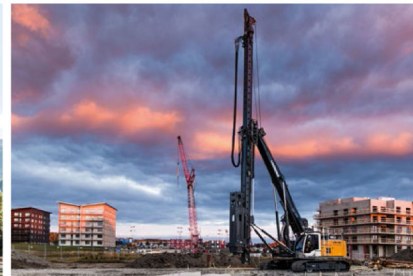


Model:

Serial number:



Product ID

Commercial name: Crawler Crane
Type: LR 1006.01.06

Document ID

Author: ORIGINAL OPERATOR'S MANUAL
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Foreword

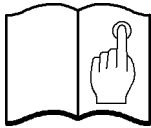
The name **Liebherr** doesn't just stand for products and services. It has become a byword for ideas and innovations. For progress which has proved its worth in the marketplace.

We constantly strive to extend and improve our diverse range of products and services. This requires ongoing cooperation and sharing of experience with our customers and business partners throughout the world. We are therefore grateful for any ideas and suggestions for improvements.

Inform Liebherr customer service if the machine is sold or bought by a previous owner.

Notes regarding the documentation

Components of the documentation



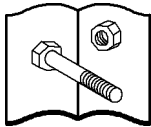
Operating manual

Information for safe operation and preventive maintenance of the machine.



Technical information

Information about the electrical system and hydraulic system of the machine.



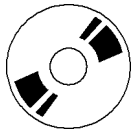
Spare parts catalog

Information about procurement of spare parts.



Load charts

Load charts for all machine setups.



The entire documentation is saved on the CD-ROMs. The displayed symbols provide information about the content of the CD-ROM.

Current document status

The delivered documentation is compiled solely for the listed serial number and can thus **not** be used for other machines of the same series.

To ensure that the documentation is completely up-to-date at all times:

- Do not remove individual documents.
- Reprint missing or illegible pages from the supplied CD-ROM and replace them or request new ones from the Liebherr customer service.
- Immediately file new documents that have been provided for conversion work.
- Replace changed document and destroy the old version (this especially applies to load charts).
- Always replace CD-ROM with updated version, for example from the change documentation.
- If the documentation is available in several languages, make sure that **all language versions** are updated.

Storing the documentation

The **operating manual** must always be kept ready at hand in the cabin.

The currently required **load charts** must be kept in the cabin.

The **spare parts catalog** and the **technical information** must be available to maintenance personnel and Liebherr service personnel as required.

Structure of the operating manual

The operating manual consists of individual, consecutively numbered chapters.

The table of contents provides information about the structure of the individual chapters.

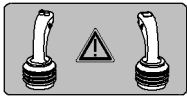
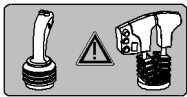
The sequences of the actions described in the sections must be observed at all times.

Display conventions

Numerical values and units

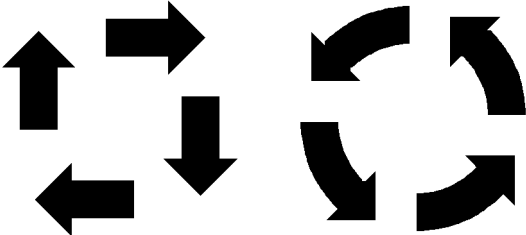
This machine was designed and built according to the metric system of units. Numerical values in the imperial system of units are converted and rounded.



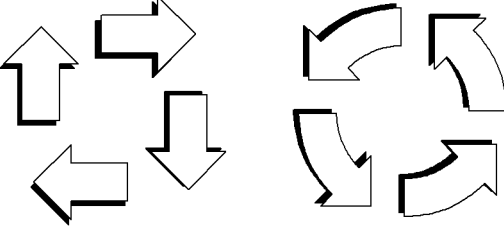


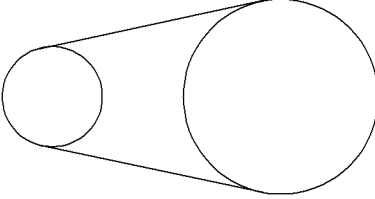
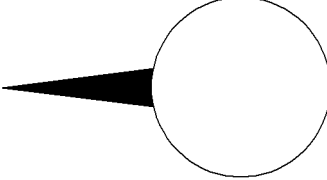
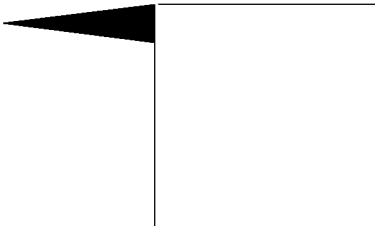
Symbols

Symbol	Meaning
*	Optional additional equipment
□	Requirement must be met
▶	Performing an action
▷	Consequence of an action
	Specific characteristics or procedures on a machine with two multi-directional control levers
	Specific characteristics or procedures on a machine with a multi-directional control lever and a double T-lever

Symbols

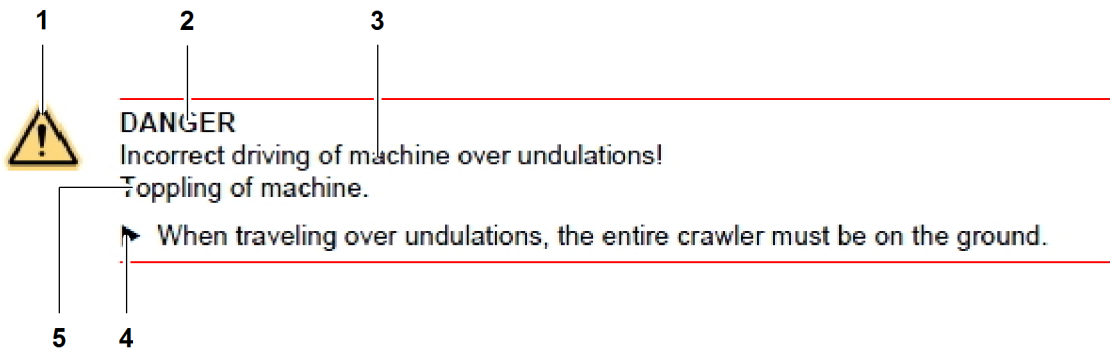
Symbols in illustrations

Symbol	Meaning
	Actions

Symbol	Meaning
	Imperative sequence of multiple actions in an illustration
	Random sequence of multiple actions in an illustration
	Consequences of actions
	Consequences of actions with imperative sequence
	Consequences of actions with random sequence
	Exact enlargement of an area
	Enlargement of an area or a component in the same perspective as in the illustration
	Enlargement of an area or a component in a different perspective as in the illustration

Symbols in illustrations

Labeling of the warning message



Name		Description
1	Warning signs	Warns of possible injuries
2	Signal word	For further information see: Signal words
3	Danger source	Explanation of danger (contexts)
4	Measures	Measures to prevent the danger
5	Consequences of the danger	Consequences in case of non-observance and possibly additional information required for comprehension

Labeling of the warning message

Signal words



DANGER

Indicates an immediate dangerous situation which will result in death or serious injury if it is not avoided.

▶ Refers to current action to reduce or avoid the danger(s).



WARNING

Indicates a dangerous situation which could result in death or serious injury if it is not avoided.

▶ Refers to current action to reduce or avoid the danger(s).



CAUTION

Indicates a dangerous situation which could result in minor or moderate injury if it is not avoided.

▶ Refers to current action to reduce or avoid the danger(s).

NOTICE

Indicates a dangerous situation which could result in material damage if it is not avoided.

▶ Refers to current action to reduce or avoid the danger(s).

Further designations



Note

Indicates useful tips and hints.

- ▶ Refers to the current action and demonstrates how to perform actions in an easier way.
-

Publisher's imprint

Version

In the interest of our customers, we reserve the right to make changes in line with technical developments. This documentation therefore corresponds to the technical situation at the time of delivery of the machine, and not to the current state of development at the manufacturer.

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Technical terms and abbreviations

List of abbreviations

Abbreviation	Technical term
AGR	Abgasrückführung
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
BGV	Berufsgenossenschaftliche Vorschriften
CAN	Controller Area Network
DIN	Deutsches Institut für Normung
EN	European Norm
IEC	International Electrotechnical Commission
IP	International Protection
ISO	International Organization for Standardization
MDE	Maschinendatenerfassung
NRS	Nachrüstsatz
ÖNORM	Österreichische Norm
OSHA	Occupational Safety and Health Administration
PDE	Prozessdatenerfassung
SWL	Safe Working Load

List of abbreviations

Glossary

Technical term	Definition/explanation
Abgasrückführung	Serves for reducing the emission of nitrogen oxides that develop during the combustion of fuel in diesel engines.
American National Standards Institute	American National Standards Institute.
American Society of Mechanical Engineers	Professional association of mechanical engineers in the USA.
Berufsgenossenschaftliche Vorschriften	Accident prevention regulations issued by the German Mutual Indemnity Associations.
Controller Area Network	Serial data transmission system.
Deutsches Institut für Normung	Most important national standards organization in the Federal Republic of Germany.

Technical term	Definition/explanation
European Norm	Regulations that were issued by one of the three European Standardization Committees (European Committee for Standardization, European Committee for Electrotechnical Standardization and European Telecommunications Standards Institute).
International Electrotechnical Commission	International Standardization Organization for standards in the field of electrotechnology and electronics.
International Organization for Standardization	International association of standardization organizations that drafts and issues international standards.
International Protection	The protection classes classified with IP define the suitability of electric operating materials for different ambient conditions (water, dust, etc.) as well as protective measures to protect against possible hazards during their use.
Lastmomentbegrenzung	Electronic overload protection system.
Litronic	Electrohydraulic proportional control of the machine. Crane control and management system.
Maschinendatenerfassung	Record and save the most important machine data (status, utilization, operating times, etc.).
Nachrüstsatz	Optional equipment of a machine.
Occupational Safety and Health Administration	American Federal Authority that was established to enforce the Federal Labor Safety Law and issues safety regulations for the industry.
Österreichische Norm	National standard issued by the Austrian Standards Institute.
Prozessdatenerfassung	System for electronic recording, saving and visualization of process data.
Safe Working Load	Maximum admissible load without consideration of dynamic forces.

Glossary

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9.51.2	Preserving the machine	2162

1 Product description

1 Product description

This chapter deals with the following issues:

- Application options of the machine
- Wrong or improper use of the machine
- Machine components
- Technical data

The illustrations in this operation manual are for general information purposes. They may be shown as diagrams and do not necessarily correspond to the current machine setup.



WARNING

Inadmissible or improper procedure!
Severe injuries, damage to machine.

If the operation manual contains insufficient information:

- ▶ Contact Liebherr customer service.

1.1 Type plate

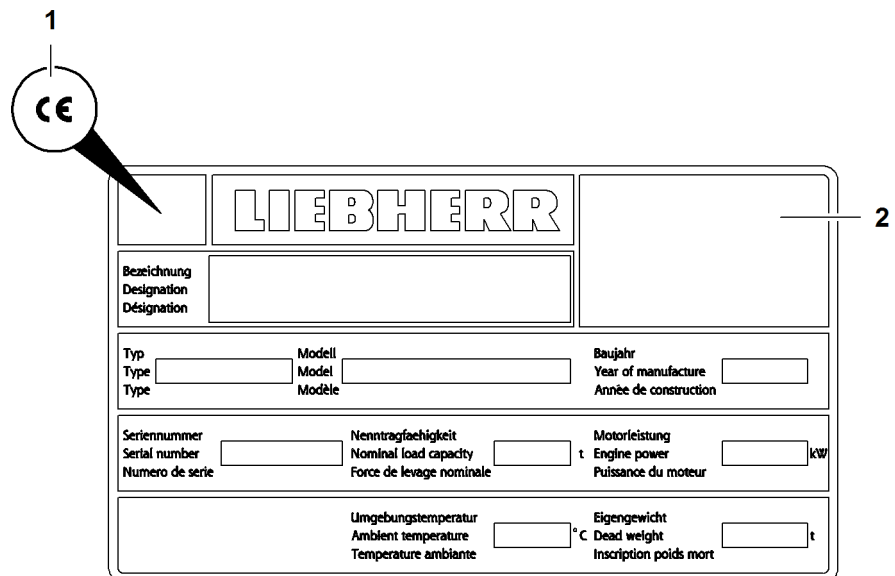


Fig. 1: Type plate (illustration of principle)

1 CE label

2 Manufacturer's address

If the machine corresponds to guideline 2006/42/EU, the type plate bears the CE label 1.

1.2 Declaration of conformity

Right behind the cover sheet, the documentation contains the EU declaration of conformity in acc. with guideline 2006/42/EU when delivering the machine with CE label. The EU declaration of conformity in its present version and language is valid in all countries of the European Union as well as in countries that recognize the guideline 2006/42/EU. Additional documentation may also be enclosed like documents relating to a prototype test or an international approval test. The test report for individual verification is archived with the manufacturer and can be requested if required.

1.3 Intended use

The supplied equipment determines the possible applications of the machine.

The machine is classified in crane group A1 in acc. with ISO 4301-1.

The machine is only designed and constructed for the intended use stated and described in the operating manual.

The machine may only be operated in admissible setup condition and mode.

Special machine tasks that deviate from the tasks described in the operating manual must be coordinated with the machine manufacturer beforehand.

Intended use of the machine is a basic requirement of safe operation.

Non-observation of the intended machine use results in grave consequences:

- Life-threatening or fatal injuries
- Severe damage to the machine, assets or contamination of the environment for which the manufacturer of the machine cannot be held liable.
- Loss of warranty and guarantee claims

Utilization not described in the operating manual must be authorized in writing by the manufacturer. Any other use of the machine without written consent of the manufacturer is deemed abnormal use.

Intended use of the machine is exclusively defined as follows:

- Application in working ranges and under the operating conditions listed and described in the operating manual.
- Use of interchangeable equipment provided or approved by the machine manufacturer.
- Moving the machine without load with lifting accessory in line with the admissible load chart with supervision of a signaller.
- Moving the machine with lifted load in line with the admissible load chart with supervision of a signaller.
- A signaller must observe traveling of the machine within the admissible traveling range with suspended and admissible load and in admissible position of the uppercarriage and the boom.
- Lifting and lowering as well as horizontal transport of loads with the corresponding lifting accessory whose mass and center of gravity is known.

Intended use of the machine observing the following specifications and requirements:

- Complete safety equipment is installed and functioning properly.
- All preventive and corrective maintenance works stated in the preventive maintenance plan and inspection plan of the operating manual were performed according to specifications by maintenance personnel or Liebherr service personnel.
- All safety instructions in this operating manual are being observed.
- All valid national and international safety regulations (e.g. oil or gas industry) are observed by the owner, if applicable.
- The consumables listed in the operating manual are being used.
- All persons involved meet the personnel requirements on staff according to the operating manual.
- All persons involved meet their responsibilities according to the operating manual.
- The technical information values are being observed.
- Load charts are being observed.
- The machine is operated exclusively with the lifting accessory approved by the manufacturer under consideration of the corresponding mode and load curve

Intended use

- and observation of the operating manual, warning and safety devices and the valid load chart.
- Operational restrictions are being observed.
 - “ISO 12480-1 Cranes-Safe use-Part 1: General” is observed with respect to lifting gear.
 - Intended and abnormal use of the interchangeable equipment is being observed.

1.4 Special modes of operation

The following applies to special modes of operation:

- Special modes of operation may significantly reduce the service life of the machine.
- Special operating modes may result in excessive stress on the machine causing premature damage.
- Special modes of operation are the sole responsibility of the machine operator.
- Special modes of operation may result in undefined loading conditions with high dynamic stresses and excessive diagonal pulls, which may lead to immediate or early damage.

Special modes include:

- Vibrator mode or hammer mode
 - Leader-mounted vibrators and hammers
 - Free-hanging vibrators and hammers
 - Vibrator lances/probes
- Installation of exchangeable equipment:
 - Fixed leader
 - Swinging leader
 - Crane mount drill
- Free-fall operation
- Utilization on floating constructions



Note

- ▶ For more information regarding special modes of operation: contact Liebherr service department.
-

1.5 Inappropriate use

Inappropriate use of the machine includes any reasonably foreseeable misuse in line with the machine directive 2006/42/EG.

Use of the machine is deemed not according to purpose under the following conditions:

- Any structural modification of the machine and equipment that affects operational safety and that has been carried out without the written declaration of approval of the manufacturer.
- Installation of spare parts and use of media or exchangeable equipment not approved and authorized by the manufacturer.
- Operation of the machine outside of the limit values approved by the machine's manufacturer, like e.g. ambient temperature range, load chart (load/radius), wind speed, operating restrictions and diagonal pull.
- Start-up or operation of the machine without knowledge of the operation manual and/or without qualification of the machine operator demanded by national regulations.
- Start-up or operation of the machine if operation is not admissible according to the specifications of the machine's location due to explosion hazard indicated on the machine's type plate.
- Machine operator does not possess the necessary skills to comprehend the operation manual.
- Start-up or operation of the machine by persons not authorized by the operator.
- Any kind of work with the machine that endangers operational safety.
- Start-up or operation of the machine without approval test or recurring inspection if this is prescribed by national or international directives and standards.
- Start-up or operation of the machine without properly installed or not properly functioning safety installations and safety equipment.
- Performance of repairs not authorized by the manufacturer.
- Bypass or conversion of the required safety installations set in the factory.
- Transport of persons along with the load or with rigging equipment not intended for this purpose.
- Operation of the machine in an unapproved mode.
- Operation of the machine with open cabin door.
- Pulling or dragging a load on the ground.
- Breakaway of stuck loads under slack rope or with other components besides the hoisting gear intended for this purpose.
- Breakaway of stuck tools, rigging equipment or equipment parts (e.g. drilling equipment, piling equipment or grab).
- Start-up or operation of the machine if other persons apart from the machine operator are located outside of the cabin or on the machine.
- Start-up or operation of the machine with incomplete operation manual (e.g. missing or illegible pages).
- Start-up or operation of the machine if the operation manual is not available in the contractually agreed language.
- Lifting of loads attached to several load lifting devices without consideration of ISO 12480-1.
- Lifting of persons with the exception of machines with valid EC-type examination certificate and the corresponding machine configuration or approval by national authorities.
- Lifting of persons for entertainment purposes, for example shows, "bungee jumping", "suspended restaurants" or lifting of other devices on or beneath which persons are located.

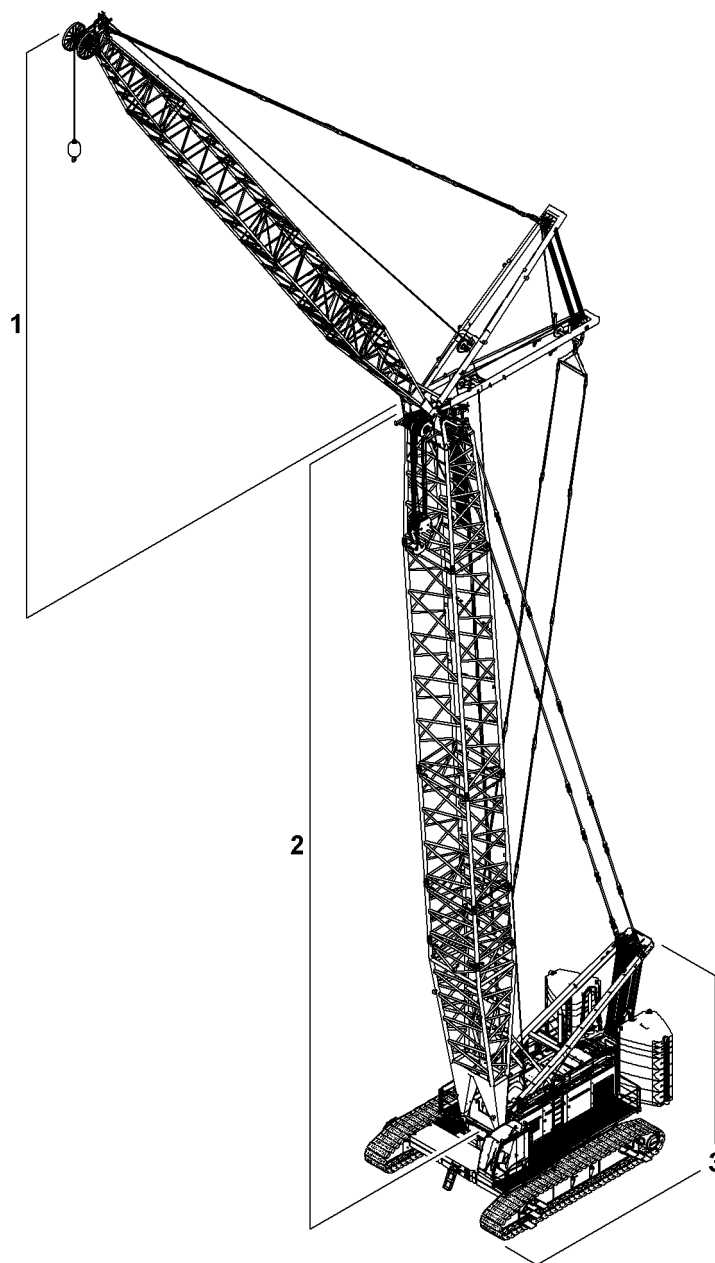
- Use of the machine in special modes not listed in the operation manual, not approved by the manufacturer and without the corresponding adaptations on the machine.
- Tilting the machine.
- Use of the machine on uneven, undulating, non-compacted, soft ground or on ground not suited for the arising pressure.
- Moving the machine without adequate vision and without signalman.
- Use of the machine as tractor with the exception of machines with towing attachment or drawbar eye under observation of the admissible supported loads, trailing loads or trailer loads.
- Increasing the mass of already lifted loads.
- Operation of the machine not in conformity with the current machine configuration (e.g. counterweight weights, boom components, reeving) with the programed setup.
- Lifting of loads in emergency mode (except for failure of the energy supply).
- Lifting loads on the ground with other components/kinematics than the hoisting gear intended for this purpose.
- Start-up or operation of the machine below ground (mining).
- Initial start-up of machine.
- Use of the machine for earth-moving work (e.g. leveling).
- Sea travel without observation of the specifications in the operation manual.
- Operation of the machine in assembly mode or with activated assembly functions instead of the mode intended for operation.
- Operation of machine above the specified crane group without reduction of loads.
- Installation of exchangeable equipment (e.g. fixed leader, swinging leader or crane mount drills) not previously agreed with the manufacturer.

1.6 Machine

1.6.1 Machine overview

Machine without derrick equipment*

The diagram below provides an overview of the machine components.



*Fig. 2: Machine without derrick equipment**

- | | | | |
|---|--------------------------|---|---------------|
| 1 | Fixed jib or luffing jib | 3 | Basic machine |
| 2 | Main boom | | |

Machine with derrick equipment*

The diagram below provides an overview of the machine components with derrick equipment.

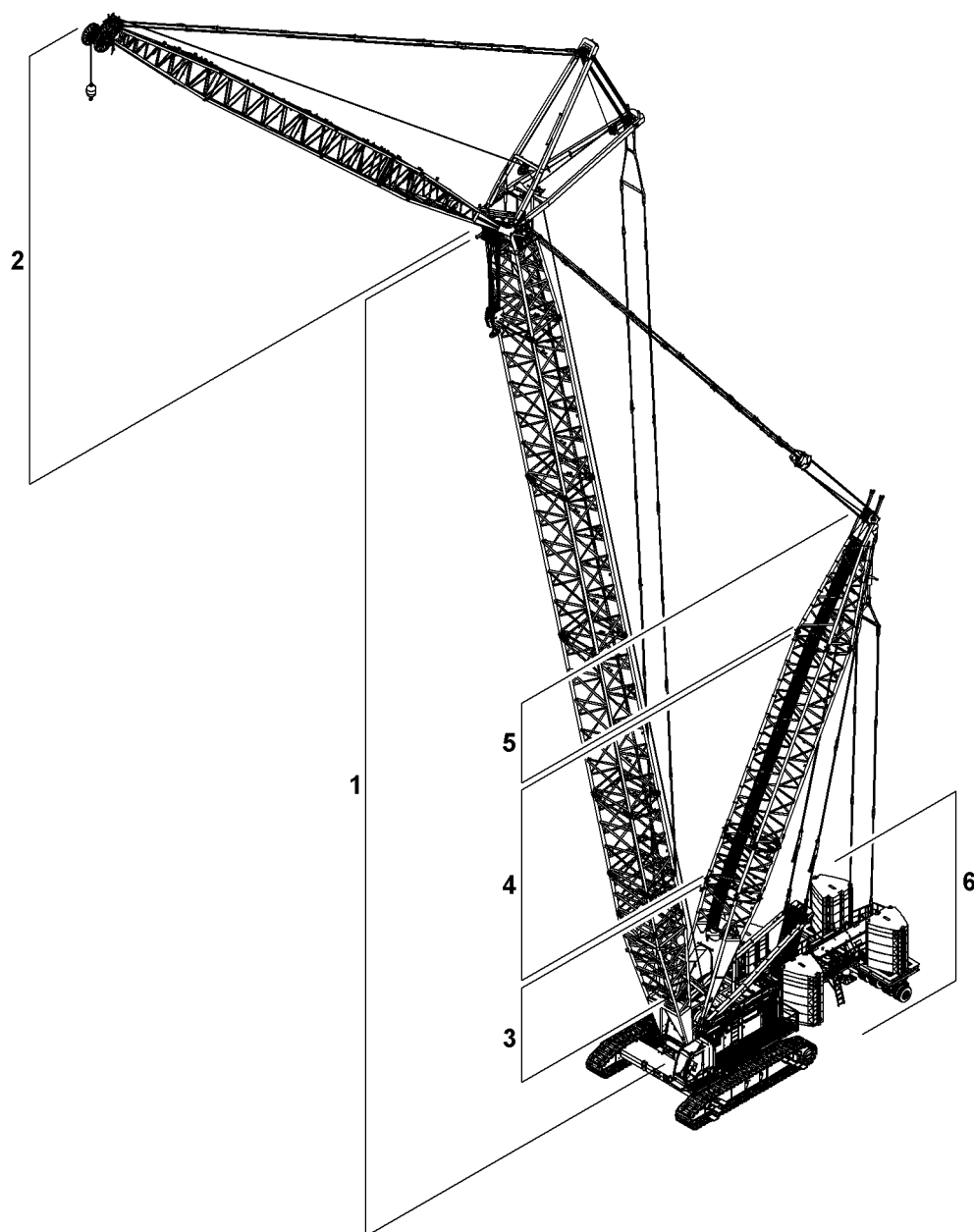


Fig. 3: Machine with derrick equipment*

- | | | | |
|---|---------------------------|---|---|
| 1 | Main boom | 4 | Derrick boom sections |
| 2 | Fixed jib or luffing jib | 5 | Derrick boom head |
| 3 | Derrick boom base section | 6 | Suspended counterweight or counterweight carriage |

1.6.2 Technical data

Application conditions

Ambient temperatures

Name	Value
Storage	-40 °C (-40 °F) to 40 °C (104 °F)
Operation	-20 °C (-4 °F) to 40 °C (104 °F)
Operation at low temperatures*	to -25 °C (-13 °F) (For more information see: 2.15.2 Operation of the machine down to -25 °C (-13 °F)*, page 631)
	to -40 °C (-40 °F) (For more information see: 2.15.3 Operation of the machine down to -40 °C (-40 °F)*, page 632)

Tab. 1: Technical data ambient temperatures

Application height

The exhaust gas turbocharger of the diesel engine reduces the influence of falling air pressure on the engine output at high altitude. Still, a performance reduction is to be expected with the diesel engine when operating the machine at high altitude above sea level and at high air temperatures.

When using the machine at high altitudes above sea level: The diesel engine control unit adjusts the engine characteristic curve automatically. A membrane located on the side of the control unit measures air pressure.

Emissions

Noise measurement data

Name	Value
Guaranteed sound pressure level L_{PA} in cabin	72.4 dB(A) 72.4 db(A)
Guaranteed sound output level L_{WA} of machine	see notice signs on cabin

Tab. 2: Technical data noise measurement data

The noise measurement data was determined in accordance with the standard EN 13000 Appendix G.

Reflections may increase the sound pressure level by 5 dB(A) (5 db(A)) to 10 dB(A) (10 db(A)) when working in confined spaces.

Vibrations

Name	Value
Vibrations on the upper limbs of the machine operator	< 2.5 m/s ² (8.2 ft/s ²)
Vibrations on entire body of machine operator	< 0.5 m/s ² (1.64 ft/s ²)

Tab. 3: Technical data vibrations

The measuring inaccuracy is defined in standard EN 12096:1997, table D.1 "Inaccuracy K for various measured values a".

Diesel engine

Name	Value
Type	D 946 A7
Manufacturer	Liebherr-Machines Bulle S.A
For further information please refer to the operation manual of the engine manufacturer on CD.	

Tab. 4: Technical data diesel engine

Interfaces

External power supply obstacle warning light*

Name	Value
Nominal voltage	AC 230 V, 50 Hz, ±15 %
	AC 115 V, 60 Hz, ±15 %
Phases	1 + N + PE
(For more information see: 1.44.1 External power supply aircraft warning light, page 445)	

Tab. 5: Technical data external power supply obstacle warning light

External power supply low temperature package*

Name	Value
Nominal voltage	AC 230 V, 50 Hz, ±15 %
	AC 115 V, 60 Hz, ±15 %
Phases	3 + N + PE
(For more information see: 1.44.2 External supply low temperature package, page 447)	

Tab. 6: Technical data external power supply low temperature package

Lubricants and consumables

Detailed information about lubricants and consumables (For more information see: [9.2 Lubricants and consumables, page 1945](#)).

Winches

winch1/winch2

Winch1/winch2	as crane winch	as free-fall winch
Nominal line pull (7th layer)	150 kN 33,720 lb _f	130 kN 29,230 lb _f
Rope Ø	28 mm 1.10" in	28 mm 1.10" in
Drum Ø	730 mm 2' 5" ft-in	730 mm 2' 5" ft-in

Tab. 7: Technical data winch1/winch2

- A) The load moment limiter (LML) limits the line pull in crane operation to a nominal value of 150 kN (33,720 lb_f). The nominal line pull must not be exceeded.



WARNING

Operating winches in the 8th rope layer is not permitted!
Severe injuries, damage to machine.

- Only ever wind the rope to the eighth layer for transport purposes.

Rope layer(s)	Winding length	Remark
1	7 m 23' ft-in	3 safety windings
1	62 m 203' 5" ft-in	Effective length with 1 rope layer
2	135 m 442' 11" ft-in	Effective length with 2 rope layers
3	213 m 698' 10" ft-in	Effective length with 3 rope layers
4	296 m 971' 2" ft-in	Effective length with 4 rope layers
5	383 m 1256' 7" ft-in	Effective length with 5 rope layers
6	474 m 1555' 1" ft-in	Effective length with 6 rope layers
7	571 m 1873' 4" ft-in	Total effective length

Tab. 8: Technical data winch1/winch2

Main boom luffing winch

Name	Value
Nominal line pull (1st layer)	180 kN 40,470 lb _f
Rope Ø	24 mm 0.94" in
Drum Ø	480 mm 1' 7" ft-in
Rope length	441 m 1446' 10" ft-in

Tab. 9: Technical data main boom luffing winch

Jib luffing winch

Name	Value
Nominal line pull (5th layer)	82 kN 18,430 lb _f
Rope Ø	20 mm 0.79" in
Drum Ø	490 mm 1' 7" ft-in
Rope length	385 m 1263' 1" ft-in ^{A)}

Tab. 10: Technical data jib luffing winch

A) When fitting the luffing jib 1916, it is admissible up to a main boom length of 71 m (232' 11" ft-in) to use the rope of the jib luffing winch with a length of 310 m (1017' 1" ft-in). As of a main boom length of 74 m (242' 9" ft-in) the rope of the jib luffing winch with a length of 385 m (1263' 1" ft-in) must be used.

Rope reeving winch*

Name	Value
Nominal line pull (7th layer)	17.5 kN 3,930 lb _f
Rope Ø	8 mm 0.31" in
Drum Ø	198 mm 7.80" in
Rope length	240 m 787' 5" ft-in

Tab. 11: Technical data rope reeving winch

Swing

Name	Value
Maximum rotation speed	2 min ⁻¹ 2 rpm

Tab. 12: Technical data swing gear

Crawler

Name	Value
Maximum travel speed	1.22 km/h 1 mph
Pull force machine	1893 kN 425,570 lb _f
Climbing ability with reduced load (see load chart)	maximum 1 %

Tab. 13: Technical data crawler

When travelling on inclines with a main boom and jib but no load, the gradient limits relating to the climbing ability of the machine are shown in the following tables in the "Work planning" section ([For more information see: 6 Operational planning, page 1099](#)).

1.6.3 Safety equipment

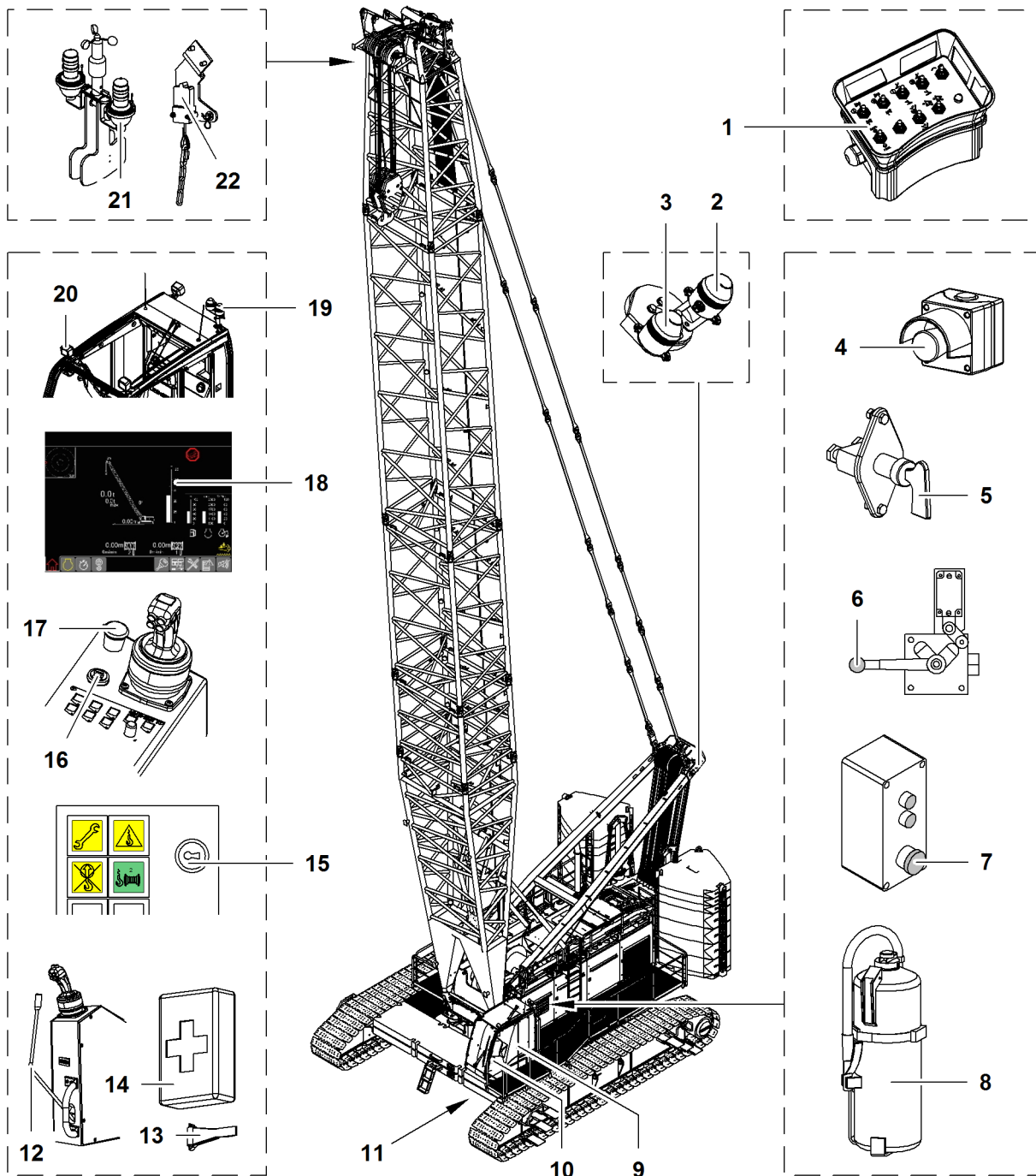


Fig. 4: Safety equipment

- | | | | | | |
|---|-------------------------------------|----|--|----|--|
| 1 | Emergency control system* | 9 | Door arrester | 17 | Emergency stop (cabin) |
| 2 | Load moment limiter lamp | 10 | Door lock | 18 | Display load moment utilization on the monitor |
| 3 | Flashing light | 11 | Vehicle horn, load moment limiter horn and acoustic signaling device | 19 | Load moment limiter lamp and flashing light |
| 4 | Emergency stop (engine compartment) | 12 | Safety lever | 20 | Floodlight (3x) |
| 5 | Main battery switch | 13 | Emergency hammer | 21 | Obstacle warning light* |

See next page for continuation of the image legend

Machine

6	Gate valve <i>free-fall operation</i>	14	First-aid box	22	Hoist limit switch (2x)
7	Emergency stop (refueling pump)	15	Lock of control panel X12		
8	Fire extinguisher (2x)	16	Ignition lock (ignition key)		

**Note**

Fire extinguishers are subject to national regulations!

- Arrange for the plant operator to provide fire extinguishers, replace them as necessary and inspect them periodically.

1.6.4 Monitoring installations

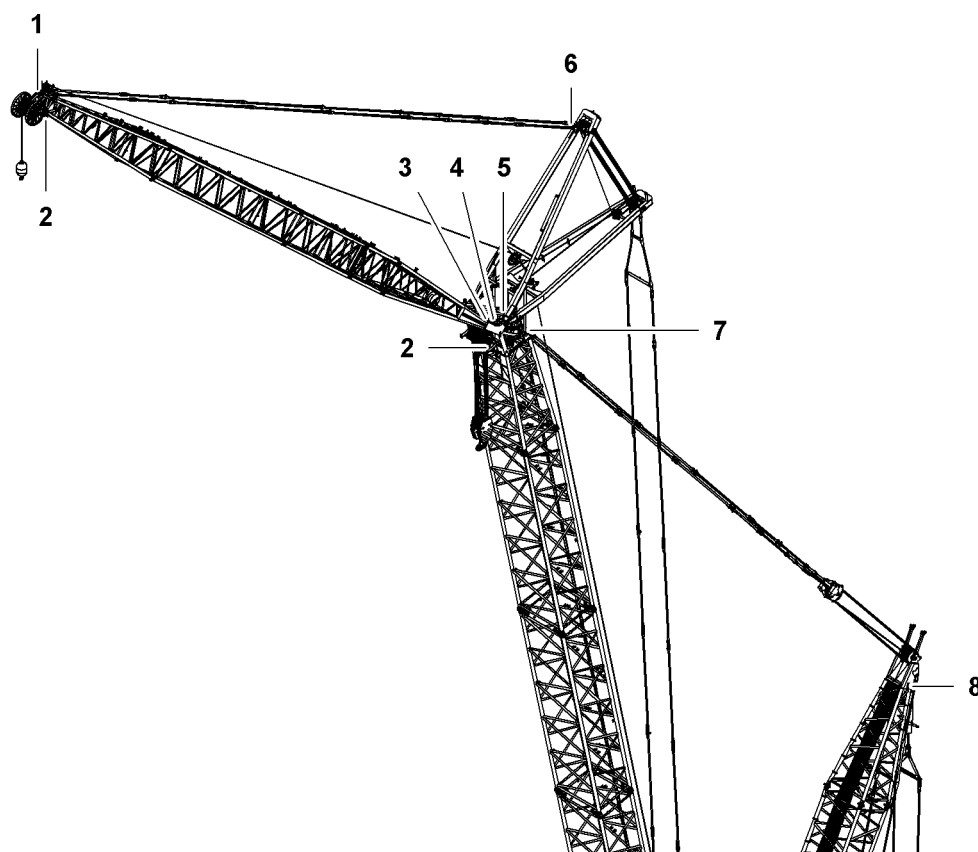


Fig. 5: Monitoring installations on the boom

1	Anemometer	5	Proximity switch for locking flaps
2	Hoist limit switch	6	Tension load cell (2x)
3	Jib, bottom limit switch	7	Tension load cell (2x)
4	Jib, top limit switch	8	Tension load cell (2x)

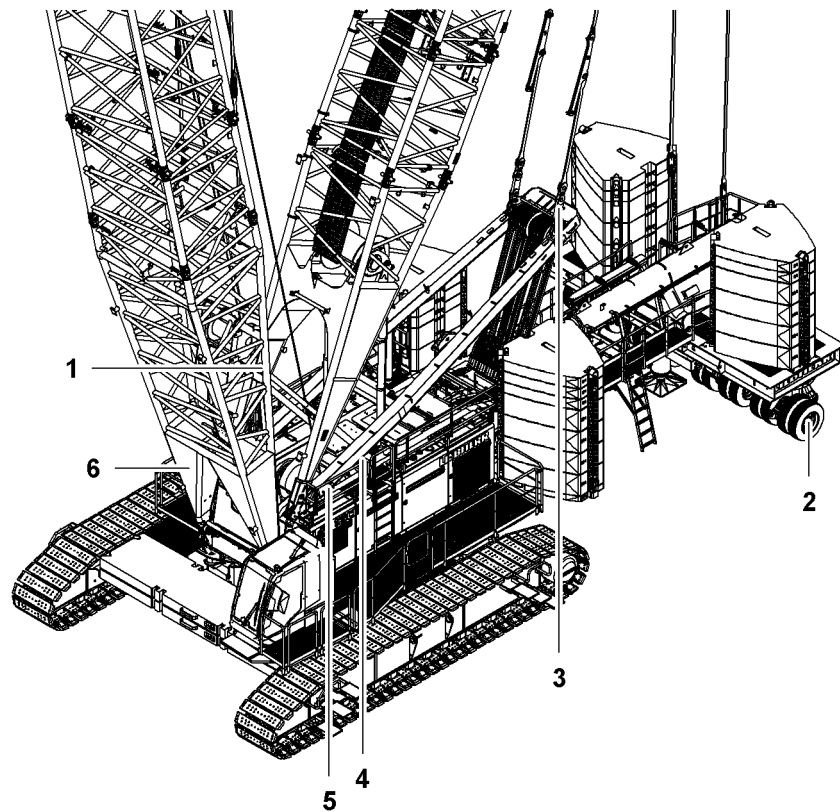


Fig. 6: Monitoring installations on basic machine

- | | | | |
|---|--------------------------------------|---|--|
| 1 | Control switch tilting-back supports | 4 | 3-windings limit switch (on all winches) |
| 2 | Angle sensor (on each wheel set) | 5 | Mechanical angle indicator |
| 3 | Tension load cell (2x) | 6 | Main boom, top limit switch |

1.7 Basic machine

1.7.1 Basic machine overview

Basic machine with undercarriage with fixed track width

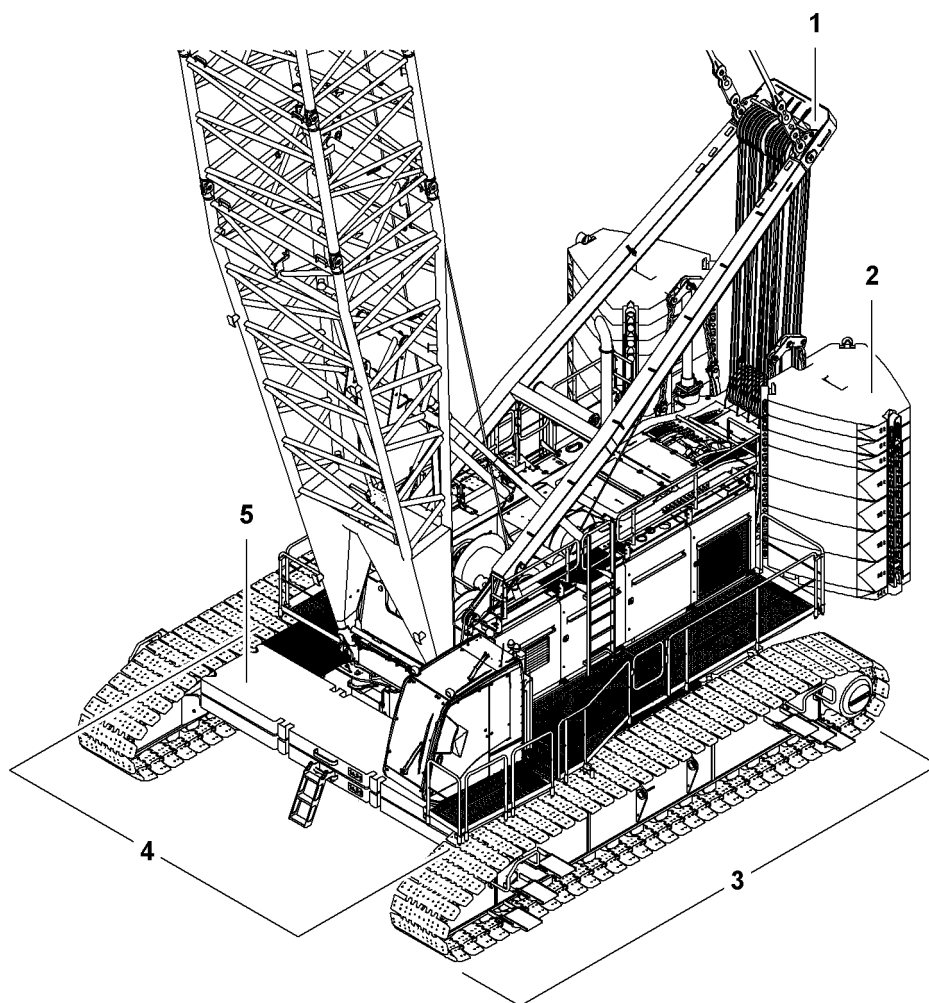


Fig. 7: Basic machine with undercarriage with fixed track width

- | | | | |
|---|--------------------|---|-----------------------|
| 1 | A-frame1 | 4 | Uppercarriage |
| 2 | Rear counterweight | 5 | Carbody counterweight |
| 3 | Undercarriage | | |

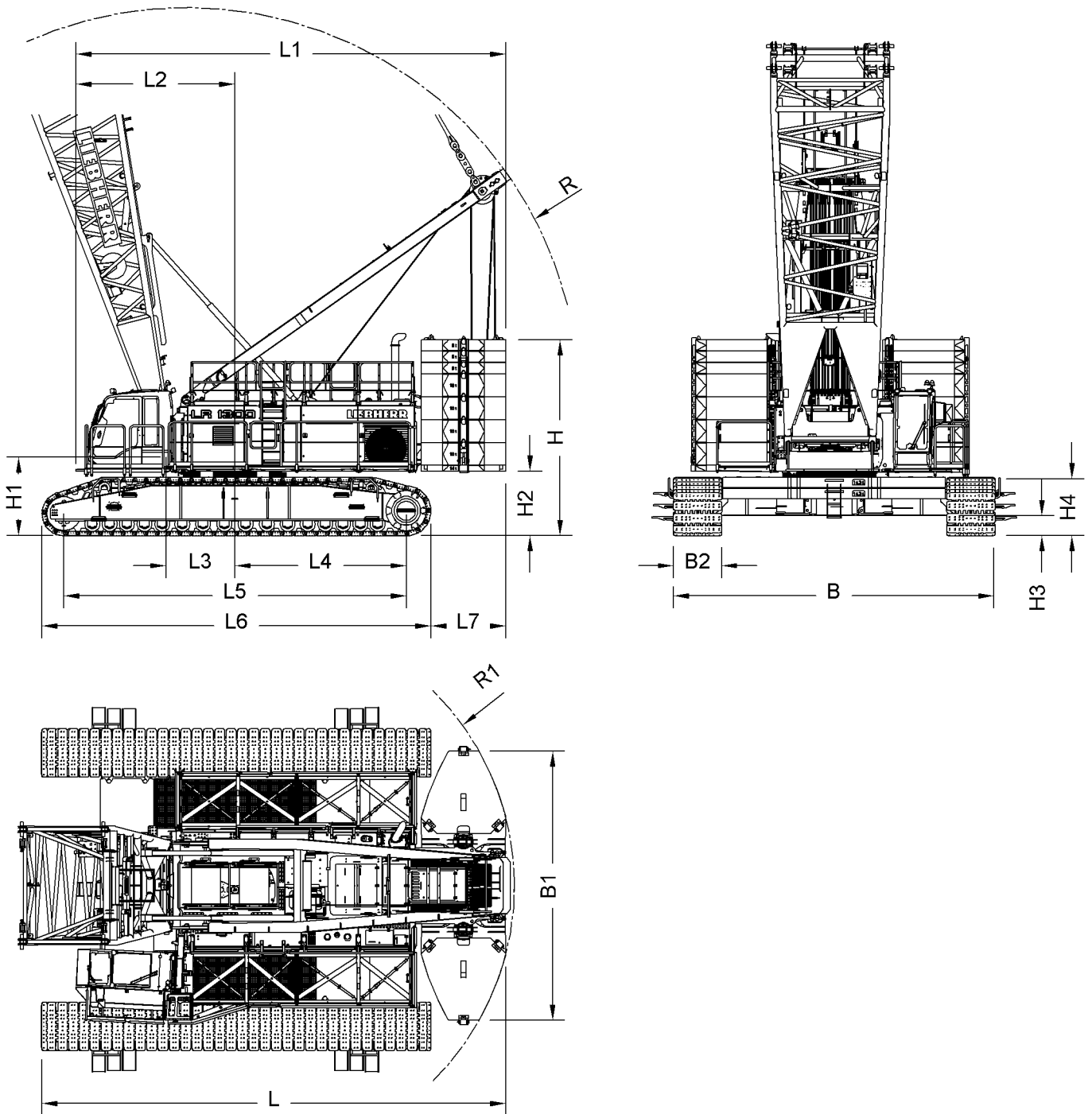


Fig. 8: Dimensions basic machine with undercarriage with fixed track width

Name		Value
L	Length basic machine	11560 mm 37' 11" ft-in
B	Width basic machine	8000 mm 26' 3" ft-in
H	Height basic machine with maximum rear counterweight	5000 mm 16' 5" ft-in
Detailed dimensions:		

Basic machine

Name		Value
L1	Length uppercarriage with rear counterweight	10700 mm 35' 1" ft-in
L2	Rotation axis to front edge of cabin	3960 mm 13' ft-in
L3	Rotation axis to pivot point of main boom base section	1700 mm 5' 7" ft-in
L4	Rotation axis to center of tumbler	4260 mm 14' ft-in
L5	Wheelbase (center idler wheel to center tumbler)	8520 mm 27' 11" ft-in
L6	Length crawler side frame	9700 mm 31' 10" ft-in
L7	Rear edge crawler side frame to rear edge rear counterweight	1870 mm 6' 2" ft-in
B1	Width rear counterweight	6930 mm 22' 9" ft-in
B2	Width base plates	1200 mm 3' 11" ft-in
H1	Height main boom base section pivot point	2250 mm 7' 5" ft-in
H2	Ground clearance rear counterweight	1600 mm 5' 3" ft-in
H3	Ground clearance undercarriage	500 mm 1' 8" ft-in
H4	Height crawler side frame	1460 mm 4' 9" ft-in
R	A-frame1 swing radius	9750 mm 32' ft-in
R1	Rear counterweight swing radius	6980 mm 22' 11" ft-in
Dimensions basic machine with 1500 mm (4' 11" ft-in) base plates:		
B(1500)	Width basic machine with 1500 mm (4' 11" ft-in) base plates	8300 mm 27' 3" ft-in
B2(1500)	Width 1500 mm (4' 11" ft-in) base plates	1500 mm 4' 11" ft-in
H4(1500)	Height crawler side frame with 1500 mm (4' 11" ft-in) base plates	1485 mm 4' 10" ft-in

Tab. 14: Technical data basic machine with undercarriage with fixed track width

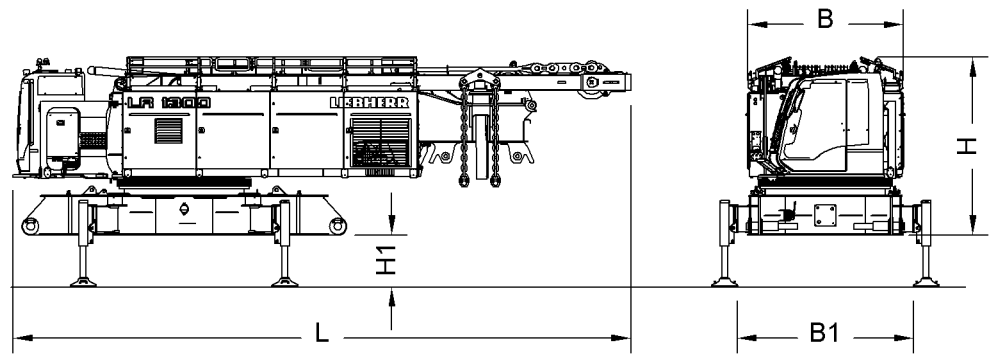


Fig. 9: Dimensions of basic machine in transport position on jacks

Name		Value
L	Length basic machine in transport position	11850 mm 38' 11" ft-in
B	Width basic machine in transport position	2990 mm 9' 10" ft-in
H	Height basic machine in transport position	3400 mm 11' 2" ft-in
Detailed dimensions:		
B1	Width between support pads	3360 mm 11' ft-in
H1	Ground clearance basic machine	975 mm 3' 2" ft-in
	Ground clearance basic machine with telescopic jack	1415 mm 4' 8" ft-in

Tab. 15: Technical data basic machine in transport position on jacks

Basic machine with undercarriage* with adjustable track width

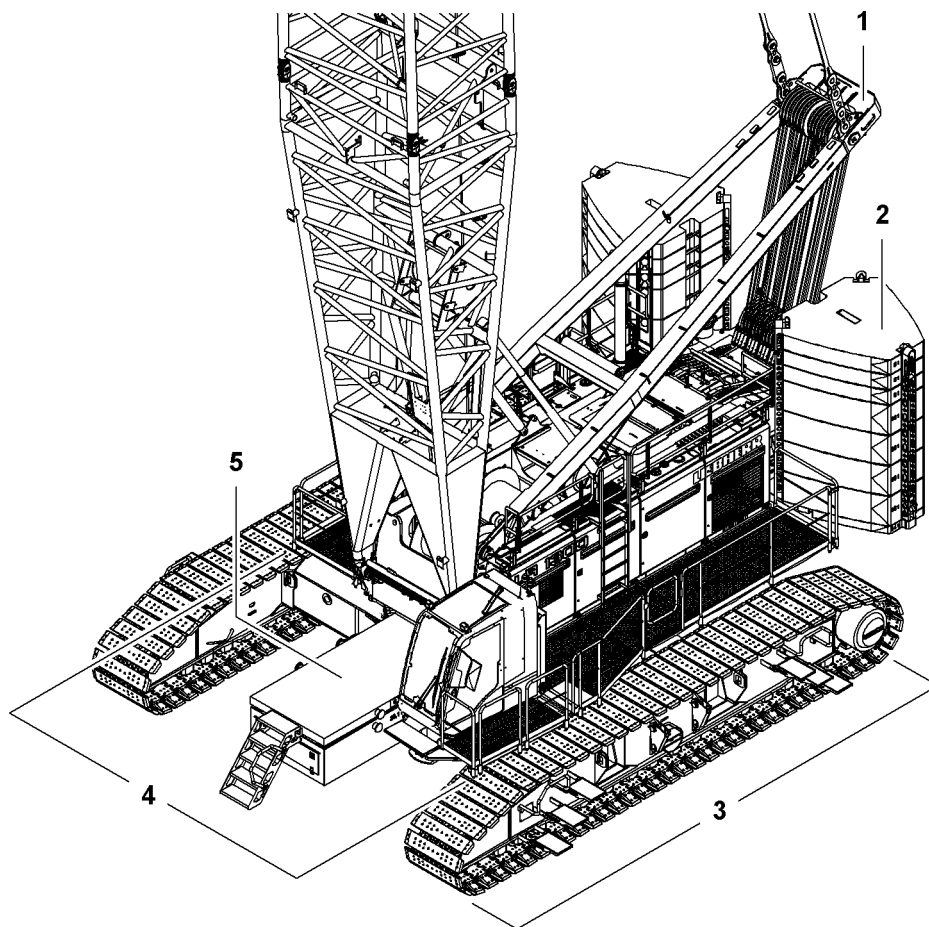


Fig. 10: Basic machine with undercarriage* with adjustable track width

- | | | | |
|---|--------------------|---|-----------------------|
| 1 | A-frame1 | 4 | Uppercarriage |
| 2 | Rear counterweight | 5 | Carbody counterweight |
| 3 | Undercarriage | | |

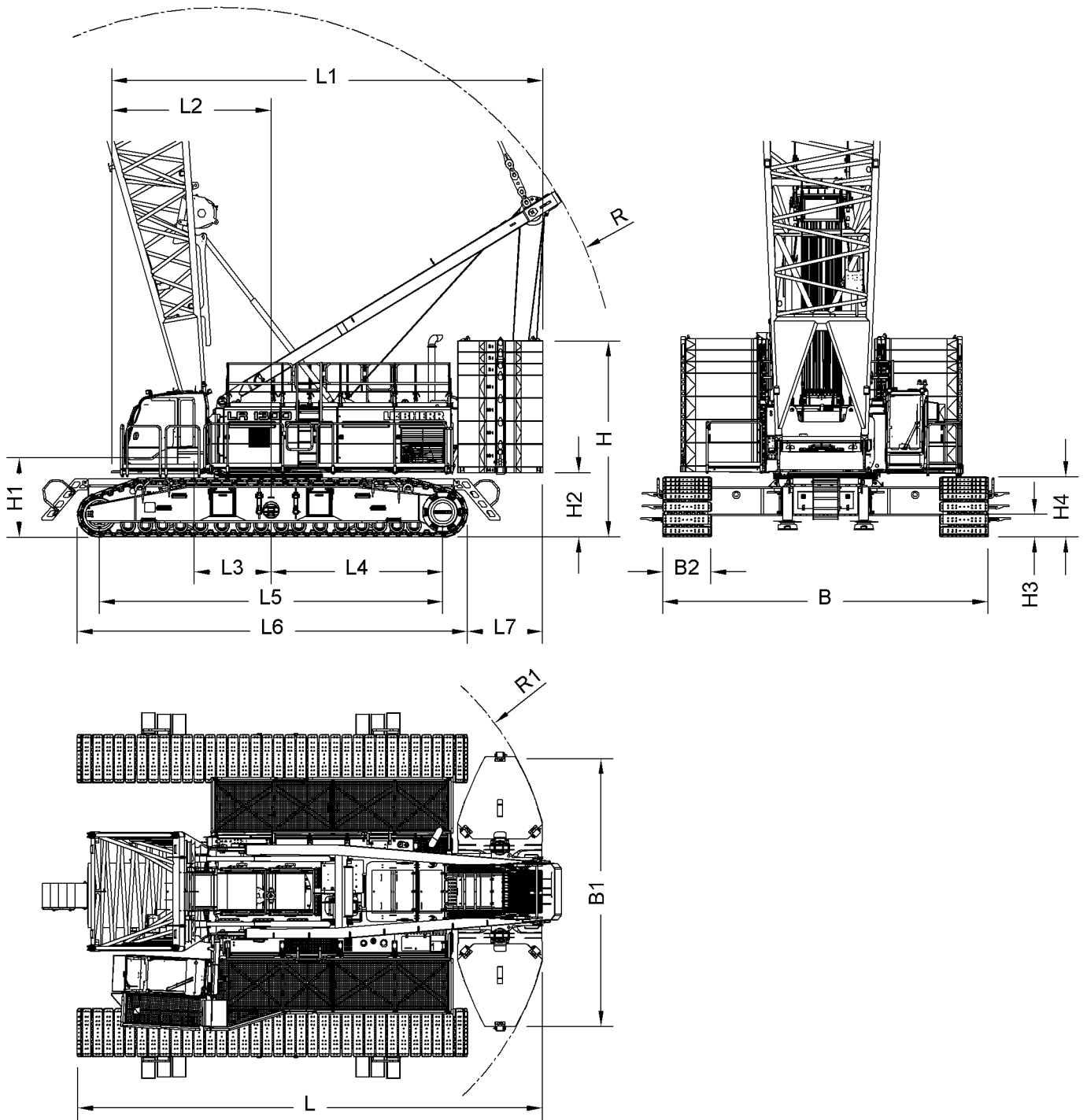


Fig. 11: Dimensions basic machine with undercarriage* with adjustable track width

Name		Value
L	Length basic machine	11560 mm 37' 11" ft-in
B	Width basic machine	8000 mm 26' 3" ft-in
H	Height basic machine with maximum rear counterweight	5160 mm 16' 11" ft-in
Detailed dimensions:		

Basic machine

Name		Value
L1	Length uppercarriage with rear counterweight	10700 mm 35' 1" ft-in
L2	Rotation axis to front edge of cabin	3960 mm 13' ft-in
L3	Rotation axis to pivot point of main boom base section	1700 mm 5' 7" ft-in
L4	Rotation axis to center of tumbler	4260 mm 14' ft-in
L5	Wheelbase (center idler wheel to center tumbler)	8520 mm 27' 11" ft-in
L6	Length crawler side frame	9683 mm 31' 9" ft-in
L7	Rear edge crawler side frame to rear edge rear counterweight	1870 mm 6' 2" ft-in
B1	Width rear counterweight	6930 mm 22' 9" ft-in
B2	Width base plates	1200 mm 3' 11" ft-in
H1	Height main boom base section pivot point	2400 mm 7' 10" ft-in
H2	Ground clearance rear counterweight	1760 mm 5' 9" ft-in
H3	Ground clearance undercarriage	520 mm 1' 8" ft-in
H4	Height crawler side frame	1474 mm 4' 10" ft-in
R	A-frame1 swing radius	9750 mm 32' ft-in
R1	Rear counterweight swing radius	6980 mm 22' 11" ft-in
Dimensions basic machine with 1500 mm (4' 11" ft-in) base plates:		
B(1500)	Width basic machine with 1500 mm (4' 11" ft-in) base plates	8300 mm 27' 3" ft-in
L6(1500)	Length crawler side frame with 1500 mm (4' 11" ft-in) base plates	9703 mm 31' 10" ft-in
B2(1500)	Width 1500 mm (4' 11" ft-in) base plates	1500 mm 4' 11" ft-in
H4(1500)	Height crawler side frame with 1500 mm (4' 11" ft-in) base plates	1482 mm 4' 10" ft-in

Tab. 16: Technical data basic machine with undercarriage with adjustable track width

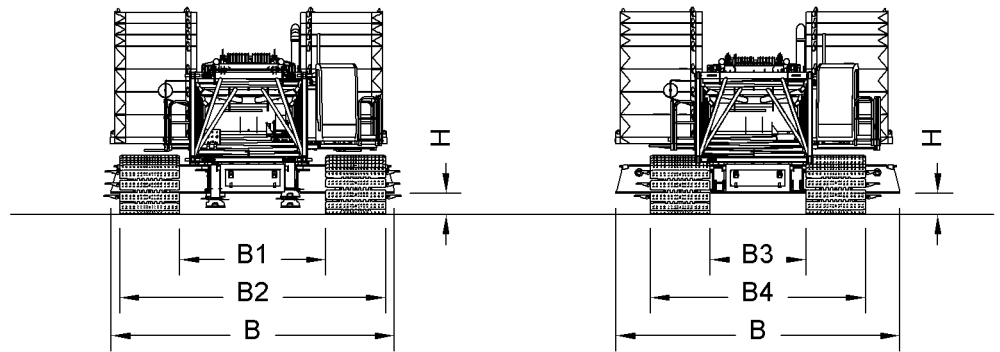


Fig. 12: Dimensions basic machine with track width adjustment

Name		Value
B	Width undercarriage	7100 mm 23' 4" ft-in
H	Ground clearance undercarriage	520 mm 1' 8" ft-in
Detailed dimensions:		
B1	Width inside edges of base plate with medium track	3970 mm 13' ft-in
B2	Width outer edges of base plate with medium track	6370 mm 20' 11" ft-in
B3	Width inside edges of base plates when narrow track is used	2400 mm 7' 10" ft-in
B4	Width outside edges of base plates when narrow track is used	4800 mm 15' 9" ft-in

Tab. 17: Technical data basic machine with track width adjustment

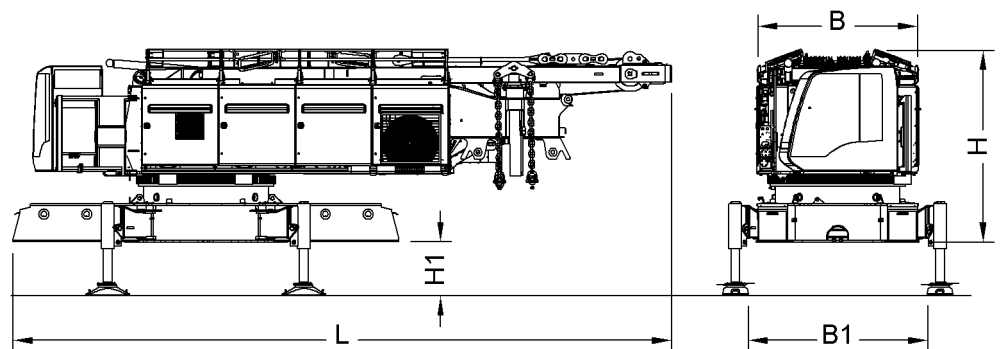


Fig. 13: Dimensions basic machine in transport position on jacks

Name		Value
L	Length basic machine in transport position	12300 mm 40' 4" ft-in
B	Width basic machine in transport position	3000 mm 9' 10" ft-in
H	Height basic machine in transport position	3500 mm 11' 6" ft-in

Basic machine

Name		Value
Detailed dimensions:		
B1	Width between support pads	3285 mm 10' 9" ft-in
H1	Ground clearance basic machine	970 mm 3' 2" ft-in

Tab. 18: Technical data basic machine in transport position on jacks

1.7.2 A-frame1

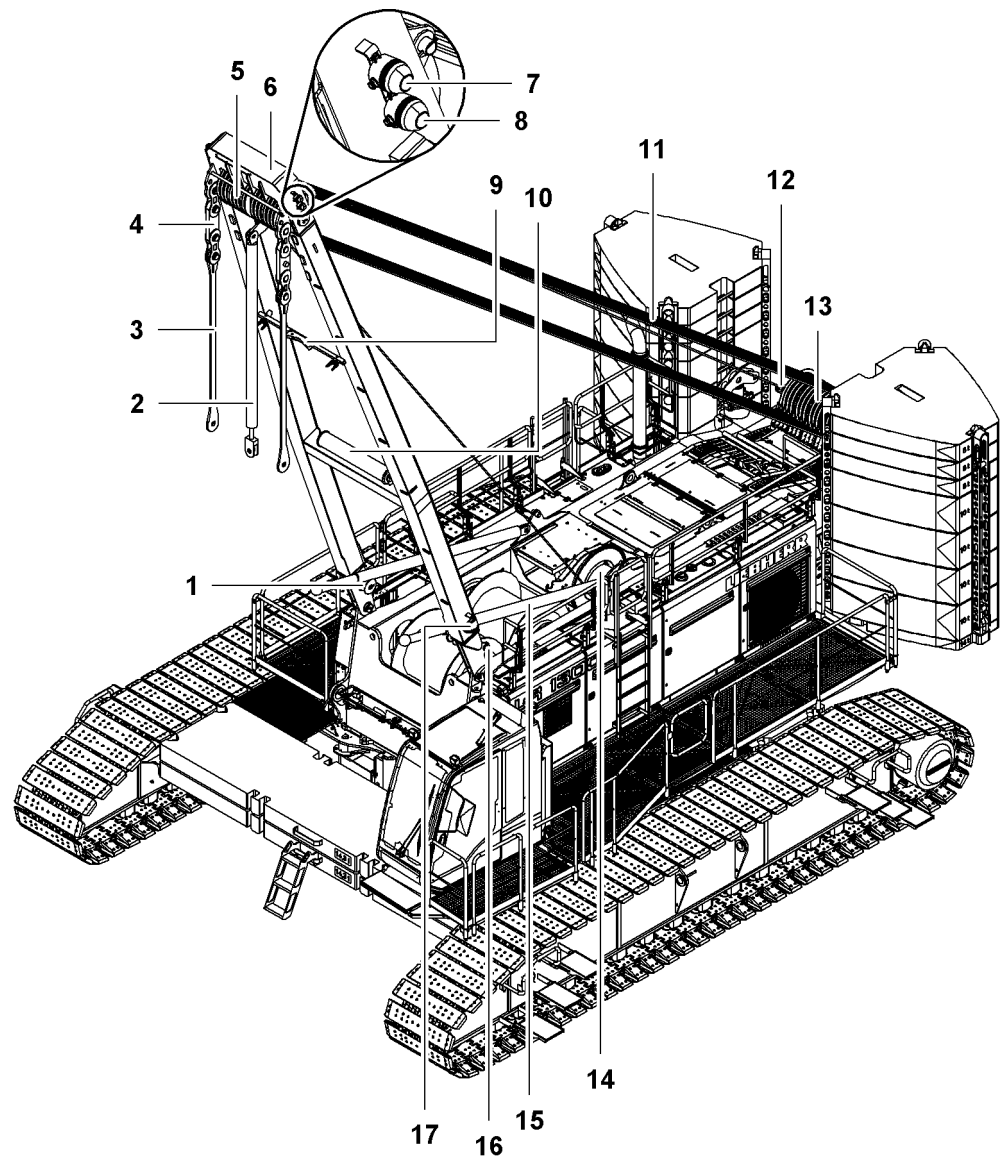


Fig. 14: A-frame1

- | | | | |
|---|--|----|---------------------------------|
| 1 | Supporting roll (2x) for main boom tilting-back supports | 10 | Rope protection roller |
| 2 | Assembly cylinder | 11 | Rope of main boom luffing winch |
| 3 | A-frame1 equalizer | 12 | Rope fixing point |
| 4 | Tension load cell (2x) | 13 | Uppercarriage pulley set |

See next page for continuation of the image legend

5	A-frame1 pulley set	14	Main boom luffing winch
6	A-frame1	15	Main boom tilting-back support (2x)
7	Load moment limiter lamp	16	A-frame1 cylinder (2x)
8	Flashing light	17	Mechanical angle indicator
9	Crossbar		

Below a certain main boom angle (or if the main boom is not installed), the main boom tilting-back supports **15** rest on the supporting rolls **1**. The main boom tilting-back supports **15** run in guide rails on the main boom base section and prevent the main boom from tipping backwards.

The assembly cylinder **2** serves for all lifting jobs when using the self-assembly system. If A-frame1 is tilted backwards, the crossbar **9** prevents the assembly cylinder from falling through A-frame1.

The A-frame1 equalizer **3** and the main boom pendant straps connect A-frame1 to the boom head.

A-frame1 **6**:

- is coupled to the front of the uppercarriage.
- is used for erecting, adjusting and laying down the main boom.
- is laid down backwards on the uppercarriage for transport.

The rope protection roller **10** protects A-frame1 from damage caused by the main boom luffing winch.

The main boom luffing winch **14** adjusts A-frame1. The rope of the main boom luffing winch **11** is reeved between the uppercarriage pulley set **13**, the A-frame1 pulley set **5** and the main boom luffing winch **14** and fastened to the rope fixing point **12** on the uppercarriage.

The A-frame1 cylinders **17**:

- prevent A-frame1 from falling back onto the uppercarriage.
- lift A-frame1 out of its transport position on the uppercarriage, or lower it into its transport position.

The mechanical boom angle indicator **18** shows the machine operator the current angular position of A-frame1.

1.7.3 Steel pendant straps on A-frame1

A-frame1 equalizer

Installation site in crane operation:

- Main boom 2821 ([For more information see: Pendant straps A-frame1 to main boom head 2821, page 1322](#))
- Main boom 2821 + derrick boom 2220 ([For more information see: A-frame1 to 2220 derrick boom head pendant straps, page 1416](#))
- Main boom 2821 + reducing adapter 2821/2316 ([For more information see: Pendant straps A-frame1 to main boom head 2316, page 1571](#))

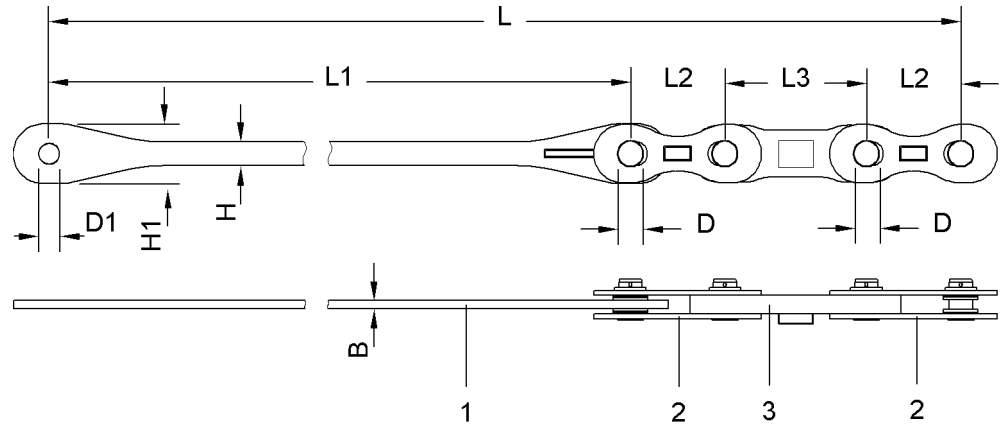


Fig. 15: Dimensions equalizer on A-frame 1

- 1 Pendant strap
- 2 Connecting links
- 3 Tension load cell

Name		Value
L	Length	3730 mm 12' 3" ft-in
L1	Length of pendant strap	2680 mm 8' 10" ft-in
L2	Length of connecting link	300 mm 1' ft-in
L3	Length of tension load cell	450 mm 1' 6" ft-in
W	Width of pendant strap	25 mm 0.98" in
H	Height of pendant strap	77 mm 3.03" in
H1	Height of pendant strap	190 mm 7.48" in
D	Pin Ø	75 mm 2.95" in
D1	Pin Ø	65 mm 2.56" in
Weight		155 kg 342 lb

Tab. 19: Technical data equalizer of A-frame 1

1.7.4 CF pendant straps on A-frame1

A-frame1 equalizer

Installation site in crane operation:

- Main boom 2821 (For more information see: [Pendant straps A-frame1 to main boom head 2821, page 1324](#))
- Main boom 2821 + derrick boom 2220 (For more information see: [A-frame1 to 2220 derrick boom head pendant straps, page 1420](#))

- Main boom 2821 + reducing adapter 2821/2316 (For more information see: Pendant straps A-frame1 to main boom head 2316, page 1573)

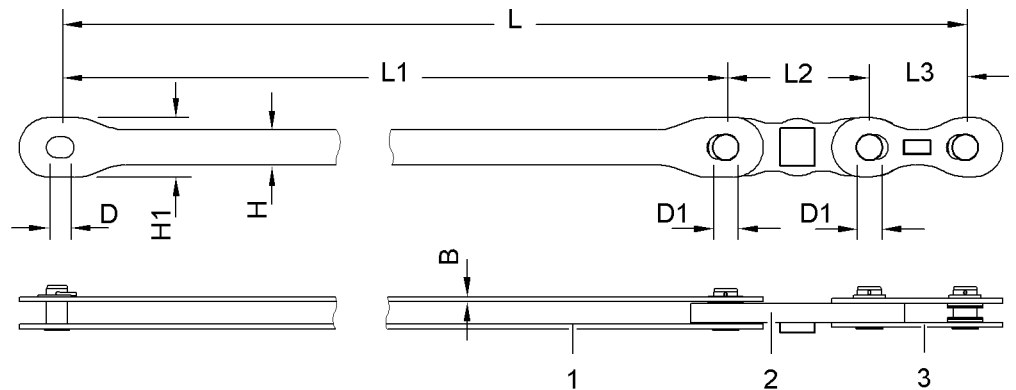


Fig. 16: Dimensions equalizer on A-frame1

- 1 Pendant straps
- 2 Tension load cell
- 3 Connecting links

Name		Value
L	Length	3700 mm 12' 2" ft-in
L1	Length of pendant strap	2950 mm 9' 8" ft-in
L2	Length of tension load cell	450 mm 1' 6" ft-in
L3	Length of connecting link	300 mm 1' ft-in
B	Width of pendant strap	15 mm 0.59" in
H	Height of pendant strap	110 mm 4.33" in
H1	Height of pendant strap	185 mm 7.28" in
D	Pin Ø	65 mm 2.56" in
D1	Pin Ø	75 mm 2.95" in
Weight		122 kg 269 lb

Tab. 20: Technical data equalizer of A-frame1

1.7.5 Uppercarriage

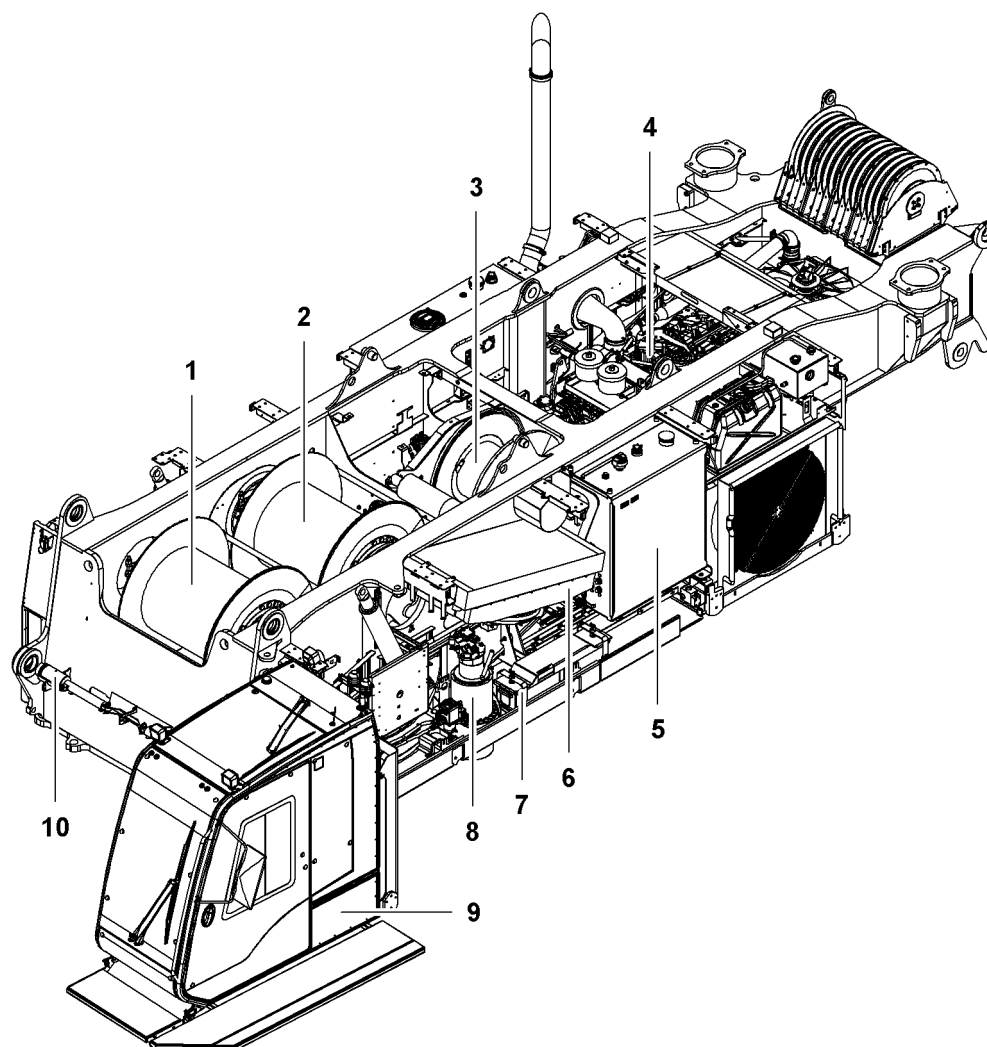


Fig. 17: Uppercarriage viewed from front left

1	Winch2	6	Hydraulic oil cooler
2	Winch1	7	Battery box
3	Main boom luffing winch	8	Swing gear (2x)
4	Central power unit	9	Cabin
5	Fuel tank	10	Pin connection cylinder for main boom base section

The uppercarriage:

- is a self-supporting, torsion-resistant structure.
- accommodates the winches, swings, the central power unit, cabin, A-frame1 and the main boom.
- is connected to the undercarriage by a roller-bearing swing ring.

Winch1 2 and winch2 1 control the lifting/lowering of the hook/pulley block.

The main boom is adjusted using the main boom luffing winch 3.

The central power unit 4:

- is located in the sealed machine housing and protected from weather influences and dirt.
- consists of a diesel engine and hydraulic pumps of the hydraulic system.
- supplies all consumers through the hydraulic line network.

The fuel tank **5** supplies fuel to the diesel engine. The optional refueling pump makes it easier to fill the fuel tank.

The swing gears **8**:

- are positioned on the uppercarriage, on the left behind the cabin.
- engage with the roller-bearing swing ring on the undercarriage.

The cabin **9**:

- contains all required control elements and operating elements.
- has a large safety-glass window and is sound-proofed.
- is equipped with an ergonomic operator's seat.
- can be tilted back by as much as 18.5° using hydraulic cylinders.
- can be folded in sideways for transport.

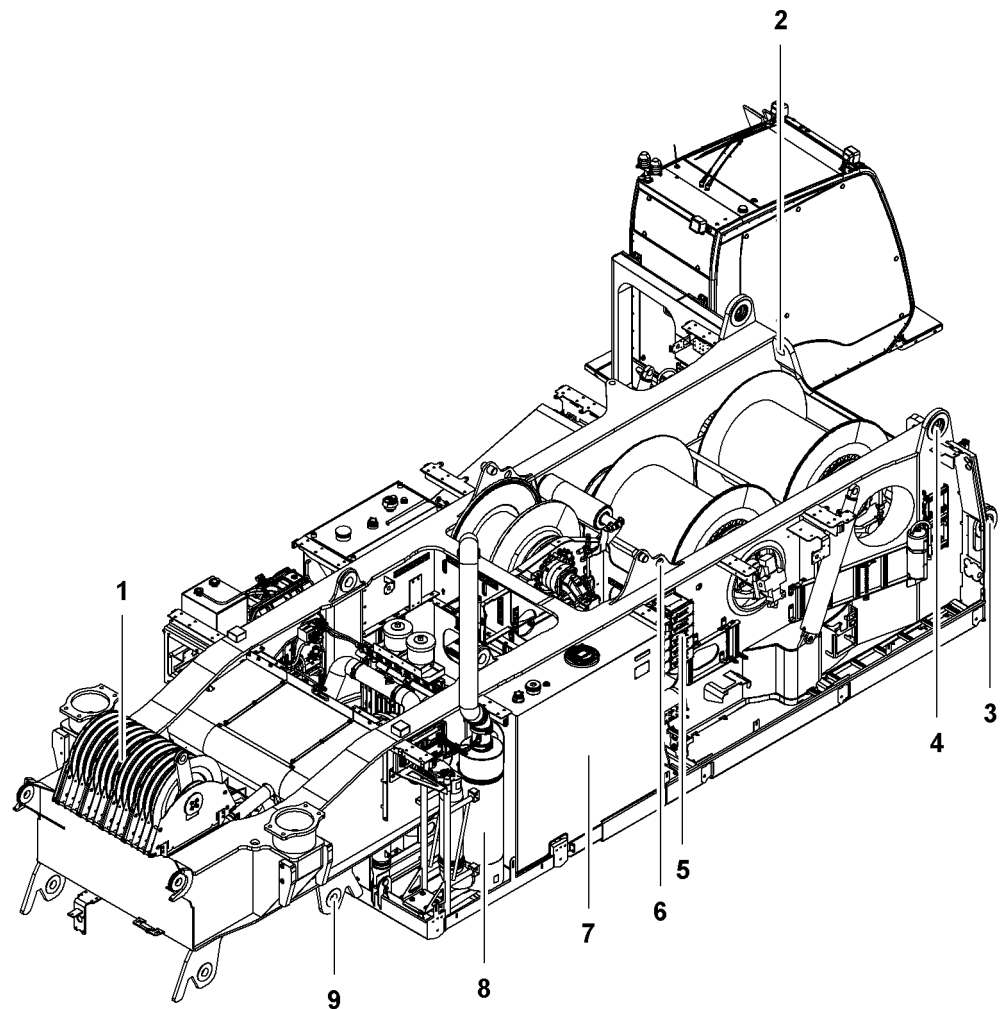


Fig. 18: Uppercarriage viewed from rear right

- | | | | |
|----------|--|----------|--|
| 1 | Pulley set | 6 | Pivot point (2x) for main boom tilting-back supports |
| 2 | Rigging point (2x) for loading basic machine | 7 | Hydraulic oil tank |
| 3 | Pivot point (2x) for main boom base section | 8 | Exhaust system |
| 4 | Pivot point (2x) for A-frame1 | 9 | Pin connection point (4x) for rear counterweight |
| 5 | CAN modules | | |

The hydraulic oil tank 7:

- supplies the entire hydraulic system.
- is equipped with a return circuit filter and a venting filter.
- has inspection glasses and an electric fill level sensor.

1.7.6 Cabin

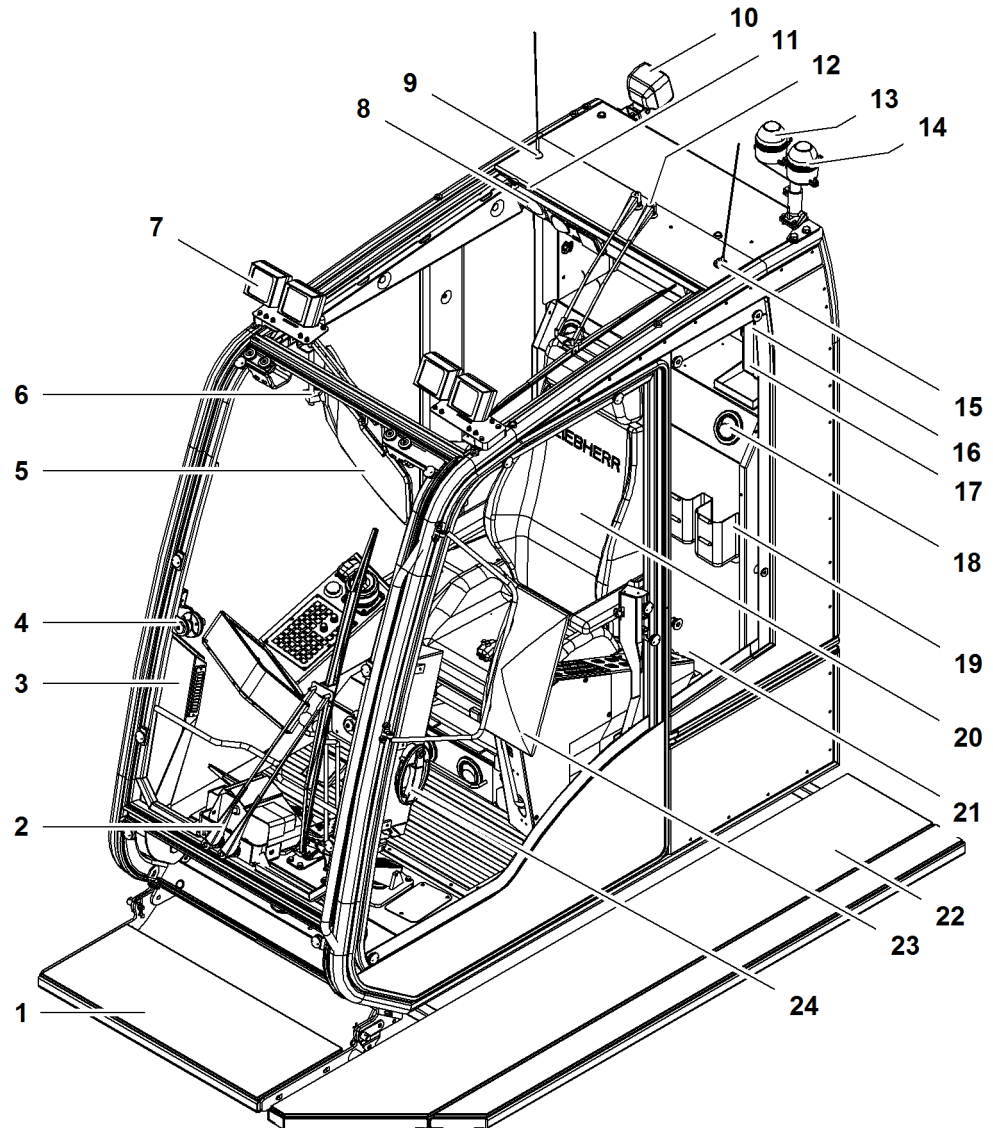


Fig. 19: Cabin

- | | | | |
|----|---------------------------|----|-----------------------------|
| 1 | Front platform | 13 | Flashing light |
| 2 | Front windscreen wiper | 14 | Load moment limiter lamp |
| 3 | Air nozzle | 15 | GSM antenna |
| 4 | Window lock (both sides) | 16 | First-aid box |
| 5 | Sun blind | 17 | Emergency hammer |
| 6 | Internal rearview mirror | 18 | Air nozzle |
| 7 | Front floodlight (4x) | 19 | Drink holder |
| 8 | Reading lamp | 20 | Operator's seat |
| 9 | Radio antenna | 21 | Screen wash fluid tank (2x) |
| 10 | Rear floodlight | 22 | Side platform |
| 11 | Sun blind for roof window | 23 | External rearview mirror |
| 12 | Roof windscreen wiper | 24 | Door lock |

1.7.7 Central power unit

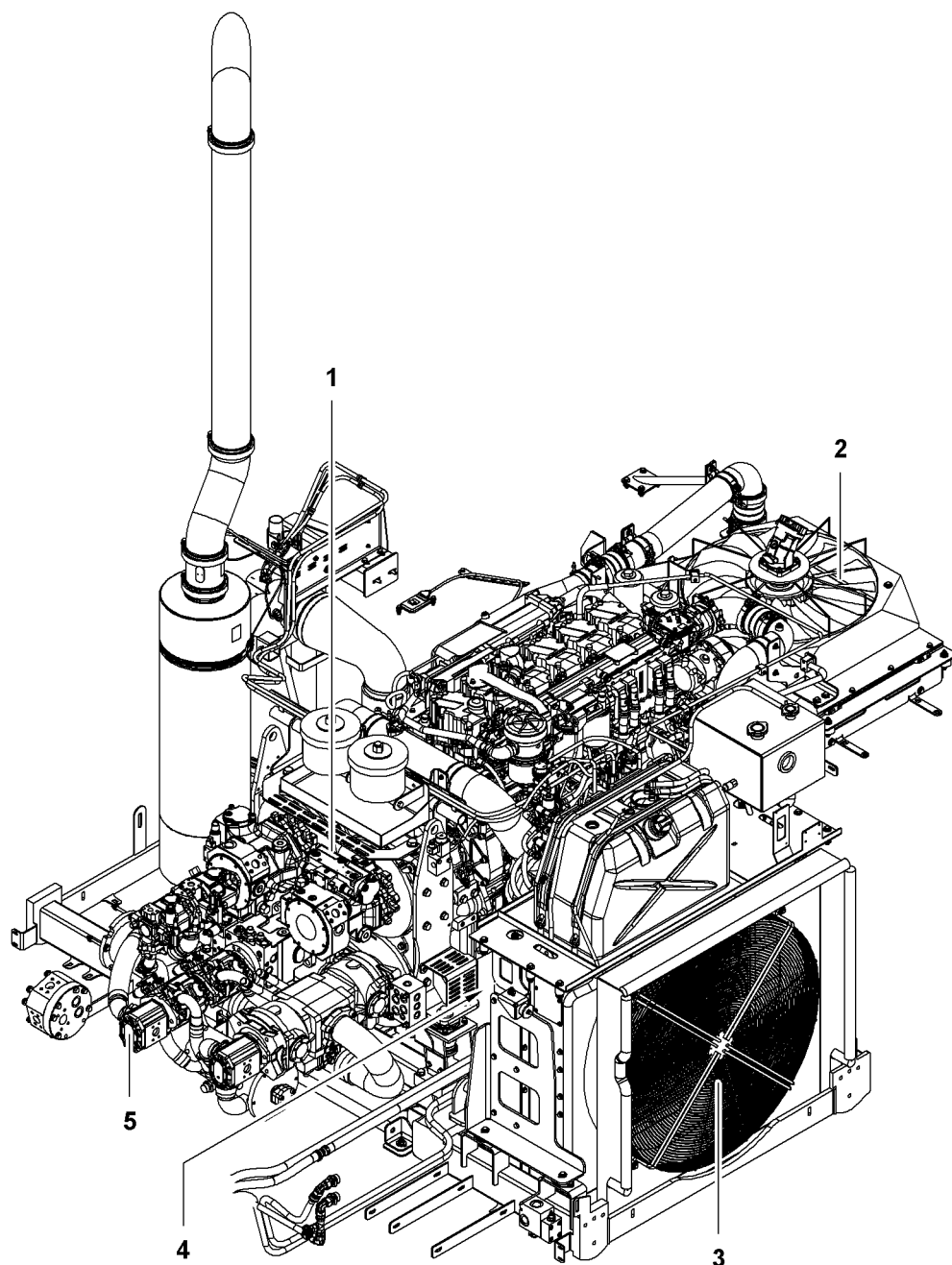


Fig. 20: Central power unit viewed from front left

- | | | | |
|---|----------------------|---|----------------|
| 1 | Distribution gearbox | 4 | Air filter |
| 2 | Charge air cooler | 5 | Pump equipment |
| 3 | Water cooler | | |

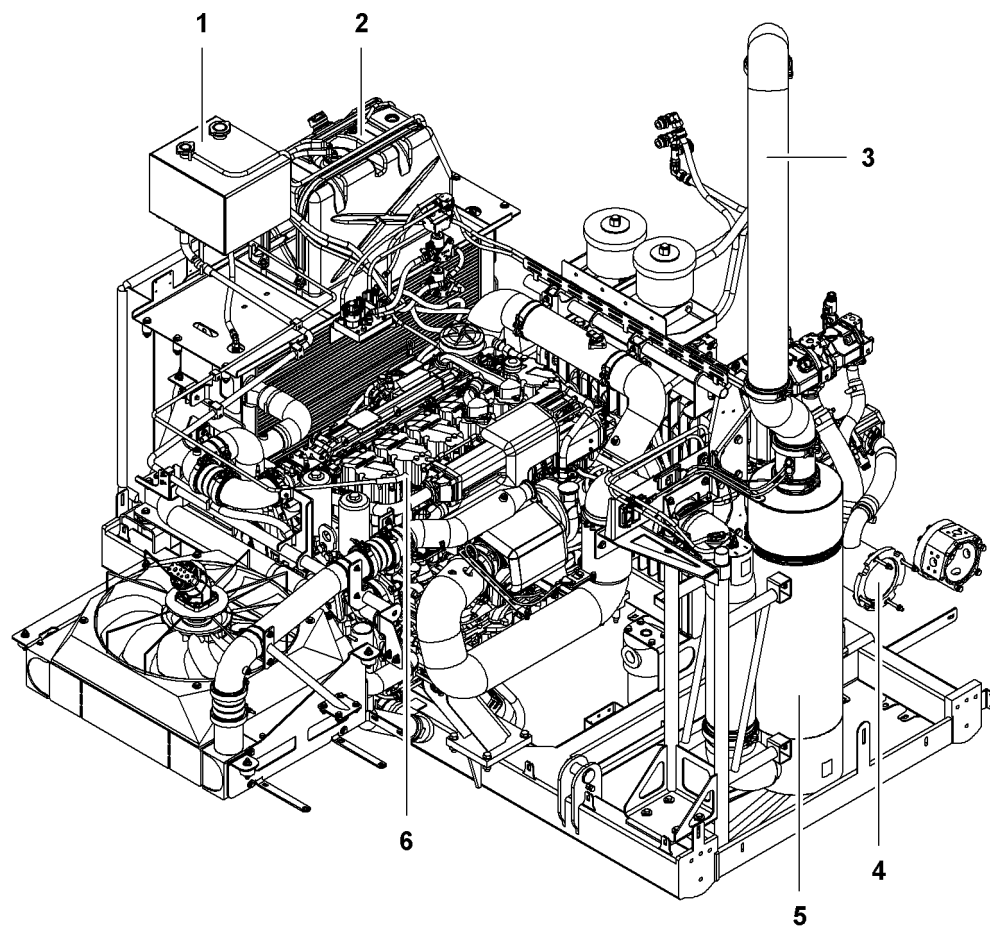


Fig. 21: Central power unit viewed from right rear

- | | | | |
|---|-------------------|---|--------------------------------|
| 1 | Compensation tank | 4 | Hydraulic oil suction pipe |
| 2 | Urea tank* | 5 | Exhaust aftertreatment system* |
| 3 | Exhaust pipe | 6 | Diesel engine |

1.7.8 Platforms on uppercarriage

Platforms on uppercarriage with undercarriage with fixed track width

Platforms on uppercarriage with undercarriage with fixed track width are mounted on undercarriage.

Platforms on uppercarriage with undercarriage with adjustable track width

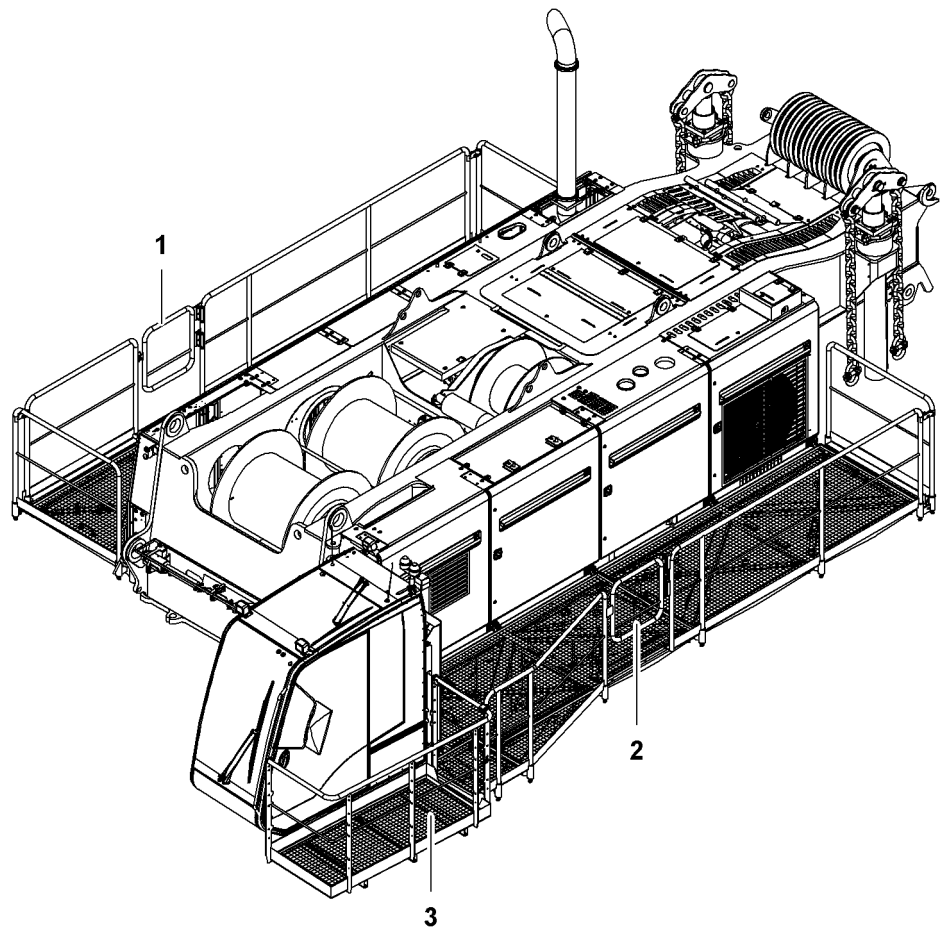


Fig. 22: Platforms on uppercarriage

- 1 Right platform
- 2 Left platform

- 3 Platform on cabin

Platform on cabin

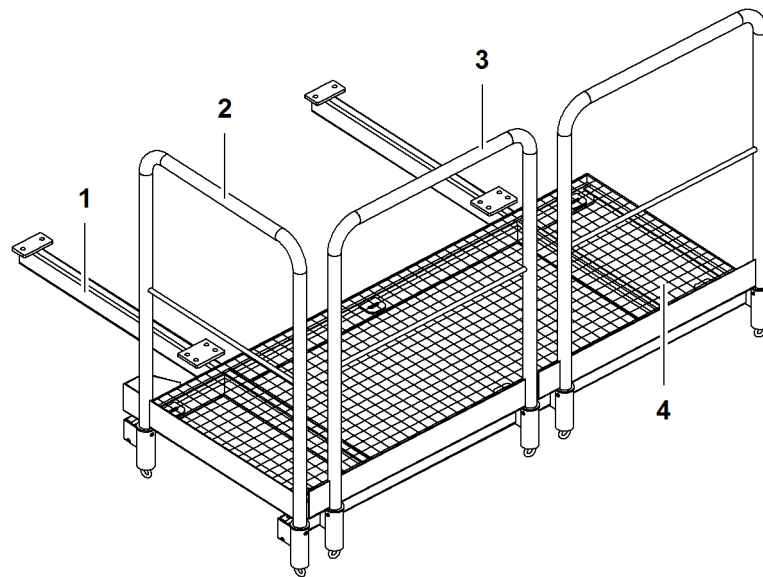


Fig. 23: Platform on cabin

- | | |
|---|--|
| <p>1 Frame</p> <p>2 Handrail part A</p> | <p>3 Handrail part B (2x)</p> <p>4 Catwalk grating</p> |
|---|--|

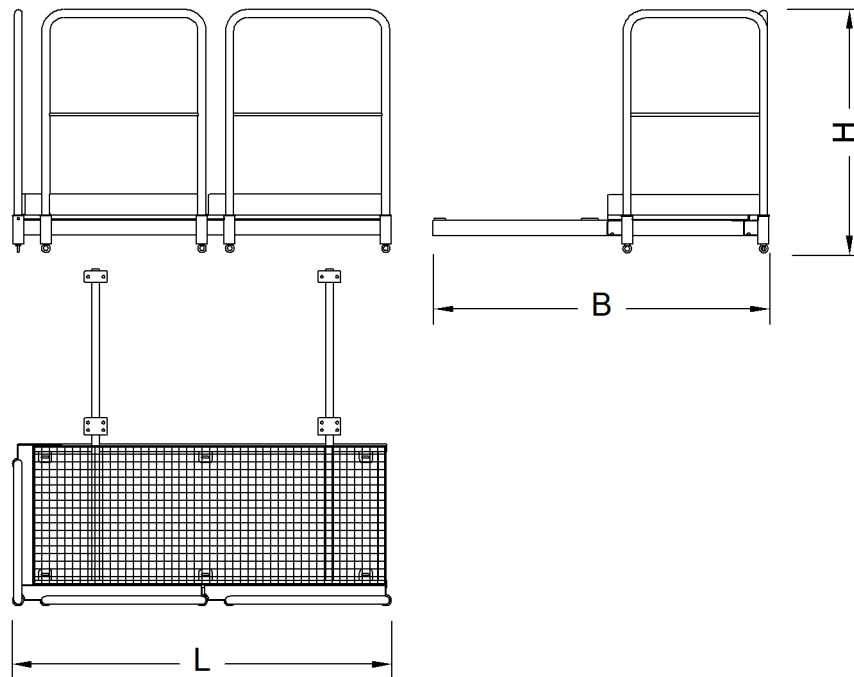


Fig. 24: Dimensions platform on cabin

Name		Value
L	Length	1986 mm 6' 6" ft-in
B	Width	1764 mm 5' 9" ft-in

Name		Value
H	Height	1273 mm 4' 2" ft-in
Weight		125 kg 276 lb

Tab. 21: Technical data platform on cabin

Frame

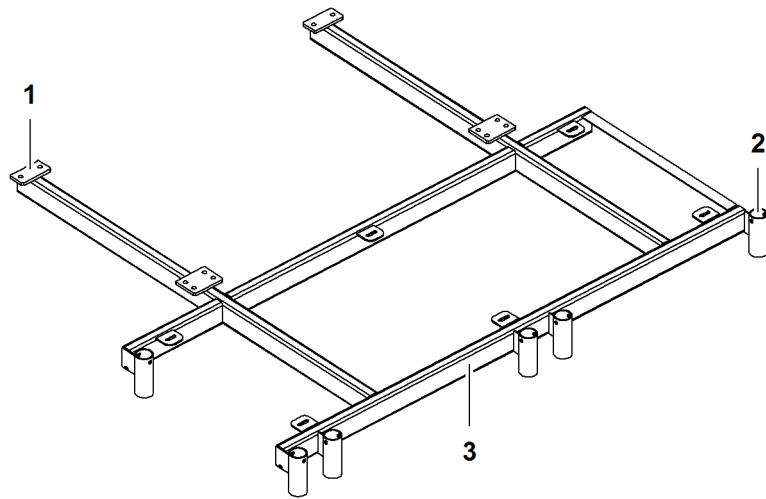


Fig. 25: Frame

- 1 Attachment point
- 2 Mount for handrail part

3 Frame

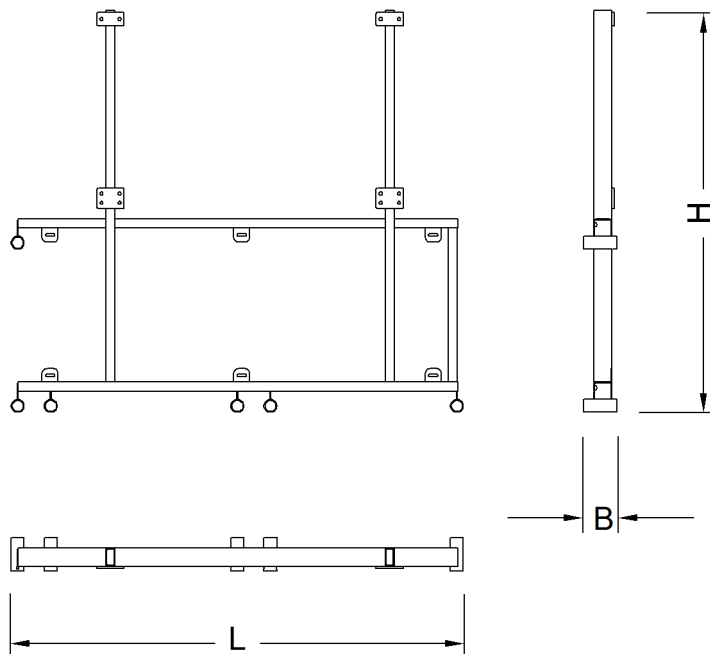


Fig. 26: Frame dimensions

Name		Value
L	Length	1983 mm 6' 6" ft-in
B	Width	146 mm 5.75" in
H	Height	1792 mm 5' 11" ft-in
Weight		57 kg 126 lb

Tab. 22: Technical data frame

Handrail part A

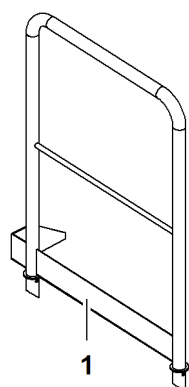


Fig. 27: Handrail part A

1 Handrail part A

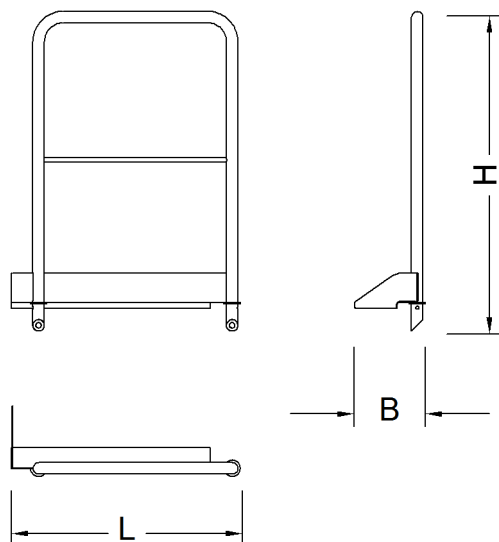


Fig. 28: Dimensions handrail part A

Name		Value
L	Length	846 mm 2' 9" ft-in

Name		Value
B	Width	260 mm 10.24" in
H	Height	1182 mm 3' 11" ft-in
Weight		15 kg 33.07 lb

Tab. 23: Technical data handrail part A

Handrail part B

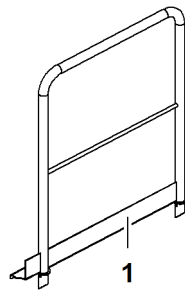


Fig. 29: Handrail part B

1 Handrail part B

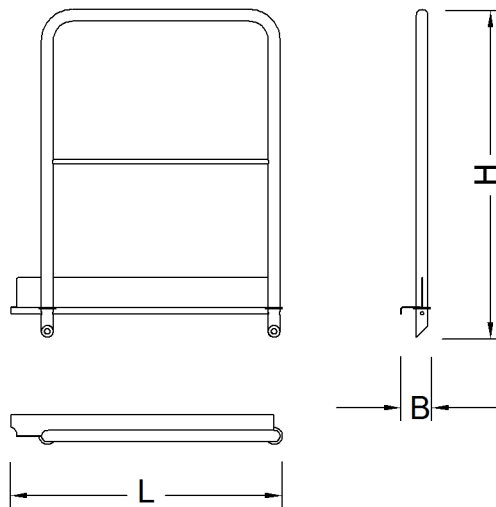


Fig. 30: Dimensions handrail part B

Name		Value
L	Length	978 mm 3' 3" ft-in
B	Width	107 mm 4.21" in
H	Height	1182 mm 3' 11" ft-in

Name	Value
Weight	16 kg 35.27 lb

Tab. 24: Technical data handrail part B

Catwalk grating

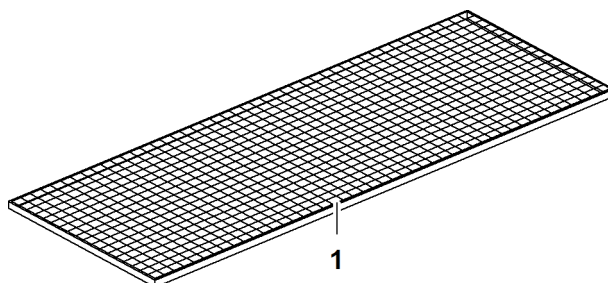


Fig. 31: Catwalk grating

1 Catwalk grating

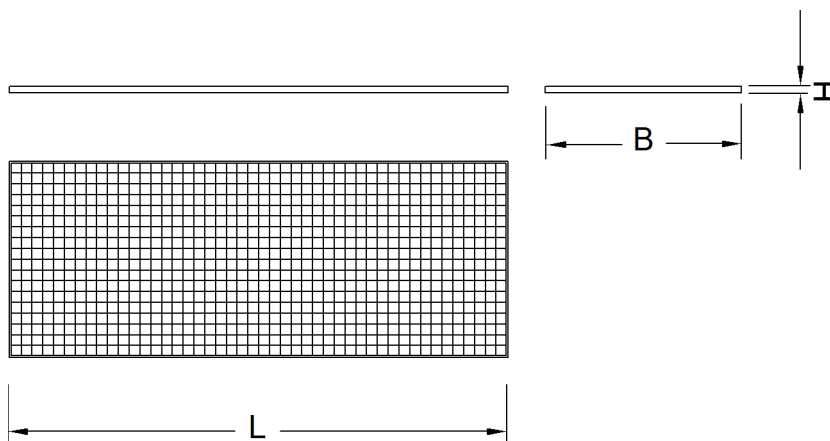


Fig. 32: Dimensions catwalk grating

Name	Value
L Length	1847 mm 6' 1" ft-in
B Width	727 mm 2' 5" ft-in
H Height	25 mm 0.98" in
Weight	16 kg 35.27 lb

Tab. 25: Technical data catwalk grating

Right platform on uppercarriage

The right platform on the uppercarriage consists of the following components:

- Bracket supports
- Brackets

- Sheet metal
- Diagonals
- Handrail parts
- Catwalk grating
- Strap supports
- Straps

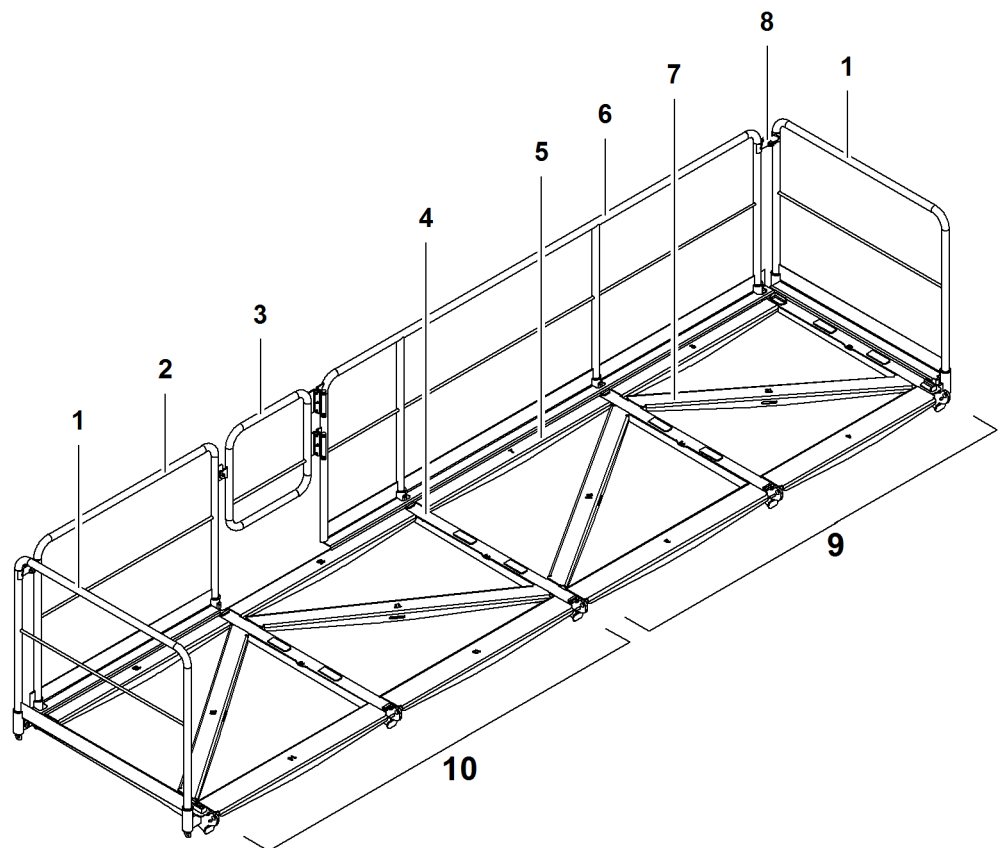


Fig. 33: Right platform on uppercarriage

- | | | | |
|---|----------------|----|---------------------|
| 1 | Handrail part1 | 6 | Handrail part3 |
| 2 | Handrail part2 | 7 | Diagonal (4x) |
| 3 | Access | 8 | Handrail joint (2x) |
| 4 | Bracket (5x) | 9 | Grating B |
| 5 | Plate (8x) | 10 | Grating A |

The straps and strap supports are not illustrated.

Brackets, plates and diagonals are marked with part numbers.

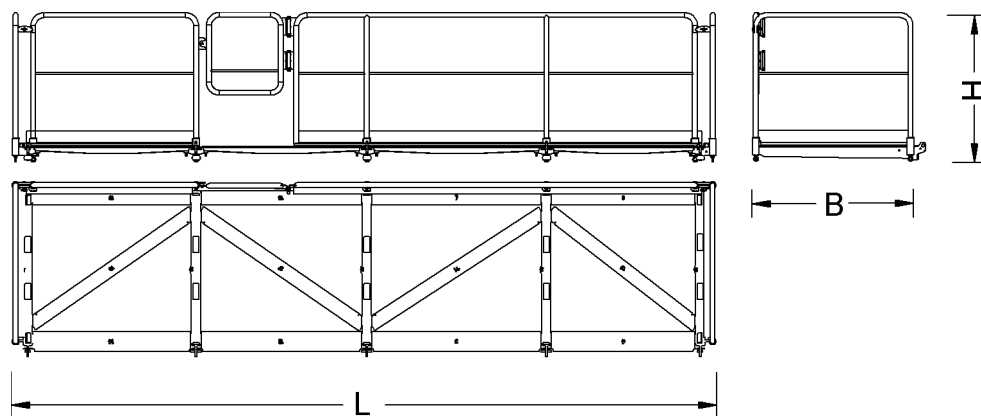


Fig. 34: Dimensions right platform on uppercarriage

Name		Value
L	Length	6019 mm 19' 9" ft-in
B	Width	1513 mm 5' ft-in
H	Height	1275 mm 4' 2" ft-in
Weight		550 kg 1,213 lb

Tab. 26: Technical data right platform on uppercarriage

Handrail part1 for right platform

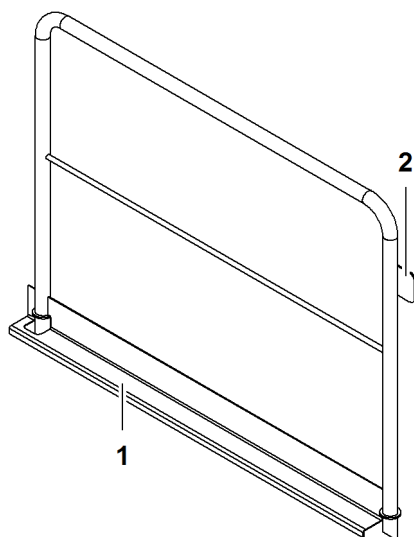


Fig. 35: Handrail part1 for right platform

- 1 Handrail part1
- 2 Stop for access

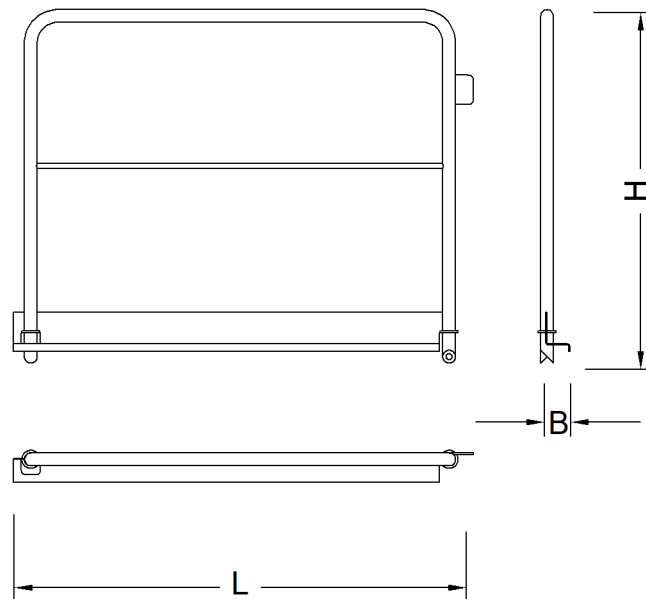


Fig. 36: Dimensions handrail part1 for right platform

Name		Value
L	Length	1534 mm 5' ft-in
B	Width	107 mm 4.21" in
H	Height	1177 mm 3' 10" ft-in
Weight		40 kg 88.18 lb

Tab. 27: Technical data handrail part1 for right platform

Handrail part2 for right platform

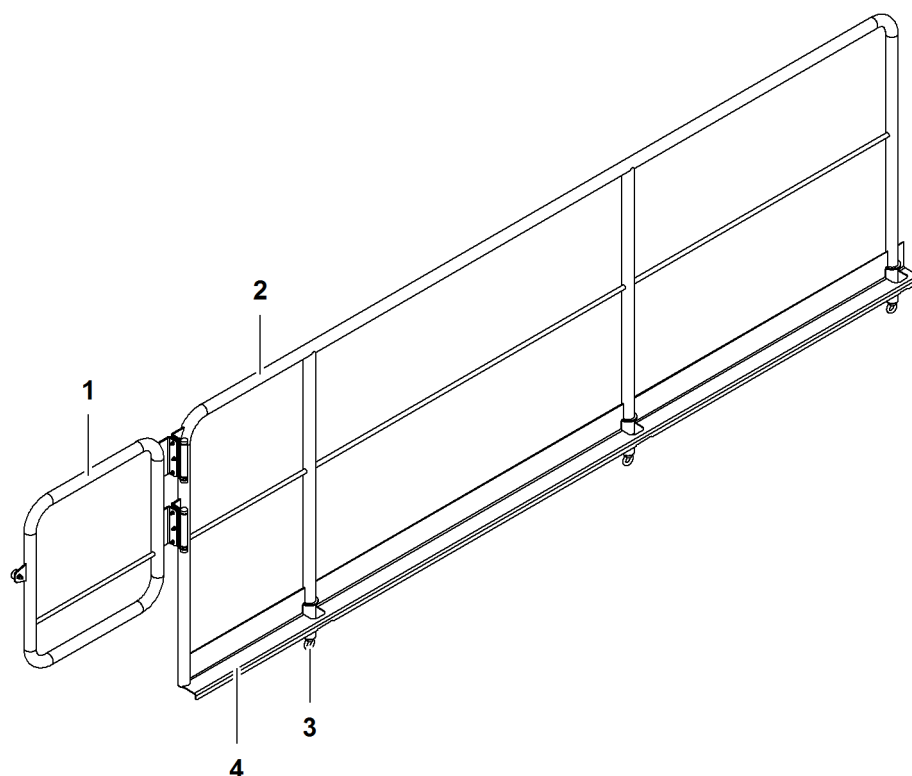


Fig. 37: Handrail part2 for right platform

- 1 Mount for access
- 2 Handrail part2

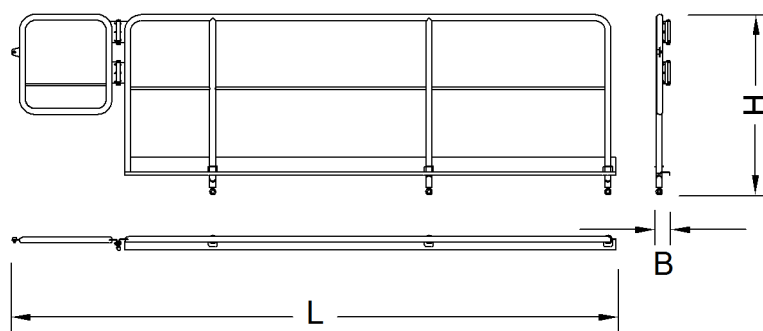


Fig. 38: Dimensions handrail part2 for right platform

Name		Value
L	Length	4290 mm 14' 1" ft-in
B	Width	107 mm 4.21" in
H	Height	1278 mm 4' 2" ft-in
Weight		48 kg 106 lb

Tab. 28: Technical data handrail part2 for right platform

Handrail part3 for right platform

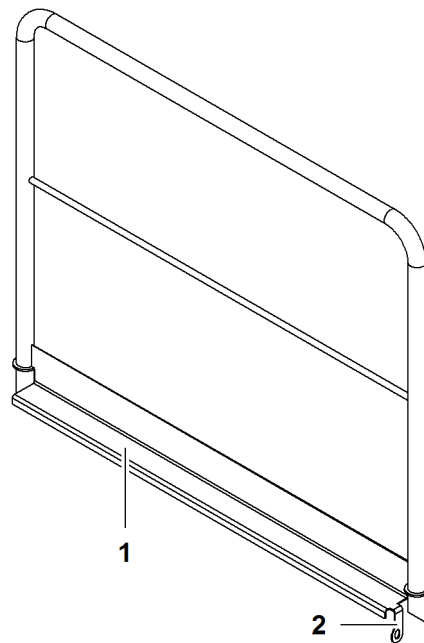


Fig. 39: Handrail part3 for right platform

1 Handrail part3

2 Locking element

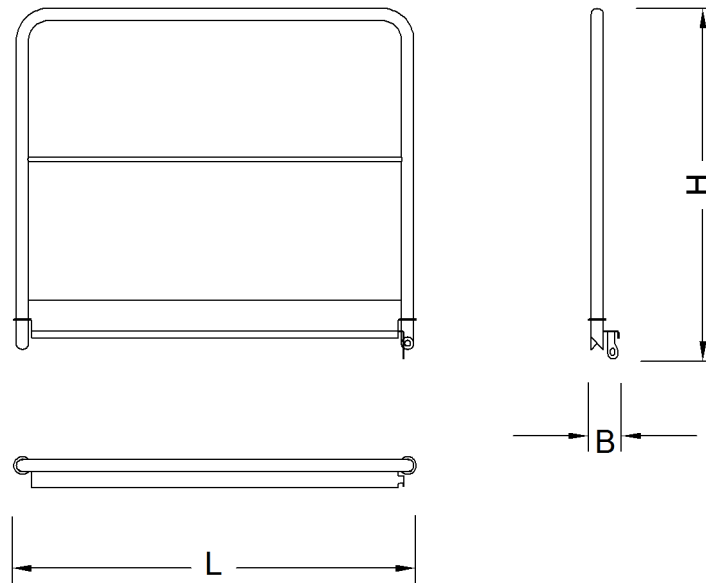


Fig. 40: Dimensions handrail part3 for right platform

Name		Value
L	Length	1390 mm 4' 7" ft-in
B	Width	98 mm 3.86" in
H	Height	1208 mm 4' ft-in

Name	Value
Weight	21 kg 46.30 lb

Tab. 29: Technical data handrail part3 for right platform

Grating A for right platform

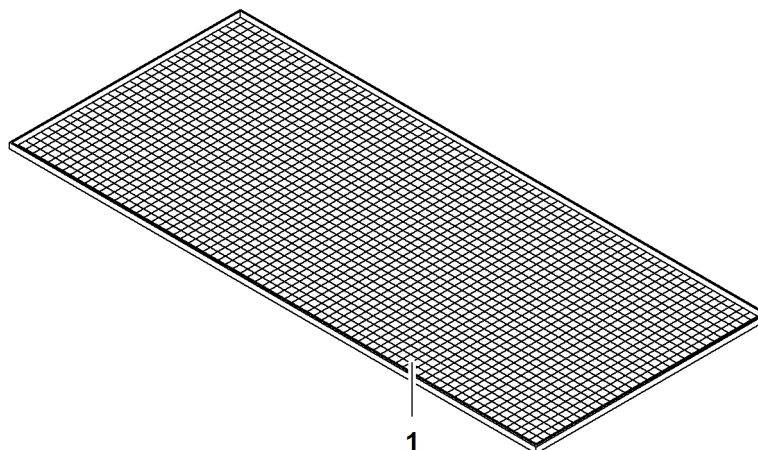


Fig. 41: Grating A for right platform

1 Grating A

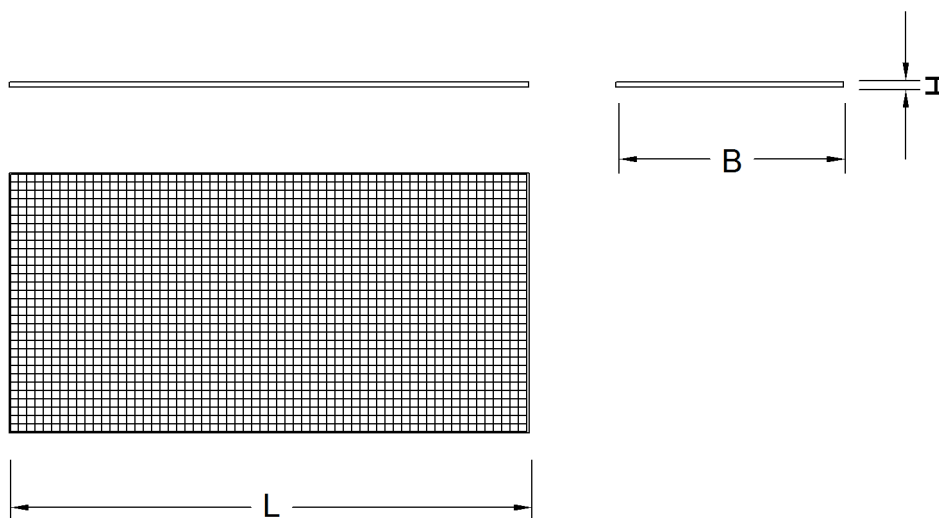


Fig. 42: Dimensions grating A for right platform

Name	Value
L Length	2847 mm 9' 4" ft-in
B Width	1247 mm 4' 1" ft-in
H Height	30 mm 1.18" in

Name	Value
Weight	50.5 kg 111 lb

Tab. 30: Technical data grating A for right platform

Grating B for right platform

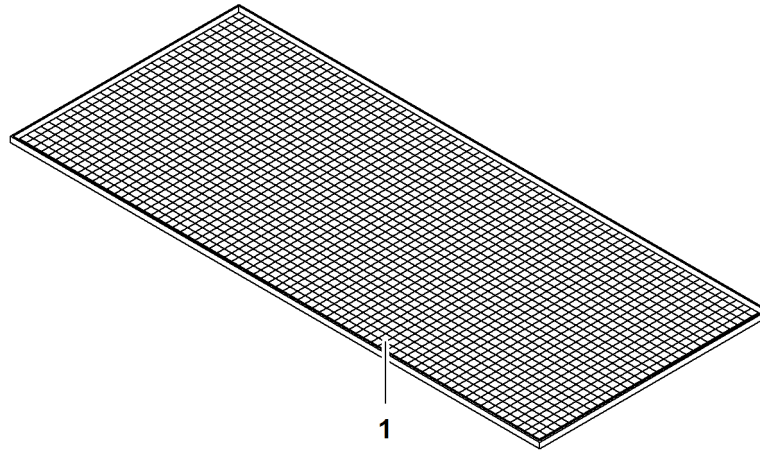


Fig. 43: Grating B for right platform

1 Grating B

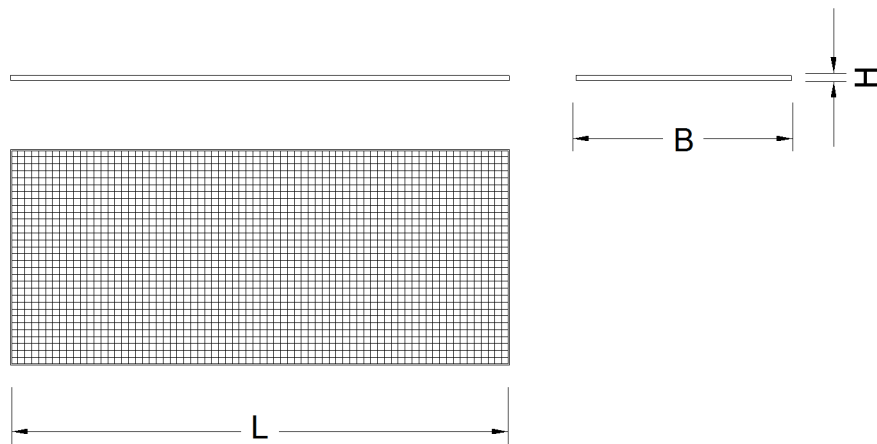


Fig. 44: Dimensions grating B for right platform

Name	Value
L Length	2887 mm 9' 6" ft-in
B Width	1247 mm 4' 1" ft-in
H Height	30 mm 1.18" in
Weight	49.5 kg 109 lb

Tab. 31: Technical data grating B for right platform

Left platform on uppercarriage

The left platform on the uppercarriage consists of the following components:

- Bracket supports
- Brackets
- Sheet metal
- Diagonals
- Handrail parts
- Catwalk grating
- Strap supports
- Straps

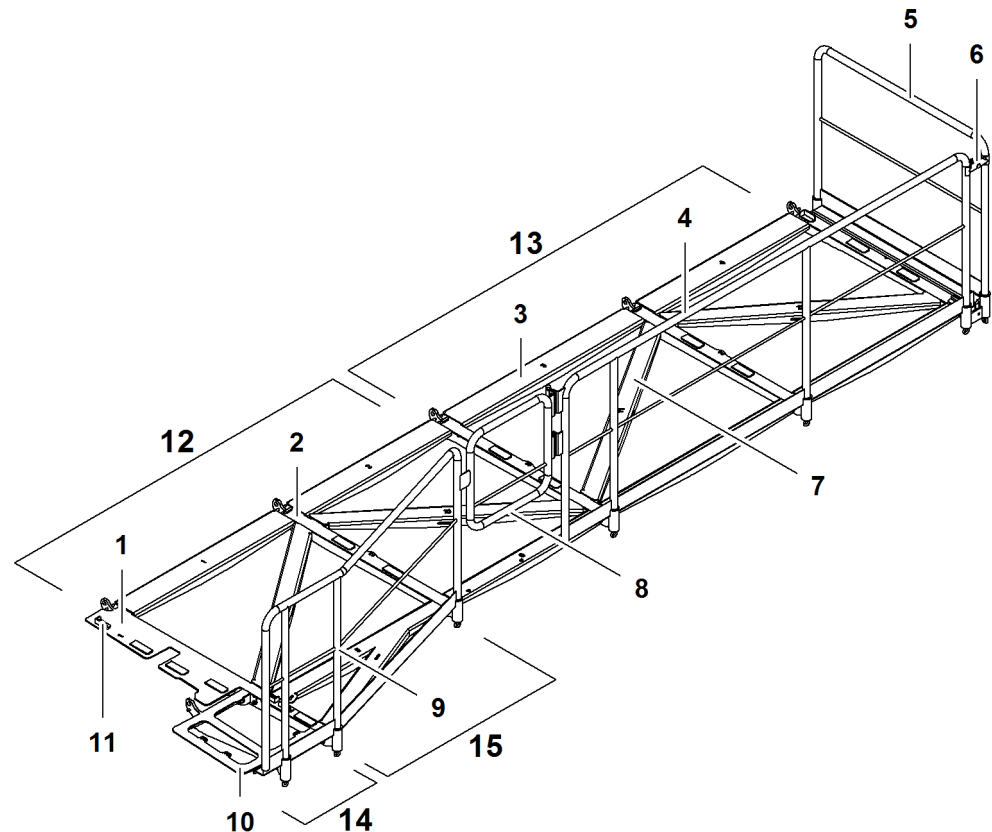


Fig. 45: Left platform on uppercarriage

- | | | | |
|---|---------------------|----|-----------------|
| 1 | Bracket1 | 9 | Handrail part6 |
| 2 | Bracket (4x) | 10 | Bracket KnK1 |
| 3 | Plate (8x) | 11 | Mount for grate |
| 4 | Handrail part5 | 12 | Grating C |
| 5 | Handrail part4 | 13 | Grating D |
| 6 | Handrail connection | 14 | Grating A |
| 7 | Diagonal (4x) | 15 | Grating B |
| 8 | Access | | |

The straps and strap supports are not illustrated.

Brackets, plates and diagonals are marked with part numbers.

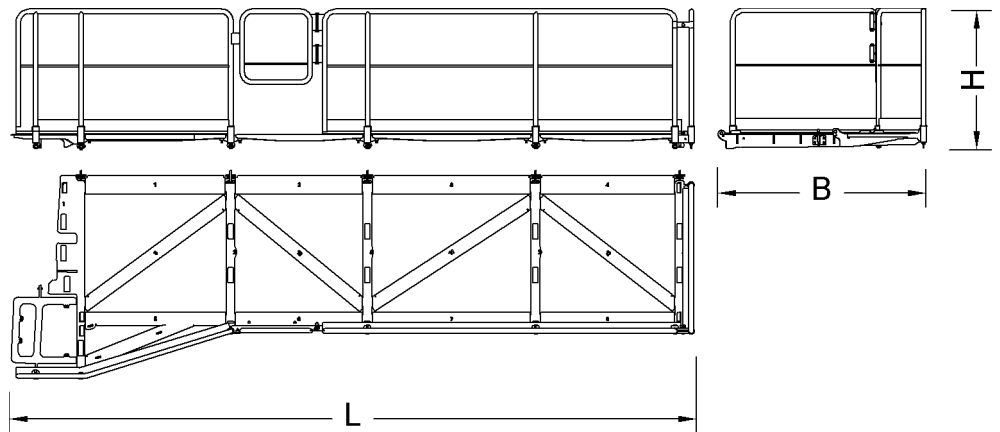


Fig. 46: Dimensions left platform on uppercarriage

Name		Value
L	Length	6241 mm 20' 6" ft-in
B	Width	1771 mm 5' 10" ft-in
H	Height	1275 mm 4' 2" ft-in
Weight		570 kg 1,257 lb

Tab. 32: Technical data left platform on uppercarriage

Handrail part6 for left platform

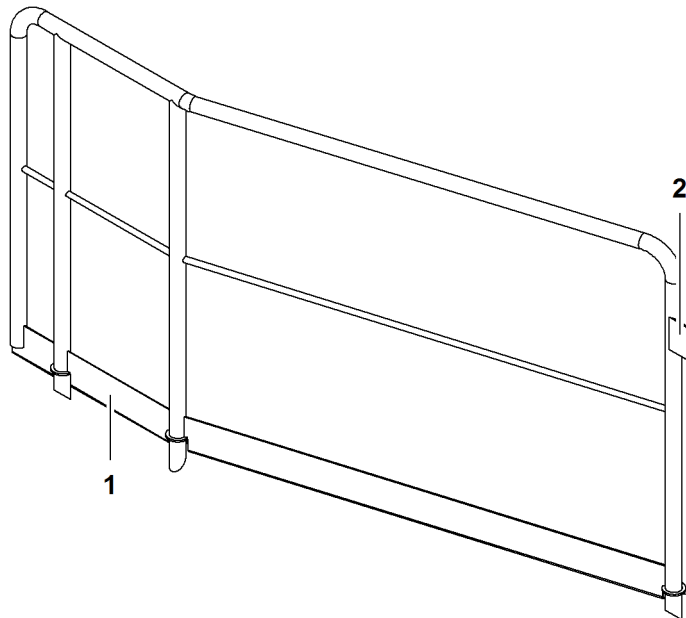


Fig. 47: Handrail part6 for left platform

- 1 Handrail part6
- 2 Stop for access

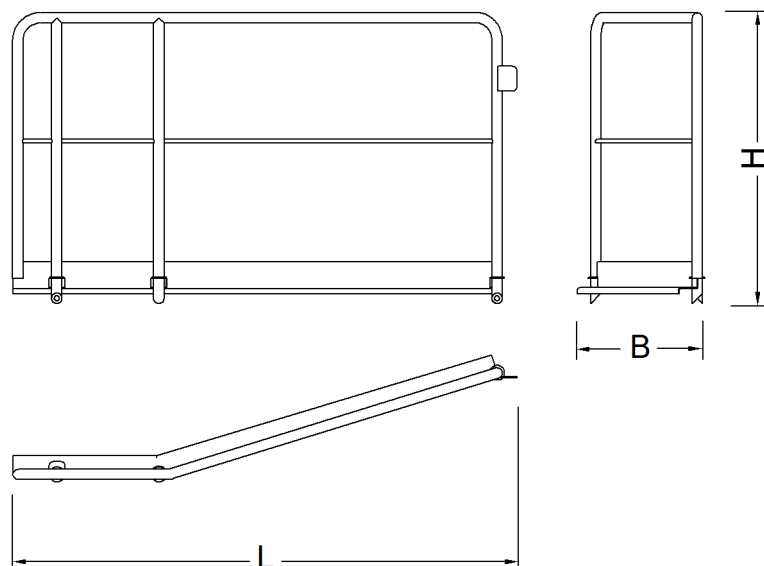


Fig. 48: Dimensions handrail part6 for left platform

Name		Value
L	Length	2042 mm 6' 8" ft-in
B	Width	505 mm 1' 8" ft-in
H	Height	1177 mm 3' 10" ft-in
Weight		32 kg 70.55 lb

Tab. 33: Technical data handrail part6 for left platform

Handrail part5 for left platform

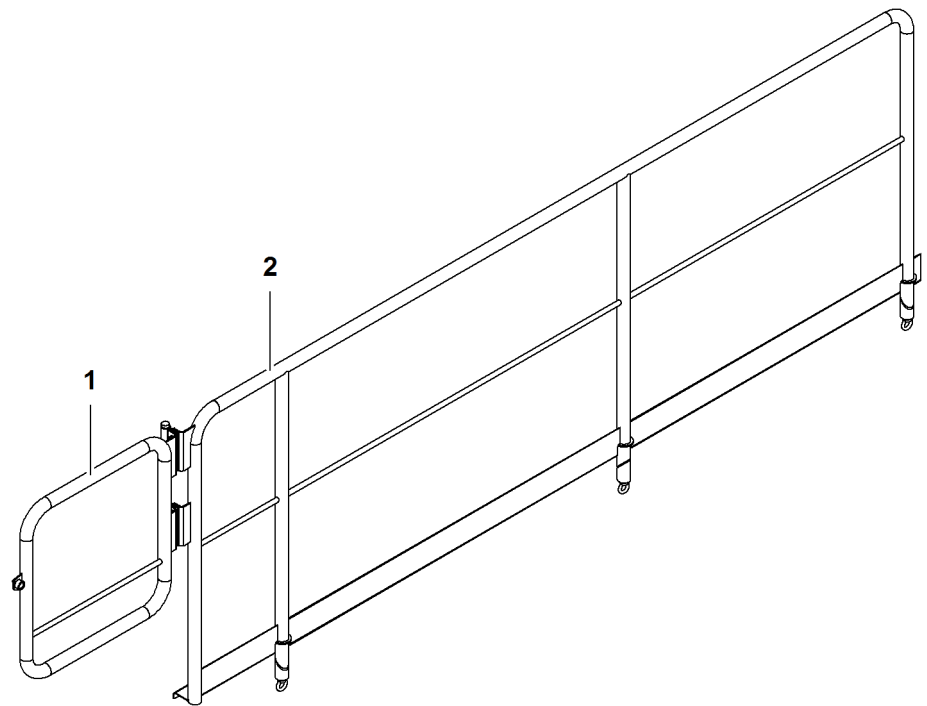


Fig. 49: Handrail part5 for left platform

- 1** Access
- 2** Handrail part5

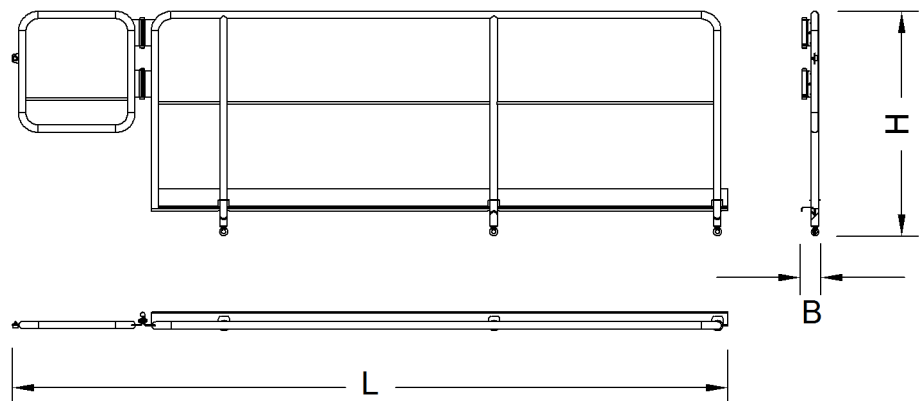


Fig. 50: Dimensions handrail part5 for left platform

Name		Value
L	Length	4066 mm 13' 4" ft-in
B	Width	107 mm 4.21" in
H	Height	1275 mm 4' 2" ft-in
Weight		47 kg 104 lb

Tab. 34: Technical data handrail part5 for left platform

Handrail part4 for left platform

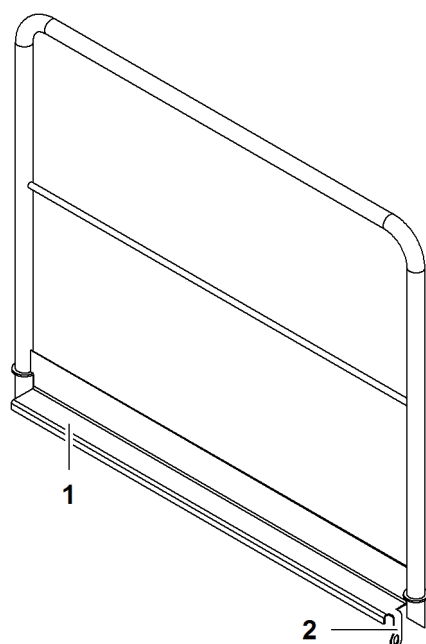


Fig. 51: Handrail part4 for left platform

1 Handrail part4

2 Locking element

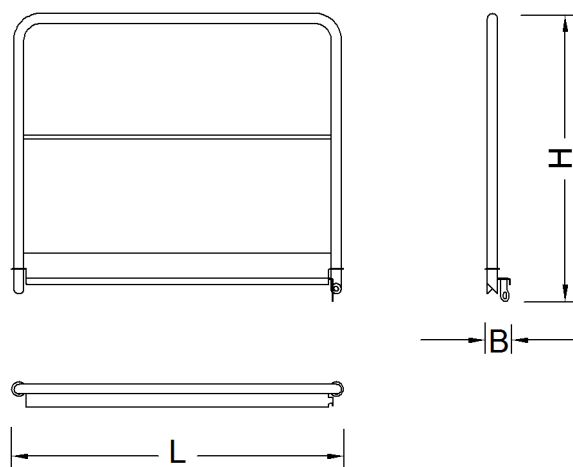


Fig. 52: Dimensions handrail part4 for left platform

Name		Value
L	Length	1390 mm 4' 7" ft-in
B	Width	98 mm 3.86" in
H	Height	1208 mm 4' ft-in
Weight		20 kg 44.09 lb

Tab. 35: Technical data handrail part4 for left platform

Grating A for left platform

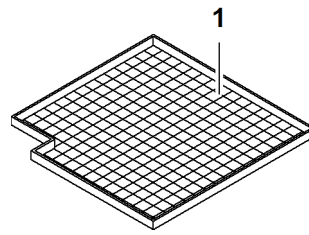


Fig. 53: Grating A for left platform

1 Grating A

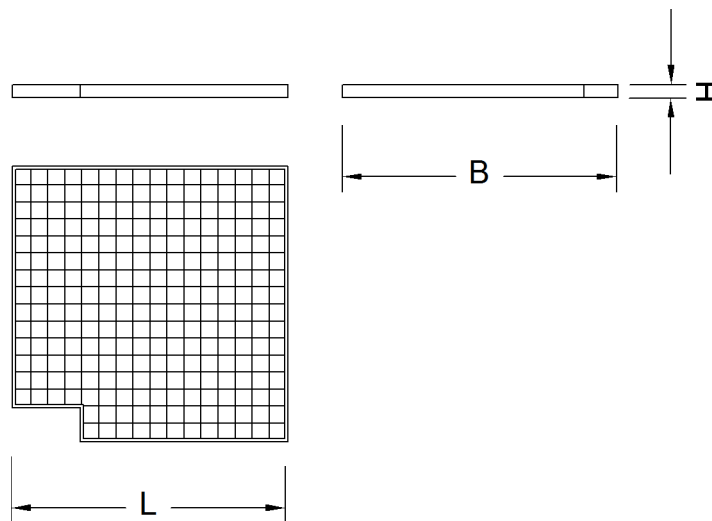


Fig. 54: Dimensions grating A for left platform

Name		Value
L	Length	647 mm 2' 1" ft-in
B	Width	647 mm 2' 1" ft-in
H	Height	30 mm 1.18" in

Tab. 36: Technical data grating A for left platform

Grating B for left platform

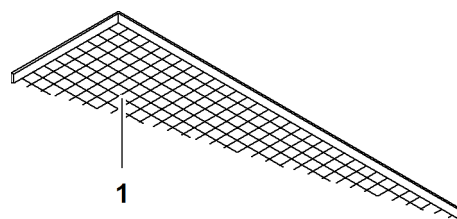


Fig. 55: Grating B for left platform

1 Grating B

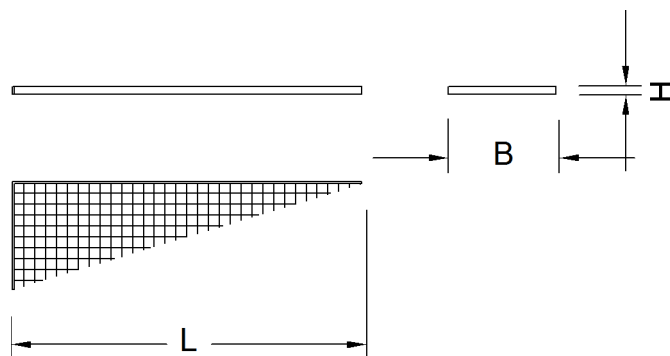


Fig. 56: Dimensions grating B for left platform

Name		Value
L	Length	1287 mm 4' 3" ft-in
B	Width	197 mm 7.76" in
H	Height	30 mm 1.18" in

Tab. 37: Technical data grating B for left platform

Grating C for left platform

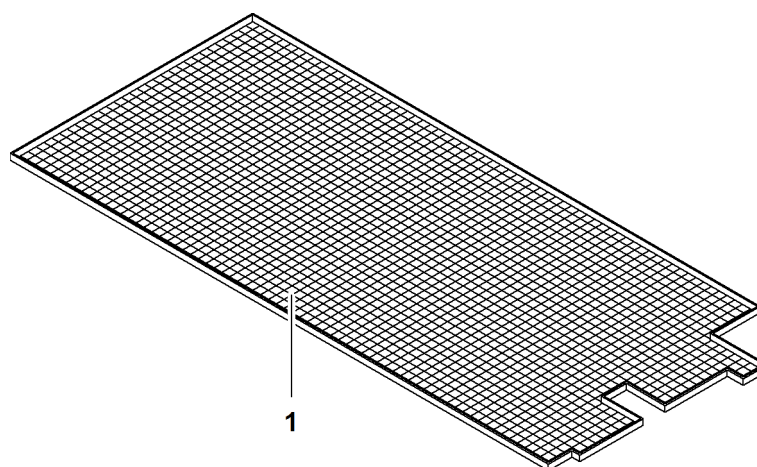


Fig. 57: Grating C for left platform

1 Grating C

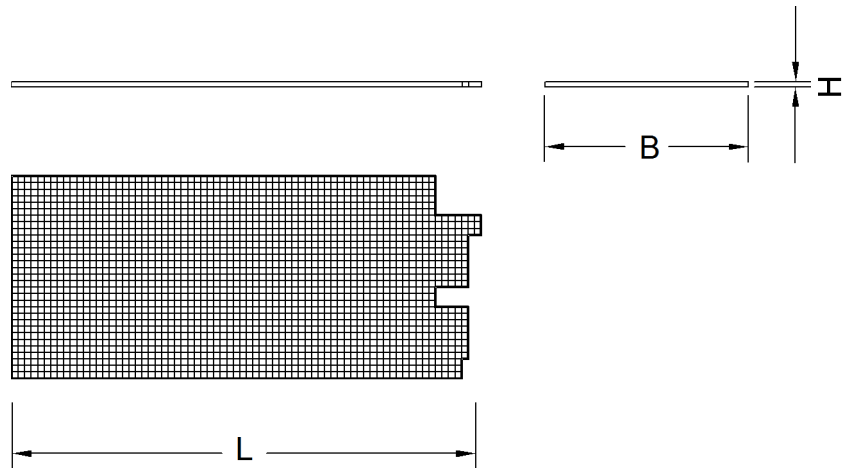


Fig. 58: Dimensions grating C for left platform

Name		Value
L	Length	2887 mm 9' 6" ft-in
B	Width	1247 mm 4' 1" ft-in
H	Height	30 mm 1.18" in
Weight		50.5 kg 111 lb

Tab. 38: Technical data grating C for left platform

Grating D for left platform

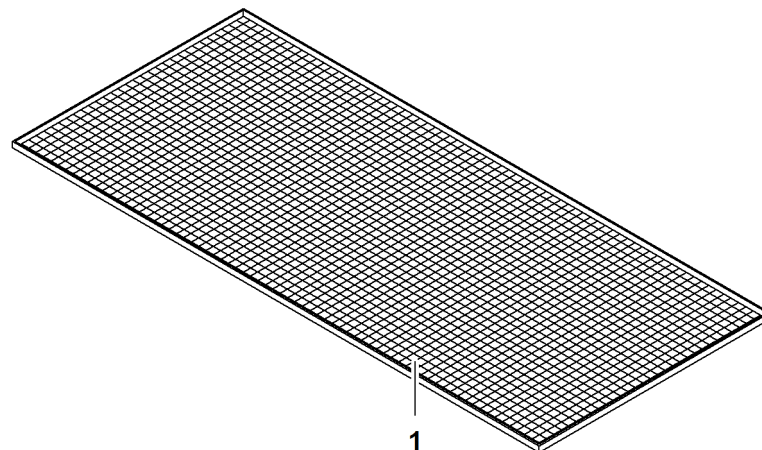


Fig. 59: Grating D for left platform

- 1 Grating D

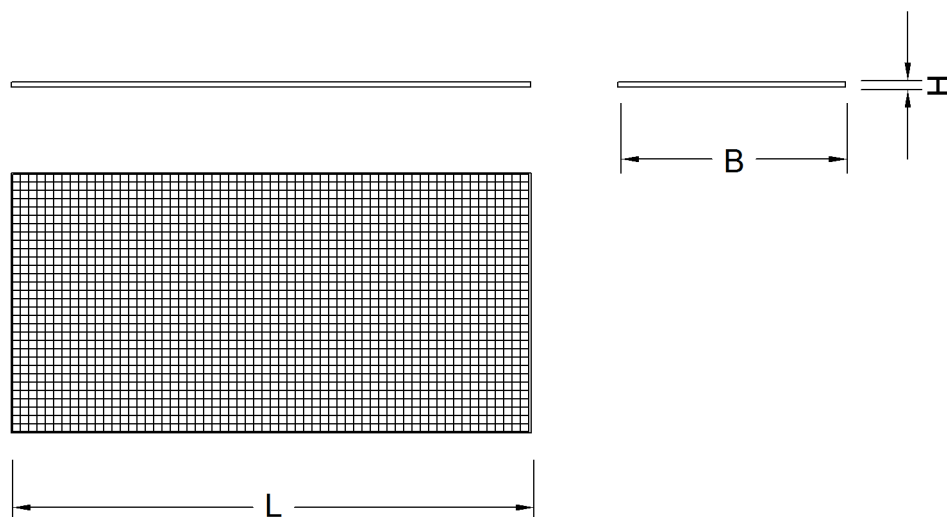


Fig. 60: Dimensions grating D for left platform

Name		Value
L	Length	2847 mm 9' 4" ft-in
B	Width	1247 mm 4' 1" ft-in
H	Height	30 mm 1.18" in
Weight		49.5 kg 109 lb

Tab. 39: Technical data grating D for left platform

Bracket1

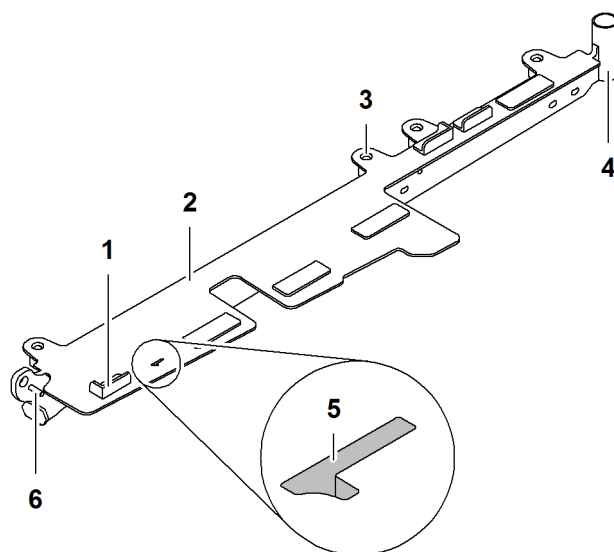


Fig. 61: Bracket1

- 1 Guide (3x) for grating
- 2 Bracket1
- 3 Pin
- 4 Mount for handrail
- 5 Part number

See next page for continuation of the image legend

3 Pin connection point (4x) for plates and diagonals

6 Pin connection point for bracket support

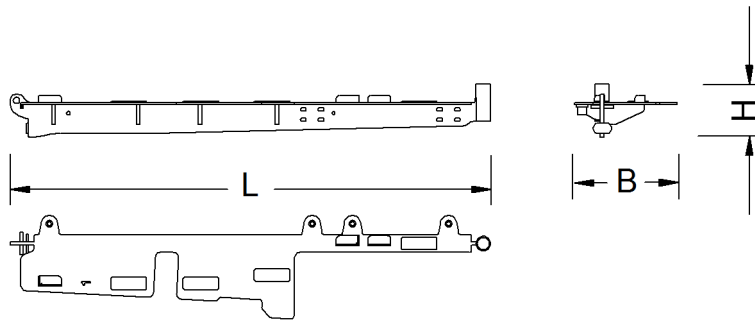


Fig. 62: Dimensions bracket1

Name		Value
L	Length	1902 mm 6' 3" ft-in
B	Width	409 mm 1' 4" ft-in
H	Height	209 mm 8.23" in
Weight		47 kg 104 lb

Tab. 40: Technical data bracket1

Bracket KnK1

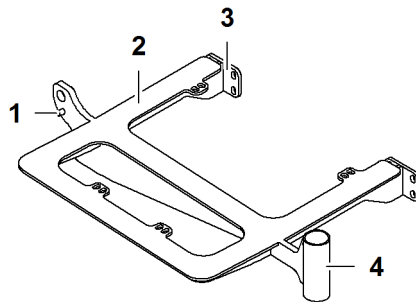


Fig. 63: Bracket KnK1

1 Pin connection point for bracket support K3
2 Bracket KnK1

3 Pin connection point (2x) for bracket1
4 Mount for handrail part

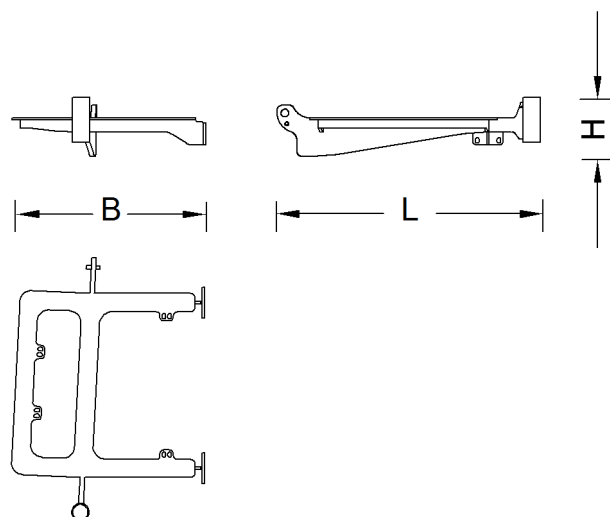


Fig. 64: Dimensions bracket KnK1

Name		Value
L	Length	857 mm 2' 10" ft-in
B	Width	631 mm 2' 1" ft-in
H	Height	192 mm 7.56" in
Weight		22 kg 48.50 lb

Tab. 41: Technical data bracket KnK1

Bracket2

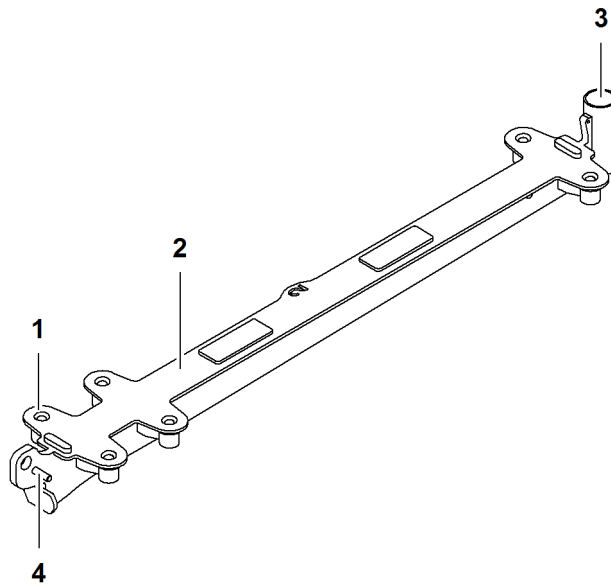


Fig. 65: Bracket2

- 1 Pin connection point (6x) for plates and diagonals
- 2 Bracket2
- 3 Mount for handrail part
- 4 Pin connection point for bracket support

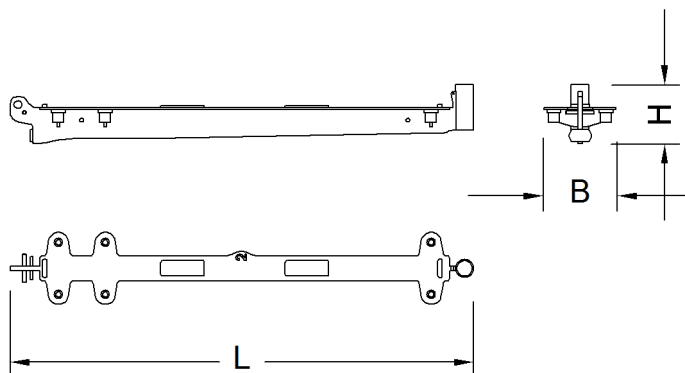


Fig. 66: Dimensions bracket2

Name		Value
L	Length	1491 mm 4' 11" ft-in
B	Width	232 mm 9.13" in
H	Height	189 mm 7.44" in
Weight		25.3 kg 55.78 lb

Tab. 42: Technical data bracket2

Bracket3

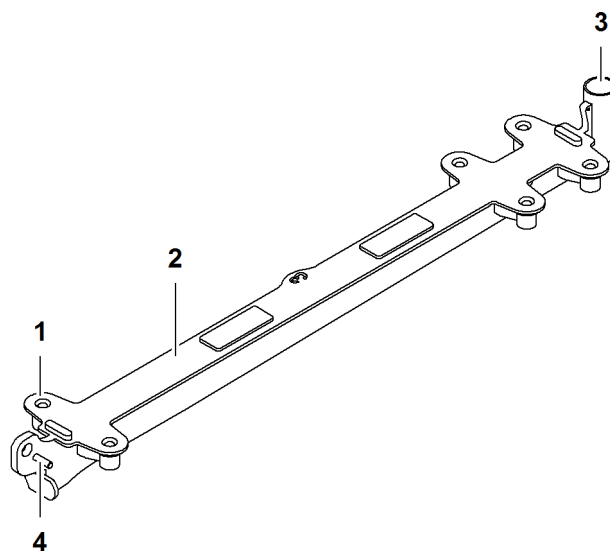


Fig. 67: Bracket3

- | | |
|---|--|
| <p>1 Pin connection point (6x) for plates and diagonals</p> <p>2 Bracket3</p> | <p>3 Mount for handrail part</p> <p>4 Pin connection point for bracket support</p> |
|---|--|

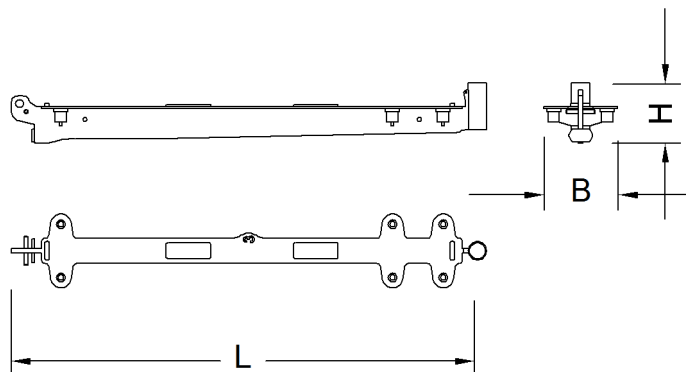


Fig. 68: Dimensions bracket3

Name		Value
L	Length	1491 mm 4' 11" ft-in
B	Width	232 mm 9.13" in
H	Height	189 mm 7.44" in
Weight		25.5 kg 56.22 lb

Tab. 43: Technical data bracket3

Bracket4

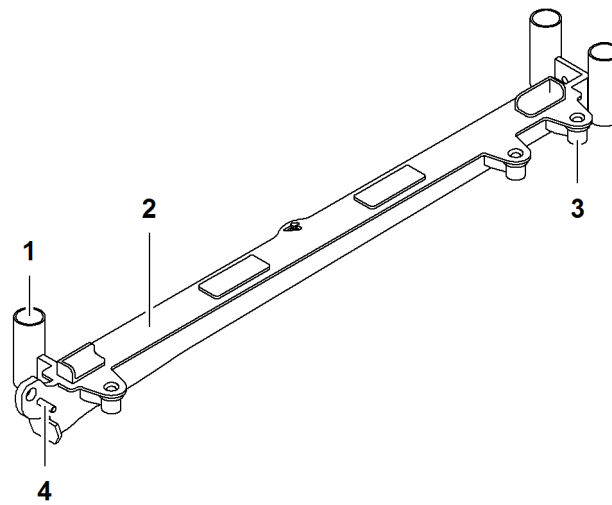


Fig. 69: Bracket4

- | | |
|---|---|
| <p>1 Mount (3x) for handrail part</p> <p>2 Bracket4</p> | <p>3 Pin connection point (3x) for plates and diagonals</p> <p>4 Pin connection point for bracket support</p> |
|---|---|

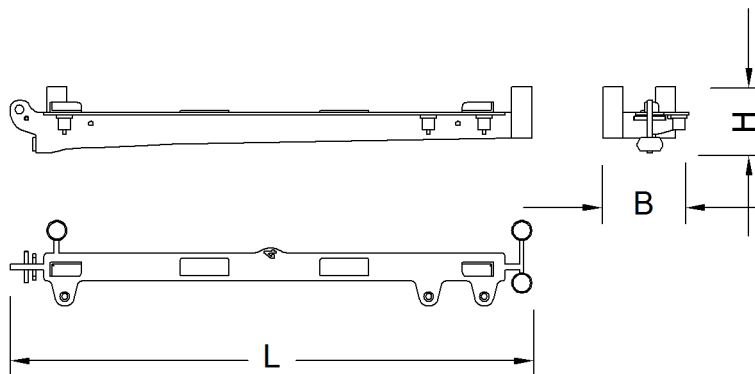


Fig. 70: Dimensions bracket4

Name		Value
L	Length	1491 mm 4' 11" ft-in
B	Width	245 mm 9.65" in
H	Height	189 mm 7.44" in
Weight		25 kg 55.11 lb

Tab. 44: Technical data bracket4

Bracket5

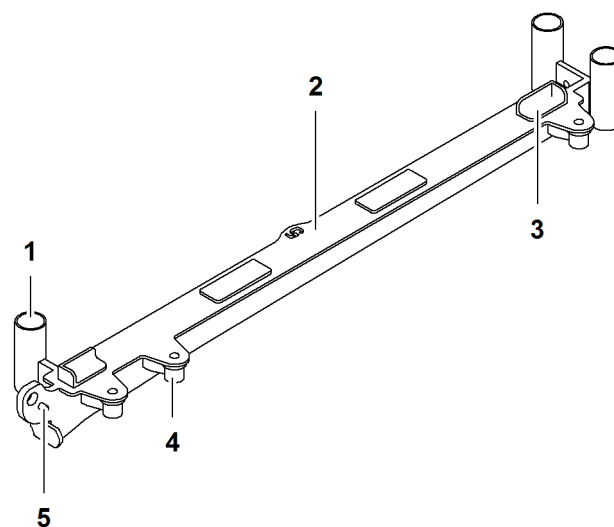


Fig. 71: Bracket5

- | | | | |
|---|------------------------------|---|--|
| 1 | Mount (3x) for handrail part | 4 | Pin connection point (3x) for plates and diagonals |
| 2 | Bracket5 | 4 | Pin connection point for bracket support |
| 3 | Guide for grating | | |

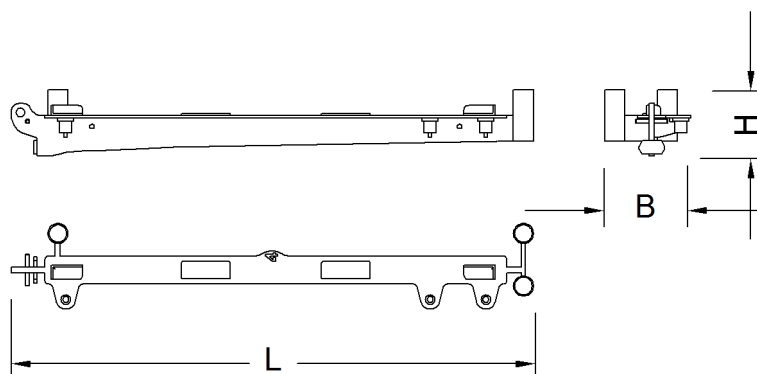


Fig. 72: Dimensions bracket5

Name		Value
L	Length	1491 mm 4' 11" ft-in
B	Width	245 mm 9.65" in
H	Height	189 mm 7.44" in
Weight		25.5 kg 56.22 lb

Tab. 45: Technical data bracket5

Bracket6

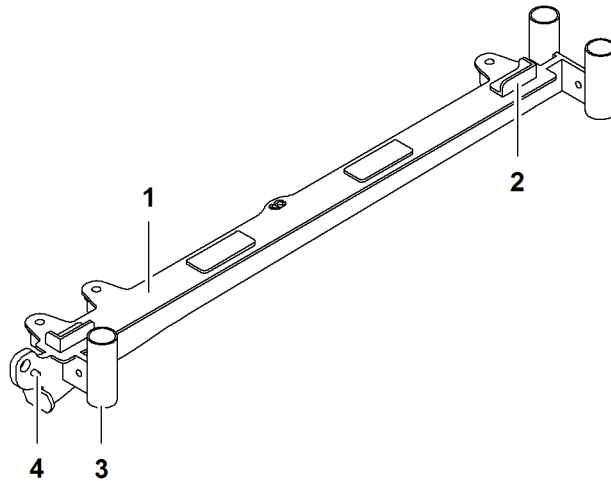


Fig. 73: Bracket6

- | | | | |
|----------|-------------------|----------|--|
| 1 | Bracket6 | 3 | Mount for handrail part |
| 2 | Guide for grating | 4 | Pin connection point for bracket support |

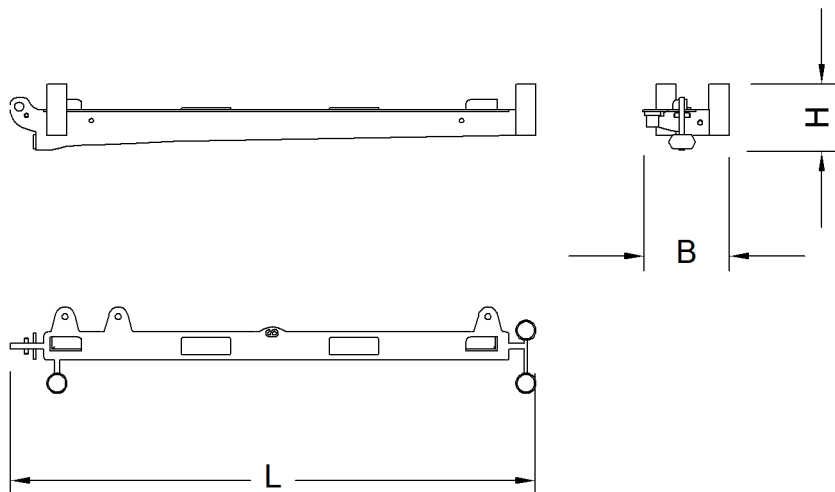


Fig. 74: Dimensions bracket6

Name		Value
L	Length	1491 mm 4' 11" ft-in
B	Width	245 mm 9.65" in
H	Height	189 mm 7.44" in
Weight		25 kg 55.11 lb

Tab. 46: Technical data bracket6

Blech1

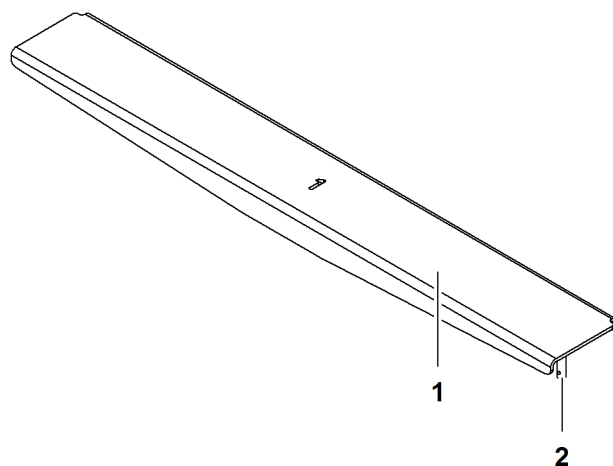


Fig. 75: Blech1

1 Blech1

2 Pin

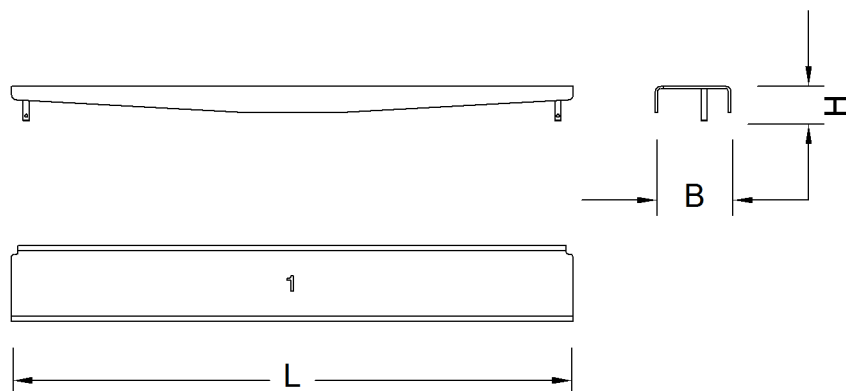


Fig. 76: Dimensions plate1

Name		Value
L	Length	1275 mm 4' 2" ft-in
B	Width	172 mm 6.77" in
H	Height	79 mm 3.11" in
Weight		12 kg 26.46 lb

Tab. 47: Technical data plate1

Blech2

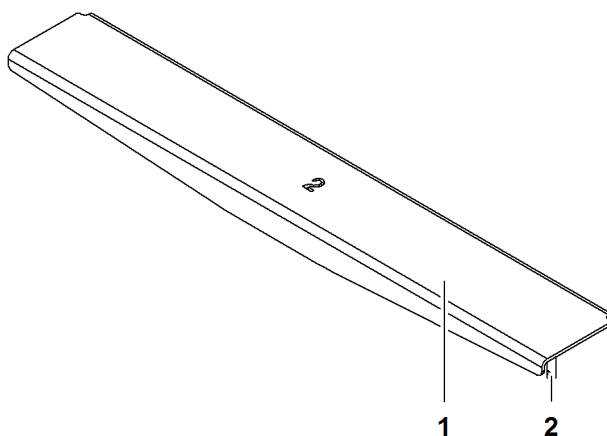


Fig. 77: Blech2

- 1 Blech2
- 2 Pin

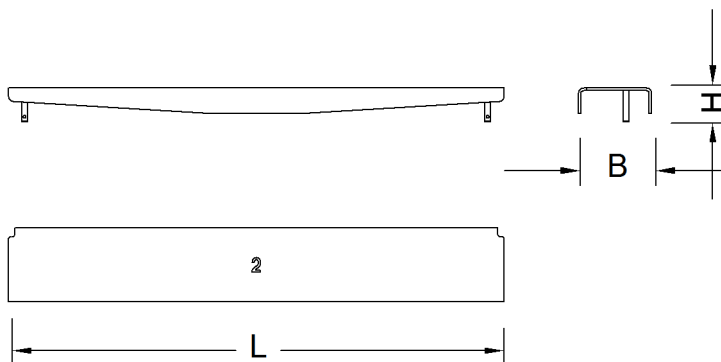


Fig. 78: Dimensions plate2

Name		Value
L	Length	1158 mm 3' 10" ft-in
B	Width	172 mm 6.77" in
H	Height	79 mm 3.11" in
Weight		11 kg 24.25 lb

Tab. 48: Technical data plate2

Blech3

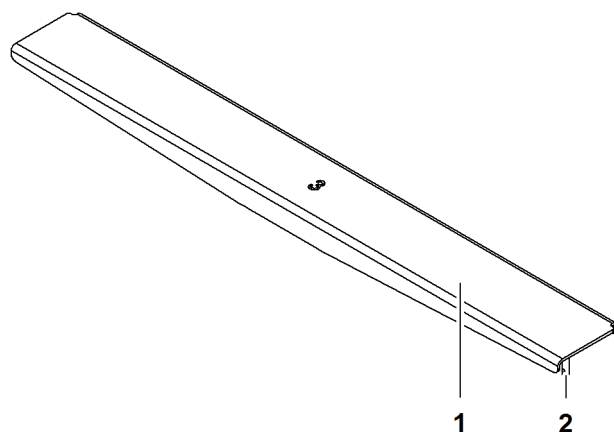


Fig. 79: Blech3

1 Blech3

2 Pin

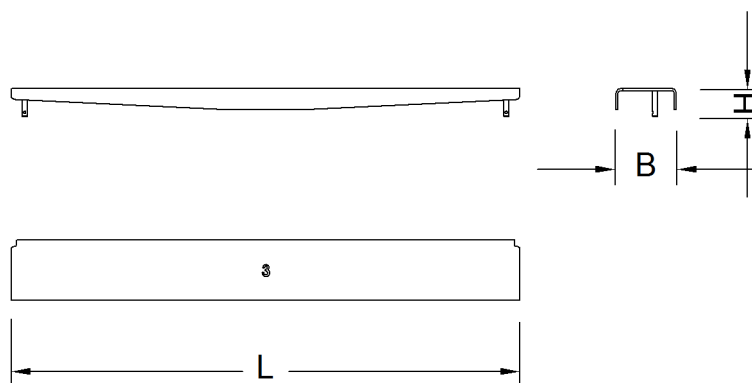


Fig. 80: Dimensions plate3

Name		Value
L	Length	1446 mm 4' 9" ft-in
B	Width	172 mm 6.77" in
H	Height	79 mm 3.11" in
Weight		17 kg 37.48 lb

Tab. 49: Technical data plate3

Blech4

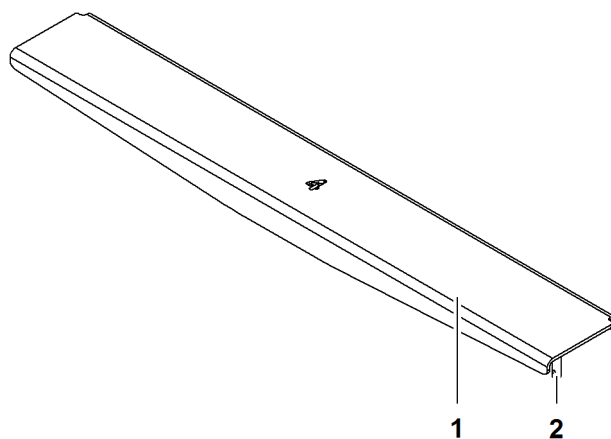


Fig. 81: Blech4

- 1 Blech4
- 2 Pin

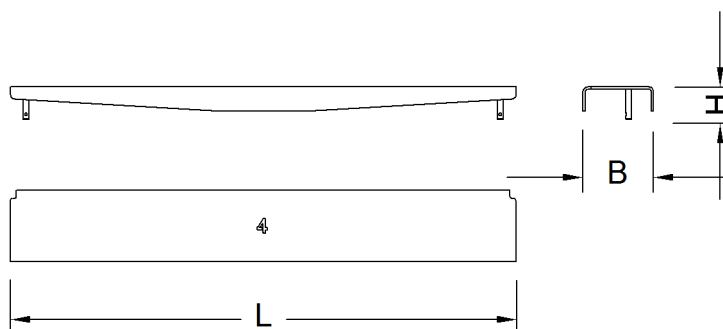


Fig. 82: Dimensions plate4

Name		Value
L	Length	1227 mm 4' ft-in
B	Width	172 mm 6.77" in
H	Height	79 mm 3.11" in
Weight		14.5 kg 31.97 lb

Tab. 50: Technical data plate4

Blech5

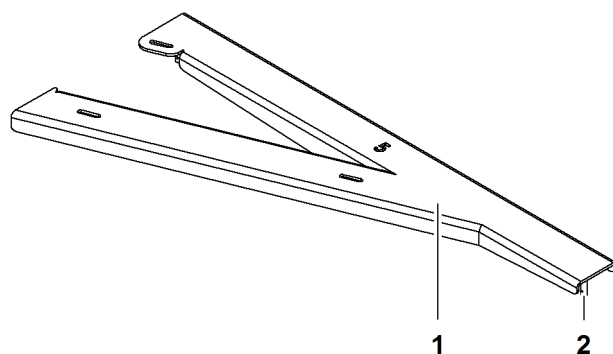


Fig. 83: Blech5

1 Blech5

2 Pin

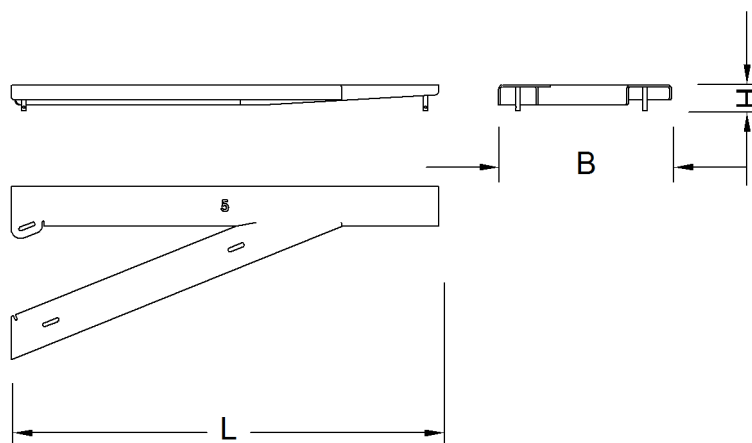


Fig. 84: Dimensions plate5

Name		Value
L	Length	1284 mm 4' 3" ft-in
B	Width	521 mm 1' 9" ft-in
H	Height	79 mm 3.11" in
Weight		22 kg 48.50 lb

Tab. 51: Technical data plate5

Blech6

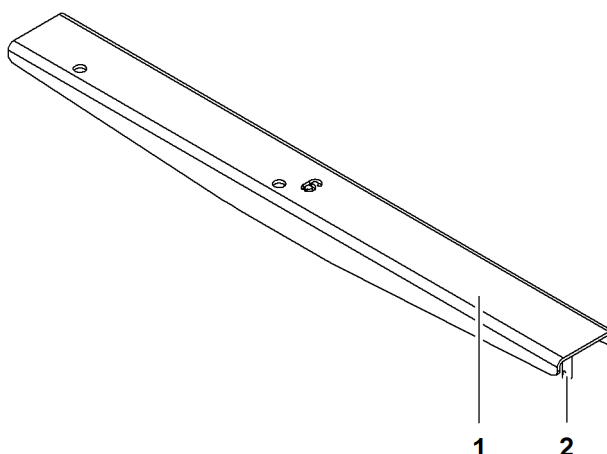


Fig. 85: Blech6

1 Blech6

2 Pin

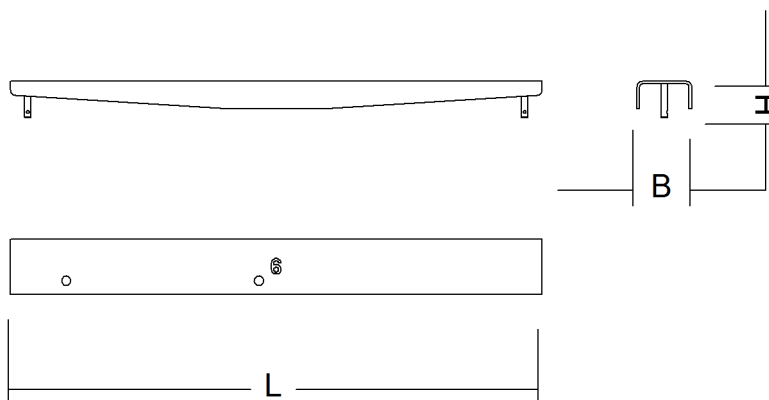


Fig. 86: Dimensions plate6

Name		Value
L	Length	1158 mm 3' 10" ft-in
B	Width	120 mm 4.72" in
H	Height	79 mm 3.11" in
Weight		11 kg 24.25 lb

Tab. 52: Technical data plate6

Blech7

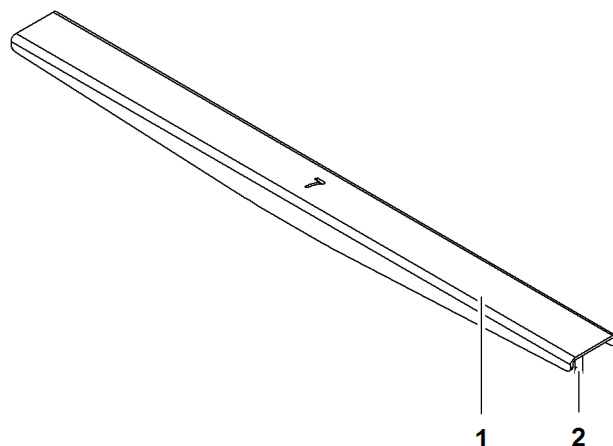


Fig. 87: Blech7

1 Blech7

2 Pin

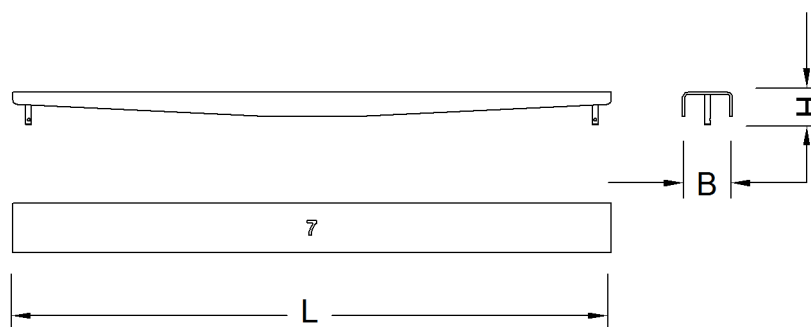


Fig. 88: Dimensions plate7

Name		Value
L	Length	1446 mm 4' 9" ft-in
B	Width	120 mm 4.72" in
H	Height	79 mm 3.11" in
Weight		13.3 kg 29.32 lb

Tab. 53: Technical data plate7

Blech8

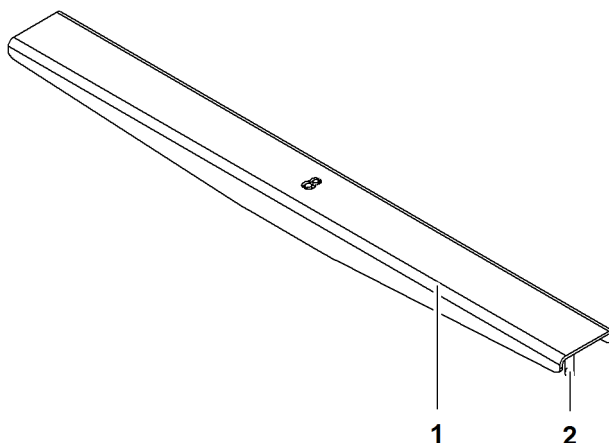


Fig. 89: Blech8

- 1 Blech8
- 2 Pin

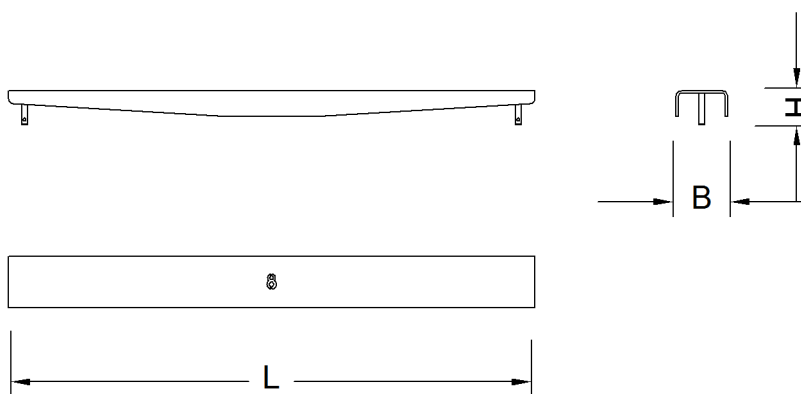


Fig. 90: Dimensions plate8

Name		Value
L	Length	1227 mm 4' ft-in
B	Width	120 mm 4.72" in
H	Height	79 mm 3.11" in
Weight		11.4 kg 25.13 lb

Tab. 54: Technical data plate8

Blech13

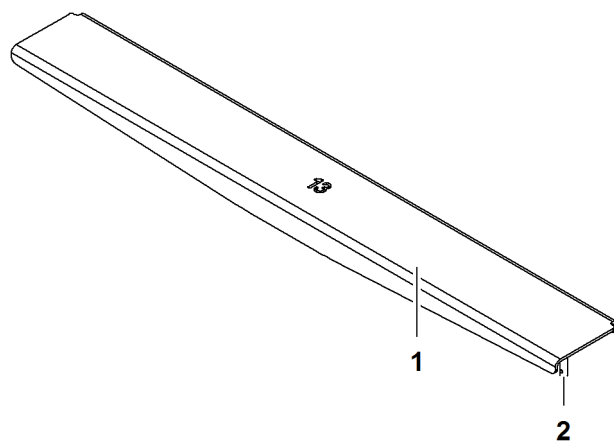


Fig. 91: Blech13

- 1 Blech13
- 2 Pin

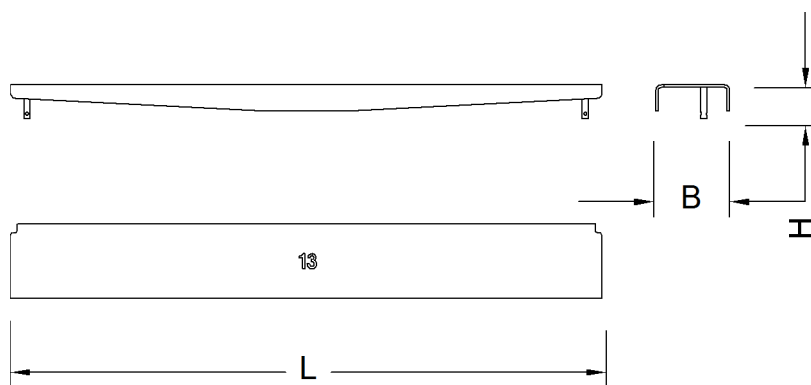


Fig. 92: Dimensions plate13

Name		Value
L	Length	1371 mm 4' 6" ft-in
B	Width	172 mm 6.77" in
H	Height	79 mm 3.11" in
Weight		16 kg 35.27 lb

Tab. 55: Technical data plate13

Blech14

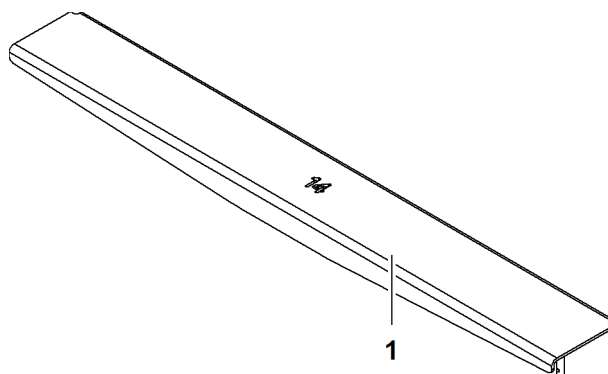


Fig. 93: Blech14

- 1 Blech14
- 2 Pin

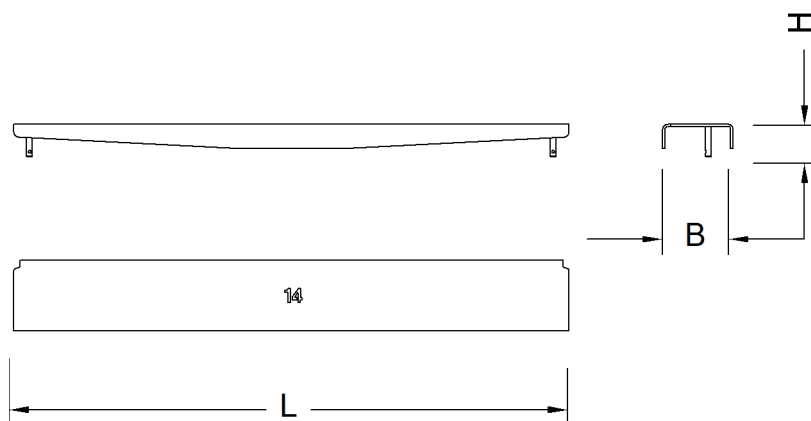


Fig. 94: Dimensions plate14

Name		Value
L	Length	1349 mm 4' 5" ft-in
B	Width	172 mm 6.77" in
H	Height	79 mm 3.11" in
Weight		15.7 kg 34.61 lb

Tab. 56: Technical data plate14

Blech15

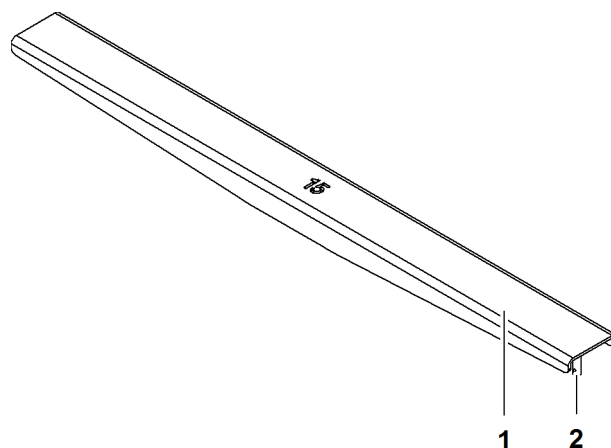


Fig. 95: Blech15

1 Blech15

2 Pin

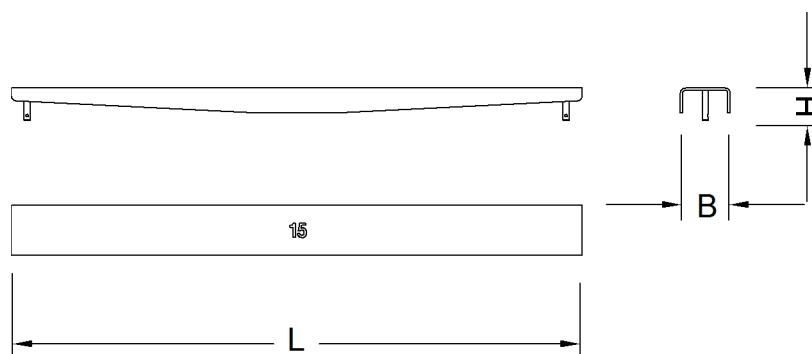


Fig. 96: Dimensions plate15

Name		Value
L	Length	1371 mm 4' 6" ft-in
B	Width	120 mm 4.72" in
H	Height	79 mm 3.11" in
Weight		12.7 kg 28.00 lb

Tab. 57: Technical data plate15

Blech16

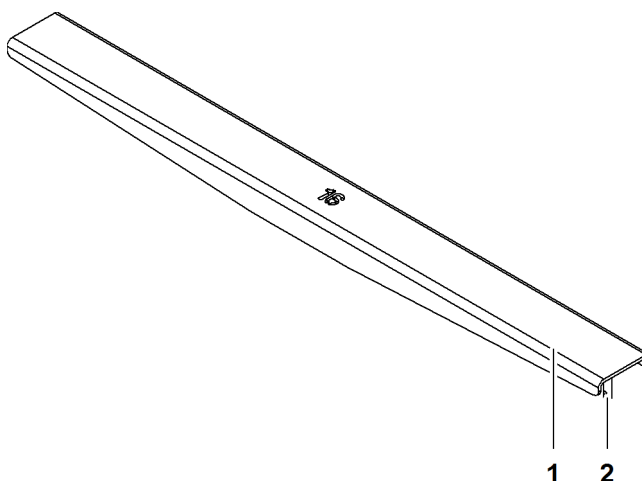


Fig. 97: Blech16

1 Blech16

2 Pin

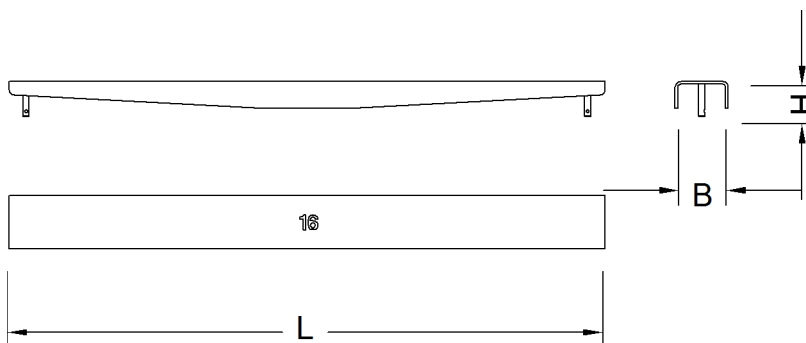


Fig. 98: Dimensions plate16

Name		Value
L	Length	1349 mm 4' 5" ft-in
B	Width	120 mm 4.72" in
H	Height	79 mm 3.11" in
Weight		12.5 kg 27.56 lb

Tab. 58: Technical data plate16

Diagonale9

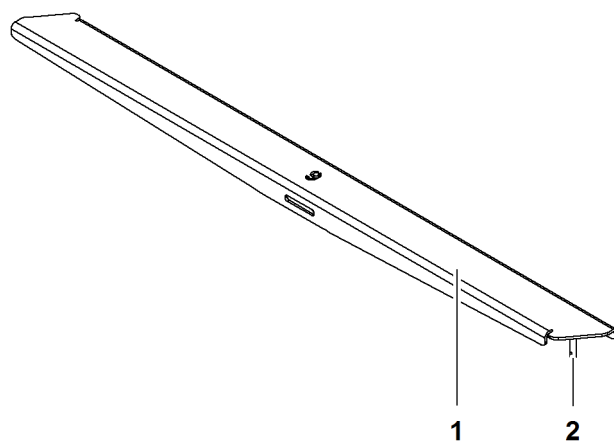


Fig. 99: Diagonale9

- 1 Diagonale9
- 2 Pin

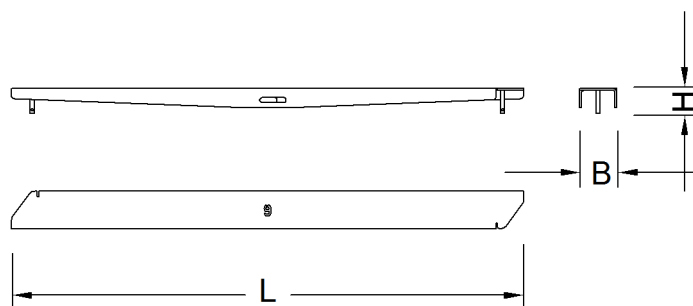


Fig. 100: Dimensions diagonal9

Name		Value
L	Length	1634 mm 5' 4" ft-in
B	Width	120 mm 4.72" in
H	Height	79 mm 3.11" in
Weight		14.5 kg 31.97 lb

Tab. 59: Technical data diagonal9

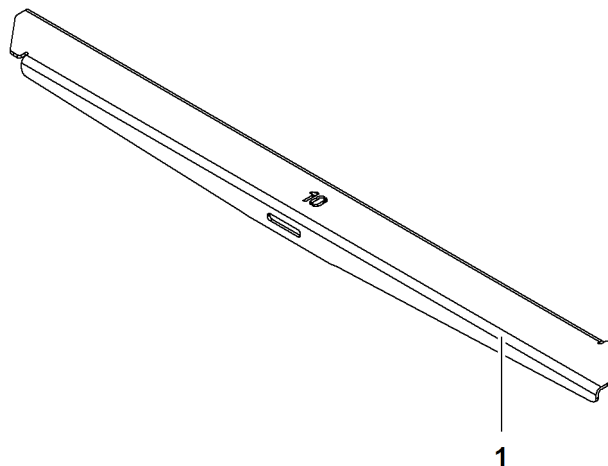
Diagonale10

Fig. 101: Diagonale10

1 Diagonale10

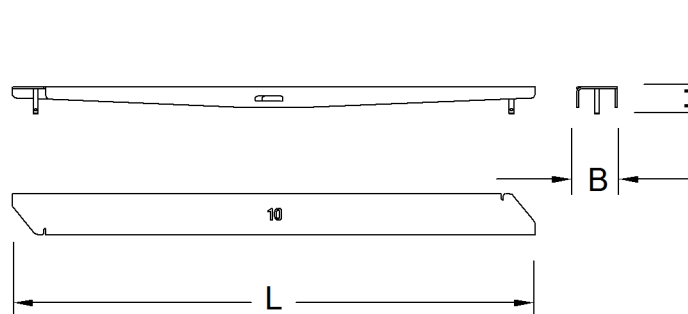


Fig. 102: Dimensions diagonal10

Name		Value
L	Length	1539 mm 5' 1" ft-in
B	Width	120 mm 4.72" in
H	Height	79 mm 3.11" in
Weight		13.6 kg 29.98 lb

Tab. 60: Technical data diagonal10

Diagonale11

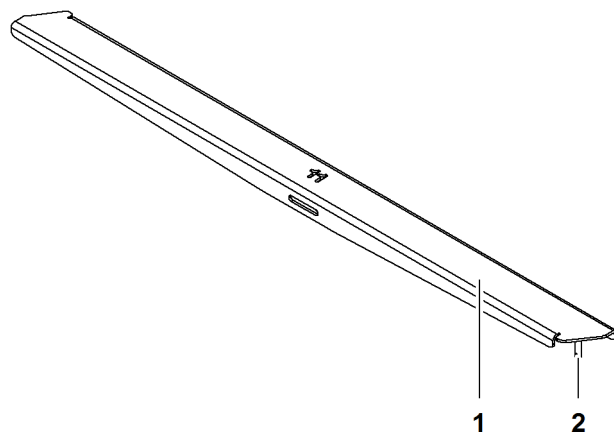


Fig. 103: Diagonale11

- 1 Diagonale11
- 2 Pin

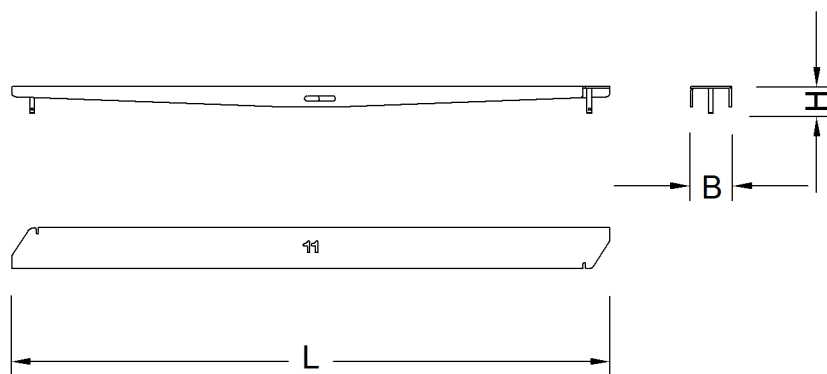


Fig. 104: Dimensions diagonal11

Name		Value
L	Length	1752 mm 5' 9" ft-in
B	Width	120 mm 4.72" in
H	Height	79 mm 3.11" in
Weight		15.7 kg 34.61 lb

Tab. 61: Technical data diagonal11

Diagonale12

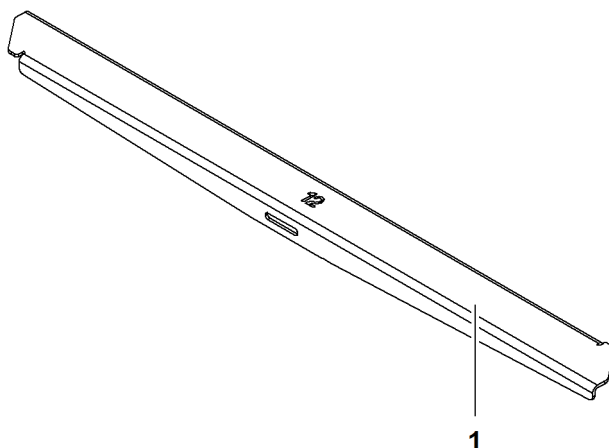


Fig. 105: Diagonale12

1 Diagonale12

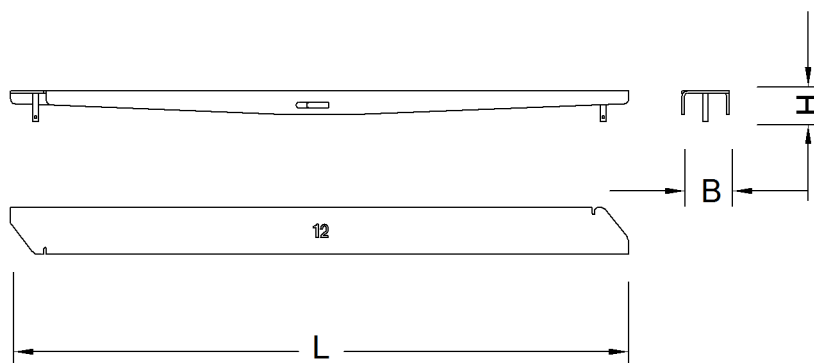


Fig. 106: Dimensions diagonal12

Name		Value
L	Length	1584 mm 5' 2" ft-in
B	Width	120 mm 4.72" in
H	Height	79 mm 3.11" in
Weight		14.1 kg 31.08 lb

Tab. 62: Technical data diagonal12

Diagonale17

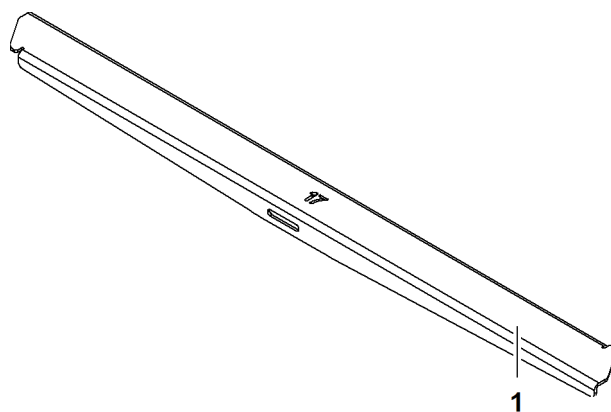


Fig. 107: Diagonale17

1 Diagonale17

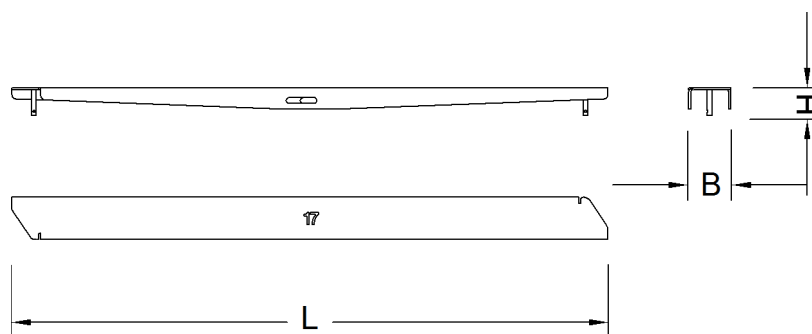


Fig. 108: Dimensions diagonal17

Name		Value
L	Length	1696 mm 5' 7" ft-in
B	Width	120 mm 4.72" in
H	Height	79 mm 3.11" in
Weight		15.1 kg 33.29 lb

Tab. 63: Technical data diagonal17

Diagonale18

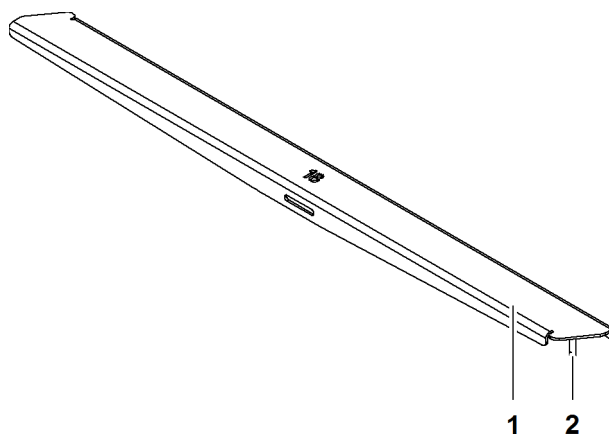


Fig. 109: Diagonale18

- 1 Diagonale18
- 2 Pin

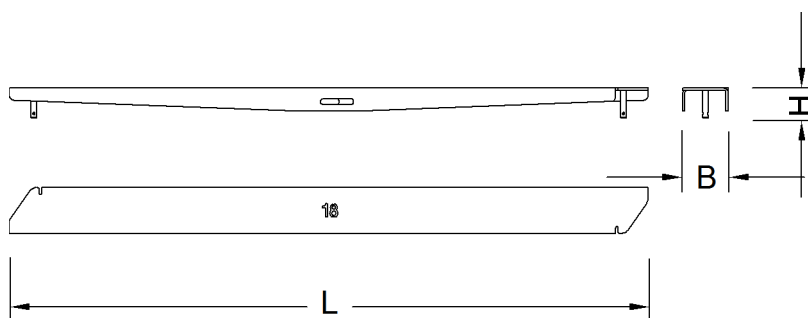


Fig. 110: Dimensions diagonal18

Name		Value
L	Length	1678 mm 5' 6" ft-in
B	Width	120 mm 4.72" in
H	Height	79 mm 3.11" in
Weight		15 kg 33.07 lb

Tab. 64: Technical data diagonal18

Bracket support K1

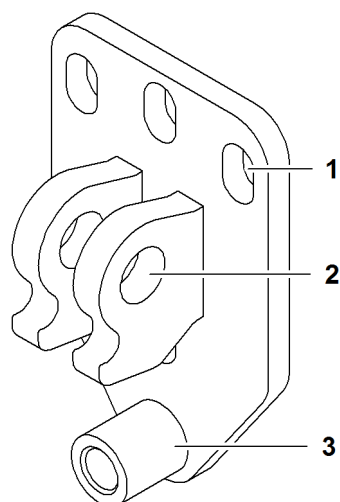


Fig. 111: Bracket support K1

- 1 Attachment point uppercarriage
- 2 Attachment point bracket
- 3 Adjusting screw bracket

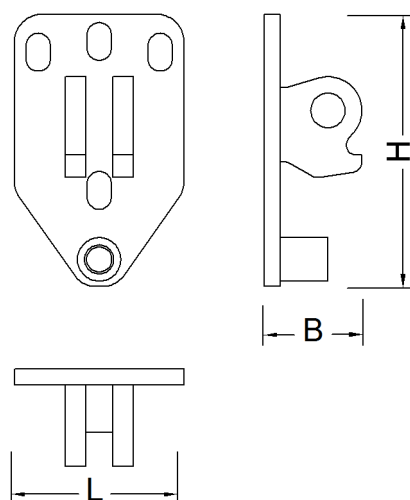


Fig. 112: Dimensions bracket support K1

Name		Value
L	Length	125 mm 4.92" in
B	Width	72 mm 2.83" in
H	Height	201 mm 7.91" in

Tab. 65: Technical data bracket support K1

Bracket support K2

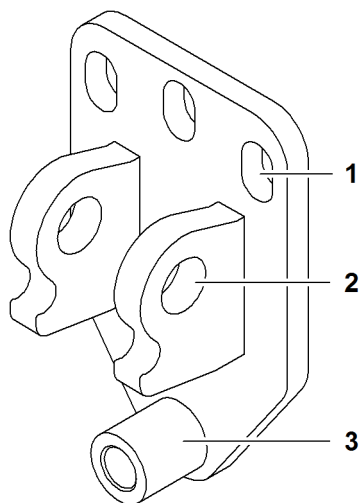


Fig. 113: Bracket support K2

- 1** Attachment point uppercarriage
- 2** Attachment point bracket
- 3** Adjusting screw bracket

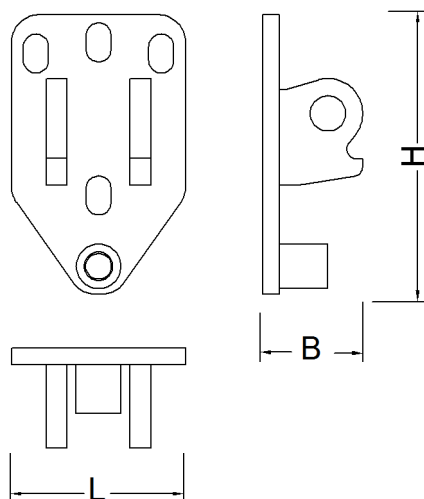


Fig. 114: Dimensions bracket support K2

Name		Value
L	Length	125 mm 4.92" in
B	Width	72 mm 2.83" in
H	Height	201 mm 7.91" in

Tab. 66: Technical data bracket support K2

Bracket support K3

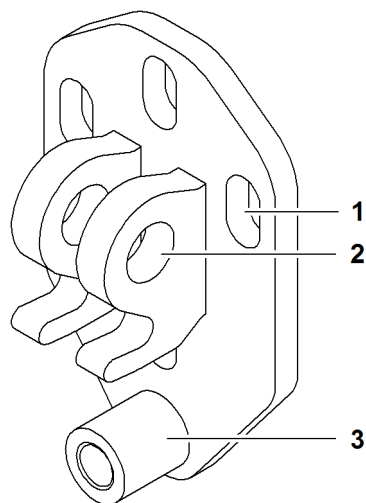


Fig. 115: Bracket support K3

- 1 Attachment point uppercarriage
- 2 Attachment point bracket
- 3 Adjusting screw bracket

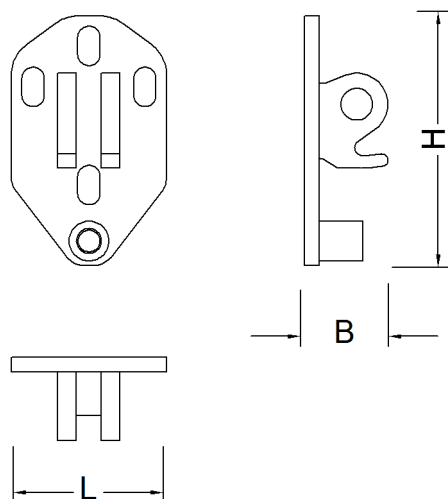


Fig. 116: Dimensions bracket support K3

Name		Value
L	Length	125 mm 4.92" in
B	Width	67 mm 2.64" in
H	Height	201 mm 7.91" in

Tab. 67: Technical data bracket support K3

Handrail connection

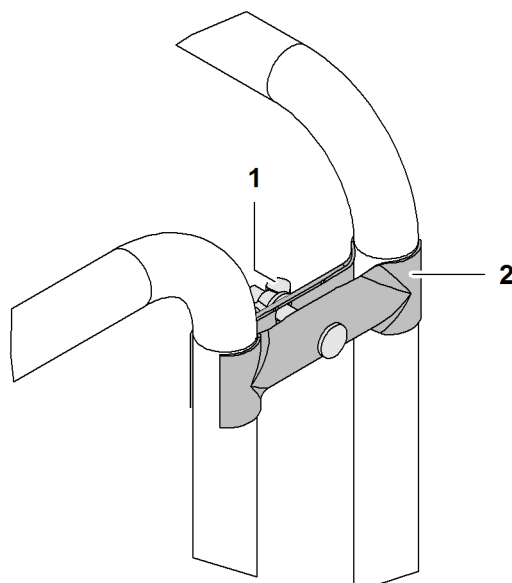


Fig. 117: Handrail connection

1 Wing nut

2 Handrail connection

Strap

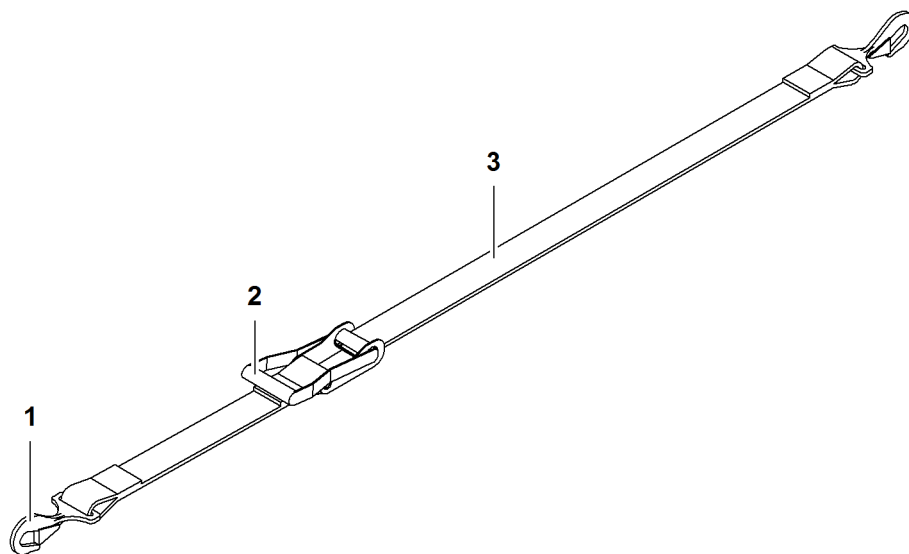


Fig. 118: Strap

1 Hook (2x)
2 Ratchet

3 Strap

Name	Value
Minimum length	1684 mm 5' 6" ft-in
Belt width	50 mm 1.97" in

Name	Value
SWL	2.5 t 5,511 lb

Tab. 68: Technical data strap

Strap support

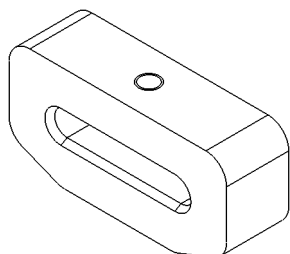


Fig. 119: Strap support

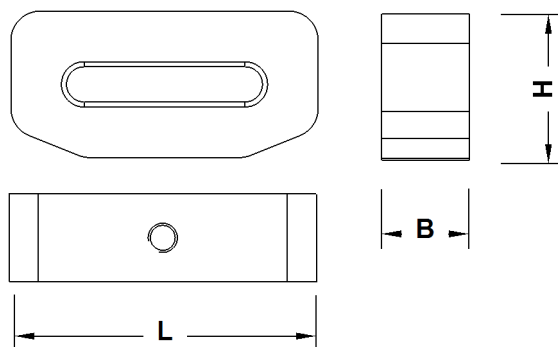


Fig. 120: Dimensions strap support

Name	Value
L Length	105 mm 4.13" in
B Width	30 mm 1.18" in
H Height	50 mm 1.97" in

Tab. 69: Technical data strap support

1.7.9 Undercarriage

Undercarriage with fixed track width with carbody counterweight

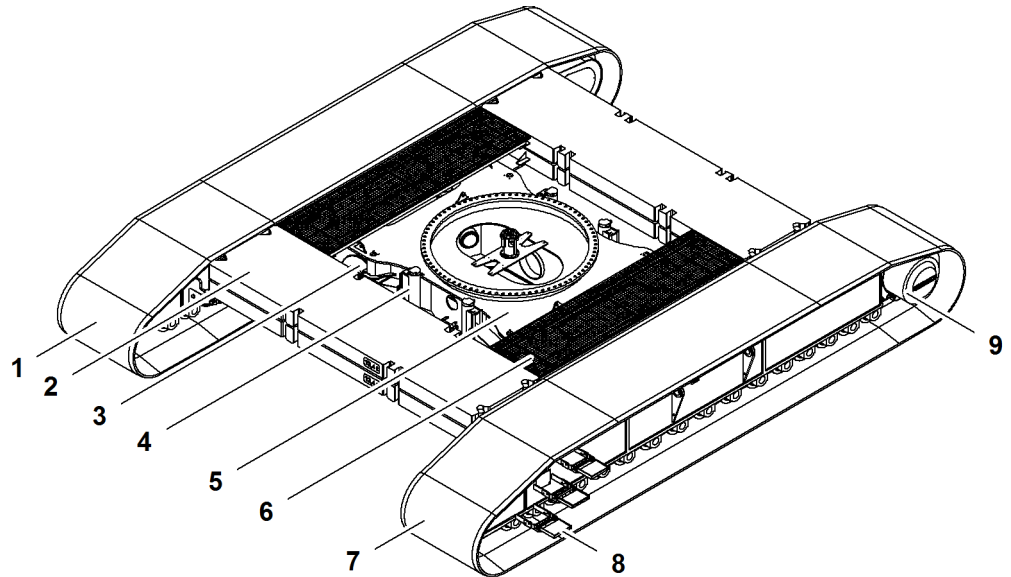


Fig. 121: Undercarriage with fixed track width with carbody counterweight

1	Right crawler side frame	6	Platforms
2	Carbody counterweight slab 14.3 t (31,526 lb) (4x)	7	Left crawler side frame
3	Base plate for support cylinder (4x)	8	Steps
4	Support cylinder (4x)	9	Tumbler (2x)
5	Center part		

Crawler side frames **1 + 7** are attached to the center part **5** by two pins each at the front and the back.

The crawler side frames **1 + 7** can be detached from the center part **5** for transport.

The carbody counterweight slabs 14.3 t (31,526 lb) **2** are attached to the front and rear of the undercarriage.

The carbody counterweight slabs 14.3 t (31,526 lb) **2** provide higher stability.

The support cylinders **4** support the basic machine.

The center part **5** is a welded structure.

The center part **5** supports the rotatable uppercarriage.

The folding steps **8** and platforms **6** allow safe access to the cabin and the uppercarriage.

Undercarriage with fixed track width without carbody counterweight

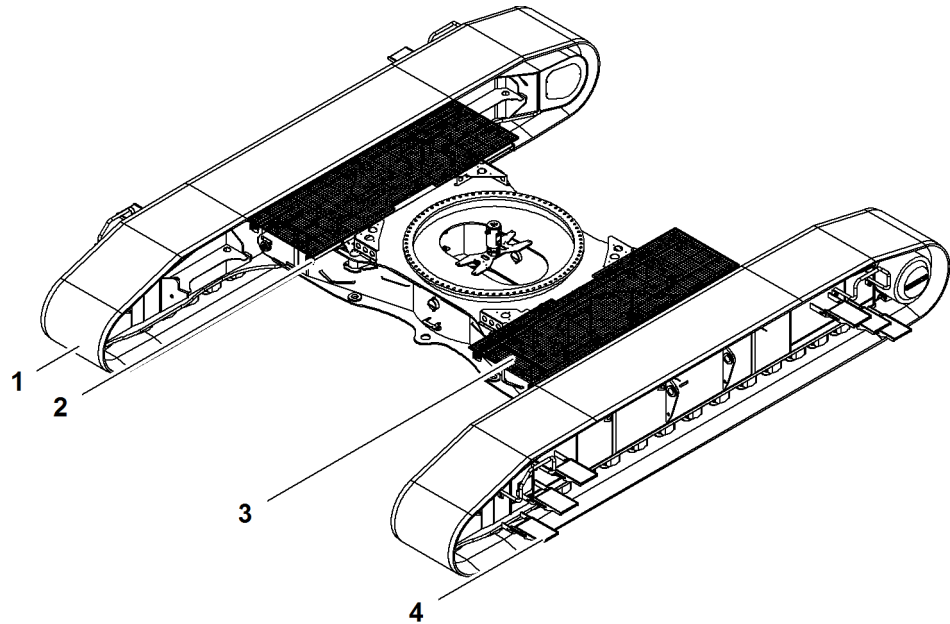


Fig. 122: Undercarriage with fixed track width without carbody counterweight

- | | | | |
|---|-------------------------|---|---------------|
| 1 | Crawler side frame (2x) | 3 | Platform (2x) |
| 2 | Mount (4x) | 4 | Steps (2x) |

The platforms 3 are resting on the mounts 2.

Undercarriage with adjustable track width* with carbody counterweight

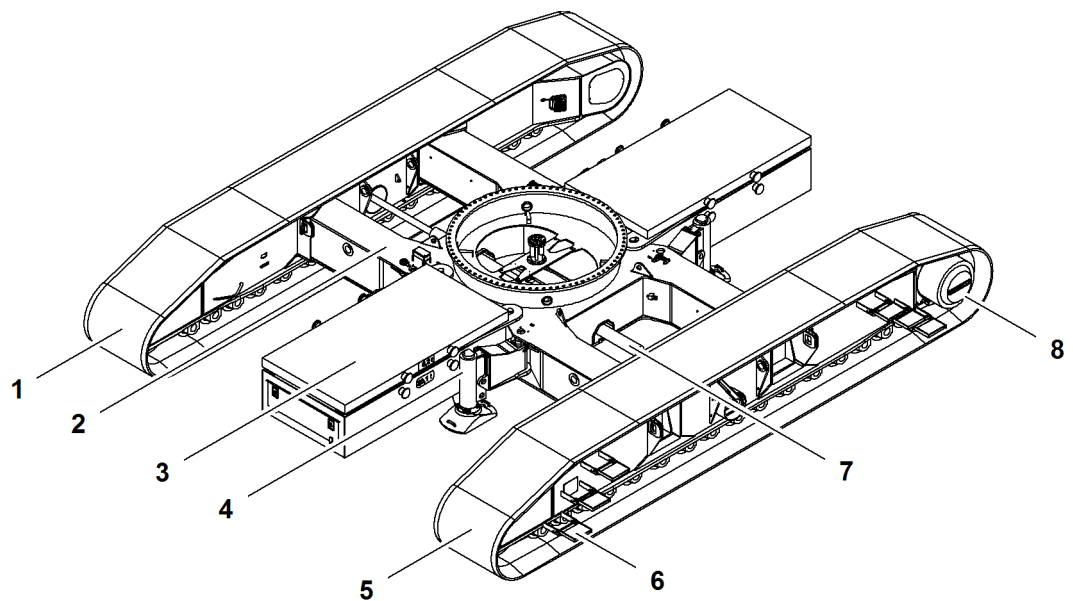


Fig. 123: Undercarriage with adjustable track width with carbody counterweight

- | | | | |
|---|--------------------------|---|-------------------------|
| 1 | Right crawler side frame | 5 | Left crawler side frame |
|---|--------------------------|---|-------------------------|

[See next page for continuation of the image legend](#)

2	Center part	6	Steps (2x)
3	Carbody counterweight slabs (4x)	7	Track width adjusting cylinder (2x)
4	Support cylinder (4x)	8	Tumbler (2x)

Each of the crawler side frames **1 + 5** is attached to the center part **2** with a pin at the front and the back.

The crawler side frames **1 + 5** can be detached from the center part **2** for transport.

The crawler side frames **1 + 5** can be pinned in narrow or wide track.

The carbody counterweight slabs **3** are attached to the front and rear of the undercarriage.

The carbody counterweight slabs **3** provide higher stability.

The support cylinders **4** support the basic machine.

The center part **2** is a welded structure.

The center part **2** supports the rotatable uppercarriage.

The folding steps **6** allow safe access to cabin and uppercarriage.

Undercarriage with adjustable track width* without carbody counterweight

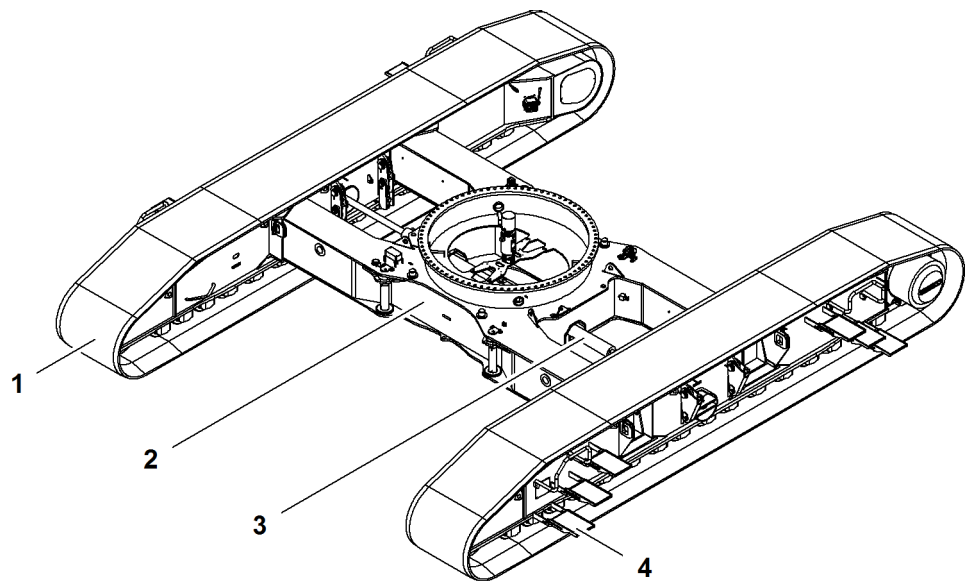


Fig. 124: Undercarriage with adjustable track width without carbody counterweight*

1	Crawler side frame (2x)	3	Track width adjusting cylinder (2x)
2	Center part	4	Steps (4x)

1.7.10 Crawler side frame

Crawler side frame for undercarriage with fixed track width

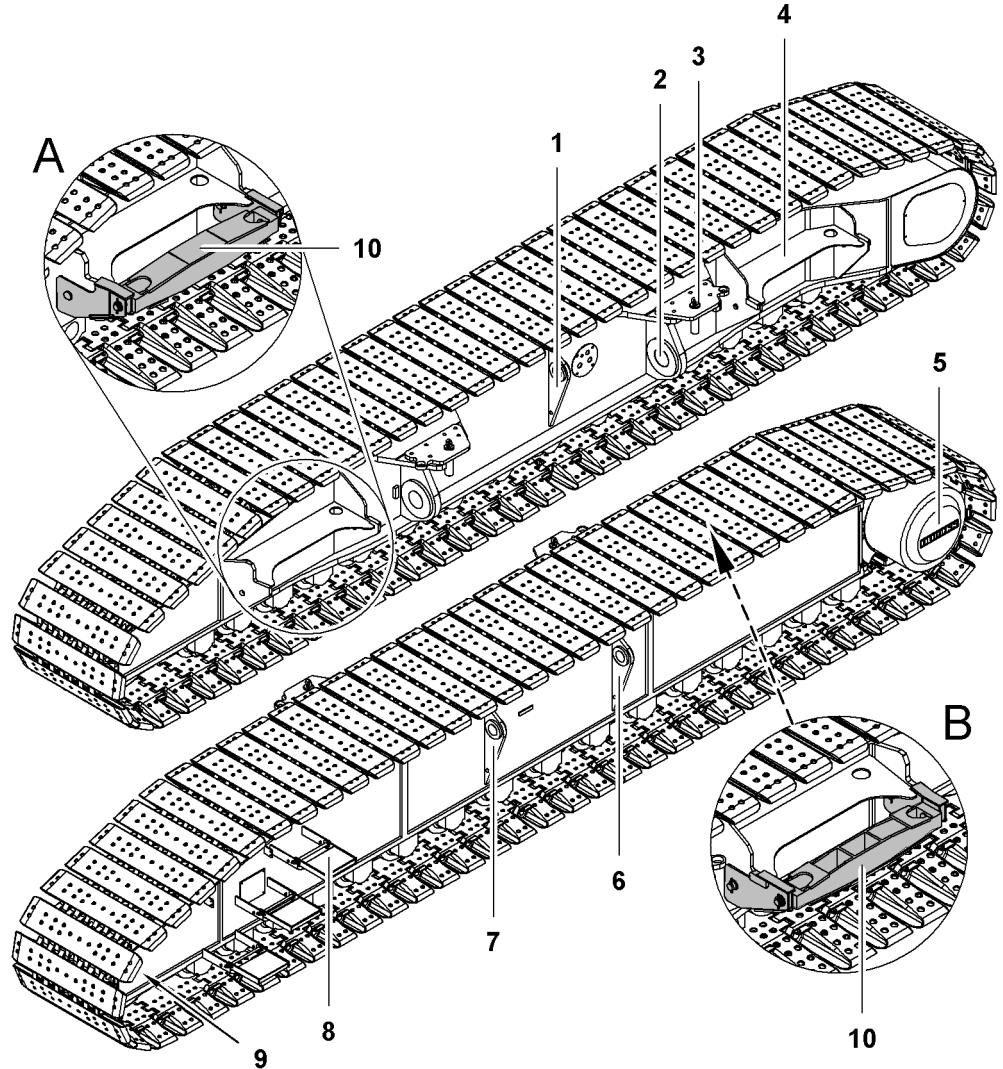


Fig. 125: Crawler side frame for undercarriage with fixed track width

- | | | | |
|---|---|----|---|
| 1 | Pivot point for folding bracket | 7 | Pivot point for folding bracket |
| 2 | Pin connection point (4x) for center part | 8 | Step (6x) |
| 3 | Pins (4x) for pin connection with center part | 9 | Idler wheel (2x) |
| 4 | Support (4x) for carbody counterweight | 10 | Support (4x) for carbody counterweight (1500 mm (4' 11" ft-in) base plates) |
| 5 | Tumbler (2x) | A | Detail right crawler side frame (1500 mm (4' 11" ft-in) base plates) |
| 6 | Pivot point for folding bracket | B | Detail left crawler side frame (1500 mm (4' 11" ft-in) base plates) |

The following base plates are available for the crawler side frames:

- 1200 mm (3' 11" ft-in) base plates
- 1500 mm (4' 11" ft-in) base plates

Detail **A + B** shows the additional supports **10** for the carbody counterweight slabs for crawler side frames with 1500 mm (4' 11" ft-in) base plates.

Foldable brackets are attached to the pivot points **1 + 6 + 7** onto which crawler side frames are attached for loading.

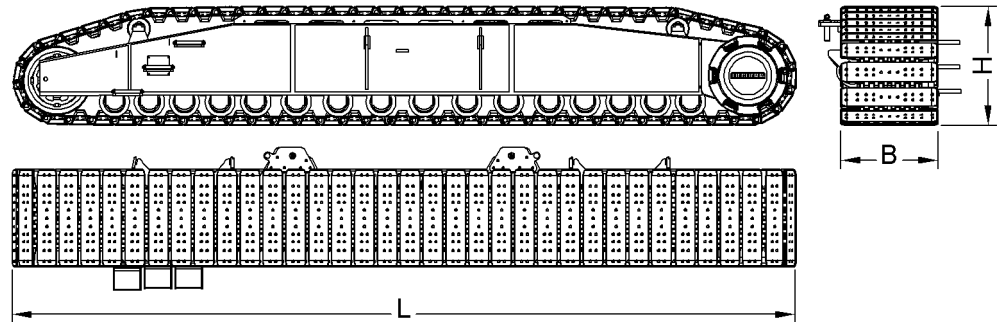


Fig. 126: Dimensions crawler side frame for undercarriage with fixed track width

The technical data apply per crawler side frame.

Name		Value	
L	Length crawler side frame	with 1200 mm (3' 11" ft-in) base plates	9674 mm 31' 9" ft-in
		with 1500 mm (4' 11" ft-in) base plates	9694 mm 31' 10" ft-in
B	Width crawler side frame	with 1200 mm (3' 11" ft-in) base plates	1200 mm 3' 11" ft-in
		with 1500 mm (4' 11" ft-in) base plates	1500 mm 4' 11" ft-in
H	Height crawler side frame	with 1200 mm (3' 11" ft-in) base plates	1462 mm 4' 10" ft-in
		with 1500 mm (4' 11" ft-in) base plates	1482 mm 4' 10" ft-in
Weight crawler side frame with 1200 mm (3' 11" ft-in) base plates			21880 kg 48,236 lb
Weight crawler side frame with 1500 mm (4' 11" ft-in) base plates			25702 kg 56,662 lb

Tab. 70: Technical data crawler side frame for undercarriage with fixed track width

Crawler side frame for undercarriage* with adjustable track width

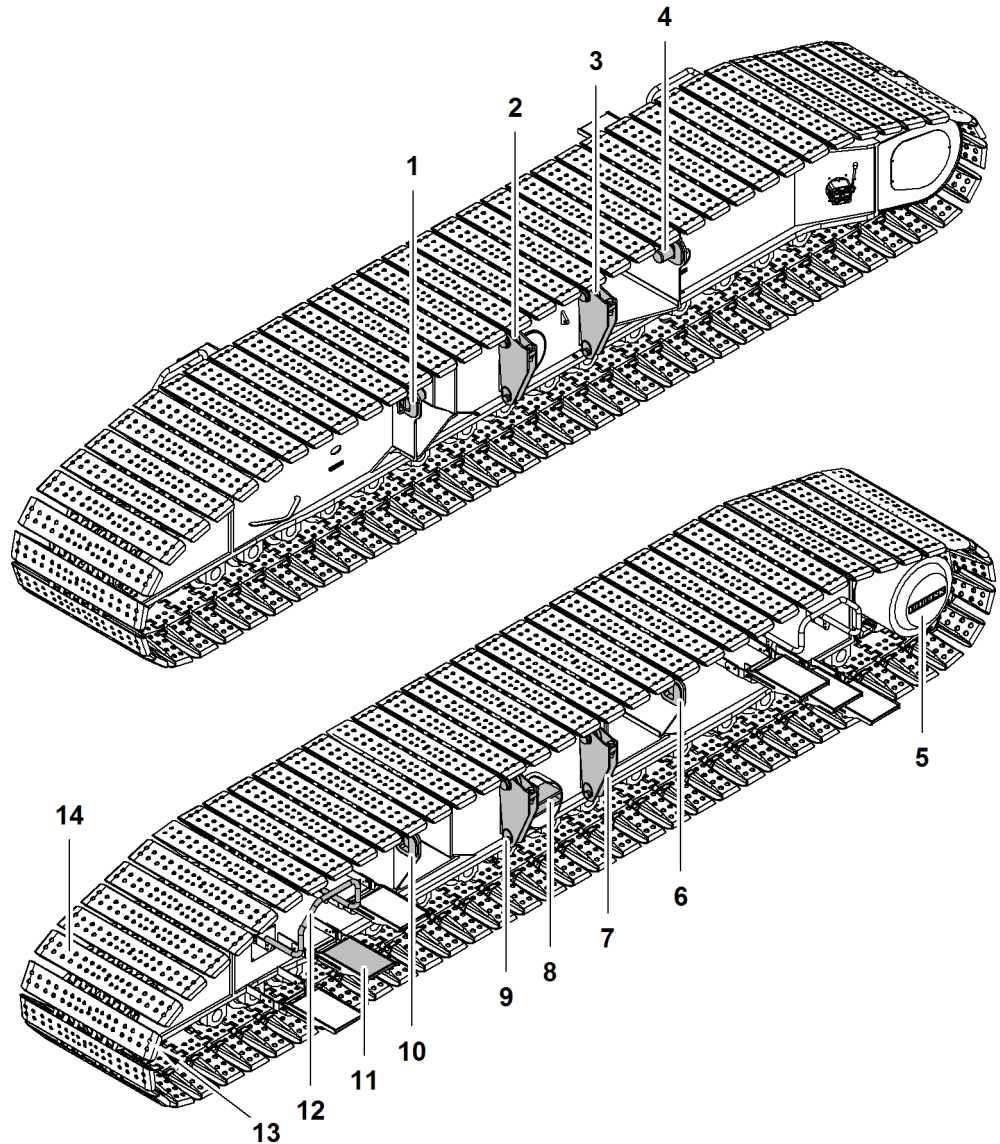


Fig. 127: Crawler side frame for undercarriage* with adjustable track width

- | | | | |
|---|--------------------------------------|----|--|
| 1 | Pin connection point for center part | 8 | Pin connection point (2x) for track width adjusting cylinder |
| 2 | Folding bracket | 9 | Folding bracket |
| 3 | Folding bracket | 10 | Pin connection point for center part |
| 4 | Pin connection point for center part | 11 | Steps (12x) |
| 5 | Tumbler (2x) | 12 | Handrail (4x) |
| 6 | Pin connection point for center part | 13 | Idler wheel (2x) |
| 7 | Folding bracket | 14 | Base plates |

The following base plates are available for the crawler side frames:

- 1200 mm (3' 11" ft-in) base plates
- 1500 mm (4' 11" ft-in) base plates

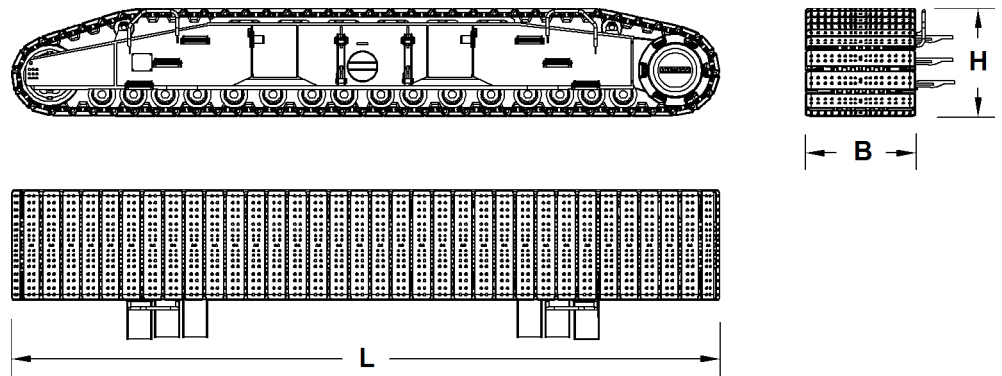


Fig. 128: Dimensions crawler side frames for undercarriages with adjustable track width

The technical data apply per crawler side frame.

Name		Value	
L	Length crawler side frame	with 1200 mm (3' 11" ft-in) base plates	9683 mm 31' 9" ft-in
		with 1500 mm (4' 11" ft-in) base plates	9703 mm 31' 10" ft-in
B	Width crawler side frame	with 1200 mm (3' 11" ft-in) base plates	1200 mm 3' 11" ft-in
		with 1500 mm (4' 11" ft-in) base plates	1500 mm 4' 11" ft-in
H	Height crawler side frame	with 1200 mm (3' 11" ft-in) base plates	1474 mm 4' 10" ft-in
		with 1500 mm (4' 11" ft-in) base plates	1482 mm 4' 10" ft-in
Weight crawler side frame with 1200 mm (3' 11" ft-in) base plates		22600 kg 49,824 lb	
Weight crawler side frame with 1500 mm (4' 11" ft-in) base plates		26200 kg 57,760 lb	

Tab. 71: Technical data crawler side frame for undercarriage with adjustable track width

1.7.11 Platforms on undercarriage

Platforms on undercarriage with fixed track width with carbody counterweight

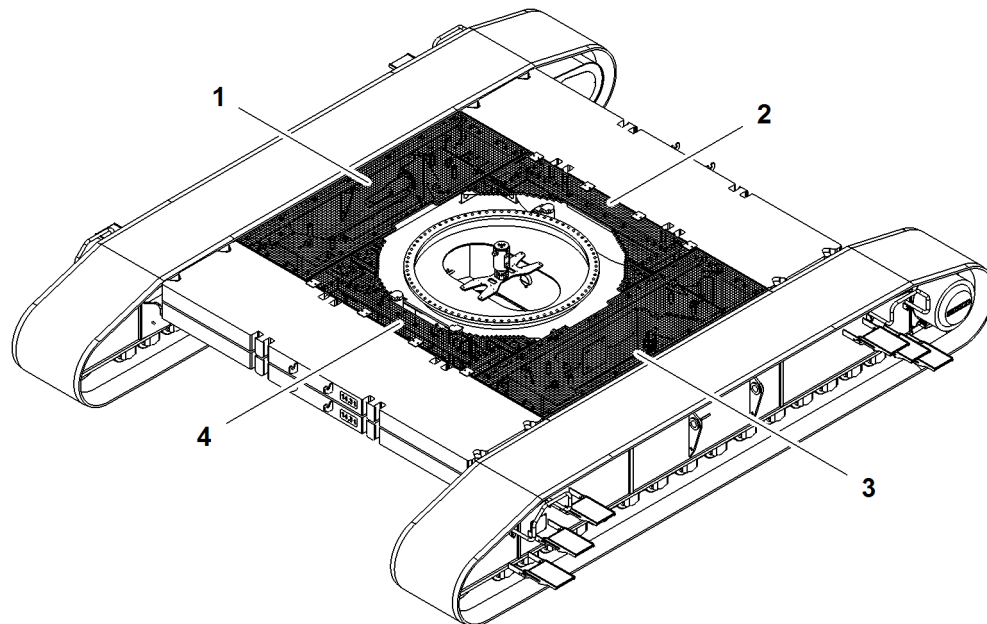


Fig. 129: Platforms on undercarriage with fixed track width with carbody counterweight

- | | | | |
|---|----------------|---|----------------|
| 1 | Right platform | 3 | Left platform |
| 2 | Rear platform | 4 | Front platform |

The platforms **1 + 3** are placed on mounts on the carbody counterweight ([For more information see: Carbody counterweight for undercarriage with fixed track width, page 153](#)).

The platforms **2 + 4** are placed on mounts on the undercarriage.

The platforms have support brackets.

The platforms **1 + 3** are fitted with distancers. The distancers are located on the undercarriage to prevent sagging.

Right and left platform

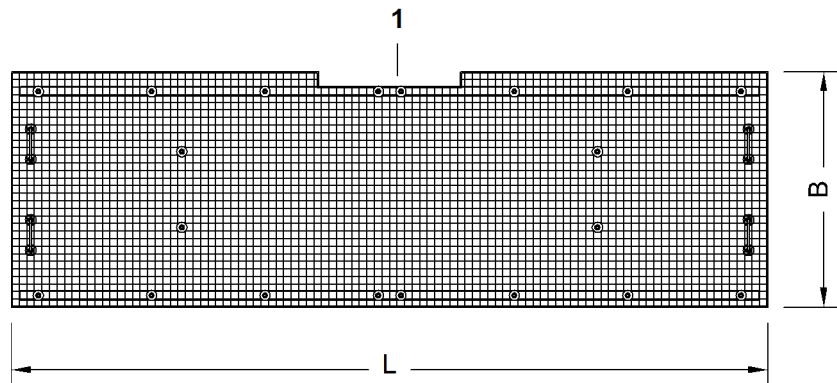


Fig. 130: Dimensions right and left platform

1 Recess

Name			Value
L	Length	with 1200 mm (3' 11" ft-in) base plates	4007 mm 13' 2" ft-in
		with 1500 mm (4' 11" ft-in) base plates	4010 mm 13' 2" ft-in
B	Width	with 1200 mm (3' 11" ft-in) base plates	1247 mm 4' 1" ft-in
		with 1500 mm (4' 11" ft-in) base plates	1005 mm 3' 4" ft-in
Weight platform with 1200 mm (3' 11" ft-in) base plates			100 kg 220 lb
Weight platform with 1500 mm (4' 11" ft-in) base plates			75 kg 165 lb

Tab. 72: Technical data right and left platform

Front and rear platform

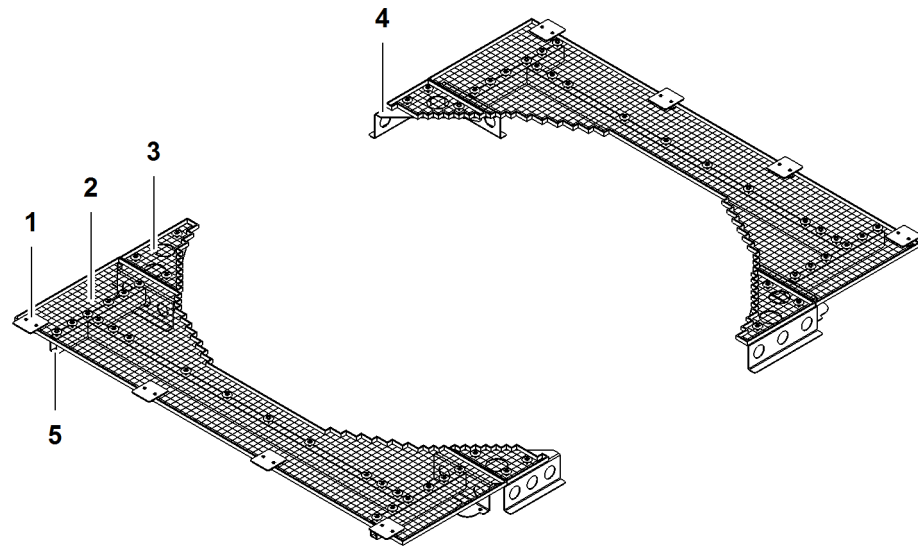


Fig. 131: Front and rear platform

- | | | | |
|---|----------------------|---|------------------|
| 1 | Support plate (8x) | 4 | Steel plate (4x) |
| 2 | Platform (2x) | 5 | Frame (2x) |
| 3 | Corner platform (4x) | | |

The frames 5 and support plates 1 are already mounted upon delivery.

Platform

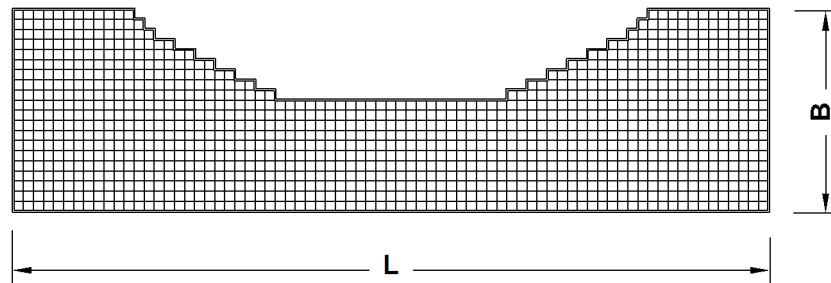


Fig. 132: Platform dimensions

Name		Value
L	Length	3007 mm 9' 10" ft-in
B	Width	807 mm 2' 8" ft-in
Weight		82 kg 181 lb

Tab. 73: Technical data platform

Right corner platform

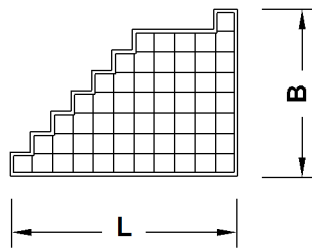


Fig. 133: Dimensions right corner platform

Name		Value
L	Length	447 mm 1' 6" ft-in
B	Width	327 mm 1' 1" ft-in
Weight		2.5 kg 5.51 lb

Tab. 74: Technical data right corner platform

Left corner platform

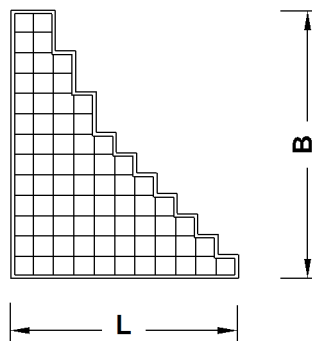


Fig. 134: Left corner platform

Name		Value
L	Length	447 mm 1' 6" ft-in
B	Width	527 mm 1' 9" ft-in
Weight		3 kg 6.61 lb

Tab. 75: Technical data left corner platform

Steel plates

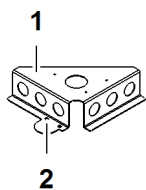


Fig. 135: Steel plates

1 Steel plate

2 Attachment shackle

Left steel plate

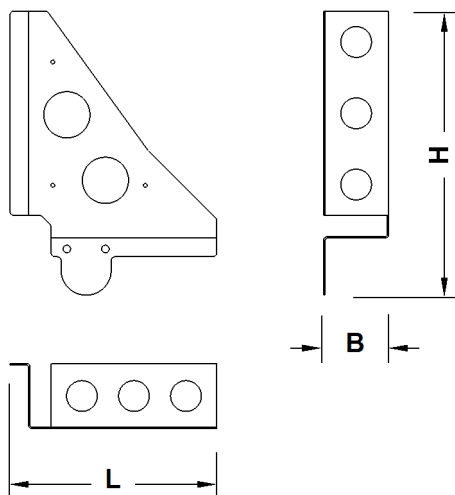


Fig. 136: Dimensions left steel plate

Name		Value
L	Length	537 mm 1' 9" ft-in
B	Width	169 mm 6.65" in
H	Height	737 mm 2' 5" ft-in
Weight		20.5 kg 45.19 lb

Tab. 76: Technical data left steel plate

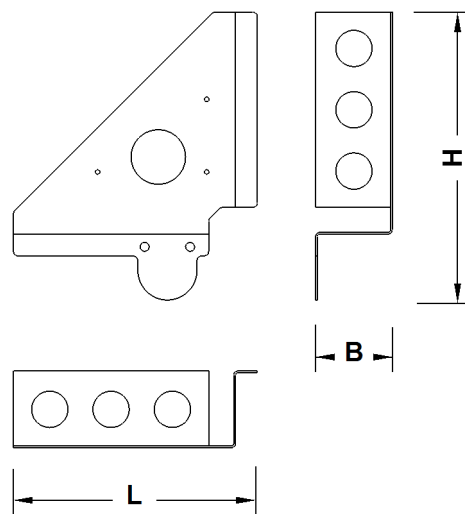
Right steel plate

Fig. 137: Dimensions right steel plate

Name		Value
L	Length	537 mm 1' 9" ft-in
B	Width	169 mm 6.65" in
H	Height	634 mm 2' 1" ft-in
Weight		18.5 kg 40.78 lb

Tab. 77: Technical data right steel plate

Platforms on undercarriage with fixed track width without carbody counterweight

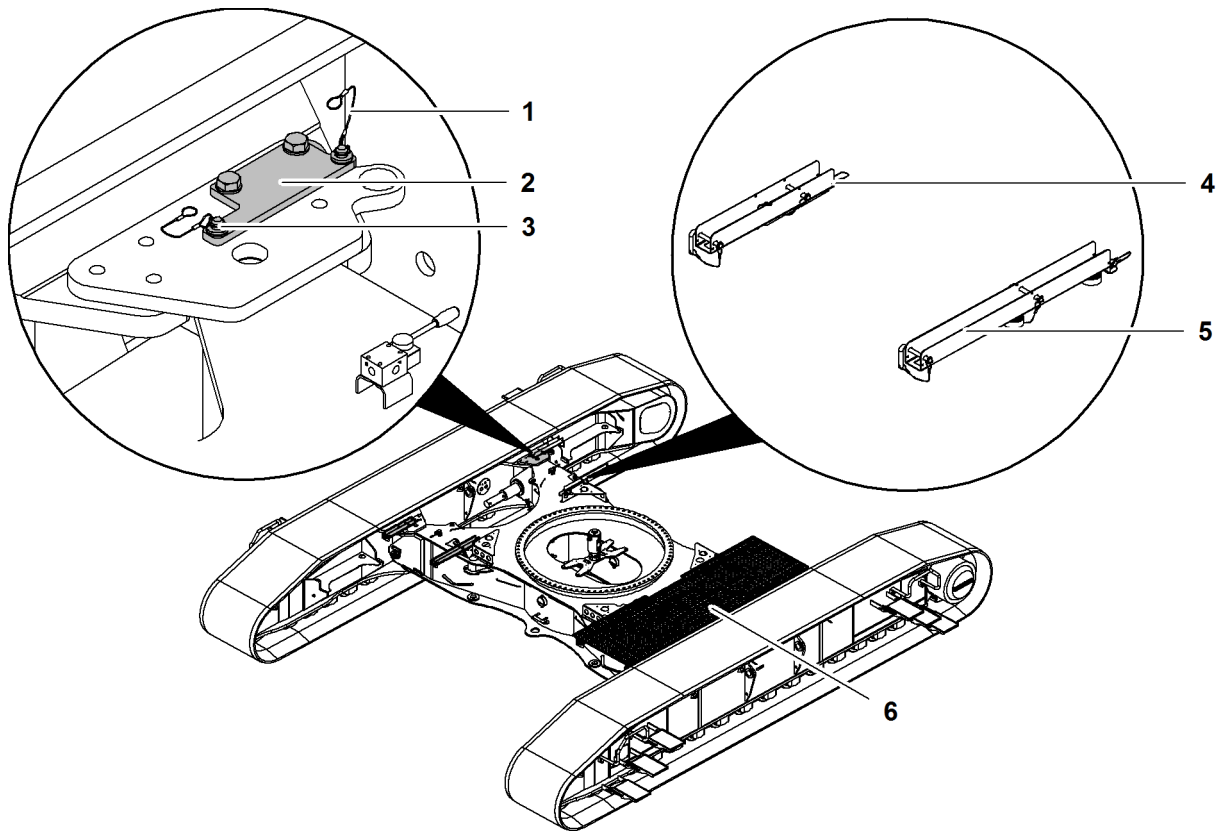


Fig. 138: Platforms on undercarriage with fixed track width without carbody counterweight

- | | | | | | |
|---|----------------------|---|----------------------|---|----------------|
| 1 | Locking element (8x) | 3 | Locking element (8x) | 5 | Long rail (4x) |
| 2 | Mount (4x) | 4 | Short rail (4x) | 6 | Platform (2x) |

Mount

Delivery includes two right mounts and two left mounts.

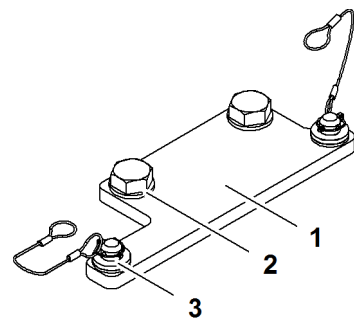


Fig. 139: Mount

- | | | | |
|---|---------------|---|----------------------|
| 1 | Mount | 3 | Locking element (2x) |
| 2 | Fastener (2x) | | |

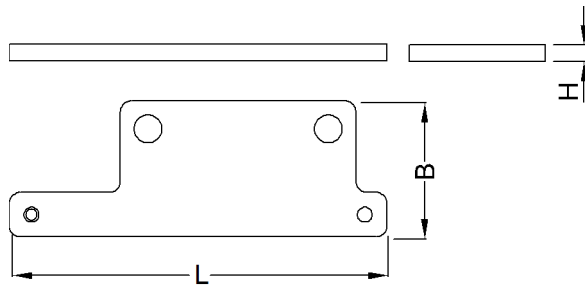


Fig. 140: Dimensions mount

Name		Value
L	Length	340 mm 1' 1" ft-in
B	Width	122 mm 4.80" in
H	Height	15 mm 0.59" in
Weight		3.5 kg 7.72 lb

Tab. 78: Technical data mount

Short rail

The scope of delivery includes four short rails.

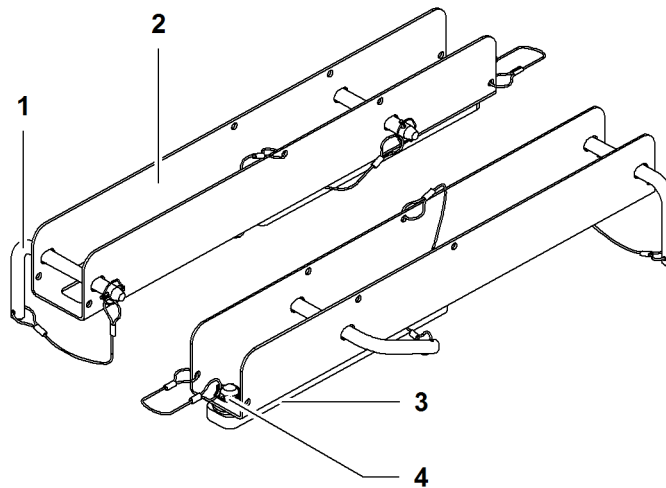


Fig. 141: Short rail

- | | | | |
|---|----------------------|---|---------------|
| 1 | Locking element (3x) | 3 | Support plate |
| 2 | Short rail | 4 | Fuse |

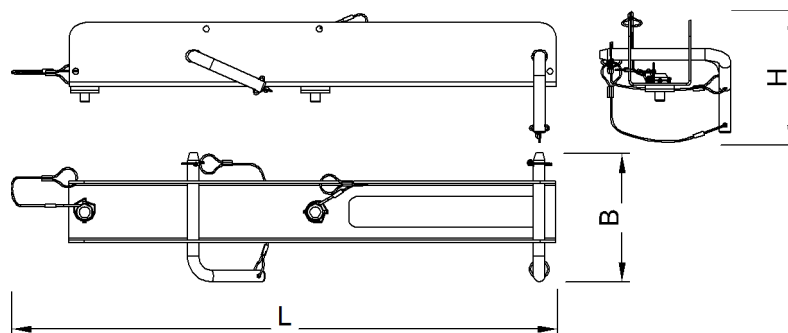


Fig. 142: Dimensions short rail

Name		Value
L	Length	633 mm 2' 1" ft-in
B	Width	168 mm 6.61" in
H	Height	103 mm 4.06" in
Weight		23.5 kg 51.81 lb

Tab. 79: Technical data short rail

Long rail

The scope of delivery includes four long rails.

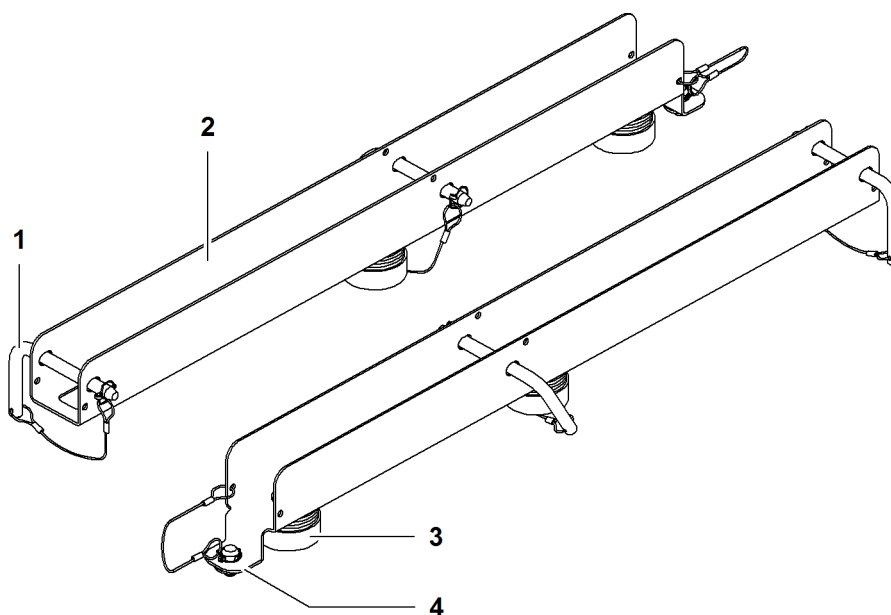


Fig. 143: Long rail

- | | | | |
|---|----------------------|---|--------------|
| 1 | Locking element (2x) | 3 | Support (2x) |
| 2 | Long rail | 4 | Fuse |

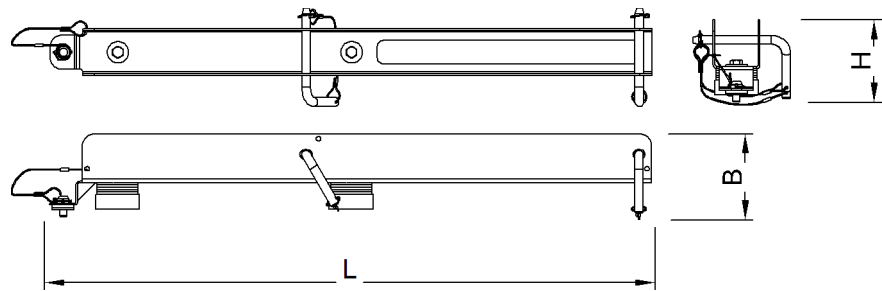


Fig. 144: Dimensions long rail

Name		Value
L	Length	1030 mm 3' 5" ft-in
B	Width	168 mm 6.61" in
H	Height	141 mm 5.55" in
Weight		36 kg 79.37 lb

Tab. 80: Technical data long rail

Platform on undercarriage with adjustable track width

With undercarriages with adjustable track width, platforms are installed on the uppercarriage.

1.7.12 Carbody counterweight

Carbody counterweight for undercarriage with fixed track width

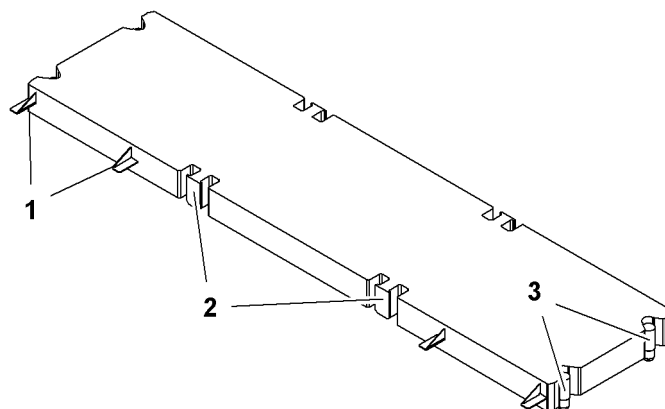


Fig. 145: Carbody counterweight for undercarriage with fixed track width

- | | | | |
|----------|----------------------------|----------|---------------------|
| 1 | Support (4x) for platforms | 3 | Locking device (4x) |
| 2 | Rigging point (4x) | | |

Carbody counterweight slab 14.3 t (31,526 lb)

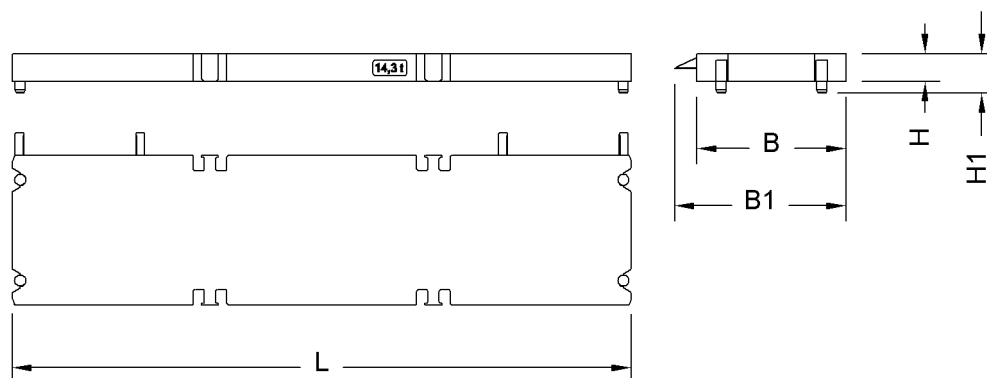


Fig. 146: Dimensions of carbody counterweight slab 14.3 t (31,526 lb)

Name		Value
L	Length	5540 mm 18' 2" ft-in
W	Width	1335 mm 4' 5" ft-in
W1	Width incl. platform supports	1535 mm 5' ft-in
H	Height	250 mm 9.84" in
H1	Height incl. locking devices	350 mm 1' 2" ft-in
Weight		14300 kg 31,526 lb

Tab. 81: Technical data carbody counterweight slab 14.3 t (31,526 lb)

Carbody counterweight slab 13.4 t (29,542 lb)*

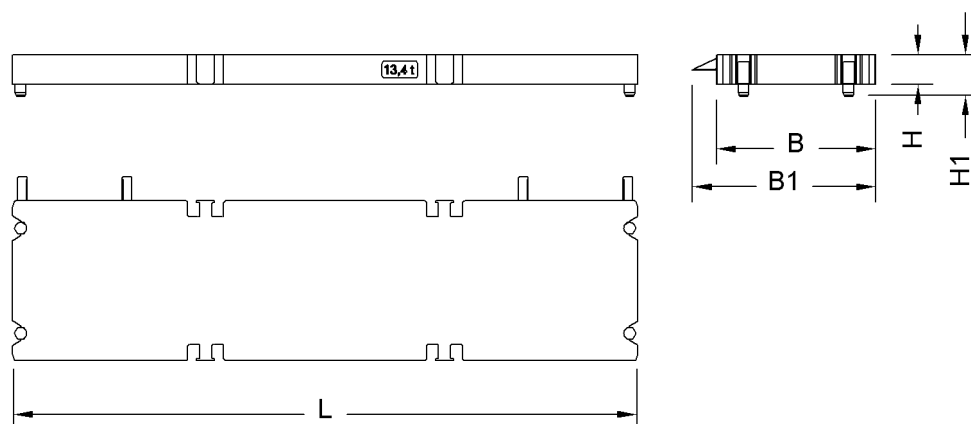


Fig. 147: Dimensions carbody counterweight slab 13.4 t (29,542 lb)

Name		Value
L	Length	5240 mm 17' 2" ft-in
B	Width	1335 mm 4' 5" ft-in
B1	Width incl. platform supports	1535 mm 5' ft-in
H	Height	250 mm 9.84" in
H1	Height incl. locking devices	350 mm 1' 2" ft-in
Weight		13400 kg 29,542 lb

Tab. 82: Technical data carbody counterweight slab 13.4 t (29,542 lb)

Carbody counterweight for undercarriage* with adjustable track width

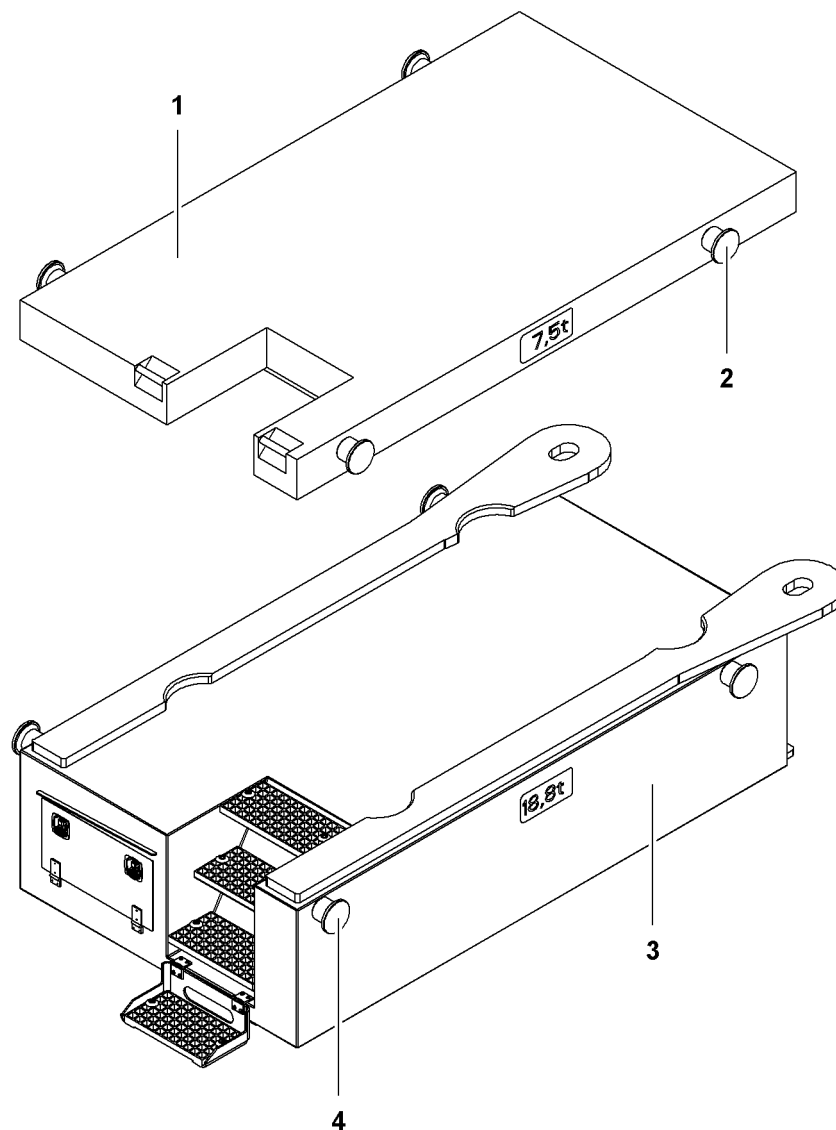


Fig. 148: Carbody counterweight for undercarriage* with adjustable track width

- | | | | |
|---|---|---|--|
| 1 | Carbody counterweight slab
7.5 t (16,534 lb) | 3 | Carbody counterweight slab
18.8 t (41,446 lb) |
| 2 | Rigging point (4x) | 4 | Rigging point (4x) |

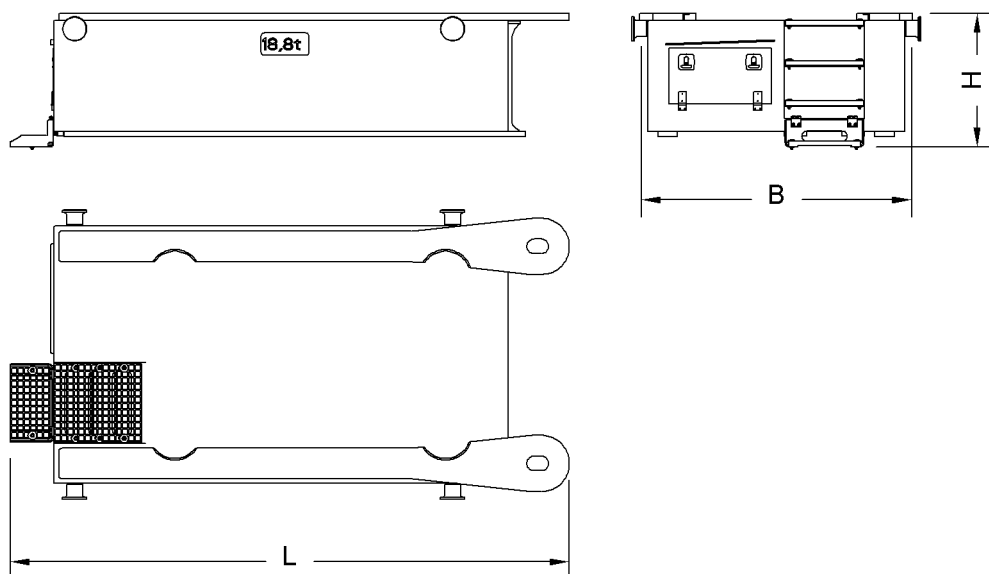
Carbody counterweight slab 18.8 t (41,446 lb)

Fig. 149: Dimensions carbody counterweight slab 18.8 t (41,446 lb)

Name		Value
L	Length	3484 mm 11' 5" ft-in
B	Width	1700 mm 5' 7" ft-in
H	Height	833 mm 2' 9" ft-in
Weight		18800 kg 41,446 lb

Tab. 83: Technical data carbody counterweight slab 18.8 t (41,446 lb)

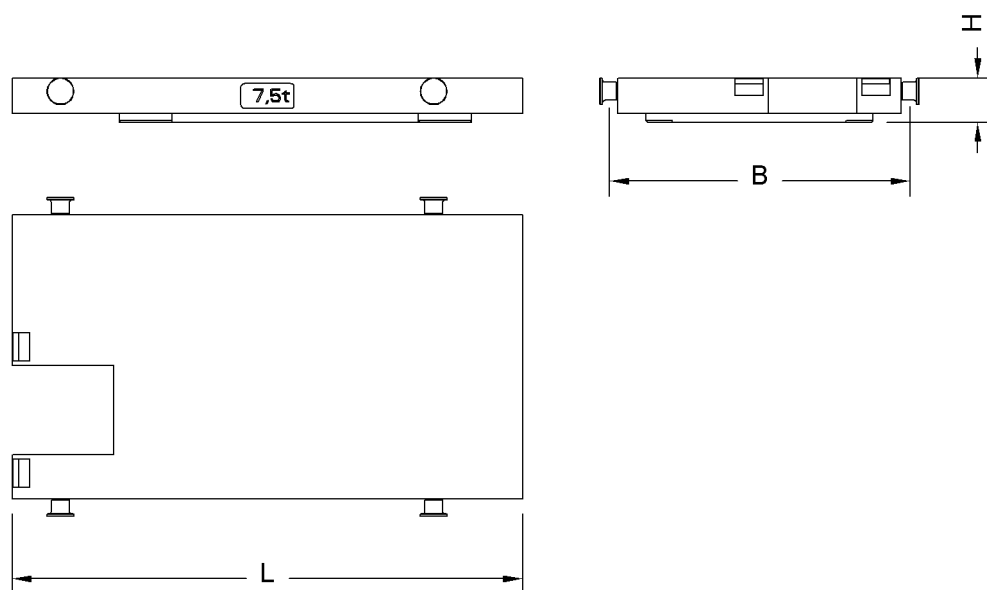
Carbody counterweight slab 7.5 t (16,534 lb)

Fig. 150: Dimensions carbody counterweight slab 7.5 t (16,534 lb)

Name		Value
L	Length	2880 mm 9' 5" ft-in
B	Width	1600 mm 5' 3" ft-in
H	Height	200 mm 7.87" in
Weight		7500 kg 16,534 lb

Tab. 84: Technical data carbody counterweight slab 7.5 t (16,534 lb)

1.7.13 Rear counterweight

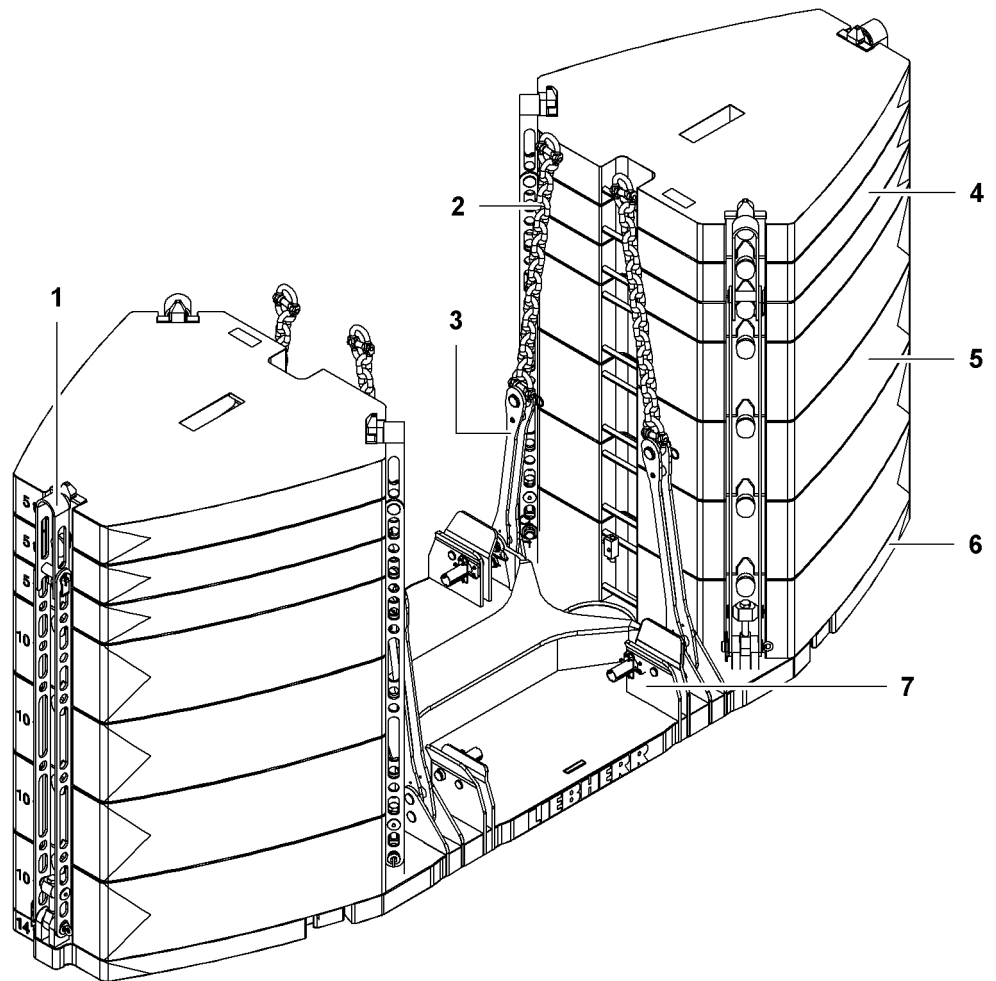


Fig. 151: Rear counterweight overview from rear left

1	Rear counterweight tie-down (6x)	5	Counterweight slab 10 t (22,046 lb) (max. 8x)
2	Counterweight hoisting chain (4x)	6	Basic counterweight slab 14 t (30,864 lb)
3	Slings (4x)	7	Pin connection point (4x) with locking devices
4	Counterweight slab 5 t (11,023 lb) (max. 6x)		

The rear counterweight:

- is a basic requirement for stability.
- is lifted by the two counterweight hoisting cylinders.
- is pinned onto the rear of the uppercarriage.

Basic counterweight slab 14 t (30,864 lb)

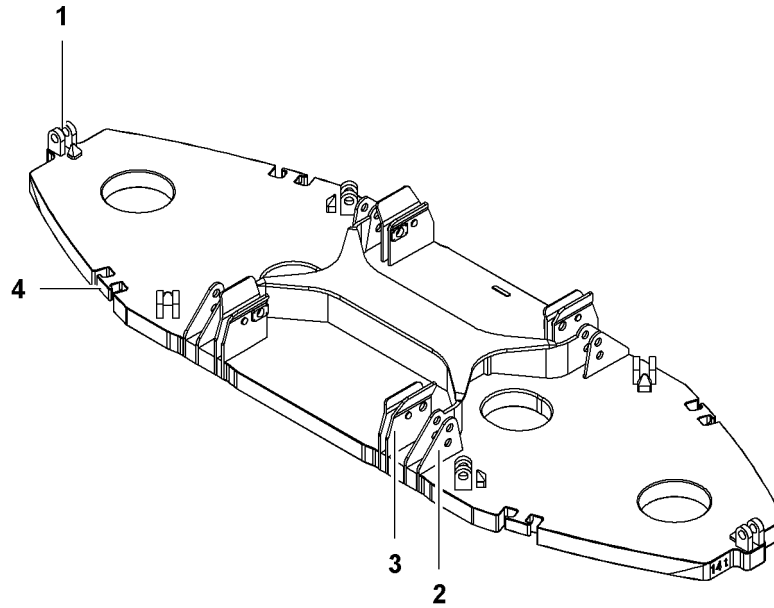


Fig. 152: Basic counterweight slab 14 t (30,864 lb)

- | | |
|--|---|
| <p>1 Pin connection point counterweight tie-down (6x)</p> <p>2 Pin connection point slinging plates (4x)</p> | <p>3 Pin connection point (4x) with locking devices</p> <p>4 Rigging point (4x)</p> |
|--|---|

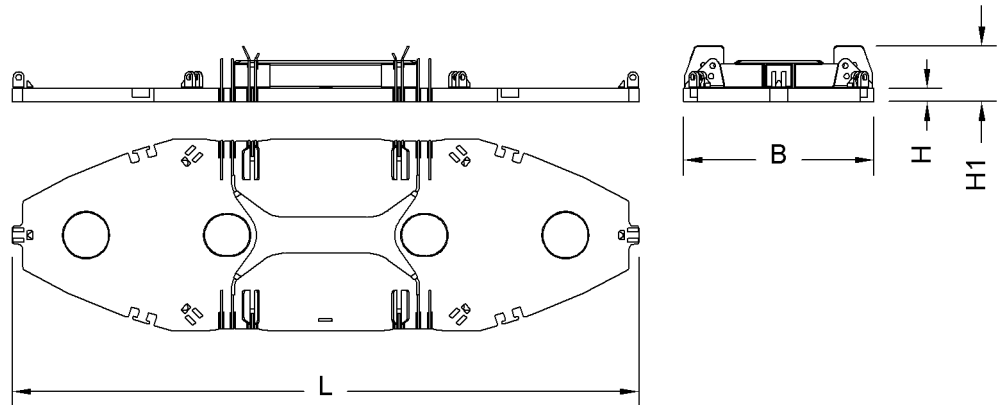


Fig. 153: Basic counterweight slab 14 t (30,864 lb) dimensions

Name		Value
L	Length incl. counterweight tie-down pin connection points	6930 mm 22' 9" ft-in
B	Width	2106 mm 6' 11" ft-in
H	Height	150 mm 5.91" in
H1	Height incl. pin connection points and locking devices	615 mm 2' ft-in

Name	Value
Weight	14000 kg 30,864 lb

Tab. 85: Technical data basic counterweight slab 14 t (30,864 lb)

Counterweight slab 10 t (22,046 lb)

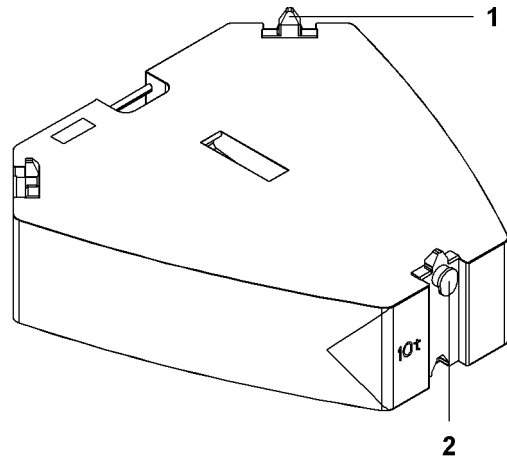


Fig. 154: Counterweight slab 10 t (22,046 lb)

- 1 Locking device (3x)
- 2 Rigging point (3x)

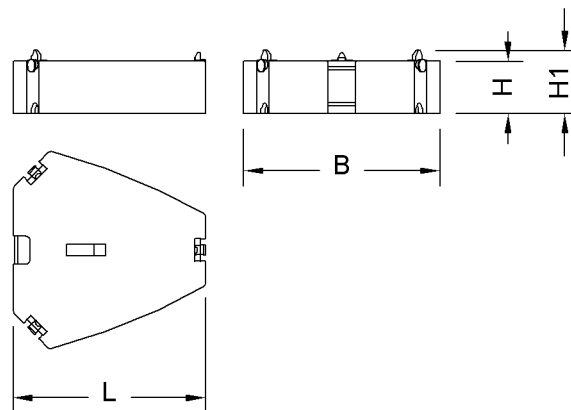


Fig. 155: Dimensions counterweight slab 10 t (22,046 lb)

Name	Value
L Length	2050 mm 6' 9" ft-in
B Width	2117 mm 6' 11" ft-in
H Height	560 mm 1' 10" ft-in
H1 Height incl. locking devices	680 mm 2' 3" ft-in

Name	Value
Weight	10000 kg 22,046 lb

Tab. 86: Technical data counterweight slab 10 t (22,046 lb)

Counterweight slab 5 t (11,023 lb)

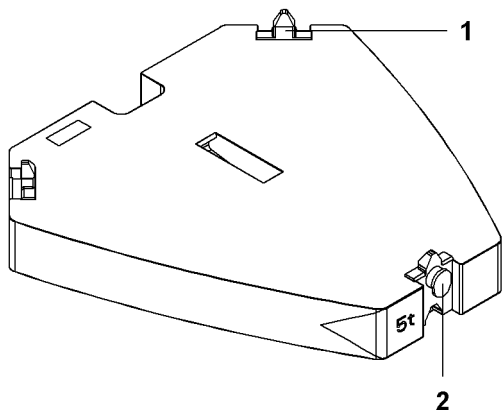


Fig. 156: Counterweight slab 5 t (11,023 lb)

- 1 Locking device (3x)
- 2 Rigging point (3x)

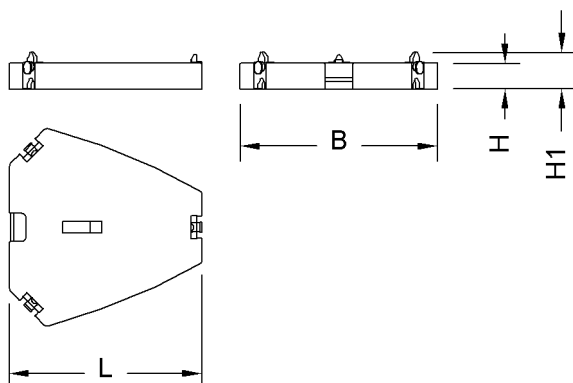


Fig. 157: Dimensions counterweight slab 5 t (11,023 lb)

Name	Value
L Length	2050 mm 6' 9" ft-in
B Width	2117 mm 6' 11" ft-in
H Height	275 mm 10.83" in
H1 Height incl. locking devices	395 mm 1' 4" ft-in
Weight	5000 kg 11,023 lb

Tab. 87: Technical data counterweight slab 5 t (11,023 lb)

1.8 Information about boom designation

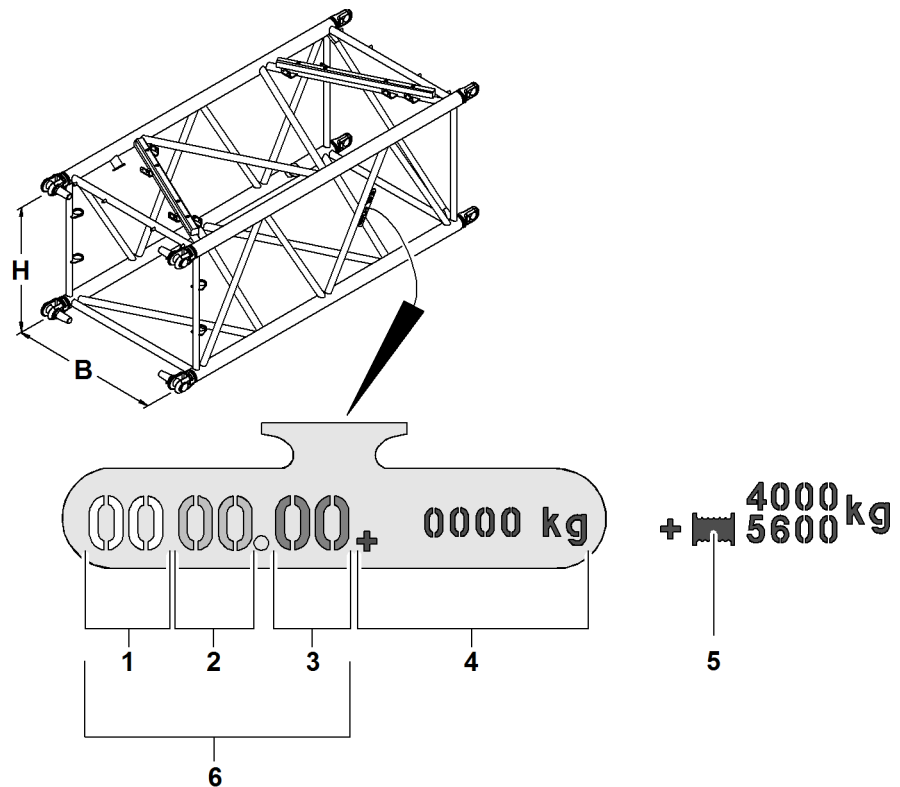


Fig. 158: Type plate of main boom section (symbolic)

- | | | | |
|---|--|---|--|
| 1 | System width of the component in [dm] | 5 | Weight of component with and without jib luffing winch |
| 2 | System height of the component in [dm] | 6 | System number |
| 3 | Wall thickness code | B | System width |
| 4 | Weight of the component | H | System height |

The **system number 6** marks boom components. The system number is used to distinguish between the different boom sections in the LR series.

Each boom component is marked with the system number.

The **system width B** provides information about the width of the boom component.

The **system height H** refers to the height of the boom component.

The **wall thickness code 3** corresponds to a specific wall thickness.

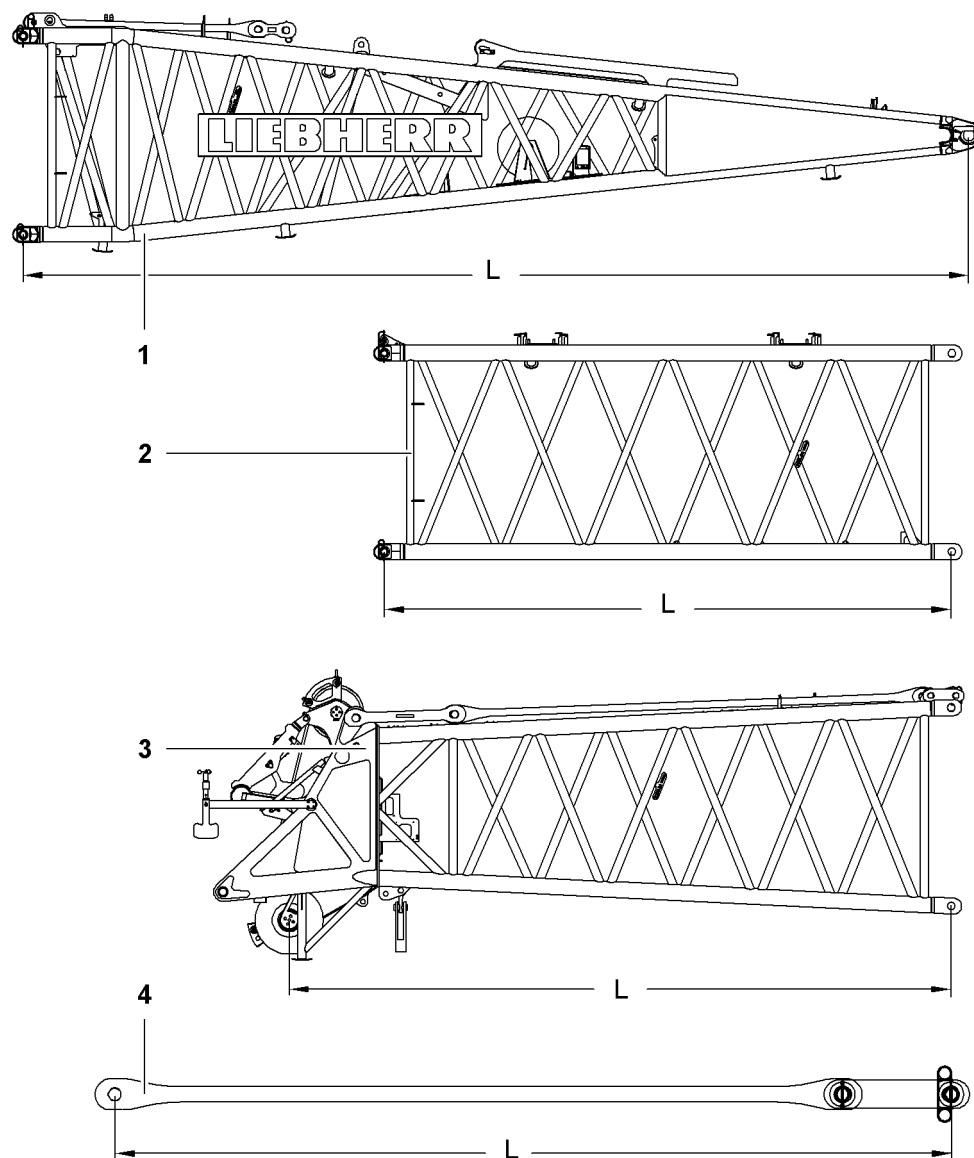


Fig. 159: System length of the boom components

- | | | | |
|---|--------------|---|---|
| 1 | Boom base | 4 | Pendant strap (including connecting link) |
| 2 | Boom section | L | System length |
| 3 | Boom head | | |

The **system length L**:

- refers to the pin connection points of the boom components and/or pendant straps.
- is used to calculate the total boom length.

1.9 Distinguishing features main boom sections LR 1300 and LR 1300 SX

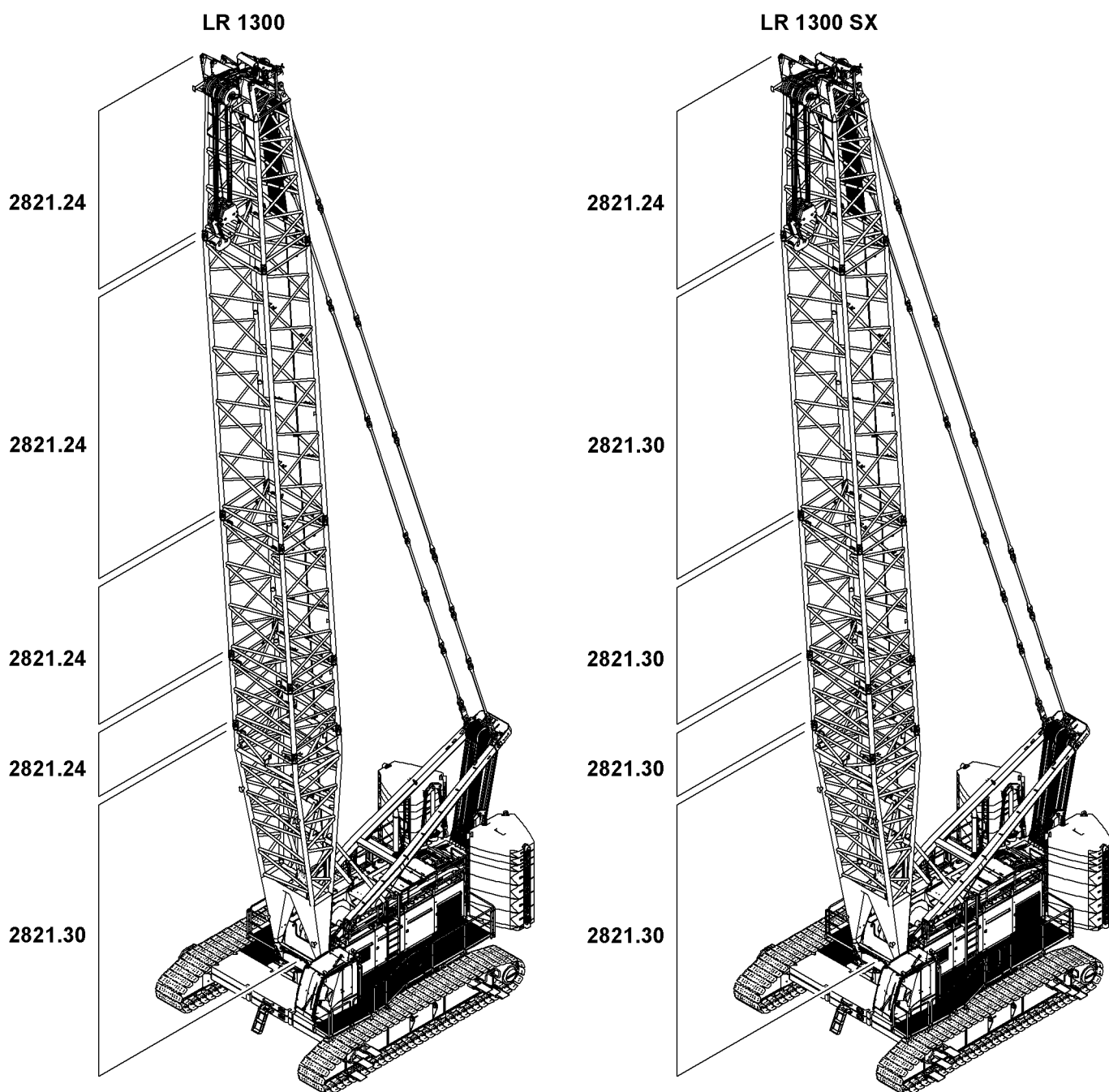


Fig. 160: Distinguishing features main boom sections LR 1300 and LR 1300 SX

The main boom sections differ with respect to wall thickness code and weight.

Distinguishing features main boom sections LR 1300 and LR 1300 SX

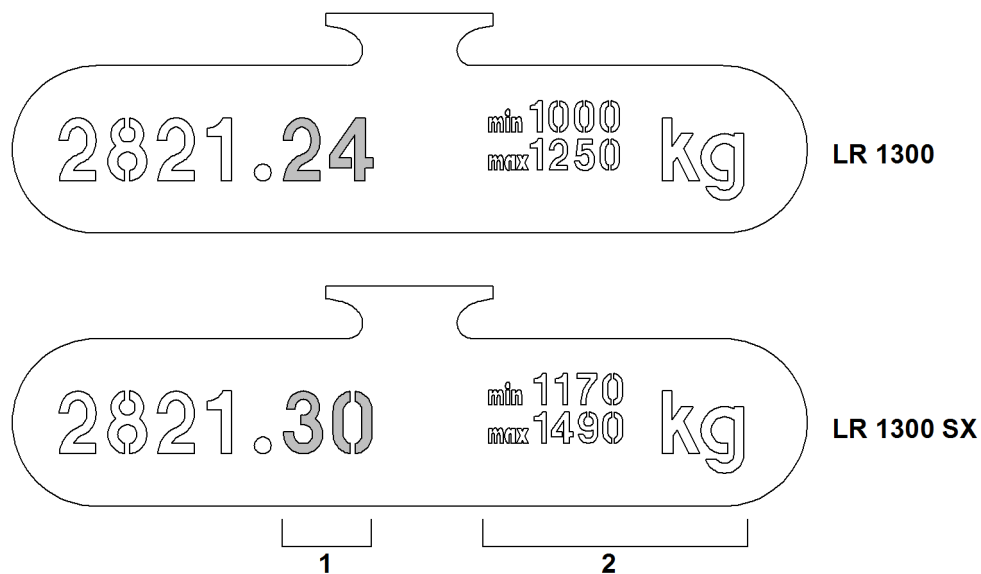


Fig. 161: Type plates of main boom sections LR 1300 and LR 1300 SX

1 Wall thickness code

2 Weight

1.10 Main boom - overview

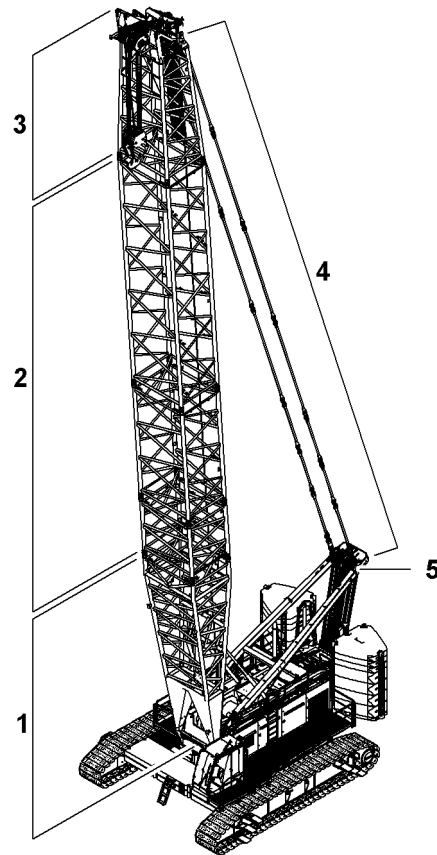


Fig. 162: Main boom - overview

- | | | | |
|---|------------------------|---|--------------------------|
| 1 | Main boom base section | 4 | Main boom pendant straps |
| 2 | Main boom sections | 5 | A-frame1 |
| 3 | Main boom head | | |

The main boom is composed of:

- Boom base section 1
- Boom sections (3 m (10 ft), 6 m (20 ft), 12 m (40 ft)) 2
- Boom head section 3

The main boom pendant straps 4 connect A-frame 1 5 to the boom head section 3.

1.11 2821 main boom

1.11.1 Main boom base section 2821.30

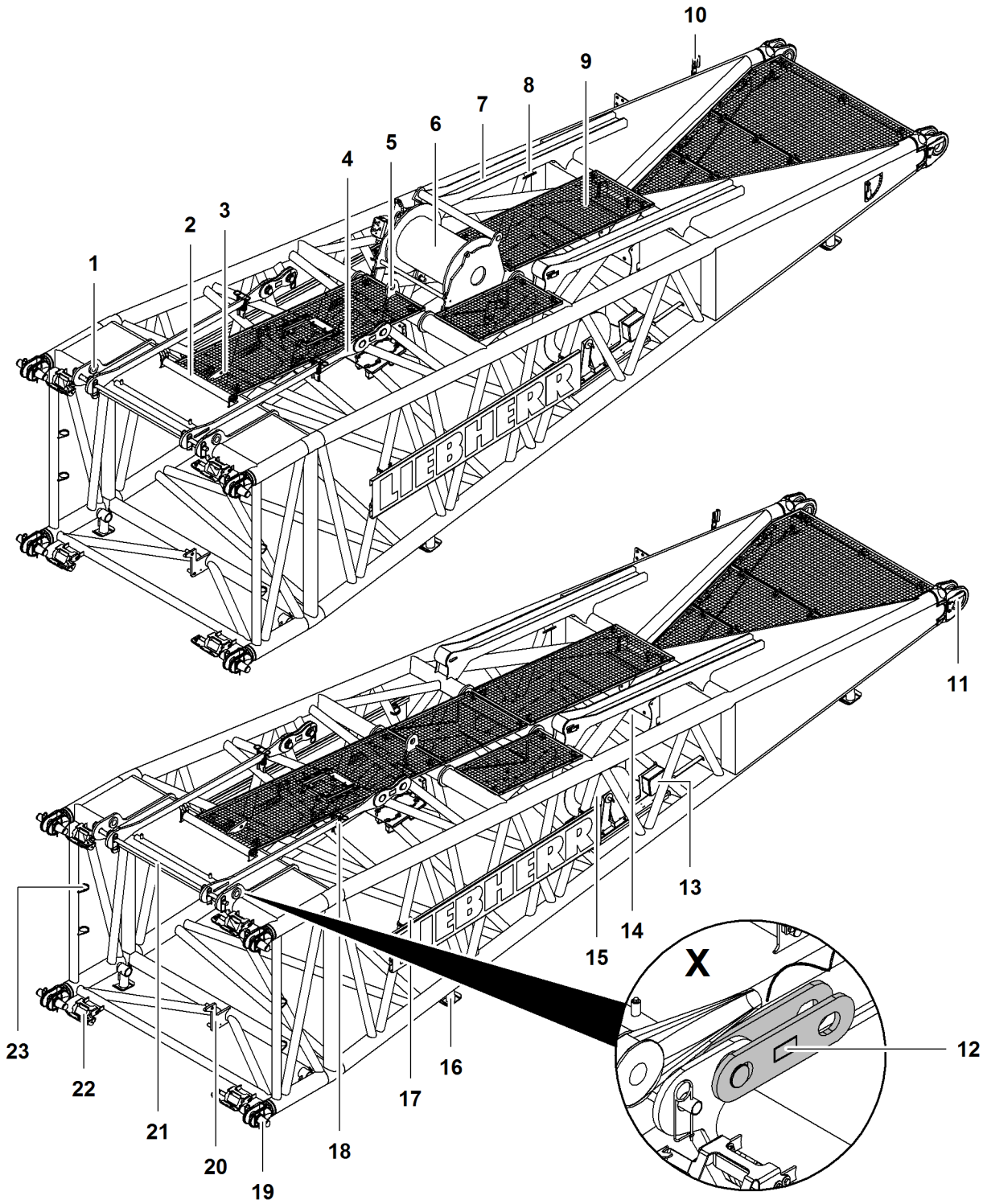


Fig. 163: Main boom base section 2821.30

- | | | |
|--|---|--|
| <p>1 Pivot point (2x) for jib backstay straps</p> <p>2 Rope protection roller</p> <p>3 Rope pulley for rope reeving winch</p> <p>4 Transport position (2x) of main boom pendant straps</p> <p>5 Pin connection point for assembly cylinder</p> <p>6 Jib luffing winch</p> <p>7 Guide rail (2x) for main boom tilting-back supports</p> <p>8 Rigging point (4x)</p> | <p>9 Platform (4x)</p> <p>10 Limit switch plate for main boom limit switch, top angle limiter</p> <p>11 Pivot point (2x) on uppercarriage</p> <p>12 Connecting link (350 mm (1' 2" ft-in)) (2x) for CF pendant straps</p> <p>13 Rope reeving winch</p> <p>14 Terminal box</p> <p>15 Cable drum</p> <p>16 Foot (6x, two of which hinged)</p> | <p>17 Boom identification plate</p> <p>18 Transport bracket (2x) for main boom pendant straps</p> <p>19 Pin connection point (4x) with double-taper pins (4x)</p> <p>20 Rope pulley (2x) for rope of rope reeving winch</p> <p>21 Transport bracket for main boom pendant straps</p> <p>22 Catch (4x) for double-taper pins</p> <p>23 Transport bracket (4x) for double-taper pins</p> |
|--|---|--|

Detail X shows the connecting links (350 mm (1' 2" ft-in)) **12** installed on the machine with CF pendant straps on the main boom base section by the factory. The connecting links (350 mm (1' 2" ft-in)) **12** are part of the jib backstay straps.

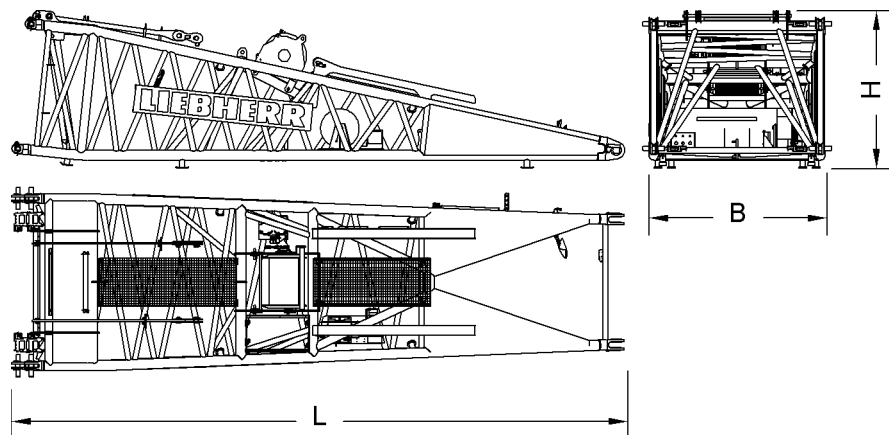


Fig. 164: Dimensions main boom base section 2821.30

Name		Value
System length		10000 mm 32' 10" ft-in
System width		2800 mm 9' 2" ft-in
System height		2100 mm 6' 11" ft-in
L	Length	10300 mm 33' 10" ft-in
W	Width	2970 mm 9' 9" ft-in
H	Height	2650 mm 8' 8" ft-in

Name	Value
Weight (incl. pendant straps, jib luffing winch and rope)	7400 kg 16,314 lb
Weight (incl. pendant straps, without jib luffing winch)	5700 kg 12,566 lb
Double-taper pins \varnothing	80 mm 3.15" in

Tab. 88: Technical data main boom base section 2821.30

1.11.2 Main boom section 2821 3 m (10 ft)

Main boom section 2821.30 3 m (10 ft) for LR 1300 SX

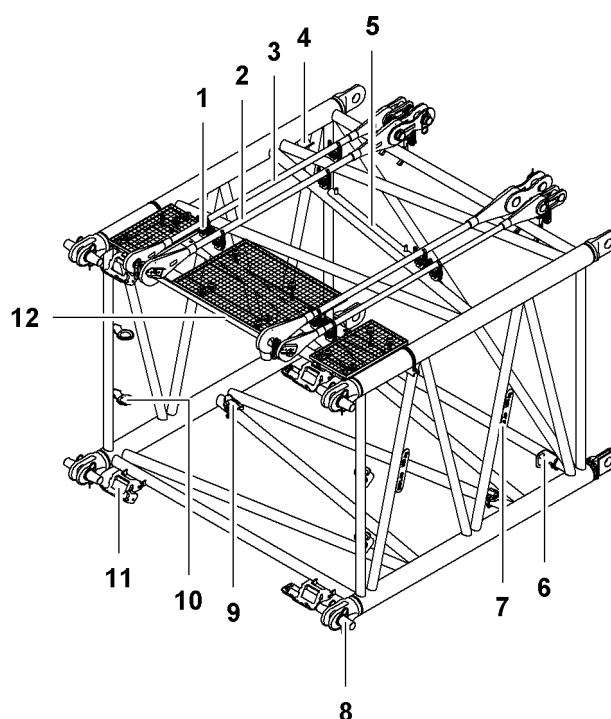


Fig. 165: Main boom section 2821.30 3 m (10 ft) for LR 1300 SX

- | | | | |
|---|--|----|---|
| 1 | Transport bracket (8x) for pendant straps | 7 | Boom identification plate (2x) |
| 2 | Transport position of main boom pendant straps 3 m (10 ft) (2x) | 8 | Pin connection point (8x) with double-taper pin (4x) |
| 3 | Transport position of jib backstay straps 3 m (10 ft) (2x) | 9 | Support (4x) for retracted jib section during transport |
| 4 | Rigging point (4x) | 10 | Transport bracket (4x) for double taper pin |
| 5 | Rope protection guard | 11 | Catch (4x) for double-taper pins |
| 6 | Pin connection point (2x) for retracted jib section during transport | 12 | Transport bracket for pendant straps |

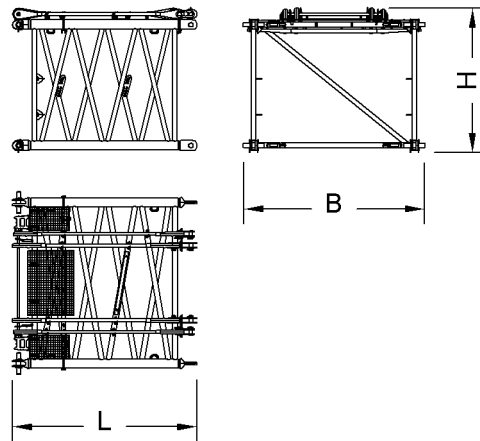


Fig. 166: Dimensions main boom section 2821.30 3 m (10 ft) for LR 1300 SX

Name		Value
System length		3000 mm 9' 10" ft-in
System width		2800 mm 9' 2" ft-in
System height		2100 mm 6' 11" ft-in
L	Length	3220 mm 10' 7" ft-in
B	Width	2970 mm 9' 9" ft-in
H	Height (incl. pendant straps)	2420 mm 7' 11" ft-in
Weight (incl. pendant straps)		1476 kg 3,254 lb
Double taper pin Ø		80 mm 3.15" in

Tab. 89: Technical data main boom section 2821.30 3 m (10 ft) for LR 1300 SX

Main boom section 2821.24 3 m (10 ft) for LR 1300

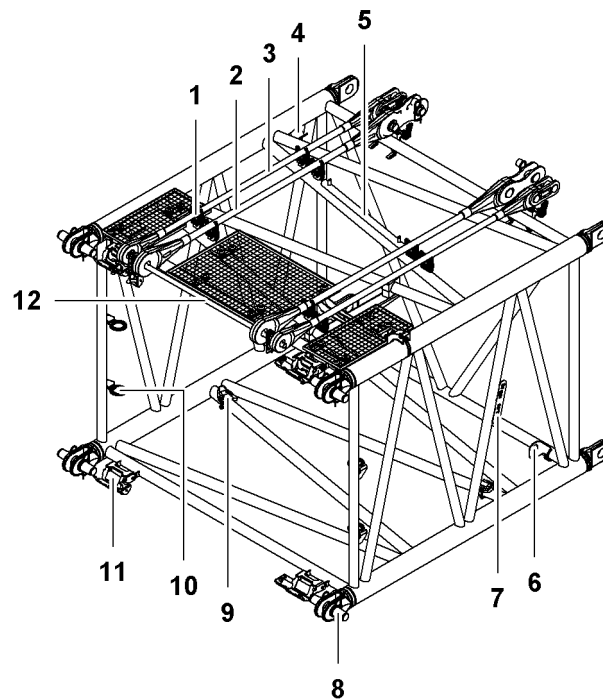


Fig. 167: Main boom section 2821.24 3 m (10 ft) for LR 1300

- | | | | |
|---|--|----|---|
| 1 | Transport bracket (8x) for pendant straps | 7 | Boom identification plate |
| 2 | Transport position of main boom pendant straps 3 m (10 ft) (2x) | 8 | Pin connection point (8x) with double-taper pin (4x) |
| 3 | Transport position of jib backstay straps 3 m (10 ft) (2x) | 9 | Support (4x) for retracted jib section during transport |
| 4 | Rigging point (4x) | 10 | Transport bracket (4x) for double taper pin |
| 5 | Rope protection guard | 11 | Catch (4x) for double-taper pins |
| 6 | Pin connection point (2x) for retracted jib section during transport | 12 | Transport bracket for pendant straps |

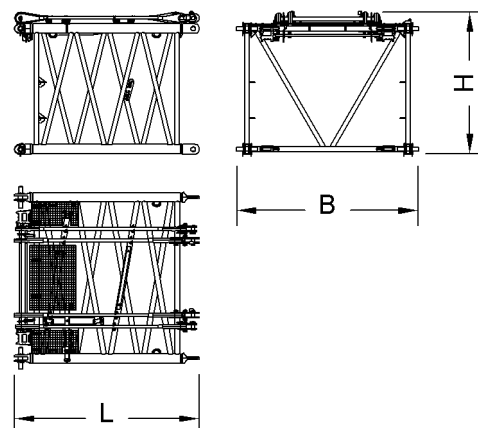


Fig. 168: Dimensions main boom section 2821.24 3 m (10 ft) for LR 1300

Name		Value
System length		3000 mm 9' 10" ft-in
System width		2800 mm 9' 2" ft-in
System height		2100 mm 6' 11" ft-in
L	Length	3220 mm 10' 7" ft-in
B	Width	2970 mm 9' 9" ft-in
H	Height (incl. pendant straps)	2420 mm 7' 11" ft-in
Weight (incl. pendant straps)		1284 kg 2,831 lb
Double taper pin Ø		80 mm 3.15" in

Tab. 90: Technical data main boom section 2821.24 3 m (10 ft) for LR 1300

1.11.3 Main boom section 2821 6 m (20 ft)

Main boom section 2821.30 6 m (20 ft) for LR 1300 SX

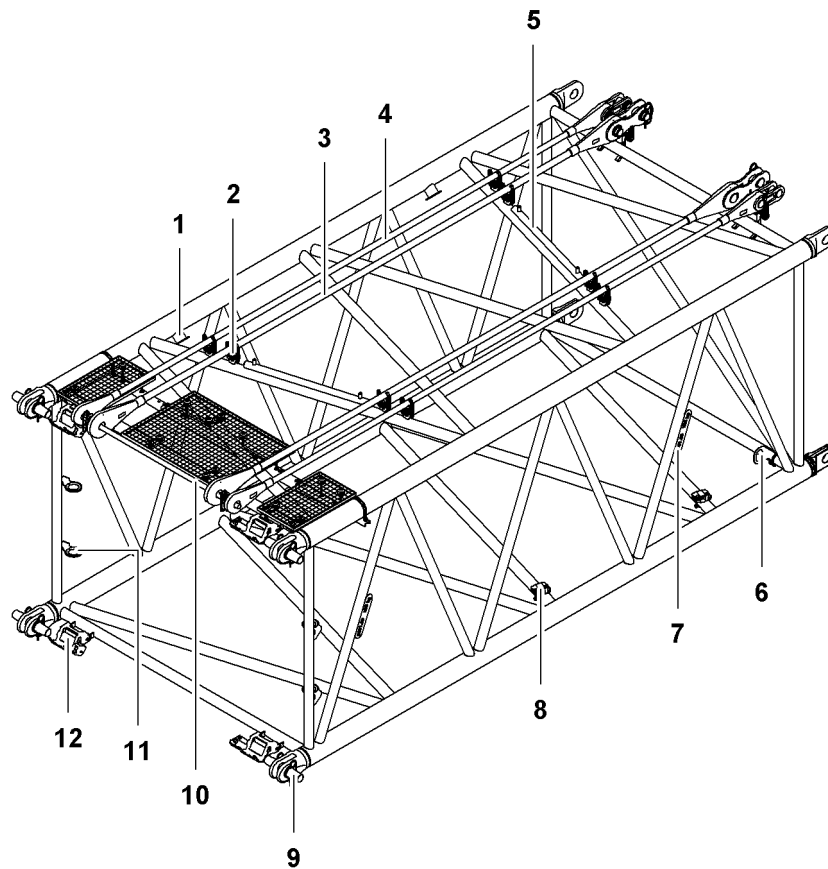


Fig. 169: Main boom section 2821.30 6 m (20 ft) for LR 1300 SX

- | | | | |
|---|--|----|---|
| 1 | Rigging point (4x) | 7 | Boom identification plate (2x) |
| 2 | Transport bracket (8x) for pendant straps | 8 | Support (4x) for retracted jib section during transport |
| 3 | Transport position of main boom pendant straps 6 m (20 ft) (2x) | 9 | Pin connection point (8x) with double-taper pin (4x) |
| 4 | Transport position of jib backstay straps 6 m (20 ft) (2x) | 10 | Transport bracket for pendant straps |
| 5 | Rope protection guard (2x) | 11 | Transport bracket (4x) for double taper pin |
| 6 | Pin connection point (2x) for retracted jib section during transport | 12 | Catch (4x) for double-taper pins |

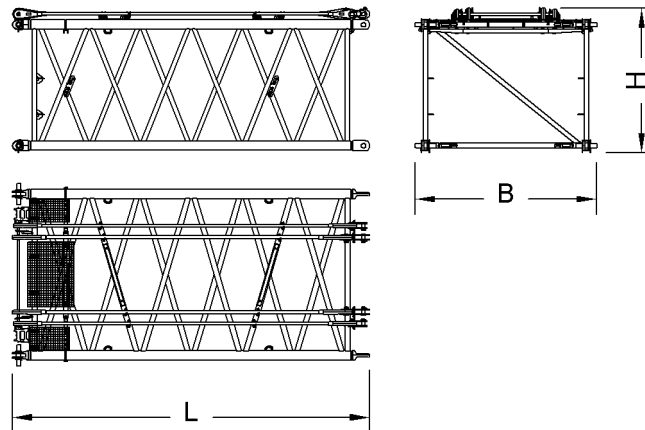


Fig. 170: Dimensions main boom section 2821.30 6 m (20 ft) for LR 1300 SX

Name		Value
System length		6000 mm 19' 8" ft-in
System width		2800 mm 9' 2" ft-in
System height		2100 mm 6' 11" ft-in
L	Length	6220 mm 20' 5" ft-in
B	Width	2970 mm 9' 9" ft-in
H	Height (incl. pendant straps)	2420 mm 7' 11" ft-in
Weight (incl. pendant straps)		2304 kg 5,079 lb
Double taper pin Ø		80 mm 3.15" in

Tab. 91: Technical data main boom section 2821.30 6 m (20 ft) for LR 1300 SX

Main boom section 2821.24 6 m (20 ft) for LR 1300

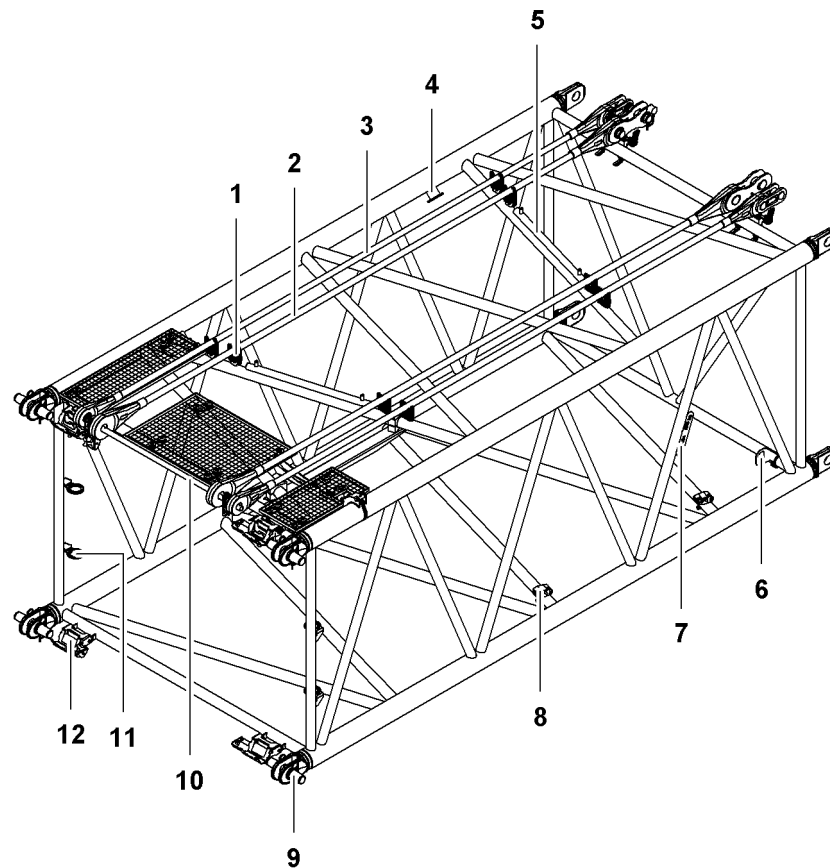


Fig. 171: Main boom section 2821.24 6 m (20 ft) for LR 1300

- | | | | |
|---|--|----|---|
| 1 | Transport bracket (8x) for pendant straps | 7 | Boom identification plate |
| 2 | Transport position of main boom pendant straps 6 m (20 ft) (2x) | 8 | Support (4x) for retracted jib section during transport |
| 3 | Transport position of jib backstay straps 6 m (20 ft) (2x) | 9 | Pin connection point (8x) with double-taper pin (4x) |
| 4 | Rigging point (4x) | 10 | Transport bracket for pendant straps |
| 5 | Rope protection guard (2x) | 11 | Transport bracket (4x) for double taper pin |
| 6 | Pin connection point (2x) for retracted jib section during transport | 12 | Catch (4x) for double-taper pins |

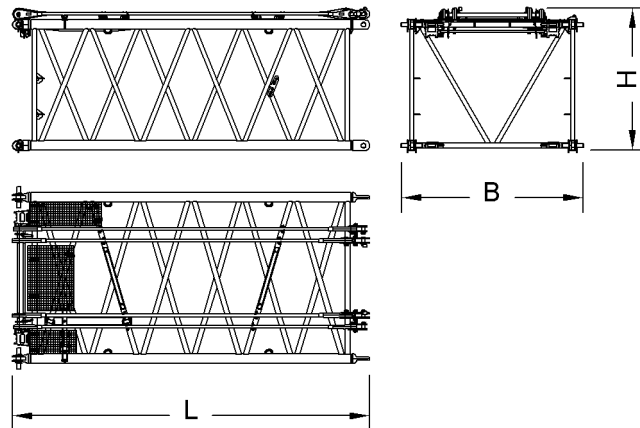


Fig. 172: Dimensions main boom section 2821.24 6 m (20 ft) for LR 1300

Name		Value
System length		6000 mm 19' 8" ft-in
System width		2800 mm 9' 2" ft-in
System height		2100 mm 6' 11" ft-in
L	Length	6220 mm 20' 5" ft-in
B	Width	2970 mm 9' 9" ft-in
H	Height (incl. pendant straps)	2420 mm 7' 11" ft-in
Weight (incl. pendant straps)		1977 kg 4,358 lb
Double taper pin Ø		80 mm 3.15" in

Tab. 92: Technical data main boom section 2821.24 6 m (20 ft) for LR 1300

1.11.4 Main boom section 2821 12 m (40 ft)

Main boom section 2821.30 12 m (40 ft) for LR 1300 SX

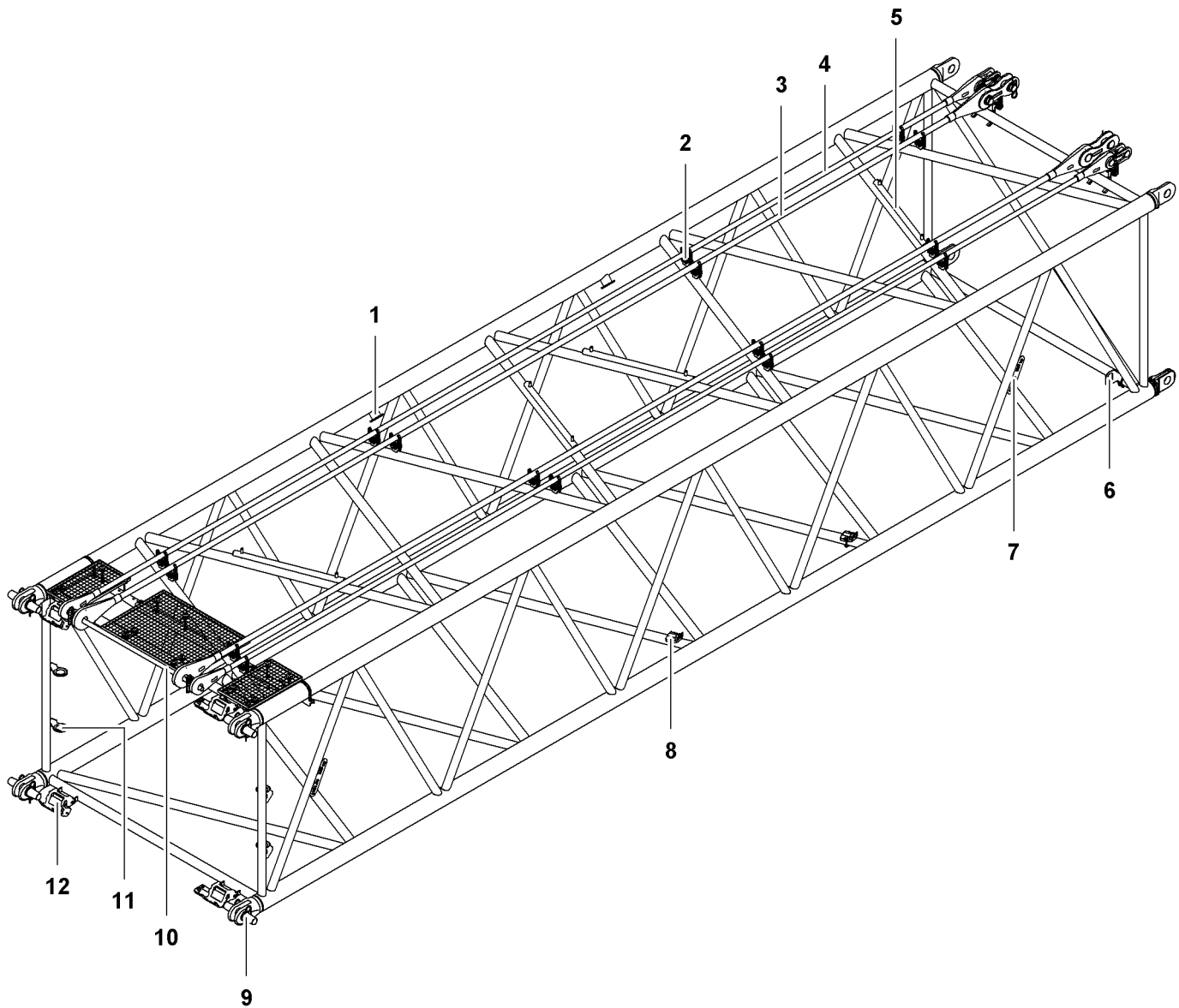


Fig. 173: Main boom section 2821.30 12 m (40 ft) for LR 1300 SX

1	Rigging point (4x)	5	Rope protection guard (3x)	9	Pin connection point (8x) with double-taper pin (4x)
2	Transport bracket (16x) for pendant straps	6	Pin connection point (2x) for retracted jib section during transport	10	Transport bracket for pendant straps
3	Transport position of main boom pendant straps 12 m (40 ft) (2x)	7	Boom identification plate (2x)	11	Transport bracket (4x) for double taper pin
4	Transport position of jib back-stay straps 12 m (40 ft) (2x)	8	Support (4x) for retracted jib section during transport	12	Catch (4x) for double-taper pins

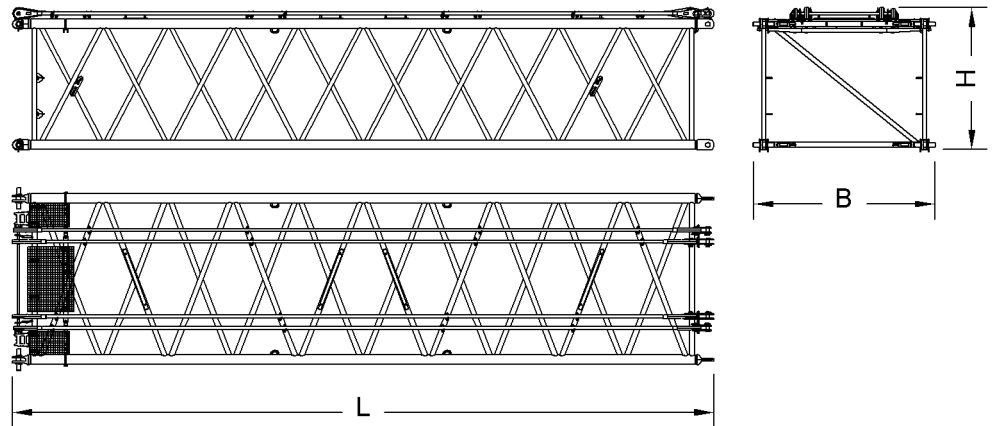


Fig. 174: Dimensions main boom section 2821.30 12 m (40 ft) for LR 1300 SX

Name		Value
System length		12000 mm 39' 4" ft-in
System width		2800 mm 9' 2" ft-in
System height		2100 mm 6' 11" ft-in
L	Length	12220 mm 40' 1" ft-in
B	Width	2970 mm 9' 9" ft-in
H	Height (incl. pendant straps)	2420 mm 7' 11" ft-in
Weight (incl. pendant straps)		4236 kg 9,339 lb
Double taper pin Ø		80 mm 3.15" in

Tab. 93: Technical data main boom section 2821.30 12 m (40 ft) for LR 1300 SX

Main boom section 2821.24 12 m (40 ft) for LR 1300

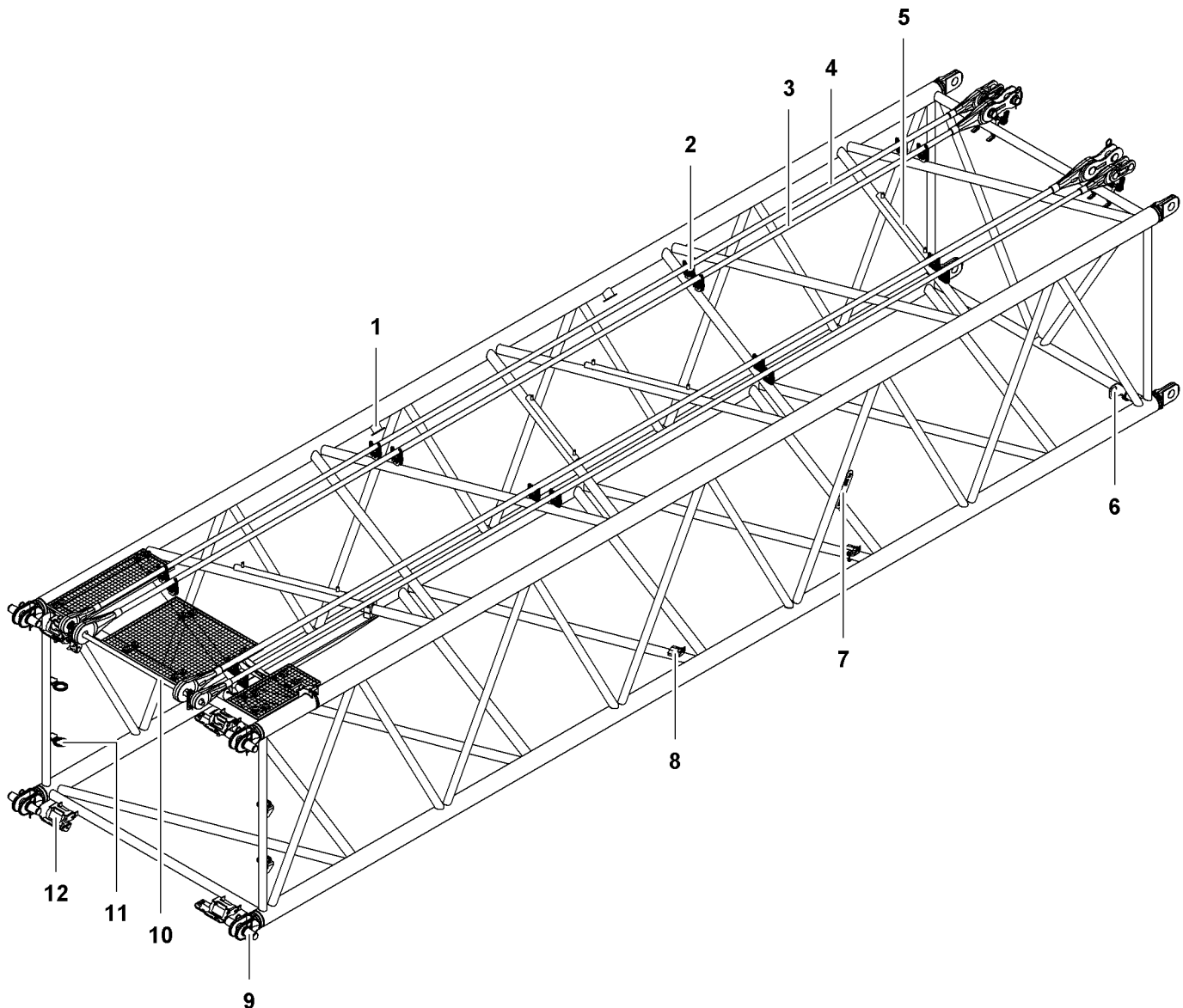


Fig. 175: Main boom section 2821.24 12 m (40 ft) for LR 1300

1	Rigging point (4x)	5	Rope protection guard (3x)	9	Pin connection point (8x) with double-taper pin (4x)
2	Transport bracket (16x) for pendant straps	6	Pin connection point (2x) for retracted jib section during transport	10	Transport bracket for pendant straps
3	Transport position of main boom pendant straps 12 m (40 ft) (2x)	7	Boom identification plate	11	Transport bracket (4x) for double taper pin
4	Transport position of jib backstay straps 12 m (40 ft) (2x)	8	Support (4x) for retracted jib section during transport	12	Catch (4x) for double-taper pins

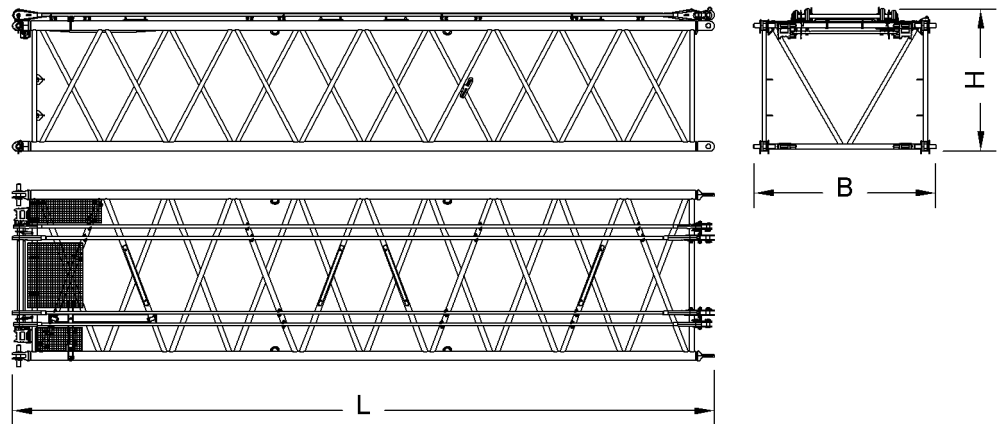


Fig. 176: Dimensions main boom section 2821.24 12 m (40 ft) for LR 1300

Name		Value
System length		12000 mm 39' 4" ft-in
System width		2800 mm 9' 2" ft-in
System height		2100 mm 6' 11" ft-in
L	Length	12220 mm 40' 1" ft-in
B	Width	2970 mm 9' 9" ft-in
H	Height (incl. pendant straps)	2420 mm 7' 11" ft-in
Weight (incl. pendant straps)		4091 kg 9,019 lb
Double taper pin Ø		80 mm 3.15" in

Tab. 94: Technical data main boom section 2821.24 12 m (40 ft) for LR 1300

1.11.5 Main boom head section 2821.24

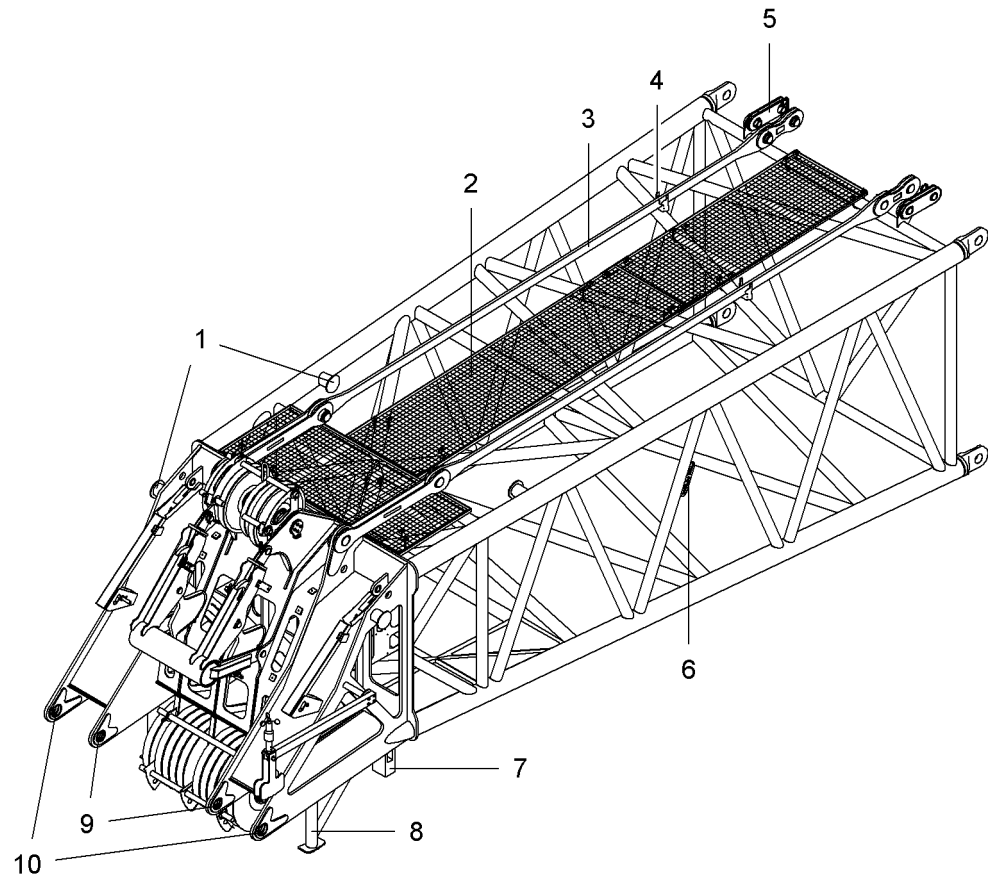


Fig. 177: Main boom head section 2821.24

- | | | | |
|----------|--|-----------|--|
| 1 | Lifting point (4x) | 6 | Boom identification plate |
| 2 | Platform (3x) | 7 | Rope fixation |
| 3 | Transport position of main boom pendant straps (2x) | 8 | Base (2x) |
| 4 | Transport fixation (2x) for pendant straps | 9 | Pin connection point (2x) for jib or auxiliary jib |
| 5 | Connecting link (2x) for jib backstay straps (if jib not attached) | 10 | Pin connection point (2x) for jib |

The jib backstay straps that are not required are pinned to the connecting links **5** if no jib has been attached and the jib backstay straps remain on the main boom. Observe the guidelines regarding the location of the jib backstay straps on the main boom as outlined in the foreword to the load chart.

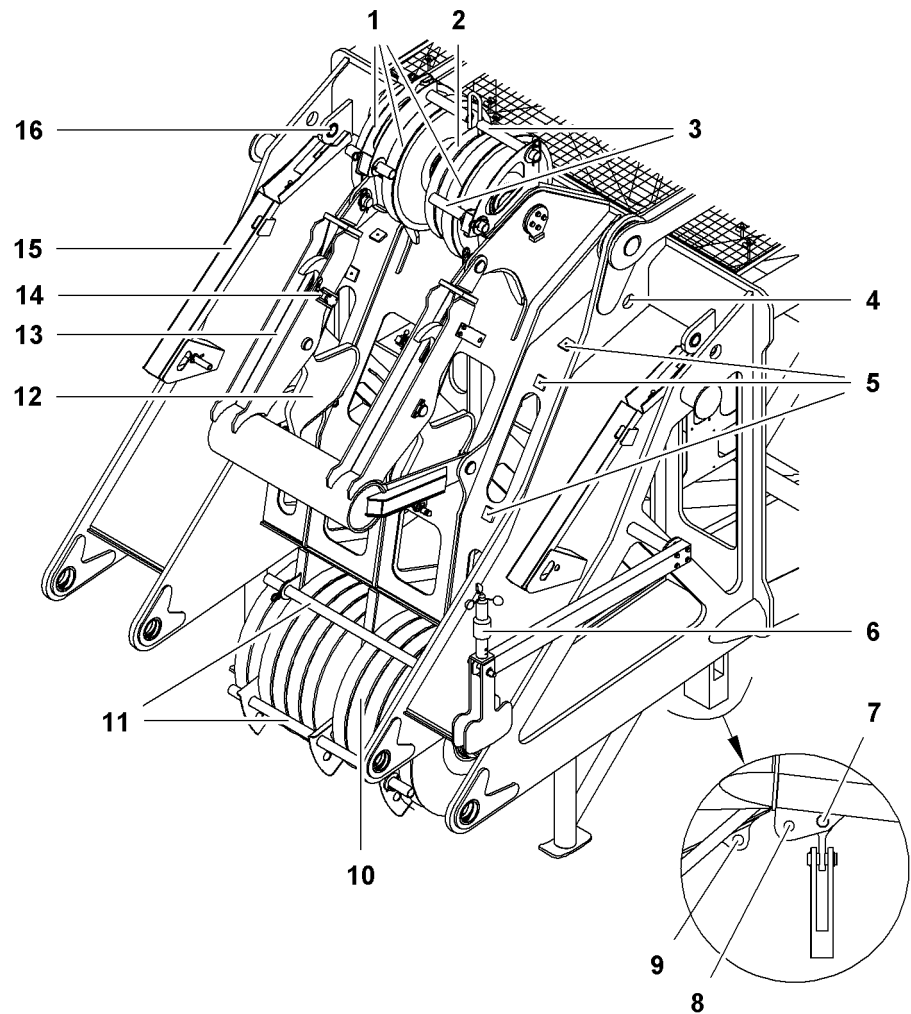


Fig. 178: Main boom head section 2821.24 detail

- | | | | |
|---|---|----|---|
| 1 | Gantry pulley (3x) for rope of winch 1/winch 2 | 9 | Pivot point (2x) for the rope fixing point at low reevings |
| 2 | Small gantry pulley for rope of luffing jib luffing winch | 10 | Pulley (10x) |
| 3 | Rope protection pipe (3x) | 11 | Rope protection pipe (2x) |
| 4 | Pin connection point (2x) for hydraulic tilting-back supports of 1916 luffing jib | 12 | Locking flaps (2x) for rigid jib tilting-back supports |
| 5 | Fastening point (8x) of guide rails for hydraulic tilting-back supports of the 1916 luffing jib | 13 | Guide rail (2x) for rigid jib tilting-back supports |
| 6 | Anemometer | 14 | Upper jib limit switch (2x) |
| 7 | Pivot point (2x) for rope fixing point | 15 | Guide rail (2x) for hydraulic tilting-back supports of 2316 luffing jib |
| 8 | Pivot point (2x) for jib head member | 16 | Pin connection point (2x) for hydraulic tilting-back supports of 2316 luffing jib |

NOTICE

Inadmissible reeving of the rope of winch1/winch2 via small gantry pulley!
Damage to small gantry pulley.

- Only guide rope of the luffing jib luffing winch across small gantry pulley 2.

For 21-fold and 22-fold reeving, an additional pulley (11th pulley) has to be fit to the 2821.24 boom head section.

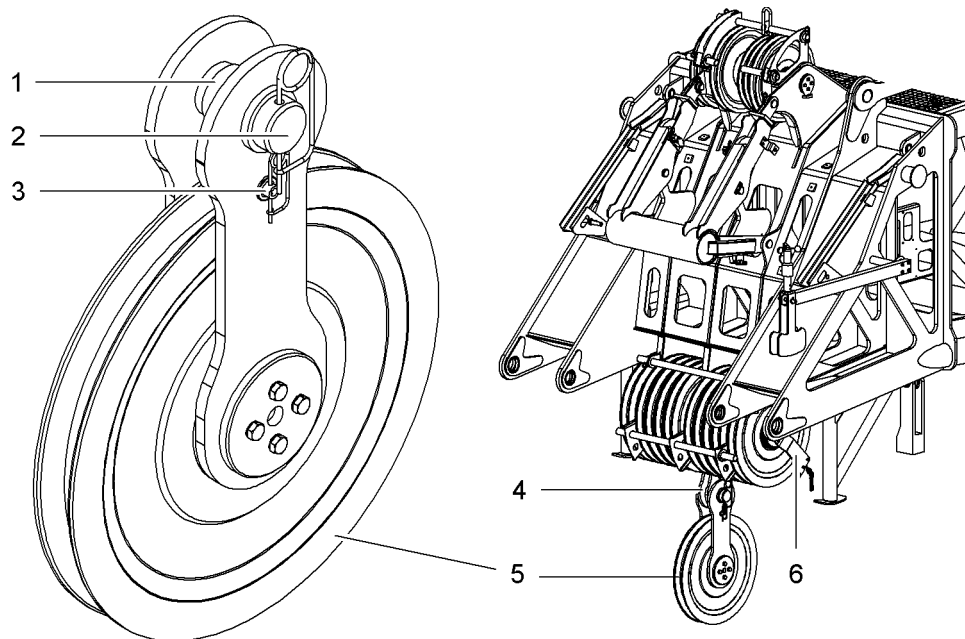


Fig. 179: 11th pulley for 21-fold and 22-fold reeving

- | | | | |
|---|-----------------------------------|---|--|
| 1 | Spacer (width = 45 mm (1.77" in)) | 4 | Bracket (2x) on main boom head section |
| 2 | Pin with washer and safety pin | 5 | 11th pulley |
| 3 | Rope protection pipe | 6 | Hoist limit switch |

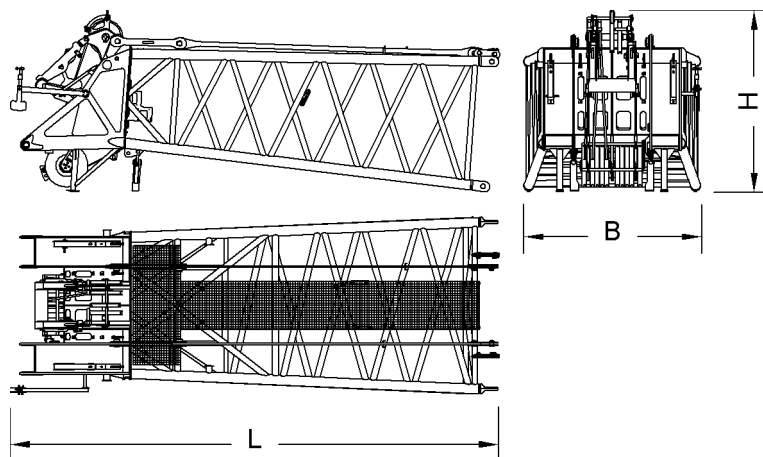


Fig. 180: Main boom head section 2821.24 dimensions

Name	Value
System length	7000 mm 23' ft-in
System width	2800 mm 9' 2" ft-in
System height	2100 mm 6' 11" ft-in

Name		Value
L	Length	8055 mm 26' 5" ft-in
B	Width	2970 mm 9' 9" ft-in
H	Height	2960 mm 9' 9" ft-in
Weight (incl. pendant straps)		5400 kg 11,905 lb

Tab. 95: Technical data main boom head section 2821.24

Name		Value
11th pulley Ø		720 mm 2' 4" ft-in
Height (incl. brackets)		960 mm 3' 2" ft-in
Weight (incl. brackets)		94 kg 207 lb
Pin Ø		80 mm 3.15" in

Tab. 96: Technical data 11th pulley

1.11.6 Rope guide (type A/B) on main boom 2821

The rope guide:

- must be installed on a main boom with a specified length.
- improves the winding properties of the ropes on the winches.
- prolongs the service life of the ropes.

Prescribed use of rope guide (type A) or rope guide (type B):

Boom configuration no.	Rope guide (type A)	Rope guide (type B)
1	x	
2	x	
3	x	
4	x	
5	x	
6		x
8		x
9		x

Tab. 97: Prescribed use of rope guide (type A) or rope guide (type B)

Rope guide (type A)

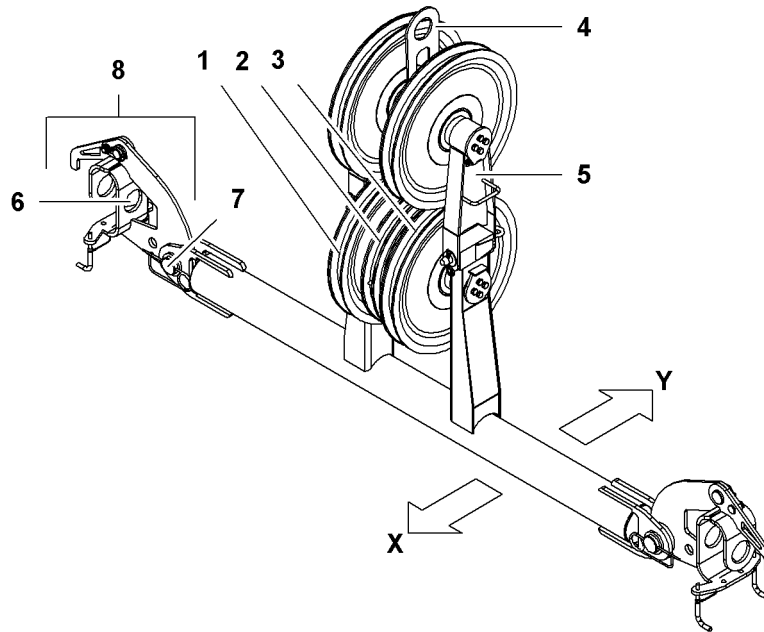


Fig. 181: Rope guide (type A)

- | | | | |
|---|---|---|---|
| 1 | Rope pulley for rope of winch1 | 6 | Pin connection point (2x) for rope guide forks with main boom section |
| 2 | Rope pulley for rope of jib luffing winch | 7 | Pin connection point (2x) for rope guide forks with rope guide |
| 3 | Rope pulley for rope of winch2 | 8 | Rope guide fork (2x) |
| 4 | Rigging point | X | Towards main boom head |
| 5 | Top part of rope guide (hinged) | Y | Towards uppercarriage |

To enable rope reeving, the top part of the rope guide 5 can be unfolded.

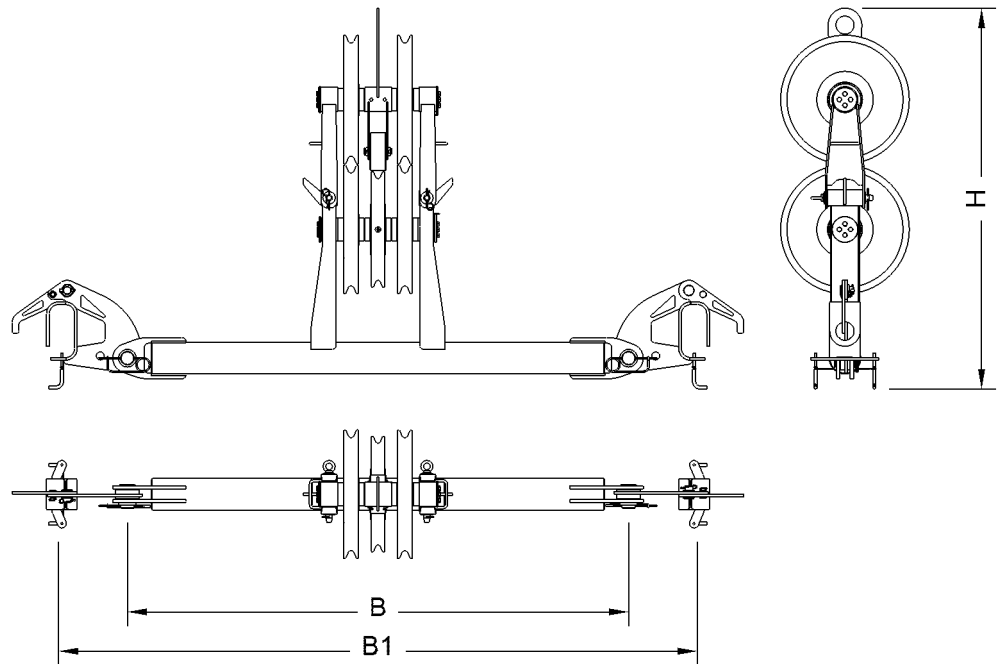


Fig. 182: Dimensions of rope guide (type A)

Name		Value
1+3	Rope pulleys for rope of winch1 and rope of winch2	500 mm (1' 8" ft-in) x 15 mm (0.59" in) x 90 mm (3.54" in)
2	Rope pulley for rope of jib luffing winch	450 mm (1' 6" ft-in) x 11 mm (0.43" in) x 90 mm (3.54" in)
B	Width	2220 mm 7' 3" ft-in
B1	Width (main boom section system dimension)	2800 mm 9' 2" ft-in
H	Height	1650 mm 5' 5" ft-in
Weight		251 kg 553 lb

Tab. 98: Rope guide (type A) technical data

Rope guide (type B)

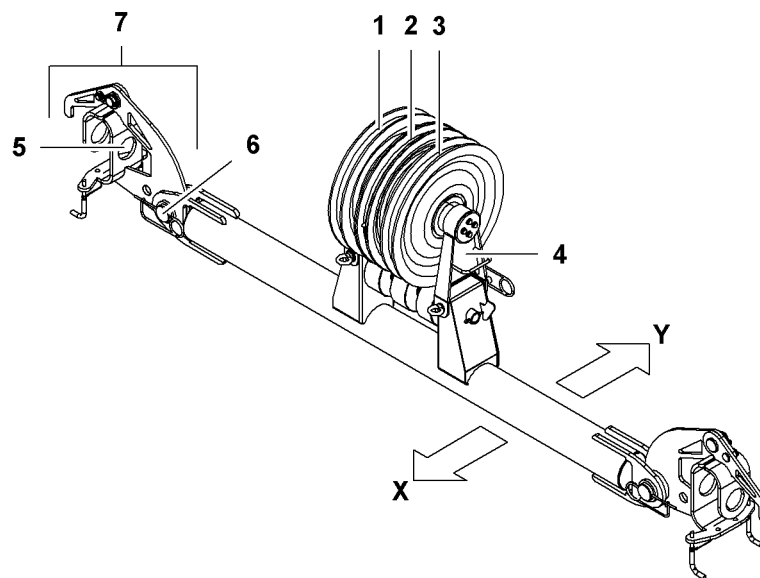


Fig. 183: Rope guide (type B)

- | | | | |
|----------|---|----------|--|
| 1 | Rope pulley for rope of winch1 | 6 | Pin connection point (2x) for rope guide forks with rope guide |
| 2 | Rope pulley for rope of jib luffing winch | 7 | Rope guide fork (2x) |
| 3 | Rope pulley for rope of winch2 | X | Towards main boom head |
| 4 | Top part of rope guide (hinged) | Y | Towards uppercarriage |
| 5 | Pin connection point (2x) for rope guide forks with main boom section | | |

To enable rope reeving, the top part of the rope guide **4** can be unfolded.

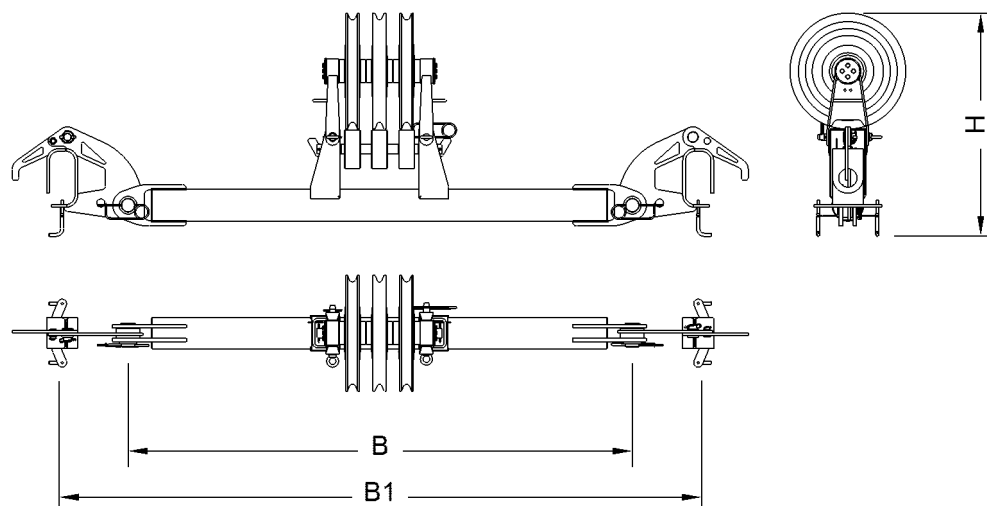


Fig. 184: Dimensions of rope guide (type B)

Name	Value
1+3 Rope pulleys for rope of winch1 and rope of winch2	450 mm (1' 6" ft-in) x 15 mm (0.59" in) x 90 mm (3.54" in)
2 Rope pulley for rope of jib luffing winch	450 mm (1' 6" ft-in) x 11 mm (0.43" in) x 90 mm (3.54" in)
B Width	2220 mm 7' 3" ft-in
B1 Width (main boom section system dimension)	2800 mm 9' 2" ft-in
H Height	940 mm 3' 1" ft-in
Weight	180 kg 397 lb

Tab. 99: Rope guide (type B) technical data

1.11.7 Mid-point suspension on main boom 2821

The mid-point suspensions on main boom 2821 differ with steel pendant straps and CF pendant straps.

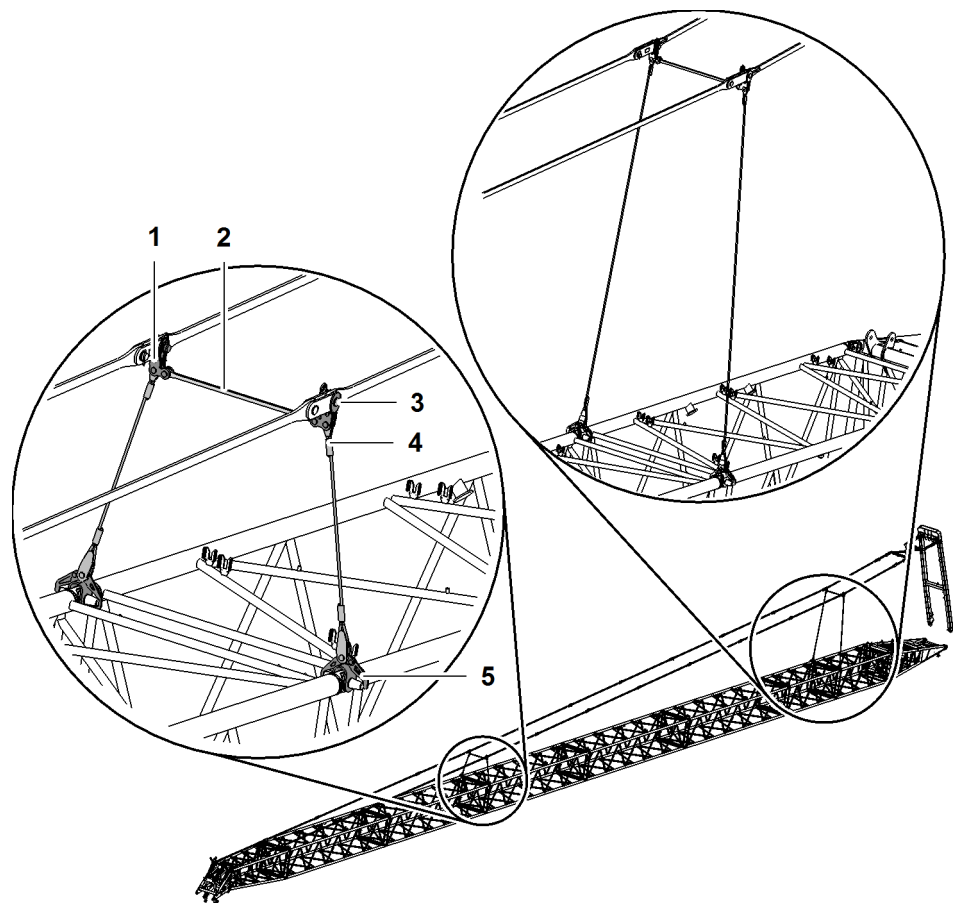


Fig. 185: Mid-point suspension on main boom 2821 (illustration of principle)

- | | | | |
|---|-----------------------------|---|------------|
| 1 | Connecting element (2x) | 4 | Stay ropes |
| 2 | Spacer bracket | 5 | Fork (2x) |
| 3 | Pin (2x) for pendant straps | | |

Connecting elements for steel pendant straps

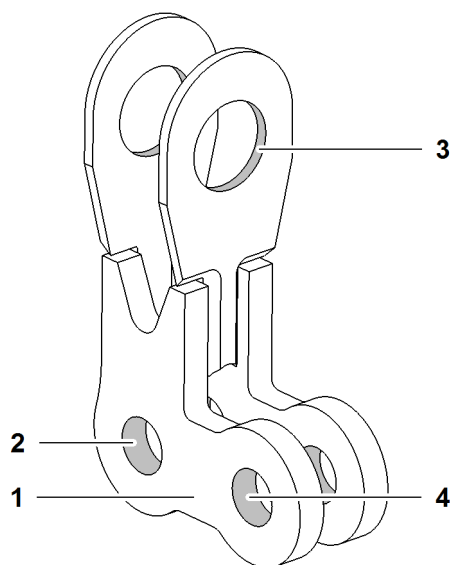


Fig. 186: Connecting elements for steel pendant straps (illustration of principle)

- | | | | |
|---|------------------------------------|---|---|
| 1 | Connecting element | 3 | Pin connection point for pendant strap |
| 2 | Pin connection point for stay rope | 4 | Pin connection point for spacer bracket |

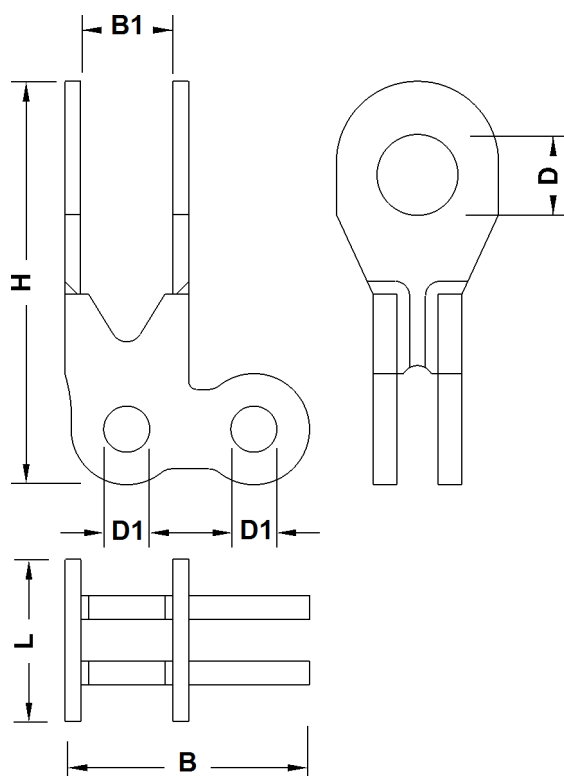


Fig. 187: Dimensions connecting elements for steel pendant straps

Name		Value
L	Length	112 mm 4.41" in
H	Height	361 mm 1' 2" ft-in
B	Width	190 mm 7.48" in
B1	Width between link	58 mm 2.28" in
D	Pin Ø	65 mm 2.56" in
D1	Pin Ø	35 mm 1.38" in

Tab. 100: Technical data connecting elements for steel pendant straps

Connecting elements for CF pendant straps

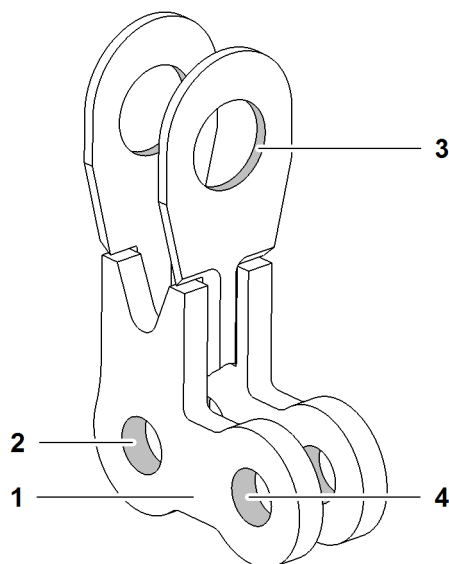


Fig. 188: Connecting elements for CF pendant straps (illustration of principle)

- | | | | |
|----------|------------------------------------|----------|---|
| 1 | Connecting element | 3 | Pin connection point for pendant strap |
| 2 | Pin connection point for stay rope | 4 | Pin connection point for spacer bracket |

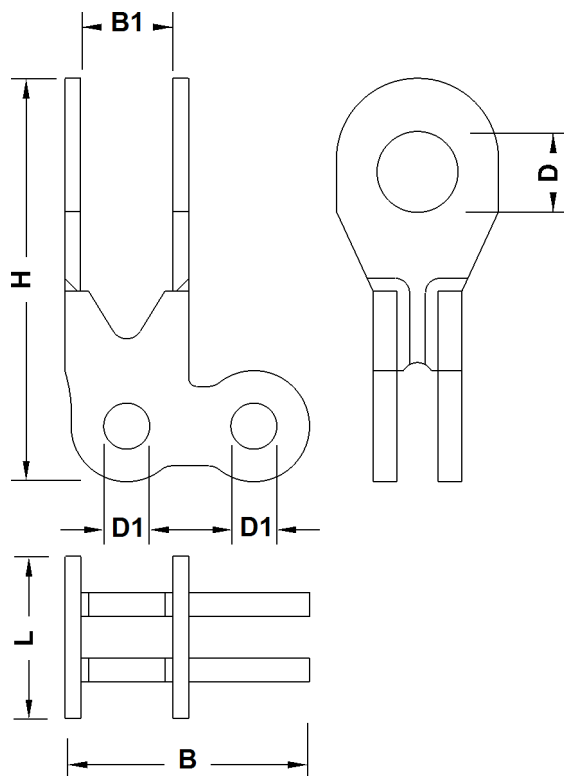


Fig. 189: Dimensions connecting elements for CF pendant straps

Name		Value
L	Length	110 mm 4.33" in
H	Height	358 mm 1' 2" ft-in
B	Width	207 mm 8.15" in
B1	Width between link	104 mm 4.09" in
D	Pin Ø	65 mm 2.56" in
D1	Pin Ø	35 mm 1.38" in

Tab. 101: Technical data connecting elements for CF pendant straps

Fork

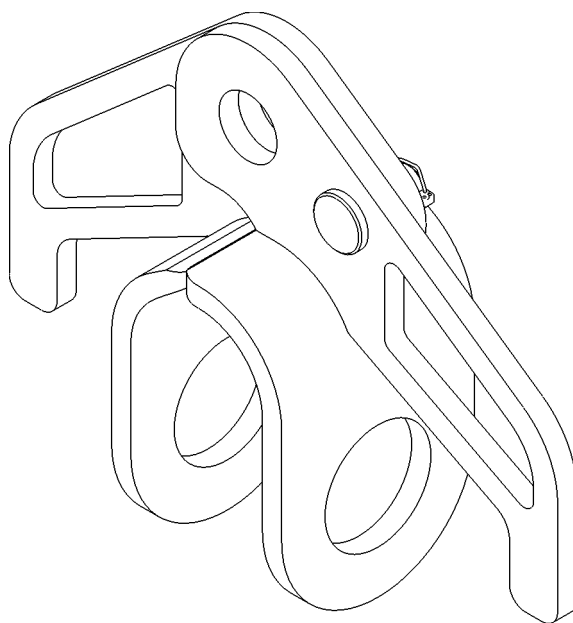


Fig. 190: Forks (illustration of principle)

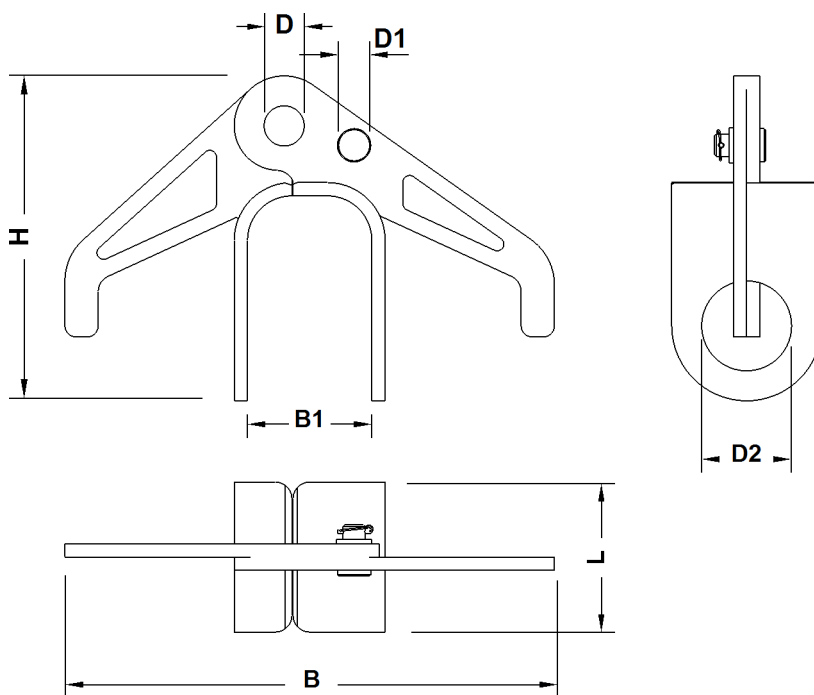


Fig. 191: Fork dimensions

Name		Value
L	Length of fork	135 mm 5.31" in
B	Width	441 mm 1' 5" ft-in

Name		Value
B1	Width of fork	112 mm 4.41" in
H	Height	293 mm 1' ft-in
D	Pin Ø	35 mm 1.38" in
D1	Pin Ø	20 mm 0.79" in
D2	Pin Ø	80 mm 3.15" in

Tab. 102: Technical data forks

Spacer bracket

The spacer brackets are identical with steel pendant straps and CF pendant straps.

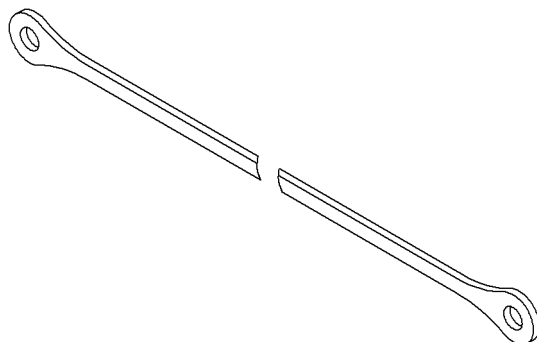


Fig. 192: Spacer brackets (illustration of principle)

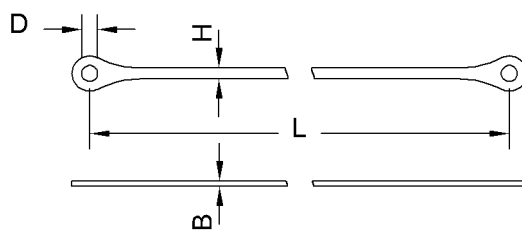


Fig. 193: Dimensions spacer brackets

Name		Value
L	Length	1100 mm 3' 7" ft-in
B	Width	10 mm 0.39" in
H	Height	40 mm 1.57" in
D	Pin Ø	35 mm 1.38" in

Tab. 103: Technical data spacer brackets

Stay ropes

Several stay ropes are assembled to achieve defined rope lengths.

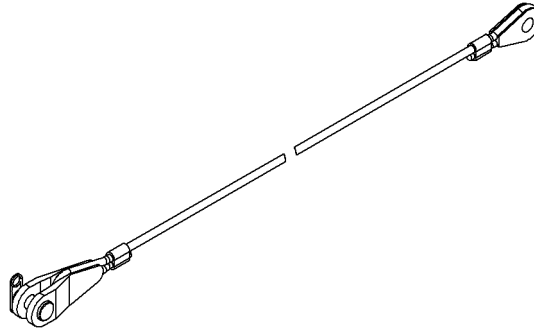


Fig. 194: Stay ropes (illustration of principle)

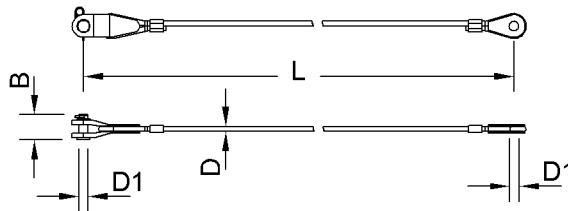


Fig. 195: Dimensions stay ropes

Name		Value
L	Length of stay rope	1100 mm 3' 7" ft-in
		1300 mm 4' 3" ft-in
		1600 mm 5' 3" ft-in
		2100 mm 6' 11" ft-in
		2600 mm 8' 6" ft-in
		3000 mm 9' 10" ft-in
D	Ø of stay rope	18 mm 0.71" in
D1	Pin Ø	35 mm 1.38" in
B	Length of pin	80 mm 3.15" in

Tab. 104: Technical data stay ropes

Pins for steel pendant straps

The pins supplied with the pendant straps must be exchanged for longer pins.

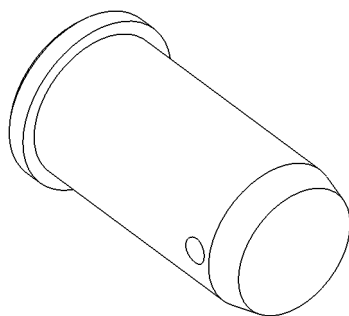


Fig. 196: Pins for steel pendant straps (illustration of principle)

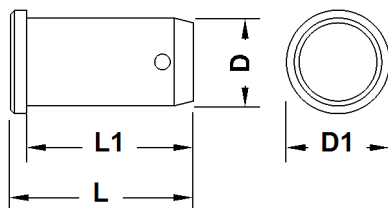


Fig. 197: Dimensions pins for steel pendant straps

Name		Value
L	Total length	140 mm 5.51" in
L1	Length	128 mm 5.04" in
D	Diameter	65 mm 2.56" in
D1	Outer diameter	80 mm 3.15" in

Tab. 105: Technical data pins for steel pendant straps

Pins for CF pendant straps

The pins supplied with the pendant straps must be exchanged for longer pins.

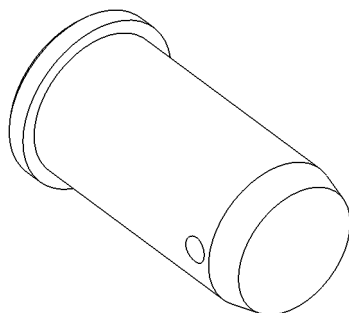


Fig. 198: Pins for CF pendant straps (illustration of principle)

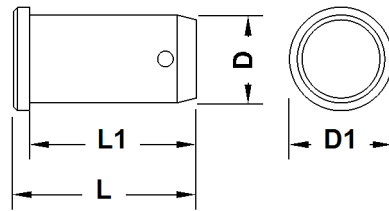


Fig. 199: Dimensions pins for CF pendant straps

Name		Value
L	Total length	170 mm 6.69" in
L1	Length	160 mm 6.30" in
D	Diameter	65 mm 2.56" in
D1	Outer diameter	85 mm 3.35" in

Tab. 106: Technical data pins for CF pendant straps

1.11.8 Steel pendant straps on main boom 2821

Steel pendant straps on main boom base section 2821.30

Equalizer of main boom base section 2821.30

Installation site in crane operation:

- Main boom 2821 (For more information see: [Pendant straps A-frame1 to main boom head 2821](#), page 1322)
- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps](#), page 1416)
- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316](#), page 1571)

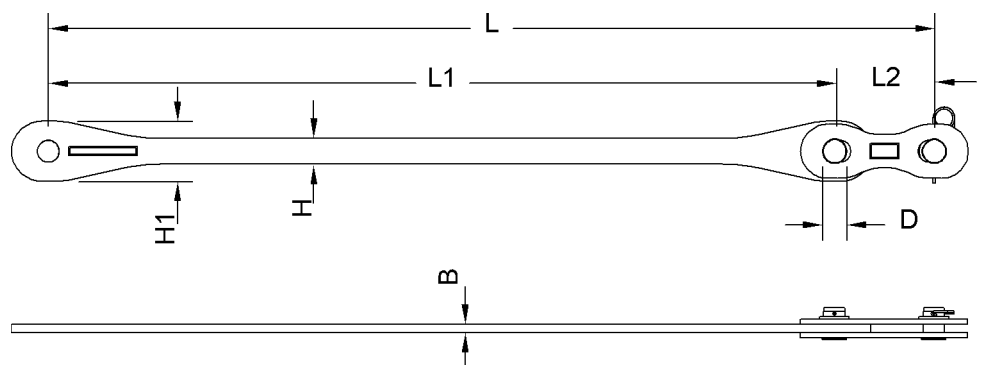


Fig. 200: Dimensions of equalizer of main boom base section 2821.30

Name		Value
L	Length	2670 mm 8' 9" ft-in
L1	Length of pendant strap	2370 mm 7' 9" ft-in
L2	Length of connecting link	300 mm 1' ft-in
W	Width of pendant strap	25 mm 0.98" in
H	Height of pendant strap	77 mm 3.03" in
H1	Height of pendant strap	180 mm 7.09" in
D	Pin Ø	65 mm 2.56" in
Weight		67 kg 148 lb

Tab. 107: Technical data equalizer of main boom base section 2821.30

Steel pendant straps on main boom section 2821.30 3 m (10 ft)

Main boom pendant strap 3 m (10 ft)

Installation site in crane operation:

- Main boom 2821 (For more information see: [Pendant straps A-frame1 to main boom head 2821, page 1322](#))
- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps, page 1416](#))
- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316, page 1571](#))

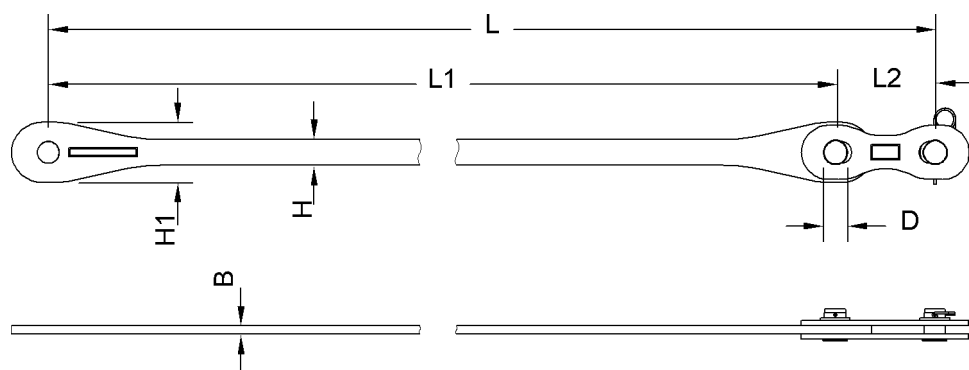


Fig. 201: Dimensions main boom pendant strap 3 m (10 ft)

Name		Value
L	Length	3000 mm 9' 10" ft-in

Name		Value
L1	Length of pendant strap	2700 mm 8' 10" ft-in
L2	Length of connecting link	300 mm 1' ft-in
H	Height of pendant strap	77 mm 3.03" in
H1	Height of pendant strap	180 mm 7.09" in
W	Width of pendant strap	25 mm 0.98" in
D	Pin Ø	65 mm 2.56" in
Weight		72 kg 159 lb

Tab. 108: Technical data main boom pendant strap 3 m (10 ft)

Jib backstay strap 3 m (10 ft)

Installation site in crane operation:

- Luffing jib 2316 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1690](#))
- Luffing jib 1916 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1709](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1792](#))
- Luffing jib 1916 + midfall 1916 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1805](#))

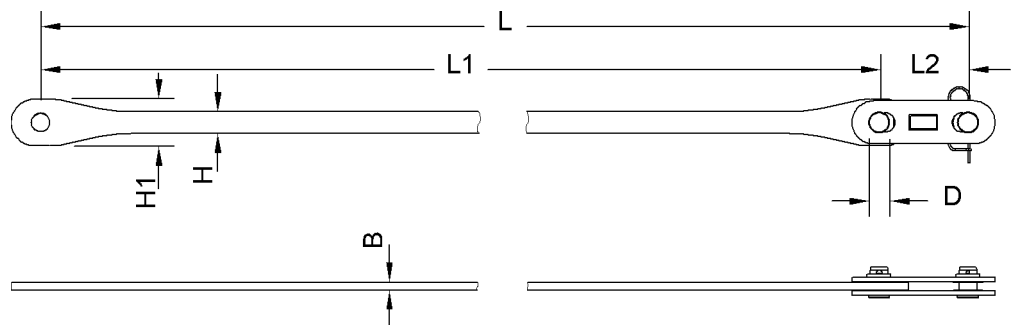


Fig. 202: Dimensions jib backstay strap 3 m (10 ft)

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2730 mm 8' 11" ft-in
L2	Length of connecting link	270 mm 10.63" in

Name		Value
W	Width of pendant strap	22 mm 0.87" in
H	Height of pendant strap	66 mm 2.60" in
H1	Height of pendant strap	140 mm 5.51" in
D	Pin Ø	55 mm 2.17" in
Weight		53 kg 117 lb

Tab. 109: Technical data jib backstay strap 3 m (10 ft)

Steel pendant straps on main boom section 2821.30 6 m (20 ft)

Main boom pendant strap 6 m (20 ft)

Installation site in crane operation:

- Main boom 2821 (For more information see: [Pendant straps A-frame1 to main boom head 2821](#), page 1322)
- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps](#), page 1416)
- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316](#), page 1571)

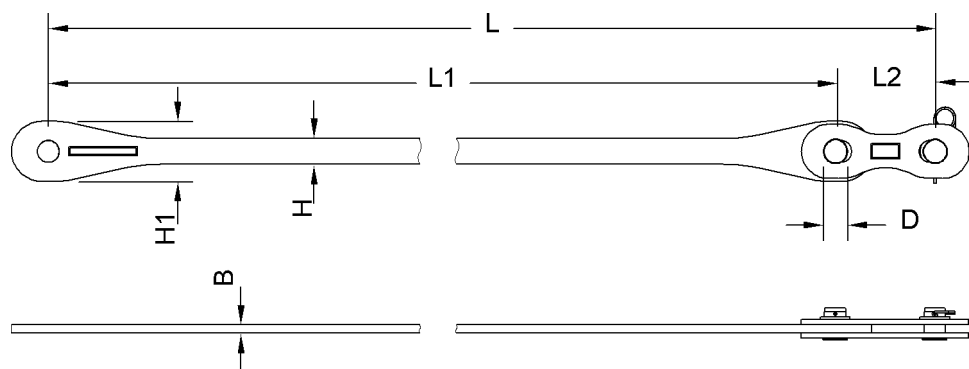


Fig. 203: Dimensions main boom pendant strap 6 m (20 ft)

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5700 mm 18' 8" ft-in
L2	Length of connecting link	300 mm 1' ft-in
H	Height of pendant strap	77 mm 3.03" in

Name		Value
H1	Height of pendant strap	180 mm 7.09" in
W	Width of pendant strap	25 mm 0.98" in
D	Pin Ø	65 mm 2.56" in
Weight		118 kg 260 lb

Tab. 110: Technical data main boom pendant strap 6 m (20 ft)

Jib backstay strap 6 m (20 ft)

Installation site in crane operation:

- Luffing jib 2316 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1690](#))
- Luffing jib 1916 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1709](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1792](#))
- Luffing jib 1916 + midfall 1916 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1805](#))

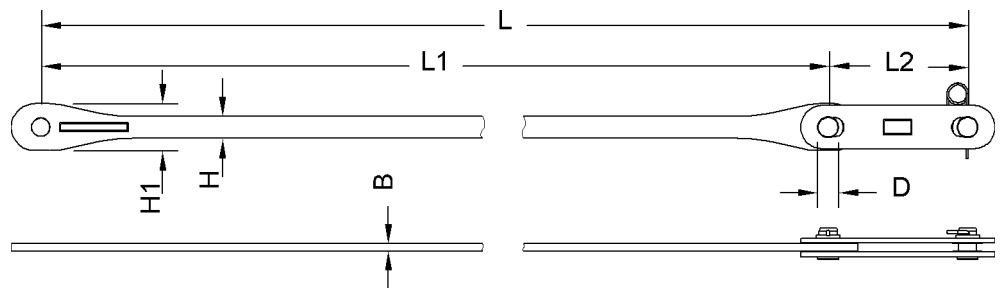


Fig. 204: Dimensions jib backstay strap 6 m (20 ft)

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5580 mm 18' 4" ft-in
L2	Length of connecting link	420 mm 1' 5" ft-in
W	Width of pendant strap	22 mm 0.87" in
H	Height of pendant strap	66 mm 2.60" in
H1	Height of pendant strap	140 mm 5.51" in
D	Pin Ø	55 mm 2.17" in

Name	Value
Weight	89 kg 196 lb

Tab. 111: Technical data jib backstay strap 6 m (20 ft)

Steel pendant straps on main boom section 2821.30 12 m (40 ft)

Main boom pendant strap 12 m (40 ft)

Installation site in crane operation:

- Main boom 2821 (For more information see: [Pendant straps A-frame1 to main boom head 2821](#), page 1322)
- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps](#), page 1416)
- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316](#), page 1571)

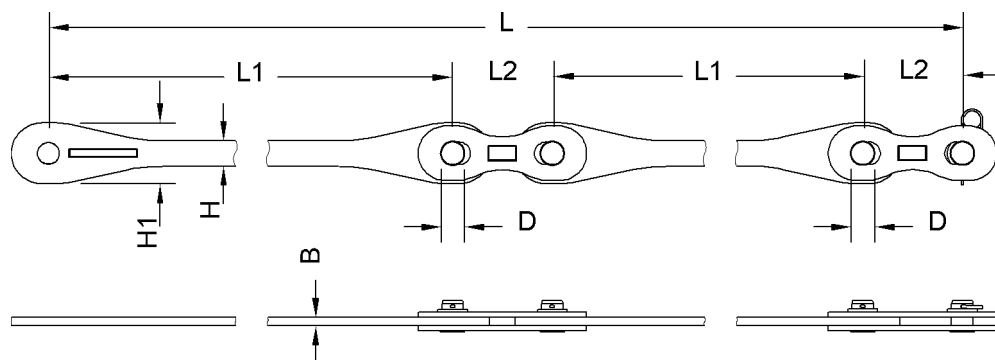


Fig. 205: Dimensions main boom pendant strap 12 m (40 ft)

Name	Value
L Length	12000 mm 39' 4" ft-in
L1 Length of pendant strap	5700 mm 18' 8" ft-in
L2 Length of connecting link	300 mm 1' ft-in
W Width of pendant strap	25 mm 0.98" in
H Height of pendant strap	77 mm 3.03" in
H1 Height of pendant strap	180 mm 7.09" in
D Pin Ø	65 mm 2.56" in
Weight	228 kg 503 lb

Tab. 112: Technical data main boom pendant strap 12 m (40 ft)

Jib backstay strap 12 m (40 ft)

Installation site in crane operation:

- Luffing jib 2316 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1690](#))
- Luffing jib 1916 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1709](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1792](#))
- Luffing jib 1916 + midfall 1916 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1805](#))

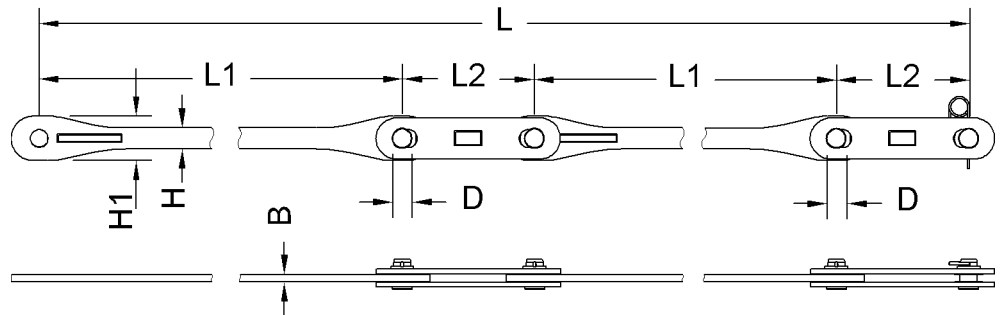


Fig. 206: Dimensions jib backstay strap 12 m (40 ft)

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	5580 mm 18' 4" ft-in
L2	Length of connecting link	420 mm 1' 5" ft-in
W	Width of pendant strap	22 mm 0.87" in
H	Height of pendant strap	66 mm 2.60" in
H1	Height of pendant strap	140 mm 5.51" in
D	Pin Ø	55 mm 2.17" in
Weight		178 kg 392 lb

Tab. 113: Technical data jib backstay strap 12 m (40 ft)

Steel pendant straps on main boom head 2821.24

Main boom pendant strap on main boom head 2821.24

Installation site in crane operation:

- Main boom 2821 (For more information see: [Pendant straps A-frame1 to main boom head 2821, page 1322](#))

- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps](#), page 1416)

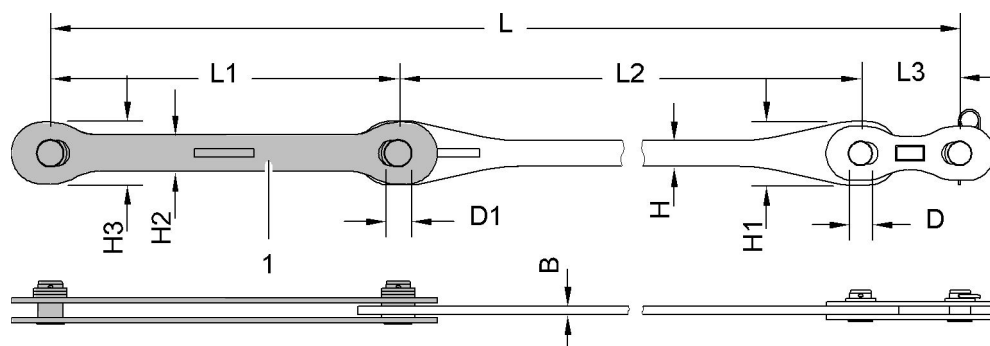


Fig. 207: Dimensions of main boom pendant strap on main boom head 2821.24

1 Connecting link (2x)



Note

If the machine is equipped with a derrick boom:

- Replace connecting links 1 on main boom head 2821.24 with connecting links with tension load cell (For more information see: [Connecting links with tension load cell](#), page 205) .

Name		Value
L	Length	6300 mm 20' 8" ft-in
L1	Length of connecting link	1050 mm 3' 5" ft-in
L2	Length of pendant strap	4950 mm 16' 3" ft-in
L3	Length of connecting link	300 mm 1' ft-in
W	Width of pendant strap	25 mm 0.98" in
H	Height of pendant strap	77 mm 3.03" in
H1	Height of pendant strap	180 mm 7.09" in
H2	Height of connecting link	110 mm 4.33" in
H3	Height of connecting link	185 mm 7.28" in
D	Pin Ø	65 mm 2.56" in
D1	Pin Ø	75 mm 2.95" in

Name	Value
Weight	154 kg 340 lb

Tab. 114: Technical data main boom pendant strap on main boom head 2821.24

Additional pendant straps/connecting links/tension load cells

Connecting links with tension load cell

Installation site in crane mode:

- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps, page 1416](#))

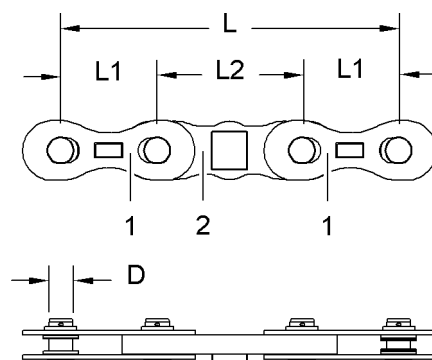


Fig. 208: Dimensions connecting links with tension load cell

- 1 Connecting links 2 Tension load cell

Name	Value
L Length	1050 mm 3' 5" ft-in
L1 Length of connecting link	300 mm 1' ft-in
L2 Length of tension load cell	450 mm 1' 6" ft-in
D Pin Ø	75 mm 2.95" in
Weight	75 kg 165 lb

Tab. 115: Technical data connecting links with tension load cell

Pendant strap with connecting link

Installation site in crane mode:

- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps, page 1416](#))

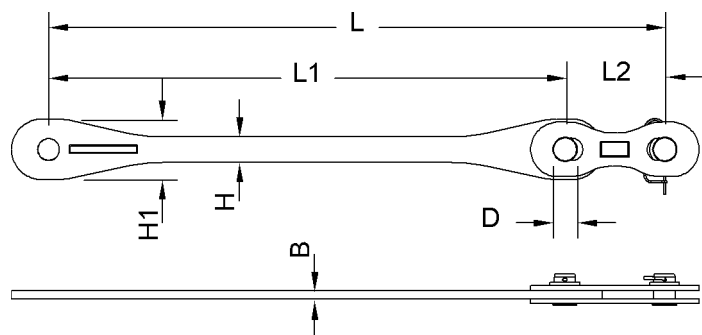


Fig. 209: Dimensions pendant strap with connecting link

Name		Value
L	Length	1855 mm 6' 1" ft-in
L1	Length of pendant strap	1555 mm 5' 1" ft-in
L2	Length of connecting link	300 mm 1' ft-in
B	Width of pendant strap	25 mm 0.98" in
H	Height of pendant strap	77 mm 3.03" in
H1	Height of pendant strap	180 mm 7.09" in
D	Pin Ø	65 mm 2.56" in
Weight		37 kg 81.57 lb

Tab. 116: Technical data pendant strap with connecting link

1.11.9 CF pendant straps on main boom 2821

CF pendant straps on main boom base section 2821.30

Equalizer of main boom base section 2821.30

Installation site in crane operation:

- Main boom 2821 (For more information see: [Pendant straps A-frame1 to main boom head 2821, page 1324](#))
- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps, page 1420](#))
- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316, page 1573](#))

Generation A of equalizer for main boom base section 2821.30

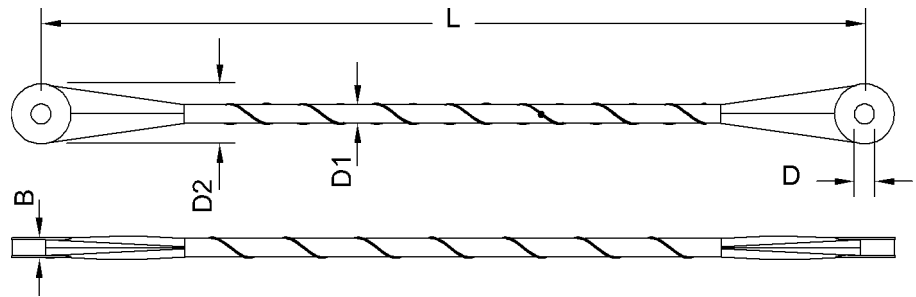


Fig. 210: Dimensions of equalizer of main boom base section 2821.30

Name	Value	
L	Length of pendant strap	2700 mm 8' 10" ft-in
W	Width	66 mm 2.60" in
D	Pin Ø	65 mm 2.56" in
D1	Pendant strap Ø	60 mm 2.36" in
D2	Pendant strap Ø	196 mm 7.72" in
Weight		29 kg 63.93 lb

Tab. 117: Technical data equalizer of main boom base section 2821.30

Generation B of equalizer for main boom base section 2821.30

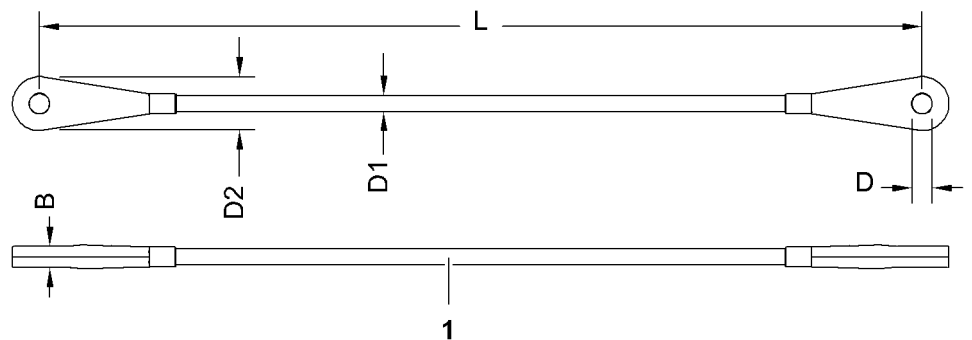


Fig. 211: Dimensions equalizer of main boom base section 2821.30

- 1 Wire mesh hose as protective sheath

Name	Value	
L	Length of pendant strap	2700 mm 8' 10" ft-in

Name		Value
B	Width	63 mm 2.48" in
D	Pin Ø	65 mm 2.56" in
D1	Pendant strap Ø	52 mm 2.05" in
D2	Pendant strap Ø	207 mm 8.15" in
Weight		29 kg 63.93 lb

Tab. 118: Technical data equalizer of main boom base section 2821.30

Connecting link

Installation site in crane mode:

- Fixed jib 1507 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1611)
- Luffing jib 2316 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1692)
- Luffing jib 1916 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1711)
- Luffing jib 2316 + midfall 2316 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1794)
- Luffing jib 1916 + midfall 1916 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1807)

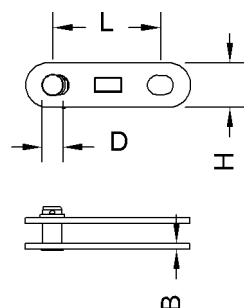


Fig. 212: Dimensions connecting link

Name		Value
L	Length of connecting link	350 mm 1' 2" ft-in
W	Width of connecting link	18 mm 0.71" in
H	Height of connecting link	140 mm 5.51" in
D	Pin Ø	60 mm 2.36" in

Name	Value
Weight	6 kg 13.23 lb

Tab. 119: Technical data connecting link

CF pendant straps on main boom section 2821.30 3 m (10 ft)

Main boom pendant strap 3 m (10 ft)

Installation site in crane operation:

- Main boom 2821 (For more information see: [Pendant straps A-frame1 to main boom head 2821](#), page 1324)
- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps](#), page 1420)
- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316](#), page 1573)

Generation A of main boom pendant strap 3 m (10 ft)

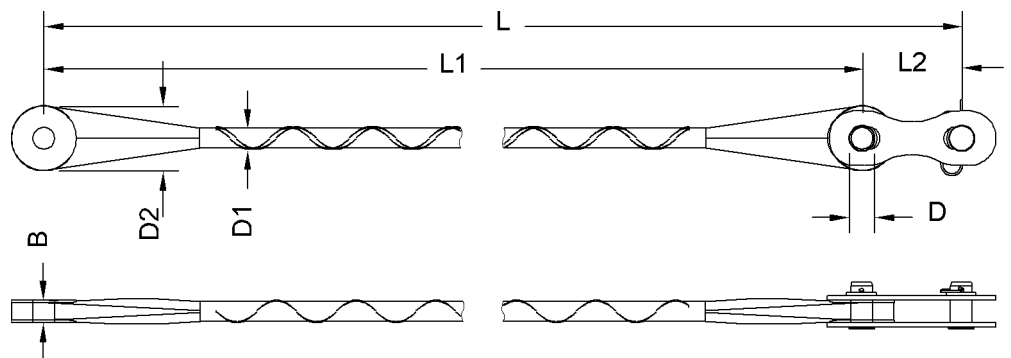


Fig. 213: Dimensions main boom pendant strap 3 m (10 ft)

Name	Value
L Length	3000 mm 9' 10" ft-in
L1 Length of pendant strap	2700 mm 8' 10" ft-in
L2 Length of connecting link	300 mm 1' ft-in
W Width	66 mm 2.60" in
D Pin Ø	65 mm 2.56" in
D1 Pendant strap Ø	60 mm 2.36" in
D2 Pendant strap Ø	196 mm 7.72" in

Name	Value
Weight	51 kg 112 lb

Tab. 120: Technical data main boom pendant strap 3 m (10 ft)

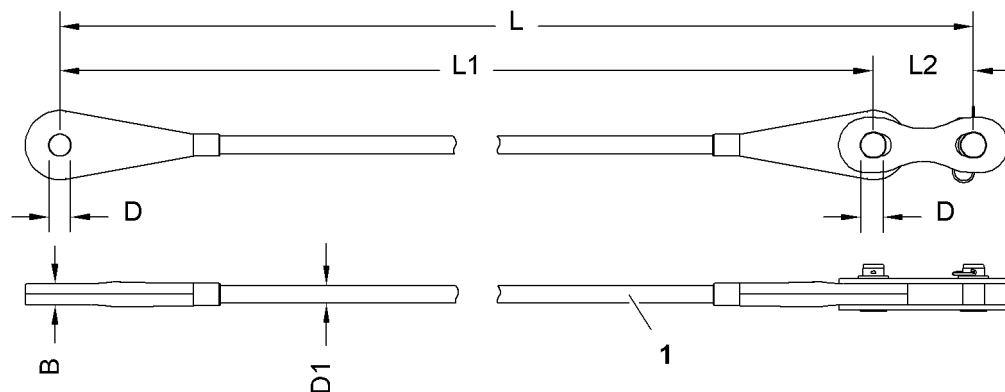
Generation B of main boom pendant strap 3 m (10 ft)

Fig. 214: Dimensions main boom pendant strap 3 m (10 ft)

- 1 Wire mesh hose as protective sheath

Name	Value
L Length	3000 mm 9' 10" ft-in
L1 Length of pendant strap	2700 mm 8' 10" ft-in
L2 Length of connecting link	300 mm 1' ft-in
W Width	63 mm 2.48" in
D Pin Ø	65 mm 2.56" in
D1 Pendant strap Ø	52 mm 2.05" in
Weight	51 kg 112 lb

Tab. 121: Technical data main boom pendant strap 3 m (10 ft)

Jib backstay strap 3 m (10 ft)

Installation site in crane mode:

- Fixed jib 1507 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1611](#))
- Luffing jib 2316 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1692](#))
- Luffing jib 1916 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1711](#))

- Luffing jib 2316 + midfall 2316 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1794)
- Luffing jib 1916 + midfall 1916 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1807)

Generation A of jib backstay strap 3 m (10 ft)

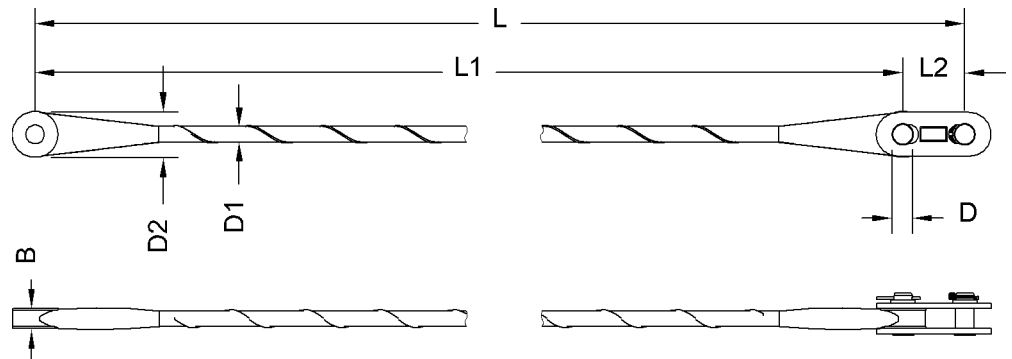


Fig. 215: Dimensions jib backstay strap 3 m (10 ft)

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2800 mm 9' 2" ft-in
L2	Length of connecting link	200 mm 7.87" in
W	Width	64 mm 2.52" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	50 mm 1.97" in
D2	Pendant strap Ø	148 mm 5.83" in
Weight		35 kg 77.16 lb

Tab. 122: Technical data jib backstay strap 3 m (10 ft)

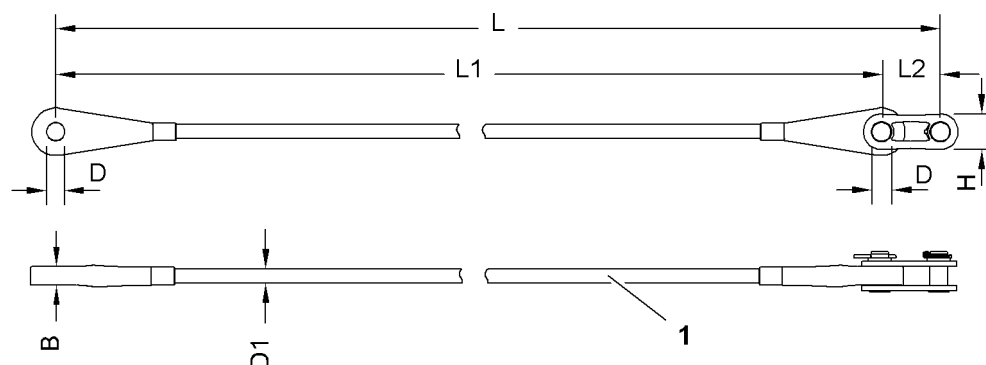
Generation B of jib backstay strap 3 m (10 ft)

Fig. 216: Dimensions jib backstay strap 3 m (10 ft)

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2800 mm 9' 2" ft-in
L2	Length of connecting link	200 mm 7.87" in
W	Width	63 mm 2.48" in
H	Height of connecting link	121 mm 4.76" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	48 mm 1.89" in
Weight		26 kg 57.32 lb

Tab. 123: Technical data jib backstay strap 3 m (10 ft)

**CF pendant straps on main boom section 2821.30
6 m (20 ft)****Main boom pendant strap 6 m (20 ft)**

Installation site in crane mode:

- Main boom 2821 (For more information see: [Pendant straps A-frame1 to main boom head 2821, page 1324](#))
- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps, page 1420](#))
- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316, page 1573](#))

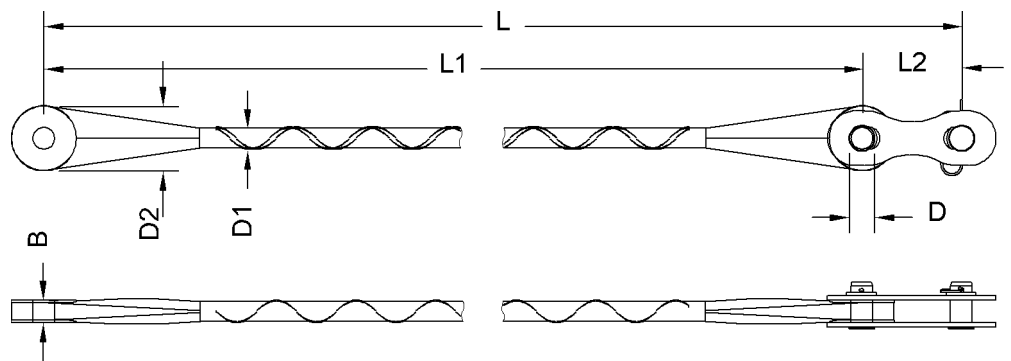
Generation A of main boom pendant strap 6 m (20 ft)

Fig. 217: Dimensions main boom pendant strap 6 m (20 ft)

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5700 mm 18' 8" ft-in
L2	Length of connecting link	300 mm 1' ft-in
W	Width	66 mm 2.60" in
D	Pin Ø	65 mm 2.56" in
D1	Pendant strap Ø	60 mm 2.36" in
D2	Pendant strap Ø	196 mm 7.72" in
Weight		62 kg 137 lb

Tab. 124: Technical data main boom pendant strap 6 m (20 ft)

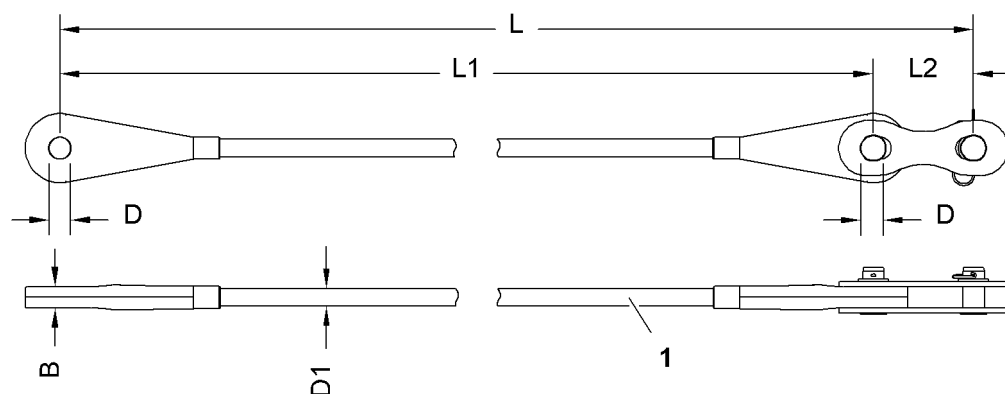
Generation B of main boom pendant strap 6 m (20 ft)

Fig. 218: Dimensions main boom pendant strap 6 m (20 ft)

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5700 mm 18' 8" ft-in
L2	Length of connecting link	300 mm 1' ft-in
W	Width	63 mm 2.48" in
D	Pin Ø	65 mm 2.56" in
D1	Pendant strap Ø	52 mm 2.05" in
Weight		62 kg 137 lb

Tab. 125: Technical data main boom pendant strap 6 m (20 ft)

Jib backstay strap 6 m (20 ft)

Installation site in crane mode:

- Fixed jib 1507 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1611](#))
- Luffing jib 2316 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1692](#))
- Luffing jib 1916 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1711](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1794](#))
- Luffing jib 1916 + midfall 1916 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821, page 1807](#))

Generation A of jib backstay strap 6 m (20 ft)

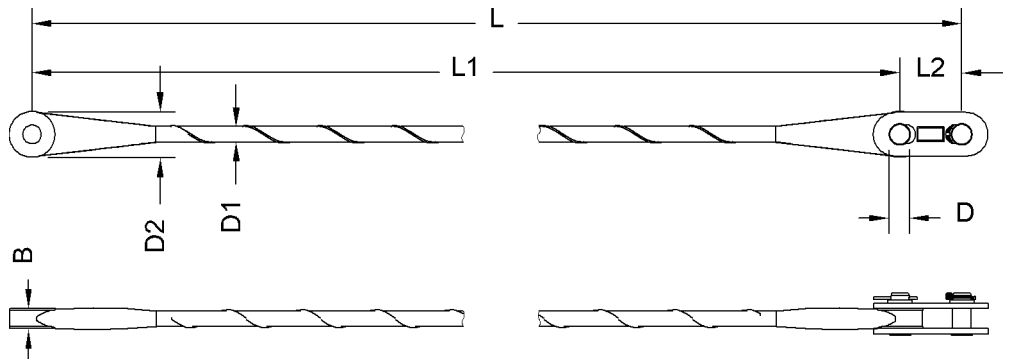


Fig. 219: Dimensions jib backstay strap 6 m (20 ft)

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5800 mm 19' ft-in
L2	Length of connecting link	200 mm 7.87" in
W	Width	64 mm 2.52" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	50 mm 1.97" in
D2	Pendant strap Ø	148 mm 5.83" in
Weight		43 kg 94.80 lb

Tab. 126: Technical data jib backstay strap 6 m (20 ft)

Generation B of jib backstay strap 6 m (20 ft)

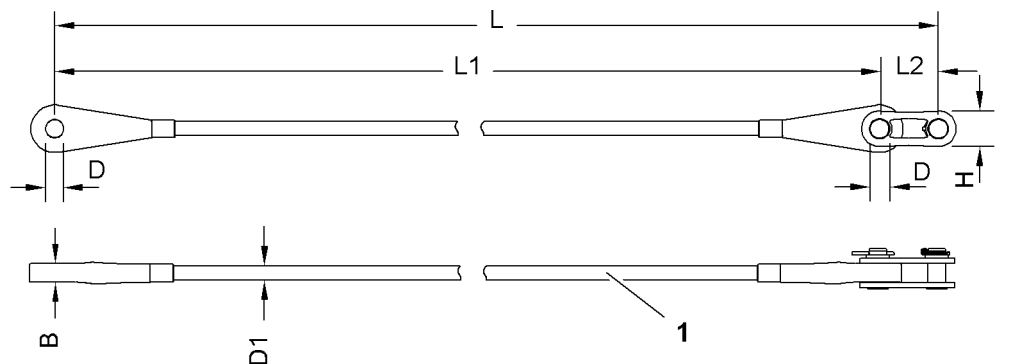


Fig. 220: Dimensions jib backstay strap 6 m (20 ft)

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5800 mm 19' ft-in
L2	Length of connecting link	200 mm 7.87" in
W	Width	63 mm 2.48" in
H	Height of connecting link	121 mm 4.76" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	48 mm 1.89" in
Weight		32 kg 70.55 lb

Tab. 127: Technical data jib backstay strap 6 m (20 ft)

CF pendant straps on main boom section 2821.30 12 m (40 ft)

Main boom pendant strap 12 m (40 ft)

Installation site in crane operation:

- Main boom 2821 (For more information see: [Pendant straps A-frame1 to main boom head 2821, page 1324](#))
- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps, page 1420](#))
- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316, page 1573](#))

Generation A of main boom pendant strap 12 m (40 ft)

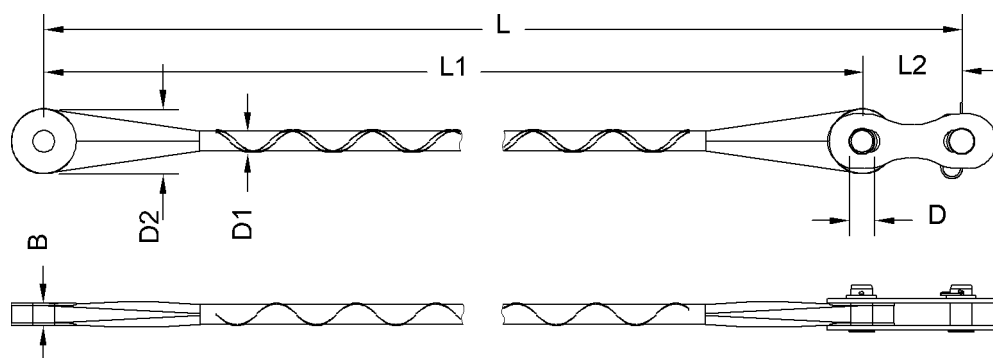


Fig. 221: Dimensions main boom pendant strap 12 m (40 ft)

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	11700 mm 38' 5" ft-in
L2	Length of connecting link	300 mm 1' ft-in
W	Width	66 mm 2.60" in
D	Pin Ø	65 mm 2.56" in
D1	Pendant strap Ø	60 mm 2.36" in
D2	Pendant strap Ø	196 mm 7.72" in
Weight		85 kg 187 lb

Tab. 128: Technical data main boom pendant strap 12 m (40 ft)

Generation B of main boom pendant strap 12 m (40 ft)

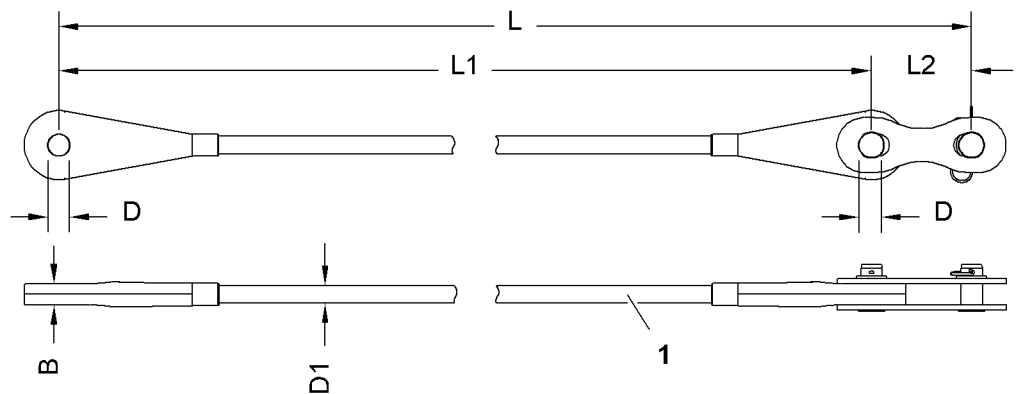


Fig. 222: Dimensions main boom pendant strap 12 m (40 ft)

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	11700 mm 38' 5" ft-in
L2	Length of connecting link	300 mm 1' ft-in
W	Width	63 mm 2.48" in
D	Pin Ø	65 mm 2.56" in

Name		Value
D1	Pendant strap \varnothing	52 mm 2.05" in
Weight		85 kg 187 lb

Tab. 129: Technical data main boom pendant strap 12 m (40 ft)

Jib backstay strap 12 m (40 ft)

Installation site in crane operation:

- Fixed jib 1507 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1611)
- Luffing jib 2316 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1692)
- Luffing jib 1916 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1711)
- Luffing jib 2316 + midfall 2316 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1794)
- Luffing jib 1916 + midfall 1916 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1807)

Generation A of jib backstay strap 12 m (40 ft)

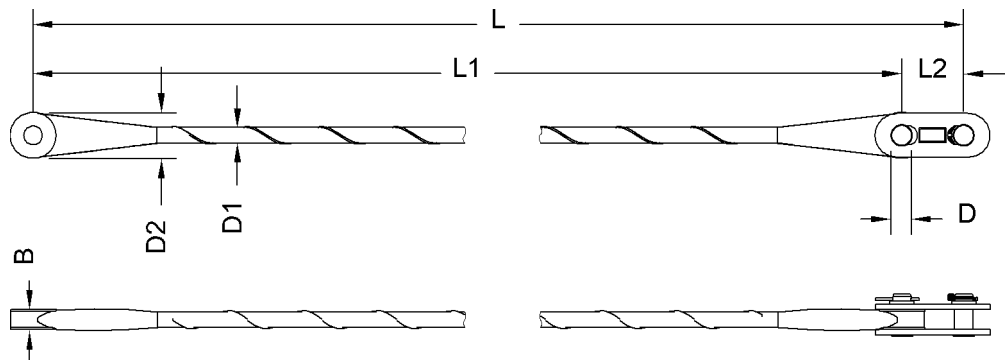


Fig. 223: Dimensions jib backstay strap 12 m (40 ft)

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	11800 mm 38' 9" ft-in
L2	Length of connecting link	200 mm 7.87" in
W	Width	64 mm 2.52" in
D	Pin \varnothing	60 mm 2.36" in
D1	Pendant strap \varnothing	50 mm 1.97" in

Name		Value
D2	Pendant strap \varnothing	148 mm 5.83" in
Weight		60 kg 132 lb

Tab. 130: Technical data jib backstay strap 12 m (40 ft)

Generation B of jib backstay strap 12 m (40 ft)

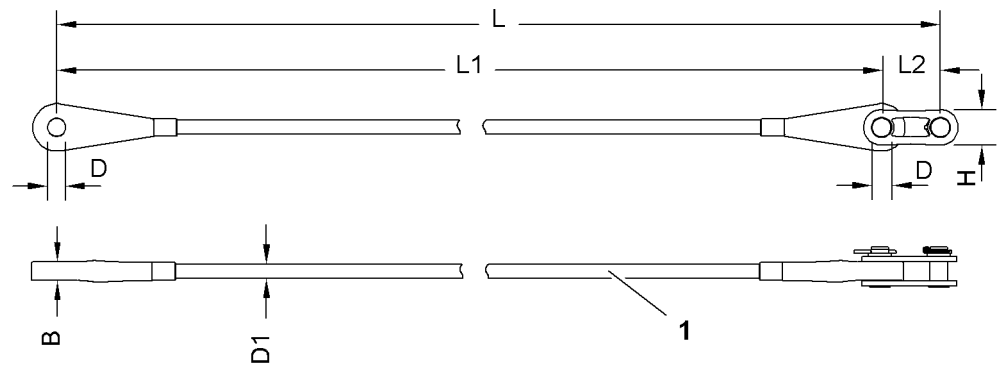


Fig. 224: Dimensions jib backstay strap 12 m (40 ft)

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	11800 mm 38' 9" ft-in
L2	Length of connecting link	200 mm 7.87" in
W	Width	63 mm 2.48" in
H	Height of connecting link	121 mm 4.76" in
D	Pin \varnothing	60 mm 2.36" in
D1	Pendant strap \varnothing	48 mm 1.89" in
Weight		43 kg 94.80 lb

Tab. 131: Technical data jib backstay strap 12 m (40 ft)

CF pendant straps on main boom head 2821.24

Main boom pendant strap on main boom head 2821.24

Installation site in crane operation:

- Main boom 2821 (For more information see: [Pendant straps A-frame1 to main boom head 2821](#), page 1324)
- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps](#), page 1420)

Generation A of main boom pendant strap on main boom head 2821.24

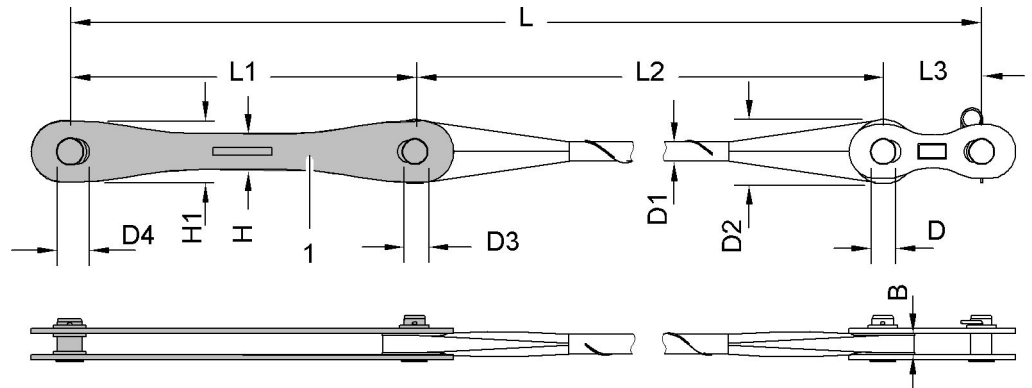


Fig. 225: Dimensions of main boom pendant strap on main boom head 2821.24

1 Connecting link (2x)



Note

If the machine is equipped with a derrick boom:

- Replace connecting links **1** on main boom head 2821.24 with connecting links with tension load cell (For more information see: [Connecting links with tension load cell](#), page 222) .

Name		Value
L	Length	6300 mm 20' 8" ft-in
L1	Length of connecting link	1050 mm 3' 5" ft-in
L2	Length of pendant strap	4950 mm 16' 3" ft-in
L3	Length of connecting link	300 mm 1' ft-in
W	Width of pendant strap	66 mm 2.60" in
H	Height of connecting link	110 mm 4.33" in
H1	Height of connecting link	185 mm 7.28" in
D	Pin Ø	65 mm 2.56" in

Name		Value
D1	Pendant strap \varnothing	66 mm 2.60" in
D2	Pendant strap \varnothing	195 mm 7.68" in
D3	Pin \varnothing	65 mm 2.56" in
D4	Pin \varnothing	75 mm 2.95" in
Weight		109 kg 240 lb

Tab. 132: Technical data main boom pendant strap on main boom head 2821.24

Generation B of main boom pendant strap on main boom head 2821.24

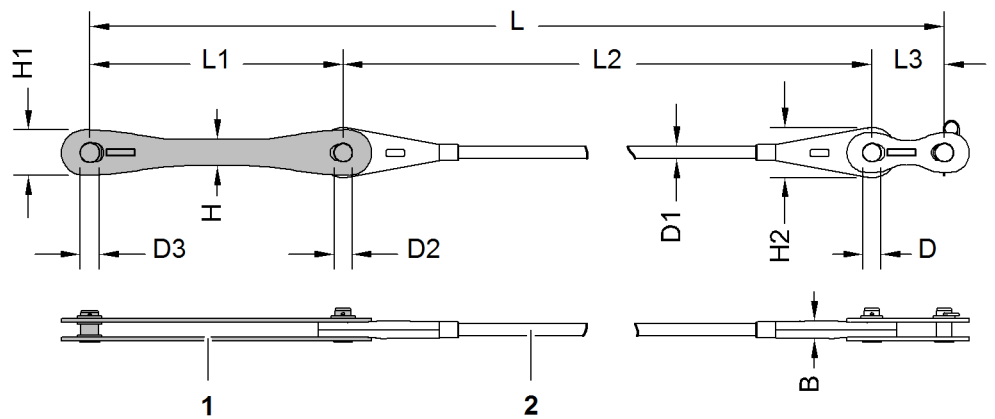


Fig. 226: Dimensions of main boom pendant strap on main boom head 2821.24

- 1 Connecting link (2x)
- 2 Wire mesh hose as protective sheath



Note

If the machine is equipped with a derrick boom:

- Replace connecting links 1 on main boom head 2821.24 with connecting links with tension load cell (For more information see: [Connecting links with tension load cell, page 222](#)).

Name		Value
L	Length	6300 mm 20' 8" ft-in
L1	Length of connecting link	1050 mm 3' 5" ft-in
L2	Length of pendant strap	4950 mm 16' 3" ft-in
L3	Length of connecting link	300 mm 1' ft-in

Name		Value
B	Width of pendant strap	63 mm 2.48" in
H	Height of connecting link	110 mm 4.33" in
H1	Height of connecting link	187 mm 7.36" in
H2	Height of pendant strap	207 mm 8.15" in
D	Pin Ø	65 mm 2.56" in
D1	Pendant strap Ø	52 mm 2.05" in
D2	Pin Ø	65 mm 2.56" in
D3	Pin Ø	75 mm 2.95" in
Weight		108 kg 238 lb

Tab. 133: Technical data main boom pendant strap on main boom head 2821.24

Additional pendant straps/connecting links/tension load cells

Connecting links with tension load cell

Installation site in crane mode:

- Main boom 2821 + derrick boom 2220 (For more information see: 2821 main boom head to 2220 derrick boom head pendant straps, page 1420)

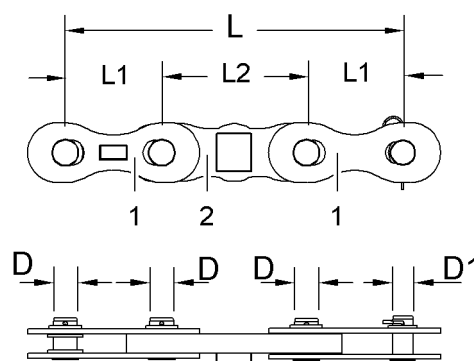


Fig. 227: Dimensions connecting links with tension load cell

- 1 Connecting links
- 2 Tension load cell

Name		Value
L	Length	1050 mm 3' 5" ft-in

Name		Value
L1	Length of connecting link	300 mm 1' ft-in
L2	Length of tension load cell	450 mm 1' 6" ft-in
D	Pin Ø	75 mm 2.95" in
D1	Pin Ø	65 mm 2.56" in
Weight		75 kg 165 lb

Tab. 134: Technical data connecting links with tension load cell

Connecting links

Installation site in crane mode:

- Main boom 2821 + derrick boom 2220 (For more information see: [2821 main boom head to 2220 derrick boom head pendant straps](#), page 1420)

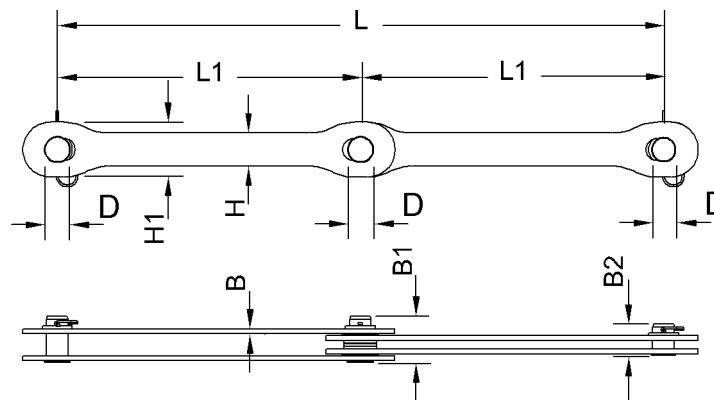


Fig. 228: Dimensions connecting links

Name		Value
L	Length	1825 mm 6' ft-in
L1	Length of connecting link	912.5 mm 3' ft-in
B	Width of connecting link	15 mm 0.59" in
B1	Length of pin	140 mm 5.51" in
B2	Length of pin	95 mm 3.74" in
H	Height of pendant strap	100 mm 3.94" in
H1	Height of pendant strap	165 mm 6.50" in

2821 main boom

Name		Value
D	Pin Ø	65 mm 2.56" in
Weight		53 kg 117 lb

Tab. 135: Technical data connecting links

1.12 Reducing piece overview

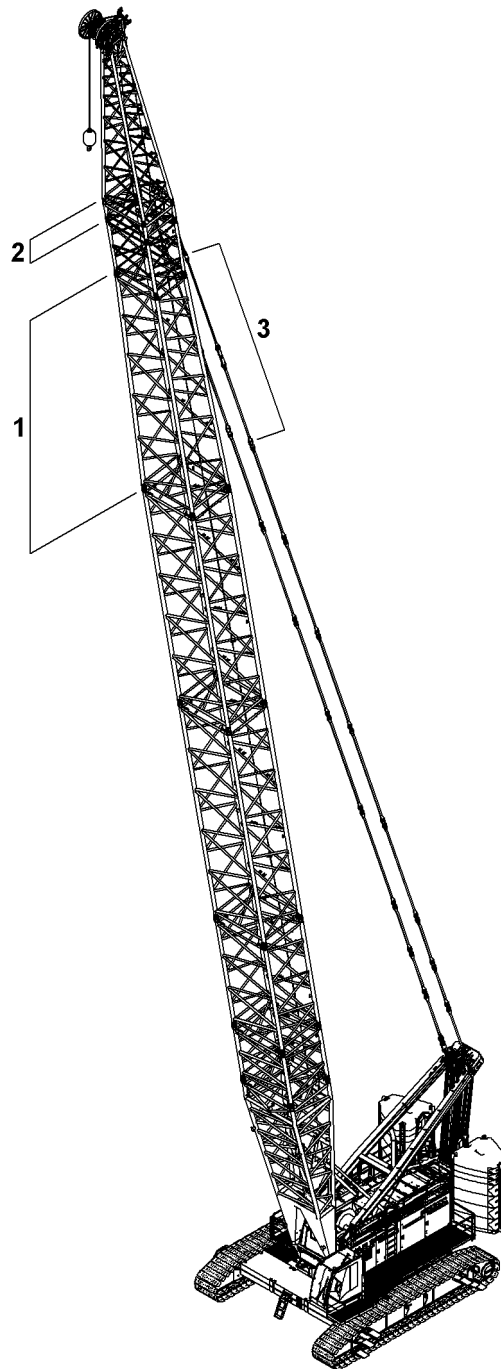


Fig. 229: Reducing adapter overview

- | | | | |
|---|-------------------|---|--------------------------------|
| 1 | Reducing adapter | 3 | Reducing adapter pendant strap |
| 2 | Main boom section | | |

1.13 2821/2316 reducing piece

1.13.1 2821/2316.24 reducing piece 12 m (40 ft)

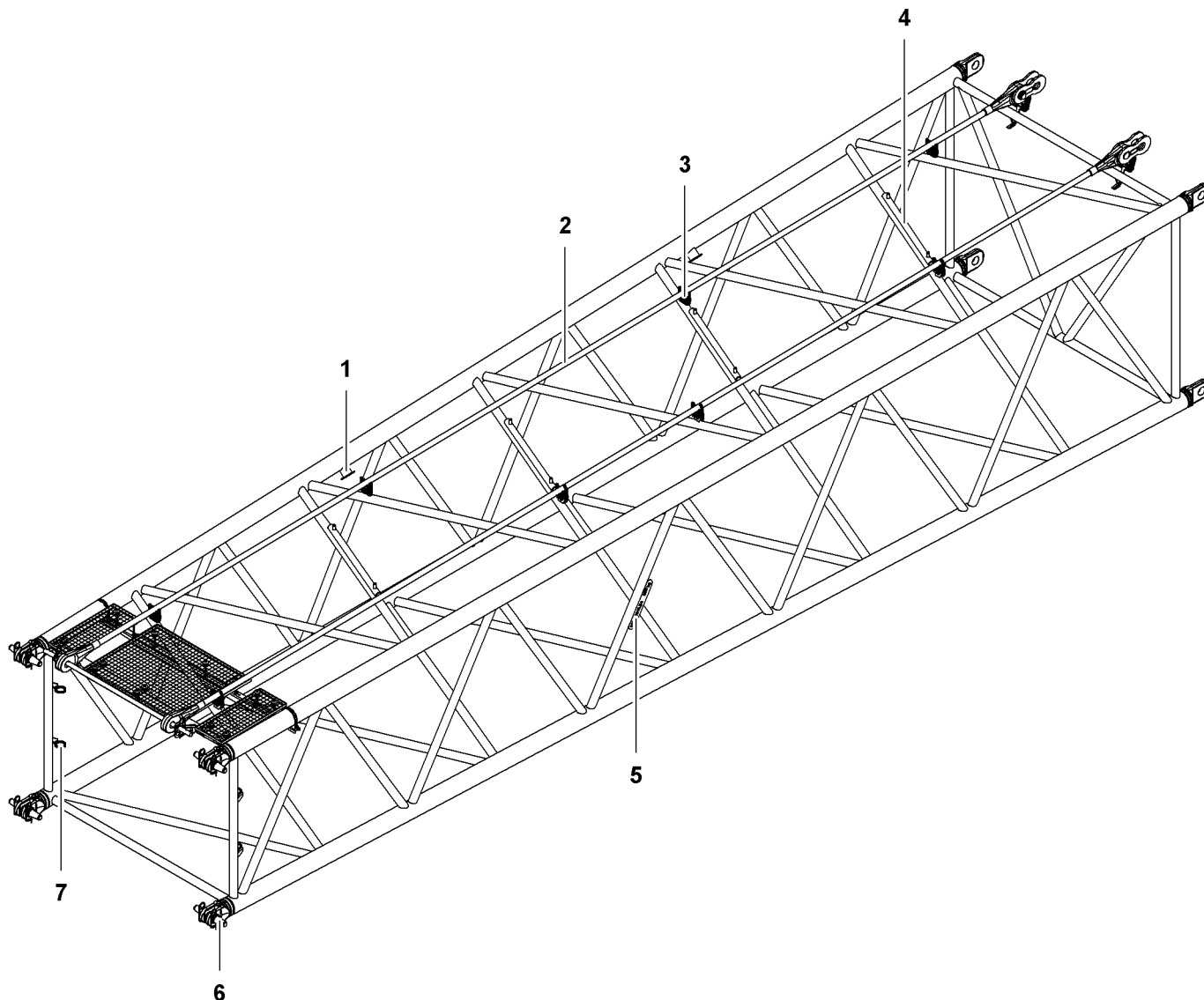


Fig. 230: Reducing adapter 2821/2316.24 12 m (40 ft)

- | | | | | | |
|---|--|---|--|---|---|
| 1 | Rigging point (4x) | 4 | Rope protection guard (6x) | 7 | Transport bracket (4x) for double taper pin |
| 2 | Transport position of reducing adapter pendant straps 12 m (40 ft) | 5 | Boom identification plate | | |
| 3 | Transport bracket (6x) for pendant straps | 6 | Pin connection point (8x) with double-taper pin (4x) | | |

2821/2316 reducing piece

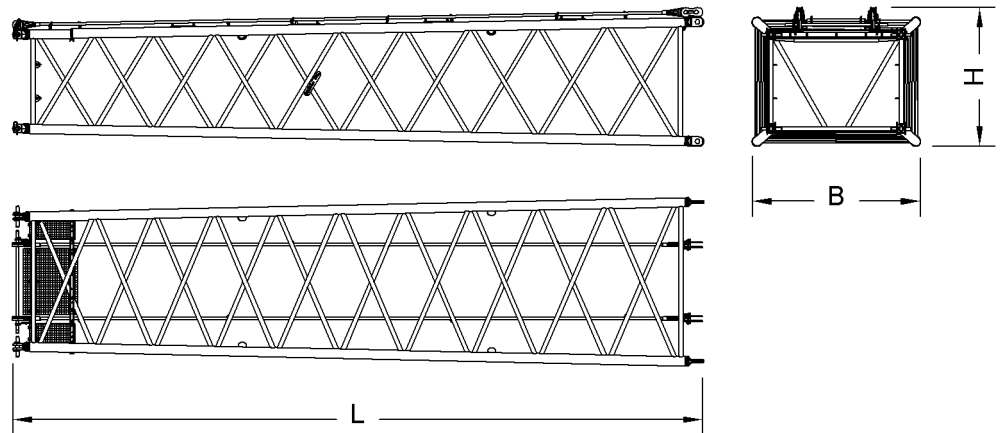


Fig. 231: Dimensions reducing adapter 2821/2316.24 12 m (40 ft)

Name		Value
System length		12000 mm 39' 4" ft-in
System width		2800 mm (9' 2" ft-in)/ 2290 mm (7' 6" ft-in)
System height		2100 mm (6' 11" ft-in)/ 1650 mm (5' 5" ft-in)
L	Length	12180 mm 40' ft-in
B	Width	2970 mm 9' 9" ft-in
H	Height (incl. pendant straps)	2470 mm 8' 1" ft-in
Weight (incl. pendant straps)		3630 kg 8,003 lb
Double-taper pins Ø		80 mm (3.15" in)/ 65 mm (2.56" in)

Tab. 136: 2821/2316.24 reducing piece technical data 12 m (40 ft)

1.13.2 Main boom section 2316.25 1 m (3 ft)

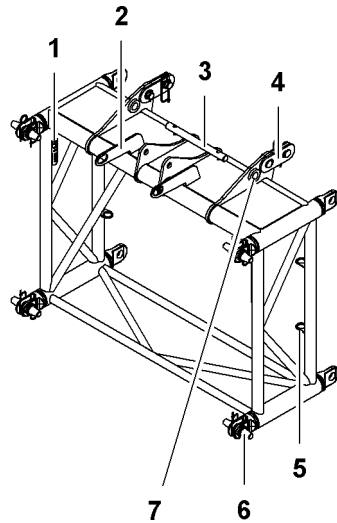


Fig. 232: Main boom section 2316.25 1 m (3 ft)

- | | | | |
|---|---|---|---|
| 1 | Boom identification plate | 5 | Transport bracket (4x) for double-taper pins |
| 2 | Link plate (2x) for main boom pendant straps | 6 | Pin connection point (8x) with double-taper pins (4x) |
| 3 | Rope protection support | 7 | Pin connection point for CF pendant straps |
| 4 | Connecting link (2x) for main boom pendant straps | | |

Machine with steel pendant straps: Connecting links 4 have a length of 200 mm (7.87" in) and a pin diameter of 55 mm (2.17" in).

Machine with CF pendant straps: Connecting links 4 have a length of 350 mm (1' 2" ft-in) and a pin diameter of 60 mm (2.36" in). The connecting links must be pinned to the pin connection point 7.

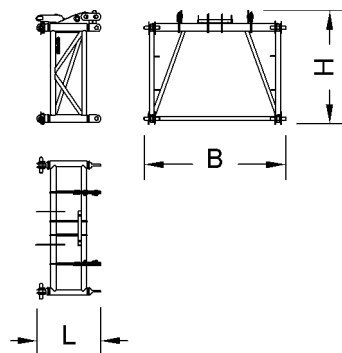


Fig. 233: Dimensions main boom section 2316.25 1 m (3 ft)

Name	Value
System length	1000 mm 3' 3" ft-in
System width	2290 mm 7' 6" ft-in

Name		Value
System height		1650 mm 5' 5" ft-in
L	Length	1150 mm 3' 9" ft-in
W	Width	2430 mm 8' ft-in
H	Height	2010 mm 6' 7" ft-in
Weight		642 kg 1,415 lb
Double-taper pins Ø		65 mm 2.56" in

Tab. 137: Technical data main boom section 2316.25 1 m (3 ft)

1.13.3 Mid-point suspension on reducing adapter 2821/2316

The mid-point suspensions on reducing adapter 2821/2316 differ with steel pendant straps and CF pendant straps.

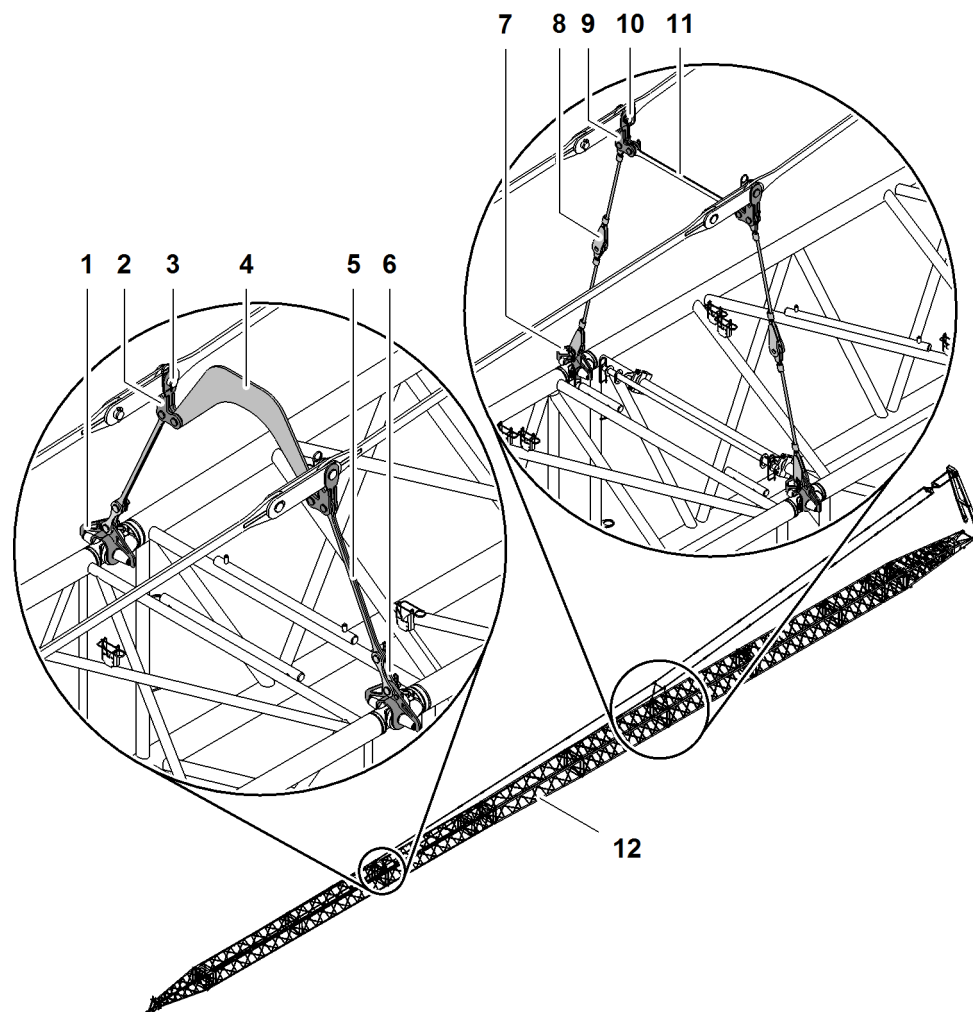


Fig. 234: Mid-point suspension on reducing adapter 2821/2316 (illustration of principle)

- | | | | |
|---|---|----|--|
| 1 | Fork (2x) behind reducing adapter | 7 | Fork (2x) in front of reducing adapter |
| 2 | Connecting element (2x) behind reducing adapter | 8 | Stay ropes |
| 3 | Pin (2x) for pendant straps behind reducing adapter | 9 | Connecting element (2x) in front of reducing adapter |
| 4 | Spacer bracket behind reducing adapter | 10 | Pin (2x) for pendant straps in front of reducing adapter |
| 5 | Top backstay shackles | 11 | Spacer bracket in front of reducing adapter |
| 6 | Bottom backstay shackles | 12 | Reducing adapter |

Connecting elements for steel pendant straps in front of reducing adapter

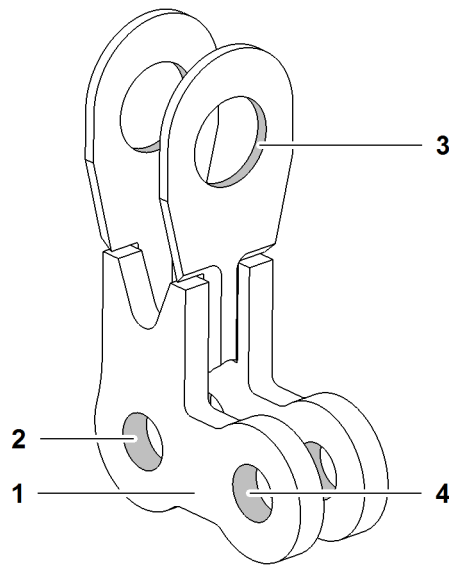


Fig. 235: Connecting elements for steel pendant straps in front of reducing adapter (illustration of principle)

- | | |
|---|--|
| <p>1 Connecting element</p> <p>2 Pin connection point for stay rope</p> | <p>3 Pin connection point for pendant strap</p> <p>4 Pin connection point for spacer bracket</p> |
|---|--|

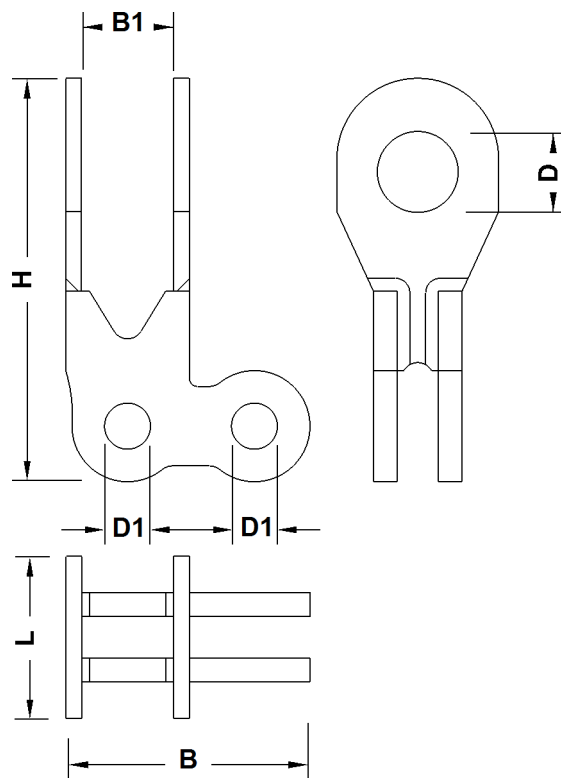


Fig. 236: Dimensions connecting elements for steel pendant straps in front of reducing adapter

Name		Value
L	Length	112 mm 4.41" in
H	Height	361 mm 1' 2" ft-in
B	Width	190 mm 7.48" in
B1	Width between links	58 mm 2.28" in
D	Pin Ø	65 mm 2.56" in
D1	Pin Ø	35 mm 1.38" in

Tab. 138: Technical data connecting elements for steel pendant straps in front of reducing adapter

Connecting elements for CF pendant straps in front of reducing adapter

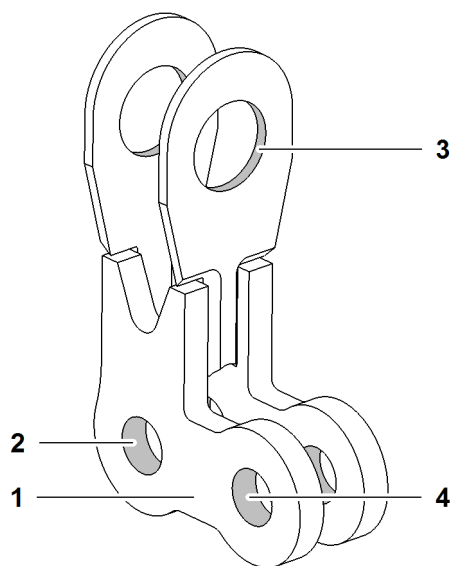


Fig. 237: Connecting elements for CF pendant straps in front of reducing adapter (illustration of principle)

- | | | | |
|---|------------------------------------|---|---|
| 1 | Connecting element | 3 | Pin connection point for pendant strap |
| 2 | Pin connection point for stay rope | 4 | Pin connection point for spacer bracket |

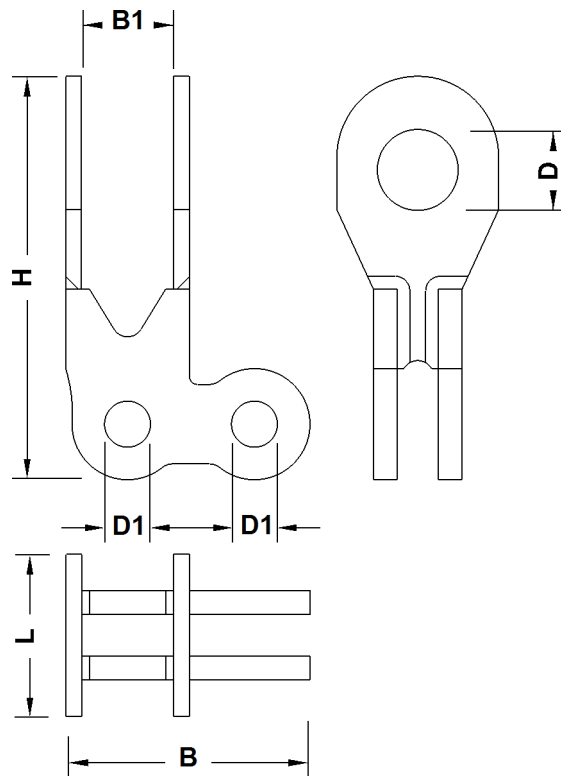


Fig. 238: Dimensions connecting elements for CF pendant straps in front of reducing adapter

Name		Value
L	Length	110 mm 4.33" in
H	Height	358 mm 1' 2" ft-in
B	Width	207 mm 8.15" in
B1	Width between links	104 mm 4.09" in
D	Pin Ø	65 mm 2.56" in
D1	Pin Ø	35 mm 1.38" in

Tab. 139: Technical data connecting elements for CF pendant straps in front of reducing adapter

Connecting elements for steel pendant straps behind reducing adapter

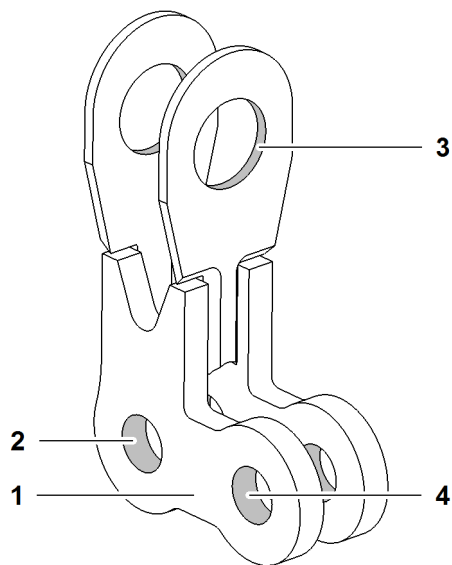


Fig. 239: Connecting elements for steel pendant straps behind reducing adapter (illustration of principle)

- | | | | |
|---|------------------------------------|---|---|
| 1 | Connecting element | 3 | Pin connection point for pendant strap |
| 2 | Pin connection point for stay rope | 4 | Pin connection point for spacer bracket |

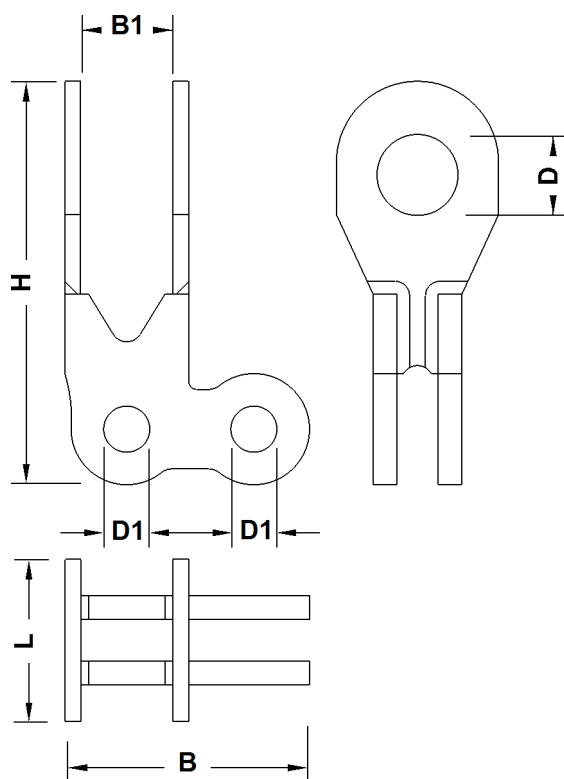


Fig. 240: Dimensions connecting elements for steel pendant straps behind reducing adapter

Name		Value
L	Length	102 mm 4.02" in
H	Height	354 mm 1' 2" ft-in
B	Width	190 mm 7.48" in
B1	Width between links	58 mm 2.28" in
D	Pin Ø	55 mm 2.17" in
D1	Pin Ø	35 mm 1.38" in

Tab. 140: Technical data connecting elements for steel pendant straps behind reducing adapter

Connecting elements for CF pendant straps behind reducing adapter

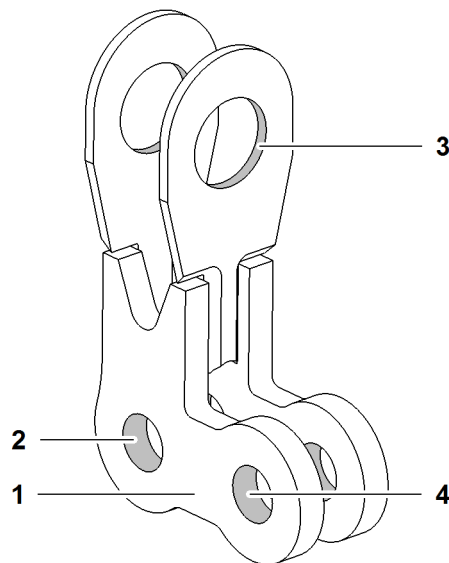


Fig. 241: Connecting elements for CF pendant straps behind reducing adapter (illustration of principle)

- | | | | |
|----------|------------------------------------|----------|---|
| 1 | Connecting element | 3 | Pin connection point for pendant strap |
| 2 | Pin connection point for stay rope | 4 | Pin connection point for spacer bracket |

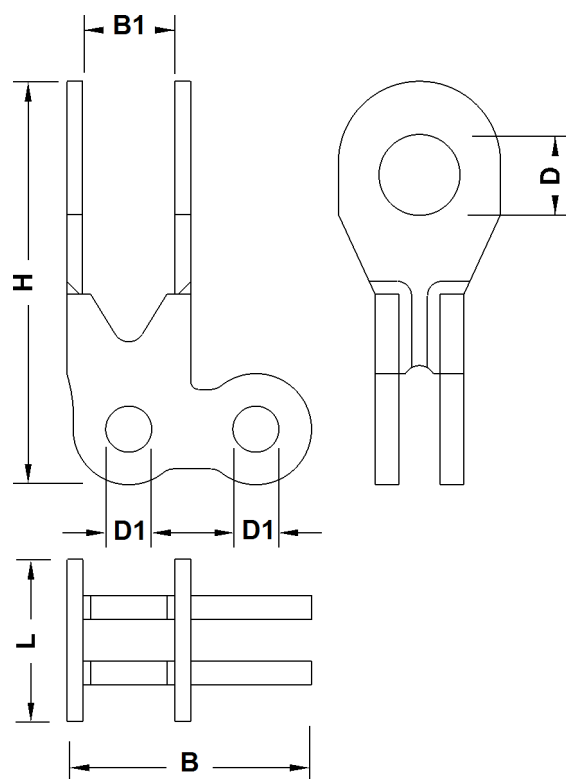


Fig. 242: Dimensions connecting elements for CF pendant straps behind reducing adapter

Name		Value
L	Length	110 mm 4.33" in
H	Height	358 mm 1' 2" ft-in
B	Width	207 mm 8.15" in
B1	Width between links	104 mm 4.09" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	35 mm 1.38" in

Tab. 141: Technical data connecting elements for CF pendant straps behind reducing adapter

Forks in front of reducing adapter

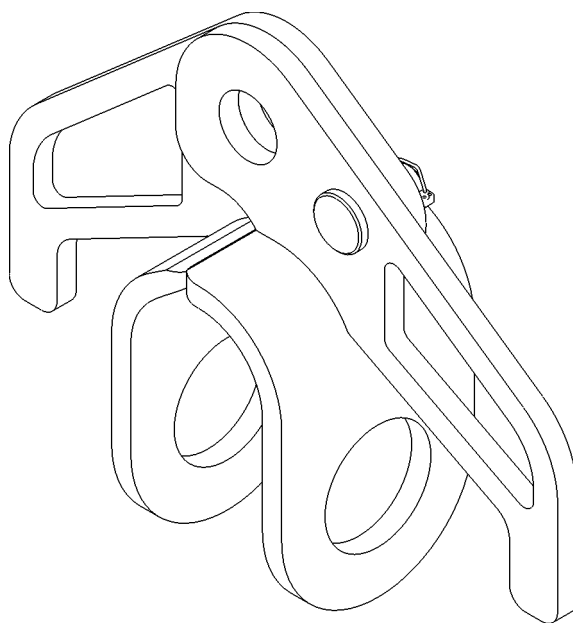


Fig. 243: Forks in front of reducing adapter (illustration of principle)

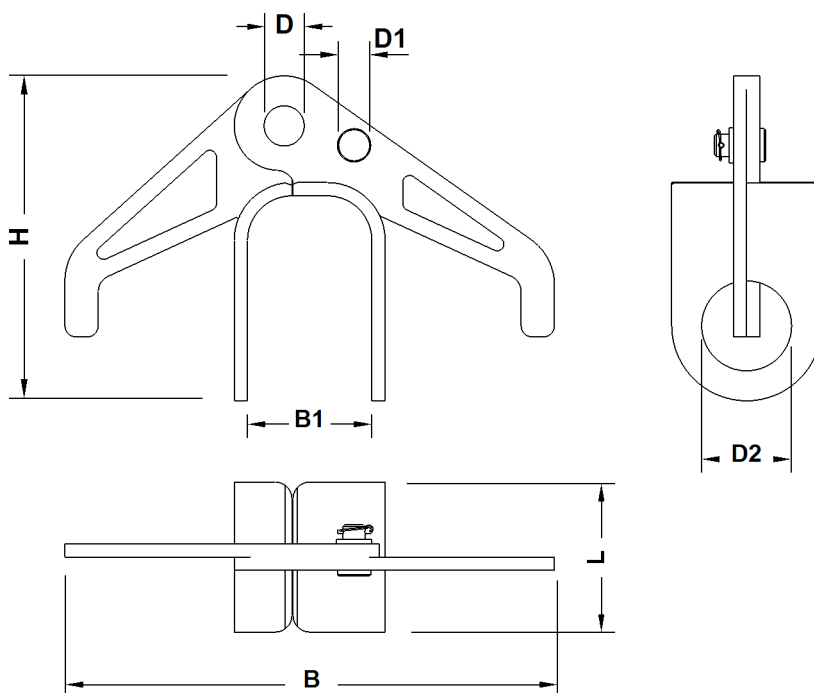


Fig. 244: Dimensions forks in front of reducing adapter

Name		Value
L	Length of fork	135 mm 5.31" in
B	Width	441 mm 1' 5" ft-in

Name		Value
B1	Width of fork	112 mm 4.41" in
H	Height	293 mm 1' ft-in
D	Pin Ø	35 mm 1.38" in
D1	Pin Ø	20 mm 0.79" in
D2	Pin Ø	80 mm 3.15" in

Tab. 142: Technical data forks in front of reducing adapter

Forks behind reducing adapter

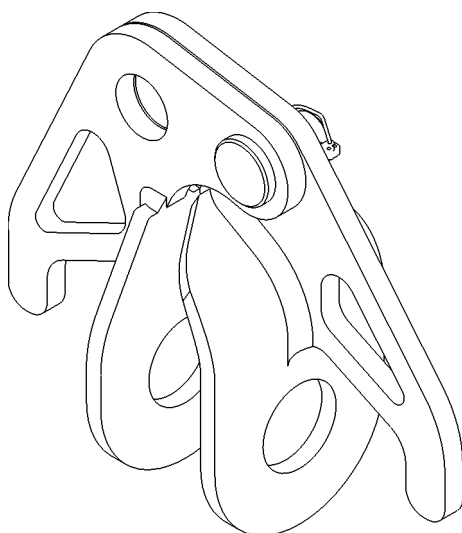


Fig. 245: Forks behind reducing adapter (illustration of principle)

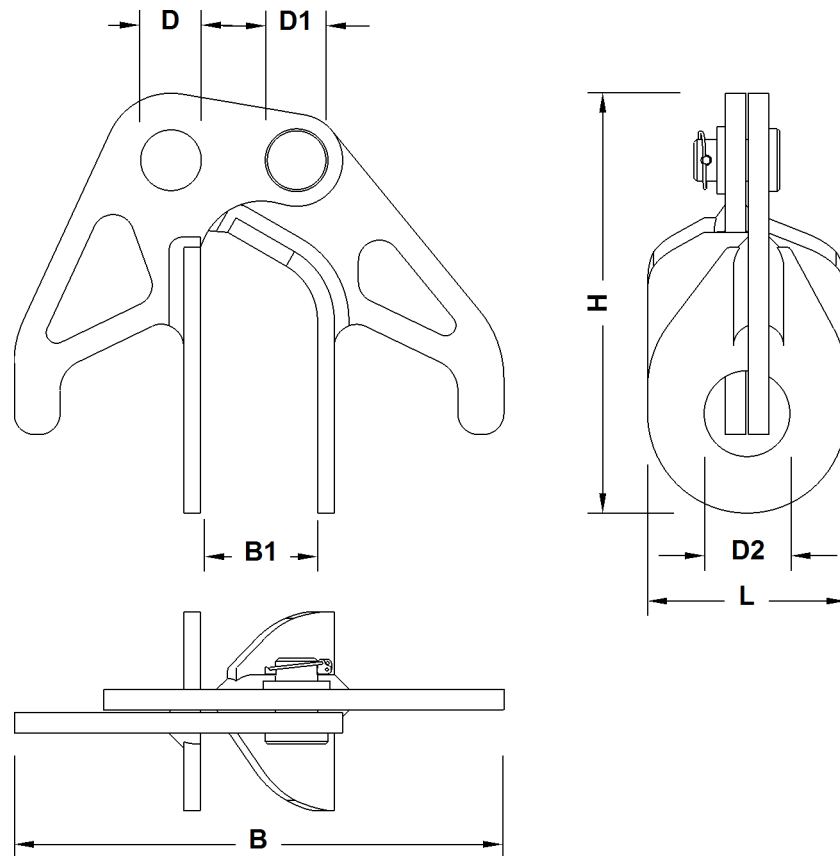


Fig. 246: Dimensions forks behind reducing adapter

Name		Value
L	Length of fork	120 mm 4.72" in
B	Width	354 mm 1' 2" ft-in
B1	Width of fork	82 mm 3.23" in
H	Height	270 mm 10.63" in
D	Pin Ø	35 mm 1.38" in
D1	Pin Ø	20 mm 0.79" in
D2	Pin Ø	65 mm 2.56" in

Tab. 143: Technical data forks behind reducing adapter

Spacer bracket in front of reducing adapter

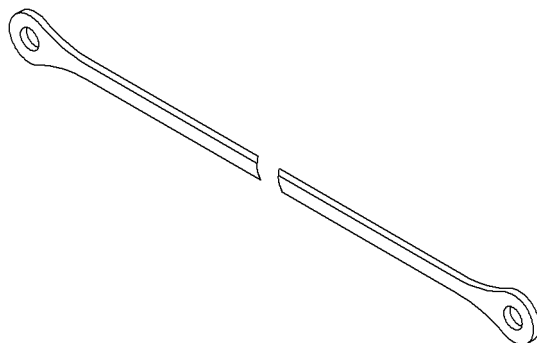


Fig. 247: Spacer bracket in front of reducing adapter (illustration of principle)

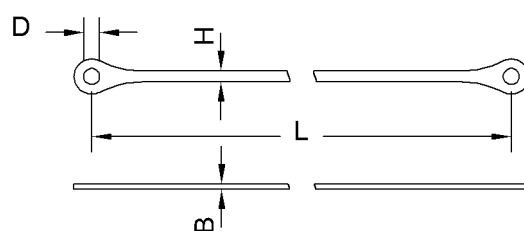


Fig. 248: Dimensions spacer bracket in front of reducing adapter

Name		Value
L	Length	1100 mm 3' 7" ft-in
B	Width	10 mm 0.39" in
H	Height	40 mm 1.57" in
D	Pin Ø	35 mm 1.38" in

Tab. 144: Technical data spacer bracket in front of reducing adapter

Spacer bracket behind reducing adapter

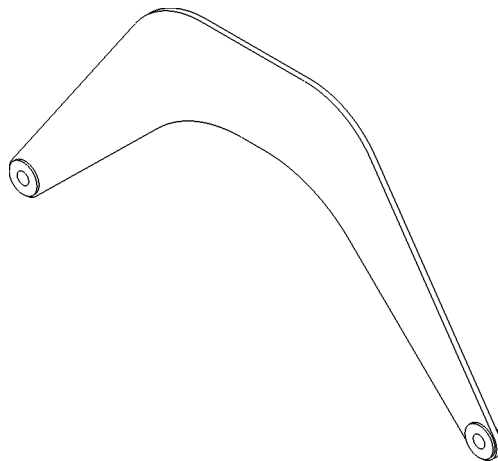


Fig. 249: Spacer bracket behind reducing adapter (illustration of principle)

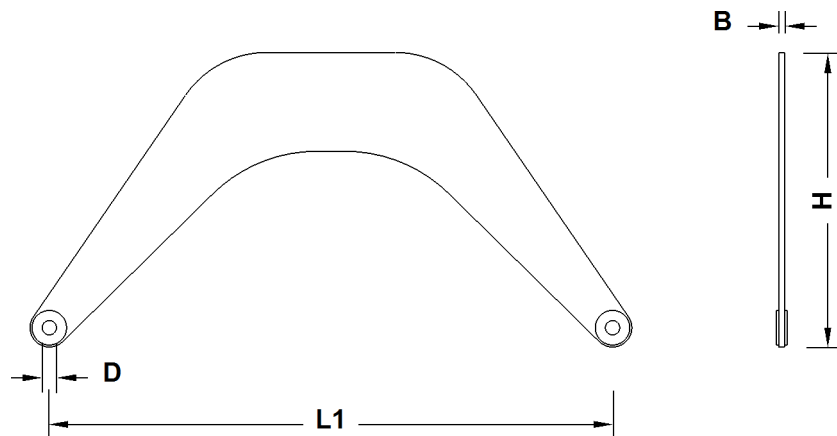


Fig. 250: Dimensions spacer bracket behind reducing adapter

Name		Value
L1	Length	1100 mm 3' 7" ft-in
B	Width	15 mm 0.59" in
H	Height	602 mm 2' ft-in
D	Pin Ø	35 mm 1.38" in

Tab. 145: Technical data spacer bracket behind reducing adapter

Backstay shackles

Top backstay shackle

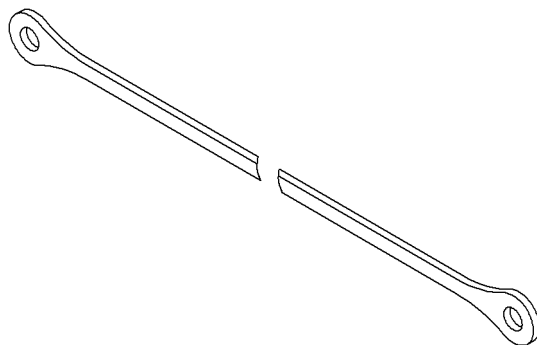


Fig. 251: Top backstay shackle (illustration of principle)

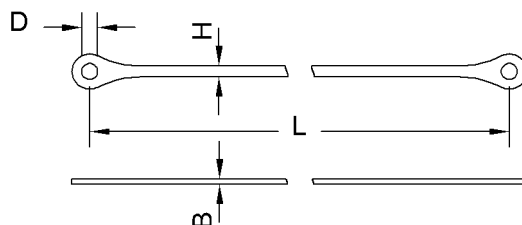


Fig. 252: Dimensions top backstay shackle

Name		Value
L	Length	420 mm 1' 5" ft-in
		540 mm 1' 9" ft-in
		730 mm 2' 5" ft-in
		950 mm 3' 1" ft-in
B	Width	12 mm 0.47" in
H	Height	80 mm 3.15" in
D	Pin Ø	35 mm 1.38" in

Tab. 146: Technical data top backstay shackle

Bottom backstay shackle

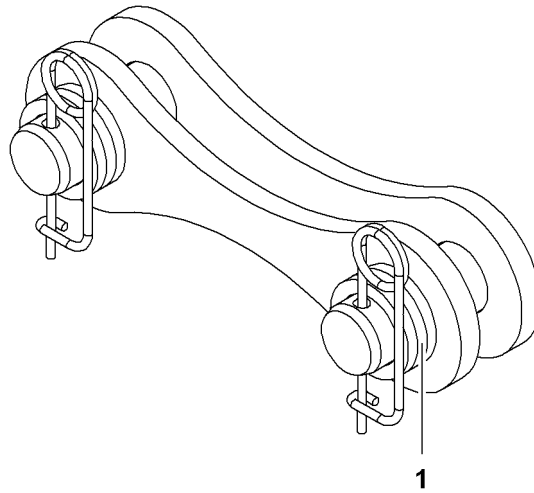


Fig. 253: Bottom backstay shackle (illustration of principle)

1 Washer (3x each)

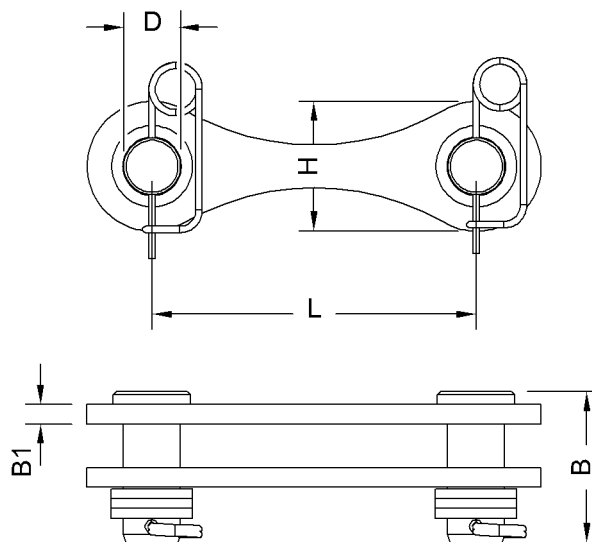


Fig. 254: Dimensions bottom backstay shackle

Name		Value
L	Length	200 mm 7.87" in
B1	Width	12 mm 0.47" in
H	Height	80 mm 3.15" in
B	Length of pin	90 mm 3.54" in
D	Pin Ø	35 mm 1.38" in

Tab. 147: Technical data bottom backstay shackle

Stay ropes

Several stay ropes are assembled to achieve defined rope lengths.

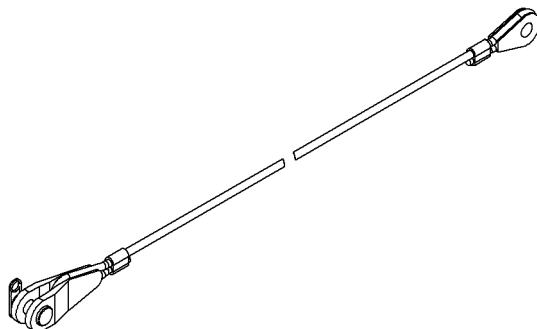


Fig. 255: Stay ropes (illustration of principle)

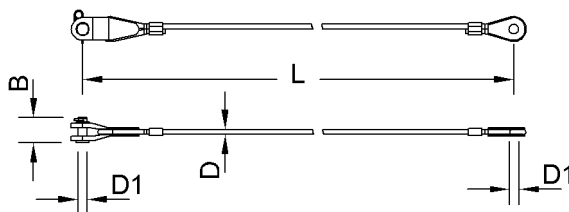


Fig. 256: Dimensions stay ropes

Name		Value
L	Length of stay rope	1100 mm 3' 7" ft-in
		1300 mm 4' 3" ft-in
		1600 mm 5' 3" ft-in
		2100 mm 6' 11" ft-in
		2600 mm 8' 6" ft-in
		3000 mm 9' 10" ft-in
D	Ø of stay rope	18 mm 0.71" in
B	Length of pin	90 mm 3.54" in
D1	Pin Ø	35 mm 1.38" in

Tab. 148: Technical data stay ropes

Pins for steel pendant straps in front of reducing adapter

The pins supplied with the pendant straps must be exchanged for longer pins.

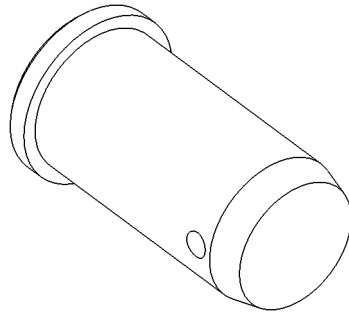


Fig. 257: Pins for steel pendant straps in front of reducing adapter (illustration of principle)

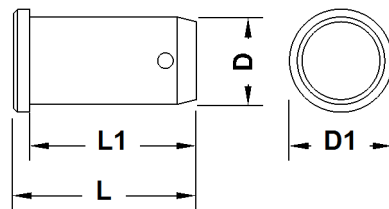


Fig. 258: Dimensions pins for steel pendant straps in front of reducing adapter

Name		Value
L	Total length	140 mm 5.51" in
L1	Length	128 mm 5.04" in
D	Diameter	65 mm 2.56" in
D1	Outer diameter	80 mm 3.15" in

Tab. 149: Technical data pins for steel pendant straps in front of reducing adapter

Pins for CF pendant straps in front of reducing adapter

The pins supplied with the pendant straps must be exchanged for longer pins.

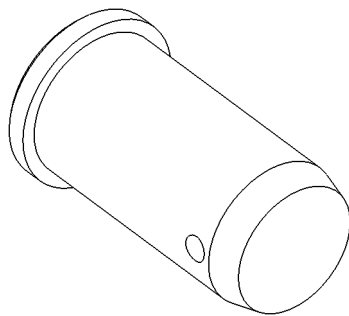


Fig. 259: Pins for CF pendant straps in front of reducing adapter (illustration of principle)

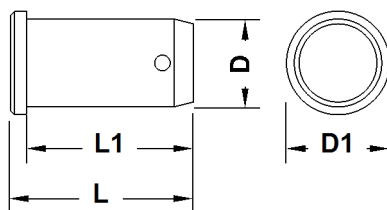


Fig. 260: Dimensions pins for CF pendant straps in front of reducing adapter

Name		Value
L	Total length	170 mm 6.69" in
L1	Length	160 mm 6.30" in
D	Diameter	65 mm 2.56" in
D1	Outer diameter	85 mm 3.35" in

Tab. 150: Technical data pins for CF pendant straps in front of reducing adapter

Pins for steel pendant straps behind reducing adapter

The pins supplied with the pendant straps must be exchanged for longer pins.

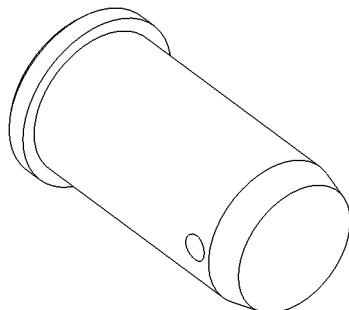


Fig. 261: Pins for steel pendant straps behind reducing adapter (illustration of principle)

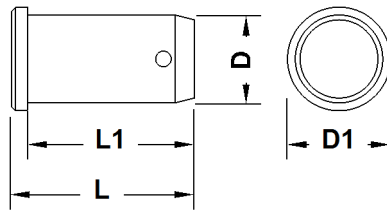


Fig. 262: Dimensions pins for steel pendant straps behind reducing adapter

Name		Value
L	Total length	120 mm 4.72" in
L1	Length	112 mm 4.41" in
D	Diameter	55 mm 2.17" in
D1	Outer diameter	63 mm 2.48" in

Tab. 151: Technical data pins for steel pendant straps behind reducing adapter

Pins for CF pendant straps behind reducing adapter

The pins supplied with the pendant straps must be exchanged for longer pins.

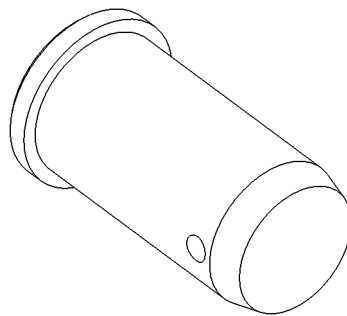


Fig. 263: Pins for CF pendant straps behind reducing adapter (illustration of principle)

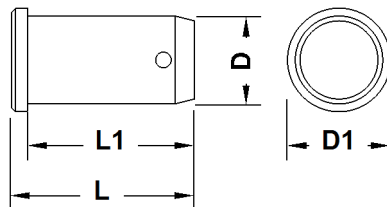


Fig. 264: Dimensions pins for CF pendant straps behind reducing adapter

Name		Value
L	Total length	158 mm 6.22" in

Name		Value
L1	Length	153 mm 6.02" in
D	Diameter	60 mm 2.36" in
D1	Outer diameter	68 mm 2.68" in

Tab. 152: Technical data pins for CF pendant straps behind reducing adapter

1.13.4 Steel pendant straps on reducing adapter 2821/2316

Steel pendant straps on reducing adapter 2821/2316.24 12 m (40 ft)

Reducing adapter pendant strap 12 m (40 ft)

Installation site in crane operation:

- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316, page 1571](#))

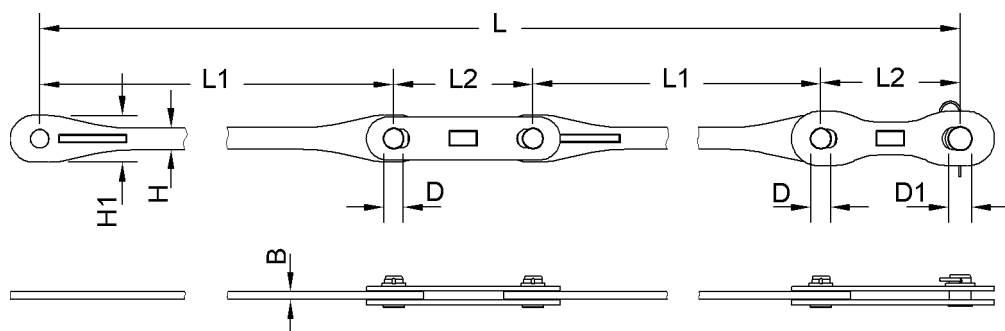


Fig. 265: Dimensions reducing adapter pendant strap 12 m (40 ft)

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	5580 mm 18' 4" ft-in
L2	Length of connecting link	420 mm 1' 5" ft-in
W	Width of pendant strap	22 mm 0.87" in
H	Height of pendant strap	66 mm 2.60" in
H1	Height of pendant strap	140 mm 5.51" in
D	Pin Ø	55 mm 2.17" in

Name		Value
D1	Pin Ø	65 mm 2.56" in
Weight		181 kg 399 lb

Tab. 153: Technical data reducing adapter pendant strap 12 m (40 ft)

Steel pendant straps on main boom section 2316.25 1 m (3 ft)

Connecting link

Installation site in crane operation:

- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316](#), page 1571)

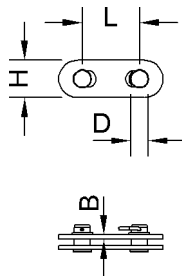


Fig. 266: Dimensions connecting link

Name		Value
L	Length of connecting link	200 mm 7.87" in
W	Width of connecting link	15 mm 0.59" in
H	Height of connecting link	130 mm 5.12" in
D	Pin Ø	55 mm 2.17" in
Weight		6 kg 13.23 lb

Tab. 154: Technical data connecting link

1.13.5 CF pendant straps on reducing adapter 2821/2316

CF pendant straps on reducing adapter 2821/2316.24 12 m (40 ft)

Reducing adapter pendant strap 12 m (40 ft)

Installation site in crane operation:

- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316, page 1573](#))

Generation A of reducing adapter pendant strap 12 m (40 ft)

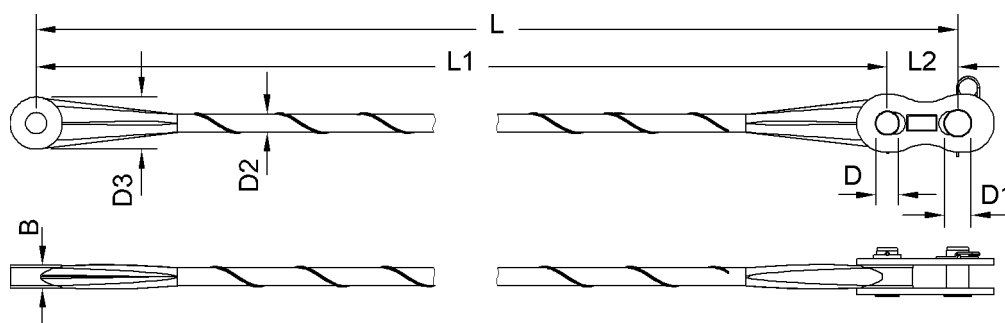


Fig. 267: Reducing adapter pendant strap 12 m (40 ft)

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	11800 mm 38' 9" ft-in
L2	Length of connecting link	200 mm 7.87" in
W	Width	64 mm 2.52" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	65 mm 2.56" in
D2	Pendant strap Ø	50 mm 1.97" in
D3	Pendant strap Ø	148 mm 5.83" in
Weight		62 kg 137 lb

Tab. 155: Technical data reducing adapter pendant strap 12 m (40 ft)

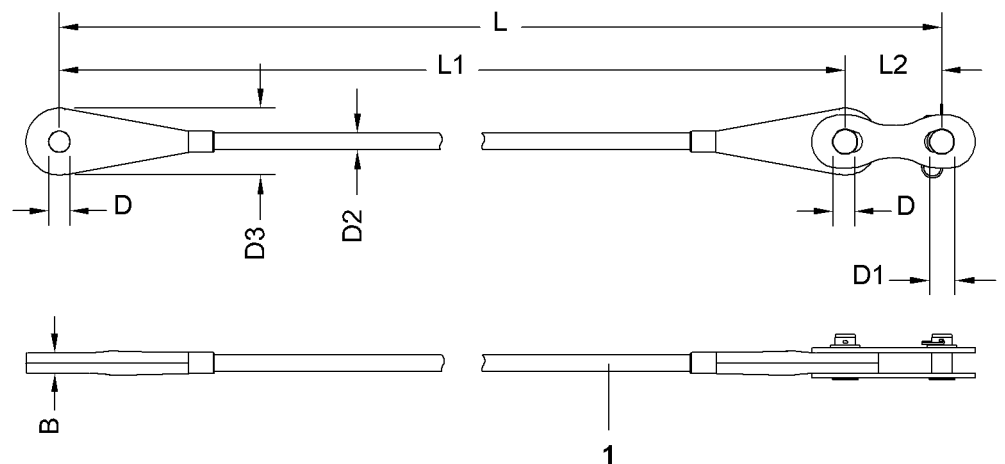
Generation B of reducing adapter pendant strap 12 m (40 ft)

Fig. 268: Dimensions reducing adapter pendant strap 12 m (40 ft)

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	11800 mm 38' 9" ft-in
L2	Length of connecting link	200 mm 7.87" in
B	Width	63 mm 2.48" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	65 mm 2.56" in
D2	Pendant strap Ø	48 mm 1.89" in
D3	Pendant strap Ø	161 mm 6.34" in
Weight		51 kg 112 lb

Tab. 156: Technical data reducing adapter pendant strap 12 m (40 ft)

CF pendant straps on main boom section 2316.25 1 m (3 ft)

Connecting link

Installation site in crane operation:

- Main boom 2821 + reducing adapter 2821/2316 (For more information see: [Pendant straps A-frame1 to main boom head 2316, page 1573](#))

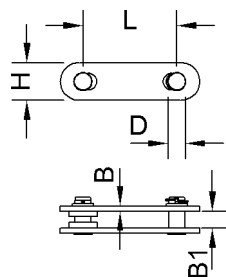


Fig. 269: Dimensions connecting link

Name		Value
L	Length of connecting link	350 mm 1' 2" ft-in
W	Width of connecting link	18 mm 0.71" in
H	Height of connecting link	140 mm 5.51" in
D	Pin Ø	60 mm 2.36" in
Weight		8 kg 17.64 lb

Tab. 157: Technical data connecting link

1.14 Fixed jib - overview

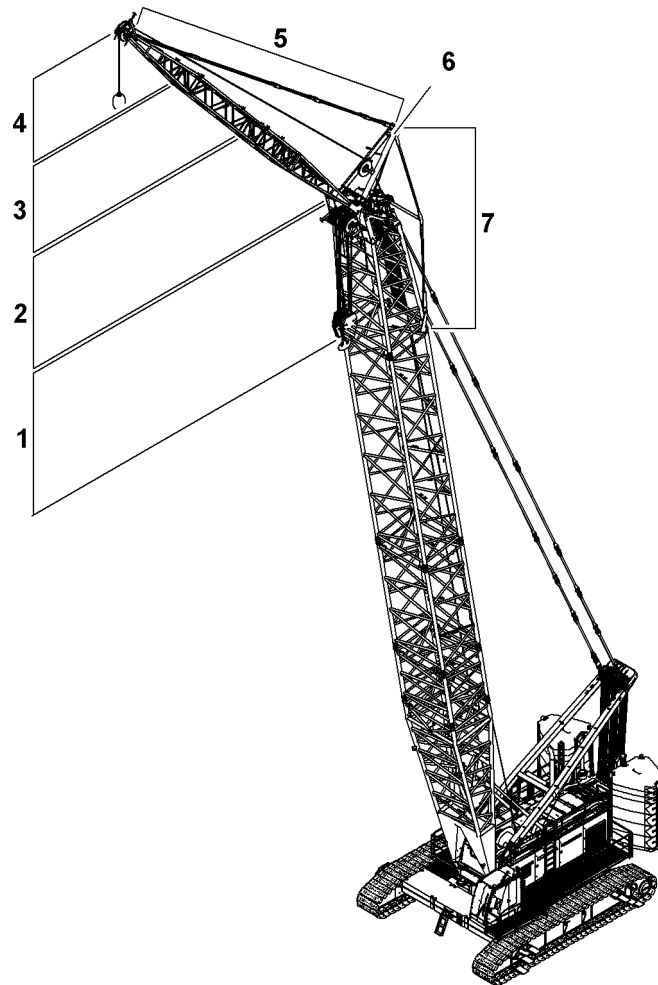


Fig. 270: Fixed jib - overview

- | | | | |
|---|-------------------|---|---------------------|
| 1 | Boom head section | 5 | Jib pendant straps |
| 2 | Jib base section | 6 | A-frame 2 |
| 3 | Jib sections | 7 | Jib backstay straps |
| 4 | Jib head section | | |

The fixed jib is composed of:

- Jib base section 2
- Jib sections (3 m (10 ft), 6 m (20 ft), 12 m (40 ft)) 3
- Jib head section 4

The jib pendant straps 5 connect A-frame 2 6 to the jib head section 4.

The jib backstay straps 7 connect A-frame 2 6 to the boom head section 1.

The fixed jib can be tensioned to 15° or 30°.

1.15 1713 fixed jib

1.15.1 Jib base section 1713.22

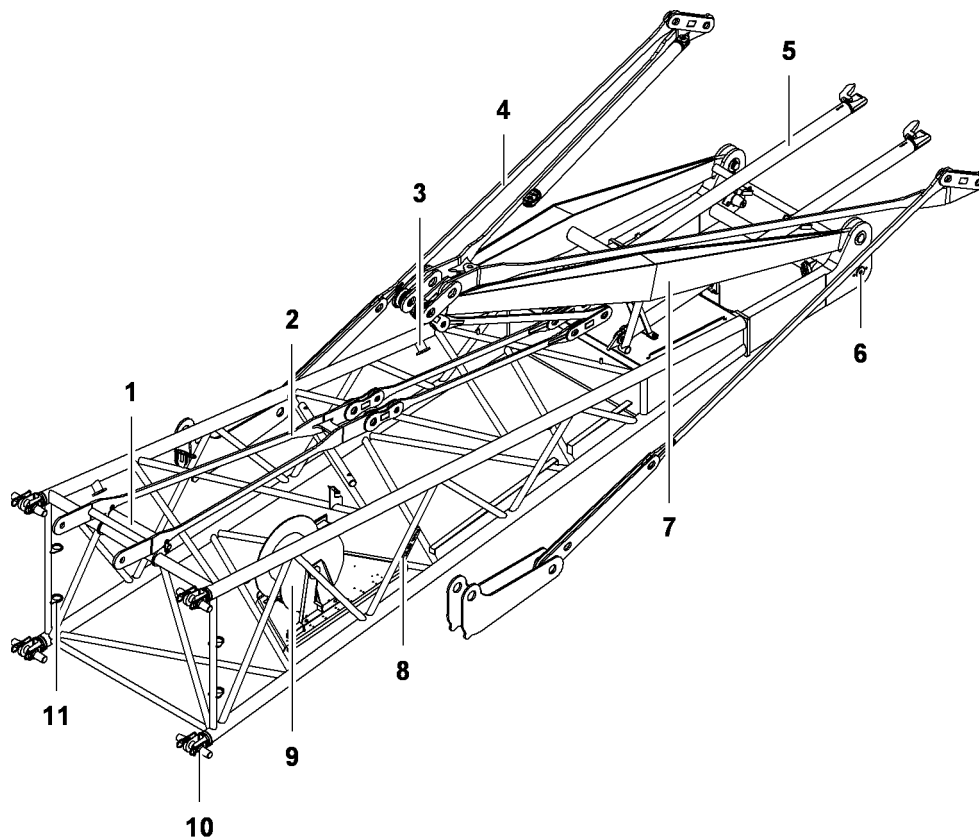


Fig. 271: Jib base section 1713.22

- | | | | |
|---|---|----|---|
| 1 | Rope protection roller | 7 | A-frame 2 |
| 2 | Transport position (2x) of jib pendant straps | 8 | Boom identification plate |
| 3 | Lifting point (4x) | 9 | Cable drum |
| 4 | Transport position of the equalizer on A-frame 2 (jib backstay strap) | 10 | Pin connection point (4x) with double-taper pins (4x) |
| 5 | Rigid tilting-back support (2x) | 11 | Transport bracket (4x) for double-taper pins |
| 6 | Pivot point (2x) for main boom head section | | |

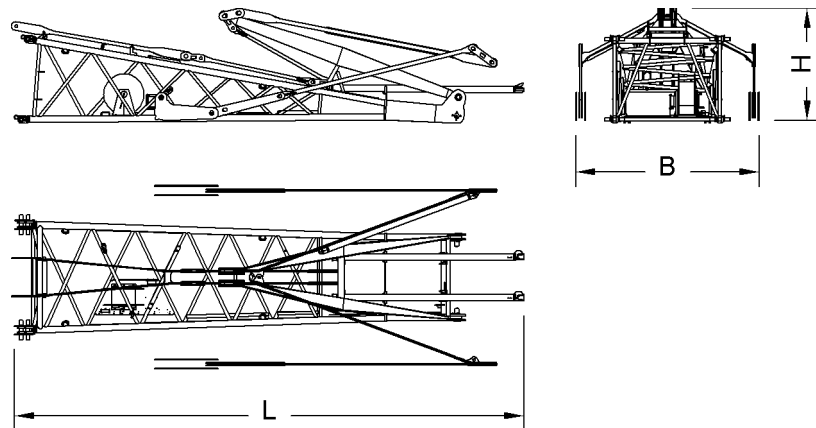


Fig. 272: Dimensions of jib base section 1713.22

Name		Value
System length		7000 mm 23' ft-in
System width		1700 mm 5' 7" ft-in
System height		1300 mm 4' 3" ft-in
L	Length	9550 mm 31' 4" ft-in
B	Width	2450 mm 8' ft-in
H	Height	1900 mm 6' 3" ft-in
Weight (incl. pendant straps, tilting-back supports and jib backstay straps)		2495 kg 5,500 lb
Double-taper pins Ø		60 mm 2.36" in

Tab. 158: Technical data jib base section 1713.22

1.15.2 1713.18 jib section 3 m (10 ft)

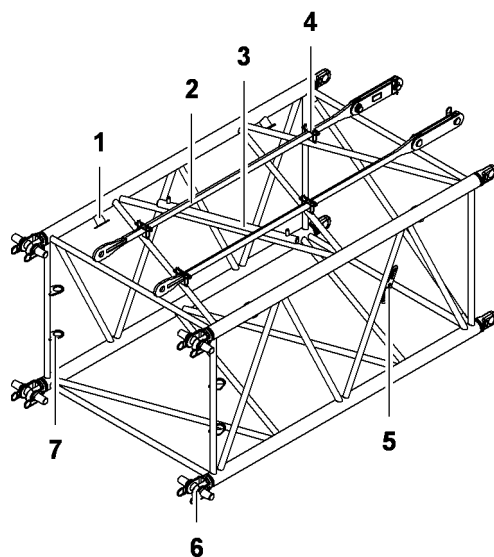


Fig. 273: 1713.18 jib section 3 m (10 ft)

- | | |
|--|--|
| <ul style="list-style-type: none"> 1 Lifting point (4x) 2 Transport position (2x) of the jib pendant straps 3 m (10 ft) 3 Rope protection support 4 Transport brackets (4x) for pendant straps | <ul style="list-style-type: none"> 5 Boom identification plate 6 Pin connection point (8x) with double-taper pins (4x) 7 Transport bracket (4x) for double-taper pins |
|--|--|

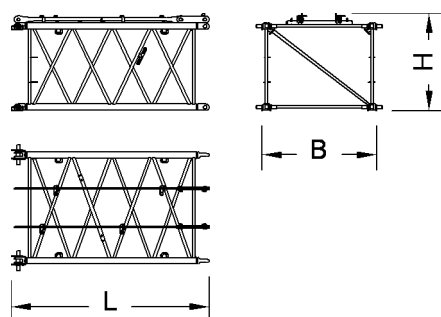


Fig. 274: Dimensions of 1713.18 jib section 3 m (10 ft)

Name		Value
System length		3000 mm 9' 10" ft-in
System width		1700 mm 5' 7" ft-in
System height		1300 mm 4' 3" ft-in
L	Length	3150 mm 10' 4" ft-in
B	Width	1820 mm 6' ft-in

Name		Value
H	Height (incl. pendant straps)	1500 mm 4' 11" ft-in
Weight (incl. pendant straps)		430 kg 948 lb
Double-taper pins \varnothing		60 mm 2.36" in

Tab. 159: Technical data for 1713.18 jib section 3 m (10 ft)

1.15.3 1713.18 jib section 6 m (20 ft)

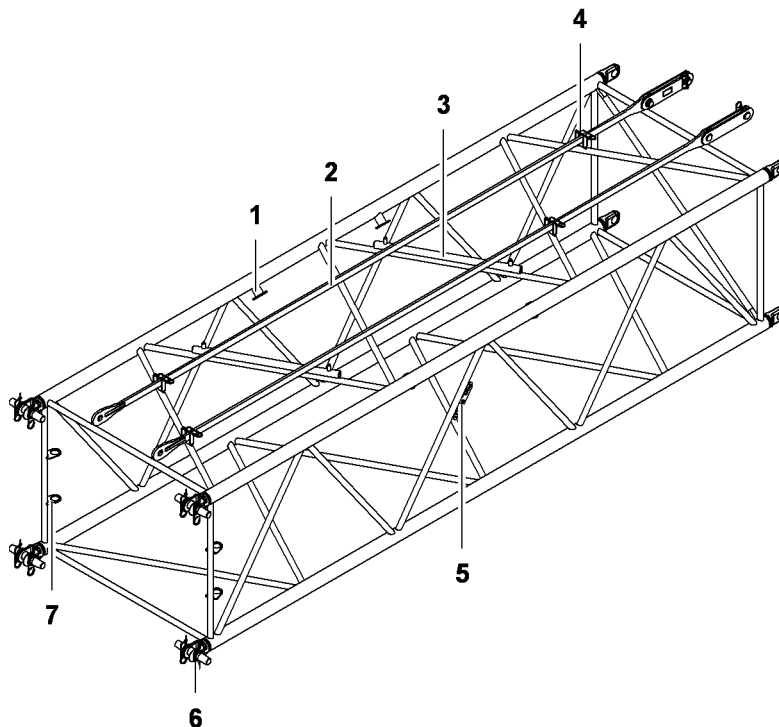


Fig. 275: 1713.18 jib section 6 m (20 ft)

- | | | | |
|---|---|---|---|
| 1 | Lifting point (4x) | 5 | Boom identification plate |
| 2 | Transport position (2x) of the jib pendant straps 6 m (20 ft) | 6 | Pin connection point (8x) with double-taper pins (4x) |
| 3 | Rope guard support (2x) | 7 | Transport bracket (4x) for double-taper pins |
| 4 | Transport brackets (4x) for pendant straps | | |

1713 fixed jib

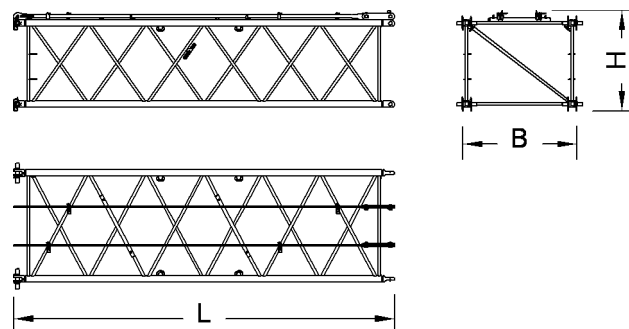


Fig. 276: Dimensions of 1713.18 jib section 6 m (20 ft)

Name		Value
System length		6000 mm 19' 8" ft-in
System width		1700 mm 5' 7" ft-in
System height		1300 mm 4' 3" ft-in
L	Length	6150 mm 20' 2" ft-in
B	Width	1820 mm 6' ft-in
H	Height (incl. pendant straps)	1500 mm 4' 11" ft-in
Weight (incl. pendant straps)		630 kg 1,389 lb
Double-taper pins Ø		60 mm 2.36" in

Tab. 160: Technical data for 1713.18 jib section 6 m (20 ft)

1.15.4 1713.18 jib section 12 m (40 ft)

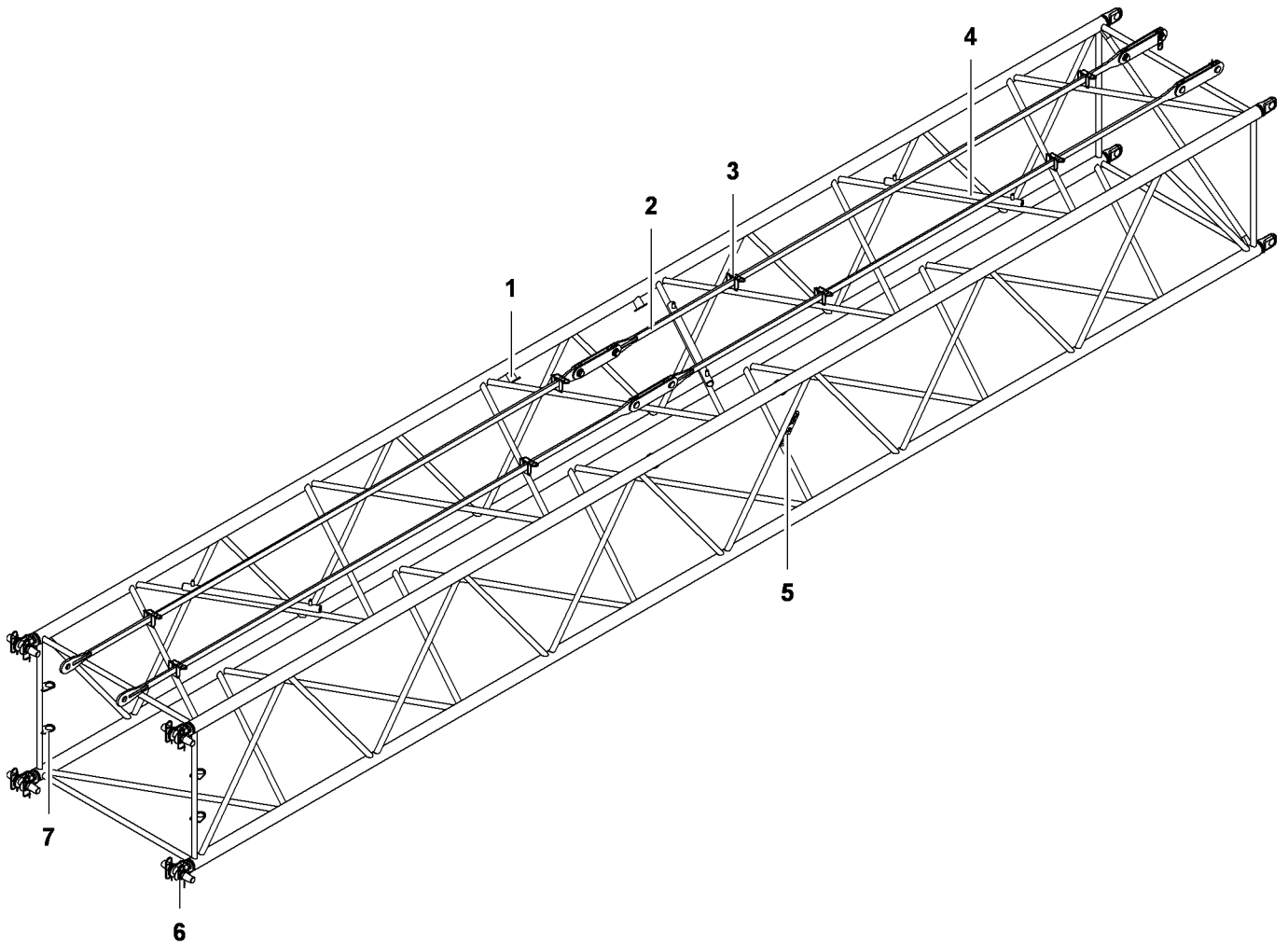


Fig. 277: 1713.18 jib section 12 m (40 ft)

- | | | | | | |
|---|--|---|---|---|--|
| 1 | Lifting point (4x) | 4 | Rope protection support (3x) | 7 | Transport bracket (4x) for double-taper pins |
| 2 | Transport position (2x) of the jib pendant straps 12 m (40 ft) | 5 | Boom identification plate | | |
| 3 | Transport bracket (8x) for pendant straps | 6 | Pin connection point (8x) with double-taper pins (4x) | | |

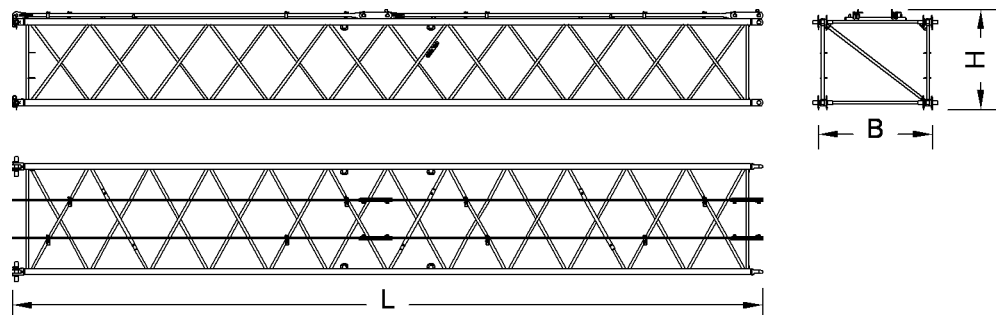


Fig. 278: Dimensions of 1713.18 jib section 12 m (40 ft)

Name		Value
System length		12000 mm 39' 4" ft-in
System width		1700 mm 5' 7" ft-in
System height		1300 mm 4' 3" ft-in
L	Length	12150 mm 39' 10" ft-in
B	Width	1820 mm 6' ft-in
H	Height (incl. pendant straps)	1500 mm 4' 11" ft-in
Weight (incl. pendant straps)		1140 kg 2,513 lb
Double-taper pins Ø		60 mm 2.36" in

Tab. 161: Technical data for 1713.18 jib section 12 m (40 ft)

1.15.5 1713.21 jib head section

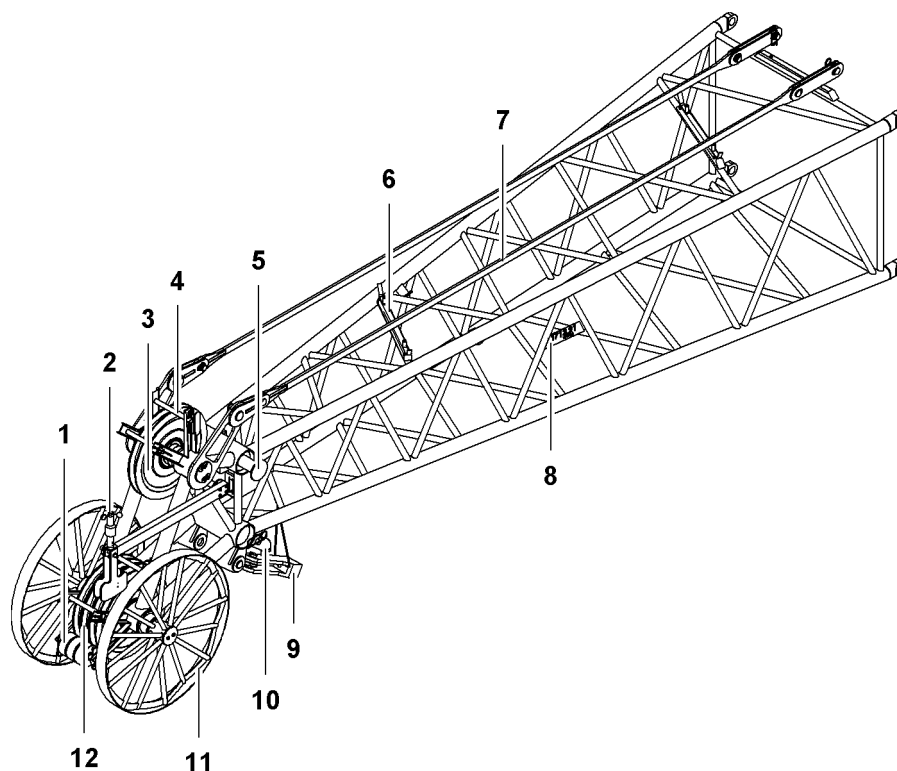


Fig. 279: 1713.21 jib head section

- | | | | |
|---|-----------------------------|---|---|
| 1 | Rope protection roller (3x) | 7 | Transport position (2x) of jib pendant straps |
| 2 | Anemometer | 8 | Boom identification plate |
| 3 | Pulley | 9 | Rope fixation |

See next page for continuation of the image legend

- | | | | |
|----------|---------------------------|-----------|-------------------------|
| 4 | Rope protection pipe (2x) | 10 | Hoist limit switch (2x) |
| 5 | Lifting point (4x) | 11 | Wheel (2x) |
| 6 | Rope guard support (2x) | 12 | Pulley (3x) |

This jib head section is designed to allow an auxiliary jib to be attached ([For more information see: 1.27 Auxiliary jib* \(15 t \(33.000 lb\)\), page 385](#)).

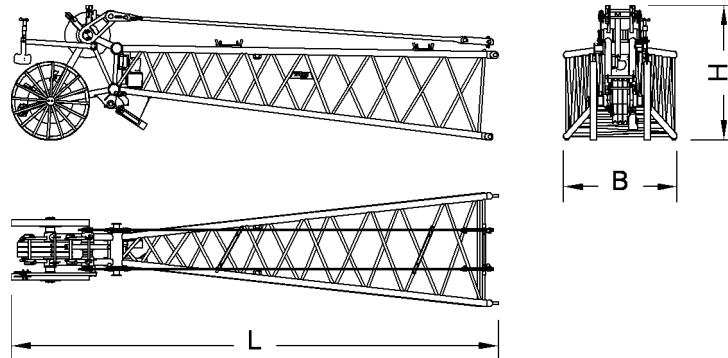


Fig. 280: 1713.21 jib head section dimensions

Name		Value
System length		7000 mm 23' ft-in
System width		1700 mm 5' 7" ft-in
System height		1300 mm 4' 3" ft-in
L	Length	7750 mm 25' 5" ft-in
B	Width	1820 mm 6' ft-in
H	Height (incl. pendant straps)	2150 mm 7' 1" ft-in
Weight (incl. pendant straps)		1353 kg 2,983 lb

Tab. 162: 1713.21 jib head section, technical data

1.15.6 Steel pendant straps on fixed jib 1713

Steel pendant straps on A-frame2

Equalizer A-frame2 (jib backstay strap)

Installation site in crane operation:

- Fixed jib 1713 ([For more information see: Backstay straps A-frame2 to main boom head 2821, page 1597](#))

1713 fixed jib

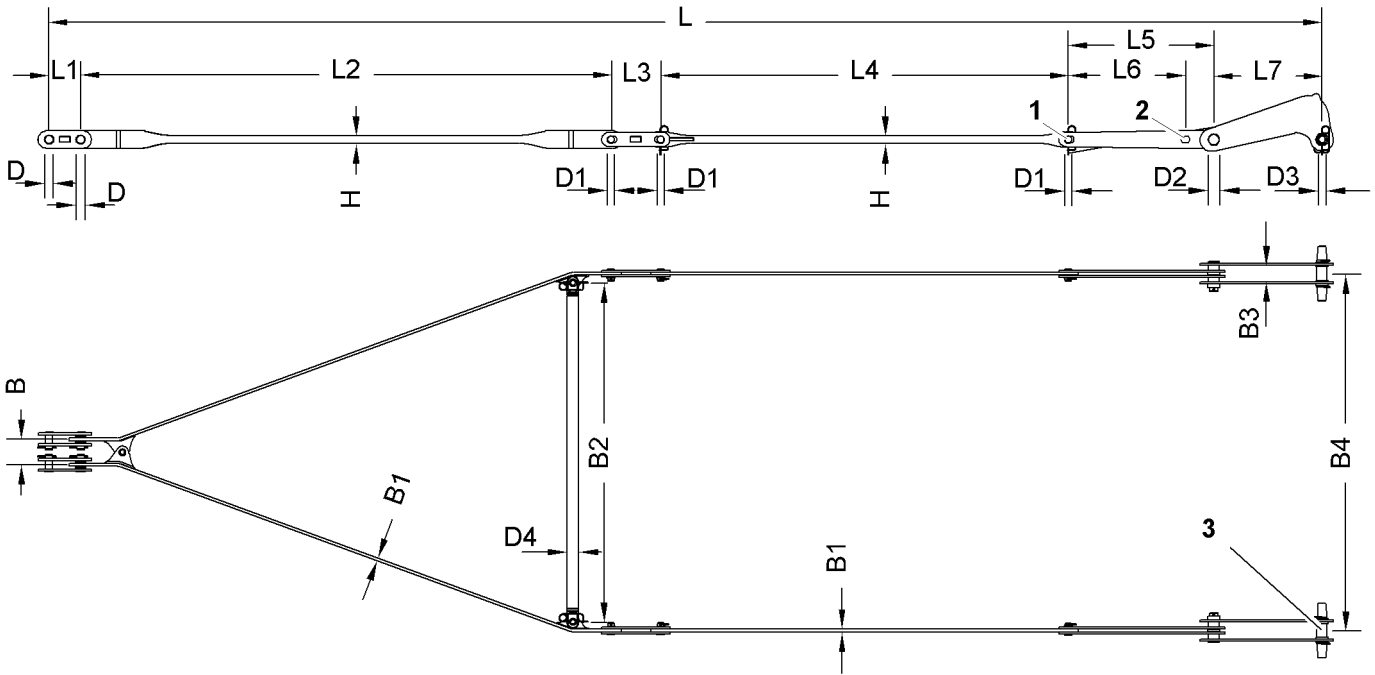


Fig. 281: Dimensions equalizer on A-frame2 (jib backstay strap)

- 1 Pin connection point 30°
- 2 Pin connection point 15°
- 3 Double-taper pins
431 mm (1' 5" ft-in)/
Ø80 mm (3.15" in) (2x)

The double-taper pins (431 mm (1' 5" ft-in) x Ø80 mm (3.15" in)) 3 replace the top double-taper pins on the main boom head.

Name		Value
L	Length	at 30° 10000 mm 32' 10" ft-in
		at 15° 9090 mm 29' 10" ft-in
L1	Length of connecting link	250 mm 9.84" in
L2	Length of crossbar	4165 mm 13' 8" ft-in
L3	Length of connecting link	390 mm 1' 3" ft-in
L4	Length of pendant strap	3202 mm 10' 6" ft-in
L5	Length of connecting link (30°)	1143 mm 3' 9" ft-in
L6	Length of connecting link (15°)	910 mm 3' ft-in
L7	Length of connecting link	850 mm 2' 9" ft-in

Name		Value
W	Width	200 mm 7.87" in
W1	Width of pendant strap	22 mm 0.87" in
W2	Width	2660 mm 8' 9" ft-in
W3	Width	132 mm 5.20" in
W4	Width	2800 mm 9' 2" ft-in
H	Height of pendant strap	62 mm 2.44" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	50 mm 1.97" in
D2	Pin Ø	70 mm 2.76" in
D3	Double-taper pins Ø	80 mm 3.15" in
D4	Spacer bar Ø	90 mm 3.54" in
Weight		582 kg 1,283 lb

Tab. 163: Technical data equalizer on A-frame2 (jib backstay strap)

Equalizer on A-frame2 (jib pendant strap)

Installation site in crane operation:

- Fixed jib 1713 (For more information see: [Pendant straps A-frame2 to jib head 1713, page 1598](#))

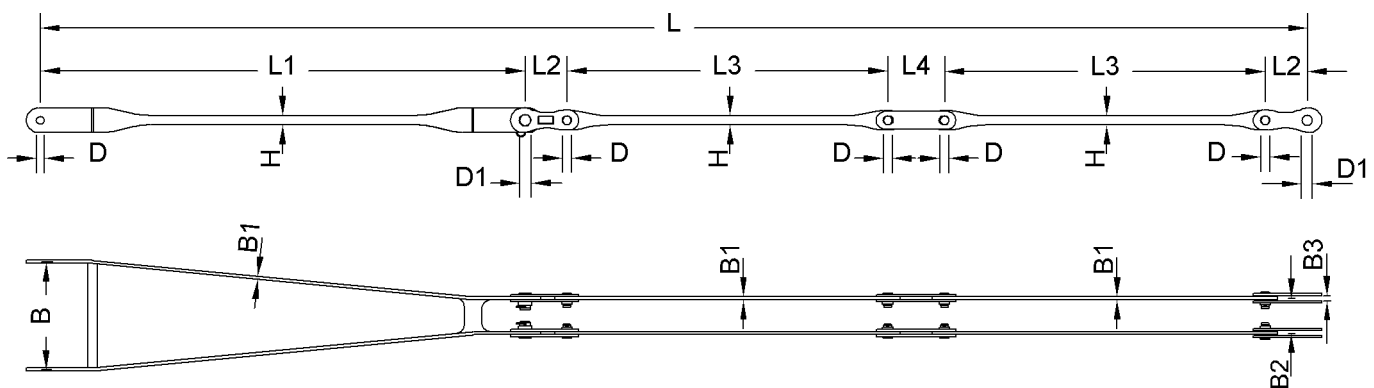


Fig. 282: Dimensions of equalizer on A-frame2 (jib pendant strap)

Name		Value
L	Length	7275 mm 23' 10" ft-in
L1	Length of crossbar	2785 mm 9' 2" ft-in
L2	Length of connecting link	240 mm 9.45" in
L3	Length of pendant strap	1842 mm 6' 1" ft-in
L4	Length of connecting link	326 mm 1' 1" ft-in
W	Width	618 mm 2' ft-in
W1	Width of pendant strap	18 mm 0.71" in
W2	Width	200 mm 7.87" in
W3	Width	30 mm 1.18" in
H	Height of pendant strap	54 mm 2.13" in
D	Pin Ø	45 mm 1.77" in
D1	Pin Ø	60 mm 2.36" in
Weight		198 kg 437 lb

Tab. 164: Technical data equalizer on A-frame2 (jib pendant strap)

Steel pendant straps on jib section 1713.18 3 m (10 ft)

Jib pendant strap 3 m (10 ft)

Installation site in crane operation:

- Fixed jib 1713 (For more information see: [Pendant straps A-frame2 to jib head 1713, page 1598](#))

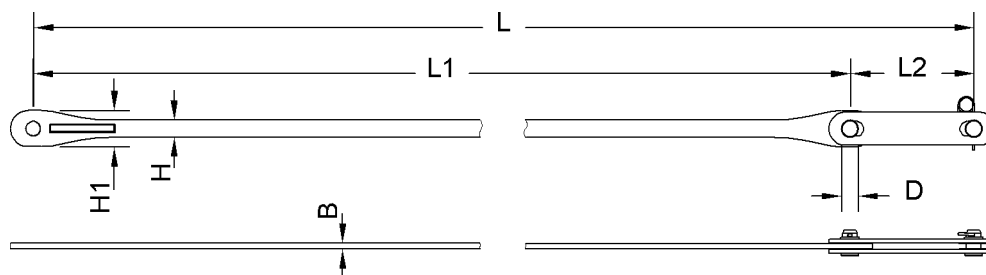


Fig. 283: Dimensions jib pendant strap 3 m (10 ft)

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2610 mm 8' 7" ft-in
L2	Length of connecting link	390 mm 1' 3" ft-in
W	Width of pendant strap	18 mm 0.71" in
H	Height of pendant strap	54 mm 2.13" in
H1	Height of pendant strap	113 mm 4.45" in
D	Pin Ø	45 mm 1.77" in
Weight		48 kg 106 lb

Tab. 165: Technical data jib pendant strap 3 m (10 ft)

Steel pendant straps on jib section 1713.18 6 m (20 ft)

Jib pendant strap 6 m (20 ft)

Installation site in crane operation:

- Fixed jib 1713 (For more information see: [Pendant straps A-frame2 to jib head 1713](#), page 1598)

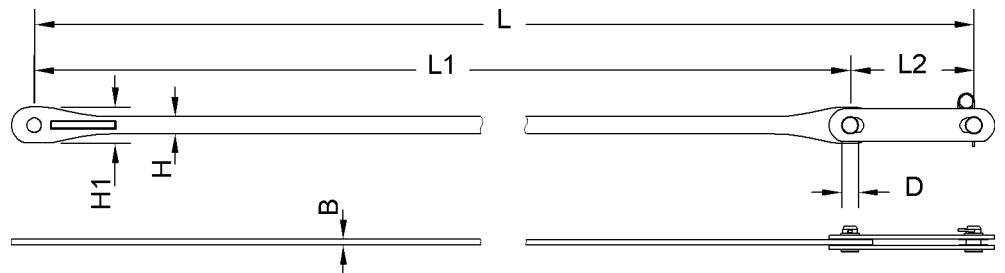


Fig. 284: Dimensions jib pendant strap 6 m (20 ft)

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5610 mm 18' 5" ft-in
L2	Length of connecting link	390 mm 1' 3" ft-in
W	Width of pendant strap	18 mm 0.71" in

Name		Value
H	Height of pendant strap	54 mm 2.13" in
H1	Height of pendant strap	113 mm 4.45" in
D	Pin Ø	45 mm 1.77" in
Weight		58 kg 128 lb

Tab. 166: Technical data jib pendant strap 6 m (20 ft)

Steel pendant straps on jib section 1713.18 12 m (40 ft)

Jib pendant strap 12 m (40 ft)

Installation site in crane mode:

- Fixed jib 1713 (For more information see: [Pendant straps A-frame2 to jib head 1713, page 1598](#))

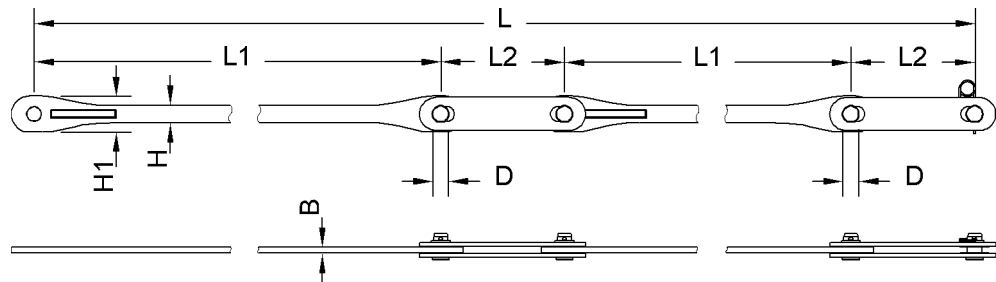


Fig. 285: Dimensions jib pendant strap 12 m (40 ft)

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	5610 mm 18' 5" ft-in
L2	Length of connecting link	390 mm 1' 3" ft-in
W	Width of pendant strap	18 mm 0.71" in
H	Height of pendant strap	54 mm 2.13" in
H1	Height of pendant strap	113 mm 4.45" in
D	Pin Ø	45 mm 1.77" in
Weight		58 kg 128 lb

Tab. 167: Technical data jib pendant strap 12 m (40 ft)

Steel pendant straps on jib head 1713.21

Jib pendant strap on jib head 1713.21

Installation site in crane operation:

- Fixed jib 1713 (For more information see: [Pendant straps A-frame2 to jib head 1713, page 1598](#))

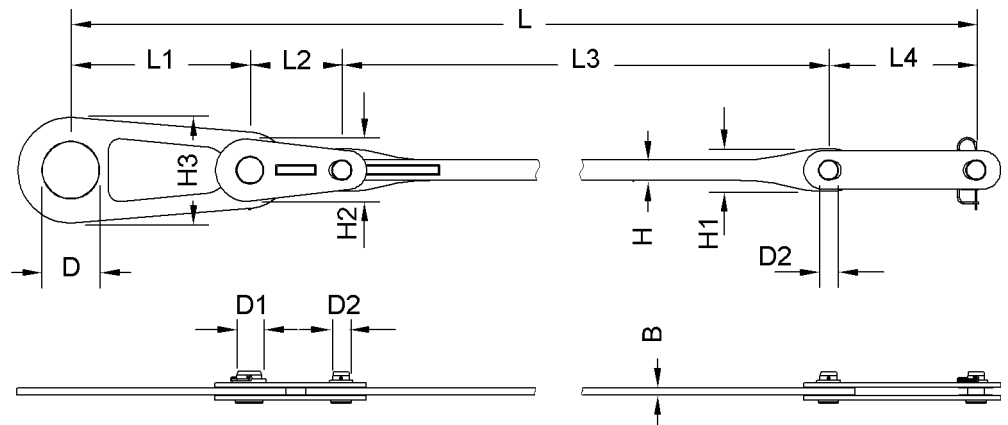


Fig. 286: Dimensions jib pendant strap on jib head 1713.21

Name		Value
L	Length	6500 mm 21' 4" ft-in
L1	Length of connecting link	474 mm 1' 7" ft-in
L2	Length of connecting link	243 mm 9.57" in
L3	Length of pendant strap	5393 mm 17' 8" ft-in
L4	Length of connecting link	390 mm 1' 3" ft-in
W	Width of pendant strap	18 mm 0.71" in
H	Height of pendant strap	54 mm 2.13" in
H1	Height of pendant strap	113 mm 4.45" in
H2	Height of connecting link	166 mm 6.54" in
H3	Height of connecting link	280 mm 11.02" in
D	Pin Ø	150 mm 5.91" in
D1	Pin Ø	65 mm 2.56" in

1713 fixed jib

Name		Value
D2	Pin Ø	45 mm 1.77" in
Weight		75 kg 165 lb

Tab. 168: Technical data jib pendant strap on jib head 1713.21

1.15.7 CF pendant straps on fixed jib 1713

When installing the fixed jib 1713 on the machine with CF pendant straps, use the steel pendant straps and the steel backstay straps ([For more information see: 1.15.6 Steel pendant straps on fixed jib 1713, page 261](#)).

1.16 1507 fixed jib

1.16.1 Jib 1507.20

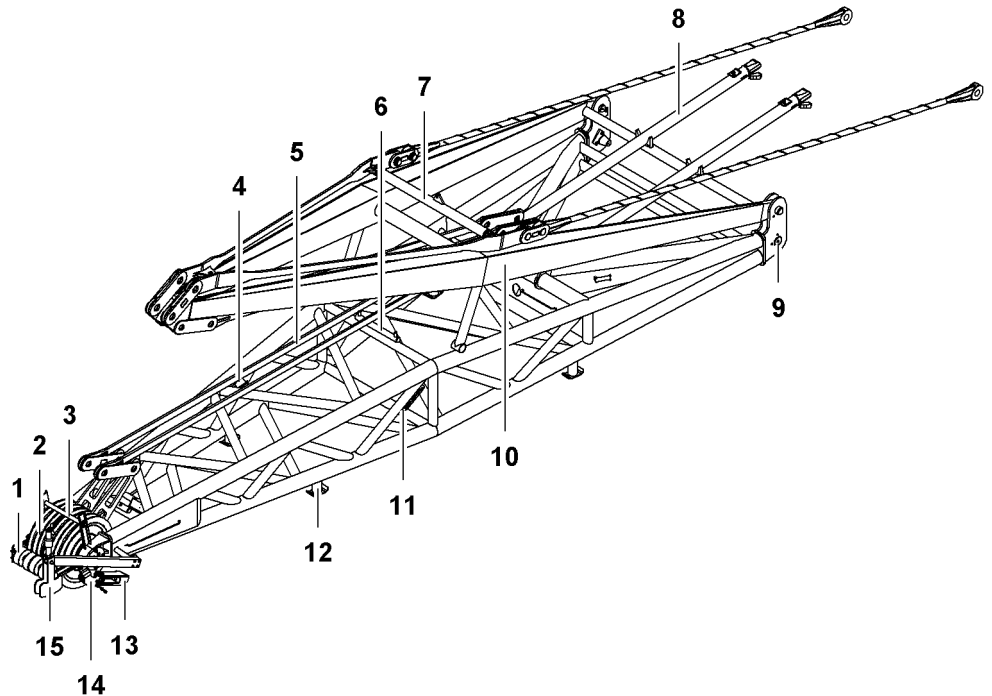


Fig. 287: Jib 1507.20

- | | | | |
|---|---|----|---|
| 1 | Rope protection roller (4x) | 9 | Pivot point (2x) for main boom head section |
| 2 | Pulley (4x) | 10 | A-frame 2 |
| 3 | Rope protection pipe | 11 | Boom identification plate |
| 4 | Lifting point (4x) | 12 | Foot (4x) |
| 5 | Transport position (2x) of jib pendant straps | 13 | Rope fixation |
| 6 | Rope protection support (3x) | 14 | Hoist limit switch (2x) |
| 7 | Transport position of the equalizer on A-frame 2 (jib backstay strap) | 15 | Anemometer |
| 8 | Rigid tilting-back support (2x) | | |

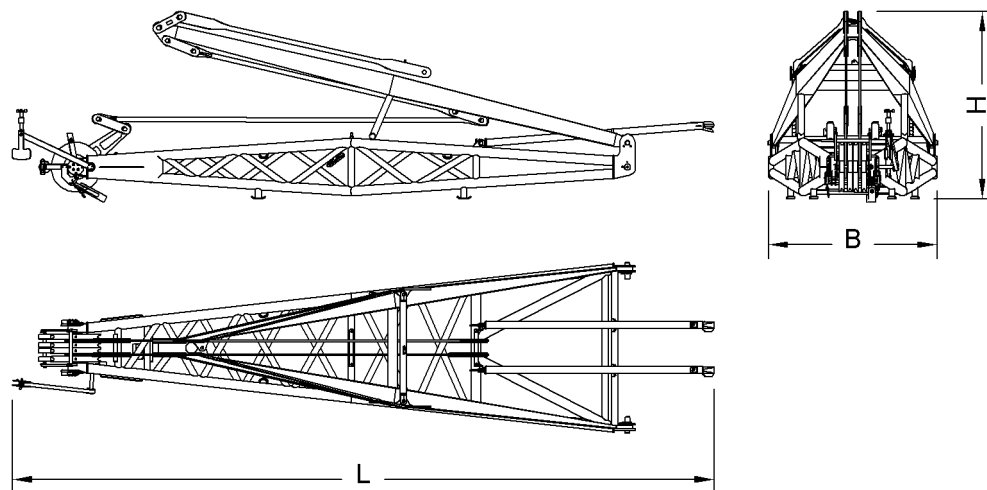


Fig. 288: Dimensions of 1507.20 jib

Name		Value
System length		8000 mm 26' 3" ft-in
System width		1500 mm 4' 11" ft-in
System height		700 mm 2' 4" ft-in
L	Length	10178 mm 33' 5" ft-in
B	Width	2470 mm 8' 1" ft-in
H	Height	2712 mm 8' 11" ft-in
Weight (incl. pendant straps, tilting-back supports and jib backstay straps)		3023 kg 6,664 lb

Tab. 169: Technical data fly jib 1507.20

1.16.2 Steel pendant straps on fixed jib 1507

Steel pendant straps on A-frame2

Equalizer A-frame2 (jib backstay strap)

Installation site in crane operation:

- Fixed jib 1507 (For more information see: [Jib backstay straps A-frame2 to main boom base section 2821](#), page 1611)

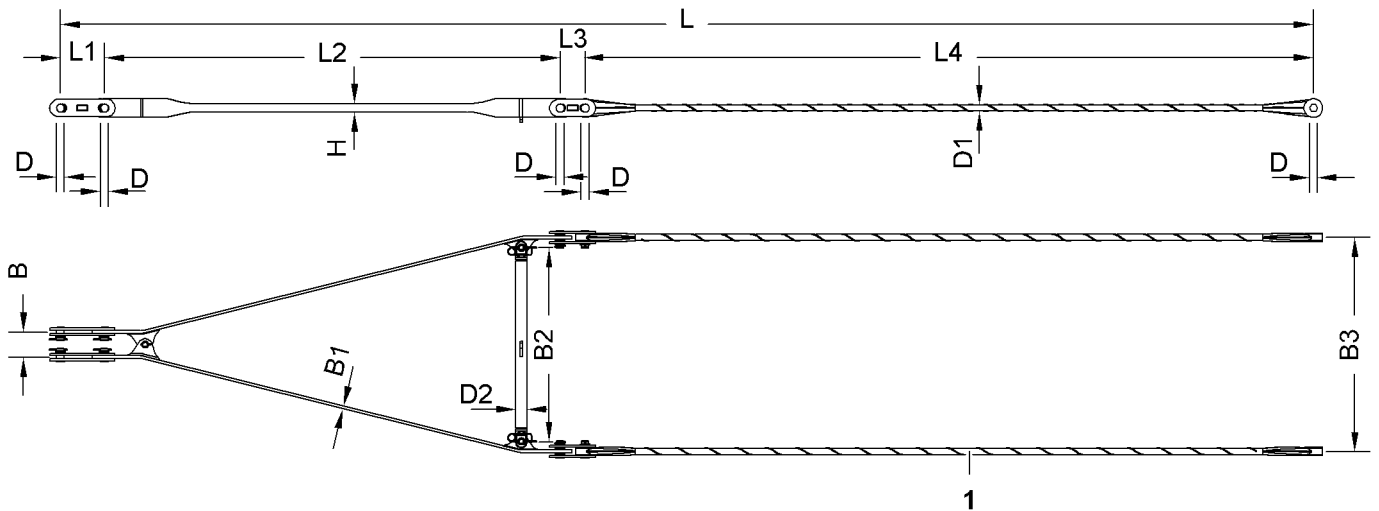


Fig. 289: Dimensions equalizer on A-frame2 (jib backstay strap)

1 CF pendant strap

Name		Value
L	Length	9980 mm 32' 9" ft-in
L1	Length of connecting link	350 mm 1' 2" ft-in
L2	Length of crossbar	3630 mm 11' 11" ft-in
L3	Length of connecting link	200 mm 7.87" in
L4	Length of pendant strap	5800 mm 19' ft-in
W	Width	200 mm 7.87" in
W1	Width of pendant strap	22 mm 0.87" in
W2	Width of spacer bar	1540 mm 5' 1" ft-in
W3	Width	1700 mm 5' 7" ft-in
H	Height of pendant strap	66 mm 2.60" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	50 mm 1.97" in
D2	Spacer bar Ø	89 mm 3.50" in

Name	Value
Weight	287 kg 633 lb

Tab. 170: Technical data equalizer on A-frame2 (jib backstay strap)

Jib pendant strap (A-frame2 to jib head 1507)

Installation site in crane operation:

- Fixed jib 1507 (For more information see: [Pendant straps A-frame2 to jib head 1507](#), page 1612)

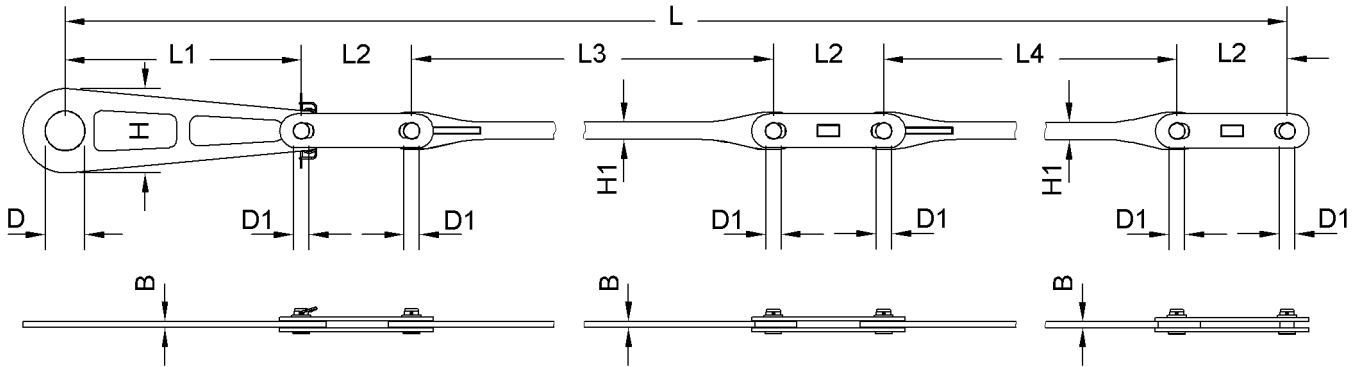


Fig. 290: Dimensions of jib pendant strap (A-frame2 to jib head 1507)

Name	Value
L Length	11615 mm 38' 1" ft-in
L1 Length of connecting link	900 mm 2' 11" ft-in
L2 Length of connecting link	420 mm 1' 5" ft-in
L3 Length of pendant strap	5580 mm 18' 4" ft-in
L4 Length of connecting link	3875 mm 12' 9" ft-in
W Width of pendant strap	22 mm 0.87" in
H Height of connecting link	320 mm 1' 1" ft-in
H1 Height of connecting link	66 mm 2.60" in
D Pin Ø	150 mm 5.91" in
D1 Pin Ø	55 mm 2.17" in
Weight	194 kg 428 lb

Tab. 171: Technical data jib pendant strap (A-frame2 to jib head 1507)

Additional connecting elements/spacer brackets for fixed jib 1507

Backstay straps connecting element on fixed jib 1507

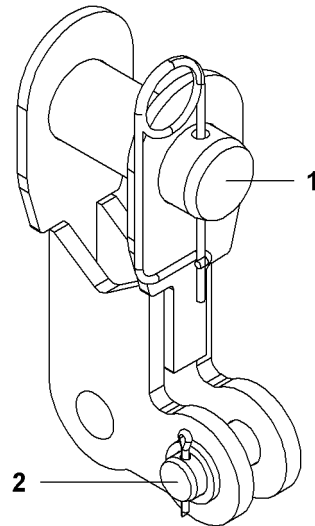


Fig. 291: Backstay straps connecting element on fixed jib 1507

- 1 Pin connection point with pendant strap
- 2 Pin connection point with spacer bracket

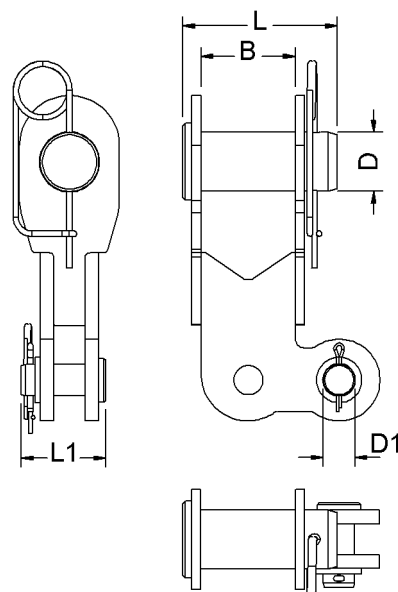


Fig. 292: Dimensions of backstay straps connecting element on fixed jib 1507

Name		Value
L	Length of pin	158 mm 6.22" in
L1	Length of pins	85 mm 3.35" in

Name		Value
W	Width	104 mm 4.09" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	35 mm 1.38" in

Tab. 172: Technical data backstay straps connecting elements on fixed jib 1507

Backstay straps spacer brackets on fixed jib 1507

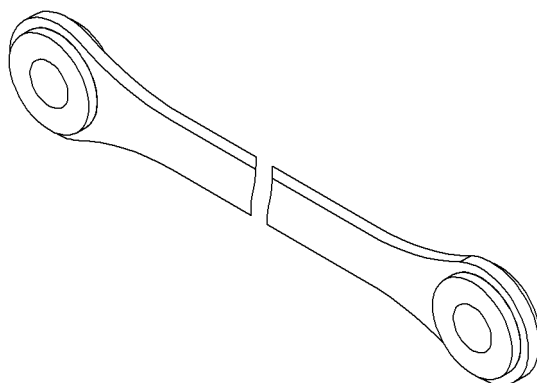


Fig. 293: Backstay straps spacer brackets on fixed jib 1507

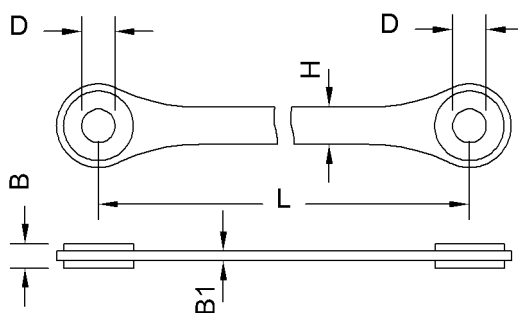


Fig. 294: Dimensions of backstay straps spacer brackets on fixed jib 1507

Name		Value
L	Length of spacer bracket	1500 mm 4' 11" ft-in
W	Width	26 mm 1.02" in
W1	Width	10 mm 0.39" in
H	Height	40 mm 1.57" in
D	Pin Ø	35 mm 1.38" in

Tab. 173: Technical data backstay straps spacer brackets on fixed jib 1507

1.16.3 CF pendant straps on fixed jib 1507

When installing the fixed jib 1507 on the machine with CF pendant straps, use the steel pendant straps and steel/CF backstay straps ([For more information see: 1.16.2 Steel pendant straps on fixed jib 1507, page 270](#)).

1.17 1008 fixed jib

1.17.1 Jib base section 1008.20

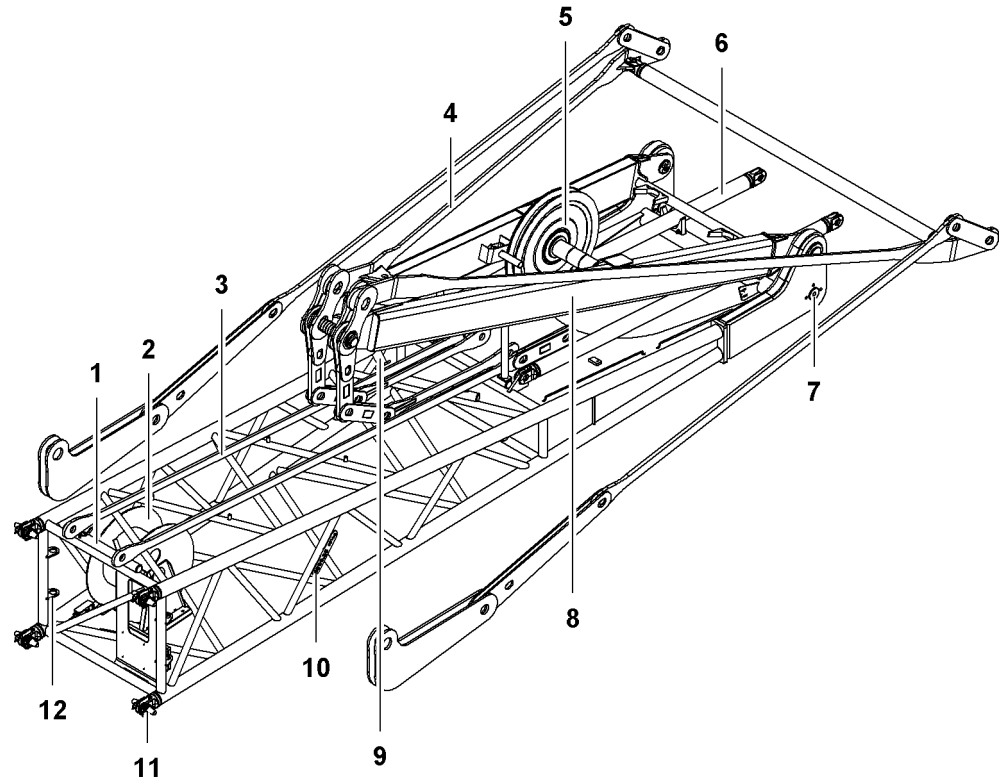


Fig. 295: Jib base section 1008.20

- | | | | |
|---|---|----|---|
| 1 | Rope guard support (2x) | 7 | Pivot point (2x) for main boom head section |
| 2 | Cable drum | 8 | A-frame 2 |
| 3 | Transport position of jib pendant straps (2x) | 9 | Lifting point (6x) |
| 4 | Transport position of the equalizer on A-frame 2 (jib backstay strap) | 10 | Boom identification plate |
| 5 | Pulley for rope of winch1/winch2 | 11 | Pin connection point (4x) with double-taper pins (4x) |
| 6 | Rigid tilting-back support (2x) | 12 | Transport bracket (4x) for double-taper pins |

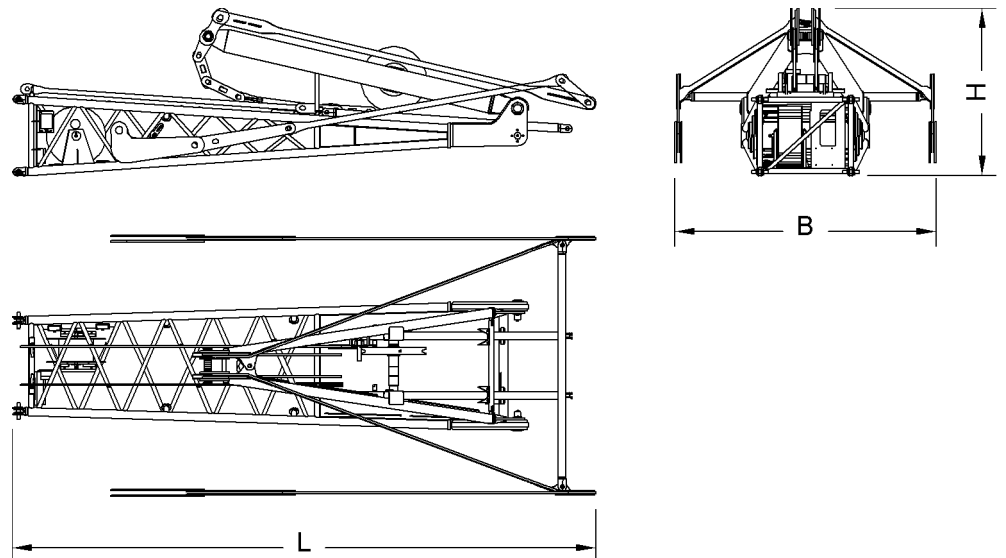


Fig. 296: Dimensions of jib base section 1008.20

Name		Value
System length		5500 mm 18' 1" ft-in
System width		1000 mm 3' 3" ft-in
System height		800 mm 2' 7" ft-in
L	Length	6620 mm 21' 9" ft-in
B	Width	2200 mm 7' 3" ft-in
H	Height	1850 mm 6' 1" ft-in
Weight (incl. pendant straps, tilting-back supports and jib backstay straps)		1950 kg 4,299 lb
Double-taper pins Ø		40 mm 1.57" in

Tab. 174: Technical data jib base section 1008.20

1.17.2 1008.17 jib section 3 m (10 ft)

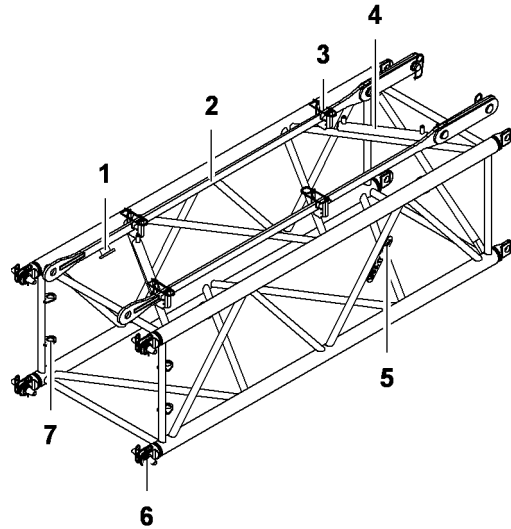


Fig. 297: 1008.17 jib section 3 m (10 ft)

- | | |
|--|--|
| <ul style="list-style-type: none"> 1 Lifting point (4x) 2 Transport position (2x) of the jib pendant straps 3 m (10 ft) 3 Transport brackets (4x) for pendant straps 4 Rope guard support (2x) | <ul style="list-style-type: none"> 5 Boom identification plate 6 Pin connection point (8x) with double-taper pins (4x) 7 Transport bracket (4x) for double-taper pins |
|--|--|

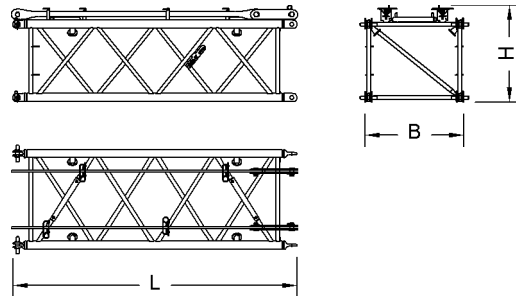


Fig. 298: Dimensions of 1008.17 jib section 3 m (10 ft)

Name		Value
System length		3000 mm 9' 10" ft-in
System width		1000 mm 3' 3" ft-in
System height		800 mm 2' 7" ft-in
L	Length	3120 mm 10' 3" ft-in
B	Width	1090 mm 3' 7" ft-in
H	Height (incl. pendant straps)	1020 mm 3' 4" ft-in

Name	Value
Weight (incl. pendant straps)	300 kg 661 lb
Double-taper pins Ø	40 mm 1.57" in

Tab. 175: Technical data for 1008.17 jib section 3 m (10 ft)

1.17.3 1008.17 jib section 6 m (20 ft)

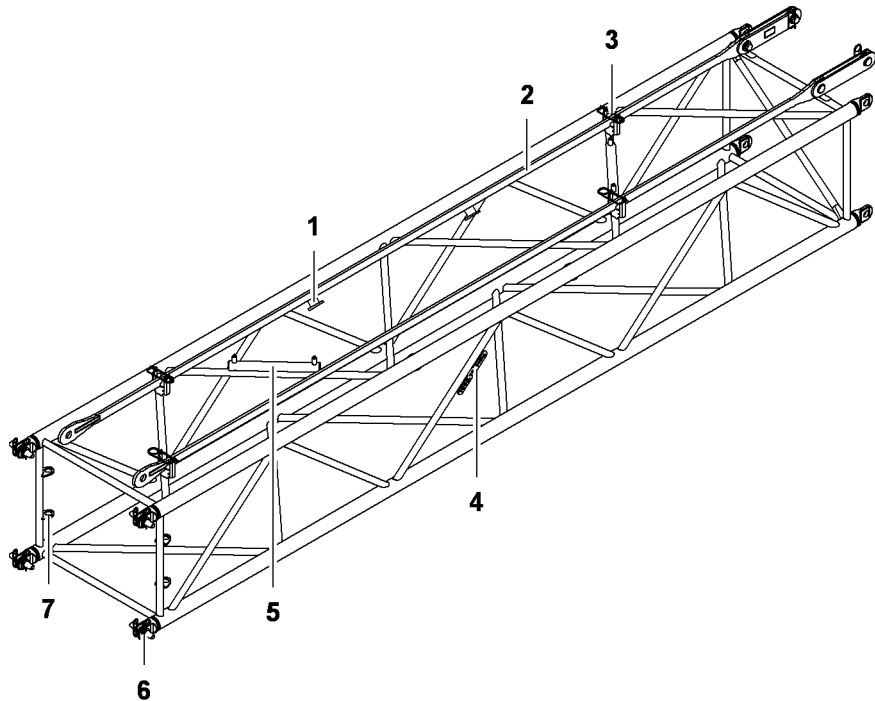


Fig. 299: 1008.17 jib section 6 m (20 ft)

- | | | | |
|---|---|---|---|
| 1 | Lifting point (4x) | 5 | Rope guard support (2x) |
| 2 | Transport position (2x) of the jib pendant straps 6 m (20 ft) | 6 | Pin connection point (8x) with double-taper pins (4x) |
| 3 | Transport brackets (4x) for pendant straps | 7 | Transport bracket (4x) for double-taper pins |
| 4 | Boom identification plate | | |

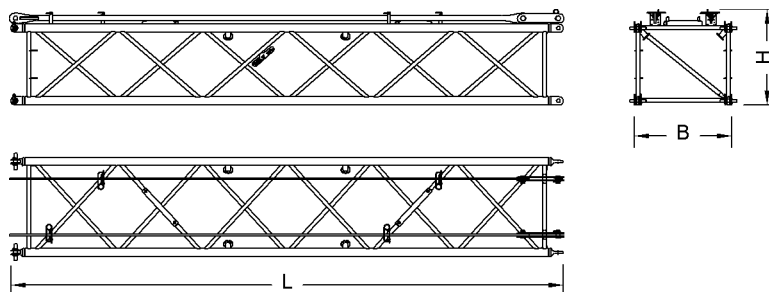


Fig. 300: Dimensions of 1008.17 jib section 6 m (20 ft)

Name		Value
System length		6000 mm 19' 8" ft-in
System width		1000 mm 3' 3" ft-in
System height		800 mm 2' 7" ft-in
L	Length	6120 mm 20' 1" ft-in
B	Width	1090 mm 3' 7" ft-in
H	Height (incl. pendant straps)	1020 mm 3' 4" ft-in
Weight (incl. pendant straps)		455 kg 1,003 lb
Double-taper pins Ø		40 mm 1.57" in

Tab. 176: Technical data for 1008.17 jib section 6 m (20 ft)

1.17.4 1008.20 jib head section

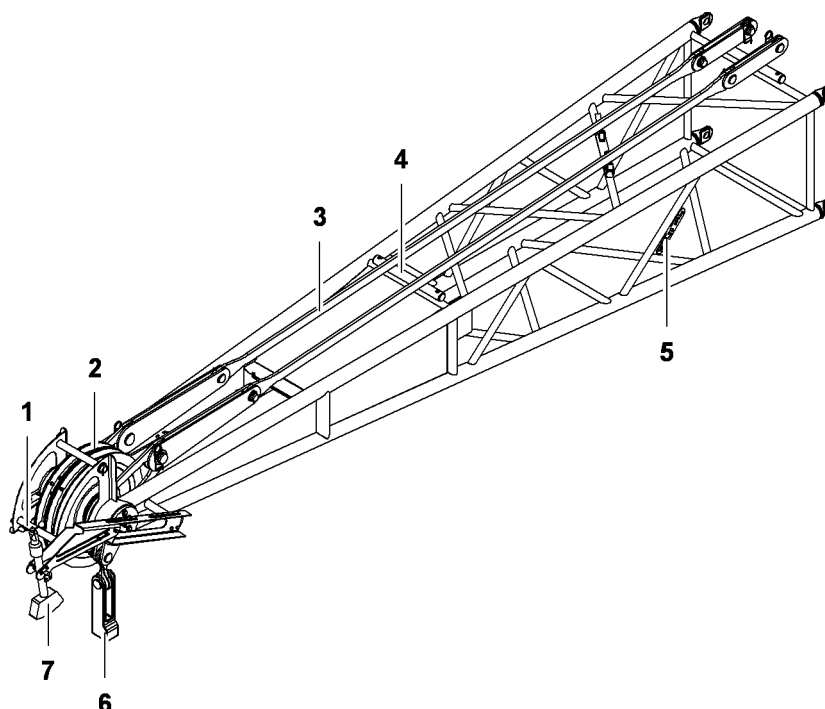


Fig. 301: 1008.20 jib head section

- | | | | |
|---|---|---|---------------------------|
| 1 | Rope protection pipe (2x) | 5 | Boom identification plate |
| 2 | Pulley (2x) | 6 | Rope fixation |
| 3 | Transport position (2x) of jib pendant straps | 7 | Anemometer |
| 4 | Rope guard support (2x) | | |

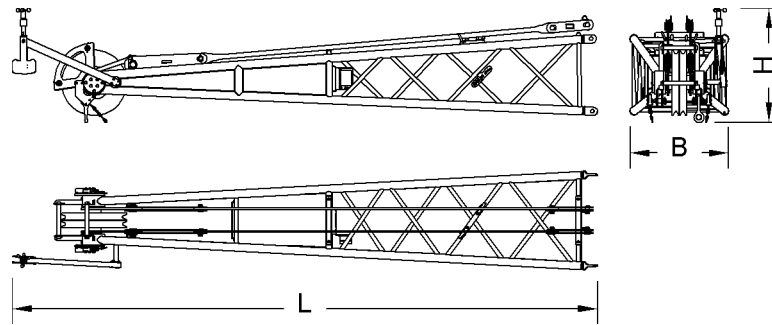


Fig. 302: 1008.20 jib head section dimensions

Name		Value
System length		5500 mm 18' 1" ft-in
System width		1000 mm 3' 3" ft-in
System height		800 mm 2' 7" ft-in
L	Length	6500 mm 21' 4" ft-in
B	Width	1090 mm 3' 7" ft-in
H	Height	1020 mm 3' 4" ft-in
Weight (incl. pendant straps)		920 kg 2,028 lb

Tab. 177: 1008.20 jib head section, technical data

1.17.5 Steel pendant straps on fixed jib 1008

Steel pendant straps on A-frame2

Equalizer A-frame2 (jib backstay strap)

Installation site in crane operation:

- Fixed jib 1008 ([For more information see: Jib backstay straps A-frame2 to main boom head 2821, page 1622](#))

1008 fixed jib

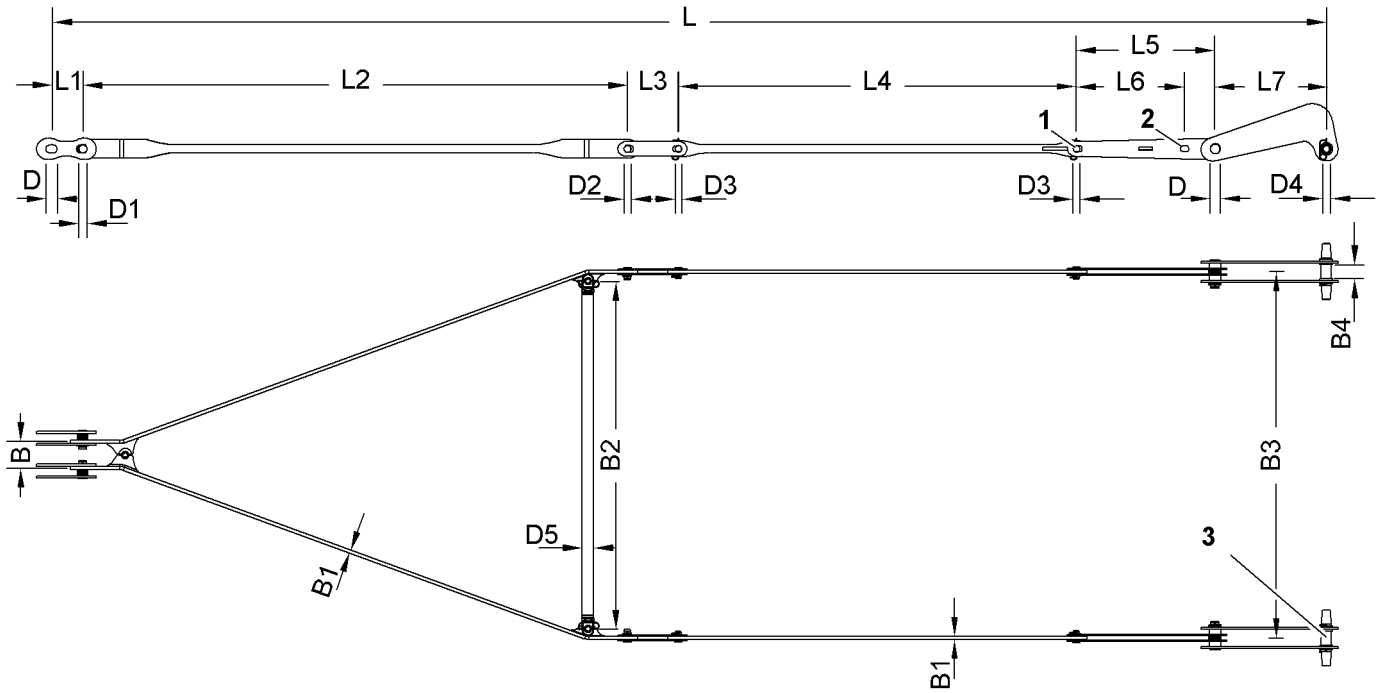


Fig. 303: Dimensions equalizer on A-frame2 (jib backstay strap)

- 1 Pin connection point 30°
- 2 Pin connection point 15°
- 3 Double-taper pins
431 mm (1' 5" ft-in)/
Ø80 mm (3.15" in) (2x)

The double-taper pins (431 mm (1' 5" ft-in) x Ø80 mm (3.15" in)) **3** replace the top double-taper pins on the main boom head.

Name		Value
L	Length	at 30° 9760 mm 32' ft-in
		at 15° 8943 mm 29' 4" ft-in
L1	Length of connecting link	250 mm 9.84" in
L2	Length of crossbar	4165 mm 13' 8" ft-in
L3	Length of connecting link	390 mm 1' 3" ft-in
L4	Length of pendant strap	3045 mm 10' ft-in
L5	Length of connecting link (30°)	1060 mm 3' 6" ft-in
L6	Length of connecting link (15°)	817 mm 2' 8" ft-in
L7	Length of connecting link	850 mm 2' 9" ft-in

Name		Value
W	Width	200 mm 7.87" in
W1	Width of pendant strap	22 mm 0.87" in
W2	Width	2660 mm 8' 9" ft-in
W3	Width	108 mm 4.25" in
W4	Width	2800 mm 9' 2" ft-in
H	Height of pendant strap	62 mm 2.44" in
D	Pin Ø	65 mm 2.56" in
D1	Pin Ø	60 mm 2.36" in
D2	Pin Ø	50 mm 1.97" in
D3	Pin Ø	45 mm 1.77" in
D4	Double-taper pins Ø	80 mm 3.15" in
D5	Spacer bar Ø	90 mm 3.54" in
Weight		548 kg 1,208 lb

Tab. 178: Technical data equalizer on A-frame2 (jib backstay strap)

Equalizer on A-frame2 (jib pendant strap)

Installation site in crane operation:

- Fixed jib 1008 (For more information see: [Pendant straps A-frame2 to jib head 1008, page 1622](#))

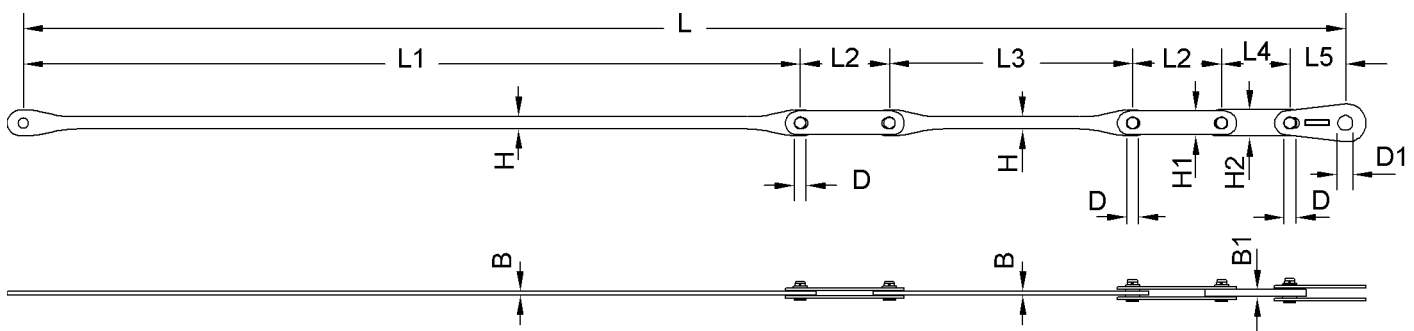


Fig. 304: Dimensions of equalizer on A-frame2 (jib pendant strap)

Name		Value
L	Length	5785 mm 19' ft-in
L1	Length of pendant strap	3400 mm 11' 2" ft-in
L2	Length of connecting link	390 mm 1' 3" ft-in
L3	Length of pendant strap	1064 mm 3' 6" ft-in
L4	Length of connecting link	298 mm 1' ft-in
L5	Length of connecting link	243 mm 9.57" in
W	Width of pendant strap	18 mm 0.71" in
W1	Width of connecting link	30 mm 1.18" in
H	Height of pendant strap	54 mm 2.13" in
H1	Height of connecting link	103 mm 4.06" in
H2	Height of connecting link	116 mm 4.57" in
D	Pin Ø	45 mm 1.77" in
D1	Pin Ø	65 mm 2.56" in
Weight		85 kg 187 lb

Tab. 179: Technical data equalizer on A-frame2 (jib pendant strap)

Steel pendant straps on jib section 1008.17 3 m (10 ft)

Jib pendant strap 3 m (10 ft)

Installation site in crane operation:

- Fixed jib 1008 (For more information see: [Pendant straps A-frame2 to jib head 1008, page 1622](#))

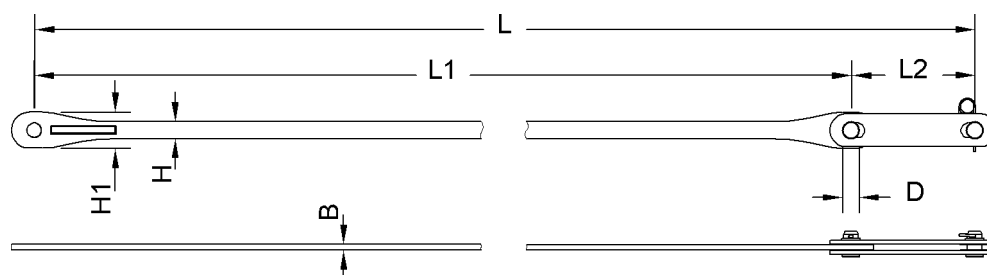


Fig. 305: Dimensions jib pendant strap 3 m (10 ft)

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2610 mm 8' 7" ft-in
L2	Length of connecting link	390 mm 1' 3" ft-in
W	Width of pendant strap	18 mm 0.71" in
H	Height of pendant strap	54 mm 2.13" in
H1	Height of pendant strap	113 mm 4.45" in
D	Pin Ø	45 mm 1.77" in
Weight		48 kg 106 lb

Tab. 180: Technical data jib pendant strap 3 m (10 ft)

Steel pendant straps on jib section 1008.17 6 m (20 ft)

Jib pendant strap 6 m (20 ft)

Installation site in crane operation:

- Fixed jib 1008 (For more information see: [Pendant straps A-frame2 to jib head 1008](#), page 1622)

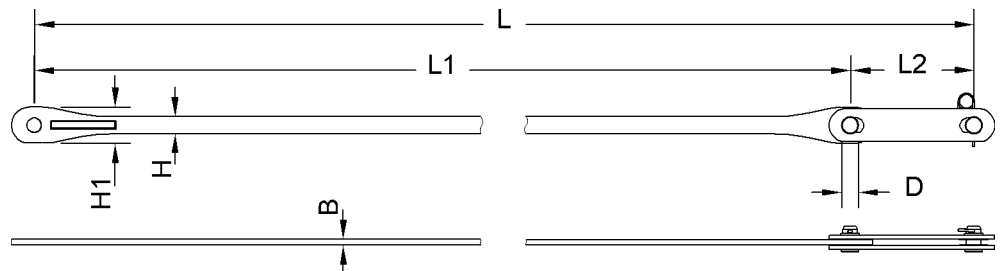


Fig. 306: Dimensions jib pendant strap 6 m (20 ft)

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5610 mm 18' 5" ft-in
L2	Length of connecting link	390 mm 1' 3" ft-in
W	Width of pendant strap	18 mm 0.71" in

Name		Value
H	Height of pendant strap	54 mm 2.13" in
H1	Height of pendant strap	113 mm 4.45" in
D	Pin Ø	45 mm 1.77" in
Weight		58 kg 128 lb

Tab. 181: Technical data jib pendant strap 6 m (20 ft)

Steel pendant straps on jib head 1008.20

Jib pendant strap on jib head 1008.20

Installation site in crane operation:

- Fixed jib 1008 (For more information see: [Pendant straps A-frame2 to jib head 1008, page 1622](#))

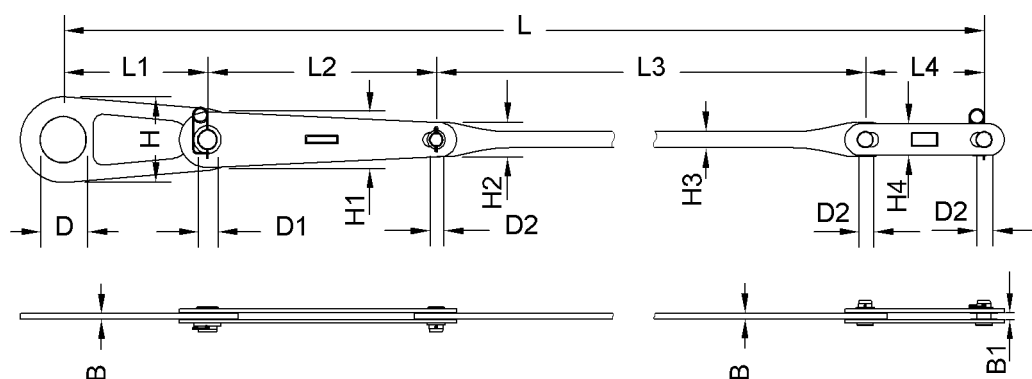


Fig. 307: Dimensions jib pendant strap on jib head 1008.20

Name		Value
L	Length	5515 mm 18' 1" ft-in
L1	Length of connecting link	474 mm 1' 7" ft-in
L2	Length of connecting link	751 mm 2' 6" ft-in
L3	Length of pendant strap	3900 mm 12' 10" ft-in
L4	Length of connecting link	390 mm 1' 3" ft-in
W	Width of pendant strap	18 mm 0.71" in
W1	Width	22 mm 0.87" in

Name		Value
H	Height of connecting link	280 mm 11.02" in
H1	Height of connecting link	182 mm 7.17" in
H2	Height of pendant strap	113 mm 4.45" in
H3	Height of pendant strap	54 mm 2.13" in
H4	Height of connecting link	103 mm 4.06" in
D	Pin Ø	150 mm 5.91" in
D1	Pin Ø	65 mm 2.56" in
D2	Pin Ø	45 mm 1.77" in
Weight		78 kg 172 lb

Tab. 182: Technical data jib pendant strap on jib head 1008.20

1.17.6 CF pendant straps on fixed jib 1008

When installing the fixed jib 1008 on the machine with CF pendant straps, use the steel pendant straps and the steel backstay straps ([For more information see: 1.17.5 Steel pendant straps on fixed jib 1008, page 281](#)).

1.18 0906 fixed jib

1.18.1 Jib 0906.21

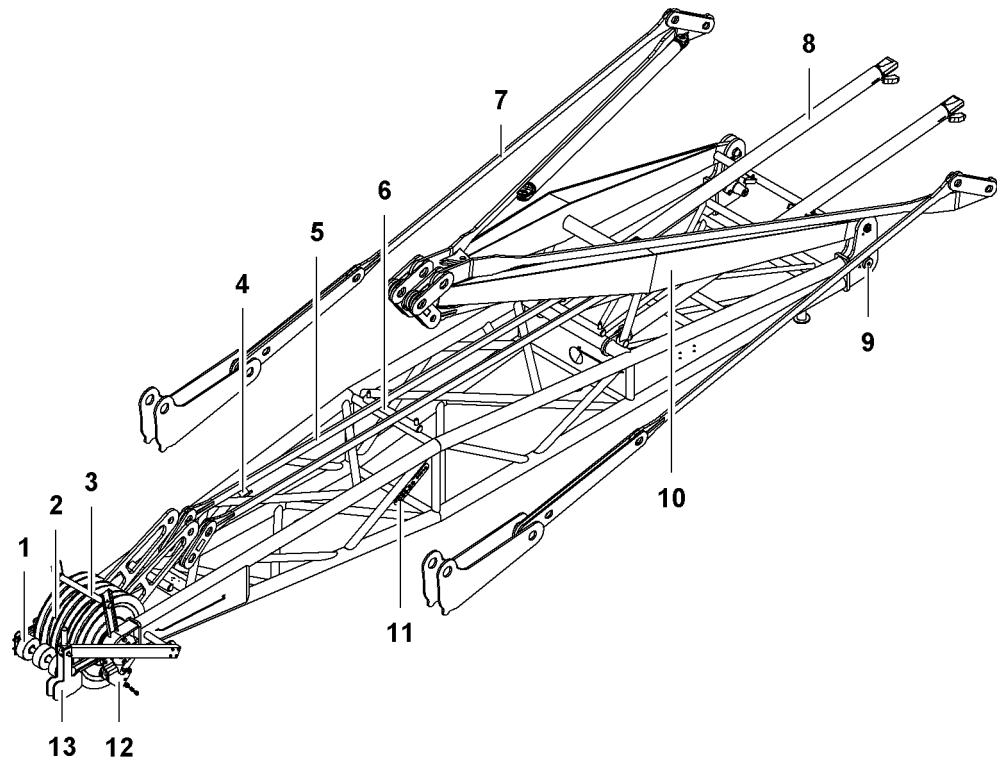


Fig. 308: Jib 0906.21

- | | | | |
|---|---|----|---|
| 1 | Rope protection roller (3x) | 8 | Rigid tilting-back support (2x) |
| 2 | Pulley (3x) | 9 | Pivot point (2x) for main boom head section |
| 3 | Rope protection pipe | 10 | A-frame 2 |
| 4 | Lifting point (4x) | 11 | Boom identification plate |
| 5 | Transport position (2x) of jib pendant straps | 12 | Hoist limit switch |
| 6 | Rope protection support (3x) | 13 | Anemometer |
| 7 | Transport position of the equalizer on A-frame 2 (jib backstay strap) | | |

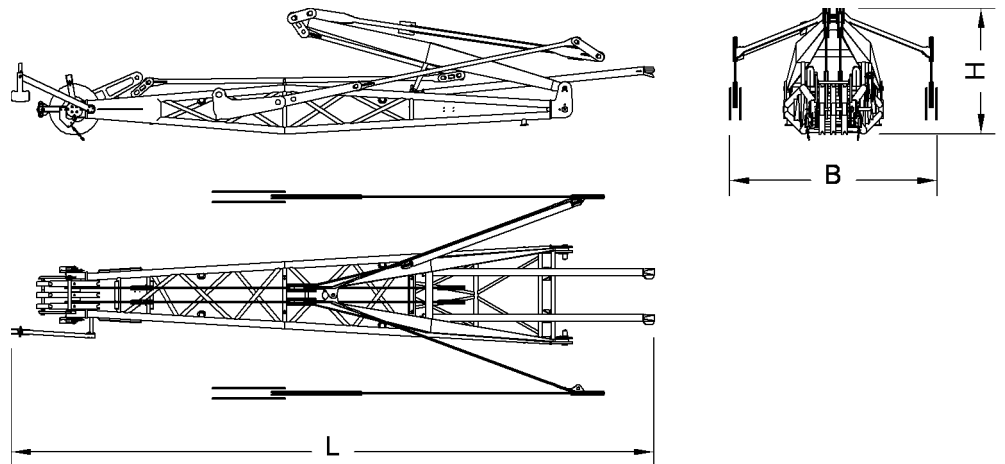


Fig. 309: Dimensions jib 0906.21

Name		Value
System length		7000 mm 23' ft-in
System width		900 mm 2' 11" ft-in
System height		600 mm 2' ft-in
L	Length	9190 mm 30' 2" ft-in
B	Width	2960 mm 9' 9" ft-in
H	Height	1800 mm 5' 11" ft-in
Weight (incl. pendant straps, tilting-back supports and jib backstay straps)		2388 kg 5,265 lb

Tab. 183: Technical data jib 0906.21

1.18.2 Steel pendant straps on fixed jib 0906

Steel pendant straps on A-frame2

Equalizer A-frame2 (jib backstay strap)

Installation site in crane operation:

- Fixed jib 0906 (For more information see: [Jib backstay straps A-frame2 to main boom head 2821](#), page 1632)

0906 fixed jib

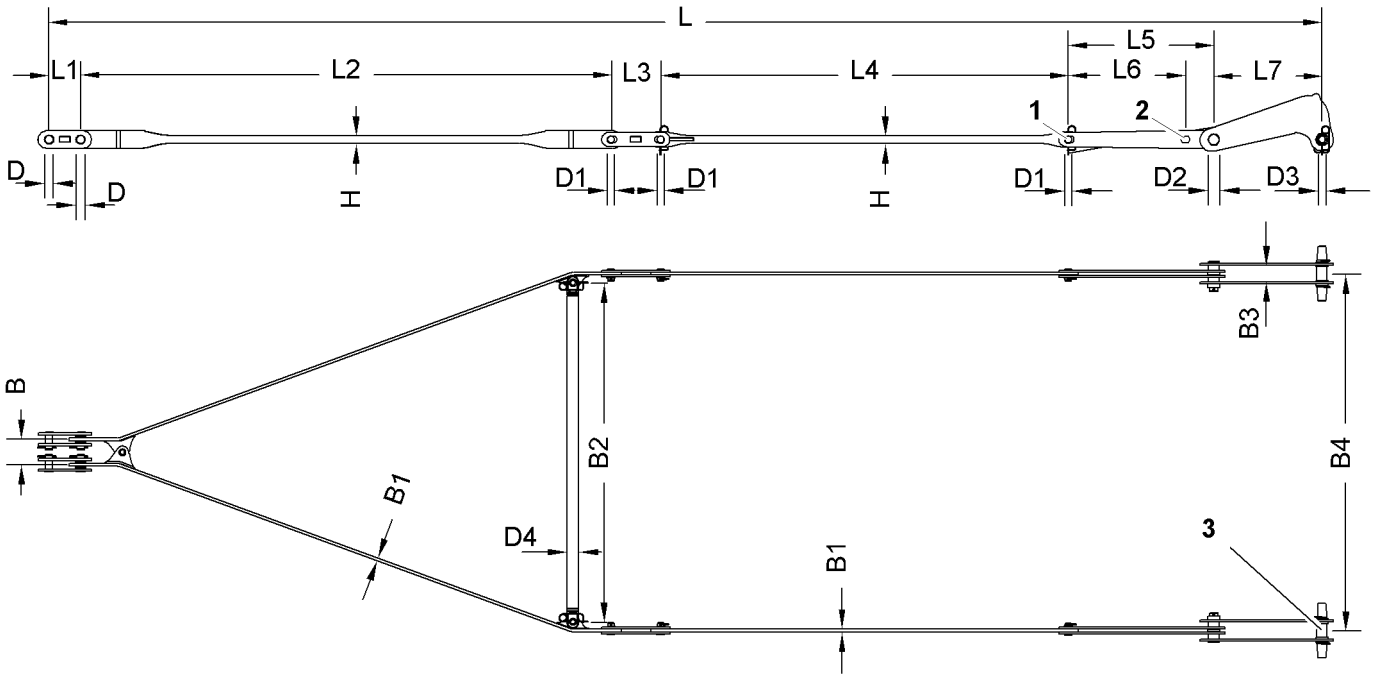


Fig. 310: Dimensions equalizer on A-frame2 (jib backstay strap)

- 1 Pin connection point 30°
- 2 DO NOT use pin connection point
- 3 Double-taper pins
431 mm (1' 5" ft-in)/
Ø80 mm (3.15" in) (2x)

The double-taper pins (431 mm (1' 5" ft-in) x Ø80 mm (3.15" in)) 3 replace the top double-taper pins on the main boom head.

Name		Value
L	Length	at 30° 10000 mm 32' 10" ft-in
L1	Length of connecting link	250 mm 9.84" in
L2	Length of crossbar	4165 mm 13' 8" ft-in
L3	Length of connecting link	390 mm 1' 3" ft-in
L4	Length of pendant strap	3202 mm 10' 6" ft-in
L5	Length of connecting link (30°)	1143 mm 3' 9" ft-in
L6	Length of connecting link (DO NOT use pin connection point)	910 mm 3' ft-in
L7	Length of connecting link	850 mm 2' 9" ft-in
W	Width	200 mm 7.87" in
W1	Width of pendant strap	22 mm 0.87" in

Name		Value
W2	Width	2660 mm 8' 9" ft-in
W3	Width	132 mm 5.20" in
W4	Width	2800 mm 9' 2" ft-in
H	Height of pendant strap	62 mm 2.44" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	50 mm 1.97" in
D2	Pin Ø	70 mm 2.76" in
D3	Double-taper pins Ø	80 mm 3.15" in
D4	Spacer bar Ø	90 mm 3.54" in
Weight		582 kg 1,283 lb

Tab. 184: Technical data equalizer on A-frame2 (jib backstay strap)

Jib pendant strap (A-frame2 to jib head 0906.21)

Installation site in crane operation:

- Fixed jib 0906 (For more information see: [Pendant straps A-frame2 to jib head 0906](#), page 1632)

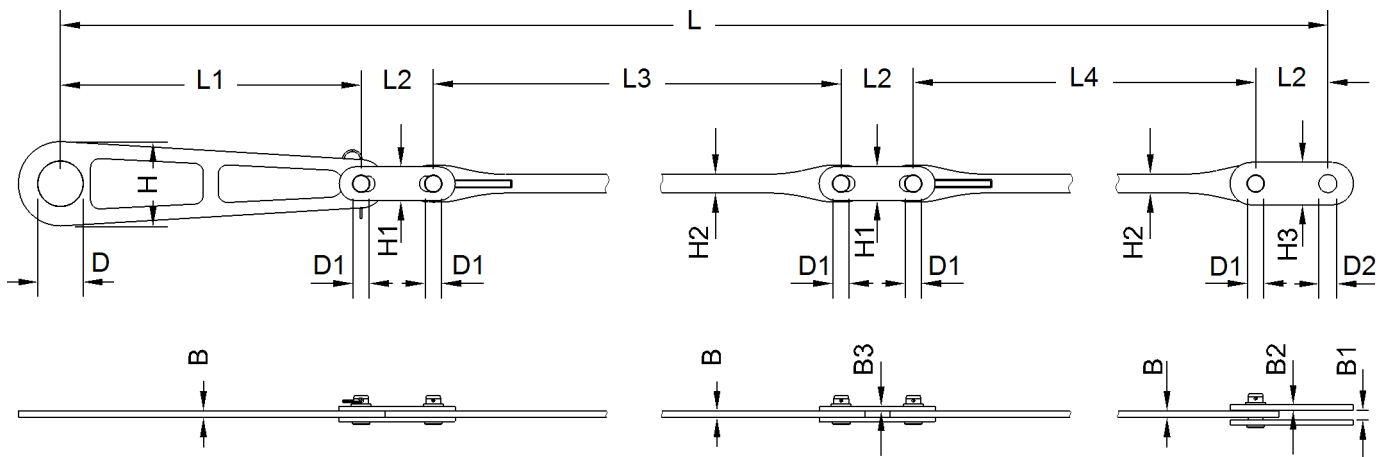


Fig. 311: Dimensions jib pendant strap (A-frame2 to jib head 0906.21)

Name		Value
L	Length	8235 mm 27' ft-in

Name		Value
L1	Length of connecting link	1000 mm 3' 3" ft-in
L2	Length of connecting link	240 mm 9.45" in
L3	Length of pendant strap	4200 mm 13' 9" ft-in
L4	Length of connecting link	2315 mm 7' 7" ft-in
W	Width of pendant strap	22 mm 0.87" in
W1	Width	30 mm 1.18" in
H	Height of connecting link	280 mm 11.02" in
H1	Height of connecting link	113 mm 4.45" in
H2	Height of pendant strap	62 mm 2.44" in
H3	Height of connecting link	141 mm 5.55" in
D	Pin Ø	150 mm 5.91" in
D1	Pin Ø	50 mm 1.97" in
D2	Pin Ø	60 mm 2.36" in
Weight		134 kg 295 lb

Tab. 185: Technical data jib pendant strap (A-frame2 to jib head 0906.21)

1.18.3 CF pendant straps on fixed jib 0906

When installing the fixed jib 0906 on the machine with CF pendant straps, use the steel pendant straps and the steel backstay straps ([For more information see: 1.18.2 Steel pendant straps on fixed jib 0906, page 289](#)).

1.19 Luffing jib - overview

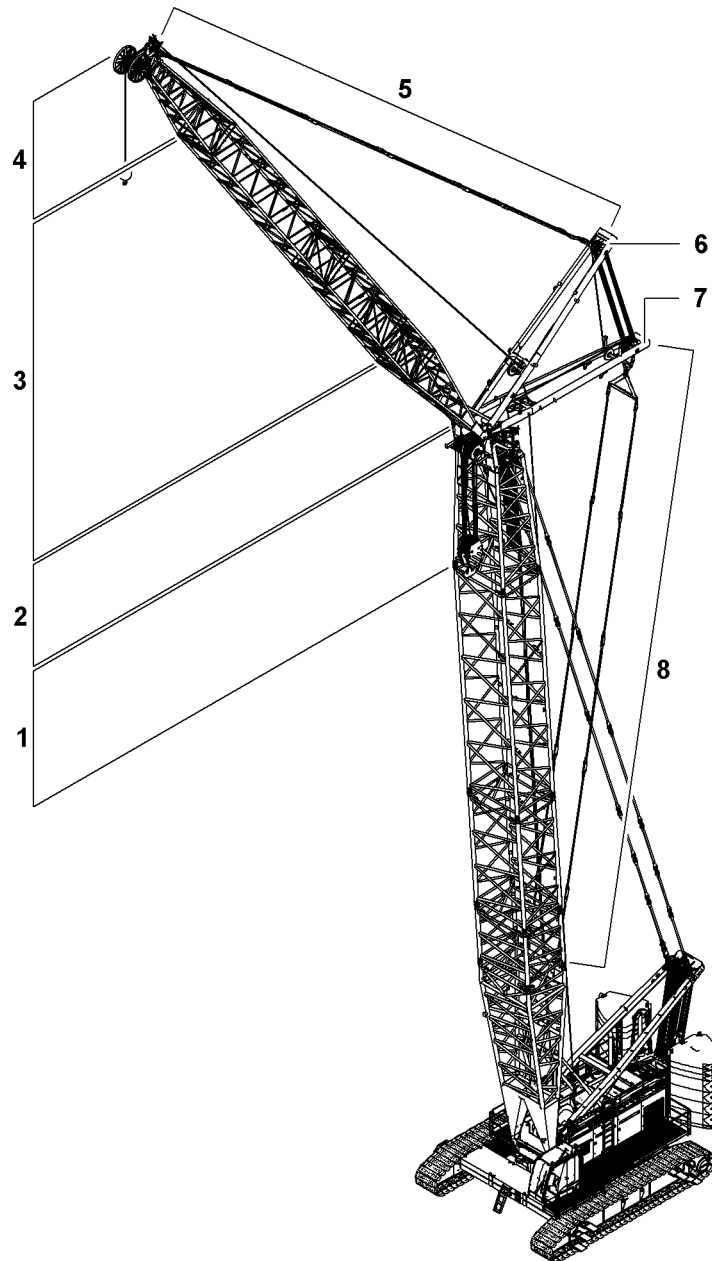


Fig. 312: Luffing jib - overview

- | | | | |
|----------|------------------|----------|---------------------|
| 1 | Main boom head | 5 | Jib pendant straps |
| 2 | Jib base section | 6 | A-frame3 |
| 3 | Jib sections | 7 | A-frame2 |
| 4 | Jib head | 8 | Jib backstay straps |

The luffing jib is composed of:

- Jib base section **2**
- Jib sections (3 m (10 ft), 6 m (20 ft), 12 m (40 ft)) **3**
- Jib head section **4**

The jib pendant straps **5** connect A-frame **3** **6** to the jib head section **4**.

The jib backstay straps **8** connect A-frame **2** **7** to the boom base section.

1.20 2316 luffing jib

1.20.1 Jib base section 2316.22

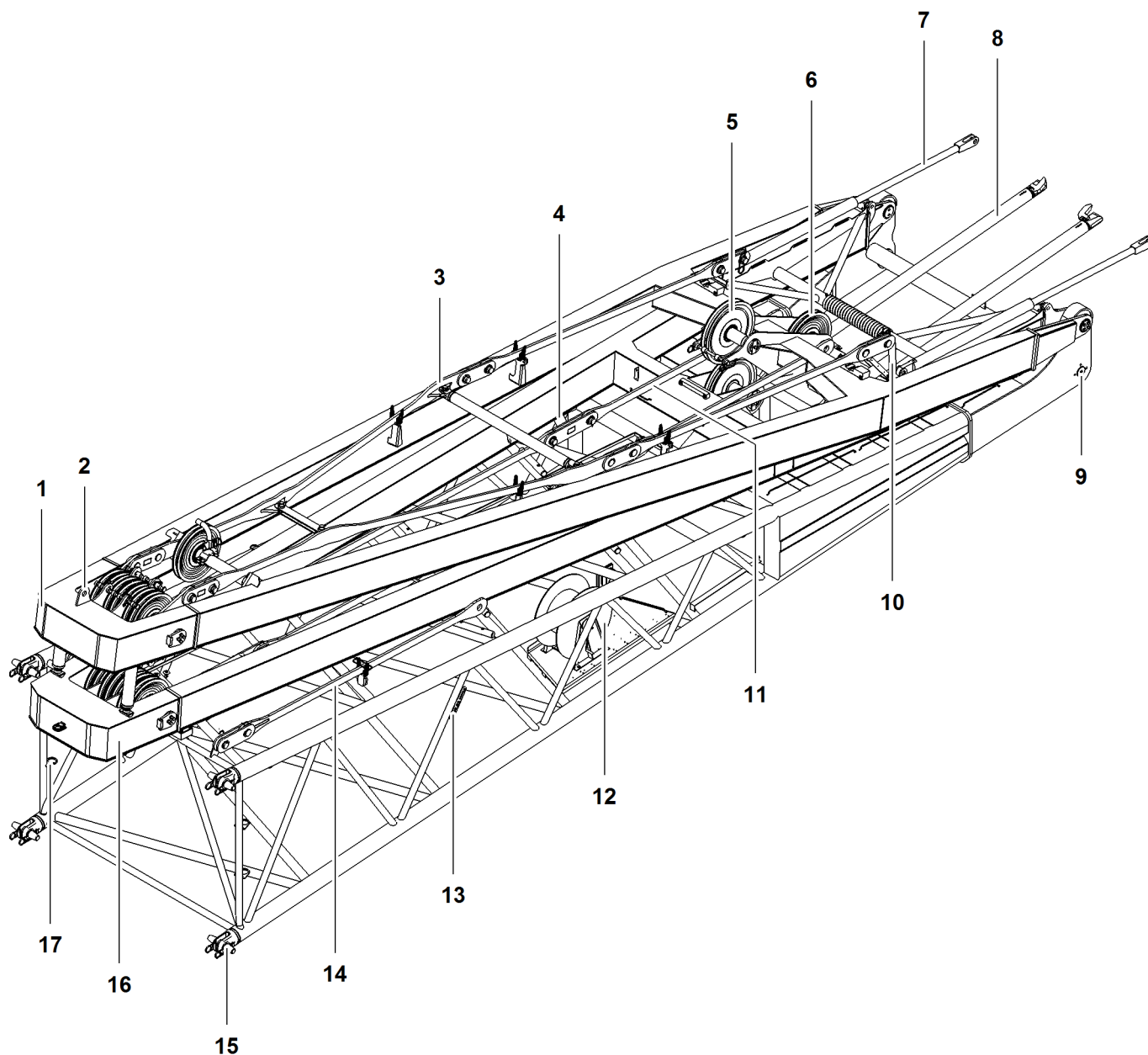


Fig. 313: Jib base section 2316.22

- | | | | | | |
|---|--|----|---|----|---|
| 1 | A-frame2 | 7 | Rigid tilting-back support (2x) | 13 | Boom identification plate |
| 2 | Shackle | 8 | Hydraulic tilting-back support (2x) | 14 | Transport position (2x) for 3 m (10 ft) pendant strap |
| 3 | Transport position of A-frame2 equalizer (jib backstay straps) | 9 | Pivot point (2x) for main boom head | 15 | Pin connection point (4x) with double-taper pin (4x) |
| 4 | Rigging point (4x) | 10 | Transport brackets (2x) of A-frame2 equalizer | 16 | A-frame3 |

See next page for continuation of the image legend

- 5** Pulley (2x) for rope of winch1/
winch2

6 Pulley (2x) for rope of jib
luffing winch
- 11** Transport position of A-
frame3 equalizer (jib pendant
strap)

12 Cable drum
- 17** Transport bracket (4x) for
double-taper pins

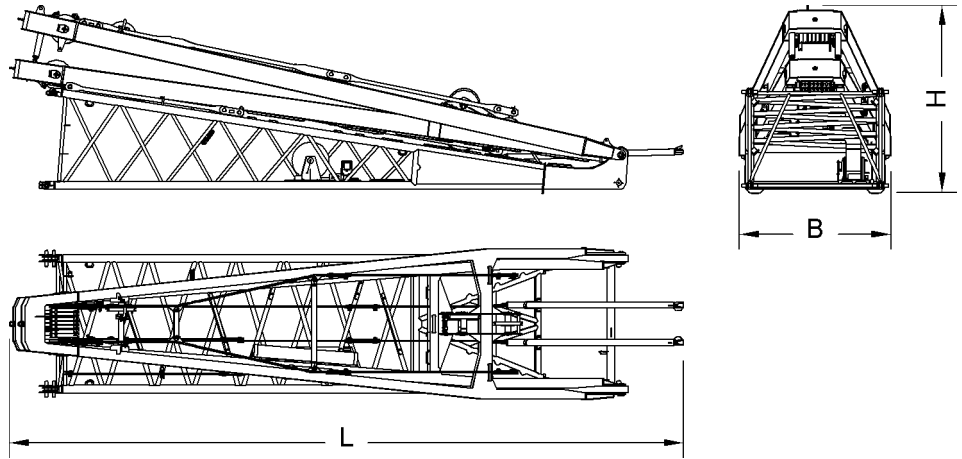


Fig. 314: Dimensions of jib base section 2316.22

Name		Value
System length		10000 mm 32' 10" ft-in
System width		2290 mm 7' 6" ft-in
System height		1650 mm 5' 5" ft-in
L	Length	11720 mm 38' 5" ft-in
B	Width	2670 mm 8' 9" ft-in
H	Height	3300 mm 10' 10" ft-in
Weight (incl. pendant straps, tilting-back supports and jib backstay straps)		8060 kg 17,769 lb
Double-taper pins Ø		65 mm 2.56" in

Tab. 186: Technical data jib base section 2316.22

1.20.2 2316.20 jib section 3 m (10 ft)

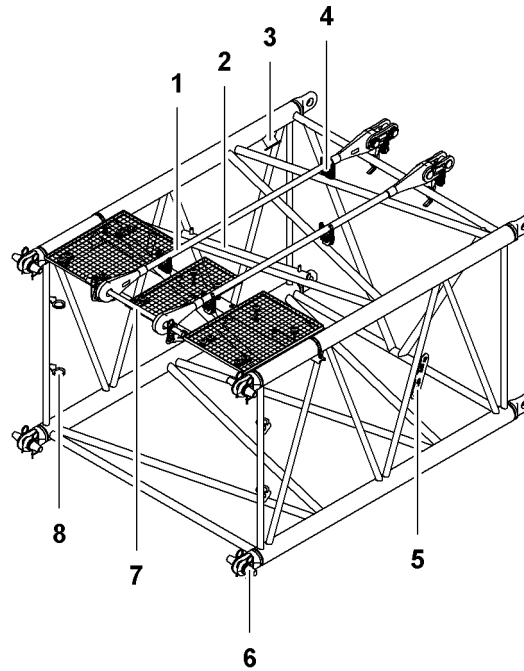


Fig. 315: Jib section 2316.20 3 m (10 ft)

- | | |
|---|--|
| <ul style="list-style-type: none"> 1 Transport position (2x) of jib pendant straps 3 m (10 ft) 2 Rope protection guard 3 Rigging point (4x) 4 Transport bracket (4x) for pendant straps | <ul style="list-style-type: none"> 5 Boom identification plate 6 Pin connection point (8x) with double-taper pin (4x) 7 Transport bracket for pendant straps 8 Transport bracket (4x) for double taper pin |
|---|--|

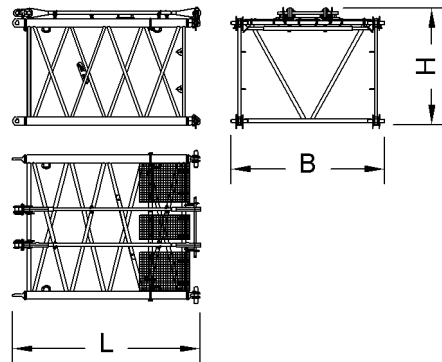


Fig. 316: Dimensions jib section 2316.20 3 m (10 ft)

Name	Value
System length	3000 mm 9' 10" ft-in
System width	2290 mm 7' 6" ft-in

Name		Value
System height		1650 mm 5' 5" ft-in
L	Length	3150 mm 10' 4" ft-in
B	Width	2430 mm 8' ft-in
H	Height (incl. pendant straps)	1910 mm 6' 3" ft-in
Weight (incl. pendant straps)		600 kg 1,323 lb
Double-taper pins Ø		65 mm 2.56" in

Tab. 187: Technical data for 2316.20 jib section 3 m (10 ft)

1.20.3 2316.20 jib section 6 m (20 ft)

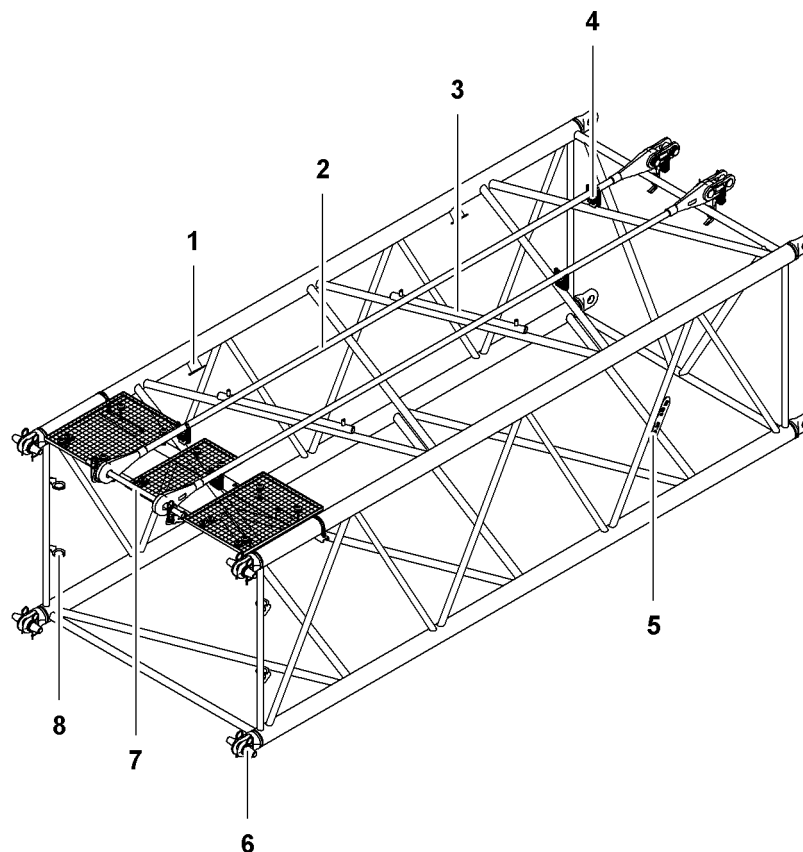


Fig. 317: Jib section 2316.20 6 m (20 ft)

- | | | | |
|---|---|---|--|
| 1 | Rigging point (4x) | 5 | Boom identification plate |
| 2 | Transport position (2x) of jib pendant straps 6 m (20 ft) | 6 | Pin connection point (8x) with double-taper pin (4x) |
| 3 | Rope protection guard (2x) | 7 | Transport bracket for pendant straps |
| 4 | Transport bracket (4x) for pendant straps | 8 | Transport bracket (4x) for double taper pin |

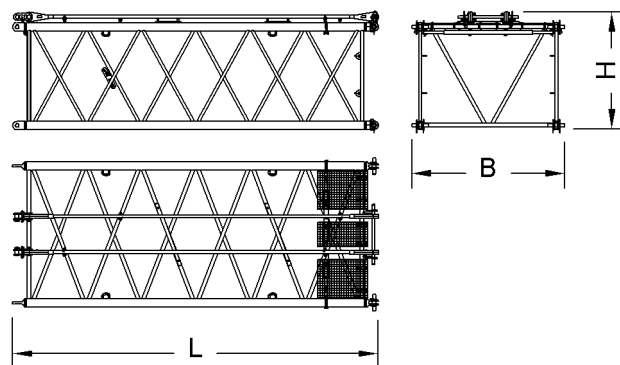


Fig. 318: Dimensions jib section 2316 6 m (20 ft)

Designation		Value
System length		6000 mm 19' 8" ft-in
System width		2290 mm 7' 6" ft-in
System height		1650 mm 5' 5" ft-in
L	Length	6150 mm 20' 2" ft-in
B	Width	2430 mm 8' ft-in
H	Height (incl. pendant straps)	1910 mm 6' 3" ft-in
Weight (incl. pendant straps)		950 kg 2,094 lb
Double-taper pins Ø		65 mm 2.56" in

Tab. 188: Technical data for 2316 jib section 6 m (20 ft)

1.20.4 2316.20 jib section 12 m (40 ft)

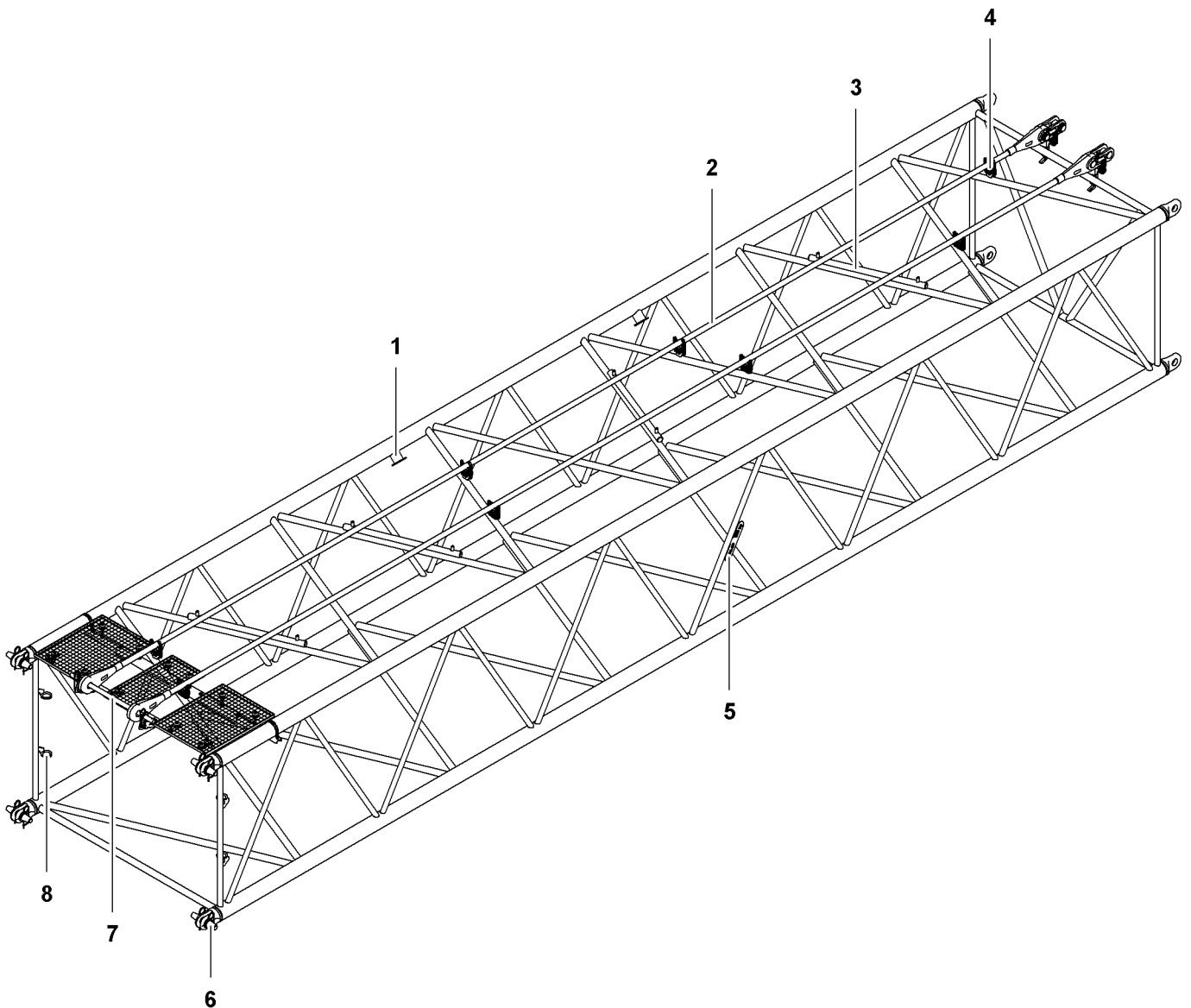


Fig. 319: Jib section 2316.20 12 m (40 ft)

- | | | | | | |
|---|--|---|--|---|---|
| 1 | Rigging point (4x) | 4 | Transport bracket (8x) for pendant straps | 7 | Transport bracket for pendant straps |
| 2 | Transport position (2x) of jib pendant straps 12 m (40 ft) | 5 | Boom identification plate | 8 | Transport bracket (4x) for double taper pin |
| 3 | Rope protection guard (3x) | 6 | Pin connection point (8x) with double-taper pin (4x) | | |

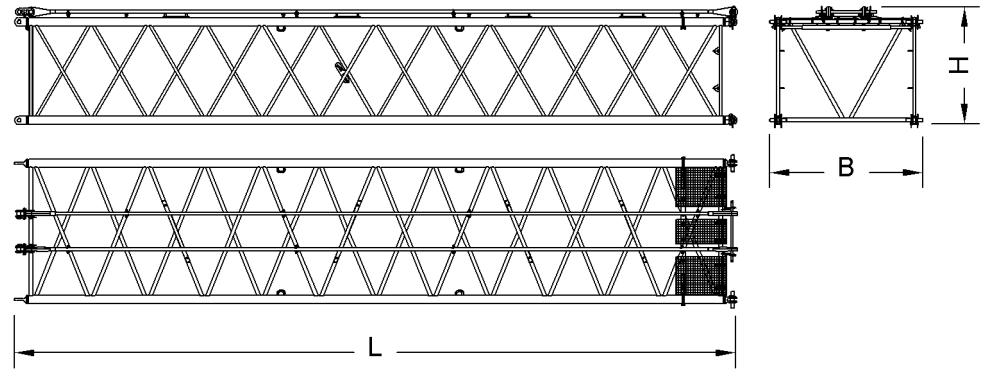


Fig. 320: Dimensions jib section 2316.20 12 m (40 ft)

Name		Value
System length		12000 mm 39' 4" ft-in
System width		2290 mm 7' 6" ft-in
System height		1650 mm 5' 5" ft-in
L	Length	12150 mm 39' 10" ft-in
B	Width	2430 mm 8' ft-in
H	Height (incl. pendant straps)	1910 mm 6' 3" ft-in
Weight (incl. pendant straps)		1750 kg 3,858 lb
Double-taper pins Ø		65 mm 2.56" in

Tab. 189: Technical data for 2316.20 jib section 12 m (40 ft)

1.20.5 2316.20 jib head section

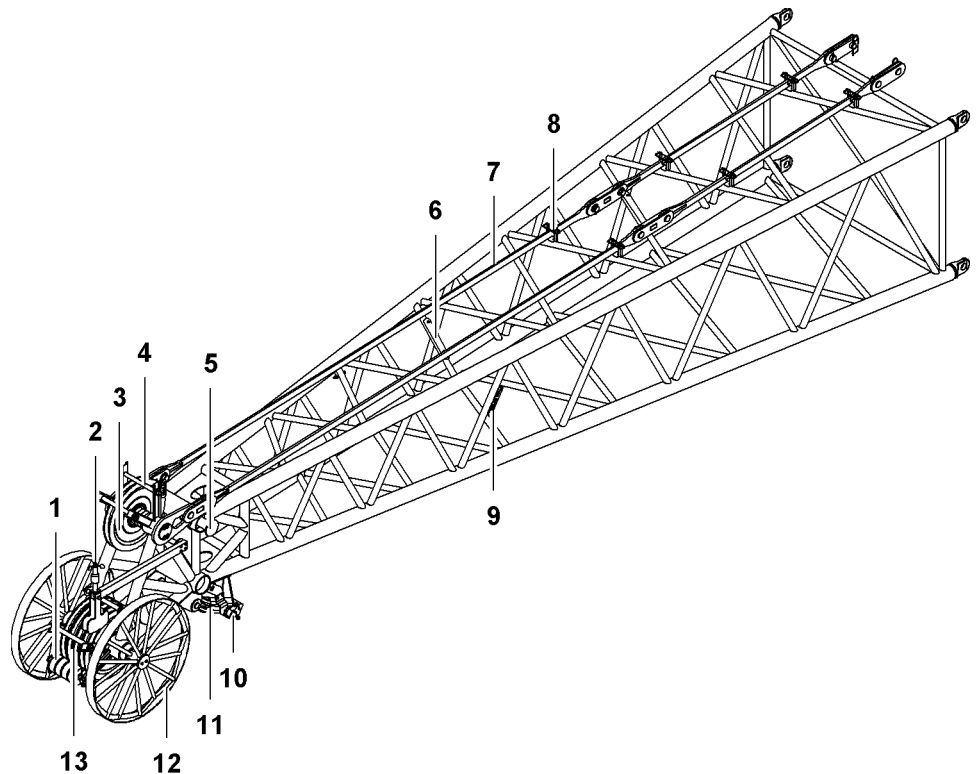


Fig. 321: 2316.20 jib head section

1	Rope protection roller (4x)	8	Transport bracket (6x) for pendant straps
2	Anemometer	9	Boom identification plate
3	Gantry pulley	10	Hoist limit switch (2x)
4	Rope protection pipe (2x)	11	Rope fixation
5	Lifting point (4x)	12	Wheel (2x)
6	Rope guard support (2x)	13	Pulley (4x)
7	Transport position (2x) of jib pendant straps		

This jib head section is designed to allow an auxiliary jib to be attached ([For more information see: 1.26 Auxiliary jib* \(30 t \(66.000 lb\)\), page 383](#)).

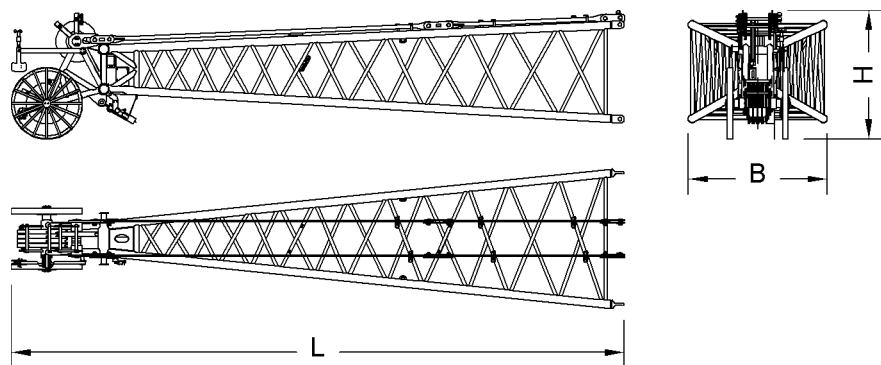


Fig. 322: 2316.20 jib head section dimensions

Name		Value
System length		10000 mm 32' 10" ft-in
System width		2290 mm 7' 6" ft-in
System height		1650 mm 5' 5" ft-in
L	Length	10750 mm 35' 3" ft-in
B	Width	2430 mm 8' ft-in
H	Height	2180 mm 7' 2" ft-in
Weight (incl. pendant straps)		2270 kg 5,004 lb

Tab. 190: 2316.20 jib head section, technical data

1.20.6 Mid-point suspension on luffing jib 2316

The mid-point suspensions on luffing jib 2316 differ with steel pendant straps and CF pendant straps.

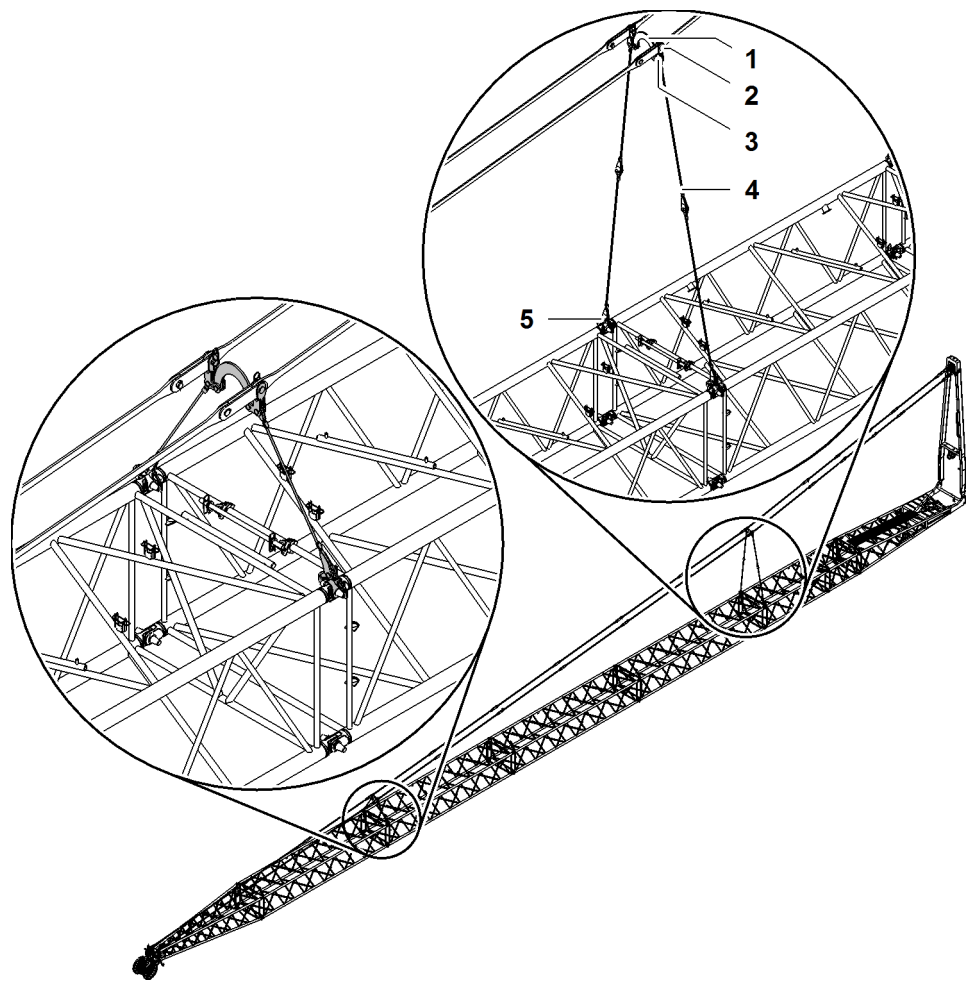


Fig. 323: Mid-point suspension on luffing jib 2316 (illustration of principle)

- | | | | |
|---|-----------------------------|---|------------|
| 1 | Connecting element (2x) | 4 | Stay ropes |
| 2 | Spacer bracket | 5 | Fork (2x) |
| 3 | Pin (2x) for pendant straps | | |

Connecting elements for steel pendant straps

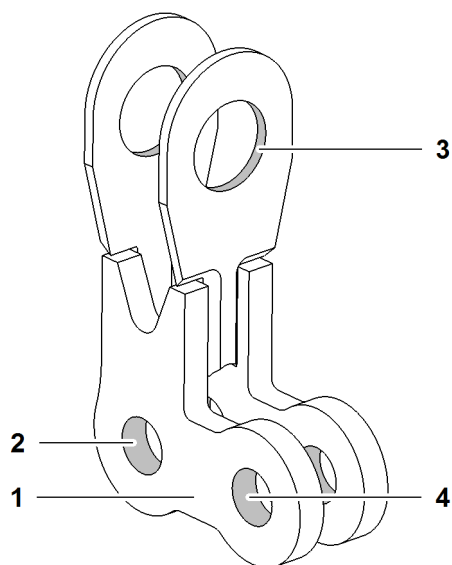


Fig. 324: Connecting elements for steel pendant straps (illustration of principle)

- | | | | |
|---|------------------------------------|---|---|
| 1 | Connecting element | 3 | Pin connection point for pendant strap |
| 2 | Pin connection point for stay rope | 4 | Pin connection point for spacer bracket |

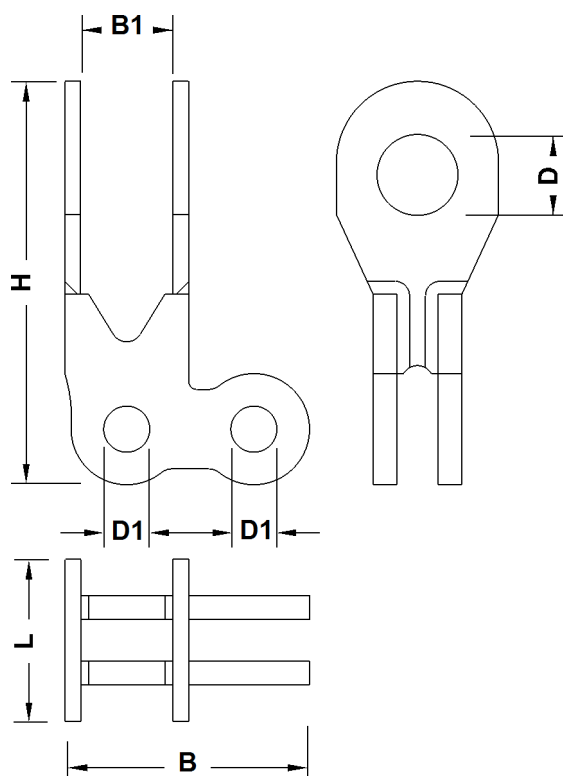


Fig. 325: Dimensions connecting elements for steel pendant straps

Name		Value
L	Length	102 mm 4.02" in
H	Height	354 mm 1' 2" ft-in
B	Width	190 mm 7.48" in
B1	Width between links	58 mm 2.28" in
D	Pin Ø	55 mm 2.17" in
D1	Pin Ø	35 mm 1.38" in

Tab. 191: Technical data connecting elements for steel pendant straps

Connecting elements for CF pendant straps

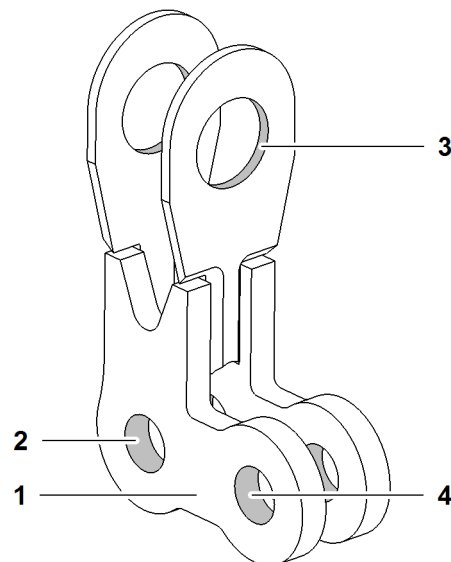


Fig. 326: Connecting elements for CF pendant straps (illustration of principle)

- | | | | |
|----------|------------------------------------|----------|---|
| 1 | Connecting element | 3 | Pin connection point for pendant strap |
| 2 | Pin connection point for stay rope | 4 | Pin connection point for spacer bracket |

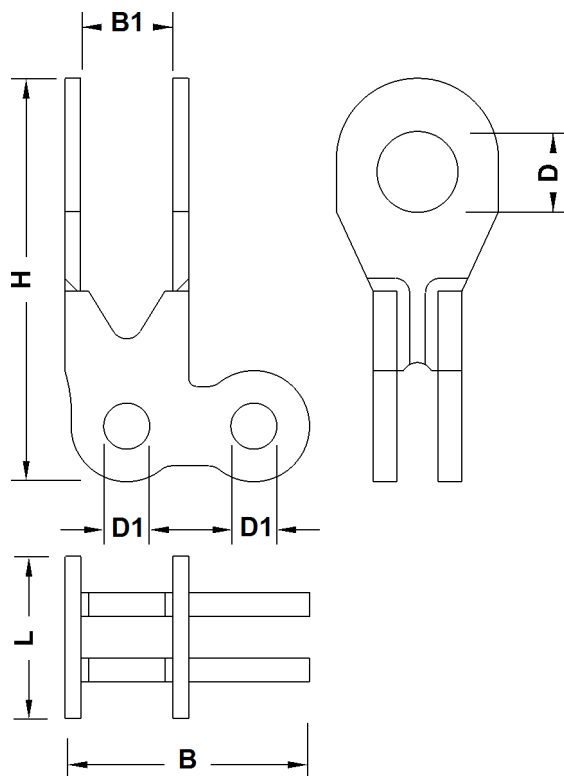


Fig. 327: Dimensions connecting elements for CF pendant straps

Name		Value
L	Length	110 mm 4.33" in
H	Height	358 mm 1' 2" ft-in
B	Width	207 mm 8.15" in
B1	Width between link	104 mm 4.09" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	35 mm 1.38" in

Tab. 192: Technical data connecting elements for CF pendant straps

Forks

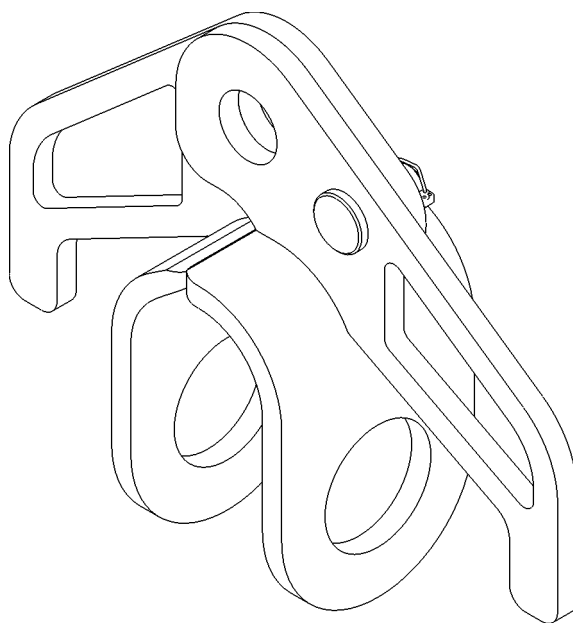


Fig. 328: Forks (illustration of principle)

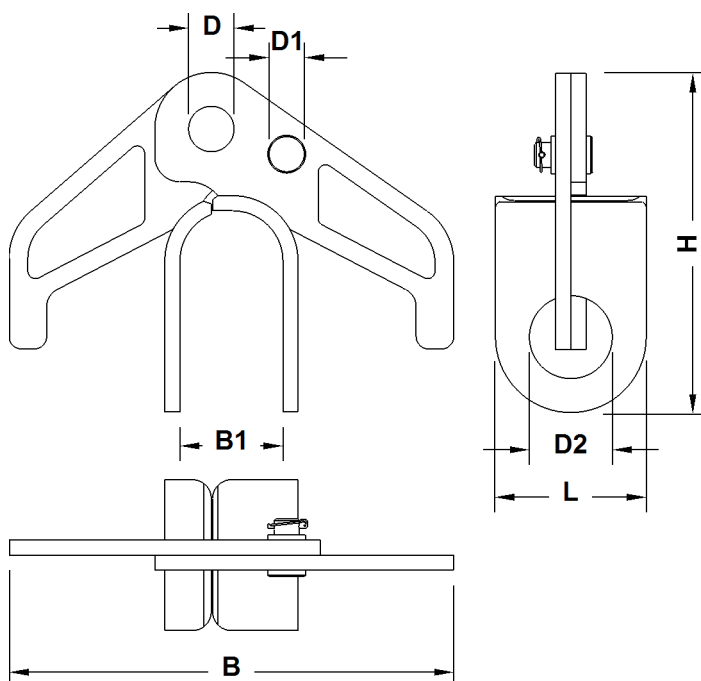


Fig. 329: Fork dimensions

Name		Value
L	Length	120 mm 4.72" in
B	Width	354 mm 1' 2" ft-in

Name		Value
B1	Inner width	82 mm 3.23" in
H	Height	270 mm 10.63" in
D	Pin Ø	35 mm 1.38" in
D1	Pin Ø	20 mm 0.79" in
D2	Pin Ø	65 mm 2.56" in

Tab. 193: Technical data forks

Spacer bracket

The spacer brackets are identical with steel pendant straps and CF pendant straps.

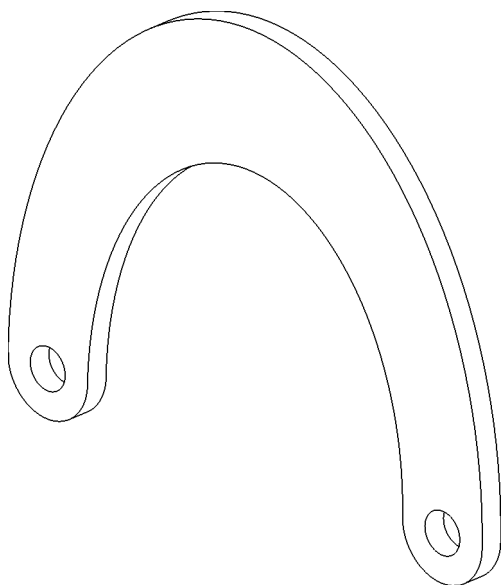


Fig. 330: Spacer brackets (illustration of principle)

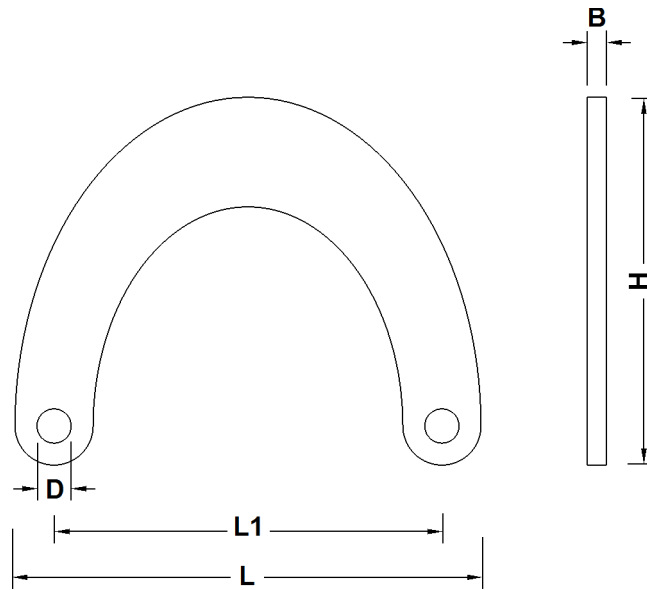


Fig. 331: Dimensions spacer brackets

Name		Value
L	Length	489 mm 1' 7" ft-in
L1	Distance between pins	407 mm 1' 4" ft-in
B	Width	20 mm 0.79" in
H	Height	386 mm 1' 3" ft-in
D	Pin Ø	35 mm 1.38" in

Tab. 194: Technical data spacer brackets

Stay ropes

Several stay ropes are assembled to achieve defined rope lengths.

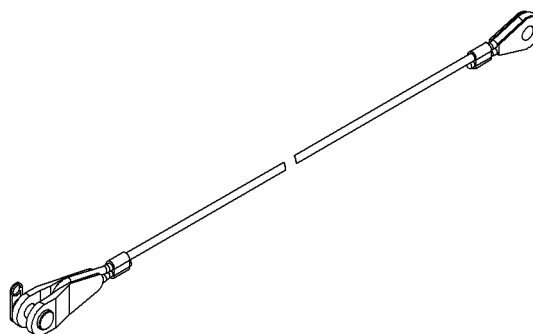


Fig. 332: Stay ropes (illustration of principle)

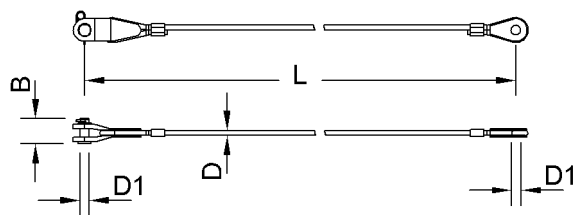


Fig. 333: Dimensions stay ropes

Name		Value
L	Length of stay rope	1100 mm 3' 7" ft-in
		1300 mm 4' 3" ft-in
		1600 mm 5' 3" ft-in
		2100 mm 6' 11" ft-in
		2600 mm 8' 6" ft-in
		3000 mm 9' 10" ft-in
D	Ø of stay rope	18 mm 0.71" in
D1	Pin Ø	35 mm 1.38" in
B	Length of pin	90 mm 3.54" in

Tab. 195: Technical data stay ropes

Pins for steel pendant straps

The pins supplied with the pendant straps must be exchanged for longer pins.

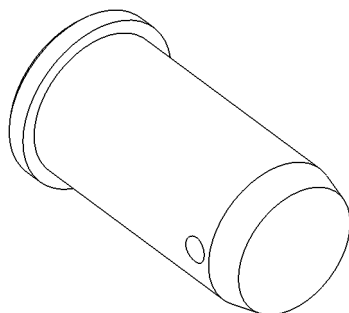


Fig. 334: Pins for steel pendant straps (illustration of principle)

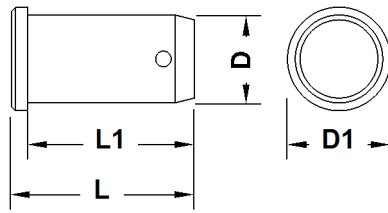


Fig. 335: Dimensions pins for steel pendant straps

Name		Value
L	Total length	120 mm 4.72" in
L1	Length	112 mm 4.41" in
D	Diameter	55 mm 2.17" in
D1	Outer diameter	63 mm 2.48" in

Tab. 196: Technical data pins for steel pendant straps

Pins for CF pendant straps

The pins supplied with the pendant straps must be exchanged for longer pins.

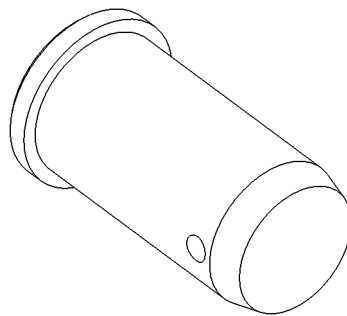


Fig. 336: Pins for CF pendant straps (illustration of principle)

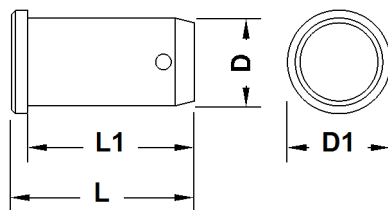


Fig. 337: Dimensions pins for CF pendant straps

Name		Value
L	Total length	158 mm 6.22" in
L1	Length	153 mm 6.02" in

Name		Value
D	Diameter	60 mm 2.36" in
D1	Outer diameter	68 mm 2.68" in

Tab. 197: Technical data pins for CF pendant straps

1.20.7 Steel pendant straps on luffing jib 2316

Steel pendant straps on jib base section 2316.20

Jib pendant strap 3 m (10 ft)

Installation site in crane operation:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1690](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1793](#))

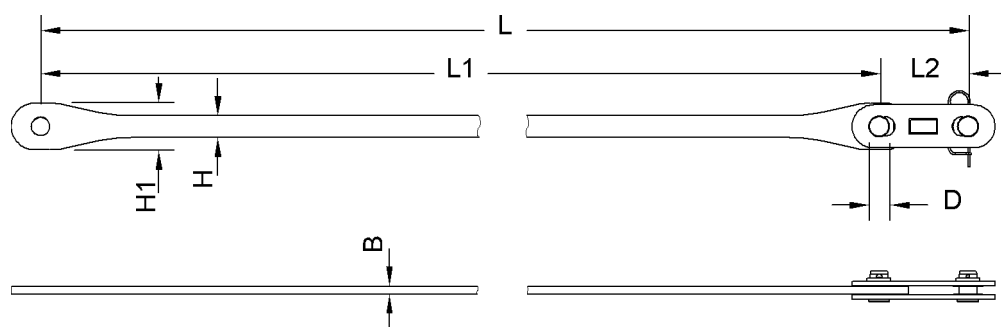


Fig. 338: Dimensions jib pendant strap 3 m (10 ft)

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2730 mm 8' 11" ft-in
L2	Length of connecting link	270 mm 10.63" in
W	Width of pendant strap	22 mm 0.87" in
H	Height of pendant strap	66 mm 2.60" in
H1	Height of pendant strap	140 mm 5.51" in
D	Pin Ø	55 mm 2.17" in

Name	Value
Weight	53 kg 117 lb

Tab. 198: Technical data jib pendant strap 3 m (10 ft)

Steel pendant straps on A-frame2

Equalizer A-frame2 (jib backstay strap)

Installation site in crane operation:

- Luffing jib 2316 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1690)
- Luffing jib 2316 + midfall 2316 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1792)

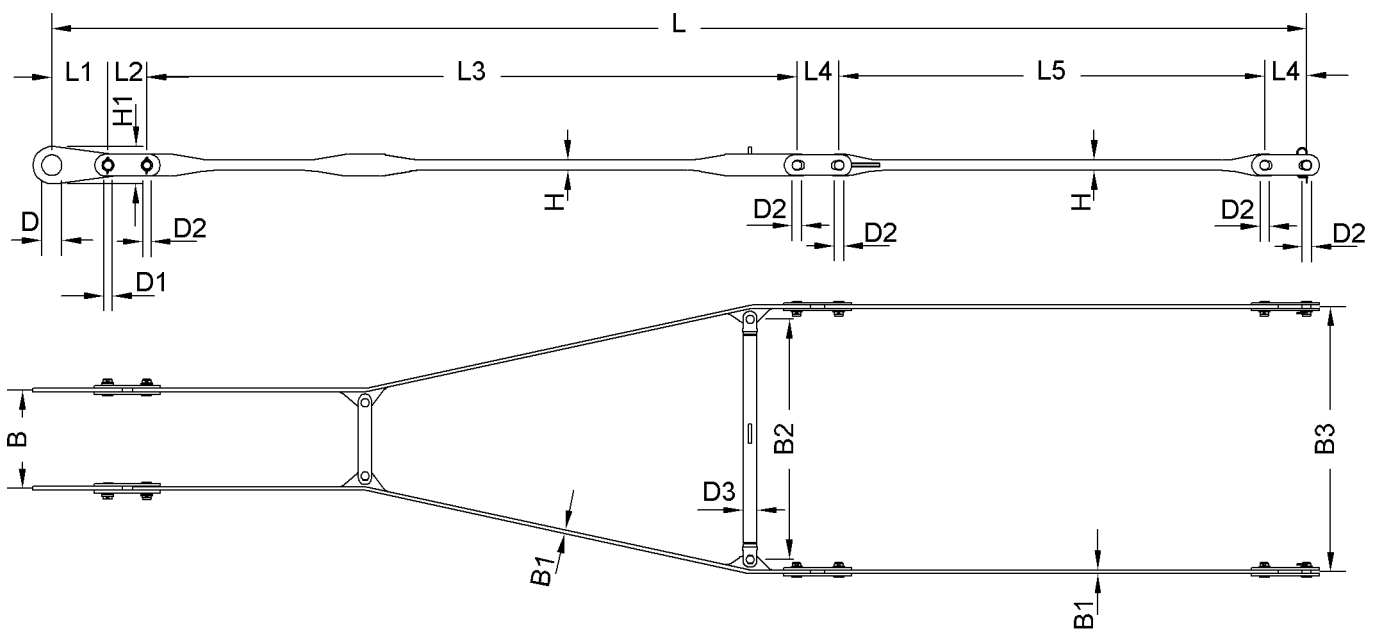


Fig. 339: Dimensions equalizer on A-frame2 (jib backstay strap)

Name	Value
L Length	8050 mm 26' 5" ft-in
L1 Length of connecting link	360 mm 1' 2" ft-in
L2 Length of connecting link	250 mm 9.84" in
L3 Length of crossbar	4170 mm 13' 8" ft-in
L4 Length of connecting link	270 mm 10.63" in
L5 Length of pendant strap	2730 mm 8' 11" ft-in

Name		Value
W	Width	630 mm 2' 1" ft-in
W1	Width of pendant strap	22 mm 0.87" in
W2	Width of spacer bar	1540 mm 5' 1" ft-in
W3	Width	1700 mm 5' 7" ft-in
H	Height of pendant strap	66 mm 2.60" in
H1	Height of connecting link	281 mm 11.06" in
D	Pin Ø	150 mm 5.91" in
D1	Pin Ø	60 mm 2.36" in
D2	Pin Ø	55 mm 2.17" in
D3	Spacer bar Ø	89 mm 3.50" in
Weight		343 kg 756 lb

Tab. 199: Technical data equalizer on A-frame2 (jib backstay strap)

Steel pendant straps on A-frame3

A-frame3 equalizer (jib pendant strap)

Installation site in crane operation:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1690](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1793](#))

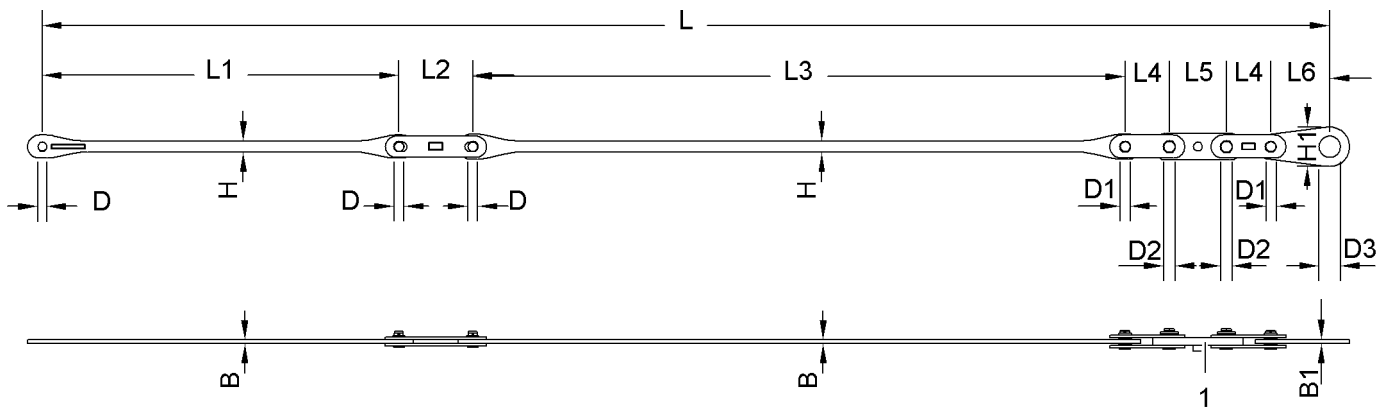


Fig. 340: Dimensions equalizer on A-frame3 (jib pendant strap)

1 Tension load cell

Name		Value
L	Length	7850 mm 25' 9" ft-in
L1	Length of pendant strap	2175 mm 7' 2" ft-in
L2	Length of connecting link	450 mm 1' 6" ft-in
L3	Length of pendant strap	3977 mm 13' 1" ft-in
L4	Length of connecting link	270 mm 10.63" in
L5	Length of tension load cell	348 mm 1' 2" ft-in
L6	Length of connecting link	360 mm 1' 2" ft-in
W	Width of pendant strap	22 mm 0.87" in
W1	Width of connecting link	25 mm 0.98" in
H	Height of pendant strap	66 mm 2.60" in
D	Pin Ø	55 mm 2.17" in
D1	Pin Ø	60 mm 2.36" in
D2	Pin Ø	62 mm 2.44" in
D3	Pin Ø	150 mm 5.91" in
Weight		167 kg 368 lb

Tab. 200: Technical data A-frame3 equalizer (jib pendant strap)

Steel pendant straps on jib section 2316.20 3 m (10 ft)

Jib pendant strap 3 m (10 ft)

Installation site in crane operation:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1690](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1793](#))

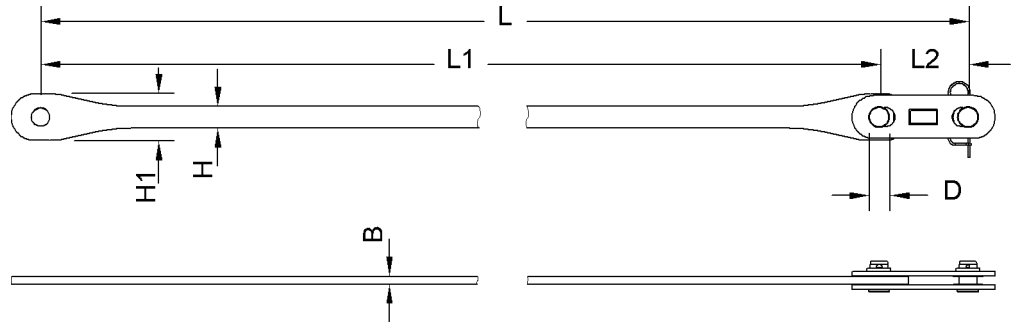


Fig. 341: Dimensions jib pendant strap 3 m (10 ft)

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2730 mm 8' 11" ft-in
L2	Length of connecting link	270 mm 10.63" in
W	Width of pendant strap	22 mm 0.87" in
H	Height of pendant strap	66 mm 2.60" in
H1	Height of pendant strap	140 mm 5.51" in
D	Pin Ø	55 mm 2.17" in
Weight		53 kg 117 lb

Tab. 201: Technical data jib pendant strap 3 m (10 ft)

Steel pendant straps on jib section 2316.20 6 m (20 ft)

Jib pendant strap 6 m (20 ft)

Installation site in crane operation:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1690](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1793](#))

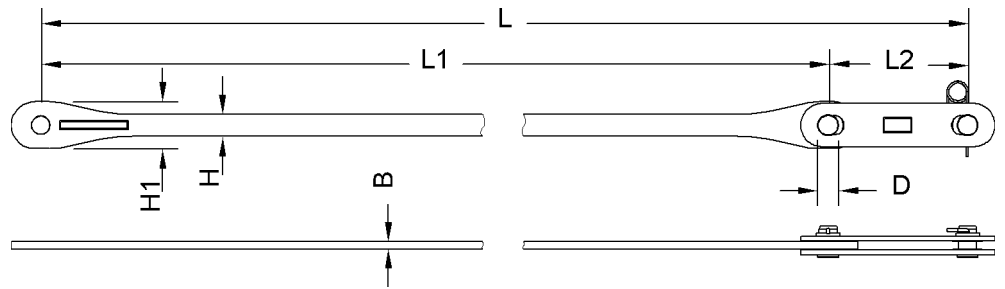


Fig. 342: Dimensions jib pendant strap 6 m (20 ft)

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5580 mm 18' 4" ft-in
L2	Length of connecting link	420 mm 1' 5" ft-in
W	Width of pendant strap	22 mm 0.87" in
H	Height of pendant strap	66 mm 2.60" in
H1	Height of pendant strap	140 mm 5.51" in
D	Pin Ø	55 mm 2.17" in
Weight		89 kg 196 lb

Tab. 202: Technical data jib pendant strap 6 m (20 ft)

Steel pendant straps on jib section 2316.20 12 m (40 ft)

Jib pendant strap 12 m (40 ft)

Installation site in crane operation:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1690](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1793](#))

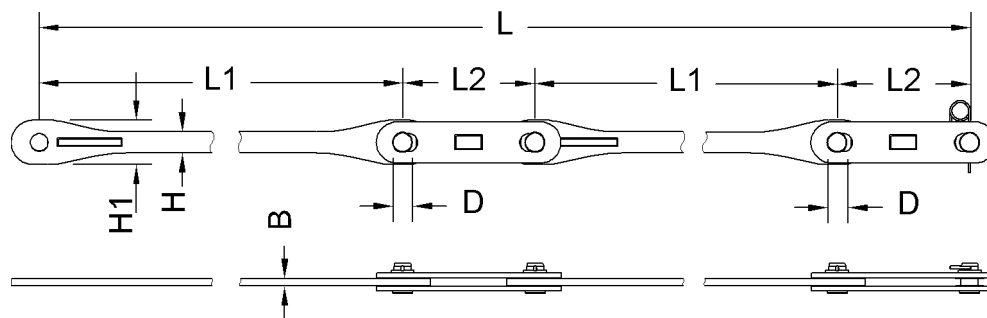


Fig. 343: Dimensions jib pendant strap 12 m (40 ft)

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	5580 mm 18' 4" ft-in
L2	Length of connecting link	420 mm 1' 5" ft-in
W	Width of pendant strap	22 mm 0.87" in
H	Height of pendant strap	66 mm 2.60" in
H1	Height of pendant strap	140 mm 5.51" in
D	Pin Ø	55 mm 2.17" in
Weight		178 kg 392 lb

Tab. 203: Technical data jib pendant strap 12 m (40 ft)

Steel pendant straps on jib head 2316.20

Jib pendant strap on jib head 2316.20

Installation site in crane operation:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1690](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316, page 1793](#))

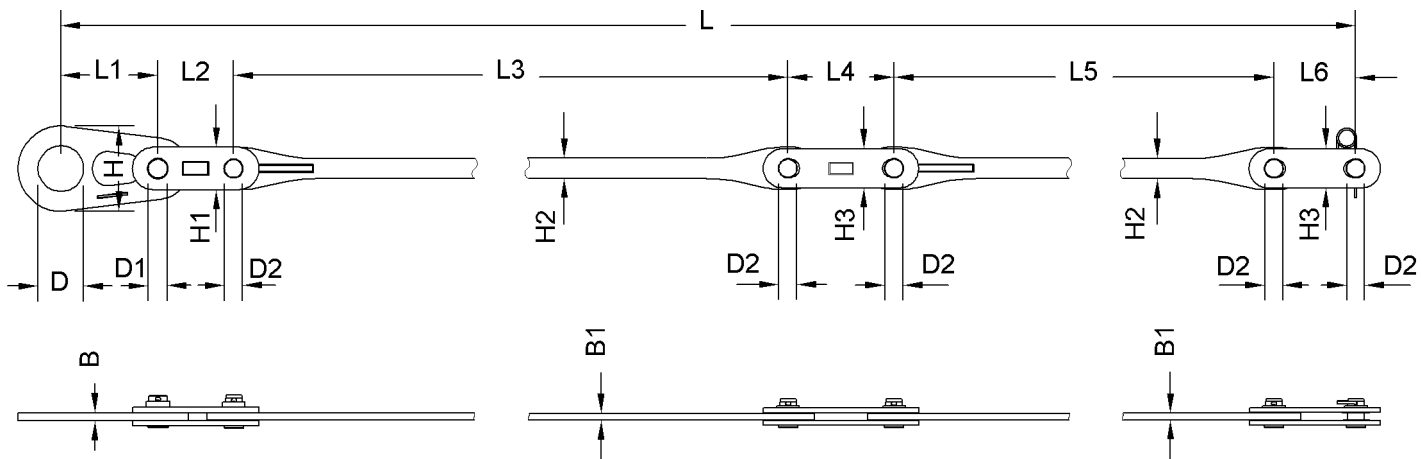


Fig. 344: Dimensions jib pendant strap on jib head 2316.20

Name		Value
L	Length	9500 mm 31' 2" ft-in
L1	Length of connecting link	320 mm 1' 1" ft-in
L2	Length of connecting link	250 mm 9.84" in
L3	Length of pendant strap	5580 mm 18' 4" ft-in
L4	Length of connecting link	350 mm 1' 2" ft-in
L5	Length of pendant strap	2730 mm 8' 11" ft-in
L6	Length of connecting link	270 mm 10.63" in
W	Width of connecting link	25 mm 0.98" in
W1	Width of pendant strap	22 mm 0.87" in
H	Height of connecting link	280 mm 11.02" in
H1	Height of connecting link	130 mm 5.12" in
H2	Height of pendant strap	66 mm 2.60" in
H3	Height of connecting link	140 mm 5.51" in
D	Pin Ø	150 mm 5.91" in
D1	Pin Ø	60 mm 2.36" in

Name		Value
D2	Pin Ø	55 mm 2.17" in
Weight		325 kg 716 lb

Tab. 204: Technical data jib pendant strap on jib head 2316.20

1.20.8 CF pendant straps on luffing jib 2316

CF pendant straps on jib base section 2316.22

Jib pendant strap 3 m (10 ft)

Installation site in crane mode:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316, page 1693](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316, page 1795](#))

Generation A of jib pendant strap 3 m (10 ft)

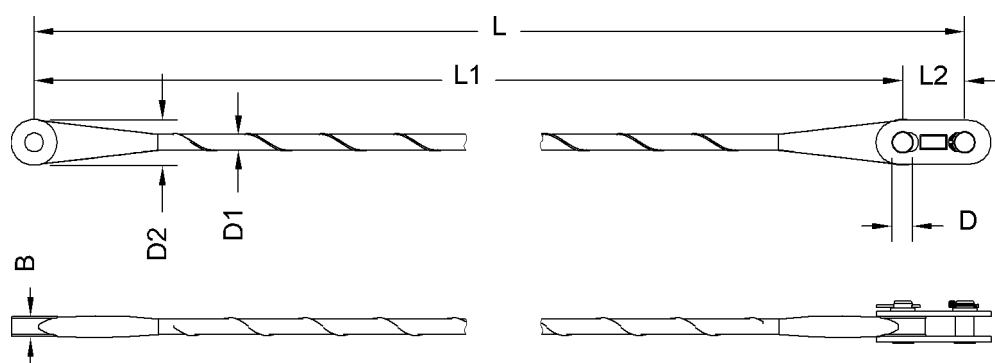


Fig. 345: Dimensions jib pendant strap 3 m (10 ft)

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2800 mm 9' 2" ft-in
L2	Length of connecting link	200 mm 7.87" in
W	Width	64 mm 2.52" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	50 mm 1.97" in
D2	Pendant strap Ø	148 mm 5.83" in

Name	Value
Weight	35 kg 77.16 lb

Tab. 205: Technical data jib pendant strap 3 m (10 ft)

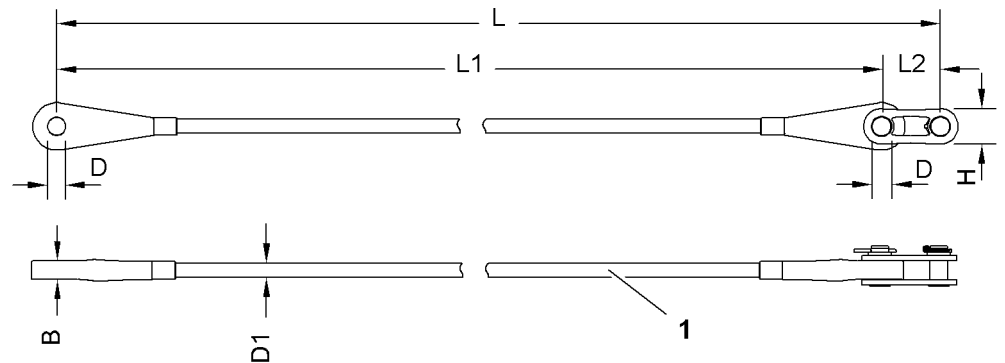
Generation B of jib pendant strap 3 m (10 ft)

Fig. 346: Dimensions jib pendant strap 3 m (10 ft)

- 1 Wire mesh hose as protective sheath

Name	Value
L Length	3000 mm 9' 10" ft-in
L1 Length of pendant strap	2800 mm 9' 2" ft-in
L2 Length of connecting link	200 mm 7.87" in
B Width	63 mm 2.48" in
H Height of connecting link	121 mm 4.76" in
D Pin Ø	60 mm 2.36" in
D1 Pendant strap Ø	48 mm 1.89" in
Weight	26 kg 57.32 lb

Tab. 206: Technical data jib pendant strap 3 m (10 ft)

CF pendant straps on A-frame2**Equalizer A-frame2 (jib backstay strap)**

Installation site in crane operation:

- Luffing jib 2316 ([For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1692](#))

- Luffing jib 2316 + midfall 2316 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1794)

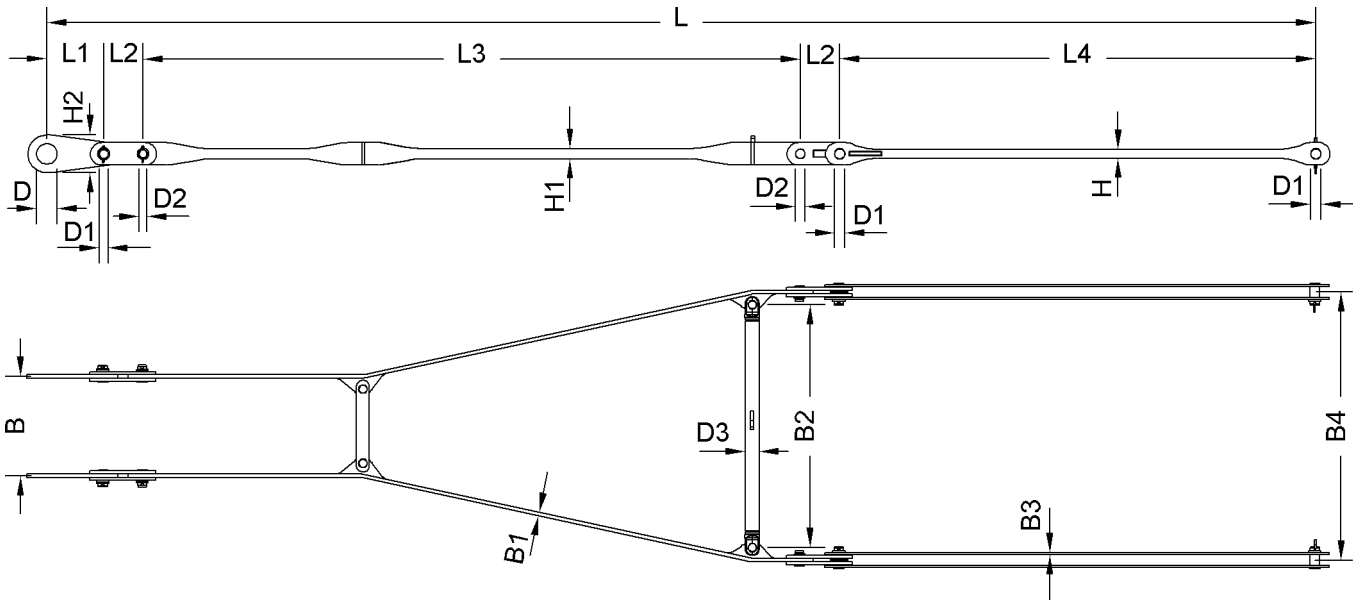


Fig. 347: Dimensions equalizer on A-frame2 (jib backstay strap)

Name		Value
L	Length	8050 mm 26' 5" ft-in
L1	Length of connecting link	360 mm 1' 2" ft-in
L2	Length of connecting link	250 mm 9.84" in
L3	Length of crossbar	4170 mm 13' 8" ft-in
L4	Length of pendant strap	3020 mm 9' 11" ft-in
W	Width	630 mm 2' 1" ft-in
W1	Width of pendant strap	22 mm 0.87" in
W2	Width of spacer bar	1540 mm 5' 1" ft-in
W3	Width of pendant strap	15 mm 0.59" in
W4	Width	1700 mm 5' 7" ft-in
H	Height of pendant strap	55 mm 2.17" in
H1	Height of pendant strap	64 mm 2.52" in

Name		Value
H2	Height of connecting link	240 mm 9.45" in
D	Pin Ø	130 mm 5.12" in
D1	Pin Ø	60 mm 2.36" in
D2	Pin Ø	55 mm 2.17" in
D3	Spacer bar Ø	89 mm 3.50" in
Weight		358 kg 789 lb

Tab. 207: Technical data equalizer on A-frame2 (jib backstay strap)

CF pendant straps on A-frame3

A-frame3 equalizer (jib pendant strap)

Installation site in crane operation:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316, page 1693](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316, page 1795](#))

Generation A of A-frame3 equalizer (jib pendant strap)

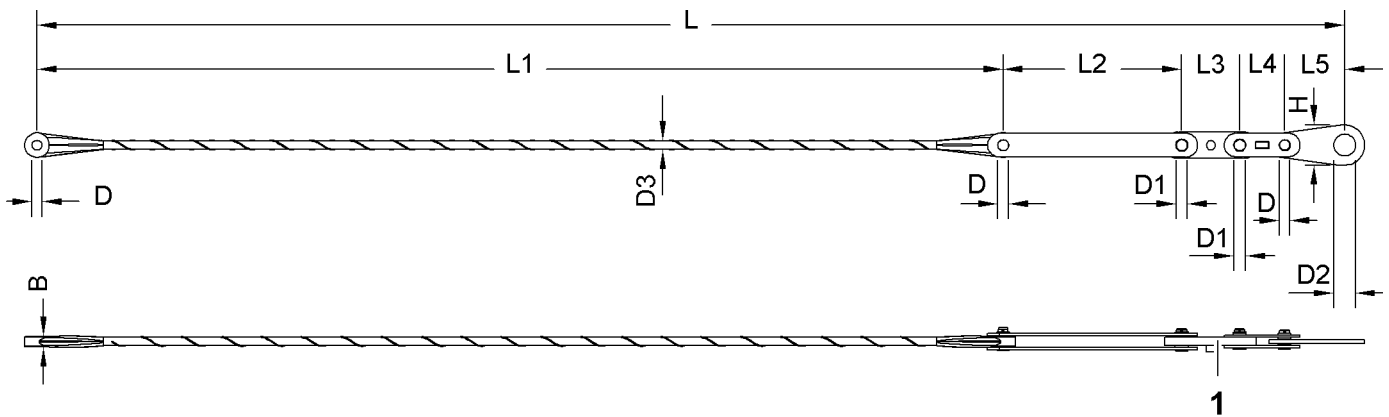


Fig. 348: Dimensions equalizer on A-frame3 (jib pendant strap)

1 Tension load cell

Name		Value
L	Length	7850 mm 25' 9" ft-in
L1	Length of pendant strap	5800 mm 19' ft-in

Name		Value
L2	Length of connecting link	1072 mm 3' 6" ft-in
L3	Length of tension load cell	348 mm 1' 2" ft-in
L4	Length of connecting link	270 mm 10.63" in
L5	Length of connecting link	360 mm 1' 2" ft-in
W	Width of pendant strap	64 mm 2.52" in
H	Height of connecting link	240 mm 9.45" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	62 mm 2.44" in
D2	Pin Ø	130 mm 5.12" in
D3	Pendant strap Ø	50 mm 1.97" in
Weight		129 kg 284 lb

Tab. 208: Technical data A-frame3 equalizer (jib pendant strap)

Generation B of A-frame3 equalizer (jib pendant strap)

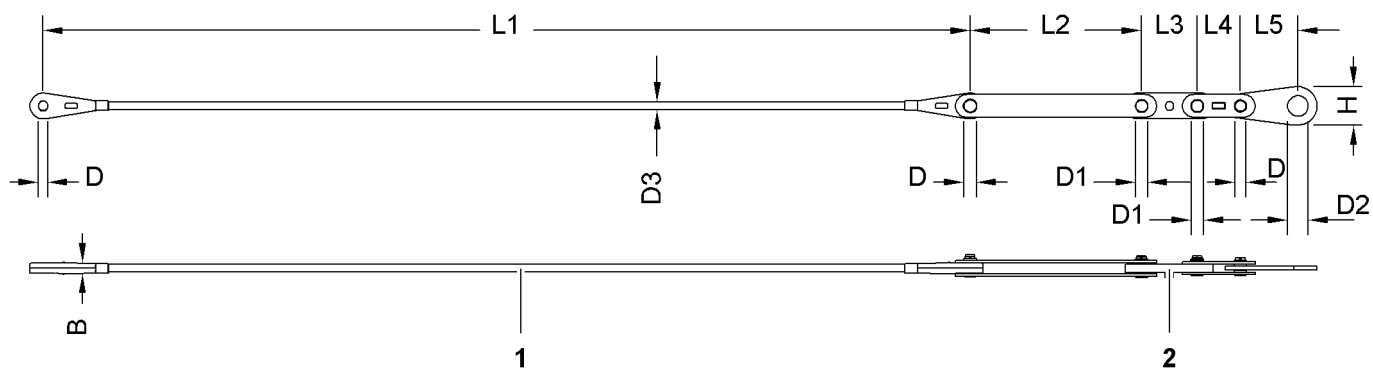


Fig. 349: Dimensions equalizer on A-frame3 (jib pendant strap)

- 1 Wire mesh hose as protective sheath
- 2 Tension load cell

Name		Value
L	Length	7850 mm 25' 9" ft-in
L1	Length of pendant strap	5800 mm 19' ft-in

Name		Value
L2	Length of connecting link	1072 mm 3' 6" ft-in
L3	Length of tension load cell	348 mm 1' 2" ft-in
L4	Length of connecting link	270 mm 10.63" in
L5	Length of connecting link	360 mm 1' 2" ft-in
B	Width of pendant strap	63 mm 2.48" in
H	Height of connecting link	240 mm 9.45" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	62 mm 2.44" in
D2	Pin Ø	130 mm 5.12" in
D3	Pendant strap Ø	48 mm 1.89" in
Weight		85 kg 187 lb

Tab. 209: Technical data A-frame3 equalizer (jib pendant strap)

CF pendant straps on jib section 2316.20 3 m (10 ft)

Jib pendant strap 3 m (10 ft)

Installation site in crane mode:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316, page 1693](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316, page 1795](#))

Generation A of jib pendant strap 3 m (10 ft)

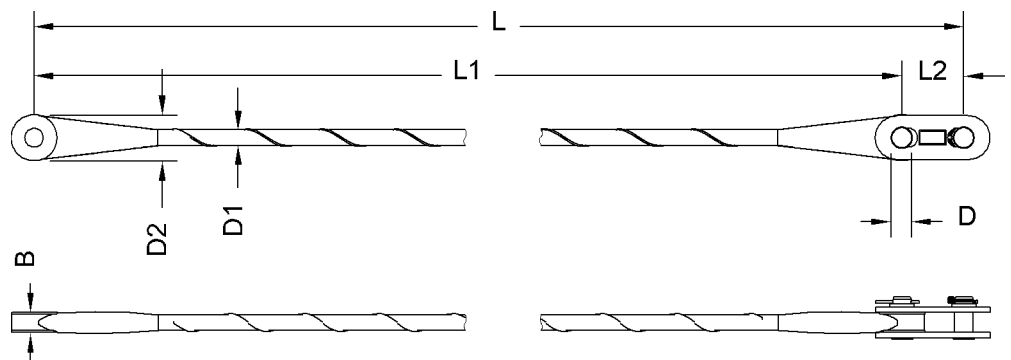


Fig. 350: Dimensions jib pendant strap 3 m (10 ft)

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2800 mm 9' 2" ft-in
L2	Length of connecting link	200 mm 7.87" in
B	Width	64 mm 2.52" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	50 mm 1.97" in
D2	Pendant strap Ø	148 mm 5.83" in
Weight		35 kg 77.16 lb

Tab. 210: Technical data jib pendant strap 3 m (10 ft)

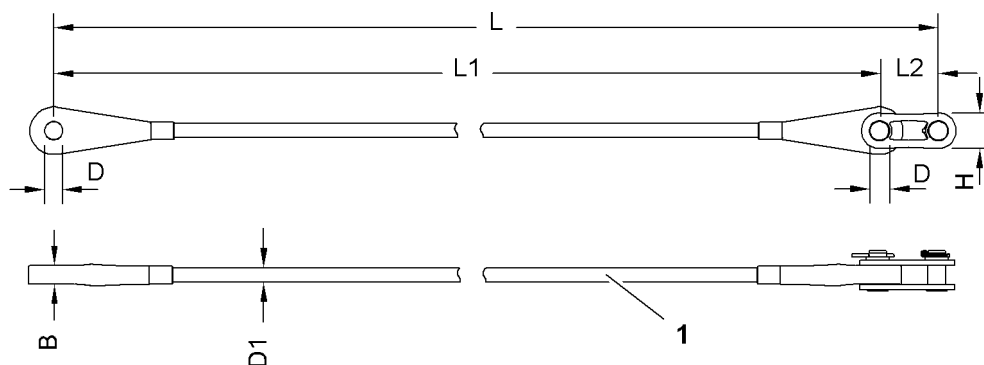
Generation B of jib pendant strap 3 m (10 ft)

Fig. 351: Dimensions jib pendant strap 3 m (10 ft)

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2800 mm 9' 2" ft-in
L2	Length of connecting link	200 mm 7.87" in
B	Width	63 mm 2.48" in
H	Height of connecting link	121 mm 4.76" in

Name		Value
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	48 mm 1.89" in
Weight		26 kg 57.32 lb

Tab. 211: Technical data jib pendant strap 3 m (10 ft)

CF pendant straps on jib section 2316.20 6 m (20 ft)

Jib pendant strap 6 m (20 ft)

Installation site in crane mode:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316, page 1693](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316, page 1795](#))

Generation A of jib pendant strap 6 m (20 ft)

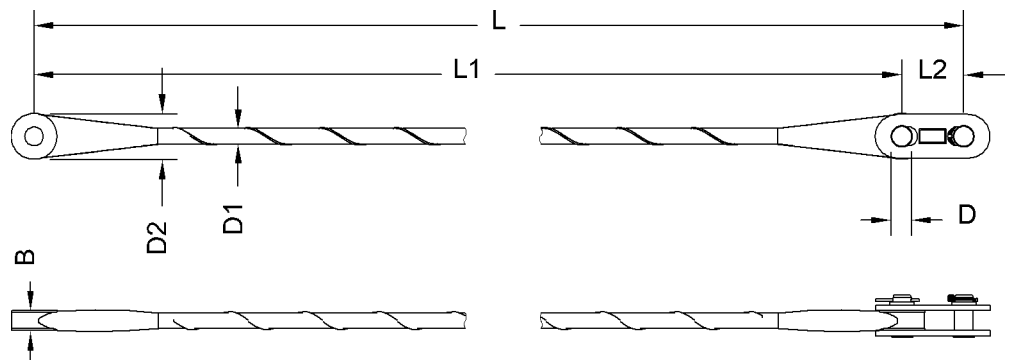


Fig. 352: Dimensions jib pendant strap 6 m (20 ft)

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5800 mm 19' ft-in
L2	Length of connecting link	200 mm 7.87" in
B	Width	64 mm 2.52" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	50 mm 1.97" in
D2	Pendant strap Ø	148 mm 5.83" in

Name	Value
Weight	43 kg 94.80 lb

Tab. 212: Technical data jib pendant strap 6 m (20 ft)

Generation B of jib pendant strap 6 m (20 ft)

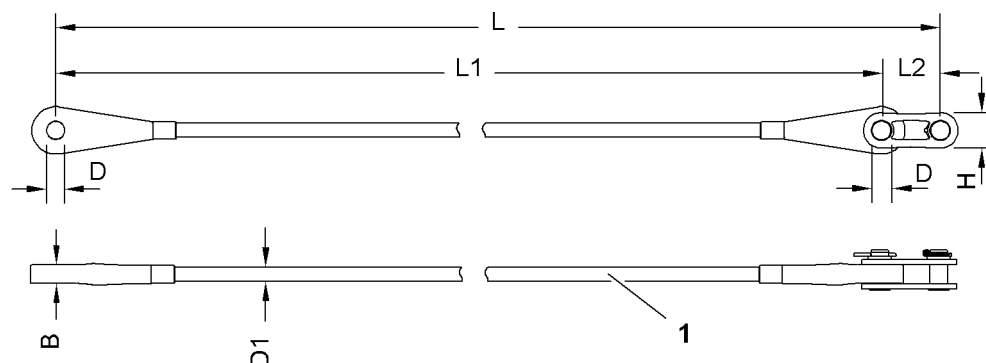


Fig. 353: Dimensions jib pendant strap 6 m (20 ft)

- 1 Wire mesh hose as protective sheath

Name	Value
L Length	6000 mm 19' 8" ft-in
L1 Length of pendant strap	5800 mm 19' ft-in
L2 Length of connecting link	200 mm 7.87" in
B Width	63 mm 2.48" in
H Height of connecting link	121 mm 4.76" in
D Pin Ø	60 mm 2.36" in
D1 Pendant strap Ø	48 mm 1.89" in
Weight	32 kg 70.55 lb

Tab. 213: Technical data jib pendant strap 6 m (20 ft)

CF pendant straps on jib section 2316.20 12 m (40 ft)

Jib pendant strap 12 m (40 ft)

Installation site in crane mode:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316, page 1693](#))

- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316](#), page 1795)

Generation A of jib pendant strap 12 m (40 ft)

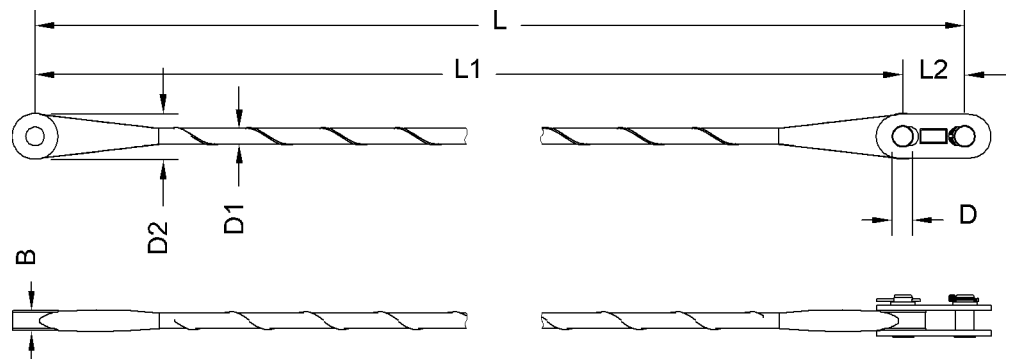


Fig. 354: Dimensions jib pendant strap 12 m (40 ft)

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	11800 mm 38' 9" ft-in
L2	Length of connecting link	200 mm 7.87" in
B	Width	64 mm 2.52" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	50 mm 1.97" in
D2	Pendant strap Ø	148 mm 5.83" in
Weight		60 kg 132 lb

Tab. 214: Technical data jib pendant strap 12 m (40 ft)

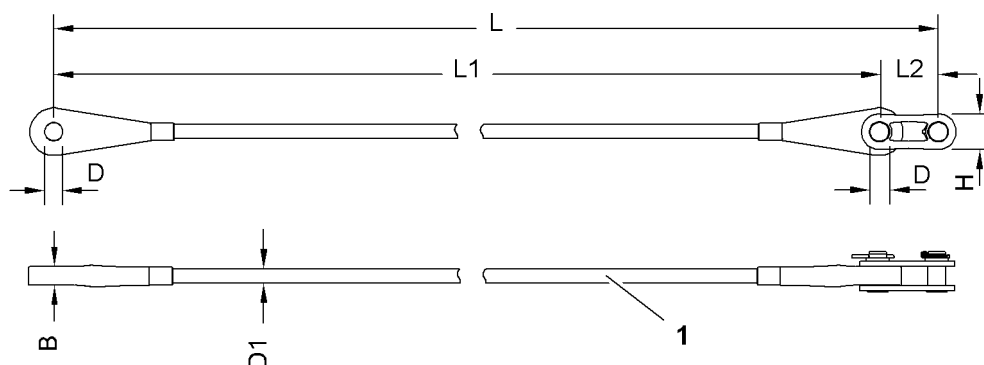
Generation B of jib pendant strap 12 m (40 ft)

Fig. 355: Dimensions jib pendant strap 12 m (40 ft)

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	11800 mm 38' 9" ft-in
L2	Length of connecting link	200 mm 7.87" in
B	Width	63 mm 2.48" in
H	Height of connecting link	121 mm 4.76" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	48 mm 1.89" in
Weight		43 kg 94.80 lb

Tab. 215: Technical data jib pendant strap 12 m (40 ft)

CF pendant straps on jib head 2316.20**Jib pendant strap on jib head 2316.20**

Installation site in crane operation:

- Luffing jib 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316, page 1693](#))
- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head 2316, page 1795](#))

Generation A of jib pendant strap on jib head 2316.20

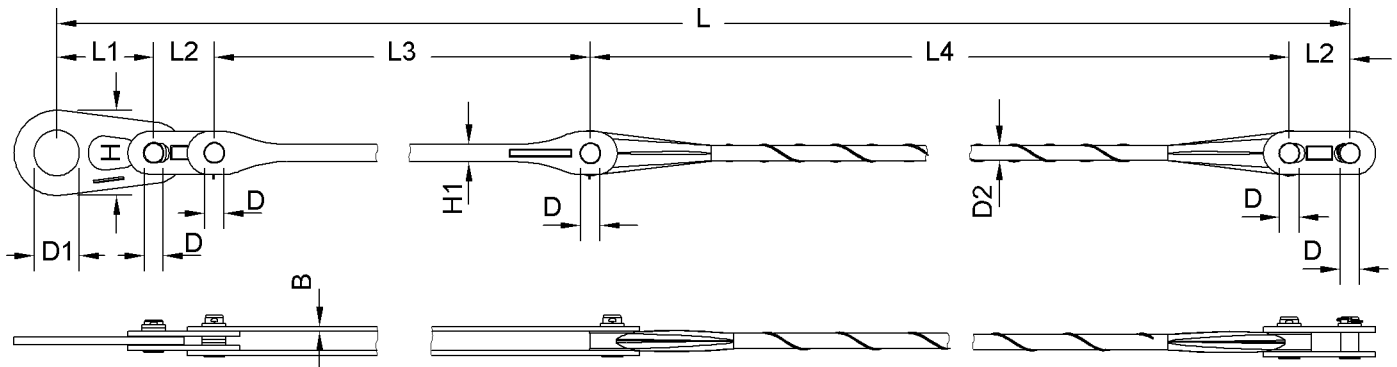


Fig. 356: Dimensions jib pendant strap on jib head 2316.20

Name		Value
L	Length	9540 mm 31' 4" ft-in
L1	Length of connecting link	320 mm 1' 1" ft-in
L2	Length of connecting link	200 mm 7.87" in
L3	Length of pendant strap	3020 mm 9' 11" ft-in
L4	Length of pendant strap	6000 mm 19' 8" ft-in
W	Width of pendant strap	15 mm 0.59" in
H	Height of connecting link	280 mm 11.02" in
H1	Height of connecting link	55 mm 2.17" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	150 mm 5.91" in
D2	Pendant strap Ø	50 mm 1.97" in
Weight		119 kg 262 lb

Tab. 216: Technical data jib pendant strap on jib head 2316.20

Generation B of jib pendant strap on jib head 2316.20

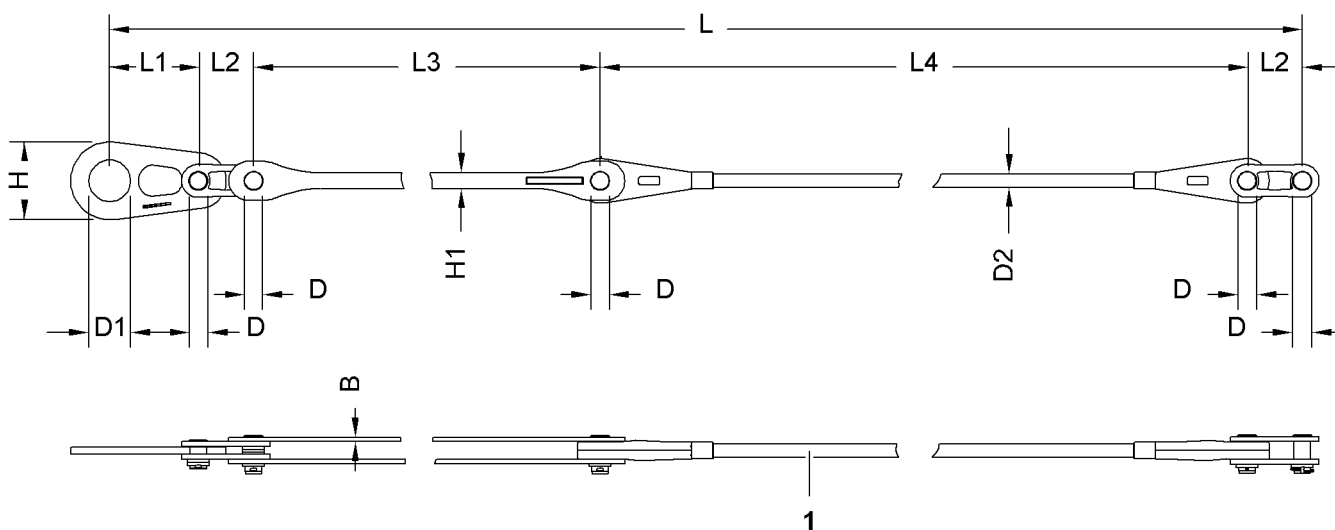


Fig. 357: Dimensions jib pendant strap on jib head 2316.20

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	9540 mm 31' 4" ft-in
L1	Length of connecting link	320 mm 1' 1" ft-in
L2	Length of connecting link	200 mm 7.87" in
L3	Length of pendant strap	3020 mm 9' 11" ft-in
L4	Length of pendant strap	6000 mm 19' 8" ft-in
B	Width of pendant strap	15 mm 0.59" in
H	Height of connecting link	280 mm 11.02" in
H1	Height of pendant strap	57 mm 2.24" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	150 mm 5.91" in
D2	Pendant strap Ø	48 mm 1.89" in
Weight		111 kg 245 lb

Tab. 217: Technical data jib pendant strap on jib head 2316.20

1.21 1916 luffing jib

1.21.1 Jib base section 1916.22

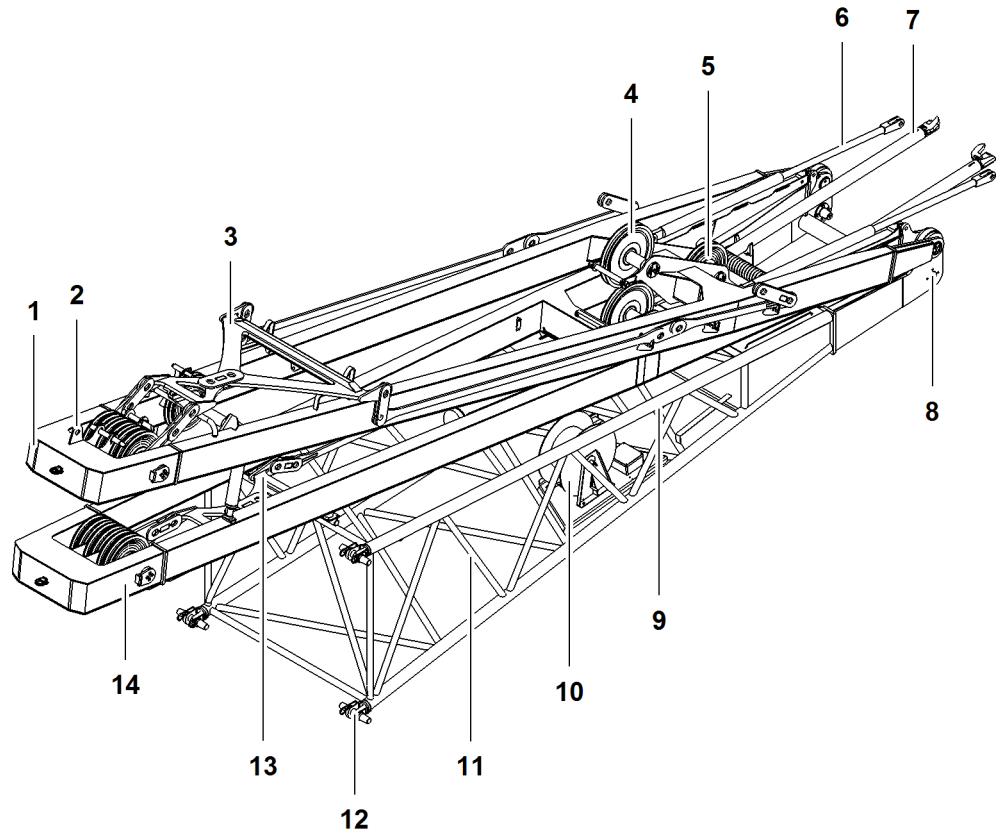


Fig. 358: Jib base section 1916.22

- | | | | |
|---|--|----|--|
| 1 | A-frame2 | 8 | Pivot point (2x) for main boom head |
| 2 | Shackle | 9 | Rigging point (4x) |
| 3 | Transport position of A-frame2 equalizer (jib backstay straps) | 10 | Cable drum |
| 4 | Pulley (2x) for rope of winch1/ winch2 | 11 | Boom identification plate |
| 5 | Pulley (2x) for rope of jib luffing winch | 12 | Pin connection point (4x) with double-taper pin (4x) |
| 6 | Rigid tilting-back support (2x) | 13 | Transport position of A-frame3 equalizer (jib pendant strap) |
| 7 | Hydraulic tilting-back support (2x) | 14 | A-frame3 |

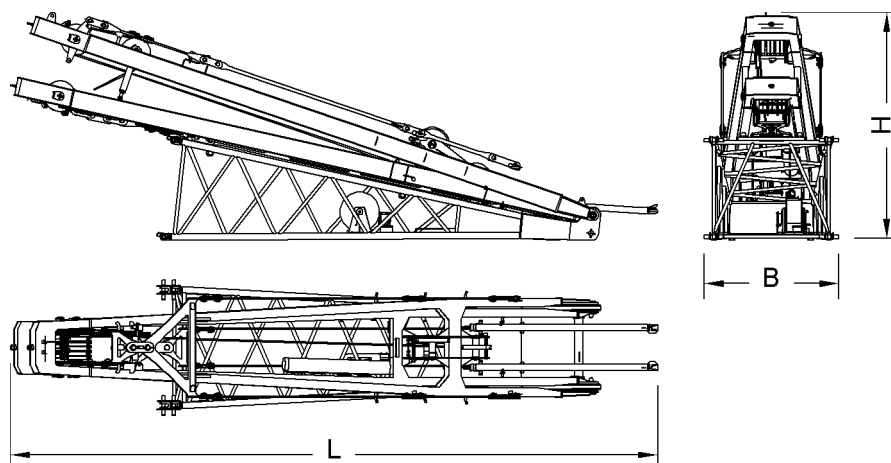


Fig. 359: Dimensions of jib base section 1916.22

Name		Value
System length		7000 mm 23' ft-in
System width		1900 mm 6' 3" ft-in
System height		1600 mm 5' 3" ft-in
L	Length	10850 mm 35' 7" ft-in
B	Width	2010 mm 6' 7" ft-in
H	Height	3150 mm 10' 4" ft-in
Weight (incl. pendant straps, tilting-back supports and jib backstay straps)		6000 kg 13,228 lb
Double-taper pins Ø		60 mm 2.36" in

Tab. 218: Technical data jib base section 1916.22

1.21.2 1916.18 jib section 3 m (10 ft)

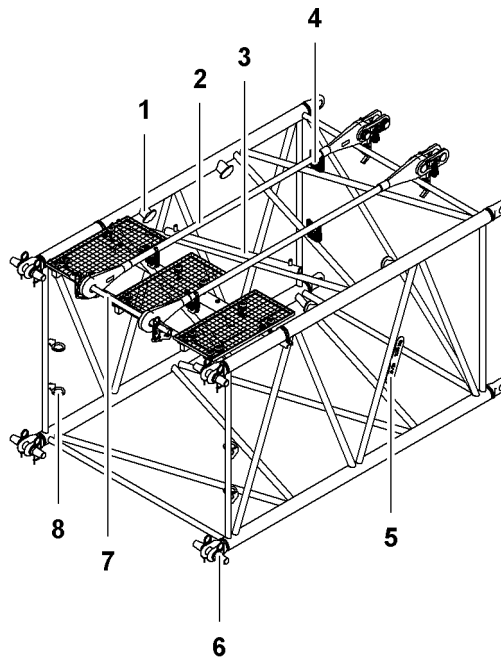


Fig. 360: Jib section 1916.18 3 m (10 ft)

- | | |
|---|--|
| <ul style="list-style-type: none"> 1 Rigging point (4x) 2 Transport position (2x) of jib pendant straps 3 m (10 ft) 3 Rope protection guard 4 Transport bracket (4x) for pendant straps | <ul style="list-style-type: none"> 5 Boom identification plate 6 Pin connection point (8x) with double-taper pin (4x) 7 Transport bracket for pendant straps 8 Transport bracket (4x) for double taper pin |
|---|--|

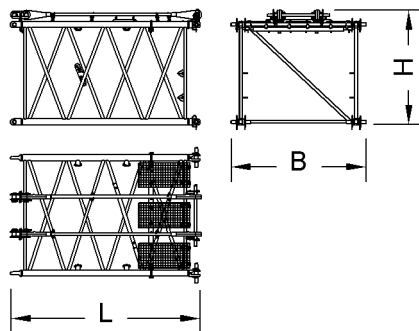


Fig. 361: Dimensions of 1916.18 jib section 3 m (10 ft)

Name	Value
System length	3000 mm 9' 10" ft-in
System width	1900 mm 6' 3" ft-in
System height	1600 mm 5' 3" ft-in

Name		Value
L	Length	3150 mm 10' 4" ft-in
B	Width	2010 mm 6' 7" ft-in
H	Height (incl. pendant straps)	1850 mm 6' 1" ft-in
Weight (incl. pendant straps)		475 kg 1,047 lb
Double-taper pins Ø		60 mm 2.36" in

Tab. 219: Technical data for 1916.18 jib section 3 m (10 ft)

1.21.3 1916.18 jib section 6 m (20 ft)

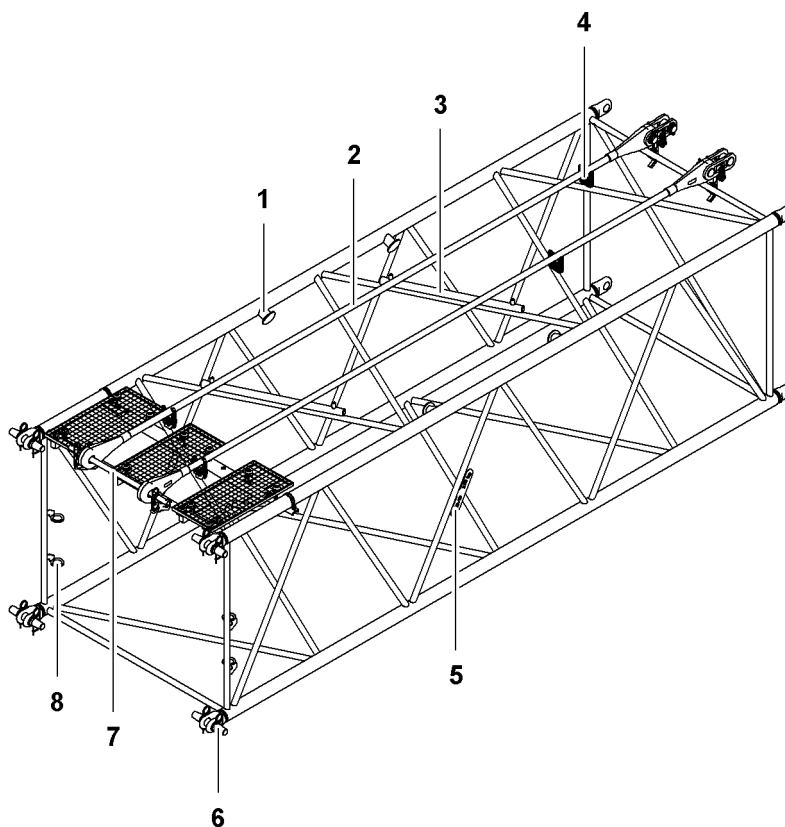


Fig. 362: Jib section 1916.18 6 m (20 ft)

- | | | | |
|---|---|---|--|
| 1 | Rigging point (4x) | 5 | Boom identification plate |
| 2 | Transport position (2x) of jib pendant straps 6 m (20 ft) | 6 | Pin connection point (8x) with double-taper pin (4x) |
| 3 | Rope protection guard (2x) | 7 | Transport bracket for pendant straps |
| 4 | Transport bracket (4x) for pendant straps | 8 | Transport bracket (4x) for double taper pin |

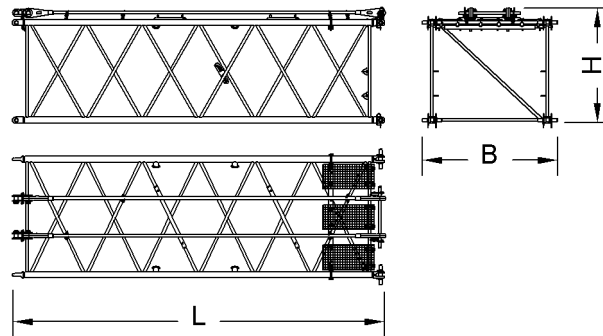


Fig. 363: Dimensions jib section 1916.18 6 m (20 ft)

Name		Value
System length		6000 mm 19' 8" ft-in
System width		1900 mm 6' 3" ft-in
System height		1600 mm 5' 3" ft-in
L	Length	6150 mm 20' 2" ft-in
B	Width	2010 mm 6' 7" ft-in
H	Height (incl. pendant straps)	1850 mm 6' 1" ft-in
Weight (incl. pendant straps)		690 kg 1,521 lb
Double-taper pins Ø		60 mm 2.36" in

Tab. 220: Technical data for 1916.18 jib section 6 m (20 ft)

1.21.4 1916.18 jib section 12 m (40 ft)

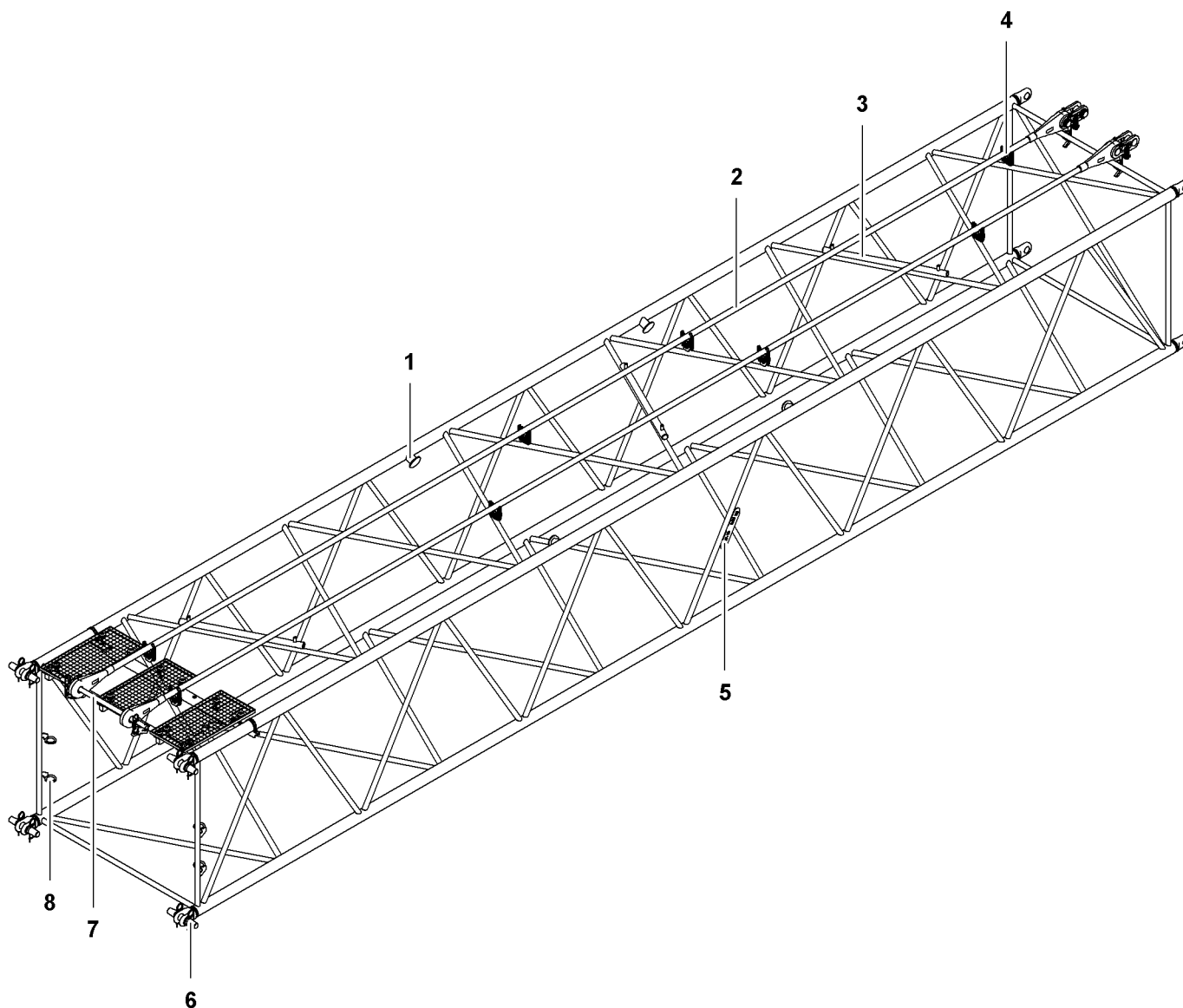


Fig. 364: Jib section 1916.18 12 m (40 ft)

- | | | | | | |
|---|--|---|--|---|---|
| 1 | Rigging point (4x) | 4 | Transport bracket (8x) for pendant straps | 7 | Transport bracket for pendant straps |
| 2 | Transport position (2x) of jib pendant straps 12 m (40 ft) | 5 | Boom identification plate | 8 | Transport bracket (4x) for double taper pin |
| 3 | Rope protection guard (3x) | 6 | Pin connection point (8x) with double-taper pin (4x) | | |

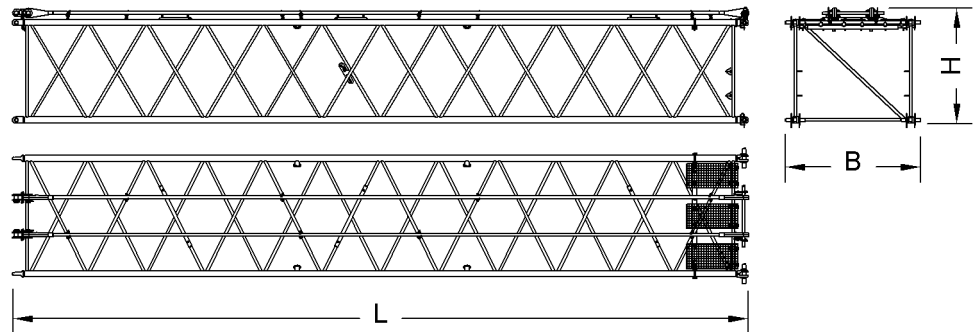


Fig. 365: Dimensions jib section 1916.18 12 m (40 ft)

Name		Value
System length		12000 mm 39' 4" ft-in
System width		1900 mm 6' 3" ft-in
System height		1600 mm 5' 3" ft-in
L	Length	12150 mm 39' 10" ft-in
B	Width	2010 mm 6' 7" ft-in
H	Height (incl. pendant straps)	1850 mm 6' 1" ft-in
Weight (incl. pendant straps)		1250 kg 2,756 lb
Double-taper pins Ø		60 mm 2.36" in

Tab. 221: Technical data for 1916.18 jib section 12 m (40 ft)

1.21.5 1916.21 jib head section

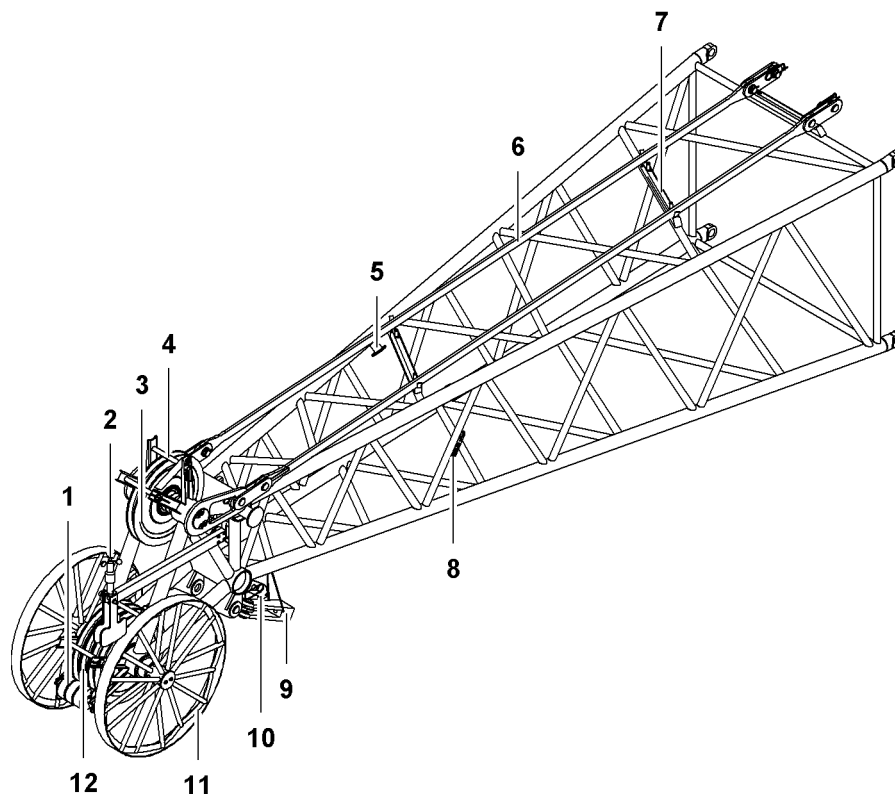


Fig. 366: 1916.21 jib head section

- | | | | |
|---|---|----|---------------------------|
| 1 | Rope protection roller (3x) | 7 | Rope guard support (2x) |
| 2 | Anemometer | 8 | Boom identification plate |
| 3 | Pulley | 9 | Rope fixation |
| 4 | Rope protection pipe (2x) | 10 | Hoist limit switch (2x) |
| 5 | Lifting point (4x) | 11 | Wheel (2x) |
| 6 | Transport position (2x) of jib pendant straps | 12 | Pulley (3x) |

This jib head section is designed to allow an auxiliary jib to be attached ([For more information see: 1.27 Auxiliary jib* \(15 t \(33.000 lb\)\), page 385](#)).

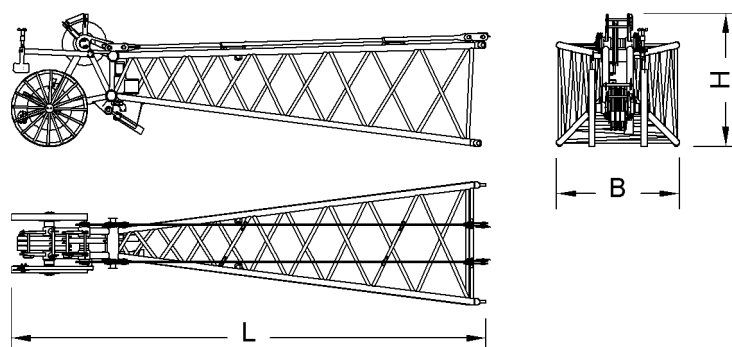


Fig. 367: 1916.21 jib head section dimensions

Name		Value
System length		7000 mm 23' ft-in
System width		1900 mm 6' 3" ft-in
System height		1600 mm 5' 3" ft-in
L	Length	7750 mm 25' 5" ft-in
B	Width	2010 mm 6' 7" ft-in
H	Height	2200 mm 7' 3" ft-in
Weight (incl. pendant straps)		1420 kg 3,131 lb

Tab. 222: 1916.21 jib head section, technical data

1.21.6 Mid-point suspension on luffing jib 1916

The mid-point suspensions on luffing jib 1916 differ with steel pendant straps and CF pendant straps.

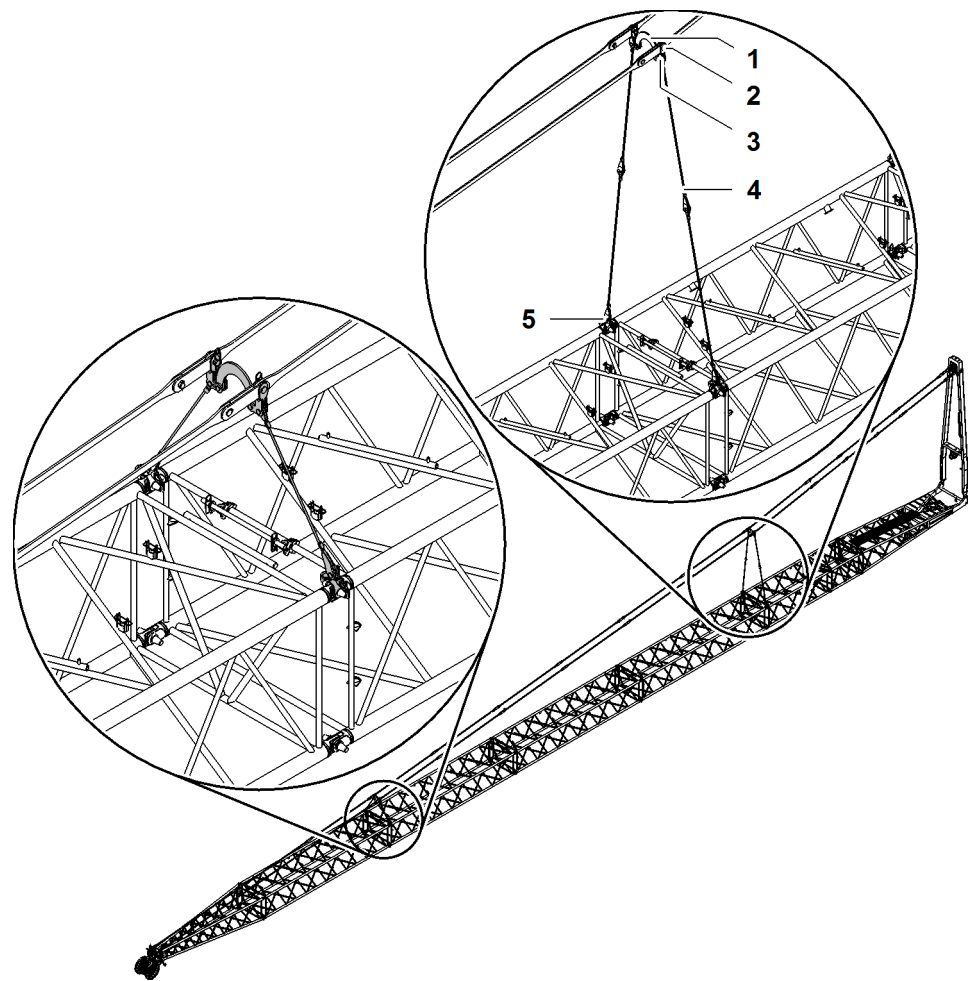


Fig. 368: Mid-point suspension on luffing jib 1916 (illustration of principle)

- | | | | |
|---|-----------------------------|---|------------|
| 1 | Connecting element (2x) | 4 | Stay ropes |
| 2 | Spacer bracket | 5 | Fork (2x) |
| 3 | Pin (2x) for pendant straps | | |

Connecting elements for steel pendant straps

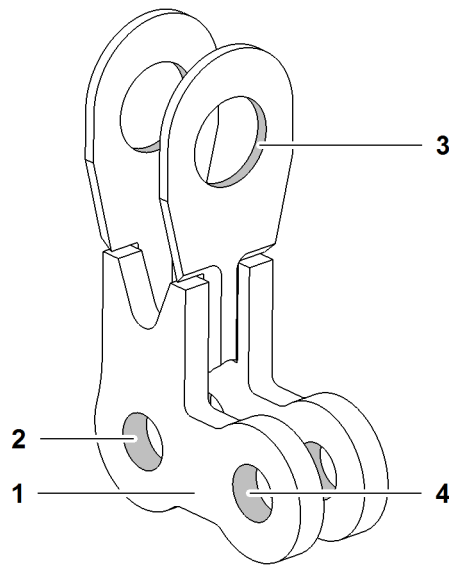


Fig. 369: Connecting elements for steel pendant straps (illustration of principle)

- | | | | |
|---|------------------------------------|---|---|
| 1 | Connecting element | 3 | Pin connection point for pendant strap |
| 2 | Pin connection point for stay rope | 4 | Pin connection point for spacer bracket |

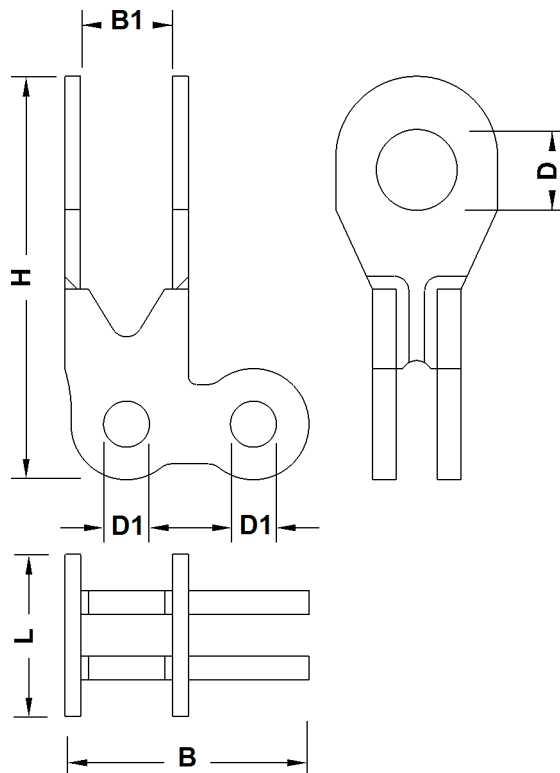


Fig. 370: Dimensions connecting elements for steel pendant straps

Name		Value
L	Length	102 mm 4.02" in
H	Height	354 mm 1' 2" ft-in
B	Width	190 mm 7.48" in
B1	Width between links	58 mm 2.28" in
D	Pin Ø	50 mm 1.97" in
D1	Pin Ø	35 mm 1.38" in

Tab. 223: Technical data connecting elements for steel pendant straps

Connecting elements for CF pendant straps

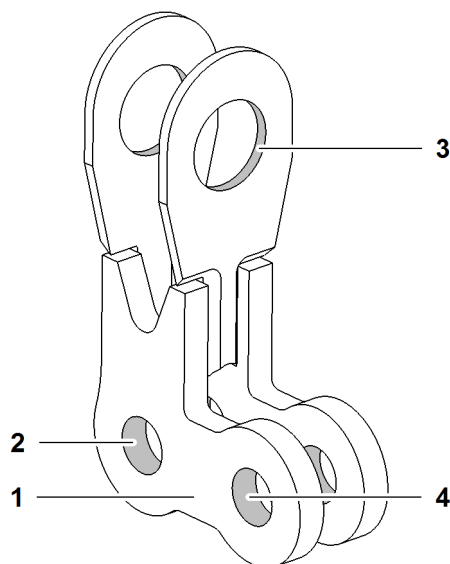


Fig. 371: Connecting elements for CF pendant straps (illustration of principle)

- | | | | |
|----------|------------------------------------|----------|---|
| 1 | Connecting element | 3 | Pin connection point for pendant strap |
| 2 | Pin connection point for stay rope | 4 | Pin connection point for spacer bracket |

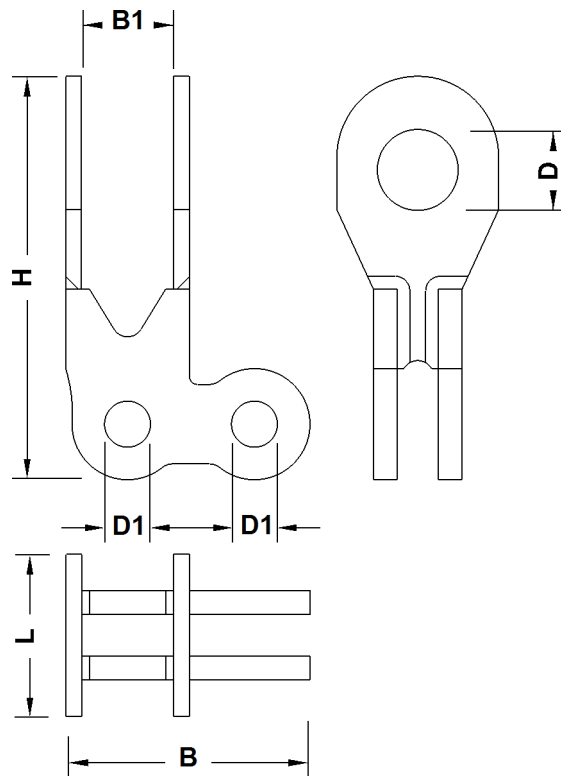


Fig. 372: Dimensions connecting elements for CF pendant straps

Name		Value
L	Length	110 mm 4.33" in
H	Height	358 mm 1' 2" ft-in
B	Width	207 mm 8.15" in
B1	Width between link	104 mm 4.09" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	35 mm 1.38" in

Tab. 224: Technical data connecting elements for CF pendant straps

Forks

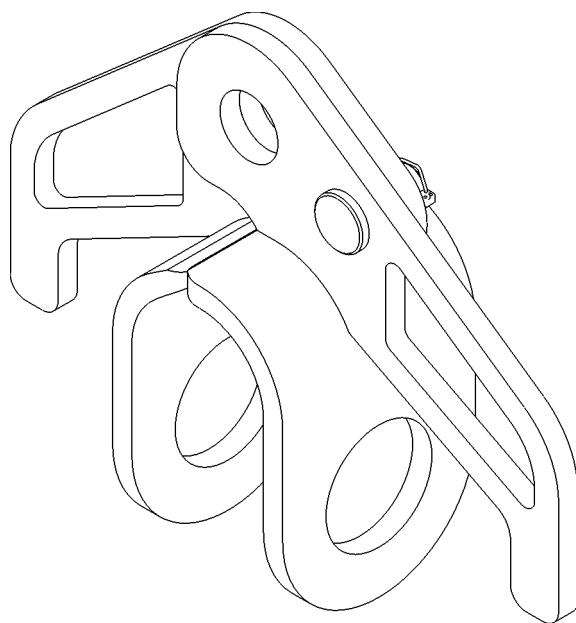


Fig. 373: Forks (illustration of principle)

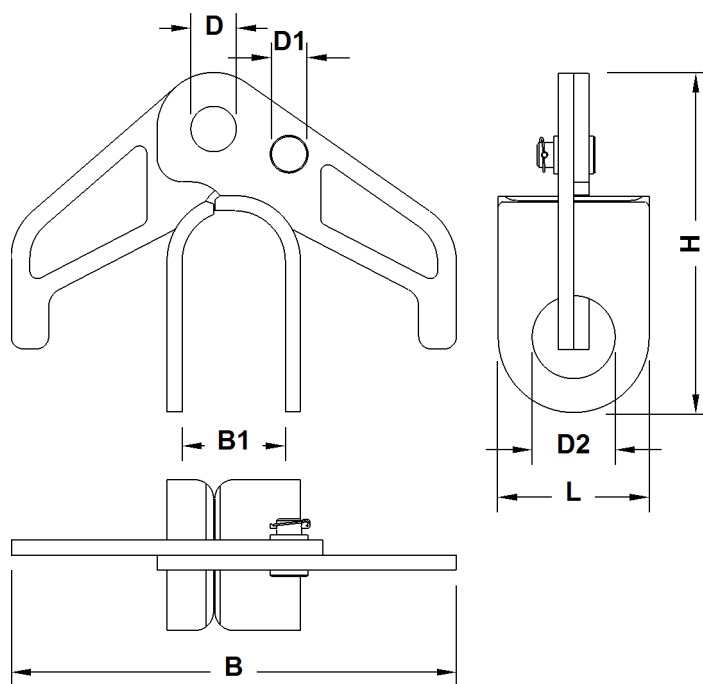


Fig. 374: Fork dimensions

Name		Value
L	Length	100 mm 3.94" in
B	Width	395 mm 1' 4" ft-in

Name		Value
B1	Inner width	106 mm 4.17" in
H	Height	260 mm 10.24" in
D	Pin Ø	35 mm 1.38" in
D1	Pin Ø	20 mm 0.79" in
D2	Pin Ø	60 mm 2.36" in

Tab. 225: Technical data forks

Spacer bracket

The spacer brackets are identical with steel pendant straps and CF pendant straps.

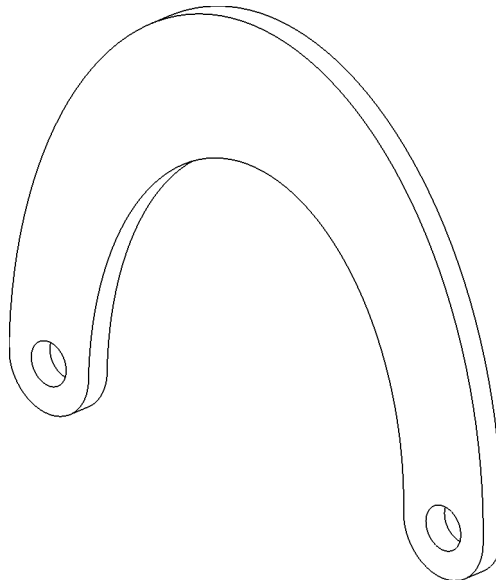


Fig. 375: Spacer brackets (illustration of principle)

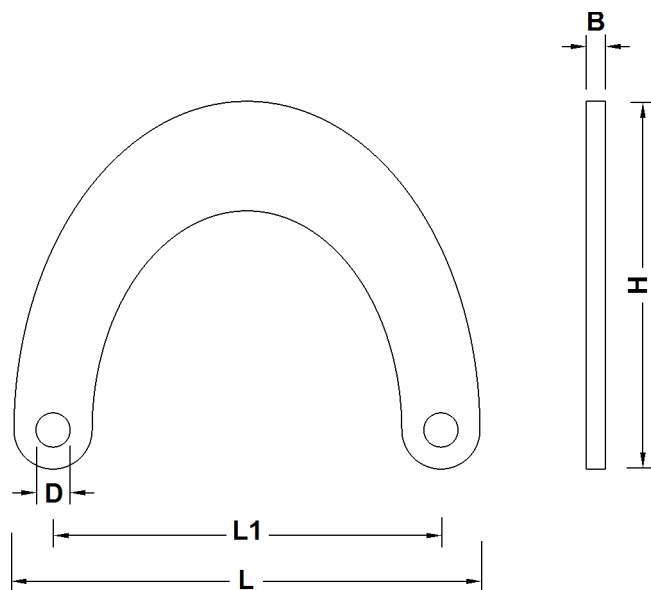


Fig. 376: Dimensions spacer brackets

Name		Value
L	Length	489 mm 1' 7" ft-in
L1	Distance between pins	407 mm 1' 4" ft-in
B	Width	20 mm 0.79" in
H	Height	386 mm 1' 3" ft-in
D	Pin Ø	35 mm 1.38" in

Tab. 226: Technical data spacer brackets

Stay ropes

Several stay ropes are assembled to achieve defined rope lengths.

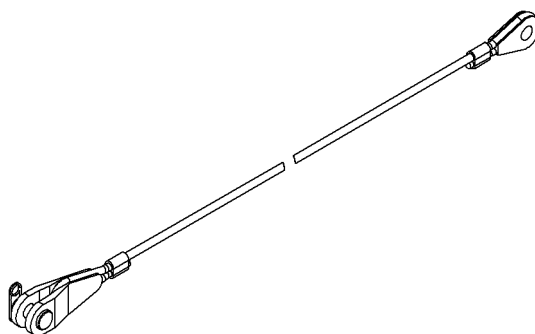


Fig. 377: Stay ropes (illustration of principle)

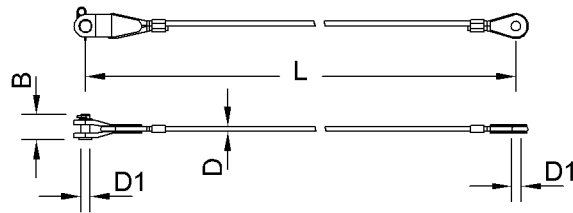


Fig. 378: Dimensions stay ropes

Name		Value
L	Length of stay rope	1100 mm 3' 7" ft-in
		1300 mm 4' 3" ft-in
		1600 mm 5' 3" ft-in
		2100 mm 6' 11" ft-in
		2600 mm 8' 6" ft-in
		3000 mm 9' 10" ft-in
D	Ø of stay rope	18 mm 0.71" in
D1	Pin Ø	35 mm 1.38" in
B	Length of pin	90 mm 3.54" in

Tab. 227: Technical data stay ropes

Pins for steel pendant straps

The pins supplied with the pendant straps must be exchanged for longer pins.

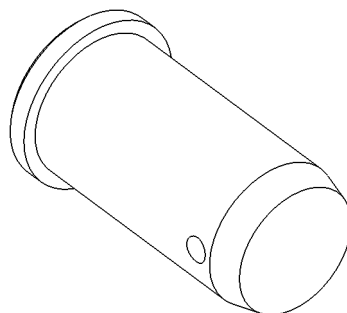


Fig. 379: Pins for steel pendant straps (illustration of principle)

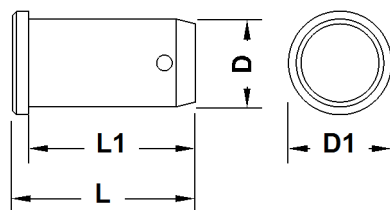


Fig. 380: Dimensions pins for steel pendant straps

Name		Value
L	Total length	120 mm 4.72" in
L1	Length	112 mm 4.41" in
D	Pin Ø	50 mm 1.97" in
D1	Collar Ø	58 mm 2.28" in

Tab. 228: Technical data pins for steel pendant straps

Pins for CF pendant straps

The pins supplied with the pendant straps must be exchanged for longer pins.

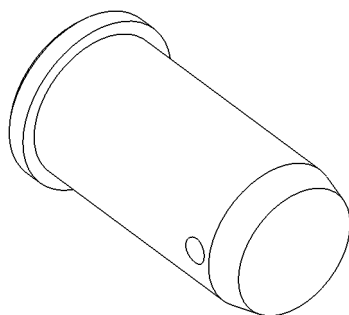


Fig. 381: Pins for CF pendant straps (illustration of principle)

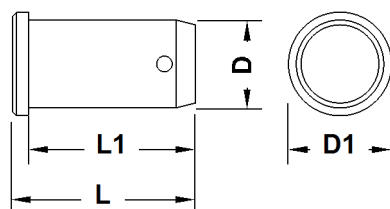


Fig. 382: Dimensions pins for CF pendant straps

Name		Value
L	Total length	158 mm 6.22" in
L1	Length	153 mm 6.02" in

Name		Value
D	Pin Ø	60 mm 2.36" in
D1	Collar Ø	68 mm 2.68" in

Tab. 229: Technical data pins for CF pendant straps

1.21.7 Steel pendant straps on luffing jib 1916

Steel pendant straps on A-frame2

Equalizer A-frame2 (jib backstay strap)

Installation site in crane operation:

- Luffing jib 1916 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1709)
- Luffing jib 1916 + midfall 1916 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1805)

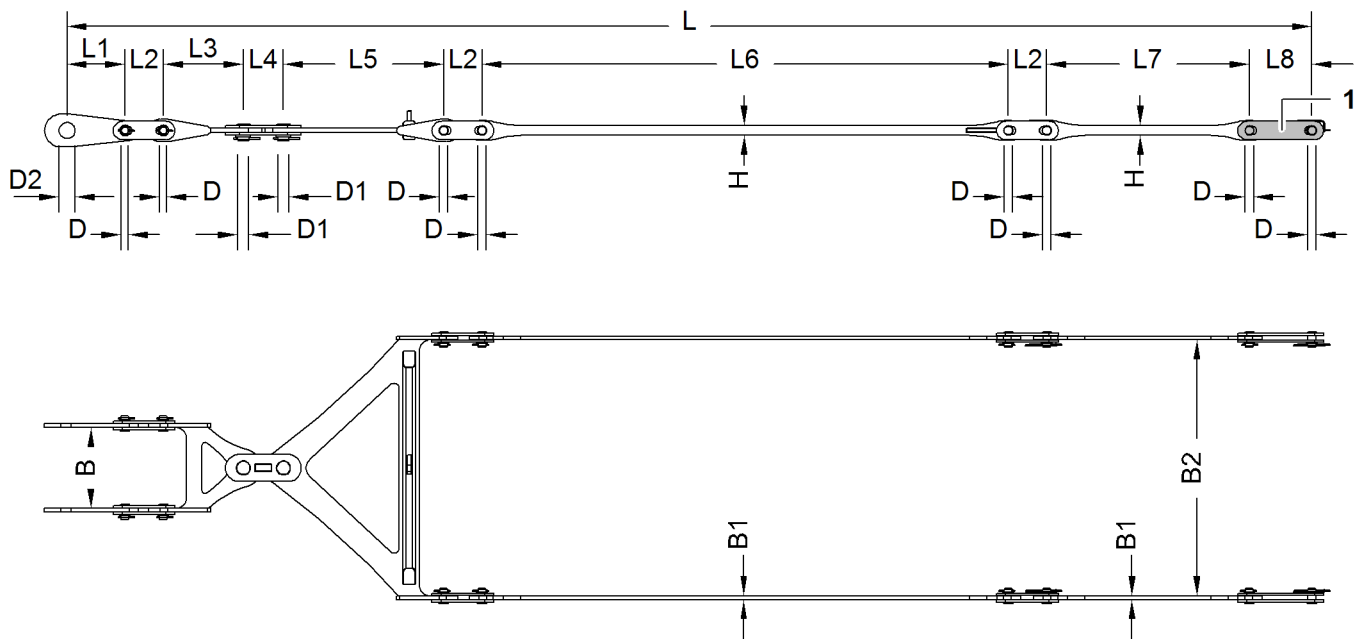


Fig. 383: Dimensions equalizer on A-frame2 (jib backstay strap)

1 Connecting link (4x)

When attaching the luffing jib 1916 to the machine, replace the connecting link 1 with a "connecting link (conversion kit)" (For more information see: Connecting link (conversion kit), page 357) .

Name		Value
L	Length	7769 mm 25' 6" ft-in
L1	Length of connecting link	360 mm 1' 2" ft-in

Name		Value
L2	Length of connecting link	240 mm 9.45" in
L3	Length of rocker	500 mm 1' 8" ft-in
L4	Length of connecting link	250 mm 9.84" in
L5	Length of rocker	1000 mm 3' 3" ft-in
L6	Length of pendant strap	3284 mm 10' 9" ft-in
L7	Length of pendant strap	1265 mm 4' 2" ft-in
L8	Length of connecting link	390 mm 1' 3" ft-in
B	Width	527 mm 1' 9" ft-in
B1	Width of pendant strap	22 mm 0.87" in
B2	Width of spacer bar	1620 mm 5' 4" ft-in
H	Height of pendant strap	62 mm 2.44" in
D	Pin Ø	50 mm 1.97" in
D1	Pin Ø	70 mm 2.76" in
D2	Pin Ø	100 mm 3.94" in
Weight		462 kg 1,019 lb

Tab. 230: Technical data equalizer on A-frame2 (jib backstay strap)

Steel pendant straps on A-frame3

A-frame3 equalizer (jib pendant strap)

Installation site in crane operation:

- Luffing jib 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1710](#))
- Luffing jib 1916 + midfall 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1806](#))

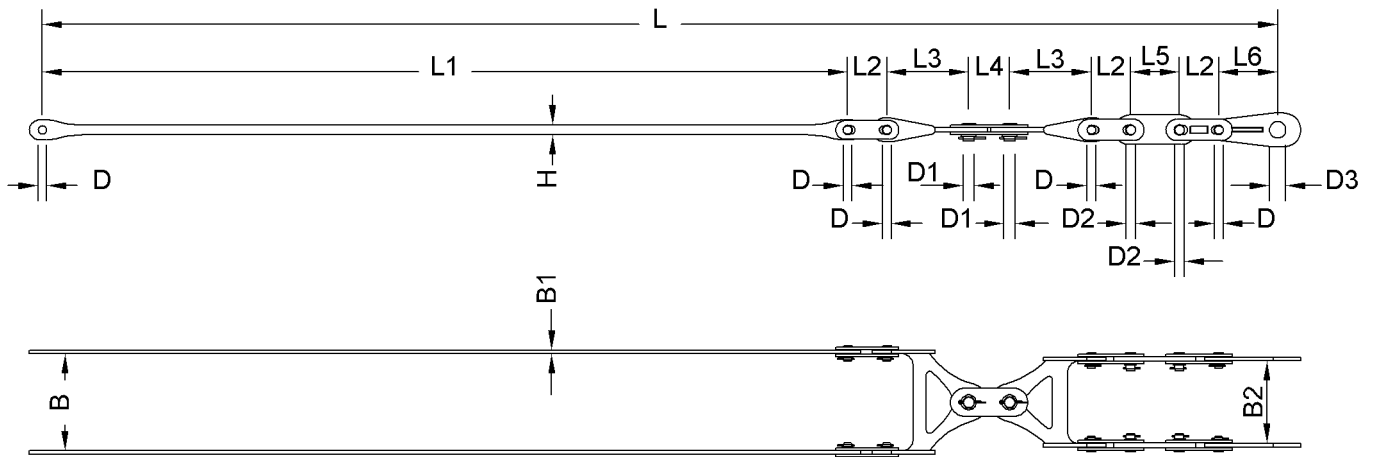


Fig. 384: Dimensions equalizer on A-frame3 (jib pendant strap)

Name		Value
L	Length	7550 mm 24' 9" ft-in
L1	Length of pendant strap	4922 mm 16' 2" ft-in
L2	Length of connecting link	240 mm 9.45" in
L3	Length of rocker	500 mm 1' 8" ft-in
L4	Length of connecting link	250 mm 9.84" in
L5	Length of tension load cell	298 mm 1' ft-in
L6	Length of connecting link	360 mm 1' 2" ft-in
B	Width	614 mm 2' ft-in
B1	Width of pendant strap	22 mm 0.87" in
B2	Width	527 mm 1' 9" ft-in
H	Height of pendant strap	62 mm 2.44" in
D	Pin Ø	50 mm 1.97" in
D1	Pin Ø	70 mm 2.76" in
D2	Pin Ø	55 mm 2.17" in
D3	Pin Ø	100 mm 3.94" in

Name	Value
Weight	332 kg 732 lb

Tab. 231: Technical data A-frame3 equalizer (jib pendant strap)

Steel pendant straps on jib section 1916.18 3 m (10 ft)

Jib pendant strap 3 m (10 ft)

Installation site in crane operation:

- Luffing jib 1916 (For more information see: Pendant straps A-frame3 to jib head 1916, page 1710)
- Luffing jib 1916 + midfall 1916 (For more information see: Pendant straps A-frame3 to jib head 1916, page 1806)

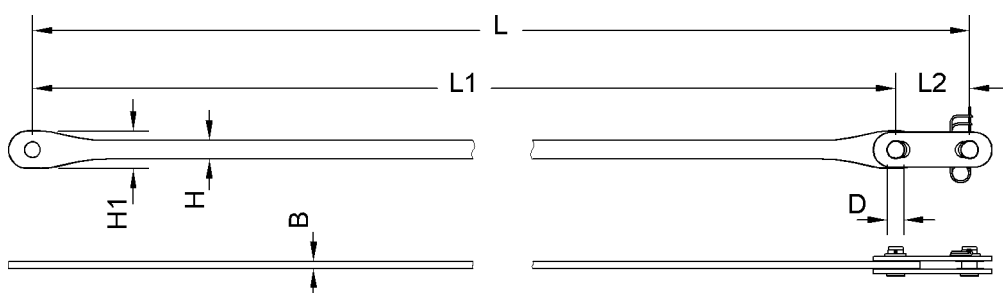


Fig. 385: Dimensions jib pendant strap 3 m (10 ft)

Name	Value
L Length	3000 mm 9' 10" ft-in
L1 Length of pendant strap	2760 mm 9' 1" ft-in
L2 Length of connecting link	240 mm 9.45" in
W Width of pendant strap	22 mm 0.87" in
H Height of pendant strap	62 mm 2.44" in
H1 Height of pendant strap	120 mm 4.72" in
D Pin Ø	50 mm 1.97" in
Weight	46 kg 101 lb

Tab. 232: Technical data jib pendant strap3 m (10 ft)

Steel pendant straps on jib section 1916.18 6 m (20 ft)

Jib pendant strap 6 m (20 ft)

Installation site in crane operation:

- Luffing jib 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1710](#))
- Luffing jib 1916 + midfall 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1806](#))

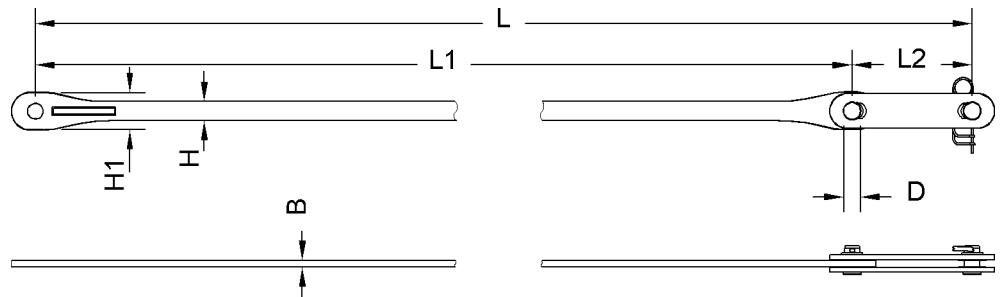


Fig. 386: Dimensions jib pendant strap 6 m (20 ft)

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5610 mm 18' 5" ft-in
L2	Length of connecting link	390 mm 1' 3" ft-in
W	Width of pendant strap	22 mm 0.87" in
H	Height of pendant strap	62 mm 2.44" in
H1	Height of pendant strap	120 mm 4.72" in
D	Pin Ø	50 mm 1.97" in
Weight		80 kg 176 lb

Tab. 233: Technical data jib pendant strap 6 m (20 ft)

Steel pendant straps on jib section 1916.18 12 m (40 ft)

Jib pendant strap 12 m (40 ft)

Installation site in crane operation:

- Luffing jib 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1710](#))
- Luffing jib 1916 + midfall 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1806](#))

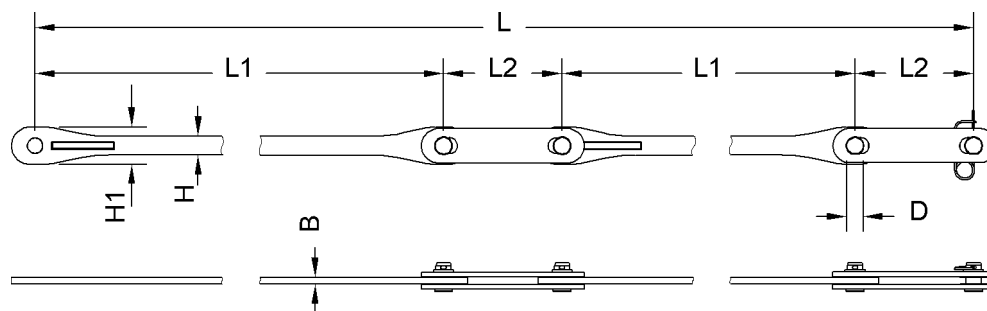


Fig. 387: Dimensions jib pendant strap 12 m (40 ft)

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	5610 mm 18' 5" ft-in
L2	Length of connecting link	390 mm 1' 3" ft-in
W	Width of pendant strap	22 mm 0.87" in
H	Height of pendant strap	62 mm 2.44" in
H1	Height of pendant strap	120 mm 4.72" in
D	Pin Ø	50 mm 1.97" in
Weight		160 kg 353 lb

Tab. 234: Technical data jib pendant strap 12 m (40 ft)

Steel pendant straps on jib head 1916.21

Jib pendant strap on jib head 1916.21

Installation site in crane operation:

- Luffing jib 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1710](#))
- Luffing jib 1916 + midfall 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1806](#))

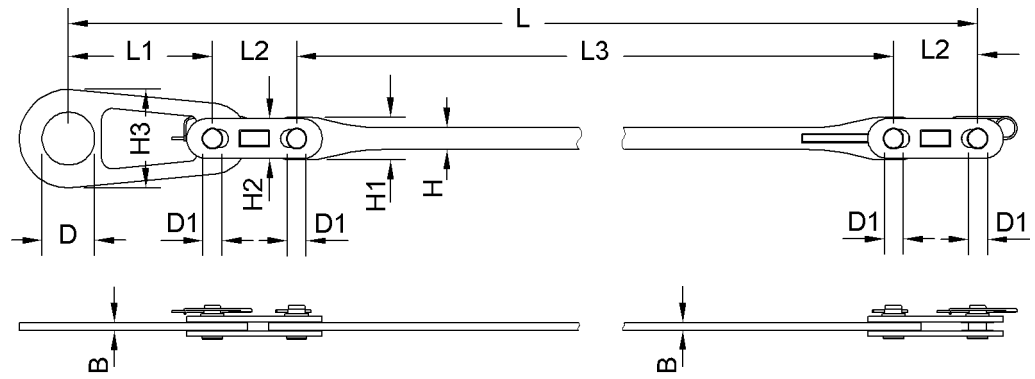


Fig. 388: Dimensions jib pendant strap on jib head 1916.21

Name		Value
L	Length	6500 mm 21' 4" ft-in
L1	Length of connecting link	410 mm 1' 4" ft-in
L2	Length of connecting link	240 mm 9.45" in
L3	Length of pendant strap	6090 mm 20' ft-in
W	Width of pendant strap	22 mm 0.87" in
H	Height of pendant strap	62 mm 2.44" in
H1	Height of pendant strap	122 mm 4.80" in
H2	Height of connecting link	113 mm 4.45" in
H3	Height of connecting link	240 mm 9.45" in
D	Pin Ø	150 mm 5.91" in
D1	Pin Ø	50 mm 1.97" in
Weight		95 kg 209 lb

Tab. 235: Technical data jib pendant strap on jib head 1916.21

Additional pendant straps/connecting links for luffing jib 1916

Connecting link (conversion kit)

Installation site in crane operation:

- Luffing jib 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916](#), page 1710)

- Luffing jib 1916 + midfall 1916 (For more information see: Pendant straps A-frame3 to jib head 1916, page 1806)

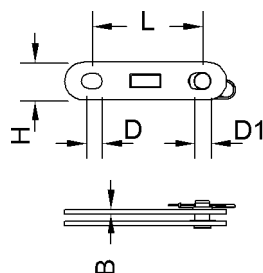


Fig. 389: Dimensions connecting link (conversion kit)

Name		Value
L	Length of connecting link	390 mm 1' 3" ft-in
W	Width of connecting link	15 mm 0.59" in
H	Height of connecting link	130 mm 5.12" in
D	Pin Ø	50 mm 1.97" in
D1	Pin Ø	55 mm 2.17" in
Weight		16.5 kg 36.38 lb

Tab. 236: Technical data connecting link (conversion kit)

1.21.8 CF pendant straps on luffing jib 1916

CF pendant straps on A-frame2

Equalizer A-frame2 (jib backstay strap)

Installation site in crane operation:

- Luffing jib 1916 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1711)
- Luffing jib 1916 + midfall 1916 (For more information see: Jib backstay straps A-frame2 to main boom base section 2821, page 1807)

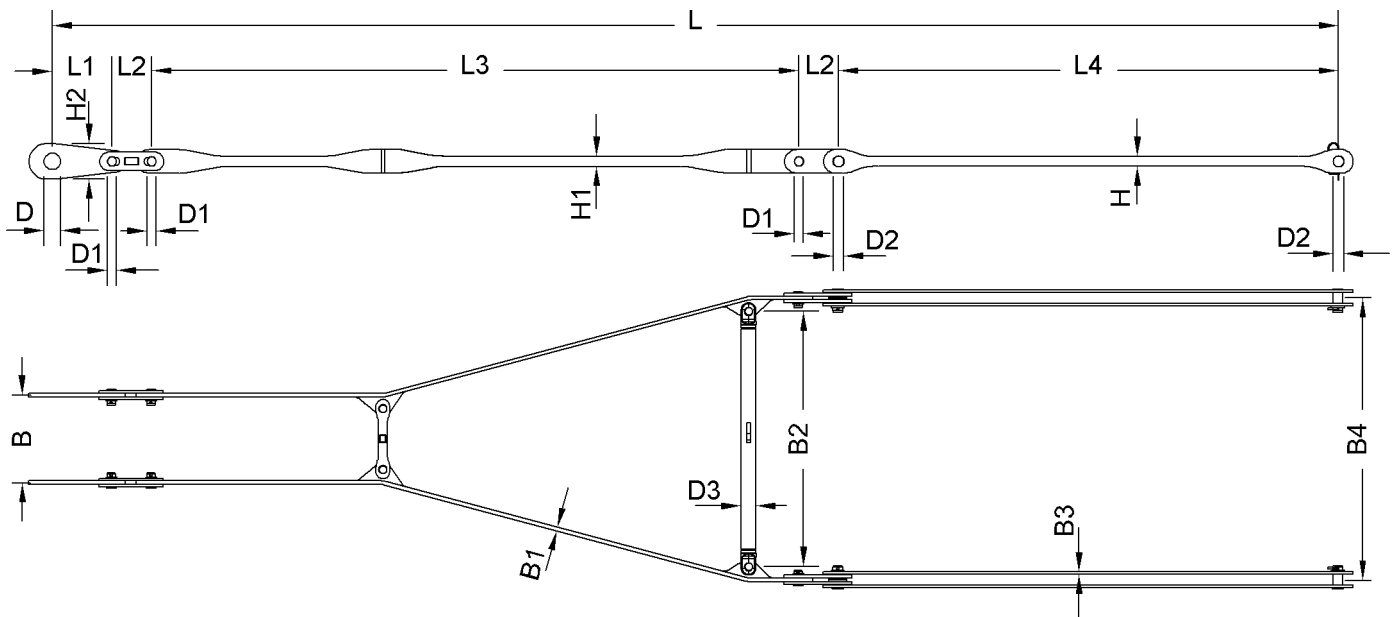


Fig. 390: Dimensions equalizer on A-frame2 (jib backstay strap)

Name		Value
L	Length	7769 mm 25' 6" ft-in
L1	Length of connecting link	360 mm 1' 2" ft-in
L2	Length of connecting link	240 mm 9.45" in
L3	Length of pendant strap	3909 mm 12' 10" ft-in
L4	Length of pendant strap	3020 mm 9' 11" ft-in
W	Width	527 mm 1' 9" ft-in
W1	Width of pendant strap	22 mm 0.87" in
W2	Width of spacer bar	1540 mm 5' 1" ft-in
W3	Width of pendant strap	15 mm 0.59" in
W4	Width	1700 mm 5' 7" ft-in
H	Height of pendant strap	55 mm 2.17" in
H1	Height of pendant strap	62 mm 2.44" in
H2	Height of connecting link	280 mm 11.02" in

Name		Value
D	Pin Ø	140 mm 5.51" in
D1	Pin Ø	50 mm 1.97" in
D2	Pin Ø	60 mm 2.36" in
D2	Spacer bar Ø	90 mm 3.54" in
Weight		191 kg 421 lb

Tab. 237: Technical data equalizer on A-frame2 (jib backstay strap)

CF pendant straps on A-frame3

A-frame3 equalizer (jib pendant strap)

Installation site in crane mode:

- Luffing jib 1916 (For more information see: Pendant straps A-frame3 to jib head 1916, page 1712)
- Luffing jib 1916 + midfall 1916 (For more information see: Pendant straps A-frame3 to jib head 1916, page 1808)

Generation A of A-frame3 equalizer (jib pendant strap)

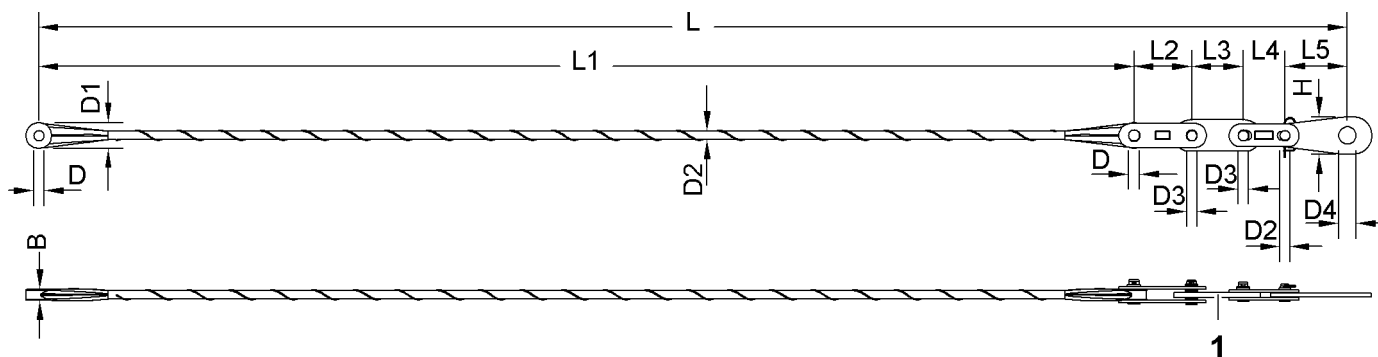


Fig. 391: Dimensions equalizer on A-frame3 (jib pendant strap)

1 Tension load cell

Name		Value
L	Length	7550 mm 24' 9" ft-in
L1	Length of pendant strap	6320 mm 20' 9" ft-in
L2	Length of connecting link	332 mm 1' 1" ft-in
L3	Length of tension load cell	298 mm 1' ft-in

Name		Value
L4	Length of connecting link	240 mm 9.45" in
L5	Length of connecting link	360 mm 1' 2" ft-in
W	Width	64 mm 2.52" in
H	Height of connecting link	216 mm 8.50" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	148 mm 5.83" in
D2	Pendant strap Ø	50 mm 1.97" in
D3	Pin Ø	55 mm 2.17" in
D4	Pin Ø	100 mm 3.94" in
Weight		205 kg 452 lb

Tab. 238: Technical data A-frame3 equalizer (jib pendant strap)

Generation B of A-frame3 equalizer (jib pendant strap)

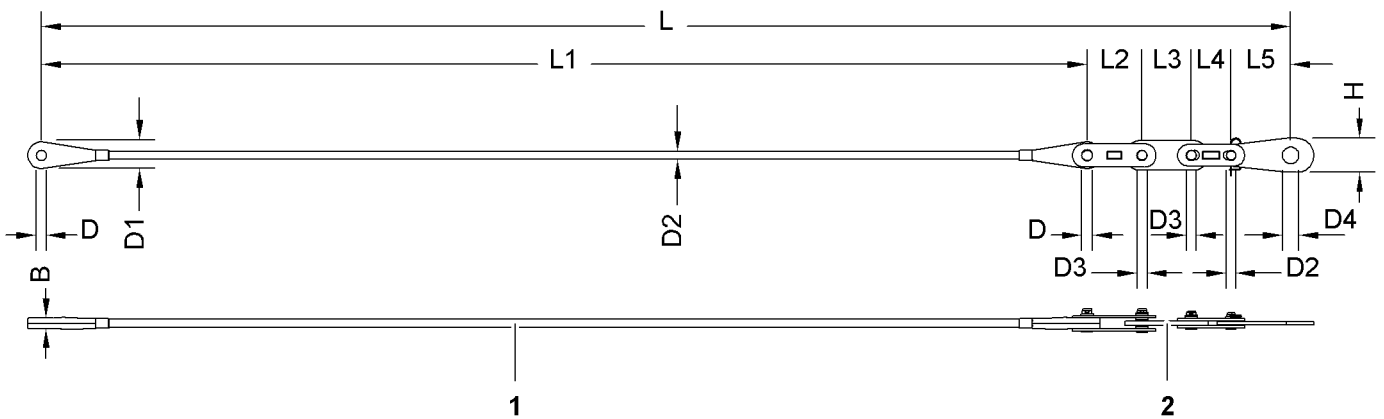


Fig. 392: Dimensions equalizer on A-frame3 (jib pendant strap)

- 1 Wire mesh hose as protective sheath
- 2 Tension load cell

Name		Value
L	Length	7550 mm 24' 9" ft-in
L1	Length of pendant strap	6320 mm 20' 9" ft-in

Name		Value
L2	Length of connecting link	332 mm 1' 1" ft-in
L3	Length of tension load cell	298 mm 1' ft-in
L4	Length of connecting link	240 mm 9.45" in
L5	Length of connecting link	360 mm 1' 2" ft-in
B	Width	63 mm 2.48" in
H	Height of connecting link	216 mm 8.50" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	161 mm 6.34" in
D2	Pendant strap Ø	48 mm 1.89" in
D3	Pin Ø	55 mm 2.17" in
D4	Pin Ø	100 mm 3.94" in
Weight		125 kg 276 lb

Tab. 239: Technical data A-frame3 equalizer (jib pendant strap)

CF pendant straps on jib section 1916.18 3 m (10 ft)

Jib pendant strap 3 m (10 ft)

Installation site in crane operation:

- Luffing jib 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1712](#))
- Luffing jib 1916 + midfall 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1808](#))

Generation A of jib pendant strap 3 m (10 ft)

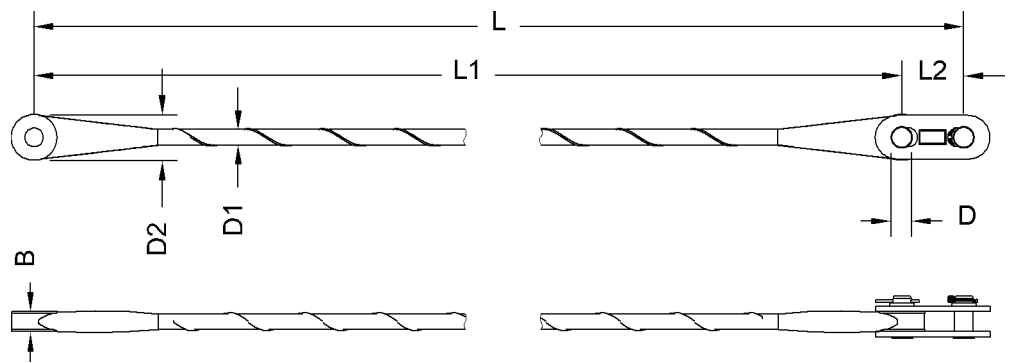


Fig. 393: Dimensions jib pendant strap 3 m (10 ft)

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2800 mm 9' 2" ft-in
L2	Length of connecting link	200 mm 7.87" in
B	Width	64 mm 2.52" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	50 mm 1.97" in
D2	Pendant strap Ø	148 mm 5.83" in
Weight		35 kg 77.16 lb

Tab. 240: Technical data jib pendant strap 3 m (10 ft)

Generation B of jib pendant strap 3 m (10 ft)

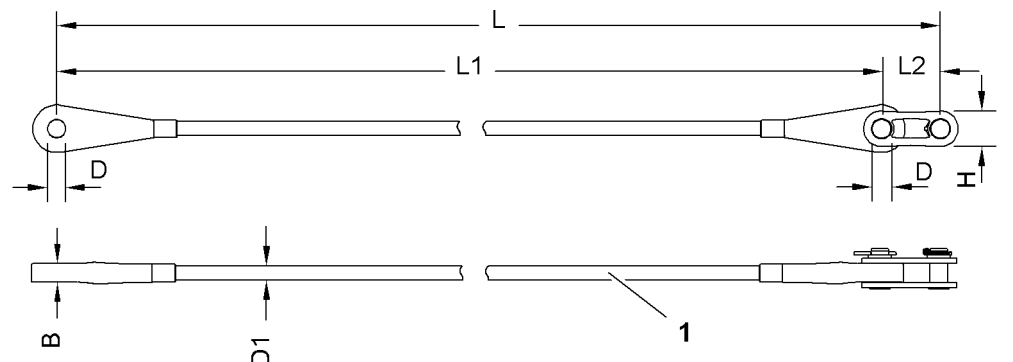


Fig. 394: Dimensions jib pendant strap 3 m (10 ft)

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	3000 mm 9' 10" ft-in
L1	Length of pendant strap	2800 mm 9' 2" ft-in
L2	Length of connecting link	200 mm 7.87" in
B	Width	63 mm 2.48" in
H	Height of connecting link	121 mm 4.76" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	48 mm 1.89" in
Weight		26 kg 57.32 lb

Tab. 241: Technical data jib pendant strap 3 m (10 ft)

CF pendant straps on jib section 1916.18 6 m (20 ft)

Jib pendant strap 6 m (20 ft)

Installation site in crane mode:

- Luffing jib 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1712](#))
- Luffing jib 1916 + midfall 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1808](#))

Generation A of jib pendant strap 6 m (20 ft)

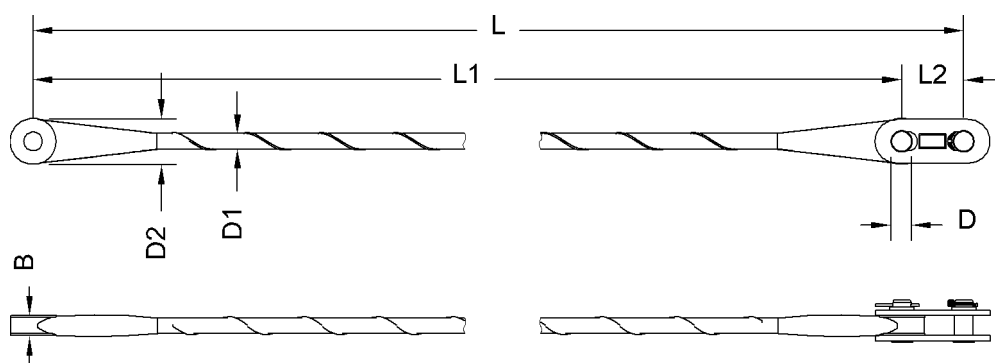


Fig. 395: Dimensions jib pendant strap 6 m (20 ft)

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5800 mm 19' ft-in

Name		Value
L2	Length of connecting link	200 mm 7.87" in
B	Width	64 mm 2.52" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	50 mm 1.97" in
D2	Pendant strap Ø	148 mm 5.83" in
Weight		43 kg 94.80 lb

Tab. 242: Technical data jib pendant strap 6 m (20 ft)

Generation B of jib pendant strap 6 m (20 ft)

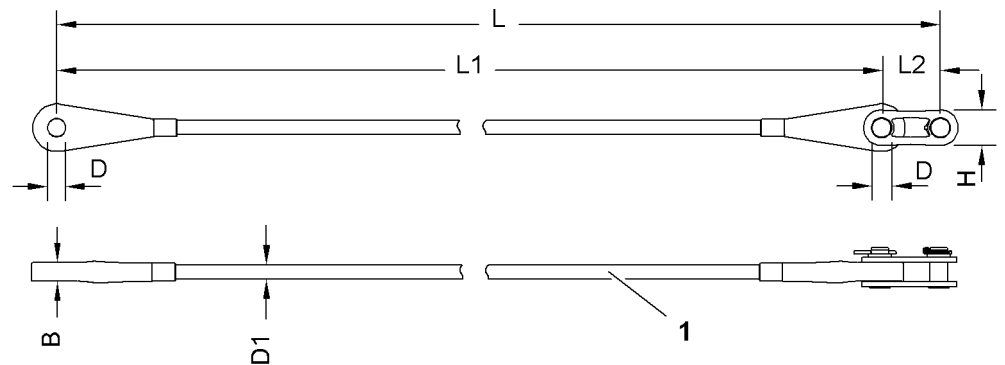


Fig. 396: Dimensions jib pendant strap 6 m (20 ft)

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	6000 mm 19' 8" ft-in
L1	Length of pendant strap	5800 mm 19' ft-in
L2	Length of connecting link	200 mm 7.87" in
B	Width	63 mm 2.48" in
H	Height of connecting link	121 mm 4.76" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	48 mm 1.89" in

Name	Value
Weight	32 kg 70.55 lb

Tab. 243: Technical data jib pendant strap 6 m (20 ft)

CF pendant straps on jib section 1916.18 12 m (40 ft)

Jib pendant strap 12 m (40 ft)

Installation site in crane mode:

- Luffing jib 1916 (For more information see: Pendant straps A-frame3 to jib head 1916, page 1712)
- Luffing jib 1916 + midfall 1916 (For more information see: Pendant straps A-frame3 to jib head 1916, page 1808)

Generation A of jib pendant strap 12 m (40 ft)

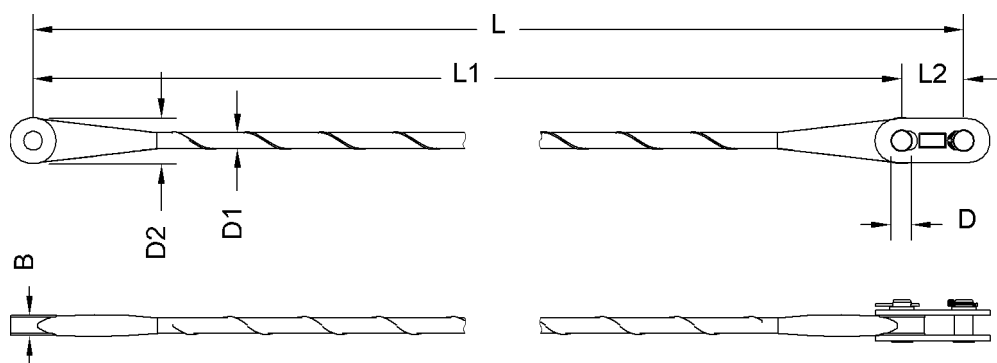


Fig. 397: Dimensions jib pendant strap 12 m (40 ft)

Name	Value
L Length	12000 mm 39' 4" ft-in
L1 Length of pendant strap	11800 mm 38' 9" ft-in
L2 Length of connecting link	200 mm 7.87" in
B Width	64 mm 2.52" in
D Pin Ø	60 mm 2.36" in
D1 Pendant strap Ø	50 mm 1.97" in
D2 Pendant strap Ø	148 mm 5.83" in
Weight	60 kg 132 lb

Tab. 244: Technical data jib pendant strap 12 m (40 ft)

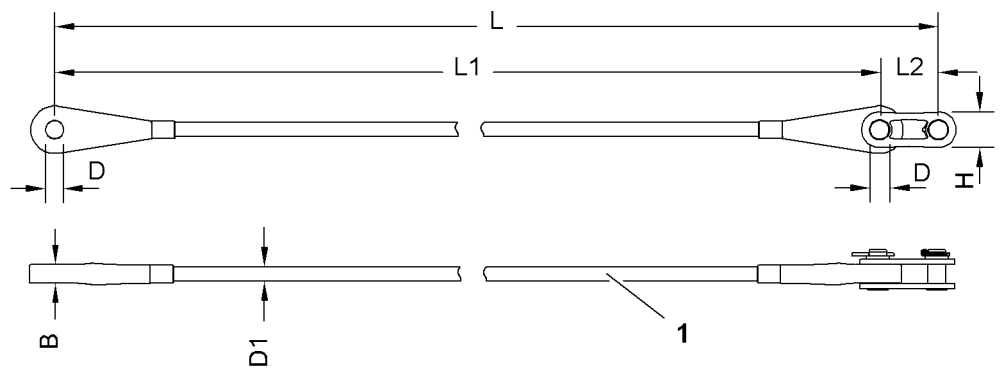
Generation B of jib pendant strap 12 m (40 ft)

Fig. 398: Dimensions jib pendant strap 12 m (40 ft)

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of pendant strap	11800 mm 38' 9" ft-in
L2	Length of connecting link	200 mm 7.87" in
B	Width	63 mm 2.48" in
H	Height of connecting link	121 mm 4.76" in
D	Pin Ø	60 mm 2.36" in
D1	Pendant strap Ø	48 mm 1.89" in
Weight		43 kg 94.80 lb

Tab. 245: Technical data jib pendant strap 12 m (40 ft)

CF pendant straps on jib head 1916.21**Jib pendant strap on jib head 1916.21**

Installation site in crane operation:

- Luffing jib 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1712](#))
- Luffing jib 1916 + midfall 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1808](#))

Generation A of jib pendant strap on jib head 1916.21

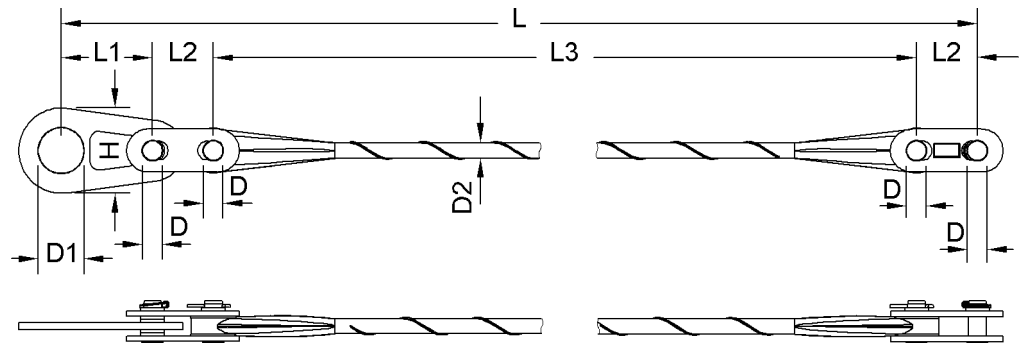


Fig. 399: Dimensions jib pendant strap on jib head 1916.21

Name		Value
L	Length	6500 mm 21' 4" ft-in
L1	Length of connecting link	300 mm 1' ft-in
L2	Length of connecting link	200 mm 7.87" in
L3	Length of pendant strap	5800 mm 19' ft-in
H	Height of connecting link	280 mm 11.02" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	150 mm 5.91" in
D2	Pendant strap Ø	50 mm 1.97" in
Weight		69 kg 152 lb

Tab. 246: Technical data jib pendant strap on jib head 1916.21

Generation B of jib pendant strap on jib head 1916.21

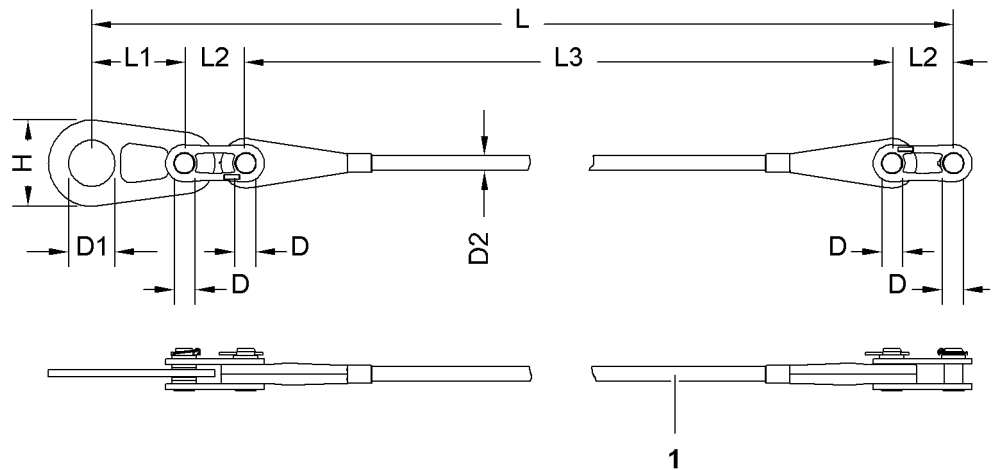


Fig. 400: Dimensions jib pendant strap on jib head 1916.21

- 1 Wire mesh hose as protective sheath

Name		Value
L	Length	6500 mm 21' 4" ft-in
L1	Length of connecting link	300 mm 1' ft-in
L2	Length of connecting link	200 mm 7.87" in
L3	Length of pendant strap	5800 mm 19' ft-in
H	Height of connecting link	280 mm 11.02" in
D	Pin Ø	60 mm 2.36" in
D1	Pin Ø	150 mm 5.91" in
D2	Pendant strap Ø	48 mm 1.89" in
Weight		69 kg 152 lb

Tab. 247: Technical data jib pendant strap on jib head 1916.21

1.22 Midfall overview

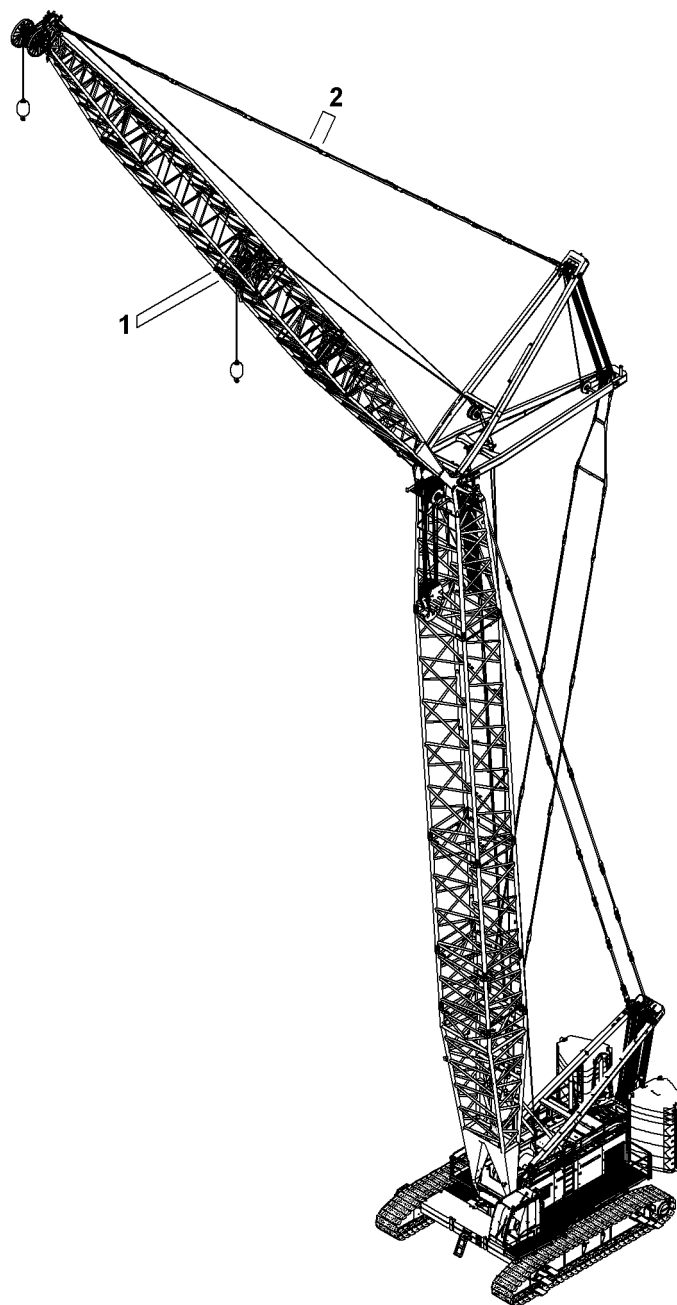


Fig. 401: Midfall overview

1 Midfall

2 Midfall connecting link

The Midfall connecting link **2** replaces the first connecting link of the first jib pendant strap 12 m (40 ft) beyond the Midfall assembly position.

1.23 2316.25 Midfall

1.23.1 Midfall 2316.25

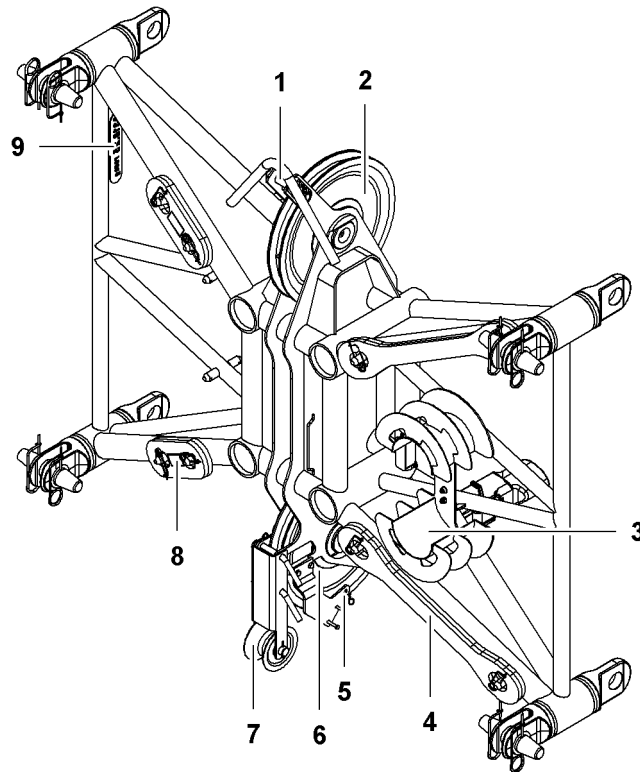


Fig. 402: Midfall 2316.25

- | | | | |
|---|---|---|---|
| 1 | Rope protection pipe | 6 | Bottom pulley |
| 2 | Top pulley | 7 | Rope pulley |
| 3 | Cable bracket | 8 | Storage position of connecting links 420 mm (1' 5" ft-in) or of connecting links 200 mm (7.87" in) (4x) |
| 4 | Transport position of connecting links 920 mm (3' ft-in) or of connecting links 700 mm (2' 4" ft-in) (4x) | 9 | Boom identification plate |
| 5 | Hoist limit switch | | |

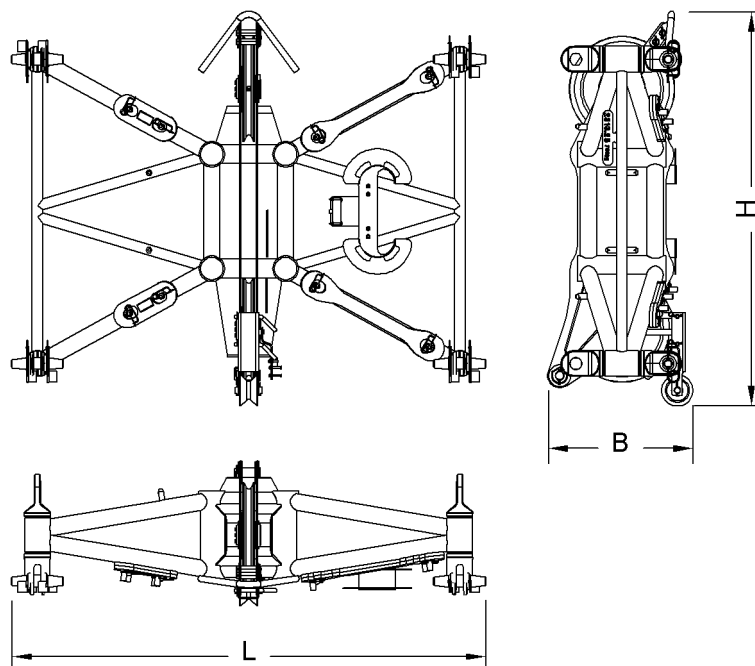


Fig. 403: Midfall 2316.25 dimensions

Name		Value
System length		500 mm 1' 8" ft-in
System width		2290 mm 7' 6" ft-in
System height		1650 mm 5' 5" ft-in
L	Length	2600 mm 8' 6" ft-in
W	Width	800 mm 2' 7" ft-in
H	Height	2100 mm 6' 11" ft-in
Weight (incl. connecting links)		690 kg 1,521 lb
Double-taper pins Ø		65 mm 2.56" in

Tab. 248: Midfall 2316.25 technical data

1.23.2 Mid-point suspension on midfall 2316.25

The mid-point suspensions on midfall 2316.25 differ with steel pendant straps and CF pendant straps.

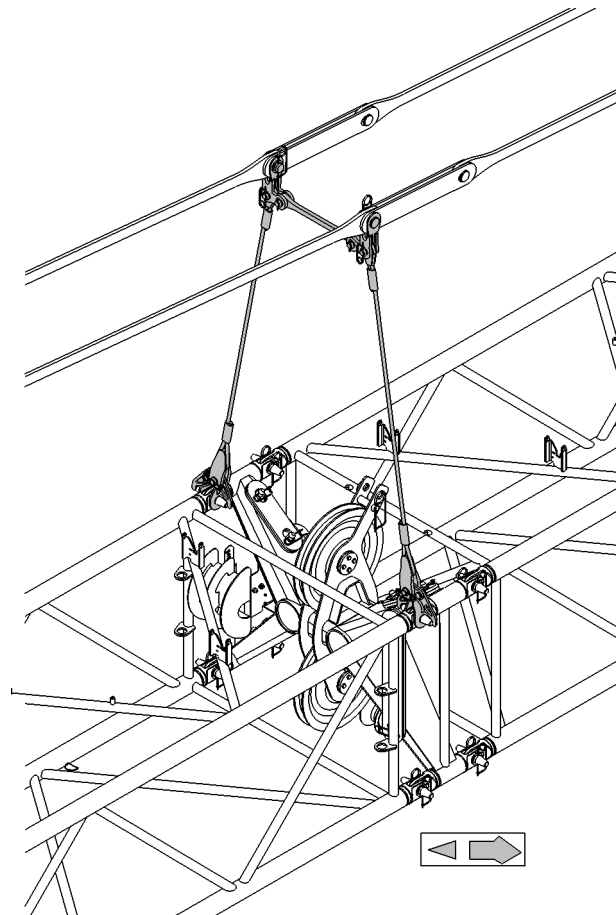


Fig. 404: Mid-point suspension on midfall 2316.25 (illustration of principle)

The mid-point suspension on midfall 2316.25 is identical with the mid-point suspension on luffing jib 2316 (For more information see: [1.20.6 Mid-point suspension on luffing jib 2316](#), page 302) .

1.23.3 Steel pendant straps on midfall 2316.25

Midfall connecting link

Installation site in crane operation:

- Luffing jib 2316 + midfall 2316 (For more information see: [Pendant straps A-frame3 to jib head section 2316](#), page 1793)

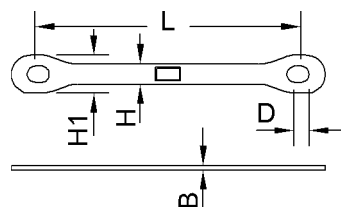


Fig. 405: Dimensions midfall connecting link

The midfall connecting link replaces the first connecting link of the first jib pendant strap 12 m (40 ft) behind the midfall installation position.

Name		Value
L	Length of connecting link	920 mm 3' ft-in
W	Width of connecting link	15 mm 0.59" in
H	Height of connecting link	70 mm 2.76" in
H1	Height of connecting link	130 mm 5.12" in
D	Pin Ø	55 mm 2.17" in
Weight		10.1 kg 22.27 lb

Tab. 249: Technical data midfall connecting link

1.23.4 CF pendant straps on midfall 2316.25

Midfall connecting link

Installation site in crane operation:

- Luffing jib 2316 + midfall 2316 (For more information see: Pendant straps A-frame3 to jib head 2316, page 1795)

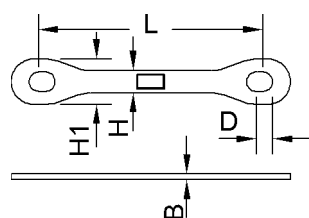


Fig. 406: Dimensions midfall connecting link

The midfall connecting link replaces the first connecting link of the first jib pendant strap 12 m (40 ft) behind the midfall installation position.

Name		Value
L	Length of connecting link	700 mm 2' 4" ft-in
W	Width of connecting link	18 mm 0.71" in
H	Height of connecting link	70 mm 2.76" in
H1	Height of connecting link	142 mm 5.59" in
D	Pin Ø	60 mm 2.36" in

Name	Value
Weight	2.6 kg 5.73 lb

Tab. 250: Technical data midfall connecting link

1.24 1916.32 Midfall

1.24.1 Midfall 1916.32

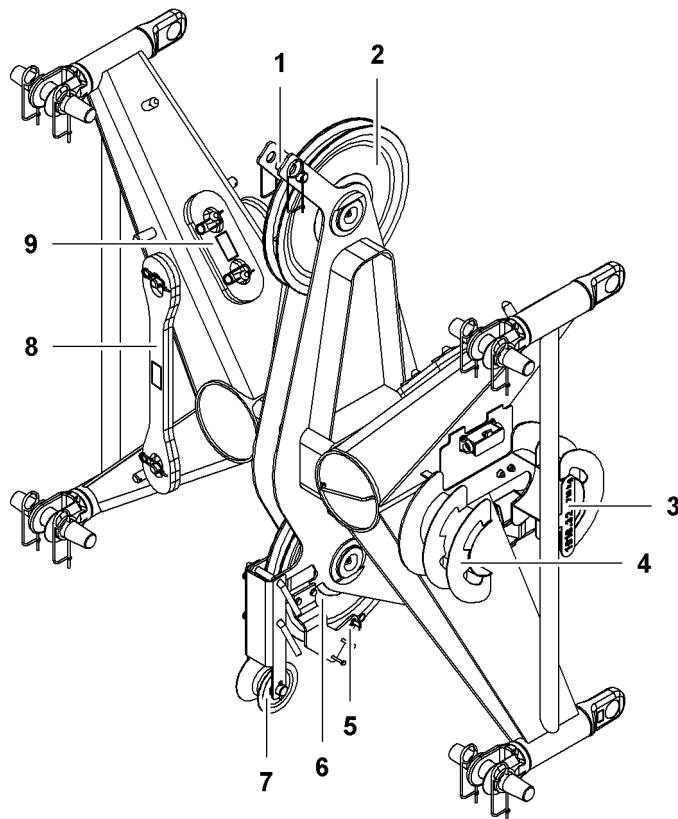


Fig. 407: Midfall 1916.32

- | | | | |
|---|---------------------------------|---|---|
| 1 | Rope protection pipe | 6 | Bottom rope pulley |
| 2 | Top rope pulley | 7 | Rope pulley |
| 3 | Type plate of main boom section | 8 | Transport position of connecting links 890 mm (2' 11" ft-in) or of connecting links 700 mm (2' 4" ft-in) (4x) |
| 4 | Cable bracket | 9 | Storage position (4x) of connecting links 390 mm (1' 3" ft-in) or of connecting links 200 mm (7.87" in) |
| 5 | Hoist limit switch | | |

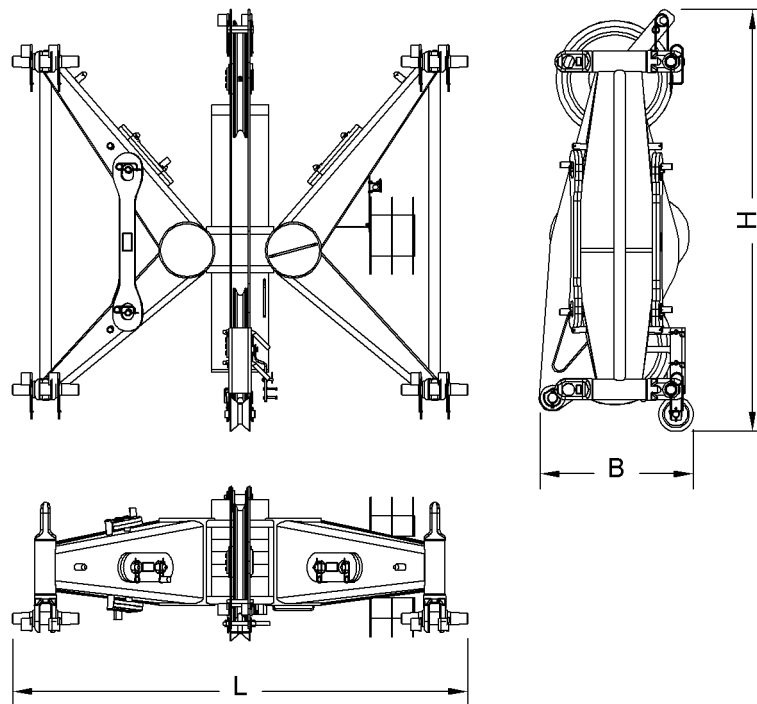


Fig. 408: Midfall 1916.32 dimensions

Name		Value
System length		500 mm 1' 8" ft-in
System width		1900 mm 6' 3" ft-in
System height		1600 mm 5' 3" ft-in
L	Length	2000 mm 6' 7" ft-in
B	Width	750 mm 2' 6" ft-in
H	Height	2060 mm 6' 9" ft-in
Weight (incl. connecting links)		670 kg 1,477 lb
Double-taper pin Ø		60 mm 2.36" in

Tab. 251: Midfall 1916.32 technical data

1.24.2 Mid-point suspension on midfall 1916.32

The mid-point suspensions on midfall 1916.32 differ with steel pendant straps and CF pendant straps.

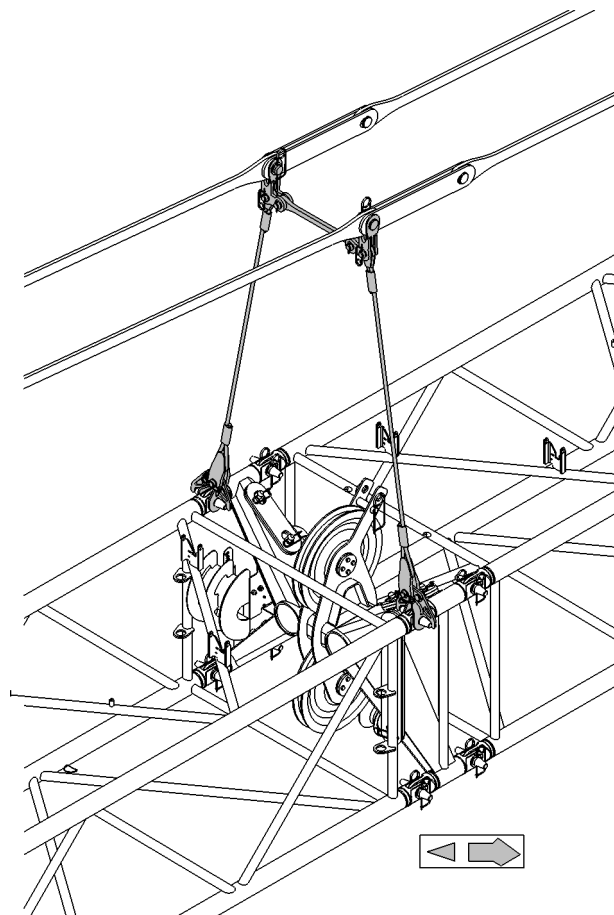


Fig. 409: Mid-point suspension on midfall 1916.32 (illustration of principle)

The mid-point suspension on midfall 1916.32 is identical with the mid-point suspension on luffing jib 1916 (For more information see: [1.21.6 Mid-point suspension on luffing jib 1916, page 341](#)).

1.24.3 Steel pendant straps on midfall 1916.32

Midfall connecting link

Installation site in crane operation:

- Luffing jib 1916 + midfall 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1806](#))

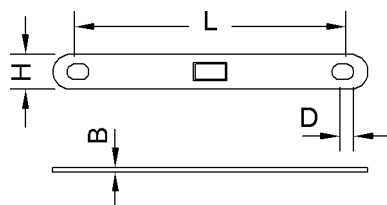


Fig. 410: Dimensions midfall connecting link

The midfall connecting link replaces the first connecting link of the first jib pendant strap 12 m (40 ft) behind the midfall installation position.

Name		Value
L	Length of connecting link	890 mm 2' 11" ft-in
W	Width of connecting link	15 mm 0.59" in
H	Height of connecting link	114 mm 4.49" in
D	Pin Ø	50 mm 1.97" in
Weight		12.8 kg 28.22 lb

Tab. 252: Technical data midfall connecting link

1.24.4 CF pendant straps on midfall 1916.32

Midfall connecting link

Installation site in crane operation:

- Luffing jib 1916 + midfall 1916 (For more information see: [Pendant straps A-frame3 to jib head 1916, page 1808](#))

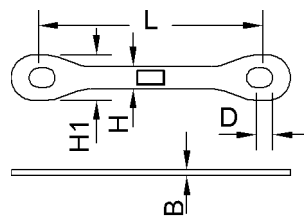


Fig. 411: Dimensions midfall connecting link

The midfall connecting link replaces the first connecting link of the first jib pendant strap 12 m (40 ft) behind the midfall installation position.

Name		Value
L	Length of connecting link	700 mm 2' 4" ft-in
W	Width of connecting link	18 mm 0.71" in
H	Height of connecting link	70 mm 2.76" in
H1	Height of connecting link	142 mm 5.59" in
D	Pin Ø	60 mm 2.36" in
Weight		2.6 kg 5.73 lb

Tab. 253: Technical data midfall connecting link

1.25 Auxiliary jib* (36 t (79.300 lb))

This auxiliary jib can be attached to any boom head section.

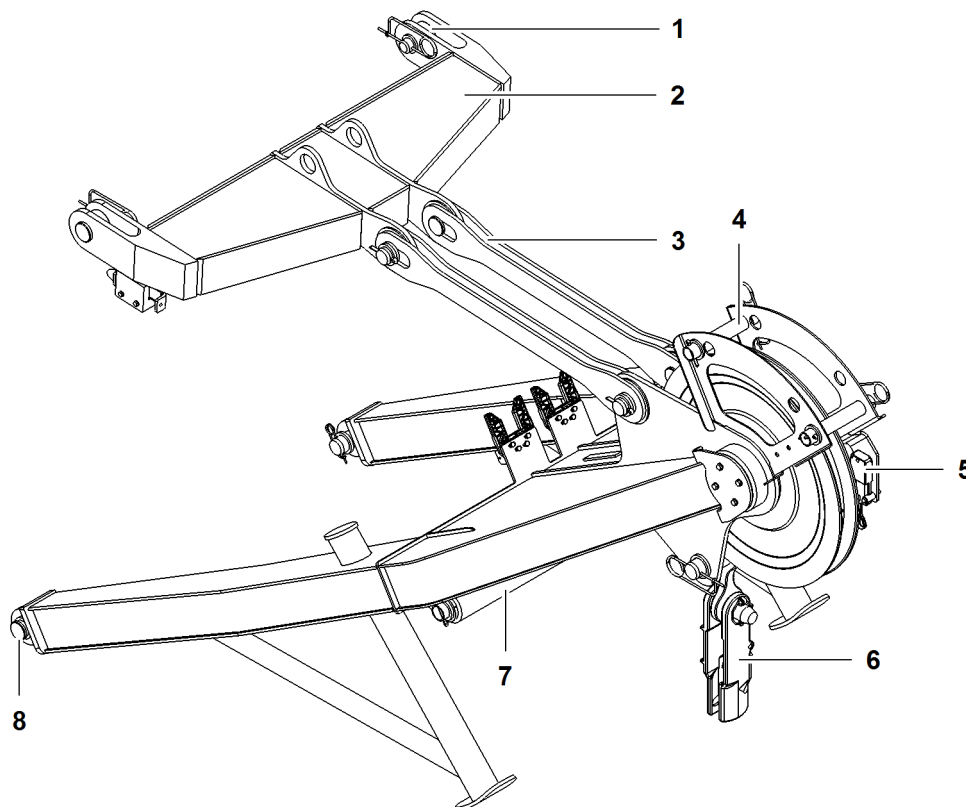


Fig. 412: Auxiliary jib (36 t (79.300 lb)) for the boom head section

- | | | | |
|---|---|---|--|
| 1 | Top pin connection point (2x) on main boom head | 5 | Hoist limit switch |
| 2 | Crossbar | 6 | Rope fixation |
| 3 | Pendant strap (2x) | 7 | Rope protection roller |
| 4 | Rope protection pipe (2x) | 8 | Bottom pin connection point (2x) on main boom head |

The auxiliary jib is designed for a maximum load of 36 t (79.300 lb). A second, optional pulley (3-fold reeving) is required if the maximum lifting capacity is to be achieved.

The radius change and the weight increase of the main boom head due to the auxiliary jib are taken into account by the Load moment limiter. Due to this weight increase, it is not possible to erect the main boom to all possible heights.

Recommended values for radius enlargement using the auxiliary jib:

Machine type	Main boom angle			
	15°	20°	45°	86°
LR 1001	1380 mm 4' 6" ft-in	-	1900 mm 6' 3" ft-in	1760 mm 5' 9" ft-in
LR 1002	1210 mm 4' ft-in	-	1890 mm 6' 2" ft-in	2000 mm 6' 7" ft-in

Machine type	Main boom angle			
	15°	20°	45°	86°
LR 1003	1210 mm 4' ft-in	-	1890 mm 6' 2" ft-in	2000 mm 6' 7" ft-in
LR 1004	1210 mm 4' ft-in	-	1780 mm 5' 10" ft-in	1800 mm 5' 11" ft-in
LR 1006	-	1320 mm 4' 4" ft-in	1780 mm 5' 10" ft-in	1790 mm 5' 10" ft-in

Tab. 254: Guideline values for radius enlargement through auxiliary jib (36 t (79.300 lb)) for main boom head

NOTICE

Incorrectly hoisted load with the 2821 main boom and an auxiliary jib attached (L = 1034 mm (3' 5" ft-in)) and main boom angle less than 20°!
Risk of damage to the rope.

- ▶ Hoist a load with the main boom exclusively when the main boom angle is greater than 20°.

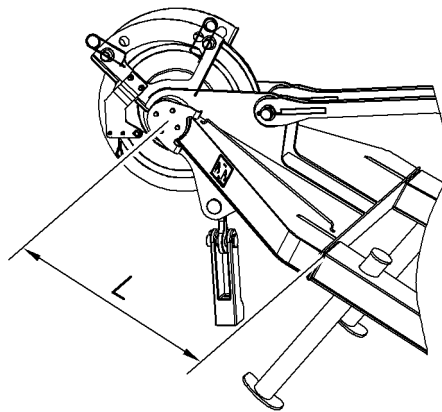


Fig. 413: Dimension L on auxiliary jib (36 t (79.300 lb))

Dimension L on auxiliary jib	Is a load allowed to be hoisted with a 2821 main boom when an auxiliary jib is fit and the main boom angle is less than 20°?
1034 mm 3' 5" ft-in	NO
954 mm 3' 2" ft-in	YES

Tab. 255: Dimension L on auxiliary jib (36 t (79.300 lb))

Auxiliary jib* (36 t (79.300 lb))

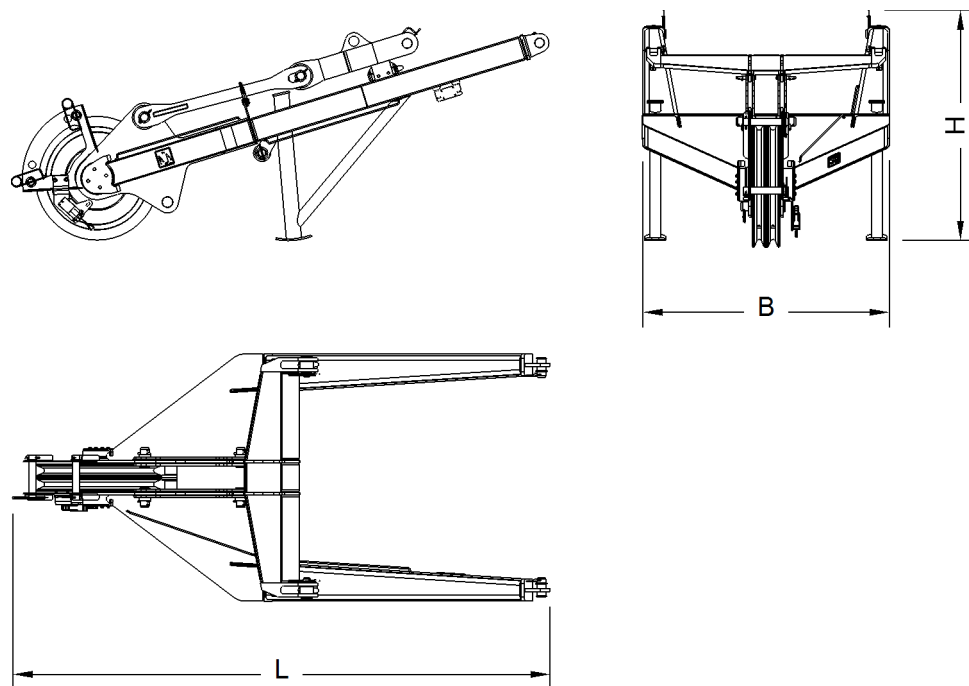


Fig. 414: Dimensions of auxiliary jib (36 t (79.300 lb)) for the boom head section

Name		Value
L	Length	3190 mm 10' 6" ft-in
W	Width	1520 mm 5' ft-in
H	Height	1400 mm 4' 7" ft-in
Weight		620 kg 1,367 lb

Tab. 256: Technical data auxiliary jib (36 t (79.300 lb)) for main boom head

1.26 Auxiliary jib* (30 t (66.000 lb))

This auxiliary jib can be attached to the 2316 luffing jib head section.

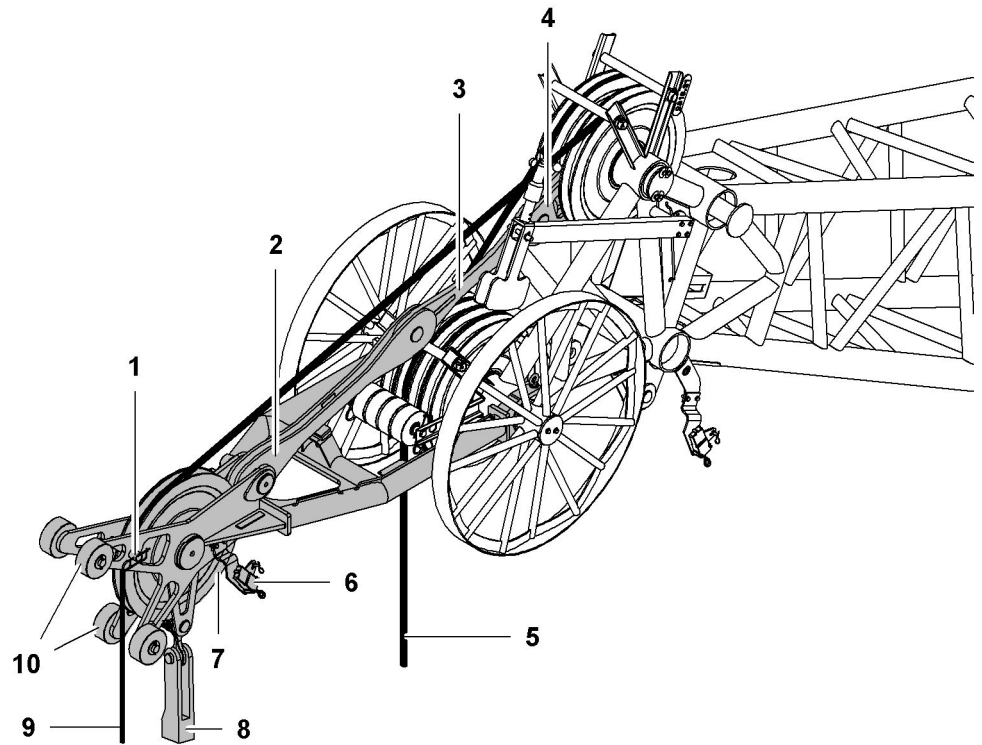


Fig. 415: Auxiliary jib (30 t (66.000 lb)) for luffing jib head 2316

- | | | | |
|---|----------------------------|----|----------------------|
| 1 | Rope protection pipes (2x) | 6 | Hoist limit switch |
| 2 | Connecting links (2x) | 7 | Pulley |
| 3 | Pendant strap | 8 | Rope fixation |
| 4 | Connecting links (2x) | 9 | Winch 2 hoist rope |
| 5 | Winch 1 hoist rope | 10 | Running rollers (4x) |

The auxiliary jib is designed with a maximum lifting capacity of 30 t (66,138 lb).

The increase in weight of the jib head section caused by the auxiliary jib has been taken into account in the Load Moment Limiter (LML).

Recommended values for radius enlargement using the auxiliary jib:

Jib angle	Radius enlargement
15°	1773 mm 5' 10" ft-in
45°	1692 mm 5' 7" ft-in
78°	1083 mm 3' 7" ft-in

Tab. 257: Guideline values for radius enlargement by the auxiliary jib (30 t (66.000 lb)) for luffing jib head 2316

Auxiliary jib* (30 t (66.000 lb))

Designation		Value
L	Length	2600 mm 8' 6" ft-in
B	Width	850 mm 2' 9" ft-in
H	Height	750 mm 2' 6" ft-in
Weight		408 kg 899 lb

Tab. 258: Technical data: auxiliary jib for 2316 luffing jib head section

1.27 Auxiliary jib* (15 t (33.000 lb))

This auxiliary jib can be attached to the 1916, 1713, 1309, 1008 luffing jib head sections.

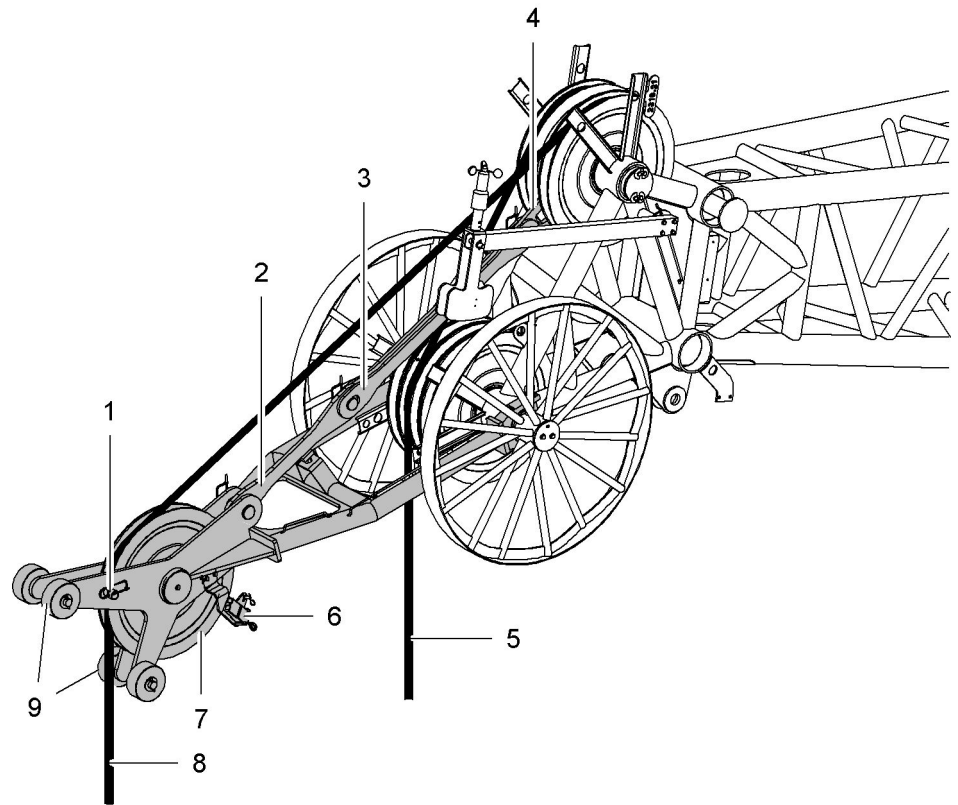


Fig. 416: Auxiliary jib (15 t (33.000 lb)) for luffing jib head 1916, 1713, 1309, 1008

- | | | | |
|---|----------------------|---|---------------------|
| 1 | Rope protection pipe | 6 | Hoist limit switch |
| 2 | Pendant strap | 7 | Pulley |
| 3 | Connecting link (2x) | 8 | Winch 2 rope |
| 4 | Connecting link | 9 | Running roller (4x) |
| 5 | Winch 1 rope | | |

The auxiliary jib is designed with a maximum lifting capacity of 15 t (33,069 lb).

The increase in weight of the jib head section caused by the auxiliary jib has been taken into account in the Load Moment Limiter.

Recommended values for radius enlargement using the auxiliary jib:

Jib angle	Radius enlargement
15°	1773 mm 5' 10" ft-in
45°	1691 mm 5' 7" ft-in
78°	1083 mm 3' 7" ft-in

Tab. 259: Guideline values for radius enlargement by the auxiliary jib (15 t (33.000 lb)) for luffing jib head 1916, 1713, 1309, 1008

Auxiliary jib* (15 t (33.000 lb))

Designation		Value
L	Length	2600 mm 8' 6" ft-in
B	Width	720 mm 2' 4" ft-in
H	Height	750 mm 2' 6" ft-in
Weight		350 kg 772 lb

Tab. 260: Technical data: auxiliary jib for 1916, 1713, 1309, 1008 luffing jib head sections

1.28 Derrick equipment*

1.28.1 Overview of derrick equipment

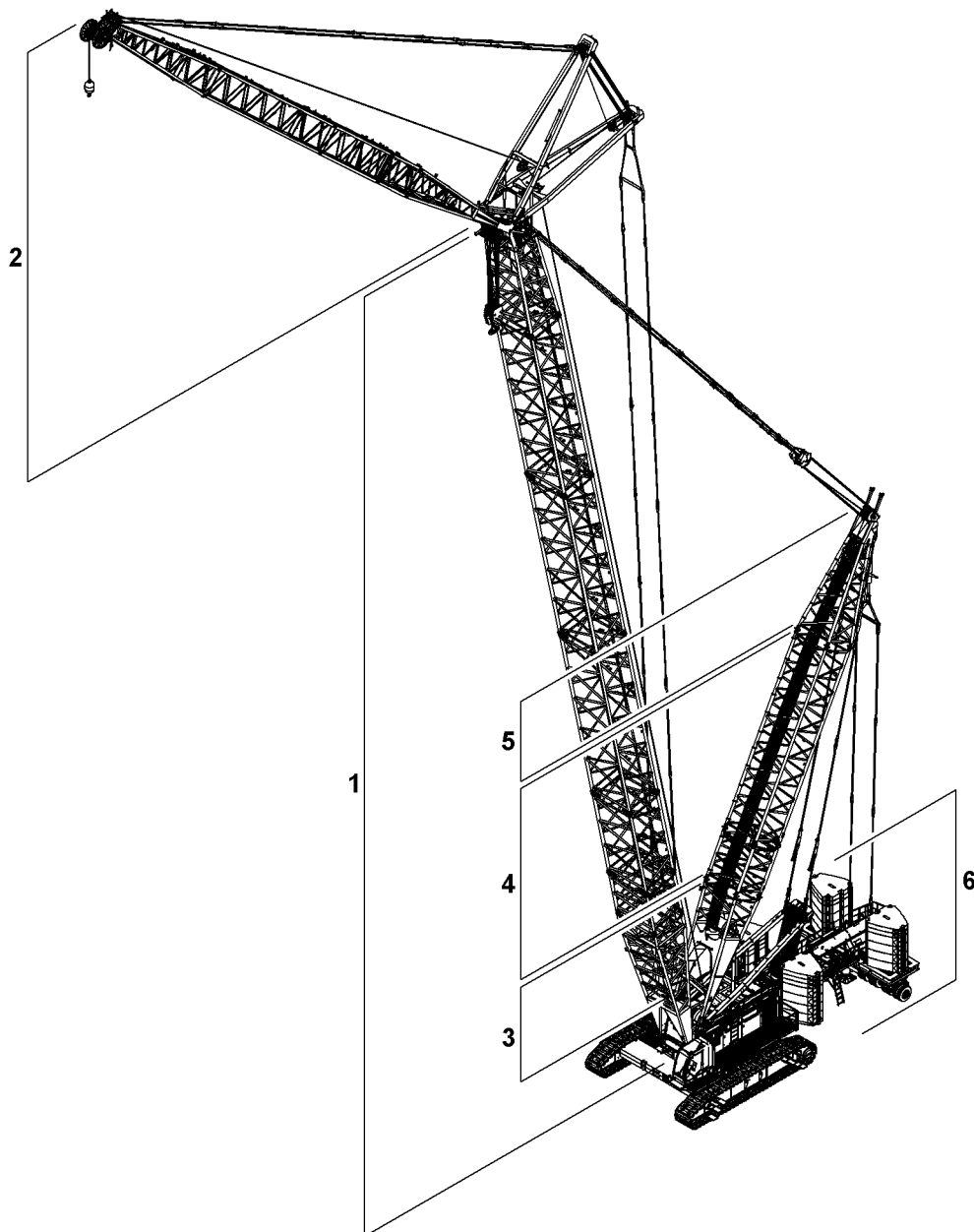


Fig. 417: Overview of derrick equipment

- | | | | |
|---|---------------------------|---|---|
| 1 | Main boom | 4 | Derrick boom sections |
| 2 | Fixed jib or luffing jib | 5 | Derrick boom head |
| 3 | Derrick boom base section | 6 | Suspended counterweight or counterweight carriage |

1.28.2 Derrick boom 2220

Derrick boom base section 2220.24

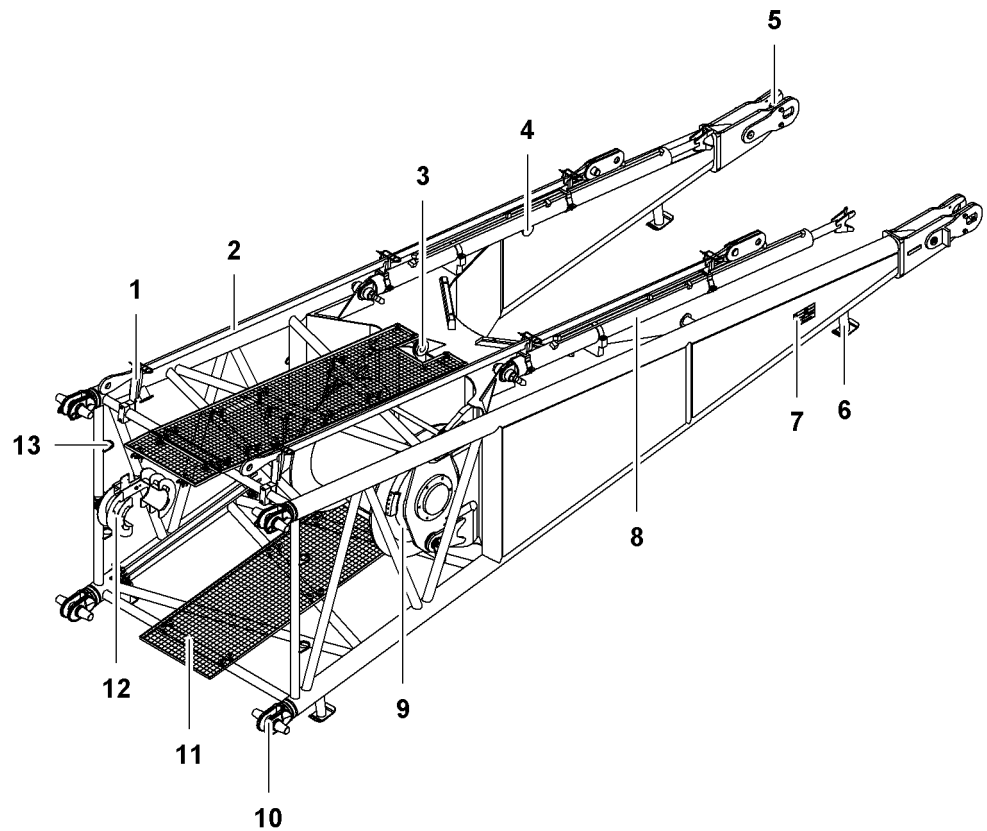


Fig. 418: Derrick boom base section 2220.24

- | | | | |
|---|--|----|--|
| 1 | Transport bracket (6x) for main boom pendant straps | 8 | Derrick tilting-back support (2x) |
| 2 | Transport position (2x) of main boom pendant straps for main boom head 2220.24 (LR 1005.xx.xx) | 9 | Derrick winch |
| 3 | Pin connection point for assembly cylinder | 10 | Pin connection point (4x) with double-taper pin (4x) |
| 4 | Rigging point (4x) | 11 | Catwalk (2x) |
| 5 | Pivot point (2x) for uppercarriage | 12 | Cable bracket for electric cable |
| 6 | Foot (4x) | 13 | Transport bracket (4x) for double taper pin |
| 7 | Derrick type plate | | |

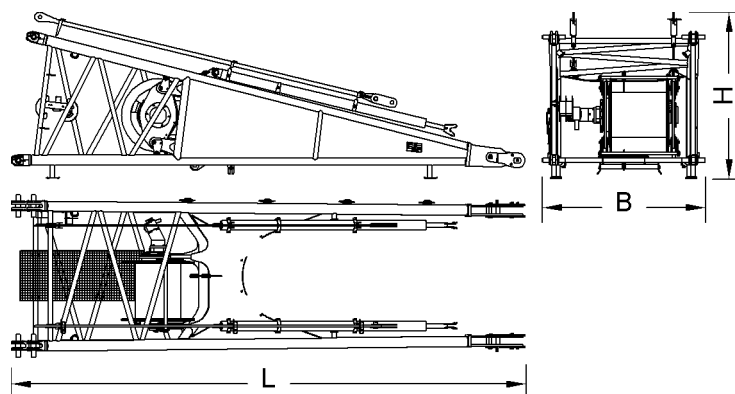


Fig. 419: Dimensions of derrick boom base section 2220.24

Name		Value
System length		8000 mm 26' 3" ft-in
System width		2250 mm 7' 5" ft-in
System height		2000 mm 6' 7" ft-in
L	Length	8290 mm 27' 2" ft-in
B	Width	2450 mm 8' ft-in
H	Height (incl. pendant straps)	2680 mm 8' 10" ft-in
Weight (incl. derrick tilting-back supports, derrick pendant straps, derrick winch, rope of derrick winch)		8100 kg 17,857 lb
Double taper pin Ø		80 mm 3.15" in

Tab. 261: Technical data derrick boom base section 2220.24

Derrick boom section 2220.24 3 m (10 ft)

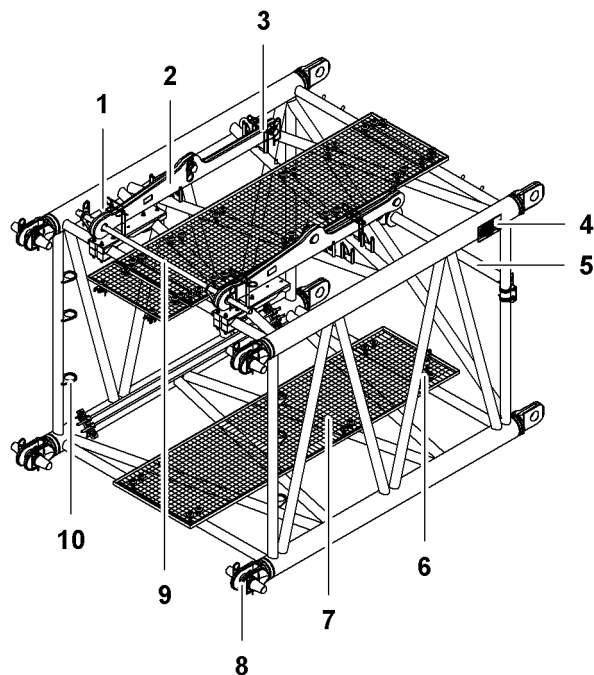


Fig. 420: Derrick boom section 2220.24 3 m (10 ft)

- | | | | |
|---|---|----|--|
| 1 | Rigging point (4x) | 6 | Boom identification plate |
| 2 | Transport position (2x) of adapter connecting links | 7 | Catwalk (2x) |
| 3 | Transport bracket (4x) for adapter connecting links | 8 | Pin connection point (8x) with double-taper pin (4x) |
| 4 | Derrick type plate | 9 | Transport bracket for adapter connecting links |
| 5 | Rope protection roller | 10 | Transport bracket (4x) for double taper pin |

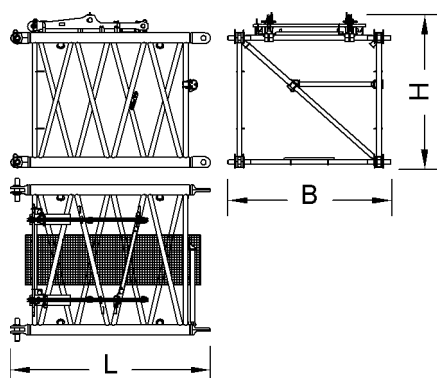


Fig. 421: Dimensions of derrick boom section 2220.24 3 m (10 ft)

Name	Value
System length	3000 mm 9' 10" ft-in

Name		Value
System width		2250 mm 7' 5" ft-in
System height		2000 mm 6' 7" ft-in
L	Length	3220 mm 10' 7" ft-in
B	Width	2420 mm 7' 11" ft-in
H	Height (incl. connecting link adapters)	2460 mm 8' 1" ft-in
Weight (incl. connecting link adapters)		1100 kg 2,425 lb
Double taper pin Ø		80 mm 3.15" in

Tab. 262: Technical data derrick boom section 2220.24 3 m (10 ft)

Derrick boom section 2220.22 11.7 m (38 ft)

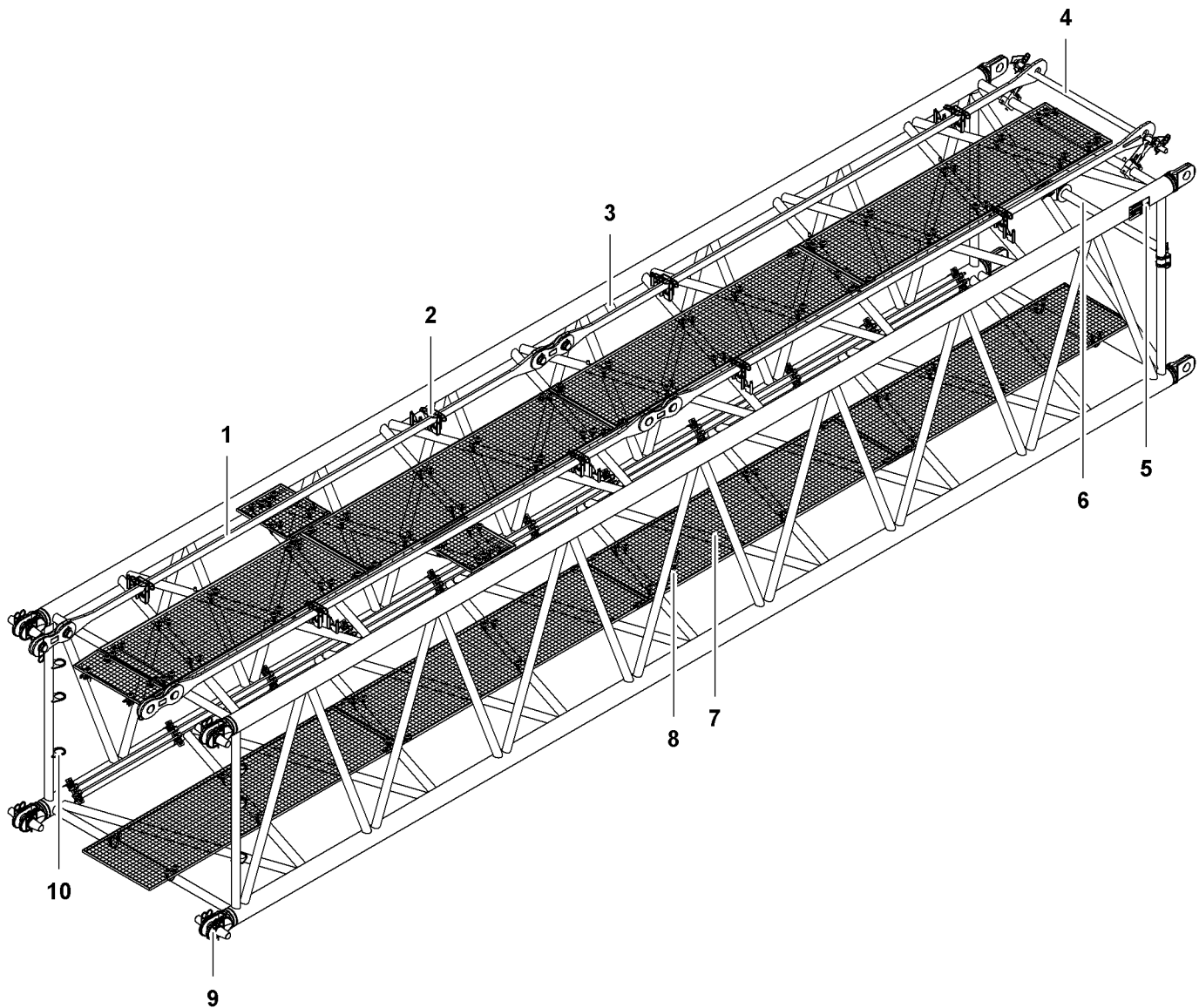


Fig. 422: Derrick boom section 2220.22 11.7 m (38 ft)

- | | | | | | |
|---|---|---|---------------------------|----|--|
| 1 | Transport position (2x) of derrick boom pendant straps 12 m (40 ft) | 5 | Derrick type plate | 9 | Pin connection point (8x) with double-taper pin (4x) |
| 2 | Transport bracket (8x) for derrick boom pendant straps 12 m (40 ft) | 6 | Rope protection roller | 10 | Transport bracket (4x) for double taper pin |
| 3 | Rigging point (4x) | 7 | Catwalk (8x) | | |
| 4 | Transport bracket derrick boom pendant straps | 8 | Boom identification plate | | |

Derrick equipment*

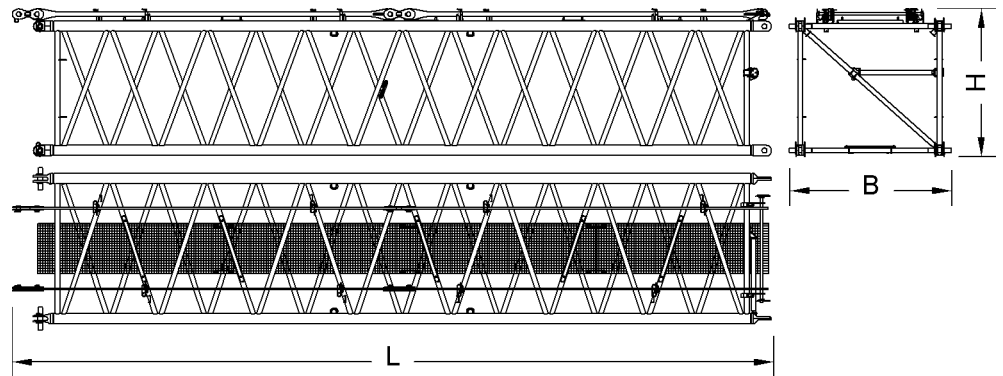


Fig. 423: Dimensions of derrick boom section 2220.22 11.7 m (38 ft)

Name		Value
System length		11700 mm 38' 5" ft-in
System width		2250 mm 7' 5" ft-in
System height		2000 mm 6' 7" ft-in
L	Length	11920 mm 39' 1" ft-in
B	Width	2420 mm 7' 11" ft-in
H	Height (incl. pendant straps)	2370 mm 7' 9" ft-in
Weight (incl. pendant straps)		3604 kg 7,945 lb
Double taper pin Ø		80 mm 3.15" in

Tab. 263: Technical data derrick boom section 2220.22 11.7 m (38 ft)

Derrick boom head 2220.22

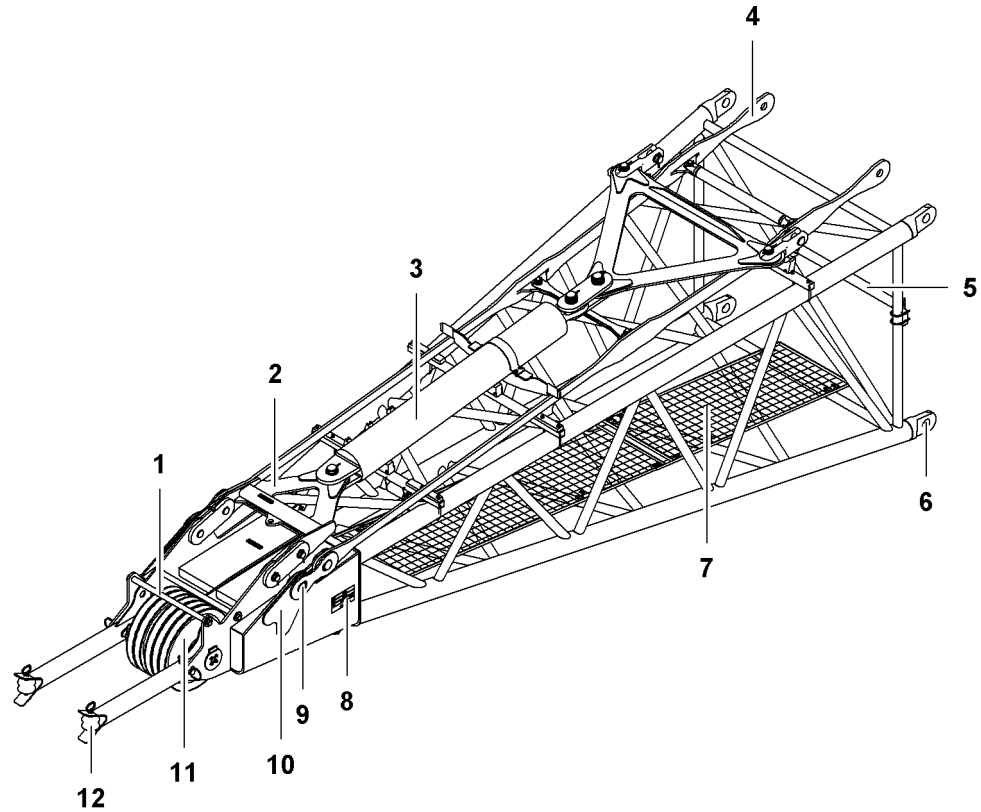


Fig. 424: Derrick boom head 2220.22

- | | | | |
|---|-------------------------------------|----|---|
| 1 | Rope protection pipe (2x) | 7 | Catwalk (2x) |
| 2 | Crossbar for derrick hoist cylinder | 8 | Derrick type plate |
| 3 | Derrick hoist cylinder | 9 | Crossbar pin connection (2x) with derrick boom head |
| 4 | Crossbar with connecting link | 10 | Reinforcement (4x) on the derrick boom head |
| 5 | Rope protection roller | 11 | Pulley (5x) |
| 6 | Pin connection point (4x) | 12 | Transport bracket (2x) for derrick rope rigging |

The crossbar 2 for the derrick hoist cylinder 3 is bolted onto a side of the derrick boom head with tension load cells.

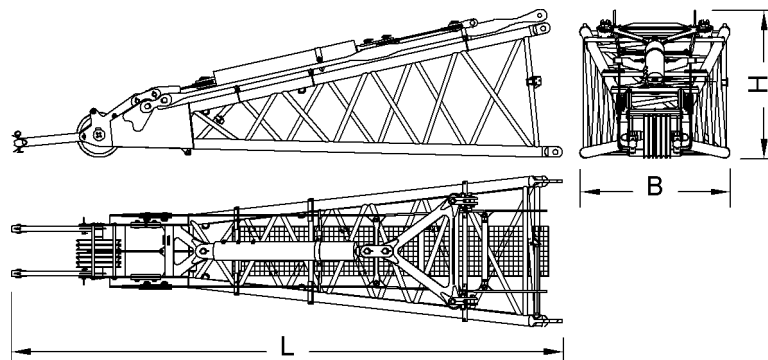


Fig. 425: Dimensions of the derrick boom head 2220.22

Name		Value
System length		7300 mm 23' 11" ft-in
System width		2250 mm 7' 5" ft-in
System height		2000 mm 6' 7" ft-in
L	Length	8880 mm 29' 2" ft-in
B	Width	2420 mm 7' 11" ft-in
H	Height (incl. pendant straps)	2380 mm 7' 10" ft-in
Weight (incl. pendant straps, crossbars, derrick hoist cylinder)		4490 kg 9,899 lb

Tab. 264: Technical data derrick boom head 2220.22

Derrick rope rigging with crossbar

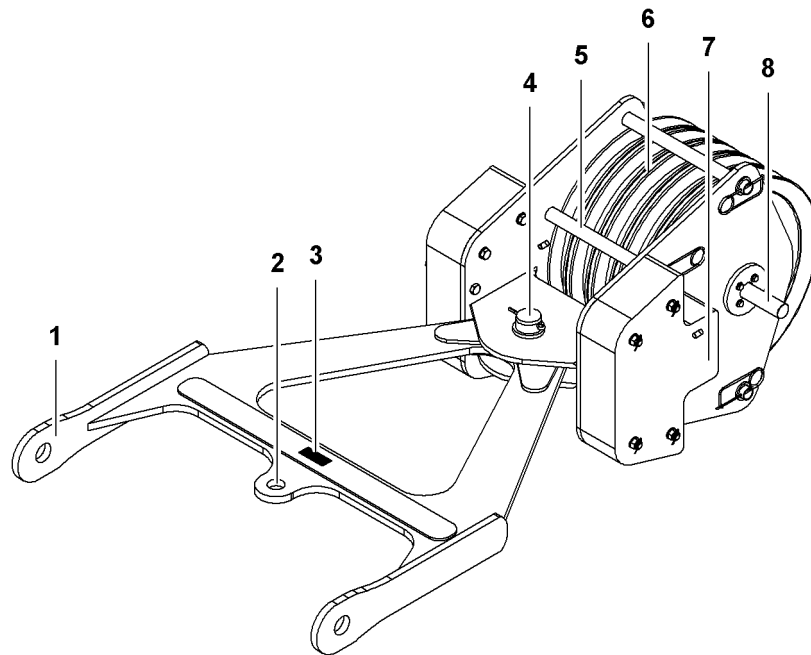


Fig. 426: Derrick rope rigging with crossbar

- | | | | |
|----------|---|----------|---------------------------|
| 1 | Crossbar | 5 | Rope protection pipe (4x) |
| 2 | Pivot point (max. 16 t (35,273 lb))
for hoist work during assembly | 6 | Pulley (5x) |
| 3 | Type designation LR 1300 | 7 | Counterweight weight (2x) |
| 4 | Pin Ø80 mm (3.15" in) | 8 | Axis |

For assembly work with the derrick rope rigging, a shackle or a swivel is attached to the pivot point **2** on the crossbar **1**.

For transport, the derrick rope rigging with the axis **8** is attached on both sides on the transport bracket on the derrick boom head.

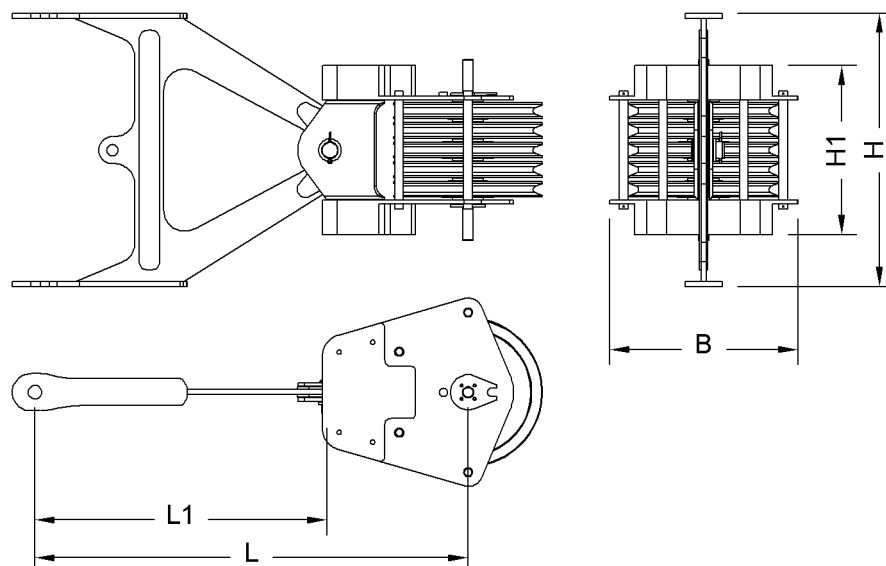


Fig. 427: Dimensions derrick rope rigging with crossbar

Name		Value
L	Length	2145 mm 7' ft-in
L1	Length of crossbar	1475 mm 4' 10" ft-in
B	Width of derrick rope rigging	914 mm 3' ft-in
H	Height of crossbar	1300 mm 4' 3" ft-in
H1	Height of derrick rope rigging	821 mm 2' 8" ft-in
Pulleys Ø		630 mm 2' 1" ft-in
Weight		1781 kg 3,926 lb

Tab. 265: Technical data derrick rope rigging with crossbar

Pendant straps on derrick boom 2220

Pendant straps on derrick boom section 2220.24 3 m (10 ft)

Adapter connecting link

Installation site in crane mode:

- Main boom 2821 + derrick boom 2220 (steel pendant straps) ([For more information see: A-frame1 to 2220 derrick boom head pendant straps, page 1416](#))
- Main boom 2821 + derrick boom 2220 (CF pendant straps) ([For more information see: A-frame1 to 2220 derrick boom head pendant straps, page 1420](#))

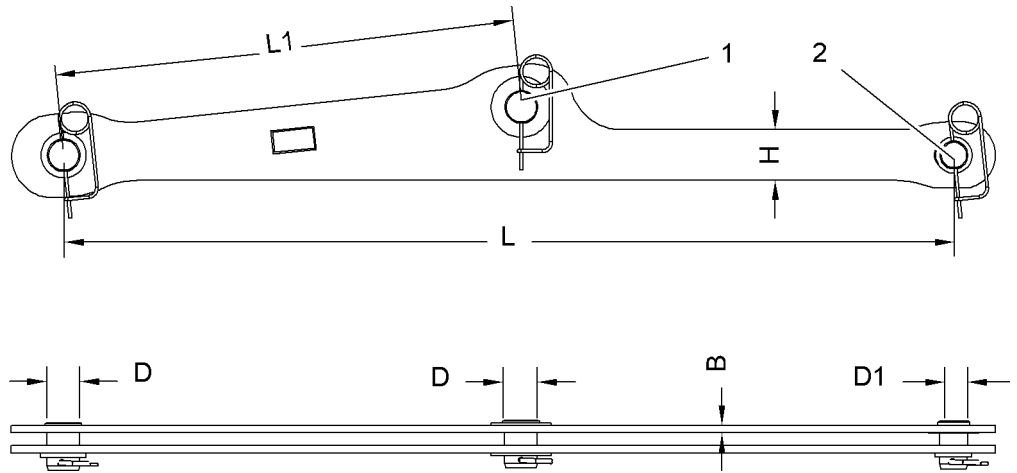


Fig. 428: Dimensions adapter connecting link

- 1 Pin connection point of A-frame1 equalizer - LR 1006
- 2 Pin connection point of A-frame1 equalizer - LR 1005

Name		Value
L	Length	1765 mm 5' 9" ft-in
L1	Length	913 mm 3' ft-in
B	Width	15 mm 0.59" in
H	Height	100 mm 3.94" in
D	Pin Ø	65 mm 2.56" in
D1	Pin Ø	55 mm 2.17" in
Weight		15 kg 33.07 lb

Tab. 266: Technical data adapter connecting links

Pendant straps on derrick boom section 2220.22 11.7 m (38 ft)

Derrick boom pendant strap 12 m (40 ft)

Installation site in crane mode:

- Main boom 2821 + derrick boom 2220 (steel pendant straps) (For more information see: [A-frame1 to 2220 derrick boom head pendant straps, page 1416](#))
- Main boom 2821 + derrick boom 2220 (CF pendant straps) (For more information see: [A-frame1 to 2220 derrick boom head pendant straps, page 1420](#))

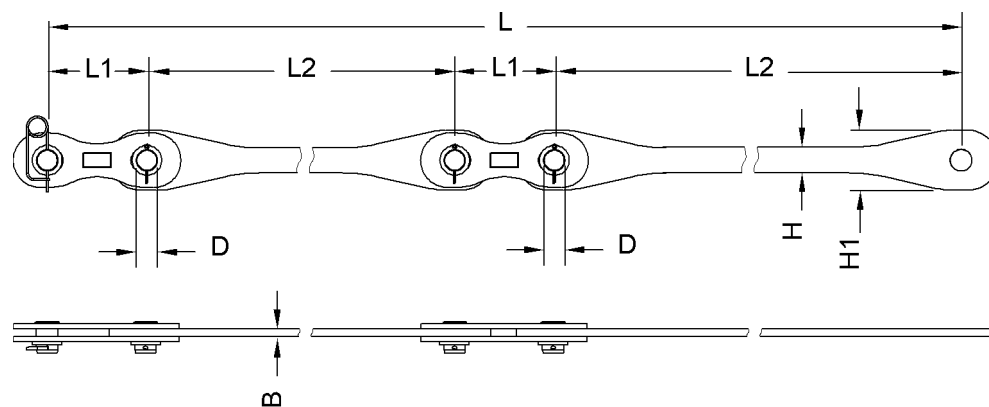


Fig. 429: Dimensions derrick boom pendant strap 12 m (40 ft)

Name		Value
L	Length	12000 mm 39' 4" ft-in
L1	Length of connecting link	300 mm 1' ft-in
L2	Length of pendant strap	5700 mm 18' 8" ft-in
B	Width of pendant strap	25 mm 0.98" in
H	Height of pendant strap	77 mm 3.03" in
H1	Height of pendant strap	180 mm 7.09" in
D	Pin Ø	65 mm 2.56" in
Weight		228 kg 503 lb

Tab. 267: Technical data derrick boom pendant strap 12 m (40 ft)

Pendant straps on derrick boom head 2220.22

Derrick boom pendant strap (crossbar)

Installation site in crane mode:

- Main boom 2821 + derrick boom 2220 (steel pendant straps) ([For more information see: A-frame1 to 2220 derrick boom head pendant straps, page 1416](#))
- Main boom 2821 + derrick boom 2220 (CF pendant straps) ([For more information see: A-frame1 to 2220 derrick boom head pendant straps, page 1420](#))

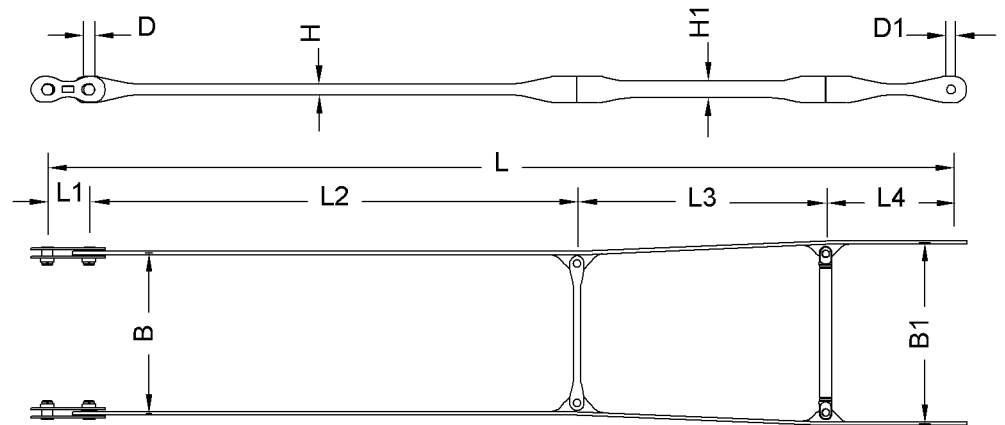


Fig. 430: Dimensions derrick boom pendant strap (crossbar)

Name		Value
L	Length	6500 mm 21' 4" ft-in
L1	Length of connecting link	300 mm 1' ft-in
L2	Length	3510 mm 11' 6" ft-in
L3	Length	1790 mm 5' 10" ft-in
L4	Length	900 mm 2' 11" ft-in
B	Width of crossbar	1150 mm 3' 9" ft-in
B1	Width of crossbar	1300 mm 4' 3" ft-in
H	Height of pendant strap	77 mm 3.03" in
H1	Height of pendant strap	120 mm 4.72" in
D	Pin Ø	75 mm 2.95" in
D1	Pin Ø	65 mm 2.56" in
Weight		175 kg 386 lb

Tab. 268: Technical data derrick boom pendant strap (crossbar)

1.28.3 Suspended counterweight

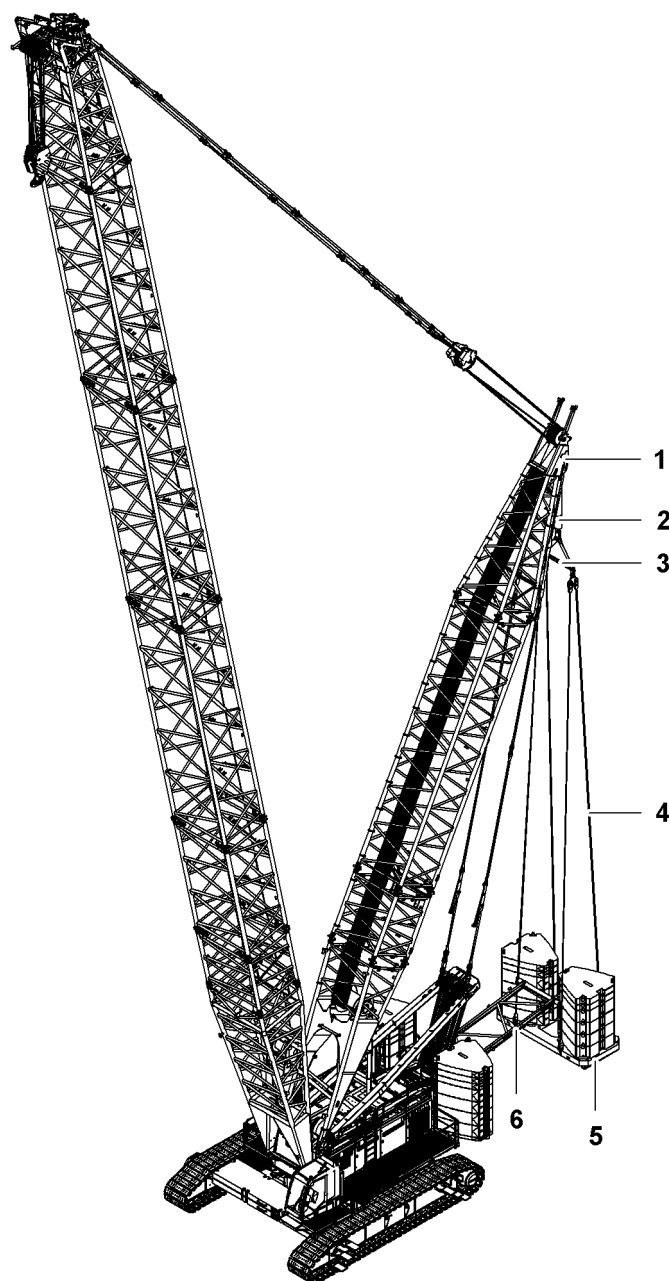


Fig. 431: Overview suspended counterweight

- | | | | |
|---|------------------------|---|---------------------------------------|
| 1 | Derrick boom | 4 | Suspended counterweight pendant ropes |
| 2 | Derrick hoist cylinder | 5 | Counterweight frame |
| 3 | Crossbar | 6 | Spacer frame |

The spacer frame **6** defines the radius of the suspended counterweight during rotating and moving. It is installed between the uppercarriage and the suspended counterweight **4** pendant ropes. To ensure correct positioning of the spacer frame **6**, it is installed with folding brackets and rope clamps on the front suspended counterweight pendant ropes **4**.

The four suspended counterweight pendant ropes **4** have a diameter of 34 mm (1.34" in) and a length of 21.5 m (70' 6" ft-in). They are installed between the spacer frame **6** and the crossbar **3**.

The derrick hoist cylinder **1** installed on the derrick boom **2** allows lifting of the suspended counterweight by up to 2 m (6' 7" ft-in).

By placing counterweight slabs on the counterweight frame **5**, a maximum counterweight of 120 t (264,551 lb) can be realized.

Spacer frame

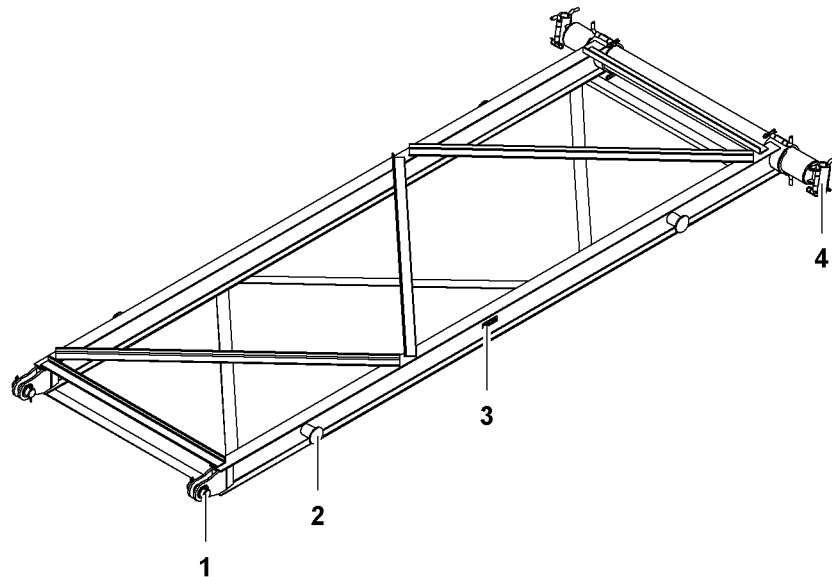


Fig. 432: Spacer frame

- 1** Pivot point (2x) for uppercarriage
- 2** Rigging point (4x)
- 3** Type designation LR 1300
- 4** Rope attachment (2x)

The pendant ropes are connected with the spacer frame on the two rope attachments **4**.

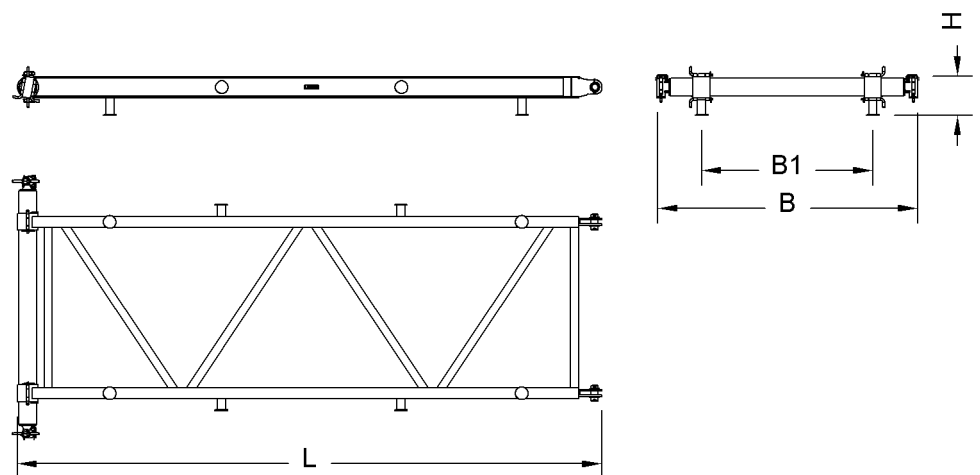


Fig. 433: Dimensions of spacer frame

Name		Value
L	Length	5533 mm 18' 2" ft-in

Name		Value
B	Width	2469 mm 8' 1" ft-in
B1	Width	1620 mm 5' 4" ft-in
H	Height	368 mm 1' 2" ft-in
Weight		484 kg 1,067 lb

Tab. 269: Technical data spacer frame

Counterweight frame

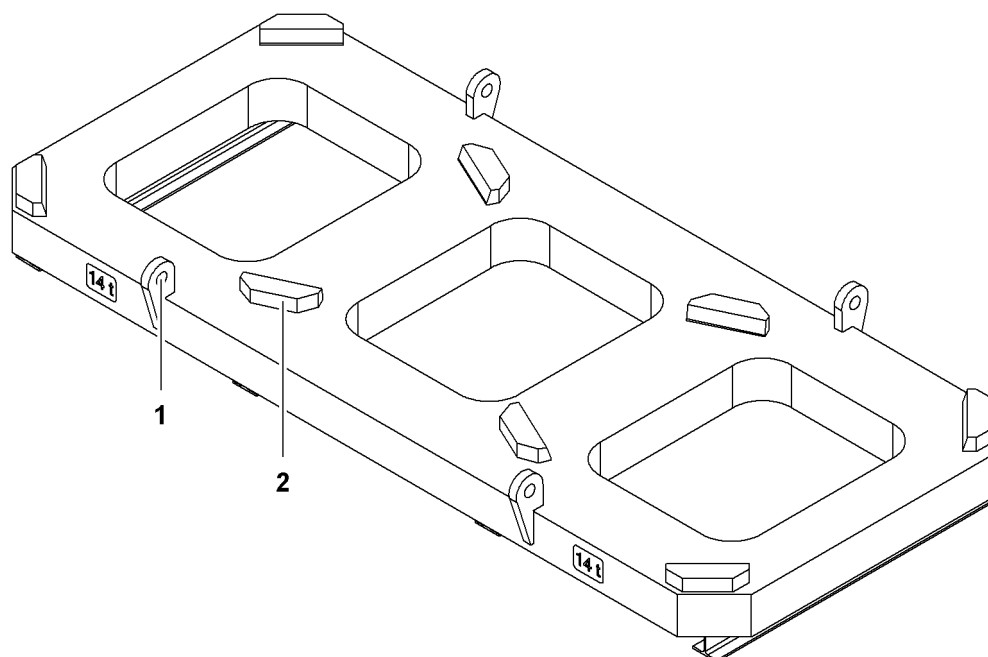


Fig. 434: Counterweight frame

- 1** Pin connection point (4x) for pendant ropes **2** Locking device (8x)

The Locking devices **2** prevent sliding of the counterweight slabs.

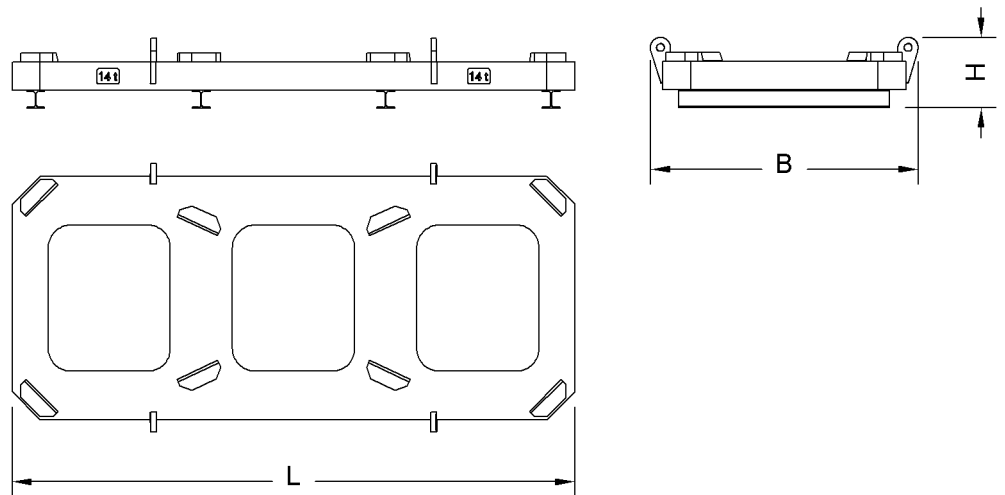


Fig. 435: Dimensions counterweight frames

Name		Value
L	Length	2170 mm 7' 1" ft-in
B	Width	5020 mm 16' 6" ft-in
H	Height	626 mm 2' 1" ft-in
Weight		13700 kg 30,203 lb

Tab. 270: Technical data counterweight frame

Counterweight slab 10 t (22,046 lb)

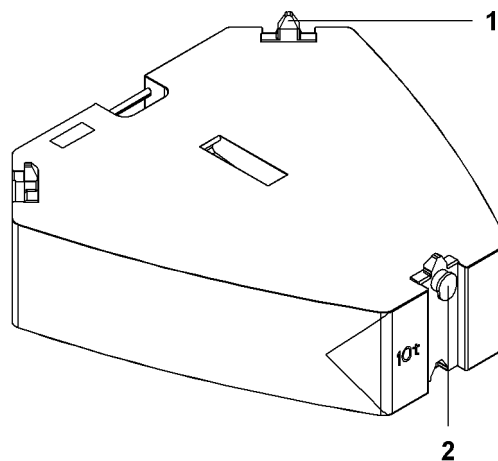


Fig. 436: Counterweight slab 10 t (22,046 lb)

- 1 Locking device (3x)
- 2 Rigging point (3x)

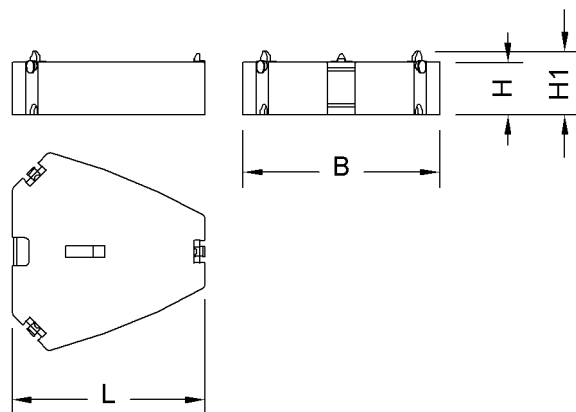


Fig. 437: Dimensions counterweight slab 10 t (22,046 lb)

Name		Value
L	Length	2050 mm 6' 9" ft-in
B	Width	2117 mm 6' 11" ft-in
H	Height	560 mm 1' 10" ft-in
H1	Height incl. locking devices	680 mm 2' 3" ft-in
Weight		10000 kg 22,046 lb

Tab. 271: Technical data counterweight slab 10 t (22,046 lb)

Counterweight slab 5 t (11,023 lb)

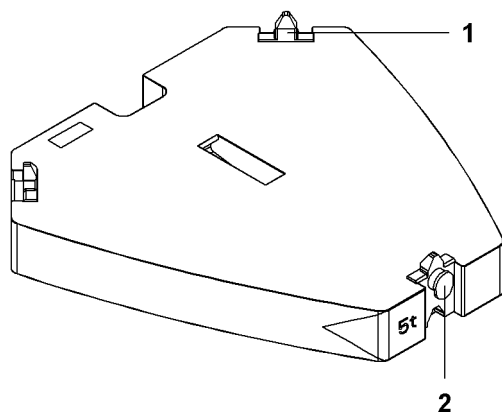


Fig. 438: Counterweight slab 5 t (11,023 lb)

- 1 Locking device (3x)
- 2 Rigging point (3x)

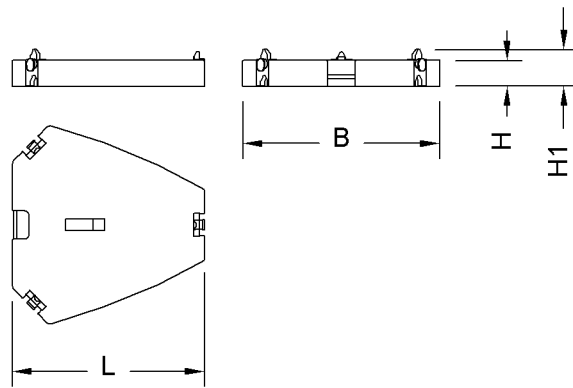


Fig. 439: Dimensions counterweight slab 5 t (11,023 lb)

Name		Value
L	Length	2050 mm 6' 9" ft-in
B	Width	2117 mm 6' 11" ft-in
H	Height	275 mm 10.83" in
H1	Height incl. locking devices	395 mm 1' 4" ft-in
Weight		5000 kg 11,023 lb

Tab. 272: Technical data counterweight slab 5 t (11,023 lb)

1.28.4 Counterweight carriage

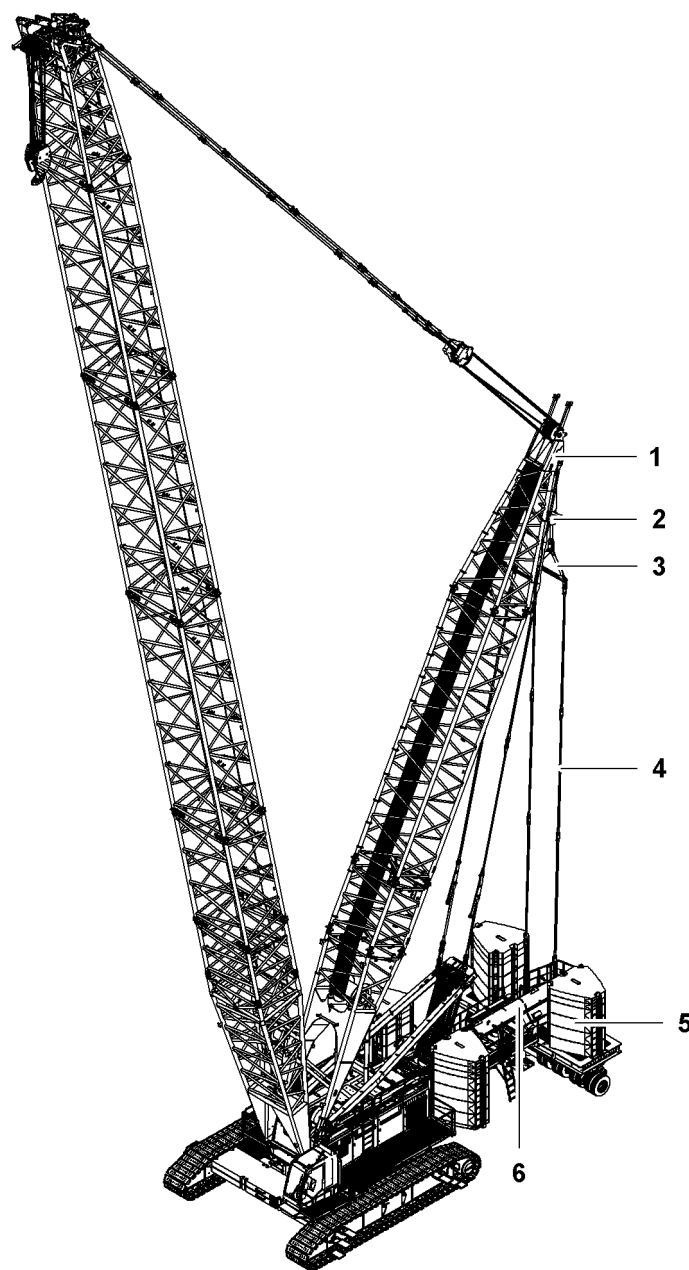


Fig. 440: Overview of counterweight carriage

- | | | | |
|---|------------------------|---|---------------------------------------|
| 1 | Derrick boom | 4 | Counterweight carriage pendant straps |
| 2 | Derrick hoist cylinder | 5 | Counterweight carriage |
| 3 | Crossbar | 6 | Extension device |

The counterweight carriage **5** is permanently pinned to the uppercarriage.

The wheel sets allow the counterweight to be pulled along and turned, even when the counterweight carriage pendant straps **4** are slack.

The counterweight carriage pendant straps **4** are installed with the connecting links between the counterweight carriage **5** and the crossbar **3**.

The derrick hoist cylinder **1** installed on the derrick boom **2** allows lifting the counterweight carriage **5** and/or careful addition of counterweight to the derrick boom **1**.

The hydraulic telescopic extension device **5** of the counterweight carriage **5** allows adjusting the radius between rotation axis and counterweight from 12.15 m (39' 10" ft-in) to 15.75 m (51' 8" ft-in).

By placing counterweight slabs on the counterweight carriage **6**, a maximum counterweight of 120 t (264,551 lb) can be realized.

Extension device

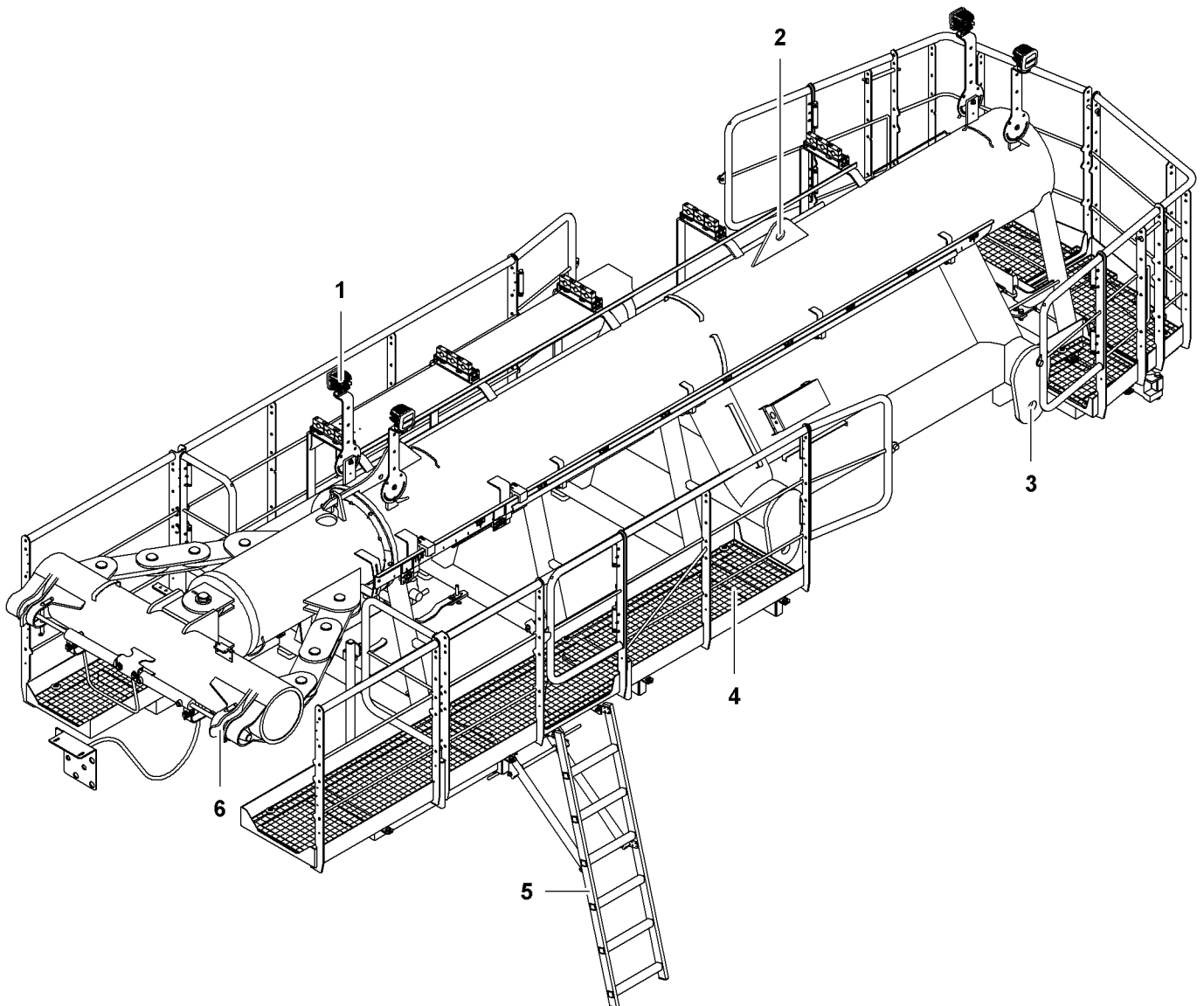


Fig. 441: Extension device

- | | | | | | |
|---|--------------------|---|--|---|---|
| 1 | Floodlight (4x) | 3 | Pin connection point (4x) for counterweight carriage | 5 | Ladder |
| 2 | Rigging point (2x) | 4 | Platform and catwalks | 6 | Pin connection point (2x) for basic machine |

Derrick equipment*

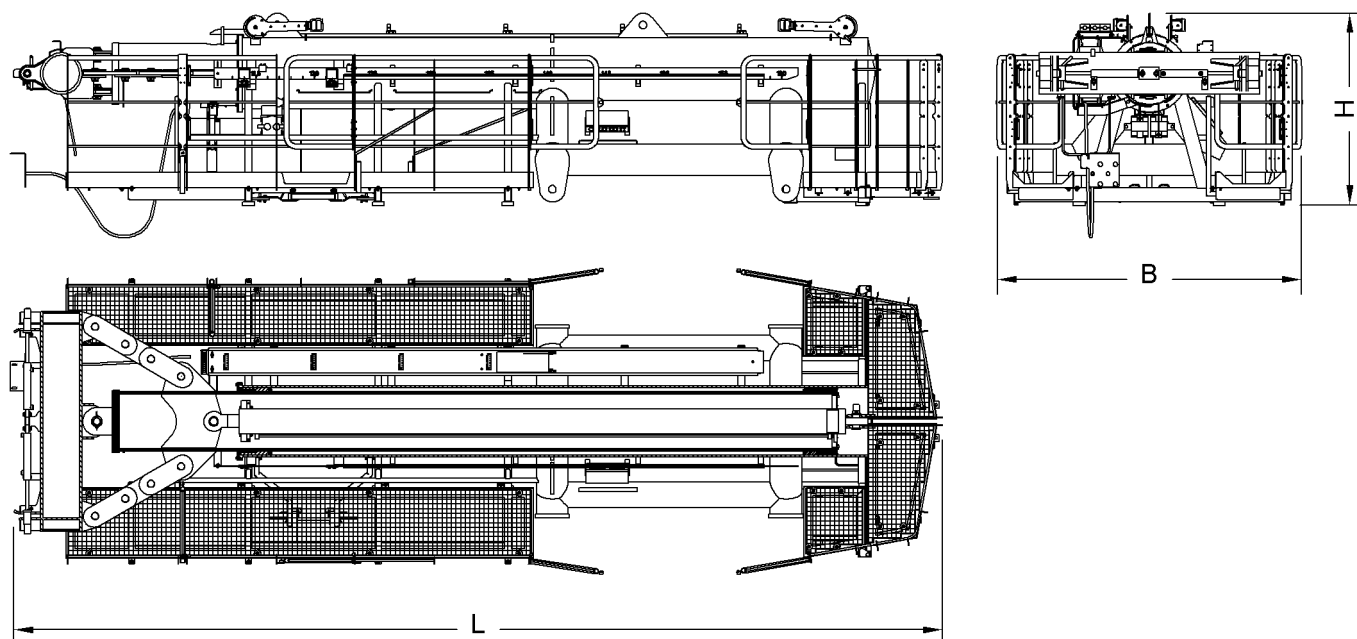


Fig. 442: Dimensions extension device

Name		Value
L	Length	7950 mm 26' 1" ft-in
B	Width	2620 mm 8' 7" ft-in
H	Height	1645 mm 5' 5" ft-in
Weight		6700 kg 14,771 lb

Tab. 273: Technical data extension device

Counterweight carriage

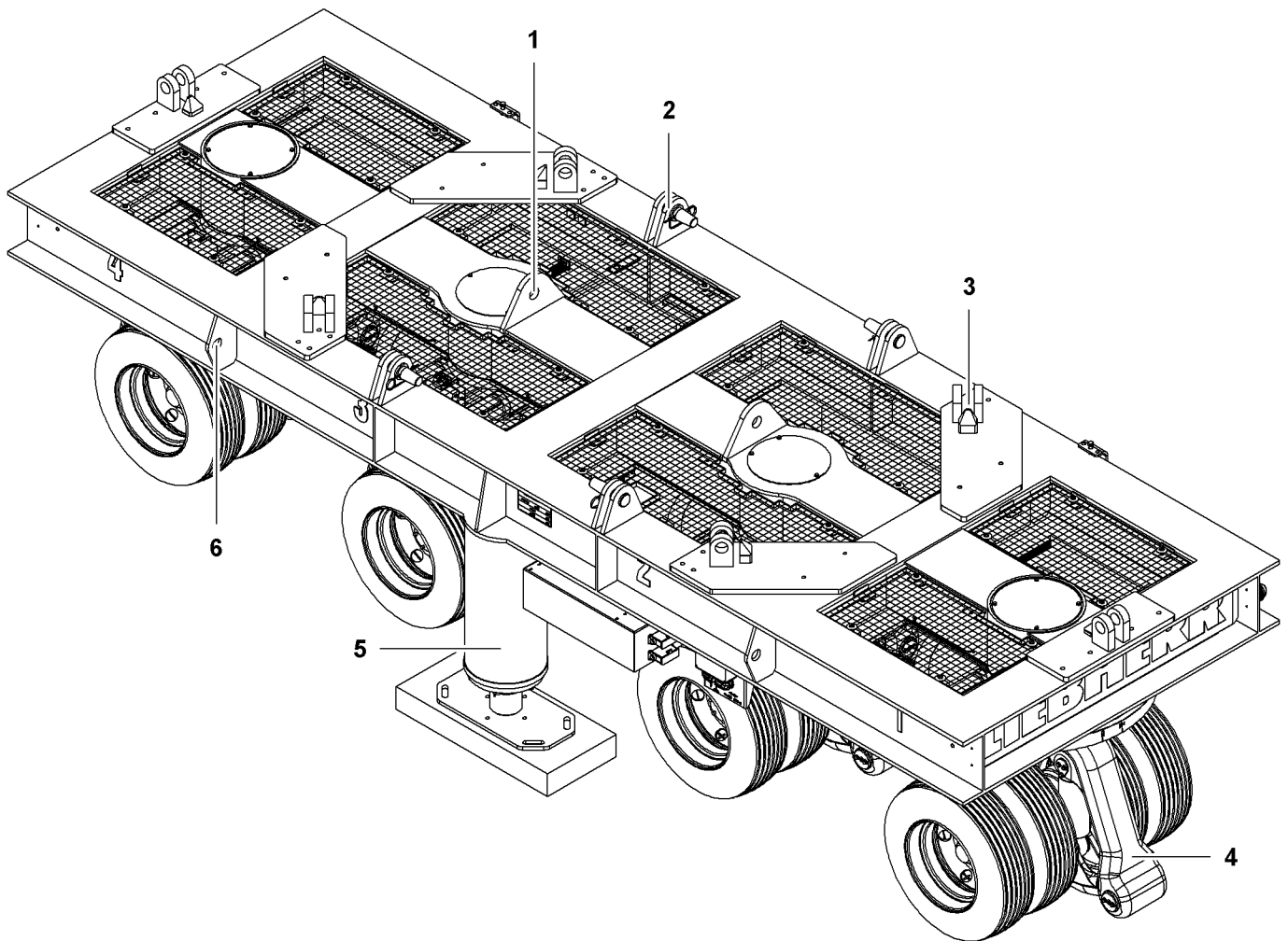


Fig. 443: Counterweight carriage

- | | | | | | |
|---|---|---|--|---|--------------------|
| 1 | Pin connection point (2x) for counterweight carriage pendant straps | 3 | Locking device aid and backstay shackle (6x) | 5 | Jack (2x) |
| 2 | Pin connection point (4x) for extension device | 4 | Wheel set (4x) | 6 | Rigging point (4x) |

The counterweight carriage is equipped with four turning wheel sets **4**, which enable the uppercarriage to be moved and turned.

In order to also be able to align the wheel sets **4** when fully ballasted, all wheel sets **4** must be suspended using both jacks **5**.

The Locking device aids **3** prevent the counterweight slabs from sliding to the side. The counterweight slabs are additionally lashed on the backstay shackles **3**.

Derrick equipment*

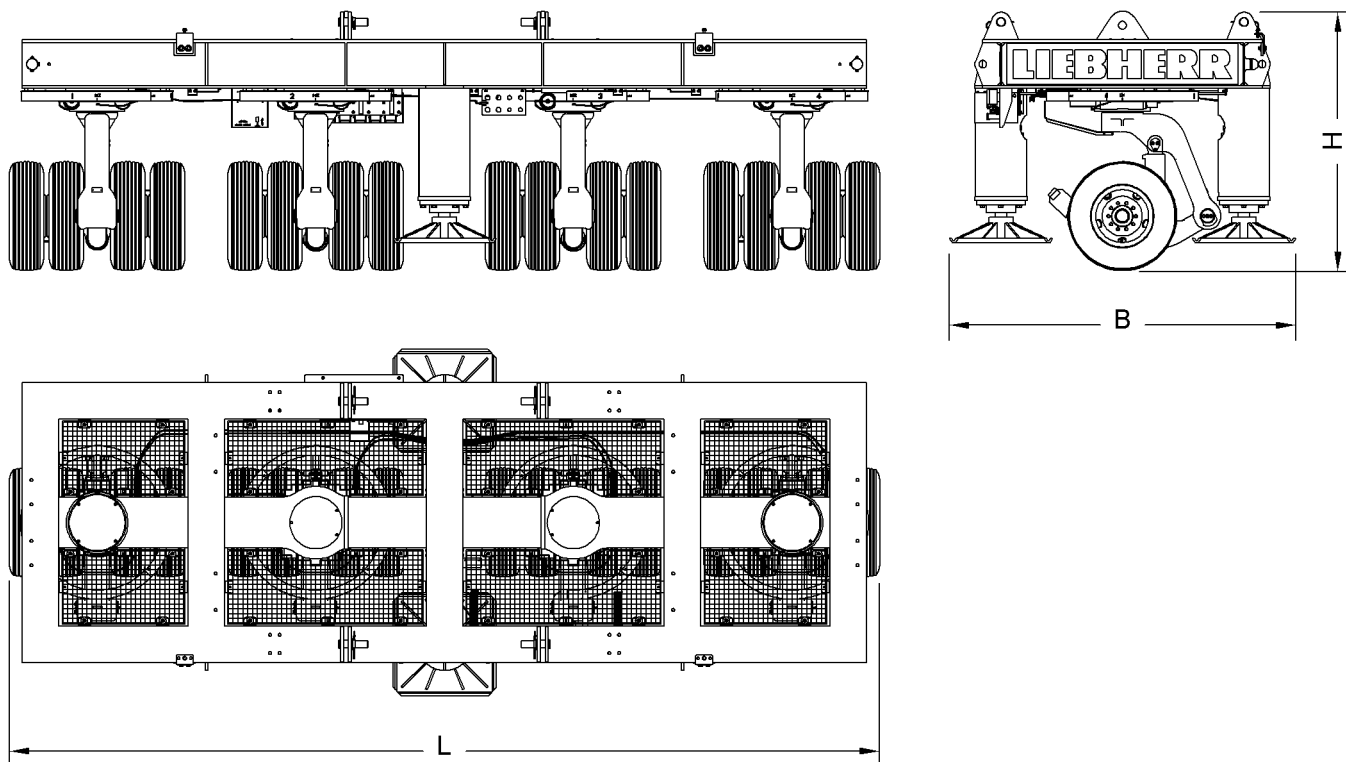


Fig. 444: Dimensions counterweight carriage

Name		Value
L	Length	7167 mm 23' 6" ft-in
B	Width	2850 mm 9' 4" ft-in
H	Height	2130 mm 7' ft-in
Weight		12187 kg 26,867 lb

Tab. 274: Technical data counterweight carriage

Counterweight slab 10 t (22,046 lb)

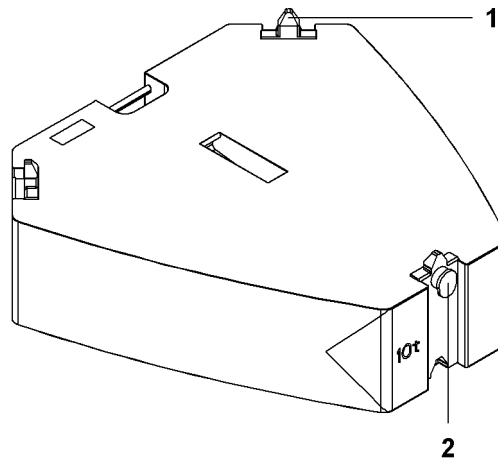


Fig. 445: Counterweight slab 10 t (22,046 lb)

- 1 Locking device (3x)
- 2 Rigging point (3x)

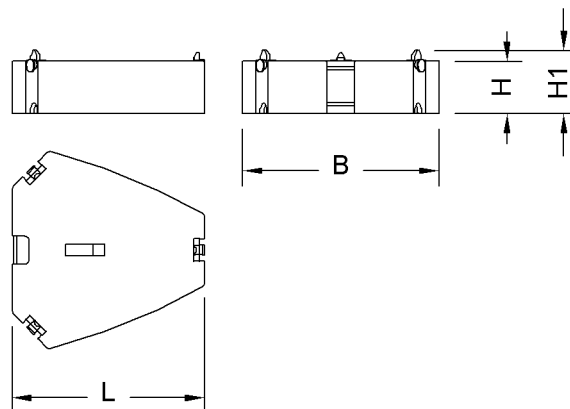


Fig. 446: Dimensions counterweight slab 10 t (22,046 lb)

Name		Value
L	Length	2050 mm 6' 9" ft-in
B	Width	2117 mm 6' 11" ft-in
H	Height	560 mm 1' 10" ft-in
H1	Height incl. locking devices	680 mm 2' 3" ft-in
Weight		10000 kg 22,046 lb

Tab. 275: Technical data counterweight slab 10 t (22,046 lb)

Counterweight slab 5 t (11,023 lb)

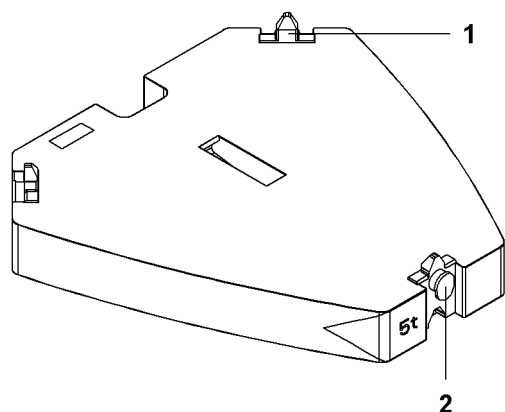


Fig. 447: Counterweight slab 5 t (11,023 lb)

- 1 Locking device (3x)
- 2 Rigging point (3x)

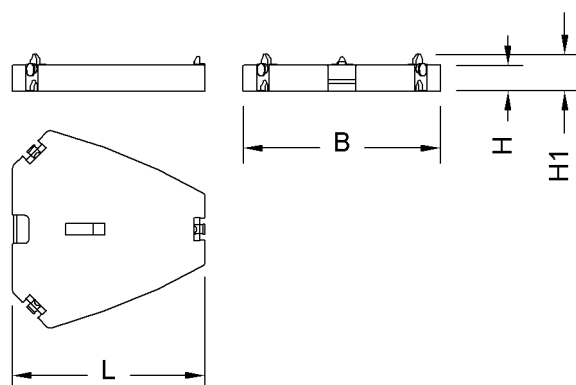


Fig. 448: Dimensions counterweight slab 5 t (11,023 lb)

Name		Value
L	Length	2050 mm 6' 9" ft-in
B	Width	2117 mm 6' 11" ft-in
H	Height	275 mm 10.83" in
H1	Height incl. locking devices	395 mm 1' 4" ft-in
Weight		5000 kg 11,023 lb

Tab. 276: Technical data counterweight slab 5 t (11,023 lb)

1.29 Rope fixing point

1.29.1 Main boom head

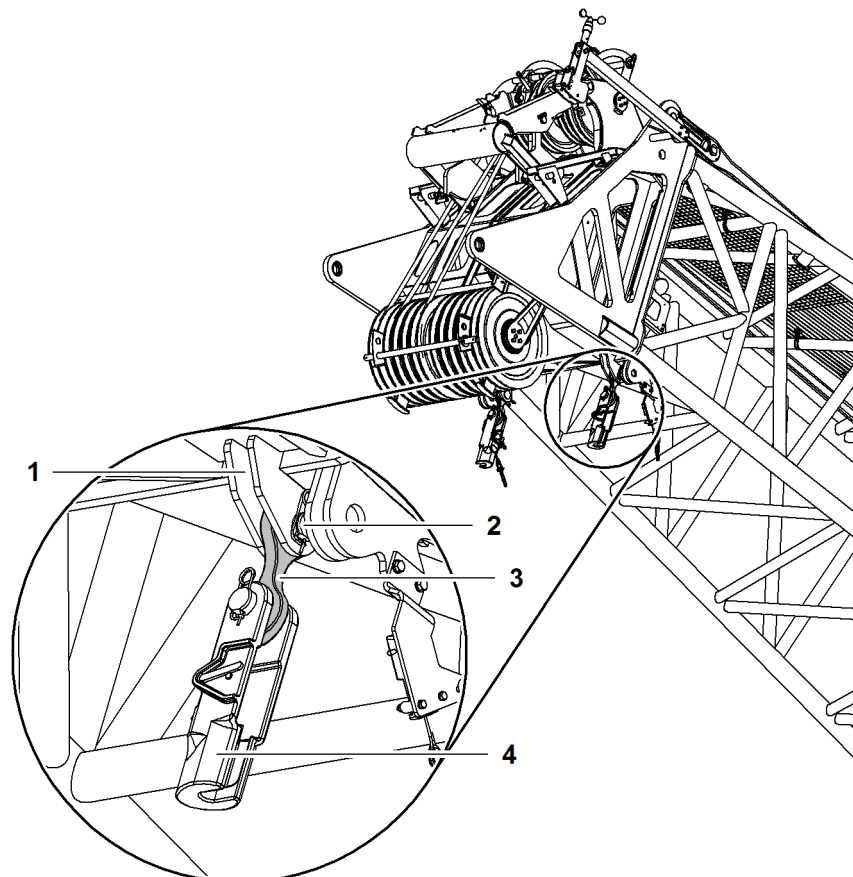


Fig. 449: Rope fixing point on main boom head (illustration of principle)

- | | | | |
|---|---|---|-------------|
| 1 | Pin connection point (2x) for rope fixing point | 3 | Cross link |
| 2 | Pin for rope fixing point | 4 | Pocket lock |

1.29.2 Fixed jib head section

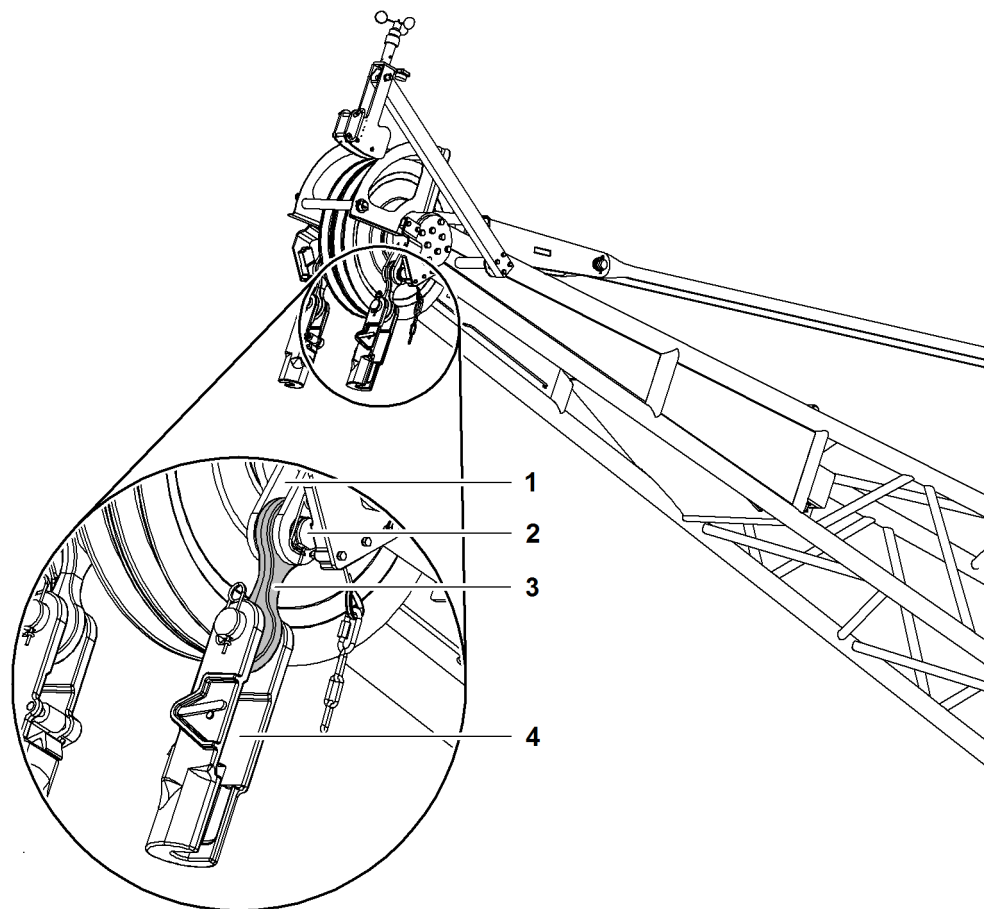


Fig. 450: Rope fixing point on fixed jib head section (illustration of principle)

- | | | | |
|---|---|---|-------------|
| 1 | Pin connection point (2x) for rope fixing point | 3 | Cross link |
| 2 | Pin for rope fixing point | 4 | Pocket lock |

The components of the rope fixing point are identical for the main boom head and the jib head section.

1.29.3 Luffing jib head section

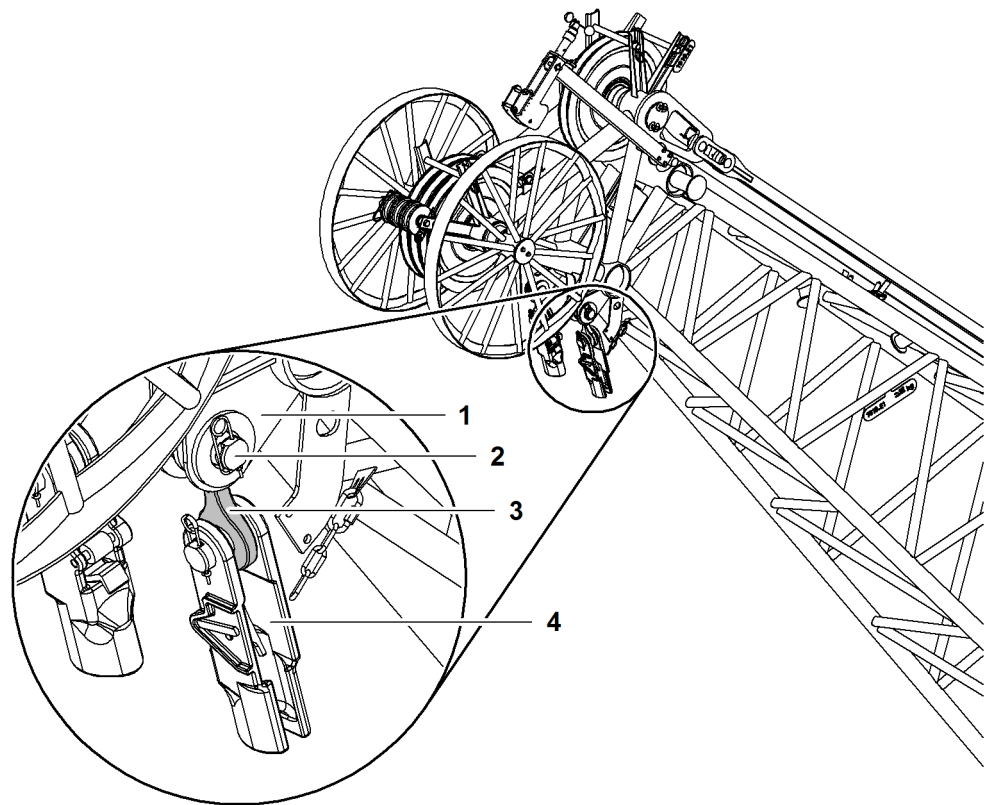


Fig. 451: Rope fixing point on luffing jib head section (illustration of principle)

- | | | | |
|---|---|---|-------------|
| 1 | Pin connection point (2x) for rope fixing point | 3 | Cross link |
| 2 | Pin for rope fixing point | 4 | Pocket lock |

The components of the rope fixing point are identical for the main boom head and the jib head section.

1.29.4 Auxiliary jib (36 t (79.300 lb)) on main boom head

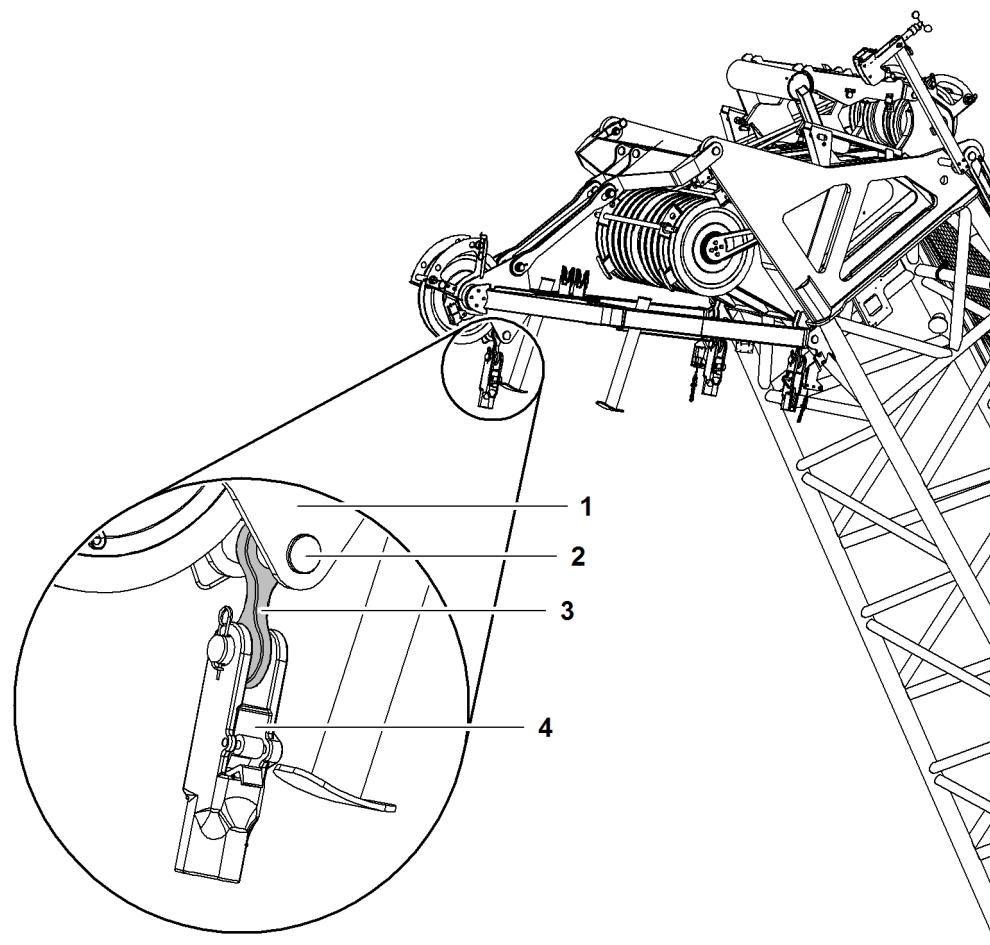


Fig. 452: Rope fixing point on auxiliary jib (36 t (79.300 lb)) on main boom head (illustration of principle)

- | | | | |
|---|--|---|-------------|
| 1 | Pin connection point for rope fixing point | 3 | Cross link |
| 2 | Pin for rope fixing point | 4 | Pocket lock |

Components of the rope fixing point are identical for main boom head and auxiliary jib (36 t (79.300 lb)).

1.29.5 Auxiliary jib (15 t (33.000 lb)) on jib head section

There is no rope fixing point on auxiliary jib (15 t (33.000 lb)) on jib head, because reeving is only done once.

1.29.6 Auxiliary jib (30 t (66.000 lb)) on jib head 2316

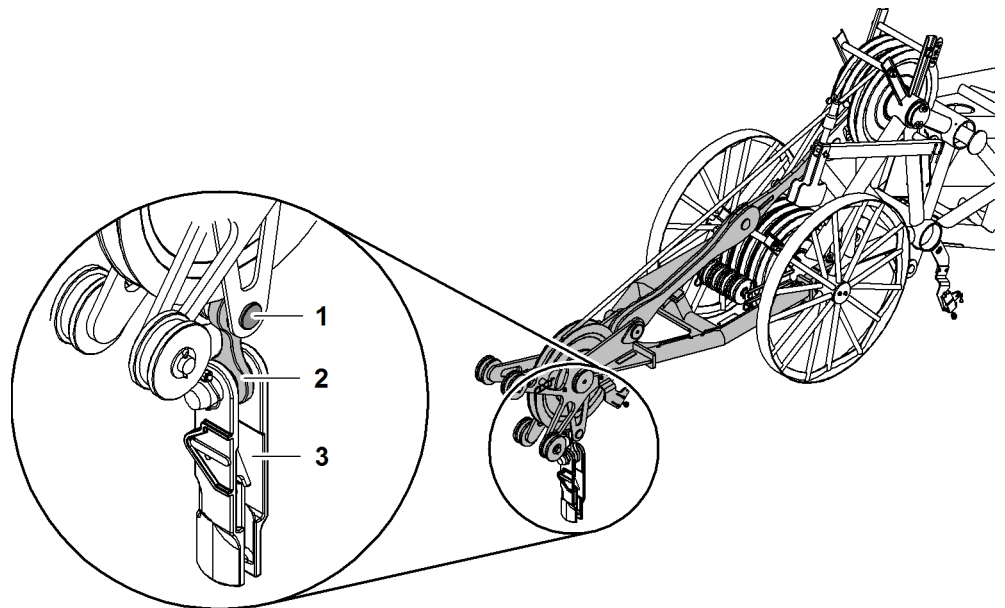


Fig. 453: Rope fixing point on auxiliary jib (30 t (66.000 lb)) on jib head 2316

- | | | | |
|---|---------------------------|---|-------------|
| 1 | Pin for rope fixing point | 3 | Pocket lock |
| 2 | Cross link | | |

Components of rope fixing point for auxiliary jibs (15 t (33.000 lb)) on jib head and auxiliary jib (30 t (66.000 lb)) on jib head are identical.

1.29.7 Midfall

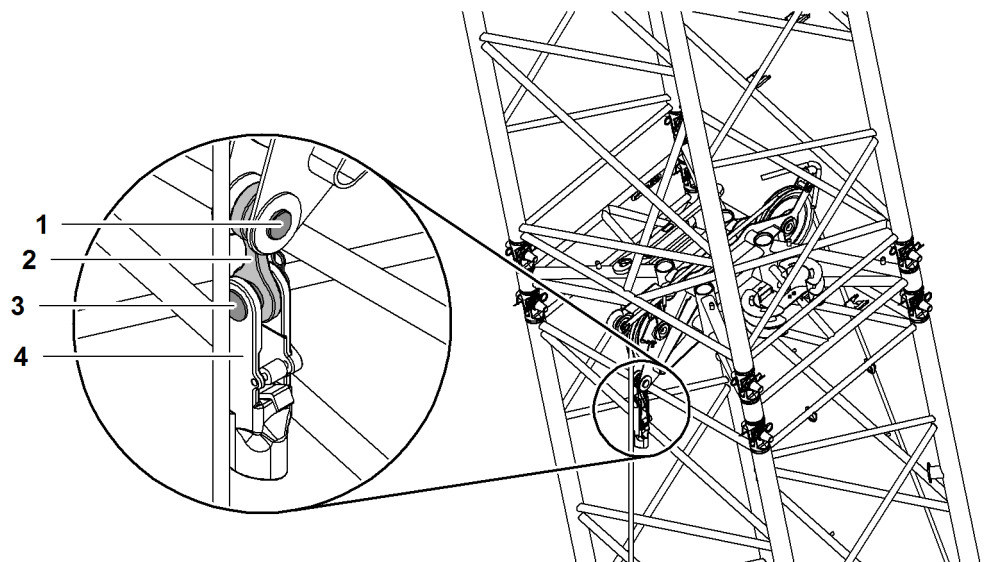


Fig. 454: Rope fixing point on midfall (illustration of principle)

- | | | | |
|---|---------------------------|---|----------------------|
| 1 | Pin for rope fixing point | 3 | Pins for pocket lock |
| 2 | Cross link | 4 | Pocket lock |

Components of rope fixing point for jib head and midfall are identical.

1.29.8 Pocket lock

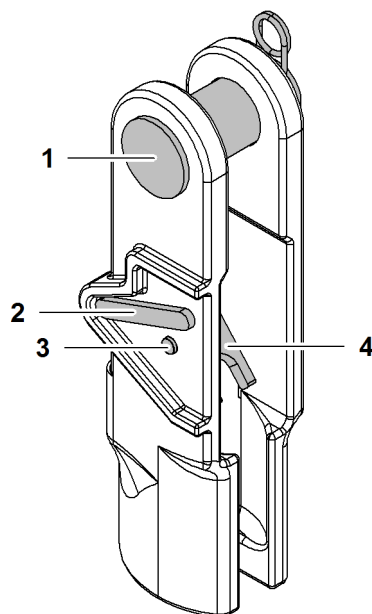


Fig. 455: Pocket lock

- | | |
|------------------------------------|---|
| <p>1 Pin</p> <p>2 Safety latch</p> | <p>3 Safety button</p> <p>4 Latching device</p> |
|------------------------------------|---|

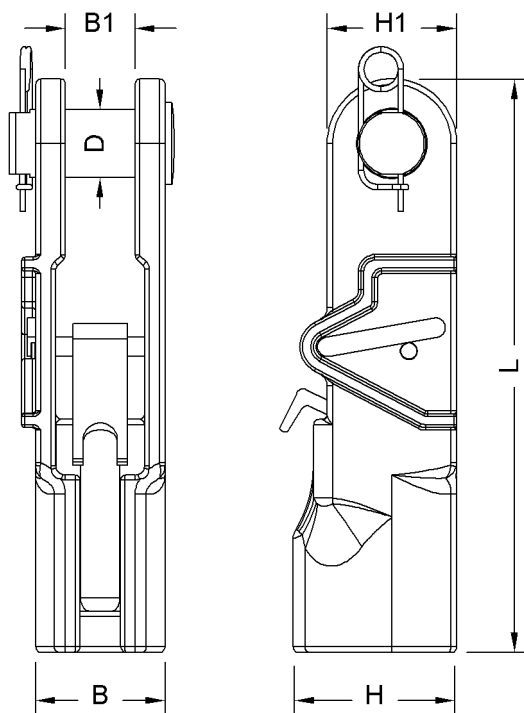


Fig. 456: Dimensions pocket lock

Name		Value
L	Length	533 mm 1' 9" ft-in

Name		Value
B	Width	107 mm 4.21" in
B1	Width	57 mm 2.24" in
H	Height	142 mm 5.59" in
H1	Height	95 mm 3.74" in
D	Pin Ø	57 mm 2.24" in
Weight		28.8 kg 63.49 lb
Rope Ø		27 mm (1.06" in) to 29 mm (1.14" in)

Tab. 277: Technical data pocket lock

1.29.9 Cross link

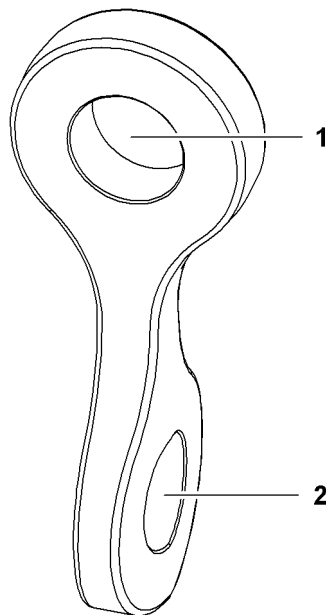


Fig. 457: Cross link

- 1** Pin connection point for boom head (Ø 52 mm (2.05" in))
- 2** Pin connection point for pocket lock (Ø 58 mm (2.28" in))

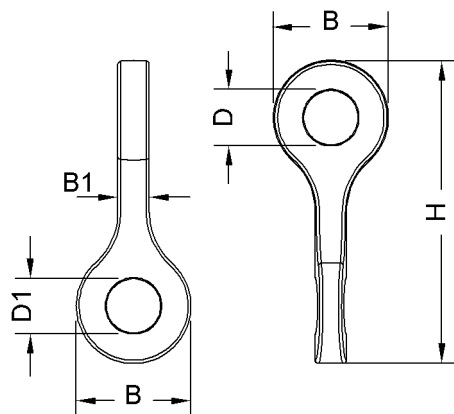


Fig. 458: Cross strap dimensions

Name		Value
B	Width	110 mm 4.33" in
B1	Width	30 mm 1.18" in
H	Height	290 mm 11.42" in
D	Pin Ø	52 mm 2.05" in
D1	Pin Ø	58 mm 2.28" in
Weight		4.7 kg 10.36 lb

Tab. 278: Technical data cross strap

1.29.10 Pin for pin connection point on boom head

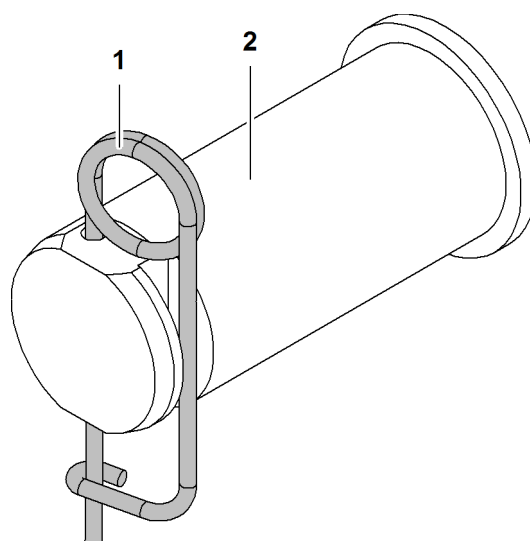


Fig. 459: Pin for pin connection point on boom head

- 1 Locking spring
- 2 Pin

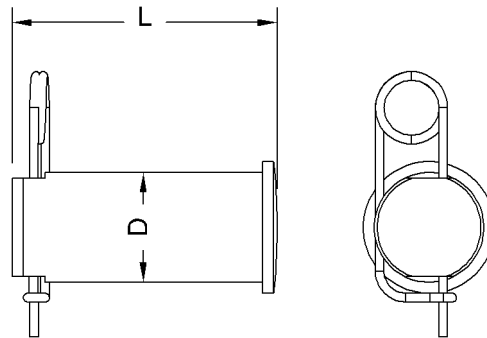


Fig. 460: Dimensions pin for pin connection point on boom head

Name		Value
L	Length	115 mm 4.53" in
D	Pin Ø	50 mm 1.97" in
Weight		2 kg 4.41 lb

Tab. 279: Technical data pin for pin connection point on boom head

1.30 Pulley block/hook*

1.30.1 Pulley block (300 t (661,377 lb))

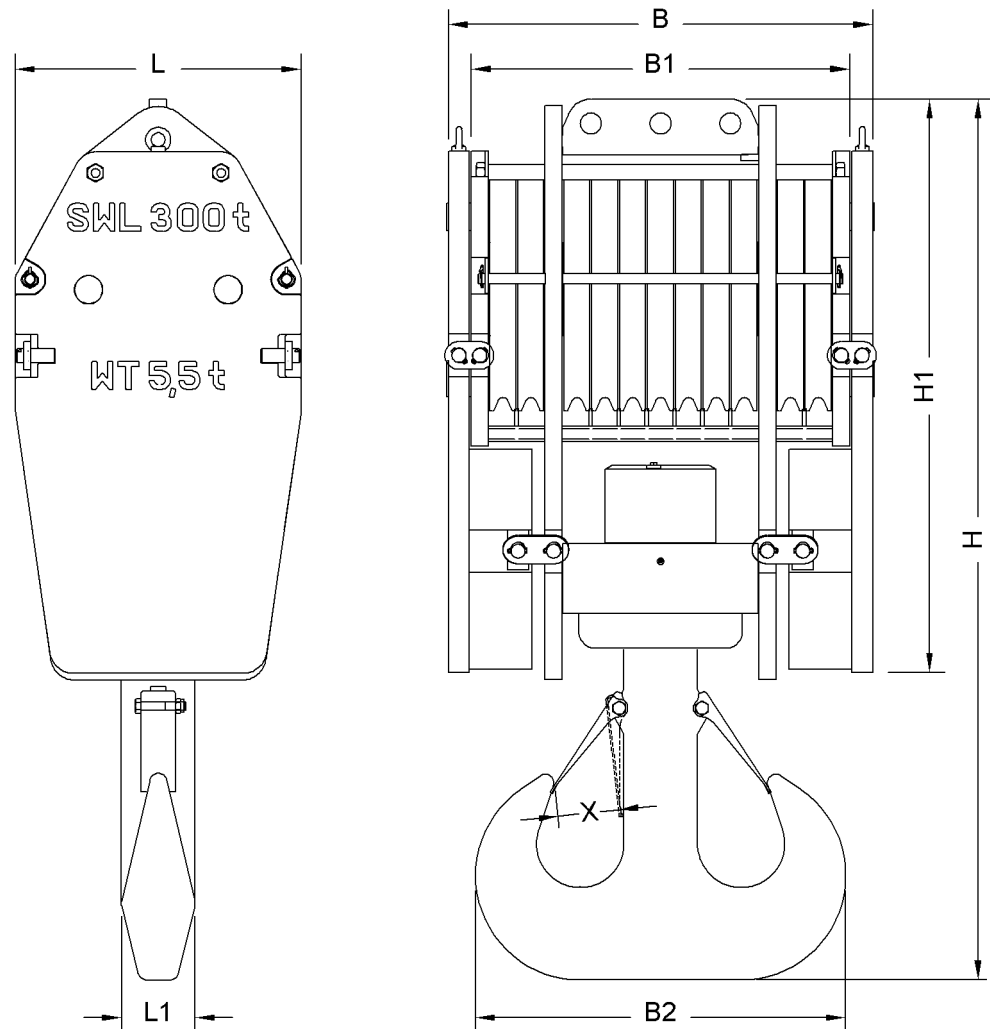


Fig. 461: Pulley block dimensions (300 t (661,377 lb))

Name		Value
L	Pulley block length	820 mm 2' 8" ft-in
L1	Hook length	212 mm 8.35" in
B	Pulley block width with additional weights	1227 mm 4' ft-in
B1	Width of pulley block without additional weights	1097 mm 3' 7" ft-in
B2	Hook width	1062 mm 3' 6" ft-in

Name		Value
H	Height of pulley block with hook	2523 mm 8' 3" ft-in
H1	Height of pulley block without hook	1665 mm 5' 6" ft-in
X	Jaw width	175 mm 6.89" in
Weight with additional weights		5500 kg 12,125 lb
Weight without additional weights		3200 kg 7,055 lb
Maximum reeving		23
Rope Ø		28 mm 1.10" in

Tab. 280: Technical data pulley block (300 t (661,377 lb))

1.30.2 Pulley block (160 t (352,734 lb))

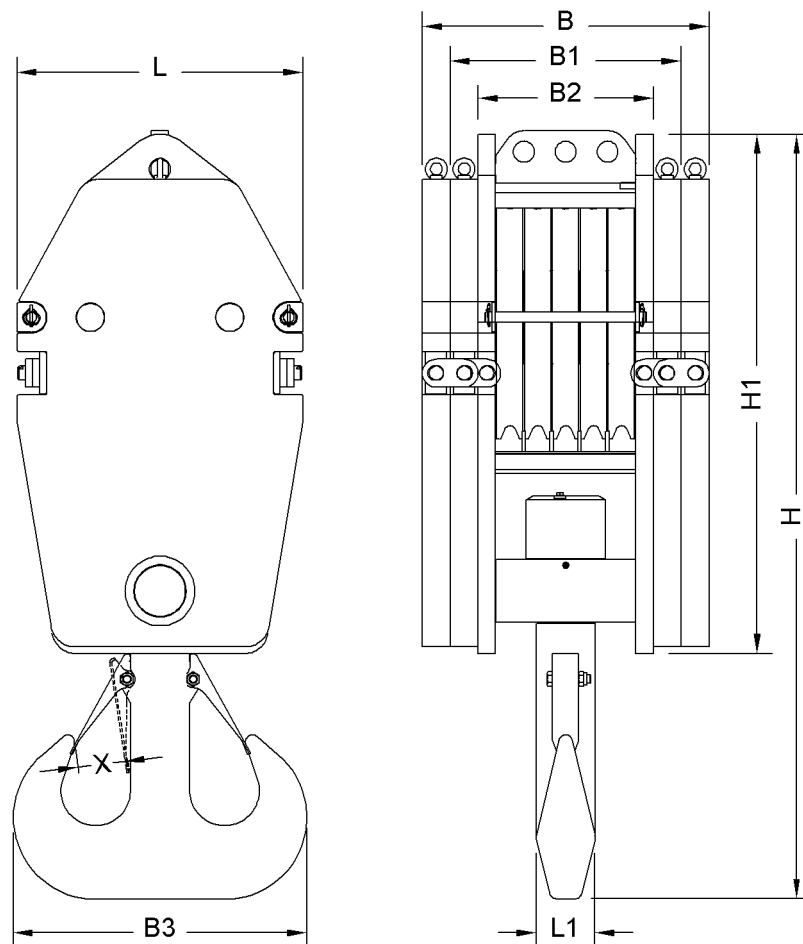


Fig. 462: Pulley block dimensions (160 t (352,734 lb))

Pulley block/hook*

Name		Value
L	Pulley block length	820 mm 2' 8" ft-in
L1	Hook length	170 mm 6.69" in
B	Pulley block width with four additional weights	823 mm 2' 8" ft-in
B1	Pulley block width with two additional weights	663 mm 2' 2" ft-in
B2	Width of pulley block without additional weights	503 mm 1' 8" ft-in
B3	Hook width	842 mm 2' 9" ft-in
H	Height of pulley block with hook	2205 mm 7' 3" ft-in
H1	Height of pulley block without hook	1490 mm 4' 11" ft-in
X	Jaw width	135 mm 5.31" in
Weight with four additional weights		4000 kg 8,818 lb
Weight with two additional weights		2800 kg 6,173 lb
Weight without additional weights		1600 kg 3,527 lb
Maximum reeving		11
Rope Ø		28 mm 1.10" in

Tab. 281: Technical data pulley block (160 t (352,734 lb))

1.30.3 Pulley block (100 t (220,459 lb))

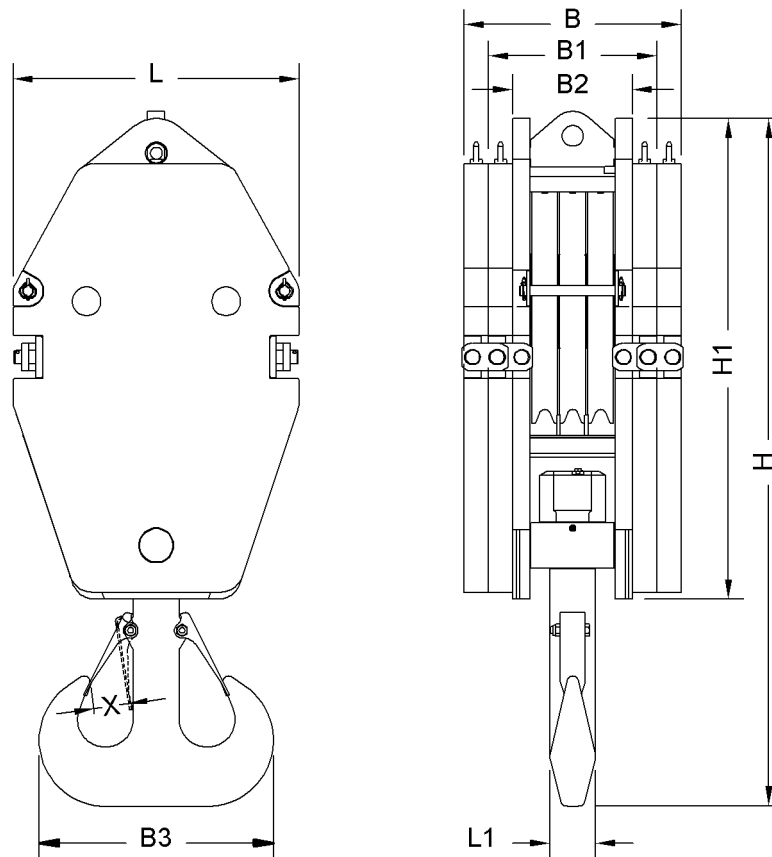


Fig. 463: Pulley block dimensions (100 t (220,459 lb))

Name		Value
L	Pulley block length	820 mm 2' 8" ft-in
L1	Hook length	132 mm 5.20" in
B	Pulley block width with four additional weights	623 mm 2' 1" ft-in
B1	Pulley block width with two additional weights	483 mm 1' 7" ft-in
B2	Width of pulley block without additional weights	343 mm 1' 2" ft-in
B3	Hook width	672 mm 2' 2" ft-in
H	Height of pulley block with hook	1994 mm 6' 7" ft-in
H1	Height of pulley block without hook	1380 mm 4' 6" ft-in
X	Jaw width	100 mm 3.94" in

Name	Value
Weight with four additional weights	3000 kg 6,614 lb
Weight with two additional weights	2050 kg 4,519 lb
Weight without additional weights	1100 kg 2,425 lb
Maximum reeving	7
Rope Ø	28 mm 1.10" in

Tab. 282: Technical data pulley block (100 t (220,459 lb))

1.30.4 Pulley block (50 t (110,230 lb))

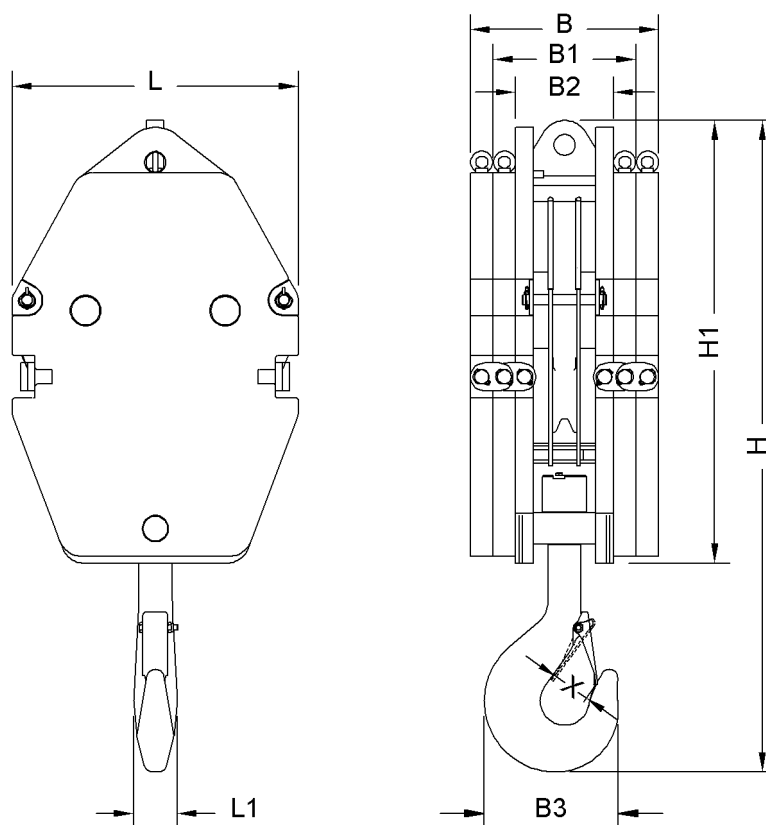


Fig. 464: Pulley block dimensions (50 t (110,230 lb))

Name	Value
L Pulley block length	820 mm 2' 8" ft-in
L1 Hook length	125 mm 4.92" in
B Pulley block width with four additional weights	540 mm 1' 9" ft-in

Name		Value
B1	Pulley block width with two additional weights	410 mm 1' 4" ft-in
B2	Width of pulley block without additional weights	280 mm 11.02" in
B3	Hook width	384 mm 1' 3" ft-in
H	Height of pulley block with hook	1852 mm 6' 1" ft-in
H1	Height of pulley block without hook	1270 mm 4' 2" ft-in
X	Jaw width	100 mm 3.94" in
Weight with four additional weights		2400 kg 5,291 lb
Weight with two additional weights		1600 kg 3,527 lb
Weight without additional weights		800 kg 1,764 lb
Maximum reeving		3
Rope Ø		28 mm 1.10" in

Tab. 283: Technical data pulley block (50 t (110,230 lb))

1.30.5 Hook (16 t (35,273 lb))

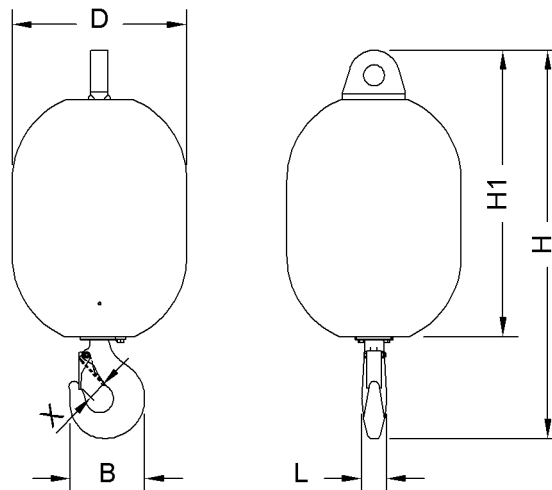


Fig. 465: Hook dimensions (16 t (35,273 lb))

Name		Value
L	Hook length	71 mm 2.80" in

Pulley block/hook*

Name		Value
B	Hook width	217 mm 8.54" in
H	Height of pulley block with hook	1115 mm 3' 8" ft-in
H1	Height of pulley block without hook	822 mm 2' 8" ft-in
D	Hook Ø	500 mm 1' 8" ft-in
X	Jaw width	50 mm 1.97" in
Weight		900 kg 1,984 lb
Maximum reeving		1
Suitable for pocket lock for rope Ø		27 mm (1.06" in) to 29 mm (1.14" in)

Tab. 284: Technical data hook (16 t (35,273 lb))

1.31 Abseil rescue equipment*

The abseil rescue equipment BORNACK KE 10 St crane is behind the driver's seat in the cab.

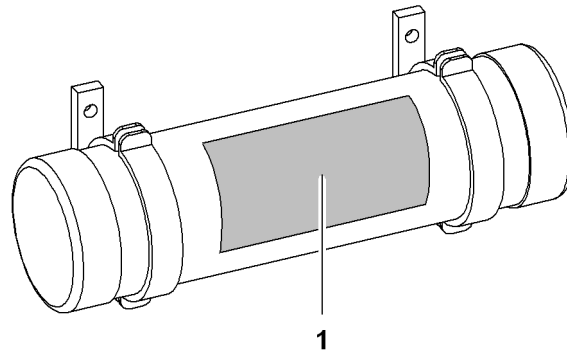


Fig. 466: Abseil rescue equipment

- 1 Operating instructions

1.32 Safety barrier*

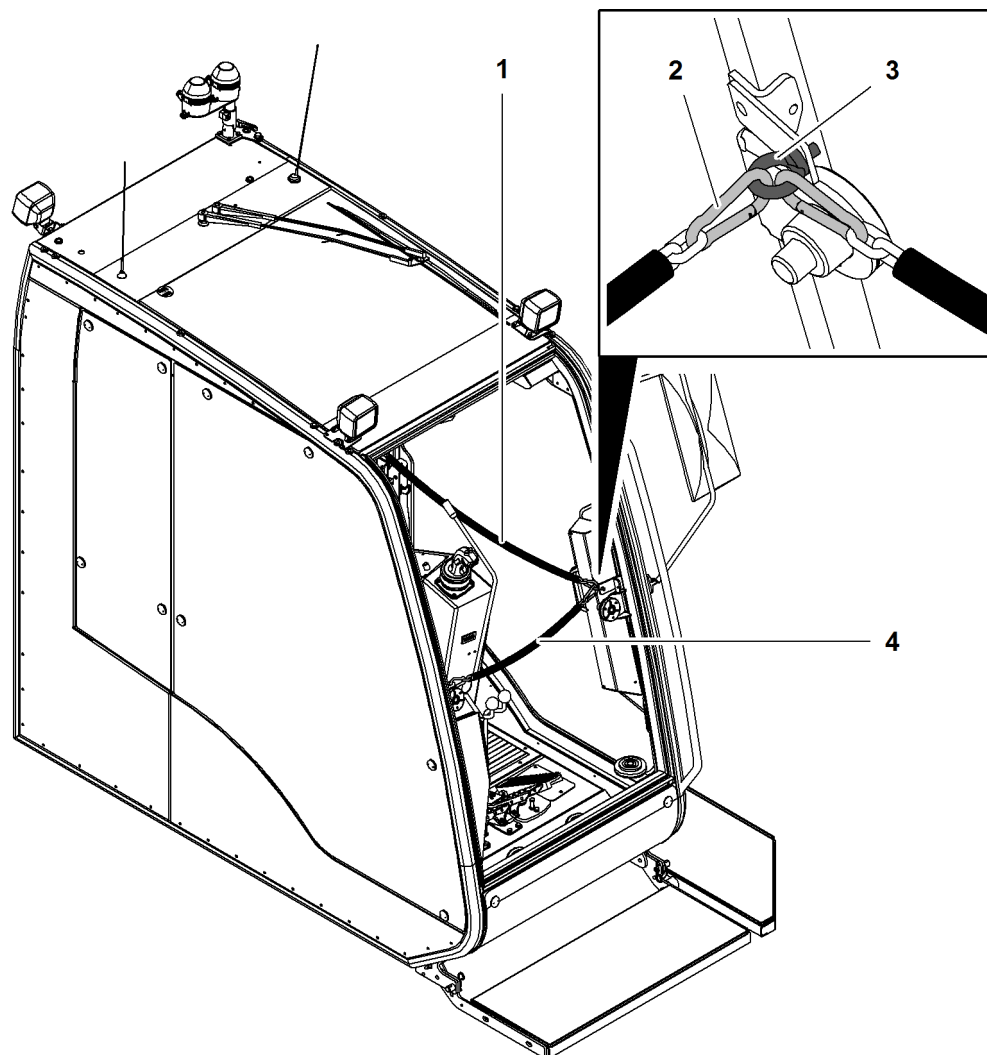


Fig. 467: Fall arrest

- | | | | |
|---|----------------|---|---------------|
| 1 | Chain | 3 | Eye bolt (3x) |
| 2 | Carabiner (4x) | 4 | Chain |



WARNING

No safety barrier on the operator's platform!
risk of falling from the cab.

- ▶ Ensure that the chains are attached properly when entering the cab.

The safety barrier consists of 2 chains:

- Chain 1 is fitted in front of the cab door.
- Chain 4 is fitted in front of the front windscreen.

1.33 Slinging plates on uppercarriage*

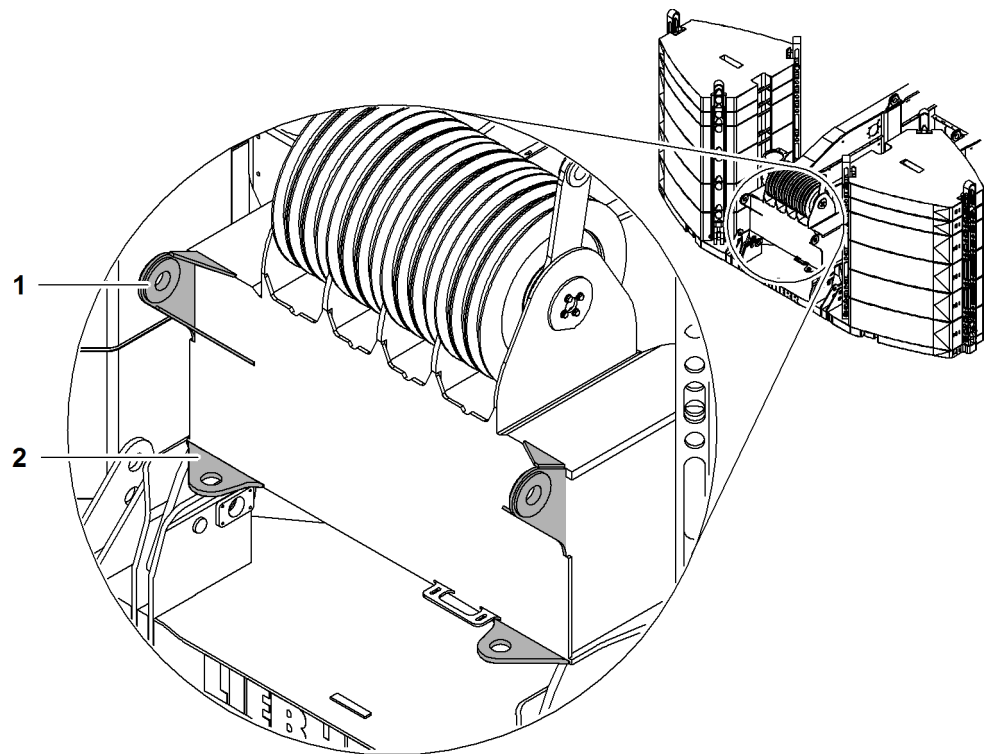


Fig. 468: Uppercarriage rear

1 Slinging plate (2x)

2 Limit stop (2x)



WARNING

Incorrect use of slinging plates!
Serious injury.
Damage to machine.

- ▶ Only use slinging plates to install a power pack.
- ▶ When installing a power pack: Contact Liebherr customer service.



WARNING

Inadmissible stress of the limit stops with tensile and vertical forces!
Serious injury.
Damage to machine.

- ▶ Only stress limit stop with slinging plates with compression forces.



WARNING

Inadmissible pin strength!
Serious injury.
Damage to machine.

- ▶ Only use pins made of 34 CrNiMo6 material.

1.34 Suction flap*

The suction flap closes the suction pipe when the ignition is switched off. This prevents the undesired effect of the diesel engine 'running on'.

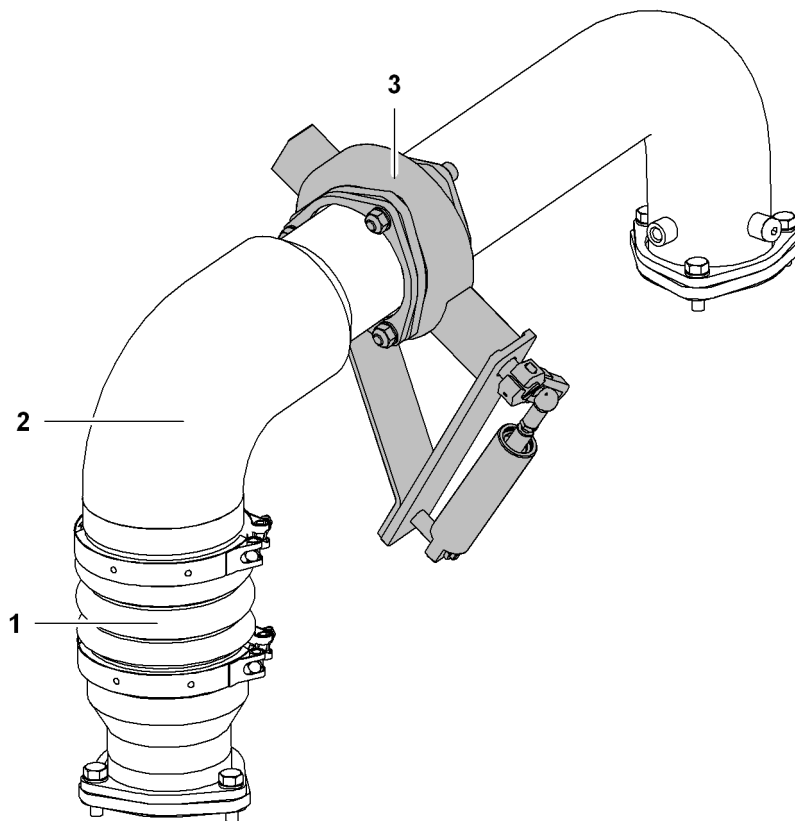


Fig. 469: Suction flap

- 1 Charge air hose
- 2 Charge air pipe

- 3 Shut-off device

1.35 Armrests* for operator's seat

The armrests in the optional special equipment are movable and can be adjusted to match the machine operator's exact needs.

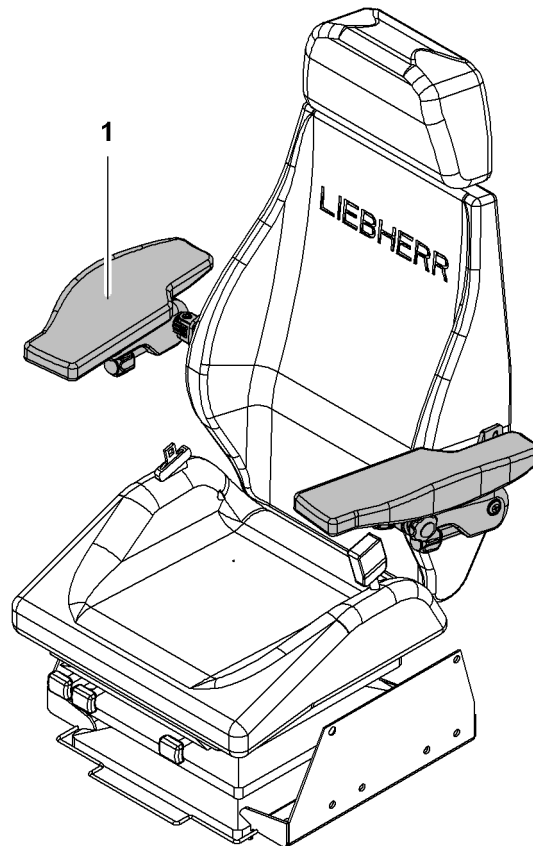


Fig. 470: Armrests for operator's seat

1 Armrests (2x)

1.36 Vertical Line Finder* assistance system

The Vertical Line Finder assistance system serves to determine the rope's angle of departure on the boom head. The determined angle of departure of the rope is displayed on the monitor. This allows the machine operator to detect and prevent a diagonal pull.

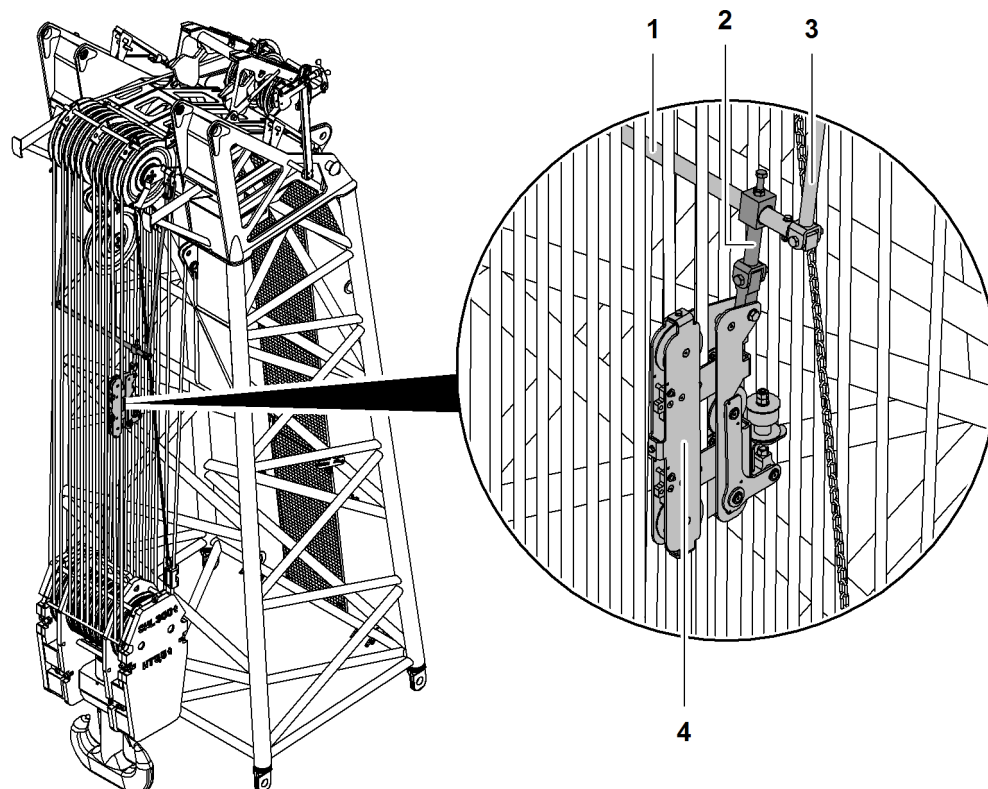


Fig. 471: Vertical Line Finder on main boom head (illustration of principle)

- | | | | |
|---|--------------------------|---|--------------------|
| 1 | Transverse pipe | 3 | Vertical pipe (2x) |
| 2 | Bracket for rope opening | 4 | Rope opening |

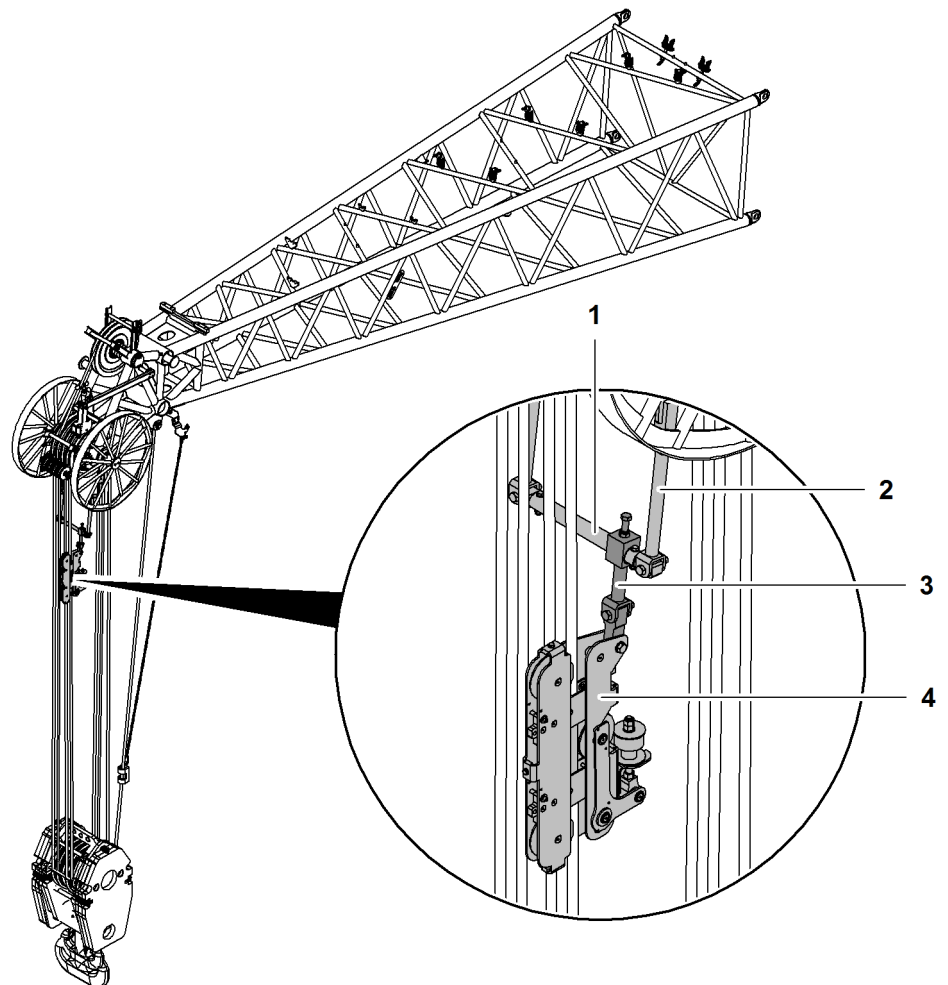


Fig. 472: Vertical Line Finder on jib head (illustration of principle)

- | | | | |
|---|--------------------|---|--------------------------|
| 1 | Transverse pipe | 3 | Bracket for rope opening |
| 2 | Vertical pipe (2x) | 4 | Rope opening |

1.37 Outside mirror*

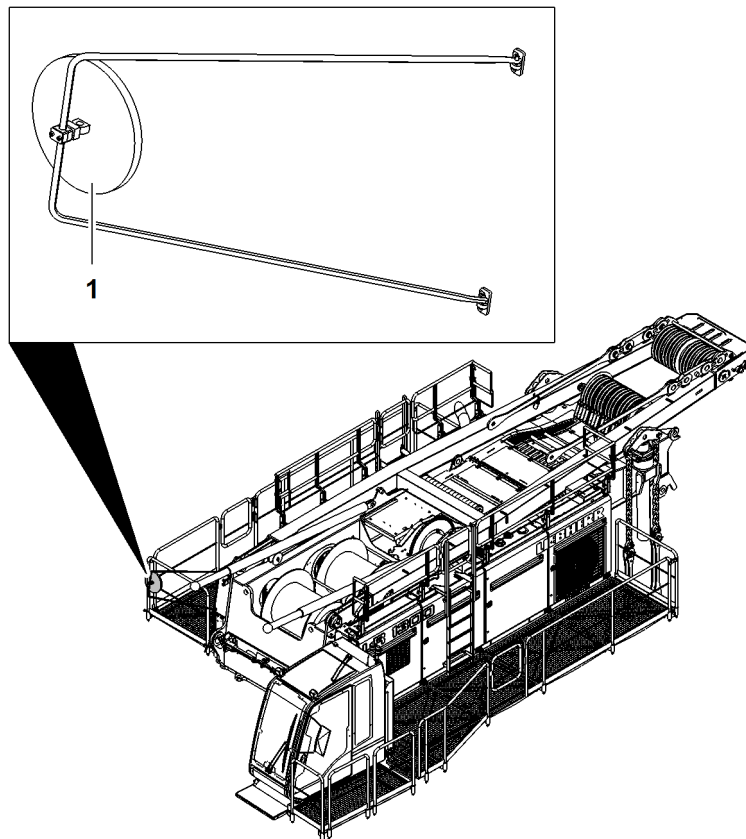


Fig. 473: Outside mirror (illustration of principle)

1 Outside mirror

The outside mirror 1 is installed on the right side of the uppercarriage.

The outside mirror 1 is folded in or deinstalled for transport.

1.38 Counterweight carriage preparation unit*

In order to transport the counterweight carriage from one basic machine to another basic machine, the machine is equipped with a counterweight carriage preparation unit.

The counterweight carriage preparation unit consists of:

- Hydraulic connections and electricity connections for the rear counterweight carriage on the uppercarriage
- Control panel X26 with mount

1.38.1 Hydraulic connections and electricity connections for the counterweight carriage

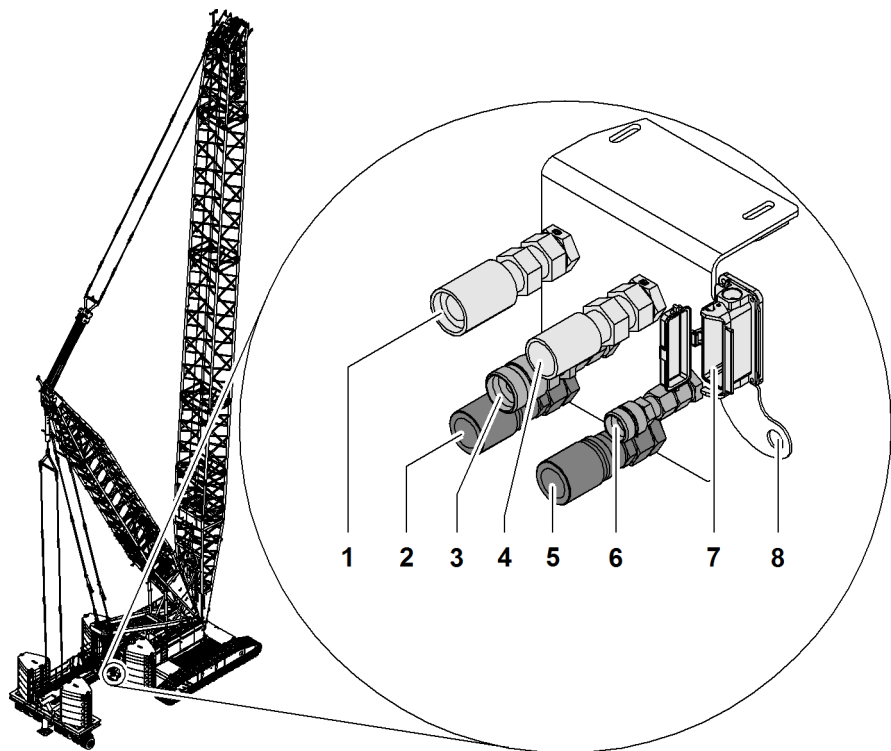


Fig. 474: Counterweight carriage preparation unit

- | | | | |
|---|-----------------------|---|--------------------------|
| 1 | Lower (red) | 5 | Leak oil (blue) |
| 2 | Leak oil (blue) | 6 | Control pressure (black) |
| 3 | High pressure (green) | 7 | Electric plug |
| 4 | Lift (yellow) | 8 | CAN bus plug |

1.38.2 Control panel X26 and mount

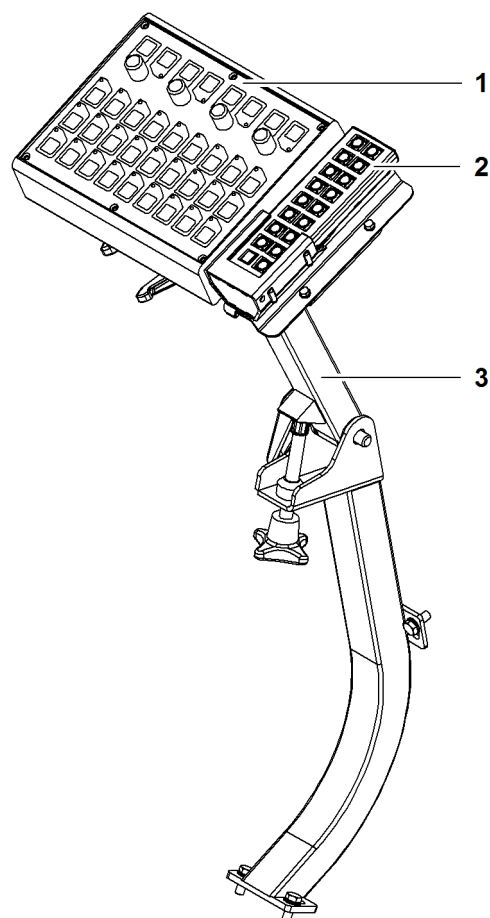


Fig. 475: Control panel X26 with mount

- | | | | |
|---|---|---|-------|
| 1 | Control panel X26 | 3 | Mount |
| 2 | Remote control panel (not part of the delivery) | | |

1.39 Tagline winch*

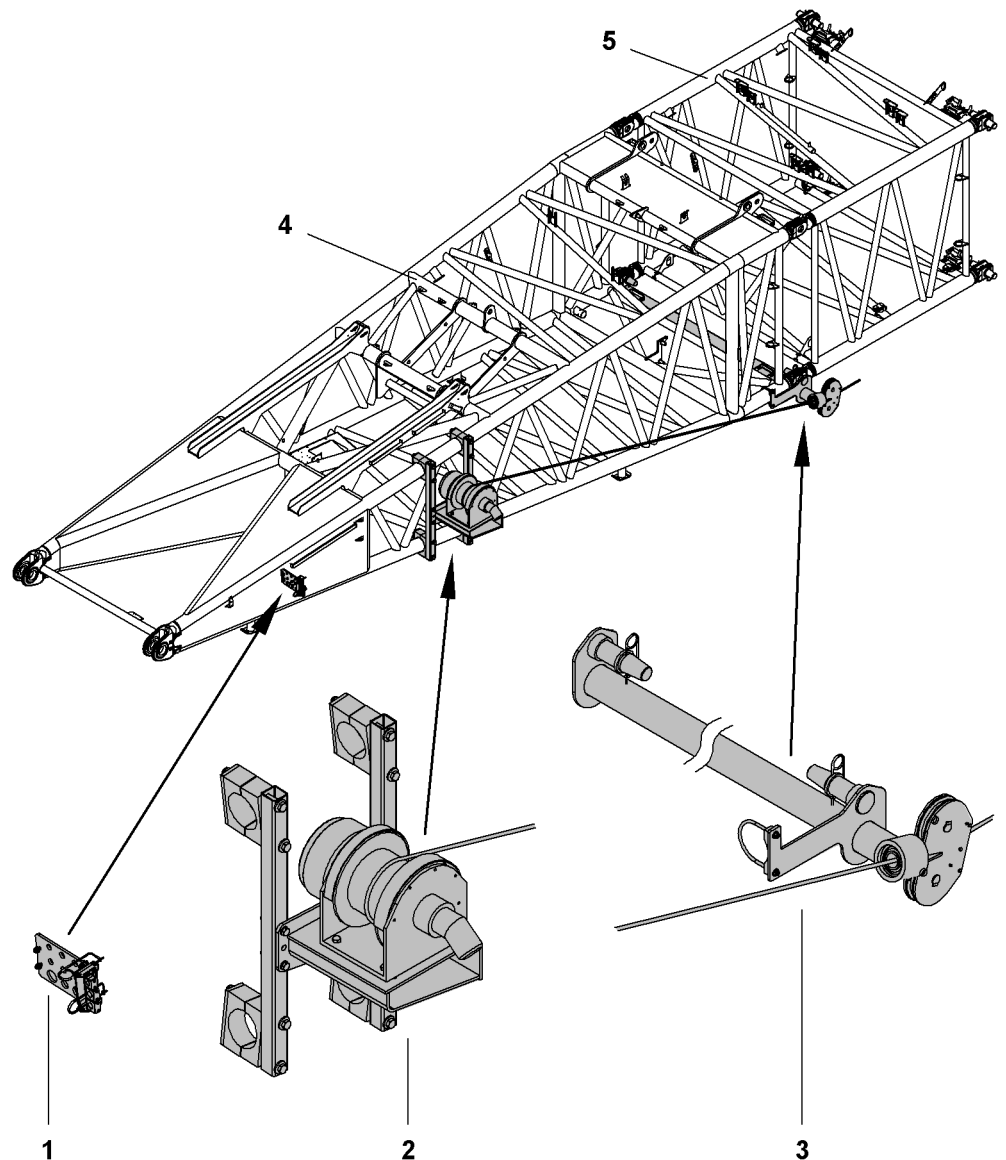


Fig. 476: Tagline winch

- | | | | |
|---|----------------|---|-------------------|
| 1 | Bulkhead plate | 4 | Boom base section |
| 2 | Tagline winch | 5 | Main boom section |
| 3 | Rope bracket | | |

The tagline winch:

- is driven by a hydraulic motor via a planetary gearbox.
- is equipped with a fixed-caliper disc brake.

The tagline is attached to the rigging material with an adjustable pull force. The tagline winch 2 dampens the swinging movements of the rigging material by winding and unwinding the tagline.

The rotatable rope bracket 3 prevents the tagline from being damaged if the rope runs unevenly.

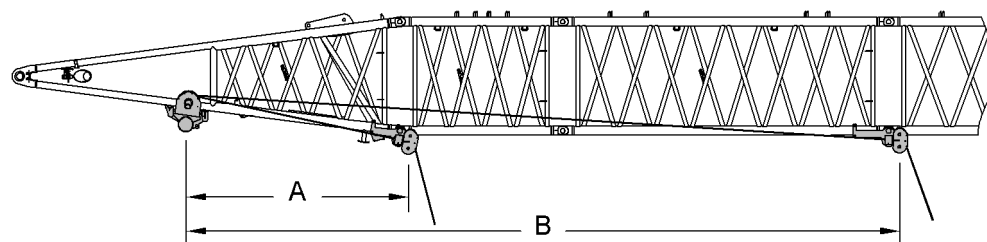


Fig. 477: Assembly position of the rope bracket (schematic diagram)

A Minimum distance

B Maximum distance

Because of the special way the winch unwinds, there is a minimum distance **A** of 3700 mm (12' 2" ft-in) and a maximum distance **B** of 13000 mm (42' 8" ft-in) between the winch and rope bracket.

The rope bracket may be mounted in the following positions:

- after the boom base section
- after the 3 m (10 ft) boom section
- after the first 6 m (20 ft) boom section
- after the 3 m (10 ft) boom section and the first 6 m (20 ft) boom section

Name	Winch with one caliper	Winch with two calipers
Maximum winch line pull	15 kN 3,370 lb _f	28 kN 6,290 lb _f
Minimum constant tension	2 kN 450 lb _f	2 kN 450 lb _f
Rope \varnothing	14 mm 0.55" in	14 mm 0.55" in
Drum \varnothing	270 mm 10.63" in	270 mm 10.63" in
Maximum rope speed (full load)	110 m/min 360' 11" ft-in/min	110 m/min 360' 11" ft-in/min
Maximum rope speed (empty hook)	124 m/min 406' 10" ft-in/min	124 m/min 406' 10" ft-in/min
Rope length	80 m 262' 6" ft-in	80 m 262' 6" ft-in

Tab. 285: Technical data tagline winch

1.40 Refueling pump*

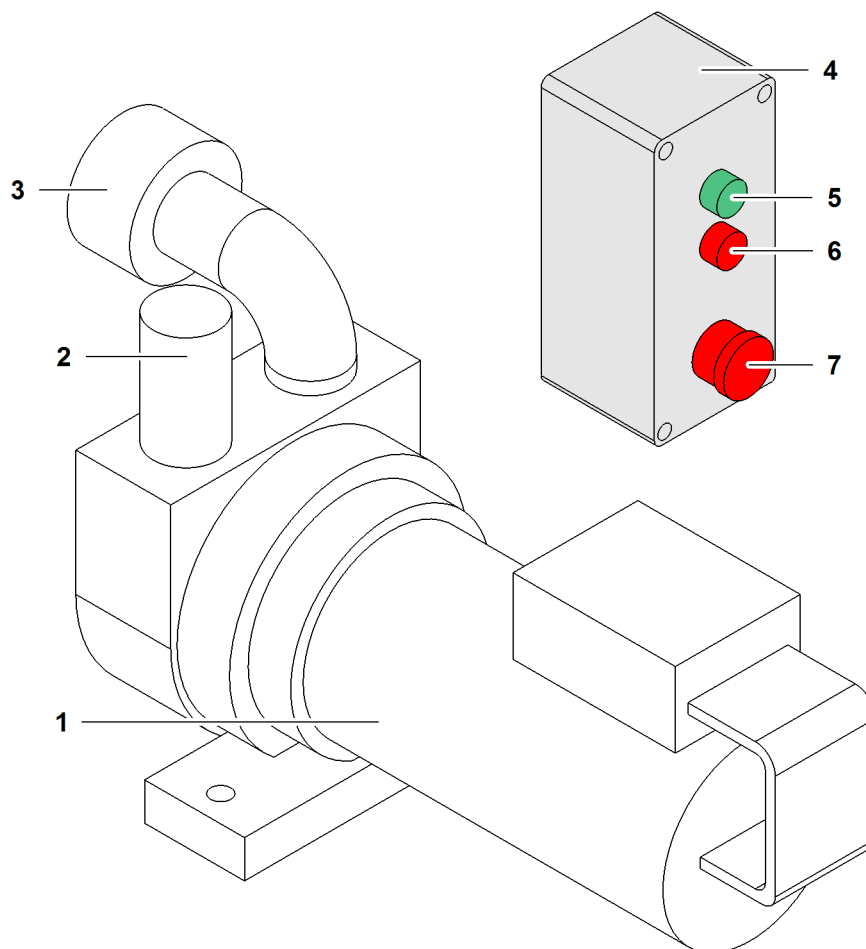


Fig. 478: Refuelling pump

- | | | | |
|---|-----------------------------|---|--------------------------|
| 1 | Motor | 5 | "Pump on" button (green) |
| 2 | Supply line to fuel tank | 6 | "Pump off" button (red) |
| 3 | Connection for suction hose | 7 | Emergency stop |
| 4 | Control panel | | |

The refueling pump is fitted to the right-hand side of the uppercarriage, next to the fuel tank.

Designation	Value
Suction height	max. 4 m (13' 1" ft-in)
Delivery rate	50 l/min 13.21 gal/min
Operating time	max. 20 min
Idling time	max. 30 s

Tab. 286: Refueling pump technical data

1.41 Cab roof protection guard*

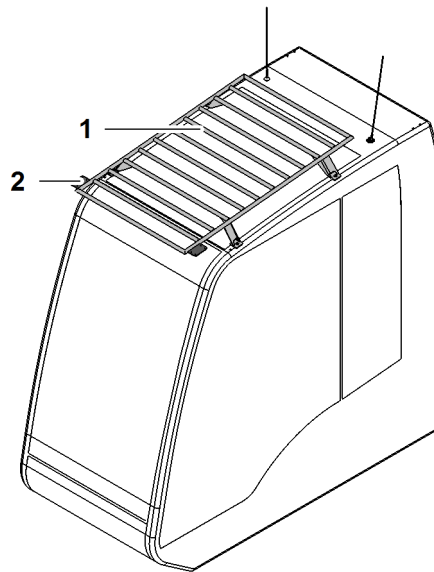


Fig. 479: Cab roof protection guard

1 Cab roof protection guard

2 Mountings (2x) for floodlights

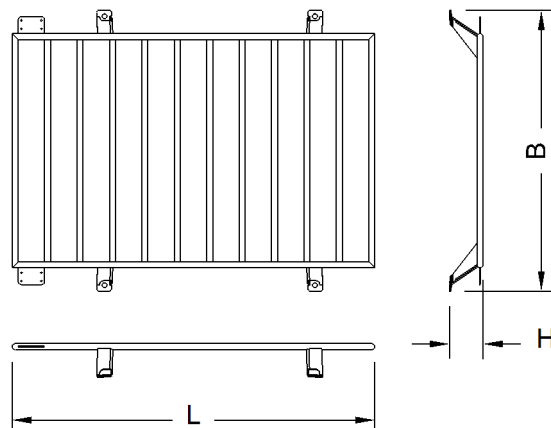


Fig. 480: Dimensions of cab roof protection guard

Designation		Value
L	Length	1208 mm 4' ft-in
B	Width	936 mm 3' 1" ft-in
H	Height	112 mm 4.41" in
Weight		30 kg 66.14 lb

Tab. 287: Technical data: cab roof protection guard

1.42 Derrick preparation unit

In order to transport the derrick from one basic machine to another basic machine, the machine is equipped with a derrick preparation unit.

The derrick preparation unit consists of hydraulic connections and electricity connections for the derrick.

The connections are located on the front right of the uppercarriage.

1.42.1 Hydraulic connections and electricity connections for the derrick

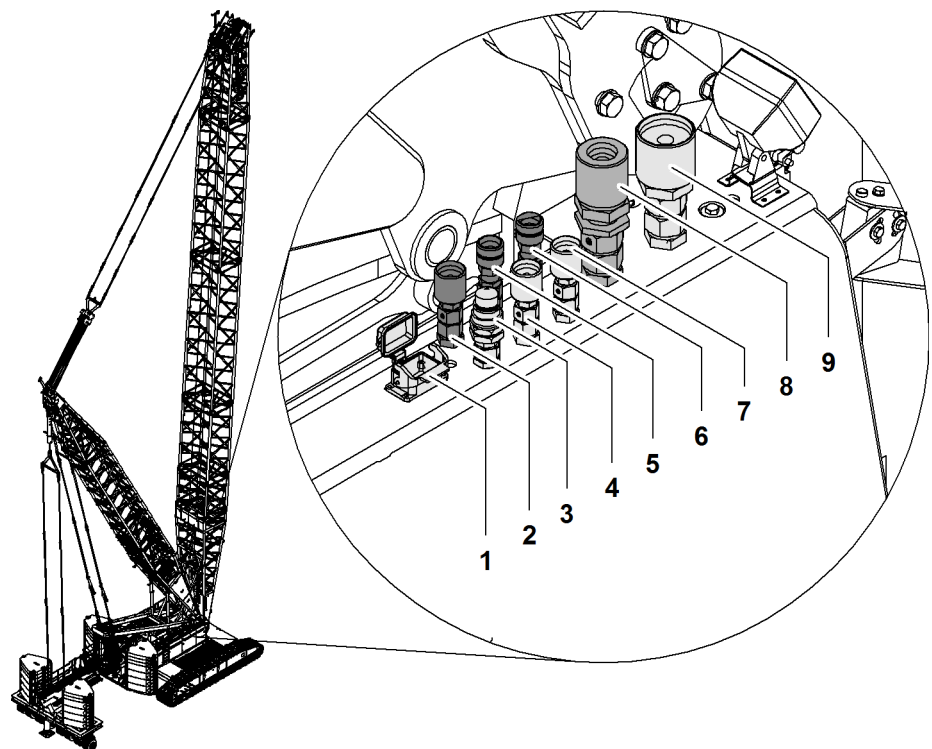


Fig. 481: Derrick preparation unit

- | | | | |
|---|-------------------------------------|---|--------------------------------------|
| 1 | Electric plug | 6 | Lift derrick hoist cylinder (green) |
| 2 | Feed pressure | 7 | Lower derrick hoist cylinder (green) |
| 3 | Leakage oil | 8 | Lower derrick winch |
| 4 | Derrick tilting-back supports (red) | 9 | Lift derrick winch |
| 5 | Derrick tilting-back supports (red) | | |

1.43 Lightning rods*

The lightning rods facilitate directed conduction of lightning flashes through the steel structure of the machine.

Depending on the machine configuration, the lightning rods are installed in the following positions:

- Main boom head
- Jib head
- A-frame2
- A-frame3
- Derrick boom head

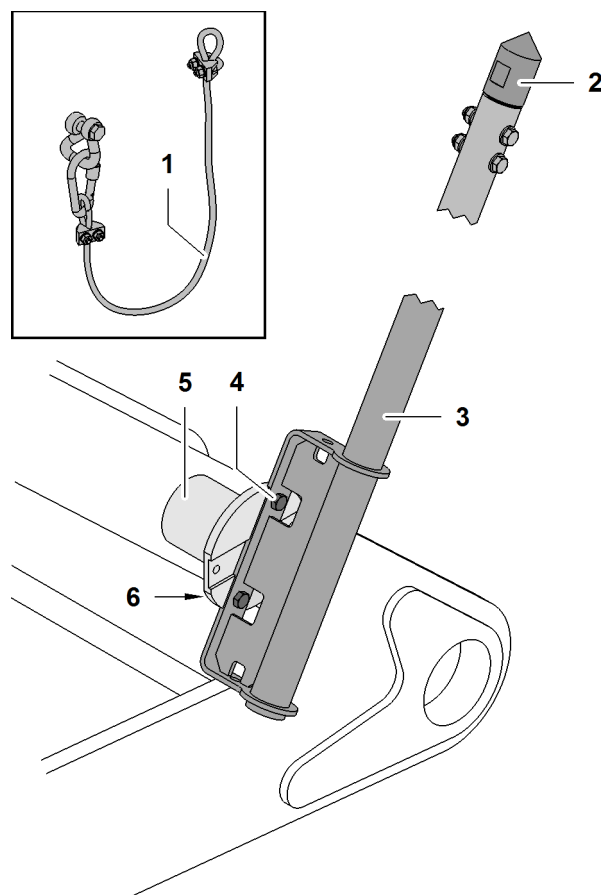


Fig. 482: Lightning rod

- | | | | |
|---|--|---|----------------|
| 1 | Safety rope with shackle and carabiner | 4 | Screw (2x) |
| 2 | Tip | 5 | Mounting plate |
| 3 | Lightning rod | 6 | Nut (2x) |

The lightning rod **3** is attached with screws **4** on the mounting plate **5** and locked with nuts **6**.

The safety rope **1** prevents dropping of the lightning rod **3**.

The tip **2** is made of bronze.

1.44 External power supply*

The external supply is required for the following components:

- Aircraft warning light
- Low temperature package

External power can also be supplied by an external power unit.

1.44.1 External power supply aircraft warning light

External power supply serves for charging, trickle charging or boosting the batteries when the machine is switched off. The supply voltage is 230 V or 115 V.

The “external power supply aircraft warning light” operates the aircraft warning light ([For more information see: 1.52 Aircraft warning light*, page 476](#)) .

NOTICE

Batteries will not be charged if the main battery switch is turned off!
Damage to batteries.

- ▶ Do not turn off main battery switch during charging.
-

The aircraft warning light is supplied with power via the batteries and the generator of the machine. With the “external power supply aircraft warning light”, the aircraft warning light can be operated overnight when the ignition is off as well as over longer periods, e.g. during the weekend without straining the battery.

Supply

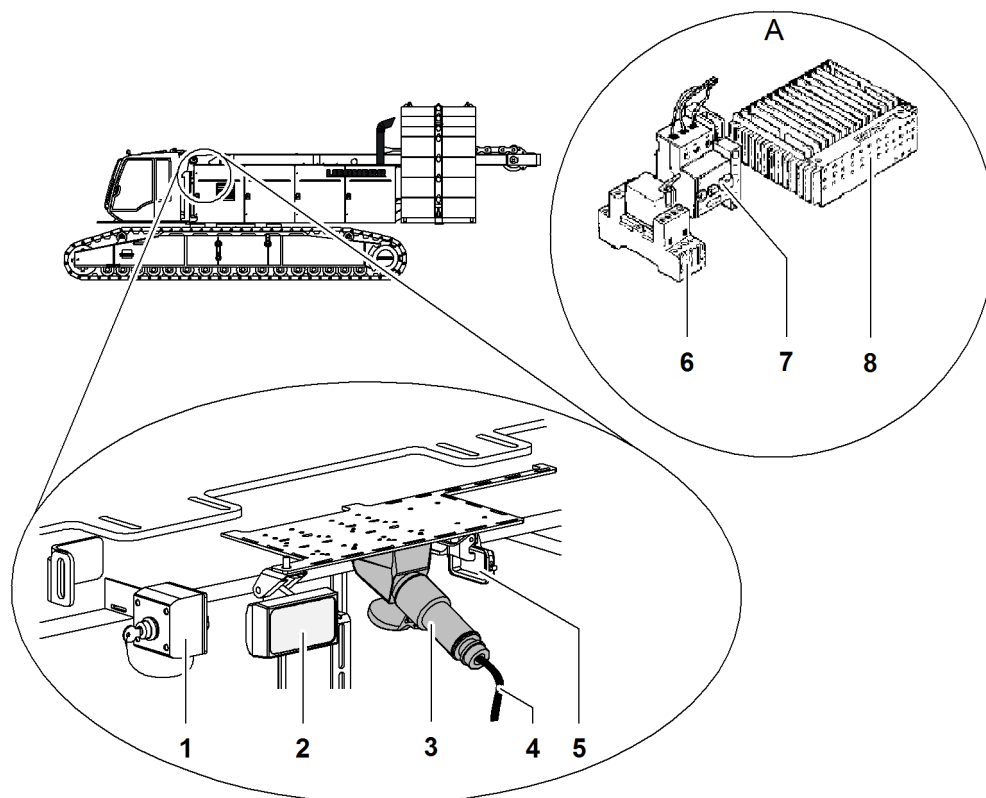


Fig. 483: External power supply

- | | | | |
|---|--|---|---|
| 1 | Key switch <i>Load moment limitation shut-down</i> | 5 | Control panel emergency operation control connection plug |
| 2 | Floodlight | 6 | Circuit breaker |
| 3 | External supply connection plug | 7 | Engine protection switch |
| 4 | Mains cable | 8 | Charger |

Detail A is located in the switch cabinet behind the cabin.

Charger

Name	Value
Nominal voltage	115/230 V, 50/60 Hz
Output voltage	28.8 V / 27.6 V
Maximum output current	25 A

Tab. 288: Technical data charger

Mains cable



WARNING

Faulty mains cable!
Electric shock.

- ▶ Have mains cable repaired/replaced by qualified expert technical maintenance personnel.
- ▶ Make sure that the mains cable meets the national safety regulations.
- ▶ Make sure that the mains cable is suited for use on construction sites.



WARNING

Damaged mains cable!
Electric shock.

- ▶ When laying the mains cable, make sure that no damage occurs.

The required mains cable for external connection is not supplied with the machine. A matching plug is located in the socket in the uppercarriage.

Mains cable:

- One phase
- One neutral conductor
- One protective conductor

1.44.2 External supply low temperature package

External power supply serves for charging, trickle charging or boosting the batteries. Certain components of the low temperature package are supplied directly. The supply voltage is 3 x 230 V.

The "low temperature external power supply" operates the following:

- Aircraft warning light ([For more information see: 1.52 Aircraft warning light*](#), [page 476](#))
- Low temperature package
- Socket in cabin ([For more information see: 1.73 Socket* in cabin, page 515](#))

NOTICE

Batteries will not be charged if the main battery switch is turned off!
Damage to batteries.

- ▶ Do not turn off main battery switch during charging.

The aircraft warning light and the auxiliary heating are supplied with power via the batteries and the generator of the machine. With the "external power supply low temperature package", the aircraft warning light and the auxiliary heating can be operated overnight when the ignition is off and even for longer periods, e.g. over weekends without draining the battery.

The socket in the cabin and other components of the low temperature package (e.g. engine pre-heater, ...) are only supplied with power if the "external supply low temperature package" is plugged in.

Supply

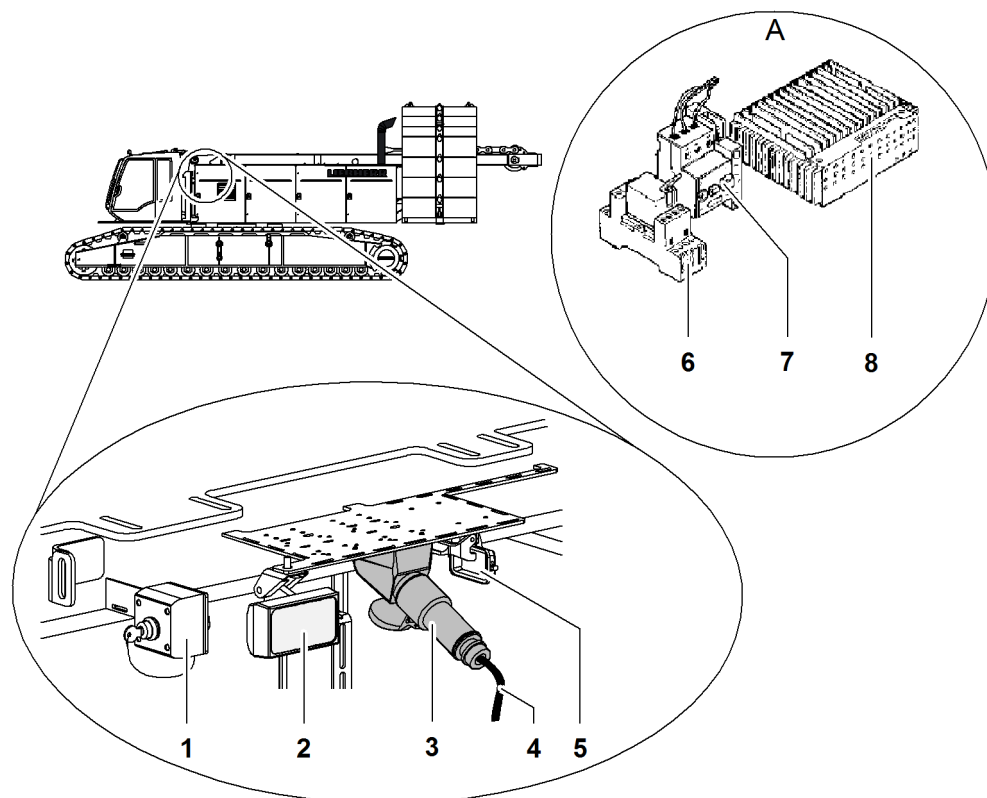


Fig. 484: External power supply

- | | | | |
|---|--|---|---|
| 1 | Key switch <i>Load moment limitation shut-down</i> | 5 | Control panel emergency operation control connection plug |
| 2 | Floodlight | 6 | Circuit breaker |
| 3 | External supply connection plug | 7 | Engine protection switch |
| 4 | Mains cable | 8 | Charger |

Detail A is located in the switch cabinet behind the cabin.

Charger

Name	Value
Nominal voltage	115/230 V, 50/60 Hz
Output voltage	28.8 V / 27.6 V
Maximum output current	25 A

Tab. 289: Technical data charger

Mains cable

**WARNING**

Faulty mains cable!
Electric shock.

- ▶ Have mains cable repaired/replaced by qualified expert technical maintenance personnel.
 - ▶ Make sure that the mains cable meets the national safety regulations.
 - ▶ Make sure that the mains cable is suited for use on construction sites.
-

**WARNING**

Damaged mains cable!
Electric shock.

- ▶ When laying the mains cable, make sure that no damage occurs.
-

The required mains cable for external connection is not supplied with the machine. A matching plug is located in the socket in the uppercarriage.

Mains cable:

- Three phases
- One neutral conductor
- One protective conductor

1.45 Radio remote control*

The radio transmitter is designed in accordance with the directives and guidelines of BGV D6 for cranes, ZH 1/547 "directives for radio remote controls of cranes" and DIN EN 13557. The radio transmitter has been tested in accordance with EMV guidelines and fulfils the pertinent standards regarding transient emissions and immunity to interference for industrial application.

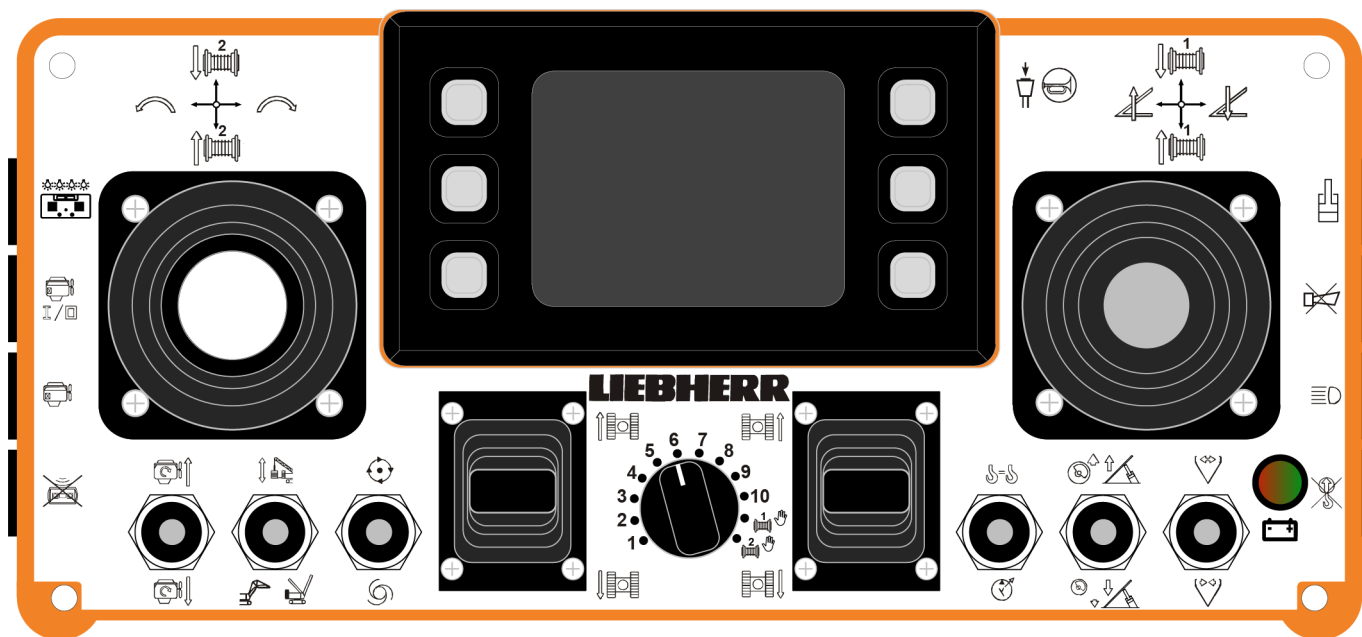


Fig. 485: Radio remote control

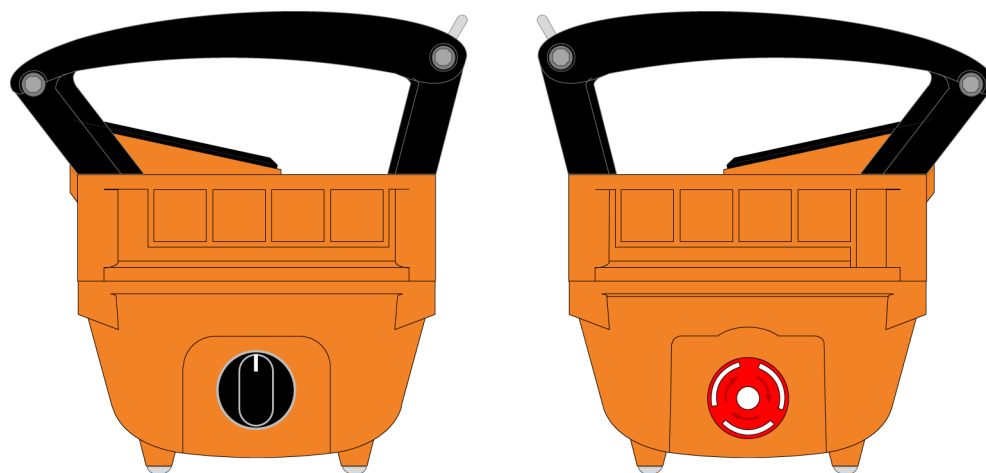


Fig. 486: Radio remote control

Name	Value
Length	358 mm 1' 2" ft-in
Width	182 mm 7.17" in

Name	Value
Height	178 mm 7.01" in
Frequency range	1790 MHz to 1930 MHz (1930 MHz)
Transmission power	< 10 mW
Operating temperature	-20 °C (-4 °F) to 70 °C (158 °F)
Battery charging time	max: 4 h
Operating time	approx. 9 h in permanent operation
Weight	3 kg 6.61 lb

Tab. 290: Technical data radio remote control

Name	Value
Length	270 mm 10.63" in
Width	160 mm 6.30" in
Height	115 mm 4.53" in
Operating temperature	-20 °C (-4 °F) to 70 °C (158 °F)
Weight	3.5 kg 7.72 lb

Tab. 291: Technical data receiver module (radio receiver on machine)

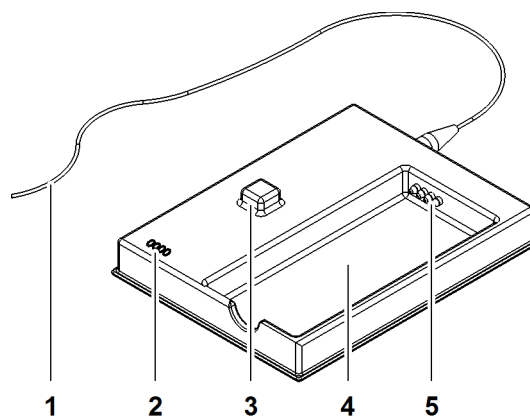


Fig. 487: Battery charger

- | | | | |
|---|-------------------------|---|---------------------|
| 1 | Cable | 4 | Loading compartment |
| 2 | LED (4x) | 5 | Contact pin (4x) |
| 3 | Button <i>Unloading</i> | | |

The battery charger is installed on the machine's back shelf.

Radio remote control*

Name	Value
Length	186 mm 7.32" in
Width	140 mm 5.51" in
Height	42 mm 1.65" in
Operating voltage	100 V to 240 V (240 V)
Power consumption	12 W
Output voltage	< 10 V
Output current	0.4 A .4 A
Weight	0.85 kg 1.87 lb
Compatible batteries	NiCd batteries type FuB 10 AA and FuB 10 XL
	NiMh batteries type BA214061

Tab. 292: Technical data battery charger

1.46 Foot pedal adjuster*

The foot pedal adjuster* ensures the optimum position of the foot pedals for the respective machine operator.

Additional foot pedal plates are mounted on the foot pedal *Brake free-fall winch1* and the foot pedal *Brake free-fall winch2*.

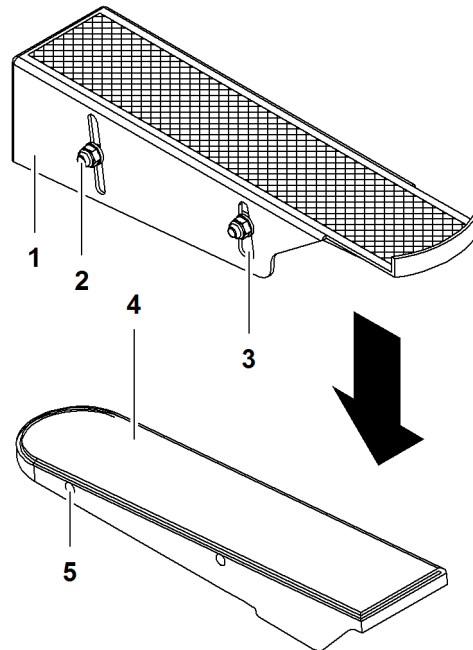


Fig. 488: Foot pedal adjuster*

- | | | | |
|---|------------------------|---|----------------------|
| 1 | Foot pedal plate | 4 | Foot pedal |
| 2 | Screw (2x) | 5 | Boring (2) for screw |
| 3 | Longitudinal hole (2x) | | |

The height and inclination of the foot pedals can be adjusted with the screws 2 in the longitudinal holes 3.

1.47 GSM/GPRS/GPS modem

A GSM/GPRS/GPS modem is connected to the Litronic control system.

The modem is located in switching cabinet X1. This enables the latest operating data, position data and the stored machine data to be transmitted to Liebherr after sales service.

Subject to certain conditions, Liebherr after sales service can use a diagnostic system to determine the reasons behind faults, to prepare accordingly for engineers to attend and to organize the spare parts supply quickly and efficiently.

Name	Value
Frequency	850 MHz, 900 MHz (900 MHz), 1800 MHz (1800 MHz), 1900 MHz (1900 MHz)
Nominal voltage	6.5 V to 48 V (48 V)

Tab. 293: Technical data for GSM/GPRS/GPS modem

1.48 Virtual Private Network (VPN)*

This retrofit kit allows data sent from a 2G modem to be picked up by a 3G network.

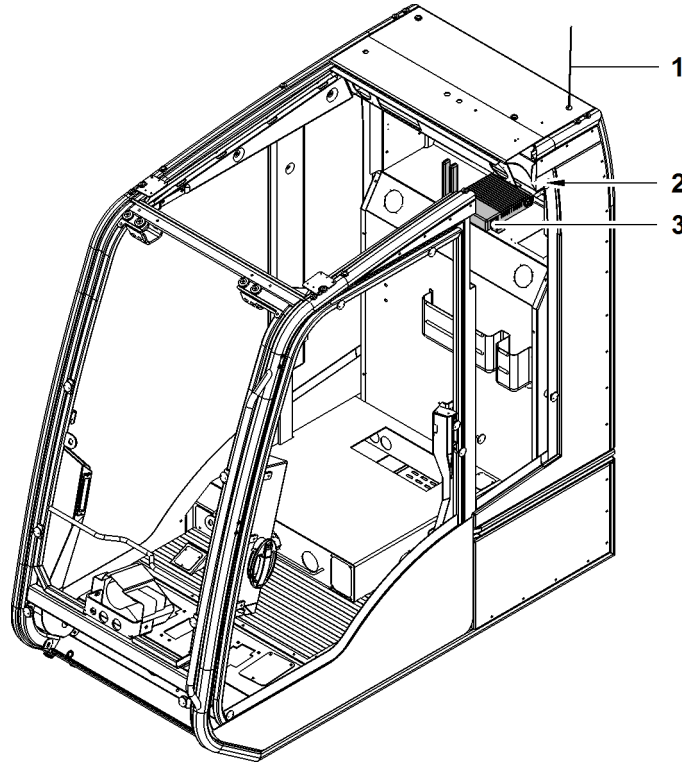


Fig. 489: Overview

- | | | | |
|---|------------|---|---------------|
| 1 | Antenna | 3 | 3G VPN router |
| 2 | Power unit | | |

The 3G VPN router **3** is mounted on the back shelf of the cabin.

Power is supplied by the power unit **2**.

Reception occurs via SIM card and an antenna **1**.

1.48.1 Cisco 3G VPN router

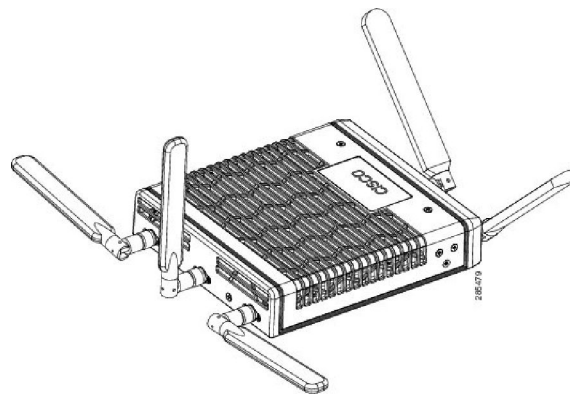


Fig. 490: Cisco 3G VPN router

The Cisco 3G VPN router is specially configured by Liebherr for each machine.

Name	Value
Cisco 3G VPN router	C819HG+7-K9
Power consumption	20 W
Nominal voltage	24 V
Weight	1.5 kg 3.31 lb

Tab. 294: Technical data for Cisco 3G VPN router

1.48.2 SIM card

Name	Value
SIM card	Vodafone
Network	3G

Tab. 295: SIM card technical data

1.48.3 Power unit

Name	Value
Power unit	Cisco PWR1-20W-24VDC
Input voltage	24 V
Output voltage	5 V
Maximum power output	20 W

Tab. 296: Technical data for power unit

1.48.4 Cisco 3G antenna

Name	Value
Cisco 3G antenna	Outdoor omnidirectional
Frequency band	800 MHz, 850 MHz (850 MHz), 900 MHz (900 MHz), 1800 MHz (1800 MHz), 1900 MHz (1900 MHz), 2100 MHz (2100 MHz)
Impedence	50 Ohm 50 ohm
Application temperature	-40 °C (-40 °F) to 85 °C (185 °F)
Housing classification	IP65

Tab. 297: Technical data for Cisco 3G antenna

1.49 Hook fixing point *

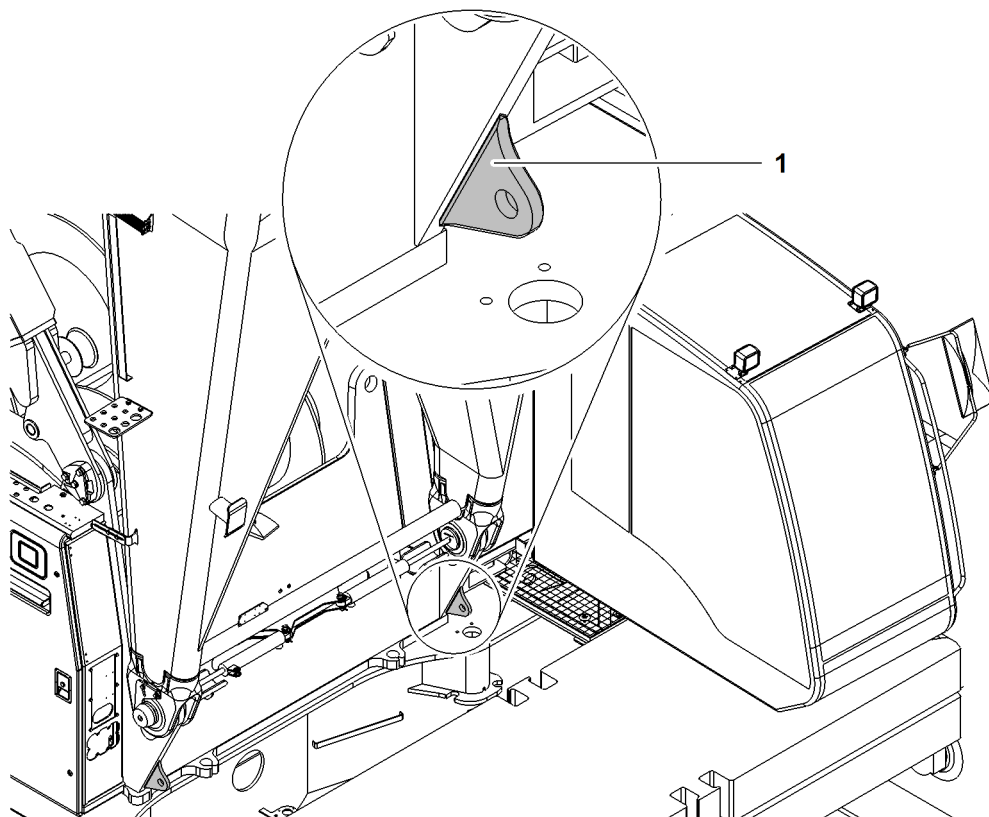


Fig. 491: Hook fixing point (illustration of principle)

1 Link (2x)

NOTICE

Inadmissible use of hook fixing point links 1!
Damage to the uppercarriage.

- ▶ Only use links 1 as hook fixing point.



WARNING

Incorrect procedure when using the hook fixing point!
Severe injuries through rope rupture, damage to the structure.

- ▶ Hook fixing point must exclusively be used in parked positions.
 - ▶ Only attach hook with stay rope on link plates 1.
-

Hook fixing point *

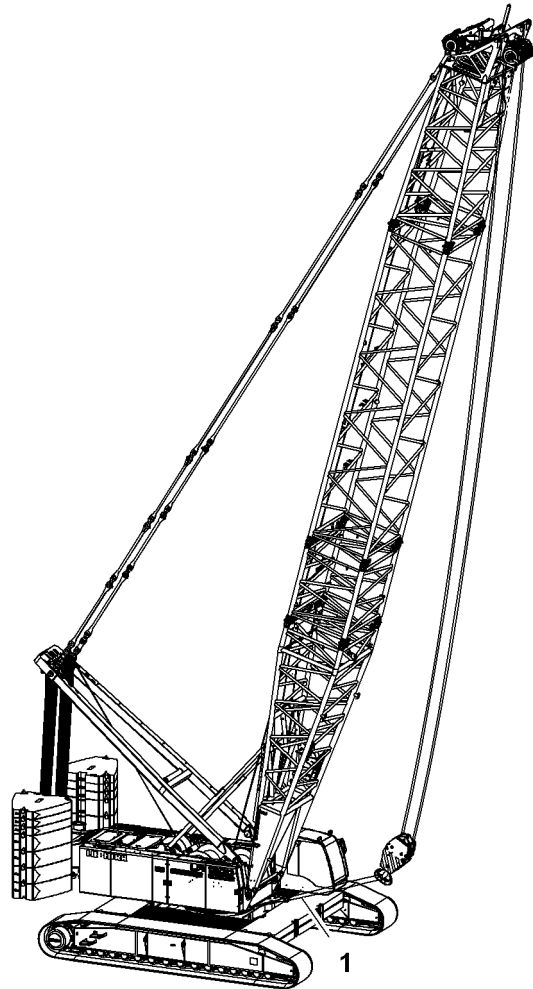


Fig. 492: Hook fixing point (illustration of principle)

1 Safety retaining rope

1.50 Handrail* / wide steps*

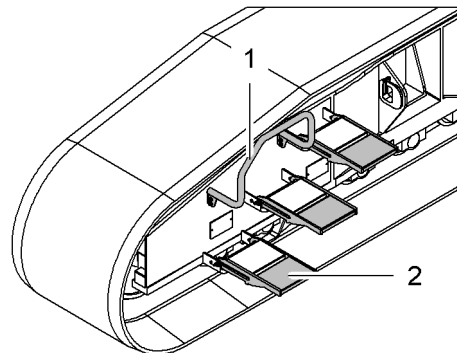


Fig. 493: Handrail / wide steps

1 handrail

2 Wide steps

The handrail **1** and the wide steps **2** allow personnel to climb onto the crawler side frame more easily.

1.51 Ventilation, heating and air-conditioning

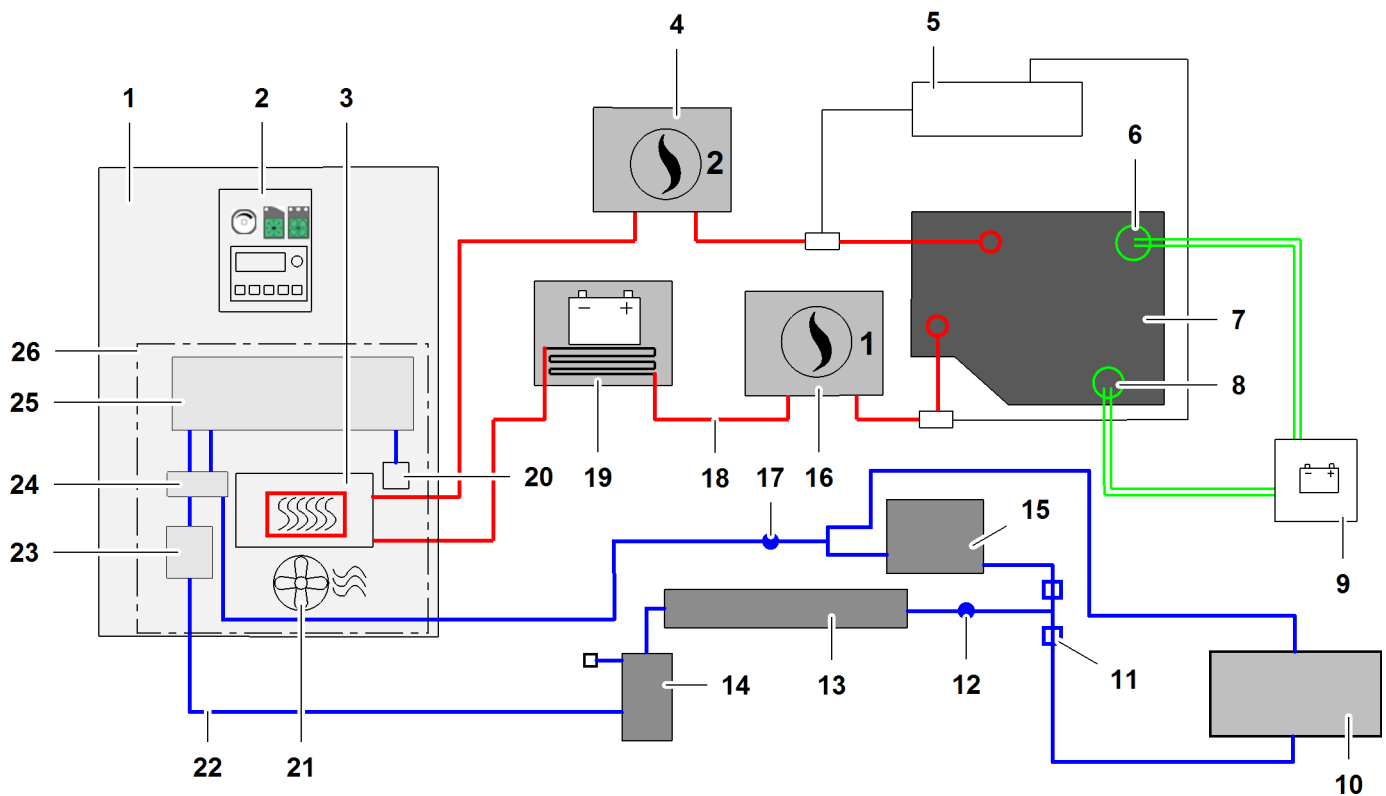


Fig. 494: Ventilation, heating and air-conditioning (illustration of principle)

1	Cabin	10	External air conditioning system*	19	Battery heating*
2	Operating elements in cabin	11	Non-return valve (2x)	20	Thermostat
3	Heat exchanger in climatic box	12	Filling coupling (high pressure)	21	Blower
4	Auxiliary water heating*	13	Condenser	22	Cooling circuit (shown in blue)
5	Urea tank	14	Dryer	23	Solenoid valve
6	Diesel engine coolant heating*	15	A/C compressor	24	Expansion valve
7	Diesel engine	16	Auxiliary water heating*	25	Evaporator
8	Diesel engine lubrication oil heating*	17	Filling coupling (low pressure)	26	Climatic box
9	Switch cabinet X1	18	Heating circuit (shown in red)		

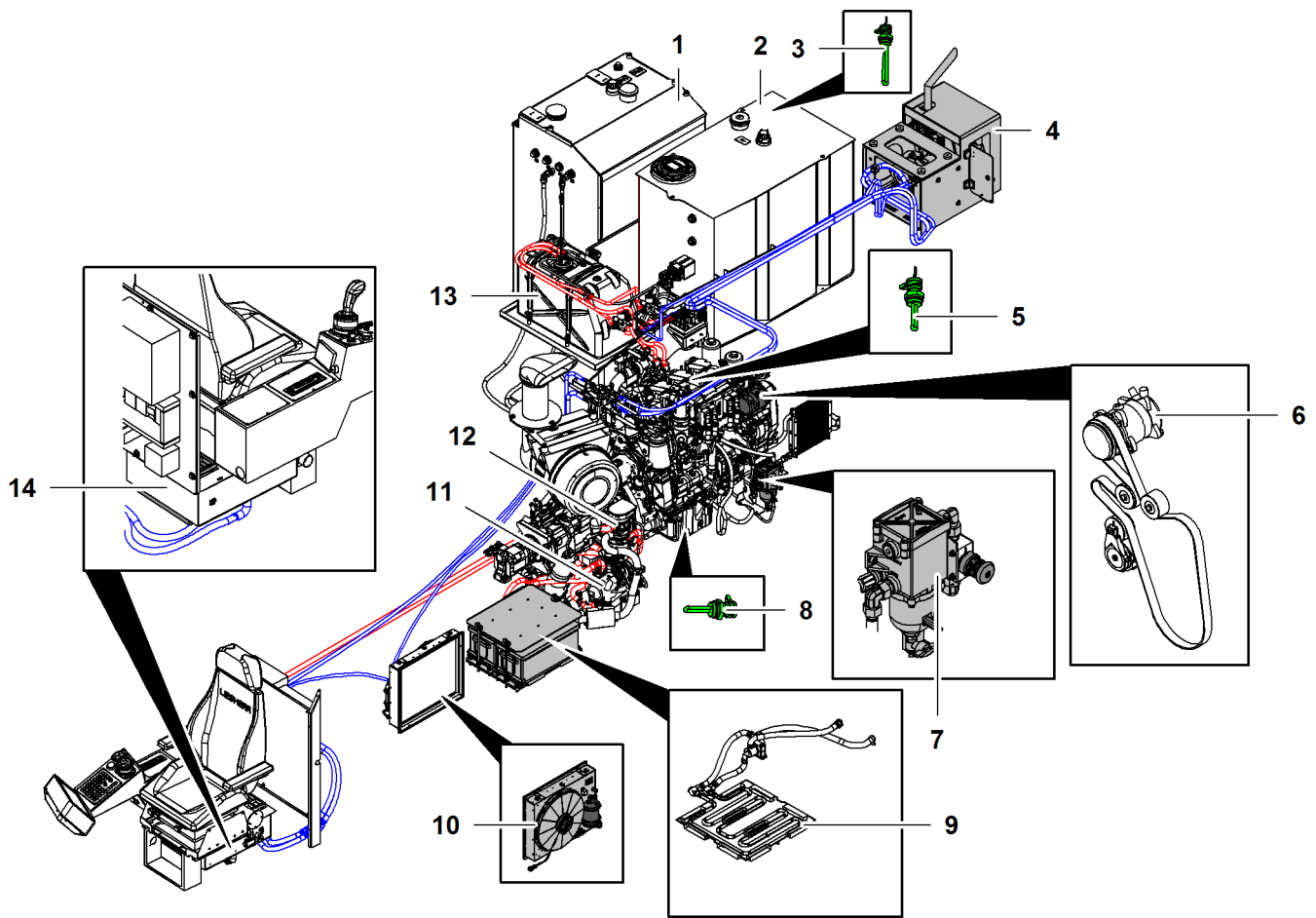


Fig. 495: Installation situation ventilation, heating and air-conditioning (illustration of principle)

1	Fuel tank	6	A/C compressor	11	Auxiliary water heating*
2	Hydraulic oil tank	7	Fuel pre-filter heating	12	Auxiliary water heating*
3	Immersion heater of hydraulic oil tank heating*	8	Immersion heater of diesel engine lubrication oil heating*	13	Urea tank
4	External air conditioning system*	9	Battery heating*	14	Climatic box
5	Immersion heater of diesel engine coolant heating*	10	Condenser		

The components may be installed individually or in groups.

The installation positions of the individual components or the modules varies according to machine type.

1.51.1 Cooling circuit

The air conditioning system is combined with the heating and ventilation systems of the operator's cabin. The heating and air conditioning system only work when the diesel engine is running.

The external air conditioning system is connected to the air conditioning system, which is why only the diesel engine may be in operation.

Air conditioning system

The air conditioning system consists of the following components:

- Condenser on uppercarriage door

- Dryer on condenser
- A/C compressor on diesel engine
- Climatic box beneath cabin

Condenser on uppercarriage door/dryer on condenser

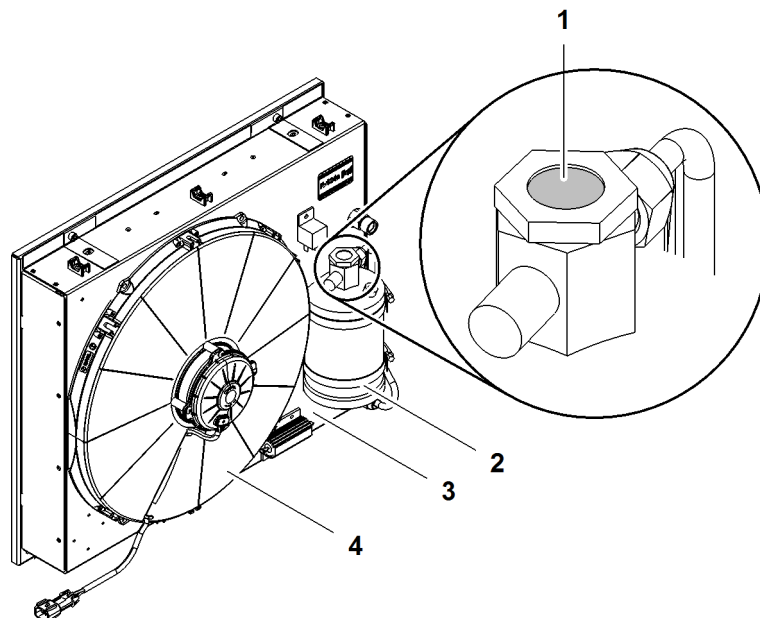


Fig. 496: Condenser on uppercarriage door/dryer on condenser

- | | | | |
|---|------------------|---|-----------|
| 1 | Inspection glass | 3 | Condenser |
| 2 | Dryer | 4 | Fan |

Name	Value
Maximum cooling output	10.1 kW
Nominal voltage	24 V
Maximum nominal current	8.7 A
Fan capacity	3650 m ³ /h (4,773.98 yd ³ /h) (free-blowing)
Fan motor	dual-stage
Coolant	R134 A without CFC
Weight	10.5 kg 23.15 lb

Tab. 298: Technical data condenser

A/C compressor on diesel engine

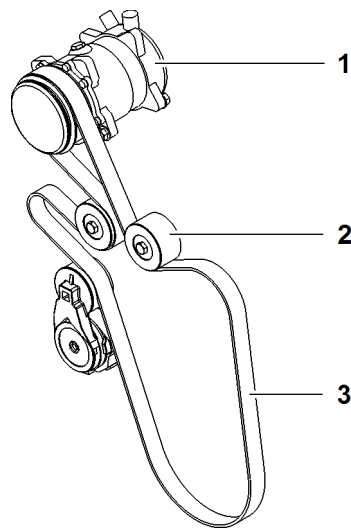


Fig. 497: A/C compressor on diesel engine

- | | | | |
|---|------------------------|---|-------------|
| 1 | A/C compressor | 3 | Drive belts |
| 2 | Deflection pulley (3x) | | |

The A/C compressor 1 is installed on the diesel engine. The A/C compressor 1 is driven via the drive belt 3.

Climatic box beneath cabin

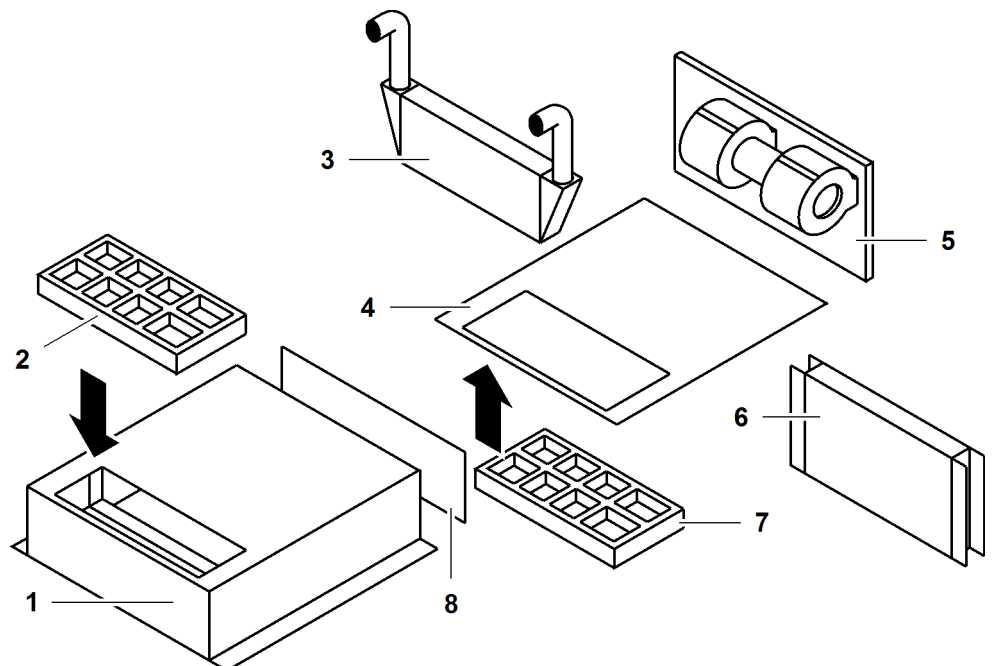


Fig. 498: Climatic box beneath cabin (illustration of principle)

- | | | | |
|---|------------------------------|---|---------------------------------|
| 1 | Climatic box | 5 | Blower |
| 2 | Recirculated air filter | 6 | Evaporator |
| 3 | Heat exchanger | 7 | Fresh air filter |
| 4 | Bottom plate of climatic box | 8 | Flap recirculated air/fresh air |

The cabin is supplied with warm air by the heat exchanger 3.

The cabin is supplied with cold air by the evaporator **6**.

The air flow is controlled with the recirculated air/fresh air flap **8**.

External air conditioning system*

The external air conditioning system consists of the following components:

- Drive unit
- Control unit *external air conditioning system*

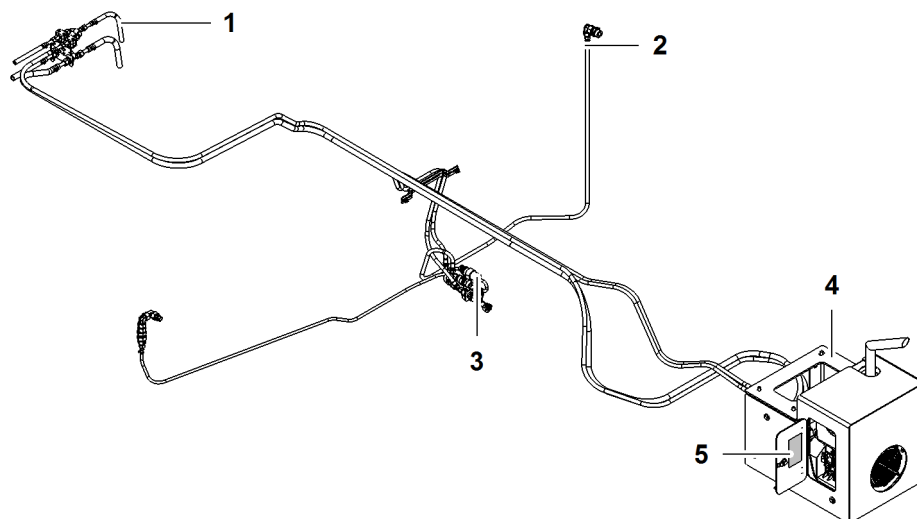
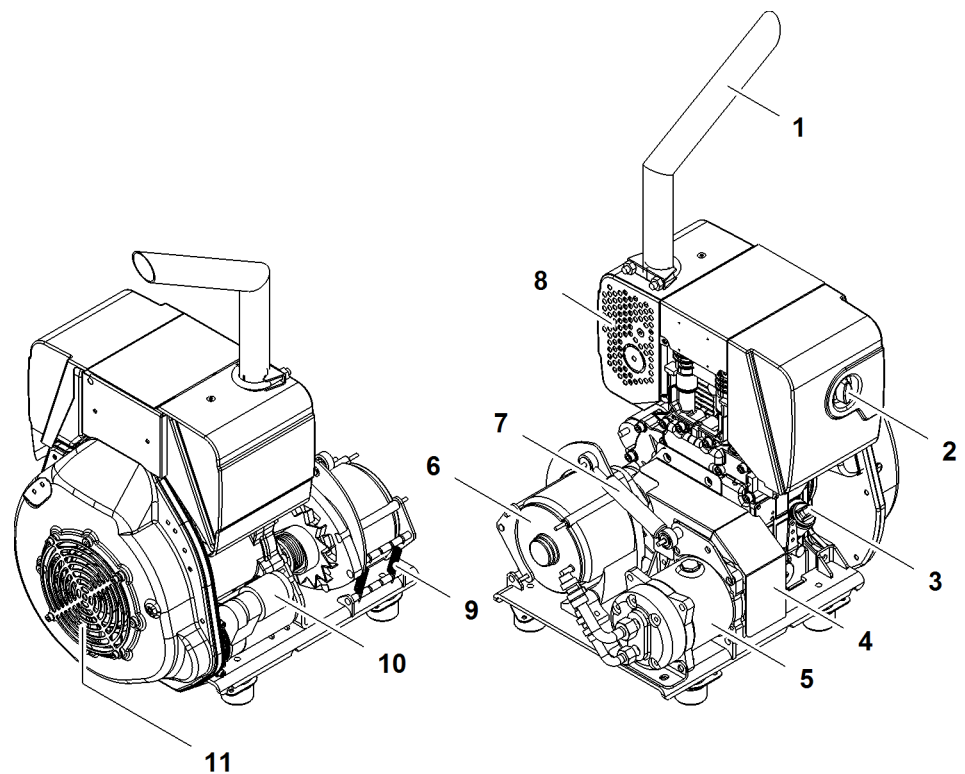


Fig. 499: External air conditioning system (illustration of principle)

- | | | | |
|---|--------------------------|---|----------------------------|
| 1 | Coolant line | 4 | Drive unit |
| 2 | Connection for fuel tank | 5 | Maintenance intervals sign |
| 3 | Diesel pump | | |

The external air conditioning system cools down or heats up the cabin without operation of the diesel engine.

Drive unit*Fig. 500: Drive unit*

- | | | | |
|----------|---------------------|-----------|----------------------------------|
| 1 | Exhaust system | 7 | Vibration damper of belt tension |
| 2 | Air filter cover | 8 | Cover |
| 3 | Oil dipstick | 9 | Spring (2x) for belt tension |
| 4 | Cover of belt drive | 10 | Starter |
| 5 | Compressor | 11 | Fan |
| 6 | Generator | | |

The drive unit is depicted without cover.

The cooling air and the combustion air for the diesel engine are sucked in through the fan **11**.

The belt drive is located behind the cover **4**.

The springs **9** guarantee optimum belt tension. Shocks are absorbed by the vibration damper **7**.

The generator **6** charges the batteries when the machine is turned off.

Name	Value
Engine type	HATZ 1B40 CARB
Fuel	Diesel
Nominal voltage	24 V
Charging current	40 A
Engine output	5.6 kW
Cooling capacity	4.7 kW
Coolant	R134 A without CFC

Name	Value
Weight	78 kg 172 lb

Tab. 299: Technical data drive unit

Control unit external air conditioning system

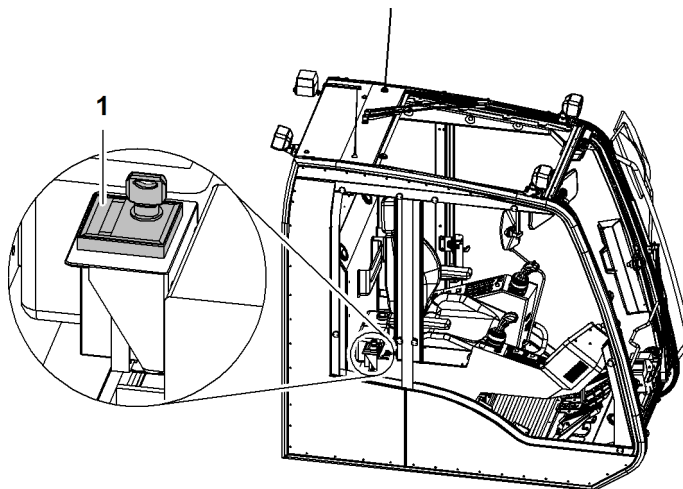


Fig. 501: Control unit external air conditioning system

- 1 Control unit External air conditioning system with ignition key

1.51.2 Heating circuit

Auxiliary water heating*

The auxiliary water heating serves to preheat the diesel engine, heat the cabin and switch cabinet X1 and to defrost the windows.

Warm water is generated through diesel combustion. The water is pumped into the coolant circuit of the diesel engine with a circulation pump. This heats the diesel engine and the heating circuit heats the cabin.

The auxiliary water heating can be programmed with the operating element *auxiliary heating* in the cabin .

No external power supply is required for operating the auxiliary water heating.

An auxiliary heating system allows operation down to -25 °C (-13 °F). Two auxiliary heating system allow operation down to -40 °C (-40 °F).

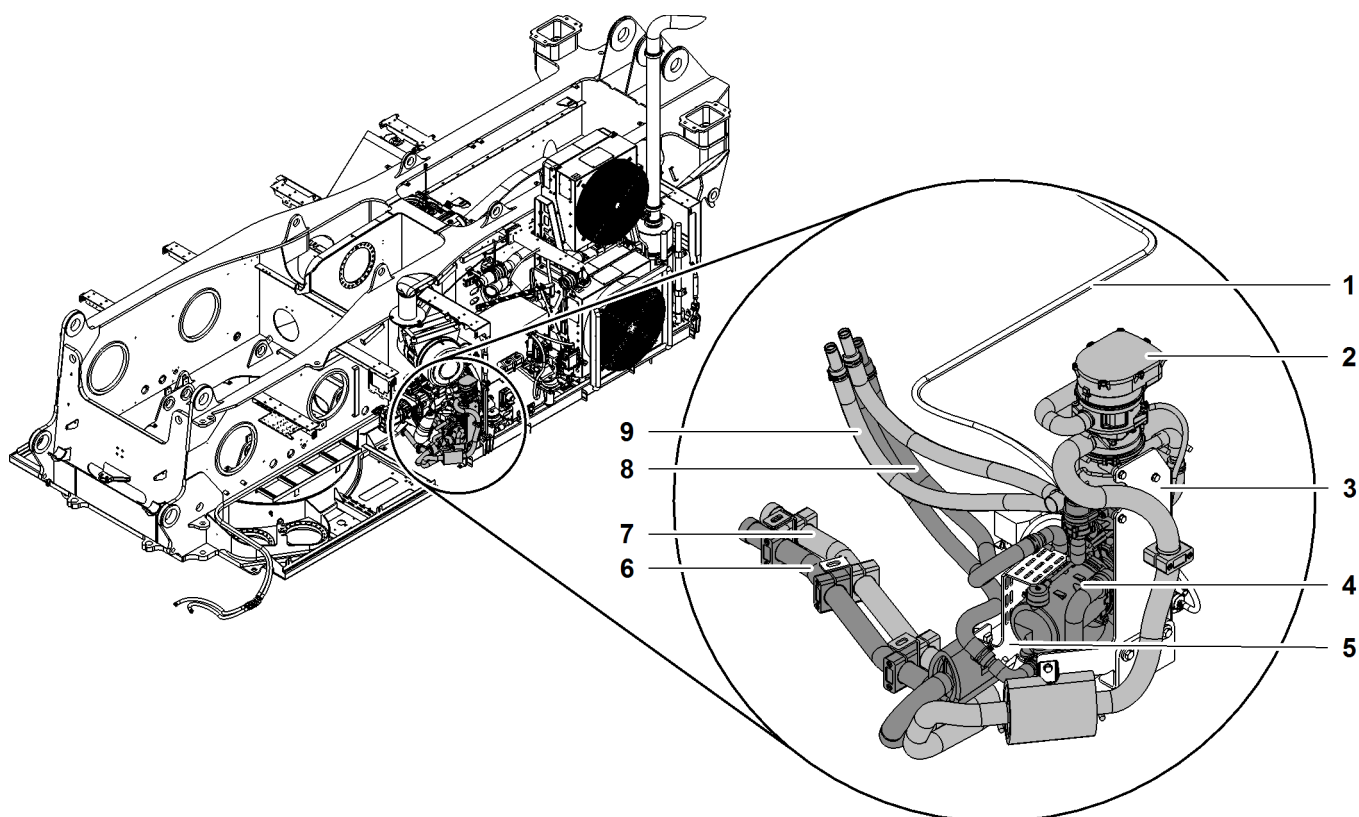


Fig. 502: Installation positions auxiliary water heating (LR 1002, LR 1003 und LR 1004) (illustration of principle)

1	Fuel line	4	Auxiliary water heating*	7	Exhaust pipe
2	Auxiliary water heating*	5	Bracket	8	Warm water pipe (2x)
3	Bracket	6	Exhaust pipe	9	Warm water pipe (2x)

Mufflers are installed on the exhaust pipes **6 + 7**. A fuel filter is installed on the fuel line **1**.

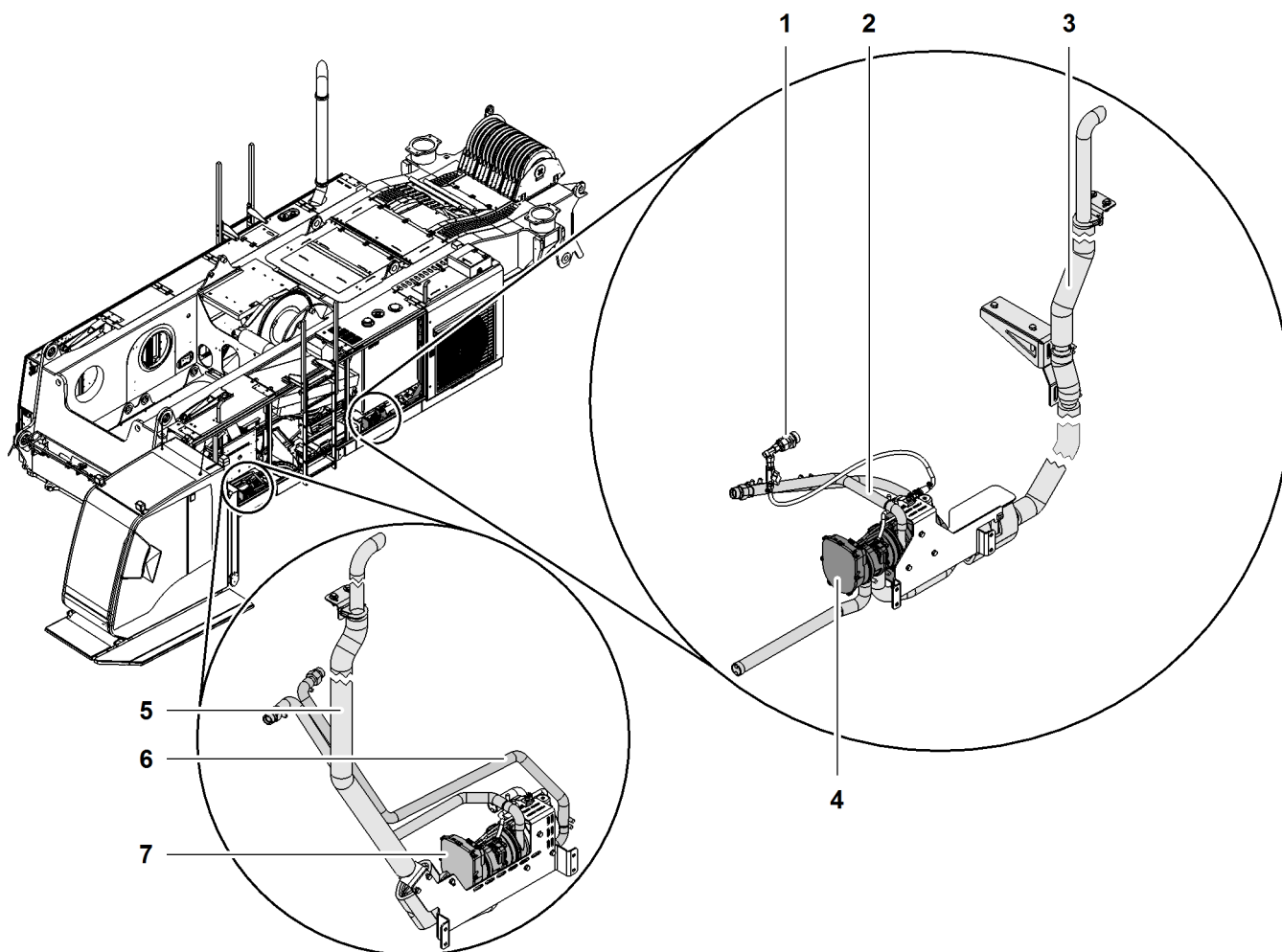


Fig. 503: Installation position auxiliary water heating (LR 1006)

- | | | | | | |
|---|-----------------|---|--------------------------|---|--------------------------|
| 1 | Fuel line | 4 | Auxiliary water heating* | 7 | Auxiliary water heating* |
| 2 | Warm water pipe | 5 | Exhaust pipe | | |
| 3 | Exhaust pipe | 6 | Warm water pipe | | |

Mufflers are installed on the exhaust pipes 3 + 5. A fuel filter is installed on the fuel line 1.

Name	Value
Webasto auxiliary heating Thermo Pro 90	
Maximum heating output	9.1 kW
Nominal voltage	24 V
Nominal power consumption	80 W
Automatic height adjustment	down to 3500 m (11482' 11" ft-in)
Weight	4.9 kg 10.80 lb
Operating temperature	-40 °C (-40 °F) to 80 °C (176 °F)

Tab. 300: Technical data auxiliary water heating

Battery heating*

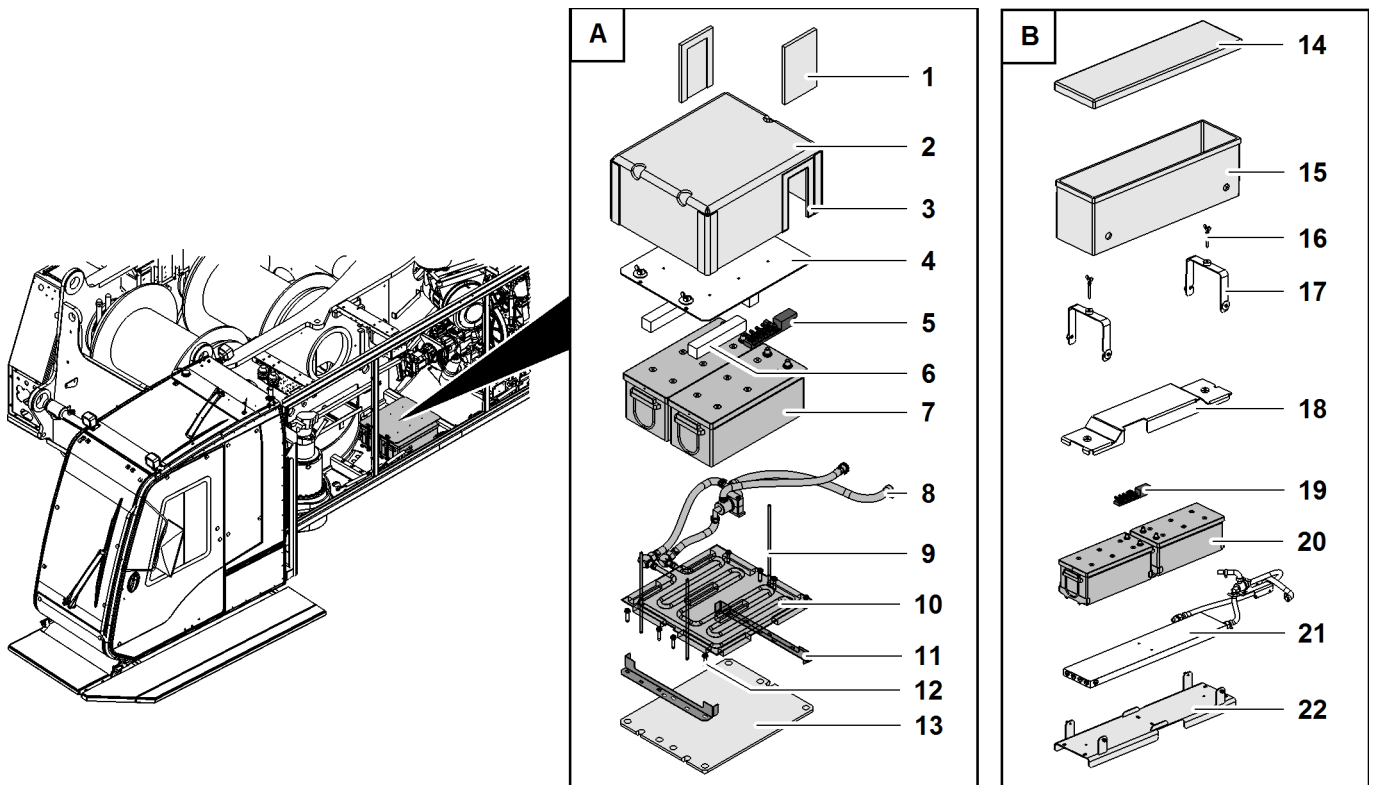


Fig. 504: Battery heating (illustration of principle)

1	Lateral insulation (2x)	9	Threaded bar (3x) with screw fitting	17	Bracket (2x)
2	Insulation	10	Heating coil	18	Cover
3	Velcro fastener	11	Battery holder	19	Fuse block
4	Cover	12	Screws	20	Battery (2x)
5	Fuse block	13	Plate	21	Heating coil
6	Wooden block (3x)	14	Top insulation	22	Plate
7	Battery (2x)	15	Insulation	A	Installation variant LR 1002, LR 1003, LR 1004
8	Connection diesel engine cooling circuit	16	Screw (2x)	B	Installation variant LR 1006

Via the connection **8** on the diesel engine's coolant circuit, a heating coil **10 + 21** warms the batteries **7 + 20**.

1.51.3 Auxiliary air heating*

The auxiliary air heating serves to heat the cabin and switch cabinet X1 and to defrost the windows.

Warm air is generated through diesel combustion. The air is blown into the cabin by the blower. This heats the cabin.

The auxiliary air heating can be programmed with the operating element *auxiliary heating* in the cabin .

No external power supply is required for operating the auxiliary air heating.

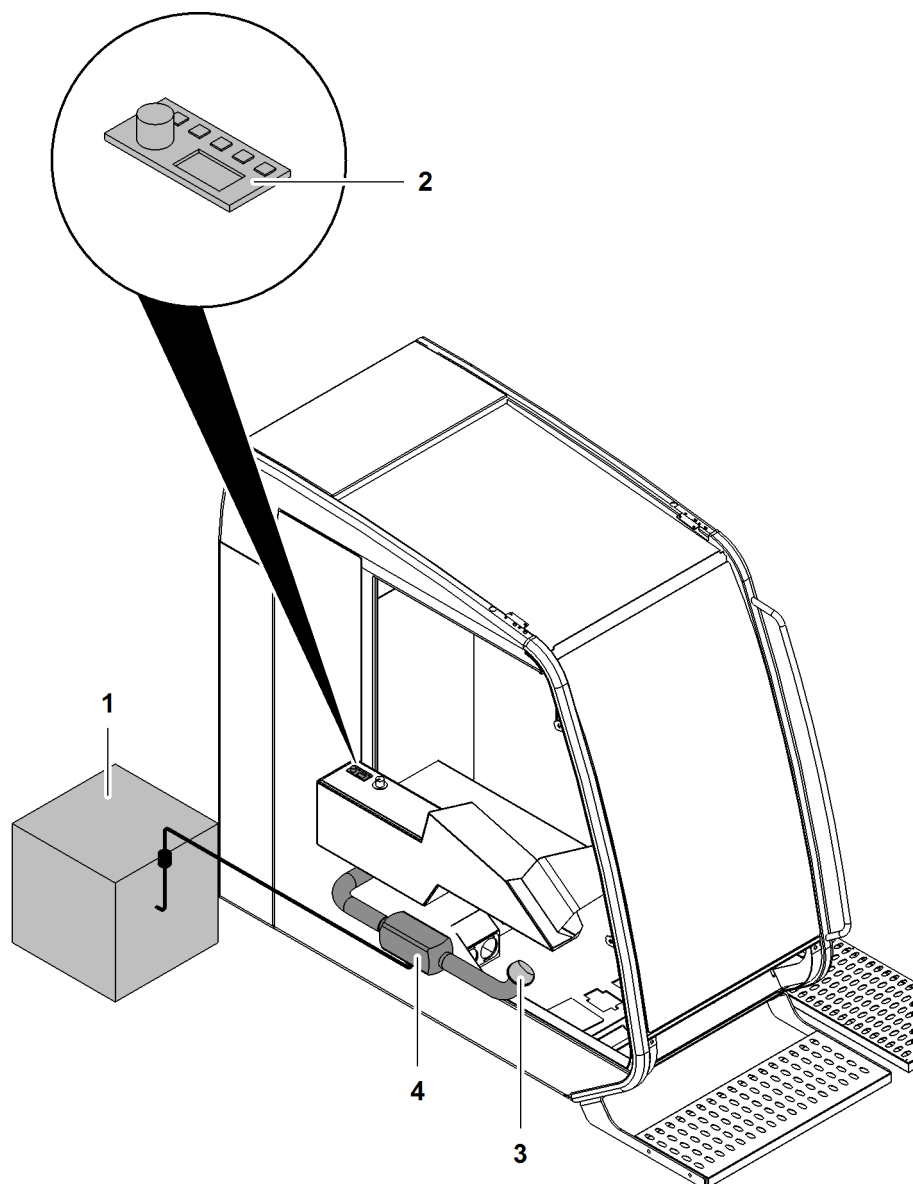


Fig. 505: Auxiliary air heating installation position (illustration of principle)

- | | | | |
|---|--------------------------------|---|-------------------|
| 1 | Fuel tank | 3 | Air vent |
| 2 | Auxiliary heating control unit | 4 | Auxiliary heating |

Name	Value
Webasto air heater Airtronik D2	
Maximum heating output	2.2 kW
Nominal voltage	24 V
Maximum nominal output	34 W
Operating temperature	-40 °C (-40 °F) to 70 °C (158 °F)
Weight	2.7 kg 5.95 lb

Tab. 301: Technical data auxiliary air heating

Auxiliary heating control unit

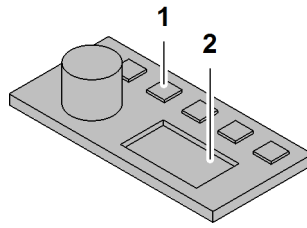


Fig. 506: Auxiliary heating control unit

1 Buttons

2 Display

Auxiliary heating altitude kit*

The auxiliary heating altitude kit is required when operating the machine at high altitudes.

After starting the heater, the air pressure sensor measures the atmospheric air pressure at intervals. It then transfers the measuring values to the heater's control unit. The control unit analyzes the measurement values and adapts the fuel flow rate of the dosing pump to the current atmospheric air pressure. Reduction of the flow rate starts as from 1400 m (4593' 2" ft-in). At the same time, this requires a reduction of the heating output of 9% per 1000 m (3280' 10" ft-in).

Name	Value
Altitude kit for Webasto air heater Airtronik D2	
Maximum permitted height	4000 m 13123' 4" ft-in
Measuring range	60 kPa (8.70 psi) to 115 kPa (16.68 psi)
Nominal voltage	8 V to 32 V
Dimensions	76 mm (2.99" in) x 76 mm (2.99" in) x 29 mm (1.14" in)
Operating temperature	-40 °C (-40 °F) to 85 °C (185 °F)

Tab. 302: Technical data auxiliary heating altitude kit

1.51.4 Electric components

An external power supply with the national nominal mains voltage is needed to operate the electric components.

Hydraulic oil tank heater*

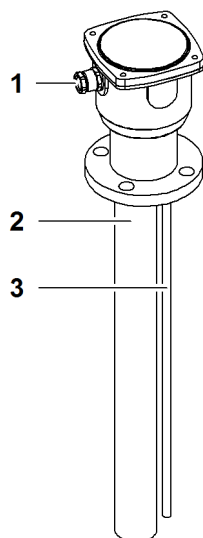


Fig. 507: Hydraulic oil tank heater

- | | | | |
|---|---------------------|---|--------------------|
| 1 | Electric connection | 3 | Temperature sensor |
| 2 | Immersion heater | | |

The immersion heater 2 is installed in the hydraulic oil tank.

Name	Value
Output	600 W
Nominal voltage	200 V to 254 V
Weight	12 kg 26.46 lb
Length	709 mm 2' 4" ft-in
Diameter	52 mm 2.05" in
Safety thermostat	set to 100 °C (212 °F)
Control thermostat	set to 20 °C (68 °F)

Tab. 303: Technical data hydraulic oil tank heater

Diesel engine coolant heating*

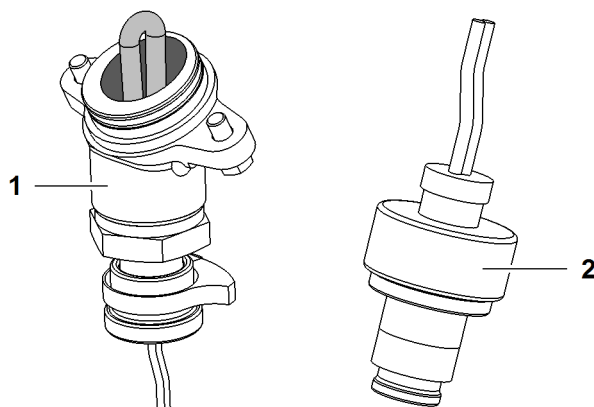


Fig. 508: Diesel engine coolant heating

1 Immersion heater

2 Thermostat

The immersion heater 1 is installed in the diesel engine's coolant circuit.

The temperature of the coolant rises by approx. 3 °C (37 °F) per hour. The thermostat on the diesel engine adjusts the temperature between 50 °C (122 °F) and 60 °C (140 °F).

Name	Value
Output	1 kW
Nominal voltage	200 V to 254 V
Nominal voltage	4.2 A
Length	84 mm 3.31" in
Heater diameter	38 mm 1.50" in

Tab. 304: Technical data diesel engine coolant heating

Diesel engine lubrication oil heating*

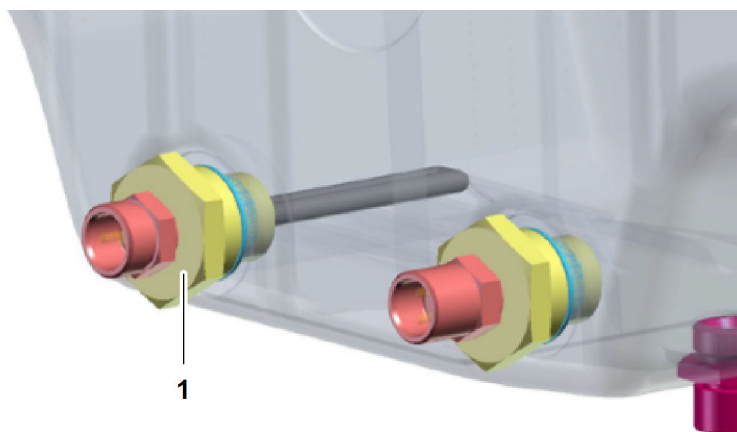


Fig. 509: Diesel engine lubrication oil heating

1 Immersion heater

The immersion heater 1 is installed in the oil sump of the diesel engine.

Name	Value
Output	300 W
Nominal voltage	200 V to 254 V
Weight	0.5 kg 1.10 lb
Control thermostat	37 °C (99 °F) to 48 °C (118 °F)

Tab. 305: Technical data diesel engine lubrication oil heating

1.51.5 Mechanic components

Fuel pre-filter heating

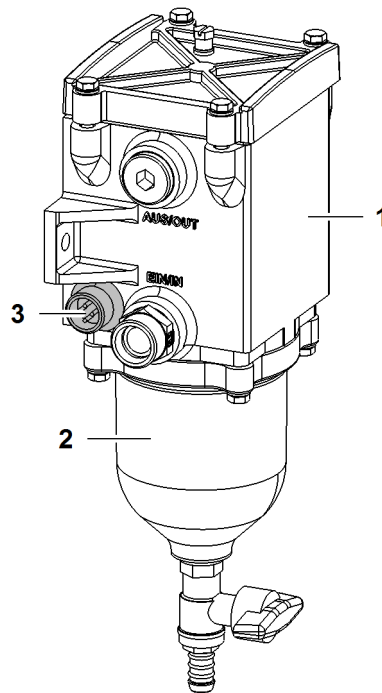


Fig. 510: Fuel pre-filter heating

- | | |
|---|-------------------------|
| <p>1 Fuel pre-filter</p> <p>2 Condensate trap</p> | <p>3 Voltage supply</p> |
|---|-------------------------|

The fuel pre-filter heater warms up the fuel. The fuel pre-filter heater is not active until the ignition is switched on.

Hydraulic oil heater*

If the diesel engine is running and the hydraulic oil temperature drops below a certain value, the hydraulic oil heater is activated automatic via the Litronic control.

The hydraulic oil heater is turned off automatically once the hydraulic oil temperature has reached a certain value.

Low temperature function lock*

A temperature sensor is installed on the machine.

If the external temperature drops below -25 °C (-13 °F), the machine cannot be put into operation.

If the outside temperature falls below -25 °C (-13 °F) during operation, the following movements are blocked:

- Winch1 and winch2
- Main boom luffing winch
- Jib luffing winch
- Slewing gear
- Crawler

1.52 Aircraft warning light*

**Note**

Use of the aircraft warning light is prescribed by national or regional regulations!

► Inform yourself about national and local regulations prior to using the machine.

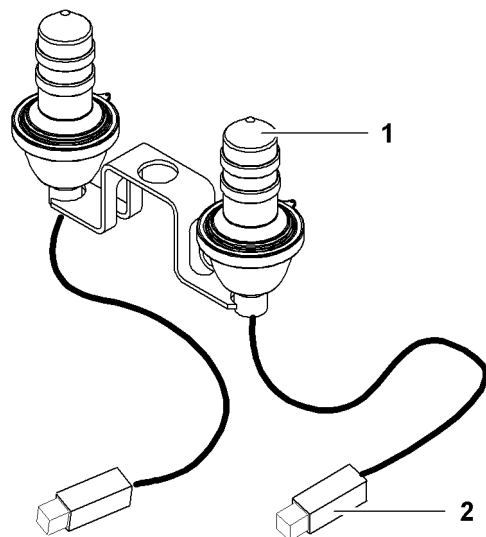


Fig. 511: Aircraft warning light

1 Aircraft warning light (2x)

2 Plug (2x)

1.53 Third hoist limit switch*

If a third rope is guided across a main boom or jib head section (e.g. auxiliary winch on main boom base section), the third hoist limit switch is required.

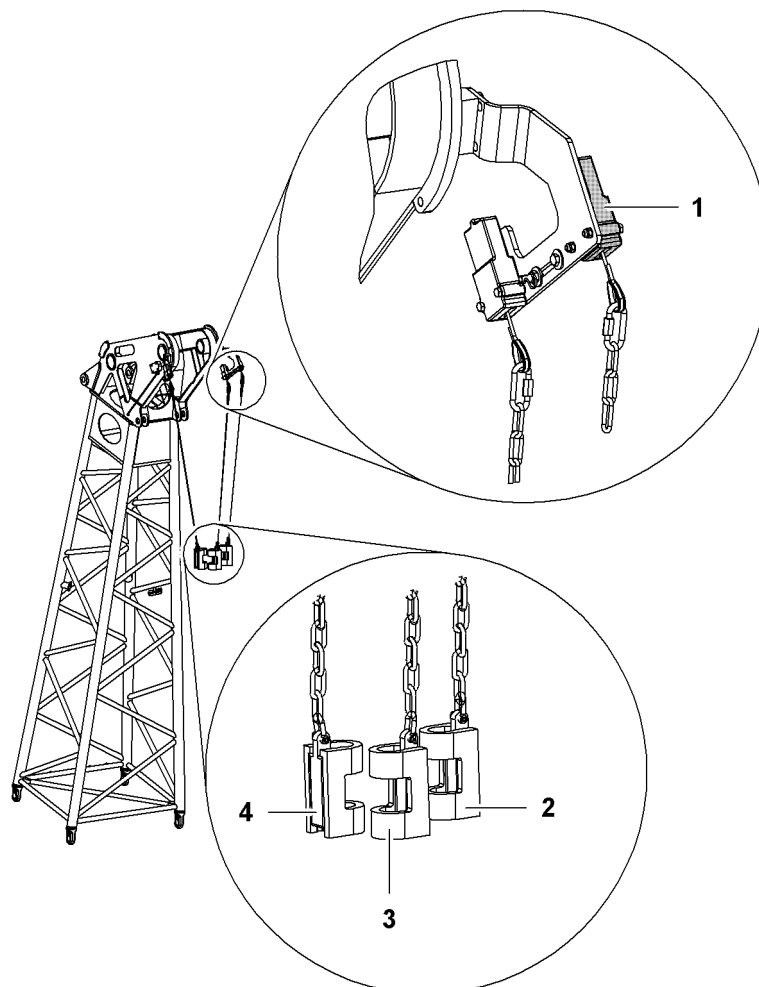


Fig. 512: Third hoist limit switch

- | | | | |
|---|----------------------------------|---|---|
| 1 | Hoist limit switches (2x) | 3 | Hoist limit switch weight auxiliary winch |
| 2 | Hoist limit switch weight winch1 | 4 | Hoist limit switch weight winch2 |

Hoist limit switch clamp* for auxiliary jib (36 t (79.300 lb))

1.54 Hoist limit switch clamp* for auxiliary jib (36 t (79.300 lb))

The hoist limit switch clamp replaces the hoist limit switch weight on the auxiliary jib (36 t (79.300 lb)).

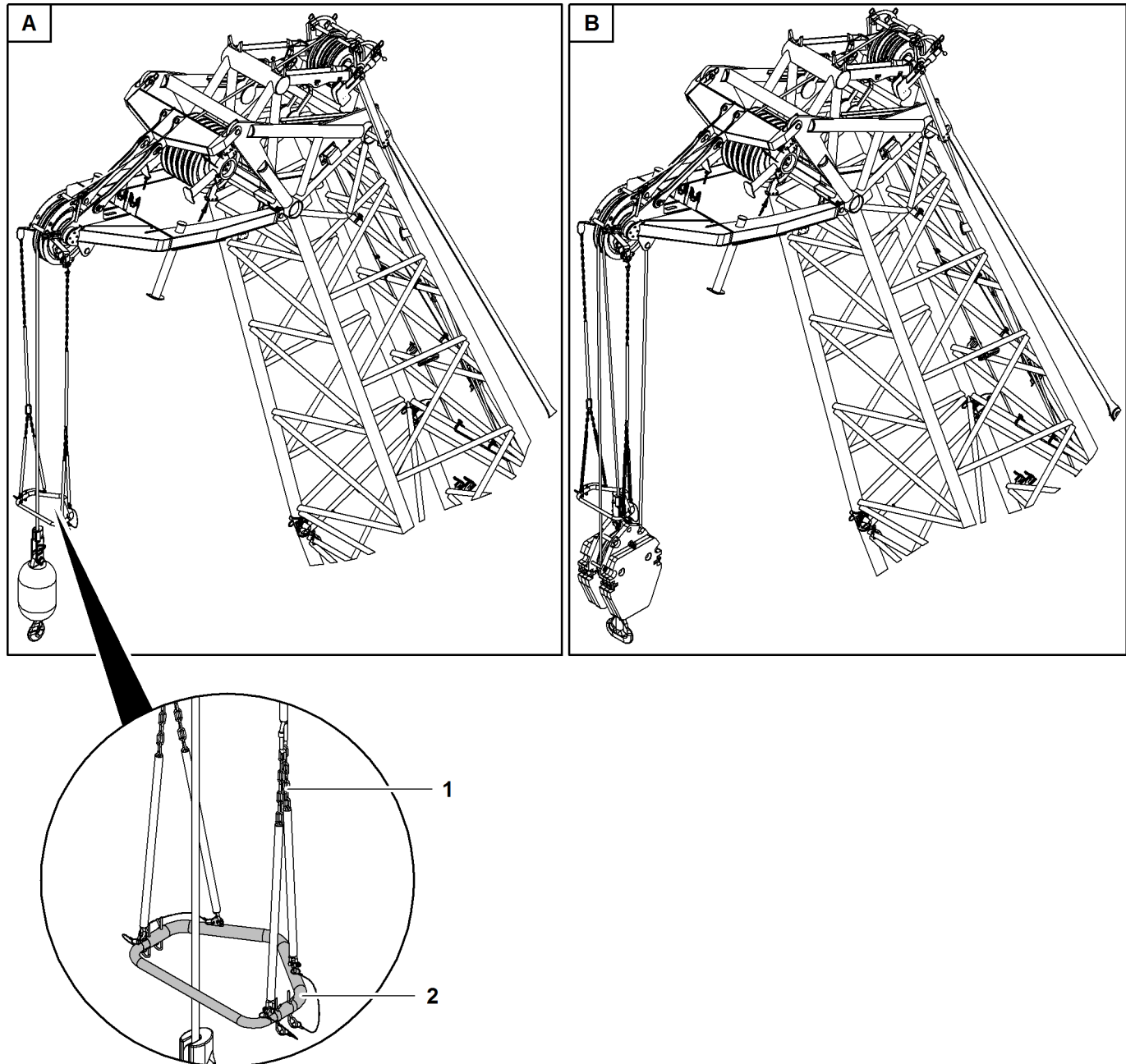


Fig. 513: Hoist limit switch clamp* for auxiliary jib (36 t (79.300 lb))

- | | | | |
|---|--------------------------|---|---|
| 1 | Chain (4x) | A | Auxiliary jib (36 t (79.300 lb))
with single reeving |
| 2 | Hoist limit switch clamp | B | Auxiliary jib (36 t (79.300 lb))
with double or triple reeving |

1.55 Hydraulic cab elevation*

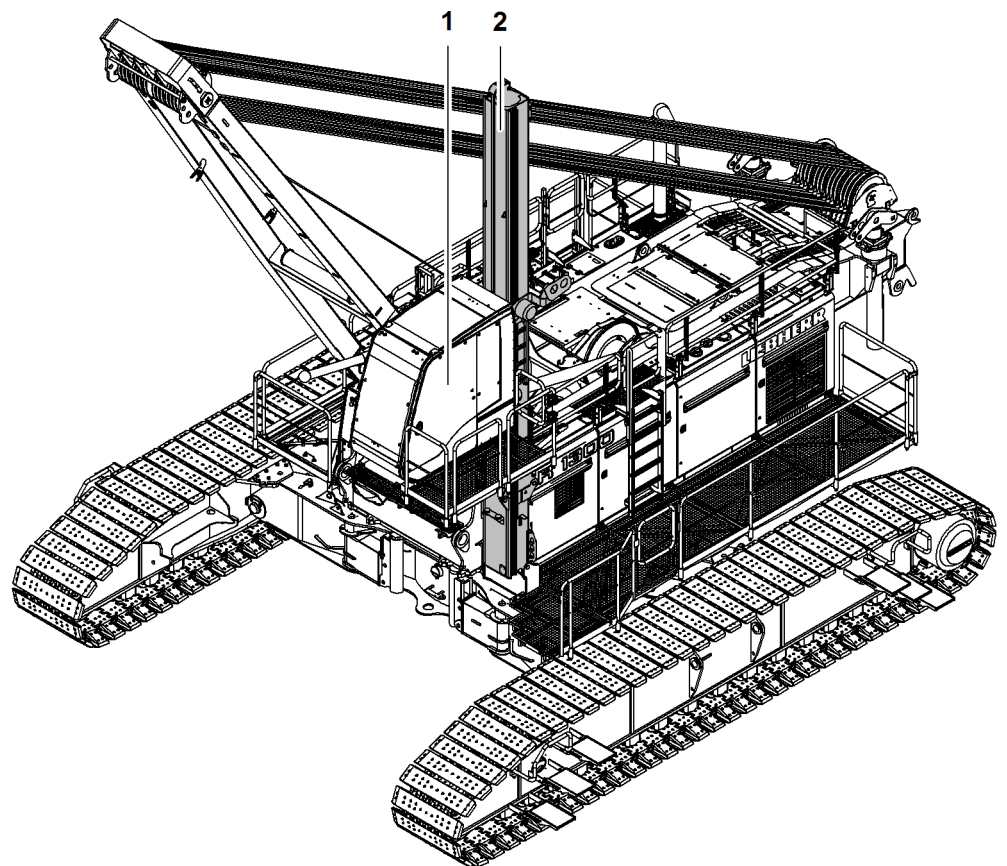


Fig. 514: Hydraulic cabin elevation (illustration of principle)

1 Cabin

2 Mast

The hydraulic cabin elevation allows continuous, vertical adjustment of the cabin 1.

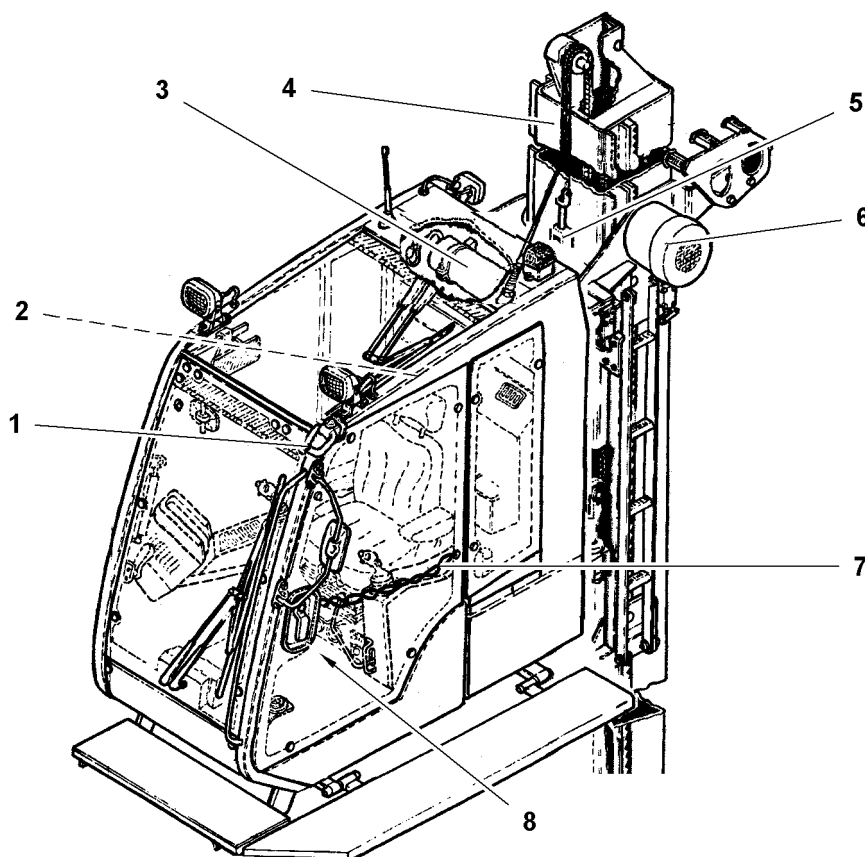


Fig. 515: Hydraulic cabin elevation - detail

- | | | | |
|---|--|---|---|
| 1 | Suspension point for emergency descent rescue equipment | 5 | Chain |
| 2 | Suspension point for emergency descent rescue equipment (with installed cabin roof protection guard) | 6 | Overrun brake |
| 3 | Abseil rescue equipment | 7 | Safety chain |
| 4 | Mast | 8 | Operating elements for the cab elevation system |

Name	Value
Maximum adjusting height	6 m 19' 8" ft-in
Lifting speed of cabin	8 m/min 26' 3" ft-in/min
Lowering speed of cabin	11 m/min 36' 1" ft-in/min
Fall arrester responds at rate of fall	0.69 m/s 2.26 ft/s
Lowering speed of cabin during emergency lowering	4.5 m/min 14' 9" ft-in/min

Tab. 306: Technical data hydraulic cabin elevation

1.56 Cabin handrail*

The cabin handrail serves as fall arrest and ascension aid.

The cabin handrail is available in the following variants:

- Variant 1
- Variant 2

The variants differ when used on the undercarriage:

- with carbody counterweight
- without carbody counterweight

1.56.1 Cabin handrail variant 1 with undercarriage with carbody counterweight

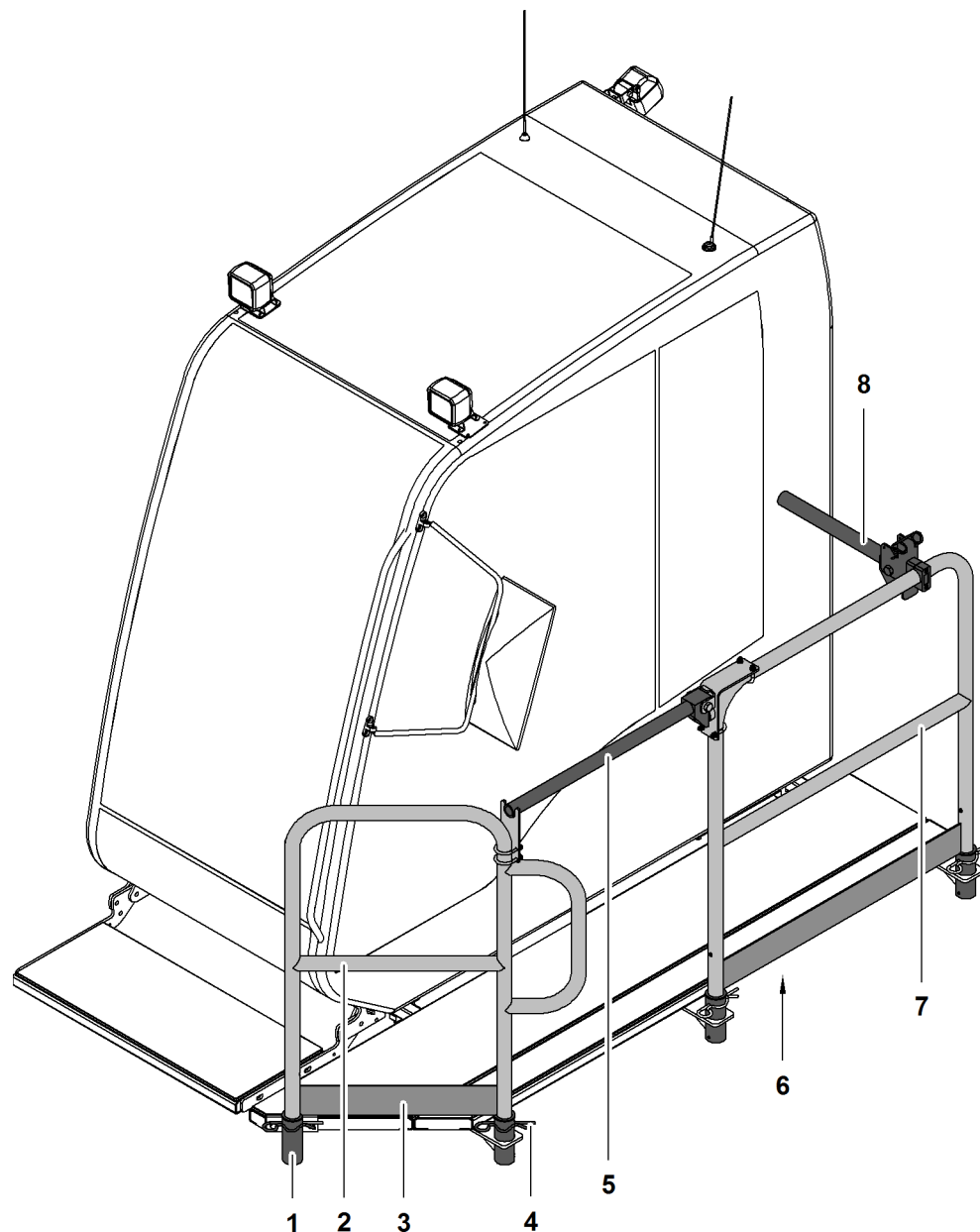


Fig. 516: Cabin handrail variant 1 with undercarriage with carbody counterweight

- | | | | |
|---|------------------------|---|---------------|
| 1 | Mount (4x) | 5 | Chopper bar |
| 2 | Front handrail | 6 | Mount (2x) |
| 3 | Foot board (2x) | 7 | Rear handrail |
| 4 | Spring cotter pin (4x) | 8 | Chopper bar |

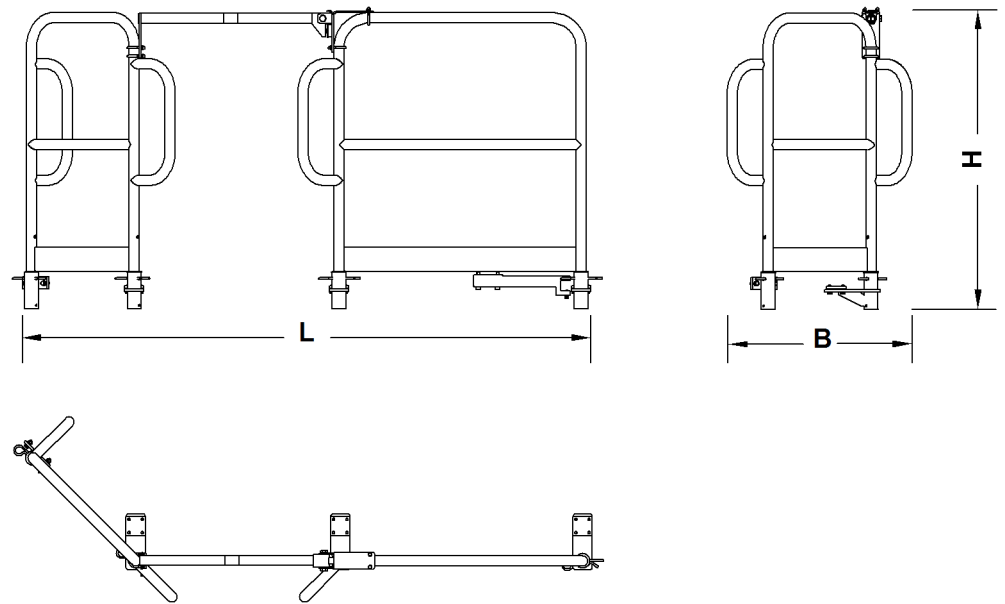


Fig. 517: Dimensions cabin handrail variant 1 with undercarriage with carbody counterweight

Name		Value
L	Length	2347 mm 7' 8" ft-in
B	Width	764 mm 2' 6" ft-in
H	Height	1237 mm 4' 1" ft-in
Weight		55 kg 121 lb

Tab. 307: Technical data cabin handrail variant 1 with undercarriage with carbody counterweight

1.56.2 Cabin handrail variant 1 with undercarriage without carbody counterweight

The cabin handrail consists of the following components:

- Small cabin handrail
- Large cabin handrail
- Mounts on platform
- Mounts below cabin
- Chopper bar
- Ladder with mount
- Extension platforms

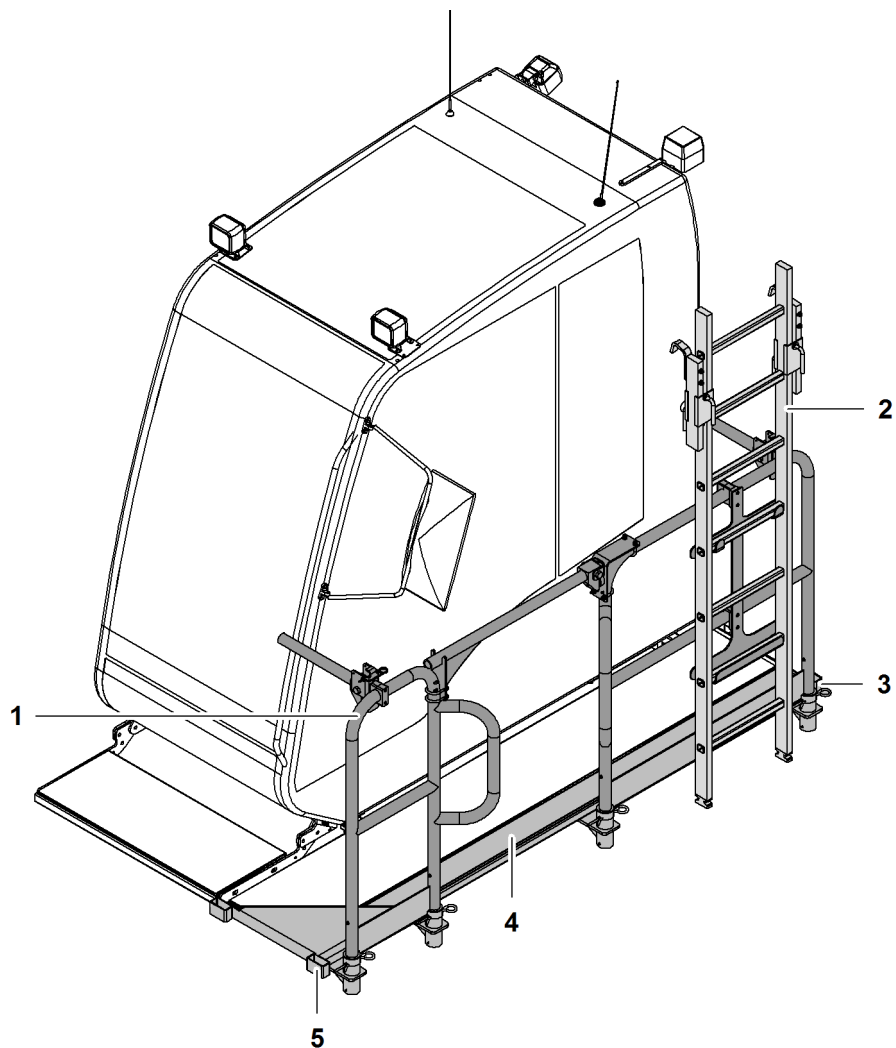


Fig. 518: Cabin handrail variant 1 with undercarriage without carbody counterweight

- | | | | |
|---|------------------------------|---|------------|
| 1 | Handrail | 4 | Platform |
| 2 | Ladder in transport position | 5 | Strut (2x) |
| 3 | Strut (2x) | | |

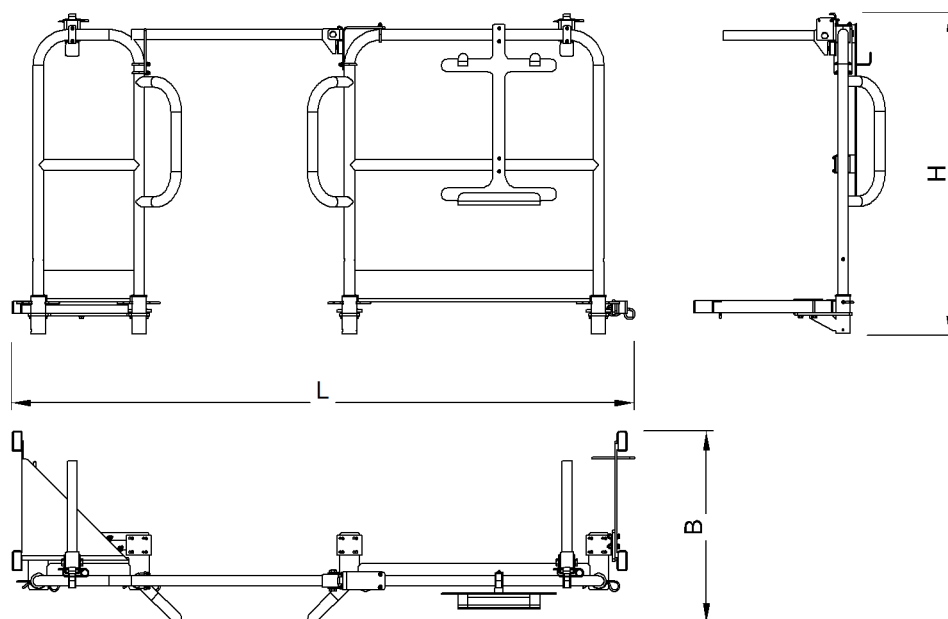


Fig. 519: Dimensions cabin handrail variant 1 with undercarriage without carbody counterweight

Name		Value
L	Length	mm in
B	Width	mm in
H	Height	mm in
Weight		kg lb

Tab. 308: Technical data cabin handrail variant 1 with undercarriage without carbody counterweight

1.56.3 Cabin handrail variant 2 with undercarriage with carbody counterweight

The cabin handrail consists of the following components:

- Cabin handrail
- Mounts on platform
- Mounts below cabin

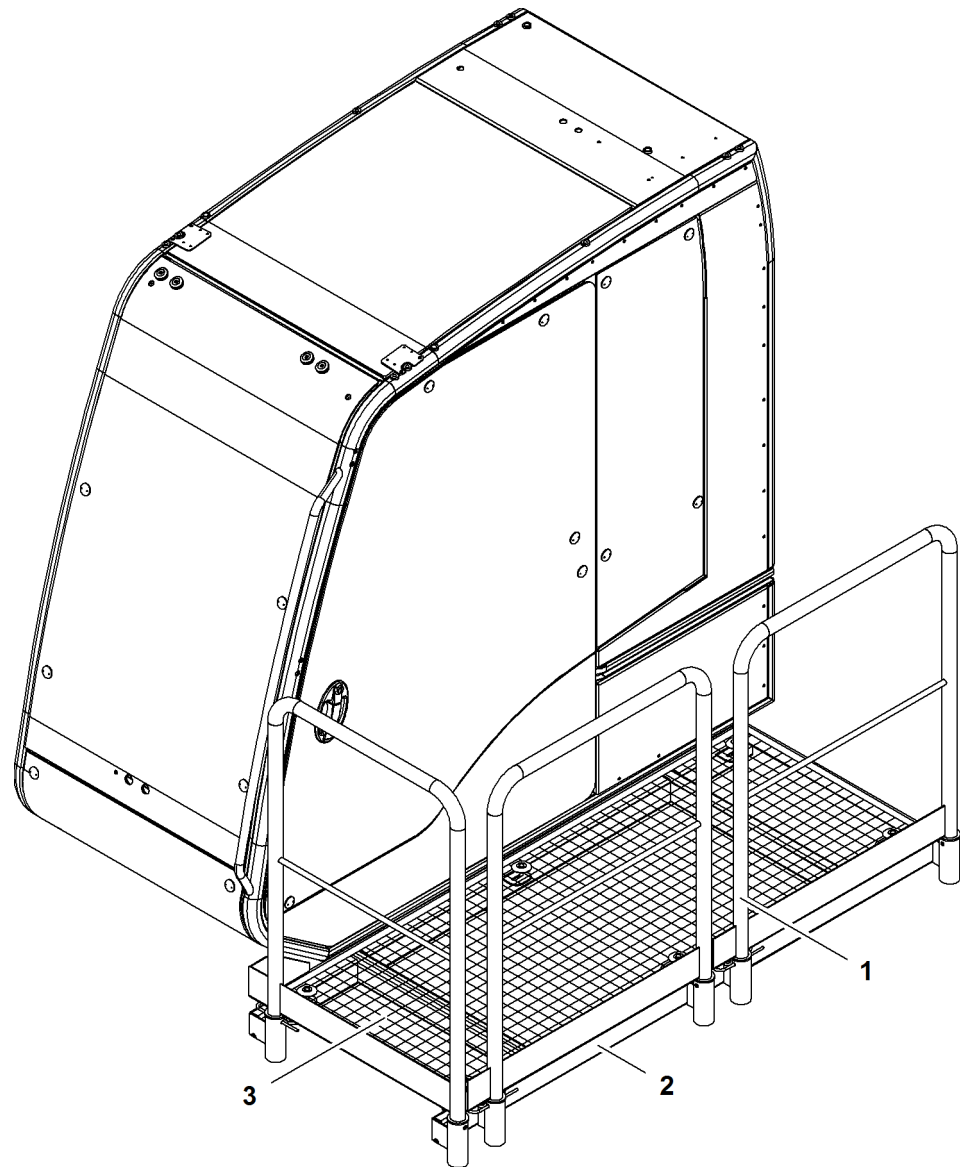


Fig. 520: Cabin handrail variant 2 with undercarriage with carbody counterweight

- | | | | |
|---|---------------|---|----------|
| 1 | Handrail (3x) | 3 | Platform |
| 2 | Frame | | |

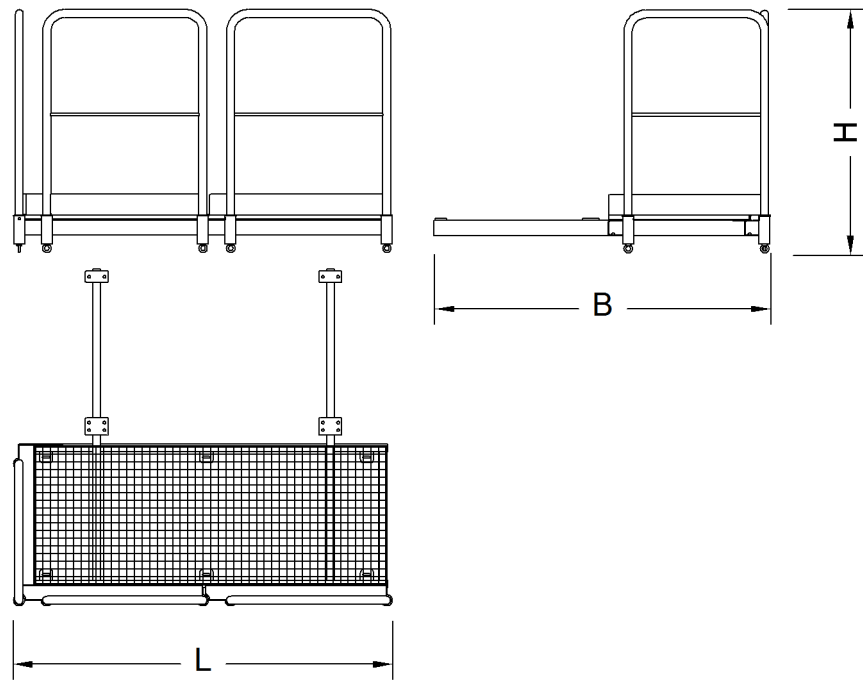


Fig. 521: Dimensions cabin handrail variant 2 with undercarriage with carbody counterweight

Name		Value
L	Length	1986 mm 6' 6" ft-in
B	Width	1764 mm 5' 9" ft-in
H	Height	1273 mm 4' 2" ft-in
Weight		125 kg 276 lb

Tab. 309: Technical data cabin handrail variant 2 with undercarriage with carbody counterweight

1.56.4 Cabin handrail variant 2 with undercarriage without carbody counterweight

The cabin handrail consists of the following components:

- Small cabin handrail
- Large cabin handrail
- Mounts on platform
- Mounts below cabin
- Chopper bar
- Ladder with mount

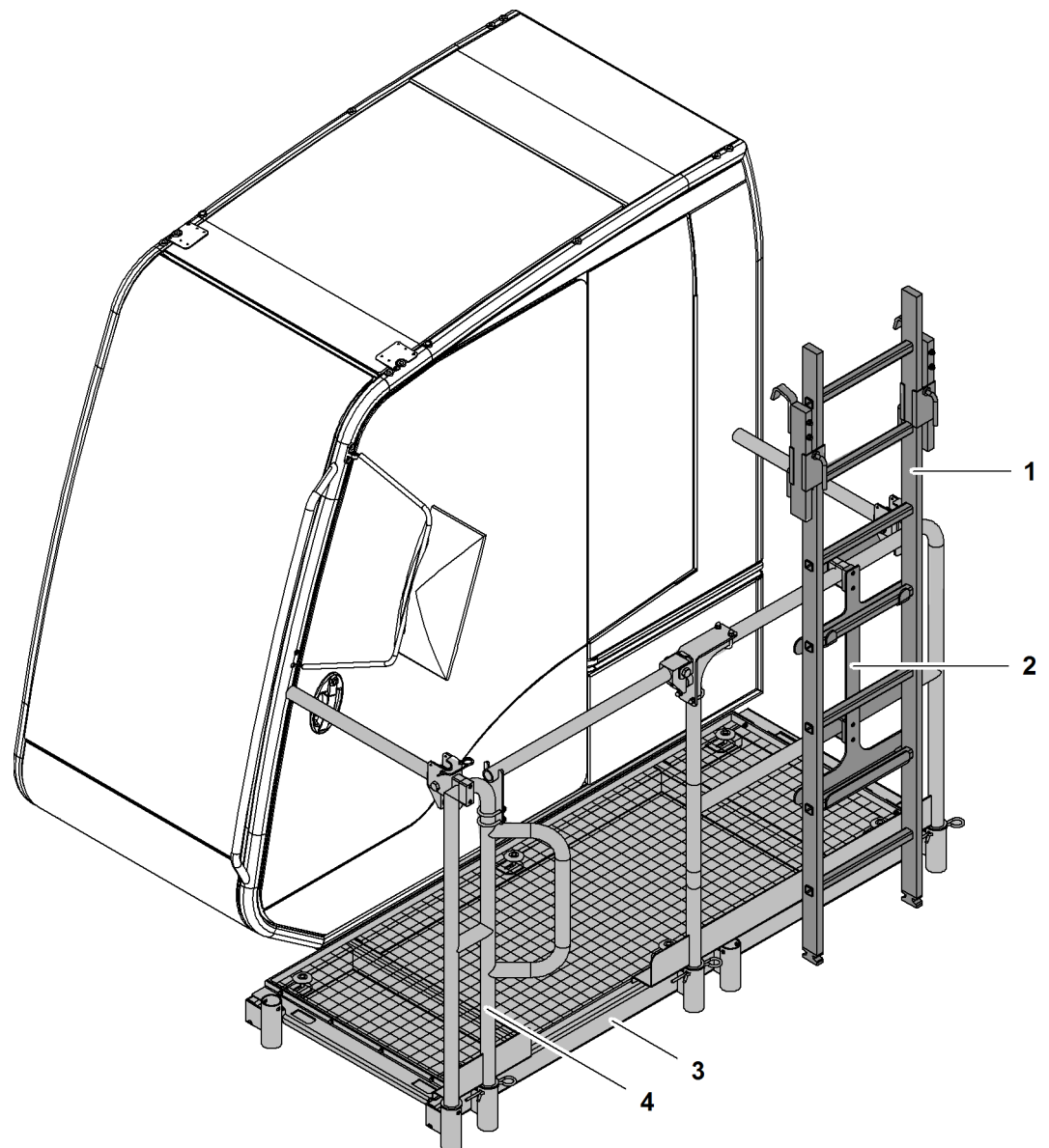


Fig. 522: Cabin handrail variant 2 with undercarriage without carbody counterweight

- | | | | |
|---|------------------------------|---|---------------|
| 1 | Ladder in transport position | 3 | Platform |
| 2 | Mount for ladder | 4 | Handrail (2x) |

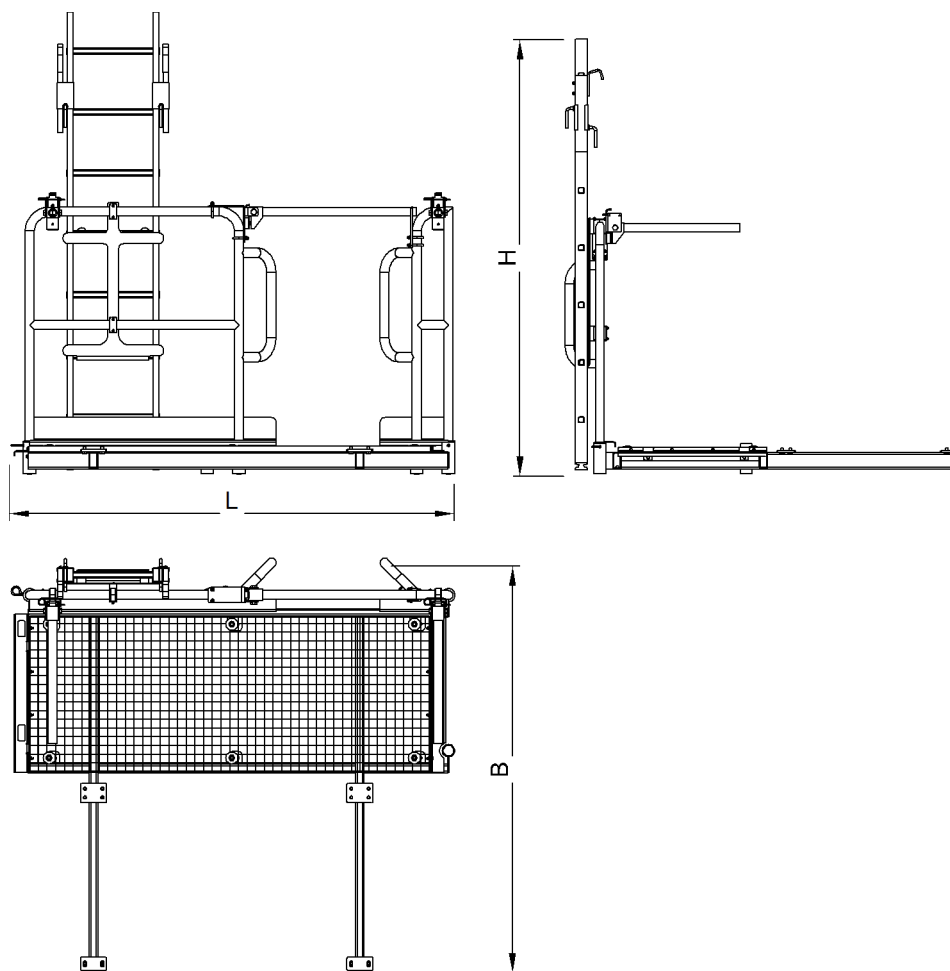


Fig. 523: Dimensions cabin handrail variant 2 with undercarriage without carbody counterweight

Name		Value
L	Length	2137 mm 7' ft-in
B	Width	1935 mm 6' 4" ft-in
H	Height	2104 mm 6' 11" ft-in
Weight		kg lb

Tab. 310: Technical data cabin handrail variant 2 with undercarriage without carbody counterweight

1.57 Cable remote control

The cable remote control serves to control the counterweight hoisting cylinders, jacks, track width adjusting cylinders, and pin connection cylinders of the hydraulic pin connection of the main boom base section.

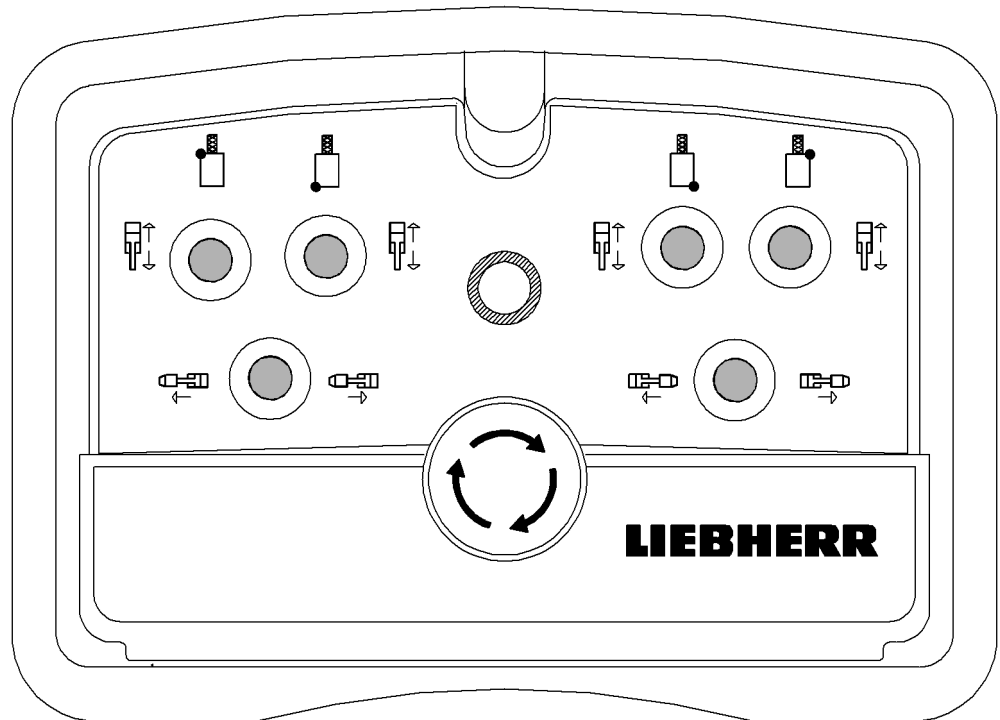


Fig. 524: Cable remote control

The continuation of the electric cable with its connector is not shown.

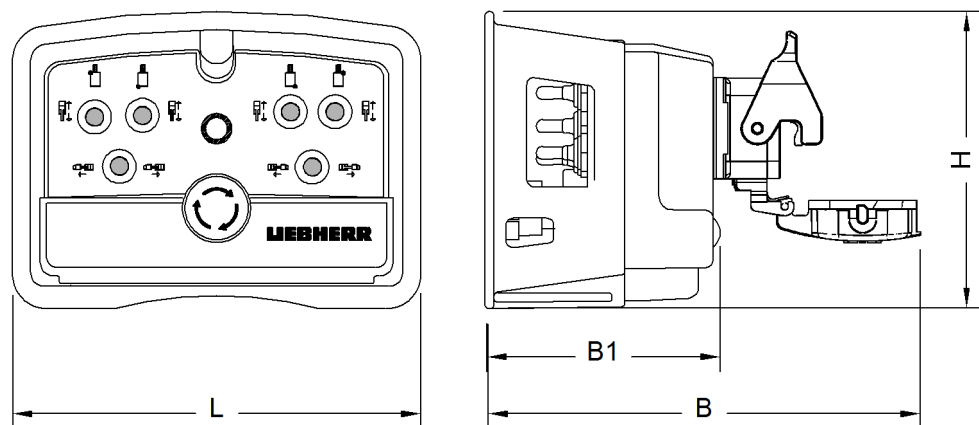


Fig. 525: Dimensions cable remote control

Name		Value
L	Length	175 mm 6.89" in

Name		Value
B	Width	184 mm 7.24" in
B1	Width	99 mm 3.90" in
H	Height	127 mm 5.00" in
Weight (without electric cable)		1 kg 2.20 lb

Tab. 311: Technical data cable remote control

1.58 Catwalks* for boom

Catwalks are available for main boom components and derrick components.

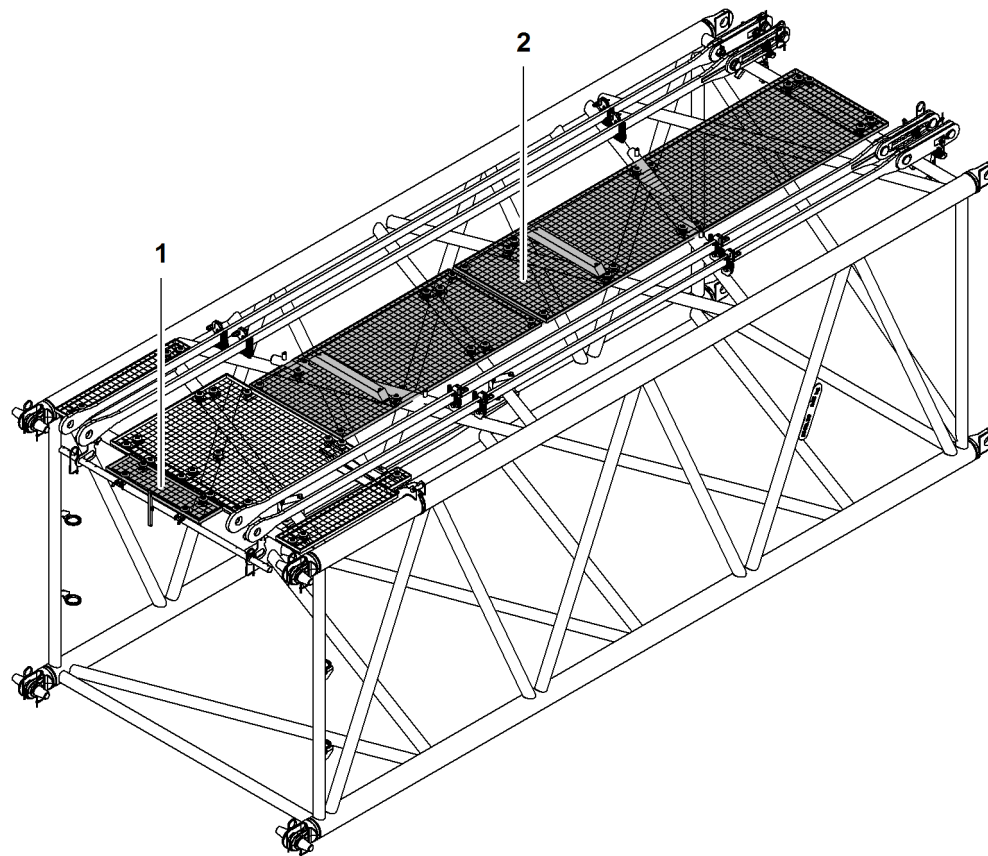


Fig. 526: Catwalks for booms without fall arrest (illustration of principle)

1 Catwalk (hinged)

2 Catwalk

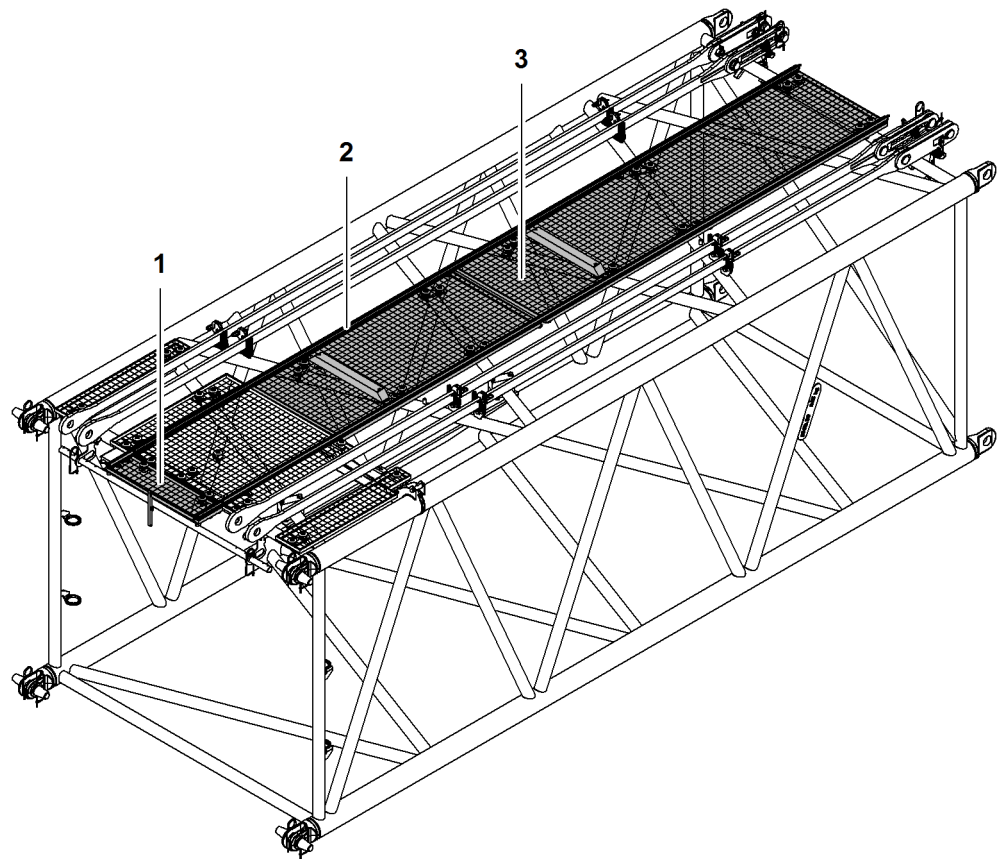


Fig. 527: Catwalks for booms with fall arrest (illustration of principle)

- | | | | |
|---|------------------|---|---------|
| 1 | Catwalk (hinged) | 3 | Catwalk |
| 2 | Fall arrest | | |

1.59 Leak oil return*

The leak oil return (also called leak oil collector) collects the leak oils of equipment and other consumers on the main boom base section. The leak oils are returned to the hydraulic oil tank.

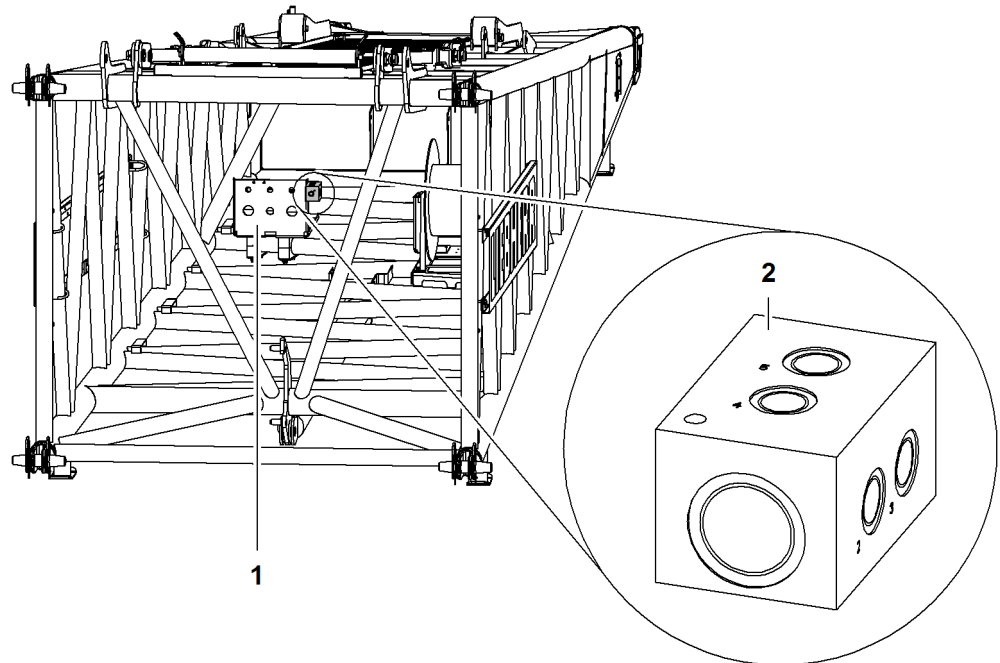


Fig. 528: Leak oil return

- 1** Bulkhead plate in the main boom base section **2** Leak oil return block

Numbers from 1 to 8 are embossed on the leak oil return block **2**.

1. Leak oil return to hydraulic tank
2. [Reserve]
3. Leak oil hose winch right (only HS devices)
4. [Reserve]
5. [Reserve]
6. Leak oil rope reeving winch
7. Leak oil hose winch left (only HS devices)
8. Leak oil leader winch

Optionally available:

- Leak oil jib luffing winch
- Leak oil tagline winch

1.60 Ladder* for boom

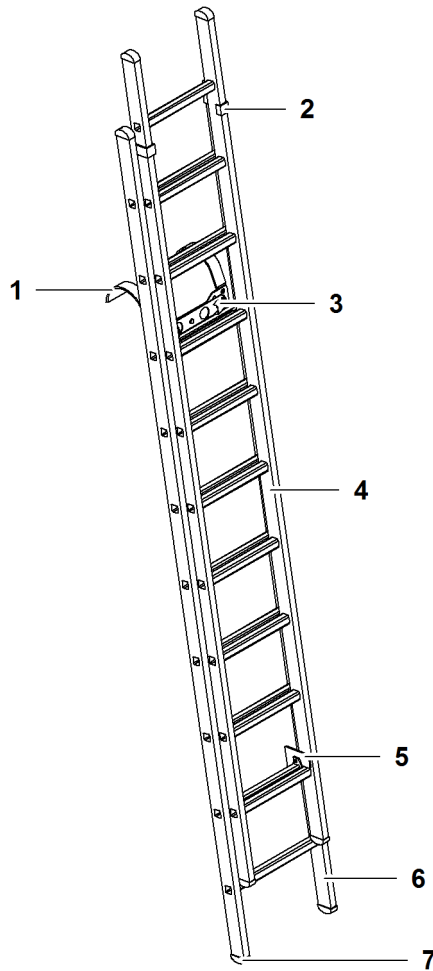


Fig. 529: Ladder for boom

- | | | | |
|---|------------------------|---|-----------------------------|
| 1 | Support for boom | 5 | Locking element (2x) |
| 2 | Guide rail (2x) | 6 | Ladder |
| 3 | Locking element (2x) | 7 | Adjustable rubber foot (2x) |
| 4 | Adjustable ladder part | | |

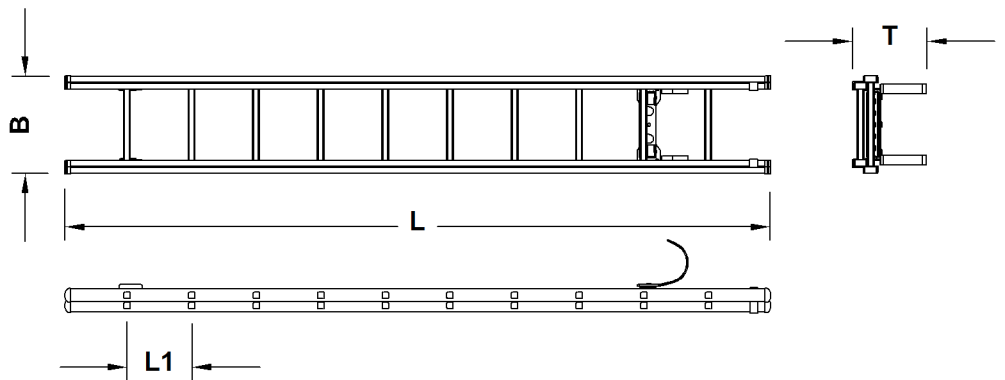


Fig. 530: Ladder for boom dimensions

Ladder* for boom

Name		Value
L	Minimum length	3060 mm 10' ft-in
	Maximum length	4920 mm 16' 2" ft-in
L1	Spoke distance	280 mm 11.02" in
B	Width	420 mm 1' 5" ft-in
T	Depth	320 mm (1' 1" ft-in) (2x)
Maximum working height		6000 mm 19' 8" ft-in
Number of spokes		2 x 10 spokes
Weight		15.2 kg 33.51 lb

Tab. 312: Ladder for boom technical data

1.61 Ladder* for uppercarriage

A ladder for the uppercarriage is supplied with each machine. A second ladder is optionally available to fit a ladder on each side of the uppercarriage.

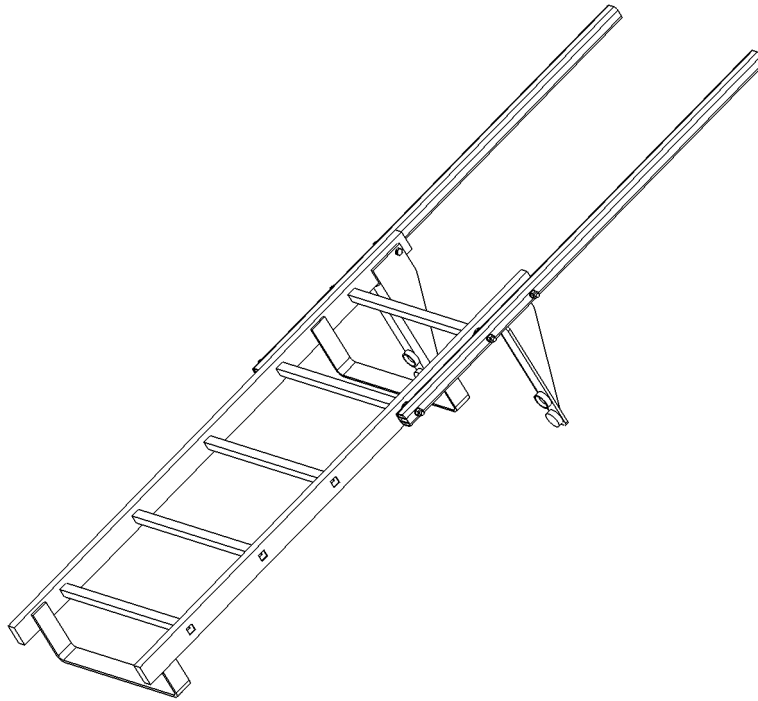


Fig. 531: Uppercarriage ladder

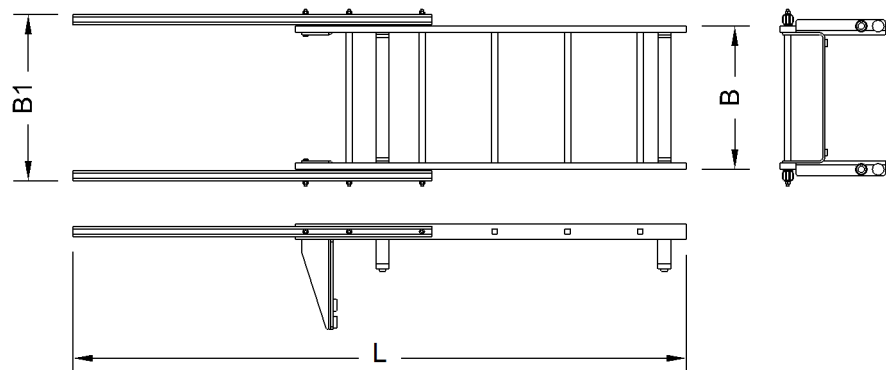


Fig. 532: Dimensions of ladder for uppercarriage

Name		Value
L	Length	2574 mm 8' 5" ft-in
B	Width	550 mm 1' 10" ft-in
B1	Width	604 mm 2' ft-in

Ladder* for uppercarriage

Name	Value
Weight	15 kg 33.07 lb

Tab. 313: Technical data ladder for uppercarriage

1.62 Reading light* for cabin

The reading light serves for additional illumination of the control panels. The reading light is turned into the desired position with its bendable swan neck.

The exact installation position varies according to machine type.

The following control panels are illuminated:

- Control panel X23
- Control panel X25

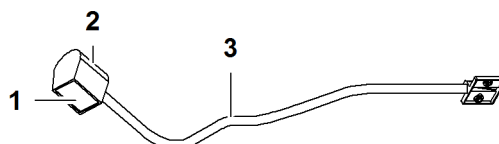


Fig. 533: Reading light

- 1 Lamp
2 Switch

- 3 Swan neck

Name	Value
Length of swan neck	500 mm 1' 8" ft-in
Illuminant	Xenon bulb
Nominal voltage	24 V
Power consumption of illuminant	7.5 W

Tab. 314: Technical data reading light

1.63 Litronic control system

The Litronic control system in the machine permits electrohydraulic proportional control, which in turn means that several main movements can be carried out. This control system has been designed to provide effective and economical operation.

The central unit of the Litronic control system is located in the switch cabinet of the machine and is connected via the CAN bus to the engine control unit, and all the sensors, transmitters and limit switches.

Litronic control system I/O devices in the cab:

- Monitor:
 - is in the form of a touch screen.
 - shows the current screens, machine setups, load charts and error protocols.
 - enables a function to be selected by touching the symbols with the finger.
- Control lever
- Keyboards and the Litronic service panel
- Safety lever at the front of the left-hand control panel
- Foot pedals
- Process data recording (PDE) combined with an external PCMCIA drive and a needle printer
- Machine data acquisition (MDE)

The central unit of the Litronic control system includes two drives for PCMCIA storage media and interfaces. The switch cabinet to the side contains the GSM/GPRS/GPS modem used for data transmission.

I/O devices outside the cab:

- Tension load cells and angle sensors
- Sensors, limit switches and transmitters that are situated at various locations on the machine or its equipment
- Warning signal (horn)
- Warning device (siren)
- Load moment limiter (LML)
- Reversing alarm
- Flashing light on the cab roof

The Litronic control system receives the latest data from the tension load cells, angle sensors, sensors, limit switches and transmitters, compares them, performs some calculations and outputs the results.

Some machine data are collected by the system. Liebherr uses the stored data to improve the operation and reliability.

1.64 Retrofit kits* for operation with two ropes over the jib head section

1.64.1 Retrofit kit for luffing jibs 1008 / 1309 / 1713 / 1916 / 2316

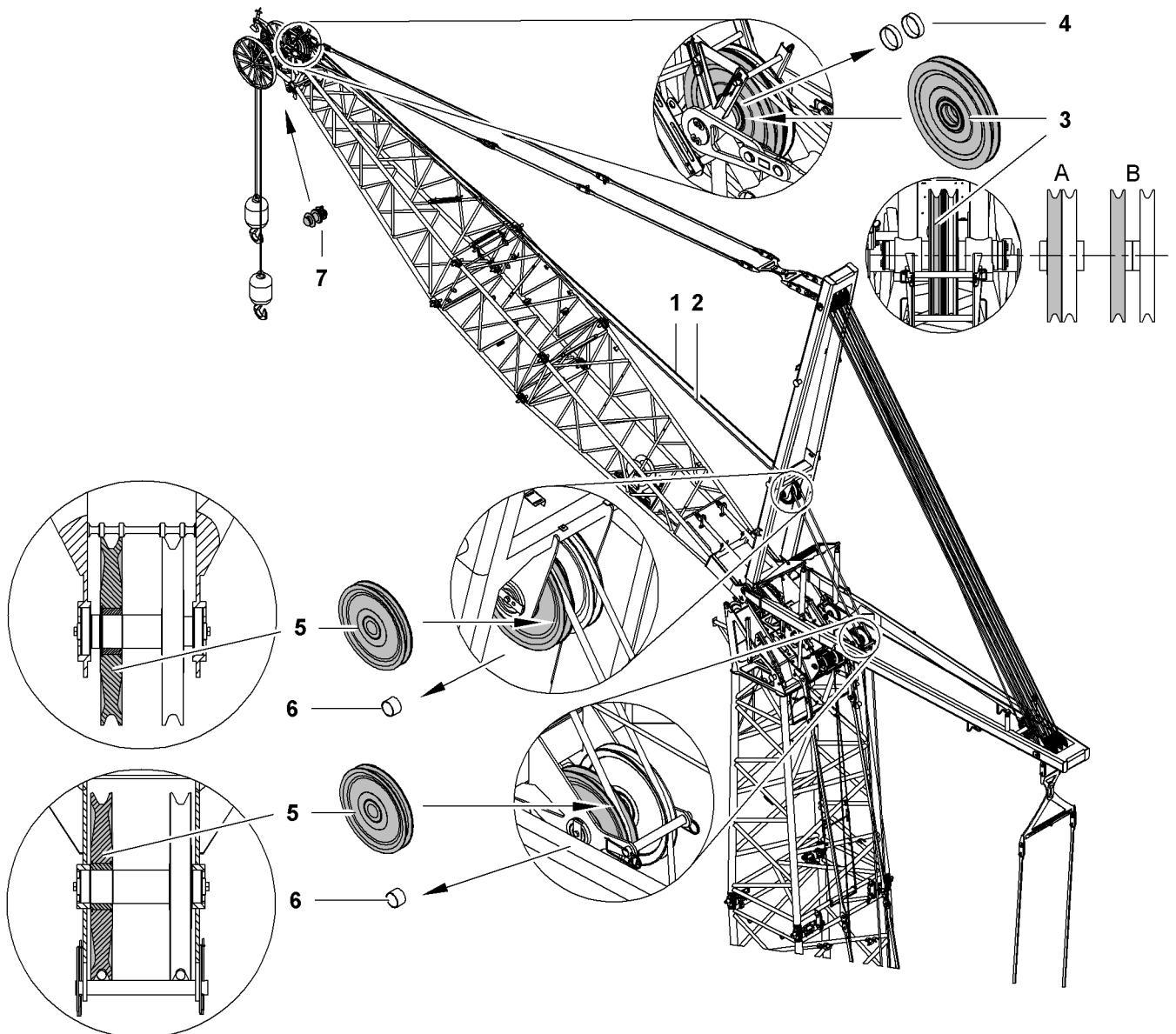


Fig. 534: Additional pulleys and rope fixing point with two ropes over luffing jib head section

1	Winch2 rope	4	Bush (2x)	7	Pins, washers and safety pins for rope fixing point
2	Winch1 rope	5	Pulley (2x)	A	Assembly position A
3	Pulley	6	Bush (2x)	B	Assembly position B

The pulley 3 (630 mm (2' 1" ft-in) x 15 mm (0.59" in) x 140 mm (5.51" in)) replaces the two bushes 4 (152 mm (5.98" in) x 141 mm (5.55" in) x 40 mm (1.57" in)).

Retrofit kits* for operation with two ropes over the jib head section

The pulleys **5** (500 mm (1' 8" ft-in) x 15 mm (0.59" in) x 90 mm (3.54" in)) replace the bushes **6** (101.6 mm (4.00" in) x 90.5 mm (3.56" in) x 67 mm (2.64" in)).

Assembly position	Type of jib
A	Luffing jib 1008
	Luffing jib 1309
	Luffing jib 1713
	Luffing jib 1916
B	Luffing jib 2316

Tab. 315: Assembly position for pulley on the jib head section

1.64.2 Retrofit kit for 1008 fixed jib

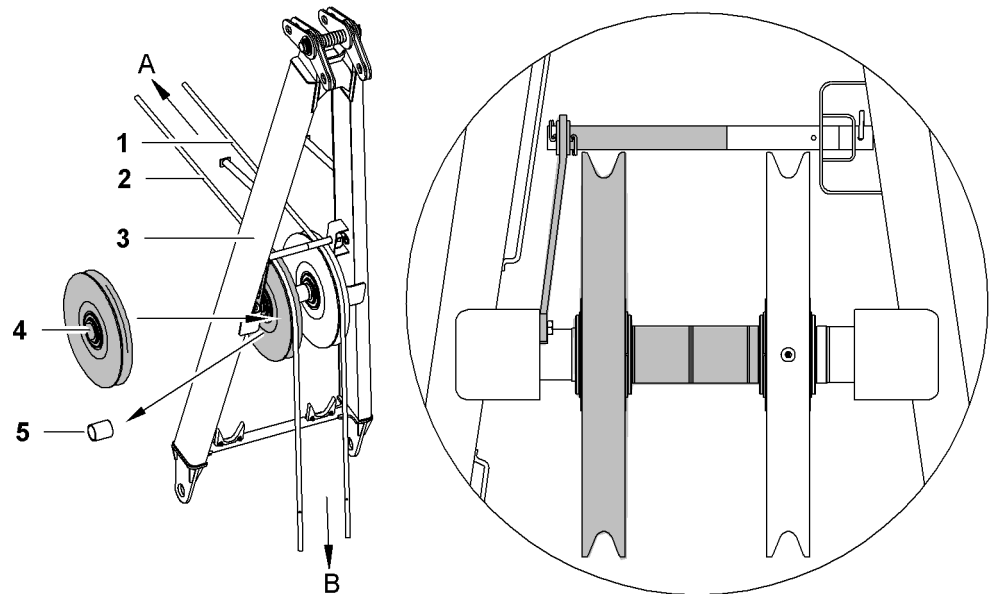


Fig. 535: Retrofit kit for 1008 fixed jib

- | | |
|--|--------------------|
| A Direction of jib head section | 3 A-frame 2 |
| B Direction of main boom | 4 Pulley |
| 1 Winch1 rope | 5 Socket |
| 2 winch2 rope | |

The pulley **4** (630 mm (2' 1" ft-in) x 15 mm (0.59" in) x 140 mm (5.51" in)) and all the components shown in grey in the detailed drawing replace the bush **5** (101.6 mm (4.00" in) x 90.5 mm (3.56" in) x 120 mm (4.72" in)).

1.64.3 Retrofit kit for 0806 fixed jib

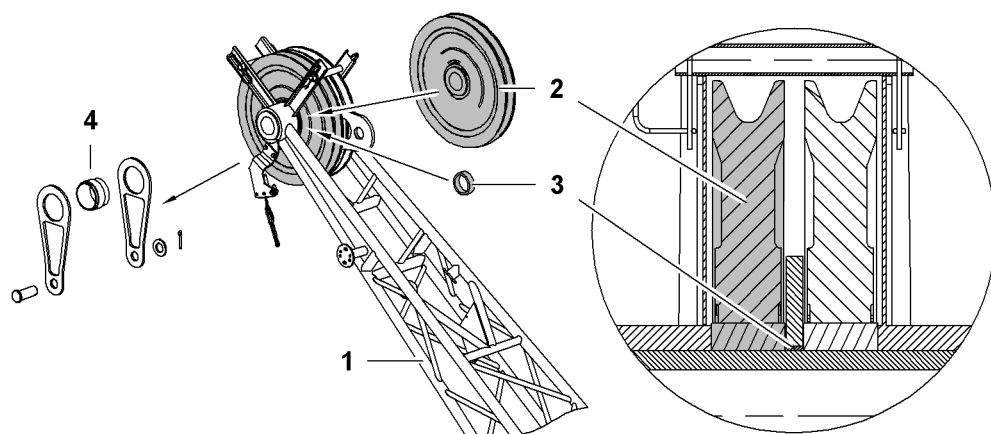


Fig. 536: Retrofit kit for 0806 fixed jib

- | | | | |
|---|-----------------------|---|------------------------------|
| 1 | 0806 jib head section | 3 | Socket |
| 2 | Pulley | 4 | Rope fixing point components |

The pulley **2** (630 mm (2' 1" ft-in) x 15 mm (0.59" in) x 140 mm (5.51" in)) and the bush **3** (150 mm (5.91" in) x 140 mm (5.51" in) x 19 mm (0.75" in)) replace all the rope fixing point components **4**.

1.65 Luffing jib luffing winch as auxiliary winch*

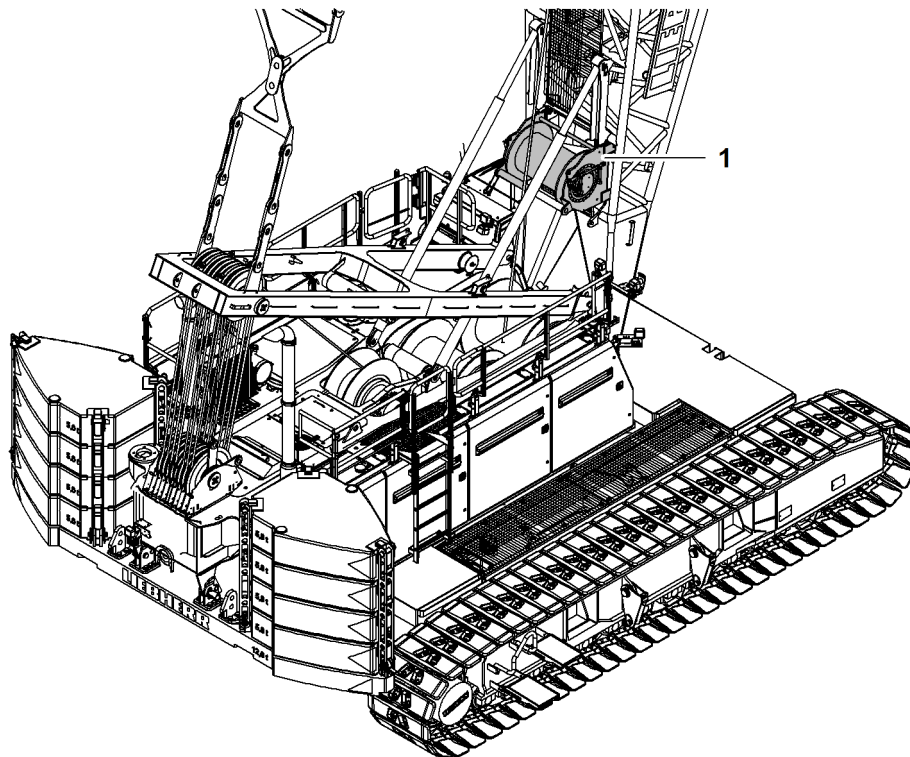


Fig. 537: Luffing jib luffing winch as auxiliary winch

1 Jib luffing winch

The jib adjustment winch 1 is used to adjust the jib.

With the retrofitting kit "jib luffing winch as auxiliary winch," the jib luffing winch 1 can also be used as auxiliary winch.

1.66 By-pass flow filter system*

The SDU-H350 RK/TWIN by-pass flow filter system comprises two filter housings with filter elements (SDFC), a dynamic pressure manometer, the hoses and an oil sump with drain screw.

The exact installation position varies according to machine type.

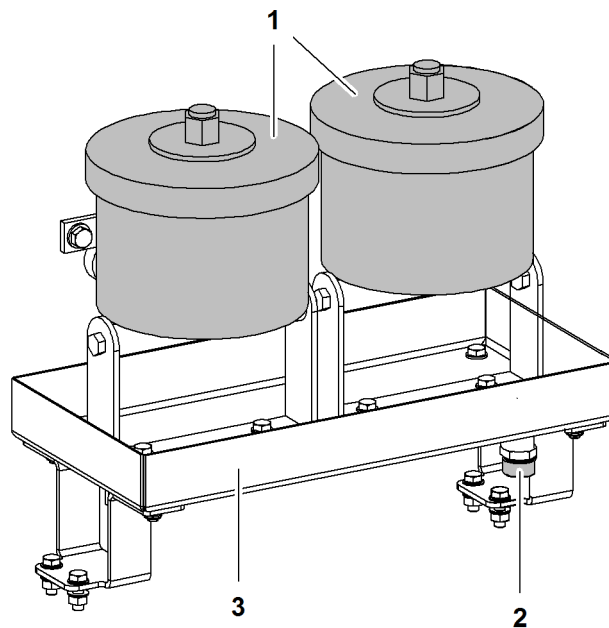


Fig. 538: By-pass flow filter system

- | | | | |
|---|---------------------|---|----------|
| 1 | Filter housing (2x) | 3 | Oil sump |
| 2 | Drain plug | | |

The cellulose-based filter elements (SDFC) absorb abrasive and catalytic contamination, foreign matter ($> 1 \mu\text{m}$) and free water content from pressure liquids and other lubricants. Despite the fact that the filters are very fine ($< 1 \mu\text{m}$), oil additives and admixtures are not filtered out, as the filtration occurs at very low and gentle pressure levels ($< 5 \text{ bar (72.52 psi)}$). Read the counter pressure off the dynamic pressure manometer situated under the left filter housing.

1.67 Emergency operation control*

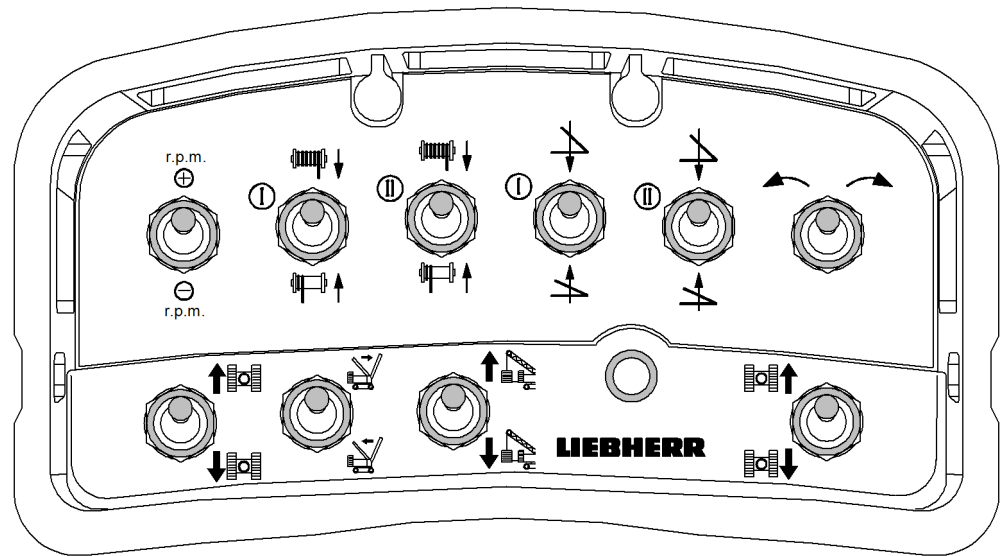


Fig. 539: Emergency control system

Name	Value
Length	248 mm 9.76" in
Width	118 mm 4.65" in
Height	137 mm 5.39" in
Nominal voltage	18 V to 36 V
Operating temperature	-40 °C (-40 °F) to 90 °C (194 °F)
Storage temperature	-50 °C (-58 °F) to 90 °C (194 °F)
Weight	5.5 kg 12.13 lb

Tab. 316: Technical data emergency control system

1.68 Visual motion warning device*

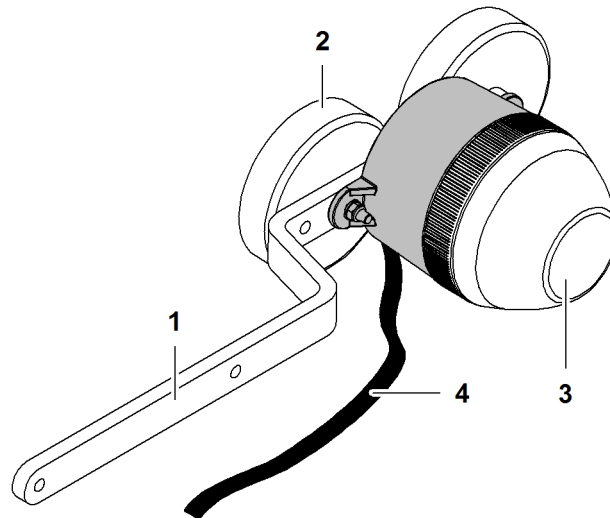


Fig. 540: Visual motion warning device

- | | | | |
|----------|-------------|----------|----------------|
| 1 | Handle | 3 | Flashing light |
| 2 | Magnet (2x) | 4 | Electric cable |

The visual motion warning devices on the rear counterweight are an additional safety feature and emit a warning when the crawlers are moving or the crane is swinging.

The visual motion warning devices are flashing lights that are fitted in suitable locations on the rear counterweight using magnets.

The plug is located in the periphery of acoustic motion detectors.

The electric connection is established with the following plugs:

- 4A / H 1.1
- 4A / H 1.2

NOTICE

Incorrect assembly/disassembly of the visual motion warning devices!
Risk of damage to the visual motion warning devices.

- ▶ Do not trap or crush the electric cable.
 - ▶ Only fit the visual warning devices after the rear counterweight has been attached.
 - ▶ Always remove the visual motion warning devices before removing the rear counterweight.
-

Name	Value
Illuminant	Xenon
Nominal voltage	24 V
Current consumption	0.3 A
Output	5 W
Flashing frequency	60 flashes/minute

Visual motion warning device*

Name	Value
Temperature range	-30 °C (-22 °F) to 50 °C (122 °F)

Tab. 317: Visual motion warning device technical data

Name	Value
Illuminant	LED
Nominal voltage	24 V
Current consumption	0.3 A
Temperature range	-40 °C (-40 °F) to 60 °C (140 °F)

Tab. 318: Visual motion warning device technical data

1.69 Process data recording (PDE)*

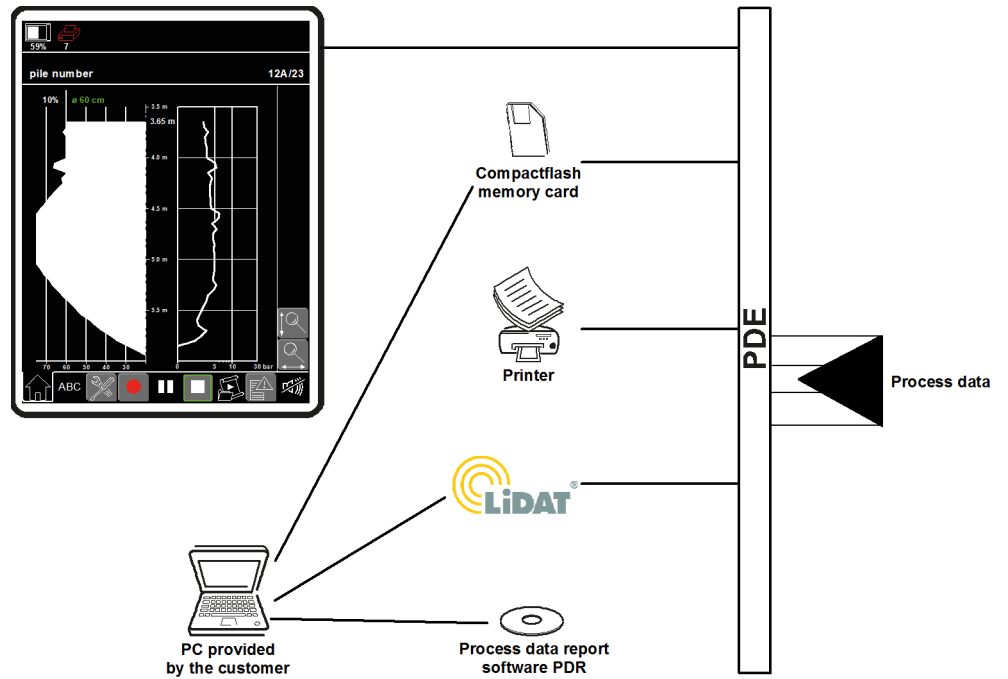


Fig. 541: Process data recording (illustration of principle)

Process data recording (PDE) is described in the operating manual for process data recording.

1.70 Process data report (PDR)*

The process data report (PDR) is described in the operating manual for the process data report.

1.71 Pump wear indicator*

Chip controls enable early detection of wear on hydraulic pumps.

The magnet in the chip control draws dirt particles out of the hydraulic oil. In case of inadmissible contamination, an error message appears on the monitor.

The following pumps are equipped with a chip control:

- Winch1
- Winch2
- Swing
- LPVD-pump

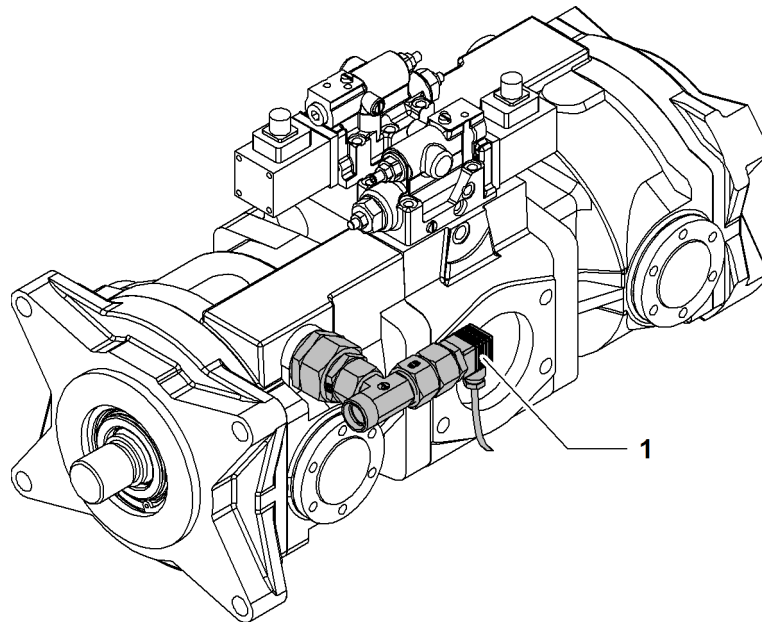


Fig. 542: Pump wear indicator (illustration of principle)

1 Chip control

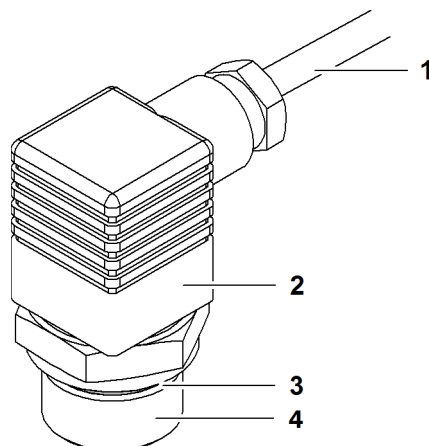


Fig. 543: Chip control

1 Electric cable
2 Plug

3 Seal ring
4 Magnet

Pump wear indicator*

Name	Value
Maximum switching voltage	30 V
Maximum switching current	0.2 A
Maximum oil pressure	6 bar 87.02 psi
Ambient temperature	-25 °C (-13 °F) to 90 °C (194 °F)
Maximum torque	60 Nm 44 ft-lb

Tab. 319: Technical data chip control

1.72 Quick latch couplings* on jib luffing winch

Quick latch couplings ease the installation or dismantling of the jib luffing winch on the main boom base section.

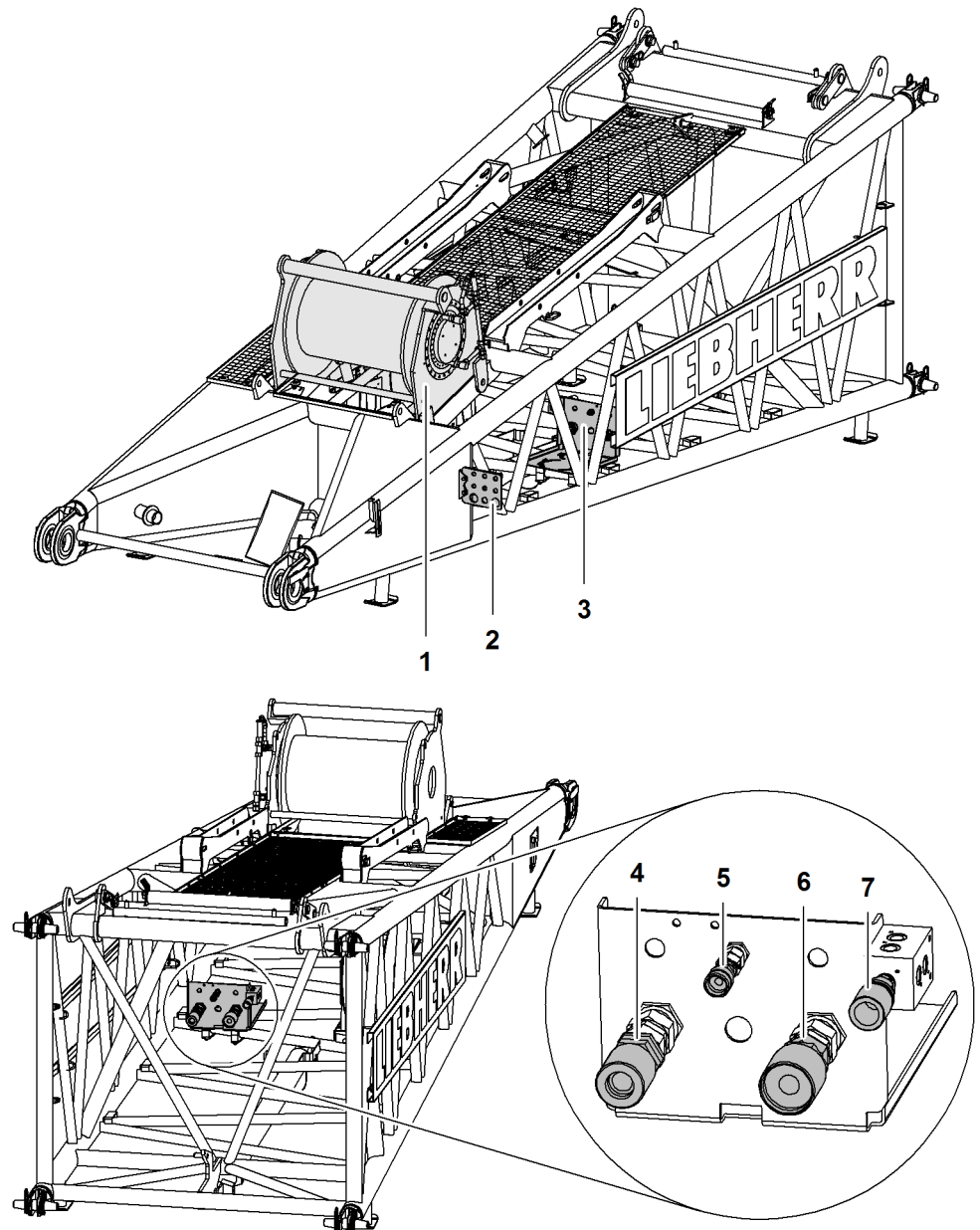


Fig. 544: Quick latch couplings on jib luffing winch

- | | | | |
|---|--|---|---------------------------------|
| 1 | Luffing jib luffing winch | 5 | Hydraulic line for flushing oil |
| 2 | Bulkhead plate 1 | 6 | Hydraulic line lifting |
| 3 | Bulkhead plate 2 with quick latch coupling | 7 | Hydraulic line for leak oil |
| 4 | Hydraulic line lowering | | |

With the main boom base sections with a length of 10 m (32' 10" ft-in), the quick latch couplings are mounted backwards.

Bulkhead plate 2 3 features hydraulic connections for:

- Assembly cylinder

Quick latch couplings* on jib luffing winch

- Rope reeving winch
- Luffing jib luffing winch
- Tagline winch

Only the hydraulic connections of the jib luffing winch are designed with quick latch couplings. The hydraulic connections vary in size and shape to prevent wrong connection.

Screw connections:

- Hydraulic line lifting
- Hydraulic line lowering

Plug-type connections:

- Hydraulic line for leak oil
- Hydraulic line for flushing oil

1.73 Socket* in cabin

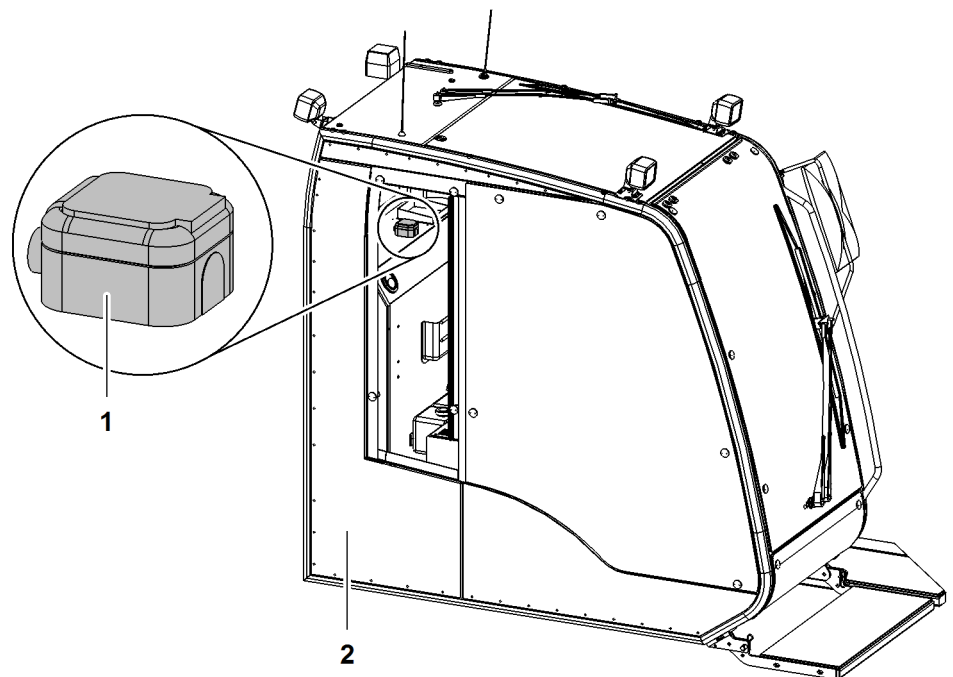


Fig. 545: Socket* in cabin

1 Socket

2 Cabin

The socket for mains voltage is installed in the cabin on the back shelve.

To operate the socket in the cabin, the external power supply retrofit kit is required additionally.

The socket is only ready for operation with plugged in external power supply.

1.74 Falling object protection* for cabin

There are two versions of falling object protection available:

- Foldable falling object protection
- Fixed falling object protection

The fixed falling object protection must be deinstalled for maintenance work.

1.74.1 Foldable falling object protection*

The foldable falling object protection was tested in acc. with DIN EN ISO 3449 stage 2.

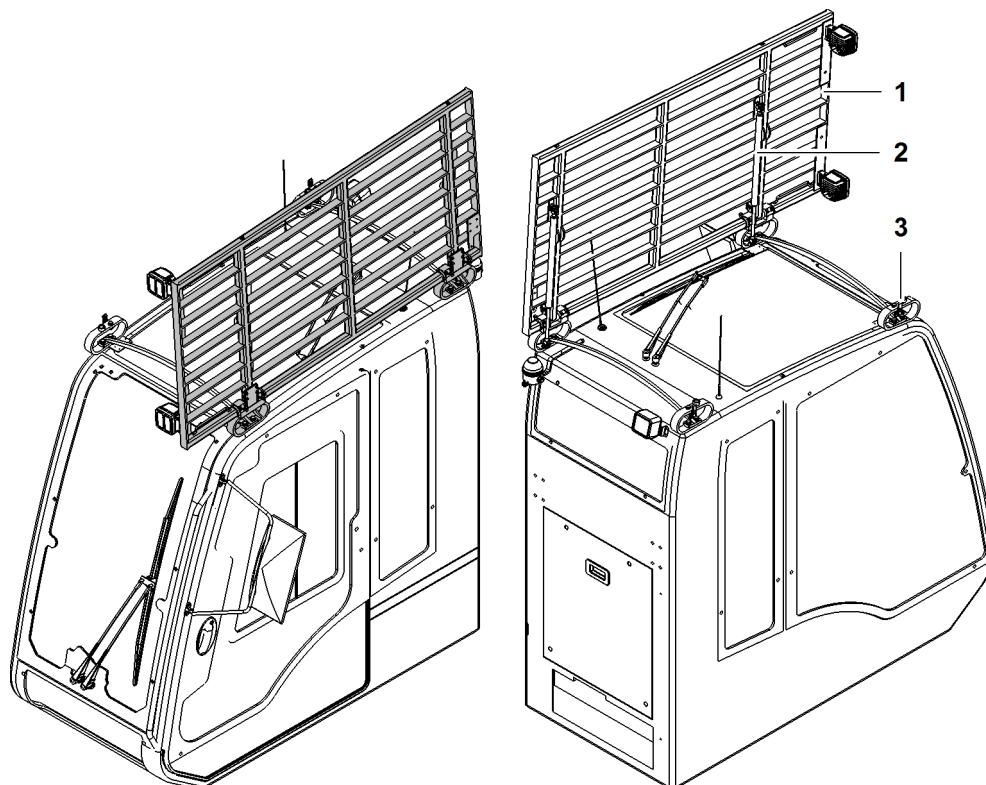


Fig. 546: Foldable falling object protection

- | | | | |
|---|---------------------------|---|-----------|
| 1 | Falling object protection | 3 | Lock (2x) |
| 2 | Pneumatic spring (2x) | | |

Floodlights on cabin are mounted on falling object protection.

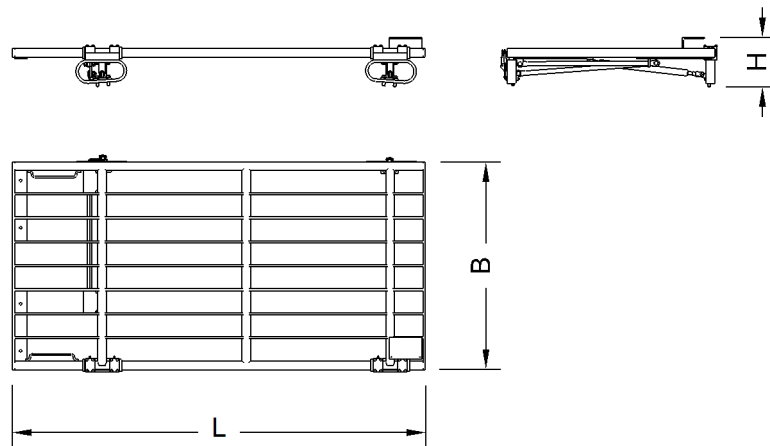


Fig. 547: Dimensions foldable falling object protection

Name		Value
L	Length	1880 mm 6' 2" ft-in
W	Width	984 mm 3' 3" ft-in
H	Height	209 mm 8.23" in
Weight		102 kg 225 lb

Tab. 320: Technical data: foldable falling object protection

1.74.2 Fixed falling object protection

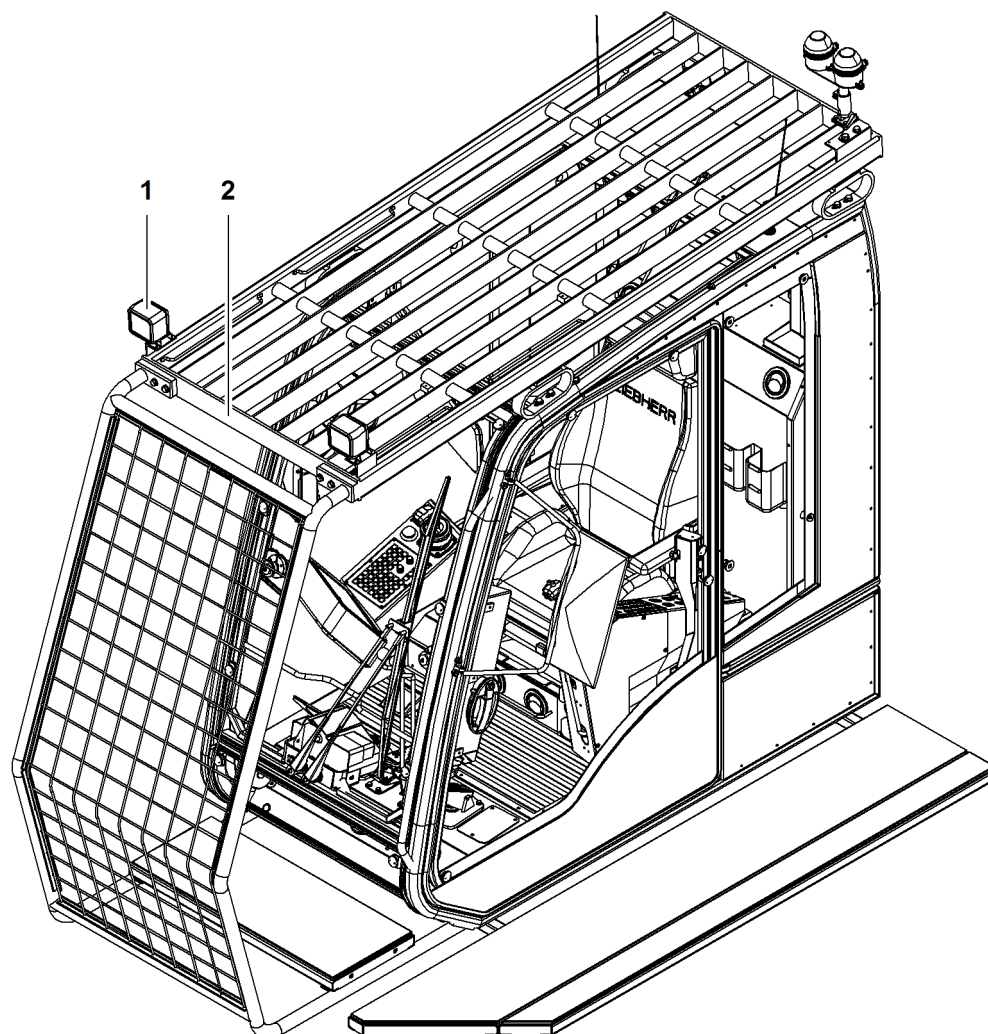


Fig. 548: Fixed falling object protection

1 Floodlight (2x)

2 Falling object protection

Floodlights on cabin are mounted on falling object protection.

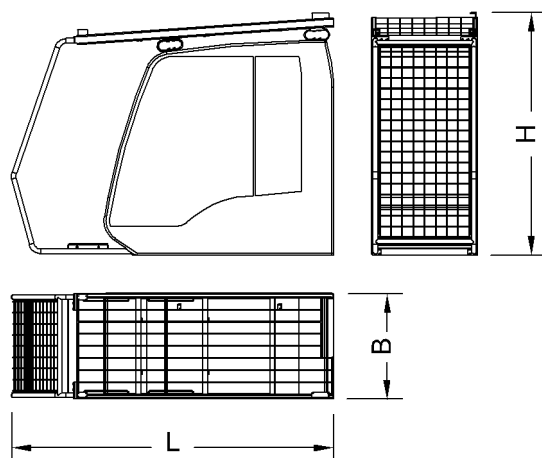


Fig. 549: Dimensions fixed falling object protection

Name		Value
L	Length	2889 mm 9' 6" ft-in
W	Width	945 mm 3' 1" ft-in
H	Height	2184 mm 7' 2" ft-in
Weight		167 kg 368 lb

Tab. 321: Technical data fixed falling object protection

1.75 Vandalism protection*

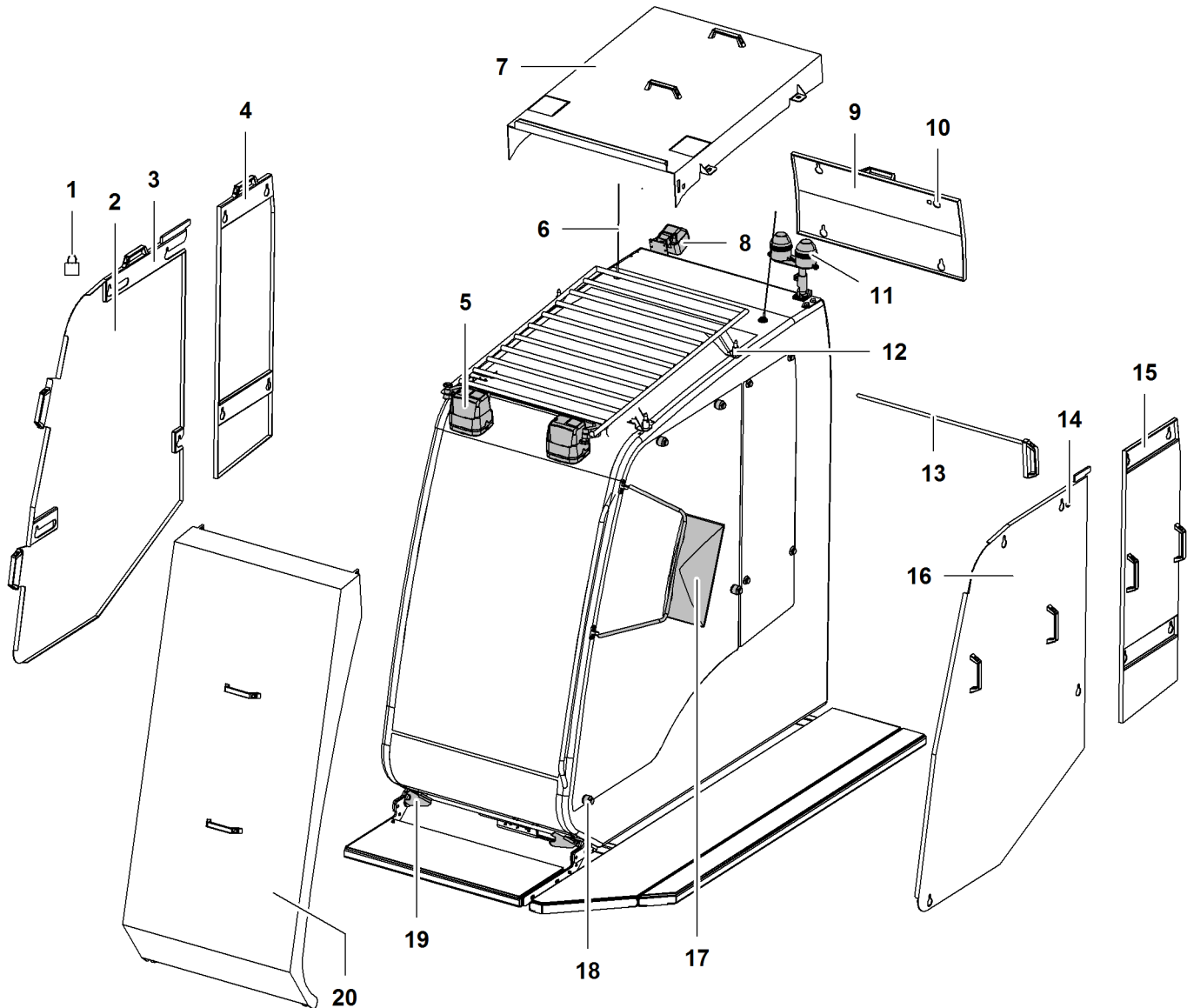


Fig. 550: Vandalism protection

- | | | | | | |
|---|-----------------------|----|---|----|------------------------------|
| 1 | Padlock | 8 | Rear floodlight | 15 | Left rear cover |
| 2 | Right front cover | 9 | Rear cover | 16 | Left front cover |
| 3 | Lock | 10 | Lock | 17 | Side mirror |
| 4 | Right rear cover | 11 | Flashing light/load moment limiter lamp | 18 | Suspension equipment (8x) |
| 5 | Front floodlight (2x) | 12 | Bracket (4x) for top cover | 19 | Bracket (2x) for front cover |
| 6 | Antenna (2x) | 13 | Barrier rod | 20 | Front cover |
| 7 | Top cover | 14 | Lock | | |

1.75.1 Top cover

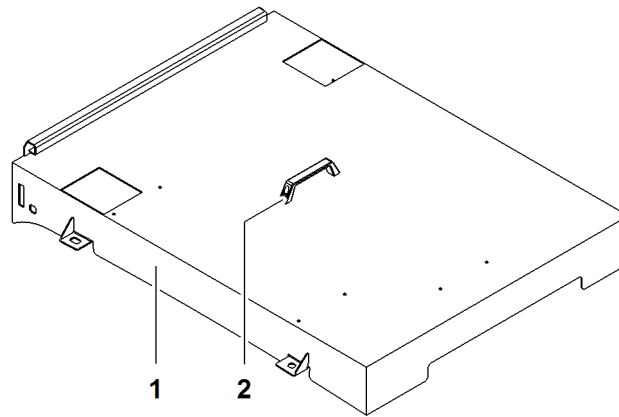


Fig. 551: Top cover

1 Top cover

2 Carrier handle

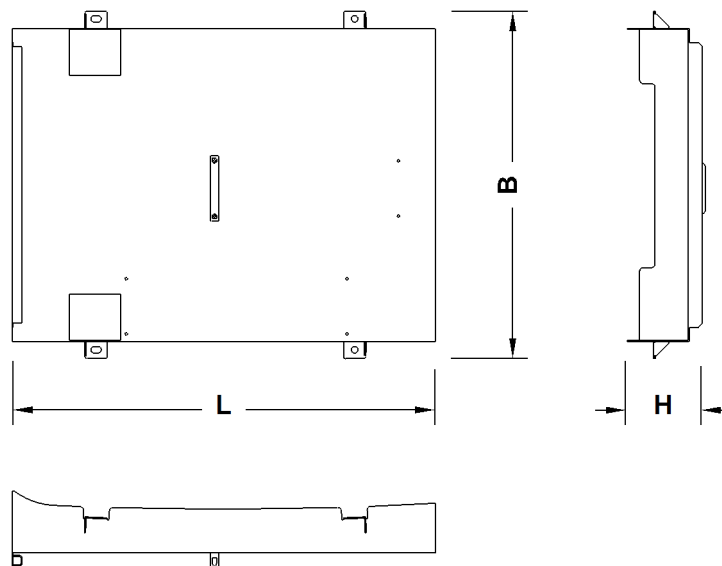


Fig. 552: Dimensions top cover

Name		Value
L	Length	1150 mm 3' 9" ft-in
B	Width	944 mm 3' 1" ft-in
H	Height	212 mm 8.35" in
Weight		11 kg 24.25 lb

Tab. 322: Technical data top cover

1.75.2 Rear cover

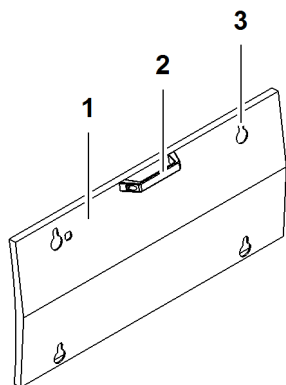


Fig. 553: Rear cover

- 1 Rear cover
- 2 Carrier handle
- 3 Suspension equipment (4x)

The lock for locking is not illustrated.

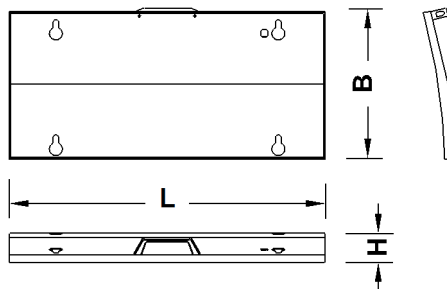


Fig. 554: Dimensions rear cover

Name		Value
L	Length	850 mm 2' 9" ft-in
B	Width	408 mm 1' 4" ft-in
H	Height	79 mm 3.11" in
Weight		3 kg 6.61 lb

Tab. 323: Technical data rear cover

1.75.3 Front cover

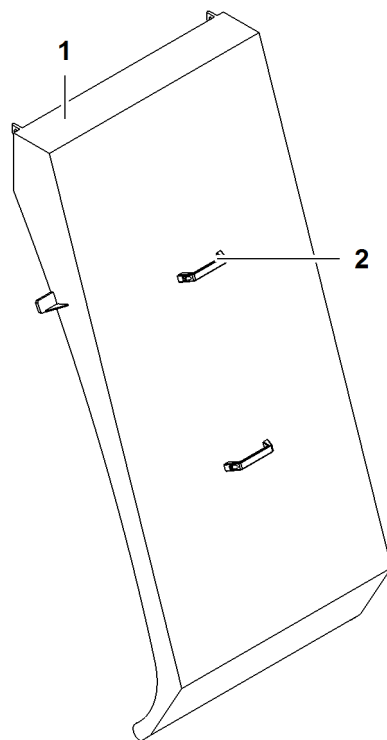


Fig. 555: Front cover

1 Front cover

2 Carrier handle (2x)

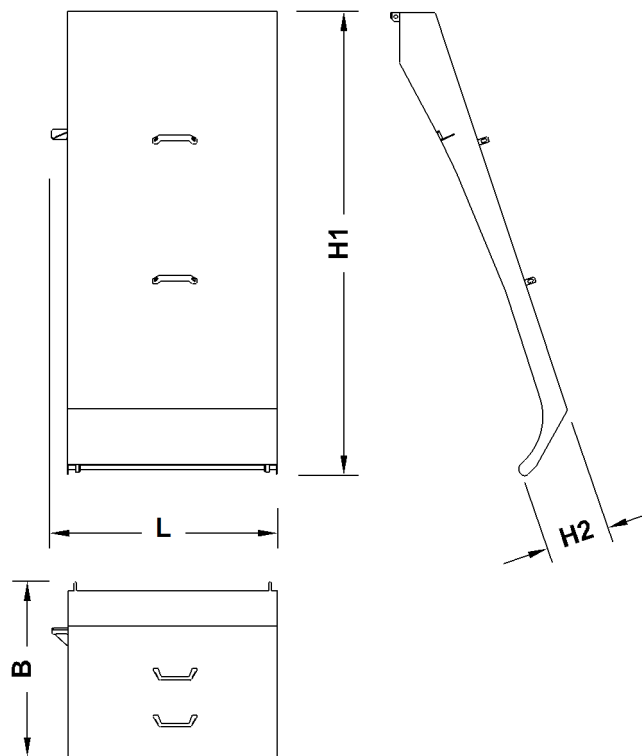


Fig. 556: Dimensions front cover

Vandalism protection*

Name		Value
L	Length	915 mm 3' ft-in
B	Width	717 mm 2' 4" ft-in
H1	Height	1880 mm 6' 2" ft-in
H2	Height	264 mm 10.39" in
Weight		19 kg 41.89 lb

Tab. 324: Technical data front cover

1.75.4 Right front cover

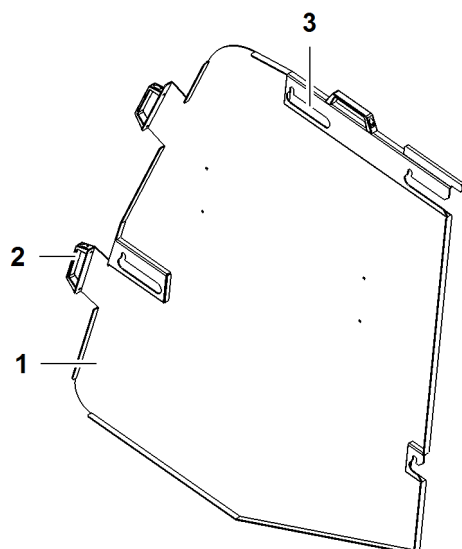


Fig. 557: Right front cover

- 1 Right front cover
- 2 Carrier handle (3x)

- 3 Suspension equipment (4x)

The lock for locking is not illustrated.

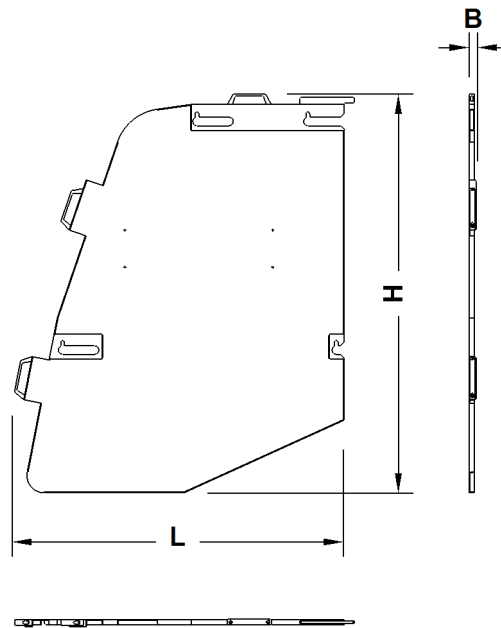


Fig. 558: Dimensions right front cover

Name		Value
L	Length	1377 mm 4' 6" ft-in
B	Width	29 mm 1.14" in
H	Height	1605 mm 5' 3" ft-in
Weight		14 kg 30.86 lb

Tab. 325: Technical data right front cover

1.75.5 Right rear cover

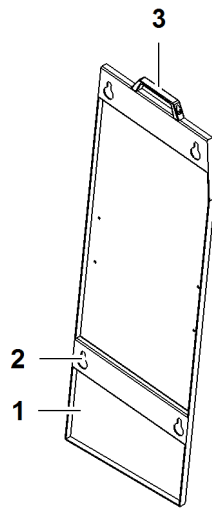


Fig. 559: Right rear cover

- 1 Right rear cover
- 2 Suspension equipment (4x)
- 3 Carrier handle

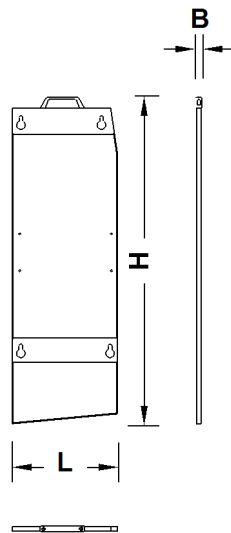


Fig. 560: Dimensions right rear cover

Name		Value
L	Length	425 mm 1' 5" ft-in
B	Width	23 mm 0.91" in
H	Height	1323 mm 4' 4" ft-in
Weight		5 kg 11.02 lb

Tab. 326: Technical data right rear cover

1.75.6 Left front cover

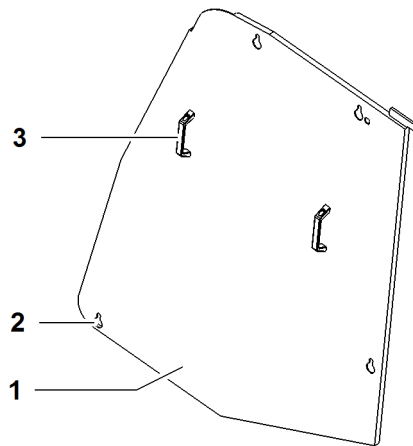


Fig. 561: Left front cover

- 1 Left front cover
- 2 Suspension equipment (4x)
- 3 Carrier handle (2x)

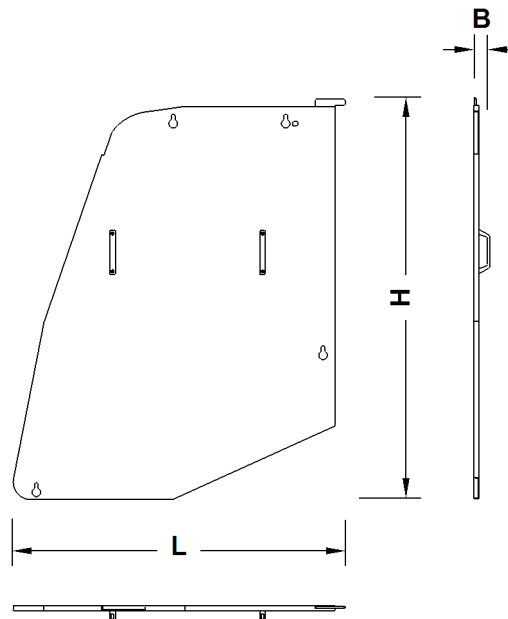


Fig. 562: Dimensions left front cover

Name		Value
L	Length	1327 mm 4' 4" ft-in
B	Width	63 mm 2.48" in
H	Height	1605 mm 5' 3" ft-in
Weight		14 kg 30.86 lb

Tab. 327: Technical data left front cover

1.75.7 Left rear cover

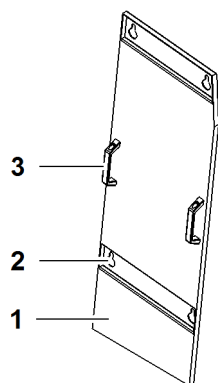


Fig. 563: Left rear cover

- 1 Left rear cover
- 2 Suspension equipment (4x)
- 3 Carrier handle (2x)

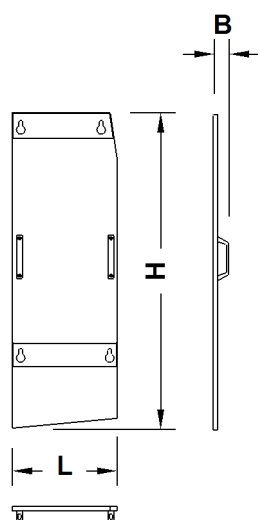


Fig. 564: Dimensions left rear cover

Name		Value
L	Length	425 mm 1' 5" ft-in
B	Width	63 mm 2.48" in
H	Height	1280 mm 4' 2" ft-in
Weight		5 kg 11.02 lb

Tab. 328: Technical data left rear cover

1.75.8 Brackets for front cover

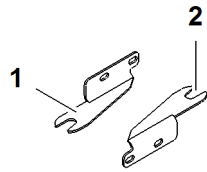


Fig. 565: Brackets for front cover

- 1 Bracket (2x) for front cover
- 2 Suspension equipment (2x)

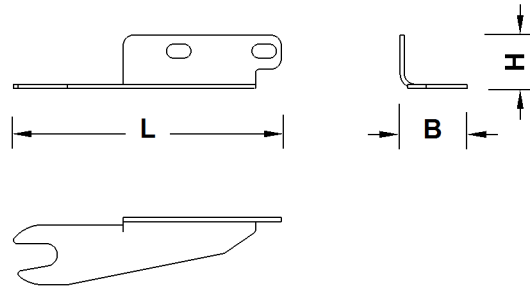


Fig. 566: Dimensions brackets for front cover

Name		Value
L	Length	250 mm 9.84" in
B	Width	63 mm 2.48" in
H	Height	50 mm 1.97" in
Weight		0.5 kg 1.10 lb

Tab. 329: Technical data brackets for front cover

1.75.9 Barrier rod

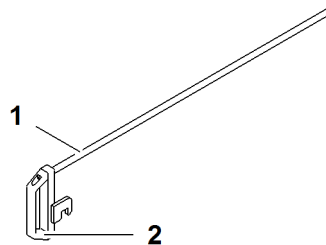


Fig. 567: Barrier rod

- 1 Barrier rod
- 2 Carrier handle

A padlock is supplied with the barrier rod 1.

Vandalism protection*

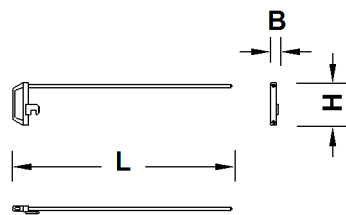


Fig. 568: Dimensions barrier rod

Name		Value
L	Length	913 mm 3' ft-in
B	Width	33 mm 1.30" in
H	Height	178 mm 7.01" in
Weight		1.8 kg 3.97 lb

Tab. 330: Technical data barrier rod

1.76 Video monitoring system*

The video surveillance system is divided into:

- Video surveillance - basic device
- Video surveillance - boom

1.76.1 Cabin overview

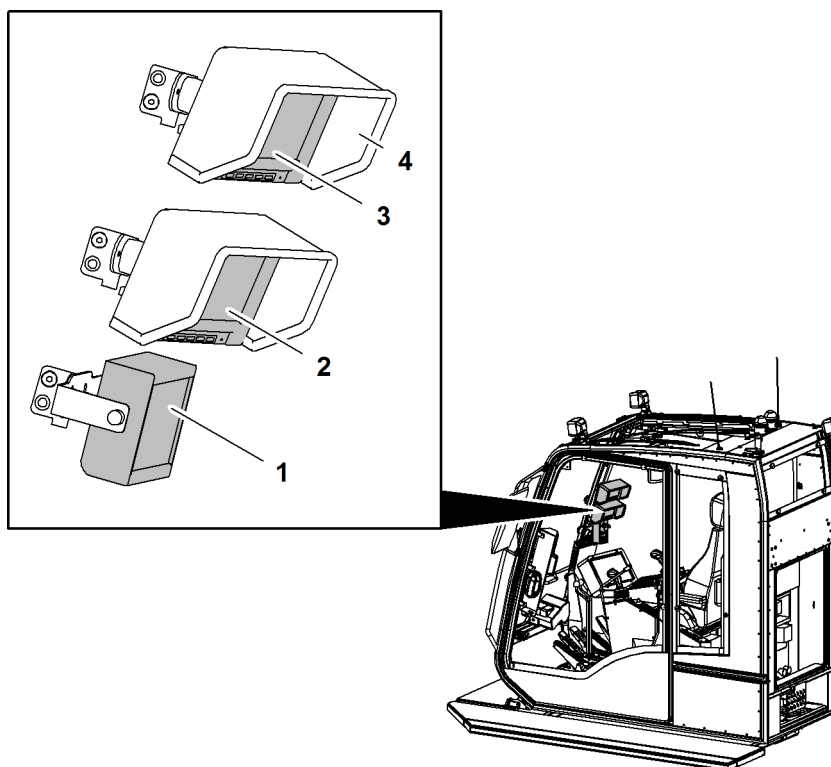


Fig. 569: Cabin overview

- | | | | |
|---|-----------------------------------|---|---|
| 1 | Control panel zoom camera | 3 | Monitor video surveillance - basic device |
| 2 | Monitor video surveillance - boom | 4 | Light protection cover |

1.76.2 Machine overview

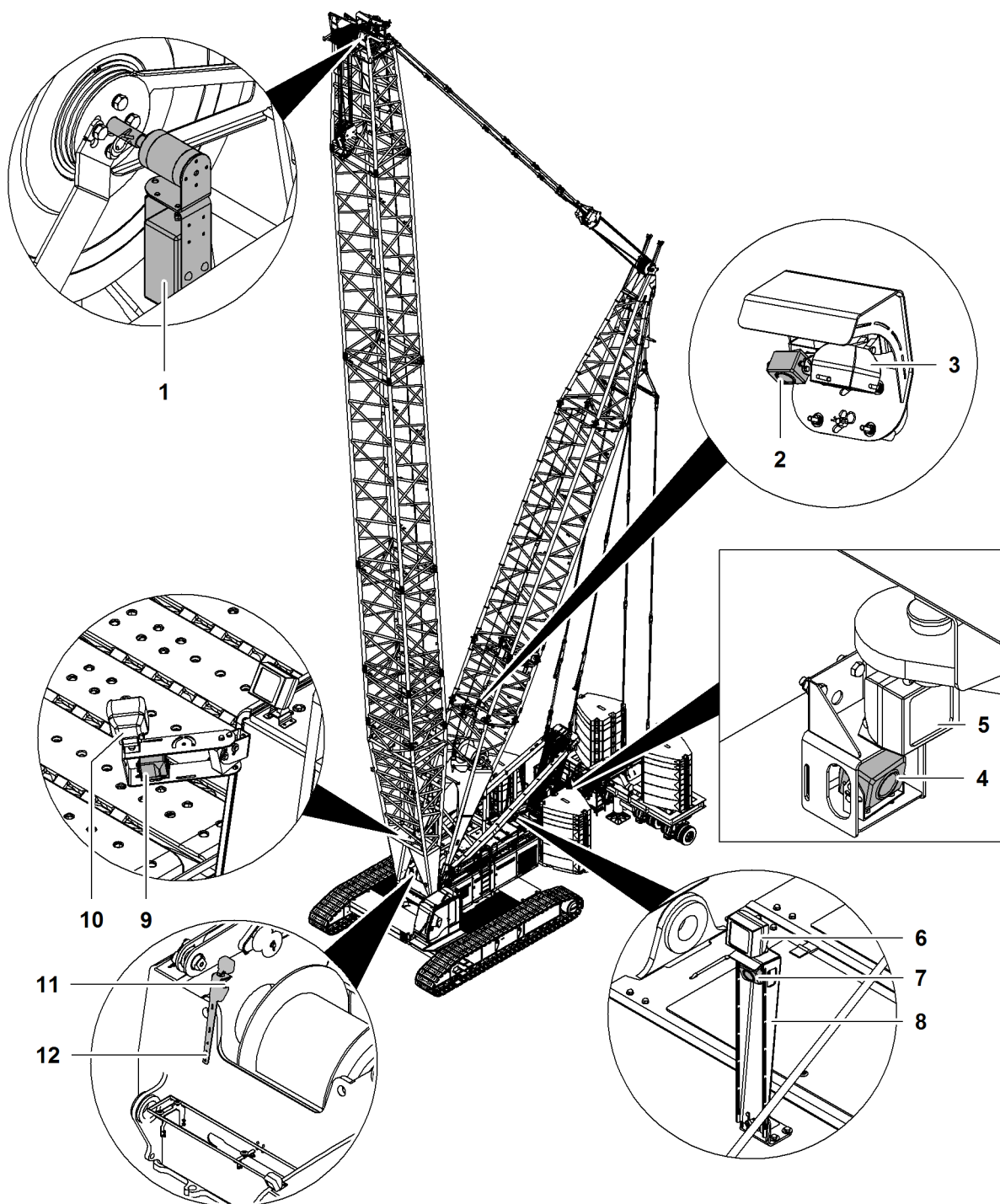


Fig. 570: Machine overview (illustration of principle)

- | | | | | | |
|---|--|---|----------------------|----|-------------------------|
| 1 | Zoom camera in boom head | 5 | Floodlight | 9 | Floodlight |
| 2 | Derrick winch camera | 6 | Floodlight | 10 | Right camera |
| 3 | Floodlight | 7 | Camera winch1/winch2 | 11 | Camera winch1/winch2 |
| 4 | Rearview camera/counterweight carriage | 8 | Mount | 12 | Bracket with floodlight |

Either camera winch1/winch2 7 or camera winch1/winch2 11 are installed.

Name	Monitor	Camera
Video surveillance - basic device	Quad monitor	Right camera 10
		Rearview camera/counter-weight carriage 4
		Camera winch1/winch2 7 or camera winch1/winch2 11
		Derrick winch camera 2
Video surveillance - boom	Quad monitor with control panel	Zoom camera 1

Tab. 331: Overview of video surveillance system

1.76.3 Video surveillance - basic device

Up to four cameras are connected directly to the monitor.

Video surveillance system basic device consists of:

- Quad monitor
- Camera

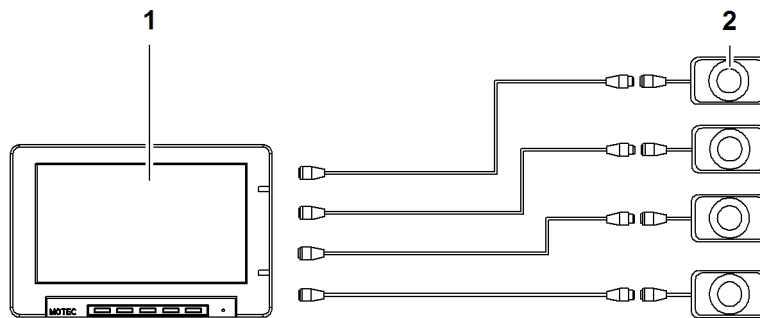


Fig. 571: Diagram video surveillance system basic device

1 Quad monitor in cabin

2 Camera (max. 4x)

Angle of view on the side

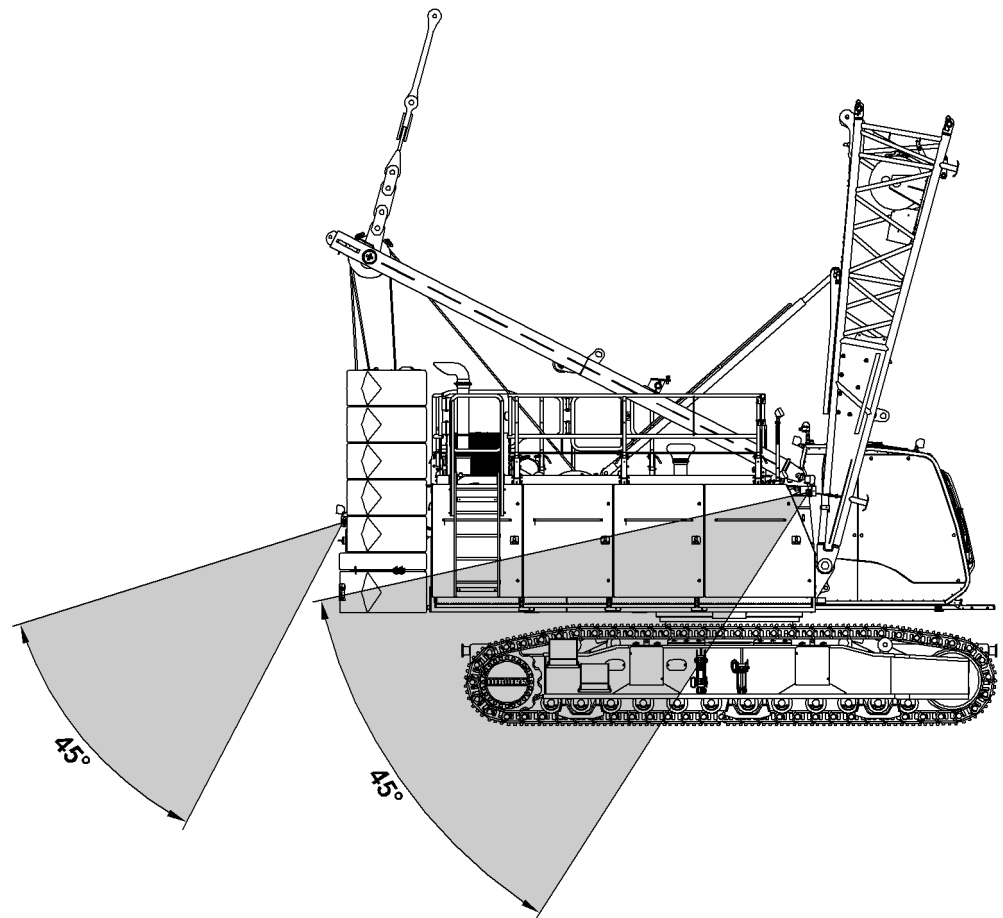


Fig. 572: Angle of view camera right and camera reverse drive/counterweight carriage (illustration of principle)

Angle of view rear

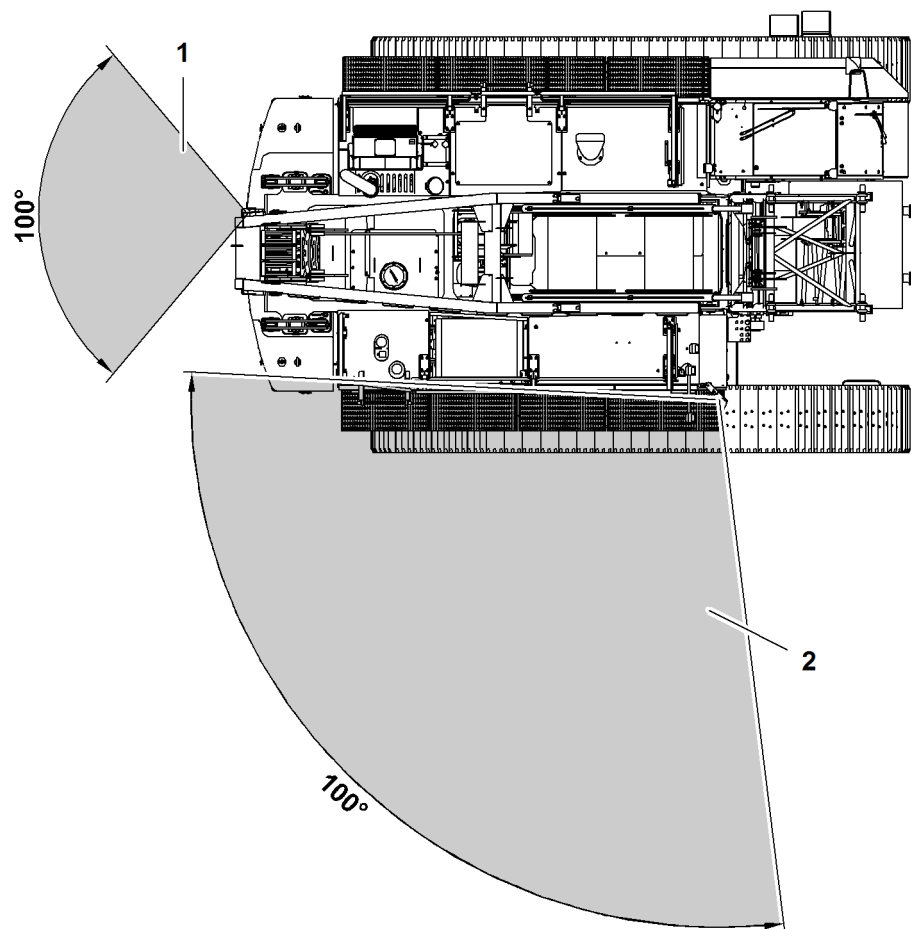


Fig. 573: Angle of view camera right and camera reverse drive/counterweight carriage (illustration of principle)

1.76.4 Video surveillance - boom

Only one camera is connected. This camera is located at the boom head.

The boom video surveillance system device consists of:

- Quad monitor
- Control panel
- Zoom camera

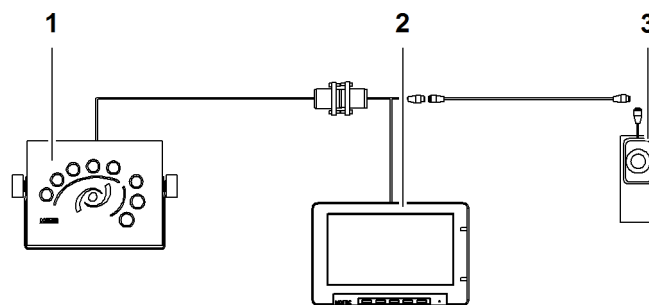


Fig. 574: Diagram boom video surveillance

- | | | | |
|---|-----------------------|---|-------------|
| 1 | Control panel | 3 | Zoom camera |
| 2 | Quad monitor in cabin | | |

1.76.5 Quad monitor

Contained in the kit:

- Color monitor
- Mount with ball joint
- Light protection cover

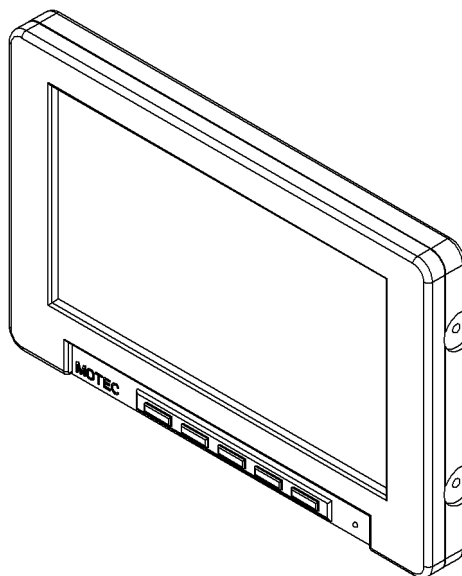


Fig. 575: Quad monitor

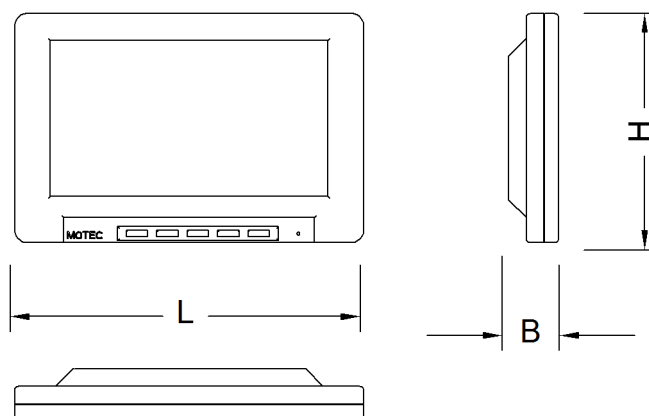


Fig. 576: Dimensions quad monitor

Name		Value
L	Length	195 mm 7.68" in
B	Width	28 mm 1.10" in
H	Height	128 mm 5.04" in
Screen diagonal		17.8 cm 7.01" in
Resolution		234 (v) x 1440 (h)
Nominal voltage		12 V
Power consumption (4 cameras)		max. 1,600 mA
Protection class		IP 30
Shock resistance		> 20 g
Operating temperature		-30 °C (-22 °F) to 80 °C (176 °F)
Storage temperature		-35 °C (-31 °F) to 85 °C (185 °F)
Weight		600 g 1.32 lb

Tab. 332: Technical data quad monitor

1.76.6 Camera

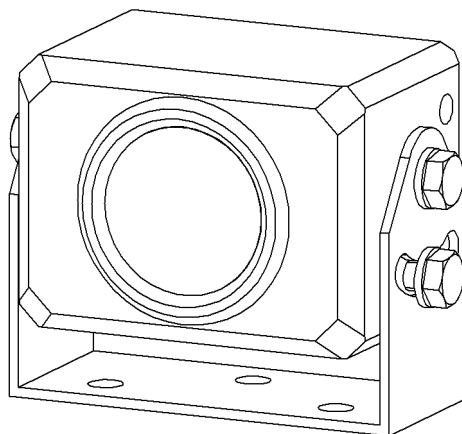


Fig. 577: Camera

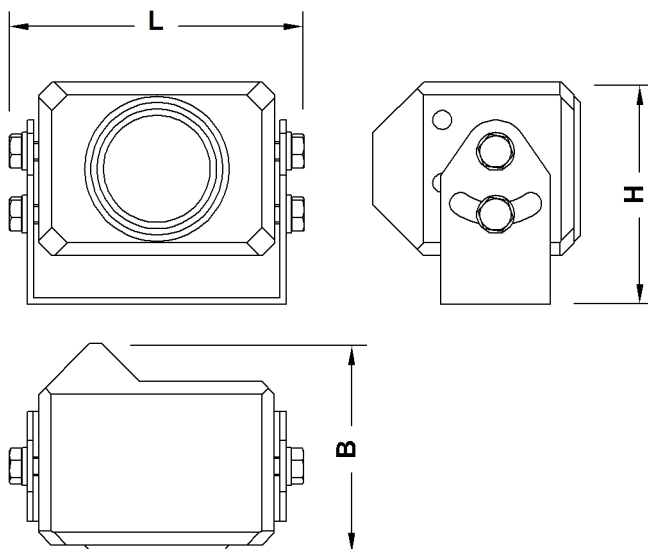


Fig. 578: Dimensions camera

Name		Value
L	Length	92 mm 3.62" in
B	Width	61 mm 2.40" in
H	Height	55 mm 2.17" in
Resolution		320,000 pixels
Nominal voltage		12 V
Current consumption		0.25 A
Protection class		IP 69K
Shock resistance		> 50 g

Name	Value
Operating temperature	-35 °C (-31 °F) to 75 °C (167 °F)
Storage temperature	-40 °C (-40 °F) to 80 °C (176 °F)
Windscreen heater	Automatically controlled
Brightness adjustment	Automatic

Tab. 333: Technical data camera

1.76.7 Control panel zoom camera

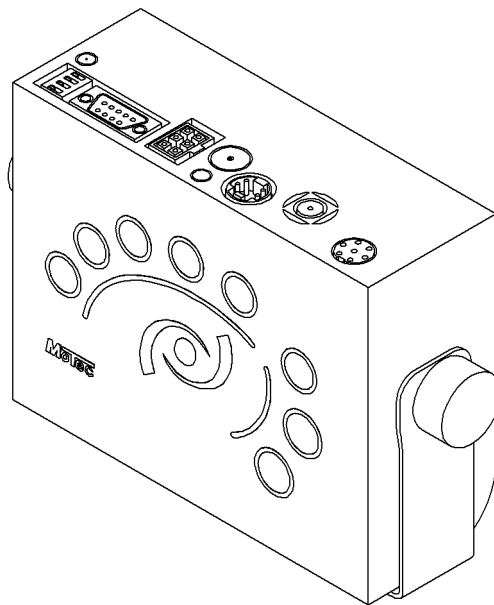


Fig. 579: Control panel zoom camera

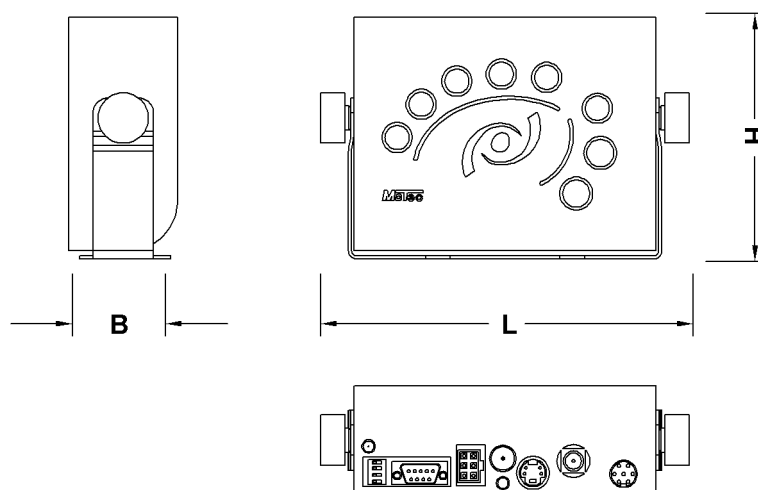


Fig. 580: Dimensions control panel zoom camera

Name		Value
L	Length	175 mm 6.89" in
B	Width	54 mm 2.13" in
H	Height	120 mm 4.72" in
Nominal voltage		24 V
Current consumption		max. 0.5 A
Protection class		IP 54
Operating temperature		-30 °C (-22 °F) to 60 °C (140 °F)
Storage temperature		-40 °C (-40 °F) to 85 °C (185 °F)
Weight (without electric cable)		0.75 kg 1.65 lb

Tab. 334: Technical data control panel zoom camera

1.76.8 Zoom camera

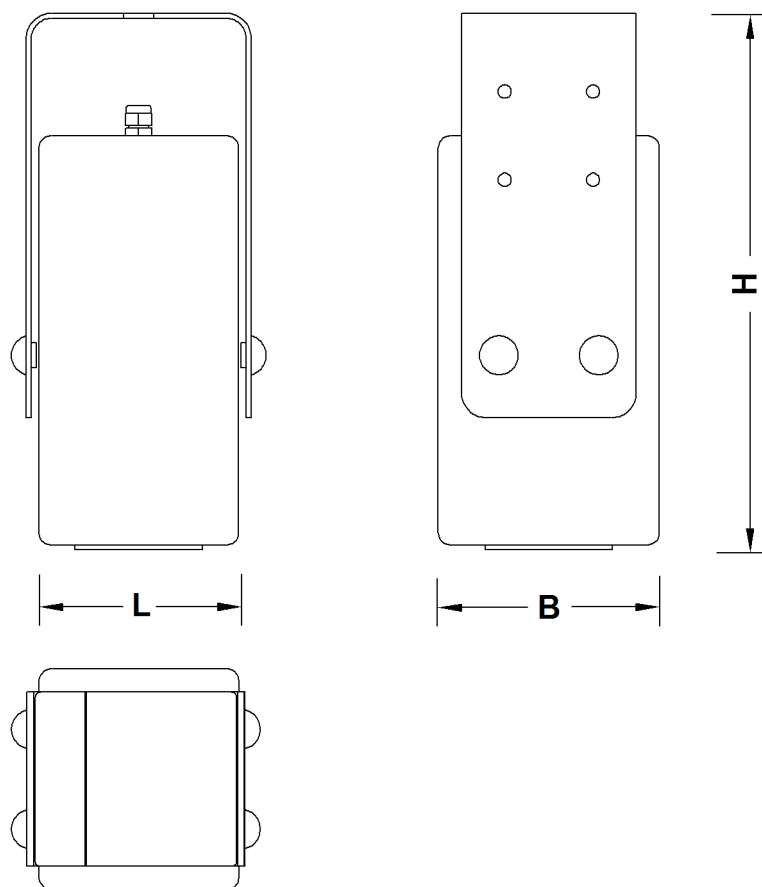


Fig. 581: Dimensions zoom camera

Name		Value
L	Length	80 mm 3.15" in
B	Width	90 mm 3.54" in
H	Height	234 mm 9.21" in
Resolution		440,000 pixels
Zoom factors		18 x optical, 12 x digital
Nominal voltage		24 V
Current consumption		max. 0.45 mA
Protection class		IP 68
Operating temperature		-35 °C (-31 °F) to 60 °C (140 °F)
Storage temperature		-40 °C (-40 °F) to 85 °C (185 °F)
Heating		Windscreen heater, elec- tronically controlled. Acti- vation point: < 15 °C (59 °F)
Weight (with tip mount)		5 kg 11.02 lb

Tab. 335: Technical data zoom camera

1.76.9 Mounts

The mounts are tip mounts.

A different mount may be required depending on the installation site of the zoom camera. There are three different mounts.

If the camera is transported to another installation site, the corresponding mount must be installed.

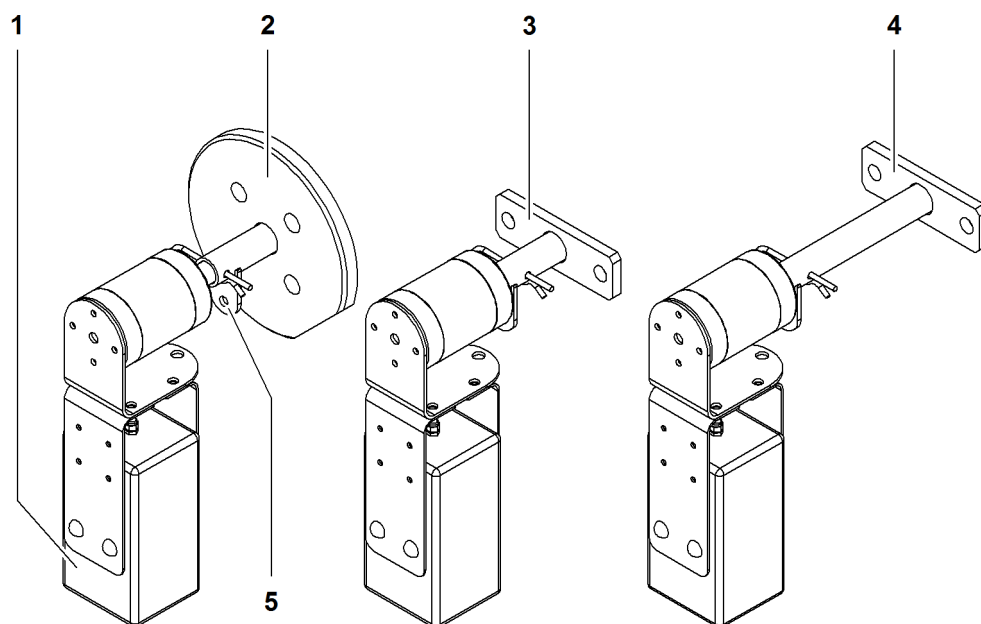


Fig. 582: Mounts A, B and C for zoom camera

- | | | | |
|---|-------------|---|------------------------------------|
| 1 | Zoom camera | 4 | Mount C |
| 2 | Mount A | 5 | Connecting link for securing chain |
| 3 | Mount B | | |

The chain for securing the camera is hooked into the connecting link 5 with a carabiner.

Mount A

Zoom camera with mount A is installed on:

- Main boom head 1311
- Main boom head 2017
- Main boom head 2018
- Main boom head 2220
- Main boom head 2320
- Main boom head 2821

The mount can be installed on the left or the right.

The axle support of the main boom head is exchanged for mount A here.

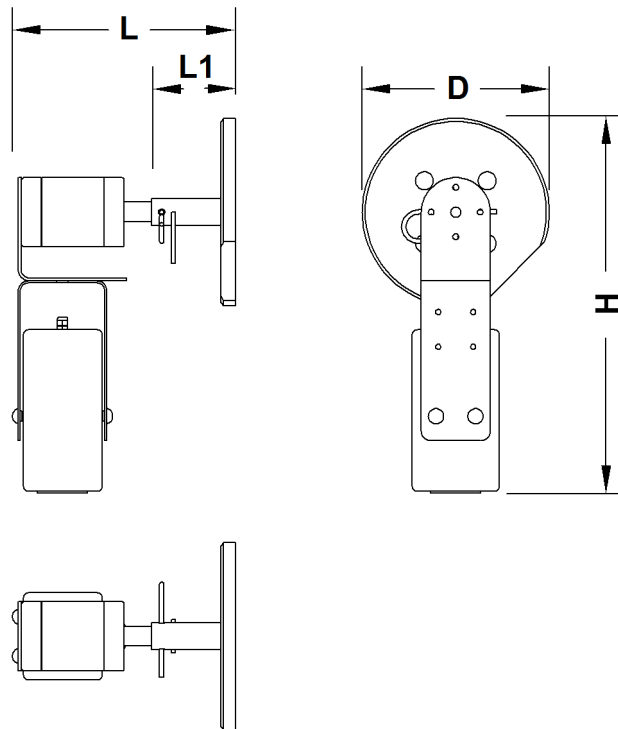


Fig. 583: Dimensions mount A

Name		Value
D	Diameter	190 mm 7.48" in
L	Total length	227 mm 8.94" in
L1	Length	85 mm 3.35" in
H	Height	380 mm 1' 3" ft-in

Tab. 336: Technical data mount A

Mount B

Zoom camera with mount B is installed on:

- Auxiliary jib 36 t (79,365 lb)
- Auxiliary jib 15 t (33,069 lb)
- Fixed jib head 0806
- Fixed jib head 1713
- Luffing jib head 1008
- Luffing jib head 1309
- Luffing jib head 1713
- Luffing jib head 1916
- Luffing jib head 2316

The mount can be installed on the left or the right.

With the auxiliary jib 36 t (79,365 lb), the mount is installed on the axle support.

With auxiliary jib 15 t (33,069 lb), a plate must be installed additionally.

An angle has to be installed additionally with fixed jib head 0806.

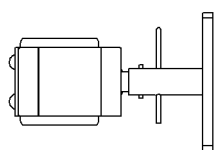
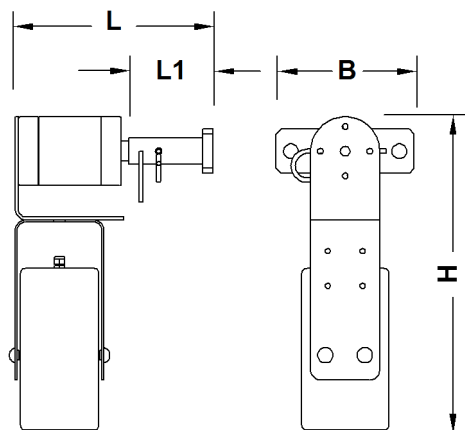


Fig. 584: Dimensions mount B

Name		Value
L	Total length	207 mm 8.15" in
L1	Length	85 mm 3.35" in
B	Width	140 mm 5.51" in
H	Height	320 mm 1' 1" ft-in

Tab. 337: Technical data mount B

Mount C

Zoom camera with mount C is installed on:

- Fixed jib head 0906
- Fixed jib head 1008
- Fixed jib head 1507

The mount can be installed on the left or the right.

An angle has to be installed additionally with fixed jib head 1008.

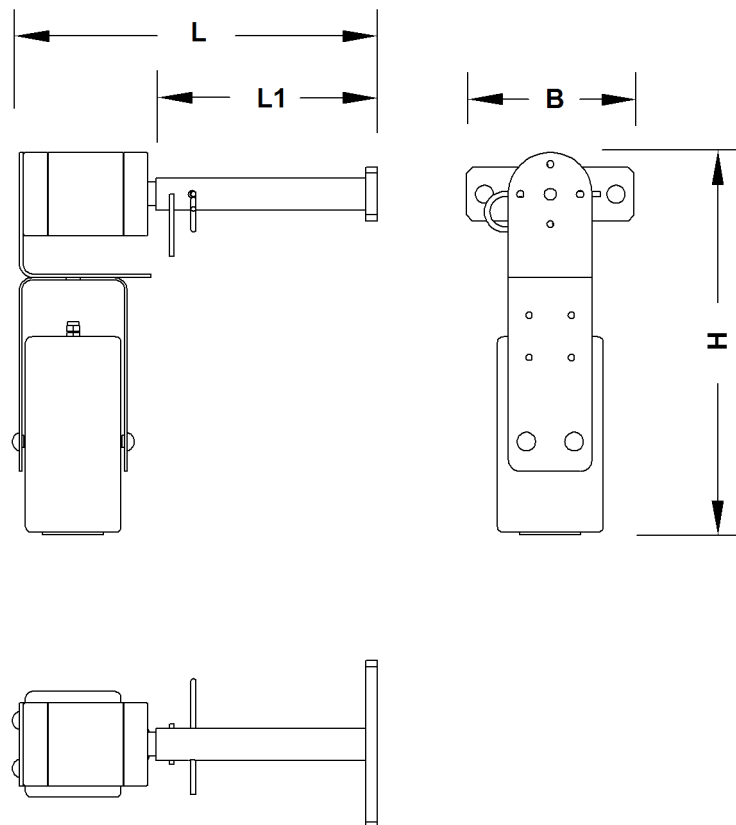


Fig. 585: Dimensions mount C

Name		Value
L	Total length	306 mm 1' ft-in
L1	Length	183 mm 7.20" in
B	Width	140 mm 5.51" in
H	Height	320 mm 1' 1" ft-in

Tab. 338: Technical data mount C

Plate

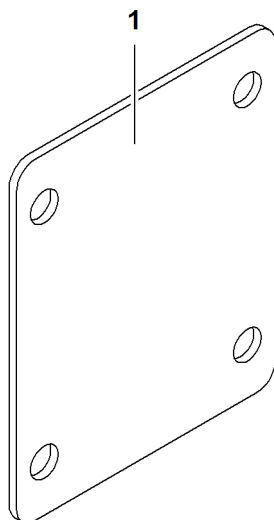


Fig. 586: Plate

1 Plate

Name		Value
L	Length	140 mm 5.51" in
B	Width	4 mm 0.16" in
H	Height	170 mm 6.69" in

Tab. 339: Technical data plate

Angle

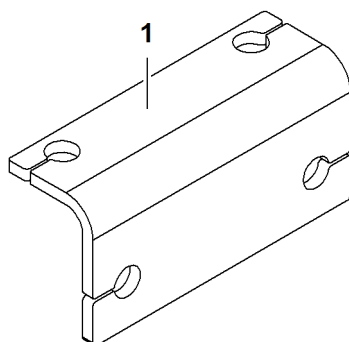


Fig. 587: Angle

1 Angle

Name		Value
L	Length	150 mm 5.91" in

Name		Value
B	Width	50 mm 1.97" in
H	Height	70 mm 2.76" in
Material thickness		6 mm 0.24" in

Tab. 340: Technical data angle

1.76.10 Camera cable in main boom base section

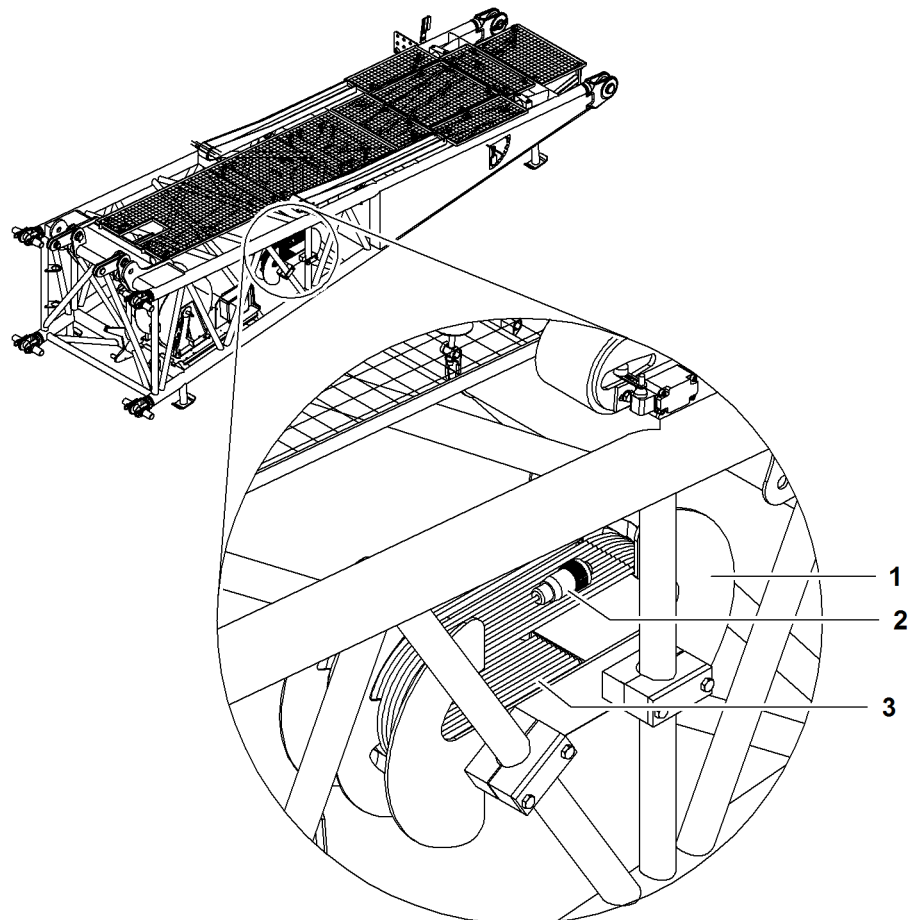


Fig. 588: Camera cable in main boom base section

- | | | | |
|----------|---------------------------|----------|------------|
| 1 | Camera cable | 3 | Cable drum |
| 2 | Electric screw connection | | |

A cable drum **3** with the camera cable **1** is located in the main boom base section. The electric screw connection **2** is guided into the uppercarriage with the electrics of the main boom base section.

Name	Value
Conductor resistance	< 76 mΩ/m
Capacity	< 80 pF/m

Name	Value
Operating temperature	-40 °C (-40 °F) to 70 °C (158 °F)
Bending radius	> 80 mm (3.15" in)
Weight	approx. 0.82 kg/m (0.55 lb/ft)

Tab. 341: Technical data camera cable

1.76.11 Zoom camera in main boom head

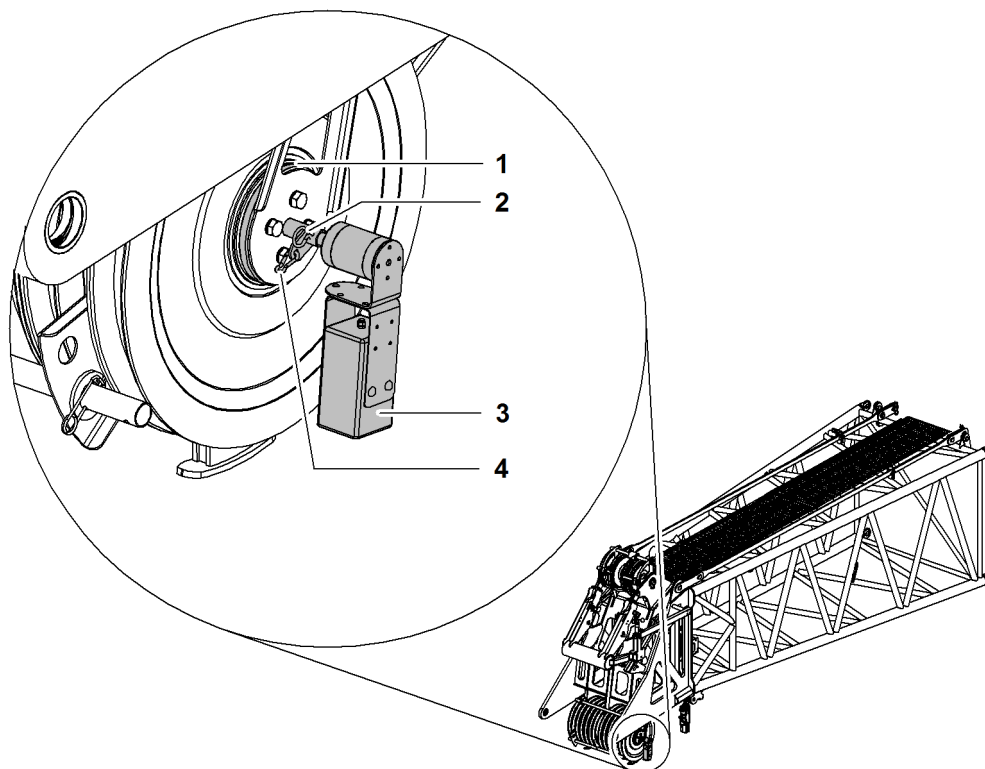


Fig. 589: Zoom camera in main boom head

- | | | | |
|---|-------------------|---|-------------|
| 1 | Mount A | 3 | Zoom camera |
| 2 | Spring cotter pin | 4 | Carabiner |

1.76.12 Zoom camera in fixed jib head

Fixed jib head 1008

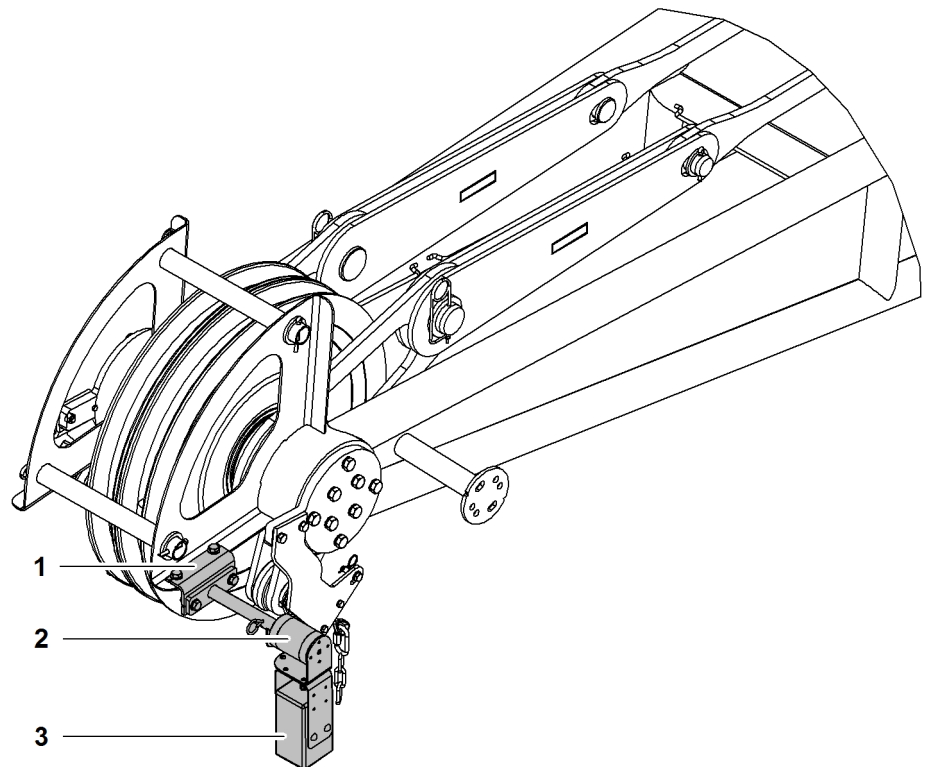


Fig. 590: Zoom camera in fixed jib head 1008

- | | | | |
|---|---------|---|-------------|
| 1 | Angle | 3 | Zoom camera |
| 2 | Mount C | | |

Fixed jib head 0906 and 1507

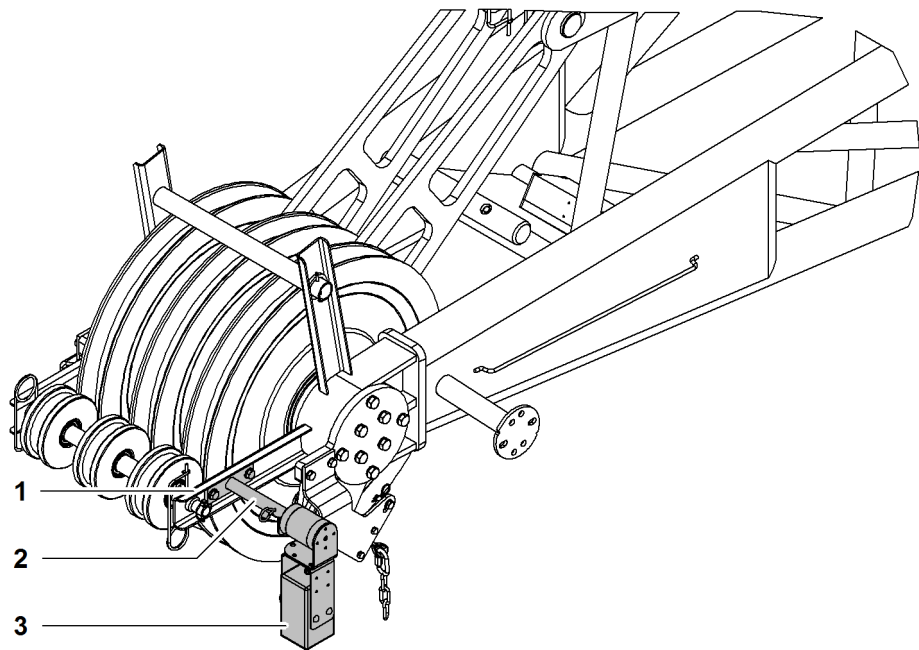


Fig. 591: Zoom camera in fixed jib head 0906 and 1507

- | | | | |
|---|----------------------------------|---|-------------|
| 1 | Mount rope protection pulley set | 3 | Zoom camera |
| 2 | Mount C | | |

1.76.13 Zoom camera in luffing jib head

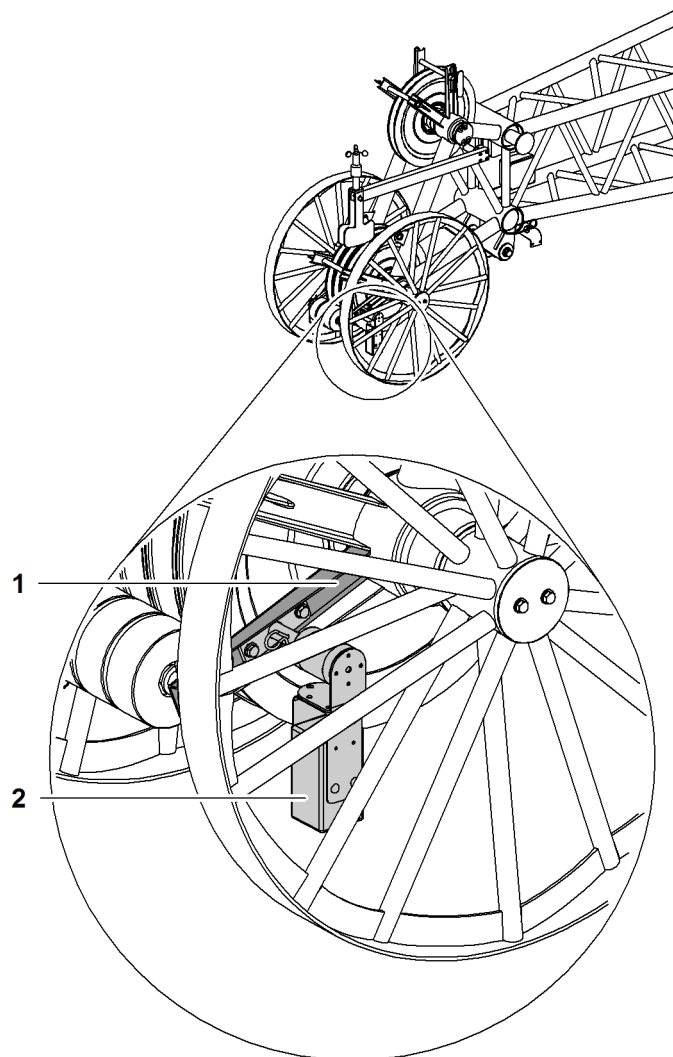


Fig. 592: Zoom camera in luffing jib head

- 1 Mount rope protection pulley set 2 Zoom camera with mount B

1.76.14 Zoom camera in auxiliary jib 36 t (79300 lb)

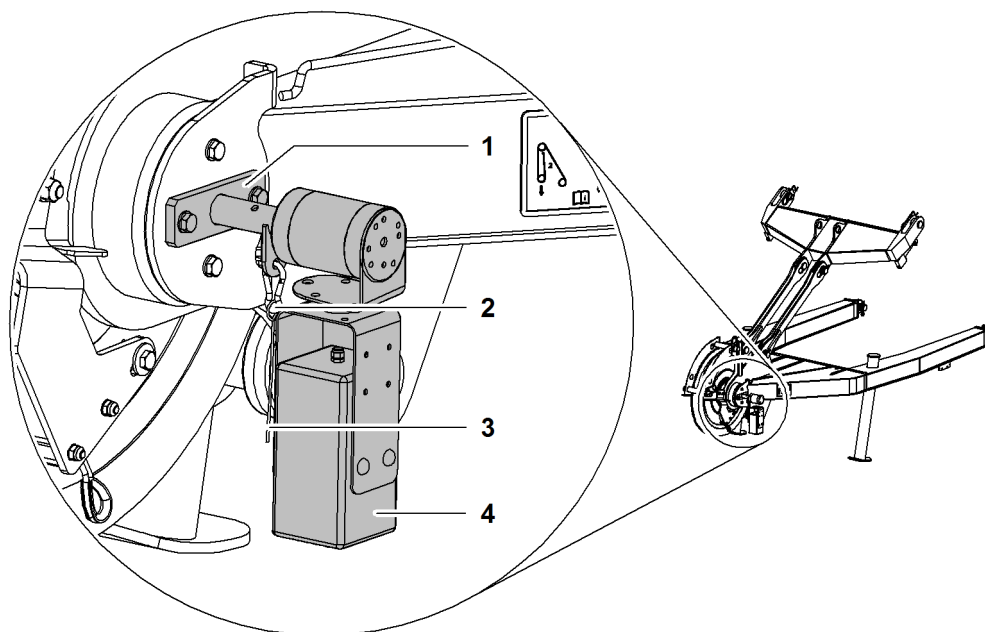


Fig. 593: Zoom camera in auxiliary jib 36 t (79300 lb)

- | | | | |
|---|-----------|---|----------------|
| 1 | Mount B | 3 | Securing chain |
| 2 | Carabiner | 4 | Zoom camera |

1.76.15 Zoom camera in auxiliary jib 15 t (33000 lb)

The zoom camera in the auxiliary jib 15 t (33000 lb) is mounted with a plate on the jib head.

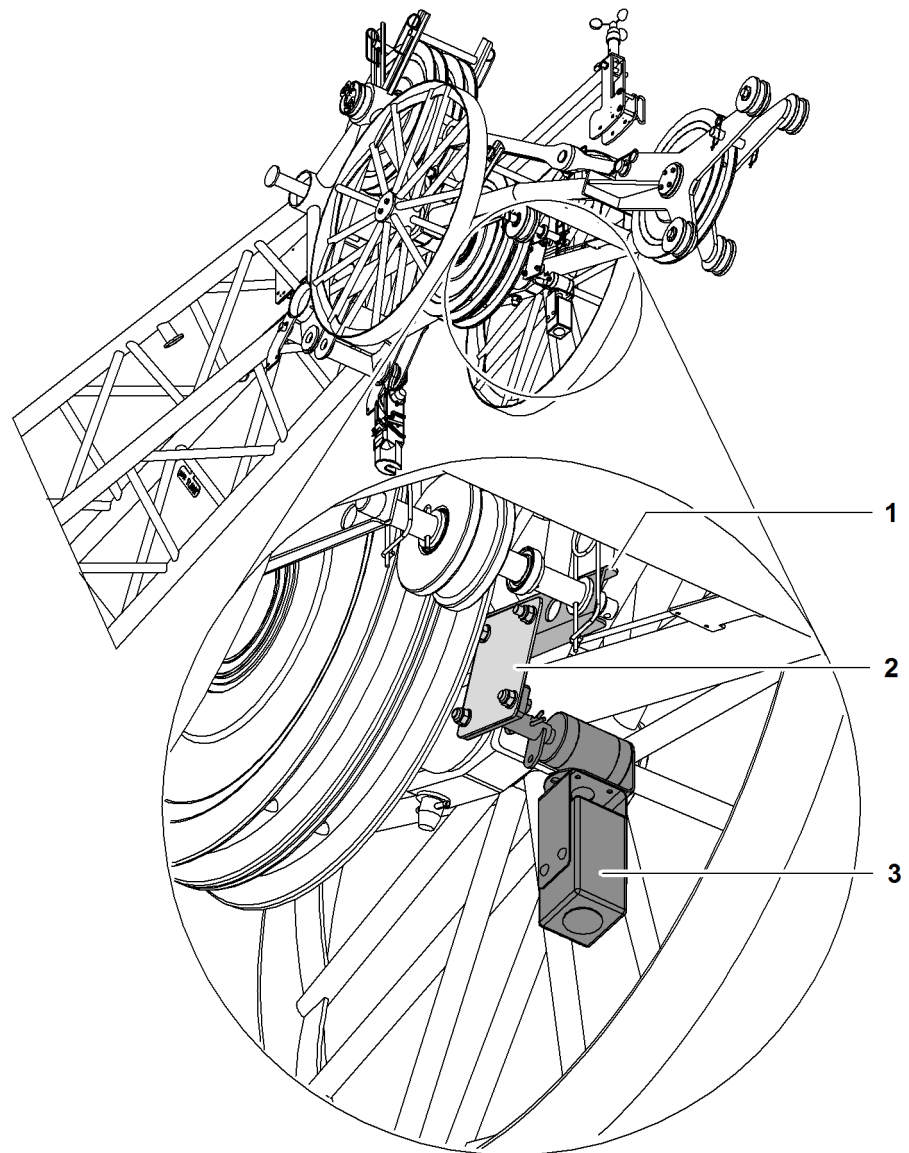


Fig. 594: Zoom camera in auxiliary jib 15 t (33000 lb)

- | | | | |
|---|----------------------------|---|--------------------------|
| 1 | Rope protection pipe mount | 3 | Zoom camera with mount B |
| 2 | Plate | | |

1.76.16 Foot pedal* for zoom camera

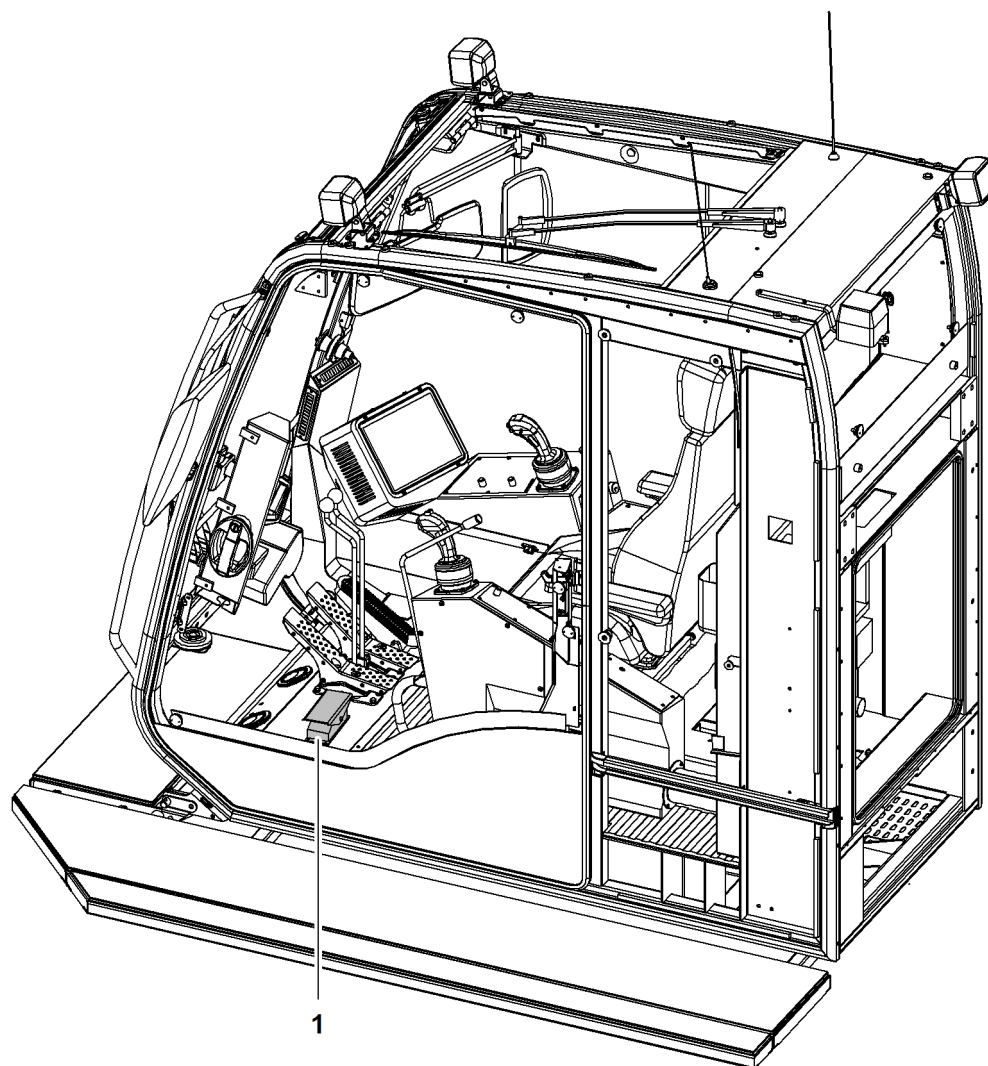


Fig. 595: Foot pedal for zoom camera*

1 Foot pedal

The camera zoom can be operated with the foot pedal **1** besides the control panel.

1.77 Central lubrication system

The central lubrication system lubricates the swing ring bearing. With the corresponding retrofit kit, the swing ring tooth flank is also lubricated via the central lubrication system.

The central lubrication system's lubricating pump is located in the uppercarriage.

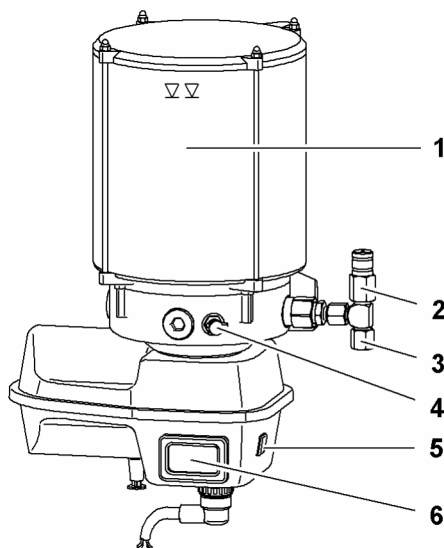


Fig. 596: Central lubrication system

- | | | | |
|---|--------------------------------|---|-----------------------------------|
| 1 | Supply container | 4 | Filling nipple |
| 2 | Positive pressure relief valve | 5 | Button <i>Interim lubrication</i> |
| 3 | Pump outlet | 6 | Control unit |

1.78 Additional floodlights*

The following auxiliary floodlights are available:

- Floodlights on uppercarriage
- Floodlight on cabin
- Adjustable floodlights on main boom base section
- Floodlights on main boom
- Floodlight with LED on main boom head
- Floodlights on jib head section

1.78.1 Floodlights on uppercarriage

The following illuminants are available:

- Halogen bulb H3
- LED

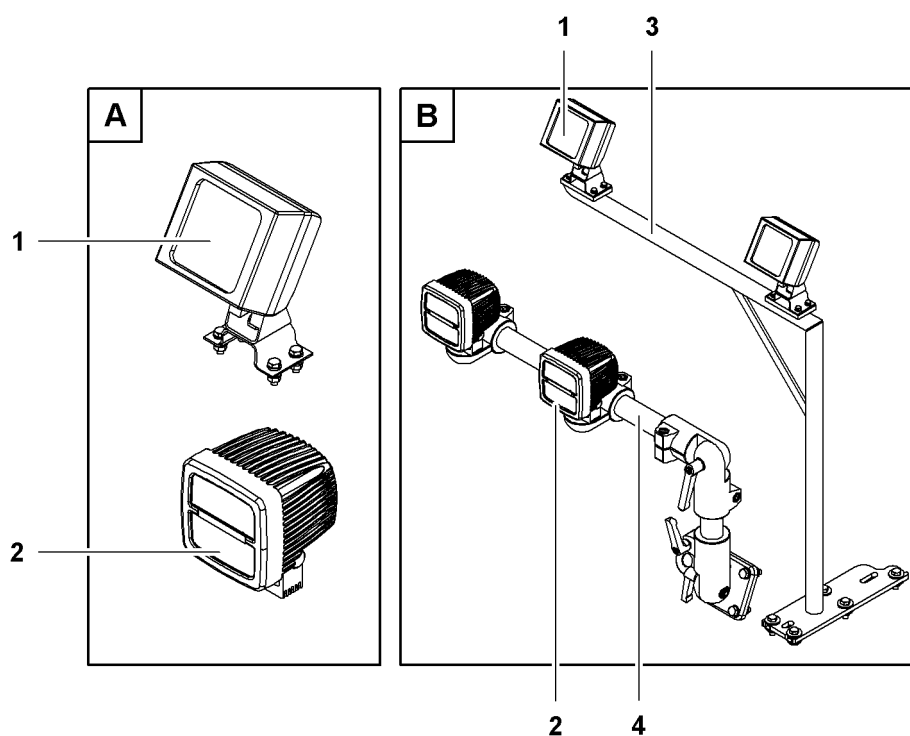


Fig. 597: Floodlights on uppercarriage

- | | | | |
|---|-------------------------|---|-----------------------|
| 1 | Floodlight with bulb H3 | 4 | Stayer |
| 2 | Floodlight with LED | A | Floodlight on cabin |
| 3 | Stayer | B | Floodlight with frame |

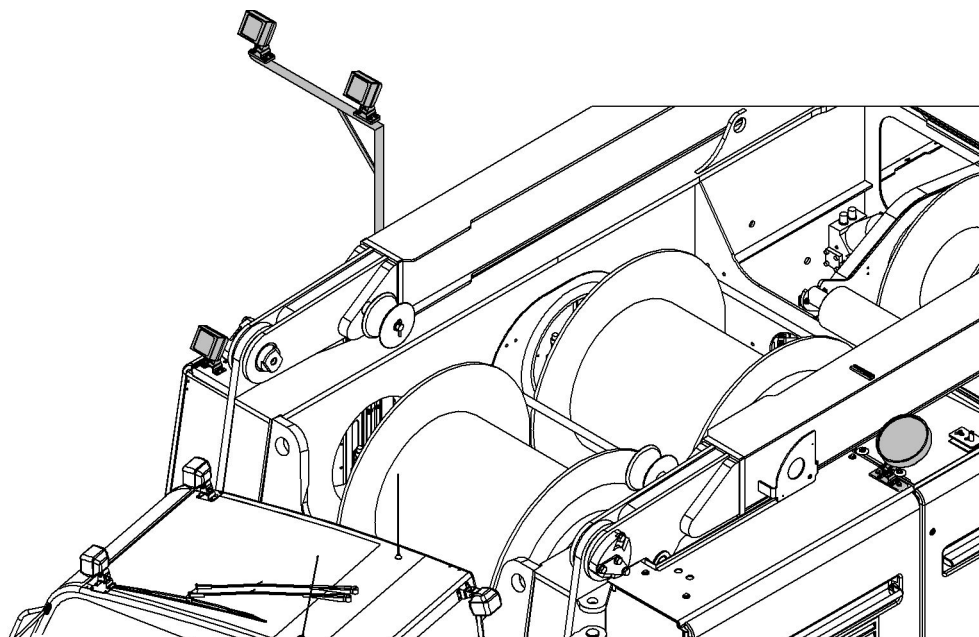


Fig. 598: Floodlights on uppercarriage

The exact installation position of the search floodlight varies according to machine type.

Name	Value
Illuminant	Halogen bulb H3
Power consumption per floodlight	70 W
Nominal voltage	24 V
Weight of each floodlight	0.7 kg 1.54 lb
Width of stayer	700 mm 2' 4" ft-in
Height of stayer	700 mm 2' 4" ft-in

Tab. 342: Technical data floodlight with bulb H3

Name	Value
Illuminant	LED
Power consumption per floodlight	50 W
Nominal voltage	24 V
Weight of each floodlight	1.5 kg 3.31 lb
Width of stayer	700 mm 2' 4" ft-in
Height of stayer	470 mm 1' 7" ft-in

Tab. 343: Technical data floodlight with LED

Additional floodlights*

Name	Value
Illuminant	Halogen bulb H3
Power consumption	70 W
Nominal voltage	24 V
Weight	1.5 kg 3.31 lb

Tab. 344: Technical data search floodlight

1.78.2 Floodlight on cabin

The following floodlights are available:

- Halogen bulb H3
- LED

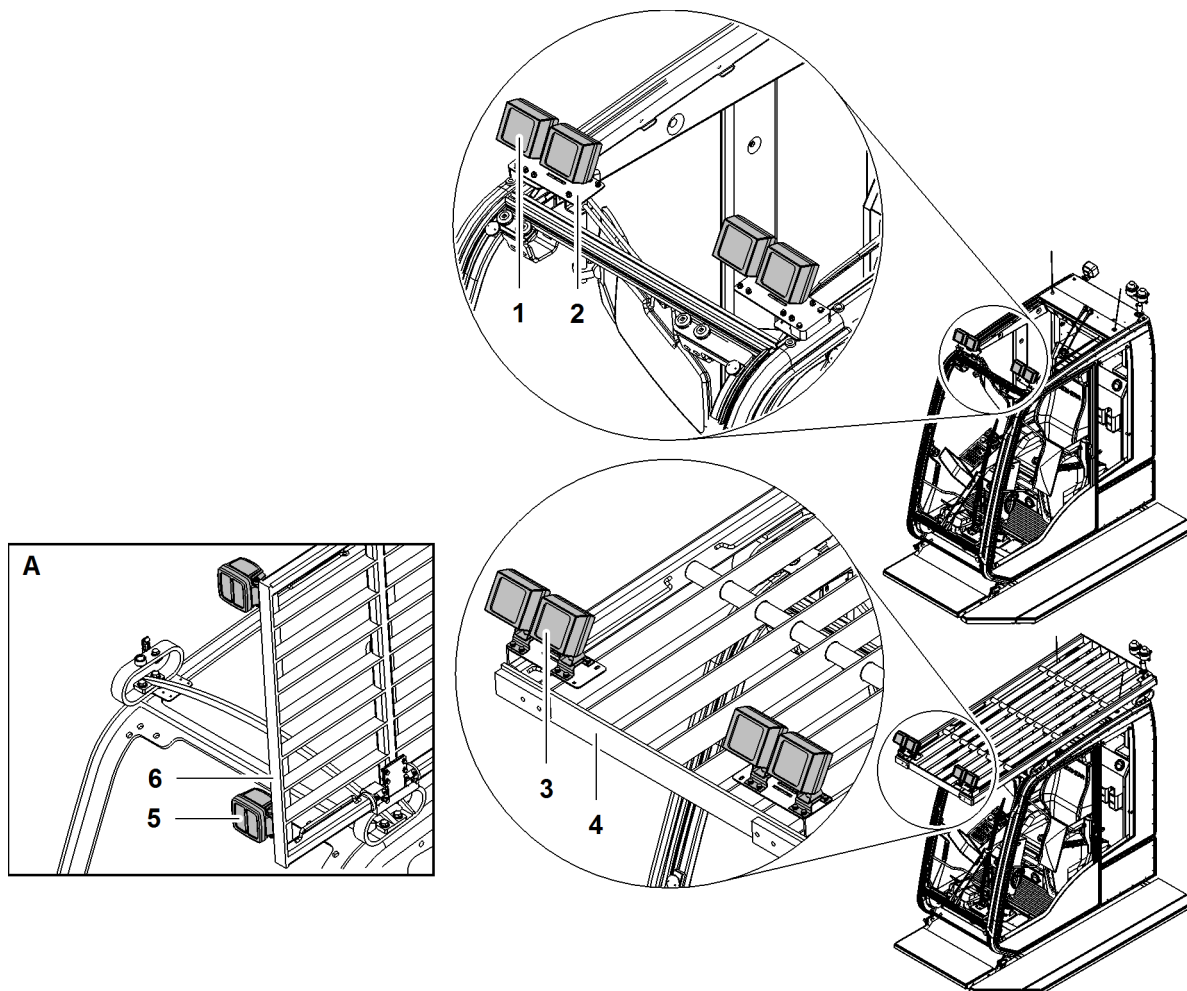


Fig. 599: Floodlight on cabin

- | | | | | | |
|----------|------------------------------------|----------|---------------------------------|----------|------------------------------------|
| A | Foldable falling object protection | 3 | Floodlight (4x) | 6 | Foldable falling object protection |
| 1 | Floodlight (4x) | 4 | Fixed falling object protection | 5 | Floodlight (2x) |
| 2 | Mount (2x) | 5 | Floodlight (2x) | | |

Picture **A** shows foldable falling object protection in opened state.

Name	Value
Illuminant	Halogen bulb H3
Nominal voltage	24 V
Power consumption per floodlight	70 W
Weight of each floodlight	0.7 kg 1.54 lb

Tab. 345: Technical data floodlight with bulb H3

Name	Value
Illuminant	LED
Nominal voltage	24 V
Power consumption per floodlight	50 W
Weight of each floodlight	1.5 kg 3.31 lb

Tab. 346: Technical data floodlight with LED

1.78.3 Adjustable floodlights on main boom base section

The following floodlights are available:

- Xenon gas discharge lamp
- LED

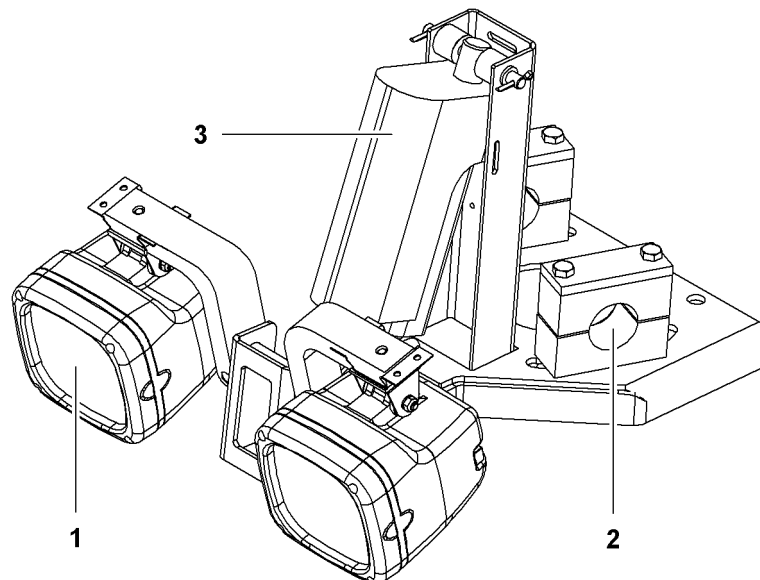


Fig. 600: Adjustable floodlights on main boom base section

- | | |
|--------------------------------|--------------------------------------|
| 1 Floodlight (2x) | 3 Variable displacement motor |
| 2 Attachment point (2x) | |

The variable displacement motor **1** can be used to adjust floodlights **3** by 141°.

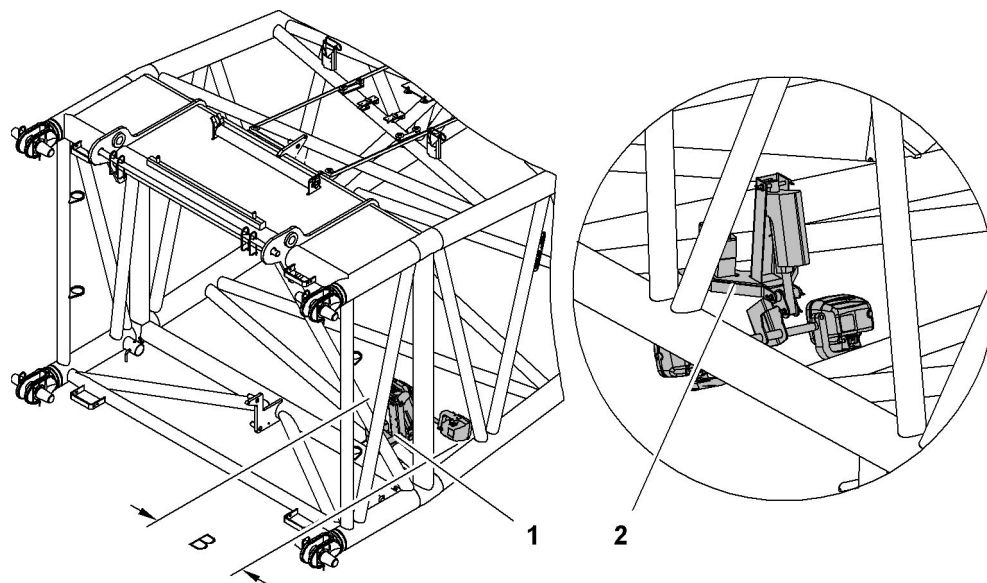


Fig. 601: Adjustable floodlights on main boom base section

1 Floodlight folded in

2 Floodlight folded out

The exact installation position of the floodlights varies according to machine type.

Name		Value
Illuminant		Xenon gas discharge lamp
B	Width	740 mm 2' 5" ft-in
Nominal voltage		24 V
Power consumption per floodlight		42 W
Weight		14.5 kg 31.97 lb

Tab. 347: Technical data floodlight with xenon gas discharge lamp

Name		Value
Illuminant		LED
B	Width	668 mm 2' 2" ft-in
Nominal voltage		24 V
Power consumption per floodlight		50 W
Weight		15.5 kg 34.17 lb

Tab. 348: Technical data floodlight with LED

1.78.4 Floodlights on main boom

The following floodlights are available on the main boom:

- High-pressure sodium vapor lamp
- LED floodlights

Floodlight with high-pressure sodium vapor lamp on main boom

Several pairs of floodlights with high-pressure sodium vapor lamps can be installed on main boom.

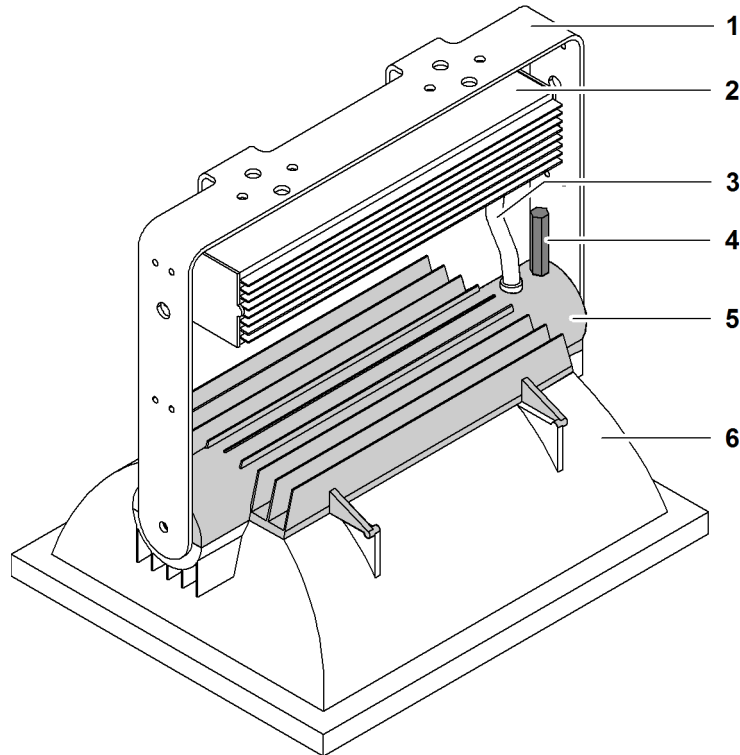


Fig. 602: Floodlight with high-pressure sodium vapor lamp

- | | | | |
|---|----------------|---|----------------|
| 1 | Bracket | 4 | Lever (2x) |
| 2 | Control gear | 5 | Cover |
| 3 | Electric cable | 6 | Main reflector |

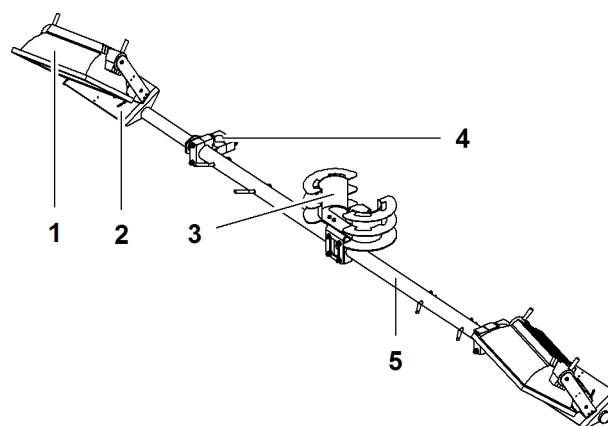


Fig. 603: Floodlight mount with high-pressure sodium vapor lamp

- | | | | |
|---|-------------------|---|-------------------------------------|
| 1 | Floodlight (2x) | 4 | Attachment point (2x) for main boom |
| 2 | Fixing bases (2x) | 5 | Mount |
| 3 | Cable bracket | | |

Attachment bases **2** can be adjusted by 60°.

The maximum cable length is 25 m (82' ft-in).

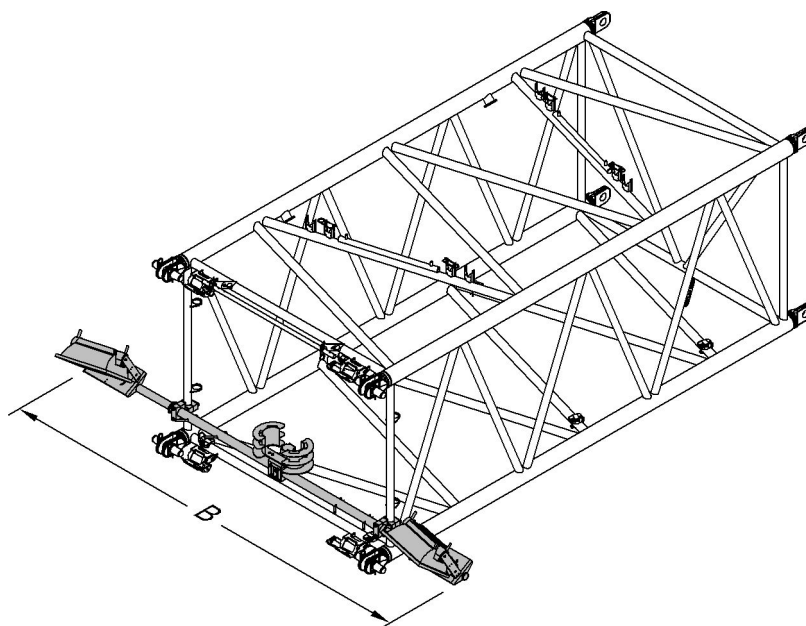


Fig. 604: Floodlight with high-pressure sodium vapor lamp mounted on main boom

Name		Value
Illuminant		High-pressure sodium vapor lamp
B	Width	5150 mm 16' 11" ft-in
Nominal voltage		230 V
Power consumption per floodlight		1000 W
Weight		101 kg 223 lb

Tab. 349: Technical data floodlight with high-pressure sodium vapor lamp

Floodlight with LED on main boom

Only one pair of floodlights with LED can be installed on main boom.

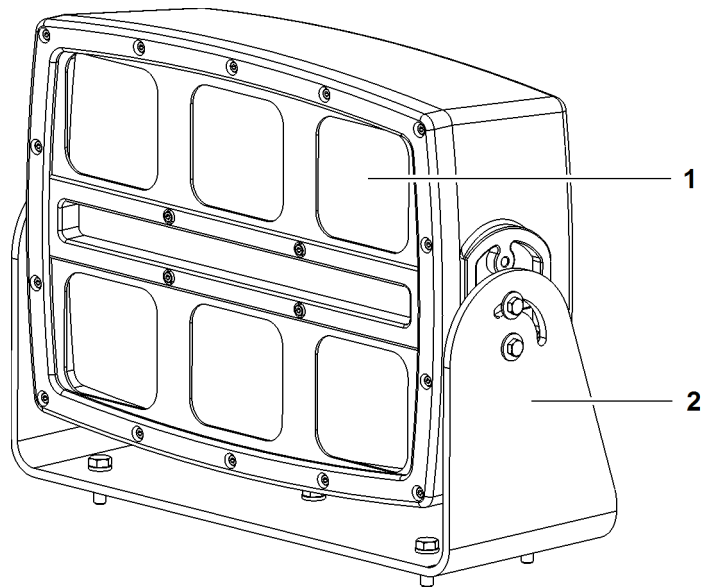


Fig. 605: Floodlight with LED on main boom

- | | | | |
|---|------------------------|---|-------|
| 1 | Illumination unit (6x) | 2 | Mount |
|---|------------------------|---|-------|

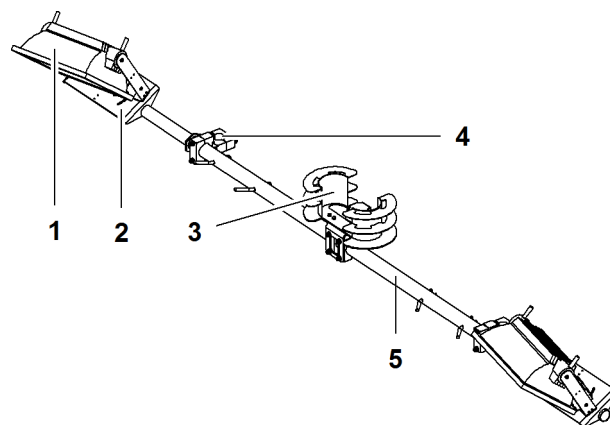


Fig. 606: Mount of floodlight with LED

- | | | | |
|---|-------------------|---|-------------------------------------|
| 1 | Floodlight (2x) | 4 | Attachment point (2x) for main boom |
| 2 | Fixing bases (2x) | 5 | Mount |
| 3 | Cable bracket | | |

The attachment bases **2** can be tilted by 60°.

The maximum cable length is 25 m (82' ft-in).

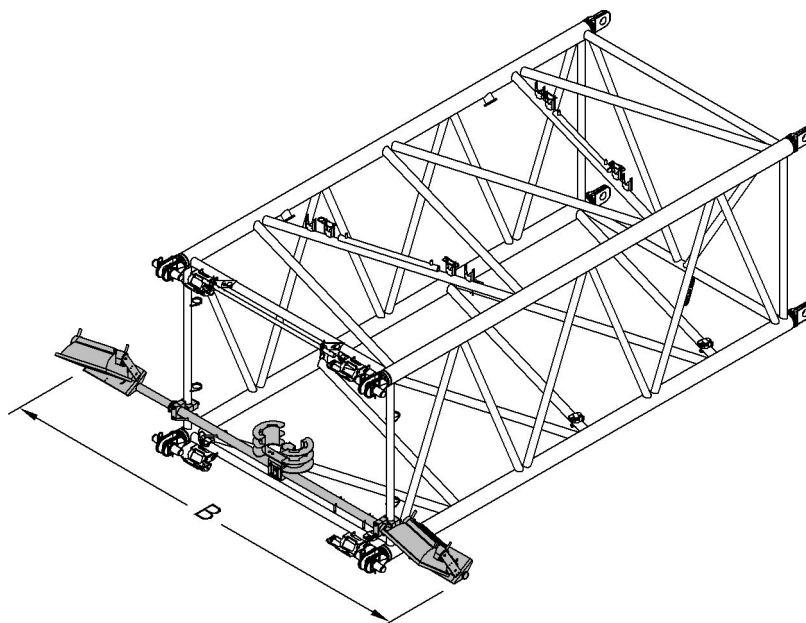


Fig. 607: Floodlight with LED mounted on main boom

Name		Value
B	Width	5150 mm 16' 11" ft-in
Illuminant		LED
Nominal voltage		24 V
Power consumption per floodlight		300 W
Weight		165 kg 364 lb

Tab. 350: Technical data floodlight with LED

1.78.5 Floodlight with LED on main boom head*

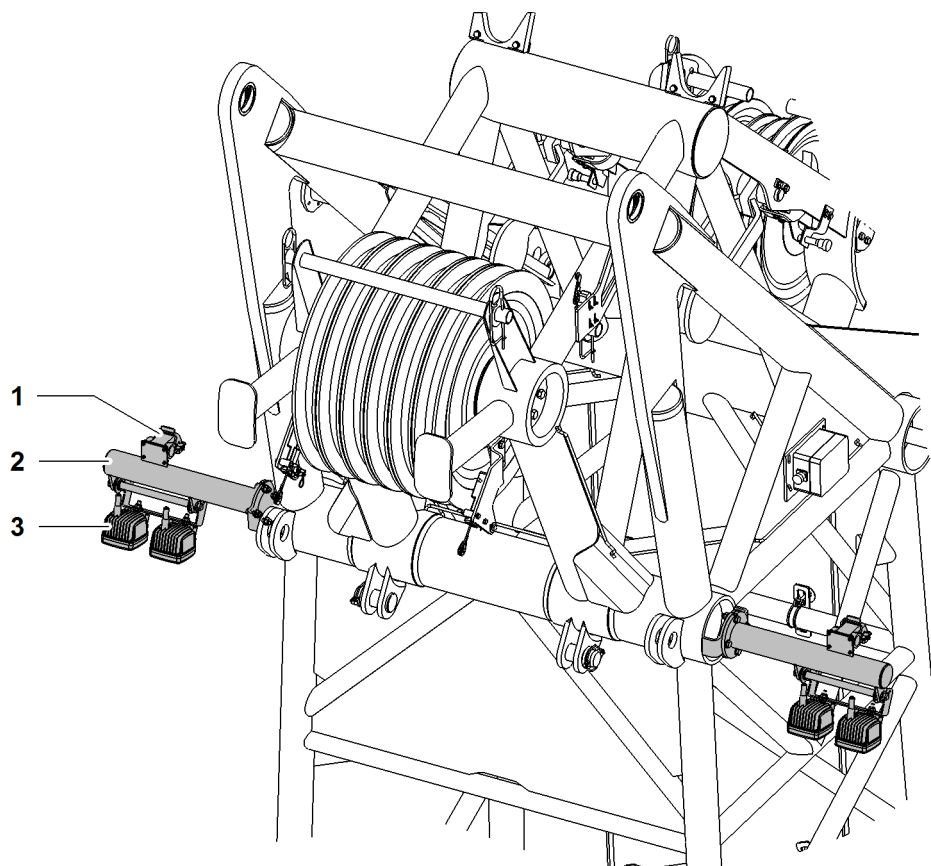


Fig. 608: Floodlight with LED on main boom head

1 Socket (2x)
2 Mount (2x)

3 Floodlight with LED (4x)

Floodlights with LED for main boom head* are available for machine types LR 1001, LR 1002 and LR 1003.

Name	Value
Illuminant	LED
Nominal voltage	24 V
Current consumption	0.3 A
Output	50 W
Temperature range	-40 °C (-40 °F) to 85 °C (185 °F)

Tab. 351: Technical data floodlight with LED

1.78.6 Floodlight with high-pressure sodium vapor lamp on jib head section

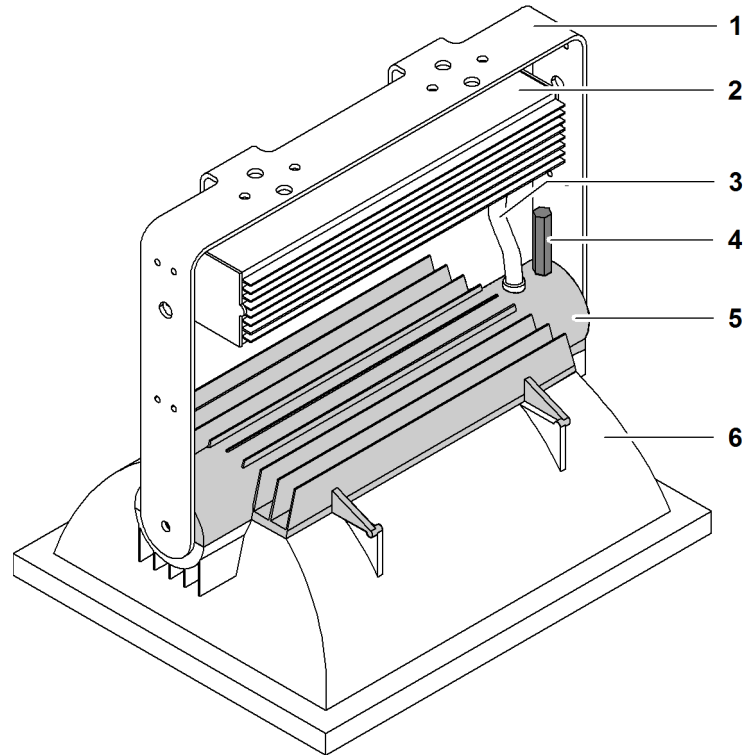


Fig. 609: Floodlight with high-pressure sodium vapor lamp

- | | | | |
|---|----------------|---|----------------|
| 1 | Mount | 4 | Lever (2x) |
| 2 | Control gear | 5 | Cover |
| 3 | Electric cable | 6 | Main reflector |

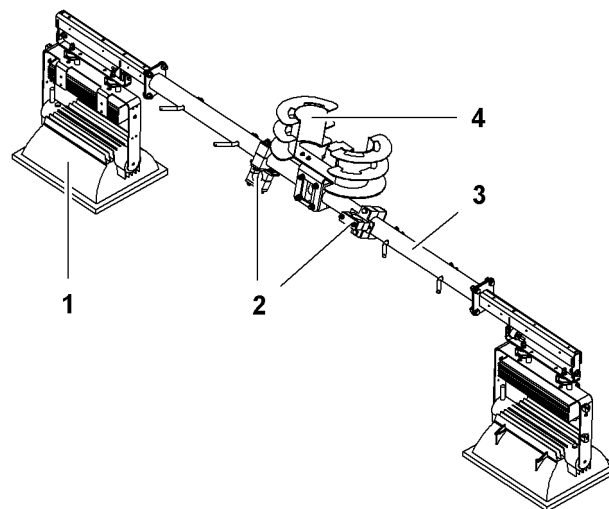


Fig. 610: Mount of floodlight with high-pressure sodium vapor lamp

- | | | | |
|---|-----------------------|---|---------------|
| 1 | Floodlight (2x) | 3 | Mount |
| 2 | Attachment point (2x) | 4 | Cable bracket |

Cable length: 25 m (82' ft-in).

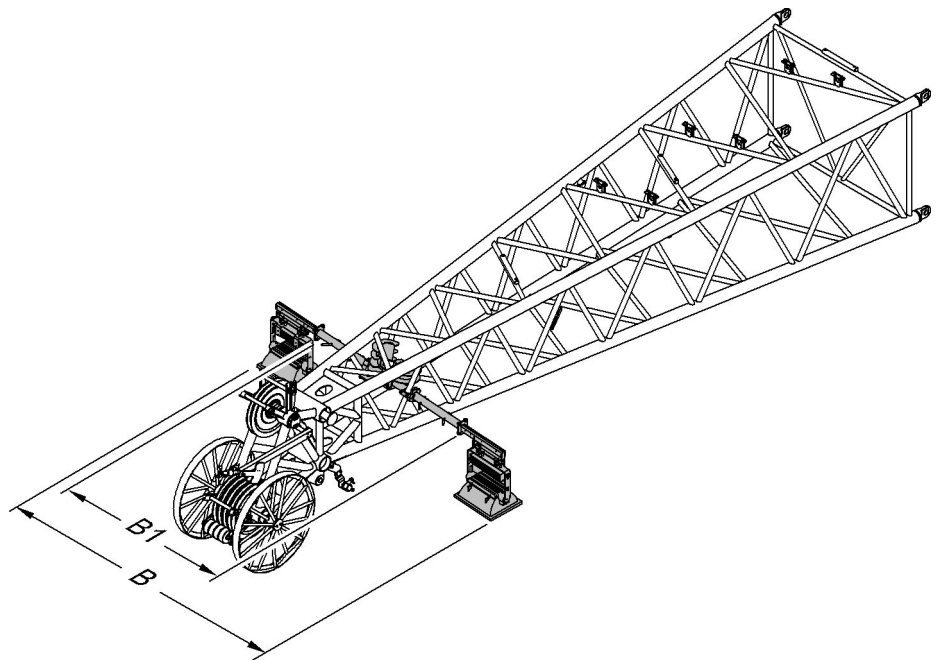


Fig. 611: Floodlight with high-pressure sodium vapor lamp mounted on jib head section

Name		Value
Illuminant		High-pressure sodium vapor lamp
B	Width	4028 mm 13' 3" ft-in
B1	Width	2409 mm 7' 11" ft-in
Nominal voltage		230 V
Power consumption per floodlight		1000 W
Weight		233 kg 514 lb

Tab. 352: Technical data floodlight with high-pressure sodium vapor lamp

Additional floodlights*

Safety instructions 2

2 Safety instructions

2 Safety instructions

This chapter deals with the following issues:

- Areas of responsibility and required personnel
- Dangers and remaining risks despite proper use
- Measures to prevent danger



WARNING

Inadmissible or improper procedure!
Severe injuries, damage to machine.

If the operation manual contains insufficient information:

- ▶ Contact Liebherr customer service.
-

2.1 Safe operation of the machine

2.1.1 Personnel selection

The safe operation of machines depends on the selection of competent personnel.

Training certificates and evidence of practical experience of persons, such as machine operators, prove helpful in the selection of competent personnel. The persons responsible for the selection must make sure that the employees are efficiently organized to ensure good cooperation in the course of the work.

Persons whose efficiency is impaired by alcohol, drugs or other factors may not be part of the personnel. The assigned tasks must be clear to the personnel. Personnel undergoing training must be properly supervised.

2.1.2 Safe system of work

A safe system of work is determined and must be followed whenever the machine is used, no matter whether it is a single lifting process, a work process or a group of repetitive processes. The same principles apply to machine operations carried out at a remote location (mobile machines), such as fixed machines, for instance in a factory or on a dock.

The safe system of work states the following:

- Operational planning: All machine operations are planned in advance to ensure that they are executed safely and that all foreseeable risks have been considered. Planning must be performed by persons that have the corresponding expertise and which have been appointed for this purpose. In case of repetitive use or routine operations, this planning is most probably only required for first use. On regular tests, it is to ensure that no factors have changed.
- Selection, preparation for commissioning and use of suitable machines and equipment.
- Preventive maintenance, tests, inspections on machines and equipment.

- Provision of properly trained and competent personnel who were informed about their corresponding responsibilities and those of the other persons involved in machine operation.
- Adequate supervision by properly trained and competent personnel who possess the required authority.
- Ensuring that all required certificates and documents are available.
- Preventing unauthorized movements or unauthorized use of the machine at any time.
- Safety of persons not involved in machine operation.
- Cooperation with other involved parties to achieve the corresponding conformity with authorizations. Cooperation with other parties to prevent or protect against danger.
- Establishing a communication system, which is understood by all persons involved in the actual lifting process or working process. To ensure safety during use, it is imperative that all personnel can clearly communicate in the same language.

All necessary preparations for the installation site, assembly, disassembly and preventive maintenance of the machine are to be understood as part of the machine operation.

The above points concerning a safe system of work are effectively communicated to all parties involved.

2.1.3 Preventive maintenance

General

The machine and other equipment used for the lifting process or work process are kept in a faultless state.

Sufficient information is available for carrying out the maintenance work. All preventive maintenance is carried out by trained personnel who have sufficient knowledge of current work instructions. The frequency and extent of such preventive maintenance should take into account all the factors affecting the machine when performing work ([For more information see: 9 Maintenance, page 1931](#)).

Regular preventive maintenance

A systematic procedure for preventive maintenance is established to ensure safe and faultless operation of the machine.

The preventive maintenance and inspection plan in the manufacturer's operating manual defines the execution of certain work at specified intervals. These intervals should not be exceeded. Specified information can include, for instance, lubrication points that must be taken into account during preventive maintenance, the interval or frequency of lubrication and oil changes, and the grade and quality of the lubricants to be used. The preventive maintenance and inspection plan also involves other essential maintenance work, such as the replacement of filters, recommended tire pressures, frequency for the verification of attachment pin safety, recommended torque values and other settings, such as clutches, brakes ([For more information see: 9.1 Maintenance and inspection schedule, page 1931](#)).

Regular inspections are carried out in intervals that must take into account how often the machine is used and the environmental conditions.

An effectively and systematically planned procedure for preventive maintenance must consider the fact that the machine might have to be put out of operation until essential maintenance works have been completed.

Spare parts

Only Liebherr spare parts may be used.

Repairs

If major repairs must be carried out on part of the machine, it is important to strictly observe the correct working instructions specified by the manufacturer. If the manufacturer's instructions are not available, an specialized engineer must define the work instructions.

2.2 Areas of responsibility

2.2.1 Manufacturer

The manufacturer has the following responsibilities:

- He is responsible for the operationally safe state of the machine including accessories and documentation at the time of transfer to the owner.
- He observes his product monitoring obligation and documents all preventive maintenance and repair work carried out by Liebherr service personnel.
- He ensures operational state of machine through a worldwide servicing and repair service.
- He operates a training center and offers training to operating and maintenance personnel as a service to the owner.

2.2.2 Owner

The operator which can also be the owner has the following responsibilities:

- He ensures that the machine is operated and maintained by trained personnel only.
- He provides the necessary protective equipment to all persons involved in lifting or working with the machine.
- He checks personnel at regular intervals for safety-conscious working.
- He is responsible for the operationally safe state of the machine including accessories and documentation from handover by the manufacturer.
- He notifies the manufacturer of any accident involving the machine, which resulted in serious injuries or major property damage.
- He appoints Liebherr service personnel according to the preventive maintenance and inspection plan.
- He gives Liebherr service personnel unrestricted access to the machine with regard to the product monitoring obligation.
- He does not carry out any alterations on the machine without consulting the manufacturer.
- He uses original Liebherr spare parts only.
- He contacts the Liebherr customer service if the information in the operating manual is insufficient.

If the work is not carried out by the owner, he ensures that his areas of responsibility are contractually transferred to the organization that carries out the work.

The owner designates an "appointed person" for monitoring the machine's use.

The tasks of the appointed person include the following:

- Assessing the machine, so that the necessary planning, machine or machinery selection, hoisting gear and lifting equipment selection as well as instructions and supervision are ensured for safe execution of the task. If necessary, this involves agreeing with other responsible persons to ensure the necessary cooperation with other involved organizations.
- Ensuring that necessary tests, inspections, such as those required by national or Liebherr standards, as well as appropriate preventive maintenance of the equipment have been carried out.
- Ensuring that there is an effective procedure for reporting defects and events, as well as implementing necessary corrective measures.
- Taking responsibility for organization and monitoring machine use. Ensuring that the role of machine operator and other roles are only assigned to competent persons, and authorizing their activities.

The appointed person shall be given the authority necessary to exercise all assigned duties and, in particular, the authority to stop operation, whenever the person assumes that a risk could arise from continuing operation.

Tasks (but not responsibilities) can be transferred to third parties, if appropriate.

Since the machine operator operates the machine, it would not be appropriate to entrust the machine operator with supervising the entire machine use.

2.2.3 Machine operator

The machine operator has the following responsibilities:

- He is responsible for proper machine operation in accordance with the operating manual and as part of the safe system of work ([For more information see: 2.1.2 Safe system of work, page 571](#)).
- At any time, he must react exclusively to the signal of a slinger or a signaller, unless a stop signal is given. This slinger or signaller must be clearly identified ([For more information see: 2.2.4 Slinger, page 574](#)), ([For more information see: 2.2.5 Signaller, page 575](#)).
- He has read and understood the operating manual.
- He operates the machine appropriately within the machine limit values.
- He wears protective equipment.
- He notifies the owner of each unsafe modification of the machine.
- He stops operating the machine immediately if safe operation of the machine is no longer possible.
- He ensures that a passenger is seated in the seat provided and is wearing a safety belt – if the manufacturer provides for and allows a passenger to be carried.
- He does not carry out any alterations on the machine without consulting the manufacturer.
- He uses original Liebherr spare parts only.
- He contacts his supervisor if the information in the operating manual is insufficient.

2.2.4 Slinger

The slinger has the following responsibilities:

- He is responsible for fixing and releasing the load on or off the lifting accessory of the machine, and for using the correct sling gear and equipment in accordance with the duty plan for the proper handling of loads.
- He is responsible for initializing the planned movement of the machine and load. If there is more than one slinger, only one has this responsibility at any given time, depending on his relative position with respect to the machine.

- In order to maintain continuous signaling in cases where the machine operator cannot see the slinger, a signaller has to convey the signals to the machine operator. Alternatively, it is possible to use other acoustic or visual methods.
- If the responsibility of the slinger for directing the machine and load is transferred to another person in the course of the machine's use, the slinger must indicate clearly to the machine operator that the responsibility was transferred to someone else and to whom. Furthermore, the machine operator and the newly appointed person must show clearly that they accept the transfer of responsibility.
- He wears protective equipment.
- He contacts his supervisor if the information in the operating manual is insufficient.

2.2.5 Signaller

The signaller has the following responsibilities:

- He is responsible for conveying the signal from the slinger to the machine operator. The slinger can be asked to transfer his responsibility for directing the machine movements and the load temporarily to the signaller, especially when the signaller has no eye contact with the machine operator. It is imperative that only one person has this responsibility at any given time.
- If the responsibility for directing the machine and load is transferred to another person in the course of the machine's use, the signaller should indicate clearly to the machine operator that the responsibility was transferred to someone else and to whom. Furthermore, the machine operator and the newly appointed person must show clearly that they accept the transfer of responsibility.
- He wears protective equipment.
- He contacts his supervisor if the information in the operating manual is insufficient.

2.2.6 Maintenance personnel

Maintenance personnel have the following responsibilities:

- They are responsible for the preventive maintenance of the machine assigned to them according to the preventative maintenance and inspection plan to guarantee safe and satisfactory operation. They carry out all necessary preventative maintenance work in accordance with the preventative maintenance and inspection plan and within the scope of the safe system of work ([For more information see: 2.1.2 Safe system of work, page 571](#)).
- They have read and understood the operating manual.
- They wear protective equipment.
- They do not carrying out any alterations on the machine without a written approval by the manufacturer.
- They use original Liebherr spare parts only.
- They contact the supervisor if the information in the operating manual is insufficient.

2.2.7 Installation personnel and disassembly personnel

Installation personnel and disassembly personnel have the following responsibilities:

- They are responsible for assembling and disassembling the machine in accordance with the manufacturer's operating manual. If two or more persons are required for the activity, one is appointed as head assembler or disassembler to monitor the assembling and disassembling work continuously.
- They clarify uncertainties immediately with the supervisor.

- They wear protective equipment.
- They contact the supervisor if the information in the operating manual is insufficient.

2.2.8 Helper

The helper has the following responsibilities:

- He supports the machine operator during the work process by performing manual and monitoring activities within the working range of the machine. This includes, for instance, laying out the tools, connecting tool parts and auxiliary material but also the monitoring of movements in areas where the view is partly obstructed.
- He wears protective equipment.
- He contacts his supervisor if the information in the operating manual is insufficient.

2.2.9 Liebherr service personnel

Liebherr service personnel have the following responsibilities:

- They are responsible to carry out the preventive maintenance of the machine assigned to them to ensure safe and satisfactory operation. They carry out all necessary preventative maintenance work in accordance with the preventative maintenance and inspection plan and within the scope of the safe system of work ([For more information see: 2.1.2 Safe system of work, page 571](#)).
- They carry out only the work, which was authorized by Liebherr or by a Liebherr service point.
- They wear protective equipment.
- They do not carrying out any alterations on the machine without a written approval by the manufacturer.
- They use original Liebherr spare parts only.

2.2.10 Certified and institutionally authorized persons

Certified and institutionally authorized persons have the following responsibilities:

- They carry out tests and preventive maintenance in accordance with the manufacturer's preventive maintenance and inspection plan to ensure uninterrupted, safe and reliable operation of the machine – a task which requires special professional competence and which therefore cannot be executed by the maintenance personnel or Liebherr service personnel. Certified and institutionally authorized persons can also carry out approvals and product certifications on behalf of a notified body in accordance with the current applicable directives and standards.
- They wear protective equipment.
- They give permission and acceptance to the owner for further use of the machine.
- They have the authorization to prohibit further use of the component or machine.
- Upon successful acceptance, they issue a certificate on behalf of the notified body.

2.3 Requirements to personnel

2.3.1 Machine operator

The machine operator meets the following conditions:

- He is competent.
- He has completed the statutory minimum age, unless he is under the direct supervision of an authorized person for the purpose of training.
- He is physically and mentally suitable, especially with regard to sight, hearing, reflexes and short reaction times.
- He is physically able to operate the machine safely.
- He is capable of judging distances, heights and clearances.
- He is trained adequately with regard to the machine type to be operated and has sufficient knowledge about the machine, its controls and its safety devices.
- He is competent with slinging and signaling.
- He is familiar with all fire extinguishers on the machine and is trained on how to use them.
- He is familiar with all the means of escape provided for cases of emergency.
- He is authorized to operate the machine.
- He presents a health certificate to the owner as a confirmation of his physical suitability to operate a machine, if national regulations demand it.
- He does not have any physical or mental impairments that have a negative influence on the stipulated requirements.
- He is not under the influence of alcohol or drugs.

2.3.2 Slinger

The slinger meets the following conditions:

- He is competent.
- He has completed the statutory minimum age, unless he is under the direct supervision of an authorized person for the purpose of training.
- He is physically and mentally suitable, especially with regard to sight, hearing, reflexes and short reaction times.
- He is physically able to handle lifting accessories, sling gear and equipment.
- He is capable of assessing masses, balancing loads, and assessing distances, heights and clearances.
- He is trained in slinging techniques.
- He is capable of selecting the required lifting accessory, sling gear and equipment in a state suitable for the load to be lifted.
- He is trained in signaling and familiar with hand signals.
- He is able to give precise and clear verbal instructions whenever he uses an audio device (e.g., radio device) and can use this device.
- He is able to guide the load and to direct a safe movement of the machine and the load.
- He is authorized to perform the slinging work.
- He is trained in securing loads against accidental unlatching.
- He is trained in avoiding damage to sling gear.
- He does not have any physical or mental impairments that have a negative influence on the stipulated requirements.
- He is not under the influence of alcohol or drugs.

2.3.3 Signaller

The signaller meets the following conditions:

- He is competent.
- He has completed the statutory minimum age, unless he is under the direct supervision of an authorized person for the purpose of training.
- He is physically and mentally suitable, especially with regard to sight, hearing, reflexes, short reaction times and agility.
- He is capable of judging distances, heights and clearances.
- He is trained in signaling and familiar with hand signals.
- He is able to give precise and clear verbal instructions whenever he uses an audio device (e.g., radio device) and can use this device.
- He is able to guide the load and to direct a safe movement of the machine and the load.
- He is authorized to make hand signals.
- He does not have any physical or mental impairments that have a negative influence on the stipulated requirements.
- He is not under the influence of alcohol or drugs.

2.3.4 Maintenance personnel

Maintenance personnel are trained personnel who have the appropriate qualifications possessing specialist knowledge and the experience required to carry out the respective preventive maintenance.

Maintenance personnel meet the following conditions:

- They are competent.
- They are perfectly familiar with the machine to be maintained and its associated dangers.
- They are properly trained and authorized, according to the duties of the owner. This includes attending appropriate courses whenever special equipment is used.
- They are familiar with the preventive maintenance and inspection plan, and the recommended procedures and precautions ([For more information see: 2.1.3 Preventive maintenance, page 572](#)).
- They are physically and mentally suitable, especially with regard to sight, hearing, reflexes, short reaction times and agility.
- They are physically able to handle lifting accessories, sling gear and equipment.
- They have reached the statutory minimum age.
- They do not have any physical or mental impairments that have a negative influence on the stipulated requirements.
- They are not under the influence of alcohol or drugs.

2.3.5 Installation personnel and disassembly personnel

Installation personnel and disassembly personnel meet the following conditions:

- They are competent.
- They have completed the statutory minimum age, unless they are under the direct supervision of an authorized person for the purpose of training.
- They are physically and mentally suitable, especially with regard to sight, hearing, reflexes, short reaction times and agility.
- They are physically able to handle lifting accessories, sling gear and equipment.
- They are able to work confidently and safely in heights.
- They are capable of assessing masses, balancing loads, and assessing distances, heights and clearances.

- They are trained in slinging and signaling techniques and are familiar with hand signals.
- They are capable of selecting the required lifting accessory, sling gear and equipment in a state suitable for the load to be lifted.
- They are adequately trained in assembling/disassembling and in operating the machine type to be installed.
- They are adequately trained in setting up and testing the safety devices on the machine to be installed.
- They are perfectly familiar with the machine they are going to assemble or disassemble and its associated dangers.
- They are familiar with all procedures and precautions for assembly and disassembly.
- They do not have any physical or mental impairments that have a negative influence on the stipulated requirements.
- They are not under the influence of alcohol or drugs.

2.3.6 Helper

The helper meets the following conditions:

- He is able to perform physically demanding activities.
- He is able to carry out technically demanding activities (using tools and measuring instruments).
- He knows the steps of the work procedure and carries out the activities assigned to the helper role.
- He does not have any physical or mental impairments that have a negative influence on the stipulated requirements.
- He is not under the influence of alcohol or drugs.

2.3.7 Liebherr service personnel

Liebherr service personnel are specially trained personnel who have extensive knowledge of components or systems. They are mainly Liebherr service personnel that were directly trained by the manufacturer or one of its service centers.

Liebherr service personnel meet the following conditions:

- They are competent.
- They are perfectly familiar with the machine to be maintained and its associated dangers.
- They are properly trained and authorized, according to the duties of the owner. This includes attending appropriate courses whenever special equipment is used.
- They are familiar with the preventive maintenance and inspection plan, and the recommended procedures and precautions ([For more information see: 2.1.3 Preventive maintenance, page 572](#)).
- They are physically and mentally suitable, especially with regard to sight, hearing, reflexes, short reaction times and agility.
- They are physically able to handle lifting accessories, sling gear and equipment.
- They have reached the statutory minimum age.
- They do not have any physical or mental impairments that have a negative influence on the stipulated requirements.
- They are not under the influence of alcohol or drugs.

2.3.8 Certified and institutionally authorized persons

Certified and institutionally authorized persons meet the following conditions:

- They are competent.

- They have the required knowledge on how to test components.
- They have experience in testing components.
- They are up-to-date with valid standards, directives and accident prevention regulations.
- They were appointed by the notified body.

2.4 Personal protective equipment

It is the personal responsibility of the machine operator, slinger, signalman, maintenance personnel, assembly personnel, disassembly personnel and assistants to:

- Wearing the required personal protective gear.
- Regular cleaning and care of the protective gear.
- Replacing any defective items of protective gear promptly.

The personal protective gear comprises:

- **Safety helmet**, if head injuries are possible due to:
 - collision,
 - swinging, falling, toppling or flying objects
- **Safety goggles**, if eye injuries are possible due to:
 - corrosive or pressurised liquids
 - loose flying parts
- **Ear protection**, if the sound level is likely to be excessive
- **Breathing mask**, where there is danger from health-threatening gases, vapour, smoke or dust in the working environment
- **Protective gloves**, if hand injuries are possible due to:
 - Burns
 - pointed or sharp objects
- **Reflective, boldly-coloured clothing** if prompt recognition by other personnel is necessary.
- **Safety shoes**, if foot injuries are possible due to:
 - collision or trapping
 - pointed or sharp objects
 - swaying or falling objects
- **Special protective clothing**, where there is a risk of burns, hypothermia, chemical burns, stabbing or cutting injuries to the body

2.5 Workplace

The operation of the machine specified for one machine operator.

The workplace is located in the cabin on the uppercarriage.

Make sure the following conditions are met:

- No one other than the machine operator is on the machine or within the danger zone around the machine.
- The machine operator is in the cabin at all times.

Only operate operating elements from the operator's seat.

To ensure a safe workplace:

- Keep cabin clean.
- Do not deposit objects on the control panels.
- Do not store any tools in the cabin.

- Hang up discarded clothing on clothing hook.
- Keep access to the cabin clean, free of snow and ice, and do not block access or escapes with objects.
- Keep windows and mirrors (inside and outside of the machine) clean, free of moisture and ice.

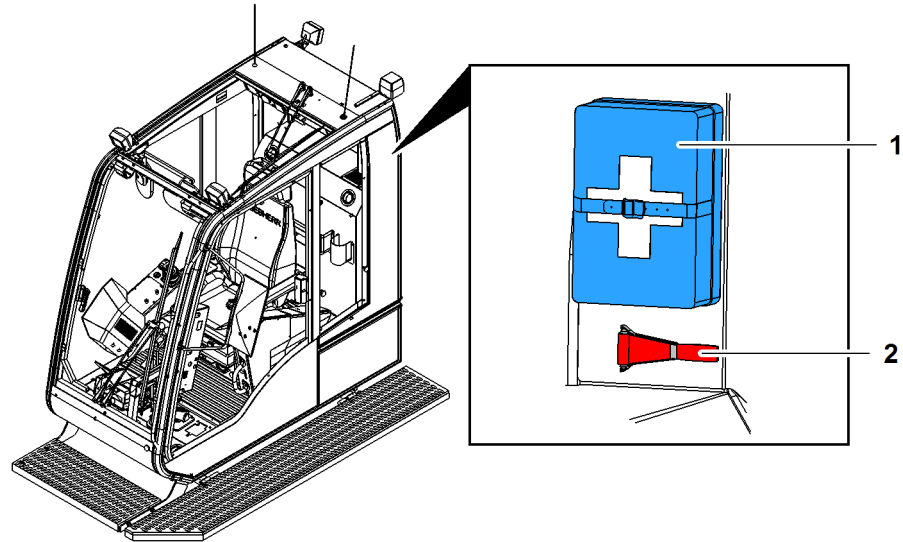


Fig. 612: Emergency devices

1 First aid box

2 Emergency hammer

At first delivery of the machine, the first aid box 1 is equipped in accordance with ÖNORM V 5101.



Note

- ▶ Replace all sterile items and plasters if necessary or after use.
- ▶ Observe the “first aid” and national regulations measures.

If the door of the cabinet can no longer be opened by hand, the protective glazing of the side windows can be broken with the emergency hammer 2 to create an emergency exit.

2.6 Danger zone



WARNING

Staying in danger zone!
Falling loads or components could hit people.
People could get caught in moving machine components or loads.
Death, serious injury.

- ▶ Make sure that no persons are located in the danger zone.
- ▶ Leave danger zone.
- ▶ Block off danger zone if necessary.

The danger zone of the machine is composed of the length of equipment and the oscillating load path x together.

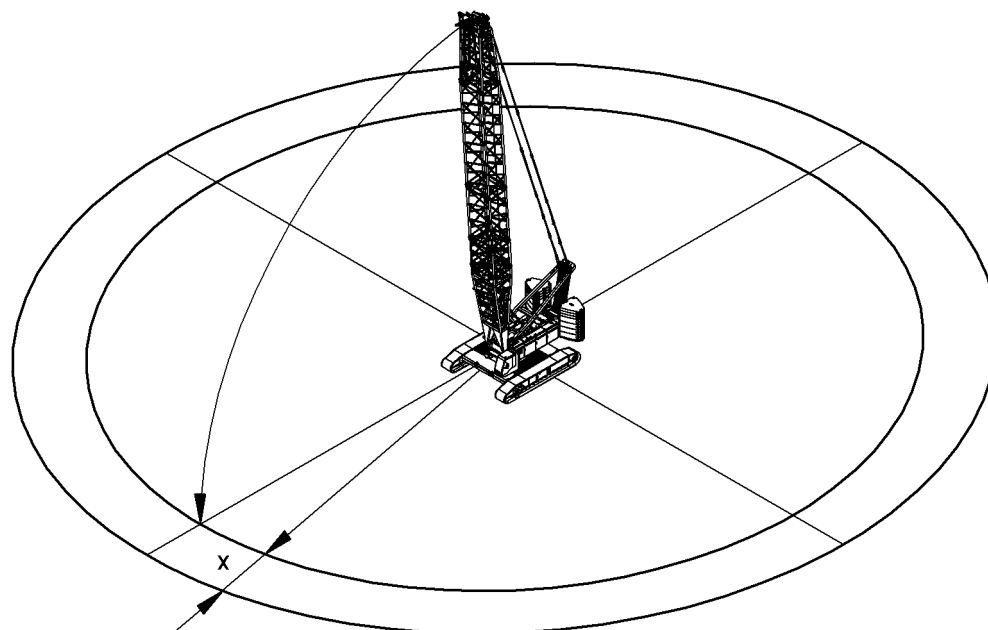


Fig. 613: Danger zone of machine

x Oscillating load path

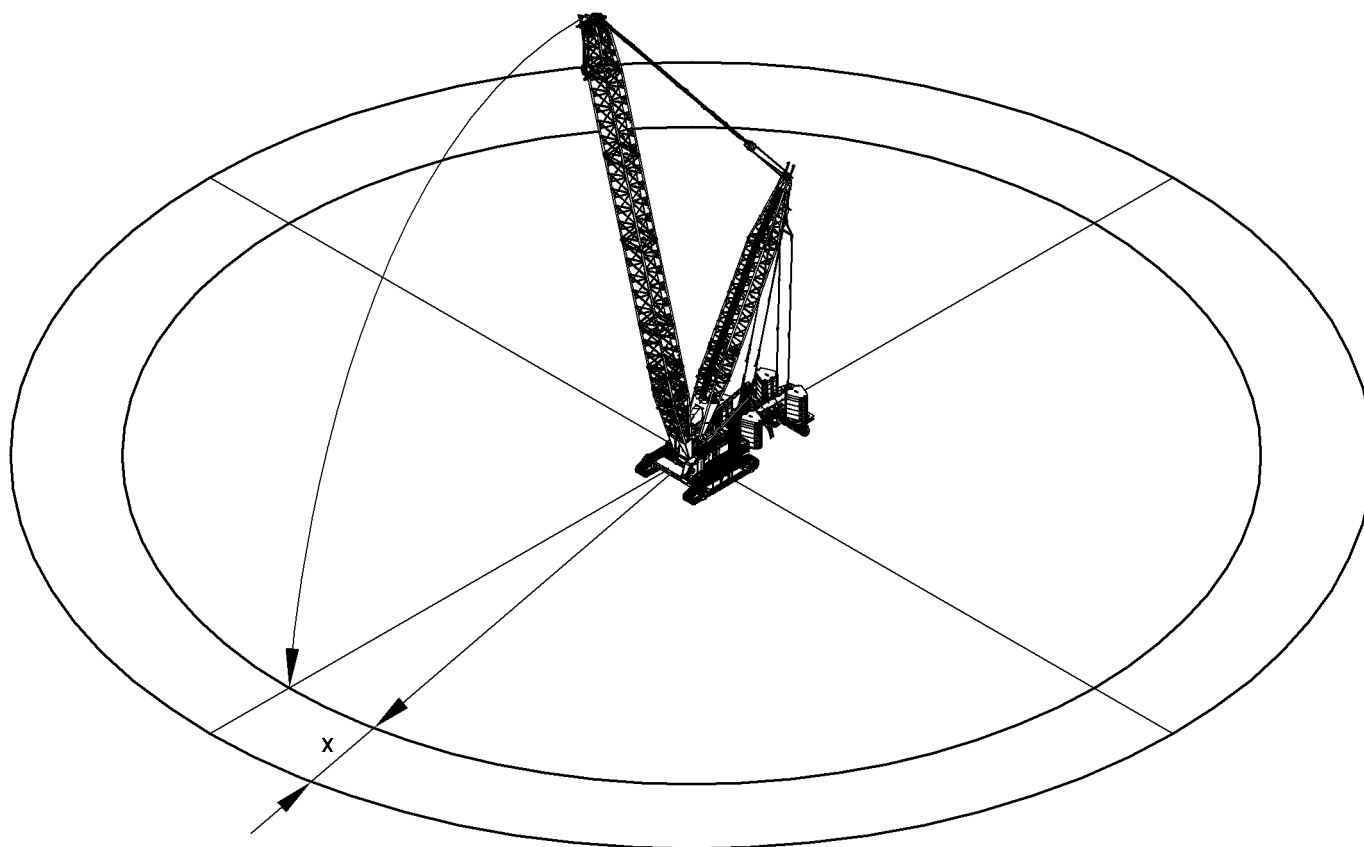


Fig. 614: Danger zone of machine with derrick equipment

x Oscillating load path

2.7 Safety signs on the machine



WARNING

Missing, damaged or illegible safety signs!

- ▶ Check safety signs to ensure they are complete and legible.
- ▶ Replace missing or illegible safety signs with new, original ones.

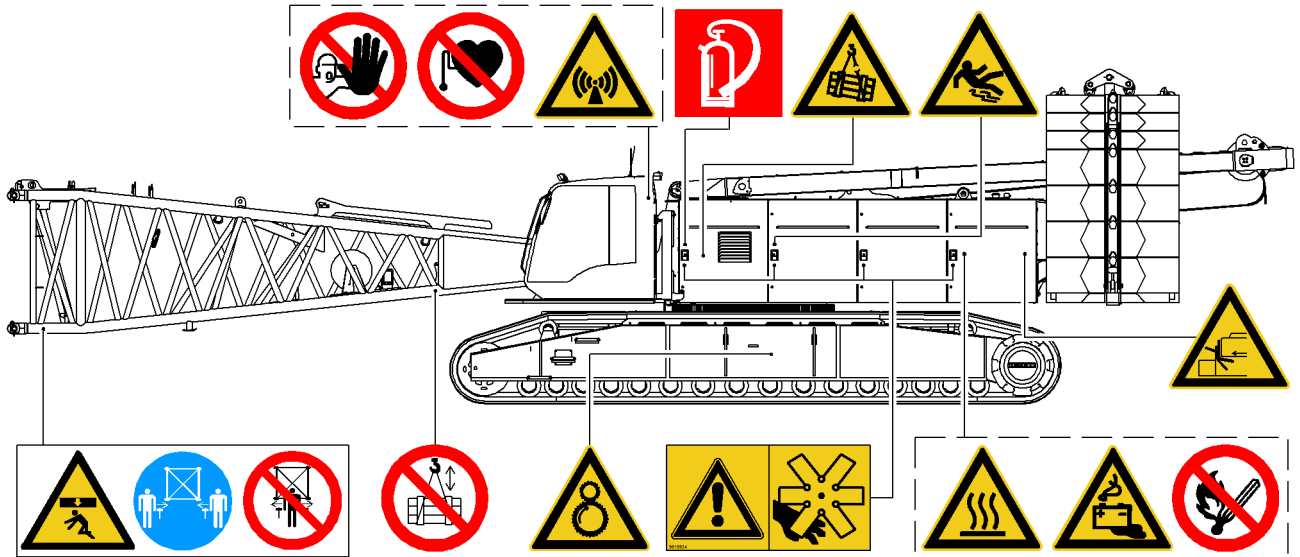


Fig. 615: Safety signs on the left-hand side of the machine

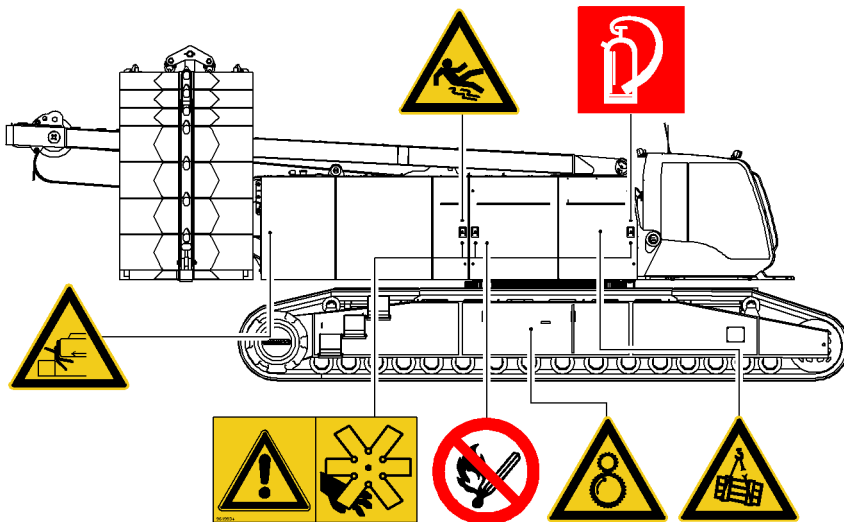


Fig. 616: Safety signs on the right-hand side of the machine

Safety signs on the machine

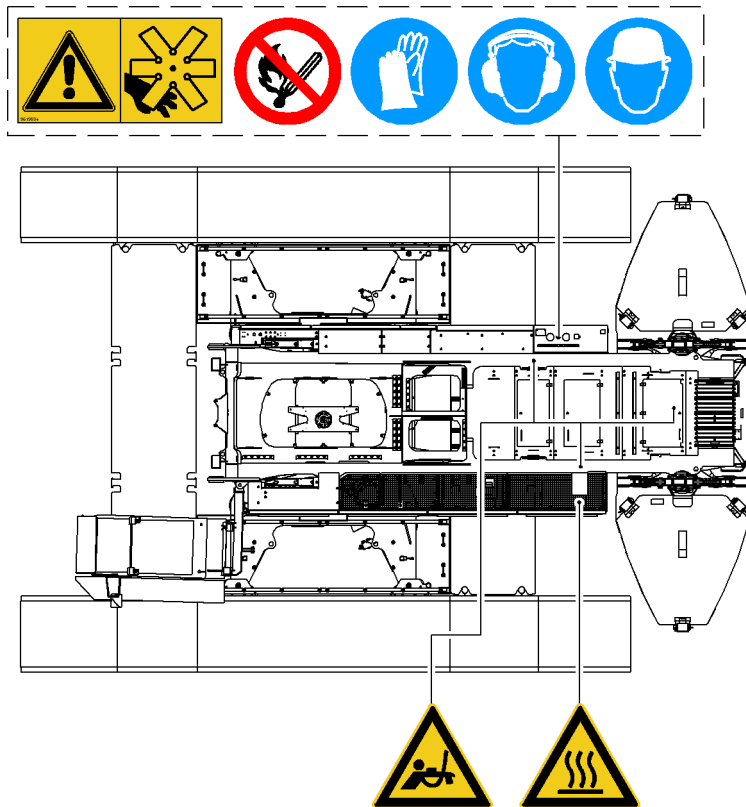


Fig. 617: Safety signs on the top of the machine

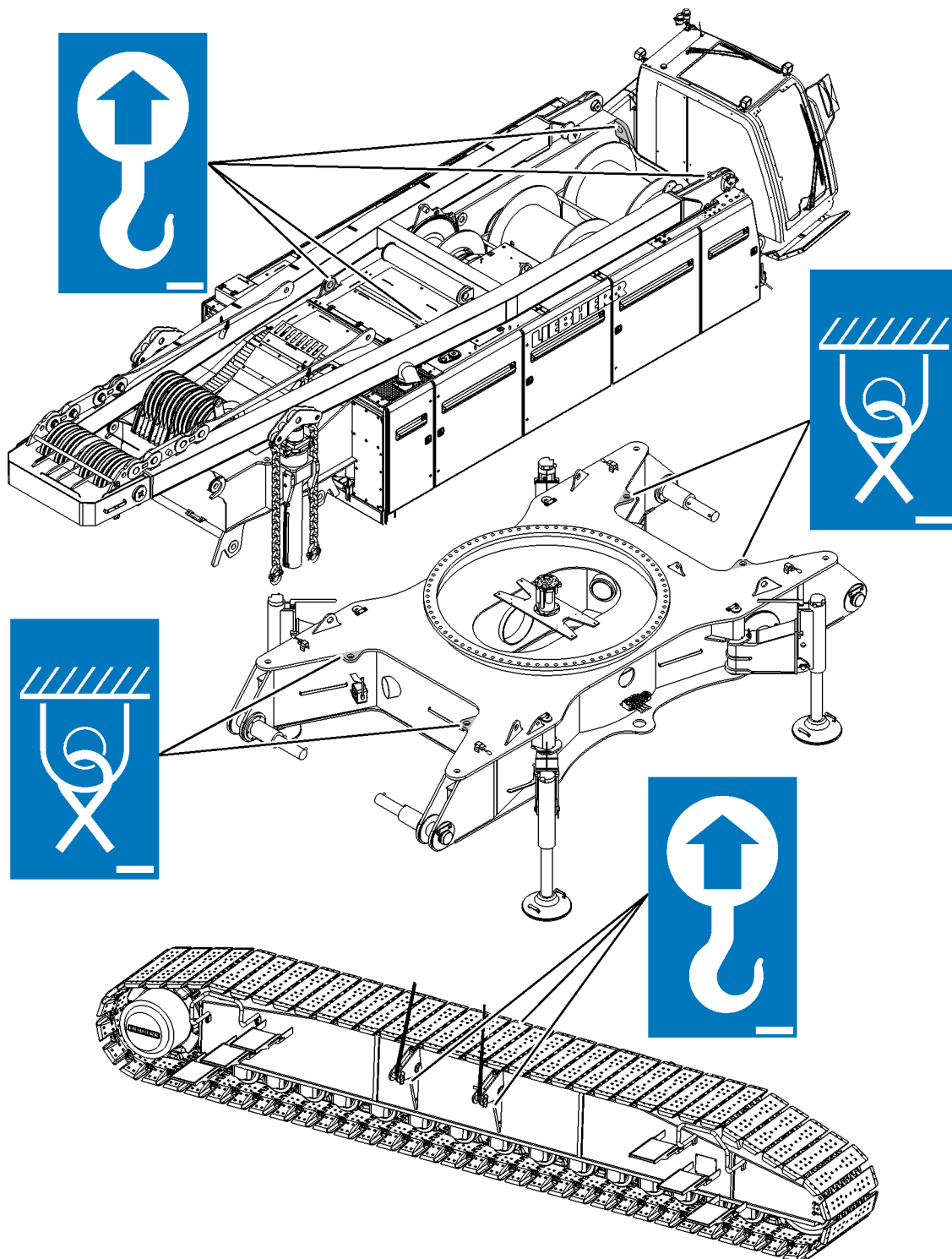


Fig. 618: Labelling of lashing points and rigging points for undercarriage with fixed track width

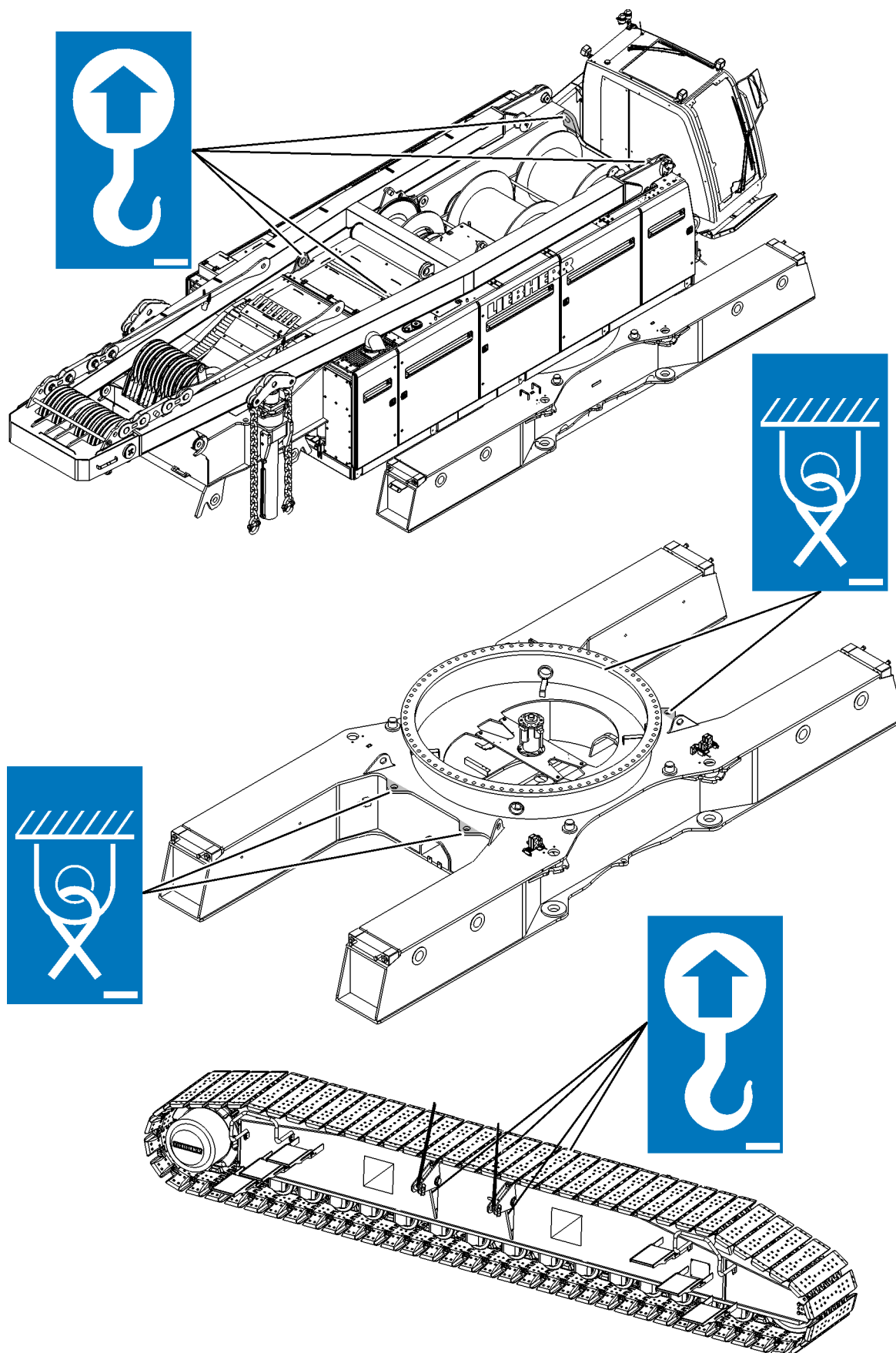


Fig. 619: Labelling of lashing points and rigging points for undercarriage* with adjustable track width

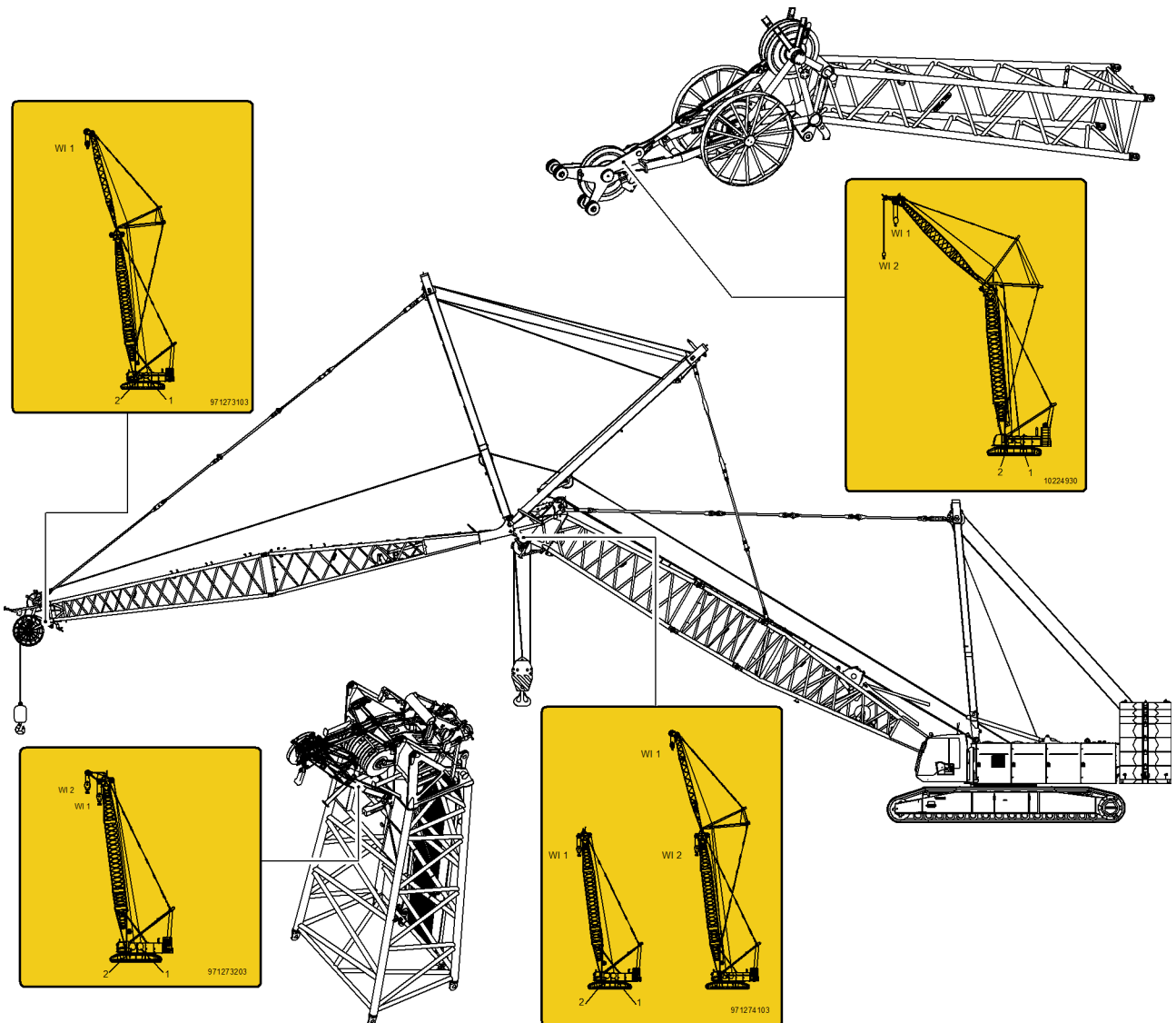


Fig. 620: Safety signs on boom

Safety signs on the machine

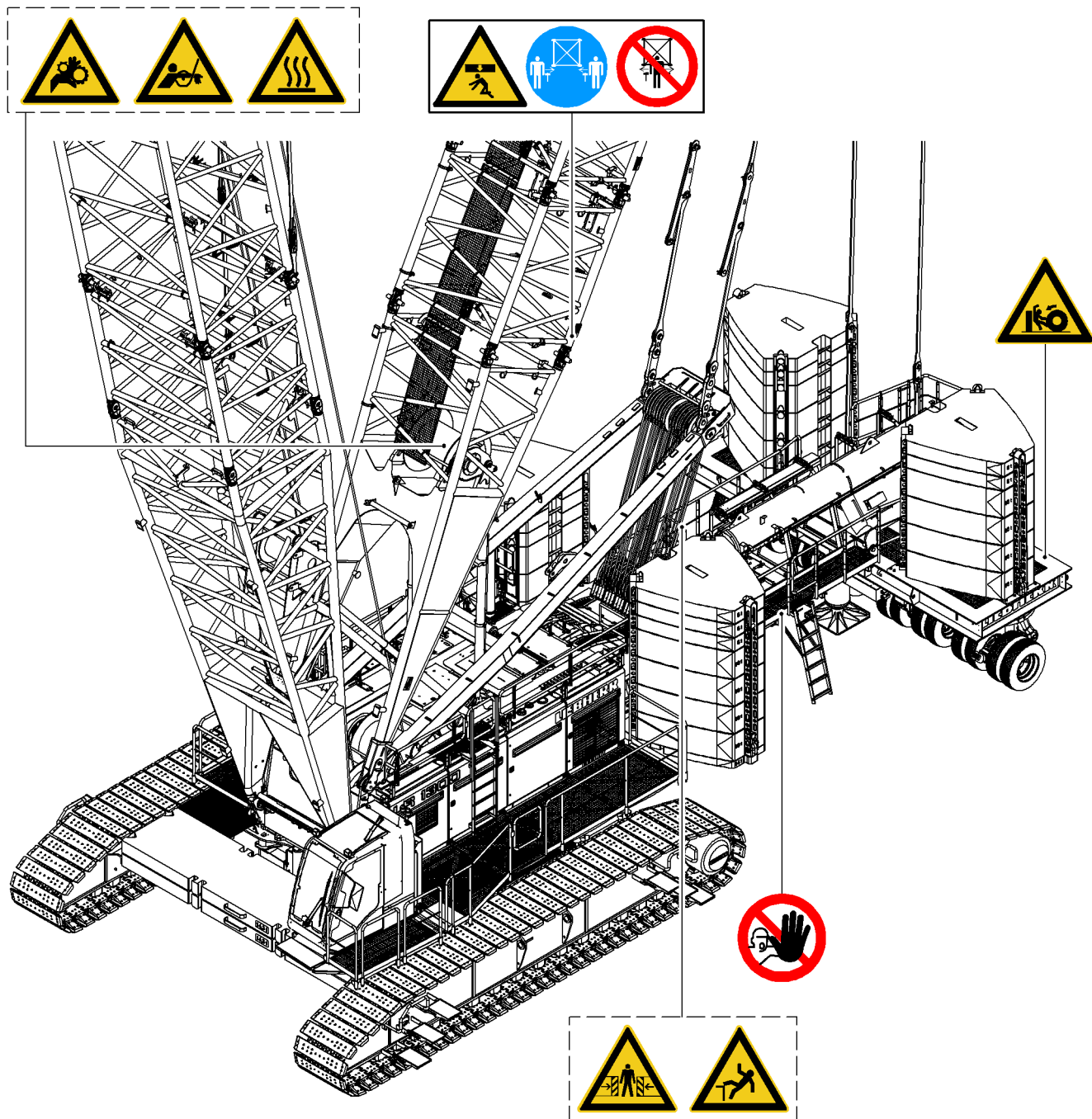


Fig. 621: Safety signs on machine with derrick equipment*

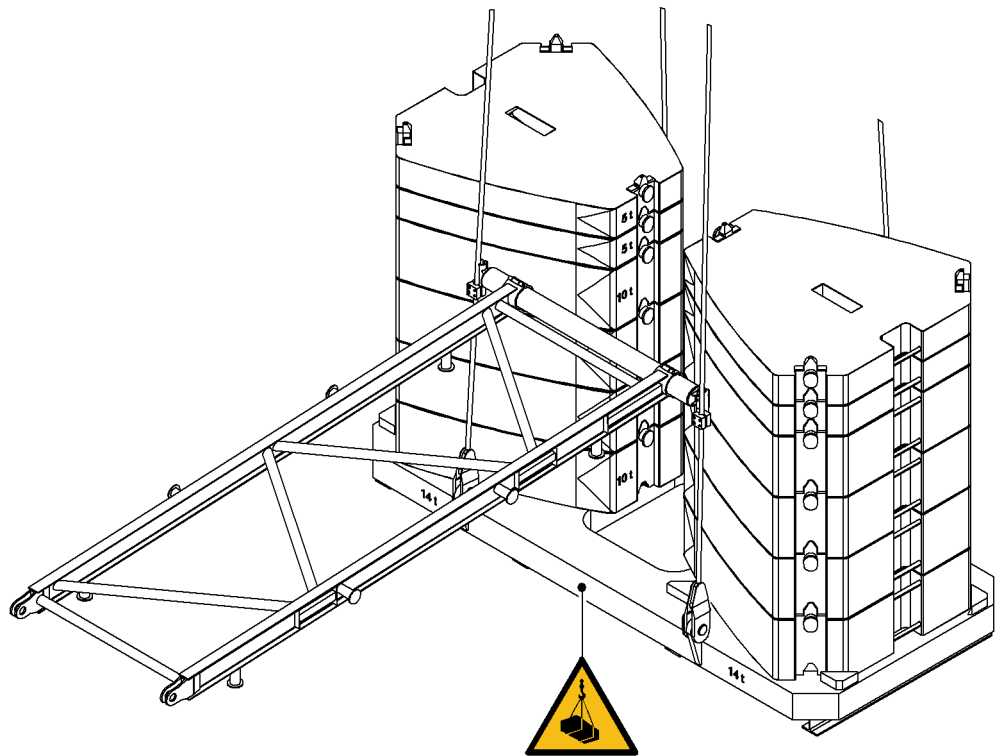


Fig. 622: Safety signs on suspended counterweight of derrick equipment*

The warning sign on the suspended counterweight is attached on all sides of the counterweight frame.

2.8 Safety signs on the machine (US market)



WARNING

Missing, damaged or illegible safety signs!

- ▶ Check safety signs to ensure they are complete and legible.
 - ▶ Replace missing or illegible safety signs with new, original ones.
-

Safety signs on the machine (US market)

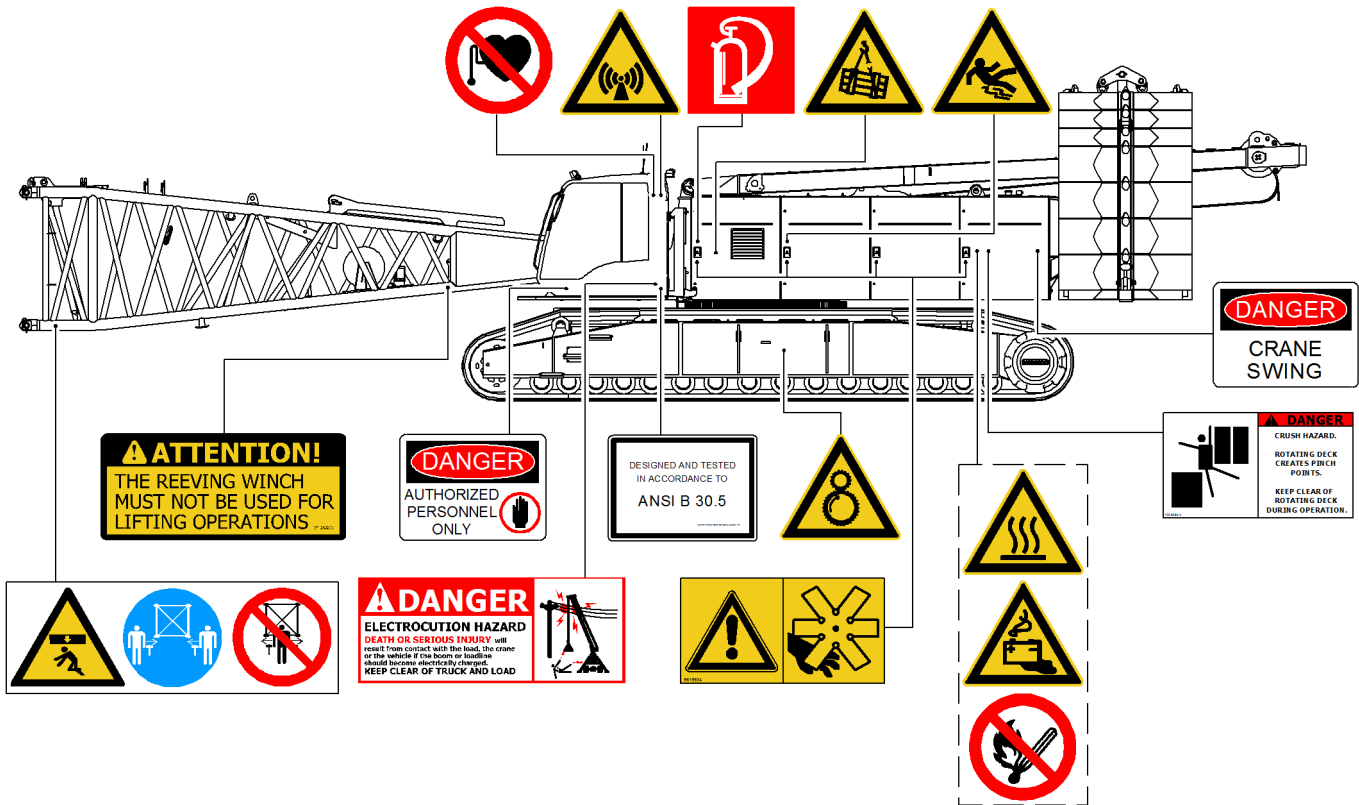


Fig. 623: Safety signs on the left-hand side of the machine

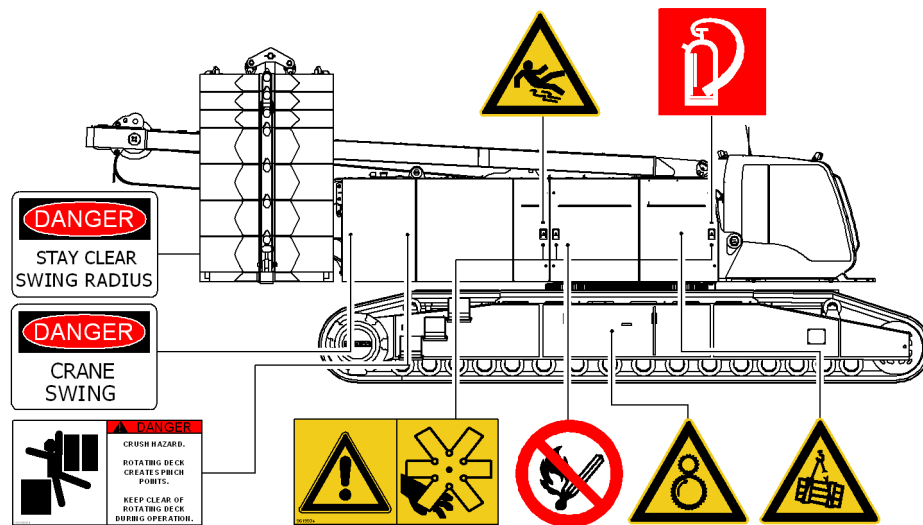


Fig. 624: Safety signs on the right-hand side of the machine

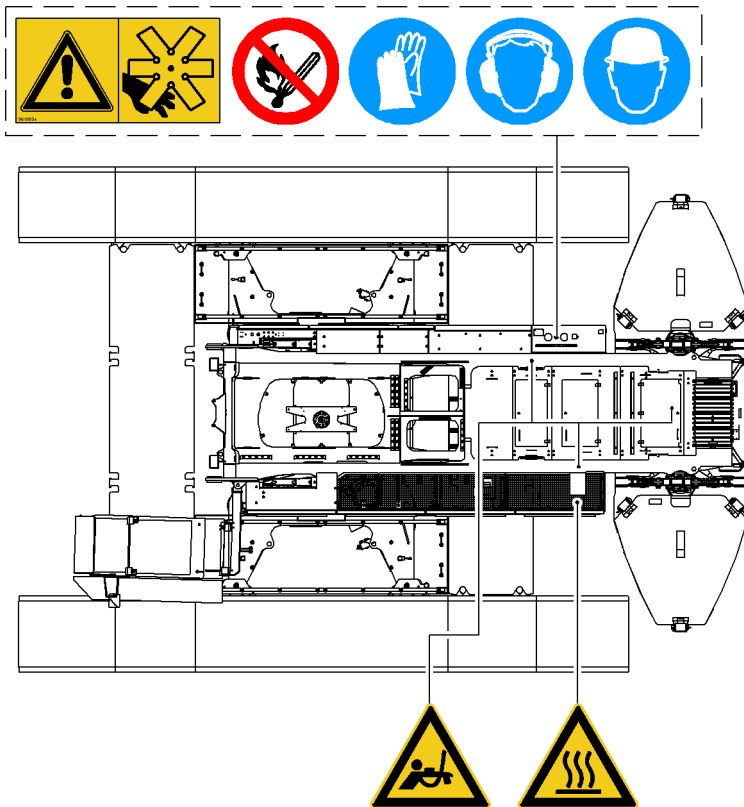


Fig. 625: Safety signs on the top of the machine

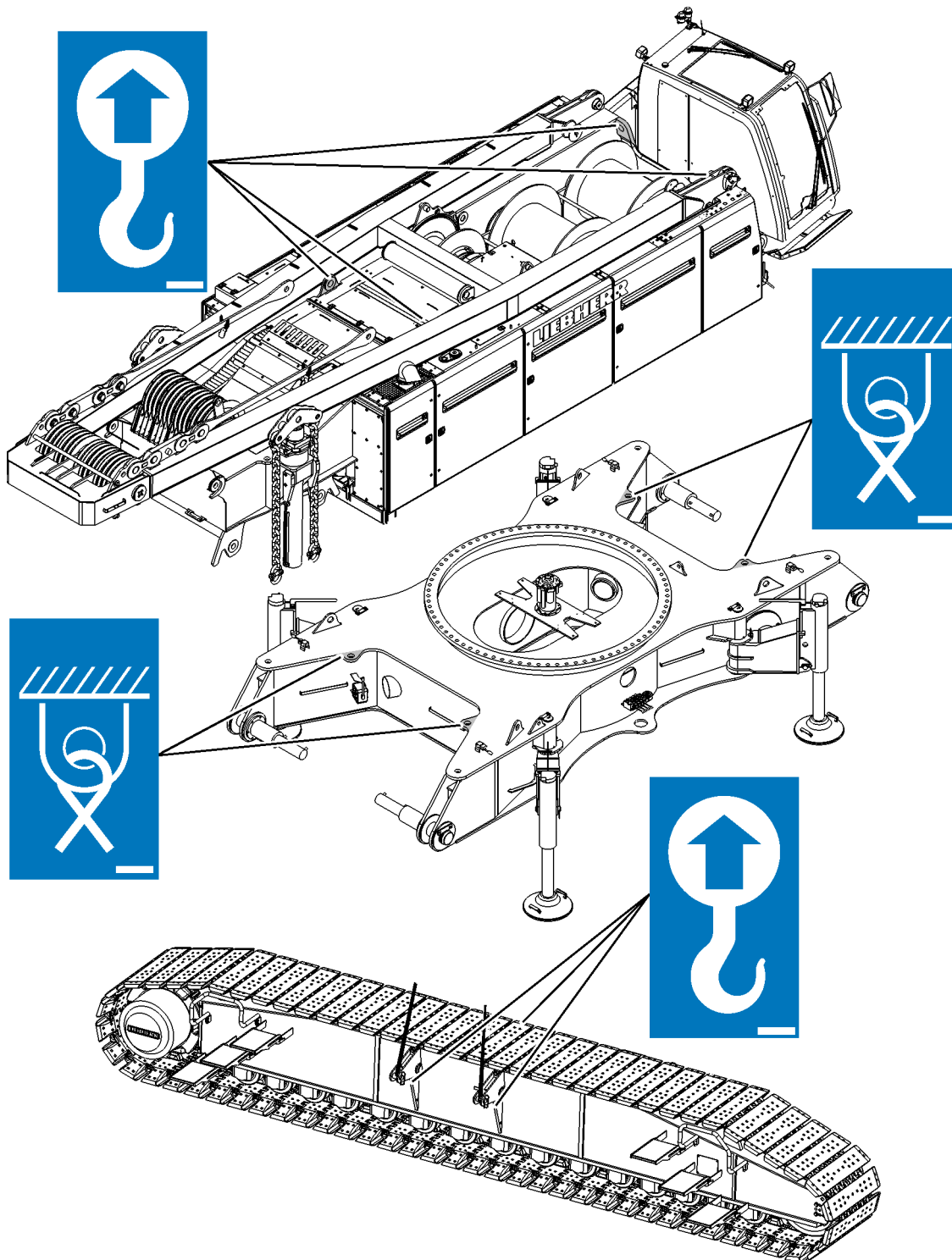


Fig. 626: Labelling of lashing points and rigging points for undercarriage with fixed track width

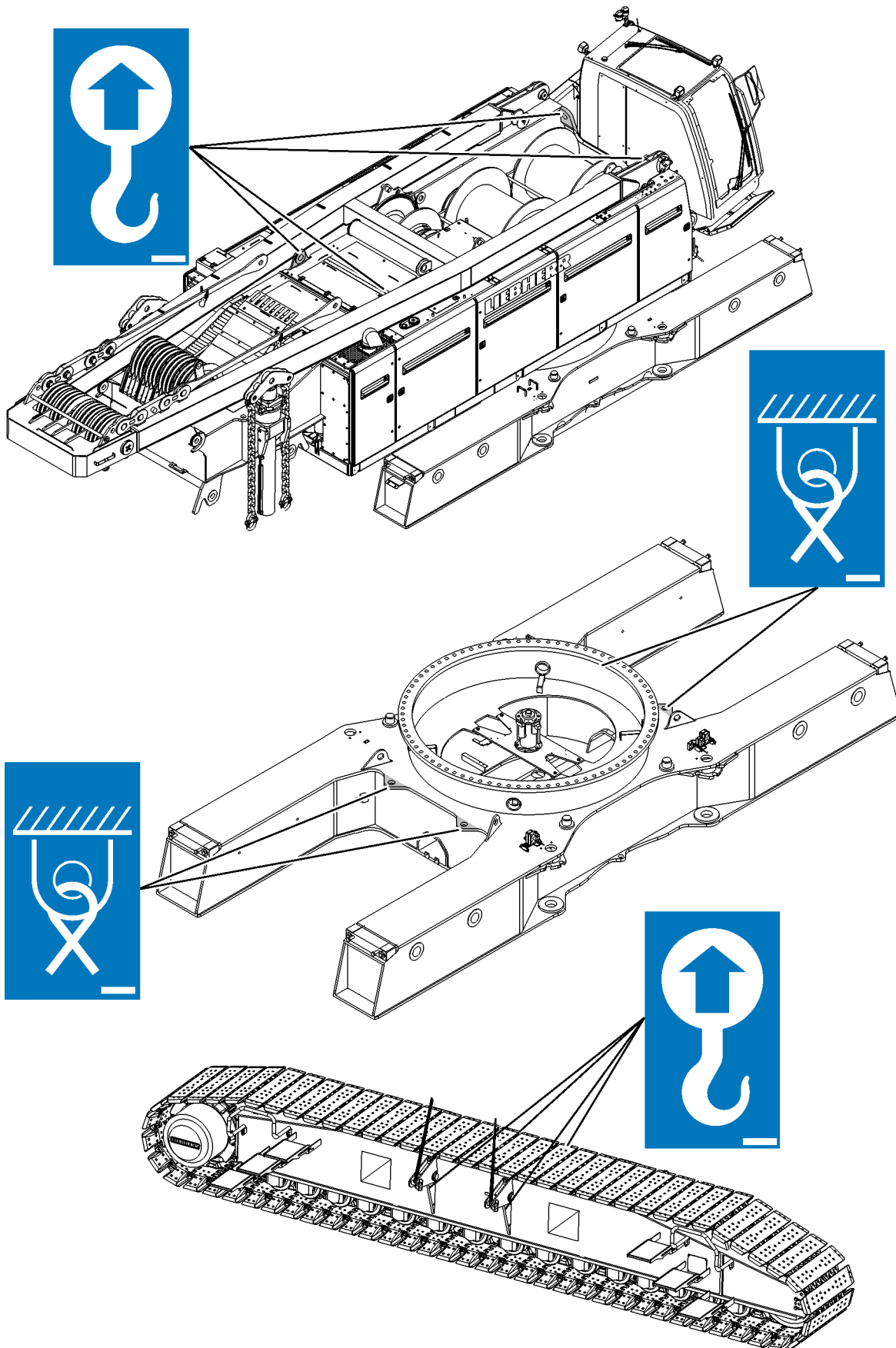


Fig. 627: Labelling of lashing points and rigging points for undercarriage* with adjustable track width

Safety signs on the machine (US market)

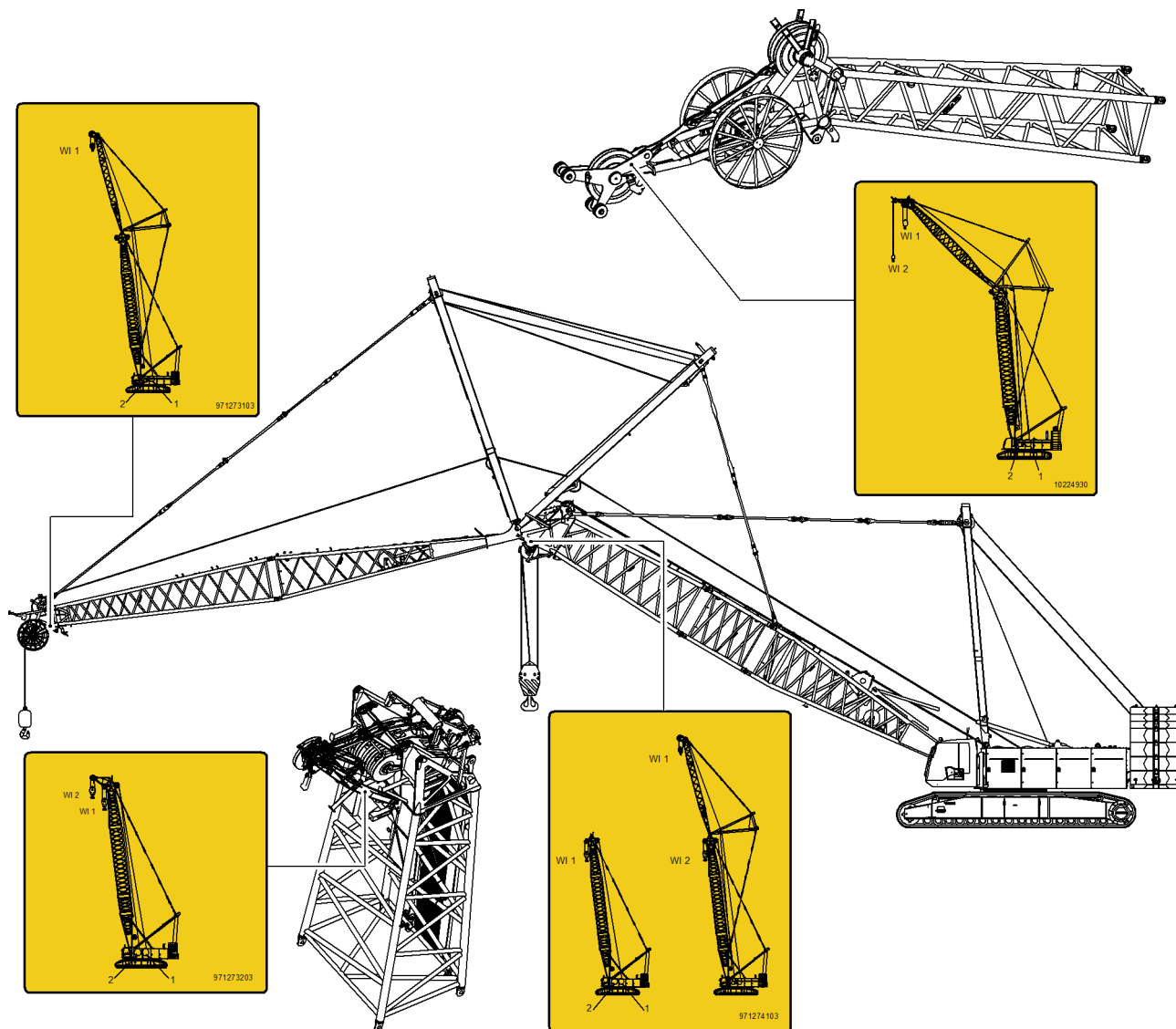


Fig. 628: Safety signs on boom

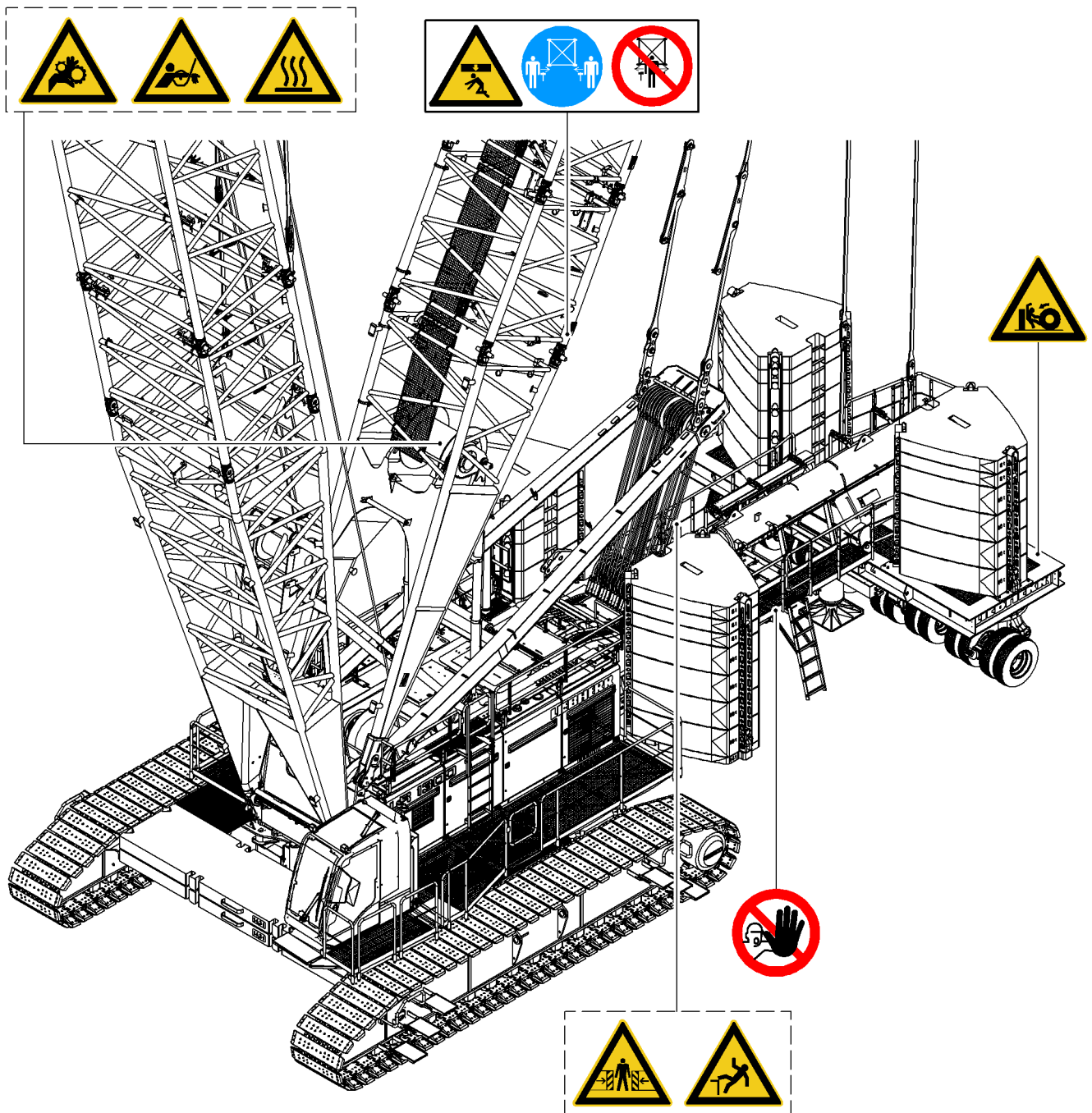


Fig. 629: Safety signs on machine with derrick equipment*

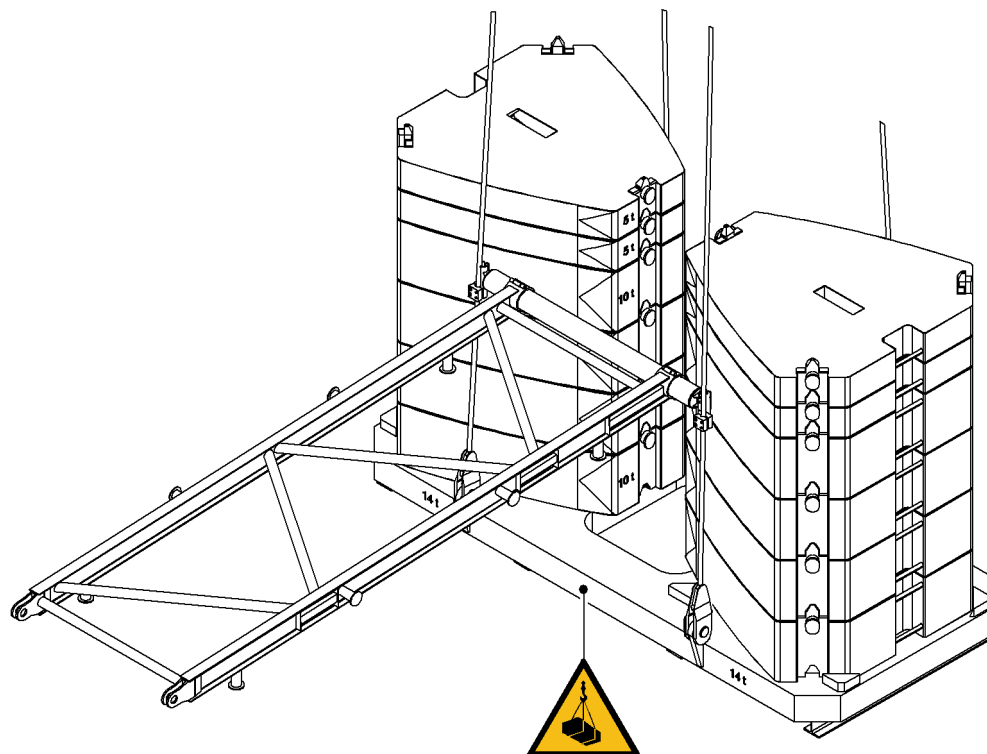


Fig. 630: Safety signs on suspended counterweight of derrick equipment*

The warning sign on the suspended counterweight is attached on all sides of the counterweight frame.

2.9 Meaning of the safety signs

Safety signs are divided into different groups that differ with respect to shape and colour.

2.9.1 Mandatory signs

Characteristics of instruction signs:

- Round
- No rim
- Blue background
- White pictogram

Instruction signs indicate safety-relevant behavior.

General mandatory action sign



Observe operating manual





Wear ear protection



Wear eye protection



Wear safety footwear



Wear protective gloves



Wear protective clothing



Wear a face shield



Wear head protection



Wear a safety harness



Wear safety belts

2.9.2 Prohibition signs

Characteristics of prohibition signs:

- Round
- Red rim
- Red diagonal bar
- White background
- Black pictogram

Prohibition signs prohibit behavior that causes danger.

General prohibition signs



Meaning of the safety signs

	Smoking prohibited
	Fire, open ignition sources and smoking prohibited
	Pedestrians forbidden
	Prohibited for ground conveyors
	Access for persons with pacemakers or implanted defibrillators prohibited
	No access for unauthorised personnel
	Entering the area prohibited
	Switching prohibited
	Do not lift load
	No climbing for unauthorised personnel
	High-pressure cleaning prohibited
	Transport of persons prohibited

2.9.3 Warning signs

Characteristics of warning signs:

- Triangular

- Black rim
- Yellow background
- Black pictogram

Warning signs indicate risks or hazards.

General warning signs



Observe operation manual



Warning of non-ionizing radiation



Warning of obstacles on the ground



Warning of fall hazard



Warning of slipping hazard



Warning of electric voltage



Warning of suspended loads



Warning of hot surfaces



Warning of automatic start



Warning of crushing hazard



Warning of crushing hazard when falling



Warning of hand injuries

Meaning of the safety signs



Warning of counter-rotating rollers



Warning against staying the swing range



Warning of crushing hazard from above



Warning of crushing hazard from above



Warning of getting rolled over



Warning of getting rolled over



Warning of getting drawn into winches



Warning of dangers through pressure container



Warning of hazards through battery charging



Warning of dangers through hydraulic oil

2.9.4 Rescue signs

Features of rescue signs:

- Square
- No frame
- Green background
- White pictogram

Rescue signs mark the locations of first aid equipment and emergency exits.



First aid



Emergency exit



Emergency exit

2.9.5 Fire protection signs

Characteristics of fire protection signs:

- Square
- No rim
- Red background
- White pictogram

Fire protection signs mark the location of fire alarms or fire extinguishing equipment.



Fire extinguishers



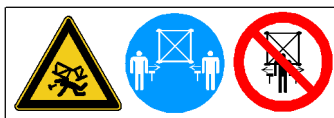
Fire detector

2.10 Meaning of machine-specific signs

2.10.1 Safety signs



Warning indicating rotating machine parts



Do not stand inside the boom sections



Keep your distance to the machine if it is operated with the radio remote control



Lifting load with rope reeving winch is prohibited

Meaning of machine-specific signs



No access for unauthorized personnel



Warning of crushing hazard



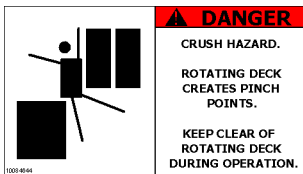
Persons must stay out of swing range



Warning indicating dangerous electrical voltage



Warning indicating dangerous electrical voltage



Persons must stay out of swing range

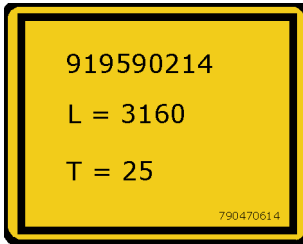
2.10.2 Notice signs



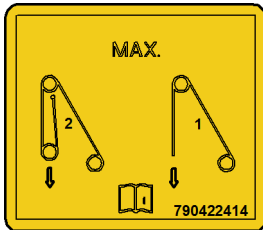
Fueling up with diesel



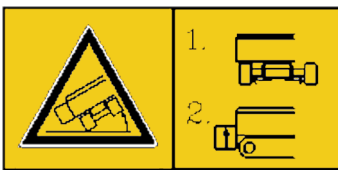
Prior to fueling turn off auxiliary heating* and external air conditioning system*



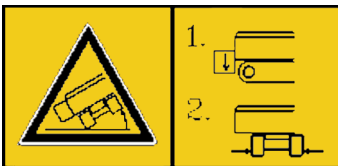
Technical data tilting-back supports



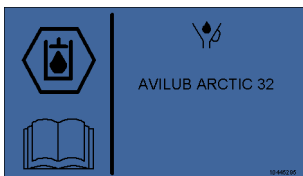
Observe rope reeving auxiliary jib



Caution danger of toppling



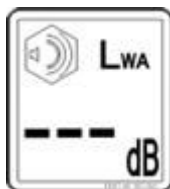
Caution danger of toppling



Initial hydraulic oil filling

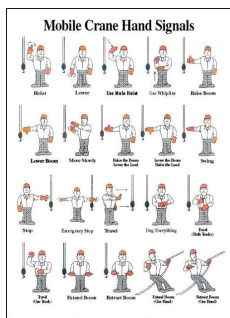


Constructed and tested in accordance with ANSI B 30.5

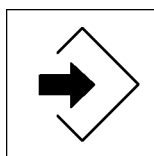


Guaranteed sound power level L_{WA} of machine

Meaning of machine-specific signs



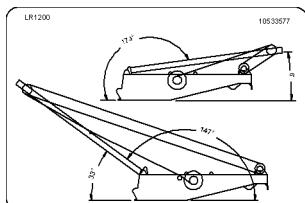
Hand signals in acc. with ASME/ANSI B30.5



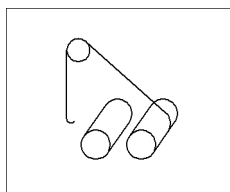
Data recording



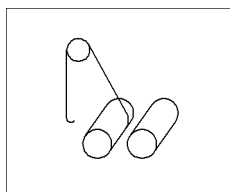
Liebherr data recording



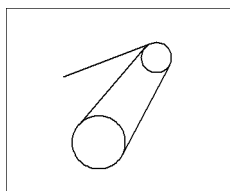
Angle limitation of A-frame1



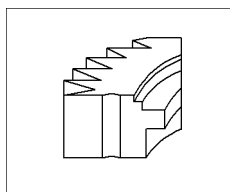
Grease nipple winch1



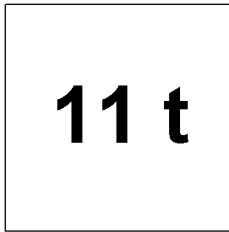
Grease nipple winch2



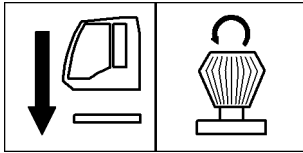
Grease nipple main boom adjusting winch



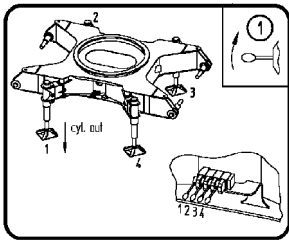
Grease nipple swing ring



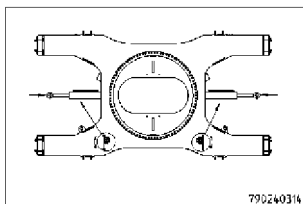
Weight details rigging points



Emergency lowering valve cabin elevation



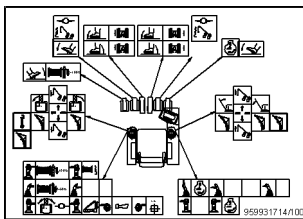
Undercarriage support cylinder



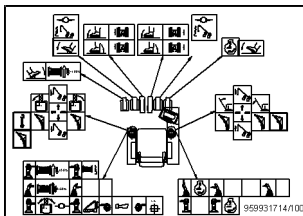
Undercarriage track width adjusting cylinder

-20 °C	0 °C	+20 °C	+40 °C
100bar	110bar	120bar	130bar
-4 °F	32 °F	68 °F	104 °F
1450 PSI	1595 PSI	1740 PSI	1885 PSI

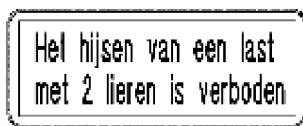
Accumulator jib



Pictogram multi-directional control lever



Pictogram double T control lever



Operation with both booms

Hazards



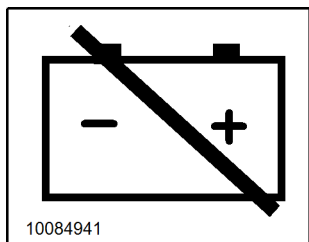
Rigging point



Lashing points



Only use synthetic round slings here



Main battery switch

2.11 Hazards

2.11.1 Mechanical action



WARNING

Mechanical actions due to moving machinery!

When operating the machine, numerous hazards and situations can arise that can cause life-threatening injuries.

- ▶ Observe handling-specific and situation-specific safety notes.



Note

Observe the following safety notes:

- ▶ Wear suitable personal protective equipment.
- ▶ Only work on non-moving parts.

Examples of mechanical impact:

- Standing under a suspended load.
- Danger of being drawn in by moving drive units or machine parts.
- Danger of falling when working without safety gear.

- Danger of crushing due to unsecured components such as doors or sliding elements.



First aid

1. Protection/personal safety
 - Identify - what is the nature of the emergency?
 - Think - what are the dangers for the injured party or the helper?
 - Act - make the situation safe.
2. Emergency call
3. Emergency life-saving measures
 - Recovery position
 - Cardiac massage, artificial respiration and defibrillation
 - Staunch bleeding, shock prevention
4. Additional first aid

2.11.2 Electrical energy



WARNING

Electricity in conductive machine parts!

- ▶ Observe handling-specific and situation-specific safety notes.



Note

Observe the following safety notes:

- ▶ Only carry out work with the electrical supply switched off.
- ▶ Secure the machine to prevent unauthorised startup.

Examples of electrical energy:

- External power supply
- Generator



WARNING

Live machine parts!
risk of electric shock.

- ▶ Before recovering an injured party ensure that there is no further risk of electrocution.



First aid

1. Protection/personal safety
 - Identify - what is the nature of the emergency?
 - Think - what are the dangers for the injured party or the helper?
 - Act - make the situation safe.
2. Emergency call
3. Emergency life-saving measures
 - Recovery position
 - Cardiac massage, artificial respiration and defibrillation
 - Staunch bleeding, shock prevention
4. Additional first aid



Note

- ▶ Seek medical attention after electrical accidents. The person affected may experience symptoms of an irregular heartbeat some time after the accident.

2.11.3 Hydraulic energy



WARNING

Escaping hydraulic oil under high pressure!
Leakages in hydraulic lines can cause injuries to skin, destroy tissue and can cause blood poisoning due to the high pressures involved.

- ▶ Observe handling-specific and situation-specific safety notes.



Note

Observe the following safety notes:

- ▶ Repairs on hydraulic systems may only be performed by Liebherr service personnel.
- ▶ Before starting work ensure that the whole system has been depressurised.
- ▶ Never attempt to locate the leakage point with your hand or other part of the body
- ▶ Immediately replace damaged components of the hydraulic system with original Liebherr spare parts.

Examples of hydraulic energy:

- Tissue damage from leaks.
- Sepsis from hydraulic oil entering bloodstream.



First aid

1. Protection/personal safety
 - Identify - what is the nature of the emergency?
 - Think - what are the dangers for the injured party or the helper?
 - Act - make the situation safe.
2. Emergency call
3. Emergency life-saving measures
 - Recovery position
 - Cardiac massage, artificial respiration and defibrillation
 - Staunch bleeding, shock prevention
4. Additional first aid
 - Gently cover injured area(s) with a sterile anti-bacterial bandage.
 - Rinse eyes with pure drinking water.

2.11.4 Burns



CAUTION

Contact with hot surfaces and consumables!
High surface and equipment temperatures can lead to burns or scalding.

- ▶ Observe handling-specific and situation-specific safety notes.



Note

Observe the following safety notes:

- ▶ Always wear suitable protective gloves when working on hot components.
- ▶ Only carry out work on the machine after it has cooled down and is stopped.

Examples of burns and scalding:

- Burns from contact with the entire drive system.

- Scalding from steam exiting from the cooling system or hydraulic oil from the drive system.



First aid

1. Protection/personal safety
 - Identify - what is the nature of the emergency?
 - Think - what are the dangers for the injured party or the helper?
 - Act - make the situation safe.
2. Emergency call
3. Emergency life-saving measures
 - Recovery position
 - Cardiac massage, artificial respiration and defibrillation
 - Staunch bleeding, shock prevention
4. Additional first aid

First degree burns (reddening of skin):

 - Cool the affected body part by rinsing with cold fresh water.
 - Gently cover injured area(s) with a sterile anti-bacterial bandage.

Second degree burns (blistering of skin):

 - Cool the affected body part by rinsing with cold fresh water.
 - Gently cover the area using a sterile anti-bacterial bandage. Do not apply pressure.

Third degree burns (charring of skin and tissue):

 - Gently cover the area using a sterile anti-bacterial bandage. Do not apply pressure.

2.11.5 Chemical burns



CAUTION

Contact with corrosive consumables!

Acids and bases cause chemical burns to skin and tissue, and blindness if they come in contact with the eye.

Acids and bases will damage clothing.

- ▶ Observe handling-specific and situation-specific safety notes.



Note

Observe the following safety notes:

- ▶ When working with acids always wear suitable safety goggles or face protection, protective clothing and gloves.

Examples of chemical burns:

- Chemical burns from handling acidic consumables.
- Chemical burns from leaking battery acid.



First aid

1. Protection/personal safety
 - Identify - what is the nature of the emergency?
 - Think - what are the dangers for the injured party or the helper?
 - Act - make the situation safe.
2. Emergency call
3. Emergency life-saving measures
 - Recovery position
 - Cardiac massage, artificial respiration and defibrillation
 - Staunch bleeding, shock prevention
4. Additional first aid
 - Removing clothing from injured body parts.
 - Rinse injured areas with drinking water.

- Gently cover the area with a sterile anti-bacterial bandage.

2.11.6 Fire and explosion



WARNING

No fire, naked flames or electrostatic discharges!
Danger of fire and danger of explosion due to easily flammable operating materials or gas mixtures resulting from these.

- ▶ Observe handling-specific and situation-specific safety notes.



WARNING

Improper handling of the machine in dusty environments (e.g. dust formation when unloading bulk goods)!
Increased risk of fire.

- ▶ Make sure that the operator prevents dust formation through technical or organizational measures.
- ▶ Shorten cleaning intervals and maintenance intervals.



Note

Observe the following safety notes:

- ▶ Do not store any flammable materials or carry them in the machine, only in fire-proof containers.
- ▶ Wipe any spilled diesel fuel off the machine and neutralise it on the ground with bonding agents
- ▶ Do not clean the machine with flammable fluids.
- ▶ Do not store any cleaning cloths in the engine compartment and remove flammable residues, e.g. oil spills, coal dust and paper residues.
- ▶ Only fuel up the machine in a well-ventilated place or ensure fresh air supply.
- ▶ Make sure there is good metallic contact between the pump nozzle and the filler neck during refuelling. If possible, ground the machine at the fuelling station while it is being refuelled.
- ▶ No open fire when handling flammable materials.

Examples for dangers of fire and dangers of explosion:

- Escaped fuel is a fire hazard.
- Detonating gas in combination with a spark when charging or discharging batteries.
- Vapourised fuel in combination with an electrostatic discharge between the machine and the fuel rig.



First aid

1. Protection/personal safety
 - Identify - what is the nature of the emergency?
 - Think - what are the dangers for the injured party or the helper?
 - Act - make the situation safe.
2. Emergency call
3. Emergency life-saving measures
 - Recovery position
 - Cardiac massage, artificial respiration and defibrillation
 - Staunch bleeding, shock prevention
4. Additional first aid

- (For more information see: 2.11.4 Burns, page 608)
- (For more information see: 2.12.3 Firefighting, page 626)

2.11.7 Poisoning and suffocation



WARNING

Inadequate ventilation or fresh air!
Poisonous vapours or other atmospheres hazardous to health can lead to poisoning or suffocation.

- ▶ Observe handling-specific and situation-related safety notes.



Note

Observe the following safety notes:

- ▶ Ensure adequate ventilation in the cab.
- ▶ Use breathing apparatus when working with hazardous materials.

Examples of dangers of intoxication and choking:

- Engine exhaust gases contain carbon monoxide and other hazardous gases.
- If the machine is used in areas where hazardous substances are present, contact with hazardous gases is a possibility.
- The refrigerant from the air conditioning system circuit displaces the oxygen in the air.



First aid

1. Protection/personal safety
 - Identify - what is the nature of the emergency?
 - Think - what are the dangers for the injured party or the helper?
 - Act - make the situation safe.
2. Emergency call
3. Emergency life-saving measures
 - Recovery position
 - Cardiac massage, artificial respiration and defibrillation
 - Staunch bleeding, shock prevention
4. Additional first aid

2.11.8 Electromagnetic influence



WARNING

Electromagnetic influence when the machine is deployed near transmitting stations, radar stations or directional radio systems!
Malfunctions or failure of electronic implants (pacemakers).
Malfunction or failure of the control system.

- ▶ Observe handling-specific and situation-specific safety notes.



Note

Observe the following safety notes:

- ▶ The machine must be stopped if there is suspected electromagnetic interference to the controls.

Examples of electromagnetic influence:

- Fault or failure of the control system in the vicinity of transmission systems, radio-relay systems or radar systems.

- Environmental influence through the use of electromagnetic rigging material or integrated radio devices.

2.11.9 Exposure to wind



DANGER

Fatal exposure to wind!

Toppling of machine, structural breakdown.

- ▶ Observe handling-specific and situation-specific safety notes.
-



DANGER

Inadmissible operation of machine when exceeding the maximum permissible wind speed in accordance with the foreword of the valid load chart!

Toppling of machine, structural breakdown.

- ▶ Make sure that machine is only operated at admissible wind speed.
 - ▶ In case of higher wind speeds, reduce load, put boom into parked position, lay boom down ([For more information see: 6.7 Restrictions due to exposure to wind, page 1109](#)).
-

**Note**

Observe the following safety notes:

- ▶ Ensure that every lift is planned and performed by a person appointed by the owner.
- ▶ Determine and consider the geometric form factor (air drag coefficient) and the projection of the area exposed to wind for each load.
- ▶ Note that the squared wind speed enters the calculation of the wind load. A slight increase of the wind speed results in an enormous increase of the wind load.
- ▶ Note that catwalks on the boom sections increase the wind load.
- ▶ Note that the wind speed, shape and size of the load have an essential influence on the stability and load of the machine (see: [tab. 354, page 618](#)).
- ▶ Inform yourself about wind conditions at the work site (ground profiles and building profiles, areas with slipstream, meteorological data, relevant ambient conditions) as well as weather forecasts for the planned working time and take these into consideration.
- ▶ Before starting work, inform yourself about the weather forecast and the current wind speed at the machine's location. If high wind speeds are to be expected in the next hours, do not start up the machine and take protective measures to prevent storm damage.
- ▶ Observe admissible wind speeds and specified reductions of the loads in the foreword of the valid load chart.
- ▶ Note that the area exposed to wind of the load considered in the load calculation is 1.2 m²/t (cw value as factor already considered). If the load's area that is exposed to wind is larger: Calculate maximum permissible wind speed (see: [fig. 732, page 617](#)) or contact Liebherr customer service. Loads may not be picked up until this evaluation has been performed.
- ▶ Observe current wind speed on monitor in cabin.
- ▶ Watch out for dangerous gusts of wind during operation.
- ▶ Move loads slowly and carefully and avoid any swinging.

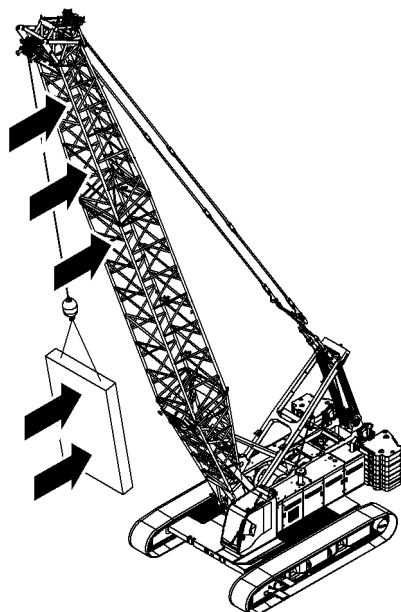


Fig. 729: Exposure to wind on the front of the machine and the load (illustration of principle)

Exposure to wind on the front of the machine and the load has the following effects:

- Machine's stability decreases.
- Risk of toppling of machine increases.
- With maximum main boom angle without load, tilting-back supports may be overstrained and main boom may be destroyed.
- Load swings and damages or destroys main boom.

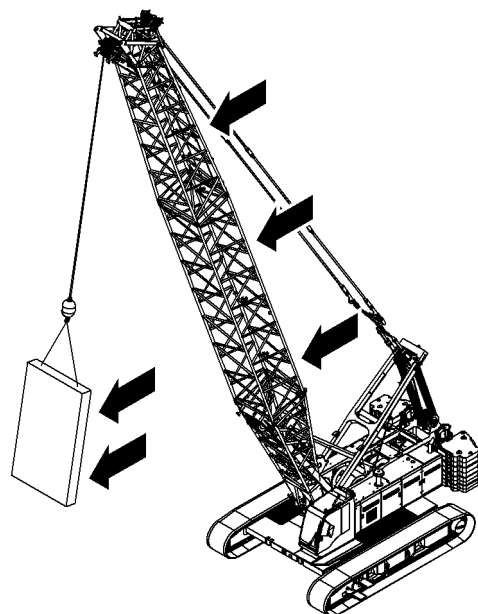


Fig. 730: Exposure to wind on the rear of the machine and the load (illustration of principle)

Exposure to wind on the rear of the machine and the load has the following effects:

- Machine's stability decreases.
- Risk of toppling of machine increases.
- Wind load acts as an additional load on the hook or pulley block.
- Swing radius increases.

- Load swings and damages or destroys main boom.

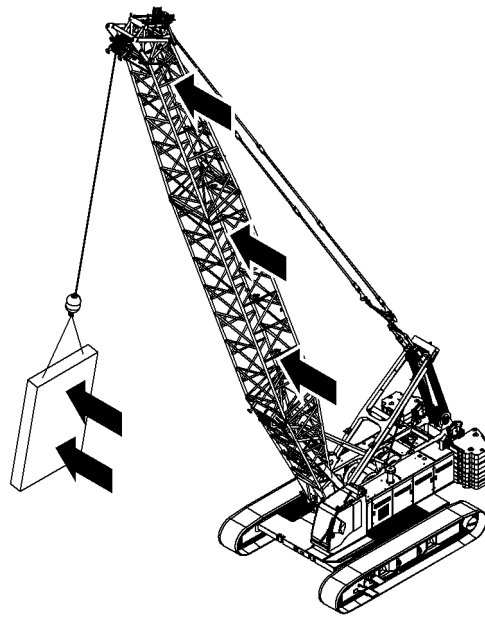


Fig. 731: Exposure to wind on the side of the machine and the load (illustration of principle)

Exposure to wind on the side of the machine and the load has the following effects:

- Machine's stability decreases.
- Risk of toppling of machine increases.
- Additional diagonal pull results.
- Failure of the main boom structure.
- Load swings and damages or destroys main boom.



Note

For rough estimation of the wind speed at maximum boom height:

- ▶ Obtain the maximum wind speed to be expected from the weather office.
- ▶ Note that the wind speeds provided by the weather office are averaged wind speeds measured at a height of 10 m (32' 10" ft-in).
- ▶ Determine the 3-second wind gust speed at maximum boom height with averaged values provided by the weather office and the following chart.
- ▶ Make sure that the machine is only operated at permissible wind speeds in accordance with the foreword of the load chart.

Beaufort degree	3	4	5	6	7	8	9	10
v(d) ^{A)}	5.4 m/s 17.72 ft/s	7.9 m/s 25.92 ft/s	10.7 m/s 35.1 ft/s	13.8 m/s 45.28 ft/s	17.1 m/s 56.1 ft/s	20.7 m/s 67.91 ft/s	24.4 m/s 80.05 ft/s	28.4 m/s 93.18 ft/s
z ^{B)}	v(z) ^{C)}							
10 m 32' 10" ft-in	7.6 m/s 24.93 ft/s	11.1 m/s 36.42 ft/s	15.0 m/s 49.21 ft/s	19.3 m/s 63.32 ft/s	23.9 m/s 78.41 ft/s	29.0 m/s 95.14 ft/s	34.2 m/s 112.2 ft/s	39.8 m/s 130.58 ft/s
20 m 65' 7" ft-in	8.1 m/s 26.57 ft/s	11.9 m/s 39.04 ft/s	16.1 m/s 52.82 ft/s	20.7 m/s 67.91 ft/s	25.7 m/s 84.32 ft/s	31.1 m/s 102.03 ft/s	36.6 m/s 120.08 ft/s	42.7 m/s 140.09 ft/s

Hazards

Beaufort degree	3	4	5	6	7	8	9	10
v(d)^{A)}	5.4 m/s 17.72 ft/s	7.9 m/s 25.92 ft/s	10.7 m/s 35.1 ft/s	13.8 m/s 45.28 ft/s	17.1 m/s 56.1 ft/s	20.7 m/s 67.91 ft/s	24.4 m/s 80.05 ft/s	28.4 m/s 93.18 ft/s
z^{B)}	v(z)^{C)}							
30 m 98' 5" ft-in	8.5 m/s 27.89 ft/s	12.4 m/s 40.68 ft/s	16.8 m/s 55.12 ft/s	21.6 m/s 70.87 ft/s	26.8 m/s 87.93 ft/s	32.4 m/s 106.3 ft/s	38.2 m/s 125.33 ft/s	44.5 m/s 146 ft/s
40 m 131' 3" ft-in	8.7 m/s 28.54 ft/s	12.8 m/s 41.99 ft/s	17.3 m/s 56.76 ft/s	22.3 m/s 73.16 ft/s	27.6 m/s 90.55 ft/s	33.4 m/s 109.58 ft/s	39.4 m/s 129.27 ft/s	45.8 m/s 150.26 ft/s
50 m 164' ft-in	8.9 m/s 29.2 ft/s	13.1 m/s 42.98 ft/s	17.7 m/s 58.07 ft/s	22.8 m/s 74.8 ft/s	28.3 m/s 92.85 ft/s	34.2 m/s 112.2 ft/s	40.3 m/s 132.22 ft/s	46.9 m/s 153.87 ft/s
60 m 196' 10" ft-in	9.1 m/s 29.86 ft/s	13.3 m/s 43.64 ft/s	18.0 m/s 59.06 ft/s	23.3 m/s 76.44 ft/s	28.8 m/s 94.49 ft/s	34.9 m/s 114.5 ft/s	41.1 m/s 134.84 ft/s	47.9 m/s 157.15 ft/s
70 m 229' 8" ft-in	9.3 m/s 30.51 ft/s	13.5 m/s 44.29 ft/s	18.3 m/s 60.04 ft/s	23.6 m/s 77.43 ft/s	29.3 m/s 96.13 ft/s	35.5 m/s 116.47 ft/s	41.8 m/s 137.14 ft/s	48.7 m/s 159.78 ft/s
80 m 262' 6" ft-in	9.4 m/s 30.84 ft/s	13.7 m/s 44.95 ft/s	18.6 m/s 61.02 ft/s	24.0 m/s 78.74 ft/s	29.7 m/s 97.44 ft/s	36.0 m/s 118.11 ft/s	42.4 m/s 139.11 ft/s	49.4 m/s 162.07 ft/s
90 m 295' 3" ft-in	9.5 m/s 31.17 ft/s	13.9 m/s 45.6 ft/s	18.8 m/s 61.68 ft/s	24.3 m/s 79.72 ft/s	30.1 m/s 98.75 ft/s	36.4 m/s 119.42 ft/s	42.9 m/s 140.75 ft/s	50.0 m/s 164.04 ft/s
100 m 328' 1" ft-in	9.6 m/s 31.5 ft/s	14.1 m/s 46.26 ft/s	19.1 m/s 62.66 ft/s	24.6 m/s 80.71 ft/s	30.4 m/s 99.74 ft/s	36.9 m/s 121.06 ft/s	43.4 m/s 142.39 ft/s	50.6 m/s 166.01 ft/s
110 m 360' 11" ft-in	9.7 m/s 31.82 ft/s	14.2 m/s 46.59 ft/s	19.2 m/s 62.99 ft/s	24.8 m/s 81.36 ft/s	30.8 m/s 101.05 ft/s	37.2 m/s 122.05 ft/s	43.9 m/s 144.03 ft/s	51.1 m/s 167.65 ft/s
120 m 393' 8" ft-in	9.8 m/s 32.15 ft/s	14.3 m/s 46.92 ft/s	19.4 m/s 63.65 ft/s	25.1 m/s 82.35 ft/s	31.1 m/s 102.03 ft/s	37.6 m/s 123.36 ft/s	44.3 m/s 145.34 ft/s	51.6 m/s 169.29 ft/s
130 m 426' 6" ft-in	9.9 m/s 32.48 ft/s	14.5 m/s 47.57 ft/s	19.6 m/s 64.3 ft/s	25.3 m/s 83.01 ft/s	31.3 m/s 102.69 ft/s	37.9 m/s 124.34 ft/s	44.7 m/s 146.65 ft/s	52.0 m/s 170.6 ft/s
140 m 459' 4" ft-in	10.0 m/s 32.81 ft/s	14.6 m/s 47.9 ft/s	19.8 m/s 64.96 ft/s	25.5 m/s 83.66 ft/s	31.6 m/s 103.67 ft/s	38.2 m/s 125.33 ft/s	45.1 m/s 147.97 ft/s	52.5 m/s 172.24 ft/s
150 m 492' 2" ft-in	10.0 m/s 32.81 ft/s	14.7 m/s 48.23 ft/s	19.9 m/s 65.29 ft/s	25.7 m/s 84.32 ft/s	31.8 m/s 104.33 ft/s	38.5 m/s 126.31 ft/s	45.4 m/s 148.95 ft/s	52.9 m/s 173.56 ft/s
160 m 524' 11" ft-in	10.1 m/s 33.14 ft/s	14.8 m/s 48.56 ft/s	20.1 m/s 65.94 ft/s	25.9 m/s 84.97 ft/s	32.1 m/s 105.31 ft/s	38.8 m/s 127.3 ft/s	45.7 m/s 149.93 ft/s	53.2 m/s 174.54 ft/s
170 m 557' 9" ft-in	10.2 m/s 33.46 ft/s	14.9 m/s 48.88 ft/s	20.2 m/s 66.27 ft/s	26.0 m/s 85.3 ft/s	32.3 m/s 105.97 ft/s	39.1 m/s 128.28 ft/s	46.0 m/s 150.92 ft/s	53.6 m/s 175.85 ft/s
180 m 590' 7" ft-in	10.3 m/s 33.79 ft/s	15.0 m/s 49.21 ft/s	20.3 m/s 66.6 ft/s	26.2 m/s 85.96 ft/s	32.5 m/s 106.63 ft/s	39.3 m/s 128.94 ft/s	46.3 m/s 151.9 ft/s	53.9 m/s 176.84 ft/s
190 m 623' 4" ft-in	10.3 m/s 33.79 ft/s	15.1 m/s 49.54 ft/s	20.4 m/s 66.93 ft/s	26.4 m/s 86.61 ft/s	32.7 m/s 107.28 ft/s	39.5 m/s 129.59 ft/s	46.6 m/s 152.89 ft/s	54.2 m/s 177.82 ft/s
200 m 656' 2" ft-in	10.4 m/s 34.12 ft/s	15.2 m/s 49.87 ft/s	20.6 m/s 67.59 ft/s	26.5 m/s 86.94 ft/s	32.8 m/s 107.61 ft/s	39.8 m/s 130.58 ft/s	46.9 m/s 153.87 ft/s	54.6 m/s 179.13 ft/s

Tab. 353: 3 second wind gust speed in dependence of average wind speed according to Beaufort scale and height

A) Wind speed determined over 10 minutes **v(d)** in 10 m (32' 10" ft-in) height (top limit of the Beaufort stage).

B) Height **z** above level ground.

C) Speed **(v)z** of a 3 second wind gust acting at a height of **z** decisive for the calculation.

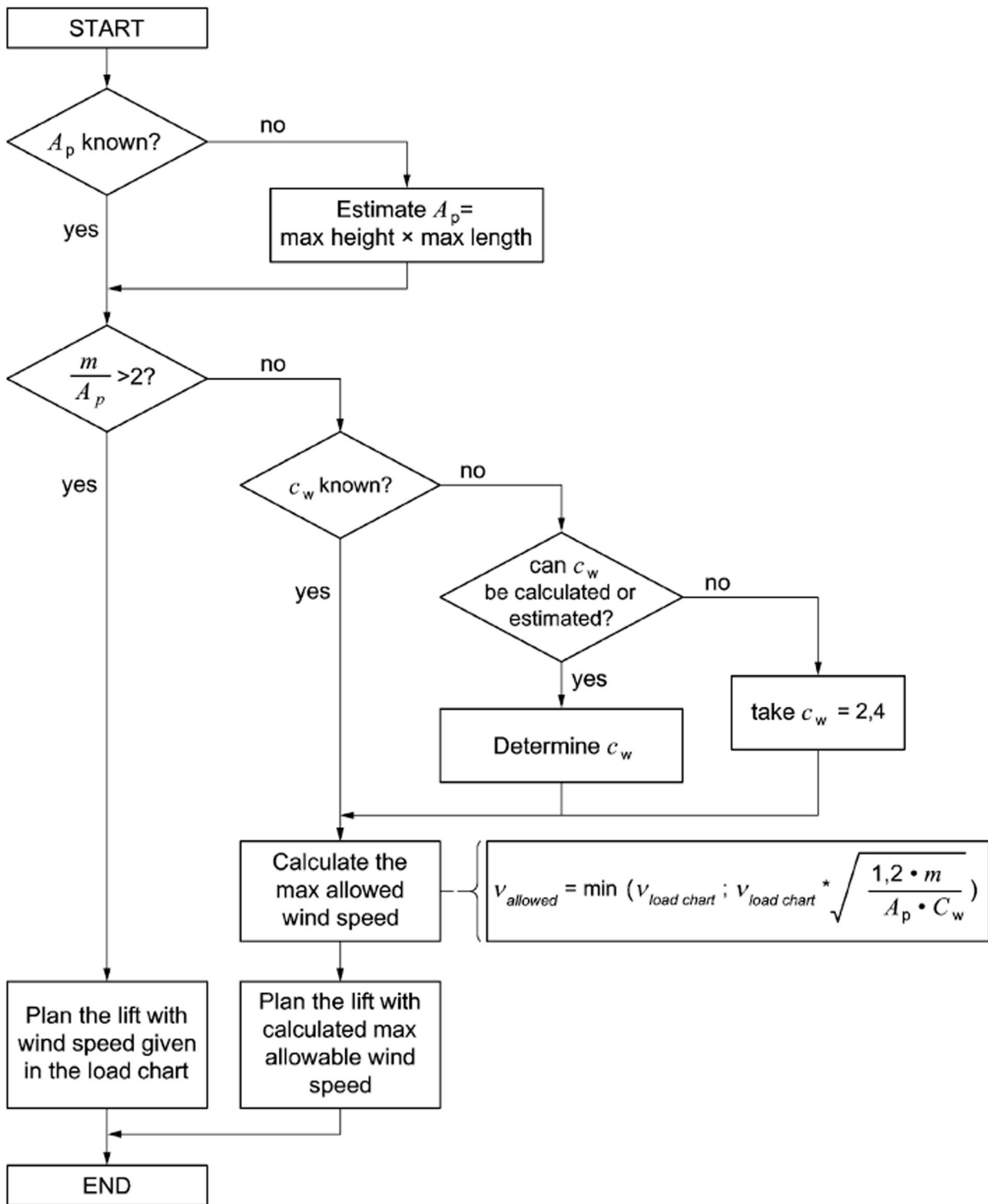


Fig. 732: Simplified procedure for determining the maximum permissible wind speed in accordance with EN 13000 Annex N

m Working load

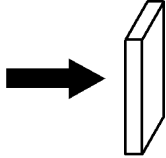
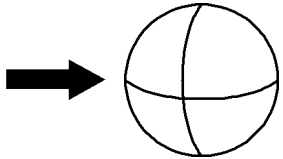
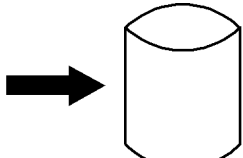
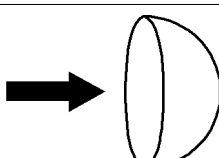
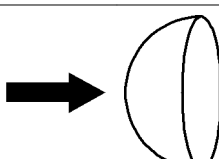
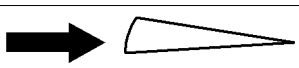
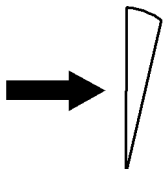
A_p Projected area

c_w Drag coefficient

v_{allowed} Maximum 3-second wind gust speed on boom head in [m/s]

v_{load chart} Wind speed from the load chart in [m/s]

Factor 2 (mentioned in equation $m/A_p > 2$) corresponds to the ratio between the maximum air drag coefficient of 2.4 and the usual air drag coefficient of 1.2, which is used for load assumptions.

Shape	Example	Drag coefficient: c_w
	Slab, formwork or sheet pile	1.1 to 2.0
	Sphere, sphere-shaped container	0.3 to 0.4
	Silo, reactor container	0.6 to 1.0
	Semi-sphere	0.8 to 1.2
	Semi-sphere	0.2 to 0.3
	Wind generator blade or complete rotor	0.05 to 0.1
	Wind generator blade or complete rotor	Approximately 1.6

Tab. 354: Typical types and the corresponding c_w values according to EN 13000 Annex N

2.11.10 Snow load and ice load



DANGER

Snow or ice on the machine!
Structural breakdown.

- ▶ Observe handling-specific and situation-specific safety notes.

**WARNING**

Falling chunks of snow and ice!
Serious injury.

- ▶ Make sure that the boom is free of snow and ice.

**CAUTION**

Snow and ice on access paths and escape routes!
Fall from machine, impassable escape routes.

- ▶ Make sure that access paths/escape routes are free from ice and snow.

**CAUTION**

Freezing of the machine and its movable parts!
Slight injuries, damage to machine.

- ▶ De-ice all movable parts of the machine prior to start-up.

**Note**

Observe the following safety notes:

- ▶ Lay down the boom and carefully remove any large accumulations of ice and snow.
- ▶ Remove snow and ice from all sensitive parts like e.g. limit switches and guides.
- ▶ Avoid dynamic load movements: remove snow and ice from load.

These factors lead to premature switching off of the Load Moment Limiter (LMB).
Work with the maximum admissible load is no longer possible.

2.11.11 Ground bearing strength

**DANGER**

Ground has a limited bearing strength!
Machine toppling over.

- ▶ Carry out work planning.
- ▶ Observe handling and situation-specific safety notes.

**Note**

Observe the following safety notes:

- ▶ Values for permitted ground pressure must be determined by officially-certified specialist engineers.
- ▶ During work planning, calculate the ground pressure exerted when the machine is in use. Observe the values in the valid load chart and/or request the required data from the manufacturer.
- ▶ Use crane mats if necessary.
- ▶ Reinforce the ground if necessary.

**DANGER**

Improper use of crane mats!
Machine toppling over.

- ▶ Lay crane mats next to each other without any gaps between them.
- ▶ Place digger mats diagonal to the crawler chain.
- ▶ Ensure that the crawler side frames lie fully on the crane mats.

2.11.12 Lightning strike

**WARNING**

Electric shock from lightning!
Coming into contact with a direct or indirect current flow caused by a voltage flash-over or step voltage can be fatal.
Fall hazard when working at heights.
It can also cause a total loss of control, damage to the electronics or to local welding spots on supports, especially on the swing ring.

- ▶ Observe handling-specific and situation-specific safety notes.

**Note**

Observe the following safety notes:

- ▶ Lay down the boom before a storm breaks.
- ▶ Disconnect electric lines and main boom base section from uppercarriage.
- ▶ Always stay away from large, free-standing metal parts (e.g. machine) during a thunderstorm.
- ▶ Machines without direct contact between steel structure and ground must be grounded.
- ▶ Only evacuate the cab in the case of fire.

The closed machine operator's cab acts as a Faraday cage. The charge is channeled through the machine and into the ground.

Promptly lay down the boom if any of the following criteria apply:

- On sites that experience frequent storms
- With long boom combinations
- On exposed sites

Measures to take after a lightning strike on the machine has been observed or is suspected:

- Thoroughly inspect the machine paying particular attention to any damaged cables, hoses and ropes.
- Check the operational capability of the control system.
- Slowly move the slewing gear and listen for any unusual noises.
- Inspect the boom for damage.
- Contact Liebherr after sales service.

**First aid**

1. Protection/personal safety
 - Identify - what is the nature of the emergency?
 - Think - what are the dangers for the injured party or the helper?
 - Act - make the situation safe.
2. Emergency call
3. Emergency life-saving measures

- Recovery position
 - Cardiac massage, artificial respiration and defibrillation
 - Staunch bleeding, shock prevention
4. Additional first aid
- (For more information see: 2.12.1 Procedure in event of current transfer, page 624)

2.11.13 Overhead lines



WARNING

Danger through electrical energy and fire!

Death through direct or indirect flow of electricity across the body due to voltage flashover or step voltage.

- ▶ Observe action-related and situation-related safety notices.



Note

Observe the safety notes:

- ▶ Inform the public utility company prior to starting work. The representative of the public utility company issues a written approval for installing and working with the machine.
- ▶ Observe the safety distance specified in national regulations or by a representative of the public utilities company.
- ▶ Make sure that the danger zone of the machine does not overlap with the specified safety distance.
- ▶ Inform all employees at the location of the machine about the dangers involved with electric voltage.
- ▶ When traveling with the machine on undulations, make sure to reduce the distance to the cable.
- ▶ Order a signaller to monitor the machine and the cable, to observe the safety distance and to remain in constant contact with the machine operator.

Examples for current arching with overhead lines:

- Direct contact with an overhead line.
- Undercutting the safety distance creates an electric arc.
- Overhead line falls down; a discharge voltage drop forms around the overhead line on the ground.

Protective devices of various national power grids behave differently in case of an error. After a ground fault, do not assume that the grid will be shut down automatically and lastingly. A potential discharge voltage drop forms around the machine and/or the torn off overhead line (For more information see: 2.12.1 Procedure in event of current transfer, page 624) .



First aid

1. Securing/self-protection
 - Recognizing - What kind of emergency is it?
 - Thinking- Which dangers threaten the injured persons or the helper?
 - Acting - Securing the site as the situation demands.
2. Emergency call
3. Immediate life-saving measures
 - Recovery position
 - Cardiac massage, mouth-to-mouth resuscitation and defibrillation
 - Controlling bleeding, counteracting shock

- 4. Additional first aid
 - (For more information see: 2.12.1 Procedure in event of current transfer, page 624)

Reference values for safety distances to overhead lines

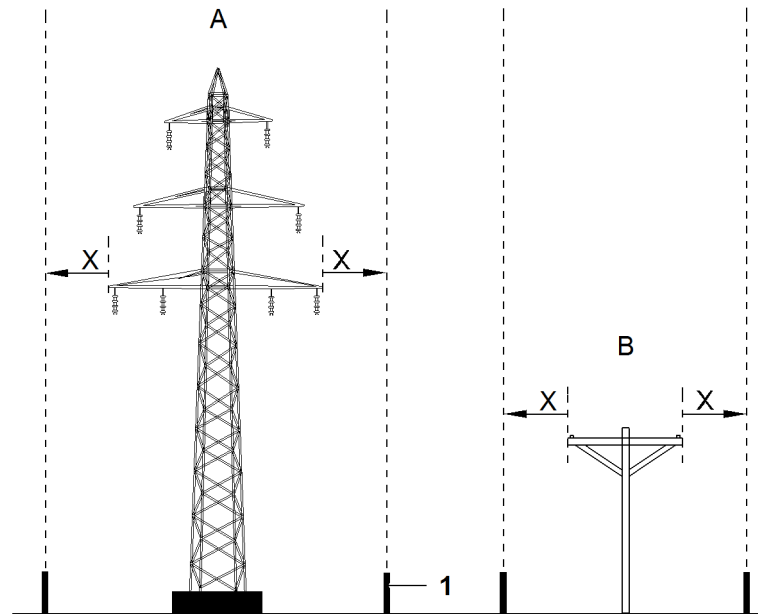


Fig. 749: Overhead lines (illustration of principle)

- A** High-voltage lines
- B** Low-voltage lines and medium-voltage lines
- 1** Barrier

The necessary safety distance depends on the nominal voltage of the overhead line.

The safety distances to the overhead lines are stated exemplary in ISO 12480-1 and OSHA Part 1926.

These details are reference values. The respective nationally specified safety distances must be observed.

The public utilities company will provide more precise information about the nominal voltage.

Overhead line		Safety distance X
B	Low-voltage lines	3000 mm 9' 10" ft-in
	Medium-voltage lines	
A	High-voltage lines	6000 mm 19' 8" ft-in

Tab. 355: Safety distances (in accordance with ISO 12480-1 Cranes - Safe use)

Nominal voltage	Safety distance X
to 350 kV	6100 mm 20 ft

Nominal voltage	Safety distance X
over 350 kV	15250 mm 50 ft

Tab. 356: Safety distances (in accordance with Occupational Safety and Health Administration OSHA Part 1926.1408 and 1926.1409)

2.11.14 Environment

NOTICE

Risk of damage to the environment caused by pollutants!

If their release is not controlled, fuels, oils, cleaning agents, coolant, etc. can enter the ground or rivers and cause environmental damage.

- ▶ Observe handling-specific and situation-specific safety notes.



Note

Observe the following safety notes:

- ▶ If the machine leaks, immediately collect the escaping liquid and seal the leak.
- ▶ Bind any spilled liquid with binding agent or neutralise it with suitable agents.
- ▶ When draining or catching liquids use suitable containers (capacities and resistant to chemicals).
- ▶ Carry out cleaning work on firm well-drained ground.
- ▶ Observe the national and international environmental regulations for the disposal of chemicals or waste.
- ▶ Notify the emergency services and authorities if large amounts of substances that are harmful to the environment escape.

Examples of environmental hazards:

- Leakages
- Refilling consumables incorrectly

2.12 What to do in dangerous situations

2.12.1 Procedure in event of current transfer

Resistance area, step voltage

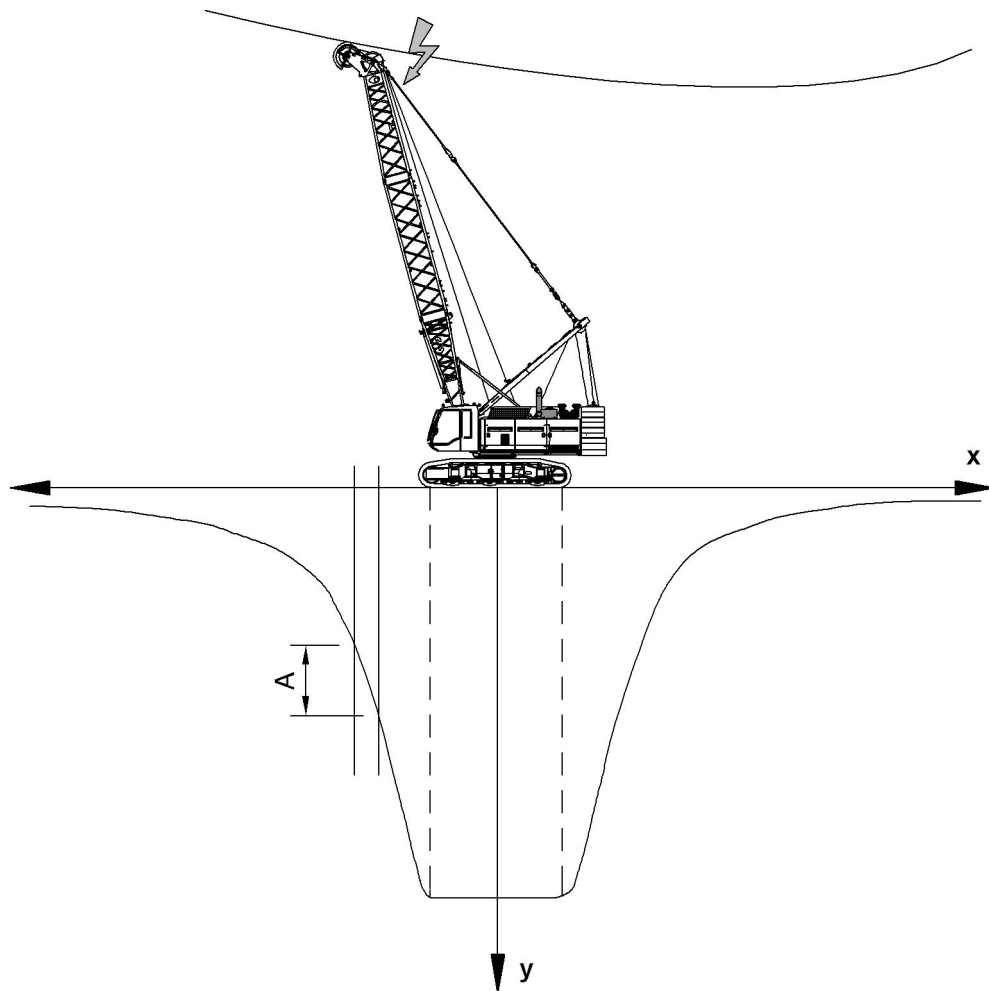


Fig. 750: Resistance area, step voltage

x Extension
y Voltage

A Step voltage

In case of current arcing to the machine by touching an exposed electrical line, the current spreads in the ground at the point of entry. The voltage decreases after a funnel-shaped curve; a resistance area is formed.

The extent of the resistance area depends on:

- Voltage
- Current intensity
- Ground resistance

If a person moves within the resistance area, a potential difference forms between his feet (step voltage **A**).

The step voltage increases:

- the closer the person is to the point of electrical arcing.
- the greater the step.

First response to a current transfer

- Remain calm.
- Alert power supply company.
- Do not leave cabin:
 - Remaining in the closed cabin is relatively safe as it acts as a Faraday cage.
 - Evacuate cabin exclusively in event of fire.
- If Litronic control system is still functioning:
 - Move machine out of danger zone.
 - Remain in cabin until current is no longer being conducted through the machine.

Leaving the machine in event of current transfer with fire

- Never touch live parts machine (ropes, load, crawlers, etc) if you are in contact with the ground.
- Select the jumping direction so that contact with live parts is not possible.
- Jump to a safe distance from the machine and land on both feet.
- Land on both feet at the same time with legs closed (not spread).
- Do not hold on to machine or live parts.
- Hop away on both feet with both legs pressed together.
- While hopping away, keep clear of all live parts.



Note

- ▶ After any electricity impact on the human body, contact a physician. An irregular heartbeat may occur even some time after the accident.

2.12.2 How to respond in the event of a fire



WARNING

Incorrect behaviour in event of fire!

- ▶ Observe handling and situation-specific safety notes.

- Switch off the engine.
- Alert the emergency services.
- Move people out of the danger zone, administer first aid if required ([For more information see: 2.11.4 Burns, page 608](#)) .
- Only start to fight the fire if there is no risk to your personal safety ([For more information see: 2.12.3 Firefighting, page 626](#)) .



WARNING

Danger of backflash!

Even if the fire appears to be extinguished, escaping fuel or oil coming in contact with hot components may reignite.

Once the risk of backflashing no longer persists:

- ▶ Start assessing the damage.

2.12.3 Firefighting

Fire classes



WARNING

Appropriate extinguishers must be used!
If unsuitable extinguishers are used, they may be ineffective or even introduce additional hazards.

- ▶ Use an extinguisher that is appropriate for the fire class.



Fires involving solid and chiefly organic materials that normally smoulder



Fires involving liquids or liquefying materials



Fires involving gases



Fires involving metals

Use of the fire extinguisher

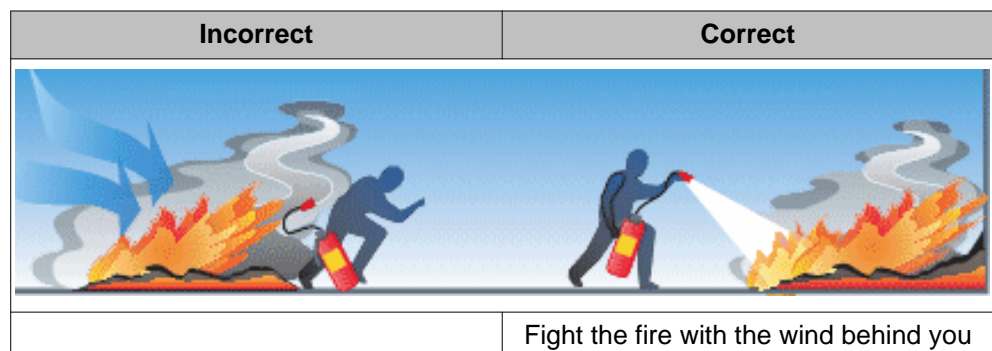









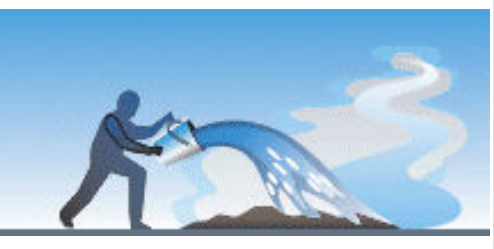


Note

Fire extinguishers are subject to national regulations!

- ▶ Arrange for the plant operator to provide fire extinguishers, replace them as necessary and inspect them periodically.

- Take fire extinguishers on the machine off the holders and ready them for operation.
- Fight the source of the fire with several short bursts.
- While fighting the fire, ask your colleagues to alert the fire brigade.



Incorrect	Correct
	
<p>Extinguish the fire from the front to the back and from the bottom to the top</p>	
	
<p>But: Extinguish dropping and liquid fires from the top to the bottom</p>	
	
<p>Do not use extinguishers in succession but use several extinguishers at the same time</p>	
	
<p>Make sure that the fire does not reignite - always extinguish glowing embers with water</p>	
	
<p>Do not put the fire extinguishers back in place after use - refill them</p>	

Tab. 357: Use of the fire extinguisher

2.13 Working at heights



WARNING

Working at heights without precautions!
Fall from machine.

- ▶ Only perform work on the machine on the ground.

If work at heights is necessary:

- ▶ Secure yourself against falling.
- ▶ Observe international and national regulations.



Note

Liebherr recommends:

- ▶ When working at heights use suitable working platforms.

2.14 Application on floating devices

Liebherr crawler cranes were exclusively developed as assembly cranes and are designed for a limited number of load cycles.

The crane structure was constructed and calculated under assumption of certain conditions, like for example:

- No permanent use.
- Very slight dynamic influences through individual movements.
- Load conditions correspond to the standard EN 13000 "Cranes - Vehicle Cranes" and other similar standards.

Liebherr duty cycle crawler cranes are developed as transport cranes and intended for special use (e.g. grab operation).

Duty cycle crawler cranes are designed and calculated for higher dynamic influences, but are also subject to a limited number of load cycles. The construction of these duty cycle crawler cranes corresponds to the standard EN 474-12 "Earth-moving Machinery - Safety, Requirements for Cable Excavators" and other comparable standards.

Liebherr crawler cranes and Liebherr duty cycle crawler cranes are not designed and developed for offshore conditions acc. to the standard EN 13852-2 "Cranes - Offshore Cranes".



DANGER

Improper use of Liebherr crawler cranes and Liebherr duty cycle crawler cranes on floating devices!

Machine toppling over, structural breakdown.

- ▶ Observe the manufacturer's guidelines and regulations.
- ▶ Observe the industrial safety guidelines and regulations.
- ▶ Perform application planning and risk assessment.
- ▶ Observe international and national guidelines and regulations.

2.14.1 Operation of the machine on floating devices



DANGER

Improper operation of the machine on floating devices!
Machine toppling over, structural breakdown.

- ▶ Only operate the machine according to all following regulations.

In general, the machine must be operated the same way on floating devices as on land.

Operation of the machine on floating devices is only permitted at calm sea without waves.

The only admissible boom configurations are “main boom” or “main boom + auxiliary jib”. The use of main booms in combination with fixed or luffing jibs or with heavy load equipment like e.g. a derrick with suspended counterweight and/or wheeled counterweight carriage is prohibited.

The lifting and lowering of loads can be regarded the same way as operation on land under the following prerequisites:

- Calm sea.
- Minimal movement of the floating device.
- Load is constantly vertically suspended.
- There is no inadmissible diagonal pull due to a movement of the floating device.

The maximum admissible load according to the valid load chart may not be exceeded under any circumstances during operation. All notices in the foreword of the load chart must be observed.

The maximum longitudinal and diagonal incline of the floating device must be calculated by a shipbuilding engineer. The load must be reduced if the incline of the floating device exceeds 1% (0.57°). These reduced load charts (for inclines of 1°, 2° or 3°) are available from the Liebherr customer service. These incline charts are only valid for the boom configuration “main boom”. The maximum incline may never exceed 3°.

It is not permitted to lower the load hook or the pulley block below water level with crawler cranes.

With duty cycle crawler cranes, it is permissible to also work below water level with a specially suited load lifting device.

The decision of whether the conditions for operation on floating devices are given is at the sole discretion and responsibility of the operator. The manufacturer expressly recommends consulting a shipbuilding engineer.

The forces resulting from operation must be safely borne by the structure of the floating device.

Prior to operating the machine, the operator must ensure the following conditions:

- Machine is properly secured .
- All functional, technical and static interactions between the machine and the floating device are tested and approved.

2.14.2 Transport of the machine on floating devices

The operator bears sole responsibility for transporting the machine.

The machine must be secured while being transported on the floating device.

The machine must be secured on the floating device in such a way that the following consequences are ruled out:

- Damage to machine
- Sliding of machine
- Rotation of uppercarriage
- Capsizing of the floating device

Forces may result during transport through acceleration or deformation of the floating device. These forces may have an incalculable influence on the machine structure and impair the support structure, stability or service life of the machine, for example.

NOTICE

Improper transport of the machine on floating devices!
Damage to machine.

- ▶ Put down main boom.
 - ▶ Secure main boom against lateral movement.
 - ▶ Secure main boom against lifting.
 - ▶ Make sure that the main boom is not distorted, because distortions of the floating device may lead to damage to the boom structure or machine.
 - ▶ Deinstall counterweight from the uppercarriage and secure on floating device.
-

Erecting and dismantling the machine on the floating device is the sole responsibility of the operator.

2.14.3 Higher risk of machine corrosion on floating devices

The possibly higher risk of corrosion on machines in a maritime environment is the sole responsibility of the operator.

The following components may be damaged prematurely due to corrosion in a maritime environment (examples):

- Hydraulic cylinders
- Steel ropes
- Electric and electronic components
- Cabin

Therefore, the main components and the structure of the machine must be checked periodically by the maintenance personnel.

The machine structure may not come into direct contact with saltwater.

2.15 Use at low temperatures

The following measures must be performed and all requirements and conditions fulfilled when operating Liebherr duty cycle crawler cranes, crawler excavators and deep foundation machines at low temperatures.

Prerequisites for start-up at sub-zero temperatures:

- Ensure unobstructed view from the cabin. The cabin's windows are clean and the mirrors properly adjusted.

- Check that snow and ice have been removed from the cabin, uppercarriage, crawler side frames, platforms, limit switches, ropes, drums, pulleys, load, and also, where possible, from the booms and/or leader and accessory equipment.
- Sling gear is approved for the prevailing ambient temperatures.
- Load rigging points are approved for the prevailing ambient temperatures.
- Load drop-off site can safely bear the load and is permitted for the prevailing outdoor temperatures.

Conditions for operation at sub-zero temperatures:

- Use antifreeze.
- Heat machine to operating temperature.
- At the start, perform all machine movements without load to mix cold hydraulic oil with pre-heated hydraulic oil until the gearbox and its components are pre-heated to approx. 0 °C (32 °F).
- Do not subject the machine to any impact loads.
- Operate machine slowly and continuously.
- Operate machine within the limits of the load chart.
- When moving the machine, ensure that snow or ice along the path and/or on the crawler side frames do not lead to abrupt machine movements.
- Operate the machine in line with all specifications and guidelines contained in the operation manual.



DANGER

Improper use of Liebherr duty cycle crawler cranes, crawler excavators and deep foundation machines at low temperatures!
Structural breakdown, load breakaway, damage to machine.

- ▶ Observe the manufacturer's guidelines and specifications.

2.15.1 Operation of the machine down to -20 °C (-4 °F) (standard)

Admissible ambient temperatures			
Operation:	down to -20 °C (-4 °F)	Storage:	down to -40 °C (-40 °F)

Tab. 358: Admissible ambient temperatures for operation and storage

Measures:

- Note and observe all generally admissible prerequisites and requirements.

2.15.2 Operation of the machine down to -25 °C (-13 °F)*

Admissible ambient temperatures			
Operation:	down to -25 °C (-13 °F)	Storage:	down to -40 °C (-40 °F)

Tab. 359: Admissible ambient temperatures for operation and storage

Measures (in addition to all other topics addressed beforehand):

- Install low temperature package (engine pre-heating, auxiliary heating (water)) and external power supply.

Additional prerequisites for start-up:

- Cabin with electronic modules and displays is pre-heated prior to start-up using the provided equipment (low temperature package).

- Diesel engine and power units are pre-heated prior to start-up using the provided equipment (low temperature package).

2.15.3 Operation of the machine down to -40 °C (-40 °F)*

Admissible ambient temperatures			
Operation:	down to -40 °C (-40 °F)	Storage:	down to -40 °C (-40 °F)

Tab. 360: Admissible ambient temperatures for operation and storage

Measures (in addition to all other topics addressed beforehand):

- Exchange hydraulic oil, gearbox oil, fuels and lubricants.
- Exchange hydraulic cylinders and hydraulic accumulators.
- Install low-temperature package (engine pre-heating), improved insulation (e.g. of the fuel system), auxiliary heating (water) battery pre-heater, fuel pre-filter heater, oil pre-heating unit and external power supply.
- Exchange attachment parts (in part).
- Exchange undercarriage components (cam rollers, carrier rollers, idler wheel).
- Exchange electric/electronic components (e.g. battery).
- Exchange gearbox (in part).
- Exchange rubber elements and plastic elements (e.g. v-belts, radiator fans).
- Perform changes to the steel structure and load-bearing parts so that all used parts in the load chain meet the necessary requirements as well as use of special welding additives.
- Ensure that pins, screws and ropes including end fittings correspond to ambient temperatures.

Additional prerequisites for start-up:

- Start diesel engine at least 20 minutes prior to starting work.

2.16 Hand signals

The hand signals:

- serve to communicate during visual contact between the machine operator and the signalman or additional personnel
- are clearly defined in national and international standards



Note

- ▶ The hand signals to be used must be coordinated with all persons involved.

The following overview includes:

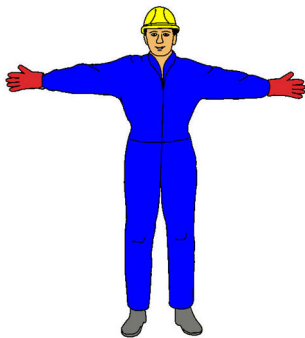
- the hand signals in accordance with BGV A8 (Germany)
- the hand signals in accordance with ASME/ANSI B30.5 (United States of America)

2.16.1 General hand signals in accordance with BGV A8



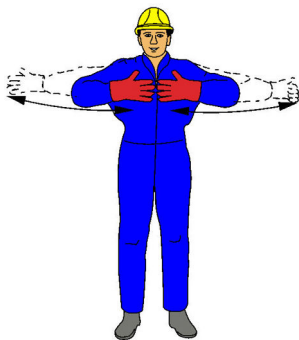
Attention, start, stop

- Extend right arm upward
- Palm faces forward



Stop, pause

- Extend both arms horizontally at your side
- Palms face forward



Stop - danger

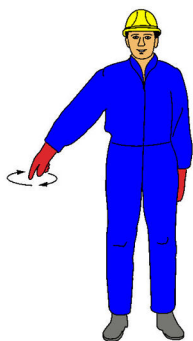
- First extend both arms horizontally at your side
- Palms face forward
- Now angle and extend both arms alternately



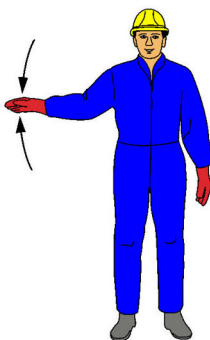
Hoist

- Angle right arm upwards
- Palm faces forward
- Make slow circular motions with hand

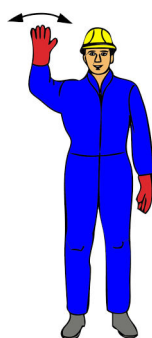
Hand signals

**Lower**

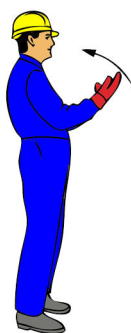
- Extend right arm downward
- Palm faces inward
- Make slow circular motions with hand

**Slow**

- Extend right arm horizontally
- Palm faces down
- Slowly move hand up and down

**Travel**

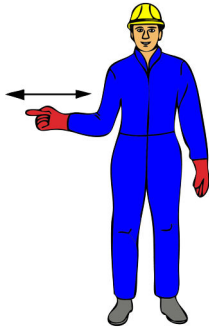
- Angle right arm upwards
- Palm faces forward
- Move arm back and forth at your side

**Approach**

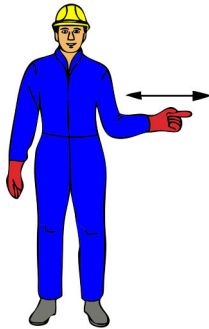
- Bend both arms
- Palms face inward
- Wave towards you with forearms

**Leave**

- Bend both arms
- Palms face outward
- Wave away from you with forearms

**Travel to right** (from the point of view of the signalman)

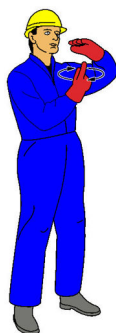
- Slightly angle right arm in horizontal position
- Move arm back and forth at your side

**Travel to left** (from the point of view of the signalman)

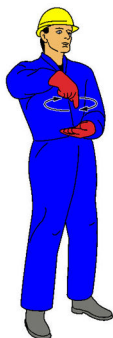
- Slightly angle left arm in horizontal position
- Move arm back and forth at your side

**Reduce distance**

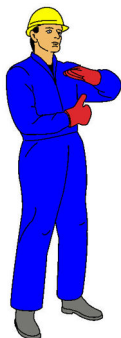
- Keep both palms parallel and bring together corresponding to the distance

2.16.2 Special hand signals for sling gear application**Raise load slowly**

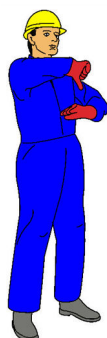
- Angle right arm upwards
- Extended finger points upwards
- Right hand makes small circular motions
- Extend left hand and hold over right hand

**Lower load slowly**

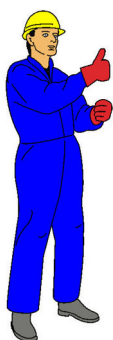
- Keep right arm downward
- Extended finger points downwards
- Right hand makes small circular motions
- Place left hand under right hand

**Lift main boom**

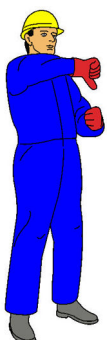
- Angle right arm upwards
- Extended thumb points upwards
- Extend left hand and hold over right hand

**Lower main boom**

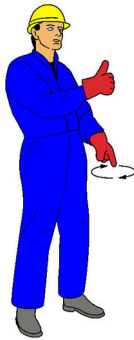
- Angle right arm
- Extended thumb points down
- Extend left hand and hold underneath right hand

**Raise main boom and hold load**

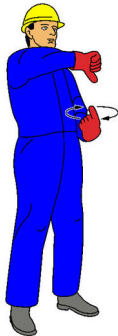
- Angle right arm upwards
- Extended thumb points upwards
- Make a fist with left hand and hold underneath right hand

**Lower main boom and maintain load**

- Angle right arm
- Extended thumb points down
- Make a fist with left hand and hold underneath right hand

**Raise main boom and lower load**

- Angle right arm upwards
- Extended thumb points upwards
- Extend left arm, index finger points downward
- Make circular motions with left hand and hold underneath right hand

**Lower main boom and lift load**

- Angle right arm
- Extended thumb points down
- Angle left arm, index finger points upward
- Make circular motions with left hand and hold underneath right hand

**Slew uppercarriage to the right**

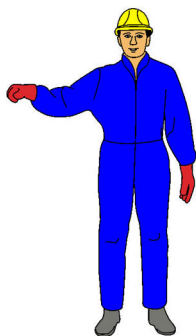
- Angle left arm and hold up
- Extended thumb points upward in slewing direction
- Extend right arm downward
- Index finger points down and makes circular motions

**Slew uppercarriage to the left**

- Angle right arm and hold up
- Extended thumb points upward in slewing direction
- Extend left arm downward
- Index finger points down and makes circular motions

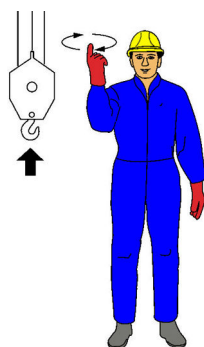
**Open grab**

- Extend right arm horizontally
- Open hand downward

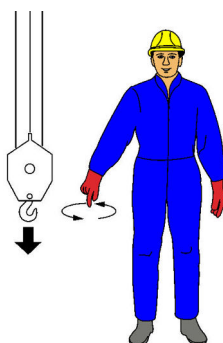
**Close grab**

- Extend right arm horizontally
- Make a fist

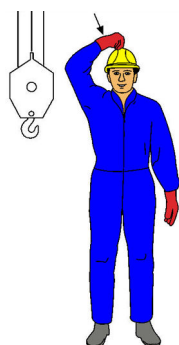
2.16.3 Hand signals for lifting gear application in accordance with ASME/ANSI B30.5

**Lift load**

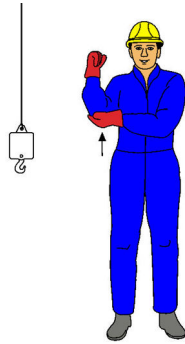
- Angle right arm upwards
- Extended index finger points upwards
- Make slow circular motions with hand

**Lower load**

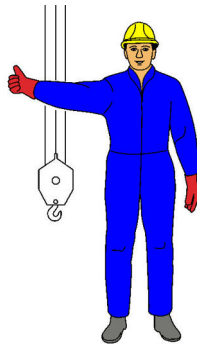
- Extend right arm downward
- Extended index finger points down
- Make slow circular motions with hand

**Use of main winch**

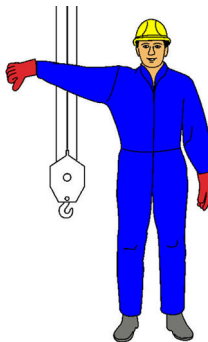
- Knock with fist on hardhat
- Then give more hand signals

**Use of auxiliary winch**

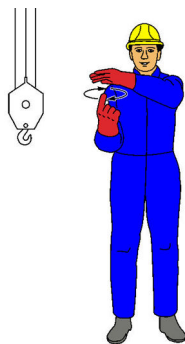
- Angle right arm upwards
- Knock on your right elbow from below with left hand
- Then give more hand signals

**Lift main boom**

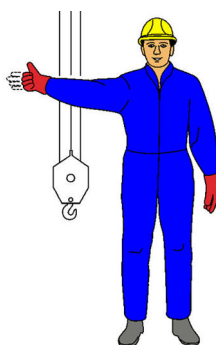
- Extend right arm horizontally
- Extended thumb points upwards

**Lower main boom**

- Extend right arm horizontally
- Extended thumb points down

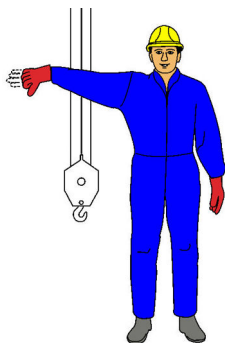
**Moving slowly**

- Use one hand to give required hand signal. (E.g. lift load)
- Hold one hand over or underneath other hand

**Raise main boom and lower load**

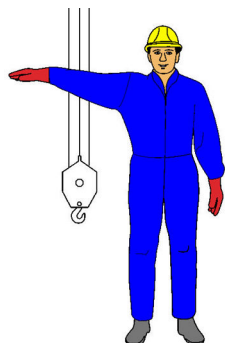
- Extend right arm horizontally
- Extended thumb points upwards
- Extend/angle the other fingers alternately as long as the load is supposed to be lowered

Hand signals



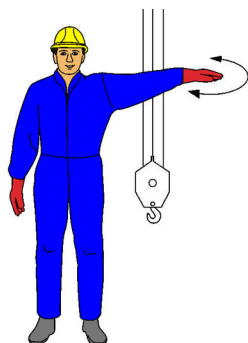
Lower main boom and lift load

- Extend right arm horizontally
- Extended thumb points down
- Extend/angle the other fingers alternately as long as the load is supposed to be lifted



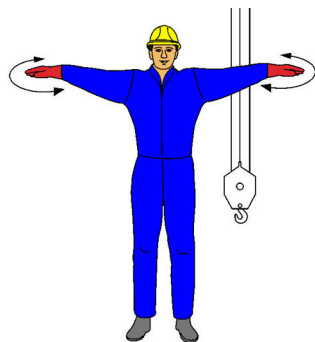
Rotate

- Extend right arm horizontally
- Palm faces down
- Extended finger points in rotation direction



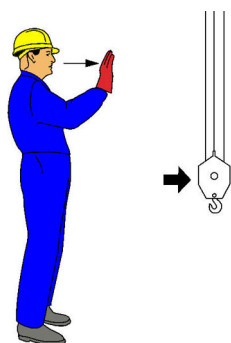
Stop

- Extend one arm horizontally
- Palm faces down
- Move arm back and forth horizontally



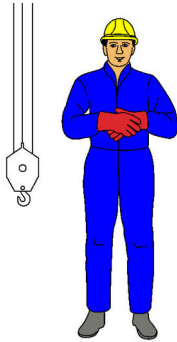
Emergency stop

- Extend both arms horizontally
- Palms face down
- Swing both arms back and forth horizontally



Travel

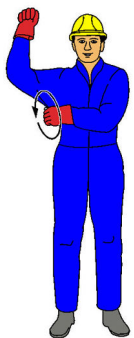
- Angle one arm
- Palm faces forward
- Make a motion in the direction of travel with one open hand

**Park and secure machine**

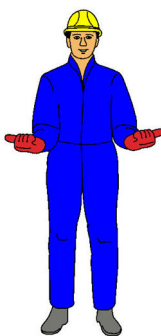
- Hook hands in front of your body

**Traveling with both crawler chains**

- Hold both fists in front of your body
- Indicate travel direction with circular motions

**Traveling with one crawler chain**

- Angle arm, keep fist raised on the side of the stationary crawler chain
- Angle other arm in front of body on the side of the crawler chain to be moved
- Indicate travel direction making circular motions with fist

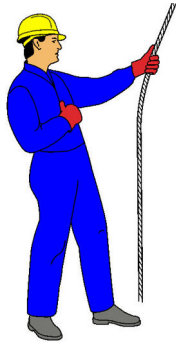
**Telescope boom out**

- Hold both fists in front of body
- Thumbs face outward

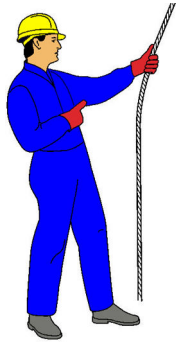
**Telescope boom in**

- Hold both fists in front of body
- Thumbs point towards each other

Hand signals

**Telescope boom in** (single hand signal)

- Hold one fist in front of chest
- Thumb points toward chest

**Telescope boom out** (single hand signal)

- Hold one fist in front of chest
- Thumbs point outward

Control and operating elements 3

3 Control and operating elements

3 Control and operating elements

This chapter deals with the following issues:

- Alignment of control and operating elements
- Names of control and operating elements



WARNING

Inadmissible or improper procedure!
Severe injuries, damage to machine.

If the operation manual contains insufficient information:

- ▶ Contact Liebherr customer service.
-

3.1 Operating elements on the undercarriage

3.1.1 Operating elements at undercarriage with fixed track width

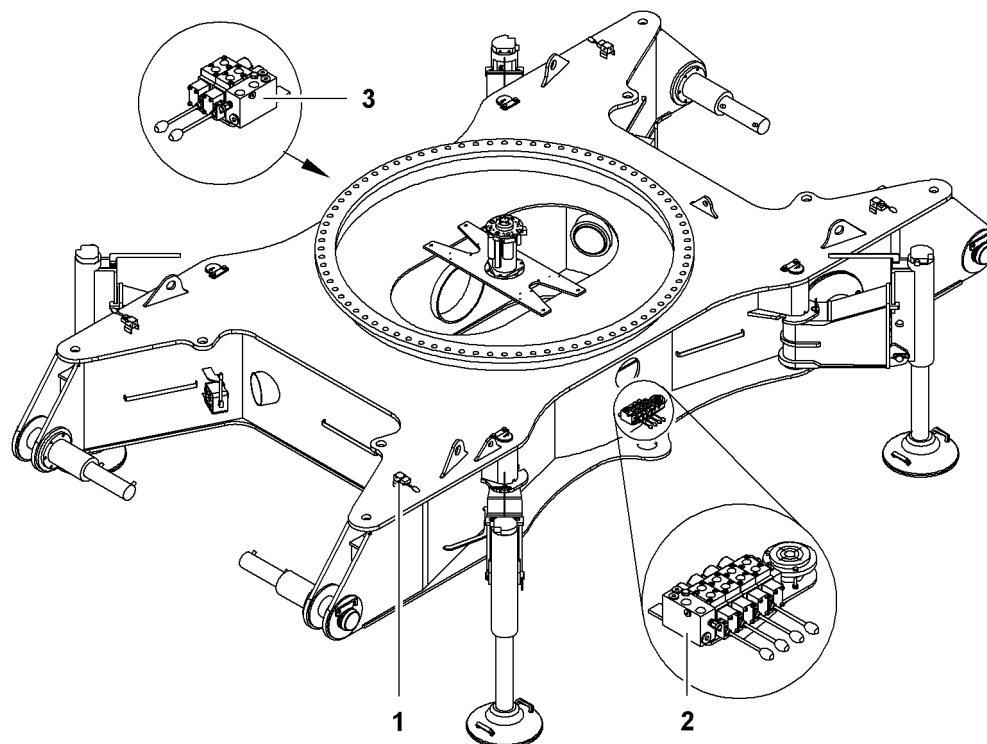


Fig. 805: Operating elements at undercarriage with fixed track width

- | | | | |
|---|---|---|--|
| 1 | Control lever (4x) for crawler side frame-pin connection cylinder | 3 | Control lever (2x) for jack (optional) |
| 2 | Control lever (4x) for jack with tilt display | | |

3.1.2 Operating elements at undercarriage* with adjustable track width

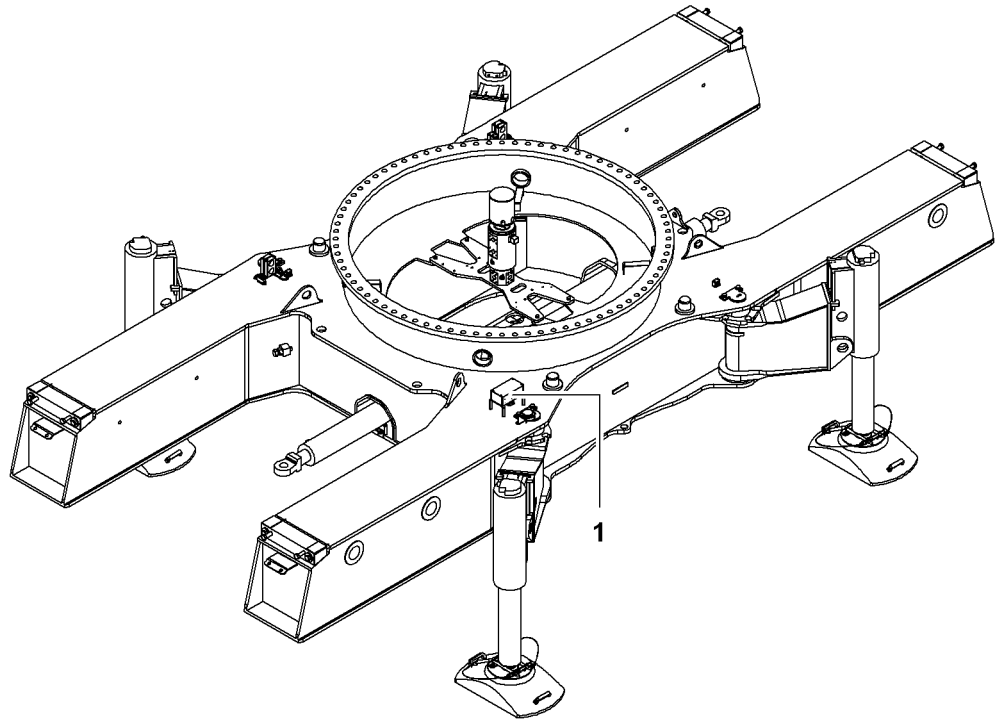


Fig. 806: Operating elements at undercarriage* with adjustable track width

- 1 Connection plug of cable remote control

3.2 Operating elements on the uppercarriage

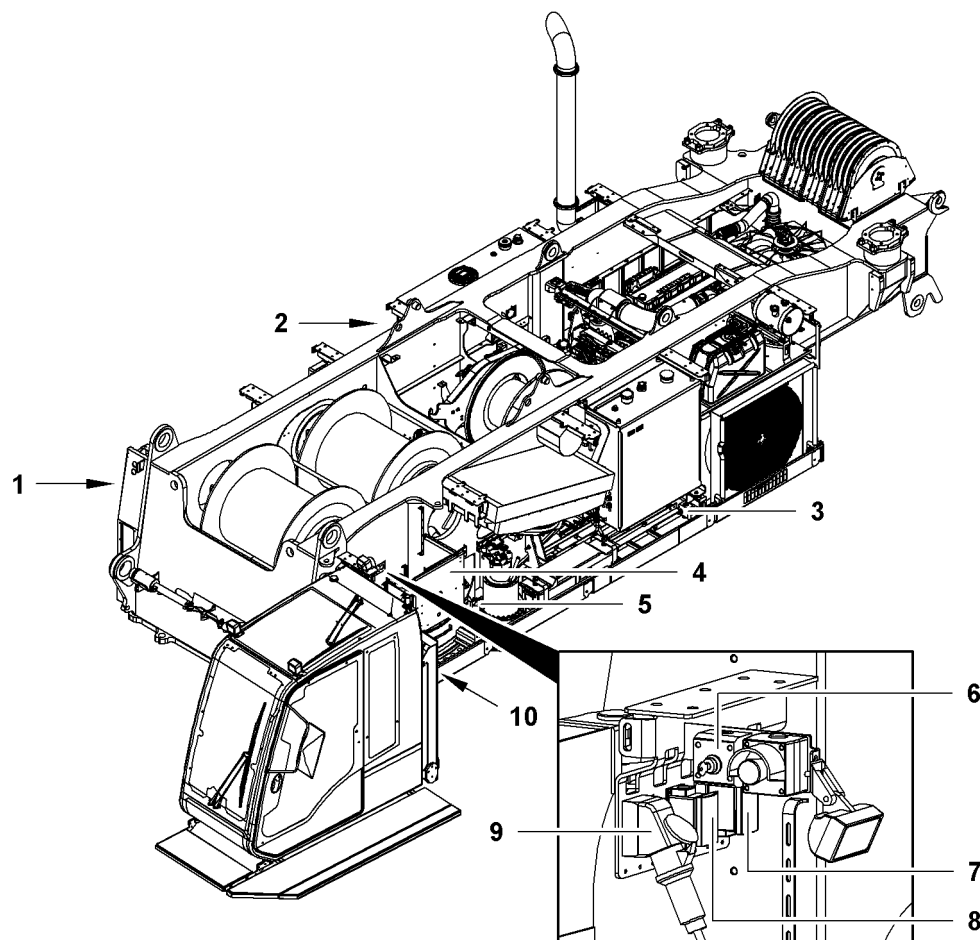


Fig. 807: Operating elements on the uppercarriage

- | | | | |
|---|---|----|---|
| 1 | Connection plug of cable remote control | 6 | Key switch <i>load moment limiter shut-down</i> |
| 2 | Refueling pump control panel | 7 | Control panel emergency control system connection plug |
| 3 | Connection plug of cable remote control | 8 | Control panel emergency control system connection plug |
| 4 | Gate valve <i>free-fall operation</i> | 9 | External supply connection plug |
| 5 | Main battery switch | 10 | Cable remote control oddments tray and control panel emergency control system |

The *load moment limiter shut down* key switch **6** has no effect on machines with an ANSI load chart.

3.3 Operating elements on counterweight carriage*

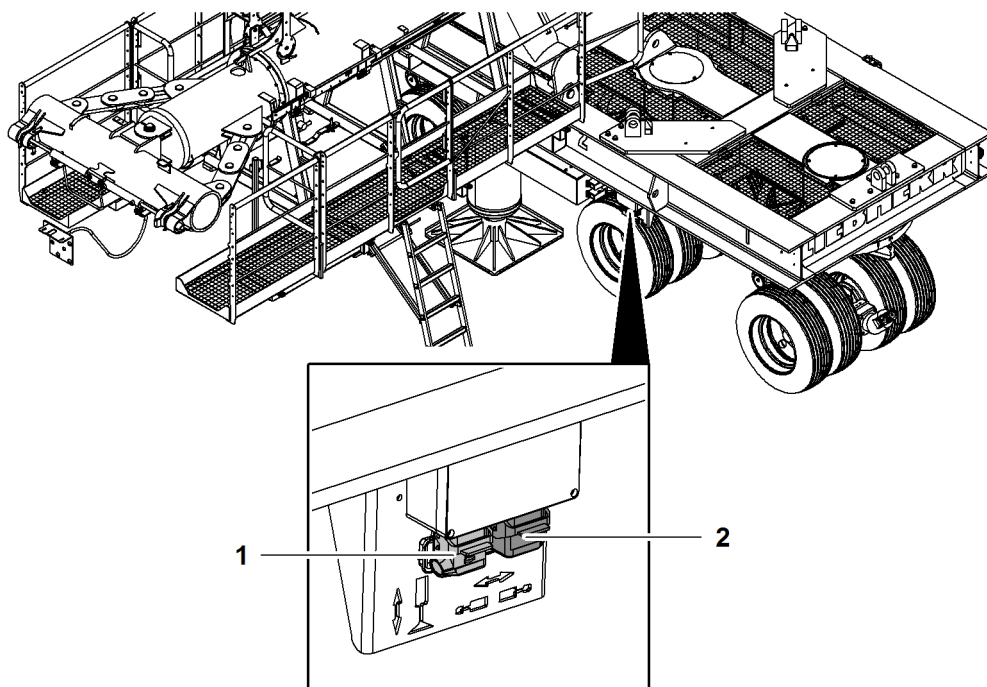


Fig. 808: Operating elements on counterweight carriage

1 Plug for jack

2 Plug for pin connection cylinder

3.4 Cabin

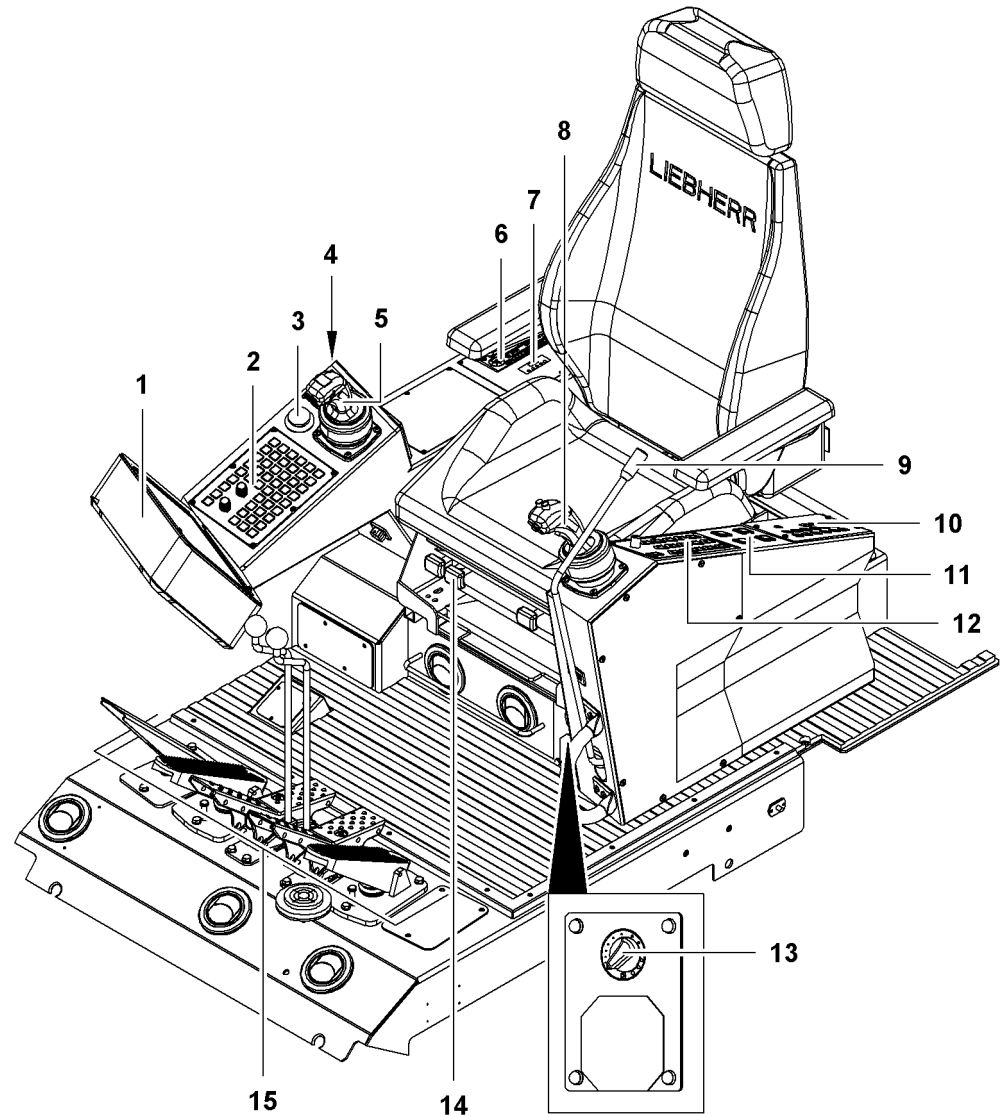


Fig. 809: Cabin

- | | | | |
|---|---|----|--|
| 1 | Monitor | 9 | Safety lever |
| 2 | Control panel X23 | 10 | Control panel X12 |
| 3 | Emergency stop | 11 | Buttons <i>Additional floodlights</i> |
| 4 | Ignition key/ignition lock | 12 | Control panel X11 |
| 5 | Multi-directional control lever or right double T-lever | 13 | Switch <i>Recirculated air/fresh air</i> |
| 6 | Radio | 14 | Lever <i>operator's seat adjustment</i> (3x) |
| 7 | Operating element <i>auxiliary heating</i> | 15 | Foot pedals and hand levers |
| 8 | Left multi-directional control lever | | |

3.5 Left control lever

3.5.1 Function assignment of the left control lever on machine without derrick equipment*

Left multi-directional control lever



Assigned functions of control levers on a machine with two multi-directional control levers.

Function assignment of buttons on left multi-directional control lever

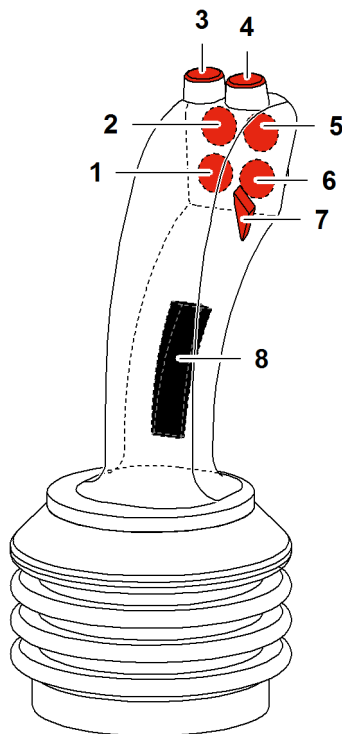






















Fig. 811: Function assignment of buttons on left multi-directional control lever

Button	Mode	Preselection or additional button	Name and function
1	 Crane mode		[not used]
	 Assembly functions		[not used]

Left control lever

Button	Mode	Preselection or additional button	Name and function
2	 Crane mode		Tagline winch free-wheel Activate/deactivate tagline winch free-wheel.
	 Assembly functions		Tagline winch free-wheel Activate/deactivate tagline winch free-wheel.
3	 Crane mode		Horn Sound horn.
	 Assembly functions		Horn Sound horn.
4	 Crane mode		[not used]
	 Assembly functions		[not used]
5	 Crane mode		Maximum pull force tagline winch Select maximum pull force of tagline winch.
	 Assembly functions		Maximum pull force tagline winch Select maximum pull force of tagline winch.

Button	Mode	Preselection or additional button	Name and function
6	 Crane mode		Swing free-wheel Activate/deactivate swing free-wheel.
	 Crane mode	 Vertical Line Finder	Vertical Line Finder Position boom head above load's center of gravity.
	 Assembly functions		Swing free-wheel Activate/deactivate swing free-wheel.
	 Assembly functions	 Vertical Line Finder	Vertical Line Finder Position boom head above load's center of gravity.
7	 Crane mode		Constant tension tagline winch Set constant tension of tagline winch.
	 Assembly functions		Constant tension tagline winch Set constant tension of tagline winch.
8	 Crane mode		[not used]
	 Assembly functions		[not used]

Tab. 361: Function assignment of buttons on left multi-directional control lever

Assigned functions for movement directions on left-hand multi-directional joystick

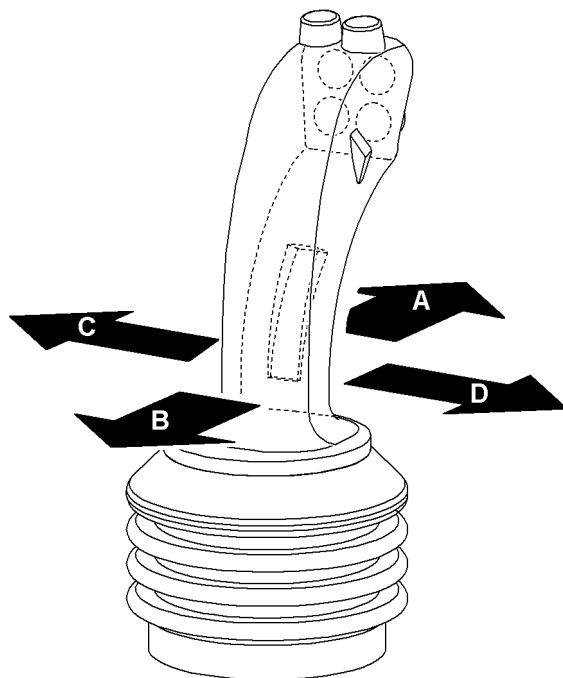



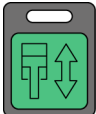



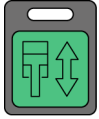



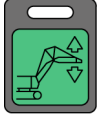
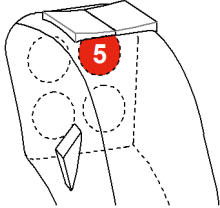




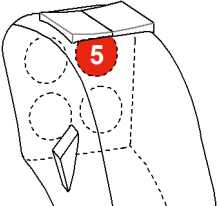


Fig. 832: Function assignment for movement directions on left multi-directional control lever

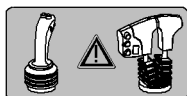
Direction of movement	Mode	Preselection or additional button	Function
A	 Crane mode		Lower winch2
	 Assembly functions		Lower winch2
	 Assembly functions	 Assembly cylinder	Extend assembly cylinder

Direction of movement	Mode	Preselection or additional button	Function
B	 Crane mode		Lifting winch2
	 Assembly functions		Lifting winch2
	 Assembly functions	 Assembly cylinder	Retract assembly cylinder
C	 Crane mode		Swing uppercarriage to the left
	 Assembly functions		Swing uppercarriage to the left
	 Assembly functions	 Jib luffing winch or 	Lower jib

Left control lever

Direction of movement	Mode	Preselection or additional button	Function
D	 Crane mode		Swing uppercarriage to the right
	 Assembly functions		Swing uppercarriage to the right
	 Assembly functions	 Jib luffing winch or 	Lift jib

Tab. 362: Function assignment for movement directions on left multi-directional control lever

Left multi-directional control lever

Assigned functions of the control levers on a machine with a multi-directional control lever and a double T-lever.

Assigned functions for buttons on left-hand multi-directional joystick

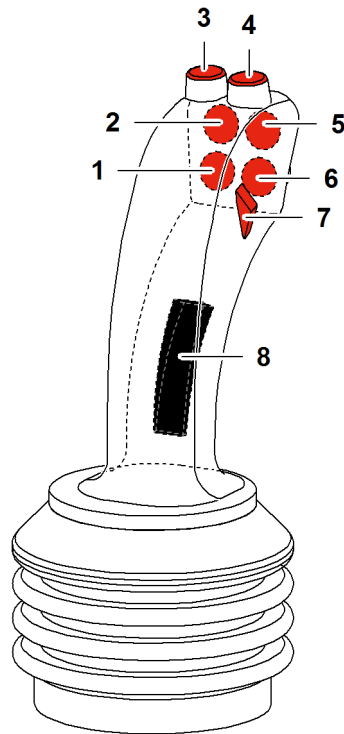


























Fig. 852: Function assignment of buttons on left multi-directional control lever

Button	Mode	Preselection or additional button	Name and function
1	 Crane mode		[not used]
	 Assembly functions		[not used]
2	 Crane mode		Tagline winch free-wheel Activate/deactivate tagline winch free-wheel.
	 Assembly functions		Tagline winch free-wheel Activate/deactivate tagline winch free-wheel.

Left control lever

Button	Mode	Preselection or additional button	Name and function
3	 Crane mode		Horn Sound horn.
	 Assembly functions		Horn Sound horn.
4	 Crane mode		[not used]
	 Assembly functions		[not used]
5	 Crane mode		Maximum pull force tagline winch Select maximum pull force of tagline winch.
	 Assembly functions		Maximum pull force tagline winch Select maximum pull force of tagline winch.
6	 Crane mode		Swing free-wheel Activate/deactivate swing free-wheel.
	 Crane mode	 Vertical Line Finder	Vertical Line Finder Position boom head above load's center of gravity.
	 Assembly functions		Swing free-wheel Activate/deactivate swing free-wheel.
	 Assembly functions	 Vertical Line Finder	Vertical Line Finder Position boom head above load's center of gravity.

Button	Mode	Preselection or additional button	Name and function
7	 Crane mode		<p>Constant tension tagline winch</p> <p>Set constant tension of tagline winch.</p>
	 Assembly functions		<p>Constant tension tagline winch</p> <p>Set constant tension of tagline winch.</p>
8	 Crane mode	 Horizontal load path/ Vertical Line Finder winch1 or  Horizontal load path/ Vertical Line Finder winch2	<p>Activate horizontal load path</p> <p>horizontal load path for winch1 or winch2.</p>
	 Assembly functions	 Horizontal load path/ Vertical Line Finder winch1 or  Horizontal load path/ Vertical Line Finder winch2	<p>Activate horizontal load path</p> <p>horizontal load path for winch1 or winch2.</p>

Tab. 363: Function assignment of buttons on left multi-directional control lever

Assigned functions for movement directions on left-hand multi-directional joystick

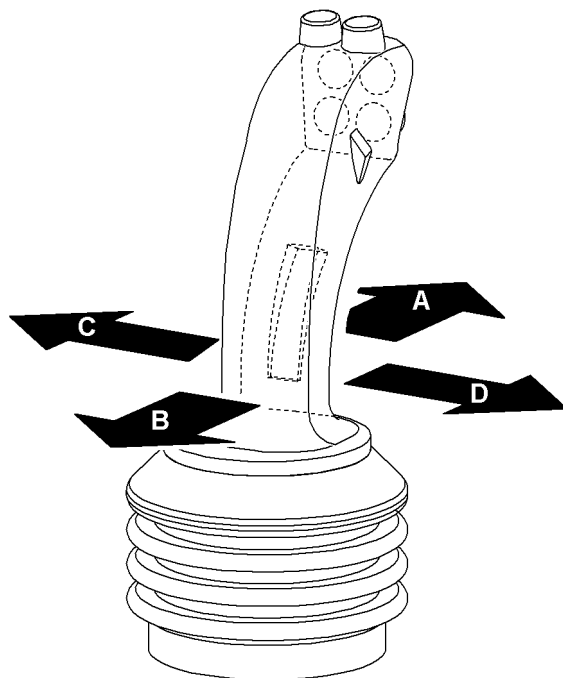










Fig. 877: Function assignment for movement directions on left multi-directional control lever

Direction of movement	Mode	Preselection or additional button	Function
A	 Crane mode		Lower main boom
	 Assembly functions		Lower main boom
B	 Crane mode		Lift main boom
	 Assembly functions		Lift main boom

Direction of movement	Mode	Preselection or additional button	Function
C	 Crane mode		Swing uppercarriage to the left
	 Assembly functions		Swing uppercarriage to the left
D	 Crane mode		Swing uppercarriage to the right
	 Assembly functions		Swing uppercarriage to the right

Tab. 364: Function assignment for movement directions on left multi-directional control lever

3.5.2 Function assignment of the left control lever on machine with derrick equipment*

Left multi-directional control lever



Function assignment of control levers on a machine with two multi-directional control levers

Function assignment of buttons on left multi-directional control lever

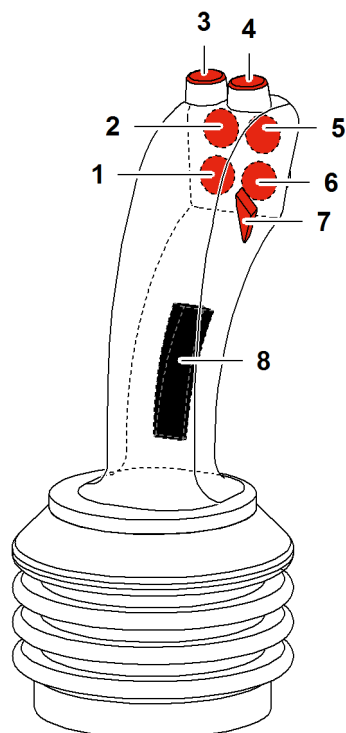






















Fig. 887: Function assignment of buttons on left multi-directional control lever

Button	Mode	Preselection or additional button	Name and function
1	 Crane mode		Derrick hoist cylinder Activates/deactivates derrick hoist cylinder.
	 Assembly functions		Derrick hoist cylinder Activates/deactivates derrick hoist cylinder.
2	 Crane mode		Tagline winch free-wheel Activate/deactivate tagline winch free-wheel.
	 Assembly functions		Tagline winch free-wheel Activate/deactivate tagline winch free-wheel.

Button	Mode	Preselection or additional button	Name and function
3	 Crane mode		Horn Sound horn.
	 Assembly functions		Horn Sound horn.
4	 Crane mode		[not used]
	 Assembly functions		[not used]
5	 Crane mode		Maximum pull force tagline winch Select maximum pull force of tagline winch.
	 Assembly functions		Maximum pull force tagline winch Select maximum pull force of tagline winch.
6	 Crane mode		Swing free-wheel Activate/deactivate swing free-wheel.
	 Crane mode	 Vertical Line Finder	Vertical Line Finder Position boom head above load's center of gravity.
	 Assembly functions		Swing free-wheel Activate/deactivate swing free-wheel.
	 Assembly functions	 Vertical Line Finder	Vertical Line Finder Position boom head above load's center of gravity.

Left control lever

Button	Mode	Preselection or additional button	Name and function
7	 Crane mode		Constant tension tagline winch Set constant tension of tagline winch.
	 Assembly functions		Constant tension tagline winch Set constant tension of tagline winch.
8	 Crane mode		[not used]
	 Assembly functions		[not used]

Tab. 365: Function assignment of buttons on left multi-directional control lever

Function assignment for movement directions on left multi-directional control lever

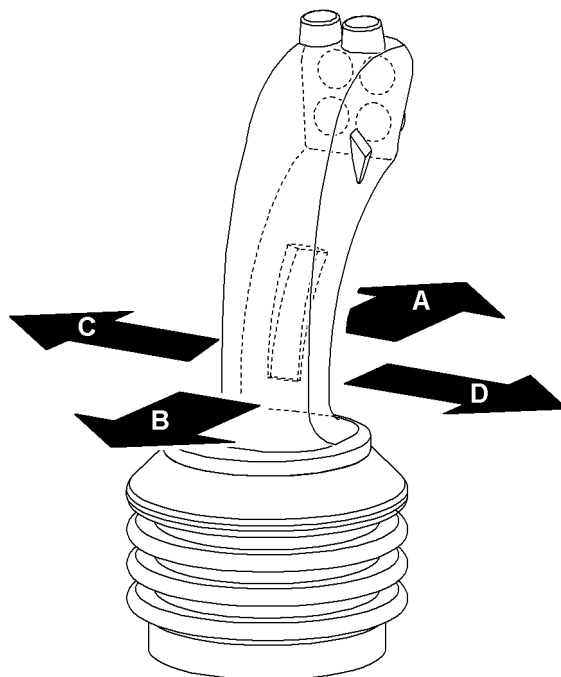


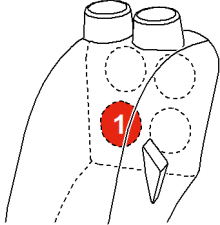


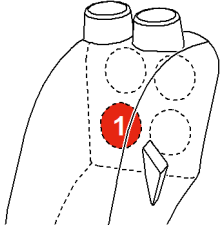




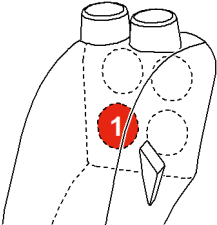


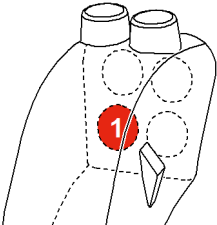

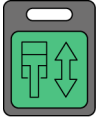


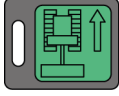





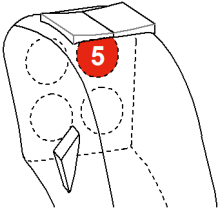


Fig. 908: Function assignment for movement directions on left multi-directional control lever



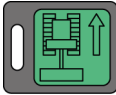





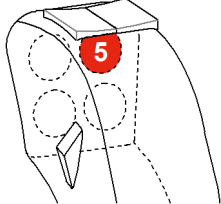
Direction of movement	Mode	Preselection or additional button	Function
A	 Crane mode		Lower winch2
	 Crane mode		Extending the derrick hoist cylinder
	 Assembly functions		Lower winch2
	 Assembly functions		Extending the derrick hoist cylinder
	 Assembly functions	 Assembly cylinder	Extend assembly cylinder

Left control lever

Direction of movement	Mode	Preselection or additional button	Function
B	 Crane mode		Lifting winch2
	 Crane mode		Retracting the derrick hoist cylinder
	 Assembly functions		Lifting winch2
	 Assembly functions		Retracting the derrick hoist cylinder
	 Assembly functions	 Assembly cylinder	Retract assembly cylinder

Direction of movement	Mode	Preselection or additional button	Function
C	 Crane mode		Swing uppercarriage to the left
	 Crane mode	 Trailer travel mode	Steer wheel sets of counterweight carriage to the left
	 Assembly functions		Swing uppercarriage to the left
	 Assembly functions	 Derrick winch	Lower main boom ^{A)}
	 Assembly functions	 Jib luffing winch or 	Lower jib

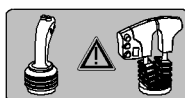
Left control lever

Direction of movement	Mode	Preselection or additional button	Function
D	 Crane mode		Swing uppercarriage to the right
	 Crane mode	 Trailer travel mode	Steer wheel sets of counterweight carriage to the right
	 Assembly functions		Swing uppercarriage to the right
	 Assembly functions	 Derrick winch	Lift main boom ^{A)}
	 Assembly functions	 Jib luffing winch or 	Lift jib

Tab. 366: Function assignment for movement directions on left multi-directional control lever

A) By default, this function is on the left multi-directional control lever. "Jib luffing winch" must be additionally selected to enable this function on the right multi-directional control lever.

Left multi-directional control lever



Function assignment of control levers on a machine with a multi-directional control lever and a double T-lever

Function assignment of buttons on left multi-directional control lever

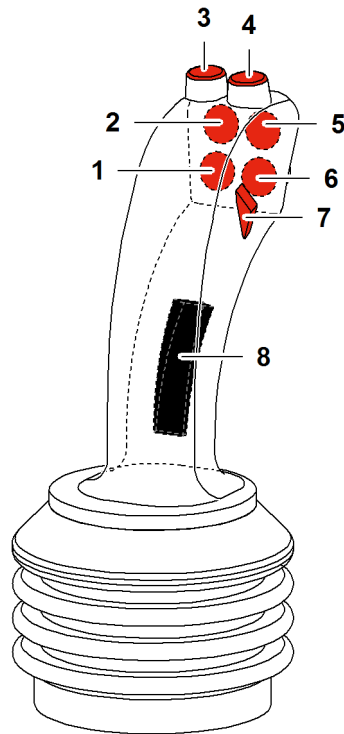


























Fig. 944: Function assignment of buttons on left multi-directional control lever

Button	Mode	Preselection or additional button	Name and function
1	 Crane mode		Derrick hoist cylinder Activates/deactivates derrick hoist cylinder.
	 Assembly functions		Derrick hoist cylinder Activates/deactivates derrick hoist cylinder.
2	 Crane mode		Tagline winch free-wheel Activate/deactivate tagline winch free-wheel.
	 Assembly functions		Tagline winch free-wheel Activate/deactivate tagline winch free-wheel.

Left control lever

Button	Mode	Preselection or additional button	Name and function
3	 Crane mode		Horn Sound horn.
	 Assembly functions		Horn Sound horn.
4	 Crane mode		[not used]
	 Assembly functions		[not used]
5	 Crane mode		Maximum pull force tagline winch Select maximum pull force of tagline winch.
	 Assembly functions		Maximum pull force tagline winch Select maximum pull force of tagline winch.
6	 Crane mode		Swing free-wheel Activate/deactivate swing free-wheel.
	 Crane mode	 Vertical Line Finder	Vertical Line Finder Position boom head above load's center of gravity.
	 Assembly functions		Swing free-wheel Activate/deactivate swing free-wheel.
	 Assembly functions	 Vertical Line Finder	Vertical Line Finder Position boom head above load's center of gravity.

Button	Mode	Preselection or additional button	Name and function
7	 Crane mode		<p>Constant tension tagline winch</p> <p>Set constant tension of tagline winch.</p>
	 Assembly functions		<p>Constant tension tagline winch</p> <p>Set constant tension of tagline winch.</p>
8	 Crane mode	 Horizontal load path/ Vertical Line Finder winch1 or  Horizontal load path/ Vertical Line Finder winch2	<p>Activate horizontal load path</p> <p>horizontal load path for winch1 or winch2.</p>
	 Assembly functions	 Horizontal load path/ Vertical Line Finder winch1 or  Horizontal load path/ Vertical Line Finder winch2	<p>Activate horizontal load path</p> <p>horizontal load path for winch1 or winch2.</p>

Tab. 367: Function assignment of buttons on left multi-directional control lever

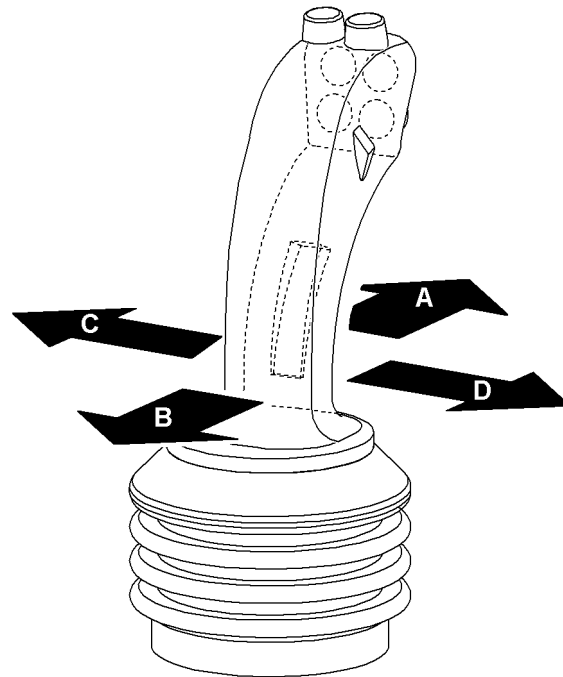



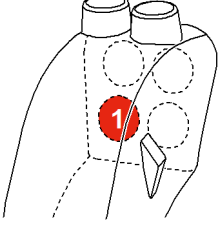


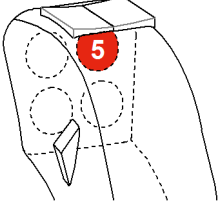




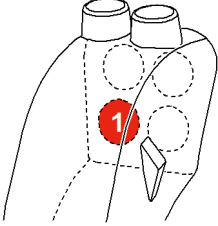



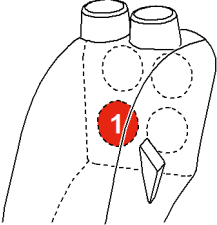


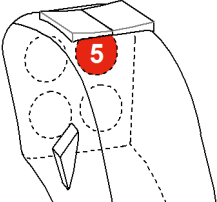




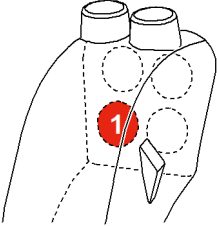


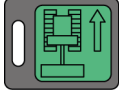



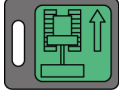

Function assignment for movement directions on left multi-directional control lever

Fig. 969: Function assignment for movement directions on left multi-directional control lever

Direction of movement	Mode	Preselection or additional button	Function
A	 Crane mode	 Derrick winch	Lower main boom ^{A)}
	 Crane mode		Extending the derrick hoist cylinder
	 Assembly functions	 Jib luffing winch or 	Lower main boom ^{B)}
	 Assembly functions	 Extend A-frame1 cylinder and  Cylinder adjustment functions	Lower derrick boom
	 Assembly functions		Extending the derrick hoist cylinder

Left control lever

Direction of movement	Mode	Preselection or additional button	Function
B	 Crane mode	 Derrick winch	Lift main boom ^{A)}
	 Crane mode		Retracting the derrick hoist cylinder
	 Assembly functions	 Jib luffing winch or 	Lift main boom ^{B)}
	 Assembly functions	 Extend A-frame1 cylinder and  Cylinder adjustment functions	Lift derrick boom
	 Assembly functions		Retracting the derrick hoist cylinder

Direction of movement	Mode	Preselection or additional button	Function
C	 Crane mode		Swing uppercarriage to the left
	 Crane mode	 Trailer travel mode	Steer wheel sets of counterweight carriage to the left
	 Assembly functions		Swing uppercarriage to the left
D	 Crane mode		Swing uppercarriage to the right
	 Crane mode	 Trailer travel mode	Steer wheel sets of counterweight carriage to the right
	 Assembly functions		Swing uppercarriage to the right

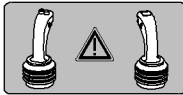
Tab. 368: Function assignment for movement directions on left multi-directional control lever

- A) In crane mode, “Derrick winch” is automatically activated.
- B) By default, this function is on the outer T-lever. “Jib luffing winch” must be additionally selected to enable this function on the left multi-directional control lever.

3.6 Right control lever

3.6.1 Function assignment of the right control lever on machine without derrick equipment*

Right multi-directional control lever



Assigned functions of control levers on a machine with two multi-directional control levers.

Function assignment of buttons on right multi-directional control lever

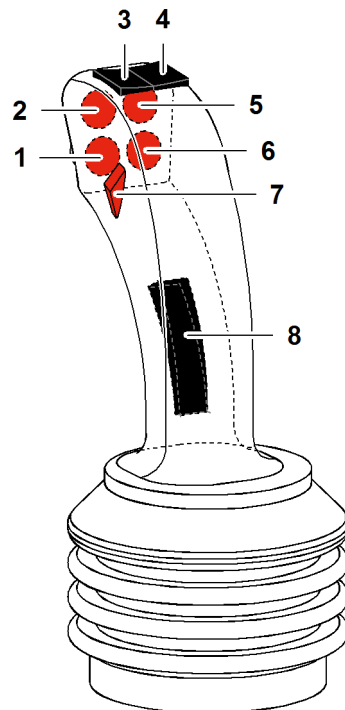






















Fig. 1003: Function assignment of buttons on right multi-directional control lever

Button	Mode	Preselection or additional button	Name and function
1	 Crane mode		[not used]
	 Assembly functions		[not used]

Button	Mode	Preselection or additional button	Name and function
2	 Crane mode		Save/delete constant engine RPM Save current diesel engine RPM as constant engine RPM or delete saved constant engine RPM.
	 Assembly functions		Save/delete constant engine RPM Save current diesel engine RPM as constant engine RPM or delete saved constant engine RPM.
3	 Crane mode		Increase RPM Increase diesel engine RPM.
	 Assembly functions		Increase RPM Increase diesel engine RPM.
4	 Crane mode		Decrease RPM Decrease diesel engine RPM.
	 Assembly functions		Decrease RPM Decrease diesel engine RPM.
5	 Crane mode		Jib luffing winch Activate/deactivate jib luffing winch.
	 Assembly functions		Jib luffing winch Activate/deactivate jib luffing winch.
6	 Crane mode		Winch synchronization Activates/deactivates winch synchronization.
	 Assembly functions		Winch synchronization Activates/deactivates winch synchronization.

Right control lever

Button	Mode	Preselection or additional button	Name and function
7	 Crane mode		[not used]
	 Assembly functions		[not used]
8	 Crane mode	 Horizontal load path/ Vertical Line Finder winch1 or  Horizontal load path/ Vertical Line Finder winch2	Activate horizontal load path horizontal load path for winch1 or winch2.
	 Assembly functions	 Horizontal load path/ Vertical Line Finder winch1 or  Horizontal load path/ Vertical Line Finder winch2	Activate horizontal load path horizontal load path for winch1 or winch2.

Tab. 369: Function assignment of buttons on right multi-directional control lever

Assigned functions for movement directions on right-hand multi-directional joystick

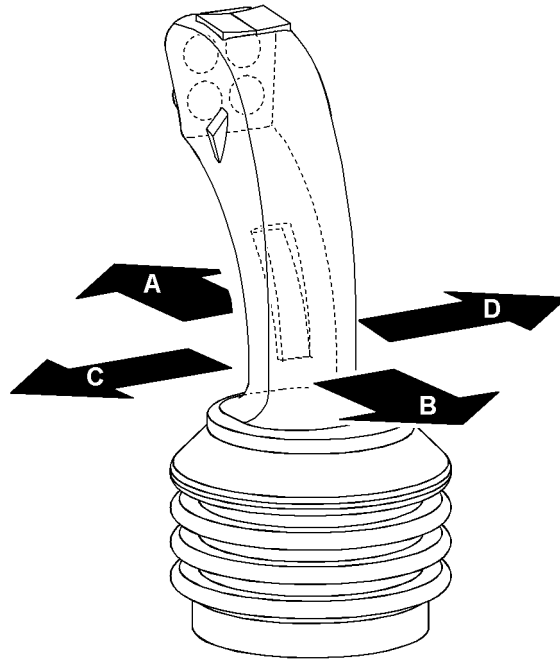



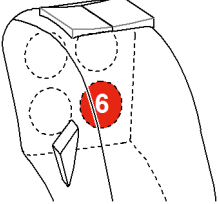



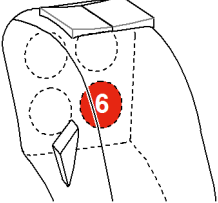



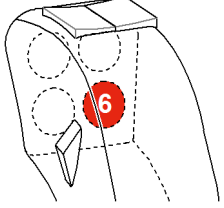



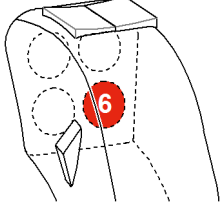




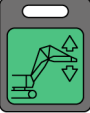
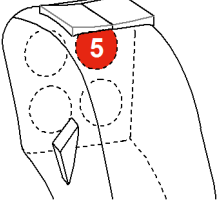


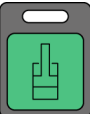
Fig. 1024: Function assignment of movement directions on right multi-directional control lever




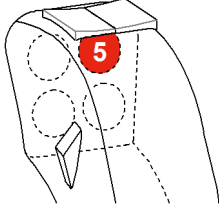



Right control lever

Direction of movement	Mode	Preselection or additional button	Function
A	 Crane mode		Lower winch1
	 Crane mode	 Winch synchronization or 	Lower winch1 and winch2
	 Assembly functions		Lower winch1
	 Assembly functions	 Winch synchronization or 	Lower winch1 and winch2

Direction of movement	Mode	Preselection or additional button	Function
B	 Crane mode		Lifting winch1
	 Crane mode	 Winch synchronization or 	Lift winch1 and winch2
	 Assembly functions		Lifting winch1
	 Assembly functions	 Winch synchronization or 	Lift winch1 and winch2

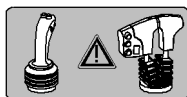
Right control lever

Direction of movement	Mode	Preselection or additional button	Function
C	 Crane mode		Lift main boom
	 Crane mode	 Jib luffing winch or 	Lift jib
	 Assembly functions	 Extend A-frame1 cylinder and  Cylinder adjustment functions	Lift main boom

Direction of movement	Mode	Preselection or additional button	Function
D	 Crane mode		Lower main boom
	 Crane mode	 Jib luffing winch or 	Lower jib
	 Assembly functions	 Extend A-frame1 cylinder and  Cylinder adjustment functions	Lower main boom

Tab. 370: Function assignment of movement directions on right multi-directional control lever

Right double T-lever



Assigned functions of the control levers on a machine with a multi-directional control lever and a double T-lever.

Function assignment of buttons on right double T-lever

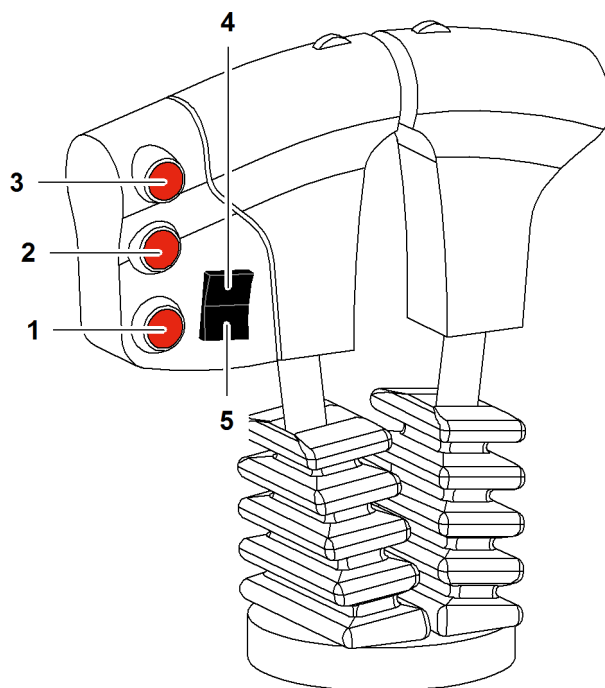












Fig. 1056: Function assignment of buttons on right double T-lever

Button	Mode	Preselection or additional button	Name and function
1	 Crane mode		Save/delete constant engine RPM Save current diesel engine RPM as constant engine RPM or delete saved constant engine RPM.
	 Assembly functions		Save/delete constant engine RPM Save current diesel engine RPM as constant engine RPM or delete saved constant engine RPM.
2	 Crane mode		Winch synchronization Activates/deactivates winch synchronization.
	 Assembly functions		Winch synchronization Activates/deactivates winch synchronization.

Button	Mode	Preselection or additional button	Name and function
3	 Crane mode		Jib luffing winch Activate/deactivate jib luffing winch.
	 Assembly functions		Jib luffing winch Activate/deactivate jib luffing winch.
4	 Crane mode		Increase RPM Increase diesel engine RPM.
	 Assembly functions		Increase RPM Increase diesel engine RPM.
5	 Crane mode		Decrease RPM Decrease diesel engine RPM.
	 Assembly functions		Decrease RPM Decrease diesel engine RPM.

Tab. 371: Function assignment of buttons on right double T-lever

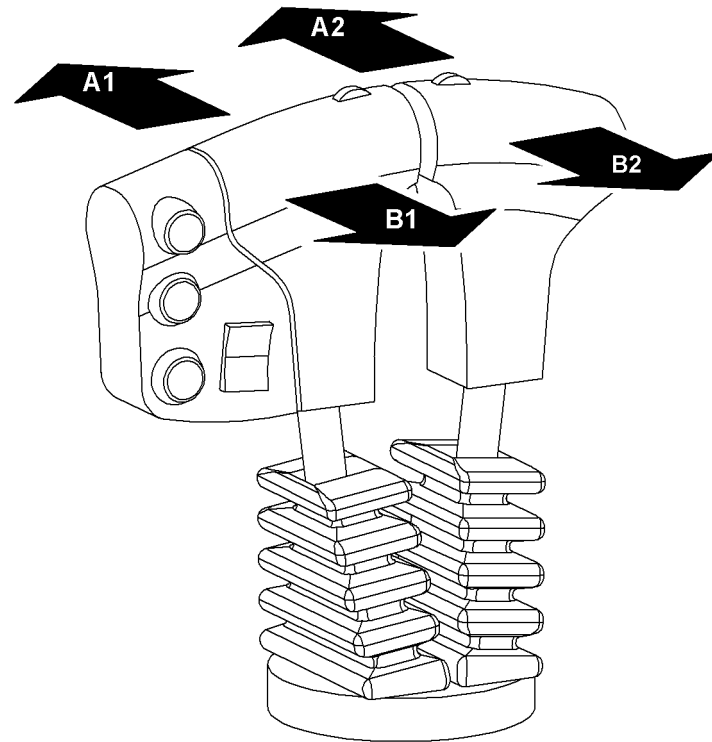



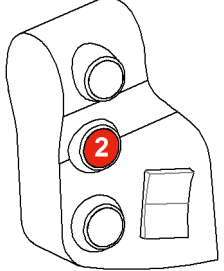



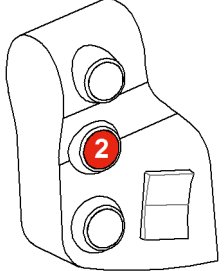



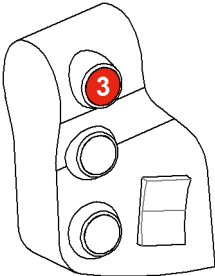


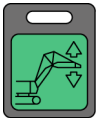
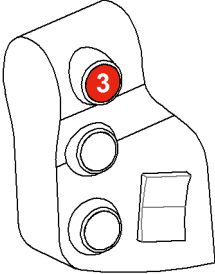





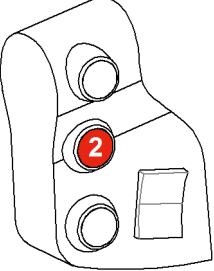



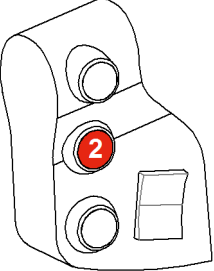
Assigned functions for movement directions on right-hand double T-lever

Fig. 1067: Function assignment for movement directions on right double T-lever




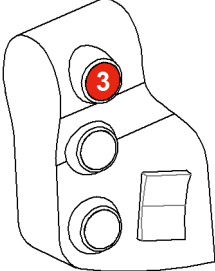


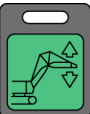
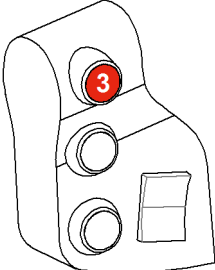


Direction of movement	Mode	Preselection or additional button	Function
A1	 Crane mode		Lower winch1
	 Crane mode	 Winch synchronization or 	Lower winch1 and winch2
	 Assembly functions		Lower winch1
	 Assembly functions	 Winch synchronization or 	Lower winch1 and winch2

Right control lever

Direction of movement	Mode	Preselection or additional button	Function
A2	 Crane mode		Lower winch2
	 Crane mode	 Jib luffing winch or 	Lower jib
	 Assembly functions		Lower winch2
	 Assembly functions	 Jib luffing winch or 	Lower jib
	 Assembly functions	 Assembly cylinder	Extend assembly cylinder

Direction of movement	Mode	Preselection or additional button	Function
B1	 Crane mode		Lifting winch1
	 Crane mode	 Winch synchronization or 	Lift winch1 and winch2
	 Assembly functions		Lifting winch1
	 Assembly functions	 Winch synchronization or 	Lift winch1 and winch2

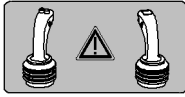
Right control lever

Direction of movement	Mode	Preselection or additional button	Function
	 Crane mode		Lifting winch2
	 Crane mode	 Jib luffing winch or 	Lift jib
B2	 Assembly functions		Lifting winch2
	 Assembly functions	 Jib luffing winch or 	Lift jib
	 Assembly functions	 Assembly cylinder	Retract assembly cylinder

Tab. 372: Function assignment for movement directions on right double T-lever

3.6.2 Function assignment of the right control lever on machine with derrick equipment*

Right multi-directional control lever



Function assignment of control levers on a machine with two multi-directional control levers

Function assignment of buttons on right multi-directional control lever

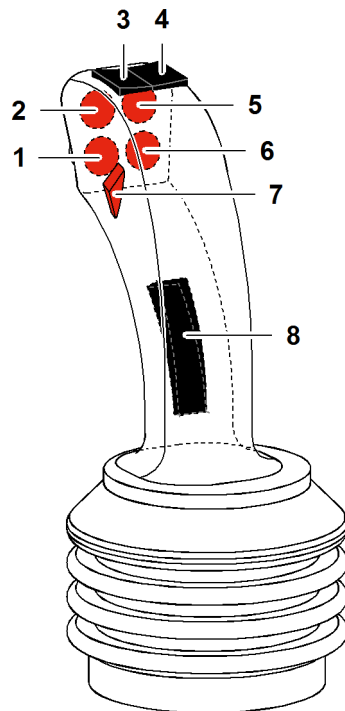






















Fig. 1105: Function assignment of buttons on right multi-directional control lever

Button	Mode	Preselection or additional button	Name and function
1	 Crane mode		[not used]
	 Assembly functions		[not used]

Right control lever

Button	Mode	Preselection or additional button	Name and function
2	 Crane mode		Save/delete constant engine RPM Save current diesel engine RPM as constant engine RPM or delete saved constant engine RPM.
	 Assembly functions		Save/delete constant engine RPM Save current diesel engine RPM as constant engine RPM or delete saved constant engine RPM.
3	 Crane mode		Increase RPM Increase diesel engine RPM.
	 Assembly functions		Increase RPM Increase diesel engine RPM.
4	 Crane mode		Decrease RPM Decrease diesel engine RPM.
	 Assembly functions		Decrease RPM Decrease diesel engine RPM.
5	 Crane mode		Jib luffing winch Activate/deactivate jib luffing winch.
	 Assembly functions		Jib luffing winch Activate/deactivate jib luffing winch.
6	 Crane mode		Winch synchronization Activates/deactivates winch synchronization.
	 Assembly functions		Winch synchronization Activates/deactivates winch synchronization.

Button	Mode	Preselection or additional button	Name and function
7	 Crane mode		[not used]
	 Assembly functions		[not used]
8	 Crane mode	 Horizontal load path/ Vertical Line Finder winch1 or  Horizontal load path/ Vertical Line Finder winch2	<p>Activate horizontal load path</p> <p>horizontal load path for winch1 or winch2.</p>
	 Assembly functions	 Horizontal load path/ Vertical Line Finder winch1 or  Horizontal load path/ Vertical Line Finder winch2	<p>Activate horizontal load path</p> <p>horizontal load path for winch1 or winch2.</p>

Tab. 373: Function assignment of buttons on right multi-directional control lever

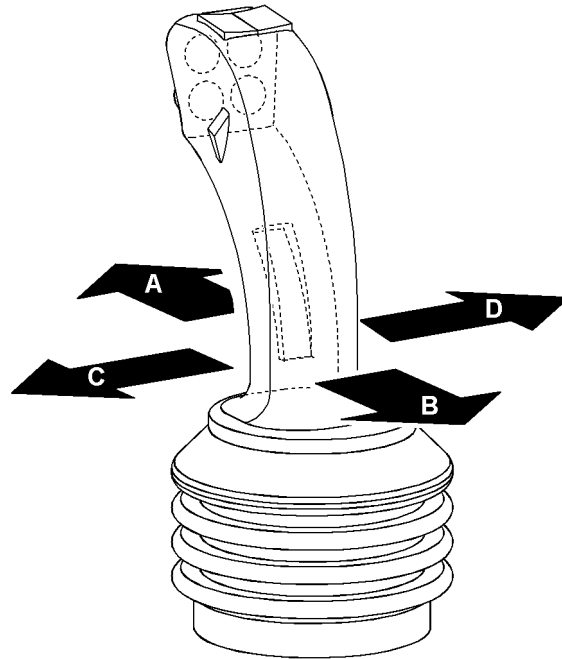



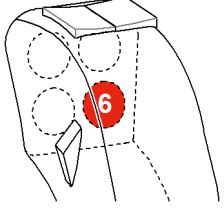



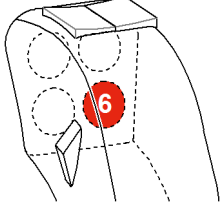



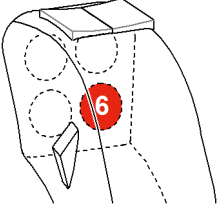



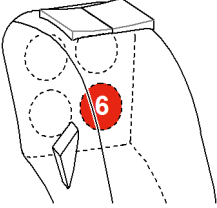




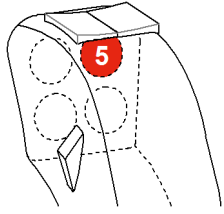

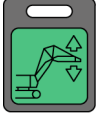
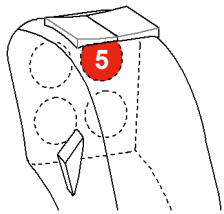



Function assignment of movement directions on right multi-directional control lever

Fig. 1126: Function assignment of movement directions on right multi-directional control lever





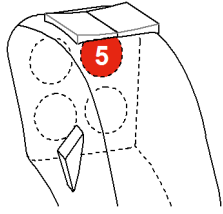


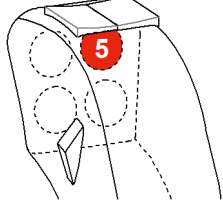


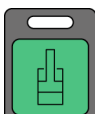
Direction of movement	Mode	Preselection or additional button	Function
A	 Crane mode		Lower winch1
	 Crane mode	 Winch synchronization or 	Lower winch1 and winch2
	 Assembly functions		Lower winch1
	 Assembly functions	 Winch synchronization or 	Lower winch1 and winch2

Right control lever

Direction of movement	Mode	Preselection or additional button	Function
B	 Crane mode		Lifting winch1
	 Crane mode	 Winch synchronization or 	Lift winch1 and winch2
	 Assembly functions		Lifting winch1
	 Assembly functions	 Winch synchronization or 	Lift winch1 and winch2

Direction of movement	Mode	Preselection or additional button	Function
C	 Crane mode	 Derrick winch	Lift main boom ^{A)}
	 Crane mode	 Jib luffing winch or 	Lift jib
	 Assembly functions	 Jib luffing winch or 	Lift main boom ^{B)}
	 Assembly functions	 Extend A-frame1 cylinder and  Cylinder adjustment functions	Lift derrick boom

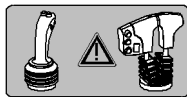
Right control lever

Direction of movement	Mode	Preselection or additional button	Function
D	 Crane mode	 Derrick winch	Lower main boom ^{A)}
	 Crane mode	 Jib luffing winch or 	Lower jib
	 Assembly functions	 Jib luffing winch or 	Lower main boom ^{B)}
	 Assembly functions	 Extend A-frame1 cylinder and  Cylinder adjustment functions	Lower derrick boom

Tab. 374: Function assignment of movement directions on right multi-directional control lever

- A) In crane mode, "Derrick winch" is automatically activated.
- B) By default, this function is on the left multi-directional control lever. "Jib luffing winch" must be additionally selected to enable this function on the right multi-directional control lever.

Right double T-lever



Function assignment of control levers on a machine with a multi-directional control lever and a double T-lever

Function assignment of buttons on right double T-lever

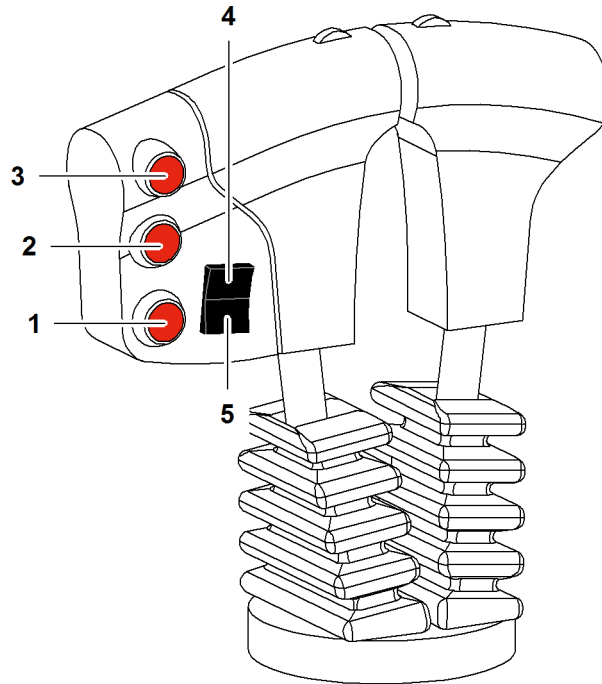












Fig. 1166: Function assignment of buttons on right double T-lever

Button	Mode	Preselection or additional button	Name and function
1	 Crane mode		Save/delete constant engine RPM Save current diesel engine RPM as constant engine RPM or delete saved constant engine RPM.
	 Assembly functions		Save/delete constant engine RPM Save current diesel engine RPM as constant engine RPM or delete saved constant engine RPM.
2	 Crane mode		Winch synchronization Activates/deactivates winch synchronization.
	 Assembly functions		Winch synchronization Activates/deactivates winch synchronization.

Right control lever

Button	Mode	Preselection or additional button	Name and function
3	 Crane mode		Jib luffing winch Activate/deactivate jib luffing winch.
	 Assembly functions		Jib luffing winch Activate/deactivate jib luffing winch.
4	 Crane mode		Increase RPM Increase diesel engine RPM.
	 Assembly functions		Increase RPM Increase diesel engine RPM.
5	 Crane mode		Decrease RPM Decrease diesel engine RPM.
	 Assembly functions		Decrease RPM Decrease diesel engine RPM.

Tab. 375: Function assignment of buttons on right double T-lever

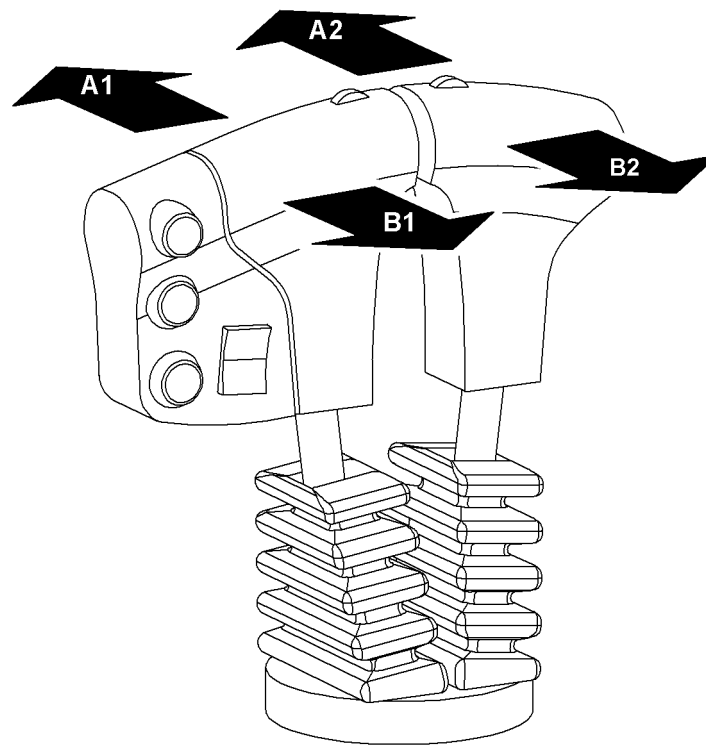



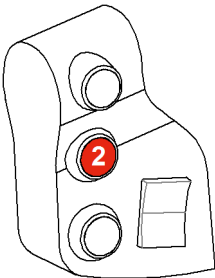



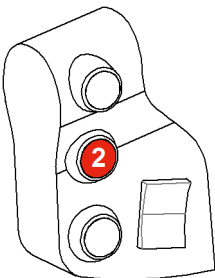


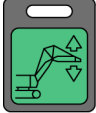
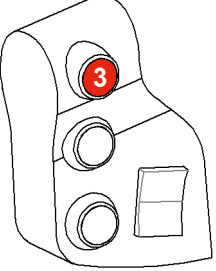





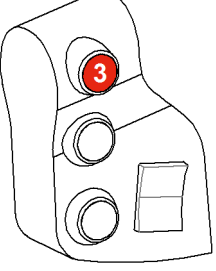


Function assignment for movement directions on right double T-lever




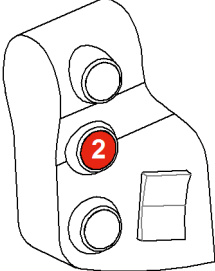



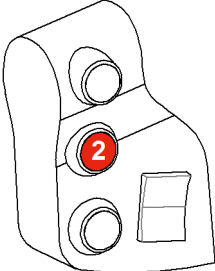
Fig. 1177: Function assignment for movement directions on right double T-lever




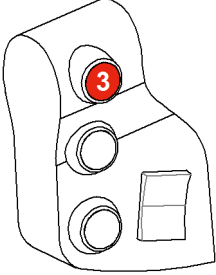





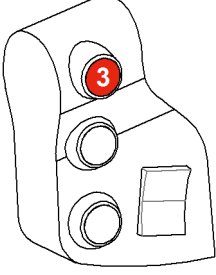

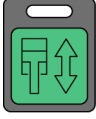
Right control lever

Direction of movement	Mode	Preselection or additional button	Function
A1	 Crane mode		Lower winch1
	 Crane mode	 Winch synchronization or 	Lower winch1 and winch2
	 Assembly functions		Lower winch1
	 Assembly functions	 Winch synchronization or 	Lower winch1 and winch2

Direction of movement	Mode	Preselection or additional button	Function
	 Crane mode		Lower winch2
	 Crane mode	 Jib luffing winch or 	Lower jib
A2	 Assembly functions		Lower winch2
	 Assembly functions	 Derrick winch	Lower main boom ^{A)}
	 Assembly functions	 Jib luffing winch or 	Lower jib
	 Assembly functions	 Assembly cylinder	Extend assembly cylinder

Right control lever

Direction of movement	Mode	Preselection or additional button	Function
B1	 Crane mode		Lifting winch1
	 Crane mode	 Winch synchronization or 	Lift winch1 and winch2
	 Assembly functions		Lifting winch1
	 Assembly functions	 Winch synchronization or 	Lift winch1 and winch2

Direction of movement	Mode	Preselection or additional button	Function
B2	 Crane mode		Lifting winch2
	 Crane mode	 Jib luffing winch or 	Lift jib
	 Assembly functions		Lifting winch2
	 Assembly functions	 Derrick winch	Lift main boom ^{A)}
	 Assembly functions	 Jib luffing winch or 	Lift jib
 Assembly functions	 Assembly cylinder	Retract assembly cylinder	

Tab. 376: Function assignment for movement directions on right double T-lever

Right control lever

- A) By default, this function is on the outer T-lever. "Jib luffing winch" must be additionally selected to enable this function on the left multi-directional control lever.

3.7 Foot pedals and hand levers



Assigned functions of the foot pedals and hand lever on a machine with two multi-directional joysticks.

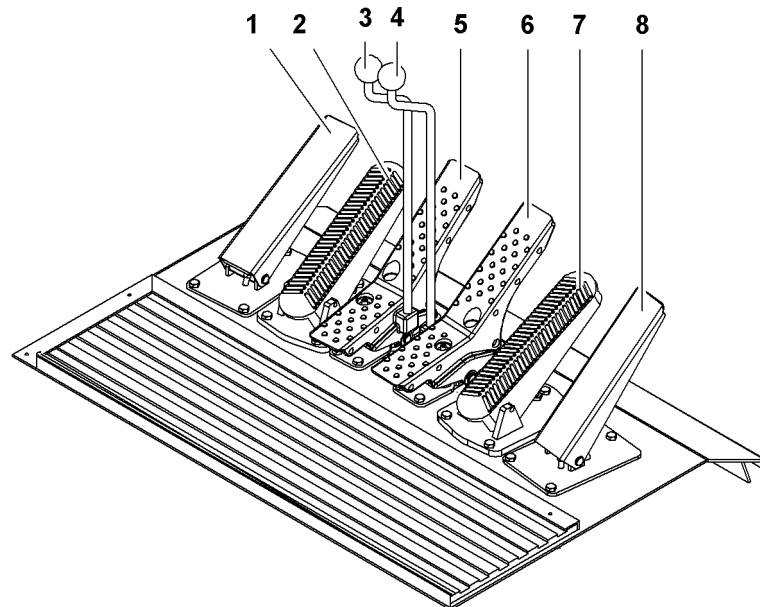
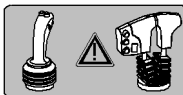


Fig. 1219: Foot pedals and hand levers (multi-directional joystick)

- | | | | |
|---|-------------------------------------|---|--------------------------------------|
| 1 | Foot pedal for <i>tagline winch</i> | 5 | Foot pedal for <i>left crawler</i> |
| 2 | Foot pedal <i>brake winch2</i> | 6 | Foot pedal for <i>right crawler</i> |
| 3 | Hand lever for <i>left crawler</i> | 7 | Foot pedal <i>brake winch1</i> |
| 4 | Hand lever for <i>right crawler</i> | 8 | Foot pedal for <i>rotation speed</i> |



Assigned functions of the foot pedals and hand levers on a machine with a multi-directional joystick and a double T-lever.

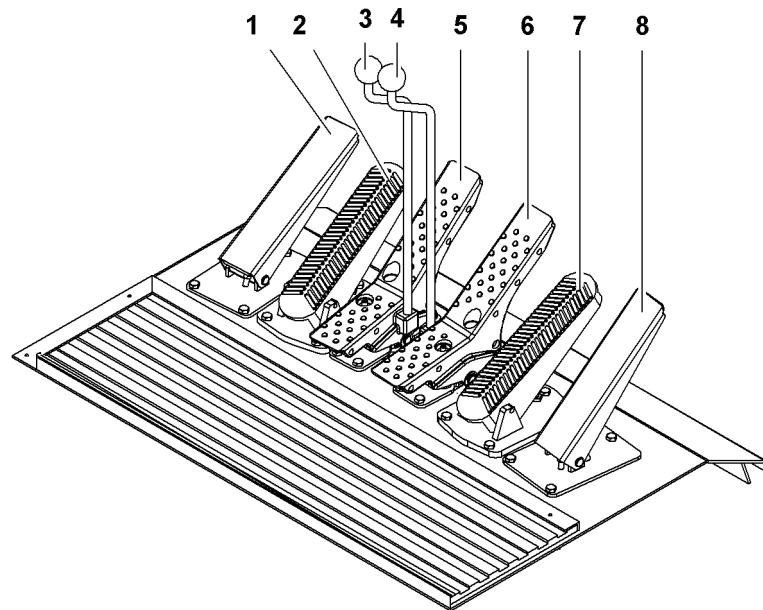


Fig. 1221: Foot pedals and hand levers (double T-lever)

- | | | | |
|---|-------------------------------------|---|--------------------------------------|
| 1 | Foot pedal for <i>tagline winch</i> | 5 | Foot pedal for <i>left crawler</i> |
| 2 | Foot pedal <i>brake winch1</i> | 6 | Foot pedal for <i>right crawler</i> |
| 3 | Hand lever for <i>left crawler</i> | 7 | Foot pedal <i>brake winch2</i> |
| 4 | Hand lever for <i>right crawler</i> | 8 | Foot pedal for <i>rotation speed</i> |

3.8 Circular bubble

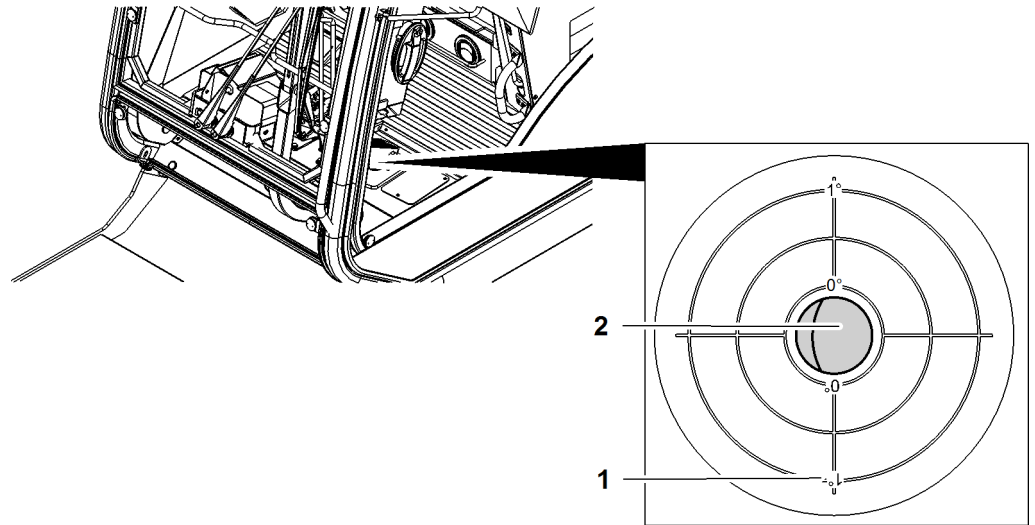


Fig. 1222: Circular bubble

1 Scaling

2 Air bubble

3.9 Operating hours counter

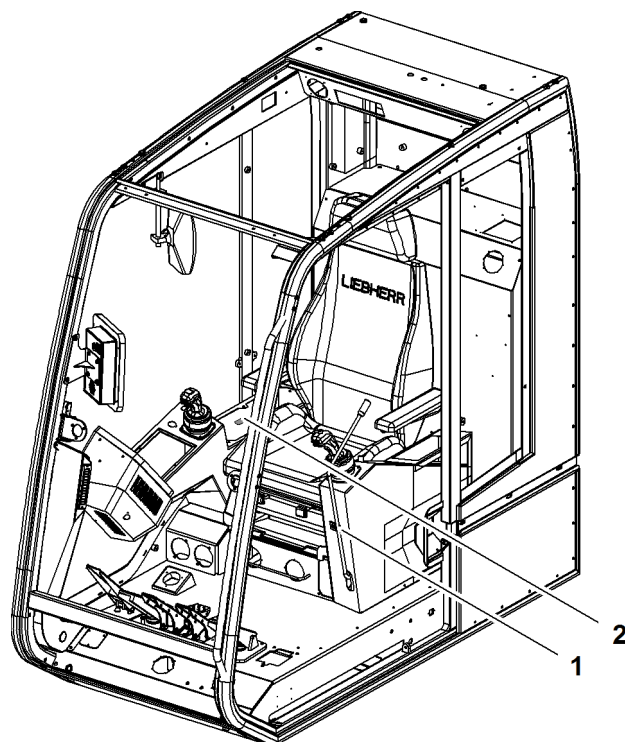


Fig. 1223:

- 1 Regular operating hours counter 2 Additional operating hours counter

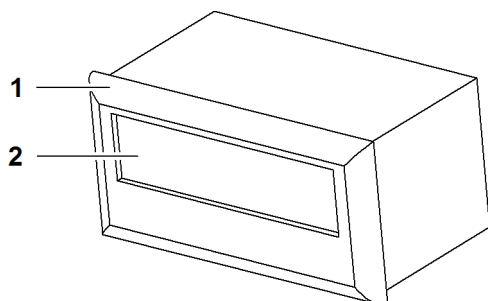


Fig. 1224:

- 1 Operating hours counter 2 Display

An operating hours counter **1** is located on the left operating panel above the safety lever.

The regular operating hours counter is only in operation while the engine is running.

The total hours of the running engine are shown on the display **2**.

3.9.2 Additional operating hours counter*

An additional operating hours counter is installed in the right operating panel.

The additional operating hours counter is in operation at *Ignition position "1"*.

The total hours at Ignition position "1" are shown on the display.

3.10 Control panel X11

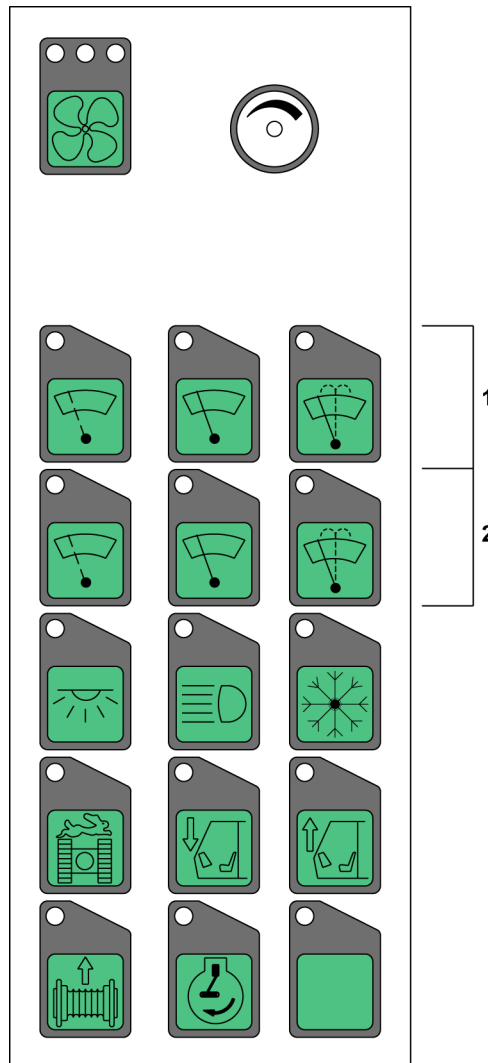
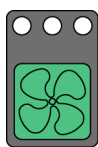


Fig. 1225: Control panel X11

1 Front windscreen wiper

2 Roof windscreen wiper

All buttons and switches contain LEDs that visibly indicate which function or settings are currently active.



Heating and air conditioning system fan speed

Controlling the blower stages for heating or air conditioning system.



Heating and air conditioning system temperature

Controlling the temperature for heating or air conditioning system.

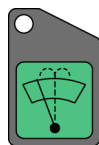


Intermittent windscreen wiper

Switching the pertaining windscreen wiper to interval mode.

**Windscreen wiper**

Switching the pertaining windshield wiper on or off.

**Windscreen wash system**

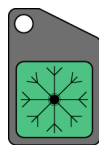
Turning the windscreen wiper system on or off.

**Engine compartment lighting**

Turn the engine compartment lighting on or off.

**Floodlights on uppercarriage**

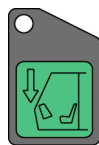
Turning the floodlight on the uppercarriage on or off.

**Air conditioning**

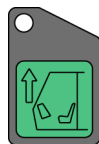
Turning the air conditioning system on or off.

**Crawlers overdrive**

Turning the overdrive of the crawler on or off.

**Cab tilting device down**

Tilting the cabin downwards.

**Cab tilting device up**

Tilting the cabin upwards.

**Rope reeving winch**

Turning the rope reeving winch on or off with activated assembly functions.

**Additional compressor**

Turning the additional compressor on or off.

3.11 Control panel X12

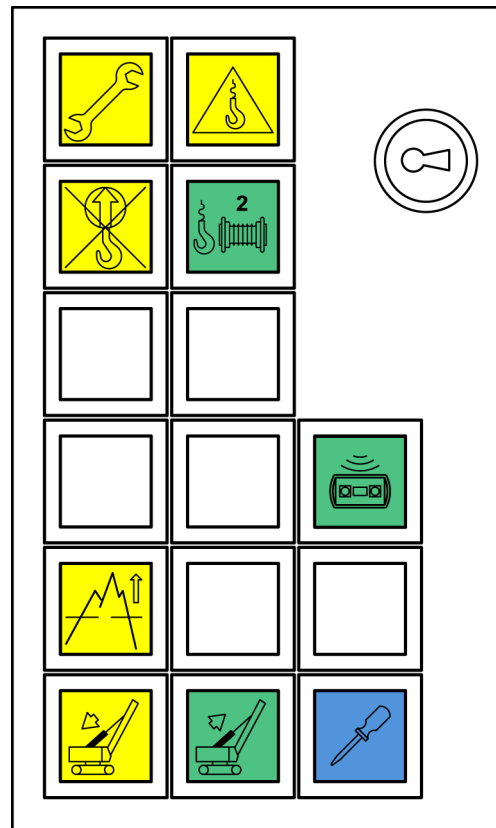


Fig. 1239: Control panel X12

All buttons and switches contain LEDs that visibly indicate which function or settings are currently active.



Assembly functions

Turning assembly functions on or off.



Unsecured free-fall operation

Turning unsecured free-fall mode for winch1 and winch2 on or off.



Load moment limitation shut down key switch release

Switch the function of the button *Load moment limiter assembly/self-lock* on control panel X23 to the function *Load moment limiter shutdown*.

The *load moment limiter shut down enable* switch has no effect on machines with a CE load chart.



Interlock control winch2

[Not assigned]



Radio remote control

The function of the ignition key on the machine is replicated on the key switch on the radio remote control.

**Retract the tilting back support cylinders**

Retracting the tilting-back support cylinders for the main boom. Manual operation is exclusively possible when assembly mode functions are switched on.

**Extend the tilting back support cylinders**

Extending the tilting-back support cylinders for the main boom.

**Mode**

Switch mode.

**Application height**

Switching the application height of the auxiliary heating.

If the machine is used at altitudes above 2800 m (9186' 4" ft-in), the auxiliary heating must be switched.

3.12 Control panel X23

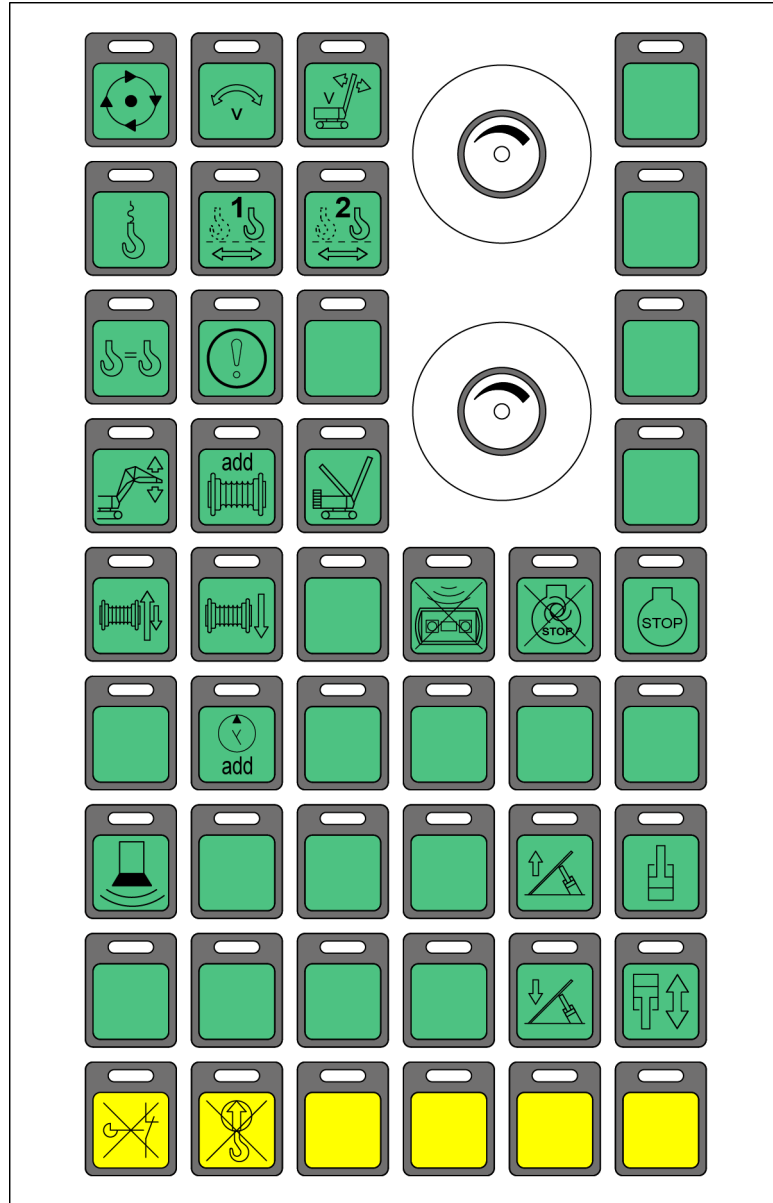


Fig. 1249: Control panel X23

All buttons and switches contain LEDs that visibly indicate which function or settings are currently active.



Swing gear free-wheel

Turn swing gear free-wheel on or off.



Swing gear speed level

Select speed level for the swing gear.

**Speed level boom adjustment**

Select the speed level for boom adjustment.

**Free-fall**

Turn the free-fall mode for winch1 and winch2 on or off.

**Horizontal load path/Vertical Line Finder winch1**

Activate or deactivate horizontal load path for winch1.

Activate or deactivate Vertical Line Finder for winch1.

**Horizontal load path/Vertical Line Finder winch2**

Activate or deactivate horizontal load path for winch2.

Activate or deactivate Vertical Line Finder for winch2.

**Winch synchronization**

Turn the winch synchronization on or off.

**Sensitive lift**

Activate/deactivate the function sensitive lift.

**Jib luffing winch**

Activate/deactivate jib luffing winch.

**Additional winch**

Activate/deactivate the additional winch.

**Derrick winch**

Activate/deactivate the derrick winch.

**Tagline winch**

Activate/deactivate the tagline winch.

**Constant tension**

Turn the constant tension for winch1 or winch2 on or off.

**Taking/ceding control**

Take or cede control of/on the radio remote control.

**Automatic diesel engine stop system**

Switch the diesel engine automatic stop system on or off.

**Engine stop**

Switch off diesel engine.

**Generator**

Turn the generator on or off.

**Hammer/vibrator**

Turn hammer/vibrator on or off.

**Extending A-frame1 cylinders**

Extend A-frame1 cylinders. Works exclusively when assembly mode functions are activated.

**Cylinder adjustment functions**

Activate/deactivate cylinder adjustment functions on undercarriage and uppercarriage.

**Retracting A-frame1 cylinders**

Retract A-frame1 cylinders. Works exclusively when assembly mode functions are activated.

**Assembly cylinder**

Activate/deactivate assembly cylinder.

**Bypassing limit switch**

Bypasses certain limit switches when rigging, converting and unrigging the boom with activated assembly functions.

**Load moment limitation assembly/self-lock**

Turn the function load moment limitation assembly or load moment limitation self-lock on and off.

With machines with an ANSI load chart and after selection of the switch *Load moment limitation shut down enable*, the button *Load moment limitation assembly/self-lock* enables the load moment limitation shut down function.

3.13 Control panel X26 for counterweight carriage*

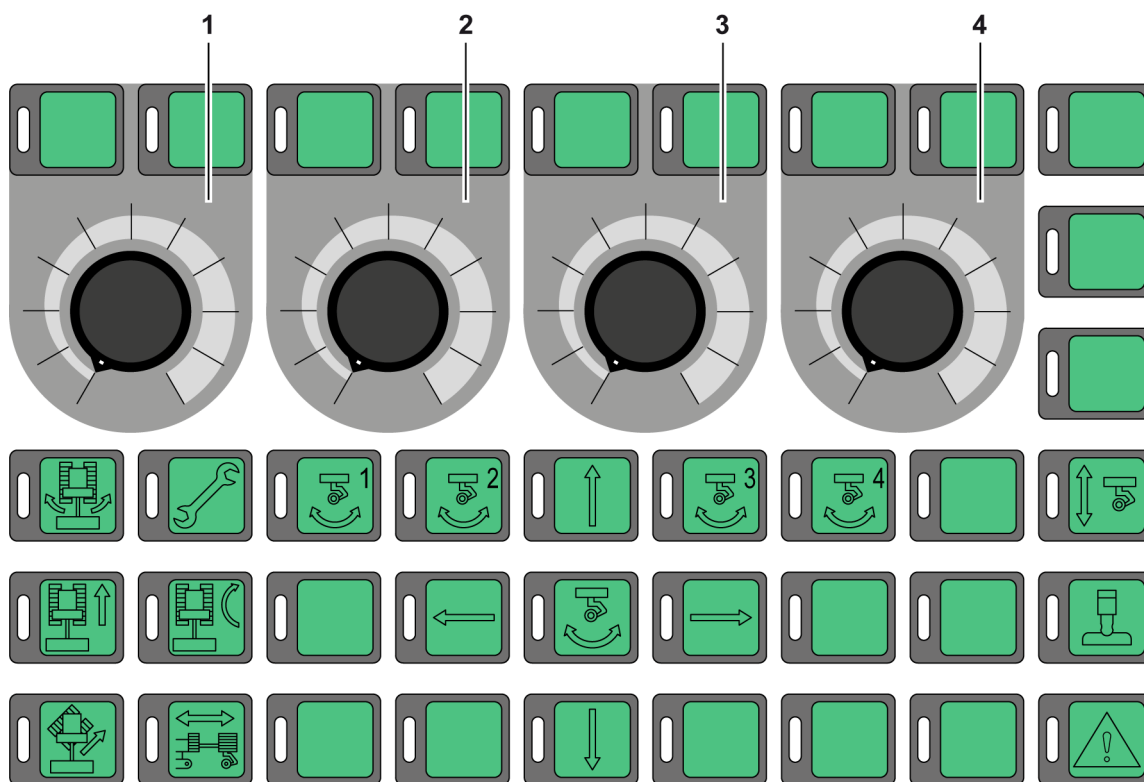


Fig. 1274: Control panel X26 for counterweight carriage*

- | | | | |
|---|--------------------------------------|---|--------------------------------------|
| 1 | Control unit <i>first wheel set</i> | 3 | Control unit <i>third wheel set</i> |
| 2 | Control unit <i>second wheel set</i> | 4 | Control unit <i>fourth wheel set</i> |

All buttons and switches contain LEDs that visibly indicate which function or settings are currently active.

3.13.1 Operating units

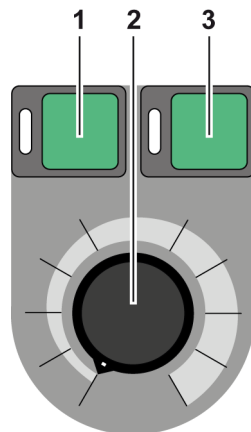


Fig. 1275: Wheel set operating unit

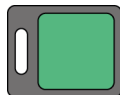
- | | |
|---|--|
| <p>1 Turn the button <i>wheel set counter-clockwise</i></p> <p>2 [Not used]</p> | <p>3 Turn the button <i>wheel set clockwise</i></p> |
|---|--|



Turn wheel set counter-clockwise

Button not used.

LED in the button is lit when the wheel set moves counter-clockwise.

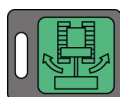


Turn wheel set clockwise

Button not used.

LED in the button is lit when the wheel set turns clockwise.

3.13.2 Buttons



Mode rotate uppercarriage

Activates/deactivates rotate uppercarriage mode.

Wheel sets align to uppercarriage swing.



Counterweight carriage assembly functions

Activate/deactivate assembly functions of counterweight carriage.



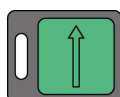
First wheel set

Select first wheel set (e.g. for service purposes).



Second wheel set

Select second wheel set (e.g. for service purposes).



Decreasing radius/support

Decrease radius of counterweight carriage.

Decrease support of counterweight carriage.

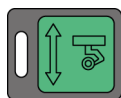


Third wheel set

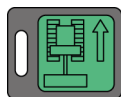
Select third wheel set (e.g. for service purposes).

**Fourth wheel set**

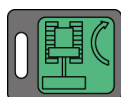
Select fourth wheel set (e.g. for service purposes).

**Wheel set height adjustment**

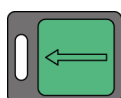
Activates/deactivates height adjustment of the wheel sets.
Height adjustment is operated on counterweight carriage.

**Trailer travel mode**

Activates/deactivates trailer travel mode.

**Follower travel mode**

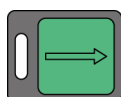
Activates/deactivates follower travel mode.

**Turning the wheel sets counter-clockwise**

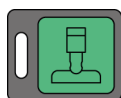
Turns the wheel sets counter-clockwise.

**Align wheel sets**

Align wheel sets in line with selected mode.
If no mode was selected, all wheel sets can be aligned manually.

**Turning the wheel sets clockwise**

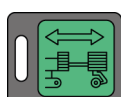
Turns the wheel sets clockwise.

**Counterweight carriage support**

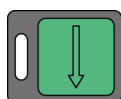
Activates/deactivates counterweight carriage support.

**Crab mode**

Activates/deactivates crab mode.

**Counterweight carriage radius adjustment**

Activates/deactivates radius adjustment of counterweight carriage.

**Increasing radius/support**

Increases the radius of the counterweight carriage.
Increases the support of the counterweight carriage.

**Confirming error message**

Confirms error message and releases operating lock.

3.14 Monitor

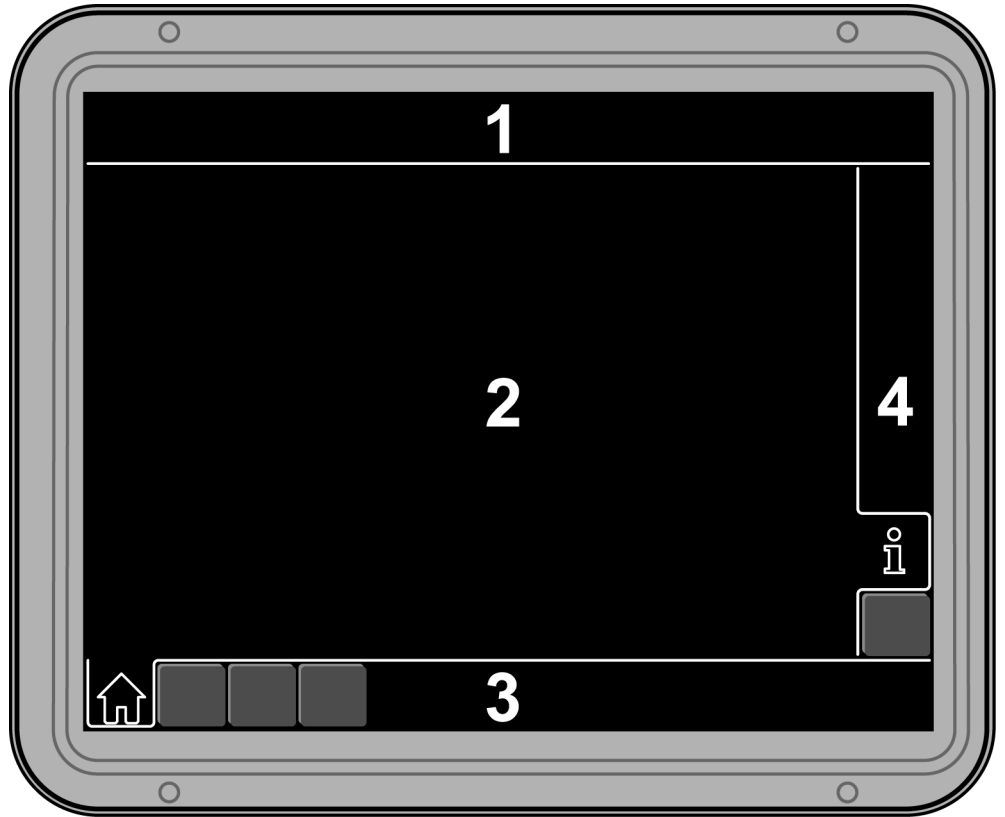


Fig. 1296: Monitor sections

- | | | | |
|---|-----------------|---|-------------|
| 1 | Status bar | 3 | Menu bar |
| 2 | Display section | 4 | Submenu bar |

3.14.1 Status bar

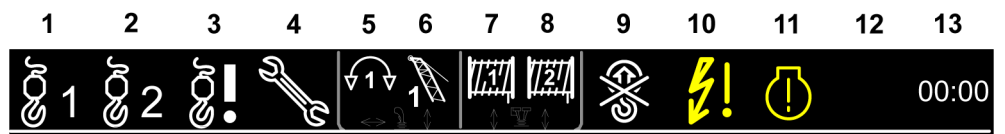
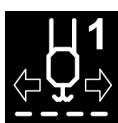


Fig. 1297: Status bar - positioning

Position 1



Free fall winch1
Winch1 is in free fall.



Horizontal load path winch1
Horizontal load path for winch1 is switched on.

**Sensitive lift (blinks)**

Sensitive lift is switched on.

Position 2**Free fall winch2**

Winch2 is in free fall.

**Horizontal load path winch2**

Horizontal load path for winch2 is switched on.

Position 3**Secured free-fall operation**

Secured free-fall mode switched on.

**Unsecured free-fall operation**

Unsecured free-fall mode switched on.

**Radio remote control* active**

Radio remote control is turned on.

Machine functions are controlled with the radio remote control.

If the symbol blinks, the control of the machine function is suspended.

**Radio remote control* inactive**

Radio remote control is turned on.

Machine functions are controlled from the cabin.

**Radio remote control* connection error**

Connection to radio remote control not possible.

Position 4**Assembly functions**

Assembly functions are switched on.

**Emergency operation control system***

Control panel of the emergency operation control is connected.

Position 5



Swing gear speed level

Speed level 1 for the swing gear is set.



Swing gear speed level

Speed level 2 for the swing gear is set.



Swing gear speed level

Speed level 3 for the swing gear is set.



Swing gear free-wheel

Swing gear free-wheel is switched on.



Swing gear locked

Swing gear is locked.

Position 6



Assignment on a machine with two multi-directional control levers



Winch2

Winch2 is selected.



Winch2 locked

Winch2 is locked.



Derrick hoist cylinder (only in derrick mode)

Derrick hoist cylinder has been selected.



Assignment on a machine with a multi-directional control lever and a double T control lever



Speed level main boom

Speed level 1 selected for main boom.



Speed level main boom

Speed level 2 selected for main boom.



Speed level main boom

Speed level 3 selected for main boom.



Main boom locked

Main boom is locked.

**Speed level jib**

Speed level 1 is selected for jib.

**Speed level jib**

Speed level 2 is selected for jib.

**Speed level jib**

Speed level 3 is selected for jib.

**Derrick boom** (only in derrick mode)

Derrick boom is selected.

**Derrick hoist cylinder** (only in derrick mode)

Derrick hoist cylinder has been selected.

Position 7**Assignment on a machine with two multi-directional control levers****Speed level main boom**

Speed level 1 selected for main boom.

**Speed level main boom**

Speed level 2 selected for main boom.

**Speed level main boom**

Speed level 3 selected for main boom.

**Main boom locked**

Main boom is locked.

**Speed level jib**

Speed level 1 is selected for jib.

**Speed level jib**

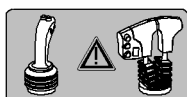
Speed level 2 is selected for jib.

**Speed level jib**

Speed level 3 is selected for jib.

**Derrick boom** (only in derrick mode)

Derrick boom is selected.

**Assignment on a machine with a multi-directional control lever and a double T control lever**

**Winch1**

Winch1 is selected.

**Winch1 locked**

Winch1 is locked.

**Winch synchronization**

Winch synchronization is switched on.

Position 8**Assignment on a machine with two multi-directional control levers****Winch1**

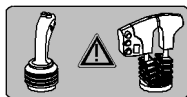
Winch1 is selected.

**Winch1 locked**

Winch1 is locked.

**Winch synchronization**

Winch synchronization is switched on.

**Assignment on a machine with a multi-directional control lever and a double T control lever****Winch2**

Winch2 is selected.

**Winch2 locked**

Winch2 is locked.

Position 9**Turning off load moment limitation**

Load moment limitation is turned off.

**Load moment limitation warning (lit yellow)**

Load moment is utilized to more than 90% capacity.

**Load moment limitation stop (blinks red)**

Load moment is utilized to more than 100% capacity.

**Danger of toppling backwards** (lit red)

Machine may topple backwards due to insufficient radius.

Position 10**Electrical system warning** (lit yellow)

An error has occurred in the electrical system.

**Electrical system error** (blinks red)

An error has occurred in the electrical system.

Position 11**General diesel engine error** (lit yellow)

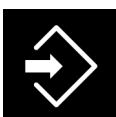
General diesel engine error has occurred.

**Grave diesel engine error** (blinks red)

A grave diesel engine error has occurred.

Position 12**Assist crane required** (blinks)

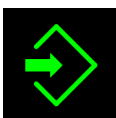
Assist crane is required to erect the boom or lay down the boom.

**Data recording active**

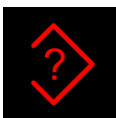
Data is being recorded.

**Initialize data recording** (lit yellow)

Data recording is being initialized.

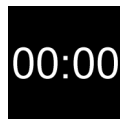
**Data recording successfully initialized** (lit green)

Data recording was successfully initialized.

**Data recording error** (lit red)

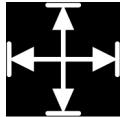
Error in data recording.

Position 13



Time

Current time.



Drive limited (blinks)

Several limit switches block the current movement direction of the control lever. If only one limit switch blocks the current movement direction of the control lever, the symbol of the corresponding limit switch blinks in place of the symbol *Drive limited*.



A-frame1, rear limit switch (blinks)

Minimum A-frame1 angle reached. Lift main boom is locked.



Main boom, top limit switch (blinks)

Maximum main boom angle reached. Lift main boom is locked.



Main boom, bottom limit switch (blinks)

Minimum main boom angle reached. Lower main boom is blocked.



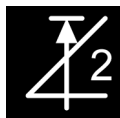
Main boom, top angle limiter (blinks)

Maximum main boom angle exceeded. Lift main boom is locked.



Main boom, bottom angle limiter (blinks)

Minimum main boom angle exceeded. Lower main boom is blocked.



Jib, top limit switch (blinks)

Maximum jib angle reached. Lift jib is blocked.



Jib, bottom limit switch (blinks)

Minimum jib angle reached. Lower jib is blocked.



Jib, top angle limiter (blinks)

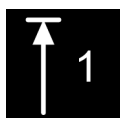
Maximum jib angle exceeded. Lift jib and lower jib are locked.

Jib can only be lowered with the button *Bypassing limit switch* on control panel X23.



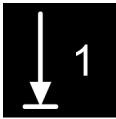
Jib, bottom angle limiter (blinks)

Minimum jib angle exceeded. Lower jib is blocked.

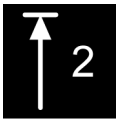


Winch1, top limit switch (blinks)

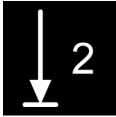
Maximum lifting height of winch1 reached. Lift winch1, lower main boom and lower jib are locked.

**Winch1, bottom limit switch** (blinks)

Only three windings left on rope drum of winch1. Lowering winch1 is locked.

**Winch2, top limit switch** (blinks)

Maximum lifting height of winch2 reached. Lift winch2, lower main boom and lower jib are blocked.

**Winch2, bottom limit switch** (blinks)

Only three windings left on rope drum of winch2. Lowering winch2 is locked.

**Auxiliary winch, top limit switch** (blinks)

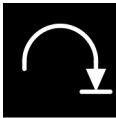
Maximum lifting height of auxiliary winch reached. Lift auxiliary winch is blocked.

**Auxiliary winch, bottom limit switch** (blinks)

Only three windings left on rope drum of auxiliary winch. Lower auxiliary winch is blocked.

**Swing gear, swing range limitation counter-clockwise** (blinks)

Counter-clockwise slewing range limitation has been reached. Turning the upper-carriage counter-clockwise is locked.

**Swing gear, swing range limitation clockwise** (blinks)

Clockwise slewing range limitation has been reached. Turning the uppercarriage clockwise is locked.

**Tilting back supports cylinder** (blinks)

Tilting-back support cylinders are not fully extended. Lift main boom is locked.

**A-frame1 cylinder** (blinks)

A-frame1 cylinders are not fully extended (only if assembly mode functions are switched on). Lift and lower main boom are blocked.

**Locking flaps error** (blinks)

Main boom with luffing jib erected above a specified angle and locking flaps are not yet in proper position. Lift main boom and jib are blocked.

**Winch blocked due to selection of different load position** (blinks)

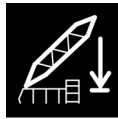
Winch is blocked due to different load position.

**Slack rope monitoring** (blinks)

Stop due to slack rope monitoring has triggered.

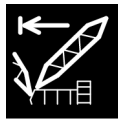
**Derrick boom, rear limit switch** (blinks, only in derrick mode)

Minimum derrick boom angle has been reached (only with activated assembly functions). Lift derrick boom is blocked.



Derrick boom, working position limit switch (blinks, only in derrick mode)

Derrick boom is not in working position.



Derrick winch, bottom limit switch (blinks, only in derrick mode)

Only three windings left on rope drum of derrick winch. Lower derrick winch is blocked.

EXT

External control limit switch (blinks)

Limit switch was triggered by external control.

3.14.2 Display section

The display section provides information about current machine parameters.

3.14.3 Menu bar

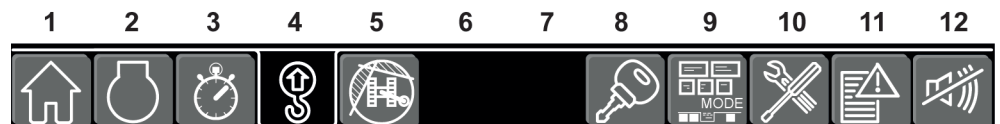


Fig. 1390: Menu bar - positioning

Position 1



Operation

Switch to the *Operation* screen.



Operation (blinks yellow)

Switch to the screen *Operation*. There is at least one warning.



Operation (blinks red)

Switch to the *Operation* screen. There is at least one operation error.

Position 2



Aggregate

Switch to the *Aggregate* screen.



Aggregate (blinks yellow)

Switch to the *Aggregate* screen. There is at least one warning.



Aggregate (blinks red)

Switch to the *Aggregate* screen. There is at least one operation error.

Position 3



Operating hours

Switch to the *Operating hours* screen.



Operating hours (blinks yellow)

Switch to the *Operating hours* screen. There is at least one warning.



Operating hours (blinks red)

Switch to the *Operating hours* screen. There is at least one operation error.

Position 4



Setup

Switch to the *Setup* screen.

Position 5



Working range limitation

Switch to the *Working range limitation* screen.



Working range limitation (blinks yellow)

Switch to the *Working range limitation* screen. Machine was moved and working range limitation must be reprogrammed.

Position 8



Access control

Switch to the *Access control* screen.

Position 9



Mode

Switch to the *Mode* screen.

Position 10



Settings

Switch to the *Settings* screen.

Position 11



Error messages

Switch to the *Error messages* screen.



Error messages (blinks red)

Switch to the screen *Error messages*. At least one unconfirmed error message is present.

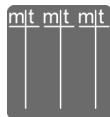
Position 12



Warning buzzer

Turn off warning buzzer and confirm error message. Only visible if an operation error occurs.

3.14.4 Submenu bar



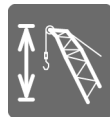
Setup - load chart

Switch to the screen *Setup - load chart*.



Working range limitation - working range limitation

Switch to the *Working range limitation - working range limitation* screen.



Working range limitation - lifting height limitation

Switch to the *Working range limitation - lifting height limitation* screen.



Settings - Litronic testing system

Switch to the *Settings - Litronic testing system* screen.



Settings - units

Switch to the *Settings - units* screen.



Settings - components

Switch to the *Settings - components* screen.

3.15 Screen Start

These symbols appear on the start screen as soon as the machine is switched on.
No action possible during start-up.

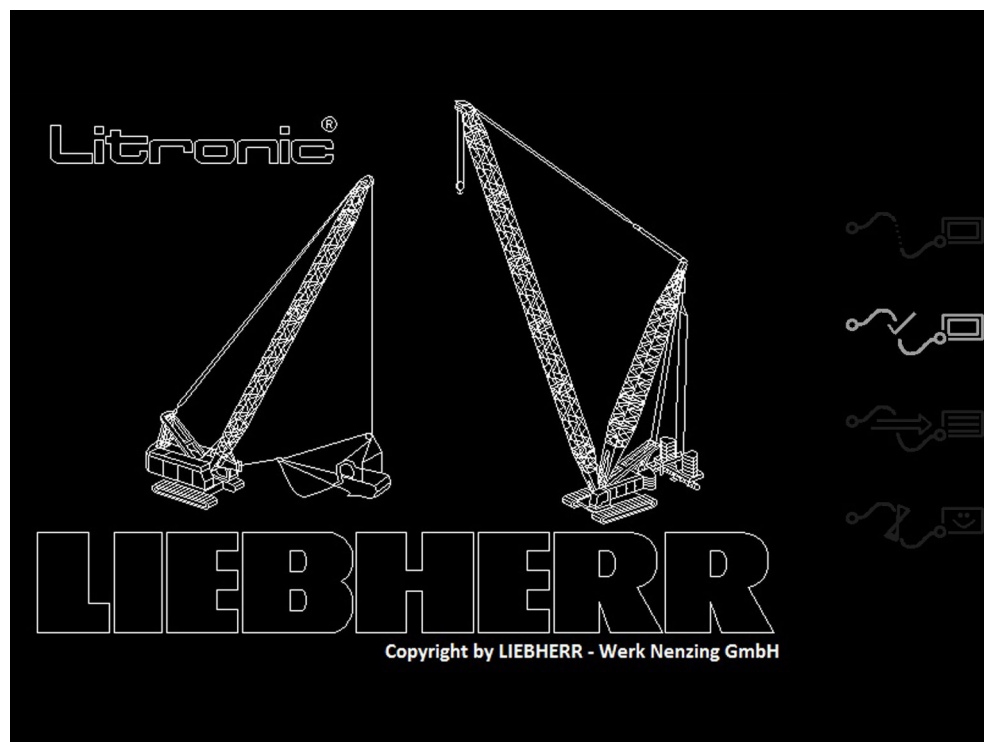


Fig. 1415: Start screen



Establishing connection (counts up to three)



Connected



Receiving data



Visualization



Download

3.16 Operation screen



Operation

Switch to the *Operation* screen.

The *Operation* screen informs the machine operator about the most important information during operation.

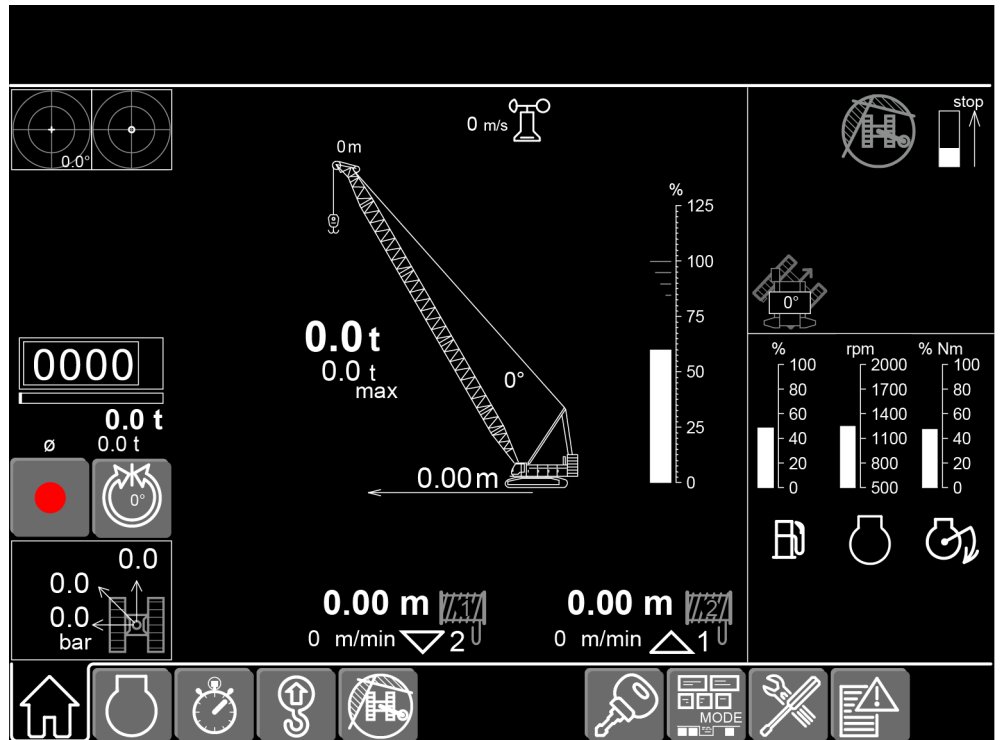


Fig. 1422: Operation screen



Recording (lit red)

Start recording of load cycles.



Stop

Stop recording of load cycles.



Trigger point

Set trigger point.

Shows the swing gear angle.

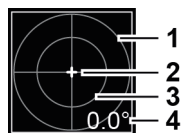


Fig. 1426: Screen section Inclination display

- | | | | |
|---|------------------------|---|---------------------------------------|
| 1 | Inclination circle 4° | 3 | Inclination circle 2° |
| 2 | Inclination of machine | 4 | Absolute inclination angle of machine |

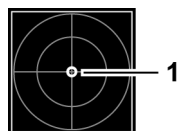
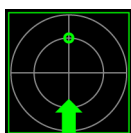


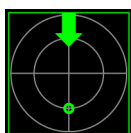
Fig. 1427: Screen section Vertical Line Finder

- 1 Deviation of boom head to load's center of gravity



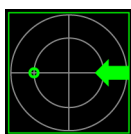
Vertical Line Finder - lower boom

Machine lowers boom to correct deviation.



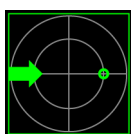
Vertical Line Finder - lift boom

Machine lifts boom to correct deviation.



Vertical Line Finder - swing uppercarriage to the left

Machine swings the uppercarriage to the left to correct deviation.



Vertical Line Finder - swing uppercarriage to the right

Machine swings the uppercarriage to the right to correct deviation.

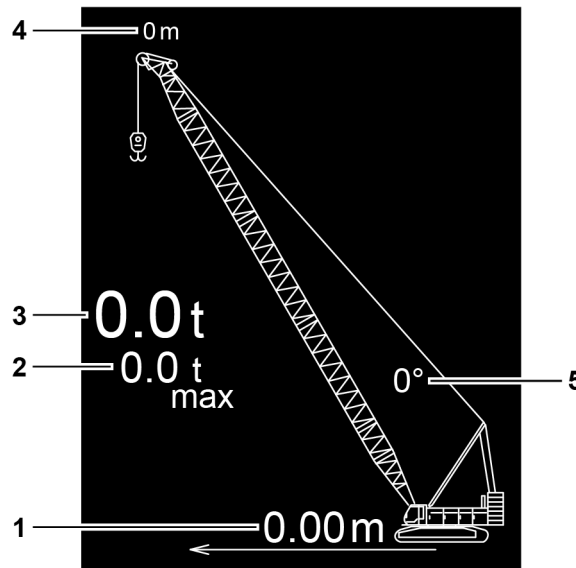


Fig. 1432: Screen section Operation

- | | | | |
|---|-----------------------------|---|---------------------------------|
| 1 | Radius of load on main boom | 4 | Rope pulley height on main boom |
| 2 | Maximum load on main boom | 5 | Main boom angle |
| 3 | Load on main boom | | |

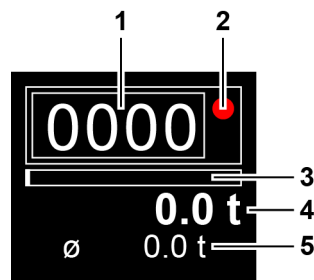


Fig. 1433: Load recorder screen section

- | | | | |
|---|-------------------------------|---|-----------------------------|
| 1 | Load cycles | 4 | Total load calculation |
| 2 | Recording activated (lit red) | 5 | Average load per load cycle |
| 3 | Free memory space | | |



Fig. 1434: Screen section Ground pressure

- | | | | |
|---|---|---|---------------------------------|
| 1 | Maximum ground pressure to the side | 3 | Maximum ground pressure forward |
| 2 | Maximum ground pressure across one edge | | |

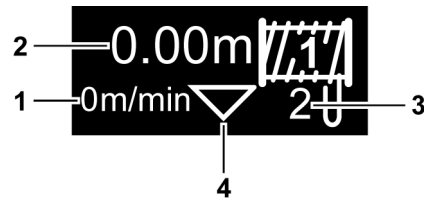


Fig. 1435: Screen section Winch1

- 1 Speed of load on winch1
- 2 Traveled path of load path on winch1
- 3 Reeving of winch1 rope
- 4 Movement direction of load on winch1

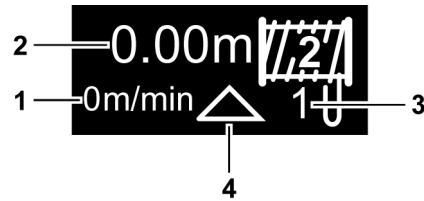


Fig. 1436: Screen section Winch2

- 1 Speed of load on winch2
- 2 Traveled path of load path on winch2
- 3 Reeving of winch2 rope
- 4 Movement direction of load on winch2



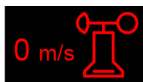
Wind speed

Current wind speed.



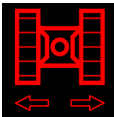
Wind speed (lit yellow)

Wind speed is high.



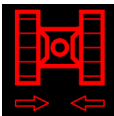
Wind speed (blinks red)

Wind speed is too high.



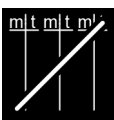
Track monitoring (blinks red)

Narrow track selected as track width and wide track is set up.



Track monitoring (blinks red)

Wide track selected as track width and narrow track is set up.



No valid load chart available

No valid load chart available for current boom position.



Danger of toppling warning (lit yellow)

Danger of toppling of the machine.



Danger of toppling stop (lit red)

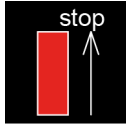
Danger of toppling of the machine.

**Swing range limitation**

Slewing range limitation is active. Rotate uppercarriage is locked.

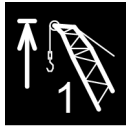
**Working range limitation**

Working range limitation is active.

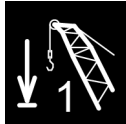
**Working range limitation stop**

Distance up to a stop of the working range limitation.

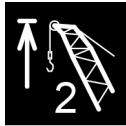
When the symbol is lit red, a working range limitation stop has been reached.

**Top lifting height limitation winch1**

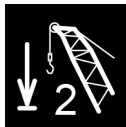
Top lifting height limitation winch1 is active. Lift winch1 is locked.

**Bottom lifting height limitation winch1**

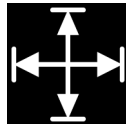
Bottom lifting height limitation winch1 is active. Lower winch1 is blocked.

**Top lifting height limitation winch2**

Top lifting height limitation winch2 is active. Lift winch2 is locked.

**Bottom lifting height limitation winch2**

Bottom lifting height limitation winch2 is active. Lower winch2 is blocked.

**General limitation**

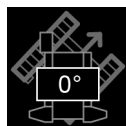
General limitation is active. Movements that change the radius are locked.

**Radius limitation maximum radius**

Radius limiter maximum radius is activated. Movements that enlarge the radius are locked.

**Radius limitation minimum radius**

Radius limiter minimum radius is active. Movements that decrease the radius are locked.

**Uppercarriage slewing angle**

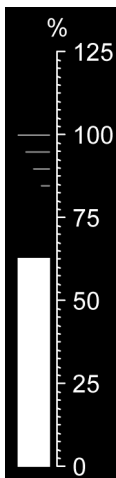
Slewing angle of uppercarriage.

**External control**

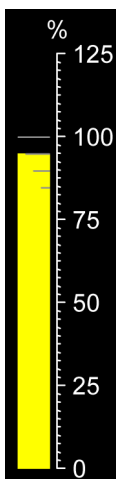
External control mode is activated.

**External control** (lit yellow)

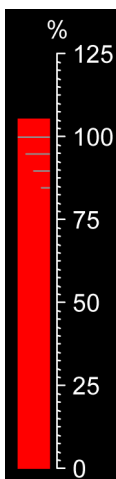
Communication problem between external control and machine.

**Load moment utilization**

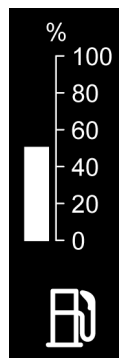
Load moment utilization.

**Load moment utilization** (lit yellow)

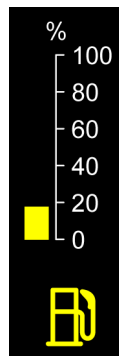
Load moment is utilized to more than 90% capacity.

**Load moment utilization** (blinks red)

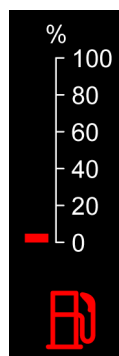
Load moment is utilized to more than 100% capacity.

**Fuel fill level**

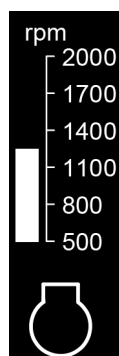
Fill level of the fuel tank as percentage of the maximum filling capacity.

**Fuel fill level (lit yellow)**

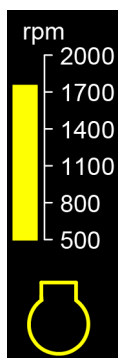
Fill level of fuel tank is less than 15 % of the maximum filling capacity.

**Fuel fill level (blinks red)**

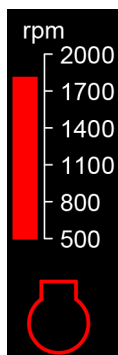
Fill level of fuel tank is less than 5 % of the maximum filling capacity.

**Diesel engine RPM**

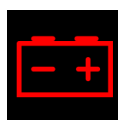
Diesel engine RPM.

**Diesel engine RPM (lit yellow)**

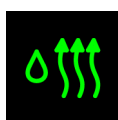
Diesel engine RPM is high.

**Diesel engine RPM (blinks red)**

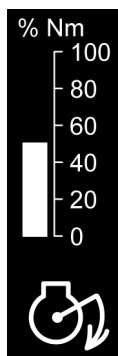
Diesel engine RPM is too high.

**Battery charge (blinks red)**

Battery is not charging.

**Hydraulic oil heater (lit green)**

The temperature of the hydraulic oil is increased automatically with the hydraulic oil heater (if fit).

**Diesel engine utilization**

Utilization of the diesel engine as percentage of the currently possible maximum utilization.

**Diesel engine (lit yellow)**

Diesel engine is being preheated.

**Diesel engine (lit green)**

Diesel engine is ready to start.

**Diesel engine**

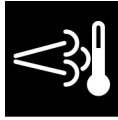
Diesel engine is post-heated.

**Exhaust aftertreatment system (lit yellow)**

Fill level of urea tank is low or error in exhaust aftertreatment system.

**Exhaust aftertreatment system (blinks red)**

Fill level of urea tank is too low or error in exhaust aftertreatment system.

**Exhaust gas temperature**

Exhaust gas temperature is increased.

**Exhaust aftertreatment system (lit yellow)**

Fill level of urea tank is low or error in exhaust aftertreatment system.

**Exhaust aftertreatment system (blinks red)**

Fill level of urea tank is too low or error in exhaust aftertreatment system.

**Restarting machine**

Restart machine.

**ECO mode***

ECO mode is activated.

3.17 Screen *Operation* in derrick mode



Operation

Switch to the *Operation* screen.

The *Operation* screen informs the machine operator about the most important information during operation.

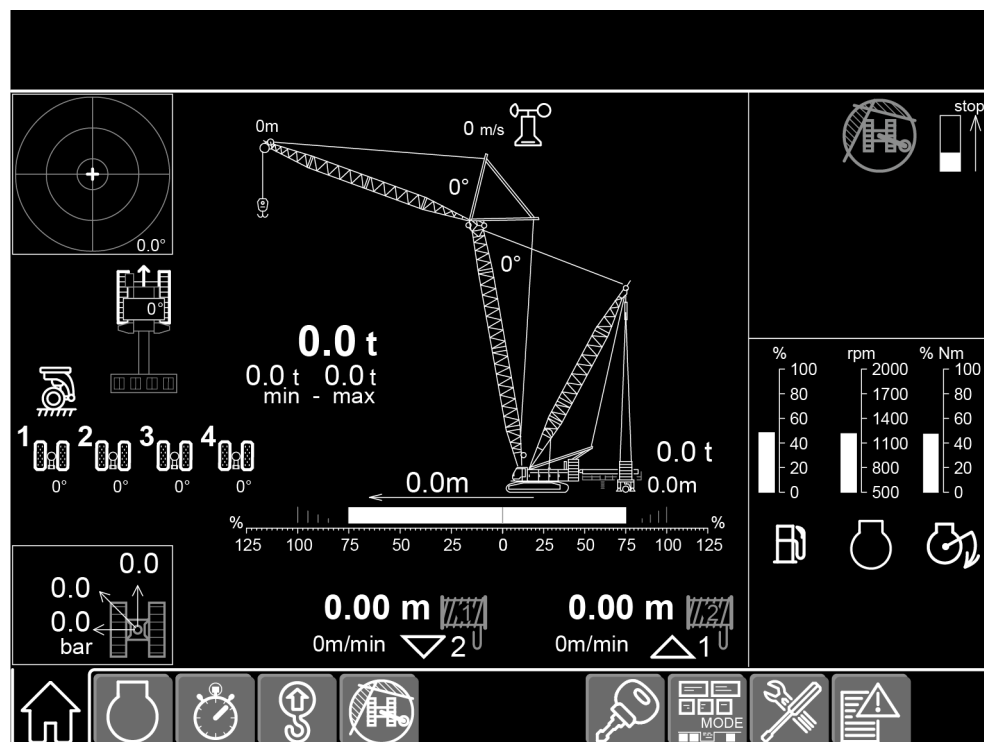


Fig. 1481: Screen *Operation* in derrick mode

The symbols of the *Operation* screen in derrick mode are identical with the symbols of the *Operation* (For more information see: [3.16 Operation screen, page 733](#)) screen.

The additional symbols of the *Operation* screen in derrick mode are described in the following.

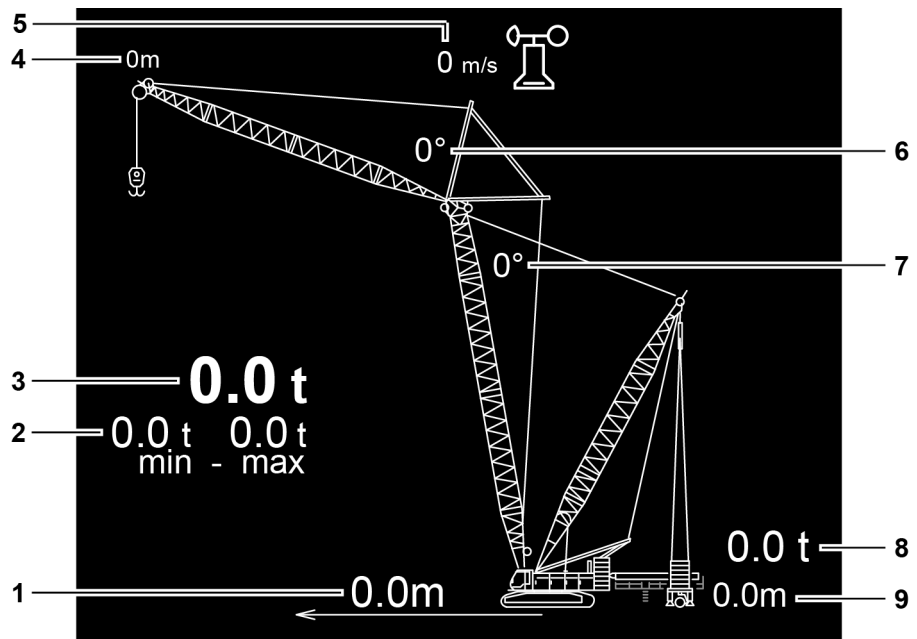


Fig. 1482: Screen section Operation with counterweight carriage

- | | | | |
|---|----------------------------------|---|----------------------------------|
| 1 | Radius of load on boom | 6 | Jib angle |
| 2 | Minimum and maximum load on boom | 7 | Main boom angle |
| 3 | Load on boom | 8 | Load on derrick boom |
| 4 | Pulley height on boom | 9 | Radius of counterweight carriage |
| 5 | Wind speed | | |

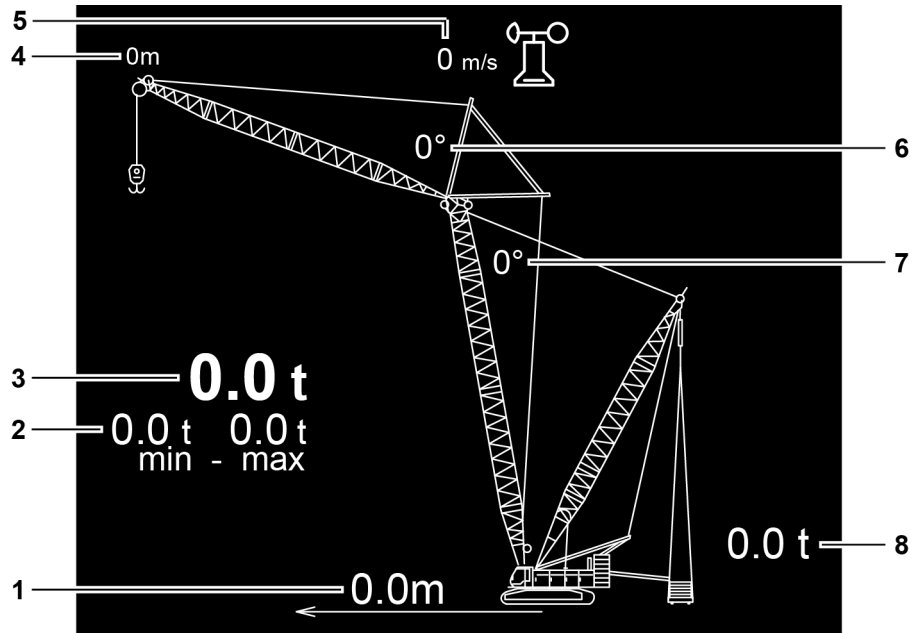


Fig. 1483: Screen section Operation with suspended counterweight

- | | | | |
|---|----------------------------------|---|----------------------|
| 1 | Radius of load on boom | 5 | Wind speed |
| 2 | Minimum and maximum load on boom | 6 | Jib angle |
| 3 | Load on boom | 7 | Main boom angle |
| 4 | Pulley height on boom | 8 | Load on derrick boom |

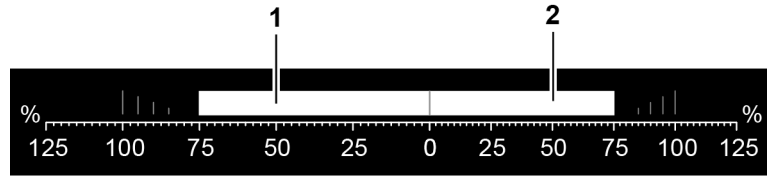


Fig. 1484: Screen section Load moment utilization

- 1 Utilization of load moment on boom
- 2 Utilization of load moment on derrick boom

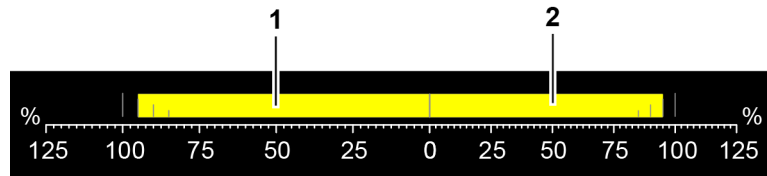


Fig. 1485: Screen section Load moment utilization (lit yellow)

- 1 Load moment on boom is used to more than 90% capacity
- 2 Load moment on derrick boom is used to more than 90% capacity

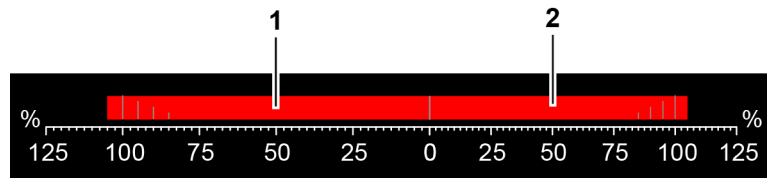


Fig. 1486: Screen section Load moment utilization (blinks red)

- 1 Load moment on boom is used to more than 100% capacity
- 2 Load moment on derrick boom is used to more than 100% capacity

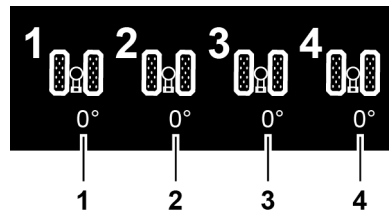


Fig. 1487: Screen section wheel sets

- 4 Angle of first wheel set
- 4 Angle of second wheel set
- 4 Angle of third wheel set
- 4 Angle of fourth wheel set



Wheel set (lit yellow)

Wheel set must be aligned.



Wheel set (lit red)

Wheel set is not aligned.



Operation of counterweight carriage blocked (lit yellow)

Operation of counterweight carriage is blocked due to an error.



Wheel sets are down

Wheel sets are down.

**Wheel sets are down** (lit yellow)

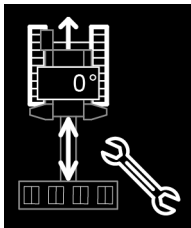
Pressure in wheel sets is too high and at least one wheel set must be aligned.

**Wheel sets are lifted**

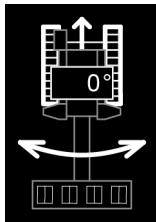
Wheel sets are lifted.

**Wheel sets are lifted** (lit yellow)

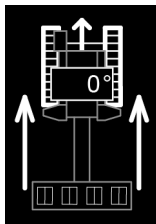
Wheel sets in unknown position.

**Assembly functions counterweight carriage**

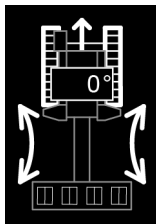
Assembly functions counterweight carriage are activated.

**Swing uppercarriage mode**

Swing uppercarriage mode is activated.

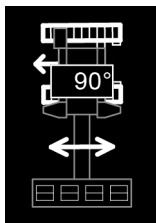
**Trailer travel mode**

Trailer travel mode is activated.

**Follower travel mode**

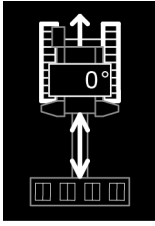
Follower travel mode is activated.

The arrows are indicated either on the left or on the right side.

**Crab mode**

Crab mode is activated.

Screen *Operation* in derrick mode



Radius adjustment counterweight carriage

Radius adjustment counterweight carriage is activated.

3.18 Engine monitoring screen



Engine monitoring

Switch to the *Engine monitoring* screen.

The *Engine monitoring* screen provides information on the operating status of the main engine.

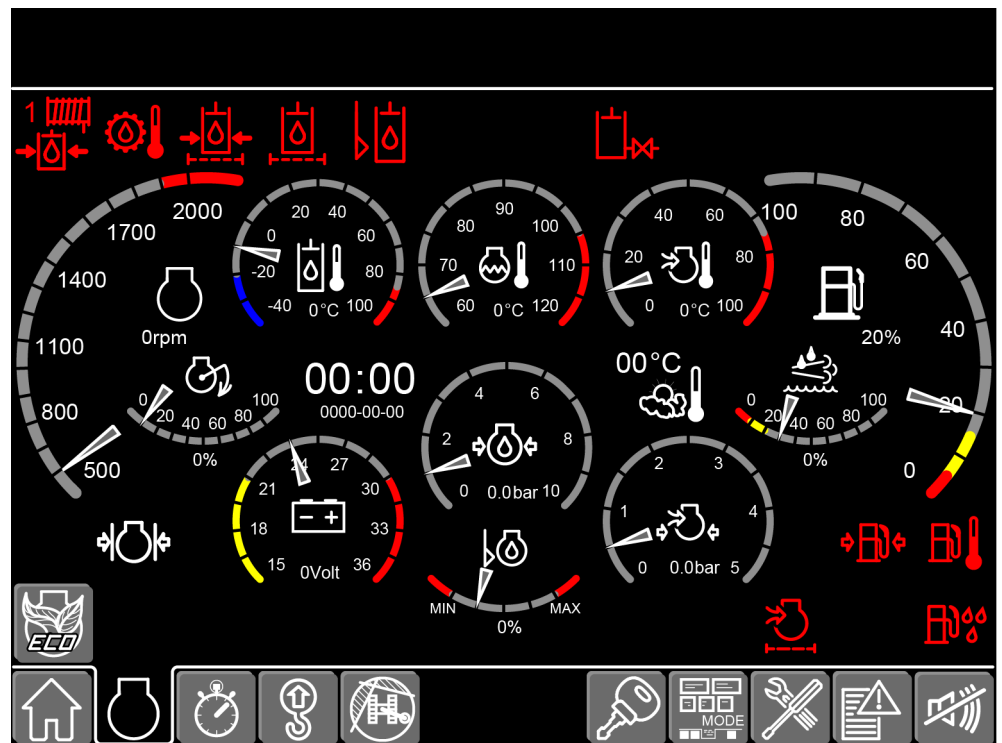


Fig. 1502: Engine monitoring screen



ECO mode*

Activate RPM limitation of the diesel engine.



ECO mode* (lit blue)

Preselection of the RPM limitation of the diesel engine.



ECO mode* (lit green)

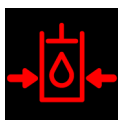
RPM limitation of the diesel engine is activated.

Deactivate RPM limitation of the diesel engine.

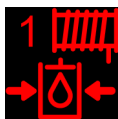


Activating the lubrication oil fill level

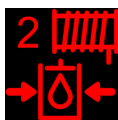
Activate diesel engine lubrication oil fill level. Lubrication oil fill level of diesel engine is displayed for 5 s.

**Supply pressure** (blinks red)

Supply pressure is too low.

**Supply pressure winch1** (blinks red)

Feed pressure on winch1 is too low.

**Feed pressure winch2** (blinks red)

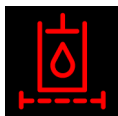
Feed pressure on winch2 is too low.

**Gearbox oil temperature** (blinks red)

Temperature of gearbox oil in the distribution gearbox is too high.

**Supply pressure oil filter** (blinks red)

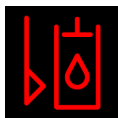
Supply pressure oil filter does not work correctly.

**Hydraulic oil filter** (blinks red)

Hydraulic oil filter does not work correctly.

**Hydraulic oil fill level** (lit yellow)

Fill level of the hydraulic oil tank is low.

**Hydraulic oil fill level** (blinks red)

Fill level of hydraulic oil tank is too low.

**Hydraulic oil fill level** (lit yellow)

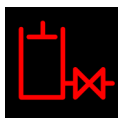
Fill level of the hydraulic oil tank is high.

**Coolant fill level** (lit yellow)

Coolant fill level is low.

**Coolant fill level** (blinks red)

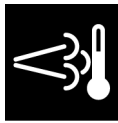
Coolant fill level is too low.

**Gate valve hydraulic oil tank** (blinks red)*Hydraulic oil tank gate valve is closed.***Exhaust aftertreatment system** (lit yellow)

Fill level of urea tank is low or error in exhaust aftertreatment system.

**Exhaust aftertreatment system** (blinks red)

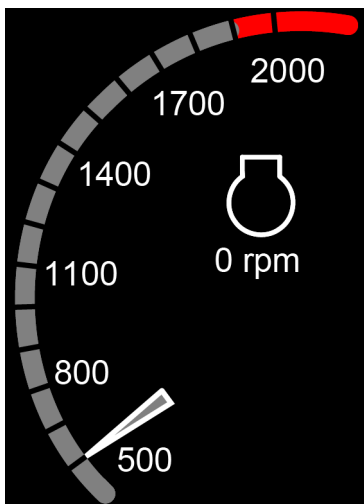
Fill level of urea tank is too low or error in exhaust aftertreatment system.

**Exhaust gas temperature**

Exhaust gas temperature is increased.

**Restart machine**

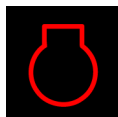
Restart machine.

**RPM**

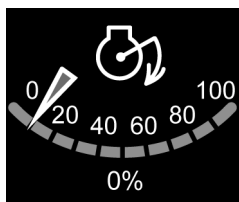
RPM of the diesel engine.

**RPM** (lit yellow)

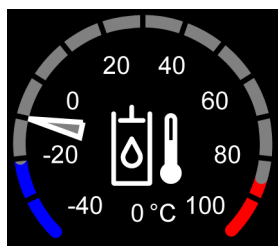
Diesel engine RPM is high.

**RPM** (blinks red)

Diesel engine RPM is too high.

**Diesel engine utilization**

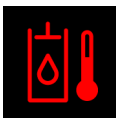
Utilization of the diesel engine as percentage of the currently possible maximum utilization.

**Hydraulic oil temperature**

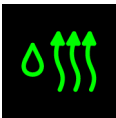
Temperature of the hydraulic oil.

**Hydraulic oil temperature** (lit yellow)

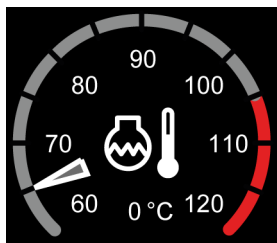
Hydraulic oil temperature is high.

**Hydraulic oil temperature** (blinks red)

Hydraulic oil temperature is too high.

**Hydraulic oil heater** (lit green)

The hydraulic oil heater (if fit) automatically raises the hydraulic oil temperature to -10 °C (14 °F).

**Coolant temperature**

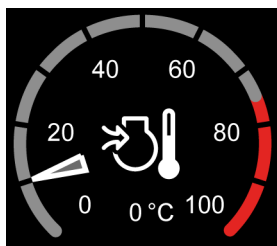
Temperature of the diesel engine coolant.

**Coolant temperature** (lit yellow)

Temperature of the diesel engine coolant is high.

**Coolant temperature** (blinks red)

Temperature of diesel engine coolant is too high.

**Charge air temperature**

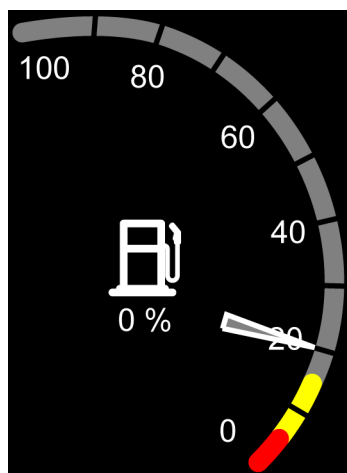
Temperature of the diesel engine charge air.

**Charge air temperature** (lit yellow)

Temperature of the diesel engine charge air is high.

**Charge air temperature** (blinks red)

Temperature of diesel engine charge air is too high.

**Fuel fill level**

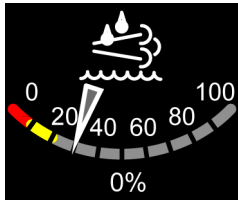
Fill level of the fuel tank as percentage of the maximum filling capacity.

**Fuel fill level (lit yellow)**

Fill level of fuel tank is less than 15 % of the maximum filling capacity.

**Fuel fill level (blinks red)**

Fill level of fuel tank is less than 5 % of the maximum filling capacity.

**Urea solution fill level**

Fill level of the urea tank as percentage of the maximum filling capacity.

**Exhaust aftertreatment system (lit yellow)**

Fill level of urea tank is low or error in exhaust aftertreatment system.

**Exhaust aftertreatment system (blinks red)**

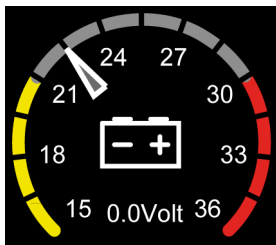
Fill level of urea tank is too low or error in exhaust aftertreatment system.

**Time**

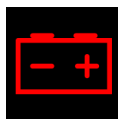
Current time.

**Outside temperature**

Current outside temperature.

**Battery voltage**

Voltage of the battery.

**Battery charge (blinks red)**

Battery is not charging.

**Lubrication oil pressure**

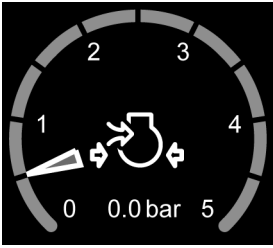
Pressure of the lubrication oil of the diesel engine.

**Lubrication oil pressure (lit yellow)**

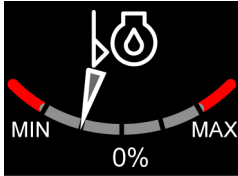
Pressure of diesel engine lubrication oil is low.

**Lubrication oil pressure** (blinks red)

Pressure of diesel engine lubrication oil is too low.

**Charge air pressure**

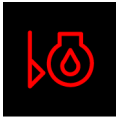
Pressure of the diesel engine charge air.

**Lubrication oil fill level**

Fill level of the lubrication oil of the diesel engine as percentage of the maximum filling capacity.

**Lubrication oil fill level** (lit yellow)

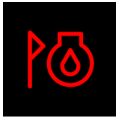
Fill level of diesel engine lubrication oil is low.

**Lubrication oil fill level** (blinks red)

Lubrication oil fill level of diesel engine is too low.

**Lubrication oil fill level** (lit yellow)

Fill level of diesel engine lubrication oil is high.

**Lubrication oil fill level** (blinks red)

Fill level of diesel engine lubrication oil is too high.

**Power limitation**

Power limitation of diesel engine is active due to utilization height.

**Power limitation** (lit yellow)

Power limitation of diesel engine is active due to an operational error.

**Charge air filter** (lit yellow)

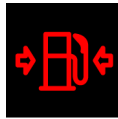
Charge air filter does not work correctly.

**Charge air filter** (blinks red)

Charge air filter does not work correctly.

**Fuel pressure** (lit yellow)

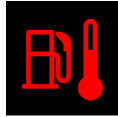
Fuel pressure is low or high.

**Fuel pressure** (blinks red)

Fuel pressure is too low or too high.

**Fuel temperature** (lit yellow)

Fuel temperature is high.

**Fuel temperature** (blinks red)

Fuel temperature is too high.

**Fuel filter** (blinks red)

Water in the fuel filter.

3.19 Operating hours screen



Operating hours

Switch to the *Operating hours* screen.

The *Operating hours* screen informs the machine operator about the operating hours of the various machine components.

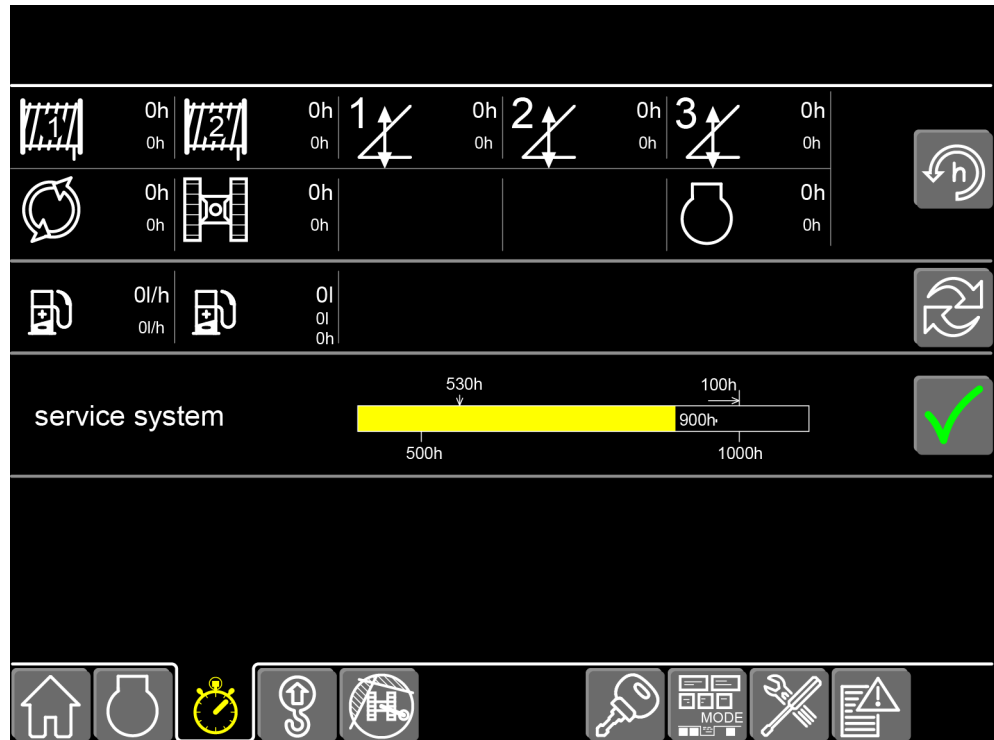


Fig. 1566: Operating hours screen



Resetting the operating hours

Reset relative operating hours to zero.



Resetting the fuel consumption

Reset the fuel consumption to zero.



Confirming maintenance interval

Confirm completed maintenance interval.

This button is only displayed to authorized users.



Operating hours winch1

Absolute and relative operating hours of winch1.



0h
0h

Operating hours winch2

Absolute and relative operating hours of winch2.



0h
0h

Operating hours main boom adjusting winch

Absolute and relative operating hours of the main boom adjusting winch.



0h
0h

Operating hours jib luffing winch

Absolute and relative operating hours of jib luffing winch.



0h
0h

Operating hours auxiliary winch

Absolute and relative operating hours of auxiliary winch.



0h
0h

Operation hours of the derrick winch

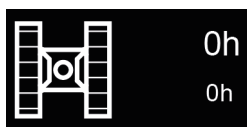
Absolute and relative operating hours of derrick winch.



0h
0h

Operating hours swing gear

Absolute and relative operating hours of the swing gear.



0h
0h

Operating hours crawler

Absolute and relative operating hours of the crawler.



0h
0h

Operating hours diesel engine

Absolute and relative operating hours of diesel engine.



0l/h
0l/h

Average fuel consumption

Absolute and relative average fuel consumption.



0l
0l
0h

Total fuel consumption

Total fuel consumption.

Relative fuel consumption in the displayed period.

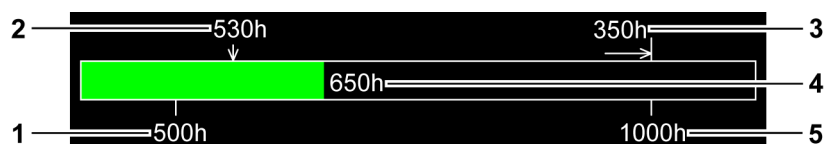


Fig. 1581: Maintenance intervals (lit green)

- | | | | |
|---|---------------------------------------|---|---------------------------------|
| 1 | Last maintenance interval | 4 | Current machine operating hours |
| 2 | Last preventive maintenance performed | 5 | Next maintenance interval |

See next page for continuation of the image legend

3 Operating hours until next preventive maintenance



Fig. 1582: Maintenance intervals - maintenance intervals pending shortly (lit yellow)



Fig. 1583: Maintenance intervals - maintenance interval past due (lit red)

3.20 Setup screen



Setup

Switch to the *Setup* screen.

The *Setup* screen serves to define and confirm the setup of the machine.

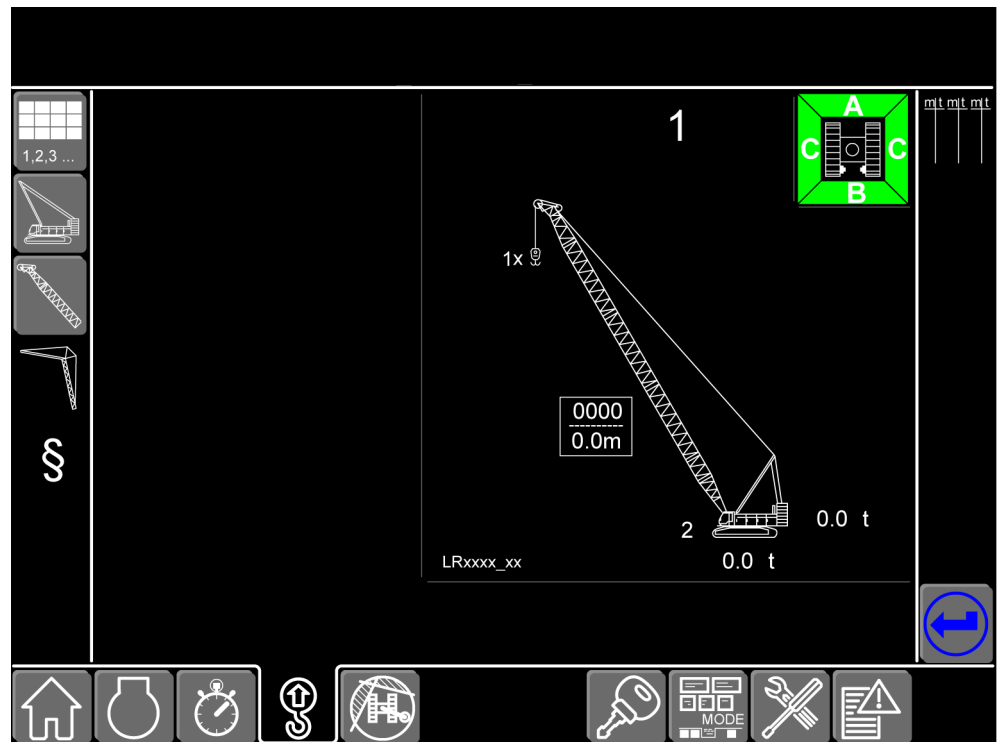


Fig. 1585: Setup screen



Boom configuration

Switch to the *Setup - boom configuration* screen.



Basic machine

Switch to the *Setup - basic machine* screen.



Main boom

Switch to the *Setup - main boom* screen.



Jib

Switch to the *Setup - jib* screen.



Calculation rules

Switch to the *Setup - calculation rules* screen.

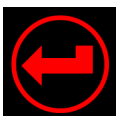
Setup screen

**Load chart**Switch to the *Setup - load chart* screen.**Calculating load charts**

Calculate load chart. No calculation required.

**Calculate load chart) (lit blue).**

Calculate load chart. Symbol is lit blue if the setup is changed and a recalculation of the load chart is required.

**Calculate load chart (blinks red)**

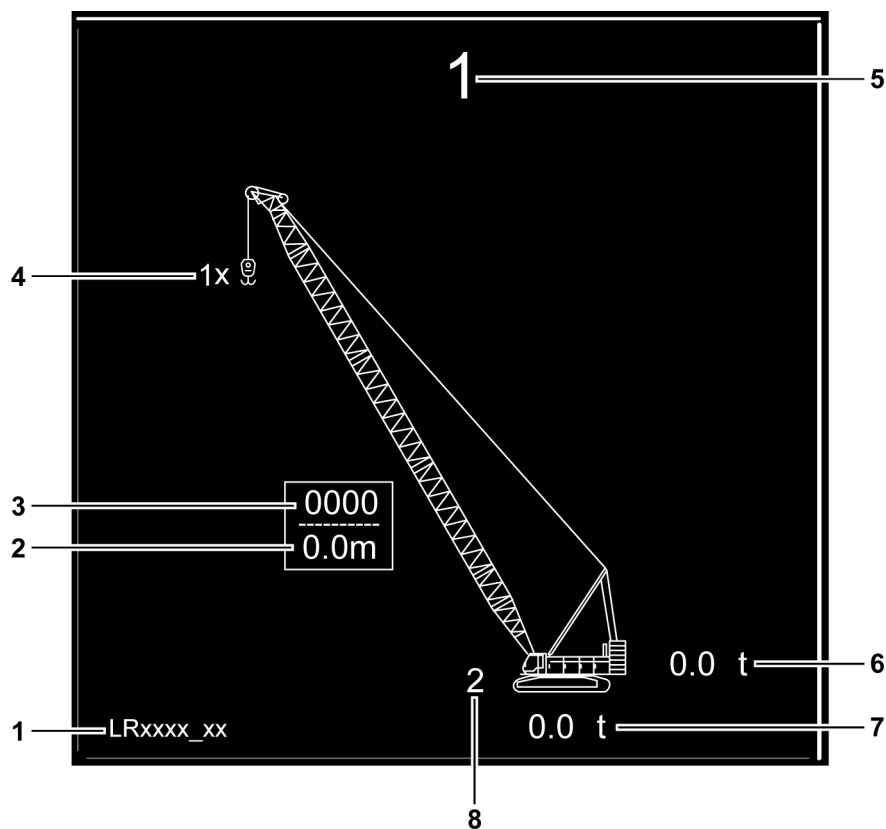
Calculate load chart. Symbol blinks red if the entered setup is invalid.

**Calculating load charts**

Calculate load chart. Symbol is crossed out if the load moment exceeds 50 % and if the recalculation of the load chart is not possible.

**Hourglass**

Load chart is calculated.

*Fig. 1597: Setup screen clipping*

- 1 Machine type
- 2 Main boom length

- 5 Boom configuration
- 6 Rear counterweight

See next page for continuation of the image legend

- | | | | |
|---|----------------------------|---|-----------------------|
| 3 | System dimension main boom | 7 | Carbody counterweight |
| 4 | Rope reeving | 8 | Track width |

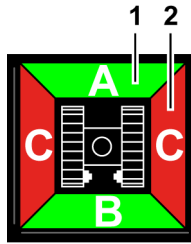


Fig. 1598: Screen clipping Erectability

- | | | | |
|---|---|---|--------------------------------|
| 1 | Boom configuration can be erected (green area) | B | Can be erected via tumbler |
| 2 | Boom configuration cannot be erected (red area) | C | Can be erected across the side |
| A | Can be erected via idler wheel | | |

3.20.1 Setup - boom configuration screen



Boom configuration setup

Switch to the *Setup - boom configuration* screen.

The *Setup - boom configuration* screen serves to define and confirm the boom configuration.

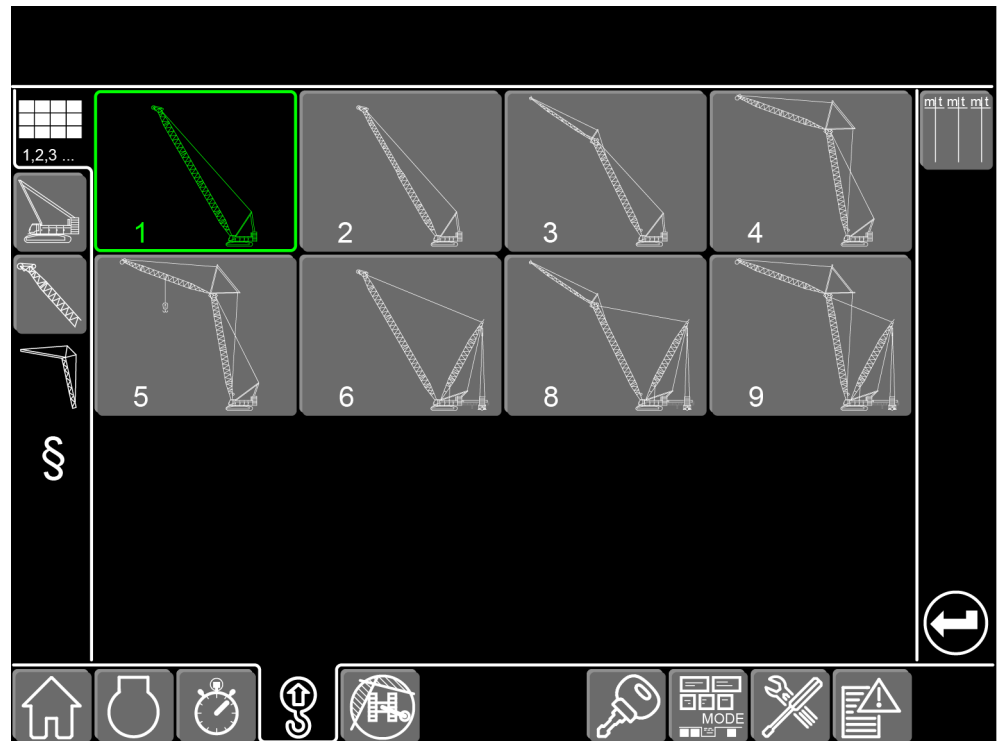
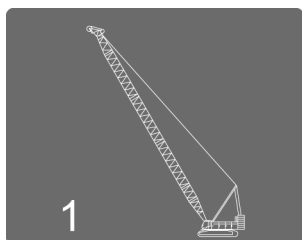
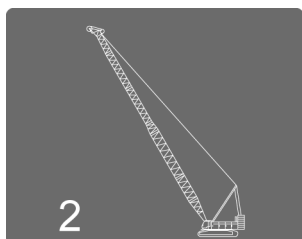


Fig. 1600: Screen Setup boom configuration

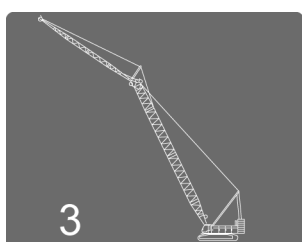
Setup screen

**Boom configuration 1 - main boom**

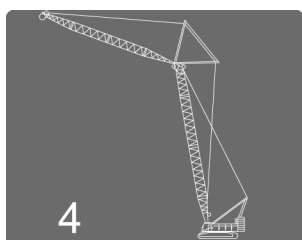
Select boom configuration 1 - main boom.

**Boom configuration 2 - main boom + reducing adapter**

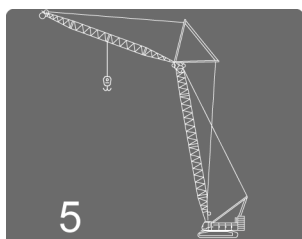
Select boom configuration 2 - main boom + reducing adapter.

**Boom configuration 3 - main boom + fixed jib**

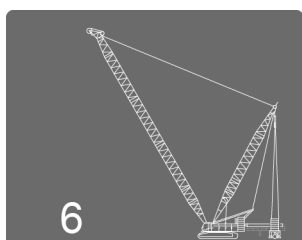
Select boom configuration 3 - main boom + fixed jib.

**Boom configuration 4 - main boom + luffing jib**

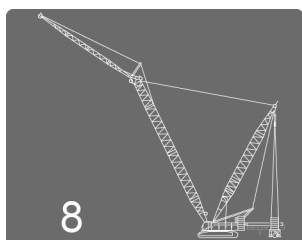
Select boom configuration 4 - main boom + luffing jib.

**Boom configuration 5 - main boom + luffing jib + midfall**

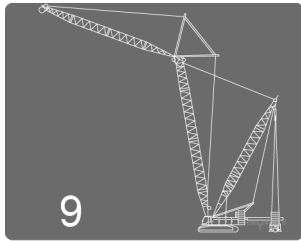
Select boom configuration 5 - main boom + luffing jib + midfall.

**Boom configuration 6 - main boom + derrick**

Select boom configuration 6 - main boom + derrick.

**Boom configuration 8 - main boom + fixed jib + derrick**

Select boom configuration 8 - main boom + fixed jib + derrick.



Boom configuration 9 - main boom + luffing jib + derrick

Select boom configuration 9 - main boom + luffing jib + derrick.

3.20.2 Setup - boom configuration 1 screen

Setup - basic machine screen



Setup - basic machine

Switch to the *Setup - basic machine* screen.

The *Setup - basic machine* screen serves to define and confirm the track width and counterweights.

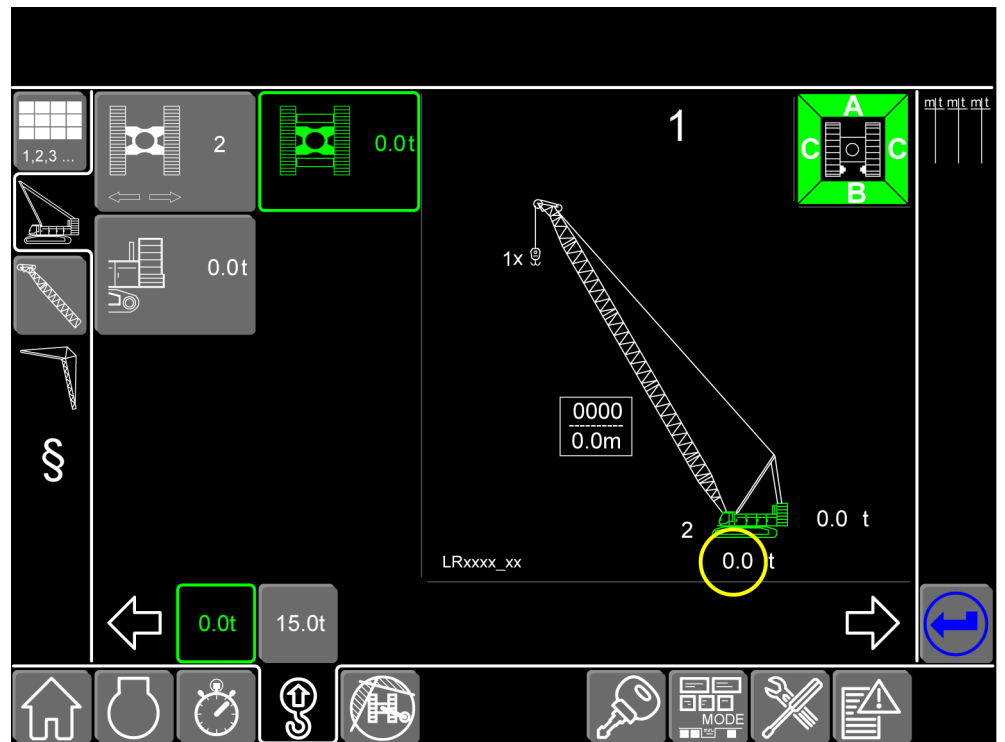
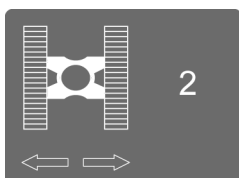


Fig. 1610: Setup - basic machine screen

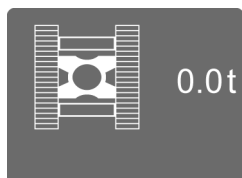


Track width

Select the track width.

- 1: Narrow track
- 2: Wide track
- 3: Blocked Crawlers

Setup screen

**Carbody counterweight**

Select the weight of carbody counterweight.

**Rear counterweight**

Select the weight of rear counterweight.

**Smaller values**

Switch to next smaller values.

**Larger values**

Switch to next larger values.

**Value**

Select value.

Setup - main boom screen**Setup - main boom**Switch to the *Setup - main boom* screen.

The *Setup - main boom* screen serves to define and confirm the main boom head, the main boom length and the reeving of the load hook.

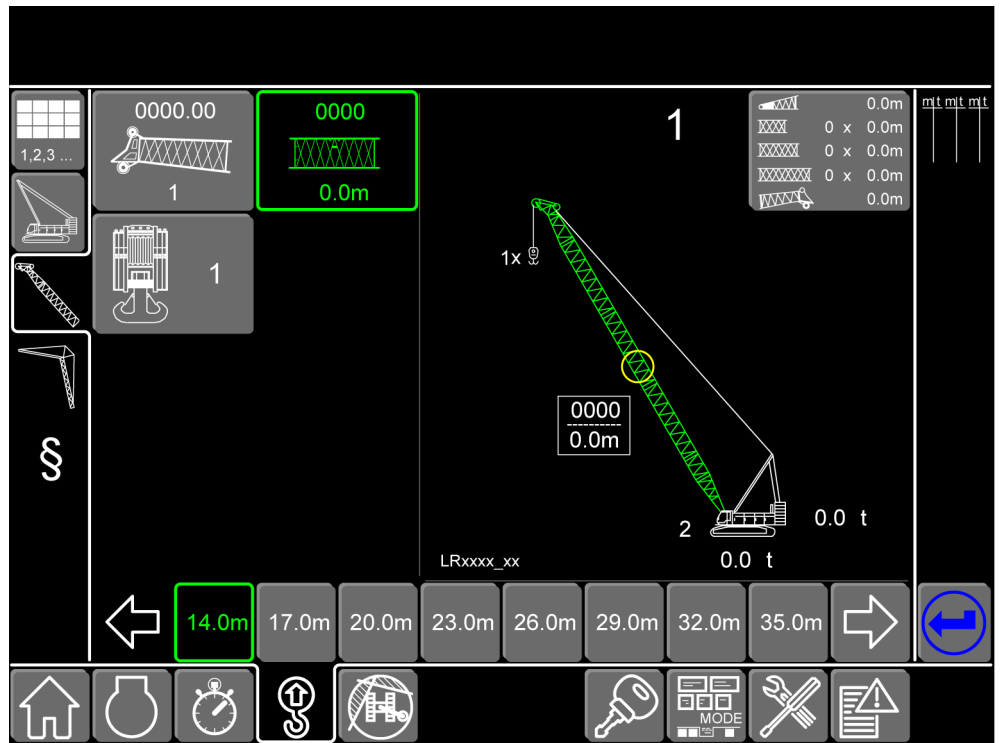
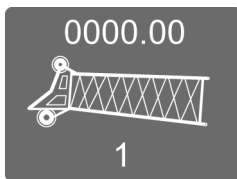
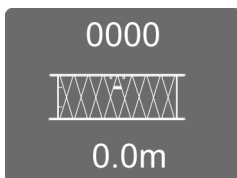


Fig. 1618: Setup - main boom screen



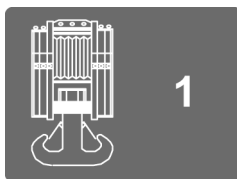
Main boom head

Select main boom head in line with foreword to the valid load chart.



Main boom length

Select the main boom length.



Rope reeving

Select rope reeving.



Smaller values

Switch to next smaller values.



Larger values

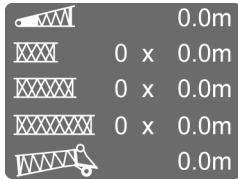
Switch to next larger values.



Value

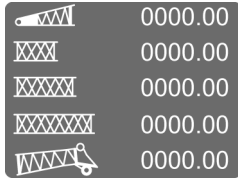
Select value.

Setup screen



Main boom components

Button shows the composition of the main boom components and their lengths.
Switch to composition of the main boom components and their system dimensions.



Main boom components

Button shows the composition of the main boom components and their system dimensions.
Switch to composition of the main boom components and their lengths.

3.20.3 Setup - boom configuration 2 screen

Setup - basic machine screen



Setup - basic machine

Switch to the *Setup - basic machine* screen.

The *Setup - basic machine* screen serves to define and confirm the track width and counterweights.

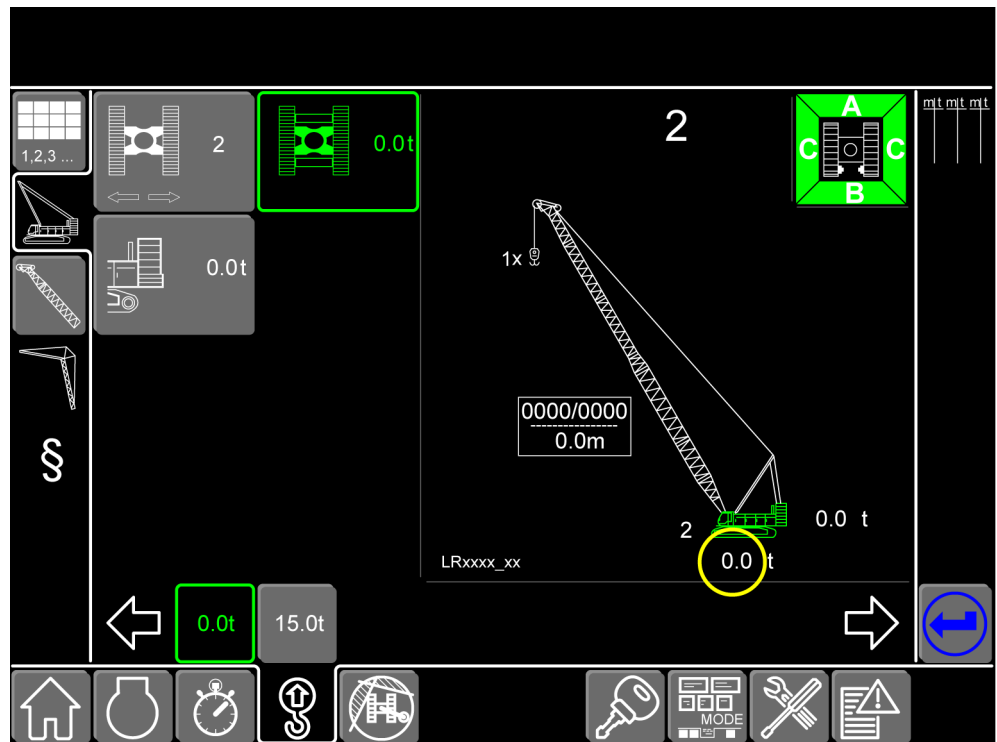
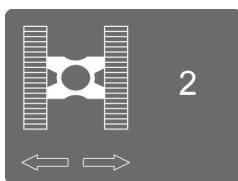


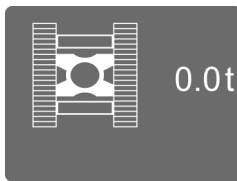
Fig. 1628: Setup - basic machine screen



Track width

Select the track width.

- 1: Narrow track
- 2: Wide track
- 3: Blocked Crawlers

**Carbody counterweight**

Select the weight of carbody counterweight.

**Rear counterweight**

Select the weight of rear counterweight.

**Smaller values**

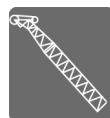
Switch to next smaller values.

**Larger values**

Switch to next larger values.

**Value**

Select value.

Setup - main boom screen**Setup - main boom**

Switch to the *Setup - main boom* screen.

The *Setup - main boom* screen serves to define and confirm the main boom head, the main boom length and the reeving of the load hook.

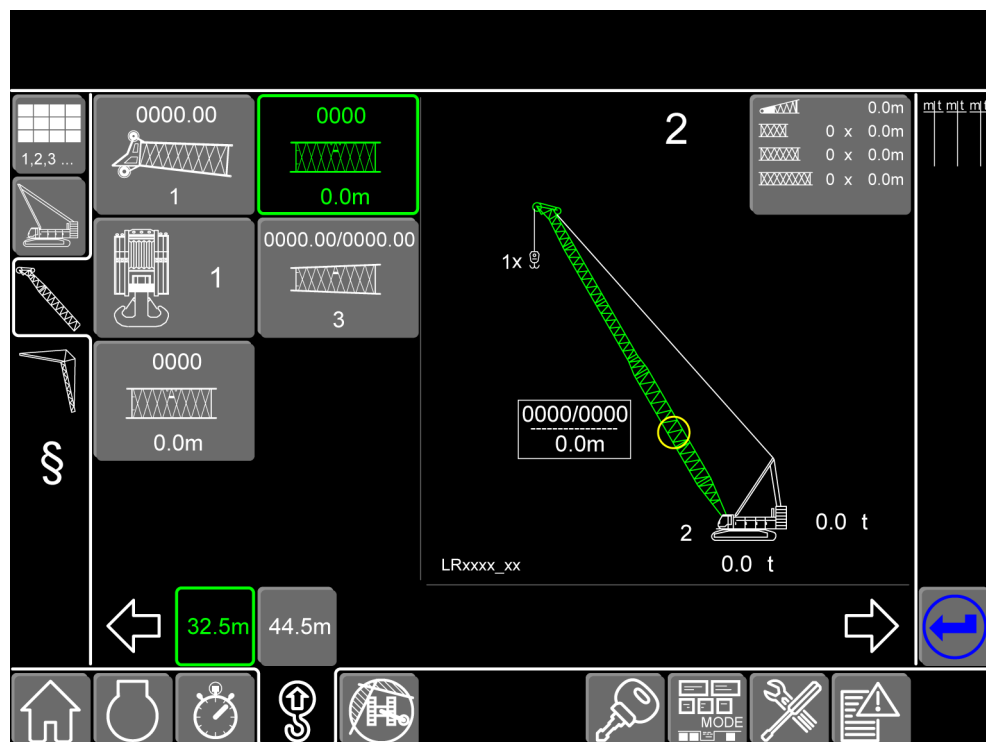
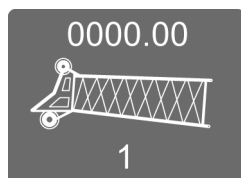
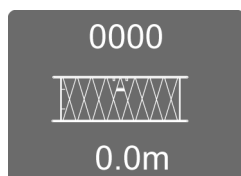


Fig. 1636: Setup - main boom screen



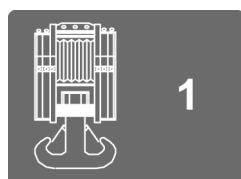
Main boom head

Select main boom head in line with forward to the valid load chart.



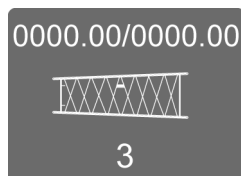
Main boom length up to reducing adapter

Select main boom length up to reducing adapter.



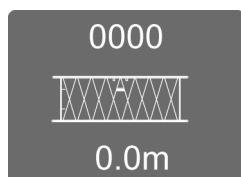
Rope reeving

Select rope reeving.



Reducing adapter

Select reducing adapter.



Main boom length beyond reducing adapter

Select main boom length beyond reducing adapter.

**Smaller values**

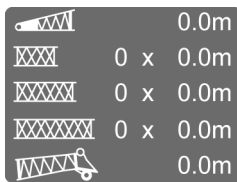
Switch to next smaller values.

**Larger values**

Switch to next larger values.

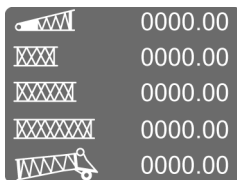
**Value**

Select value.

**Main boom components**

Button shows the composition of the main boom components and their lengths.

Switch to composition of the main boom components and their system dimensions.

**Main boom components**

Button shows the composition of the main boom components and their system dimensions.

Switch to composition of the main boom components and their lengths.

3.20.4 Setup - boom configuration 3 screen

Setup - basic machine screen

**Setup - basic machine**

Switch to the *Setup - basic machine* screen.

The *Setup - basic machine* screen serves to define and confirm the track width and counterweights.

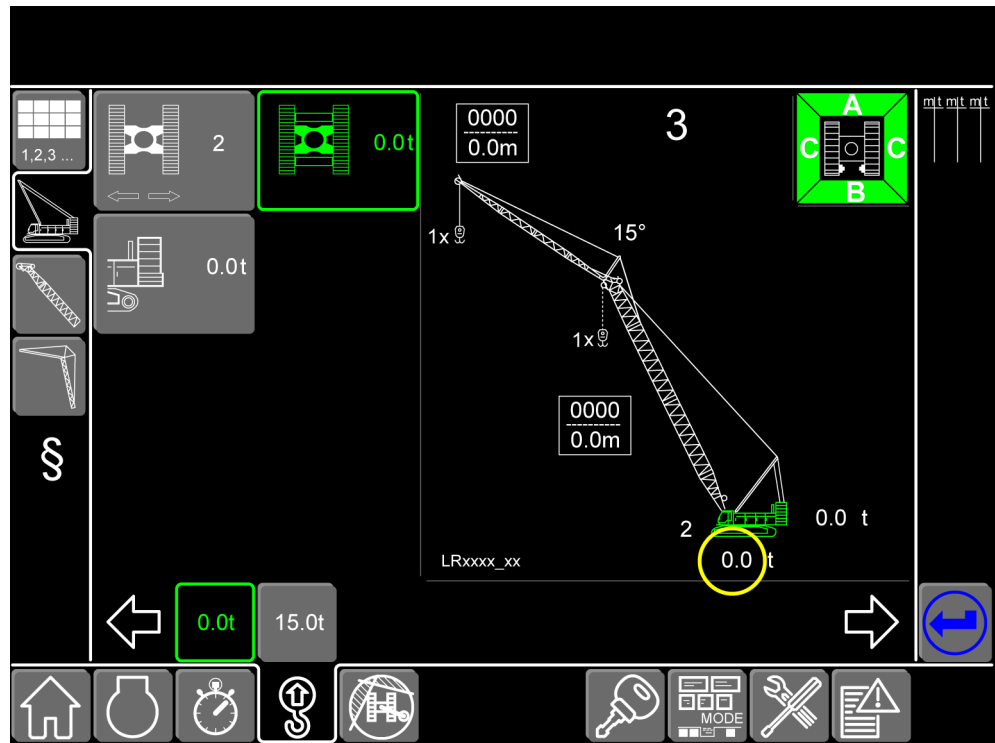
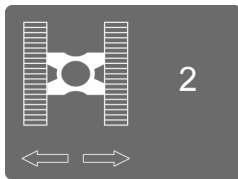


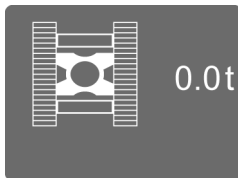
Fig. 1648: Setup - basic machine screen



Track width

Select the track width.

- 1: Narrow track
- 2: Wide track
- 3: Blocked Crawlers



Carbody counterweight

Select the weight of carbody counterweight.



Rear counterweight

Select the weight of rear counterweight.



Smaller values

Switch to next smaller values.



Larger values

Switch to next larger values.



Value

Select value.

Setup - main boom screen



Setup - main boom

Switch to the *Setup - main boom* screen.

The *Setup - main boom* screen serves to define and confirm the main boom head, the main boom length and the reeving of the load hook.

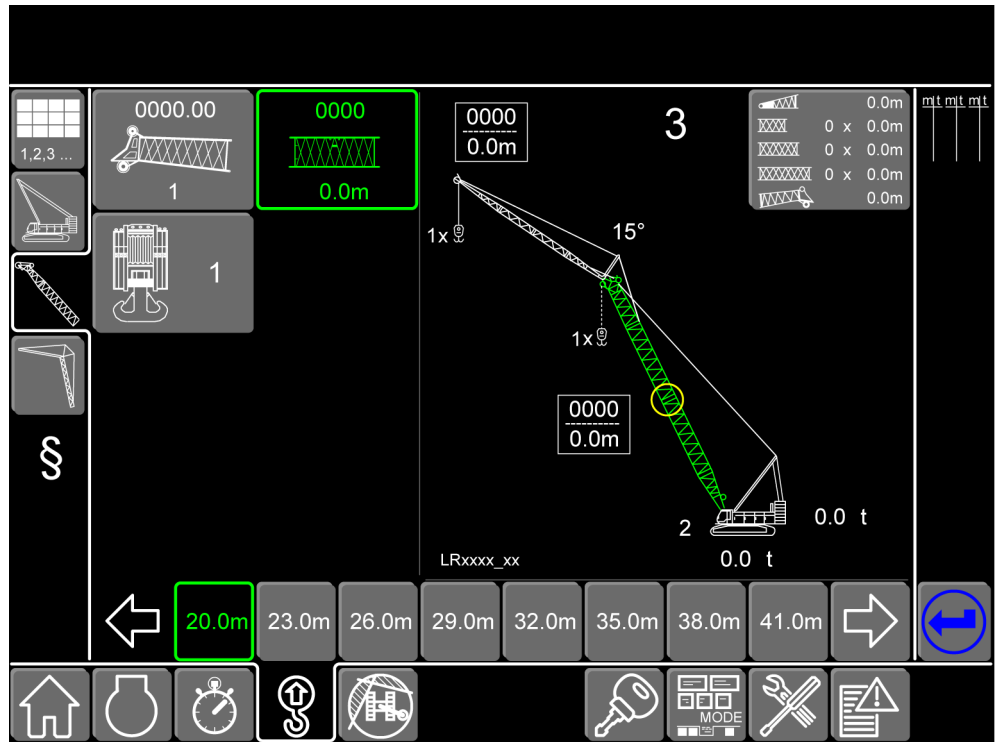
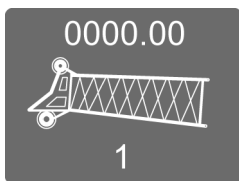
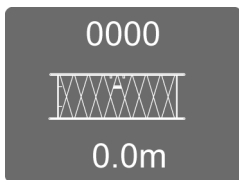


Fig. 1656: Setup - main boom screen



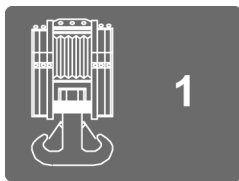
Main boom head

Select main boom head in line with foreword to the valid load chart.



Main boom length

Select the main boom length.



Rope reeving

Select rope reeving.



Smaller values

Switch to next smaller values.

Setup screen



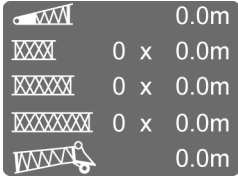
Larger values

Switch to next larger values.



Value

Select value.



Main boom components

Button shows the composition of the main boom components and their lengths.

Switch to composition of the main boom components and their system dimensions.



Main boom components

Button shows the composition of the main boom components and their system dimensions.

Switch to composition of the main boom components and their lengths.

Setup - jib screen



Setup - jib

Switch to the *Setup - jib* screen.

The *Setup - jib* screen serves to define and confirm the jib head, the jib length and the reeving of the load hook.

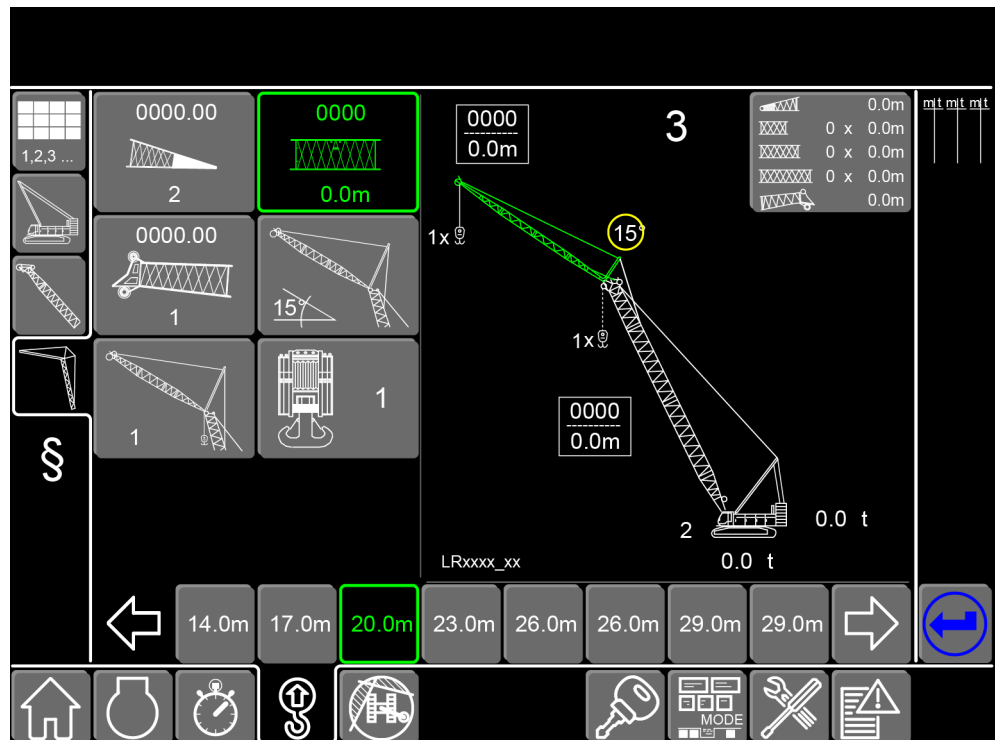
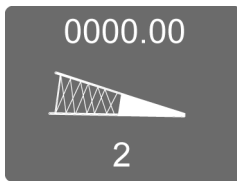
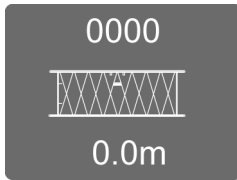


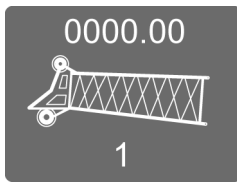
Fig. 1666: Setup - jib screen



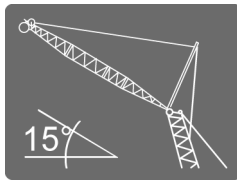
System dimension of the jib
Select system dimension of the jib.



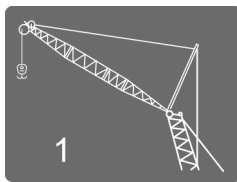
Jib length
Select jib length.



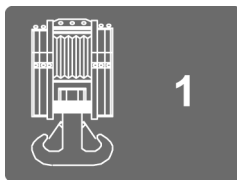
Jib head
Select jib head in line with foreword to the valid load chart.



Tensioning position
Select tensioning position between jib and main boom in degrees.



Load position
Select load position.



Rope reeving
Select rope reeving.



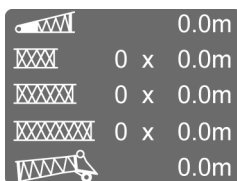
Smaller values
Switch to next smaller values.



Larger values
Switch to next larger values.

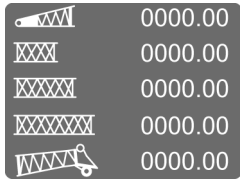


Value
Select value.



Jib components
Button shows the composition of the jib components and their lengths.
Switch to composition of the jib components and their system dimensions.

Setup screen



Jib components

Button shows the composition of the jib components and their system dimensions.
Switch to composition of the jib components and their lengths.

3.20.5 Setup - boom configuration 4 screen

Setup - basic machine screen



Setup - basic machine

Switch to the *Setup - basic machine* screen.

The *Setup - basic machine* screen serves to define and confirm the track width and counterweights.

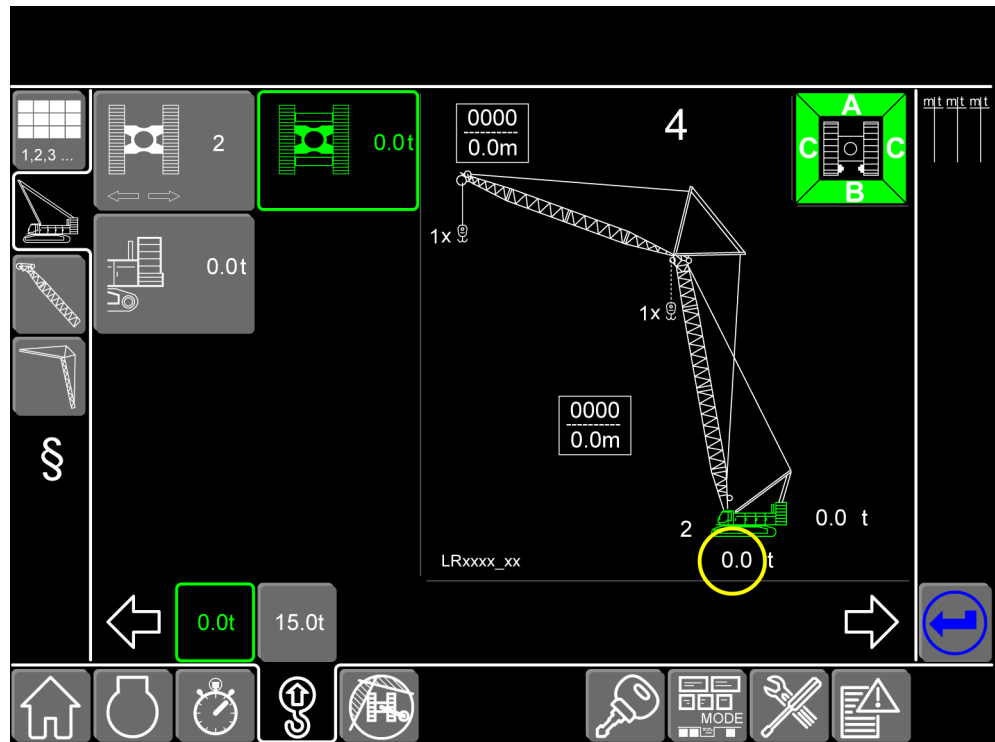
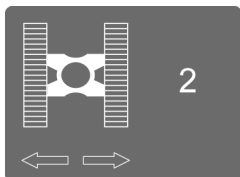


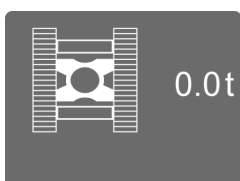
Fig. 1679: Setup - basic machine screen



Track width

Select the track width.

- 1: Narrow track
- 2: Wide track
- 3: Blocked Crawlers



Carbody counterweight

Select the weight of carbody counterweight.



Rear counterweight

Select the weight of rear counterweight.



Smaller values

Switch to next smaller values.



Larger values

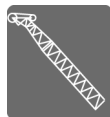
Switch to next larger values.



Value

Select value.

Setup - main boom screen



Setup - main boom

Switch to the *Setup - main boom* screen.

The *Setup - main boom* screen serves to define and confirm the main boom head, the main boom length and the reeving of the load hook.

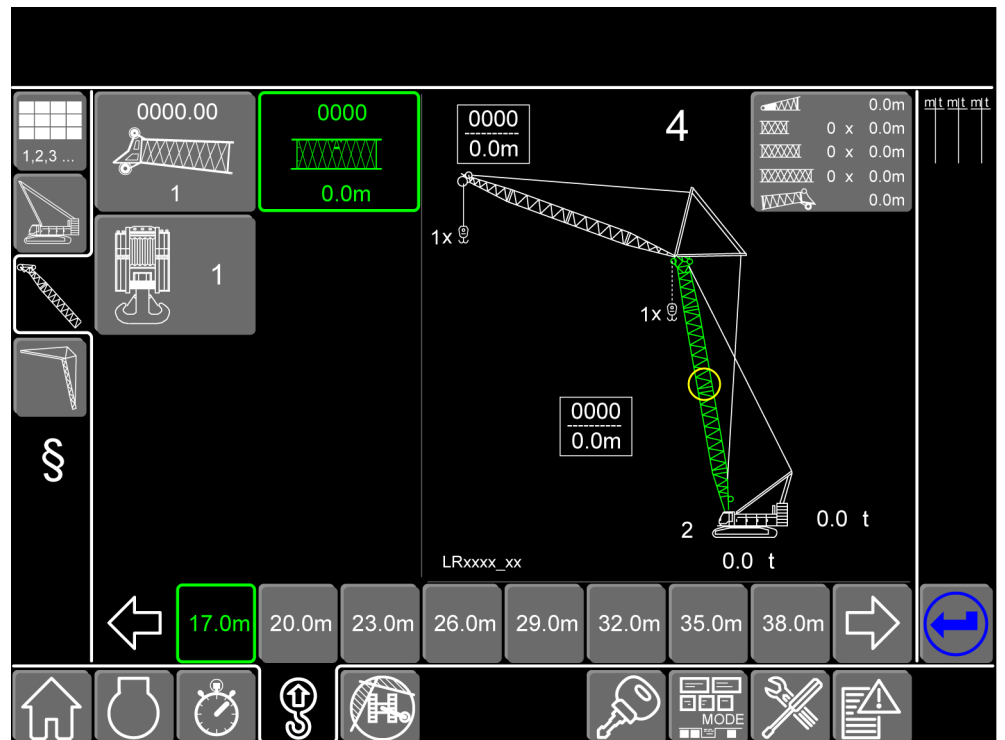
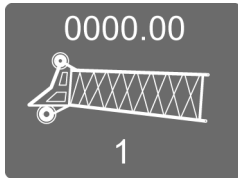
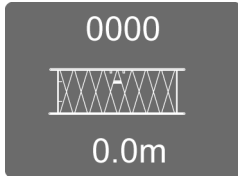


Fig. 1687: Setup - main boom screen

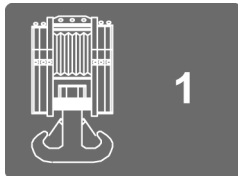
Setup screen

**Main boom head**

Select main boom head in line with foreword to the valid load chart.

**Main boom length**

Select the main boom length.

**Rope reeving**

Select rope reeving.

**Smaller values**

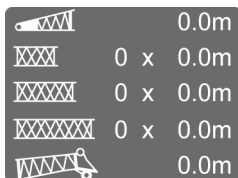
Switch to next smaller values.

**Larger values**

Switch to next larger values.

**Value**

Select value.

**Main boom components**

Button shows the composition of the main boom components and their lengths.

Switch to composition of the main boom components and their system dimensions.

**Main boom components**

Button shows the composition of the main boom components and their system dimensions.

Switch to composition of the main boom components and their lengths.

Setup - jib screen**Setup - jib**

Switch to the *Setup - jib* screen.

The *Setup - jib* screen serves to define and confirm the jib head, the jib length and the reeving of the load hook.

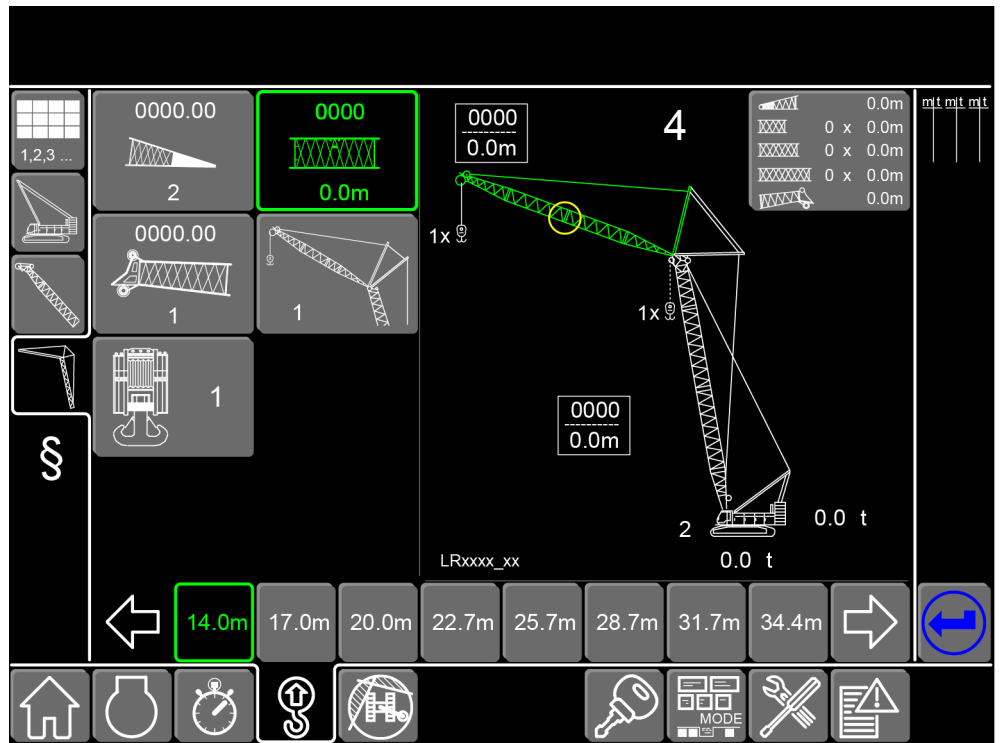
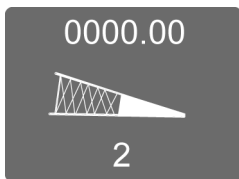
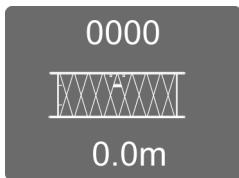


Fig. 1697: Setup - jib screen



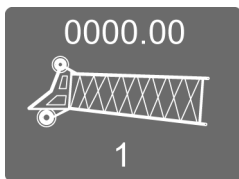
System dimension of the jib

Select system dimension of the jib.



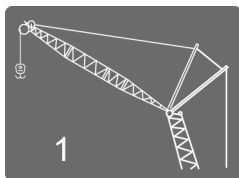
Jib length

Select jib length.



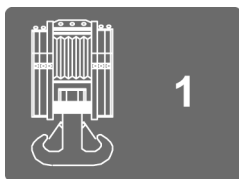
Jib head

Select jib head in line with foreword to the valid load chart.



Load position

Select load position.



Rope reeving

Select rope reeving.

**Smaller values**

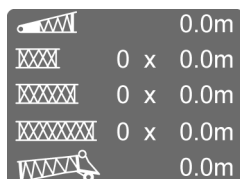
Switch to next smaller values.

**Larger values**

Switch to next larger values.

**Value**

Select value.

**Jib components**

Button shows the composition of the jib components and their lengths.

Switch to composition of the jib components and their system dimensions.

**Jib components**

Button shows the composition of the jib components and their system dimensions.

Switch to composition of the jib components and their lengths.

3.20.6 Setup - boom configuration 5 screen

Setup - basic machine screen

**Setup - basic machine**Switch to the *Setup - basic machine* screen.

The *Setup - basic machine* screen serves to define and confirm the track width and counterweights.

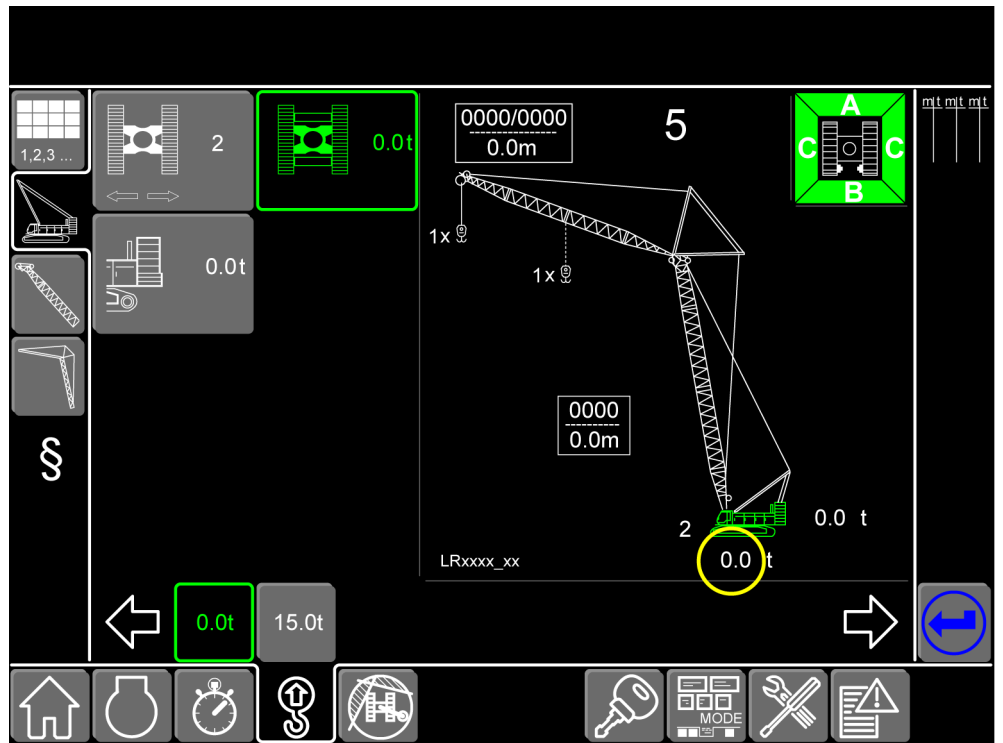
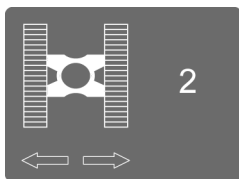


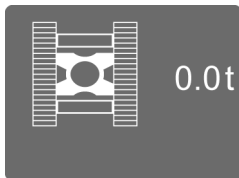
Fig. 1709: Setup - basic machine screen



Track width

Select the track width.

- 1: Narrow track
- 2: Wide track
- 3: Blocked Crawlers



Carbody counterweight

Select the weight of carbody counterweight.



Rear counterweight

Select the weight of rear counterweight.



Smaller values

Switch to next smaller values.



Larger values

Switch to next larger values.



Value

Select value.

Setup - main boom screen



Setup - main boom

Switch to the *Setup - main boom* screen.

The *Setup - main boom* screen serves to define and confirm the main boom head, the main boom length and the reeving of the load hook.

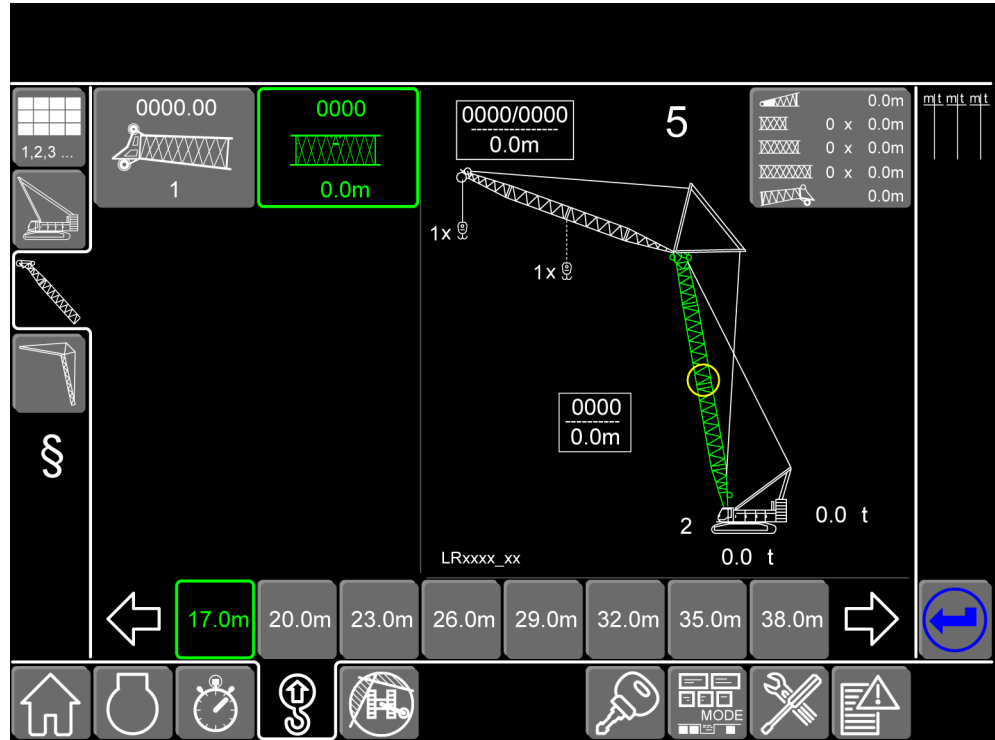
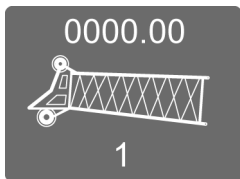
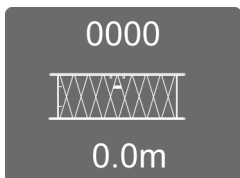


Fig. 1717: Setup - main boom screen



Main boom head

Select main boom head in line with forward to the valid load chart.



Main boom length

Select the main boom length.



Smaller values

Switch to next smaller values.

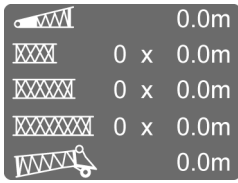


Larger values

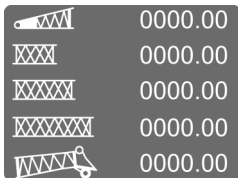
Switch to next larger values.



Value
Select value.



Main boom components
Button shows the composition of the main boom components and their lengths.
Switch to composition of the main boom components and their system dimensions.



Main boom components
Button shows the composition of the main boom components and their system dimensions.
Switch to composition of the main boom components and their lengths.

Setup - jib screen



Setup - jib
Switch to the *Setup - jib* screen.

The *Setup - jib* screen serves to define and confirm the jib head, the jib length and the reeving of the load hook.

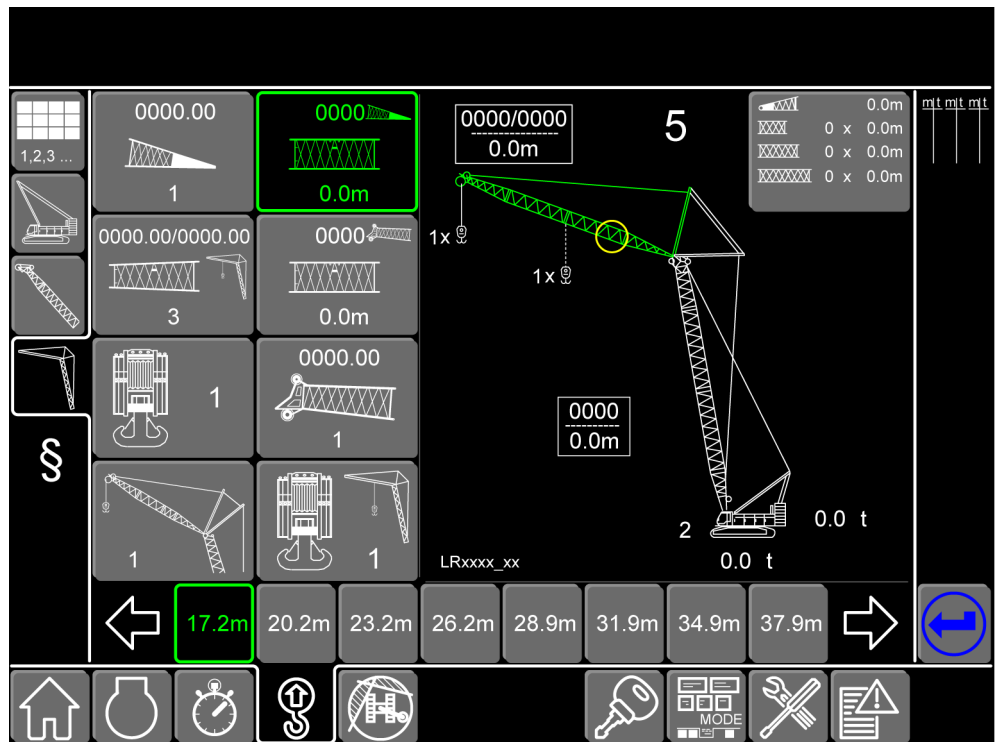
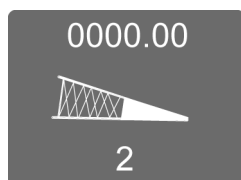
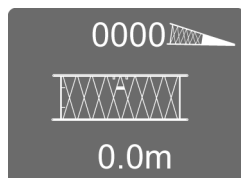


Fig. 1726: Setup - jib screen

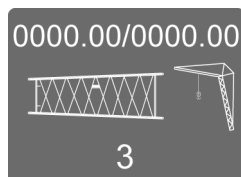
Setup screen

**System dimension of the jib**

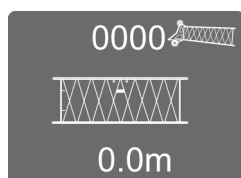
Select system dimension of the jib.

**Jib length up to Midfall**

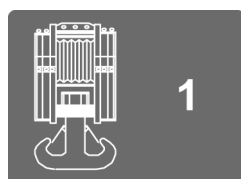
Select jib length up to midfall.

**Midfall**

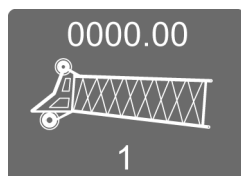
Select midfall. The control system displays the midfall as a reducing adapter.

**Jib length after midfall**

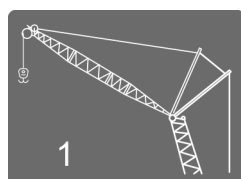
Select jib length after midfall.

**Rope reeving**

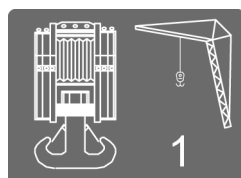
Select rope reeving.

**Jib head**

Select jib head in line with foreword to the valid load chart.

**Load position**

Select load position.

**Reeving midfall**

Select reeving of midfall.

**Smaller values**

Switch to next smaller values.

**Larger values**

Switch to next larger values.

**Value**

Select value.

	0.0m
	0 x 0.0m
	0 x 0.0m
	0 x 0.0m
	0.0m

Jib components

Button shows the composition of the jib components and their lengths.

Switch to composition of the jib components and their system dimensions.

	0000.00
	0000.00
	0000.00
	0000.00
	0000.00

Jib components

Button shows the composition of the jib components and their system dimensions.

Switch to composition of the jib components and their lengths.

3.20.7 Setup screen - boom configuration 6

Setup - basic machine screen

**Setup - basic machine**

Switch to the *Setup - basic machine* screen.

The *Setup - basic machine* screen serves to define and confirm the track width and counterweights.

Setup screen

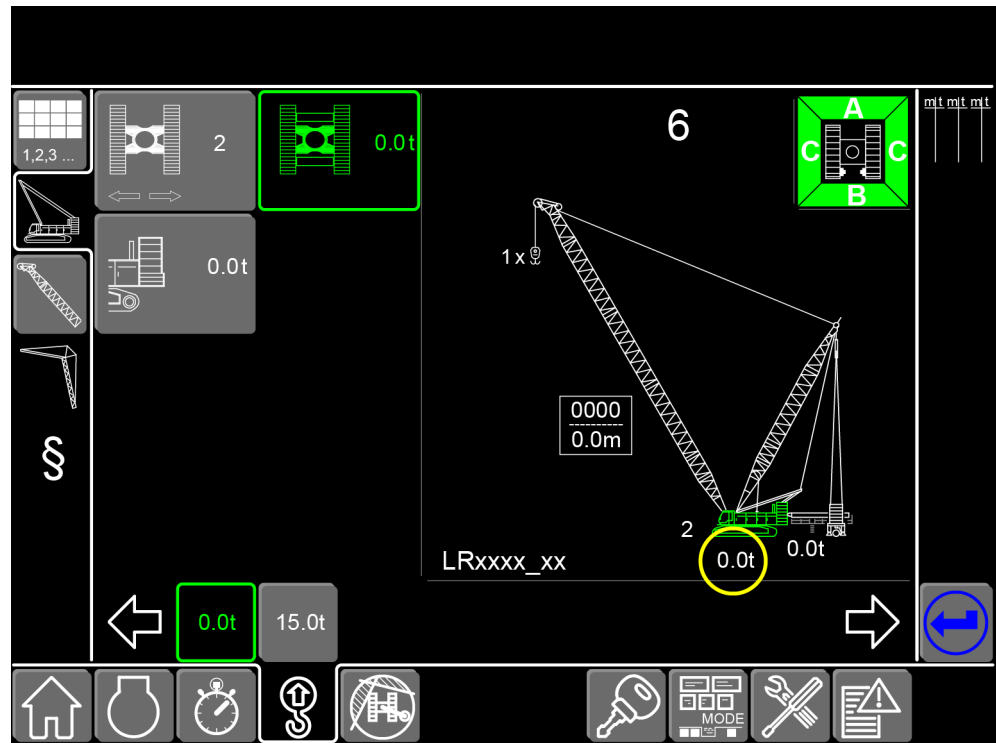
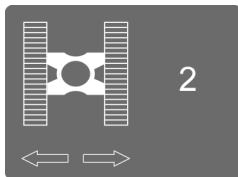


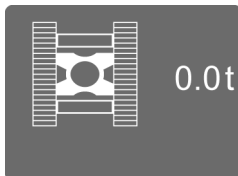
Fig. 1741: Screen Setup - basic machine



Track width

Select the track width.

- 1: Narrow track
- 2: Wide track
- 3: Blocked Crawlers



Carbody counterweight

Select the weight of carbody counterweight.



Rear counterweight

Select the weight of rear counterweight.



Smaller values

Switch to next smaller values.



Larger values

Switch to next larger values.



Value

Select value.

Setup - main boom screen



Setup - main boom

Switch to the *Setup - main boom* screen.

The *Setup - main boom* screen serves to define and confirm the main boom head, the main boom length and the reeving of the load hook.

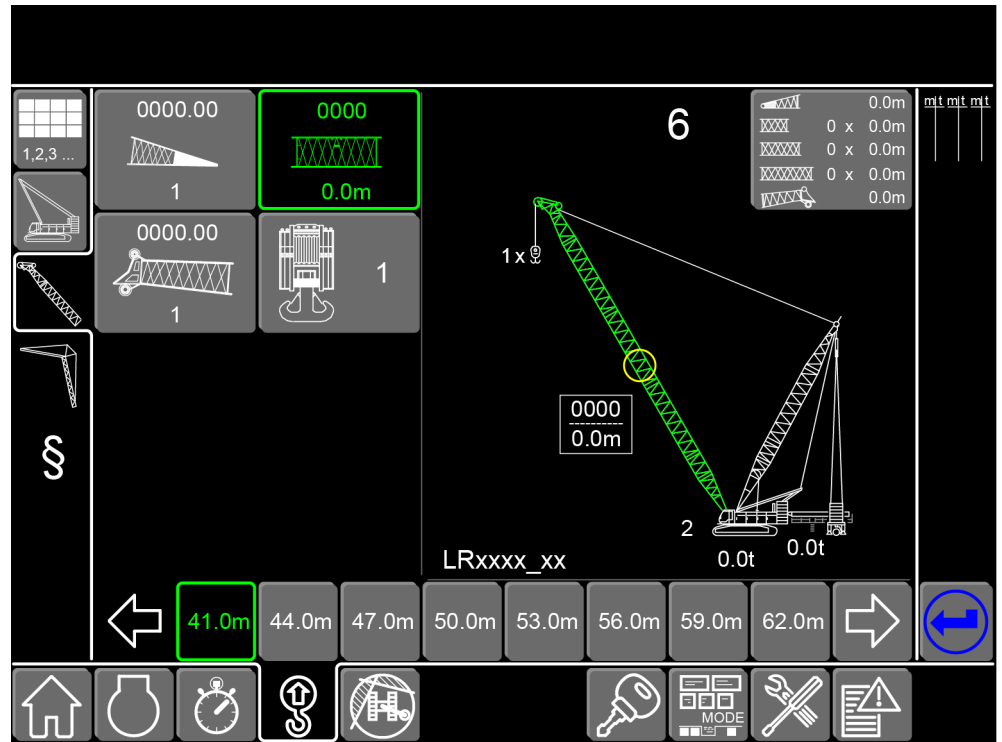
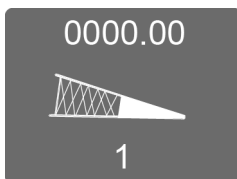
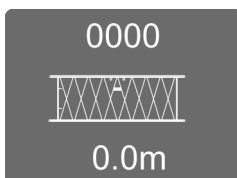


Fig. 1749: Setup - main boom screen



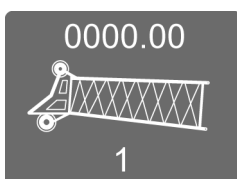
Main boom system dimension

Select main boom system dimension.



Main boom length

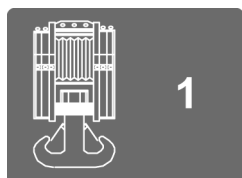
Select the main boom length.



Main boom head

Select main boom head in line with foreword to the valid load chart.

Setup screen

**Rope reeving**

Select rope reeving.

**Smaller values**

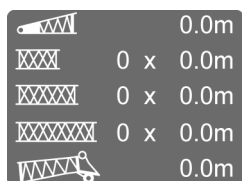
Switch to next smaller values.

**Larger values**

Switch to next larger values.

**Value**

Select value.

**Main boom components**

Button shows the composition of the main boom components and their lengths.

Switch to composition of the main boom components and their system dimensions.

**Main boom components**

Button shows the composition of the main boom components and their system dimensions.

Switch to composition of the main boom components and their lengths.

3.20.8 Setup screen - boom configuration 8

Screen Setup - basic machine

**Setup - basic machine**Switch to *Setup - basic machine* screen.The screen *Setup - basic machine* serves to define and confirm the track width and counterweights.

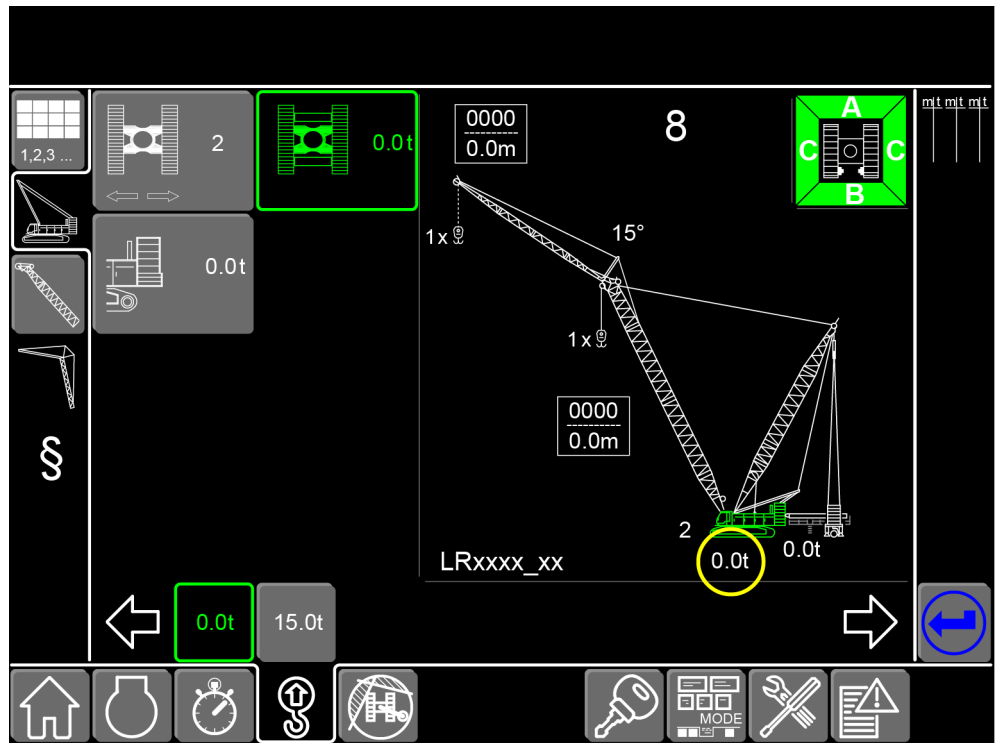
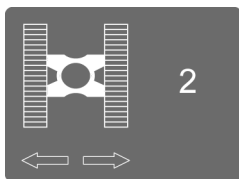


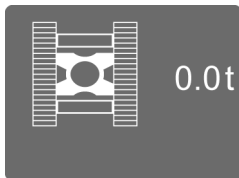
Fig. 1760: Screen Setup - basic machine



Track width

Select track width.

- 1: Narrow track
- 2: Wide track
- 3: Blocked crawlers



Carbody counterweight

Select weight of carbody counterweight.



Rear counterweight

Select weight of rear counterweight.



Smaller values

Switch to next smaller values.



Larger values

Switch to next larger values.



Value

Select value.

Screen Setup - main boom



Setup - main boom

Switch to *Setup - main boom* screen.

The screen *Setup - main boom* serves to define and confirm the main boom head, the main boom length and the reeving of the hook.

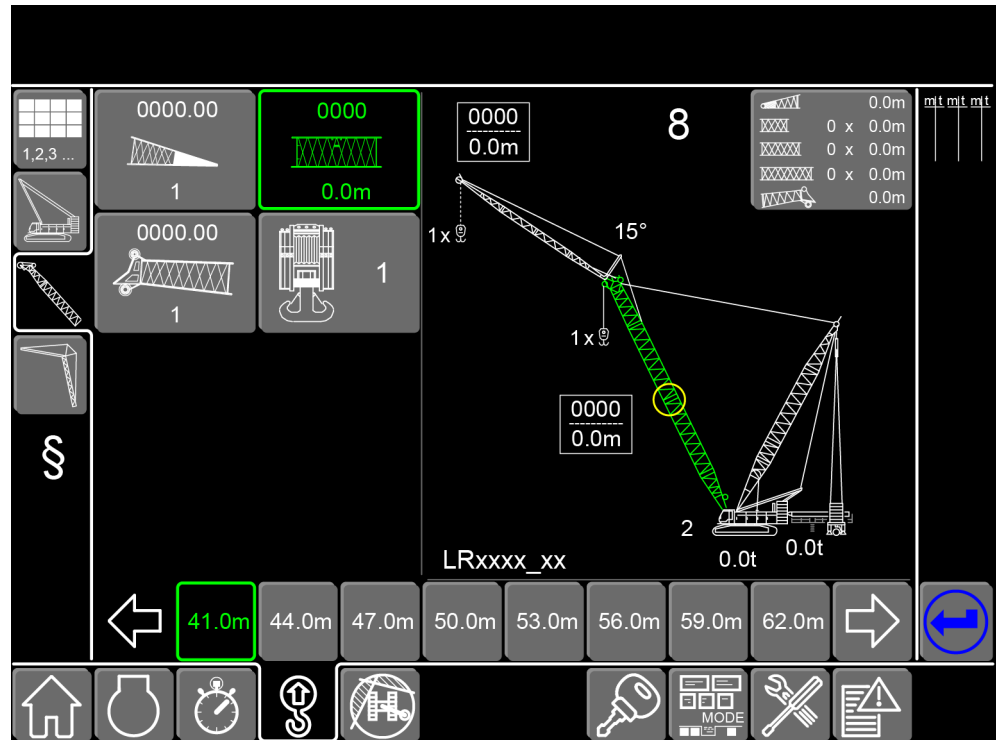
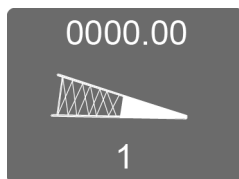
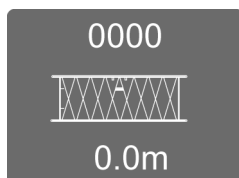


Fig. 1768: Screen Setup - main boom



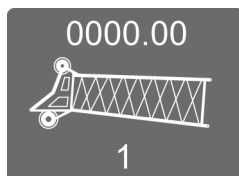
Main boom system dimension

Select main boom system dimension.



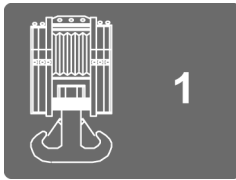
Main boom length

Select main boom length.



Main boom head

Select main boom head in line with foreword to the valid load chart.

**Rope reeving**

Select rope reeving.

**Smaller values**

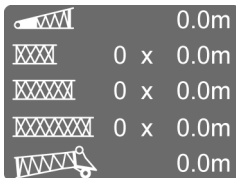
Switch to next smaller values.

**Larger values**

Switch to next larger values.

**Value**

Select value.

**Main boom components**

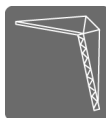
Button shows the composition of the main boom components and their lengths.

Switch to composition of the main boom components and their system dimensions.

**Main boom components**

Button shows the composition of the main boom components and their system dimensions.

Switch to composition of the main boom components and their lengths.

Setup - jib screen**Setup - jib**

Switch to the *Setup - jib* screen.

The *Setup - jib* screen serves to define and confirm the jib head, the jib length and the reeving of the load hook.

Setup screen

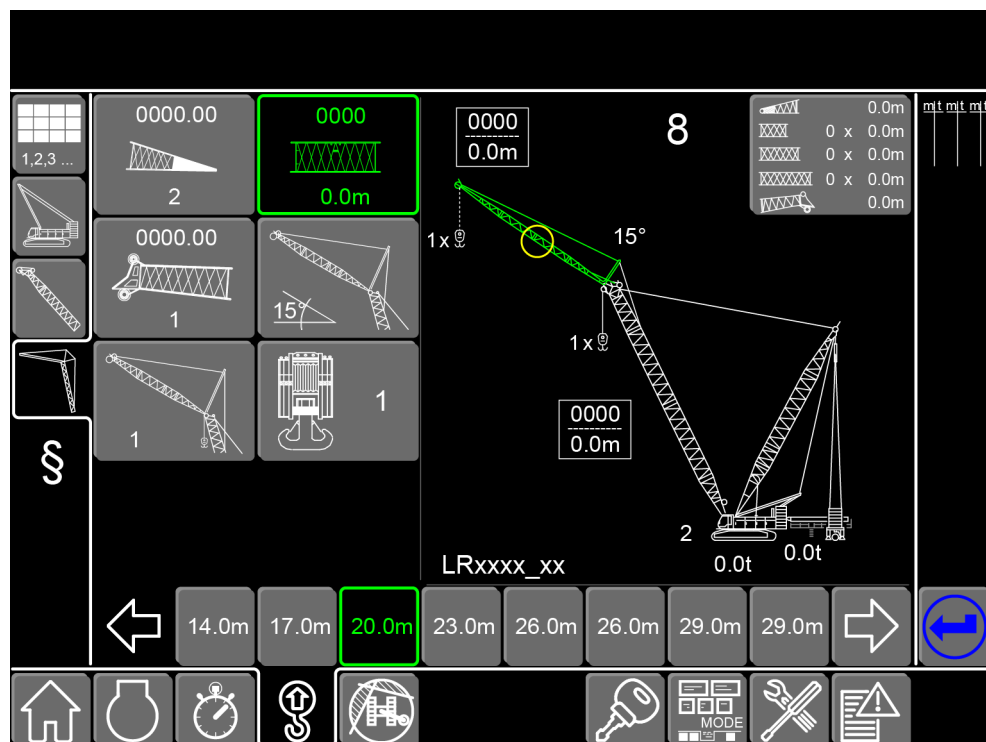
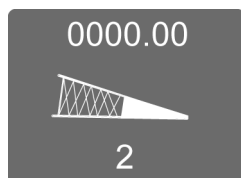
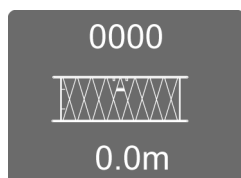


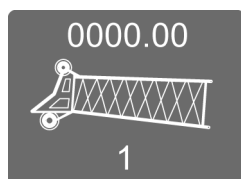
Fig. 1779: Screen Setup - jib

**System dimension of the jib**

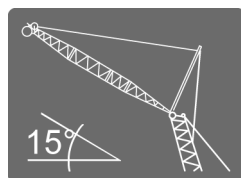
Select system dimension of the jib.

**Jib length**

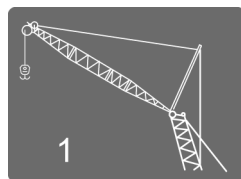
Select jib length.

**Jib head**

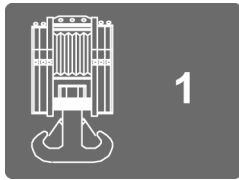
Select jib head in line with foreword to the valid load chart.

**Tensioning position**

Select tensioning position between jib and main boom in degrees.

**Load position**

Select load position.



Rope reeving
Select rope reeving.



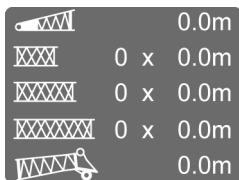
Smaller values
Switch to next smaller values.



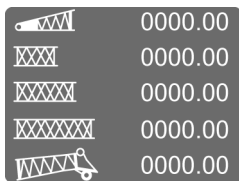
Larger values
Switch to next larger values.



Value
Select value.



Jib components
Button shows the composition of the jib components and their lengths.
Switch to composition of the jib components and their system dimensions.



Jib components
Button shows the composition of the jib components and their system dimensions.
Switch to composition of the jib components and their lengths.

3.20.9 Setup screen - boom configuration 9

Screen Setup - basic machine



Setup - basic machine
Switch to *Setup - basic machine* screen.

The screen *Setup - basic machine* serves to define and confirm the track width and counterweights.

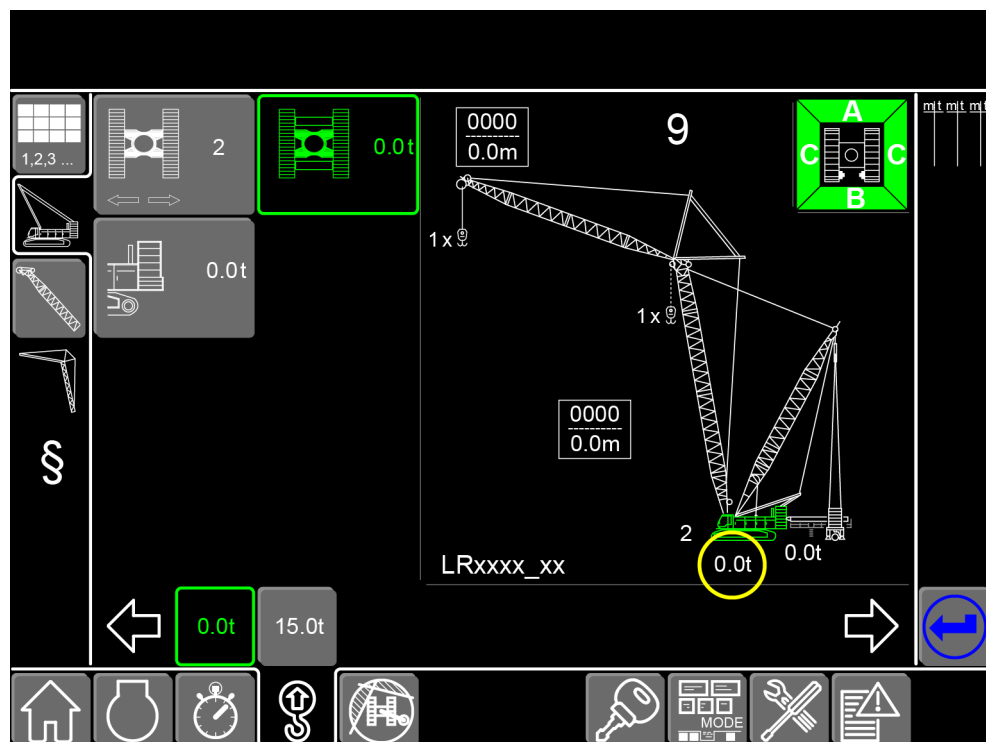
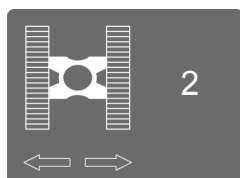


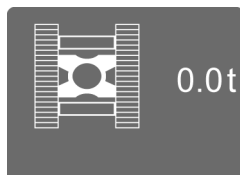
Fig. 1792: Screen Setup - basic machine



Track width

Select track width.

- 1: Narrow track
- 2: Wide track
- 3: Blocked crawlers



Carbody counterweight

Select weight of carbody counterweight.



Rear counterweight

Select weight of rear counterweight.



Smaller values

Switch to next smaller values.



Larger values

Switch to next larger values.



Value

Select value.

Screen Setup - main boom



Setup - main boom

Switch to *Setup - main boom* screen.

The screen *Setup - main boom* serves to define and confirm the main boom head, the main boom length and the reeving of the hook.

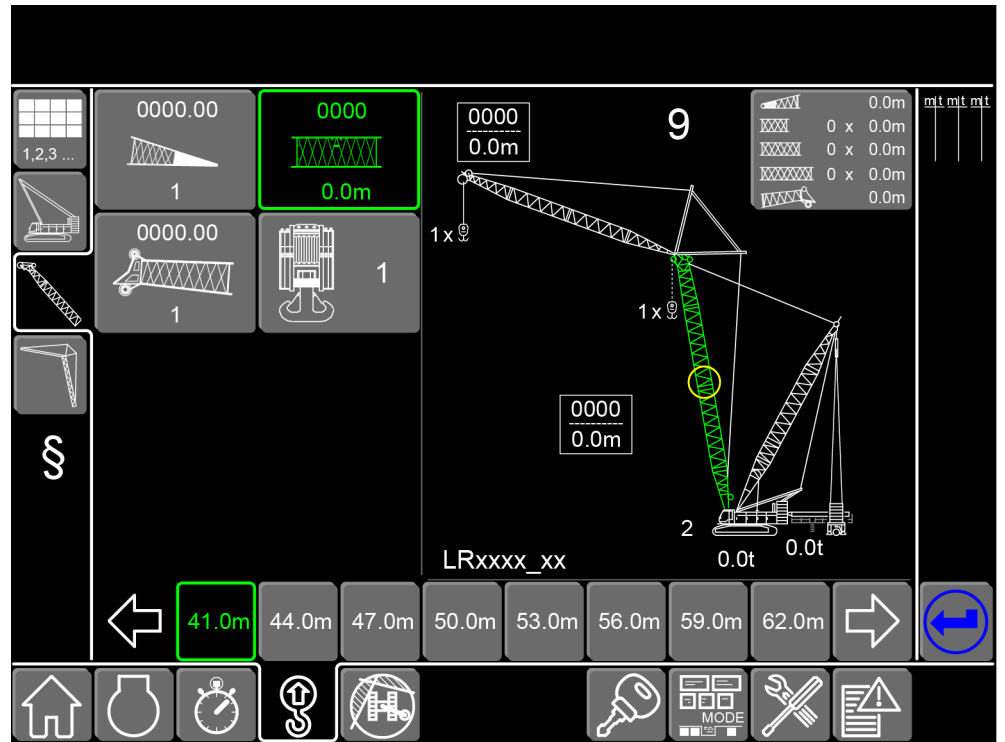
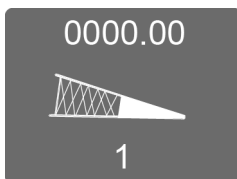
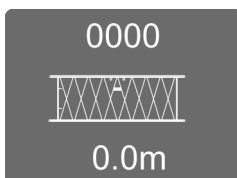


Fig. 1800: Screen Setup - main boom



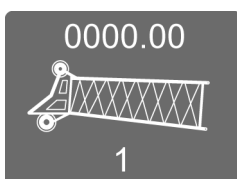
Main boom system dimension

Select main boom system dimension.



Main boom length

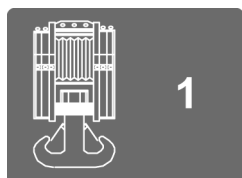
Select main boom length.



Main boom head

Select main boom head in line with foreword to the valid load chart.

Setup screen

**Rope reeving**

Select rope reeving.

**Smaller values**

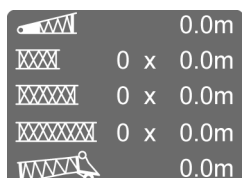
Switch to next smaller values.

**Larger values**

Switch to next larger values.

**Value**

Select value.

**Main boom components**

Button shows the composition of the main boom components and their lengths.

Switch to composition of the main boom components and their system dimensions.

**Main boom components**

Button shows the composition of the main boom components and their system dimensions.

Switch to composition of the main boom components and their lengths.

Setup - jib screen**Setup - jib**Switch to the *Setup - jib* screen.

The *Setup - jib* screen serves to define and confirm the jib head, the jib length and the reeving of the load hook.

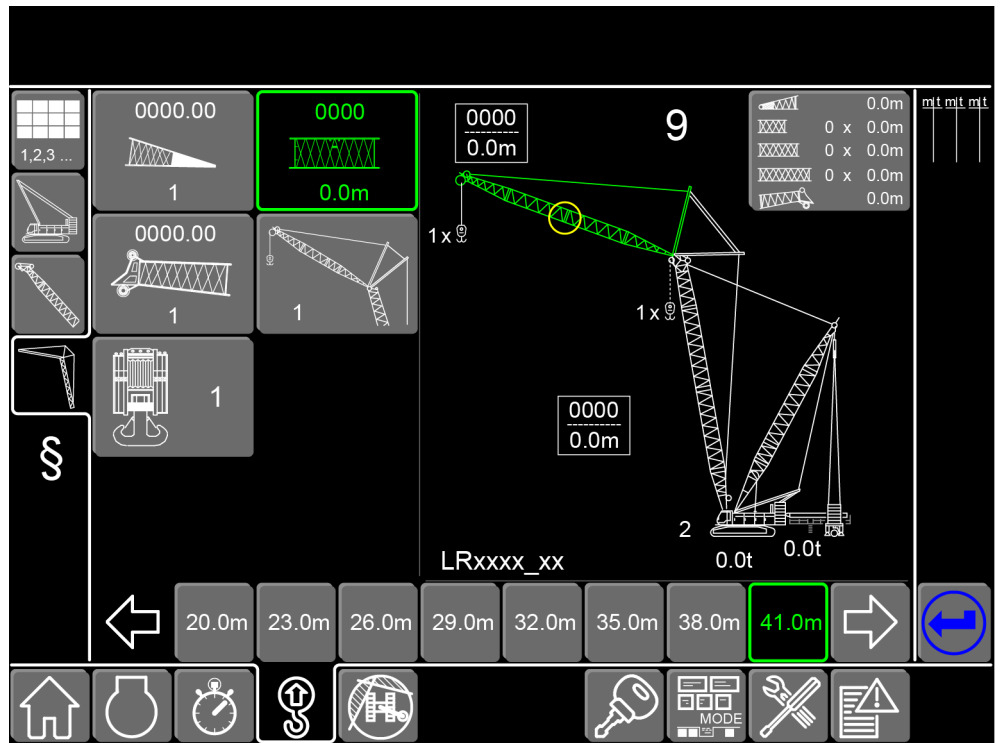
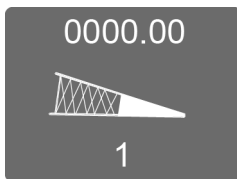
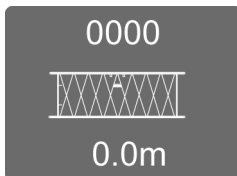


Fig. 1811: Screen Setup - jib



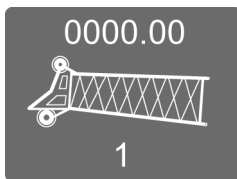
System dimension of the jib

Select system dimension of the jib.



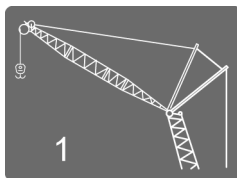
Jib length

Select jib length.



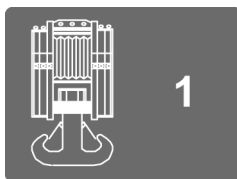
Jib head

Select jib head in line with foreword to the valid load chart.



Load position

Select load position.



Rope reeving

Select rope reeving.

Setup screen

**Smaller values**

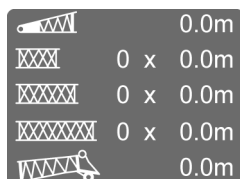
Switch to next smaller values.

**Larger values**

Switch to next larger values.

**Value**

Select value.

**Jib components**

Button shows the composition of the jib components and their lengths.

Switch to composition of the jib components and their system dimensions.

**Jib components**

Button shows the composition of the jib components and their system dimensions.

Switch to composition of the jib components and their lengths.

3.20.10 Setup - load chart screen

Switch to the *Setup - load chart* screen.

The *Setup - load chart* screen shows the radius and corresponding lifting capacity for the programmed setup.

VERSION: 00000000 000000 / ALPHA = 0.0°							
m	t	m	t	m	t	m	t
31.9	5.0	40.0	3.6	48.5	2.6	0.0	0.0
32.0	5.0	40.5	3.5	49.0	2.5	0.0	0.0
32.5	4.9	41.0	3.4	49.5	2.5	0.0	0.0
33.0	4.8	41.5	3.4	50.0	2.4	0.0	0.0
33.5	4.7	42.0	3.3	50.5	2.4	0.0	0.0
34.0	4.6	42.5	3.2	51.0	2.3	0.0	0.0
34.5	4.5	43.0	3.2	51.5	2.3	0.0	0.0
35.0	4.4	43.5	3.1	52.0	2.2	0.0	0.0
35.5	4.3	44.0	3.1	52.5	2.2	0.0	0.0
36.0	4.2	44.5	3.0	53.0	2.1	0.0	0.0
36.5	4.1	45.0	2.9	53.5	2.1	0.0	0.0
37.0	4.0	45.5	2.9	54.0	2.0	0.0	0.0
37.5	4.0	46.0	2.8	54.5	2.0	0.0	0.0
38.0	3.9	46.5	2.8	0.0	0.0	0.0	0.0
38.5	3.8	47.0	2.7	0.0	0.0	0.0	0.0
39.0	3.7	47.5	2.7	0.0	0.0	0.0	0.0
39.5	3.7	48.0	2.6	0.0	0.0	0.0	0.0

Fig. 1823: Setup - load chart screen

- | | | | |
|---|------------------------------|---|---|
| 1 | Value of the smallest radius | 3 | Main boom angle alpha or differential angle gamma |
| 2 | Load chart version | 4 | Invalid values |

The value of the smallest radius is specified exactly. All other values are rounded to whole numbers.

Invalid values are listed in the table with a 0.0

Gamma is the calculated difference in angle between main boom angle Alpha and jib angle Beta.

3.21 Screen *Working range limitation*



Working range limitation

Switch to the *Working range limitation* screen.

3.21.1 Screen *Working range limitation - working range limitation*



Working range limitation - working range limitation

Switch to the *Working range limitation - working range limitation* screen.

The *Working range limitation - working range limitation* screen provides settings for limiting the working range of the swing and the booms of the machine. The working range limitations are programmed by approaching the stop positions and pressing the button stop position.

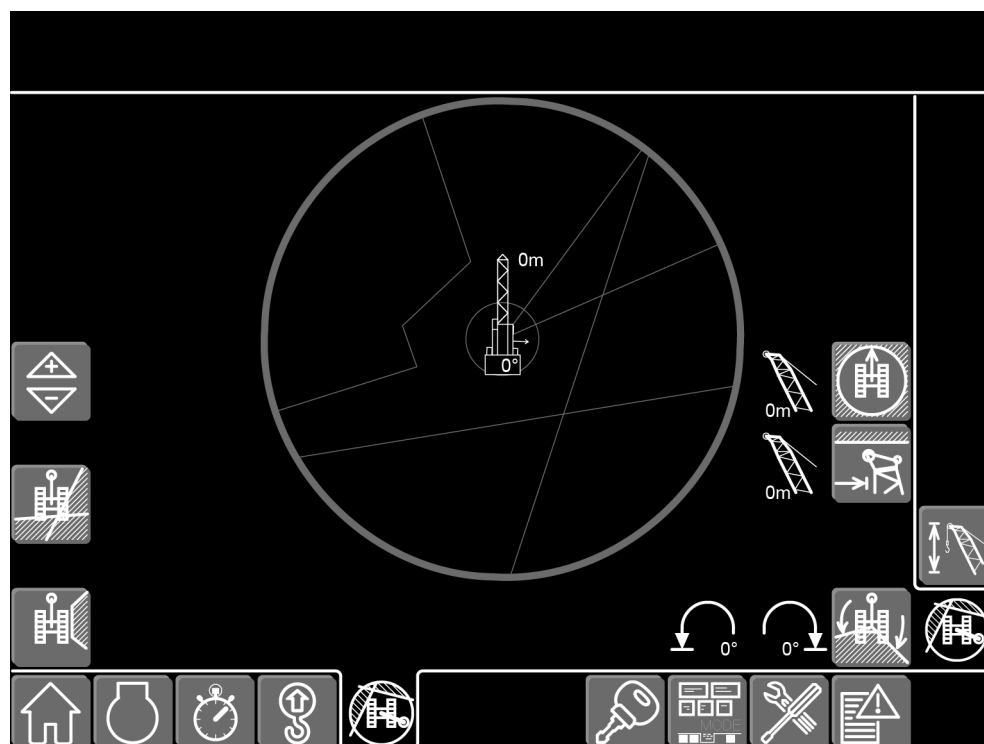


Fig. 1826: Screen *Working range limitation - working range limitation - main boom - limitations turned off*

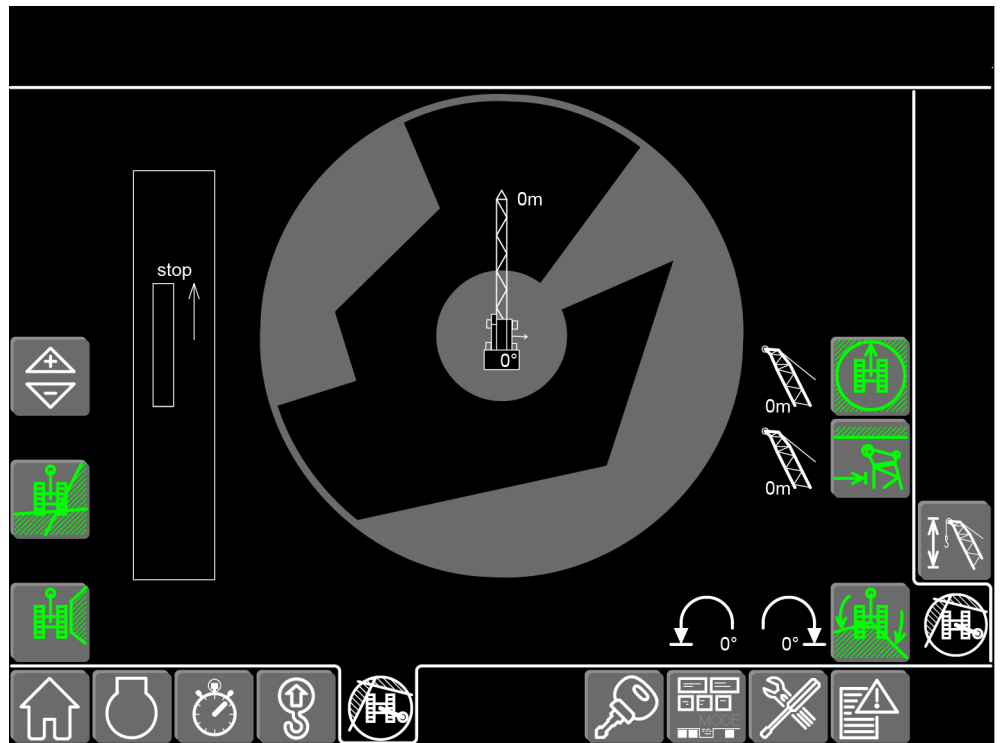


Fig. 1827: Screen Working range limitation - working range limitation - main boom - limitations turned on

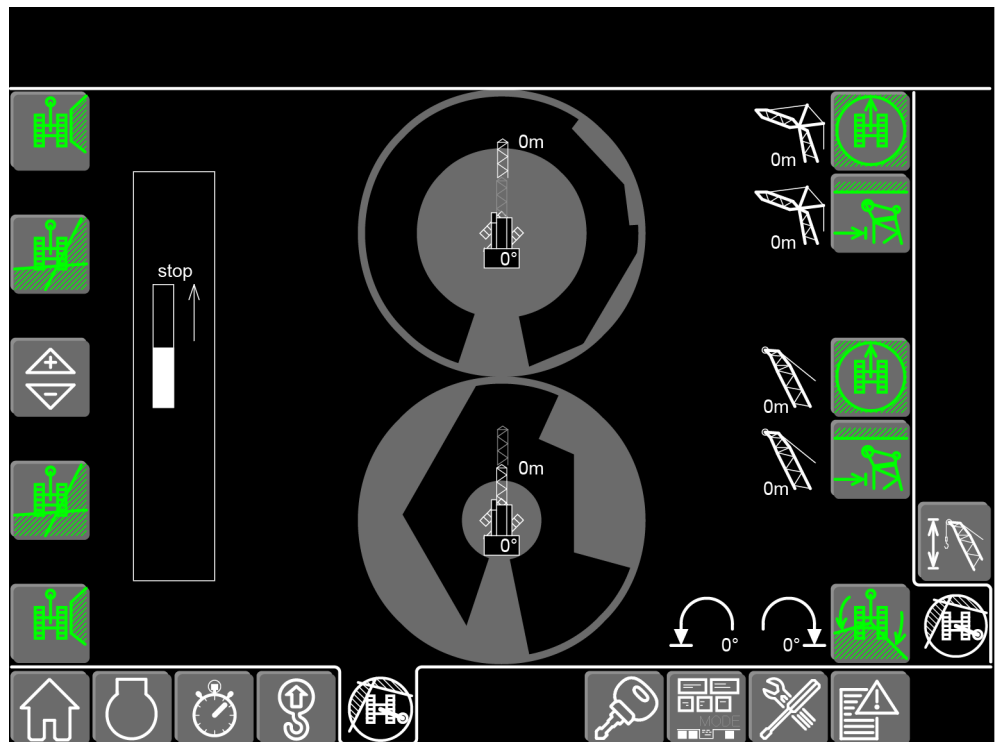


Fig. 1828: Screen Working range limitation - working range limitation - main boom and jib - limitations turned on

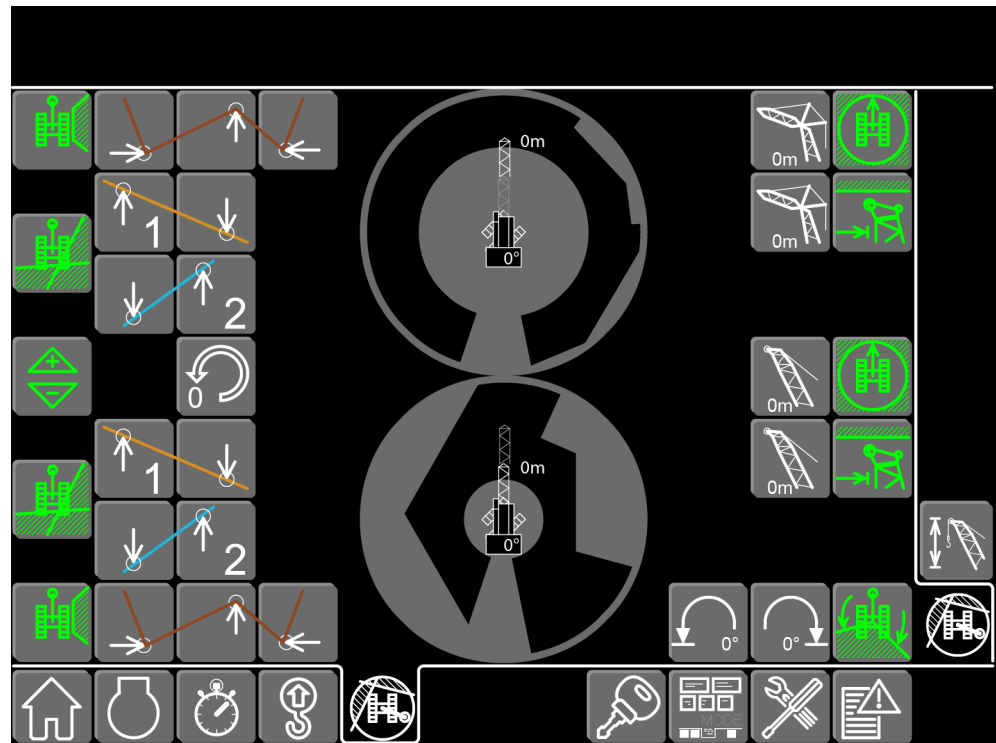


Fig. 1829: Screen Working range limitation - working range limitation - main boom and jib - program stop positions

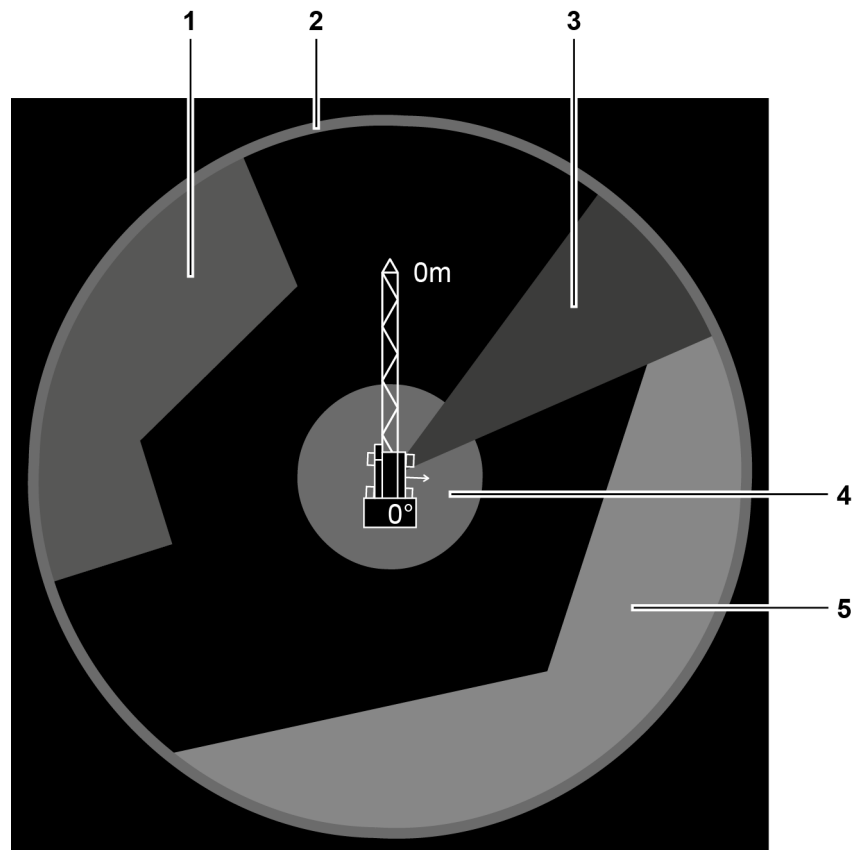


Fig. 1830: Screen section Working range limitation (illustration of principle)

1 Sector limitation

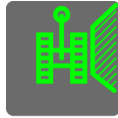
4 Radius limitation minimum radius

See next page for continuation of the image legend

- 2 Radius limitation maximum radius 5 Edge limitation
 3 Slewing range limitation

**Sector limitation**

Activate last programmed sector limitation.

**Sector limitation (lit green)**

Deactivate last programmed sector limitation.

**Sector limitation - stop position1**

Program stop position1 of the sector limitation.

**Sector limitation - stop position2**

Program stop position2 of the sector limitation.

**Sector limitation - stop position3**

Program stop position3 of the sector limitation.

**Edge limitation**

Activate last programmed edge limitation.

**Edge limitation (lit green)**

Deactivate last programmed edge limitation.

**Edge limitation - edge1 - stop position1**

Edge1 - program stop position1 of edge limitation.

**Edge limitation - edge1 - stop position2**

Edge1 - program stop position2 of edge limitation.

**Edge limitation - edge2 - stop position1**

Edge2 - program stop position1 of edge limitation.

**Edge limitation - edge2 - stop position2**

Edge2 - program stop position2 of edge limitation.

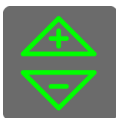
**Programming**

Show buttons of the stop positions.

The following stop positions are available:

- Edge limitation
- Sector limitation
- Boom radius limitation

– Swing limitation



Programming (lit green)

Hide buttons of the stop positions.



Programming (lit red)

Machine was moved and working range limitation must be reprogrammed.



Resetting limitations

Reset all limitations. Button must be pressed for more than 1 second.



Stop position maximum radius jib

Shows the last programmed stop position of the jib's maximum radius.



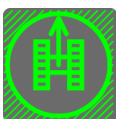
Stop position maximum radius jib

Program the stop position of the jib's maximum radius.



Radius limitation maximum jib radius

Activate last programmed radius limitation maximum jib radius.



Radius limitation maximum jib radius (lit green)

Deactivate last programmed radius limitation maximum jib radius.



Stop position minimum radius jib

Shows the last programmed stop position of the jib's minimum radius.



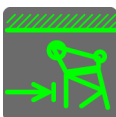
Stop position minimum radius jib

Program the stop position of the jib's minimum radius.



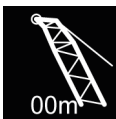
Radius limitation minimum jib radius

Activate last programmed radius limitation minimum jib radius.



Radius limitation minimum jib radius (lit green)

Deactivate last programmed radius limitation minimum jib radius.



Stop position maximum radius main boom

Shows the last programmed stop position of the main boom's maximum radius.



Stop position maximum radius main boom

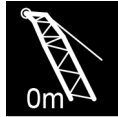
Program the stop position of the main boom's maximum radius.

**Radius limitation maximum main boom radius**

Activate last programmed radius limitation maximum main boom radius.

**Radius limitation maximum main boom radius (lit green)**

Deactivate last programmed radius limitation maximum main boom radius.

**Stop position minimum radius main boom**

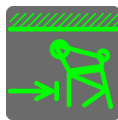
Shows the last programmed stop position of the main boom's minimum radius.

**Stop position minimum radius main boom**

Program the stop position of the main boom's minimum radius.

**Radius limitation minimum main boom radius**

Activate last programmed radius limitation minimum main boom radius.

**Radius limitation minimum main boom radius (lit green)**

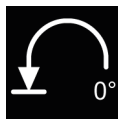
Deactivate last programmed radius limitation minimum main boom radius.

**Slewing range limitation**

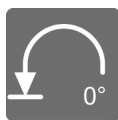
Activate last programmed slewing range limitation.

**Slewing range limitation (lit green)**

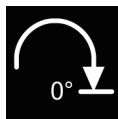
Deactivate last programmed slewing range limitation.

**Slewing range limitation - left stop position**

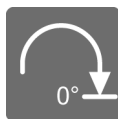
Shows the last programmed left stop position of the slewing range limitation.

**Slewing range limitation - left stop position**

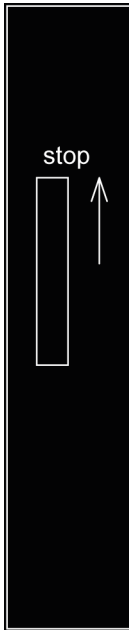
Program left stop position of slewing range limitation.

**Slewing range limitation -right stop position**

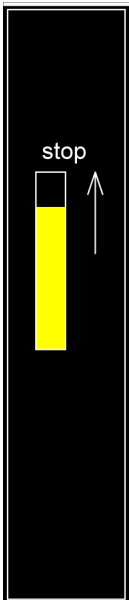
Shows the last programmed right stop position of the slewing range limitation.

**Slewing range limitation -right stop position**

Program right stop position of slewing range limitation.

**Bar display working range limitation**

Stop position is more than 5 m (16' 5" ft-in) away.

**Bar display working range limitation (lit yellow)**

Stop position reached.



Bar display working range limitation (lit red)

Stop position reached.

The reached stop positions are displayed.

3.21.2 Screen *Working range limitation - lifting height limitation*



Working range limitation - lifting height limitation

Switch to the *Working range limitation - lifting height limitation* screen.

The screen *Working range limitation - lifting height limitation* offers settings for the lifting height limitation of winch1 and winch2.

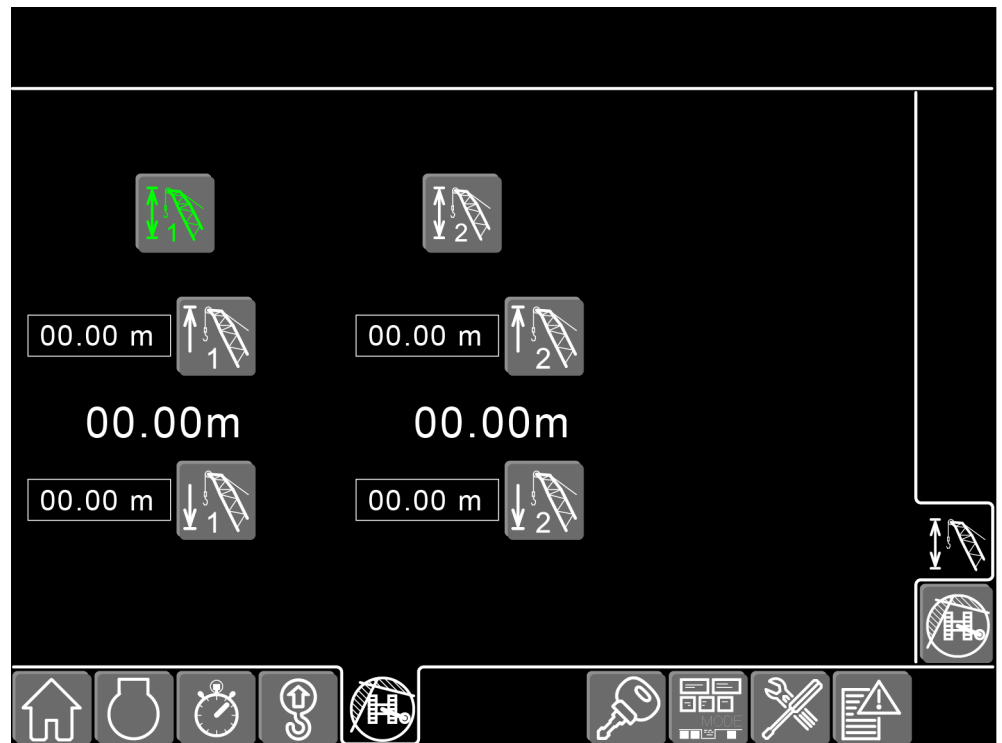


Fig. 1872: Screen *Working range limitation - lifting height limitation*

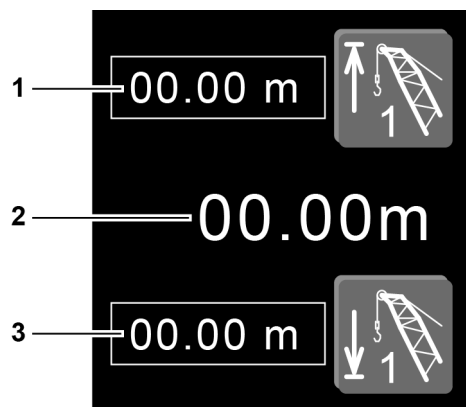


Fig. 1873: Screen section Lifting height limitation winch1

- | | | | |
|---|----------------------------------|---|--------------------------------|
| 1 | Top stop position of winch1 | 3 | Bottom stop position of winch1 |
| 2 | Current lifting height of winch1 | | |

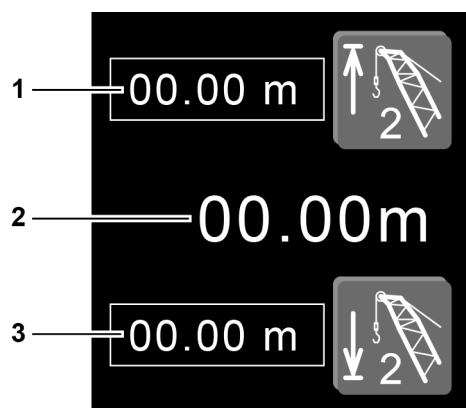


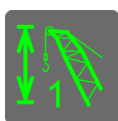
Fig. 1874: Screen section Lifting height limitation winch2

- | | | | |
|---|----------------------------------|---|--------------------------------|
| 1 | Top stop position of winch2 | 3 | Bottom stop position of winch2 |
| 2 | Current lifting height of winch2 | | |



Lifting height limitation winch1

Activate last programmed lifting height limitation of winch1.



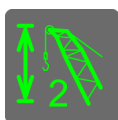
Lifting height limitation winch1 (lit green)

Deactivate last programmed lifting height limitation of winch1.



Lifting height limitation winch2

Activate last programmed lifting height limitation of winch2.



Lifting height limitation winch2 (lit green)

Deactivate last programmed lifting height limitation of winch2.



Lifting height limitation winch1 - top stop position

Program top stop position of lifting height limitation of winch1.

**Lifting height limitation winch1 - bottom stop position**

Program bottom stop position of lifting height limitation of winch1.

**Lifting height limitation winch2 - top stop position**

Program top stop position of lifting height limitation of winch2.

**Lifting height limitation winch2 - bottom stop position**

Program bottom stop position of lifting height limitation of winch2.

3.22 Screen Access control



Access control

Switch to the *Access control* screen.

The *Access control* screen serves to manage and/or control access to the machine.

3.22.1 Without retrofit kit access control (black ignition keys)

This situation occurs under the following conditions:

- Machine was delivered with software without the *Access control* screen.
- Machine was delivered with black ignition keys.
- Machine receives a retrospective software update and now features the *Access control* screen.
- Retrofit kit access control was not purchased.

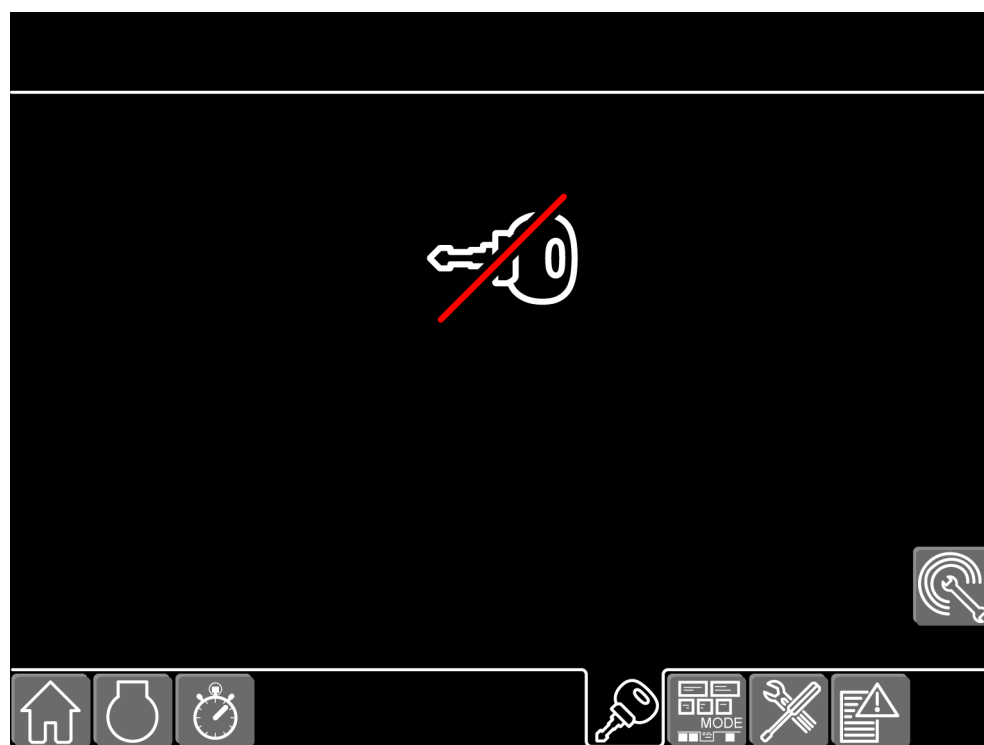


Fig. 1884: Access control screen - without retrofit kit access control (black ignition keys)



Remote service

Turn on the remote service.



Remote service (lit green)

Turn off the remote service.

3.22.2 Without retrofit kit access control (blue ignition keys)

This situation occurs under the following conditions:

- Machine was delivered with current software with the *Access control* screen.
- Machine was delivered with blue, user-specific ignition keys.
- Retrofit kit access control was not purchased.

Each blue, user-specific ignition key allows operating the machine.

Each blue, user-specific ignition key can be assigned a name.

An access control of an individual ignition key cannot be defined.

The maximum number of blue, user-specific ignition keys is 50.



Fig. 1887: Access control screen - without retrofit kit access control (blue ignition keys)

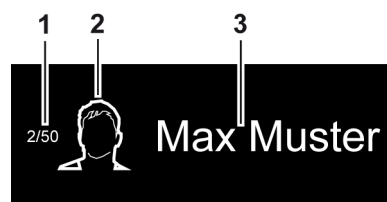


Fig. 1888: Screen section User

- | | |
|--|----------------------------------|
| <p>1 Second ignition key of max. 50 possible ones</p> <p>2 User without access control</p> | <p>3 Name of the user</p> |
|--|----------------------------------|



Keypad

Show keyboard for changing the name.

**Remote service**

Turn on the remote service.

**Remote service (lit green)**

Turn off the remote service.

3.22.3 With retrofit kit access control (red and blue ignition keys)*

This situation occurs under the following conditions:

- Machine was delivered with current software with the *Access control* screen.
- Machine was delivered with a red administrator ignition key and blue, user-specific ignition keys.
- Retrofit kit access control was purchased.

Only the red administrator ignition key functions when the machine is commissioned.

Each blue, user-specific ignition key must first be authorized by the administrator, thus guaranteeing access control.

The maximum number of blue, user-specific ignition keys is 50.



Fig. 1892: Screen Access control - with retrofit kit access control (access with red administrator ignition key)

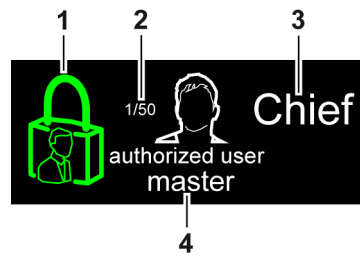


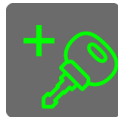
Fig. 1893: Screen section Administrator

- | | |
|---|--|
| <p>1 Retrofit kit access control</p> <p>2 First ignition key of max. 50 possible ones</p> | <p>3 Name of administrator</p> <p>4 Administrator with access control (red ignition key)</p> |
|---|--|



Keypad

Show keyboard for changing the name.



Authorize ignition key (lit green)

Authorize blue, user-specific ignition key.



Delete authorization of an ignition key (lit red)

Remove the authorization of a blue, user-specific ignition key.



Delete authorization of all ignition keys (lit red)

Delete authorization of all blue, user-specific ignition keys.



Remote service

Turn on the remote service.



Remote service (lit green)

Turn off the remote service.



Fig. 1900: Access control screen - with retrofit kit access control (access with blue, user-specific ignition key)

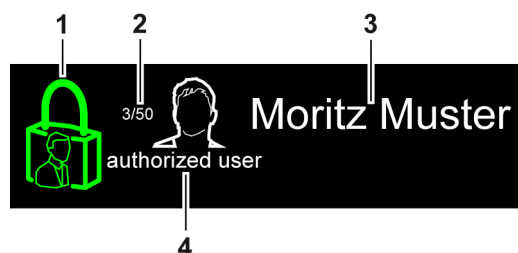


Fig. 1901: Screen section Authorized user

- | | | | |
|---|---|---|-----------------------------|
| 1 | Retrofit kit access control | 3 | Name of the authorized user |
| 2 | Third ignition key of max. 50 possible ones | 4 | Authorized user |



Keypad

Show keyboard for changing the name.



Remote service

Turn on the remote service.



Remote service (lit green)

Turn off the remote service.

3.23 Mode screen



Mode

Switch to the *Mode* screen.

The *Mode* screen informs the machine operator about the modes that can be selected on this machine. The currently selected mode is displayed in green.

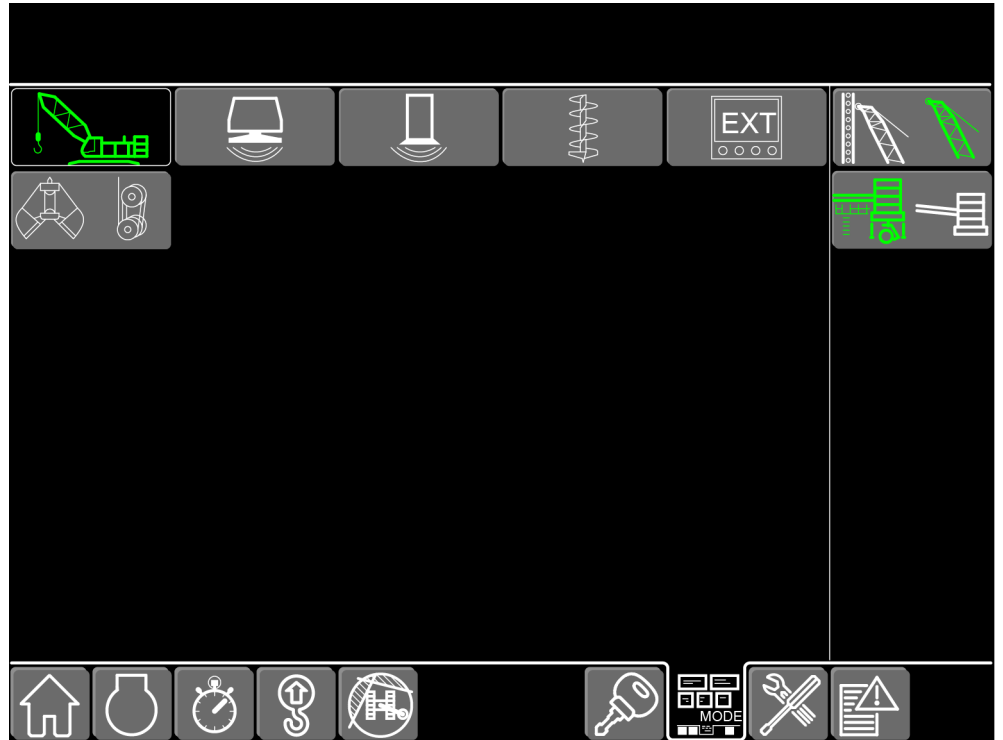


Fig. 1906: Mode screen



Crane operation

Select crane operation mode.



Vibrator operation

Select vibrator operation mode.



Hammer operation

Select hammer operation mode.



Drilling operation

Select rotary drive mode.

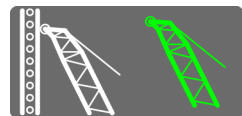
Mode screen

**External control**

Select external control mode.

**Mechanical grab mode**

Select mechanical grab mode.

**Leader mode**

Select leader mode.

**Counterweight carriage/suspended counterweight (only in derrick mode)**

Select counterweight carriage or suspended counterweight.

**Confirmation**

Confirm input.

**Restarting machine**

Restart machine to save the selected mode.

3.24 Settings screen



Settings

Switch to the *Settings* screen.

3.24.1 Screen *Settings - components*



Settings - components

Switch to the *Settings - components* screen.

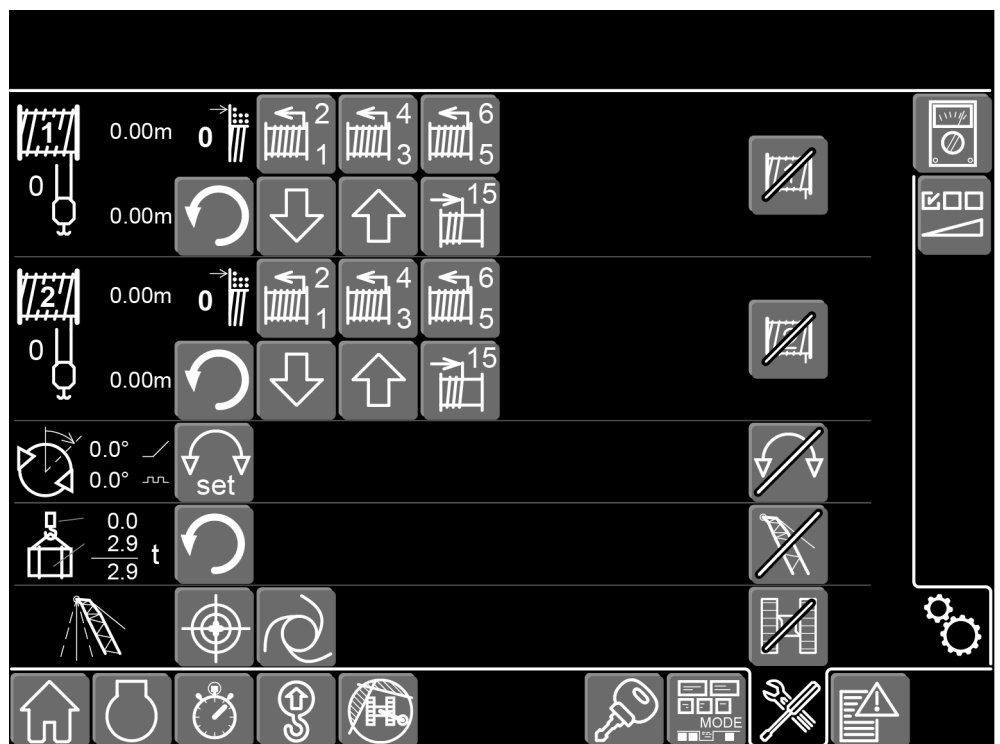


Fig. 1919: *Settings - components* screen

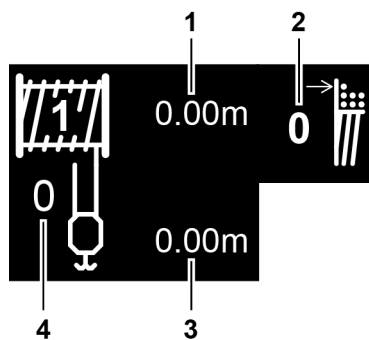


Fig. 1920: *Screen clipping Winch1*

- | | | | |
|---|--------------------------------|---|--------------------------------|
| 1 | Absolute length of winch1 rope | 3 | Relative length of winch1 rope |
| 2 | Position of winch1 rope | 4 | Reeving of winch1 rope |

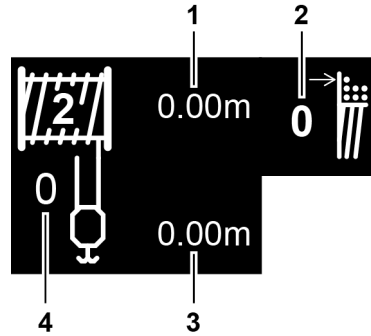


Fig. 1921: Screen clipping Winch2

- 1 Absolute length of winch2 rope
- 2 Position of winch2 rope
- 3 Relative length of winch2 rope
- 4 Reeving of winch2 rope

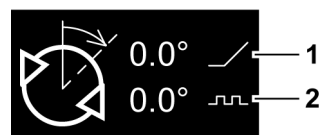


Fig. 1922: Swing angle transmitter screen clipping

- 1 Analog swing angle signal
- 2 Digital swing angle signal

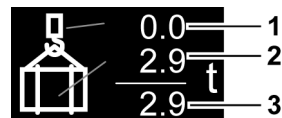


Fig. 1923: Load display screen clipping

- 1 Weight of empty hook and rope of winch1/winch2
- 2 Weight of load
- 3 Total weight



Setting to zero

Set relative rope length of the selected winch to zero. Button must be pressed for more than 1 s.

On the load display, set the weight of winch1/winch2 rope and pulley block and/or empty hook to zero.



Reset load display (lit green)

Reset load display to total weight. Button must be pressed for more than 1 s.



Programing rope layer change 1-2

Program layer change of selected winch from first to second rope layer. Button must be pressed for more than 1 s.



Programing rope layer change 3-4

Program layer change of selected winch from third to fourth rope layer. Button must be pressed for more than 1 s.



Programing rope layer change 5-6

Program layer change of selected winch from fifth to sixth rope layer. Button must be pressed for more than 1 s.

**Reducing reeving**

Reduce reeving of the selected winch.

**Increasing reeving**

Increase reeving of the selected winch.

**Setting the rope length to 15 windings**

Set length of rope of selected winch to 15 windings. Button must be pressed for more than 1 s.

**Synchronizing the swing angle transmitter**

Synchronize the digital swing angle signal with the analog swing angle signal. Button must be pressed for more than 1 s.

**Setting the deviation of the Vertical Line Finder to zero**

Set deviations of Vertical Line Finder to zero. Button must be pressed for more than 1 s.

**Vertical Line Finder**

Activate positioning of boom head above load's center of gravity. Button must be pressed for more than 1 s.

**Vertical Line Finder (lit green)**

Deactivate positioning of boom head above load's center of gravity. Button must be pressed for more than 1 s.

**Vertical Line Finder (lit red)**

Positioning the boom head above the load's center of gravity is locked. Deviations of the Vertical Line Finder must be corrected.

**Locking or unlocking winch1**

Lock winch1. Button must be pressed for more than 1 s.

**Locking or unlocking winch1 (lit red)**

Unlock winch1. Button must be pressed for more than 1 s.

**Locking or unlocking winch2**

Lock winch2. Button must be pressed for more than 1 s.

**Locking or unlocking winch2 (lit red)**

Unlock winch2. Button must be pressed for more than 1 s.

**Locking or unlocking the swing**

Lock the swing. Button must be pressed for more than 1 s.

**Locking or unlocking swing (lit red)**

Unlock swing. Button must be pressed for more than 1 s.

**Locking or unlocking boom**

Lock boom. Button must be pressed for more than 1 s.

**Locking or unlocking boom (lit red)**

Unlock boom. Button must be pressed for more than 1 s.

**Locking or unlocking the crawler**

Lock crawler. Button must be pressed for more than 1 s.

**Locking or unlocking crawler (lit red)**

Unlock crawler. Button must be pressed for more than 1 s.

3.24.2 Settings - units screen

**Settings - units**

Switch to the *Settings - units* screen.

The screen *Settings - units* offers settings for the monitor and the control levers.



Fig. 1948: Settings - units screen

**Unit weight**

Switch the weight unit.

**Unit weight**

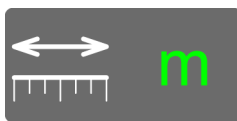
Switch the weight unit.

**Unit temperature**

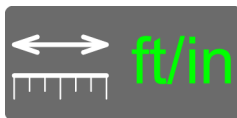
Switch the temperature unit.

**Unit temperature**

Switch the temperature unit.

**Unit length**

Switch the length unit.

**Unit length**

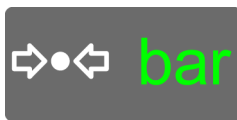
Switch the length unit.

**Unit speed**

Switch the speed unit.

**Unit speed**

Switch the speed unit.

**Unit pressure**

Switch the pressure unit.

**Unit pressure**

Switch the pressure unit.

**Unit volume**

Switch the volume unit.

**Unit volume**

Switch the volume unit.

**Format date**

Switch the date format.

**Format date**

Switch the date format.

**Format date**

Switch the date format.

**Format time**

Switch the time format to 24 hours.

**Format time**

Switch the time format to 12 hours.

**Rope length measurement**

Switch to rope length measurement.

**Lifting height measurement**

Switch to lifting height measurement.

**Vibrator winch1**

Activate the vibrator on the control lever for winch1.

**Vibrator winch1 (lit green)**

Deactivate the vibrator on the control lever for winch1.

**Vibrator winch2**

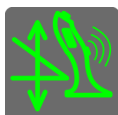
Activate the vibrator on the control lever for winch2.

**Vibrator winch2 (lit green)**

Deactivate the vibrator on the control lever for winch2.

**Boom vibrator**

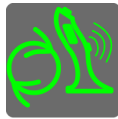
Activate the vibrator on the control lever for the boom.

**Boom vibrator (lit green)**

Deactivate the vibrator on the control lever for the boom.

**Swing vibrator**

Activate the vibrator on the control lever for the swing.

**Swing vibrator (lit green)**

Deactivate the vibrator on the control lever for the swing.

**Vibrator additional winch**

Activate the vibrator on the control lever for the additional winch.

**Additional winch vibrator (lit green)**

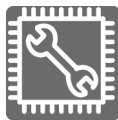
Deactivate the vibrator on the control lever for the additional winch.

**SCOTTI language**

Switch to the *SCOTTI language* screen.

**SCOTTI time zone**

Switch to the *SCOTTI time zone* screen.

**SCOTTI start page**

Switch to the *SCOTTI start page* screen.

**Reducing the volume**

Reduces the volume of the warning signal.

**Increasing the volume**

Increases the volume of the warning signal.

**Inverting the monitor**

Inverts the monitor for night work.

**Reducing the brightness**

Reduces the brightness of the monitor.

**Increasing the brightness**

Increases the brightness of the monitor.

3.24.3 Screen Settings - Litronic testing system

**Settings - Litronic testing system**

Switch to the *Settings - Litronic testing system* screen.

The *Settings - Litronic testing system* screen shows inputs and outputs, markers, intrasystem variables and machine statuses.

Menu bar

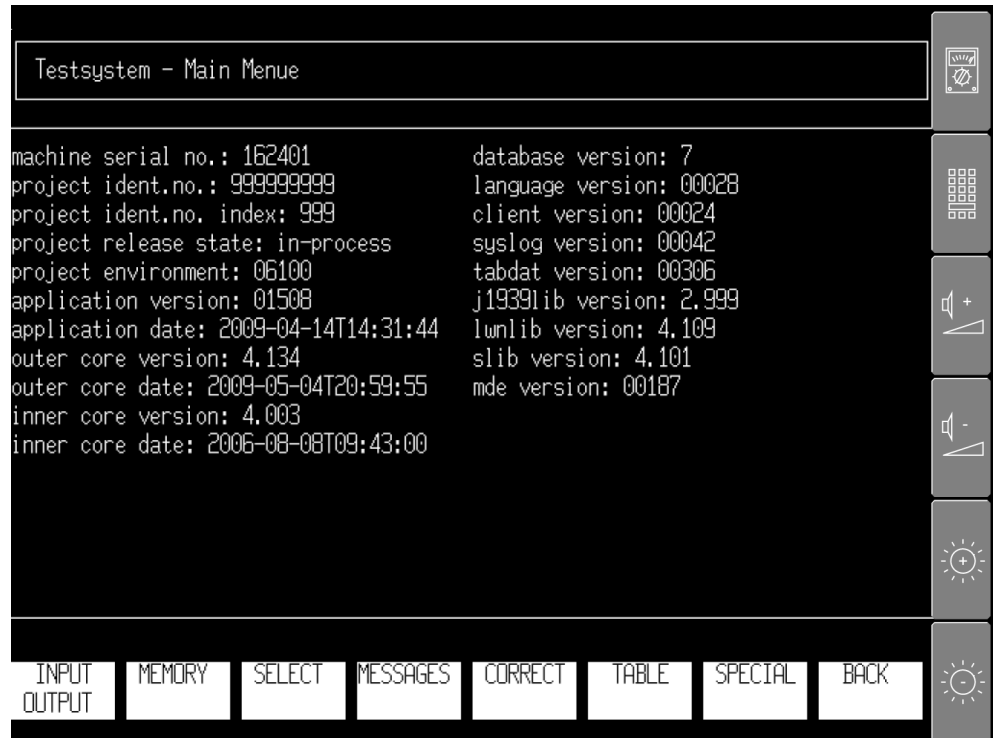


Fig. 1987: Settings - Litronic testing system screen with menu bar



Settings - Litronic testing system

Switch to the *Settings - Litronic testing system* screen.



Keyboard menu

Switch to keyboard menu ([For more information see: Keyboard menu, page 821](#)).



Increasing the volume of the warning buzzer

Increase the volume of the warning buzzer.



Decreasing the volume of the warning buzzer

Decrease the volume of the warning buzzer.



Increasing the brightness of the monitor

Increase the brightness of the monitor (3 stages).



Decreasing the brightness of the monitor

Decrease the brightness of the monitor (3 stages).

Keyboard menu

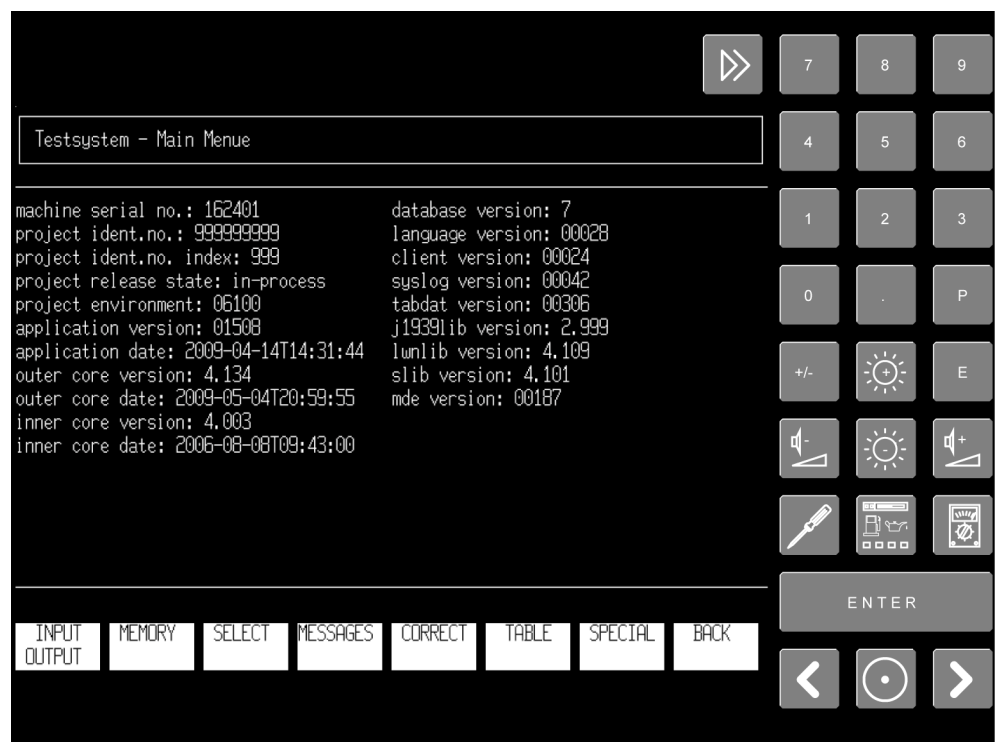


Fig. 1994: Settings - Litronic testing system screen with keyboard menu



Minimize

Switch to menu bar ([For more information see: Menu bar, page 820](#)) .

Settings screen

**Numbers**

Enter numbers.

**Decimal point**

Enter comma.

**Powers**

Select potencies.

**Inverting numbers**

Invert numbers.

**Exponential numbers**

Select exponents.

**Increasing the brightness of the monitor**

Increase the brightness of the monitor (3 stages).

**Decreasing the brightness of the monitor**

Decrease the brightness of the monitor (3 stages).

**Increasing the volume of the warning buzzer**

Increase the volume of the warning buzzer.

**Decreasing the volume of the warning buzzer**

Decrease the volume of the warning buzzer.

**Settings - Litronic testing system - correction values**Switch to the *Settings - Litronic testing system - correction values* screen.**Screen**

Switch to the last selected screen.

**Settings - Litronic testing system**Switch to screen *Settings - Litronic testing system*.**Enter**

Apply entered values.

**Back**

Change to previous input field.

**Continue**

Change to next input field.

**Testing system screen**

Switch to the monitor testing system.

3.25 Error messages screen



Error messages

Switch to the *Error messages* screen.

The *Error messages* screen informs in the local language about errors in/on the machine.

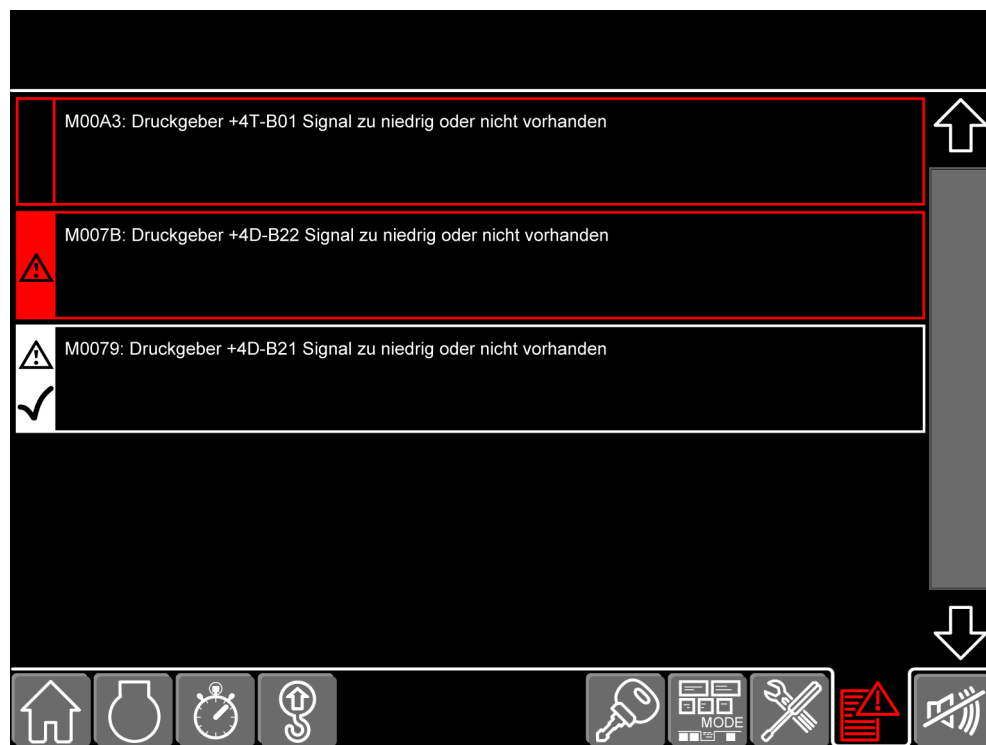



Fig. 2013: Error messages screen



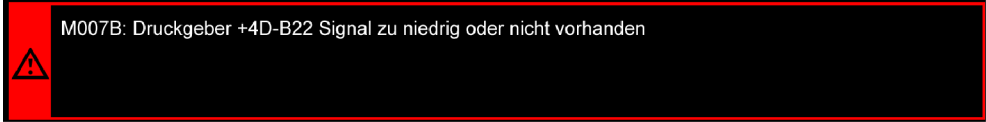
Scrollbar

Navigate through the error messages. The scrollbar is activated as of five error messages.



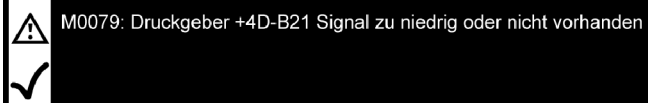
M00A3: Druckgeber +4T-B01 Signal zu niedrig oder nicht vorhanden

Fig. 2015: Error already remedied - not yet acknowledged (lit red)



M007B: Druckgeber +4D-B22 Signal zu niedrig oder nicht vorhanden

Fig. 2016: Error message - not acknowledged (lit red)



M0079: Druckgeber +4D-B21 Signal zu niedrig oder nicht vorhanden

Fig. 2017: Error message - acknowledged

3.26 Cable remote control

The cable remote control can be connected on the uppercarriage or on the undercarriage.

3.26.1 Cable remote control on uppercarriage

If the cable remote control is connected to the uppercarriage, the pin connection cylinders for the main boom base section and the counterweight hoisting cylinders can be operated.

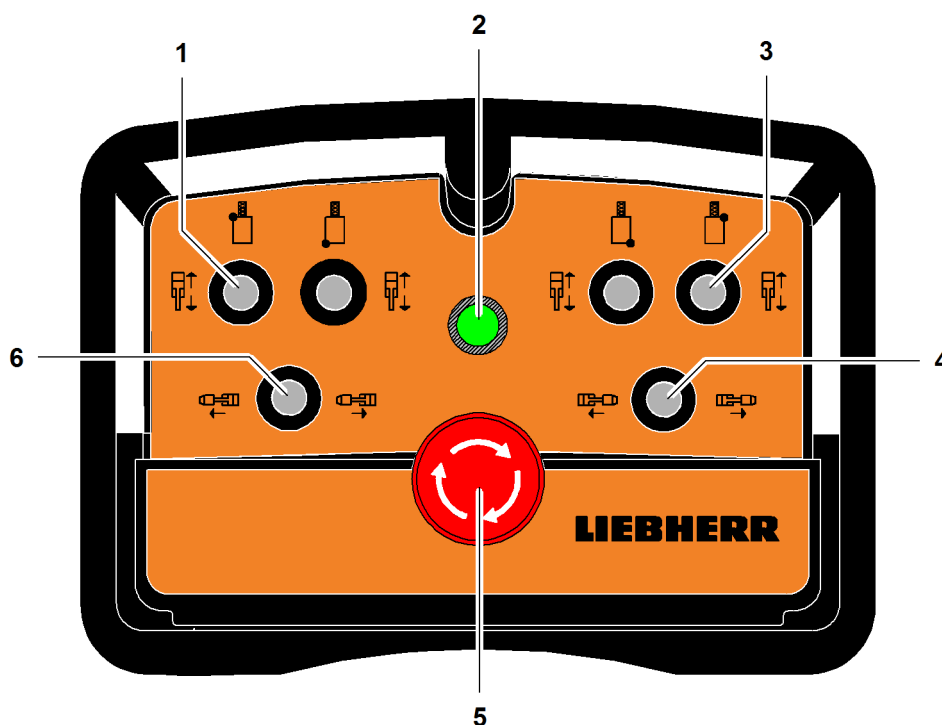


Fig. 2018: Cable remote control on uppercarriage

- | | | | |
|---|--|---|--|
| 1 | Toggle switch <i>Left counterweight hoisting cylinder</i> | 4 | Toggle switch <i>Left pin connection cylinder</i> |
| 2 | Control lamp | 5 | Emergency stop |
| 3 | Toggle switch <i>Right counterweight hoisting cylinder</i> | 6 | Toggle switch <i>Right pin connection cylinder</i> |

3.26.2 Cable remote control on undercarriage

If the cable remote control is connected to the undercarriage, the support cylinders and the track width adjusting cylinders can be operated.

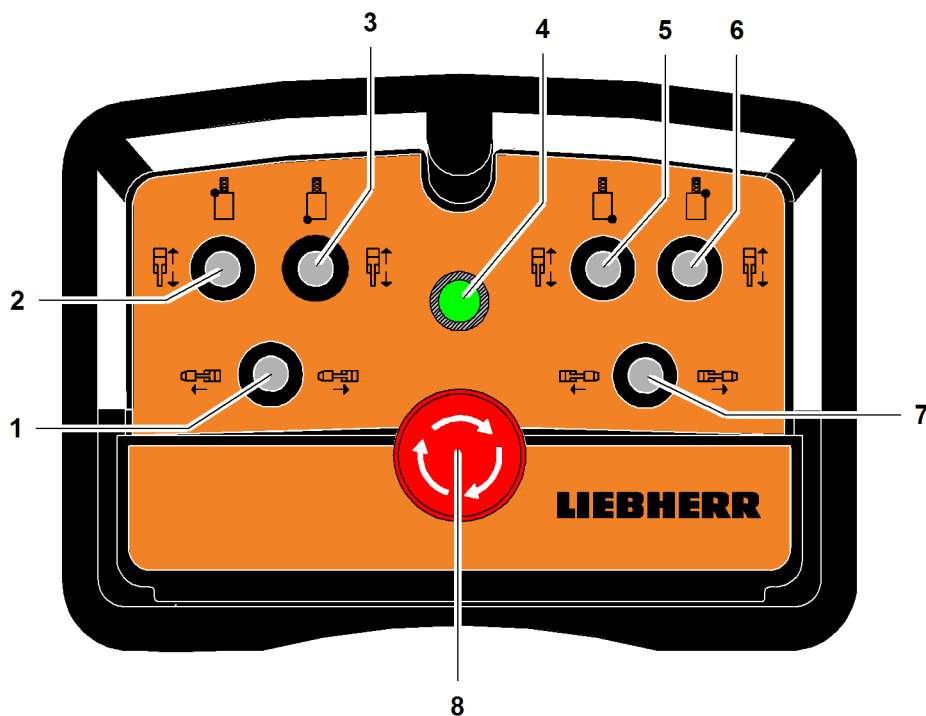


Fig. 2019: Cable remote control on undercarriage

- | | | | |
|---|---|---|--|
| 1 | Toggle switch left track width adjusting cylinder | 5 | Toggle switch right rear support cylinder |
| 2 | Toggle switch left front support cylinder | 6 | Toggle switch right front support cylinder |
| 3 | Toggle switch left rear support cylinder | 7 | Toggle switch right track width adjusting cylinder |
| 4 | Control lamp | 8 | Emergency stop |

3.27 Radio remote control*

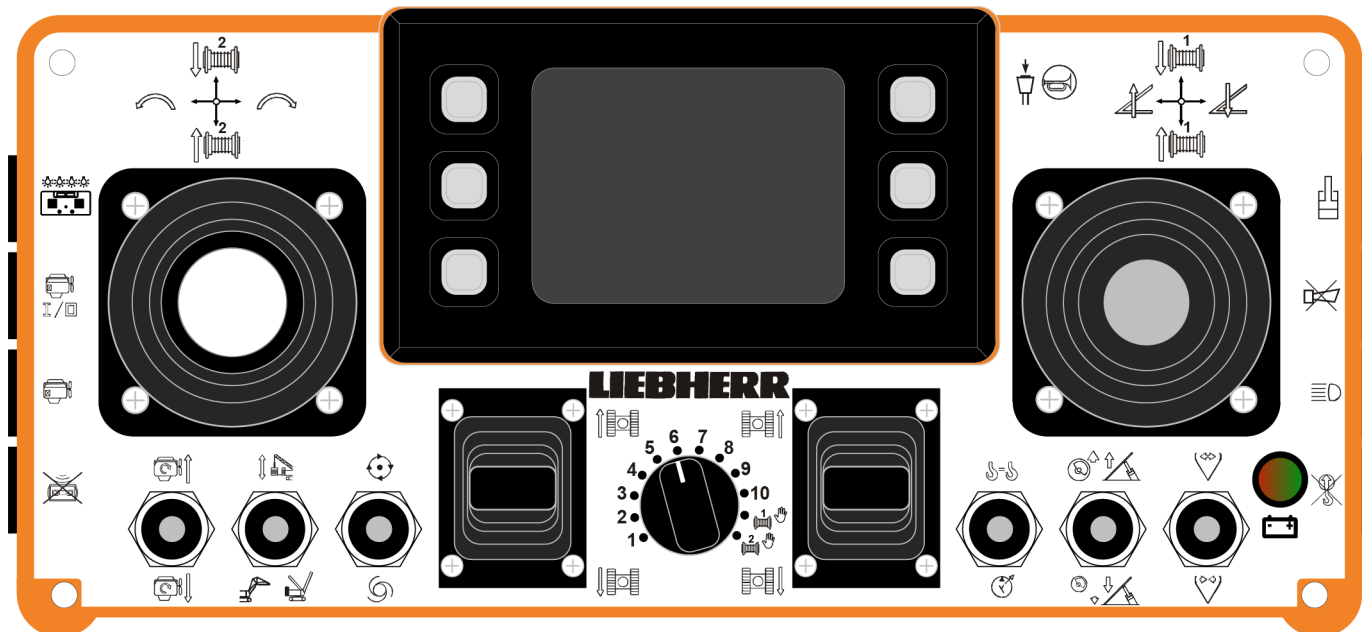


Fig. 2020: Radio remote control (view from top)

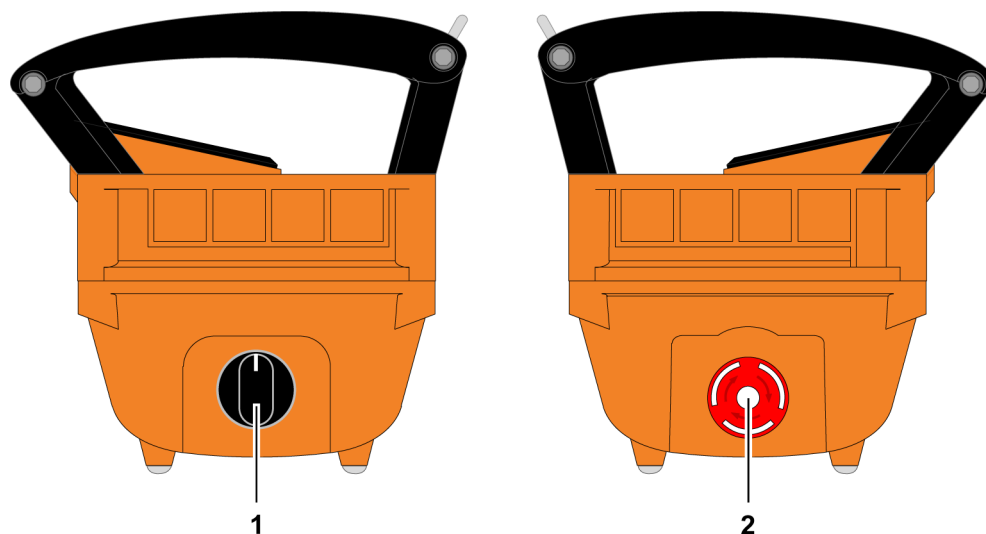


Fig. 2021: Radio remote control (view from side)

1 Rotary switch On/Off

2 Emergency stop

3.27.1 Operating elements

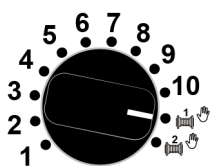


Battery charge state

LED green: battery charge state OK.

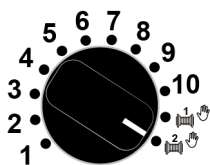
LED red: battery charge state low.

Rotary switch



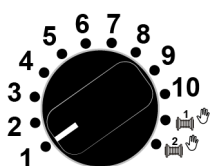
Rotary switch

Assembly function rope change winch1



Rotary switch

Assembly function rope change winch2



Rotary switch

[1 to 10 not used]

Left control lever

Function assignment movement directions of left control lever

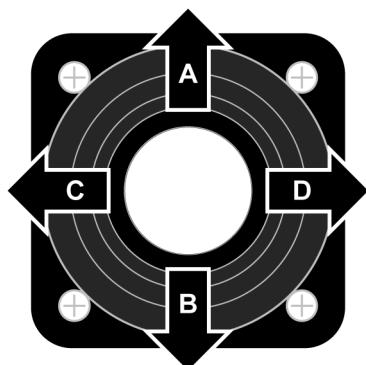
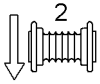




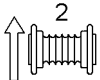








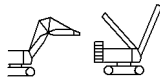






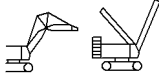

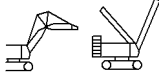


Fig. 2026: Function assignment movement directions of left control lever

Radio remote control*

Movement direction	Pictogram	Mode	Toggle switch ^{A)}	Function
A		 Crane operation		Lower winch2
		 Crane operation		Retract derrick hoist cylinder
		 Assembly functions		Lower winch2
B		 Crane operation		Lifting winch2
		 Crane operation		Extend derrick hoist cylinder
		 Assembly functions		Lifting winch2
C		 Crane operation		Swinging uppercarriage to the left
		 Assembly functions		Swinging uppercarriage to the left
		 Assembly functions		Lower jib
		 Assembly functions		Lower main boom in derrick mode ^{B)}

Movement direction	Pictogram	Mode	Toggle switch ^{A)}	Function
D		 Crane operation		Swing uppercarriage to the right
		 Assembly functions		Swing uppercarriage to the right
		 Assembly functions		Lift jib
		 Assembly functions		Lift main boom in derrick mode ^{B)}

Tab. 377: Function assignment movement directions of left control lever

- A) Some toggle switches have several functions. The desired function can be selected by repeatedly actuating the toggle switch.
- B) By default, this function is assigned to the left control lever. This function is only active on the right control lever after selecting "Jib luffing winch".

Right control lever

Function assignment buttons of right control lever

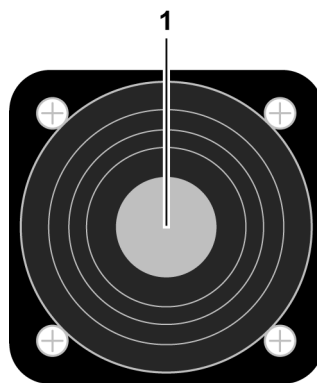





Fig. 2051: Function assignment buttons of right control lever

Radio remote control*

Button	Pictogram	Mode	Toggle switch	Name and function
1		 Crane operation		Signal horn Sound signal horn.
		 Assembly functions		Signal horn Sound signal horn.

Tab. 378: Function assignment buttons of right control lever

Function assignment movement direction of right control lever

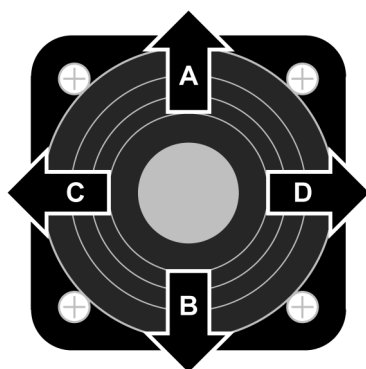









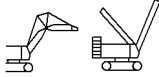



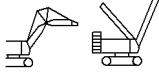



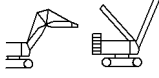



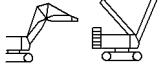


Fig. 2055: Function assignment movement direction of right control lever

Movement direction	Pictogram	Mode	Toggle switch ^{A)}	Function
A		 Crane operation		Lower winch1
		 Assembly functions		Lower winch1
B		 Crane operation		Lifting winch1
		 Assembly functions		Lifting winch1

Movement direction	Pictogram	Mode	Toggle switch ^{A)}	Function
C		 Crane operation		Lift main boom
		 Crane operation		Lift jib
		 Assembly functions		Lift main boom
		 Assembly functions		Lift derrick boom in derrick mode
		 Assembly functions		Lift main boom in derrick mode ^{B)}
D		 Crane operation		Lower main boom
		 Crane operation		Lower jib
		 Assembly functions		Lower main boom
		 Assembly functions		Lower derrick boom in derrick mode
		 Assembly functions		Lower main boom in derrick mode ^{B)}

Tab. 379: Function assignment movement direction of right control lever

A) Some toggle switches have several functions. The desired function can be selected by repeatedly actuating the toggle switch.

Radio remote control*

- B) By default, this function is assigned to the left control lever. This function is only active on the right control lever after selecting "Jib luffing winch".

Left linear control lever

Function assignment for movement directions on left linear control lever

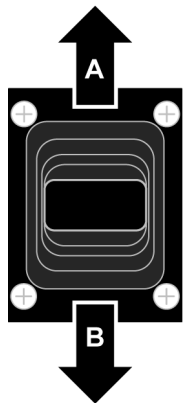


Fig. 2078: Function assignment for movement directions on left linear control lever

Movement direction	Pictogram	Mode	Toggle switch	Function
A		 Crane operation		Moving left crawler forward
		 Assembly functions		Moving left crawler forward
B		 Crane operation		Moving left crawler backward
		 Assembly functions		Moving left crawler backward

Tab. 380: Function assignment for movement directions on left linear control lever

Right linear control lever

Function assignment of movement directions on right linear control lever

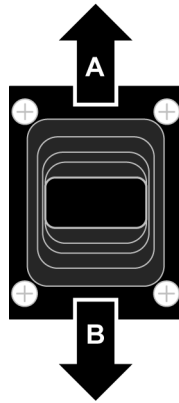


Fig. 2085: Function assignment of movement directions on right linear control lever

Movement direction	Pictogram	Mode	Toggle switch	Function
A		 Crane operation		Moving right crawler forward
		 Assembly functions		Moving right crawler forward
B		 Crane operation		Moving right crawler backward
		 Assembly functions		Moving right crawler backward

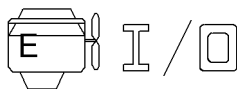
Tab. 381: Function assignment of movement directions on right linear control lever

Buttons on the side



Lighting

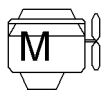
Turn illumination of radio remote control on for 10 seconds.



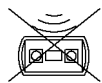
Diesel engine

Switch the diesel engine on or off.

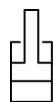
Radio remote control*

**Save/delete constant engine RPM**

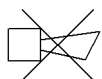
Save current diesel engine RPM as constant engine RPM or delete saved constant engine RPM.

**Taking/ceding control**

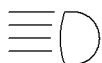
Take or cede control of/on the radio remote control.

**Cylinder adjustment functions**

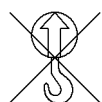
Activate/deactivate cylinder adjustment functions on undercarriage and uppercarriage.

**Warning buzzer**

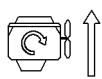
Deactivate warning buzzer.

**Floodlights on uppercarriage**

Turn floodlight on uppercarriage on or off.

**Load moment limitation assembly/self-lock**

Turn the function load moment limitation or load moment limitation self-lock on or off (This is the only function of this button even with machines with an ANSI load chart. The switch *Switch Load moment limitation shut down key switch release* on control panel *X12* has no influence on this function).

Toggle switch**Increasing the rotational speed**

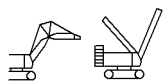
Increase diesel engine RPM.

**Decreasing the rotational speed**

Decrease diesel engine RPM.

**Derrick hoist cylinder**

Select Derrick hoist cylinder (not possible with activated assembly function).

**Jib luffing winch/derrick winch**

Select jib luffing winch.

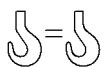
In derrick mode: select Derrick winch.

**Swing gear free-wheel**

Turn swing gear free-wheel on.

**Automatic mode preselect**

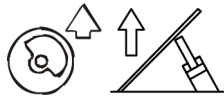
[not used]

**Winch synchronization**

Turning on winch synchronization.

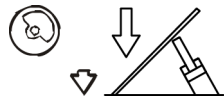
**Additional hydraulic system**

[not used]



Extending A-frame1 cylinders

Extend A-frame1 cylinders. Works exclusively when assembly mode functions are switched on.



Retracting A-frame1 cylinders

Retract A-frame1 cylinders. Works exclusively when assembly mode functions are switched on.



Opening the clamp

[not used]



Closing the clamp

[not used]

3.27.2 Monitor

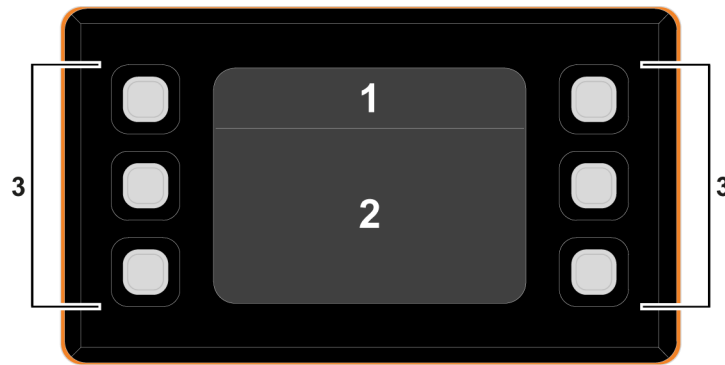


Fig. 2112: Monitor sections

- 1 Status bar
- 2 Display section
- 3 Monitor buttons

Status bar

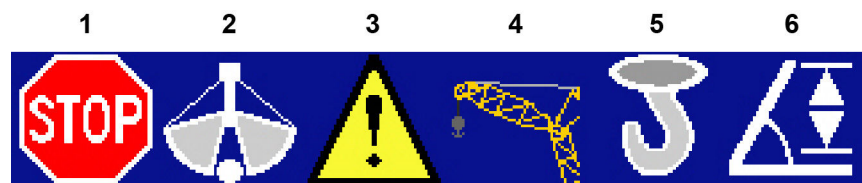


Fig. 2113: Status bar - positioning

Position 1



Winch synchronization

Winch synchronization is switched on.

Radio remote control*

**Load moment limitation warning** (lit yellow)

Load moment is utilized to more than 90% capacity.

**Load moment limitation stop** (lit red)

Load moment is utilized to more than 100% capacity.

**Turning off load moment limitation**

Load moment limitation is turned off.

**Radio remote control locked**

Radio remote control is locked. Machine cannot be operated via radio remote control.

Position 2**Swing gear speed level**

Speed level 1 for the swing gear is set.

**Swing gear speed level**

Speed level 2 for the swing gear is set.

**Swing gear speed level**

Speed level 3 for the swing gear is set.

**Swing gear free-wheel**

Swing gear free-wheel is activated.

**Derrick hoist cylinder**

Derrick hoist cylinder has been selected.

**Rope change winch1**

Assembly function rope change winch1 is selected.

**Rope change winch2**

Assembly function rope change winch2 is selected.

Position 3**Speed level main boom**

Speed level 1 selected for main boom.

**Speed level main boom**

Speed level 2 selected for main boom.

**Speed level main boom**

Speed level 3 selected for main boom.

**Speed level jib**

Speed level 1 is selected for jib.

Speed level jib

Speed level 2 is selected for jib.

**Speed level jib**

Speed level 3 is selected for jib.

**Auxiliary winch**

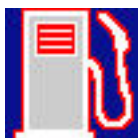
Auxiliary winch is selected.

Position 4**Battery charge**

Battery is not charging.

**Fuel fill level (lit yellow)**

Fill level of fuel tank is less than 15% of the maximum filling capacity.

**Fuel fill level (lit red)**

Fill level of fuel tank is less than 5% of the maximum filling capacity.

**Hydraulic oil fill level**

Fill level of hydraulic oil tank is too low.

Radio remote control*

**Lubrication oil pressure**

Pressure of the lubrication oil of the diesel engine is too high.

Position 5**Diesel engine**

Diesel engine is being pre-heated or post-heated.

**Drive limited**

Several limit switches block the current movement direction of the control lever.

**Limit switch bypassed**

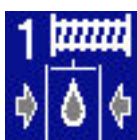
Certain limit switches when rigging, converting and unrigging the boom with activated assembly functions are bypassed.

Position 6**Error messages**

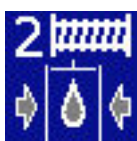
At least one confirmed error message is present.

**Error messages**

At least one unconfirmed error message is present.

**Feed pressure winch1**

Feed pressure on winch1 is too low.

**Feed pressure winch2**

Feed pressure on winch2 is too low.

**General error**

General error has occurred.

**Confirmation**

Selected function on rotary switch must be confirmed.

Display section

Operation screen

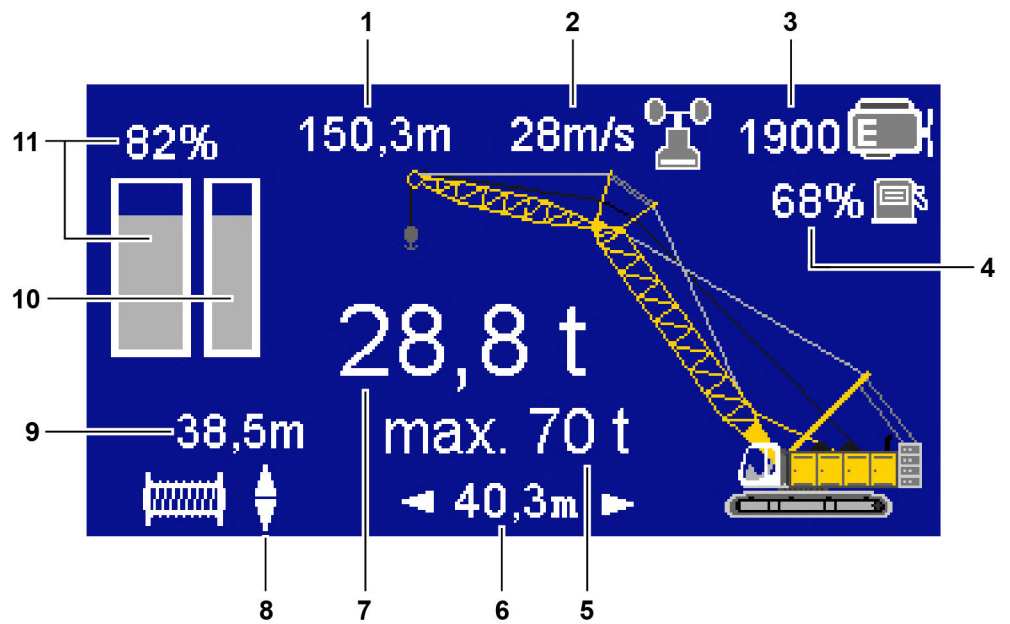


Fig. 2147: Operation screen

- | | | | |
|----------|----------------------------|-----------|---|
| 1 | Rope pulley height on boom | 7 | Load on boom |
| 2 | Wind speed | 8 | Reeving direction of winch1/
winch2 rope |
| 3 | Rotational speed | 9 | Length of winch1/winch2 rope |
| 4 | Fuel fill level | 10 | Load moment utilization to the rear |
| 5 | Maximum load on boom | 11 | Load moment utilization to the
front |
| 6 | Radius of load on boom | | |

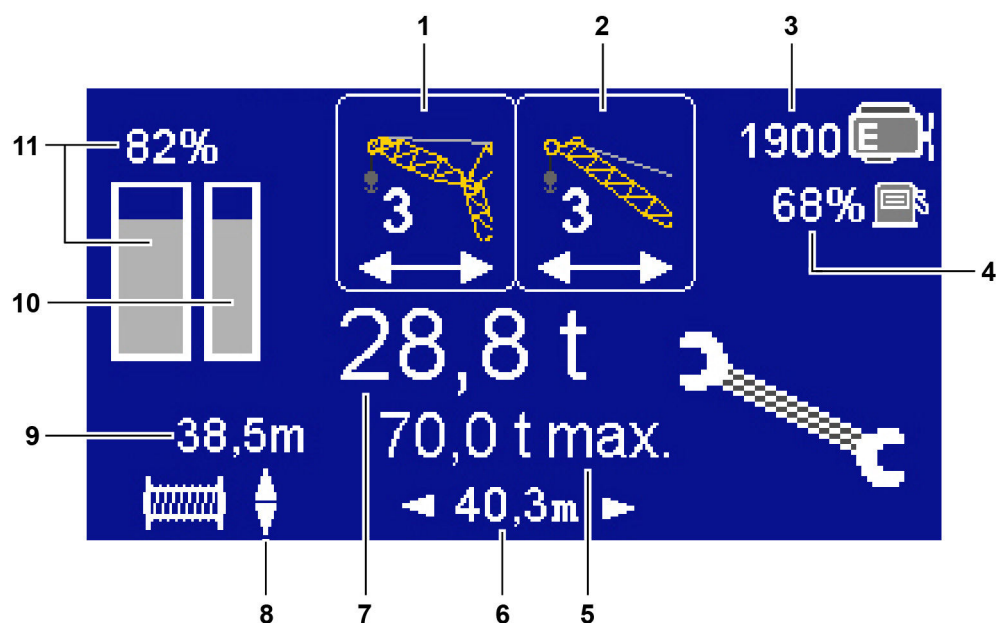
Operation screen with activated assembly functions

Fig. 2148: Operation screen with activated assembly functions

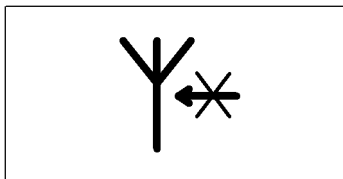
- | | | | |
|---|---|----|--|
| 1 | Horizontal function assignment of left control lever | 7 | Load on boom |
| 2 | Horizontal function assignment of right control lever | 8 | Reaving direction of winch1/ winch2 rope |
| 3 | Rotational speed | 9 | Length of winch1/winch2 rope |
| 4 | Fuel fill level | 10 | Load moment utilization to the rear |
| 5 | Maximum load | 11 | Load moment utilization to the front |
| 6 | Radius of load on boom | | |

Stop screen

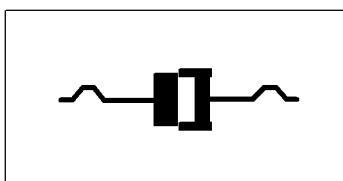
Fig. 2149: Stop screen

Stop

The *Stop* screen appears on the monitor if free-fall mode was selected on the machine.

**Radio connection established/error**

Connection between radio transmitter (control panel) and radio receiver (receiver module on the machine) established, or faulty.

**Establishing machine control connection/error**

Connection established between radio receiver (receiver module in the machine) and machine control, or connection is faulty.

Screen *Confirm connection*

Fig. 2152: Screen *Confirm connection*

The screen *Connection established confirmed* appears in the following situations:

- Activating the radio remote control
- Disconnection for more than 8 seconds
- Emergency stop

Monitor buttons



Fig. 2153: Monitor buttons

Button	Screen	Name and function
1	Operation	Setting the rope length to zero Set rope length of winch1/winch2 to zero.
	Operation with activated assembly functions	Setting the rope length to zero Set rope length of winch1/winch2 to zero.
2	Operation	Setting the load display to zero Set weight of winch1 rope, winch2 rope and the pulley block and/or empty hook to zero.
	Operation with activated assembly functions	Setting the load display to zero Set weight of winch1 rope, winch2 rope and the pulley block and/or empty hook to zero.
3	Operation	Monitor settings Configure monitor settings.
	Operation with activated assembly functions	Monitor settings Configure monitor settings.
4	Operation	[not used]
	Operation with activated assembly functions	Confirmation Confirmation of selected function on rotary switch.

Button	Screen	Name and function
5	<i>Operation</i>	Speed level boom adjustment Control speed level for boom adjustment.
	<i>Operation with activated assembly functions</i>	Speed level boom adjustment Control speed level for boom adjustment.
6	<i>Operation</i>	Swing gear speed level Set speed level for the swing gear.
	<i>Operation with activated assembly functions</i>	Swing gear speed level Set speed level for the swing gear.

Tab. 382: Function assignment of monitor buttons

3.28 Emergency operation control*

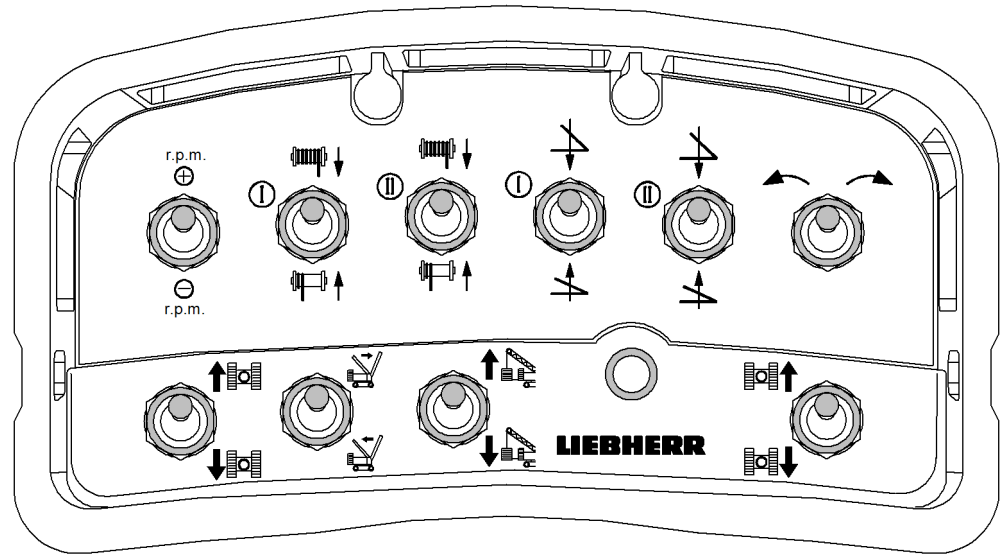









Fig. 2154: Emergency control system

The toggle switches on the control panel are touch-sensitive, meaning that a function is performed for as long as the toggle switch is pressed. The toggle switch for RPM control is a maintained-contact button.

- r.p.m. \oplus **Increase RPM**
 Increase the RPM of the diesel engine.
- r.p.m. \ominus **Reduce RPM**
 Reduce the RPM of the diesel engine.
- ⓪  **Lower winch 1**
 Lower winch1.
- ⓪  **Raise winch 1**
 Lift winch1.
- ⓪  **Lower winch 2**
 Lower winch2.
- ⓪  **Raise winch 2**
 Lift winch2.
- ⓪  **Lower the main boom**
 Lower the main boom.
 In derrick mode, lower the derrick boom.
- ⓪  **Raise the main boom**
 Lift the main boom.
 In derrick mode, lift the derrick boom.
- ⓪  **Lower jib**
 Lower jib.

-   **Raise jib**
Lift jib.
-  **Swing uppercarriage to the left**
Swing uppercarriage to the left.
-  **Swing uppercarriage to the right**
Swing uppercarriage to the right.
-  **Move left crawler forward**
Move left crawler forward.
-  **Move left crawler backward**
Move left crawler backward.
-  **Lower derrick winch**
In derrick mode, lower the main boom.
-  **Raise derrick winch**
In derrick mode, lift the main boom.
-  **Retracting the derrick hoist cylinder**
In derrick mode, retract derrick hoist cylinder.
-  **Extend derrick hoist cylinder**
In derrick mode, extend derrick hoist cylinder.
-  **Move right crawler forward**
Move right crawler forward.
-  **Move right crawler backward**
Move right crawler backward.
-  **Status display (LED)**
The status display (LED) lights up when the ignition is switched on.

3.29 Hydraulic cab elevation*

3.29.1 Operating elements in the cab



Raising the cabin

Raise cabin.



Lowering the cabin downward

Lower cabin.

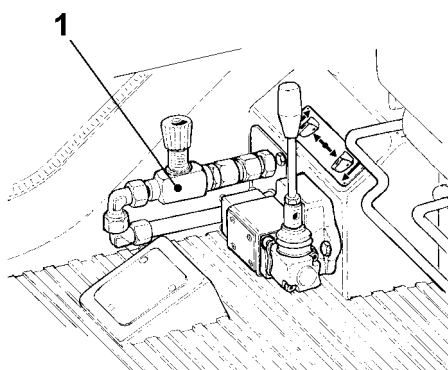


Fig. 2178: Operating elements in the cabin

- 1 Emergency lowering valve for cabin

3.29.2 Operating elements on mast

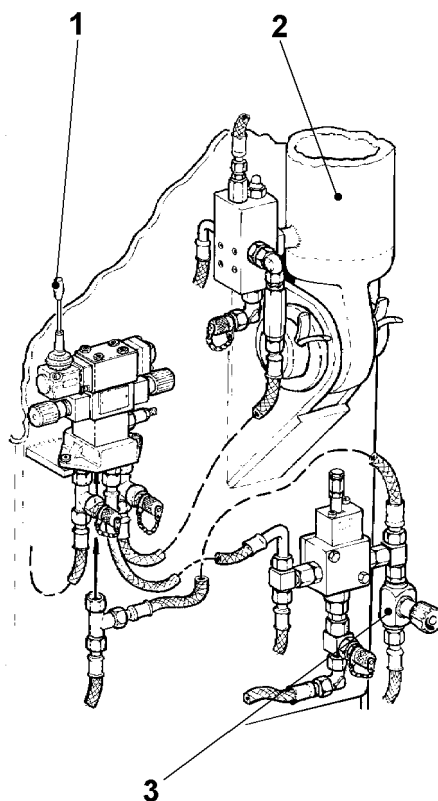


Fig. 2179: Operating elements on mast

- | | |
|---|---|
| <p>1 Adjusting lever for the leader</p> <p>2 Adjustment cylinder for the leader</p> | <p>3 Emergency lowering valve for the cab</p> |
|---|---|

3.29.3 Limit switches

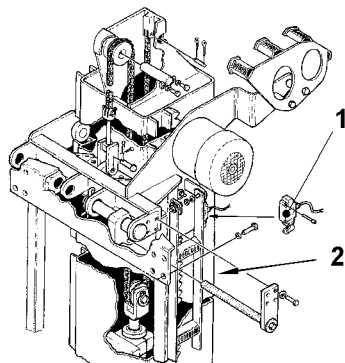


Fig. 2180: Limit switches

- | | |
|-------------------------|-------------------------|
| <p>1 Limit switches</p> | <p>2 Limit switches</p> |
|-------------------------|-------------------------|

Hydraulic cab elevation*

The limit switch **1** monitors whether the cab is in the lowered position.

The limit switch **2** monitors whether the cab has been extended laterally.

3.30 Control unit *external air conditioning system**

The control unit *External air conditioning system* serves to control and monitor the diesel engine of the external air conditioning system.

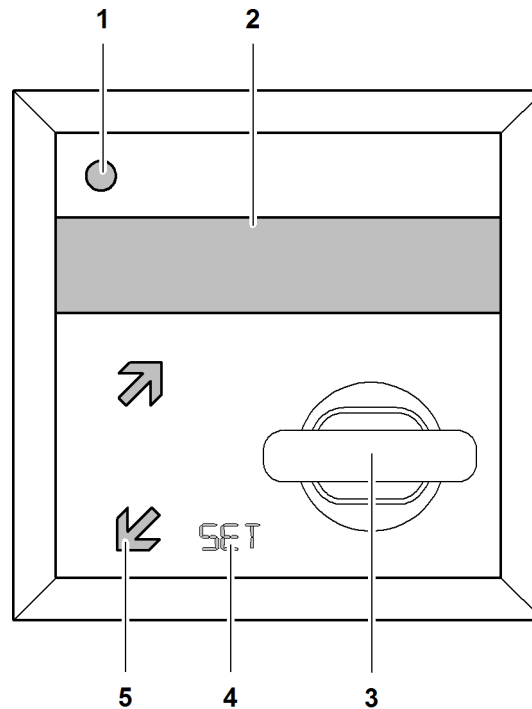
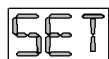


Fig. 2181: Control unit *external air conditioning system*

- | | | | |
|---|-------------------------|---|----------------------|
| 1 | Operating LED/error LED | 4 | Button <i>SET</i> |
| 2 | Display | 5 | Button <i>F1, F2</i> |
| 3 | Ignition key | | |

The following values are shown on the display:

- Software version
- Oil pressure
- Operating hours
 - Total operating hours
 - Daily operating hours
- Engine temperature
- Diesel engine RPM
- Error messages



SET

Display changes.

Confirm input.



F1

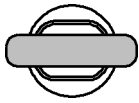
Change to next display.

Increase value.

Control unit *external air conditioning system****F2**

Change to previous display.

Decrease value.

**Ignition key**

- Position 0: OFF
- Position 1: ON
- Position 2: Start

3.31 Auxiliary heating* control unit

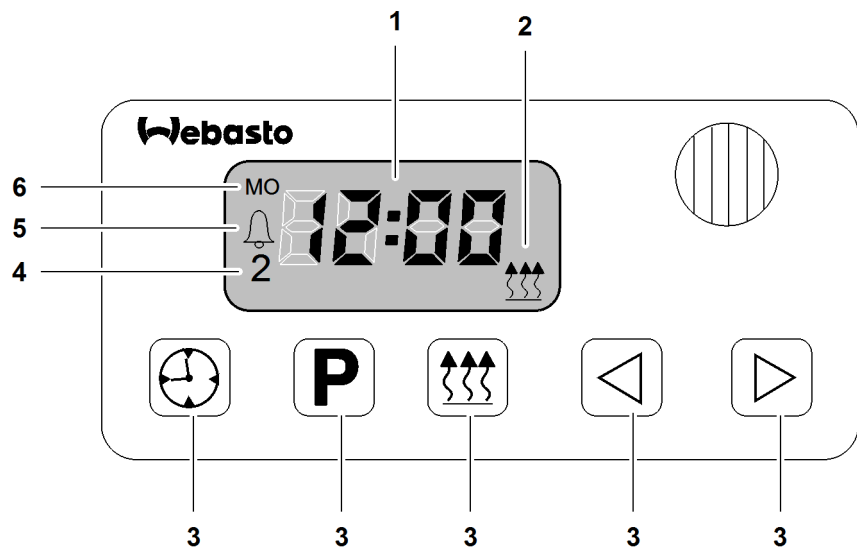


Fig. 2186: Auxiliary heating control unit

- | | | | |
|---|----------------|---|--------------------|
| 1 | Time display | 4 | Code number memory |
| 2 | Status display | 5 | Alarm indicator |
| 3 | Button | 6 | Day |



Time



Program



Immediate heating



Back



Next

3.32 Video monitoring system*

3.32.1 Quad monitor

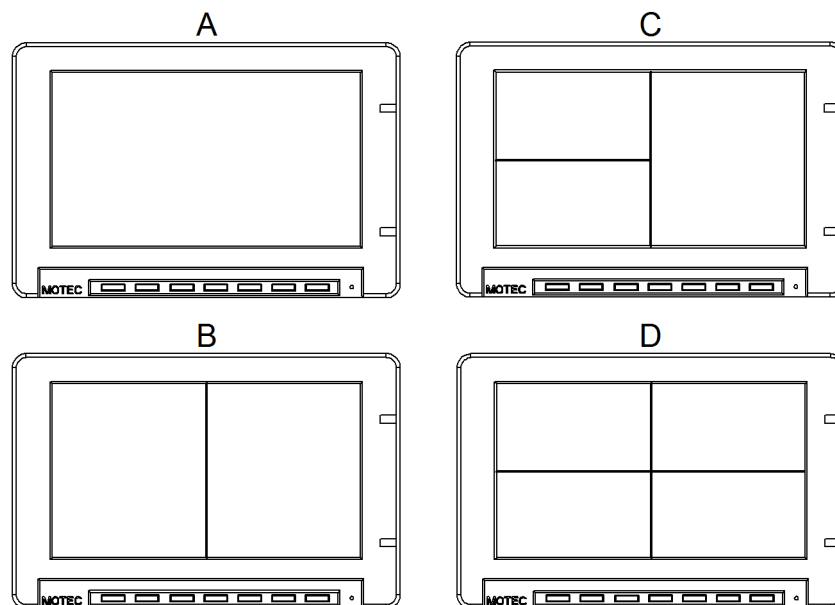


Fig. 2192: Quad monitor

A Single image mode

B Split image mode

C Three-image mode

D Four-image mode



Monitor

Turn the monitor on or off.



Calling up and switching the menu

Switch between the following menu items:

- Color
- Brightness
- Contrast
- Volume
- Language
- Standard (reset to factory setting)



Plus

Move values up.



Minus

Move values down.



Day/night mode

Switch monitor between day mode and night mode.



Camera switching

Switch between the cameras.

In single image mode, switch between the following camera images:

- Camera 1
- Camera 2
- Camera 3

- Camera 4

In split image mode, switch between the following camera images:

- Camera 1 and camera 2
- Camera 2 and camera 3
- Camera 3 and camera 4
- Camera 4 and camera 1

This button has no function in 3-image and 4-image mode.

MODE

Image mode

Switch between image modes:

- Single image mode
- Split image mode
- Three-image mode
- Four-image mode

3.32.2 Control panel zoom camera

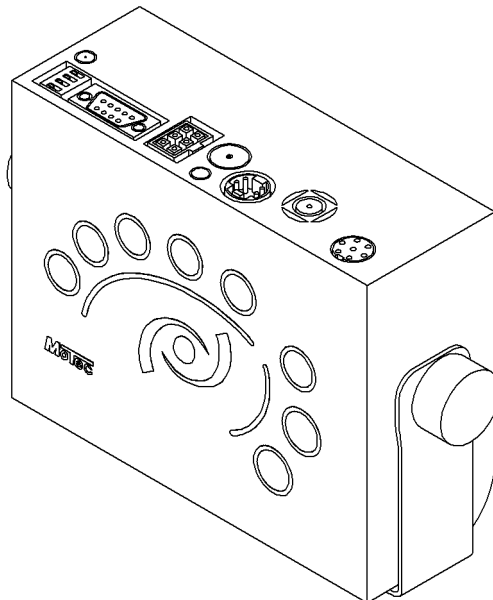


Fig. 2200: Control panel zoom camera



Video monitoring system

Turn the video surveillance system on or off.



Gain

Turn the camera brightness on or off.



Automatic focus/function button

Turn the automatic focus of the camera on or off.

Function button in combination with other buttons.

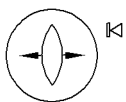


Manual focus

Focus the camera image.

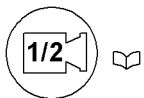
Function button in combination with other buttons.

Video monitoring system*

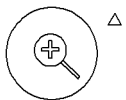
**Manual focus**

Focus the camera image.

Function button in combination with other buttons.

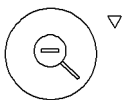
**Camera selector switch**

Switch from zoom camera (camera 1) to optional camera (camera 2).

**Zoom out**

Zoom the camera image out.

Function button in combination with other buttons.

**Zoom in**

Zoom the camera image in.

Function button in combination with other buttons.

3.33 Central lubrication*

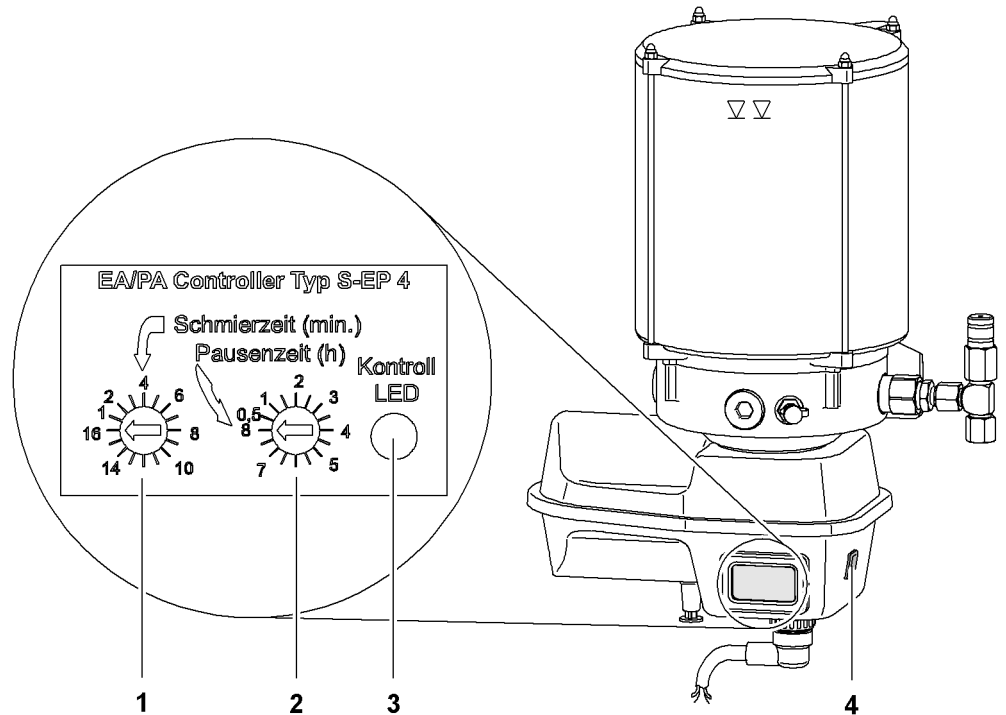
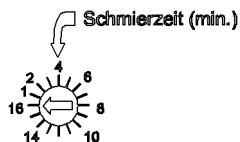


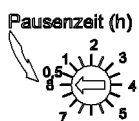
Fig. 2209: Central lubrication operating elements

- | | | | |
|---|--|---|----------------------------|
| 1 | Set lubrication time rotary control knob | 3 | Yellow indicator light |
| 2 | Set pause time rotary control knob | 4 | Interim lubrication button |



Set lubrication time

Set lubrication interval.



Set pause time

Set pause interval.



Yellow indicator light

Lights up for 1.5 seconds after the ignition is switched on to signal that the control system is ready for operation.



Interim lubrication

Perform interim lubrication.

3.34 Additional floodlights*

3.34.1 Cabin

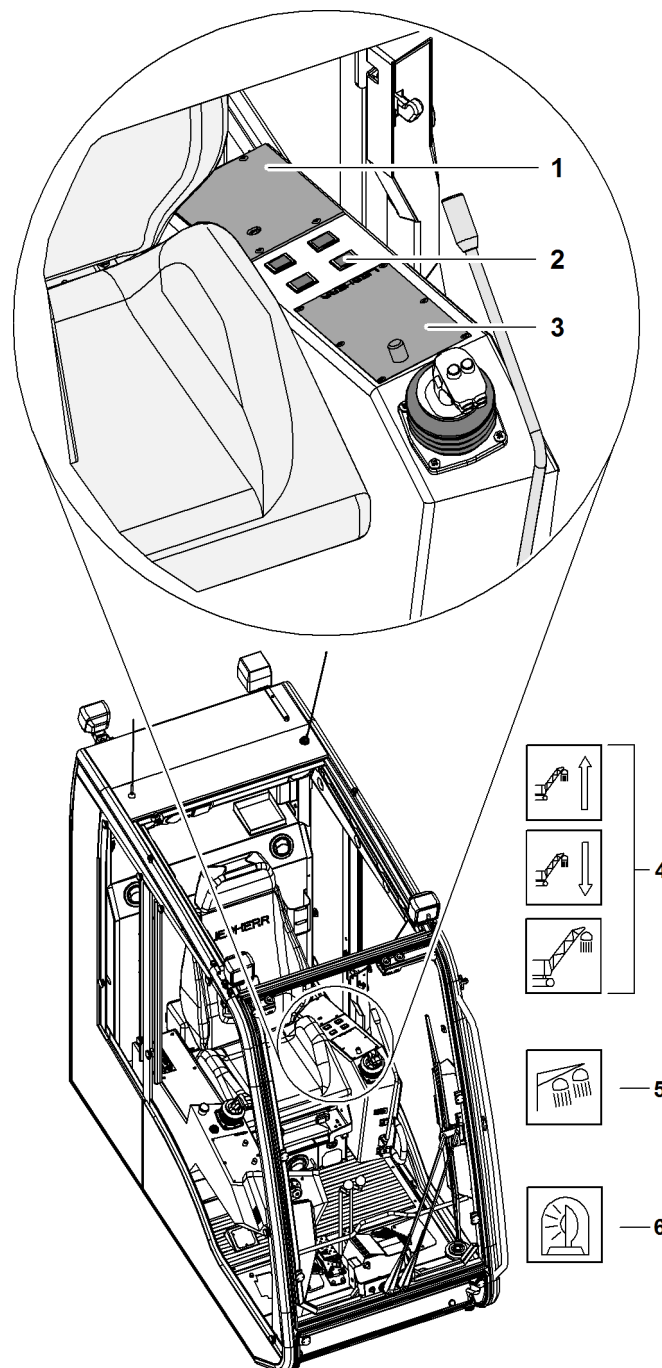


Fig. 2214: Buttons Additional floodlights

- | | | | |
|---|--------------------------------|---|---|
| 1 | Control panel X12 | 4 | Button Floodlight main boom base section (3x) |
| 2 | Buttons Additional floodlights | 5 | Button Boom searchlight |
| 3 | Control panel X11 | 6 | Button Obstacle warning light |

**Boom base section floodlights**

Turn the floodlight on the main boom base section on or off.

**Move the floodlights upwards**

Move the floodlight in the main boom base section upwards.

**Move the floodlights downwards**

Move the floodlight in the main boom base section downwards.

**Boom floodlight**

Turn all boom floodlights on or off.

**Obstacle warning light**

Activates/deactivates the obstacle warning light.

Additional floodlights*

4 Operation

4 Operation

This chapter deals with the following issues:

- Safe commissioning of the machine
- Secondary machine functions
- Main machine functions
- Safe shutdown of the machine



WARNING

Inadmissible or improper procedure!
Severe injuries, damage to machine.

If the operation manual contains insufficient information:

- ▶ Contact Liebherr customer service.
-

4.1 Checks before start up



DANGER

Unauthorized use of a damaged machine!

- ▶ Do not use a machine that is damaged in any way.
 - ▶ Defects and errors are to be reported to the relevant supervisor and to Liebherr customer service.
-



DANGER

Improper change of counterweights during operation of the machine!
Toppling of machine.

- ▶ Make sure that the set-up boom configuration can be put down at any time with the installed counterweights.
 - ▶ Observe erectability charts.
-

NOTICE

Do not use a preserved machine if it has been preserved for storage for up to/more than 7 months!

Damage to machine.

- ▶ Ensure that the machine is treated with permitted lubricants.
 - ▶ Make sure that all oil levels are correct.
-

Ensure that the following conditions are fulfilled:

- Maintenance and inspection work has been carried out according to specifications.
- Operation manual has been read and understood.
- Operation manual is at hand in cabin.

- ❑ Current load chart needed to operate the machine is at hand in cabin.

4.1.1 Inspecting the machine

The machine must be inspected prior to each start-up.

- ▶ Make sure that there are no leaks (hydraulic oil, engine oil, gearbox oil, coolant, fuel).
- ▶ Make sure that there is no damage.
- ▶ Make sure that safety installations are in place and functioning.
- ▶ Make sure that locking elements are in place.
- ▶ Make sure that pin connections and screw connections have a tight fit.
- ▶ Make sure that ropes and pulleys do not show any wear.
- ▶ Make sure that there are no obstacles in the working range.
- ▶ Make sure that uppercarriage can be turned without restrictions.
- ▶ Make sure that boom cannot come into contact with overhead lines.
- ▶ Make sure that safety signs are in place and legible.
- ▶ Make sure that fire extinguishers are in place, ready for operation (intact seal, test date has not expired), and freely accessible at all times.
- ▶ Remove coarse dirt from machine.
- ▶ Make sure that machine is free from ice and snow.
- ▶ Make sure that vision in the cabin is clear.
- ▶ Clean windows and mirrors of the cabin and adjust them properly.
- ▶ Make sure that mechanic angle indicator on main boom base section or on a-frame¹ can be moved freely.

4.1.2 Checking position of main battery switch

NOTICE

Battery main switch is switched off while the machine is in use!
Damage to the electrical system.

- ▶ Only switch the battery main switch off when the machine is switched off.
-

- ▶ Check position of main battery switch.

If the battery main switch is not switched on:

- ▶ Switch on the battery main switch.

4.2 Startup

4.2.1 Adjusting the operator's seat

- ▶ Check the seat position and adjust if necessary.

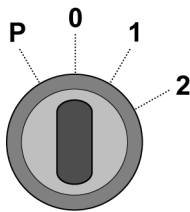


Note

Liebherr recommends:

- ▶ Wear safety belt while the machine is in operation.
-

4.2.2 Switching on the ignition



- ▶ Insert ignition key in ignition lock and turn to position "1".
 - ▷ *Start* screen appears on the monitor.
 - ▷ The *Setup* screen appears once the Litronic control system is ready for operation.

Troubleshooting

Error message appears?

Voltage drops during the start-up process may cause error messages to appear on the monitor.

- ▶ Switch ignition off and leave it off for at least 10 seconds.
 - ▶ Turn ignition key to position "1" again.
-

Troubleshooting

Error message appears after several attempts?

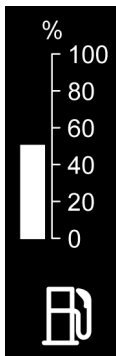
- ▶ Contact Liebherr customer service.
-

4.2.3 Confirming the existing setup

The last defined *setup* screen appears on the monitor.

- ▶ Check all values and change to the current setup where necessary ([For more information see: 4.13 Programming the setup, page 914](#)) .
- ▶ Confirm the setup.
 - ▷ The *Operation* screen appears on the monitor.

4.2.4 Checking the fuel fill level



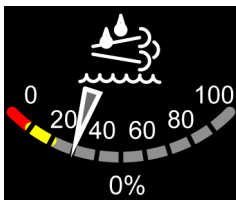
The current fuel fill level is displayed on the *operation* screen and on the *power unit* screen.

▶ Check the fuel fill level.

If the fuel level is not sufficient:

▶ top up with fuel.

4.2.5 Checking the urea solution fill level



The urea solution fill level indicator is shown on the *power unit* screen.

▶ Check the urea solution fill level.

If the urea solution fill level is not sufficient:

▶ top up with urea solution.

4.2.6 Checking the hydraulic oil tank gate valve

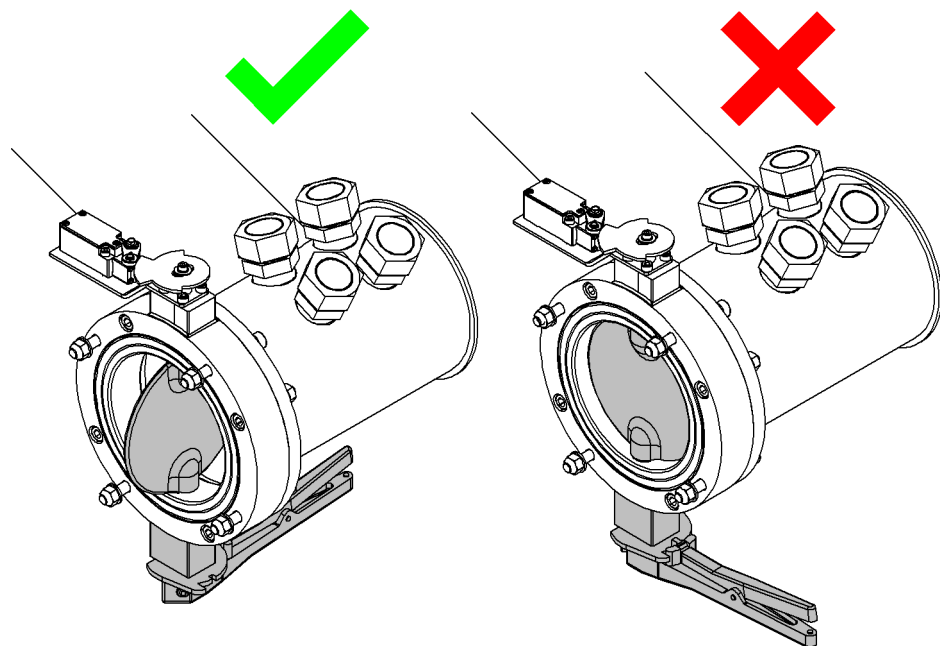


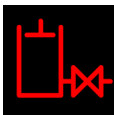
Fig. 2223: Checking the hydraulic oil tank gate valve

With closed gate valve of *hydraulic oil tank* the diesel engine cannot be started.

▶ Check the gate valve of the *hydraulic oil tank*.

If the symbol *Gate valve hydraulic oil tank* blinks on the monitor:

▶ Open *hydraulic oil tank* gate valve.



4.2.7 Starting the diesel engine

NOTICE

Starting aids contain ether!
Damage to diesel engine.

- ▶ Do not use any starting aids containing ether.

Make sure the following conditions are met:

- Checks before startup were carried out.
- No one other than the machine operator is on the machine or within the danger zone around the machine.
- Safety lever is pulled up.
- All emergency stops are unlocked.
- Operation* screen appears on the monitor.
- Uppercarriage door, cabin door and cabin windows are closed.
- Communication between machine operator, slinger and signaller is ensured.



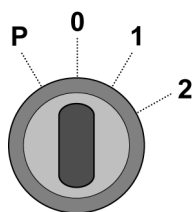
Fig. 2225: Symbol Diesel engine (lit green)

The symbol *Diesel engine* appears on the monitor after the ignition is switched on. At low outside temperatures, the diesel engine is automatically preheated by the flame start system and made ready to start. If the symbol *Diesel engine* is lit green, the machine is ready to start.

NOTICE

Ignition process too long!
Damage to the starter motor.

- ▶ Hold the ignition key in position "2" for a maximum of 10 seconds.



- ▶ Briefly turn the ignition key to position "2".

When the diesel engine has started:

- ▶ Release ignition key.
 - ▷ The symbol *Diesel engine* disappears on the monitor.

Troubleshooting

The engine has not started successfully?

- ▶ Wait for at least 20 seconds.
- ▶ Repeat the start-up process.

4.2.8 Adjusting the diesel engine RPM

NOTICE

Warm-up period of the diesel engine too short!
Damage to diesel engine.

- ▶ The diesel engine should be allowed a short warm-up period before being subjected to full load.

The current rotational speed is displayed on the *operation* screen and on the *power unit* screen.

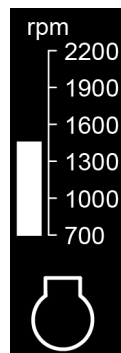


Fig. 2227: Screen section rotational speed on the Operation screen

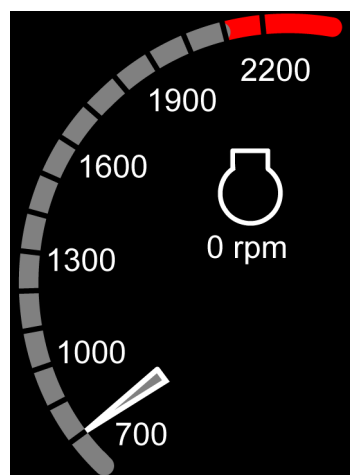


Fig. 2228: Screen section rotational speed on the Power unit screen

Adjusting the diesel engine RPM with the control lever

Procedure on a machine with two multi-directional control levers



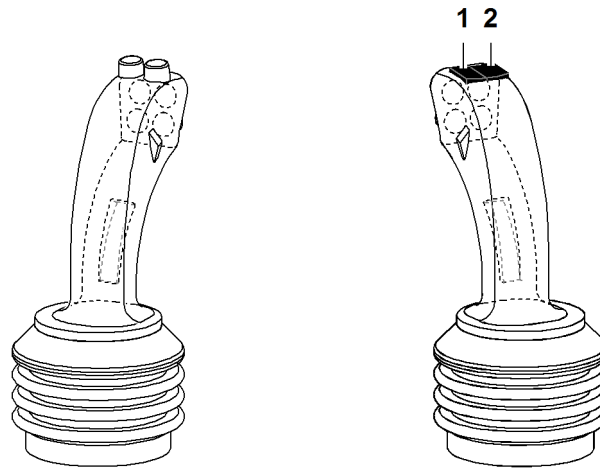
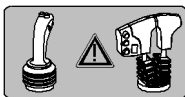


Fig. 2230: Adjusting the diesel engine RPM with the multi-directional control lever

1 Button *Increase rotational speed* **2** Button *Decrease rotational speed*

The *Increase rotational speed 1* and *Decrease rotational speed 2* buttons adjust the rotational speed from idle to maximum.

- ▶ Press and hold the button *Increase rotational speed 1* on the right multi-directional control lever.
 - ▷ The diesel engine RPM increases.
- ▶ Press and hold the button *Decrease rotational speed 2* on the right multi-directional control lever.
 - ▷ The diesel engine RPM decreases.



Procedure on a machine with multi-directional control lever and double T-lever

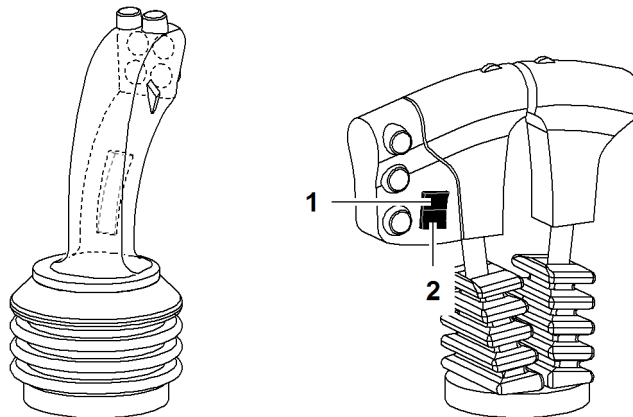


Fig. 2232: Adjusting the diesel engine RPM with the double T control lever

1 Button *Increase rotational speed* **2** Button *Decrease rotational speed*

The *Increase rotational speed 1* and *Decrease rotational speed 2* buttons adjust the rotational speed from idle to maximum.

- ▶ Press and hold the button *Increase rotational speed 1* on the right double T control lever.
 - ▷ The diesel engine RPM increases.
- ▶ Press and hold the button *Decrease rotational speed 2* button on the right double T control lever.
 - ▷ The diesel engine RPM decreases.

Adjusting the diesel engine RPM with the foot pedal

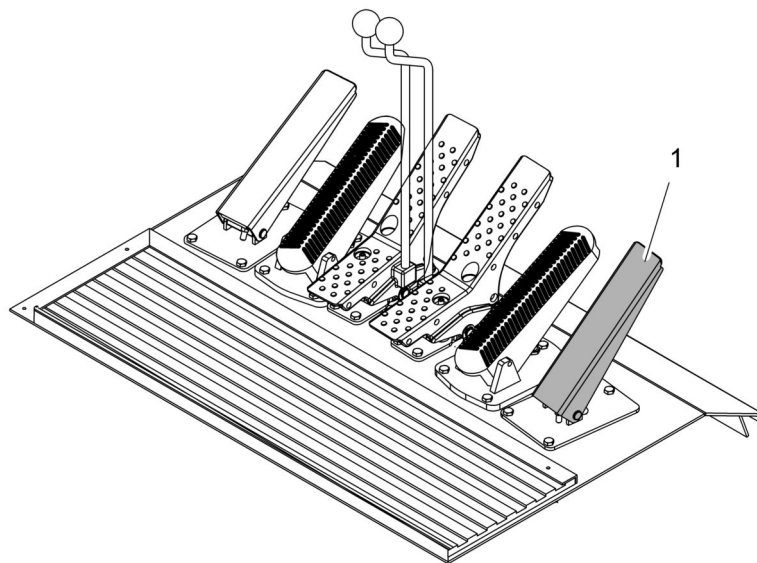


Fig. 2233: Adjusting the diesel engine RPM with the foot pedal

1 Foot pedal *rotational speed*

The foot pedal *rotational speed* 1 serves to adjust the rotational speed from a set constant engine RPM or from idling RPM up to maximum RPM. The constant engine RPM remains stored in memory.

- ▶ Press the foot pedal for *rotational speed* 1 downwards.
 - ▷ The diesel engine RPM increases.
- ▶ Release the foot pedal for *rotational speed* 1.
 - ▷ The diesel engine RPM decreases until it reaches the set constant RPM value or idle value.

4.2.9 Setting the constant engine RPM



Note

Efficient operation of the diesel engine:

- ▶ Ensure constant engine RPM of at least 1400 min⁻¹ (1400 rpm).

A specific rotational speed value can be selected from across the entire speed range and stored in the memory.

Procedure on a machine with two multi-directional control levers



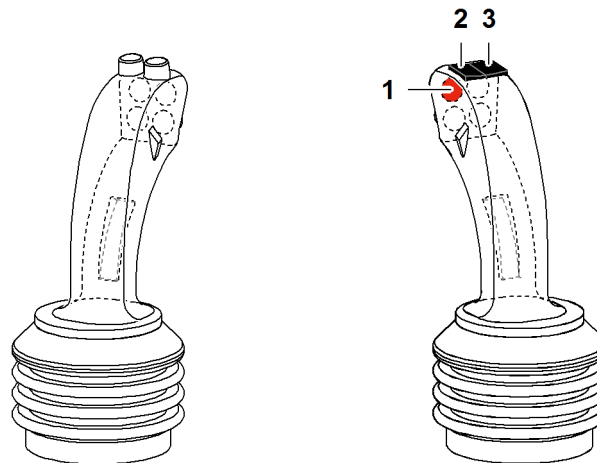


Fig. 2235: Setting a constant engine RPM using the multi-directional control lever

- | | |
|--|---|
| 1 Button <i>Save/delete constant engine RPM</i> | 3 Button <i>Decrease rotational speed engine RPM</i> |
| 2 Button <i>Increase rotational speed</i> | |

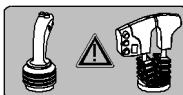
- ▶ Set the required rotational speed using the *Increase RPM 2* and *Decrease RPM 3* buttons on the right multi-directional control lever.

Once the required rotational speed has been reached:

- ▶ Press the button *Save/delete constant engine RPM 1* on the right multi-directional control lever.
 - ▷ The input is confirmed by a short signal tone and saved.

Deleting the set constant engine RPM:

- ▶ Press again the button *Save/delete constant engine RPM 1* on the right multi-directional control lever.



Procedure on a machine with multi-directional control lever and double T-lever

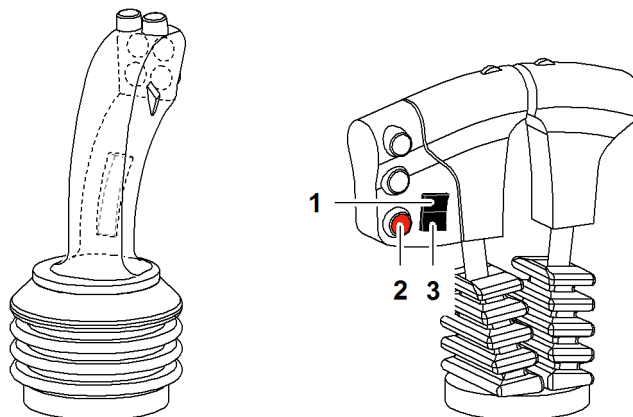


Fig. 2237: Setting the constant engine RPM using the double T control lever

- | | |
|--|--|
| 1 Button <i>Increase rotational speed</i> | 3 Button <i>Decrease rotational speed</i> |
| 2 Button <i>Save/delete constant engine RPM</i> | |

- ▶ Set the required rotational speed using the buttons *Increase RPM 1* and *Decrease RPM 3* on the right double T control lever.

Once the required rotational speed has been reached:

- ▶ Press the button *Save/delete constant engine RPM 2* on the right double T control lever.
 - ▷ The input is confirmed by a short signal tone and saved.

Deleting the set constant engine RPM:

- ▶ Press the button *Save/delete constant engine RPM 2* on the right double T control lever again.

4.2.10 Lowering the safety lever



WARNING

Improper use of operating elements!
Severe injury.

- ▶ Only operate operating elements from the operator's seat.

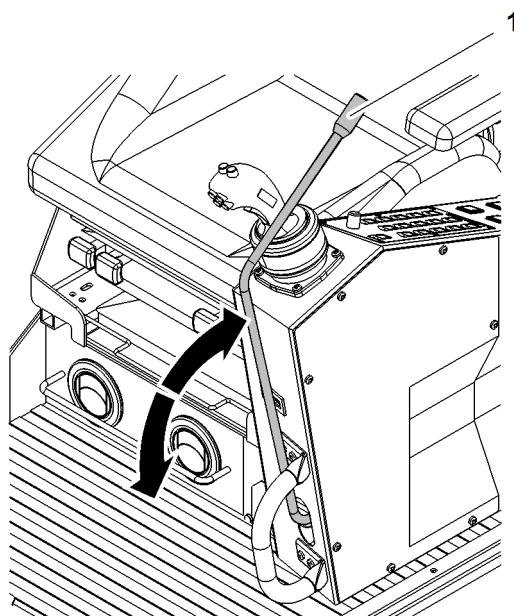


Fig. 2238: Lowering the safety lever

1 Safety lever

- ▶ Move into sitting position in cabin.
- ▶ Lower safety lever 1.
 - ▷ Operating elements in cabin are enabled.

4.2.11 Checking the tilting-back support cylinder



The switch *Extend tilting-back support cylinder* switch on control panel X12 must be lit.

- ▶ Check the *Extend tilting-back support cylinder* switch on control panel X12.

If the switch *Extend tilting-back support cylinder* switch on control panel X12 is not lit:

- ▶ Press the *Extend tilting-back support cylinder* switch on control panel X12.

4.3 Control panels

4.3.1 Setting control panel X25* or control panel X26*

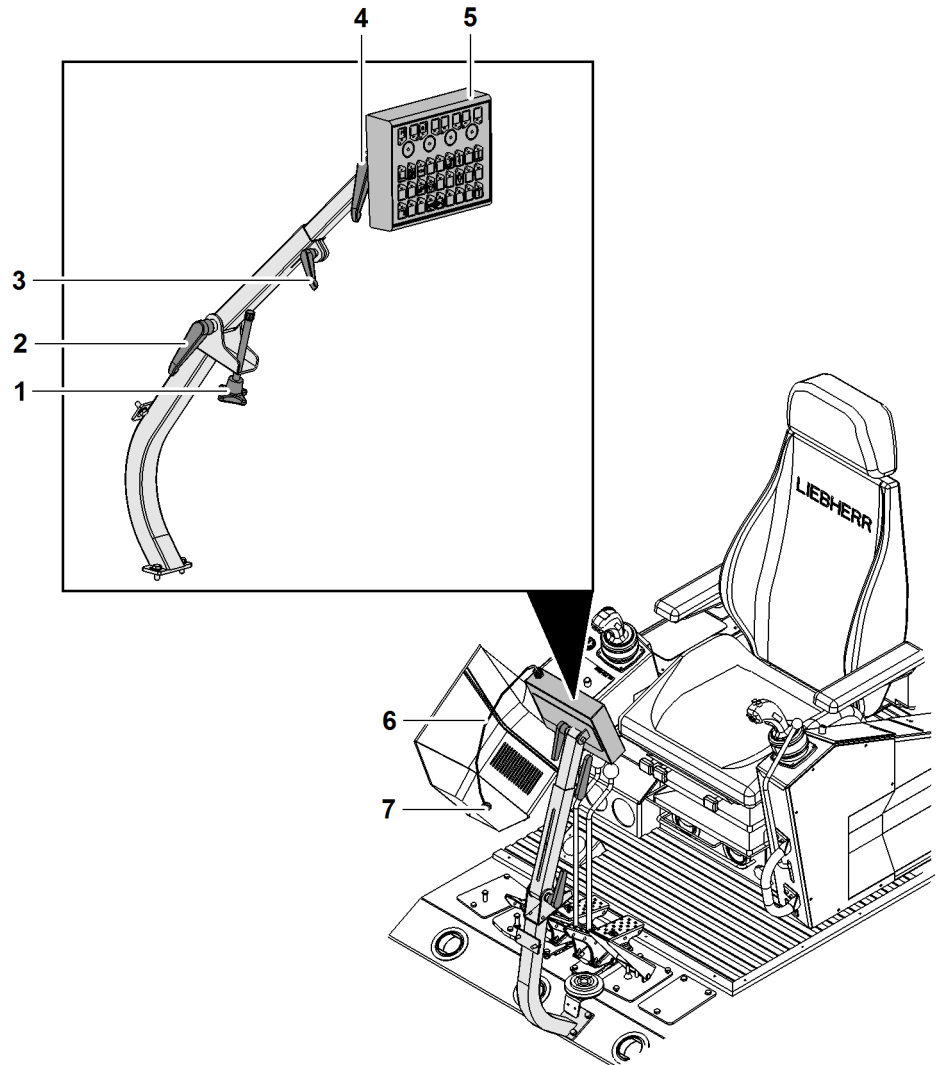


Fig. 2240: Setting control panel X25 or control panel X26

- | | | | |
|---|--|---|--|
| 1 | Inclination adjuster of bracket | 5 | Control panel X25 or control panel X26 |
| 2 | Clamping device inclination adjuster | 6 | Cable for control panel X25 or control panel X26 |
| 3 | Clamping device bracket height adjuster | 7 | Socket on the monitor for control panel X25 or control panel X26 |
| 4 | Clamping device inclination adjustment control panel | | |

Clamping devices

The clamping devices 2 + 3 + 4 are ratchets and can be turned in any desired position.

- ▶ Pull out clamping device.

- ▶ Turn clamping device into the desired position.
- ▶ Let go of clamping device.
 - ▷ Clamping device engages.

Bracket

Adjusting the inclination of the bracket

- ▶ Undo clamping device **2**.
- ▶ Turn inclination adjuster **1** until the desired position has been reached.
- ▶ Tighten clamping device **2**.

Adjusting the height of the bracket

- ▶ Undo clamping device **3**.
- ▶ Pull out control panel **X25** or control panel **X26 5** until the desired position has been reached.
- ▶ Tighten clamping device **3**.

Adjusting the tilt of control panel X25 or control panel X26

- ▶ Release inclination adjuster **4**.
- ▶ Adjust control panel **X25** or control panel **X26 5** until the desired position has been reached.
- ▶ Tighten inclination adjuster **4**.
- ▶ Insert cable **6** in socket **7**.

4.4 Operator's seat



CAUTION

Incorrect operator's seat settings!
Wrong operation of operating elements.

► Adjust operator's seat and control stand.

Ensure that the following conditions are fulfilled:

- Operating elements are easily reached.
- Control elements and operating elements are well-visible.

When the operator's seat is correctly adjusted and properly used, it conforms to the requirements of ISO 2631-1 for protection against whole-body vibration.



Fig. 2241: Operator's seat

- | | | | |
|---|--|----|--|
| 1 | Lever <i>Adjust rear seat height</i> | 7 | Clasp* |
| 2 | Seat belt buckle* | 8 | Lever <i>Adjust backrest tilt</i> |
| 3 | Armrest (2x) | 9 | Adjusting wheel <i>Adjust dampening</i> |
| 4 | Headrest | 10 | Lever <i>Adjust operator's seat horizontally</i> |
| 5 | Backrest | 11 | Lever <i>Adjust control stand horizontally</i> |
| 6 | Adjusting wheel <i>Adjust armrest (2x)</i> | 12 | Lever <i>Adjust front seat height</i> |

4.4.1 Adjusting the control stand horizontally

Ensure that the following conditions are fulfilled:

- Safety lever is pulled up.

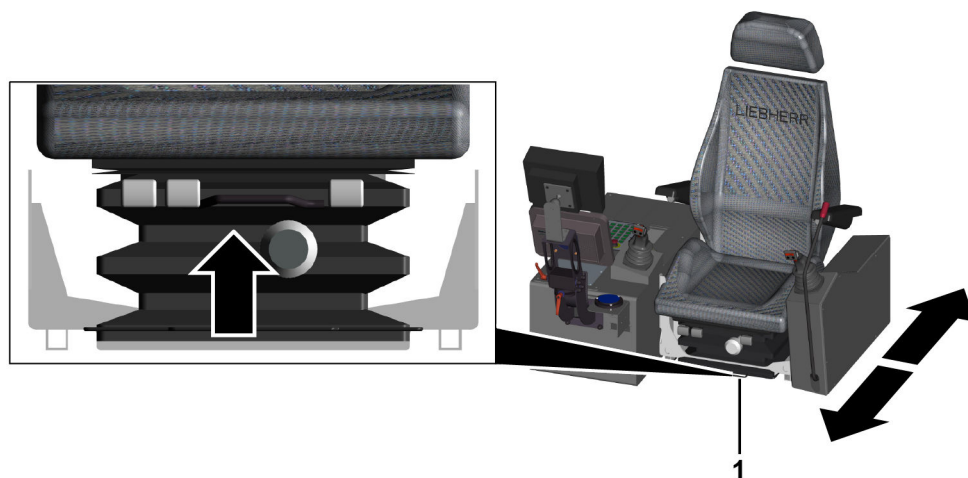


Fig. 2242: Adjusting the control stand horizontally (illustration of principle)

1 Lever *Adjust control stand horizontally*

- ▶ Pull up and hold the lever *Adjust control stand horizontally 1*.
- ▶ Adjust control stand horizontally.
- ▶ Release the lever *Adjust control stand horizontally 1*.
 - ▷ Control stand engages automatically.

4.4.2 Adjusting the operator's seat

Ensure that the following conditions are fulfilled:

- Safety lever is pulled up.



Fig. 2243: Adjusting the operator's seat horizontally

1 Lever *Adjust operator's seat horizontally*

- ▶ Pull up and hold the lever *Adjust operator's seat horizontally 1*.
- ▶ Adjust operator's seat horizontally.
- ▶ Release the lever *Adjust operator's seat horizontally 1*.
 - ▷ Operator's seat engages automatically.

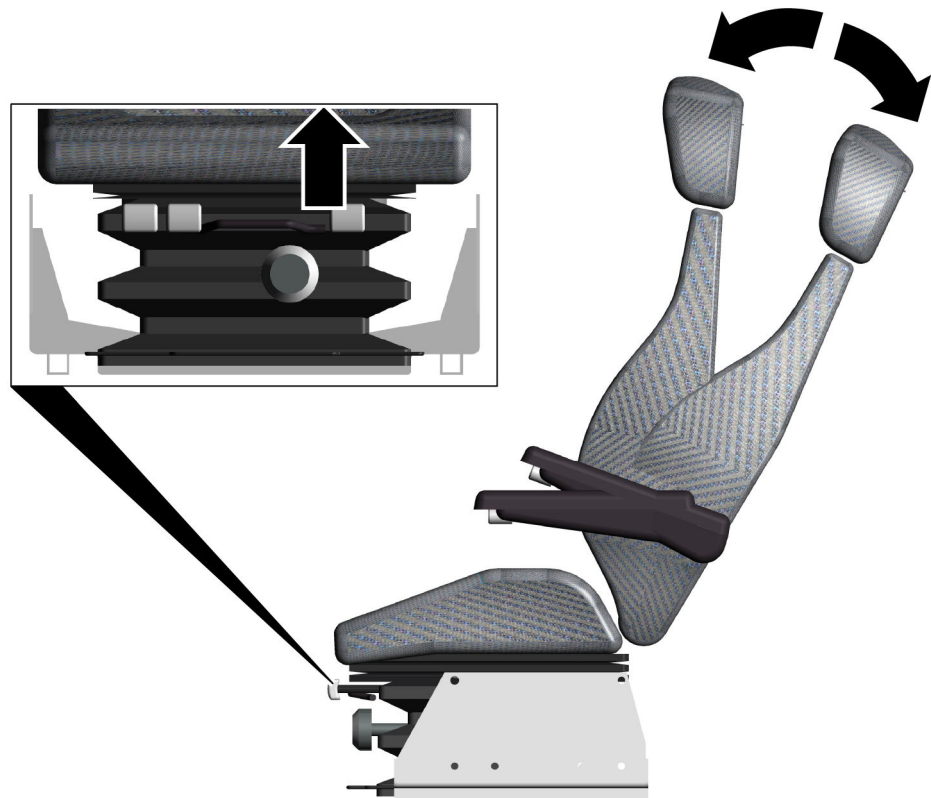


Fig. 2244: Adjusting the backrest tilt

- ▶ Pull up the lever *Adjust backrest tilt*.
- ▶ Press back gently against seat back.
 - ▷ Seat back inclines backwards.
- ▶ Lower the lever *Adjust backrest tilt*.
 - ▷ Backrest tilts forward.

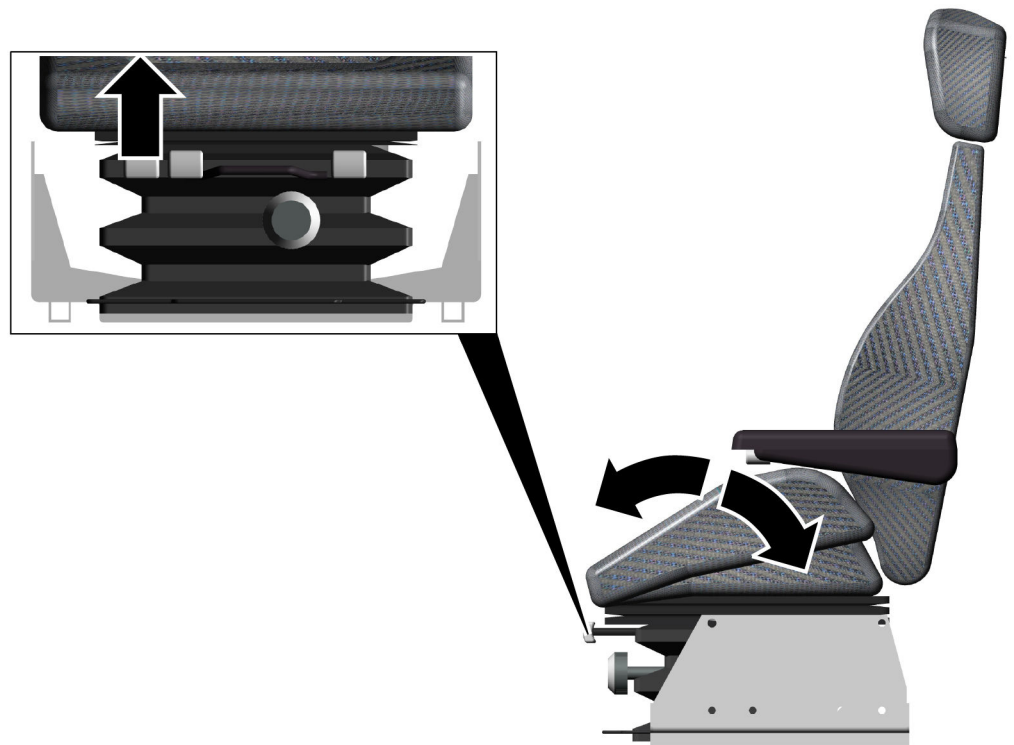


Fig. 2245: Adjusting the rear seat height

- ▶ Pull up the lever *Adjust rear seat height*.
- ▶ Adjust rear seat height by putting on weight or taking weight off.

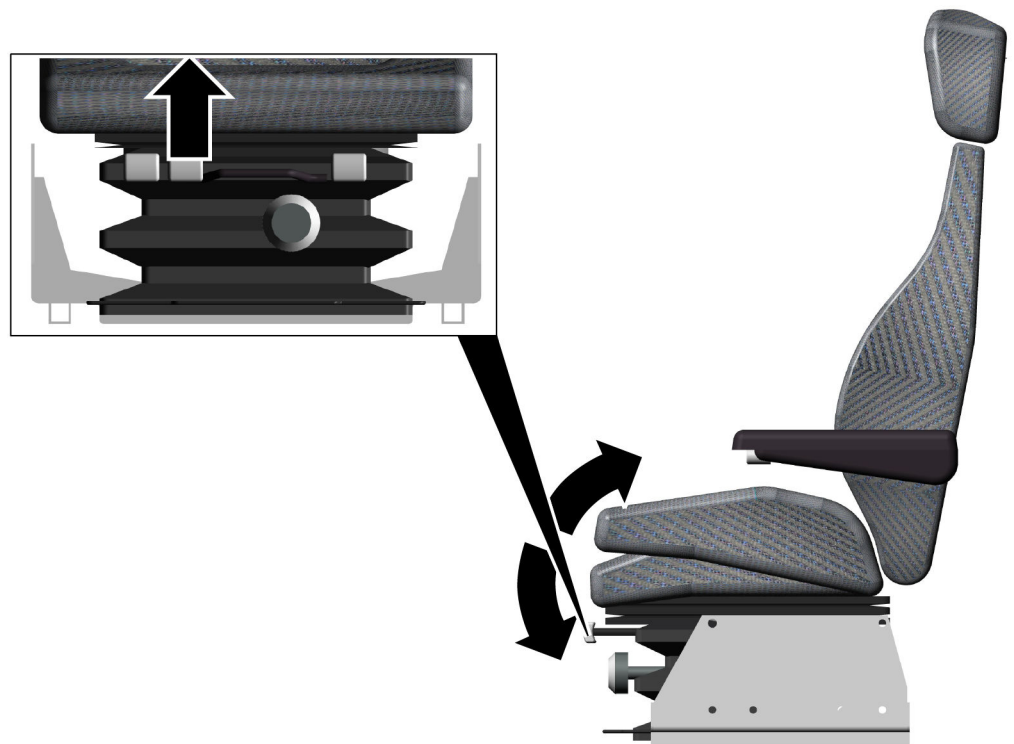


Fig. 2246: Adjusting the front seat height

- ▶ Pull up the lever *Adjust front seat height*.

- ▶ Adjust front seat height by putting on weight or taking weight off.

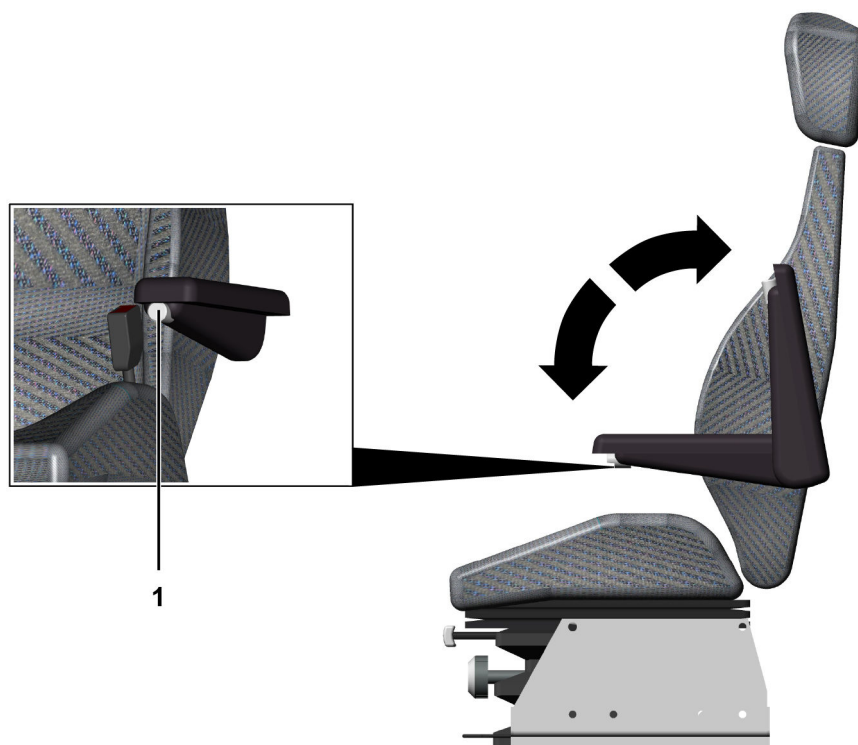


Fig. 2247: Adjusting the armrests

- 1 Adjusting wheel *Adjust armrest* (2x)
 - ▶ Adjust armrest.
 - ▶ Turn adjusting wheel *Adjust armrest* 1 clockwise.
 - ▶ Repeat procedure with second armrest.
 - ▷ Armrests are adjusted.

4.4.3 Adjusting the dampening



Fig. 2248: Decreasing the dampening

- ▶ Decreasing the dampening: Turn adjusting wheel *Adjust dampening* clockwise.
 - ▷ Dampening is decreased.

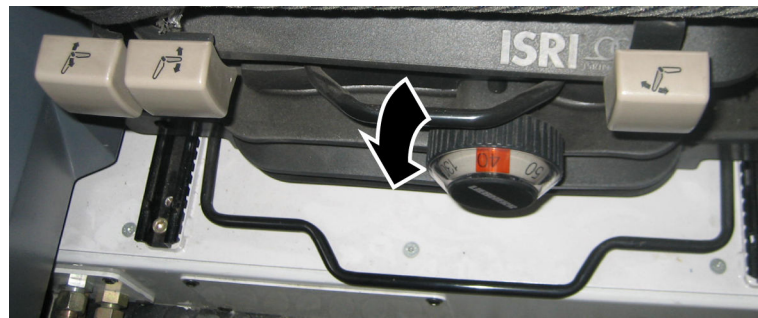


Fig. 2249: Increasing the dampening

- ▶ Increasing the dampening: Turn adjusting wheel *Adjust dampening* counter-clockwise.
 - ▷ Dampening is increased.

4.4.4 Adjusting the ergonomics*

The operator's seat with air suspension has two air chambers that can be filled or emptied separately.

The operator's seat with seat heating* has heaters in the seat cushion and in the backrest.

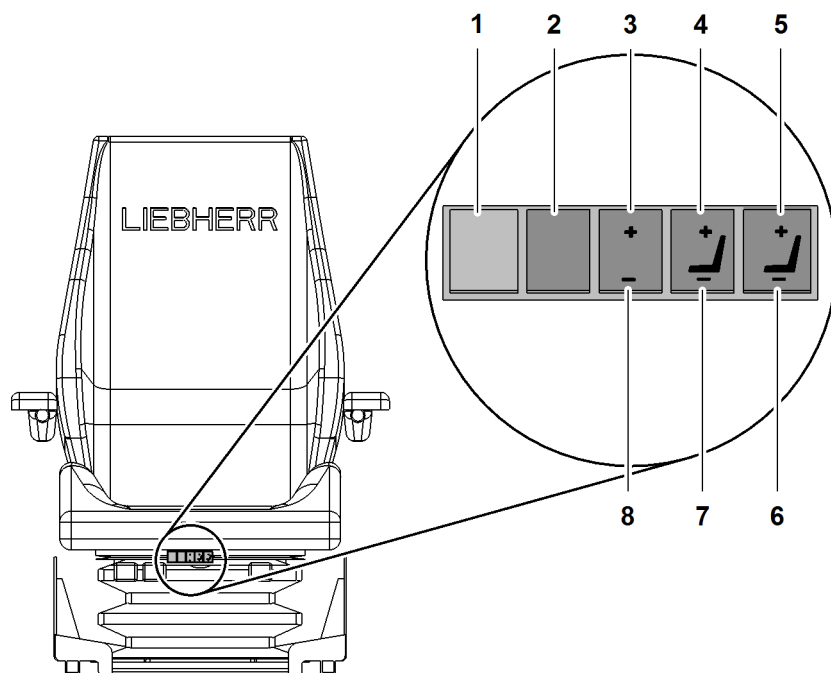


Fig. 2250: Adjusting the ergonomics*

- | | |
|---|---|
| <ul style="list-style-type: none"> 1 [not used] 2 Button <i>Seat heating</i> 3 Button <i>Increase weight</i> 4 Button <i>Increase bottom lumbar vertebrae support</i> | <ul style="list-style-type: none"> 6 Button <i>Increase top lumbar vertebrae support</i> 6 Button <i>Decrease top lumbar vertebrae support</i> 7 Button <i>Decrease bottom lumbar vertebrae support</i> 8 Button <i>Decrease weight</i> |
|---|---|

Turning the seat heating on or off

- ▶ Press the button *Seat heating 2* on the operator's seat.
 - ▷ Seat heating is switched on.
- ▶ Press the button *Seat heating 2* on the operator's seat again.
 - ▷ Seat heating is switched off.

Increasing or decreasing the weight

- ▶ Press the button *Increase weight 3* on the operator's seat.
 - ▷ Weight is being increased.
- ▶ Press the button *Decrease weight 8* on the operator's seat.
 - ▷ Weight is being decreased.

Increasing or decreasing the lumbar vertebrae support

- ▶ Press the button *Increase bottom lumbar vertebrae support 4* on the operator's seat.
 - ▷ Bottom lumbar vertebrae support is being increased.
- ▶ Press the button *Decrease bottom lumbar vertebrae support 7* on the operator's seat.
 - ▷ Bottom lumbar vertebrae support is being decreased.
- ▶ Press the button *Increase top lumbar vertebrae support 5* on the operator's seat.
 - ▷ Top lumbar vertebrae support is being increased.
- ▶ Press the button *Decrease top lumbar vertebrae support 6* on the operator's seat.
 - ▷ Top lumbar vertebrae support is being decreased.

4.4.5 Safety belt*



Fig. 2251: Safety belt

1 Belt buckle

2 Clasp

Putting on safety belt

In case of abrupt movement, the belt retractor blocks so that the belt cannot be pulled out further.

The belt has an automatic belt tightener.

It is not necessary to adjust the belt length.

- ▶ Pull belt buckle 1 out of belt retainer.
- ▶ Pull belt across body at height of pelvis.
- ▶ Insert seat belt buckle 1 into snap lock 2.
 - ▷ Safety belt is put on.

Releasing safety belt

- ▶ Press latch release on snap-lock 2.
 - ▷ Belt automatically winds up in belt mounting.

4.5 Lighting

4.5.1 Operating the floodlights on the uppercarriage

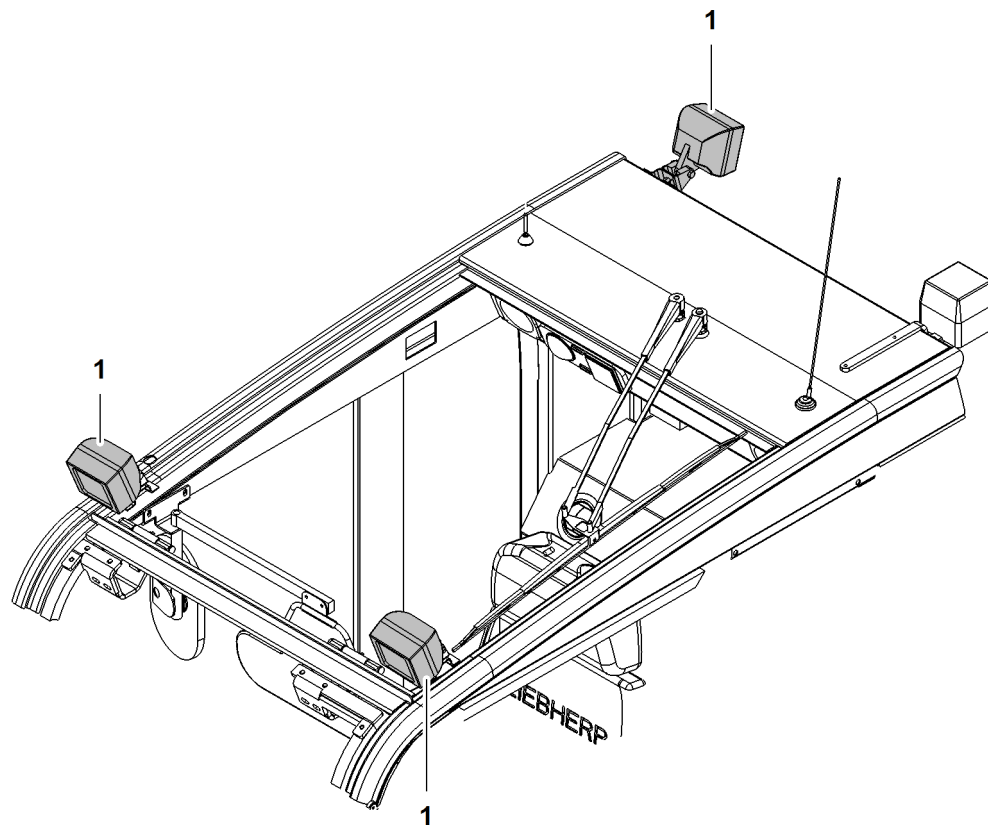


Fig. 2252: Operating the floodlights on the uppercarriage

1 Floodlights on uppercarriage



- ▶ Press the button *Floodlights on uppercarriage* on control panel X11.
- ▷ Floodlights on uppercarriage 1 light up.

4.5.2 Operating additional floodlights



CAUTION

Lamps with high luminosity that get very hot!
Risk of eye injury, burns.

- ▶ Do not directly look into floodlights that are turned on.
- ▶ Do not touch heated panes of the floodlights.

Operating main boom base section floodlights



- ▶ Press the button *Main boom base section floodlight*.
- ▷ Main boom base section floodlight is lit.



- ▶ Press the button *Adjust floodlight upward*.
 - ▷ Floodlight on main boom base section adjusts upward.



- ▶ Press the button *Adjust floodlight downward*.
 - ▷ Floodlight on main boom base section adjusts downward.

Operating all floodlights on boom



- ▶ Press the button *Boom floodlight*.
 - ▷ All floodlights on boom are lit.

4.5.3 Operating cabin lighting

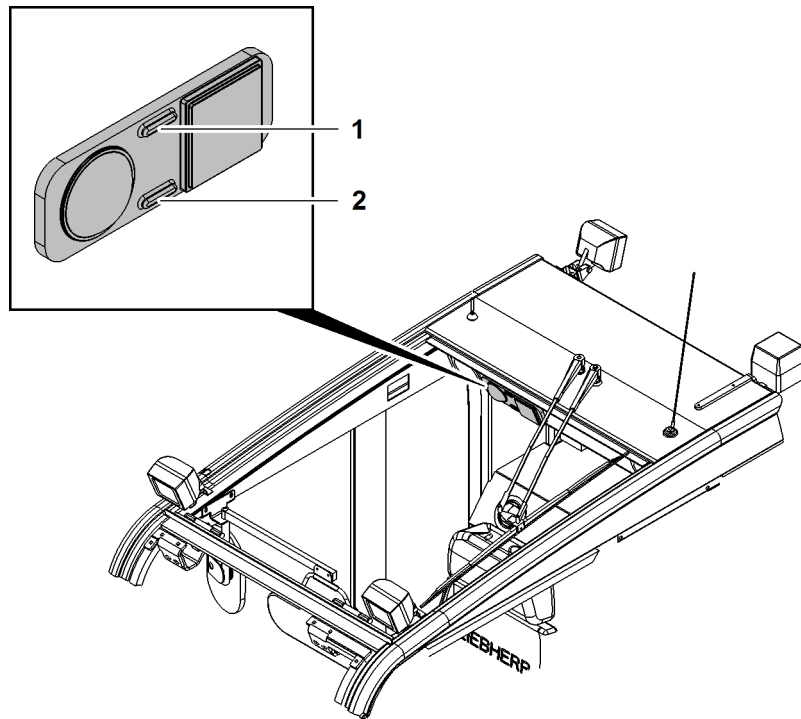


Fig. 2258: Operating cabin lighting

- 1 Press the reading lamp *button* 2 Press the Interior lighting *button*

Button *Interior lighting* is either in position "Automatic", "OFF" or "ON".

- ▶ Press the *Reading lamp 1* button.
 - ▷ The reading lamp is switched on.
- ▶ Press the *Interior lighting 2* button.
 - ▷ The interior lighting is switched on.

4.5.4 Operating the engine compartment lighting



- ▶ Press the button *Engine compartment lighting* on control panel X11.
 - ▷ The work lights in the engine compartment light up.

4.6 Windscreen wiper system

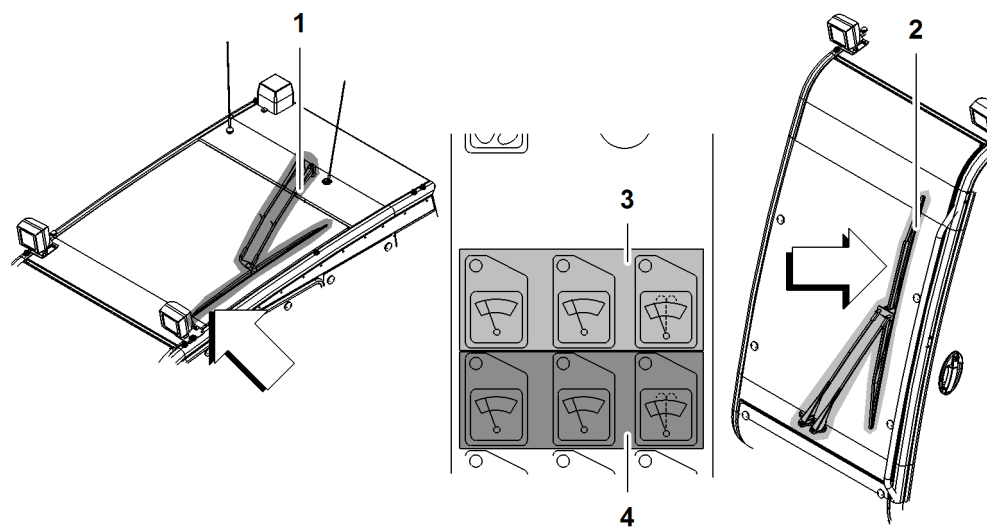
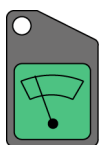


Fig. 2260: Windscreen wiper system

- | | | | |
|---|-----------------------------------|---|--|
| 1 | Windscreen wiper for roof window | 3 | Operating elements on control panel X11 for front windscreen wiper |
| 2 | Windscreen wiper for front window | 4 | Operating elements on control panel X11 for roof windscreen wiper |

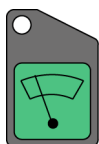
4.6.1 Operating the windscreen wipers

Activates/deactivates continuous mode of the windscreen wiper.



- ▶ Press the *Windscreen wiper* button on control panel X11.

▷ Continuous mode of windscreen wiper is activated.



- ▶ Press the *Windscreen wiper* button on control panel X11 again.

▷ Continuous mode of windscreen wiper is deactivated.

Activates/deactivates interval mode of the windscreen wiper



- ▶ Press the *Intermittent windscreen wiper* button on control panel X11.

▷ Interval mode of the windscreen wiper is activated.



▶ Press the button *Interval mode windscreen wiper* on control panel X11 again.

▷ Interval mode of the windscreen wiper is deactivated.

4.6.2 Operating the windscreen washer system



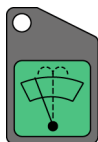
WARNING

Flammable fluid in windscreen washer bottle!
Fire, explosion.

▶ Fill windscreen washer bottle exclusively with non-flammable fluids.

Ensure that the following conditions are fulfilled:

- Container for windscreen washer system is filled.
- At low ambient temperatures: sufficient antifreeze for windscreen wiper system has been added.



▶ Press and hold the button *Windscreen wiper system* on control panel X11.
▷ Windscreen wiper runs continuously and windscreen cleaning fluid is sprayed on.

4.7 Ventilation, heating and air-conditioning

The following table shows the recommended settings for ventilation, heating and air conditioning.

Button <i>Fan speed heating/air conditioning system</i>	Rotary control knob <i>Temperature heating/air conditioning system</i>	Button <i>Air conditioning system</i>	Switch <i>Recirculated air/fresh air</i>	Position of the air vents		
					Left	Right
at least level 1	all the way to the left (blue zone)	Off	as required	Rear air vents	as required	as required
				Bottom air vents	as required	as required
				Front air vents	as required	as required
				Ventilation duct	as required	as required

Tab. 383: Recommended ventilation setting

Button <i>Fan speed heating/air conditioning system</i>	Rotary control knob <i>Temperature heating/air conditioning system</i>	Button <i>Air conditioning system</i>	Switch <i>Recirculated air/fresh air</i>	Position of the air vents		
					Left	Right
at least level 1	All the way to the right (red zone)	Off	as required	Rear air vents	as required	as required
				Bottom air vents	open	open
				Front air vents	open	open
				Ventilation duct	as required	as required

Tab. 384: Recommended heating setting

Button <i>Fan speed</i> <i>heating/air</i> <i>conditioning</i> <i>system</i>	Rotary control knob <i>Temperature</i> <i>heating/air</i> <i>conditioning</i> <i>system</i>	Button <i>Air</i> <i>conditioning</i> <i>system</i>	Switch <i>Recircu-</i> <i>lated air/</i> <i>fresh air</i>	Position of the air vents		
					Left	Right
at least level 1	all the way to the left (blue zone)	On	as required	Rear air vents	open to the top	open to the top
				Bottom air vents	closed	closed
				Front air vents	closed	open to the top
				Ventilation duct	open to the top	open to the top

Tab. 385: Recommended cooling setting

Button <i>Fan speed</i> <i>heating/air</i> <i>conditioning</i> <i>system</i>	Rotary control knob <i>Temperature</i> <i>heating/air</i> <i>conditioning</i> <i>system</i>	Button <i>Air</i> <i>conditioning</i> <i>system</i>	Switch <i>Recircu-</i> <i>lated air/</i> <i>fresh air</i>	Position of the air vents		
					Left	Right
at least level 1	all the way to the right (red zone)	On	Recircu- lated air	Rear air vents	open lateral towards window	open lateral towards window
				Bottom air vents	closed	closed
				Front air vents	open towards window	open towards window
				Ventilation duct	open towards window front	open lateral towards window

Tab. 386: Recommended dehumidification setting

4.7.1 Setting the air vent

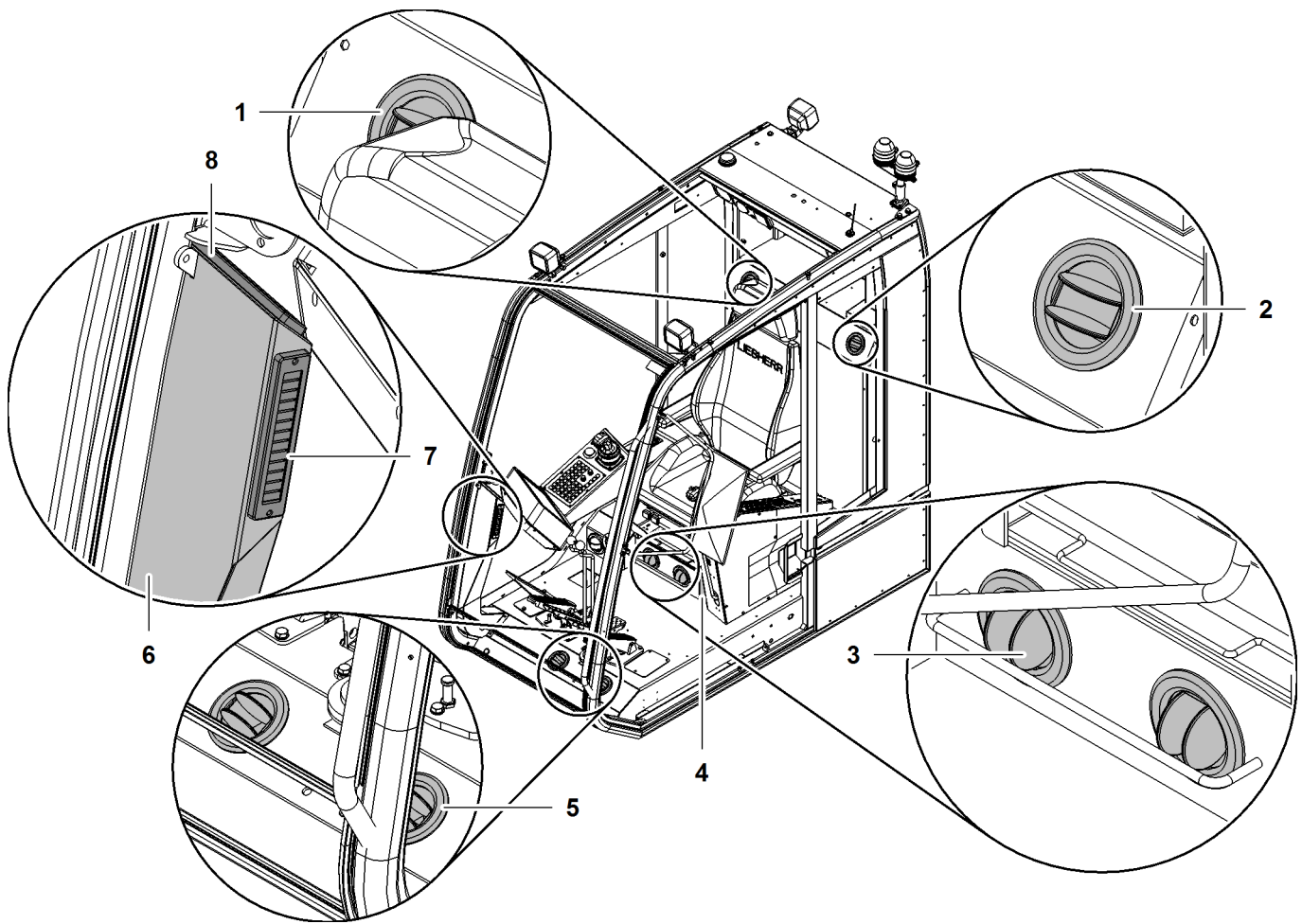


Fig. 2266: Air vent overview

- | | | | | | |
|---|----------------------|---|--|---|----------------------|
| 1 | Right rear air vent | 4 | Switch <i>Recirculated air/fresh air</i> | 7 | Lateral lamella vent |
| 2 | Left rear air vent | 5 | Front air vent (2x) | 8 | Top lamella vent |
| 3 | Bottom air vent (2x) | 6 | Ventilation duct | | |

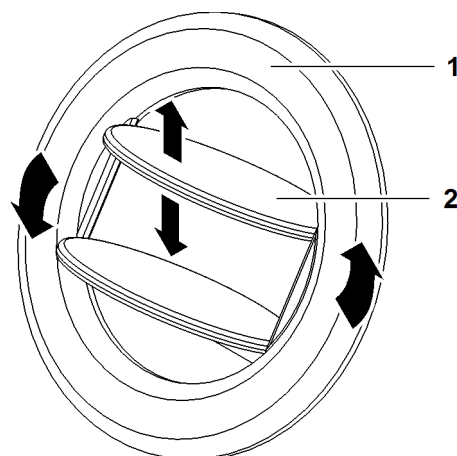


Fig. 2267: Setting the air vent

- | | | | |
|---|------|---|-----------|
| 1 | Ring | 2 | Flap (2x) |
|---|------|---|-----------|

- ▶ Turn ring 1 into desired position.
- ▶ Set flaps 2 to desired position.

4.7.2 Adjusting the lamella vents

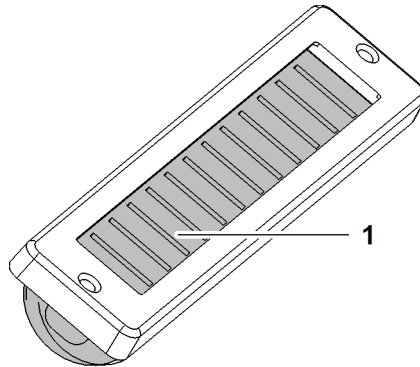


Fig. 2268: Adjusting the lamella vents

1 Lamella

- ▶ Turn lamella 1 into desired position.

4.7.3 Setting recirculated air or fresh air

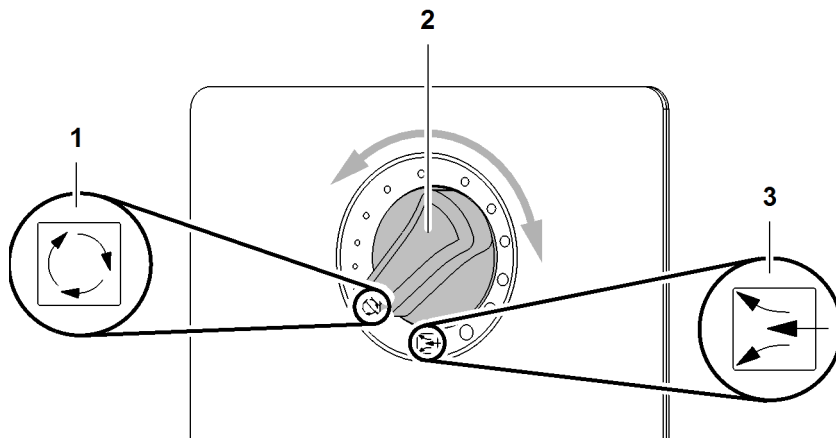


Fig. 2269: Setting recirculated air or fresh air

1 Recirculated air "position"

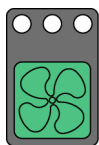
3 Fresh air "position"

2 Switch *Recirculated air/fresh air*

- ▶ Set the switch *Recirculated air/fresh air* 2 to the position "Recirculated air" 1.
 - ▷ The air is circulated around the cab.
- ▶ Set *Recirculated air/fresh air switch* to 2 Fresh air "position" 3.
 - ▷ The blower conveys fresh air from the outside into the cabin.

4.7.4 Operating the ventilation

The LED of the buttons indicate the selected blower level. Three different fan speeds are possible.



- ▶ Press the *Heating/air conditioning fan speed* button on control panel X11.
 - ▷ The fan blows.

4.7.5 Using the heater

Ensure that the following conditions are fulfilled:

- Diesel engine is switched on.
- Ventilation is switched on.



- ▶ Turn the *Heating temperature/air conditioning* rotary control knob on the X11 control panel to the right (red zone).
 - ▷ The heating is turned up.



- ▶ Turn the *Heating temperature/air conditioning* rotary control knob on the X11 control panel to the left (blue zone).
 - ▷ The heating is turned down.

4.7.6 Turning the air conditioning system on or off



WARNING

Leaks in the air conditioning coolant circuit in an enclosed space!
Risk of suffocation.

If there is a high coolant concentration in the air:

- ▶ Immediately leave the closed room (cab).



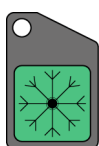
CAUTION

Rotating parts!
Risk of injury to limbs.

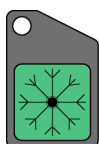
- ▶ Make sure that there are no persons in the vicinity of the fan on the condenser.

Ensure that the following conditions are fulfilled:

- Diesel engine is switched on.
- Ventilation is switched on.



- ▶ Press the *Air conditioning system* button on control panel X11.
 - ▷ The air conditioning is switched on.



- ▶ Press the button *Air conditioning system* on control panel X11 again.
 - ▷ Air conditioning system is switched off.

4.7.7 Operating the external air conditioning system*

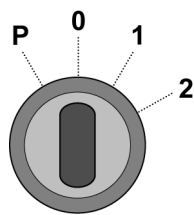
NOTICE

Inadmissible operation of both diesel engines!
Overpressure in the cooling circuit.
Coolant leak.

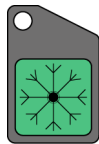
- ▶ Ensure that only one diesel engine is in operation.

Turning the external air conditioning system* on or off

Preparing the operating of the external air conditioning system



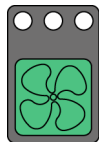
- ▶ Turn ignition key of machine to position "1".



- ▶ Press the *Air conditioning system* button on control panel X11.

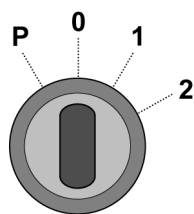


- ▶ Turn rotary control knob *Temperature heating/air conditioning system* on control panel X11 to the left (blue zone).



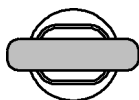
- ▶ Press the button *Fan speed heating/air conditioning system* on control panel X11 until the desired fan speed is set.

- ▶ Set the button *Recirculated air/fresh air* beneath operator's seat to the position "Recirculated air".



- ▶ Turn ignition key of machine to position "0".
 - ▷ Operation of the external air conditioning system has been prepared.

Turning the external air conditioning system on



- ▶ Turn ignition key on control unit *External air conditioning system* to position "1".

- ▷ Software version is displayed for two seconds on the display of control unit *External air conditioning system*:

H A T Z multiflex
S 0 5 2 0 4 4 3 / 2 0 1 1

Fig. 2281: Software version

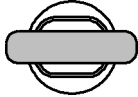
- ▷ Operating state before start is shown on the display of control unit *External air conditioning system*:

!!! OIL !!!	0,0 h
00°	0000

Fig. 2282: Operating state before start

The following parameters appear:

- Display top left: Error oil pressure indicator
- Display top right: Operating hours
- Display bottom left: Engine temperature
- Display bottom right: Diesel engine RPM



- ▶ Turn ignition key on control unit *External air conditioning system* briefly to position "2".

- ▷ Diesel engine is switched on.
- ▷ External air conditioning system is in operation.
- ▷ Operating state after start is shown on the display of control unit *External air conditioning system*.

OIL ✓	0,0 h
25°	1000

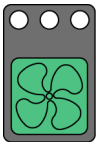
Fig. 2284: Operating state after start

The following parameters appear:

- Display top left: Oil pressure indicator OK
- Display top right: Operating hours
- Display bottom left: Engine temperature
- Display bottom right: Diesel engine RPM

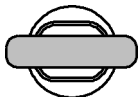


- ▶ Turn rotary control knob *Temperature heating/air conditioning system* on control panel X11 to the desired temperature.



- ▶ Press the button *Fan speed heating/air conditioning system* on control panel X11 until the desired fan speed is set.
 - ▷ External air conditioning system cools down or heats up cabin to the desired temperature.

Turning the external air conditioning system off



- ▶ Turn ignition key on control unit *External air conditioning system* to position "0".
 - ▷ External air conditioning system is turned off.

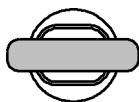
Setting manual start or automatic start

With manual start, the external air conditioning system can be turned on or off manually at any time with the ignition key.

With automatic start, the external air conditioning system is turned on or off automatically with the machine's diesel engine.

Make sure the following prerequisites are met:

- Operation of the external air conditioning system* has been prepared.



- ▶ Turn ignition key on control unit *External air conditioning system* to position "1".

- ▷ Software version is displayed for two seconds on the display of control unit *External air conditioning system*:

H A T Z multiflex S 0 5 2 0 4 4 3 / 2 0 1 1
--

Fig. 2289: Software version

- ▷ Operating state before start is shown on the display of control unit *External air conditioning system*:

!!! OIL !!! 00°	0,0 h 0000
--------------------	---------------

Fig. 2290: Operating state before start



- ▶ Press button *F1* on control unit *External air conditioning system*.

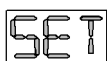
- ▷ Start mode/daily operating hours is shown on the display of control unit *External air conditioning system*:

a u t o m a t i k TagBSZ: 0,0 h

Fig. 2292: Start mode/daily operating hours

The following parameters appear:

- Top display: Automatic start
- Bottom display: Daily operating hours



- ▶ Press button *SET* on control unit *External air conditioning system*.

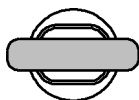
- ▷ Start mode/daily operating hours is shown on the display of control unit *External air conditioning system*:

m a n u e l l TagBSZ: 0,0 h

Fig. 2294: Start mode/daily operating hours

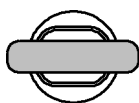
The following parameters appear:

- Top display = manual start
- Bottom display = daily operating hours



- ▶ Turn ignition key on control unit *External air conditioning system* to position "0".
 - ▷ Settings are saved.
 - ▷ The new settings are active at the next start.

Requesting the operating hours



- ▶ Turn ignition key on control unit *External air conditioning system* to position "1".

- ▷ Software version is displayed for two seconds on the display of control unit *External air conditioning system*:

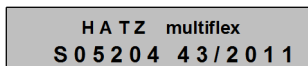


Fig. 2297: Software version

- ▷ Operating state before start is shown on the display of control unit *External air conditioning system*:

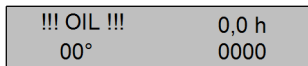


Fig. 2298: Operating state before start



- ▶ Press button *F1* on control unit *External air conditioning system*.

- ▷ Start mode/daily operating hours is shown on the display of control unit *External air conditioning system*:

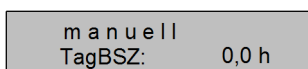


Fig. 2300: Start mode/daily operating hours

The following parameters appear:

- Top display = manual start
- Bottom display = daily operating hours



- ▶ Press button *F1* on control unit *External air conditioning system*.

- ▷ Total operating time/diesel engine RPM are shown on the display of control unit *External air conditioning system*:

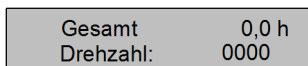
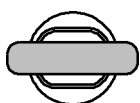


Fig. 2302: Total operating time/diesel engine RPM

The following parameters appear:

- Top display: Total operating hours
- Bottom display: Diesel engine RPM



- ▶ Turn ignition key on control unit *External air conditioning system* to position "0".

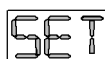
Operating the menu



Note

Change of basic settings!
Loss of warranty.

- ▶ Make sure that no basic settings are changed.



- ▶ Press and hold the button *SET* on control unit *External air conditioning system* and turn ignition key on control unit *External air conditioning system* to position "1".
- ▷ Menu is shown on the display of control unit *External air conditioning system*:

*** SETUP - MENUE***
[1] Einstellungen

Fig. 2305: Menu

The following parameters appear:

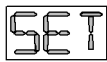
- Top display: Menu
- Bottom display: [1] Settings

The following menus can be selected:

- [1] Settings
- [2] Service
- [3] Safety
- [4] Daily operating hours
- [5] Total operating hours
- [6] Exit

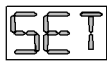


- ▶ Press the button *F1* on control unit *External air conditioning system* until the desired menu is displayed.



- ▶ Press button *SET* on control unit *External air conditioning system*.
 - ▷ Desired menu is selected.

Resetting daily operating hours



- ▶ Press and hold the button *SET* on control unit *External air conditioning system* and turn ignition key on control unit *External air conditioning system* to position "1".

- ▷ Menu is shown on the display of control unit *External air conditioning system*:

*** SETUP - MENUE***
[1] Einstellungen

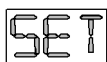
Fig. 2309: Menu

The following parameters appear:

- Top display: Menu
- Bottom display: [1] Settings



- ▶ Press the button *F1* on control unit *External air conditioning system* until the menu "[4] Daily operating hours" is displayed.



- ▶ Press button *SET* on control unit *External air conditioning system*.

- ▷ The menu "[4] Daily operating hours" is shown on the display of control unit *External air conditioning system*:

*** Tageszaehler***
Pin-Nr.: _ _ _ _

Fig. 2312: Menu [4] Daily operating hours

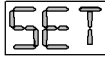
The following parameters appear:

- Top display: Daily operating hours
- Bottom display: Pin number query

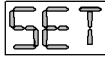
The PIN number is 4000.



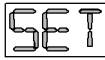
- ▶ Press the button *F1* on control unit *External air conditioning system* until "4" is displayed in the first PIN number field.



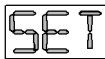
- ▶ Press button *SET* on control unit *External air conditioning system*.
 - ▷ First PIN number field is selected.
 - ▷ Second PIN number field blinks and shows "0".



- ▶ Press button *SET* on control unit *External air conditioning system*.
 - ▷ Second PIN number field is selected.
 - ▷ Third PIN number field blinks and shows "0".



- ▶ Press button *SET* on control unit *External air conditioning system*.
 - ▷ Third PIN number field is selected.
 - ▷ Fourth PIN number field blinks and shows "0".



- ▶ Press button *SET* on control unit *External air conditioning system*.
 - ▷ Fourth PIN number field is selected.
 - ▷ The menu "Delete day counter" is shown on the display of control unit *External air conditioning system*:

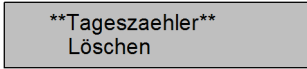


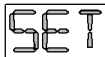
Fig. 2318: Menu Delete day counter

The following parameters appear:

- Top display: Daily operating hours
- Bottom display: Delete

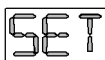


- ▶ Press button *F1* on control unit *External air conditioning system*.



- ▶ Press button *SET* on control unit *External air conditioning system*.
 - ▷ Daily operating hours are reset.

Displaying error messages



- ▶ Press and hold the button *SET* on control unit *External air conditioning system* and turn ignition key on control unit *External air conditioning system* to position "1".
 - ▷ Menu is shown on the display of control unit *External air conditioning system*:

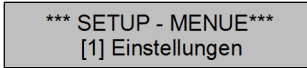


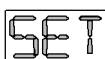
Fig. 2322: Menu

The following parameters appear:

- Top display: Menu
- Bottom display: [1] Settings



- ▶ Press the button *F1* on control unit *External air conditioning system* until the menu "[2] Service" is displayed.



- ▶ Press button *SET* on control unit *External air conditioning system*.

- ▷ The menu “[2] Service” is shown on the display of control unit *External air conditioning system*:

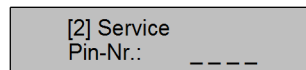


Fig. 2325: Menu [2] Service

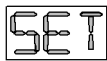
The following parameters appear:

- Top display: Service
- Bottom display: Pin number query

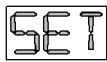
The PIN number is 2000.



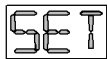
- ▶ Press the button *F1* on control unit *External air conditioning system* until “2” is displayed in the first PIN number field.



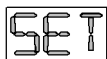
- ▶ Press button *SET* on control unit *External air conditioning system*.
 - ▷ First PIN number field is selected.
 - ▷ Second PIN number field blinks and shows “0”.



- ▶ Press button *SET* on control unit *External air conditioning system*.
 - ▷ Second PIN number field is selected.
 - ▷ Third PIN number field blinks and shows “0”.



- ▶ Press button *SET* on control unit *External air conditioning system*.
 - ▷ Third PIN number field is selected.
 - ▷ Fourth PIN number field blinks and shows “0”.



- ▶ Press button *SET* on control unit *External air conditioning system*.
 - ▷ Fourth PIN number field is selected.
 - ▷ The menu “[2] Service/[1] Service settings” is shown on the display of control unit *External air conditioning system*:

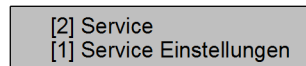


Fig. 2331: Menu [2] Service/[1] Service settings

The following parameters appear:

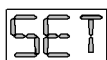
- Top display: [2] Service
- Bottom display: [1] Service settings

The following menus can be selected:

- [1] Service settings
- Error memory
- Exit



- ▶ Press the button *F1* on control unit *External air conditioning system* until the menu “Error memory” is displayed.



- ▶ Press button *SET* on control unit *External air conditioning system*.
 - ▷ The menu “[2] Service/Error memory” is shown on the display of control unit *External air conditioning system*:

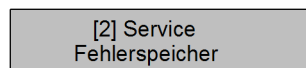
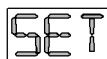


Fig. 2334: Menu [2] Service/Error memory

The following parameters appear:

- Display top line: [2] Service
- Display bottom line: Error memory



- ▶ Press button *SET* on control unit *External air conditioning system*.

- ▷ The first error message is shown on the display of control unit *External air conditioning system*:

Nr. 1	0,0 h
Oeldruck	

Fig. 2336: First error message

The following parameters appear:

- Display top left: Error number
- Display top right: Operating hour at which the error occurred
- Bottom display: Type of error



- ▶ Press button *F1* on control unit *External air conditioning system*.
 - ▷ Error messages are displayed in sequence.

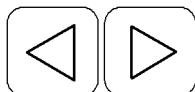
4.7.8 Auxiliary heating*

A heating start time can be preset within a seven day period with control unit *Auxiliary heating*. Three start times can be programmed, however only one can be activated.

The control unit *Auxiliary heating* has an alarm function.

When the ignition is switched on, the clock displays the current time and the day. The display and buttons are illuminated when the heating system is in operation.

All symbols on the display flash after the power supply has been connected. The time and weekday must be set.



The clock has been designed so that all flashing symbols can be set with the button *Back* or with the button *Next*. The displayed time is saved if no button is pressed for a period of five seconds. Time-scrolling is accelerated if either the *Back* or *Next* buttons are pressed for longer than two seconds.

If the ignition is switched off while the heating system is in continuous heating mode, a remaining operating time of 15 minutes is displayed and the heating system remains active.

Switching on auxiliary heating

Switching on auxiliary heating manually



- ▶ Press the button *Instant heating* on control unit *Auxiliary heating*.

When ignition is switched off:

- ▷ Auxiliary heating is switched on for programmed duration.

When ignition is switched on:

- ▷ Permanent auxiliary heating operation is turned on.

Switching on auxiliary heating automatically

- ▶ Set start of heating ([For more information see: Setting start of heating, page 901](#)).

Switching off auxiliary heating

Switching off auxiliary heating manually



- ▶ Press the button *Instant heating* on control unit *Auxiliary heating*.
 - ▷ Auxiliary heating is turned off.

Switching off auxiliary heating automatically

- ▶ Set activation time (For more information see: [Setting the activation time, page 902](#)).

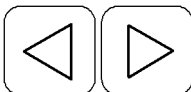
Switching off auxiliary heating using remaining operating time

- ▶ Set remaining operating time (For more information see: [Setting remaining operating time, page 902](#)).

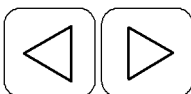
Setting the time and day



- ▶ Press the button *Time* on control unit *Auxiliary heating* for more than two seconds.
 - ▷ Time blinks on the display of control unit *Auxiliary heating*.



- ▶ Set time using *Back* or *Next* buttons.
- ▶ Wait five seconds.
 - ▷ Time is set.
 - ▷ Day blinks on the display of control unit *Auxiliary heating*.



- ▶ Set day using *Back* or *Next* buttons.
- ▶ Wait five seconds.
 - ▷ Day is set.

Calling up time and day

Time and day are always on the display when ignition is switched on.

When ignition is switched off:

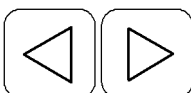


- ▶ Press the button *Time* on control unit *Auxiliary heating*.
 - ▷ Time and day are shown on the display of control unit *Auxiliary heating* for five seconds.

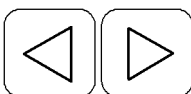
Setting start of heating



- ▶ Press the button *Program* on control unit *Auxiliary heating*.
 - ▷ Indicator memory slot1 blinks on the display of control unit *Auxiliary heating*.



- ▶ Set start of heating using *Back* or *Next* buttons.
- ▶ Wait five seconds.
 - ▷ Time is set.
 - ▷ Day blinks on the display of control unit *Auxiliary heating*.



- ▶ Set day using *Back* or *Next* buttons.
- ▶ Wait five seconds.
 - ▷ Day is set.
 - ▷ Indicator memory slot1 is shown on the display of control unit *Auxiliary heating*.

- ▷ Start of heating is set.
- ▶ If required, repeat procedure at indicator memory slot2 and memory slot3.
 - ▷ Start of heating is set.

Displaying or deleting start of heating

Displaying start of heating



- ▶ Press the button *Program* on control unit *Auxiliary heating* until desired memory slot is shown on the display of control unit *Auxiliary heating*.
 - ▷ Start of heating is shown on the display of control unit *Auxiliary heating*.

Deleting start of heating



- ▶ Press the button *Program* on control unit *Auxiliary heating* until no memory slot is shown on the display of control unit *Auxiliary heating*.
 - ▷ Time is shown on the display of control unit *Auxiliary heating*.
 - ▷ Start of heating is deleted.

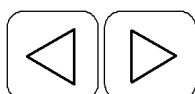
Setting the activation time

Make sure the following prerequisites are met:

- Heater is switched off.



- ▶ Press the button *Back* on control unit *Auxiliary heating* for three seconds.
 - ▷ Activation time blinks on the display of control unit *Auxiliary heating*.



- ▶ Program activation time to between one and 120 minutes using *Back* or *Next* buttons.
- ▶ Wait five seconds.
 - ▷ Activation time is set.

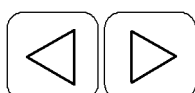
Setting remaining operating time

Make sure the following prerequisites are met:

- Ignition is turned off.
- Heater is switched on.



- ▶ Press the button *Back* on control unit *Auxiliary heating*.
 - ▷ Remaining time blinks on the display of control unit *Auxiliary heating*.



- ▶ Program remaining time to between one and 120 minutes using *Back* or *Next* buttons.
- ▶ Wait five seconds.
 - ▷ Remaining time is set.

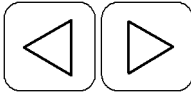
Setting the alarm

The alarm is not linked to any specific day.

The alarm switches itself off after five minutes, or if a button is pressed.



- ▶ Press the button *Program* on control unit *Auxiliary heating* until the bell symbol is shown on the display of control unit *Auxiliary heating*.



- ▶ Set alarm time using *Back* or *Next* buttons.
 - ▷ Alarm time is set.

Displaying or deleting alarm times

Displaying the alarm time



- ▶ Press the button *Program* on control unit *Auxiliary heating* until the bell symbol is shown on the display of control unit *Auxiliary heating*.
 - ▷ Alarm time is shown on the display of control unit *Auxiliary heating*.

Deleting alarm time



- ▶ Press the button *Program* on control unit *Auxiliary heating* until the bell symbol is no longer shown on the display of control unit *Auxiliary heating*.
 - ▷ Alarm time is deleted.

4.8 Additional cab equipment

4.8.1 Using the horn

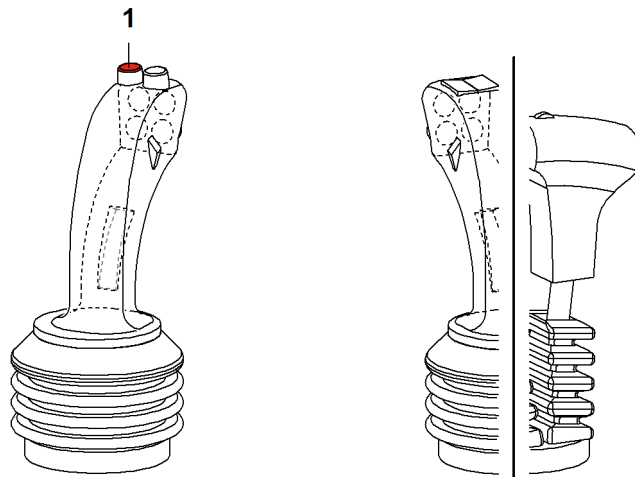


Fig. 2358: Operating the horn

1 Button *Horn*

- ▶ Press the button *Horn* 1 on left multi-directional control lever.
 - ▷ The horn sounds.

4.8.2 Operating the safety lever



WARNING

Drives may still be moving after having been switched off!
Serious injury.

- ▶ Fold safety lever up only when drives have stopped.
-

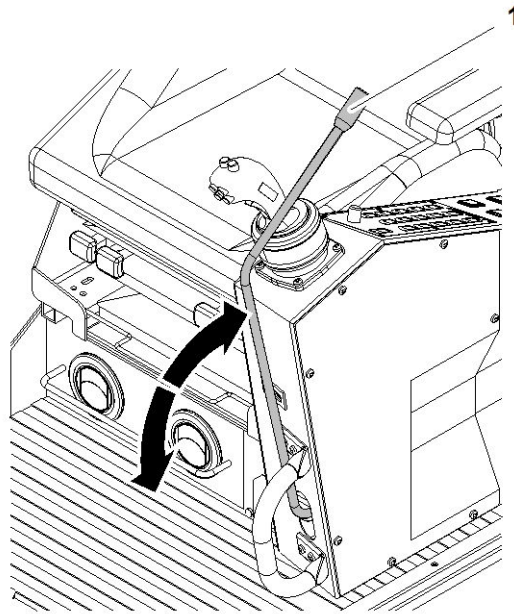


Fig. 2359: Operating the safety lever

1 Safety lever

► Lift safety lever 1.

- ▷ This blocks the foot pedals, control lever and buttons.

The safety lever 1 must be lifted in the following situations:

- When leaving the cabin.
- During breaks (even if the machine operator is still in the cabin).
- When reading the operating manual.

► Lower safety lever 1 for operation.

4.8.3 Operating the radio

Ensure that the following conditions are fulfilled:

- Ignition key is in position "1" or position "P".

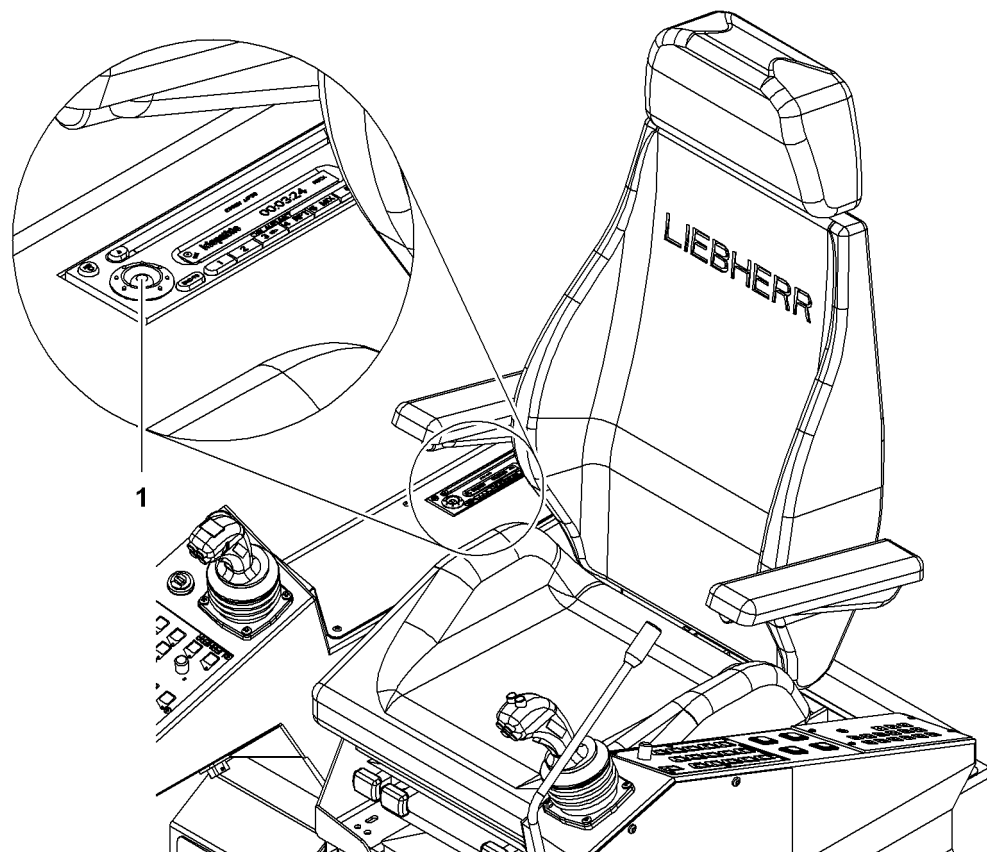


Fig. 2360: Operating the radio

1 Installed radio

► Please refer to the radio 1 operating manual.

4.8.4 Using the ashtray



WARNING

Flammable waste is in the ashtray!
Risk of fire, explosion.

► Do not place any flammable waste in the ashtray.

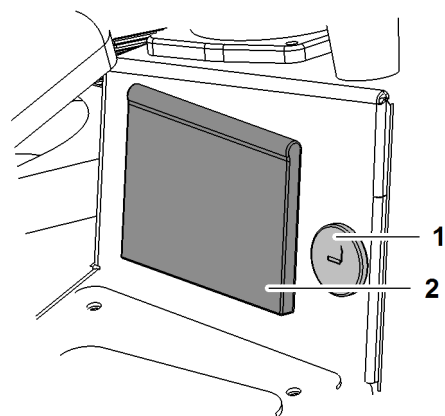


Fig. 2361: Using the ashtray

1 Cigarette lighter

2 Ashtray

- ▶ To use the ashtray **2**, fold it out.
- ▶ To empty the ashtray: lightly press the clip in the middle downwards.

4.8.5 Using the cigarette lighter

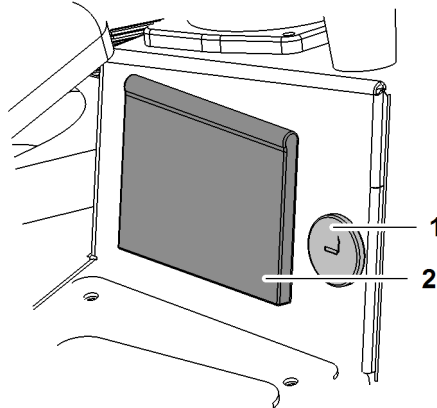


Fig. 2362: Using the cigarette lighter

1 Cigarette lighter

2 Ashtray

- ▶ Press the handle of the cigarette lighter **1** until it engages.
 - ▷ After about 1 minute the handle disengages automatically and the surface of the cigarette lighter glows.

4.9 Cab tilting device*

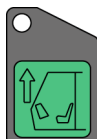


WARNING

Danger if attempting to enter or leave the cab when tilted!
Risk of falling off the uppercarriage.

- ▶ Only enter and leave the cab when it is in a horizontal or lowered position.

4.9.1 Tilting the cabin



- ▶ Press the *Tilt cabin up* button on control panel X11.
 - ▷ The cab can tilt up to a maximum of 20°.



- ▶ Press the *Tilt cabin down* button on control panel X11.
 - ▷ The cab can tilt down to a maximum of 0°.

4.10 Hydraulic cabin elevation*

4.10.1 Adjusting the cabin



WARNING

Incorrect operation of hydraulic cabin elevation system!
Severe injuries, damage to machine.

- ▶ Ensure that only the machine operator is in the cabin.
- ▶ Check the function of all safety devices before adjusting the cabin.
- ▶ Do not move the machine when the cabin is elevated.



WARNING

Personnel or objects underneath the cabin when it is lowered!
Severe injuries, damage to machine.

- ▶ Make sure that no-one is standing in the danger zone.
- ▶ Ensure that there are no objects underneath the cabin.
- ▶ Check the area under the cabin before lowering it.

Ensure that the following conditions are fulfilled:

- Mast is erected and pinned.
- Emergency lowering valves are closed.
- Cabin is in working position.
- Chain guide is removed.
- Chain is pinned to cabin.
- Crane operation is selected.
- Diesel engine is switched on.
- Cylinder adjustment functions are on.
- Safety chain is attached.

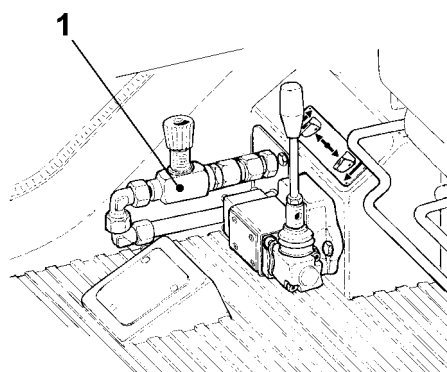


Fig. 2365: Adjusting the cabin

- 1 Emergency lowering valve for cabin



- ▶ Press and hold the button *Raise cabin* on the right control panel.
 - ▷ Cabin moves upwards.



- ▶ Press and hold the button *Lower cabin* on the right control panel.
 - ▷ Cabin moves down.



Note

If cabin can no longer be lowered with the button *Lower cabin*:

- ▶ Lower cabin with emergency lowering valve **1** in cabin or emergency lowering valve on mast.
-

Abseiling rescue device

If the safety gear of the hydraulic cabin elevation has triggered, the cabin can not longer be adjusted. The machine operator in this instance must abseil down using the abseiling rescue device.

If the cabin can no longer be adjusted:

- ▶ Use abseiling rescue device ([For more information see: 4.44.1 Using abseil rescue equipment, page 1061](#)) .
- ▶ Contact Liebherr customer service.

4.11 Central lubrication*

The central swing ring bearing lubrication system lubricates automatically at the programmed lubrication times and break times. The lubrication process is stated when starting the diesel engine and works during the operation of the machine and with lowered safety lever.

The central swing ring tooth flank lubrication system lubricates automatically at the programmed lubrication times and break times. The lubrication process is stated when operating the swing and works during the operation of the machine and with lowered safety lever.

NOTICE

Insufficient lubrication!

the swing ring bearings and/or swing ring tooth flanks may be damaged.

- ▶ Do not exceed the lubrication times and break times set by the factory.
-

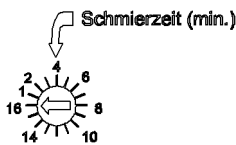
NOTICE

Incorrect adjustment of the positive pressure relief valve!

Central lubrication system may be damaged.

- ▶ Retain manufacturer's settings on the positive pressure relief valve.
-

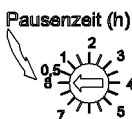
4.11.1 Set lubrication time



The range of adjustment for lubrication time is from 1 to 16 minutes. The factory setting for lubrication time is 2 minutes.

- ▶ Turn the *Set lubrication time* rotary control knob to the desired lubrication time.

4.11.2 Set pause time



The range of adjustment for pause time is from 0.5 to 8 hours. The factory setting for pause time is 1 hour.

- ▶ Turn the *Set pause time* rotary control knob to the desired pause time.

4.11.3 Interim lubrication



- ▶ Press the *Interim lubrication* button.

4.12 Mode

4.12.1 Turning the assembly functions on or off



- ▶ Press the switch *Assembly functions* on control panel X12.

- ▷ Assembly functions are switched on.
- ▷ Symbol *Assembly functions* is displayed on the monitor:



Fig. 2372: Symbol *Assembly functions*



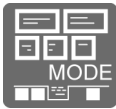
- ▶ Press the switch *Assembly functions* on control panel X12 again.
 - ▷ Assembly functions are switched on.
 - ▷ The symbol *Assembly functions* is no longer displayed on the monitor.

4.12.2 Selecting mode

Crane mode is the machine's standard mode. The machine is automatically in crane mode, if no assembly functions or any special mode has been selected. The electronic load moment limitation (LML) and all safety devices are activated.

Make sure the following conditions are met:

- Machine has been fully set up.
- Tilting-back cylinders have been extended.



- ▶ Press the button *Mode* on the monitor.
 - ▷ The *Mode* screen appears on the monitor.



- ▶ Press button for desired mode (e.g. crane mode) on the monitor.



- ▶ Press and hold the button *Mode* on control panel X12.



- ▶ Press the *Confirm* button on the monitor.

- ▶ Let go of the button *Mode* on control panel X12.
 - ▷ The symbol *Restart machine* is displayed on the monitor:



Fig. 2378: Symbol *Restart machine*

- ▶ Switch off the ignition.
- ▶ Start diesel engine after approx. 10 seconds.
 - ▷ Desired mode is selected.

4.13 Programming the setup



DANGER

Unacceptable setup!

Toppling of machine, structural breakdown.

- ▶ Only program a set-up on the machine that is in accordance with the load chart.
- ▶ Re-calculate the setup if there is any change to the setup. This includes changes during operation, (e.g. rope of winch1/winch2, reeving, or change of load position).



Note

The only load chart that is permitted and applicable for operational purposes is the electronic load chart on the machine. The printed load chart and the load chart on the CD are copies of the electronic load chart on the machine.

If the identification numbers and revision numbers of the two load charts do not match:

- ▶ Order new printed/CD versions of the load charts from Liebherr after sales service.

The set-up is retained when the ignition is switched off.

Ensure that you understand what the symbols on the *setup* screen mean ([For more information see: 3.20 Setup screen, page 757](#)).

4.13.1 Call up the *Setup* screen



- ▶ Press the *Setup* button on the monitor.
 - ▷ The *setup* screen with the current configuration appears.

4.13.2 Selecting and changing settings

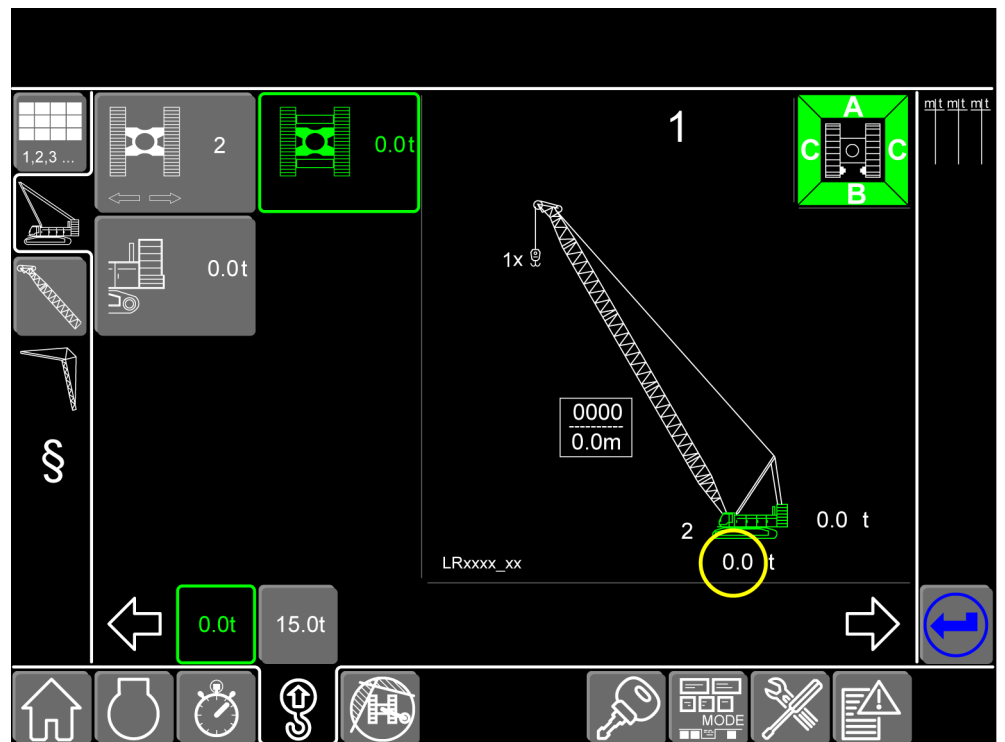
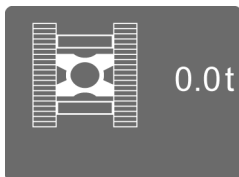


Fig. 2380: Example of a Setup screen



- ▶ Press the *Basic machine* button on the monitor.



- ▶ Press the button for the desired setting on the monitor.



- ▶ Press the *Value* button on the monitor.
 - ▷ Selected value is applied.



- When wanting to switch to the next larger values:
- ▶ Press the *Higher values* button on the monitor.



- When wanting to switch to the next smaller values:
- ▶ Press the *Lower values* button on the monitor.

4.13.3 Calculating the revised set-up

Do not press any keys during the calculation. This will cancel the calculation.



- ▶ Press the button *Calculate load chart* (lit blue) on the monitor.

- ▷ Calculation starts.
- ▷ During calculation, the *hourglass* symbol appears instead of the *Calculate load chart* button.



Fig. 2387: Hourglass symbol

- ▷ Once the calculation is completed, the symbol *Calculate load chart* appears:

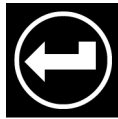


Fig. 2388: Symbol *Calculate load chart*

Troubleshooting

Symbol *Calculate load chart* blinks red?

The entry was incorrect.

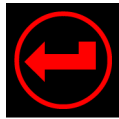


Fig. 2389: Symbol *Calculate load chart* (blinks red)

- ▶ Locate and change wrong input on *setup* screen.
 - ▶ Restart the calculation.
-

4.13.4 Checking the programmed setup



- ▶ Switch to the *Operation* screen: Press the *Mode* button on the monitor.

If the setup was changed:

- ▶ drive one load circle without load.

4.14 Load moment limitation (LML)

4.14.1 General



DANGER

Incorrect procedure!

Toppling of machine, structural breakdown.

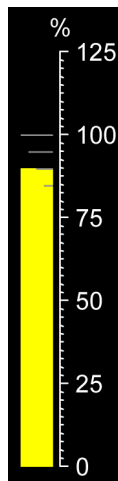
- ▶ Ensure that the machine operator knows the weight of the load, the radius of the boom and the values of the applicable load chart.
- ▶ Work only with permitted values of the load chart.
- ▶ Never use the load moment limitation as a routine way of switching the machine off.

The load moment limitation:

- is an electronic limiter of the load moment.
- is adapted to the application in question through input of the setup.
- stops and locks all machine movements that increase the load moment when reaching the maximum load moment and the functions "Lift main boom" and "Lift jib".

The load moment limitation has various information displays:

- Load moment limitation on the *operation* screen on the monitor
- Load moment limitation lights on cabin roof and on A-frame¹
- Warning buzzer inside the cabin
- Load moment limitation signal to warn people in the danger zone around the machine

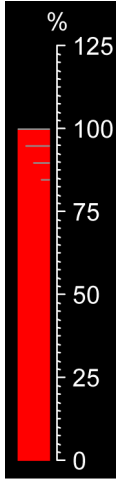


The **90% mark** of the load moment utilization on the *Operation* screen is reached:

- The *Load moment limitation warning* symbol appears on the monitor.
- Load moment limitation lamps light up orange.
- Warning buzzer in cabin sounds (interval: short sound, long pause). The warning buzzer can be suppressed after 5 seconds using the *Warning buzzer* button.



Fig. 2392: Symbol Load moment limitation warning (lit yellow)



The **100% mark** of the load moment utilization on the *Operation* screen is reached:

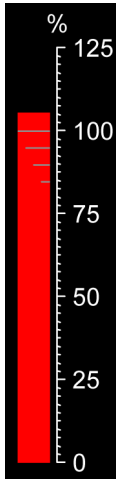
- The *Load moment limitation stop* symbol appears on the monitor.
- The following machine movements are disabled:
 - Lift winch1.
 - Lift winch2.
 - Lower main boom.
 - Lower jib.
 - Lower suspended counterweight.
 - Reduce counterweight carriage radius.
 - Lift counterweight carriage support.
- "Lift main boom" is permitted up to 105% of the maximum permitted load moment.
- "Lift jib" is permitted up to 105% of maximum permitted load moment.
- Load moment limitation lamps light up red.
- Load moment limitation signal sounds.
- Warning buzzer in cabin sounds (interval: short sound, short pause). The warning buzzer can be suppressed after 5 seconds using the *Warning buzzer* button.



Fig. 2394: Load moment limitation stop symbol



To circumvent a deadlock, the maximum permitted load moment can be increased by 5% using the button *Load moment limitation assembly/self-lock*.

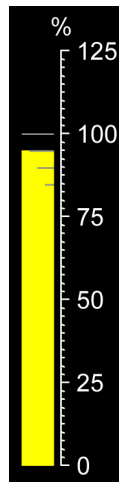


The **105% mark** of the load moment utilization on the *Operation* screen is reached:

- The *Load moment limitation stop* symbol appears on the monitor.
- The following machine movements are disabled:
 - Lift winch1.
 - Lift winch2.
 - Lower main boom.
 - Lower jib.
 - Lower suspended counterweight.
 - Reduce counterweight carriage radius.
 - Lift counterweight carriage support.
- "Lift main boom" is permitted up to 110% of the maximum permitted load moment.
- "Lift jib" is permitted up to 110% of maximum permitted load moment.
- Load moment limitation lamps light up red.
- Load moment limitation signal sounds.
- Warning buzzer in cabin sounds (interval: short sound, short pause). The warning buzzer can be suppressed after 5 seconds using the *Warning buzzer* button.



Fig. 2397: Load moment limitation stop symbol

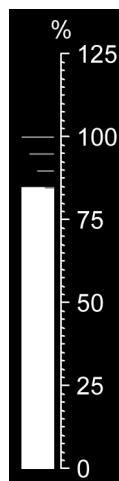


The **95% mark** of the load moment utilization on the *Operation* screen is undercut:

- The *Load moment limitation warning* symbol appears on the monitor.
- Load moment limitation lamps light up orange.
- Warning buzzer in cabin sounds (interval: short sound, long pause). The warning buzzer can be suppressed after 5 seconds using the *Warning buzzer* button.



Fig. 2399: Symbol Load moment limitation warning (lit yellow)



The **85% mark** of the load moment utilization on the *Operation* screen is undercut:

- The *Load moment limitation warning* symbol disappears on the monitor.
- Load moment limitation lamps light up green.
- Warning buzzer inside the cabin stops.



Symbol **Danger of toppling backwards** appears on monitor:

- Machine may topple backwards due to insufficient radius.
- Function “Lift main boom” and/or “lift jib” locked. In case of emergency, it is possible to deactivate the function locks with the key switch *Load moment limitation shut-off* (machine with CE load chart) or the button *Load moment limitation shut-off* (machine with ANSI load chart).

If the function “Load moment limitation self-lock” or “Load moment limitation deactivation” is active, machine data is recorded as specified in the guidelines. A storage medium for this purpose is located in switch cabinet X1. The machine operator must ensure that the storage medium is not removed.

4.14.2 Load moment limitation self-lock



DANGER

Inappropriate use of the function "Load moment limitation self-lock"!
Toppling of machine, structural breakdown.

- ▶ Only use the "Load moment limitation self-lock" function to cancel a self-lock (Deadlock) situation.



When pressing the button *Load moment limitation assembly/self-lock* on control panel X23, the load moment limitation decides which function will be activated according to the current machine geometry. If no load chart exists for the current geometry, the "Load moment limitation assembly" function is activated ([For more information see: 7 Assembly and dismantling, page 1181](#)). If a load chart exists for the current geometry, the function "Load moment limitation self-lock" is activated.

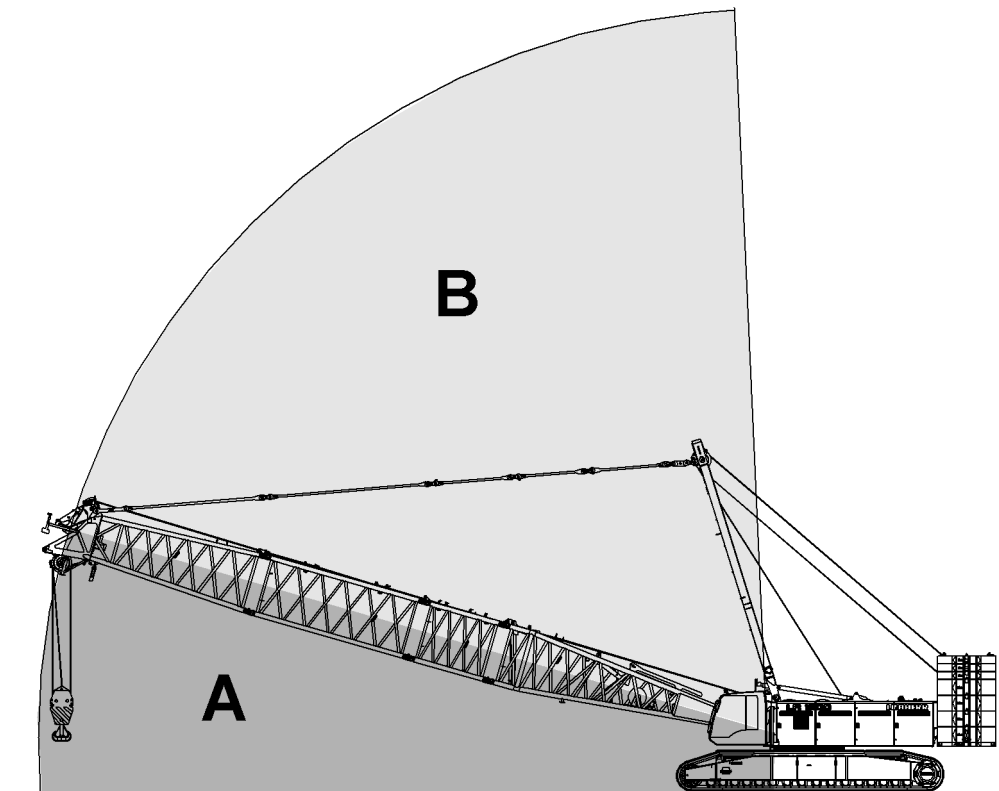


Fig. 2403: Diagram: Geometry of the machine inside and outside the load chart

- | | |
|--|---|
| <p>A Geometry of the machine outside the load chart</p> | <p>B Geometry of the machine inside the load chart</p> |
|--|---|

Example of a self-lock (Deadlock): A load close to the maximum permitted load moment is lowered from a great height. The increasing weight of the rope between the pulley block and the boom head increases the load moment and results in a load moment limitation stop followed by a self-lock, as the following movements are disabled:

- Lift winch1.
- Lift winch2.
- Lower main boom.
- Lift main boom (above 105% utilization).
- Lower jib.

- Lift jib (above 105% utilization).
- Lower suspended counterweight.
- Reduce counterweight carriage radius.
- Lift counterweight carriage support.

The “load moment limitation self-blocking” function reenables all movements up to 105% utilization of the maximum permitted load moment (raise main boom/jib up to 110% utilization). The speed of the movements is reduced on machines with a CE load chart.

Make sure the following conditions are met:

- Load moment limitation is functioning properly.
- Control levers are in zero position.



- ▶ Press the button *Load moment limitation assembly/self-lock* on control panel X23.

There is a load chart for the current machine geometry:

- ▷ Function “load moment limitation self-lock” is active.
- ▷ The LED in the button *Load moment limitation assembly/self-lock* is lit.
- ▷ Machine movements up to 105% utilization of the maximum permitted load moment are possible.
- ▷ “Lift main boom” is permitted up to 110% utilization of the maximum permitted load moment.
- ▷ Speeds of machine movements (lift/lower winch1, lift/lower winch2, lift/lower main boom, lift/lower jib, lift/lower auxiliary winch, swing gear left/right) are reduced to 15%.
- ▷ Crawler speed is reduced to 25%.
- ▷ Load moment limitation lamps light up orange.
- ▷ The *Load moment limitation warning* symbol appears on the monitor:



Fig. 2405: Symbol Load moment limitation warning (lit yellow)

- ▷ If the machine is using a CE load chart, the *Data recording active* symbol appears on the monitor:

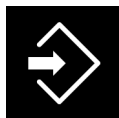


Fig. 2406: Data recording active symbol

The function “Load moment limitation self-lock” is deactivated in the following situations:

- There is no load chart for the current machine geometry.
- Load moment limitation is not functioning properly.
- Machine operator does not carry out any machine movements for more than 10 seconds.
- Diesel engine is switched off and 10 seconds have passed.
- Machine operator actuates key switch *Turn off load moment limitation*.
- Machine operator presses the button *Load moment limitation assembly/self-lock* on control panel X23.



▶ Press the button *Load moment limitation assembly/self-lock* on control panel X23.

- ▷ Function "Load moment limitation self-lock" is deactivated.
- ▷ LED in the button *Load moment limitation assembly/self-lock* goes out.
- ▷ Load moment limitation is active.
- ▷ Load moment limitation lamps light up according to the current status of the load moment limitation system.
- ▷ If the machine is using a CE load chart, the *Data recording active* symbol disappears on the monitor.

4.14.3 Load moment limitation shut-off (CE load chart)

The following description of the function "Load moment limitation shut-off" is only valid for machines with a CE load chart.



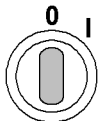
DANGER

Inappropriate use of the function "Load moment limitation shut-down"!
Toppling of machine, structural breakdown.

- ▶ The function "Load moment limitation shut-down" is to be used exclusively for checking the machine using a test load or when the load moment limitation fails. These checks may only be carried out by specialists from the national, certified testing institute.
- ▶ If the load moment limitation fails, use the function "Load moment limitation shut-down" to move the machine out of the danger zone.

Make sure the following conditions are met:

- Diesel engine is switched on.
- Control levers are in zero position.
- ▶ Leave cabin and open uppercarriage door.
- ▶ Actuate key switch *Load moment limitation shut-down*.



- ▷ Load moment limitation is turned off.
- ▷ Any preselection of the button *Load moment limitation assembly/self-lock* on control panel X23 is deselected.
- ▷ Speeds of machine movements (lift winch1, lift winch2, lower main boom, lower jib, lift auxiliary winch) are reduced to 15%.
- ▷ Load moment limitation lamps blink red.
- ▷ Load moment limitation signal sounds permanently.
- ▷ The *load moment limitation off* symbol appears on the monitor:



Fig. 2409: Symbol Load moment limitation turned off

- ▷ The *Data recording active* symbol appears on the monitor:

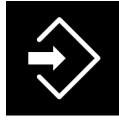


Fig. 2410: Data recording active symbol

The function “Load moment limitation shut-down” is deactivated in the following situations:

- Diesel engine is switched off.
- 30 minutes have passed since activation of the function and the control levers are in zero position.
- Machine operator actuates key switch *Turn off load moment limitation*.
- ▶ Actuate key switch *Load moment limitation shut-down*.
 - ▷ Load moment limitation is active.
 - ▷ Load moment limitation lamps light up according to the current status of the load moment limitation system.
 - ▷ Load moment limitation signal sounds according to the current status of the load moment limitation system.
 - ▷ The symbol *Load moment limitation off* disappears on the monitor.
 - ▷ The *Data recording active* symbol disappears on the monitor.

4.14.4 Load moment limitation shut-off (ANSI load chart)

The following description of the function “Load moment limitation shut-off” is only valid for machines with an ANSI load chart.



DANGER

Inappropriate use of the function “Load moment limitation shut-down”!
Toppling of machine, structural breakdown.

- ▶ The function “Load moment limitation shut-down” is to be used exclusively for checking the machine using a test load or when the load moment limitation fails. These checks may only be carried out by specialists from the national, certified testing institute.
- ▶ If the load moment limitation fails, use the function “Load moment limitation shut-down” to move the machine out of the danger zone.

Make sure the following conditions are met:

- Diesel engine is switched on.
- Control levers are in zero position.

- ▶ Unlock control panel X12.



- ▶ Press the switch *Load moment limitation shut down key switch release* on control panel X12.

- ▷ The lamp in the switch *Load moment limitation shut down key switch release* lights up.
- ▷ The LED in the button *Load moment limitation assembly/self-lock* flashes.



- ▶ Press the button *Load moment limitation assembly/self-lock* on control panel X23.

- ▷ Load moment limitation is turned off.
- ▷ The LED in the button *Load moment limitation assembly/self-lock* is lit.
- ▷ Load moment limitation lamps blink red.

- ▷ Load moment limitation signal sounds permanently.
- ▷ The *load moment limitation off* symbol appears on the monitor:



Fig. 2413: Symbol Load moment limitation turned off

The function "Load moment limitation shut-down" is deactivated in the following situations:

- Machine operator actuates the safety lever.
- Machine operator presses the button *Load moment limitation assembly/self-lock* on control panel X23.



- ▶ Press the button *Load moment limitation assembly/self-lock* on control panel X23.
 - ▷ The LED in the button *Load moment limitation assembly/self-lock* flashes.
 - ▷ Load moment limitation is active.
 - ▷ Load moment limitation lamps light up according to the current status of the load moment limitation system.
 - ▷ Load moment limitation signal sounds according to the current status of the load moment limitation system.
 - ▷ The symbol *Load moment limitation off* disappears on the monitor.



- ▶ Press the switch *Load moment limitation shut down key switch release* on control panel X12.
 - ▷ Load moment limitation lamps go out.
 - ▷ The lamp in the switch *Load moment limitation shut down key switch release* goes out.
- ▶ Lock control panel X12 and remove the key.
- ▶ Ensure that the key is kept outside of the cabin by a person appointed by the owner.

4.15 Calculating load charts online

The Litronic control system simulates load charts for any setup online. The currently selected setup is used for the calculation.

Depending on the specified setup and load position, additional values will be required.

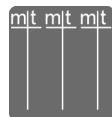
No additional values need to be entered for boom configurations 1, 2 and 3.

With boom configuration 4, 5 and 9, a load chart can only be calculated for one main boom angle (alpha). The main boom angle must be entered manually prior to calculation.

4.15.1 Calculating load charts



- ▶ Press the *Setup* button on the monitor.
 - ▷ The *Setup* screen appears on the monitor.



- ▶ Press the *Load chart* button on the monitor.
 - ▷ The *Setup - load chart* screen appears on the monitor.

- ▶ Press input field on the monitor.
 - ▷ Input field selected.



- ▶ Increasing the value in selected input field by +1: press the *Increase value +1* button on the monitor.



- ▶ Increasing the value in selected input field by +0.1: press the *Increase value +0.1* button on the monitor.



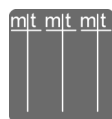
- ▶ Decreasing the value in selected input field by -0.1: press the *Decrease value -0.1* button on the monitor.



- ▶ Decreasing the value in selected input field by -1: press the *Decrease value -1* button on the monitor.

- ▶ Press input field on the monitor again.
 - ▷ Input confirmed.

- ▶ Repeat the process until all the values have been entered.



- ▶ Press the *Load chart* button on the monitor.
 - ▷ Calculation starts.
 - ▷ The load chart with the calculated values is displayed.

4.15.2 Boom configuration 4 - load position 1

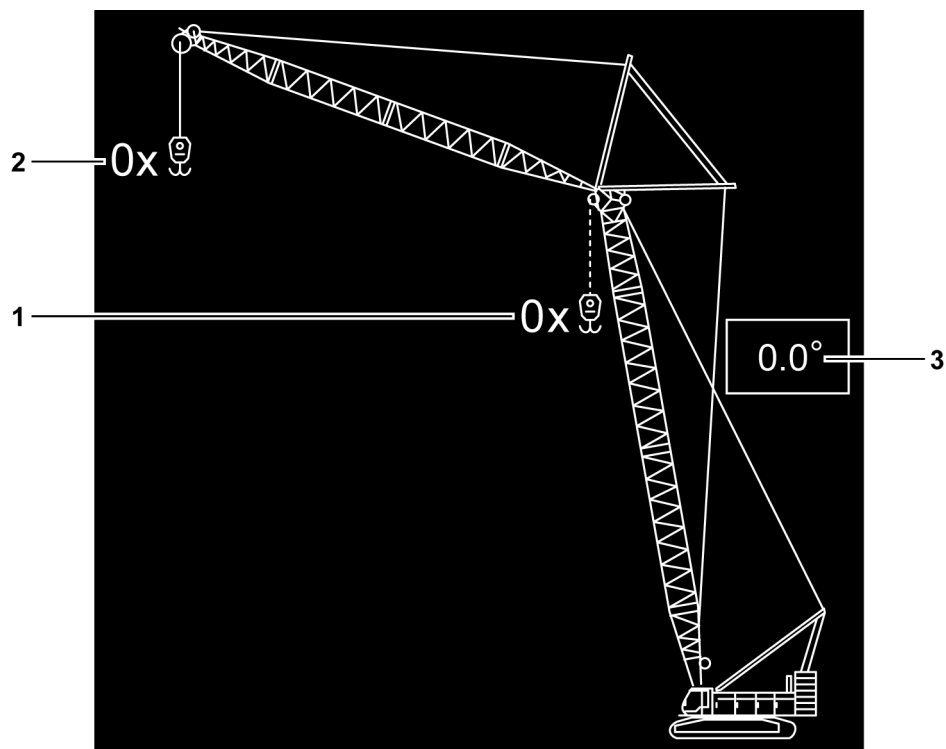


Fig. 2423: Boom configuration 4 - load position 1

- 1 Reeving load position 2 (main boom head). 3 Main boom angle (alpha)
- 2 Reeving load position 1 (jib head).

When calling up the screen *Load chart* in boom configuration 4 with load position 1, the screen for entering the main boom angle (Alpha) 3 appears.

4.15.3 Boom configuration 4 - load position 2

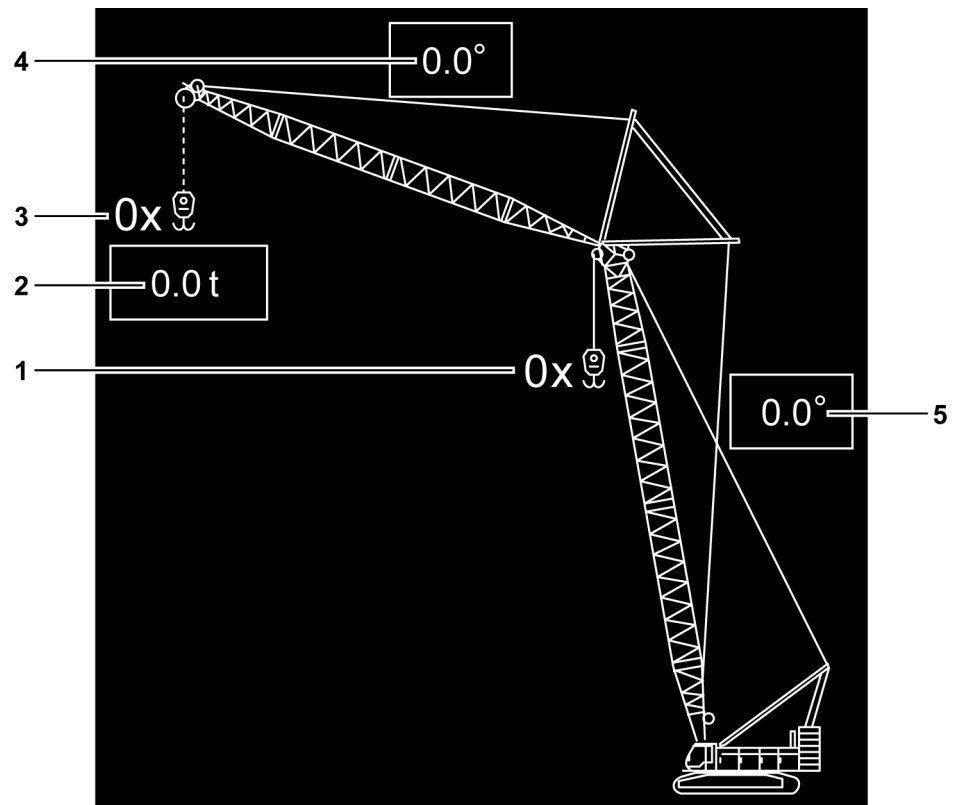


Fig. 2424: Boom configuration 4 - load position 2

- | | | | |
|---|---|---|-------------------------|
| 1 | Reeving load position 2 (main boom head). | 4 | Jib angle (alpha) |
| 2 | Load on load position 1 (jib head). | 5 | Main boom angle (alpha) |
| 3 | Reeving load position 1 (jib head). | | |

When calling up the screen *Load chart* in boom configuration 4 with load position 2, a screen for entering the main boom angle (alpha) **5**, the jib angle (beta) **4** and the load in load position 1 (jib head) **2** appears.

The permitted values for load on load position 1 (jib head) **2** can be found in the foreword to the valid load chart.

4.15.4 Boom configuration 5 - load position 1

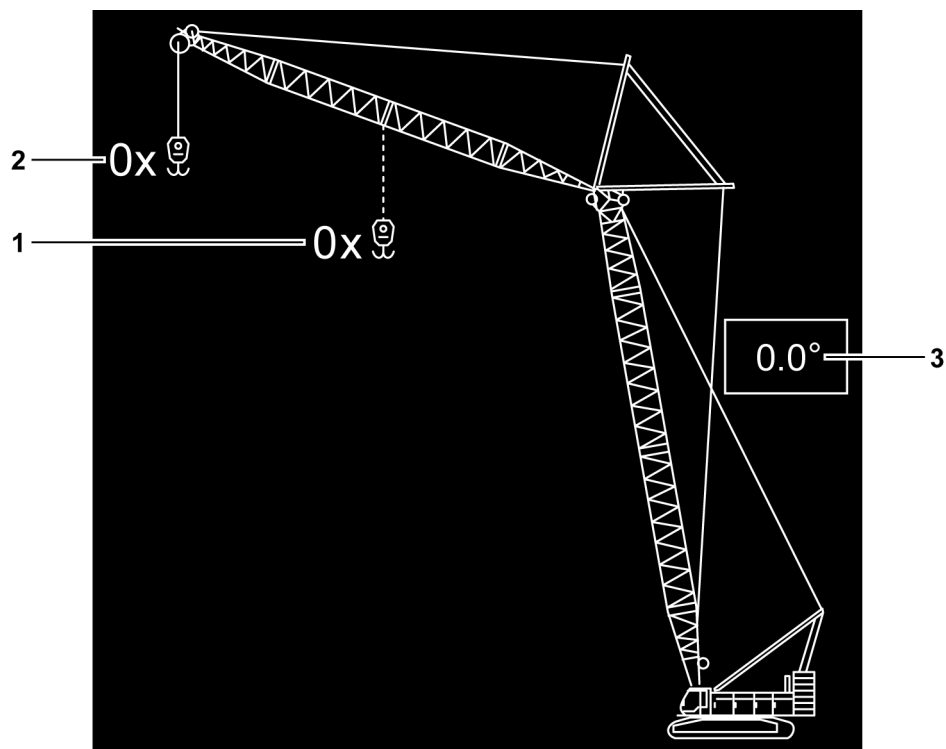


Fig. 2425: Boom configuration 5 - load position 1

- | | | | |
|---|-------------------------------------|---|-------------------------|
| 1 | Reeving load position 3 (midfall) | 3 | Main boom angle (alpha) |
| 2 | Reeving load position 1 (jib head). | | |

When calling up the screen *Load chart* in boom configuration 5 with load position 1, the screen for entering the main boom angle (Alpha) 3 appears.

4.15.5 Boom configuration 5 - load position 3

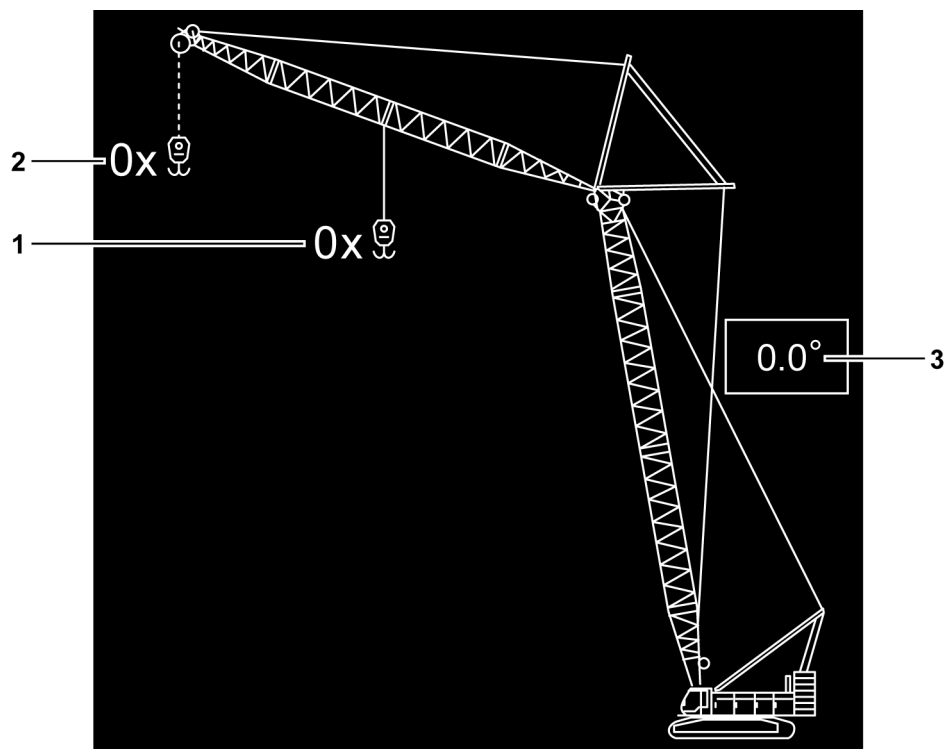


Fig. 2426: Boom configuration 5 - load position 3

- | | | | |
|---|-------------------------------------|---|-------------------------|
| 1 | Reeving load position 3 (midfall) | 3 | Main boom angle (alpha) |
| 2 | Reeving load position 1 (jib head). | | |

When calling up the screen *Load chart* in boom configuration 5 with load position 3, the screen for entering the main boom angle (Alpha) 3 appears.

4.15.6 Boom configuration 6 - load position 2

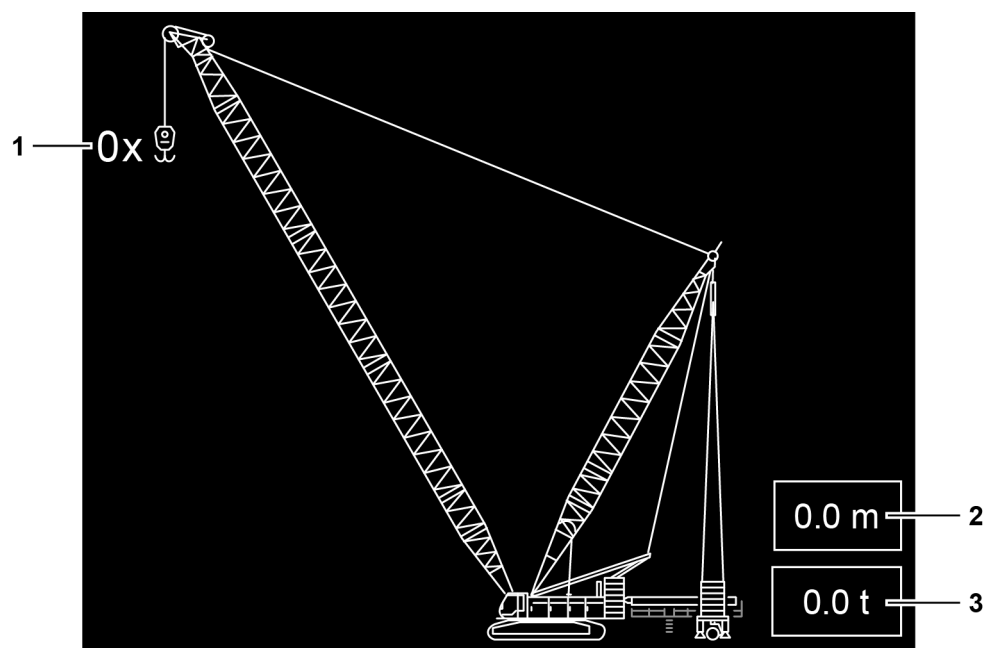


Fig. 2427: Boom configuration 6 - load position 2

- | | |
|---|---------------------------------|
| <p>1 Reeving load position 2 (main boom head)</p> <p>2 Radius of counterweight carriage</p> | <p>3 Weight on derrick boom</p> |
|---|---------------------------------|

When calling up the screen *load chart* in boom configuration 6 with load position 2, a screen appears for entering the radius of counterweight carriage **2** and the weight on the derrick boom **3**.

The admissible values are stated in the valid load chart.

4.15.7 Boom configuration 8 - load position 1

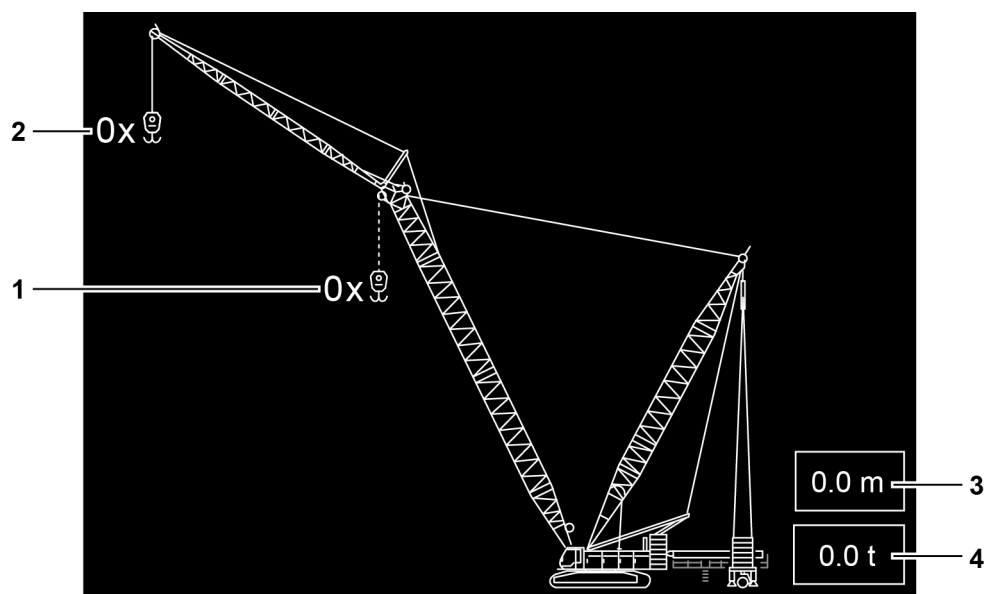


Fig. 2428: Boom configuration 8 - load position 1

- | | | | |
|---|--|---|----------------------------------|
| 1 | Reeving load position 2 (main boom head) | 3 | Radius of counterweight carriage |
| 2 | Reeving load position 1 (jib head) | 4 | Weight on derrick boom |

When calling up the screen *load chart* in boom configuration 8 with load position 1, a screen appears for entering the radius of counterweight carriage **3** and the weight on the derrick boom **4**.

The admissible values are stated in the valid load chart.

4.15.8 Boom configuration 8 - load position 2

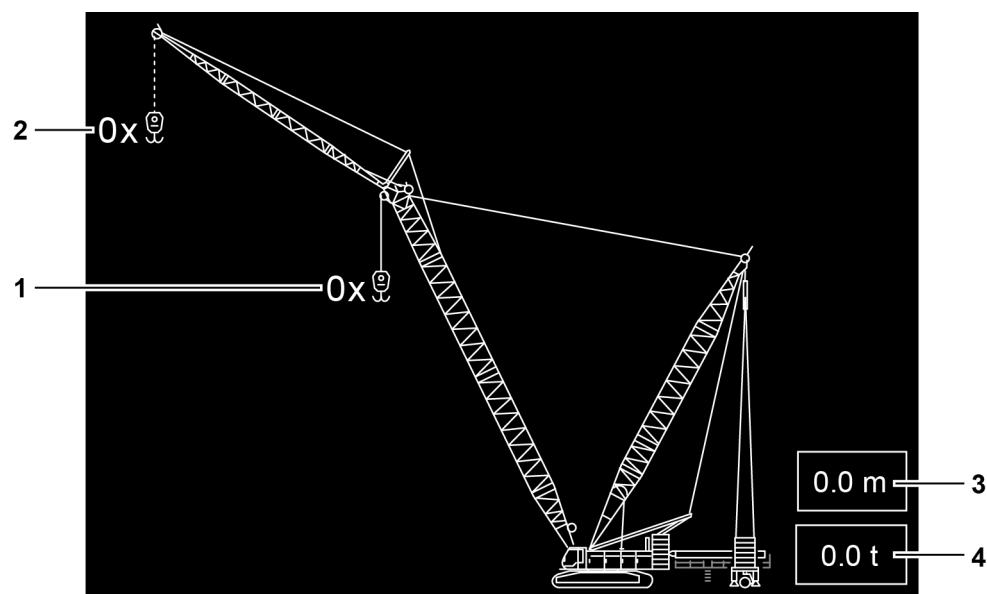


Fig. 2429: Boom configuration 8 - load position 2

- | | | | |
|---|--|---|----------------------------------|
| 1 | Reeving load position 2 (main boom head) | 3 | Radius of counterweight carriage |
| 2 | Reeving load position 1 (jib head) | 4 | Weight on derrick boom |

When calling up the screen *load chart* in boom configuration 8 with load position 2, a screen appears for entering the radius of counterweight carriage **3** and the weight on the derrick boom **4**.

The admissible values are stated in the valid load chart.

4.15.9 Boom configuration 9 - load position 1

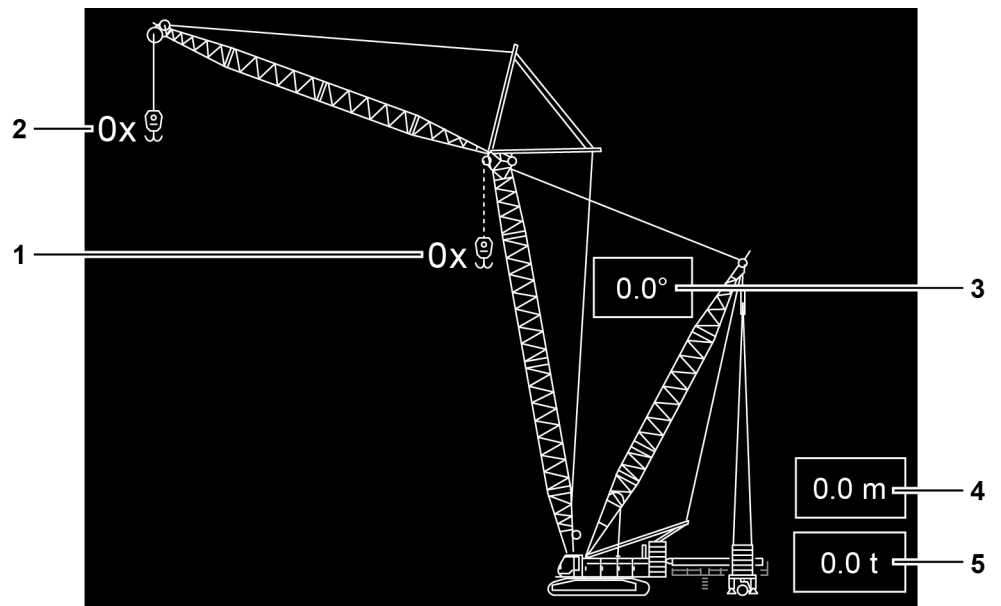


Fig. 2430: Boom configuration 9 - load position 1

- | | | | |
|---|--|---|----------------------------------|
| 1 | Reeving load position 2 (main boom head) | 4 | Radius of counterweight carriage |
| 2 | Reeving load position 1 (jib head) | 5 | Weight on derrick boom |
| 3 | Main boom angle (alpha) | | |

When calling up the screen *Load chart* in boom configuration 9 with load position 1, a screen appears for entering the main boom angle (alpha) **3**, the radius of the counterweight carriage **4** and the weight on the derrick boom **5**.

The admissible values for the radius of the counterweight carriage **4** and the weight on the derrick boom **5** are stated in the valid load chart.

4.15.10 Boom configuration 9 - load position 2

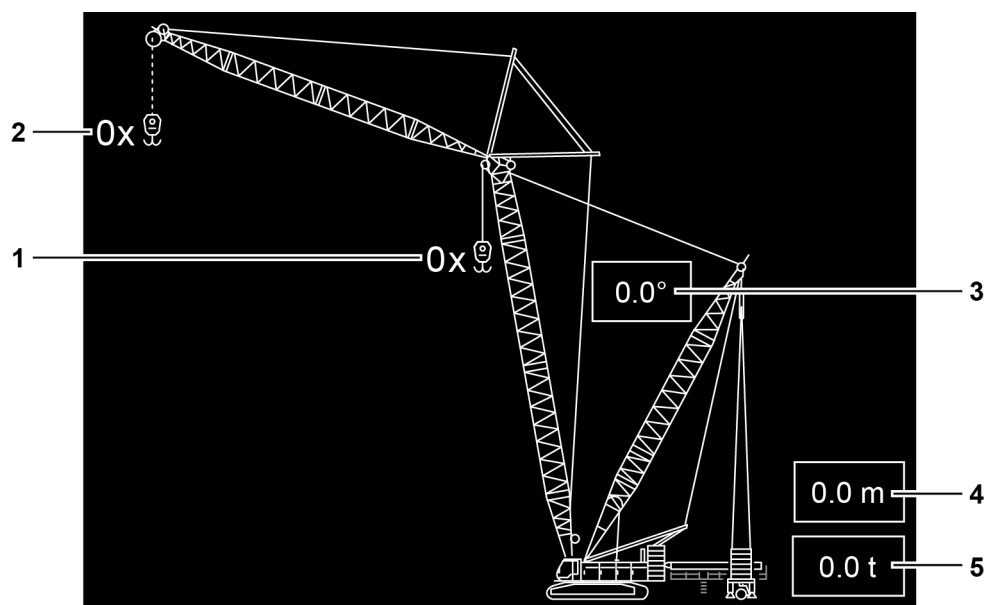


Fig. 2431: Boom configuration 9 - load position 2

- | | | | |
|---|--|---|----------------------------------|
| 1 | Reeving load position 2 (main boom head) | 4 | Radius of counterweight carriage |
| 2 | Reeving load position 1 (jib head) | 5 | Weight on derrick boom |
| 3 | Main boom angle (alpha) | | |

When calling up the screen *Load chart* in boom configuration 9 with load position 2, a screen appears for entering the main boom angle (alpha) **3**, the radius of the counterweight carriage **4** and the weight on the derrick boom **5**.

The admissible values for the radius of the counterweight carriage **4** and the weight on the derrick boom **5** are stated in the valid load chart.

4.16 Set the load capacity display to zero (taring)

During taring the weight of winch1 and winch2 rope and of the pulley block is set to zero so that only the actual weight of the hoisting load is displayed.

Load taring:

- can be done at any time.
- is best done just before slinging the load.

4.16.1 Setting the load display of winch1 or winch2 to zero



- ▶ Press the *Settings* button on the monitor.



- ▶ Press the *Set to zero* button at winch1 or winch2 for more than 1 second on the monitor.
 - ▷ Load display shows zero.



- ▶ Press the *Reset load display* button at winch1 or winch2 for more than 1 second on the monitor.
 - ▷ Load display shows total load.

4.17 Single hook operation/two-hook operation

The following hook operations are permitted:

- Single hook operation
- Twin hook operation

In single hook operation, only one hook/pulley block may be moved at any given time. In two-hook operation, two hooks/pulley blocks may be moved at the same time.

Single hook operation is permitted in the following versions:

- Single-hook mode with one winch on one hook
- Single-hook mode with two winches on one hook
- Single-hook mode with two winches on two hooks

Two-hook operation is permitted in the following versions:

- Twin-hook mode with two hooks on two loads
- Twin-hook mode with two hooks on one load

All the permitted hook operations are demonstrated on the diagrams below.



WARNING

Using an unauthorised hook operation!
Severe injuries, damage to machine.

- ▶ Only use authorised hook operations.



DANGER

Improper reeving of winch1 or winch2 rope!
Structural breakdown, load breakaway.

- ▶ Reeve the rope according to the rope reeving system.

If a deviation from the rope reeving systems is necessary or no rope reeving system is available:

- ▶ Ensure that the selected rope reeving system loads the boom head and entire boom symmetrically.
- ▶ Make sure that winch1 or winch2 rope do not contact anywhere.
- ▶ Make sure that the diagonal pull of the winch1 or winch2 rope do not exceed 2°.
- ▶ Ensure that the pulley blocks/hooks do not collide.
- ▶ Fit the hoist limit switch weight for winch1 on the winch1 rope.
- ▶ Fit the hoist limit switch weight for winch2 on the winch2 rope.
- ▶ It is preferable to fit the hoist limit switch weight when the rope is stationary.
- ▶ Ensure that the hoist limit switch chains do not cross over.
- ▶ Ensure that the hoist limit switch chains do not touch at any point.
- ▶ Only ever bypass unused hoist limit switches.

For special loads, the appropriate rope reeving systems may be obtained from Liebherr after sales service **exclusively on providing the following information:**

- Machine type
- Serial number
- Full details of the boom configuration and counterweight in place
- Details of the pulley block/hook in use

– A detailed description of the work to be carried out

Notes on the diagrams and symbols used

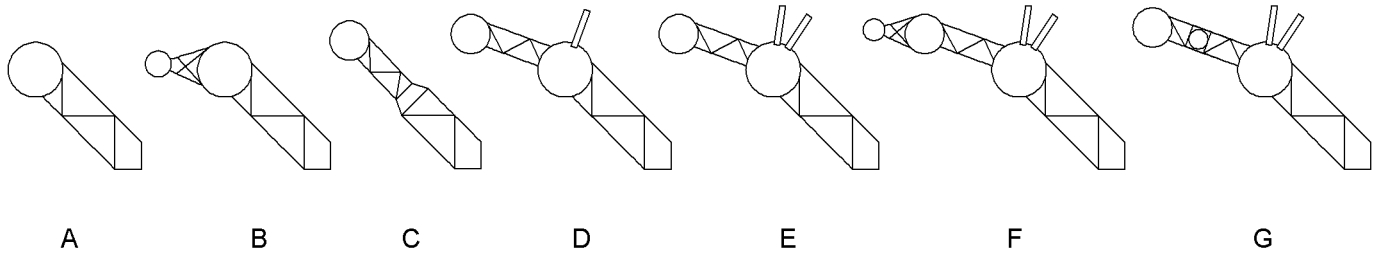
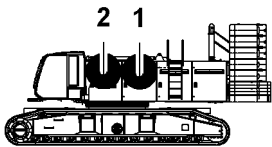


Fig. 2435: Diagram of the boom configurations

- A** Main boom
- B** Main boom with auxiliary jib attached
- C** Main boom + reducing piece
- D** Main boom + fixed jib
- E** Main boom + luffing jib
- F** Main boom + luffing jib with auxiliary jib attached
- G** Main boom + luffing jib + Midfall

Symbol	Meaning
1 ②	<p>The numbers 1 or 2 denote winch1 or winch2 rope.</p>  <p>The circle marks the rope of winch1 or winch2 whose reeving must be preselected when programming the setup.</p>
①=②	Select reeving of winch1 or winch2 rope when programming the setup. Rope reeving is symmetrical.
①+②	Select total reeving of winch1 and winch2 rope when programming the setup.
①②	Select the lower reeving when programming the setup.
●	Select the relevant reeving with this boom head/load position.
┆	Empty hook
┆ ■	Load
┆ □	Empty hook with specified dead weight
┆ ┆ ■	Twin-hook mode with two hooks on one load
┆ ┆ ┆ ■	Single-hook mode with two winches on one hook
Directional instructions are given from the machine operator's point of view in the cabin.	

Tab. 387: Meaning of the symbols

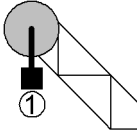
4.17.1 Single-hook mode with one winch on one hook

Ensure that the following conditions are fulfilled:

- Only winch1 rope is reeved.

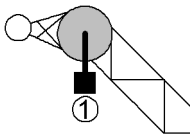
Main boom

Load on boom head section (winch1 rope)



- ▶ Reeve winch1 rope on the boom head section.
- ▶ Select main boom head.
- ▶ Select reeving of winch1 rope at main boom head.

Load on boom head section (winch1 rope) with auxiliary jib attached



No load chart exists for this configuration. The static moment of the auxiliary jib reduces the valid lifting capacities of the main boom.

The auxiliary jib falsifies the load display on the *Operation* screen. The load moment limiter switches off at the maximum permitted load moment.

- ▶ Reeve winch1 rope on the boom head section.
- ▶ Select main boom head.
- ▶ Select reeving of winch1 rope at main boom head.
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity with auxiliary jib attached (36 t (79300 lb)):

$$SWL_{RED} = SWL_{HPT} - 1000 \text{ kg (2,205 lb)}$$

SWL_{RED} = reduced lifting capacity for hoisting with the boom head section

SWL_{HPT} = lifting capacity for hoisting with the boom head section according to the load chart

To precisely calculate the reduced lifting capacity:

$$SWL_{RED} = \frac{SWL_{HPT} * (R_{HPT} - X) - (SWL_{SP} + m_{SP}) * (R_{HPT} - X + R_{SP})}{(R_{HPT} - X)}$$

Fig. 2449: How to calculate the reduced load

SWL_{RED} = reduced lifting capacity for hoisting with the boom head section

SWL_{HPT} = maximum lifting capacity for main boom from the load chart at R_{HPT}

R_{HPT} = radius of the main boom

X = Distance between rotation axis and main boom pivot point

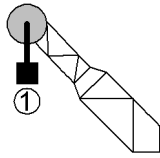
SWL_{SP} = Load on auxiliary jib (in this case no weight)

m_{SP} = weight of the auxiliary jib

R_{SP} = Radius enlargement through auxiliary jib

- ▶ Note the reductions in the valid lifting capacities due to the auxiliary jib attached.

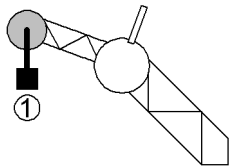
Main boom + reducing piece



Load on boom head section (winch1 rope)

- ▶ Reeve winch1 rope on the boom head section.
- ▶ Select main boom head.
- ▶ Select reeving of winch1 rope at main boom head.

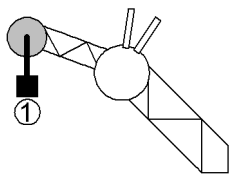
Main boom + fixed jib



Load on jib head section (winch1 rope)

- ▶ Reeve winch1 rope on jib head section.
- ▶ Select reeving of winch1 rope at jib head.
- ▶ Select load position 1 (jib head).

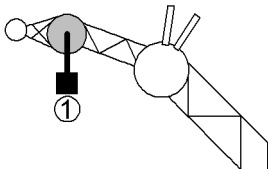
Main boom + luffing jib



Load on jib head section (winch1 rope)

- ▶ Reeve winch1 rope on jib head section.
- ▶ Select reeving of winch1 rope at jib head.
- ▶ Select load position 1 (jib head).

Load on jib head section (winch1 rope) with auxiliary jib attached



No load chart exists for this configuration. The static moment of the auxiliary jib reduces the valid lifting capacities of the jib.

The auxiliary jib falsifies the load display on the *Operation* screen. The load moment limiter switches off at the maximum permitted load moment.

- ▶ Reeve winch1 rope on jib head section.
- ▶ Select reeving of winch1 rope at jib head.
- ▶ Select load position 1 (jib head).
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity with auxiliary jib attached (30 t (66.000 lb)):

$$SWL_{RED} = SWL_{NDL} - 500 \text{ kg (1,102 lb)}$$

For a rough calculation of the reduced lifting capacity with auxiliary jib attached (15 t (33.000 lb)):

$$SWL_{RED} = SWL_{NDL} - 400 \text{ kg (882 lb)}$$

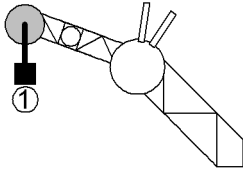
SWL_{RED} = reduced lifting capacity for hoisting with the jib head section

SWL_{NDL} = lifting capacity for hoisting with the jib head section according to the load chart

- ▶ Note the reductions in the valid lifting capacities due to the auxiliary jib attached.

Main boom + luffing jib + Midfall

Load on jib head section (winch1 rope)



- ▶ Reeve winch1 rope on jib head section.
- ▶ Select reeving of winch1 rope at jib head.
- ▶ Select load position 1 (jib head).

4.17.2 Single-hook mode with two winches on one hook

With long main booms and multiple reeving, the winch1 or winch2 rope may become too short. Under certain circumstances it is permitted for winch1 and winch2 rope to be reeved via the boom head section or the jib head section 1507 on a single hook.

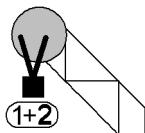


DANGER

Wrong procedure in single-hook mode with two winches on one hook!
Structural failure, load breakaway.

- ▶ Use ropes of the same length and quality for winch1 and winch2.
- ▶ Winch1 and winch2 ropes must only be reeved in accordance with the rope reeving diagrams.
- ▶ Winch1 and winch2 ropes must only be reeved on a pulley block.
- ▶ Select the total of winch1 and winch2 rope reeving with the main boom head or jib head.
- ▶ Activate winch synchronization on control panel X23.

Load on main boom head (winch1 and winch2 rope)



- ▶ Winch1 and winch2 ropes must only be reeved in accordance with the rope reeving diagrams.
- ▶ Select main boom head.
- ▶ Select total reeving of winch1 and winch2 rope at main boom head.
- ▶ In order to obtain an accurate rope measuring system value on the *Operation* screen: adjust reeving of winch2 rope to the actual number of reeves of winch2 rope (For more information see: [4.31 Rope measuring system*](#), page 1025) .

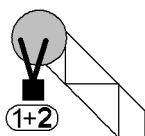


Note

The value displayed by the rope measuring system for winch1 is incorrect!

- ▶ Pay attention only to the value displayed by the rope measuring system for winch 2.

Load on jib head 1507 (winch1 and winch2 rope)



- ▶ Winch1 and winch2 ropes must only be reeved in accordance with the rope reeving diagrams.
- ▶ Select 1507 jib head.
- ▶ Select total reeving of winch1 and winch2 rope at jib head 1507.

- ▶ In order to obtain an accurate rope length measurement value on the *Operation* screen: adjust reeving of winch2 rope to the actual number of reeves of winch2 rope (For more information see: 4.31 Rope measuring system*, page 1025) .

**Note**

The value displayed by the rope measuring system for winch1 is incorrect!

- ▶ Pay attention only to the value displayed by the rope measuring system for winch 2.

4.17.3 Single-hook mode with two winches on two hooks

With single-hook mode with two winches on two loads, winch1 rope and winch2 rope are reeved. However, the load is moved with one rope only. The second rope stands still.

The ropes may be reeved in a non-symmetrical manner.

**DANGER**

Wrong procedure in single-hook mode with two winches on two hooks!
Structural failure, load breakaway.

- ▶ Only move the load using one rope.
- ▶ Only move with one rope at any given time.

If the load is moved with the other rope or the load position changes:

- ▶ Reprogram the setup.

**DANGER**

Maximum permissible lifting capacity is exceeded!
Risk of machine toppling over, structural breakdown.

- ▶ Take into account all relevant weights as the total load.
- ▶ Do not exceed the maximum permitted lifting capacity.

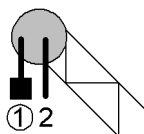
The total load consists of:

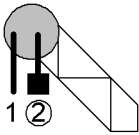
- the weight of the load to be lifted
- Weight of both hooks or pulley blocks
- The weight of all suspended ropes
- The weight of the load pick-up equipment
- Weight of the auxiliary jib (if attached)

Main boom

Load on boom head section (winch1 rope)

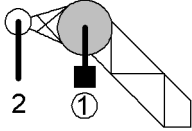
- ▶ Reeve winch1 rope on the boom head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select main boom head.
- ▶ Select reeving of winch1 rope at main boom head.





Load on boom head section (winch2 rope)

- ▶ Reeve winch1 rope on the boom head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select main boom head.
- ▶ Select reeving of winch2 rope at main boom head.



Load on boom head section (winch1 rope)

No load chart exists for this configuration. The static moment of the auxiliary jib reduces the valid lifting capacities of the main boom.

The auxiliary jib falsifies the load display on the *Operation* screen. The load moment limiter switches off at the maximum permitted load moment.

- ▶ Reeve winch1 rope on the boom head section.
- ▶ Guide the left winch2 rope over the boom head section and reeve onto the auxiliary jib.
- ▶ Select main boom head.
- ▶ Select reeving of winch1 rope at main boom head.
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (36 t (79300 lb)) and empty hook with 600 kg (1,323 lb):

$$SWL_{RED} = SWL_{HPT} - 2000 \text{ kg (4,409 lb)}$$

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (36 t (79300 lb)) and empty hook with 1500 kg (3,307 lb):

$$SWL_{RED} = SWL_{HPT} - 3250 \text{ kg (7,165 lb)}$$

SWL_{RED} = reduced lifting capacity for hoisting with the boom head section

SWL_{HPT} = lifting capacity for hoisting with the boom head section according to the load chart

To precisely calculate the reduced lifting capacity:

$$SWL_{RED} = \frac{SWL_{HPT} * (R_{HPT} - X) - (SWL_{SP} + m_{SP}) * (R_{HPT} - X + R_{SP})}{(R_{HPT} - X)}$$

Fig. 2460: How to calculate the reduced load

SWL_{RED} = reduced lifting capacity for hoisting with the boom head section

SWL_{HPT} = maximum lifting capacity for main boom from the load chart at R_{HPT}

R_{HPT} = radius of the main boom

X = Distance between rotation axis and main boom pivot point

SWL_{SP} = Load on auxiliary jib (in this case the empty hook weight)

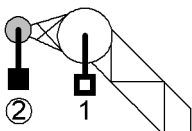
m_{SP} = weight of the auxiliary jib

R_{SP} = Radius enlargement through auxiliary jib

- ▶ Note the reductions in the valid lifting capacities due to the auxiliary jib attached.

Load on auxiliary jib (winch2 rope)

- ▶ Reeve winch1 rope on the boom head section.
- ▶ Guide the left winch2 rope over the boom head section and reeve onto the auxiliary jib.
- ▶ Select auxiliary jib.



- ▶ Select reeving of winch2 rope at auxiliary jib.



CAUTION

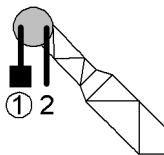
Empty hook weight on the boom head section is not permitted!
Incorrect load display. The Load Moment Limiter switches off at the maximum permitted load moment.

- ▶ Keep to the specified empty hook weight on the main boom head stipulated in the foreword to the valid load chart.

- ▶ Keep to the specified empty hook weight on the main boom head stipulated in the foreword to the valid load chart.

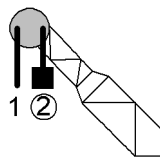
Main boom + reducing piece

Load on main boom head (winch1 rope)



- ▶ Reeve winch1 rope on the boom head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select main boom head.
- ▶ Select reeving of winch1 rope at main boom head.

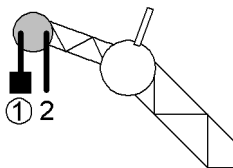
Load on boom head section (winch2 rope)



- ▶ Reeve winch1 rope on the boom head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select main boom head.
- ▶ Select reeving of winch2 rope at main boom head.

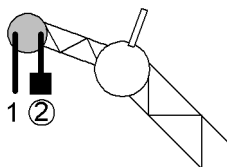
Main boom + fixed jib

Load on jib head section (winch1 rope)



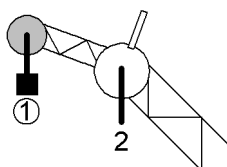
- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on jib head section.
- ▶ Select reeving of winch1 rope at jib head.
- ▶ Select load position 1 (jib head).

Load on jib head section (winch2 rope)

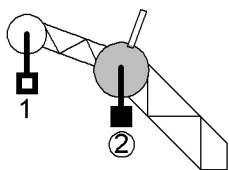


- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on jib head section.
- ▶ Select reeving of winch2 rope at jib head.
- ▶ Select load position 1 (jib head).

Load on jib head section (winch1 rope)



- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select reeving of winch1 rope at jib head.
- ▶ Select load position 1 (jib head).



Load on boom head section (winch2 rope)

- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select reeving of winch2 rope at main boom head.
- ▶ Select load position 2 (main boom head).



CAUTION

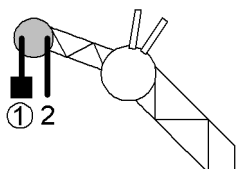
Empty hook weight at load position 1 (jib head section) is not permitted! Incorrect load display. The Load Moment Limiter switches off at the maximum permitted load moment.

- ▶ Keep to the specified empty hook weight at load position 1 (jib head) stipulated in the foreword to the load chart.
- ▶ Ensure that the empty hook weight does not exceed the jib lifting capacity.
- ▶ Ensure that the empty hook weight is more than the permitted minimum weight of the pulley block/hook (For more information see: [6.4 Choosing the correct hook or pulley block, page 1105](#)).

- ▶ Keep to the specified empty hook weight at load position 1 (jib head) stipulated in the foreword to the load chart.
 - ▷ Winch1 is locked.

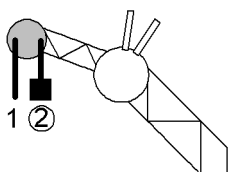
Main boom + luffing jib

Load on jib head section (winch1 rope)



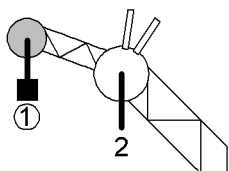
- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on jib head section.
- ▶ Select reeving of winch1 rope at jib head.
- ▶ Select load position 1 (jib head).

Load on jib head section (winch2 rope)

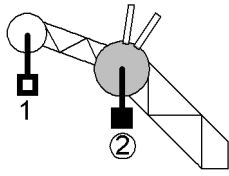


- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on jib head section.
- ▶ Select reeving of winch2 rope at jib head.
- ▶ Select load position 1 (jib head).

Load on jib head section (winch1 rope)



- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select reeving of winch1 rope at jib head.
- ▶ Select load position 1 (jib head).



Load on boom head section (winch2 rope)

- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select reeving of winch2 rope at main boom head.
- ▶ Select load position 2 (main boom head).



CAUTION

Exceeding of admissible empty hook weight on load position 1 (jib head)!
The Load Moment Limiter switches off at the maximum permitted load moment.

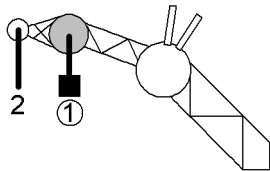
- ▶ Do not exceed the specified empty hook weight at load position 1 (jib head) stipulated in the foreword to the load chart.
- ▶ Ensure that the empty hook weight does not exceed the jib lifting capacity.
- ▶ Ensure that the empty hook weight is more than the permitted minimum weight of the pulley block/hook (For more information see: [6.4 Choosing the correct hook or pulley block, page 1105](#)).

- ▶ Do not exceed the specified empty hook weight at load position 1 (jib head) stipulated in the foreword to the load chart.



Note

- ▶ To maximise the valid lifting capacities for hoisting using the main boom: raise the luffing jib to the maximum angle.



Load on jib head section (winch1 rope) with auxiliary jib attached

No load chart exists for this configuration. The static moment of the auxiliary jib including the empty hook reduces the valid lifting capacities of the jib.

The auxiliary jib including the empty hook falsify the load display on the *Operation* screen. The load moment limiter switches off at the maximum permitted load moment.

- ▶ Reeve winch1 rope on jib head section.
- ▶ Guide the left winch2 rope over the jib head section and reeve onto the auxiliary jib.
- ▶ Select reeving of winch1 rope at jib head.
- ▶ Select load position 1 (jib head).
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (30 t (66.000 lb)) and empty hook with 900 kg (1,984 lb):

$$SWL_{RED} = SWL_{NDL} - 1400 \text{ kg (3,086 lb)}$$

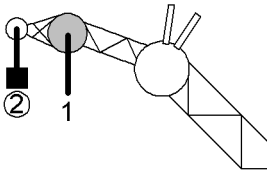
For a rough calculation of the reduced lifting capacity at auxiliary jib attached (15 t (33.000 lb)) and empty hook with 600 kg (1,323 lb):

$$SWL_{RED} = SWL_{NDL} - 1100 \text{ kg (2,425 lb)}$$

SWL_{RED} = reduced lifting capacity for hoisting with the jib head section

SWL_{NDL} = lifting capacity for hoisting with the jib head section according to the load chart

- ▶ Note the reductions in the valid lifting capacities due to the auxiliary jib attached.



Load on auxiliary jib (winch2 rope)

No load chart exists for this configuration. The static moment of the auxiliary jib and the empty hook reduce the valid lifting capacities of the jib.

The auxiliary jib and the empty hook falsify the load display on the *Operation* screen. The load moment limiter switches off at the maximum permitted load moment.

The auxiliary jib falsifies the radius display on the *Operation* screen. The auxiliary jib falsifies the lifting height display on the *Operation* screen.

- ▶ Reeve winch1 rope on jib head section.
- ▶ Guide the left winch2 rope over the jib head section and reeve onto the auxiliary jib.
- ▶ Select reeving of winch2 rope at jib head.
- ▶ Select load position 1 (jib head).
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity with auxiliary jib attached (30 t (66.000 lb)):

$$SWL_{RED} = SWL_{NDL} - 500 \text{ kg (1,102 lb)}$$

For a rough calculation of the reduced lifting capacity with auxiliary jib attached (15 t (33.000 lb)):

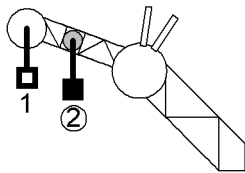
$$SWL_{RED} = SWL_{NDL} - 400 \text{ kg (882 lb)}$$

SWL_{RED} = reduced lifting capacity for hoisting with the auxiliary jib

SWL_{NDL} = lifting capacity for hoisting with the jib head section according to the load chart

- ▶ Note the reductions in the valid lifting capacities due to the auxiliary jib attached.

Main boom + luffing jib + Midfall



Load on midfall (winch2 rope)

- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on midfall.
- ▶ Select reeving of winch2 rope at midfall.
- ▶ Select load position 3 (midfall).



CAUTION

Empty hook weight at load position 1 (jib head section) is not permitted! Incorrect load display. The Load Moment Limiter switches off at the maximum permitted load moment.

- ▶ Keep to the specified empty hook weight at load position 1 (jib head) stipulated in the foreword to the load chart.
- ▶ Ensure that the empty hook weight does not exceed the jib lifting capacity.
- ▶ Ensure that the empty hook weight is more than the permitted minimum weight of the pulley block/hook (For more information see: [6.4 Choosing the correct hook or pulley block, page 1105](#)).

- ▶ Do not exceed the specified empty hook weight at load position 1 (jib head) stipulated in the foreword to the load chart.

▷ Winch1 is locked.

4.17.4 Twin-hook mode with two hooks on two loads

Twin-hook mode with two hooks on two loads represents the principle of main hoist + auxiliary hoist.



DANGER

Maximum permissible lifting capacity is exceeded!
Structural breakdown, toppling of machine.

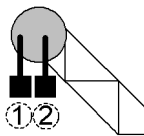
- ▶ Take into account all relevant weights as the total load.
- ▶ Do not exceed the maximum permitted lifting capacity.

The total load consists of:

- Weight of the loads to be lifted
- Weight of both hooks or pulley blocks
- The weight of all suspended ropes
- The weight of the load pick-up equipment
- Weight of the auxiliary jib (if attached)

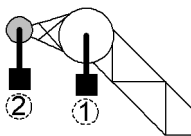
Main boom

Load on boom head section (winch1 rope) + load on boom head section (winch2 rope)



- ▶ Reeve winch1 rope on the boom head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select main boom head.
- ▶ Select lower reeving of the two ropes at the main boom head.

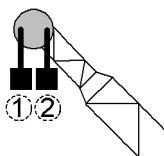
Load on boom head section (winch1 rope) + load on auxiliary jib (winch2 rope)



- ▶ Reeve winch1 rope on the boom head section.
- ▶ Guide the left winch2 rope over the boom head section and reeve onto the auxiliary jib.
- ▶ Select auxiliary jib.
- ▶ Select lower reeving of the two ropes at the auxiliary jib.

Main boom + reducing piece

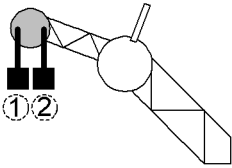
Load on boom head section (winch1 rope) + load on boom head section (winch2 rope)



- ▶ Reeve winch1 rope on the boom head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select main boom head.
- ▶ Select lower reeving of the two ropes at the main boom head.

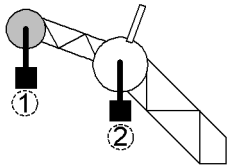
Main boom + fixed jib

Load on jib head section (winch1 rope) + load on jib head section (winch2 rope)



- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on jib head section.
- ▶ Select lower reeving of the two ropes at the jib head.
- ▶ Select load position 1 (jib head).

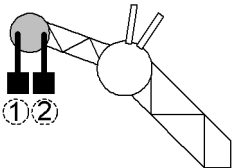
Load on jib head section (winch1 rope) + load on main boom head section (winch2 rope)



- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select lower reeving of the two ropes at the jib head.
- ▶ Select load position 1 (jib head).

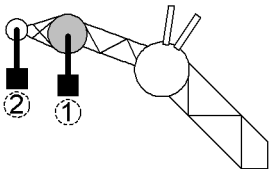
Main boom + luffing jib

Load on jib head section (winch1 rope) + load on jib head section (winch2 rope)



- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on jib head section.
- ▶ Select lower reeving of the two ropes at the jib head.
- ▶ Select load position 1 (jib head).

Load on jib head section (winch1 rope) + load on auxiliary jib (winch2 rope)



No load chart exists for this configuration. The static moment of the auxiliary jib reduces the valid lifting capacities of the jib.

The auxiliary jib falsifies the load display on the *Operation* screen. The load moment limiter switches off at the maximum permitted load moment.

The auxiliary jib falsifies the radius display on the *Operation* screen. The auxiliary jib falsifies the lifting height display on the *Operation* screen.

- ▶ Reeve winch1 rope on jib head section.
- ▶ Guide the left winch2 rope over the boom head section and reeve onto the auxiliary jib.
- ▶ Select lower reeving of the two ropes at the jib head.
- ▶ Select load position 1 (jib head).
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (30 t (66.000 lb)) and empty hook with 600 kg (1,323 lb):

$$SWL_{RED} = SWL_{NDL} - 900 \text{ kg (1,984 lb)}$$

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (15 t (33.000 lb)) and empty hook with 600 kg (1,323 lb):

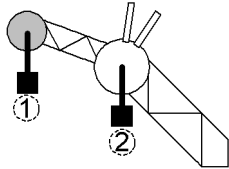
$$SWL_{RED} = SWL_{NDL} - 800 \text{ kg (1,764 lb)}$$

SWL_{RED} = reduced lifting capacity for hoisting with the jib head section

SWL_{NDL} = lifting capacity for hoisting with the jib head section according to the load chart

- ▶ Note the reductions in the valid lifting capacities due to the auxiliary jib attached.

Load on jib head section (winch1 rope) + load on main boom head section (winch2 rope)



- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Select lower reeving of the two ropes at the jib head.
- ▶ Select load position 1 (jib head).

4.17.5 Twin-hook mode with two hooks on one load

Twin-hook mode moves a load using two hooks. Twin-hook mode falsifies the load display on the *Operation* screen. The load moment limiter switches off at the maximum permitted load moment.

Two hooks on one load is admissible.

Moving two hooks at the same time is admissible.

Winch synchronisation is permitted.



DANGER

Wrong procedure in twin-hook mode with two hooks on one load!

- ▶ Avoid longitudinal diagonal pull.
- ▶ Do not exceed maximum lateral diagonal pull of 1 %.
- ▶ Ensure that the load can be raised by the two hooks in unison.

If both ropes are reeved at the same boom head/load position:

- ▶ Reeve the ropes symmetrically.

If both ropes are reeved at the different boom heads/load positions:

- ▶ Reeve both ropes at least as often as has been selected on the relevant boom head/load position.

If winch synchronisation is used:

- ▶ Activate winch synchronization on control panel X23.



DANGER

Maximum permissible lifting capacity is exceeded!

Risk of machine toppling over, structural breakdown.

- ▶ Take into account all relevant weights as the total load.
- ▶ Do not exceed the maximum permitted lifting capacity.

The total load consists of:

- the weight of the load to be lifted
- Weight of both hooks or pulley blocks
- The weight of all suspended ropes
- The weight of the load pick-up equipment
- Weight of the auxiliary jib (if attached)

Swinging the load when load is on different boom heads/load positions



DANGER

Wrong procedure swinging the load in twin-hook mode!
Risk of machine toppling over, structural breakdown.

- ▶ The load must only be swung in the direction that most reduces the load moment.

Ensure that the following conditions are fulfilled:

- The load with the largest radius is suspended on the boom head/load position.

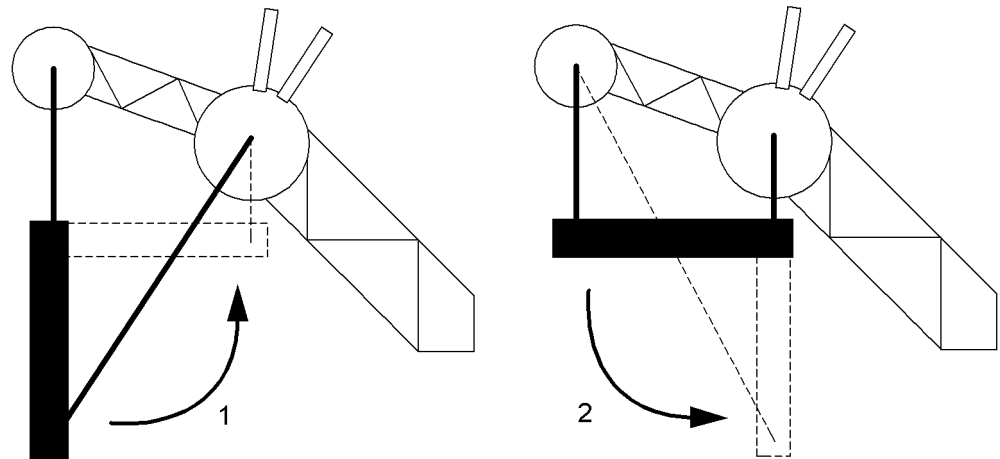


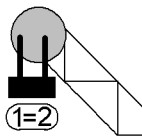
Fig. 2483: Diagram of the swinging process with the lowest load moment

- | | |
|---|---|
| <p>1 Swinging the load towards the basic machine</p> | <p>2 Swinging the load towards the basic machine</p> |
|---|---|

- ▶ Only swing the load towards the basic machine.
 - ▷ The load moment is reduced.

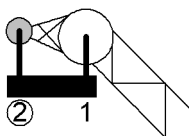
Main boom

Load on boom head section (winch1 and winch2 rope)



- ▶ Reeve winch1 rope on the boom head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Reeve winch2 rope as often as winch1 rope.
- ▶ Select main boom head.
- ▶ Select reeving of winch1 rope (= reeving of winch2 rope) at main boom head.
- ▶ Activate winch synchronization on control panel X23 if required.

Load on boom head section (winch1 rope) + auxiliary jib (winch2 rope)

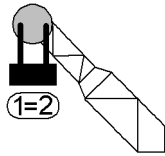


- ▶ Reeve winch1 rope on the boom head section.
- ▶ Guide the left winch2 rope over the boom head section and reeve onto the auxiliary jib.
- ▶ Reeve winch1 rope at the boom head section at least as often as winch2 rope on the auxiliary jib.

- ▶ Select auxiliary jib.
- ▶ Select reeving of winch2 rope at auxiliary jib.
- ▶ Activate winch synchronization on control panel X23 if required.

Main boom + reducing piece

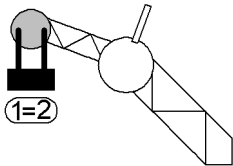
Load on boom head section (winch1 and winch2 rope)



- ▶ Reeve winch1 rope on the boom head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Reeve winch2 rope as often as winch1 rope.
- ▶ Select main boom head.
- ▶ Select reeving of winch1 rope (= reeving of winch2 rope) at main boom head.
- ▶ Activate winch synchronization on control panel X23 if required.

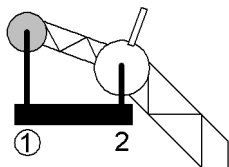
Main boom + fixed jib

Load on jib head section (winch1 and winch2 rope)



- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on jib head section.
- ▶ Reeve winch2 rope as often as winch1 rope.
- ▶ Select reeving of winch1 rope (= reeving of winch2 rope) at jib head.
- ▶ Select load position 1 (jib head).
- ▶ Activate winch synchronization on control panel X23 if required.

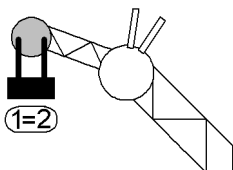
Load on jib head section (winch1 rope) + on main boom head section (winch2 rope)



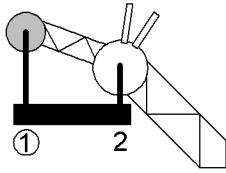
- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Reeve winch2 rope at the boom head section at least as often as winch2 rope on the jib head section.
- ▶ Select load position 1 (jib head).
- ▶ Select reeving of winch1 rope at jib head.
- ▶ Activate winch synchronization on control panel X23 if required.

Main boom + luffing jib

Load on jib head section (winch1 and winch2 rope)

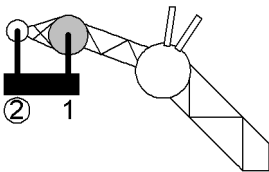


- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on jib head section.
- ▶ Reeve winch2 rope as often as winch1 rope.
- ▶ Select reeving of winch1 rope (= reeving of winch2 rope) at jib head.
- ▶ Select load position 1 (jib head).
- ▶ Activate winch synchronization on control panel X23 if required.



Load on jib head section (winch1 rope) + on main boom head section (winch2 rope)

- ▶ Reeve winch1 rope on jib head section.
- ▶ Reeve winch2 rope on the boom head section.
- ▶ Reeve winch2 rope at the boom head section at least as often as winch2 rope on the jib head section.
- ▶ Select load position 1 (jib head).
- ▶ Select reeving of winch1 rope at jib head.
- ▶ Activate winch synchronization on control panel X23 if required.



Load on jib head section (winch1 rope) + auxiliary jib (winch2 rope)

No load chart exists for this configuration. The static moment of the auxiliary jib reduces the valid lifting capacities of the jib.

The auxiliary jib falsifies the load display on the *Operation* screen. The load moment limiter switches off at the maximum permitted load moment.

The auxiliary jib falsifies the radius display on the *Operation* screen. The auxiliary jib falsifies the lifting height display on the *Operation* screen.

- ▶ Reeve winch1 rope on jib head section.
- ▶ Guide the left winch2 rope over the jib head section and reeve onto the auxiliary jib.
- ▶ Reeve winch1 rope at the jib head section at least as often as winch2 rope on the auxiliary jib.
- ▶ Select reeving of winch2 rope at jib head.
- ▶ Select load position 1 (jib head).
- ▶ Activate winch synchronization on control panel X23 if required.
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (30 t (66.000 lb)) and empty hook with 900 kg (1,984 lb):

$$SWL_{RED} = SWL_{NDL} - 1400 \text{ kg (3,086 lb)}$$

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (15 t (33.000 lb)) and empty hook with 600 kg (1,323 lb):

$$SWL_{RED} = SWL_{NDL} - 1100 \text{ kg (2,425 lb)}$$

SWL_{RED} = reduced lifting capacity for hoisting with the jib head section

SWL_{NDL} = lifting capacity for hoisting with the jib head section according to the load chart

- ▶ Note the reductions in the valid lifting capacities due to the auxiliary jib attached.

4.18 Crawler

4.18.1 Setting the crawler speed



The crawler can be operated in normal gear or overdrive. In overdrive, the speed can be continuously adjusted from 0 to 1.5 km/h (1 mph) with the crawler pedals.

- ▶ Press the button *Crawler overdrive* on control panel X11.
 - ▷ Crawler overdrive selected.
 - ▷ The LED in the button *Crawler overdrive* lights up.
- ▶ Press the button *Crawler overdrive* on control panel X11 again.
 - ▷ Normal crawler gear selected.
 - ▷ LED in the button *Crawler overdrive* goes off.

4.18.2 Operating the crawler



DANGER

Ground with unknown load-bearing capacity!
Toppling of machine.

- ▶ Travel exclusively on ground with known load-bearing capacity.
- ▶ If in doubt, contact Liebherr customer service.



WARNING

Areas that the operator cannot see when moving!
Severe injuries, damage to machine.

- ▶ Do not drive on areas that the driver cannot see without the aid of a signaller.



DANGER

Incorrect traveling of machine on gradients!
Toppling of machine.

- ▶ Observe restrictions when traveling on gradients .



Note

Stated movement directions apply exclusively if the crawler drives (tumblers) of the crawler side frames are at the rear!

Traveling backwards (idler wheel in the rear, tumbler in the front) causes significantly higher wear due to higher chain tension.

- ▶ Observe travel direction.

Traveling with a load on the boom is allowed exclusively with reduced load. The reduced load is indicated in the foreword to the load chart.

Hand levers are screwed onto the foot pedals (inside). The hand levers are operated in the same way as the foot pedals.

Ensure the following conditions are met:

- Suspended counterweight (if available) is lifted.

Moving the machine forward

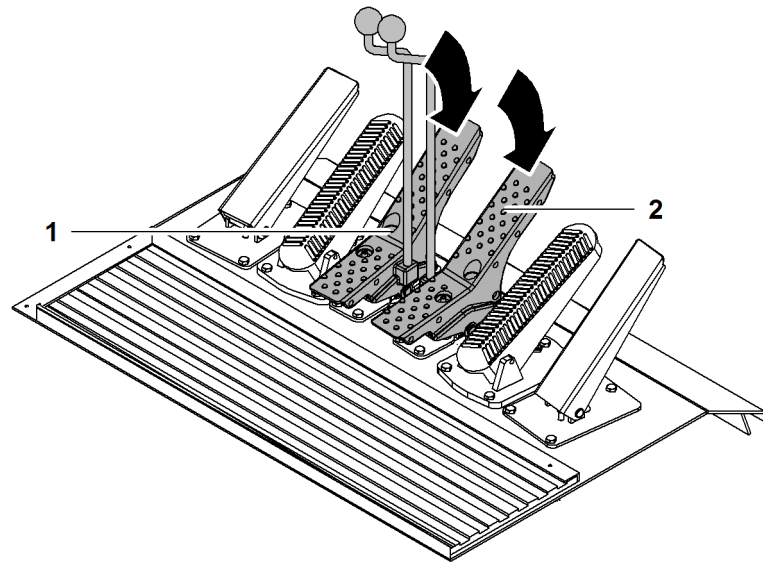


Fig. 2493: Moving the machine forward

1 Foot pedal *left crawler*

2 Foot pedal *right crawler*

- ▶ Press the foot pedal *Left crawler 1* and the foot pedal *Right crawler 2* forward at the same time.
 - ▷ Movement buzzer sounds.
 - ▷ Machine moves forward:

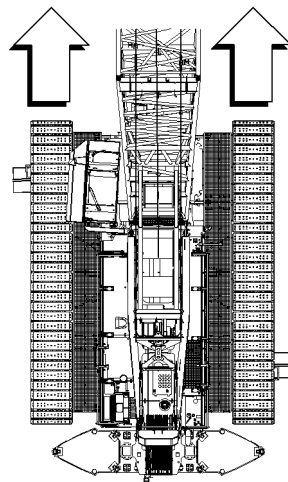


Fig. 2494: Machine moves forward

Moving the machine backwards

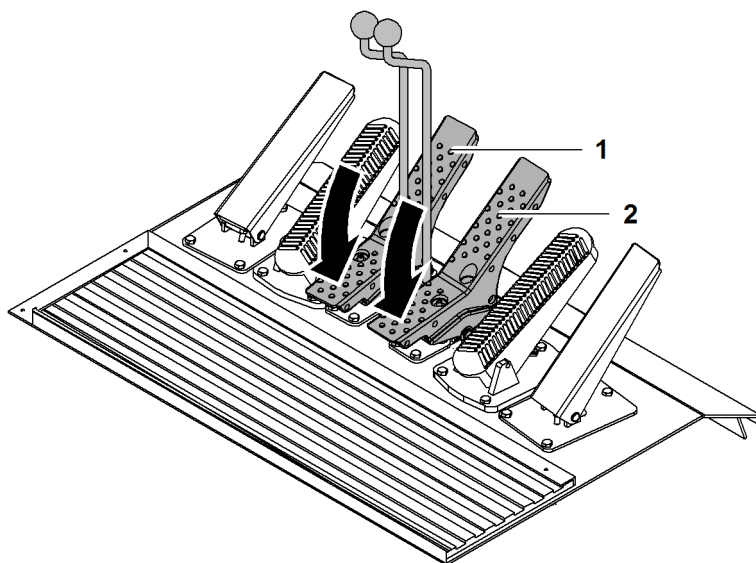


Fig. 2495: Moving the machine backwards

- 1 Foot pedal *left crawler* 2 Foot pedal *right crawler*

- ▶ Press foot pedal *Left crawler 1* and foot pedal *Right crawler 2* backward at the same time.
 - ▷ Movement buzzer sounds.
 - ▷ Machine moves backward:

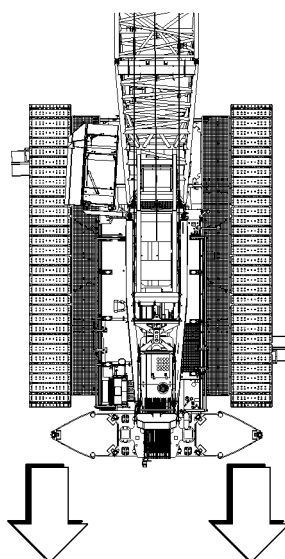


Fig. 2496: Machine moves backward

Swing machine to the left

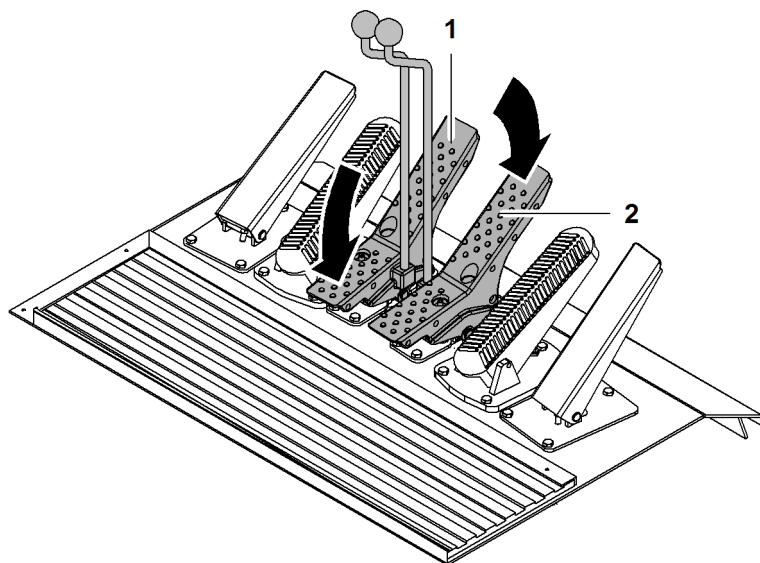


Fig. 2497: Swing machine to the left

1 Foot pedal *left crawler*

2 Foot pedal *right crawler*

- ▶ Press foot pedal *Left crawler* 1 backward and foot pedal *Right crawler* 2 forward at the same time.
 - ▷ Movement buzzer sounds.
 - ▷ Machine swings to the left:

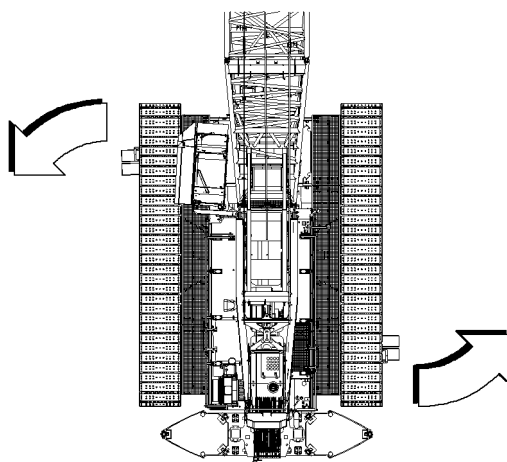


Fig. 2498: Machine swings to the left

Swing machine to the right

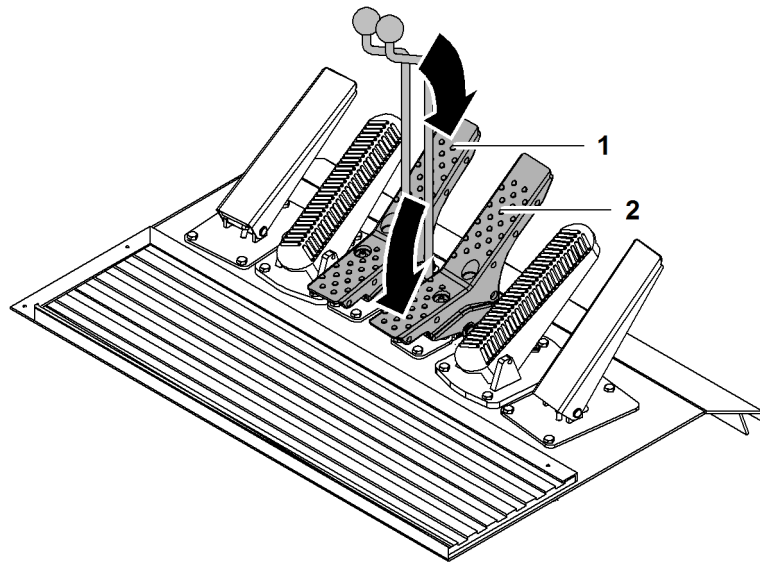


Fig. 2499: Swing machine to the right

1 Foot pedal *left crawler*

2 Foot pedal *right crawler*

- ▶ Press foot pedal *Left crawler* 1 forward and foot pedal *Right crawler* 2 backward at the same time.
 - ▷ Movement buzzer sounds.
 - ▷ Machine swings to the right:

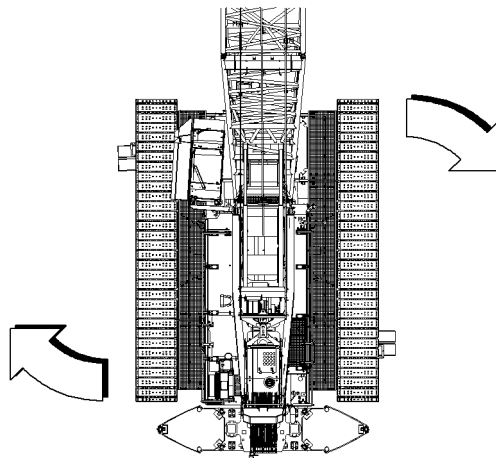


Fig. 2500: Machine swings to the right

4.18.3 Operating the crawler with counterweight carriage*

Three modes are possible when traveling with counterweight carriage:

- Trailer mode
- Follower mode
- Crab mode

Operating the crawler with counterweight carriage is identical to operating the crawler without counterweight carriage ([For more information see: 4.18.2 Operating the crawler, page 953](#)).

The wheel sets of the counterweight carriage are in free-wheel.

Swing gear is locked.

Moving the machine in trailer mode

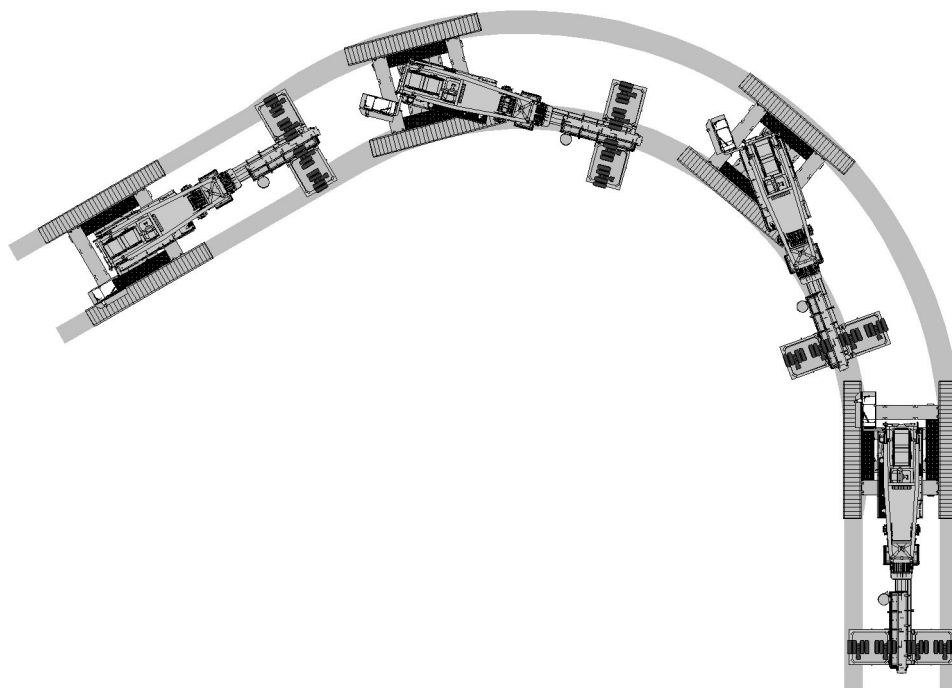


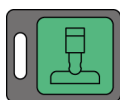
Fig. 2501: Moving the machine in trailer mode

In trailer mode, the counterweight carriage is towed behind the basic machine.

The wheel sets are aligned in the direction of travel. The wheel sets are not adjusted automatically during travel. Manual adjustment in a range of $\pm 10^\circ$ is possible.

Ensure the following conditions are met:

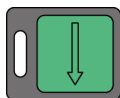
- Support of counterweight carriage is possible due to soil conditions.
- ▶ Press the button *Counterweight carriage support* on control panel X26.



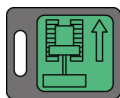
Note

Liebherr recommends:

- ▶ Monitor process with video equipment and/or a signaller.



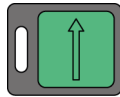
- ▶ Press and hold the button *Increasing radius/support* on control panel X26 until support cylinders are fully extended.
 - ▷ Counterweight carriage is supported.



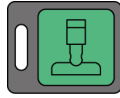
- ▶ Press the button *Trailer travel mode* on control panel X26.



- ▶ Press the button *Align wheel sets* on control panel X26.
 - ▷ Wheel sets are being aligned.



- ▶ Press and hold the button *Decreasing radius/support* on control panel X26 until support cylinders are fully retracted.
 - ▷ Counterweight carriage rests on wheel sets.



- ▶ Press the button *Counterweight carriage support* on control panel X26 again.

- ▶ Operate crawler.

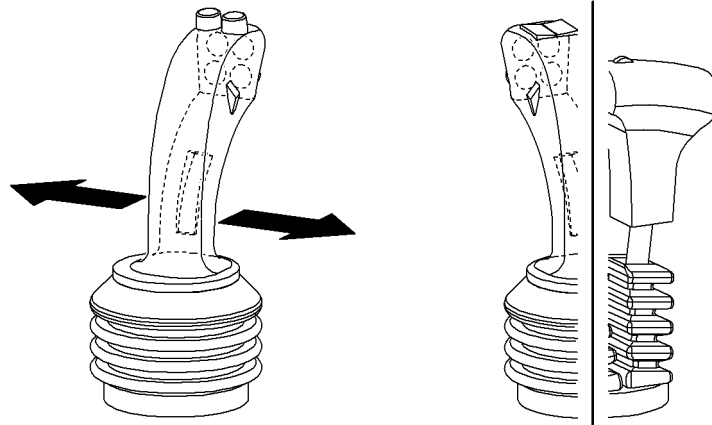


Fig. 2508: Readjusting the wheel sets

- ▶ If required, steer wheel sets to the right: Move left multi-directional control lever to the left.
- ▶ If required, steer wheel sets to the left: Move left multi-directional control lever to the right.

Moving the machine in follower mode

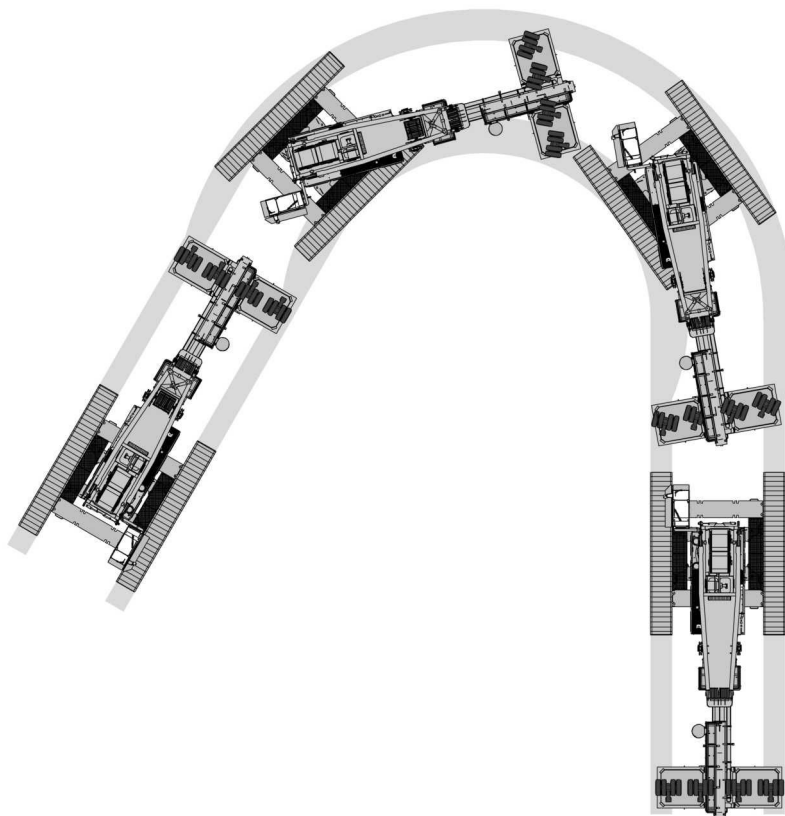


Fig. 2509: Moving the machine in follower mode

In follower mode, the counterweight carriage is towed behind the basic machine.

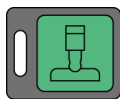
The wheel sets are aligned in the direction of travel. The wheel sets are readjusted automatically to ensure following in the track of the basic machine.

Follower mode is permitted in an angle range of 330° to 30° and 150° to 210°.

Ensure the following conditions are met:

Support of counterweight carriage is possible due to soil conditions.

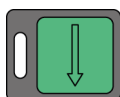
▶ Press the button *Counterweight carriage support* on control panel X26.



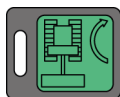
Note

Liebherr recommends:

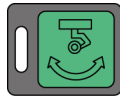
▶ Monitor process with video equipment and/or a signaller.



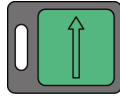
▶ Press and hold the button *Increasing radius/support* on control panel X26 until support cylinders are fully extended.
 ▷ Counterweight carriage is supported.



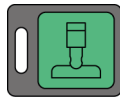
▶ Press the button *Follower travel mode* on control panel X26.



- ▶ Press the button *Align wheel sets* on control panel X26.
 - ▷ Wheel sets are being aligned.



- ▶ Press and hold the button *Decreasing radius/support* on control panel X26 until support cylinders are fully retracted.
 - ▷ Counterweight carriage rests on wheel sets.



- ▶ Press the button *Counterweight carriage support* on control panel X26 again.

- ▶ Operate crawler.

Moving the machine in crab mode

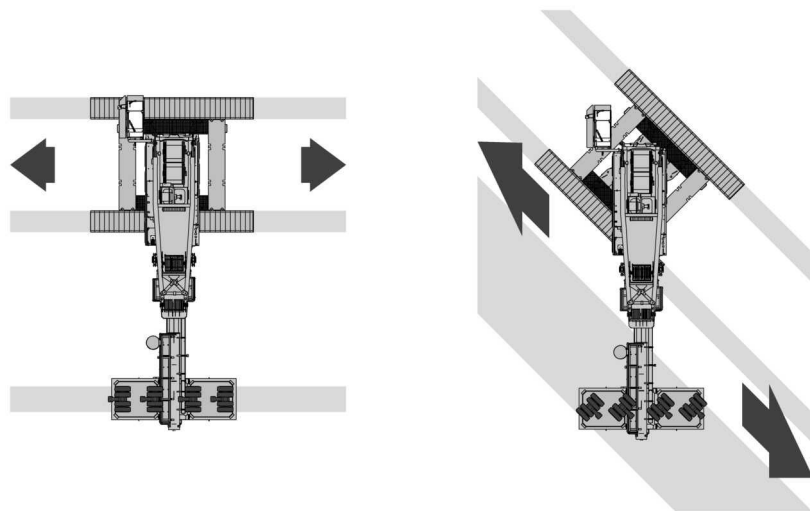


Fig. 2516: Moving the machine in crab mode

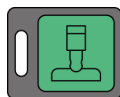
In crab mode, the counterweight carriage is aligned parallel to the crawler side frame and pulled along.

The wheel sets align parallel to the undercarriage in the direction of travel. The wheel sets are automatically adjusted and driven during travel.

Crab mode is permitted in an angle range of 60° to 120° and 240° to 300°.

Ensure the following conditions are met:

- Support of counterweight carriage is possible due to soil conditions.



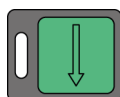
- ▶ Press the button *Counterweight carriage support* on control panel X26.



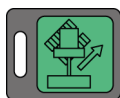
Note

Liebherr recommends:

- ▶ Monitor process with video equipment and/or a signaller.



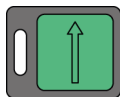
- ▶ Press and hold the button *Increasing radius/support* on control panel X26 until support cylinders are fully extended.
 - ▷ Counterweight carriage is supported.



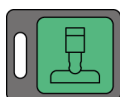
- ▶ Press the button *Crab mode* on control panel X26.



- ▶ Press the button *Align wheel sets* on control panel X26.
 - ▷ Wheel sets are being aligned.



- ▶ Press and hold the button *Decreasing radius/support* on control panel X26 until support cylinders are fully retracted.
 - ▷ Counterweight carriage rests on wheel sets.



- ▶ Press the button *Counterweight carriage support* on control panel X26 again.

- ▶ Operate crawler.

4.18.4 Locking or unlocking the crawler

The crawler can be locked to prevent accidental operation.



- ▶ Press the button *Settings* on the monitor.
 - ▷ The *Settings* screen appears.



- ▶ Press the button *Locking crawler* on the monitor for more than 1 second.
 - ▷ Crawler is locked.



- ▶ Press the button *Unlocking crawler* on the monitor for more than 1 second.
 - ▷ Crawler is unlocked.

4.19 Swing gear



WARNING

Persons or obstacles in the slewing range!
Severe injuries, damage to machine.

- ▶ Ensure that there are no persons or obstacles in the slewing range.
- ▶ Leave danger zone.

4.19.1 Setting the swing speed

The crawler crane has no safety devices to limit the swing speed.

The maximum swing gear speeds of the speed levels are shown in the technical data for the swing.

In derrick mode, slewing of the uppercarriage is possible at speed level 1 exclusively.



DANGER

Excessive swing speed!
Toppling of machine, structural breakdown.

- ▶ Before each swinging motion, determine the maximum admissible swing speed for the current load and radius.
- ▶ Check that the preset speed level is appropriate before any swing movement.
- ▶ Ensure that the maximum swing speed of the selected speed level does not exceed the maximum admissible swing speed.

The following diagram shows the maximum admissible swing speed in dependence of the radius.

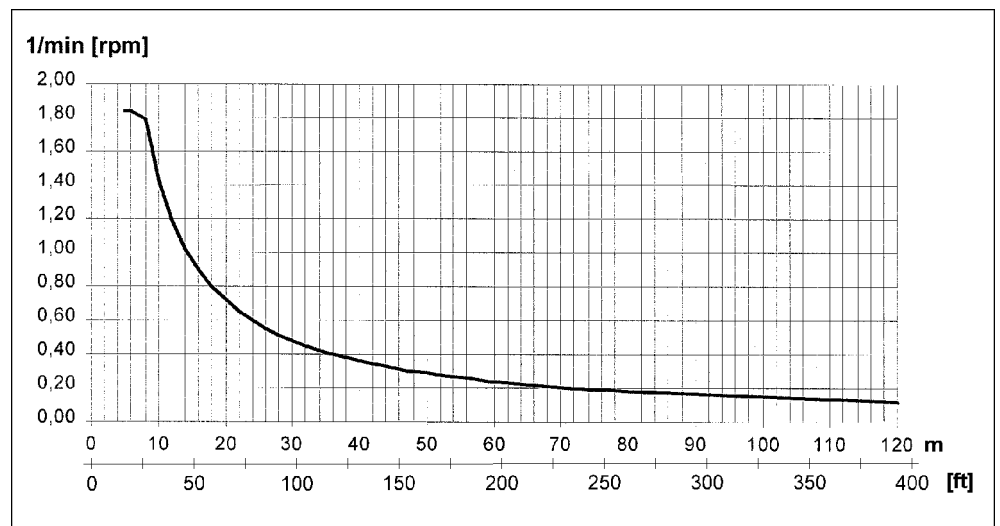


Fig. 2526: Setting the swing speed



DANGER

Swing speed too fast for an emergency stop!
 An emergency stop results in additional dangers resulting from the inertia of moving masses (e.g. swinging of the load).
 Toppling of machine, structural breakdown.

- ▶ Select swing speed so that the admissible diagonal pull is not exceeded in case of an emergency stop.

The load must be further reduced in case of the following factors:

- Large boom lengths.
- Loads that approach the maximum permissible load.
- Wind gusts, especially if the load to be lifted has a large wind impact surface.

The swing gear speed level is retained when the ignition is switched off.



- ▶ Press the button *Swing gear speed level* on control panel X23.

- ▷ Symbol *Swing gear speed level* appears on monitor:



Fig. 2528: Symbol Swing gear speed level

- ▶ Press the button *Swing gear speed level* on control panel X23 again.
 - ▷ The number (1 to 3) in the symbol *Swing gear speed level* changes.

4.19.2 Turning swing gear free-wheel on or off

If swing gear free-wheel is turned on, the swing brake remains open.



WARNING

Open swing gear brake!
 Severe injuries, damage to machine.

If the uppercarriage keeps rotating:

- ▶ slow/stop rotary movement by moving the control lever in the opposite direction.

Ensure the following conditions are met:

- Swing gear is stationary.
- No control lever function is active.

Turning swing gear free-wheel on or off on control panel X23



- ▶ Press the button *Swing gear free-wheel* on control panel X23.

- ▷ Swing gear free-wheel turned on.
- ▷ The symbol *Swing gear free-wheel* appears on the monitor:



Fig. 2530: Symbol Swing gear free-wheel

- ▶ Press the button *Swing gear free-wheel* on control panel X23 again.
 - ▷ Swing gear free-wheel turned off.
 - ▷ The symbol *Swing gear free-wheel* disappears on the monitor.

Turning swing gear free-wheel on or off using the control lever

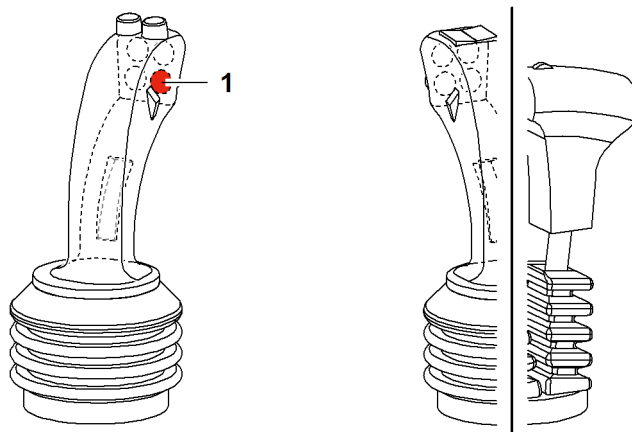


Fig. 2531: Turning swing free-wheel on or off using the multi-directional control lever

1 Button *Swing gear free-wheel*

Swing gear free-wheel is active for as long as you hold down the button *Swing gear free-wheel 1*.

- ▶ Press and hold the button *Swing gear free-wheel 1* on the left multi-directional control lever.
 - ▷ Swing gear free-wheel is turned on.
 - ▷ The symbol *Swing gear free-wheel* appears on the monitor:



Fig. 2532: Symbol Swing gear free-wheel

- ▶ Release the button *Swing gear free-wheel 1*.
 - ▷ Swing gear free-wheel is turned off.
 - ▷ The symbol *Swing gear free-wheel* disappears on the monitor.

4.19.3 Operating the swing gear



DANGER

Improper use of swing gear!
Toppling of machine, structural breakdown.

- ▶ Accelerate and brake the swing gear slowly.

NOTICE

A-frame1 protrudes beyond rear counterweight!
 Damage to A-frame1.

- ▶ Check position of A-frame1 prior to turning uppercarriage.
- ▶ Consider the values in the following table.

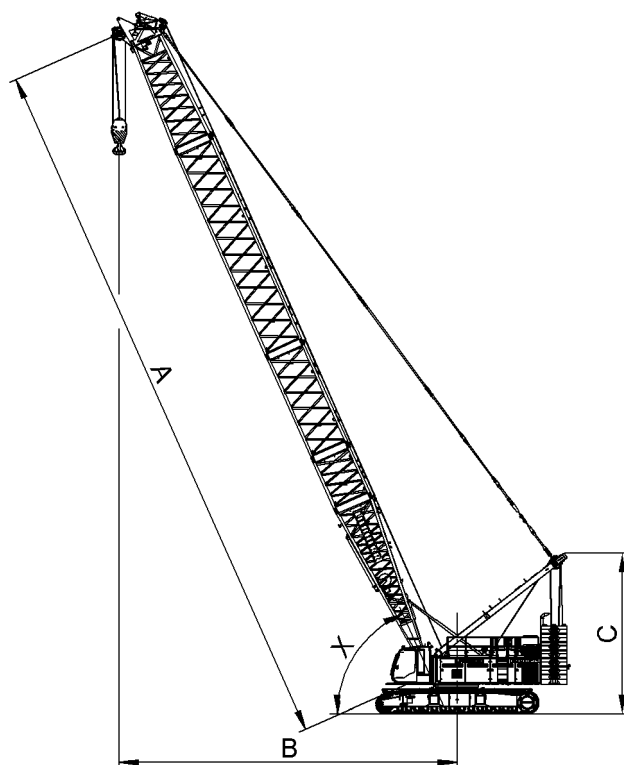


Fig. 2533: Position of A-frame1 in dependence on main boom angle (illustration of principle)

As of the stated main boom angle, A-frame1 protrudes beyond the rear counterweight. This angle changes depending on the main boom length.

Main boom length A	Radius B	Height A-frame1 C	Main boom angle X
LR 1006			
20 m 66 ft	5.8 m 19' ft-in	9.3 m 30' 6" ft-in	81.5 °
38 m 125 ft	12.4 m 40' 8" ft-in	9.3 m 30' 6" ft-in	75.5 °
50 m 164 ft	17.1 m 56' 1" ft-in	9.4 m 30' 10" ft-in	73.5 °
74 m 243 ft	25.7 m 84' 4" ft-in	9.4 m 30' 10" ft-in	72 °
98 m 322 ft	33.1 m 108' 7" ft-in	9.2 m 30' 2" ft-in	72 °
LR 1004			

Main boom length A	Radius B	Height A-frame1 C	Main boom angle X
20 m 66 ft	9 m 29' 6" ft-in	8.6 m 28' 3" ft-in	71.5 °
38 m 125 ft	18.1 m 59' 5" ft-in	8.6 m 28' 3" ft-in	66 °
62 m 203 ft	30.2 m 99' 1" ft-in	8.7 m 28' 7" ft-in	63.5 °
74 m 243 ft	36.2 m 118' 9" ft-in	8.7 m 28' 7" ft-in	63 °
86 m 282 ft	43 m 141' 1" ft-in	8.6 m 28' 3" ft-in	63 °
LR 1003			
25.7 m 84 ft	8.3 m 27' 3" ft-in	7.4 m 24' 3" ft-in	77 °
40.4 m 133 ft	13.6 m 44' 7" ft-in	7.4 m 24' 3" ft-in	74 °
58.1 m 191 ft	19 m 62' 4" ft-in	7.3 m 23' 11" ft-in	73.5 °
69.8 m 229 ft	24 m 78' 9" ft-in	7.4 m 24' 3" ft-in	72 °
87.5 m 287 ft	29.5 m 96' 9" ft-in	7.3 m 23' 11" ft-in	72 °
LR 1002			
20 m 66 ft	2.9 m 9' 6" ft-in	5.5 m 18' 1" ft-in	88 °
38 m 125 ft	4.9 m 16' 1" ft-in	5.3 m 17' 5" ft-in	86 °
50 m 164 ft	6.2 m 20' 4" ft-in	5.2 m 17' 1" ft-in	85.5 °
68 m 223 ft	9.4 m 30' 10" ft-in	5.3 m 17' 5" ft-in	84 °
80 m 262 ft	10.6 m 34' 9" ft-in	5.3 m 17' 5" ft-in	84 °
LR 1001			
17 m 56 ft	4.4 m 14' 5" ft-in	6.5 m 21' 4" ft-in	82.5 °
32 m 105 ft	9.1 m 29' 10" ft-in	6.5 m 21' 4" ft-in	77.5 °
41 m 135 ft	12 m 39' 4" ft-in	6.5 m 21' 4" ft-in	76 °
56 m 184 ft	16.1 m 52' 10" ft-in	6.5 m 21' 4" ft-in	75.5 °

Main boom length A	Radius B	Height A-frame1 C	Main boom angle X
68 m 223 ft	19.1 m 62' 8" ft-in	6.4 m 21' ft-in	75.5 °

Tab. 388: Position of A-frame1 in dependence of main boom angle with different main boom lengths

Swinging uppercarriage to the left

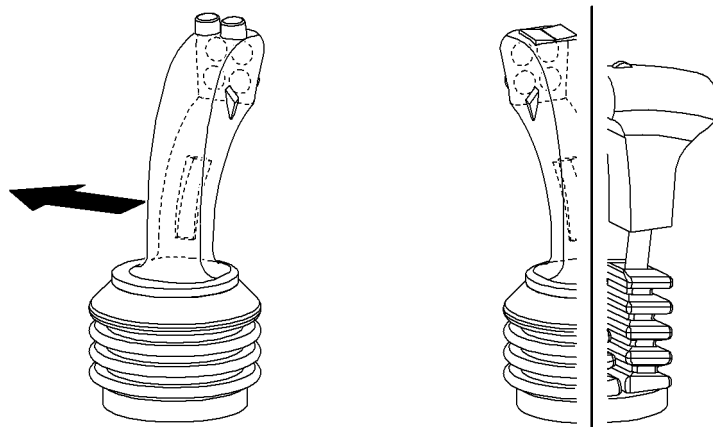


Fig. 2534: Swinging uppercarriage to the left

- ▶ Move left multi-directional control lever to the left.
 - ▷ Uppercarriage swings to the left (counter-clockwise).
 - ▷ Movement buzzer sounds.

Swing uppercarriage to the right

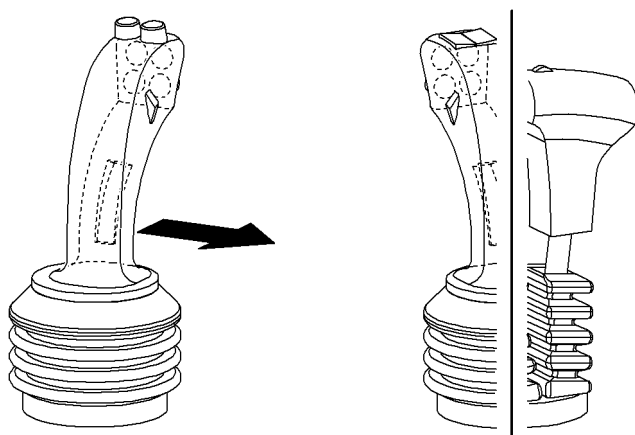


Fig. 2535: Swing uppercarriage to the right

- ▶ Move left multi-directional control lever to the right.
 - ▷ Uppercarriage swings to the right (clockwise).
 - ▷ Movement buzzer sounds.

4.19.4 Operating the swing gear with suspended counterweight*



DANGER

Improper use of swing gear!
Toppling of machine, structural breakdown.

- ▶ Accelerate and brake the swing gear slowly.
- ▶ Lift suspended counterweight before turning the uppercarriage.

Swinging uppercarriage to the left



DANGER

Improper lifting of suspended counterweight!
Toppling of machine.

- ▶ Monitor load moment limiter continuously.
- ▶ Lower boom if necessary.

- ▶ Lift suspended counterweight.

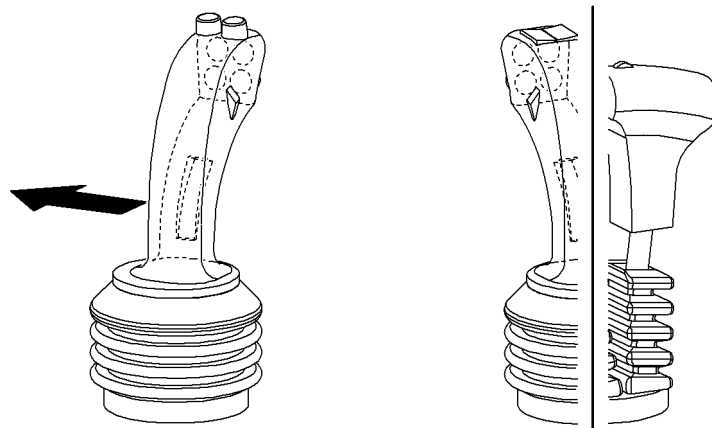


Fig. 2536: Swinging uppercarriage to the left

- ▶ Move left multi-directional control lever to the left.
 - ▷ Uppercarriage swings to the left (counter-clockwise).
 - ▷ Movement buzzer sounds.
- ▶ Lay down suspended counterweight.

Swing uppercarriage to the right



DANGER

Improper lifting of suspended counterweight!
Toppling of machine.

- ▶ Monitor load moment limiter continuously.
- ▶ Lower boom if necessary.

- ▶ Lift suspended counterweight.

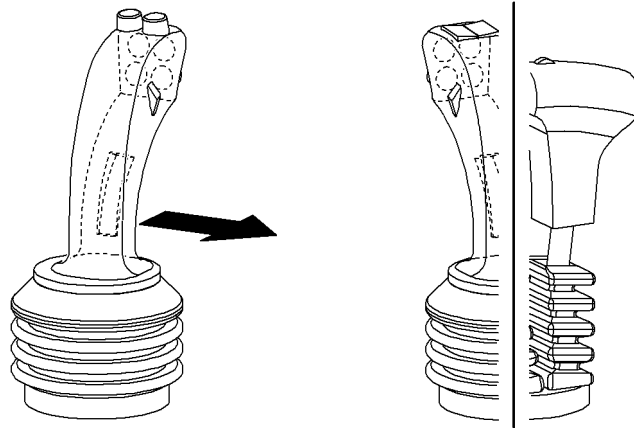


Fig. 2537: Swing uppercarriage to the right

- ▶ Move left multi-directional control lever to the right.
 - ▷ Uppercarriage swings to the right (clockwise).
 - ▷ Movement buzzer sounds.
- ▶ Lay down suspended counterweight.

4.19.5 Operating the swing gear with counterweight carriage*

Operating the swing gear with counterweight carriage is identical to operating the swing without counterweight carriage (For more information see: [4.19.3 Operating the swing gear, page 965](#)).

The wheel sets of the counterweight carriage are driven.
Crawler is locked.



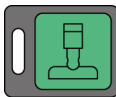
DANGER

Improper use of swing gear!
Toppling of machine, structural breakdown.

- ▶ Accelerate and brake the swing gear slowly.
- ▶ Align wheel sets before turning the uppercarriage.

Ensure the following conditions are met:

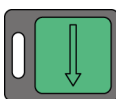
- Support of counterweight carriage is possible due to soil conditions.
- ▶ Press the button *Counterweight carriage support* on control panel X26.



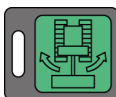
Note

Liebherr recommends:

- ▶ Monitor process with video equipment and/or a signaller.



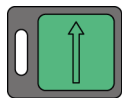
- ▶ Press and hold the button *Increasing radius/support* on control panel X26 until support cylinders are fully extended.
 - ▷ Counterweight carriage is supported.



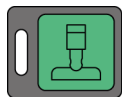
- ▶ Press the button *Mode rotation uppercarriage* on control panel X26.



- ▶ Press the button *Align wheel sets* on control panel X26.
 - ▷ Wheel sets are being aligned.



- ▶ Press and hold the button *Decreasing radius/support* on control panel X26 until support cylinders are fully retracted.
 - ▷ Counterweight carriage rests on wheel sets.



- ▶ Press the button *Counterweight carriage support* on control panel X26 again.

- ▶ Operate swing gear.

4.19.6 Locking or unlocking the swing gear

The swing gear can be locked to prevent accidental operation.



- ▶ Press the button *Settings* on the monitor.
 - ▷ The *Settings* screen appears.



- ▶ Press the button *Locking swing gear* on the monitor for more than 1 second.
 - ▷ Swing gear is locked.



- ▶ Press the button *Unlocking swing gear* on monitor for more than 1 second.
 - ▷ Swing gear is unlocked.

4.20 Main boom

The main boom is adjusted using the boom winch.

In derrick mode, the main boom is adjusted using the derrick winch and derrick rope rigging. A-frame¹ and derrick boom remain in a fixed position.

The adjustment range of the main boom can also be limited by the radius limiter, limit switch or load moment limiter.

4.20.1 Operating the main boom

Ensure that the following conditions are fulfilled:

- No limit switch is active and blocking a movement.
- There are no persons or obstacles in the danger zone.
- Derrick winch is selected (only in derrick mode).

Lifting the main boom



Procedure on a machine with two multi-directional control levers

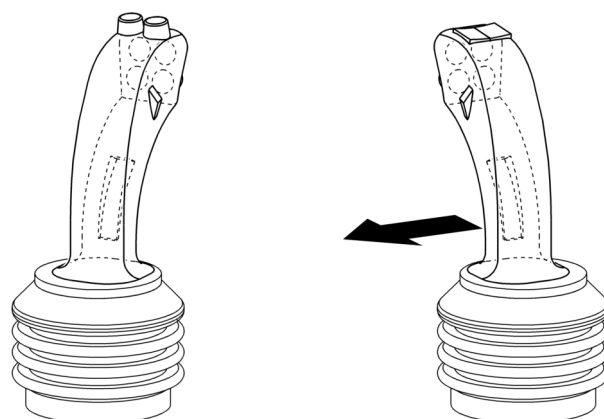


Fig. 2548: Lifting the main boom using the multi-directional control lever

- ▶ Push the right multi-directional joystick to the left.
 - ▷ The main boom rises:

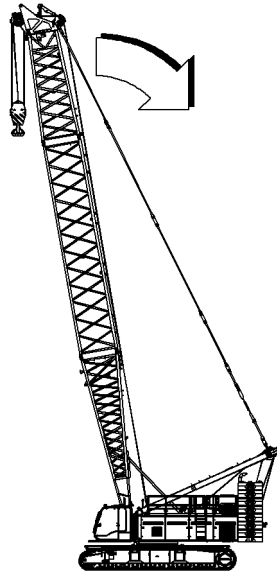
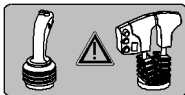


Fig. 2549: The main boom rises



Procedure on a machine with a multi-directional control lever and a double T-lever.

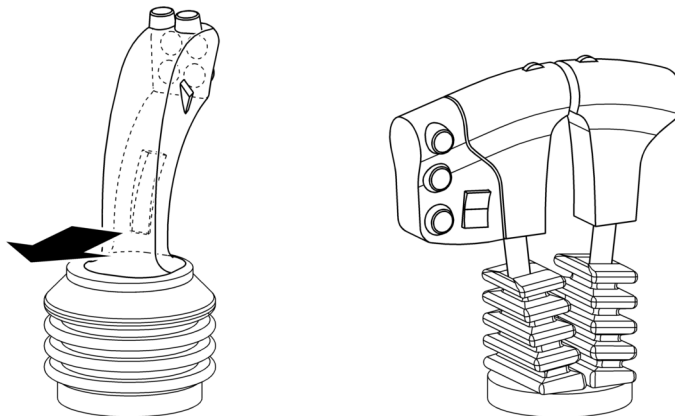


Fig. 2551: Lifting the main boom using the double T-lever

- ▶ Push the left multi-directional joystick backwards.
- ▷ The main boom rises:

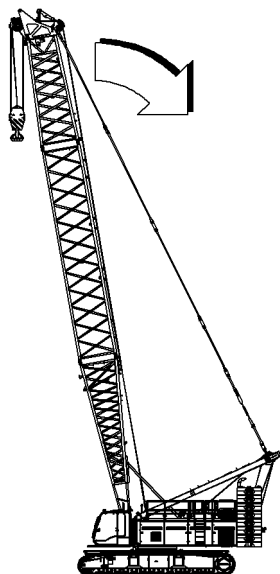


Fig. 2552: The main boom rises

Lowering the main boom



Procedure on a machine with two multi-directional control levers

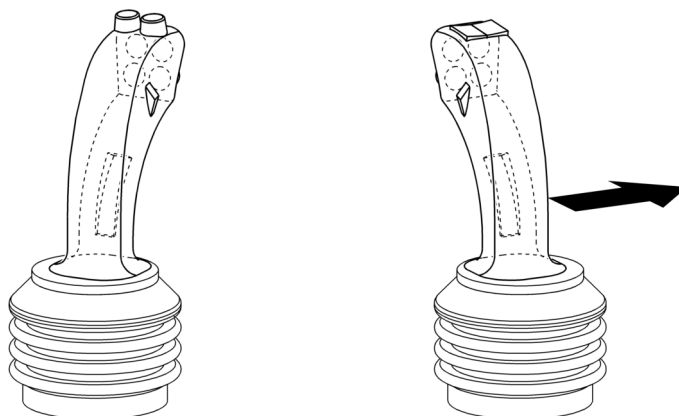


Fig. 2554: Lowering the main boom using the multi-directional control lever

- ▶ Push the right multi-directional joystick to the right.
 - ▷ The main boom lowers:

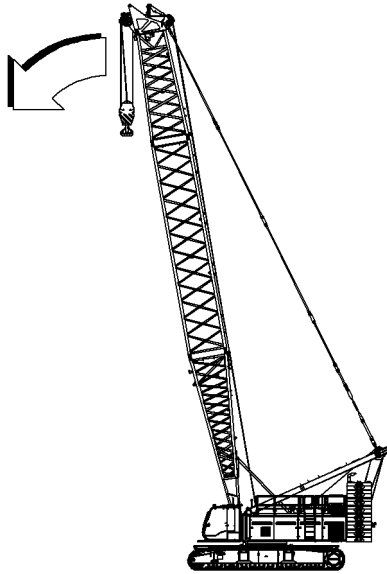
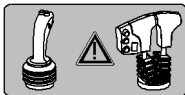


Fig. 2555: The main boom lowers



Procedure on a machine with a multi-directional control lever and a double T-lever.

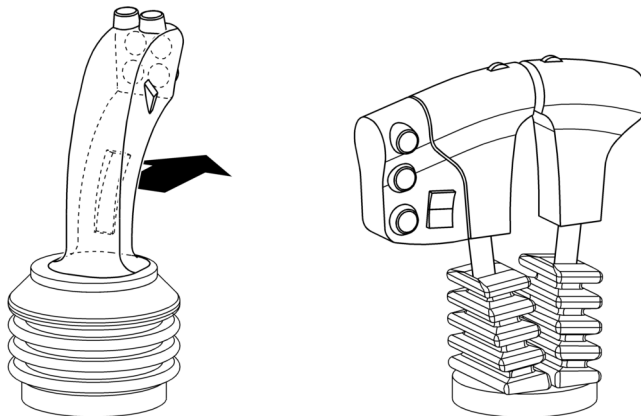


Fig. 2557: Lowering the main boom using the double T-lever

- ▶ Push the left multi-directional joystick forwards.
- ▷ The main boom lowers:

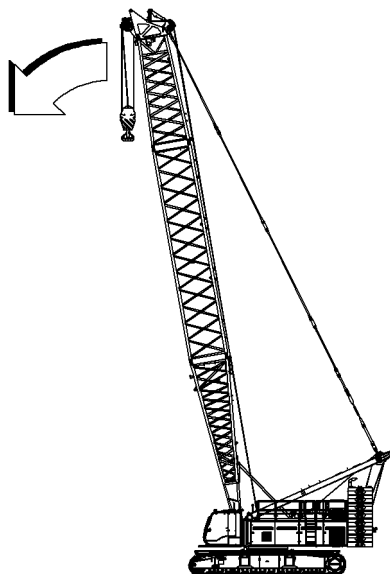


Fig. 2558: The main boom lowers

4.20.2 Locking or unlocking the main boom

The main boom can be locked to prevent it from being operated accidentally.



- ▶ Press the *Settings* button on screen.
 - ▷ The *Settings* screen appears.



- ▶ Press the *Lock main boom* button on screen for more than 1 second.
 - ▷ Main boom is locked.



- ▶ Press the *Unlock main boom* button on screen for more than 1 second.
 - ▷ Main boom is unlocked.

4.21 Jib

The jib is adjusted using the jib luffing winch.

The adjustment range of the jib can also be limited by the Load Moment Limiter, boom radius limitation or limit switch.

4.21.1 Selecting the jib

The selected boom is identified on the screen by a symbol.

The selection remains stored even after the machine is restarted.

Selecting jib on control lever

Procedure on a machine with two multi-directional control levers

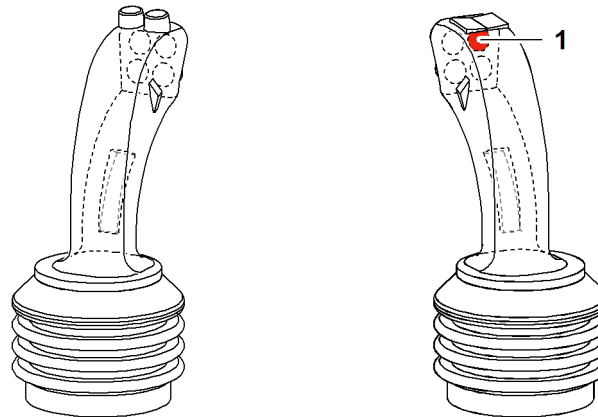


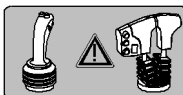
Fig. 2563: Selecting the jib

1 Button *Jib luffing winch*

- ▶ Press the button *jib luffing winch* 1 on the right multi-directional control lever.
 - ▷ Jib luffing winch is selected.
 - ▷ Symbol *Jib speed level adjustment* is displayed on the monitor:



Fig. 2564: Symbol *Jib speed level adjustment*



Procedure on a machine with a multi-directional control lever and a double T-lever.

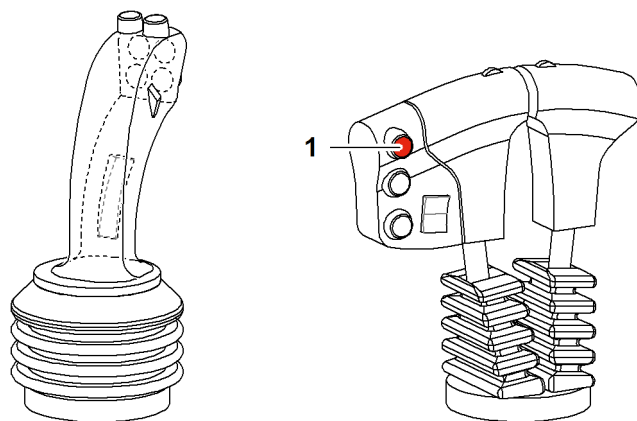


Fig. 2566: Selecting the jib

1 Button *Jib luffing winch*

- ▶ Press the button *jib luffing winch* 1 on the right double T-lever.
 - ▷ Jib luffing winch is selected.
 - ▷ Symbol *Jib speed level adjustment* is displayed on the monitor:



Fig. 2567: Symbol *Jib speed level adjustment*

Selecting the jib on control panel X23



- ▶ Press the button *Jib luffing winch* on control panel X23.

- ▷ Jib luffing winch is selected.
- ▷ Symbol *Jib speed level adjustment* is displayed on the monitor:



Fig. 2569: Symbol *Jib speed level adjustment*

4.21.2 Operating the jib

Ensure that the following conditions are fulfilled:

- No limit switch is active and blocking a movement.
- There are no persons or obstacles in the danger zone.

Lift jib



Procedure on a machine with two multi-directional control levers

Simultaneous adjustment of the main boom and the jib is not possible in crane mode.

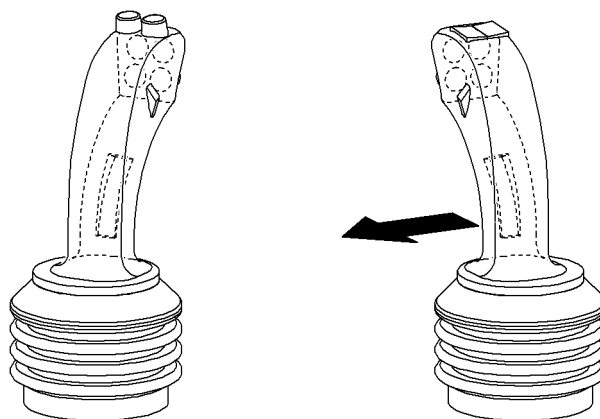


Fig. 2571: Lifting the jib

- ▶ Push the right multi-directional joystick to the left.
- ▷ The jib rises:

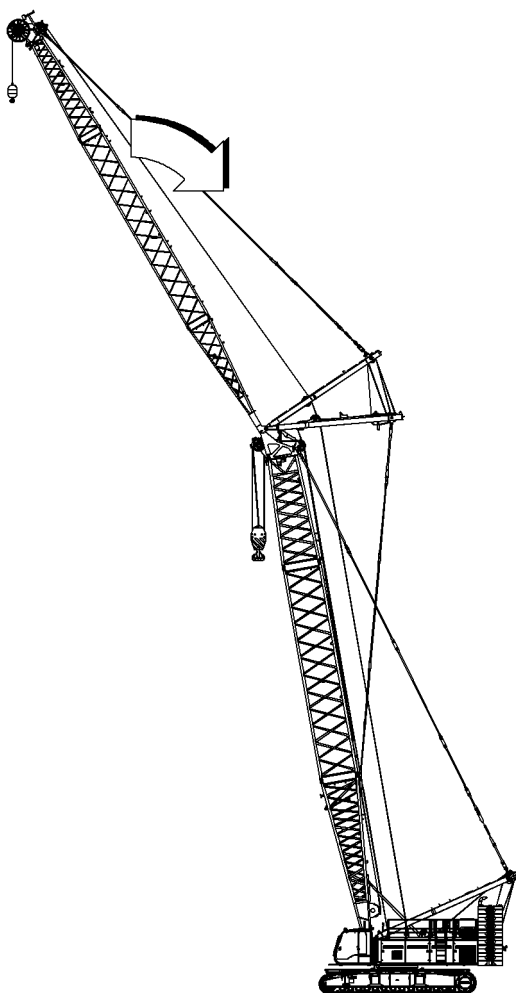
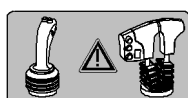


Fig. 2572: The jib rises



Procedure on a machine with a multi-directional control lever and a double T-lever.

Simultaneous adjustment of the jib and winch2 is not possible.

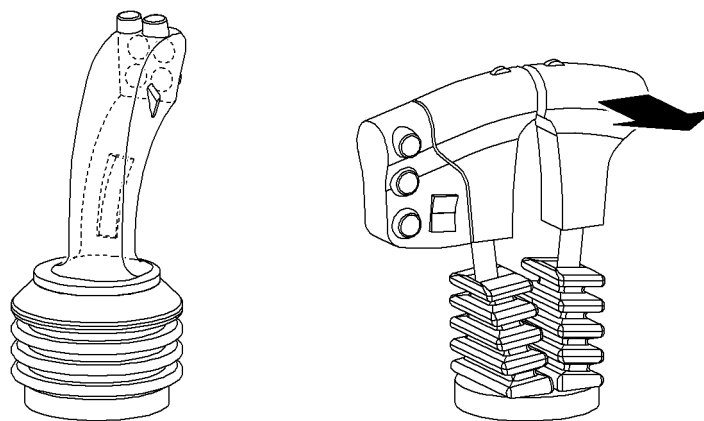


Fig. 2574: Lifting the jib

- ▶ Push the outer T-lever backwards.
- ▷ The jib rises:

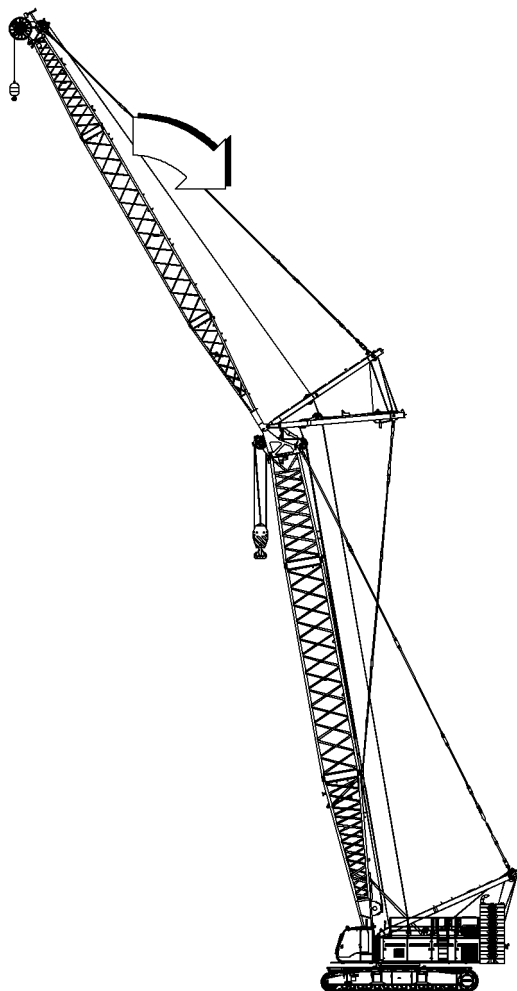


Fig. 2575: The jib rises

Lower jib



Procedure on a machine with two multi-directional control levers

Simultaneous adjustment of the main boom and the jib is not possible in crane mode.

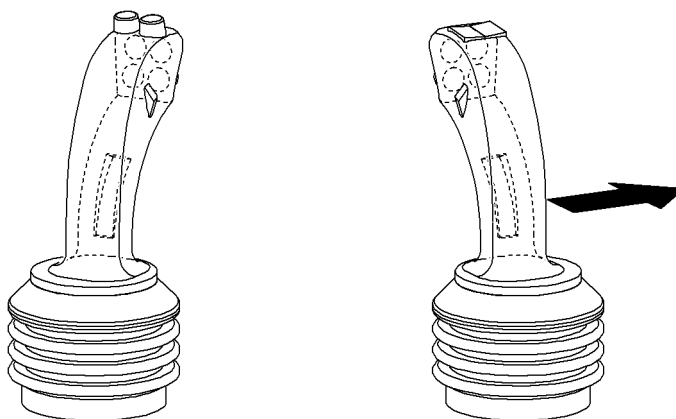


Fig. 2577: Lowering the jib

- ▶ Push the right multi-directional joystick to the right.
- ▷ The jib lowers:

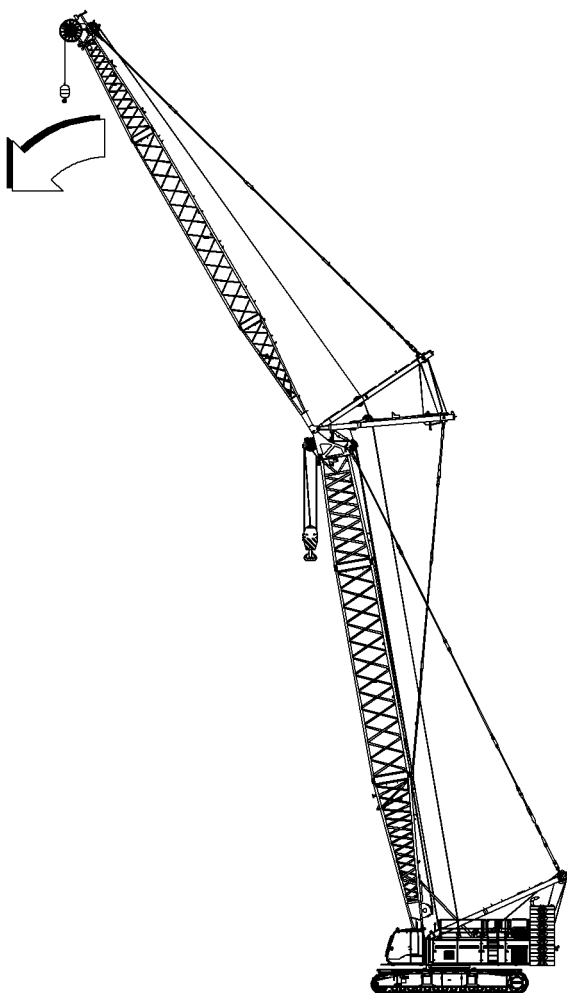
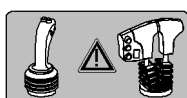


Fig. 2578: The jib lowers



Procedure on a machine with a multi-directional control lever and a double T-lever.

Simultaneous adjustment of the jib and winch2 is not possible.

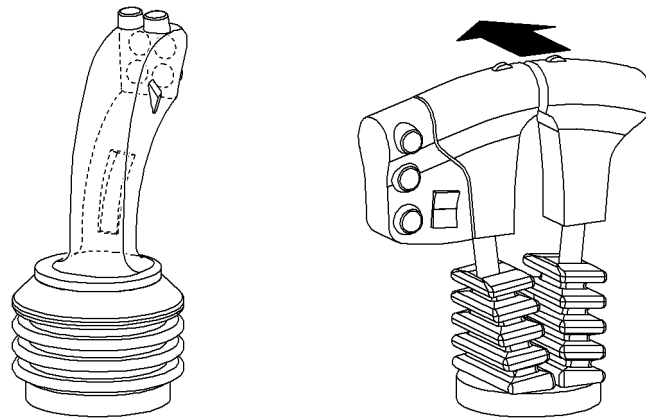


Fig. 2580: Lowering the jib

- ▶ Push the outer T-lever forwards.
- ▷ The jib lowers:

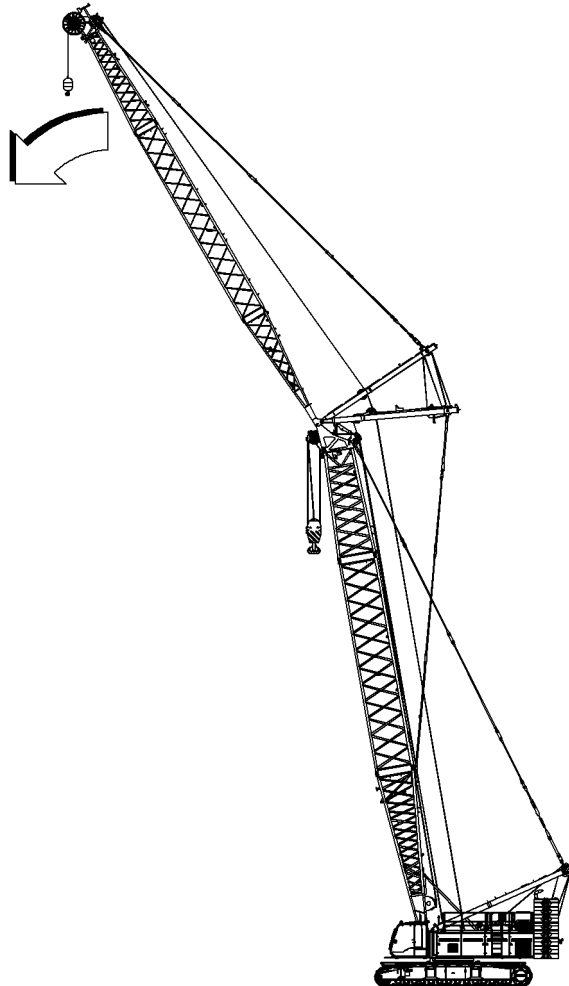


Fig. 2581: The jib lowers

4.22 Winch 1/Winch 2



WARNING

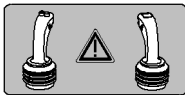
Pulling out of the ropes!

- ▶ Do not turn the winches unless a rope is reeved.
- ▶ Ensure that the rope is tight and evenly positioned on the winch.
- ▶ Have Liebherr after sales service set the 3 rope windings limit switch.

The adjustment range is defined by the set-up, is load-dependent, and is monitored by the LML (load moment limiter). The hoist limit switch and 3 rope windings limit switch restrict the adjustment range. The 3 rope windings limit switch is a safety device that prevents the rope from being pulled out of the rope fixing point on the winch.

4.22.1 Operating winch 1

Lifting the load on winch1



Procedure on a machine with two multi-directional control levers

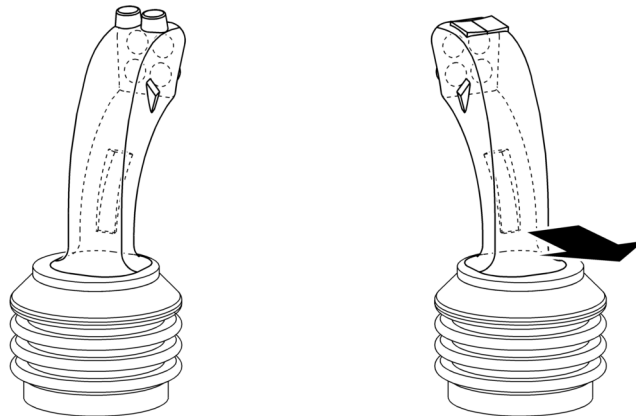


Fig. 2583: Lifting the load on winch1 with the multi-directional control lever

- ▶ Push the right multi-directional joystick backwards.
 - ▷ Load on winch1 is lifted:

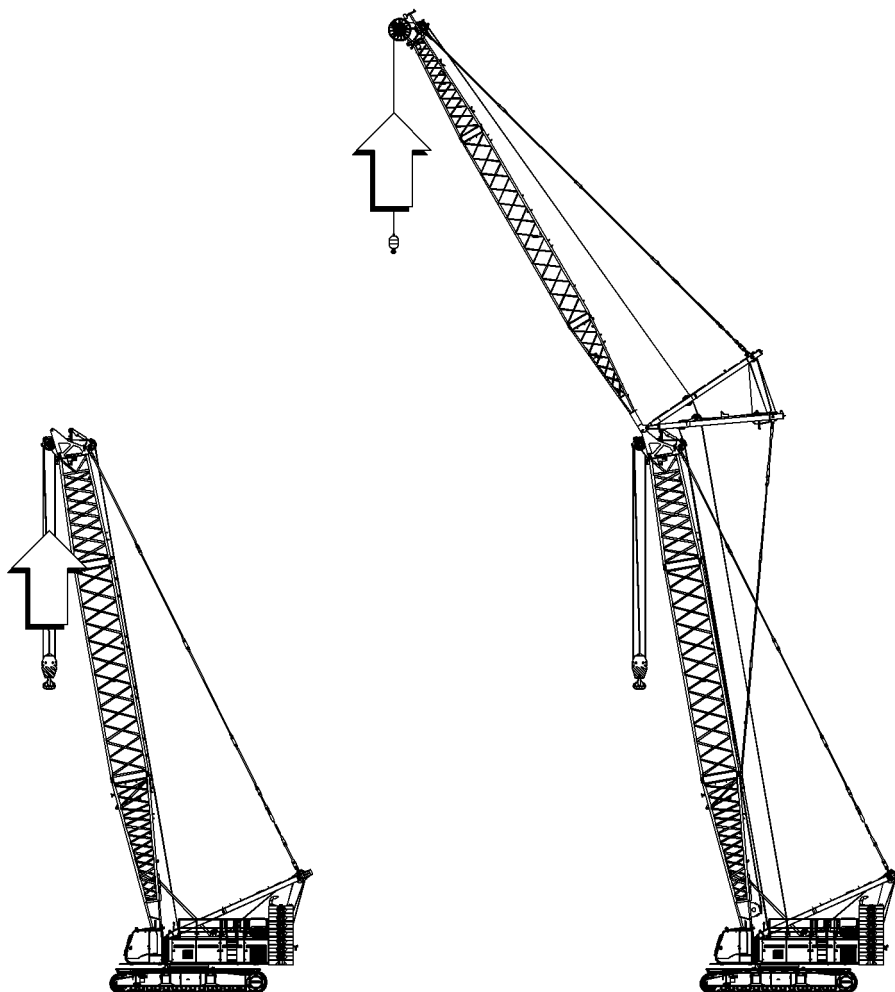
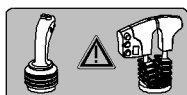


Fig. 2584: Load on winch1 is lifted



Procedure on a machine with a multi-directional control lever and a double T-lever.

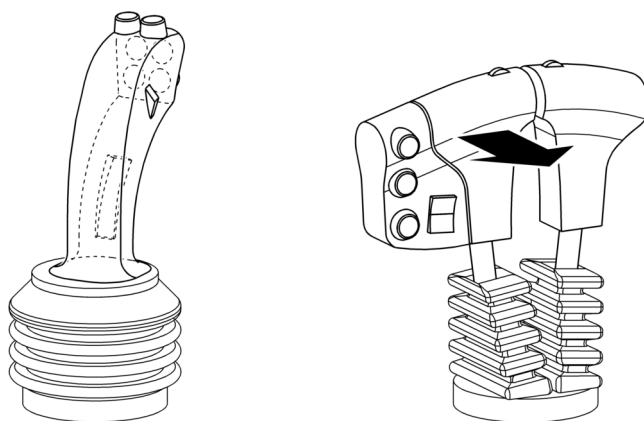


Fig. 2586: Lifting the load on winch1 with the double T-lever

- ▶ Push the inner T-bar control lever backwards.
- ▷ Load on winch1 is lifted:

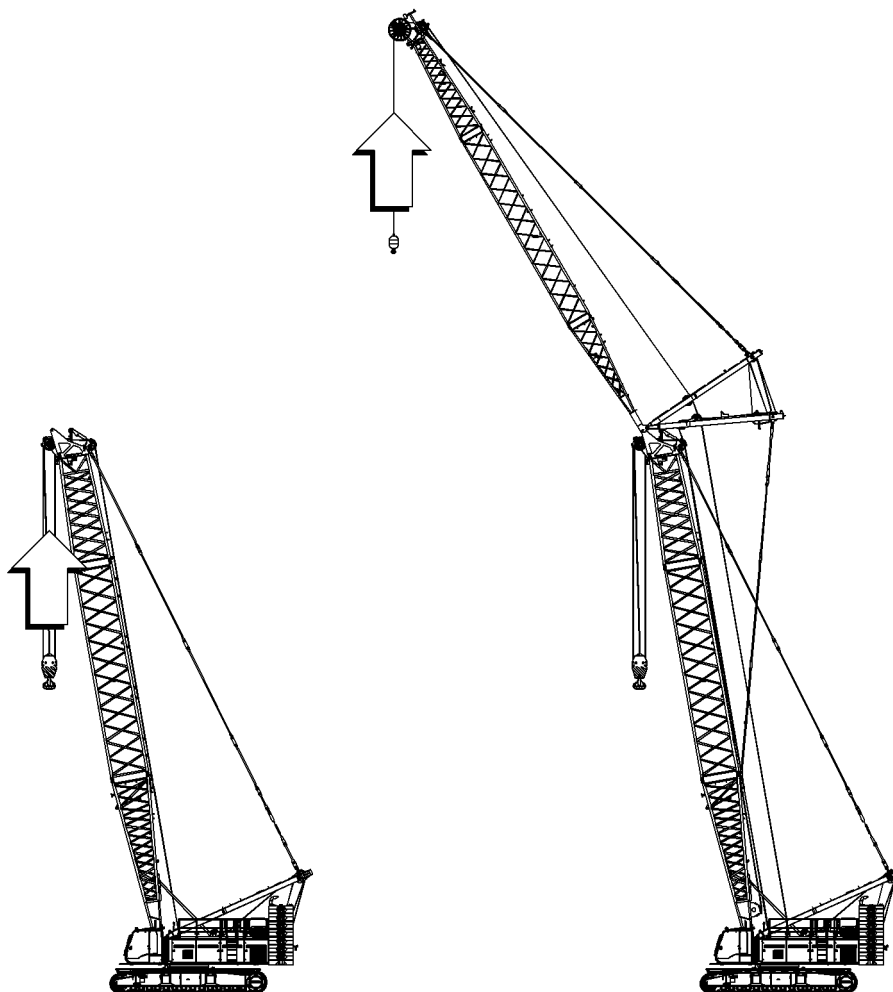


Fig. 2587: Load on winch1 is lifted

Lowering the load on winch1

Procedure on a machine with two multi-directional control levers

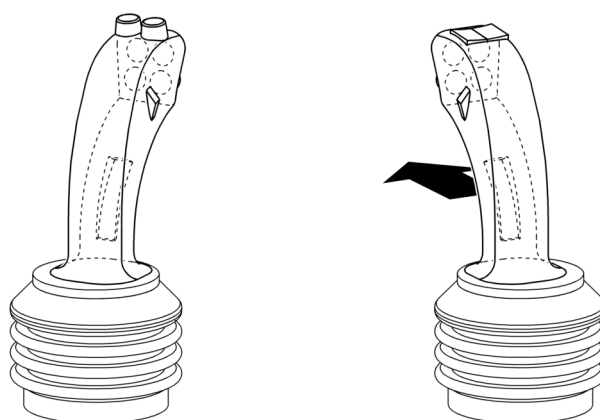


Fig. 2589: Lowering the load on winch1 with the multi-directional control lever

- Push the right multi-directional control lever forwards.

▷ Load on winch1 is lowered:

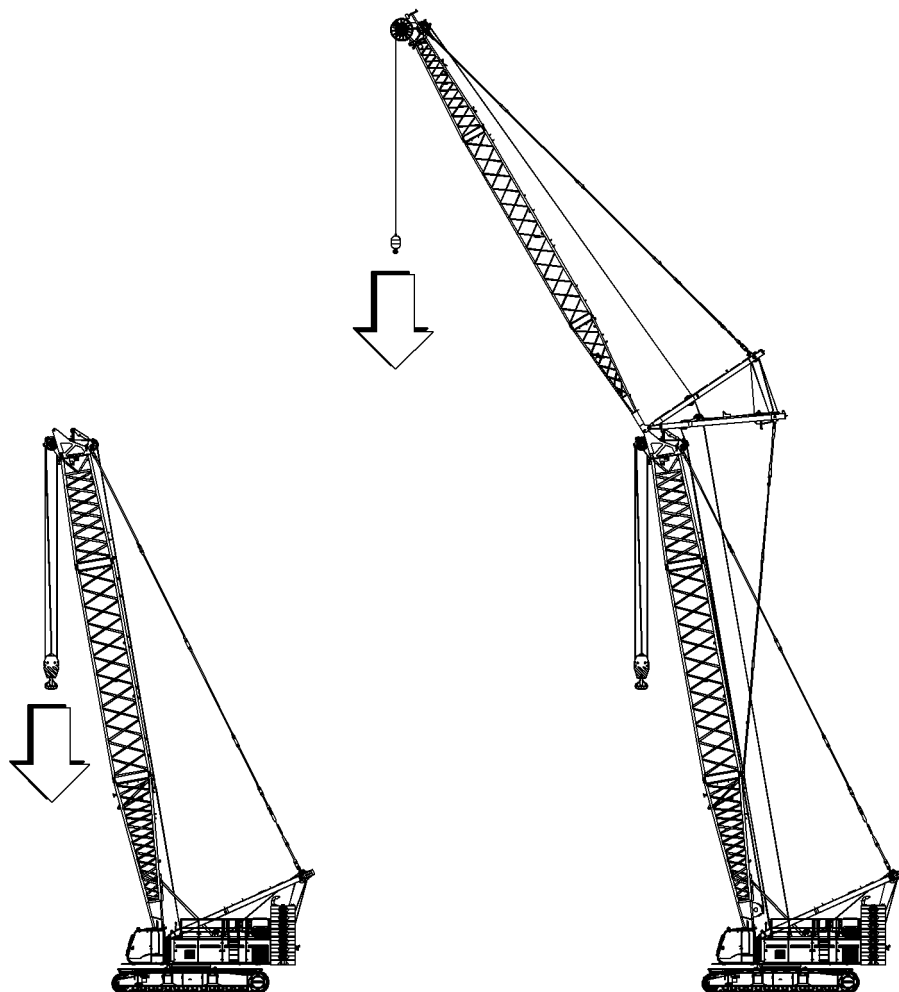


Fig. 2590: Load on winch1 is lowered



Procedure on a machine with a multi-directional control lever and a double T-lever.

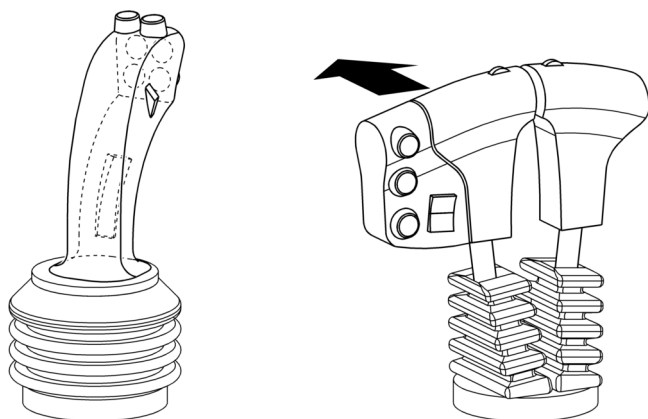


Fig. 2592: Lowering the load on winch1 with the double T-lever

- ▶ Push the inner T-bar control lever forwards.
- ▷ Load on winch1 is lowered:

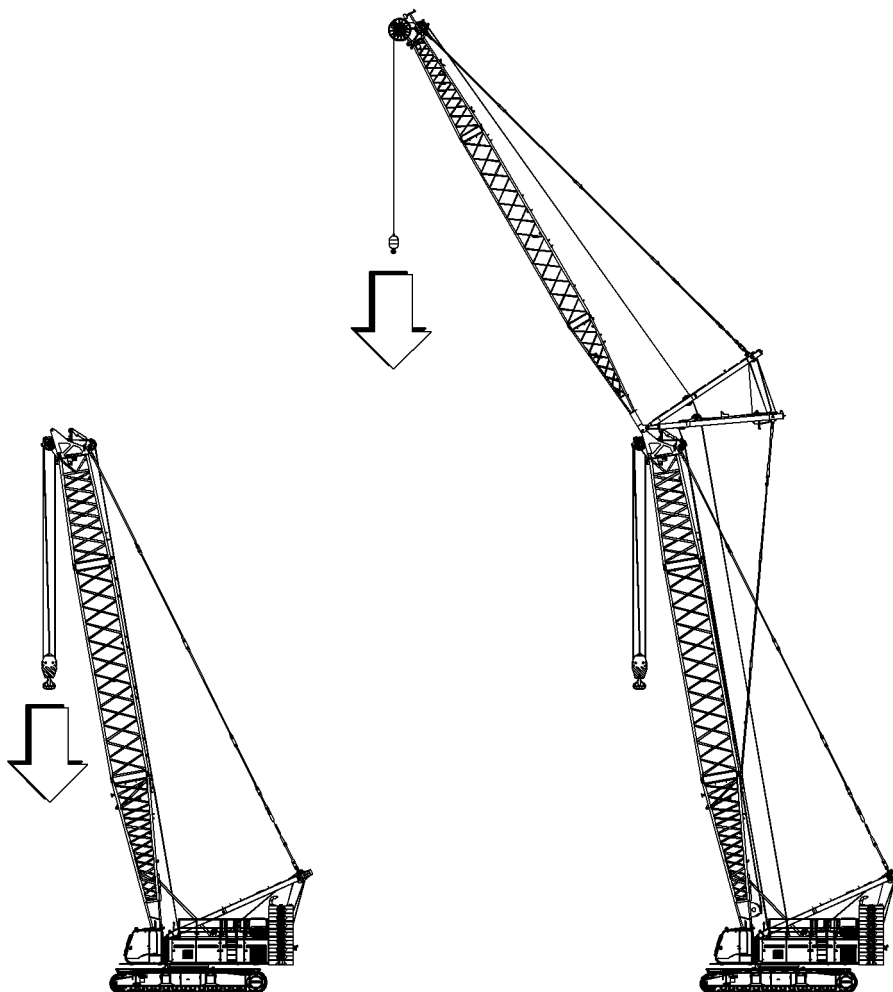


Fig. 2593: Load on winch1 is lowered

4.22.2 Operating winch 2

Lifting the load on winch2

Procedure on a machine with two multi-directional control levers



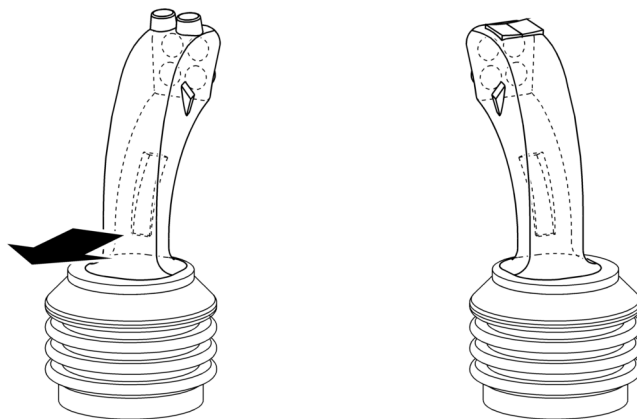


Fig. 2595: Lifting the load on winch2 with the multi-directional control lever

- ▶ Push the left multi-directional joystick backwards.
- ▷ Load on winch2 is lifted:

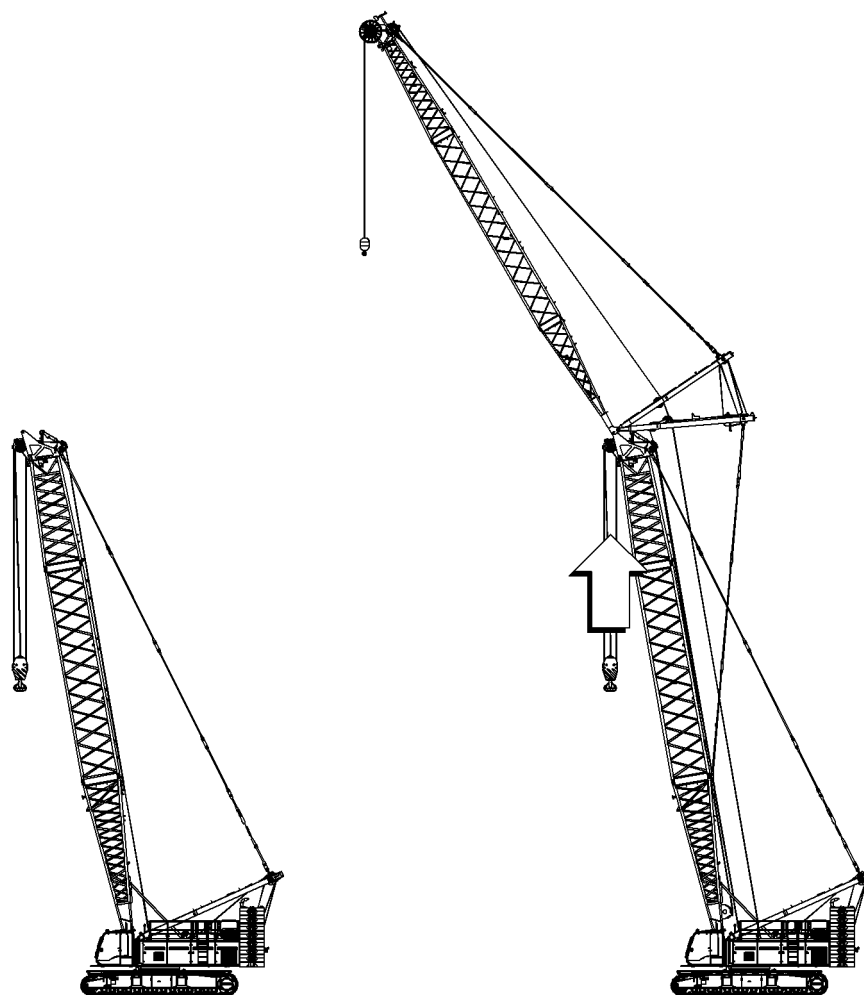
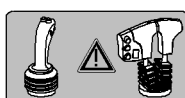


Fig. 2596: Load on winch2 is lifted



Procedure on a machine with a multi-directional control lever and a double T-lever.

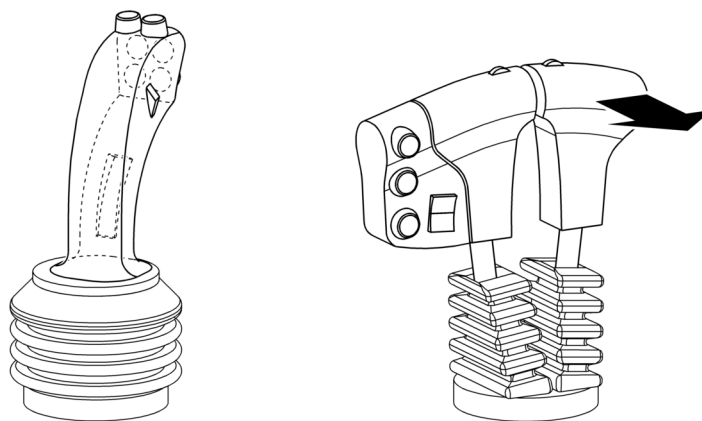


Fig. 2598: Lifting the load on winch2 with the double T-lever

- ▶ Push the outer T-lever backwards.
- ▷ Load on winch2 is lifted:

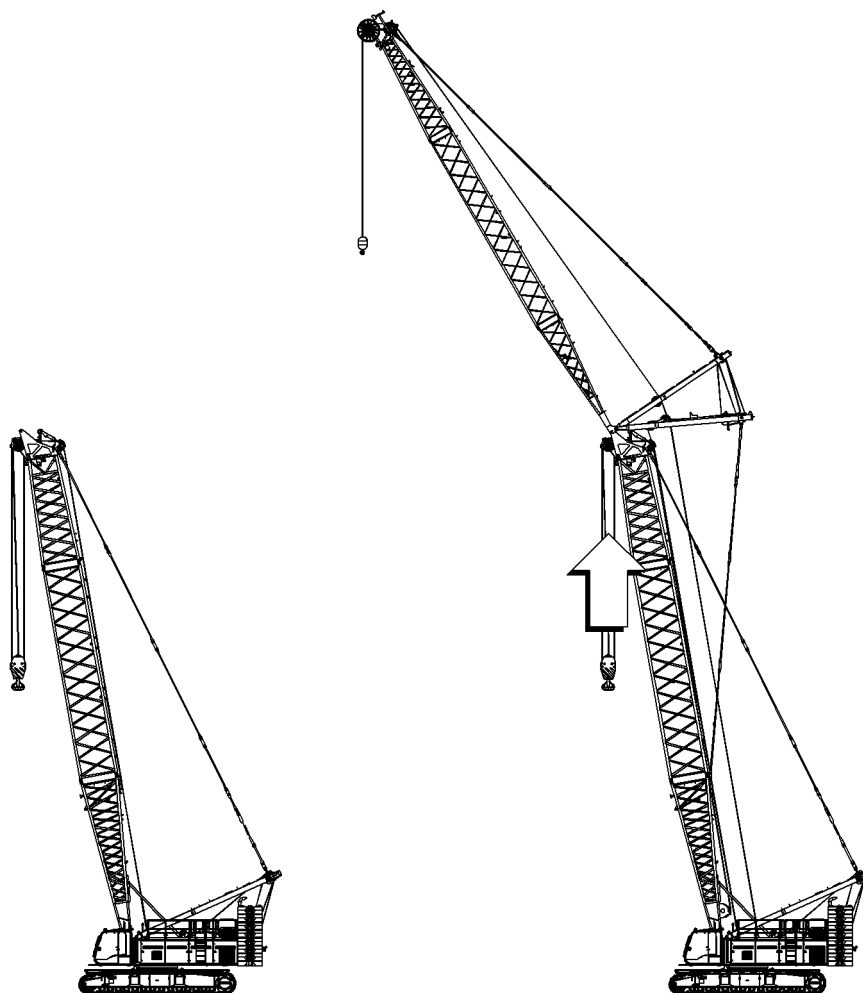


Fig. 2599: Load on winch2 is lifted

Lowering the load on winch2

Procedure on a machine with two multi-directional control levers



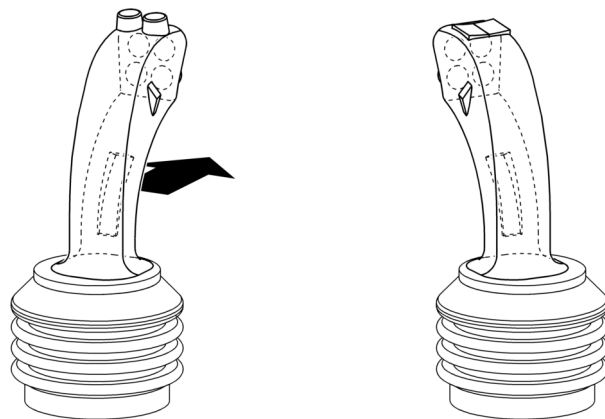


Fig. 2601: Lowering the load on winch2 with the multi-directional control lever

- ▶ Push the left multi-directional control lever forwards.
- ▷ Load on winch2 is lowered:

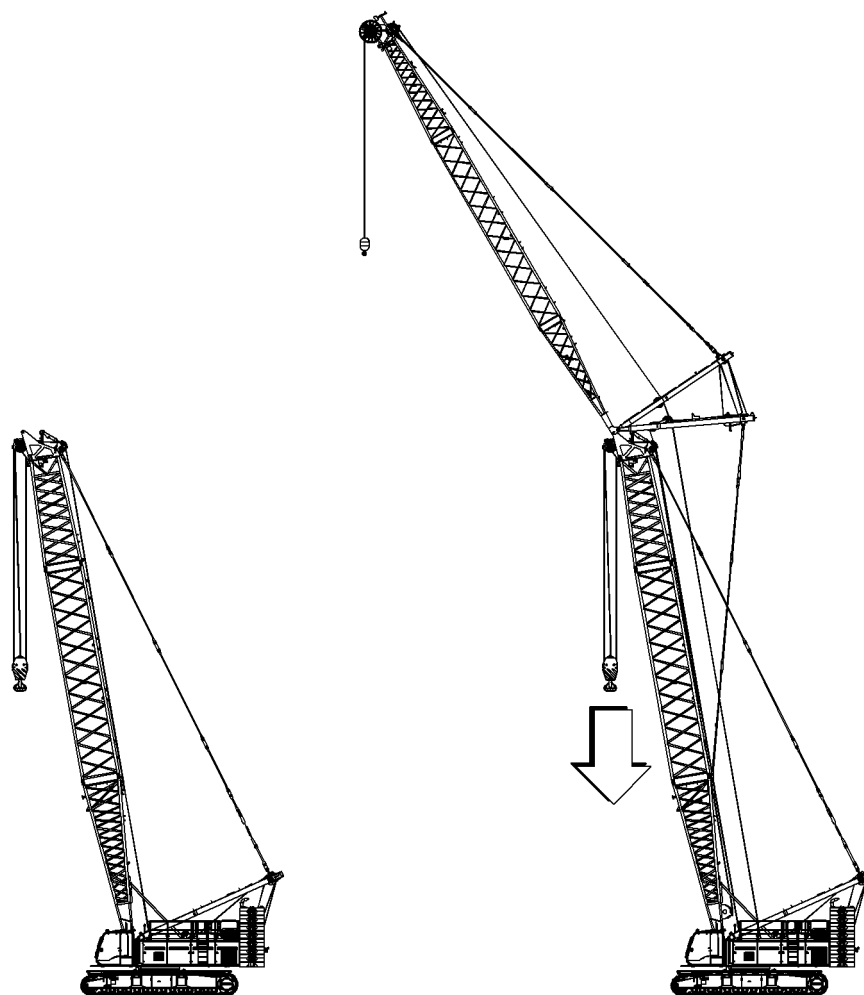


Fig. 2602: Load on winch2 is lowered



Procedure on a machine with a multi-directional control lever and a double T-lever.

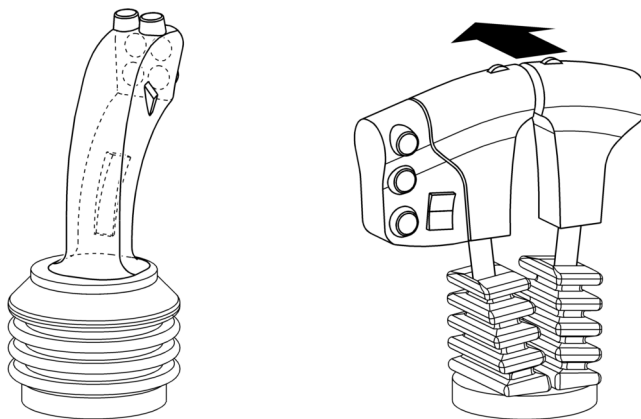


Fig. 2604: Lowering the load on winch2 with the double T-lever

- ▶ Push the outer T-lever forwards.
- ▷ Load on winch2 is lowered:

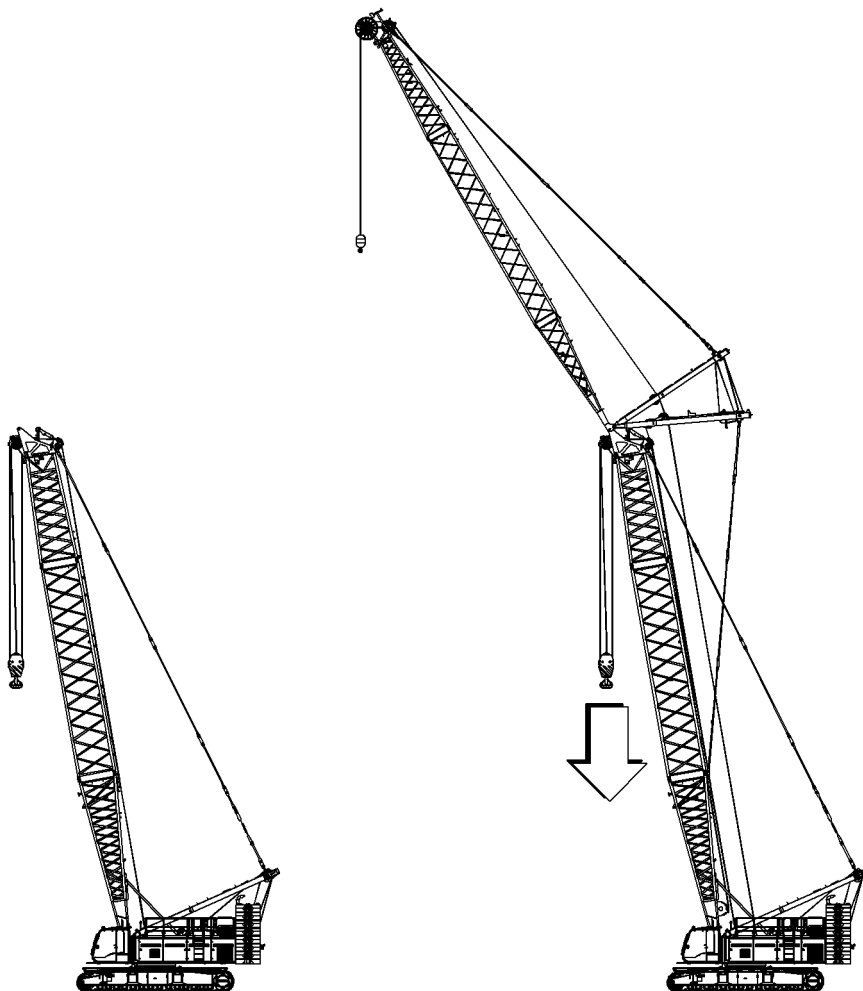


Fig. 2605: Load on winch2 is lowered

4.22.3 Locking or unlocking winch1/winch2

To prevent accidental operation of the winches, winch1 or winch2 can be locked.



- ▶ Press the *Settings* button on screen.
 - ▷ The *Settings* screen appears.



- ▶ Press the *Lock winch1* button on screen for more than 1 second.
 - ▷ Winch1 is locked.



- ▶ Press the *Lock winch2* button on screen for more than 1 second.
 - ▷ Winch2 is locked.



- ▶ Press the *Unlock winch1* button on screen for more than 1 second.
 - ▷ Winch1 is unlocked.



- ▶ Press the *Unlock winch2* button on screen for more than 1 second.
 - ▷ Winch2 is unlocked.

4.23 Counterweight carriage* radius adjustment



WARNING

Persons or obstacles in the adjustment range!
Severe injuries, damage to machine.

- ▶ Ensure that there are no persons or obstacles in the adjustment range.
- ▶ Leave the danger area.

Refer to the valid load chart for the admissible radius values of the counterweight carriage.

The radius of the counterweight carriage is considered in the load calculation.

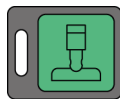
4.23.1 Activating the radius adjustment of the counterweight carriage

The wheel sets of the wheeled counterweight carriage free-wheel.

Crawler and swing are locked.

Ensure that the following conditions are fulfilled:

- No load on the boom support that would prevent the wheeled counterweight carriage being jacked up.
- The ground conditions are such that the wheeled counterweight carriage can be jacked up.



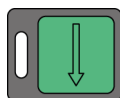
- ▶ Press the *Counterweight carriage support* button on control panel X26.



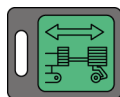
Note

Liebherr recommends:

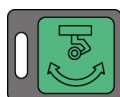
- ▶ This procedure must be monitored by video and/or by the signalman.



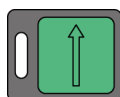
- ▶ Press and hold the button *Increase radius/support* on control panel X26 until jacks are fully extended.
 - ▷ Counterweight carriage is supported.



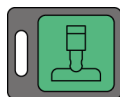
- ▶ Press the button *Counterweight carriage radius adjustment* on control panel X26.



- ▶ Press the button *Align wheel sets* on control panel X26.
 - ▷ Wheel sets are being aligned.

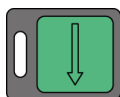


- ▶ Press and hold the button *Decrease radius/support* on control panel X26 until jacks are fully retracted.
 - ▷ Counterweight carriage rests on wheel sets.



- ▶ Press the button *Counterweight carriage support* on control panel X26 again.

4.23.2 Increasing the radius of the counterweight carriage



▶ Press and hold the button *Increase radius/support* on control panel X26.

▷ Radius of counterweight carriage increases:

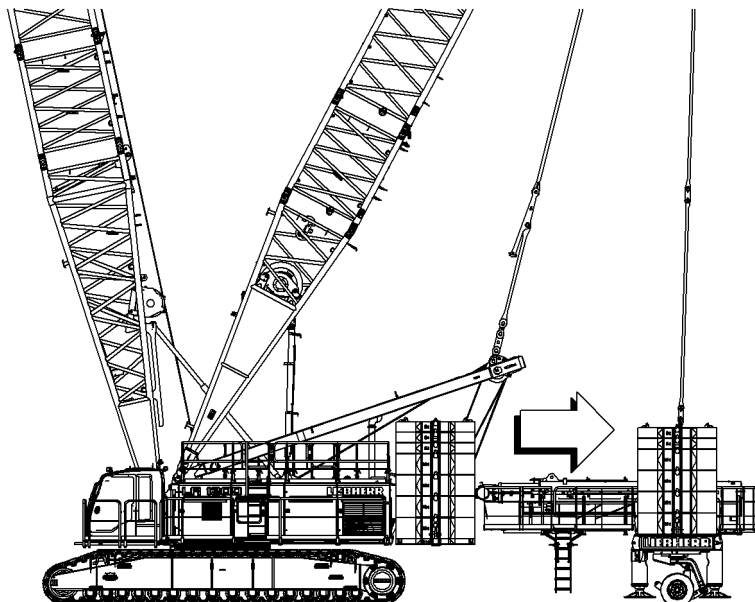
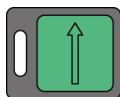


Fig. 2618: Radius of counterweight carriage increases

4.23.3 Decreasing the radius of the counterweight carriage



▶ Press and hold the button *Decrease radius/support* on control panel X26.

▷ Radius of counterweight carriage decreases:

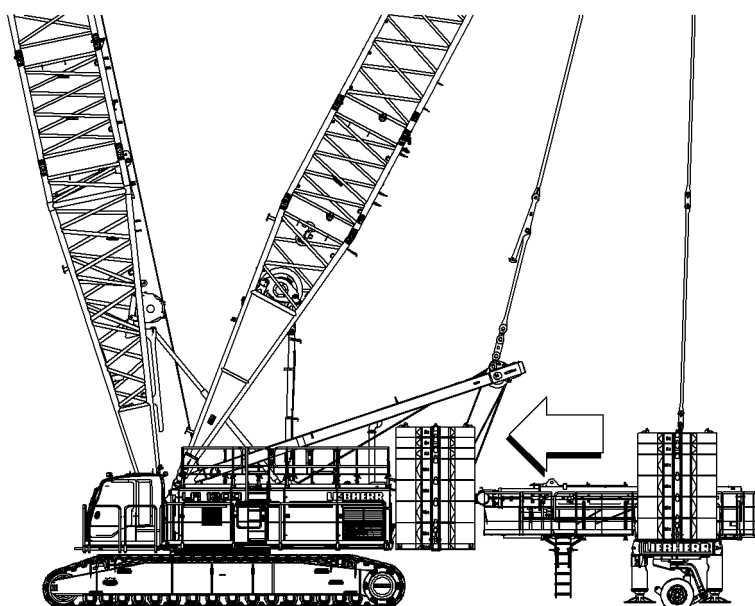
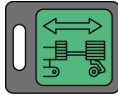


Fig. 2620: Radius of counterweight carriage decreases

4.23.4 Deactivating the radius adjustment of the counterweight carriage



- ▶ Press the button *Counterweight carriage radius adjustment* on control panel X26 again.

4.24 Derrick hoist cylinder*

The suspended counterweight or counterweight carriage can be lifted/lowered using the derrick hoist cylinder.

4.24.1 Selecting the derrick hoist cylinder

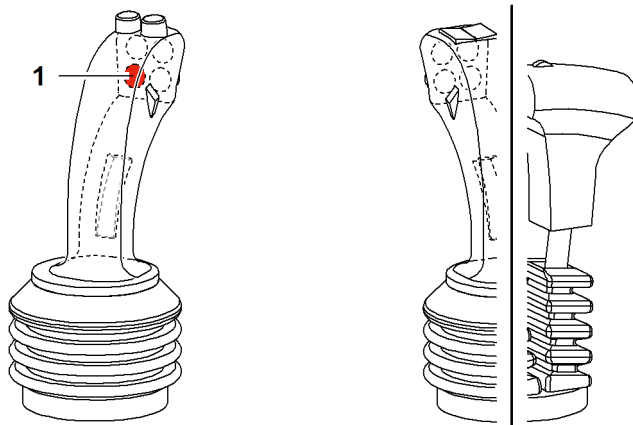


Fig. 2622: Selecting the derrick hoist cylinder

1 Button *Derrick hoist cylinder*

- ▶ Press the button *derrick hoist cylinder* 1 on the left multi-directional control lever.
 - ▷ *Derrick hoist cylinder* has been selected.
 - ▷ The symbol *derrick hoist cylinder* is displayed on the monitor:



Fig. 2623: Symbol *derrick hoist cylinder*

4.24.2 Operating the derrick hoist cylinder

Extending the derrick hoist cylinder

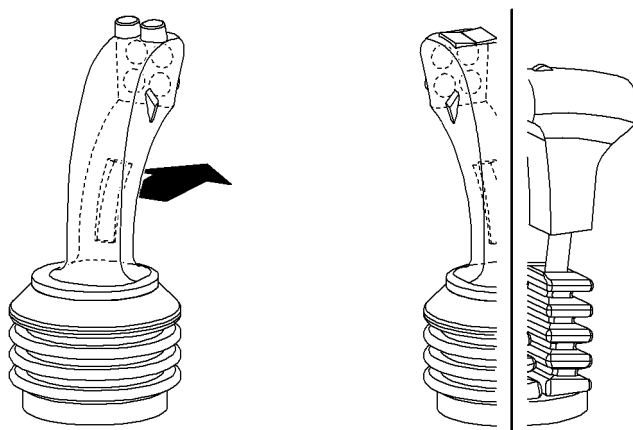


Fig. 2624: Extending the derrick hoist cylinder

- ▶ Push the left multi-directional joystick forwards.
 - ▷ Derrick lifting cylinder extends.

Retracting the derrick hoist cylinder

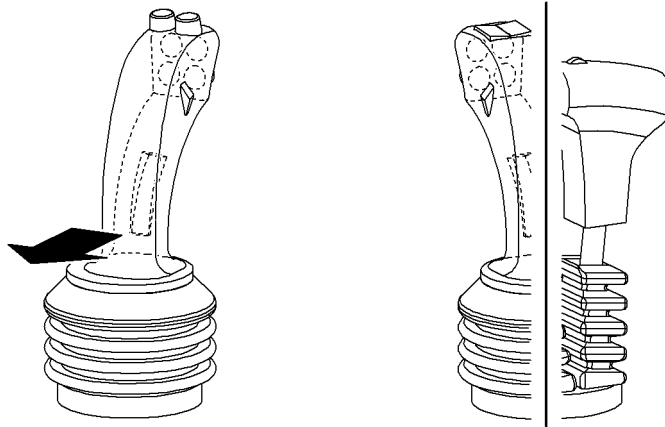


Fig. 2625: Retracting the derrick hoist cylinder

- ▶ Push left multi-directional control lever backwards.
 - ▷ Derrick hoist cylinder retracts.

4.25 Free-fall mode*

Fast lowering of the empty hook is possible in free-fall mode.



DANGER

Incorrect use of free-fall mode!
Toppling of machine, structural breakdown.

- ▶ Only use free-fall mode at load position 1 (main boom head).
- ▶ Only use free-fall mode with empty hook.
- ▶ All braking operations must be carried out carefully and sensitively.
- ▶ When braking the empty hook, do not exceed admissible load in free-fall mode.
- ▶ Permanently observe the load moment limitation on the *Operation* screen when braking.

4.25.1 Activating free-fall mode

Make sure the following conditions are met:

- Diesel engine is switched off.
- Machine is equipped with free-fall winches.

NOTICE

Incorrect activation of free-fall mode!
Damage to hydraulic system.

- ▶ Only adjust *free-fall mode* locking element when diesel engine is switched off.

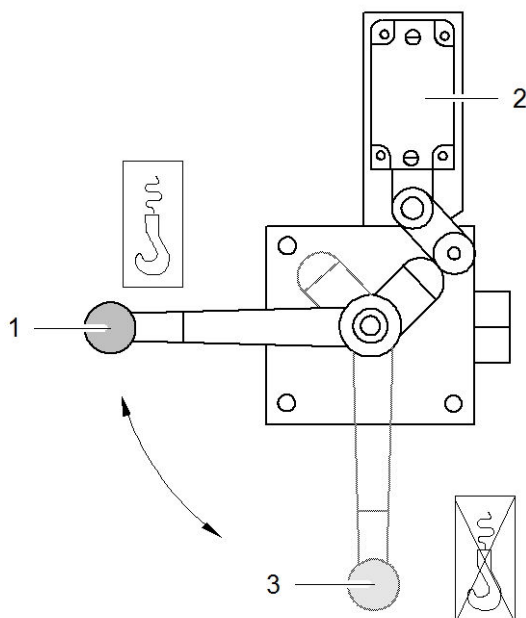


Fig. 2626: Activating free-fall mode

- | | | | |
|---|---------------|---|----------------|
| 1 | “ON” position | 3 | “OFF” position |
| 2 | Limit switch | | |

- ▶ Set locking element *Free-fall mode* to position “ON” 1.

- ▷ The limit switch **2** tells the Litronic control system that free-fall mode has been activated.
- ▷ Symbol *Secured free-fall mode* is displayed on the monitor:



Fig. 2627: Secured free-fall mode symbol

4.25.2 Selecting free-fall mode

Make sure the following conditions are met:

- Free-fall mode* locking element is set to "ON".

Selecting secured free-fall mode

Secured free-fall mode is selected by default.



If the switch *Unsecured free-fall operation* is lit on control panel X12:

- ▶ Actuate switch *Unsecured free-fall operation* switch on control panel X12.

- ▷ Secured free-fall mode selected.
- ▷ Symbol *Secured free-fall mode* is displayed on the monitor:



Fig. 2629: Secured free-fall mode symbol

Selecting unsecured free-fall mode



- ▶ Actuate switch *Unsecured free-fall operation* switch on control panel X12.

- ▷ Unsecured free-fall mode selected.
- ▷ Symbol *Unsecured free-fall mode* appears on the monitor:



Fig. 2631: Unsecured free-fall mode symbol

4.25.3 Operating free-fall mode

Make sure the following conditions are met:

- Free-fall mode* locking element is set to "ON".



Assigned functions of the foot pedals on a machine with two multi-directional control levers

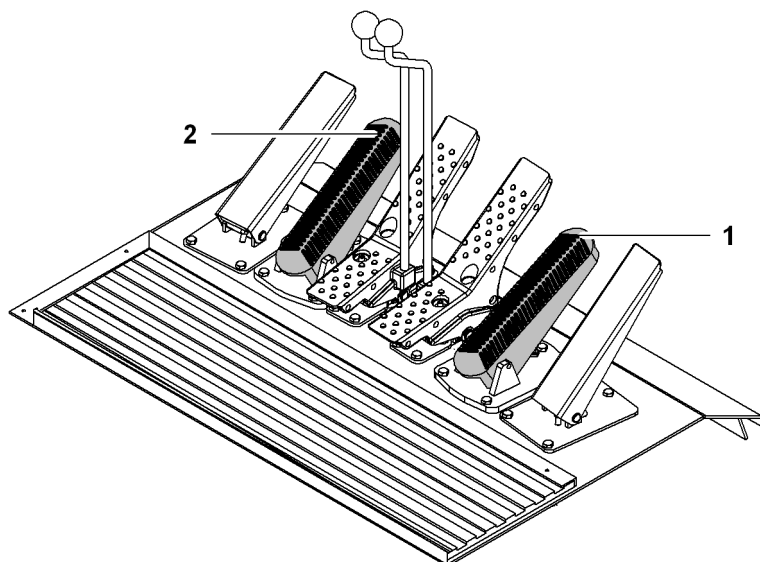
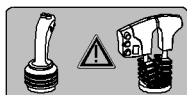


Fig. 2633: Foot pedals

1 Foot pedal *Free-fall winch1 brake* 2 Foot pedal *Free-fall winch2 brake*



Assigned functions of the foot pedals on a machine with a multi-directional control lever and a double T control lever

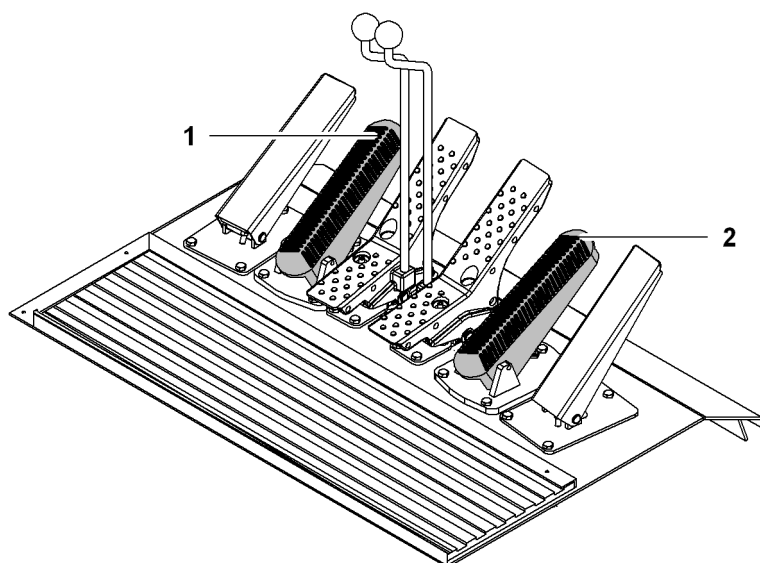


Fig. 2635: Foot pedals

1 Foot pedal *Free-fall winch1 brake* 2 Foot pedal *Free-fall winch2 brake*

Observe the following sequence and procedure.

Selecting free-fall mode for winch1



▶ Press and hold the button *Free fall* on control panel X23.

▶ Fully press down on the foot pedal *Brake free-fall winch1* 1.
 ▷ The symbol *Free-fall winch1* appears on the monitor:



Fig. 2637: Free-fall winch1 symbol

If the symbol *Free-fall winch1* appears on the monitor:

- ▶ Release the button *Free fall* on control panel X23.

Selecting free-fall mode for winch2



- ▶ Press and hold the button *Free fall* on control panel X23.

- ▶ Fully press down on the foot pedal *Brake free-fall winch2 2*.
 - ▷ The symbol *Free-fall winch2* appears on the monitor:



Fig. 2639: Free-fall winch2 symbol

If the symbol *Free-fall winch2* appears on the monitor:

- ▶ Release the button *Free fall* on control panel X23.

Lifting the empty hook in free-fall mode



WARNING

Opened multi-disk brake is in unsecured free-fall mode after raising the empty hook!

The free-fall winch is immediately back in free-fall as soon as the control lever is placed in neutral.

- ▶ Keep empty hook with completely depressed foot pedal *Free-fall brake winch1* or foot pedal *Free-fall brake winch2* in position.
-
- ▶ Move the appropriate control lever. The foot pedal *Free-fall brake winch1* or the foot pedal *Free-fall brake winch2* can be released, but does not have to be.

Troubleshooting

The load cannot be lifted?

A winch stop monitor checks the swing movement of the free-fall winches. The load can only be lifted again after the corresponding free-fall winch is stopped.

If winch1 does not stand still:

- ▶ depress foot pedal *brake free-fall winch1* stronger.

If winch2 does not stand still:

- ▶ depress foot pedal *brake free-fall winch2* stronger.

If the problem persists:

- ▶ Contact Liebherr customer service.

Lowering the empty hook in free-fall mode



CAUTION

Overrunning of winch1/winch2 rope!

Slack rope formation.

Loose and irregular winding on the free-fall winch.

Altered 3-rope windings limit switch and altered rope measuring system.

- ▶ Stop the free-fall winch with the appropriate foot pedal *Free-fall brake winch1* or the foot pedal *Free-fall winch2* immediately once the empty hook has touched the ground.

- ▶ Lowering empty hook on winch1: Release foot pedal *Brake free-fall winch1*.

- ▶ Lowering empty hook on winch2: Release foot pedal *Brake free-fall winch2*.

Stopping the empty hook in free-fall mode

- ▶ Stopping empty hook on winch1: Press foot pedal *Free-fall winch1 brake*.
 - ▷ Winch1 is braked until it comes to a stop.

- ▶ Stopping empty hook on winch2: Press foot pedal *Free-fall winch2 brake*.
 - ▷ Winch2 is braked until it comes to a stop.

4.25.4 Deactivating free-fall mode

Make sure the following conditions are met:

- Winch1 and winch2 stand still.



DANGER

Winches will turn when the safety lever is pulled up!

Free-fall mode is not locked.

Toppling of machine, structural breakdown.

- ▶ Make sure that winches are stationary before the safety lever is pulled up.



- ▶ Press the button *Free fall* button on control panel X23.

- ▶ Pull up safety lever.

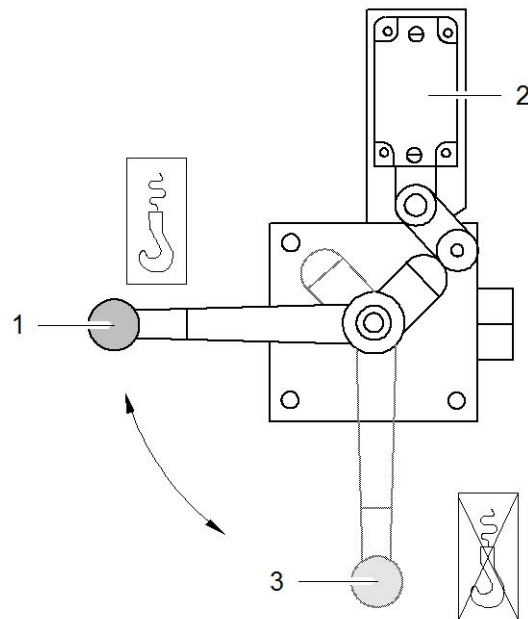


Fig. 2641: Deactivating free-fall mode

1 "ON" position

3 "OFF" position

2 Limit switch

- ▶ Set *Free-fall mode* locking element to position "OFF".
 - ▷ Free-fall mode is switched off.
 - ▷ Symbols for free-fall mode no longer appear on the monitor.

4.26 Winch synchronization*

Winch synchronization involves synchronizing the rope speeds of winch1 and winch2.

Using the winch synchronization:

- Single hook mode with two winches on one hook
- Twin hook mode with two winches on one load
- Working with crossbeams

4.26.1 Activating winch synchronization

Ensure that the following conditions are fulfilled:

- Winch1 rope and winch2 rope have the same length.
- Winch1 rope and winch2 rope are reeved evenly.
- Load is distributed evenly on winch1 and winch2.
- Winch1 and winch2 stand still.

Activate winch synchronization on control lever

Procedure on a machine with two multi-directional control levers

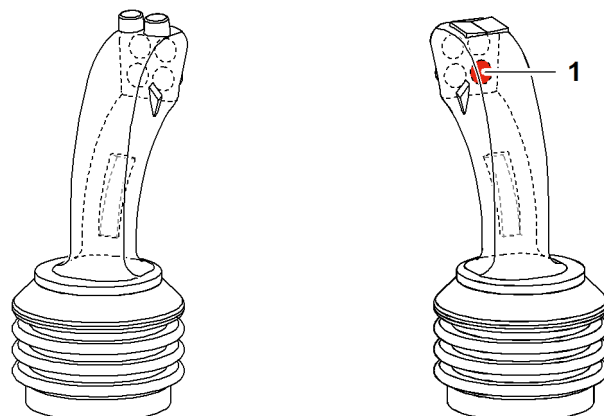


Fig. 2643: Activate winch synchronization on multi-directional control lever

1 Button *Winch synchronization*

- ▶ Press and hold the *Winch synchronization 1* button on the right multi-directional control lever.
 - ▷ Winch synchronization is activated until the button *Winch synchronization* is no longer pushed and winch1 and winch2 stand still.
 - ▷ The symbol *Winch synchronization* appears on screen:



Fig. 2644: Winch synchronization symbol



Procedure on a machine with a multi-directional control lever and a double T-lever.

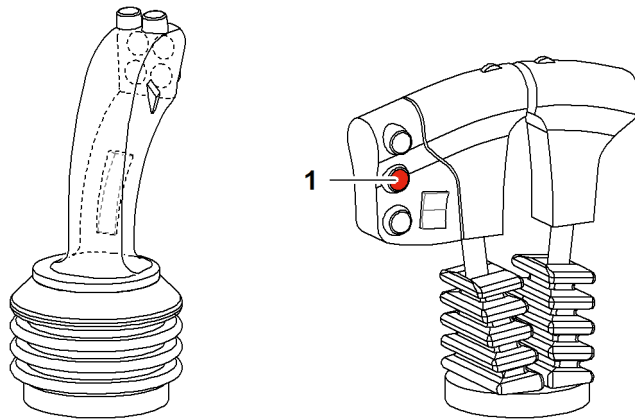


Fig. 2646: Switching the winch synchronization on using the double T-lever

1 Button Winch synchronization

- ▶ Press and hold the *Winch synchronization 1* button on the right double T-lever.
 - ▷ Winch synchronization is activated until the button *Winch synchronization* is no longer pushed and winch1 and winch2 stand still.
 - ▷ The symbol *Winch synchronization* appears on screen:



Fig. 2647: Winch synchronization symbol

Activating the winch synchronization on control panel X23



- ▶ Press the *Winch synchronization* button on control panel X23.

- ▷ Winch synchronization is activated and remains on after winch1 and winch2 stand still.
- ▷ The symbol *Winch synchronization* appears on screen:



Fig. 2649: Winch synchronization symbol

4.26.2 Operating the winch synchronization

NOTICE

Incorrect adjustment of the main boom when winch synchronization is activated!
Tilting of the hook or the crossbar.
Damage to machine.

- ▶ Only adjust the main boom when lifting or lowering winch1 and winch2 simultaneously.



Procedure on a machine with two multi-directional control levers

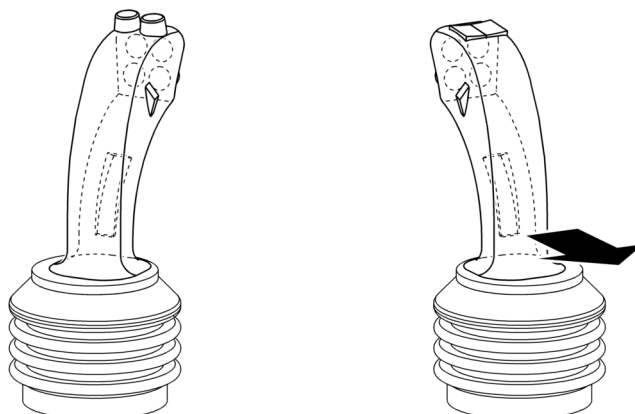


Fig. 2651: Lifting winch1 and winch2 with the multi-directional control lever

- ▶ Lifting winch1 and winch2: push the right multi-directional control lever backwards.
 - ▷ Winch1 and winch2 lift.

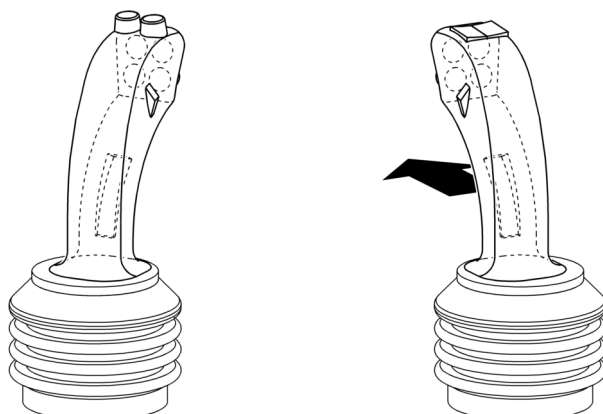


Fig. 2652: Lowering winch1 and winch2 with the multi-directional control lever

- ▶ Lowering winch1 and winch2: push the right multi-directional control lever forwards.
 - ▷ Winch1 and winch2 lower.



Procedure on a machine with a multi-directional control lever and a double T-lever.

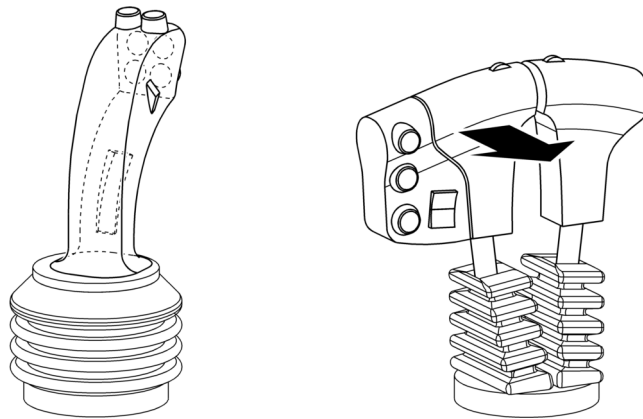


Fig. 2654: Lifting winch1 and winch2 with the double T-lever

- ▶ Lifting winch1 and winch2: push the inner T-bar control lever backwards.
 - ▷ Winch1 and winch2 lift.

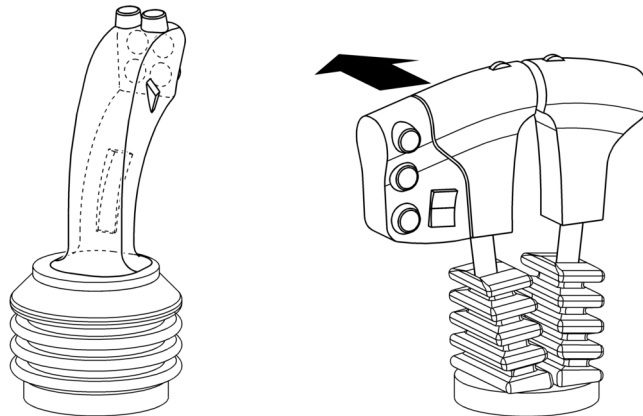


Fig. 2655: Lowering winch1 and winch2 with the double T-lever

- ▶ Lowering winch1 and winch2: push the inner T-bar control lever forwards.
 - ▷ Winch1 and winch2 lower.

4.26.3 Deactivating winch synchronization

Ensure that the following conditions are fulfilled:

- Winch1 and winch2 stand still.

Deactivate winch synchronization on control lever

- ▶ Release the *Winch synchronization* button on the right control lever.
 - ▷ Winch synchronization is switched off.

Deactivating the winch synchronization on control panel X23



- ▶ Press the *Winch synchronization* button on control panel X23 again.
 - ▷ Winch synchronization is switched off.

4.27 Blocked crawlers*

To extend the tipping line of the machine, steel plates of a precise thickness can be inserted underneath the tumbler or idler. The difference in height between the running rollers and the tumbler (or the running rollers and the idler) is evened out.

Properties of blocked crawlers:

- Extension of tilting edge
- Increased load-bearing capacity
- Swing radius limitation of uppercarriage
- Traveling with machine is prohibited
- Can lead to higher ground pressures

The example below explains the system. This example only applies to one machine configuration.



DANGER

Incorrect operation of blocked crawlers!

Structural breakdown.

The structure curve specifies the minimum loading limit of the components (swing, pendant straps, A-frames, chord pipes, diagonals, etc.).

► Work only with values that are within the structure curve (grey load chart value).

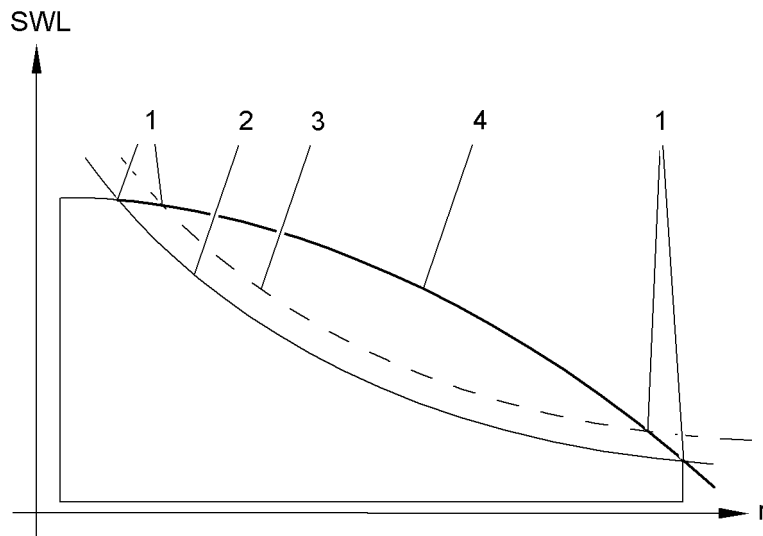


Fig. 2657: Diagram

- | | |
|---|--|
| <p>1 Intersection between tilt curve and structure curve</p> <p>2 Tilt curve for maximum counterweight (360°)</p> | <p>3 Tilt curve for blocked crawlers (limited swing angle)</p> <p>4 Structure curve of the machine</p> |
|---|--|

The tilt curve is calculated from the equilibrium of weights rotating forwards and backwards (dead weight + load weights). The minimum of the two curves gives the valid load capacity chart.

Blocked crawlers can extend the normal lifting capacity range that is limited by the machine tilt curve 2. It may be the case that the extended tilt curve 3 is intersected by the falling structure curve 4. If this is the case, the structure curve takes precedence with respect to the maximum radius.

Make sure that the support plates are laid out in the required thickness.

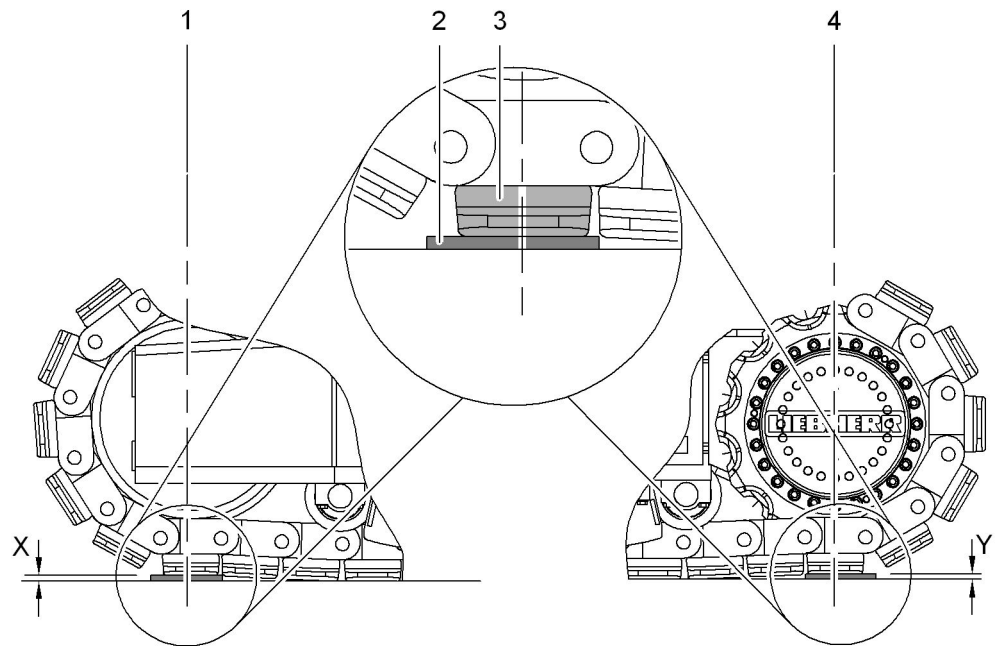


Fig. 2658: Positioning of the support plates

- 1 Center line of idler
- 2 Support plate
- 3 Ground plate
- 4 Center line of tumbler

Machine type	Idler wheel X	Tumbler Y
LR 1001	20 mm 0.79" in	20 mm 0.79" in
LR 1002	25 mm 0.98" in	25 mm 0.98" in
LR 1003	20 mm 0.79" in	20 mm 0.79" in
LR 1004	22 mm 0.87" in	15 mm 0.59" in
LR 1006	25 mm 0.98" in	17 mm 0.67" in

Tab. 389: Positioning of support pads

4.27.1 Driving onto the support plates



DANGER

Inappropriate driving onto support plates!
Machine toppling over.

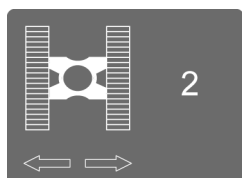
- ▶ The left and right base plates of the crawler side frames must be positioned exactly the same so they are both driven onto the support plates at the same time.
- ▶ Equalize the crawler position on both sides simultaneously. When necessary, move the crawler side frames towards one another.
- ▶ Place support plates in front of the crawler side frames.

Blocked crawlers*

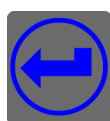
- ▶ Move precisely onto the support plates (see: fig. 2658, page 1009) .
- ▶ Lock and disable the crawler.
- ▶ Press the *Setup* button on the monitor.
 - ▷ The *Setup* screen appears on the monitor.



- ▶ Press the *Setup - basic machine* button on the monitor.
 - ▷ The *Setup - basic machine* screen appears on the monitor.



- ▶ Press the button *Track width* on the monitor and select value "3".



- ▶ Press the button *Calculate load chart* (lit blue) on the monitor.
 - ▷ Load chart is being recalculated.

4.27.2 Working with Blocked Crawlers

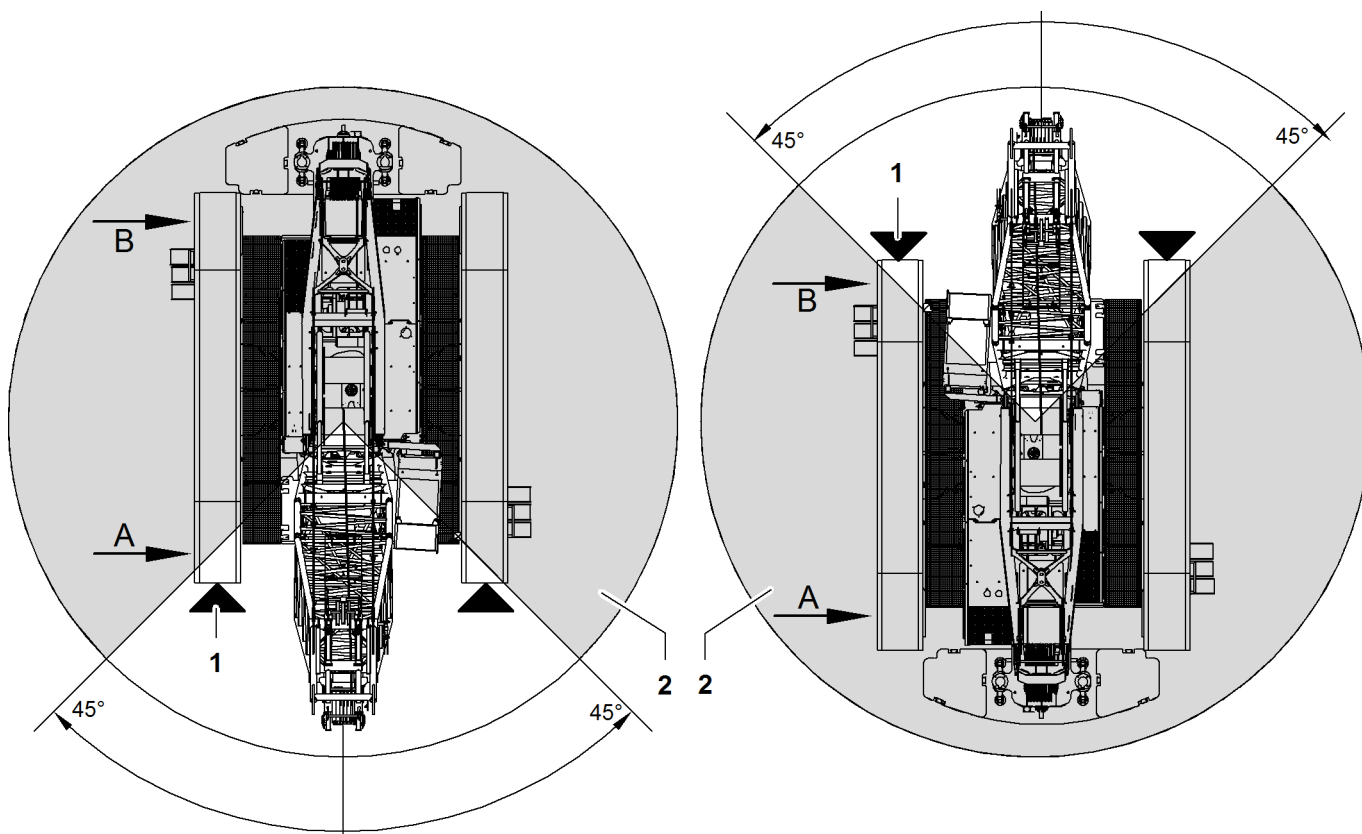


Fig. 2663: Working with blocked crawlers

- | | | | |
|---|-----------------|---|--------------|
| 1 | Base plate (2x) | A | Tumbler (2x) |
| 2 | Blocked area | B | Idler (2x) |

**DANGER**

Uppercarriage swing angle is too great!
Machine toppling over.

- ▶ Rotation is permitted only up to an angle of $\pm 45^\circ$ along the crawler side frames.
- ▶ Do not move into the blocked area **2**.

In EU load charts, the swing movement of the uppercarriage will be automatically restricted via the swing angle transmitter.

With ANSI load charts, responsibility for swinging the uppercarriage rests with the machine operator.

4.28 Assembly cylinder *

4.28.1 Select assembly cylinder



- ▶ Press the *Assembly cylinder* button on control panel X23.

4.28.2 Operating the assembly cylinder



WARNING

Individuals in the swing range of the assembly cylinder!
Severe injury.

- ▶ Ensure that there is nobody in the swing range of the assembly cylinder.
- ▶ Leave the danger area.

Extend assembly cylinder



Procedure on a machine with two multi-directional control levers

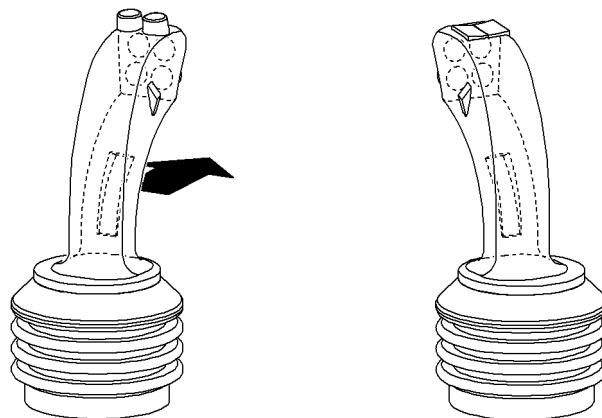
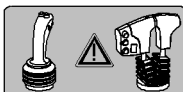


Fig. 2666: Extending the assembly cylinder with multi-directional control lever

- ▶ Push left multi-directional control lever forward.
 - ▷ The assembly cylinder extends.



Procedure on a machine with a multi-directional control lever and a double T-lever.

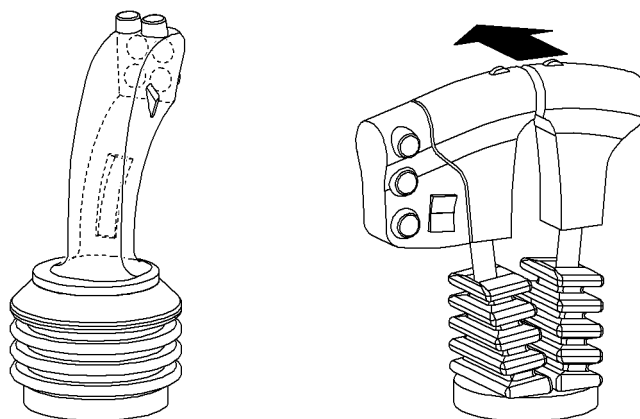


Fig. 2668: Extending the assembly cylinder using the double T-lever

- ▶ Push the outer T-lever forwards.
 - ▷ The assembly cylinder extends.

Retract assembly cylinder

Procedure on a machine with two multi-directional control levers

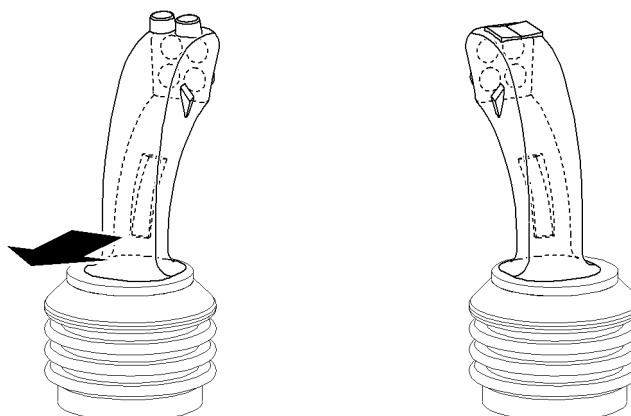
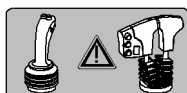


Fig. 2670: Retracting the assembly cylinder with multi-directional control lever

- ▶ Push the left multi-directional control lever backwards.
 - ▷ The assembly cylinder retracts.



Procedure on a machine with a multi-directional control lever and a double T-lever.

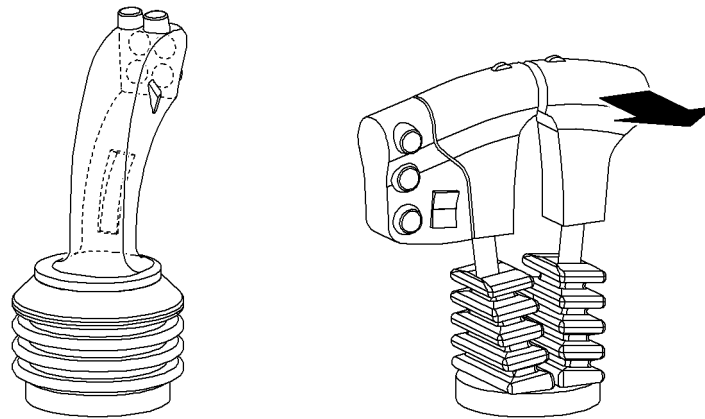


Fig. 2672: Extending the assembly cylinder using the double T-lever

- ▶ Push the outer T-lever backwards.
- ▷ The assembly cylinder retracts.

4.29 Filling machine with fuel

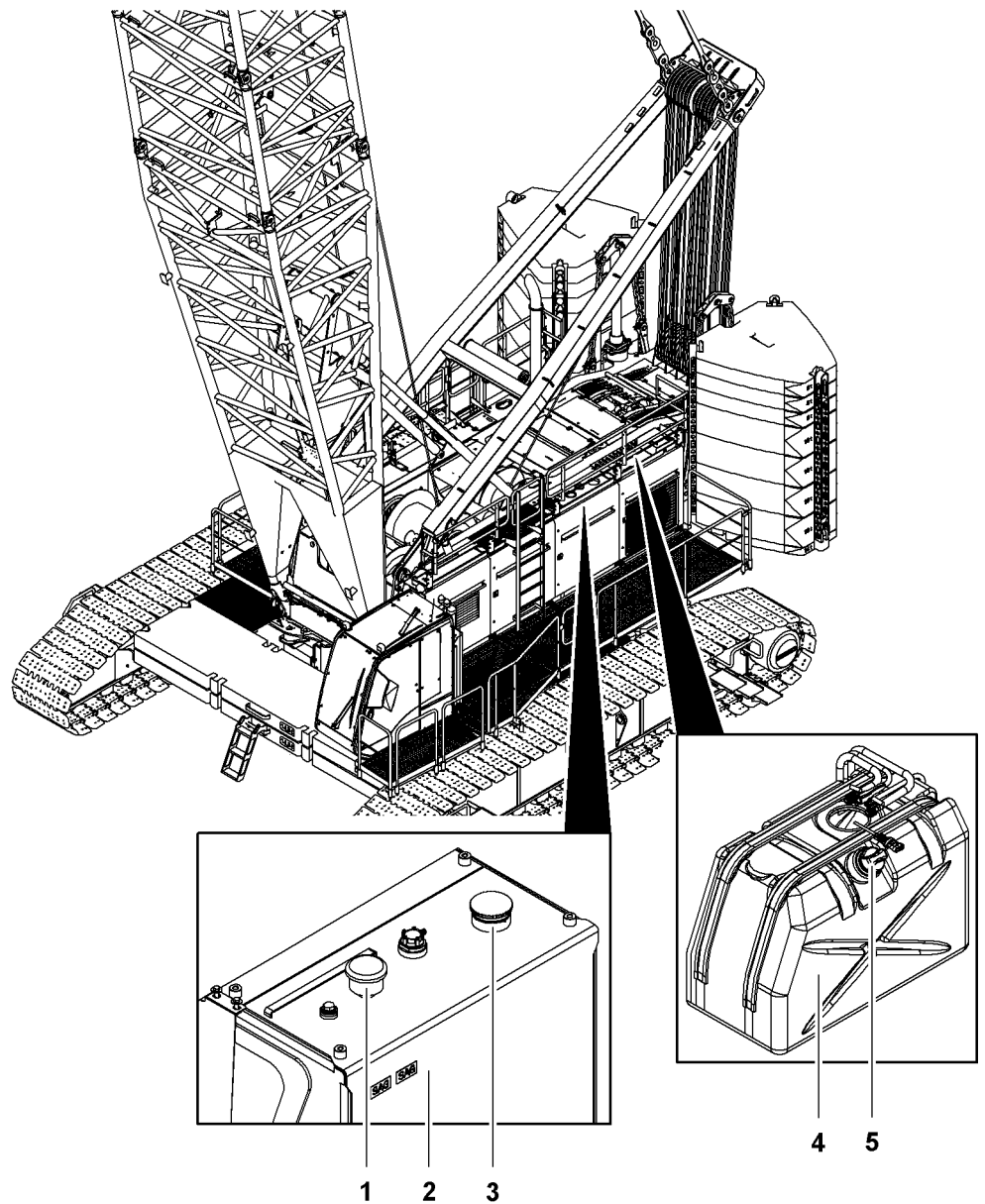


Fig. 2673: Filling machine with fuel

- | | | | |
|---|----------------|---|------------|
| 1 | Venting filter | 4 | Urea tank |
| 2 | Fuel tank | 5 | Tank cover |
| 3 | Tank cover | | |

4.29.1 Filling the fuel tank

Make sure the following prerequisites are met:

- Auxiliary heating* is turned off.
- External air conditioning system* is turned off.

Filling machine with fuel from a tank truck

- ▶ Switch off diesel engine.

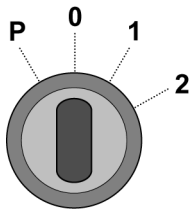
- ▶ Direct tank truck to the refueling point.
- ▶ Unlock and remove the tank cover **3**.
- ▶ Check the filler screen underneath for dirt, clean and replace if necessary.
- ▶ Fill the fuel tank **2** with the appropriate fuel according to the season (summer or winter diesel) ([For more information see: 9.2.5 Fuel, page 1953](#)) .
- ▶ Close and lock tank cover **3**.

Filling the machine with fuel from a refueling pump

NOTICE

Incorrect use of refueling pump!
Damage to the refueling pump.

- ▶ Refueling pump must only be used for pumping fuel.
 - ▶ Only use the supplied suction hose.
 - ▶ Ensure that the refueling pump does not run dry.
-



- ▶ Switch off diesel engine.
- ▶ Turn ignition key to position "1".

- ▶ Position fuel container.
- ▶ Open the center right uppercarriage door.
- ▶ Remove cover from refueling pump.
- ▶ Attach suction hose to refueling pump connector.
- ▶ Totally immerse other end of the hose with the fuel filter in the fuel.
- ▶ Press the *Pump ON* (green) button on the control panel of the refueling pump.
 - ▷ Pump starts to run.
 - ▷ As soon as the maximum filling capacity is reached, the refueling pump shuts off automatically.
- ▶ Remove the suction hose from the refueling pump and hold it up, allowing the remaining fuel to flow back into the fuel container.
- ▶ Roll up suction hose and stow it away.
- ▶ Replace cover on refueling pump.
- ▶ Close the center right uppercarriage door.

4.29.2 Filling up with urea solution*

- ▶ Switch off diesel engine.
- ▶ Open cover of urea tank **4**.
- ▶ Remove tank cover **5**.
- ▶ Fill urea tank **4** with urea solution.
- ▶ Close tank cover **5**.

4.30 Radio remote control*

4.30.1 Battery

The operating time of the battery depends on its age and the ambient temperature. Older batteries lose their capacity over time. With temperatures of below 0 °C (32 °F), the battery does not achieve its full capacity.

NOTICE

Incorrect handling of battery!
Damage to battery.

- ▶ Charge battery completely before first use.
 - ▶ Only recharge battery when it is completely discharged.
 - ▶ Protect battery from overheating, dust and moisture.
 - ▶ Only store battery at room temperature (20 °C (68 °F)).
 - ▶ Use supplied protective caps during storage.
 - ▶ After prolonged storage, charge battery before reuse.
-

4.30.2 Battery charger

NOTICE

Incorrect handling of the battery charger!
Risk of damage to battery charger or rechargeable battery.

- ▶ Protect battery charger from overheating, dust and moisture.
- ▶ Do not perform any technical modifications on battery charger or connection cable.

If a defect occurs on the battery charger or the connection cable:

- ▶ discontinue operation of battery charger.
 - ▶ Contact Liebherr customer service.
-

Charging battery with battery charger

NOTICE

Improper charging of battery!
Risk of damage to battery charger or rechargeable battery.

- ▶ Only charge batteries of type FuB 10 AA or FuB 10 XL with the battery charger QA115600.
 - ▶ Only operate the battery charger in explosion-protected areas.
 - ▶ Operate battery charger with permitted mains nominal voltage only (markings on bottom of battery charger).
 - ▶ Only operate battery charger indoors.
 - ▶ Operate battery charger at room temperature (20 °C (68 °F)).
 - ▶ Do not cover battery charger during operation.
-

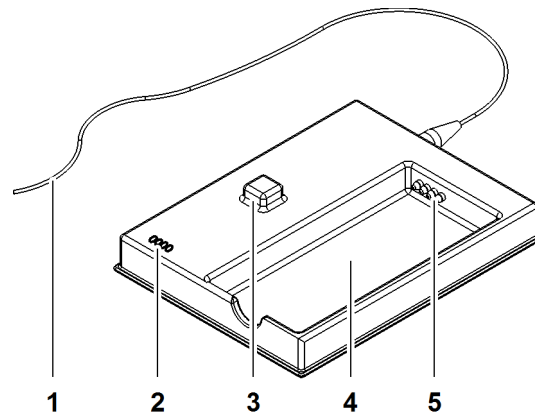


Fig. 2675: Battery charger

- | | | | |
|---|-------------------------|---|---------------------|
| 1 | Connection cable | 4 | Loading compartment |
| 2 | LED (4x) | 5 | Contact pin (4x) |
| 3 | Button <i>Unloading</i> | | |

Observe correct polarity of battery.

- ▶ Insert battery with label on the outside into charging slot 4.
- ▷ Charging process starts automatically.

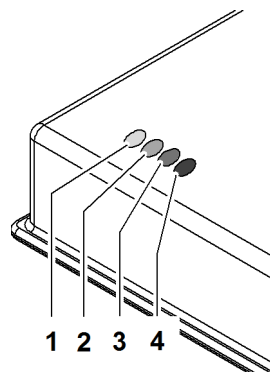


Fig. 2676: LEDs on battery charger

- | | | | |
|---|------|---|------|
| 1 | LED1 | 3 | LED3 |
| 2 | LED2 | 4 | LED4 |

Function of LED1 1:

- lit red
- Battery is defective

Function of LED2 2:

- lit yellow
- Battery is charging

Function of LED3 3:

- lit green
- Battery is charged

Function of LED4 4:

- lit yellow
- Battery is discharging

If the battery is to be discharged:

- ▶ Insert battery.
- ▶ Press the *discharge* button.
- ▷ Battery is completely discharged and automatically charged again.

4.30.3 Starting the machine with the radio remote control



WARNING

Improper operation of radio remote control!
Severe injuries, damage to machine.

- ▶ Ensure that the working range is visible from all sides.
- ▶ Ensure visual contact with the machine and the load at all times.
- ▶ Turn radio remote control off when changing location, during work breaks or at the end of work.
- ▶ Only stow away completely turned off radio remote control.
- ▶ Only remain outside the danger zone.
- ▶ Make sure that the machine operator is familiar with machine operation via radio remote control.



WARNING

Errors or defects while operating the radio remote control!
Inadmissible operational safety and reliability.
Severe injuries, damage to machine.

- ▶ Switch radio remote control off.
- ▶ Secure radio remote control against unauthorized startup.
- ▶ Press the switch *Radio remote control* on control panel X12.
- ▶ Contact Liebherr customer service.



WARNING

Improper procedure with occurring error message!
Severe injuries, damage to machine.

In case of an error message:

- ▶ Adjust the mode with the radio remote control.
- ▶ Remedy error message on the monitor in the cabin.

The use of a radio remote control has the following disadvantages:

- Machine reactions seem delayed.
- The movement direction may be confusing depending on location and viewpoint of the machine.

Preparing the machine with the radio remote control

Make sure the following conditions are met:

- Ignition is switched off.
- Safety lever is lowered.



- ▶ Press the switch *Radio remote control* on control panel X12.
 - ▷ The function of the ignition key on the machine is replicated on the rotary switch *On/Off* of the radio remote control.
 - ▷ Control levers in cabin are disabled.
 - ▷ The monitor in the cabin is activated to display error messages.

Switching on the remote control

Make sure the following conditions are met:

- Battery of the radio remote control is charged and in perfect state.
- Radio remote control battery is inserted in radio remote control.
- Control levers are in zero position.
- ▶ Set the rotary switch *On/Off* on the radio remote control to "On".
 - ▷ Connection established between radio remote control and machine.
 Once the radio connection has been established:
 - ▷ The screen *Confirm connection* appears on the monitor of the radio remote control:



Fig. 2678: Screen Confirm connection

- ▶ Press the button *Horn* on the right control lever of the radio remote control.
 - ▷ Machine functions are controlled with the radio remote control.
 - ▷ The *Operation* screen appears on the monitor of the radio remote control:

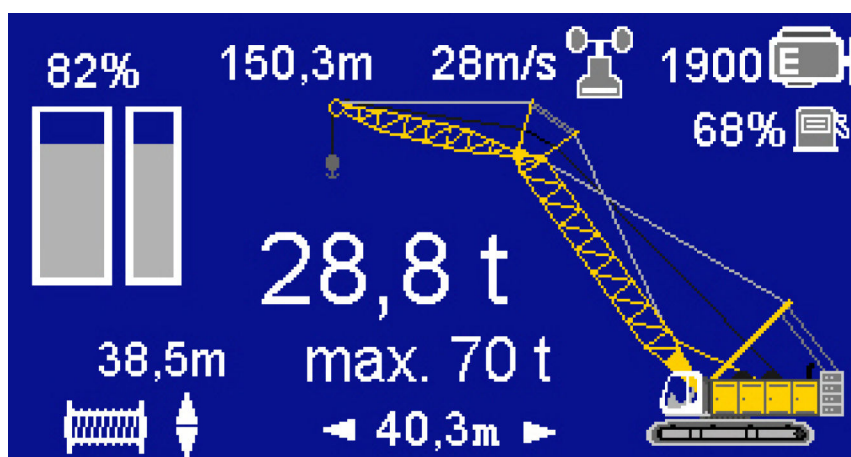


Fig. 2679: Operation screen

- ▷ The symbol *Preheat* is displayed on the monitor of the radio remote control:



Fig. 2680: Preheat symbol

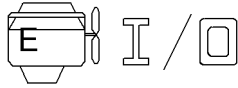
Switching the diesel engine on or off

Make sure the following conditions are met:

Symbol *Preheat* is hidden on the monitor of the radio remote control.

- ▶ Press the button *Diesel engine* on the radio remote control.
 - ▷ Diesel engine is switched on.

- ▶ Press the button *Diesel engine* on the radio remote control again.
 - ▷ Diesel engine is switched off.



Taking/ceding control

Make sure the following conditions are met:

Control levers are in zero position.

Take/cede control to/from radio remote control



- ▶ Press the button *Take/cede control* on the radio remote control.

- ▷ Control of machine functions is suspended.
- ▷ All machine functions are stopped.
- ▷ Symbol *Radio remote control locked* is displayed on the monitor of the radio remote control:



Fig. 2683: Symbol Radio remote control blocked (blinks)

- ▷ Symbol *Radio remote control* inactive* blinks on cabin monitor:



Fig. 2684: Symbol Radio remote control* inactive



- ▶ Press the button *Take/cede control* on the radio remote control again.

- ▷ Control of the machine functions is ceded to the radio remote control.
- ▷ Symbol *Radio remote control locked* is hidden on the monitor of the radio remote control.
- ▷ Symbol *Radio remote control* active* is displayed on the cabin monitor:



Fig. 2686: Symbol Radio remote control* active

Taking/ceding control in cabin



- ▶ Press the button *Take/cede control* on control panel X23.

- ▷ Control of machine functions is suspended.
- ▷ All machine functions are stopped.
- ▷ Symbol *Radio remote control locked* is displayed on the monitor of the radio remote control:



Fig. 2688: Symbol Radio remote control blocked (blinks)

- ▷ Symbol *Radio remote control* inactive* blinks on cabin monitor:



Fig. 2689: Symbol Radio remote control* inactive



- ▶ Press the button *Take/cede control* on control panel X23 again.

- ▷ Control of the machine functions is ceded to the cabin.
- ▷ Symbol *Radio remote control locked* is lit on the monitor of the radio remote control:



Fig. 2691: Symbol Radio remote control blocked (lit)

- ▷ Symbol *Radio remote control* inactive* is lit on cabin monitor:



Fig. 2692: Symbol Radio remote control* inactive

Radio transmission interruptions

Remedying radio transmission interruptions of less than 8 seconds

Machine functions are controlled with the radio remote control.

- ▶ Radio transmission is being interrupted.
 - ▷ Winches, swing gear and crawler are being locked.
 - ▷ Movements are limited via integration time.
 - ▷ Symbol *Radio remote control* connection error* is displayed on the cabin monitor:

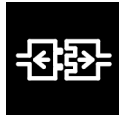


Fig. 2693: Symbol *Radio remote control* connection error*

- ▷ Radio connection is automatically reestablished within 8 seconds.
- ▶ Put control lever to zero position.
 - ▷ Control of machine functions is released.

Remedying radio transmission interruptions longer than 8 seconds

Machine functions are controlled with the radio remote control.

- ▶ Radio transmission is interrupted for more than 8 seconds.
 - ▷ Receiver of radio remote control triggers emergency stop.
 - ▷ Symbol *Radio remote control* connection error* is displayed on the cabin monitor:



Fig. 2694: Symbol *Radio remote control* connection error*

- ▷ Radio connection is reestablished automatically.
 - ▷ The screen *Confirm connection* appears on the monitor of the radio remote control:



Fig. 2695: Screen Confirm connection

- ▶ Press the button *Horn* on the right control lever of the radio remote control.
 - ▷ Machine control is being switched on.
 - ▷ Connection between receiver of radio remote control and machine control is established.
 - ▷ If the connection is successfully established, the *operation* screen appears on the monitor of the radio remote control:

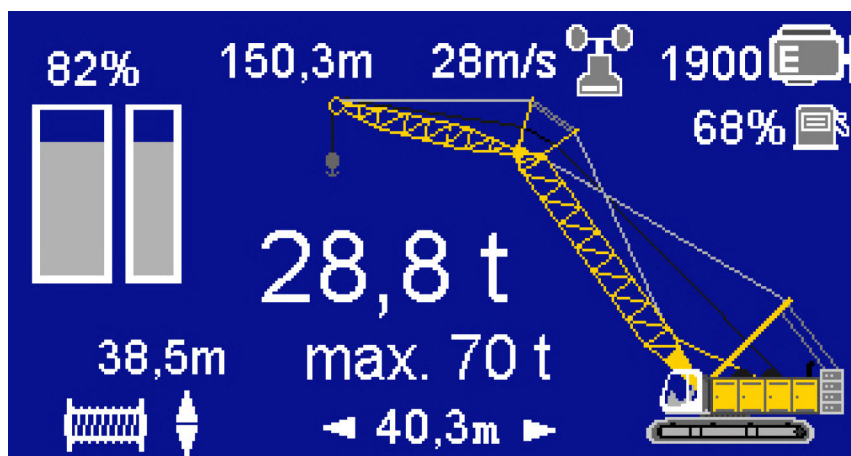


Fig. 2696: Operation screen

4.31 Rope measuring system*

The rope measuring system:

- displays the calculated rope length between the boom head and the load on the *Operation* screen and the *Settings* screen.
- keeps the machine operator constantly informed of the exact position of the load
- is displayed separately for each winch.

4.31.1 Setting the rope length to zero

Setting the rope length of winch1 to zero



- ▶ Press the *Settings* button on the monitor.



- ▶ Press the *Set to zero* button at winch1 for more than 1 second on the monitor.
 - ▷ Rope length of winch1 is set to zero

Setting the rope length of winch2 to zero



- ▶ Press the *Settings* button on the monitor.



- ▶ Press the *Set to zero* button at winch2 for more than 1 second on the monitor.
 - ▷ Rope length of winch2 is set to zero

4.31.2 Calibrating the rope measuring system

Programming layer change

To display the rope length exactly, a layer change must be programmed for the winch concerned.

The layer change:

- is programmed when the machine leaves the factory.
- normally only has to be reprogrammed after a rope change or winch repair.

Ensure that the following conditions are fulfilled:

- An assistant is available.
- Unobstructed eye contact between the assistant and the machine operator.

Programing rope layer change 1-2



- ▶ Press the *Settings* button on the monitor.



- ▶ Operate winch1 or winch2 until the rope moves from the first to the second layer.
- ▶ Stop winch1 or winch2 precisely at the layer change.
- ▶ Press the *Program rope layer change 1-2* button at winch1 or winch2 for more than 1 second on the monitor.
 - ▷ Layer change is programmed.

Programing rope layer change 3-4



- ▶ Press the *Settings* button on the monitor.



- ▶ Operate winch1 or winch2 until the rope moves from the third to the fourth layer.
- ▶ Stop winch1 or winch2 precisely at the layer change.
- ▶ Press the *Program rope layer change 3-4* button at winch1 or winch2 for more than 1 second on the monitor.
 - ▷ Layer change is programmed.

Programing rope layer change 5-6



- ▶ Press the *Settings* button on the monitor.



- ▶ Operate winch1 or winch2 until the rope moves from the fifth to the sixth layer.
- ▶ Stop winch1 or winch2 precisely at the layer change.
- ▶ Press the *Program rope layer change 5-6* button at winch1 or winch2 for more than 1 second on the monitor.
 - ▷ Layer change is programmed.

Setting the rope length to 15 windings

With short ropes with which the second layer cannot be reached, the rope measuring system can be calibrated with 15 windings on the first layer.



- ▶ Press the *Settings* button on the monitor.



- ▶ Operate winch1 or winch2 until there are exactly 15 windings on the first layer.
- ▶ Press the button *Set rope length to 15 windings* on winch1 or winch2 for more than 1 second on the monitor.
 - ▷ Rope measuring system is calibrated.

4.32 Ground pressure display*

4.32.1 Operating the ground pressure display



DANGER

Ground has a limited bearing strength!
Machine toppling over.

- ▶ Observe the safety notes regarding the load-bearing capacity of the ground ([For more information see: 2.11.11 Ground bearing strength, page 619](#)).



DANGER

Idealized, theoretical ground pressure display values.
Machine toppling over.

- ▶ Note that considerably higher ground pressure values can occur in the field.

The ground pressure indicator on the *Operation* screen shows the ground pressure in bar (psi) calculated by the control independent of the position of the uppercarriage.

The displayed values are theoretical maximum values based on current load and radius.

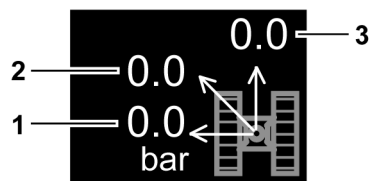


Fig. 2709: Screen clipping Ground pressure

- | | |
|---|---|
| <p>1 Maximum ground pressure to the side</p> <p>2 Maximum ground pressure across one edge</p> | <p>3 Maximum ground pressure forward</p> |
|---|---|
- Maximum ground pressure to the side **1**: Uppercarriage slewed diagonal to direction of travel (90°/270°)
 - Maximum ground pressure across one edge **2**: Uppercarriage slewed across one of the four undercarriage edges (45°/135°/225°/315°)
 - Maximum ground pressure forward **3**: Uppercarriage slewed in or opposite to direction of travel (0°/180°)

4.33 Inclination display*

4.33.1 Operating the inclinometer

The inclination indicator on the screen *Operation* shows the angle of the uppercarriage in the x and y axis in degrees.

Values up to $\pm 5^\circ$ can be displayed.

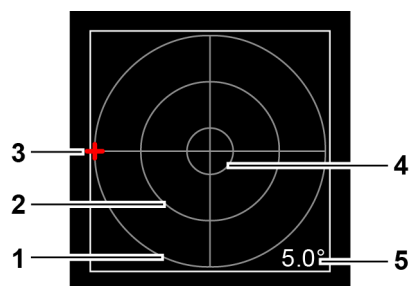


Fig. 2710: Screen clipping Inclination display

- | | | | |
|---|------------------------------|---|------------------------------|
| 1 | Inclination circle 5° | 4 | Inclination circle 1° |
| 2 | Inclination circle 3° | 5 | Inclination angle of machine |
| 3 | Spirit level | | |

4.34 Load recorder*

The load recorder writes and saves all load cycles with a **minimum load of 1 t (2,205 lb) weight** without hook and without sling gear. The uppercarriage must completely travel the range of 5° before and 5° after the trigger point (trigger) with the swing gear. In order to increase the accuracy of the load measurement, hoist movements should be avoided in the area of the trigger point.

A valid load cycle has the following procedure:

- Raise load.
- Move load over trigger point.
- Set down the load.
- Save the load cycle on the memory card*.

4.34.1 Setting trigger points

Make sure the following conditions are met:

- The *Operation* screen is displayed on the monitor.

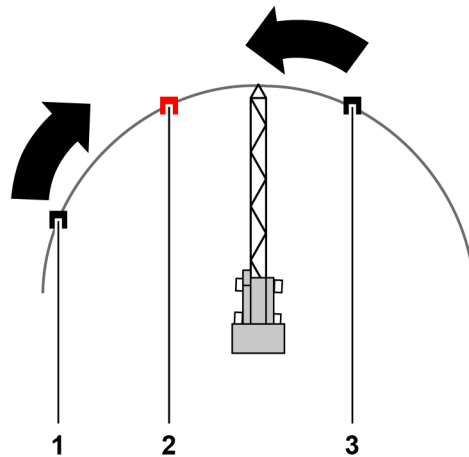


Fig. 2711: Setting trigger points

- | | |
|---|------------------------------------|
| <p>1 Load to be lifted</p> <p>2 Trigger point</p> | <p>3 Load to be lowered</p> |
|---|------------------------------------|

- ▶ Position boom right between the load to be lifted **1** and the position of the load to be lowered **3**.



- ▶ Press the *Trigger point* button on the monitor.
 - ▷ Trigger point **2** is set.
 - ▷ Slewing angle position is displayed.

If the slewing angle of the machine changes:

- ▶ Reset trigger point.

4.34.2 Operating the load recorder

If the recording is not stopped before switching off the machine, recording will resume following a restart. To save a new load cycle, the *Stop* button must be pressed followed by the *Recording* button on the monitor.

The following data is recorded when the load recorder is started:

- Date when started.
- Hour when started.
- Serial number of the device.
- Serial number of the ignition key.
- Assigned text of ignition key - Operator identification.

The following data is recorded on every load cycle:

- Current time.
- Current date.
- Number of current load cycle.
- Load on hook.
- Tared load on hook.
- Sum of load values.
- Rotation speed.

The following data is recorded when the load recorder is stopped:

- Stop time date.
- Stop time hour.
- Sum of the load values of the recorded period.

Recording load cycles

Make sure the following conditions are met:

- Trigger point is set.
- The *Operation* screen is displayed on the monitor.
- ▶ Press the *Record* button on the monitor.
 - ▷ Symbol *Recording activated* appears on monitor:

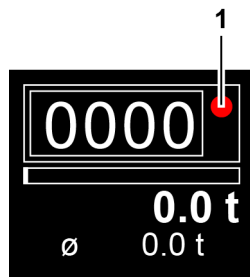


Fig. 2714: Screen section Load recorder

- 1** Recording activated (lit red)
 - ▷ Recording of loading cycles starts.
 - ▷ Data is saved.
 - ▷ The *stop* button appears on monitor:



Fig. 2715: Stop button

Stopping load cycle recording

Make sure the following conditions are met:

- Load recorder records data.
- The *Operation* screen is displayed on the monitor.



▶ Press the *Stop* button on the monitor.

- ▷ Data is saved.
- ▷ Symbol *Recording activated* is hidden on the monitor:

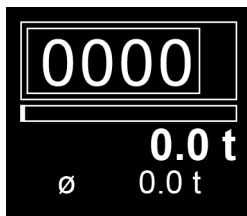


Fig. 2717: Screen section Load recorder

- ▷ A new load cycle can be recorded.

4.35 Working range limitation*



WARNING

Exceeding of working range limitation through dynamic and inertia!
Severe injuries, collision of machine with obstacles.

- ▶ Program working range limitation with safety distance.
- ▶ Approach the working range limitations slowly.



WARNING

Incorrect working range limitations after moving the machine!
Severe injuries, damage to machine.

- ▶ Check working range limitations after each time the machine is moved and reprogram if necessary.

4.35.1 Operating the edge limitation

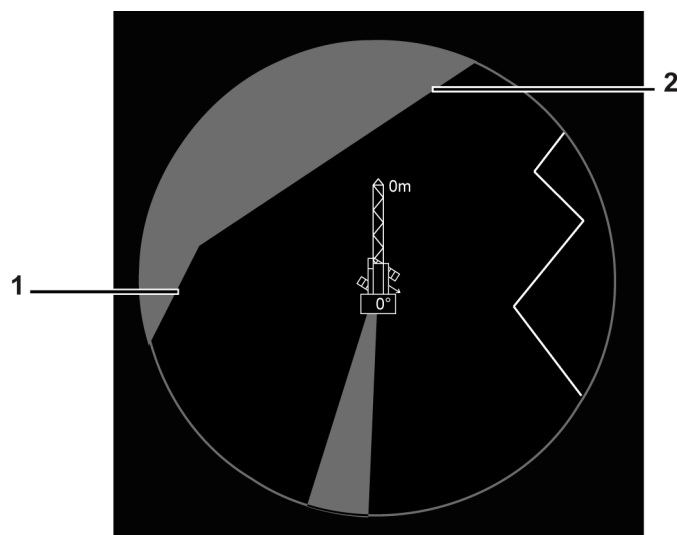


Fig. 2718: Screen section Working range limitation - edge limitation

1 Edge1

2 Edge2

Programming the edge limitation

The procedure for programming the edge limitation is identical for the main boom and the jib.



- ▶ Press the *Working range limitation* button on the monitor.
 - ▷ Screen *Working range limitation - working range limitation* is displayed.



- ▶ Press the *Programming* button on the monitor.
 - ▷ The stop positions buttons appear.

- ▶ Edge1 - approach stop position1.



▶ Press the button *Edge limitation - edge1 - stop position1* on the monitor.

▶ Edge1 - approach stop position2.



▶ Press the button *Edge limitation - edge1 - stop position2* on the monitor.
 ▷ Edge1 is programmed.

▶ Edge2 - approach stop position1.



▶ Press the button *Edge limitation - edge2 - stop position1* on the monitor.

▶ Edge2 - approach stop position2.



▶ Press the button *Edge limitation - edge2 - stop position2* on the monitor.
 ▷ Edge2 is programmed.

Turning the edge limitation on or off



▶ Press the *Edge limitation* button on the monitor.

▷ Edge limitation is activated:

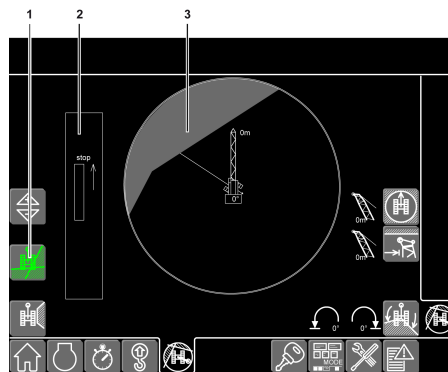


Fig. 2726: Screen Working range limitation - working range limitation - edge limitation activated

1 Button *Edge limitation*

3 Programmed edge limitation

2 Bar display



▶ Press the button *Edge limitation* (lit green) on the monitor.
 ▷ The edge limitation is switched off.

4.35.2 Operating the sector limitation

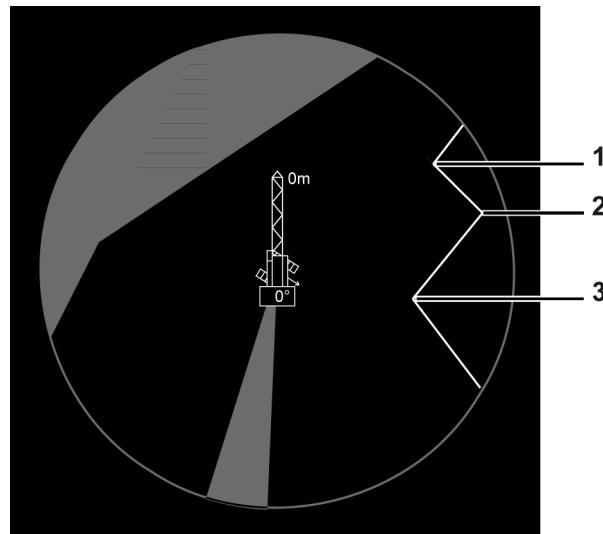


Fig. 2728: Screen section Working range limitation - sector limitation

- | | | | |
|---|----------------|---|----------------|
| 1 | Stop position1 | 3 | Stop position3 |
| 2 | Stop position2 | | |

Programming the sector limitation

The procedure for programming the sector limitation is identical for the main boom and the jib.



- ▶ Press the *Working range limitation* button on the monitor.
 - ▷ Screen *Working range limitation - working range limitation* is displayed.



- ▶ Press the *Programming* button on the monitor.
 - ▷ The stop positions buttons appear.



- ▶ Approach stop position1.
- ▶ Press the button *Sector limitation - stop position1* on the monitor.



- ▶ Approach stop position2.
- ▶ Press the button *Sector limitation - stop position2* on the monitor.



- ▶ Approach stop position3.
- ▶ Press the button *Sector limitation - stop position3* on the monitor.
 - ▷ Sector limitation is programmed.

Turning the sector limitation on or off



▶ Press the *Sector limitation* button on the monitor.

▷ Sector limitation is activated:

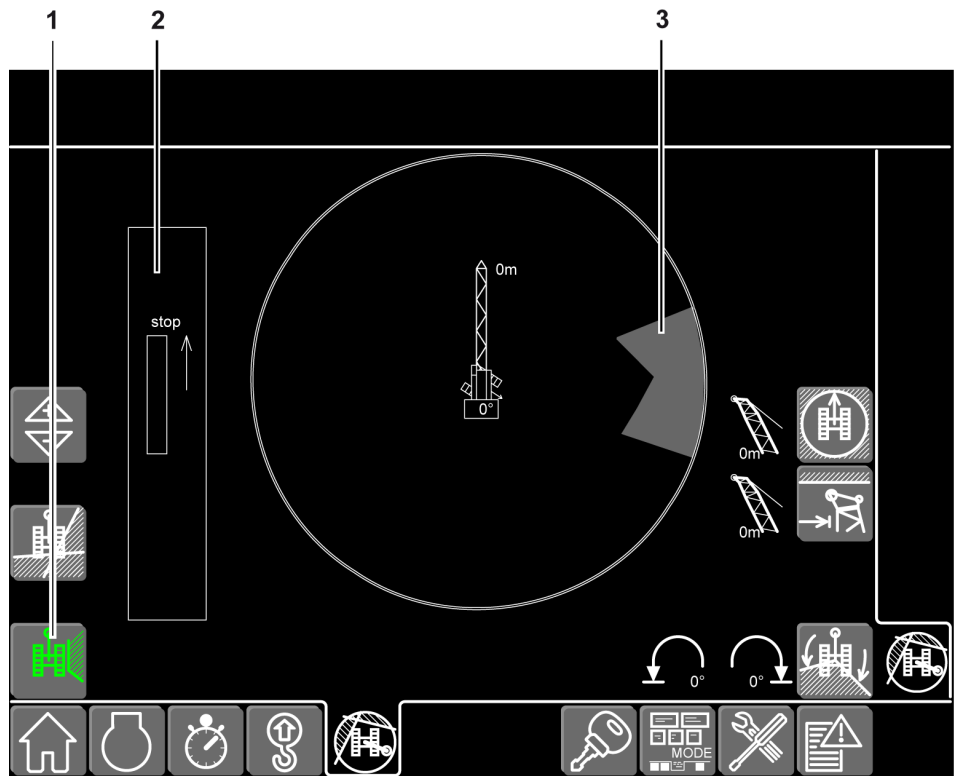
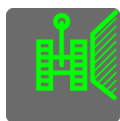


Fig. 2735: Screen Working range limitation - working range limitation - sector limitation activated

- | | | | |
|---|---------------------------------|---|------------------------------|
| 1 | Button <i>Sector limitation</i> | 3 | Programmed sector limitation |
| 2 | Bar display | | |



▶ Press the button *Sector limitation* (lit green) on the monitor.
 ▷ Sector limitation is switched off.

4.35.3 Operating the radius limitation

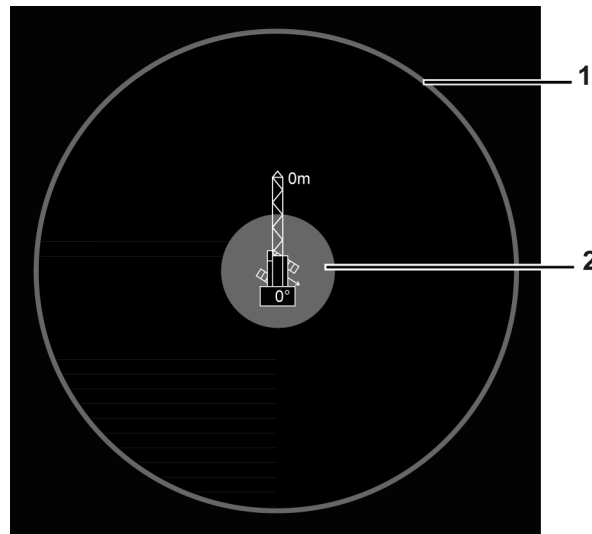


Fig. 2737: Screen section Working range limitation - radius limitation

1 Maximum radius

2 Minimum radius

Programming the main boom radius limitation



- ▶ Press the *Working range limitation* button on the monitor.
 - ▷ Screen *Working range limitation - working range limitation* is displayed.



- ▶ Press the *Programming* button on the monitor.
 - ▷ The stop positions buttons appear.



- ▶ Approach the stop position of the maximum main boom radius.
- ▶ Press the button *Stop position maximum main boom radius* next to the button *Radius limitation maximum main boom radius* on the monitor.
 - ▷ Radius limitation maximum main boom radius is programmed.



- ▶ Approach the stop position of the minimum main boom radius.
- ▶ Press the button *Stop position minimum main boom radius* next to the button *Radius limitation minimum main boom radius* on the monitor.
 - ▷ Radius limitation minimum main boom radius is programmed.

Programming the jib radius limitation



- ▶ Press the *Working range limitation* button on the monitor.
 - ▷ Screen *Working range limitation - working range limitation* is displayed.



- ▶ Press the *Programming* button on the monitor.
 - ▷ The stop positions buttons appear.

- ▶ Approach the stop position of the maximum jib radius.



- ▶ Press the button *Stop position maximum jib radius* next to the button *Radius limitation maximum jib radius* on the monitor.
 - ▷ Radius limitation maximum jib radius is programmed.



- ▶ Approach the stop position of the minimum jib radius.
- ▶ Press the button *Stop position minimum jib radius* next to the button *Radius limitation minimum jib radius* on the monitor.
 - ▷ Radius limitation minimum jib radius is programmed.

Activating/deactivating the radius limitation

Activating/deactivating the minimum radius radius limitation



- ▶ Press the button *Radius limitation minimum radius* for main boom or jib on the monitor.

- ▷ Radius limitation minimum radius is activated for main boom or jib:

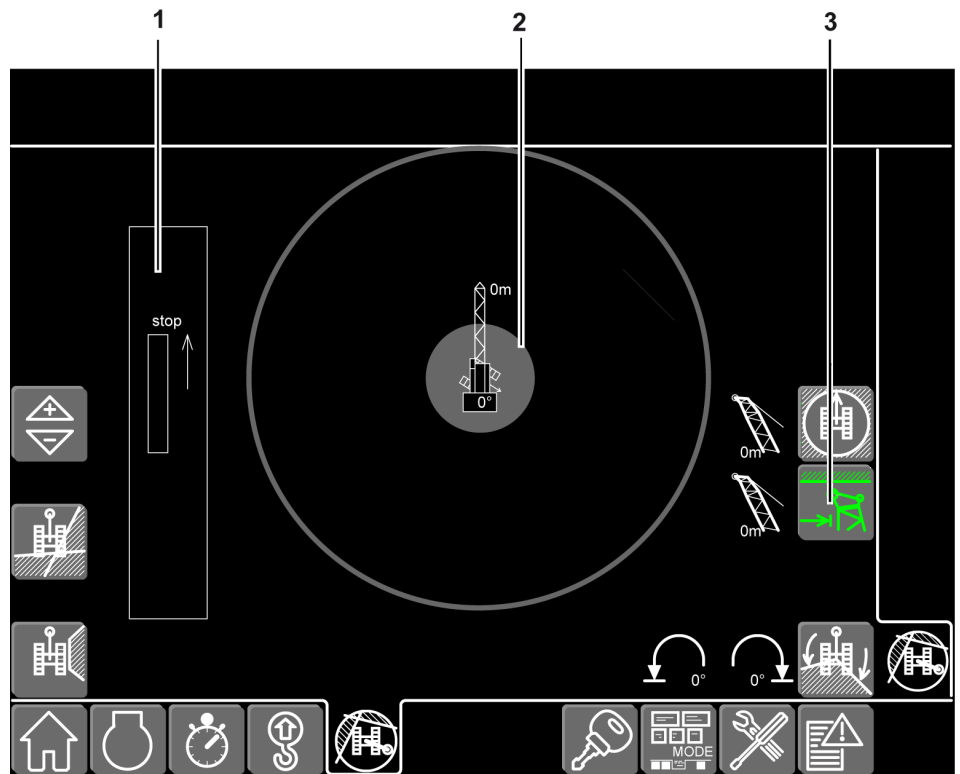


Fig. 2747: Screen Working range limitation - working range limitation - radius limitation minimum radius activated

- | | |
|---|---|
| <p>1 Bar display</p> <p>2 Programmed radius limitation minimum radius</p> | <p>3 Button <i>Radius limitation minimum radius</i></p> |
|---|---|



- ▶ Press the button *Radius limitation minimum radius* (lit green) for main boom or jib on the monitor.
 - ▷ Radius limitation minimum radius is deactivated for main boom or jib.

Activating/deactivating the maximum radius limitation



▶ Press the button *Radius limitation maximum radius* for main boom or jib on the monitor.

▷ Radius limitation maximum radius is activated for main boom or jib:

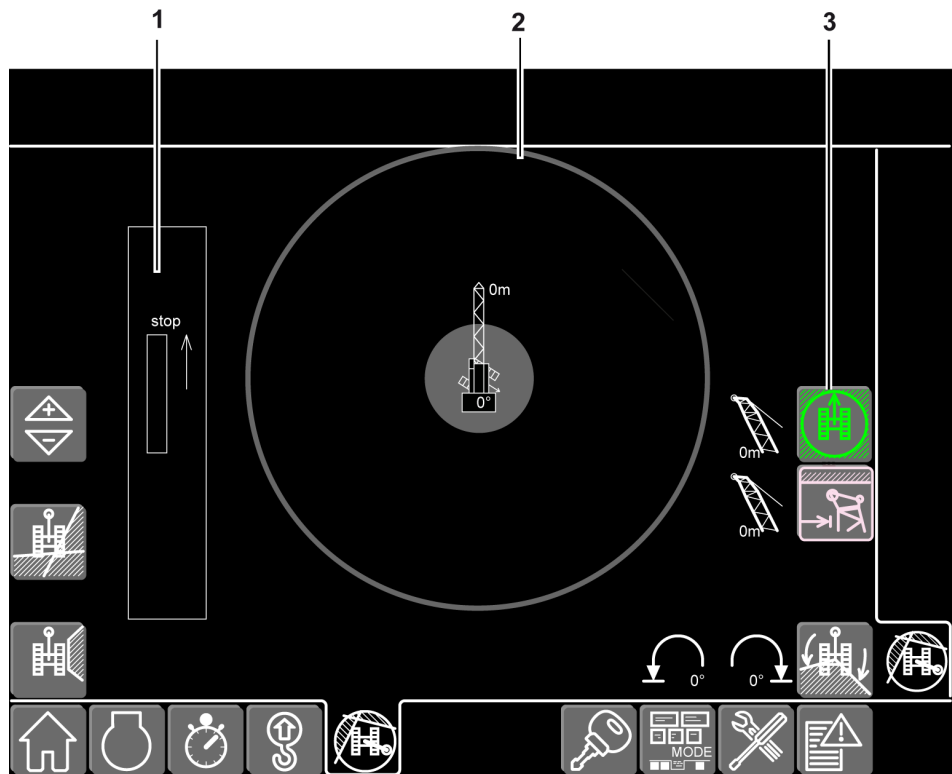
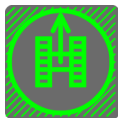


Fig. 2750: Screen Working range limitation - working range limitation - radius limitation maximum radius activated

- | | |
|---|---|
| <p>1 Bar display</p> <p>2 Programmed radius limitation maximum radius</p> | <p>3 Button <i>Radius limitation maximum radius</i></p> |
|---|---|



▶ Press the button *Radius limitation maximum radius* (lit green) for main boom or jib on the monitor.

▷ Radius limitation maximum radius is deactivated for main boom or jib.

4.35.4 Operating the slewing range limitation

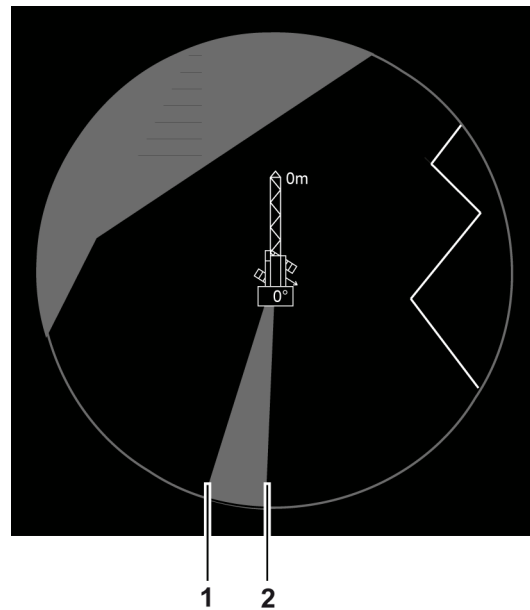


Fig. 2752: Screen section Working range limitation - slewing range limitation

1 Left stop position

2 Right stop position

Programing the slewing range limitation



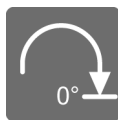
- ▶ Press the button *Working range limitation* on the monitor.
 - ▷ Screen *Working range limitation - working range limitation* is displayed.



- ▶ Press the *Programming* button on the monitor.
 - ▷ The stop positions buttons appear.



- ▶ Approach left stop position.
- ▶ Press the button *Slewing range limitation - left stop position* on the monitor.

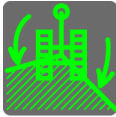


- ▶ Approach right stop position.
- ▶ Press the button *Slewing range limitation - right stop position* on the monitor.
 - ▷ Slewing range limitation is programed.

Activating/deactivating the slewing range limitation



- ▶ Press the *Slewing range limitation* button on the monitor.
 - ▷ Slewing range limitation is activated.



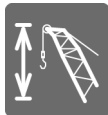
- ▶ Press the button *Slewing range limitation* (lit green) on the monitor.
 - ▷ Slewing range limitation is deactivated.

4.35.5 Operating the lifting height limitation

Programming the lifting height limitation



- ▶ Press the button *Working range limitation* on the monitor.
 - ▷ Screen *Working range limitation - working range limitation* is displayed.



- ▶ Press the button *Working range limitation - lifting height limitation* on the monitor.
 - ▷ Screen *Working range limitation - lifting height limitation* is displayed.

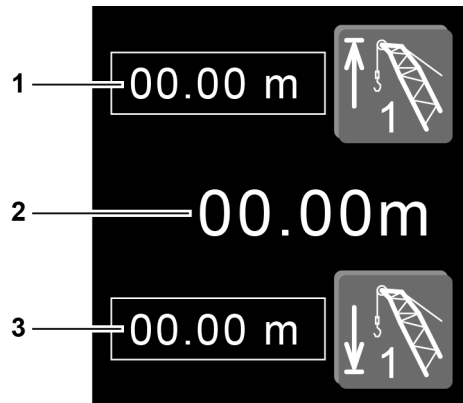


Fig. 2761: Screen section *Lifting height limitation winch1*

- 1** Top stop position of winch1
- 2** Current lifting height of winch1
- 3** Bottom stop position of winch1

- ▶ Click Top stop position **1** of winch1 on the monitor and enter the desired value.
 - or**



Press the button *Lifting height limitation winch1 - top stop position* on the monitor.

- ▷ Current lifting height **2** of winch1 is programmed as top stop position **1** of winch1.

- ▶ Click Bottom stop position **3** of winch1 on the monitor and enter the desired value.
 - or**



Press the button *Lifting height limitation winch1 - bottom stop position* on the monitor.

- ▷ Current lifting height **2** of winch1 is programmed as bottom stop position **3** of winch1.

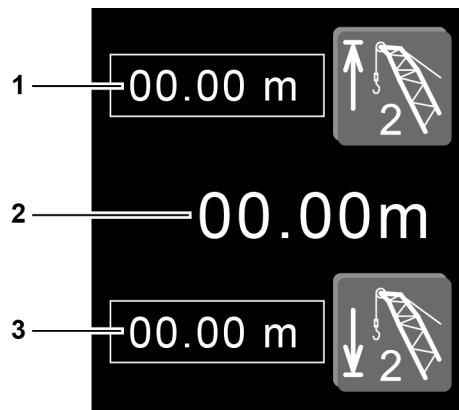


Fig. 2764: Screen section Lifting height limitation winch2

- 1** Top stop position of winch2 **3** Bottom stop position of winch2
2 Current lifting height of winch2

- ▶ Click Top stop position **1** of winch2 on the monitor and enter the desired value.
or



Press the button *Lifting height limitation winch2 - top stop position* on the monitor.

- ▷ Current lifting height **2** of winch2 is programmed as top stop position **1** of winch2.

- ▶ Click Bottom stop position **3** of winch2 on the monitor and enter the desired value.
or



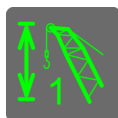
Press the button *Lifting height limitation winch2 - bottom stop position* on the monitor.

- ▷ Current lifting height **2** of winch2 is programmed as bottom stop position **3** of winch2.

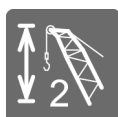
Activating/deactivating the lifting height limitation



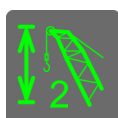
- ▶ Press the button *Lifting height limitation winch1* on the monitor.
▷ Lifting height limitation of winch1 is activated.



- ▶ Press the button *Lifting height limitation winch1* (lit green) on the monitor.
▷ Lifting height limitation of winch1 is deactivated.



- ▶ Press the button *Lifting height limitation winch2* on the monitor.
▷ Lifting height limitation of winch2 is activated.



- ▶ Press the button *Lifting height limitation winch2* (lit green) on the monitor.
▷ Lifting height limitation of winch2 is deactivated.

4.35.6 Cancelling the stop after crawler operation

Movements of the swing and the booms are stopped after operating the crawler.



- ▶ Press the button *Working range limitation* on the monitor (blinks yellow).
 - ▷ Screen *Working range limitation - working range limitation* is displayed.



- ▶ Press the button *Program* (lit red) on the monitor.
 - ▷ The stop positions buttons appear.



If the stop positions are still valid despite moving the machine:

- ▶ Press the button *Program* (lit red) on the monitor again.
 - ▷ The button *Programming* is lit green.
 - ▷ Working range limitations are confirmed.
 - ▷ Movements of the swing and the booms are cleared.

If the stop positions are no longer valid because of moving the machine:

- ▶ Reprogram the working range limitations.

4.35.7 Resetting limitations



- ▶ Press the button *Working range limitation* on the monitor.
 - ▷ Screen *Working range limitation - working range limitation* is displayed.



- ▶ Press the *Programming* button on the monitor.
 - ▷ The stop positions buttons appear.



- ▶ Press the *Reset limitations* button on the monitor for more than 1 second.
 - ▷ All limitations are reset.

4.36 Assistance system horizontal load path*

The assistance system horizontal load path makes it possible to keep the lifting height of the load constant when the radius is changed. The assistance system horizontal load path functions when adjusting the main boom, adjusting the job and when simultaneously adjusting both booms.

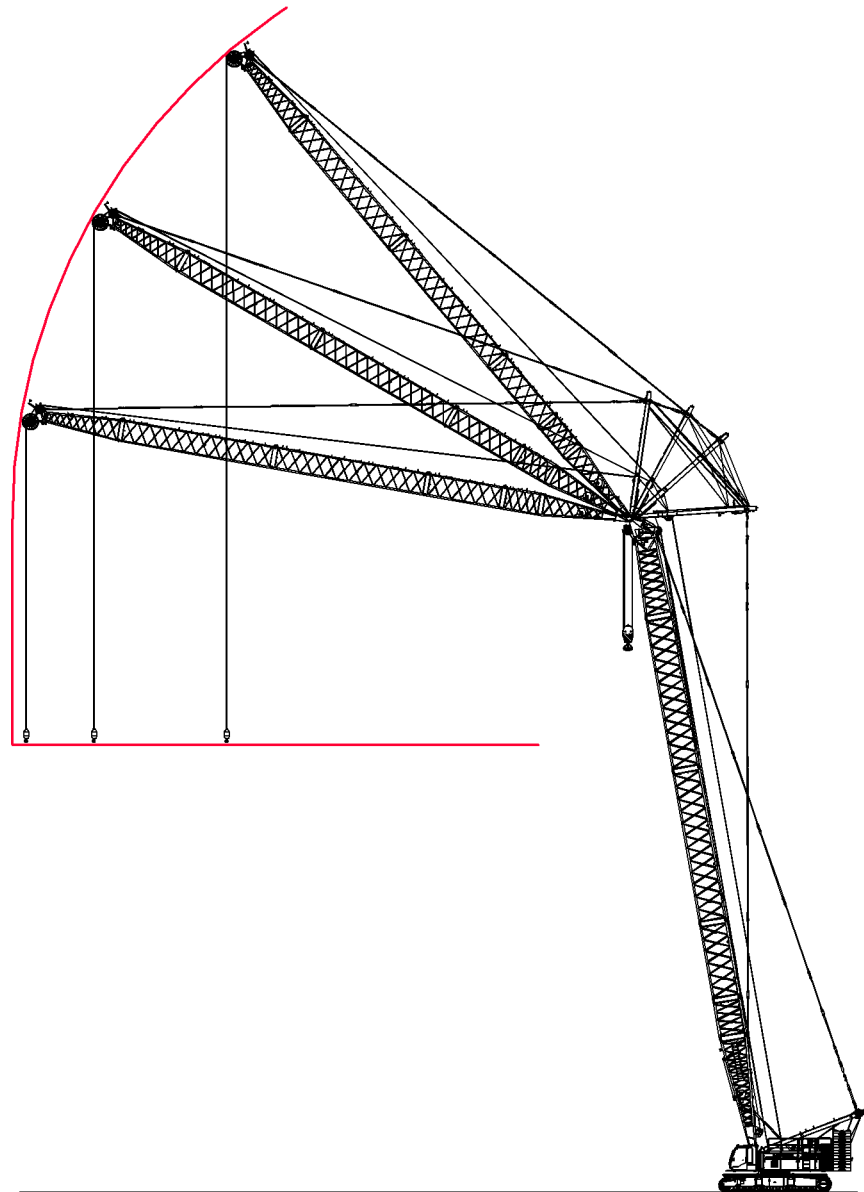


Fig. 2777: Assistance system horizontal load path (illustration of principle)

4.36.1 Activating horizontal load path

Activating horizontal load path for winch1

Make sure the following prerequisites are met:

- Winch1 stands still.
- Control lever is in zero position.



- ▶ Press the button *Horizontal load path/Vertical line finder winch1* on control panel X23.
 - ▷ Horizontal load path for winch1 is activated.

Activating horizontal load path for winch2

Make sure the following prerequisites are met:

- Winch2 stands still.
- Control lever is in zero position.



- ▶ Press the button *Horizontal load path/Vertical line finder winch2* on control panel X23.
 - ▷ Horizontal load path for winch2 is activated.

4.36.2 Activating horizontal load path

Make sure the following prerequisites are met:

- Horizontal load path for winch1 or winch2 is activated.
- Control lever is in zero position.



Procedure on a machine with two multi-directional control levers

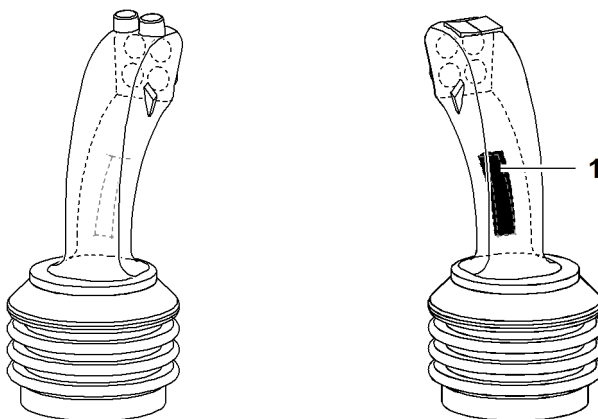


Fig. 2781: Activating horizontal load path with multi-directional control lever

1 Button *Horizontal load path*

- ▶ Press and hold the *Horizontal load path 1* button on the right multi-directional control lever.
- ▶ Adjust main boom (For more information see: [4.20.1 Operating the main boom, page 972](#)) or jib (For more information see: [4.21.2 Operating the jib, page 978](#)) .
 - ▷ Lifting height of load is kept constant.
 If horizontal load path is activated for winch1:
 - ▷ The symbol *Horizontal load path winch1* is displayed on the monitor:

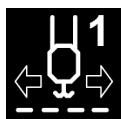


Fig. 2782: Symbol *Horizontal load path winch1*

If horizontal load path is activated for winch2:

▷ The symbol *Horizontal load path winch2* is displayed on the monitor:

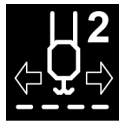
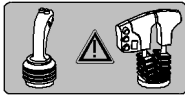


Fig. 2783: Symbol Horizontal load path winch2

- ▶ Release the *Horizontal load path* button on the right multi-directional control lever.



Procedure on a machine with a multi-directional control lever and a double T-lever

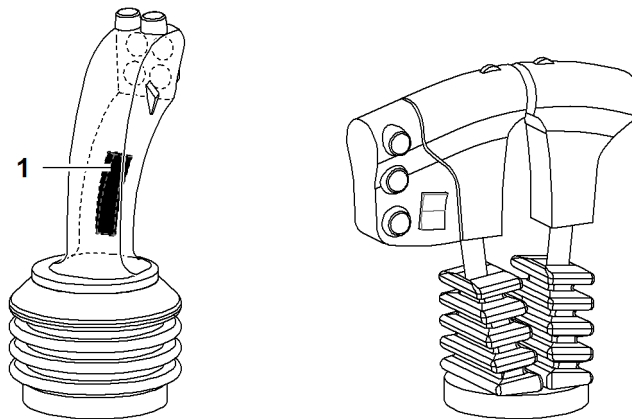


Fig. 2785: Activating horizontal load path with double-T lever

1 Button Horizontal load path

- ▶ Press and hold the *Horizontal load path 1* button on the left multi-directional control lever.
- ▶ Adjust main boom (For more information see: [4.20.1 Operating the main boom, page 972](#)) or jib (For more information see: [4.21.2 Operating the jib, page 978](#)) .
 - ▷ Lifting height of load is kept constant.

If horizontal load path is activated for winch1:

▷ The symbol *Horizontal load path winch1* is displayed on the monitor:

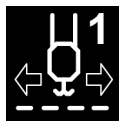


Fig. 2786: Symbol Horizontal load path winch1

If horizontal load path is activated for winch2:

▷ The symbol *Horizontal load path winch2* is displayed on the monitor:



Fig. 2787: Symbol Horizontal load path winch2

- ▶ Release the *Horizontal load path* button on the left multi-directional control lever.

4.36.3 Deactivating horizontal load path

Deactivating horizontal load path for winch1

Make sure the following prerequisites are met:

- Winch1 stands still.
- Control lever is in zero position.



- ▶ Press the button *Horizontal load path/Vertical line finder winch1* on control panel X23 again.
 - ▷ Horizontal load path for winch1 is deactivated.

Deactivating horizontal load path for winch2

Make sure the following prerequisites are met:

- Winch2 stands still.
- Control lever is in zero position.



- ▶ Press the button *Horizontal load path/Vertical line finder winch2* on control panel X23 again.
 - ▷ Horizontal load path for winch2 is deactivated.

4.37 Assistance system Vertical Line Finder*

The angle of rope departure on the boom head is determined with the Vertical Line Finder assistance system. The determined angle of rope departure is displayed on the monitor. This way, the machine operator can detect and avoid a diagonal pull.

The boom head can be positioned above the load's center of gravity during lifting the load with the Vertical Line Finder assistance system.

4.37.1 Setting offsets of the Vertical Line Finder to zero

Make sure the following conditions are met:

- Load is lifted and does not swing.
- Minimum weight of load is 2 t (4,409 lb) x number of reevings.

The offset of the Vertical Line Finder must be reset to zero at each change of reeving or change of the boom configuration.



- ▶ Press the button *Settings* on the monitor.
 - ▷ The *Settings* screen appears on the monitor.



- ▶ Press the button *Set offset of Vertical Line Finder to zero* on the monitor for more than 1 second.
 - ▷ Offset of the Vertical Line Finder is set to zero.

4.37.2 Activating the positioning of boom head above load's center of gravity



- ▶ Press the button *Settings* on the monitor.
 - ▷ The *Settings* screen appears on the monitor.



- ▶ Press button *Vertical Line Finder* for more than 1 second on the monitor.
 - ▷ Positioning boom head above the load's center of gravity is activated.

4.37.3 Positioning boom head above load's center of gravity

Make sure the following conditions are met:

- Load is on the ground.
- Load is rigged to hook.
- Vertical Line Finder is mounted on boom head with the rigged load.
- Machine operates in single-hook mode.
- Machine is assembled without derrick equipment*.

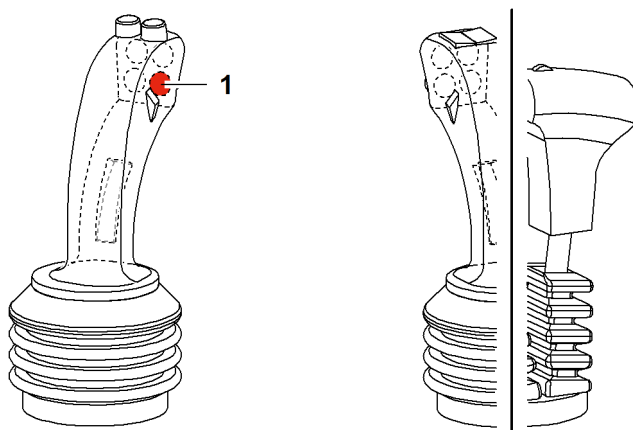


Fig. 2794: Positioning boom head above load's center of gravity

1 Button Vertical Line Finder



If load is rigged on winch1:

- ▶ Press button *Horizontal load path/Vertical Line Finder winch1* on control panel X23.
- ▶ Lift load on winch1 and simultaneously press and hold button *Vertical Line Finder 1* on left multi-directional control lever.



If load is rigged on winch2:

- ▶ Press button *Horizontal load path/Vertical Line Finder winch2* on control panel X23.
- ▶ Lift load on winch2 and simultaneously press and hold button *Vertical Line Finder 1* on left multi-directional control lever.
 - ▷ Machine adjusts boom and turns uppercarriage until boom head is above the load's center of gravity.
 - ▷ Screen section *Vertical Line Finder* on the *Operation* screen on the monitor is displayed in green:

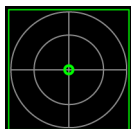


Fig. 2797: Screen section Vertical Line Finder

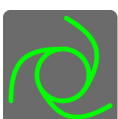
When load is lifted off the ground:

- ▶ Let go of button *Vertical Line Finder 1* on left multi-directional control lever.

4.37.4 Deactivating positioning of boom head above load's center of gravity



- ▶ Press the button *Settings* on the monitor.
 - ▷ The *Settings* screen appears on the monitor.



- ▶ Press button *Vertical Line Finder* (lit green) for more than 1 second on the monitor.
 - ▷ Positioning boom head above the load's center of gravity is switched off.

4.38 Rope reeving winch



WARNING

Improper use of rope reeving winch!
Severe injuries, damage to machine.

- ▶ Only use rope reeving winch to reeve ropes.
- ▶ Do not install any swivels in the reeving winch rope.

4.38.1 Setting the rope reeving winch to free-wheel

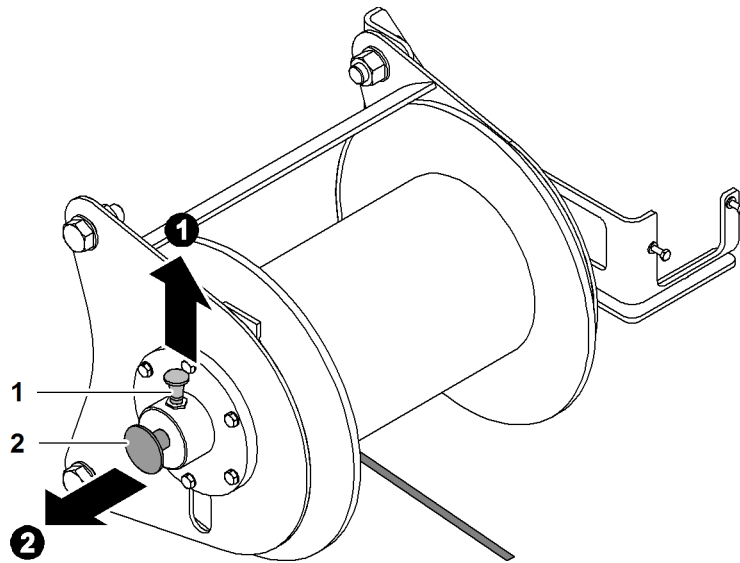


Fig. 2800: Setting the rope reeving winch to free-wheel

1 Securing element

2 Axis



Note

Liebherr recommends:

- ▶ To facilitate extension of the axis 2: Move rope reeving winch forward and backward by hand.
- ▶ Pull up securing element 1 and pull out axis 2 at the same time.
 - ▷ Rope reeving winch is set to free-fall.

4.38.2 Deactivating rope reeving winch free-fall

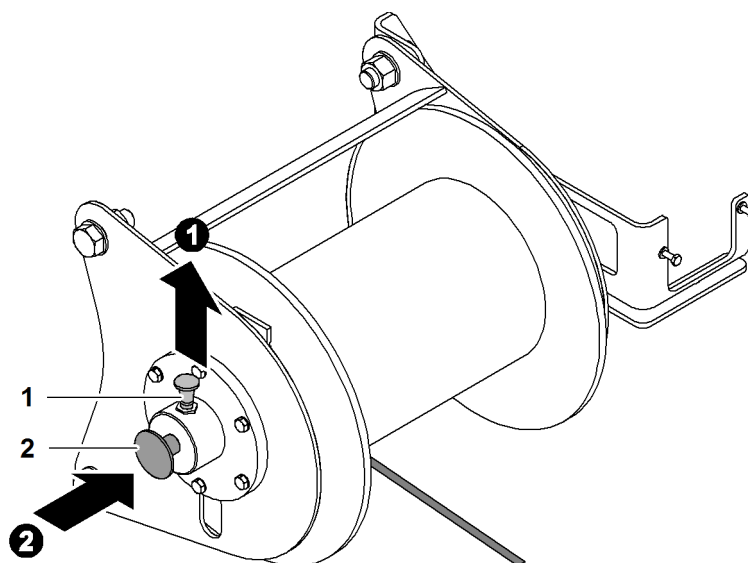


Fig. 2801: Deactivating rope reeving winch free-fall

1 Securing element

2 Axis



Note

Liebherr recommends:

- ▶ To facilitate pushing in the axis 2: Move rope reeving winch forward and backward by hand.
- ▶ Pull up securing element 1 and push in axis 2 at the same time.
 - ▷ Rope reeving winch free-wheel is deactivated.

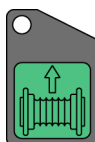
4.38.3 Reeving the rope of the rope reeving winch



WARNING

Do not stand in close proximity to the rope reeving winch and the rope of the rope reeving winch!
Severe injury.

- ▶ Make sure that nobody is located in the danger zone.
- ▶ Leave danger zone.



- ▶ Press and hold the *Rope reeving winch* button on control panel X11.
 - ▷ Rope of rope reeving winch is reeved.
- ▶ Press the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch is deactivated.

4.39 Tagline winch*



WARNING

Use of the tagline winch requires a special mode of operation!
Severe injuries, damage to machine.

- ▶ For more information regarding special modes of operation: Contact Liebherr after sales service.



WARNING

The tagline winch must not be used as an auxiliary winch!
The tagline winch fixed-caliber disc brake is released in case of an emergency stop or after switching off the diesel engine.
Severe injuries, damage to machine.

- ▶ Only use the tagline winch for its intended purpose.



WARNING

Inadmissible pulling up of safety lever with activated tagline winch!
Tagline winch is not addressed and automatically switches to free-wheel.
Severe injuries, damage to machine.

- ▶ Only work with tagline winch when safety lever is lowered.

4.39.1 Putting the tagline winch into operation

- ▶ Unwind tagline rope manually from the tagline winch.

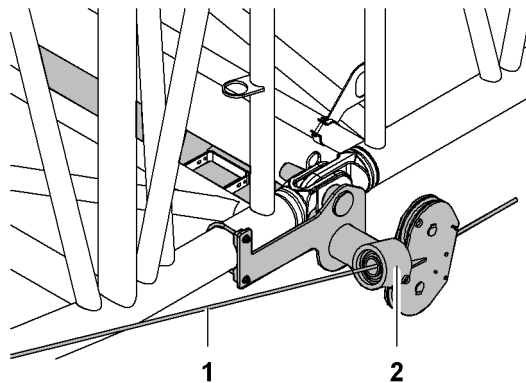


Fig. 2803: Feed tagline through rope bracket

1 Tagline winch rope 2 Rope bracket

- ▶ Feed tagline winch rope 1 through rope bracket 2.

NOTICE

Incorrect use of the machine with tagline winch switched off and tagline winch rope 1 attached to the rigging material!
Damage to the tagline winch.

When the tagline winch rope 1 is attached to the rigging material:

- ▶ Only operate machine with tagline winch switched on.

- ▶ Attach tagline winch rope **1** properly to rigging material.
- ▶ Check the oil level of the tagline winch

4.39.2 Turn the tagline winch on or off

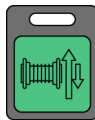
Immediately after the tagline winch is switched on, the tagline is wound up and tensioned with the preset constant tension ([For more information see: 4.39.3 Set the constant tension of the tagline winch, page 1052](#)).



CAUTION

The rigging material may suddenly swing out when the tagline winch is switched on!

- ▶ As the tagline winch is switched on and while it is being used, ensure that no one is near the rigging material or between the tagline winch and the rigging material.
- ▶ Watch the reaction of the rigging material when the tagline winch is switched on.



- ▶ Press the *Tagline* button on control panel X23.
 - ▷ The tagline winch is switched on.
- ▶ Press the *Tagline* button on control panel X23 again.
 - ▷ The tagline winch is switched off.

4.39.3 Set the constant tension of the tagline winch

The constant tension is at least 2 kN (450 lb_f) and no more than 50% of the maximum pull force.

Increasing the constant pull of the tagline winch

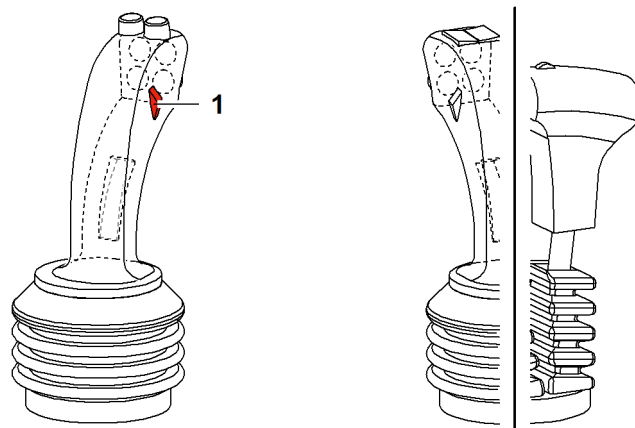


Fig. 2805: Increasing the constant pull of the tagline winch

- 1 Rotary control knob *Constant pull tagline winch*
- ▶ Turn up rotary control knob *Constant pull tagline winch 1* on left multi-directional control lever.
 - ▷ The constant tension of the tagline winch increases to a maximum of 50% of the maximum pull force.

Reducing the constant pull of the tagline winch

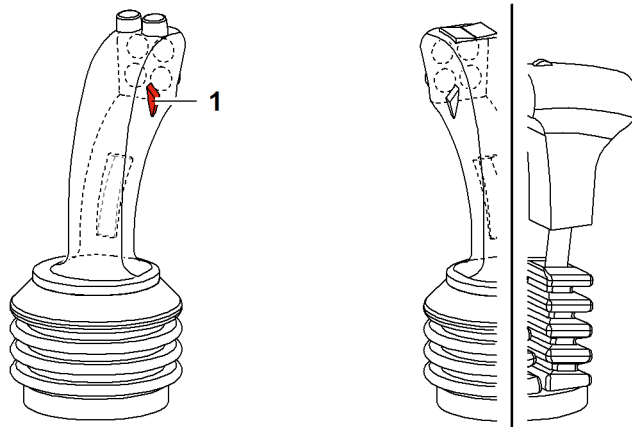


Fig. 2806: Reducing the constant pull of the tagline winch

1 Rotary control knob *Constant pull tagline winch*

- ▶ Turn down rotary control knob *Constant pull tagline winch 1* on left multi-directional control lever.
 - ▷ The constant pull of the tagline winch reduces to a minimum of the minimum pull force.

4.39.4 Setting the pull force of the tagline winch

The *tagline winch* foot pedal is used to adjust the pull force of the tagline winch between the preset constant pull and the maximum pull force.

Increasing the pull force of the tagline winch

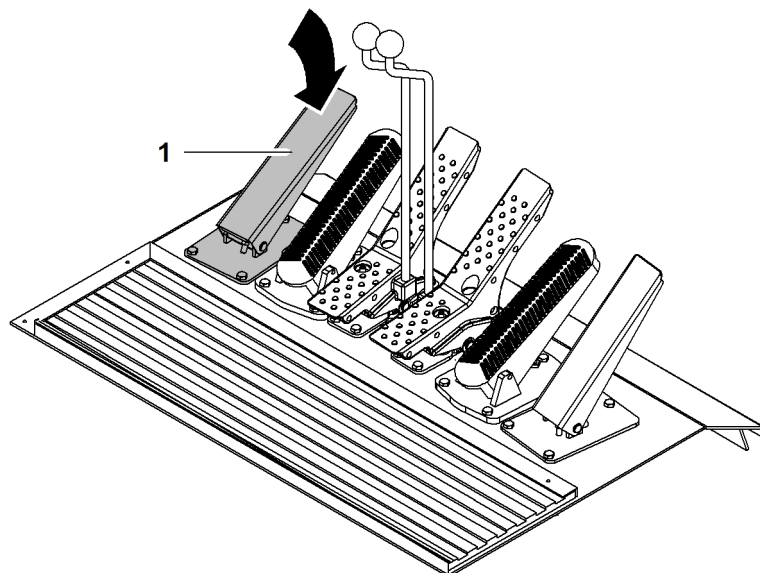


Fig. 2807: Increasing the pull force of the tagline winch

1 Foot pedal for *tagline winch*

- ▶ Press the foot pedal of the *tagline winch 1* forwards.
 - ▷ Pull force of tagline winch is increased.

Decreasing the pull force of the tagline winch

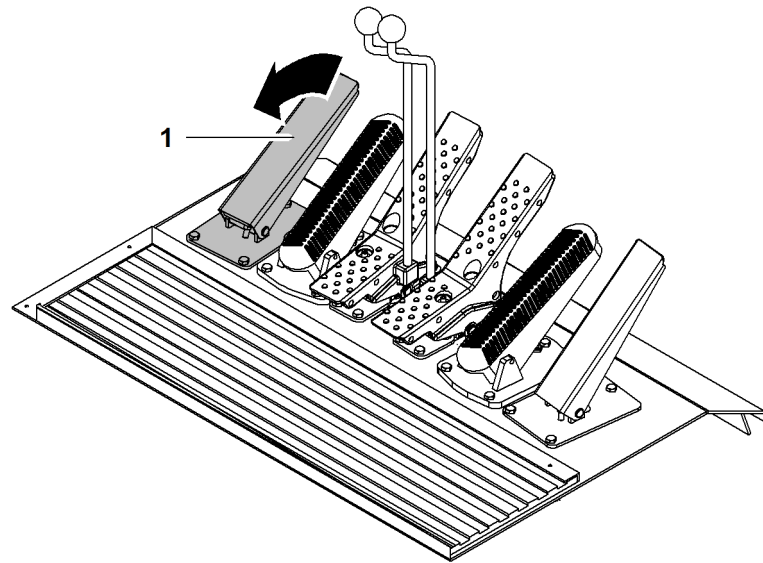


Fig. 2808: Decreasing the pull force of the tagline winch

1 Foot pedal for *tagline winch*

- ▶ Let the foot pedal of the *tagline winch* 1 move backwards.
 - ▷ Pull force of tagline winch is reduced.

4.39.5 Select maximum pull force of the tagline winch

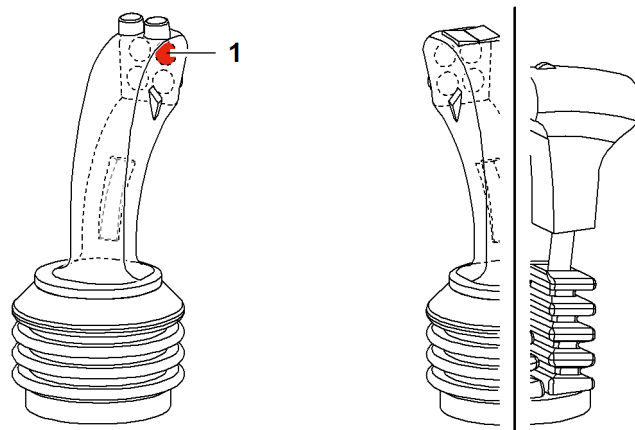


Fig. 2809: Select maximum pull force of the tagline winch

1 Button *Maximum pull force tagline winch*

- ▶ Press and hold the button *Maximum pull force tagline winch* 1 on the left multi-directional control lever.
 - ▷ Tagline winch winds up the tagline with maximum pull force.
- ▶ Release button *Maximum pull force tagline winch* 1.
 - ▷ Tagline winch winds up the tagline with set constant pull.

4.39.6 Turning tagline winch free-wheel on or off

The free-wheel unwinds the tagline from the tagline winch without braking.

Free-wheel serves for fast release or slewing off of the rigging material.

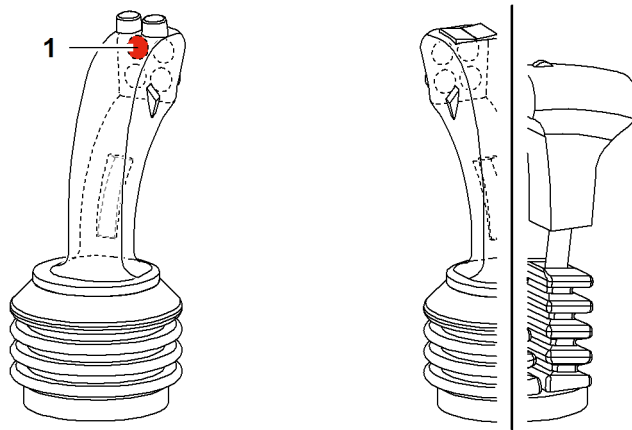


Fig. 2810: Turning tagline winch free-wheel on or off

1 Button *Tagline winch free-wheel*

- ▶ Press and hold the button *Tagline winch free-wheel* **1** on the left multi-directional control lever.
 - ▷ Tagline winch is freewheeling.

NOTICE

Freewheeling must not be switched off when the tagline winch is rotating!
Damage to the tagline winch.

- ▶ Do not switch freewheeling off until the tagline winch has stopped moving.
-
- ▶ Let go of the button *Tagline winch free-wheel* **1**.
 - ▷ Tagline winch winds up the tagline with constant pull.

4.40 Luffing jib luffing winch as auxiliary winch*



DANGER

Inadmissible rope on luffing jib luffing winch!
Load breakaway.

- ▶ Make sure that the correct rope for the respective application of the luffing jib luffing winch is used.



Note

Liebherr recommends:

- ▶ Only use original Liebherr ropes.

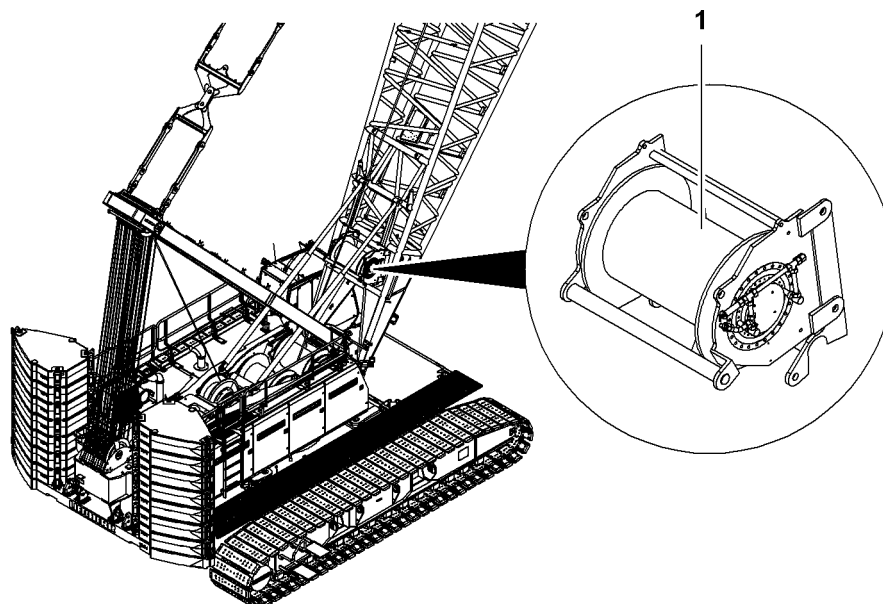


Fig. 2811: Luffing jib luffing winch as auxiliary winch

1 Jib luffing winch

4.40.1 Use as jib luffing winch

Ensure that the following conditions are satisfied:

- Boom configuration 4 "Main boom with luffing jib" is selected.
- Rope on jib luffing winch is not **rotation-resistant**.
- Rope on jib luffing winch complies with break force.
- Rope on jib luffing winch has the required rope safety.
- Rope on jib luffing winch complies with standard **ISO 4308** or **ANSI B30.5**.
- Rope on jib luffing winch has a diameter of 20 mm (0.79" in).
- Rope fixing point is located on A-frame².

4.40.2 Use as leader height adjusting winch



WARNING

Use of the jib luffing winch as leader height adjusting winch constitutes a special operating mode!

Severe injuries, damage to machine.

- ▶ For more information regarding special modes: Contact Liebherr customer service.

Make sure the following prerequisites are met:

- Boom configuration 1 "Main boom" is selected.
- Control panel X25 for leader* is plugged in.
- Rope on jib luffing winch is not **rotation-resistant**.
- Rope on jib luffing winch complies with break force.
- Rope on jib luffing winch has the required degree of rope safety.
- Rope on jib luffing winch complies with standard **ISO 4308** or **ANSI B30.5**.
- Rope on jib luffing winch has a diameter of 20 mm (0.79" in).
- Rope fixing point is located on the leader.
- No swivel is attached to rope fixing point.

- ▶ Use jib luffing winch as leader height adjusting winch.

4.40.3 Use as auxiliary winch



DANGER

Improper use!

Damage to machine.

- ▶ Observe proper use.

Ensure that the following conditions are satisfied:

- A boom configuration **except for** boom configuration 4 "Luffing jib" is selected.
- Control panel X25 for leader* is unplugged.
- Retrofitting kit "Third hoist limit switch" is mounted to boom head.
- 3 rope windings limit switch is mounted to jib luffing winch.
- Rope on jib luffing winch is **rotation-resistant**.
- Rope on jib luffing winch complies with break force.
- Rope on jib luffing winch has the required rope safety.
- Rope on jib luffing winch complies with standard **ISO 4308** or **ANSI B30.5**.
- Rope on jib luffing winch has a diameter of 20 mm (0.79" in).

The retrofit kit "jib luffing winch as auxiliary winch" consists of:

- 3-rope windings limit switch
- Hydraulic pressure limiter
- Pocket lock (with rope fixing point)
- Cross strap

The retrofitting kit "Third hoist limit switch" is required to operate the jib luffing winch as an auxiliary winch.

- ▶ Use jib luffing winch as auxiliary winch.

4.41 Diesel engine automatic stop system*

The diesel engine automatic stop system works automatically to reduce the fuel consumption during idle phases.

The diesel engine is shut off automatically when the safety lever is pulled up and the stop time has run down.

The LED in the button *Diesel engine automatic stop system* displays the status of the diesel engine automatic stop system.

LED status	Description
Lit	Diesel engine automatic stop system is activated and there is nothing preventing the shut-off of the diesel engine.
Blinks regularly	Diesel engine automatic stop system is active and the diesel engine was switched off by the diesel engine automatic stop system.
Blinks irregularly	Diesel engine automatic stop system is activated and there is something preventing the shut-off of the diesel engine.
Not lit	Diesel engine automatic stop system is deactivated.

Tab. 390: Diesel engine automatic stop system

4.41.1 Switching the diesel engine automatic stop system on or off

The diesel engine automatic stop system is automatically active as soon as the ignition is switched on.



- ▶ Press the *Diesel engine automatic stop system* button on control panel X23.
 - ▷ Diesel engine automatic stop system is switched off.



- ▶ Press the *Diesel engine automatic stop system* button on control panel X23 again.
 - ▷ Diesel engine automatic stop system is activated.

4.42 ECO mode*

4.42.1 ECO mode operation

Make sure the following conditions are met:

- ❑ The *Power unit* screen is displayed on the monitor.



- ▶ Press the *ECO mode* button in the *Power unit* screen on the monitor.

- ▷ The *ECO mode* button changes its color:



Fig. 2815: *ECO mode* button (lit blue)

- ▷ The *Restart machine* symbol is displayed in the *Power unit* screen on the monitor:



Fig. 2816: *Symbol Restart machine* (lit blue)

- ▷ The *Restart machine* symbol is displayed in the *Operation* screen on the monitor:



Fig. 2817: *Symbol Restart machine* (lit blue)

- ▶ Restart the machine.

- ▷ The *ECO mode* button in the *Power unit* screen changes its color:



Fig. 2818: *ECO mode* button (lit green)

- ▷ The *ECO mode activated* symbol is displayed in the *Operation* screen on the monitor:



Fig. 2819: *Symbol ECO mode activated*

- ▷ ECO mode is activated.

4.43 Sensitive hoisting*

The "Sensitive hoisting" function allows loads to be gently hoisted.

The function applies the following safety limitations to the crane operation:

- Winch 1 and Winch 2 are limited to a maximum speed of 30 m/min (98' 5" ft-in/min).
- The load chart values are reduced by 50%.

The load chart that is called up on-screen is not changed and displays the standard lifting capacities.

4.43.1 Turning the function sensitive lift on or off

Ensure that the following conditions are fulfilled:

- The gate valve *Free-fall mode* is located in the "OFF" position.



- ▶ Press the button *Sensitive lift* on control panel X23.

- ▷ Sensitive lift is activated.
- ▷ The symbol *Sensitive lift* appears on screen:



Fig. 2821: Symbol Sensitive lift

- ▶ Press the button *Sensitive lift* on control panel X23 again.
 - ▷ Sensitive lift is deactivated.
 - ▷ The symbol *Sensitive lift* disappears on screen.

4.43.2 Operating sensitive hoisting

Ensure that the following conditions are fulfilled:

- Speed level 1 for the swing is set.
- Speed level 1 is selected for the boom.
- ▶ Operate sensitive hoisting.

4.44 Abseil rescue equipment*

4.44.1 Using abseil rescue equipment



WARNING

Incorrect use of the abseil rescue equipment BORNACK KE 10 St crane!
risk of falling from the cab.

- ▶ Observe operating manual of the abseil rescue equipment.

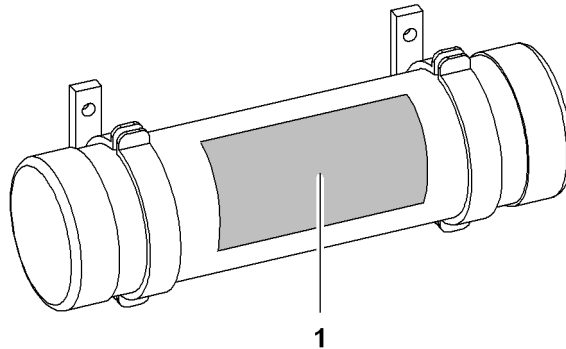


Fig. 2822: Abseil rescue equipment

1 Operating instructions

- ▶ Read operating manual 1 for abseil rescue equipment.
- ▶ Take abseil rescue equipment out of storage box.
- ▶ Put on abseil rescue equipment.
- ▶ Open the cab door.

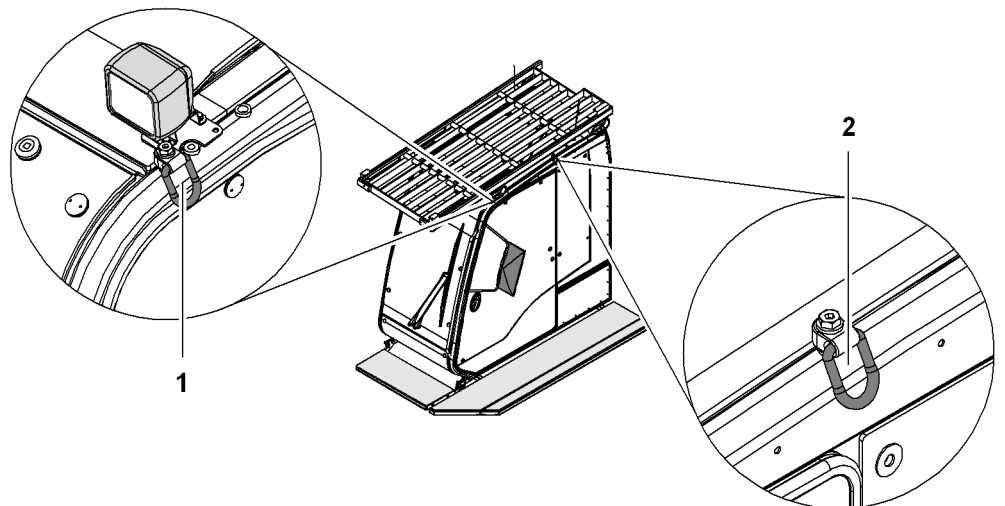


Fig. 2823: Suspension points of abseil rescue equipment

1 Suspension point on cab with cab roof protection guard 2 Suspension point on cab with falling object protection

- ▶ Attach abseil rescue equipment to suspension point 1, 2.

Abseil rescue equipment*

- ▶ Open the fall-arrest chain on the cab door (if one is fitted).
- ▶ Abseil down as described in the operating instructions.

4.45 Emergency stop

4.45.1 Using emergency stop



DANGER

Machine under extreme stress under load during an emergency stop!
Toppling of machine, structural breakdown.

- ▶ Only use emergency stop for emergency cut-off of the machine.



DANGER

Unauthorized unlocking of the emergency stop!

- ▶ Clear up and remedy reason for emergency stop prior to unlocking.

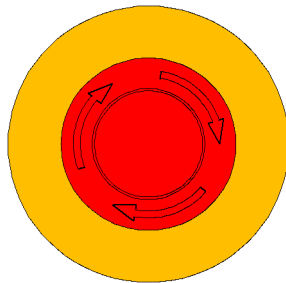


Fig. 2824: Emergency stop on control panel

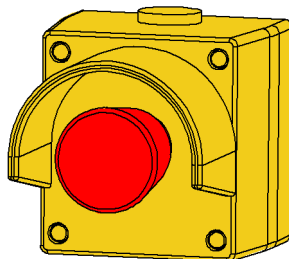


Fig. 2825: Emergency stop in engine compartment

If an emergency stop is triggered while a load is being moved:

- ▶ Have the multi-disc holding brakes inspected by Liebherr after sales service.
- ▶ Unlocking the activated emergency stop: gently depress the emergency stop and turn to the right.
- ▶ Perform visual inspection for damage on steel structure, ropes and pulleys.

After actuating the emergency-stop, the exhaust aftertreatment system is no longer blown out by the compressor. The exhaust aftertreatment system gets clogged through crystallizing of the urea solution.

- ▶ Contact Liebherr customer service.

4.46 Shutdown



WARNING

Unauthorised use of machine!
Severe injuries, damage to machine.

- ▶ When leaving the machine, it must be protected against unauthorised use, vandalism and any possible adverse environmental impact.

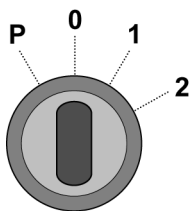
When shutting down the machine, distinguish between:

- **Short work interruption**
 - Waiting time or breaks
 - The machine operator remains on site.
- **Long work interruption**
 - Overnight or several days
 - The machine operator leaves the site.

4.46.1 Short work interruption

Machine operator remains in cab

- ▶ Set down the load.
- ▶ Pull up safety lever.
- ▶ Turn ignition key to position "P" (parked position).
 - ▷ Diesel engine is turned off.
 - ▷ Litronic control system is switched off.

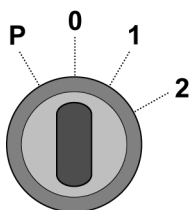


The following components continue to be supplied with power:

- ▷ Engine compartment lighting
- ▷ Cab lighting
- ▷ Windscreen wiper
- ▷ Horn
- ▷ Radio
- ▷ Heater blower
- ▷ Socket in cabin
- ▷ Cigarette lighter

Machine operator leaves cab

- ▶ Set down the load.
- ▶ With derrick operation, lower suspended counterweight/wheeled counterweight carriage on the ground.
- ▶ Tilt cabin downward all the way.
- ▶ Pull up safety lever.
- ▶ Turn ignition key to position "0".
 - ▷ Diesel engine is switched off.
 - ▷ Litronic control system is switched off.

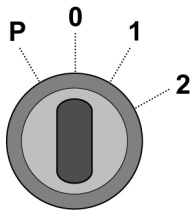


- ▶ Lock cab after leaving.

4.46.2 Long work interruption

Ensure that the following conditions are fulfilled:

- Machine is not obstructing traffic.
 - The place where the machine is left is adequately secured.
 - External energy supply for the safety equipment is secured (e.g. obstacle warning light).
- ▶ Set down and secure the load.
 - ▶ Place the boom in its parked position.
 - ▶ Draw the empty hook upwards or use the hook fixing point if there is one.
 - ▶ With derrick operation, lower suspended counterweight/wheeled counterweight carriage on the ground.
 - ▶ Tilt cabin downward all the way.
 - ▶ Pull up safety lever.
 - ▶ Turn ignition key to position "0".
 - ▷ Diesel engine is switched off.
 - ▷ Litronic control system is switched off.



- ▶ Switch off the auxiliary heating, or program it correctly.
- ▶ Remove the ignition key and keep it in a safe place.
- ▶ Lock the cabin and doors to the machinery area.

4.46.3 Switching off battery main switch

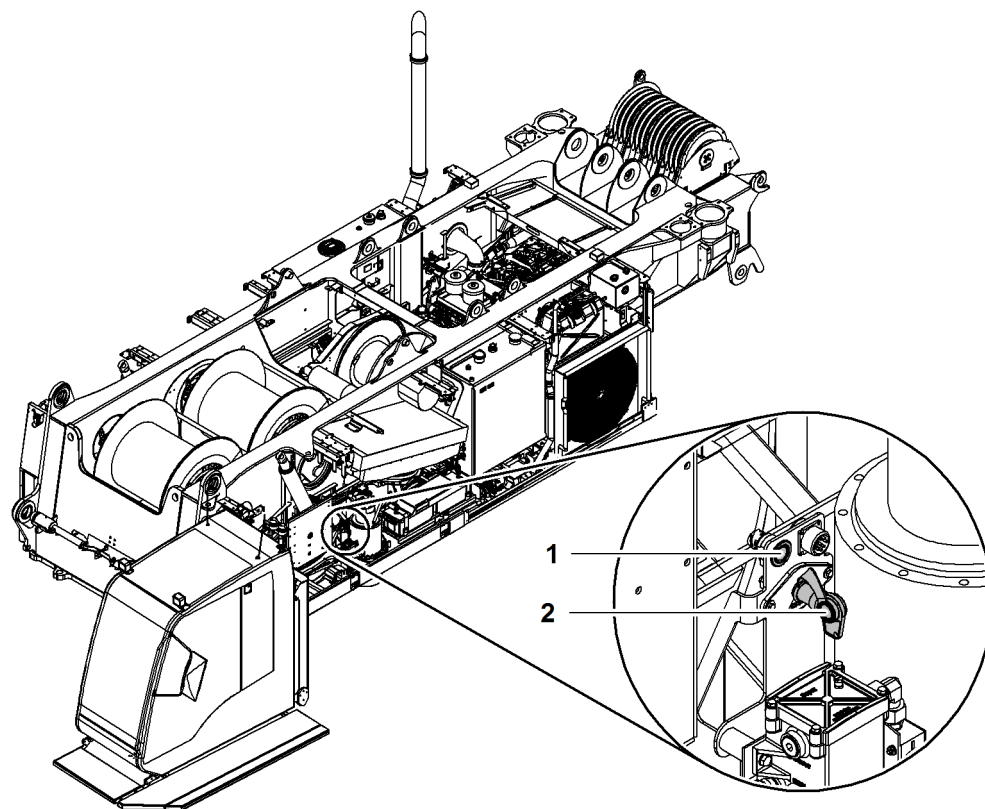


Fig. 2829: Turning off the main battery switch (illustration of principle)

1 Warning light

2 Main battery switch

NOTICE

Incorrect switching off of main battery switch **2**!
Damage to machine

- ▶ Do not switch off main battery switch **2** until warning light **1** is turned off.

Once warning light **1** is off:

- ▶ Switching off battery main switch **2**: Turn battery main switch **2** to the left.

4.47 Hydraulic emergency mode*

Hydraulic emergency mode allows winch 2, the main boom winch and swing to be controlled using an external hydraulic power pack.

4.47.1 Winch 2 emergency mode

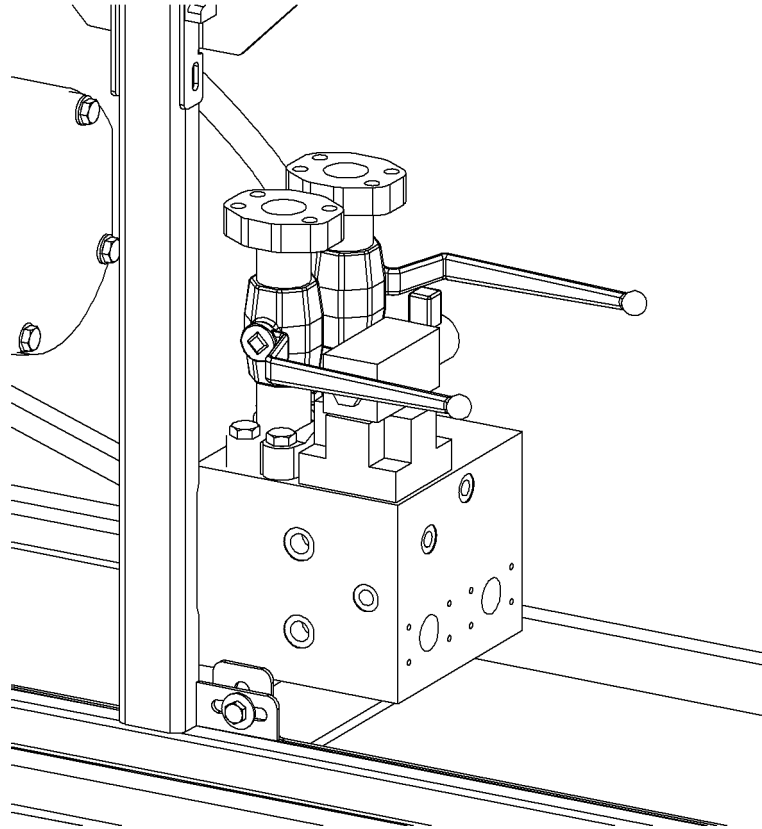


Fig. 2830: High-pressure lines winch 2 gate valves closed

Ensure that the following conditions are fulfilled:

- High-pressure lines winch 2 gate valves are closed.
- An external hydraulic power pack is connected.

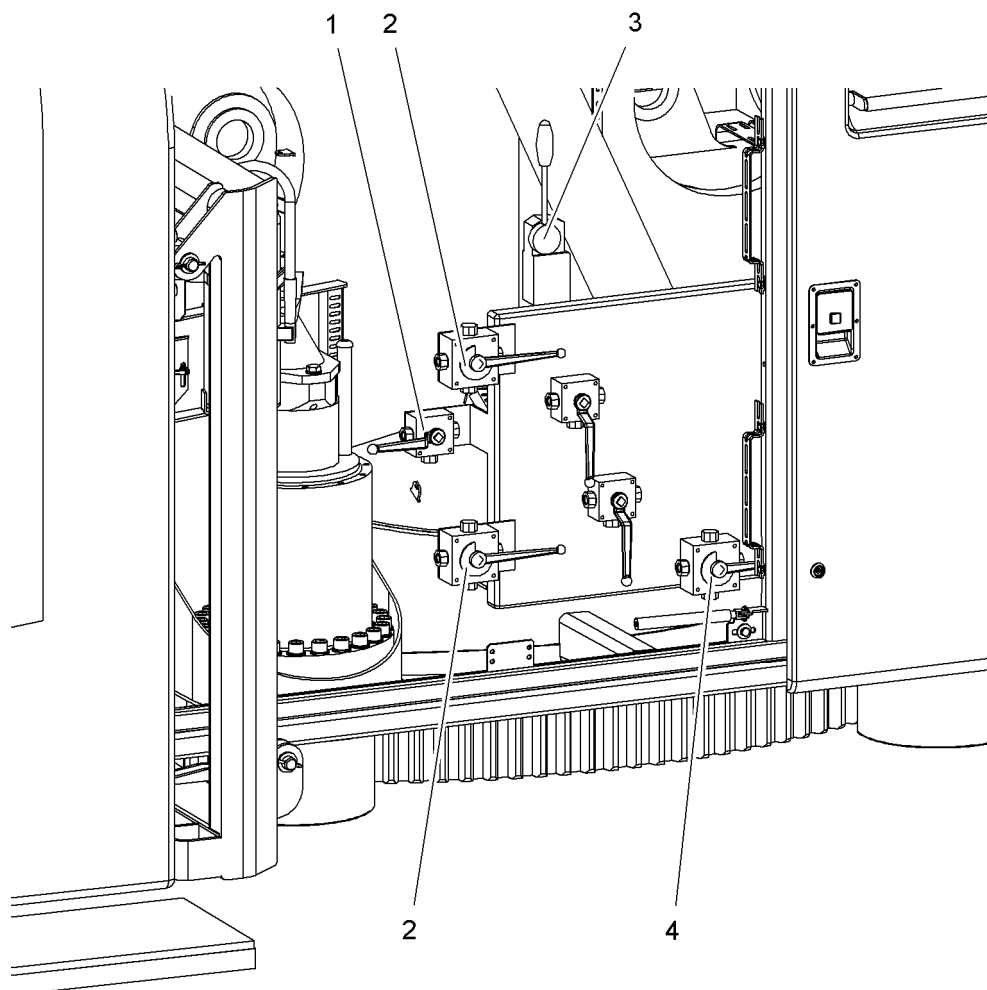


Fig. 2831: Emergency mode gate valves in "Control winch 2" position

- | | | | |
|---|--|---|--------------------------------------|
| 1 | Brake winch 2 gate valve | 3 | Control lever |
| 2 | Function selection high-pressure lines gate valve (2x) | 4 | Function selection brake gate valves |

- ▶ Turn *Function selection High-pressure lines* gate valves **2** to "Control winch 2" position.
- ▶ Turn *Function selection brake* gate valves **4** to "Control winch 2" position.
- ▶ Turn *Brake winch 2* gate valve **1** to "Control winch 2" position.
- ▶ Move the control lever **3** to the right.
 - ▷ The load hook/pulley block rises.
- ▶ Move the control lever **3** to the left.
 - ▷ The load hook/pulley block lowers.

4.47.2 Main boom adjusting winch emergency mode

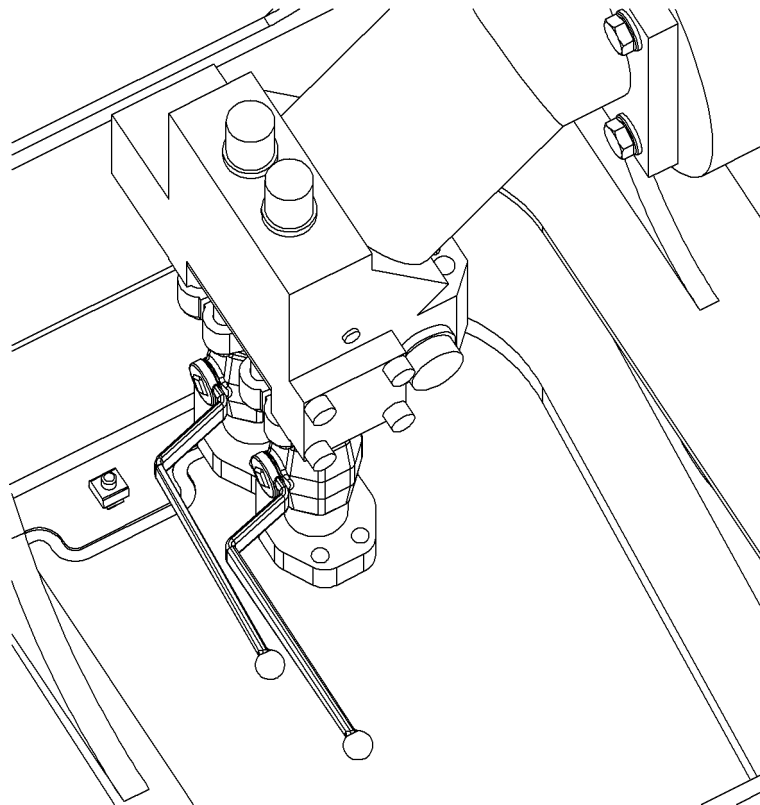


Fig. 2832: High-pressure lines main boom adjusting winch gate valves closed

Ensure that the following conditions are fulfilled:

- High-pressure lines main boom adjusting winch gate valves are closed.
- An external hydraulic power pack is connected.

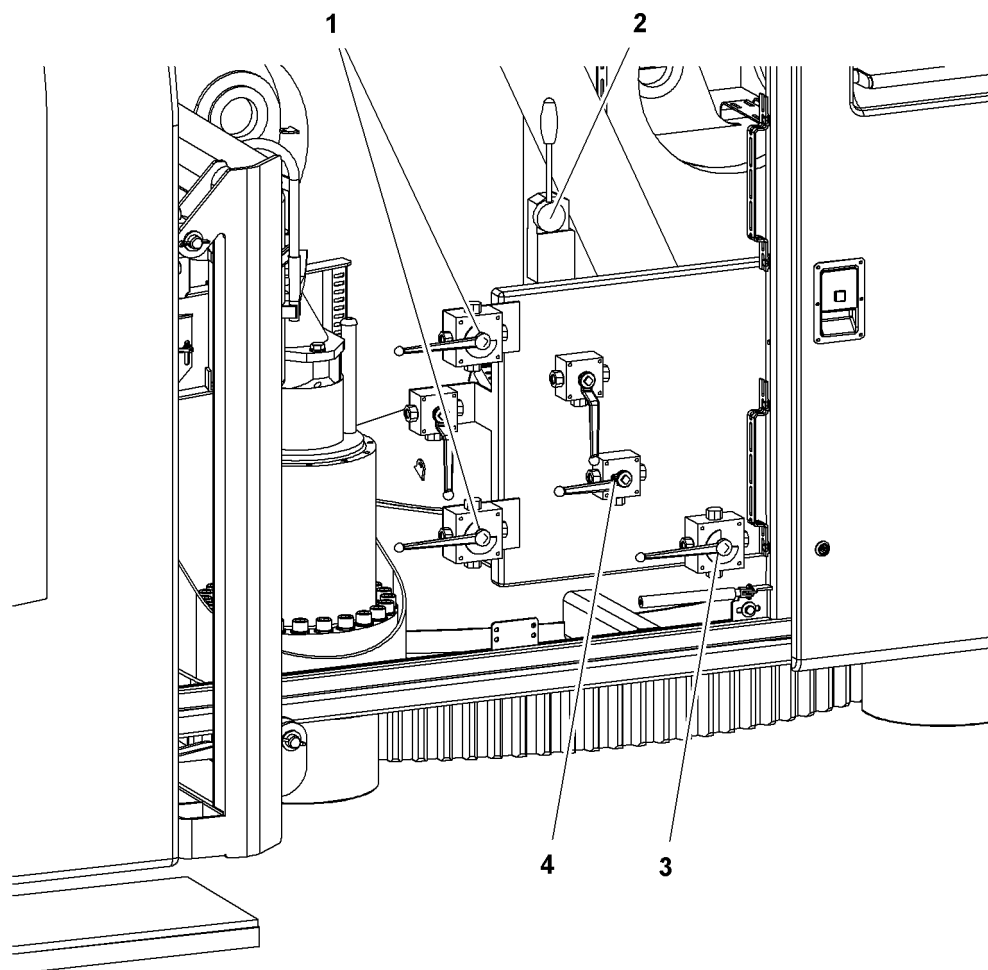


Fig. 2833: Emergency mode gate valves in "Control main boom winch" position

- | | | | |
|---|--|---|--------------------------------------|
| 1 | Function selection high-pressure lines gate valve (2x) | 3 | Function selection brake gate valves |
| 2 | Control lever | 4 | Brake main boom winch gate valve |

- ▶ Turn *Function selection High-pressure lines gate valves 1* to "Control main boom winch" position.
- ▶ Turn *Function selection brake gate valves 3* to "Control main boom winch" position.
- ▶ Turn *Brake main boom adjusting winch gate valve 4* to "Control main boom winch" position.
- ▶ Move the control lever **2** to the right.
 - ▷ The main boom rises.
- ▶ Move the control lever **2** to the left.
 - ▷ The main boom lowers.

4.47.3 Swing emergency mode

Swing emergency mode controls a single swing gear. If a second swing gear is present, only the brakes are released.

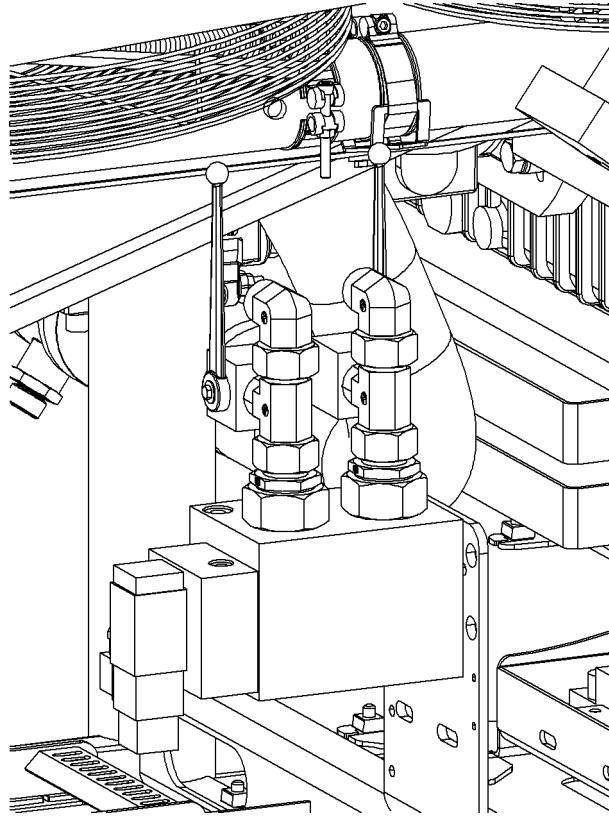


Fig. 2834: Swing high-pressure lines gate valves closed

Ensure that the following conditions are fulfilled:

- Swing high-pressure lines* gate valves are closed.
- An external hydraulic power pack is connected.

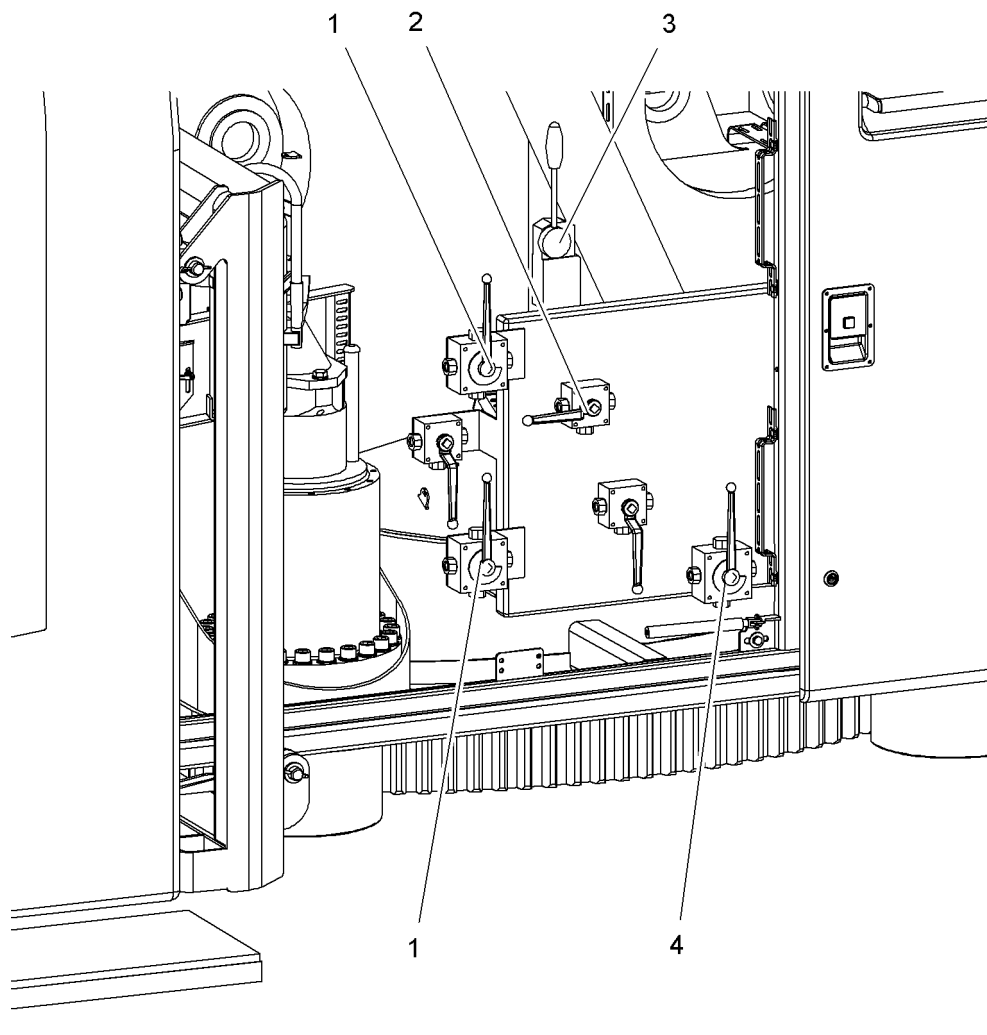


Fig. 2835: Emergency mode gate valves in "Control swing" position

- | | | | |
|---|--|---|--------------------------------------|
| 1 | Function selection high-pressure lines gate valve (2x) | 3 | Control lever |
| 2 | Brake swing gate valve | 4 | Function selection brake gate valves |

- ▶ Turn *Function selection High-pressure lines* gate valves **1** to "Control swing" position.
- ▶ Turn *Function selection brake* gate valves **4** to "Control swing" position.
- ▶ Turn *Brake swing* gate valve **2** to "Control swing" position.
- ▶ Move the control lever **3** to the right.
 - ▷ Uppercarriage turns to the left.
- ▶ Move the control lever **3** to the left.
 - ▷ Uppercarriage turns to the right.

4.48 Emergency operation control*

Should a fault occur that causes the Litronic control system to fail, the emergency operation controller allows the machine to be moved out of the danger area.



WARNING

Unauthorized or improper use of the emergency operation controller!

- ▶ Do not use the emergency operation controller unless an emergency has arisen.
- ▶ Cordon off a large area around the danger zone.
- ▶ Employ a signalman to direct the movements.
- ▶ Exercise the utmost care when using the emergency operation controller.
- ▶ Remember that all safety features are bypassed and will not work.

In the case of long booms and when operating the swing, remember that control of the functions is not integrated.

All speeds are reduced by two thirds. Speeds cannot be adjusted on the control panel except for RPM.

NOTICE

Unauthorized use of the emergency operation controller when a wheeled counterweight carriage is attached!

Damage to the machine and the counterweight carriage.

- ▶ Never use emergency operation when a wheeled counterweight carriage is attached.

4.48.1 Operating the emergency control

- ▶ Switching off the machine: turn ignition key to position "0".
- ▶ Open the front most left uppercarriage door.
- ▶ Plug in and lock emergency control system.



WARNING

Unauthorized use of the emergency operation controller!
Severe injury.

- ▶ Only operate emergency control in the cabin.

- ▶ Sit in the cabin.

The status display (LED) of the emergency control system lights up as soon as the ignition is switched on.

- ▶ Start the diesel engine using the ignition key.
- ▶ Lower control safety lever in cabin.
- ▶ Operate the emergency control.

When the machine has been moved out of the danger area:

- ▶ Switch off machine.

Emergency operation control*

- ▶ Unplug emergency control system.
- ▶ Close front left uppercarriage door.

Operational faults, diagnosis 5

5 Operational faults, diagnosis

5 Operational faults, diagnosis

This chapter deals with the following issues:

- Operation errors of the machine and the corresponding diagnosis



WARNING

Inadmissible or improper procedure!
Severe injuries, damage to machine.

If the operation manual contains insufficient information:

- ▶ Contact Liebherr customer service.
-

5.1 Malfunctions

5.1.1 Identifying faults

Faults are very often caused by incorrect operation or inadequate maintenance of the machine.

NOTICE

Improper procedure with occurring error message!
Damage to machine.

In case of an error message:

- ▶ Concentrate on work process and continue it while permanently monitoring until risk-free stopping of all machine movements is possible.

Once all machine movements have stopped:

- ▶ Remedy all error causes and acknowledge error messages. Acknowledging the error messages alone will not remedy the causes of the errors.
-

- ▶ Observe all symbols and error messages on the monitor.

- ▶ Observe all acoustic warning signals from the monitor.

5.1.2 Error displays on monitor






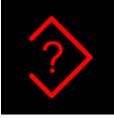
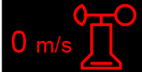


NOTICE

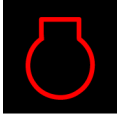







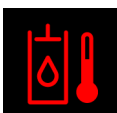
Serious engine error messages are being ignored!
Damage to diesel engine.

In case of a grave engine error message:








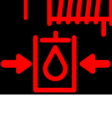

- ▶ Switch off diesel engine.
-



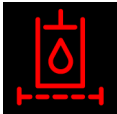
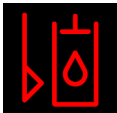
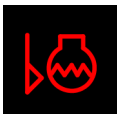
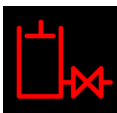



Malfunctions


Symbol/status	Cause	Remedy
 blinks red	Admissible load moment was exceeded.	Reduce load moment.
 lit red	Machine may topple backwards due to insufficient radius.	Increase radius.
 blinks red	Error in the electrical system.	Contact Liebherr customer service.
 blinks red	Serious engine error has occurred.	Perform troubleshooting and remedy error (For more information see: Rectifying grave engine error message, page 1082) .
 lit yellow	General engine error has occurred.	Perform troubleshooting and remedy error (For more information see: Rectifying general engine error messages, page 1082) .
 blinks red	Data recording error.	Contact Liebherr customer service.
 blinks red	Wind speed too high.	Lay down boom.
 lit red	Machine may topple.	Reduce radius.
 blinks red	Battery is not charging.	Contact Liebherr customer service.

Symbol/status	Cause	Remedy
 blinks red	Diesel engine RPM is too high.	Reduce rotational speed.
 lit yellow	Fill level of urea tank is less than 10 % of the maximum filling capacity or error in exhaust aftertreatment system.	Fill in urea solution or contact Liebherr customer service.
 lit yellow  lit yellow	Fill level of urea tank is less than 5 % of the maximum filling capacity or error in exhaust aftertreatment system.	Fill in urea solution or contact Liebherr customer service.
 lit yellow  blinks red	Fill level of urea tank is less than 2.5 % of the maximum filling capacity or error in exhaust aftertreatment system.	Fill in urea solution or contact Liebherr customer service.
 blinks red  blinks red	Fill level of urea tank is less than 0 % of the maximum filling capacity or error in exhaust aftertreatment system.	Fill in urea solution or contact Liebherr customer service.
 blinks red	Hydraulic oil temperature is too high.	Contact Liebherr customer service.

Malfunctions

Symbol/status	Cause	Remedy
 blinks red	Temperature of diesel engine coolant is too high.	Contact Liebherr customer service.
 blinks red	Temperature of diesel engine charge air is too high.	Contact Liebherr customer service.
 blinks red	Fill level of fuel tank is less than 5 % of the maximum filling capacity.	Fill in fuel.
 blinks red	Pressure of diesel engine lubrication oil is too low.	Contact Liebherr customer service.
 blinks red	Lubrication oil fill level of diesel engine is too low.	Fill in lubrication oil.
 blinks red	Fill level of diesel engine lubrication oil is too high.	Drain lubrication oil.
 blinks red	Supply pressure is too low.	Contact Liebherr customer service.
 blinks red	Feed pressure on winch1 is too low.	Contact Liebherr customer service.
 blinks red	Feed pressure on winch2 is too low.	Contact Liebherr customer service.

Symbol/status	Cause	Remedy
 blinks red	Temperature of gearbox oil in the distribution gearbox is too high.	Contact Liebherr customer service.
 blinks red	Supply pressure oil filter does not work correctly.	Contact Liebherr customer service.
 blinks red	Hydraulic oil filter does not work correctly.	Contact Liebherr customer service.
 blinks red	Fill level of hydraulic oil tank is too low.	Fill in hydraulic oil.
 blinks red	Coolant fill level is too low.	Fill in coolant.
 blinks red	<i>Hydraulic oil tank gate valve is closed.</i>	Ensure there is no danger. Open <i>hydraulic oil tank gate valve</i> .
 blinks red	Fuel pressure is too low or too high.	Contact Liebherr customer service.
 blinks red	Fuel temperature is too high.	Contact Liebherr customer service.
 blinks red	Water in the fuel filter.	Drain water into condensation trap.

Symbol/status	Cause	Remedy
 <p>blinks red</p>	Charge air filter does not work correctly.	Contact Liebherr customer service.

Tab. 391: Error displays

5.1.3 Troubleshooting

Rectifying grave engine error message

The cause of the error appears either on the *Power unit* screen or on the *error message* screen.

Possible error causes are:

- Coolant temperature > 104 °C (219 °F)
- Charge air temperature > 80 °C (176 °F)
- Fuel temperature > 90 °C (194 °F)
- Oil pressure safety curve undercut
- Coolant level too low
- Hydraulic oil level too low
- Water in fuel
- Problem with high-pressure control
- Fuel pressure too low
- Fuel rail pressure too high

The speeds of these functions and movements are reduced by 50 % in the event of an error message:

- Lift winch1 and winch2
- Lift feed
- Rotary drive
- Crawler
- Hammer
- Grab
- Cutting wheels

- ▶ Stop the dangerous movement.
- ▶ Place load on the ground.
- ▶ Switch off diesel engine.
- ▶ Determine and rectify cause of error.

If the cause of the error cannot be determined and rectified:

- ▶ Contact Liebherr customer service.

Rectifying general engine error messages

- ▶ Carry out troubleshooting in the Litronic® testing system.
- ▶ Determine and rectify cause of error.

If the cause of the error cannot be determined and rectified:

- ▶ Contact Liebherr customer service.

5.2 Litronic testing system

5.2.1 Litronic testing system overview



WARNING

Unauthorized changes to Litronic testing system!
Damage to machine.

- ▶ Only have adjustment values or correction values changed by Liebherr service personnel.
-

The Litronic testing system is an extensive diagnosis tool and service tool available on the monitor, on a service notebook or via a modem connection (if available). The Litronic testing system serves to view the inputs and outputs, markers, internal variables and statuses.

The Litronic® testing system provides the following functions:

- Display of the ID number of the installed software and the software version
- Display of the inputs and outputs of the modules with comment text
- Display of the internal variables with comment text
- Displays a selection list
- Displays correction values (machine parameters)
- Displays messages (message stack)
- Displays special functions:
 - Modem configuration
 - Memory card control (CF)
 - CAN configuration status

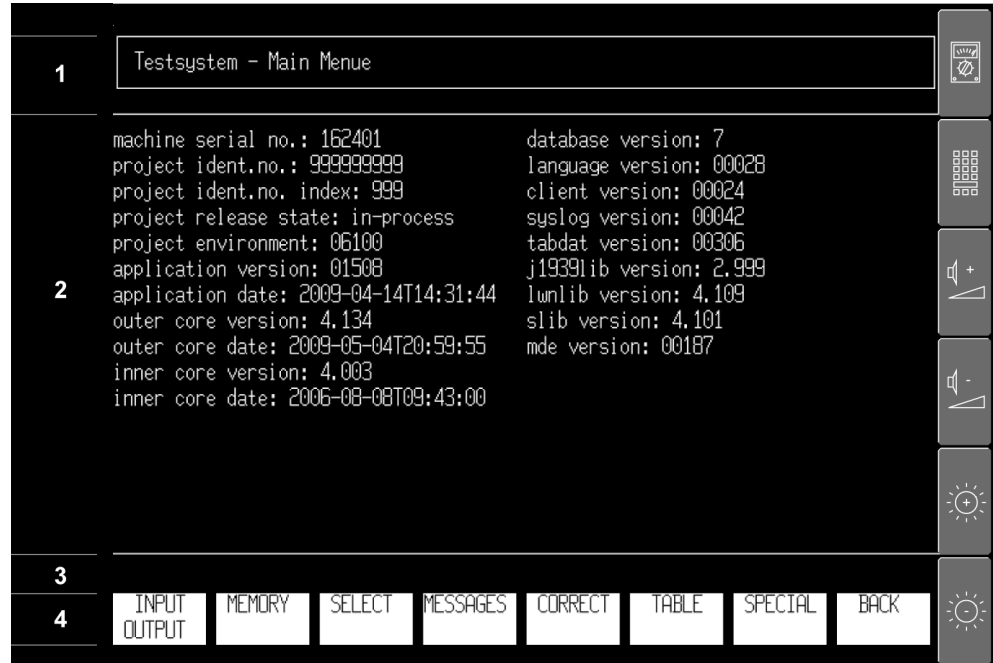


Fig. 2873: Litronic® testing system overview

- | | |
|--|--|
| <p>1 Header: Name of the current screen</p> <p>2 Main window: Displays information</p> | <p>3 Input line: For display and correction of entered values, display of status messages and input prompts</p> <p>4 Menu bar: Buttons</p> |
|--|--|

The Litronic® testing system comprises a number of screen pages; the buttons are used to move from page to page. Some pages have two menu bars that you can toggle between using the button *MENU 1/2*. The first menu bar always appears when a page is opened. When the Litronic® testing system is first started, the homepage (Main Menu) is displayed. On each subsequent start, the page last open when the system was exited is loaded. The other settings are also retained.

Certain commands can be executed several times in succession by entering the number of repetitions (these appear in the input line) or by pressing the required button. This includes *PREVIOUS* and *NEXT* for example.

5.2.2 Screen pages

Main screen page

Switch from the main screen to the different screens of the Litronic testing system. Exit the current screen with the *BACK* button.

The following pages can be reached from the main screen page:

- Screen *INPUT/OUTPUT*
- Screen *MEMORY*
- Screen *SELECT*
- Screen *CORRECTION*
- Screen *MESSAGES*
- Screen *SPECIAL FUNCTIONS*

Screen *INPUT/OUTPUT*

The *INPUT/OUTPUT* screen serves to view the inputs and outputs of the modules.

Description of the buttons:

- *NEXT CAN LINE* moves to the next CAN line.
- *PREVIOUS MODULE* and *NEXT MODULE* switches between the modules of the selected CAN line.
- *PREVIOUS* and *NEXT* move the Cursor up and down to highlight a channel in the selected module. The highlighted channel is displayed as an inverse I or O.
- The marked channel can be taken over into the select list with *SELECT*. If the channel was already selected, the channel is deleted from the list again. The inverse display shows whether a channel has been selected.
- *MENU 1/2* switches between the two menu bars.
- *DOCUMENT* displays 16 channels (inputs or outputs) with comment text on one page. With digital modules (32 channels) use *PREVIOUS* and *NEXT* to switch to the second page.
- *UNDOCUM* displays all inputs or outputs on one page.
- *IDENTIFY* displays 16 inputs or outputs on one page with the identifier on one page. With digital modules (32 channels) use *PREVIOUS* and *NEXT* to switch to the second page.
- *BACK* returns to the main screen.

Screen *MEMORY*

The *MEMORY* screen shows the internally used buffer stores (markers).

Description of the buttons:

- *NEXT SECTION* moves between the 16 flag sections: X-B-W-D, 1-2-3-4.
- *PREVIOUS PAGE* and *NEXT PAGE* to switch between the pages. One page contains 16 markers of the selected section.
- *PREVIOUS* and *NEXT* move between the flags. The highlighted flag is displayed as an inverse M.
- The marked marker can be taken over into the select list with *SELECT*. If the marker was already selected, the marker is deleted from the list again. The inverse display of the marker shows whether a marker has been selected.
- *MENU 1/2* switches between the two menu bars.
- *DOCUMENT* displays the markers with comment text.
- *IDENTIFY* displays the flags with the identifier.
- *BACK* returns to the main screen.

Screen *SELECT*

The values can be entered in the select list to prevent having to switch between the input menu, output menu and marker menu pages. Now the entries can be viewed and edited on the *SELECT* screen. The select screen may consist of several pages. If the list is full and a new value is entered, the oldest value is deleted from the list. The select lists can also be saved on memory cards and loaded from there.

How to add entries to the Select list:

- With the *SELECT* button on the *INPUT/OUTPUT*, *MEMORY* screens or *CORRECTION*
- With the *ADD* button on the *SELECT* screen by entering the IEC address
- With the *LOAD FROM CARD* button on the *SELECT* screen from a file

How to delete entries from the Select list:

- Reselect a selected value with the *SELECT* button on the *INPUT/OUTPUT*, *MEMORY* or *CORRECTION* screens.
- Delete the marked entry with the *DELETE* button on the *SELECT* screen.

Description of the buttons:

- *ADD* adds a new entry to the Select list. A menu bar is displayed in which the IEC address is entered.

- *DELETE* deletes the marked entry from the select list.
- *PREVIOUS* and *NEXT* to switch between the individual select entries. The marked entry is displayed with an inverted I, O or M.
- *NEXT PAGE* moves to the next page of the Select list so that more values can be viewed.
- *IDENTIFY* displays the inputs, outputs and markers with the identifier.
- *DOCUMENT* displays the inputs, outputs and markers with comment text.
- *LOAD FROM CARD* loads a new Select list from a file A menu is then displayed. The menu contains a list of files, one of which can be selected, and also allows a specific file name to be entered .
- *SAVE TO CARD* saves the current Select list in a file. A menu appears from which the name of the file can be selected .
- *MENU 1/2* switches between the two menu bars.
- *BACK* returns to the main screen.

Screen *Add Selection*

The *Add Selection* screen is called up with the *ADD* button on the *SELECT* screen. The IEC address of a new select entry can be entered this way. The ICE address is entered with the corresponding buttons in the input field.

Example:

- Desired IEC address: %QW1.17.1
- %, Q and W are entered using the appropriate buttons.
- 1.17.1 is entered as a normal number and can be edited as necessary using the button *TAKE & BACK* to apply the address.

Description of the buttons:

- Use M, I or Q to select the IEC type flag, input or output. These change each time a key is pressed and appear in the input bar. A correction can be made by pressing another type.
- Use X, B, W and D to select the size of the IEC entry. These change each time a key is pressed and appear in the input bar. A correction is made by pressing another size.
- *TAKE & BACK* returns to the *SELECT* screen and applies the IEC address from the entry bar.

Screen *Select File Load*

A saved select list can be loaded from the memory card on the *Select File Load* screen.

Description of the buttons:

- *CHARACTER NEXT* adds a new character to the end of the input bar. New characters can also be added by entering numbers and letters.
- *CHARACTER DOWN* and *CHARACTER UP* change the last character on the input bar.
- *PREVIOUS* and *NEXT* move the cursor up and down in the select list. When selecting a file, the name of the file is taken over into the entry bar.
- *LOAD* loads the selected file displayed in the entry bar and returns to the *SELECT* screen.
- *BACK* cancels the process and returns to the *SELECT* screen.

Screen *Select File Save*

A select list can be saved on the memory card on the *Select File Save* screen.

Description of the buttons:

- *CHARACTER NEXT* adds a new character to the end of the input bar. New characters can also be added by entering numbers and letters.

- *CHARACTER DOWN* and *CHARACTER UP* change the last character on the input bar.
- *PREVIOUS* and *NEXT* move the cursor up and down in the select list. When selecting a file, the name of the file is taken over into the entry bar.
- *SAVE* saves the select list in a file (enter file name in the entry bar) and returns to the *SELECT* screen.
- *BACK* cancels the process and returns to the *SELECT* screen.

Screen **CORRECTION**

The *CORRECTION* screen displays correction values.

Description of the buttons:

- *NEXT SECTION* switches between the four correction value sections: X-B-W-D.
- *PREVIOUS PAGE* and *NEXT PAGE* to switch between the pages. One page contains 16 correction values of the selected section.
- *PREVIOUS* and *NEXT* move between the correction values. The highlighted correction value is displayed as an inverse M.
- *DOCUMENT* displays the correction values with comment text.
- *IDENTIFY* displays the correction values with the identifier.
- *BASE MIN & MAX* displays the correction values with the default value and upper and lower limits.
- *SAVE TO CARD* saves the current correction values in a file. The file name can be selected from the menu that now appears. A standard file name (created from the current date) is suggested. This name can be changed if required .
- Use *SELECT* to add the highlighted entry to the Select list. If the entry is already selected, it will be removed from the list. The name of a correction value will be displayed inverse if it is selected.
- *MENU 1/2* switches between the two menu bars.
- *BACK* returns to the main screen.

Screen **MESSAGES**

The *MESSAGES* screen shows the saved application messages (e.g. sensor errors) and all system errors (e.g. CAN bus, modules, central unit). The application messages are buffered internally.

Description of the buttons:

- *ALL* lists all saved messages (maximum 15,000).
- *PREVIOUS START* and *NEXT START* move between all messages saved at each start-up.
- *PRIORITY MAXFILTER* and *PRIORITY MINFILTER* list the saved messages filtered by priority.
- *GROUP FILTER* lists the saved messages filtered by certain groups.
- *SINCE START* lists only the messages since the current machine start-up.
- *LANGUAGE* enables a different language for the messages. Messages that are not found in the selected language will be displayed in English. Switching only has an effect on the *MESSAGES* screen .
- *PREVIOUS* and *NEXT* move between the messages.
- *SAVE TO CARD* saves all messages (*ALL* or *SINCE START*) in a file. The file name can be selected from the menu that now appears. A standard file name (created from the current date) is suggested. This name can be changed if required .
- *MENU 1/2* switches between the two menu bars.
- *BACK* returns to the main screen.

Screen *Language Selection*

The message language can be selected on the *Language Selection* screen.

Description of the buttons:

- *PREVIOUS* and *NEXT* move between the different languages.
- *SELECT* is used to select and load the highlighted language.

Screen *SPECIAL FUNCTIONS*

From the *SPECIAL FUNCTIONS* screen, you can access various additional screens or return to the main screen with the *BACK* button.

Screen *Modem Function*

The GSM modem can be configured and operated on the *Modem Function* screen.

The current modem status (e.g. Online, Offline, False PIN) can be viewed in the entry bar.

Description of the buttons:

- *DIAL* dials a previously entered phone number.
- *HANGUP* terminates an active modem connection (hang up handset).
- *RLP ON/OFF* activates or deactivates the radio link protocol for GSM modem connections. The settings first become effective after the next program start.
- *V32/V110* activates the V32 protocol or V110 protocol for GSM modem connections. The settings first become effective after the next program start.
- *PREVIOUS* and *NEXT* change between the interfaces; the default Modem Client is COM2.
- *PIN INPUT* allows the PIN codes for the GSM modem to be entered manually.
- *MODEM CONNECT* enables the modem server programme to be started on an unused interface.
- *MENU 1/2* switches between the two menu bars.
- *BACK* returns to the *SPECIAL FUNCTIONS* screen.

Screen *Drive Function*

The *Drive Function* screen displays information about the current drive.

Description of the buttons:

- *REMOVE CARD* must be performed before removing a memory card from the drive. Switching off the Litronic control system is another option. The system automatically recognises when a new card has been inserted.
- *DIR LIST* displays the files and directories (no subdirectories) of the current drive.
- *PREVIOUS DRIVE* and *NEXT DRIVE* switch between the individual drives known to the Litronic control system.
- *CHECK CARD* checks the current drive for errors.
- *BACK* returns to the *SPECIAL FUNCTIONS* screen.

Screen *Time Function*

The *Time Function* screen shows the date and time.

Description of the buttons:

- *DAYLIGHT SAVING* switches to the summer time setting.
- *TIMEZONE MOVE WEST* moves the time zone setting one hour westwards.
- *BACK* returns to the *SPECIAL FUNCTIONS* screen.

Priority Level screen (for Liebherr service personnel only)

The Litronic code can be entered on the *Priority Level* screen to access supervisor level. The supervisor level is required to e.g. set the time.

Description of the buttons:

- When the *LEVEL CHANGE* key is pressed, the value in the input bar is copied and examined to see whether it is a valid Litronic® code.
- *BACK* returns to the *SPECIAL FUNCTIONS* screen.

Screen CAN Configuration

The *CAN Configuration* screen shows all installed CAN modules with utilization status.

Description of the buttons:

- *NEXT PAGE* switches to the next screen.
- *BACK* returns to the *SPECIAL FUNCTIONS* screen.

Screen CAN Line Information

The *CAN Line Information* screen shows the used CAN lines and settings.

Description of the buttons:

- *MODULE INFO* switches to the *CAN Configuration* screen.
- *BACK* returns to the *SPECIAL FUNCTIONS* screen.

Screen Display Configuration

On the *Display Configuration* screen, you can select options for the display of the *INPUT/OUTPUT* screen.

Description of the buttons:

- *ALL MODULES* displays all CAN modules on the *INPUT/OUTPUT* screen.
- *ONLY USED MODULES* only displays the CAN modules set to “used” on the *INPUT/OUTPUT* screen.
- With *NUMBER STYLE* the inputs, outputs and markers are switched between standard display and hexadecimal display.
- *UPDATE INTERVAL* changes the update speed of the input, output and marker display.
- *BACK* returns to the *SPECIAL FUNCTIONS* screen.

Screen System Language Selection

The system language can be selected on the *System Language Selection* screen, whereby a language is selected or the internal standard language loaded.

The selected system language is only activated once the Litronic control system is switched back on.

Description of the buttons:

- *PREVIOUS* and *NEXT* move between the different languages.
- *SELECT* loads the marked language as new system language and returns to the *SPECIAL FUNCTIONS* screen.
- *USE DEFAULT* loads the English language as new system language and returns to the *SPECIAL FUNCTIONS* screen.
- *MENU 1/2* switches between the two menu bars.
- *BACK* cancels the process and returns to the *SPECIAL FUNCTIONS* screen.

Screen *Sampling Trace*

The *Sampling Trace* screen is used for the online data recording of previously defined inputs and outputs. The *Sampling Trace* screen displays information about the “sampling trace” and allows to change the status and save the recorded data.

Description of the buttons:

- *SAMPLE ACTIVE* activates “sampling trace” after the options were defined. Serves to record and check the trigger conditions.
- *TRIGGER MANUAL* simulates the trigger conditions. *TRIGGER MANUAL* is only available if “Sampling Trace” is activated and the trigger conditions were not yet fulfilled.
- *END MANUAL* stops recording of the “sampling trace” and automatically leads to ready state. *END MANUAL* is only available if the “sampling trace” is activated.
- *LOAD FROM CARD* loads a configuration from a saved “Sampling Trace” file. A menu appears from which the name of the file can be selected .
- *SAVE TO CARD* saves the recorded data and the “Sampling Trace” configuration in a file. A menu appears from which the name of the file can be selected .
- *SAVE TO SELECT* saves the variables used in the “Sampling Trace” in the Select list. Existing entries in the Select list are deleted.
- *LOAD FROM SELECT* loads the selected variables into the “sampling trace” list.
- *PREVIOUS* and *NEXT* switch between the configuration data. The marked entry is displayed inverted.
- *CHANGE* changes the marked entry to the value in the entry bar. The value must lie within the valid limits.
- *MENU 1/2* switches between the two menu bars.
- *BACK* returns to the *SPECIAL FUNCTIONS* screen.

Screen *System Status*

The *System Status* screen shows the current system status (e.g. running, stopped) and the timing of the SPS tasks.

Description of the buttons:

- *SYSTEM TASKS* displays information about the system tasks.
- *BOARD INFO* displays information about the circuit board (e.g. voltage, temperature).
- *BACK* returns to the *SPECIAL FUNCTIONS* screen.

Screen *MDE/PDE*

The *MDE/PDE* screen displays the status of the MDR (Machine Data Recording), the PDR (Process Data Recording), and the data logger.

Description of the buttons:

- *MDE* displays the MDR data.
- *PDE* displays the PDR data.
- *SELECT GRAPHIC* lists saved graphics (e.g. company logo) for printout of the PDR data. The desired graphic can be selected.
- *LOGGER* displays the data logger.
- *BACK* returns to the *SPECIAL FUNCTIONS* screen.

Screen *Clients*

The *Clients* screen displays the status of the individual communication interfaces (clients).

Description of the buttons:

- *PREVIOUS* and *NEXT* move between the interfaces.
- *BACK* returns to the *SPECIAL FUNCTIONS* screen.

5.2.3 Starting the Litronic testing system



WARNING

No error messages from the Litronic control displayed in the Litronic testing system!

- ▶ Only perform crane work on the *Operation* screen.
-



- ▶ Press the *Settings* button on the screen.
 - ▷ The *Settings* screen appears on the monitor.



- ▶ Press the *Litronic testing system* button on the monitor.
 - ▷ The Litronic testing system main screen is displayed on the monitor.

5.3 Fuses

5.3.1 List of fuses

The following table lists the fuses by rating and module.

Fuse	Rating	Module
F1	50 A	Main fuse module
F2	50 A	Main fuse ignition on
F3	50 A	Main fuse additional supply engine control
F4	10 A	Main fuse fuel pre-filter heating
F5	20 A	Engine control device
F6	20 A	Voltage supply exhaust aftertreatment system
F7		
F8	13 A	Main fuse parked position
F9	13 A	Main fuse LD+, cabin tilt (LED+)
F10	13 A	Main fuse measurement supply
F21	10 A	Radio, horn, camera surveillance, switching cabinet ventilation, PA system
F22	10 A	Cabin lighting, engine compartment lighting
F23	5 A	Voltage supply control panel X11
F24	10 A	Cigarette lighter, windscreen wash system, heating control valve, charger for radio remote control
F25	5 A	Front windscreen wiper
F26	5 A	Top windscreen wiper
F31	5 A	Boom voltage supply
F32	10 A	CAN bus input module 33
F33	10 A	CAN bus input module 41
F34	10 A	CAN bus input module 42
F35	10 A	CAN bus input module 34 + 43
F36	10 A	Reserve
F41	10 A	Voltage supply engine electronics, control of fuel pre-filter heating
F42	10 A	Voltage supply modem
F43	10 A	Voltage supply assembly functions (tilting-back supports, cylinder adjustments)
F44	10 A	Safety lever, emergency operation
F45	10 A	Voltage supply CAN bus line 1 + 2
F46	10 A	Voltage supply CAN bus line 3 + 4
F47	5 A	PDR screen

Fuse	Rating	Module
F48	10 A	Voltage supply control panel X12, control auxiliary heating clock, key switch <i>Load moment limiter shutoff</i>
F49	15 A	Floodlights on cabin
F50	15 A	Floodlights on uppercarriage
F51	15 A	Additional floodlight on uppercarriage
F52	15 A	Refueling pump
F53	10 A	Supply leader electronics
F54	10 A	Reserve
F55	15 A	Additional equipment
F56	10 A	Additional equipment, electronic seat heating and positioning
F71	10 A	CAN-bus output module 17, register 4, safety valves, relay control LD+
F72	10 A	CAN-bus output module 9, register 4, emergency stop engine
F73	10 A	CAN bus output module 9, register 3
F74	10 A	Control computer + control computer PDE, emergency stop
F75	10 A	CAN bus output module 18, register 2
F76	15 A	Cabin ventilator, interior cabin lighting, voltage supply, engine diagnosis plug
F81	10 A	CAN bus output module 17, register 1-3
F82	10 A	CAN bus output module 18, register 1, 3, 4
F83	10 A	CAN bus output module 19
F84	10 A	CAN bus output module 9, register 1
F85	10 A	CAN bus output module 9, register 2
F86	10 A	CAN bus output module 10, register 1
F87	10 A	CAN bus output module 10, register 2
F88	10 A	CAN bus output module 10, register 3
F89	10 A	CAN bus output module 10, register 4
F90	10 A	Monitoring relay LED+, cabin tilt
F90.1	10 A	Hydraulic grab
F90.2	10 A	CAN bus output module 20
F91	10 A	Optional fuse OLN, SCR hose heaters
F92	10 A	AGR fuse
F93	10 A	AGR fuse
F94	10 A	DK fuse
F95	10 A	Lambda fuse
F96	10 A	Lambda fuse

Tab. 392: List of fuses

Fuse	Rating	Module
F11	10 A	Auxiliary heating
F12	16 A	Auxiliary heating
F13	10 A	Cabin elevation
F14	6 A	Obstacle warning light
F15	16 A	Hydraulic grab, slurry wall grab
F16	20 A	Hydraulic grab
F17	50 A	Slurry wall grab
F18	10 A	Floodlights on boom
F19	25 A	Refueling pump
F20	16 A	Floodlights on main boom head
F61	20 A	Slurry wall grab
F62		Slurry wall grab
F63	10 A	Slurry wall grab
F64	10 A	Slurry wall grab
F65	10 A	Slurry wall grab
F66	10 A	Slurry wall grab
F101	10 A	Counterweight limit switch, Diseko module
F102	10 A	Counterweight limit switch, Diseko module
F103	10 A	Counterweight limit switch, Diseko module
F104	10 A	Counterweight limit switch
F105		
F106		
F111	10 A	Counterweight limit switch, Diseko module
F112	10 A	Counterweight limit switch, Diseko module
F113	10 A	Counterweight limit switch, Diseko module
F114		
F115		
F116		

Tab. 393: List of fuses - optional additional equipment

5.3.2 Checking fuses

The switch cabinet is located behind the cabin.

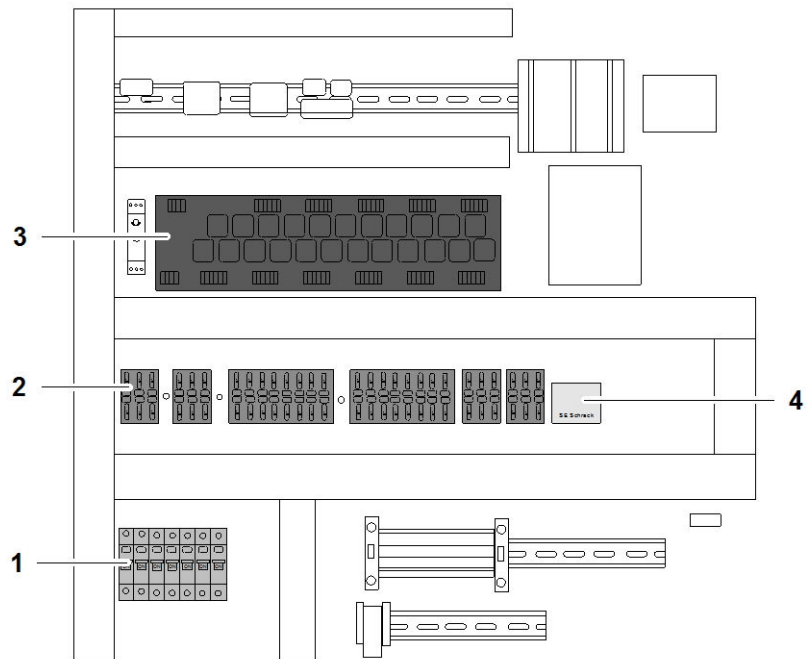


Fig. 2876: Switch cabinet

- | | |
|--|---|
| <p>1 Automatic circuit breaker</p> <p>2 Flat fuse elements</p> | <p>3 Changeover relay</p> <p>4 Fuse box with reserve fuses, fuse checker and holder</p> |
|--|---|

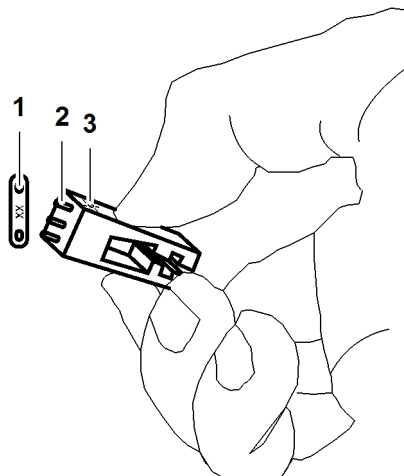


Fig. 2877: Checking fuses

- | | |
|-----------------------------------|--------------|
| <p>1 Fuse</p> <p>2 Metal pins</p> | <p>3 LED</p> |
|-----------------------------------|--------------|

The fuse is OK if the green LED 3 on the fuse checker is lit.

- ▶ Checking fuses: Hold fuse checker with metal pins 2 to the live fuse 1.

Troubleshooting

The green LED 3 on the fuse checker is not lit?

- ▶ Change fuse.
-

5.3.3 Changing fuses

NOTICE

Wrong fuses!
Damage to the electrical system.

- ▶ Switch off main battery switch.
 - ▶ Only use fuses that match the amperage (color coding) specified by the manufacturer.
-
- ▶ Switch off main battery switch.
 - ▶ Take matching fuse out of fuse box.

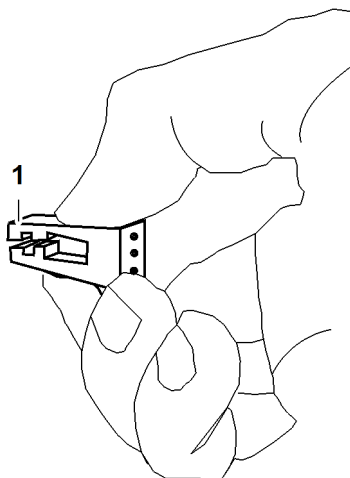


Fig. 2878: Change fuse

1 Safety bracket

- ▶ Changing the fuse: Pull defect fuse with fuse holder 1 out of socket.
- ▶ Insert new fuse with safety bracket 1 into fuse holder.

Operational planning 6

6 Operational planning

6 Operational planning

This section deals with the following subjects:

- Planning basics for secure and problem-free application



WARNING

Prohibited or improper procedure!
Severe injuries, damage to machine.

If the information in the operation manual is insufficient:

- ▶ contact Liebherr customer service.
-



WARNING

Incorrect work planning!
Severe injuries, damage to the machine.

- ▶ Always create a work plan before using the machine. Operational planning is vital for safe and problem-free operation of the machine.
-

Exemplary procedure:

- Plan how the machine and equipment are to be transported.
- Specify the type of application and the relevant operating mode.
- Discuss the weights and dimensions of the loads to be lifted.
- Note the load-bearing capacity of the ground.
- Plan the assembly site and note any spatial restrictions (such as buildings).
- Note overhead cables and underground pipes and cables, and the relevant safety distances.
- Note the influence of aircraft, transmitter and radar systems, the weather, etc.

This is just a small selection of the most important points in work planning.

6.1 Assembly site



DANGER

Ground has a limited bearing strength!
Machine toppling over.

- ▶ Observe the safety notes regarding the load-bearing capacity of the ground ([For more information see: 2.11.11 Ground bearing strength, page 619](#)).
-

The ground pressure being exerted by the machine in operation can be read off the optional ground pressure display.

The following maximum ground pressures occur below the jacks of the basic machine during assembly and when utilizing the self-assembly system:

Type	Maximum ground pressure
LR 1001	12 kg/cm ² 170.68 psi
LR 1002	12 kg/cm ² 170.68 psi
LR 1003	18 kg/cm ² 256.02 psi
LR 1004	12 kg/cm ² 170.68 psi
LR 1006	18.8 kg/cm ² 267.40 psi

Tab. 394: Ground pressures under the basic machine's jacks

Maximum ground pressures depending on counterweight of counterweight carriage*:

Counterweight carriage weight	Maximum ground pressure
19.2 t 42,328 lb	5.5 kg/cm ² 78.23 psi
33.6 t 74,074 lb	6.3 kg/cm ² 89.61 psi
48 t 105,820 lb	7.2 kg/cm ² 102.41 psi
62.4 t 137,566 lb	8.1 kg/cm ² 115.21 psi
76.8 t 169,313 lb	8.8 kg/cm ² 125.16 psi
91.2 t 201,059 lb	9.3 kg/cm ² 132.28 psi
105.6 t 232,805 lb	9.9 kg/cm ² 140.81 psi
120 t 264,551 lb	10.2 kg/cm ² 145.08 psi

Tab. 395: Ground pressures below counterweight carriage*

Maximum ground pressures depending on counterweight of suspended counterweight*:

Suspended counterweight weight	Maximum ground pressure
4 t 8,818 lb	0.33 kg/cm ² 4.69 psi
20 t 44,092 lb	1.66 kg/cm ² 23.61 psi
40 t 88,184 lb	3.32 kg/cm ² 47.22 psi

Suspended counterweight weight	Maximum ground pressure
60 t 132,275 lb	4.99 kg/cm ² 70.97 psi
80 t 176,367 lb	6.65 kg/cm ² 94.58 psi
100 t 220,459 lb	8.31 kg/cm ² 118.19 psi
120 t 264,551 lb	9.97 kg/cm ² 141.80 psi

Tab. 396: Ground pressures below suspended counterweight*

6.2 Tools required

We recommend the following equipment for assembling the machine:

- Wooden blocks for supporting the boom components
- Permitted grease for lubricating the pins ([For more information see: 9.2.3 Lubrication chart, page 1949](#))

6.2.1 Machine with self-assembly system

The machine is designed to be assembled without the need for an assist crane.

If there is not enough space or the ground conditions are not suitable for self assembly, an assist crane should be used for support.

All the rigging is supplied.

6.2.2 Machine without self-assembly system



WARNING

Incorrect work planning!

- ▶ Consider what aids will be necessary when assembling a machine without a self-assembly system ([For more information see: 7.33 Assembling the machine without a self-assembly system, page 1861](#)) .
 - ▶ Any questions or uncertainties must be referred to Liebherr after sales service for clarification.
-

The customer is responsible for selecting the appropriate tools.

6.3 Required length of winch1/winch2 rope

The length of the winch1/winch2 ropes depends on the following factors:

- boom pendant strap
- Boom length
- the minimum radius of the boom
- Reeving

The following formula is used to roughly calculate the rope length of winch1/winch2 needed to lower the hook or pulley block to the ground.

6.3.1 Calculating the length of winch1/winch2 rope

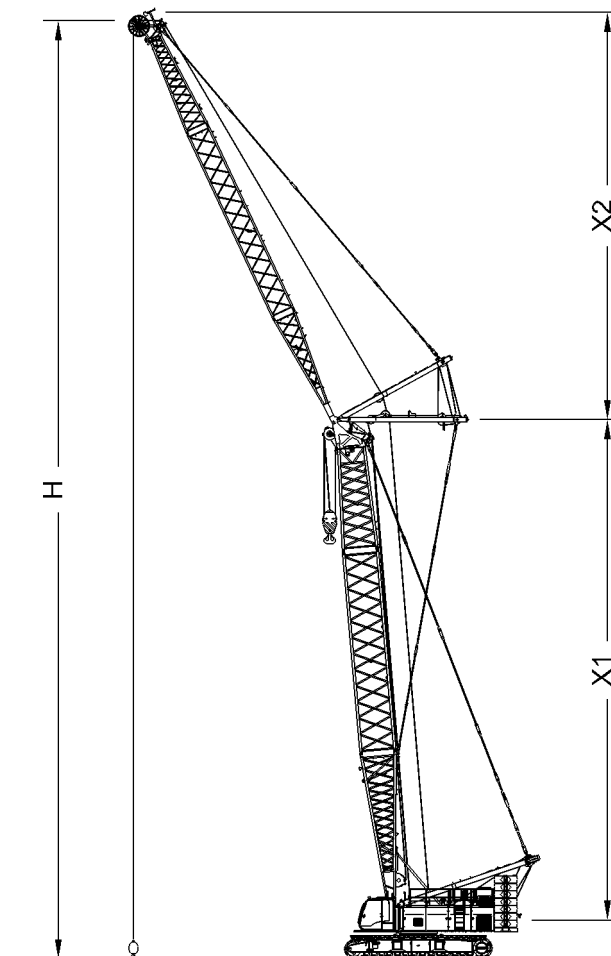


Fig. 2879: Calculating the length of winch1/winch2 rope

$$S = X1 + X2 + (n \times H) + 3_{sw} + R$$

Abbreviations	Designation
S	Length of winch1/winch2 rope
X1	Main boom length
X2	Jib length
n	Number of reevings

Required length of winch1/winch2 rope

Abbreviations	Designation
H	Pulley height: Maximum value from the current load chart
3_{sw}	Safety windings: approx. 7 m (23' ft-in) length of rope remaining on the winch
R	Reserve: allows for the rope sag and the rope lying on the rope pulleys

Tab. 397: Explanation of the variables for calculating the rope length of winch1/
winch2

6.4 Choosing the correct hook or pulley block

NOTICE

Incorrect hook or pulley block selected!

Pulley blocks or hooks with too low an unladen weight cannot be lowered.

Pulley blocks or hooks with an excessively high unladen weight reduce the maximum lifting capacity.

- ▶ Select the hook and/or pulley block using the table below.
- ▶ For pulley blocks or hooks with removable counterweight slabs, the weight must be selected so that the minimum weight for the boom length is attained.

Ensure that the following conditions are fulfilled:

- The hook or pulley block is permissible for the load to be lifted.
- The groove diameter of the pulley block matches the rope diameter.
- The unladen weight of the hook or pulley block is sufficient for the boom length and reeving.

Rope reeving	1	2	3	4	5	6	7	8	9	10
Total boom length	Dead weight of the hook/pulley block									
190 m 623 ft	1150 kg 2,535 lb	2050 kg 4,519 lb								
180 m 590 ft	1100 kg 2,425 lb	1900 kg 4,189 lb	3000 kg 6,614 lb							
170 m 558 ft	1000 kg 2,205 lb	1800 kg 3,968 lb	2800 kg 6,173 lb							
150 m 492 ft	900 kg 1,984 lb	1600 kg 3,527 lb	2500 kg 5,511 lb							
130 m 426 ft	800 kg 1,764 lb	1400 kg 3,086 lb	2150 kg 4,740 lb							
120 m 393 ft	700 kg 1,543 lb	1300 kg 2,866 lb	2000 kg 4,409 lb	2750 kg 6,063 lb						
110 m 360 ft	650 kg 1,433 lb	1200 kg 2,646 lb	1800 kg 3,968 lb	2500 kg 5,511 lb						
100 m 328 ft	600 kg 1,323 lb	1050 kg 2,315 lb	1650 kg 3,638 lb	2300 kg 5,071 lb	2950 kg 6,504 lb					
90 m 295 ft	550 kg 1,213 lb	950 kg 2,094 lb	1500 kg 3,307 lb	2050 kg 4,519 lb	2650 kg 5,842 lb	3300 kg 7,275 lb				
80 m 262 ft	500 kg 1,102 lb	850 kg 1,874 lb	1350 kg 2,976 lb	1850 kg 4,078 lb	2350 kg 5,181 lb	2900 kg 6,393 lb	3500 kg 7,716 lb			
70 m 230 ft	450 kg 992 lb	750 kg 1,653 lb	1200 kg 2,646 lb	1600 kg 3,527 lb	2100 kg 4,630 lb	2550 kg 5,622 lb	3100 kg 6,834 lb	3600 kg 7,937 lb		
60 m 197 ft	350 kg 772 lb	650 kg 1,433 lb	1000 kg 2,205 lb	1400 kg 3,086 lb	1800 kg 3,968 lb	2200 kg 4,850 lb	2650 kg 5,842 lb	3100 kg 6,834 lb	3600 kg 7,937 lb	
50 m 164 ft	300 kg 661 lb	550 kg 1,213 lb	850 kg 1,874 lb	1150 kg 2,535 lb	1500 kg 3,307 lb	1850 kg 4,078 lb	2200 kg 4,850 lb	2600 kg 5,732 lb	3000 kg 6,614 lb	3450 kg 7,606 lb

Choosing the correct hook or pulley block

Rope reeving	1	2	3	4	5	6	7	8	9	10
Total boom length	Dead weight of the hook/pulley block									
40 m 131 ft	250 kg 551 lb	450 kg 992 lb	650 kg 1,433 lb	950 kg 2,094 lb	1200 kg 2,646 lb	1500 kg 3,307 lb	1800 kg 3,968 lb	2100 kg 4,630 lb	2400 kg 5,291 lb	2750 kg 6,063 lb
30 m 98 ft	200 kg 441 lb	350 kg 772 lb	500 kg 1,102 lb	700 kg 1,543 lb	900 kg 1,984 lb	1100 kg 2,425 lb	1350 kg 2,976 lb	1600 kg 3,527 lb	1800 kg 3,968 lb	2100 kg 4,630 lb
20 m 66 ft	150 kg 331 lb	250 kg 551 lb	350 kg 772 lb	500 kg 1,102 lb	600 kg 1,323 lb	750 kg 1,653 lb	900 kg 1,984 lb	1100 kg 2,425 lb	1250 kg 2,756 lb	1400 kg 3,086 lb

Tab. 398: Selecting the hook/pulley block for reeving 1 to 10

Rope reeving	11	12	13	14	15	16	17	18	19	20
Total boom length	Dead weight of the hook/pulley block									
50 m 164 ft	3900 kg 8,598 lb	4350 kg 9,590 lb	4800 kg 10,582 lb	5300 kg 11,684 lb						
40 m 131 ft	3100 kg 6,834 lb	3500 kg 7,716 lb	3900 kg 8,598 lb	4300 kg 9,480 lb	4700 kg 10,362 lb	5150 kg 11,354 lb				
30 m 98 ft	2350 kg 5,181 lb	2650 kg 5,842 lb	2950 kg 6,504 lb	3250 kg 7,165 lb	3550 kg 7,826 lb	3900 kg 8,598 lb	4250 kg 9,370 lb	4600 kg 10,141 lb	4950 kg 10,913 lb	5350 kg 11,795 lb
20 m 66 ft	1600 kg 3,527 lb	1800 kg 3,968 lb	2000 kg 4,409 lb	2200 kg 4,850 lb	2400 kg 5,291 lb	2650 kg 5,842 lb	2900 kg 6,393 lb	3100 kg 6,834 lb	3350 kg 7,385 lb	3600 kg 7,937 lb

Tab. 399: Selecting the hook/pulley block for reeving 11 to 20

6.5 Positioning the hook or pulley block



DANGER

Incorrect positioning or raising of the the hook or pulley block when erecting!

- ▶ The permitted weight of the hook or pulley block is listed in the load chart.
 - ▶ Only erect when the hook/pulley block is on the ground.
 - ▶ Slacking of the rope must be avoided when erecting.
 - ▶ Do not drag the hook or pulley block.
 - ▶ Ensure that there is no diagonal pull when lifting the hook or pulley block.
 - ▶ Do not raise the hook or pulley block without a valid load chart.
-

The positioning of the hook or pulley block is dependent in each case on their own dead weight, which can be found in the load chart.

The weight of the hook or pulley block can be found on a plate on the hook or pulley block.

6.6 Choice of correct winch in derrick operation



WARNING

Incorrect winch function(s)!
Severe injuries, damage to machine.

► Use the winches exclusively as shown.

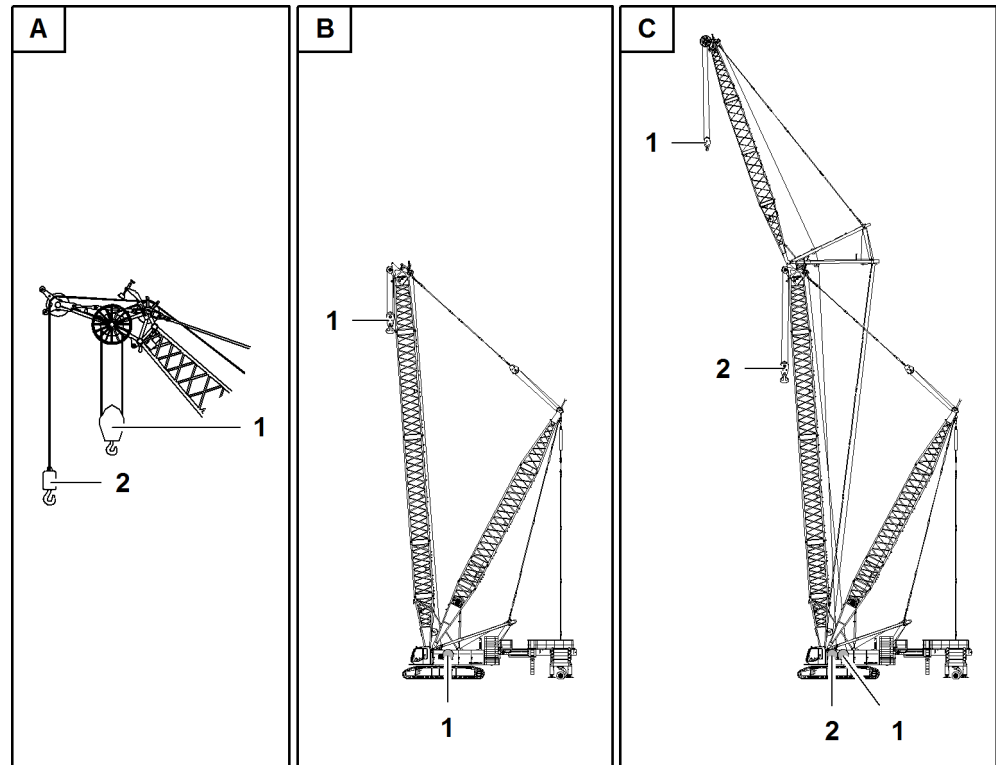


Fig. 2880: Choice of correct winch in derrick mode

- | | | | |
|----------|--|----------|-----------------|
| 1 | Winch 1 | B | Main boom |
| 2 | Winch 2 | C | Main boom + jib |
| A | Main boom + auxiliary jib or jib + auxiliary jib | | |

6.7 Restrictions due to exposure to wind



DANGER

Fatal exposure to wind!
Toppling of machine, structural breakdown.

- ▶ Observe general safety notices concerning exposure to wind ([For more information see: 2.11.9 Exposure to wind, page 612](#)).

The procedure for higher wind speeds during operation of the machine orients itself on the subsequent three steps:

- Reducing the load
- Setting boom to parked position
- Lay down boom

6.7.1 Erecting the boom



DANGER

Excessive wind load!
Toppling of machine, structural breakdown.

If the maximum admissible wind speed according to the foreword of the valid load chart has been reached:

- ▶ Do not erect boom.

If wind speeds above the maximum admissible wind speed according to the foreword of the valid load chart are reached or expected, the boom may not be erected.

6.7.2 Reducing the load

With the corresponding wind speeds, the load must be reduced in accordance with the following charts. The charts show minimum values. All stated wind speeds are 3 second wind gust speeds measured at maximum boom height. The stated wind speeds are only valid in wide track operation and with all counterweights attached to the machine. In case of deviating machine configuration: Contact Liebherr customer service. The machine operator is responsible for reducing the load and adapting the work mode.

Load reduction for a machine without derrick equipment*

Load reduction of main boom 2821 (+ auxiliary jib)

Load reduction for a machine with CE load chart



CE

Restrictions due to exposure to wind

Main boom length	All
Wind speed	Reduction of load by
10 m/s 32.81 ft/s	0%
12 m/s 39.37 ft/s	10%
14 m/s 45.93 ft/s	20%
16 m/s 52.49 ft/s	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 400: Load reduction of main boom 2821 (+ auxiliary jib)



ANSI

Load reduction for a machine with ANSI load chart

Main boom length	All
Wind speed	Reduction of load by
7 m/s 22.97 ft/s	0%
9 m/s 29.53 ft/s	10%
11 m/s 36.09 ft/s	
13 m/s 42.65 ft/s	20%
16 m/s 52.49 ft/s	30%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 401: Load reduction of main boom 2821 (+ auxiliary jib)

Load reduction of main boom 2821 + reducing adapter 2821/2316



CE

Load reduction for a machine with CE load chart

Main boom length	All
Wind speed	Reduction of load by
10 m/s 32.81 ft/s	0%

Main boom length	All
Wind speed	Reduction of load by
12 m/s 39.37 ft/s	10%
14 m/s 45.93 ft/s	
16 m/s 52.49 ft/s	20%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 402: Load reduction of main boom 2821 + reducing adapter 2821/2316



Load reduction for a machine with ANSI load chart

Main boom length	All
Wind speed	Reduction of load by
7 m/s 22.97 ft/s	0%
9 m/s 29.53 ft/s	10%
11 m/s 36.09 ft/s	
13 m/s 42.65 ft/s	20%
16 m/s 52.49 ft/s	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 403: Load reduction of main boom 2821 + reducing adapter 2821/2316

Load reduction of main boom 2821 + fixed jib 1713



Load reduction for a machine with CE load chart

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
10 m/s 32.81 ft/s	0%
12 m/s 39.37 ft/s	10%

Restrictions due to exposure to wind

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
14 m/s 45.93 ft/s	20%
16 m/s 52.49 ft/s	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 404: Load reduction of main boom 2821 + fixed jib 1713



ANSI

Load reduction for a machine with ANSI load chart

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
7 m/s 22.97 ft/s	0%
9 m/s 29.53 ft/s	10%
11 m/s 36.09 ft/s	
13 m/s 42.65 ft/s	20%
16 m/s 52.49 ft/s	30%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 405: Load reduction of main boom 2821 + fixed jib 1713

Load reduction of main boom 2821 + fixed jib 1507

CE

Load reduction for a machine with CE load chart

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
10 m/s 32.81 ft/s	0%
12 m/s 39.37 ft/s	10%

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
14 m/s 45.93 ft/s	20%
16 m/s 52.49 ft/s	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 406: Load reduction of main boom 2821 + fixed jib 1507



ANSI

Load reduction for a machine with ANSI load chart

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
7 m/s 22.97 ft/s	0%
9 m/s 29.53 ft/s	10%
11 m/s 36.09 ft/s	
13 m/s 42.65 ft/s	20%
16 m/s 52.49 ft/s	30%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 407: Load reduction of main boom 2821 + fixed jib 1507

Load reduction of main boom 2821 + fixed jib 1008

CE

Load reduction for a machine with CE load chart

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
10 m/s 32.81 ft/s	0%
12 m/s 39.37 ft/s	20%
14 m/s 45.93 ft/s	

Restrictions due to exposure to wind

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
16 m/s 52.49 ft/s	30%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 408: Load reduction of main boom 2821 + fixed jib 1008



ANSI

Load reduction for a machine with ANSI load chart

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
7 m/s 22.97 ft/s	0%
9 m/s 29.53 ft/s	10%
11 m/s 36.09 ft/s	
13 m/s 42.65 ft/s	20%
16 m/s 52.49 ft/s	30%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 409: Load reduction of main boom 2821 + fixed jib 1008

Load reduction of main boom 2821 + fixed jib 0906

CE

Load reduction for a machine with CE load chart

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
10 m/s 32.81 ft/s	0%
12 m/s 39.37 ft/s	10%
14 m/s 45.93 ft/s	20%
16 m/s 52.49 ft/s	

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 410: Load reduction of main boom 2821 + fixed jib 0906



Load reduction for a machine with ANSI load chart

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
7 m/s 22.97 ft/s	0%
9 m/s 29.53 ft/s	10%
11 m/s 36.09 ft/s	
13 m/s 42.65 ft/s	20%
16 m/s 52.49 ft/s	30%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 411: Load reduction of main boom 2821 + fixed jib 0906

Load reduction of main boom 2821 + luffing jib 2316 (+ auxiliary jib)



Load reduction for a machine with CE load chart

Main boom length	All			
Jib length	20 m (66 ft) to 26 m (85 ft)	29 m (95 ft) to 50 m (164 ft)	53 m (174 ft) to 74 m (243 ft)	77 m (253 ft) to 113 m (371 ft)
Wind speed	Reduction of load by			
10 m/s 32.81 ft/s	0%	0%	0%	0%

Restrictions due to exposure to wind

Main boom length	All			
Jib length	20 m (66 ft) to 26 m (85 ft)	29 m (95 ft) to 50 m (164 ft)	53 m (174 ft) to 74 m (243 ft)	77 m (253 ft) to 113 m (371 ft)
Wind speed	Reduction of load by			
12 m/s 39.37 ft/s	10%	20%	40%	100%
14 m/s 45.93 ft/s	20%	30%	70%	
16 m/s 52.49 ft/s	30%	40%	90%	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited			

Tab. 412: Load reduction of main boom 2821 + luffing jib 2316 (+ auxiliary jib)



ANSI

Load reduction for a machine with ANSI load chart

Main boom length	All				
Jib length	20 m (66 ft) to 26 m (85 ft)	29 m (95 ft) to 50 m (164 ft)	53 m (174 ft) to 74 m (243 ft)	77 m (253 ft) to 92 m (302 ft)	95 m (312 ft) to 113 m (371 ft)
Wind speed	Reduction of load by				
7 m/s 22.97 ft/s	0%	0%	0%	0%	0%
9 m/s 29.53 ft/s	10%	10%	10%	10%	100%
11 m/s 36.09 ft/s	20%	20%	20%	40%	
13 m/s 42.65 ft/s		30%	40%	70%	
16 m/s 52.49 ft/s	30%	50%	70%	100%	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited				

Tab. 413: Load reduction of main boom 2821 + luffing jib 2316 (+ auxiliary jib)

Load reduction of main boom 2821 + luffing jib 1916 (+ auxiliary jib)



Load reduction for a machine with CE load chart

Main boom length	All			
Jib length	20 m (66 ft) to 26 m (85 ft)	29 m (95 ft) to 50 m (164 ft)	53 m (174 ft) to 74 m (243 ft)	77 m (253 ft) to 95 m (312 ft)
Wind speed	Reduction of load by			
10 m/s 32.81 ft/s	0%	0%	0%	0%
12 m/s 39.37 ft/s	10%	20%	30%	70%
14 m/s 45.93 ft/s	20%	30%	50%	80%
16 m/s 52.49 ft/s	30%	40%	80%	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited			

Tab. 414: Load reduction of main boom 2821 + luffing jib 1916 (+ auxiliary jib)



Load reduction for a machine with ANSI load chart

Main boom length	All		
Jib length	20 m (66 ft) to 50 m (164 ft)	53 m (174 ft) to 74 m (243 ft)	77 m (253 ft) to 95 m (312 ft)
Wind speed	Reduction of load by		
7 m/s 22.97 ft/s	0%	0%	0%
9 m/s 29.53 ft/s		10%	10%
11 m/s 36.09 ft/s			30%
13 m/s 42.65 ft/s		10%	40%
16 m/s 52.49 ft/s	20%	50%	90%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 415: Load reduction of main boom 2821 + luffing jib 1916 (+ auxiliary jib)

Load reduction of main boom 2821 + luffing jib 2316 + midfall 2316



Load reduction for a machine with CE load chart

Main boom length	All		
Jib length	38.5 m (126 ft) to 50.5 m (166 ft)	53.5 m (176 ft) to 74.5 m (244 ft)	77.5 m (254 ft) to 110.5 m (362 ft)
Wind speed	Reduction of load by		
10 m/s 32.81 ft/s	0%	0%	0%
12 m/s 39.37 ft/s	20%	40%	100%
14 m/s 45.93 ft/s	30%	70%	
16 m/s 52.49 ft/s	40%	90%	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 416: Load reduction of main boom 2821 + luffing jib 2316 + midfall 2316



Load reduction for a machine with ANSI load chart

Main boom length	All			
Jib length	38.5 m (126 ft) to 50.5 m (166 ft)	53.5 m (176 ft) to 74.5 m (244 ft)	77.5 m (254 ft) to 92.5 m (304 ft)	95.5 m (313 ft) to 110.5 m (362 ft)
Wind speed	Reduction of load by			
7 m/s 22.97 ft/s	0%	0%	0%	0%
9 m/s 29.53 ft/s	10%	10%	10%	100%
11 m/s 36.09 ft/s	20%	20%	40%	
13 m/s 42.65 ft/s	30%	40%	70%	
16 m/s 52.49 ft/s	50%	70%	100%	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited			

Tab. 417: Load reduction of main boom 2821 + luffing jib 2316 + midfall 2316

Load reduction of main boom 2821 + luffing jib 1916 + midfall 1916



Load reduction for a machine with CE load chart

Main boom length	All		
Jib length	32.5 m (107 ft) to 50.5 m (166 ft)	53.5 m (176 ft) to 74.5 m (244 ft)	77.5 m (254 ft) to 95.5 m (313 ft)
Wind speed	Reduction of load by		
10 m/s 32.81 ft/s	0%	0%	0%
12 m/s 39.37 ft/s	20%	30%	70%
14 m/s 45.93 ft/s	30%	50%	80%
16 m/s 52.49 ft/s	40%	80%	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 418: Load reduction of main boom 2821 + luffing jib 1916 + midfall 1916



Load reduction for a machine with ANSI load chart

Main boom length	All		
Jib length	32.5 m (107 ft) to 50.5 m (166 ft)	53.5 m (176 ft) to 74.5 m (244 ft)	77.5 m (254 ft) to 95.5 m (313 ft)
Wind speed	Reduction of load by		
7 m/s 22.97 ft/s	0%	0%	0%
9 m/s 29.53 ft/s		10%	10%
11 m/s 36.09 ft/s			30%
13 m/s 42.65 ft/s		10%	40%
16 m/s 52.49 ft/s	20%	50%	90%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 419: Load reduction of main boom 2821 + luffing jib 1916 + midfall 1916

Load reduction for a machine with derrick equipment*

Load reduction main boom 2821 + derrick (+ auxiliary jib)



Load reduction for a machine with CE load chart

Main boom length	44 m (144 ft) to 65 m (213 ft)	68 m (223 ft) to 101 m (331 ft)	104 m (341 ft) to 119 m (390 ft)
Wind speed	Reduction of load by		
10 m/s 32.81 ft/s	0%	0%	0%
12 m/s 39.37 ft/s ^{A)}	10%	20%	20%
14 m/s 45.93 ft/s ^{A) B)}	20%	30%	40%
16 m/s 52.49 ft/s ^{A) B)}	30%	50%	60%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 420: Load reduction main boom 2821 + derrick (+ auxiliary jib)

- A) Minimum reduction 2 t (4,409 lb).
 B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.



Load reduction for a machine with ANSI load chart

Main boom length	44 m (144 ft) to 77 m (253 ft)	80 m (262 ft) to 101 m (331 ft)	104 m (341 ft) to 119 m (390 ft)
Wind speed	Reduction of load by		
7 m/s 22.97 ft/s	0%	0%	0%
9 m/s 29.53 ft/s ^{A)}	10%	10%	10%
11 m/s 36.09 ft/s ^{A)}	20%	30%	30%
13 m/s 42.65 ft/s ^{A) B)}	30%	40%	40%
16 m/s 52.49 ft/s ^{A) B)}	50%	60%	70%

Main boom length	44 m (144 ft) to 77 m (253 ft)	80 m (262 ft) to 101 m (331 ft)	104 m (341 ft) to 119 m (390 ft)
Wind speed	Reduction of load by		
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 421: Load reduction main boom 2821 + derrick (+ auxiliary jib)

- A) Minimum reduction 2 t (4,409 lb).
- B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.

Load reduction main boom 2821 + fixed jib 1713 + derrick



Load reduction for a machine with CE load chart

Main boom length	50 m (164 ft) to 62 m (203 ft)	65 m (213 ft) to 98 m (322 ft)	101 m (332 ft) to 110 m (361 ft)
Jib length	All		
Wind speed	Reduction of load by		
10 m/s 32.81 ft/s	0%	0%	0%
12 m/s 39.37 ft/s A) B)	10%	10%	10%
14 m/s 45.93 ft/s A) B)		20%	40%
16 m/s 52.49 ft/s A) B)		30%	50%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 422: Load reduction main boom 2821 + fixed jib 1713 + derrick

- A) Minimum reduction 2 t (4,409 lb).
- B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.



Load reduction for a machine with ANSI load chart

Main boom length	50 m (164 ft) to 62 m (203 ft)	65 m (213 ft) to 98 m (322 ft)	101 m (331 ft) to 110 m (361 ft)
Jib length	All		
Wind speed	Reduction of load by		
7 m/s 22.97 ft/s	0%	0%	0%
9 m/s 29.53 ft/s ^{A)}		10%	10%
11 m/s 36.09 ft/s ^{A)}	10%	20%	20%
13 m/s 42.65 ft/s ^{A) B)}		30%	40%
16 m/s 52.49 ft/s ^{A) B)}		40%	50%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 423: Load reduction main boom 2821 + fixed jib 1713 + derrick

- A) Minimum reduction 2 t (4,409 lb).
 B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.

Load reduction main boom 2821 + fixed jib 1507 + derrick



Load reduction for a machine with CE load chart

Main boom length	44 m (144 ft) to 80 m (262 ft)	83 m (272 ft) to 113 m (371 ft)
Jib length	All	
Wind speed	Reduction of load by	
10 m/s 32.81 ft/s	0%	0%
12 m/s 39.37 ft/s ^{A)}	10%	20%
14 m/s 45.93 ft/s ^{A) B)}	20%	30%
16 m/s 52.49 ft/s ^{A) B)}	30%	40%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited	

Tab. 424: Load reduction main boom 2821 + fixed jib 1507 + derrick

- A) Minimum reduction 2 t (4,409 lb).

- B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.



Load reduction for a machine with ANSI load chart

Main boom length	All
Jib length	All
Wind speed	Reduction of load by
7 m/s 22.97 ft/s	0%
9 m/s 29.53 ft/s ^{A)}	10%
11 m/s 36.09 ft/s ^{A)}	20%
13 m/s 42.65 ft/s ^{A) B)}	30%
16 m/s 52.49 ft/s ^{A) B)}	50%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited

Tab. 425: Load reduction main boom 2821 + fixed jib 1507 + derrick

- A) Minimum reduction 2 t (4,409 lb).
- B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.

Load reduction main boom 2821 + fixed jib 1008 + derrick



Load reduction for a machine with CE load chart

Main boom length	44 m (144 ft) to 62 m (203 ft)	65 m (213 ft) to 110 m (361 ft)
Jib length	All	
Wind speed	Reduction of load by	
10 m/s 32.81 ft/s	0%	0%

Main boom length	44 m (144 ft) to 62 m (203 ft)	65 m (213 ft) to 110 m (361 ft)
Jib length	All	
Wind speed	Reduction of load by	
12 m/s 39.37 ft/s ^{A)}	10%	10%
14 m/s 45.93 ft/s ^{A) B)}		20%
16 m/s 52.49 ft/s ^{A) B)}	20%	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited	

Tab. 426: Load reduction main boom 2821 + fixed jib 1008 + derrick

- A) Minimum reduction 2 t (4,409 lb).
 B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.



ANSI

Load reduction for a machine with ANSI load chart

Main boom length	44 m (144 ft) to 62 m (203 ft)	65 m (213 ft) to 86 m (282 ft)	89 m (292 ft) to 110 m (361 ft)
Jib length	All		
Wind speed	Reduction of load by		
7 m/s 22.97 ft/s	0%	0%	0%
9 m/s 29.53 ft/s ^{A)}	10%	10%	10%
11 m/s 36.09 ft/s ^{A)}			20%
13 m/s 42.65 ft/s ^{A) B)}			
16 m/s 52.49 ft/s ^{A) B)}	20%	30%	30%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 427: Load reduction main boom 2821 + fixed jib 1008 + derrick

- A) Minimum reduction 2 t (4,409 lb).
 B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.

Load reduction main boom 2821 + fixed jib 0906 + derrick**Load reduction for a machine with CE load chart**

Main boom length	50 m (164 ft) to 62 m (203 ft)	65 m (213 ft) to 80 m (262 ft)	83 m (272 ft) to 116 m (381 ft)
Jib length	All		
Wind speed	Reduction of load by		
10 m/s 32.81 ft/s	0%	0%	0%
12 m/s 39.37 ft/s ^{A)}	10%	10%	20%
14 m/s 45.93 ft/s ^{A) B)}		20%	30%
16 m/s 52.49 ft/s ^{A) B)}		40%	60%
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 428: Load reduction main boom 2821 + fixed jib 0906 + derrick

A) Minimum reduction 2 t (4,409 lb).

B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.

**Load reduction for a machine with ANSI load chart**

Main boom length	50 m (164 ft) to 62 m (203 ft)	65 m (213 ft) to 98 m (322 ft)	101 m (331 ft) to 116 m (381 ft)
Jib length	All		
Wind speed	Reduction of load by		
7 m/s 22.97 ft/s	0%	0%	0%
9 m/s 29.53 ft/s ^{A)}	10%	10%	10%
11 m/s 36.09 ft/s ^{A)}		20%	30%
13 m/s 42.65 ft/s ^{A) B)}		30%	40%
16 m/s 52.49 ft/s ^{A) B)}		50%	60%

Restrictions due to exposure to wind

Main boom length	50 m (164 ft) to 62 m (203 ft)	65 m (213 ft) to 98 m (322 ft)	101 m (331 ft) to 116 m (381 ft)
Jib length	All		
Wind speed	Reduction of load by		
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 429: Load reduction main boom 2821 + fixed jib 0906 + derrick

- A) Minimum reduction 2 t (4,409 lb).
 B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.

Load reduction main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib)



Load reduction for a machine with CE load chart

Main boom length	All			
Jib length	20 m (66 ft) to 32 m (105 ft)	35 m (115 ft) to 50 m (164 ft)	53 m (174 ft) to 68 m (223 ft)	71 m (233 ft) to 113 m (371 ft)
Wind speed	Reduction of load by			
10 m/s 32.81 ft/s	0%	0%	0%	0%
12 m/s 39.37 ft/s A)	20%	30%	60%	100%
14 m/s 45.93 ft/s A) B)	30%	50%	100%	
16 m/s 52.49 ft/s A) B)	50%	80%		
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited			

Tab. 430: Load reduction main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib)

- A) Minimum reduction 2 t (4,409 lb).
 B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.



Load reduction for a machine with ANSI load chart

Main boom length	All				
Jib length	20 m (66 ft) to 32 m (105 ft)	35 m (115 ft) to 50 m (164 ft)	53 m (174 ft) to 68 m (223 ft)	71 m (233 ft) to 86 m (282 ft)	89 m (292 ft) to 113 m (371 ft)
Wind speed	Reduction of load by				
7 m/s 22.97 ft/s	0%	0%	0%	0%	0%
9 m/s 29.53 ft/s ^{A)}	20%	20%	30%	50%	100%
11 m/s 36.09 ft/s ^{A)}	30%	40%	60%	90%	
13 m/s 42.65 ft/s ^{A) B)}	50%	60%	90%	100%	
16 m/s 52.49 ft/s ^{A) B)}	70%	90%	100%		
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited				

Tab. 431: Load reduction main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib)

- A) Minimum reduction 2 t (4,409 lb).
- B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.

Load reduction main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib)



Load reduction for a machine with CE load chart

Main boom length	All				
Jib length	20 m (66 ft) to 32 m (105 ft)	35 m (115 ft) to 44 m (144 ft)	47 m (154 ft) to 56 m (184 ft)	59 m (194 ft) to 68 m (223 ft)	71 m (233 ft) to 95 m (312 ft)
Wind speed	Reduction of load by				
10 m/s 32.81 ft/s	0%	0%	0%	0%	0%

Main boom length	All				
Jib length	20 m (66 ft) to 32 m (105 ft)	35 m (115 ft) to 44 m (144 ft)	47 m (154 ft) to 56 m (184 ft)	59 m (194 ft) to 68 m (223 ft)	71 m (233 ft) to 95 m (312 ft)
Wind speed	Reduction of load by				
12 m/s 39.37 ft/s ^{A)}	20%	20%	30%	40%	100%
14 m/s 45.93 ft/s ^{A) B)}	30%	40%	60%	100%	
16 m/s 52.49 ft/s ^{A) B)}	50%	60%	80%		
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited				

Tab. 432: Load reduction main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib)

- A) Minimum reduction 2 t (4,409 lb).
 B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.



ANSI

Load reduction for a machine with ANSI load chart

Main boom length	All		
Jib length	20 m (66 ft) to 44 m (144 ft)	47 m (154 ft) to 68 m (223 ft)	71 m (233 ft) to 95 m (312 ft)
Wind speed	Reduction of load by		
7 m/s 22.97 ft/s	0%	0%	0%
9 m/s 29.53 ft/s ^{A)}	10%	20%	30%
11 m/s 36.09 ft/s ^{A)}	30%	30%	50%
13 m/s 42.65 ft/s ^{A) B)}	40%	50%	100%
16 m/s 52.49 ft/s ^{A) B)}	60%	100%	
Above 16 m/s (52.49 ft/s)	100 % = operation prohibited		

Tab. 433: Load reduction main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib)

- A) Minimum reduction 2 t (4,409 lb).
- B) Increase "SWLmin" value by 10% when operating with suspended counterweight. In the load chart, the "SWLmin" value is shown in brackets under the load chart value. The "SWLmin" value is the load chart value required to lift the suspended counterweight off the ground.

6.7.3 Parked positions of boom configurations



DANGER

Wind speed too high!
Toppling of machine.

- ▶ Turn boom into the wind.
- ▶ Before the maximum permitted wind speed is exceeded, place boom in specified parked position.
- ▶ Lay the suspended counterweight/counterweight carriage on the ground.
- ▶ Relieve the strain on the holding ropes and/or pendant straps.
- ▶ Place load on the ground.
- ▶ Pull up hook.

The parked positions of the boom configurations apply for the stated maximum wind speeds in the following tables. If these values are exceeded, the boom must be laid down.

All stated wind speeds are 3 second wind gust speeds measured at maximum boom height. The stated wind speeds are only valid in wide track operation and with all counterweights attached to the machine. In case of deviating machine configuration: Contact Liebherr customer service.

Parked position for a machine without derrick equipment*

Parked position of main boom 2821 (+ auxiliary jib)

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	20 m (20 ft) to 26 m (85 ft)
Main boom angle	54° to 60°

Tab. 434: Parked position of main boom 2821 (+ auxiliary jib)

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	29 m (95 ft) to 104 m (341 ft)
Main boom angle	72° to 80°

Tab. 435: Parked position of main boom 2821 (+ auxiliary jib)

Parked position of main boom 2821 + reducing adapter 2821/2316

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	69 m (226 ft) to 114 m (374 ft)
Main boom angle	72° to 80°

Tab. 436: Parked position of main boom 2821 + reducing adapter 2821/2316

Description	Value
Maximum wind speed	20 m/s 65.62 ft/s
Main boom length	117 m (384 ft) to 123 m (404 ft)
Main boom angle	72° to 80°

Tab. 437: Parked position of main boom 2821 + reducing adapter 2821/2316

Parked position of main boom 2821 + fixed jib 1713

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	All
Main boom angle	72° to 78°
Jib length	All
Jib offset	15° or 30°

Tab. 438: Parked position of main boom 2821 + fixed jib 1713

Parked position of main boom 2821 + fixed jib 1507

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	20 m (66 ft) to 26 m (85 ft)
Main boom angle	68° to 72°
Jib offset	28 °

Tab. 439: Parked position of main boom 2821 + fixed jib 1507

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s

Description	Value
Main boom length	29 m (95 ft) to 86 m (282 ft)
Main boom angle	72° to 78°
Jib offset	28 °

Tab. 440: Parked position of main boom 2821 + fixed jib 1507

Parked position of main boom 2821 + fixed jib 1008

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	20 m (66 ft) to 26 m (85 ft)
Main boom angle	68° to 72°
Jib length	All
Jib offset	15° or 30°

Tab. 441: Parked position of main boom 2821 + fixed jib 1008

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	29 m (95 ft) to 86 m (282 ft)
Main boom angle	72° to 78°
Jib length	All
Jib offset	15° or 30°

Tab. 442: Parked position of main boom 2821 + fixed jib 1008

Parked position of main boom 2821 + fixed jib 0906

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	20 m (66 ft) to 26 m (85 ft)
Main boom angle	68° to 72°
Jib offset	30 °

Tab. 443: Parked position of main boom 2821 + fixed jib 0906

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	29 m (95 ft) to 95 m (312 ft)

Restrictions due to exposure to wind

Description	Value
Main boom angle	72° to 78°
Jib offset	30 °

Tab. 444: Parked position of main boom 2821 + fixed jib 0906

Parked position of main boom 2821 + luffing jib 2316 (+ auxiliary jib)

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	20 m (66 ft) to 74 m (243 ft)
Main boom angle	80 °
Jib length	20 m (66 ft) to 68 m (223 ft)
Jib angle	66° to 70°

Tab. 445: Parked position of main boom 2821 + luffing jib 2316 (+ auxiliary jib)

Description	Value
Maximum wind speed	18 m/s 59.06 ft/s
Main boom length	20 m (66 ft) to 74 m (243 ft)
Main boom angle	80 °
Jib length	71 m (233 ft) to 86 m (282 ft)
Jib angle	66° to 70°

Tab. 446: Parked position of main boom 2821 + luffing jib 2316 (+ auxiliary jib)



Note

- All combinations with a jib length from 89 m (292 ft) to 113 m (371 ft) must be laid down when the wind speed reaches a value at which work is no longer permitted (see preface of valid load chart).

Parked position of main boom 2821 + luffing jib 1916 (+ auxiliary jib)

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	20 m (66 ft) to 74 m (243 ft)
Main boom angle	80 °

Description	Value
Jib length	20 m (66 ft) to 80 m (262 ft)
Jib angle	66° to 70°

Tab. 447: Parked position of main boom 2821 + luffing jib 1916 (+ auxiliary jib)

Description	Value
Maximum wind speed	18 m/s 59.06 ft/s
Main boom length	20 m (66 ft) to 74 m (243 ft)
Main boom angle	80 °
Jib length	83 m (272 ft) to 95 m (312 ft)
Jib angle	64° to 70°

Tab. 448: Parked position of main boom 2821 + luffing jib 1916 (+ auxiliary jib)

Parked position of main boom 2821 + luffing jib 2316 + midfall 2316

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	20 m (66 ft) to 71 m (233 ft)
Main boom angle	80 °
Jib length	38.5 m (126 ft) to 65.5 m (215 ft)
Jib angle	66° to 70°

Tab. 449: Parked position of main boom 2821 + luffing jib 2316 + midfall 2316

Description	Value
Maximum wind speed	18 m/s 59.06 ft/s
Main boom length	20 m (66 ft) to 71 m (233 ft)
Main boom angle	80 °
Jib length	68.5 m (225 ft) to 83.5 m (274 ft)
Jib angle	66° to 70°

Tab. 450: Parked position of main boom 2821 + luffing jib 2316 + midfall 2316

**Note**

- ▶ All combinations above a jib length of 86.5 m (284 ft) must be laid down when the wind speed reaches a value at which work is no longer permitted (see preface of valid load chart).

Parked position of main boom 2821 + luffing jib 1916 + midfall 1916

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	20 m (66 ft) to 74 m (243 ft)
Main boom angle	80 °
Jib length	32.5 m (107 ft) to 77.5 m (254 ft)
Jib angle	66° to 70°

Tab. 451: Parked position of main boom 2821 + luffing jib 1916 + midfall 1916

Description	Value
Maximum wind speed	18 m/s 59.06 ft/s
Main boom length	20 m (66 ft) to 74 m (243 ft)
Main boom angle	80 °
Jib length	80.5 m (264 ft) to 95.5 m (313 ft)
Jib angle	64° to 70°

Tab. 452: Parked position of main boom 2821 + luffing jib 1916 + midfall 1916

Parked position for a machine with derrick equipment*

Parked position main boom 2821 + derrick (+ auxiliary jib)

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	44 m (144 ft) to 98 m (322 ft)
Main boom angle	74° to 78°

Tab. 453: Parked position main boom 2821 + derrick (+ auxiliary jib)

Description	Value
Maximum wind speed	20 m/s 66 ft
Main boom length	101 m (331 ft) to 119 m (390 ft)
Main boom angle	74° to 78°

Tab. 454: Parked position main boom 2821 + derrick (+ auxiliary jib)

Parked position main boom 2821 + fixed jib 1713 + derrick

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	50 m (164 ft) to 95 m (312 ft)
Main boom angle	78° to 80°
Jib length	All
Jib offset	15° or 30°

Tab. 455: Parked position main boom 2821 + fixed jib 1713 + derrick

Description	Value
Maximum wind speed	20 m/s 65.62 ft/s
Main boom length	98 m (322 ft) to 110 m (361 ft)
Main boom angle	78° to 80°
Jib length	All
Jib offset	15° or 30°

Tab. 456: Parked position main boom 2821 + fixed jib 1713 + derrick

Parked position main boom 2821 + fixed jib 1507 + derrick

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	44 m (144 ft) to 98 m (322 ft)
Main boom angle	72° to 80°
Jib offset	28 °

Tab. 457: Parked position main boom 2821 + fixed jib 1507 + derrick

Restrictions due to exposure to wind

Description	Value
Maximum wind speed	20 m/s 65.62 ft/s
Main boom length	101 m (331 ft) to 113 m (371 ft)
Main boom angle	72° to 80°
Jib offset	28 °

Tab. 458: Parked position main boom 2821 + fixed jib 1507 + derrick

Parked position main boom 2821 + fixed jib 1008 + derrick

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	44 m (144 ft) to 95 m (312 ft)
Main boom angle	72° to 80°
Jib length	All
Jib offset	15° or 30°

Tab. 459: Parked position main boom 2821 + fixed jib 1008 + derrick

Description	Value
Maximum wind speed	19 m/s 62.34 ft/s
Main boom length	98 m (322 ft) to 110 m (361 ft)
Main boom angle	78° to 80°
Jib length	All
Jib offset	15° or 30°

Tab. 460: Parked position main boom 2821 + fixed jib 1008 + derrick

Parked position main boom 2821 + fixed jib 0906 + derrick

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	44 m (144 ft) to 98 m (322 ft)
Main boom angle	72° to 80°
Jib offset	30 °

Tab. 461: Parked position main boom 2821 + fixed jib 0906 + derrick

Description	Value
Maximum wind speed	20 m/s 65.62 ft/s
Main boom length	101 m (331 ft) to 116 m (390 ft)
Main boom angle	72° to 80°
Jib offset	30 °

Tab. 462: Parked position main boom 2821 + fixed jib 0906 + derrick

Parked position main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib)

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	44 m (144 ft) to 86 m (282 ft)
Main boom angle	80 °
Jib length	20 m (66 ft) to 50 m (164 ft)
Jib angle	66° to 70°

Tab. 463: Parked position main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib)

Description	Value
Maximum wind speed	20 m/s 65.62 ft/s
Main boom length	44 m (144 ft) to 86 m (282 ft)
Main boom angle	80 °
Jib length	53 m (174 ft) to 68 m (223 ft)
Jib angle	66° to 70°

Tab. 464: Parked position main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib)

Description	Value
Maximum wind speed	18 m/s 59.06 ft/s
Main boom length	44 m (144 ft) to 86 m (282 ft)
Main boom angle	80 °
Jib length	71 m (233 ft) to 104 m (341 ft)

Restrictions due to exposure to wind

Description	Value
Jib angle	66° to 70°

Tab. 465: Parked position main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib)



Note

- Lay down boom combinations as of a jib length of 107 m (351 ft) or a total boom length of 160 m (525 ft) if the wind speed reaches a value at which work is no longer permissible (see foreword to valid load chart).

Parked position main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib)

Description	Value
Maximum wind speed	22 m/s 72.18 ft/s
Main boom length	44 m (144 ft) to 92 m (302 ft)
Main boom angle	80 °
Jib length	20 m (66 ft) to 56 m (184 ft)
Jib angle	66° to 70°

Tab. 466: Parked position main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib)

Description	Value
Maximum wind speed	18 m/s 59.06 ft/s
Main boom length	44 m (144) to 92 m (302 ft)
Main boom angle	80 °
Jib length	59 m (194 ft) to 80 m (262 ft)
Jib angle	66° to 70°

Tab. 467: Parked position main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib)

Description	Value
Maximum wind speed	14 m/s 45.93 ft/s
Main boom length	44 m (144) to 92 m (302 ft)
Main boom angle	80 °
Jib length	83 m (272 ft) to 95 m (312 ft)

Description	Value
Jib angle	66° to 70°

Tab. 468: Parked position main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib)

6.7.4 Lay down boom

The “laying-down wind speed” for the boom is reached when the maximum permissible wind speeds for the parked position are exceeded or expected to be exceeded.



DANGER

Excessive wind load!
Toppling of machine, structural breakdown.

- ▶ Lay down entire boom on the ground against the wind before maximum permissible wind speed is reached.

If it is not possible to lay down with a boom combination including luffing jib:

- ▶ Contact Liebherr customer service.

Observe the following safety guidelines and notes:

- Always lay down the entire main boom flat on the ground. Supporting the boom on an undulation always bears a residual danger. If the main boom is not set down completely (but only near the ground), this may lead to the destruction of the boom or the swing gear brake.
- Always set the main boom down so that it is facing either into or against the wind. If the main boom can only be set down crosswise to the wind direction due to limited space, then it must be set down before the wind speed reaches the maximum permissible speed.
- In bad weather or if a storm is forecast and work is to be interrupted for a day or more, or if the machine operator and helper will be absent, as a rule the entire boom must be placed on the ground.
- If it turns out during planning that the boom cannot be set down completely at the site due to a lack of space and danger of a storm: contact the manufacturer in time to arrange special protective measures against storm damage.



Note

Liebherr recommends:

- ▶ The safest measure is always to lay down the boom.

6.8 Traveling on gradients



DANGER

Incorrect traveling of machine on gradients!
Toppling of machine.

- ▶ Take great care with every travel movement of the machine.
- ▶ Avoid dynamic travel movements.



DANGER

Inadmissible traveling with suspended counterweight on gradients!
Toppling of machine.

- ▶ Deinstall suspended counterweight.
- ▶ Leave holding ropes on derrick boom.
- ▶ Install maximum rear counterweight and carbody counterweight.



DANGER

Improper traveling with counterweight carriage on gradients!
Toppling of machine.

- ▶ Only travel in trailer mode.
- ▶ Ensure that all wheel sets are in contact with the ground.
- ▶ Ensure that the upward tilt of the counterweight carriage is max. 45%.
- ▶ Ensure that the downward tilt of the counterweight carriage is max. 15%.
- ▶ Ensure that the lateral torsion of the counterweight carriage is max. 3.5%.
- ▶ Remove counterweight slabs from counterweight carriage.
- ▶ Install maximum rear counterweight and carbody counterweight.

The following points must be observed when traveling on gradients:

- The inclination value in % must be measured by a person named by the owner and communicated to the machine operator before the machine is moved.
- Lateral gradients must not exceed 1 % when traveling.
- Machine must be fitted with maximum rear counterweight and carbody counterweight.
- Machine can be in narrow track, medium track or wide track.
- Machine may only be moved when the crawlers are in normal gear.
- Uppercarriage is parallel to crawler side frame.
- When driving on an incline, only the installed hook and/or the installed pulley block may be on the boom.
- Specified boom angles:
 - are always relative to the machine's horizontal standing area.
 - must be checked and/or adjusted before an traveling on a gradient.



DANGER

Incorrect travel of machine over undulations!
Toppling of machine.

- ▶ Ensure that when traveling over undulations, the entire crawler must be on the ground.

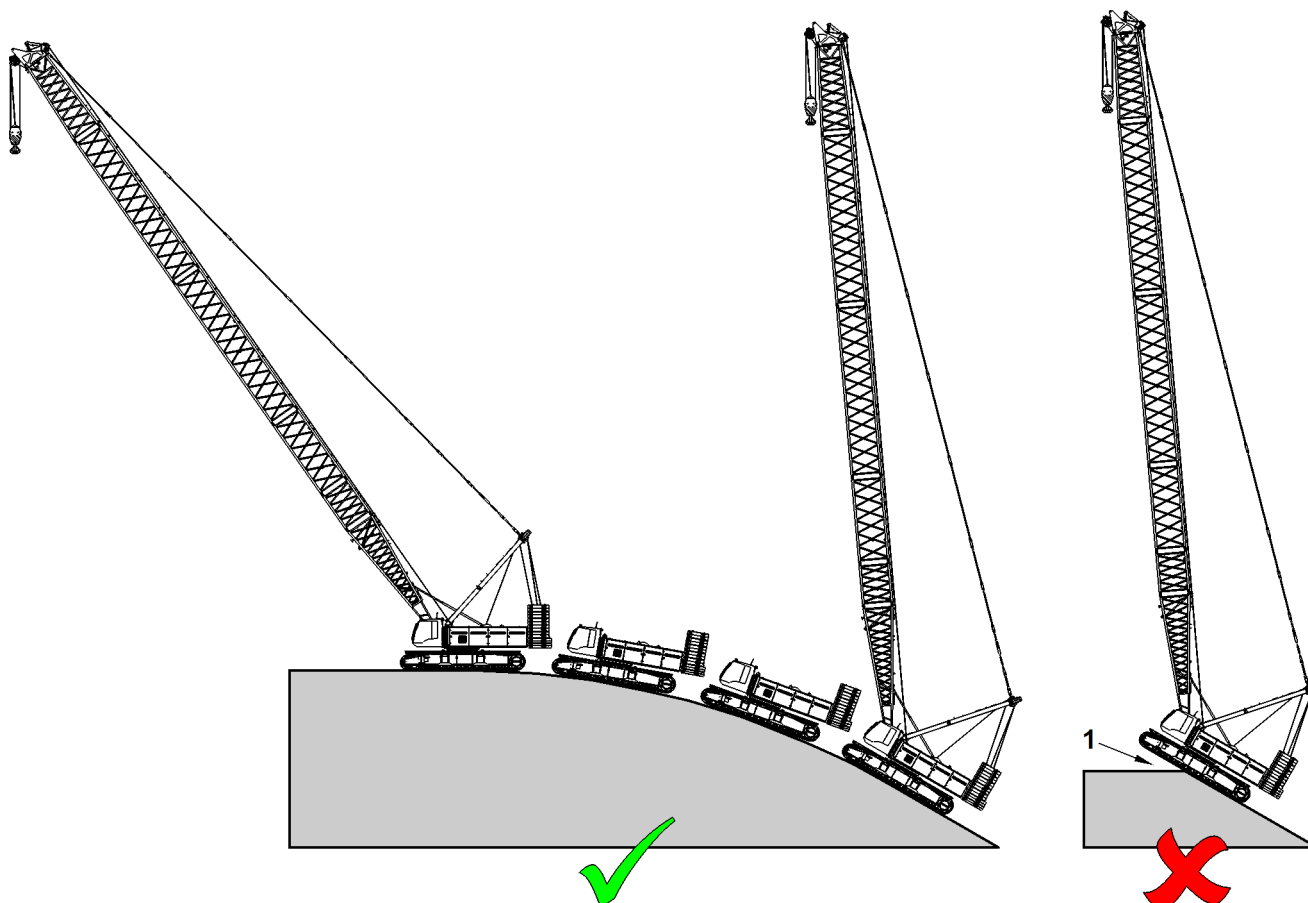


Fig. 2915: Travel over undulations (diagram)

1 Prohibited situation



Note

The following diagrams are purely to illustrate the incline! The boom angles and the inclinations shown in the diagrams do not correspond to the values in the table. All values shown in the table include maximum ballasting!

- ▶ Only use values from the table.
- ▶ If you require values for special combinations: Contact Liebherr customer service.

6.8.1 Permitted gradient for a machine without derrick equipment*

Permitted gradient main boom 2821 (+ auxiliary jib)

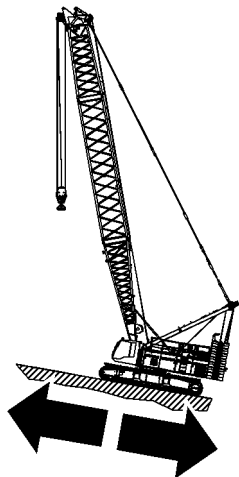


Fig. 2916: Permitted gradient main boom 2821 (+ auxiliary jib), boom travel uphill

Description	Value	
Main boom angle	40 °	50 °
Main boom length	max. gradient in %, boom travel uphill	
20 m (66 ft) to 53 m (174 ft)	10	-
56 m (184 ft) to 104 m (341 ft)	-	20

Tab. 469: Permitted gradient main boom 2821 (+ auxiliary jib), boom travel uphill

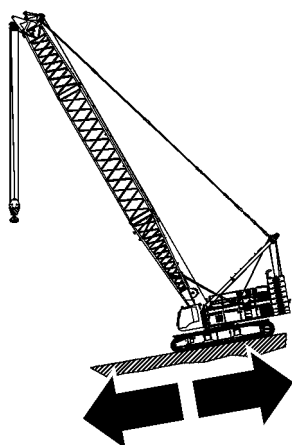


Fig. 2917: Permitted gradient for main boom 2821 (+ auxiliary jib), boom travel downhill

Description	Value	
Main boom angle	86 °	60 °
Main boom length	max. gradient in %, boom travel downhill	

Description	Value	
20 m (66 ft) to 53 m (174 ft)	-	30
56 m (184 ft) to 95 m (312 ft)	30	-
98 m (322 ft) to 104 m (341 ft)	20	-

Tab. 470: Permitted gradient for main boom 2821 (+ auxiliary jib), boom travel downhill

Permitted gradient for main boom 2821 + reducing adapter 2821/2316

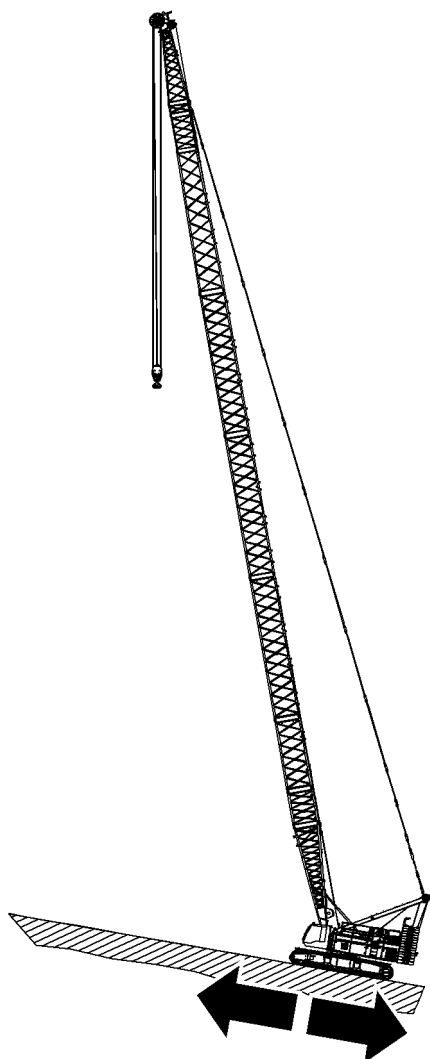


Fig. 2918: Permitted gradient for main boom 2821 + reducing adapter 2821/2316, boom travel uphill

Description	Value
Main boom angle	50 °
Main boom length	max. gradient in %, boom travel uphill

Description	Value
69 m (226 ft) to 123 m (404 ft)	20

Tab. 471: Permitted gradient for main boom 2821 + reducing adapter 2821/2316, boom travel uphill



Fig. 2919: Permitted gradient for main boom 2821 + reducing adapter 2821/2316, boom travel downhill

Description	Value
Main boom angle	78 °
Main boom length	max. gradient in %, boom travel downhill
69 m (226 ft) to 78 m (256 ft)	30
81 m (266 ft) to 114 m (374 ft)	20
117 m (384 ft) to 123 m (404 ft)	10

Tab. 472: Permitted gradient for main boom 2821 + reducing adapter 2821/2316, boom travel downhill

Permitted gradient for main boom 2821 + fixed jib 1713

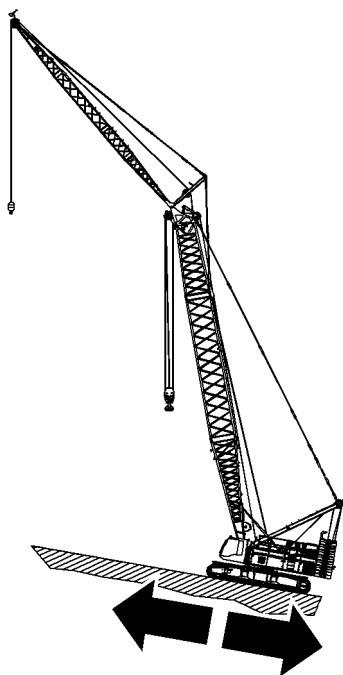


Fig. 2920: Permitted gradient for main boom 2821 + fixed jib 1713, boom travel uphill

Description	Value
Main boom angle	50 °
Jib length	All
Jib offset	15° or 30°
Main boom length	max. gradient in %, boom travel uphill
20 m (66 ft) to 83 m (272 ft)	20

Tab. 473: Permitted gradient for main boom 2821 + fixed jib 1713, boom travel uphill

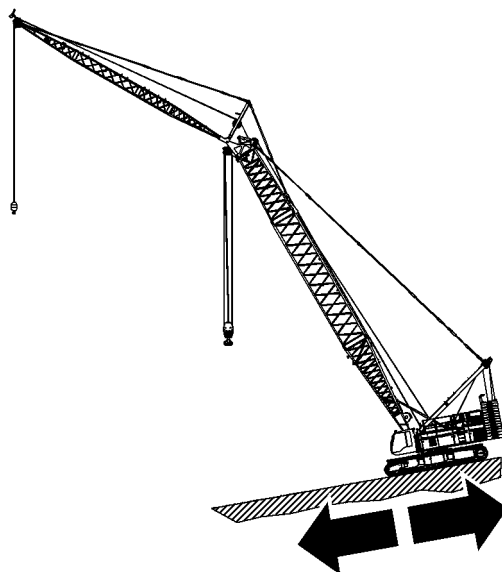


Fig. 2921: Permitted gradient for main boom 2821 + fixed jib 1713, boom travel downhill

Description	Value	
	Main boom angle	80 °
Jib length	All	
Jib offset	15° or 30°	
Main boom length	max. gradient in %, boom travel downhill	
20 m (66 ft) to 41 m (135 ft)	-	30
44 m (144 ft) to 80 m (262 ft)	20	-
83 m 272 ft	10	-

Tab. 474: Permitted gradient for main boom 2821 + fixed jib 1713, boom travel downhill

Permitted gradient for main boom 2821 + fixed jib 1507

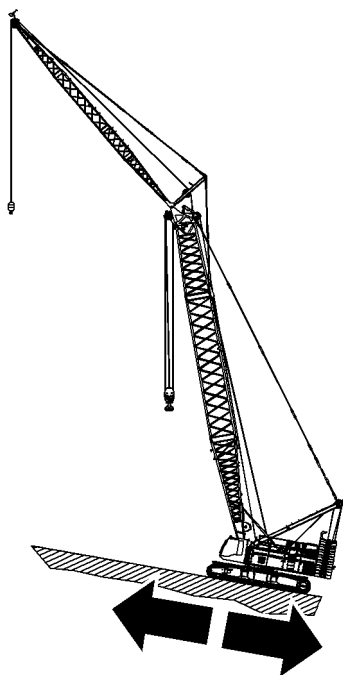


Fig. 2922: Permitted gradient for main boom 2821 + fixed jib 1507, boom travel uphill

Description	Value	
Main boom angle	40 °	50 °
Jib offset	28 °	
Main boom length	max. gradient in %, boom travel uphill	
20 m (66 ft) to 38 m (125 ft)	20	-
41 m (135 ft) to 86 m (282 ft)	-	20

Tab. 475: Permitted gradient for main boom 2821 + fixed jib 1507, boom travel uphill

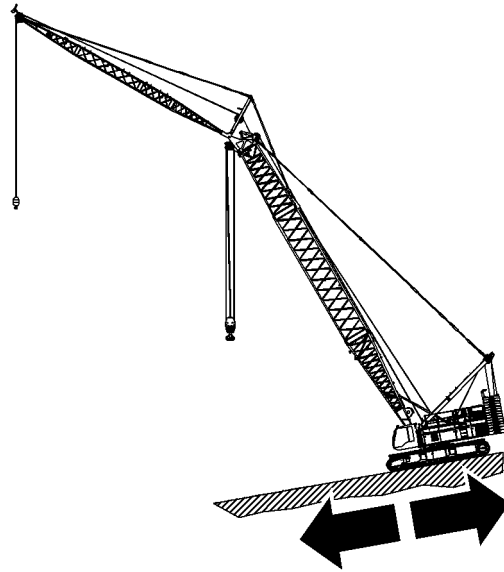


Fig. 2923: Permitted gradient for main boom 2821 + fixed jib 1507, boom travel downhill

Description	Value	
Main boom angle	80 °	70 °
Jib offset	28 °	
Main boom length	max. gradient in %, boom travel downhill	
20 m (66 ft) to 38 m (125 ft)	-	30
41 m (135 ft) to 86 m (282 ft)	20	-

Tab. 476: Permitted gradient for main boom 2821 + fixed jib 1507, boom travel downhill

Permitted gradient for main boom 2821 + fixed jib 1008

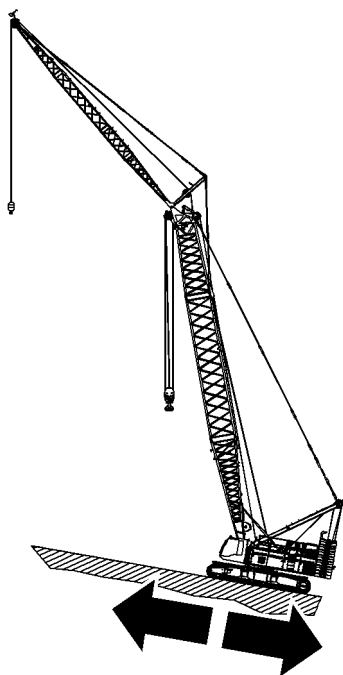


Fig. 2924: Permitted gradient for main boom 2821 + fixed jib 1008, boom travel uphill

Description	Value	
Main boom angle	40 °	50 °
Jib length	All	
Jib offset	15° or 30°	
Main boom length	max. gradient in %, boom travel uphill	
20 m (66 ft) to 41 m (135 ft)	20	-
44 m (144 ft) to 86 m (282 ft)	-	20

Tab. 477: Permitted gradient for main boom 2821 + fixed jib 1008, boom travel uphill

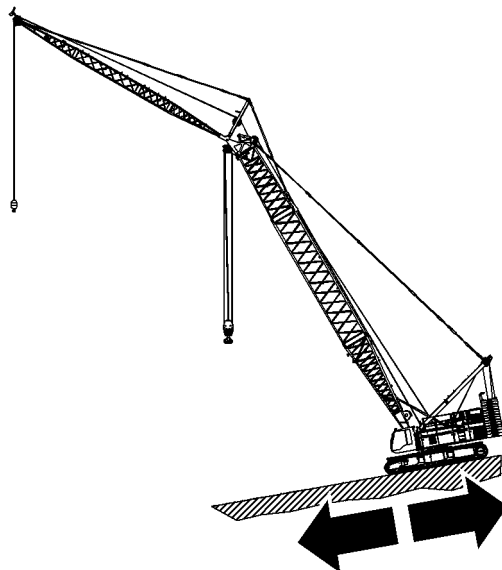


Fig. 2925: Permitted gradient for main boom 2821 + fixed jib 1008, boom travel downhill

Description	Value	
	Main boom angle	80 °
Jib length	All	
Jib offset	15° or 30°	
Main boom length	max. gradient in %, boom travel downhill	
20 m (66 ft) to 41 m (135 ft)	-	30
44 m (144 ft) to 83 m (272 ft)	20	-
86 m 282 ft	10	-

Tab. 478: Permitted gradient for main boom 2821 + fixed jib 1008, boom travel downhill

Permitted gradient for main boom 2821 + fixed jib 0906

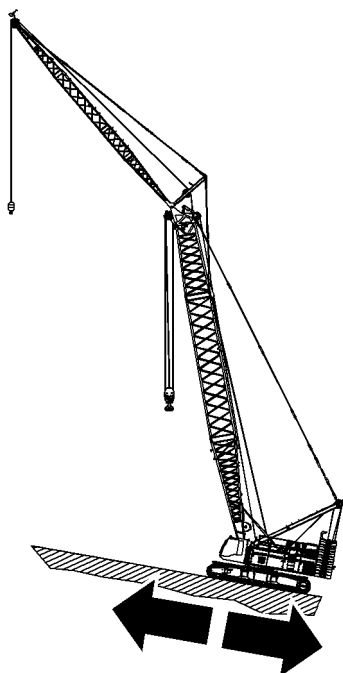


Fig. 2926: Permitted gradient for main boom 2821 + fixed jib 0906, boom travel uphill

Description	Value	
Main boom angle	40 °	50 °
Jib offset	30 °	
Main boom length	max. gradient in %, boom travel uphill	
20 m (66 ft) to 38 m (125 ft)	20	-
41 m (135 ft) to 95 m (312 ft)	-	20

Tab. 479: Permitted gradient for main boom 2821 + fixed jib 0906, boom travel uphill

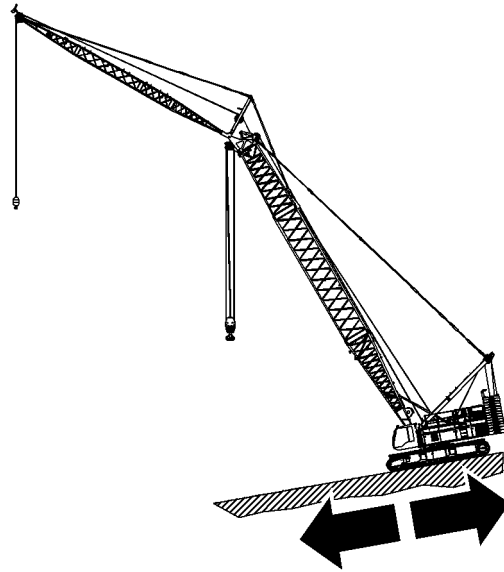


Fig. 2927: Permitted gradient for main boom 2821 + fixed jib 0906, boom travel downhill

Description	Value	
Main boom angle	80 °	70 °
Jib offset	30 °	
Main boom length	max. gradient in %, boom travel downhill	
20 m (66 ft) to 38 m (125 ft)	-	30
41 m (135 ft) to 95 m (312 ft)	20	-

Tab. 480: Permitted gradient for main boom 2821 + fixed jib 0906, boom travel downhill

Permitted gradient for main boom 2821 + luffing jib 2316 (+ auxiliary jib)

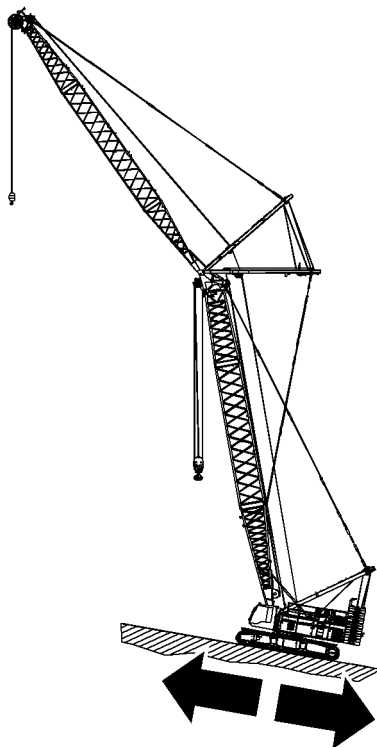


Fig. 2928: Permitted gradient for main boom 2821 + luffing jib 2316 (+ auxiliary jib), boom travel uphill

Description	Value	
Main boom angle	45 °	65 °
Jib angle	15 °	25 °
Jib length	20 m (66 ft) to 47 m (154 ft)	50 m (164 ft) to 113 m (371 ft)
Main boom length	max. gradient in %, boom travel uphill	
20 m (66 ft) to 71 m (233 ft)	15	20

Tab. 481: Permitted gradient for main boom 2821 + luffing jib 2316 (+ auxiliary jib), boom travel uphill

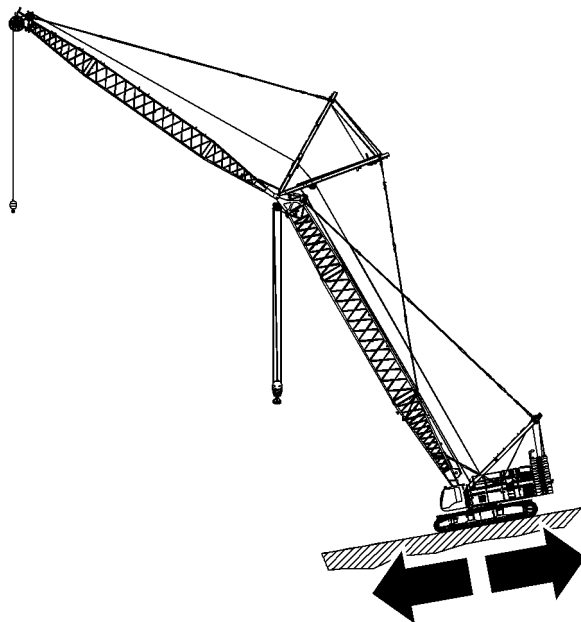


Fig. 2929: Permitted gradient for main boom 2821 + luffing jib 2316 (+ auxiliary jib), boom travel downhill

Description	Value		
Main boom angle	83 °		
Jib angle	73 °		
Jib length	20 m (66 ft) to 86 m (282 ft)	20 m (66 ft) to 47 m (154 ft)	50 m (164 ft) to 86 m (282 ft)
Main boom length	max. gradient in %, boom travel downhill		
20 m (66 ft) to 35 m (115 ft)	20	-	-
38 m (125 ft) to 71 m (233 ft)	-	20	10

Tab. 482: Permitted gradient for main boom 2821 + luffing jib 2316 (+ auxiliary jib), boom travel downhill

Permitted gradient for main boom 2821 + luffing jib 1916 (+ auxiliary jib)

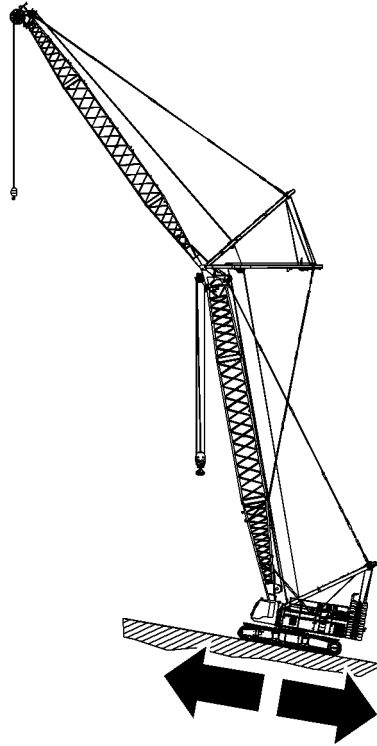


Fig. 2930: Permitted gradient for main boom 2821 + luffing jib 1916 (+ auxiliary jib), boom travel uphill

Description	Value	
Main boom angle	45 °	65 °
Jib angle	15 °	25 °
Jib length	20 m (66 ft) to 47 m (154 ft)	50 m (164 ft) to 95 m (312 ft)
Main boom length	max. gradient in %, boom travel uphill	
29 m (95 ft) to 74 m (243 ft)	20	20

Tab. 483: Permitted gradient for main boom 2821 + luffing jib 1916 (+ auxiliary jib), boom travel uphill

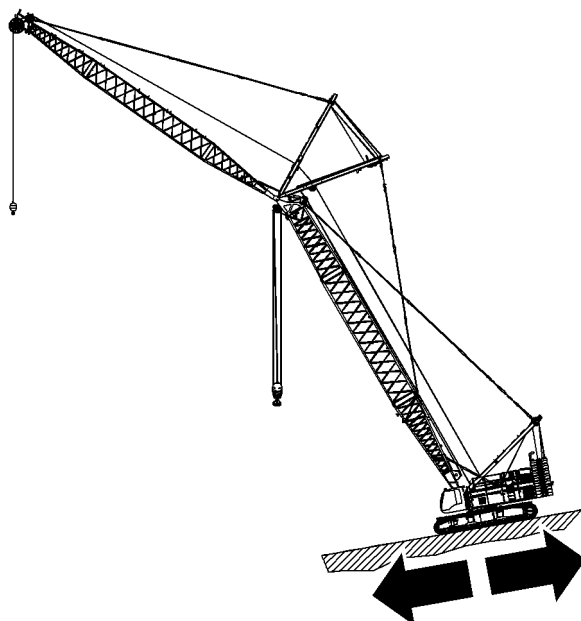


Fig. 2931: Permitted gradient for main boom 2821 + luffing jib 1916 (+ auxiliary jib), boom travel downhill

Description	Value			
Main boom angle	75 °	88 °	88 °	88 °
Jib angle	70 °	78 °	78 °	78 °
Jib length	20 m (66 ft) to 47 m (154 ft)	20 m (66 ft) to 47 m (154 ft)	50 m (164 ft) to 68 m (223 ft)	71 m (233 ft) to 95 m (312 ft)
Main boom length	max. gradient in %, boom travel downhill			
29 m (95 ft) to 50 m (164 ft)	20	-	-	-
53 m (174 ft) to 74 m (243 ft)	-	20	-	-
29 m (95 ft) to 74 m (243 ft)	-	-	20	10

Tab. 484: Permitted gradient for main boom 2821 + luffing jib 1916 (+ auxiliary jib), boom travel downhill

Permitted gradient for main boom 2821 + luffing jib 2316 + midfall 2316

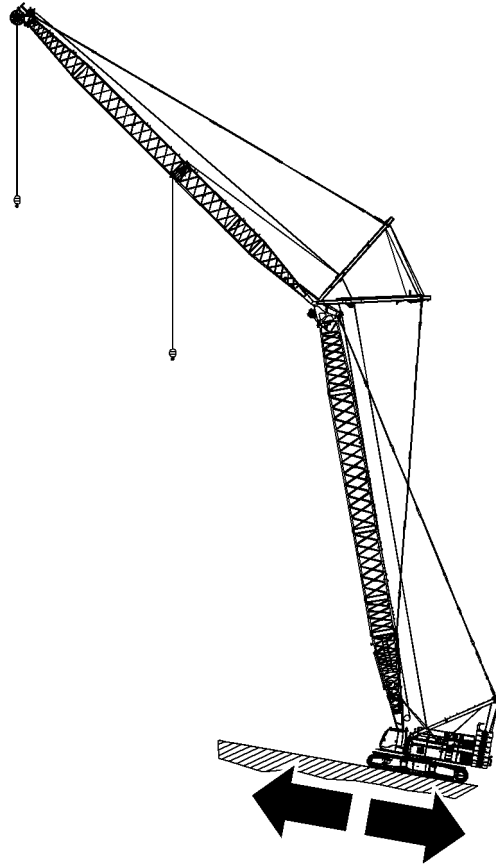


Fig. 2932: Permitted gradient for main boom 2821 + luffing jib 2316 + midfall 2316, boom travel uphill

Description	Value	
Main boom angle	45 °	65 °
Jib angle	15 °	25 °
Jib length	20 m (66 ft) to 47 m (154 ft)	50 m (164 ft) to 113 m (371 ft)
Main boom length	max. gradient in %, boom travel uphill	
20 m (66 ft) to 71 m (233 ft)	15	20

Tab. 485: Permitted gradient for main boom 2821 + luffing jib 2316 + midfall 2316, boom travel uphill

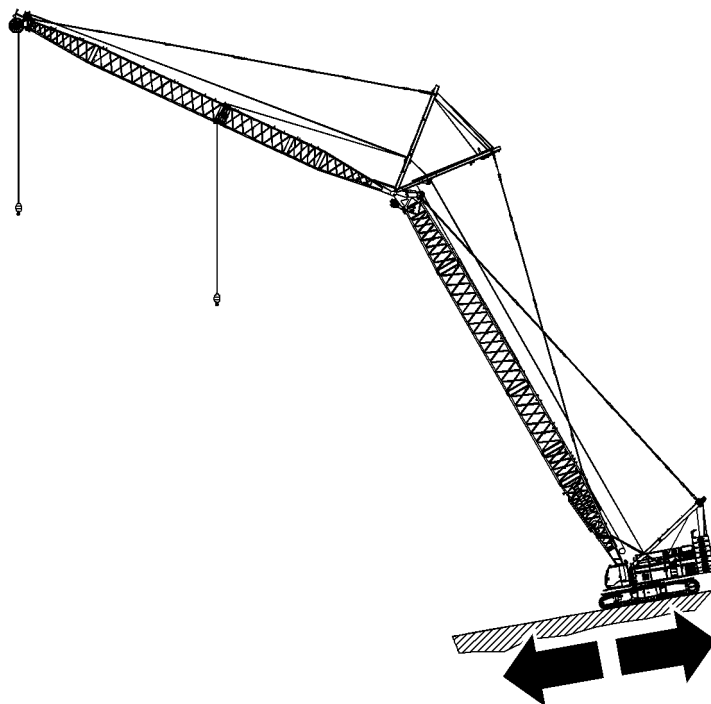


Fig. 2933: Permitted gradient for main boom 2821 + luffing jib 2316 + midfall 2316, boom travel downhill

Description	Value		
Main boom angle	83 °		
Jib angle	73 °		
Jib length	20 m (66 ft) to 86 m (282 ft)	20 m (66 ft) to 47 m (154 ft)	50 m (164 ft) to 86 m (282 ft)
Main boom length	max. gradient in %, boom travel downhill		
20 m (66 ft) to 35 m (115 ft)	20	-	-
38 m (125 ft) to 71 m (233 ft)	-	20	10

Tab. 486: Permitted gradient for main boom 2821 + luffing jib 2316 + midfall 2316, boom travel downhill

Permitted gradient for main boom 2821 + luffing jib 1916 + midfall 1916

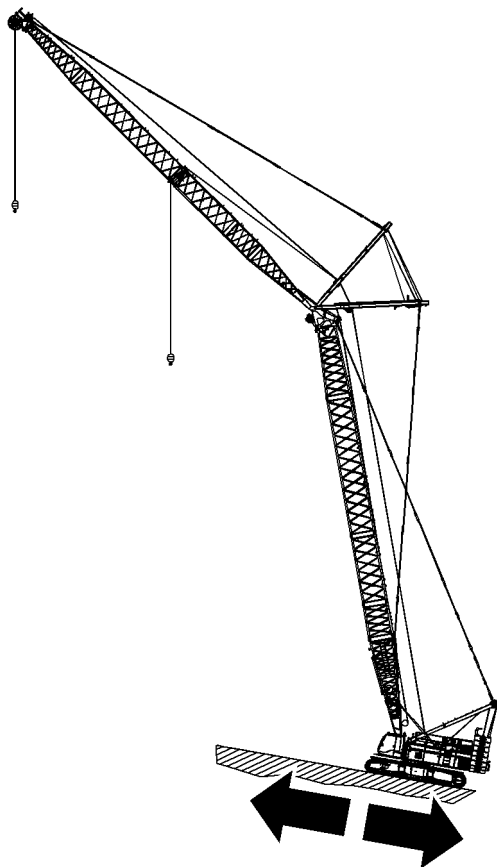


Fig. 2934: Permitted gradient for main boom 2821 + luffing jib 1916 + midfall 1916, boom travel uphill

Description	Value	
Main boom angle	45 °	65 °
Jib angle	15 °	25 °
Jib length	20 m (66 ft) to 47 m (154 ft)	50 m (164 ft) to 95 m (312 ft)
Main boom length	max. gradient in %, boom travel uphill	
29 m (95 ft) to 74 m (243 ft)	20	20

Tab. 487: Permitted gradient for main boom 2821 + luffing jib 1916 + midfall 1916, boom travel uphill

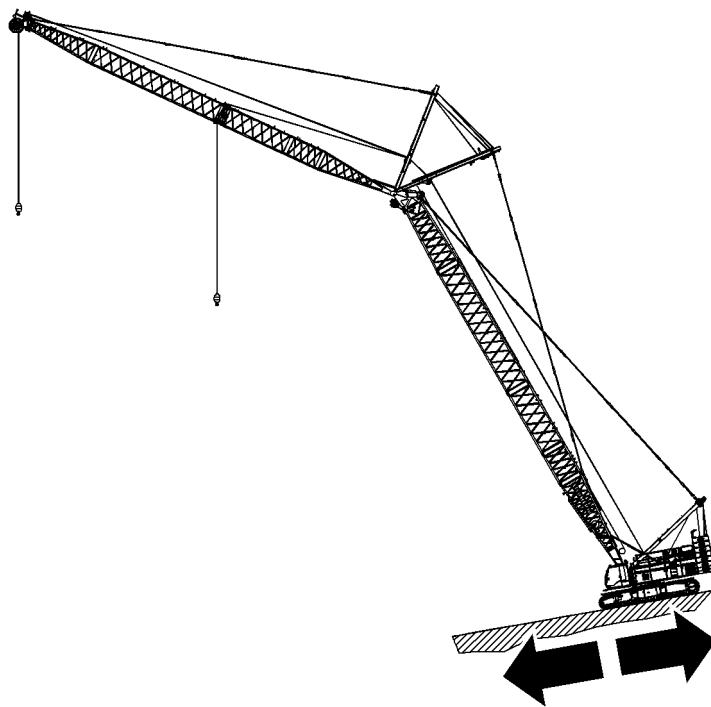


Fig. 2935: Permitted gradient for main boom 2821 + luffing jib 1916 + midfall 1916, boom travel downhill

Description	Value			
Main boom angle	75 °	88 °	88 °	88 °
Jib angle	70 °	78 °	78 °	78 °
Jib length	20 m (66 ft) to 47 m (154 ft)	20 m (66 ft) to 47 m (154 ft)	50 m (164 ft) to 68 m (223 ft)	71 m (233 ft) to 95 m (312 ft)
Main boom length	max. gradient in %, boom travel downhill			
29 m (95 ft) to 50 m (164 ft)	20	-	-	-
53 m (174 ft) to 74 m (243 ft)	-	20	-	-
29 m (95 ft) to 74 m (243 ft)	-	-	20	10

Tab. 488: Permitted gradient for main boom 2821 + luffing jib 1916 + midfall 1916, boom travel downhill

6.8.2 Permitted gradient for a machine with derrick equipment*

Permitted gradient for main boom 2821 + derrick (+ auxiliary jib)

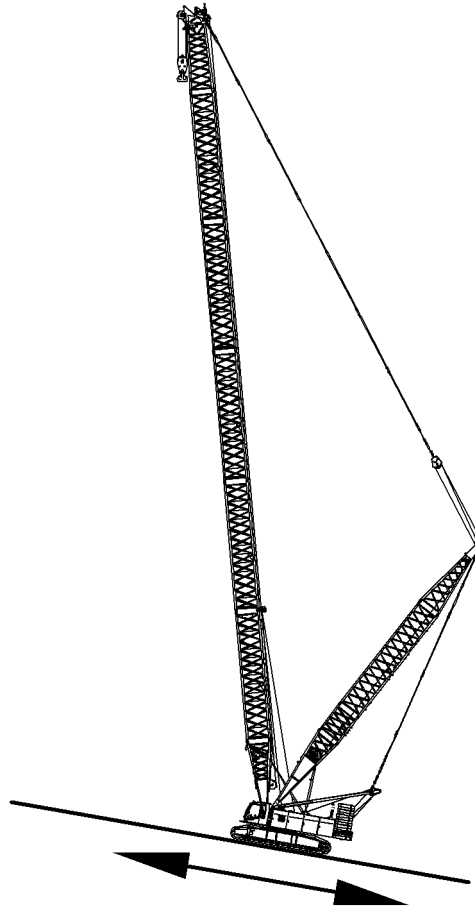


Fig. 2936: Permitted gradient - main boom 2821 + derrick (+ auxiliary jib), boom travel uphill

Description	Value
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)
Main boom angle	50 °
Main boom length	max. gradient in %, boom travel uphill
44 m (144 ft) to 74 m (243 ft)	15
77 m (253 ft) to 98 m (322 ft)	15
101 m (331 ft) to 119 m (390 ft)	-

Tab. 489: Permitted gradient - main boom 2821 + derrick (+ auxiliary jib), boom travel uphill

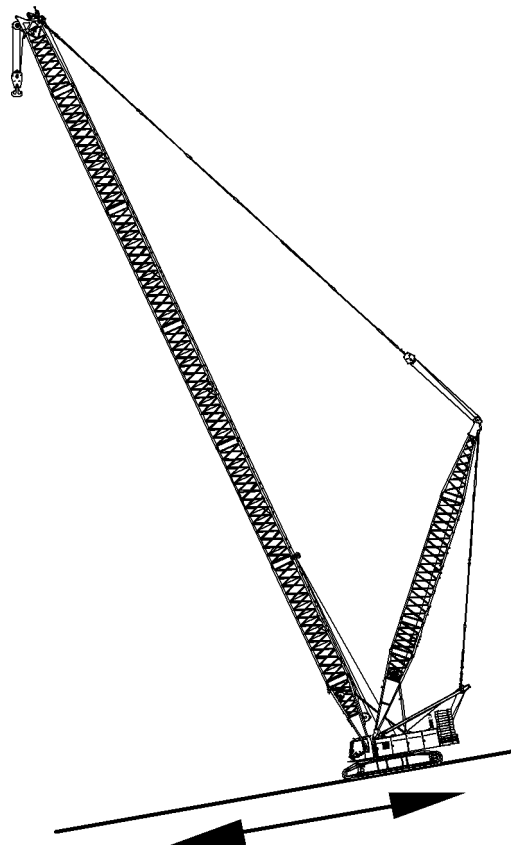


Fig. 2937: Permitted gradient for main boom 2821 + derrick (+ auxiliary jib), boom travel downhill

Description	Value
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)
Main boom angle	78 °
Main boom length	max. gradient in %, boom travel downhill
44 m (144 ft) to 74 m (243 ft)	30
77 m (253 ft) to 98 m (322 ft)	20
101 m (331 ft) to 119 m (390 ft)	10

Tab. 490: Permitted gradient for main boom 2821 + derrick (+ auxiliary jib), boom travel downhill

Permitted gradient for main boom 2821 + fixed jib 1713 + derrick

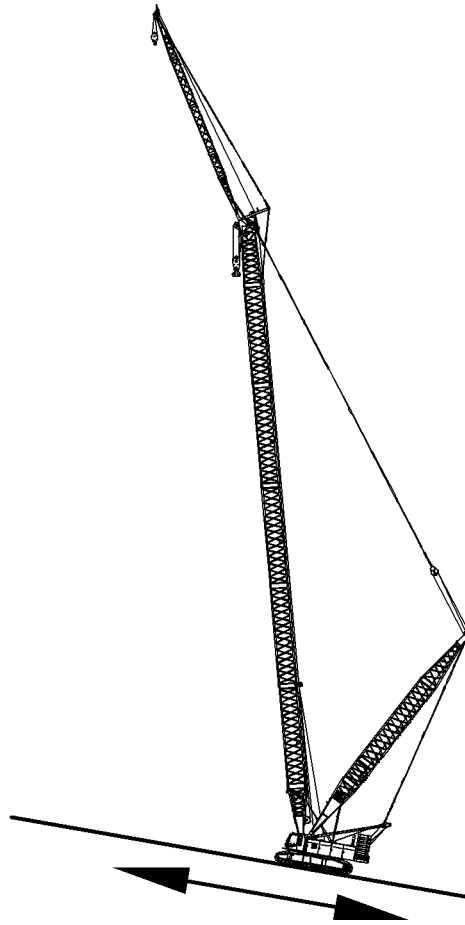


Fig. 2938: Permitted gradient for main boom 2821 + fixed jib 1713 + derrick, boom travel uphill

Description	Value	
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)	
Main boom angle	40 °	50 °
Jib offset	15° or 30°	
Jib length	All	
Main boom length	max. gradient in %, boom travel uphill	
50 m (164 ft) to 59 m (194 ft)	20	-
62 m (203 ft) to 95 m (312 ft)	-	20
98 m (322 ft) to 110 m (361 ft)	-	20

Tab. 491: Permitted gradient for main boom 2821 + fixed jib 1713 + derrick, boom travel uphill

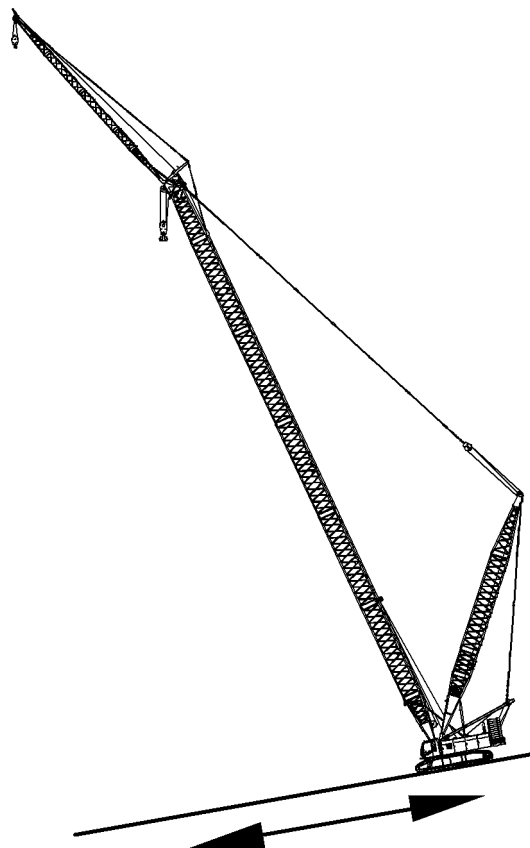


Fig. 2939: Permitted gradient for main boom 2821 + fixed jib 1713 + derrick, boom travel downhill

Description	Value	
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)	
Main boom angle	80 °	86 °
Jib offset	15° or 30°	
Jib length	All	
Main boom length	max. gradient in %, boom travel downhill	
50 m (164 ft) to 59 m (194 ft)	30	-
62 m (203 ft) to 95 m (312 ft)	-	20
98 m (322 ft) to 110 m (361 ft)	-	10

Tab. 492: Permitted gradient for main boom 2821 + fixed jib 1713 + derrick, boom travel downhill

Permitted gradient for main boom 2821 + fixed jib 1507 + derrick

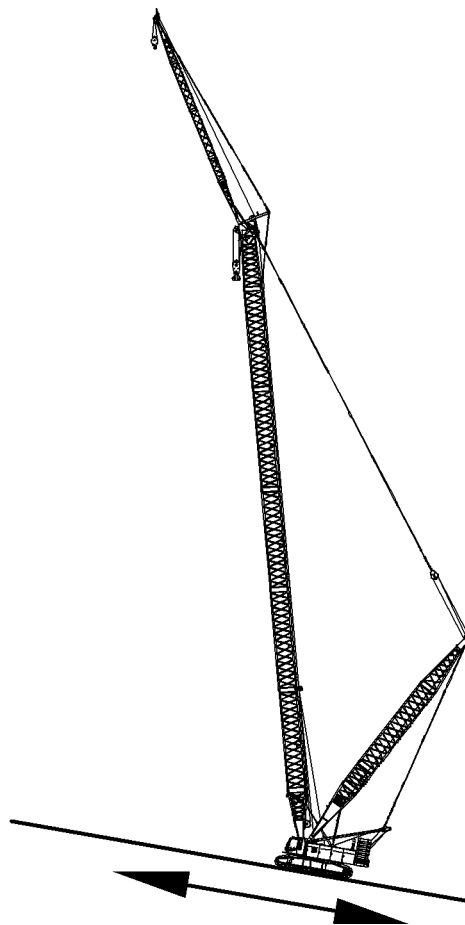


Fig. 2940: Permitted gradient for main boom 2821 + fixed jib 1507 + derrick, boom travel uphill

Description	Value	
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)	
Main boom angle	40 °	50 °
Jib offset	28 °	
Main boom length	max. gradient in %, boom travel uphill	
44 m (144 ft) to 80 m (262 ft)	20	-
83 m (272 ft) to 113 m (371 ft)	-	20

Tab. 493: Permitted gradient for main boom 2821 + fixed jib 1507 + derrick, boom travel uphill

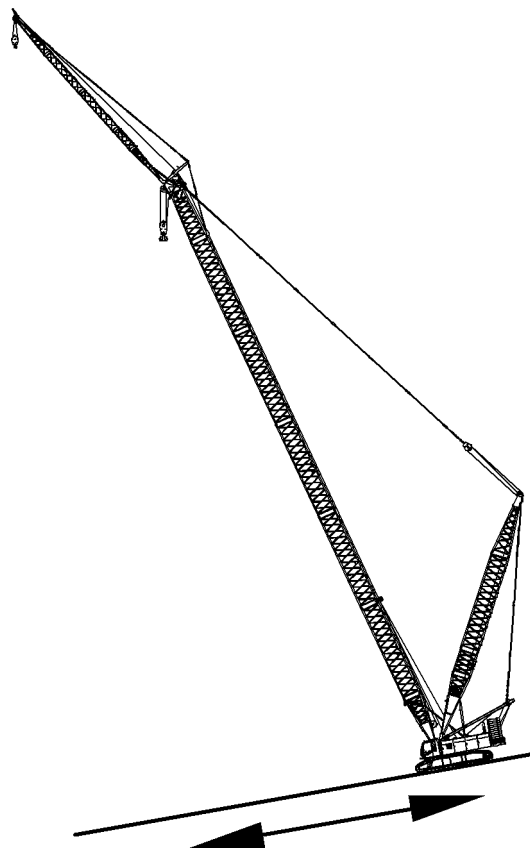


Fig. 2941: Permitted gradient for main boom 2821 + fixed jib 1507 + derrick, boom travel downhill

Description	Value	
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)	
Main boom angle	80 °	86 °
Jib offset	28 °	
Main boom length	max. gradient in %, boom travel downhill	
44 m (144 ft) to 80 m (262 ft)	20	-
83 m (272 ft) to 113 m (371 ft)	-	10

Tab. 494: Permitted gradient for main boom 2821 + fixed jib 1507 + derrick, boom travel downhill

Permitted gradient for main boom 2821 + fixed jib 1008 + derrick

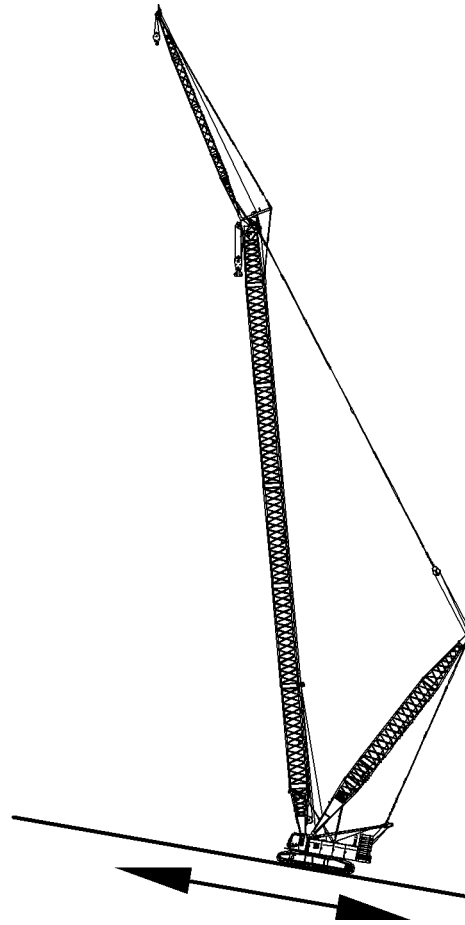


Fig. 2942: Permitted gradient for main boom 2821 + fixed jib 1008 + derrick, boom travel uphill

Description	Value	
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)	
Main boom angle	40 °	50 °
Jib offset	15° or 30°	
Jib length	All	
Main boom length	max. gradient in %, boom travel uphill	
44 m (144 ft) to 59 m (194 ft)	20	-
62 m (203 ft) to 95 m (312 ft)	-	20
98 m (322 ft) to 110 m (361 ft)	-	20

Tab. 495: Permitted gradient for main boom 2821 + fixed jib 1008 + derrick, boom travel uphill

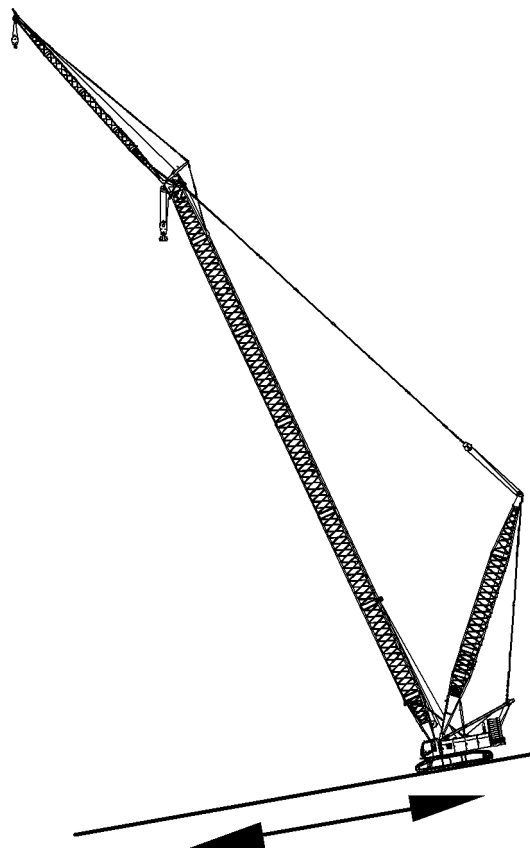


Fig. 2943: Permitted gradient for main boom 2821 + fixed jib 1008 + derrick, boom travel downhill

Description	Value	
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)	
Main boom angle	80 °	86 °
Jib offset	15° or 30°	
Jib length	All	
Main boom length	max. gradient in %, boom travel downhill	
44 m (144 ft) to 59 m (194 ft)	30	-
62 m (203 ft) to 95 m (312 ft)	-	20
98 m (322 ft) to 110 m (361 ft)	-	10

Tab. 496: Permitted gradient for main boom 2821 + fixed jib 1008 + derrick, boom travel downhill

Permitted gradient for main boom 2821 + fixed jib 0906 + derrick

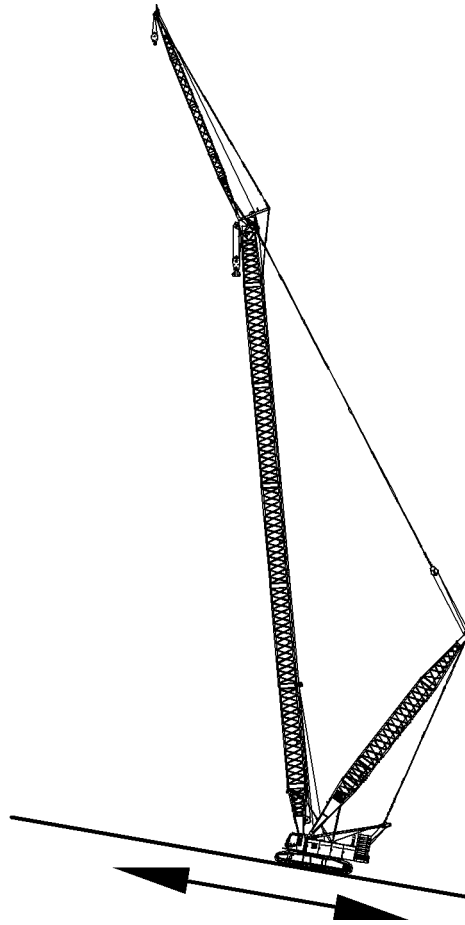


Fig. 2944: Permitted gradient for main boom 2821 + fixed jib 0906 + derrick, boom travel uphill

Description	Value	
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)	
Main boom angle	40 °	50 °
Jib offset	30 °	
Main boom length	max. gradient in %, boom travel uphill	
50 m (164 ft) to 59 m (194 ft)	20	-
62 m (203 ft) to 80 m (262 ft)	-	20
83 m (272 ft) to 116 m (381 ft)	-	20

Tab. 497: Permitted gradient for main boom 2821 + fixed jib 0906 + derrick, boom travel uphill

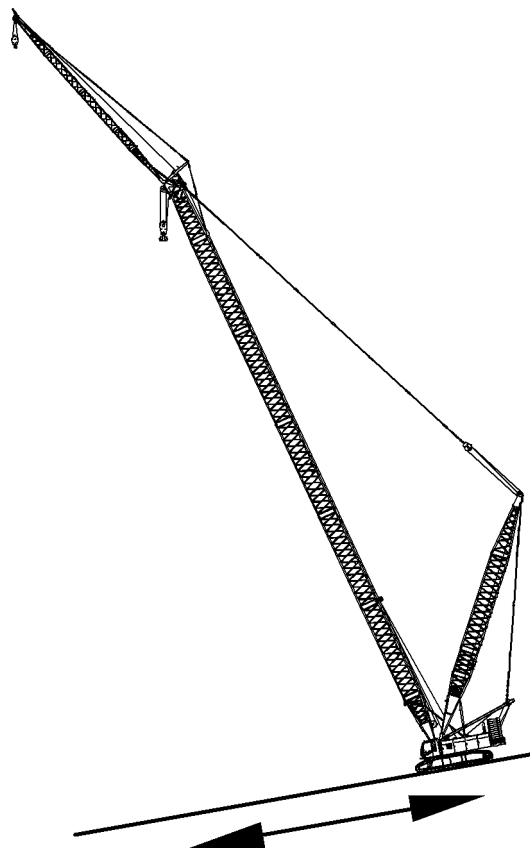


Fig. 2945: Permitted gradient for main boom 2821 + fixed jib 0906 + derrick, boom travel downhill

Description	Value	
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)	
Main boom angle	80 °	86 °
Jib offset	30 °	
Main boom length	max. gradient in %, boom travel downhill	
50 m (164 ft) to 59 m (194 ft)	30	-
62 m (203 ft) to 80 m (262 ft)	20	-
83 m (272 ft) to 116 m (381 ft)	-	10

Tab. 498: Permitted gradient for main boom 2821 + fixed jib 0906 + derrick, boom travel downhill

Permitted gradient for main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib)

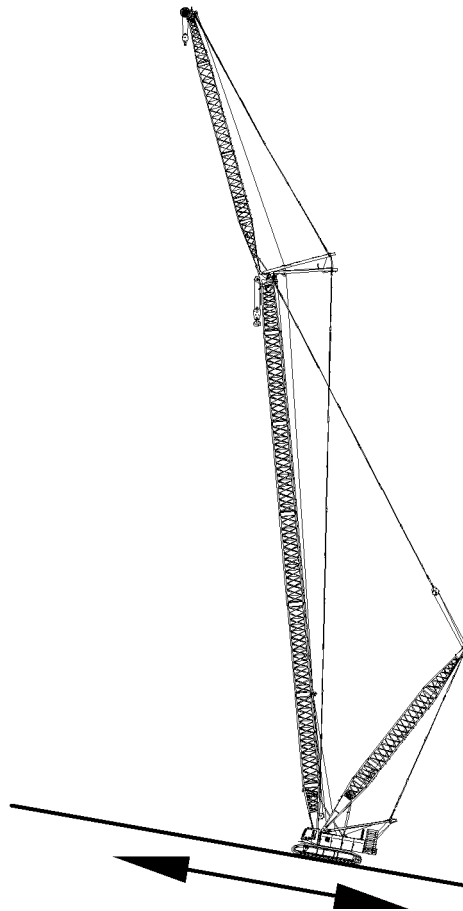


Fig. 2946: Permitted gradient for main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib), boom travel uphill

Description	Value					
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)					
Main boom angle	65 °					
Jib angle	25 °					
Jib length	20 m (66 ft) to 32 m (105 ft)	35 m (115 ft) to 50 m (164 ft)	53 m (174 ft) to 68 m (223 ft)	71 m (233 ft) to 86 m (282 ft)	89 m (292 ft) to 104 m (341 ft)	107 m (351 ft) to 113 m (371 ft)
Main boom length	max. gradient in %, boom travel uphill					
44 m (144 ft) to 50 m (164 ft)	15	15	15	-	-	-
53 m (174 ft) to 62 m (203 ft)	15	15	-	-	-	-
65 m (213 ft) to 74 m (243 ft)	15	-	-	-	-	-
77 m (253 ft) to 86 m (282 ft)	-	-	-	-	-	-

Tab. 499: Permitted gradient for main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib), boom travel uphill

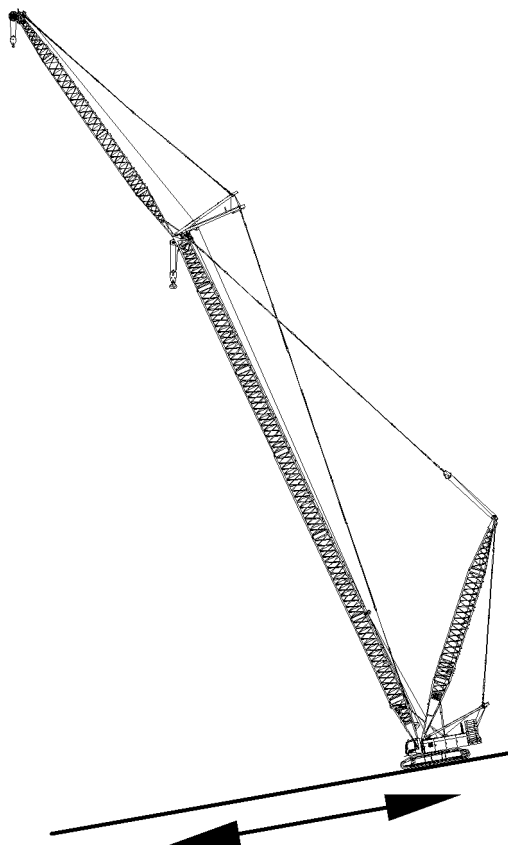


Fig. 2947: Permitted gradient for main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib), boom travel downhill

Description	Value					
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)					
Main boom angle	83 °					
Jib angle	73 °					
Jib length	20 m (66 ft) to 32 m (105 ft)	35 m (115 ft) to 50 m (164 ft)	53 m (174 ft) to 68 m (223 ft)	71 m (233 ft) to 86 m (282 ft)	89 m (292 ft) to 104 m (341 ft)	107 m (351 ft) to 113 m (371 ft)
Main boom length	max. gradient in %, boom travel downhill					
44 m (144 ft) to 50 m (164 ft)	30	25	15	10	-	-
53 m (174 ft) to 62 m (203 ft)	25	15	10	5	-	-
65 m (213 ft) to 74 m (243 ft)	15	10	5	-	-	-
77 m (253 ft) to 86 m (282 ft)	10	5	-	-	-	-

Tab. 500: Permitted gradient for main boom 2821 + luffing jib 2316 + derrick (+ auxiliary jib), boom travel downhill

Permitted gradient for main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib)

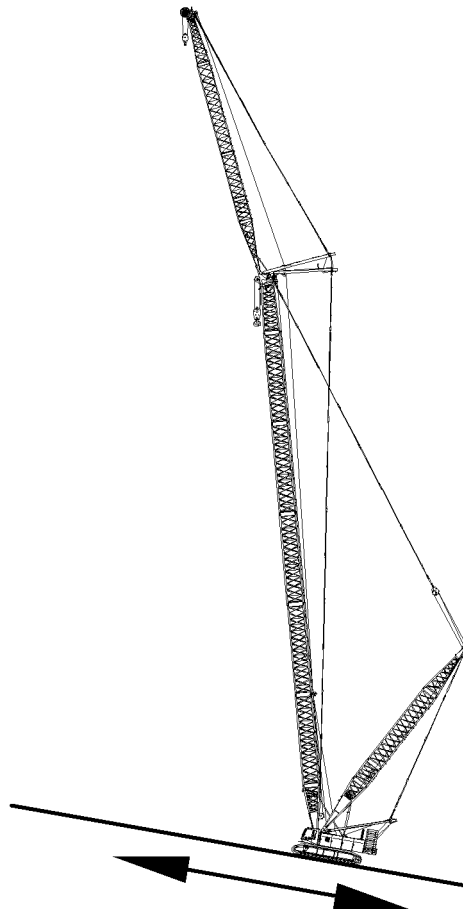


Fig. 2948: Permitted gradient for main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib), boom travel uphill

Description	Value					
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)					
Main boom angle	65 °					
Jib angle	25 °					
Jib length	20 m (66 ft) to 32 m (105 ft)	35 m (115 ft) to 44 m (144 ft)	47 m (154 ft) to 56 m (184 ft)	59 m (194 ft) to 68 m (223 ft)	71 m (233 ft) to 80 m (262 ft)	83 m (272 ft) to 95 m (312 ft)
Main boom length	max. gradient in %, boom travel uphill					
44 m (144 ft) to 56 m (184 ft)	15	15	15	15	15	-
59 m (194 ft) to 68 m (223 ft)	15	15	15	-	-	-
71 m (233 ft) to 80 m (262 ft)	15	15	-	-	-	-
83 m (272 ft) to 92 m (302 ft)	15	-	-	-	-	-

Tab. 501: Permitted gradient for main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib), boom travel uphill

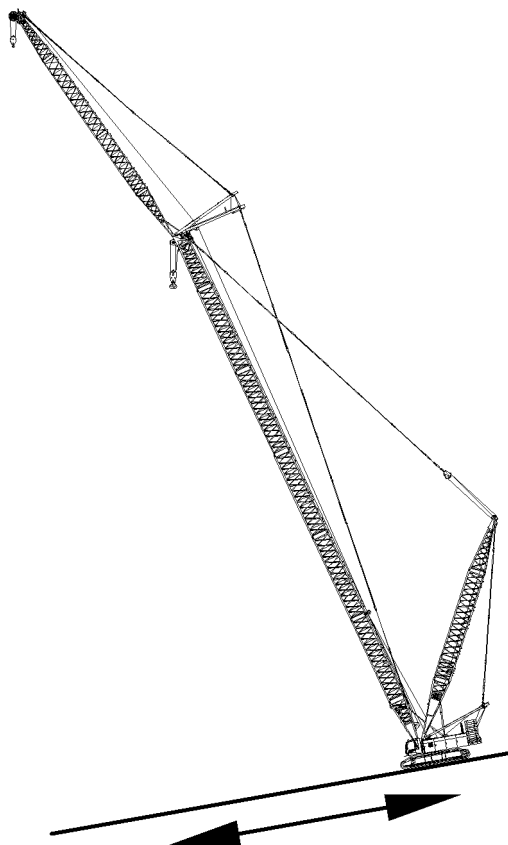


Fig. 2949: Permitted gradient for main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib), boom travel downhill

Description	Value					
Load capacity (empty hook)	1.5 t (3,307 lb) to 3 t (6,614 lb)					
Main boom angle	83 °					
Jib angle	73 °					
Jib length	20 m (66 ft) to 32 m (105 ft)	35 m (115 ft) to 44 m (144 ft)	47 m (154 ft) to 56 m (184 ft)	59 m (194 ft) to 68 m (223 ft)	71 m (233 ft) to 80 m (262 ft)	83 m (272 ft) to 95 m (312 ft)
Main boom length	max. gradient in %, boom travel downhill					
44 m (144 ft) to 56 m (184 ft)	30	25	20	15	10	5
59 m (194 ft) to 68 m (223 ft)	25	20	15	10	5	5
71 m (233 ft) to 80 m (262 ft)	15	15	10	5	5	-
83 m (272 ft) to 92 m (302 ft)	10	10	5	5	-	-

Tab. 502: Permitted gradient for main boom 2821 + luffing jib 1916 + derrick (+ auxiliary jib), boom travel downhill

6.9 Rigging equipment and/or sling gear

The machine operator must make sure that the proper rigging equipment and/or sling gear is used for the load.

The rigging equipment and/or sling gear must be selected in such a way that the load can be safely lifted, held and set down again when used properly. It must be rated for the stresses occurring during proper use of the equipment.

When selecting the sling gear (e.g. shackles, round slings) make sure that these do not damage each other or other components.

The rigging equipment and/or sling gear must not be stressed beyond its load-bearing capacity.

When lifting loads with rigging with more than two strands, make sure that the load is distributed evenly to all strands.

The machine operator must know the following:

- Weight of the load to be lifted
- The center of gravity of the load to be lifted
- The dimensions of the load to be lifted

The machine operator must make sure that valid chain certificates are available when using chain weights. The chain certificates must be requested from the manufacturer on initial equipping and from the supplier when exchanging the chains.

The machine operator must make sure that valid rope certificates are available. The rope certificates must be requested from the manufacturer on initial equipping and from the supplier when replacing the ropes.

6.9.1 4-strand round sling rigging with chain shortening devices

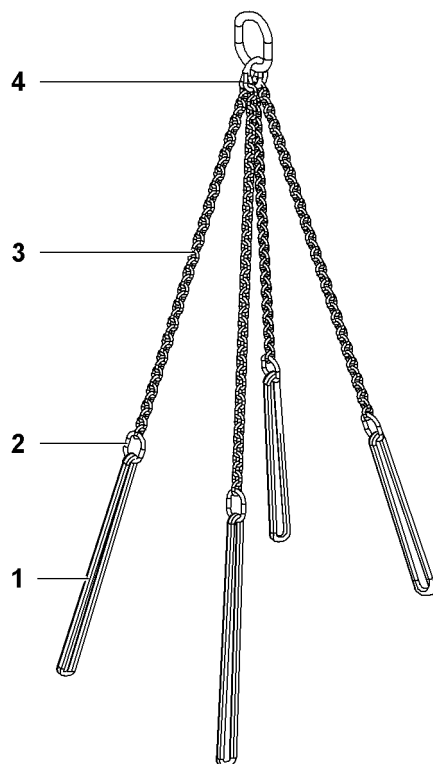


Fig. 2950: 4-strand round sling rigging with chain shortening devices

- | | | | |
|---|--|---|--|
| 1 | Round sling 10 t (22,046 lb) (4x) | 3 | Chain (4x) |
| 2 | Textile coupling 12.5 t (27,557 lb) (4x) | 4 | Suspension link with integrated chain shortening devices |

Length	Can be shortened	SWL	Application
4 m 13' 1" ft-in	from 3.6 m (11' 10" ft-in) to 1.9 m (6' 3" ft-in)	21 t 46,296 lb	Boom components
			Carbody counterweight
			Rear counterweight

Tab. 503: Technical data 4-strand round sling gear with chain shortening devices

6.9.2 4-strand round sling gear

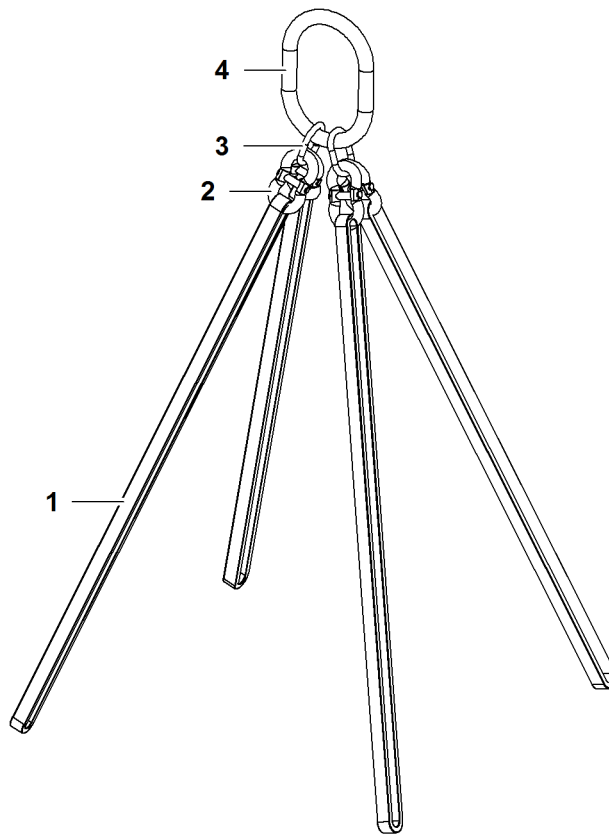


Fig. 2951: 4-strand round sling gear

- | | | | |
|----------|--|----------|---|
| 1 | Round sling 15 t (33,069 lb) (4x) | 3 | Connecting link 12.5 t (27,557 lb) (4x) |
| 2 | Textile coupling 12.5 t (27,557 lb) (4x) | 4 | Suspension link 26.5 t (58,422 lb) |

Length	SWL	SWL single-strand	Application
6 m 19' 8" ft-in	26.5 t 58,422 lb	12.5 t 27,557 lb	Crawler side frame Rear counterweight

Tab. 504: Technical data 4-strand round sling gear

6.9.3 Other lifting devices

If a jib is delivered with the machine, round slings and shackles are included that remain fixedly installed with these components.

Number	Sling gear	Length	SWL	Component
1	Round sling	3 m 9' 10" ft-in	4 t 8,818 lb	Fixed jib
1	Round sling	2 m 6' 7" ft-in	2 t 4,409 lb	Luffing jib

Rigging equipment and/or sling gear

Number	Sling gear	Length	SWL	Component
1	Round sling	10 m 32' 10" ft-in	15 t 33,069 lb	Luffing jib
1	Shackle		17 t 37,478 lb	Luffing jib
1	Shackle			Luffing jib

Tab. 505: Technical data other sling gear

Assembly and dismantling 7

7 Assembly and dismantling

7 Assembly and dismantling

This section deals with the following subjects:

- Assembling the machine
- Converting the machine on site
- Disassembling the machine



WARNING

Prohibited or improper procedure!
Severe injuries, damage to machine.

If the information in the operation manual is insufficient:

- ▶ contact Liebherr customer service.
-

For clarity reasons, some of the illustrations are simplified.

Directional instructions are given with reference to the position of the operator's seat.

7.1 Explanation of symbols used

Any lengths displayed on the symbols will be quoted in metres.

Symbol	Explanation
	Boom base section
	Boom sections
	Reducing adapter
	Midfall
	Boom head
	Boom head with boom section 1 m (3 ft)

Explanation of symbols used

Symbol	Explanation
	Jib (boom base section + boom head)
	S = Installation position of rope guide X1 = Installation position of mid-point suspension 1 X2 = Installation position of mid-point suspension 2

Tab. 506: Explanation of symbols used

The following symbol is used for orientation in graphics:

Symbol with explanation	
Position of boom base section	Position of boom head

Tab. 507: Symbol for orientation in graphics

7.2 Work instructions for assembly/disassembly



DANGER

Improper assembly/disassembly!
Toppling of machine, structural breakdown.

- ▶ All activities for machine assembly/disassembly may only be carried out in the order described.
 - ▶ In case of questions or uncertainties, please contact the installation personnel and dismantling personnel immediately.
-



WARNING

Entering working zone and danger zone while machine is running!
Severe injury.

- ▶ Make sure that the machine operator always sits in the cabin.
- ▶ Ensure unrestricted communication between machine operator and installation personnel.

When working on machine without presence of machine operator:

- ▶ Switch off the battery main switch.
-

Only use the provided Liebherr tool kit and the provided sling gear for machine assembly/disassembly.

Perform entire machine assembly/disassembly with preselected "assembly functions".

All movements of winches, hydraulic cylinders, crawlers and swing gear should be slow and travel at the lowest speed level.

7.3 Locking elements - overview

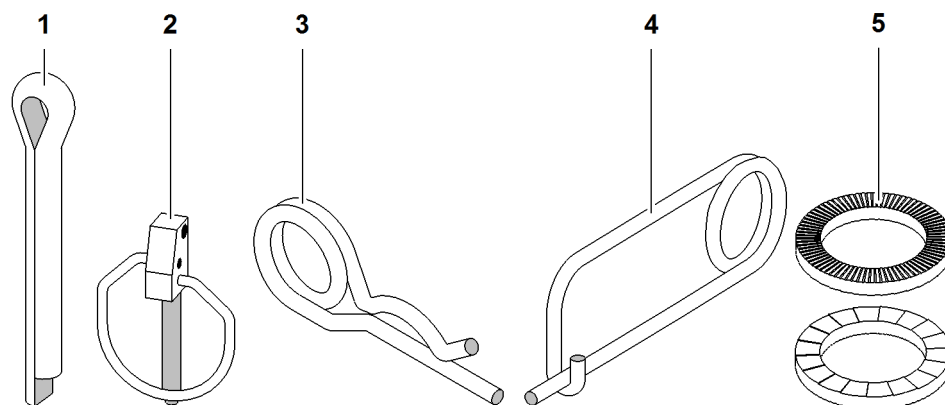


Fig. 2963: Locking elements - overview

- | | | | |
|---|-------------------|---|-----------------|
| 1 | Splint pin | 4 | Locking spring |
| 2 | Linchpin | 5 | Locking washers |
| 3 | Spring cotter pin | | |

7.3.1 Splint pin



WARNING

Improper multiple use of a splint pins!
Break of splint pin.
Severe injury.

► Use splint pin only once.

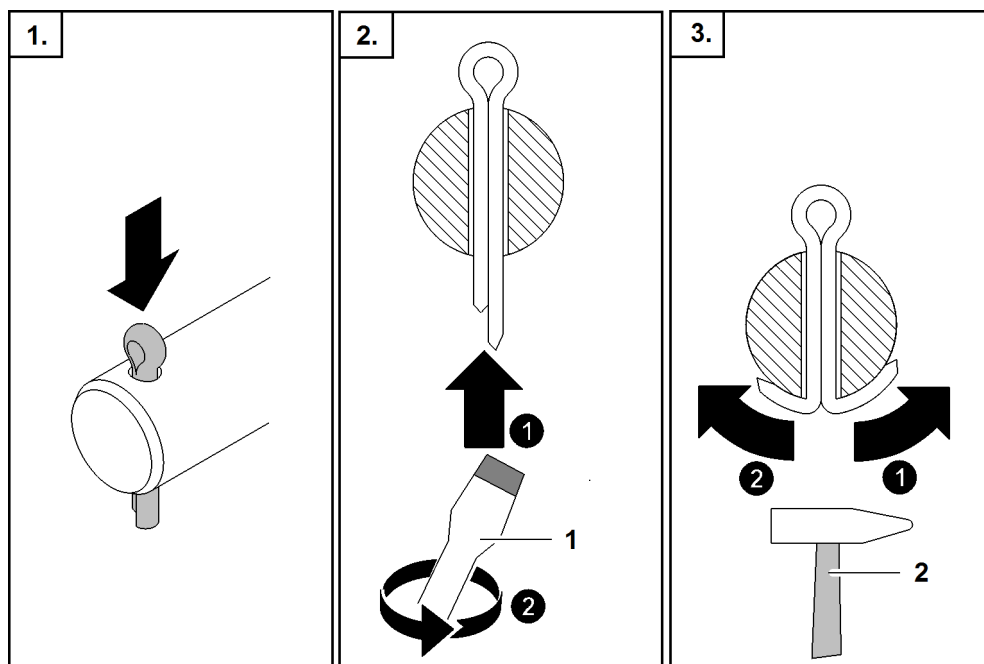


Fig. 2964: Inserting the splint pin

- | | | | |
|---|-------------|---|--------|
| 1 | Screwdriver | 2 | Hammer |
|---|-------------|---|--------|

- ▶ Insert the splint pin.
- ▶ Bend ends of splint pins outwards with screwdriver 1.
- ▶ Completely bend ends of splint pins outwards with hammer 2.

7.3.2 Linchpin

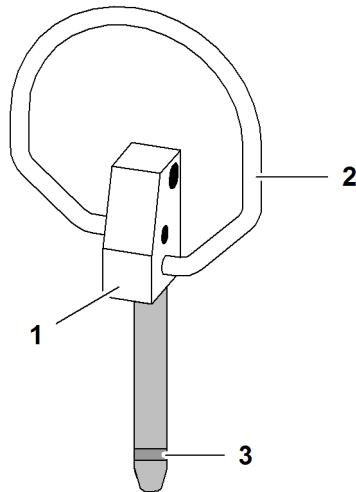


Fig. 2965: Linchpin

1 Linchpin
2 Ring

3 Notch



WARNING

Improper closing of linchpin!
Unintended loosening of linchpin.
Severe injury.

- ▶ Snap ring 2 into notch 3.
-

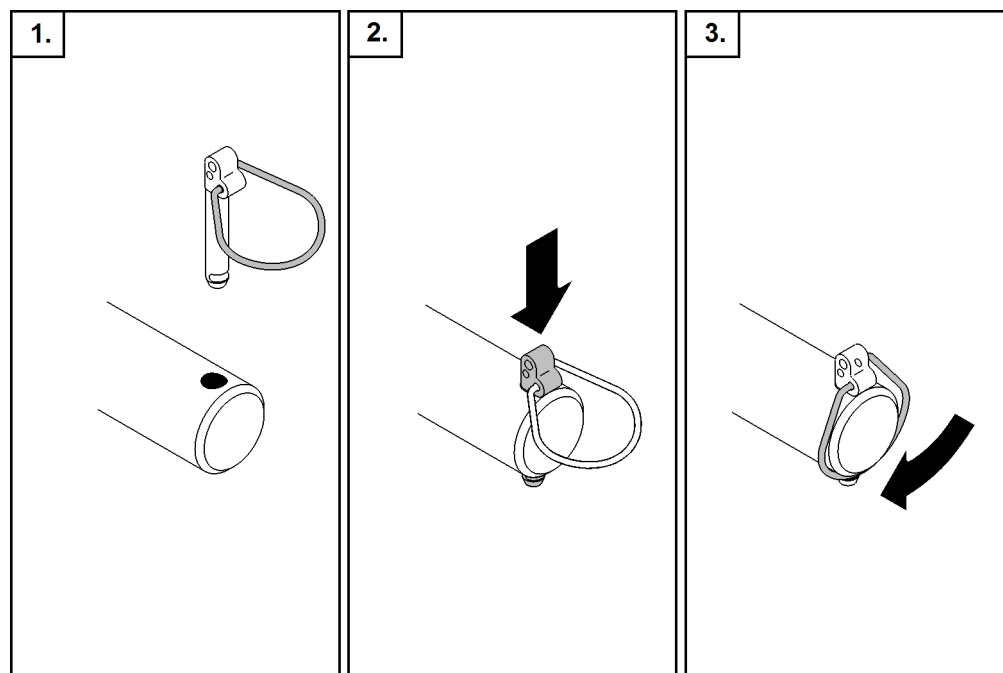


Fig. 2966: Inserting the linchpin

- ▶ Insert the linchpin.
- ▶ Snap ring into notch.

7.3.3 Spring cotter pin

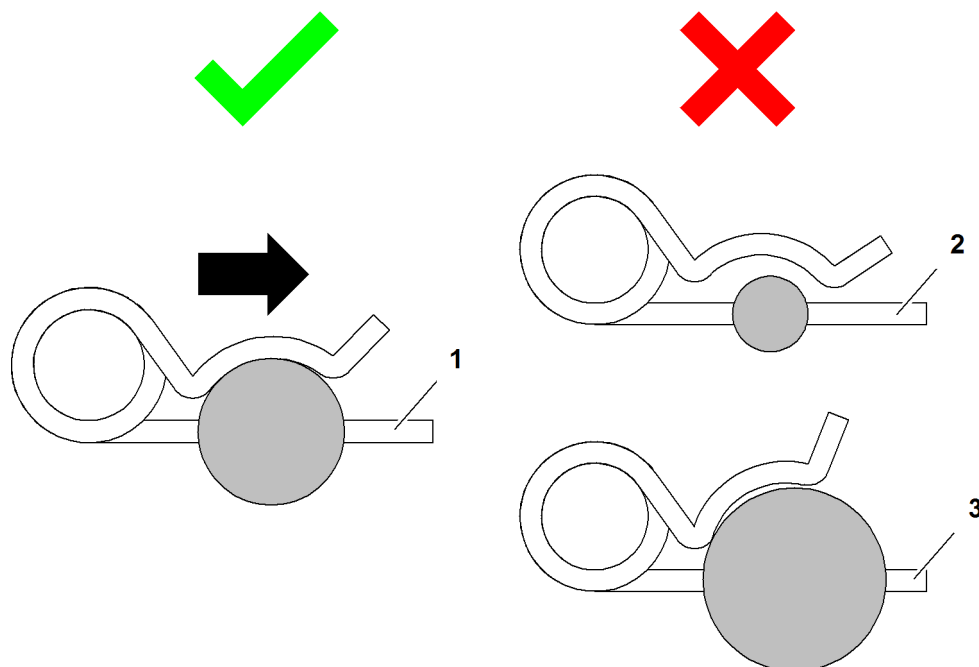


Fig. 2967: Spring cotter pin

- 1 Correct spring cotter pin
- 2 Spring cotter pin too large
- 3 Spring cotter pin too small

**WARNING**

Wrong dimension of spring cotter pin!
Unintentional loosening of the spring cotter pin.
Severe injury.

► Use correct spring cotter pin 1.

► Insert spring cotter pin.

7.3.4 Locking spring

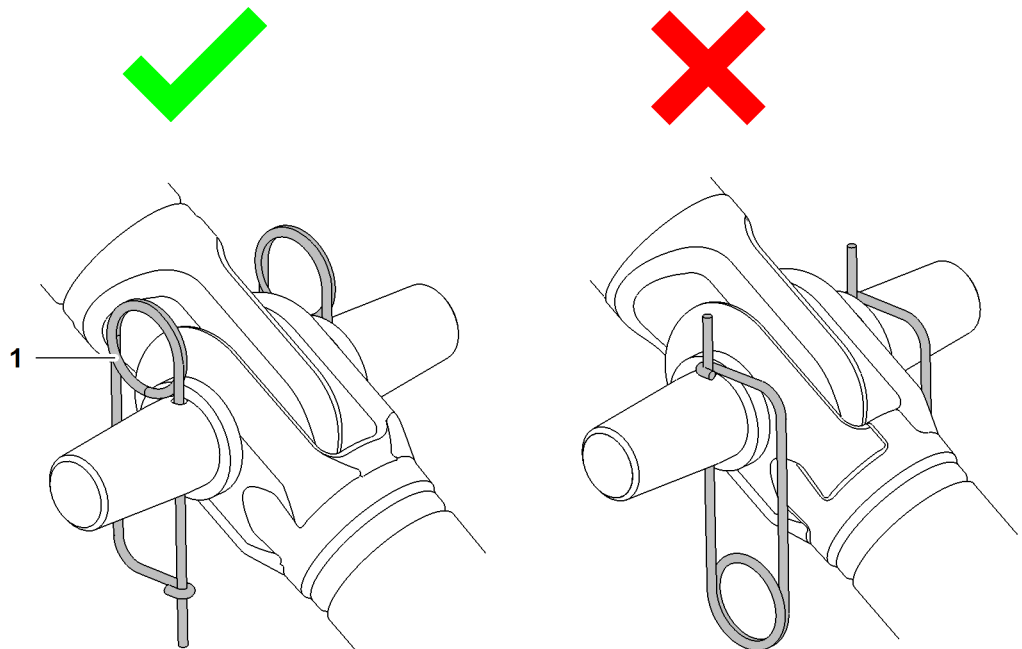


Fig. 2968: Locking spring

1 Locking spring

**WARNING**

Improperly installed locking spring!
Unintentional loosening of locking spring.
Severe injury.

► Install locking spring 1 properly.

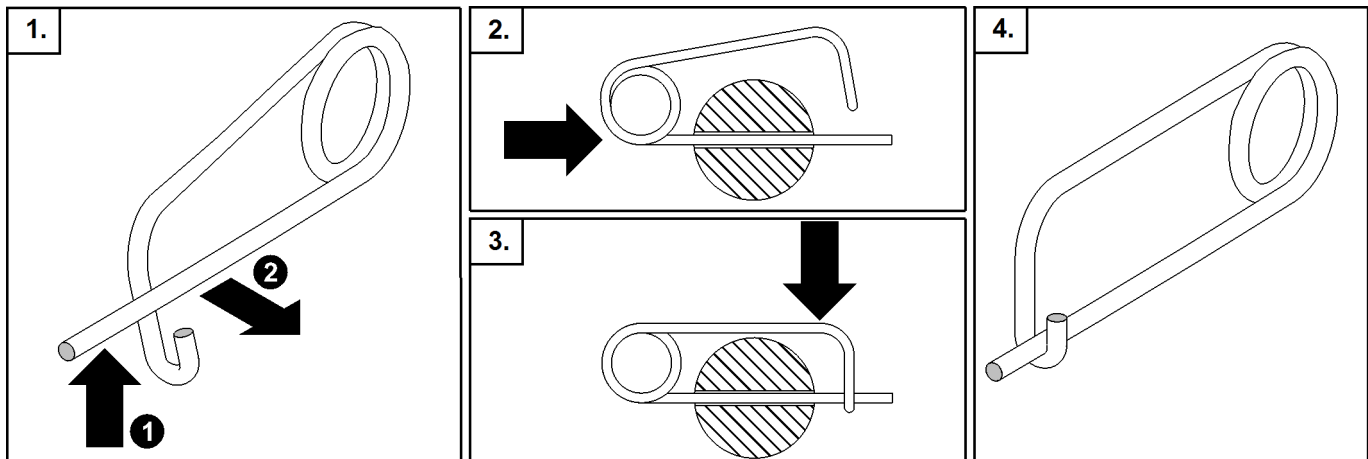


Fig. 2969: Inserting the locking spring

- ▶ Press locking spring together.
- ▶ Open locking spring.
- ▶ Insert locking spring.
- ▶ Press locking spring together.
- ▶ Close locking spring.

7.3.5 Locking washers

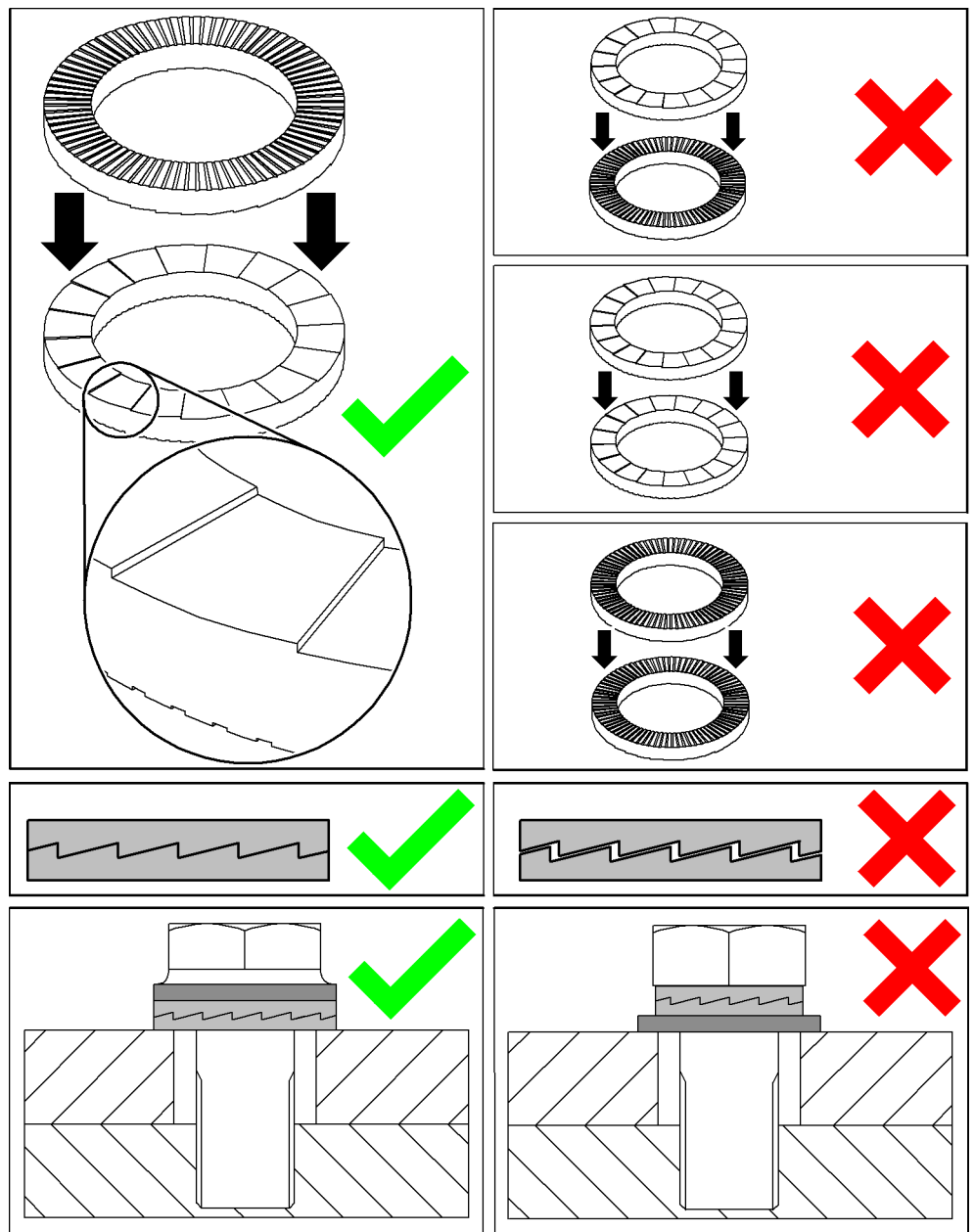


Fig. 2970: Locking washers



WARNING

Improperly installed locking washers!
Unintentional loosening of screw connection.
Severe injury.

- ▶ Install locking washer properly.
- ▶ Tighten screw with specified torque.

7.4 Assembling the basic machine

Assembly of basic machine with self-assembly system is described below.

It is not necessary to use an auxiliary crane, so this is not described.

Ensure that the following conditions are fulfilled:

- The machine has been prepared for self-assembly.
- Work plans have been drawn up.
- The number of counterweight slabs is known.
- The transport vehicles with the single components are coordinated to ensure that the procedure runs smoothly.
- Any accessories required are available.

7.4.1 Notes

The illustrations have been simplified or schematically represented for reasons of uniformity and represent the principles of assembly. They do not provide a detailed representation of the components.

7.4.2 Moving cabin platforms* into working position

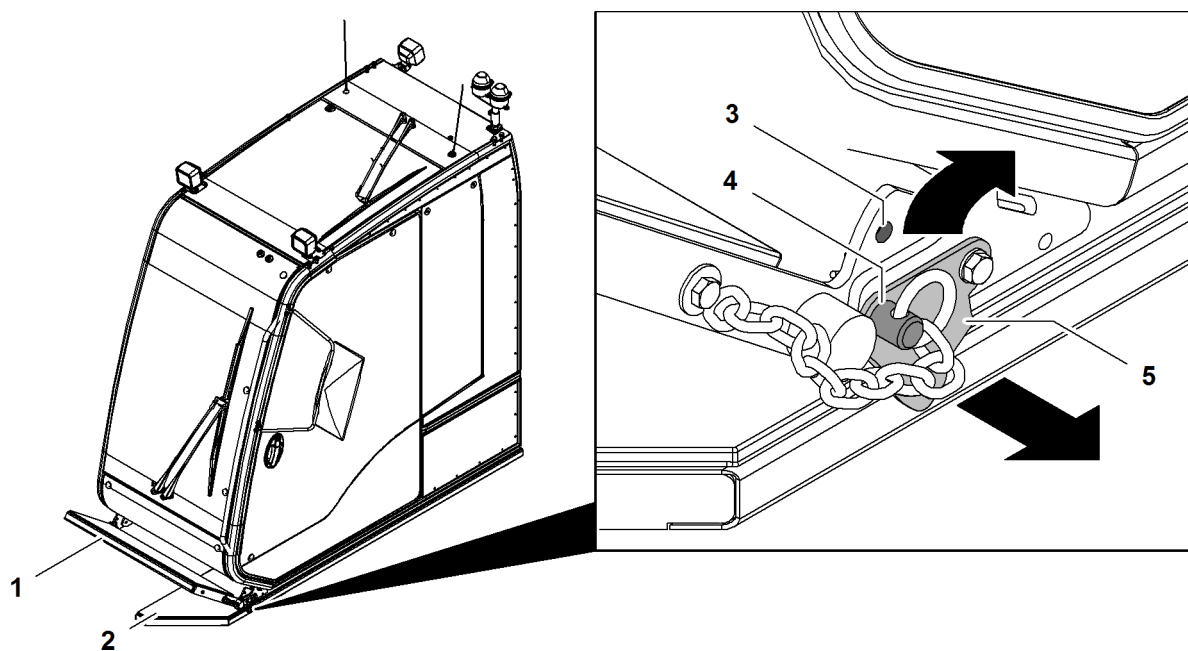


Fig. 2971: Moving cabin platforms into working position

- | | | | | | |
|---|----------------|---|--------------------------|---|-----------------|
| 1 | Front platform | 3 | Top pin connection point | 5 | Locking element |
| 2 | Side platform | 4 | Pin | | |

The pin 4 is in the bottom pin connection point.

- ▶ Remove spring cotter pin and pin 4.
- ▶ Fold upsecuring element 5.

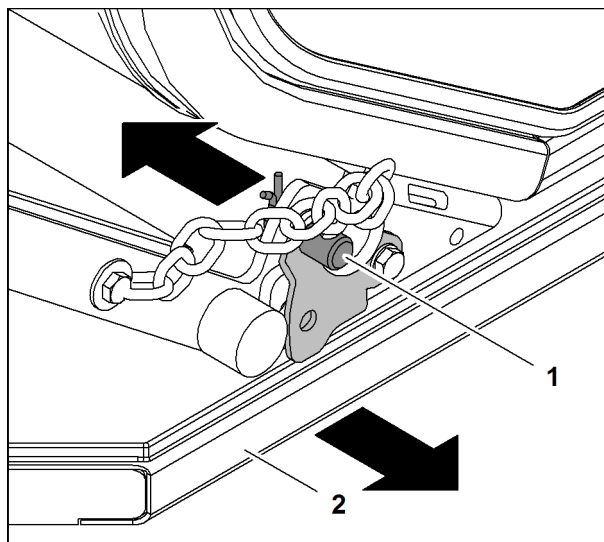


Fig. 2972: Moving the side platform into working position

- 1 Pin
- 2 Side platform

- ▶ Insert pin 1 in top pin connection point.
 - ▷ Front platform is secured.
 - ▷ Side platform 2 is unlocked.
- ▶ Pull out side platform 2.

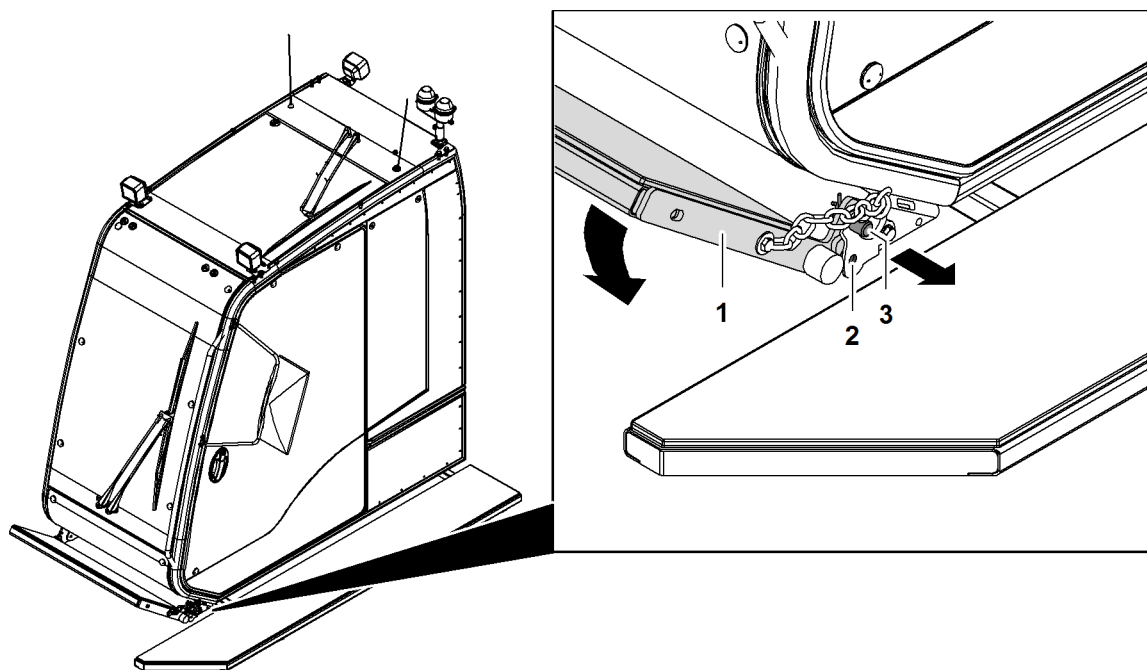


Fig. 2973: Moving the front platform into working position

- 1 Front platform
- 2 Bottom pin connection point
- 3 Pin

- ▶ Slightly lift front platform 1 and remove pins 3.

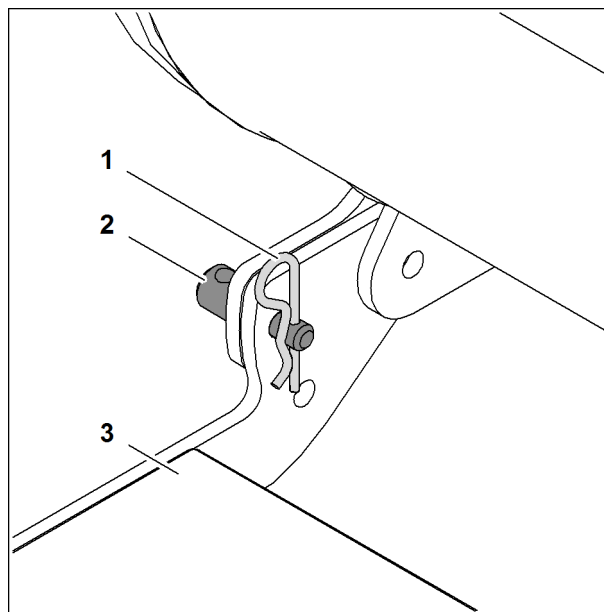


Fig. 2974: Moving the front platform into working position

- | | | | |
|---|-------------------|---|----------------|
| 1 | Spring cotter pin | 3 | Front platform |
| 2 | Pin | | |

- ▶ Repeat procedure on opposite side.
- ▶ Fold down front platform 3.

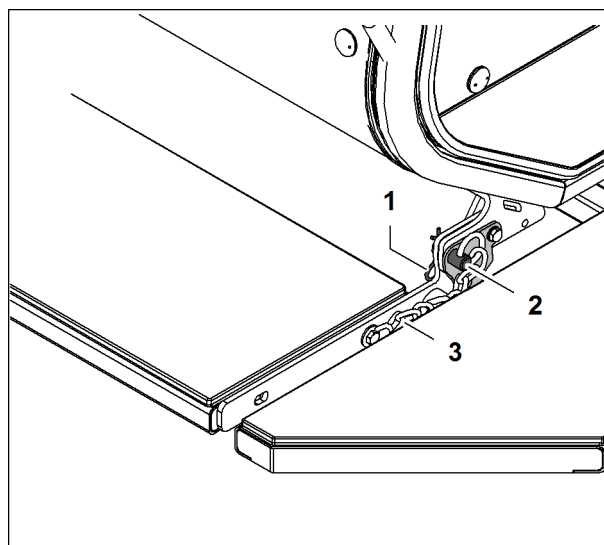


Fig. 2975: Moving the front platform into working position

- | | | | |
|---|-------------------|---|-------|
| 1 | Spring cotter pin | 3 | Chain |
| 2 | Pin | | |

- ▶ Fold down securing element.
- ▶ Insert pin 2 in top pin connection point.
- ▶ Secure pin 2 with spring cotter pin 1.

**WARNING**

Chain lying around!
Risk of falling off cabin.

- ▶ Ensure that no one trips over the chain **3**.
- ▶ Remove chain.

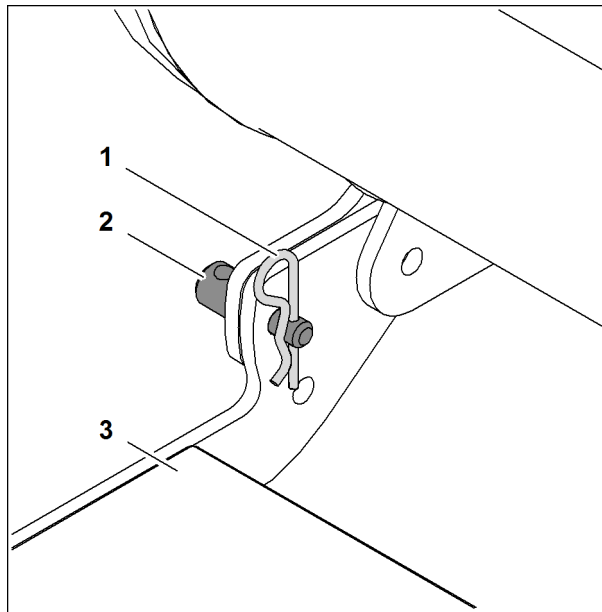


Fig. 2976: Moving the front platform into working position

- | | |
|----------------------------|-------------------------|
| 1 Spring cotter pin | 3 Front platform |
| 2 Pin | |

- ▶ Repeat procedure on opposite side.

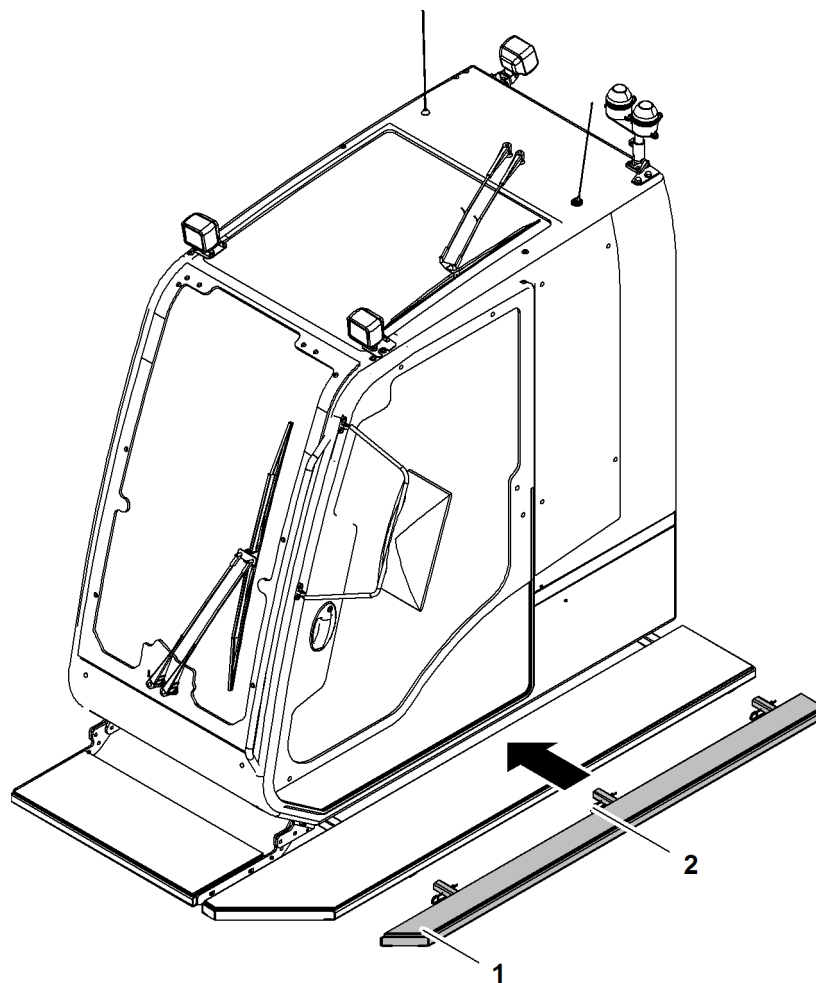


Fig. 2977: Mounting the platform extension

1 Platform extension

2 Locking spring (3x)

► Insert platform extension 1 on the side.

► Secure platform extension 1 with locking springs 2.

7.4.3 Swivel the cab to the working position

If the machine is equipped with hydraulic cabin elevation*, the cabin cannot be slewed.

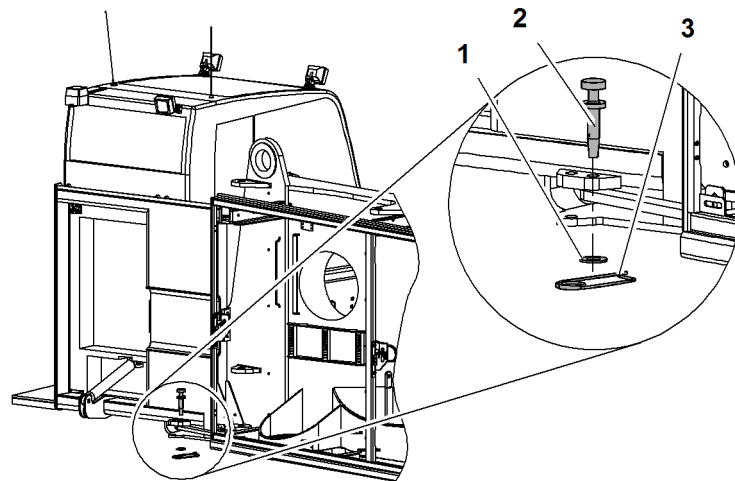


Fig. 2978: Cabin in transport position

- | | | | |
|---|--------|---|------------|
| 1 | Washer | 3 | Safety pin |
| 2 | Pin | | |

► Remove safety pin 3, washer 1 and pin 2.



CAUTION

Pivoting cab!
Risk of crushing of limbs.

- Remain outside of the swing range of the cab.
- Keep all limbs well clear of moving parts.

► Swiveling the cab to the working position manually.

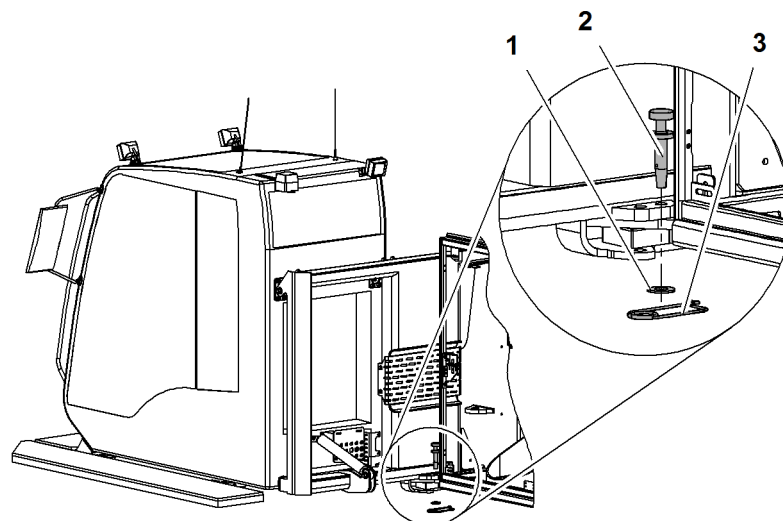


Fig. 2979: Cabin in working position

- | | | | |
|---|--------|---|------------|
| 1 | Washer | 3 | Safety pin |
| 2 | Pin | | |

► Insert pin 2 and secure with washer 1 and safety pin 3.

- ▷ The cab is swung roughly 2° towards the boom. This swinging makes it easier to see the load (for an average radius).

7.4.4 Mounting the cabin handrail*

Mounting cabin handrail variant 1 with undercarriage without carbody counterweight

If the basic machine has no platforms on the uppercarriage, this cabin handrail must be installed.

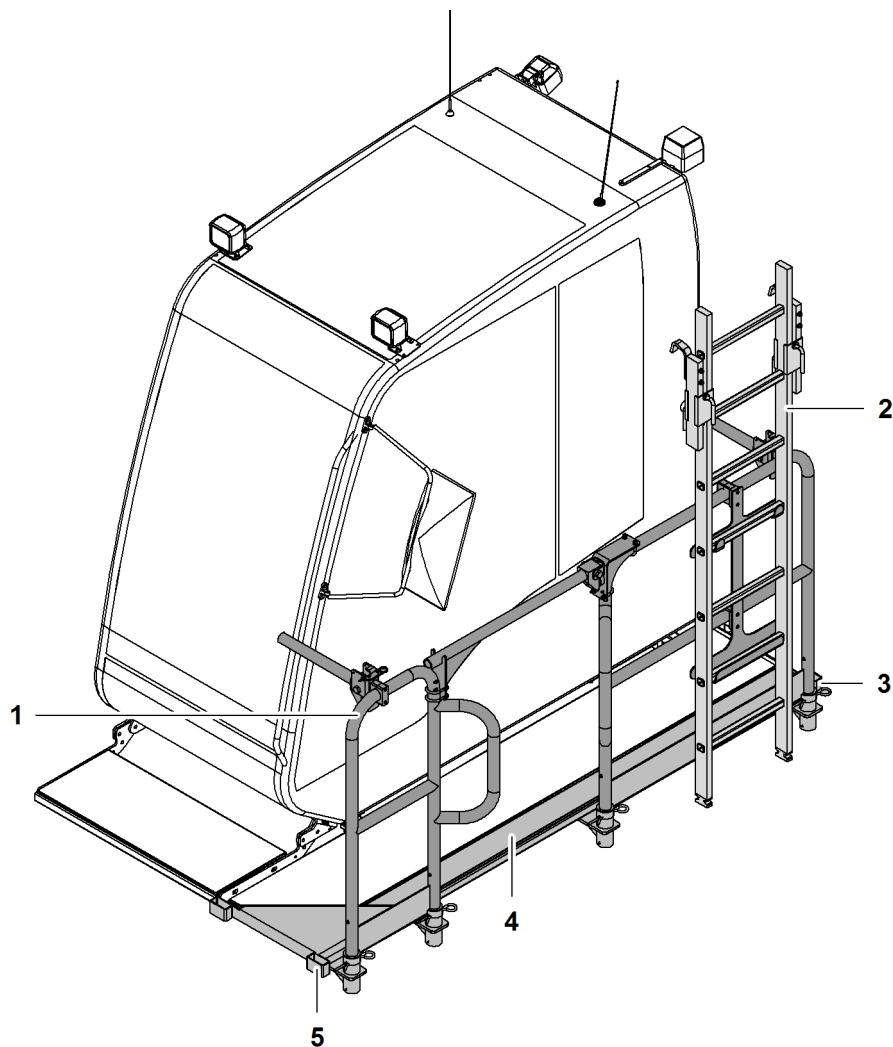


Fig. 2980: Mounting cabin handrail variant 1 with undercarriage without carbody counterweight

1	Handrail	4	Platform
2	Ladder in transport position	5	Strut (2x)
3	Strut (2x)		

- ▶ Remove locking springs.
- ▶ Push front handrail into mount 2 from above.
- ▶ Secure front handrail with locking springs.
- ▶ Push rear handrail into mount from above.
- ▶ Secure rear handrail with locking springs.
- ▶ Mount chopper bar.

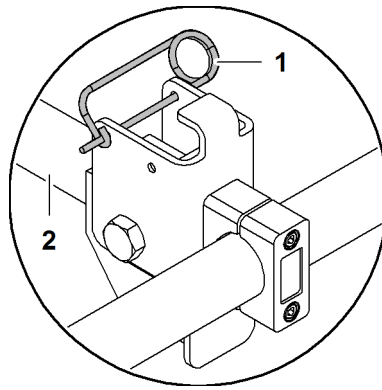


Fig. 2981: Securing the chopper bar

1 Locking spring

2 Chopper bar



WARNING

Unsecured chopper bar 2!
Falling off cabin platform.

- ▶ Ensure that chopper bar 2 is secured with locking spring 1 in closed position.
- ▶ Secure chopper bar 2 with locking spring 1 in closed position.

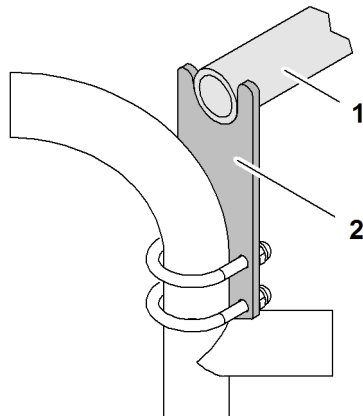


Fig. 2982: Chopper bar of cabin handrail

1 Chopper bar

2 Mount



WARNING

Unsecured chopper bar 1!
Falling off cabin platform.

- ▶ Ensure that chopper bar 1 engages in mount 2.
- ▶ Check whether chopper bar 1 engages in mount 1 by opening and closing chopper bar 2.
 - ▷ Cabin handrail is mounted and secured.

Mounting cabin handrail variant 2 with undercarriage without carbody counterweight

If the basic machine has platforms on the uppercarriage, this cabin handrail must be installed.

Make sure the following conditions are met:

- Two helpers are available.

Installing the frame on the cabin

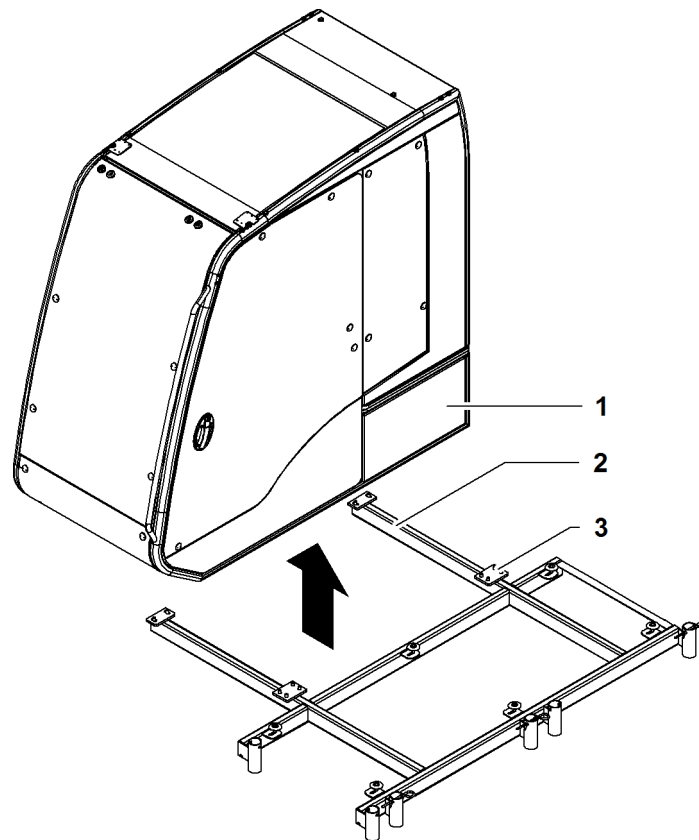


Fig. 2983: Installing the frame on the cabin

- | | | | |
|---|-------|---|-----------------------|
| 1 | Cabin | 3 | Attachment point (4x) |
| 2 | Frame | | |
- ▶ Lift frame 2 to cabin 1.
 - ▶ Installing the frame 2 on the cabin 1.

Installing handrail parts on the frame

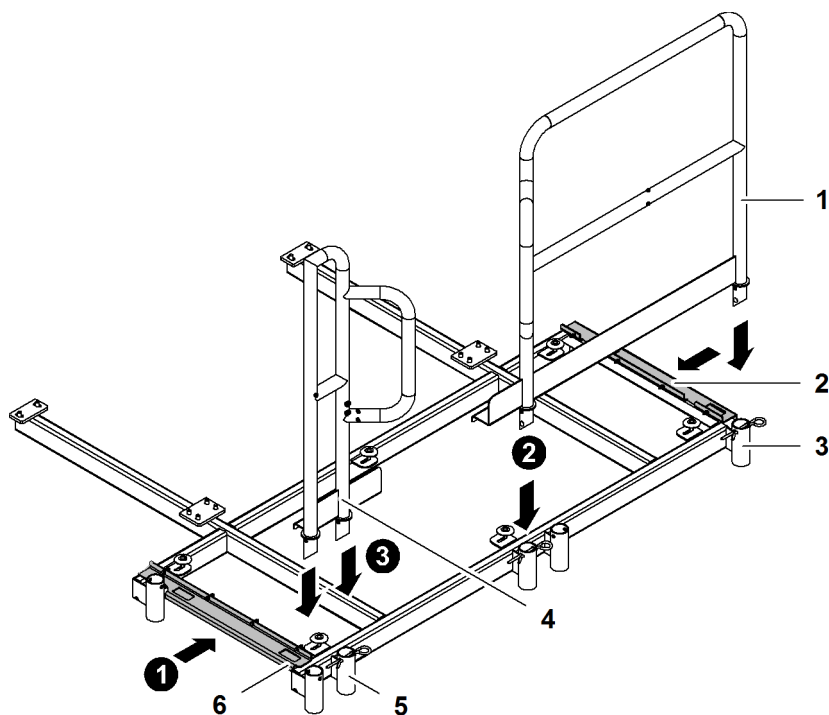


Fig. 2984: Installing handrail parts on the frame

1	Rear handrail	4	Front handrail
2	Rear angle	5	Mount
3	Mount	6	Front angle

- ▶ Remove locking elements of the mounts **3 + 5**.
- ▶ Insert front handrail **4** into mounts **3**.
- ▶ Insert rear handrail **1** into mount **5**.
- ▶ Mount rear angle **2** on frame.
- ▶ Mount front angle **6** on frame.

Securing handrail

Securing handrail with locking elements

There are two locking elements:

- Spring cotter pin outside
- Locking spring inside

Securing handrail with spring cotter pin outside

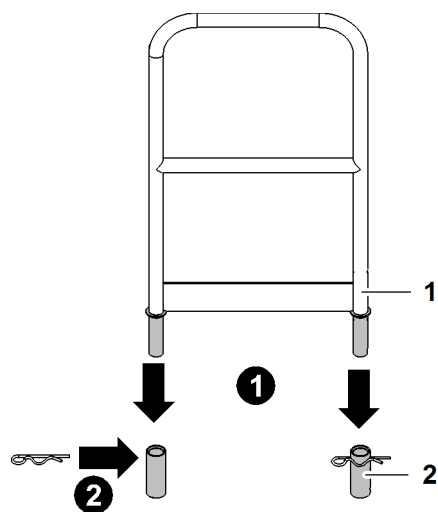


Fig. 2985: Securing handrail with spring cotter pin outside

- 1 Handrail
- 2 Mount for handrail

- ▶ Insert handrail 1 into mount 2.
- ▶ Repeat process with all handrails.

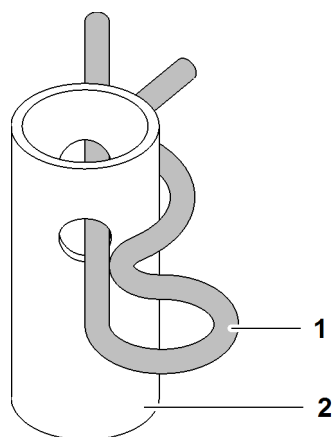


Fig. 2986: Inserting the spring cotter pin

- 1 Spring cotter pin
- 2 Mount for handrail

- ▶ Insert spring cotter pin 1.
- ▶ Repeat process with all mounts 2.
- ▶ Ensure that the spring cotter pin 1 is inserted correctly.
 - ▷ Handrails secured with spring cotter pin outside.

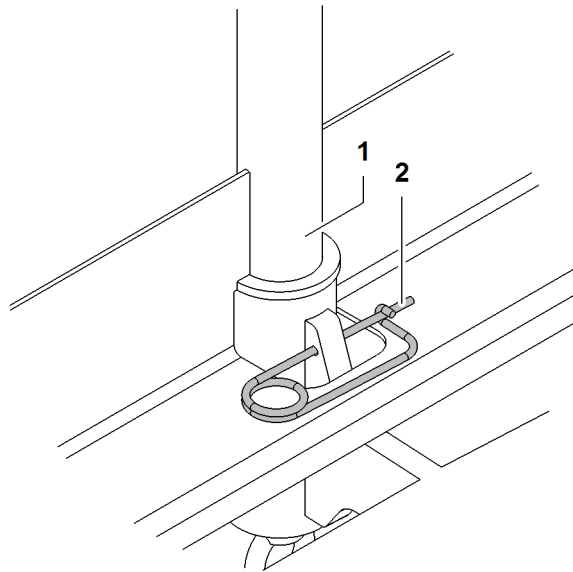
Securing handrails with locking spring inside

Fig. 2987: Securing handrails with locking spring inside

1 Handrail **2** Locking spring

- ▶ Secure handrail with locking springs **2**.
- ▶ Repeat process with all handrails **1**.
 - ▷ Secure handrails with locking springs inside.

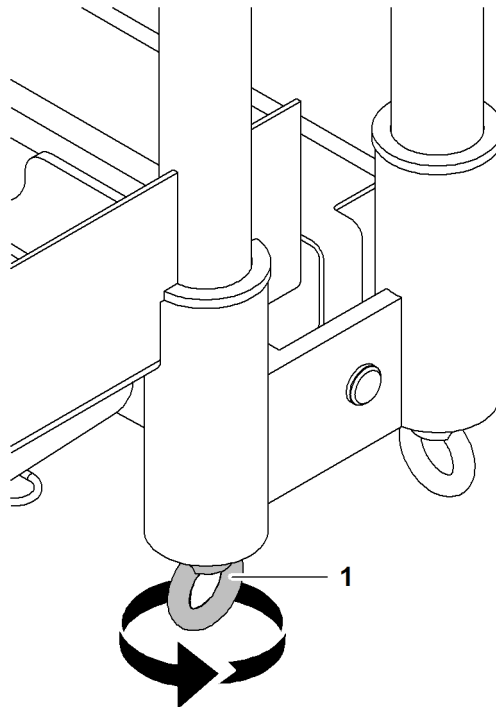
Securing handrails with eye bolt

Fig. 2988: Securing handrails with eye bolt

1 Eye bolt for handrail stabilization

- ▶ Tighten eye bolt **1**.

- ▷ Wedge of handrail stabilization secures the handrail.
- ▶ Repeat process with all handrails.

Insert catwalk grating in frame

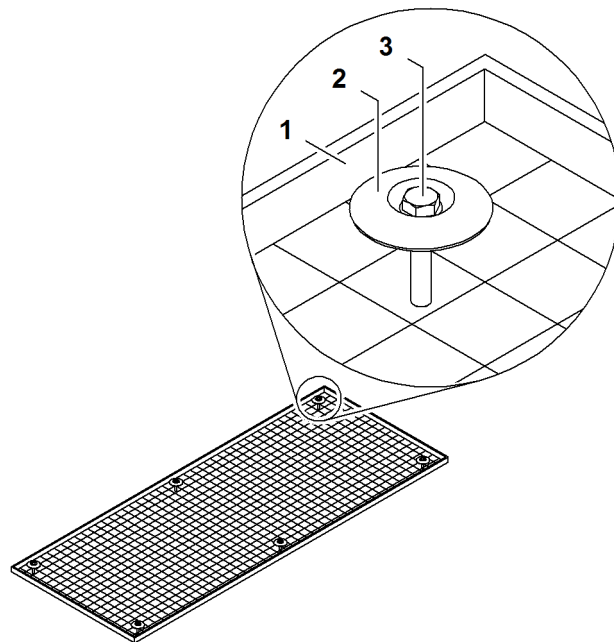


Fig. 2989: Insert catwalk grating in frame

- | | |
|--|---------------------|
| <p>1 Catwalk grating</p> <p>2 Plate (6x)</p> | <p>3 Screw (6x)</p> |
|--|---------------------|

- ▶ Insert catwalk grating **1** in frame.
- ▶ Insert screw **3** with plate **2** at catwalk grating **1** and attachment point.
- ▶ Secure screw **3** with locking washer and nut.

Completing the cabin handrail

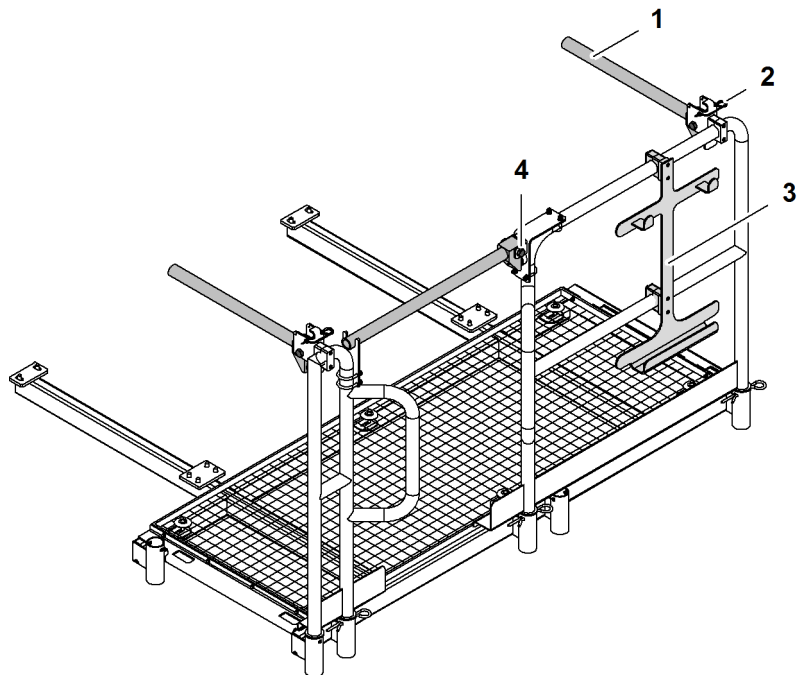


Fig. 2990: Completing the cabin handrail

- | | | | |
|----------|---------------------|----------|-----------------------|
| 1 | Chopper bar (3x) | 3 | Mount |
| 2 | Locking spring (3x) | 4 | Screw connection (3x) |

- ▶ Mount chopper bar **1** with screw connections **4**.
- ▶ Secure chopper bar **1** with locking springs **2**.
- ▶ Install mount **3** for ladder.
- ▶ Suspend ladder.
 - ▷ Cabin handrail variant 2 with undercarriage without carbody counterweight has been mounted

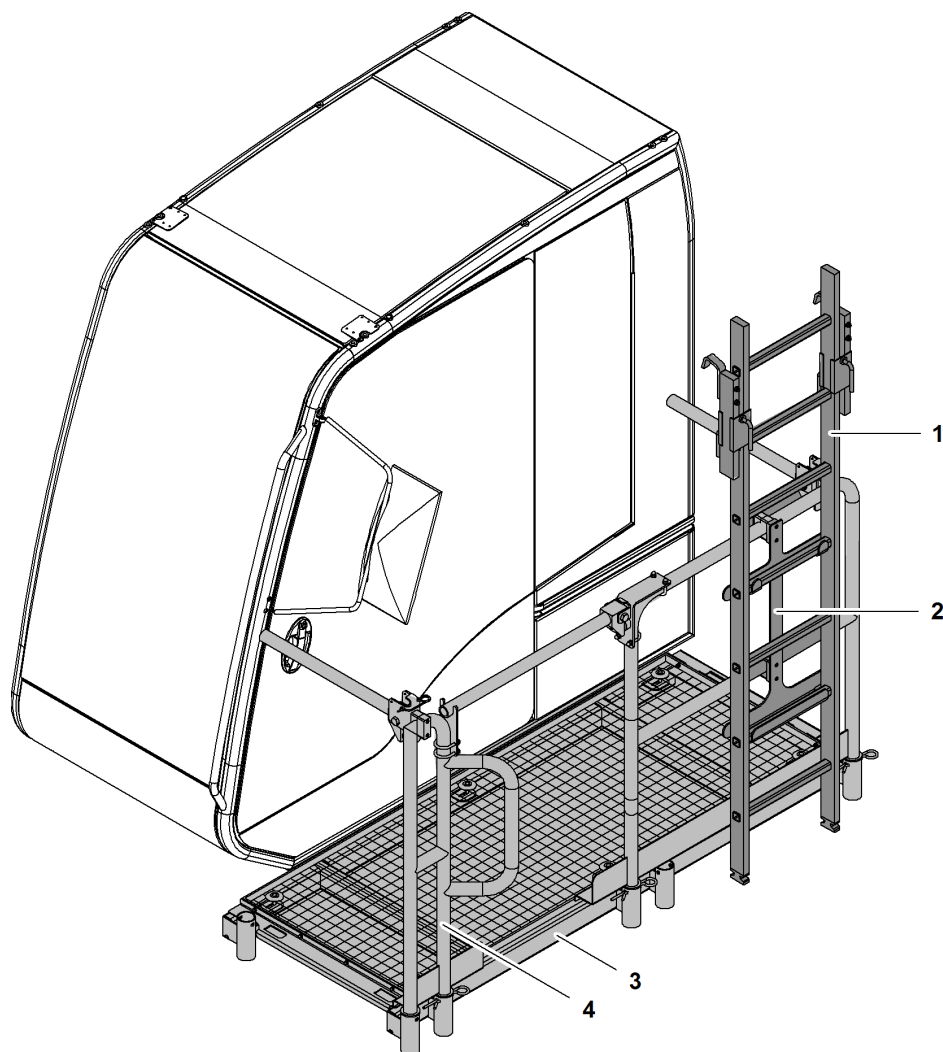


Fig. 2991: Cabin handrail variant 2 with undercarriage without carbody counterweight has been mounted

- | | | | |
|---|------------------------------|---|----------|
| 1 | Ladder in transport position | 3 | Platform |
| 2 | Mount for ladder | 4 | Handrail |

Mounting cabin handrail variant 1 with undercarriage with carbody counterweight

If the basic machine has no platforms on the uppercarriage, this cabin railing must be installed.

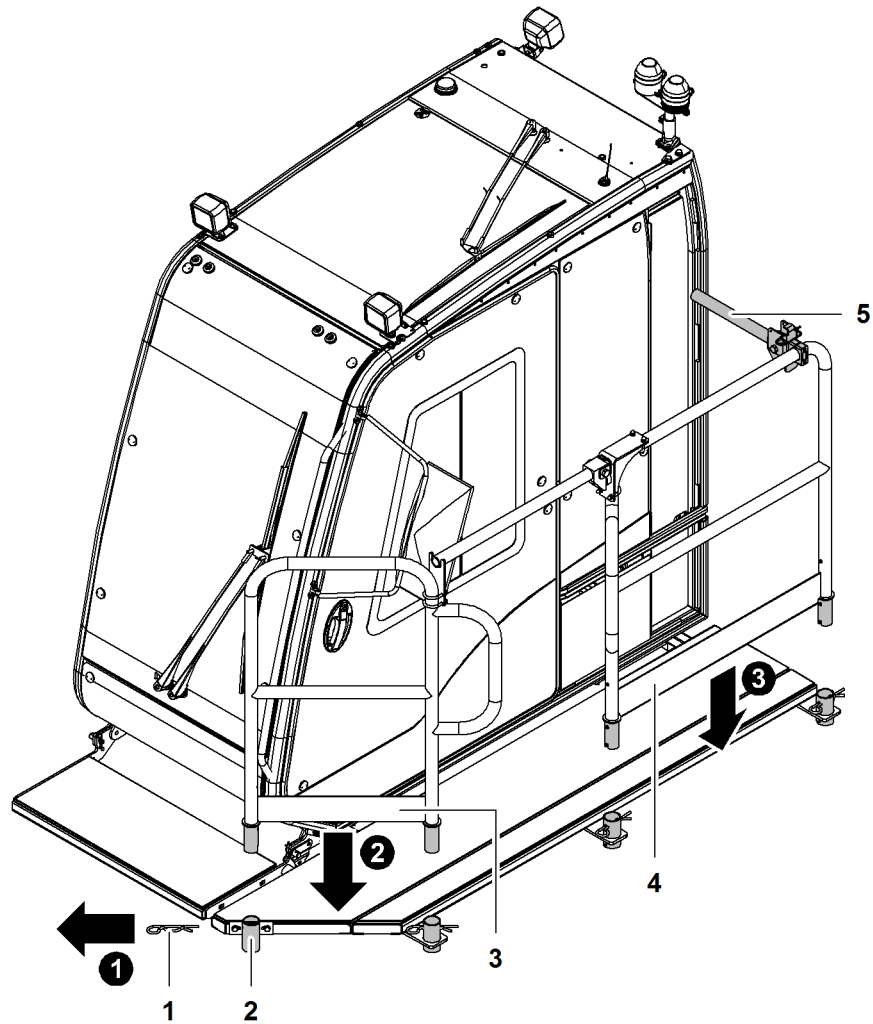


Fig. 2992: Mounting cabin handrail variant 1 with undercarriage with carbody counterweight

- | | | | |
|---|------------------------|---|---------------|
| 1 | Spring cotter pin (4x) | 4 | Rear handrail |
| 2 | Mount (4x) | 5 | Chopper bar |
| 3 | Front handrail | | |

- ▶ Remove spring cotter pin 1.
- ▶ Push front handrail 3 into mount 2 from above.
- ▶ Securing the front handrail 3 with spring cotter pin 1.
- ▶ Push rear handrail 4 into mount 2 from above.
- ▶ Secure rear handrail 4 with spring cotter pin 1.
- ▶ Mount chopper bar 5.

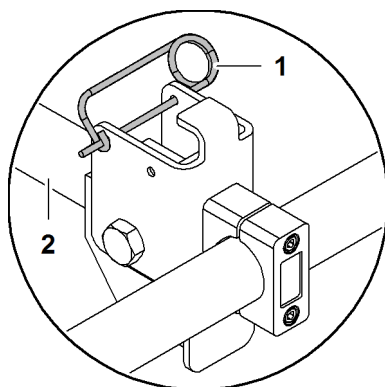


Fig. 2993: Securing the chopper bar

1 Locking spring

2 Chopper bar



WARNING

Unsecured chopper bar 2!
Falling off cabin platform.

- ▶ Ensure that chopper bar 2 is secured with locking spring 1 in closed position.
- ▶ Secure chopper bar 2 with locking spring 1 in closed position.

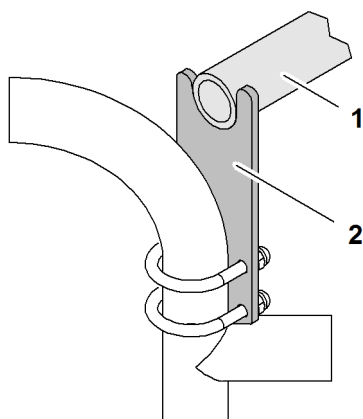


Fig. 2994: Chopper bar

1 Chopper bar

2 Mount



WARNING

Unsecured chopper bar 1!
Falling off cabin platform.

- ▶ Ensure that chopper bar 1 engages in mount 2.
- ▶ Check whether chopper bar 1 engages in mount 1 by opening and closing chopper bar 2.
 - ▷ Cabin railing is mounted and secured.

Mounting cabin handrail variant 2 with undercarriage with carbody counterweight

If the basic machine has platforms on the uppercarriage, this cabin handrail must be installed.

Make sure the following conditions are met:

- Two helpers are available.

Installing the frame on the cabin

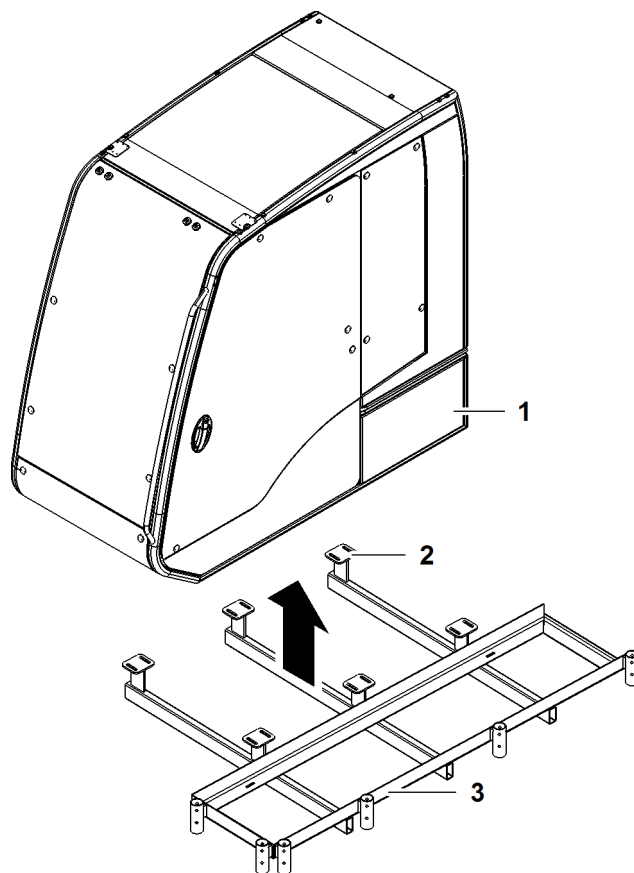


Fig. 2995: Installing the frame on the cabin

- | | | | |
|---|-----------------------|---|-------|
| 1 | Cabin | 3 | Frame |
| 2 | Attachment point (6x) | | |

- ▶ Lift frame 3 to cabin 1.
- ▶ Installing the frame 3 on the cabin 1.

Installing handrail on the frame

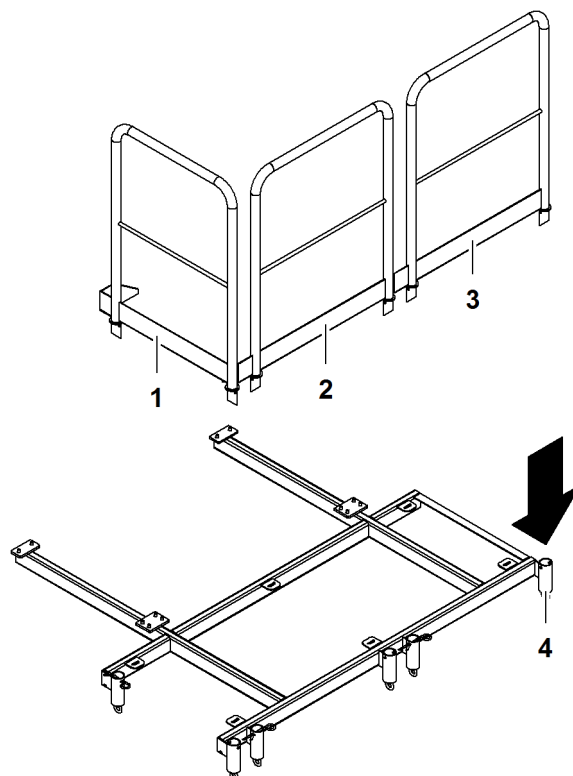


Fig. 2996: Installing handrail on the frame

- | | | | |
|---|-----------------|---|-------------------------|
| 1 | Front handrail | 3 | Rear handrail |
| 2 | Center handrail | 4 | Mount (6x) for handrail |

- ▶ Remove locking elements of the mounts 4.
- ▶ Insert front handrail 1 into mount 4.
- ▶ Insert center handrail 2 into mount 4.
- ▶ Insert rear handrail 3 into mount 4.

Securing handrail

Securing handrail with locking elements

There are two locking elements:

- Spring cotter pin outside
- Locking spring inside

Securing handrail with spring cotter pin outside

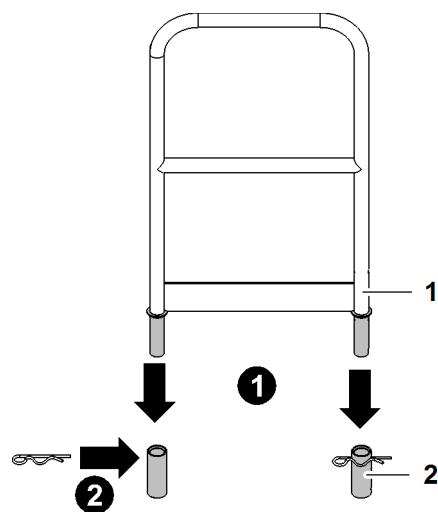


Fig. 2997: Securing handrail with spring cotter pin outside

1 Handrail 2 Mount for handrail

- ▶ Insert handrail 1 into mount 2.
- ▶ Repeat process with all handrails.

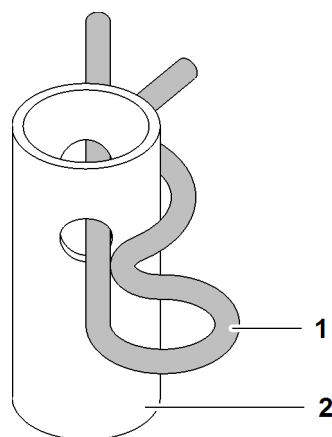


Fig. 2998: Inserting the spring cotter pin

1 Spring cotter pin 2 Mount for handrail

- ▶ Insert spring cotter pin 1.
- ▶ Repeat process with all mounts 2.
- ▶ Ensure that the spring cotter pin 1 is inserted correctly.
 - ▷ Handrails secured with spring cotter pin outside.

Securing handrails with locking spring inside

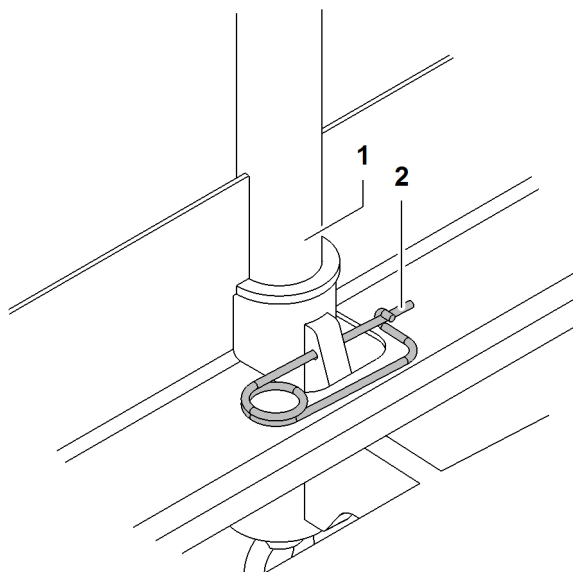


Fig. 2999: Securing handrails with locking spring inside

- 1 Handrail
- 2 Locking spring

- ▶ Secure handrail with locking springs 2.
- ▶ Repeat process with all handrails 1.
 - ▷ Secure handrails with locking springs inside.

Securing handrails with eye bolt

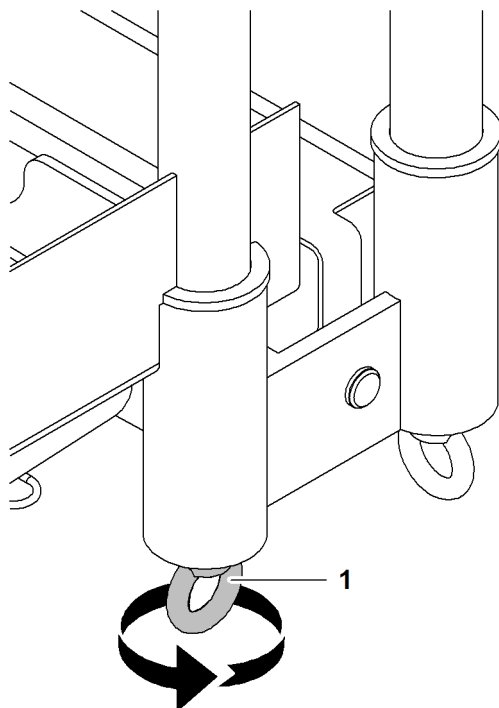


Fig. 3000: Securing handrails with eye bolt

- 1 Eye bolt for railing stabilization

- ▶ Tighten eye bolt 1.

- ▷ Wedge of handrail stabilization secures the handrail.
- ▶ Repeat process with all handrails.

Insert catwalk grating in frame

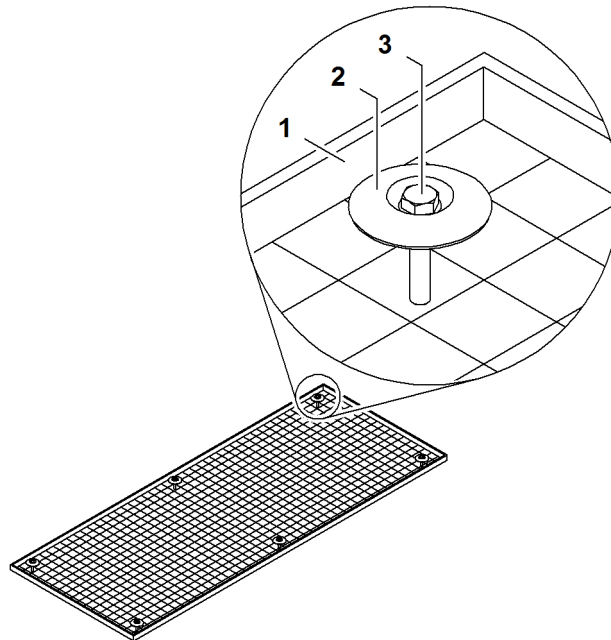


Fig. 3001: Insert catwalk grating in frame

- | | |
|--------------------------|---------------------|
| 1 Catwalk grating | 3 Screw (6x) |
| 2 Plate (6x) | |

- ▶ Insert catwalk grating **1** in frame.
- ▶ Insert screw **3** with plate **2** at catwalk grating **1** and attachment point.
- ▶ Secure screw **3** with locking washer and nut.
 - ▷ Cabin handrail variant 1 with undercarriage with carbody counterweight is mounted:

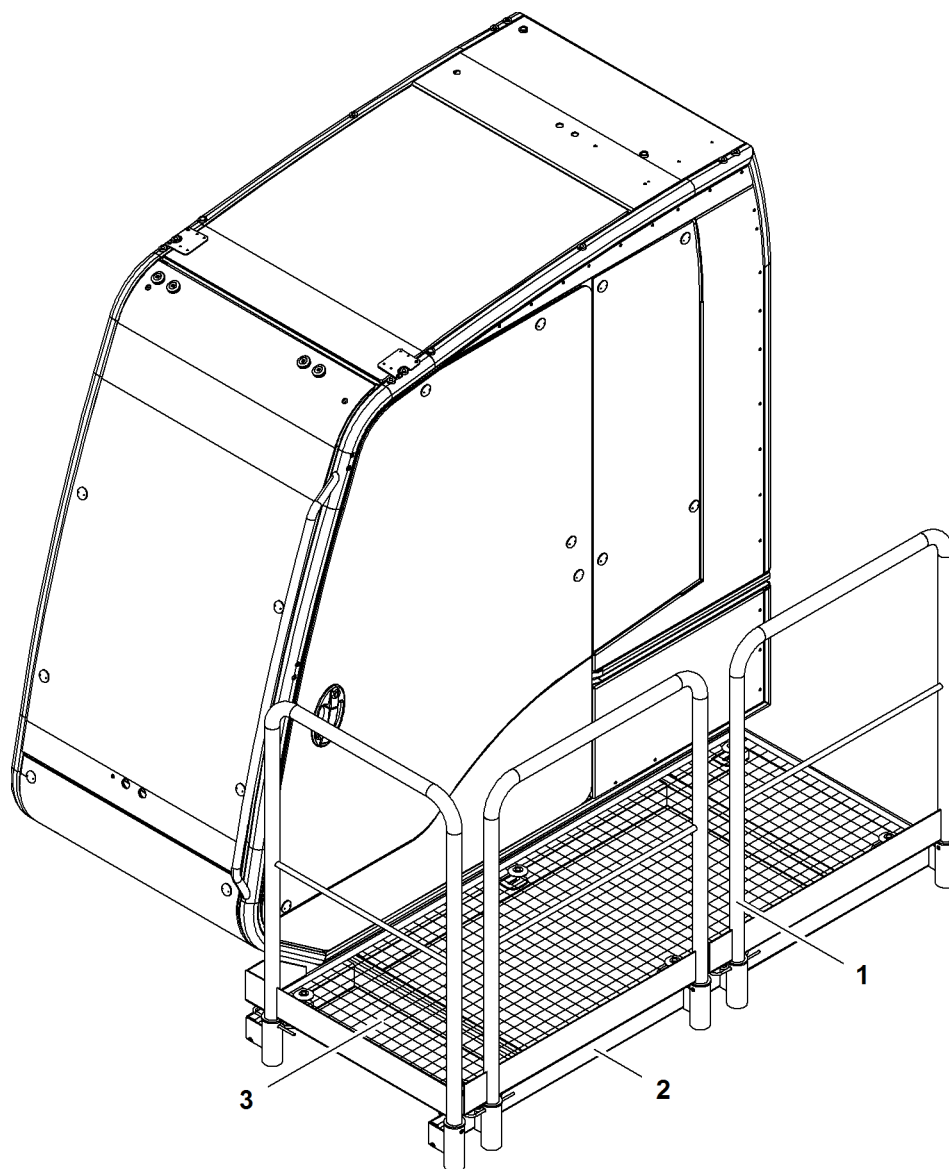


Fig. 3002: Cabin handrail variant 1 with undercarriage with carbody counterweight is mounted

- | | | | |
|---|---------------|---|----------|
| 1 | Handrail (3x) | 3 | Platform |
| 2 | Frame | | |

7.4.5 Ladder for cabin

Mounting ladder for cabin with cabin handrail variant 1

Depending on the space situation and application, the ladder can be attached at the front or the rear of the cabin.

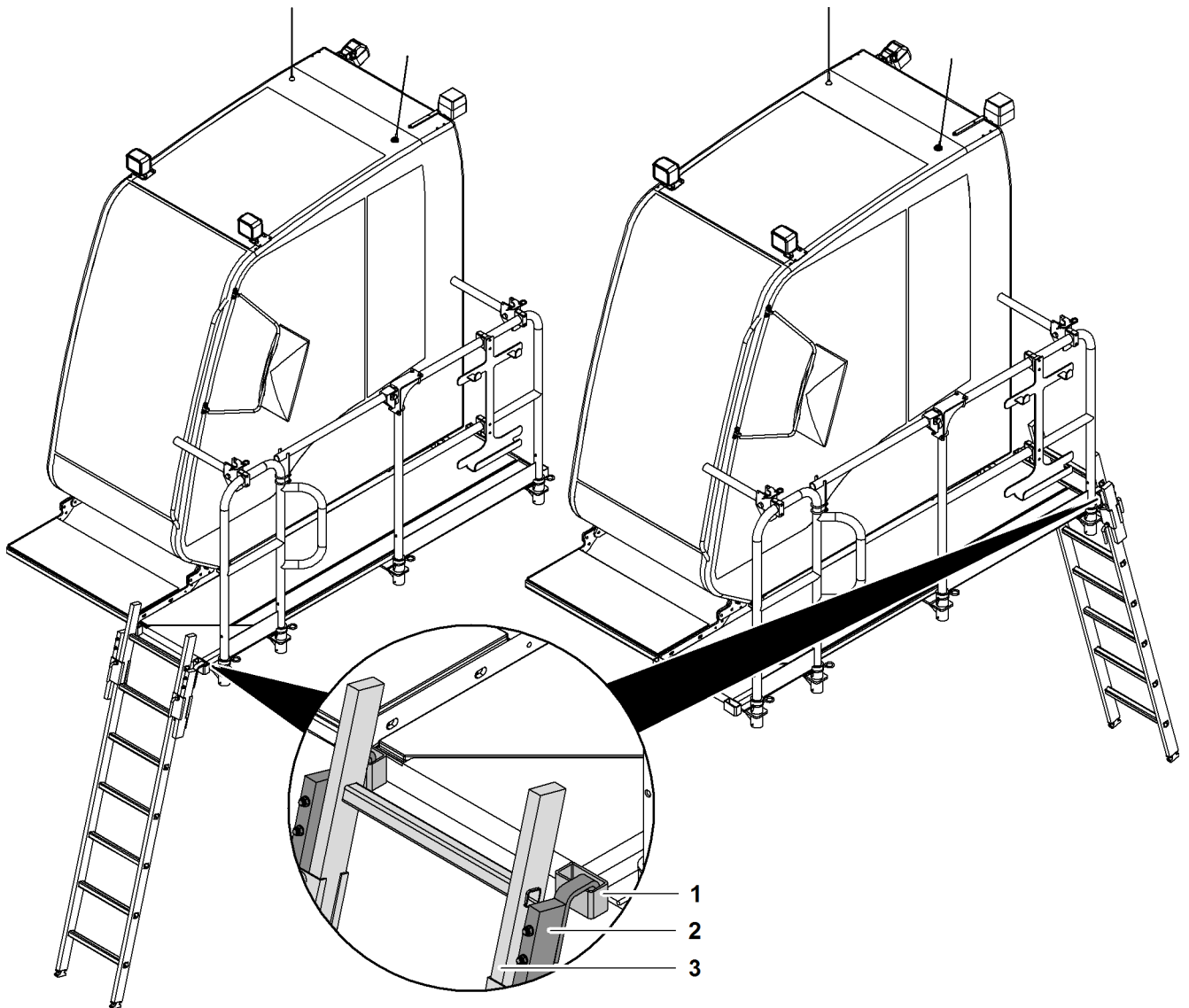


Fig. 3003: Mounting ladder for cabin with cabin handrail variant 1

1 Mount (2x)

2 Hook (2x)

3 Ladder

► Suspend ladder 3 with hooks 2 in mounts 1.

Mounting ladder for cabin with cabin handrail variant 2

Depending on the space situation and application, the ladder can be attached at the front or the rear of the cabin.

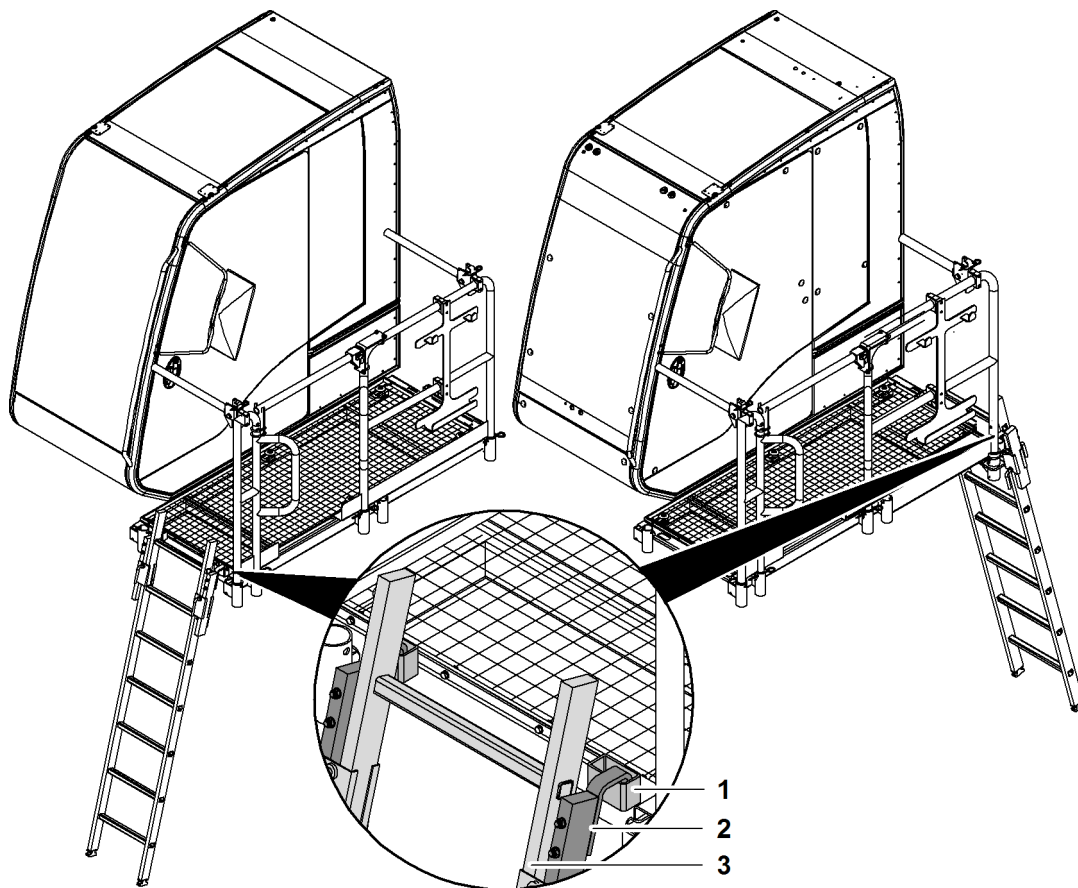


Fig. 3004: Mounting ladder for cabin with cabin handrail variant 2

1 Mount (2x)

2 Hook (2x)

3 Ladder

► Suspend ladder 3 with hooks 2 in mounts 1.

7.4.6 Putting the load moment limiter lamp and flashing light into working position

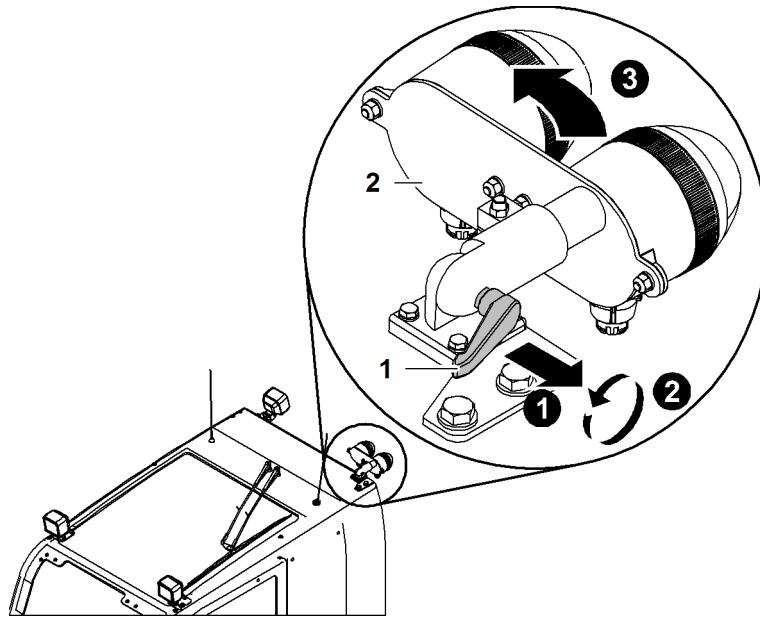


Fig. 3005: Putting the load moment limiter lamp and flashing light into working position

- | | |
|--------------------------|--|
| 1 Clamping device | 2 Load moment limiter lamp and flashing light |
|--------------------------|--|

The clamping device **1** is a ratchets and can be turned into any desired position.

- ▶ Pull out clamping device.
- ▶ Turn clamping device into the desired position.
- ▶ Let go of clamping device.
 - ▷ Clamping device engages.
- ▶ Twist clamping device counter-clockwise.
 - ▷ Screw fitting opens.
- ▶ Fold load moment limiter lamp and flashing light **2** upwards.
- ▶ Turn clamping device **1** clockwise.
 - ▷ Screw fitting closes.
 - ▷ Put load moment limiter lamp and flashing light into position.

7.4.7 Mounting the platforms on the uppercarriage

Sorting and positioning platform parts

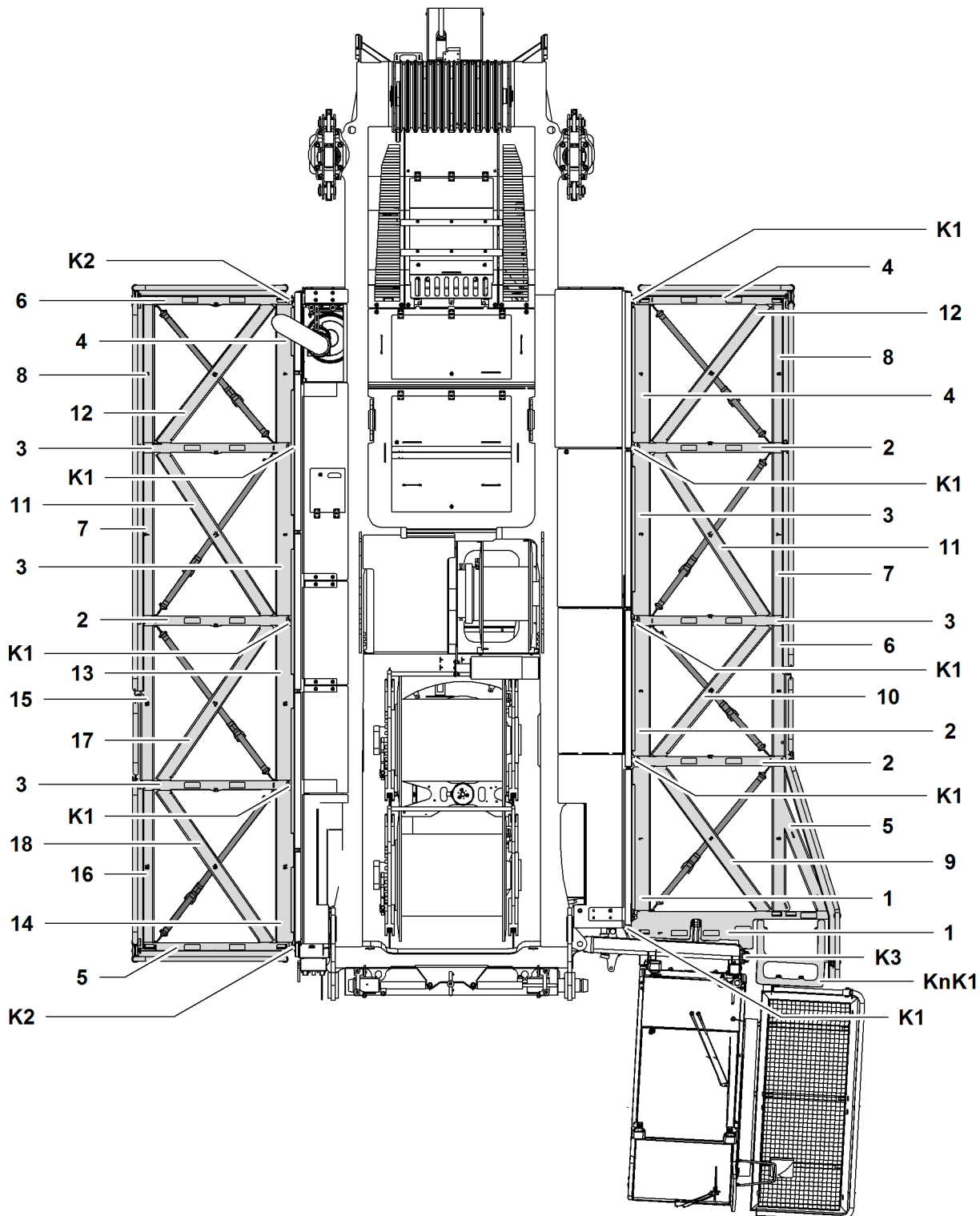


Fig. 3006: Overview of platform parts with part numbers and installation sites

The platform parts are marked with part numbers for identification.

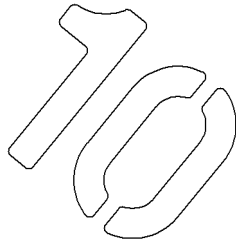


Fig. 3007: Example of a part number

Name	Part number	Number
Brackets		
Bracket	KnK1 ^{A)}	1
Bracket	1	1
Bracket	2	3
Bracket	3	3
Bracket	4	1
Bracket	5	1
Bracket	6	1
Bracket supports		
Bracket support	K1 ^{A)}	8
Bracket support	K2 ^{A)}	2
Bracket support	K3 ^{A)}	1
Plates (inside)		
Plate	1	1
Plate	2	2
Plate	3	2
Plate	4	1
Plate	13	1
Plate	14	1
Plates (outside)		
Plate	5	1
Plate	6	1
Plate	7	2
Plate	8	2
Plate	15	1
Plate	16	1
Diagonals		
Diagonal	9	1
Diagonal	10	1
Diagonal	11	2

Name	Part number	Number
Diagonal	12	2
Diagonal	17	1
Diagonal	18	1
Straps		
Strap	A)	8

Tab. 508: Overview of platform parts

A) No part number on platform part.



Note

Liebherr recommends:

▶ ensure that sufficient space is available.

▶ Sort platform parts.

▶ Position platform parts next to machine at the corresponding installation site.

Mounting bracket support K1 and bracket support K2

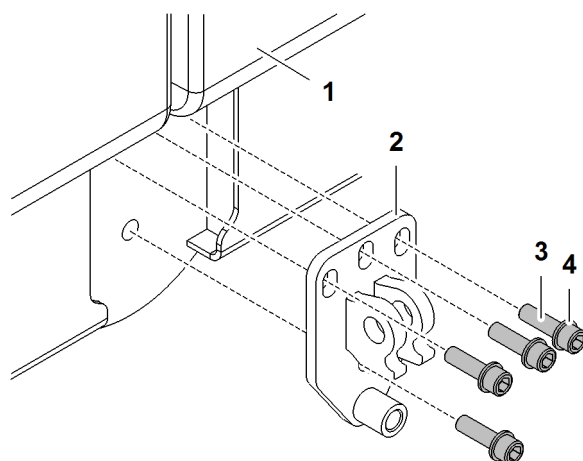


Fig. 3008: Mounting bracket support K1 and bracket support K2

1 Uppercarriage door

2 Bracket support

3 Screw (4x)

4 Washer (4x)

The bracket support 2 is defined as bracket support K1 or bracket support K2.

▶ Install bracket support 2 with screws 3 and washers 4.

▶ Repeat procedure at all installation sites for bracket support K1 and bracket support K2.

▷ Bracket support K1 and bracket support K2 are installed.

Installing bracket1

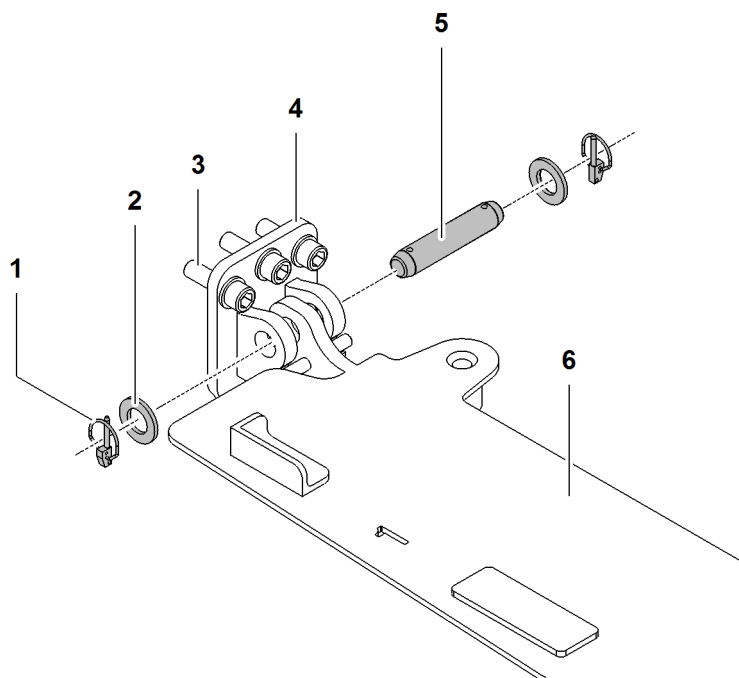


Fig. 3009: Installing bracket1

1	Linchpin (2x)	4	Bracket support
2	Washer (2x)	5	Pin
3	Screw (4x)	6	Bracket1

- ▶ Pin bracket support 4 with bracket1 6.
- ▶ Secure pins 5 on both sides with washers 2 and linchpins 1.
 - ▷ Bracket1 6 is installed.

Installing bracket KnK1

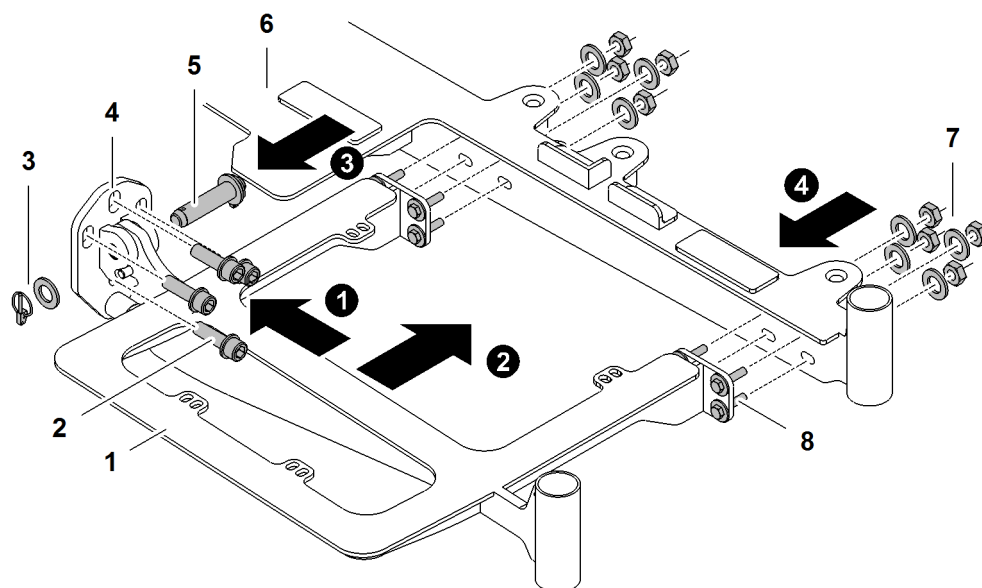


Fig. 3010: Installing bracket KnK1

1	Bracket KnK1	5	Pin
2	Screw (4x) and washer	6	Bracket1
3	Linchpin (2x) and washer	7	Nut (8x) and washer
4	Bracket support K3	8	Screw (8x) and washer

- ▶ Install bracket support K3 4 with screws 2 and washers but do not tighten all the way.
- ▶ Position bracket KnK1 1 on bracket1 6.
- ▶ Pin bracket support K3 4 with bracket KnK1 1.
- ▶ Secure pins 5 with linchpins 3 and washers.
- ▶ Insert screws 8 and washers.
- ▶ Install nuts 7 and washers but do not tighten all the way.
- ▶ Align bracket KnK1 1.
- ▶ Tighten screws 2 and screws 8.
 - ▷ Bracket KnK1 1 is installed.

Installing brackets

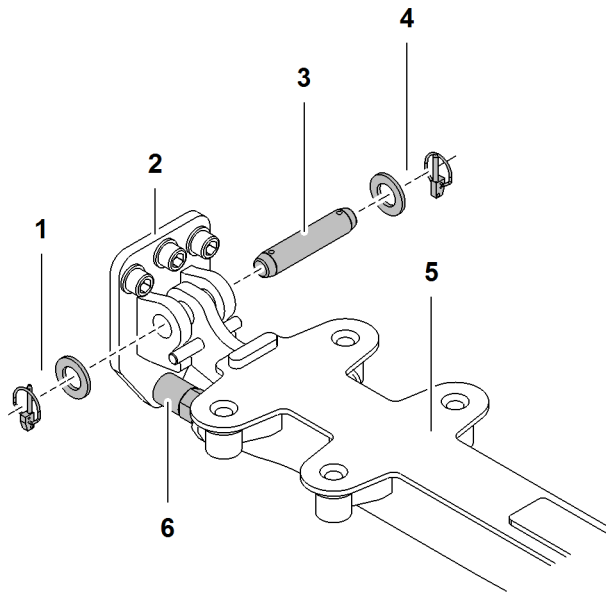


Fig. 3011: Installing brackets

- | | | | |
|---|---------------------|---|---------------------|
| 1 | Linchpin and washer | 4 | Linchpin and washer |
| 2 | Bracket support | 5 | Bracket |
| 3 | Pin | 6 | Adjusting screw |

The bracket support **2** is defined as bracket support K1 or bracket support K2.

- ▶ Pin bracket **5** with bracket support **2**.
- ▶ Secure pin **3** with linchpin **1** and washer and linchpin **4** and washer.
- ▶ Repeat the procedure for all brackets.
- ▶ Slightly lift bracket **5**.
- ▶ Level bracket **6** horizontally with adjusting screw **5**.
- ▶ Repeat the procedure for all brackets.
 - ▷ Brackets are installed.

Installing plates and diagonals

Installation of plates and diagonals is identical.

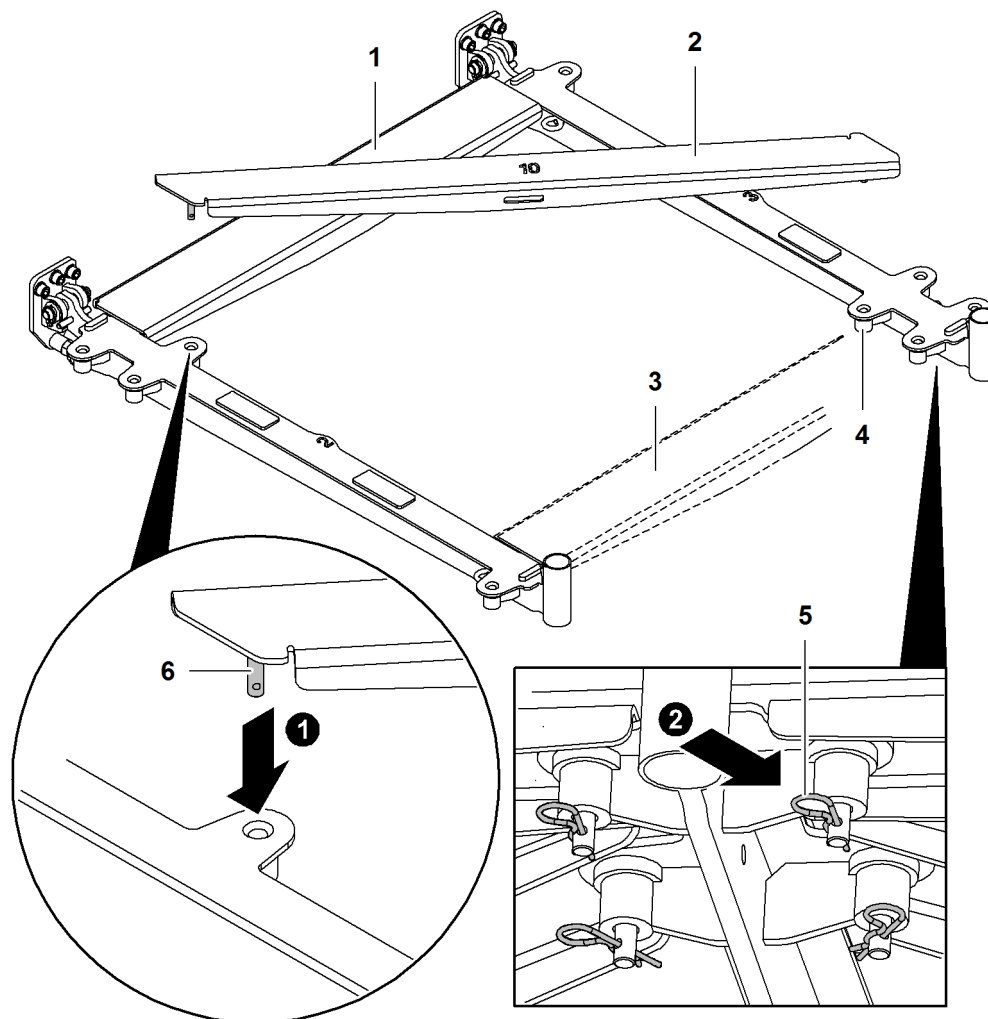


Fig. 3012: Installing plates and diagonals (illustration of principle)

- | | | | |
|---|-----------------|---|---------------------------|
| 1 | Plate (inside) | 4 | Pin connection point (6x) |
| 2 | Diagonal | 5 | Spring cotter pin (6x) |
| 3 | Plate (outside) | 6 | Pin (6x) |

Installation sequence:

- Plate 1 (inside)
- Diagonal 2
- Plate 3 (outside)

- ▶ Insert pin 6 at pin connection point 4.
- ▶ Secure pin 6 with spring cotter pin 5.
- ▶ Repeat procedure with all plates and diagonals.
 - ▷ Plates and diagonals are installed.

Sorting and positioning railing parts

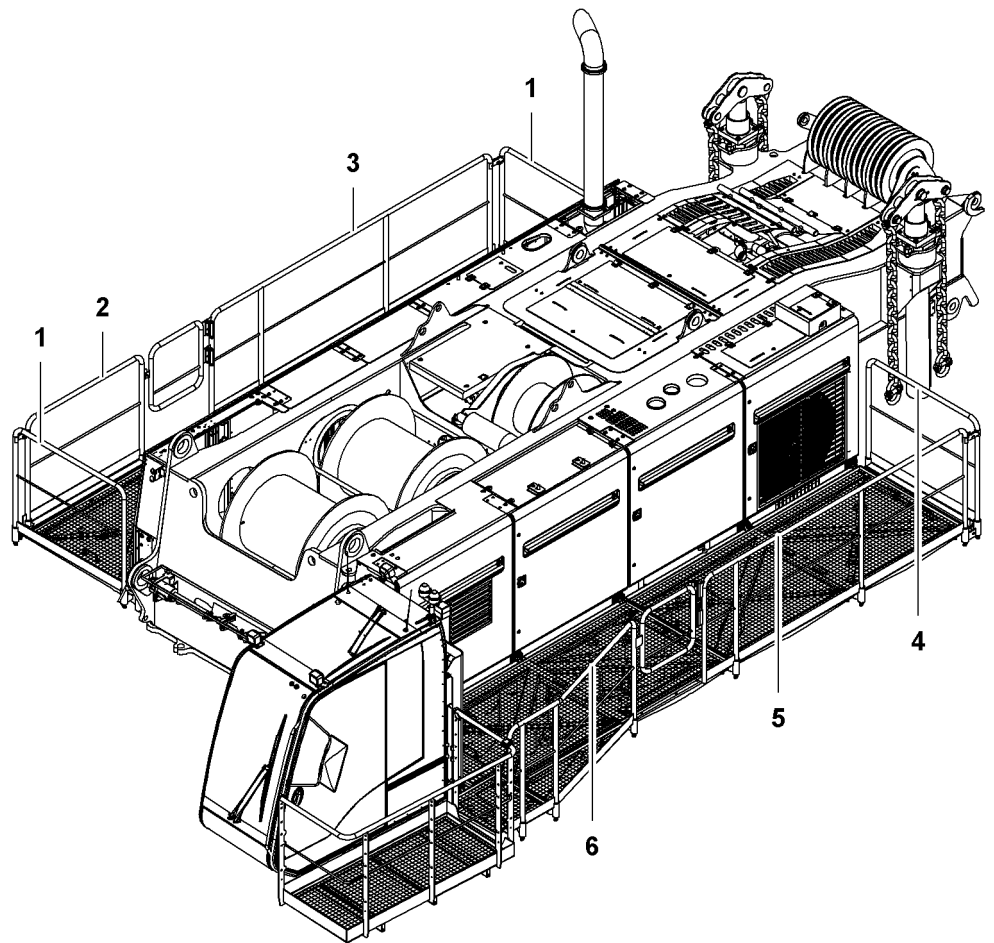


Fig. 3013: Overview of railing parts

- | | | | |
|---|---------------|---|---------------|
| 1 | Railing part1 | 4 | Railing part4 |
| 2 | Railing part2 | 5 | Railing part5 |
| 3 | Railing part3 | 6 | Railing part6 |

Name	Length	Number
Right railing		
Railing part1	1372 mm 4' 6" ft-in	2
Railing part2	1394 mm 4' 7" ft-in	1
Railing part3	3415 mm 11' 2" ft-in	1
Left railing		
Railing part6	2005 mm 6' 7" ft-in	1
Railing part5	4001 mm 13' 2" ft-in	1

Name	Length	Number
Railing part4	1390 mm 4' 7" ft-in	1

Tab. 509: Overview of railing parts



Note

Liebherr recommends:

- ▶ ensure that sufficient space is available.

- ▶ Sort railing parts.
- ▶ Position railing parts next to machine at the corresponding installation site.

Installing railing parts

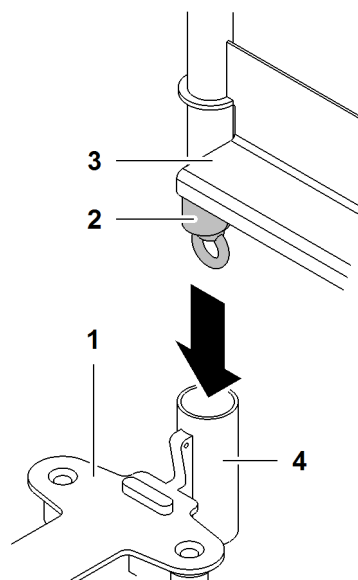


Fig. 3014: Installing railing part

- | | |
|---|-----------------------------------|
| 1 Bracket | 3 Railing part |
| 2 Eye bolt for railing stabilization | 4 Support for railing part |

- ▶ Undo eye bolt **2**.
 - ▷ Wedge of railing stabilization comes undone.
- ▶ Insert railing part **3** at supports **4**.

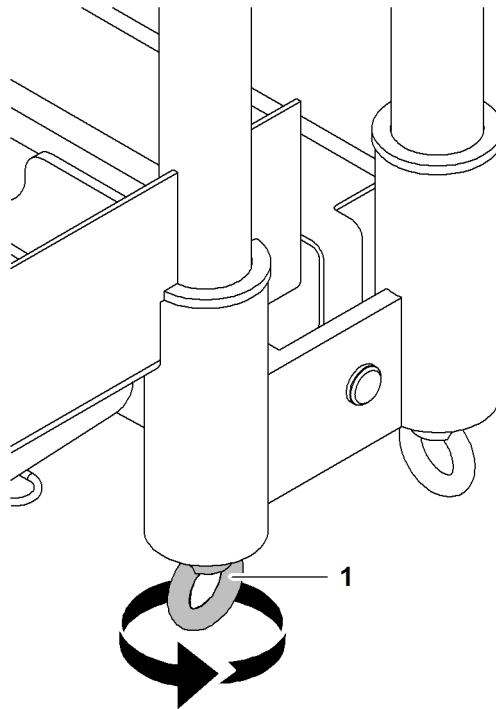


Fig. 3015: Securing the railing part

- 1 Eye bolt for railing stabilization



Note

Liebherr recommends:

- ▶ Grease thread of eye bolt 1.
- ▶ Tighten eye bolt 1.
 - ▷ Wedge of railing stabilization secures the railing part.
- ▶ Repeat the procedure with all railing parts.
 - ▷ Railing parts are installed.

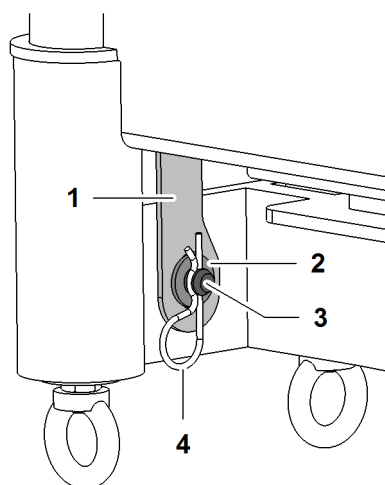


Fig. 3016: Securing the railing part with safety latch

- | | |
|----------------|---------------------|
| 1 Safety latch | 3 Pin |
| 2 Washer | 4 Spring cotter pin |

- ▶ Pin bracket with safety latch 1.

- ▶ Secure pin **3** with washer **2** and spring cotter pin **4**.
- ▶ Repeat procedure with all railing parts with safety latch **1**.

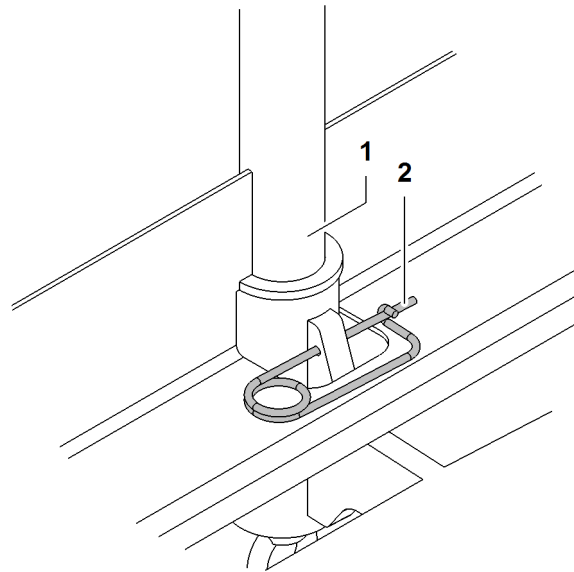


Fig. 3017: Securing the railing part with spring cotter pin

- | | |
|----------------|---------------------|
| 1 Railing part | 2 Spring cotter pin |
|----------------|---------------------|

- ▶ Secure railing part **1** with spring cotter pin **2**.
- ▶ Repeat procedure with all railing parts **1** with spring cotter pin **2**.

Installing grating A and grating B for left platform

- ▶ Lift grating A and grating B for left platform onto brackets.

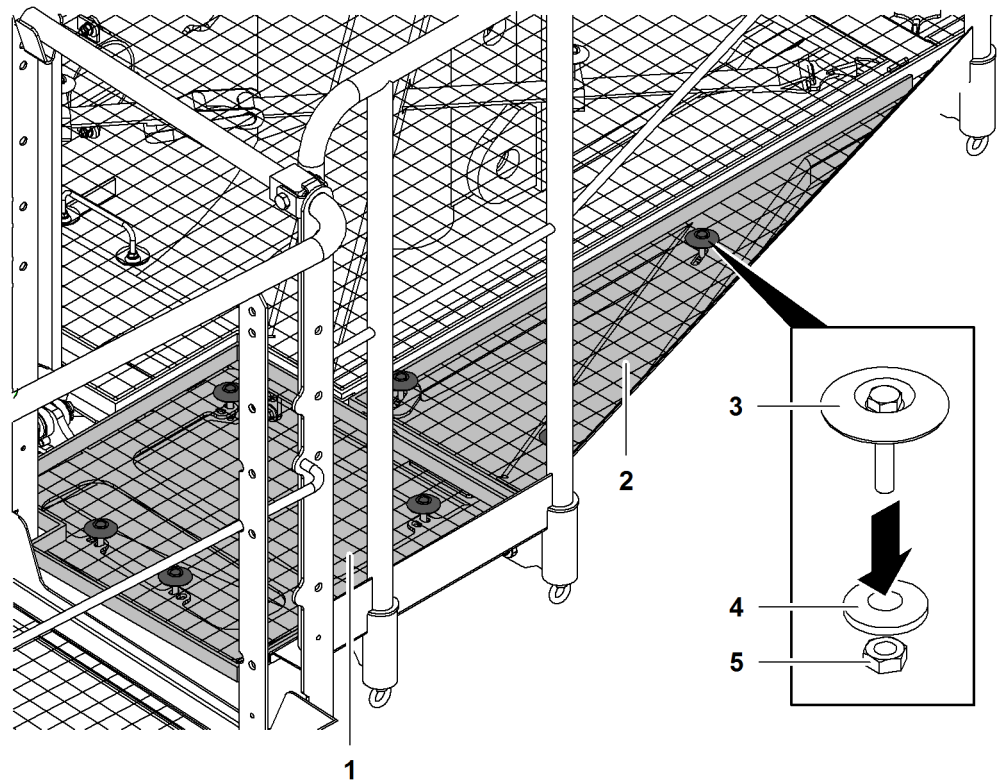


Fig. 3018: Installing grating A and grating B for left platform

- | | | | |
|---|-----------------------------|---|-------------|
| 1 | Grating A for left platform | 4 | Washer (7x) |
| 2 | Grating B for left platform | 5 | Nut (7x) |
| 3 | Screw (7x) with plate | | |

Bracket KnK1 has four attachment points for gratings.

Plate5 has three attachment points for gratings.

- ▶ Insert screw **3** with plate at grating and attachment point.
- ▶ Secure screw **3** with washer **4** and nut **5**.
- ▶ Repeat procedure on all attachment points.
 - ▷ Grating A and grating B for left platform are installed.

Installing the grating

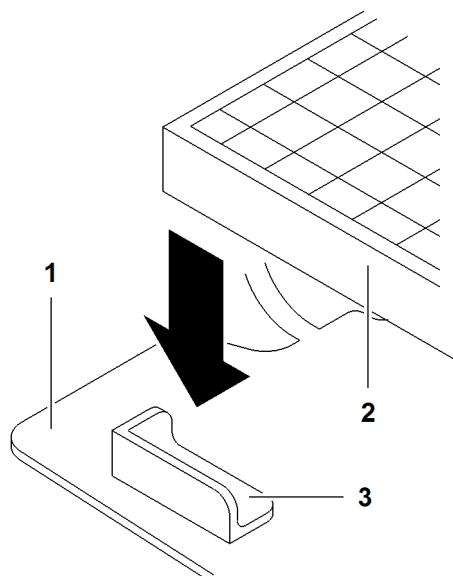


Fig. 3019: Installing the grating

- | | | | |
|---|---------|---|-------------------|
| 1 | Bracket | 3 | Guide for grating |
| 2 | Grating | | |

- ▶ Insert grating 2 in guide 3.
- ▶ Repeat procedure with all gratings 2.

Installing the strap support

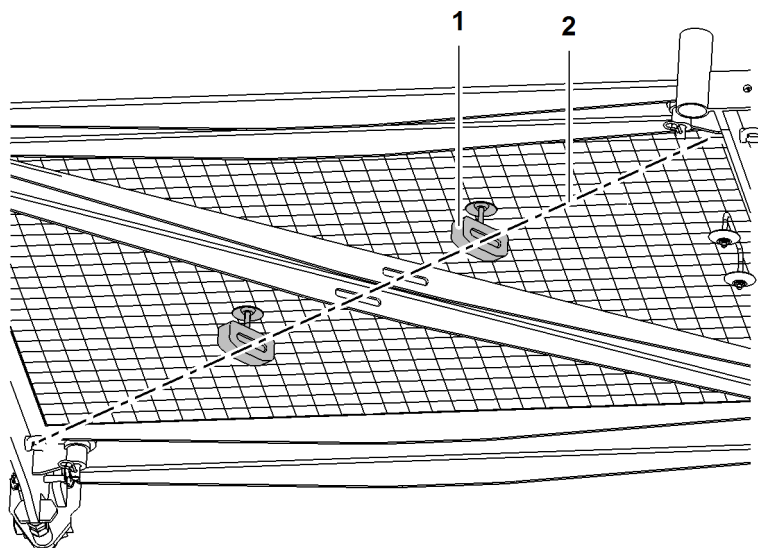


Fig. 3020: Installing the strap support

- | | | | |
|---|---------------|---|----------|
| 1 | Strap support | 2 | Diagonal |
|---|---------------|---|----------|

- ▶ Position strap support 1 with the help of the diagonal 2.
- ▶ Insert screw with plate from above at the grating.
- ▶ Attach Strap support 1 from below with screw.
- ▶ Repeat procedure on all strap supports 1.

- ▷ Strap supports **1** are installed.

Installing straps

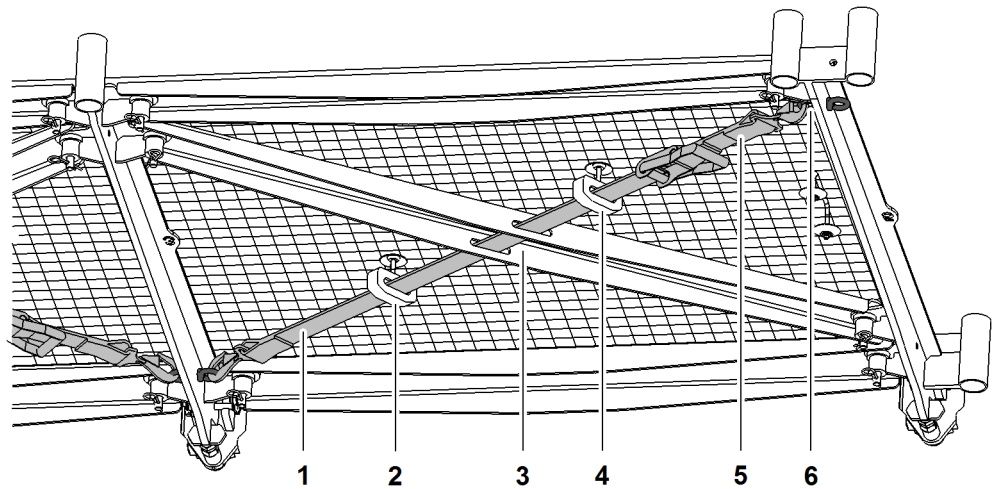


Fig. 3021: Installing straps

1	Strap	4	Strap support
2	Strap support	5	Strap with ratchet
3	Diagonal	6	Eye bolt (2x)

- ▶ Suspend strap **1** on eye bolt **6**.
- ▶ Pull strap **1** through strap support **2**.
- ▶ Pull strap **1** through diagonal **3**.
- ▶ Pull strap **1** through strap support **4**.
- ▶ Suspend strap **5** on eye bolt **6**.
- ▶ Pull strap **1** through ratchet.
- ▶ Tension strap **1** with ratchet.
- ▶ Repeat procedure with all straps **1 + 5**.
- ▷ Straps **1 + 5** are installed.

Installing railing connections

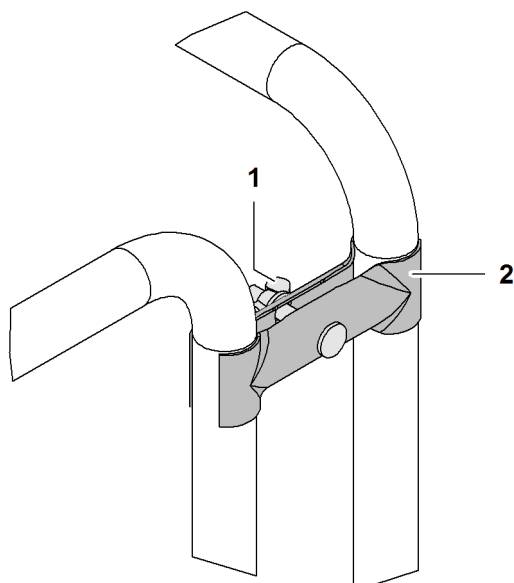


Fig. 3022: Installing railing connections

- | | |
|-------------------|-----------------------------|
| 1 Wing nut | 2 Railing connection |
|-------------------|-----------------------------|
- ▶ Undo wing nut **1**.
 - ▶ Insert railing connection **2** between railing parts.
 - ▶ Tighten wing nut **1**.
 - ▶ Repeat procedure with all railing connections **2**.
 - ▷ Railing connections **2** are installed.

Mounting uppercarriage ladder for narrow track

This ladder is only available with undercarriage* with adjustable track width.

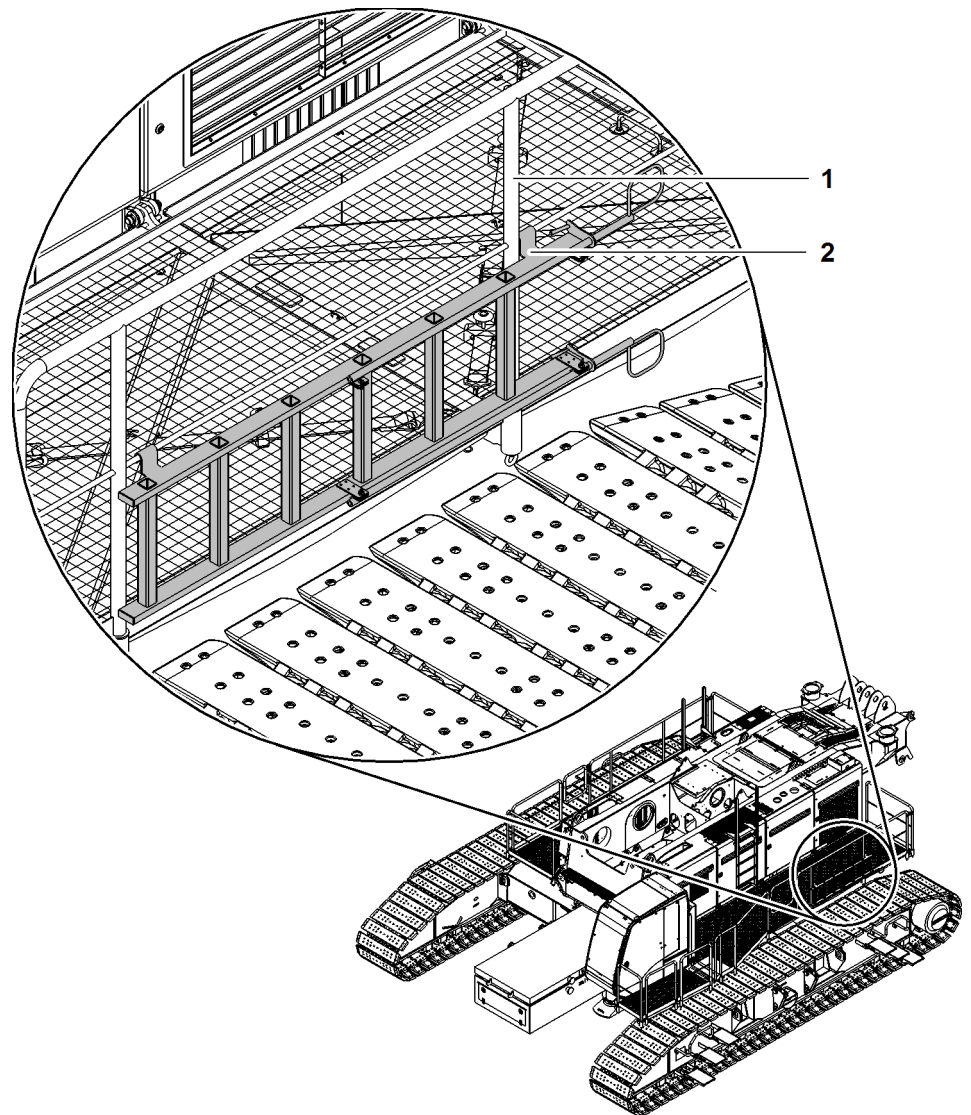


Fig. 3023: Mounting uppercarriage ladder for narrow track

1 Railing

2 Uppercarriage ladder

▶ Suspend uppercarriage ladder 2 on railing 1.

7.4.8 Mounting the ladder on the uppercarriage

The ladder is mounted on the left side of the uppercarriage.

If a second, optional ladder* is supplied, it is mounted on the right side of the uppercarriage.

If the machine is equipped with hydraulic cabin elevation*, the ladder on the left side of the uppercarriage can only be installed after the hydraulic cabin elevation mast has been erected.



CAUTION

Improper mounting of ladder!
Fall from ladder.

▶ Secure pin with linchpins.

▶ Check ladder for damage and tears prior to ascending.

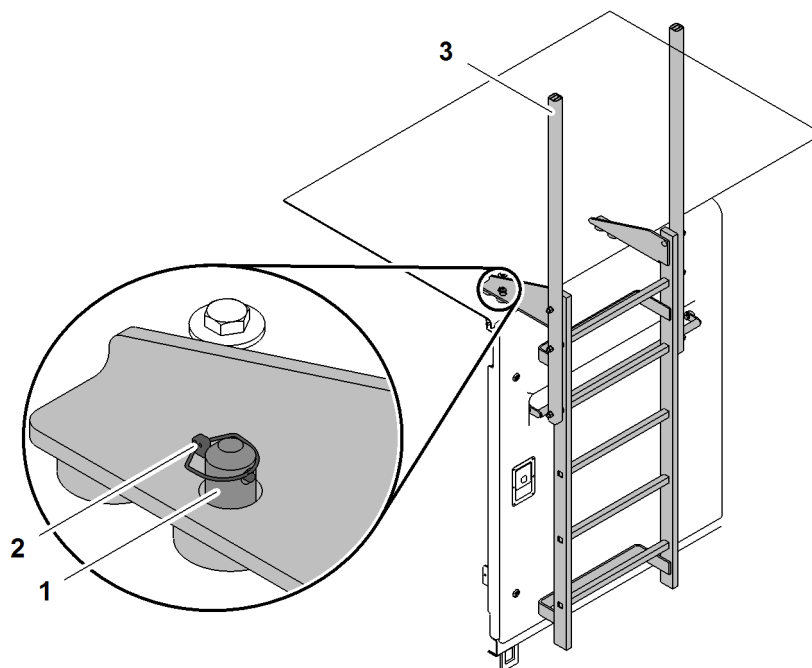


Fig. 3024: Mounting the ladder on the uppercarriage

- | | |
|----------------------------|-----------------|
| <p>1 Pin (2x)
(2x)</p> | <p>3 Ladder</p> |
|----------------------------|-----------------|

- ▶ Attach ladder 3 to pins 1.
- ▶ Secure pin 1 with linchpins 2.

7.4.9 Mounting the uppercarriage railing



WARNING

Walking on uppercarriage without appropriate safety provisions!
Risk of falling off the uppercarriage.

- ▶ A fall arrest system must be worn when working on the uppercarriage.

Uppercarriage railings must be mounted to provide a safe working environment.

If the machine is equipped with hydraulic cabin elevation*, the uppercarriage railing on the left side of the uppercarriage can only be installed after the hydraulic cabin elevation mast has been erected.

Assembly of the different uppercarriage railings is identical.

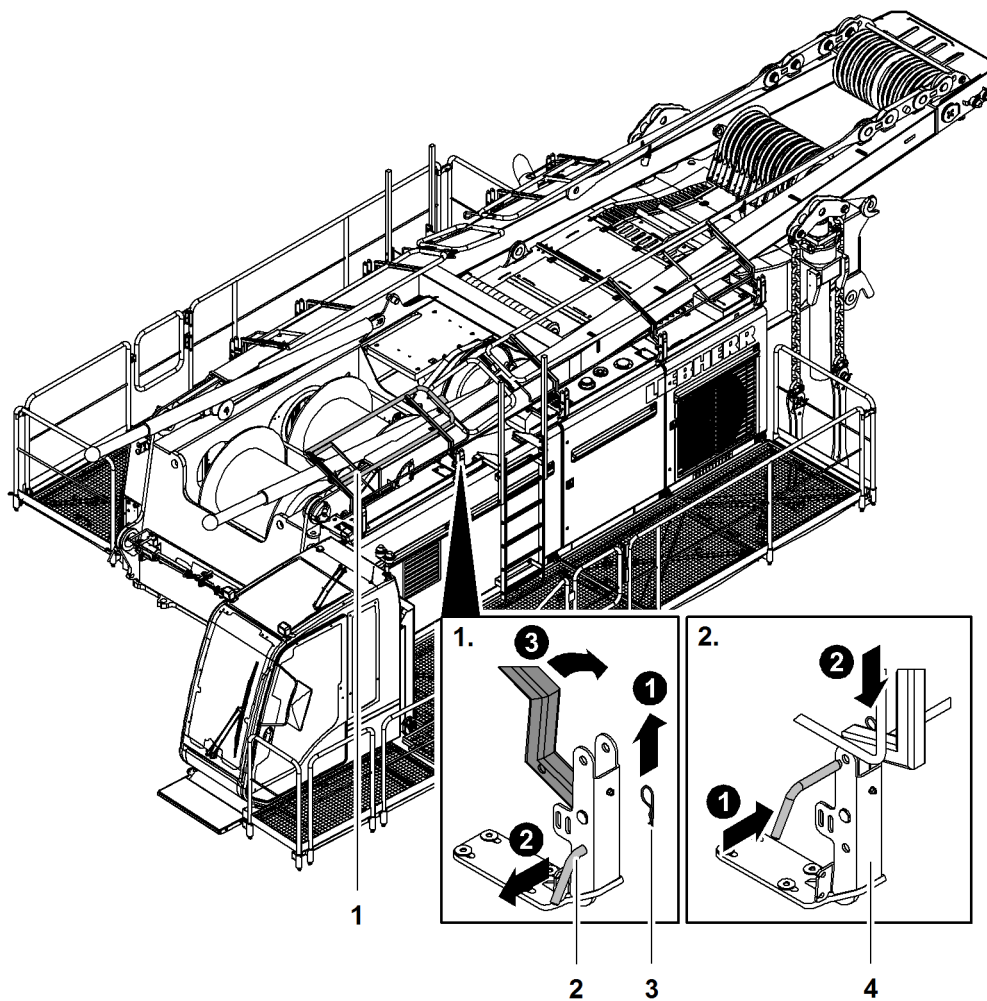


Fig. 3025: Installing the left front uppercarriage railing

- | | | | |
|---|----------------------------------|---|------------------------|
| 1 | Left front uppercarriage railing | 3 | Spring cotter pin (2x) |
| 2 | Pin (2x) | 4 | Bracket (2x) |

- ▶ Remove spring cotter pin 3 and pin 2.
- ▶ Fold up left front uppercarriage railing 1.
- ▶ Pin left front uppercarriage railing 1 with brackets 4.
- ▶ Secure pins 2 with spring cotter pins 3.

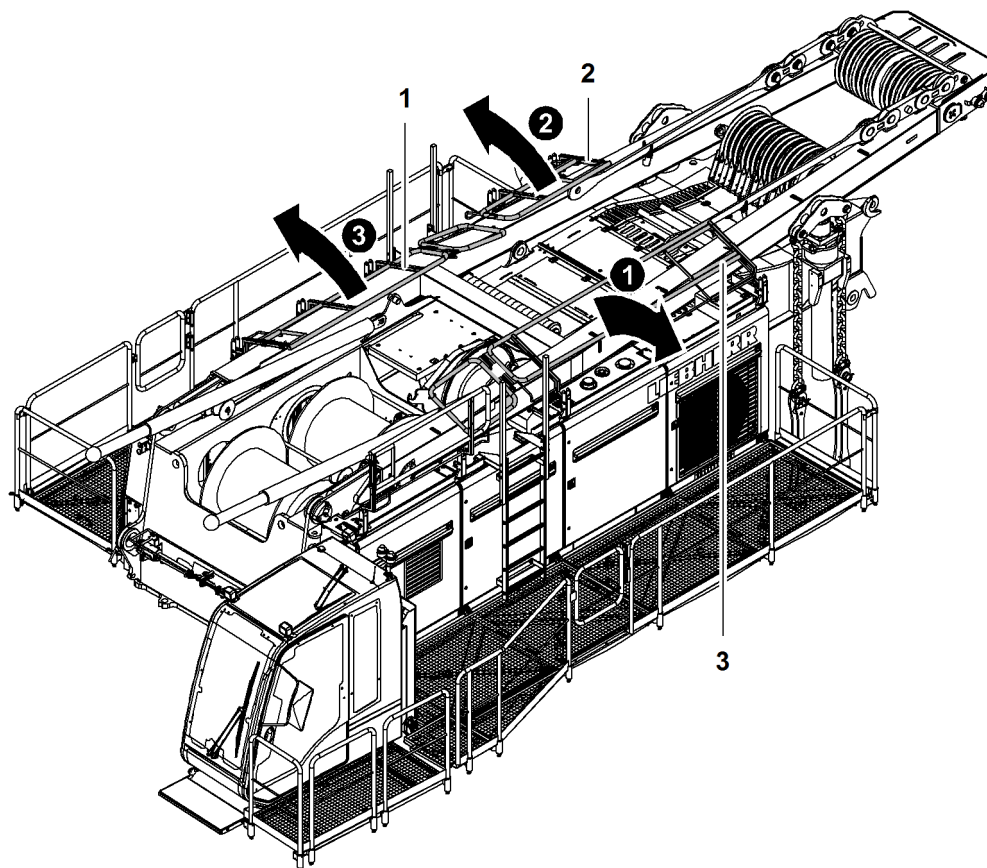


Fig. 3026: Mounting the uppercarriage railing

- | | | | |
|---|-----------------------------------|---|---------------------------------|
| 1 | Right front uppercarriage railing | 3 | Left rear uppercarriage railing |
| 2 | Right rear uppercarriage railing | | |

- ▶ Mount left rear uppercarriage railing **3** as described above.
- ▶ Mount right rear uppercarriage railing **2** as described above.
- ▶ Mount right front uppercarriage railing **1** as described above.

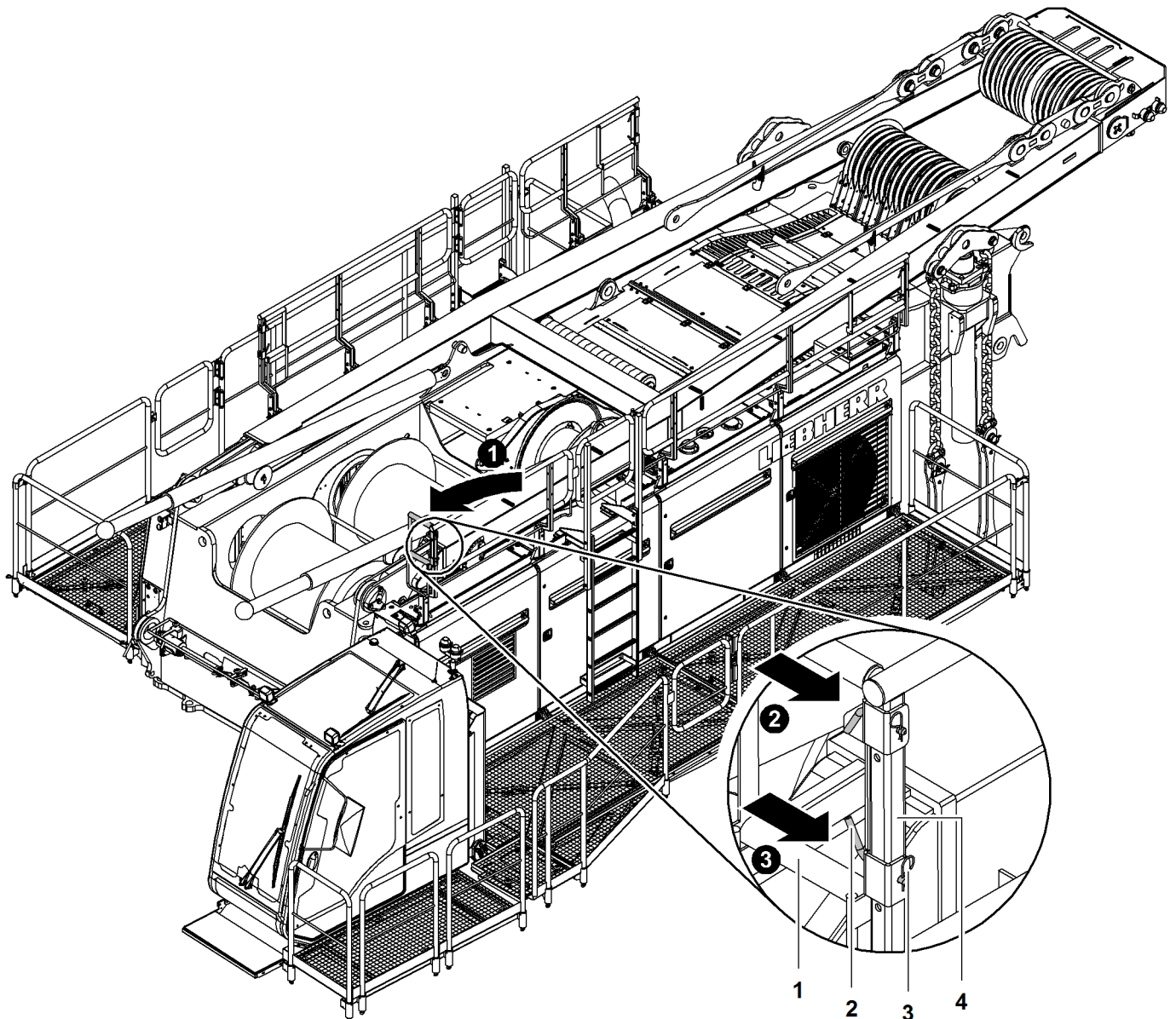


Fig. 3027: Mounting the left front uppercarriage railing part

- | | | | |
|---|---------------------------------------|---|----------------------------------|
| 1 | Left front uppercarriage railing part | 3 | Spring cotter pin (2x) |
| 2 | Pin (2x) | 4 | Left front uppercarriage railing |

- ▶ Deinstall left front uppercarriage railing part 1 on left front uppercarriage railing 4.
- ▶ Insert left front uppercarriage railing part 1 in pin connection position.
- ▶ Pin left front uppercarriage railing part 1 with left front uppercarriage railing 4.
- ▶ Secure pins 2 with spring cotter pins 3.

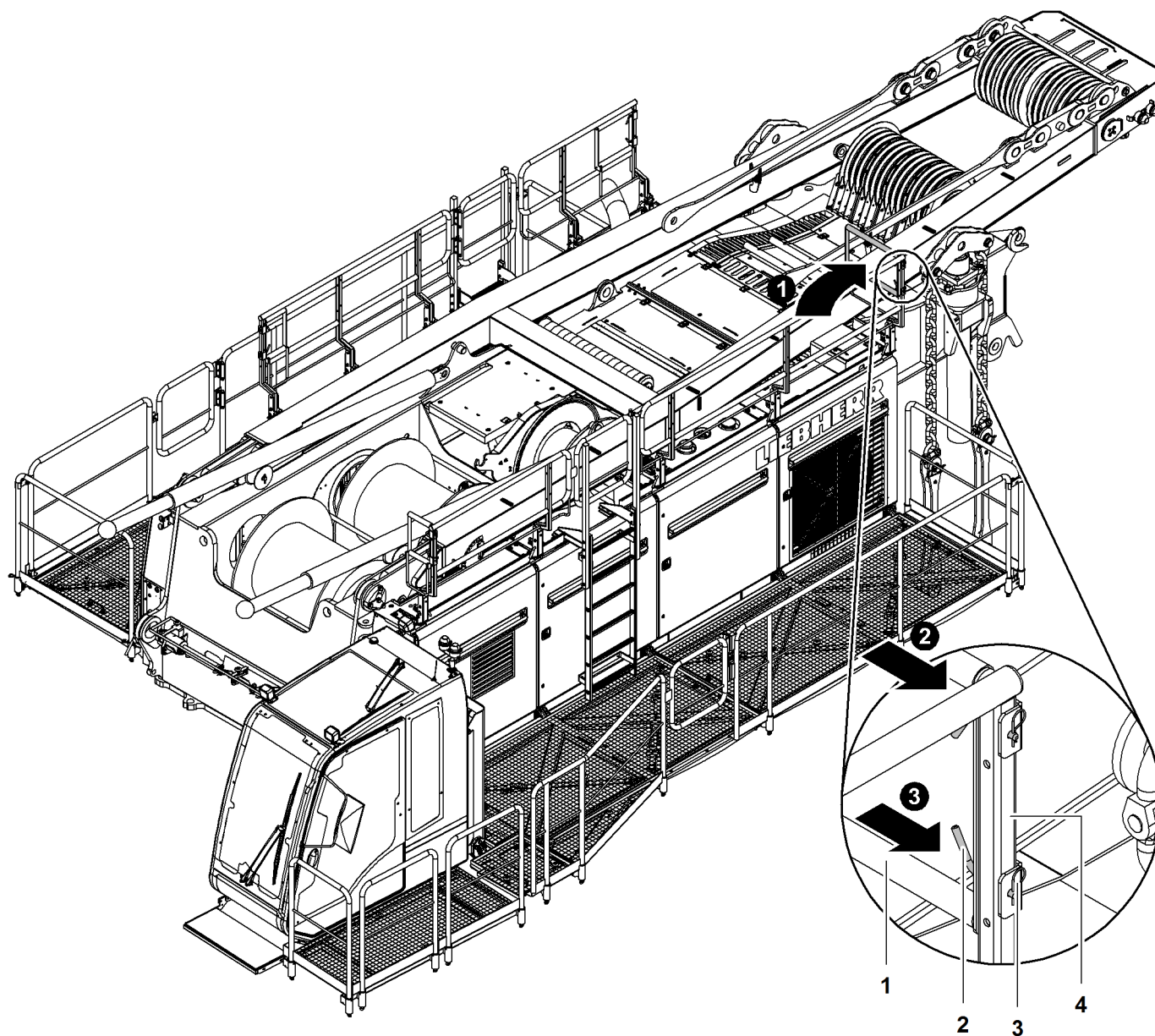


Fig. 3028: Mounting the left rear uppercarriage railing part

- | | | | |
|---|--------------------------------------|---|---------------------------------|
| 1 | Left rear uppercarriage railing part | 3 | Spring cotter pin (2x) |
| 2 | Pin (2x) | 4 | Left rear uppercarriage railing |

- ▶ Deinstall left rear uppercarriage railing part 1 on left rear uppercarriage railing 4.
- ▶ Insert left rear uppercarriage railing part 1 in pin connection position.
- ▶ Pin left rear uppercarriage railing part 1 with left rear uppercarriage railing 4.
- ▶ Secure pins 2 with spring cotter pins 3.

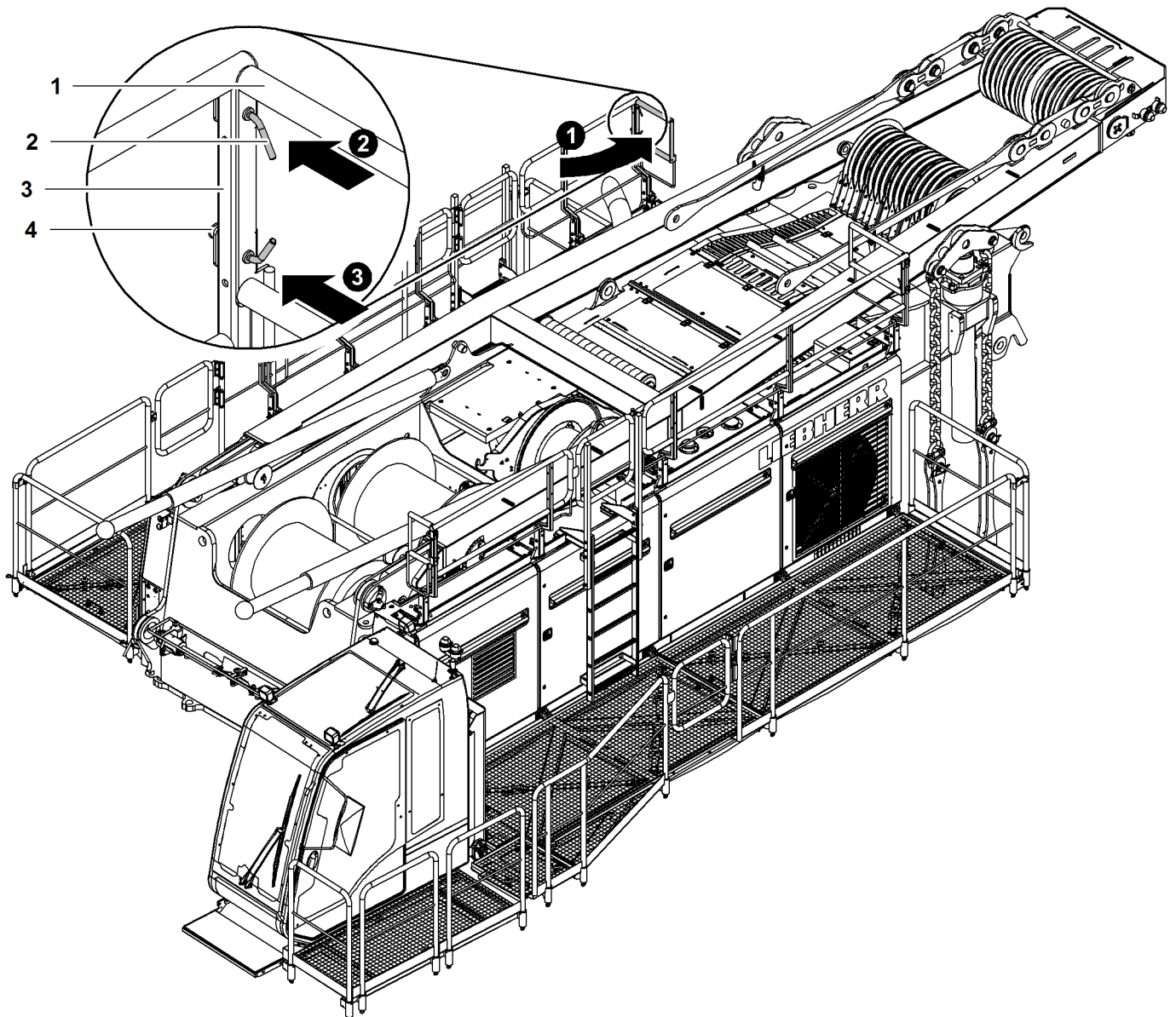


Fig. 3029: Mounting the right rear uppercarriage railing part

- | | | | |
|---|---------------------------------------|---|----------------------------------|
| 1 | Right rear uppercarriage railing part | 3 | Right rear uppercarriage railing |
| 2 | Pin (2x) | 4 | Spring cotter pin (2x) |

- ▶ Deinstall right rear uppercarriage railing part **1** on right rear uppercarriage railing **3**.
- ▶ Insert right rear uppercarriage railing part **1** in pin connection position.
- ▶ Pin right rear uppercarriage railing part **1** with right rear uppercarriage railing **3**.
- ▶ Secure pins **2** with spring cotter pins **4**.

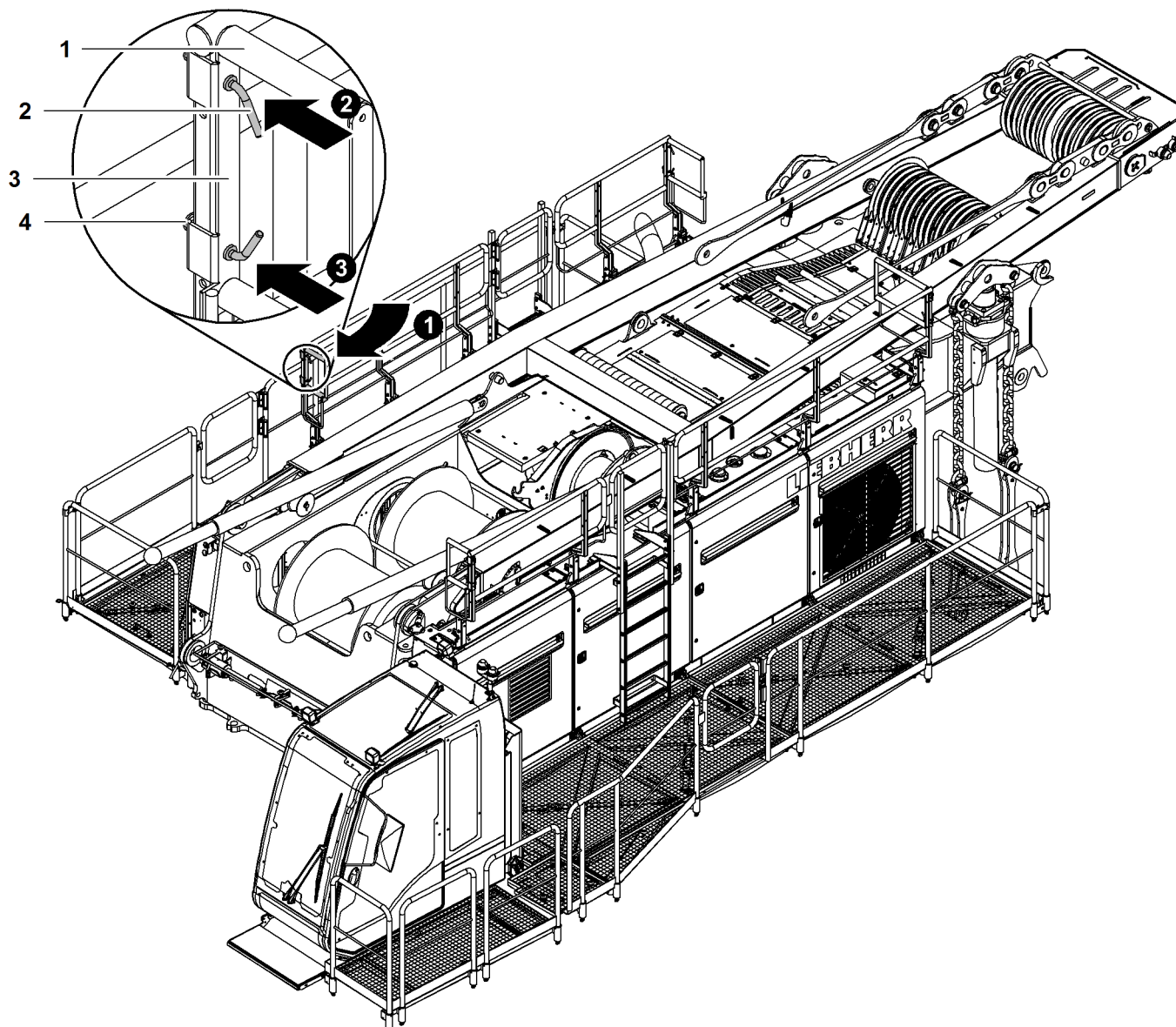


Fig. 3030: Mounting the right front uppercarriage railing part

- | | |
|---|--|
| <p>1 Right front uppercarriage railing part</p> <p>2 Pin (2x)</p> | <p>3 Right front uppercarriage railing</p> <p>4 Spring cotter pin (2x)</p> |
|---|--|

- ▶ Deinstall right front uppercarriage railing part 1 on right front uppercarriage railing 3.
- ▶ Insert right front uppercarriage railing part 1 in pin connection position.
- ▶ Pin right front uppercarriage railing part 1 with right front uppercarriage railing 3.
- ▶ Secure pins 2 with spring cotter pins 4.

7.4.10 Fitting the exhaust pipe

For transportation, the end pipe was removed from the exhaust pipe to reduce the transport height.



CAUTION

Exhaust pipe hot!
risk of burns to hands.

- ▶ Never touch the exhaust pipe before it has cooled down.

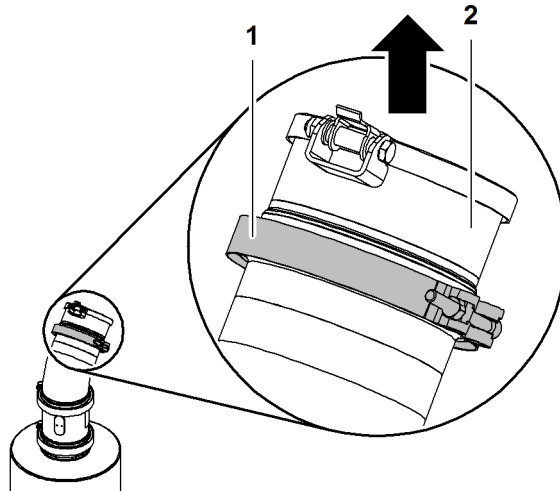


Fig. 3031: Exhaust pipe in transport position

- 1 Pipe clamp
- 2 Exhaust valve

- ▶ Undo pipe clamp 1.
- ▶ Take exhaust valve 2 off of exhaust pipe and put aside.

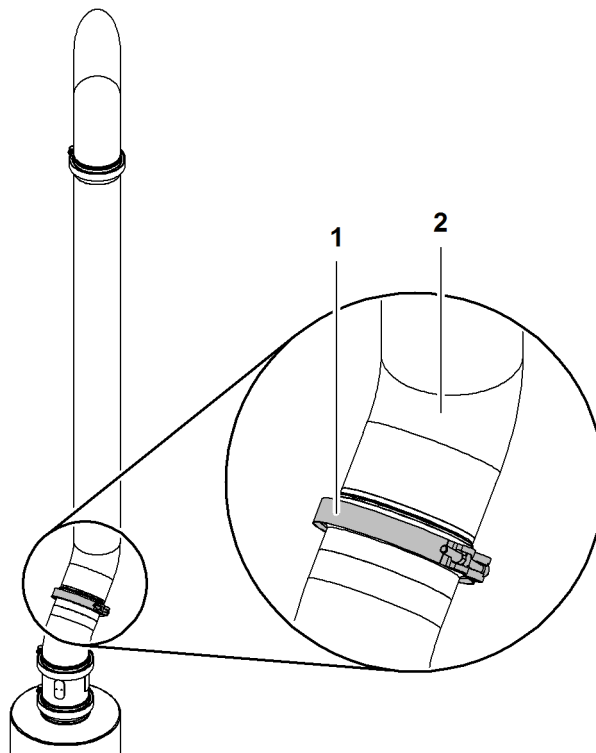


Fig. 3032: Exhaust pipe in working position

- 1 Pipe clamp
- 2 End pipe

- ▶ Put end pipe 2 onto exhaust pipe.
- ▶ Tighten pipe clamp 1.

7.4.11 Checking the position of the bypass plug

Open the front right-hand side doors on the uppercarriage to access the electric box and bypass plug.

NOTICE

Ignition is switched on!
Risk of short circuit.

- ▶ Bypass plug and electric cable must not be plugged in/unplugged unless the machine has been switched off (ignition key in position 0).
-

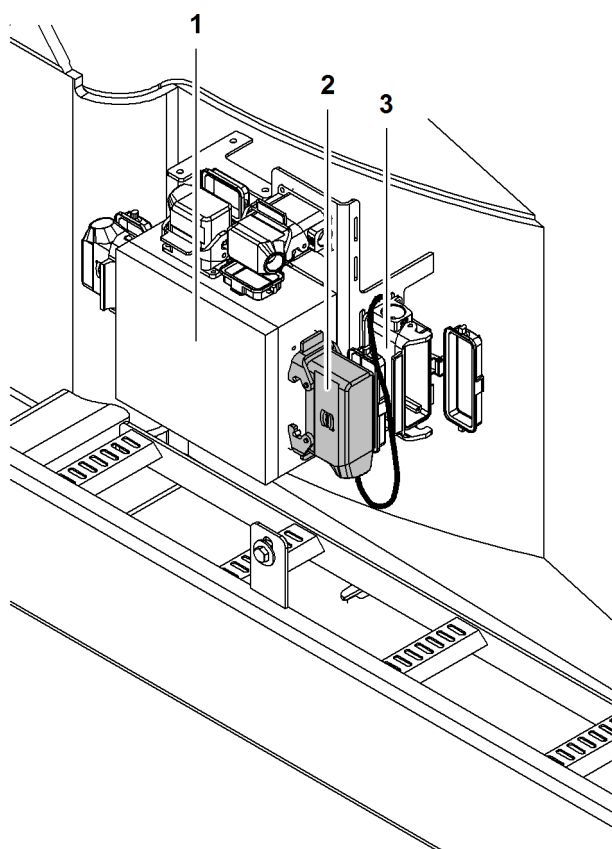


Fig. 3033: Checking the position of the bypass plug

- | | | | |
|---|--------------|---|--------------|
| 1 | Electric box | 3 | Dummy socket |
| 2 | Bypass plug | | |

The bypass plug 2 must be plugged into the electric box 1 for assembly processes.

- ▶ Check plug position.

Troubleshooting

Wrong plug position?

- ▶ Unplug/plug in bypass plug 2.
-

7.4.12 Putting the machine into operation

- ▶ Carry out checks before starting the machine (For more information see: [4.1 Checks before start up, page 863](#)).
- ▶ Put machine into operation (For more information see: [4.2 Startup, page 865](#)).

7.4.13 Switching on assembly mode functions

When assembly mode functions are switched on, the following functions can be switched on:

- *Bypass limit switch*
- *Cylinder adjustment functions*



WARNING

Changed control lever function assignment when machine functions activated!
Operating errors to the machine.

- ▶ Observe changed function assignment of control levers (For more information see: [3.5 Left control lever, page 651](#)) (For more information see: [3.6 Right control lever, page 676](#)).

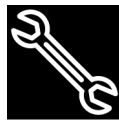


Fig. 3034: Symbol Assembly functions

The *Assembly functions* symbol indicates whether assembly functions are switched on.



If the assembly functions are not switched on:

- ▶ Press the *Assembly functions* switch on control panel X12.

- ▷ Assembly functions switched on.
- ▷ Switch *Assembly functions* is lit.
- ▷ Flashing light is on.
- ▷ Symbol *Assembly functions* is displayed on the monitor:



Fig. 3036: Symbol Assembly functions

7.4.14 Switching on cylinder adjustment functions



- ▶ Press the *Cylinder adjustment functions* button on control panel X23.
 - ▷ Cylinder adjustment functions of the machine are activated.

7.4.15 Extend the tilting back support cylinders



- ▶ Press the button *Extend tilting back support cylinders* on control panel 12 until the tilting back support cylinders are extended halfway.

7.4.16 Erecting A-frame1

Ensure that the following conditions are fulfilled:

- Cylinder adjustment functions are on.



DANGER

Machine must not be lifted when A-frame1 is laid down!
Toppling of machine.

- ▶ Erect A-frame1 before raising the machine.



- ▶ Press the *Extend A-frame1 cylinder* button on control panel X23.

NOTICE

Slack rope when erecting A-frame1!
Damage to the rope of the main boom luffing winch.

- ▶ In cold weather when ropes are stiff only move A-frame1 slowly to ensure that the rope does not form any slack.
- ▶ If the rope goes slack, check the rope, the run of the rope on the pulley set, and the winding of the rope on the winch.



Note

Liebherr recommends:

- ▶ Move A-frame1 exclusively at speed level 2 of the boom adjuster and in the medium engine rpm range.
- ▶ Critical angle on instruction plate *Observe angle limitations A-frame1*.

- ▶ Unwind the main boom luffing winch.
 - ▷ A-frame1 erects itself:

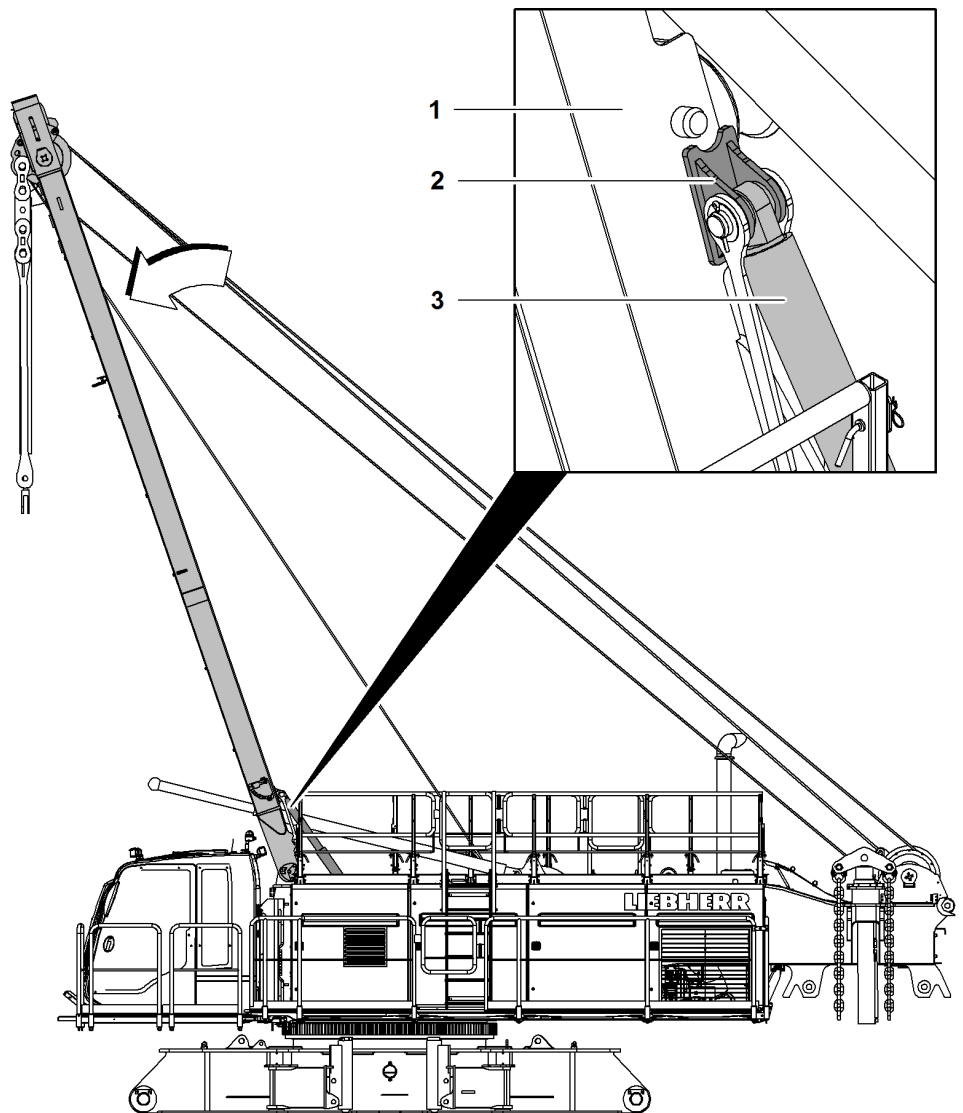


Fig. 3040: A-frame1 erects itself

- | | |
|--------------------------------------|---------------------------------|
| <p>1 A-frame1</p> <p>2 Slab (2x)</p> | <p>3 A-frame1 cylinder (2x)</p> |
|--------------------------------------|---------------------------------|

► Erect A-frame1 1 until the slabs 2 of the A-frame1 cylinders 3 lift off.

7.4.17 Unloading the machine

In order to unload it from the transport vehicle and assemble the crawler side frame, the machine must be supported on the ground using support cylinders.

Ensure the following conditions are met:

- Machine is equipped with support cylinders for self-assembly.
- Checks before startup were carried out.
- All safety measures are being observed ([For more information see: 7.2 Work instructions for assembly/disassembly, page 1183](#)).
- Mechanical boom angle indicator is checked for function and ease of movement.
- Bypass plug is plugged in.
- Cabin is in working position.
- Cabin platforms are in working position.
- Muffler pipe section is installed.

- Operator's seat is correctly adjusted.
- Assembly functions are activated.
- Cylinder adjustment functions are activated.

Unloading machine with undercarriage with fixed track width



DANGER

Incorrect unloading of machine!
Toppling of machine.

- ▶ Ensure that the machine operator is located in the cabin during the entire jack-up procedure.
- ▶ Observe the spirit level in the cabin and on the undercarriage.
- ▶ Check ground for load-bearing capacity prior to jacking.
- ▶ Never use the support cylinder with rear counterweight attached or main boom base section attached.

Placing the slewing brackets in support position

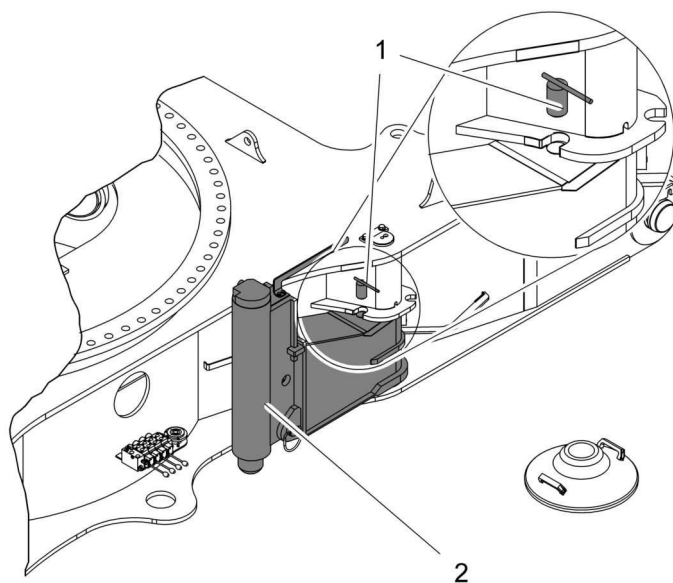


Fig. 3041: Slewing the slewing brackets* into support position

- | | | | |
|---|-----|---|-----------------|
| 1 | Pin | 2 | Slewing bracket |
|---|-----|---|-----------------|

- ▶ Remove pin 1.
- ▶ Slew slewing bracket 2 into support position.



DANGER

Slewing brackets not pinned!
Toppling of machine.

- ▶ Pin slewing brackets in support position.

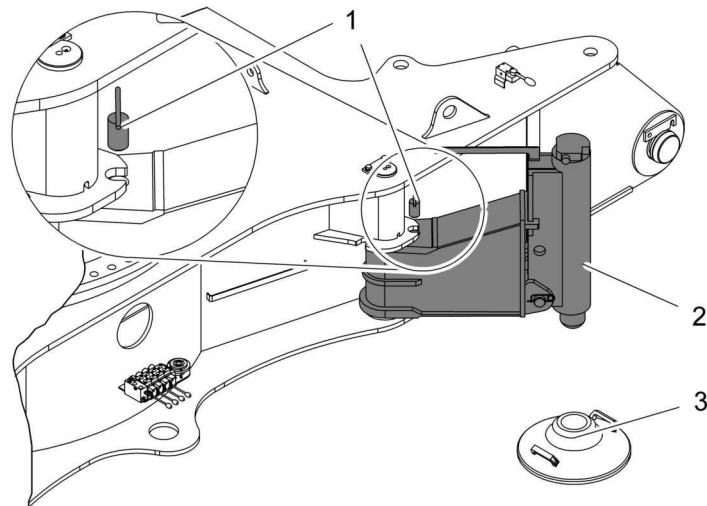


Fig. 3042: Pining slewing brackets in support position

- | | | | |
|---|-----------------|---|-------------|
| 1 | Pin | 3 | Support pad |
| 2 | Slewing bracket | | |

- ▶ Insert pins 1.
- ▶ Repeat process with all slewing brackets 2.

Placing support pads and base plates underneath



DANGER

Improper application of the support pads and base plates!
Toppling of machine.

- ▶ Use support pads attached on undercarriage.
- ▶ Place stable materials with sufficient dimensions below the support pads.
- ▶ Place the same materials beneath all support pads.
- ▶ Ensure that chocks do not protrude into the transport vehicle's track.

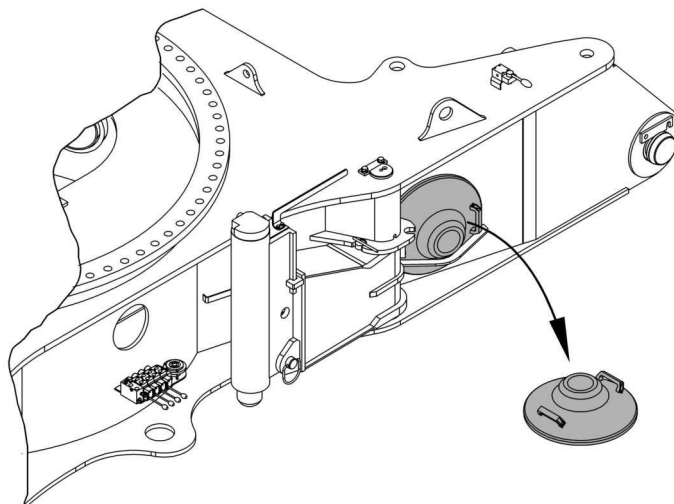


Fig. 3043: Placing support pads underneath

- ▶ Take support pad out of mount.
- ▶ Place support pad below support cylinder flat on the ground or on bedding layers.
- ▶ Repeat process with all support cylinders.

Determining the support height

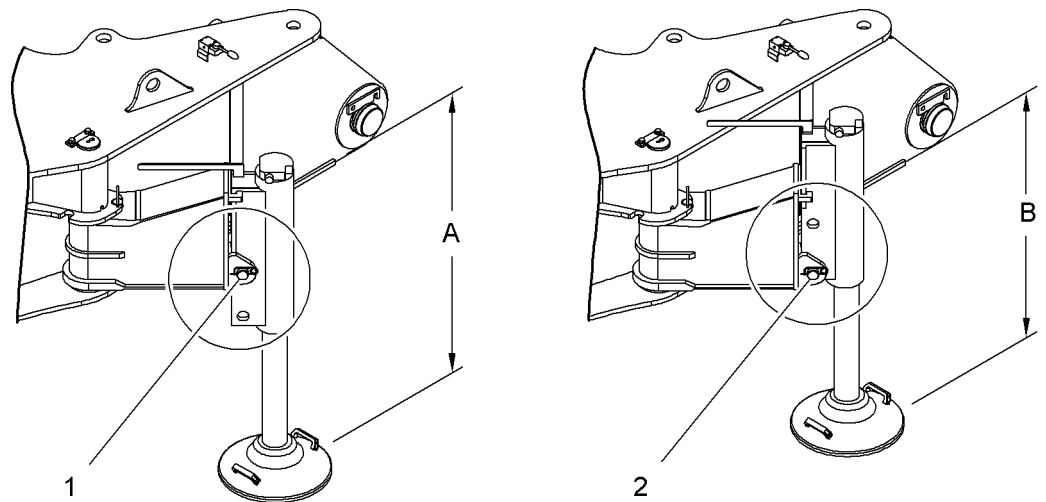


Fig. 3044: Determining the support height

- 1 Support cylinder in top pin connection position 2 Support cylinder in bottom pin connection position

	Support height A	Support height B
Standard cylinder	975 mm 3' 2" ft-in	725 mm 2' 5" ft-in
Telescopic cylinder	1415 mm 4' 8" ft-in	1165 mm 3' 10" ft-in

Tab. 510: Determining the support height

Support cylinders can be pinned to the slewing brackets in two positions.

The support height required to unload the machine depends on:

- Height of transport vehicle
- Soil conditions at the erection site
- Design of support cylinder (standard or telescope)

Example:

- Distance ground to transport vehicle loading surface: 1000 mm (3' 3" ft-in)
- Safety distance between undercarriage of basic machine and transport vehicle loading surface: 100 mm (3.94" in)
- Support height of support cylinders: 975 mm (3' 2" ft-in)
- Soil conditions: Level asphalt ground with sufficient load-bearing capacity

Result: Place support pads with a thickness of 100 mm (3.94" in) underneath.

Adjusting the support height of support cylinder

If the calculation of the support height requires a change of the support cylinder position, perform the following steps.

**DANGER**

Different support heights!
Toppling of machine.

- ▶ Pin all support cylinders to same pin connection points on slewing brackets.

**DANGER**

Inadmissible lifting of machine!
Toppling of machine.

- ▶ Extend support cylinders until pin is relieved.
- ▶ Do not lift machine.

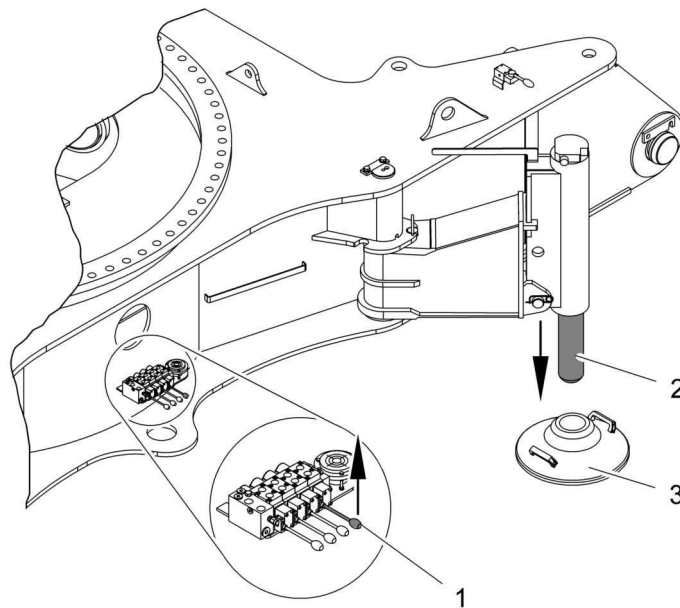


Fig. 3045: Extending support cylinders

- | | | | |
|---|------------------|---|--------------|
| 1 | Adjustment lever | 3 | Support pads |
| 2 | Support cylinder | | |

- ▶ Extend support cylinders **2** with corresponding adjustment lever **1**.
- ▶ Align support pad **3** if necessary.
- ▶ Extend support cylinder **2** until pin can be turned by hand.

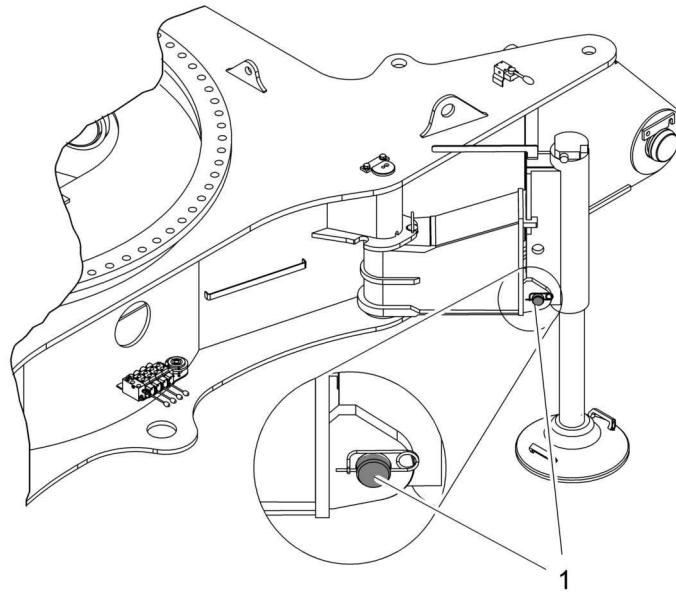


Fig. 3046: Removing the pins

1 Pin

- ▶ Remove pin 1.



CAUTION

Movable parts!
Risk of crushing limbs.

- ▶ Keep all limbs well clear of moving parts.
- ▶ Check alignment of pin connection points visually.

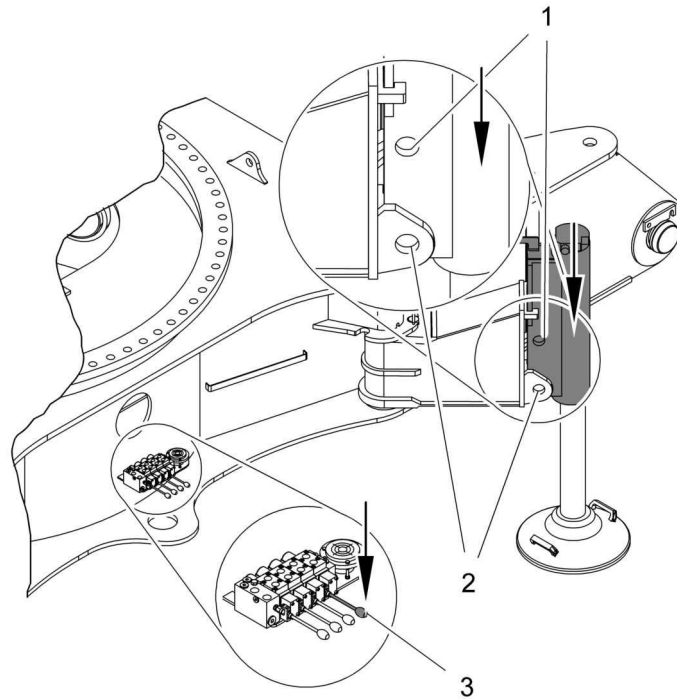


Fig. 3047: Adjusting the pin connection point

- | | | | |
|----------|-----------------------------|----------|------------------|
| 1 | Top pin connection point | 3 | Adjustment lever |
| 2 | Bottom pin connection point | | |

- ▶ Retract support cylinders with the corresponding adjustment lever **3**.
- ▷ Top part of the support cylinder moves.

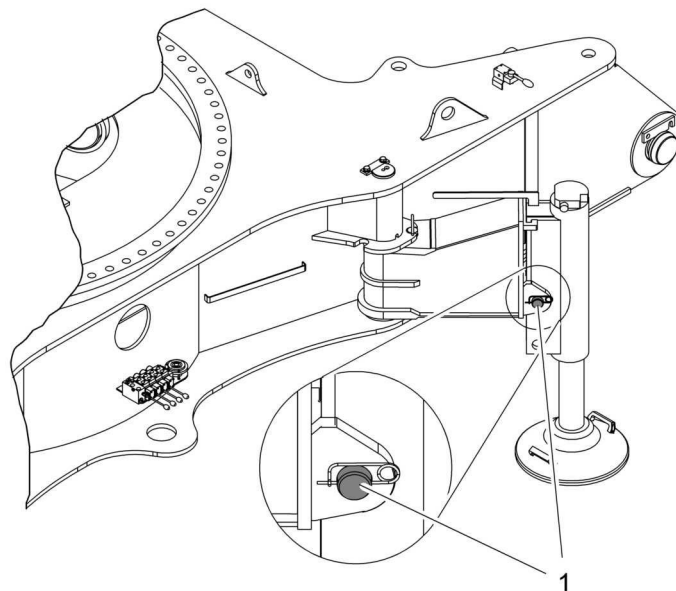


Fig. 3048: Inserting pins

- | | |
|----------|-----|
| 1 | Pin |
|----------|-----|

When the pin connection point on the slewing bracket aligns with the top pin connection point of the support cylinder:

- ▶ Insert pins **1**.

- ▶ Secure pin 1 with locking spring.
- ▶ Repeat process with all support cylinders.

Extending support cylinders



DANGER

Uneven extending of support cylinder!
Toppling of machine.

- ▶ Ensure that the air bubble in the spirit level does not move across the outer circle.
- ▶ Ensure that one or more helpers monitor the jack-up procedure.

Adjustment levers on undercarriage are used to operate support cylinders.

Several levers can be actuated at the same time.

The air bubble in the spirit level must be absolutely stationary in the innermost circle without additional bubbles.

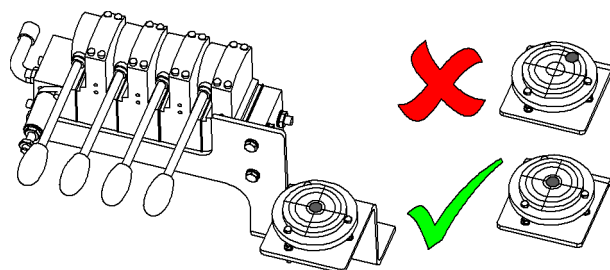


Fig. 3049: Spirit level on undercarriage



Note

Liebherr recommends:

- ▶ Always extend two support cylinders at the same time.
- ▶ Move adjustment lever up.
 - ▷ Support cylinders extend.
 - ▷ Machine lifts.
- ▶ Move adjustment lever down.
 - ▷ Support cylinders retract.
 - ▷ Machine lowers.
- ▶ Lower machine carefully and level exactly.

Driving the transport vehicle out from underneath the machine

Ensure the following conditions are met:

- There is a clearance of at least 100 mm (3.94" in) between the transport vehicle and the machine.
- The chocks between the transport vehicle and the machine were removed.
- There are no obstacles on the ground (e.g. rocks) that might cause the transport vehicle to deviate from its track.
- The transport vehicle can drive straight out from underneath the machine.
- The steering axles on the transport vehicle are straight.
- All support cylinders are extended all the way to the ground.

**DANGER**

Collision of transport vehicle with support cylinders!
Toppling of machine.

► Ensure that one or more helpers direct the transport vehicle.

► Drive the transport vehicle out from underneath the machine.

Unloading machine with undercarriage with adjustable track width

**DANGER**

Incorrect unloading of machine!
Toppling of machine.

► Ensure that the machine operator is located in the cabin during the entire jack-up procedure.

► Observe the spirit level in the cabin and on the undercarriage.

► Check ground for load-bearing capacity prior to jacking.

Placing the slewing brackets in support position

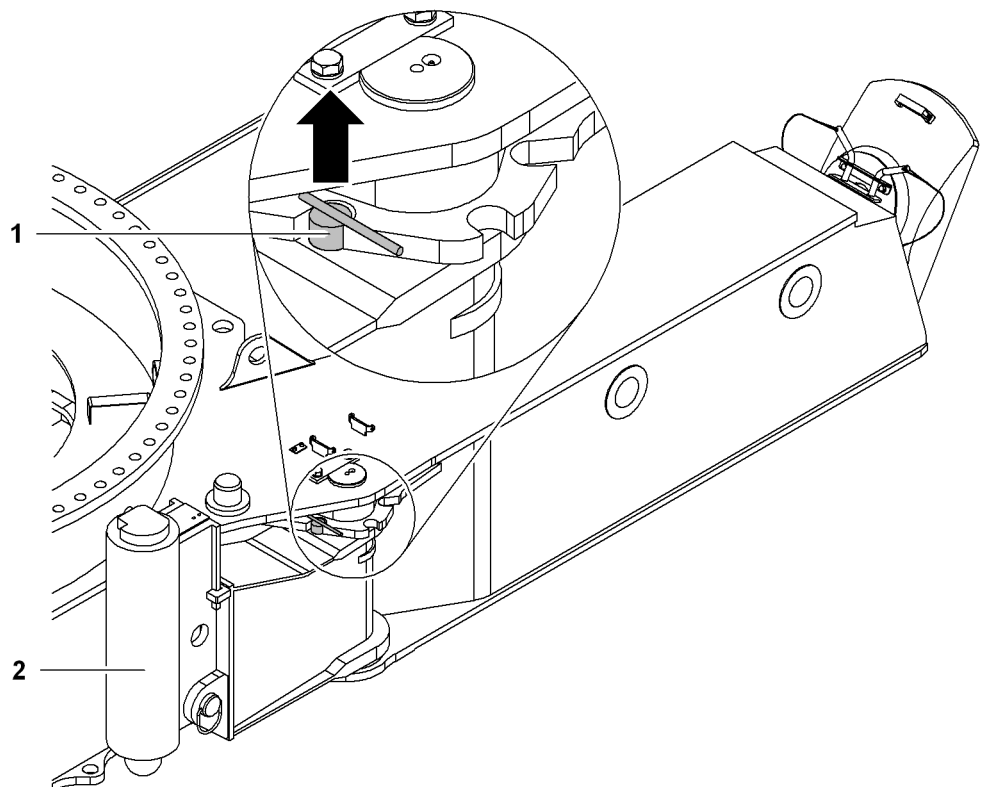


Fig. 3050: Placing the slewing brackets in support position

1 Pin

2 Slewing bracket

► Remove pin 1.

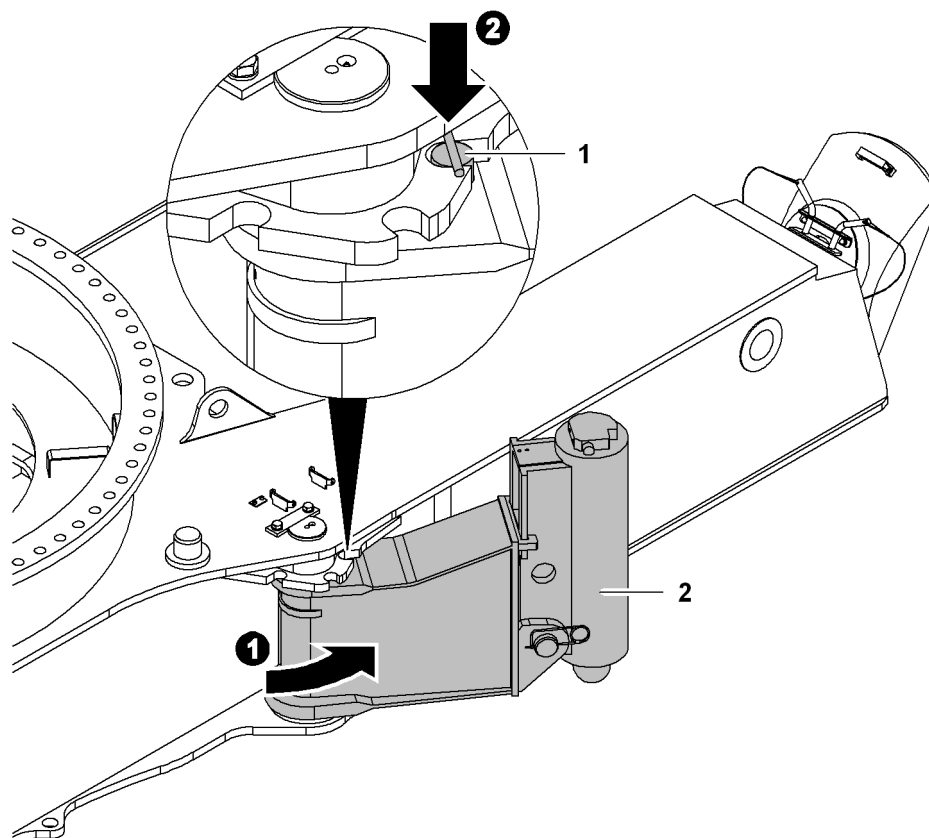


Fig. 3051: Swivel and pin slewing brackets

- 1 Pin
- 2 Slewing bracket

► Slew slewing bracket 2 into support position.



DANGER

Slewing brackets not pinned!
Toppling of machine.

► Pin slewing brackets in support position.

► Insert pins 1.

► Repeat process with all slewing brackets 2.

Placing support pads and base plates underneath



DANGER

Improper application of the support pads and base plates!
Toppling of machine.

► Use support pads attached on undercarriage.

► Place stable materials with sufficient dimensions below the support pads.

► Place the same materials beneath support pads.

► Ensure that chocks do not protrude into the transport vehicle's track.

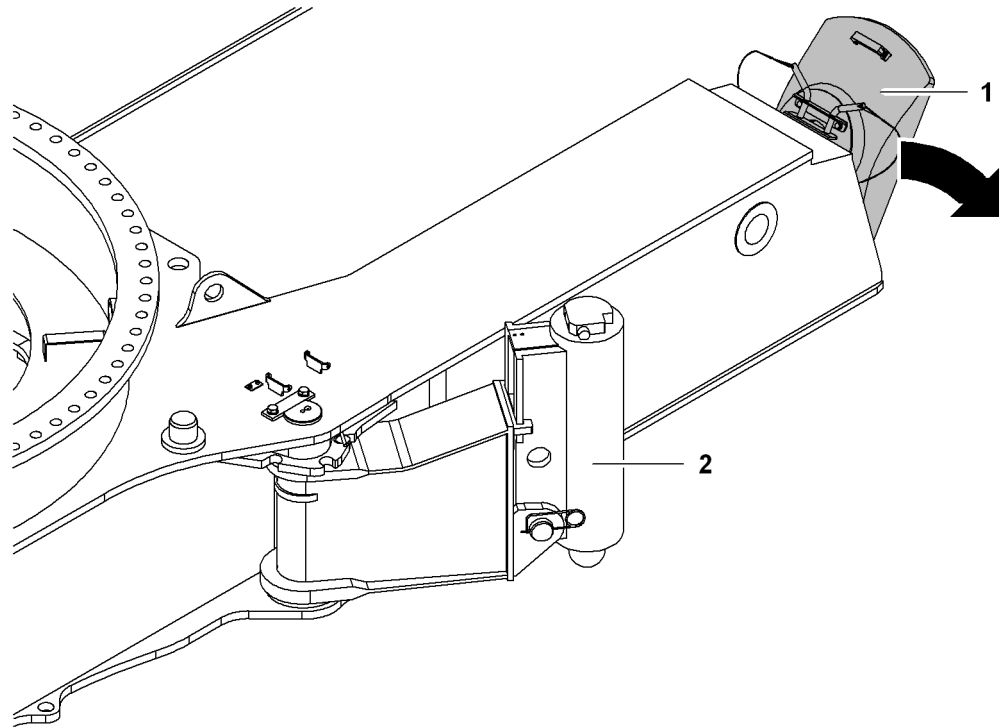


Fig. 3052: Placing support pads underneath

- 1 Support pad
- 2 Support cylinder

- ▶ Take support pad 1 out of mount.
- ▶ Place support pad 1 below support cylinder 2 flat on the ground or on bedding layers.
- ▶ Repeat process with all support cylinders 2.

Determining the support height

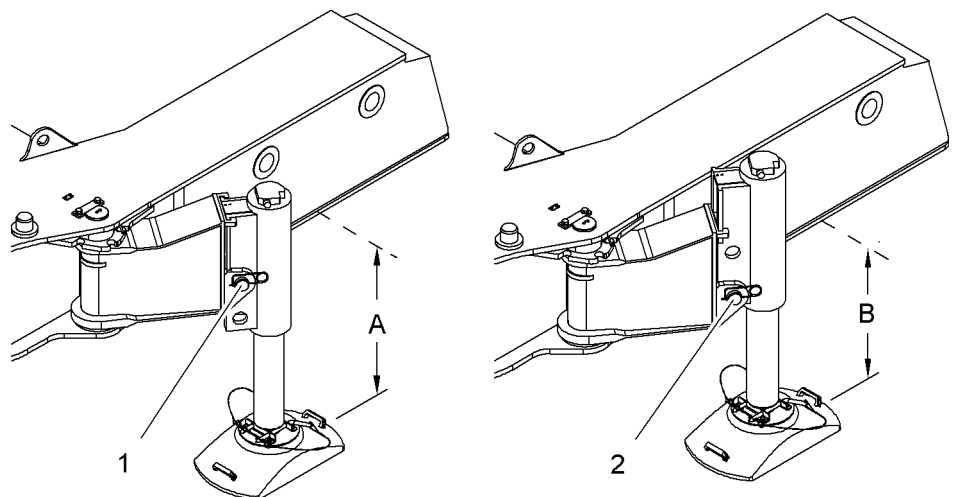


Fig. 3053: Determining the support height

- 1 Support cylinder in top pin connection position
- 2 Support cylinder in bottom pin connection position
- A Support height 970 mm (3' 2" ft-in)
- B Support height 720 mm (2' 4" ft-in)

Support cylinders can be pinned to the slewing brackets in two positions.

The support height required to unload the machine depends on:

- Height of transport vehicle
- Soil conditions at the erection site

Example:

- Distance ground to transport vehicle loading surface: 1000 mm (3' 3" ft-in)
- Safety distance between undercarriage of basic machine and low loader loading surface: 100 mm (3.94" in)
- Support height of support cylinders: 970 mm (3' 2" ft-in)
- Soil conditions: Level asphalt ground with sufficient load-bearing capacity

Result: Place support pads with a thickness of 100 mm (3.94" in) underneath.

Adjusting the support height of support cylinder

If the calculation of the support height requires a change of the support cylinder position, perform the following steps.



DANGER

Different support heights!
Toppling of machine.

- ▶ Pin all support cylinders to same pin connection points on slewing brackets.
-

- ▶ Plug in the cable remote control on the undercarriage.



DANGER

Inadmissible lifting of machine!
Toppling of machine.

- ▶ Extend support cylinders until pin is relieved.
 - ▶ Do not lift machine.
-

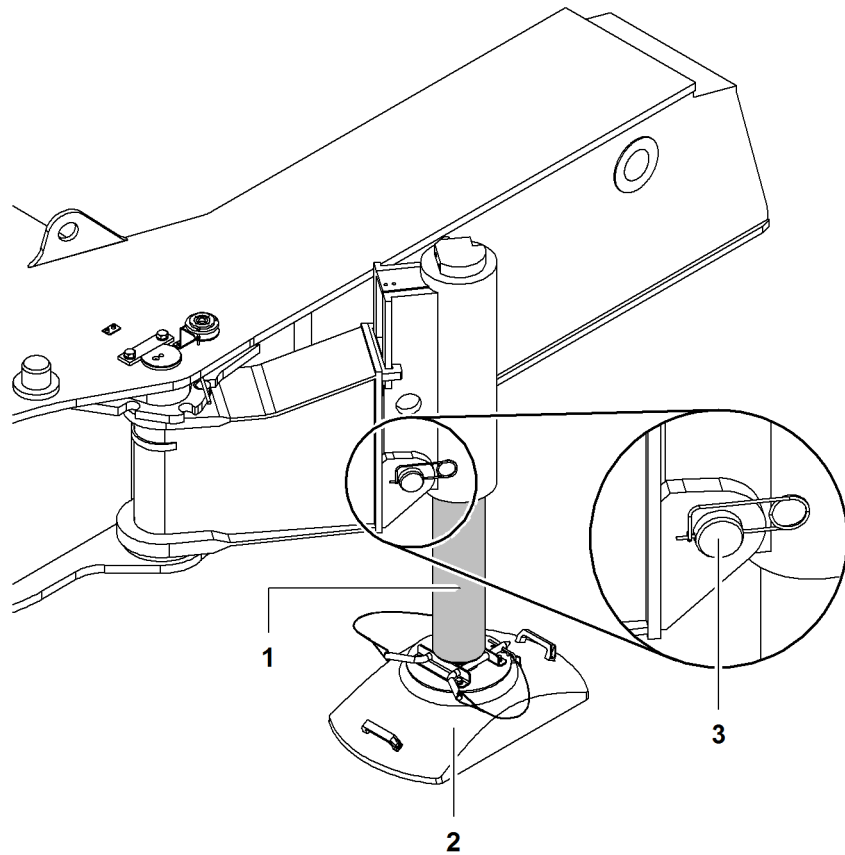


Fig. 3054: Extend support cylinders and remove pins

- | | | | |
|---|------------------|---|-----|
| 1 | Support cylinder | 3 | Pin |
| 2 | Support pad | | |

The support cylinders **1** are operated with the toggle switches of the cable remote control (For more information see: [3.26.2 Cable remote control on undercarriage, page 826](#)).

- ▶ Move the corresponding toggle switch on cable remote control forward.
 - ▷ Support cylinder **1** extends.
- ▶ Align support pad **2** if necessary.
- ▶ Extend support cylinder **1** until pin **3** can be turned by hand.
- ▶ Remove pin **3**.



CAUTION

Movable parts!
Risk of crushing limbs.

- ▶ Keep all limbs well clear of moving parts.
- ▶ Check alignment of pin connection points visually.

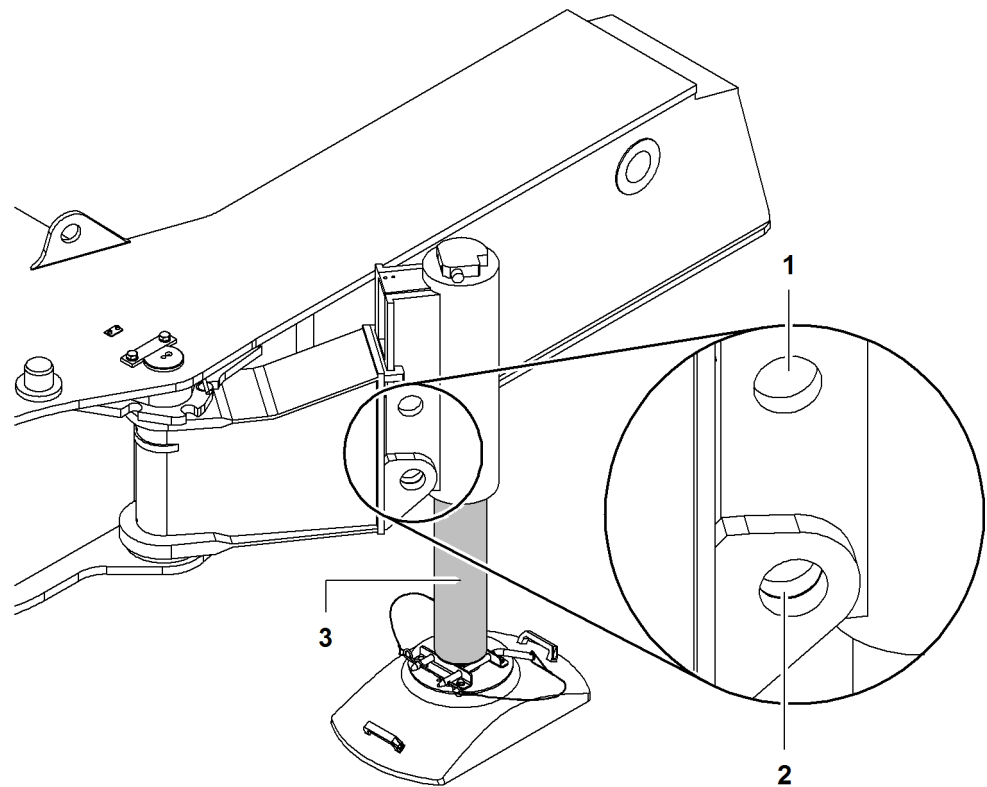


Fig. 3055: Adjusting the pin connection point

- | | | | |
|---|-----------------------------|---|------------------|
| 1 | Top pin connection point | 3 | Support cylinder |
| 2 | Bottom pin connection point | | |

- ▶ Move the corresponding toggle switch on cable remote control backward.
 - ▷ Top part of the support cylinder **3** moves.

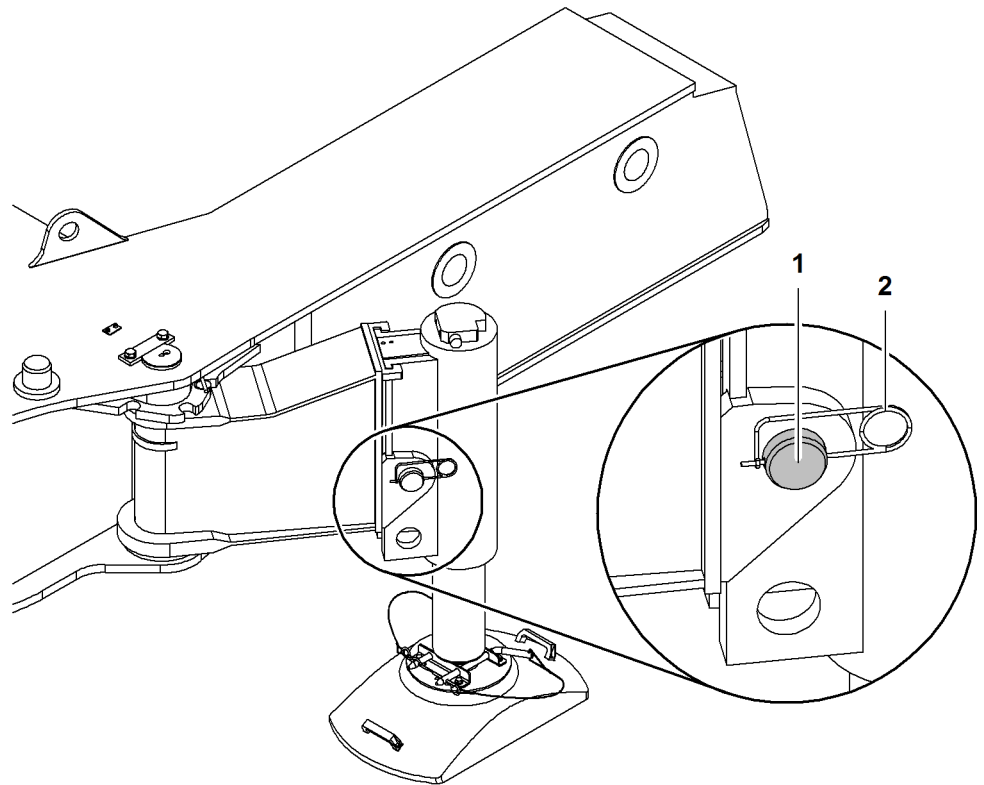


Fig. 3056: Inserting pins

1 Pin

2 Locking spring

When the pin connection point on the slewing bracket aligns with the top pin connection point of the support cylinder:

- ▶ Insert pins 1.
- ▶ Secure pin 1 with locking spring 2.
- ▶ Repeat process with all support cylinders.

Extending support cylinders



DANGER

Uneven extending of support cylinder!
Toppling of machine.

- ▶ Ensure that the air bubble in the spirit level does not move past the outer circle.
- ▶ Ensure that one or more helpers monitor the jack-up procedure.

The support cylinders are operated with the toggle switches of the cable remote control (For more information see: [3.26.2 Cable remote control on undercarriage, page 826](#)).

Several toggle switches can be actuated at the same time.

The air bubble in the spirit level must be absolutely stationary in the innermost circle without additional bubbles.

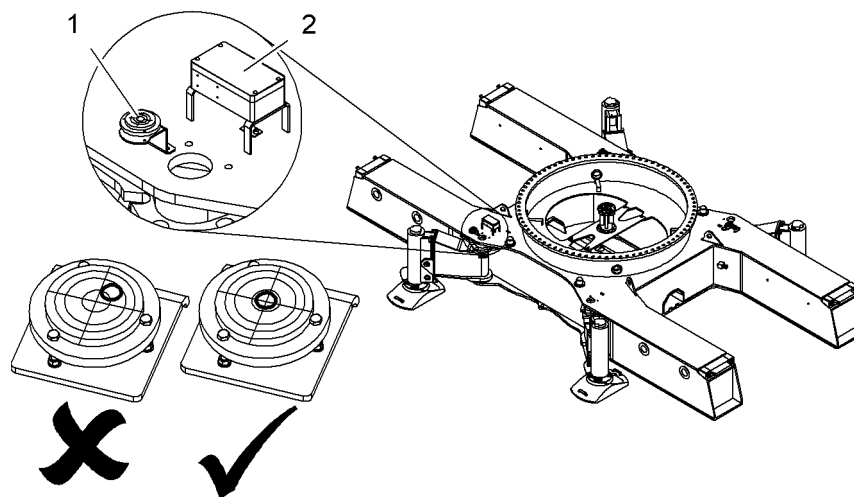


Fig. 3057: Spirit level on undercarriage

1 Spirit level

2 Connection plug of cable remote control



Note

Liebherr recommends:

- ▶ Always extend two support cylinders at the same time.
- ▶ Move the corresponding toggle switches on cable remote control forward.
 - ▷ Support cylinders extend.
 - ▷ Machine lifts.
- ▶ Move the corresponding toggle switches on cable remote control backward.
 - ▷ Support cylinders retract.
 - ▷ Machine lowers.
- ▶ Lower machine carefully and level exactly.

Driving the transport vehicle out from underneath the machine

Ensure the following conditions are met:

- There is a clearance of at least 100 mm (3.94" in) between the transport vehicle and the machine.
- The chocks between the transport vehicle and the machine were removed.
- There are no obstacles on the ground (e.g. rocks) that might cause the transport vehicle to deviate from its track.
- The transport vehicle can drive straight out from underneath the machine.
- The steering axles on the transport vehicle are straight.
- All support cylinders are extended all the way to the ground.



DANGER

Collision of transport vehicle with support cylinders!
Toppling of machine.

- ▶ Ensure that one or more helpers direct the transport vehicle.
- ▶ Drive the transport vehicle out from underneath the machine.

7.4.18 Removing the uppercarriage locking device

The uppercarriage is permanently connected to the undercarriage for transportation.

This connection prevents the uppercarriage from turning during transport.

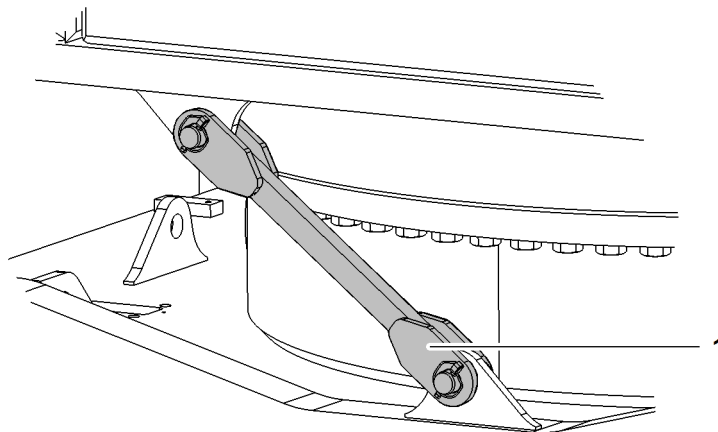


Fig. 3058: Removing the uppercarriage locking device

- 1 Uppercarriage locking device
- ▶ Remove linchpin and pin on uppercarriage.
- ▶ Place uppercarriage locking device 1 on undercarriage.
- ▶ Reinsert pin and secure with linchpin.

7.4.19 Stow away uppercarriage locking device

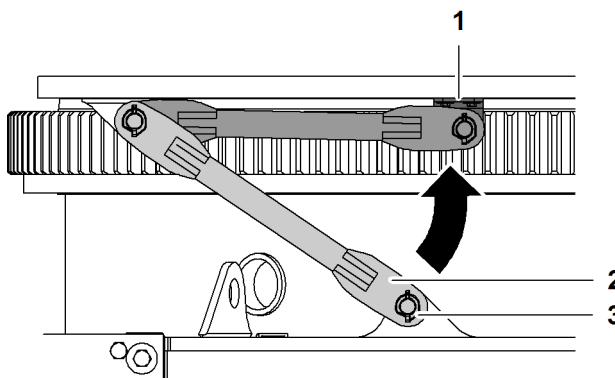


Fig. 3059: Stow away uppercarriage locking device

- 1 Mount
- 2 Uppercarriage locking device
- 3 Linchpin
- ▶ Remove linchpin 3 and pin on undercarriage.
- ▶ Swing uppercarriage locking device 2 to bracket 1 on uppercarriage.
- ▶ Reinsert pin and secure with linchpin 3.

7.4.20 Installing the crawler side frame

The installation sequence of the crawler side frames is arbitrary.

Ensure the following conditions are met:

- Approved sling gear is available (For more information see: 6.9 Rigging equipment and/or sling gear, page 1175) .
- Unloading the crawler side frames from the transport vehicle on the correct side is possible.
- It is possible to approach the machine with the transport vehicle bearing the crawler side frames.
- Support cylinders are sufficiently extended to ensure sufficient ground clearance for attaching the crawler side frames and unloading from the transport vehicle.
- Machine is leveled.
- Cylinder adjustment functions are activated.

Installing the crawler side frame with undercarriage with fixed track width

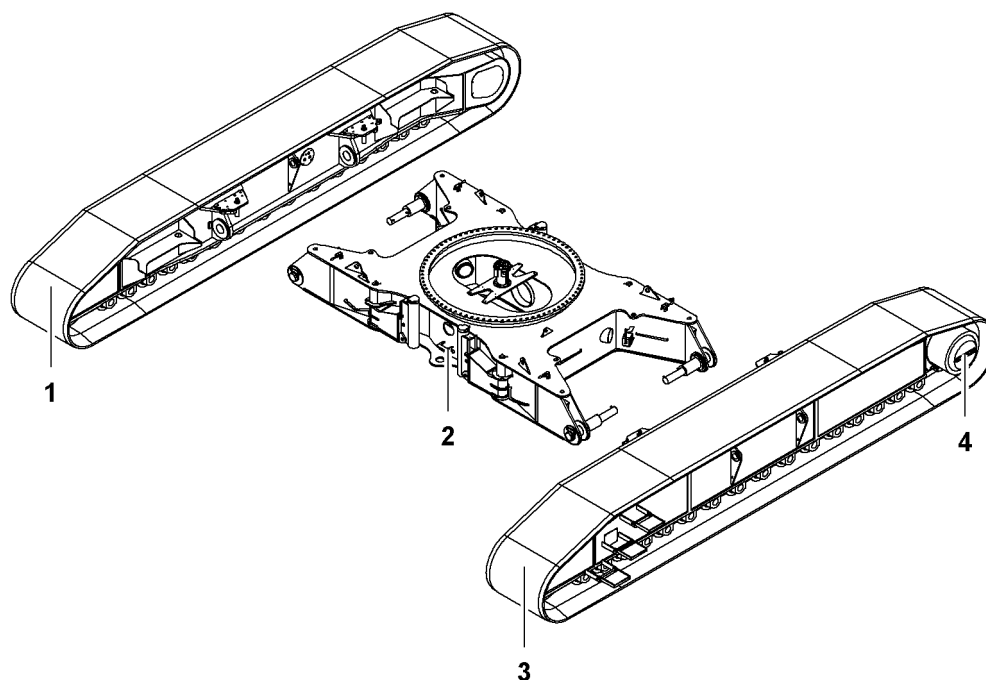


Fig. 3060: Installing the crawler side frame with undercarriage with fixed track width

- | | |
|---|--|
| <p>1 Right crawler side frame</p> <p>2 Control lever support cylinder</p> | <p>3 Left crawler side frame</p> <p>4 Crawler drive (tumbler) (2x)</p> |
|---|--|



Note

Liebherr recommends:

- ▶ to position and align the undercarriage and/or the crawler side frames, use the control levers support cylinder 2.

Preparing the undercarriage

All pin connection cylinders on the undercarriage must be retracted before the crawler side frames are attached.

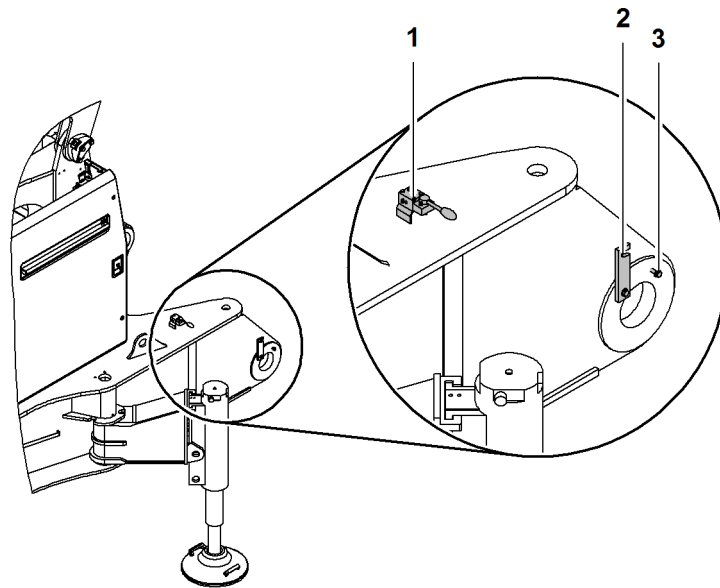


Fig. 3061: Preparing the undercarriage

- | | |
|--|-----------------------|
| <p>1 Control lever <i>pin connection cylinder</i></p> <p>2 Locking element</p> | <p>3 Screw</p> |
|--|-----------------------|

- ▶ Undo the screw **3** of the locking element **2**.
- ▶ Fold up locking element **2**.
- ▶ Actuate pin connection cylinder *control lever 1*.
 - ▷ Pin connection cylinder retracts.
- ▶ Repeat process on all pin connection points.

Rigging and mounting the first crawler side frame

Suspending the transport brackets

When loading and assembling the crawler side frame, the transport brackets prevent sagging of the crawler chains.

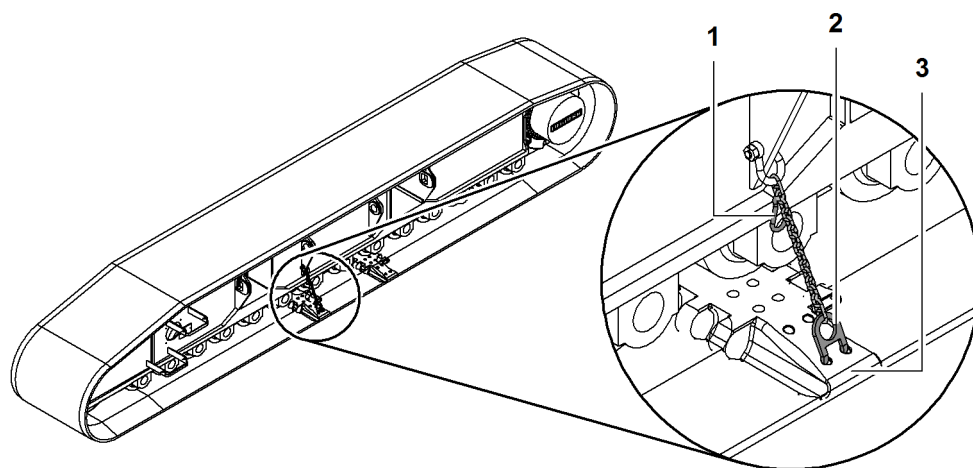


Fig. 3062: Suspending the transport brackets

- | | | | |
|---|-----------|---|------------|
| 1 | Carabiner | 3 | Base plate |
| 2 | Hook | | |

- ▶ Detach hook 2 on carabiner 1.
- ▶ Attach hook 2 at the base plate 3.
- ▶ Repeat process on opposite side of crawler side frame.

Rigging the first crawler side frame



DANGER

Maximum radius exceeded!
Toppling of machine.

- ▶ Do not exceed maximum radius.
- ▶ Pay attention to the mechanical boom angle indicator on A-frame1.

The uppercarriage can be swung by 360° within the maximum radius.

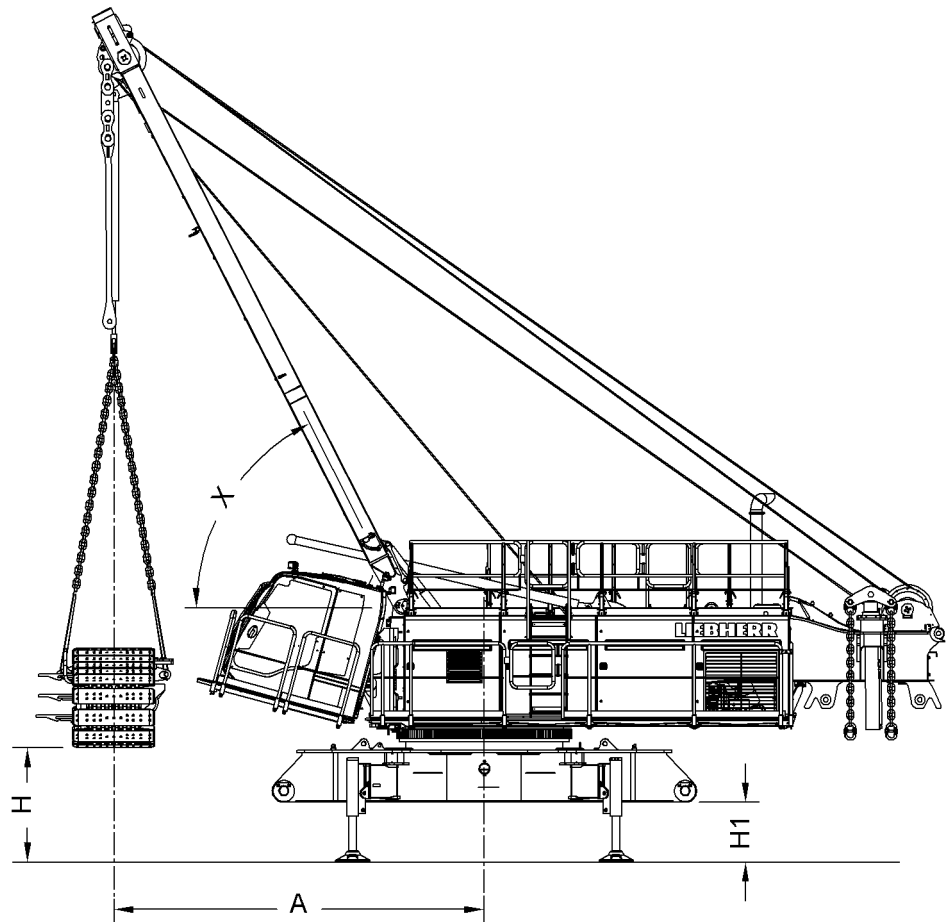


Fig. 3063: Limit values - rigging the first crawler side frame

Name	Value
A Maximum radius	4500 mm 14' 9" ft-in
H Maximum lifting height	1196 mm 3' 11" ft-in
H1 Maximum support height	975 mm 3' 2" ft-in
X Minimum angle A-frame1	70 °

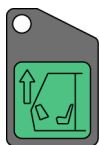
Tab. 511: Limit values - rigging the first crawler side frame

- ▶ Move the transport vehicle carrying the crawler side frame as close to the machine as possible.

NOTICE

Horizontal cabin!
Damage to cabin.

- ▶ Cabin must be tilted upward before crawler side frame is attached.



- ▶ Press the button *Cab tilting device up* on control panel X11.
- ▷ Cabin tilts upward.



CAUTION

Moving folding brackets!
Risk of crushing limbs.

- ▶ Keep all limbs well clear of moving folding brackets.

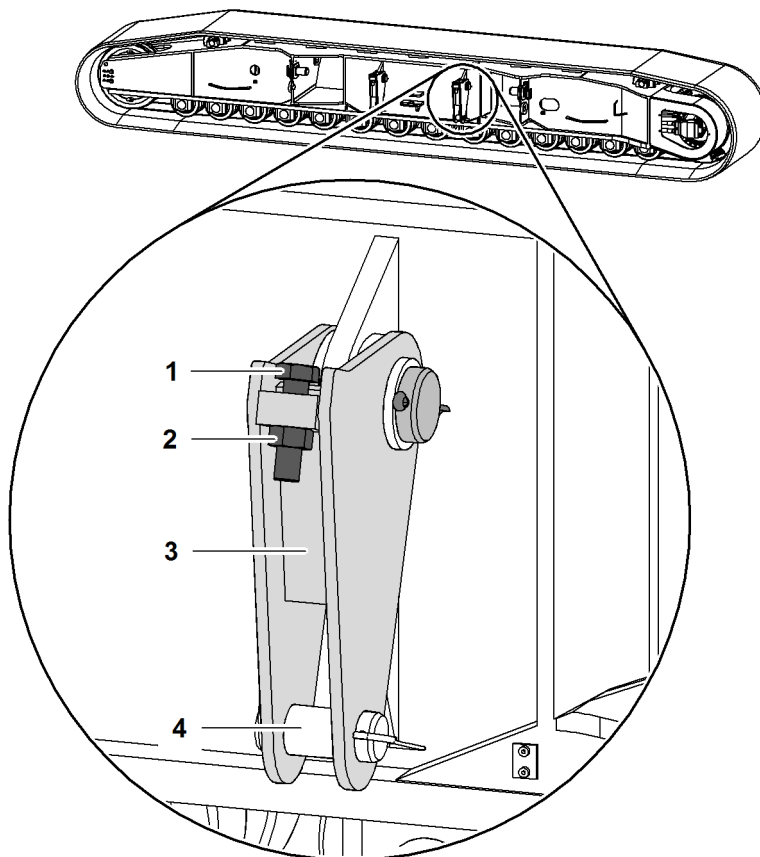


Fig. 3065: Aligning the folding brackets on the crawler side frame (illustration of principle)

- | | | | |
|---|-------|---|-----------------|
| 1 | Screw | 3 | Folding bracket |
| 2 | Nut | 4 | Pin |

Adjust angle of the folding bracket **1** by turning the screw **3**.

Once all folding brackets **3** on the crawler side frame are aligned, the crawler side frame hangs level.

- ▶ Undo nut **2**.
- ▶ Turn screw **1** to required position.
- ▶ Tighten nut **2**.
- ▶ Remove locking spring and pin **4**.
- ▶ Manually lift folding bracket **3**.

The 4th round sling of the sling gear is not required for assembly.

- ▶ Rig sling gear to folding bracket **3**.

- ▶ Insert pins **4**.
- ▶ Secure pin **4** with locking spring.
- ▶ Repeat process with all Folding brackets **3**.
- ▶ Slightly lift crawler side frame.
 - ▷ Crawler side frame is level with undercarriage:

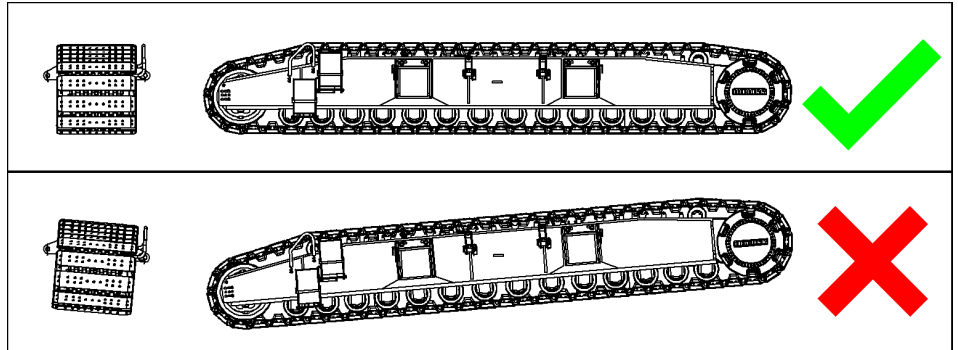


Fig. 3066: Crawler side frame is level with undercarriage (illustration of principle)

If crawler side frame is not level with undercarriage:

- ▶ Set down crawler side frame.
- ▶ Realign folding brackets **3** on crawler side frame.
- ▶ Repeat process until crawler side frame is level with undercarriage.

Installing the first crawler side frame

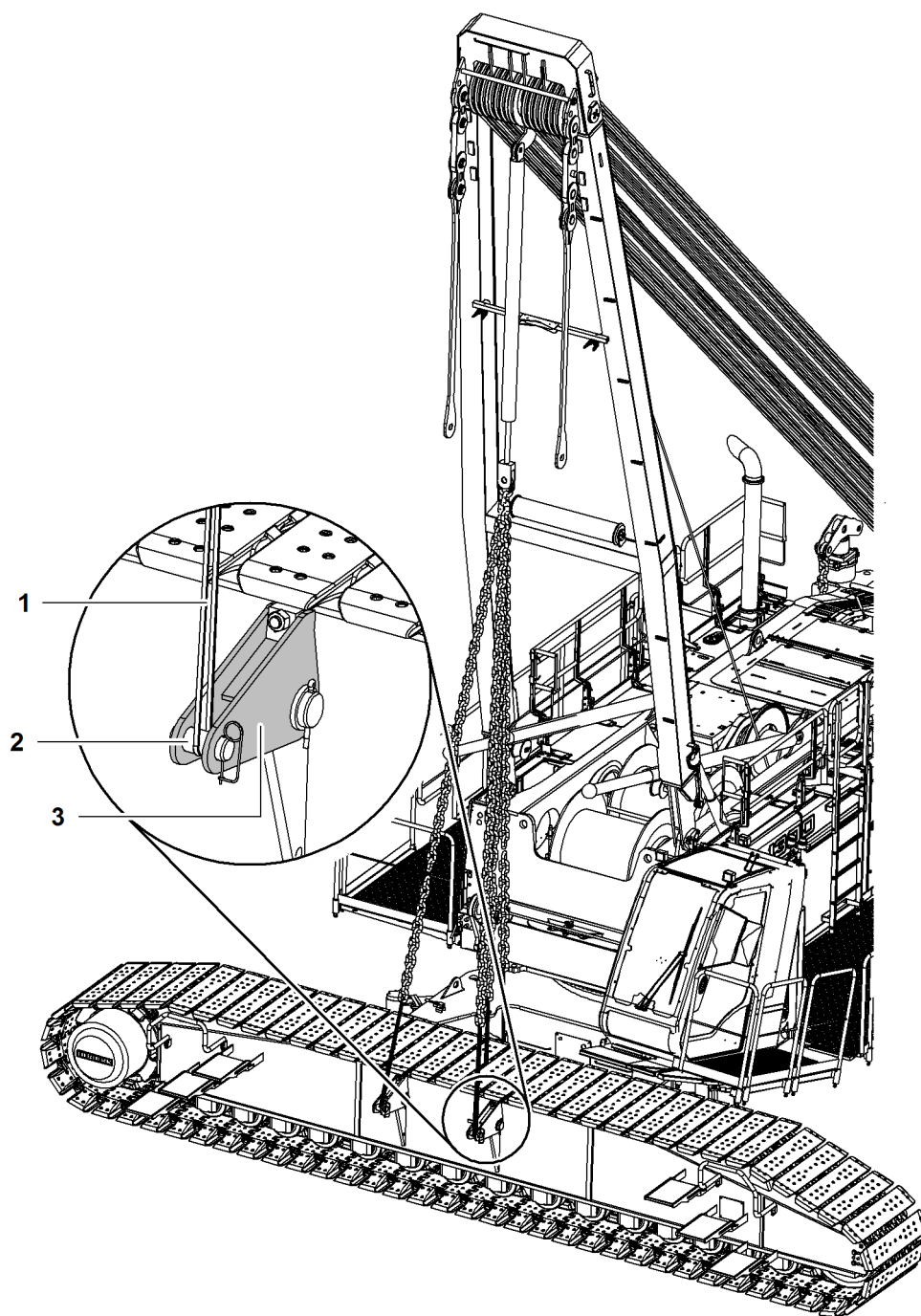


Fig. 3067: Installing the first crawler side frame

- | | | | |
|---|------------|---|-----------------|
| 1 | Sling gear | 3 | Folding bracket |
| 2 | Pin | | |



WARNING

Machine swings with a suspended load!
Death, crushing of body parts.

- ▶ Ensure that no persons are located in the danger zone.
- ▶ Leave danger zone.

- ▶ Lifting the crawler side frames from the transport vehicle.
- ▶ Remove transport vehicle.

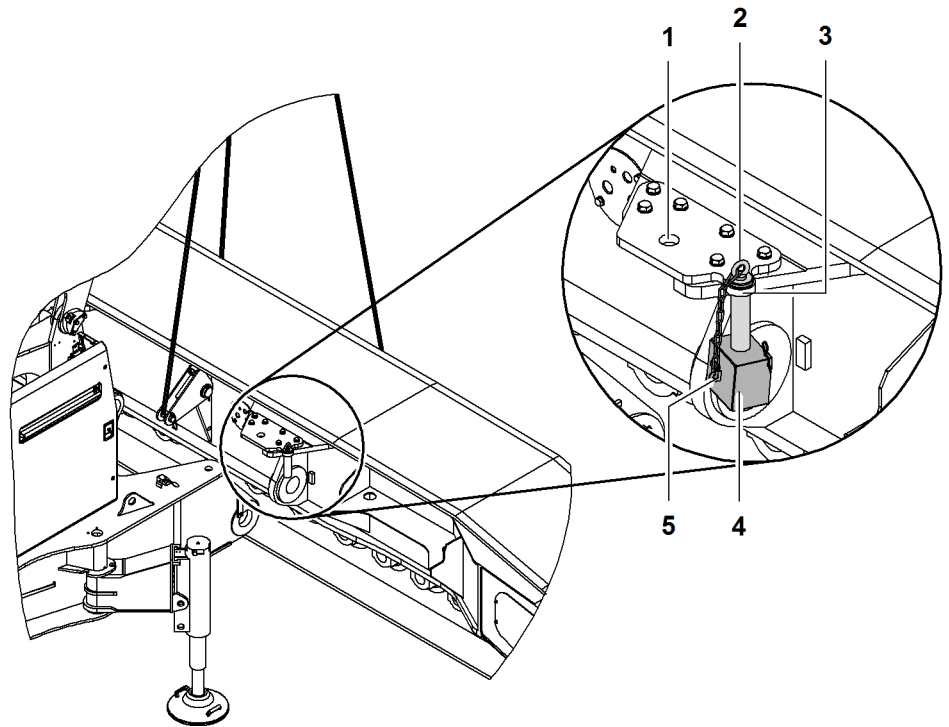


Fig. 3068: Inserting the pin in the lateral mount

- | | | | |
|---|-------------------------|---|------------------------------|
| 1 | Pin connection position | 3 | Lateral mount |
| 2 | Pin | 4 | Cover of multi-coupling (2x) |

- ▶ Remove pin 2 from pin connection position 1.
- ▶ Insert pin 2 in lateral mount 3.
- ▶ With the assistance of the signaller, align the crawler side frame exactly with the pin connection points of the undercarriage.

NOTICE

Incorrect mounting of crawler side frames!
Damage to machine.

- ▶ Mount crawler side frame slowly, step by step and evenly.
-
- ▶ Align crawler side frame symmetrically so it can be pinned from both sides.

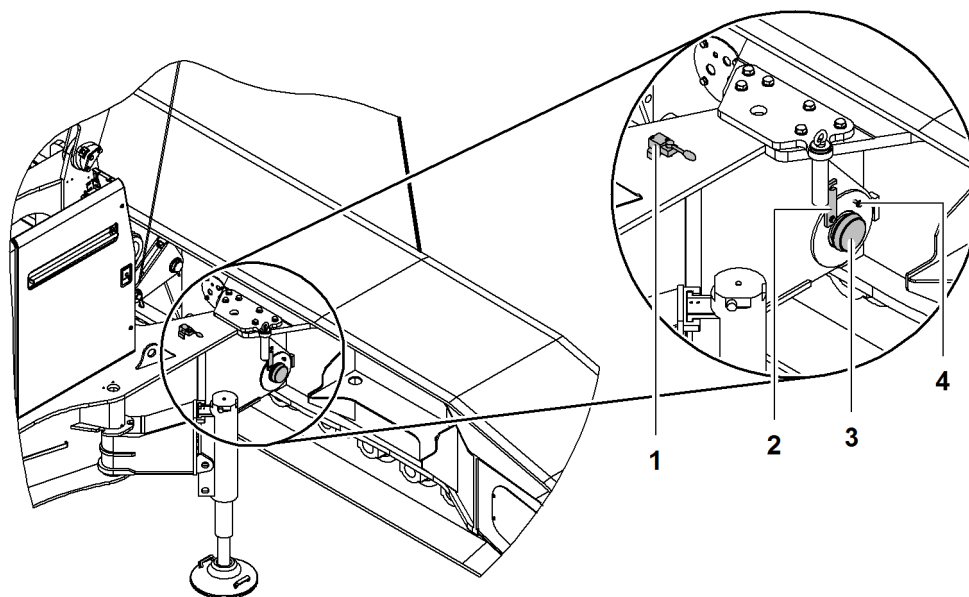


Fig. 3069: Pinning the first crawler side frame

- | | | | |
|---|---------------------------------------|---|-------------------------|
| 1 | Control lever pin connection cylinder | 3 | Pin connection cylinder |
| 2 | Locking element | 4 | Screw |

- ▶ Actuate pin connection cylinder control lever 1.
 - ▷ Pin connection cylinder 3 extends.
- ▶ Fold locking element 2 into pin connection cylinder 3 notch.
- ▶ Secure locking element 2: Tighten screw 4.

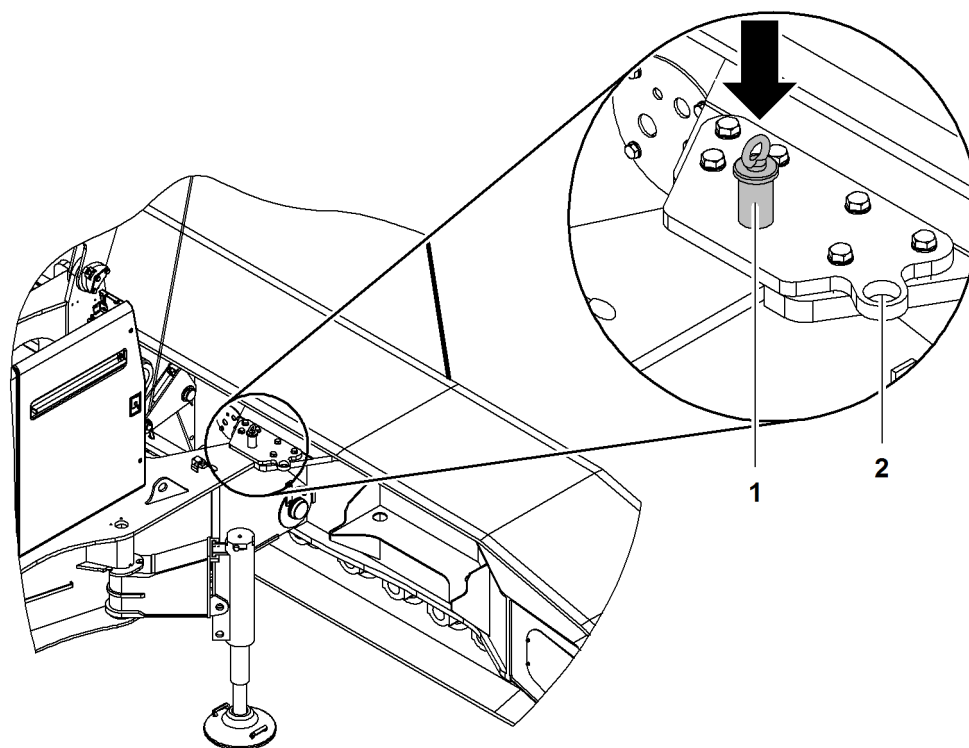


Fig. 3070: Inserting the pin into the pin connection position

- | | | | |
|---|-----|---|---------------|
| 1 | Pin | 2 | Lateral mount |
|---|-----|---|---------------|

- ▶ Remove pin **1** from lateral mount **2**.
- ▶ Insert pin **1** into the pin connection position.
- ▶ Repeat pin connection procedure on opposite side.
- ▶ Lower assembly cylinder until sling gear slackens off.
- ▶ Detach sling gear.

Removing the transport brackets

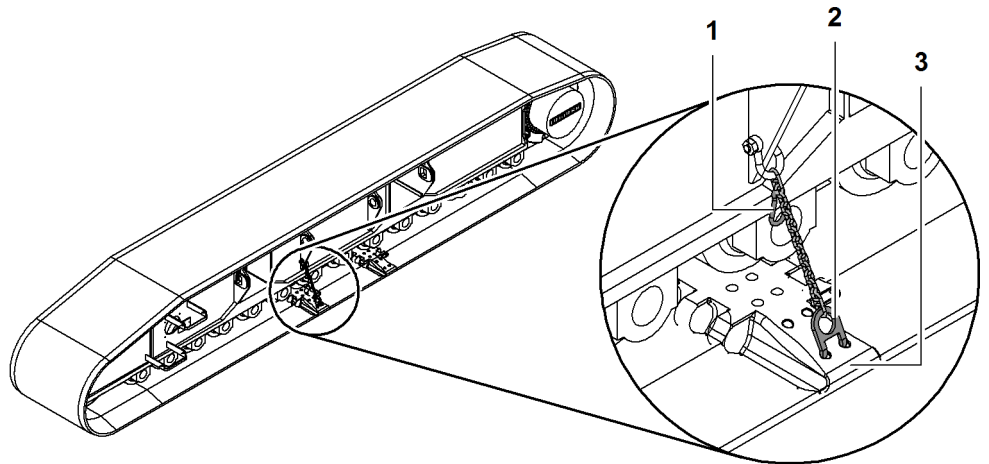


Fig. 3071: Removing the transport brackets

- | | |
|--------------------|---------------------|
| 1 Carabiner | 3 Base plate |
| 2 Hook | |

- ▶ Detach hook **2** at base plate **3**.
- ▶ Attach hook **2** to the carabiner **1**.
- ▶ Repeat process on opposite side of crawler side frame.

Rigging and mounting the second crawler side frame



DANGER

Inadmissible swing angle of uppercarriage with attached crawler side frame!
Toppling of machine.

- ▶ When viewed from the mounting position of the second crawler side frame, only swing uppercarriage by 90° to the left or right.

- ▶ Rig, adjust and install the second crawler side frame the same way as the first.



DANGER

Incorrect lowering of machine!
Toppling of machine.

- ▶ Lower machine carefully and leveled.

- ▶ Lower machine.
- ▶ Retract support cylinders.

Mounting the second crawler side frame where space is limited

If it is necessary to swing 180° from the mounting position in order to attach the second crawler side frame, then carry out the following process steps.

Ensure the following conditions are met:

- Make sure that two support plates with at least 1000 mm (3' 3" ft-in) x 1000 mm (3' 3" ft-in) and 150 mm (5.91" in) height are available.

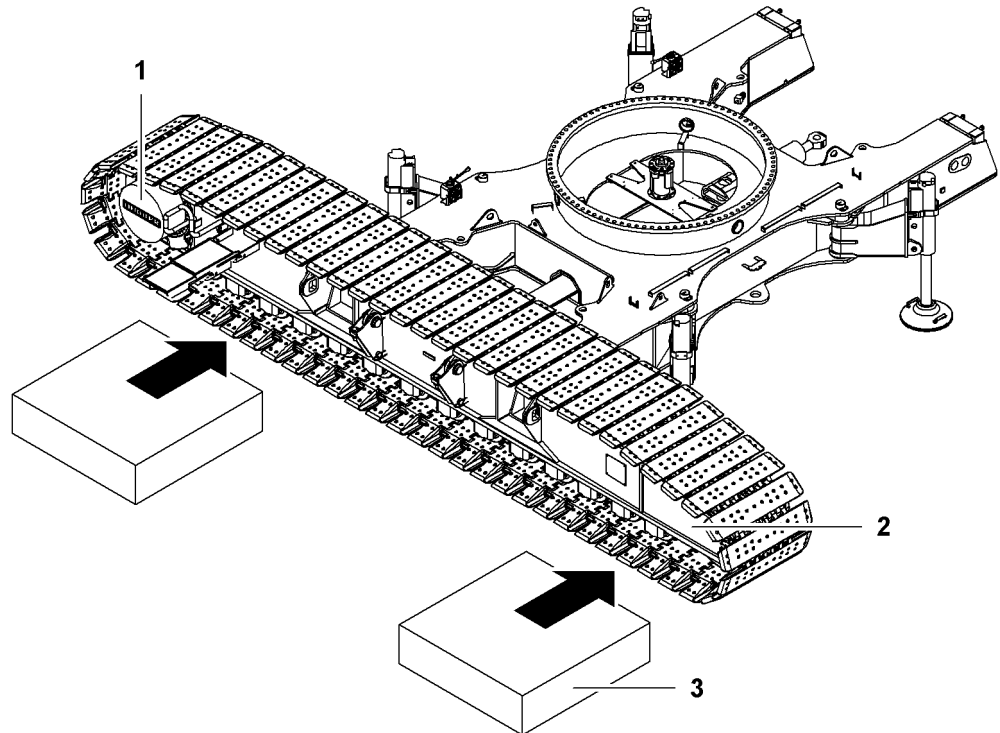


Fig. 3072: Mounting the second crawler side frame where space is limited (illustration of principle)

- 1 Crawler drive (tumbler)
- 2 Idler wheel
- 3 Support plate (2x)

- ▶ Place support plate 3 beneath crawler drive (tumbler) 1.
- ▶ Place support plate 3 beneath idler wheel 2.
- ▶ Lower crawler side frame onto support plates 3.

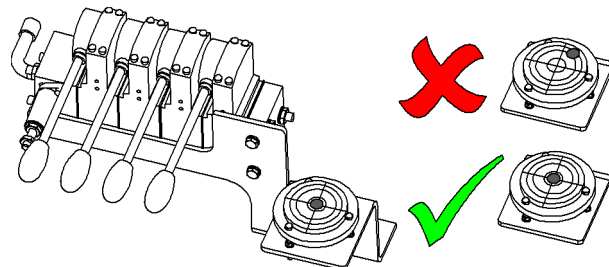


Fig. 3073: Support cylinder control lever and spirit level on undercarriage

- ▶ Level the undercarriage.

It is not necessary to observe a critical angle for the radius of A-frame1.

Uppercarriage can be swung unrestrictedly.

- ▶ Rig, adjust and install the second crawler side frame the same way as the first.
- ▶ Slightly lift machine.
- ▶ Remove support plates.

**DANGER**

Incorrect lowering of machine!
Toppling of machine.

- ▶ Lower machine carefully and leveled.

- ▶ Lower machine.
- ▶ Retract support cylinders.

Connecting the hydraulic lines of the crawler

Ensure the following conditions are met:

- Hand lever for multi-coupling is available.
- Diesel engine is turned off.

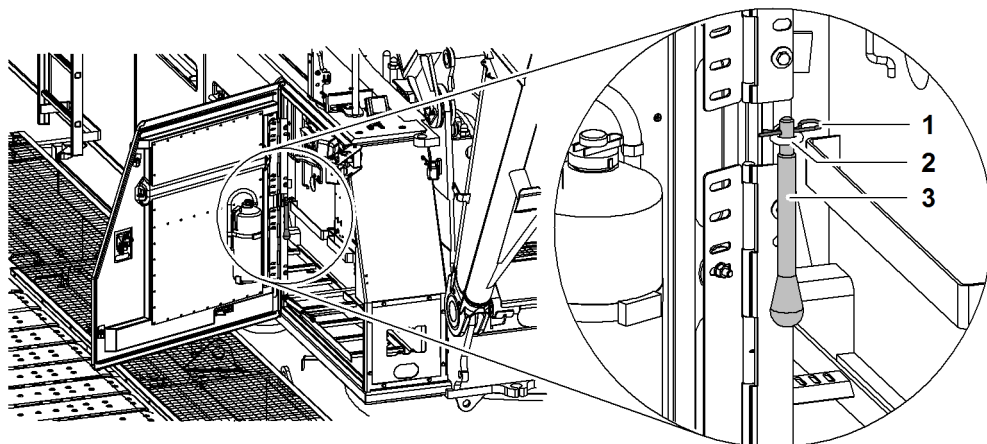


Fig. 3074: Transport bracket for hand lever of multi-coupling

- | | | | |
|---|----------------|---|------------|
| 1 | Locking spring | 3 | Hand lever |
| 2 | Ring | | |

- ▶ Lift hand lever **3** and remove locking spring **1**.
- ▶ Remove hand lever **3** downwards from ring **2**.

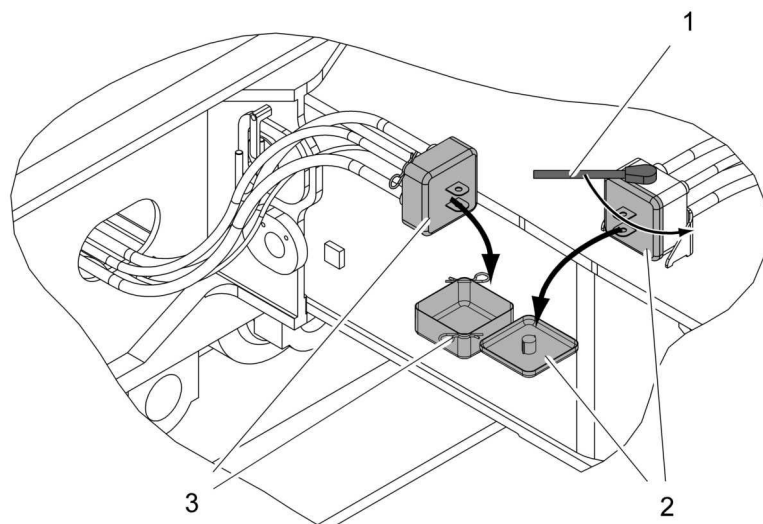


Fig. 3075: Removing the cover of the multi-couplings

- | | | | |
|---|------------|---|-------|
| 1 | Hand lever | 3 | Cover |
| 2 | Cover | | |

- ▶ Fit the hand lever 1 of the multi-coupling.
- ▶ Turn hand lever 1 in the direction of the arrow.
 - ▷ Cover 2 is loose.
- ▶ Take off the cover 2 and stow it away.
- ▶ Remove locking springs on cover 3.
- ▶ Take off the cover 3 and stow it away.

NOTICE

Dirty multi-couplings!
Damage to hydraulic system.

- ▶ Clean multi-couplings before connecting.

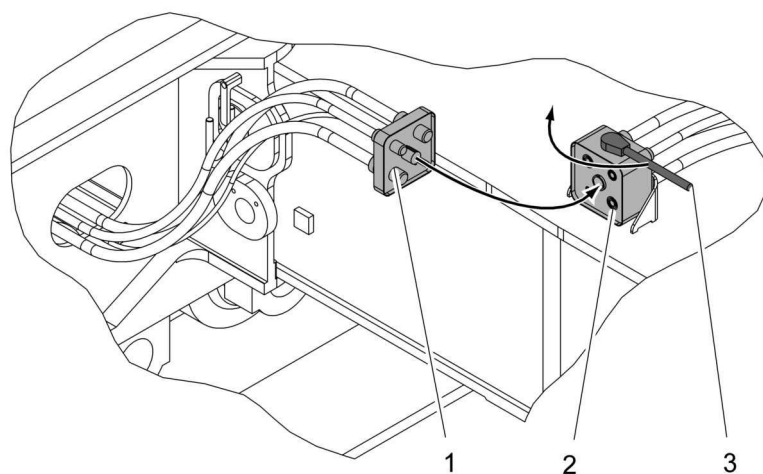


Fig. 3076: Connecting the multi-couplings

- | | | | |
|---|-------------------------------------|---|------------|
| 1 | Multi-coupling (undercarriage) | 3 | Hand lever |
| 2 | Multi-coupling (crawler side frame) | | |

- ▶ Connect multi-couplings **1 + 2**.
- ▶ Move hand lever in direction of the arrow until latch engages.
 - ▷ Multi-couplings are visibly and audibly pulled together.
 - ▷ Multi-coupling indicating pins stick out:

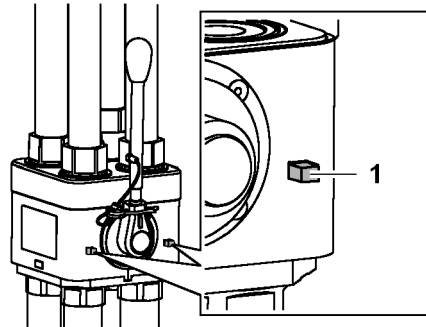


Fig. 3077: Latched multi-coupling

- 1** Indicating pin (2x)
- ▶ Disassemble the hand lever of the multi-coupling and remove.
- ▶ Repeat process with second crawler side frame.

Unfolding steps from transport position

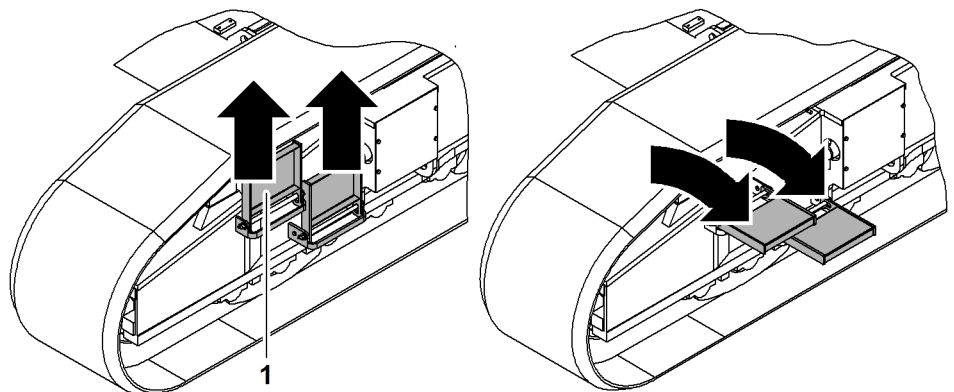


Fig. 3078: Unfolding steps from transport position

- 1** Steps (2x)
- ▶ Lift steps **1** completely.
- ▶ Fold down steps **1**.

Placing the support cylinder in transport position

The support cylinders must be pinned in transport position in order to install the carbody counterweight on the machine.

Ensure the following conditions are met:

- Installation of both crawler side frames is completed.

Adjusting the support height of support cylinder

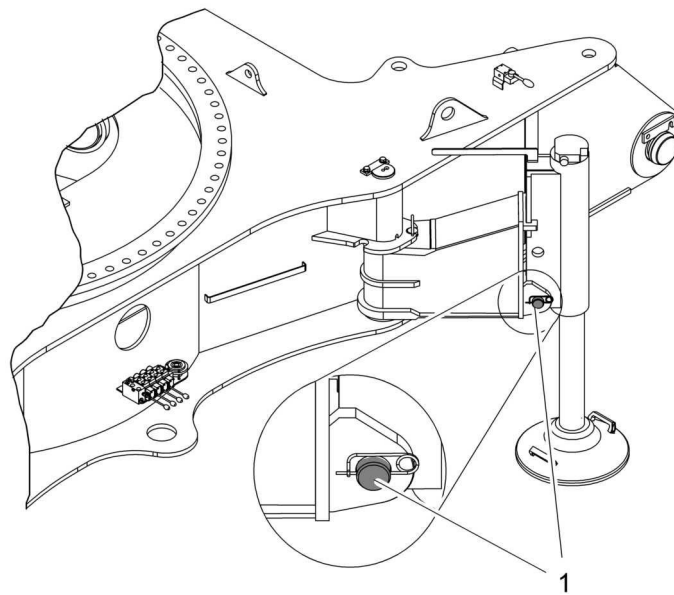


Fig. 3079: Support cylinder in bottom pin connection position

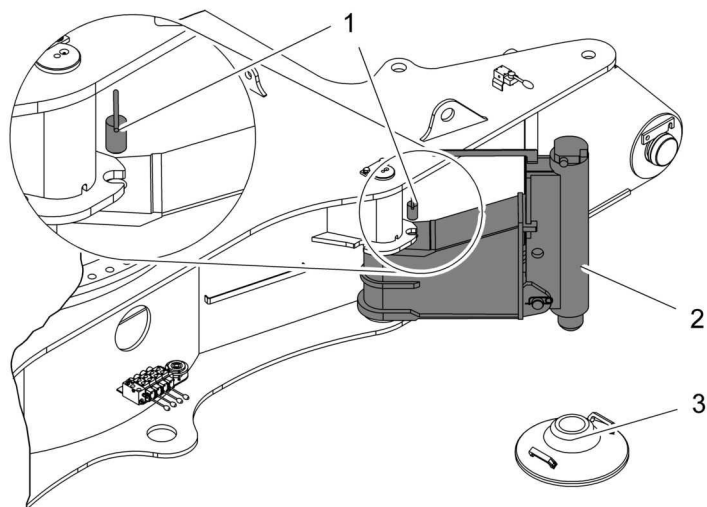
1 Bottom pin connection position



CAUTION

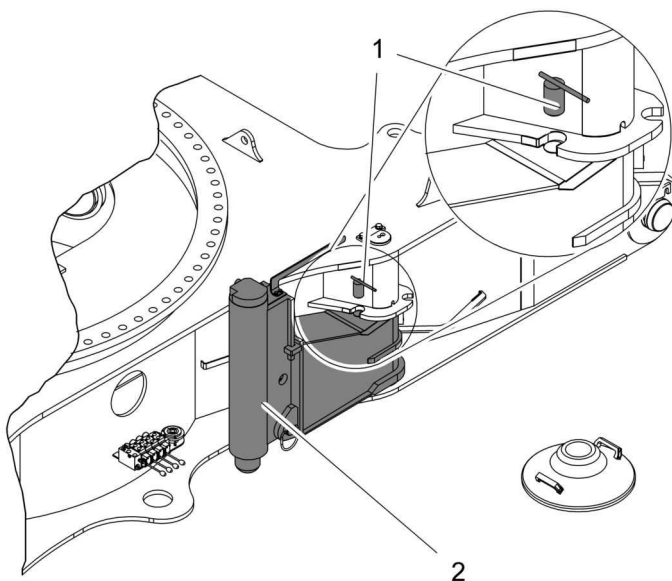
Movable parts!
Risk of crushing limbs.

- ▶ Keep all limbs well clear of moving parts.
-
- ▶ Pin support cylinder in bottom pin connection position 1.
 - ▶ Repeat process with all support cylinders.

Placing the slewing brackets in transport position*Fig. 3080: Slewing brackets in support position*

- | | |
|--------------------------|-----------------------|
| 1 Pin | 3 Support pads |
| 2 Slewing bracket | |

- ▶ Remove pin **1**.
- ▶ Slew slewing bracket **2** into transport position.

*Fig. 3081: Slewing brackets in transport position*

- | | |
|--------------|--------------------------|
| 1 Pin | 2 Slewing bracket |
|--------------|--------------------------|

- ▶ Insert pins **1**.
- ▶ Repeat process with all slewing brackets **2**.

Removing support pads and base plates

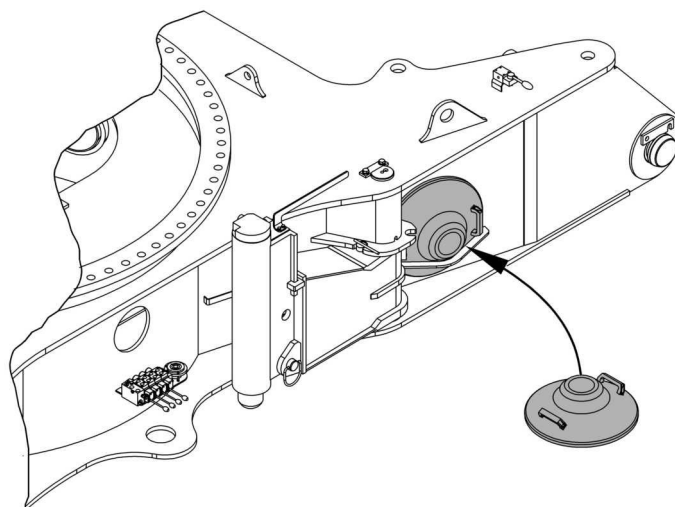


Fig. 3082: Removing the support pads

- ▶ Insert support pads in mounts.

Installing the crawler side frame with undercarriage* with adjustable track width

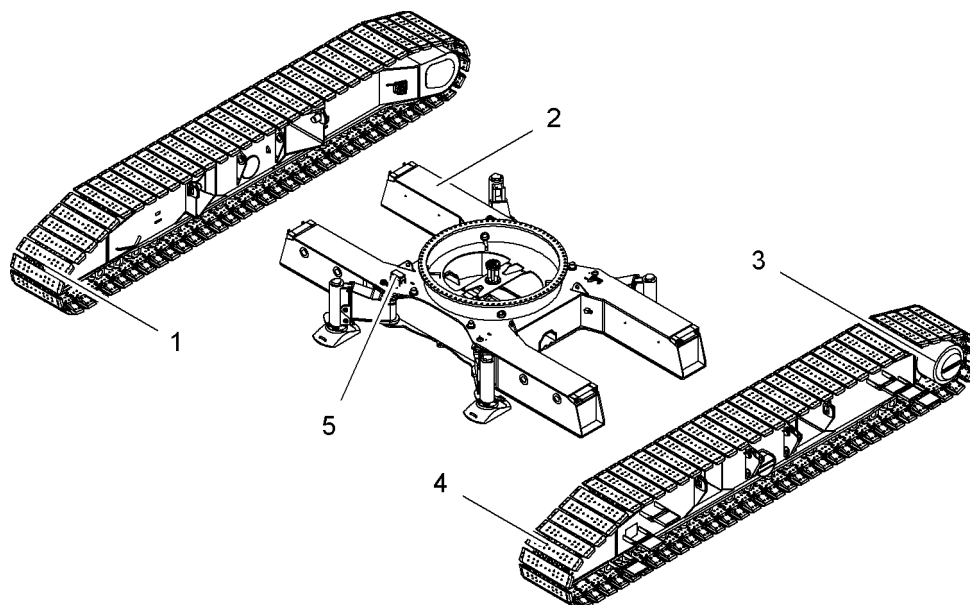


Fig. 3083: Installing the crawler side frame with undercarriage* with adjustable track width

- | | |
|---|--|
| <ul style="list-style-type: none"> 1 Right crawler side frame 2 Undercarriage 3 Crawler drive (tumbler) (2x) | <ul style="list-style-type: none"> 4 Left crawler side frame 5 Connection plug of cable remote control |
|---|--|

**Note**

Liebherr recommends:

- ▶ For orientation and alignment of the undercarriage and/or crawler side frames, use the connection plug 5 of the cable remote control.

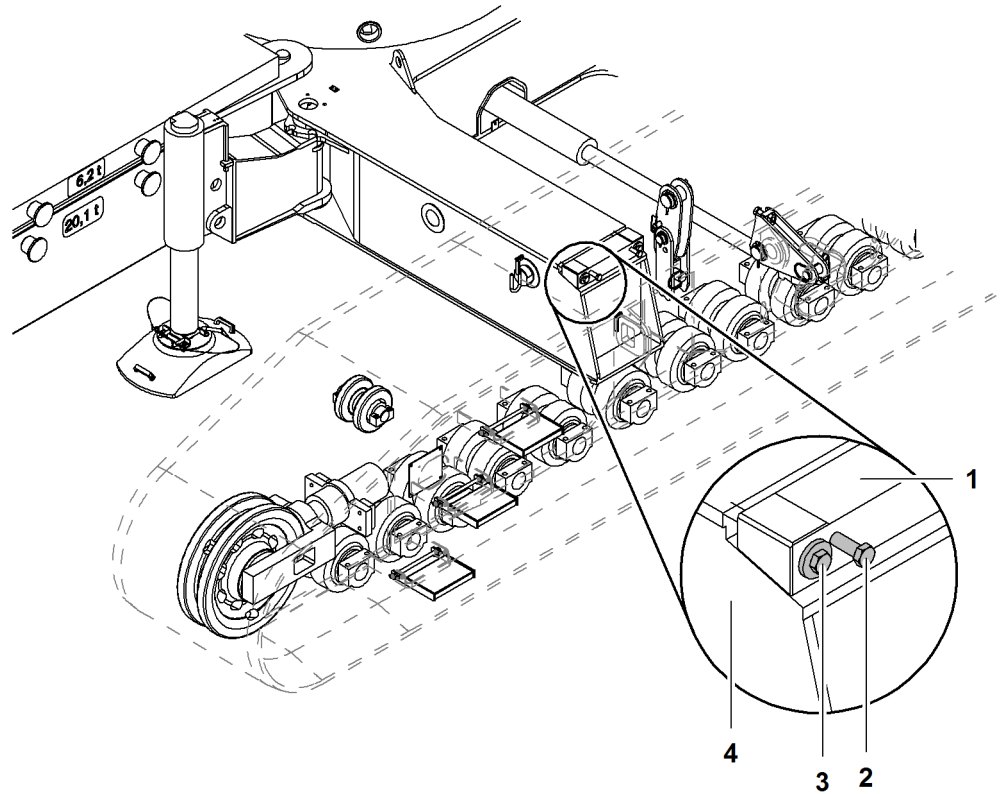
Undoing strut mountings

Fig. 3084: Undoing strut mountings

- | | | | |
|---|------------|---|--------------------|
| 1 | Wedge | 3 | Locking screw (2x) |
| 2 | Screw (2x) | 4 | Strut |

The two outer locking screws **3** must be turned almost completely out of the struts **4** so that the wedge **1** is located as close as possible to the end of the strut.

- ▶ Loosen screws **2** of the strut mounting.
- ▶ Loosen locking screws **3** of strut mounting and twist out almost all the way.
- ▶ Turn in screws **2** of strut mounting.
 - ▷ Wedge **1** loosens.
- ▶ Clean strut **4** and evenly grease the slide face.
- ▶ Repeat process on all strut mountings.

Preparing the crawler side frame

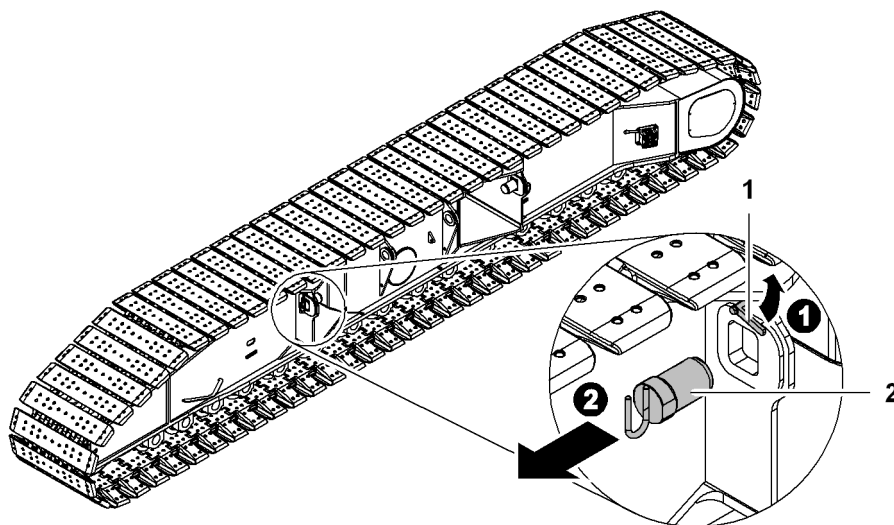


Fig. 3085: Preparing the crawler side frame

1 Safety lever

2 Pin

- ▶ Undo safety lever 1 screw.
- ▶ Fold up the safety lever 1.
- ▶ Remove pin 2.
- ▶ Repeat process on all crawler side frame pin connection points.

Rigging and mounting the first crawler side frame

Suspending the transport brackets

When loading and assembling the crawler side frame, the transport brackets prevent sagging of the crawler chains.

NOTICE

Improper installation of transport brackets!
Damage to hydraulic system.
Hydraulic oil leak.

- ▶ Ensure that the chains of the transport brackets do not damage any hydraulic oil pipes.
-

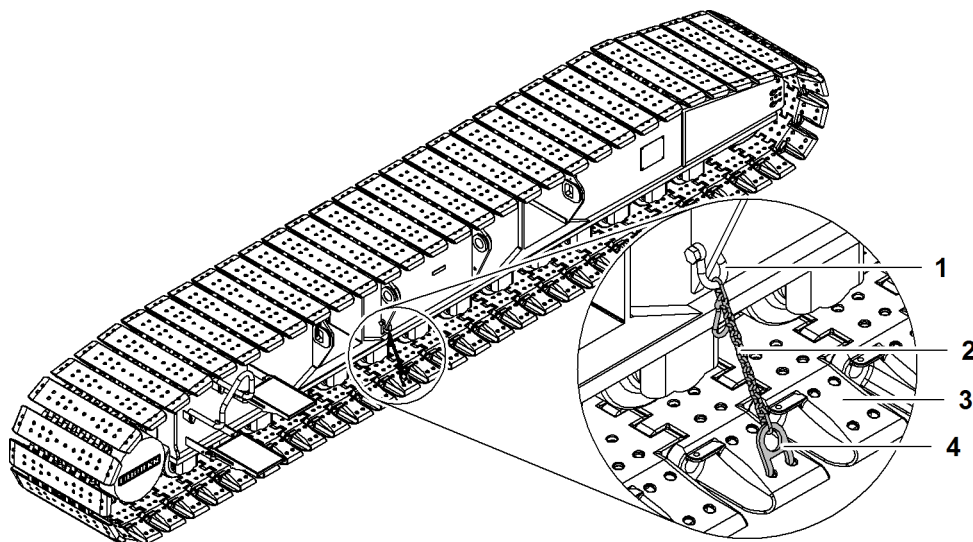


Fig. 3086: Suspending the transport brackets

- | | | | |
|---|---------|---|------------|
| 1 | Shackle | 3 | Base plate |
| 2 | Chain | 4 | Hook |

- ▶ Attach hook 4 at the base plate 3.
- ▶ Attach shackle 1 with chain 2 on a suitable spot on the crawler side frame.
- ▶ Repeat process on opposite side of crawler side frame.

Rigging the first crawler side frame



DANGER

Maximum radius exceeded!
Toppling of machine.

- ▶ Do not exceed maximum radius.
- ▶ Pay attention to the mechanical boom angle indicator on A-frame1.

The uppercarriage can be swung by 360° within the maximum radius.

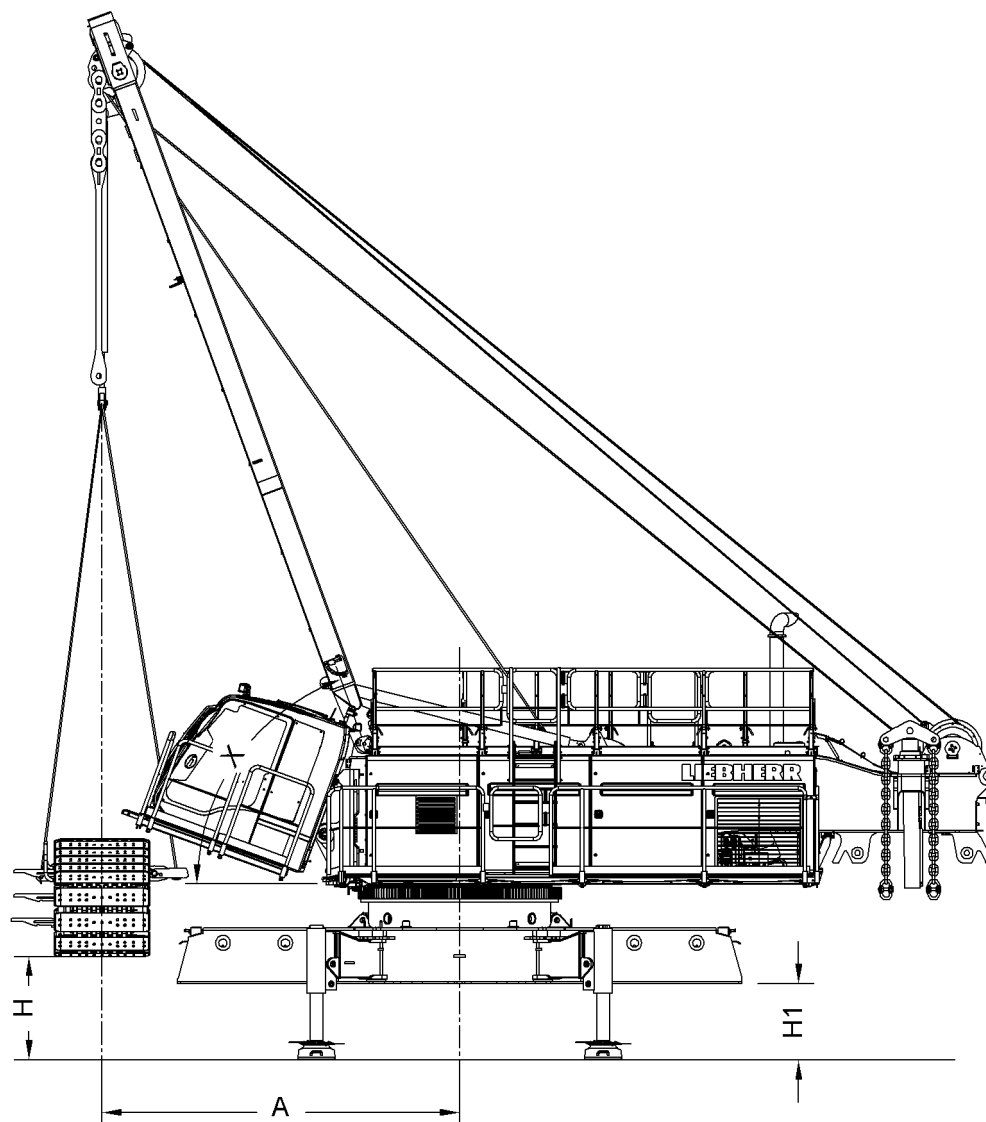


Fig. 3087: Limit values - unloading and mounting the first crawler side frame

Name	Value
A Maximum radius	4500 mm 14' 9" ft-in
H Maximum lifting height	1324 mm 4' 4" ft-in
H1 Maximum support height	970 mm 3' 2" ft-in
X Minimum angle A-frame1	70 °

Tab. 512: Limit values - unloading and mounting the first crawler side frame

- Move the transport vehicle carrying the crawler side frame as close to the machine as possible.

NOTICE

Horizontal cabin!
Damage to cabin.

- ▶ Cabin must be tilted upward before crawler side frame is attached.



- ▶ Press the button *Cab tilting device up* on control panel X11.
 - ▷ Cabin tilts upward.

**CAUTION**

Moving folding brackets!
Risk of crushing limbs.

- ▶ Keep all limbs well clear of moving folding brackets.

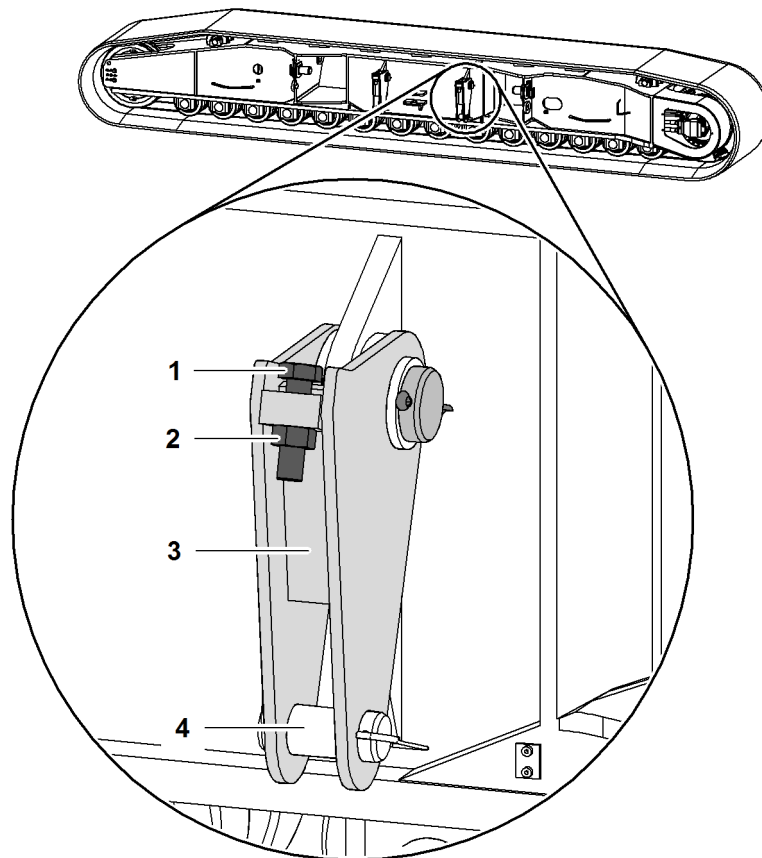


Fig. 3089: Aligning the folding brackets on the crawler side frame

- | | | | |
|---|-------|---|-----------------|
| 1 | Screw | 3 | Folding bracket |
| 2 | Nut | 4 | Pin |

Adjust angle of the folding bracket **1** by turning the screw **3**.

Once all folding brackets **3** on the crawler side frame are aligned, the crawler side frame hangs level.

- ▶ Undo nut **2**.
- ▶ Turn screw **1** to required position.
- ▶ Tighten nut **2**.

- ▶ Remove locking spring and pin 4.
- ▶ Manually lift folding bracket 3.
- ▶ Rig sling gear to folding bracket 3.
- ▶ Insert pins 4.
- ▶ Secure pin 4 with locking spring.
- ▶ Repeat process with all Folding brackets 3.
- ▶ Slightly lift crawler side frame.
 - ▷ Crawler side frame is level with undercarriage:

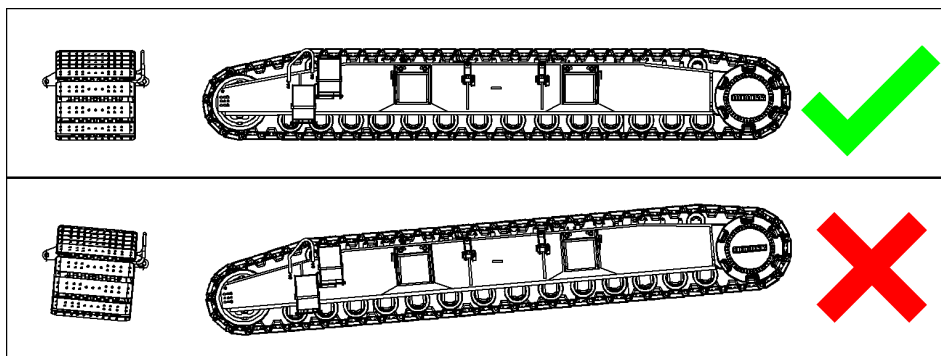


Fig. 3090: Crawler side frame is level with undercarriage

If crawler side frame is not level with undercarriage:

- ▶ Set down crawler side frame.
- ▶ Realign folding brackets 3 on crawler side frame.
- ▶ Repeat process until crawler side frame is level with undercarriage.

Installing the first crawler side frame

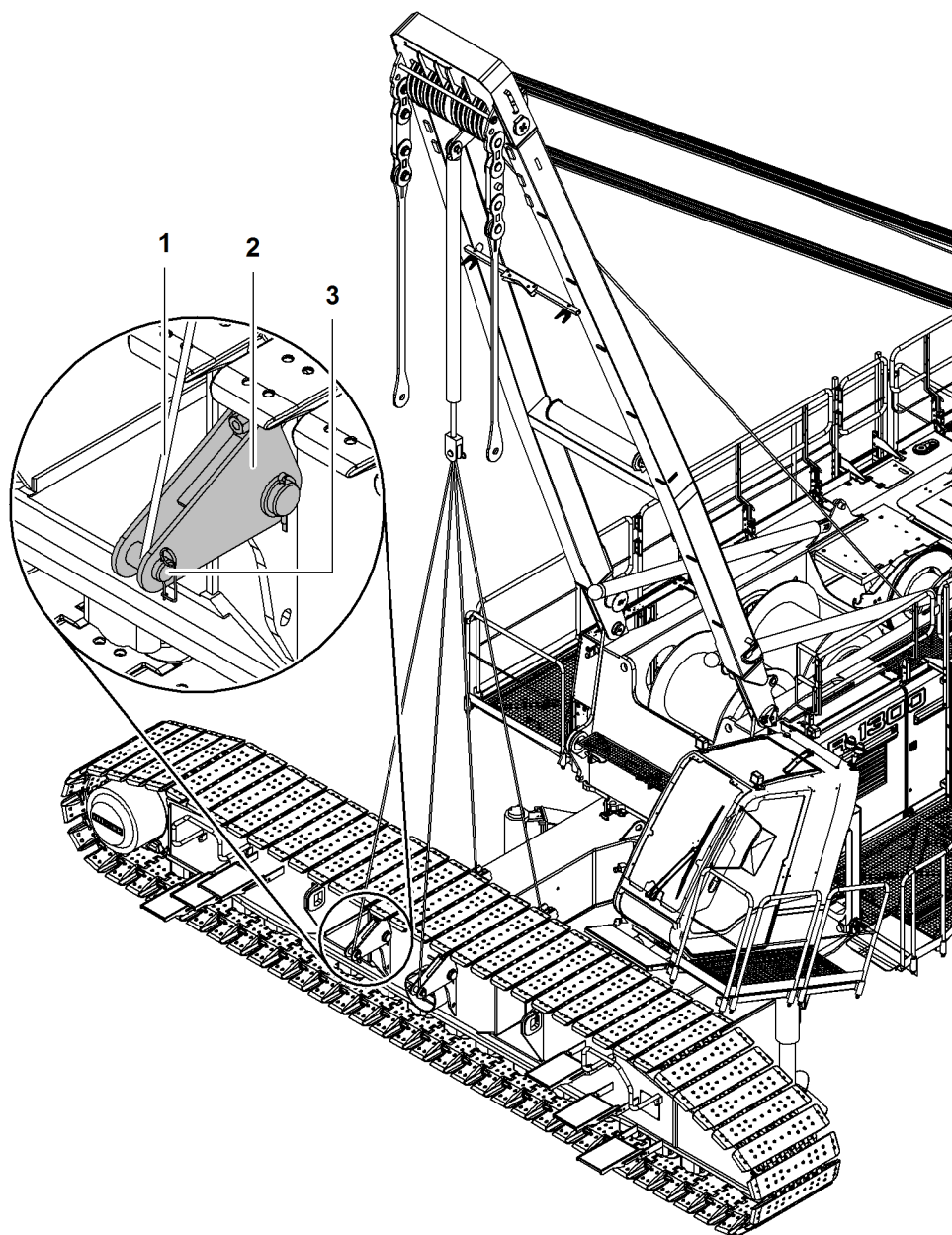


Fig. 3091: Installing the first crawler side frame

- | | | | |
|---|-----------------|---|-----|
| 1 | Sling gear | 3 | Pin |
| 2 | Folding bracket | | |

**WARNING**

Machine swings with a suspended load!
Death, crushing of body parts.

- ▶ Ensure that no persons are located in the danger zone.
 - ▶ Leave danger zone.
-
- ▶ Lifting the crawler side frames from the transport vehicle.
 - ▶ Remove transport vehicle.

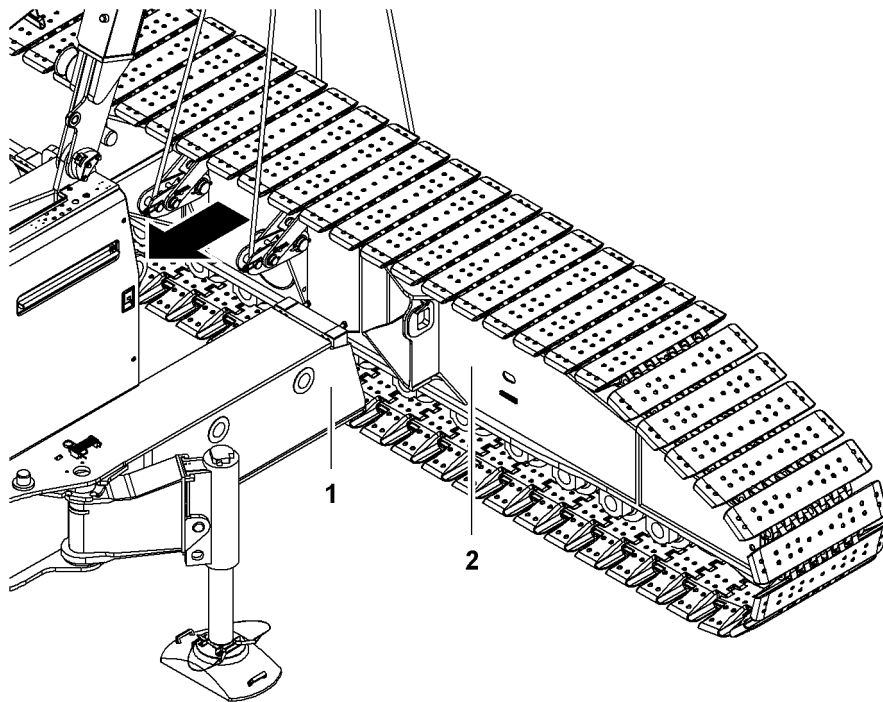


Fig. 3092: Mount first crawler side frame on struts

1 Strut (2x)

2 Crawler side frame

- ▶ Guide crawler side frame **2** to the struts **1** by lifting the main boom base section and lowering the assembly cylinder.
- ▶ With the assistance of the signaller, align the crawler side frame **2** exactly on the struts **1** of the undercarriage.

NOTICE

Incorrect mounting of crawler side frames **2**!
Damage to machine.

- ▶ Mount crawler side frame **2** slowly, step by step and evenly.
-
- ▶ Align crawler side frame **2** symmetrically so it can be pinned from both sides.

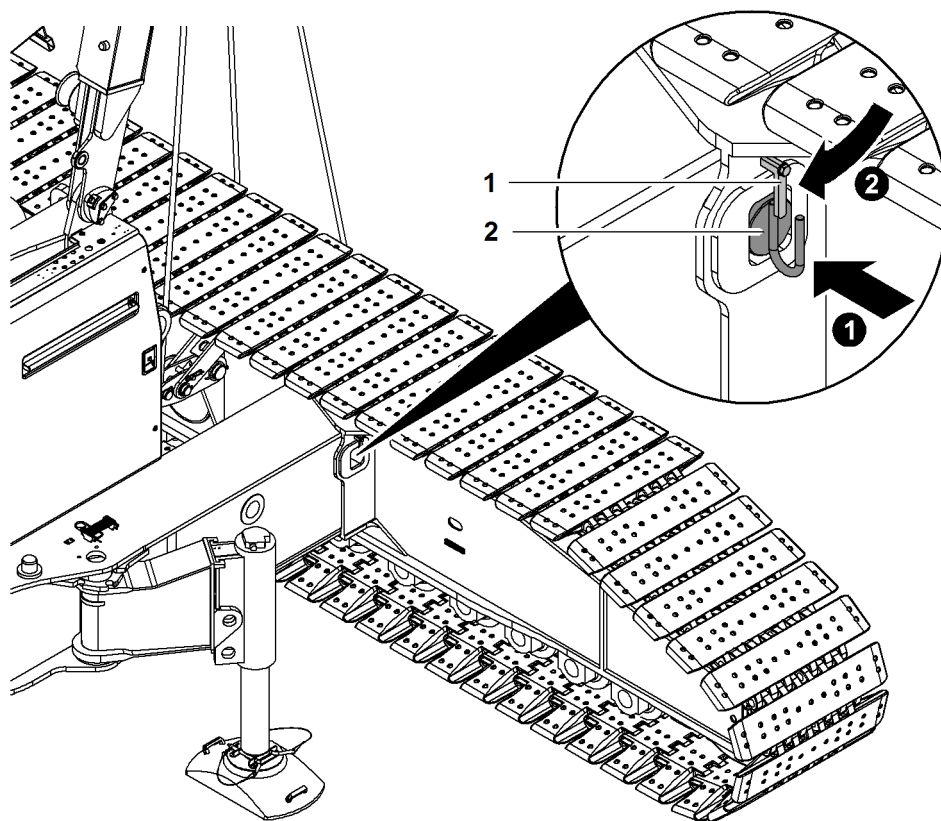


Fig. 3093: Pinning the first crawler side frame

1 Safety lever

2 Pin

- ▶ Pin crawler side frame to strut (observe installation position of pin 2).
- ▶ Undo safety lever 1 screw.
- ▶ Pull down safety lever 1.
- ▶ Tighten screw.

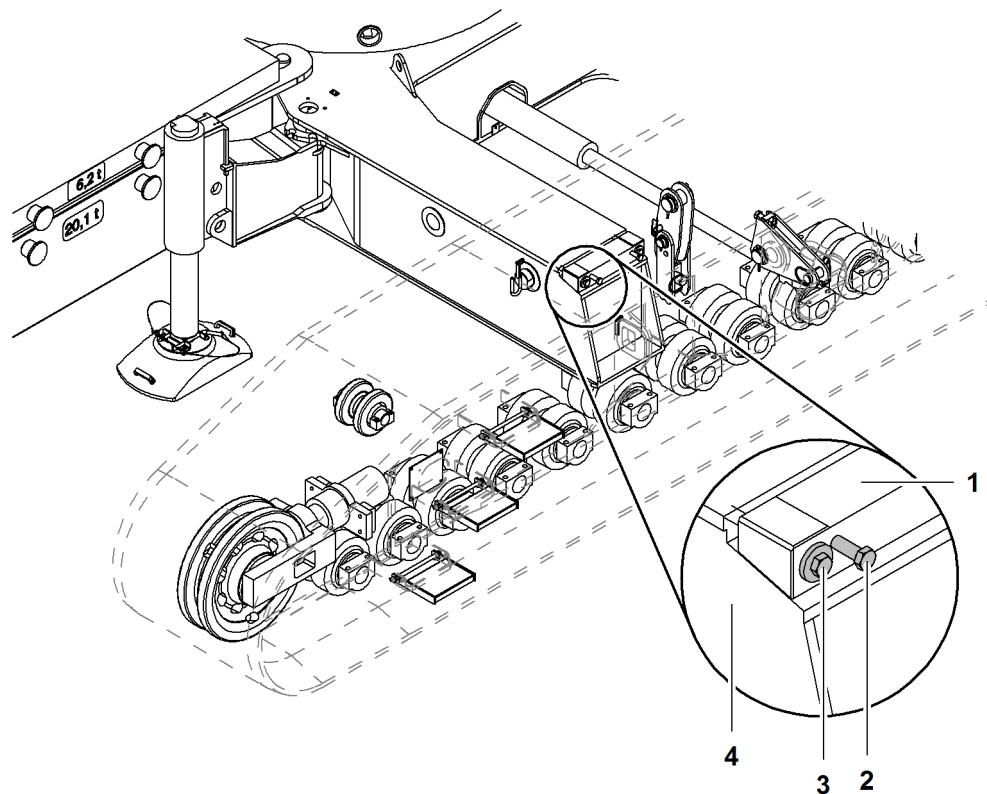


Fig. 3094: Wedging the first crawler side frame

- | | |
|---------------------|-----------------------------|
| 1 Wedge | 3 Locking screw (2x) |
| 2 Screw (2x) | 4 Strut |

- ▶ Undo screws **2**.
- ▶ Use locking screws **1** to clamp wedge **3** in place.
 - ▷ The crawler side frame is now wedged firmly on the struts **4**.
- ▶ Turn in screws **2** as far as they will go.
- ▶ Repeat the pinning and wedging procedure on the opposite side.
- ▶ Lower assembly cylinder until sling gear slackens off.
- ▶ Detach sling gear.

Removing the transport brackets

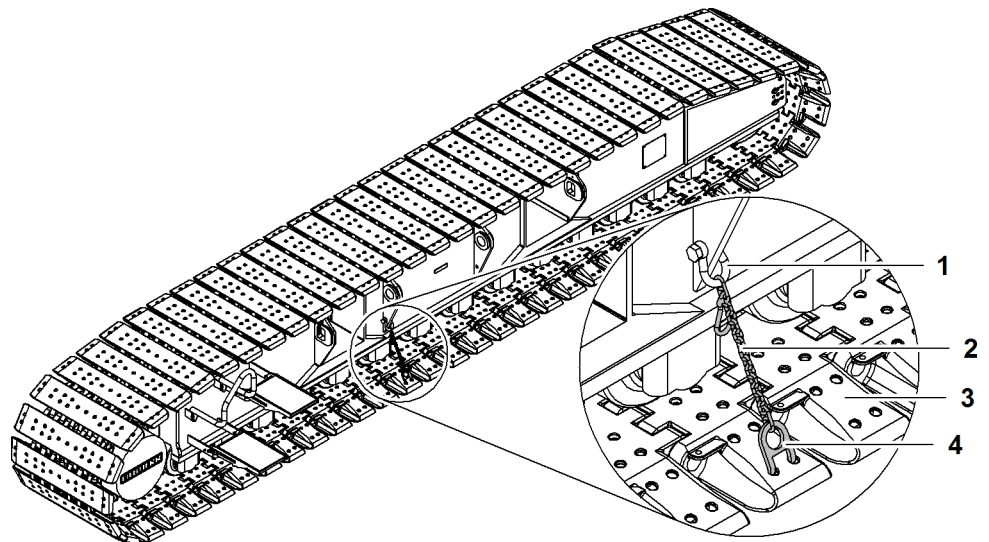


Fig. 3095: Removing the transport brackets

- | | | | |
|---|---------|---|------------|
| 1 | Shackle | 3 | Base plate |
| 2 | Chain | 4 | Hook |

- ▶ Deinstall shackle 1 and chain 2.
- ▶ Detach hook 4 at base plate 3.
- ▶ Remove transport bracket.
- ▶ Repeat process on opposite side of crawler side frame.

Rigging and mounting the second crawler side frame



DANGER

Inadmissible swing angle of uppercarriage with attached crawler side frame!
Toppling of machine.

- ▶ When viewed from the mounting position of the second crawler side frame, only swing uppercarriage by 90° to the left or right.
- ▶ Rig, adjust and install the second crawler side frame the same way as the first.



DANGER

Incorrect lowering of machine!
Toppling of machine.

- ▶ Lower machine carefully and leveled.
- ▶ Lower machine.
- ▶ Retract support cylinders.

Mounting the second crawler side frame where space is limited

If it is necessary to swing 180° from the mounting position in order to attach the second crawler side frame, then carry out the following process steps.

Ensure the following conditions are met:

- Make sure that two support plates with at least 1000 mm (3' 3" ft-in) x 1000 mm (3' 3" ft-in) and 150 mm (5.91" in) height are available.

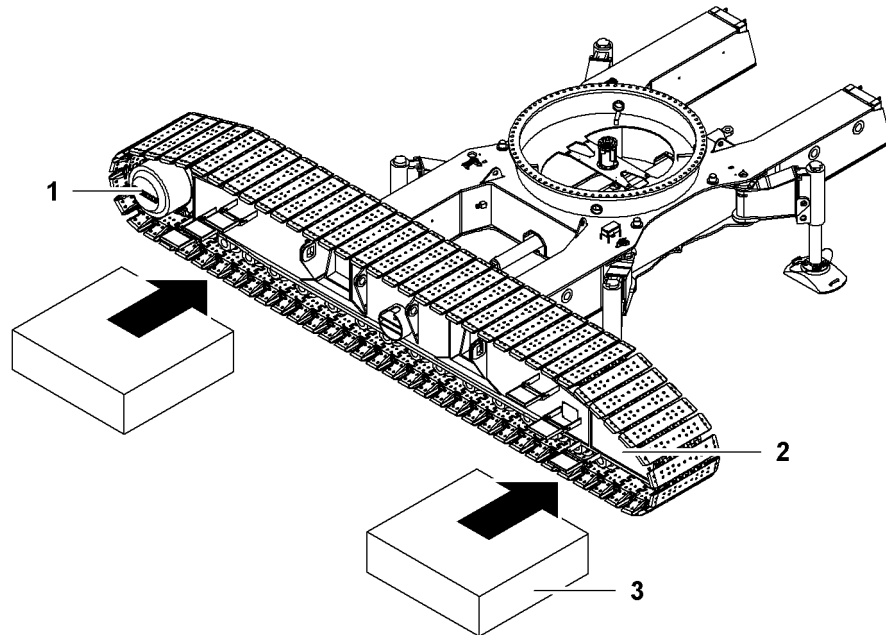


Fig. 3096: Place support plate

- | | | | |
|---|-------------------------|---|--------------------|
| 1 | Crawler drive (tumbler) | 3 | Support plate (2x) |
| 2 | Idler wheel | | |

- ▶ Place support plate 3 beneath crawler drive (tumbler) 1.
- ▶ Place support plate 3 beneath idler wheel 2.
- ▶ Lower crawler side frame onto support plates 3.

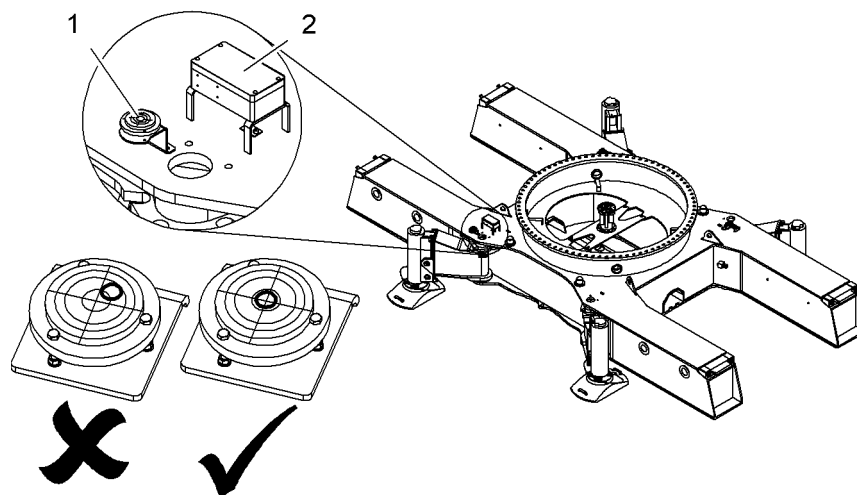


Fig. 3097: Spirit level on undercarriage

- | | | | |
|---|--------------|---|---|
| 1 | Spirit level | 2 | Connection plug of cable remote control |
|---|--------------|---|---|

- ▶ Level the undercarriage.

It is not necessary to observe a critical angle for the radius of A-frame1.

Uppercarriage can be swung unrestrictedly.

- ▶ Rig, adjust and install the second crawler side frame the same way as the first.
- ▶ Slightly lift machine.
- ▶ Remove support plates.

**DANGER**

Incorrect lowering of machine!
Toppling of machine.

- ▶ Lower machine carefully and leveled.

- ▶ Lower machine.
- ▶ Retract support cylinders.

Connecting the hydraulic lines of the crawler

Ensure the following conditions are met:

- Hand lever for multi-coupling is available.
- Diesel engine is turned off.

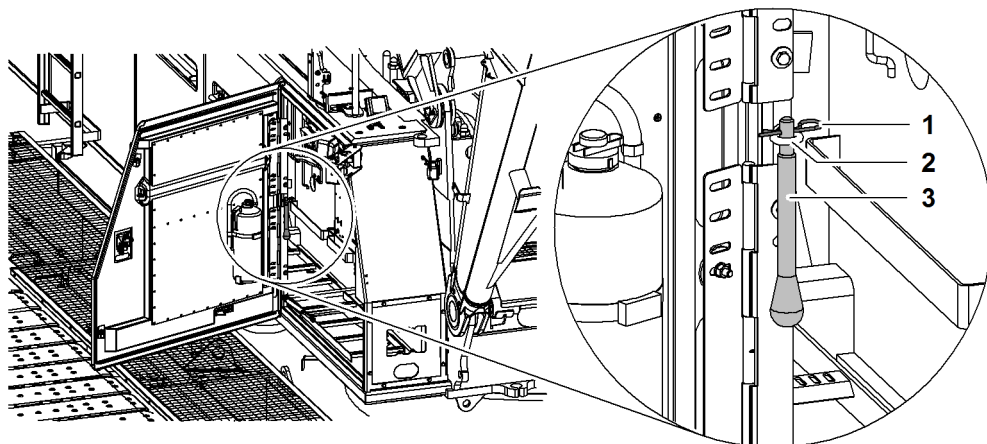


Fig. 3098: Transport bracket for hand lever of multi-coupling

- | | | | |
|---|----------------|---|------------|
| 1 | Locking spring | 3 | Hand lever |
| 2 | Ring | | |

- ▶ Lift hand lever **3** and remove locking spring **1**.
- ▶ Remove hand lever **3** downwards from ring **2**.

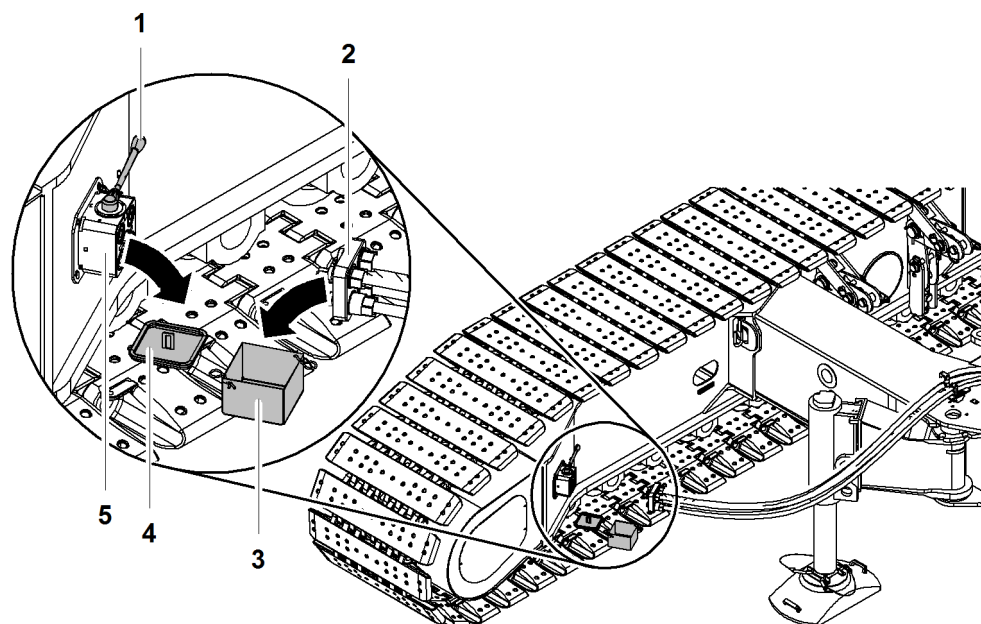


Fig. 3099: Connecting the hydraulic lines of the crawler

- | | | | |
|---|--------------------------------|---|-------------------------------------|
| 1 | Hand lever | 4 | Cover |
| 2 | Multi-coupling (undercarriage) | 5 | Multi-coupling (crawler side frame) |
| 3 | Cover | | |

- ▶ Fit the hand lever **1** of the multi-coupling.
- ▶ Remove locking springs on cover **3**.
- ▶ Turn hand lever **1** in the direction of the arrow.
 - ▷ Cover **4** is loose.
- ▶ Stow away cover **3 + 4**.

NOTICE

Dirty multi-couplings!
Damage to hydraulic system.

- ▶ Clean multi-couplings before connecting.
-
- ▶ Connect multi-couplings **2 + 5**.
 - ▶ Move the hand lever until the locking device engages.
 - ▷ Multi-couplings are visibly and audibly pulled together.
 - ▷ Multi-coupling indicating pins stick out:

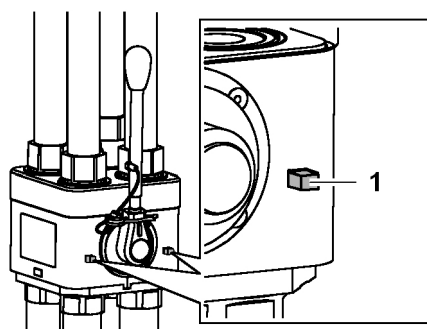


Fig. 3100: Latched multi-coupling

- 1 Indicating pin (2x)

- ▶ Disassemble the hand lever of the multi-coupling and remove.
- ▶ Repeat process with second crawler side frame.

Unfolding steps from transport position

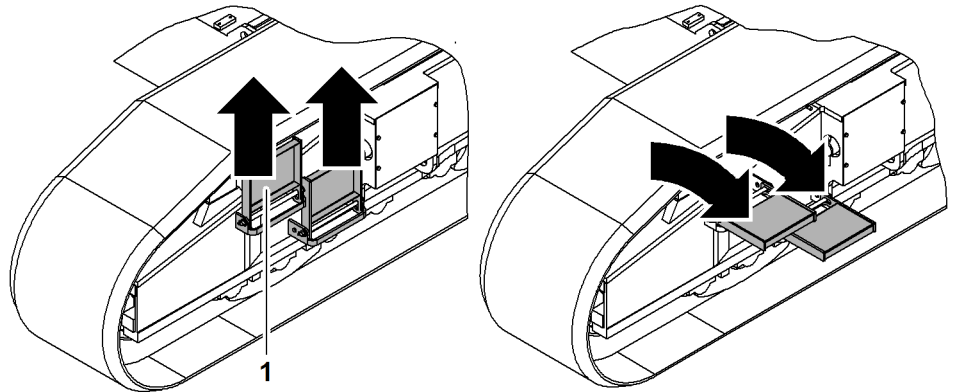


Fig. 3101: Unfolding steps from transport position

1 Steps (2x)

- ▶ Lift steps 1 completely.
- ▶ Fold down steps 1.

7.4.21 Using the machine as assembly crane

Ensure that the following conditions are fulfilled:

- Approved sling gear is available (For more information see: 6.9 Rigging equipment and/or sling gear, page 1175) .

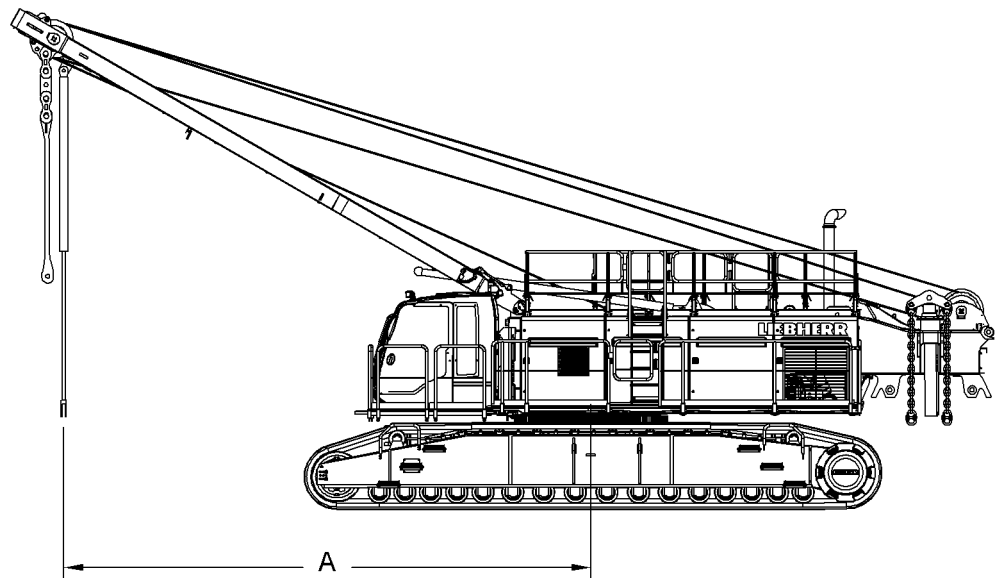


Fig. 3102: Using the machine as assembly crane



DANGER

Maximum radius exceeded!
Machine toppling over.

- ▶ Maximum radius **A** must not exceed 9200 mm (30' 2" ft-in).



- ▶ Unwind the boom winch.
 - ▷ A-frame 1 will move forwards.
- ▶ Press the *Assembly cylinder* button on control panel X23.
 - ▷ Assembly cylinder is selected.



Procedure on a machine with two multi-directional control levers

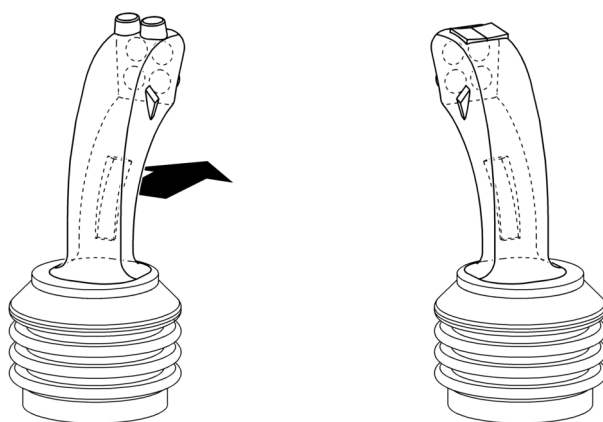
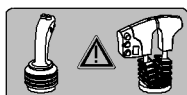


Fig. 3105: Extending the assembly cylinder with multi-directional control lever

- ▶ Push the left multi-directional control lever forwards.
 - ▷ Assembly cylinder extends.



Procedure on a machine with a multi-directional control lever and a double T-lever

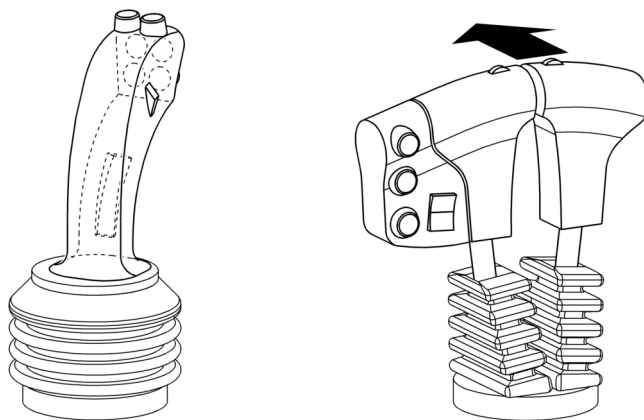


Fig. 3107: Extending the assembly cylinder using the double T-lever

- ▶ Push the outer T-control lever forwards.
 - ▷ Assembly cylinder extends.

- ▶ Remove locking spring and pin on the assembly cylinder.
- ▶ Latch sling gear.
- ▶ Insert pin into assembly cylinder and secure with locking spring.

7.4.22 Attaching carbody counterweight

If no carbody counterweight is attached, the platforms on the undercarriage can be mounted without carbody counterweight in the next work step.

The requirements stated in the load chart determine whether the machine is equipped with a carbody counterweight.



Note

Basic machine is more maneuverable without a carbody counterweight when used as an assembly crane.

Once all boom sections were unloaded and aligned on the ground:

- ▶ Attach carbody counterweight.



DANGER

Inadmissible counterweight weight!
Toppling of machine.

- ▶ Attach carbody counterweight in accordance with load chart.

Ensure the following conditions are met:

- Approved sling gear is available ([For more information see: 6.9 Rigging equipment and/or sling gear, page 1175](#)).
- Basic machine is ready for operation as assembly crane.
- Basic machine is on ground with sufficient load-bearing capacity.
- Cylinder adjustment functions are activated.

Installing the carbody counterweight with undercarriage with fixed track width

Rigging the carbody counterweight slab 14.3 t (31,526 lb)

- ▶ Move transport vehicle carrying the carbody counterweight slab 14.3 t (31,526 lb) as close to the machine as possible.

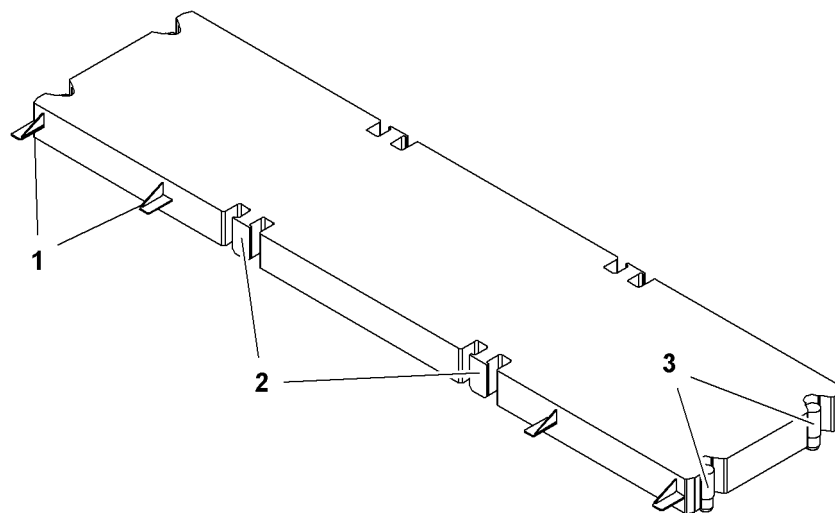


Fig. 3108: Rigging the carbody counterweight slab 14.3 t (31,526 lb)

- 1 Support for undercarriage platform
- 2 Rigging point (4x)
- 3 Locking device (4x)

The uppercarriage can be swung by 360° without restriction.

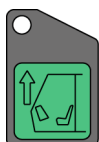
- ▶ Position assembly cylinder centrally above carbody counterweight slab 14.3 t (31,526 lb).
- ▶ Rig carbody counterweight slab 14.3 t (31,526 lb).

Installing the carbody counterweight slab 14.3 t (31,526 lb)

NOTICE

Horizontal cabin!
Damage to cabin.

- ▶ Tilt cabin upwards prior to installing carbody counterweight slab 14.3 t (31,526 lb).



If cabin is tilted down:

- ▶ Press the button *Cab tilting device up* on control panel X11.
 - ▷ Cabin tilts upward.



WARNING

Machine swings with a suspended load!
Death, crushing of body parts.

- ▶ Ensure that no persons are located in the danger zone.
- ▶ Leave danger zone.
- ▶ Lift carbody counterweight slab 14.3 t (31,526 lb) off the transport vehicle.
- ▶ Remove transport vehicle.

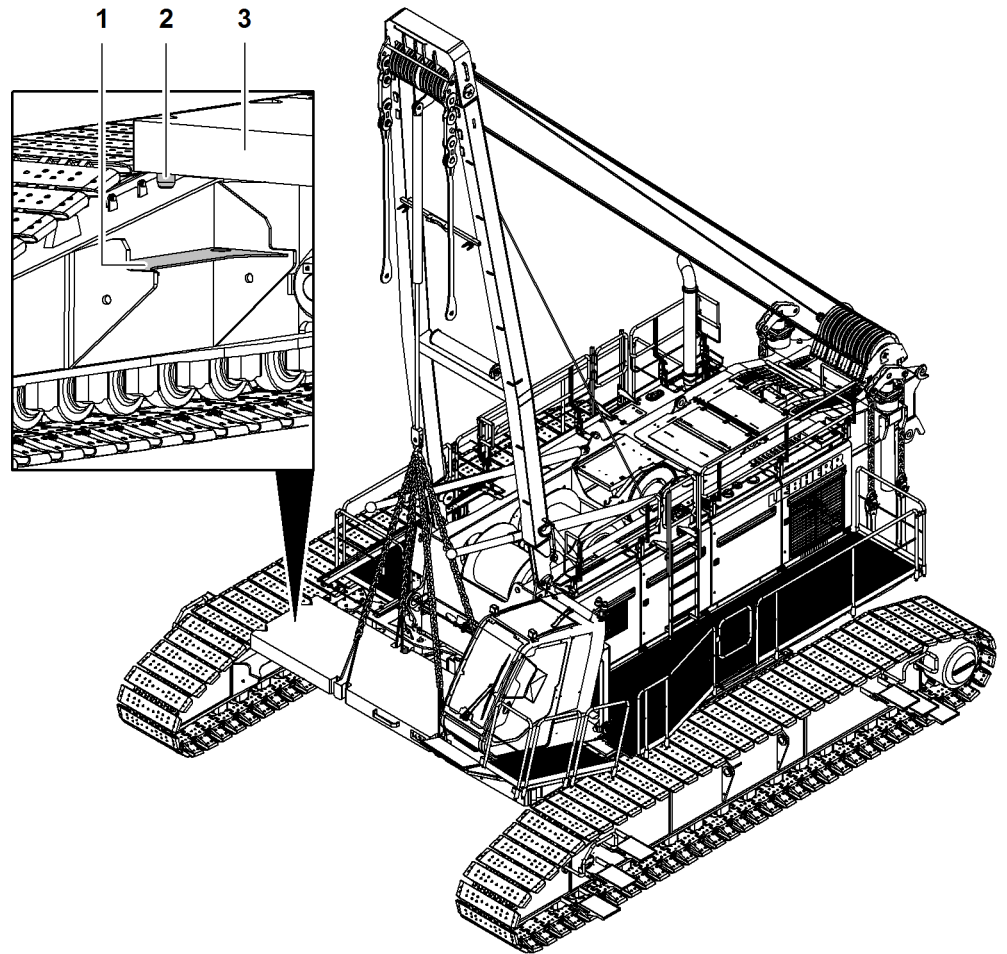


Fig. 3110: Installing the bottom carbody counterweight slab 14.3 t (31,526 lb)

- | | |
|---|--|
| <p>1 Support (2x) for bottom carbody counterweight slab
14.3 t (31,526 lb)</p> <p>2 Locking device (4x)</p> | <p>3 Bottom carbody counterweight slab 14.3 t (31,526 lb)</p> |
|---|--|

- ▶ Lift A-frame **1** and extend assembly cylinder until bottom carbody counterweight slab 14.3 t (31,526 lb) **3** is above installation position.

NOTICE

Incorrect positioning of bottom carbody counterweight slab 14.3 t (31,526 lb)!
Damage to bottom carbody counterweight slab 14.3 t (31,526 lb).

- ▶ Place locking devices **2** for bottom carbody counterweight slab 14.3 t (31,526 lb) **3** precisely in the supports **1** of bottom carbody counterweight slab 14.3 t (31,526 lb).
 - ▶ Insert bottom carbody counterweight slab 14.3 t (31,526 lb) **3** in supports **1** for bottom carbody counterweight slab 14.3 t (31,526 lb).
 - ▶ Remove sling gear.
-

NOTICE

Incorrect positioning of top carbody counterweight slab 14.3 t (31,526 lb)!
 Damage to top carbody counterweight slab 14.3 t (31,526 lb).

▶ Place upper carbody counterweight slab 14.3 t (31,526 lb) precisely in the locking device **2** of bottom carbody counterweight slab 14.3 t (31,526 lb) **3**.

▶ Rig and mount top carbody counterweight slab 14.3 t (31,526 lb) the same way as the bottom carbody counterweight slab 14.3 t (31,526 lb) **3**.

▶ Repeat process on opposite side.

Installing the steps

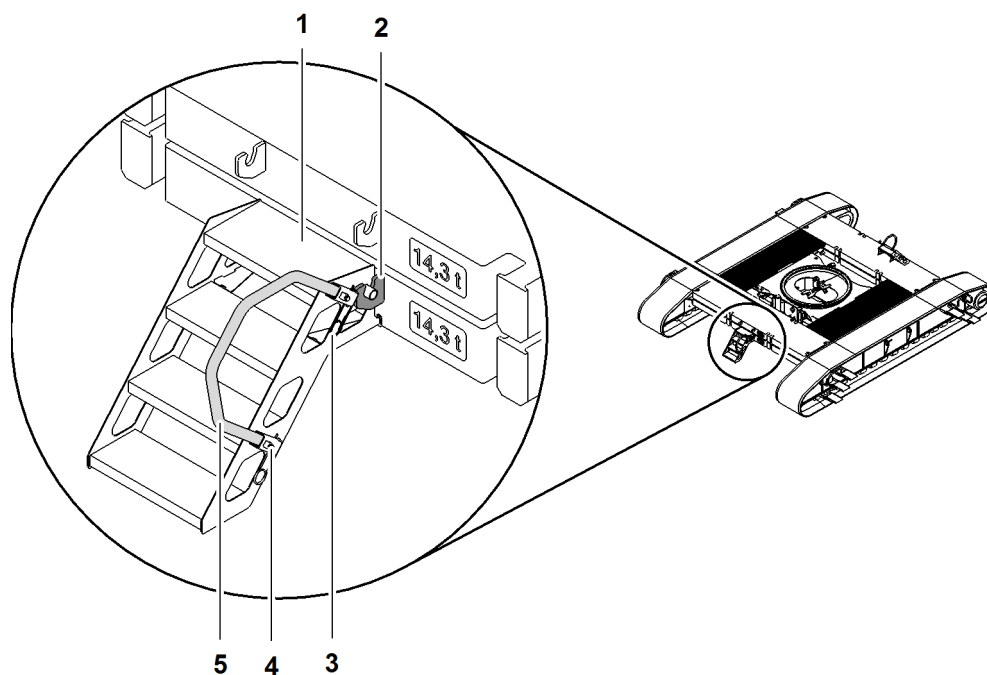


Fig. 3111: Installing the steps

- | | |
|------------------------------|---------------------|
| 1 Step | 4 Mount (2x) |
| 2 Brackets (2x) | 5 Handrail |
| 3 Locking spring (2x) | |

- ▶ Suspend steps **1** on bracket **2** at bottom counterweight slab.
- ▶ Insert handrail **5** in mount **4**.
- ▶ Secure with locking springs **3**.
- ▶ Tighten screws on mounts **4**.
- ▶ Repeat process on opposite side.
 - ▷ Steps installed.

Installing the carbody counterweight with undercarriage* with adjustable track width

Rigging and installing carbody counterweight slab 18.8 t (41,446 lb)

- ▶ Move transport vehicle with carbody counterweight slab 18.8 t (41,446 lb) as close to machine as possible.

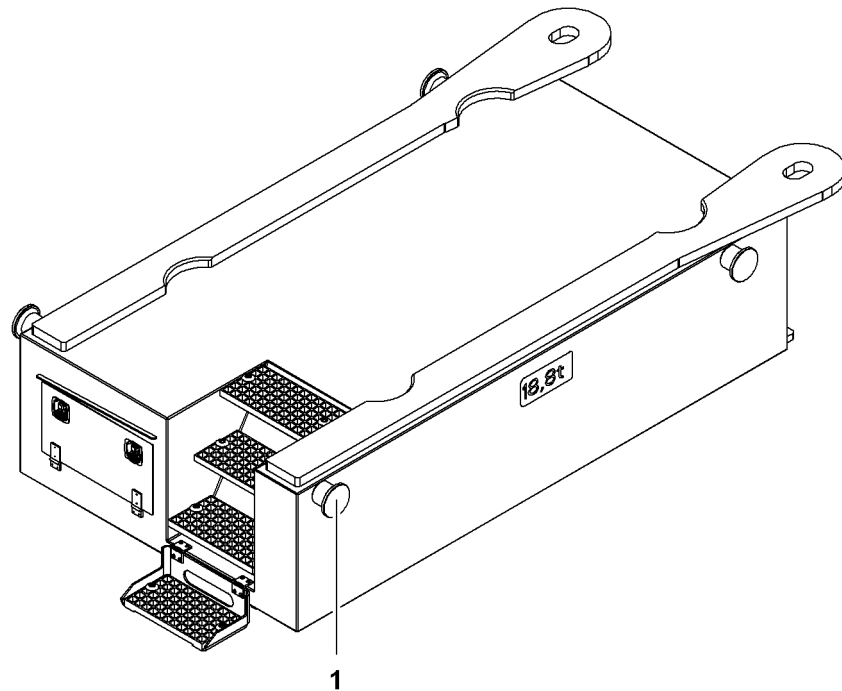


Fig. 3112: Rigging the carbody counterweight slab 18.8 t (41,446 lb)

- 1 Rigging point (4x)

The uppercarriage can be swung by 360° without restriction.

- ▶ Position assembly cylinder centrally above carbody counterweight slab 18.8 t (41,446 lb).
- ▶ Rig carbody counterweight slab 18.8 t (41,446 lb).



WARNING

Machine swings with a suspended load!
Death, crushing of body parts.

- ▶ Ensure that no persons are located in the danger zone.
 - ▶ Leave danger zone.
-
- ▶ Lift carbody counterweight slab 18.8 t (41,446 lb) off the transport vehicle.
 - ▶ Remove transport vehicle.

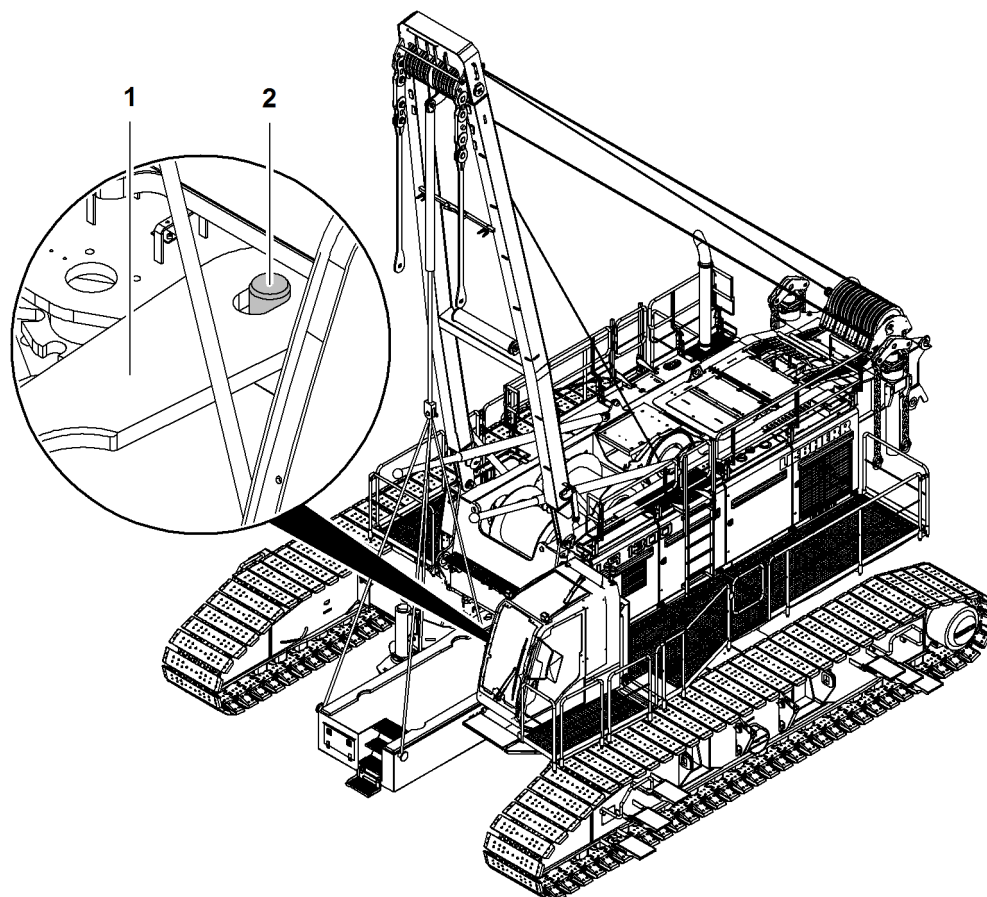


Fig. 3113: Inserting carbody counterweight slab 18.8 t (41,446 lb)

- | | |
|---|---|
| <p>1 Locking device and suspension equipment</p> | <p>2 Pins on basic machine equipment</p> |
|---|---|

- ▶ Lift A-frame 1 and extend assembly cylinder until carbody counterweight slab 18.8 t (41,446 lb) is above installation position.
- ▶ Insert recess of locking device and suspension equipment 1 at pin 2.
- ▶ Extend assembly cylinder until carbody counterweight slab 18.8 t (41,446 lb) rests completely on undercarriage.
- ▶ Remove sling gear.
- ▶ Repeat process on opposite side.

Rigging and installing carbody counterweight slab 7.5 t (16,534 lb)

- ▶ Move transport vehicle with carbody counterweight slab 7.5 t (16,534 lb) as close to machine as possible.

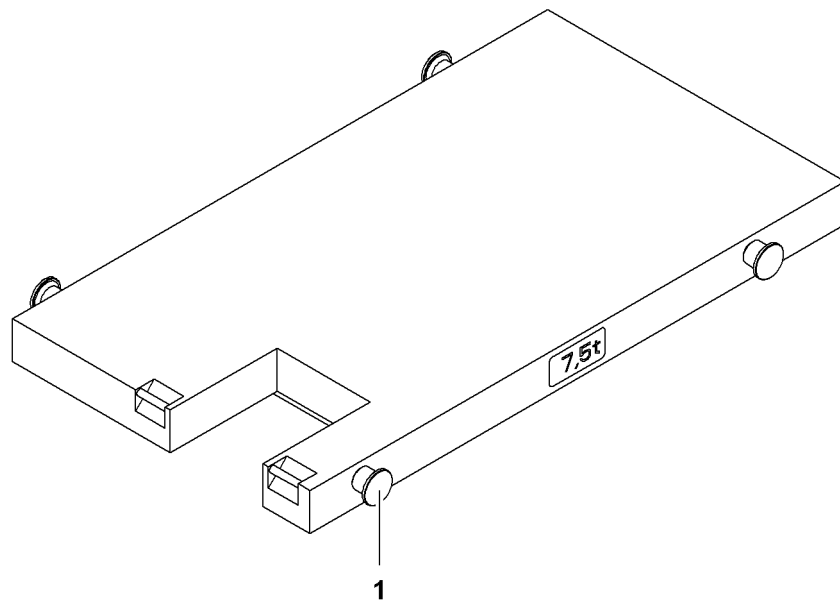


Fig. 3114: Rigging the carbody counterweight slab 7.5 t (16,534 lb)

1 Rigging point (4x)

The uppercarriage can be swung by 360° without restriction.

- ▶ Position assembly cylinder centrally above carbody counterweight slab 7.5 t (16,534 lb).
- ▶ Rig carbody counterweight slab 7.5 t (16,534 lb).



WARNING

Machine swings with a suspended load!
Death, crushing of body parts.

- ▶ Ensure that no persons are located in the danger zone.
 - ▶ Leave danger zone.
-
- ▶ Lift carbody counterweight slab 7.5 t (16,534 lb) off the transport vehicle.
 - ▶ Remove transport vehicle.

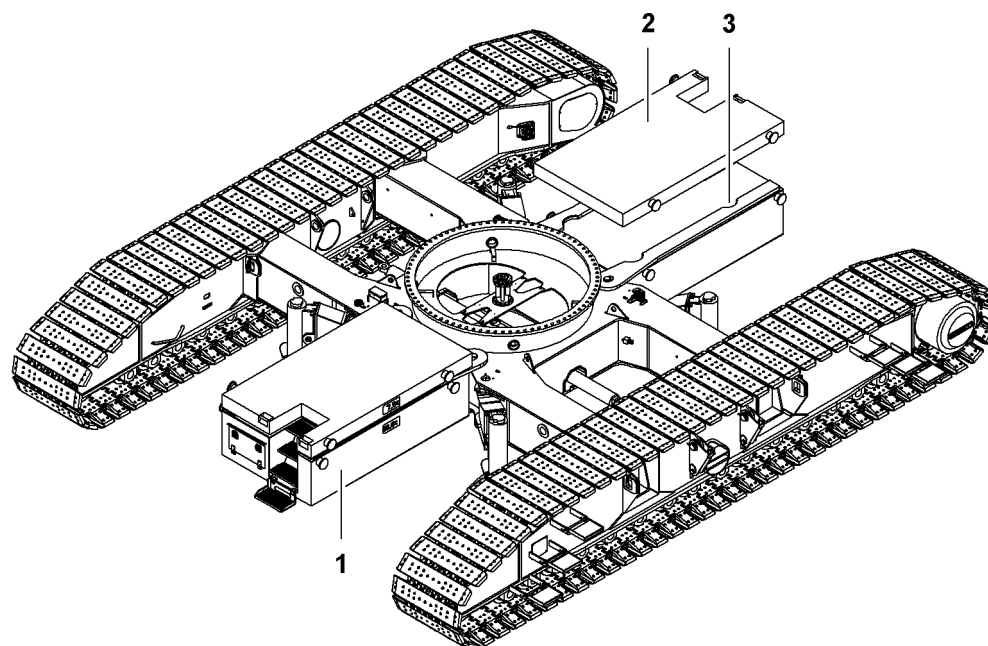


Fig. 3115: Inserting carbody counterweight slab 7.5 t (16,534 lb)

- | | |
|--|-------------------------------------|
| <p>1 Carbody counterweight slab
18.8 t (41,446 lb)</p> <p>2 Carbody counterweight slab
7.5 t (16,534 lb)</p> | <p>3 Locking device (4x)</p> |
|--|-------------------------------------|

NOTICE

Incorrect positioning of carbody counterweight slab 7.5 t (16,534 lb) **2**!
Damage to carbody counterweight slabs.

- ▶ Place carbody counterweight slab 7.5 t (16,534 lb) **2** precisely in the locking device **3** of carbody counterweight slab 18.8 t (41,446 lb) **1**.
- ▶ Place carbody counterweight slab 7.5 t (16,534 lb) **2** on carbody counterweight slab 18.8 t (41,446 lb) **1**.
- ▶ Remove sling gear.
- ▶ Repeat process on opposite side.

7.4.23 Mounting platforms on the undercarriage

Installing platforms on undercarriage with adjustable track width without carbody counterweight

With undercarriage with adjustable track width platforms are installed on uppercarriage.

Installing platforms on undercarriage with adjustable track width and carbody counterweight

With undercarriage with adjustable track width platforms are installed on uppercarriage.

Installing platforms on undercarriage with fixed track width without carbody counterweight

Ensure the following conditions are met:

- No carbody counterweight slabs are mounted on the undercarriage.
- Uppercarriage is aligned parallel to undercarriage.
- A helper is available.

Checking steel plates

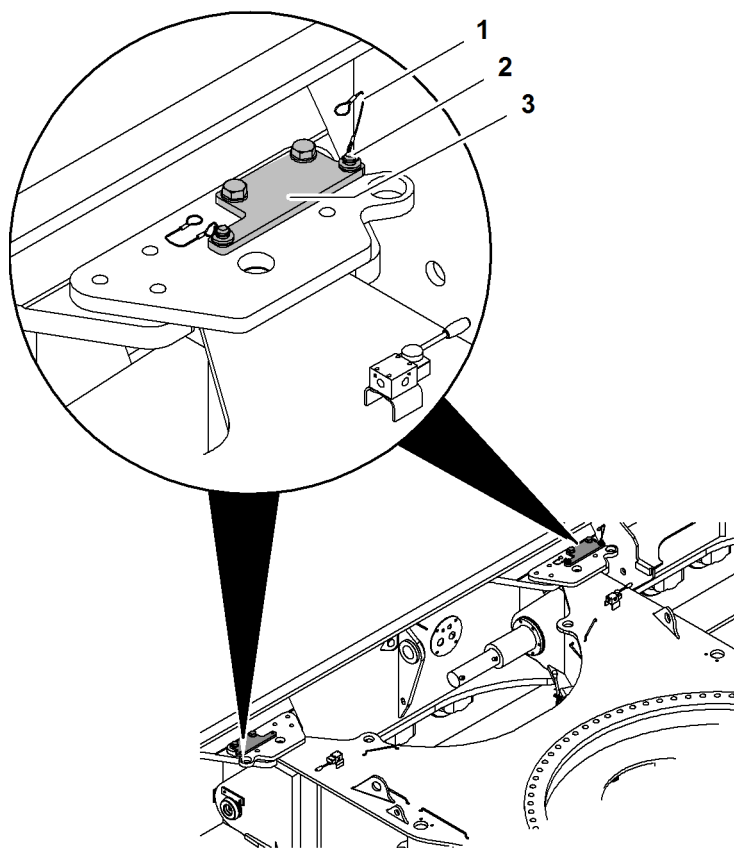


Fig. 3116: Checking steel plates

- | | | | |
|---|-----------------------|---|------------------|
| 1 | Locking elements (4x) | 3 | Steel plate (4x) |
| 2 | Pin (8x) | | |

- ▶ Check availability of steel plates 3.
- ▶ Check availability of pins 2 with locking elements 1.

Rail positions

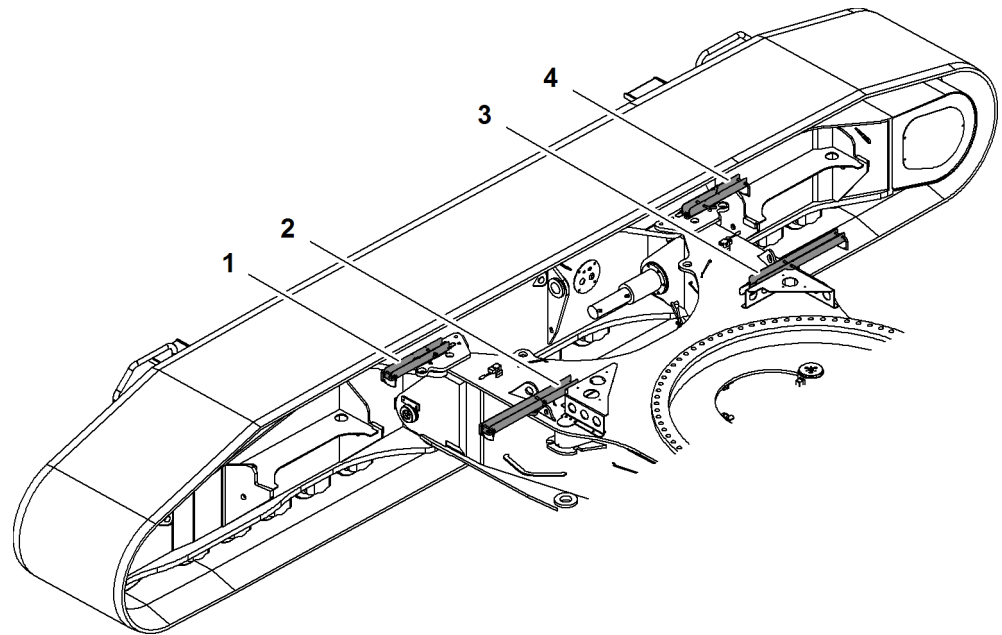


Fig. 3117: Rail positions

1 Short rail (2x)

2 Long rail (2x)

3 Long rail (2x)

4 Short rail (2x)

► Sort rails 1 + 2 + 3 + 4.

Installing rails

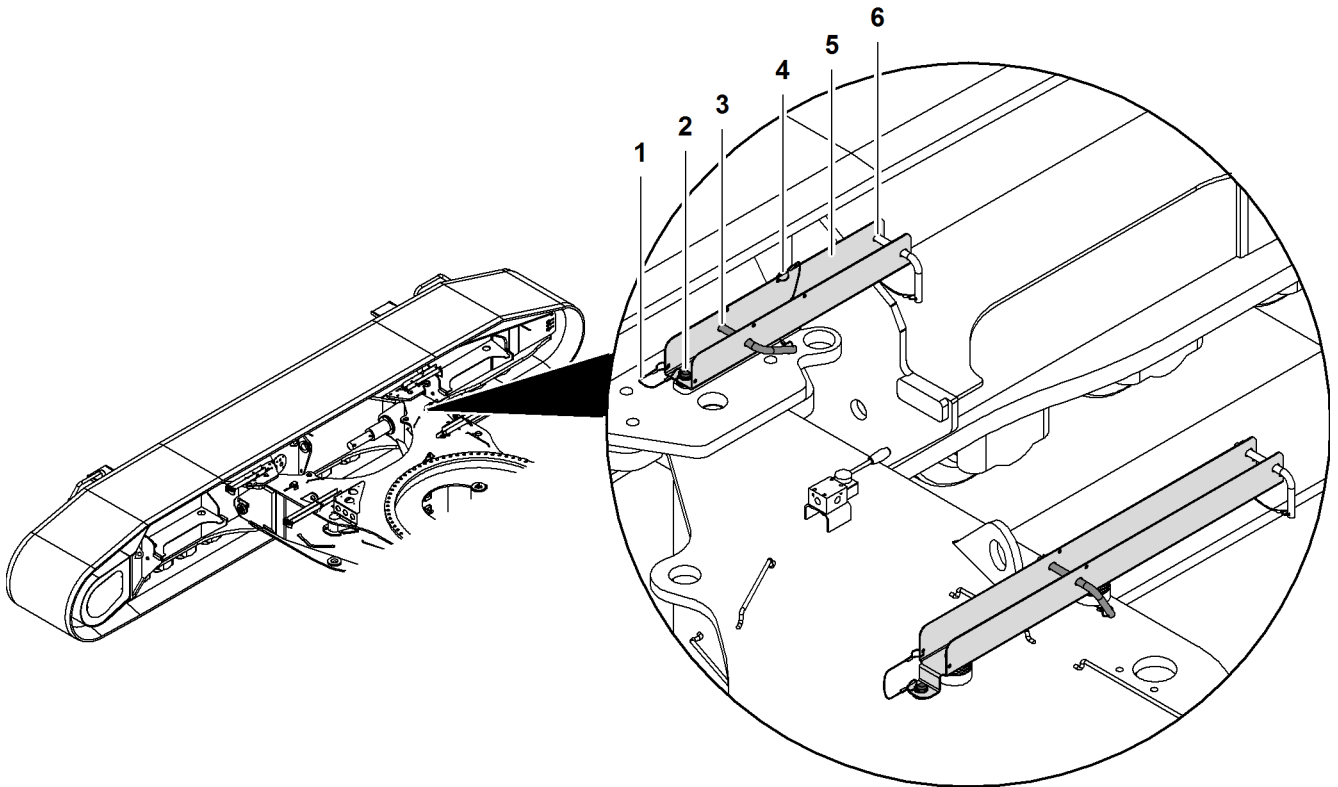


Fig. 3118: Installing rails

- | | | | | | |
|---|-----------------------|---|----------------------|---|-----------|
| 1 | Locking element (2x) | 3 | Pin (2x) | 5 | Rail (2x) |
| 2 | Attachment point (2x) | 4 | Locking element (4x) | 6 | Pin (2x) |

- ▶ Position rails 5 on attachment points 2.
- ▶ Secure attachment points 2 with locking elements 1.
- ▶ Remove pin 3 + 6.

Mounting platforms

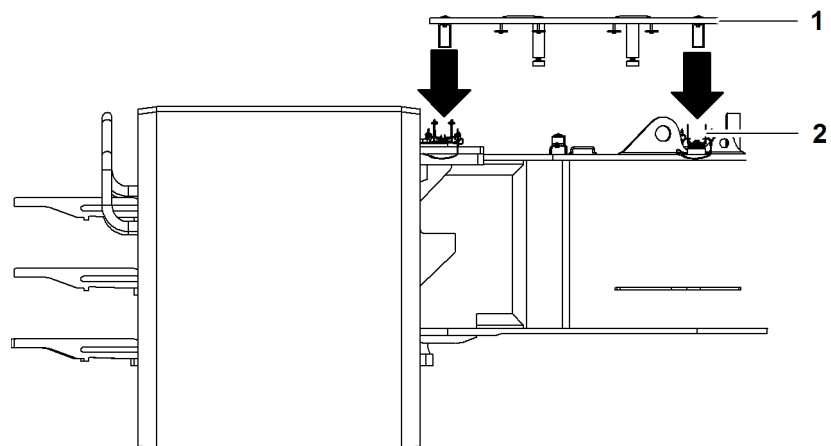


Fig. 3119: Mounting platforms

- | | | | |
|---|----------|---|-------|
| 1 | Platform | 2 | Rails |
|---|----------|---|-------|

- ▶ Position platform **1** with frame over rails **2**.
- ▶ Pin platform **1** with rails **2**.
- ▶ Secure pins with locking elements.
- ▶ Repeat process with second platform.
 - ▷ Platforms on undercarriage without carbody counterweight are mounted.

Installing platforms on undercarriage with fixed track width and carbody counterweight

Ensure the following conditions are met:

- Carbody counterweight is installed.



CAUTION

No platforms at undercarriage with fixed track width!
Risk of falling off the undercarriage.

If platforms have not been installed yet:

- ▶ Step on undercarriage with utmost care.

- ▶ Align uppercarriage parallel to undercarriage.

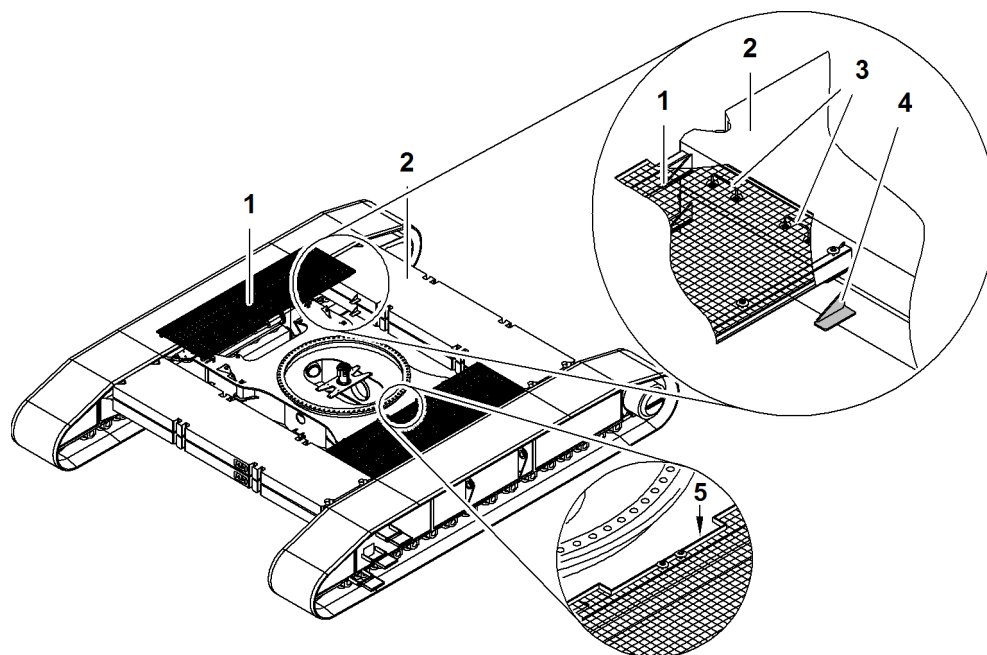


Fig. 3120: Installing platforms at undercarriage with fixed track width

- | | | | |
|----------|----------------------------|----------|------------------------|
| 1 | Platform (2x) | 4 | Support (8x) |
| 2 | Carbody counterweight (4x) | 5 | Recesses platform (2x) |
| 3 | Support bracket (8x) | | |

The platforms **1** on the undercarriage with fixed track width are placed on the supports **4** of the carbody counterweight **2**.

On crawler side frames with 1200 mm (3' 11" ft-in) grousers, the platforms **1** have a recess **5** and are therefore asymmetrical. The recesses **5** of the platforms **1** must be located on the side of the swing ring.

On crawler side frames with 1500 mm (4' 11" ft-in) grousers, the platforms **1** are identical and symmetric.

**CAUTION**

Improper positioning of the platforms!
Risk of crushing limbs.

- ▶ When installing the platforms **1**, do not move limbs between the carbody counterweight **2** and the platform **1**.
- ▶ Lift platform **1** using the support brackets **3** on both sides.
- ▶ Place the platform on the supports **4** of the carbody counterweight **2**.
- ▶ Repeat process on opposite side.

7.4.24 Fitting the rear counterweight

The requirements, which can be found in the load chart, determine whether the machine is equipped with a rear counterweight.

**DANGER**

Incorrectly raised ballast slabs!
Machine toppling over.

- ▶ Rig and lift the counterweight slabs individually.

The uppercarriage may be turned by 360° without restriction when the rear counterweight is assembled.

Ensure that the following conditions are fulfilled:

- The requisite carbody counterweight is in place.
- The ballast slab configuration is known.
- Horizontal, sufficiently supportive subsoil is available for the rear counterweight.
- Approved sling gear is available ([For more information see: 6.9 Rigging equipment and/or sling gear, page 1175](#)).

**Note**

If there is no solid ground available:

- ▶ use supports.

Positioning basic counterweight slab 14 t (30,864 lb)

- ▶ Rig basic counterweight slab 14 t (30,864 lb).
- ▶ Lift basic counterweight slab 14 t (30,864 lb).
- ▶ Lower basic counterweight slab 14 t (30,864 lb) onto ground or chocks.

Positioning the counterweight slabs 10 t (22,046 lb) and the counterweight slabs 5 t (11,023 lb)

Number of counterweight slabs 10 t (22,046 lb)	Number of counterweight slabs 5 t (11,023 lb)
Possible combination of the counterweight slabs at 124 t (273,369 lb) counterweight weight	
8	6

Number of counterweight slabs 10 t (22,046 lb)	Number of counterweight slabs 5 t (11,023 lb)
or	
6	10
or	
4	14
or	
2	18
Possible combination of the counterweight slabs at 114 t (251,323 lb) counterweight weight	
8	4
or	
6	8
or	
4	12
or	
2	16
Possible combination of the counterweight slabs at 104 t (229,277 lb) counterweight weight	
8	2
or	
6	6
or	
4	10
or	
2	14
Possible combination of the counterweight slabs at 94 t (207,231 lb) counterweight weight	
8	0
or	
6	4
or	
4	8
or	
2	12
Possible combination of the counterweight slabs at 74 t (163,140 lb) counterweight weight	
6	0
or	
4	4

Number of counterweight slabs 10 t (22,046 lb)	Number of counterweight slabs 5 t (11,023 lb)
or	
2	8
Possible combination of the counterweight slabs at 54 t (119,048 lb) counterweight weight	
4	0
or	
2	4

Tab. 513: Possible combination of counterweight slabs



DANGER

Ballast slabs are stacked unevenly!
Toppling of machine during operation.

- ▶ Ballast slabs must always be stacked equally on both sides.
-
- ▶ Rig counterweight slab 10 t (22,046 lb).
 - ▶ Lift counterweight slab 10 t (22,046 lb).
 - ▶ Position 10 t (22,046 lb) counterweight slab on 14 t (30,864 lb) basic counterweight slab or on previously laid down 10 t (22,046 lb) counterweight slab.
 - ▶ Repeat procedure with all required counterweight slabs 10 t (22,046 lb).
 - ▶ Rig counterweight slab 5 t (11,023 lb).
 - ▶ Lift counterweight slab 5 t (11,023 lb).
 - ▶ Place counterweight slab 5 t (11,023 lb) on counterweight slab 10 t (22,046 lb) or on previously set down counterweight slab 5 t (11,023 lb).
 - ▶ Repeat procedure with all required counterweight slabs 5 t (11,023 lb).

Tying down the rear counterweight

The rear counterweight tie-down can be pinned in six different positions.

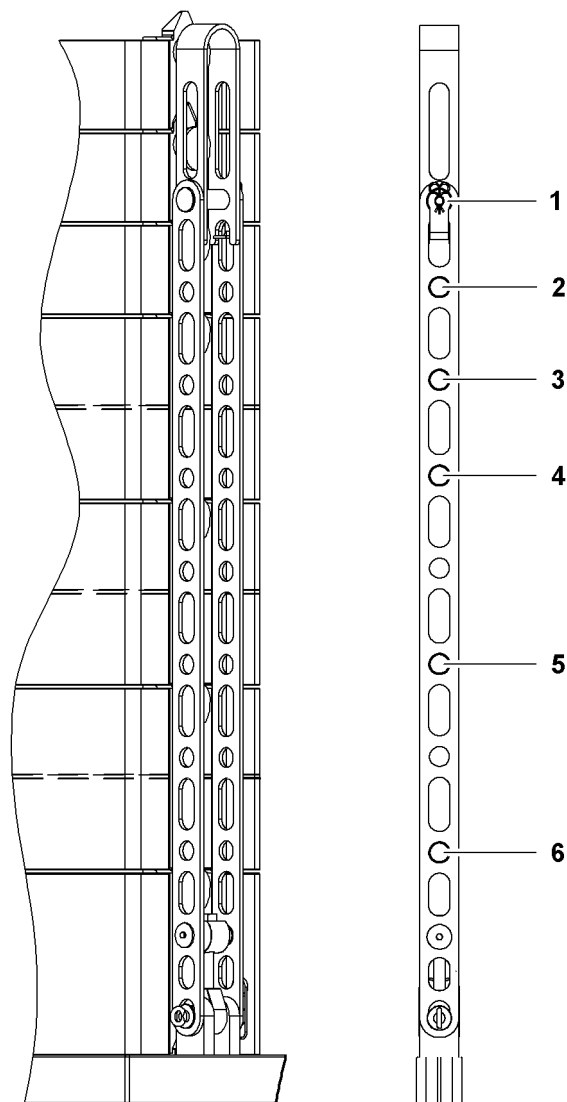


Fig. 3121: Pin connection positions of the rear counterweight tie-down

- | | |
|--|---|
| <p>1 Pin connection position of 124 t (273,369 lb) counterweight weight</p> <p>2 Pin connection position of 114 t (251,323 lb) counterweight weight</p> <p>3 Pin connection position of 104 t (229,277 lb) counterweight weight</p> | <p>4 Pin connection position of 94 t (207,231 lb) counterweight weight</p> <p>5 Pin connection position of 74 t (163,140 lb) counterweight weight</p> <p>6 Pin connection position of 54 t (119,048 lb) counterweight weight</p> |
|--|---|

- ▶ Pin counterweight tie-downs in required position.
- ▶ Secure pins with spring cotter pins.



WARNING

Incorrect lashing of rear counterweight!
Dropping counterweight slabs.

- ▶ Lash rear counterweight only as described below.

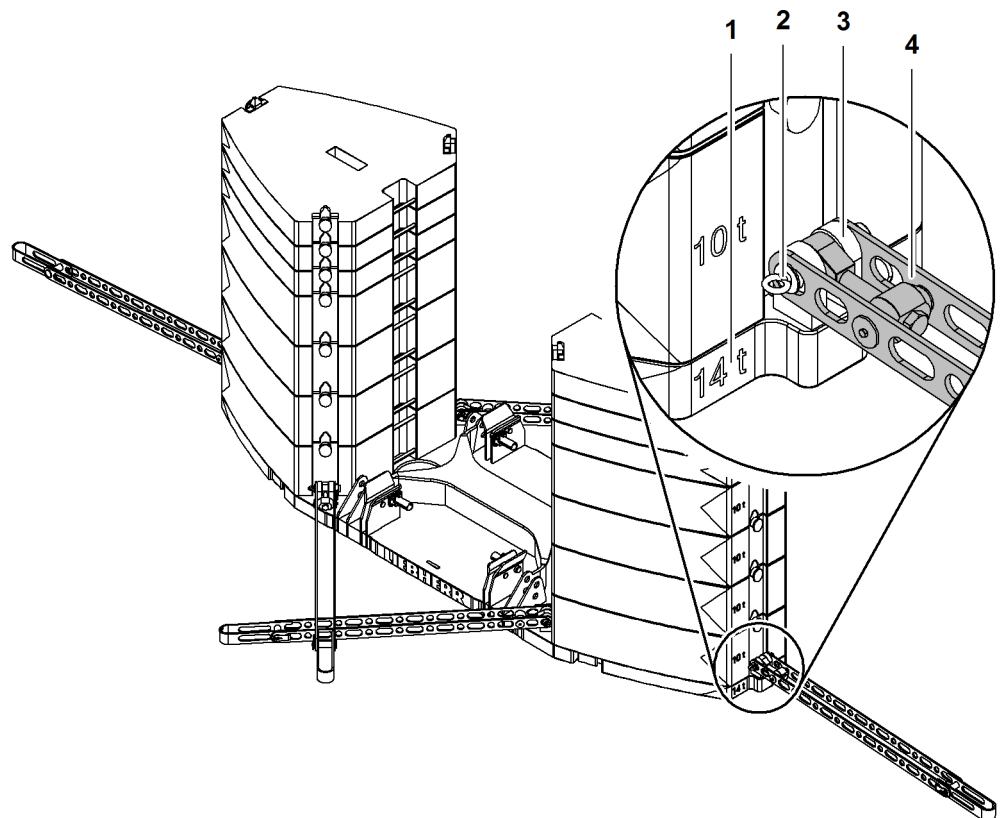


Fig. 3122: Pin counterweight tie-downs with basic counterweight slab
14 t (30,864 lb)

- | | | | |
|---|--|---|------------------------|
| 1 | Basic counterweight slab
14 t (30,864 lb) | 3 | Pin connection point |
| 2 | Pin | 4 | Counterweight tie-down |

- ▶ Pin counterweight tie-down **4** with basic counterweight slab 14 t (30,864 lb) **1**.
- ▶ Secure pin **2** with locking spring.
- ▶ Repeat procedure on all pin connection points **3**.

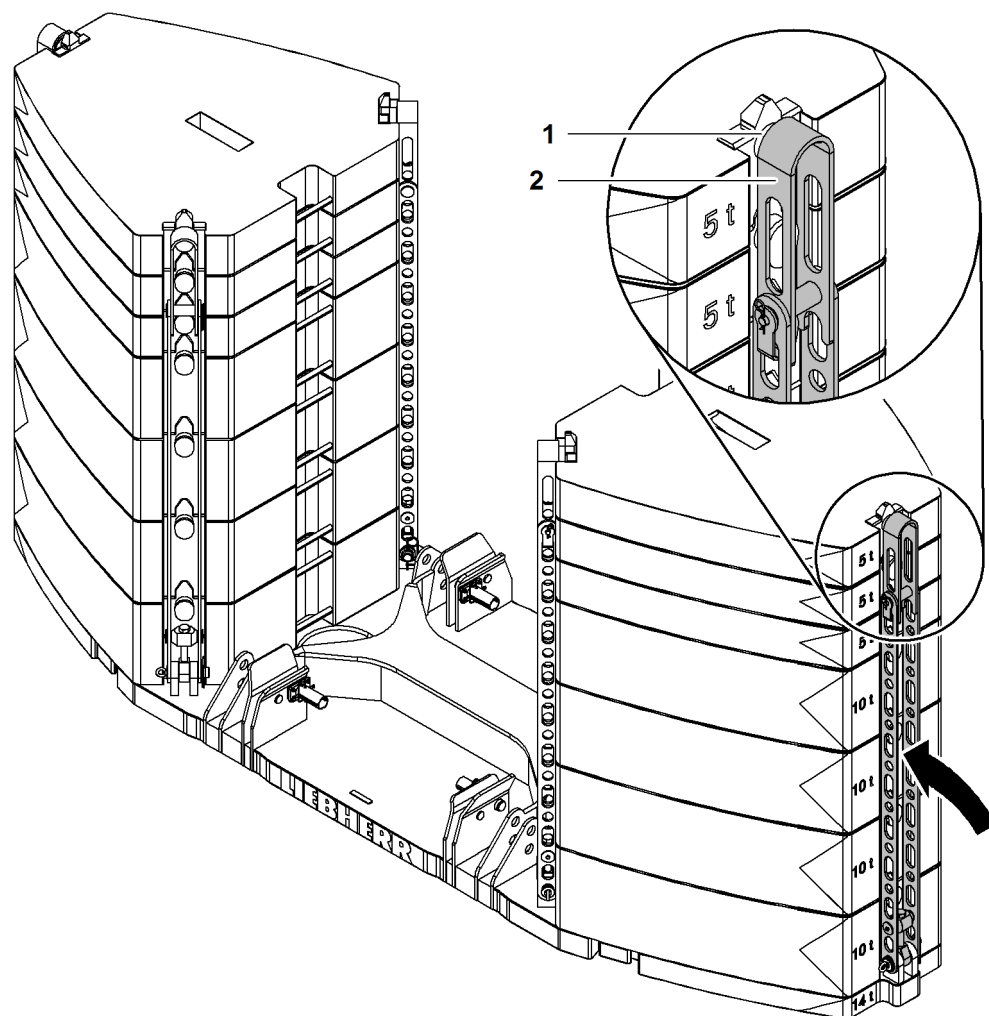


Fig. 3123: Folding up and pinning counterweight tie-downs

- | | |
|---|--|
| <p>1 Rigging point</p> <p>▶ Fold up counterweight tie-downs 2.</p> <p>▶ Lift counterweight tie-down 2 above rigging point 1 of counterweight slab.</p> <p>▶ Repeat procedure with all counterweight tie-downs 2.</p> | <p>2 Counterweight tie-down</p> |
|---|--|

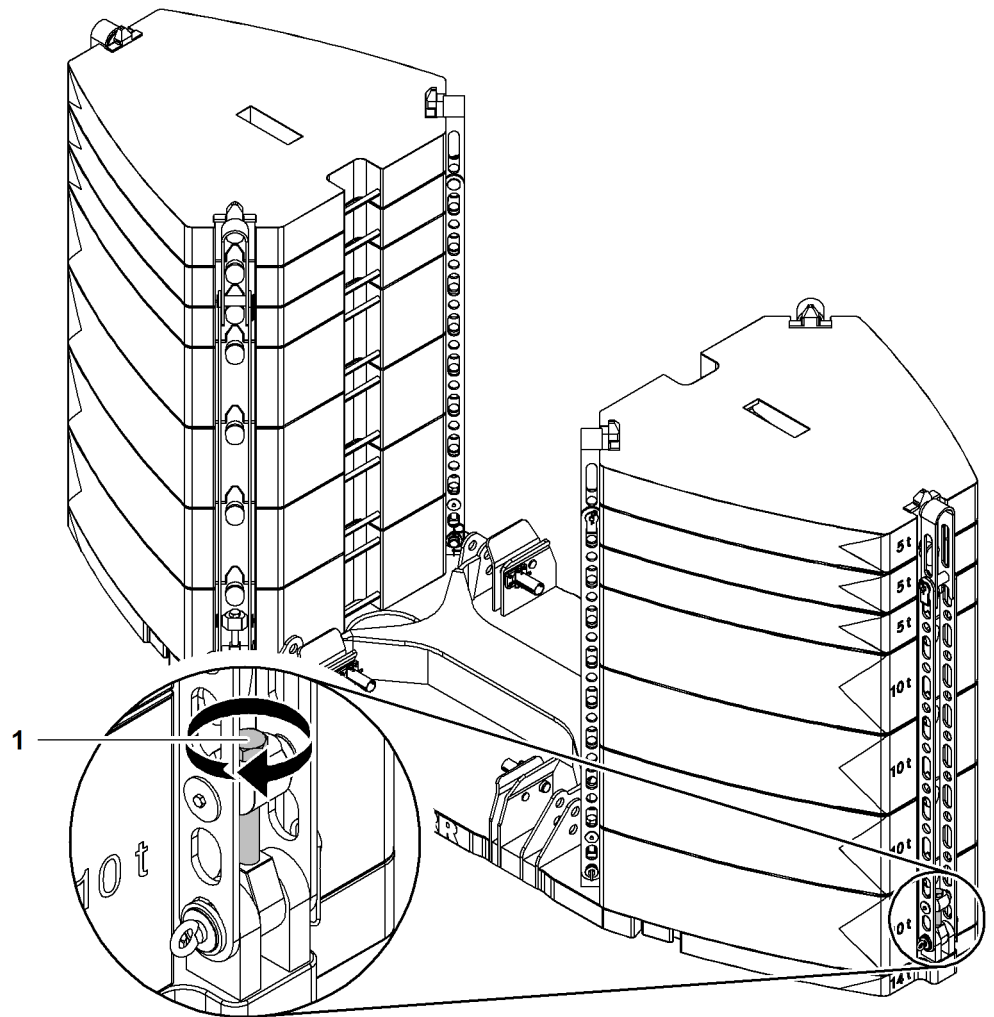


Fig. 3124: Tightening the screws of the rear counterweight tie-down

1 Screw

- ▶ Tighten the screw 1 hand-tight using a wrench.
- ▶ Repeat procedure with all counterweight tie-downs.
 - ▷ Rear counterweight is tied down.

Mount the slinging plates

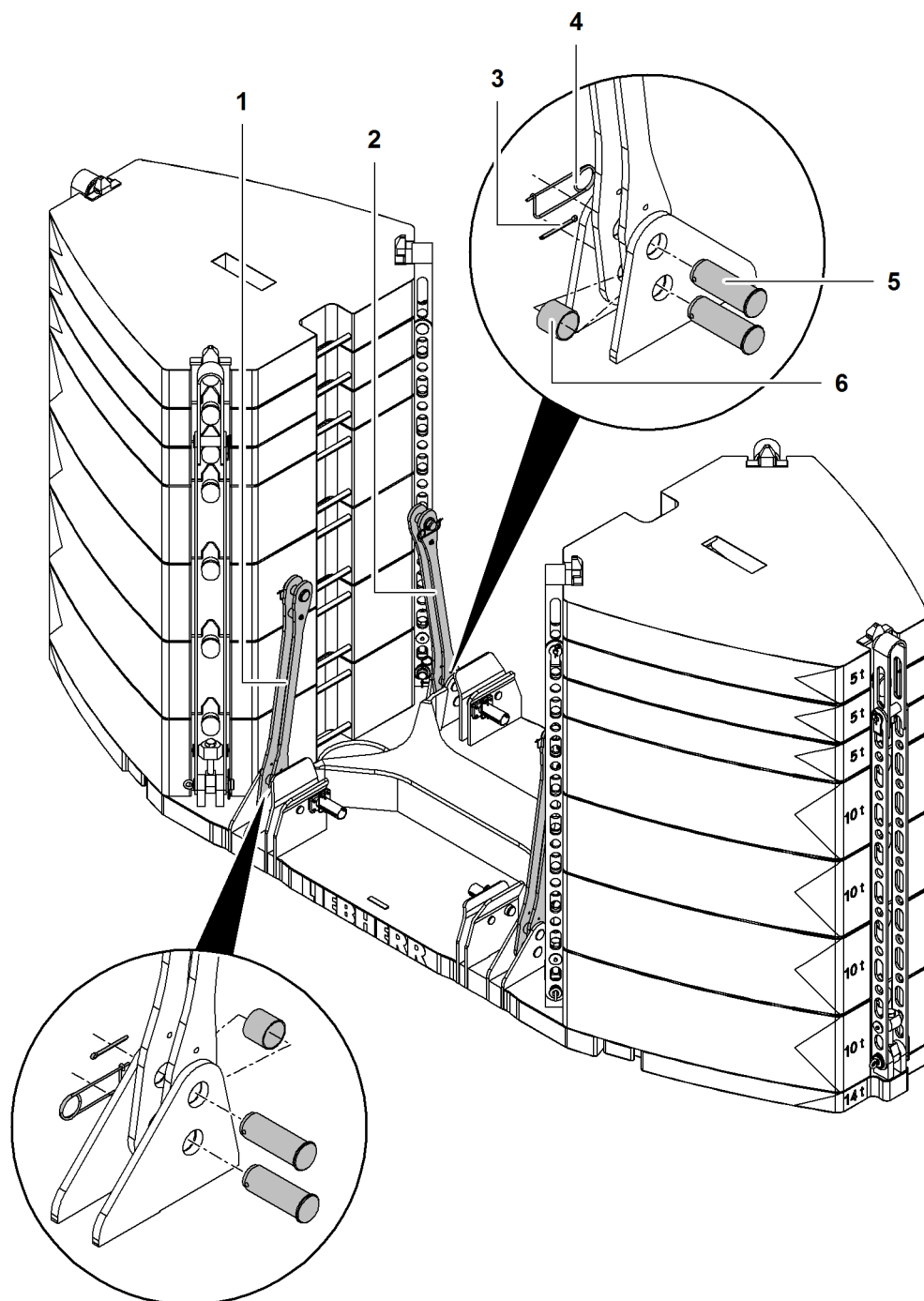


Fig. 3125: Mount the slinging plates

- | | | | |
|---|---------------------------|---|---------------------|
| 1 | Rear slinging plate (2x) | 4 | Locking spring (4x) |
| 2 | Front slinging plate (2x) | 5 | Pin (8x) |
| 3 | Split pin (4x) | 6 | Spacer ring (4x) |

Installing the front slinging plates

- ▶ Insert spacer rings 6 at bottom pin connection points.
- ▶ Pin front slinging plates 2 to basic counterweight slab 14 t (30,864 lb).
- ▶ Secure bottom pins 5 with split pins 3.

- ▶ Secure top pins **5** with locking springs **4**.

Installing the rear slinging plates

- ▶ Insert spacer rings **6** at top pin connection points.
- ▶ Pin rear slinging plates **1** to basic counterweight slab 14 t (30,864 lb).
- ▶ Secure top pins **5** with split pins **3**.
- ▶ Secure bottom pins **5** with locking springs **4**.

Lifting and pinning the rear counterweight



DANGER

Slewing of uppercarriage with rear counterweight attached not permitted!
Machine toppling over.

- ▶ Only slew the uppercarriage according to the table ([see: tab. 514, page 1313](#)) .



DANGER

Slewing of uppercarriage with narrow track not permitted (exclusively with undercarriage with adjustable track width)!
Machine toppling over.

- ▶ Ensure that machine is set up with a wide track width.

Permitted uppercarriage turning depending on counterweight		
Initial position: Uppercarriage is parallel to crawler side frames		
Rear counterweight	Carbody counterweight	
	0 t 0.00 lb	Undercarriage with fixed track width: 57 t (125,662 lb) Undercarriage* with adjustable track width: 52.6 t (115,961 lb)
0 t 0.00 lb	360°	360°
54 t 119,048 lb	360°	360° ^{A)}
74 t 163,140 lb	±10°	360° ^{A)}
94 t 207,231 lb	-	360°
104 t 229,277 lb	-	360°
114 t 251,323 lb	-	±10° (360° ^{B)})
124 t 273,369 lb	-	±10°

Tab. 514: Permitted uppercarriage turning depending on counterweight

- A) This counterweighting can occur during assembly of basic machine (unacceptable setup).
- B) Only permissible if A-frame1 is sufficiently far forward so that the slabs of A-frame1 cylinders lift off of A-frame1.

Ensure that the following conditions are fulfilled:

- Rear counterweight is assembled and lashed.
- Work with the assembly cylinder is completed.
- All boom sections are unloaded and in position.
- Counterweight hoisting cylinders are retracted.
- Cylinder adjustment functions on.

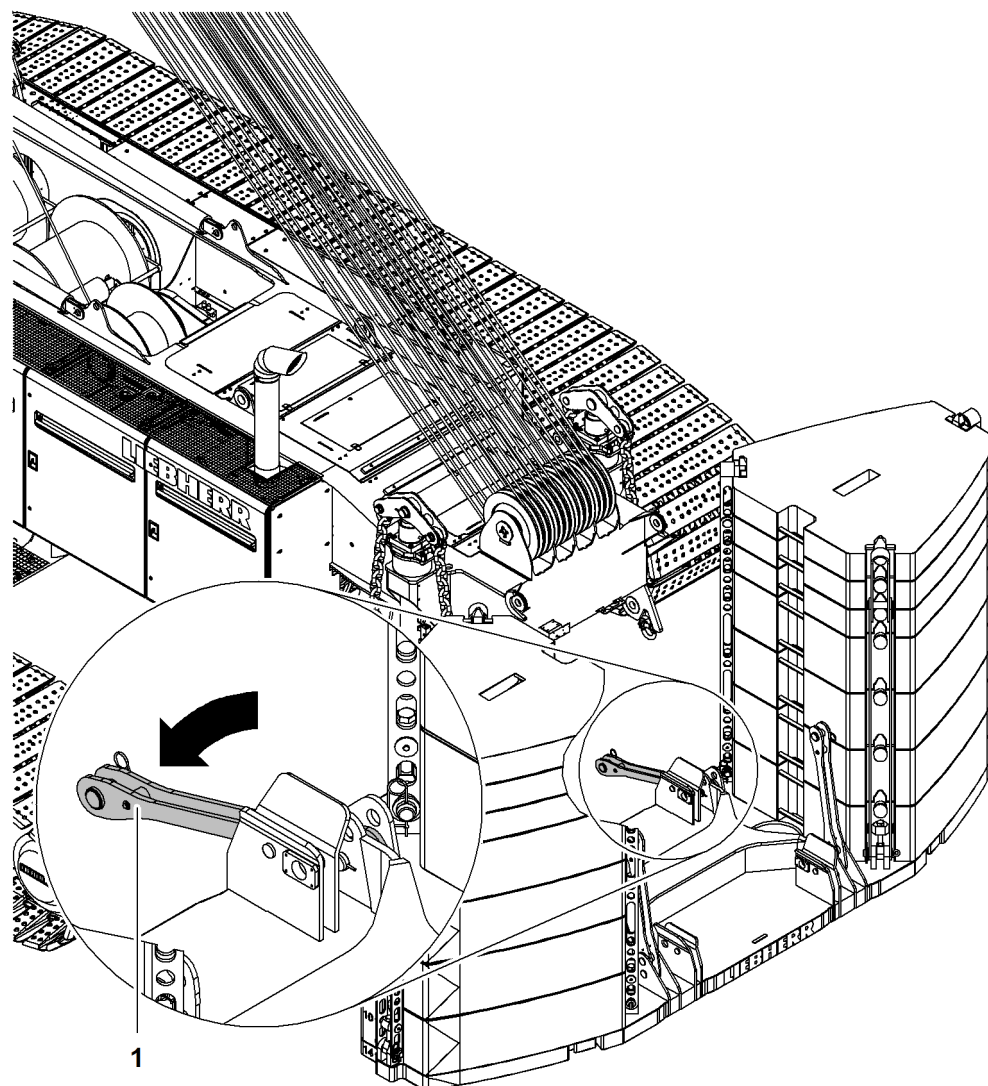


Fig. 3126: Folding the front slinging plates down

1 Front slinging plate (2x)

NOTICE

Improper installation of the rear counterweight!
Damage to machine.

► Fold down front slinging plates 1 prior to installing the rear counterweight.

► Remove locking springs at top pins.

- ▶ Remove top pins.
- ▶ Fold down front slinging plates 1.



DANGER

Incorrect lifting of rear counterweight!
Machine toppling over.

- ▶ Align uppercarriage parallel to undercarriage when lifting rear counterweight.
- ▶ Align uppercarriage with counterweight hoisting cylinder chains exactly above slinging plates of rear counterweight.

-
- ▶ Move basic machine backwards to rear counterweight until the chains of the counterweight hoisting cylinders are suspended exactly above the slinging plates of the rear counterweight.
 - ▶ Fold up front slinging plates 1.
 - ▶ Insert top pins.
 - ▶ Secure top pins with locking springs.
 - ▶ Open rear left uppercarriage door.
 - ▶ Plug in the cable remote control on the uppercarriage.

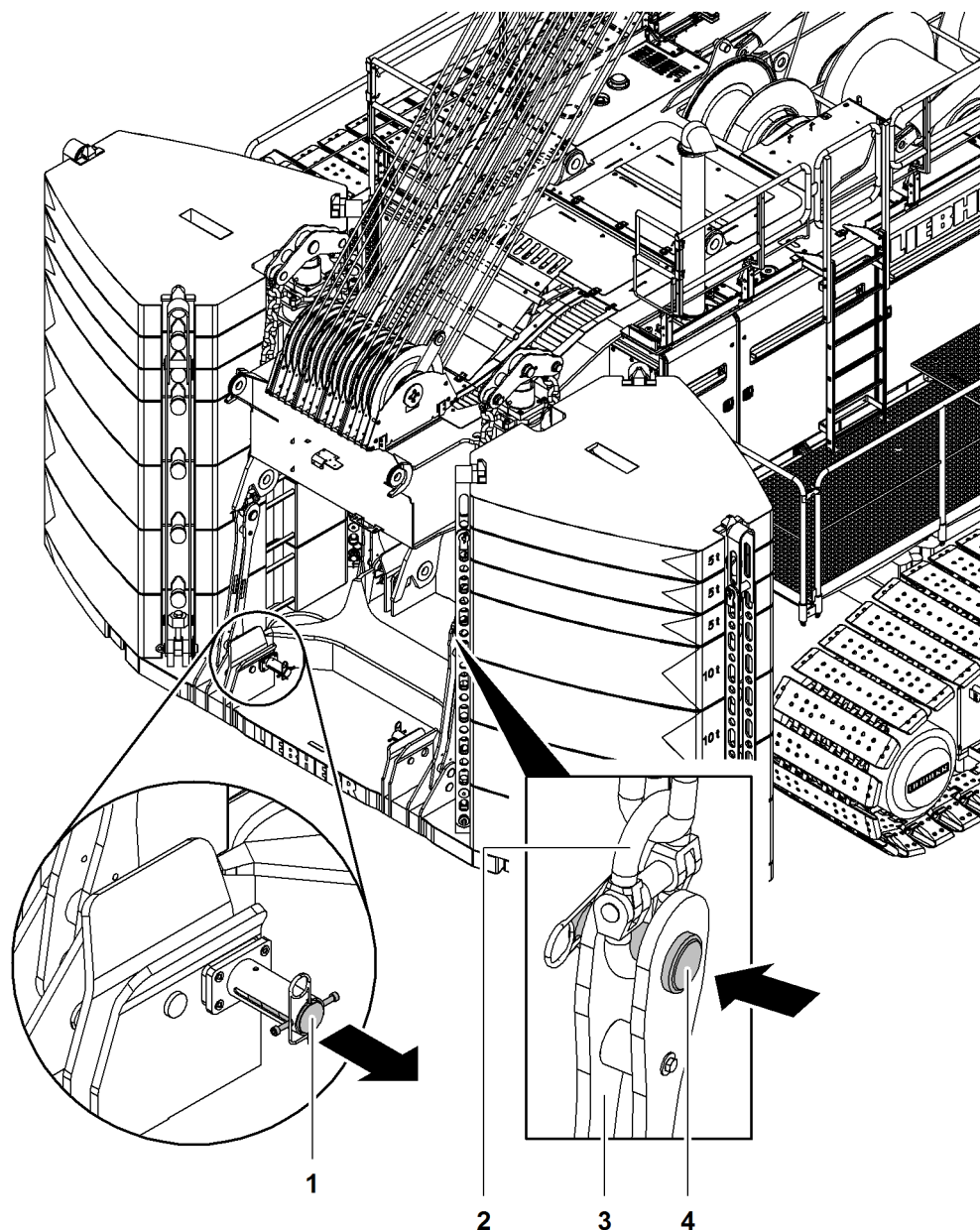


Fig. 3127: Rigging the rear counterweight

- | | | | |
|---|-------|---|----------------|
| 1 | Pin | 3 | Slinging plate |
| 2 | Chain | 4 | Pin |

- ▶ Pin chain 2 with slinging plate 3.
- ▶ Secure pin 4 with washer and locking spring.
- ▶ Pull out pin 1 until stop.
- ▶ Secure pin 1 with locking spring.
- ▶ Repeat procedure on all slinging plates 3 and pin connection points.
- ▶ Using the cable remote control, slowly extend the counterweight hoisting cylinders until the chains 2 are taut.

NOTICE

Excessive swinging of rear counterweight!
Damage to machine.

► Ensure that rear counterweight does not swing during the entire process.

► Lift rear counterweight.

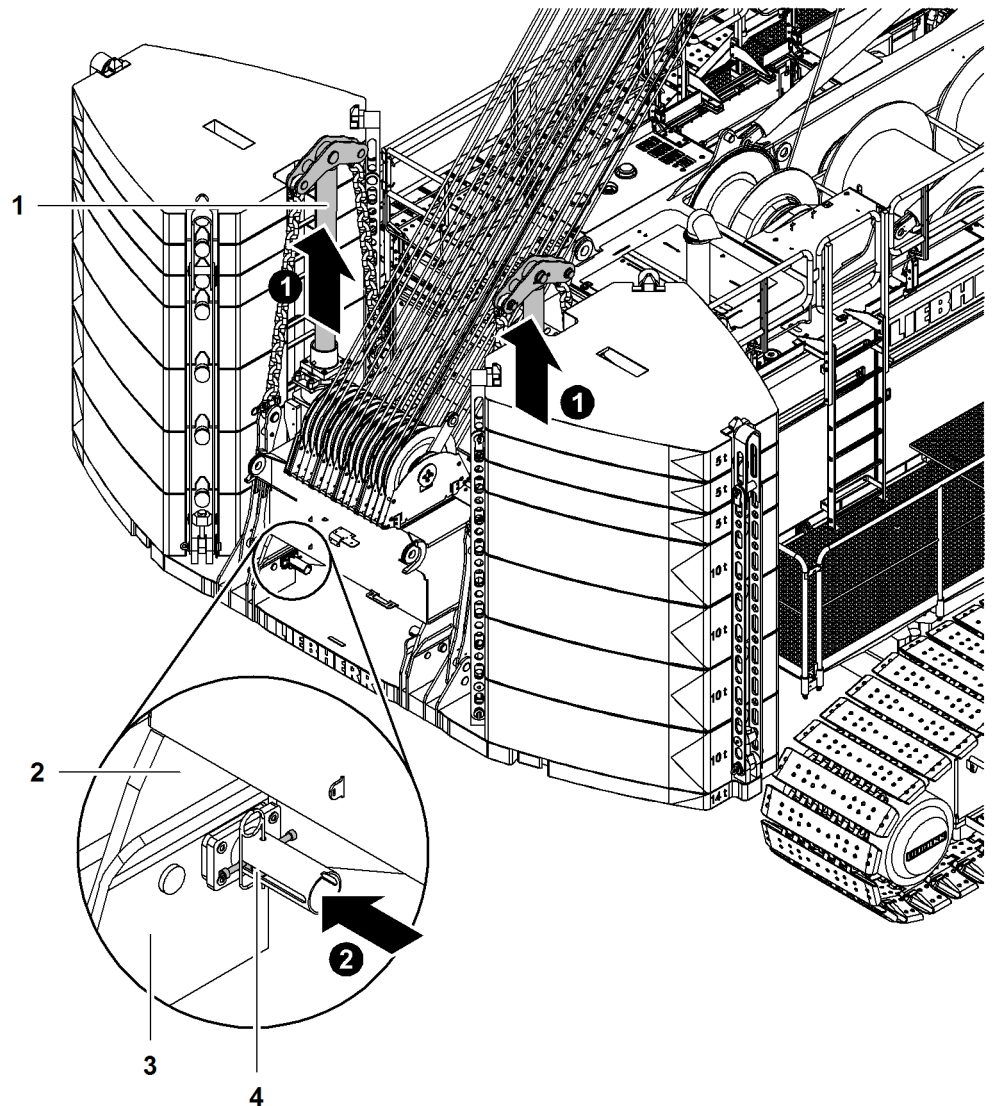


Fig. 3128: Pinning the rear counterweight

- | | | | |
|---|--|---|---|
| 1 | Counterweight hoisting cylinder (2x) | 3 | Pin connection point (4x) on rear counterweight |
| 2 | Pin connection point (4x) on uppercarriage | 4 | Pin (4x) |

► Fully extend counterweight hoisting cylinder 1.

**DANGER**

Incorrect pin connection of rear counterweight!
Machine toppling over.

- ▶ Pin rear counterweight to basic machine.
- ▶ Secure pins **4**.

If the pin connection points **2** on the uppercarriage match the pin connection points **3** on the rear counterweight:

- ▶ Push in pin **4** until stop.
- ▶ Secure pins **4** with locking springs.
 - ▷ Rear counterweight is pinned and secured.

Chains of the counterweight hoisting cylinders **1** may remain suspended.

- ▶ Fully retract the counterweight hoisting cylinders **1**.
- ▶ Unplug cable remote control on uppercarriage and stow away.
- ▶ Close rear left uppercarriage door.

7.5 Main boom 2821

System-relevant information for main boom 2821:

- Configuration of main boom
 - Installation position of rope guide (type A)
 - Mid-point suspensions installation positions
- Lengths of mid-point suspensions
- Overview of main boom 2821 steel pendant straps
- Overview of main boom 2821 CF pendant straps
- Reeving diagrams for one rope across main boom head 2821 (load position1)
- Reeving diagrams for two ropes across main boom head 2821 (load position1)
- Reeving diagrams for one rope across auxiliary jib (36 t (79300 lb)) on main boom head 2821 (load position1)
- Reeving diagrams for two ropes across auxiliary jib (36 t (79300 lb)) and main boom head 2821 (load position 1)
- Reeving diagrams jib luffing winch as auxiliary winch

7.5.1 Configuration of main boom



DANGER

Assembly with excessive main boom length!
Structural failure.

- ▶ Check main boom length in load chart for validity.

Main boom length	Configuration of main boom (symbolic)
20 m 66 ft ^{A)}	
23 m 75 ft ^{A)}	
26 m 85 ft ^{A)}	
29 m 95 ft ^{A)}	
32 m 105 ft ^{A)}	
35 m 115 ft ^{A)}	
38 m 125 ft ^{A)}	
41 m 135 ft ^{A)}	
44 m 144 ft ^{A)}	
47 m 154 ft ^{A)}	

Main boom length	Configuration of main boom (symbolic)
50 m 164 ft	
53 m 174 ft	
56 m 184 ft	
59 m 195 ft	
62 m 203 ft	
65 m 213 ft	
68 m 223 ft	
71 m 233 ft	
74 m 243 ft	
77 m 253 ft	
80 m 262 ft	
83 m 272 ft	
86 m 282 ft	
89 m 292 ft	
92 m 302 ft	
95 m 312 ft	
98 m 322 ft	
101 m 332 ft	
104 m 342 ft	

Tab. 515: Configuration of main boom 2821

A) Install rope guide exclusively with boom configuration 4, when reeving load position1 **and** load position 2.

S - Installation position rope guide (type A)

S* - Installation position rope guide (type A)

X1 - Installation position mid-point suspension 1

X2 - Installation position mid-point suspension 2

7.5.2 Lengths of mid-point suspensions

Main boom length	Stay rope 1 (X1)	Stay rope 2 (X2)
	Rope length	Rope length
77 m 253 ft ^{A)}	3.7 m 12' 2" ft-in = 2.1 m (6' 11" ft-in) + 1.6 m (5' 3" ft-in)	
80 m 262 ft ^{A)}	3.2 m 10' 6" ft-in = 1.6 m (5' 3" ft-in) + 1.6 m (5' 3" ft-in)	
83 m 272 ft	3.2 m 10' 6" ft-in = 1.6 m (5' 3" ft-in) + 1.6 m (5' 3" ft-in)	
86 m 282 ft	5.6 m 18' 4" ft-in = 3 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
89 m 292 ft	5.1 m 16' 9" ft-in = 2.1 m (6' 11" ft-in) + 3 m (9' 10" ft-in)	1.6 m 5' 3" ft-in
92 m 302 ft	5.1 m 16' 9" ft-in = 2.1 m (6' 11" ft-in) + 3 m (9' 10" ft-in)	1.6 m 5' 3" ft-in
95 m 312 ft	4.7 m 15' 5" ft-in = 2.6 m (8' 6" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
98 m 322 ft	4.7 m 15' 5" ft-in = 2.6 m (8' 6" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
101 m 332 ft	4.6 m 15' 1" ft-in = 3.0 m (9' 10" ft-in) + 1.6 m (5' 3" ft-in)	1.6 m 5' 3" ft-in

Main boom length	Stay rope 1 (X1)	Stay rope 2 (X2)
	Rope length	
104 m 342 ft	4.2 m 13' 9" ft-in = 2.6 m (8' 6" ft-in) + 1.6 m (5' 3" ft-in)	2.1 m 6' 11" ft-in

Tab. 516: Lengths of mid-point suspensions - main boom 2821

A) Machine with CF pendant straps with boom configuration main boom 2821 + luffing jib 1916: Do not install any mid-point suspensions with main boom lengths 77 m (253 ft) and 80 m (262 ft).

7.5.3 Overview of main boom 2821 steel pendant straps

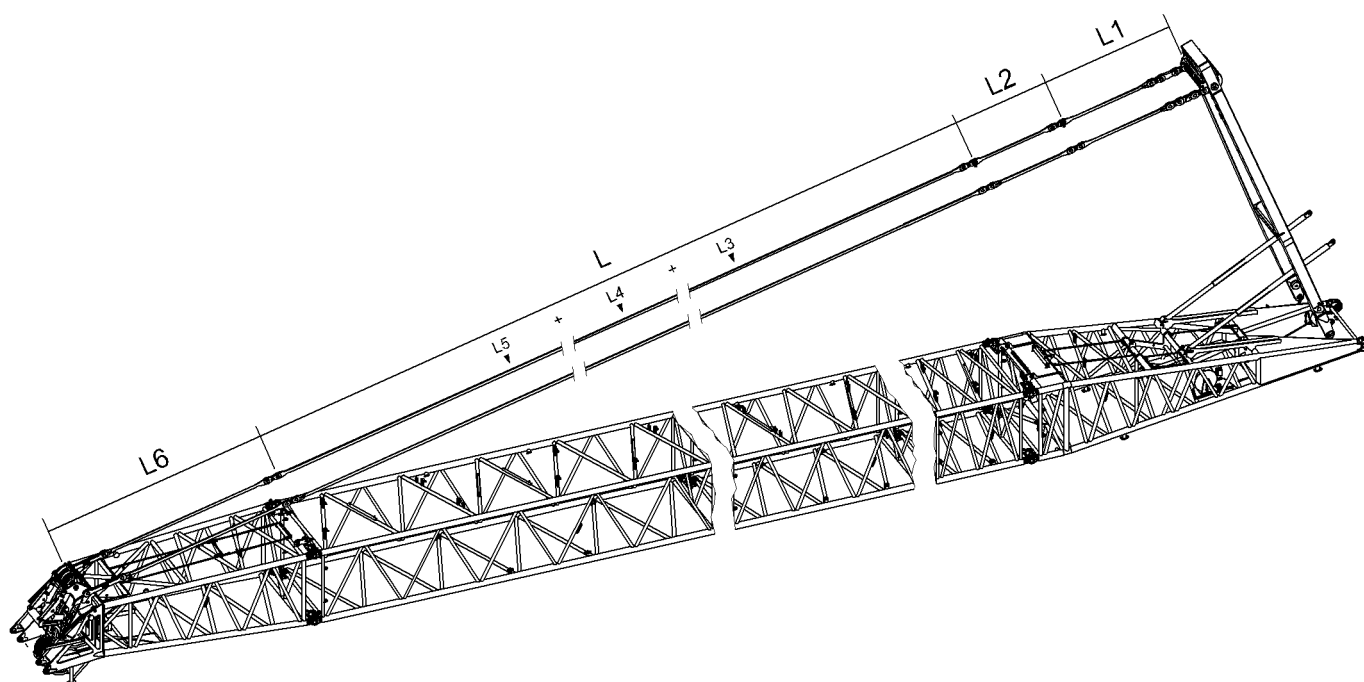


Fig. 3314: Overview of main boom 2821 steel pendant straps

Pendant straps A-frame1 to main boom head 2821

Name		Value
L1	A-frame1 equalizer (For more information see: A-frame1 equalizer , page 77)	3730 mm 12' 3" ft-in
L2	Main boom base section equalizer (For more information see: Equalizer of main boom base section 2821.30 , page 197)	2670 mm 8' 9" ft-in

Name		Value
L	Main boom pendant straps consisting of:	
	L3	Main boom pendant strap 3 m (10 ft) (For more information see: Main boom pendant strap 3 m (10 ft), page 198)
	L4	Main boom pendant strap 6 m (20 ft) (For more information see: Main boom pendant strap 6 m (20 ft), page 200)
	L5	Main boom pendant strap 12 m (40 ft) (For more information see: Main boom pendant strap 12 m (40 ft), page 202)
L6	Main boom pendant strap on main boom head 2821 (For more information see: Main boom pendant strap on main boom head 2821.24, page 203)	6300 mm 20' 8" ft-in

Tab. 517: Pendant straps A-frame1 to main boom head 2821

Configuration of main boom pendant straps (L):

Required number of main boom pendant straps 3 m (10 ft) (**L3**) corresponds to number of main boom sections 3 m (10 ft).

Required number of main boom pendant straps 6 m (20 ft) (**L4**) corresponds to number of main boom sections 6 m (20 ft).

Required number of main boom pendant straps 12 m (40 ft) (**L5**) corresponds to number of main boom sections 12 m (40 ft).

**Note**

- For the admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following table: ([For more information see: 7.5.1 Configuration of main boom, page 1319](#))

7.5.4 Overview of main boom 2821 CF pendant straps

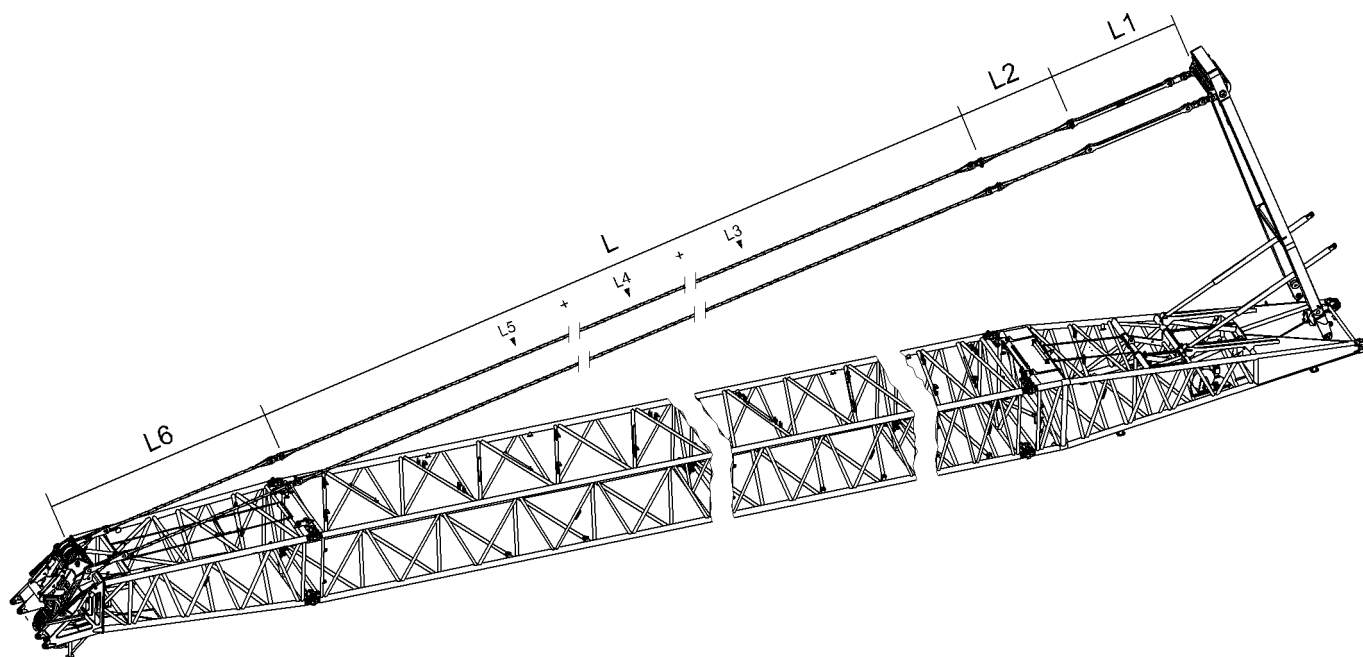


Fig. 3315: Overview of main boom 2821 CF pendant straps

Pendant straps A-frame1 to main boom head 2821

Name		Value	
L1	A-frame1 equalizer (For more information see: A-frame1 equalizer, page 78)	3700 mm 12' 2" ft-in	
L2	Main boom base section equalizer (For more information see: Equalizer of main boom base section 2821.30, page 206)	2700 mm 8' 10" ft-in	
L	Main boom pendant straps consisting of:		
	L3	Main boom pendant strap 3 m (10 ft) (For more information see: Main boom pendant strap 3 m (10 ft), page 209)	Total L3 +
	L4	Main boom pendant strap 6 m (20 ft) (For more information see: Main boom pendant strap 6 m (20 ft), page 212)	Total L4 +
L5	Main boom pendant strap 12 m (40 ft) (For more information see: Main boom pendant strap 12 m (40 ft), page 216)	Total L5	
L6	Main boom pendant strap on main boom head 2821 (For more information see: Main boom pendant strap on main boom head 2821.24, page 220)	6300 mm 20' 8" ft-in	

Tab. 518: Pendant straps A-frame1 to main boom head 2821

Configuration of main boom pendant straps (L):

Required number of main boom pendant straps 3 m (10 ft) (**L3**) corresponds to number of main boom sections 3 m (10 ft).

Required number of main boom pendant straps 6 m (20 ft) (**L4**) corresponds to number of main boom sections 6 m (20 ft).

Required number of main boom pendant straps 12 m (40 ft) (**L5**) corresponds to number of main boom sections 12 m (40 ft).

**Note**

- ▶ For the admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following table: [\(For more information see: 7.5.1 Configuration of main boom, page 1319\)](#)
-

The main boom pendant straps (**L**) may consist of generation A and generation B main boom pendant straps [\(For more information see: 1.11.9 CF pendant straps on main boom 2821, page 206\)](#). Mixing is only admissible if the number of generation B main boom pendant straps only differs by at most 1 in the left and the right strand of the main boom pendant straps.

**DANGER**

Inadmissible mixing of generation A and generation B main boom pendant straps! Structural breakdown.

- ▶ Ensure that the number of generation B main boom pendant straps differs by at most 1 in the left and the right strand of the main boom pendant straps.
-

7.5.5 Reeving diagrams for one rope across main boom head 2821 (load position 1)

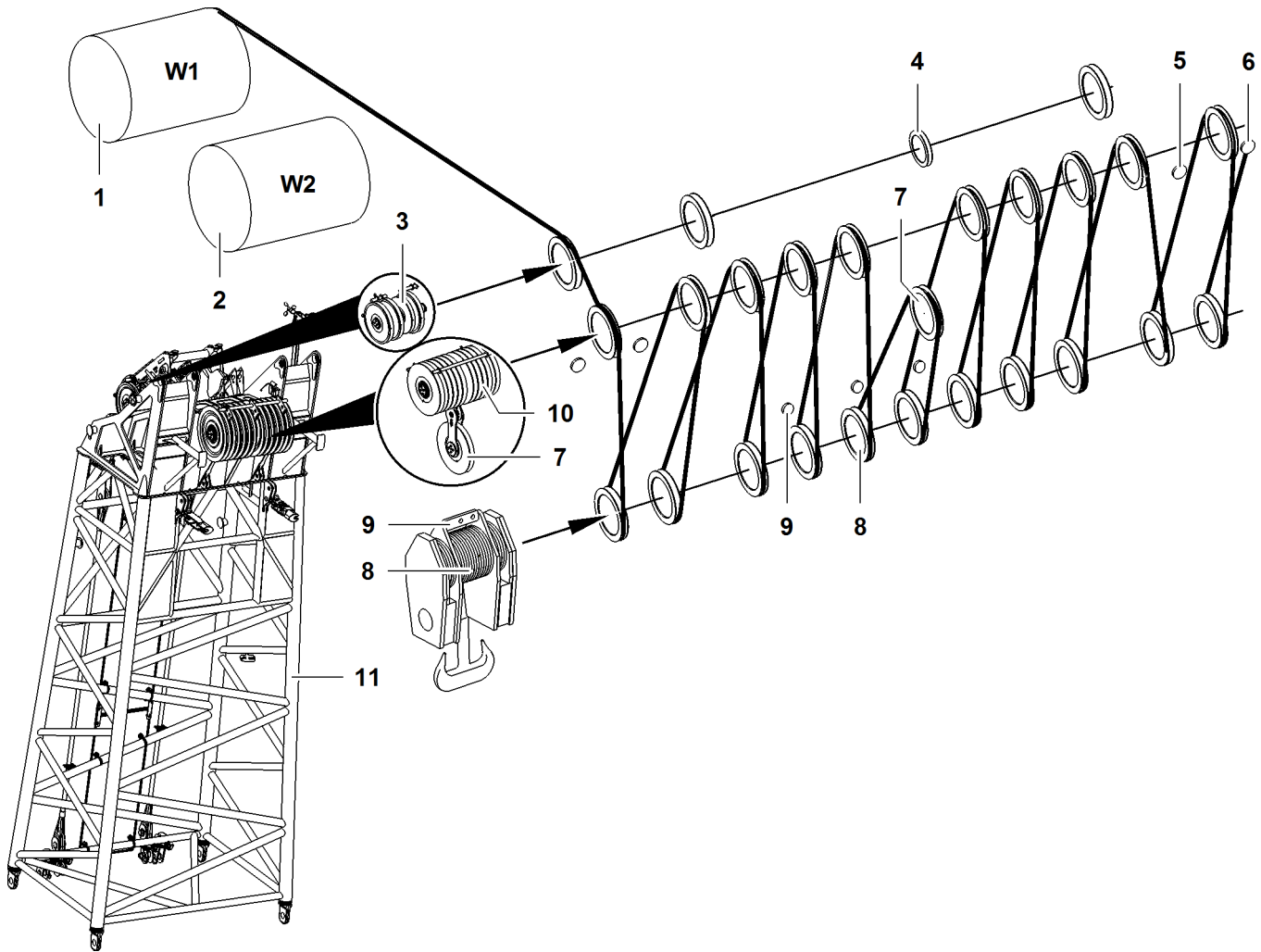


Fig. 3316: Reeving diagrams for one rope across main boom head 2821 (load position 1)

- | | | | | | |
|---|---|---|--|----|-------------------------------------|
| 1 | Winch1 | 5 | Inner rope fixing point (2x) of main boom head | 9 | Rope fixing points of pulley block |
| 2 | Winch2 | 6 | Outer rope fixing point (2x) of main boom head | 10 | Rope pulley (10x) of main boom head |
| 3 | Gantry pulley (3x) of main boom head | 7 | 11th rope pulley of main boom head | 11 | Main boom head |
| 4 | Rope pulley for rope of jib luffing winch | 8 | Pulley set of pulley block | | |

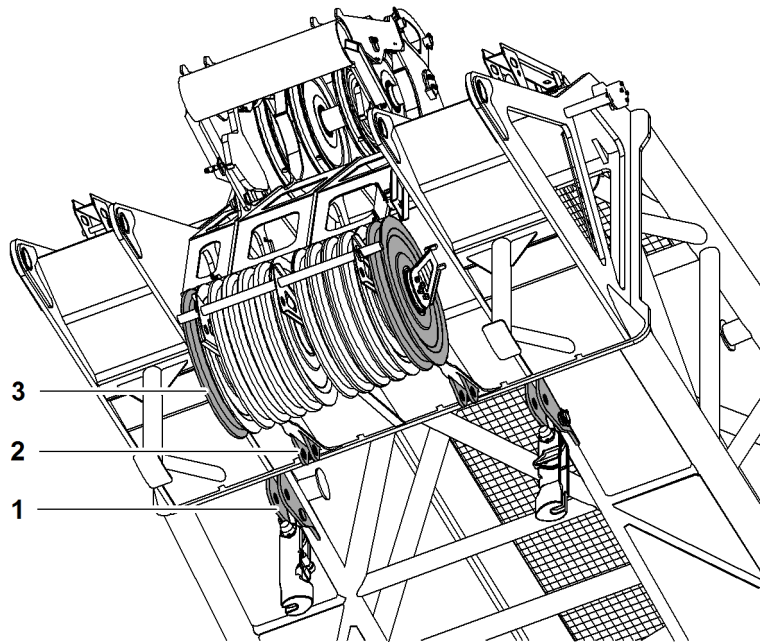


Fig. 3317: Rope fixing points main boom head 2821

- | | | | |
|---|------------------------------|---|------------------|
| 1 | Outer rope fixing point (2x) | 3 | Rope pulley (2x) |
| 2 | Inner rope fixing point (2x) | | |

If the first or last rope pulley **3** on the pulley set of the main boom head is used (reeved), the outer rope fixing point **1** is to be used.

If the first or last rope pulley **3** on the pulley set of the main boom head is not used (not reeved), the inner rope fixing point **2** is to be used.

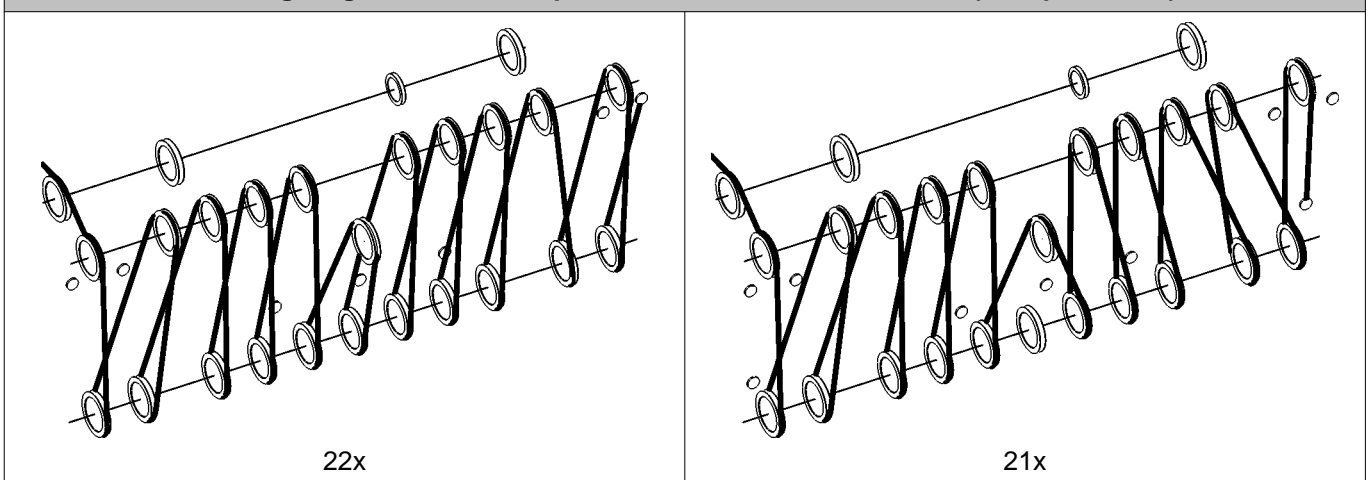


DANGER

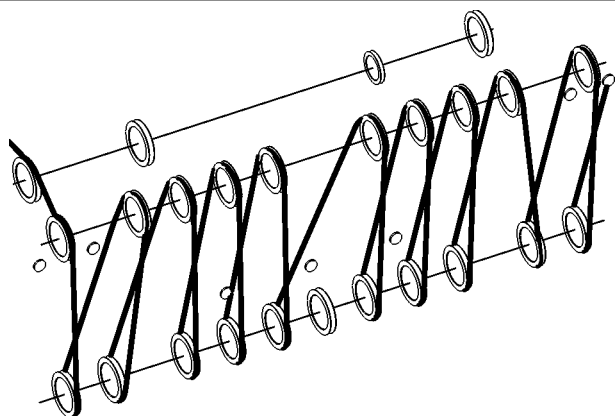
Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.

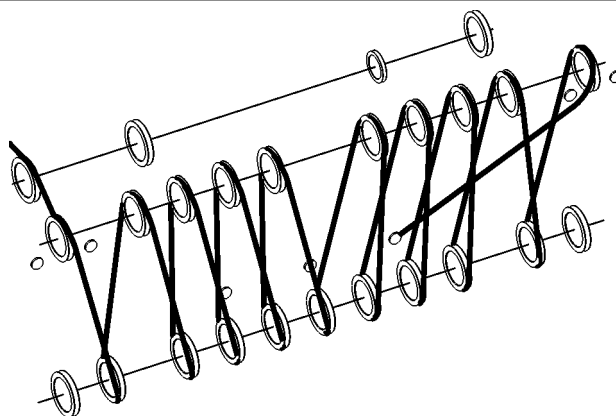
Reeving diagrams for one rope across main boom head 2821 (load position 1)



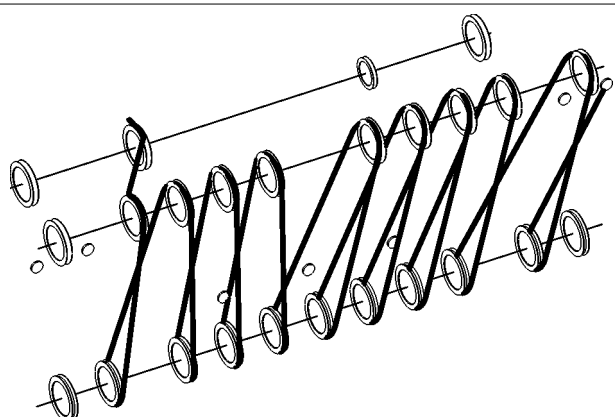
Reeving diagrams for one rope across main boom head 2821 (load position 1)



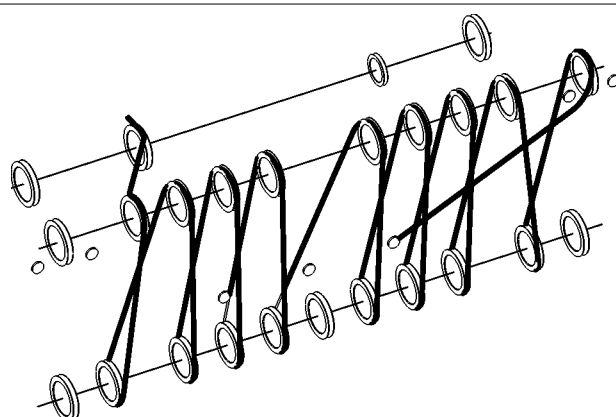
20x



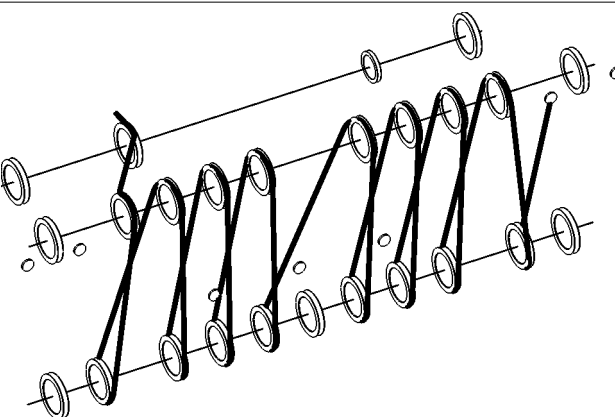
19x



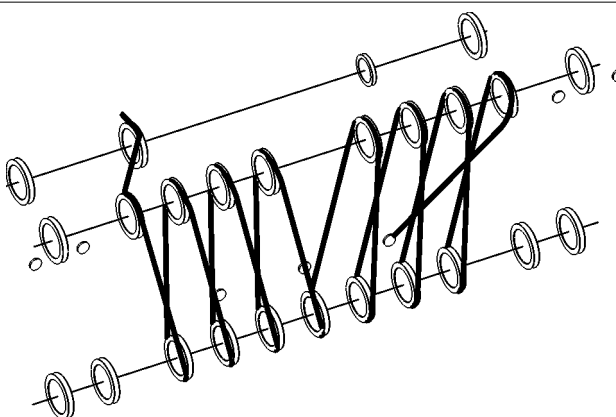
18x



17x

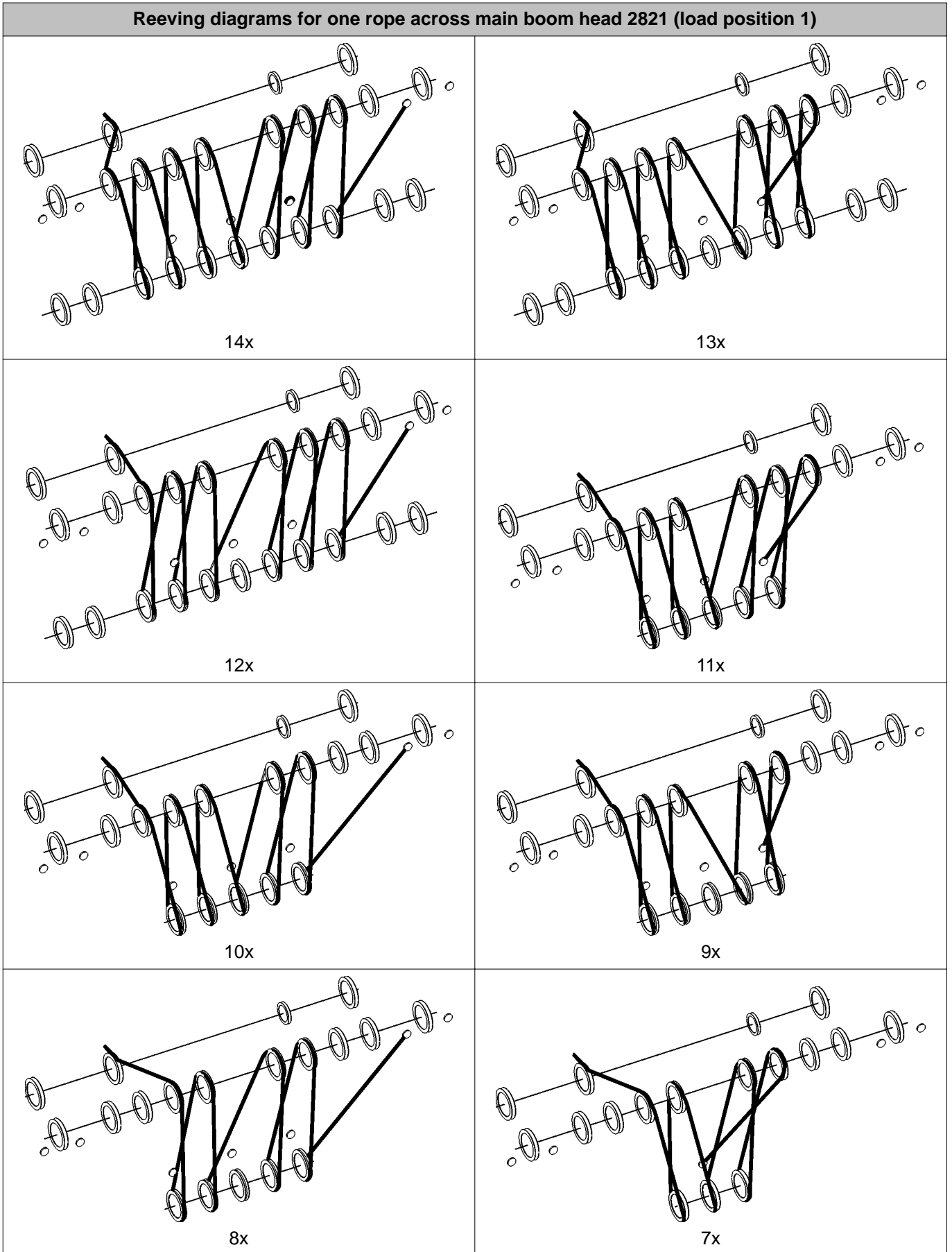


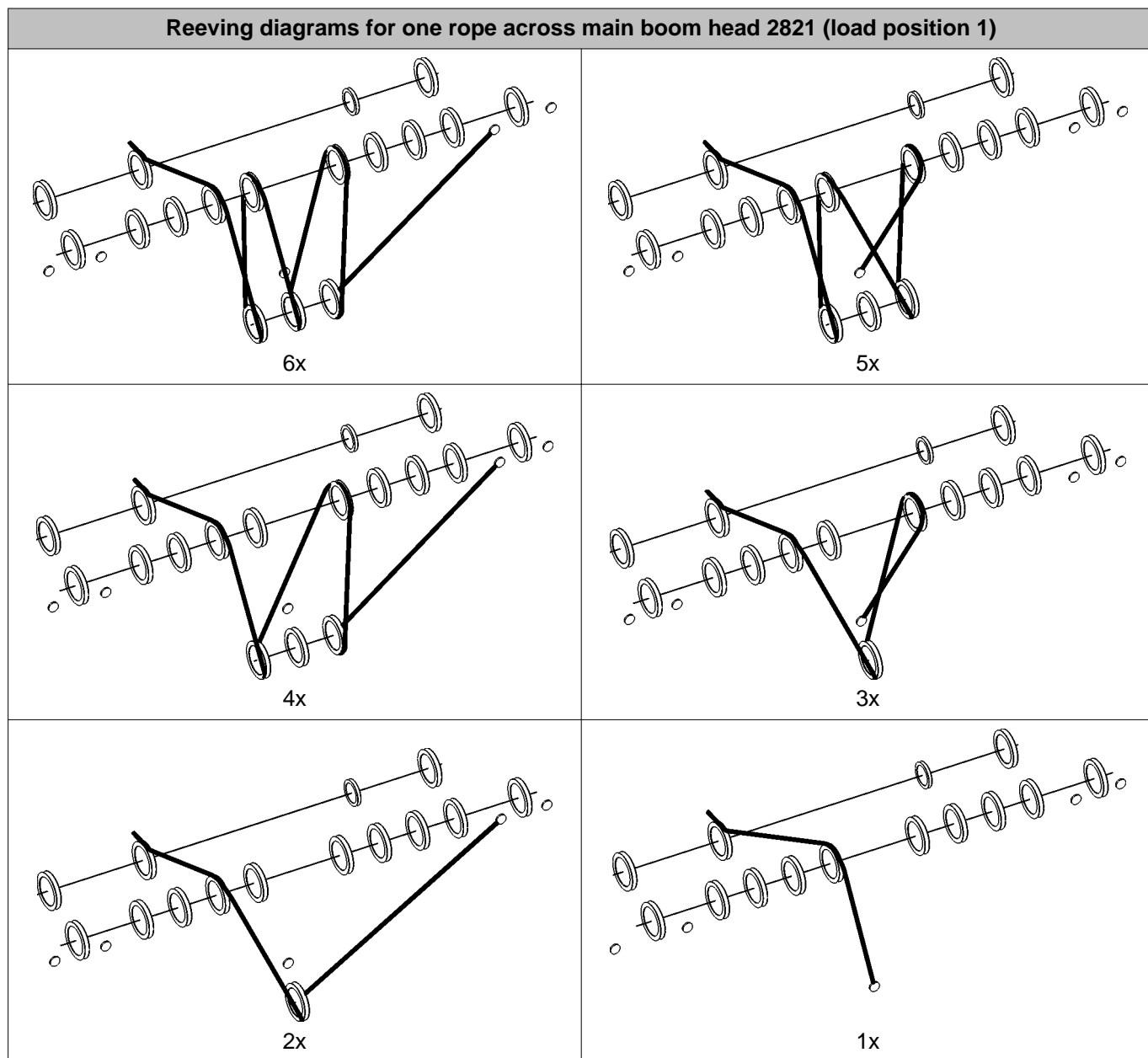
16x



15x

Reeving diagrams for one rope across main boom head 2821 (load position 1)





Tab. 519: Reeving diagrams for one rope across main boom head 2821 (load position 1)

7.5.6 Reeving diagrams for two ropes across main boom head 2821 (load position 1)

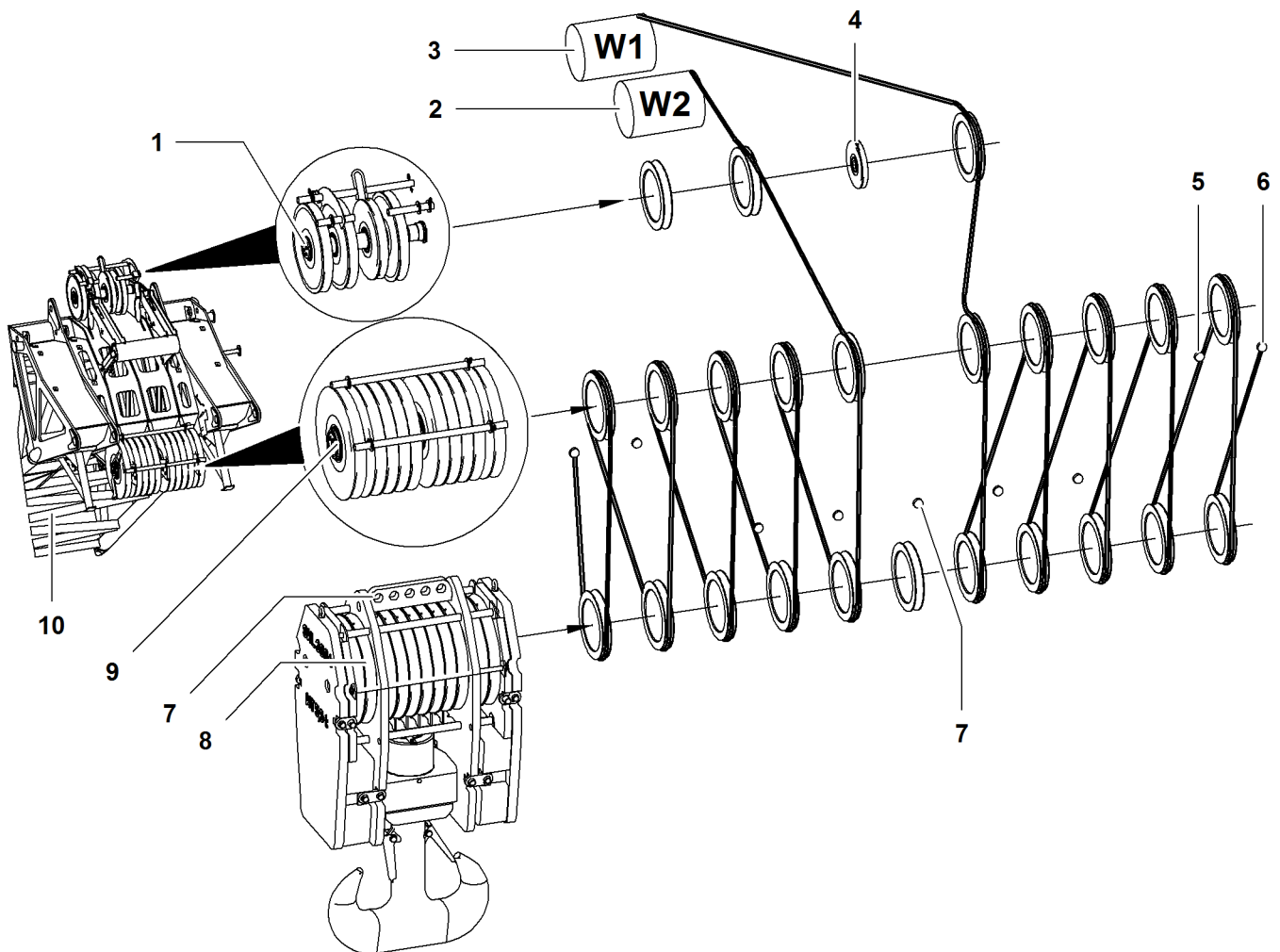


Fig. 3340: Reeving diagrams for two ropes across main boom head 2821 (load position 1)

- | | | | | | |
|---|---|---|--|----|-------------------------------------|
| 1 | Gantry pulley (3x) of main boom head | 5 | Inner rope fixing point (2x) of main boom head | 9 | Rope pulley (10x) of main boom head |
| 2 | Winch2 | 6 | Outer rope fixing point (2x) of main boom head | 10 | Main boom head |
| 3 | Winch1 | 7 | Rope fixing points of pulley block | | |
| 4 | Rope pulley for rope of jib luffing winch | 8 | Pulley set of pulley block | | |

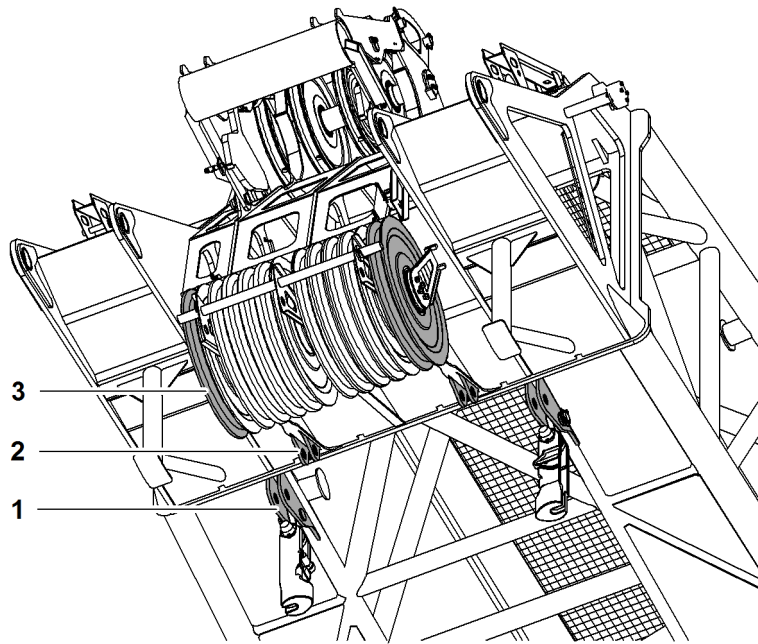


Fig. 3341: Rope fixing points main boom head 2821

- | | | | |
|---|------------------------------|---|------------------|
| 1 | Outer rope fixing point (2x) | 3 | Rope pulley (2x) |
| 2 | Inner rope fixing point (2x) | | |

If the first or last rope pulley 3 on the pulley set of the main boom head is used (reeved), the outer rope fixing point 1 is to be used.

If the first or last rope pulley 3 on the pulley set of the main boom head is not used (not reeved), the inner rope fixing point 2 is to be used.

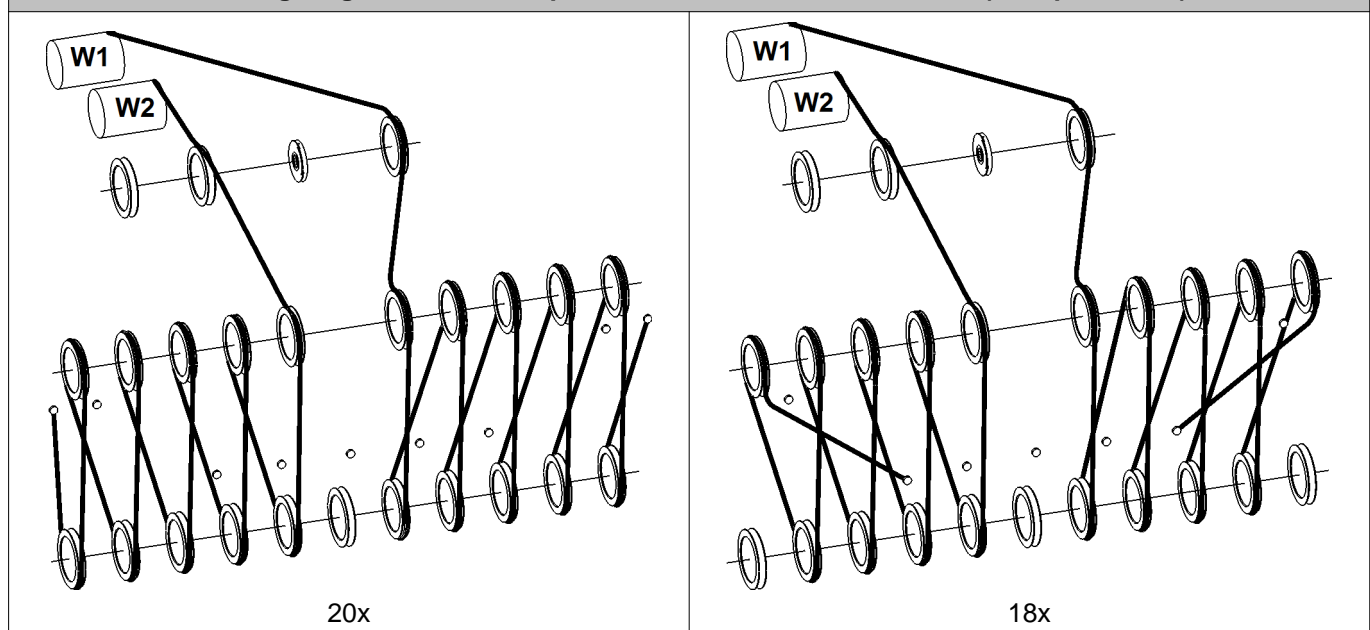


DANGER

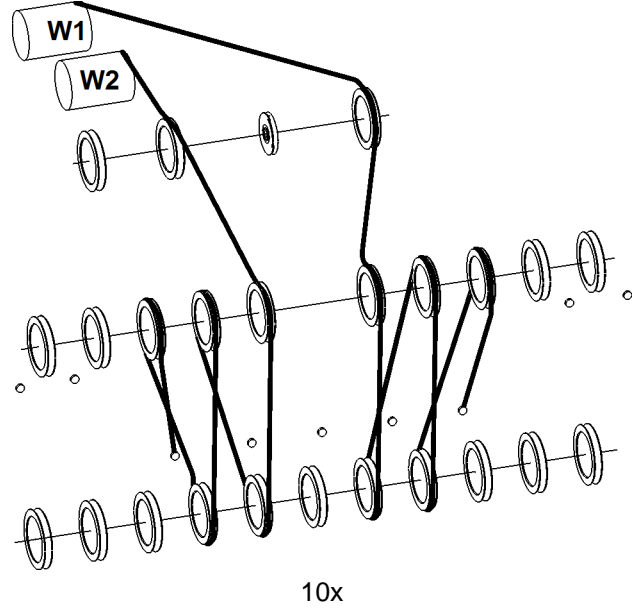
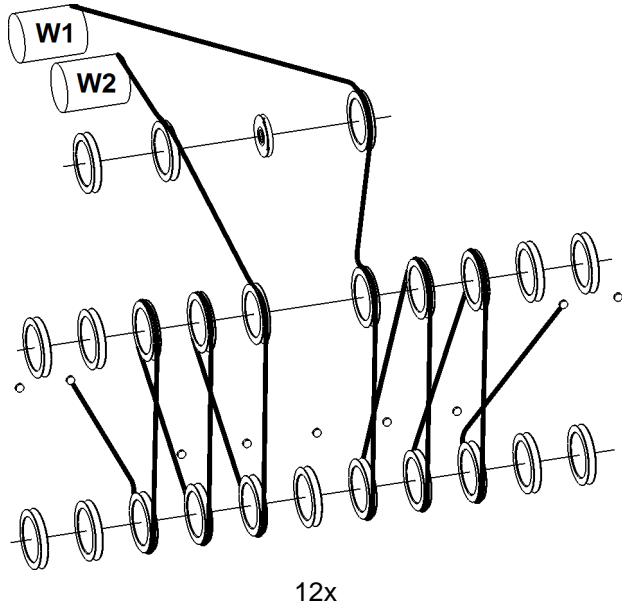
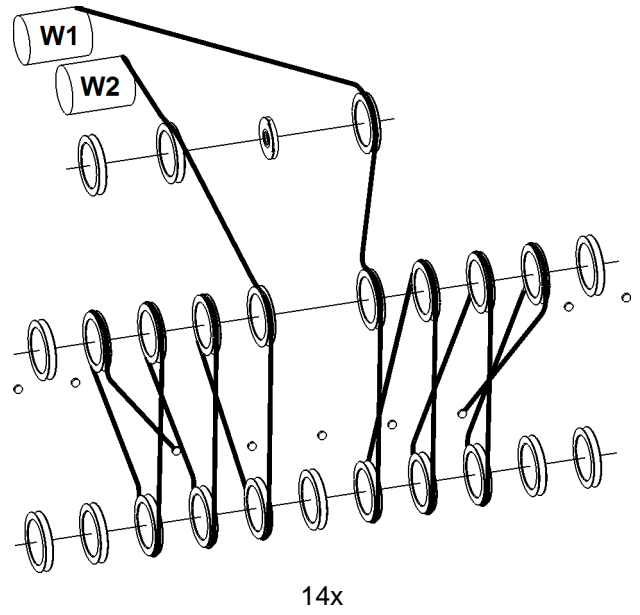
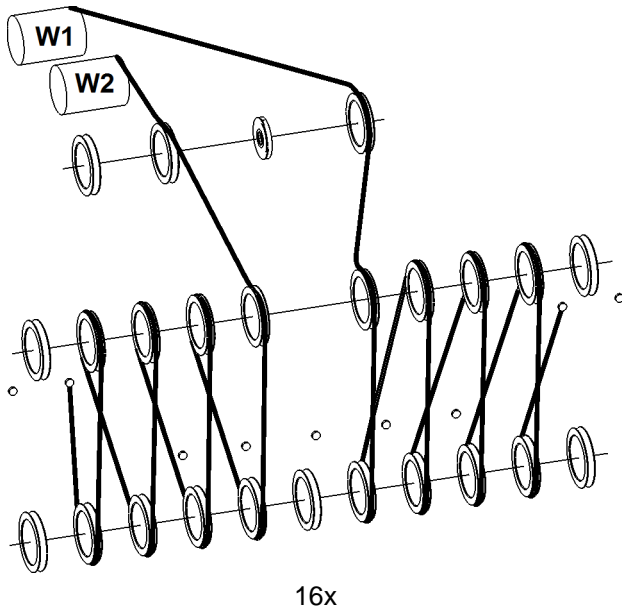
Inadmissible number of reevings!
Structural breakdown, toppling of machine.

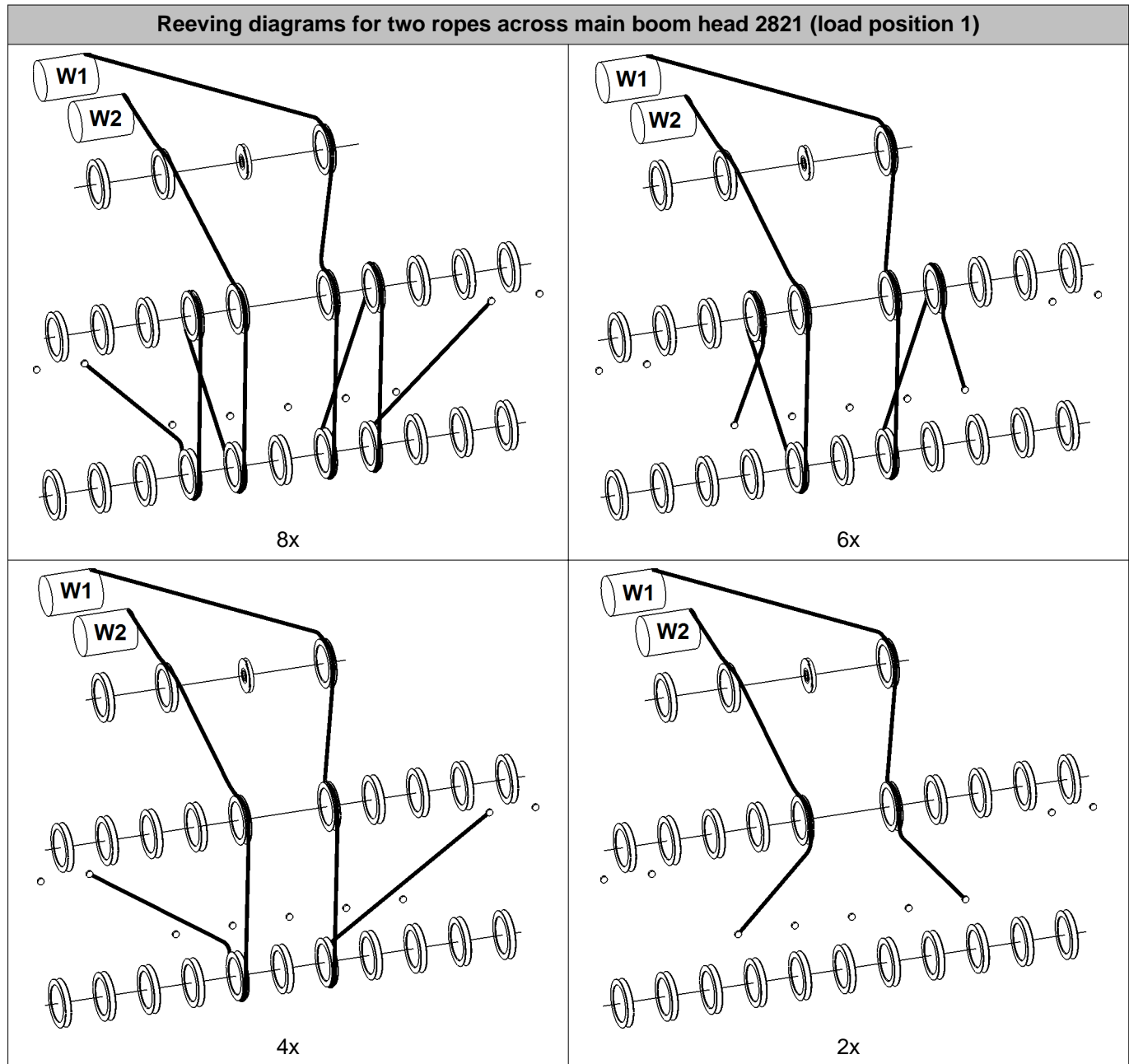
▶ Select correct number of reevings as indicated in load chart.

Reeving diagrams for two ropes across main boom head 2821 (load position 1)



Reeving diagrams for two ropes across main boom head 2821 (load position 1)





Tab. 520: Reeving diagrams for two ropes across main boom head 2821 (load position 1)

7.5.7 Reeving diagrams for one rope across auxiliary jib (36 t (79300 lb)) on main boom head 2821 (load position1)

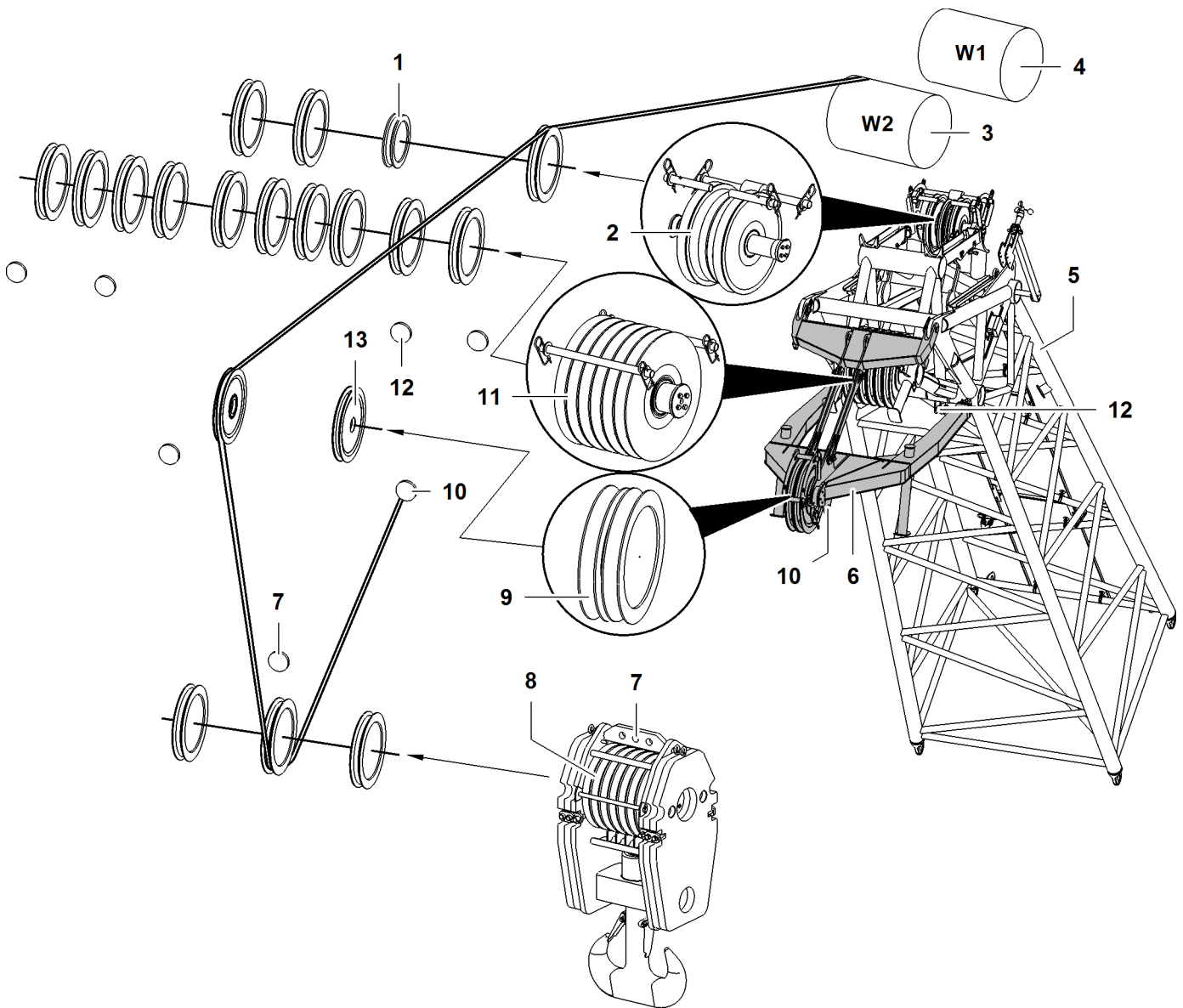


Fig. 3352: Reeving diagrams for one rope across auxiliary jib (36 t (79300 lb)) on main boom head 2821 (load position1)

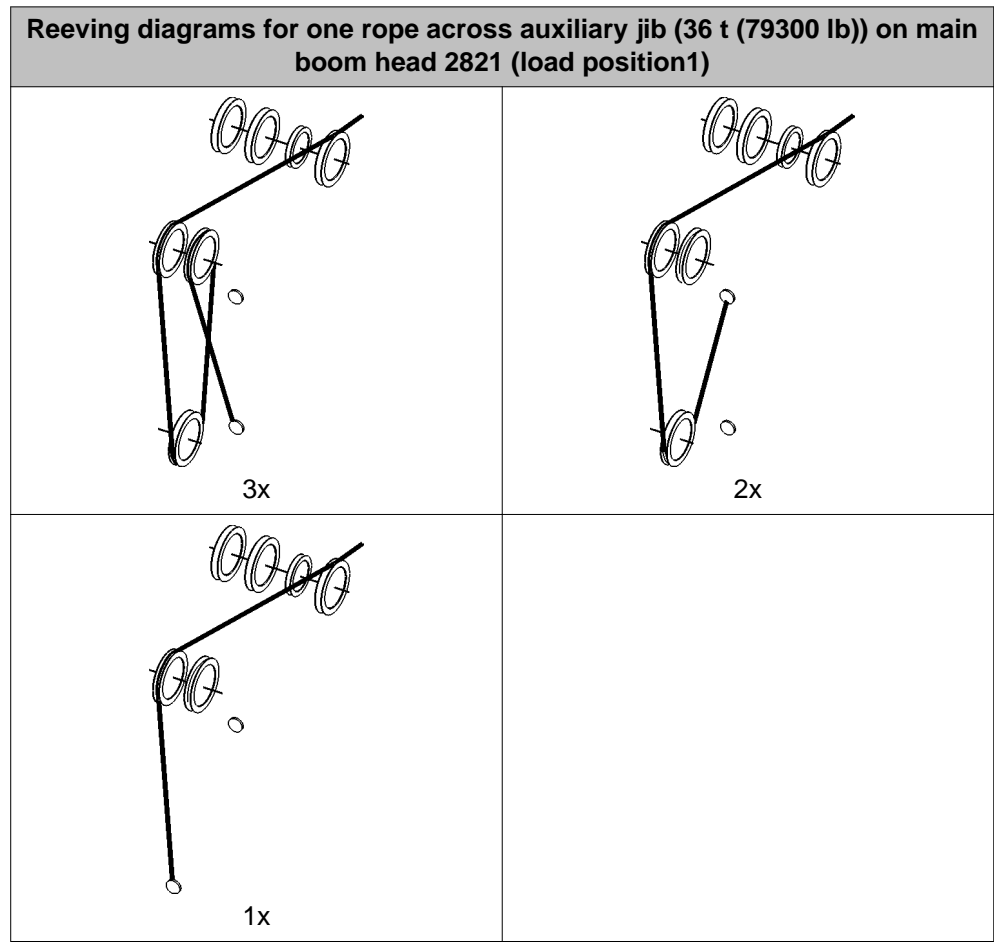
1	Rope pulley for rope of jib luffing winch	6	Auxiliary jib (36 t (79300 lb))	11	Rope pulley (10x) of main boom head
2	Gantry pulley (3x) of main boom head	7	Rope fixing points of pulley block	12	Rope fixing point (4x) of main boom head
3	Winch2	8	Pulley set of pulley block	13	Second rope pulley* for triple reeving diagram of auxiliary jib (36 t (79300 lb))
4	Winch1	9	Rope pulley of auxiliary jib (36 t (79300 lb))		
5	Main boom head	10	Rope fixing point of auxiliary jib (36 t (79300 lb))		



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

- ▶ Select correct number of reevings as indicated in load chart.



Tab. 521: Reeving diagrams for one rope across auxiliary jib (36 t (79300 lb)) on main boom head 2821 (load position1)

7.5.8 Reeving diagrams for two ropes across auxiliary jib (36 t (79300 lb)) and main boom head 2821 (load position 1)

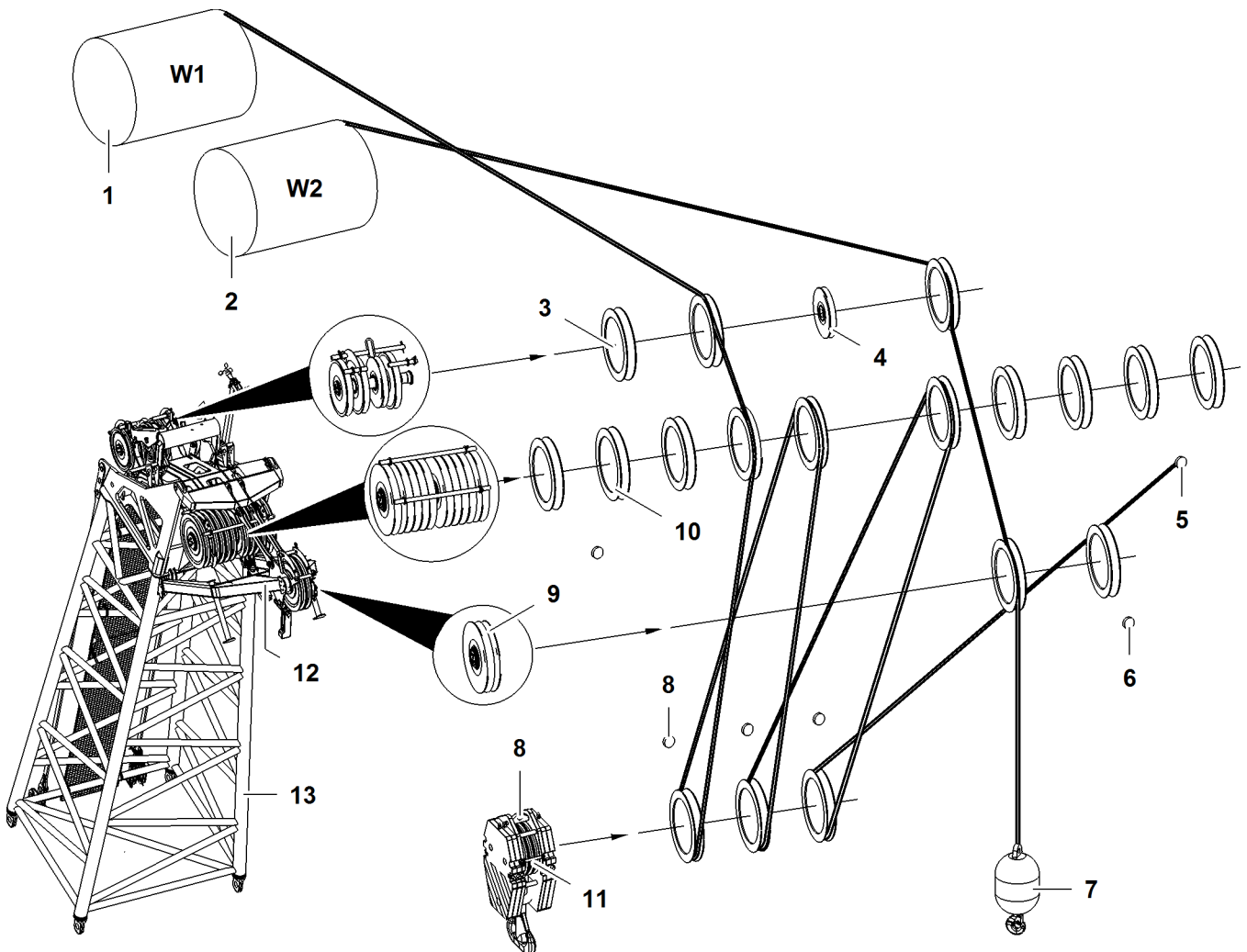


Fig. 3356: Reeving diagrams for two ropes across auxiliary jib (36 t (79300 lb)) and main boom head 2821 (load position 1)

1	Winch1	6	Rope fixing point of auxiliary jib (36 t (79300 lb))	11	Pulley set of pulley block
2	Winch2	7	Hook	12	Auxiliary jib (36 t (79300 lb))
3	Gantry pulley (3x) of main boom head	8	Rope fixing points of pulley block	13	Main boom head
4	Rope pulley for rope of jib luffing winch	9	Second rope pulley* for triple reeving diagram of auxiliary jib (36 t (79300 lb))		
5	Rope fixing point (4x) of main boom head	10	Rope pulley (10x) of main boom head		



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.

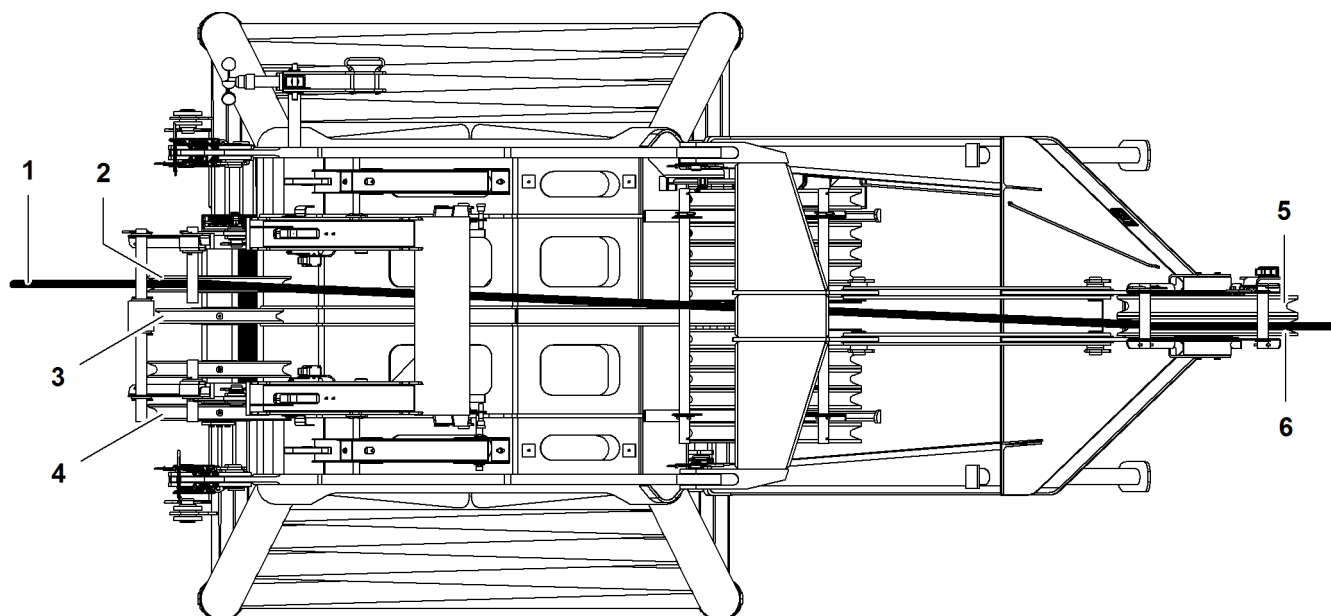


Fig. 3357: Run of the rope of auxiliary jib (36 t (79300 lb)) (illustration of principle)

- | | | | | | |
|---|--------------------------------------|---|--|---|---|
| 1 | Winch2 rope | 3 | Rope pulley for rope of jib luffing winch | 5 | Second rope pulley* for triple reeving diagram of auxiliary jib (36 t (79300 lb)) |
| 2 | Left gantry pulley of main boom head | 4 | Right gantry pulley (2x) of main boom head | 6 | Rope pulley of auxiliary jib |

The rope of winch2 1 runs from the left gantry pulley 2 to the auxiliary jib rope pulley 6.

The rope of winch1 runs from one of the right gantry pulleys 4 to the required rope pulley on the main boom head.

7.5.9 Reeving diagram - jib luffing winch as auxiliary winch



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

- ▶ Select correct number of reevings as indicated in load chart.

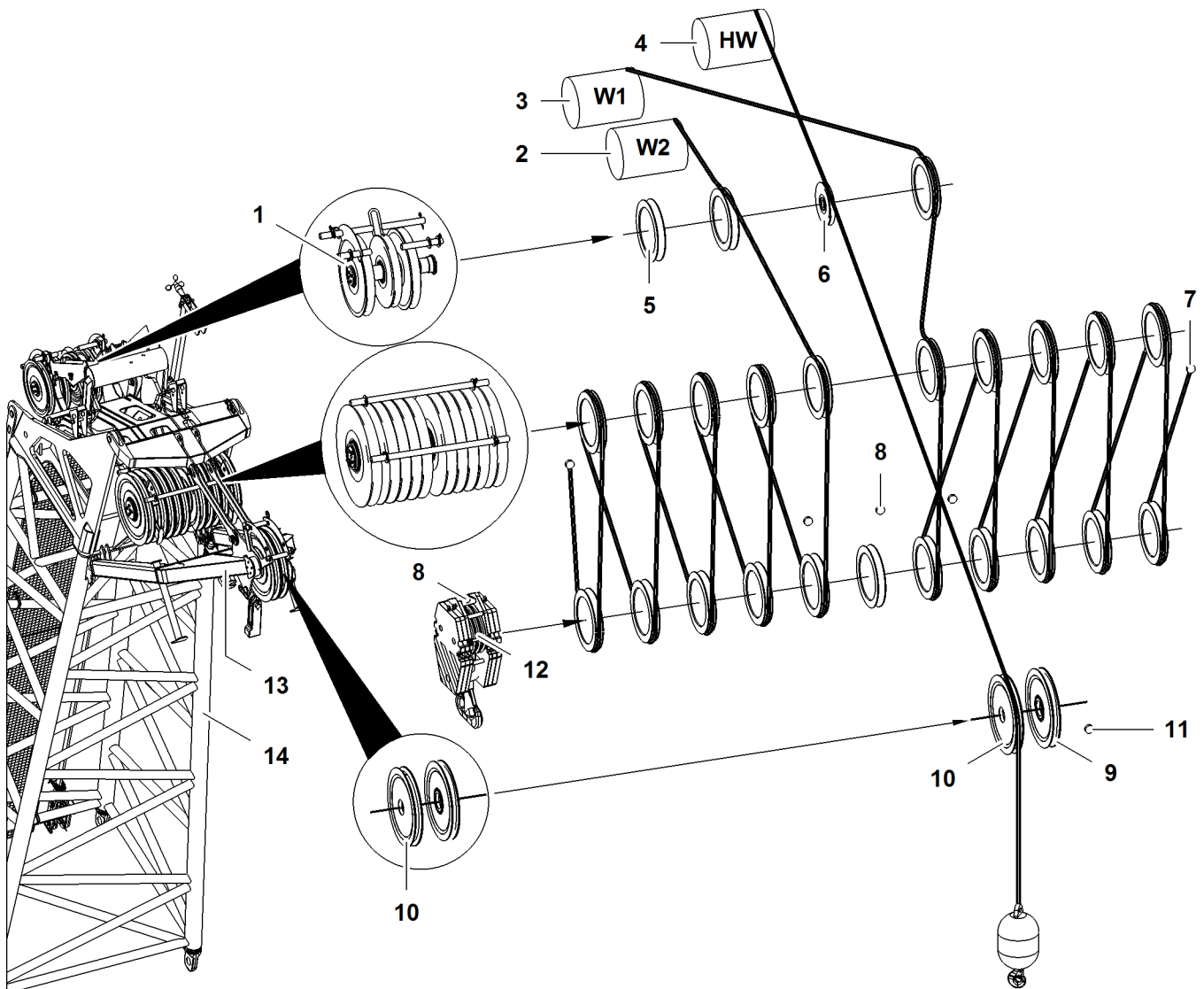


Fig. 3358: Reeving diagram - jib luffing winch as auxiliary winch (illustration of principle)

- | | | | | | |
|---|---|----|---|----|--|
| 1 | Gantry pulley (2x) of main boom head | 6 | Rope pulley for rope of jib luffing winch | 11 | Rope fixing point of auxiliary jib (36 t (79300 lb)) |
| 2 | Winch2 | 7 | Rope fixing points of main boom head | 12 | Pulley set of pulley block |
| 3 | Winch1 | 8 | Rope fixing points of pulley block | 13 | Auxiliary jib (36 t (79300 lb)) |
| 4 | Jib luffing winch as auxiliary winch* | 9 | Second rope pulley* for triple reeving diagram of auxiliary jib (36 t (79300 lb)) | 14 | Main boom head |
| 5 | Gantry pulley (only with LR 1004 and LR 1006) | 10 | Rope pulley of auxiliary jib (36 t (79300 lb)) | | |

7.6 Assembly of main boom without derrick equipment*

Make sure the following prerequisites are met:

- Assembly functions are activated.
- Machine is ready for use as assembly crane, or an assist crane is available.
- Work plans were drawn up.
- The length and the order of the main boom sections are known.
- The installation positions of the rope guide are known.
- Installation positions of the mid-point suspensions are known.
- Required accessories are available.

7.6.1 Notes

The illustrations have been simplified or schematically represented for reasons of uniformity and represent the principles of assembly. They do not provide a detailed representation of the components.

7.6.2 Programming the setup



DANGER

Inadmissible setup!

- ▶ Only program a setup on the machine that is in accordance with the load chart.
- ▶ Programming the setup on the machine ([For more information see: 4.13 Programming the setup, page 914](#)).

7.6.3 Unloading and positioning the main boom components



DANGER

Slewing of uppercarriage with rear counterweight attached not permitted!
Toppling of machine.

- ▶ Only turn uppercarriage according to the table ([For more information see: Lifting and pinning the rear counterweight, page 1313](#)).



DANGER

Wrong or defect parts or components!
Structural failure.

- ▶ Only use original Liebherr parts and original Liebherr components in perfect state.



DANGER

Improperly assembled boom configuration!
Structural failure.

- ▶ Ensure that the assembled boom configuration is compatible with the programmed setup.

**DANGER**

Incorrect arrangement of main boom sections!
Structural failure.

- ▶ Assemble the main boom according to the relevant system requirements.
- ▶ Do not replace one main boom section 6 m (20 ft) with two main boom sections 3 m (10 ft).
- ▶ Do not replace one main boom section 12 m (40 ft) with two main boom sections 6 m (20 ft).
- ▶ Ensure that with model LR 1300 only main boom sections with the system dimensions 2821.24 are installed (For more information see: 1.9 Distinguishing features main boom sections LR 1300 and LR 1300 SX, page 165) .
- ▶ Ensure that with model LR 1300 SX only main boom sections with the system dimensions 2821.30 are installed (For more information see: 1.9 Distinguishing features main boom sections LR 1300 and LR 1300 SX, page 165) .

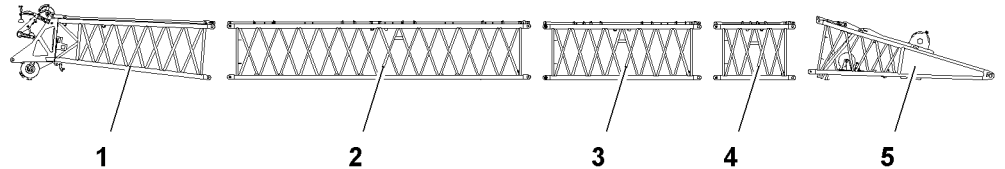


Fig. 3359: Unloading and positioning the main boom components

- | | | | |
|---|--------------------------------|---|-------------------------------|
| 1 | Main boom head | 4 | Main boom section 3 m (10 ft) |
| 2 | Main boom section 12 m (40 ft) | 5 | Main boom base section |
| 3 | Main boom section 6 m (20 ft) | | |

- ▶ Direct transport vehicles with main boom components.
- ▶ Lash main boom components by attaching sling gear to the rigging points.
- ▶ Unload main boom components onto wooden blocks using the basic machine or assist crane and position according to the relevant system instructions.

7.6.4 Assembling the ladder* for the boom

**CAUTION**

Unauthorized use of ladder!
Fall from ladder.

- ▶ Only use the ladder with boom sections on which the required ladder angle of 75° to 80° can be observed.

**CAUTION**

The ladder must not be placed under an impermissible dynamic load!
Fall from ladder, break of ladder.

- ▶ The ladder must only be used for general assembly work on pendant straps and pin connection points on the boom sections.
- ▶ Do not stand on the ladder to knock in the boom section pins.
- ▶ The ladder must be checked for damage and cracks before it is fitted and before it is used.



CAUTION

Take great care if walking on boom sections!
risk of falling from boom section.

- ▶ Only ever walk on boom sections if boom catwalks are fitted.
- ▶ A fall arrest system must be used when working on boom sections to prevent falling.



CAUTION

Slipping of the ladder!
Fall from ladder.

- ▶ Secure ladder against sliding.

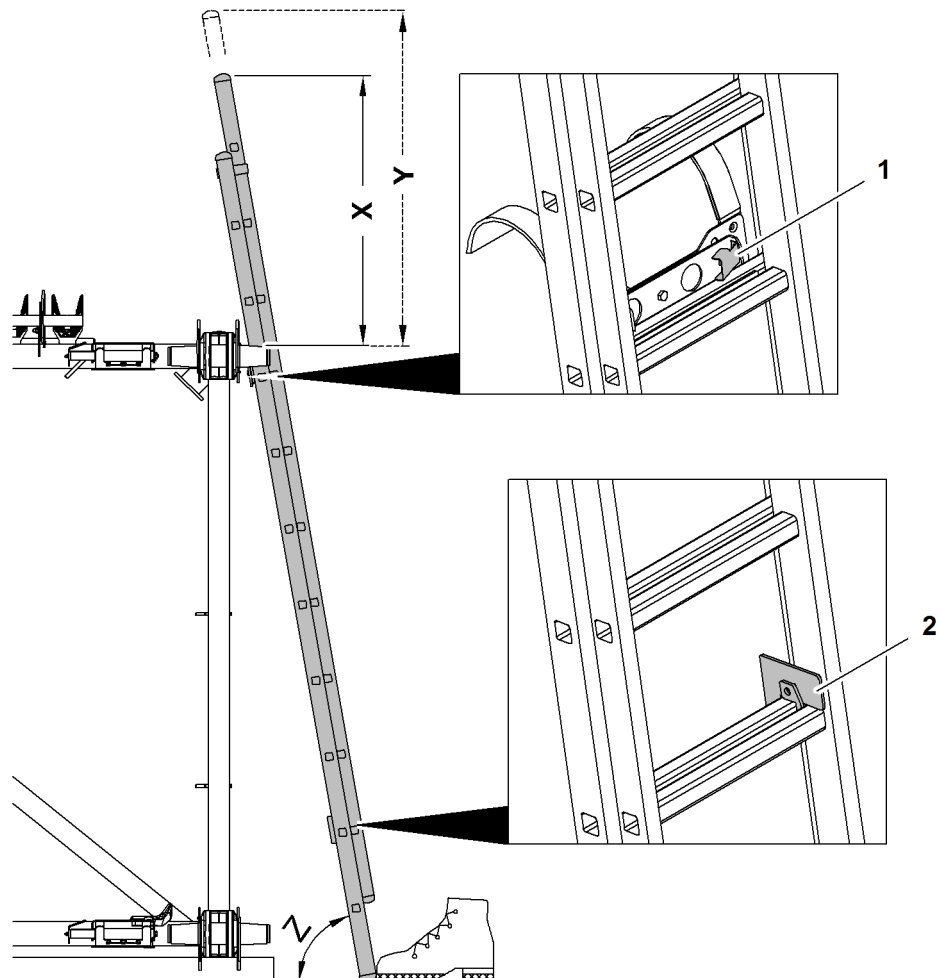


Fig. 3360: Assembling the ladder for the boom

- | | | | |
|---|------------------------|---|----------------|
| 1 | Top locking element | Y | Maximum height |
| 2 | Bottom locking element | Z | Ladder angle |
| X | Minimum height | | |

The ladder angle **Z** must remain between 75° and 80°.

The minimum height **X** must be at least 1000 mm (3' 3" ft-in).

If the maximum height **Y** is exceeded, the ladder topples.

- ▶ Insert ladder support at belt pipe of boom section.

**CAUTION**

Improperly extended ladder!
Fall from ladder.

- ▶ Observe slant angle **Z**.
- ▶ Observe minimum height **X**.
- ▶ Do not exceed maximum height **Y**.

- ▶ Extend extendable part of the ladder until minimum height **X** is exceeded.

**CAUTION**

Unsecured ladder!
Fall from ladder.

- ▶ Secure ladder against sliding.
- ▶ Ensure that locking elements engage.

- ▶ Check top locking element.
- ▶ Check bottom locking element.
 - ▷ Ladder for boom is installed:

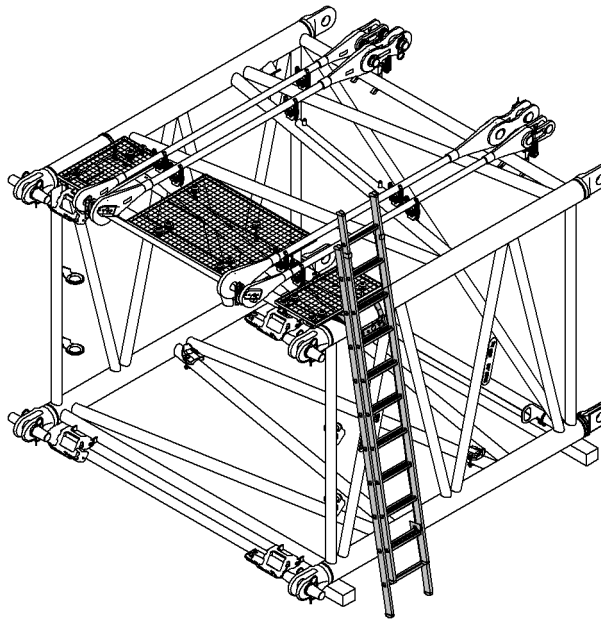


Fig. 3361: Ladder for boom is installed

7.6.5 Pinning the main boom head to the main boom sections

**WARNING**

Never stand in the inside of the main boom sections during assembly!
Severe injury.

- ▶ Only stay outside the main boom sections.
- ▶ Only knock in double-taper pin from outside.



Note

If a fixed jib is installed retrospectively (except for fixed jib 1507):

- ▶ Pin main boom head and main boom section to top pin connection points with double-taper pins on equalizer of A-frame2 (jib backstay straps) of fixed jib.

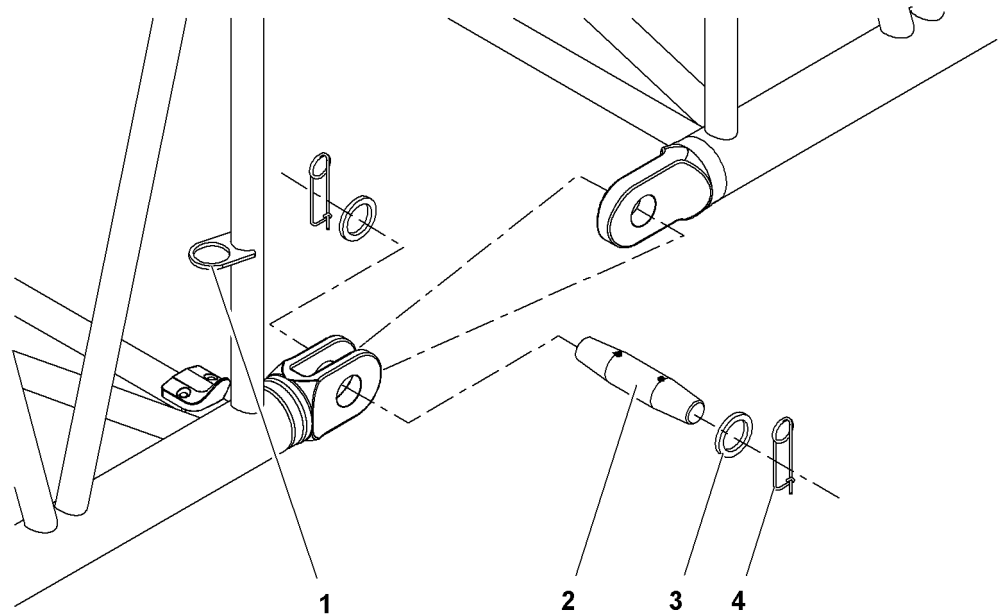


Fig. 3362: Pinning the main boom

- | | | | |
|---|---|---|---------------------|
| 1 | Transport bracket (4x) for double-taper pin | 3 | Washer (8x) |
| 2 | Double-taper pin (4x) | 4 | Locking spring (8x) |

- ▶ Remove double-taper pin 2 from transport bracket 1.



Note

Liebherr recommends:

- ▶ To make assembly and disassembly easier: grease double-taper pin.

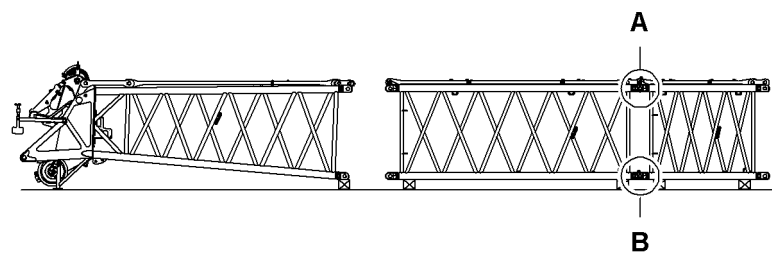


Fig. 3363: Bolting the main boom sections

- | | | | |
|---|-------------------------------|---|----------------------------------|
| A | Top pin connection point (2x) | B | Bottom pin connection point (2x) |
|---|-------------------------------|---|----------------------------------|

- ▶ Bolt all main boom sections to one another on pin connection points A + B.
- ▶ Secure double-taper pins with washers and locking springs.

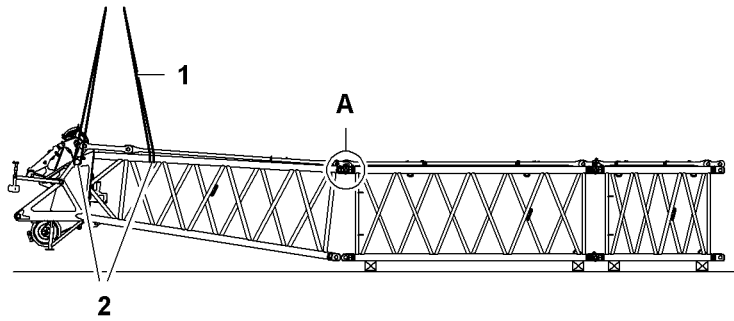


Fig. 3364: Bolting the main boom head to the main boom sections at the top

- | | | | |
|---|--------------------|---|-------------------------------|
| 1 | Round sling (4x) | A | Top pin connection point (2x) |
| 2 | Rigging point (4x) | | |

- ▶ Attach the main boom head on the rigging points **2**.
- ▶ Lift main boom head to main boom section until the top pin connection points **A** align.
- ▶ Bolt main boom head to main boom section on top pin connection points **A**.
- ▶ Secure double-taper pins with washers and locking springs.

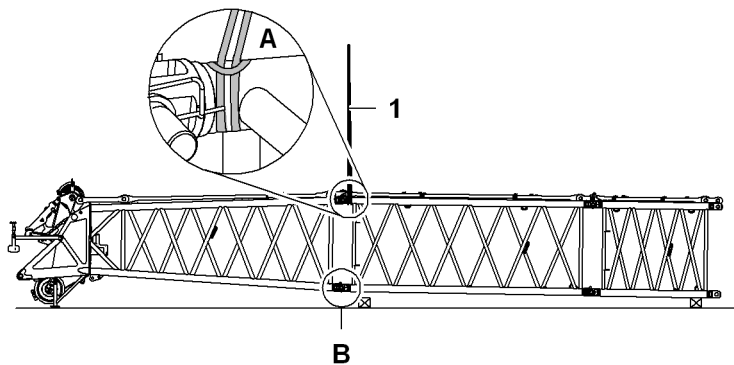


Fig. 3365: Bolting the main boom head to the main boom sections at the bottom

- | | | | |
|---|------------------|---|----------------------------------|
| 1 | Round sling (2x) | B | Bottom pin connection point (2x) |
| A | Belt pipe (2x) | | |

- ▶ Attach main boom section to belt pipes **A**.
- ▶ Lift the main boom section until the lower pin connection points **B** match.
- ▶ Bolt main boom head to the main boom section on bottom pin connection points **B**.
- ▶ Secure double-taper pins with washers and locking springs.

7.6.6 Connecting catwalks* for booms

Make sure the following conditions are met:

- Boom components are pinned to each other.

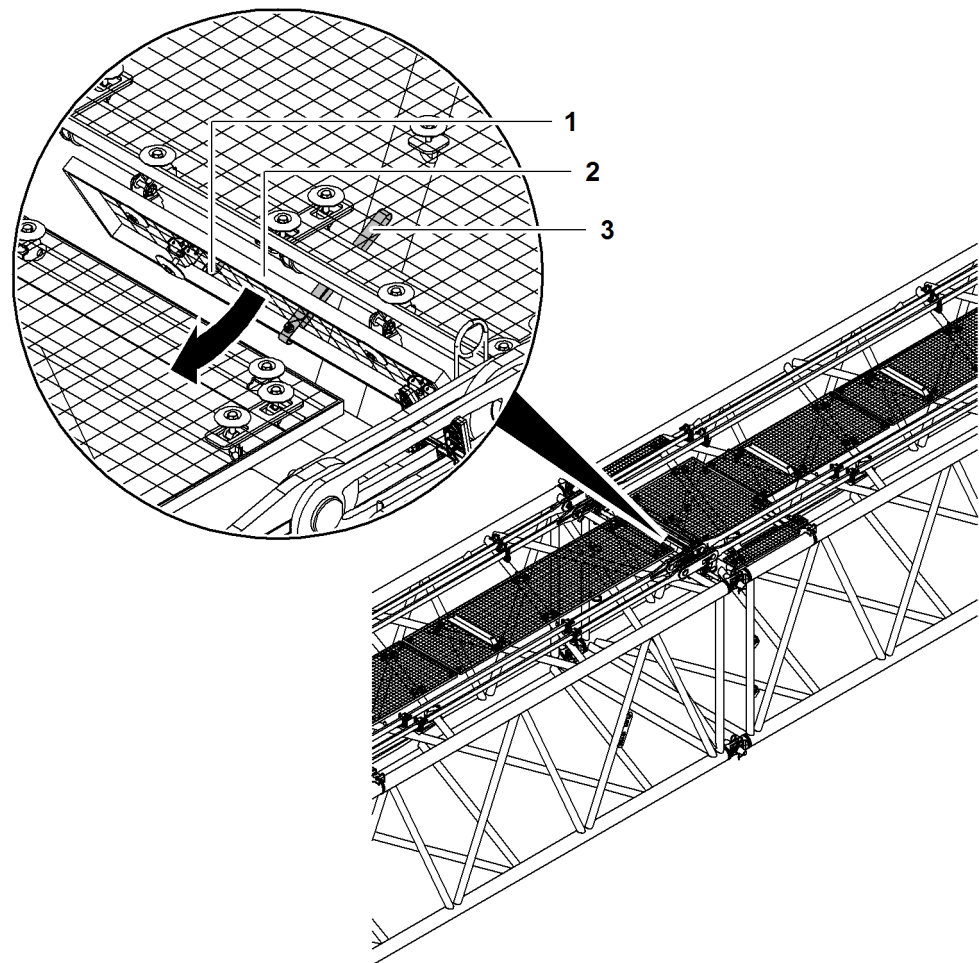


Fig. 3366: Connecting catwalks for booms (illustration of principle)

- | | | | |
|---|---------------------------------|---|---------------|
| 1 | Pin (2x) with spring cotter pin | 3 | Retainer belt |
| 2 | Catwalk (foldable) | | |

- ▶ Open retainer belt **3**.
- ▶ Remove pin **1** with spring cotter pin on both sides.
- ▶ Fold up catwalk **2**.

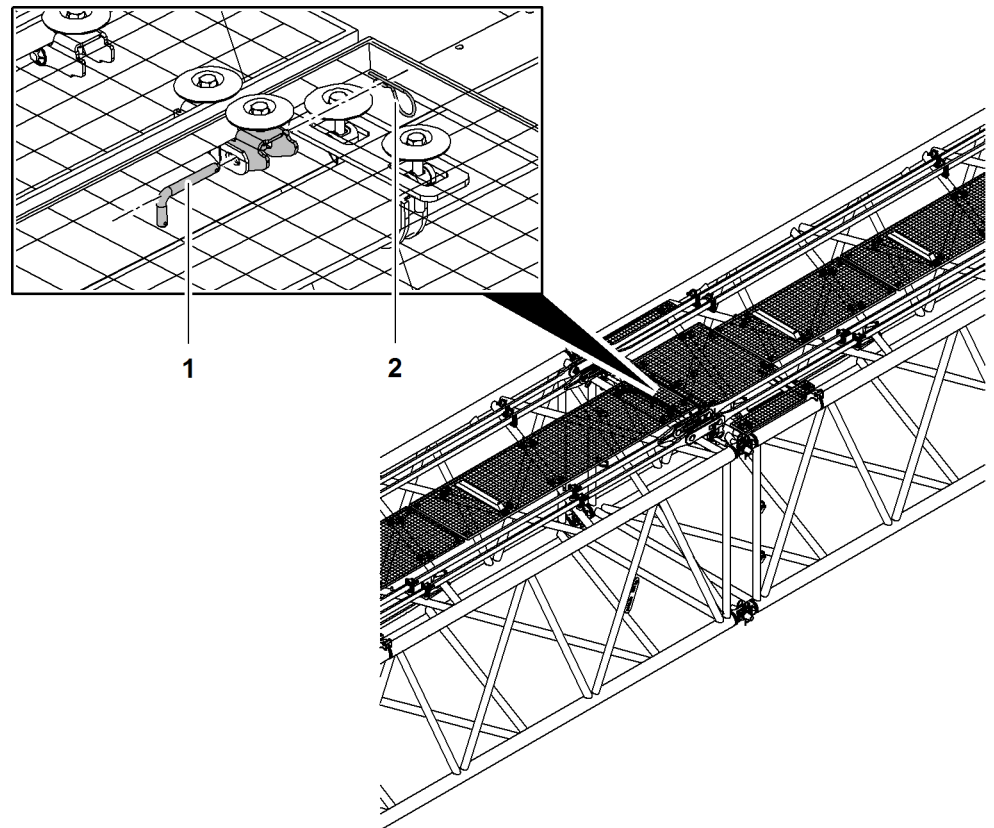


Fig. 3367: Connecting catwalks for booms (illustration of principle)

1 Pin (2x)

2 Spring cotter pin (2x)

When pin connection points of catwalks align:

- ▶ Insert pin 1 on both sides.
- ▶ Secure pins 1 with spring cotter pins 2.
- ▶ Repeat process with all boom components.

7.6.7 Connecting and checking boom fall arrest*



WARNING

Improper assembly of the boom fall arrest*!
Risk of falling off the boom.

- ▶ Ensure that the boom fall arrest* is in impeccable state.
 - ▶ Ensure that the boom fall arrest* is connected and secured between boom sections according to the specifications.
-
- ▶ Connect and check boom fall arrest* in accordance with additional documentation LIE-TAURUS.

7.6.8 Installing the rope guide

NOTICE

Wrong installation of rope guide!
Damage to rope.

- ▶ Install rope guide according to relevant system instructions.

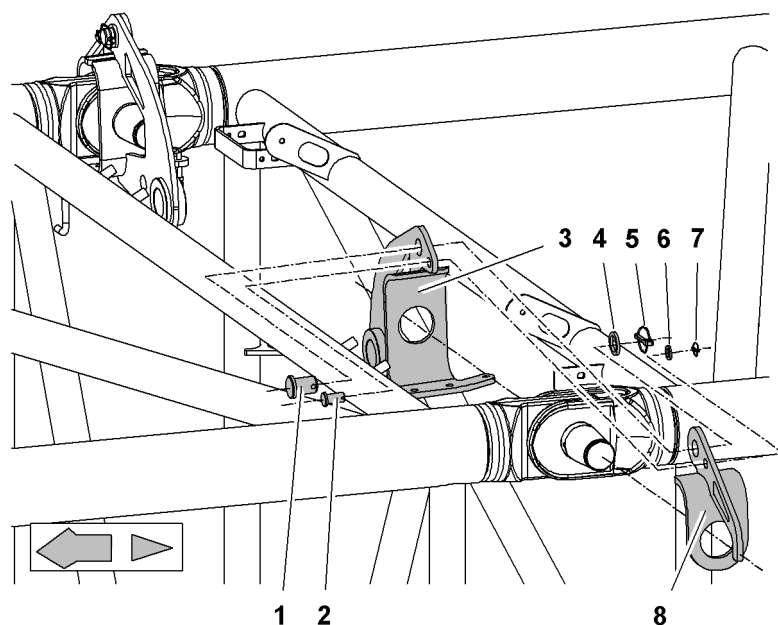


Fig. 3368: Installing forks of rope guide

- | | | | |
|---|-----------------------|---|-----------------------|
| 1 | Pin | 5 | Linchpin |
| 2 | Pin | 6 | Washer |
| 3 | Inner section of fork | 7 | Linchpin |
| 4 | Washer | 8 | Outer section of fork |

- ▶ Remove locking springs and washers from both sides of double-taper pin of boom pin connection.
- ▶ Mount inner and outer section of fork **3 + 8** on double-taper pin.
- ▶ Pin inner and outer part of fork **3 + 8**.
- ▶ Secure pins **1 + 2** with washers **4 + 6** and linchpins **5 + 7**.

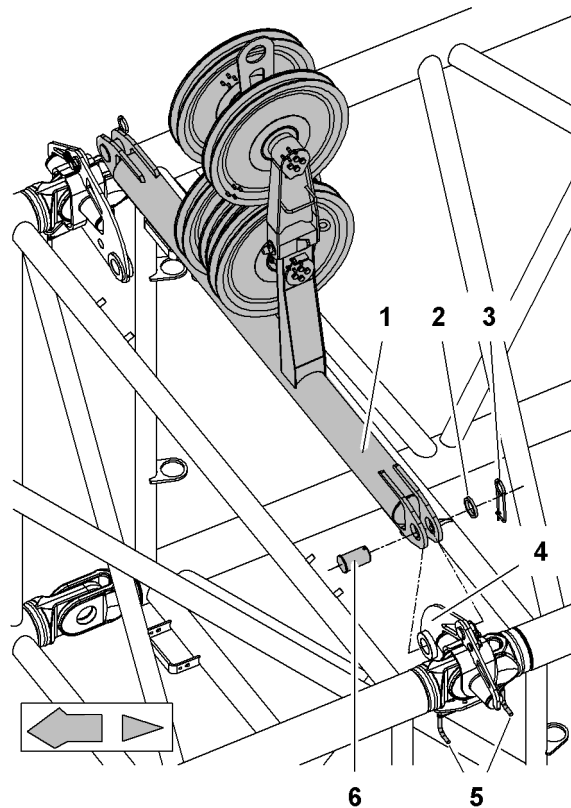


Fig. 3369: Mounting rope guide

1	Rope guide	4	Fork
2	Washer	5	Screw (2x)
3	Locking spring	6	Pin

- ▶ Pin rope guide 1 with fork 4.
- ▶ Secure pin 6 with washer 2 and locking spring 3.

If the installation position of the rope guide is identical with the installation position of the midpoint suspension:

- ▶ Pin mid-point suspension ropes to forks of rope guide.
- ▶ Secure pin with washer and locking spring.

NOTICE

Inadmissible fixation of the screws 5 before pinning the ropes of the midpoint suspension with the forks of the rope guide!
Risk of damage to components.

If ropes of mid-point suspension are pinned to forks of rope guide:

- ▶ Fix screws 5.
- ▶ Align rope guide vertically and fix with both screws 5 by hand.

7.6.9 Pinning pendant straps

- ▶ Remove locking springs of transport brackets for pendant straps.

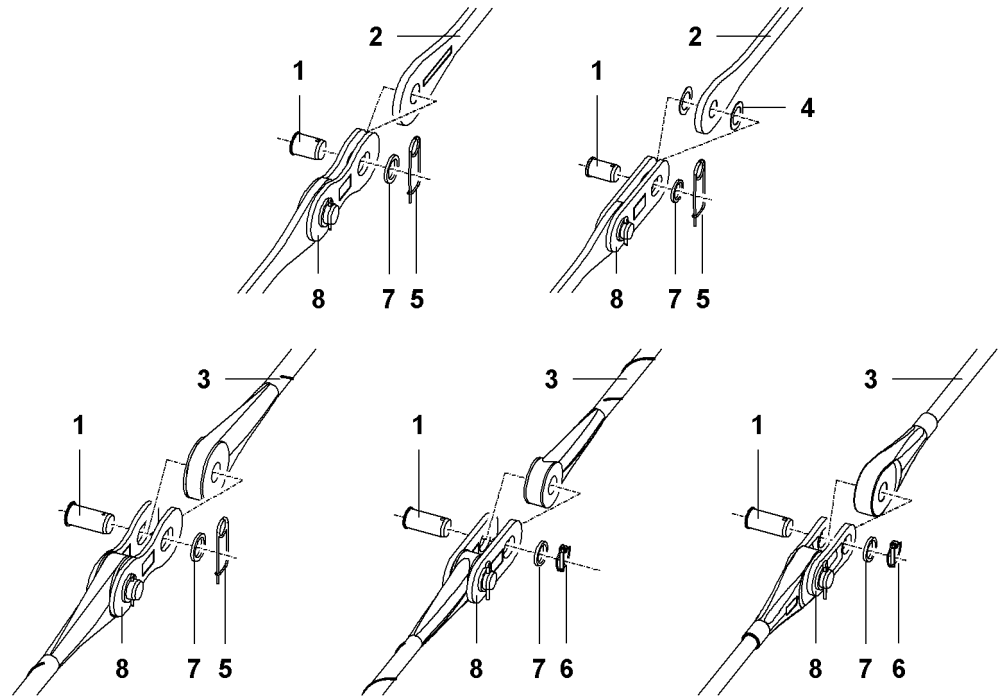


Fig. 3370: Pinning pendant straps (schematic display of different pendant straps)

1	Pin	5	Locking spring
2	Steel pendant strap	6	Linchpin
3	CF pendant strap	7	Washer
4	Plastic washer (2x)	8	Connecting link

- ▶ Remove pin 1 on connecting link 8.
- ▶ Position pendant strap 2, 3 between both connecting links 8.
or
- If the pendant strap is fitted with plastic washers 4:
Position pendant strap 2 with both-sided plastic washers 4 between both connecting links 8.
- ▶ Insert pin 1 and secure with washers 7 and locking spring 5 or linchpin 6.

7.6.10 Installing jib backstay straps

The jib backstay straps are transported on the main boom sections. If no jib will be installed, they can be removed.



Note

Higher load with deinstalled jib backstay straps!

- ▶ Observe foreword to the valid load chart.

If the jib backstay straps remain on the main boom:

- ▶ pin jib backstay straps together and secure with washers and locking springs.
- ▶ Pin connecting links on main boom head with jib backstay straps and secure with washers and locking spring.
- ▶ Pin connecting links on main boom base section with jib backstay straps and secure with washers and locking spring.
- ▶ Secure transport brackets for jib backstay straps with locking springs.

7.6.11 Installing the mid-point suspension

The lengths of the stay ropes and their assembly positions are shown in the relevant instructions for the boom.



Note

Special procedure for installing the mid-point suspension for main boom 2821 with main boom length of 80 m (262' 6" ft-in), 83 m (272' 4" ft-in) or 86 m (282' 2" ft-in) and installed jib 1507!

- ▶ Install midpoint suspension.



DANGER

Incorrect installation of mid-point suspensions!
Structural failure.

- ▶ Fit mid-point suspensions according to relevant system instructions.
- ▶ Assemble required length of stay ropes in line with system-relevant details.
- ▶ Remove locking springs and washers from both sides of double-taper pin of boom pin connection.
- ▶ Repeat process on opposite side.

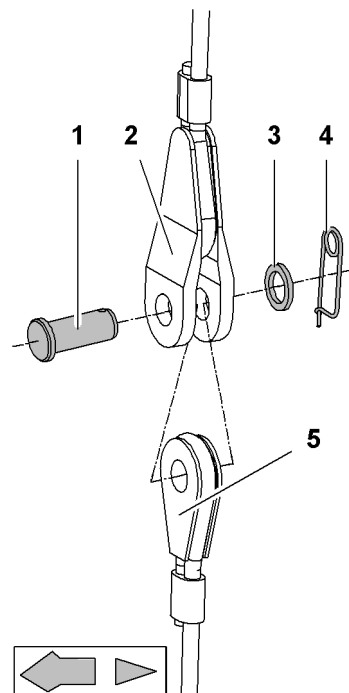


Fig. 3371: Pinning mid-point suspension stay ropes

- | | | | |
|---|---------------|---|------------------|
| 1 | Pin | 4 | Locking spring |
| 2 | Top stay rope | 5 | Bottom stay rope |
| 3 | Washer | | |

- ▶ Pin top stay rope 2 to bottom stay rope 5.
- ▶ Secure pin 1 with washer 3 and locking spring 4.

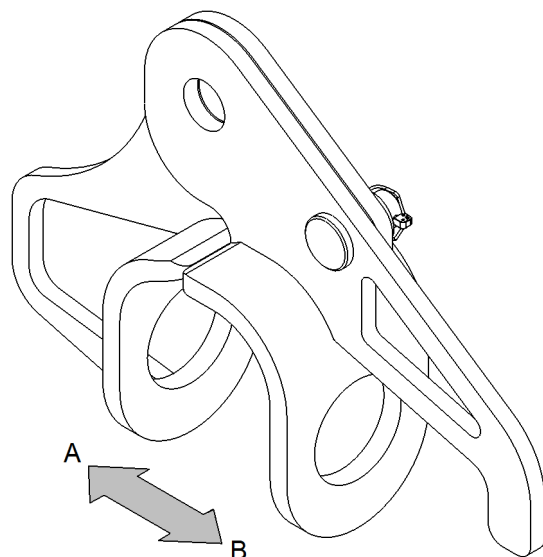


Fig. 3372: Mid-point suspension forks

A Main boom interior

B Main boom exterior

The forks may have different shapes. The permissible shape depends on the boom configuration (For more information see: 1 Product description, page 51) .

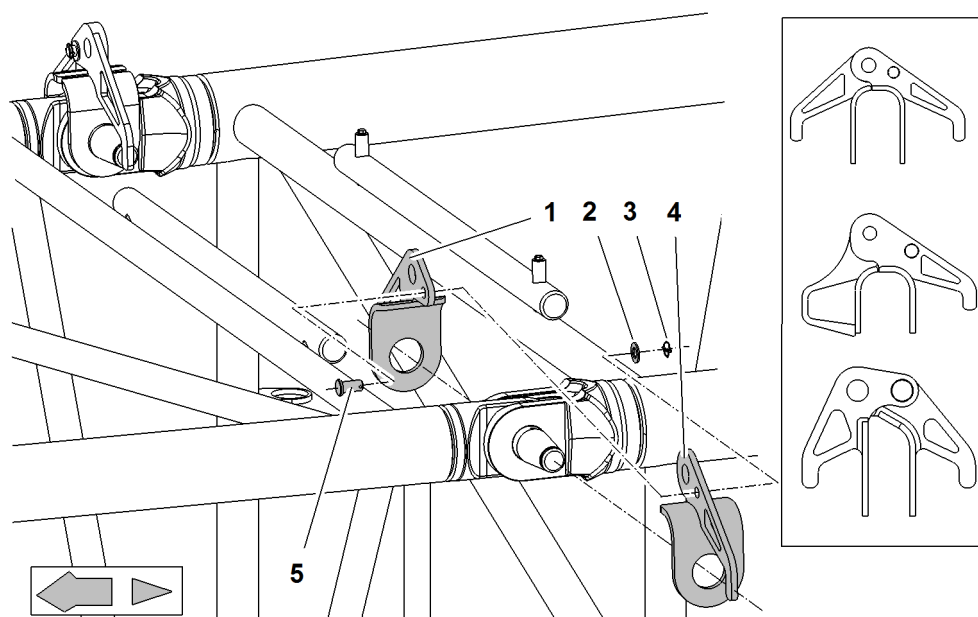


Fig. 3373: Assembling the mid-point suspension forks

1 Inner section of fork

2 Washer

3 Linchpin

4 Outer section of fork

5 Pin



Note

Special assembly procedure with identical installation position of mid-point suspension and rope guide on main boom!

► Replace mid-point suspension forks with rope guide forks.

► Mount inner section of fork 1 on double-taper pin.

- ▶ Mount outer section of fork **4** on double-taper pin.
- ▶ Pin inner section of fork **1** to outer section of fork **4**.
- ▶ Secure pin **5** with washer **2** and linchpin **3**.
- ▶ Repeat process on opposite side.

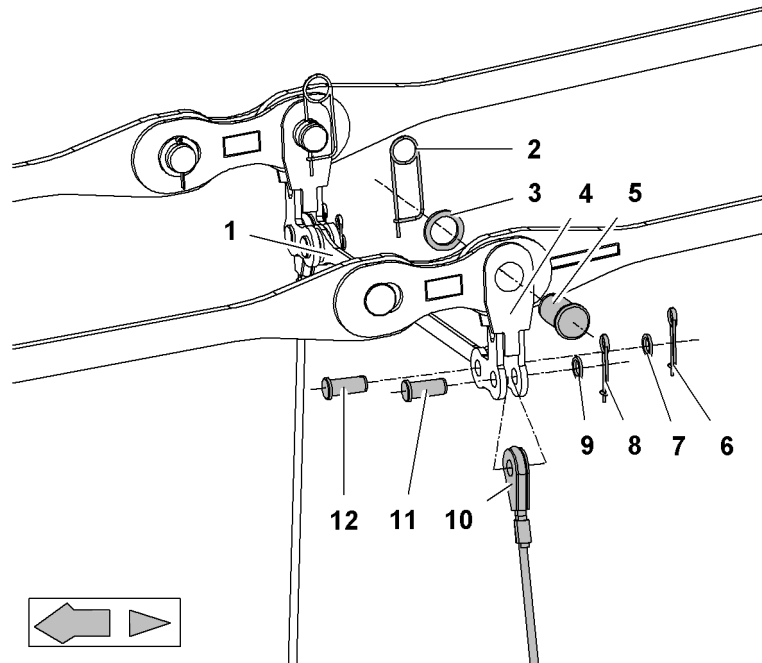


Fig. 3374: Installing the pendant straps, spacer bracket, connecting elements and mid-point suspension stay ropes

1	Spacer bracket	7	Washer
2	Locking spring	8	Locking spring
3	Washer	9	Washer
4	Connecting element	10	Stay rope
5	Pin for pendant strap	11	Pin for stay rope
6	Locking spring	12	Pin for spacer bracket

- ▶ Pin connecting element **4** to pendant strap.
- ▶ Secure pin **5** with washer **3** and locking spring **2**.
- ▶ Pin connecting element **4** to spacer bracket **1**.
- ▶ Secure pin **12** with washer **7** and locking spring **6**.
- ▶ Pin connecting element **4** to stay rope **10**.
- ▶ Secure pin **11** with washer **9** and locking spring **8**.
- ▶ Repeat process on opposite side.

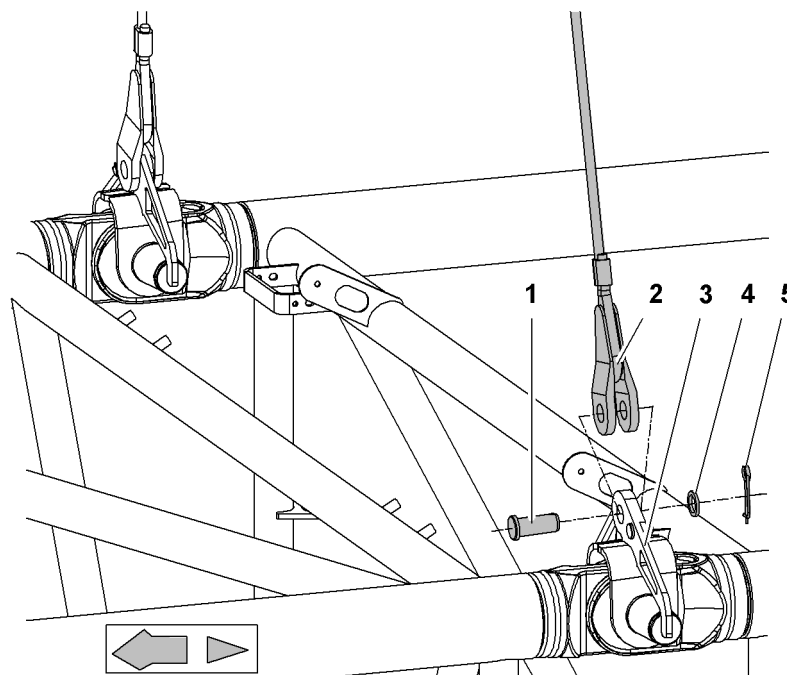


Fig. 3375: Pinning stay ropes to forks of mid-point suspension

- | | | | |
|---|-----------|---|----------------|
| 1 | Pin | 4 | Washer |
| 2 | Stay rope | 5 | Locking spring |
| 3 | Fork | | |

- ▶ Pin stay rope 2 to fork 3.
- ▶ Secure pin 1 with washer 4 and locking spring 5.
- ▶ Repeat process on opposite side.

7.6.12 Installing mid-point suspension (with main boom length 80 m (262 ft), 83 m (272 ft) und 86 m (282 ft) and attached jib 1507)

A main boom length of 80 m (262 ft), 83 m (272 ft) and 86 m (282 ft) and attached fixed jib 1507, the installation of the mid-point suspension represents a special case.



DANGER

Incorrect installation of mid-point suspensions!
Structural failure.

- ▶ Fit mid-point suspensions according to relevant system instructions.

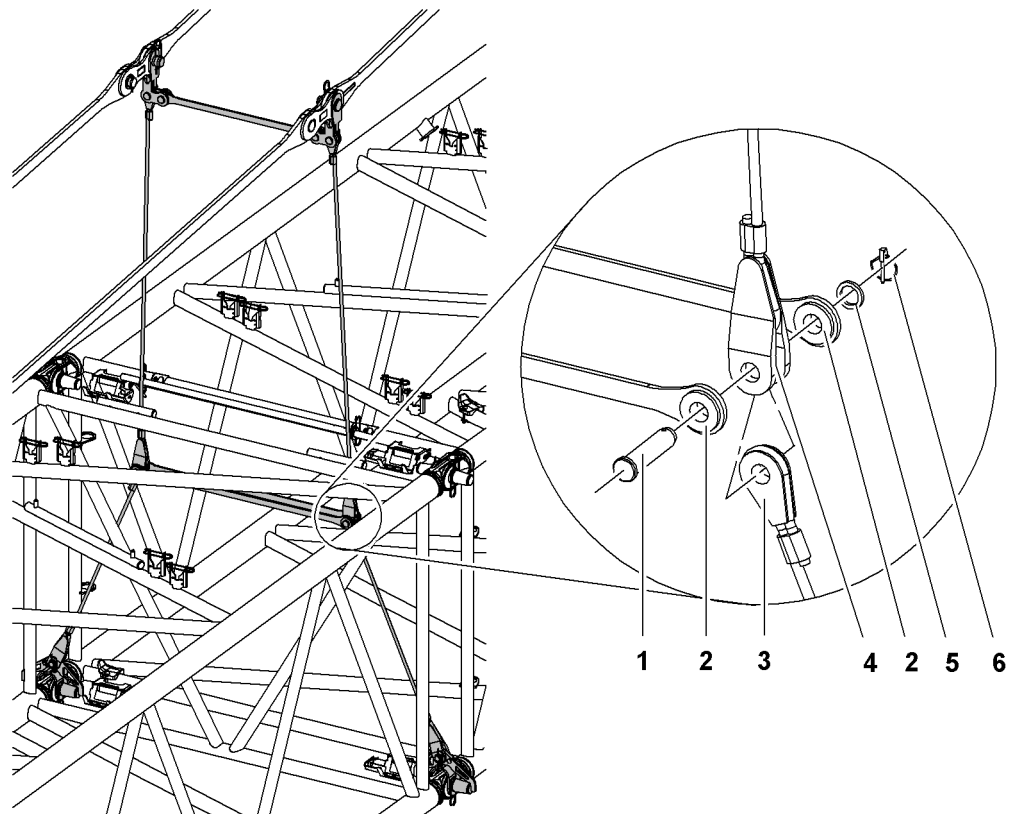


Fig. 3376: Pinning stay ropes to spacer brackets

- | | | | |
|---|------------------------|---|---------------|
| 1 | Pin for spacer bracket | 4 | Top stay rope |
| 2 | Spacer bracket (2x) | 5 | Washer |
| 3 | Bottom stay rope | 6 | Linchpin |

- ▶ Pin mid-point suspensions to pendant straps ([For more information see: Installing the mid-point suspension, page 1471](#)).
- ▶ Pin top stay rope 4 and bottom stay rope 3 to spacer bracket 2.
- ▶ Secure pin 1 with washer 5 and linchpin 6.
- ▶ Repeat process on opposite side.
- ▶ Pin mid-point suspension with main boom section ([For more information see: Installing the mid-point suspension, page 1471](#)).

7.6.13 Rigging and lifting the main boom base section



Note

If the jib has been attached using the self-assembly system:

- ▶ Assemble the fixed jib and attach it to the main boom before installing the main boom base section.
- ▶ Assemble the luffing jib prior to installing the main boom base section and install jib base section on main boom.



Note

Liebherr recommends:

- ▶ even if an assist crane is available, connecting the main boom base section to A-frame1 using the assembly cylinder is to be preferred.

Ensure that the following conditions are fulfilled:

- Work of the basic machine as assist crane is completed.

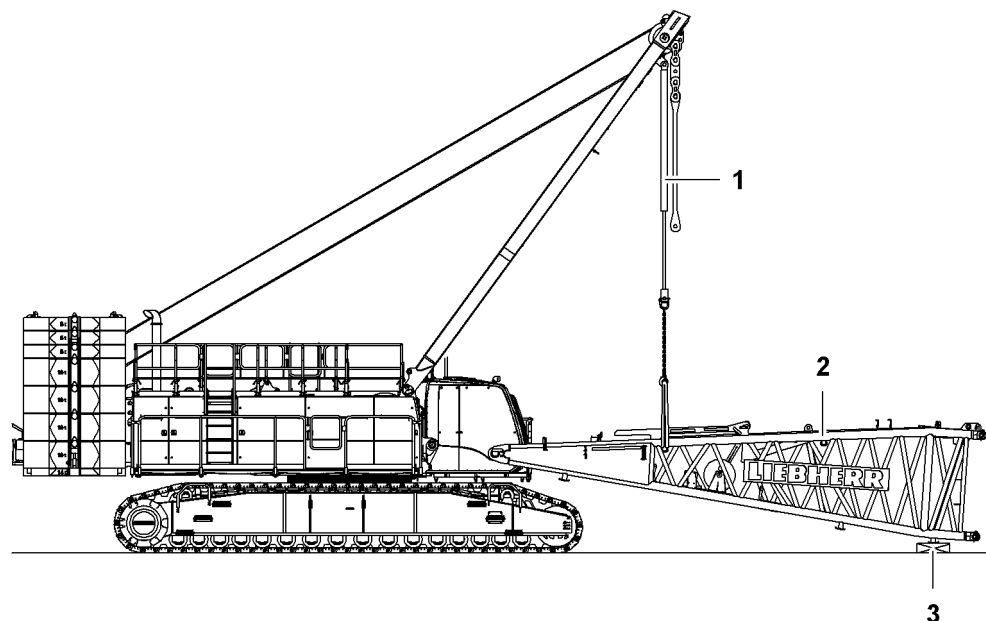


Fig. 3377: Rigging and lifting the main boom base section

- | | | | |
|---|------------------------|---|--------------|
| 1 | Assembly cylinder | 3 | Wooden block |
| 2 | Main boom base section | | |

- ▶ Support boom base section 2 front on wooden blocks 3.
- ▶ Rig main boom base section 2 to assembly cylinder 1.
- ▶ Lift main boom base section 2.

7.6.14 Attaching the boom base section to the uppercarriage



WARNING

Machine swings with a suspended load!
Crush, fatal injury.

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.

Ensure that the following conditions are fulfilled:

- Cylinder adjustment functions are switched on.
- ▶ Open the front right uppercarriage door.
- ▶ Plug in the cable remote control on the uppercarriage.

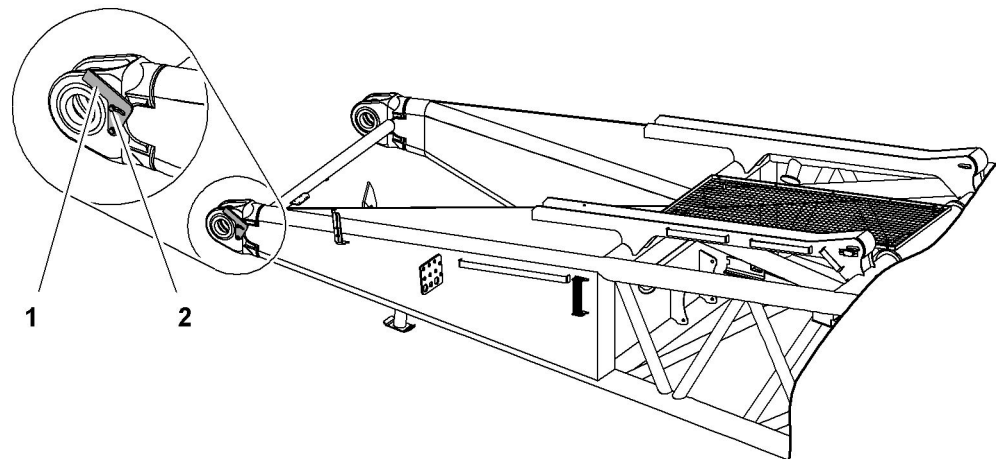


Fig. 3378: Fold up locking elements

- | | | | |
|----------|----------------------|----------|------------|
| 1 | Locking element (2x) | 2 | Screw (2x) |
|----------|----------------------|----------|------------|
- ▶ Undo screws **2**.
 - ▶ Fold up locking elements **1**.

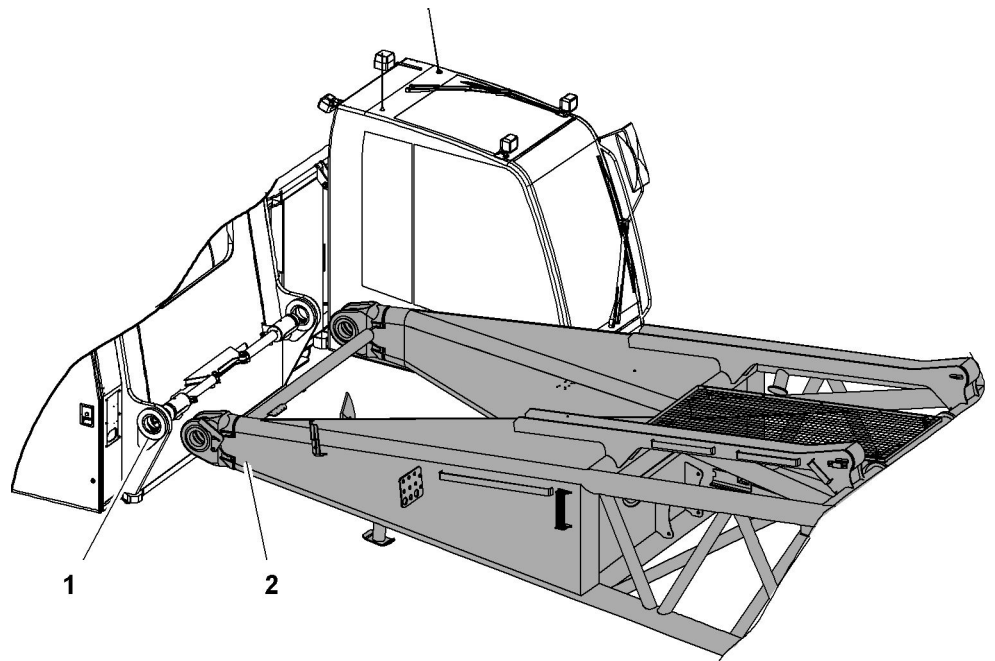


Fig. 3379: Positioning the boom base section

- | | | | |
|----------|------------------|----------|------------------------|
| 1 | Pivot point (2x) | 2 | Main boom base section |
|----------|------------------|----------|------------------------|

NOTICE

Main boom base section **2** swings!
Damage to cab.

- ▶ Ensure that an assistant guides the main boom base section **2** during installation.
-
- ▶ Align main boom base section **2** to uppercarriage pivot points **1**.

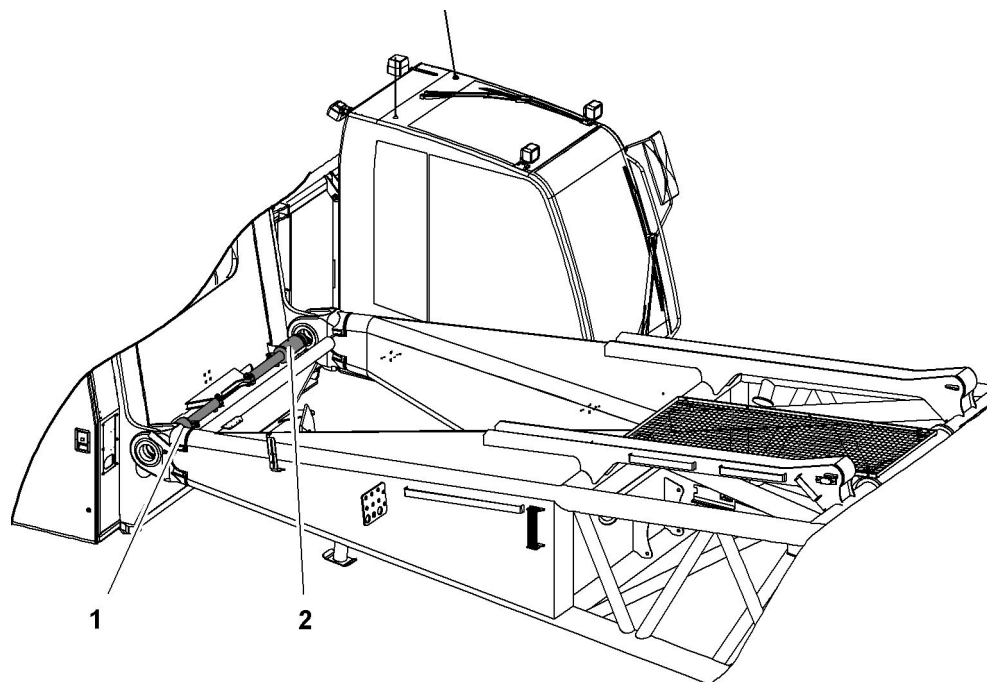


Fig. 3380: Extending the pin connection cylinder

1 Right-hand pin connection cylinder 2 Left-hand pin connection cylinder



CAUTION

Moving parts!
Crushing.

- ▶ Keep all limbs well clear of moving parts.

NOTICE

Incorrect procedure during bolting!
Pin connection cylinder and pin connection points may be damaged.

- ▶ Only extend the pin connection cylinder when the pin connection points on the boom base section and the uppercarriage are exactly aligned.

If the pin connection points of the main boom base section are flush with the pin connection points of the uppercarriage:

- ▶ Extend left pin connection cylinder **2** with cable remote control.
- ▶ Extend right pin connection cylinder **1** with cable remote control.

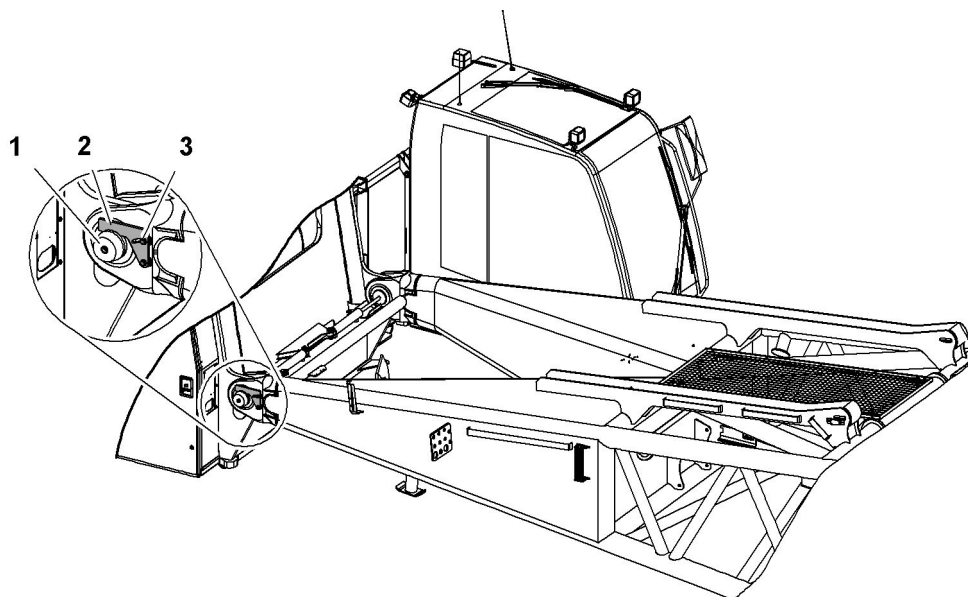


Fig. 3381: Secure pins with locking elements

- | | | | |
|---|----------------------|---|------------|
| 1 | Pin (2x) | 3 | Screw (2x) |
| 2 | Locking element (2x) | | |

- ▶ Fold locking element 2 into pin 1 notch.
- ▶ Securing the locking elements 2: tighten screws 3.
- ▶ Lower the boom base section to the ground or onto wooden blocks.
- ▶ Detach sling gear.
- ▶ Remove sling gear from assembly cylinder and stow it away.
- ▶ Unplug cable remote control on uppercarriage and stow away.
- ▶ Close the front right uppercarriage door.

7.6.15 Connecting hydraulic lines to the uppercarriage

Ensure the following conditions are met:

- Hand lever for multi-coupling is available.
- Diesel engine is turned off.

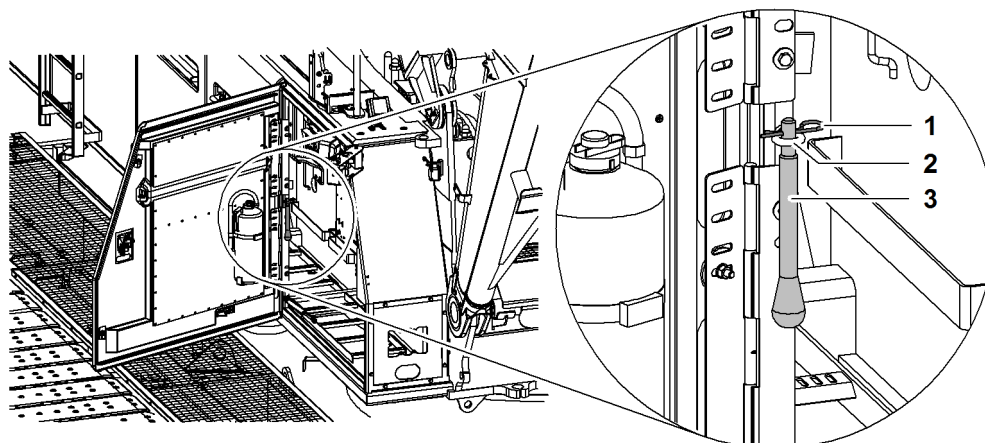


Fig. 3382: Transport bracket for hand lever of multi-coupling

- 1 Locking spring
- 2 Ring
- 3 Hand lever

- ▶ Lift hand lever 3 and remove locking spring 1.
- ▶ Remove hand lever 3 downwards from ring 2.

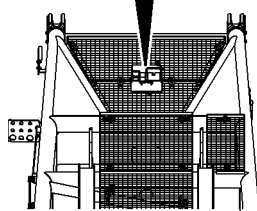
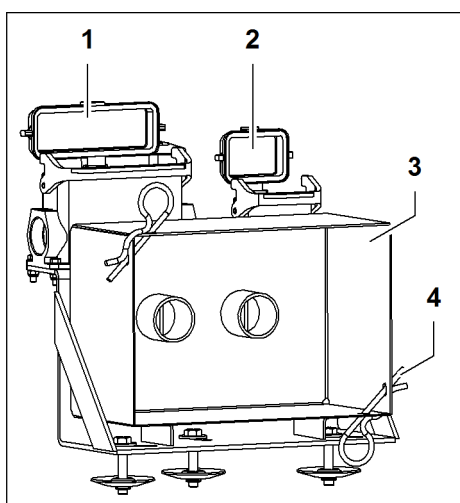


Fig. 3383: Transport position of the hydraulic pipes and electric cables on the main boom base section

- 1 Dummy socket for electrical system main boom base section
- 2 Dummy receptacle for electronics rope reeving winch
- 3 Cover of multi-coupling
- 4 Spring cotter pin

A mount for the cover **3** of the multi-coupling and dummy sockets for the electrical system are located on the catwalk of the main boom base section.

- ▶ Fit the hand lever of the multi-coupling.
- ▶ Remove spring cotter pin **4** on cover **3**.
- ▶ Turn hand lever in the direction of the arrow.
 - ▷ Multi-coupling can be taken out of mount.
 - ▷ Cover **3** remains in mounts on main boom base section.

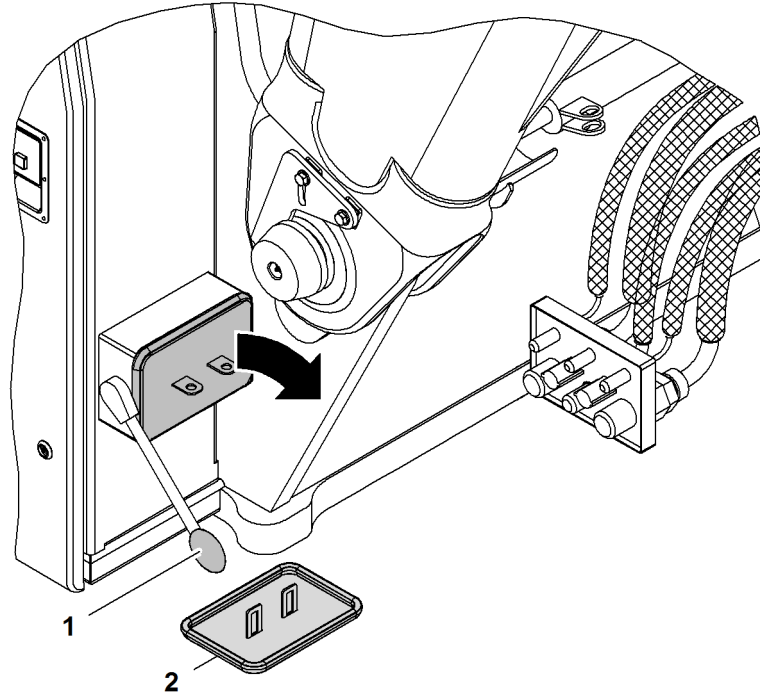


Fig. 3384: Removing the cover of the multi-couplings

- | | | | |
|----------|------------|----------|----------------|
| 1 | Hand lever | 3 | Cover |
| 2 | Cover | 4 | Locking spring |

- ▶ Fit the hand lever **1** of the multi-coupling.
- ▶ Remove the locking spring **4** on the cover **3**.
- ▶ Turn hand lever **1** in the direction of the arrow.
 - ▷ Cover **2** is loose.
- ▶ Mount cover **3** on bracket of the main boom base section and secure with locking spring.
- ▶ Stow away cover **2**.

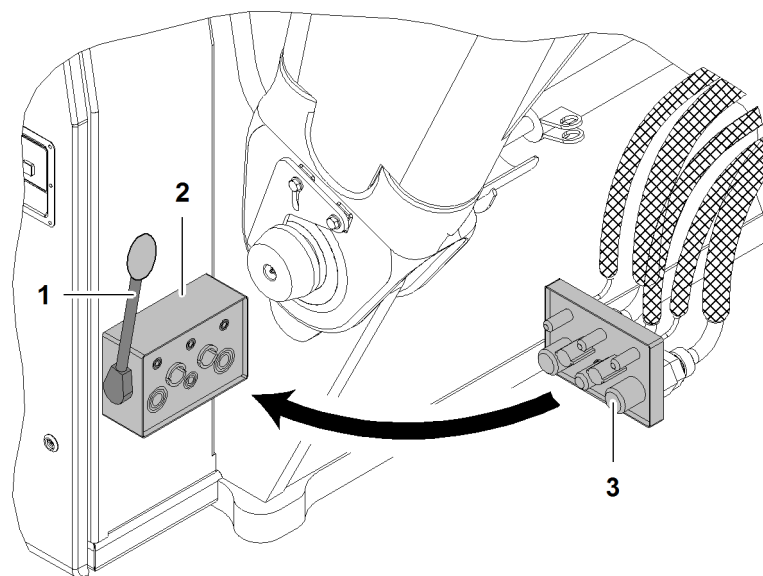


Fig. 3385: Connecting hydraulic lines to the uppercarriage

- | | |
|---|--|
| <p>1 Hand lever</p> <p>2 Multi-coupling (uppercarriage)</p> | <p>3 Multi-coupling (main boom base section)</p> |
|---|--|

NOTICE

Dirty multi-couplings!
Damage to hydraulic system.

► Clean multi-couplings before connecting.

- Connect multi-couplings 2 + 3.
- Move the hand lever 1 until the locking device engages.
 - ▷ Multi-couplings are visibly and audibly pulled together.
 - ▷ Multi-coupling indicating pins stick out:

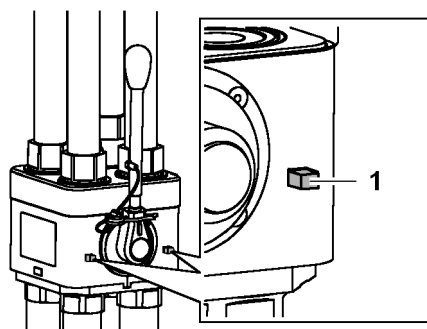


Fig. 3386: Latched multi-coupling

- 1 Indicating pin (2x)
- Deinstall hand lever 1 of multi-coupling.

7.6.16 Connecting electric lines with uppercarriage

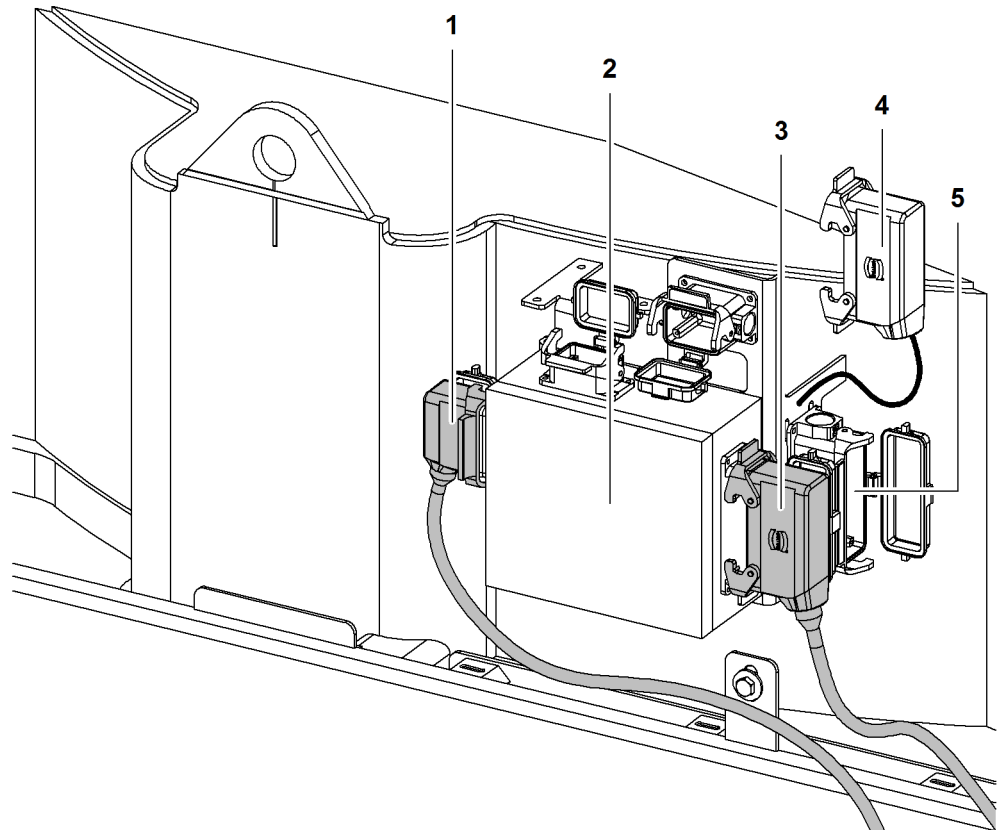


Fig. 3387: Connecting electric lines with uppercarriage

- | | | | |
|---|--|---|--------------|
| 1 | Electric line of jib luffing winch and/or rope reeving winch | 4 | Bypass plug |
| 2 | Electric box | 5 | Dummy socket |
| 3 | Electric line of main boom base section | | |

- ▶ Open right front uppercarriage door.
- ▶ Plug the bypass plug 4 into the dummy socket 5 and secure it with the retaining clips.
- ▶ Guide electrical line 3 of main boom base section through cable ducts on uppercarriage.
- ▶ Plug electric line 3 into electric box 2 and lock with brackets.
- ▶ Guide electrical line 1 of jib luffing winch through cable duct on uppercarriage.
- ▶ Plug electric line 1 into electric box 2 and lock with brackets.
- ▶ Close right front uppercarriage door.

7.6.17 Pinning the assembly cylinder to main boom base section

Ensure that the following conditions are fulfilled:

- Cylinder adjustment functions are switched on.

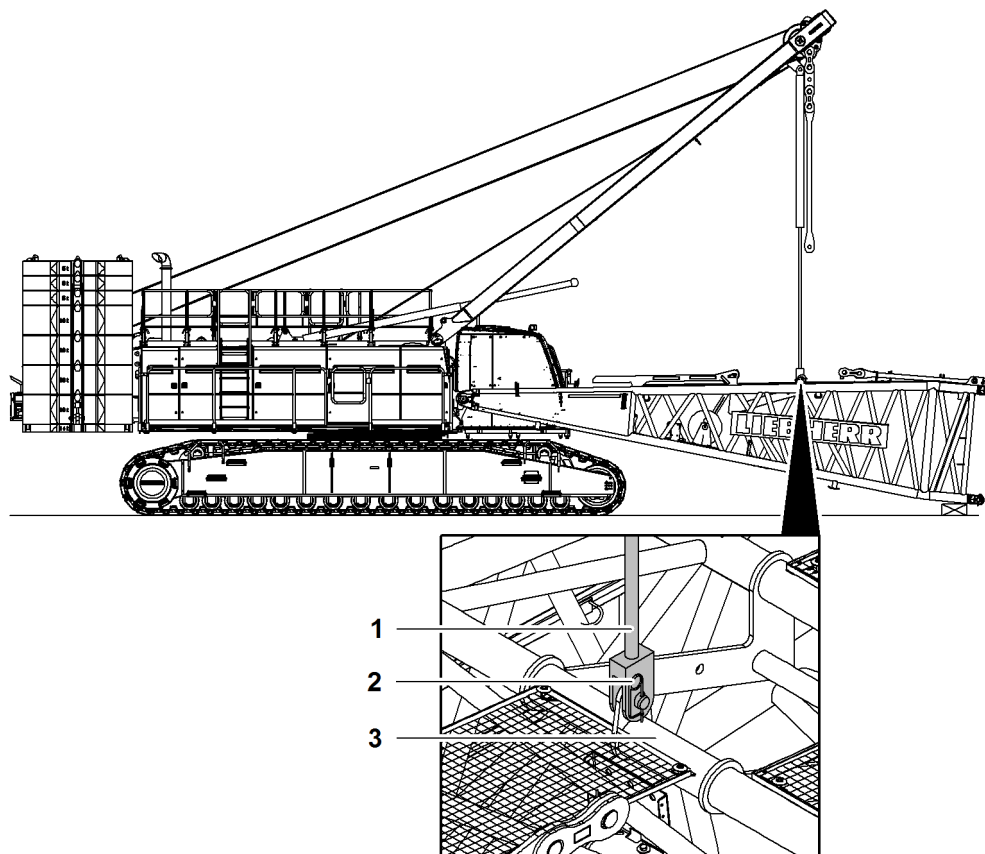


Fig. 3388: Pinning the assembly cylinder to main boom base section

- 1 Assembly cylinder
- 2 Locking spring
- 3 Main boom base section

- ▶ Unwind the boom winch.
 - ▷ A-frame1 lowers.
- ▶ Extend assembly cylinder 1.
- ▶ Pin assembly cylinder 1 to main boom base section 3.
- ▶ Secure pin with locking spring 2.

NOTICE

Lifting/lowering the main boom base section 3 with main boom luffing winch is not permitted!

Damage to main boom base section 3 and machine.

- ▶ Only lift or lower main boom base section 3 with assembly cylinder 1.
- ▶ Retract assembly cylinder 1.
 - ▷ Main boom base section 3 lifts.
- ▶ Press the switch *Extend tilting-back support cylinders* on control panel X12 until the tilting-back support cylinders are completely extended.



7.6.18 Folding the front feet of the main boom base section upwards

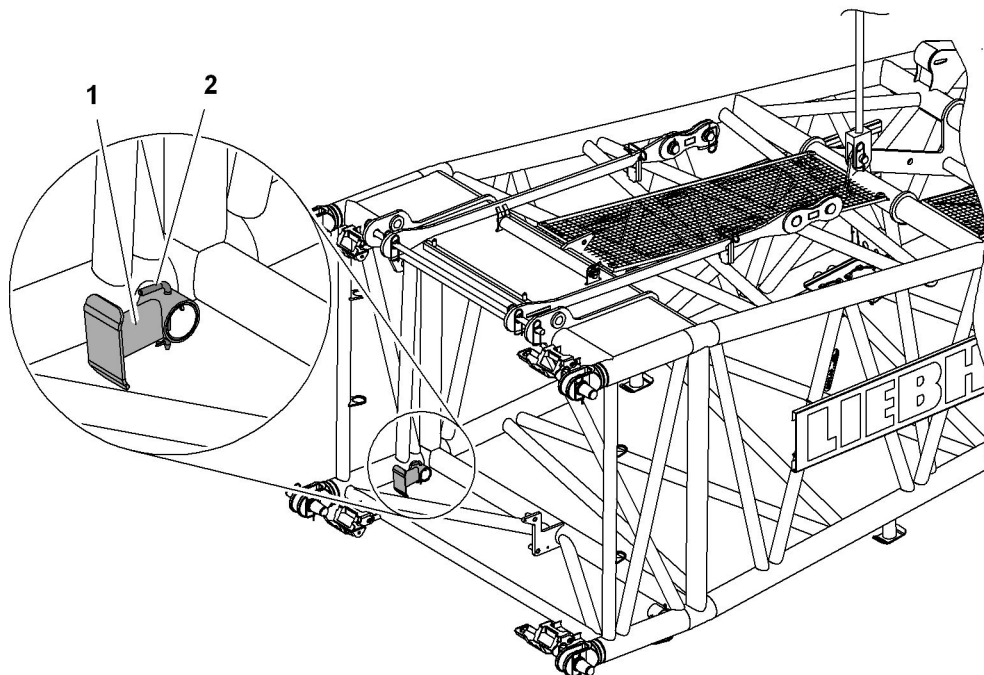


Fig. 3390: Folding the front feet of the main boom base section upwards

1 Front foot (2x) 2 Locking element (2x)

- ▶ Fold front feet 1 up by 90°.
- ▶ Secure front feet 1 with locking elements 2.

7.6.19 Bolting the boom base section to the main boom

Ensure that the following conditions are fulfilled:

- Front feet are folded up.
- ▶ Maneuver the basic machine to the main boom.

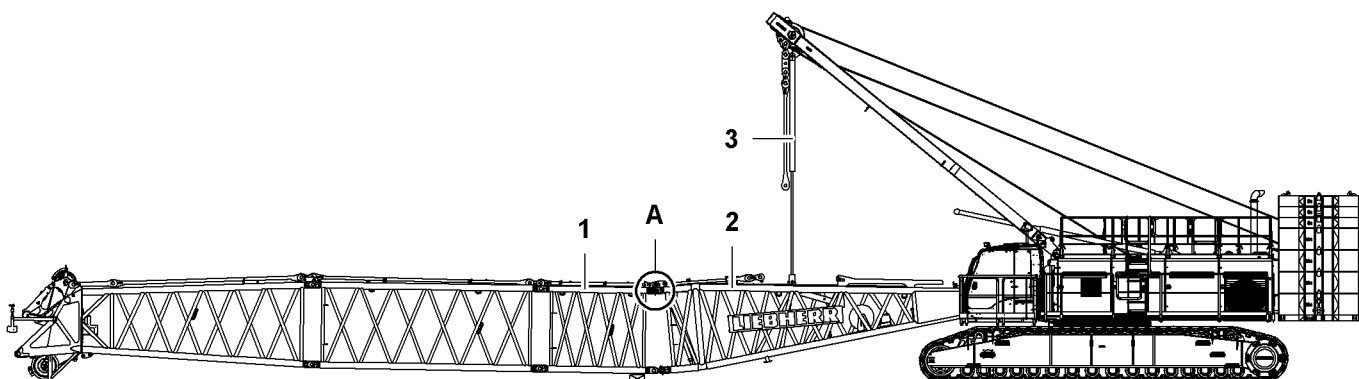


Fig. 3391: Pin main boom base section to main boom at the top

1 Main boom 3 Assembly cylinder
2 Main boom base section A Top pin connection point (2x)

- ▶ Extend or retract assembly cylinder 3 until the top pin connection points A of the main boom base section 2 and the main boom 1 are flush.

Assembly of main boom without derrick equipment*

- ▶ Pin main boom base section **2** with main boom **1** to top pin connection points **A**.
- ▶ Secure the double-taper pins with washers and safety pins.

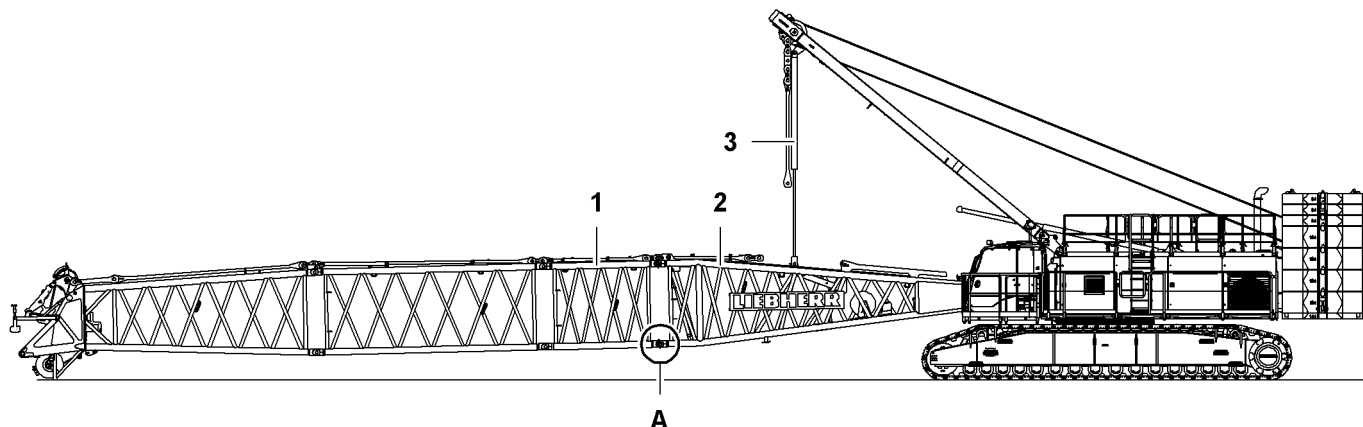


Fig. 3392: Pinning the main boom base section to the main boom at the bottom

- | | | | |
|----------|------------------------|----------|-------------------------------------|
| 1 | Main boom | 3 | Assembly cylinder |
| 2 | Main boom base section | A | Bottom pin connection point
(2x) |

NOTICE

Unauthorized raising of main boom **1** with assembly cylinder **3**!
Damage to main boom **1** and assembly cylinder **3**.

- ▶ Only retract assembly cylinder **3** so far that pinning the bottom pin connection points **A** on the main boom base section **2** is still possible.
-
- ▶ Retract assembly cylinder **3** until the bottom pin connection points **A** of the main boom base section **2** and the main boom **1** are flush.
 - ▶ Pin main boom base section **2** with main boom **1** to bottom pin connection points **A**.
 - ▶ Secure the double-taper pins with washers and safety pins.
 - ▶ Detach assembly cylinder **3** from main boom base section **2**.
 - ▶ Retract assembly cylinder **3**.

7.6.20 Bolting the equalizer on A-frame 1 to the main boom pendant straps

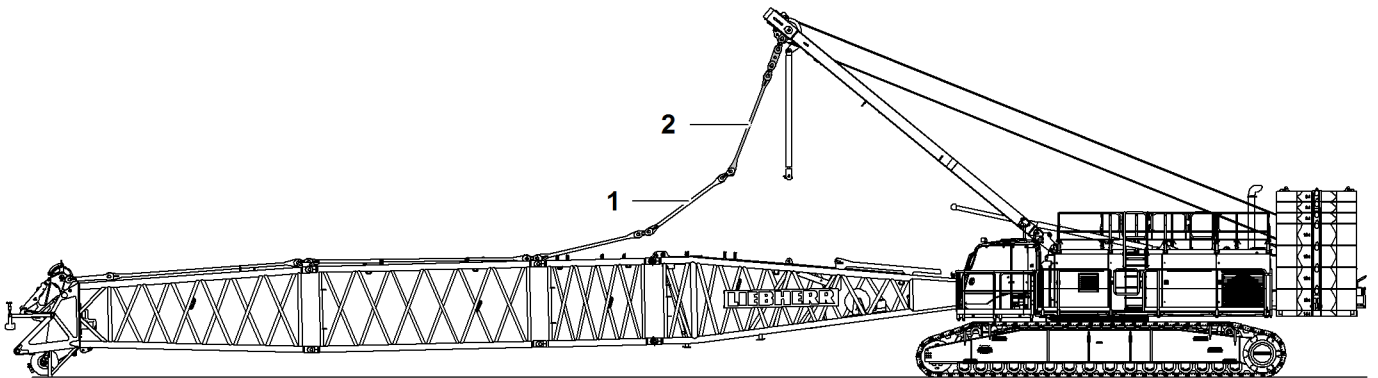


Fig. 3393: Pinning the equalizer on A-frame1 to the main boom pendant straps

- 1 Main boom pendant straps 2 A-frame1 equalizer

- ▶ Lower A-frame1 until equalizer of A-frame1 2 and main boom pendant straps 1 can be pinned together.
- ▶ Pin A-frame1 equalizer 2 to main boom pendant straps 1.
- ▶ Secure the pins with washers and safety pins.

7.6.21 Installing auxiliary jib (36 t (79300 lb)) on main boom head

Make sure that the camera mount (if available) on the main boom head is deinstalled.

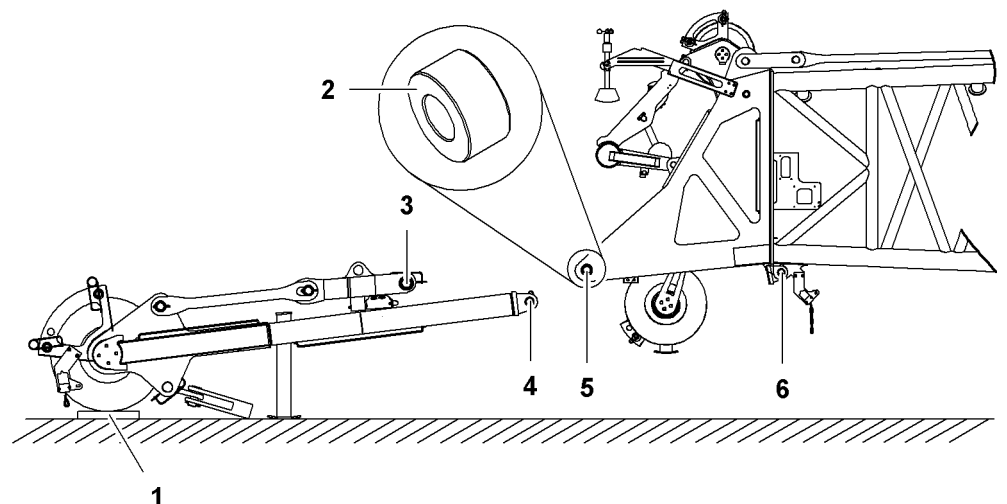


Fig. 3394: Positioning auxiliary jib (36 t (79300 lb)) in front of main boom head and inserting bushes

- | | | | |
|---|--|---|--|
| 1 | Wooden block | 4 | Lower pin connection point auxiliary jib (2x) |
| 2 | Bush (Ø 80 mm (3.15" in) x Ø 40 mm (1.57" in) x 43 mm (1.69" in)) (2x) | 5 | Upper pin connection point main boom head (2x) |

See next page for continuation of the image legend

- | | |
|---|--|
| <p>3 Upper pin connection point auxiliary jib (2x)</p> <ul style="list-style-type: none"> ▶ Position the auxiliary jib in front of the main boom head. ▶ Protecting the rope pulley: Lay a wooden block 1 under the auxiliary jib rope pulley. ▶ Insert bushes (Ø80 mm (3.15" in) x Ø40 mm (1.57" in) x 43 mm (1.69" in)) into the upper pin connection points 5 of the main boom head. ▶ Lift the main boom and move it towards the auxiliary jib until the upper pin connection points 3 on the auxiliary jib match the upper connection points of the 5 main boom head. | <p>6 Lower pin connection point main boom head (2x)</p> |
|---|--|

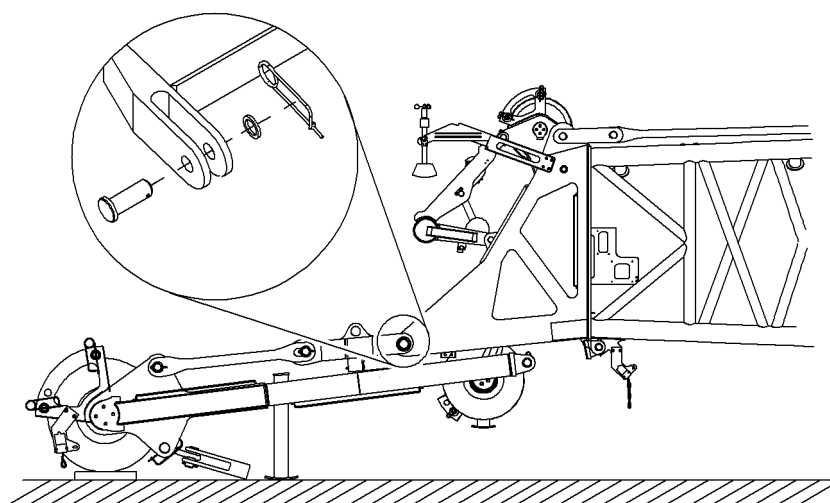


Fig. 3395: Pinning top pin connection points

- ▶ Pin top pin connection points and secure with washer and locking spring.

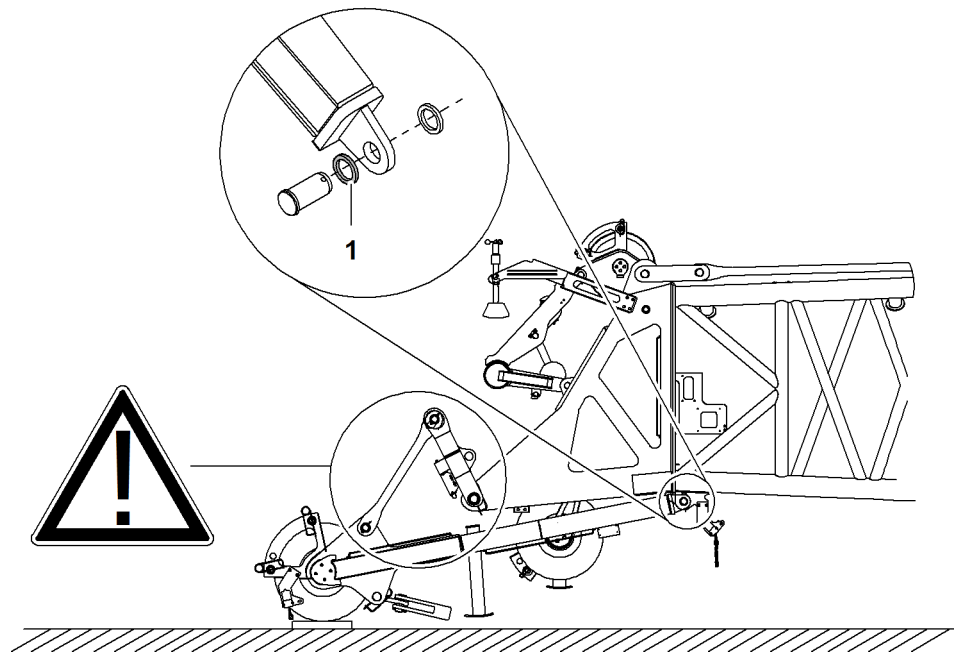


Fig. 3396: Pinning the lower pin connection points

1 Washer 8 mm (0.31" in) (2x)

The washer 8 mm (0.31" in) **1** serves to center the auxiliary jib on the main boom head.

NOTICE

Wrong positioning of auxiliary jib pendant straps!
Damage to auxiliary jib and rope pulleys on main boom head.

- ▶ Ensure that auxiliary jib pendant straps fold up.
-
- ▶ Move the main boom towards the auxiliary jib until the bottom pin connection points **4** on the auxiliary jib match the bottom connection points of the **6** main boom head.

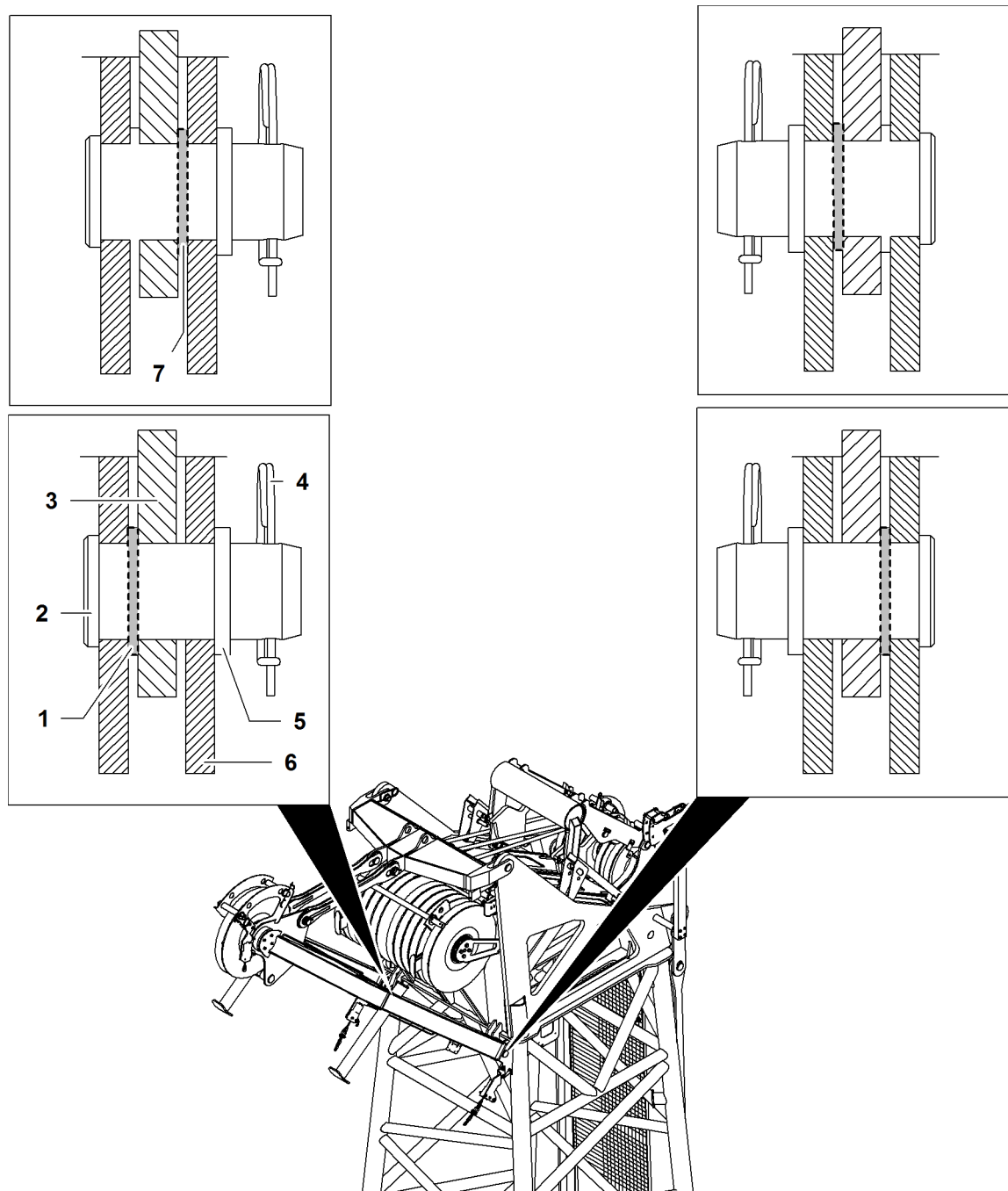


Fig. 3397: Installation notes auxiliary jib

- | | | |
|---|--|---|
| <p>1 Washer 8 mm (0.31" in) (installation site on the outside) (2x)</p> <p>2 Pin (2x)</p> <p>3 Pin connection lug auxiliary jib (2x)</p> | <p>4 Locking spring (2x)</p> <p>5 Washer (2x)</p> <p>6 Pin connection lug main boom head (4x)</p> | <p>7 Washer 8 mm (0.31" in) (installation site on the inside) (2x)</p> |
|---|--|---|

The washers 8 mm (0.31" in) must be installed both-sided on the outside (installation site outside **1**) or both-sided on the inside (installation site inside **7**).

- ▶ Push pin **2** and washer 8 mm (0.31" in) **1** through the pin connection lug **3** and the pin connection lug **6**.
- ▶ Place washer **5** on pin **2** and secure with locking spring **4**.
 - ▷ Lower pin connection points pinned and secured.

7.6.22 Installing hoist limit switch on auxiliary jib (36 t (79300 lb))

Installation of the hoist limit switch on the auxiliary jib (36 t (79300 lb)) is identical to the installation on the main boom or jib ([For more information see: Installing the hoist limit switch weight, page 1517](#)).

Connecting the hoist limit switch

The electric cable to the hoist limit switch is connected for transport to a dummy socket on the inside of one of the two auxiliary jib support tubes.

- ▶ Disconnect the bypass plug from the terminal box on the main boom head.
- ▶ Disconnect the electric cable for the hoist limit switch from the dummy socket and connect it to the terminal box on the main boom head.
- ▶ Secure the electric cable to the hoist limit switch with retaining brackets.
- ▶ Plug the bypass plug into the dummy socket and secure it with the retaining brackets.

7.6.23 Folding down the link plates for the 11th rope pulley

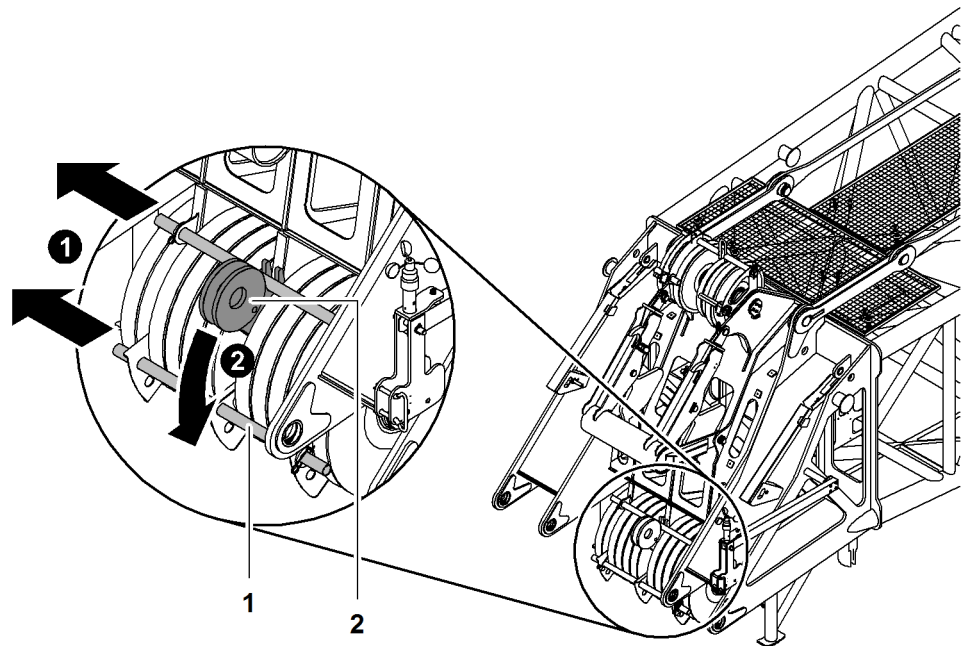


Fig. 3398: Folding down the link plates for the 11th rope pulley

1 Rope protection pipe (2x)

2 Link plate (2x) for 11th rope pulley

NOTICE

Wrong position of link plates **2** for 11th rope pulley on main boom head!
Risk of damage to winch2 rope.

- ▶ Fold down link plates **2** for 11th rope pulley.

- ▶ Remove rope protection pipes **1** on main boom head.

- ▶ Fold down link plates **2** for 11th rope pulley.

7.6.24 Installing second rope pulley* for triple reeving of auxiliary jib (36 t (79300 lb))

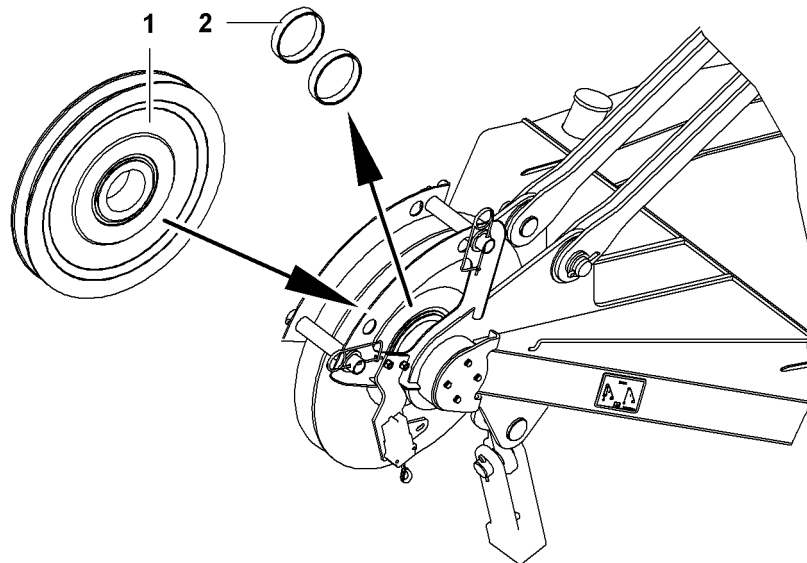


Fig. 3399: Installing second rope pulley for triple reeving of auxiliary jib (36 t (79300 lb))

- | | |
|------------------------------------|--|
| <p>1 Second rope pulley</p> | <p>2 Bushes (Ø168 mm (6.61" in) x Ø140 mm (5.51" in) x 40 mm (1.57" in)) (2x)</p> |
|------------------------------------|--|

- ▶ Remove bushes (Ø 168 mm (6.61" in) x Ø140 mm (5.51" in) x 40 mm (1.57" in)) **2**.
- ▶ Install second rope pulley.

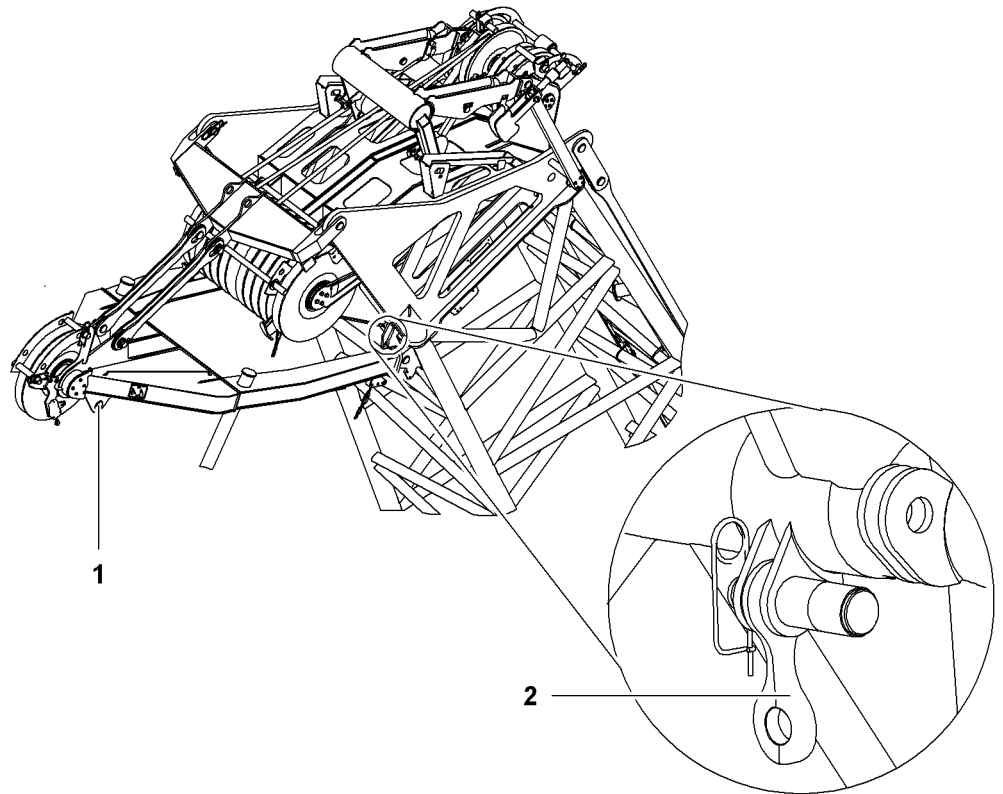


Fig. 3400: Installing cross link with pin on main boom head

1 Rope fixing point of auxiliary jib 2 Cross link with pins

NOTICE

Inadmissible position of cross link with pins 2 on auxiliary jib rope fixing point 1 with triple reeving!

Risk of damage to winch2 rope.

- ▶ Install cross link with pins on main boom head.
-
- ▶ Deinstall cross link with pins 2 from auxiliary jib rope fixing point 1.
 - ▶ Install cross links with pins 2 on main boom head.

7.6.25 Connect the electric cables

NOTICE

Incorrect handling of electric lines!

Damage to electric line and plug.

- ▶ Do not pull electric line over sharp-edged objects.
 - ▶ Do not crush or kink electric line.
 - ▶ Keep the plug clean.
-
- ▶ Unplug both electric lines on terminal box of main boom base section.

NOTICE

Improper unwinding of electric line!
 Damage to electric line.

- ▶ Slide electric line into cable drum on lateral opening of cable drum.
- ▶ Undo pin on cable drum axis.
- ▶ Unwind electric line on cable drum and pull to main boom head inside main boom.
- ▶ Plug in electric line on terminal box of main boom head and lock with retaining brackets.

There are two attachment holes beneath the terminal box for plug strain relief.

- ▶ Hinge both carabiners on cable sleeves in attachment holes.
- ▶ Fixate pin on cable drum axis.
- ▶ Plug electric line in cable drum into main boom base section terminal box again.
 - ▷ Electric line of main boom base section and main boom head connected.

If an auxiliary jib is installed:

- ▶ Plug in electric cable of auxiliary jib at main boom head.

7.6.26 Installing the aircraft warning light



Note

Use of the aircraft warning light is prescribed by national or regional regulations!

- ▶ Inform yourself about national and local regulations prior to using the machine.

Make sure the following conditions are met:

- Anemometer is not installed.

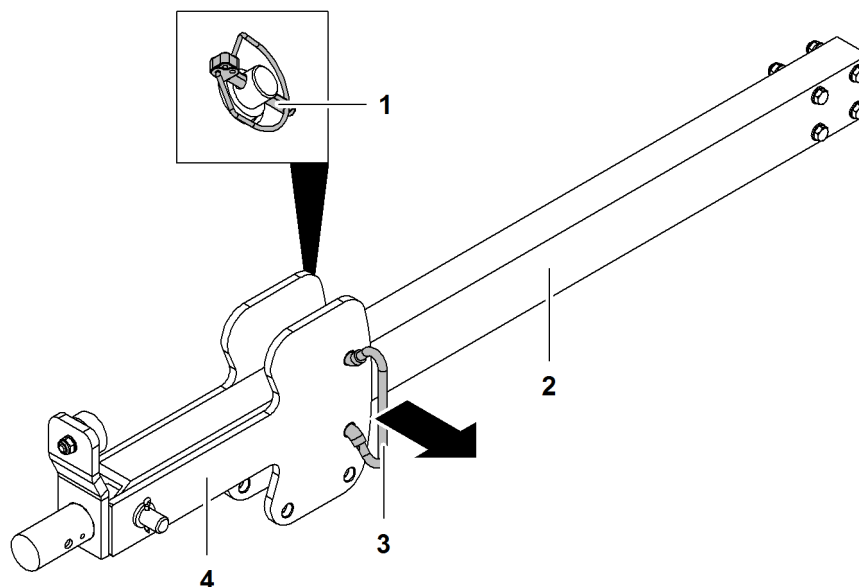


Fig. 3401: Moving the pendulum into the working position

- | | | | |
|---|---------------|---|-----------------|
| 1 | Linchpin (2x) | 3 | Locking element |
| 2 | Mount | 4 | Pendulum |

The pendulum 4 is secured on the mount 2 for machine transport.

- ▶ Remove the linchpin **1** of the locking element **3**.
- ▶ Remove **3** locking element.
- ▶ Swing pendulum **4** down.
- ▶ Slide locking element **3** through pendulum **4** and secure with linchpins **1**.

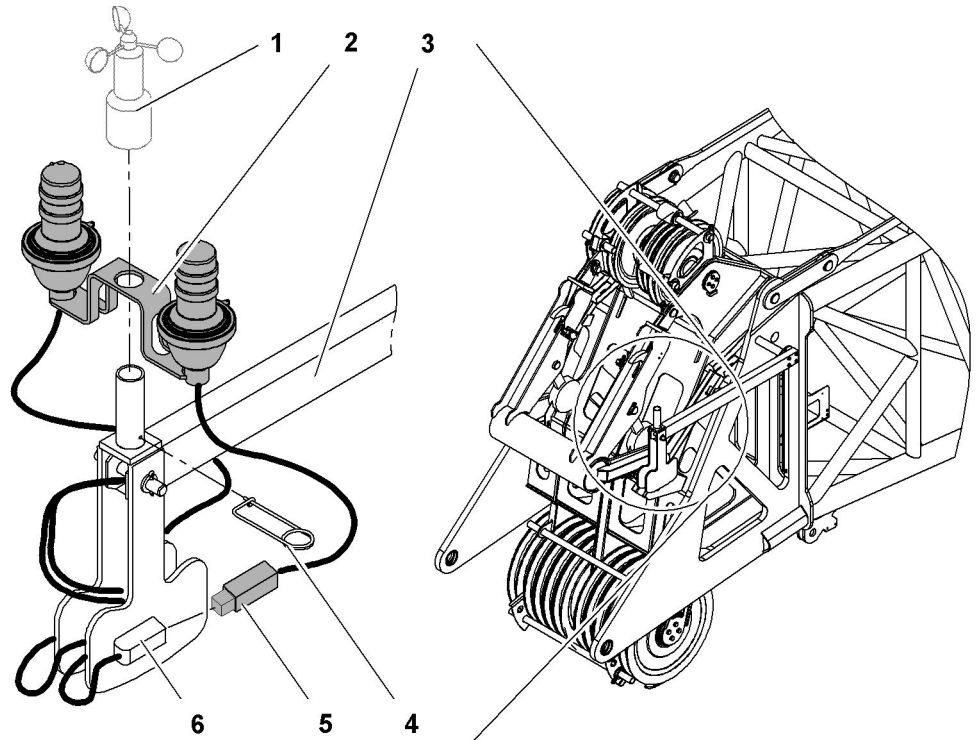


Fig. 3402: Installing the aircraft warning light

- | | | | |
|----------|------------------------|----------|----------------|
| 1 | Anemometer | 4 | Locking spring |
| 2 | Aircraft warning light | 5 | Plug |
| 3 | Mount | 6 | Coupling |

- ▶ Place aircraft warning light **2** on pipe.
 - ▷ Aircraft warning light is secured by the pipe and axis on the mount **3**.

NOTICE

Wrong insertion of locking spring!
Damage to electric cable.

- ▶ Carefully push through locking spring.

- ▶ Push through locking spring **4**.
 - ▷ Aircraft warning light **2** is secured.
- ▶ Connect plug **5** with coupling **6**.
- ▶ Lock plug **5**.

7.6.27 Installing anemometer

Make sure the following conditions are met:

- Aircraft warning light is installed (if available).

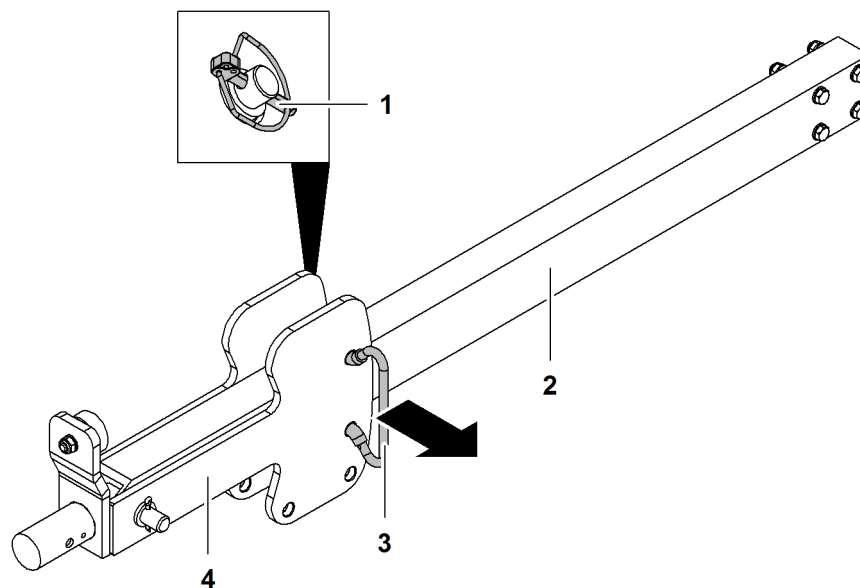


Fig. 3403: Moving the pendulum into the working position

- | | | | |
|---|---------------|---|-----------------|
| 1 | Linchpin (2x) | 3 | Locking element |
| 2 | Mount | 4 | Pendulum |

The pendulum 4 is secured on the mount 2 for machine transport.

- ▶ Remove the linchpin 1 of the locking element 3.
- ▶ Remove 3 locking element.
- ▶ Swing pendulum 4 down.
- ▶ Slide locking element 3 through pendulum 4 and secure with linchpins 1.

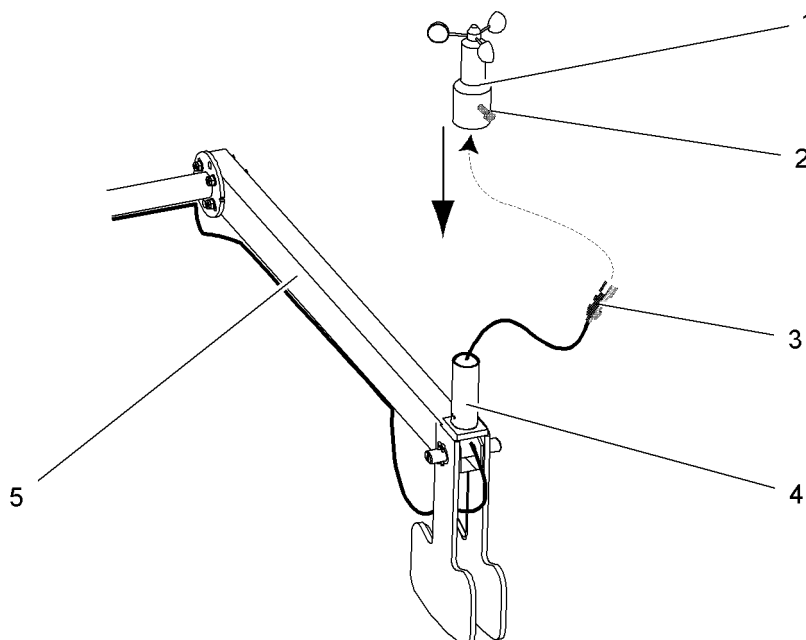


Fig. 3404: Installing anemometer

- | | | | |
|---|------------|---|-------|
| 1 | Anemometer | 4 | Pipe |
| 2 | Screw | 5 | Mount |
| 3 | Plug | | |

- ▶ Remove protective cap of plug 3.
- ▶ Plug in plug 3 on the bottom of the anemometer 1.
- ▶ Secure plug 3 with nut.

NOTICE

Improper installation of anemometer!
Damage to electric cable.

- ▶ Pull protruding electric cable through pipe before attaching anemometer.

- ▶ Mount anemometer 1 on pipe 4.
- ▶ Securing the anemometer on the mount: Tighten screw 2.

The rotor of the anemometer must be easy to turn.

- ▶ Testing the anemometer: Slightly turn rotor and watch value on monitor.
 - ▷ Wind speed value increases.

7.6.28 Moving the lightning rods* into working position

Installation positions of lightning rods on main boom head

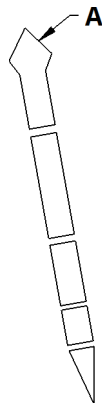


Fig. 3405: Installation positions of lightning rods on main boom head

A Main boom head

Boom configuration	Number of lightning rods	Installation positions
Main boom	1	A

Tab. 522: Installation positions and number of lightning rods on main boom head

Moving the lightning rods* on the main boom head into working position

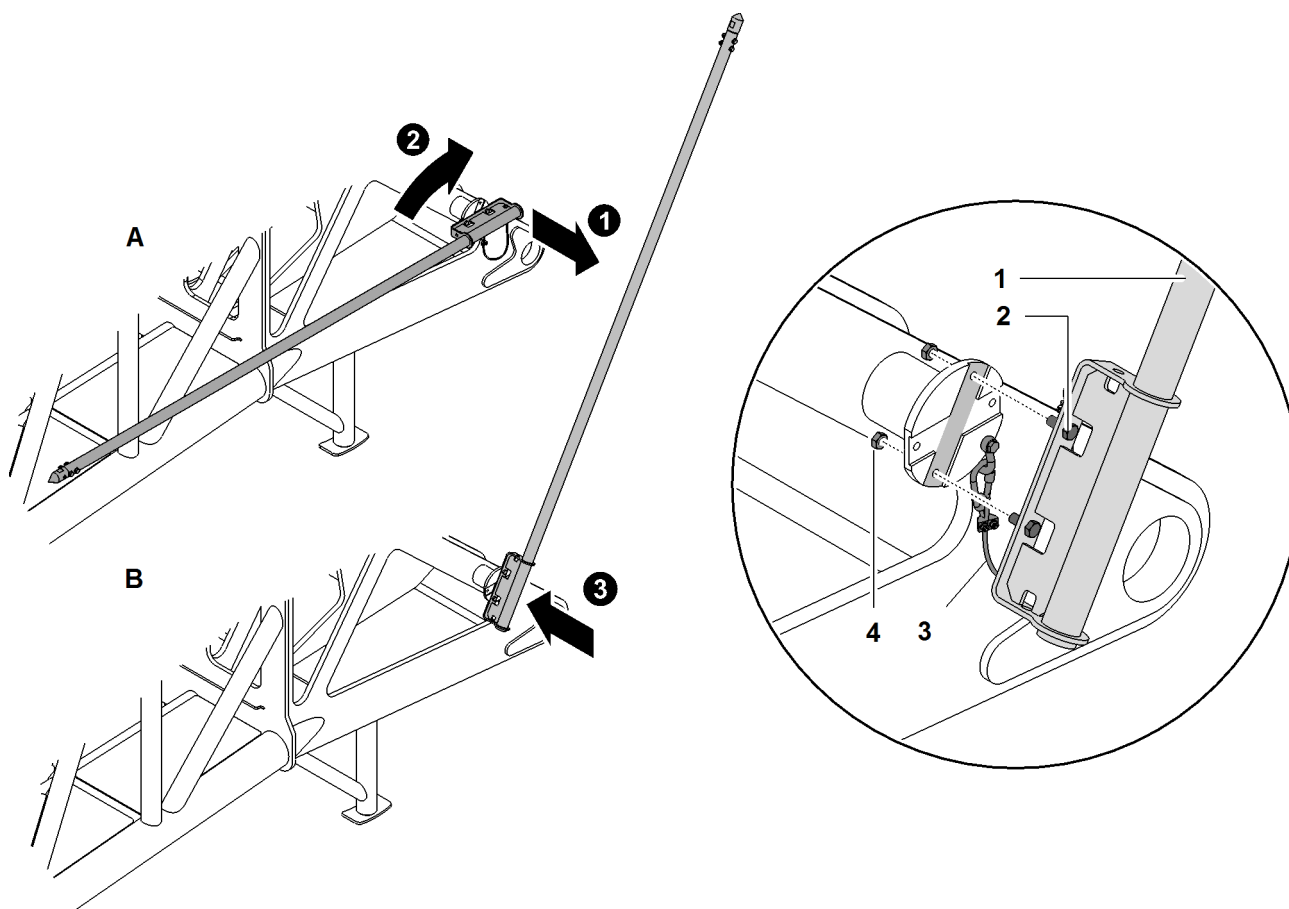


Fig. 3406: Moving the lightning rods* on the main boom head into working position (illustration of principle)

A Transport position
B Working position

1 Lightning rod
2 Screw (2x)

3 Safety rope
4 Nut (2x)

- ▶ Undo safety rope **3**.
- ▶ Undo nuts **4**.
- ▶ Undo screws **2**.
- ▶ Move lightning rod **1** from transport position **A** to working position **B**.



Note

Liebherr recommends:

- ▶ Grease threads of the screws **2**.
- ▶ Attach lightning rod **1** with screws **2**.
- ▶ Lock screws **2** with nuts **4**.

NOTICE

Safety rope not attached!
 Dropping parts.

- ▶ Ensure that safety rope **3** is attached.

- ▶ Attach safety rope **3**.

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod **1** is installed.
- ▶ Ensure that the screws of the tip are tightened.

-
- ▶ Ensure that the tip on the lightning rod **1** is installed.
 - ▶ Ensure that the screws of the tip are tightened.

7.6.29 Rope reeving

Rope must be reeved boom-specific and use-specific according to the requirements.



WARNING

Unsecured walking on boom!
Risk of falling off the boom.

- ▶ Secure yourself against falling when working on boom.

Make sure the following conditions are met:

- Cylinder adjustment functions are activated.

Reeving rope with rope reeving winch

Dismantling rope protection pipes

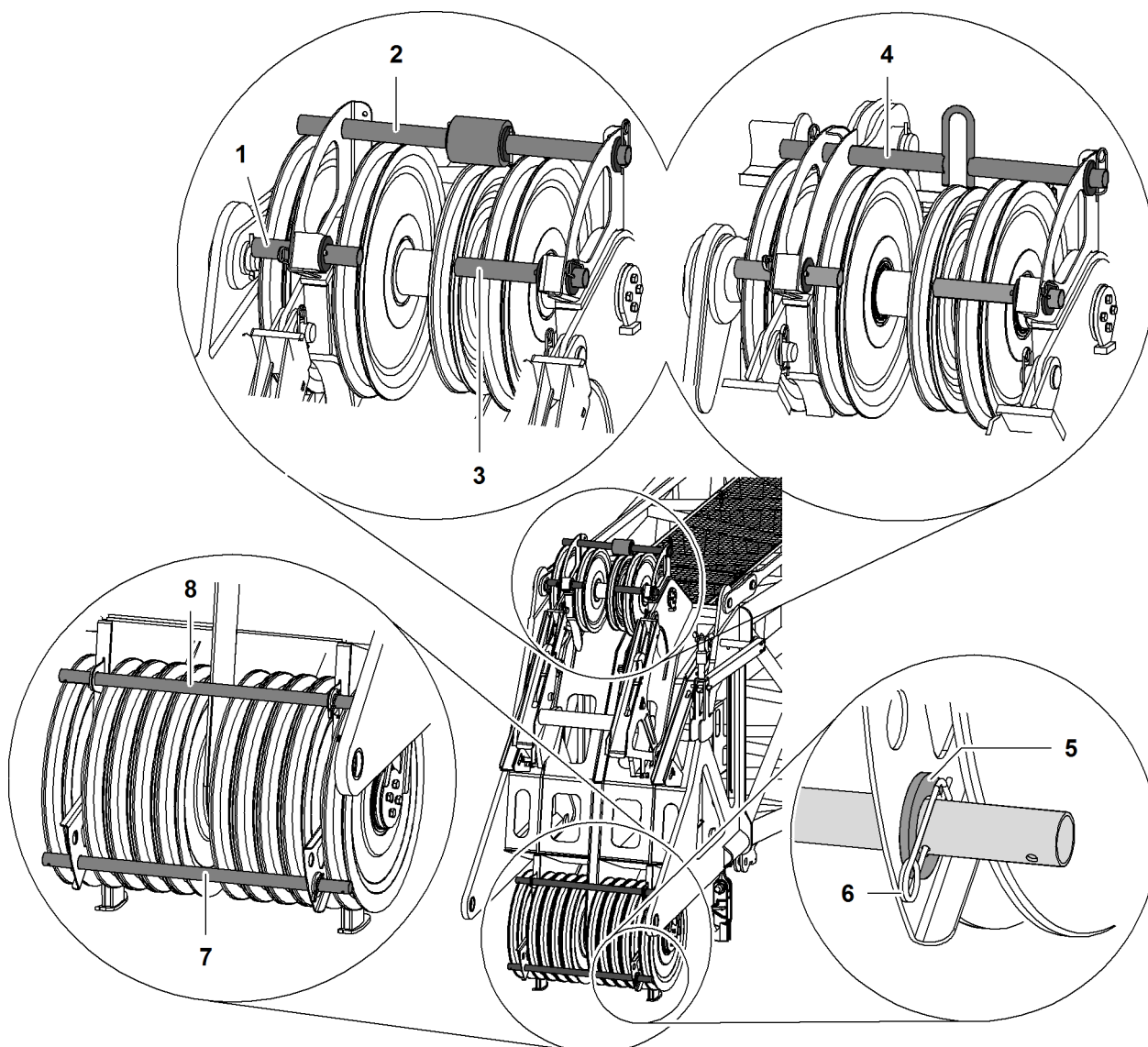


Fig. 3407: Rope protection pipes main boom head 1311, 2017, 2018, 2320, 2220, 2821

- | | | | | | |
|---|-------------------------------|---|-------------------------------|---|----------------------|
| 1 | Rope protection pipe | 4 | Rope protection type variant2 | 7 | Rope protection pipe |
| 2 | Rope protection type variant1 | 5 | Locking washer | 8 | Rope protection pipe |
| 3 | Rope protection pipe | 6 | Locking spring | | |

The rope protection pipes are secured on one side with a splint pin, on the other side with the locking spring.

- ▶ Remove locking springs **6** and locking washers **5**.
- ▶ Remove rope protection pipes **1 + 2 + 3 + 4 + 7 + 8**.

Deinstalling rope protection pipes on auxiliary jib

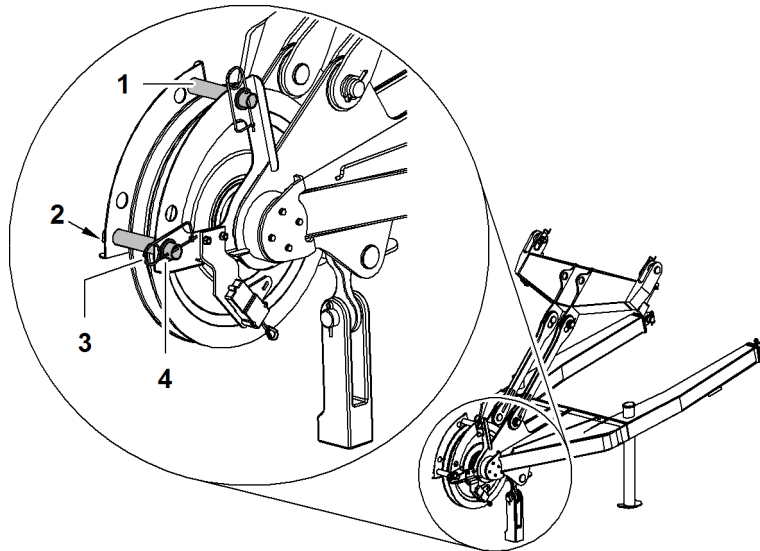


Fig. 3408: Deinstalling rope protection pipes on auxiliary jib

- | | | | |
|---|---------------------------|---|----------------|
| 1 | Rope protection pipe (2x) | 3 | Locking spring |
| 2 | Splint pin | 4 | Locking washer |

The rope protection pipes are secured on one side with a splint pin **2**, on the other side with the locking spring **3**.

- ▶ Remove rope protection pipes **1** with installed auxiliary jib.

Rope reeving

- ▶ Open up rope guide (if present).

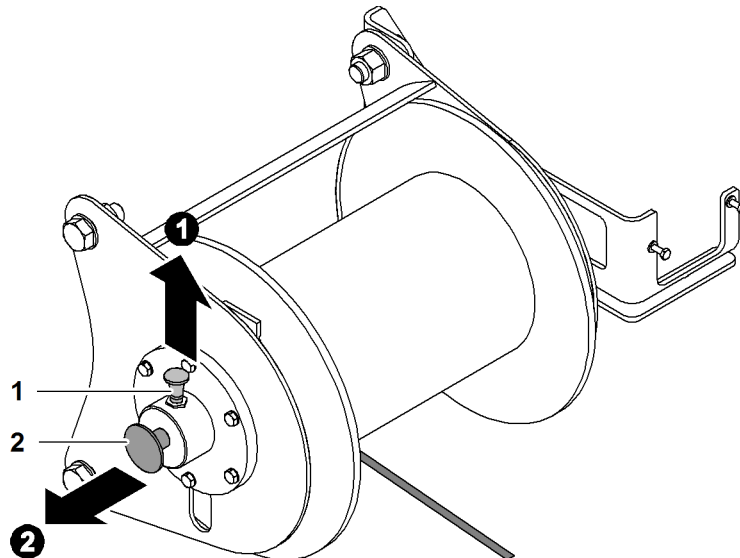


Fig. 3409: Setting the rope reeving winch to free-wheel

- | | | | |
|---|-----------------|---|------|
| 1 | Locking element | 2 | Axis |
|---|-----------------|---|------|



Note

Liebherr recommends:

▶ To facilitate extension of the axis **2**: Move rope reeving winch forward and backward by hand.

▶ Pull up securing element **1** and pull out axis **2** at the same time.

▷ Rope reeving winch is set to free-fall.

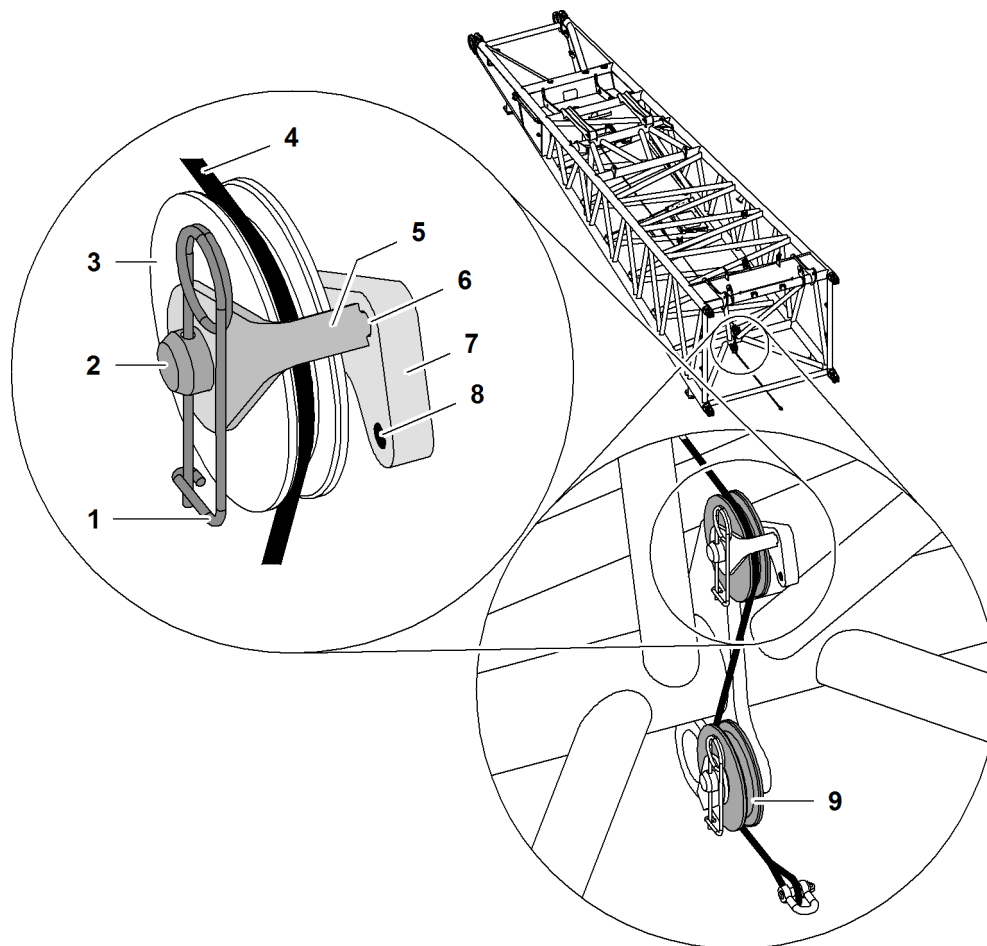


Fig. 3410: Reeving rope of the rope reeving winch

- | | | | |
|---|----------------------------|---|---------------------|
| 1 | Locking spring | 6 | Recess |
| 2 | Axis | 7 | Mount with recesses |
| 3 | Top rope pulley | 8 | Recess |
| 4 | Rope of rope reeving winch | 9 | Bottom rope pulley |
| 5 | Locking element | | |

Depending on machine type mount **7** may have one recess or two.

- ▶ Remove locking spring **1**.
- ▶ Remove **5** locking element.
- ▶ Lay rope of rope reeving winch **4** over top rope pulley **3**.

NOTICE

Incorrectly installed locking element!
Rope of rope reeving winch jumps out of rope pulley.

- ▶ Make sure that locking element **5** is installed in recess **6**.

- ▶ Attach locking element **5** to axis **2** and guide into recess **6**.
- ▶ Install all locking spring **1**.
- ▶ Repeat process on bottom rope pulley **9**.
 - ▷ Rope of rope reeving winch is guided through rope pulley.
- ▶ Pull rope of rope reeving winch under boom to boom head.
- ▶ Reeve rope of rope reeving winch according to reeving diagram.
- ▶ Pull rope of rope reeving winch next to boom to basic machine.
- ▶ Lift rope of rope reeving winch onto boom.
- ▶ Connect rope of rope reeving winch to rope of winch1/winch2.

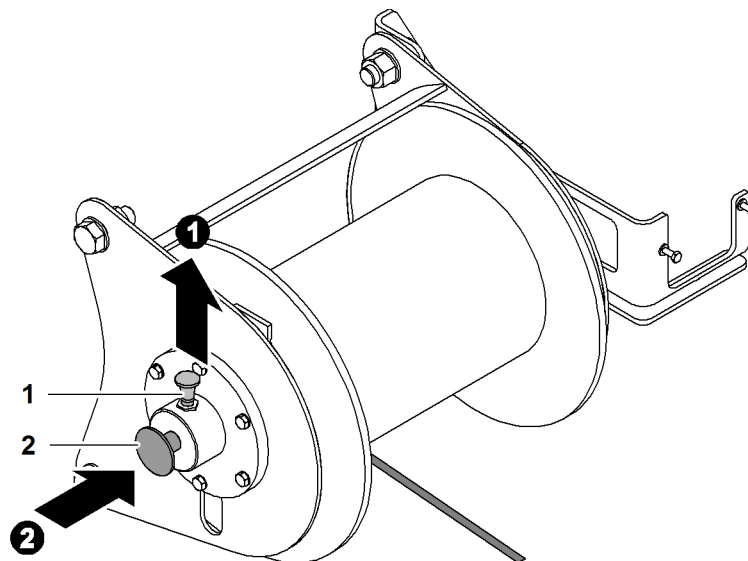


Fig. 3411: Deactivating rope reeving winch free-fall

1 Locking element

2 Axis



Note

Liebherr recommends:

- ▶ To facilitate pushing in the axis **2**: Move rope reeving winch forward and backward by hand.

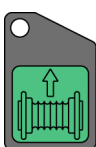
-
- ▶ Pull up securing element **1** and push in axis **2** at the same time.
 - ▷ Rope reeving winch free-wheel is deactivated.



WARNING

Do not stand in close proximity to the rope reeving winch and the rope of the rope reeving winch!

- ▶ Make sure that no persons are located in the danger zone.
- ▶ Leave danger zone.



- ▶ Press and hold the button *Rope reeving winch* on control panel *X11*.
 - ▷ Rope reeving winch winds up rope of rope reeving winch and tightens rope of winch1/winch2.

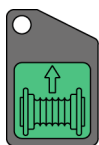


If rope of winch1/winch2 is in the 8th rope layer (only with free-fall winch 130 kN (29,230 lb.)):

- ▶ Press the button *Bypassing limit switch* on control panel X23.
 - ▷ 3-rope windings limit switch is bypassed.

No slack rope may form during unwinding.

- ▶ Unwind rope of winch1/winch2 up to rope fixing point.
- ▶ Press the button *Rope reeving winch* on control panel X11.
 - ▷ Rope reeving winch is switched off.
- ▶ Remove rope of rope reeving winch from rope of winch1/winch2.
- ▶ Press and hold the button *Rope reeving winch* on control panel X11.
 - ▷ Rope of rope reeving winch is reeved.



- ▶ Press the button *Rope reeving winch* on control panel X11.
 - ▷ Rope reeving winch is switched off.
- ▶ Close and secure rope guide (if present).

Installing rope protection pipes on main boom head

- ▶ Mount and secure rope protection pipes.

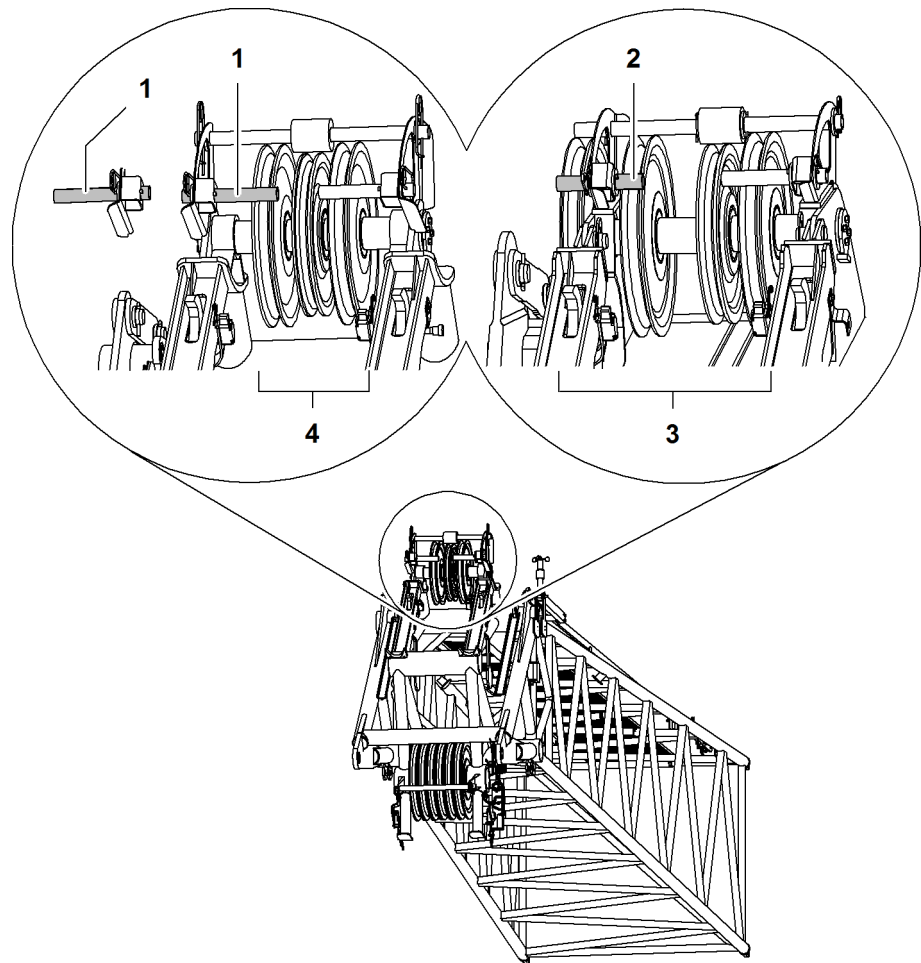


Fig. 3415: Main boom head rope protection pipe with installed fixed jib

- | | | | |
|---|----------------------|---|--|
| 1 | Rope protection pipe | 3 | Main boom head with four gantry pulleys |
| 2 | Rope protection pipe | 4 | Main boom head with three gantry pulleys |

NOTICE

Inadmissible rope protection pipe with installed fixed jib!
Rope scrapes on rope protection pipe.
Damage to rope.

- ▶ Remove rope protection pipe 1 + 2.
-

If a fixed jib is being installed:

- ▶ Remove rope protection pipe 2 on main boom head.
- or

Turn rope protection type 1 by 180° and install facing outwards.

Installing rope protection pipes on auxiliary jib

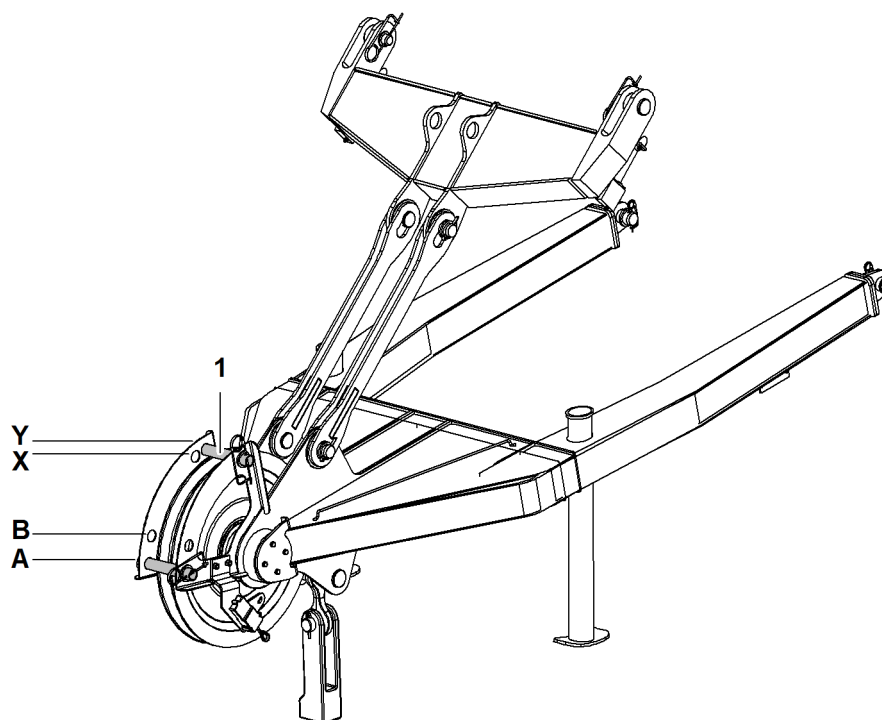


Fig. 3416: Installing rope protection pipes on auxiliary jib

- 1 Rope protection pipe (2x)
- A Installation position A for rope protection pipe
- B Installation position B for rope protection pipe
- X Installation position C for rope protection pipe
- Y Installation position Y for rope protection pipe

Installation positions of rope protection pipes on auxiliary jib depending on the main boom angle:

Machine type	Main boom angle		
	15° to 30°	20° to 30°	30° to 86°
LR 1001	B + X	-	A + Y
LR 1002	B + X	-	A + Y
LR 1003	B + X	-	A + Y
LR 1004	-	B + X	A + X
LR 1006	-	B + X	A + X

Tab. 523: Assembly positions for rope protection pipes on the auxiliary jib (36 t (79.300 lb)) for main boom head

- ▶ Rope protection pipes installed on auxiliary jib according to chart.

Reeving rope without rope reeving winch

- ▶ Remove rope protection pipes on boom and pulley block.
- ▶ Open up rope guide (if present).

- ▶ Connect auxiliary rope with rope of winch1/winch2.
- ▶ Pull auxiliary rope next to boom as far as the boom head.
- ▶ Lift auxiliary rope onto boom.
- ▶ Reeve auxiliary rope according to reeving diagram.



If rope of winch1/winch2 is in the 8th rope layer (only with free-fall winch 130 kN (29,230 lb_f)):

- ▶ Press the button *Bypassing limit switch* on control panel X23.
 - ▷ 3-rope windings limit switch is bypassed.

No slack rope may form during unwinding.

- ▶ Unwind rope of winch1/winch2 up to rope fixing point.
- ▶ Remove auxiliary rope from rope of winch1/winch2.
- ▶ Close and secure rope guide (if present).
- ▶ Mount and secure rope protection pipes.

7.6.30 Installing the rope fixing point



DANGER

Wrong installation of pins and pocket lock!
Load breakaway.

- ▶ Install pins and pocket lock according to specifications.
-

The collar of the pins and the pocket lock openings are decisive for the installation direction of the rope fixing point.

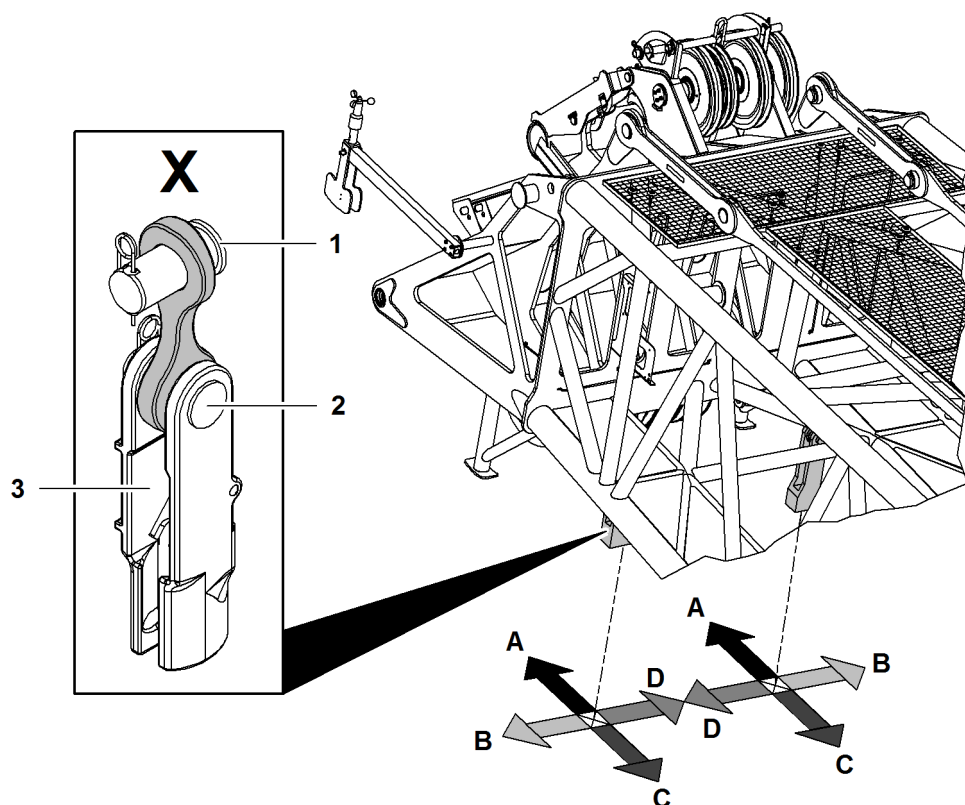


Fig. 3418: Determining the installation direction of the components of the rope fixing point of relevance for installation - main boom head (illustration of principle)

- | | | | |
|----------|--|----------|--------------------------|
| X | Components of relevance for installation | A | Direction main boom head |
| 1 | Pin collar on boom | B | Outside |
| 2 | Pin collar on pocket lock | C | Direction basic machine |
| 3 | Pocket lock opening | D | Inside |

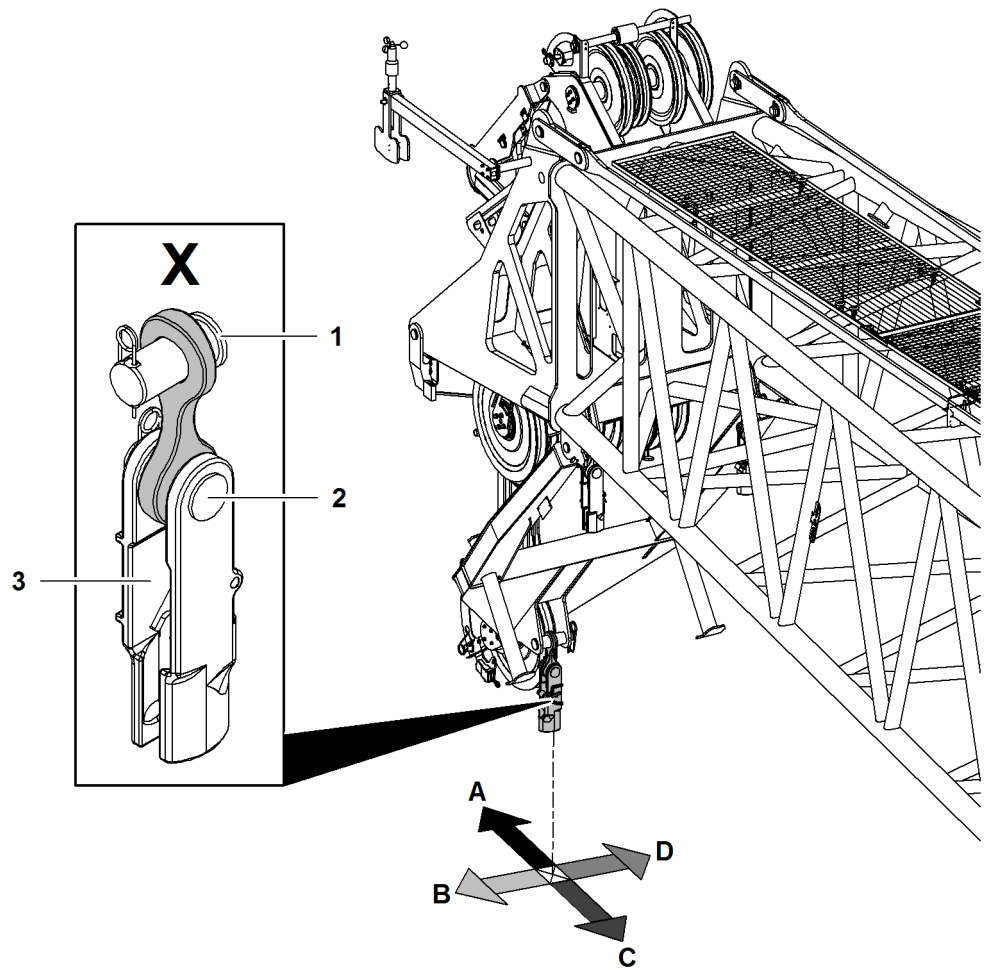


Fig. 3419: Determining the installation direction of the components of the rope fixing point of relevance for installation - auxiliary jib (illustration of principle)

- | | | | |
|----------|--|----------|--------------------------|
| X | Components of relevance for installation | A | Direction main boom head |
| 1 | Pin collar on boom | B | Outside |
| 2 | Pin collar on pocket lock | C | Direction basic machine |
| 3 | Pocket lock opening | D | Inside |

Installation direction of the rope fixing point components of relevance for installation			
	Pin collar on boom	Pin collar on pocket lock	Pocket lock opening
All rope fixing points	D	C	B
Exceptions:			
Fixed jib head section 0906	B	C	B
Fixed jib head section 1507	B	C	B

Tab. 524: Installation direction of the rope fixing point components of relevance for installation

**WARNING**

Inadmissible installation of swivels!
Severe injuries, damage to machine.

- ▶ Install rope with no twists.
- ▶ Install rope without swivels.

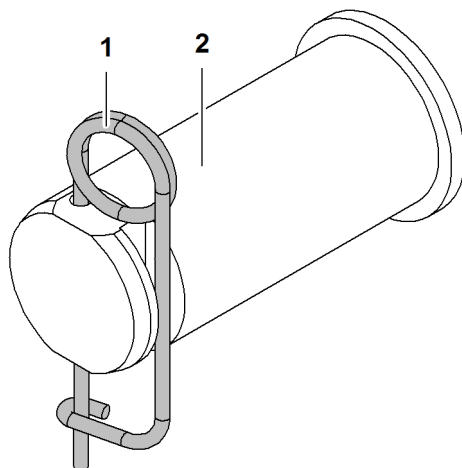


Fig. 3420: Securing the pins

1 Locking spring

2 Pin

**DANGER**

Pins 2 not completely secured!
Load breakaway.

- ▶ Ensure that locking spring 1 completely secures the pin 2.

Installing the rope fixing point on the boom head

- ▶ Pin cross strap with boom head.
- ▶ Secure pin with locking spring.
- ▶ Pin pocket lock with cross strap.
- ▶ Secure pin with locking spring.

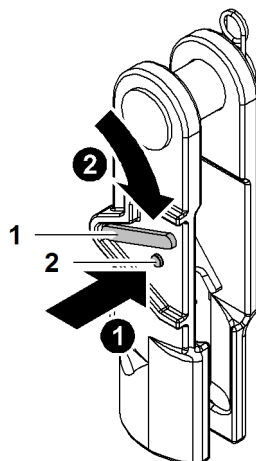


Fig. 3421: Unlocking the pocket lock

1 Safety latch

2 Locking button

- ▶ Press the locking button 2.
- ▶ Press safety latch 1 down and hold.

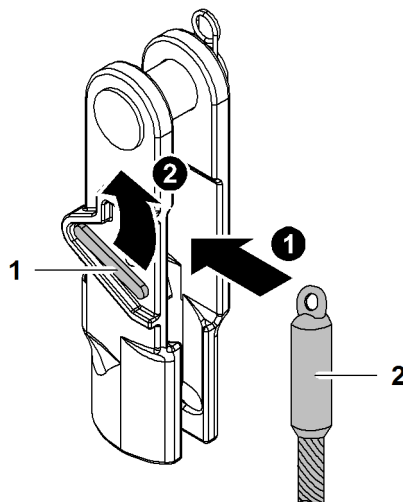


Fig. 3422: Inserting the end of rope into pocket lock and locking the pocket lock

1 Safety latch

2 End of rope

- ▶ Insert end of rope 2 in pocket lock.



DANGER

End of rope 2 not properly secured!
Load breakaway.

- ▶ Ensure that the safety latch 1 engages.

- ▶ Let go of safety latch 1.
 - ▷ Safety latch 1 engages.

Installing the rope fixing point on the hook or pulley block

- ▶ Pin pocket lock with hook or pulley block.

- ▶ Secure pin with locking spring.

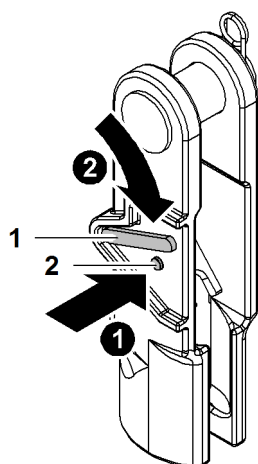


Fig. 3423: Unlocking the pocket lock

- 1 Safety latch
- 2 Locking button

- ▶ Press the locking button 2.
- ▶ Press safety latch 1 down and hold.

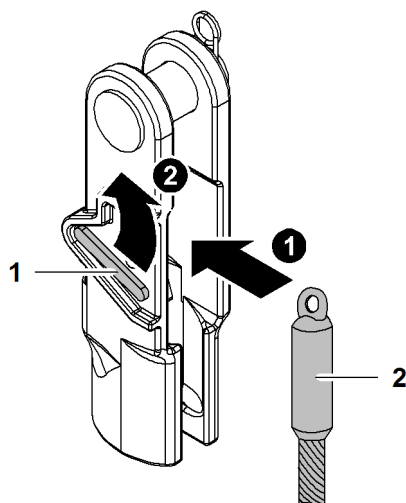


Fig. 3424: Inserting the end of rope into pocket lock and locking the pocket lock

- 1 Safety latch
- 2 End of rope

- ▶ Insert end of rope 2 in pocket lock.



DANGER

End of rope 2 not properly secured!
Load breakaway.

- ▶ Ensure that the safety latch 1 engages.

- ▶ Let go of safety latch 1.
 - ▷ Safety latch 1 engages.

7.6.31 Installing the hoist limit switch

The following can be installed on the hoist limit switch:

- Hoist limit switch weight
- Hoist limit switch bracket*

Installing the hoist limit switch weight

NOTICE

Improper installation of the hoist limit switch weight!
Damage to rope and hoist limit switch weight.

- ▶ Install hoist limit switch weight without diagonal pull.
- ▶ Always install the hoist limit switch weight on the slack rope of winch1/winch2, except with single reeving.

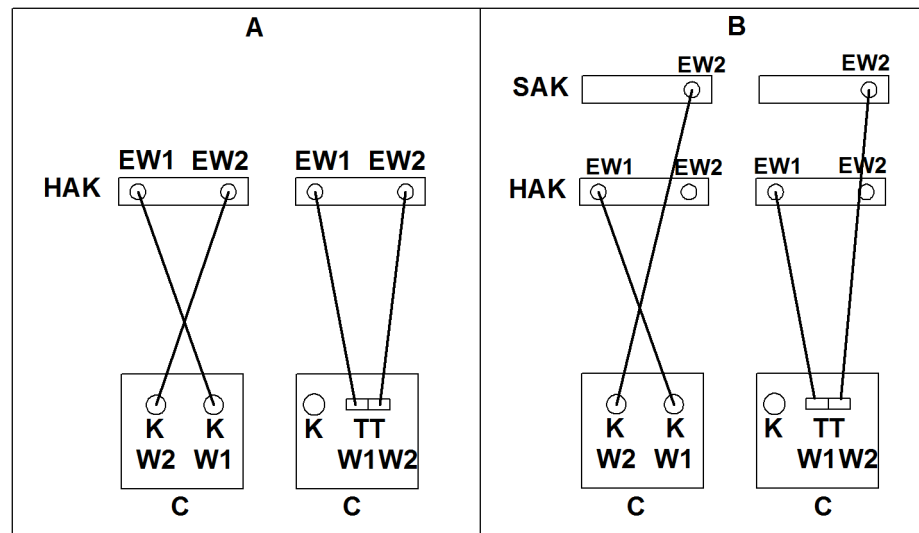


Fig. 3425: Hoist limit switch assignment depending on winch1/winch2

- | | |
|---|--|
| A Boom configuration main boom | K Multi-directional control lever |
| B Boom configuration main boom + auxiliary jib | SAK Auxiliary jib |
| C Cabin | TT Double T control lever |
| EW1 Hoist limit switch winch1 | W1 Winch1 |
| EW2 Hoist limit switch winch2 | W2 Winch2 |
| HAK Main boom head | |

NOTICE

Wrong hoist limit switch!
Hoist limit switch does not turn off.

- ▶ Make sure that the correct hoist limit switch for the correct rope of winch1/winch2 is used.

The hoist limit switch with chain and hoist limit switch weight attached is secured to the inoperative end of the hoist rope.

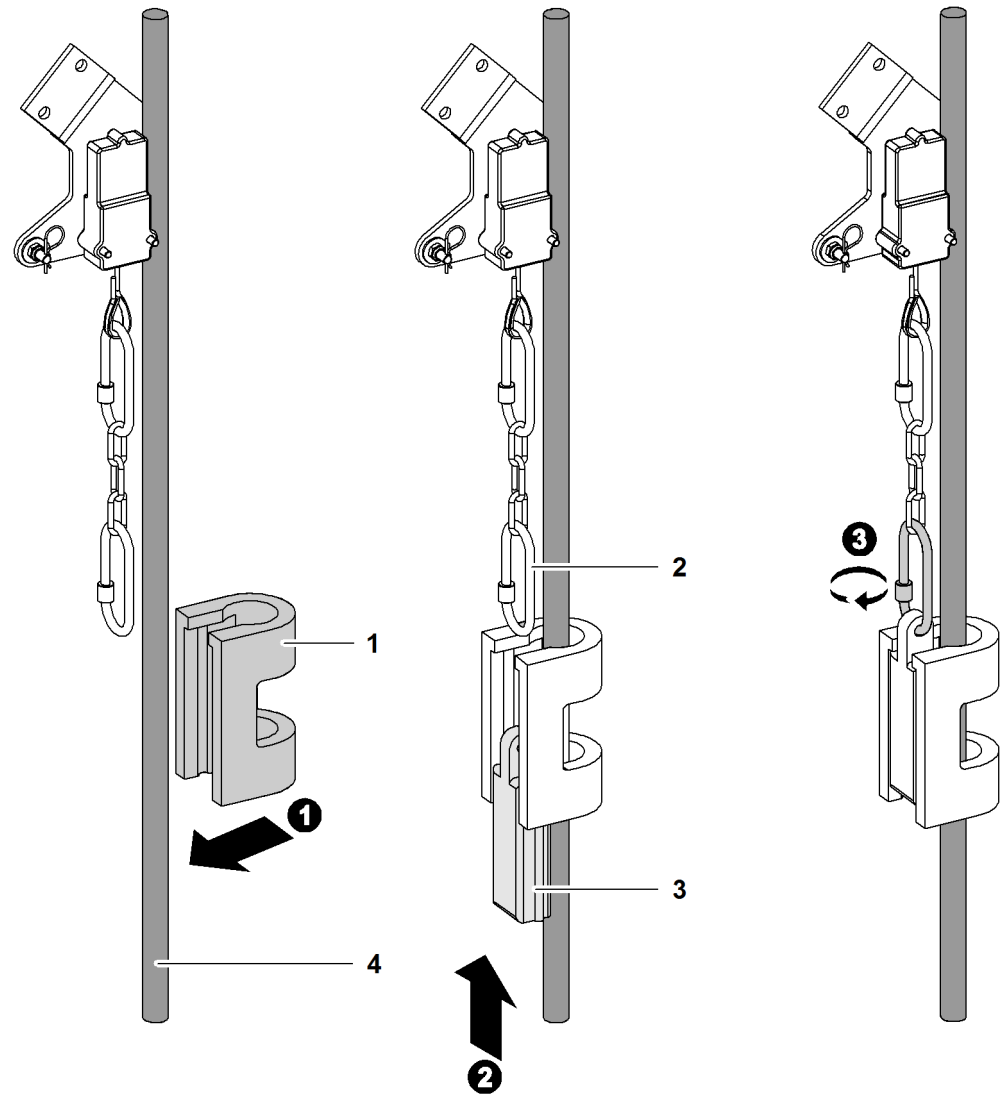


Fig. 3426: Installing the hoist limit switch weight

- | | | | |
|---|-------------------------------------|---|-----------------------------------|
| 1 | Hoist limit switch weight (U shape) | 3 | Hoist limit switch weight (wedge) |
| 2 | Carabiner | 4 | Rope of winch1/winch2 |

► Guide the hoist limit switch weight (U shape) 1 over the rope of winch1/ winch2 4.

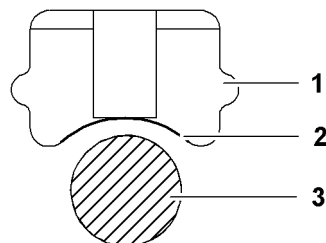


Fig. 3427: Hoist limit switch weight (wedge) view from above

- | | | | |
|---|-----------------------------------|---|-----------------------|
| 1 | Hoist limit switch weight (wedge) | 3 | Rope of winch1/winch2 |
| 2 | Curvature | | |

The hoist limit switch weight (wedge) 1 has a curvature 2 on one side.

NOTICE

Wrongly installed hoist limit switch weight (wedge)!

Hoist limit switch weight (wedge) damaged with wrong installation of rope of winch1/winch2.

- ▶ Make sure that the curvature of the hoist limit switch weight (wedge) is installed in the direction of the rope of winch1/winch2.

- ▶ Slide the hoist limit switch weight (wedge) **1** from below into the hoist limit switch weight (U shape).
- ▶ Attach the carabiner to the hoist limit switch weight (wedge) **1**.

**Note**

Liebherr recommends:

- ▶ visual inspection of the carabiner prior to installation.
- ▶ Clean dirty carabiner with a clean cloth and water.
- ▶ If necessary, re-clean with a slightly oily cloth.

NOTICE

Improper installation of carabiner!

Damage to machine.

- ▶ Make sure that the screw of the carabiner points downwards.
- ▶ Make sure that the locking element is twisted shut.

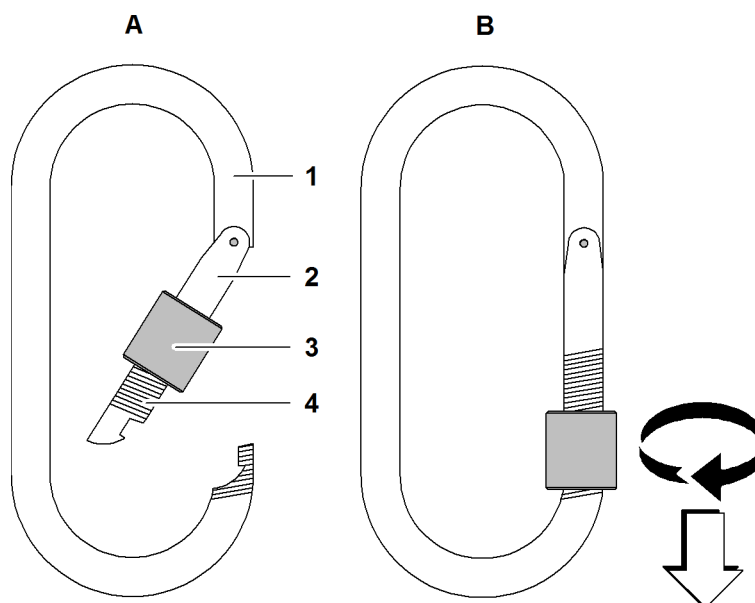


Fig. 3428: Carabiner

- | | | | |
|----------|-----------------|----------|------------------|
| 1 | Carabiner | 4 | Thread |
| 2 | Snapper | A | Opened carabiner |
| 3 | Locking element | B | Closed carabiner |

- ▶ Secure carabiner **1** with locking element **3**.

NOTICE

Chain on hoist limit switch weight is too short!

Hoist limit switch weight responds too late. Hook damages boom head.

- ▶ Ensure that hoist limit switch weight chain is at least 3 m (9' 10" ft-in) and at most 4.5 m (14' 9" ft-in) long.

-
- ▶ Attach chain between hoist limit switch weight and hoist limit switch.

7.6.32 Installing hoist limit switch bracket* variant 2 on main boom

Single reeving

The hoist limit switch bracket replaces the hoist limit switch weight.

With single reeving, a transverse pipe is installed.

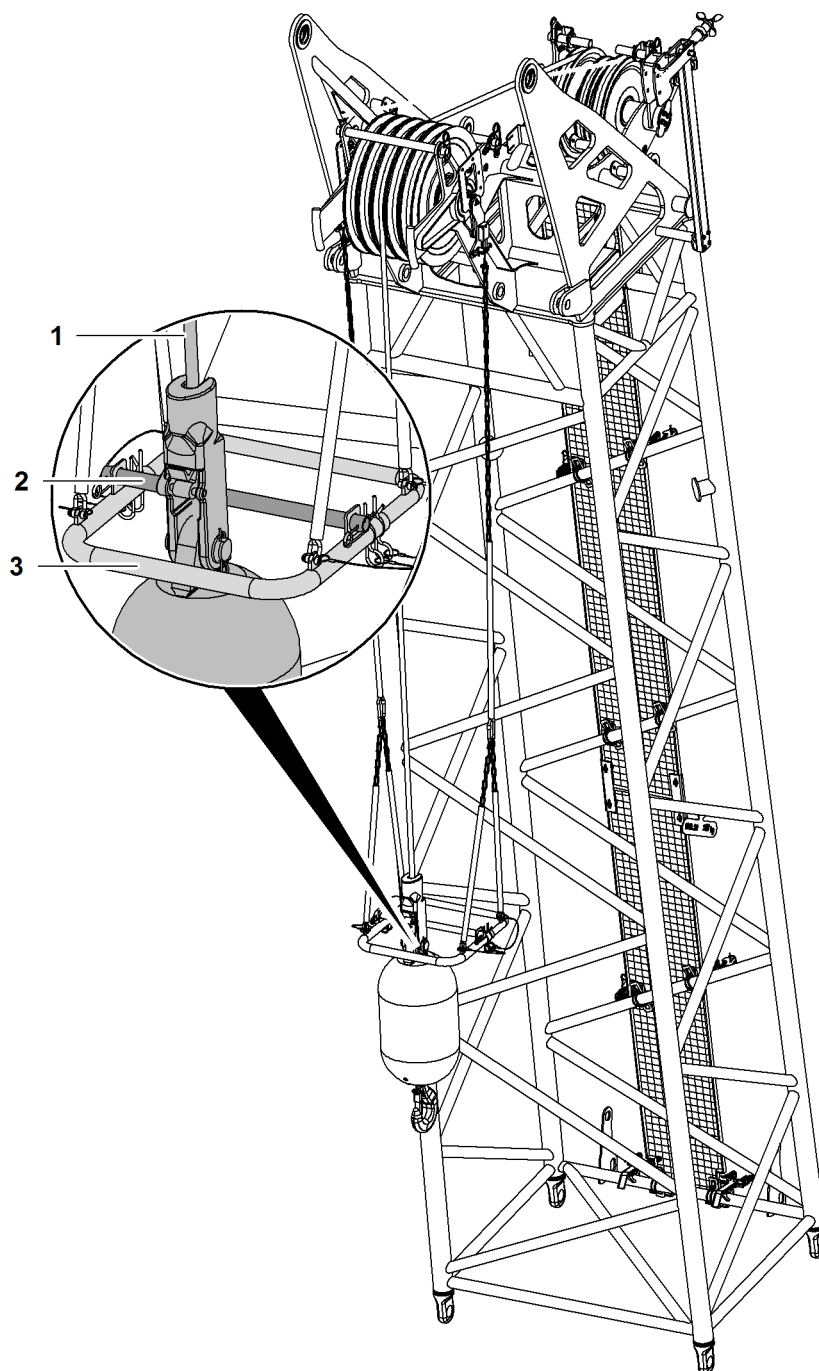


Fig. 3429: Installing hoist limit switch bracket variant 2 with single reeving on main boom head

- | | | | |
|---|-------------|---|----------------------------|
| 1 | Winch1 rope | 3 | Hoist limit switch bracket |
| 2 | Spacer pipe | | |

- ▶ Position rope 1 of winch1 in front of spacer pipe 2 of hoist limit switch bracket 3.
- ▶ Install hoist limit switch bracket 3 and secure with spring cotter pin.

Multiple reeving

The hoist limit switch bracket replaces the hoist limit switch weight.
With multiple reeving, the transverse pipe is removed.

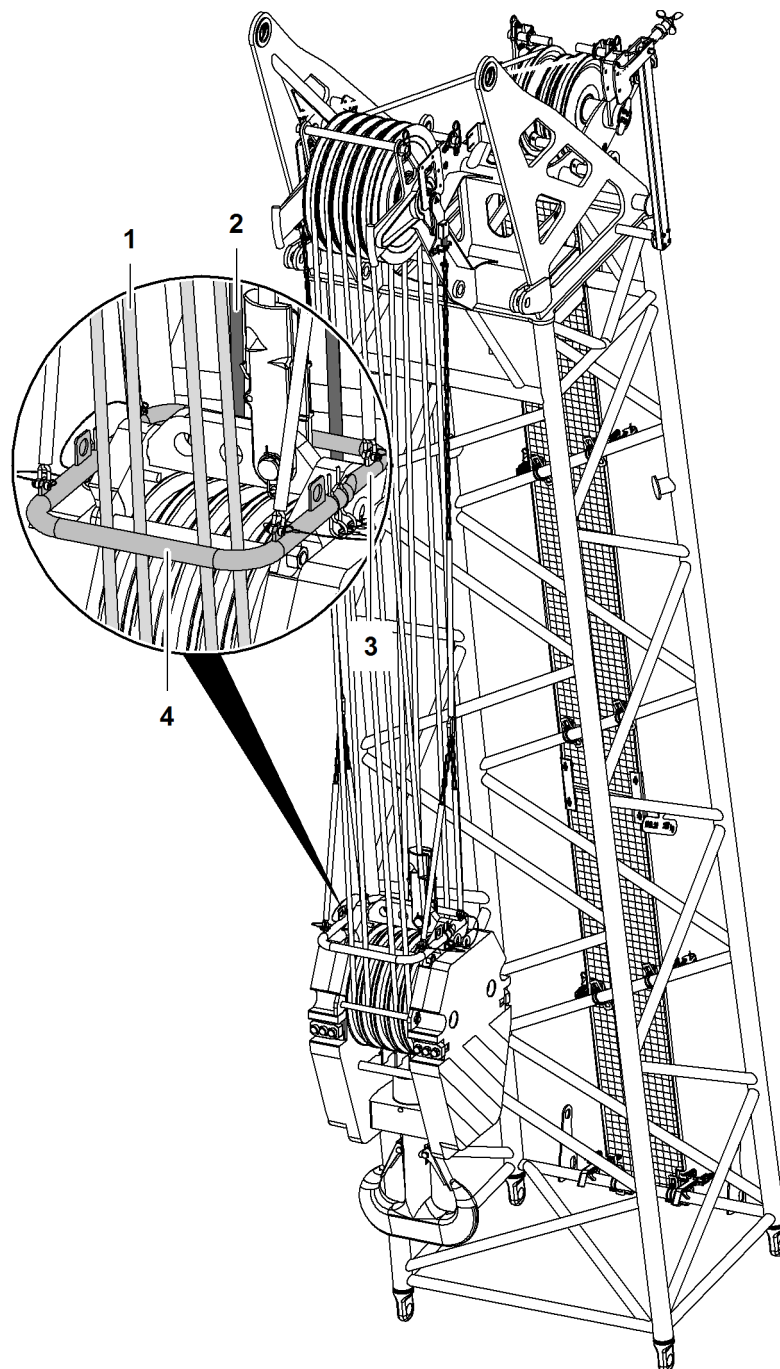


Fig. 3430: Installing hoist limit switch bracket variant 2 with multiple reeving on main boom head

- | | | | |
|---|-----------------------------|---|------------|
| 1 | Front ropes on pulley block | 3 | Rear pipe |
| 2 | Rear ropes on pulley block | 4 | Front pipe |

- ▶ Position front ropes 1 behind front pipe 4.
- ▶ Position rear ropes 2 behind rear pipe 3.
- ▶ Push front pipe 4 into rear pipe 3 and secure with spring cotter pins.

7.6.33 Installing hoist limit switch bracket* on auxiliary jib (36 t (79300 lb))

The following hoist limit switch brackets* are available:

- Variant1
- Variant2

Installing hoist limit switch bracket* variant1 on auxiliary jib (36 t (79300 lb))

The hoist limit switch bracket replaces the hoist limit switch weight on auxiliary jib (36 t (79300 lb)).

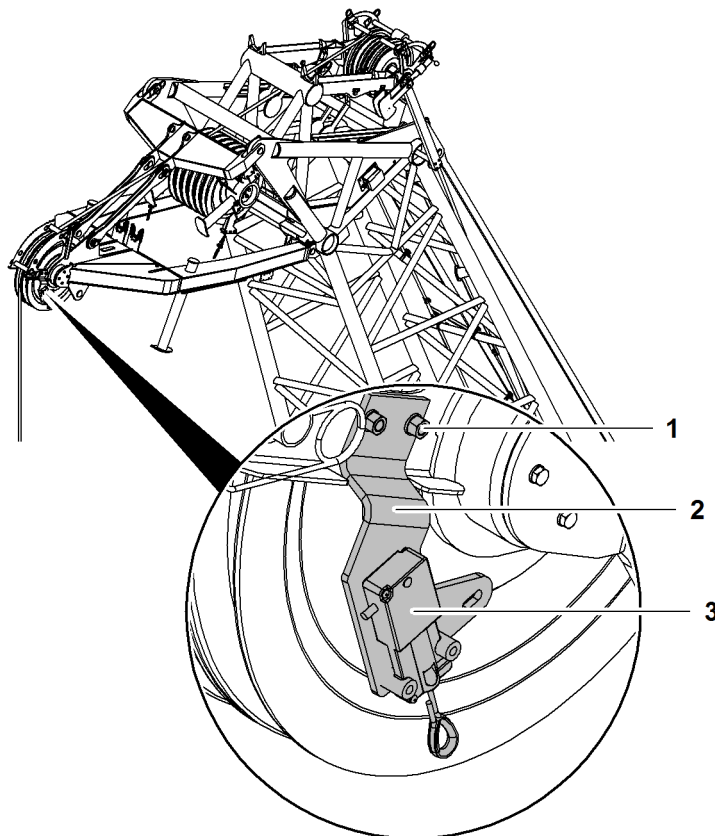


Fig. 3431: Deinstalling present limit switch plate

- | | | | |
|---|--------------------|---|--------------------|
| 1 | Screw (2x) | 3 | Hoist limit switch |
| 2 | Limit switch plate | | |

- ▶ Undo screws 1.
- ▶ Remove limit switch plate 2.
- ▶ Deinstall hoist limit switch 3 from limit switch plate 2.

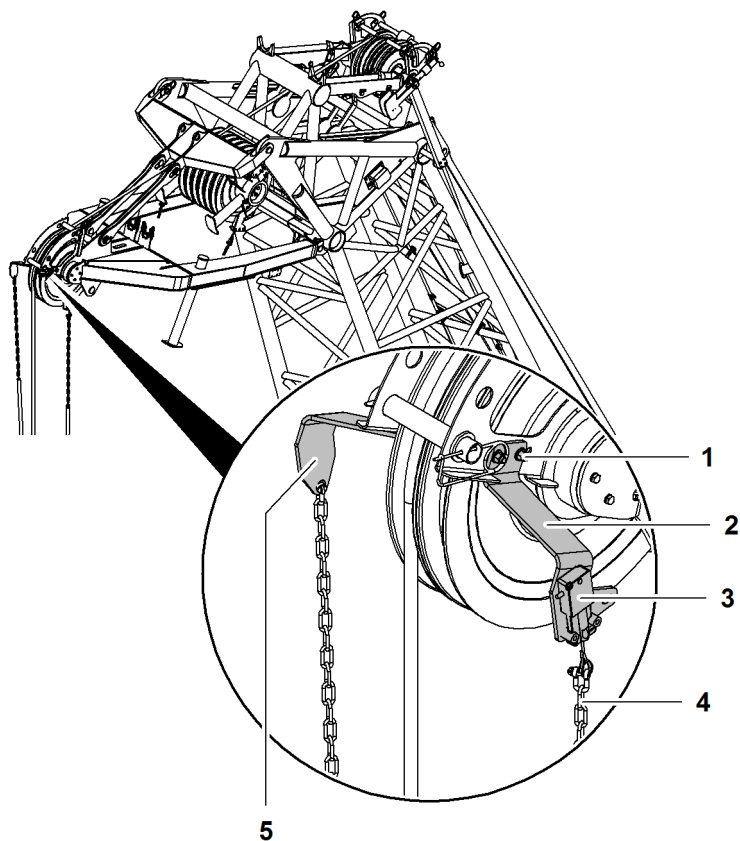


Fig. 3432: Installing hoist limit switch plate of the hoist limit switch bracket

- | | | | |
|---|--------------------|---|-------------|
| 1 | Screw (4x) | 4 | Chain (2x) |
| 2 | Limit switch plate | 5 | Steel plate |
| 3 | Hoist limit switch | | |

- ▶ Install available hoist limit switch **3** on limit switch plate **2**.
- ▶ Attach limit switch plate **2** with screws **1** on auxiliary jib (36 t (79300 lb)).
- ▶ Attach plate **5** on opposite side with screws.
- ▶ Attach chain **4** with shackle to hoist limit switch **3**.
- ▶ Attach chain **4** with shackle to plate **5**.

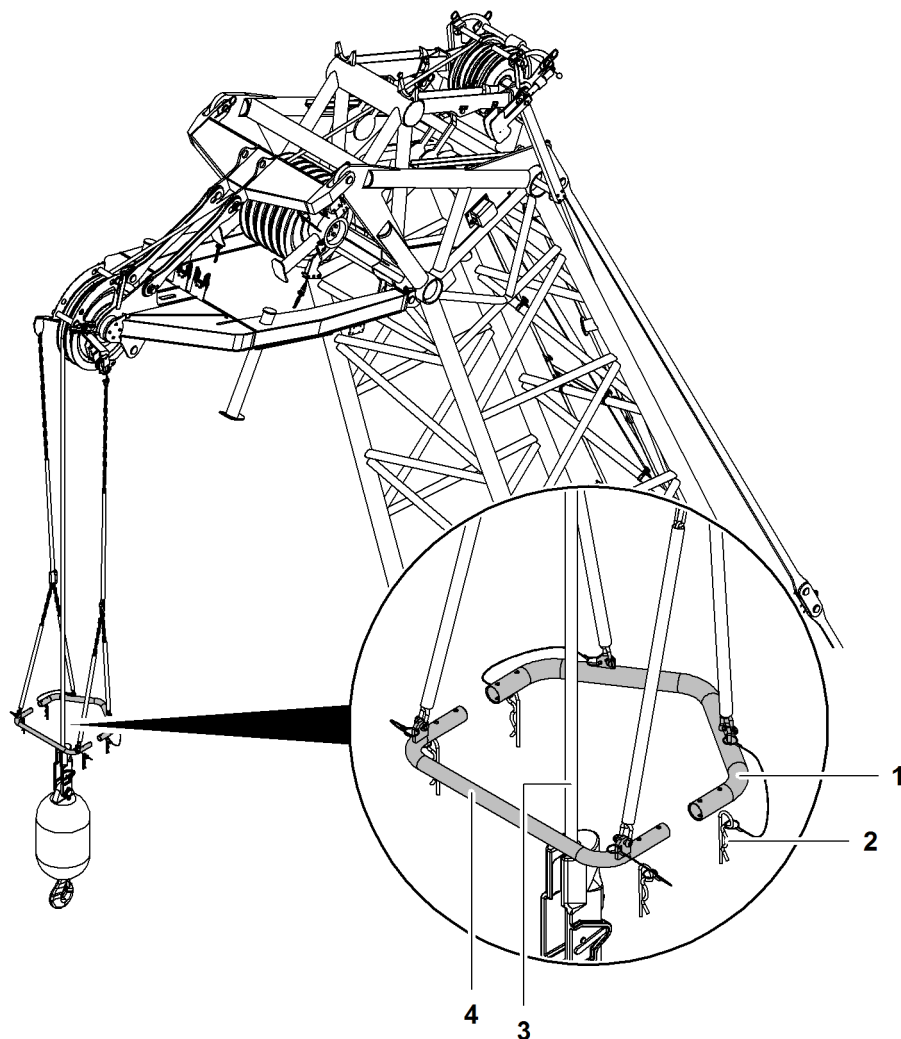


Fig. 3433: Placing rope of winch2 between hoist limit switch bracket

- | | | | |
|---|------------------------|---|-------------|
| 1 | Rear pipe | 3 | Winch2 rope |
| 2 | Spring cotter pin (4x) | 4 | Front pipe |

- ▶ Place rope 3 of winch2 between rear pipe 1 and front pipe 4.
- ▶ Push front pipe 4 in rear pipe 1.

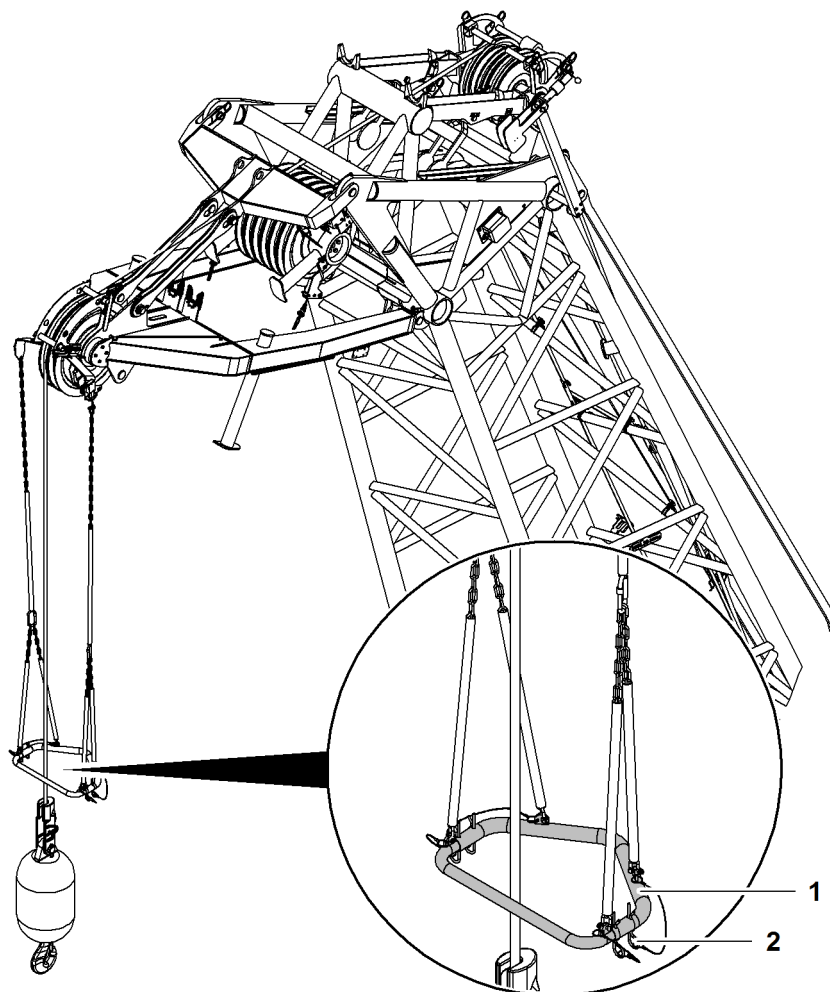


Fig. 3434: Assembling hoist limit switch bracket variant 1

- 1 Hoist limit switch bracket 2 Spring cotter pin (4x)

► Insert spring cotter pin 2 from below into boring.

Installing hoist limit switch bracket* variant 2 on auxiliary jib (36 t (79300 lb))

The hoist limit switch bracket replaces the hoist limit switch weight on auxiliary jib (36 t (79300 lb)).

Single reeving

With single reeving, a transverse pipe is installed.

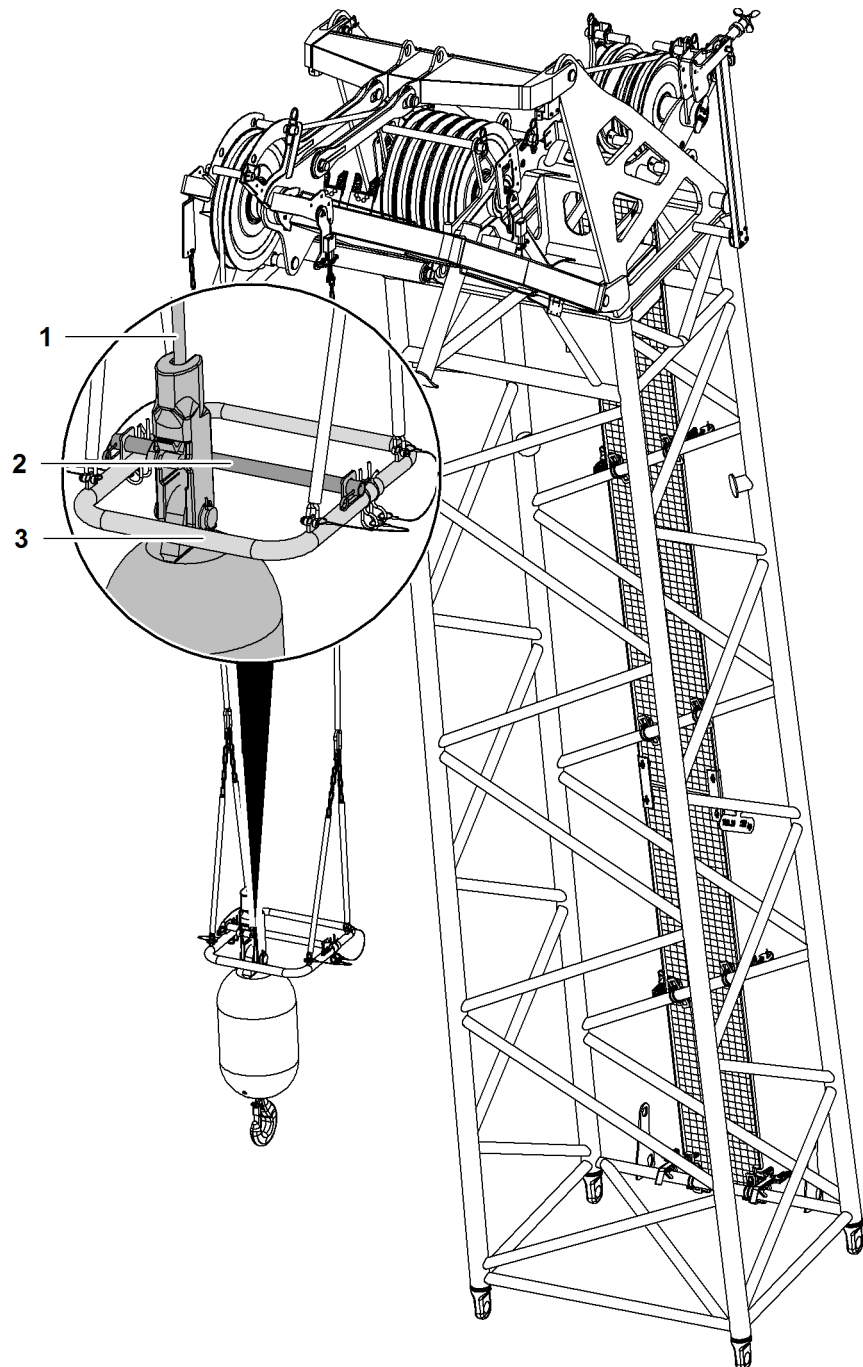


Fig. 3435: Installing hoist limit switch bracket variant 2 with single reeving on auxiliary jib on main boom head

- | | | | |
|---|-------------|---|----------------------------|
| 1 | Winch2 rope | 3 | Hoist limit switch bracket |
| 2 | Spacer pipe | | |

- ▶ Position rope 1 of winch2 in front of spacer pipe 2 of hoist limit switch bracket 3.
- ▶ Mount hoist limit switch bracket 3 and secure with spring cotter pins.

Multiple reeving

With multiple reeving, the transverse pipe is removed.

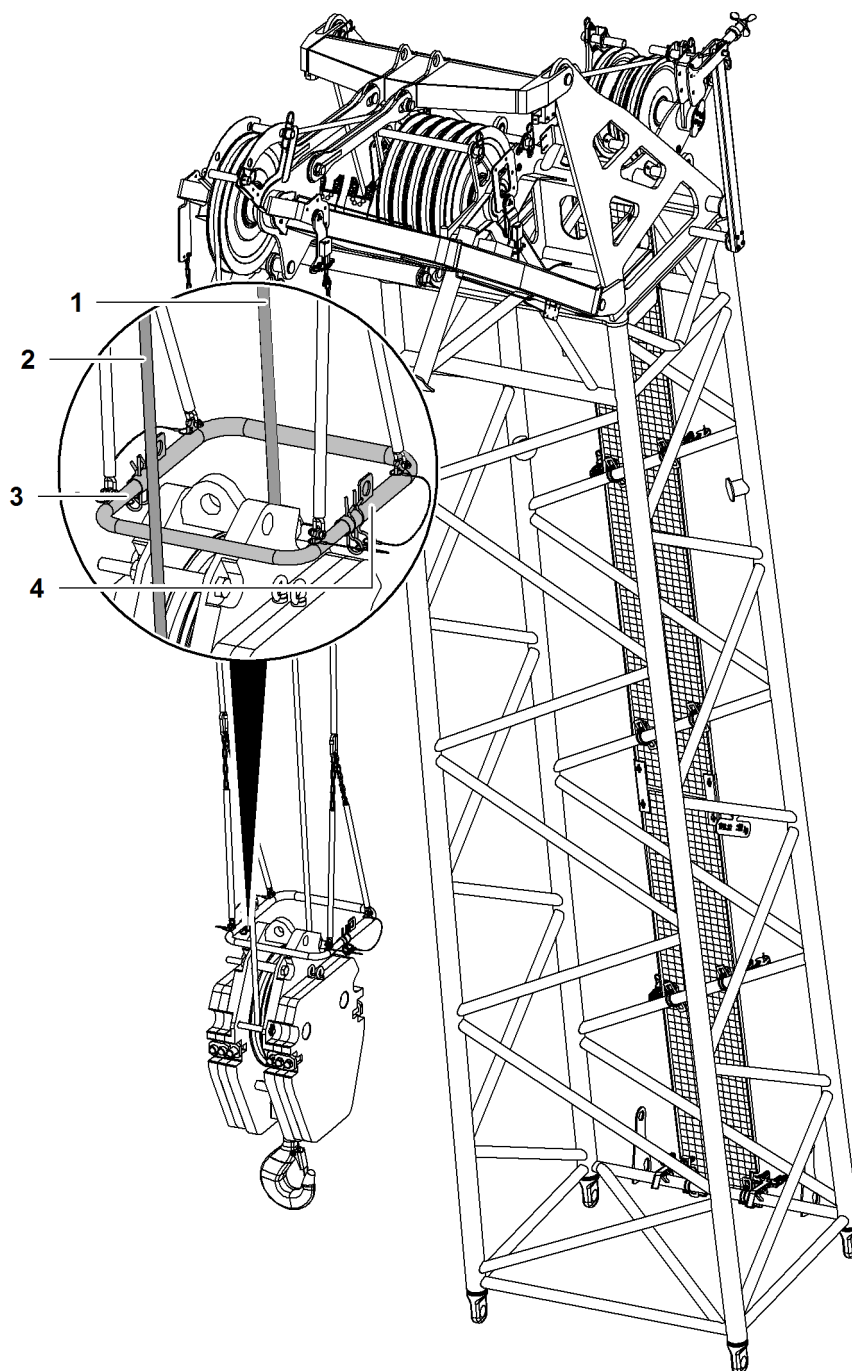


Fig. 3436: Installing hoist limit switch bracket variant 2 with multiple reeving on auxiliary jib on main boom head

- | | | | |
|----------|----------------------------|----------|------------|
| 1 | Rear rope on pulley block | 3 | Front pipe |
| 2 | Front rope on pulley block | 4 | Rear pipe |

- ▶ Position rear rope **1** between rear pipe **4** and front pipe **3**.
- ▶ Push front pipe **3** into rear pipe **4** and secure with spring cotter pins.

7.6.34 Bypassing unused hoist limit switches



DANGER

Inadmissible bypassing of hoist limit switch!
Load breakaway.

- ▶ Only bypass unused hoist limit switches.

NOTICE

Wrong hoist limit switch is bypassed!
Hook damages boom head.

- ▶ Lock winch1 with left hoist limit switch.
- ▶ Lock winch2 with right hoist limit switch.

Make sure the following conditions are met:

- Only motion is performed with a rope of winch1/winch2. A hoist limit switch is not required.

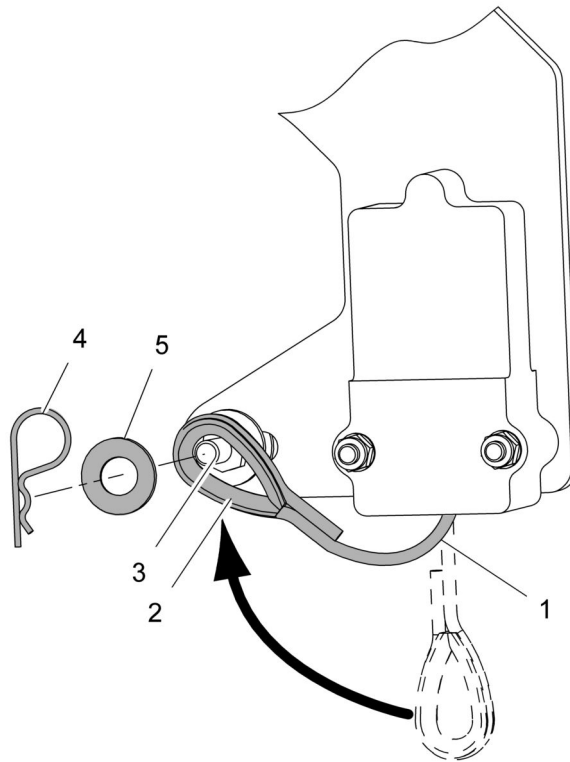


Fig. 3437: Bypassing the hoist limit switch mechanically

- | | | | |
|---|------------|---|----------------|
| 1 | Steel rope | 4 | Locking spring |
| 2 | Loop | 5 | Washer |
| 3 | Stud bolt | | |

- ▶ Pull the steel rope 1 and place the loop 2 over the stud bolt 3.
 - ▷ Hoist limit switch is bypassed.
- ▶ Protect the sling 2 from slipping off the stud bolt 3 by securing it with a washer 5 and a locking spring 4.

7.7 Erecting the main boom without derrick equipment*

7.7.1 Erecting the main boom

Ensure that the following conditions are fulfilled:

- Boom configuration can be erected with counterweight.
- Signalmen and assistants are instructed.
- All work on the main boom has been completed.
- No loose parts or tools have been left on the main boom.

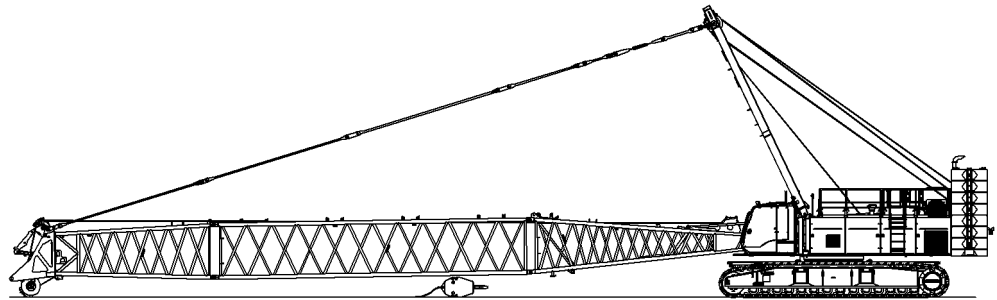


Fig. 3438: Main boom on the ground (illustration of principle)



DANGER

Hoist limit switch bypassed on control panel X23 in crane mode!
Load breakaway.

- ▶ Only bypass hoist limit switch on control panel X23 when assembling or disassembling the machine.



If hoist limit switch weight is on the ground:

- ▶ Press the *Bypass limit switch* button on control panel X23.
 - ▷ Hoist limit switches are bypassed.



- ▶ Press the *Load moment limiter assembly/self-lock* button on control panel X23.

No load chart exist for machines geometry:

- ▷ Function "load moment limiter assembly" is active.
- ▷ The LED on the button *Load moment limiter assembly/self-lock* lights up.
- ▷ Machine functions are enabled unlimited.
- ▷ Load Moment Limiter lamps flash orange.



DANGER

Erectability chart is not followed!
Machine toppling over.

- ▶ Only lift the main boom when erection is permitted according to the erectability chart.

**WARNING**

Falling objects!
Severe injury.

- ▶ Any loose parts and tools must be removed from the main boom.
- ▶ Make sure that nobody is located in the danger zone.
- ▶ Leave the danger area.

- ▶ Lift main boom slowly.
 - ▷ The main boom pendant straps are tensioned.

**WARNING**

Dangerous voltage in main boom!
Sudden sideways movement when lifting main boom off the ground.

- ▶ Make sure that no-one is standing in the danger zone.
- ▶ Leave the danger zone.

- ▶ Lift main boom further.
 - ▷ Main boom lifts off the ground.

When the auxiliary jib (36 t (79300 lb)) is attached and lifts off the ground:

- ▶ Stop main boom lift.

NOTICE

Incorrect limit stop setting for the pendant straps of the auxiliary jib!
Damage to auxiliary jib and pulleys on the main boom head when laying down.

- ▶ Ensure that the limit stop is set so that the pendant straps of the auxiliary jib fold upwards when laying down.

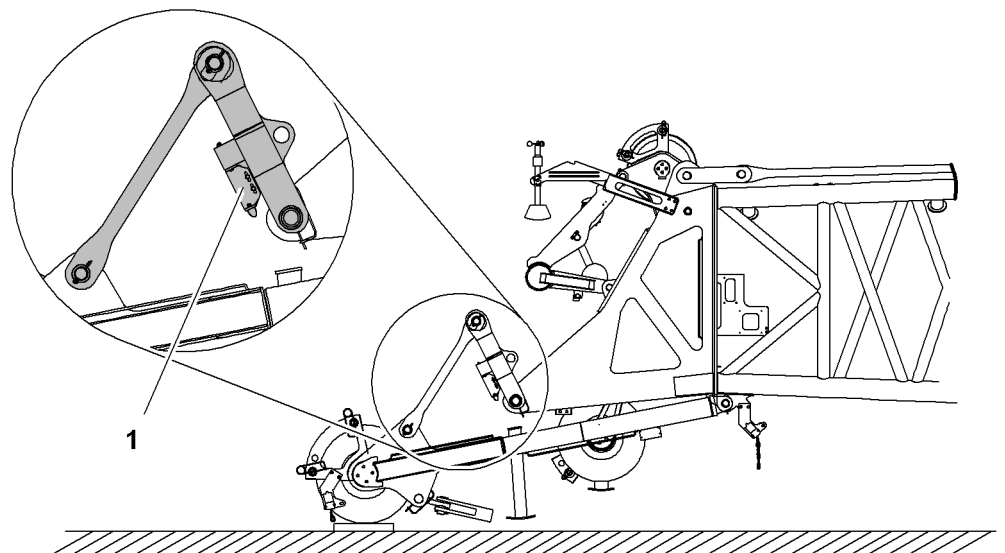


Fig. 3441: Checking the auxiliary jib limit stop

1 Limit stop

- ▶ Check the limit stop 1, if necessary lay down the main boom and set the limit stop 1.

When the limit stop 1 is set correctly:

- ▶ Lift main boom further.
 - ▷ Main boom erects itself:

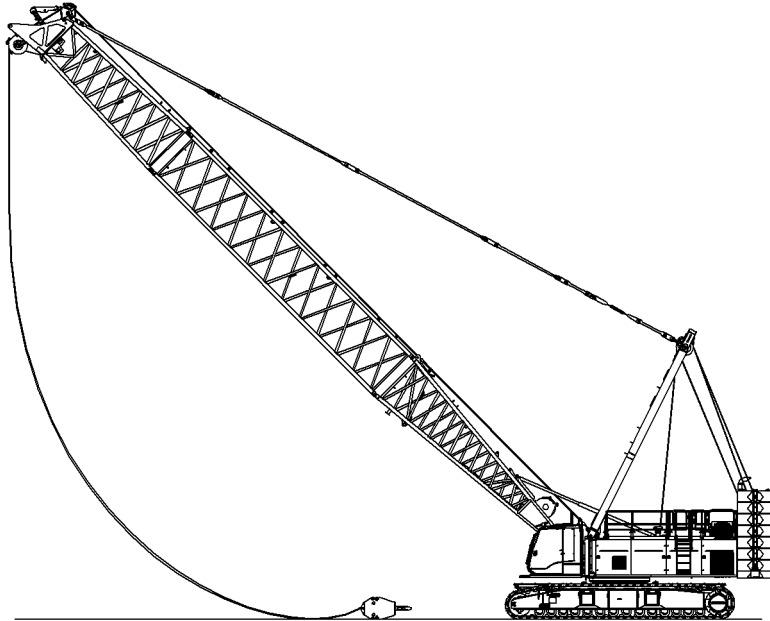


Fig. 3442: Main boom erects itself (illustration of principle)

As soon as there is a load chart for the geometry of the machine:

- ▷ Deactivate the function *Load moment limiter assembly*.
- ▷ The LED in the button *Load moment limiter assembly/self-lock* goes out.
- ▷ Load moment limiter is active.
- ▷ Load moment limiter lamps light up according to the current status of the Load Moment Limiter system.

NOTICE

Incorrect erection procedure is followed!
Damage to the equipment.

- ▶ Do not drag the hook or the pulley block along the ground.
 - ▶ Do not allow any slacking of the rope.
-

- ▶ Unwind the rope of winch1/winch2 when necessary.
 - ▷ The hook/pulley block remains on the ground.

When the maximum permitted lifting capacity is at least equal to the weight of the hook and/or pulley block:

- ▶ Raise the hook/pulley block.
- ▶ Erect the main boom until it is in the desired position.
 - ▷ Main boom is erected:

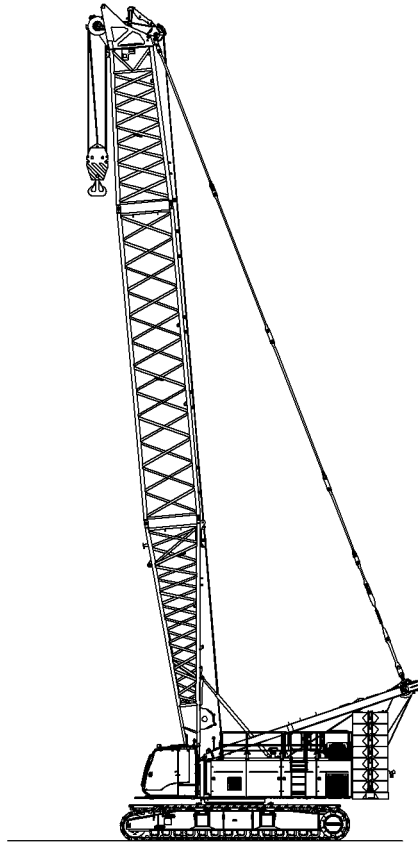


Fig. 3443: Erected main boom (illustration of principle)

7.7.2 Turning off assembly functions

Ensure the following conditions are met:

- Machine is readily mounted and erected.
- All limit switches are mounted and functioning.



- ▶ Press the switch *Assembly functions* on control panel X12.
 - ▷ Assembly functions are deactivated.
 - ▷ The symbol *Assembly functions* is no longer displayed on the monitor.

7.7.3 Checking the main boom limit switch plate for proper adjustment

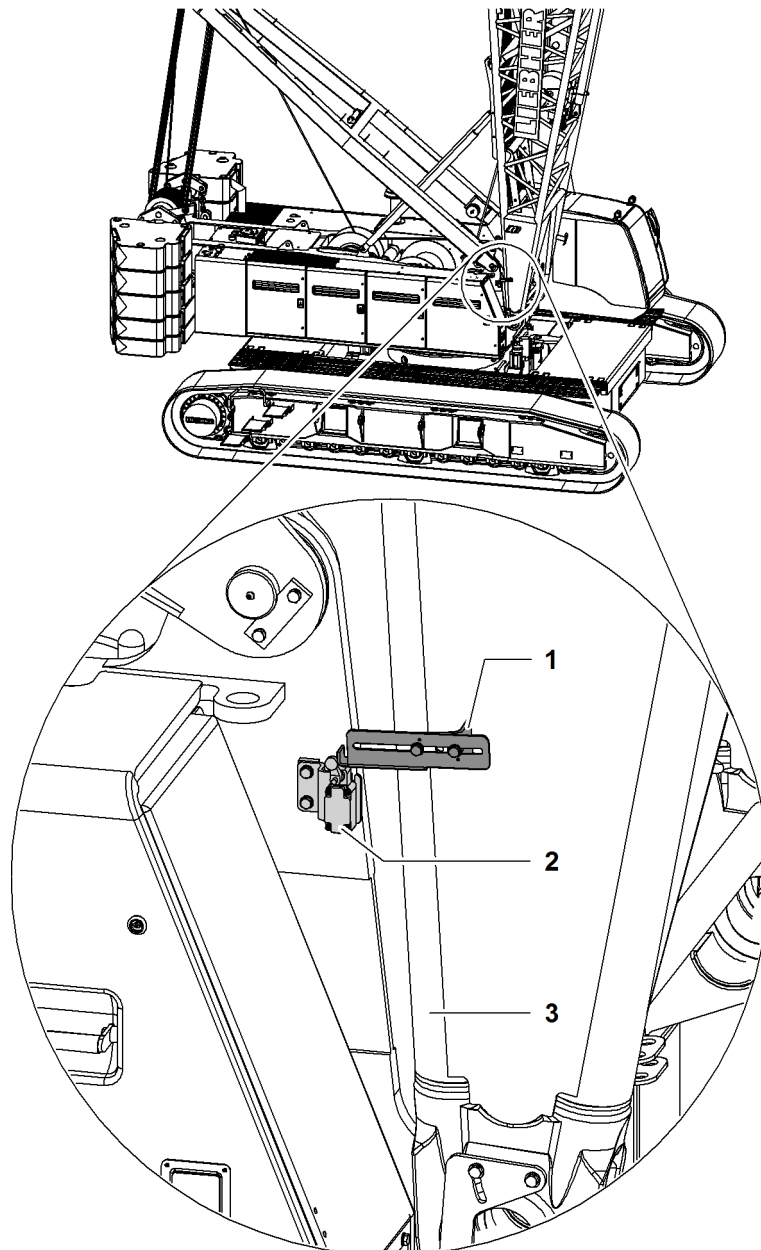


Fig. 3445: Checking the main boom limit switch plate for proper adjustment (illustration of principle)

- | | | | |
|---|--------------------|---|------------------------|
| 1 | Limit switch plate | 3 | Main boom base section |
| 2 | Limit switch | | |

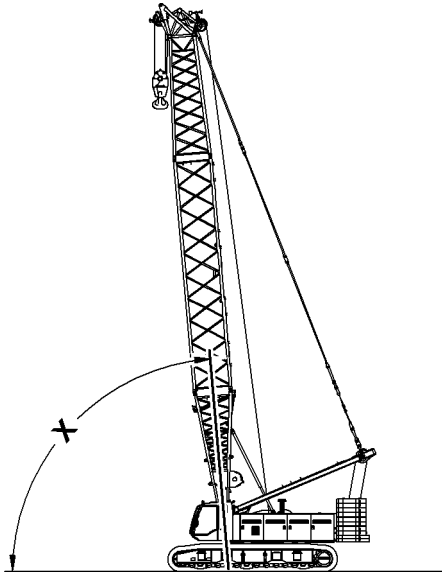


Fig. 3446: Top main boom angle (illustration of principle)

Boom configuration	Angle X
Main boom	86 °
Main boom + derrick	
Main boom + reducing adapter	
Main boom + fixed jib	88 °
Main boom + fixed jib + derrick	
Main boom + luffing jib	
Main boom + luffing jib + derrick	
Main boom + luffing jib + midfall	

Tab. 525: Main boom limit switch plate

NOTICE

Incorrectly calibrated main boom limit switch plate!
Damage to machine.

► Ensure that the main boom limit switch plate is properly calibrated.

- Erect the main boom until the *operation* screen shows the angle **X**.
- ▷ Limit switch triggers.
 - ▷ Lift main boom is locked.

If the limit switch triggers too early or not at all:

- Turn machine off.
- Contact Liebherr customer service.

7.8 Main boom 2821 + derrick boom 2220

System-relevant information for main boom 2821 + derrick boom 2220:

- Configuration of main boom in derrick mode
 - Rope guide installation position (type B)
 - Mid-point suspensions installation positions
- Lengths of mid-point suspensions
- Overview of main boom 2821 steel pendant straps + derrick boom 2220
- Overview of CF pendant straps of main boom 2821 + derrick boom 2220
- Reeving diagrams for one rope across main boom head 2821 (load position1)
- Reeving diagrams for two ropes across main boom head 2821 (load position1)
- Reeving diagrams for one rope across auxiliary jib (36 t (79300 lb)) on main boom head 2821 (load position1)
- Reeving diagrams for two ropes across auxiliary jib (36 t (79300 lb)) and main boom head 2821 (load position 1)
- Reeving diagrams jib luffing winch as auxiliary winch

7.8.1 Configuration of main boom in derrick mode



DANGER

Erected length of main boom excessive!
Structural breakdown.

- ▶ Check the main boom length in the load chart for validity.

Main boom length	Configuration of main boom (symbolic)
41 m 134 ft	
44 m 144 ft	
47 m 154 ft	
50 m 164 ft	
53 m 174 ft	
56 m 184 ft	
59 m 195 ft	
62 m 203 ft	
65 m 213 ft	
68 m 223 ft	

Main boom length	Configuration of main boom (symbolic)
71 m 233 ft	
74 m 243 ft	
77 m 253 ft	
80 m 262 ft	
83 m 272 ft	
86 m 282 ft	
89 m 292 ft	
92 m 302 ft	
95 m 312 ft	
98 m 322 ft	
101 m 332 ft	
104 m 342 ft	
107 m 351 ft	
110 m 361 ft	
113 m 371 ft	
116 m 381 ft	
119 m 390 ft	

Tab. 526: Configuration of main boom 2821 in derrick mode

S - Rope guide installation position (type B)

X1 - Assembly position of mid-point suspension 1

7.8.2 Lengths of mid-point suspensions

Main boom length	Stay rope 1 (X1)
	Rope length
95 m 311' 8" ft-in	7.2 m 23' 7" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in) + 3.0 m (9' 10" ft-in)
98 m 321' 6" ft-in	6.9 m 22' 8" ft-in = 1.6 m (5' 3" ft-in) + 1.6 m (5' 3" ft-in) + 1.6 m (5' 3" ft-in) + 2.1 m (6' 11" ft-in)
101 m 331' 4" ft-in	6.7 m 22' ft-in = 1.6 m (5' 3" ft-in) + 2.1 m (6' 11" ft-in) + 3.0 m (9' 10" ft-in)
104 m 341' 2" ft-in	9.2 m 30' 2" ft-in = 1.6 m (5' 3" ft-in) + 1.6 m (5' 3" ft-in) + 3.0 m (9' 10" ft-in) + 3.0 m (9' 10" ft-in)
107 m 351' 1" ft-in	8.9 m 29' 2" ft-in = 1.6 m (5' 3" ft-in) + 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in) + 2.6 m (8' 6" ft-in)
110 m 360' 11" ft-in	8.8 m 28' 10" ft-in = 1.6 m (5' 3" ft-in) + 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in) + 3.0 m (9' 10" ft-in)
113 m 370' 9" ft-in	8.6 m 28' 3" ft-in = 2.6 m (8' 6" ft-in) + 3.0 m (9' 10" ft-in) + 3.0 m (9' 10" ft-in)
116 m 380' 7" ft-in	8.4 m 27' 7" ft-in = 1.6 m (5' 3" ft-in) + 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in)
119 m 390' 5" ft-in	7.9 m 25' 11" ft-in = 1.6 m (5' 3" ft-in) + 1.6 m (5' 3" ft-in) + 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in)

Tab. 527: Lengths of mid-point suspensions - main boom 2821 + derrick boom 2220

7.8.3 Overview of main boom 2821 steel pendant straps + derrick boom 2220

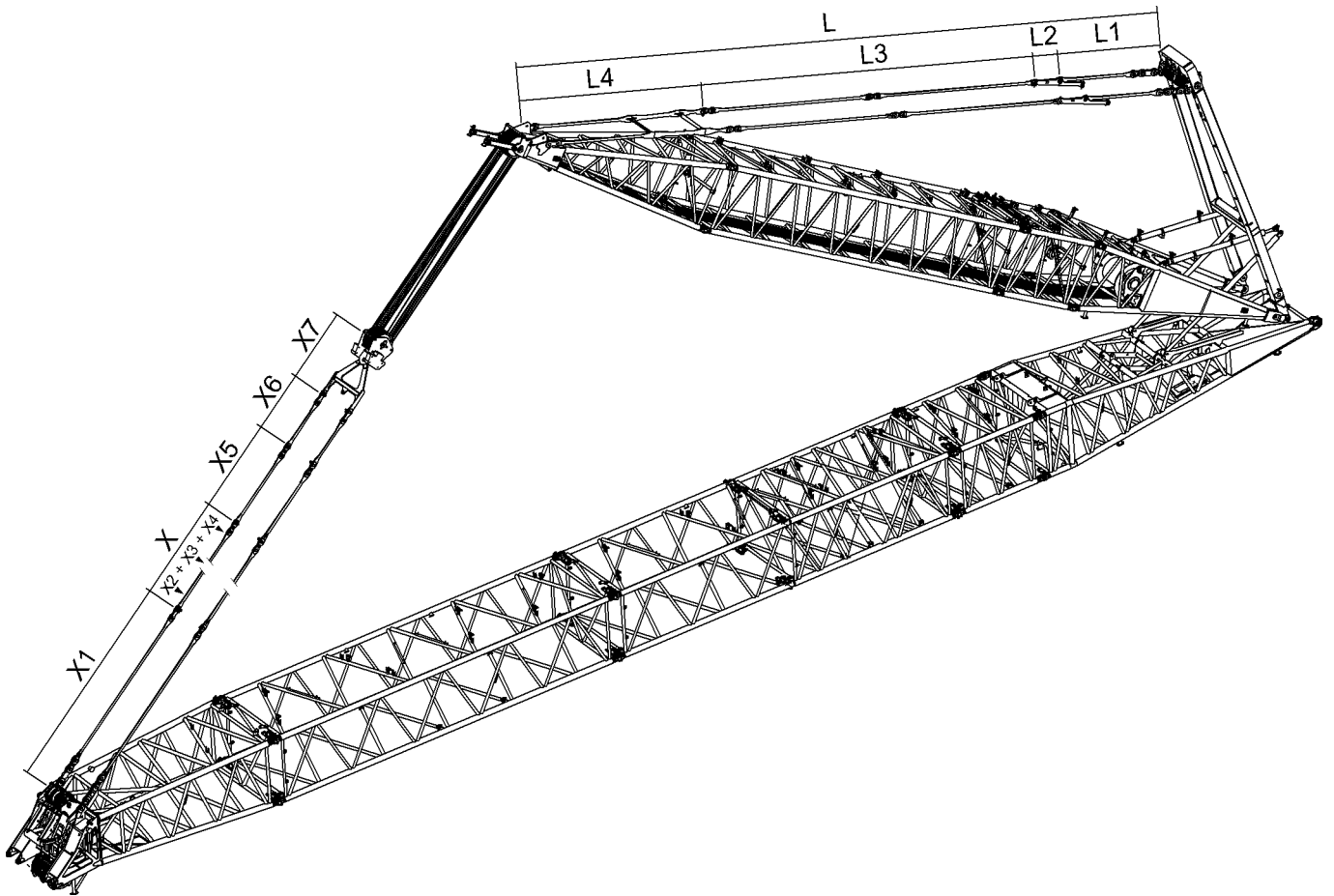


Fig. 3659: Overview of main boom 2821 steel pendant straps + derrick boom 2220

A-frame1 to 2220 derrick boom head pendant straps

Name		Value
L	Derrick boom pendant straps consisting of:	
	L1	A-frame1 equalizer (For more information see: A-frame1 equalizer , page 77)
	L2	Adapter connecting link (For more information see: Adapter connecting link , page 396)
	L3	Derrick boom pendant strap 12 m (40 ft) (For more information see: Derrick boom pendant strap 12 m (40 ft) , page 397)
L4	Derrick boom pendant strap (crossbar) (For more information see: Derrick boom pendant strap (crossbar) , page 398)	
		3730 mm 12' 3" ft-in
		913 mm 3' ft-in
		12000 mm 39' 4" ft-in
		6500 mm 21' 4" ft-in

Tab. 528: A-frame1 pendant straps to derrick boom head 2220

2821 main boom head to 2220 derrick boom head pendant straps

Name		Value
X1	Main boom pendant strap on main boom head 2821 (For more information see: Connecting links with tension load cell , page 205) +	6300 mm 20' 8" ft-in
X	Main boom pendant straps consisting of:	
	X2	Main boom pendant straps 3 m (10 ft) (For more information see: Main boom pendant strap 3 m (10 ft) , page 198)
	X3	Main boom pendant straps 6 m (20 ft) (For more information see: Main boom pendant strap 6 m (20 ft) , page 200)
X4	Main boom pendant straps 12 m (40 ft) (For more information see: Main boom pendant strap 12 m (40 ft) , page 202)	
		Total X2 +
		Total X3 +
		Total X4

Name		Value
X5	Equalizer of main boom base section 2821 (For more information see: Equalizer of main boom base section 2821.30 , page 197)	2670 mm 8' 9" ft-in
X6	Main boom pendant strap (For more information see: Pendant strap with connecting link , page 205)	1855 mm 6' 1" ft-in
X7	Derrick rope rigging with crossbar (For more information see: Derrick rope rigging with crossbar , page 395)	2145 mm 7' ft-in

Tab. 529: Main boom head pendant straps 2821 for derrick boom head 2220

Composition of the pendant straps between 2821 main boom head and 2220 derrick boom head:

Main boom length	X1	Required pendant strap length X			X5	X6	X7
		X = X2 + X3 + X4					
		X2	X3	X4			
41 m 134' 6" ft-in	6300 mm 20' 8" ft-in	-	-	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
44 m 144' 4" ft-in	6300 mm 20' 8" ft-in	-	-	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
47 m 154' 2" ft-in	6300 mm 20' 8" ft-in	-	1 x 6 m (20 ft)	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
50 m 164' ft-in	6300 mm 20' 8" ft-in	-	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
53 m 173' 11" ft-in	6300 mm 20' 8" ft-in	1 x 12 m (40 ft)	-	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
56 m 183' 9" ft-in	6300 mm 20' 8" ft-in	1 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
59 m 193' 7" ft-in	6300 mm 20' 8" ft-in	1 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
62 m 203' 5" ft-in	6300 mm 20' 8" ft-in	1 x 12 m (40 ft)	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
65 m 213' 3" ft-in	6300 mm 20' 8" ft-in	2 x 12 m (40 ft)	-	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
68 m 223' 1" ft-in	6300 mm 20' 8" ft-in	2 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
71 m 232' 11" ft-in	6300 mm 20' 8" ft-in	2 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
74 m 242' 9" ft-in	6300 mm 20' 8" ft-in	2 x 12 m (40 ft)	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
77 m 252' 7" ft-in	6300 mm 20' 8" ft-in	3 x 12 m (40 ft)	-	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
80 m 262' 6" ft-in	6300 mm 20' 8" ft-in	3 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in

Main boom length	X1	Required pendant strap length X			X5	X6	X7
		X = X2 + X3 + X4					
		X2	X3	X4			
83 m 272' 4" ft-in	6300 mm 20' 8" ft-in	3 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
86 m 282' 2" ft-in	6300 mm 20' 8" ft-in	3 x 12 m (40 ft)	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
89 m 292' ft-in	6300 mm 20' 8" ft-in	4 x 12 m (40 ft)	-	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
92 m 301' 10" ft-in	6300 mm 20' 8" ft-in	4 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
95 m 311' 8" ft-in	6300 mm 20' 8" ft-in	4 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
98 m 321' 6" ft-in	6300 mm 20' 8" ft-in	4 x 12 m (40 ft)	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
101 m 331' 4" ft-in	6300 mm 20' 8" ft-in	5 x 12 m (40 ft)	-	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
104 m 341' 2" ft-in	6300 mm 20' 8" ft-in	5 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
107 m 351' 1" ft-in	6300 mm 20' 8" ft-in	5 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
110 m 360' 11" ft-in	6300 mm 20' 8" ft-in	5 x 12 m (40 ft)	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
113 m 370' 9" ft-in	6300 mm 20' 8" ft-in	6 x 12 m (40 ft)	-	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
116 m 380' 7" ft-in	6300 mm 20' 8" ft-in	6 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in
119 m 390' 5" ft-in	6300 mm 20' 8" ft-in	6 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2670 mm 8' 9" ft-in	1855 mm 6' 1" ft-in	2145 mm 7' ft-in

Tab. 530: Configuration of main boom head 2821 pendant straps to derrick boom head 2220

7.8.4 Overview of CF pendant straps of main boom 2821 + derrick boom 2220

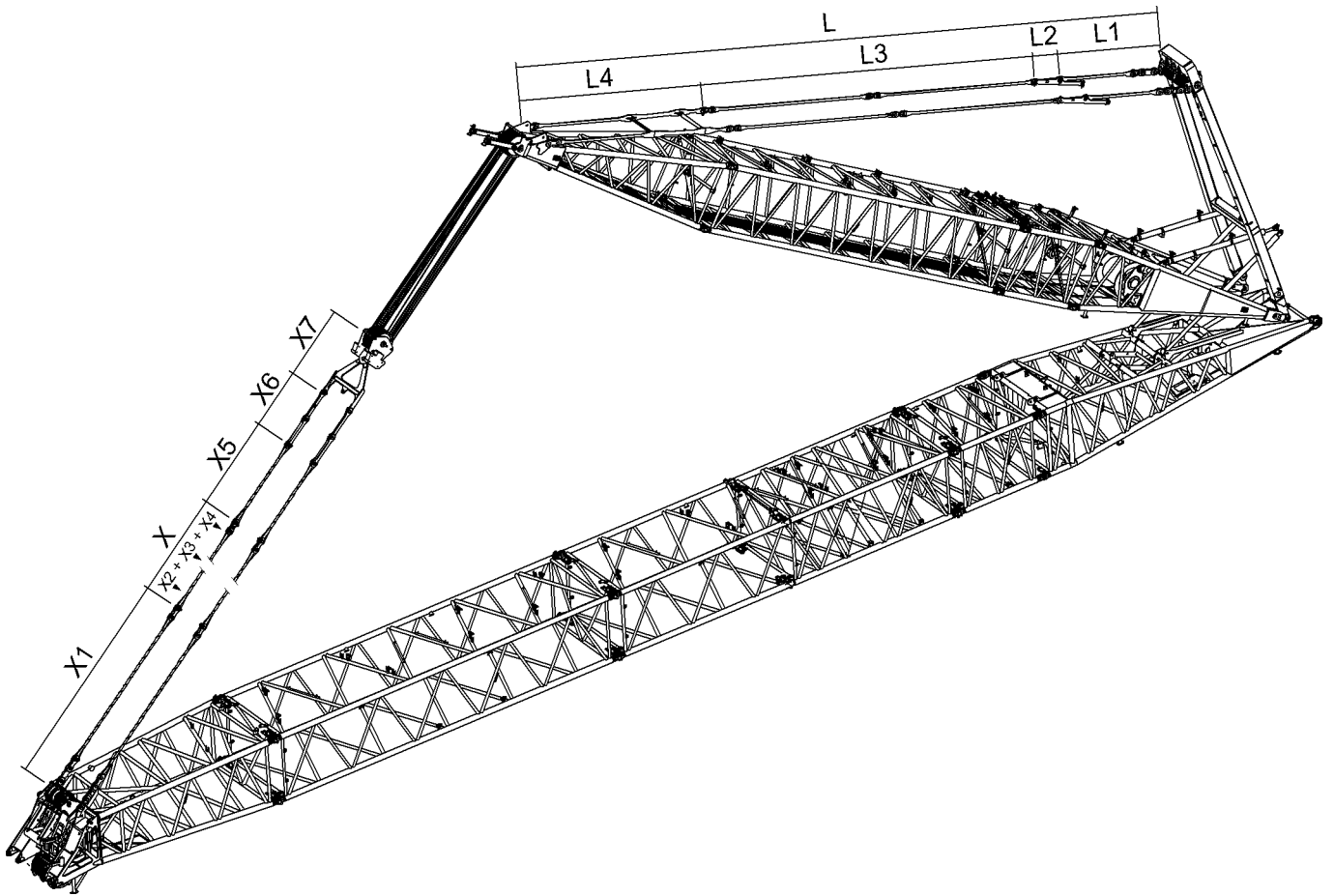


Fig. 3660: Overview of CF pendant straps of main boom 2821 + derrick boom 2220

A-frame1 to 2220 derrick boom head pendant straps

Name		Value
L	Derrick boom pendant straps consisting of:	
	L1	A-frame1 equalizer (For more information see: A-frame1 equalizer , page 78)
	L2	Adapter connecting link (For more information see: Adapter connecting link , page 396)
	L3	Derrick boom pendant strap 12 m (40 ft) (For more information see: Derrick boom pendant strap 12 m (40 ft) , page 397)
L4	Derrick boom pendant strap (crossbar) (For more information see: Derrick boom pendant strap (crossbar) , page 398)	
		3700 mm 12' 2" ft-in
		913 mm 3' ft-in
		12000 mm 39' 4" ft-in
		6500 mm 21' 4" ft-in

Tab. 531: A-frame1 pendant straps to derrick boom head 2220

2821 main boom head to 2220 derrick boom head pendant straps

Name		Value
X1	Main boom pendant strap on main boom head 2821 (For more information see: Connecting links with tension load cell , page 222) +	6300 mm 20' 8" ft-in
X	Main boom pendant straps consisting of:	
	X2	Main boom pendant strap 3 m (10 ft) (For more information see: Main boom pendant strap 3 m (10 ft) , page 209)
	X3	Main boom pendant strap 6 m (20 ft) (For more information see: Main boom pendant strap 6 m (20 ft) , page 212)
X4	Main boom pendant strap 12 m (40 ft) (For more information see: Main boom pendant strap 12 m (40 ft) , page 216)	
		Total X2 +
		Total X3 +
		Total X4

Name	Value
X5 Equalizer of main boom base section 2821 (For more information see: Equalizer of main boom base section 2821.30 , page 206)	2700 mm 8' 10" ft-in
X6 Connecting links (For more information see: Connecting links , page 223)	1825 mm 6' ft-in
X7 Derrick rope rigging with crossbar (For more information see: Derrick rope rigging with crossbar , page 395)	2145 mm 7' ft-in

Tab. 532: Main boom head pendant straps 2821 for derrick boom head 2220

Composition of the pendant straps between 2821 main boom head and 2220 derrick boom head:

Main boom length	X1	Required pendant strap length X			X5	X6	X7
		X = X2 + X3 + X4					
		X2	X3	X4			
41 m 134' 6" ft-in	6300 mm 20' 8" ft-in	-	-	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
44 m 144' 4" ft-in	6300 mm 20' 8" ft-in	-	-	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
47 m 154' 2" ft-in	6300 mm 20' 8" ft-in	-	1 x 6 m (20 ft)	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
50 m 164' ft-in	6300 mm 20' 8" ft-in	-	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
53 m 173' 11" ft-in	6300 mm 20' 8" ft-in	1 x 12 m (40 ft)	-	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
56 m 183' 9" ft-in	6300 mm 20' 8" ft-in	1 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
59 m 193' 7" ft-in	6300 mm 20' 8" ft-in	1 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
62 m 203' 5" ft-in	6300 mm 20' 8" ft-in	1 x 12 m (40 ft)	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
65 m 213' 3" ft-in	6300 mm 20' 8" ft-in	2 x 12 m (40 ft)	-	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
68 m 223' 1" ft-in	6300 mm 20' 8" ft-in	2 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
71 m 232' 11" ft-in	6300 mm 20' 8" ft-in	2 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
74 m 242' 9" ft-in	6300 mm 20' 8" ft-in	2 x 12 m (40 ft)	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
77 m 252' 7" ft-in	6300 mm 20' 8" ft-in	3 x 12 m (40 ft)	-	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
80 m 262' 6" ft-in	6300 mm 20' 8" ft-in	3 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in

Main boom length	X1	Required pendant strap length X			X5	X6	X7
		X = X2 + X3 + X4					
		X2	X3	X4			
83 m 272' 4" ft-in	6300 mm 20' 8" ft-in	3 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
86 m 282' 2" ft-in	6300 mm 20' 8" ft-in	3 x 12 m (40 ft)	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
89 m 292' ft-in	6300 mm 20' 8" ft-in	4 x 12 m (40 ft)	-	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
92 m 301' 10" ft-in	6300 mm 20' 8" ft-in	4 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
95 m 311' 8" ft-in	6300 mm 20' 8" ft-in	4 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
98 m 321' 6" ft-in	6300 mm 20' 8" ft-in	4 x 12 m (40 ft)	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
101 m 331' 4" ft-in	6300 mm 20' 8" ft-in	5 x 12 m (40 ft)	-	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
104 m 341' 2" ft-in	6300 mm 20' 8" ft-in	5 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
107 m 351' 1" ft-in	6300 mm 20' 8" ft-in	5 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
110 m 360' 11" ft-in	6300 mm 20' 8" ft-in	5 x 12 m (40 ft)	1 x 6 m (20 ft)	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
113 m 370' 9" ft-in	6300 mm 20' 8" ft-in	6 x 12 m (40 ft)	-	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
116 m 380' 7" ft-in	6300 mm 20' 8" ft-in	6 x 12 m (40 ft)	-	1 x 3 m (10 ft)	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in
119 m 390' 5" ft-in	6300 mm 20' 8" ft-in	6 x 12 m (40 ft)	1 x 6 m (20 ft)	-	2700 mm 8' 10" ft-in	1825 mm 6' ft-in	2145 mm 7' ft-in

Tab. 533: Configuration of main boom head 2821 pendant straps for derrick boom head 2220

The main boom pendant straps (**X**) may consist of generation A and generation B main boom pendant straps (For more information see: [1.11.9 CF pendant straps on main boom 2821, page 206](#)). Mixing is only admissible if the number of generation B main boom pendant straps only differs by at most 1 in the left and the right strand of the pendant straps.



DANGER

Inadmissible mixing of generation A and generation B main boom pendant straps! Structural failure.

- Ensure that the number of generation B main boom pendant straps differs by at most 1 in the left and the right strand of the pendant straps.

7.8.5 Reeving diagrams for one rope across main boom head 2821 (load position 1)

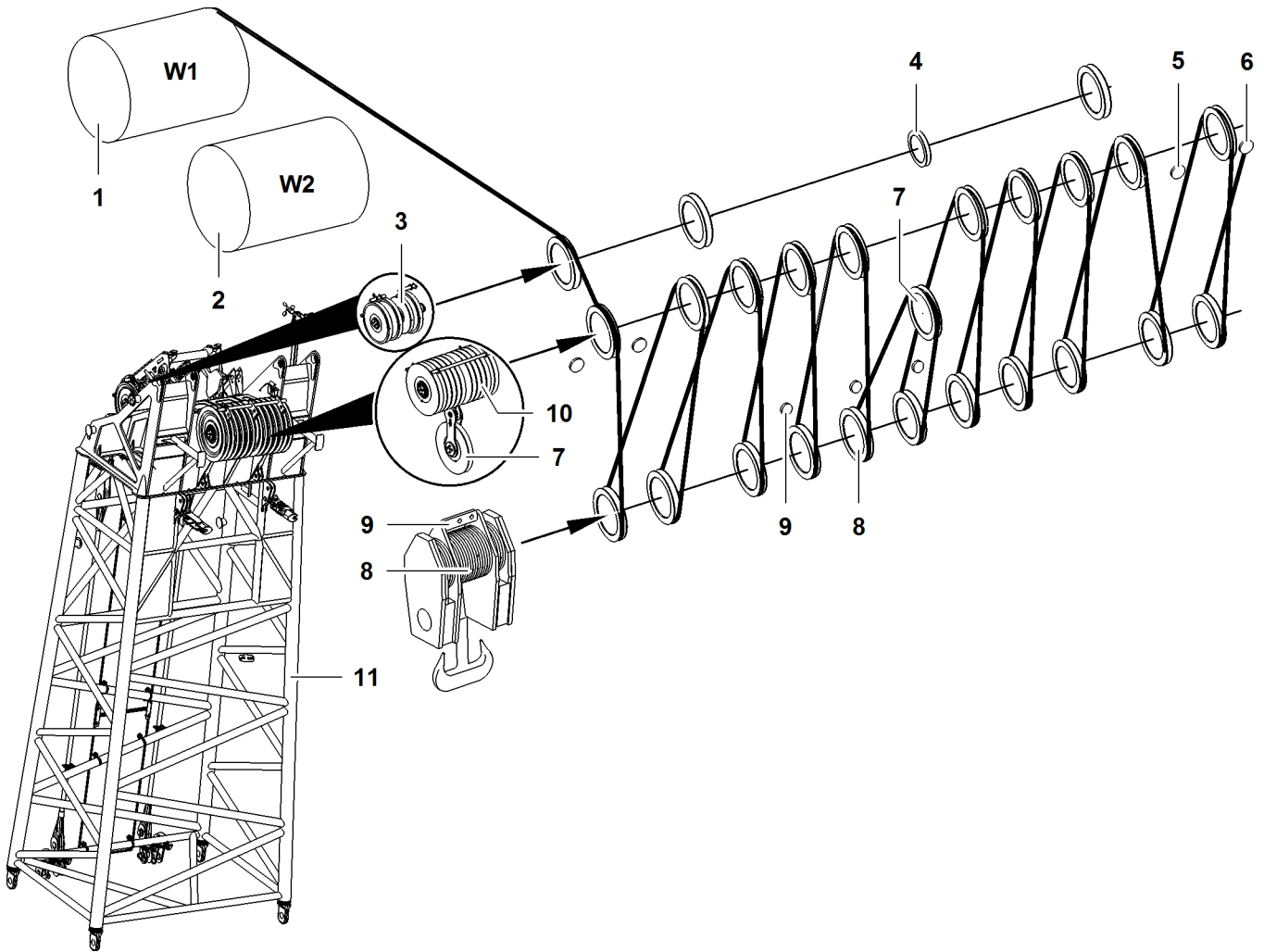


Fig. 3661: Reeving diagrams for one rope across main boom head 2821 (load position 1)

- | | | | | | |
|---|---|---|--|----|-------------------------------------|
| 1 | Winch1 | 5 | Inner rope fixing point (2x) of main boom head | 9 | Rope fixing points of pulley block |
| 2 | Winch2 | 6 | Outer rope fixing point (2x) of main boom head | 10 | Rope pulley (10x) of main boom head |
| 3 | Gantry pulley (3x) of main boom head | 7 | 11th rope pulley of main boom head | 11 | Main boom head |
| 4 | Rope pulley for rope of jib luffing winch | 8 | Pulley set of pulley block | | |

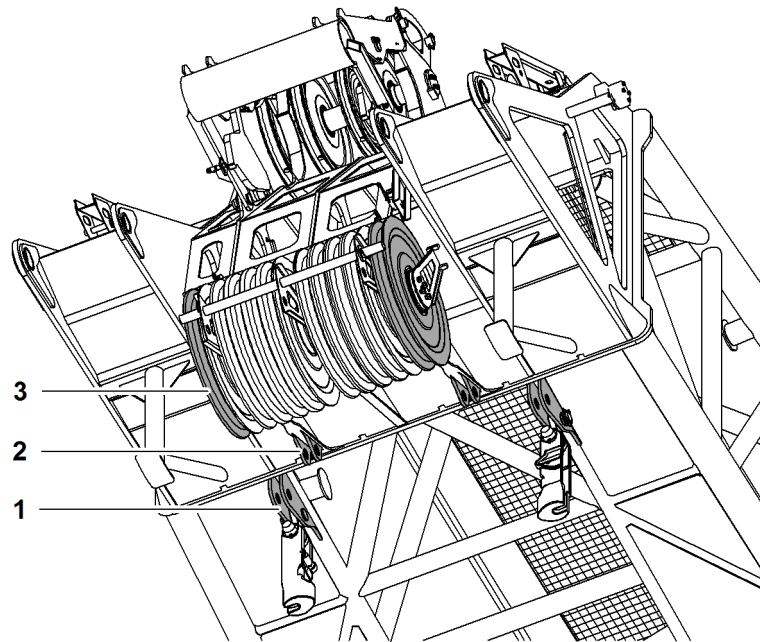


Fig. 3662: Rope fixing points main boom head 2821

- | | | | |
|---|------------------------------|---|------------------|
| 1 | Outer rope fixing point (2x) | 3 | Rope pulley (2x) |
| 2 | Inner rope fixing point (2x) | | |

If the first or last rope pulley **3** on the pulley set of the main boom head is used (reeved), the outer rope fixing point **1** is to be used.

If the first or last rope pulley **3** on the pulley set of the main boom head is not used (not reeved), the inner rope fixing point **2** is to be used.

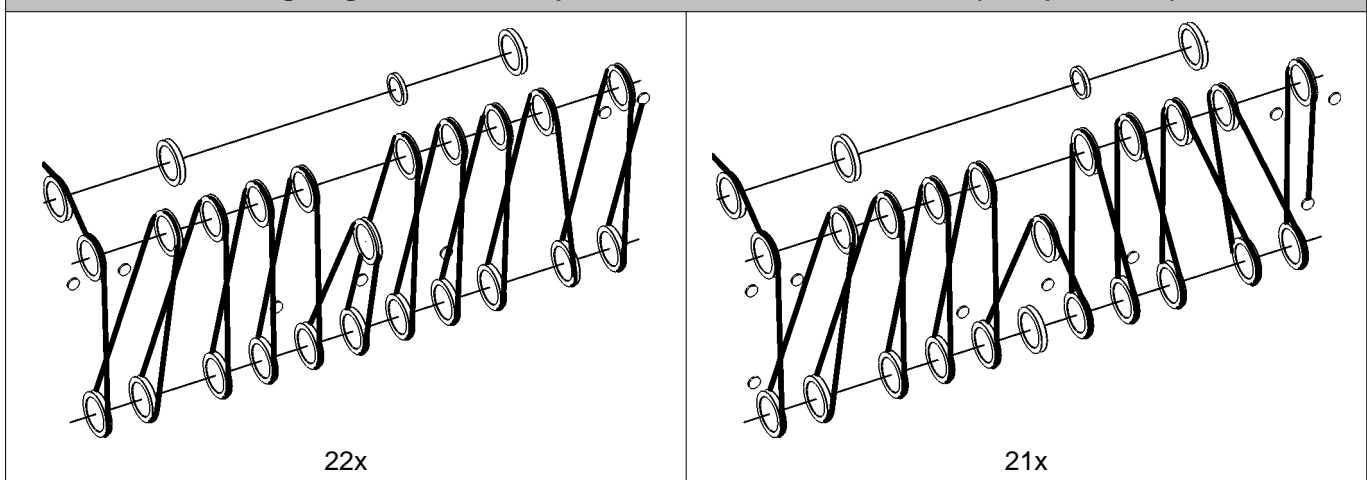


DANGER

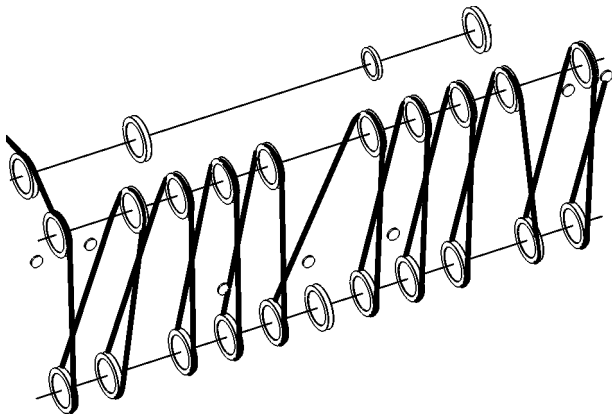
Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.

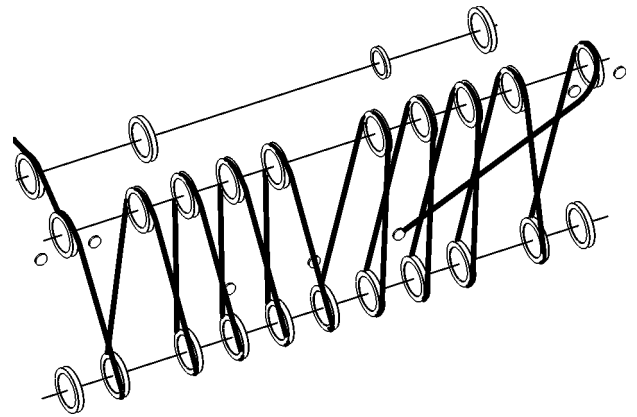
Reeving diagrams for one rope across main boom head 2821 (load position 1)



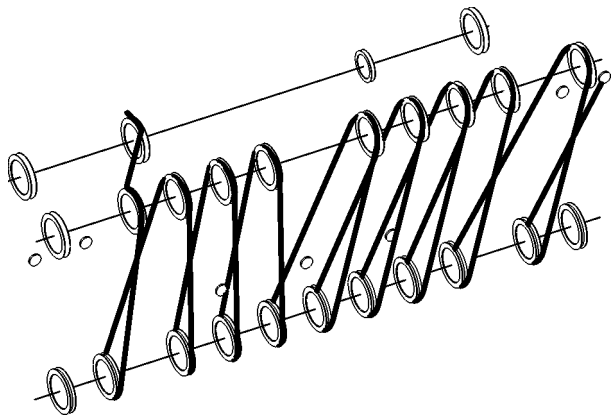
Reeving diagrams for one rope across main boom head 2821 (load position 1)



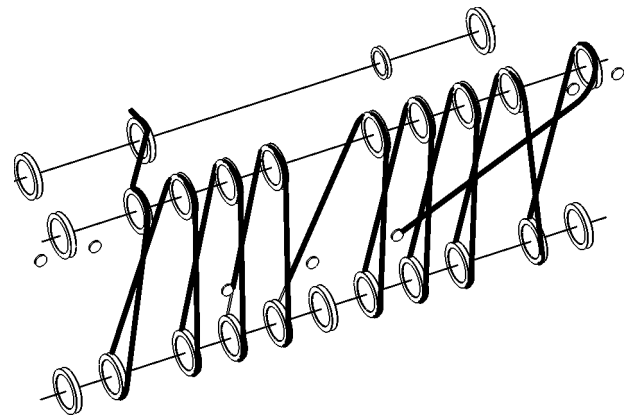
20x



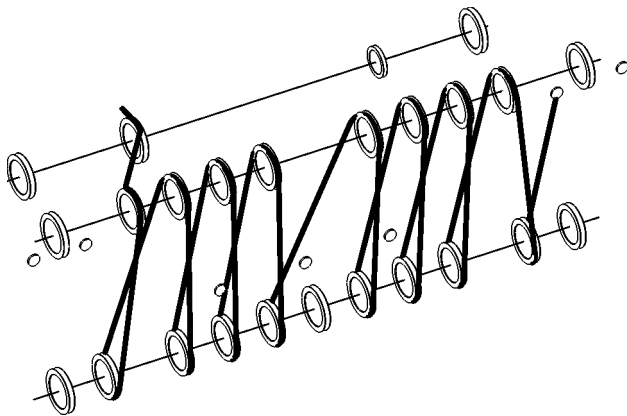
19x



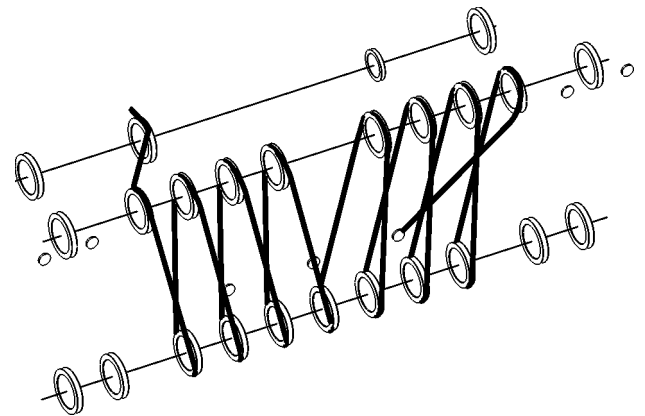
18x



17x

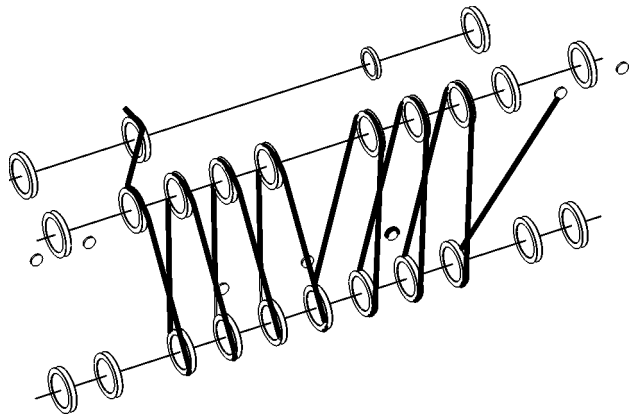


16x

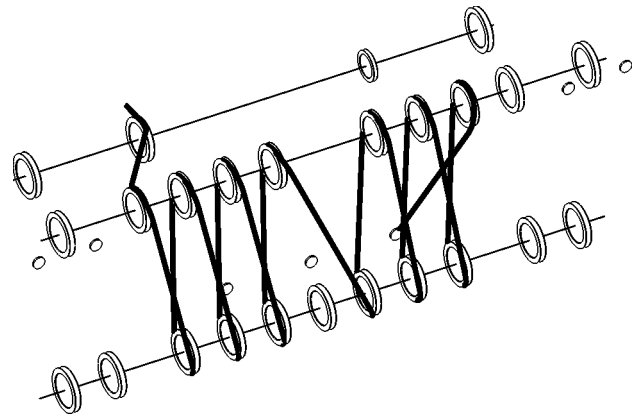


15x

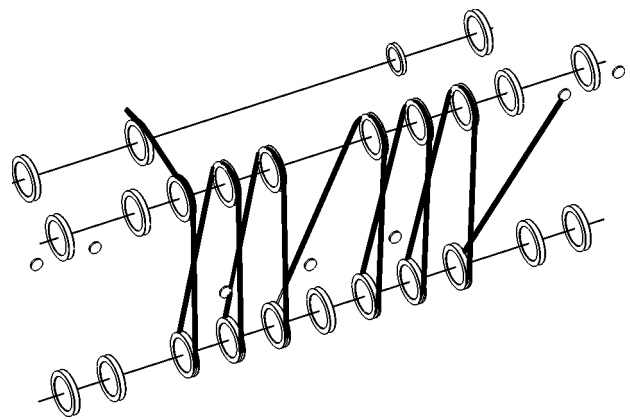
Reeving diagrams for one rope across main boom head 2821 (load position 1)



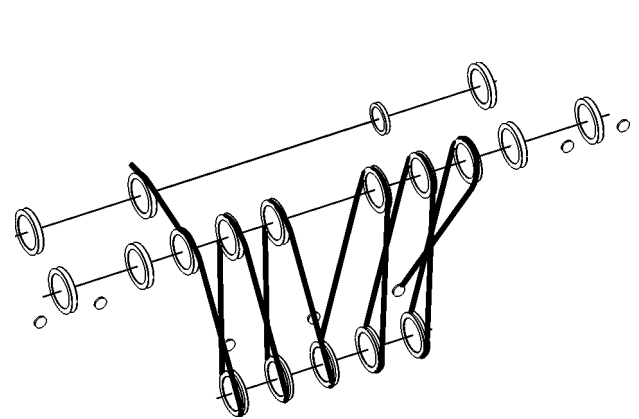
14x



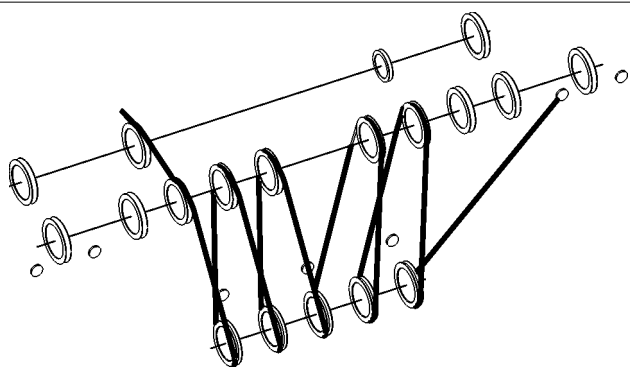
13x



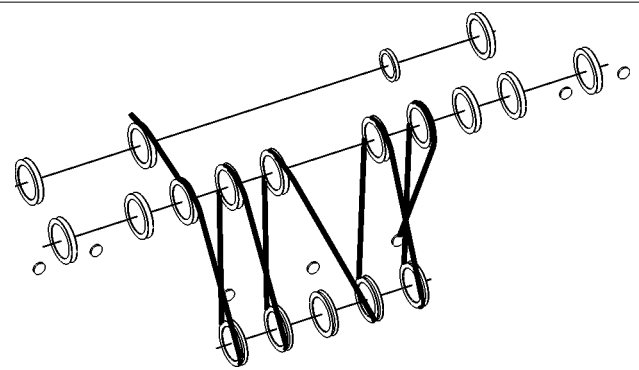
12x



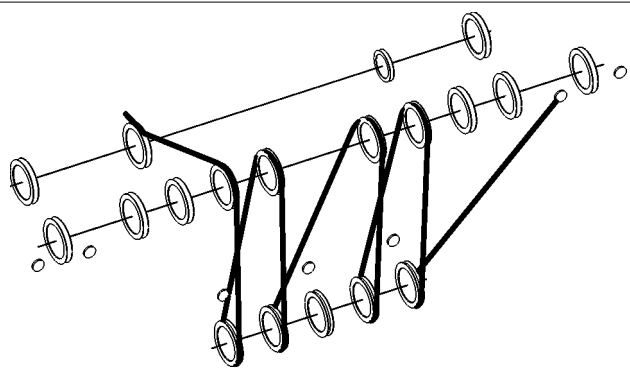
11x



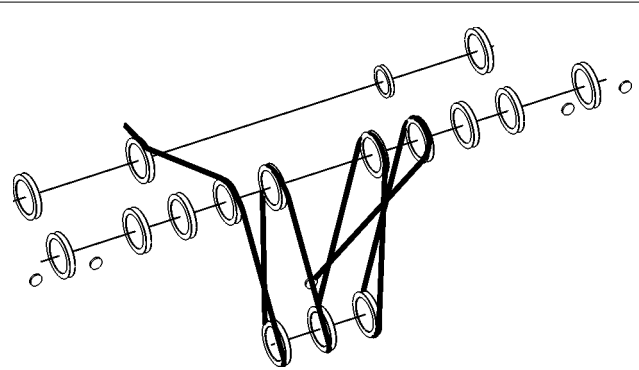
10x



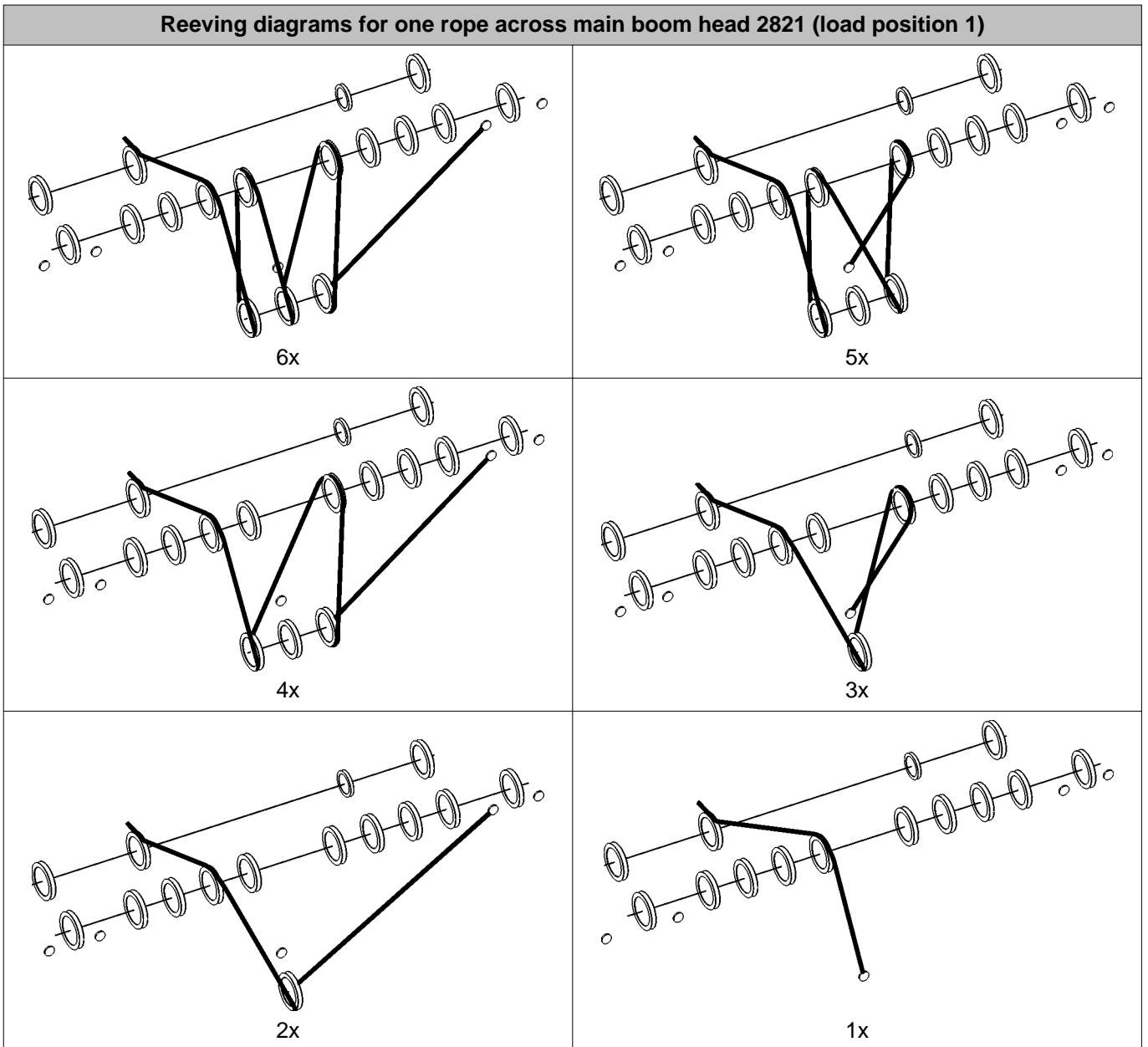
9x



8x



7x



Tab. 534: Reeving diagrams for one rope across main boom head 2821 (load position 1)

7.8.6 Reeving diagrams for two ropes across main boom head 2821 (load position1)

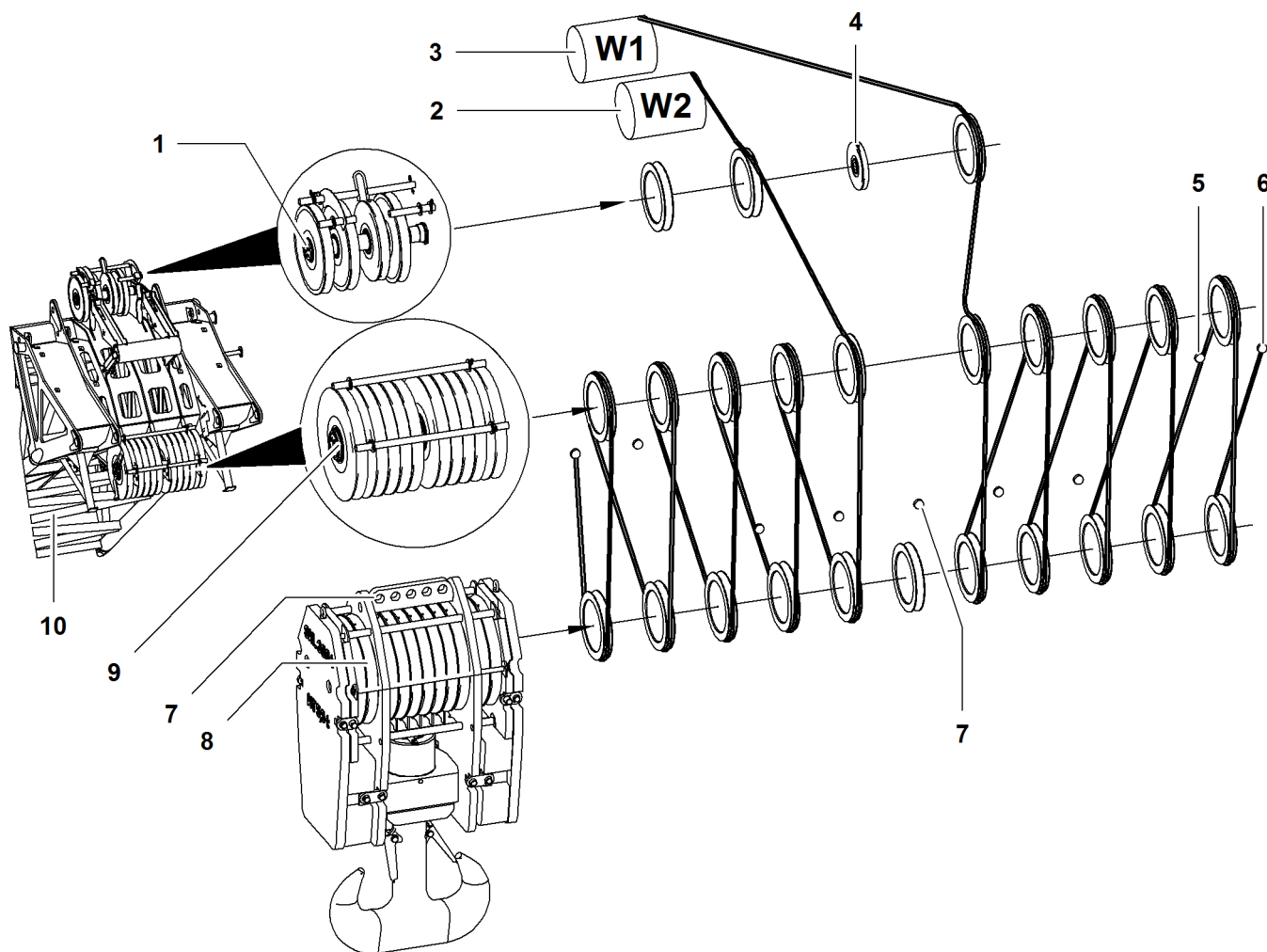


Fig. 3685: Reeving diagrams for two ropes across main boom head 2821 (load position 1)

- | | | | | | |
|---|--------------------------------------|---|--|----|--------------------------------|
| 1 | Gantry pulley (3x) of main boom head | 5 | Inner rope fixing point (2x) of main boom head | 9 | Pulley (10x) of main boom head |
| 2 | Winch2 | 6 | Outer rope fixing point (2x) of main boom head | 10 | Main boom head |
| 3 | Winch1 | 7 | Rope fixing points of pulley block | | |
| 4 | Pulley for rope of jib luffing winch | 8 | Pulley set of pulley block | | |

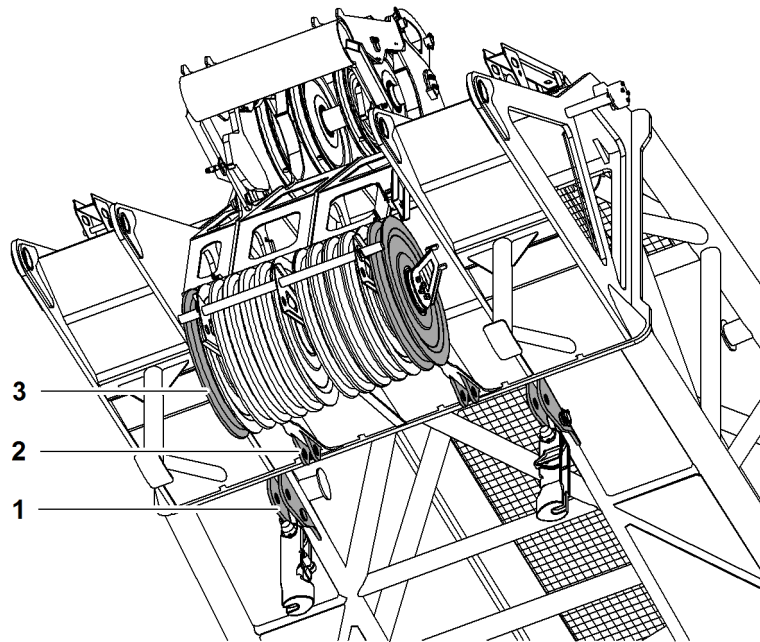


Fig. 3686: Rope fixing points main boom head 2821

- 1 Outer rope fixing point (2x)
- 2 Inner rope fixing point (2x)
- 3 Pulley (2x)

If the first or last pulley 3 on the pulley set of the main boom head is used (reeved), the outer rope fixing point 1 is to be used.

If the first or last pulley 3 on the pulley set of the main boom head is not used (not reeved), the inner rope fixing point 2 is to be used.

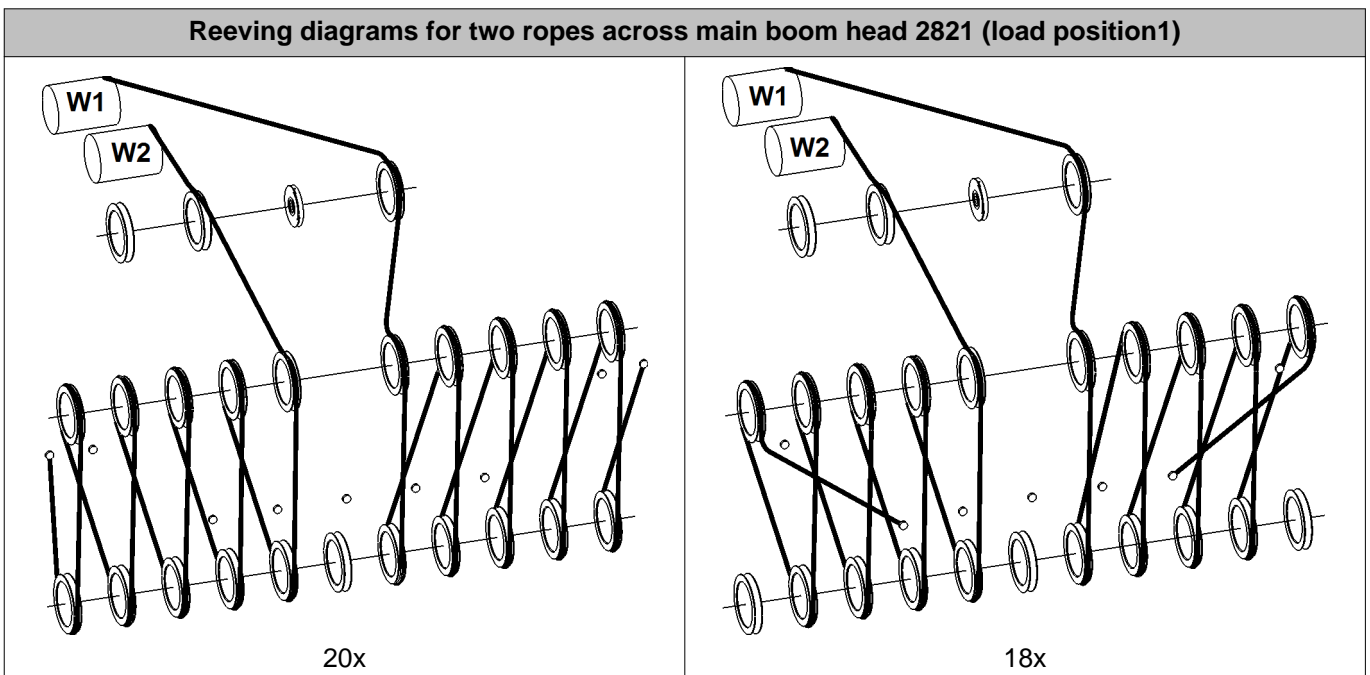


DANGER

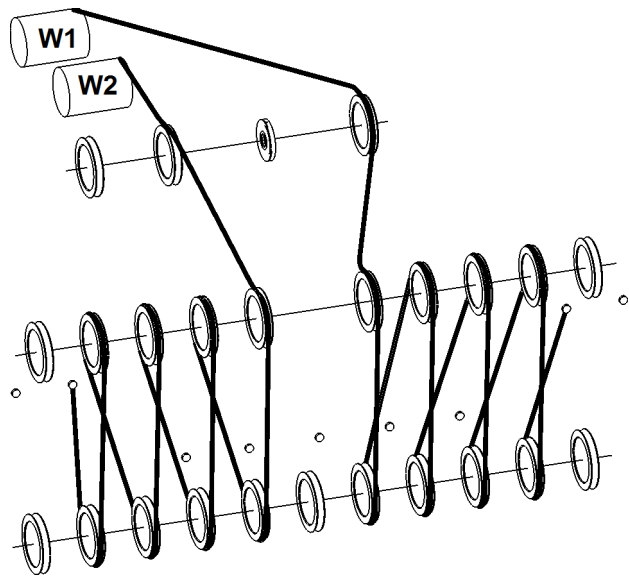
Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Choose correct number of reevings as indicated in load chart.

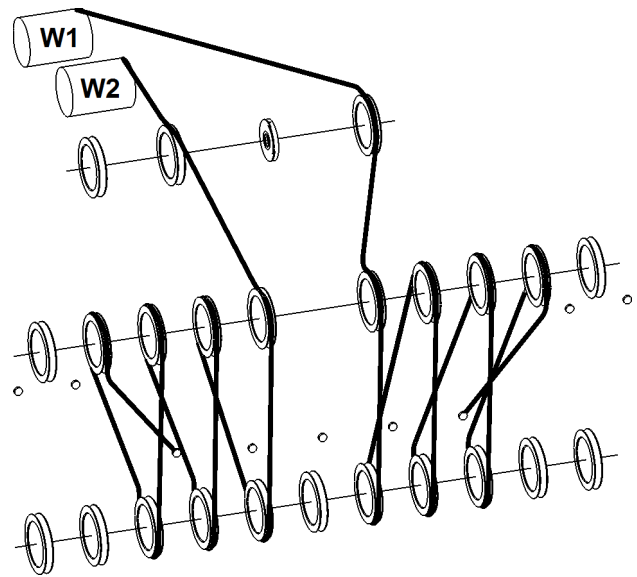
Reeving diagrams for two ropes across main boom head 2821 (load position1)



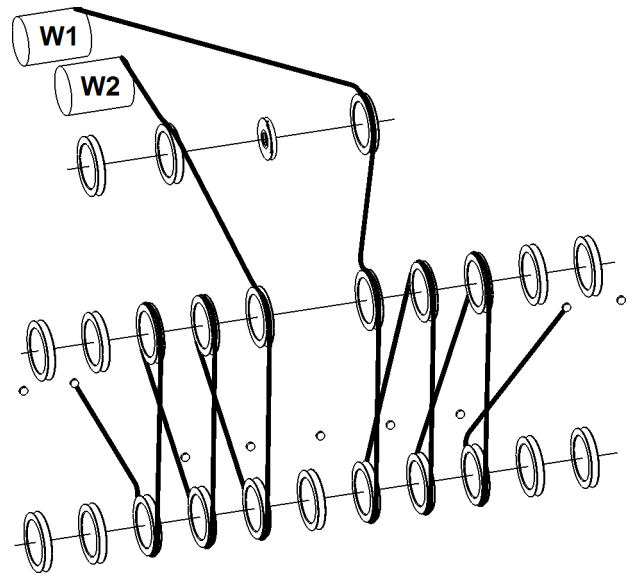
Reeving diagrams for two ropes across main boom head 2821 (load position1)



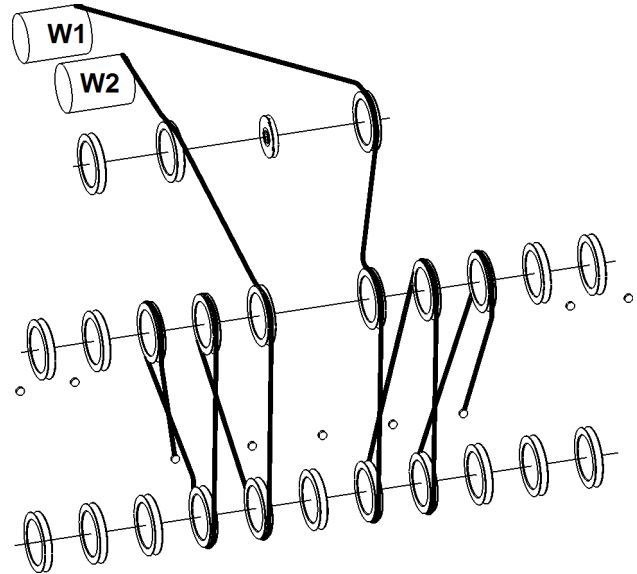
16x



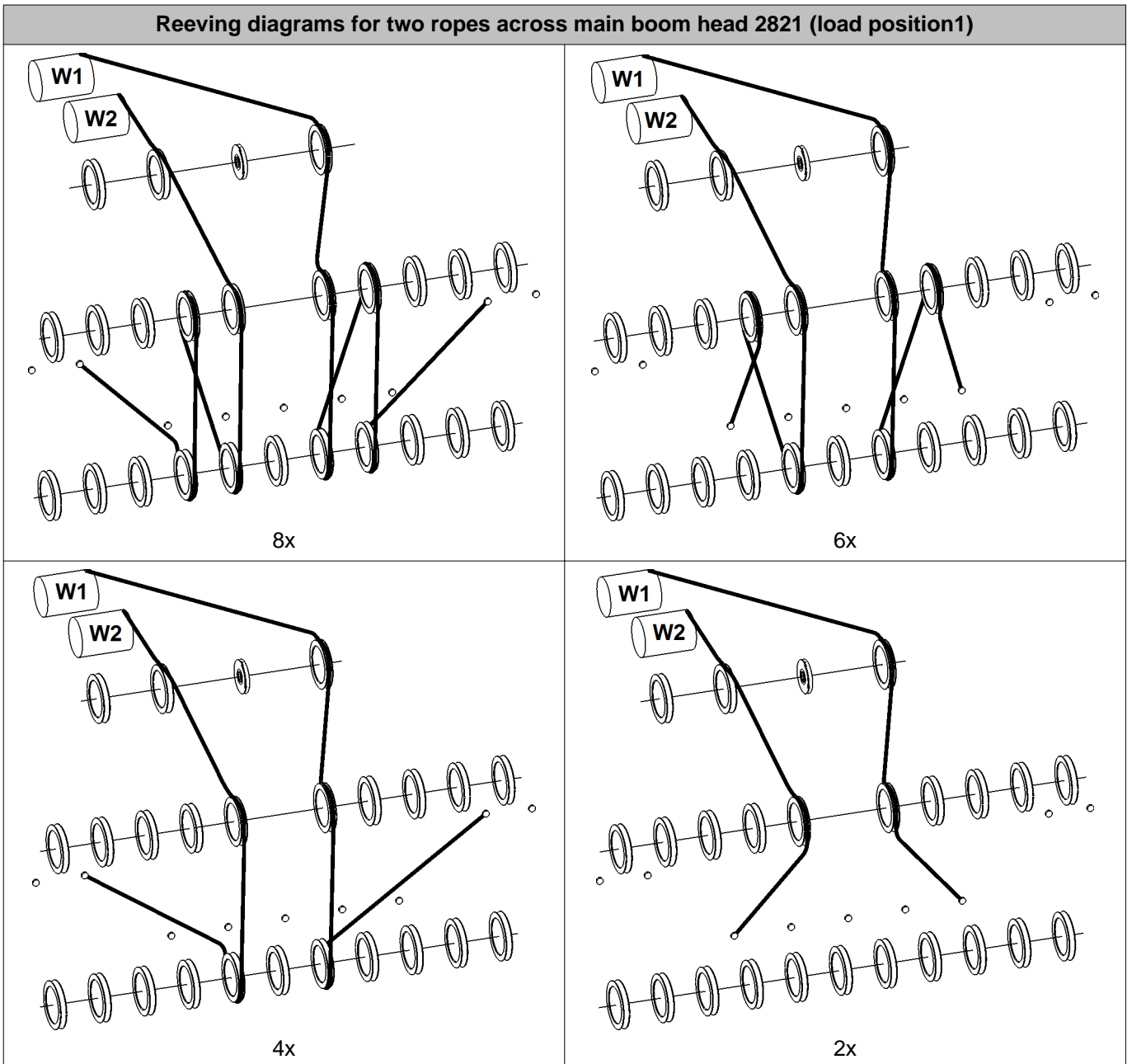
14x



12x



10x



Tab. 535: Reeving diagrams for two ropes across main boom head 2821 (load position1)

7.8.7 Reeving diagrams for one rope across auxiliary jib (36 t (79300 lb)) on main boom head 2821 (load position1)

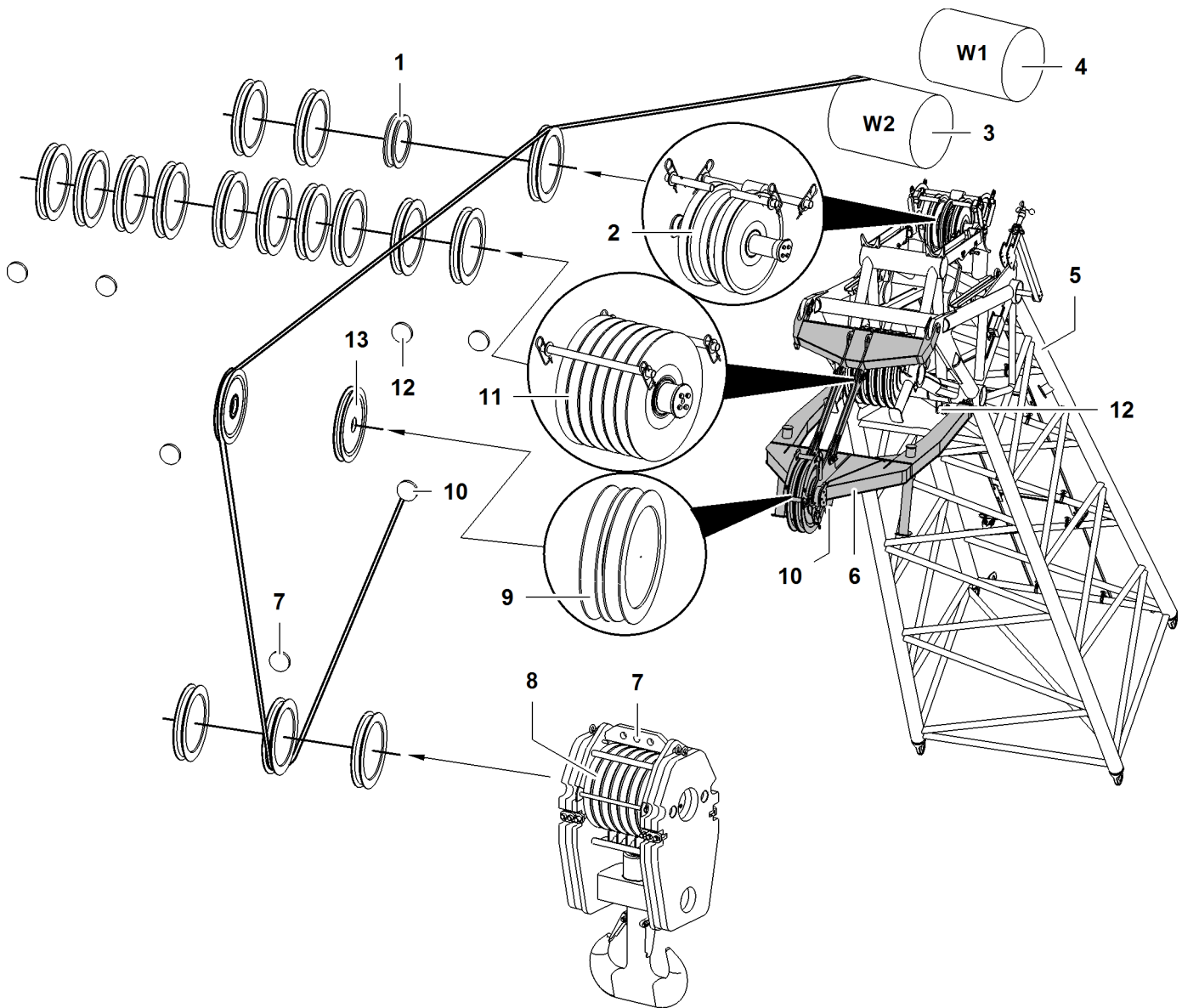


Fig. 3697: Reeving diagrams for one rope across auxiliary jib (36 t (79300 lb)) on main boom head 2821 (load position1)

- | | | | | | |
|---|---|----|--|----|---|
| 1 | Rope pulley for rope of jib luffing winch | 6 | Auxiliary jib (36 t (79300 lb)) | 11 | Rope pulley (10x) of main boom head |
| 2 | Gantry pulley (3x) of main boom head | 7 | Rope fixing points of pulley block | 12 | Rope fixing point (4x) of main boom head |
| 3 | Winch2 | 8 | Pulley set of pulley block | 13 | Second rope pulley* for triple reeving diagram of auxiliary jib (36 t (79300 lb)) |
| 4 | Winch1 | 9 | Rope pulley of auxiliary jib (36 t (79300 lb)) | | |
| 5 | Main boom head | 10 | Rope fixing point of auxiliary jib (36 t (79300 lb)) | | |

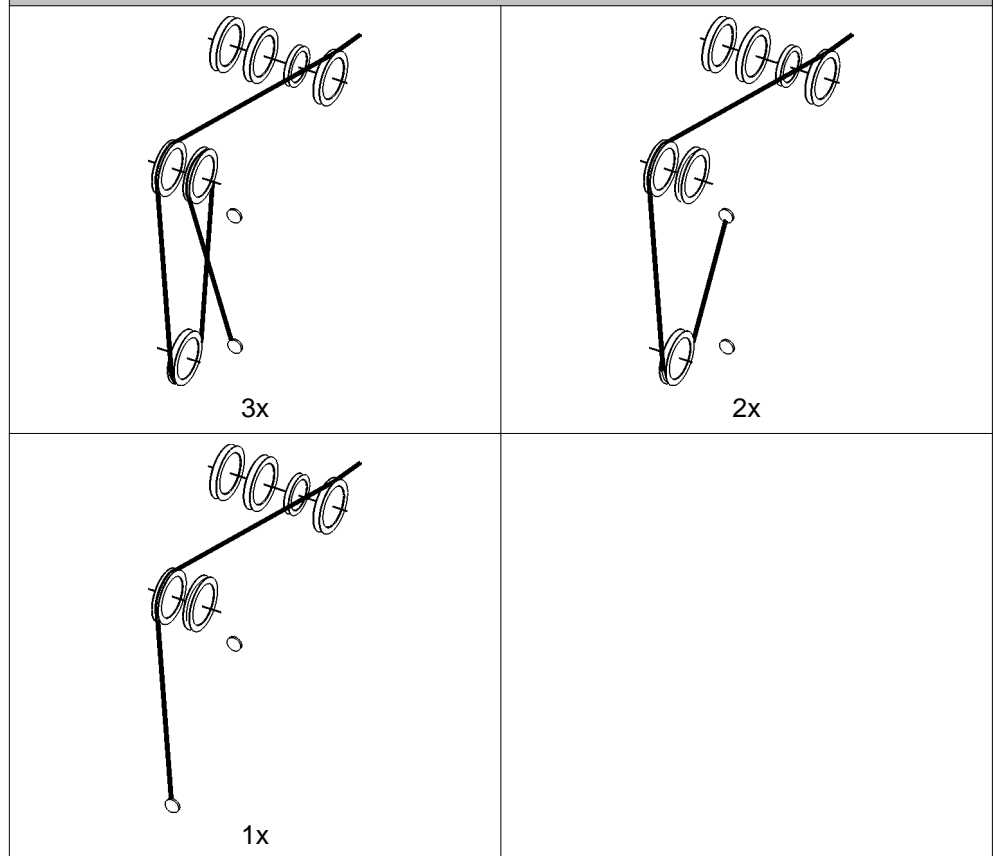


DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

- ▶ Select correct number of reevings as indicated in load chart.

Reeving diagrams for one rope across auxiliary jib (36 t (79300 lb)) on main boom head 2821 (load position1)



Tab. 536: Reeving diagrams for one rope across auxiliary jib (36 t (79300 lb)) on main boom head 2821 (load position1)

7.8.8 Reeving diagrams for two ropes across auxiliary jib (36 t (79300 lb)) and main boom head 2821 (load position 1)

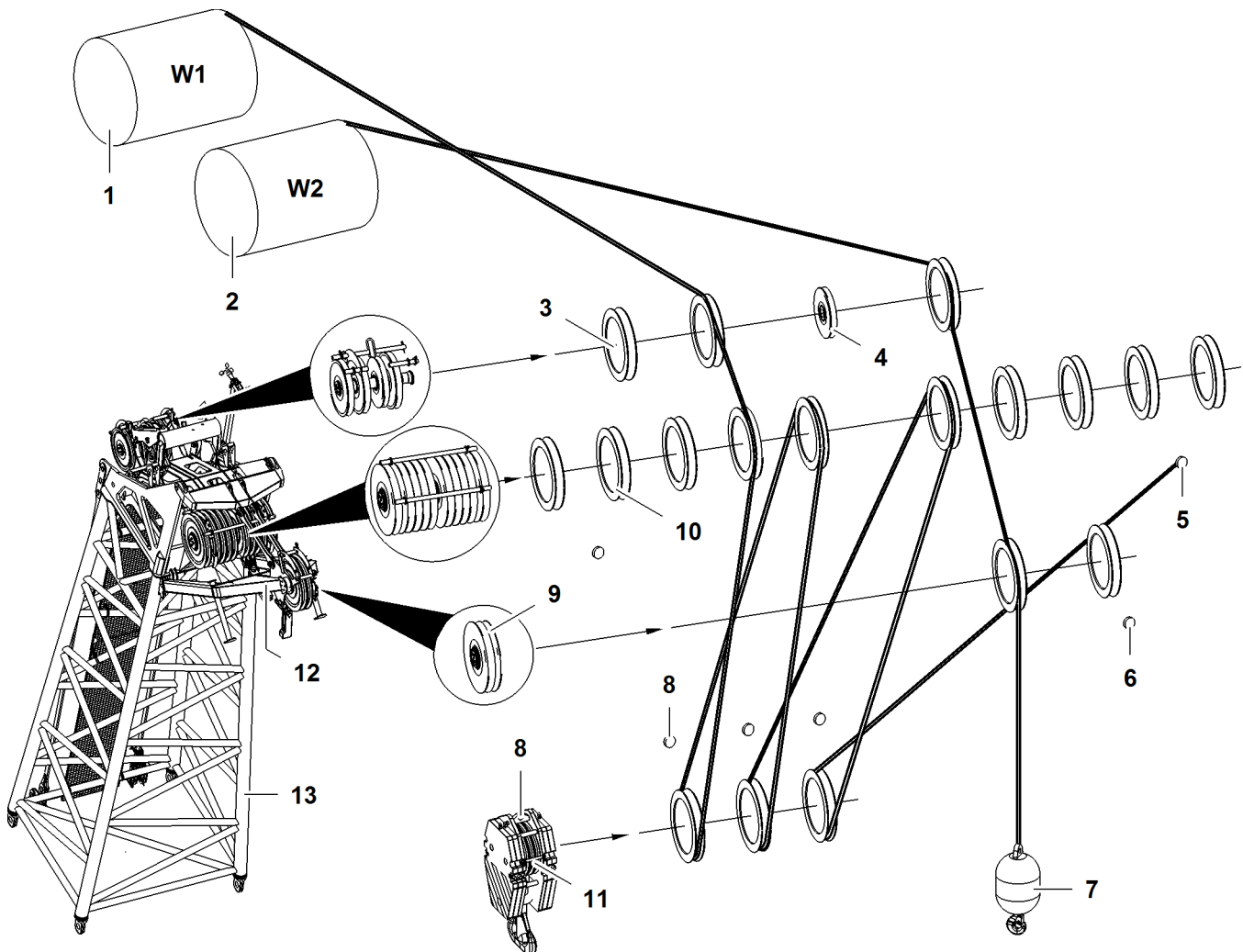


Fig. 3701: Reeving diagrams for two ropes across auxiliary jib (36 t (79300 lb)) and main boom head 2821 (load position 1)

- | | | | | | |
|---|--|----|--|----|---------------------------------|
| 1 | Winch1 | 6 | Rope fixing point of auxiliary jib (36 t (79300 lb)) | 11 | Pulley set of pulley block |
| 2 | Winch2 | 7 | Hook | 12 | Auxiliary jib (36 t (79300 lb)) |
| 3 | Gantry pulley (3x) of main boom head | 8 | Rope fixing points of pulley block | 13 | Main boom head |
| 4 | Pulley for rope of jib luffing winch | 9 | Second pulley* for triple reeving of auxiliary jib (36 t (79300 lb)) | | |
| 5 | Rope fixing point (4x) of main boom head | 10 | Pulley (10x) of main boom head | | |



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Choose correct number of reevings as indicated in load chart.

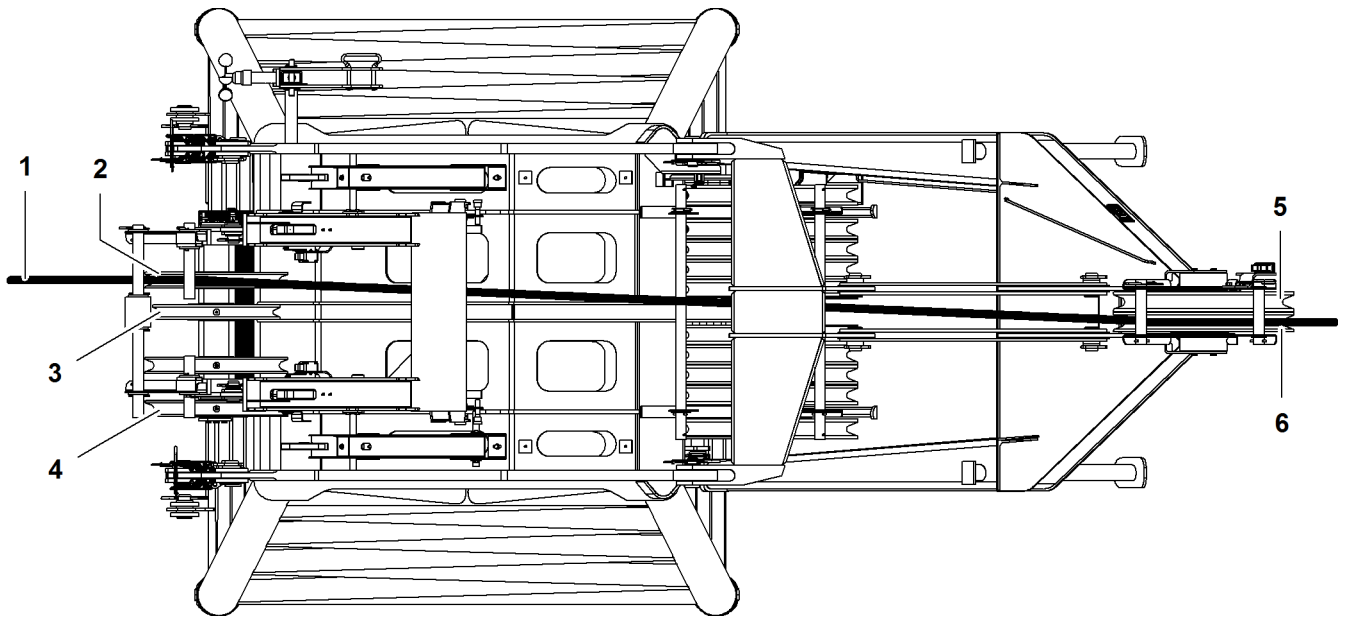


Fig. 3702: Rope run of auxiliary jib (36 t (79300 lb)) (illustration of principle)

- | | | | | | |
|---|--------------------------------------|---|--|---|--|
| 1 | Winch2 rope | 3 | Pulley for rope of jib luffing winch | 5 | Second pulley* for triple reeving of auxiliary jib (36 t (79300 lb)) |
| 2 | Left gantry pulley of main boom head | 4 | Right gantry pulley (2x) of main boom head | 6 | Pulley of auxiliary jib |

The rope of winch2 1 runs from the left gantry pulley 2 to the auxiliary jib pulley 6.

The rope of winch1 runs from one of the right gantry pulleys 4 to the required pulley on the main boom head.

7.8.9 Reeving diagram - jib luffing winch as auxiliary winch



DANGER

Incorrect number of reevings!
Structural breakdown, toppling of machine.

- ▶ Choose the correct number of reevings as per the load chart.

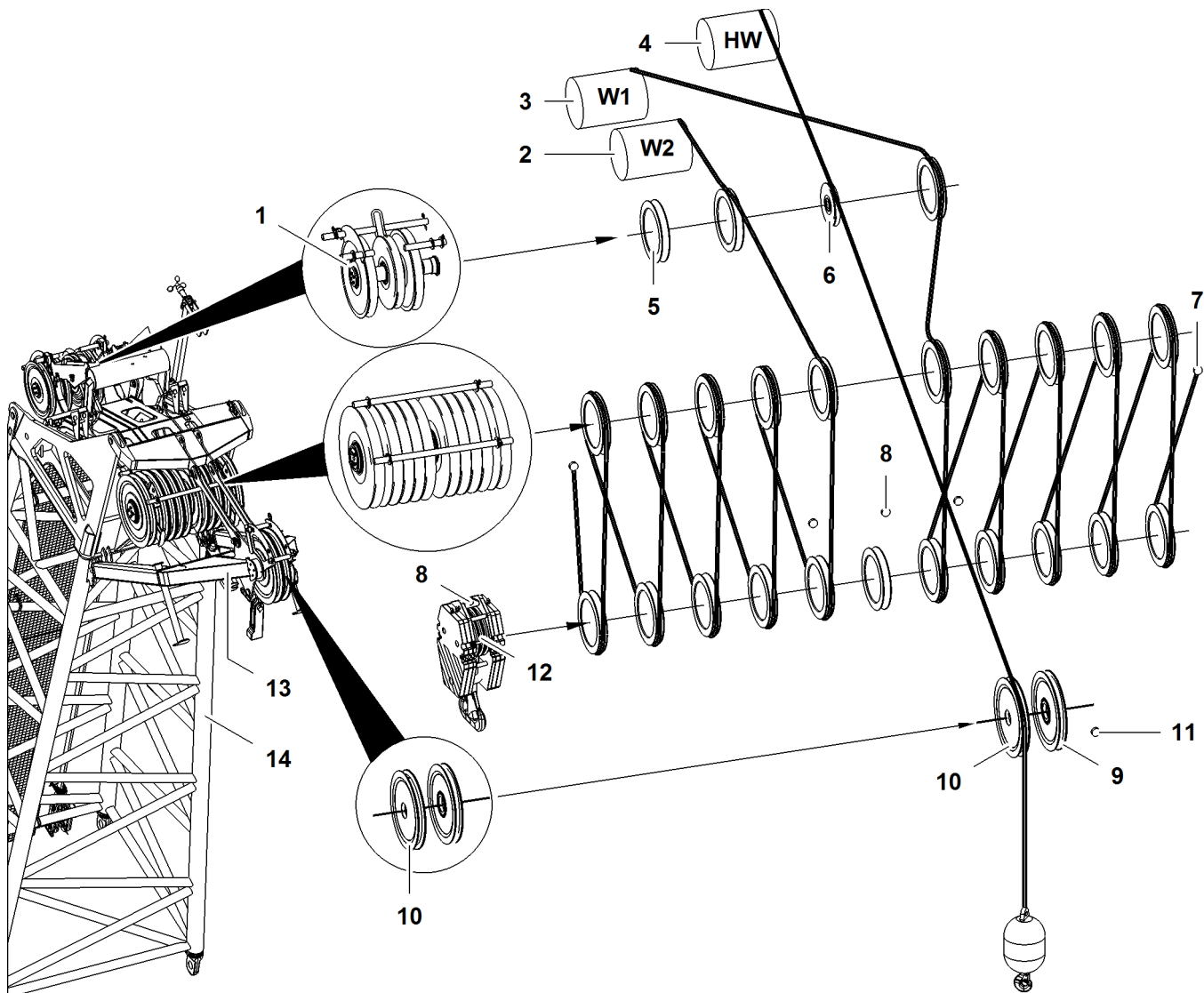


Fig. 3703: Reeving diagram - jib luffing winch as auxiliary winch (illustration of principle)

- | | | | | | |
|---|---|----|--|----|--|
| 1 | Gantry pulley (2x) of main boom head | 6 | Pulley for rope of jib luffing winch | 11 | Rope fixing point of auxiliary jib (36 t (79300 lb)) |
| 2 | Winch2 | 7 | Rope fixing points of main boom head | 12 | Pulley set of pulley block |
| 3 | Winch1 | 8 | Rope fixing points of pulley block | 13 | Auxiliary jib (36 t (79300 lb)) |
| 4 | Jib luffing winch as auxiliary winch* | 9 | Second pulley* for triple reeving of auxiliary jib (36 t (79300 lb)) | 14 | Main boom head |
| 5 | Gantry pulley (only with LR 1004 und LR 1006) | 10 | Pulley of auxiliary jib (36 t (79300 lb)) | | |

7.9 Assembly of main boom with derrick equipment*

7.9.1 Assembly of derrick boom

Notes

The illustrations have been simplified or schematically represented for reasons of uniformity and represent the principles of assembly. They do not provide a detailed representation of the components.

Unload and position the derrick boom head components



DANGER

Derrick boom head components with differing serial numbers are assembled!
Structural breakdown.

- ▶ Note the derrick identification plate on the derrick boom components.



DANGER

Wrong or defect parts or components!
Structural breakdown.

- ▶ Only use original Liebherr parts and original Liebherr components in perfect condition.

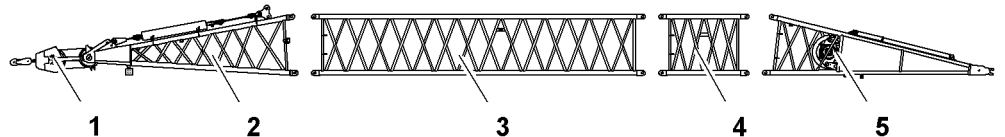


Fig. 3704: Unloading and positioning the derrick boom components

- | | | | |
|---|--|---|----------------------------------|
| 1 | Derrick pulley block | 4 | Derrick boom section 3 m (20 ft) |
| 2 | Derrick boom head | 5 | Derrick boom base section |
| 3 | Derrick boom section
11.7 m (38 ft) | | |

- ▶ Direct transport vehicles with derrick boom components.
- ▶ Rig derrick boom components with sling gear on rigging points.
- ▶ Unload derrick boom components onto wooden blocks using the basic machine or assist crane and position according to relevant system instructions.

Bolting the derrick boom



WARNING

Never stand in the inside of the derrick main boom sections during assembly!
 Serious injury.

- ▶ Never go inside the derrick boom sections.
- ▶ Drive in double-taper pins from the outside exclusively.

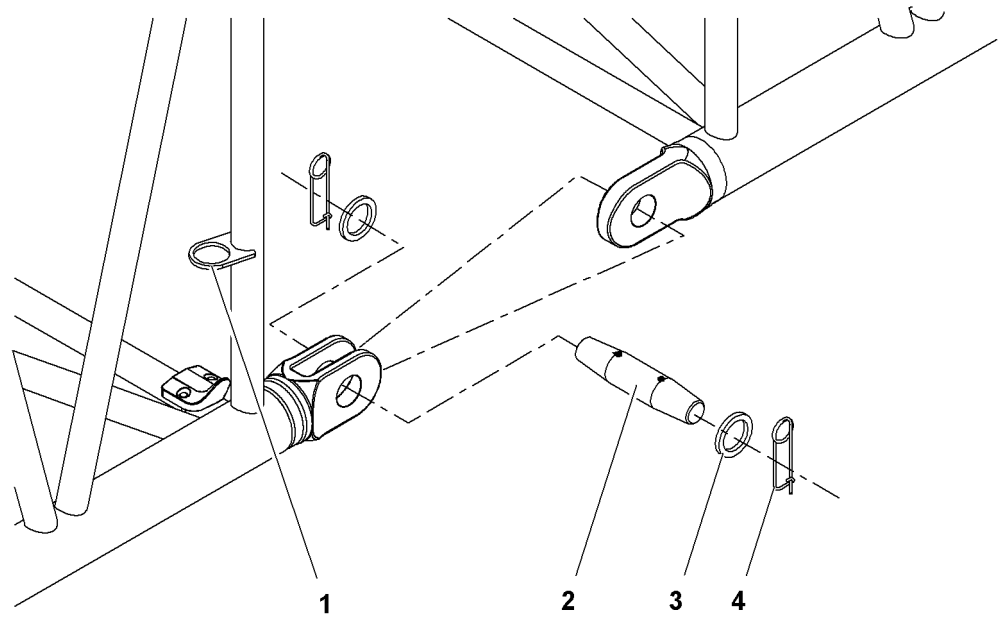


Fig. 3705: Bolting the derrick boom

- | | | | |
|---|--|---|---------------------|
| 1 | Transport bracket (4x) for double-taper pins | 3 | Washer (8x) |
| 2 | Double-taper pin (4x) | 4 | Locking spring (8x) |

- ▶ Remove the double-taper pins 2 from the transport brackets 1.



Note

Liebherr recommends:

- ▶ To make assembly and disassembly easier, grease double-taper pin.

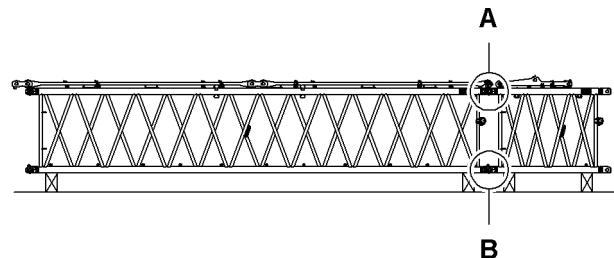


Fig. 3706: Bolt the derrick boom sections

- | | | | |
|---|-------------------------------|---|----------------------------------|
| A | Top pin connection point (2x) | B | Bottom pin connection point (2x) |
|---|-------------------------------|---|----------------------------------|

- ▶ Bolt all derrick boom sections to one another on pin connection points A + B.

- ▶ Secure the double-taper pins with washers and safety pins.

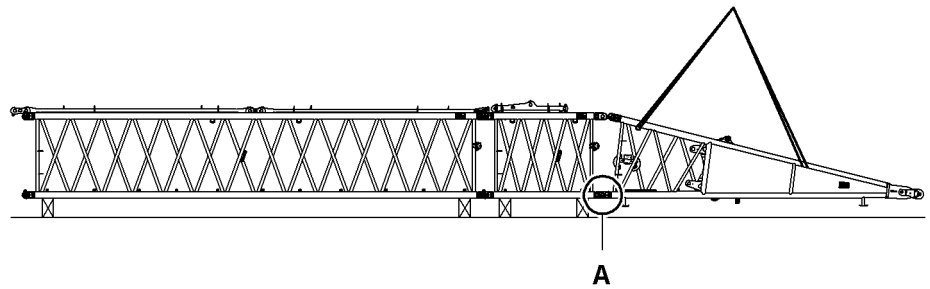


Fig. 3707: Pinning the derrick boom base section to the bottom derrick boom section

A Bottom pin connection point (2x)

- ▶ Rig derrick boom base section.
- ▶ Lift derrick boom base section to derrick boom section until bottom pin connection points **A** align.
- ▶ Pin derrick boom base section to the derrick boom section on bottom pin connection points **A**.
- ▶ Secure the double-taper pins with washers and safety pins.
- ▶ Place wooden blocks beneath derrick boom base section.

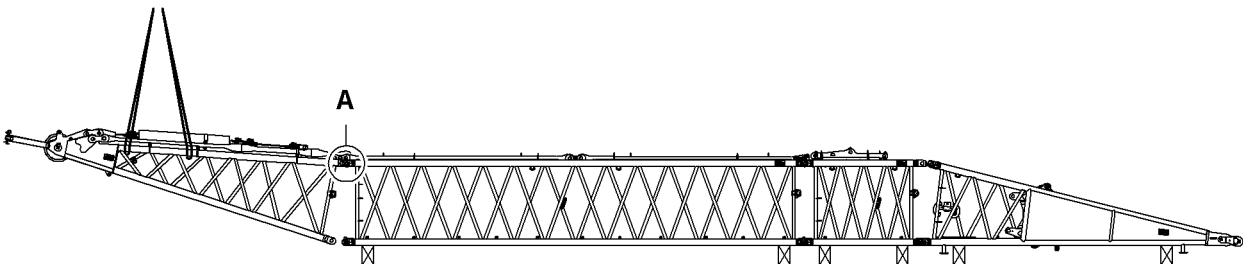


Fig. 3708: Pinning the derrick boom head to the top derrick boom section

A Top pin connection point (2x)

- ▶ Rig derrick boom head.
- ▶ Lift derrick boom head to derrick boom section until top pin connection points **A** align.
- ▶ Pin derrick boom head to derrick boom section on top pin connection points **A**.
- ▶ Secure double-taper pins with washers and locking springs.

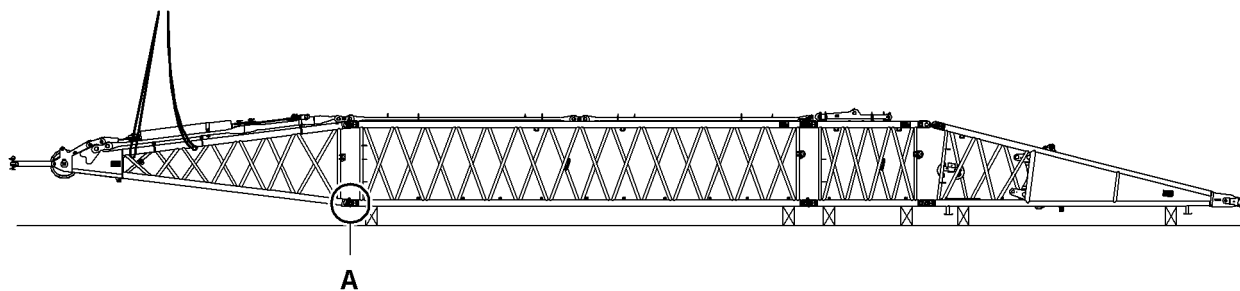


Fig. 3709: Pinning the derrick boom head to the bottom derrick boom section

A Bottom pin connection point
(2x)

- ▶ Lower the derrick boom head until the lower pin connection points **A** match.
- ▶ Bolting the derrick boom head to the derrick boom section on the lower pin connection points **A**.
- ▶ Secure the double-taper pins with washers and safety pins.

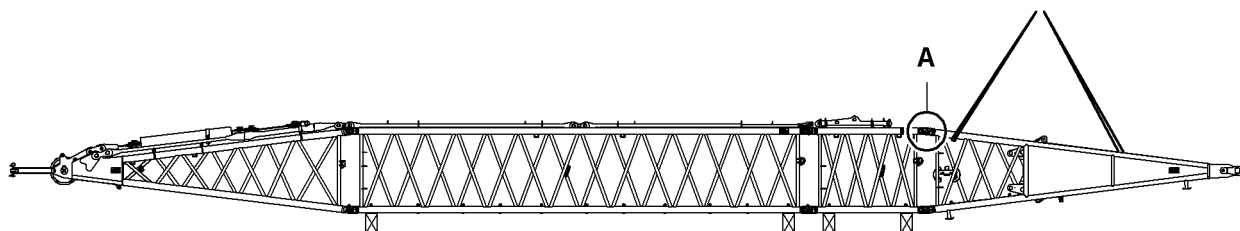


Fig. 3710: Pinning the derrick boom base section to the top derrick boom section

A Top pin connection point (2x)

- ▶ Rig derrick boom base section.
- ▶ Lift derrick boom base section until top pin connection points **A** align.
- ▶ Bolting the derrick boom base section to the derrick boom section on the upper pin connection points **A**.
- ▶ Secure the double-taper pins with washers and safety pins.

Connecting catwalks* for booms

Ensure the following conditions are met:

- Boom components are pinned to each other.

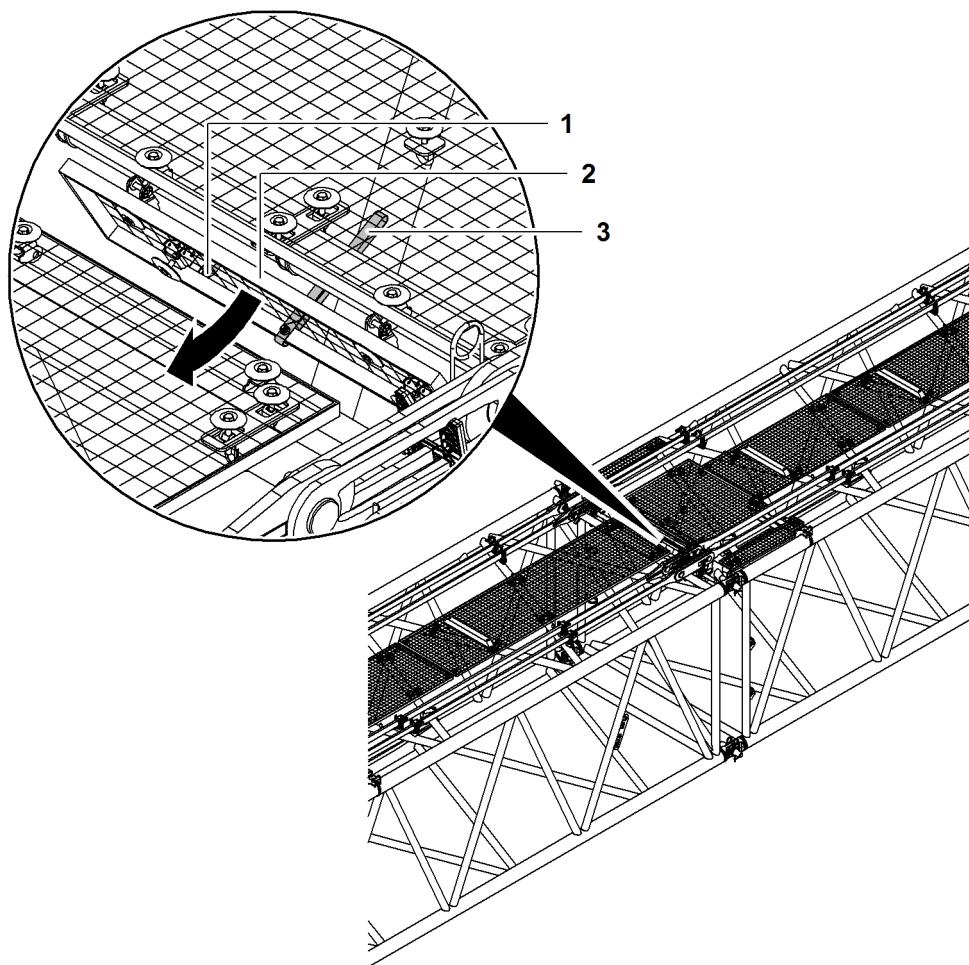


Fig. 3711: Connecting catwalks for booms (illustration of principle)

- | | | | |
|---|---------------------------------|---|---------------|
| 1 | Pin (2x) with spring cotter pin | 3 | Retainer belt |
| 2 | Catwalk (foldable) | | |

- ▶ Open retainer belt **3**.
- ▶ Remove pin **1** with spring cotter pin on both sides.
- ▶ Fold up catwalk **2**.

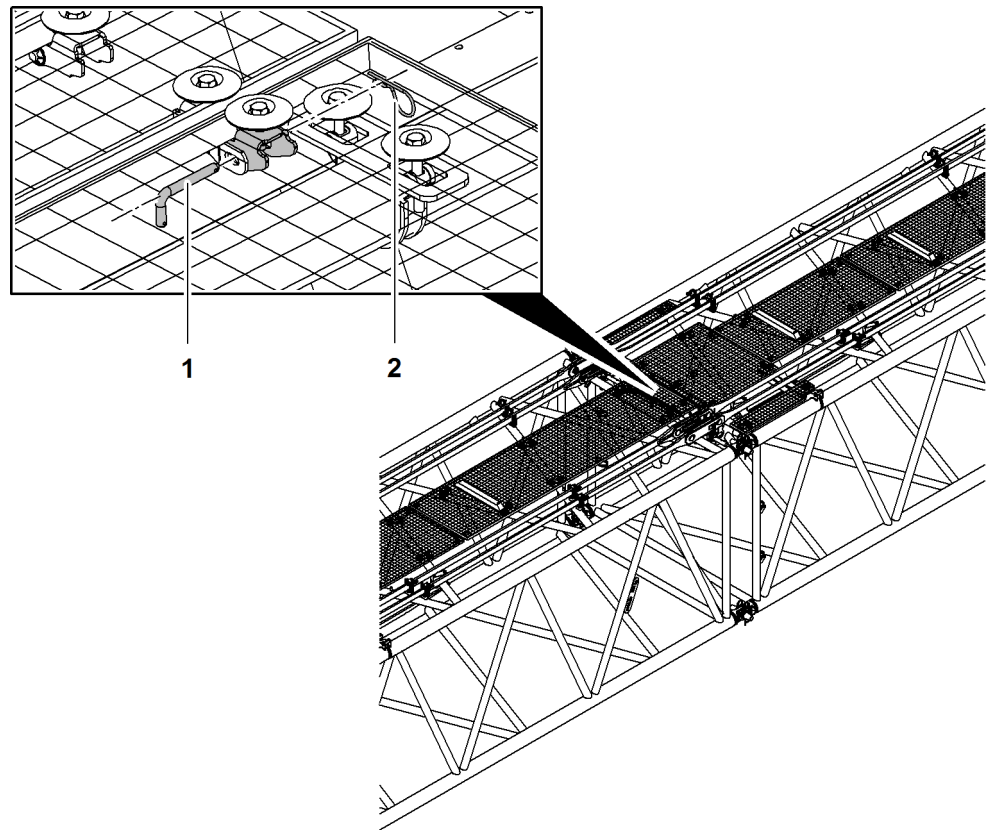


Fig. 3712: Connecting catwalks for booms (illustration of principle)

- 1 Pin (2x) 2 Spring cotter pin (2x)

When pin connection points of catwalks align:

- ▶ Insert pin **1** on both sides.
- ▶ Secure pins **1** with spring cotter pins **2**.
- ▶ Repeat process with all boom components.

Connecting and checking boom fall arrest*



WARNING

Improper assembly of the boom fall arrest*!
Risk of falling off the boom.

- ▶ Ensure that the boom fall arrest* is in impeccable state.
 - ▶ Ensure that the boom fall arrest* is connected and secured between boom sections according to the specifications.
-
- ▶ Connect and check boom fall arrest* in accordance with additional documentation LIE-TAURUS.

Connecting the hydraulic lines

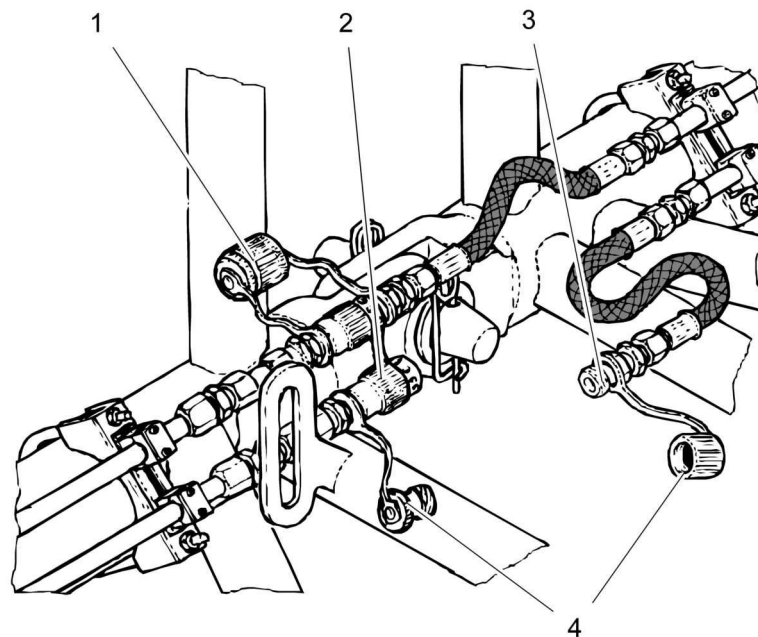


Fig. 3713: Connecting the hydraulic lines

- | | | | |
|-------|---------------------|---|---------------------|
| 1 | Protective covers | 3 | Hydraulic couplings |
| 2 + 3 | Hydraulic couplings | 4 | Protective covers |

The hydraulic lines of the individual derrick boom components must be connected.

- ▶ Remove protective covers 4 on hydraulic couplings 2 + 3.

NOTICE

Soiled hydraulic couplings 2 + 3!
Damage to the hydraulic system.

- ▶ Clean hydraulic couplings 2 + 3 before connecting.

- ▶ Connect and tighten hydraulic couplings 2 + 3.
- ▶ Screw protective covers 1 together.

Connect the electric cables

NOTICE

Electric cables have been handled incorrectly!
Damage to electric line and plug.

- ▶ Do not pull electric line over sharp-edged objects.
- ▶ Do not crush or kink electric line.
- ▶ Keep the plug clean.

- ▶ Unwind electric line from cable bracket on derrick boom base section.
- ▶ Pull electric line towards derrick boom head.
- ▶ Insert electric line on terminal box.

- ▶ Lock plug with support bracket.
- ▶ Suspend the strain relief carabiner.
- ▶ If required, rewind electric line back onto cable bracket.

Pinning pendant straps

- ▶ Remove locking springs of transport brackets for pendant straps.

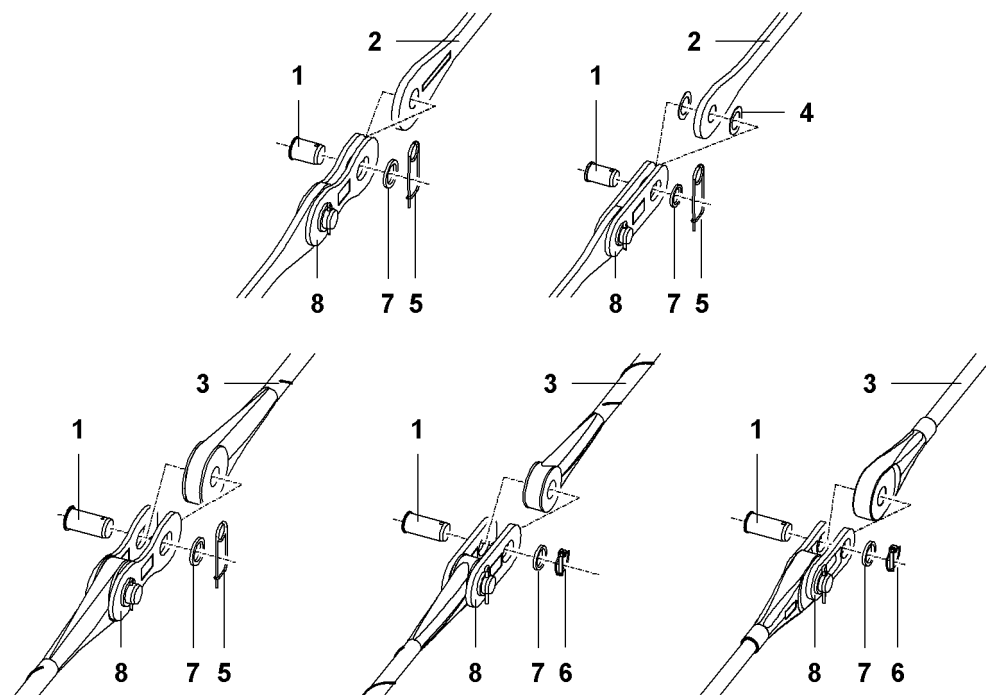


Fig. 3714: Pinning pendant straps (schematic display of different pendant straps)

- | | | | |
|---|---------------------|---|-----------------|
| 1 | Pin | 5 | Locking spring |
| 2 | Steel pendant strap | 6 | Linchpin |
| 3 | CF pendant strap | 7 | Washer |
| 4 | Plastic washer (2x) | 8 | Connecting link |

- ▶ Remove pin 1 on connecting link 8.
- ▶ Position pendant strap 2, 3 between both connecting links 8.
or
- If the pendant strap is fitted with plastic washers 4:
Position pendant strap 2 with both-sided plastic washers 4 between both connecting links 8.
- ▶ Insert pin 1 and secure with washers 7 and locking spring 5 or linchpin 6.

Bolting the pendant ropes for the suspended counterweight

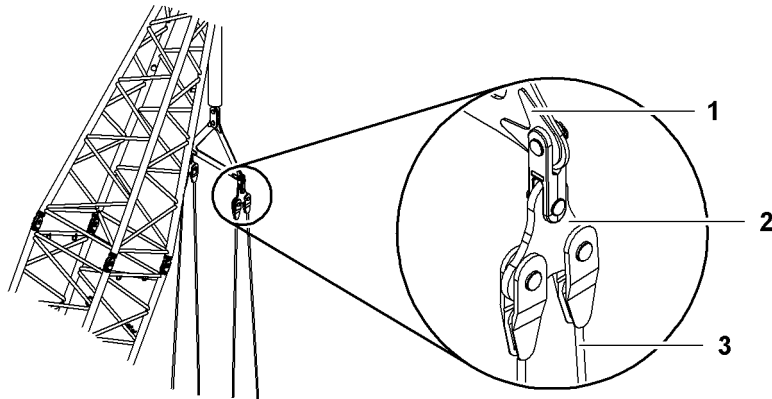


Fig. 3715: Bolting the pendant ropes for the suspended counterweight

- | | |
|-------------------------------------|----------------------------|
| 1 Crossbar of hoist cylinder | 3 Pendant rope (4x) |
| 2 Pendant rope crossbar | |

- ▶ Place pendant ropes **3** on derrick boom.
- ▶ Pin pendant rope **2** with crossbar of hoist cylinder **1**.



CAUTION

Swinging pendant ropes **3** during assembly!
Slight injuries.

- ▶ Secure pendant ropes **3**.
-
- ▶ Secure pendant ropes **3** with a string or strap on the bottom part of the derrick boom.

Bolting the pendant straps for the wheeled counterweight carriage

- ▶ Place pendant straps on derrick boom.

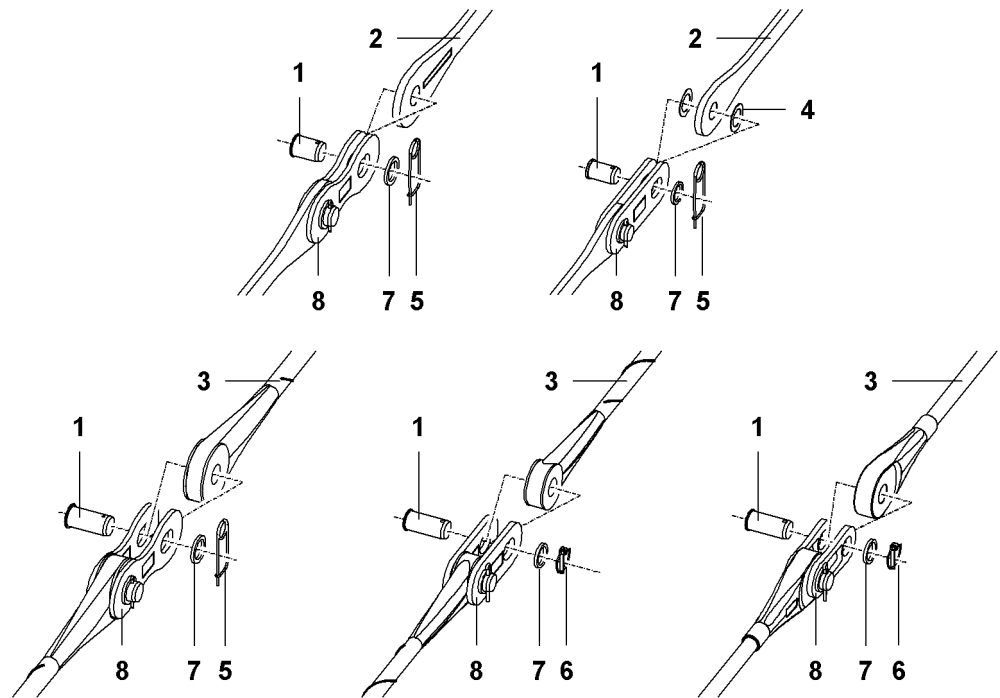


Fig. 3716: Bolt the pendant straps (schematic diagram of various pendant straps)

1	Pin	5	Safety pin
2	Steel pendant strap	6	Linch pin
3	Carbon-fibre pendant strap	7	Washer
4	Plastic washer (2x)	8	Connecting link

- ▶ Remove the pin 1 on the connecting link 8.
- ▶ Position the pendant strap 2 **bwz.** 3 between the two coupling links 8.
or

If the pendant strap has plastic washers 4:

Position the pendant strap 2 with plastic washers 4 on both sides between the two connecting links 8.

- ▶ Insert pin 1 and secure with washers 7 and safety pin 5 or lynch pin 6.



CAUTION

Hanging pendant straps during assembly!
Slight injuries.

- ▶ Secure pendant straps.
-
- ▶ Secure pendant straps with a string or strap on the bottom part of the derrick boom.

Installing the derrick boom on the uppercarriage

Ensure that the following conditions are fulfilled:

- Cylinder adjustment functions are activated.

The derrick boom is bolted to the same shaft as A-frame 1.

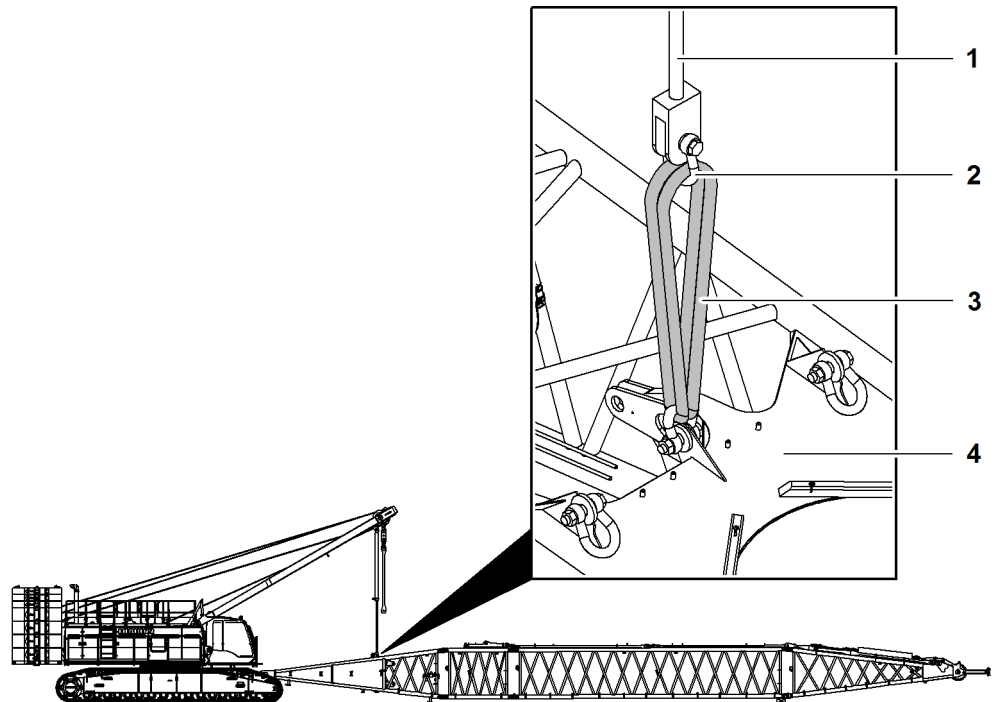


Fig. 3717: Pinning the assembly cylinder to the derrick boom base section

- | | | | |
|---|-------------------------------|---|-----------------------------|
| 1 | Assembly cylinder | 3 | Round sling 8 t (17,637 lb) |
| 2 | Shackle 25 t (55,115 lb) (2x) | 4 | Derrick boom base section |

- ▶ Unwind main boom luffing winch.
 - ▷ A-frame1 lowers.
- ▶ Extend assembly cylinder 1.
- ▶ Pin assembly cylinders 1 with shackles 2 and round sling 3 to derrick boom base section 4.

NOTICE

Dragging of the derrick boom along the ground not permitted!
Damage to derrick boom.

- ▶ Do not drag the derrick boom along the ground.

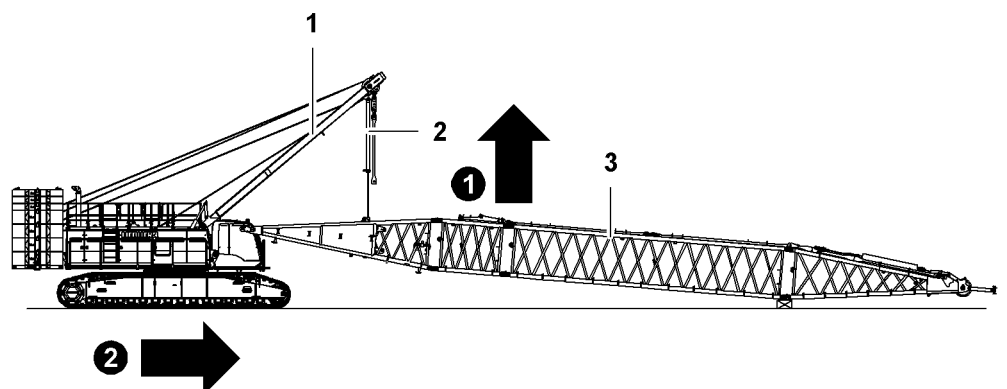


Fig. 3718: Lift derrick boom and move machine forwards

- | | | | |
|---|-------------------|---|--------------|
| 1 | A-frame1 | 3 | Derrick boom |
| 2 | Assembly cylinder | | |

- ▶ Lift derrick boom 3 with assembly cylinder 2.

Assembly of main boom with derrick equipment*

- ▶ Wind up main boom luffing winch.
 - ▷ A-frame1 1 lifts.
- ▶ Move machine forward until derrick boom 3 is located in front of A-frame1 1 pivot points.

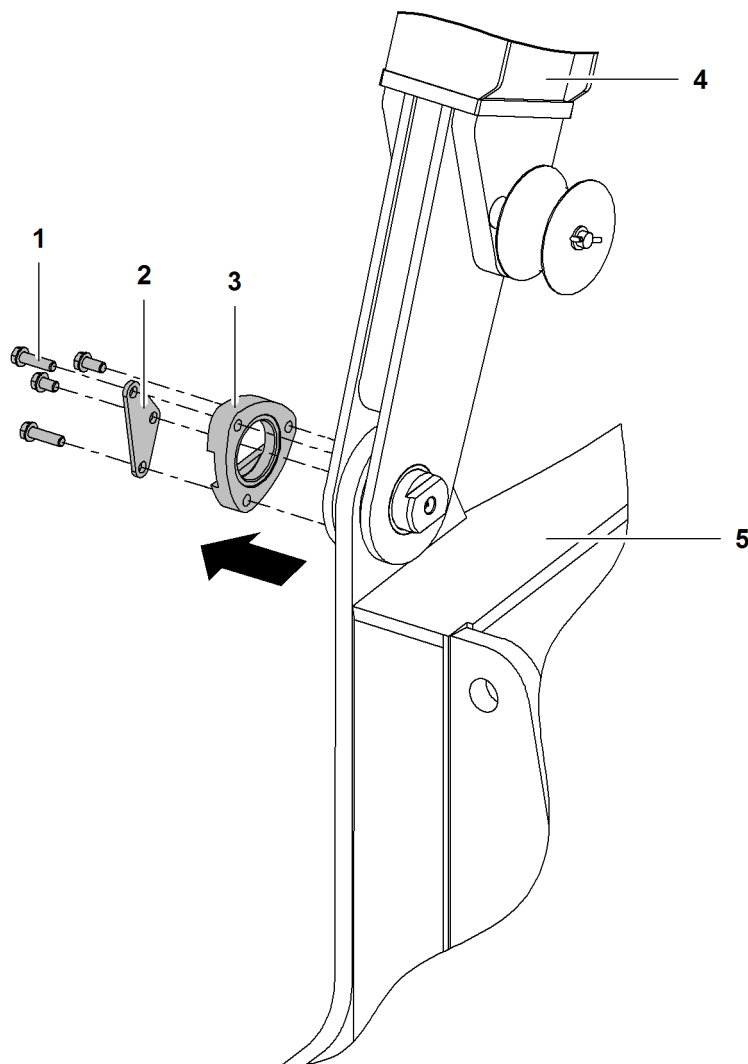


Fig. 3719: Removing A-frame1 locking elements

- | | | | |
|---|-------------------------|---|---------------|
| 1 | Screw (4x) with washers | 4 | A-frame1 |
| 2 | Plate | 5 | Uppercarriage |
| 3 | Spacer washer | | |

- ▶ Remove and store screws 1 and plate 2.
- ▶ Remove and put spacer 3 on one side.
- ▶ Repeat procedure on opposite side.

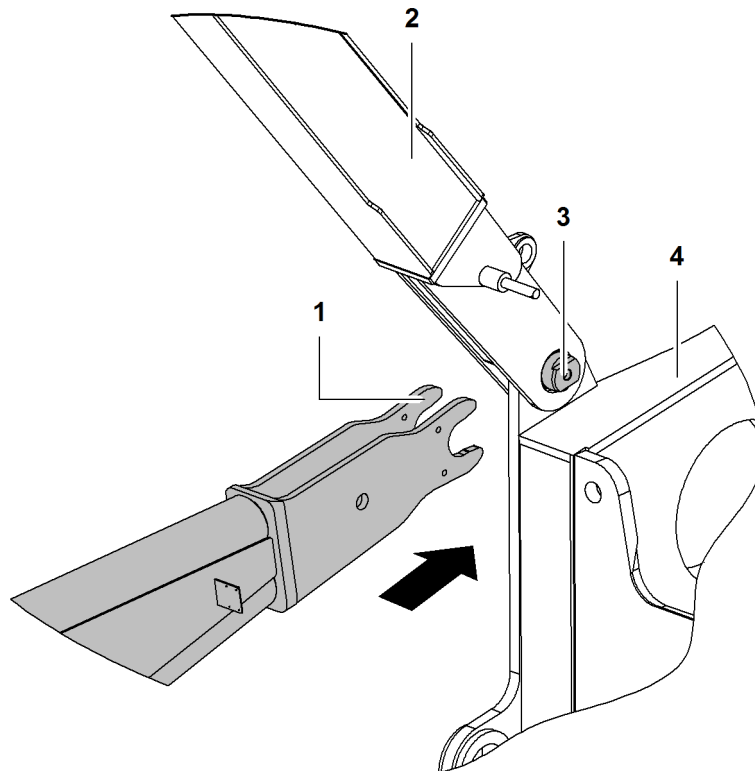


Fig. 3720: Placing the forks of the derrick boom base section on pins

1 Forks of the derrick boom base section

2 A-frame1

3 Pin

4 Uppercarriage

- Place forks 1 of the derrick boom base section both sides on pins 3 of A-frame1 2.

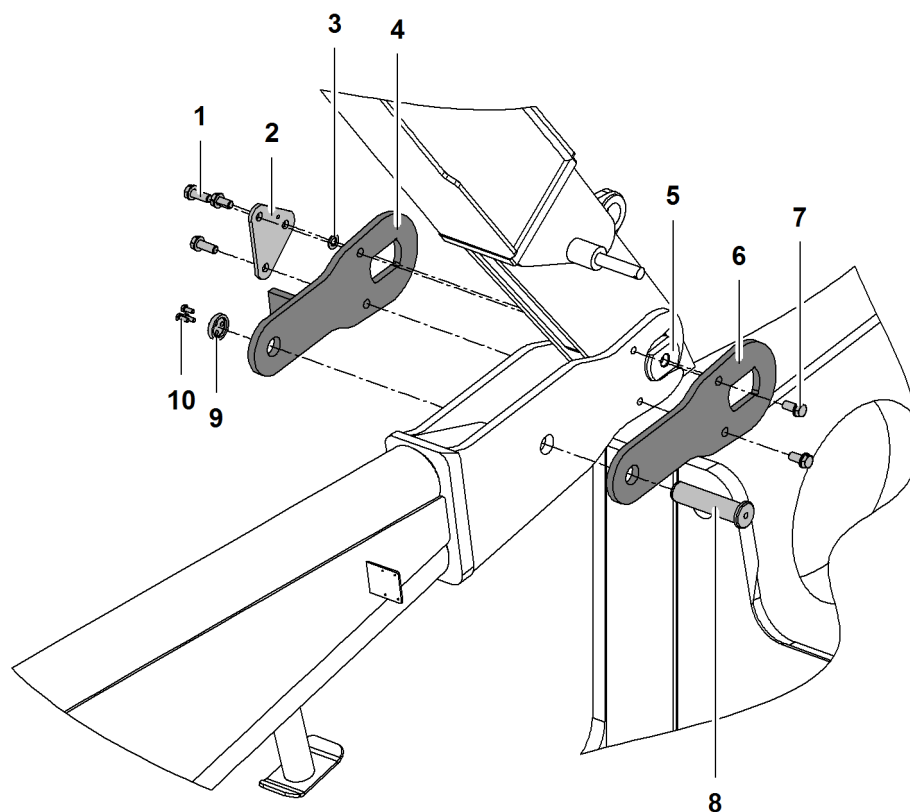


Fig. 3721: Securing the derrick boom

- | | | | |
|---|-------------------------|----|-------------------------|
| 1 | Screw (3x) with washers | 5 | Inner plate |
| 2 | Plate | 7 | Screw (2x) with washers |
| 3 | Washer | 8 | Pin |
| 4 | Pin of A-frame1 | 9 | Washer with three holes |
| 4 | Outer plate with link | 10 | Screw (3x) with washers |

- ▶ Place outer plate 4 with link on pins 4 of A-frame1.
- ▶ Place inner plate 5 on pins 4 of A-frame1.



Note

If the pin 4 of A-frame1 is not in the right position, the pin 4 must be aligned as described below!

- ▶ Put on outer plate 4 with link.
 - ▶ Secure outer plate 4 with link with washer 3, plate 2 and a screw 1 with disk.
 - ▶ Align pins 4: knock with hammer onto link of external plate 5.
-
- ▶ Secure inner plate 5 with screws 7 and washers.
 - ▶ Secure outer plate 4 with link with washer 3, plate 2 and screws 1 with disks.
 - ▶ Pin 8 must be inserted from the outside.
 - ▶ Secure pins 8 with washer 9 with three holes and screws 10 with disks.
 - ▶ Release assembly cylinder from derrick boom base section.

Connecting hydraulic lines and electric lines with the uppercarriage

NOTICE

Soiled hydraulic couplings!
Damage to the hydraulic system.

- ▶ Clean hydraulic couplings before connecting.

-
- ▶ Connect hydraulic lines with bulkhead plates on uppercarriage and tighten.
 - ▶ Screw protective covers together.

NOTICE

Incorrect handling of electric lines!
Damage to electric line and plug.

- ▶ Do not pull electric line over sharp-edged objects.
- ▶ Do not crush or kink electric line.
- ▶ Keep the plug clean.

-
- ▶ Insert electric line of derrick boom into connecting plug on the uppercarriage.
 - ▶ Lock plug with support bracket.

Reeve the Derrick pulley block

Ensure that the following conditions are fulfilled:

- Derrick winch is selected.
- The derrick pulley block is attached and bolted to the transport fixation on the derrick boom head.

Reeve derrick rope rigging with auxiliary rope

NOTICE

Improper reeving of derrick winch rope!
Damage to derrick winch rope.

- ▶ Install derrick winch rope without twists.
- ▶ Do not install any swirls in derrick winch rope.

There must be no slacking of the rope when unwinding.

- ▶ Slowly unwind derrick winch rope.

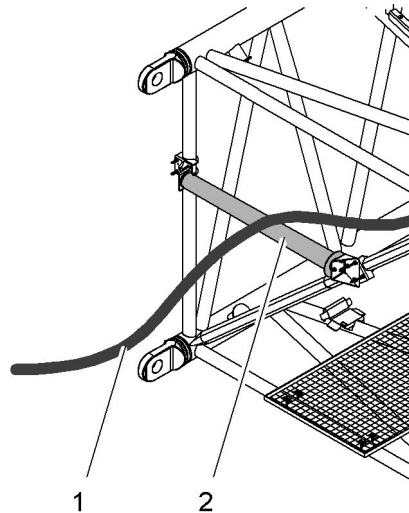


Fig. 3722: Reeve derrick rope rigging with auxiliary rope

- | | |
|--------------------------------|---------------------------------|
| 1 Rope of derrick winch | 2 Rope protection roller |
|--------------------------------|---------------------------------|
- ▶ Guide rope 1 of derrick winch across every rope protection roller 2.
 - ▶ Pull rope 1 of derrick winch towards derrick boom head.
 - ▶ Connect rope 1 of derrick winch with auxiliary rope reeved between derrick boom head and derrick rope rigging.

No slack rope may form during unwinding.

- ▶ Unwind rope 1 of derrick winch up to rope fixing point.
- ▶ Remove auxiliary rope from rope 1 of derrick winch.
- ▶ Attach rope 1 of derrick winch to rope fixing point of derrick boom head.

Reeving the derrick rope rigging without auxiliary rope

NOTICE

Improper reeving of derrick winch rope!
Damage to derrick winch rope.

- ▶ Install derrick winch rope without twists.
- ▶ Do not install any swirls in derrick winch rope.

There must be no slacking of the rope when unwinding.

- ▶ Slowly unwind derrick winch rope.

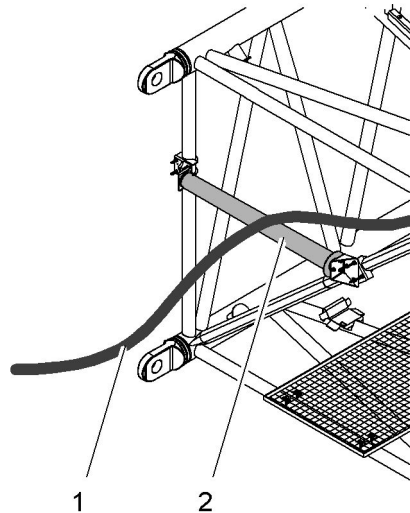


Fig. 3723: Reeving the derrick rope rigging without auxiliary rope

- 1 Rope of derrick winch
- 2 Rope protection roller
- ▶ Guide rope 1 of derrick winch across every rope protection roller 2.
- ▶ Pull rope 1 of derrick winch towards derrick boom head.

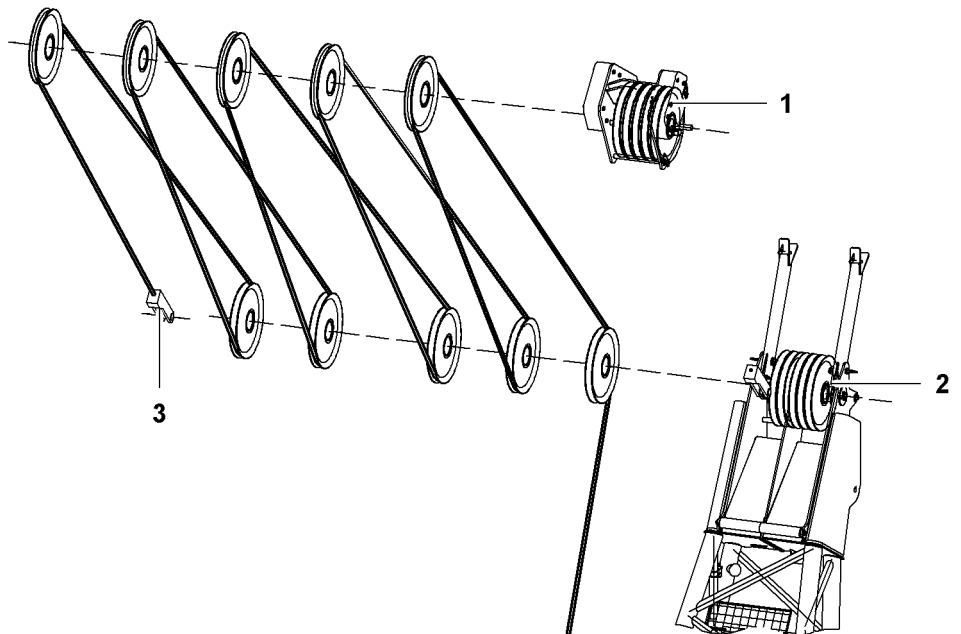


Fig. 3724: Derrick pulley block rope reeving system

- 1 Derrick pulley block
- 2 Derrick boom head
- 3 Rope fixation
- ▶ Reeve in rope of derrick winch according to reeving diagram.
- ▶ Attach rope of derrick winch on rope fixing point 3 of derrick boom head 2.

Release transport lashing from the derrick pulley block

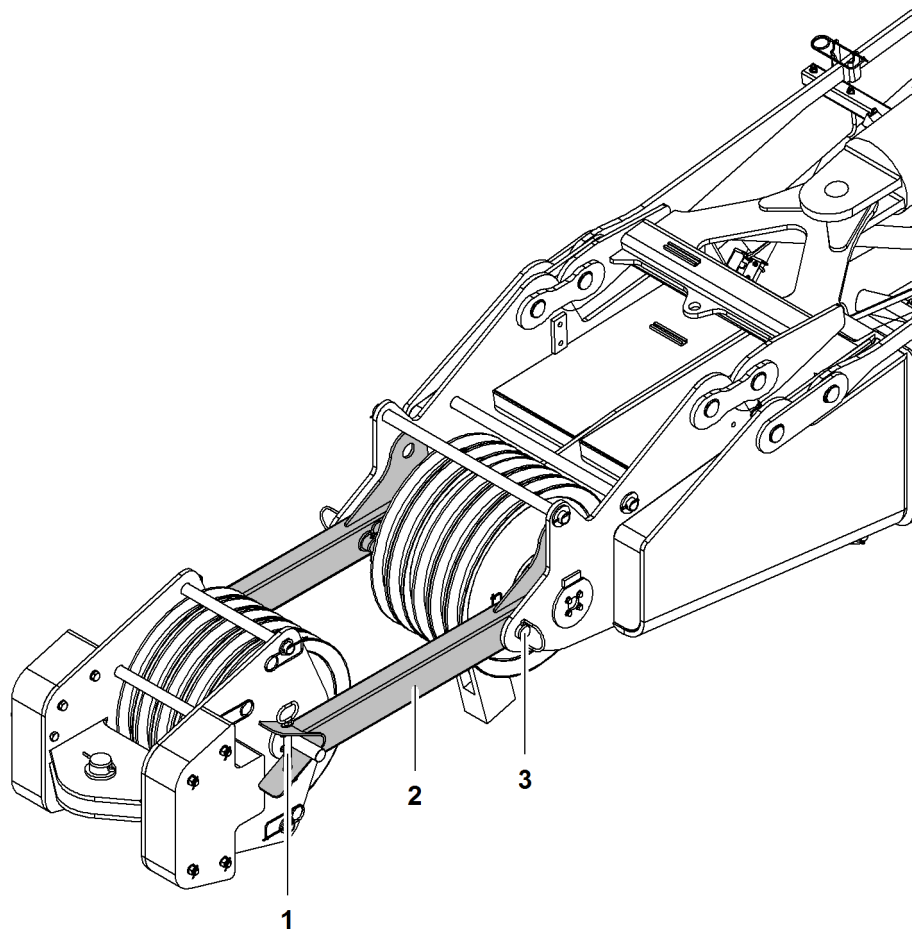


Fig. 3725: Undoing transport brackets from derrick rope rigging

- | | | | |
|---|------------------------|---|----------|
| 1 | Locking pin (2x) | 3 | Pin (2x) |
| 2 | Transport bracket (2x) | | |

- ▶ Remove locking pins 1 on transport brackets 2 and place in temporary storage.

Pinning A-frame1 equalizer to derrick boom pendant straps



WARNING

Do not stand below A-frame1!
Severe injury.

- ▶ Make sure that nobody is located in the danger zone.
- ▶ Leave the danger area.

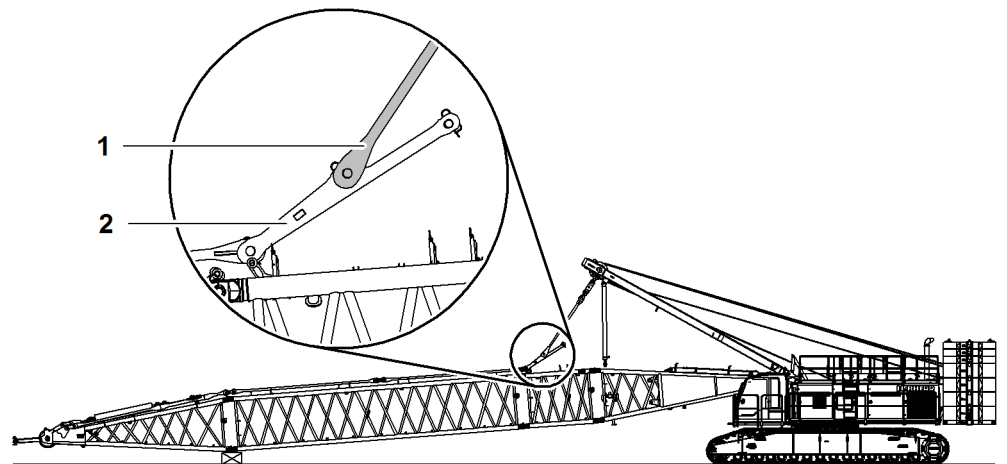


Fig. 3726: Pinning A-frame1 equalizer to derrick boom pendant straps

- 1 A-frame1 equalizer
- 2 Derrick boom pendant straps

- ▶ Lower A-frame1 until A-frame1 equalizer 1 can be pinned with derrick boom pendant straps 2.
- ▶ Pin A-frame1 equalizer 1 to derrick boom pendant straps 2.
- ▶ Secure pins with washers and locking springs.

Moving the lightning rods* into working position

Installation positions of lightning rods on derrick boom head

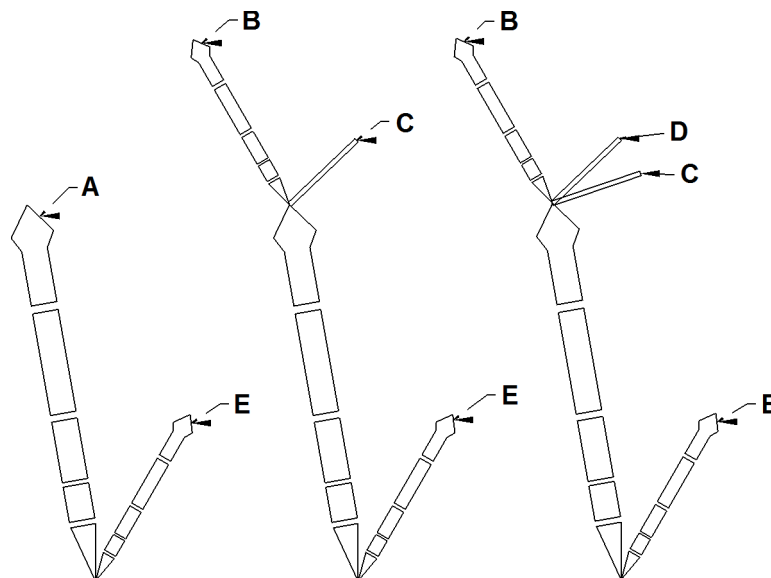


Fig. 3727: Installation positions of lightning rods on derrick boom head

- A Main boom head
- B Jib head
- C A-frame2
- D A-frame3
- E Derrick boom head

Boom configuration	Number of lightning rods	Installation positions
Main boom + derrick	2	A + E

Boom configuration	Number of lightning rods	Installation positions
Main boom + fixed jib + derrick	3	B + C + E
Main boom + luffing jib + derrick	4	B + C + D + E

Tab. 537: Installation positions and number of lightning rods on derrick boom head

Moving the lightning rods* on the derrick boom head into working position

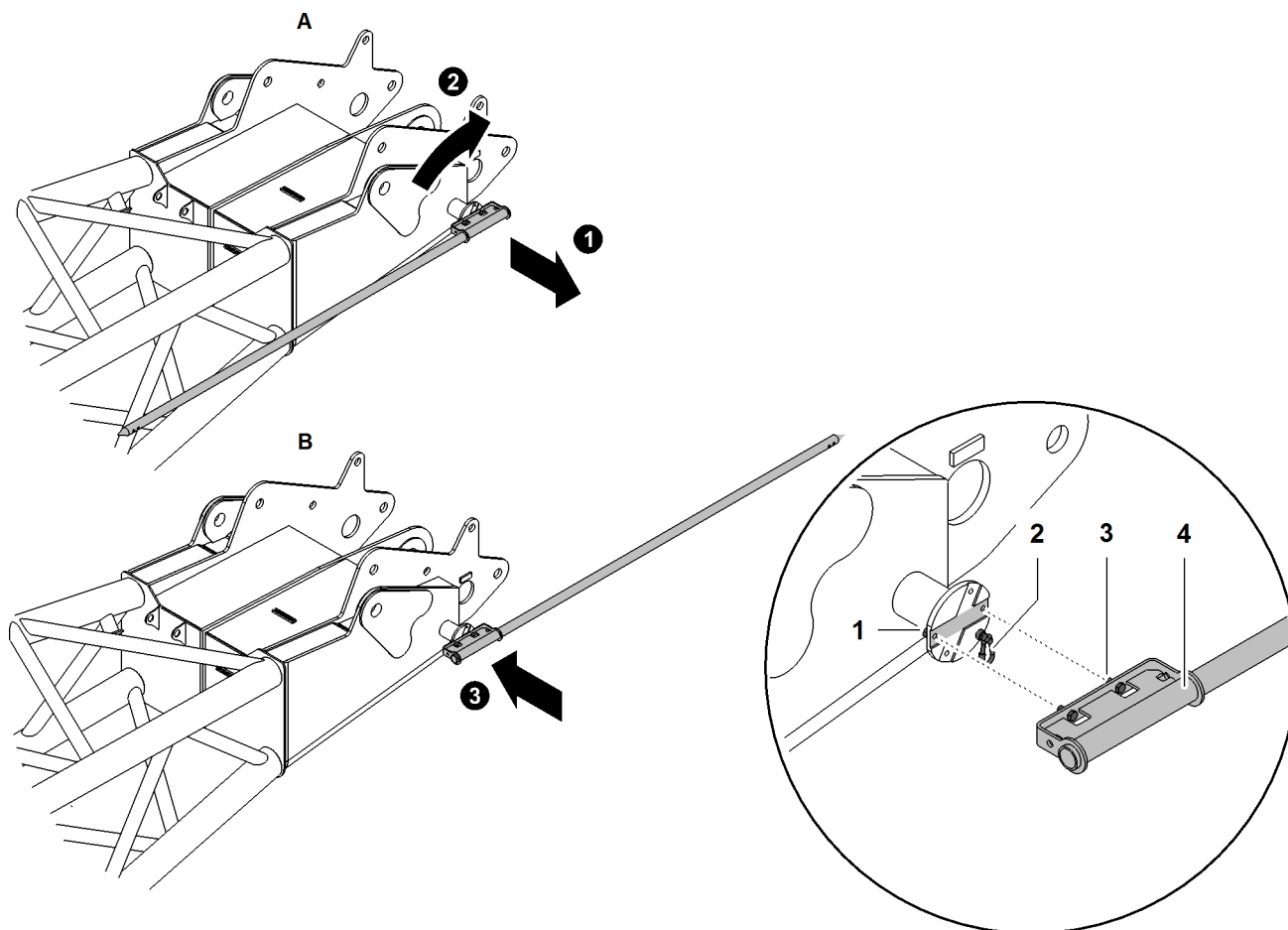


Fig. 3728: Moving the lightning rods* on the derrick boom head into working position

- | | | | | | |
|----------|--------------------|----------|-------------|----------|---------------|
| A | Transport position | 1 | Nut (2x) | 3 | Screw (2x) |
| B | Working position | 2 | Safety rope | 4 | Lightning rod |

- ▶ Undo safety rope **2**.
- ▶ Undo nuts **1**.
- ▶ Undo screws **3**.
- ▶ Move lightning rod **4** from transport position **A** to working position **B**.



Note
Liebherr recommends:

- ▶ Grease threads of the screws **3**.
- ▶ Attach lightning rod **4** with screws **3**.

- ▶ Lock screws **3** with nuts **1**.

NOTICE

Safety rope not attached!
Dropping parts.

- ▶ Ensure that safety rope **2** is attached.

- ▶ Attach safety rope **2**.

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod **4** is installed.
- ▶ Ensure that the screws of the tip are tightened.

- ▶ Ensure that the tip on the lightning rod **4** is installed.
- ▶ Ensure that the screws of the tip are tightened.

Raise derrick boom

Ensure that the following conditions are fulfilled:

- All work on the derrick boom has been completed.
- No loose parts or tools have been left on the derrick boom.

**WARNING**

Falling objects!
Severe injury.

- ▶ Any loose parts and tools must be removed from the derrick boom.
- ▶ Make sure that nobody is located in the danger zone.
- ▶ Leave the danger area.

- ▶ Slowly reeve main boom luffing winch.
 - ▷ Derrick boom pendant straps are tensioned.
- ▶ Wind up main boom luffing winch further.
 - ▷ Derrick boom lifts off the ground.
 - ▷ Derrick rope rigging swings downwards.

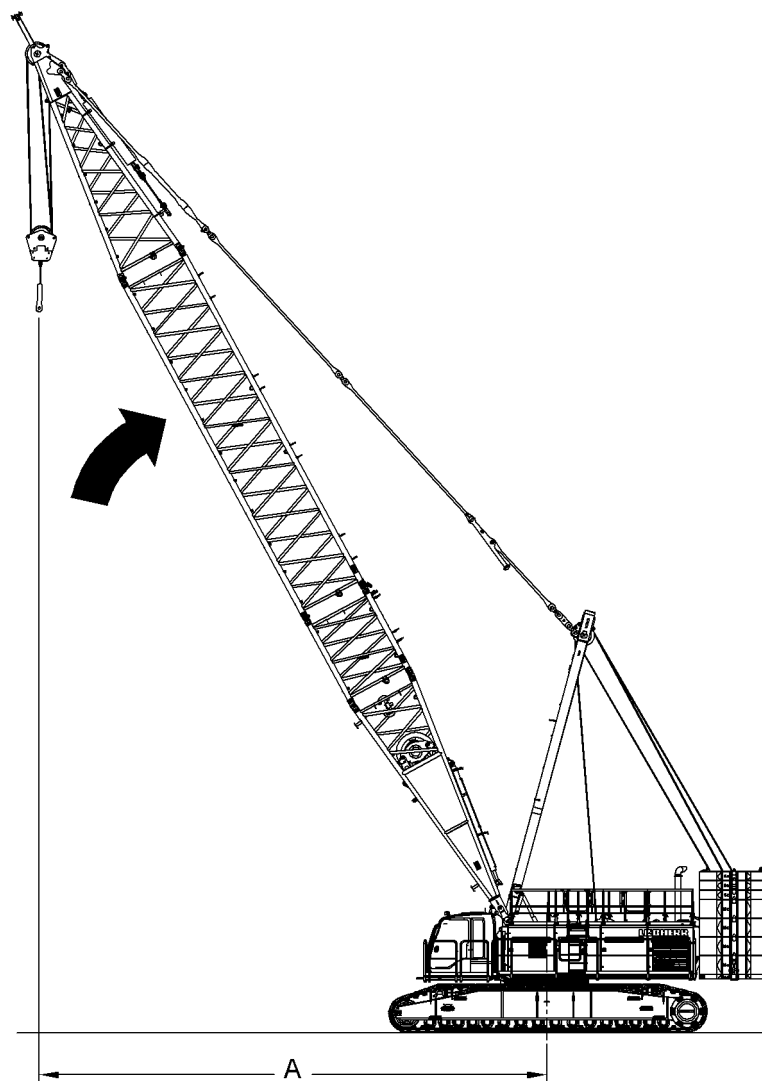


Fig. 3729: Erecting the derrick boom



DANGER

Critical angle is exceeded!
Machine toppling over.

- ▶ Do not lift derrick boom more than 70°.
 - ▶ Do not undercut minimum radius **A** of derrick boom of 11.5 m (37' 9" ft-in).
-
- ▶ Erect derrick boom until it is in the desired position.

7.9.2 Assembling the main boom

Ensure that the following conditions are fulfilled:

- Assembly functions switched on.
- The machine is ready for use as an assembly crane, or an assist crane is available.
- Work plans have been drawn up.
- The length and the order of the main boom intermediate pieces are known.
- The installation positions of the rope guide are known.
- The assembly positions of the mid-point suspensions are known.

- Any accessories required are available.

Notes

The illustrations have been simplified or schematically represented for reasons of uniformity and represent the principles of assembly. They do not provide a detailed representation of the components.

Programming the setup



DANGER

Unacceptable setup!

- ▶ Only program a setup on the machine that is in accordance with the load chart.
 - ▶ Programming the setup on the machine ([For more information see: 4.13 Programming the setup, page 914](#)).
-

Unloading and positioning the main boom section



DANGER

Slewing of uppercarriage with rear counterweight attached not permitted!
Machine toppling over.

- ▶ Slew the uppercarriage according to the table ([For more information see: Lifting and pinning the rear counterweight, page 1313](#)) exclusively.
-



DANGER

Incorrect or defect parts or components!
Structural breakdown.

- ▶ Only use original Liebherr parts and original Liebherr components in perfect condition.
-



DANGER

Improperly assembled boom configuration!
Structural breakdown.

- ▶ Ensure that the assembled boom configuration is compatible with the programmed setup.
-



DANGER

Incorrect arrangement of boom sections!
Structural breakdown.

- ▶ Assemble the main boom according to the relevant system requirements.
- ▶ A boom section of 6 m (20 ft) cannot be replaced by two boom sections of 3 m (10 ft).
- ▶ A boom section of 12 m (40 ft) cannot be replaced by two boom sections of 6 m (20 ft).
- ▶ Make sure that with model LR 1300 only main boom sections with the system dimensions 2821.24 are installed (For more information see: 1.9 Distinguishing features main boom sections LR 1300 and LR 1300 SX, page 165) .
- ▶ Make sure that with model LR 1300 SX only main boom sections with the system dimensions 2821.30 are installed (For more information see: 1.9 Distinguishing features main boom sections LR 1300 and LR 1300 SX, page 165) .

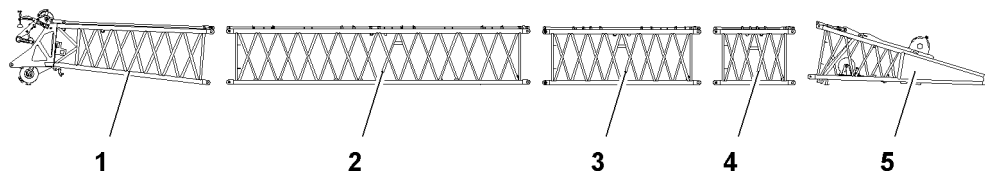


Fig. 3730: Unloading and positioning the main boom components

- | | | | |
|---|---------------------------|---|--------------------------|
| 1 | Boom head section | 4 | Boom section 3 m (10 ft) |
| 2 | Boom section 12 m (40 ft) | 5 | Boom base section |
| 3 | Boom section 6 m (20 ft) | | |

- ▶ Direct transport vehicles with boom components.
- ▶ Lash main boom sections by attaching lifting equipment to the lifting points.
- ▶ Unload main boom sections onto wooden blocks using the basic machine or assist crane and position according to the relevant system instructions.

Assembling the ladder* for the boom



CAUTION

Unauthorized use of ladder!
Fall from ladder.

- ▶ Only use the ladder with boom sections on which the required ladder angle of 75° to 80° can be observed.



CAUTION

The ladder must not be placed under an impermissible dynamic load!
Fall from ladder, break of ladder.

- ▶ The ladder must only be used for general assembly work on pendant straps and pin connection points on the boom sections.
- ▶ Do not stand on the ladder to knock in the boom section pins.
- ▶ The ladder must be checked for damage and cracks before it is fitted and before it is used.

**CAUTION**

Take great care if walking on boom sections!
risk of falling from boom section.

- ▶ Only ever walk on boom sections if boom catwalks are fitted.
- ▶ A fall arrest system must be used when working on boom sections to prevent falling.

**CAUTION**

Slipping of the ladder!
Fall from ladder.

- ▶ Secure ladder against sliding.

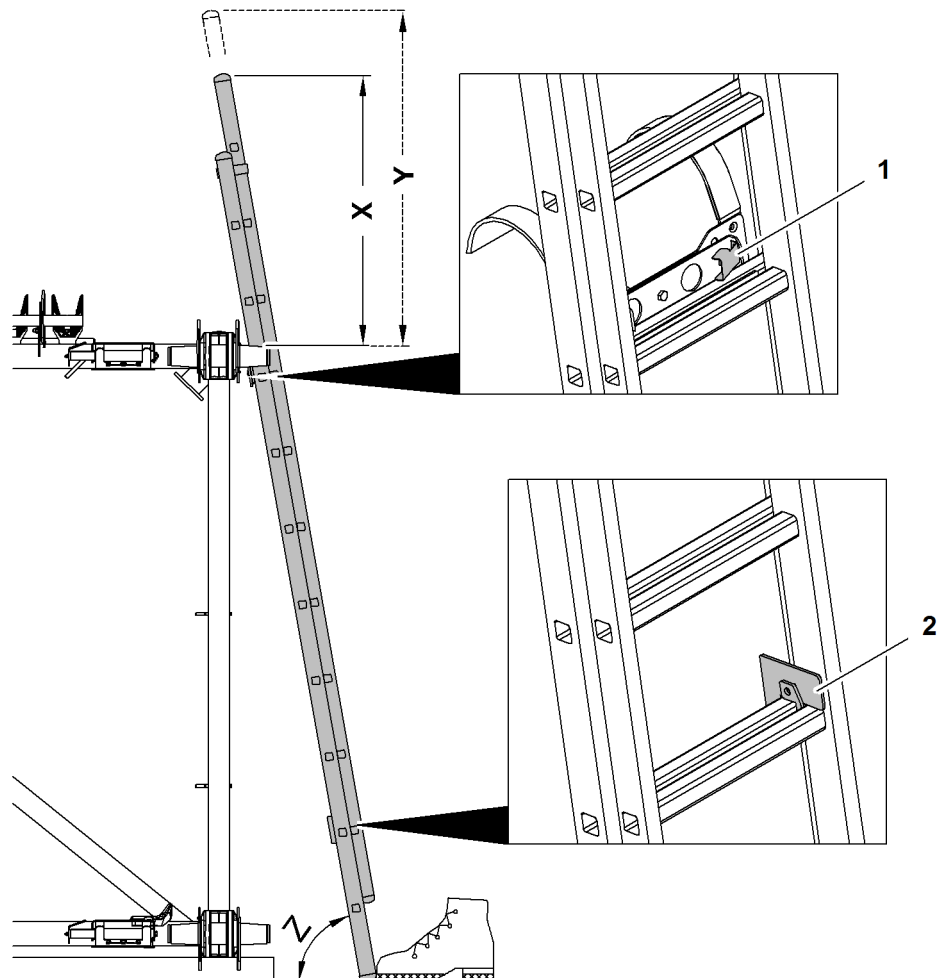


Fig. 3731: Assembling the ladder for the boom

- | | | | |
|---|------------------------|---|----------------|
| 1 | Top locking element | Y | Maximum height |
| 2 | Bottom locking element | Z | Ladder angle |
| X | Minimum height | | |

The ladder angle **Z** must remain between 75° and 80°.

The minimum height **X** must be at least 1000 mm (3' 3" ft-in).

If the maximum height **Y** is exceeded, the ladder topples.

- ▶ Insert ladder support at belt pipe of boom section.

**CAUTION**

Improperly extended ladder!
Fall from ladder.

- ▶ Observe slant angle **Z**.
- ▶ Observe minimum height **X**.
- ▶ Do not exceed maximum height **Y**.

▶ Extend extendable part of the ladder until minimum height **X** is exceeded.

**CAUTION**

Unsecured ladder!
Fall from ladder.

- ▶ Secure ladder against sliding.
- ▶ Ensure that locking elements engage.

- ▶ Check top locking element.
- ▶ Check bottom locking element.
 - ▷ Ladder for boom is installed:

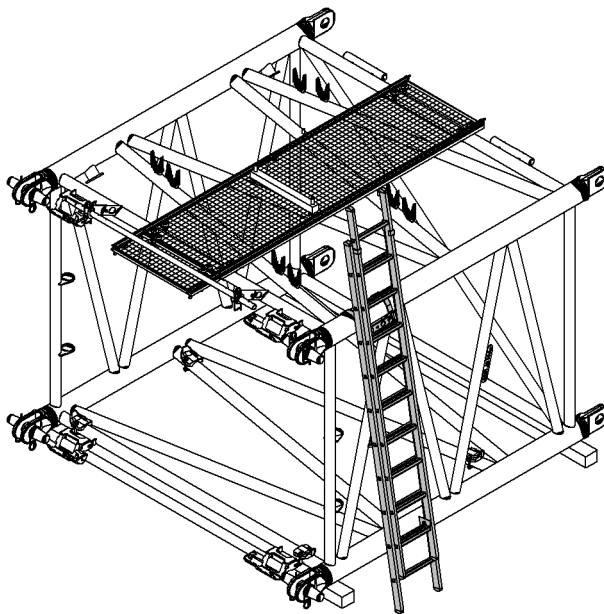


Fig. 3732: Ladder for boom is installed

Pinning together the main boom head, main boom sections and main boom base section

**WARNING**

Never stand in the inside of the main boom sections during assembly!
Serious injury.

- ▶ Never go inside the boom sections.
- ▶ Drive in double-taper pins from the outside exclusively.

**Note**

If a fixed jib (excluding fixed jib 1507) is going to be added:

- ▶ Bolt the boom head section and boom section to the upper pin connection points using double-taper pins from the A-frame 2 equalizer (jib backstay strap) of the fixed jib.

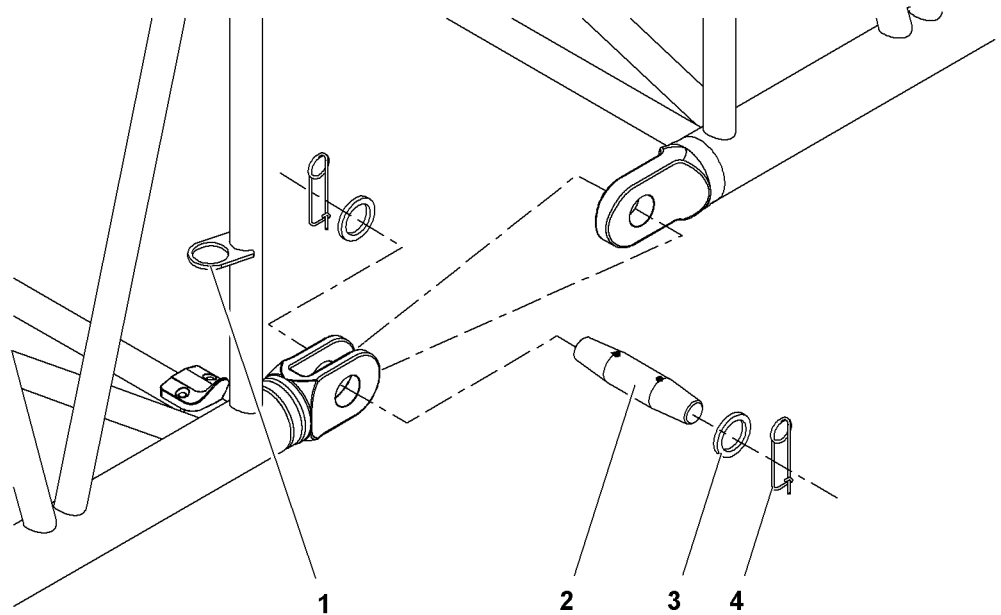


Fig. 3733: Bolting the main boom

- | | | | |
|---|--|---|---------------------|
| 1 | Transport bracket (4x) for double-taper pins | 3 | Washer (8x) |
| 2 | Double-taper pin (4x) | 4 | Locking spring (8x) |

- ▶ Remove the double-taper pins 2 from the transport brackets 1.

**Note**

Liebherr recommends:

- ▶ To make assembly and disassembly easier, grease double-taper pin.

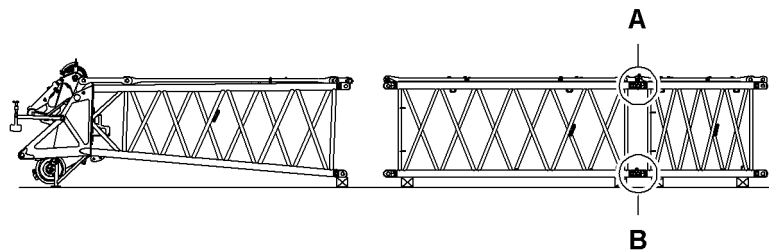


Fig. 3734: Bolting the main boom intermediate pieces

- | | | | |
|---|-------------------------------|---|----------------------------------|
| A | Top pin connection point (2x) | B | Bottom pin connection point (2x) |
|---|-------------------------------|---|----------------------------------|

- ▶ Bolt all boom sections to one another on pin connection points A + B.
- ▶ Secure the double-taper pins with washers and safety pins.

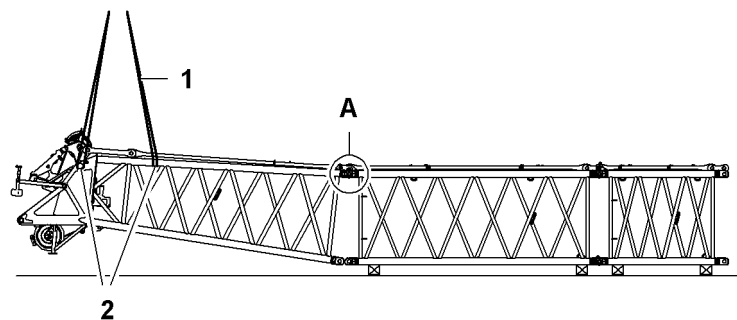


Fig. 3735: Bolting the boom head section to the boom sections at the top

- 1 Round sling (4x)
- 2 Rigging point (4x)
- A Top pin connection point (2x)

- ▶ Attach the boom head section on the lifting points 2.
- ▶ Lift the boom head section to the boom section until the upper pin connection points A match.
- ▶ Bolting the boom head section to the boom sections on the upper pin connection points A.
- ▶ Secure the double-taper pins with washers and safety pins.

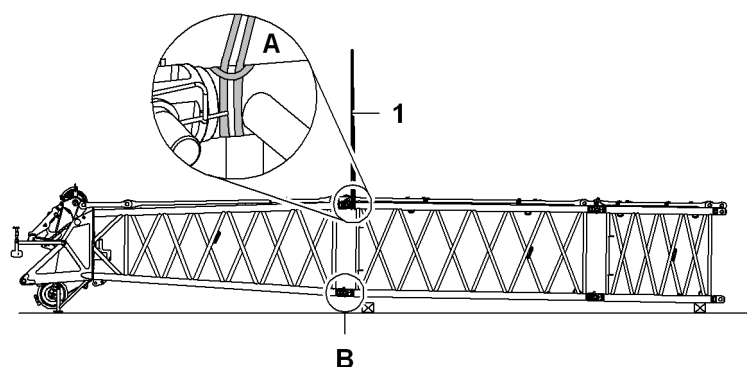


Fig. 3736: Bolting the boom head section to the boom sections at the bottom

- 1 Round sling (2x)
- A Belt pipe (2x)
- B Bottom pin connection point (2x)

- ▶ Attach boom section to chord pipes A.
- ▶ Lift the boom section until the lower pin connection points B match.
- ▶ Bolting the boom head section to the boom sections on the lower pin connection points B.
- ▶ Secure the double-taper pins with washers and safety pins.

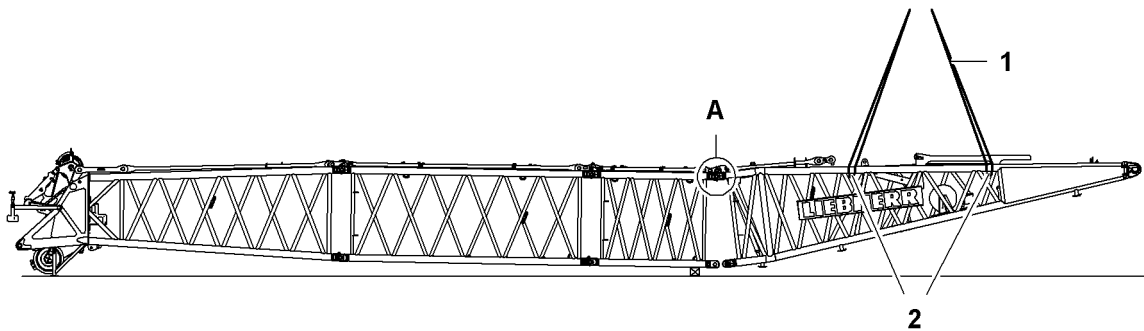


Fig. 3737: Bolting the boom base section to the boom sections at the top

1 Round sling (4x)

2 Rigging point (4x)

A Top pin connection point (2x)

- ▶ Attach the boom base section on the lifting points 2.
- ▶ Lift the boom base section to the boom section until the upper pin connection points A match.
- ▶ Bolting the boom base section to the boom sections on the upper pin connection points A.
- ▶ Secure the double-taper pins with washers and safety pins.

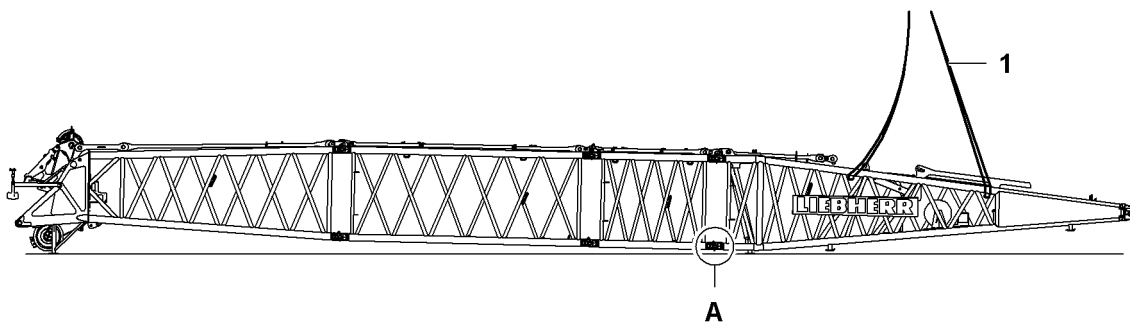


Fig. 3738: Bolting the boom base section to the boom sections at the bottom

1 Round sling (4x)

A Bottom pin connection point (2x)

- ▶ Lower the boom base section until the lower pin connection points A match.
- ▶ Bolting the boom base section to the boom sections on the lower pin connection points A.
- ▶ Secure the double-taper pins with washers and safety pins.

Connecting catwalks* for booms

Make sure the following prerequisites are met:

- Boom components are pinned to each other.

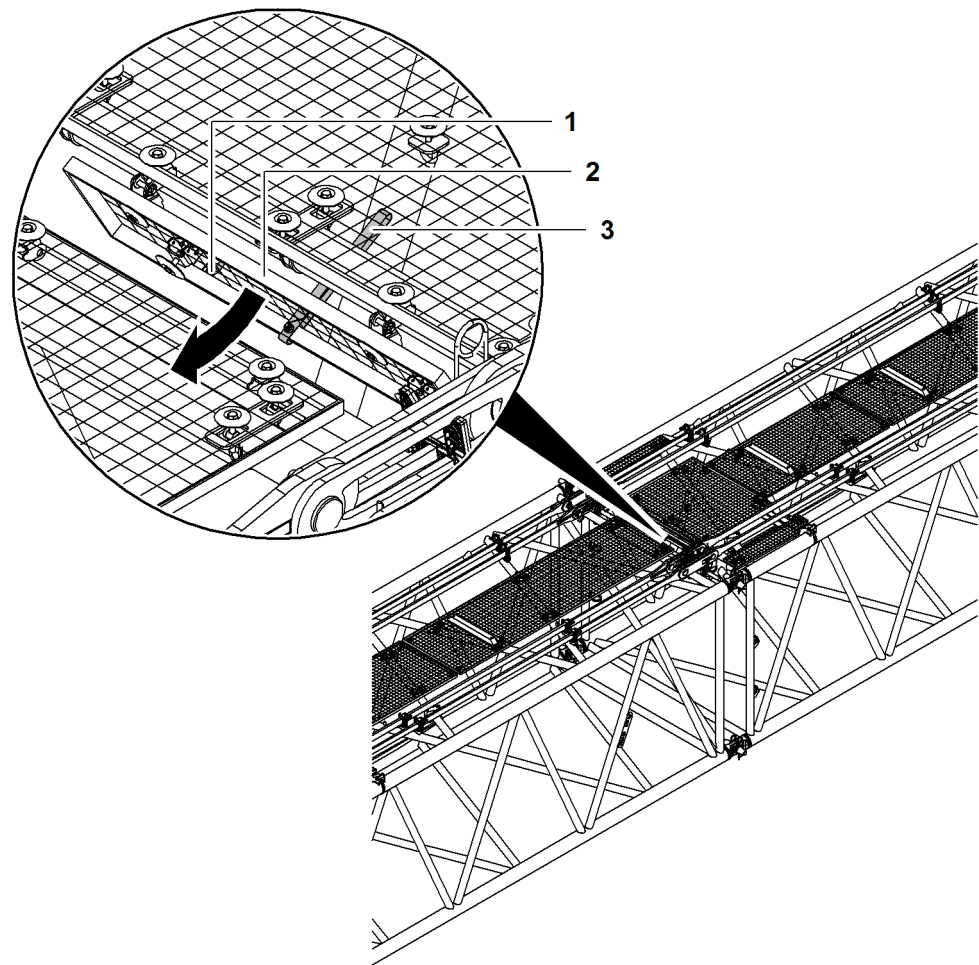


Fig. 3739: Connecting catwalks for booms (illustration of principle)

- | | | | |
|---|---------------------------------|---|---------------|
| 1 | Pin (2x) with spring cotter pin | 3 | Retainer belt |
| 2 | Catwalk (foldable) | | |

- ▶ Open retainer belt **3**.
- ▶ Remove pin **1** with spring cotter pin on both sides.
- ▶ Fold up catwalk **2**.

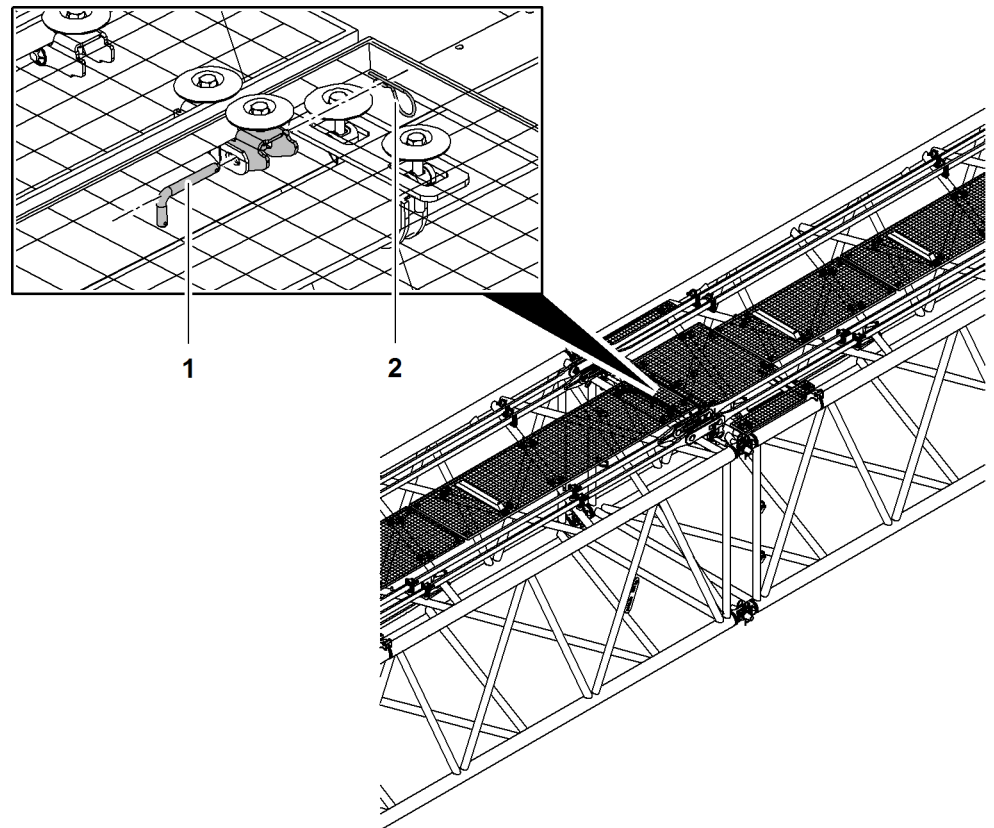


Fig. 3740: Connecting catwalks for booms (illustration of principle)

1 Pin (2x)

2 Spring cotter pin (2x)

When pin connection points of catwalks align:

- ▶ Insert pin 1 on both sides.
- ▶ Secure pins 1 with spring cotter pins 2.
- ▶ Repeat procedure with all boom components.

Connecting and checking boom fall arrest*



WARNING

Improper assembly of the boom fall arrest*!
Risk of falling off the boom.

- ▶ Ensure that the boom fall arrest* is in impeccable condition.
 - ▶ Ensure that the boom fall arrest* is connected and secured between boom sections according to the specifications.
-
- ▶ Connect and check boom fall arrest* in accordance with additional documentation LIE-TAURUS.

Installing the rope guide

NOTICE

Wrong installation of rope guide!
Damage to rope.

- ▶ Install rope guide according to relevant system instructions.

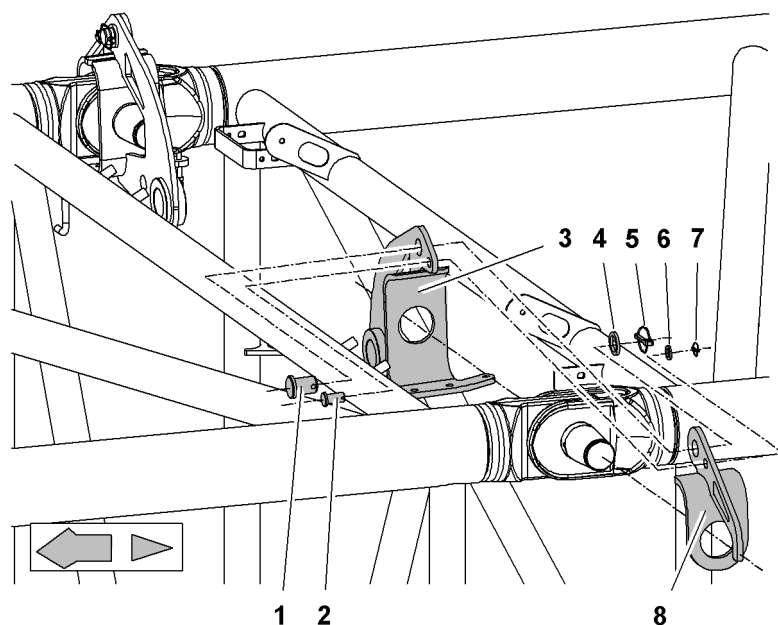


Fig. 3741: Installing forks of rope guide

1	Pin	5	Linchpin
2	Pin	6	Washer
3	Inner section of fork	7	Linchpin
4	Washer	8	Outer section of fork

- ▶ Remove locking springs and washers from both sides of double-taper pin of boom pin connection.
- ▶ Mount inner and outer section of fork **3 + 8** on double-taper pin.
- ▶ Pin inner and outer part of fork **3 + 8**.
- ▶ Secure pins **1 + 2** with washers **4 + 6** and linchpins **5 + 7**.

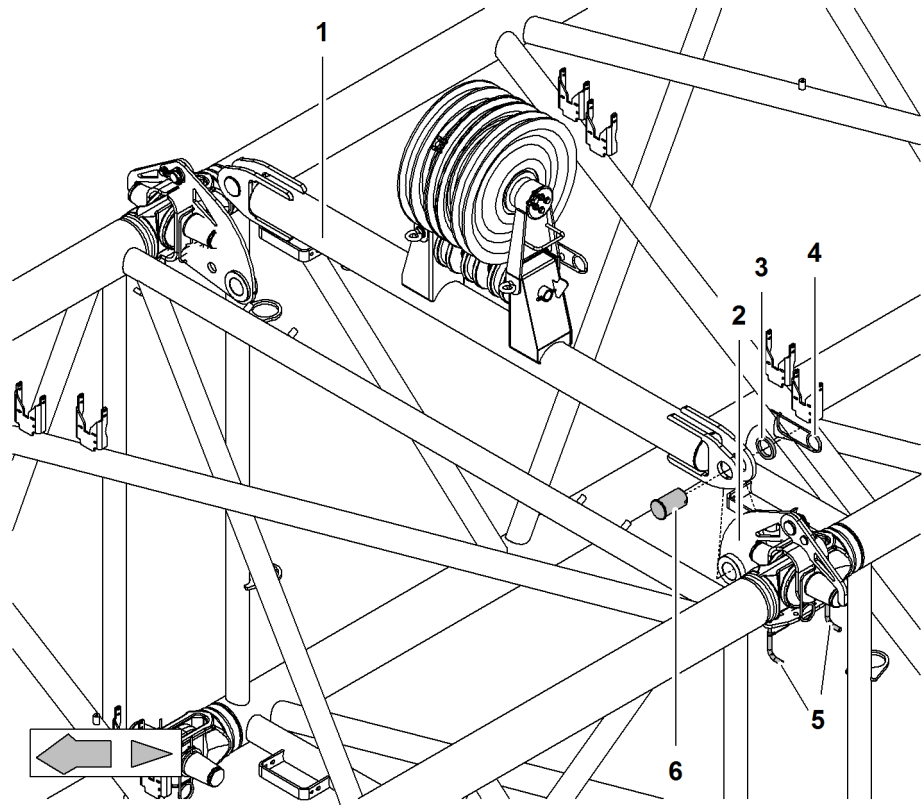


Fig. 3742: Mounting rope guide

- | | | | |
|---|------------|---|----------------|
| 1 | Rope guide | 4 | Locking spring |
| 2 | Fork | 5 | Screw (2x) |
| 3 | Washer | 6 | Pin |

- ▶ Pin rope guide 1 with fork 2.
- ▶ Secure pin 6 with washer 3 and locking spring 4.

If the installation position of the rope guide 1 is identical with the installation position of the midpoint suspension:

- ▶ Pin mid-point suspension ropes to forks 2 of rope guide 1.
- ▶ Secure pin 6 with washer 3 and locking spring 4.

NOTICE

Inadmissible fixation of the screws 5 before pinning the ropes of the midpoint suspension with the forks 2 of the rope guide 1!
Risk of damage to components.

If ropes of mid-point suspension are pinned to forks 2 of rope guide 1:

- ▶ Fix screws 5.
- ▶ Align rope guide 1 vertically and fix with both screws 5 by hand.

Pinning the pendant straps

- ▶ Remove safety pins from the transport brackets for pendant straps.

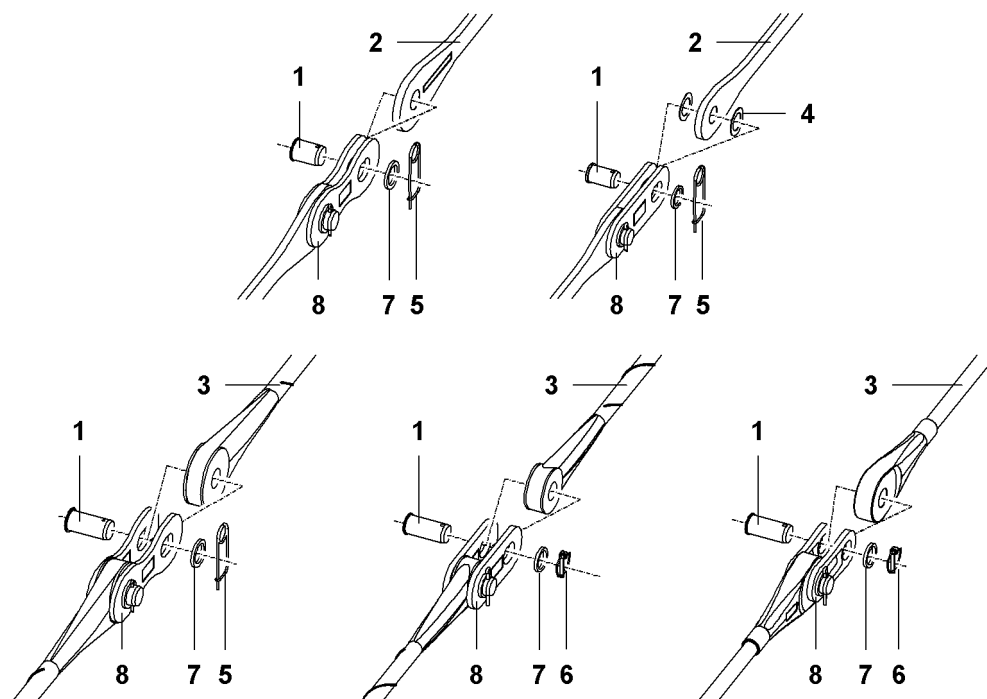


Fig. 3743: Bolt the pendant straps (schematic diagram of various pendant straps)

- | | | | |
|---|----------------------------|---|-----------------|
| 1 | Pin | 5 | Safety pin |
| 2 | Steel pendant strap | 6 | Linch pin |
| 3 | Carbon-fibre pendant strap | 7 | Washer |
| 4 | Plastic washer (2x) | 8 | Connecting link |

- ▶ Remove the pin 1 on the connecting link 8.
- ▶ Position the pendant strap 2, 3 between the two coupling links 8.
or
- If the pendant strap has plastic washers 4:
Position the pendant strap 2 with plastic washers 4 on both sides between the two connecting links 8.
- ▶ Insert pin 1 and secure with washers 7 and safety pin 5 or linch pin 6.

Removing the jib backstay straps

The jib backstay straps are transported on the boom sections. They can be removed if no jib is mounted.



Note

Higher load with deinstalled jib backstay straps!

- ▶ Refer to the foreword in the valid load capacity chart.

If the jib backstay straps are left on the main boom:

- ▶ Pin the jib backstay straps together and secure with washers and a safety pin.
- ▶ Pin the connecting links on the boom head section to the jib backstay straps and secure with washers and a safety pin.
- ▶ Pin the connecting links on the boom base section to the jib backstay straps and secure with washers and a safety pin.
- ▶ Secure the transport brackets for the jib backstay straps with safety pins.

Installing the mid-point suspension

The lengths of the stay ropes and their assembly positions are shown in the relevant instructions for the boom.



Note

Special procedure for installing the mid-point suspension for main boom 2821 with main boom length of 80 m (262' 6" ft-in), 83 m (272' 4" ft-in) or 86 m (282' 2" ft-in) and installed jib 1507!

- ▶ Install midpoint suspension.



DANGER

Incorrect installation of mid-point suspensions!
Structural failure.

- ▶ Fit mid-point suspensions according to relevant system instructions.
- ▶ Assemble required length of stay ropes in line with system-relevant details.
- ▶ Remove locking springs and washers from both sides of double-taper pin of boom pin connection.
- ▶ Repeat process on opposite side.

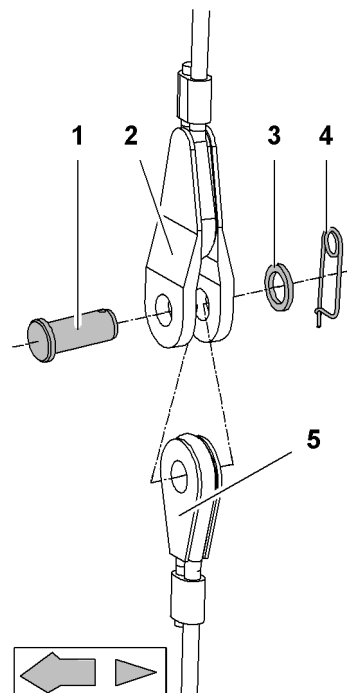


Fig. 3744: Pinning mid-point suspension stay ropes

- | | | | |
|---|---------------|---|------------------|
| 1 | Pin | 4 | Locking spring |
| 2 | Top stay rope | 5 | Bottom stay rope |
| 3 | Washer | | |

- ▶ Pin top stay rope 2 to bottom stay rope 5.
- ▶ Secure pin 1 with washer 3 and locking spring 4.

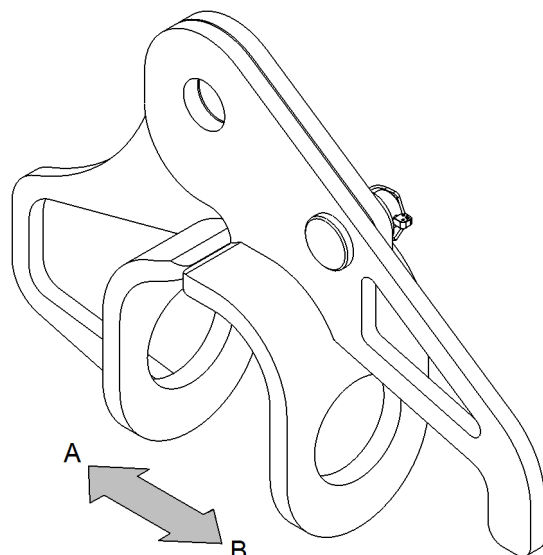


Fig. 3745: Mid-point suspension forks

A Main boom interior

B Main boom exterior

The forks may have different shapes. The permissible shape depends on the boom configuration (For more information see: 1 Product description, page 51) .

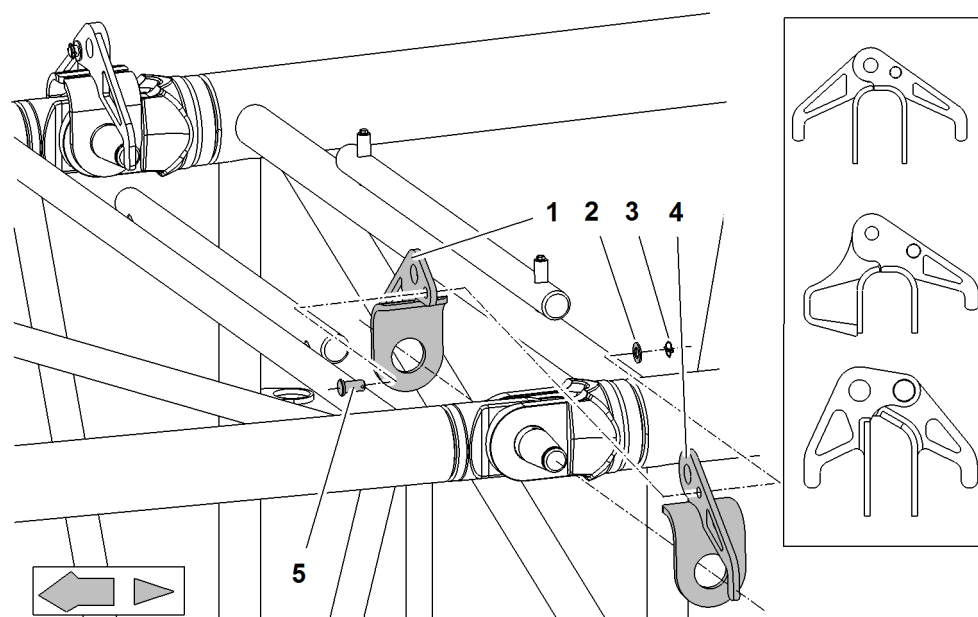


Fig. 3746: Assembling the mid-point suspension forks

- 1 Inner section of fork
- 2 Washer
- 3 Linchpin

- 4 Outer section of fork
- 5 Pin



Note

Special assembly procedure with identical installation position of mid-point suspension and rope guide on main boom!

► Replace mid-point suspension forks with rope guide forks.

► Mount inner section of fork 1 on double-taper pin.

- ▶ Mount outer section of fork **4** on double-taper pin.
- ▶ Pin inner section of fork **1** to outer section of fork **4**.
- ▶ Secure pin **5** with washer **2** and linchpin **3**.
- ▶ Repeat process on opposite side.

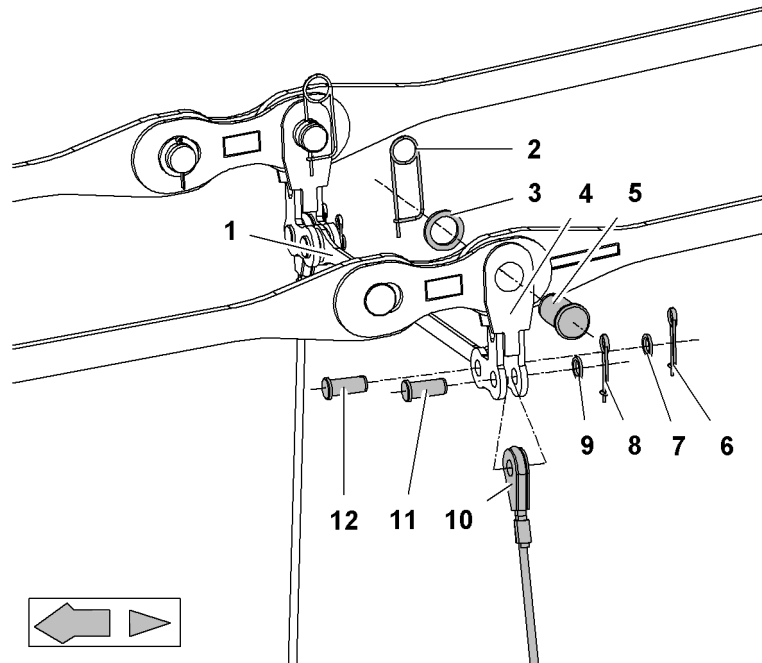


Fig. 3747: Installing the pendant straps, spacer bracket, connecting elements and mid-point suspension stay ropes

- | | | | |
|----------|-----------------------|-----------|------------------------|
| 1 | Spacer bracket | 7 | Washer |
| 2 | Locking spring | 8 | Locking spring |
| 3 | Washer | 9 | Washer |
| 4 | Connecting element | 10 | Stay rope |
| 5 | Pin for pendant strap | 11 | Pin for stay rope |
| 6 | Locking spring | 12 | Pin for spacer bracket |

- ▶ Pin connecting element **4** to pendant strap.
- ▶ Secure pin **5** with washer **3** and locking spring **2**.
- ▶ Pin connecting element **4** to spacer bracket **1**.
- ▶ Secure pin **12** with washer **7** and locking spring **6**.
- ▶ Pin connecting element **4** to stay rope **10**.
- ▶ Secure pin **11** with washer **9** and locking spring **8**.
- ▶ Repeat process on opposite side.

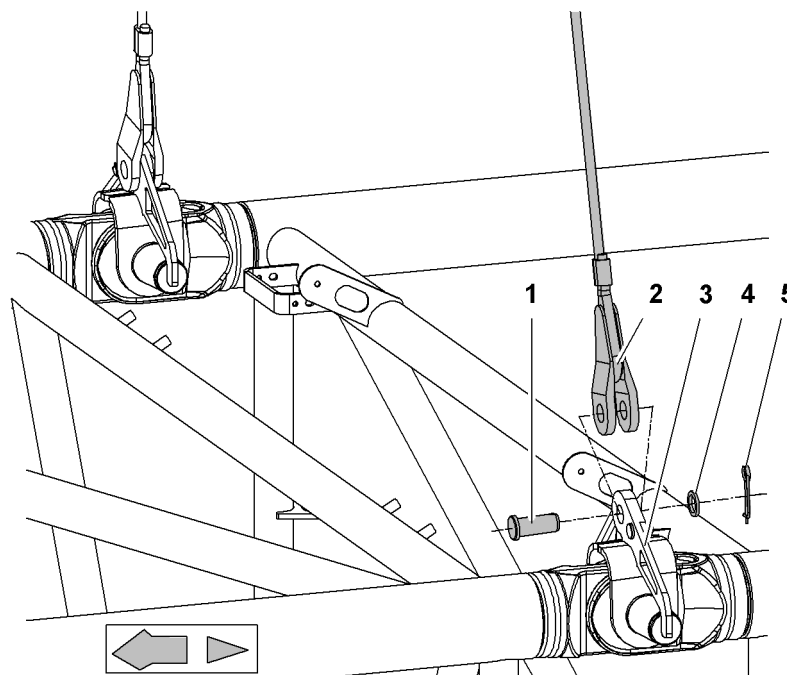


Fig. 3748: Pinning stay ropes to forks of mid-point suspension

- | | | | |
|---|-----------|---|----------------|
| 1 | Pin | 4 | Washer |
| 2 | Stay rope | 5 | Locking spring |
| 3 | Fork | | |

- ▶ Pin stay rope 2 to fork 3.
- ▶ Secure pin 1 with washer 4 and locking spring 5.
- ▶ Repeat process on opposite side.

Installing mid-point suspension (with main boom length 80 m (262 ft), 83 m (272 ft) and 86 m (282 ft) and jib 1507 attached)

With a main boom length of 80 m (262 ft), 83 m (272 ft) and 86 m (282 ft) and 1507 fixed jib attached, installation of the mid-point suspension represents a special case.



DANGER

Incorrect installation of mid-point suspensions!
Structural failure.

- ▶ Fit mid-point suspensions according to relevant system instructions.

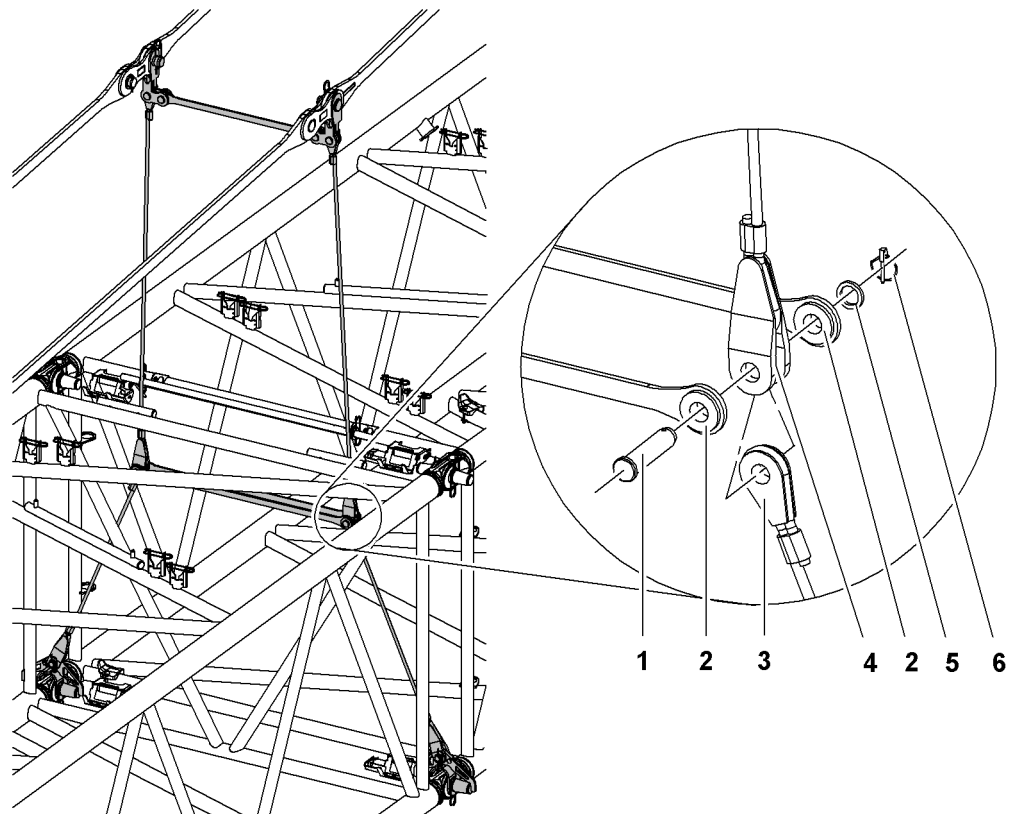


Fig. 3749: Pinning stay ropes to spacer brackets

1	Pin for spacer bracket	4	Top stay rope
2	Spacer bracket (2x)	5	Washer
3	Bottom stay rope	6	Linch pin

- ▶ Pin mid-point suspensions to pendant straps ([For more information see: Installing the mid-point suspension, page 1471](#)).
- ▶ Pin top stay rope 4 and bottom stay rope 3 to spacer bracket 2.
- ▶ Secure pin 1 with a washer 5 and linch pin 6.
- ▶ Repeat procedure on opposite side.
- ▶ Pin mid-point suspension with boom section ([For more information see: Installing the mid-point suspension, page 1471](#)).

Connect the electric cables

NOTICE

Electric cables have been handled incorrectly!
Damage to electric cable and plug.

- ▶ Do not pull the electric cable over sharp-edged objects.
 - ▶ Do not crush or kink the electric cable.
 - ▶ Keep the plug clean.
-
- ▶ Disconnect both electric cables from the terminal box on the boom base section.

NOTICE

Electric cable has been unwound incorrectly!

Electric cable may be damaged.

- ▶ Push the electric cable in the cable drum into the side opening of the cable drum.

-
- ▶ Loosen the pin on the axle of the cable drum.
 - ▶ Unwind the electric cable from the cable drum and pull it inside the main boom to the boom head section.
 - ▶ Connect the electric cable to the terminal box on the boom head section and secure using retaining clips.

Two fixing holes are provided under the terminal box to relieve the strain on the plug.

- ▶ Clip both carabiners on the cable sock into the fixing holes.
- ▶ Fix the pin on the axle of the cable drum.
- ▶ Reconnect the electric cable in the cable drum to the terminal box on the boom base section.
 - ▷ The boom base section and boom head section electric cables are connected.

If an auxiliary jib is fitted:

- ▶ Plug the auxiliary jib electric cable into the boom head section.

Installing the obstacle warning light

**Note**

Use of the obstacle warning light is prescribed by national or regional regulations!

- ▶ Before using the machine, familiarise yourself with national and local regulations.

Ensure that the following conditions are fulfilled:

- Anemometer is not installed.

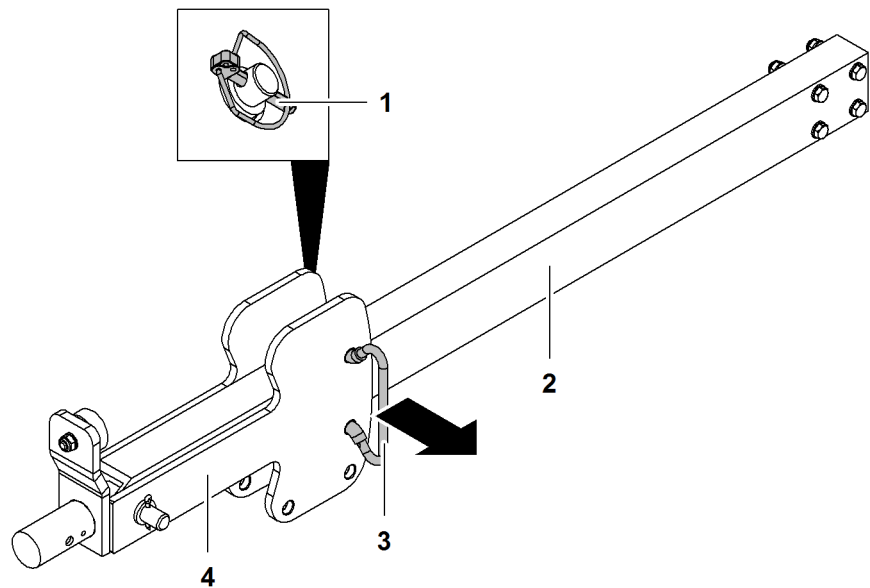


Fig. 3750: Moving the pendulum into the working position

- | | | | |
|---|----------------|---|-----------------|
| 1 | Linchpins (2x) | 3 | Locking element |
| 2 | Mount | 4 | Pendulum |

The pendulum 4 is secured on the mount 2 for machine transport.

- ▶ Remove the linchpin 1 of the locking element 3.
- ▶ Remove 3 locking element.
- ▶ Swing pendulum 4 down.
- ▶ Slide locking element 3 through pendulum 4 and secure with linchpins 1.

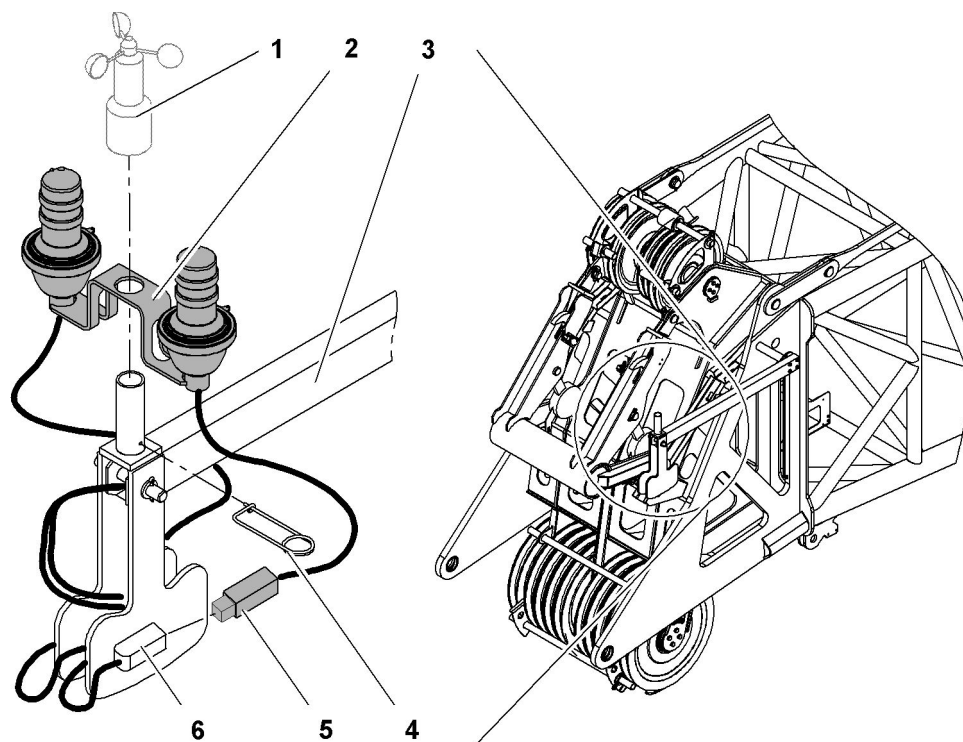


Fig. 3751: Installing the obstacle warning light

- | | | | |
|---|------------------------|---|------------|
| 1 | Anemometer | 4 | Safety pin |
| 2 | Obstacle warning light | 5 | Plug |
| 3 | Mount | 6 | Coupling |

- ▶ Place obstacle warning light 2 on pipe.
 - ▷ Obstacle warning light is secured by the pipe and axis on the bracket 3.

NOTICE

Safety pin is not fit properly!
Damage to the electric cable.

- ▶ Insert the safety pin carefully.

- ▶ Insert the safety pin 4.
 - ▷ Obstacle warning light 2 is secured.
- ▶ Connect the plug 5 to the coupling 6.
- ▶ Lock plug 5.

Fitting the anemometer

Ensure that the following conditions are fulfilled:

- Obstacle warning light is installed (if available).

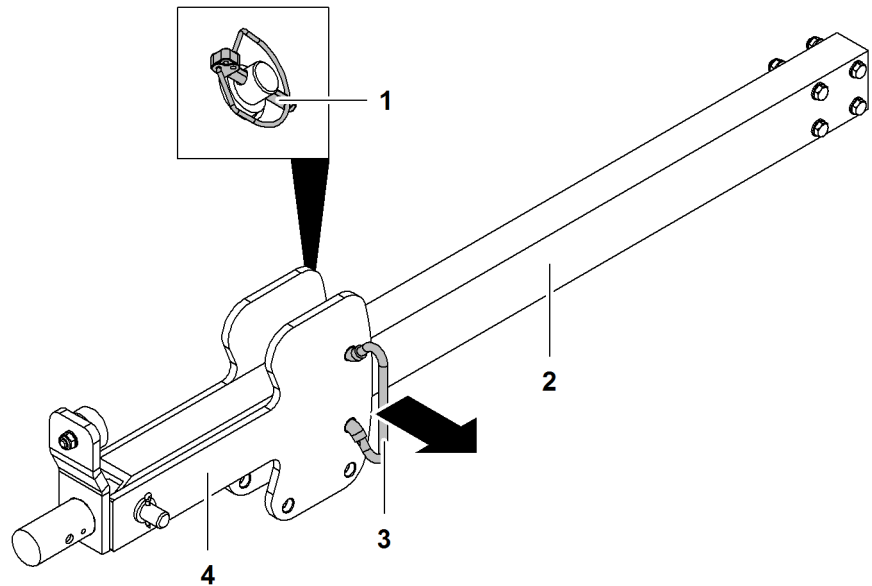


Fig. 3752: Moving the pendulum into the working position

- | | | | |
|---|----------------|---|-----------------|
| 1 | Linchpins (2x) | 3 | Locking element |
| 2 | Mount | 4 | Pendulum |

The pendulum 4 is secured on the mount 2 for machine transport.

- ▶ Remove the linchpin 1 of the locking element 3.
- ▶ Remove 3 locking element.
- ▶ Swing pendulum 4 down.
- ▶ Slide locking element 3 through pendulum 4 and secure with linchpins 1.

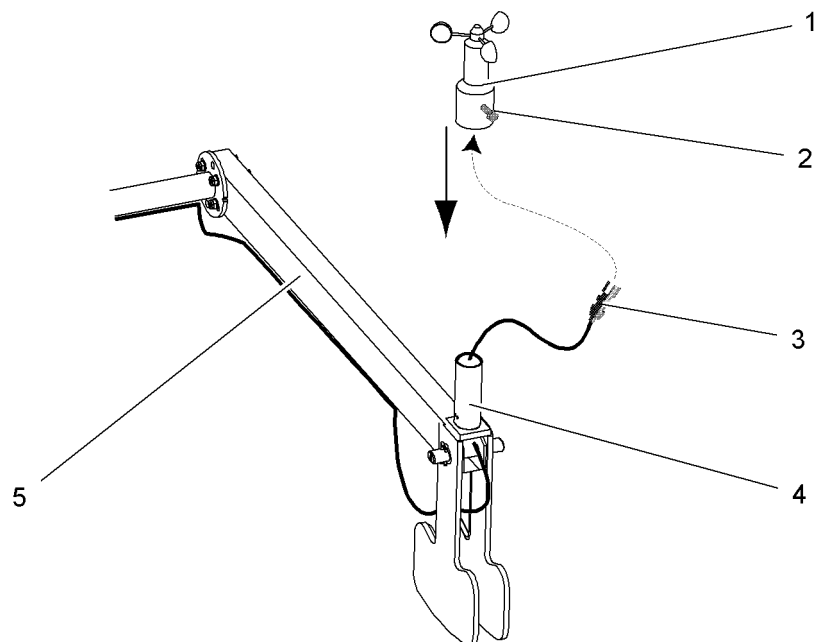


Fig. 3753: Fitting the anemometer

- | | | | |
|---|------------|---|-------|
| 1 | Anemometer | 4 | Tube |
| 2 | Screw | 5 | Mount |
| 3 | Plug | | |

- ▶ Remove cover from the plug **3**.
- ▶ Plug in the connector **3** at the bottom of the anemometer **1**.
- ▶ Secure plug **3** with nut.

NOTICE

Anemometer is not fit properly!
Damage to the electric cable.

- ▶ Pull the extended electric cable through the tube before pushing on the anemometer.

- ▶ Position the anemometer **1** on the tube **4**.
- ▶ Securing the anemometer on the mount: Tighten the screw **2**.

The rotor of the anemometer must be free to rotate slightly.

- ▶ Test the anemometer: rotate the rotor slightly and note the value on the monitor.
 - ▷ The wind speed value will increase.

Moving the lightning rods* into working position

Installation of lightning rods* on main boom head with derrick boom head

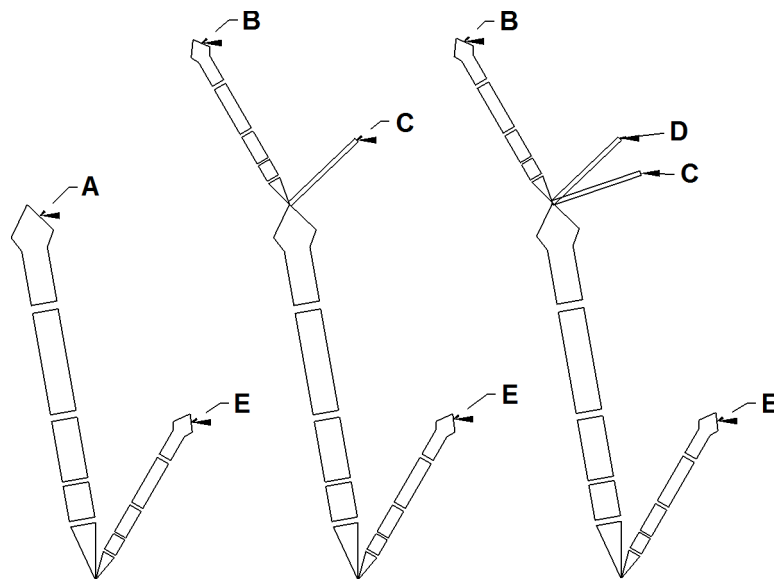


Fig. 3754: Installation of lightning rods* on main boom head with derrick boom head

- A** Main boom head
- B** Jib head
- C** A-frame2
- D** A-frame3
- E** Derrick boom head

Boom configuration	Number of lightning rods	Installation positions
Main boom + derrick	2	A + E
Main boom + fixed jib + derrick	3	B + C + E

Boom configuration	Number of lightning rods	Installation positions
Main boom + luffing jib + derrick	4	B + C + D + E

Tab. 538: Installation and number of lightning rods* on main boom head with derrick boom head

Moving the lightning rods* on the main boom head into working position

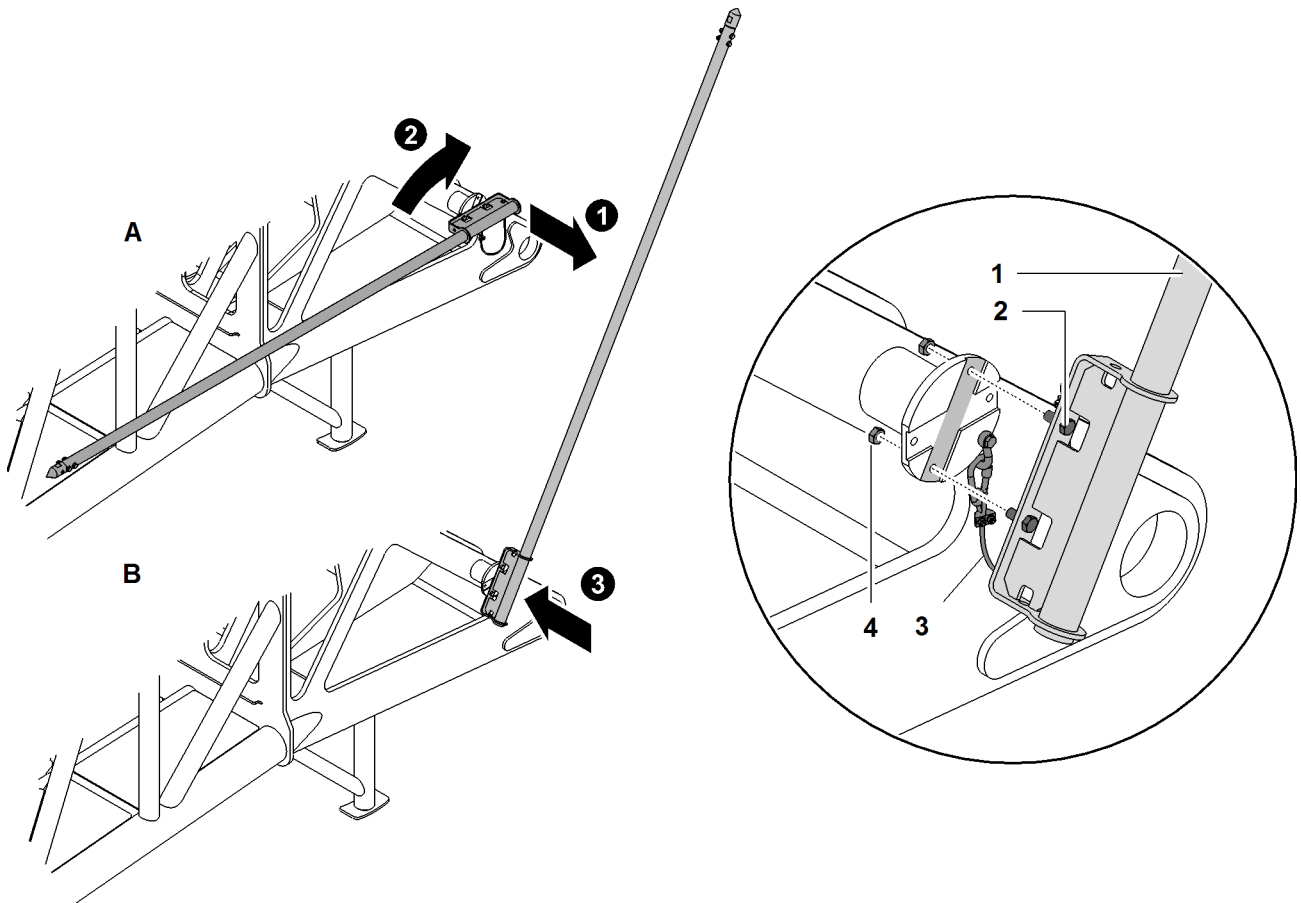


Fig. 3755: Moving the lightning rods* on the main boom head into working position (illustration of principle)

A Transport position
B Working position

1 Lightning rod
2 Screw (2x)

3 Safety rope
4 Nut (2x)

- ▶ Undo safety rope **3**.
- ▶ Undo nuts **4**.
- ▶ Undo screws **2**.
- ▶ Move lightning rod **1** from transport position **A** to working position **B**.



Note

Liebherr recommends:

- ▶ Grease threads of the screws **2**.
- ▶ Attach lightning rod **1** with screws **2**.

- ▶ Lock screws **2** with nuts **4**.

NOTICE

Safety rope not attached!
Dropping parts.

- ▶ Ensure that safety rope **3** is attached.

-
- ▶ Attach safety rope **3**.

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod **1** is installed.
- ▶ Ensure that the screws of the tip are tightened.

-
- ▶ Ensure that the tip on the lightning rod **1** is installed.
 - ▶ Ensure that the screws of the tip are tightened.

Moving the lightning rods* on A-frame2 into working position

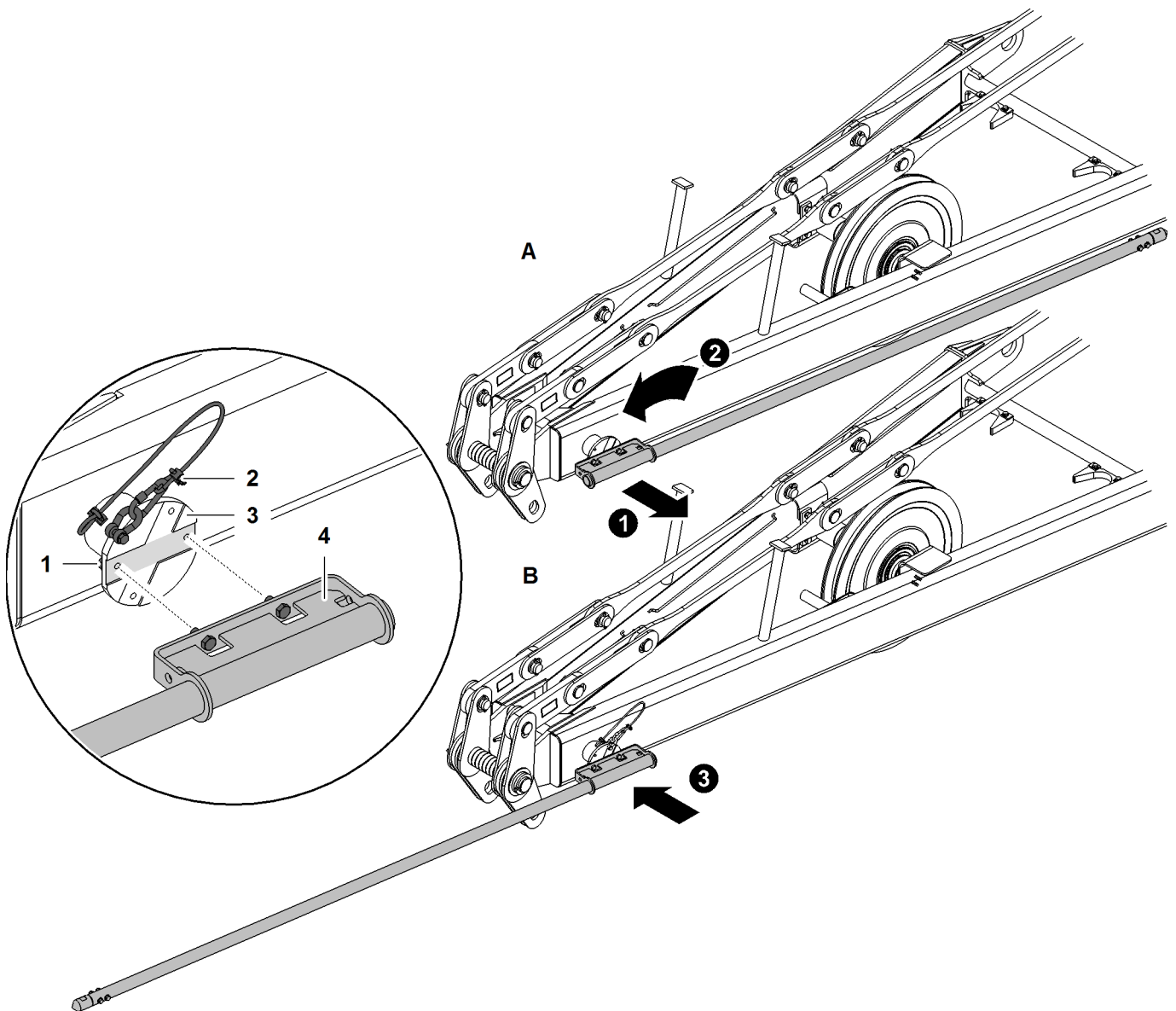


Fig. 3756: Moving the lightning rods* on A-frame2 into working position (illustration of principle)

A Transport position
B Working position

1 Nut (2x)
2 Safety rope

3 Screw (2x)
4 Lightning rod

- ▶ Undo safety rope **2**.
- ▶ Undo nuts **1**.
- ▶ Undo screws **3**.
- ▶ Move lightning rod **4** from transport position **A** to working position **B**.



Note

Liebherr recommends:

- ▶ Grease threads of the screws **3**.
- ▶ Attach lightning rod **4** with screws **3**.
- ▶ Lock screws **3** with nuts **1**.

NOTICE

Safety rope not attached!
Dropping parts.

- ▶ Ensure that safety rope **2** is attached.

- ▶ Attach safety rope **2**.

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod **4** is installed.

- ▶ Ensure that the screws of the tip are tightened.

- ▶ Ensure that the tip on the lightning rod **4** is installed.

- ▶ Ensure that the screws of the tip are tightened.

Moving the lightning rods* on A-frame2 and A-frame3 into working position

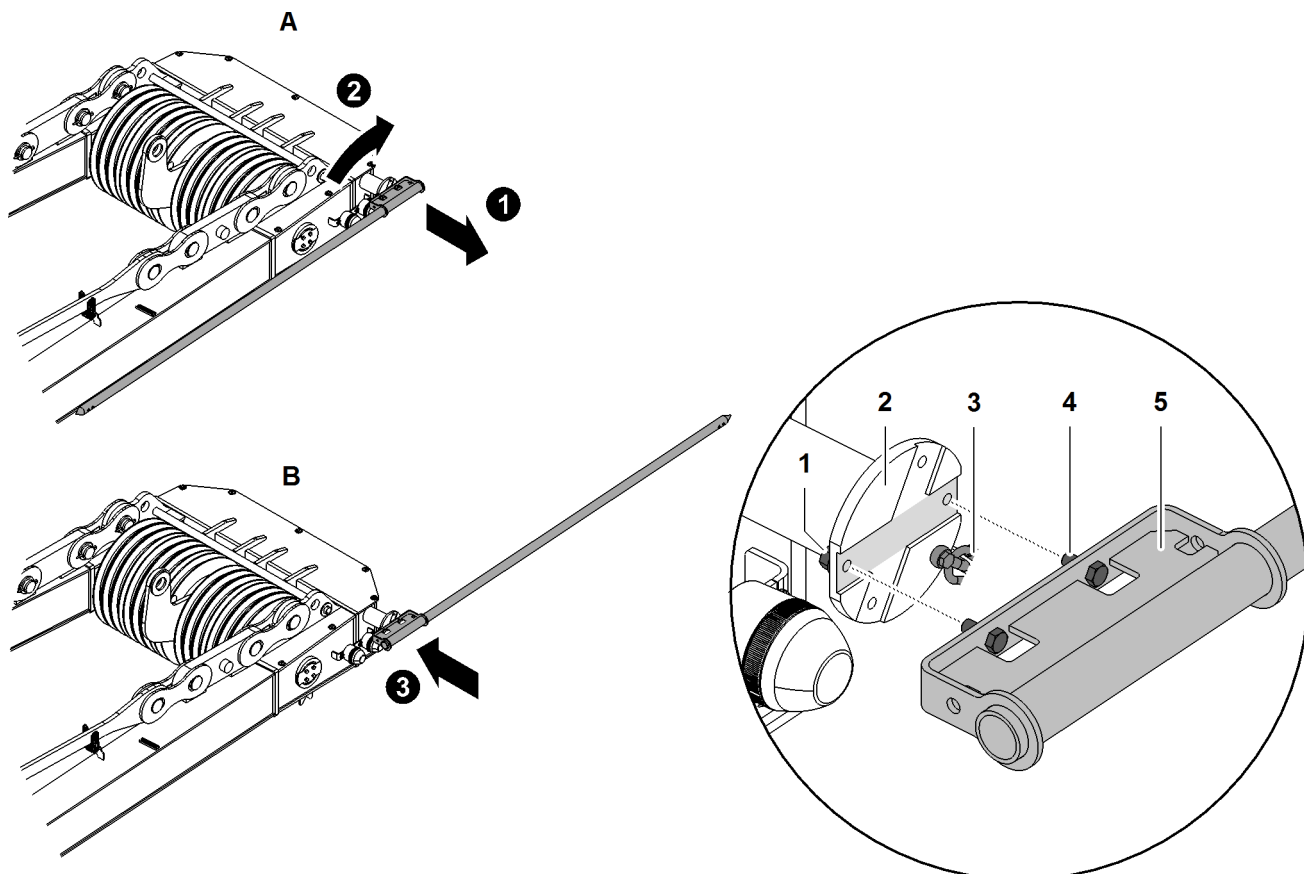


Fig. 3757: Moving the lightning rods* on A-frame2 and A-frame3 into working position (illustration of principle)

- | | | | | | |
|----------|--------------------|----------|----------------|----------|---------------|
| A | Transport position | 2 | Mounting plate | 5 | Lightning rod |
| B | Working position | 3 | Safety rope | | |
| 1 | Nut (2x) | 4 | Screw (2x) | | |

- ▶ Undo safety rope **3**.

- ▶ Undo nuts **1**.
- ▶ Undo screws **4**.
- ▶ Move lightning rod **5** from transport position **A** to working position **B**.



Note

Liebherr recommends:

- ▶ Grease threads of the screws **4**.
-

- ▶ Attach lightning rod **5** with screws **4**.
 - ▶ Lock screws **4** with nuts **1**.
-

NOTICE

Safety rope not attached!
Dropping parts.

- ▶ Ensure that safety rope **3** is attached.
-

- ▶ Attach safety rope **3**.
-

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod **5** is installed.
 - ▶ Ensure that the screws of the tip are tightened.
-

- ▶ Ensure that the tip on the lightning rod **5** is installed.
 - ▶ Ensure that the screws of the tip are tightened.
-

Moving the lightning rods* on the fixed jib head into working position

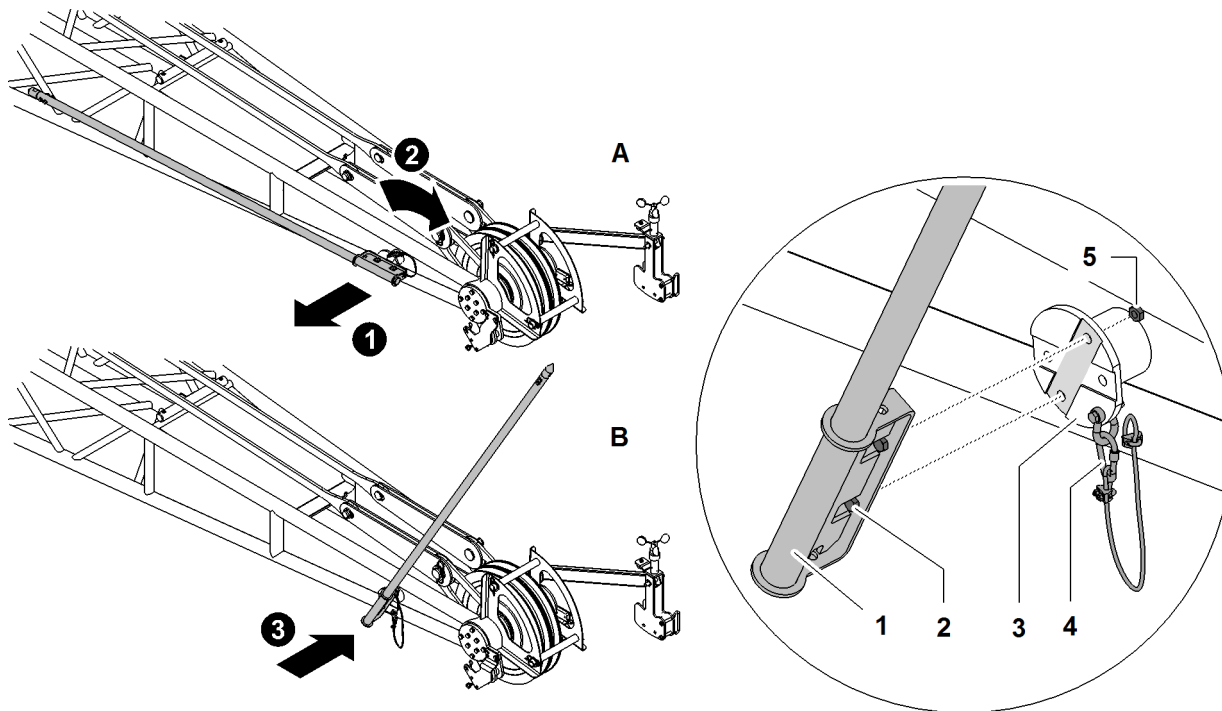


Fig. 3758: Moving the lightning rods* on the fixed jib head into working position (illustration of principle)

A	Transport position	2	Screw (2x)	5	Nut (2x)
B	Working position	3	Mounting plate		
1	Lightning rod	4	Safety rope		

- ▶ Undo safety rope 4.
- ▶ Undo nuts 5.
- ▶ Undo screws 2.
- ▶ Move lightning rod 1 from transport position A to working position B.



Note

Liebherr recommends:

- ▶ Grease threads of the screws 2.

- ▶ Attach lightning rod 1 with screws 2.
- ▶ Lock screws 2 with nuts 5.

NOTICE

Safety rope not attached!
Dropping parts.

- ▶ Ensure that safety rope 4 is attached.
- ▶ Attach safety rope 4.

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod 1 is installed.
- ▶ Ensure that the screws of the tip are tightened.

- ▶ Ensure that the tip on the lightning rod 1 is installed.
- ▶ Ensure that the screws of the tip are tightened.

Moving the lightning rods* on the luffing jib head into working position

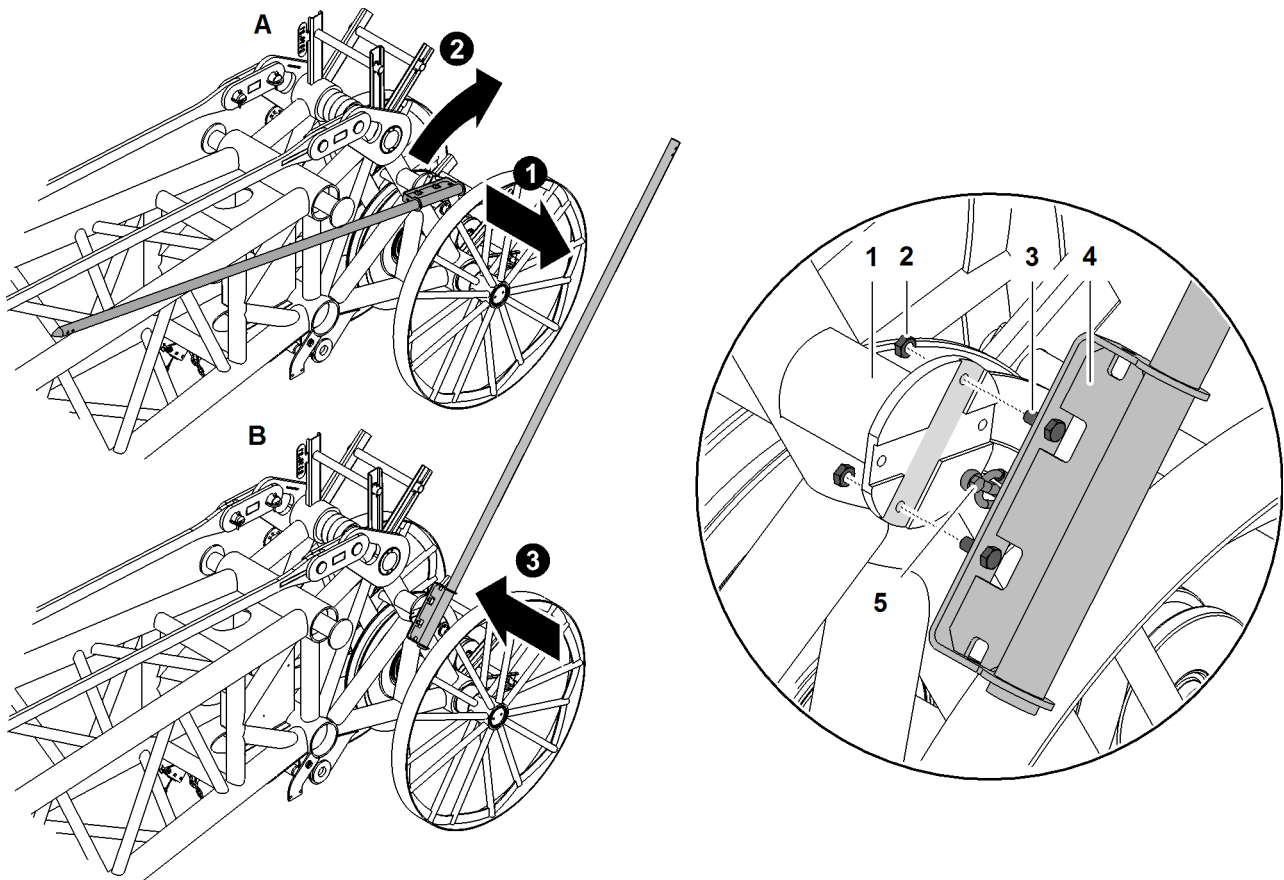


Fig. 3759: Moving the lightning rods* on the luffing jib head into working position (illustration of principle)

A Transport position
B Working position
1 Mounting plate

2 Nut (2x)
3 Screw (2x)
4 Lightning rod

5 Safety rope

- ▶ Undo safety rope 5.
- ▶ Undo nuts 2.
- ▶ Undo screws 3.
- ▶ Move lightning rod 4 from transport position **A** to working position **B**.

**Note**

Liebherr recommends:

- ▶ Grease threads of the screws **3**.

- ▶ Attach lightning rod **4** with screws **3**.

- ▶ Lock screws **3** with nuts **2**.

NOTICE

Safety rope not attached!
Dropping parts.

- ▶ Ensure that safety rope **5** is attached.

- ▶ Attach safety rope **5**.

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod **4** is installed.

- ▶ Ensure that the screws of the tip are tightened.

- ▶ Ensure that the tip on the lightning rod **4** is installed.

- ▶ Ensure that the screws of the tip are tightened.

Rigging the main boom on derrick rope rigging

The main boom is lifted and then bolted with the help of the derrick boom and derrick pulley block.

**Note**

If the jib has been attached using the self-assembly system:

- ▶ Assemble the fixed jib and attach it to the main boom before installing the main boom base section.

- ▶ Assemble the luffing jib prior to installing the main boom base section and install jib base section on main boom.

**Note**

Liebherr recommends:

- ▶ Even if an assist crane is available, assembly of the main boom with the derrick boom is preferable.

Ensure that the following conditions are fulfilled:

- Main boom is fully assembled and ready.
- Basic machine is standing aligned precisely in front of the main boom.
- Sling gear with a load-bearing capacity of at least 16 t (35,273 lb) is available.
- ▶ Unwind the derrick winch.
 - ▷ Derrick pulley block is lowered.



DANGER

Wrong rigging points when rigging main boom!
Derrick boom tips backwards when it is mounted.

- ▶ Rig the main boom as illustrated to belt pipes of the main boom sections.
- ▶ Only lift main boom sections on both sides at the rigging points.

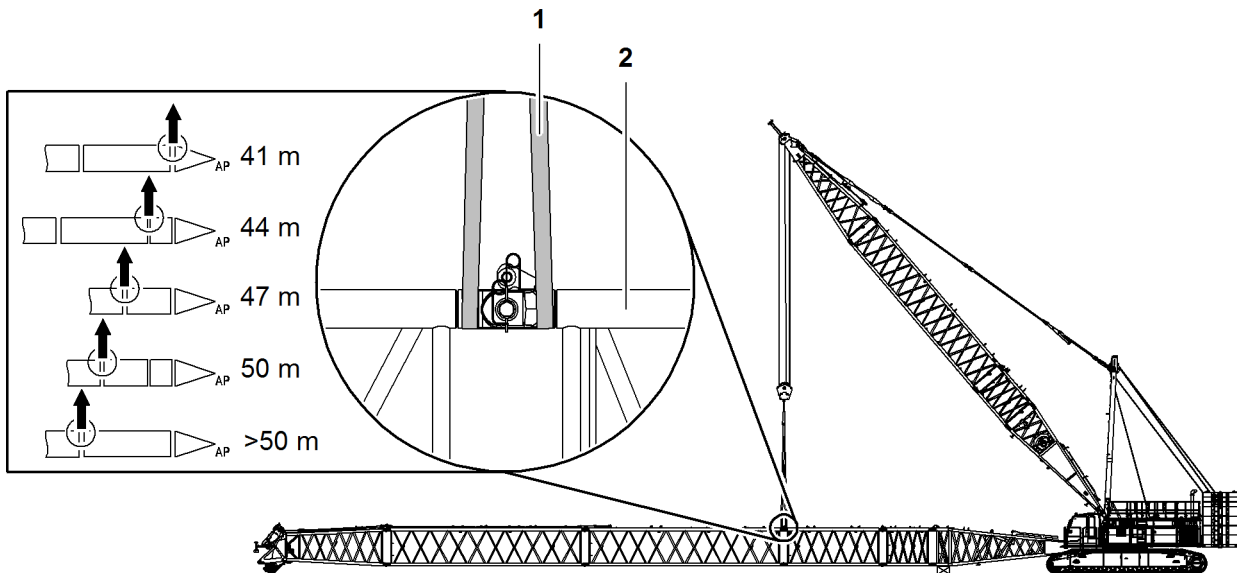


Fig. 3760: Rigging the main boom on derrick rope rigging

- 1 Sling gear
- 2 Top belt pipe of the main boom section

- ▶ Place sling gear 1 on both sides around top belt pipe 2 of main boom section.

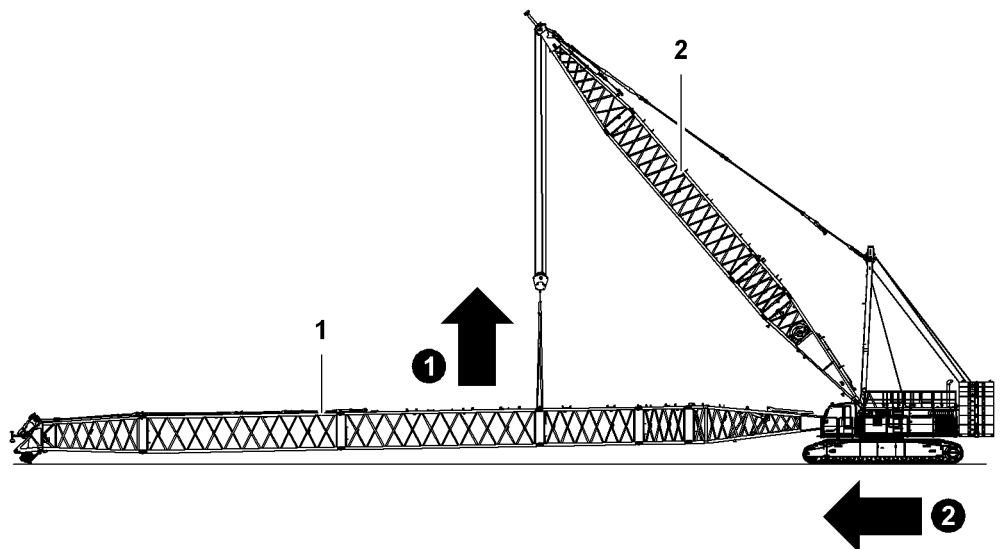


Fig. 3761: Lift main boom with derrick rope rigging

- 1 Main boom
- 2 Derrick boom

- ▶ Wind up the derrick winch.
 - ▷ Main boom 1 lifts.
- ▶ Move machine forward until main boom 1 is located in front of the uppercarriage pivot points.

Attaching the boom base section to the uppercarriage



WARNING

Machine swings with a suspended load!
Crush, fatal injury.

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.

Ensure that the following conditions are fulfilled:

- Cylinder adjustment functions are switched on.
- ▶ Open the front right uppercarriage door.
- ▶ Plug in the cable remote control on the uppercarriage.

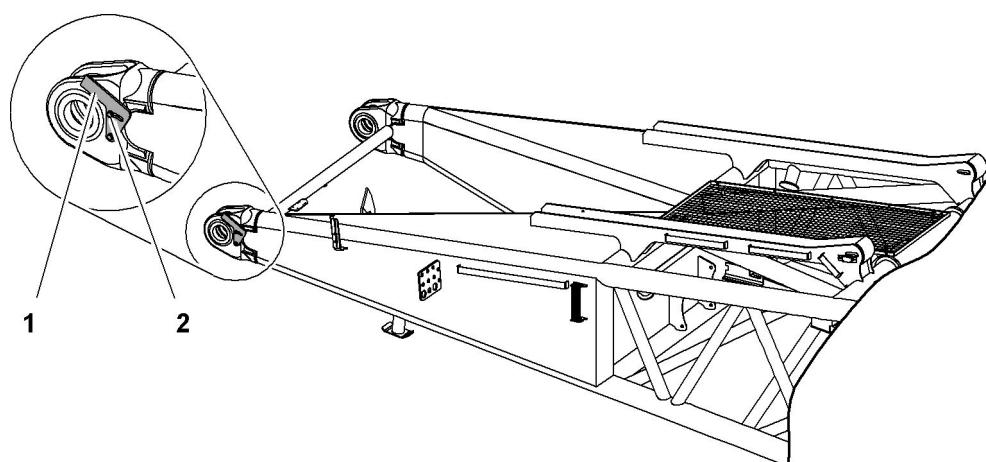


Fig. 3762: Fold up locking elements

1 Locking element (2x) 2 Screw (2x)

- ▶ Undo screws 2.
- ▶ Fold up locking elements 1.

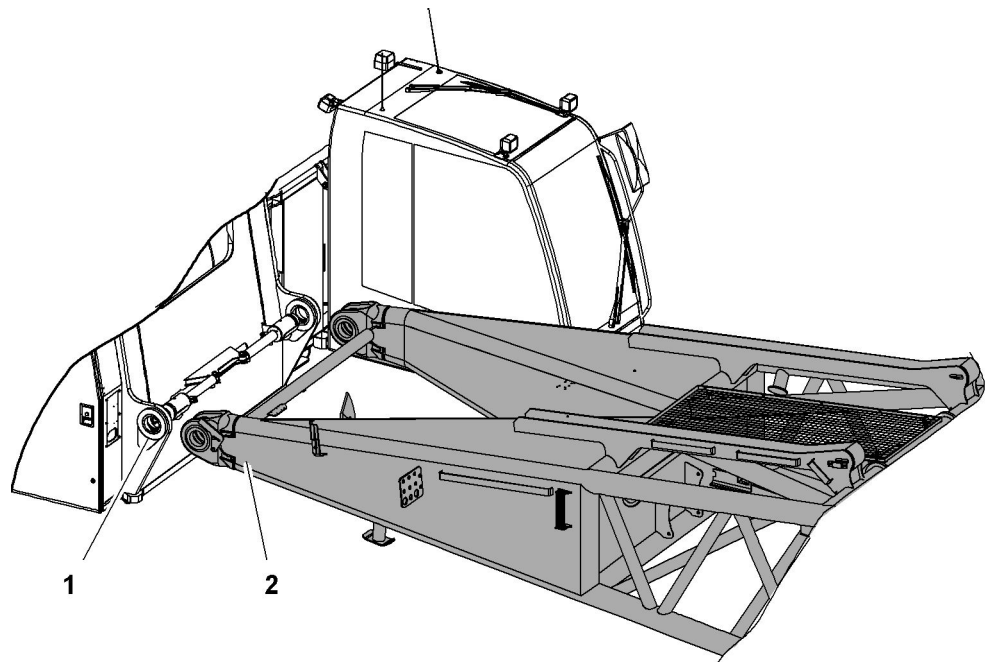


Fig. 3763: Positioning the main boom

1 Pivot point (2x)

2 Main boom

NOTICE

Main boom 2 swings!
Damage to cab.

► Ensure that an assistant guides the main boom 2 during installation.

► Align main boom 2 with pivot points 1 of uppercarriage.

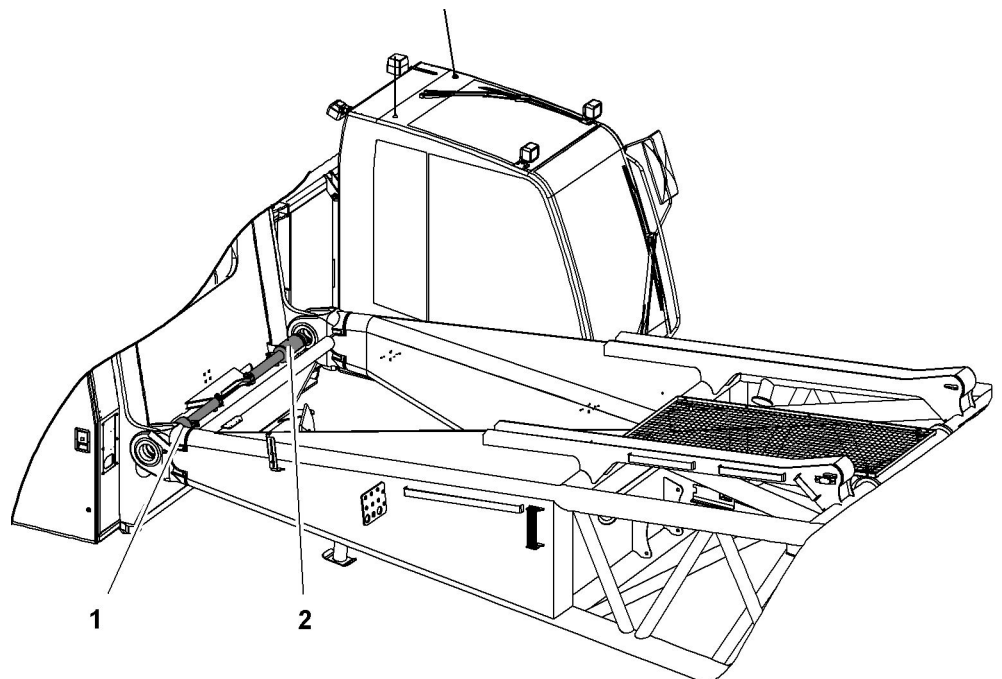


Fig. 3764: Extending the pin connection cylinder

1 Right-hand pin connection cylinder

2 Left-hand pin connection cylinder



CAUTION

Moving parts!
Crushing.

- ▶ Keep all limbs well clear of moving parts.

NOTICE

Incorrect procedure during bolting!
Pin connection cylinder and pin connection points may be damaged.

- ▶ Only extend pin connection cylinder when pin connection points of main boom and uppercarriage are aligned.

If pin connection points of main boom are aligned with the pin connection points of the uppercarriage:

- ▶ Extend left pin connection cylinder **2** with cable remote control.
- ▶ Extend right pin connection cylinder **1** with cable remote control.

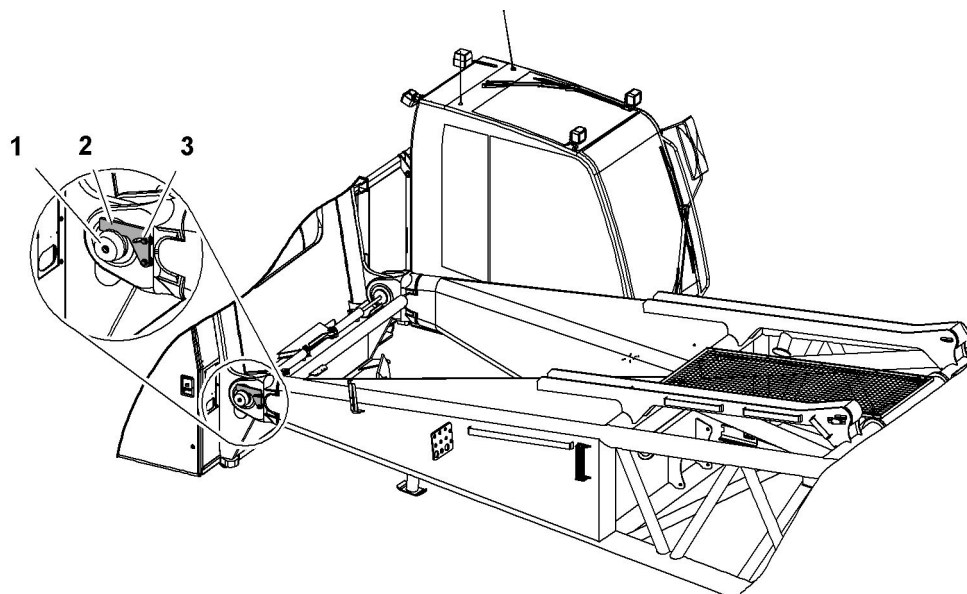


Fig. 3765: Secure pins with locking elements

- | | |
|--|----------------------------|
| <p>1 Pin (2x)
2 Locking element (2x)</p> | <p>3 Screw (2x)</p> |
|--|----------------------------|

- ▶ Fold locking element **2** into pin **1** notch.
- ▶ Securing the locking elements **2**: tighten screws **3**.
- ▶ Detach sling gear.
- ▶ Remove sling gear from derrick rope rigging and stow away.
- ▶ Remove cable remote control on basic machine and stow it away.
- ▶ Close the front right uppercarriage door.

Connecting hydraulic lines to the uppercarriage

Ensure that the following conditions are fulfilled:

- Hand lever for the multi-coupling is available.
- Diesel engine is switched off.

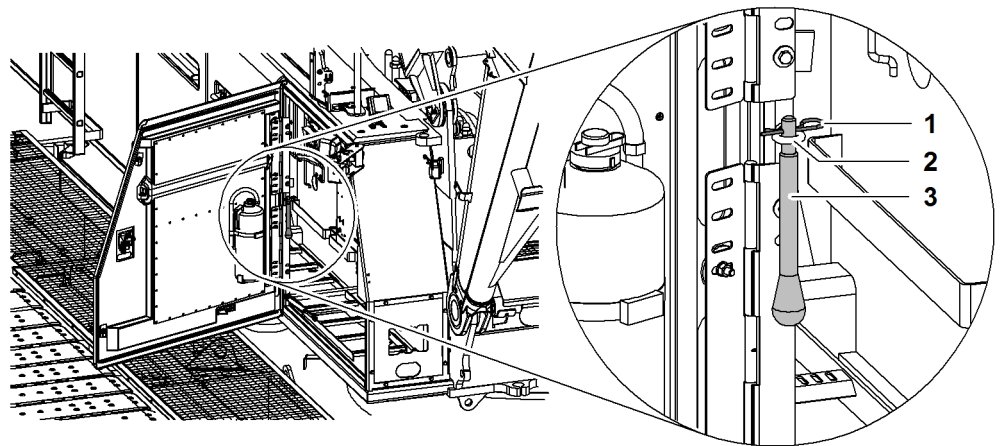


Fig. 3766: Transport mount for hand lever of multi-coupling

- | | | | |
|---|----------------|---|------------|
| 1 | Locking spring | 3 | Hand lever |
| 2 | Ring | | |

- ▶ Lift hand lever 3 and remove locking spring 1.
- ▶ Remove hand lever 3 downwards from ring 2.

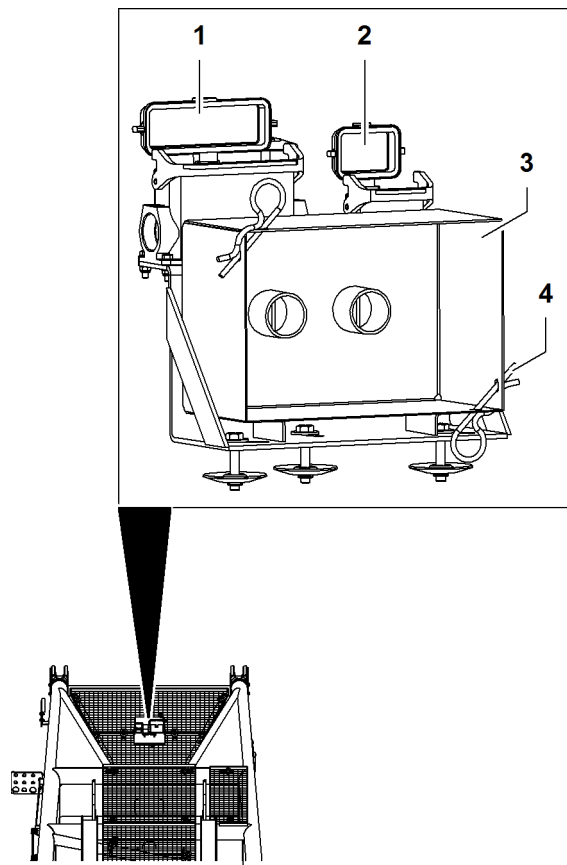


Fig. 3767: Transport position of the hydraulic pipes and electric cables on the main boom base section

- | | | | |
|---|---|---|-------------------------|
| 1 | Dummy socket for electrical system main boom base section | 3 | Cover of multi-coupling |
| 2 | Dummy receptacle for electronics rope reeving winch | 4 | Spring cotter pin |

A bracket for the cover **3** of the multi-coupling and dummy sockets for the electrical system are located on the catwalk of the main boom base section.

- ▶ Fit the hand lever of the multi-coupling.
- ▶ Remove spring cotter pin **4** on cover **3**.
- ▶ Turn hand lever in the direction of the arrow.
 - ▷ Multi-coupling can be taken out of bracket.
 - ▷ Cover **3** remains in bracket on main boom base section.

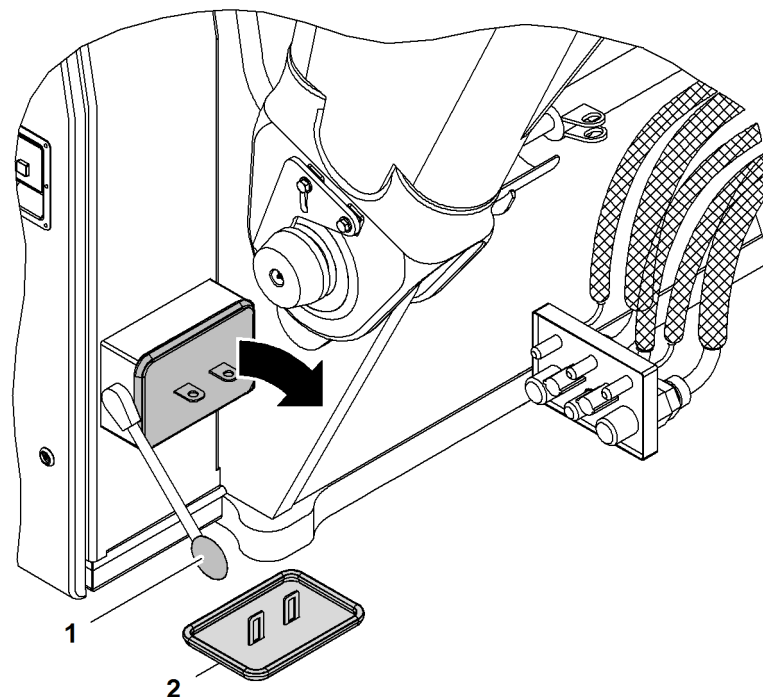


Fig. 3768: Removing the cover of the multi-couplings

- | | | | |
|----------|------------|----------|----------------|
| 1 | Hand lever | 3 | Cover |
| 2 | Cover | 4 | Locking spring |

- ▶ Fit the hand lever **1** of the multi-coupling.
- ▶ Remove the locking spring **4** on the cover **3**.
- ▶ Turn hand lever **1** in the direction of the arrow.
 - ▷ Cover **2** is loose.
- ▶ Mount cover **3** on bracket of the main boom base section and secure with locking spring.
- ▶ Remove cover **2**.

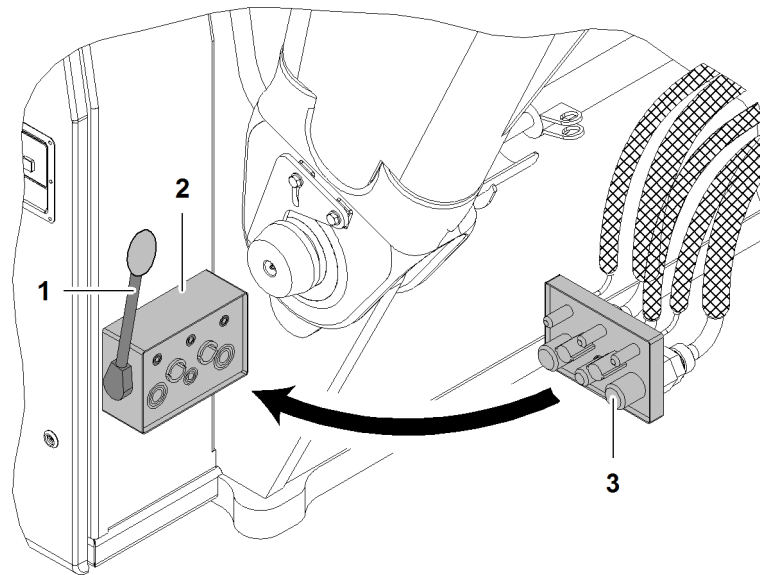


Fig. 3769: Connecting hydraulic lines to the uppercarriage

- | | |
|---|--|
| <p>1 Hand lever</p> <p>2 Multi-coupling (uppercarriage)</p> | <p>3 Multi-coupling (main boom base section)</p> |
|---|--|

NOTICE

Dirty multi-couplings!
Damage to the hydraulic system.

► Clean the multi-couplings before fitting them together.

- Connect the multi-couplings 2 + 3.
- Move hand lever 1 until latch engages.
 - ▷ The multi-couplings are visibly and audibly pulled together.
 - ▷ The multi-coupling indicating pins stick out:

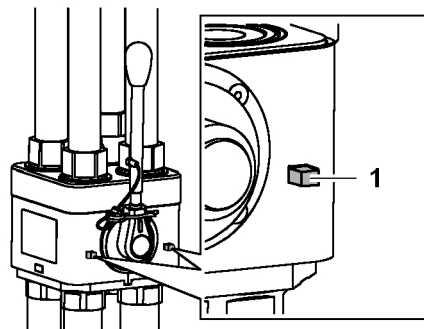


Fig. 3770: Locked multi-coupling

- | | |
|------------------------------|--|
| <p>1 Indicating pin (2x)</p> | <p>► Disassemble the hand lever 1 on the multi-coupling.</p> |
|------------------------------|--|

Connecting electric cables to the uppercarriage

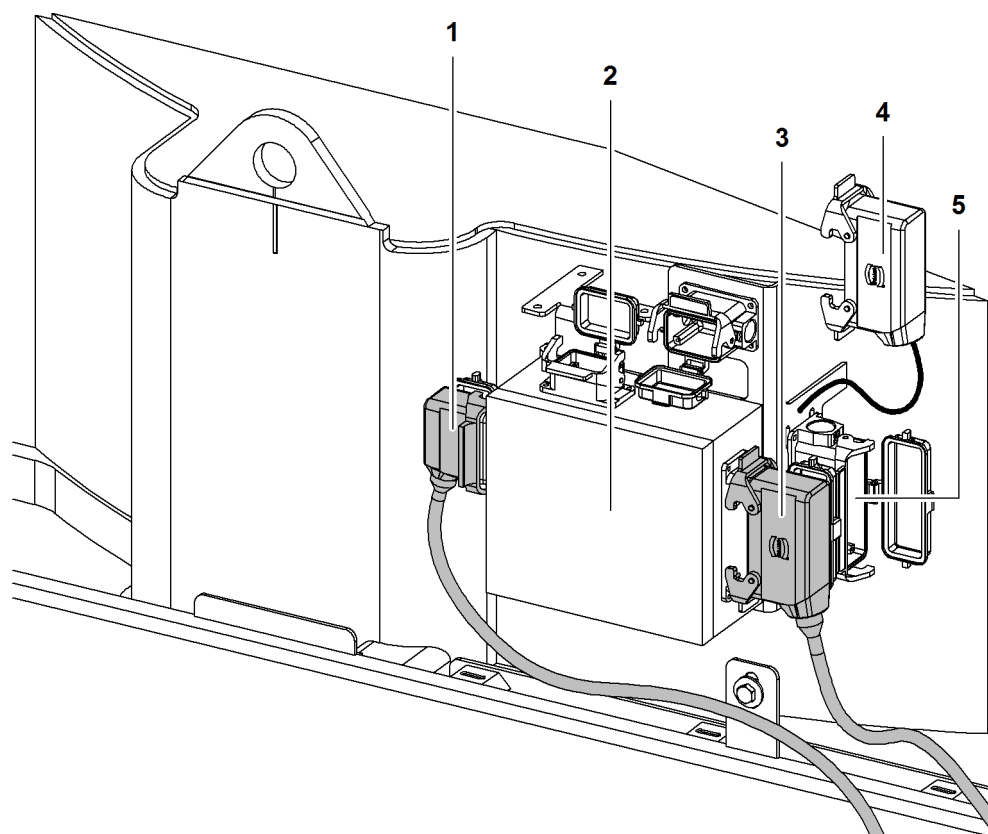


Fig. 3771: Connecting electric cables to the uppercarriage

- | | | | |
|---|--|---|------------------|
| 1 | Electric cables of the jib luffing winch and/or rope reeving winch | 4 | Bypass plug |
| 2 | Electric box | 5 | Dummy receptacle |
| 3 | Electric cables of the main boom base section | | |

- ▶ Open right front uppercarriage door.
- ▶ Plug the bypass plug **4** in the dummy receptacle **5** and secure it with the retaining clips.
- ▶ Guide the electric cables **3** of the main boom base section through the cable duct on uppercarriage.
- ▶ Plug electric line **3** into electric box **2** and lock with brackets.
- ▶ Guide the electric cables **1** of the jib luffing winch through the cable duct on uppercarriage.
- ▶ Plug electric line **1** into electric box **2** and lock with brackets.
- ▶ Close right front uppercarriage door.

Bolt the derrick pulley block with main boom pendant straps

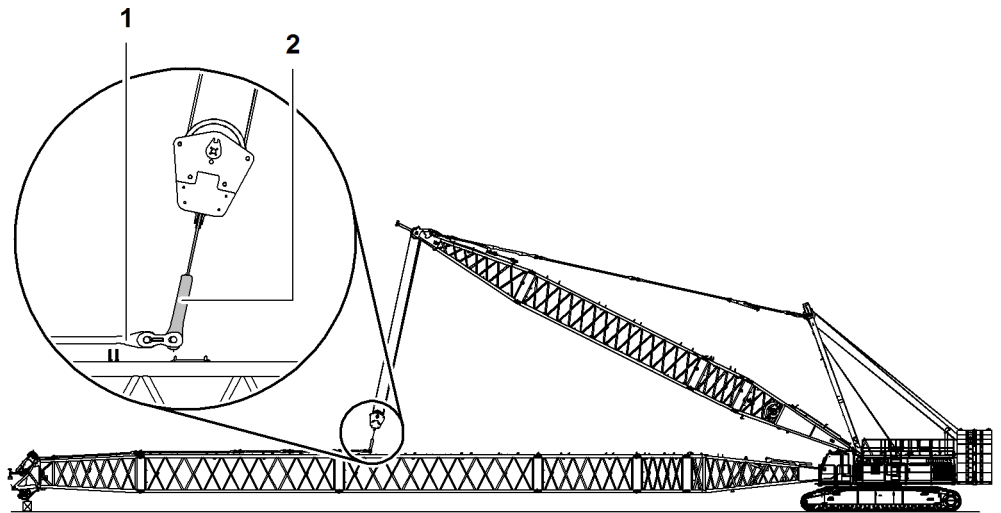


Fig. 3772: Pin derrick rope rigging with main boom pendant straps

1 Main boom pendant straps 2 Derrick rope rigging

- ▶ Unwind the boom winch.
 - ▷ Derrick boom head is lowered.
- ▶ Unwind the derrick winch.
 - ▷ Derrick rope rigging 2 lowers.
- ▶ Pin derrick rope rigging 2 with main boom pendant straps 1.
- ▶ Secure pins with washers and locking spring.

Attaching the auxiliary jib (36 t (79300 lb)) to the boom head section

Make sure that the camera support (if available) on the main boom head section is detached.

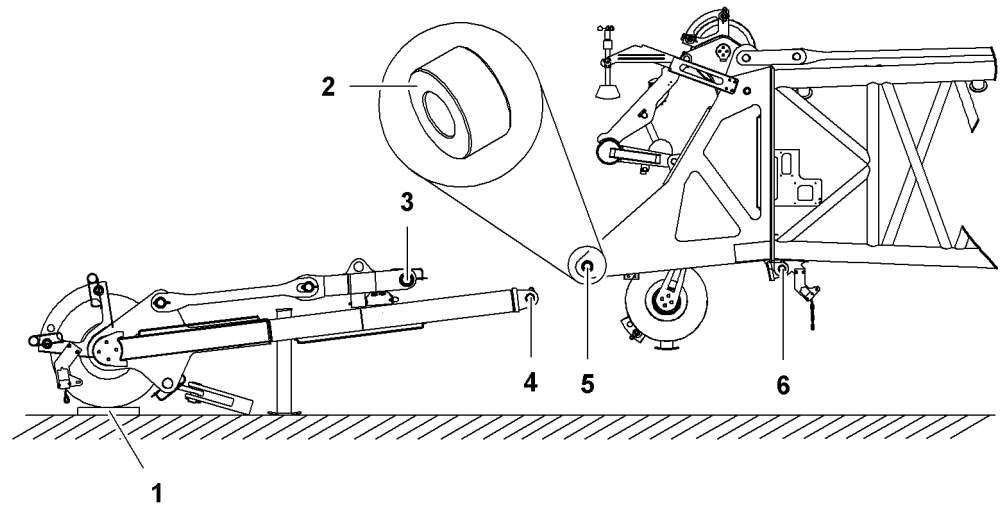


Fig. 3773: Positioning the auxiliary jib (36 t (79300 lb)) in front of the boom head section and inserting bushes

- | | | | |
|---|---|---|--|
| 1 | Wooden block | 4 | Lower pin connection point auxiliary jib (2x) |
| 2 | Bush (dia.80 mm (3.15" in) x Ø40 mm (1.57" in) x 43 mm (1.69" in)) (2x) | 5 | Upper pin connection point main boom head (2x) |
| 3 | Upper pin connection point auxiliary jib (2x) | 6 | Lower pin connection point main boom head (2x) |

- ▶ Position the auxiliary jib in front of the boom head section.
- ▶ Protecting the pulley: Lay a wooden block 1 under the auxiliary jib pulley.
- ▶ Insert bushes (Ø80 mm (3.15" in) x Ø40 mm (1.57" in) x 43 mm (1.69" in)) into the upper pin connection points 5 of the main boom head.
- ▶ Lift the main boom and move it towards the auxiliary jib until the upper pin connection points 3 on the auxiliary jib match the upper connection points of the 5 main boom head.

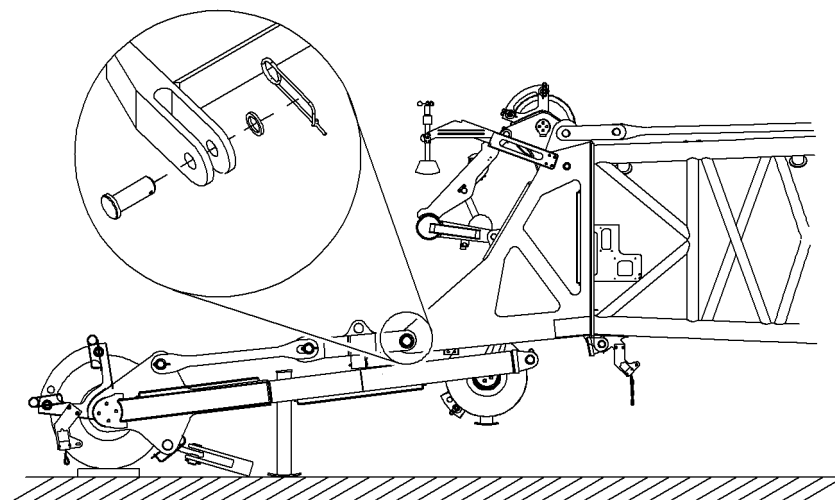


Fig. 3774: Pinning the upper pin connection points

- ▶ Pin the upper pin connection points and secure with washer and safety pin.

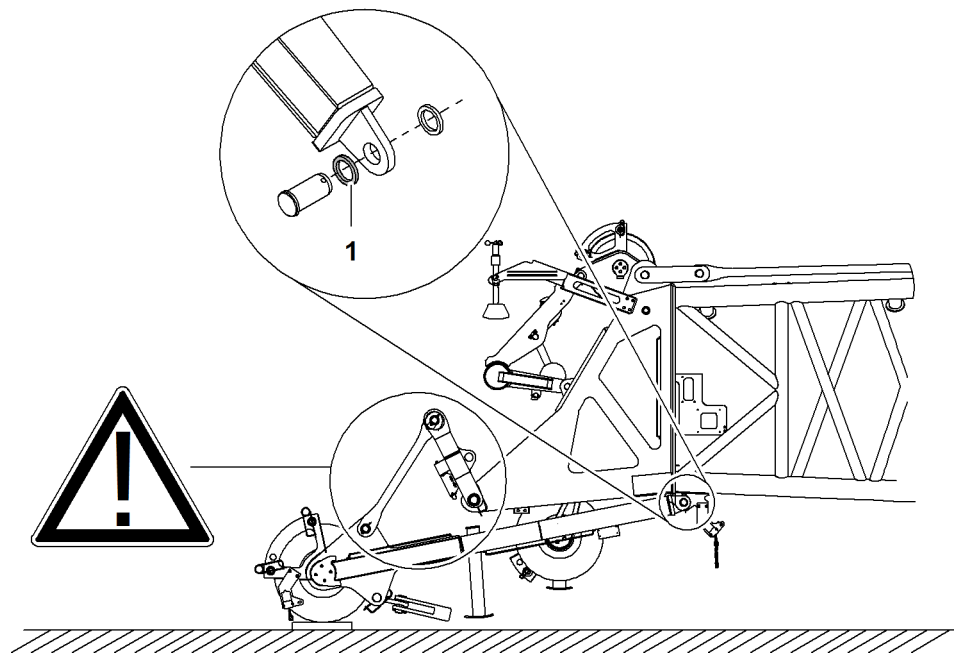


Fig. 3775: Pinning the lower pin connection points

1 Washer 8 mm (0.31" in) (2x)

The washer 8 mm (0.31" in) **1** serves to center the auxiliary jib on the main boom head.

NOTICE

Auxiliary jib pendant straps are positioned incorrectly!
Damage to auxiliary jib and pulleys on the boom head section.

- ▶ Ensure that auxiliary jib pendant straps fold up.
-

- ▶ Move the main boom towards the auxiliary jib until the bottom pin connection points **4** on the auxiliary jib match the bottom connection points of the **6** main boom head.

Assembly of main boom with derrick equipment*

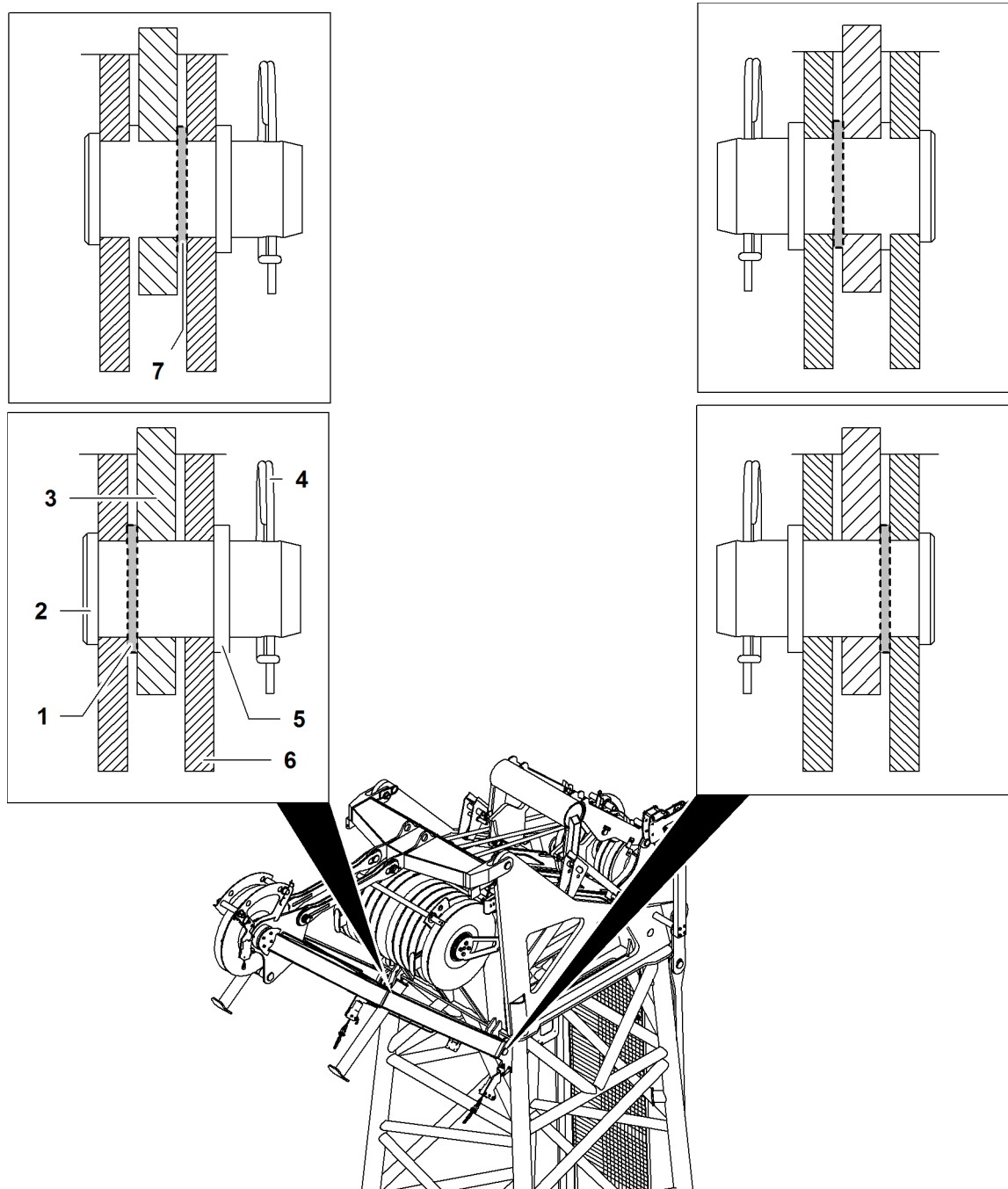


Fig. 3776: Installation notes auxiliary jib

- | | | |
|--|--|--|
| <p>1 Washer 8 mm (0.31" in) (installation site outside) (2x)</p> <p>2 Pin (2x)</p> <p>3 Pin connection lug auxiliary jib (2x)</p> | <p>4 Safety pin (2x)</p> <p>5 Washer (2x)</p> <p>6 Pin connection lug main boom head (4x)</p> | <p>7 Washer 8 mm (0.31" in) (installation site inside) (2x)</p> |
|--|--|--|

The washers 8 mm (0.31" in) must be installed both-sided on the outside (installation site outside **1**) or both-sided on the inside (installation site inside **7**).

- ▶ Push pin **2** and washer 8 mm (0.31" in) **1** through the pin connection lug **3** and the pin connection lug **6**.
- ▶ Place washer **5** on pin **2** and secure with safety pin **4**.
 - ▷ Lower pin connection points pinned and secured.

Installing the hoist limit switch on auxiliary jib (36 t (79.300 lb))

Installation of the hoist limit switch on the auxiliary jib (36 t (79.300 lb)) is identical with the installation on the main boom or jib (For more information see: [Installing the hoist limit switch weight, page 1517](#)).

Connect the hoist limit switch

The electric cable to the hoist limit switch is connected for transport to a dummy receptacle on the inside of one of the two auxiliary jib support tubes.

- ▶ Disconnect the bypass plug from the terminal box on the boom head section.
- ▶ Disconnect the electric cable for the hoist limit switch from the dummy receptacle and connect it to the terminal box on the boom head section.
- ▶ Secure the electric cable to the hoist limit switch with retaining clips.
- ▶ Plug the bypass plug into the dummy receptacle and secure it with the retaining clips.

Folding down the link plates for the 11th pulley

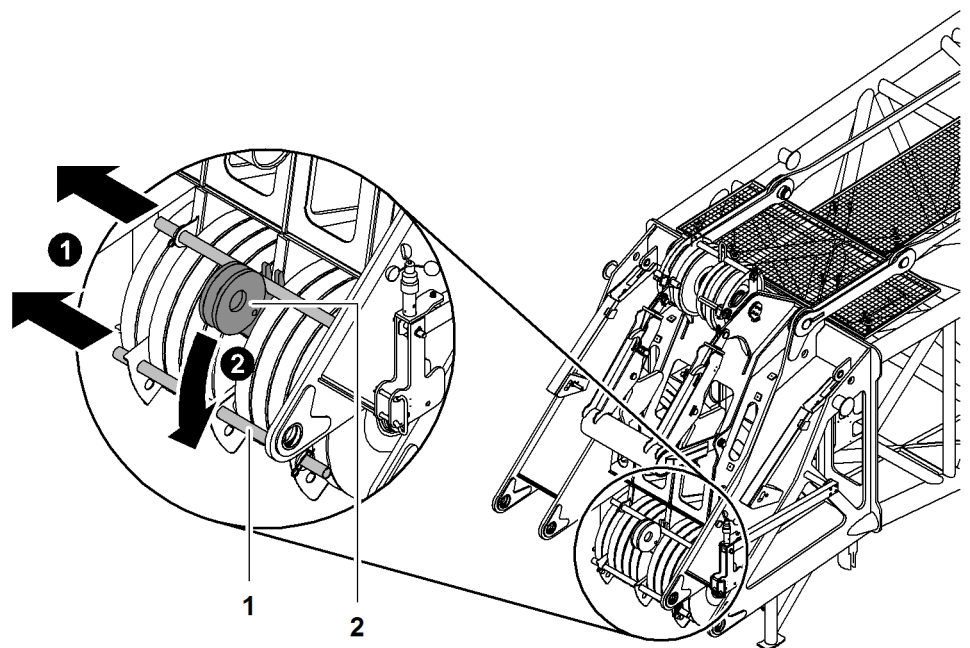


Fig. 3777: Folding down the link plates for the 11th pulley

1 Rope protection pipe (2x)

2 Link plate (2x) for 11th pulley

NOTICE

Wrong position of link plates 2 for 11th pulley on main boom head!
Risk of damage to winch2 rope.

- ▶ Fold down link plates 2 for 11th pulley.

- ▶ Remove rope protection pipes 1 on main boom head.

- ▶ Fold down link plates 2 for 11th pulley.

Installing second pulley to 3-fold reeve the auxiliary jib (36 t (79300 lb))

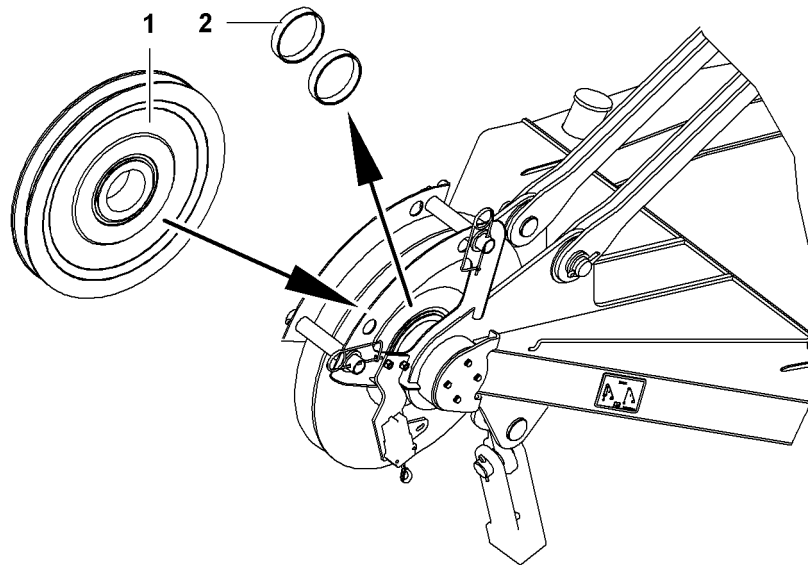


Fig. 3778: Installing second pulley to 3-fold reeve the auxiliary jib (36 t (79300 lb))

- | | |
|------------------------|--|
| 1 Second pulley | 2 Bushes (dia.168 mm (6.61" in) x
Ø140 mm (5.51" in) x
40 mm (1.57" in)) (2x) |
|------------------------|--|

- ▶ Remove bushes (dia.168 mm (6.61" in) x dia.140 mm (5.51" in) x 40 mm (1.57" in)) **2**
- ▶ Install second pulley

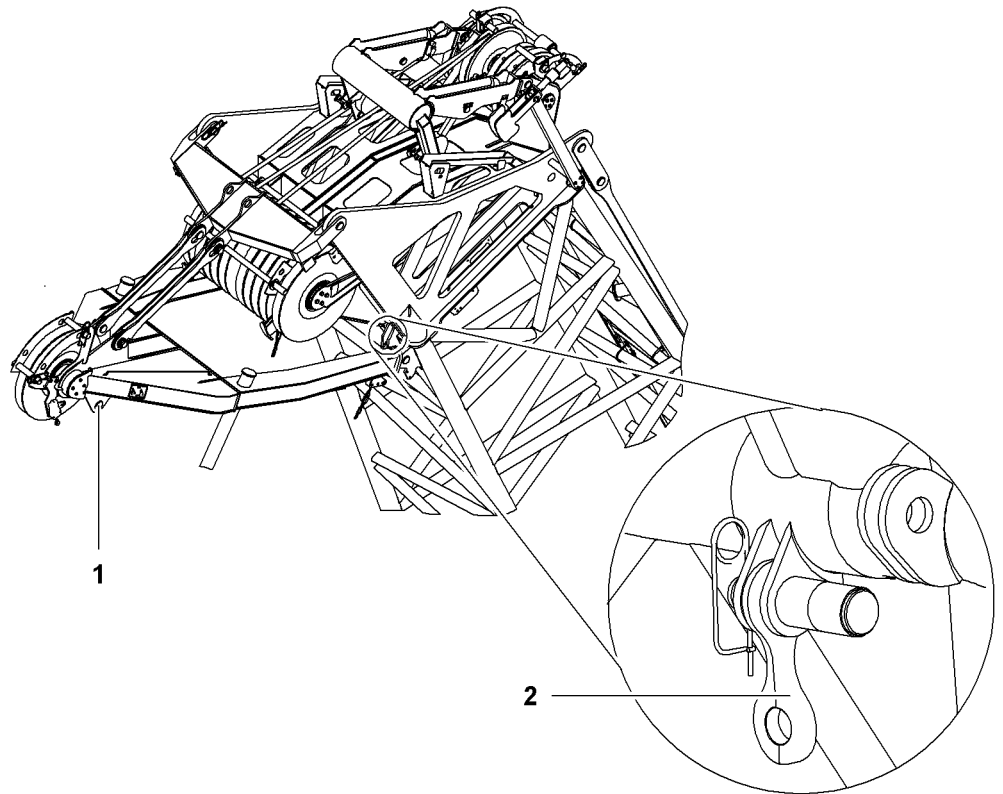


Fig. 3779: Pinning the cross strap to the boom head section

1 Auxiliary jib rope fixing point 2 Cross strap and pins

NOTICE

Cross strap and pins **2** are not positioned correctly at the rope fixing point on the auxiliary jib **1** with 3-fold reeving!
Risk of damage to winch2 rope.

- ▶ Pin the cross strap to the boom head section.
- ▶ Remove the cross strap and pins **2** from the rope fixing point of the auxiliary jib **1**.
- ▶ Pin the cross strap **2** to the boom head section.

Reeving the rope

The rope must be reeved as specified in the rope reeving diagram according to the boom and application requirements.



WARNING

Unsecured walking on the boom!
Risk of falling off the boom.

- ▶ A fall arrest system must be worn when working on the boom to prevent falling.

Ensure that the following conditions are satisfied:

- Cylinder adjustment functions are on.

Reeving the rope using a rope reeving winch

Dismantling rope protection pipes

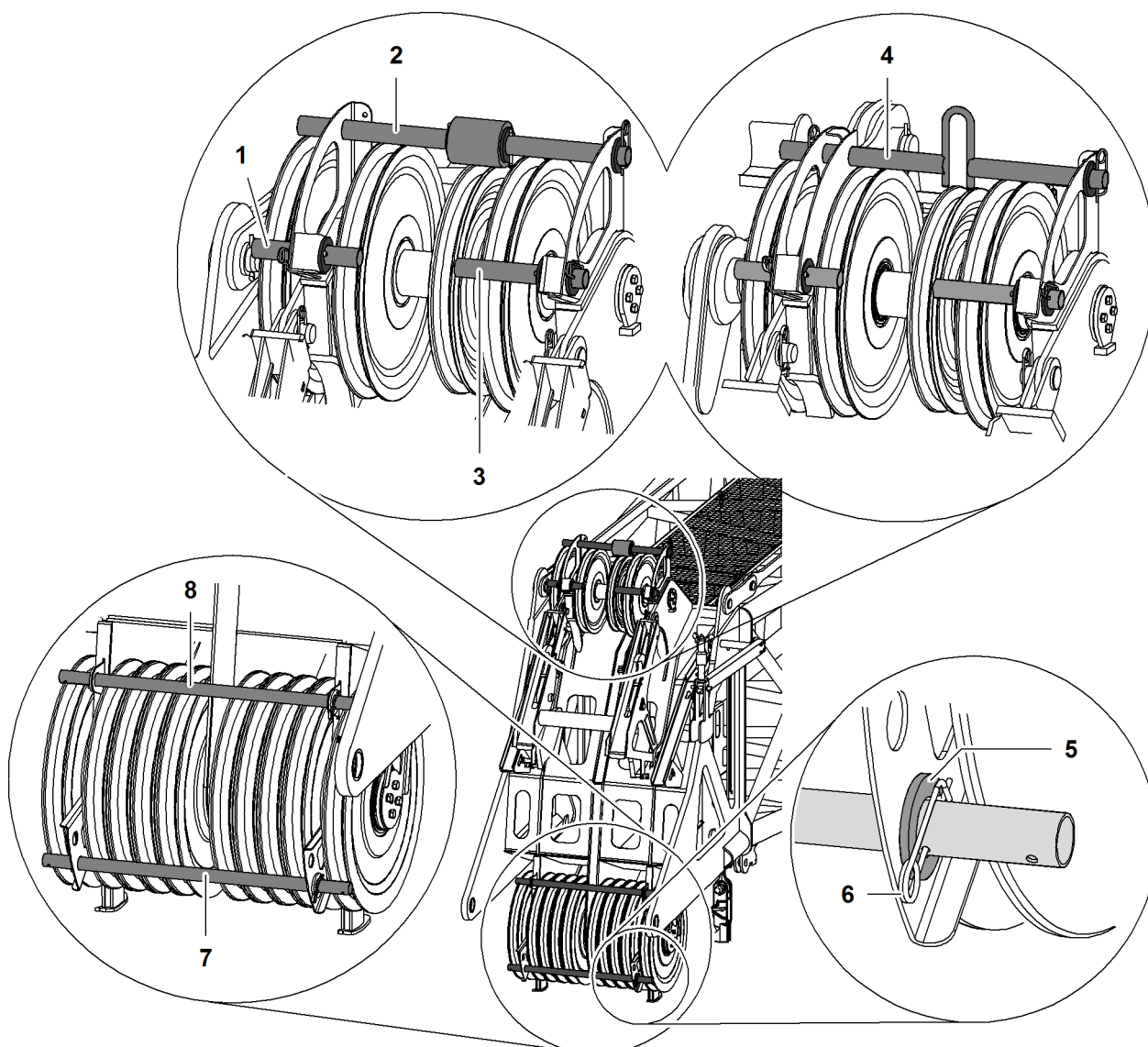
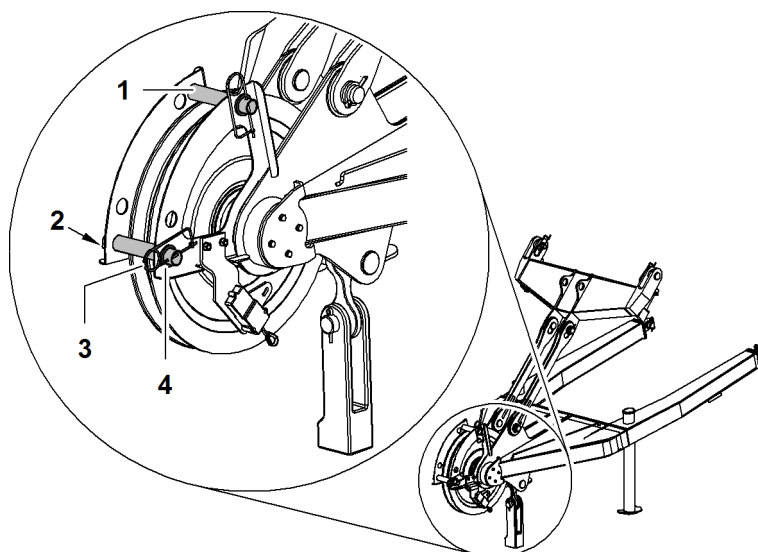


Fig. 3780: Rope protection pipes main boom head 1311, 2017, 2018, 2320, 2220, 2821

- | | | | | | |
|---|-------------------------------|---|-------------------------------|---|----------------------|
| 1 | Rope protection pipe | 4 | Rope protection pipe variant2 | 7 | Rope protection pipe |
| 2 | Rope protection pipe variant1 | 5 | Washer | 8 | Rope protection pipe |
| 3 | Rope protection pipe | 6 | Safety pin | | |

The rope protection pipes are secured with a cotter pin on one side and with a safety pin on the other side.

- ▶ Remove the safety pins **6** and the washers **5**.
- ▶ Remove the rope protection pipes **1 + 2 + 3 + 4 + 7 + 8**.

Removing the rope protection pipes on auxiliary jib*Fig. 3781: Removing the rope protection pipes on auxiliary jib*

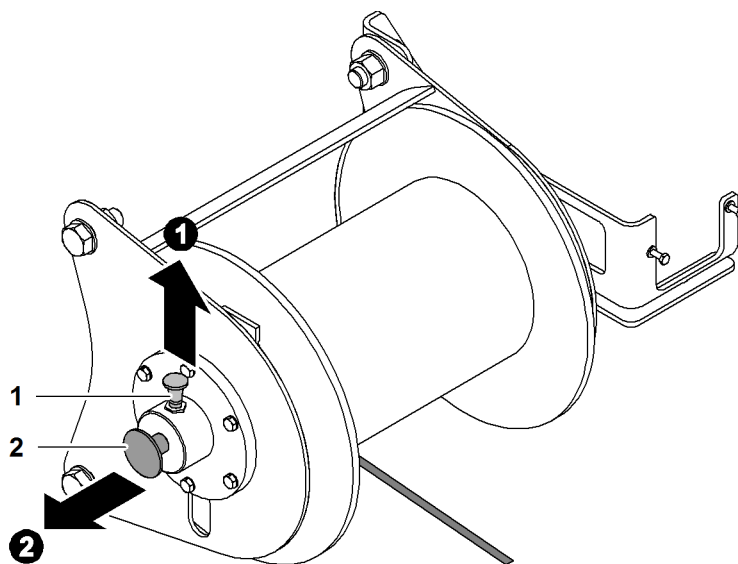
- | | | | |
|---|---------------------------|---|------------|
| 1 | Rope protection pipe (2x) | 3 | Safety pin |
| 2 | Cotter pin | 4 | Washer |

The rope protection pipes are secured with a cotter pin 2 on one side and with a safety pin 3 on the other side.

- ▶ Remove rope protection pipes 1 with attached auxiliary jib.

Reeving the rope

- ▶ Open up the rope guide (if present).

*Fig. 3782: Setting the rope lug to free-wheel*

- | | | | |
|---|------------------|---|-------|
| 1 | Securing element | 2 | Shaft |
|---|------------------|---|-------|



Note

Liebherr recommends:

- ▶ Making it easier to pull out the axle **2**: move the rope reeving winch manually back and forth.

- ▶ Pull up the locking element **1** and pull out the axle **2** at the same time.
 - ▷ Rope reeving winch is set to free-wheel.

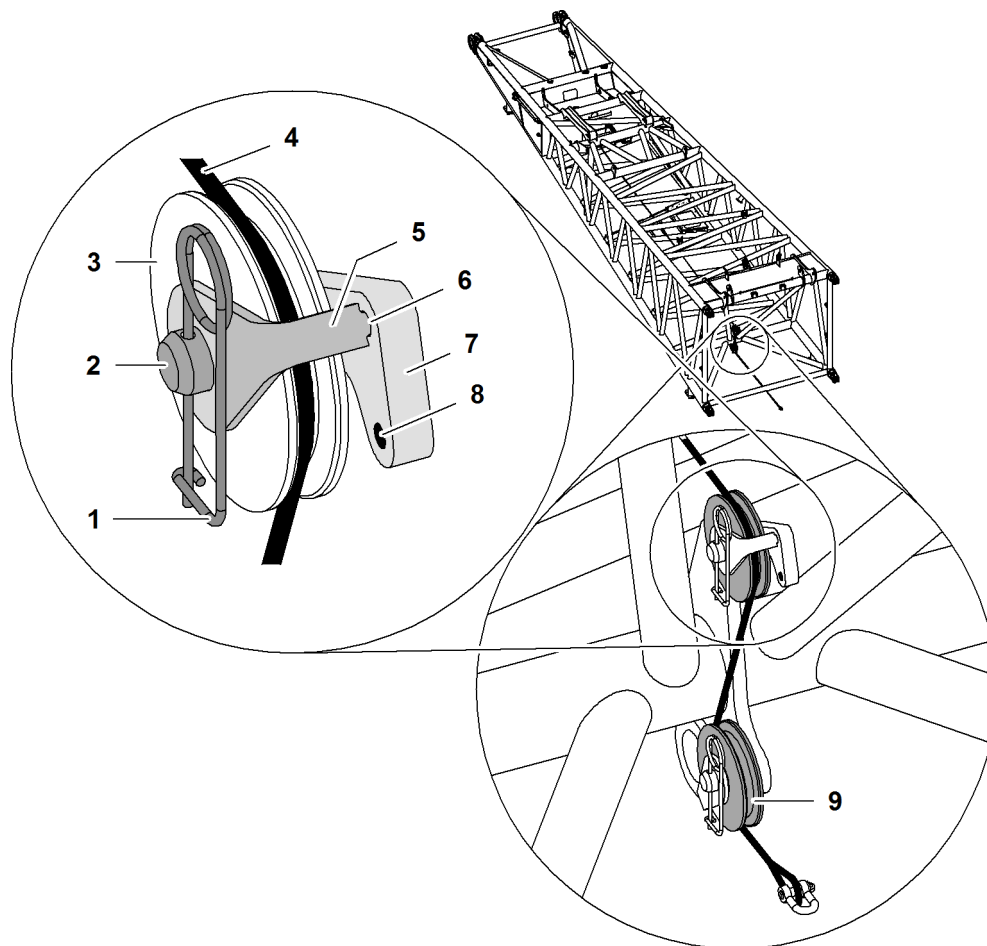


Fig. 3783: Reeving in the luffing rope of the rope reeving winch

- | | |
|---|--------------------------------|
| 1 Safety pin | 6 Recess |
| 2 Shaft | 7 Support with recesses |
| 3 Upper pulley | 8 Recess |
| 4 Rope of the rope reeving winch | 9 Lower pulley |
| 5 Locking element | |

Depending on the machine type, the mounting **7** may have one or two recesses.

- ▶ Remove safety pins **1**.
- ▶ Remove **5** securing element.
- ▶ Place rope of the rope reeving winch **4** across the top pulley **3**.

NOTICE

Wrongly mounted locking element!
Rope of the rope reeving winch jumps out of pulley.

- ▶ Make sure that the locking element **5** is mounted in recess **6**.

- ▶ Attach locking element **5** to axle **2** and guide in recess **6**.
- ▶ Attach the safety pin **1**.
- ▶ Repeat procedure on bottom pulley **9**.
 - ▷ Rope of the rope reeving winch is guided through pulleys.
- ▶ Pull the luffing rope under the boom to the boom head.
- ▶ Reeve in the rope of the rope reeving winch according to reeving plan.
- ▶ Pull the luffing rope next to the boom towards the basic machine.
- ▶ Lift luffing rope onto boom.
- ▶ Connect luffing rope with rope of winch1/winch2.

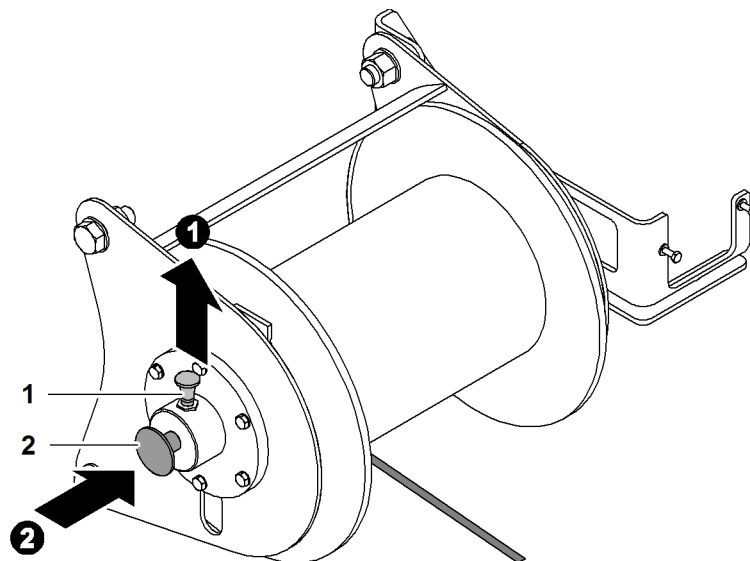


Fig. 3784: Stopping the free-wheel of the rope reeving winch

1 Locking element **2** Shaft



Note

Liebherr recommends:

- ▶ Making it easier to press in the axle **2**: move the rope reeving winch manually back and forth.

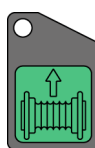
- ▶ Pull up the locking element **1** and press in the axle **2** at the same time.
 - ▷ Free-wheel of the luffing rope is deactivated.



WARNING

Never stand in the immediate vicinity of the rope reeving winch or the luffing rope!

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.



- ▶ Press and hold the *Rope reeving winch* button on control panel *X11*.
 - ▷ Rope reeving winch reeves in the rope of the rope reeving winch and tensions the rope of winch1/winch2.

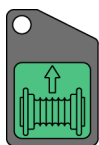


If rope of winch1/winch2 is in the 8th rope layer (only with free-fall winch 130 kN (29,230 lb,)):

- ▶ Press the *Bypass limit switch* button on control panel X23.
 - ▷ The 3-rope windings limit switch is bypassed.

There must be no slacking of the rope when unwinding.

- ▶ Unwind the rope of winch1/winch2 up to the rope fixing point.
- ▶ Press the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch switched off.
- ▶ Remove rope of the rope reeving winch from the rope of winch1/winch2.
- ▶ Press and hold the *Rope reeving winch* button on control panel X11.
 - ▷ Luffing rope is being reeved.



- ▶ Press the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch switched off.
- ▶ Close and secure the rope guide (if present).

Mounting rope protection pipes on main boom head

- ▶ Mount and secure rope protection pipes.

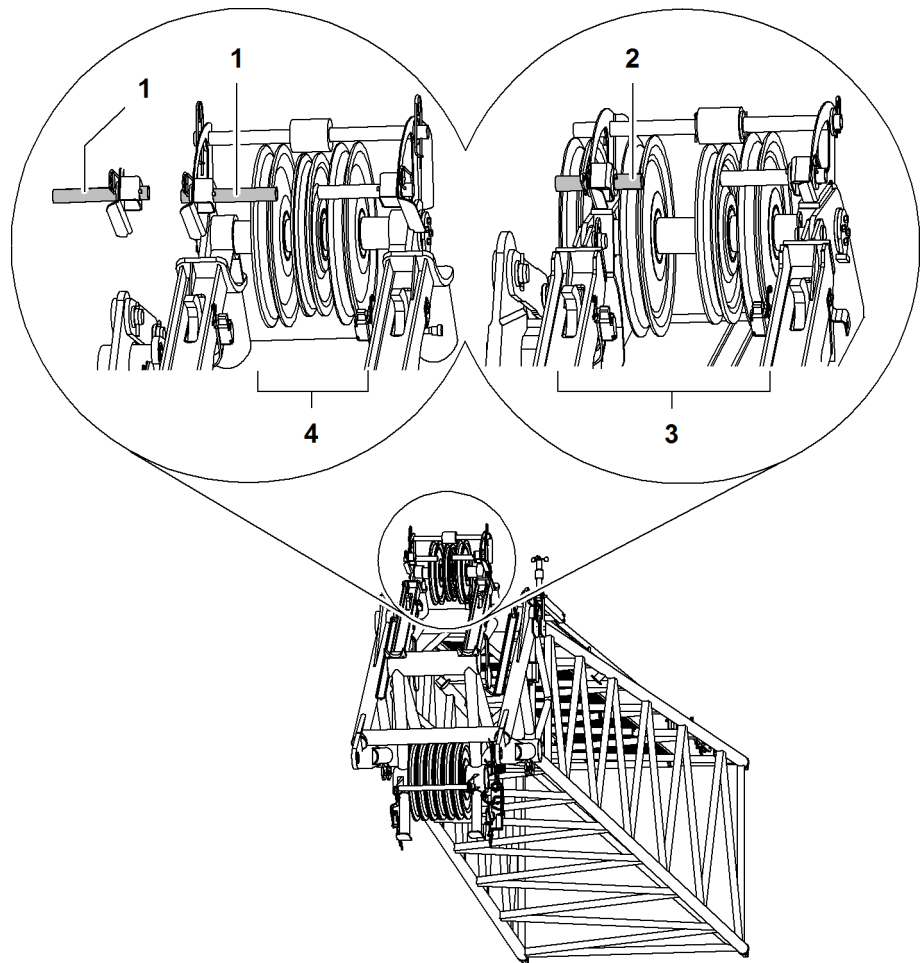


Fig. 3788: Rope protection pipe main boom head section with mounted fixed jib

- | | | | |
|---|----------------------|---|--|
| 1 | Rope protection pipe | 3 | Main boom head with four gantry pulleys |
| 2 | Rope protection pipe | 4 | Main boom head with three gantry pulleys |

NOTICE

Inadmissible rope protection pipe with mounted fixed jib!
Rope scrapes on rope protection pipe.
Damage to rope.

- ▶ Remove rope protection pipe 1 + 2.

If a fixed jib is being mounted:

- ▶ Remove rope protection pipe 2 on main boom head.
- or

Rotate rope protection pipe 1 by 180° and mount facing outwards.

Fitting the rope protection pipes to the auxiliary jib

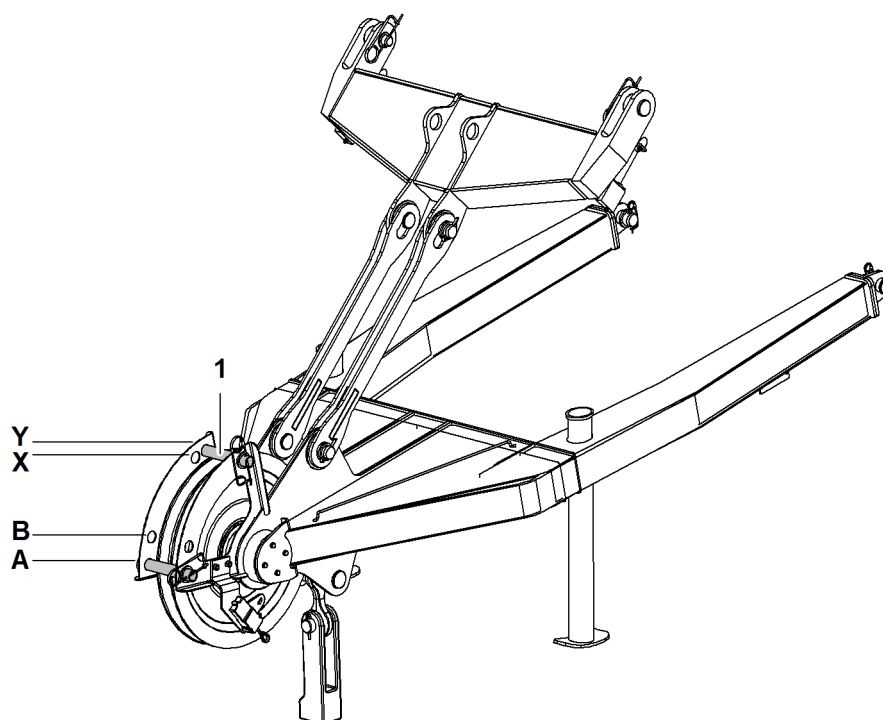


Fig. 3789: Fitting the rope protection pipes to the auxiliary jib

- | | | | |
|----------|--|----------|--|
| 1 | Rope protection pipe (2x) | X | Assembly position X for rope protection pipe |
| A | Assembly position A for rope protection pipe | Y | Assembly position Y for rope protection pipe |
| B | Assembly position B for rope protection pipe | | |

Assembly positions of the rope protection pipes on the auxiliary jib depending on the main boom angle:

Machine type	Main boom angle		
	15° to 30°	20° to 30°	30° to 86°
LR 1001	B + X	-	A + Y
LR 1002	B + X	-	A + Y
LR 1003	B + X	-	A + Y
LR 1004	-	B + X	A + X
LR 1006	-	B + X	A + X

Tab. 539: Assembly positions for rope protection pipes on the auxiliary jib (36 t (79.300 lb)) for main boom head

- ▶ Mount rope protection pipes on auxiliary jib according to chart.

Reeving the rope without using a rope reeving winch

- ▶ Remove the rope protection pipes on the boom and the pulley block.
- ▶ Open up the rope guide (if present).

- ▶ Connect auxiliary rope with the rope of winch1/winch2.
- ▶ Pull the auxiliary rope next to the boom as far as the boom head.
- ▶ Hoist the auxiliary rope onto the boom.
- ▶ Reeve the auxiliary rope according to the rope reeving system.



If rope of winch1/winch2 is in the 8th rope layer (only with free-fall winch 130 kN (29,230 lb_f)):

- ▶ Press the *Bypass limit switch* button on control panel X23.
 - ▷ The 3-rope windings limit switch is bypassed.

There must be no slacking of the rope when unwinding.

- ▶ Unwind the rope of winch1/winch2 up to the rope fixing point.
- ▶ Remove auxiliary rope from the rope of winch1/winch2.
- ▶ Close and secure the rope guide (if present).
- ▶ Mount and secure rope protection pipes.

Installing the rope fixing point



DANGER

Wrong installation of pins and pocket lock!
Load breakaway.

- ▶ Install pins and pocket lock according to specifications.

The collar of the pins and the pocket lock openings are decisive for the installation direction of the rope fixing point.

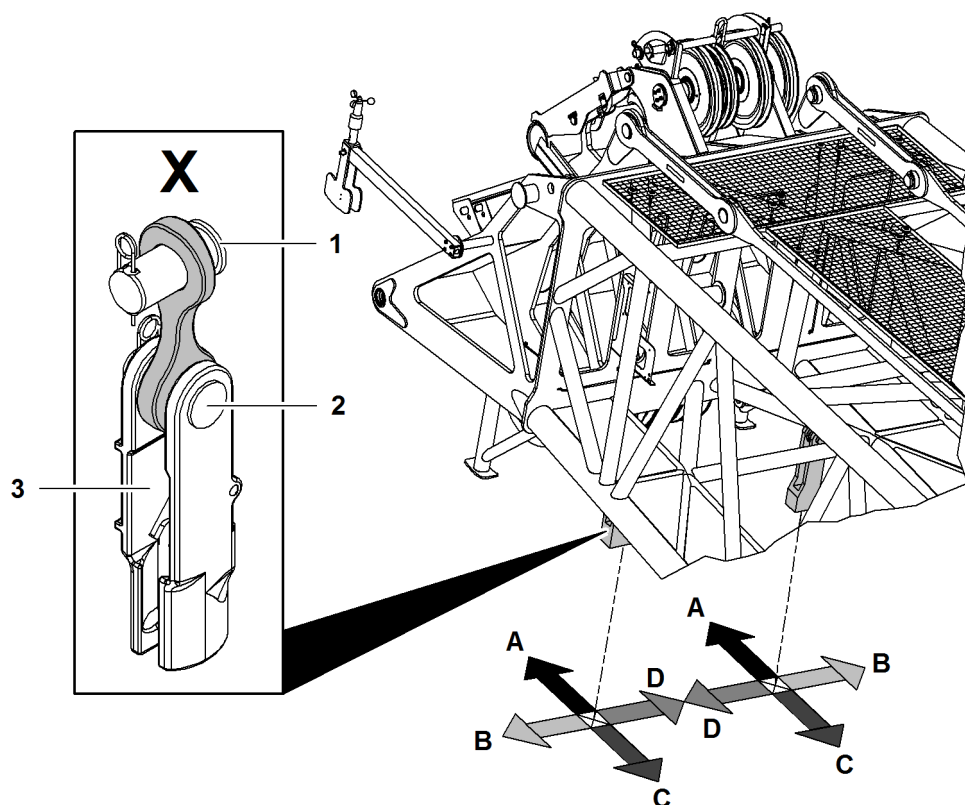


Fig. 3791: Determining the installation direction of the components of the rope fixing point of relevance for installation - main boom head (illustration of principle)

- | | | | |
|----------|--|----------|--------------------------|
| X | Components of relevance for installation | A | Direction main boom head |
| 1 | Pin collar on boom | B | Outside |
| 2 | Pin collar on pocket lock | C | Direction basic machine |
| 3 | Pocket lock opening | D | Inside |

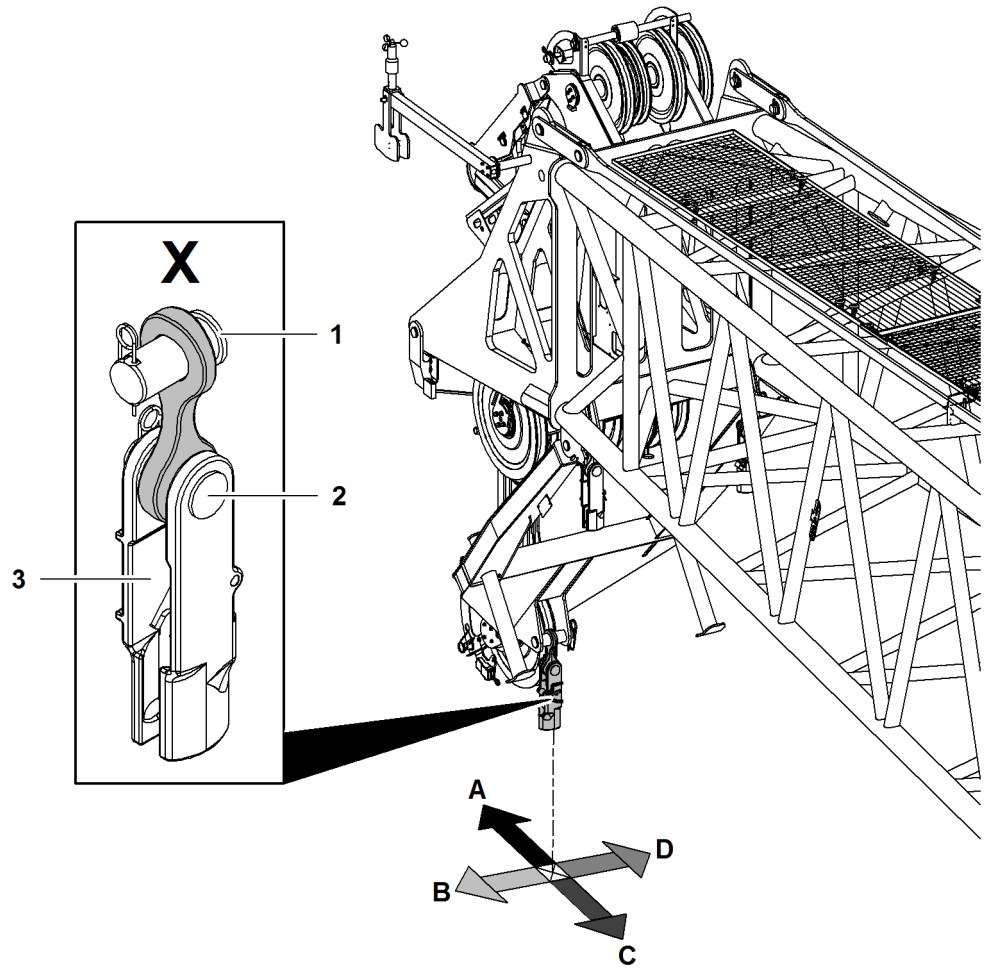


Fig. 3792: Determining the installation direction of the components of the rope fixing point of relevance for installation - auxiliary jib (illustration of principle)

- | | | | |
|----------|--|----------|--------------------------|
| X | Components of relevance for installation | A | Direction main boom head |
| 1 | Pin collar on boom | B | Outside |
| 2 | Pin collar on pocket lock | C | Direction basic machine |
| 3 | Pocket lock opening | D | Inside |

Installation direction of the rope fixing point components of relevance for installation			
	Pin collar on boom	Pin collar on pocket lock	Pocket lock opening
All rope fixing points	D	C	B
Exceptions:			
Fixed jib head section 0906	B	C	B
Fixed jib head section 1507	B	C	B

Tab. 540: Installation direction of the rope fixing point components of relevance for installation

**WARNING**

Inadmissible installation of swivels!
Severe injuries, damage to machine.

- ▶ Install rope with no twists.
- ▶ Install rope without swivels.

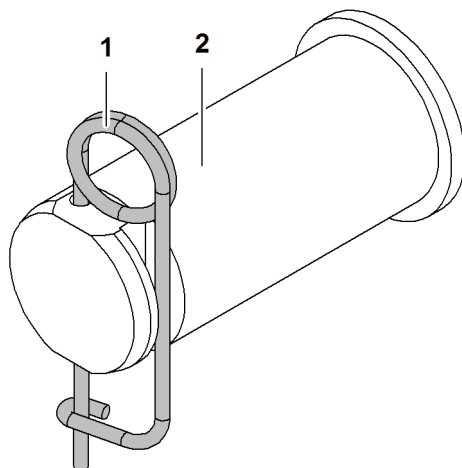


Fig. 3793: Securing the pins

1 Locking spring

2 Pin

**DANGER**

Pins 2 not completely secured!
Load breakaway.

- ▶ Ensure that locking spring 1 completely secures the pin 2.

Installing the rope fixing point on the boom head

- ▶ Pin cross strap with boom head.
- ▶ Secure pin with locking spring.
- ▶ Pin pocket lock with cross strap.
- ▶ Secure pin with locking spring.

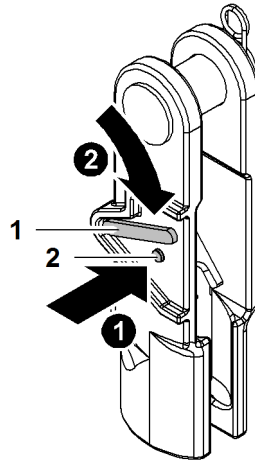


Fig. 3794: Unlocking the pocket lock

- 1 Safety latch
2 Locking button
- ▶ Press the locking button 2.
 - ▶ Press safety latch 1 down and hold.

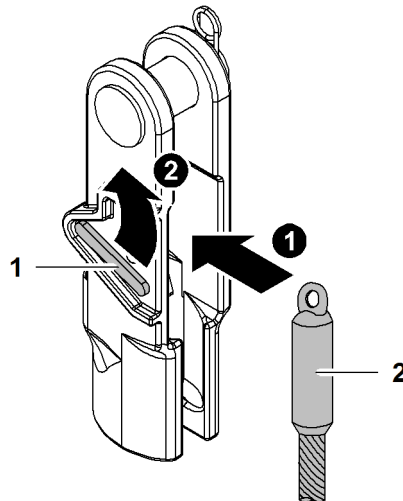


Fig. 3795: Inserting the end of rope into pocket lock and locking the pocket lock

- 1 Safety latch
2 End of rope
- ▶ Insert end of rope 2 in pocket lock.



DANGER

End of rope 2 not properly secured!
Load breakaway.

- ▶ Ensure that the safety latch 1 engages.
- ▶ Let go of safety latch 1.
 - ▷ Safety latch 1 engages.

Installing the rope fixing point on the hook or pulley block

- ▶ Pin pocket lock with hook or pulley block.
- ▶ Secure pin with locking spring.

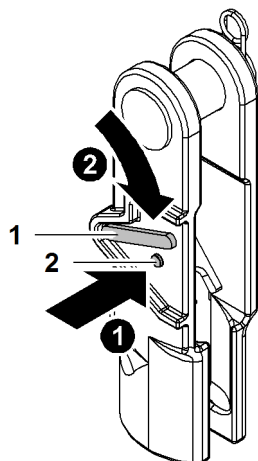


Fig. 3796: Unlocking the pocket lock

- | | |
|---|-------------------------|
| <p>1 Safety latch</p> <p>▶ Press the locking button 2.</p> <p>▶ Press safety latch 1 down and hold.</p> | <p>2 Locking button</p> |
|---|-------------------------|

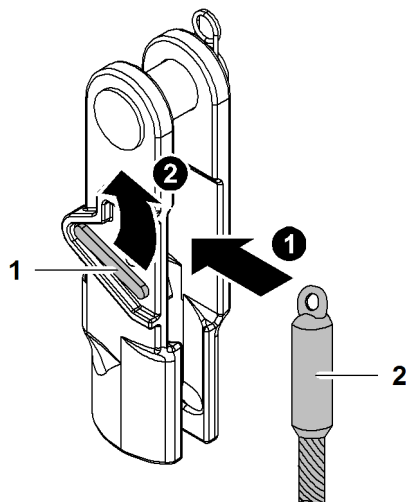


Fig. 3797: Inserting the end of rope into pocket lock and locking the pocket lock

- | | |
|---|----------------------|
| <p>1 Safety latch</p> <p>▶ Insert end of rope 2 in pocket lock.</p> | <p>2 End of rope</p> |
|---|----------------------|



DANGER

End of rope 2 not properly secured!
Load breakaway.

- ▶ Ensure that the safety latch 1 engages.
-
- ▶ Let go of safety latch 1.
 - ▷ Safety latch 1 engages.

Installing the hoist limit switch

The following can be installed on the hoist limit switch:

- Hoist limit switch weight
- Hoist limit switch bracket*

Installing the hoist limit switch weight

NOTICE

Improper installation of the hoist limit switch weight!
Damage to rope and hoist limit switch weight.

- ▶ Install hoist limit switch weight without diagonal pull.
- ▶ Always install the hoist limit switch weight on the slack rope of winch1/winch2, except with single reeving.

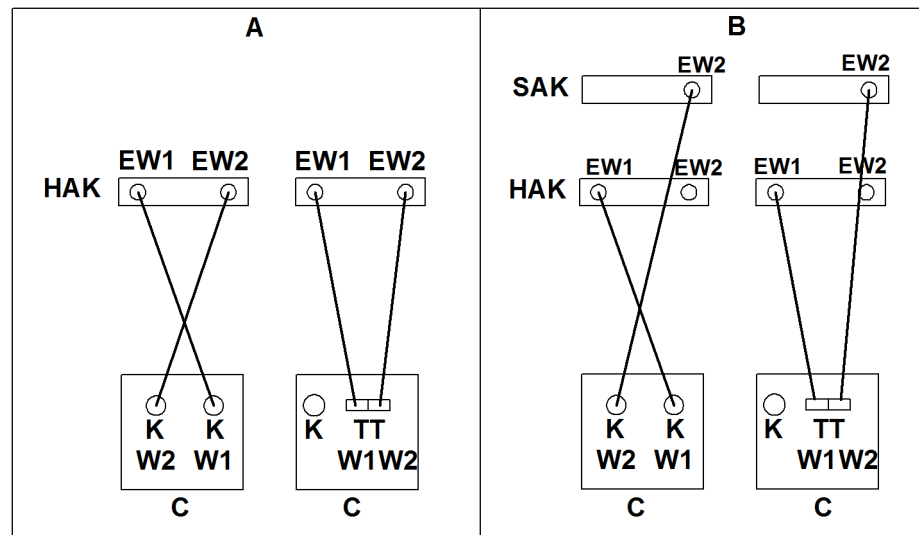


Fig. 3798: Hoist limit switch assignment depending on winch1/winch2

- | | |
|---|--|
| A Boom configuration main boom | K Multi-directional control lever |
| B Boom configuration main boom + auxiliary jib | SAK Auxiliary jib |
| C Cabin | TT Double T control lever |
| EW1 Hoist limit switch winch1 | W1 Winch1 |
| EW2 Hoist limit switch winch2 | W2 Winch2 |
| HAK Main boom head | |

NOTICE

Wrong hoist limit switch!
Hoist limit switch does not turn off.

- ▶ Ensure that the correct hoist limit switch for the correct rope of winch1/winch2 is used.

The hoist limit switch with chain and hoist limit switch weight attached is secured to the inoperative end of the hoist rope.

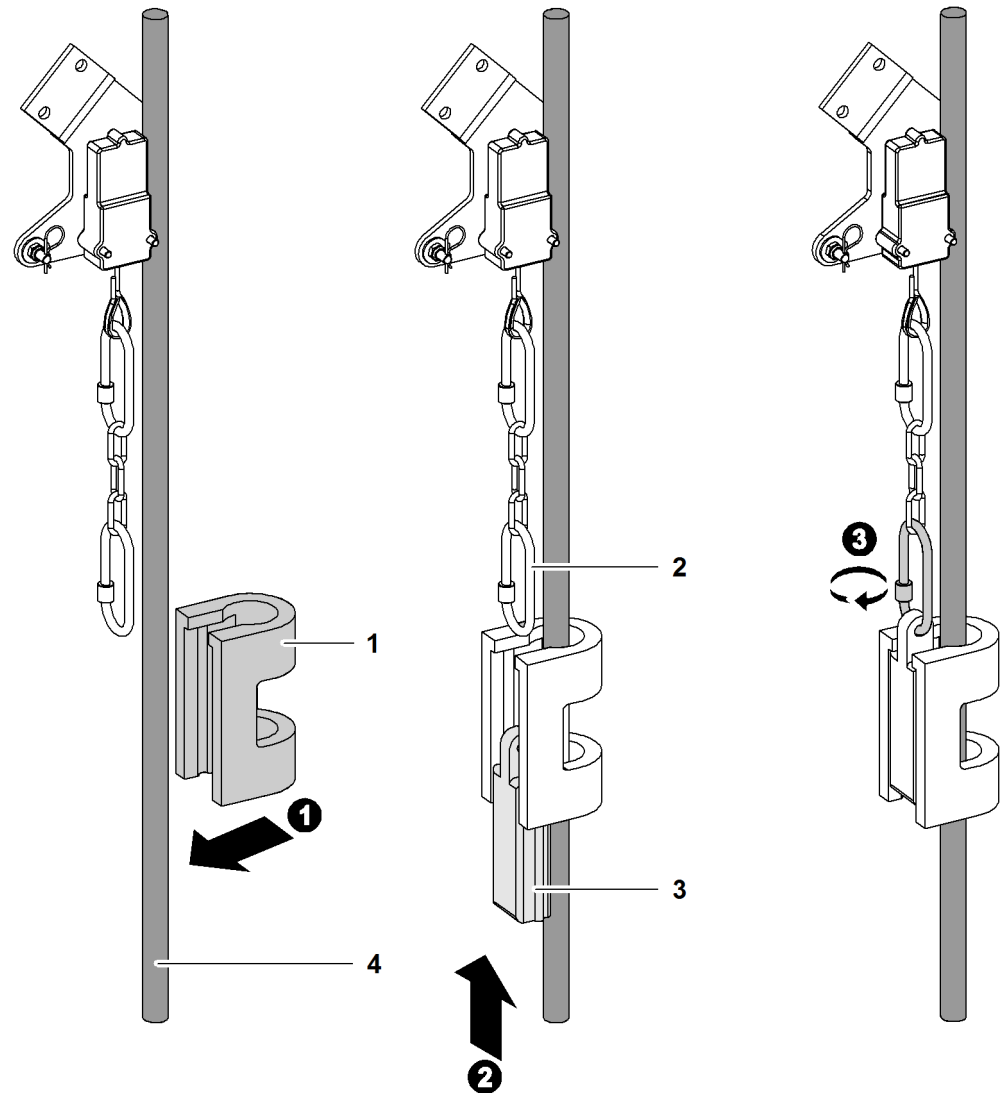


Fig. 3799: Installing the hoist limit switch weight

- | | | | |
|---|-------------------------------------|---|-----------------------------------|
| 1 | Hoist limit switch weight (U shape) | 3 | Hoist limit switch weight (wedge) |
| 2 | Carabiner | 4 | Rope of winch1/winch2 |

► Guide the hoist limit switch weight (U shape) 1 over the rope of winch1/ winch2 4.

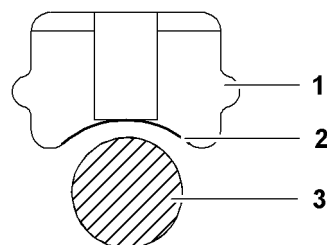


Fig. 3800: Hoist limit switch weight (wedge) view from above

- | | | | |
|---|-----------------------------------|---|-----------------------|
| 1 | Hoist limit switch weight (wedge) | 3 | Rope of winch1/winch2 |
| 2 | Curvature | | |

The hoist limit switch weight (wedge) 1 has a curvature 2 on one side.

NOTICE

Wrongly installed hoist limit switch weight (wedge)!

Hoist limit switch weight (wedge) damaged with wrong installation of rope of winch1/winch2.

- ▶ Ensure that the curvature of the hoist limit switch weight (wedge) is installed in the direction of the rope of winch1/winch2.
-
- ▶ Slide the hoist limit switch weight (wedge) **1** from below into the hoist limit switch weight (U shape).
 - ▶ Attach the carabiner to the hoist limit switch weight (wedge) **1**.

**Note**

Liebherr recommends:

- ▶ visual inspection of the carabiner prior to installation.
- ▶ Clean dirty carabiner with a clean cloth and water.
- ▶ If necessary, re-clean with a slightly oily cloth.

NOTICE

Improper installation of carabiner!

Damage to machine.

- ▶ Ensure that the screw of the carabiner points downwards.
- ▶ Ensure that the locking element is twisted shut.

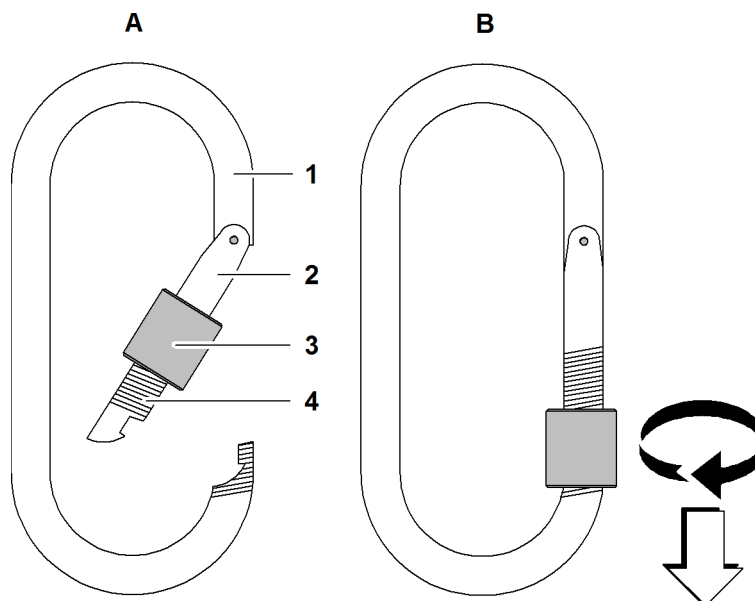


Fig. 3801: Carabiner

- | | | | |
|---|-----------------|---|------------------|
| 1 | Carabiner | 4 | Thread |
| 2 | Snapper | A | Opened carabiner |
| 3 | Locking element | B | Closed carabiner |

- ▶ Secure carabiner **1** with locking element **3**.

NOTICE

Chain on hoist limit switch weight is too short!

Hoist limit switch weight responds too late. Hook damages boom head.

- ▶ Ensure that hoist limit switch weight chain is at least 3 m (9' 10" ft-in) and at most 4.5 m (14' 9" ft-in) long.

-
- ▶ Attach chain between hoist limit switch weight and hoist limit switch.

Installing hoist limit switch bracket* variant 2 on main boom

Single reeving

The hoist limit switch bracket replaces the hoist limit switch weight.

With single reeving, a transverse pipe is installed.

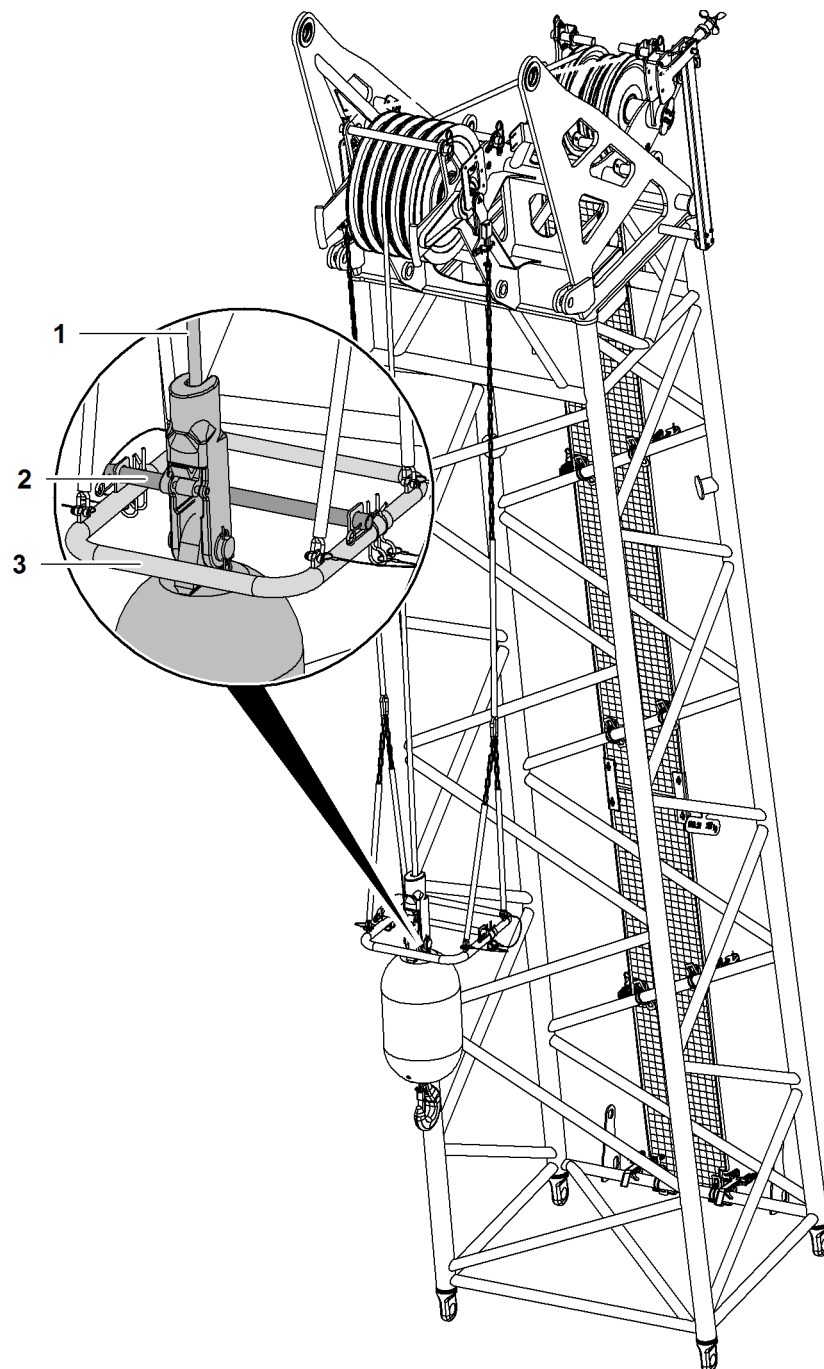


Fig. 3802: Installing hoist limit switch bracket variant 2 with single reeving on main boom head

- | | | | |
|---|-------------|---|----------------------------|
| 1 | Winch1 rope | 3 | Hoist limit switch bracket |
| 2 | Spacer pipe | | |

- ▶ Position rope 1 of winch1 in front of spacer pipe 2 of hoist limit switch bracket 3.
- ▶ Mount hoist limit switch bracket 3 and secure with spring cotter pins.

Multiple reeving

The hoist limit switch bracket replaces the hoist limit switch weight.

With multiple reeving, the transverse pipe is removed.

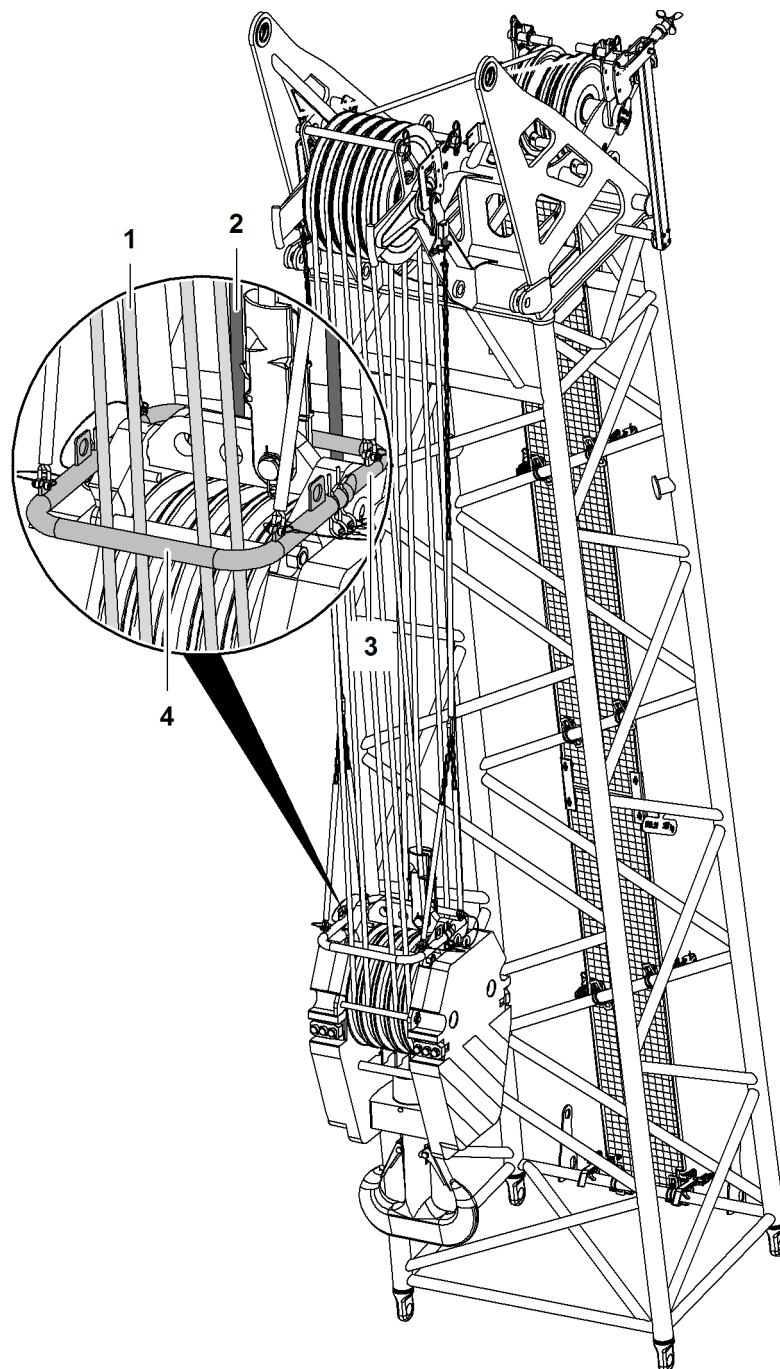


Fig. 3803: Installing hoist limit switch bracket variant 2 with multiple reeving on main boom head

- | | | | |
|---|-----------------------------|---|------------|
| 1 | Front ropes on pulley block | 3 | Rear pipe |
| 2 | Rear ropes on pulley block | 4 | Front pipe |

- ▶ Position front ropes **1** behind front pipe **4**.
- ▶ Position rear ropes **2** behind rear pipe **3**.
- ▶ Push front pipe **4** into rear pipe **3** and secure with spring cotter pins.

Installing hoist limit switch bracket* on auxiliary jib (36 t (79300 lb))

The following hoist limit switch brackets* are available:

- Variant1
- Variant2

Installing hoist limit switch bracket* variant1 on auxiliary jib (36 t (79300 lb))

The hoist limit switch bracket replaces the hoist limit switch weight on auxiliary jib (36 t (79300 lb)).

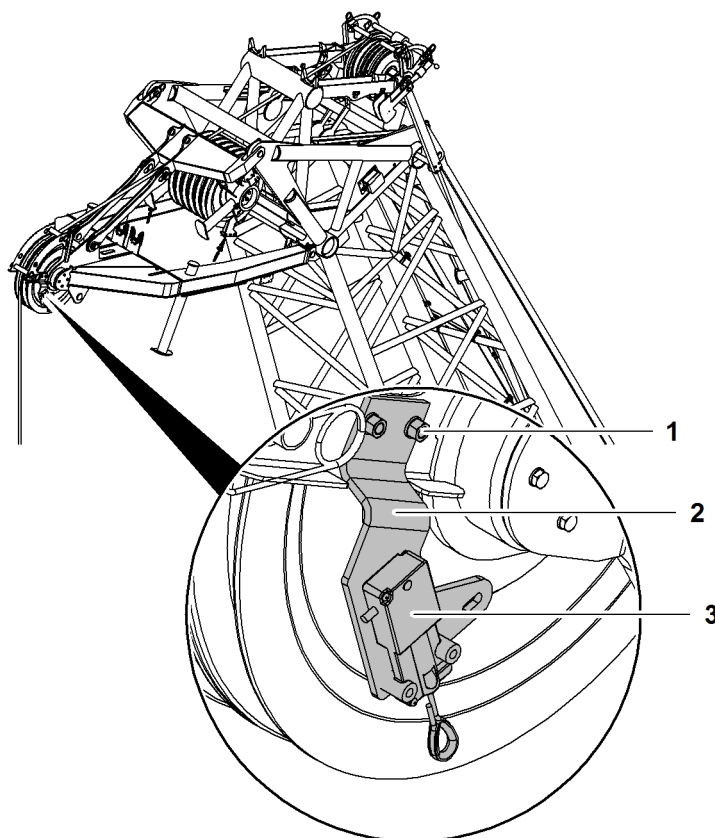


Fig. 3804: Deinstalling present limit switch plate

- | | | | |
|---|--------------------|---|--------------------|
| 1 | Screw (2x) | 3 | Hoist limit switch |
| 2 | Limit switch plate | | |

- ▶ Undo screws 1.
- ▶ Remove limit switch plate 2.
- ▶ Deinstall hoist limit switch 3 from limit switch plate 2.

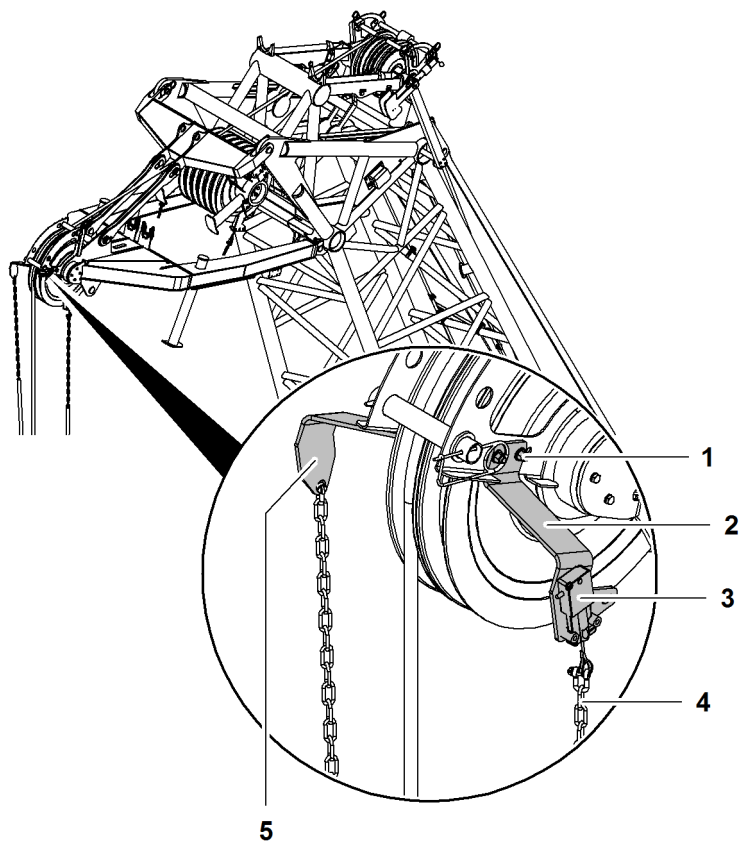


Fig. 3805: Installing hoist limit switch plate of the hoist limit switch bracket

- | | | | |
|---|--------------------|---|-------------|
| 1 | Screw (4x) | 4 | Chain (2x) |
| 2 | Limit switch plate | 5 | Steel plate |
| 3 | Hoist limit switch | | |

- ▶ Install available hoist limit switch **3** on limit switch plate **2**.
- ▶ Attach limit switch plate **2** with screws **1** on auxiliary jib (36 t (79300 lb)).
- ▶ Attach plate **5** on opposite side with screws.
- ▶ Attach chain **4** with shackle to hoist limit switch **3**.
- ▶ Attach chain **4** with shackle to plate **5**.

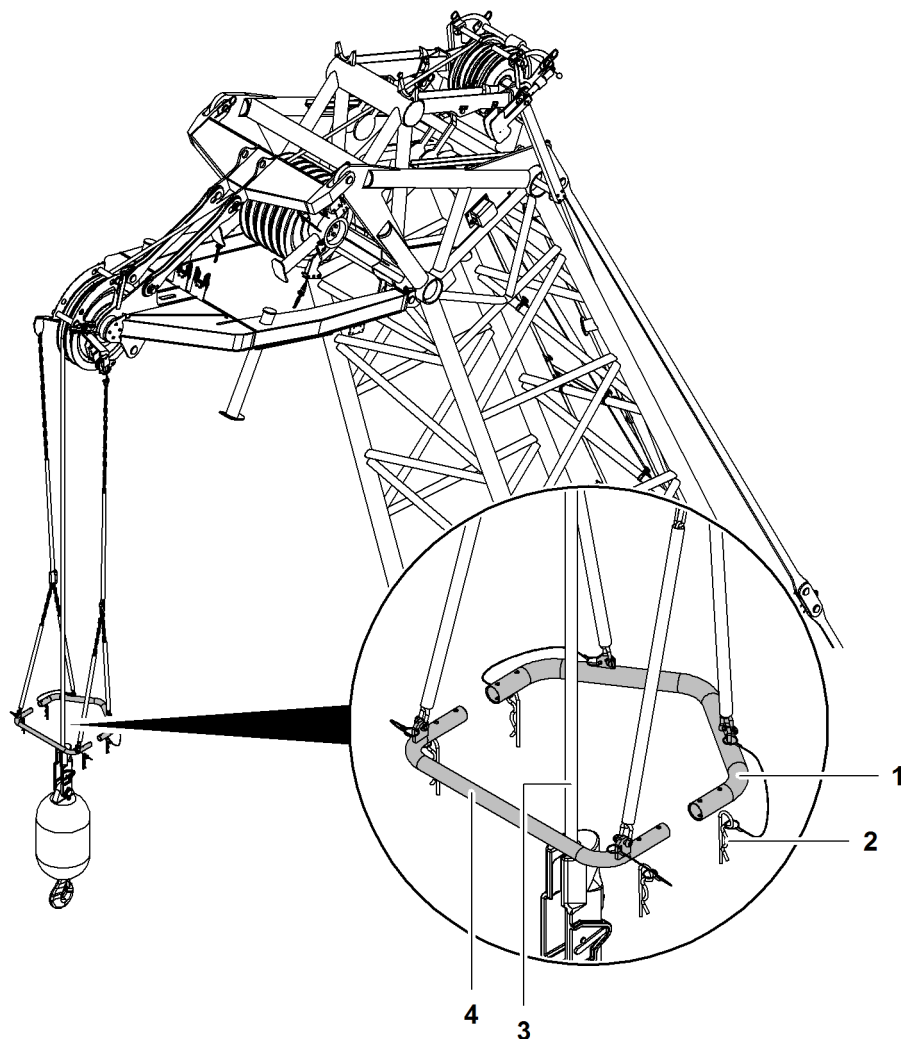


Fig. 3806: Placing rope of winch2 between hoist limit switch bracket

- | | | | |
|---|------------------------|---|-------------|
| 1 | Rear pipe | 3 | Winch2 rope |
| 2 | Spring cotter pin (4x) | 4 | Front pipe |

- ▶ Place rope 3 of winch2 between rear pipe 1 and front pipe 4.
- ▶ Push front pipe 4 in rear pipe 1.

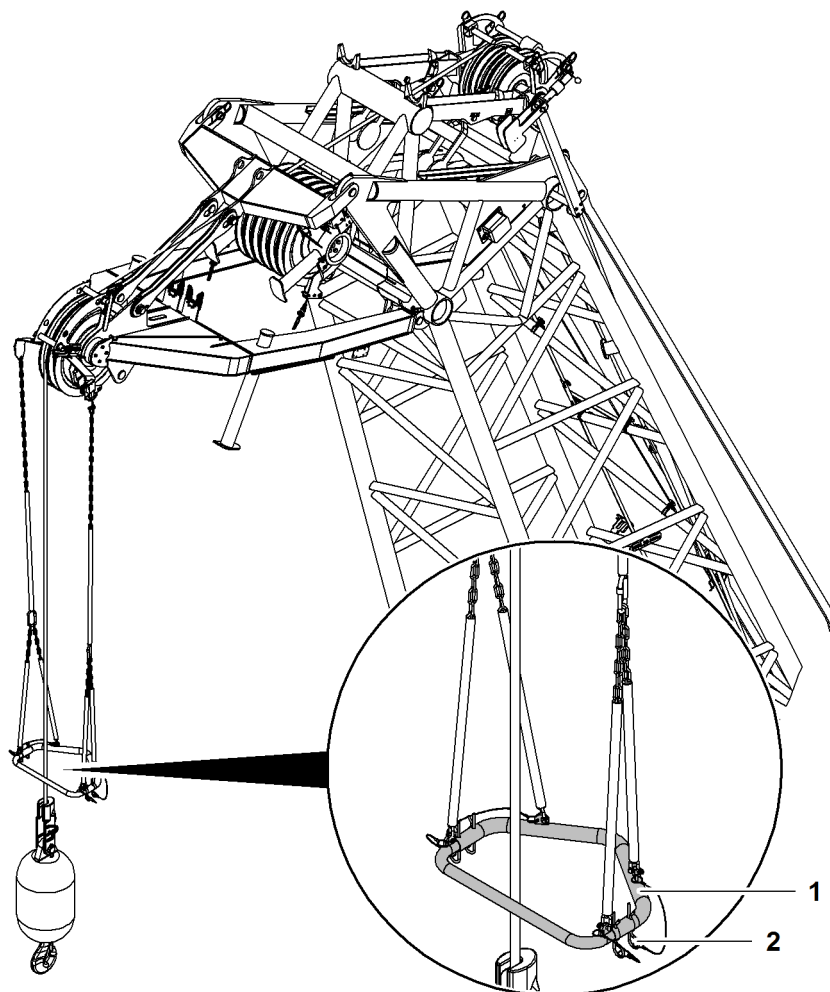


Fig. 3807: Assembling hoist limit switch bracket variant 1

- 1 Hoist limit switch bracket 2 Spring cotter pin (4x)

► Insert spring cotter pin 2 from below into boring.

Installing hoist limit switch bracket* variant 2 on auxiliary jib (36 t (79300 lb))

The hoist limit switch bracket replaces the hoist limit switch weight on auxiliary jib (36 t (79300 lb)).

Single reeving

With single reeving, a transverse pipe is installed.

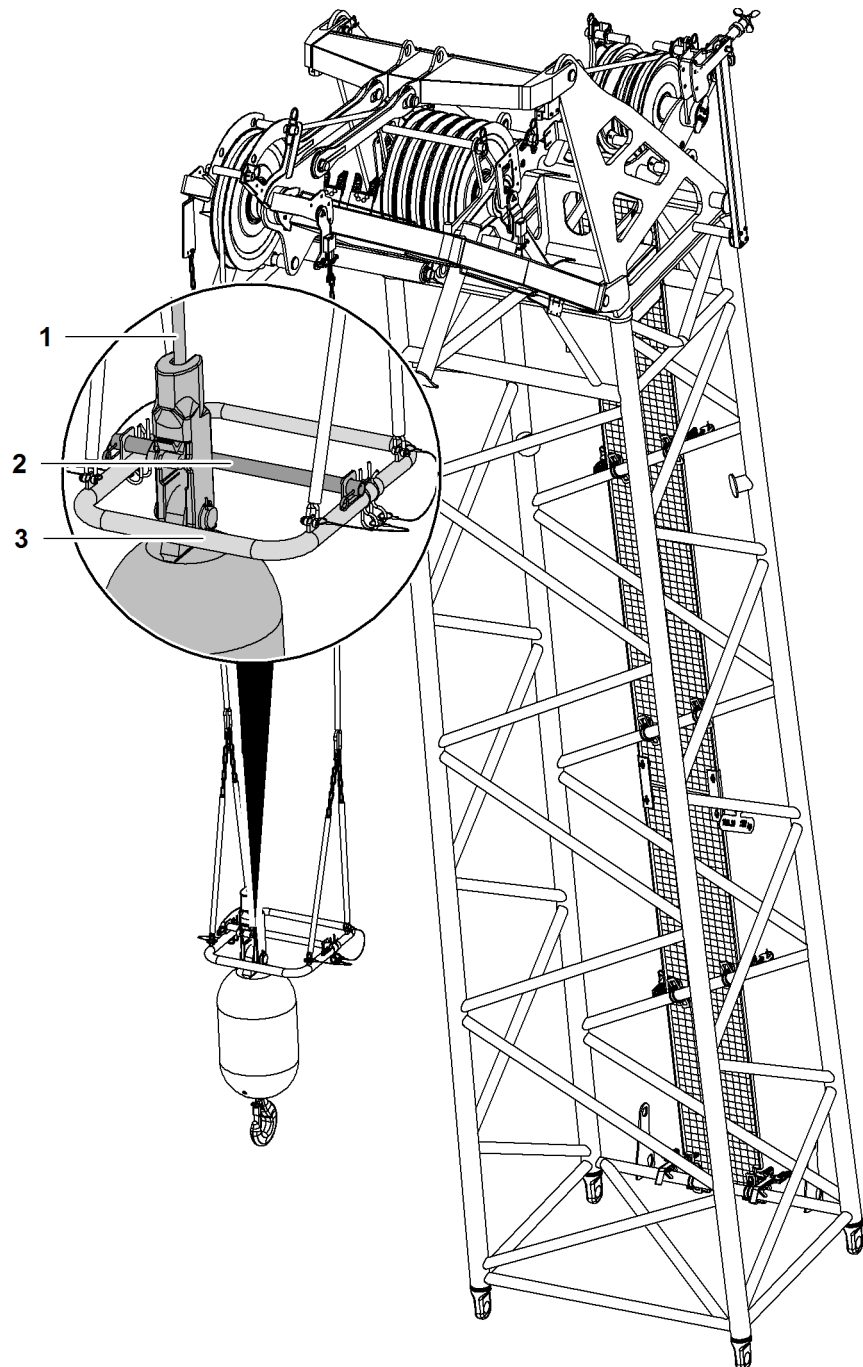


Fig. 3808: Installing hoist limit switch bracket variant 2 with single reeving on auxiliary jib on main boom head

- | | |
|--|-------------------------------------|
| <p>1 Winch2 rope
2 Spacer pipe</p> | <p>3 Hoist limit switch bracket</p> |
|--|-------------------------------------|

- ▶ Position rope 1 of winch2 in front of spacer pipe 2 of hoist limit switch bracket 3.
- ▶ Mount hoist limit switch bracket 3 and secure with spring cotter pins.

Multiple reeving

With multiple reeving, the transverse pipe is removed.

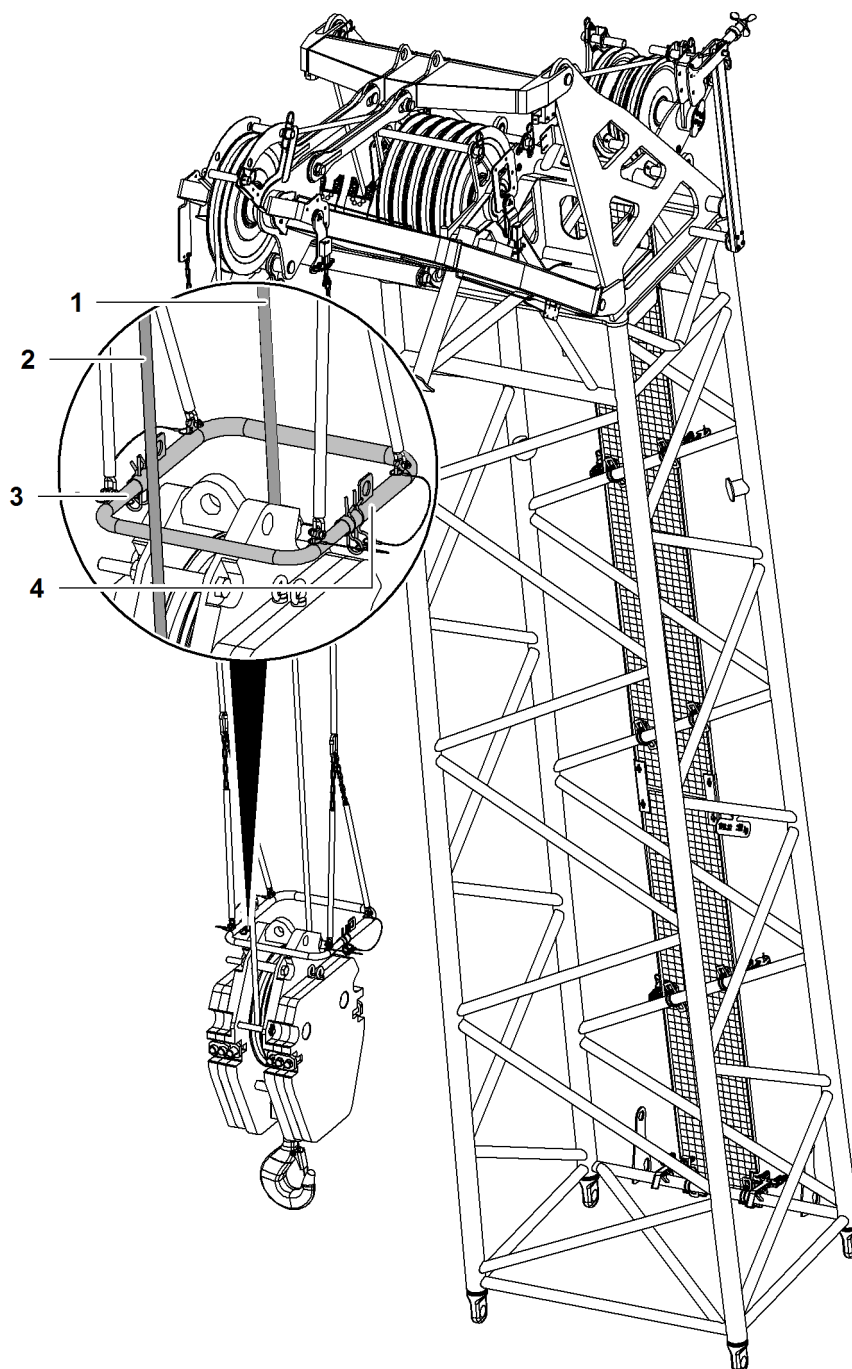


Fig. 3809: Installing hoist limit switch bracket variant 2 with multiple reeving on auxiliary jib on main boom head

- | | | | |
|----------|----------------------------|----------|------------|
| 1 | Rear rope on pulley block | 3 | Front pipe |
| 2 | Front rope on pulley block | 4 | Rear pipe |

- ▶ Position rear rope **1** between rear pipe **4** and front pipe **3**.
- ▶ Push front pipe **3** into rear pipe **4** and secure with spring cotter pins.

Bypassing unused hoist limit switches



DANGER

Inadmissible bypassing of hoist limit switch!
Load breakaway.

- ▶ Only bypass unused hoist limit switches.

NOTICE

Wrong hoist limit switch is bypassed!
Hook damages boom head.

- ▶ Lock winch1 with left hoist limit switch.
- ▶ Lock winch2 with right hoist limit switch.

Ensure the following conditions are met:

- Only motion is performed with a rope of winch1/winch2. A hoist limit switch is not required.

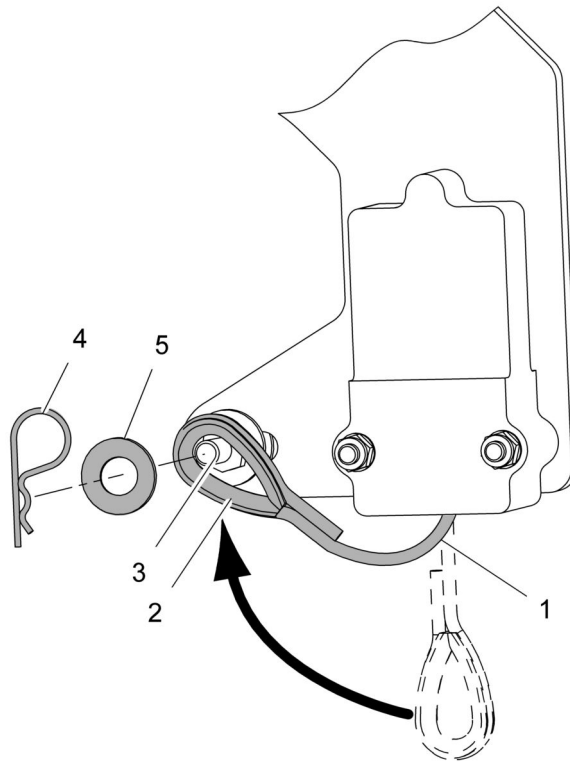


Fig. 3810: Bypassing the hoist limit switch mechanically

- | | | | |
|---|------------|---|----------------|
| 1 | Steel rope | 4 | Locking spring |
| 2 | Loop | 5 | Washer |
| 3 | Stud bolt | | |

- ▶ Pull the steel rope 1 and place the loop 2 over the stud bolt 3.
 - ▷ Hoist limit switch is bypassed.
- ▶ Protect the sling 2 from slipping off the stud bolt 3 by securing it with a washer 5 and a locking spring 4.

7.10 Assembly of suspended counterweight of derrick equipment*

The suspended counterweight must be assembled before “erecting the main boom with derrick equipment*”. This makes assembly with the assist crane easier.

Make sure the following prerequisites are met:

- Assist crane is available.

7.10.1 Positioning the counterweight frame

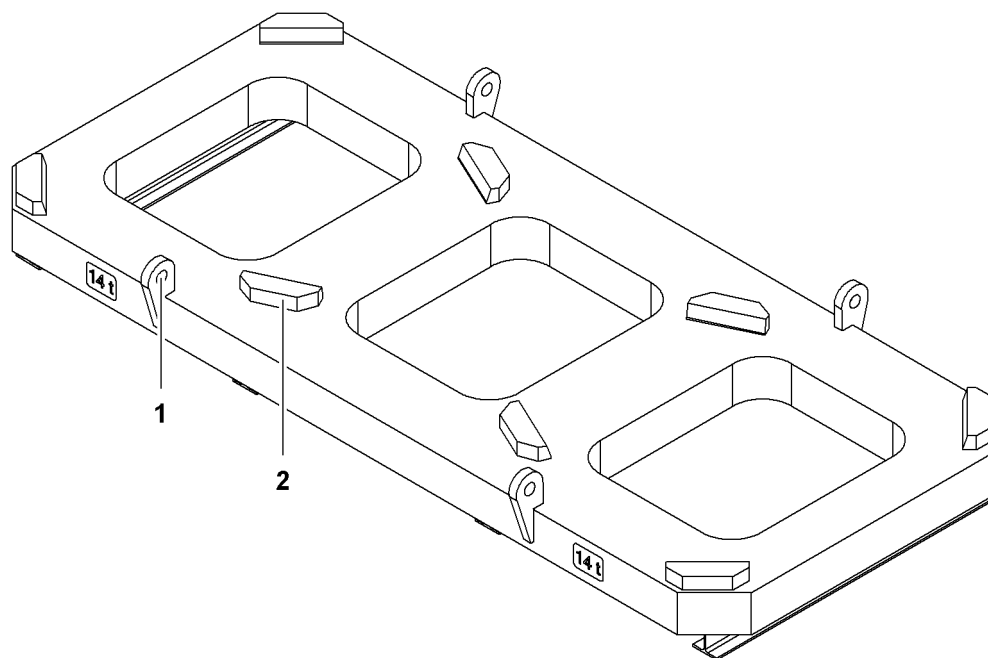


Fig. 3811: Positioning the counterweight frame

- | | |
|----------------------|-----------------------|
| 1 Rigging point (4x) | 2 Locking device (8x) |
|----------------------|-----------------------|

- ▶ Rig counterweight frame on rigging points 1.
- ▶ Lift counterweight frame.
- ▶ Center and place the counterweight frame on the ground approx. 6.5 m (21' 4" ft-in) behind the bolting points of the spacer frame.

7.10.2 Positioning the counterweight slabs



DANGER

Improper counterweight!
Toppling of machine.

- ▶ Set counterweight slab (centered) onto counter weight frame.
- ▶ Do not exceed max. admissible counterweight weight.

If not using original counterweight slabs:

- ▶ Request written permission for counterweight slabs from the manufacturer.

- ▶ Set Counterweight slabs onto counterweight frame.

**DANGER**

Sliding of counterweight slabs!
Toppling of machine.

- ▶ Stack counterweight slabs such that they are secured by locking devices.
- ▶ Secure counterweight slabs with suitable means.

7.10.3 Release the pendant ropes from the derrick boom

Releasing the temporary attachment

The suspended counterweight pendant ropes temporarily attached to the derrick boom earlier must be released before it is erected.

**WARNING**

Unsecured walking on the boom!
Risk of falling.

- ▶ A fall arrest system must be worn when working on booms to prevent falling.
- ▶ Release the temporary attachment of the suspended counterweight pendant ropes on the derrick boom.
- ▶ Place the fastening materials in temporary storage.

Securing auxiliary rope

- ▶ Attach an auxiliary rope to each of the suspended counterweight pendant ropes on the left and right.
 - ▷ These enable assistants to guide the suspended counterweight pendant ropes when erecting the derrick boom.

7.11 Assembly of counterweight carriage of derrick equipment*

The counterweight carriage is delivered in two parts.

7.11.1 Positioning the wheeled counterweight carriage

Ensure that the following conditions are fulfilled:

- Wheel sets are parallel to counterweight frame.

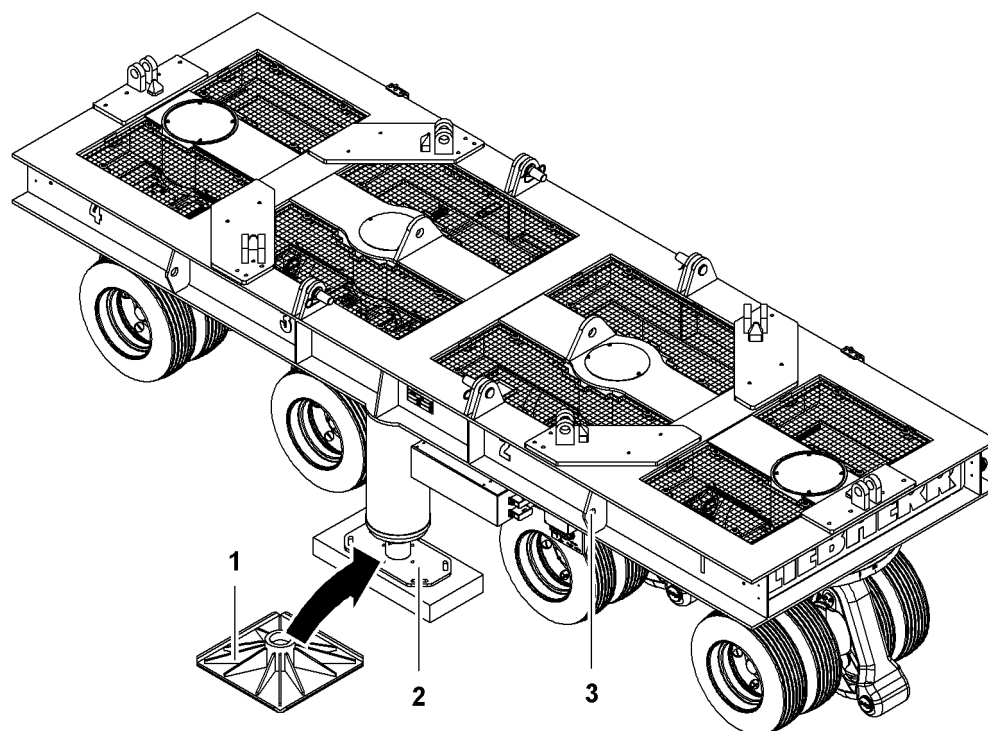


Fig. 3812: Positioning the wheeled counterweight carriage

- | | |
|------------------------------------|-----------------------------|
| 1 Working base plate (2x) | 3 Rigging point (4x) |
| 2 Transport base plate (2x) | |

- ▶ Rig counterweight carriage on rigging points **3**.
- ▶ Lift counterweight carriage.
- ▶ Lower counterweight carriage to the ground.
- ▶ Replace transport base plates **2** with working base plates **1**.

7.11.2 Attach the telescopic unit

Ensure that the following conditions are fulfilled:

- Counterweight carriage is horizontal.

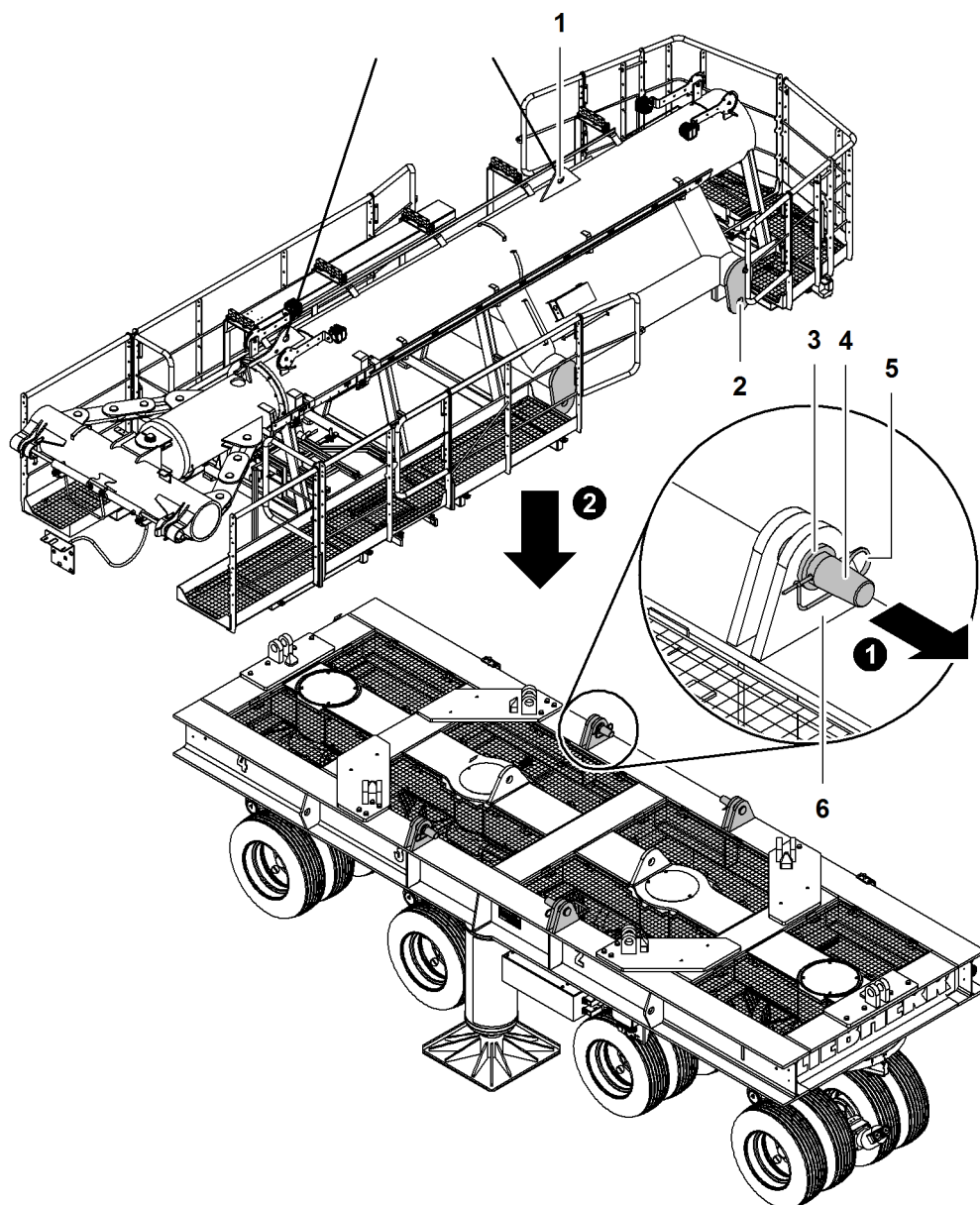


Fig. 3813: Attaching the extension device

- | | | | |
|---|--|---|---|
| 1 | Rigging point (2x) | 4 | Pin |
| 2 | Pin connection point (4x) for extension device | 5 | Locking spring |
| 3 | Washer (2x) | 6 | Pin connection point (4x) on counterweight carriage |

- ▶ Remove locking spring 5.
- ▶ Remove pins 4 and washers 3.
- ▶ Repeat procedure on all pin connection points 6 of the counterweight carriage.
- ▶ Rig extension device on rigging points 1.
- ▶ Lift extension device.

NOTICE

Improper positioning of extension device on counterweight carriage!
Damage to electric lines.

- ▶ Ensure that electric lines are not damaged when positioning the extension device on the counterweight carriage.

-
- ▶ Position extension device on counterweight carriage.

If the pin connection points **2** of the extension device aligns with the pin connection points **6** of the counterweight carriage:

- ▶ Bolt the telescopic unit to the wheeled counterweight carriage.
- ▶ Secure pin **4** with washers **3** and locking spring **5**.
- ▶ Repeat procedure on all pin connection points **6** of the counterweight carriage.

7.11.3 Connecting electric lines and hydraulic lines

- ▶ Plug electric lines of the counterweight carriage on terminal box of the extension device.
- ▶ Secure the electric plug in place.

**Note**

The hydraulic screw fittings are color-coded!

- ▶ Connect hydraulic lines of the same color.
-
- ▶ Screw hydraulic lines of the extension device into the back of the counterweight carriage.

7.11.4 Placing ladder and floodlight in working position

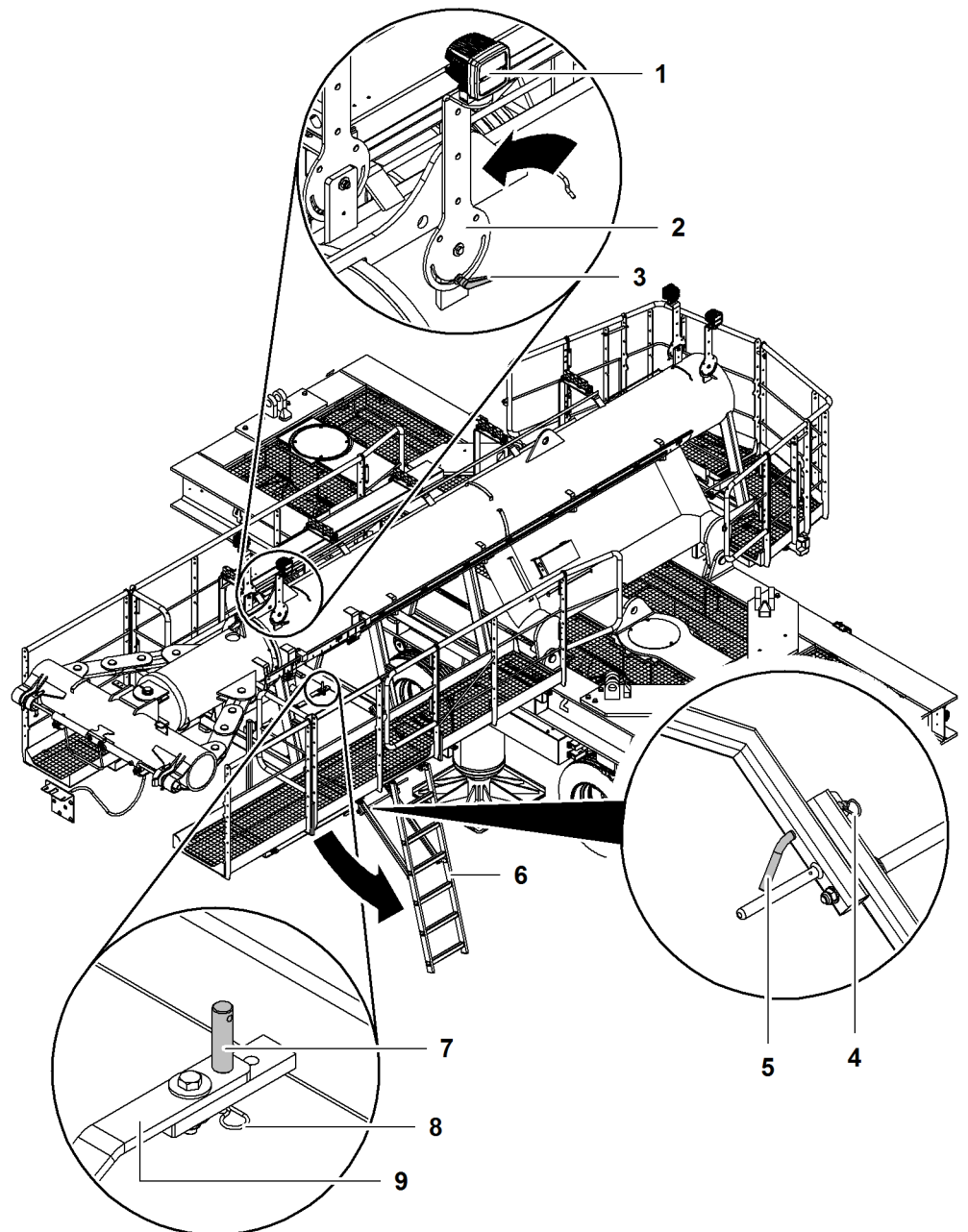


Fig. 3814: Placing ladder and floodlight in working position

- | | | | |
|---|------------------------|---|------------------------|
| 1 | Floodlight (4x) | 6 | Ladder |
| 2 | Bracket (4x) | 7 | Pin (2x) |
| 3 | Clamping device (4x) | 8 | Spring cotter pin (2x) |
| 4 | Spring cotter pin (2x) | 9 | Bar (2x) |
| 5 | Pin (2x) | | |

- ▶ Remove spring cotter pin 8.
- ▶ Remove pin 7.
- ▶ Turn bar 9 by 90°.
- ▶ Reinsert pin 7.
- ▶ Secure pin 7 with spring cotter pin 8.

Assembly of counterweight carriage of derrick equipment*

- ▶ Repeat procedure on opposite side.
- ▶ Remove spring cotter pin **4**.
- ▶ Remove pin **5**.
- ▶ Repeat procedure on opposite side.
- ▶ Fold ladder **6** down.
- ▶ Reinsert pin **5**.
- ▶ Secure pin **5** with spring cotter pin **4**.
- ▶ Repeat procedure on opposite side.
 - ▷ Ladder is in working position.
- ▶ Undo clamping device **3**.
- ▶ Turn bracket **2** by 90°.
- ▶ Tighten clamping device **3**.
- ▶ Repeat procedure on all floodlights **1**.
 - ▷ Floodlights are in working position.

7.11.5 Installing the counterweight carriage on the basic machine

Ensure the following conditions are met:

- Counterweight carriage is assembled.

Positioning the basic machine in front of the counterweight carriage

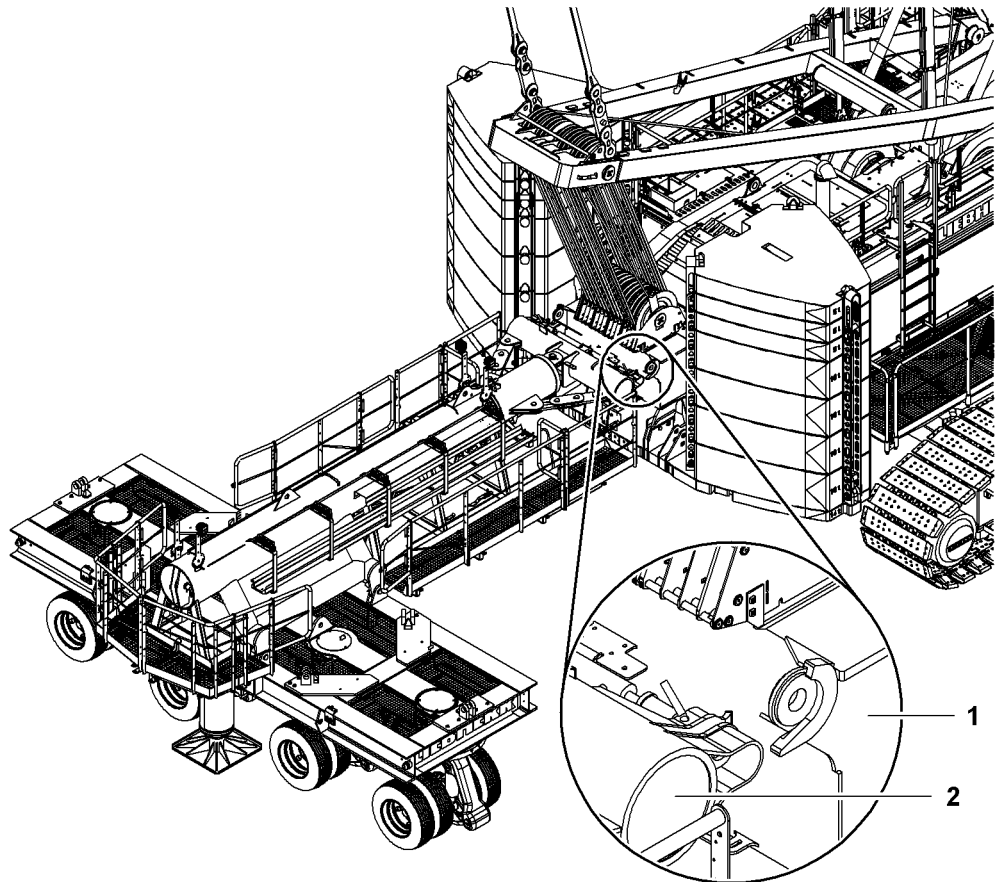


Fig. 3815: Positioning the basic machine in front of the counterweight carriage

1 Basic machine

2 Counterweight carriage

- ▶ Position rear of basic machine 1 in front of counterweight carriage 2.
- ▶ Ensure that the hydraulic lines and electric lines between the basic machine and the counterweight carriage can be connected.

Connecting electric lines and hydraulic lines with basic machine

- ▶ Plug the electric lines of the counterweight carriage into the basic machine.
- ▶ Lock electric plug.



Note

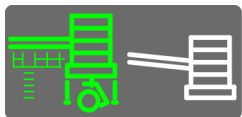
Hydraulic screw connections are color-coded!

- ▶ Connect hydraulic lines of the same color.
- ▶ Screw hydraulic lines of the counterweight carriage onto the basic machine.

Selecting the counterweight carriage



- ▶ Press the button *Mode* on the monitor.
 - ▷ The *Mode* screen is displayed on the monitor.



If the counterweight carriage of the button *Counterweight carriage/suspended counterweight* is not lit green:

- ▶ press the *Counterweight carriage/suspended counterweight* button on the monitor.
 - ▷ Counterweight carriage of the button *Counterweight carriage/suspended counterweight* is lit blue.



- ▶ Press and hold the button *Mode* on control panel *X12*.



- ▶ Press the *Confirm* button on the monitor.

- ▶ Let go of the button *Mode* on control panel *X12*.
 - ▷ The symbol *Restart machine* is displayed on the monitor:



Fig. 3820: Symbol *Restart machine*

- ▶ Switch off the ignition.
- ▶ Start diesel engine after approx. 10 seconds.
 - ▷ Counterweight carriage is selected.

Aligning the counterweight carriage for mounting

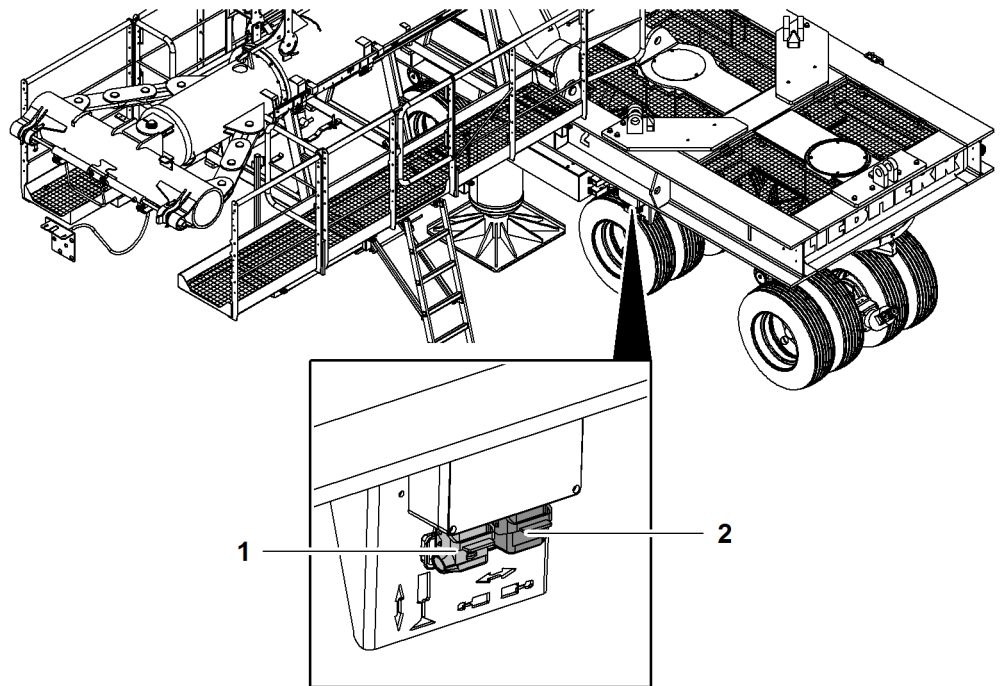


Fig. 3821: Inserting the cable remote control on the counterweight carriage

1 Plug for support cylinder 2 Plug for pin connection cylinder

- ▶ Insert cable remote control at plug 1 for support cylinder.



DANGER

Asymmetric operation of support cylinders!
Topping of counterweight carriage.

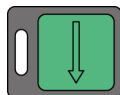
- ▶ Operate front support cylinder and rear support cylinder synchronously.



- ▶ Extend front support cylinder and rear support cylinder synchronously with cable remote control until pin connection points of the counterweight carriage and the pin connection points of the basic machine align.



- ▶ Press the button *Counterweight carriage radius adjustment* on control panel X26.



- ▶ Press and hold the button *Counterweight carriage assembly functions* on control panel X26.
- ▶ Press the button *Increasing radius/support* on control panel X26 until the pin connection points of the counterweight carriage and the pin connection points of the basic machine align.
- ▶ Press the button *Counterweight carriage assembly functions* on control panel X26.

Pinning the counterweight carriage with the basic machine

Ensure the following conditions are met:

- Signaller is in constant visual contact or radio contact to machine operator.

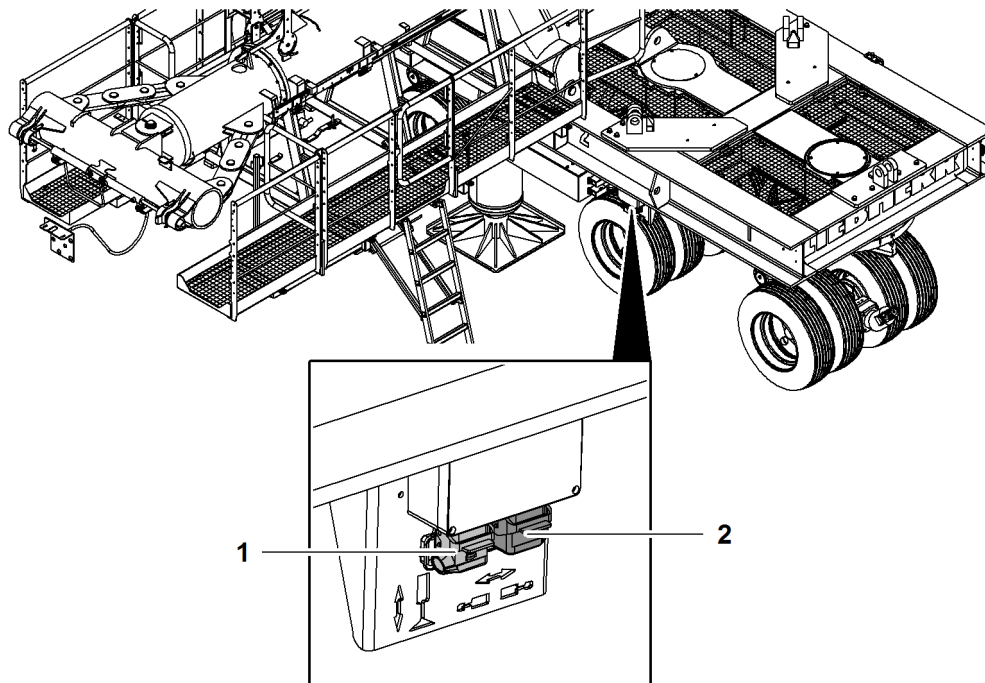


Fig. 3825: Inserting the cable remote control on the counterweight carriage

- 1 Plug for support cylinder 2 Plug for pin connection cylinder

- Insert cable remote control at plug 2 for pin connection cylinder.

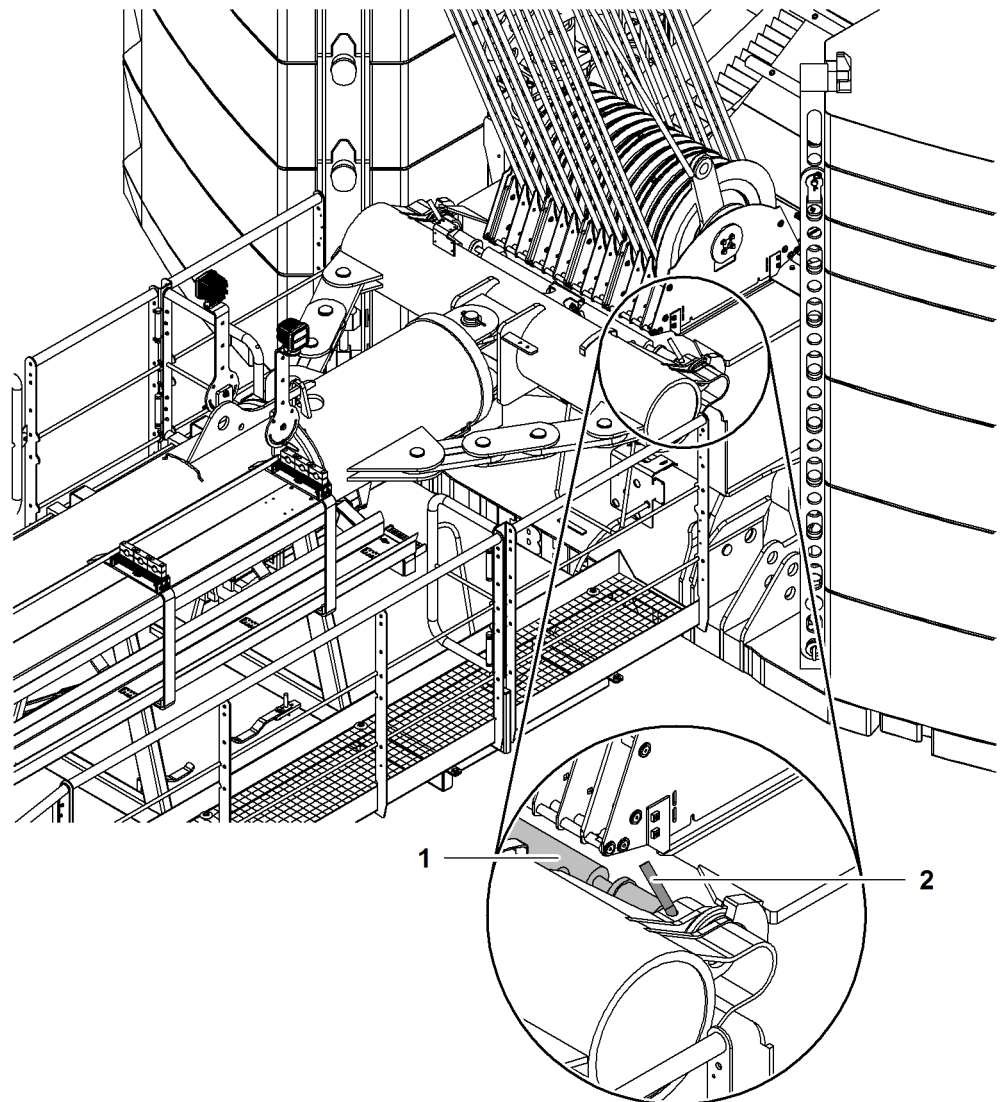


Fig. 3826: Pinning the counterweight carriage with the basic machine

1 Pin connection cylinder (2x)

2 Pin (2x)

- ▶ Remove pin 2.
- ▶ Extend pin connection cylinder 1 with cable remote control.
- ▶ Secure pin connection cylinder 1 with pins 2.

Align wheel sets

Ensure the following conditions are met:

- Counterweight carriage is pinned to basic machine.
- Electric lines and hydraulic lines are connected to basic machine.
- Height adjusting cylinders of the wheel sets are fully retracted.

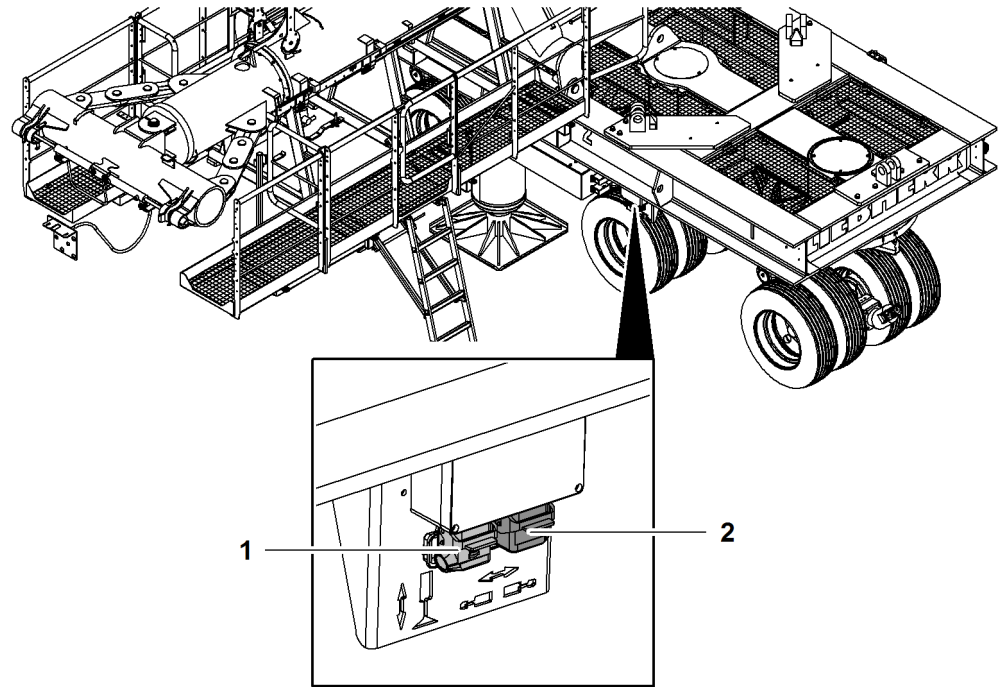


Fig. 3827: Inserting the cable remote control on the counterweight carriage

- 1 Plug for support cylinder
- 2 Plug for pin connection cylinder

- ▶ Insert cable remote control at plug 1 for support cylinder.
- ▶ Completely extend support cylinders with cable remote control.
 - ▷ Wheel sets a lifted off the ground.
- ▶ Press the button *Follower travel mode* on control panel X26.
- ▶ Press the button *Align wheel sets* on control panel X26.
 - ▷ Wheel sets align.
- ▶ Press the button *Follower travel mode* on control panel X26 again.

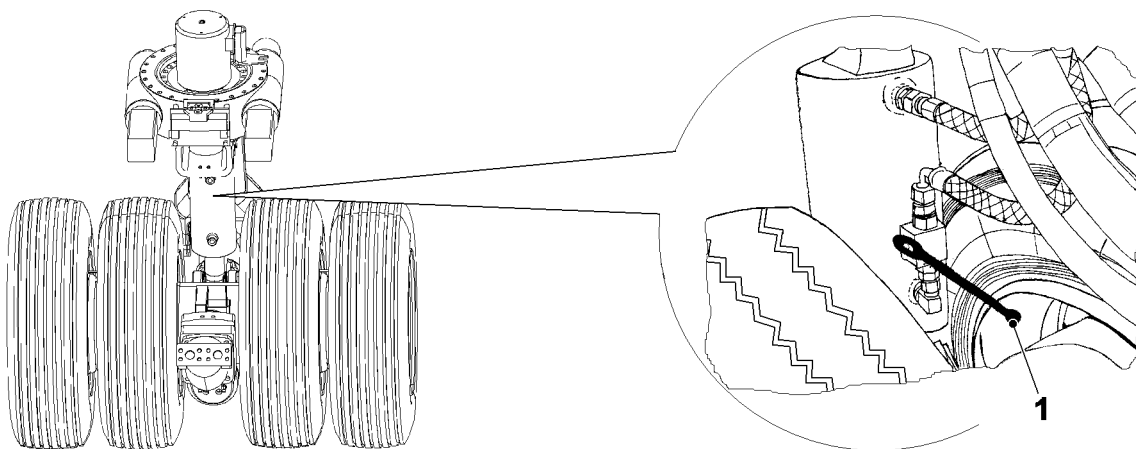
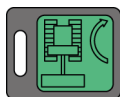
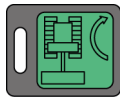


Fig. 3831: Close shut-off elements of external wheel sets.

- 1 Shut-off element (2x)

- ▶ Close shut-off elements 1 of the external wheel sets.

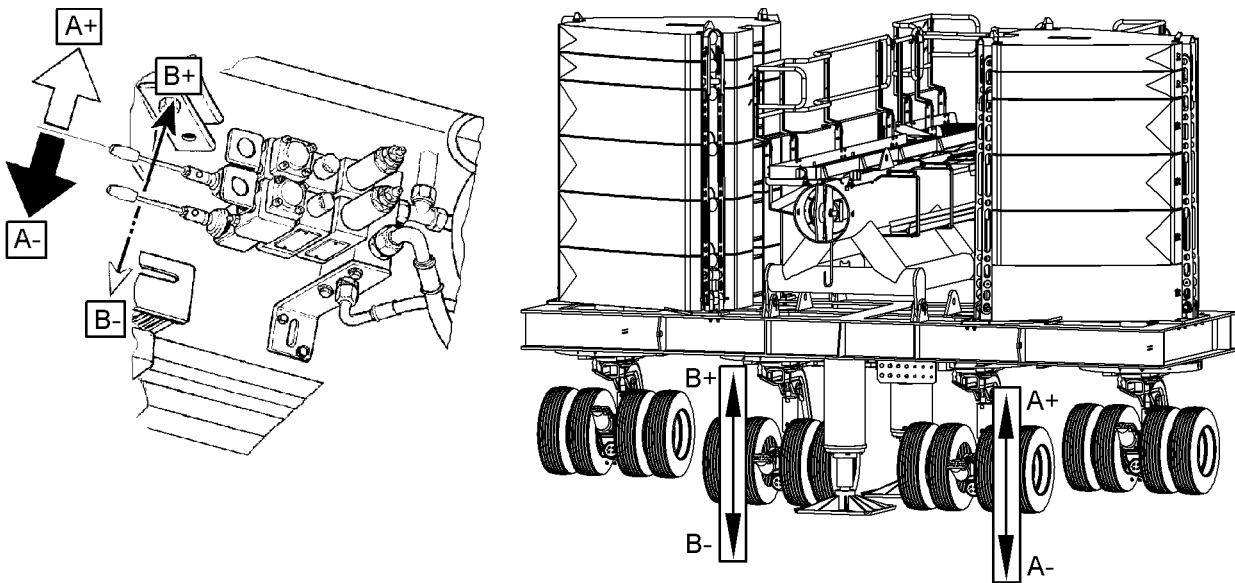


Fig. 3832: Operating the height adjusting cylinder of the inner wheel sets

The control levers of the height adjusting cylinders of the inner wheel sets are located between the support cylinders.

- ▶ Fully extend height adjusting cylinders of the inner wheel sets with control lever.



WARNING

Improper opening of shut-off element!
Wheel sets adapt automatically to height.
Crushing of body parts.

- ▶ Ensure that no persons are located beneath the wheel sets.

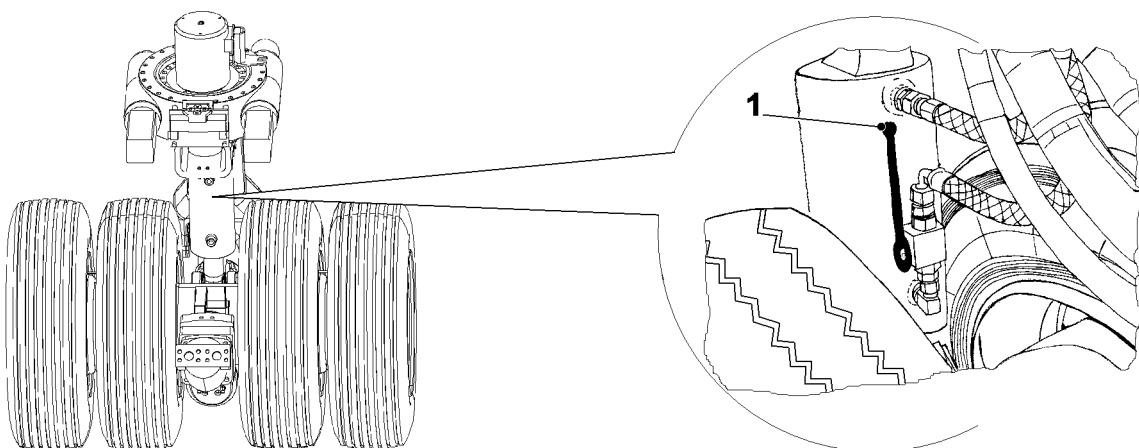


Fig. 3833: Opening the shut-off elements of the external wheel sets

1 Shut-off element (2x)

- ▶ Open the shut-off elements 1 of the external wheel sets.
 - ▷ External wheel sets adjust to the same height.
- ▶ Completely retract support cylinders with cable remote control.

Undoing counterweight carriages pendant straps from derrick boom

Undoing the temporary attachment of the counterweight carriage pendant straps

The temporarily attached counterweight carriage pendant straps on the derrick boom must be loosened before erecting.



WARNING

Unsecured walking on boom!
Risk of falling from boom.

- ▶ Secure yourself against falling when working on boom.
-
- ▶ Loosen temporarily attached counterweight carriage pendant straps on the derrick boom.
 - ▶ Place fastener material in temporary storage.

Attach auxiliary ropes and guide counterweight carriage pendant straps

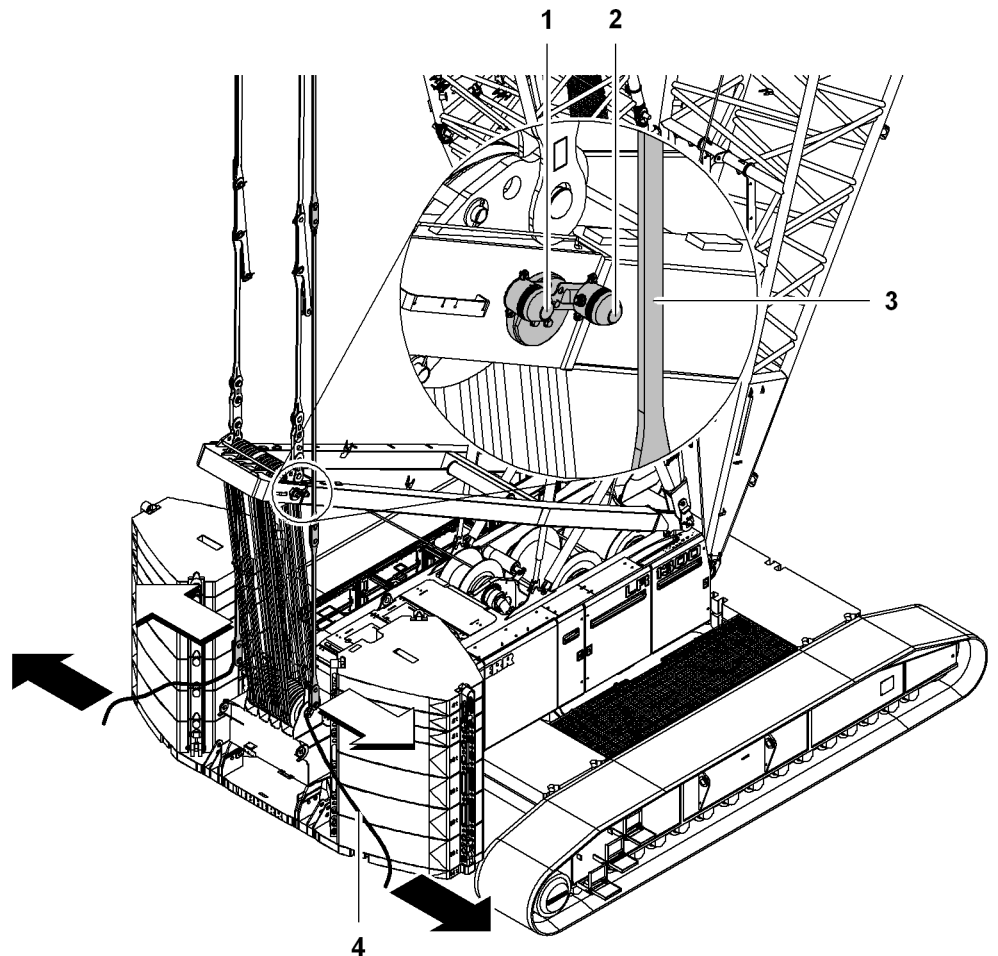


Fig. 3834: Attach auxiliary ropes and guide counterweight carriage pendant straps

- | | | | |
|---|-----------------------------|---|---|
| 1 | Load moment limitation lamp | 3 | Counterweight carriage pendant strap (2x) |
| 2 | Flashing light | 4 | Auxiliary rope (2x) |

NOTICE

Unguided counterweight carriage pendant straps **3** when erecting derrick boom!
Damage to beacon **2** and load moment limitation lamp **1**.

- ▶ Ensure that counterweight carriage pendant straps **3** are guided with auxiliary ropes **4**.
- ▶ Attach one auxiliary rope **4** on the left and the right side on counterweight carriage pendant straps **3**, respectively.
 - ▷ Helpers may guide the counterweight carriage pendant straps while erecting derrick boom.

7.11.6 Placing and lashing counterweight slabs



DANGER

Incorrect counterweight!
Machine toppling over.

- ▶ Counterweight slabs must always be stacked equally on both sides.
- ▶ Observe the maximum permissible counterweight weight.
- ▶ Ensure that counterweight slabs are secured with locking aids.

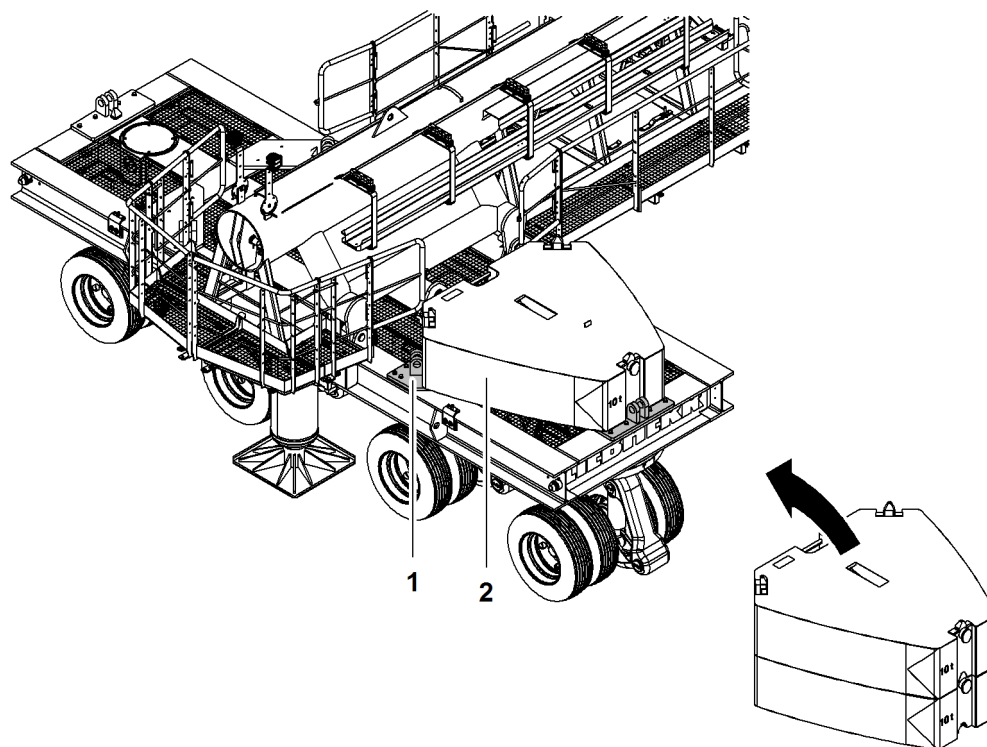


Fig. 3835: Positioning the counterweight slabs

1 Locking aid (6x)

2 Counterweight slabs

- ▶ Place counterweight slabs 2 on locking aids 1 of the counterweight carriage.



WARNING

Counterweight slabs lashed incorrectly!
Dropping counterweight slabs.

- ▶ Only lash counterweight slabs as described below.

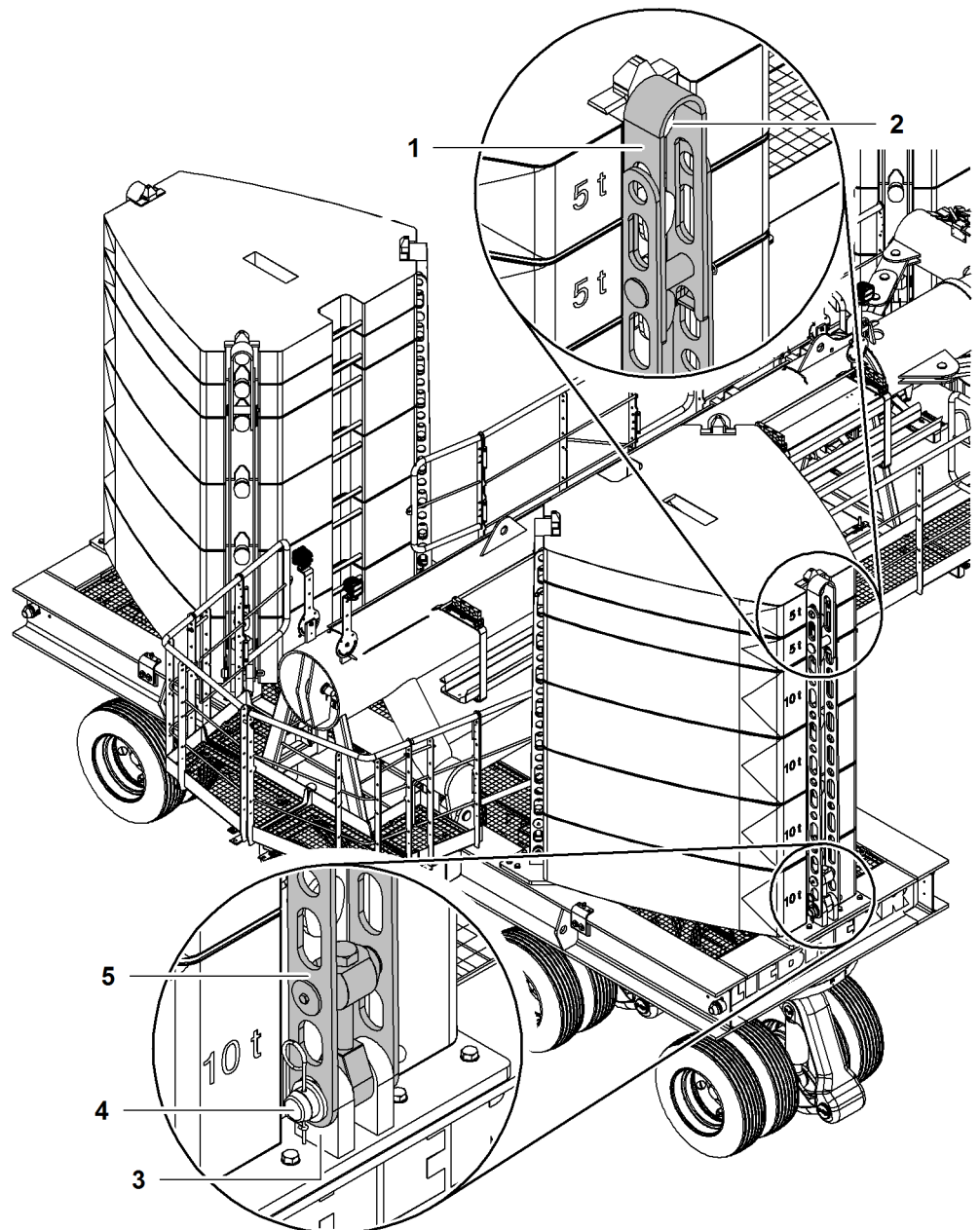


Fig. 3836: Lashing the counterweight slabs

- | | | | |
|---|--|---|--------------------------------|
| 1 | Counterweight tie-down shackle | 4 | Pin |
| 2 | Rigging point | 5 | Counterweight tie-down shackle |
| 3 | Pin connection point of the counterweight carriage | | |

- ▶ Pin counterweight tie-down shackle 5 with pin connection point 3 of the counterweight carriage.
- ▶ Secure pin 4 with washer and locking spring.
- ▶ Repeat procedure on all pin connection points 3 of the counterweight carriage.
- ▶ Fold up counterweight tie-down shackle 1.
- ▶ Lift counterweight tie-down shackle 1 over rigging point 2 of counterweight slab.
- ▶ Repeat procedure with all counterweight tie-down shackles 1.

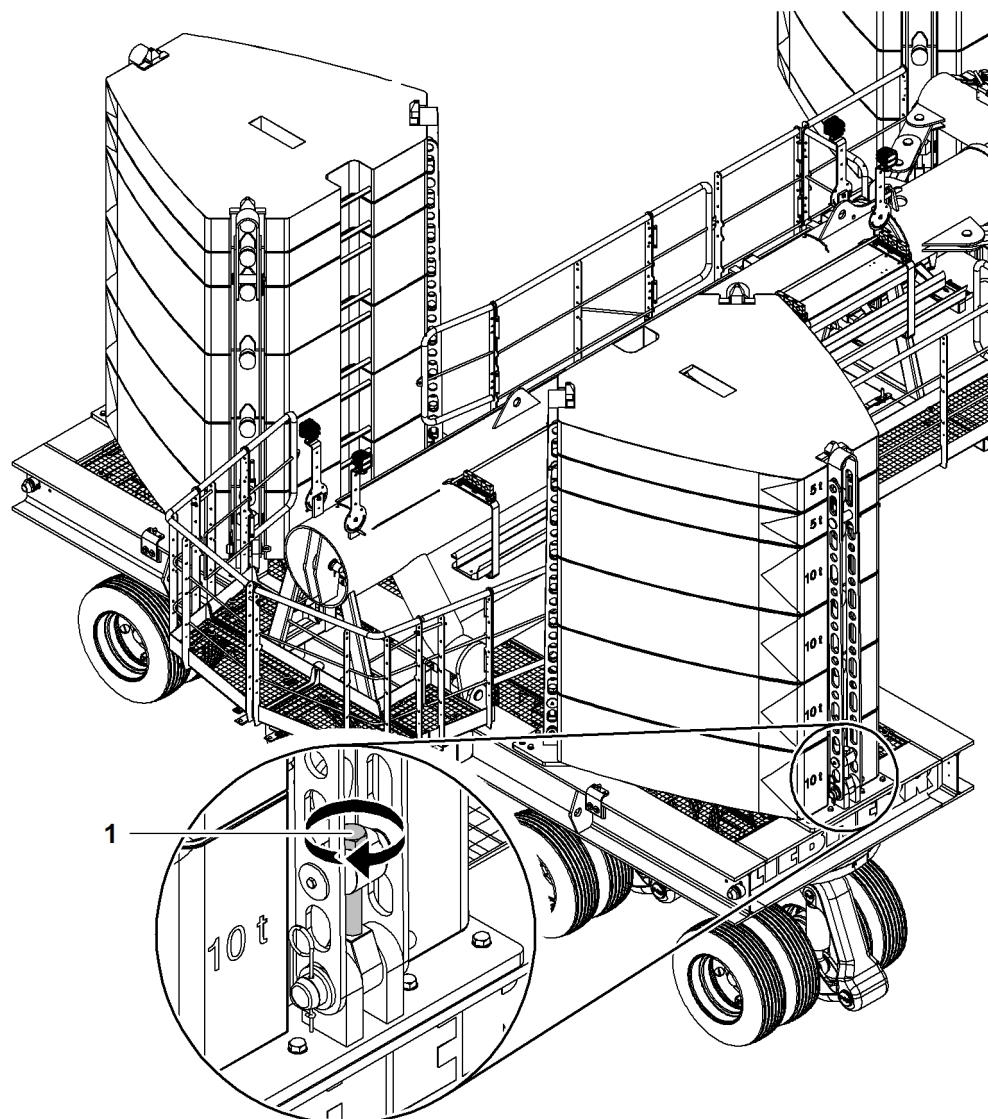


Fig. 3837: Tightening counterweight tie-down screws

1 Screw

- ▶ Tighten the screw 1 hand-tight using a wrench.
- ▶ Repeat procedure with all counterweight tie-down shackles.
 - ▷ Counterweight slabs are lashed.

7.12 Erecting the main boom with derrick equipment*

Make sure the following prerequisites are met:

- Suspended counterweight pendant ropes and/or counterweight carriage pendant straps are no longer tied to derrick boom.
- One auxiliary rope each is attached to the suspended counterweight pendant ropes and/or counterweight carriage pendant straps.
- Main boom pendant straps are connected to the derrick rope rigging.

7.12.1 Raising the derrick boom



DANGER

Inappropriate lifting of the derrick boom!
Machine toppling over.

- ▶ Leave the main boom on the ground while erecting the derrick boom.
- ▶ Ensure that the main boom pendant straps are not slack.

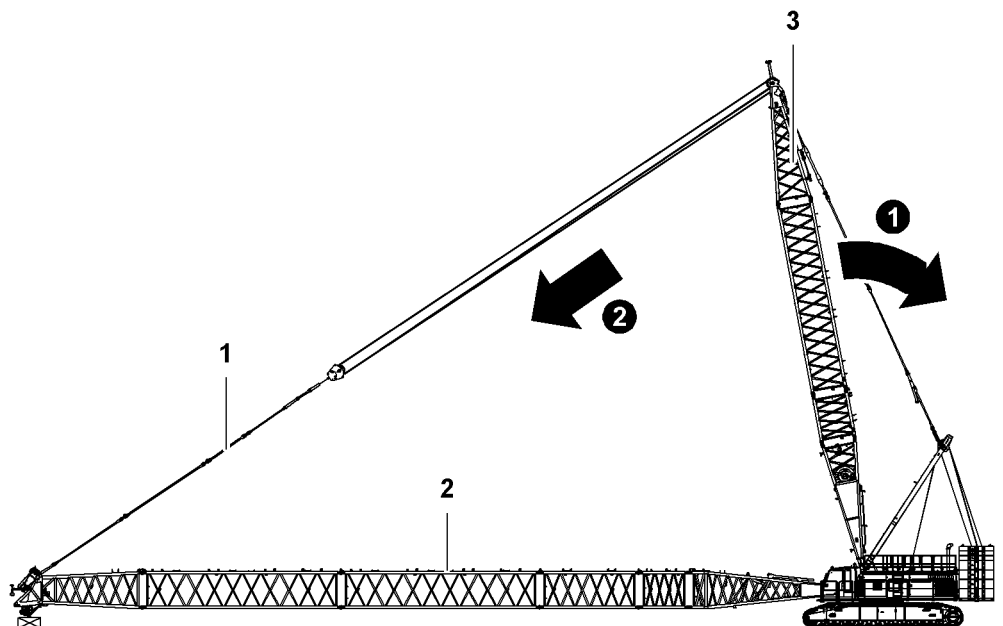


Fig. 3838: Lifting the derrick boom

- | | | | |
|---|--------------------------|---|--------------|
| 1 | Main boom pendant straps | 3 | Derrick boom |
| 2 | Main boom | | |

- ▶ Reeve derrick winch until main boom pendant straps 1 are tensioned.
- ▶ Reeve main boom luffing winch and unwind derrick winch at the same time.
 - ▷ Derrick boom 3 lifts.
 - ▷ Main boom pendant straps 1 remain pre-tensioned.
 - ▷ Main boom 2 stays on the ground.
- ▶ Erect derrick boom 3 up to 70°.
 - ▷ Limit switch triggers.
 - ▷ Main boom adjusting winch stops.



- ▶ Press the *Bypass limit switch* button on control panel X23.

NOTICE

Uncontrollable swinging of suspended counterweight pendant ropes or counterweight carriage pendant straps!
Damage to machine.

- ▶ Two assistants hold the auxiliary ropes of the suspended counterweight pendant ropes or the counterweight carriage pendant straps.
- ▶ Wind up the boom winch further.

7.12.2 Checking the derrick boom tilting-back supports

Above a derrick boom angle of 90° the derrick boom tilting-back supports swing backward.



CAUTION

Improper checking of the derrick boom tilting-back support!
Risk of crushing limbs.

- ▶ Do not place any limbs between uppercarriage and derrick boom tilting-back supports.

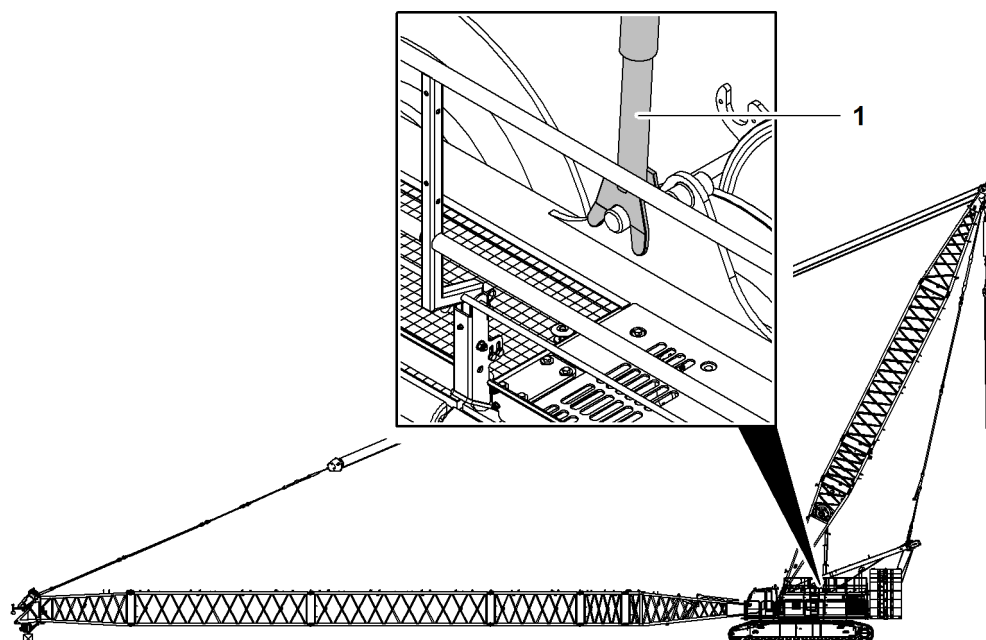


Fig. 3840: Checking the derrick boom tilting-back supports

- 1 Derrick tilting-back support (2x)
- ▶ Check forks of derrick boom tilting-back supports 1 for correct fit.
- ▶ If necessary, guide forks of derrick boom tilting-back supports 1.

7.12.3 Pinning the suspended counterweight pendant ropes to the counterweight frame

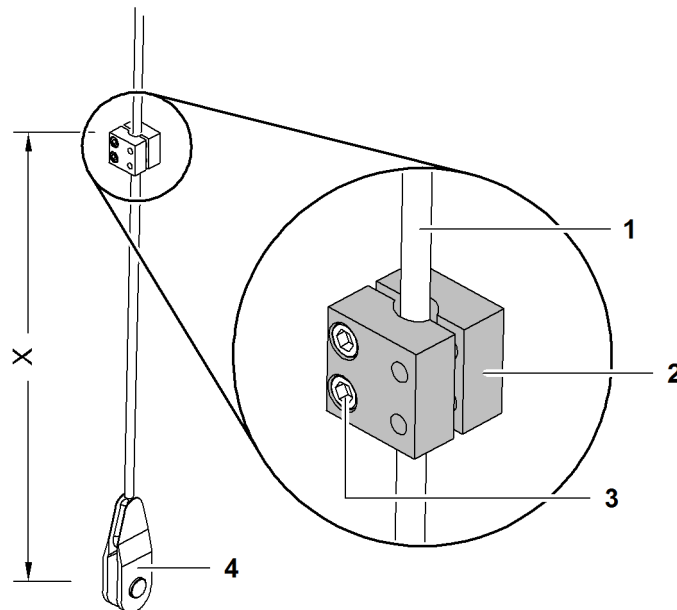


Fig. 3841: Positioning the rope clamps

- | | | | |
|---|--------------------------------------|---|------------|
| 1 | Suspended counterweight pendant rope | 3 | Screws |
| 2 | Rope clamp | 4 | Link plate |

Machine type	Distance X
LR 1005	1929 mm 6' 4" ft-in
LR 1006	1818 mm 6' ft-in

Tab. 541: Distance X depending on machine type

The rope clamps **2** must be attached at exactly the same height on the left and right.

- ▶ Attach rope clamp **2** on the front suspended counterweight pendant rope **1**.
- ▶ Position rope clamp **2** so that the top edge of the rope clamp **2** protrudes **X** over the pin connection point of the link plate **4**.
- ▶ Tighten screws **3** of the rope clamp **2**.
 - ▷ Rope clamp **2** is secured against slipping.
- ▶ Repeat procedure on opposite side.

Erecting the main boom with derrick equipment*

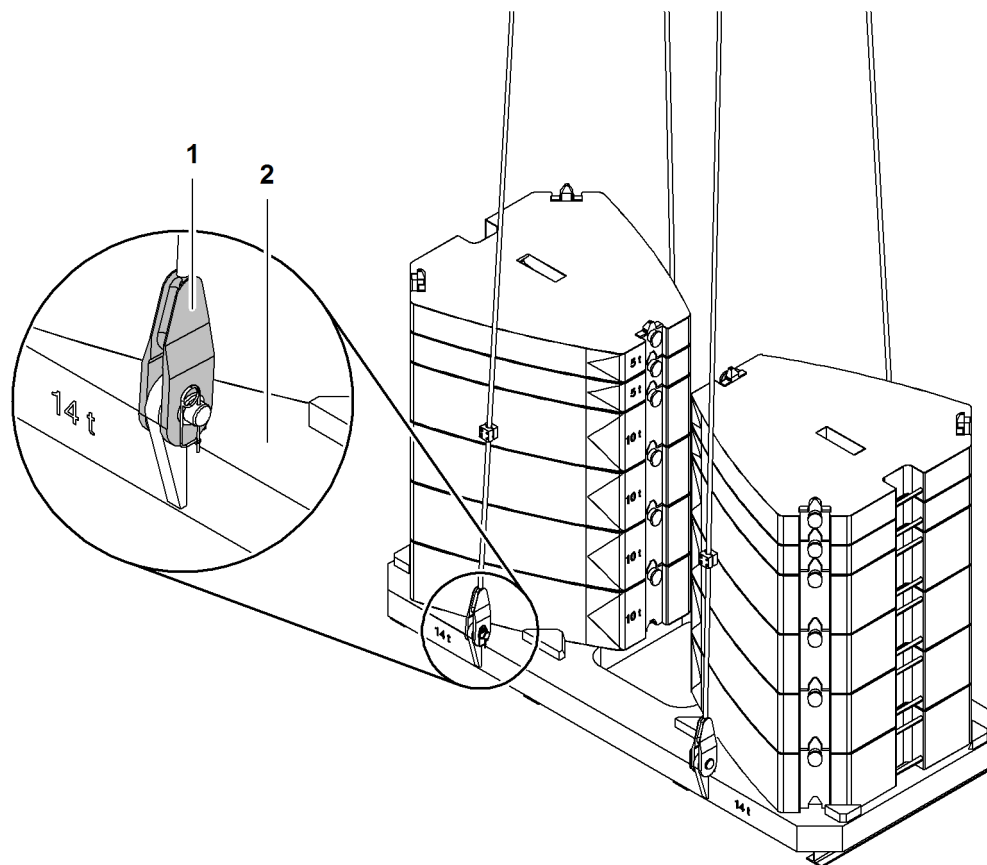


Fig. 3842: Pinning the suspended counterweight pendant ropes to the counterweight frame

- | | |
|--|-------------------------------------|
| <p>1 Suspended counterweight pendant rope</p> | <p>2 Counterweight frame</p> |
|--|-------------------------------------|

- ▶ Pin the suspended counterweight pendant rope **1** to the counterweight frame **2**.
- ▶ Secure the pins with washers and safety pins.
- ▶ Repeat procedure on all pin connection points of the counterweight frame **2**.

7.12.4 Pinning the spacer frame with the uppercarriage

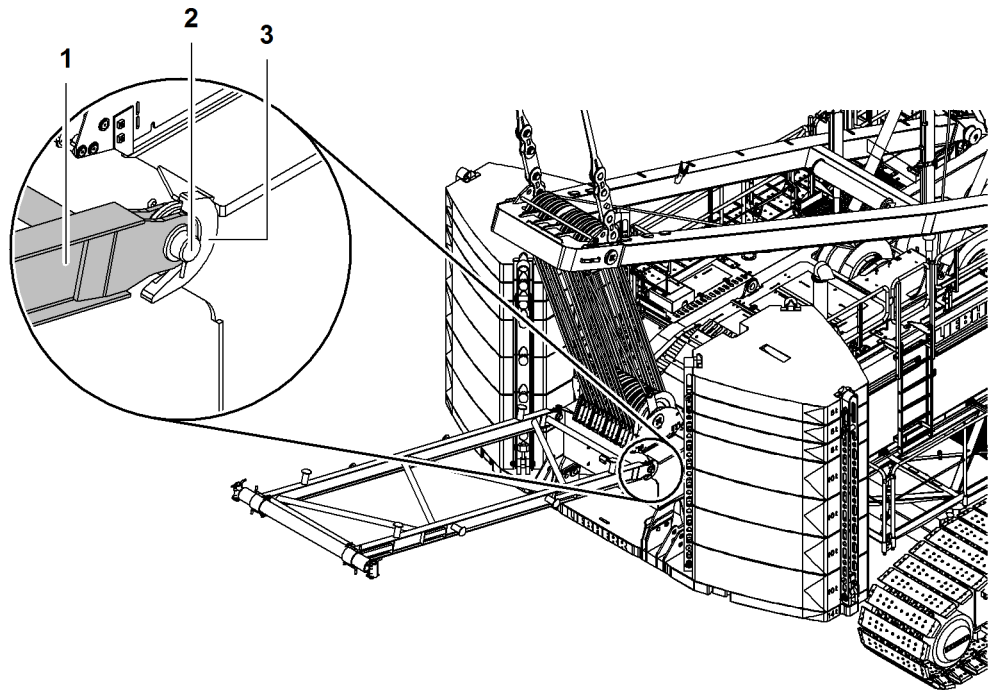


Fig. 3843: Pinning the spacer frame with the uppercarriage

- | | | | |
|---|--------------|---|---------------|
| 1 | Spacer frame | 3 | Uppercarriage |
| 2 | Pin (2x) | | |

The spacer frame 1 can be lifted with the derrick hoist cylinder or with an assist crane.

- ▶ Rig spacer frame 1.
- ▶ Align spacer frame 1 to pin connection points on uppercarriage 3.
- ▶ Pin spacer frame 1 with uppercarriage 3.
- ▶ Secure pins 2 with washers and split pins.

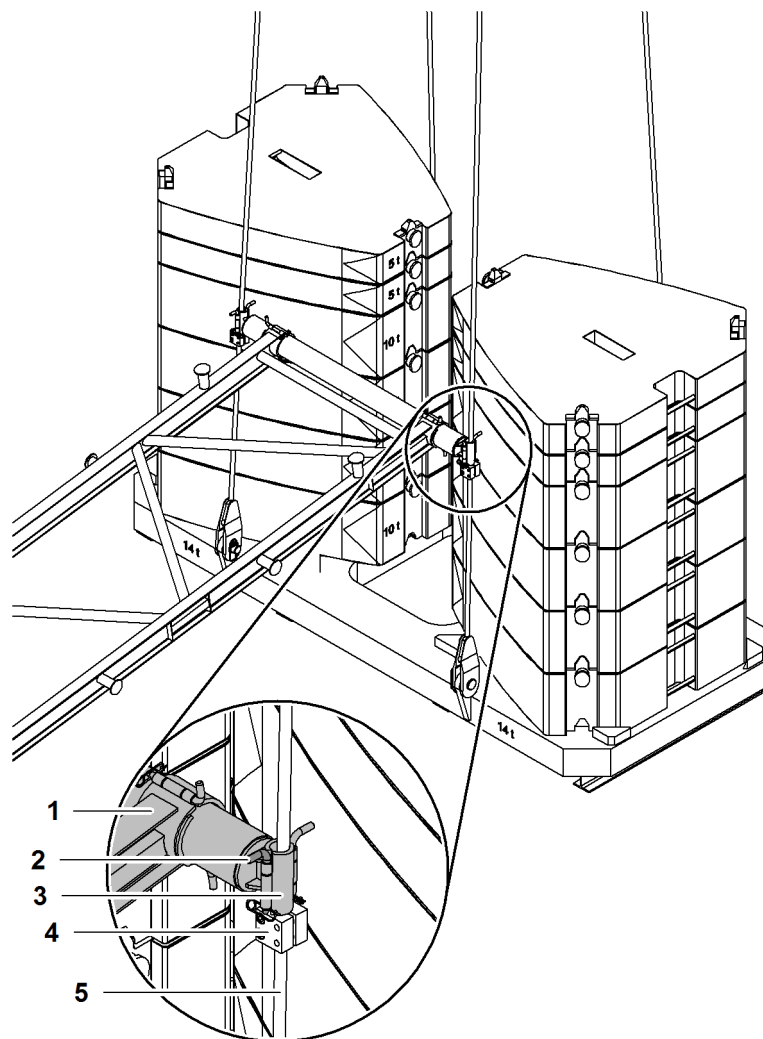


Fig. 3844: Fastening the spacer frame to the suspended counterweight pendant ropes

- | | | | |
|---|-------------------|---|---|
| 1 | Spacer frame | 4 | Rope clamp (2x) |
| 2 | Pin (2x) | 5 | Suspended counterweight pendant rope (2x) |
| 3 | Rope opening (2x) | | |

- ▶ Remove pins **2** of rope openings **3**.
- ▶ Fold open rope openings **3**.
- ▶ Lift spacer frame **1** and insert rope openings **3** on the front suspended counterweight pendant ropes **5** above the rope clamps **4**.
- ▶ Close rope openings **3**.
- ▶ Secure rope openings **3** with pins **2** and locking springs.
 - ▷ Spacer frame **1** rests on the rope clamps **4** of the suspended counterweight pendant ropes **5**.

7.12.5 Pinning the counterweight carriage pendant straps to the counterweight carriage

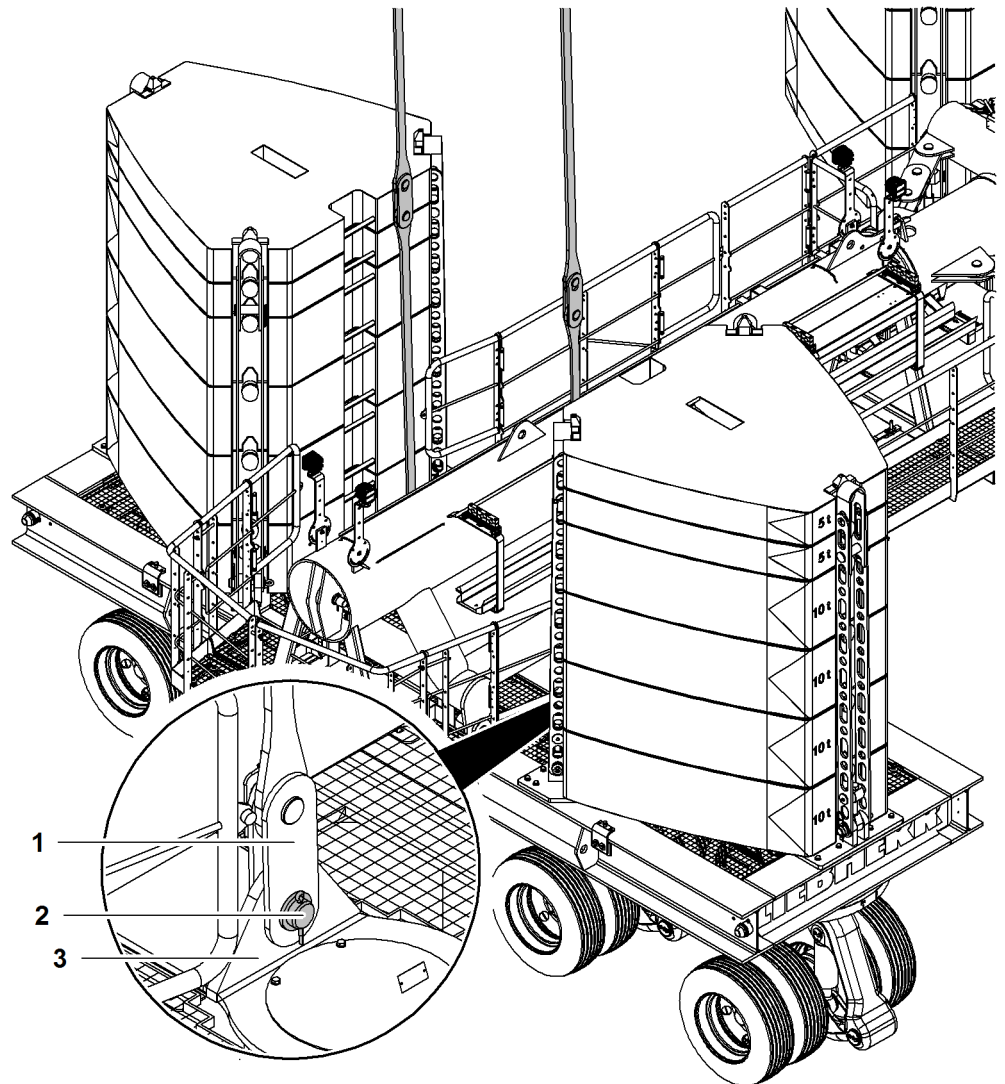


Fig. 3845: Pinning the counterweight carriage pendant straps to the counterweight carriage

- | | |
|---|---|
| <p>1 Counterweight carriage pendant straps</p> <p>2 Pin</p> | <p>3 Pin connection point on counterweight carriage</p> |
|---|---|

- ▶ Pin counterweight carriage pendant straps 1 with pin connection point on 3 counterweight carriage.
- ▶ Secure pins 2 with washers and split pins.
- ▶ Repeat procedure on opposite side.

7.12.6 Erecting the main boom



DANGER

Erectability chart is not followed!
Machine toppling over.

- ▶ Only lift main boom when erection is permitted according to the erectability chart.

Ensure that the following conditions are fulfilled:

- Boom configuration can be erected with counterweight.
- All work on the main boom has been completed.
- No loose parts or tools have been left on the main boom.

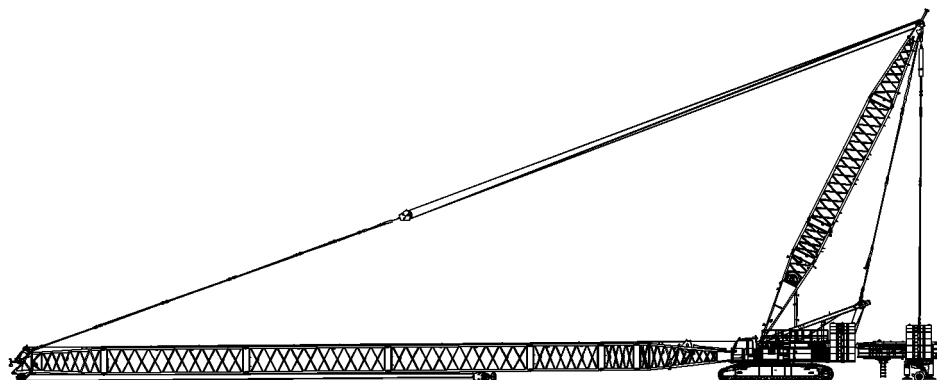


Fig. 3846: Main boom on the ground (illustration of principle)



DANGER

Hoist limit switch bypassed on control panel X23 in crane mode!
Load breakaway.

- ▶ Only bypass hoist limit switch on control panel X23 when assembling or disassembling the machine.



If hoist limit switch weight is on the ground:

- ▶ Press the *Bypass limit switch* button on control panel X23.
 - ▷ Hoist limit switches are bypassed.



- ▶ Press the *Load moment limiter assembly/self-lock* button on control panel X23.

No load chart exists for machine geometry:

- ▷ Function "load moment limiter assembly" is active.
- ▷ The LED on the button "Load moment limiter assembly/self-lock" lights up.
- ▷ Machine functions are enabled unlimited.
- ▷ Load Moment Limiter lamps flash orange.

- ▶ Pretension the counterweight on the derrick boom to approx 10 t (22,046 lb).



WARNING

Falling objects!

- ▶ Any loose parts and tools must be removed from the main boom.
- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.

- ▶ Slowly wind up the derrick winch.
 - ▷ The main boom pendant straps are tensioned.

**WARNING**

Dangerous voltage in boom!
Sudden sideways movement when lifting boom from ground.

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.

- ▶ Continue winding up the derrick winch.
 - ▷ The main boom lifts off the ground.

When the auxiliary jib (36 t (79300 lb)) is attached and lifts off the ground:

- ▶ Stop derrick winch.

NOTICE

Incorrect limit stop setting for the pendant straps of the auxiliary jib!
Damage to auxiliary jib and pulleys on the main boom head when laying down.

- ▶ Ensure that the limit stop is set so that the pendant straps of the auxiliary jib fold upwards when laying down.

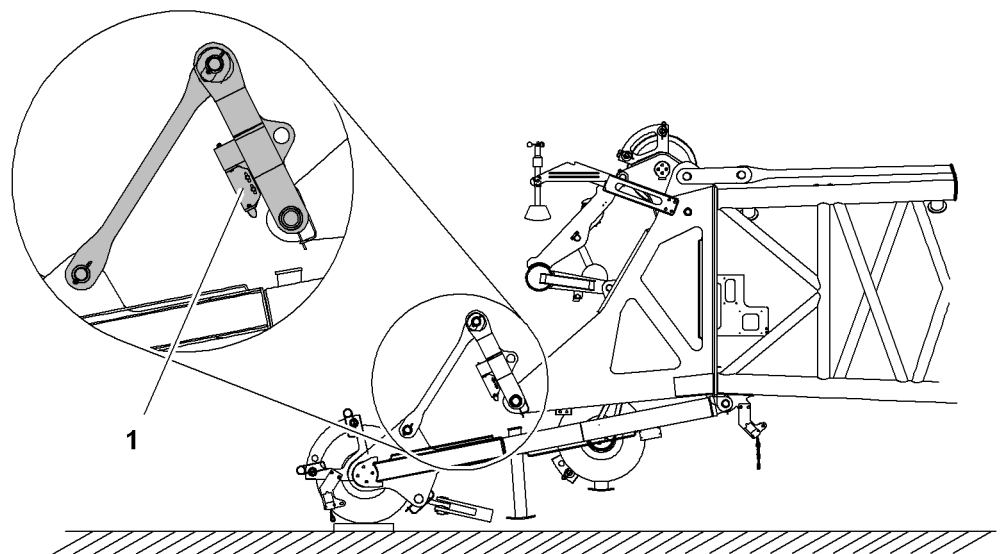


Fig. 3849: Checking the auxiliary jib limit stop

1 Limit stop

- ▶ Check the limit stop **1**, if necessary lay down the main boom and set the limit stop **1**.

When the limit stop **1** is set correctly:

- ▶ Continue winding up the derrick winch.
 - ▷ Main boom erects itself:

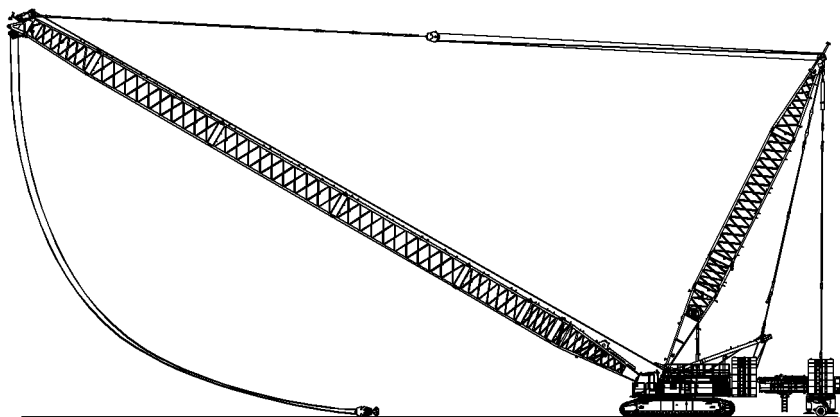


Fig. 3850: Main boom erects itself (illustration of principle)

As soon as there is a load chart for machines geometry:

- ▷ Deactivate function *load moment limiter assembly*.
- ▷ The LED on the button "Load moment limiter assembly/self-lock" goes out.
- ▷ Load moment limiter is active.
- ▷ Load moment limiter lamps light up according to the current status of the Load Moment Limiter system.

NOTICE

Incorrect erection procedure is followed!
Damage to the equipment.

- ▶ Do not drag the hook or the pulley block along the ground.
- ▶ Do not allow any slacking of the rope.

-
- ▶ Unwind the rope of winch1/winch2 when necessary.
 - ▷ The hook/pulley block remains on the ground.

When the maximum permitted lifting capacity is at least equal to the weight of the hook and/or pulley block:

- ▶ Raise the hook/pulley block.
- ▶ Erect the main boom until it is in the desired position.
 - ▷ Main boom is erected:

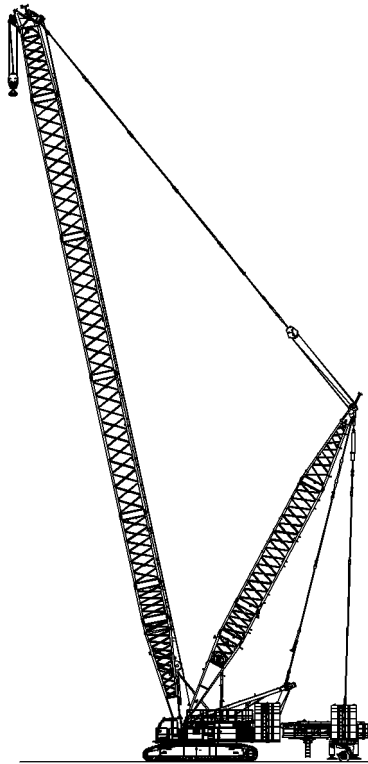


Fig. 3851: Main boom is erected

7.12.7 Turning off assembly functions

Ensure the following conditions are met:

- Machine is readily mounted and erected.
- All limit switches are mounted and functioning.



- ▶ Press the switch *Assembly functions* on control panel X12.
 - ▷ Assembly functions are deactivated.
 - ▷ The symbol *Assembly functions* is no longer displayed on the monitor.

7.12.8 Checking the main boom limit switch plate for proper adjustment

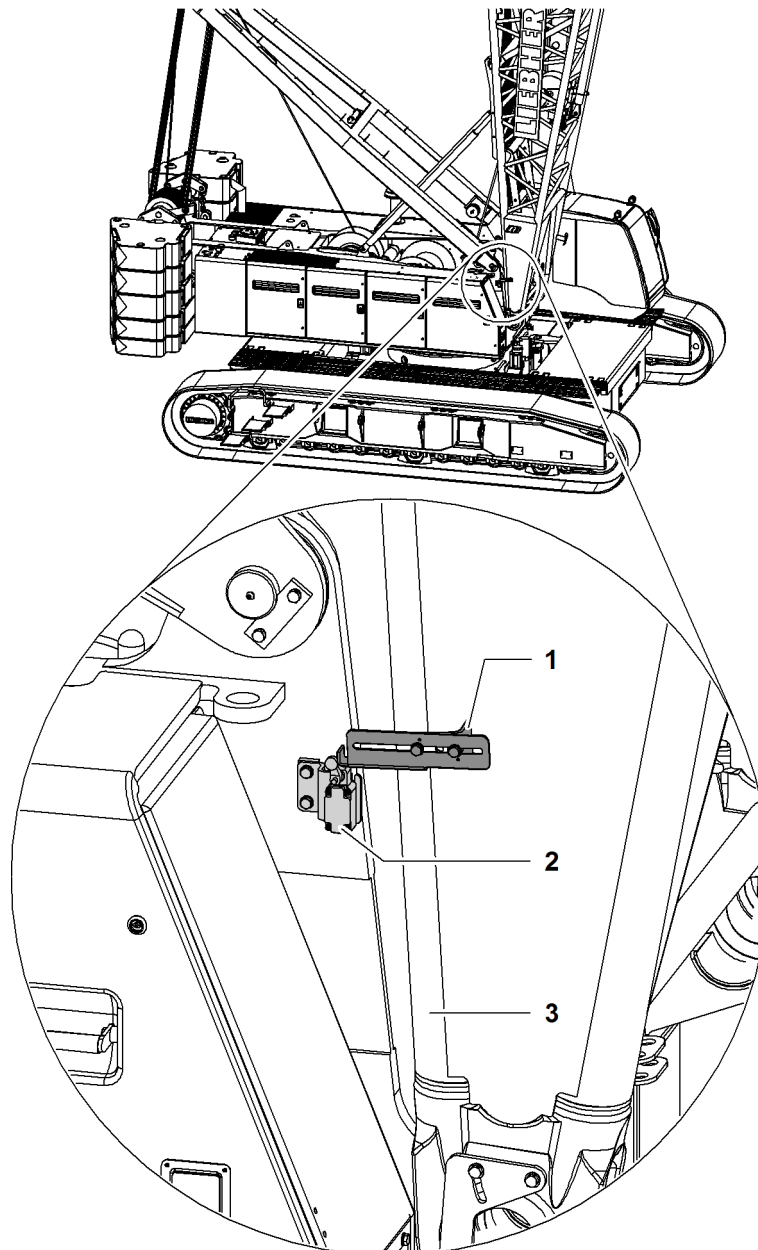


Fig. 3853: Checking the main boom limit switch plate for proper adjustment (illustration of principle)

- | | | | |
|---|--------------------|---|------------------------|
| 1 | Limit switch plate | 3 | Main boom base section |
| 2 | Limit switch | | |

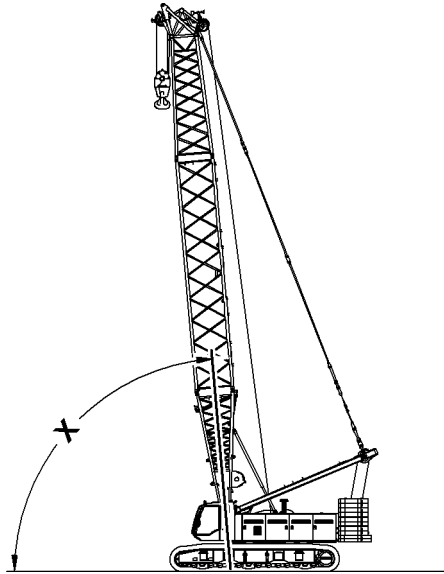


Fig. 3854: Top main boom angle (illustration of principle)

Boom configuration	Angle X
Main boom	86 °
Main boom + derrick	
Main boom + reducing adapter	
Main boom + fixed jib	88 °
Main boom + fixed jib + derrick	
Main boom + luffing jib	
Main boom + luffing jib + derrick	
Main boom + luffing jib + midfall	

Tab. 542: Main boom limit switch plate

NOTICE

Incorrectly calibrated main boom limit switch plate!
Damage to machine.

► Ensure that the main boom limit switch plate is properly calibrated.

- Erect the main boom until the *operation* screen shows the angle **X**.
- ▷ Limit switch triggers.
 - ▷ Lift main boom is locked.

If the limit switch triggers too early or not at all:

- Turn machine off.
- Contact Liebherr customer service.

7.13 Main boom 2821 + reducing adapter 2821/2316

System-relevant information for main boom 2821 + reducing adapter 2821/2316:

- Configuration of main boom
 - Installation position of rope guide (type A)
 - Mid-point suspensions installation positions
- Lengths of mid-point suspensions
- Overview of main boom 2821 steel pendant straps + reducing adapter 2821/2316
- Overview of main boom 2821 CF pendant straps + reducing adapter 2821/2316
- Reeving diagrams for one rope across main boom head 2316 (load position1)
- Reeving diagrams for two ropes across main boom head 2316 (load position1)

7.13.1 Configuration of main boom



DANGER

Excess length of main boom!
Structural breakdown.

- ▶ Check main boom length in load chart for validity.



DANGER

Reducing adapter installed in wrong installation position!
Structural breakdown.

- ▶ Only install reducing adapter at 43 m (141 ft), 46 m (151 ft) or 55 m (180 ft).

Installation position reducing adapter 43 m (141 ft)	
Main boom length	Configuration of main boom (symbolic)
69 m 226 ft	
72 m 236 ft	
75 m 246 ft	
78 m 256 ft	
81 m 266 ft	
84 m 276 ft	
87 m 285 ft	
90 m 295 ft	

Installation position reducing adapter 43 m (141 ft)	
Main boom length	Configuration of main boom (symbolic)
93 m 305 ft	
96 m 315 ft	
99 m 325 ft	
102 m 335 ft	
105 m 344 ft	
108 m 354 ft	
111 m 364 ft	
114 m 374 ft	
117 m 384 ft	
120 m 394 ft	
123 m 404 ft	

Tab. 543: Configuration of main boom 2821 + reducing adapter 2821/2316 - installation position reducing adapter 43 m (141 ft)

S - Installation position rope guide (type A)

X1 - Installation position mid-point suspension 1

X2 - Installation position mid-point suspension 2

Installation position reducing adapter 46 m (151 ft)	
Main boom length	Configuration of main boom (symbolic)
72 m 236 ft	
75 m 246 ft	
78 m 256 ft	
81 m 266 ft	
84 m 276 ft	

Installation position reducing adapter 46 m (151 ft)	
Main boom length	Configuration of main boom (symbolic)
87 m 285 ft	
90 m 295 ft	
93 m 305 ft	
96 m 315 ft	
99 m 325 ft	
102 m 335 ft	
105 m 344 ft	
108 m 354 ft	
111 m 364 ft	
114 m 374 ft	
117 m 384 ft	
120 m 394 ft	
123 m 404 ft	

Tab. 544: Configuration of main boom 2821 + reducing adapter 2821/2316 - installation position reducing adapter 46 m (151 ft)

S - Installation position rope guide (type A)

X1 - Installation position mid-point suspension 1

X2 - Installation position mid-point suspension 2

Installation position reducing adapter 55 m (180 ft)	
Main boom length	Configuration of main boom (symbolic)
81 m 266 ft	
84 m 276 ft	
87 m 285 ft	

Installation position reducing adapter 55 m (180 ft)	
Main boom length	Configuration of main boom (symbolic)
90 m 295 ft	
93 m 305 ft	
96 m 315 ft	
99 m 325 ft	
102 m 335 ft	
105 m 344 ft	
108 m 354 ft	
111 m 364 ft	
114 m 374 ft	
117 m 384 ft	
120 m 394 ft	

Tab. 545: Configuration of main boom 2821 + reducing adapter 2821/2316 - installation position reducing adapter 55 m (180 ft)

S - Installation position rope guide (type A)

X1 - Installation position mid-point suspension 1

X2 - Installation position mid-point suspension 2

7.13.2 Lengths of mid-point suspensions

Assembly position of the reducing piece 43 m (141 ft)		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
69 m 226 ft	1.3 m 4' 3" ft-in	
72 m 236 ft	1.6 m 5' 3" ft-in	
75 m 246 ft		0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)

Assembly position of the reducing piece 43 m (141 ft)		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
78 m 256 ft		0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)
81 m 266 ft	3.4 m 11' 2" ft-in = 2.1 m (6' 11" ft-in) + 1.3 m (4' 3" ft-in)	0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)
84 m 276 ft	3.7 m 12' 2" ft-in = 2.6 m (8' 6" ft-in) + 1.1 m (3' 7" ft-in)	0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)
87 m 285 ft	3.7 m 12' 2" ft-in = 2.6 m (8' 6" ft-in) + 1.1 m (3' 7" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
90 m 295 ft	3.7 m 12' 2" ft-in = 2.6 m (8' 6" ft-in) + 1.1 m (3' 7" ft-in)	0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)
93 m 305 ft	3.7 m 12' 2" ft-in = 2.6 m (8' 6" ft-in) + 1.1 m (3' 7" ft-in)	0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)
96 m 315 ft	2.7 m 8' 10" ft-in = 1.6 m (5' 3" ft-in) + 1.1 m (3' 7" ft-in)	0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)
99 m 325 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
102 m 335 ft	3.9 m 12' 10" ft-in = 2.6 m (8' 6" ft-in) + 1.3 m (4' 3" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
105 m 344 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)

Assembly position of the reducing piece 43 m (141 ft)		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
108 m 354 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
111 m 364 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
114 m 374 ft	4.1 m 13' 5" ft-in = 3.0 m (9' 10" ft-in) + 1.1 m (3' 7" ft-in)	1.6 m 5' 3" ft-in ^{A)}
117 m 384 ft	3.4 m 11' 2" ft-in = 2.1 m (6' 11" ft-in) + 1.3 m (4' 3" ft-in)	0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)
120 m 394 ft	3.4 m 11' 2" ft-in = 2.1 m (6' 11" ft-in) + 1.3 m (4' 3" ft-in)	0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)
123 m 404 ft	2.9 m 9' 6" ft-in = 1.6 m (5' 3" ft-in) + 1.3 m (4' 3" ft-in)	0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)

Tab. 546: Lengths of mid-point suspensions - 2821 main boom + 2821/2316 reducing piece - assembly position of reducing piece 43 m (141 ft)

A) Backstay pendant

Assembly position of the reducing piece 46 m (151 ft)		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
72 m 236 ft	1.3 m 4' 3" ft-in	
75 m 246 ft	1.6 m 5' 3" ft-in	
78 m 256 ft	1.6 m 5' 3" ft-in	
81 m 266 ft	1.6 m 5' 3" ft-in	

Assembly position of the reducing piece 46 m (151 ft)		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
84 m 276 ft	3.4 m 11' 2" ft-in = 2.1 m (6' 11" ft-in) + 1.3 m (4' 3" ft-in)	0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)
87 m 285 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)
90 m 295 ft	3.7 m 12' 2" ft-in = 2.6 m (8' 6" ft-in) + 1.1 m (3' 7" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
93 m 305 ft	3.7 m 12' 2" ft-in = 2.6 m (8' 6" ft-in) + 1.1 m (3' 7" ft-in)	0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)
96 m 315 ft	3.7 m 12' 2" ft-in = 2.6 m (8' 6" ft-in) + 1.1 m (3' 7" ft-in)	1.3 m 4' 3" ft-in ^{A)}
99 m 325 ft	2.7 m 8' 10" ft-in = 1.6 m (5' 3" ft-in) + 1.1 m (3' 7" ft-in)	0.62 m 2' ft-in = 0.42 m (1' 5" ft-in) + 0.2 m (7.87" in)
102 m 335 ft	2.7 m 8' 10" ft-in = 1.6 m (5' 3" ft-in) + 1.1 m (3' 7" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
105 m 344 ft	3 m 9' 10" ft-in	0.62 m 2' ft-in = 0.42 m (1' 5" ft-in) + 0.2 m (7.87" in)
108 m 354 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
111 m 364 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)

Assembly position of the reducing piece 46 m (151 ft)		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
114 m 374 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)
117 m 384 ft	3.4 m 11' 2" ft-in = 2.1 m (6' 11" ft-in) + 1.3 m (4' 3" ft-in)	0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)
120 m 394 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)
123 m 404 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)

Tab. 547: Lengths of mid-point suspensions - 2821 main boom + 2821/2316 reducing piece - assembly position of reducing piece 46 m (151 ft)

A) Backstay pendant

Assembly position of the reducing piece 55 m (180 ft)		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
81 m 266 ft	2.1 m 6' 11" ft-in	
84 m 276 ft	2.6 m 8' 6" ft-in	
87 m 285 ft	3.7 m 12' 2" ft-in = 2.6 m (8' 6" ft-in) + 1.1 m (3' 7" ft-in)	0.62 m 2' ft-in = 0.42 m (1' 5" ft-in) + 0.2 m (7.87" in)
90 m 295 ft	3.7 m 12' 2" ft-in = 2.6 m (8' 6" ft-in) + 1.1 m (3' 7" ft-in)	0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)
93 m 305 ft	3.7 m 12' 2" ft-in = 2.6 m (8' 6" ft-in) + 1.1 m (3' 7" ft-in)	0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)

Assembly position of the reducing piece 55 m (180 ft)		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
96 m 315 ft	4.1 m 13' 5" ft-in = 3.0 m (9' 10" ft-in) + 1.1 m (3' 7" ft-in)	0.74 m 2' 5" ft-in = 0.54 m (1' 9" ft-in) + 0.2 m (7.87" in)
99 m 325 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)
102 m 335 ft	4.1 m 13' 5" ft-in = 3.0 m (9' 10" ft-in) + 1.1 m (3' 7" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
105 m 344 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
108 m 354 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
111 m 364 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	1.15 m 3' 9" ft-in = 0.95 m (3' 1" ft-in) + 0.2 m (7.87" in)
114 m 374 ft	3.2 m 10' 6" ft-in = 2.1 m (6' 11" ft-in) + 1.1 m (3' 7" ft-in)	0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)
117 m 384 ft	3.4 m 11' 2" ft-in = 2.1 m (6' 11" ft-in) + 1.3 m (4' 3" ft-in)	0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)
120 m 394 ft	3.4 m 11' 2" ft-in = 2.1 m (6' 11" ft-in) + 1.3 m (4' 3" ft-in)	0.93 m 3' 1" ft-in = 0.73 m (2' 5" ft-in) + 0.2 m (7.87" in)

Tab. 548: Lengths of mid-point suspensions - 2821 main boom + 2821/2316 reducing piece - assembly position of reducing piece 55 m (180 ft)

7.13.3 Overview of main boom 2821 steel pendant straps + reducing adapter 2821/2316

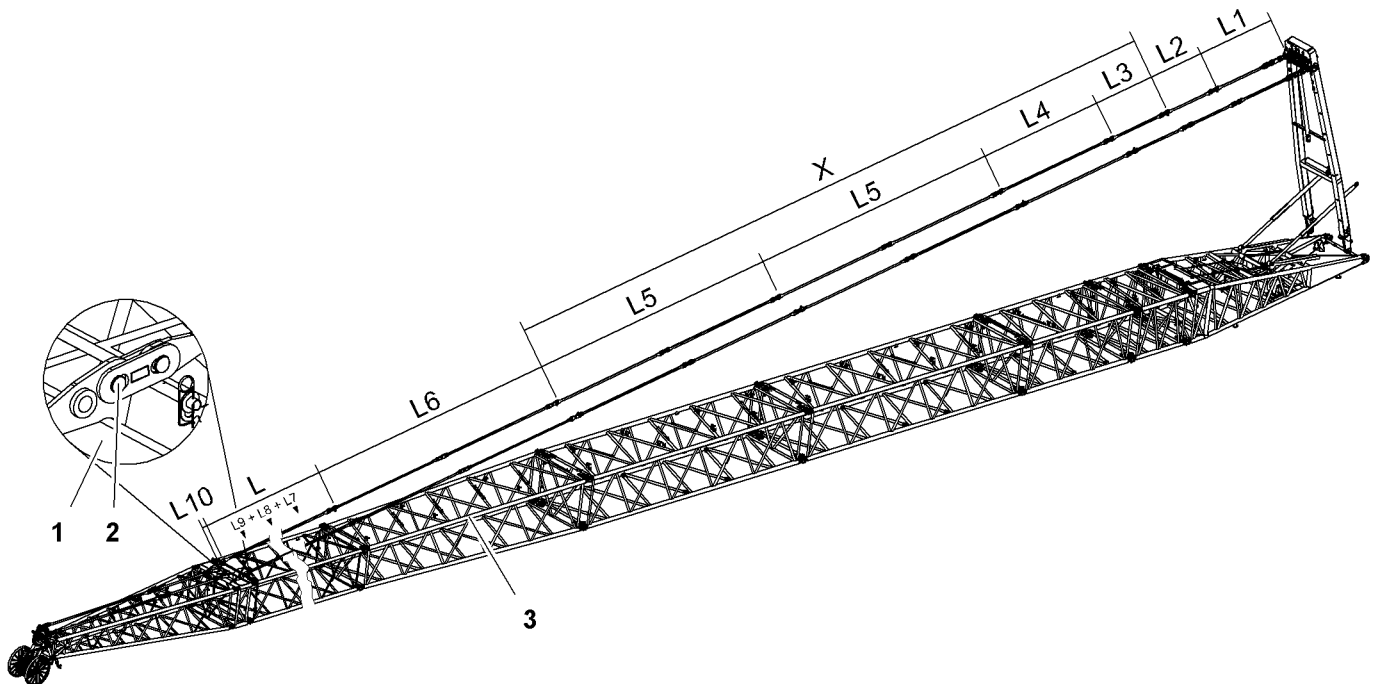


Fig. 4357: Overview of main boom 2821 steel pendant straps + reducing adapter 2821/2316

- 1 Main boom section 2316
1 m (3 ft)
- 2 Pin connection point main
boom backstay straps
- 3 Reducing adapter

Pendant straps A-frame1 to main boom head 2316

Name		Value
L1	A-frame1 equalizer (For more information see: A-frame1 equalizer, page 77)	3730 mm 12' 3" ft-in
L2	Main boom base section equalizer (For more information see: Equalizer of main boom base section 2821.30, page 197)	2670 mm 8' 9" ft-in
Main boom pendant straps consisting of:		
X	L3 Main boom pendant strap 3 m (10 ft) (For more information see: Main boom pendant strap 3 m (10 ft), page 198)	Total L3 +
	L4 Main boom pendant strap 6 m (20 ft) (For more information see: Main boom pendant strap 6 m (20 ft), page 200)	Total L4 +
	L5 Main boom pendant strap 12 m (40 ft) (For more information see: Main boom pendant strap 12 m (40 ft), page 202)	Total L5

Name		Value
L6	Reducing adapter pendant strap 12 m (40 ft) (For more information see: Reducing adapter pendant strap 12 m (40 ft), page 248)	12000 mm 39' 4" ft-in
L	Main boom pendant straps consisting of:	
	L7 Main boom pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 316)	Total L7 +
	L8 Main boom pendant strap 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft), page 316)	Total L8 +
L9 Main boom pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 317)	Total L9	
L10	Connecting link (For more information see: Connecting link, page 249)	350 mm 1' 2" ft-in

Tab. 549: Pendant straps A-frame1 to main boom head 2316

Configuration of main boom pendant straps (X):

Reducing adapter installation position	Configuration of main boom pendant straps (X)
43 m 141' 1" ft-in	$X = L3 + L4 + L5 + L5$
46 m 150' 11" ft-in	$X = L5 + L5 + L5$
55 m 180' 5" ft-in	$X = L3 + L4 + L5 + L5 + L5$

Tab. 550: Configuration of main boom pendant straps (X) depends on the reducing adapter installation position

Configuration of main boom pendant straps (L):

Required number of main boom pendant straps 3 m (10 ft) (L7) corresponds to number of main boom sections 3 m (10 ft).

Required number of main boom pendant straps 6 m (20 ft) (L8) corresponds to number of main boom sections 6 m (20 ft).

Required number of main boom pendant straps 12 m (40 ft) (L9) corresponds to number of main boom sections 12 m (40 ft).



Note

- For admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following tables: ([For more information see: 7.13.1 Configuration of main boom, page 1562](#)) .

7.13.4 Overview of main boom 2821 CF pendant straps + reducing adapter 2821/2316

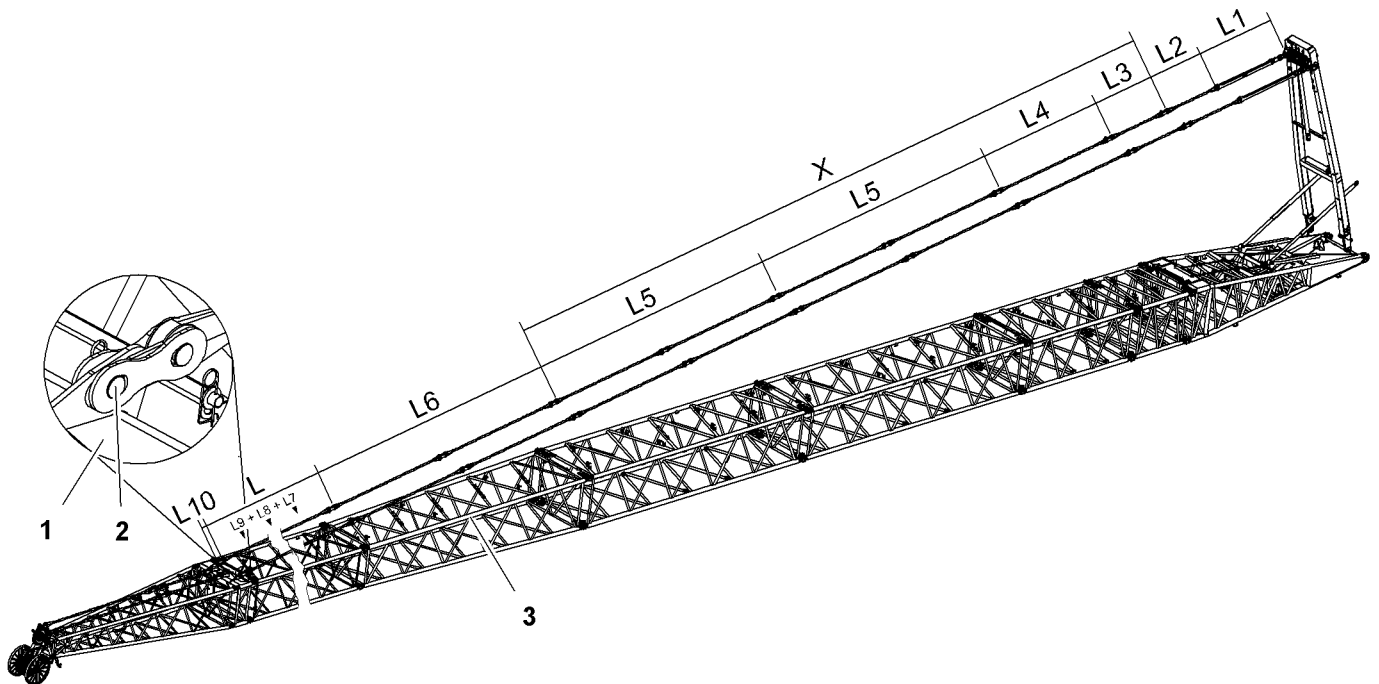


Fig. 4358: Overview of main boom 2821 CF pendant straps + reducing adapter 2821/2316

- 1 Main boom section 2316 1 m (3 ft)
- 2 Pin connection point main boom backstay straps
- 3 Reducing adapter

Pendant straps A-frame1 to main boom head 2316

Name		Value
L1	A-frame1 equalizer (For more information see: A-frame1 equalizer, page 78)	3700 mm 12' 2" ft-in
L2	Main boom base section equalizer (For more information see: Equalizer of main boom base section 2821.30, page 206)	2700 mm 8' 10" ft-in
Main boom pendant straps consisting of:		
X	L3 Main boom pendant strap 3 m (10 ft) (For more information see: Main boom pendant strap 3 m (10 ft), page 209)	Total L3 +
	L4 Main boom pendant strap 6 m (20 ft) (For more information see: Main boom pendant strap 6 m (20 ft), page 212)	Total L4 +
	L5 Main boom pendant strap 12 m (40 ft) (For more information see: Main boom pendant strap 12 m (40 ft), page 216)	Total L5

Name		Value
L6	Reducing adapter pendant strap 12 m (40 ft) (For more information see: Reducing adapter pendant strap 12 m (40 ft), page 250)	12000 mm 39' 4" ft-in
L	Main boom pendant straps consisting of:	
	L7 Main boom pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 325)	Total L7 +
	L8 Main boom pendant strap 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft), page 327)	Total L8 +
L9 Main boom pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 328)	Total L9	
L10	Connecting link (For more information see: Connecting link, page 251)	350 mm 1' 2" ft-in

Tab. 551: Pendant straps A-frame1 to main boom head 2316

Configuration of main boom pendant straps (X):

Reducing adapter installation position	Configuration of main boom pendant straps (X)
43 m 141' 1" ft-in	$X = L3 + L4 + L5 + L5$
46 m 150' 11" ft-in	$X = L5 + L5 + L5$
55 m 180' 5" ft-in	$X = L3 + L4 + L5 + L5 + L5$

Tab. 552: Configuration of main boom pendant straps (X) depends on the reducing adapter installation position

Configuration of main boom pendant straps (L):

Required number of main boom pendant straps 3 m (10 ft) (L7) corresponds to number of main boom sections 3 m (10 ft).

Required number of main boom pendant straps 6 m (20 ft) (L8) corresponds to number of main boom sections 6 m (20 ft).

Required number of main boom pendant straps 12 m (40 ft) (L9) corresponds to number of main boom sections 12 m (40 ft).



Note

- For admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following tables: ([For more information see: 7.13.1 Configuration of main boom, page 1562](#)) .

The main boom pendant straps may consist of generation A and generation B main boom pendant straps. Mixing is only admissible if the number of generation B main boom pendant straps only differs by at most 1 in the left and the right strand of the main boom pendant straps.



DANGER

Inadmissible mixing of generation A and generation B main boom pendant straps!
Structural failure.

- ▶ Ensure that the number of generation B main boom pendant straps differs by at most 1 in the left and the right strand of the main boom pendant straps.

7.13.5 Reeving diagrams for one rope across main boom head 2316 (load position 1)

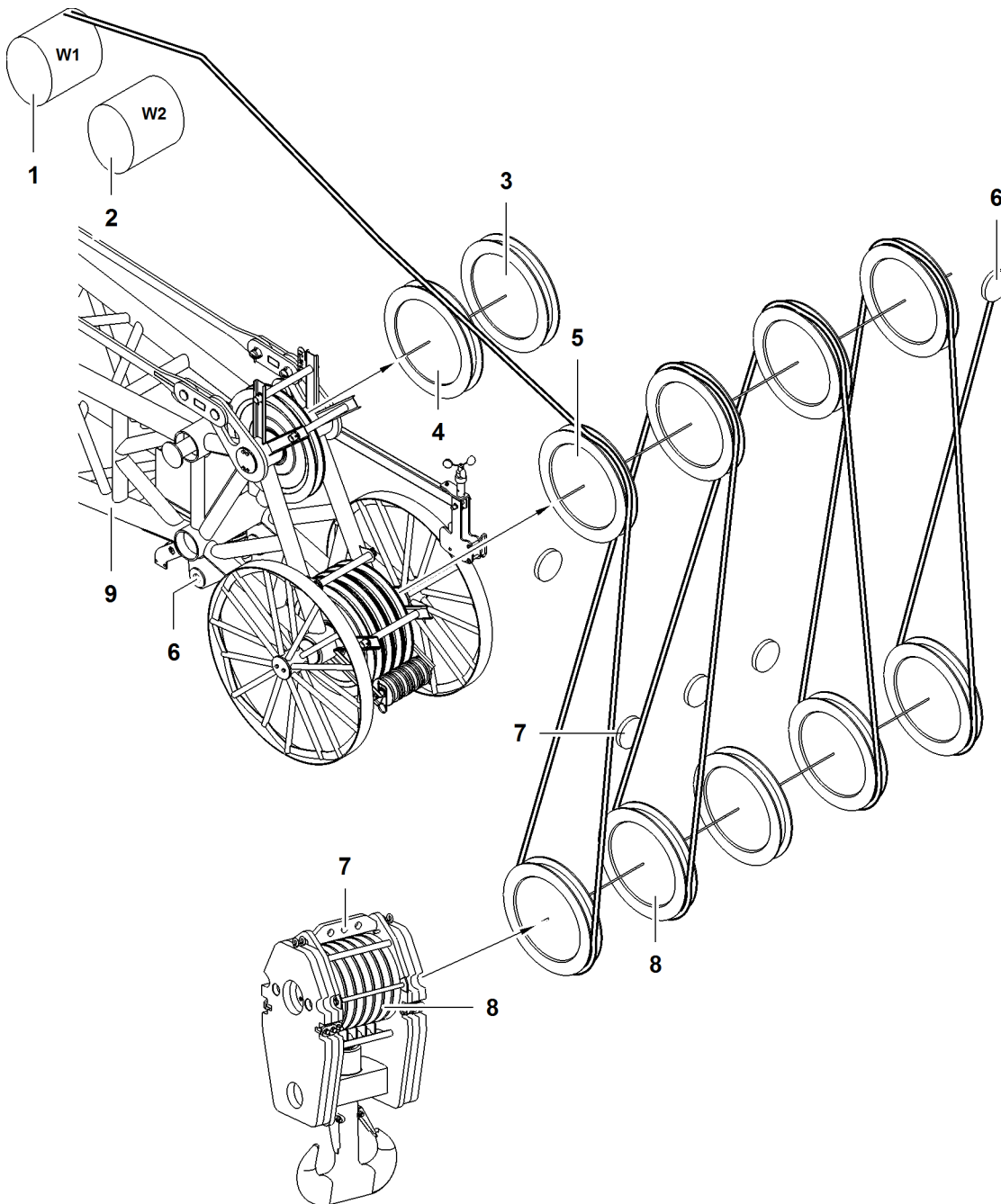


Fig. 4359: Reeving diagrams for one rope across main boom head 2316 (load position 1)

- | | | |
|----------|-----------------------------------|--------------------------------------|
| 1 Winch1 | 4 Gantry pulley of main boom head | 7 Rope fixing points of pulley block |
|----------|-----------------------------------|--------------------------------------|

See next page for continuation of the image legend

Main boom 2821 + reducing adapter 2821/2316

- | | | |
|---|---|---|
| <p>2 Winch2</p> <p>3 Retrofit kit* for operation with two ropes across jib head section</p> | <p>5 Rope pulley (4x) of main boom head</p> <p>6 Rope fixing point (2x) of main boom head</p> | <p>8 Pulley set of pulley block</p> <p>9 Main boom head</p> |
|---|---|---|

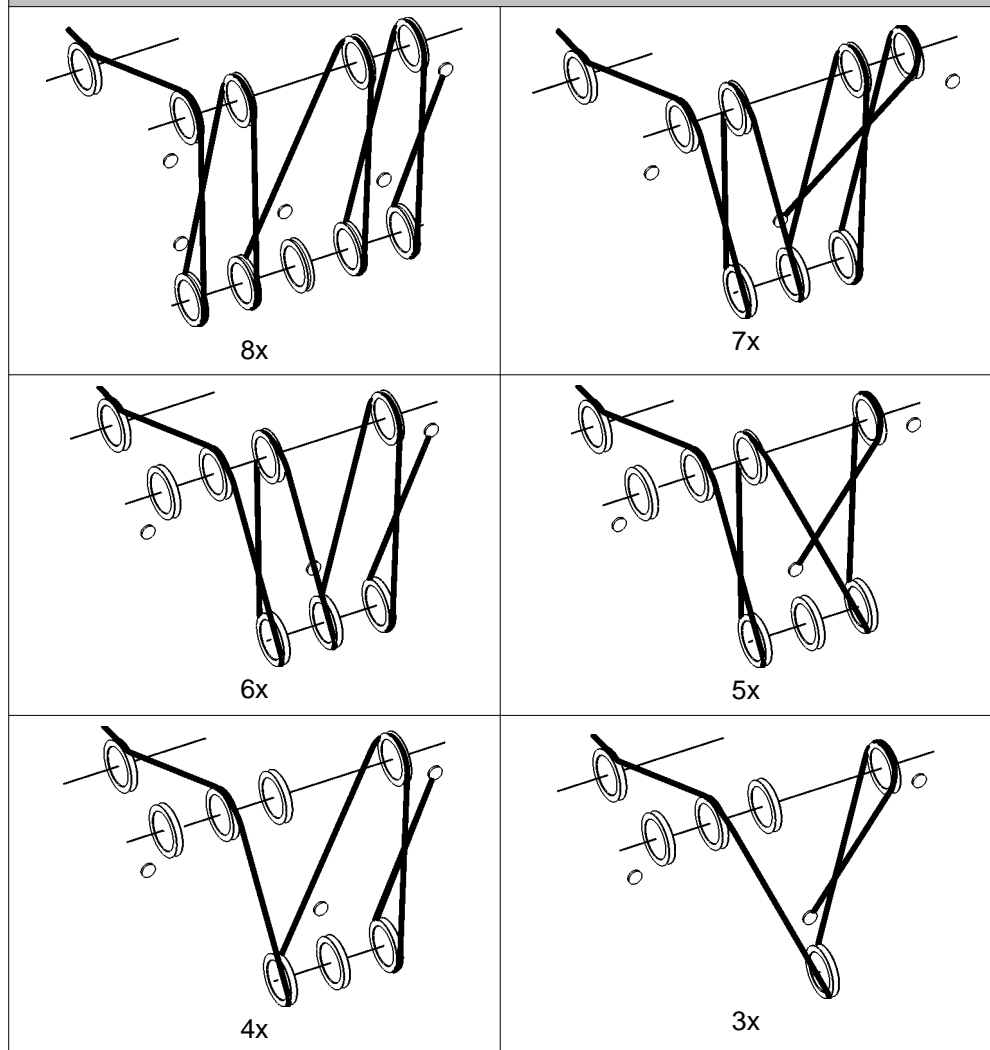


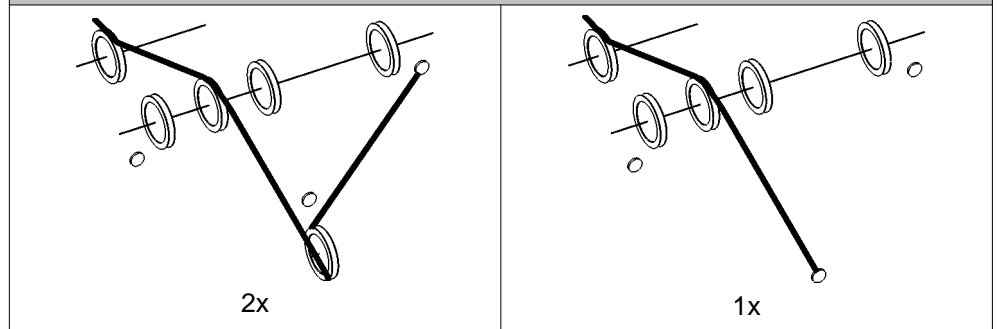
DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

▶ Select correct number of reevings as indicated in load chart.

Reeving diagrams for one rope across main boom head 2316 (load position 1)



Reeving diagrams for one rope across main boom head 2316 (load position 1)

Tab. 553: Reeving diagrams for one rope across main boom head 2316 (load position 1)

7.13.6 Reeving diagrams for two ropes across main boom head 2316 (load position 1)

**DANGER**

Inadmissible number of reeving!
Structural breakdown, toppling of machine.

► Choose correct number of reeving as indicated in load chart.

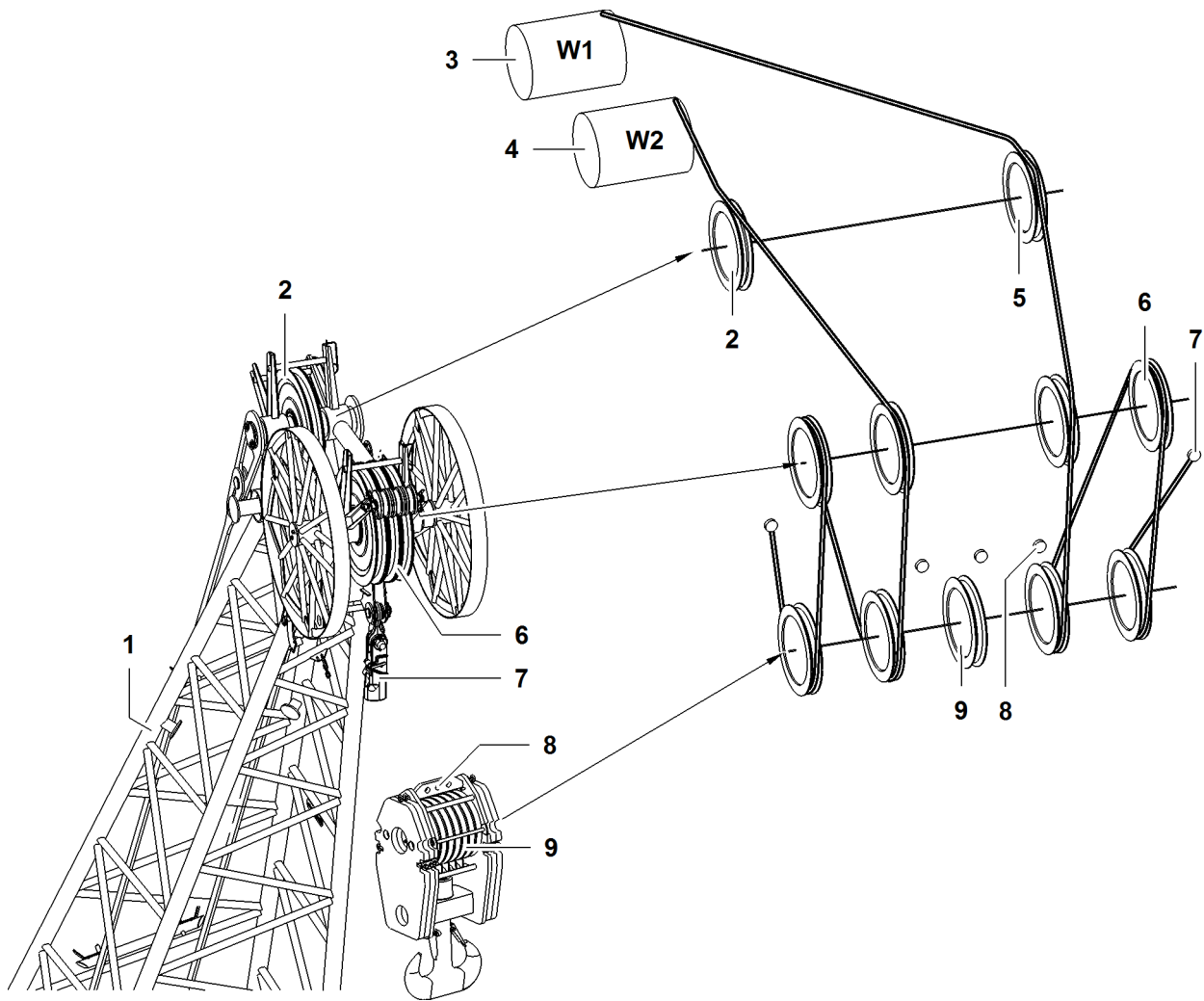


Fig. 4368: Reeving diagrams for two ropes across main boom head 2316 (load position 1)

- | | | | | | |
|---|---------------------------------|---|--|---|--|
| 1 | Main boom head | 4 | Winch2 | 7 | Rope fixing point (2x) of main boom head |
| 2 | Gantry pulley of main boom head | 5 | Retrofit kit* for operation with two ropes across jib head | 8 | Rope fixing points of pulley block |
| 3 | Winch1 | 6 | Pulley (4x) of main boom head | 9 | Pulley set of pulley block |

7.14 Assembling the main boom + reducing piece

Ensure that the following conditions are fulfilled:

- Assembly functions are switched on.
- The machine is ready for use as an assembly crane, or an assist crane is available.
- Work plans have been drawn up.
- The length and the order of the main boom intermediate pieces are known.
- The installation position of the reducing piece is known.
- Any accessories required are available.

7.14.1 Notes

The installation of the reducing adapter described in the following applies for all system dimensions of the reducing adapter.

The illustrations have been simplified or schematically represented for reasons of uniformity and represent the principles of assembly. They do not provide a detailed representation of the components.

7.14.2 Installing reducing adapter

The installation steps are identical to the installation steps of the main boom without reducing adapter. Only specific information about the installation of the reducing adapter are listed in the following. The remaining work steps must be performed as described previously for the assembly of the main boom.



DANGER

Reducing adapter installed in wrong installation position!
Structural failure.

- ▶ Only install reducing adapter in accordance with the system-relevant specifications.
- ▶ Install and pin reducing adapter at the specified position.
- ▶ Pin reducing adapter pendant straps at position of the reducing adapter with the main boom pendant straps.



DANGER

Wrong assembly of main boom!
Structural failure.

If according to system-relevant details of reducing adapter the main boom section 1 m (3 ft) is specified:

- ▶ Install main boom section 1 m (3 ft) between main boom head and last main boom section.

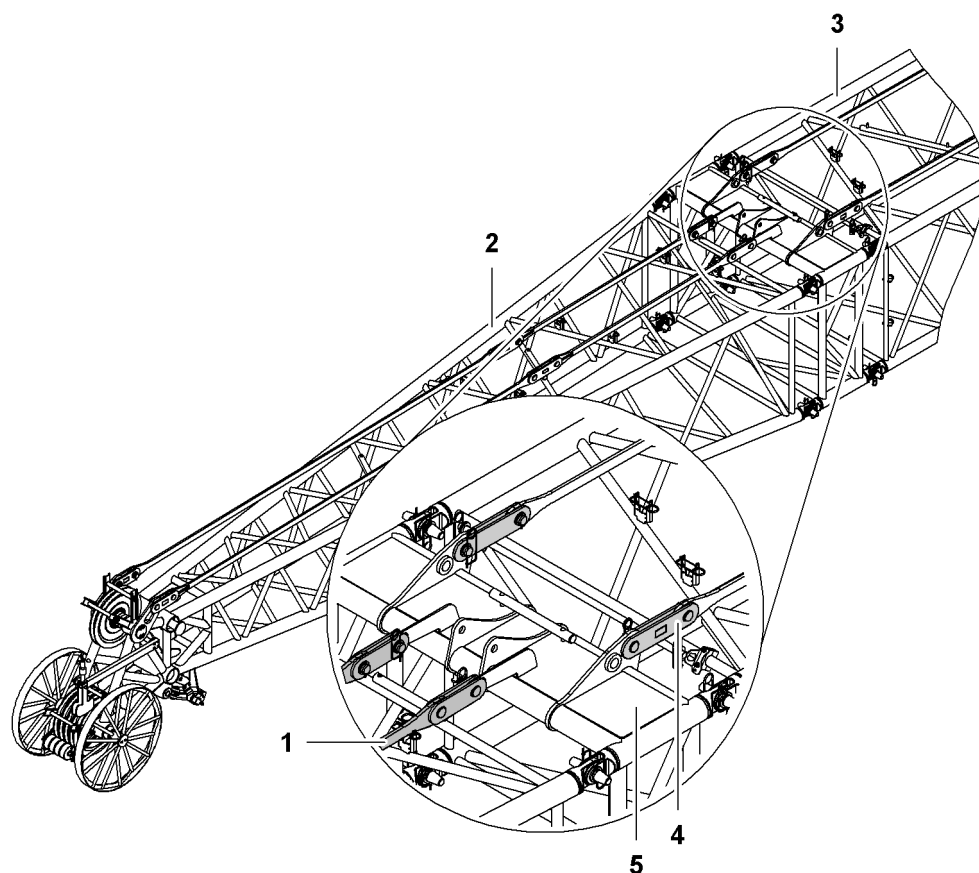


Fig. 4369: Installing main boom section 1 m (3 ft)

- | | | | |
|---|--|---|------------------------------|
| 1 | Main boom pendant strap on main boom head (2x) | 4 | Main boom pendant strap (2x) |
| 2 | Main boom head | 5 | Main boom section 1 m (3 ft) |
| 3 | Main boom section | | |

If according to system-relevant details of reducing adapter the main boom section 1 m (3 ft) **5** is specified:

- ▶ Install main boom section 1 m (3 ft) **5** between main boom head **1** and last main boom section **2**.
- ▶ Pin main boom pendant straps **4** with main boom section 1 m (3 ft) **5**.
- ▶ Pin main boom pendant straps **3** on main boom head with main boom section 1 m (3 ft) **5**.

7.14.3 Installing mid-point suspension

The lengths of the stay ropes and backstay shackles and their assembly positions are shown in the relevant instructions for the boom.



DANGER

Incorrect installation of mid-point suspensions!
Structural failure.

- ▶ Fit mid-point suspensions according to relevant system instructions.

- ▶ Assemble required length of backstay shackles in line with system-relevant details.

- ▶ Remove the locking springs and washers from both sides of the boom pin connection double-taper pin and stow away.
- ▶ Repeat procedure on opposite side.

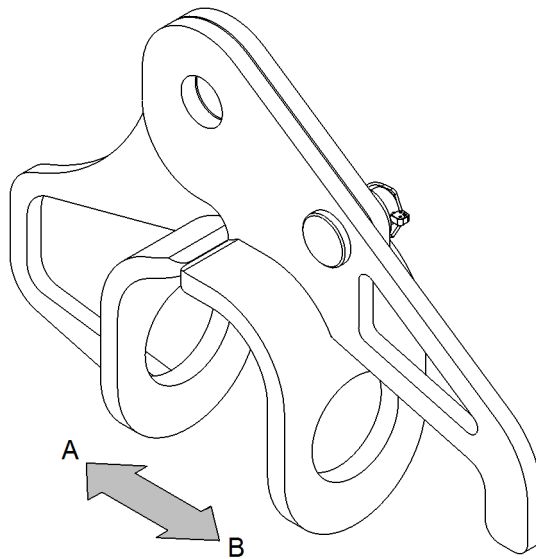


Fig. 4370: Mid-point suspension forks

- A** Main boom interior
- B** Main boom exterior

The forks may have different shapes. The permissible shape depends on the boom configuration (For more information see: [1 Product description, page 51](#)).

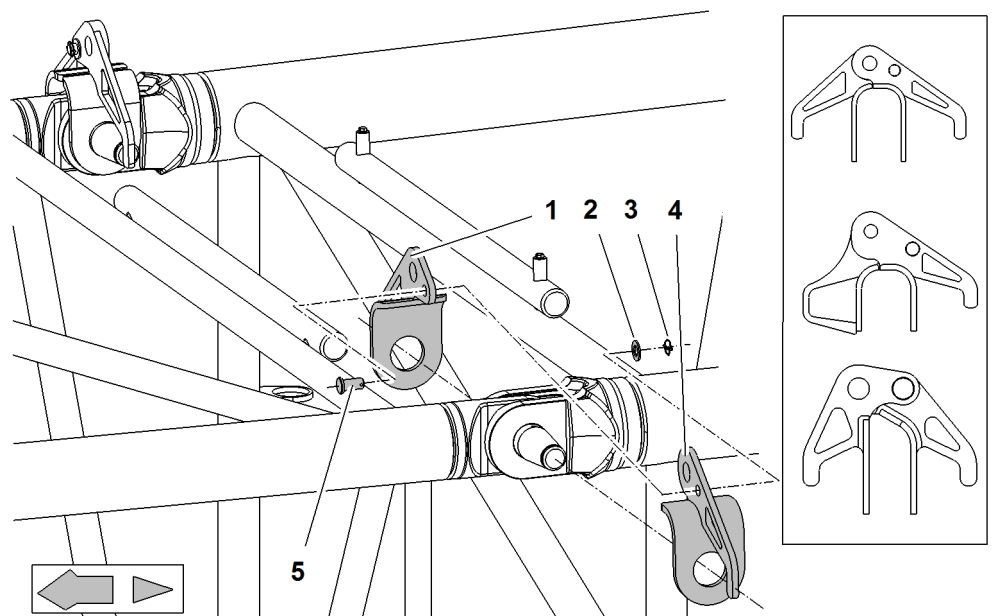


Fig. 4371: Assembling the mid-point suspension forks

- 1** Inner section of fork
- 2** Washer
- 3** Linchpin
- 4** Outer section of fork
- 5** Pin



Note

Special assembly procedure when mid-point suspension and rope guide are installed in exactly the same position on the main boom!

▶ Replace mid-point suspension forks with rope guide forks.

- ▶ Mount inner section of fork **1** on double-taper pin.
- ▶ Mount outer section of fork **4** on double-taper pin.
- ▶ Pin inner section of fork **1** to outer section of fork **4**.
- ▶ Secure pin **5** with washer **2** and linchpin **3**.
- ▶ Repeat procedure on opposite side.

The installation of the mid-point suspension in front of the reducing adapter is described in the main boom assembly instructions ([For more information see: Installing the mid-point suspension, page 1471](#)).

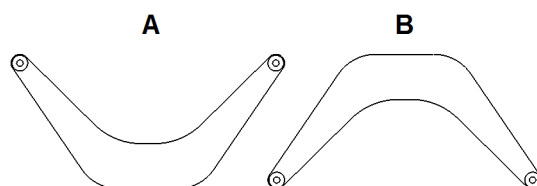


Fig. 4372: Installation direction of the spacer bracket behind the reducing adapter

A Spacer bracket down

B Spacer bracket up

Install spacer bracket behind reducing adapter in installation position spacer bracket **B up**.

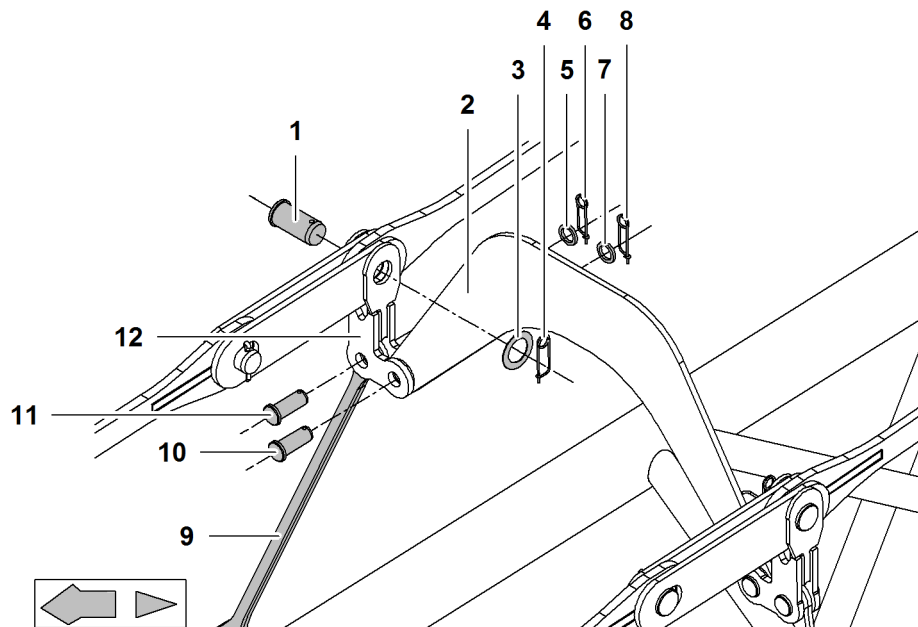


Fig. 4373: Installing pendant straps, spacer bracket, connecting elements and mid-point suspension backstay shackles behind the reducing adapter

- | | |
|---------------------------------|------------------------------------|
| 1 Pins for pendant strap | 7 Washer |
| 2 Spacer bracket | 8 Locking spring |
| 3 Washer | 9 Top backstay shackle (2x) |
| 4 Locking spring | 10 Pin for spacer bracket |

See next page for continuation of the image legend

- | | | | |
|----------|------------|-----------|--------------------------|
| 5 | Washer | 11 | Pin for backstay shackle |
| 6 | Safety pin | 12 | Connecting element |
- ▶ Pin connecting element **12** to pendant strap.
 - ▶ Secure pin **1** with washer **3** and locking spring **4**.

NOTICE

Inadmissible run of winch1/winch2 rope!
Damage to winch1/winch2 rope.

- ▶ Ensure that winch1/winch2 rope runs underneath spacer bracket **2**.

-
- ▶ Pin connecting element **12** to spacer bracket **2**.
 - ▶ Secure pin **10** with washer **7** and locking spring **8**.



Note

If stay ropes instead of backstay shackles must be installed according to system details:

- ▶ Install stay ropes using the same procedure as with backstay shackles.

-
- ▶ Pin connecting element **12** to top backstay shackles **9**.
 - ▶ Secure pin **11** with washer **5** and locking spring **6**.
 - ▶ Repeat procedure on opposite side.

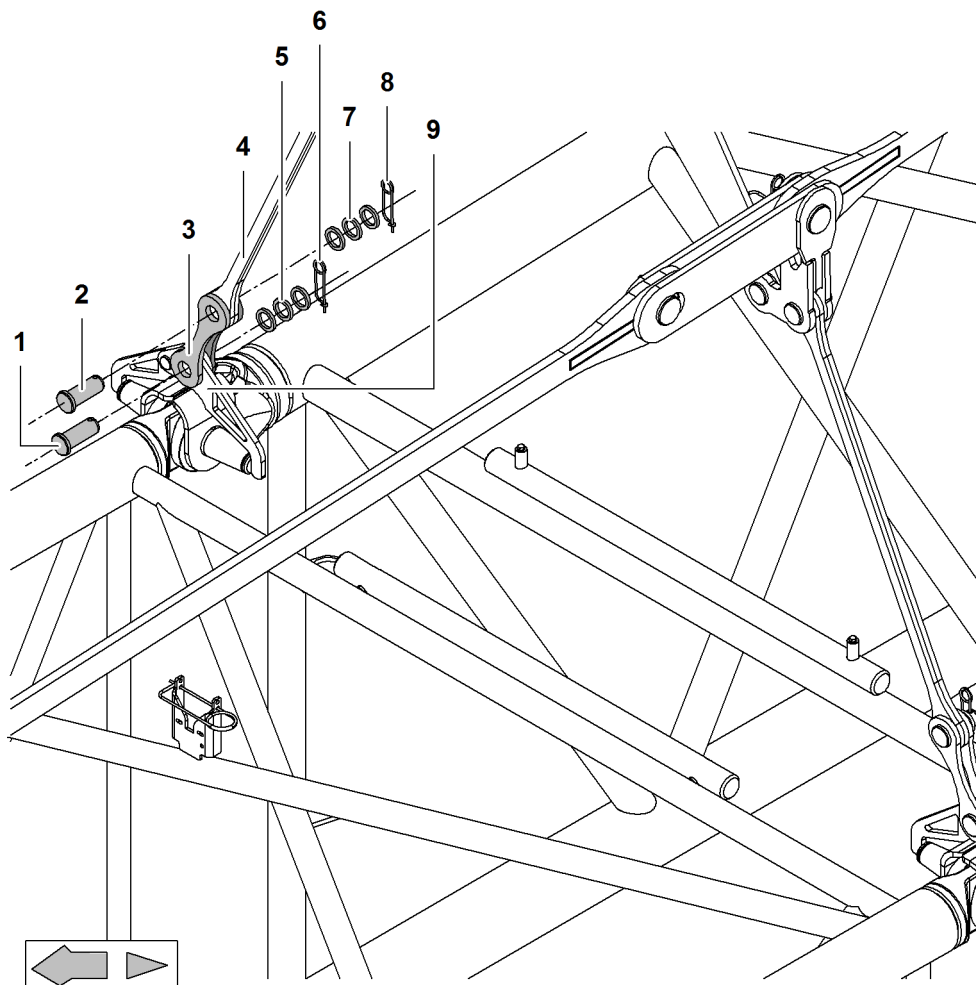


Fig. 4374: Installing bottom mid-point suspension backstay shackles behind the reducing adapter

- | | | | |
|---|------------------------------|---|----------------|
| 1 | Pin | 6 | Safety pin |
| 2 | Pin | 7 | Washers |
| 3 | Bottom backstay shackle (2x) | 8 | Locking spring |
| 4 | Top backstay shackle (2x) | 9 | Fork |
| 5 | Washers | | |



Note

- ▶ To facilitate pinning of the bottom backstay shackles **3** and fork **9**: Use A-frame1 to lift pendant straps.
- ▶ Pin bottom backstay shackles **3** to fork **9**.
As many washers **1** as possible must be inserted to keep the pin **5** from slipping.
- ▶ Secure pin **1** with washers **5** and locking spring **6**.
- ▶ Pin top backstay shackles **4** to bottom backstay shackles **3**.
As many washers **2** as possible must be inserted to keep the pin **7** from slipping.
- ▶ Secure pin **2** with washers **7** and locking spring **8**.
- ▶ Repeat procedure on opposite side.

7.14.4 Moving the lightning rods* into working position

Installation of lightning rods on jib head as main boom head

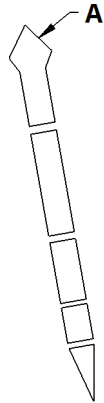


Fig. 4375: Installation of lightning rods on jib head as main boom head

A Jib head as main boom head

Boom configuration	Number of lightning rods	Installation positions
Main boom + reducing adapter	1	A

Tab. 554: Installation and number of lightning rods on jib head as main boom head

Moving the lightning rods* on the jib head as main boom head into working position

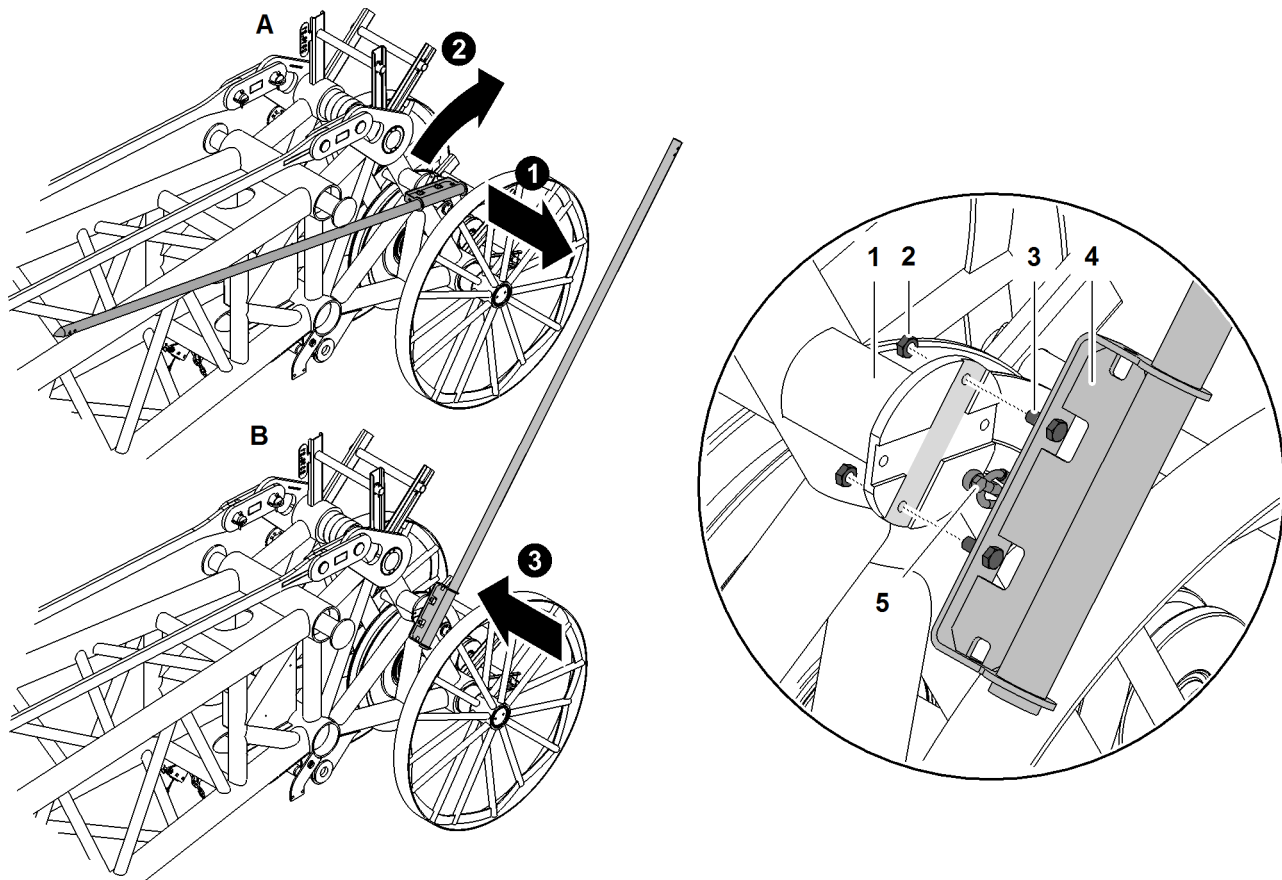


Fig. 4376: Moving the lightning rods* on the jib head as main boom head into working position (illustration of principle)

- | | | | | | |
|----------|--------------------|----------|---------------|----------|-------------|
| A | Transport position | 2 | Nut (2x) | 5 | Safety rope |
| B | Working position | 3 | Screw (2x) | | |
| 1 | Mounting plate | 4 | Lightning rod | | |

- ▶ Undo safety rope 5.
- ▶ Undo nuts 2.
- ▶ Undo screws 3.
- ▶ Move lightning rod 4 from transport position A to working position B.



Note

Liebherr recommends:

- ▶ Grease threads of the screws 3.
- ▶ Attach lightning rod 4 with screws 3.
- ▶ Lock screws 3 with nuts 2.

NOTICE

Safety rope not attached!
Dropping parts.

- ▶ Ensure that safety rope **5** is attached.

-
- ▶ Attach safety rope **5**.

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod **4** is installed.

- ▶ Ensure that the screws of the tip are tightened.

-
- ▶ Ensure that the tip on the lightning rod **4** is installed.

- ▶ Ensure that the screws of the tip are tightened.

7.14.5 Reeving the rope

The rope must be reeved as specified in the rope reeving diagram according to the boom and application requirements.



WARNING

Unsecured walking on the boom!
Risk of falling off the boom.

- ▶ A fall arrest system must be worn when working on the boom to prevent falling.

Ensure that the following conditions are satisfied:

- Cylinder adjustment functions are on.

Reeving the rope using a rope reeving winch

Dismantling rope protection pipes

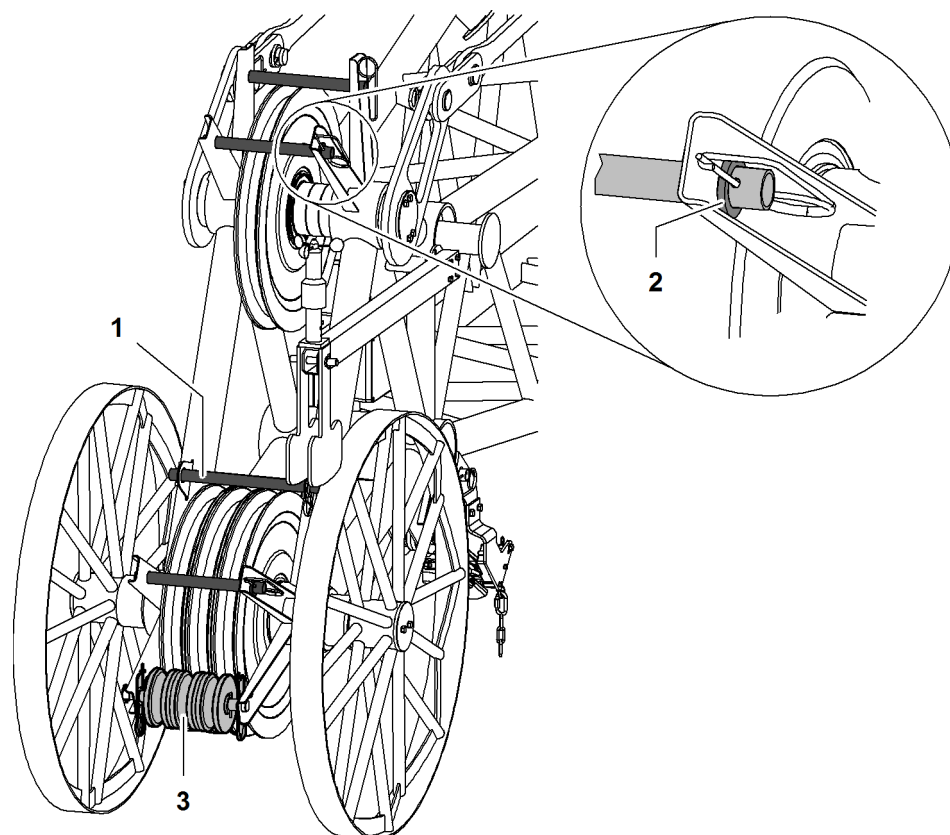


Fig. 4377: Rope protection pipes jib head section (1008, 1309, 1713, 1916, 2316)

- | | | | |
|----------|----------------------|----------|---------------------------------|
| 1 | Rope guard tube (4x) | 3 | Rope protection rollers package |
| 2 | Washer | | |

The rope protection pipes are secured with a cotter pin on one side and with a safety pin on the other side.

- ▶ Remove the safety pin and washer **2**.
- ▶ Remove the rope protection pipes **1**.

Dismantling the rope protection rollers package

The number of rope protection rollers corresponds to the number of pulleys of the jib head.

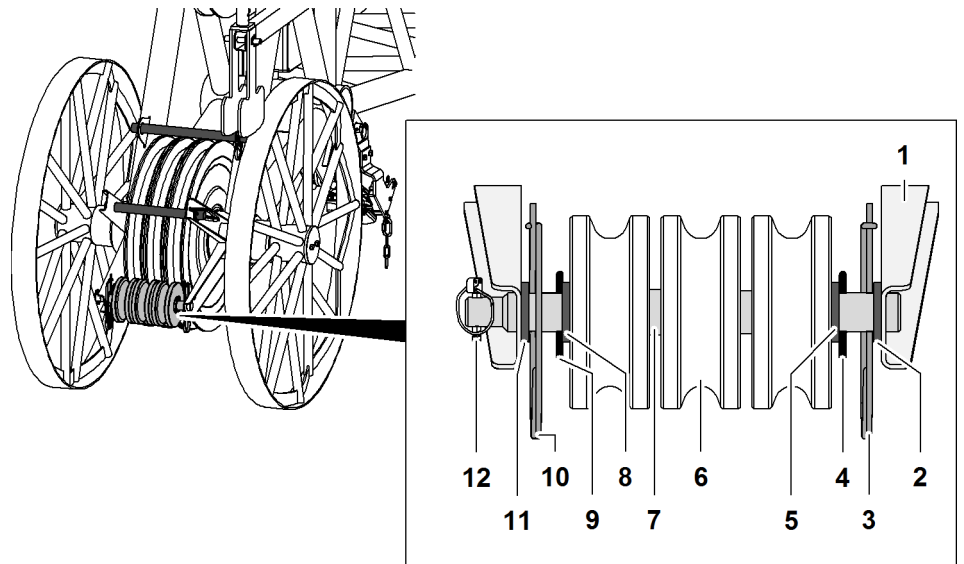


Fig. 4378: Rope protection rollers package

- | | | | |
|---|------------|----|------------|
| 1 | Mount | 7 | Shaft |
| 2 | Washer | 8 | Washer |
| 3 | Safety pin | 9 | Cotter pin |
| 4 | Cotter pin | 10 | Safety pin |
| 5 | Washer | 11 | Washer |
| 6 | Pulley | 12 | Linchpin |

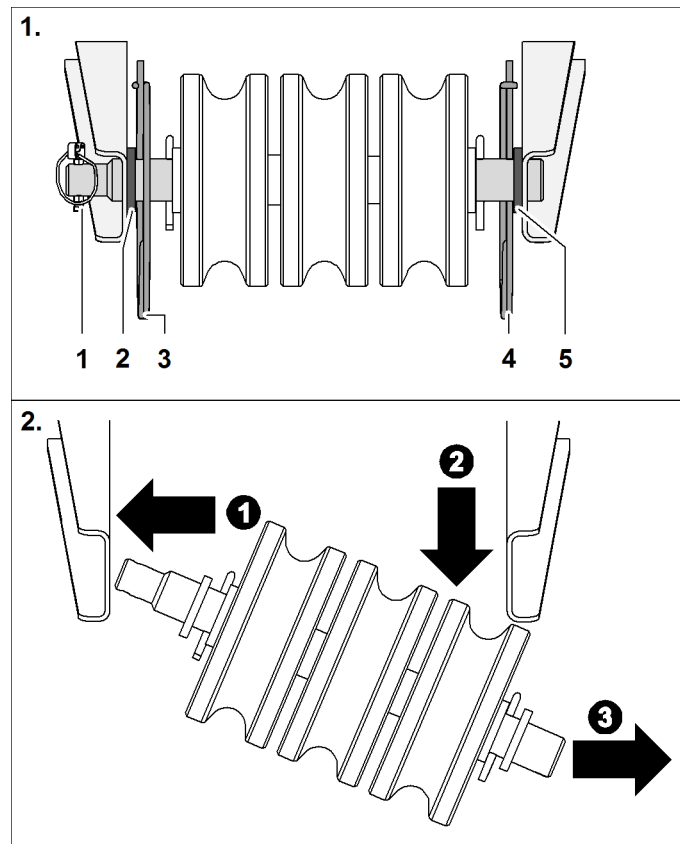


Fig. 4379: Dismantling the rope protection rollers package

- | | | | |
|---|----------|---|------------|
| 1 | Linchpin | 4 | Safety pin |
|---|----------|---|------------|

See next page for continuation of the image legend

- | | | | |
|---|------------|---|--------|
| 2 | Washer | 5 | Washer |
| 3 | Safety pin | | |

- ▶ Remove the linchpin 1.
- ▶ Remove safety pin 3 + 4.
- ▶ Take rope protection rollers package off the support.
 - ▷ Rope protection rollers package is dismantled.

Reeving the rope

- ▶ Open up the rope guide (if present).

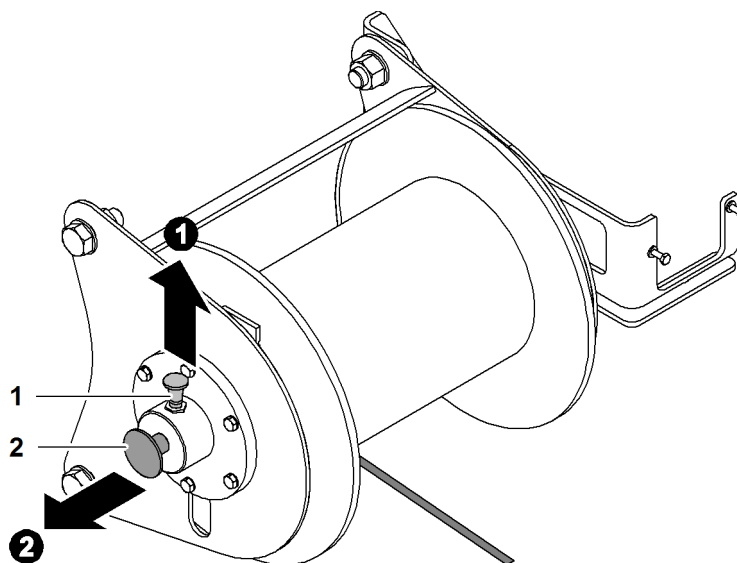


Fig. 4380: Setting the rope lug to free-wheel

- | | | | |
|---|-----------------|---|-------|
| 1 | Locking element | 2 | Shaft |
|---|-----------------|---|-------|



Note

Liebherr recommends:

- ▶ Making it easier to pull out the axle 2: move the rope reeving winch manually back and forth.
- ▶ Pull up the locking element 1 and pull out the axle 2 at the same time.
 - ▷ Rope reeving winch is set to free-wheel.

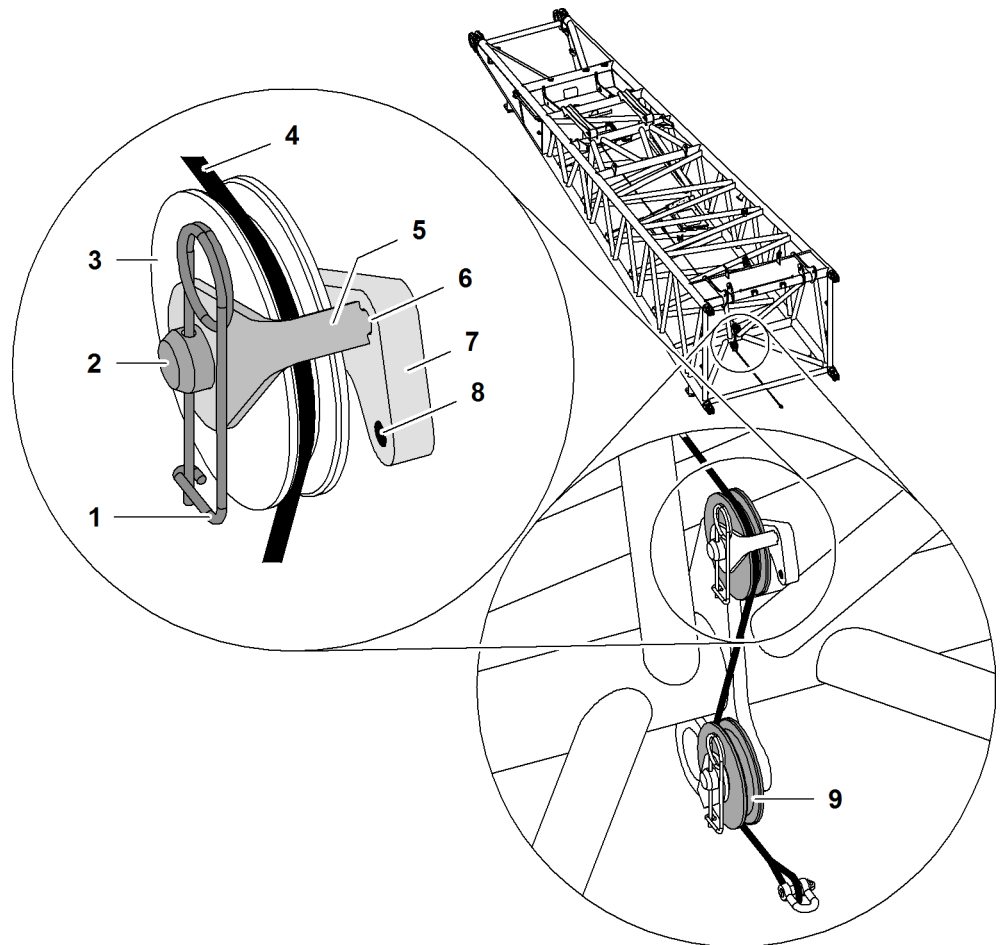


Fig. 4381: Reeving in the rope of the rope reeving winch

- | | | | |
|---|--------------------------------|---|-----------------------|
| 1 | Safety pin | 6 | Recess |
| 2 | Shaft | 7 | Support with recesses |
| 3 | Upper pulley | 8 | Recess |
| 4 | Rope of the rope reeving winch | 9 | Lower pulley |
| 5 | Locking element | | |

Depending on the machine type, the mounting 7 may have one or two recesses.

- ▶ Remove safety pins 1.
- ▶ Remove 5 securing element.
- ▶ Place rope of the rope reeving winch 4 across the top pulley 3.

NOTICE

Wrongly mounted locking element!
Rope of the rope reeving winch jumps out of pulley.

- ▶ Make sure that the locking element 5 is mounted in recess 6.
-
- ▶ Attach locking element 5 to axle 2 and guide in recess 6.
 - ▶ Attach the safety pin 1.
 - ▶ Repeat procedure on bottom pulley 9.
 - ▷ Rope of the rope reeving winch is guided through pulleys.
 - ▶ Pull the luffing rope under the boom to the boom head.
 - ▶ Reeve in the rope of the rope reeving winch according to reeving plan.

- ▶ Pull the luffing rope next to the boom towards the basic machine.
- ▶ Lift luffing rope onto boom.
- ▶ Connect luffing rope with rope of winch1/winch2.

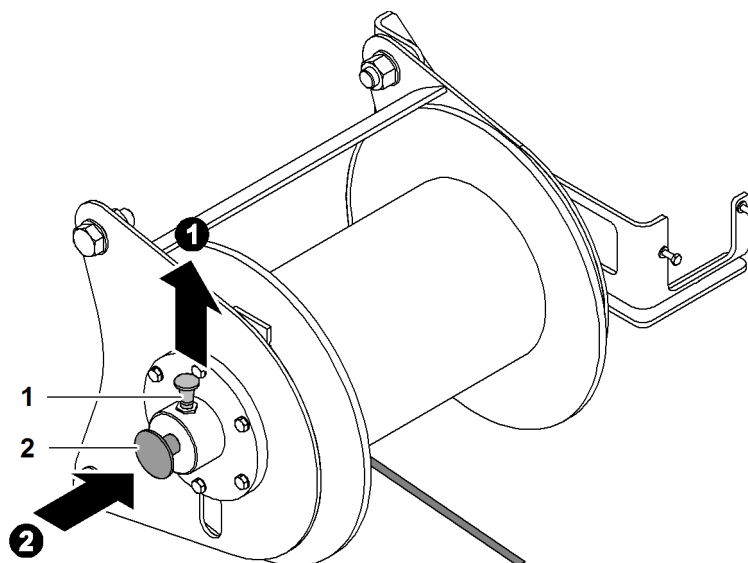


Fig. 4382: Stopping the free-wheel of the rope reeving winch

- | | |
|-------------------|---------|
| 1 Locking element | 2 Shaft |
|-------------------|---------|



Note

Liebherr recommends:

- ▶ Making it easier to press in the axle **2**: move the rope reeving winch manually back and forth.

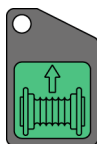
- ▶ Pull up the locking element **1** and press in the axle **2** at the same time.
 - ▷ Free-wheel of the luffing rope is deactivated.



WARNING

Never stand in the immediate vicinity of the rope reeving winch or the luffing rope!

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.



- ▶ Press and hold the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch reeves in the rope of the rope reeving winch and tensions the rope of winch1/winch2.

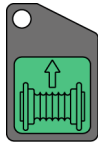


If rope of winch1/winch2 is in the 8th rope layer (only with free-fall winch 130 kN (29,230 lb.)):

- ▶ Press the *Bypass limit switch* button on control panel X23.
 - ▷ The 3-rope windings limit switch is bypassed.

There must be no slacking of the rope when unwinding.

- ▶ Unwind the rope of winch1/winch2 up to the rope fixing point.
- ▶ Press the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch switched off.



- ▶ Remove rope of the rope reeving winch from the rope of winch1/winch2.
- ▶ Press and hold the *Rope reeving winch* button on control panel X11.
 - ▷ Luffing rope is being reeved.
- ▶ Press the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch switched off.
- ▶ Close and secure the rope guide (if present).

Mounting the rope protection rollers package

NOTICE

Wrongly installed washers!

Rope protection rollers package falls out of the support.

Damage to jib head section.

- ▶ Ensure proper installation position of the washers.
-

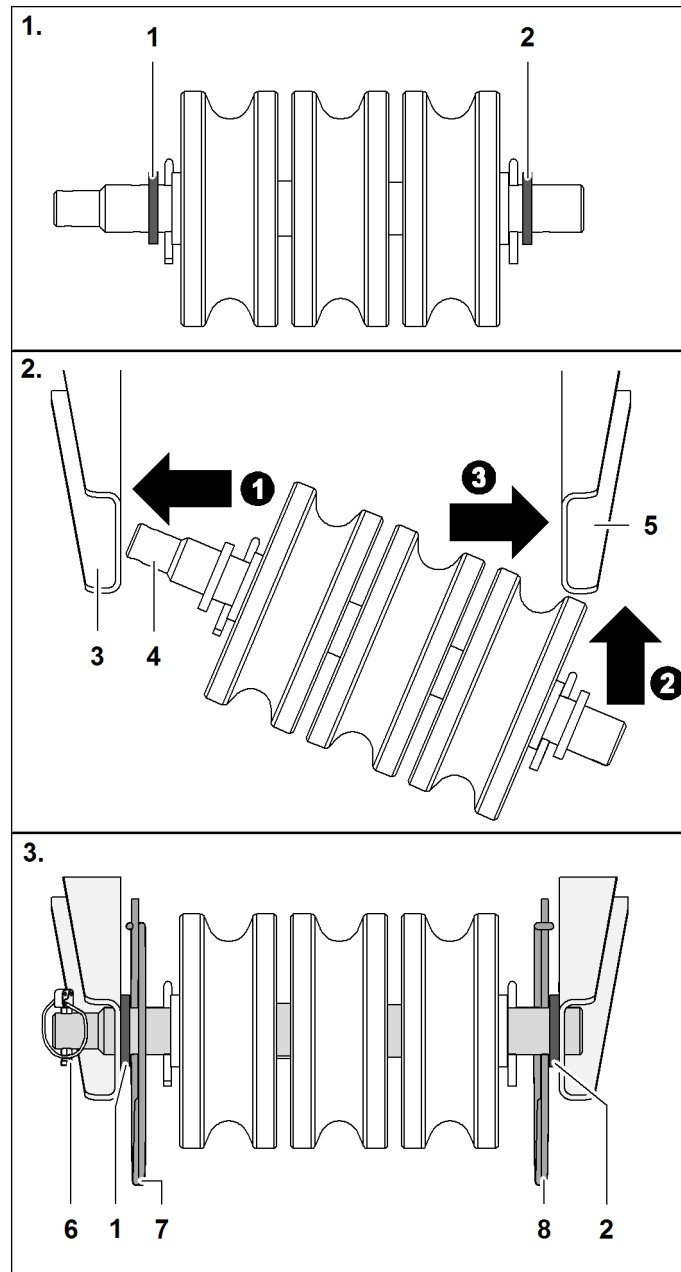


Fig. 4386: Mounting the rope protection rollers package on the jib head section

- | | | | |
|---|--------|---|------------|
| 1 | Washer | 5 | Mount |
| 2 | Washer | 6 | Linchpin |
| 3 | Mount | 7 | Safety pin |
| 4 | Shaft | 8 | Safety pin |

- ▶ Place washers 1 + 2 on axle.
- ▶ Insert axle 4 of the rope protection rollers package into support 3.
- ▶ Insert axle 4 into support 5.
- ▶ Put washers 1 + 2 into position.
- ▶ Install safety pins 7 + 8.
- ▶ Install linchpin 6.
 - ▷ Rope protection rollers package is installed.

Installing rope protection pipes

- ▶ Mount and secure rope protection pipes.

Reeving the rope without using a rope reeving winch

- ▶ Remove the rope protection pipes on the boom and the pulley block.
- ▶ Open up the rope guide (if present).
- ▶ Connect auxiliary rope with the rope of winch1/winch2.
- ▶ Pull the auxiliary rope next to the boom as far as the boom head.
- ▶ Hoist the auxiliary rope onto the boom.
- ▶ Reeve the auxiliary rope according to the rope reeving system.



If rope of winch1/winch2 is in the 8th rope layer (only with free-fall winch 130 kN (29,230 lb_t)):

- ▶ Press the *Bypass limit switch* button on control panel X23.
 - ▷ The 3-rope windings limit switch is bypassed.

There must be no slacking of the rope when unwinding.

- ▶ Unwind the rope of winch1/winch2 up to the rope fixing point.
- ▶ Remove auxiliary rope from the rope of winch1/winch2.
- ▶ Close and secure the rope guide (if present).
- ▶ Mount and secure rope protection pipes.

7.15 Fixed jib 1713

System-relevant information for fixed jib 1713 :

- Configuration of jib
- Configuration of main boom
- Overview of pendant straps on fixed jib 1713
- Reeving diagrams for one rope across jib head 1713 (load position1)
- Reeving diagrams for two ropes across jib head 1713 (load position1)
- Reeving diagrams for one rope across main boom head 2821 (load position2)

7.15.1 Configuration of jib



DANGER

Excess length of jib!
Structural breakdown.

- ▶ Check jib length in load chart for validity.

Jib length	Configuration of jib (symbolic)
14 m 46 ft	
17 m 56 ft	
20 m 66 ft	
23 m 75 ft	
26 m 85 ft	
29 m 95 ft	
32 m 105 ft	
35 m 115 ft	

Tab. 555: Configuration of fixed jib 1713

7.15.2 Configuration of main boom



DANGER

Assembly with excessive main boom length!
Structural failure.

- ▶ Check main boom length in load chart for validity.



Note

► Information on the configuration of the main boom can be found under system-related data for the main boom (For more information see: [7.5.1 Configuration of main boom, page 1319](#)).

7.15.3 Overview of pendant straps on fixed jib 1713

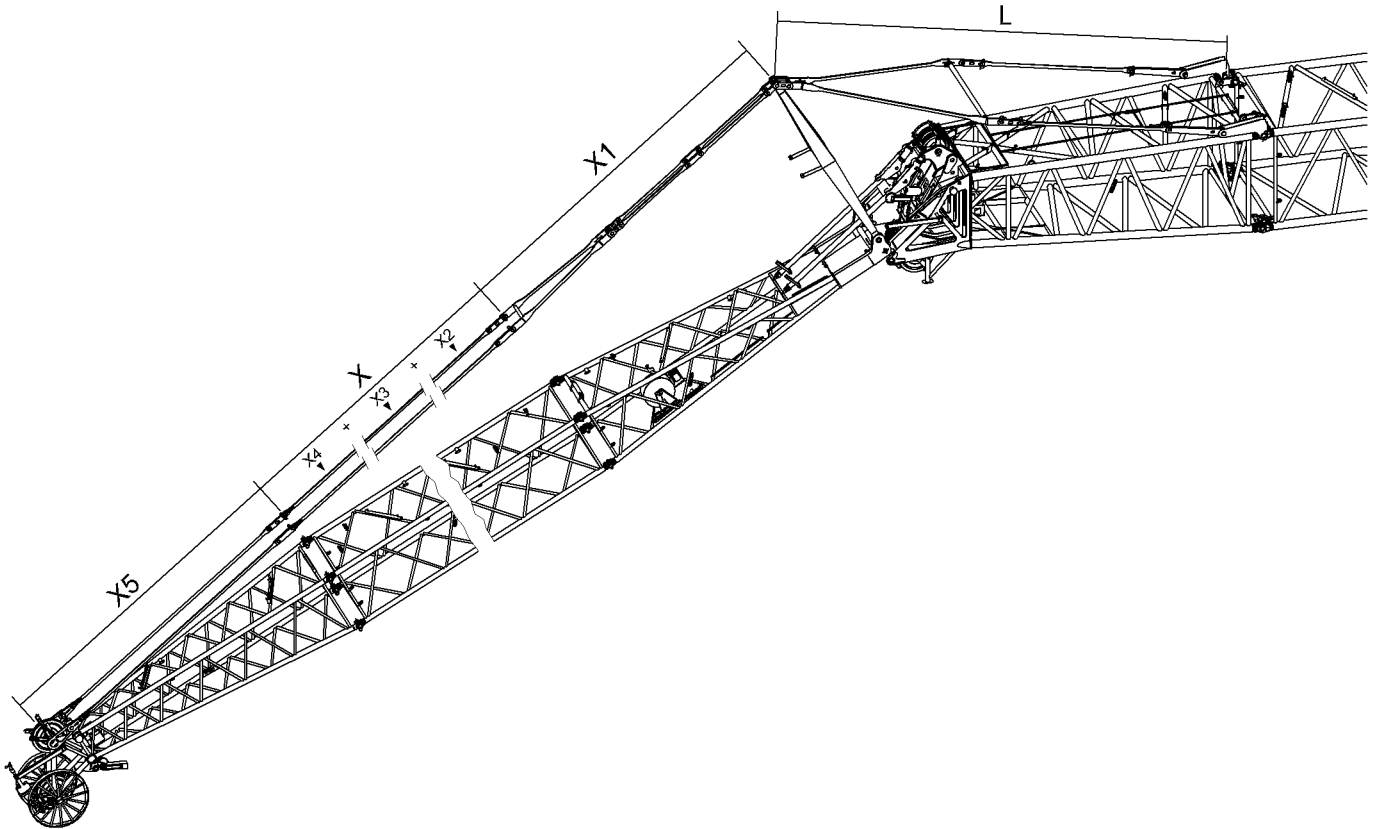


Fig. 4416: Overview of pendant straps on fixed jib 1713

Backstay straps A-frame2 to main boom head 2821

Name		Value
L	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap), page 261)	at 30°
		10000 mm 32' 10" ft-in
		at 15°
		9090 mm 29' 10" ft-in

Tab. 556: Backstay straps A-frame2 to main boom head 2821

Pendant straps A-frame2 to jib head 1713

Name		Value	
X1	A-frame2 equalizer (jib pendant strap) (For more information see: Equalizer on A-frame2 (jib pendant strap), page 263)	7275 mm 23' 10" ft-in	
X	Jib pendant straps consisting of:		
	X2	Jib pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 264)	Total X2 +
	X3	Jib pendant strap 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft), page 265)	Total X3 +
	X4	Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 266)	Total X4
X5	Jib pendant strap on jib head 1713 (For more information see: Jib pendant strap on jib head 1713.21, page 267)	6500 mm 21' 4" ft-in	

Tab. 557: Pendant straps A-frame2 to jib head 1713

Configuration of jib pendant straps (X):

Required number of jib pendant straps 3 m (10 ft) (**X2**) corresponds to number of jib sections 3 m (10 ft).

Required number of jib pendant straps 6 m (20 ft) (**X3**) corresponds to number of jib sections 6 m (20 ft).

Required number of jib pendant straps 12 m (40 ft) (**X4**) corresponds to number of jib sections 12 m (40 ft).



Note

- For the admissible number of jib sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following table: (For more information see: 7.15.1 Configuration of jib, page 1596)

7.15.4 Reeving diagrams for one rope across jib head 1713 (load position1)

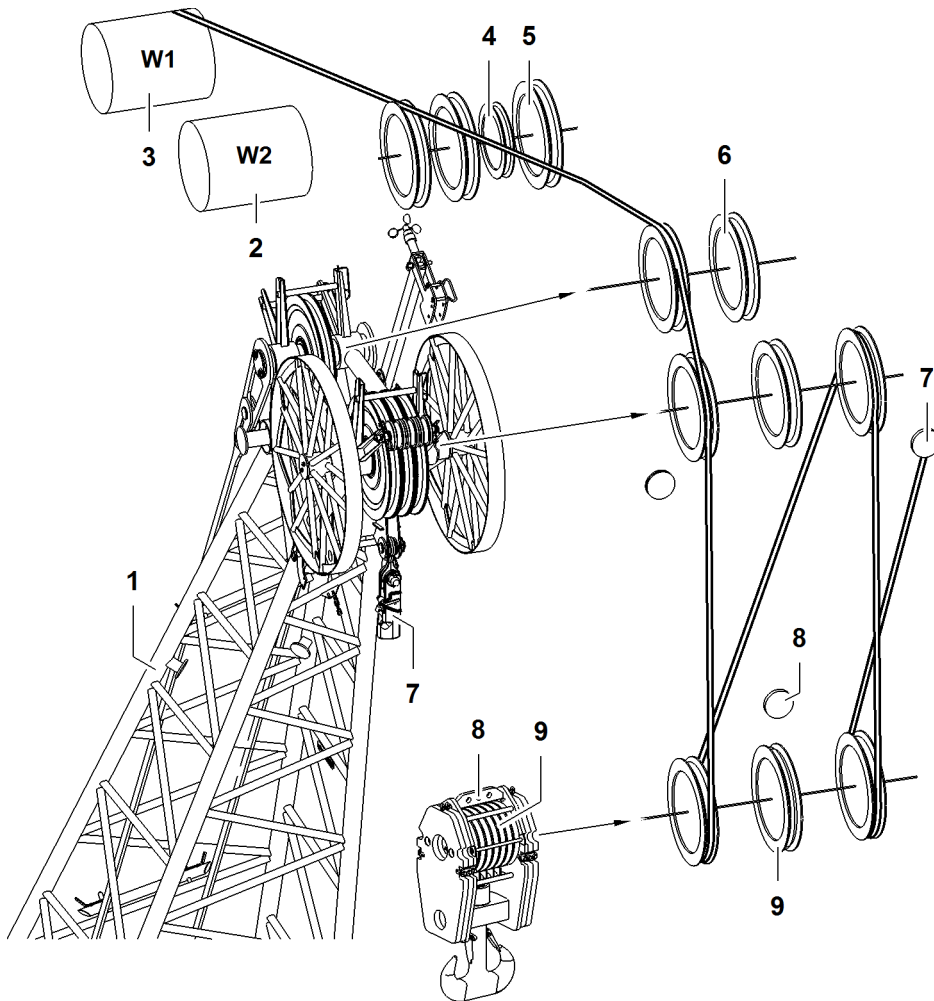


Fig. 4417: Reeving diagrams for one rope across jib head 1713 (load position1)

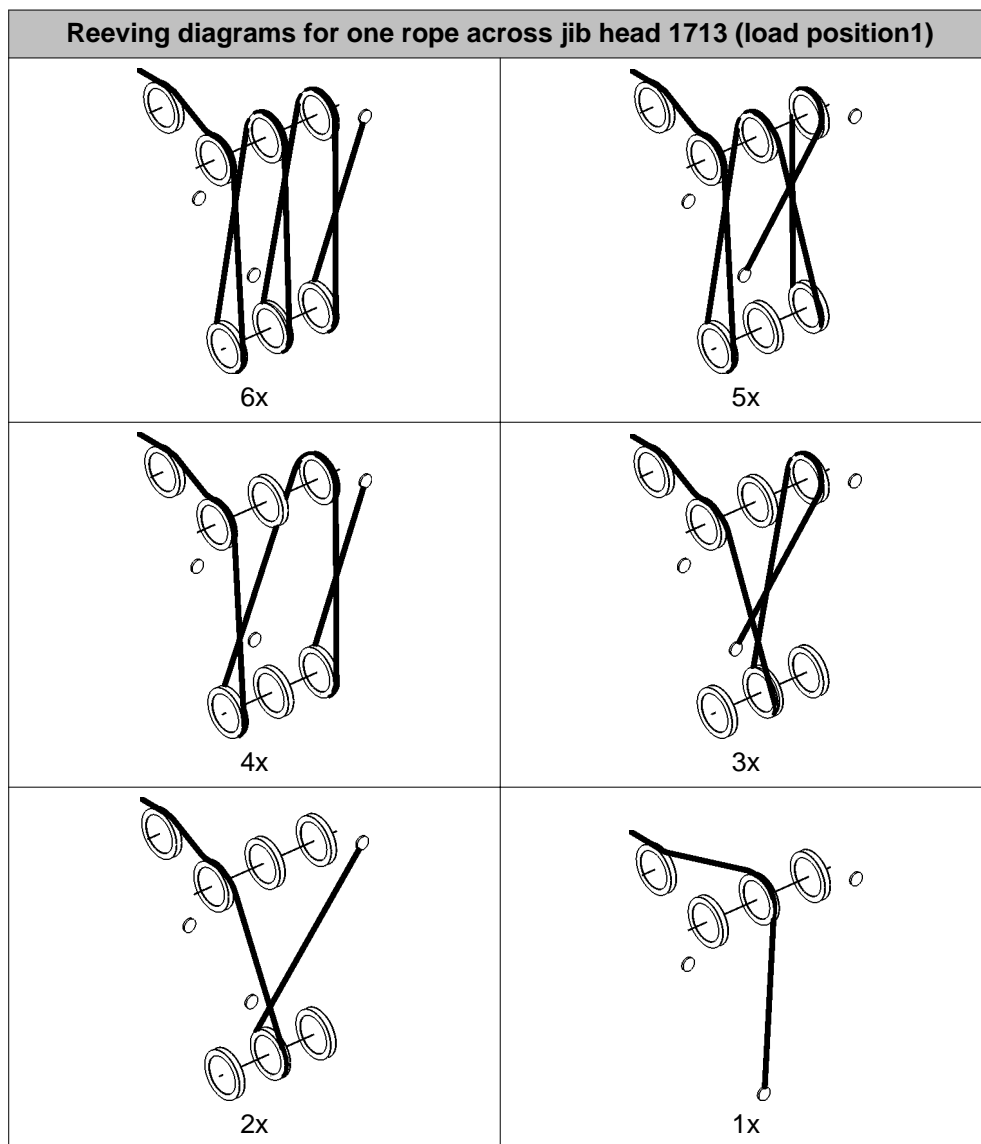
1	Jib head	4	Pulley for rope of jib luffing winch	7	Rope fixing point (2x) of jib head
2	Winch2	5	Gantry pulley (3x) of main boom head	8	Rope fixing points of pulley block
3	Winch1	6	Retrofit kit* for operation with two ropes across jib head	9	Pulley set of pulley block



DANGER

Incorrect number of reevings!
Structural breakdown, toppling of machine.

► Choose the correct number of reevings as per the load chart.



Tab. 558: Reeving diagrams for one rope across jib head 1713 (load position1)

7.15.5 Reeving diagrams for two ropes across jib head 1713 (load position1)



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

- Choose correct number of reevings as indicated in load chart.

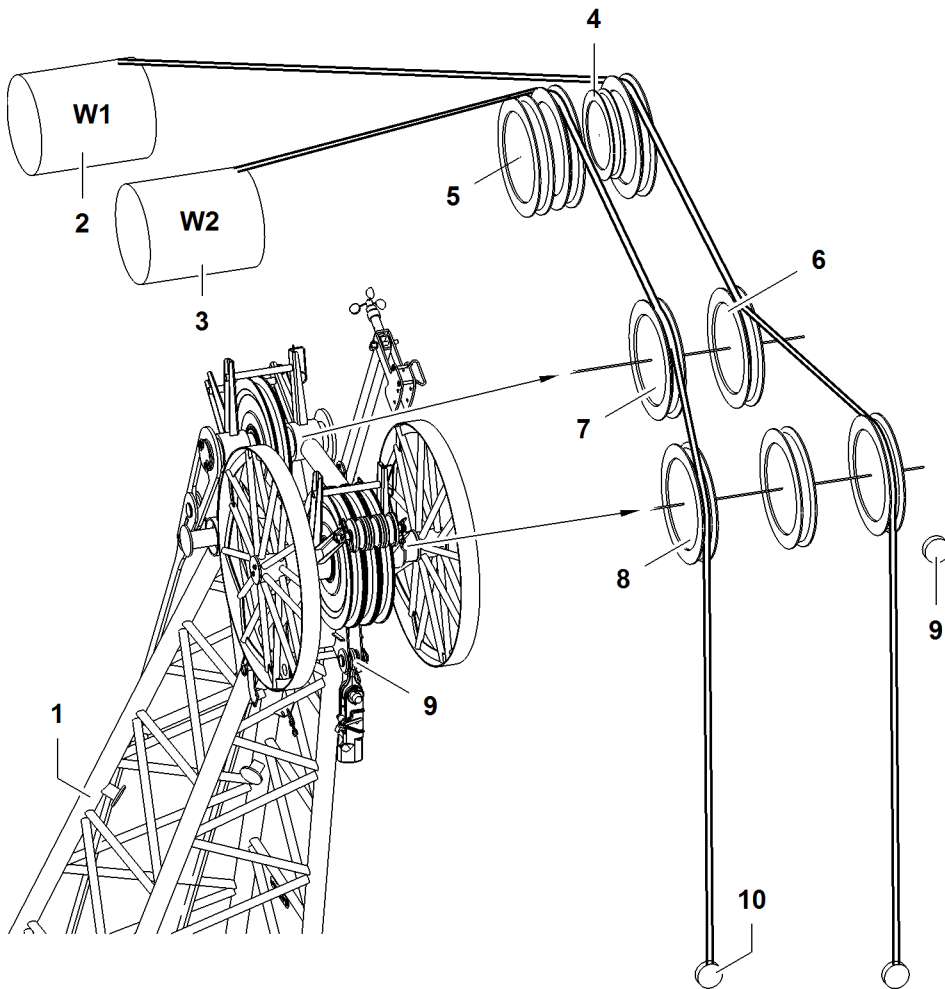


Fig. 4424: Reeving diagrams for two ropes across jib head 1713 (load position 1)

1	Jib head	5	Gantry pulley (3x) of main boom head	9	Rope fixing point (2x) of jib head
2	Winch1	6	Retrofit kit* for operation with two ropes across jib head	10	Rope fixing points of pulley block
3	Winch2	7	Gantry pulley of jib head		
4	Pulley for rope of jib luffing winch	8	Pulley (3x) of jib head		

7.15.6 Reeving diagrams for one rope across main boom head 2821 (load position 2)

If the main boom with jib attached is also used to lift a load, reeve main boom head 2821 as shown below.

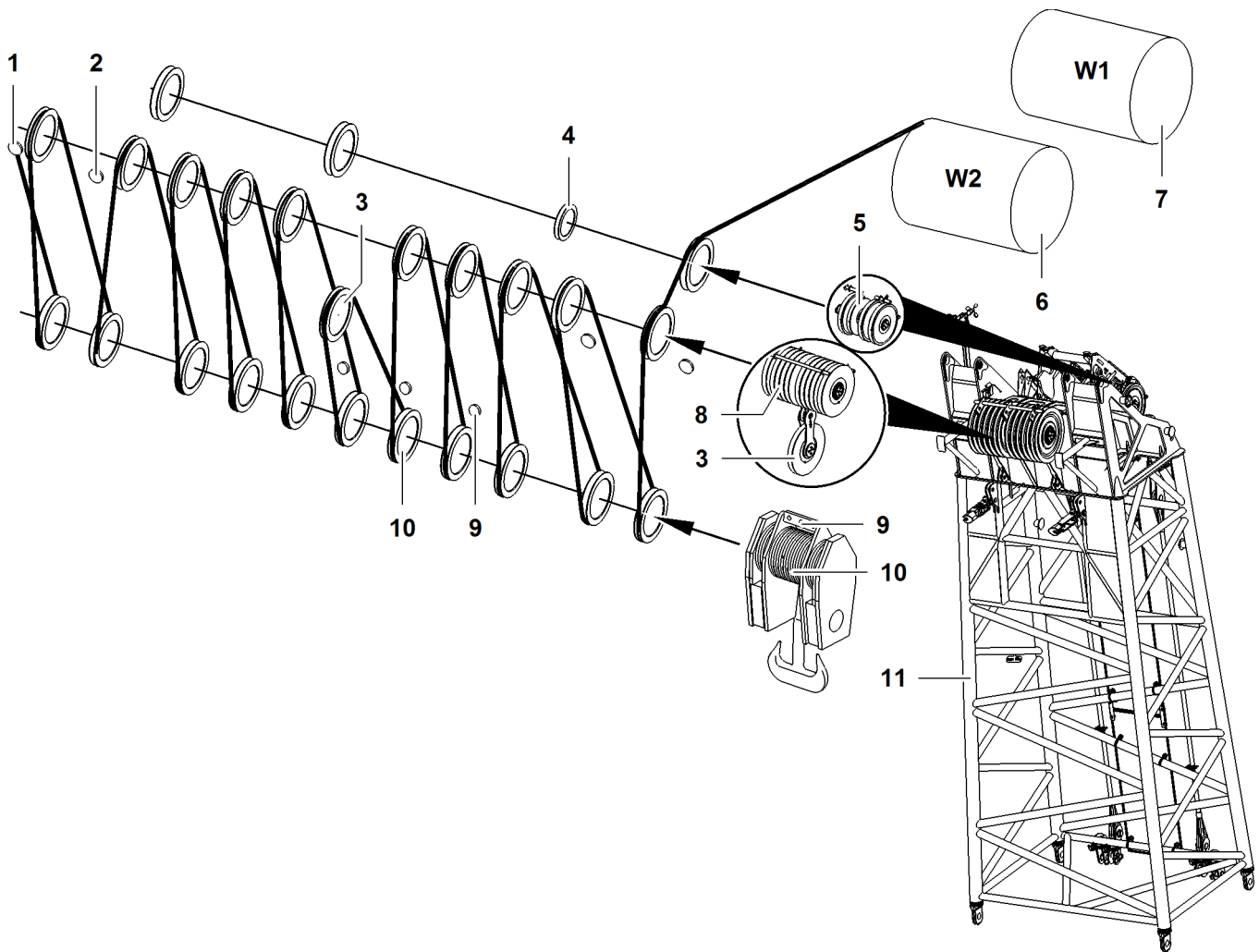


Fig. 4425: Reeving diagrams for one rope across main boom head 2821 (load position 2)

- | | | | | | |
|---|--|---|--------------------------------------|----|------------------------------------|
| 1 | Outer rope fixing point (2x) of main boom head | 5 | Gantry pulley (3x) of main boom head | 9 | Rope fixing points of pulley block |
| 2 | Inner rope fixing point (2x) of main boom head | 6 | Winch2 | 10 | Pulley set of pulley block |
| 3 | 11th rope pulley of main boom head | 7 | Winch1 | 11 | Main boom head |
| 4 | Rope pulley for rope of jib luffing winch | 8 | Rope pulley (10x) of main boom head | | |

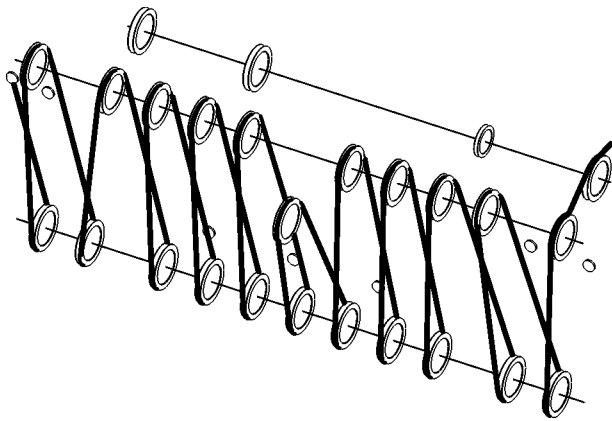


DANGER

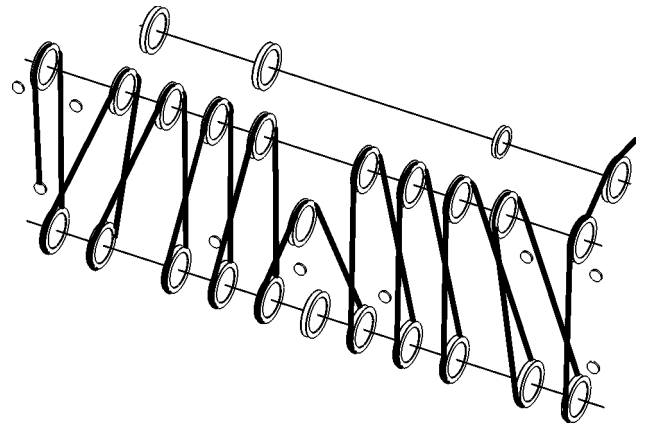
Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.

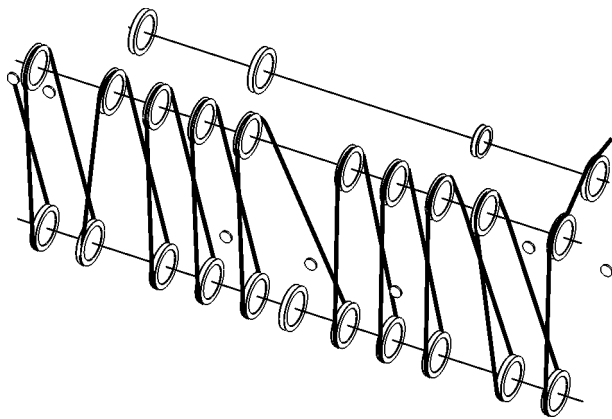
Reeving diagrams for one rope across main boom head 2821 (load position 2)



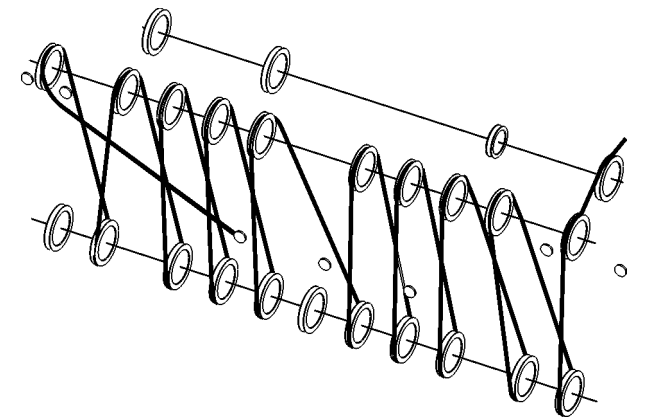
22x



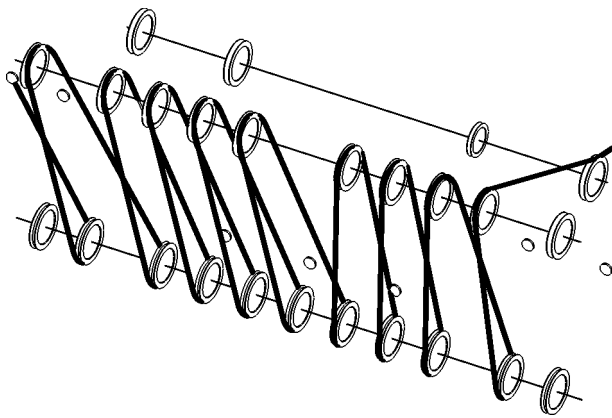
21x



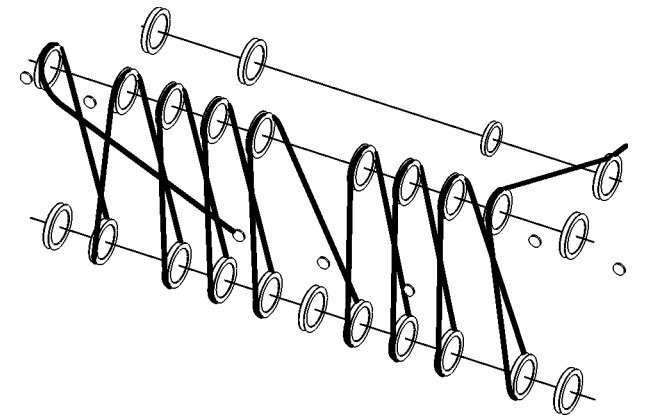
20x



19x

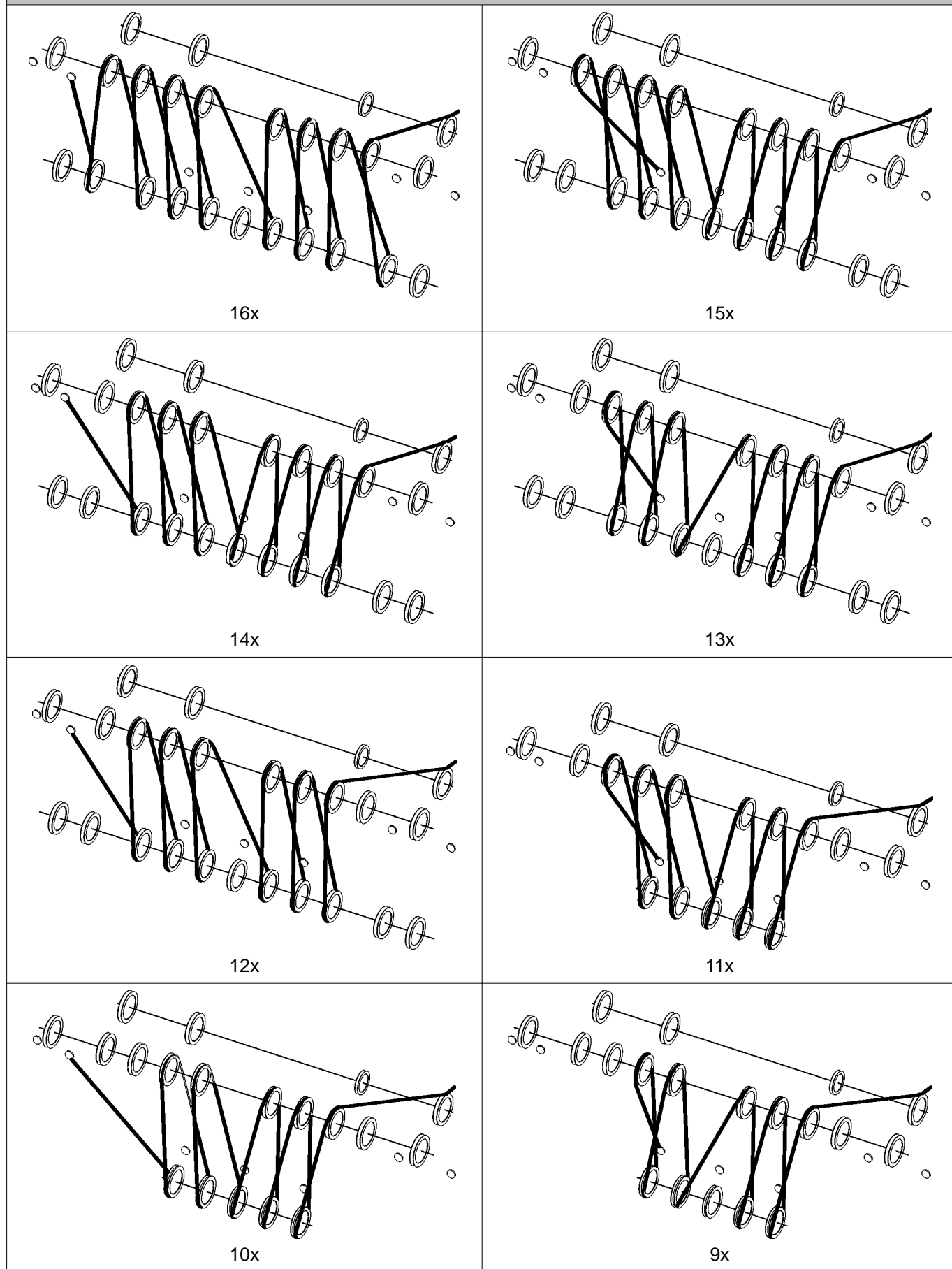


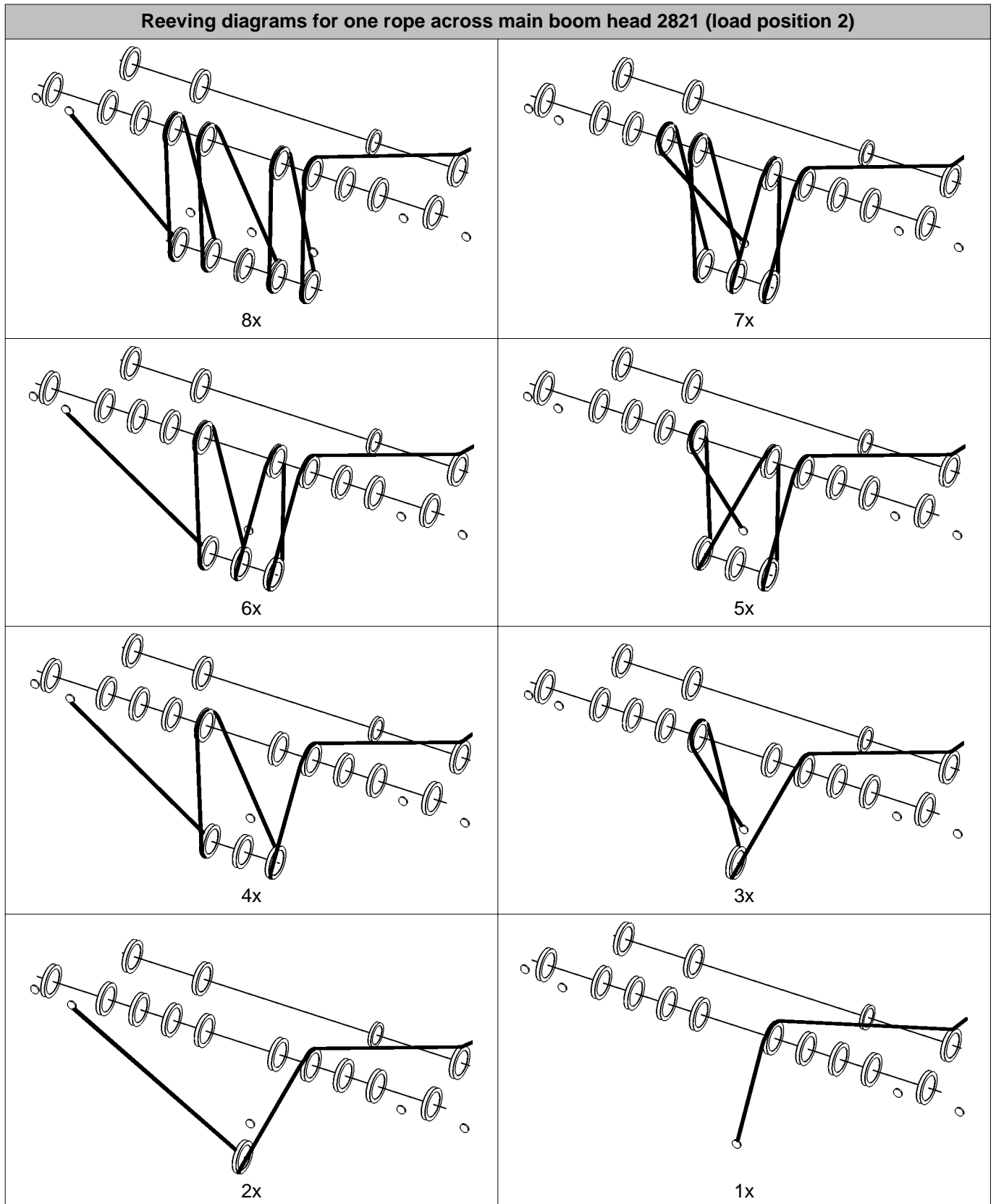
18x



17x

Reeving diagrams for one rope across main boom head 2821 (load position 2)





Tab. 559: Reeving diagrams for one rope across main boom head 2821 (load position 2)

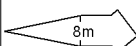
7.16 Fixed jib 1507

System-relevant information for fixed jib 1507:

- Configuration of jib
- Configuration of main boom
 - Rope guide installation position
 - Mid-point suspensions installation positions
 - Spacer bracket installation position
- Lengths of mid-point suspensions
- Composition of main boom in derrick mode with fixed jib 1507 attached
 - Rope guide installation position
 - Mid-point suspensions installation positions
 - Spacer bracket installation position
- Length of mid-point suspension in derrick mode with installed fixed jib 1507
- Overview of pendant straps on fixed jib 1507
- Reeving diagrams for one rope across jib head 1507 (load position1)
- Reeving diagrams for two ropes across jib head 1507 (load position1)
- Reeving diagrams for one rope across main boom head 2821 (load position2)

7.16.1 Configuration of jib

The fixed jib 1507 has a fixed length of 8 m (26 ft).

Jib length	Configuration of jib (symbolic)
8 m 26 ft	

Tab. 560: Configuration of fixed jib 1507

7.16.2 Configuration of main boom

System-relevant information for main boom 2821 with installed fixed jib 1507:

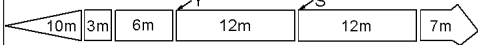
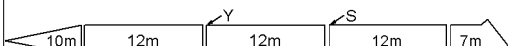
- Configuration of main boom
 - Installation position of rope guide (type A)
 - Mid-point suspensions installation positions
 - Spacer bracket installation positions
- Lengths of mid-point suspensions



DANGER

Excess length of main boom!
Structural breakdown.

- ▶ Check main boom length in load chart for validity.

Main boom length	Configuration of main boom (symbolic)
50 m 164 ft	
53 m 174 ft	

Main boom length	Configuration of main boom (symbolic)
56 m 184 ft	
59 m 195 ft	
62 m 203 ft	
65 m 213 ft	
68 m 223 ft	
71 m 233 ft	
74 m 243 ft	
77 m 253 ft	
80 m 262 ft	
83 m 272 ft	
86 m 282 ft	

Tab. 561: Configuration of main boom 2821 with fixed jib 1507 attached

S - Installation position rope guide (type A)

X1 - Installation position mid-point suspension 1

X2 - Installation position mid-point suspension 2

Y - Installation position of spacer bracket with jib backstay straps (CF) on fixed jib 1507

7.16.3 Lengths of mid-point suspensions

Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
77 m 253 ft ^{A)}	3.7 m 12' 2" ft-in = 2.1 m (6' 11" ft-in) + 1.6 m (5' 3" ft-in)	
80 m 262 ft ^{B)}	4.2 m 13' 9" ft-in = 1.6 m (5' 3" ft-in) + 2.6 m (8' 6" ft-in)	

Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	
83 m 272 ft ^{C)}	4.2 m 13' 9" ft-in = 1.6 m (5' 3" ft-in) + 2.6 m (8' 6" ft-in)	
86 m 282 ft ^{D)}	5.6 m 18' 4" ft-in = 3.0 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	4.2 m 13' 9" ft-in = 2.6 m (8' 6" ft-in) + 1.6 m (5' 3" ft-in)

Tab. 562: Lengths of mid-point suspensions - 2821 main boom with 1507 fixed jib attached

- A) Jib backstay straps run within the ropes of the mid-point suspension for a main boom length of 77 m (253 ft).
- B) Jib backstay straps run outside the ropes of the mid-point suspension for a main boom length of 80 m (262 ft).
- C) Jib backstay straps run outside the ropes of the mid-point suspension for a main boom length of 83 m (272 ft).
- D) Jib backstay straps run inside the ropes of the mid-point suspension with mid-point suspension 1 and outside them with mid-point suspension 2 on X2 with a main boom length of 86 m (282 ft).

7.16.4 Composition of main boom in derrick mode with fixed jib 1507 attached



DANGER

Excess length of main boom!
Structural breakdown.

- ▶ Check main boom length in load chart for validity.

Main boom length	Configuration of main boom (symbolic)
41 m 134 ft	
44 m 144 ft	
47 m 154 ft	
50 m 164 ft	
53 m 174 ft	
56 m 184 ft	
59 m 195 ft	

Main boom length	Configuration of main boom (symbolic)
62 m 203 ft	
65 m 213 ft	
68 m 223 ft	
71 m 233 ft	
74 m 243 ft	
77 m 253 ft	
80 m 262 ft	
83 m 272 ft	
86 m 282 ft	
89 m 292 ft	
92 m 302 ft	
95 m 312 ft	
98 m 322 ft	
101 m 332 ft	
104 m 342 ft	
107 m 351 ft	
110 m 361 ft	
113 m 371 ft	

Tab. 563: Composition of main boom 2821 in derrick mode with fixed jib 1507 attached

S - Installation position rope guide (type B)

X1 - Installation position mid-point suspension 1

Y - Installation position of spacer bracket with jib backstay straps (CF) on fixed jib 1507

7.16.5 Length of midpoint suspension in derrick mode with installed fixed jib 1507

Main boom length	Backstay pendant 1 (X1)
	Rope length
95 m 312 ft	7.2 m 23' 7" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in) + 3.0 m (9' 10" ft-in)
98 m 322 ft	6.9 m 22' 8" ft-in = 1.6 m (5' 3" ft-in) + 1.6 m (5' 3" ft-in) + 1.6 m (5' 3" ft-in) + 2.1 m (6' 11" ft-in)
101 m 332 ft	6.7 m 22' ft-in = 1.6 m (5' 3" ft-in) + 2.1 m (6' 11" ft-in) + 3.0 m (9' 10" ft-in)
104 m 342 ft	9.2 m 30' 2" ft-in = 1.6 m (5' 3" ft-in) + 1.6 m (5' 3" ft-in) + 3.0 m (9' 10" ft-in) + 3.0 m (9' 10" ft-in)
107 m 351 ft	8.9 m 29' 2" ft-in = 1.6 m (5' 3" ft-in) + 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in) + 2.6 m (8' 6" ft-in)
110 m 361 ft	8.8 m 28' 10" ft-in = 1.6 m (5' 3" ft-in) + 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in) + 3.0 m (9' 10" ft-in)
113 m 371 ft	8.6 m 28' 3" ft-in = 2.6 m (8' 6" ft-in) + 3.0 m (9' 10" ft-in) + 3.0 m (9' 10" ft-in)

Tab. 564: Lengths of mid-point suspensions - 2821 main boom in derrick operation with 1507 fixed jib attached

7.16.6 Overview of pendant straps on fixed jib 1507

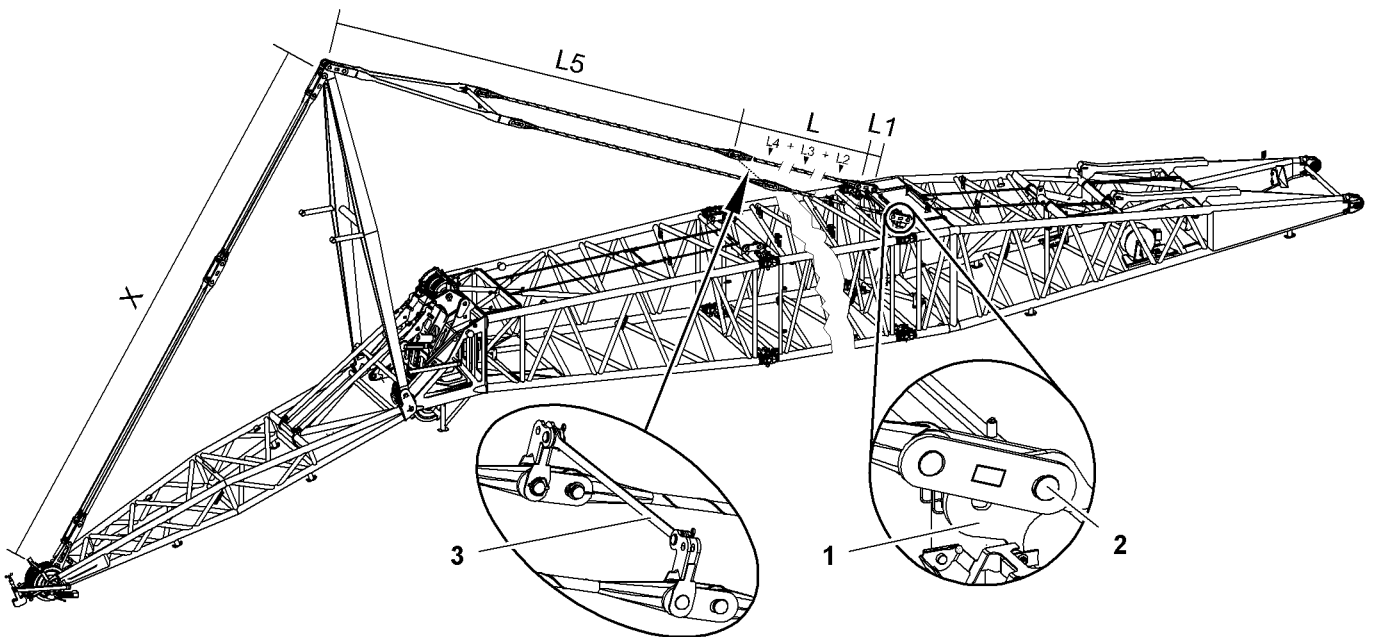


Fig. 4729: Overview of pendant straps on fixed jib 1507

- 1 Main boom base section
- 2 Pin connection point for jib backstay straps
- 3 Spacer bracket with connecting elements

Jib backstay straps A-frame2 to main boom base section 2821

Name		Value
L1	Connecting link (For more information see: Connecting link , page 208)	350 mm 1' 2" ft-in
Jib backstay straps consisting of:		
L	L2 Jib backstay strap 3 m (10 ft) (For more information see: Jib backstay strap 3 m (10 ft) , page 210)	Total L2 +
	L3 Jib backstay strap 6 m (20 ft) (For more information see: Jib backstay strap 6 m (20 ft) , page 214)	Total L3 +
	L4 Jib backstay strap 12 m (40 ft) (For more information see: Jib backstay strap 12 m (40 ft) , page 218)	Total L4
L5	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap) , page 270)	9980 mm 32' 9" ft-in

Tab. 565: Jib backstay straps A-frame2 to main boom base section 2821

Configuration of jib backstay straps (L):

Required number of jib backstay straps 3 m (10 ft) (L2) corresponds to number of main boom sections 3 m (10 ft).

Required number of jib backstay straps 6 m (20 ft) (L3) corresponds to number of main boom sections 6 m (20 ft).

Required number of jib backstay straps 12 m (40 ft) (**L4**) corresponds to number of main boom sections 12 m (40 ft).



Note

- ▶ For the admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the load chart.

The jib backstay straps (**L**) may consist of generation A and generation B jib backstay straps (For more information see: [1.16.2 Steel pendant straps on fixed jib 1507, page 270](#)) . Mixing is only admissible if the number of generation B jib backstay straps only differs by at most 1 in the left and the right strand of the backstay straps.



DANGER

Inadmissible mixing of generation A and generation B jib backstay straps!
Structural breakdown.

- ▶ Ensure that the number of generation B jib backstay straps differs by at most 1 in the left and the right strand of the backstay straps.

Pendant straps A-frame2 to jib head 1507

Name		Value
X	Jib pendant strap (A-frame2 to jib head 1507) (For more information see: Jib pendant strap (A-frame2 to jib head 1507), page 272)	11615 mm 38' 1" ft-in

Tab. 566: Pendant straps A-frame2 to jib head 1507

7.16.7 Reeving diagrams for one rope across jib head section 1507 (load position1)

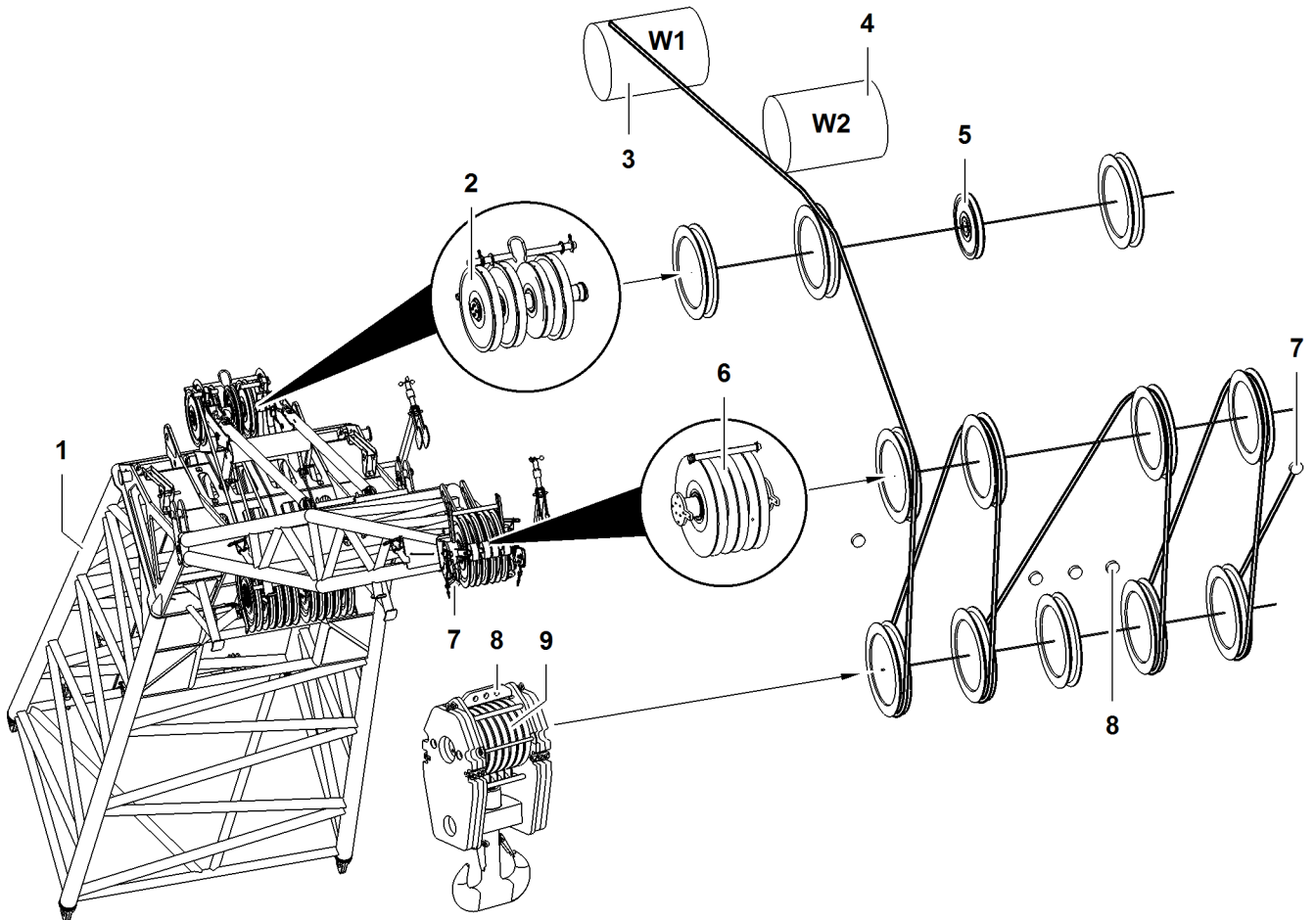


Fig. 4730: Reeving diagrams for one rope across jib head section 1507 (load position1)

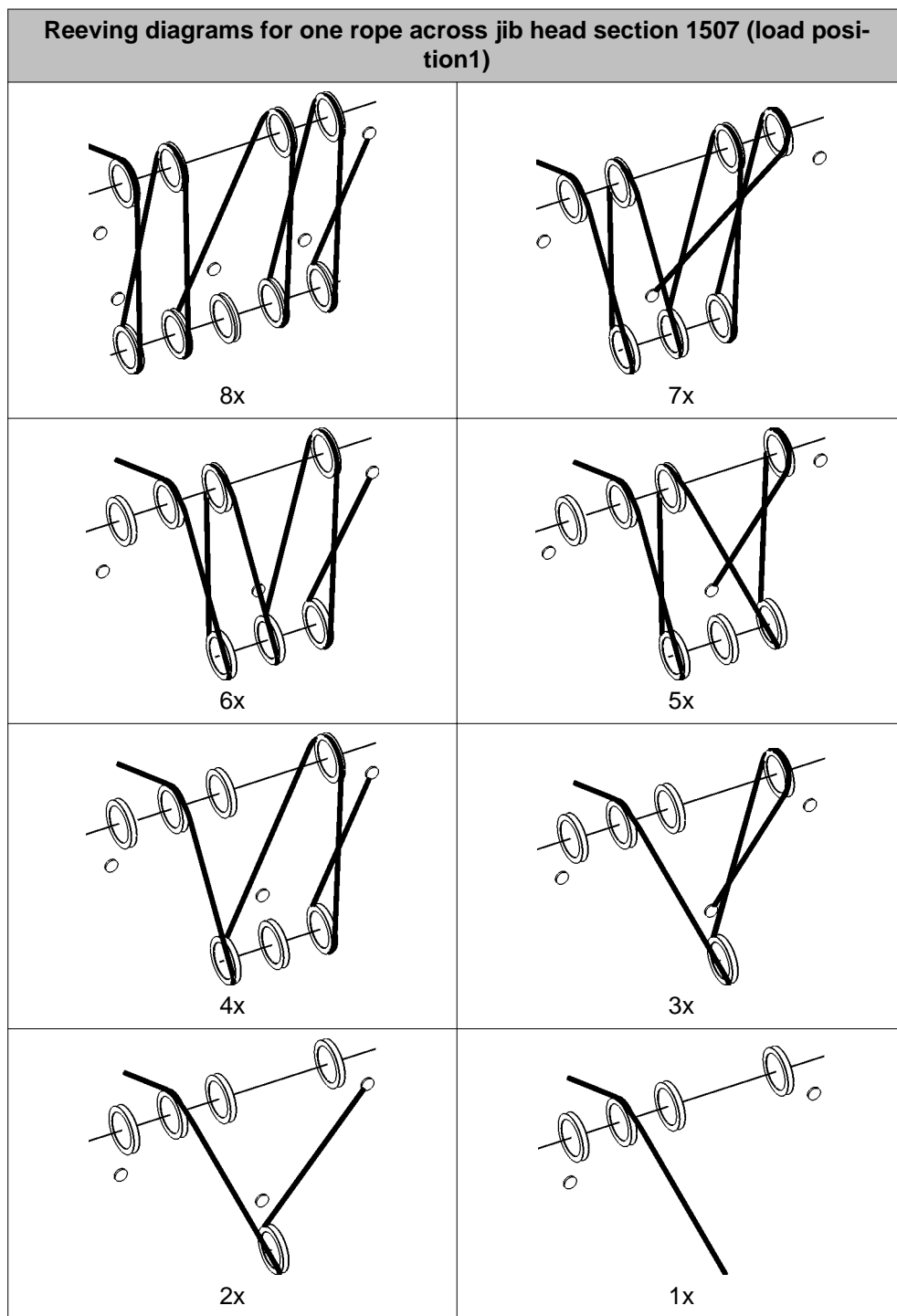
1	Main boom head	4	Winch2	7	Rope fixing point (2x) of jib head section
2	Gantry pulley (3x) of main boom head	5	Rope pulley for rope of jib luffing winch	8	Rope fixing points of pulley block
3	Winch1	6	Rope pulley (4x) of jib head section	9	Pulley set of pulley block



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.



Tab. 567: Reeving diagrams for one rope across jib head section 1507 (load position1)

7.16.8 Reeving diagrams for two ropes across jib head 1507 (load position1)

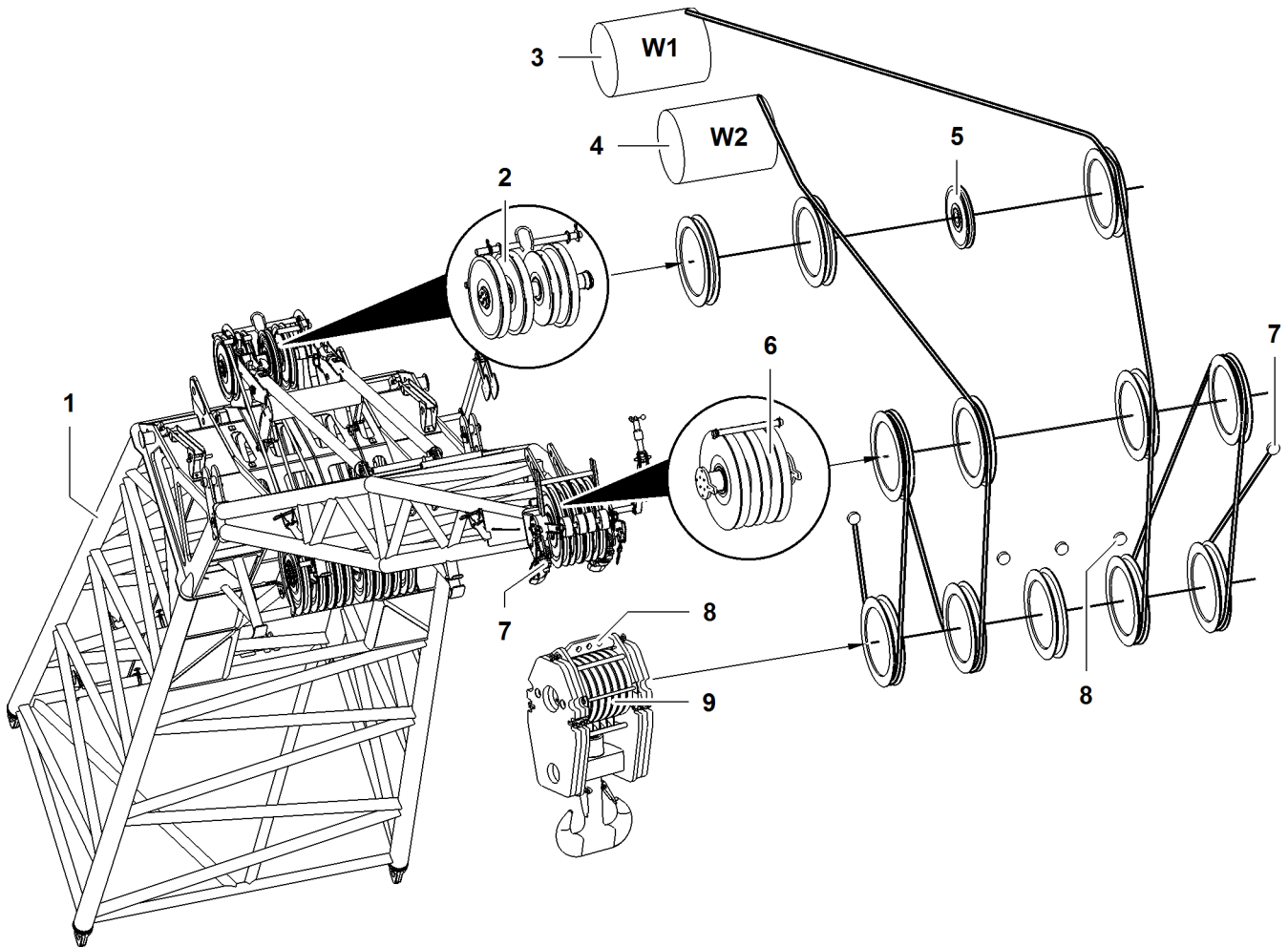
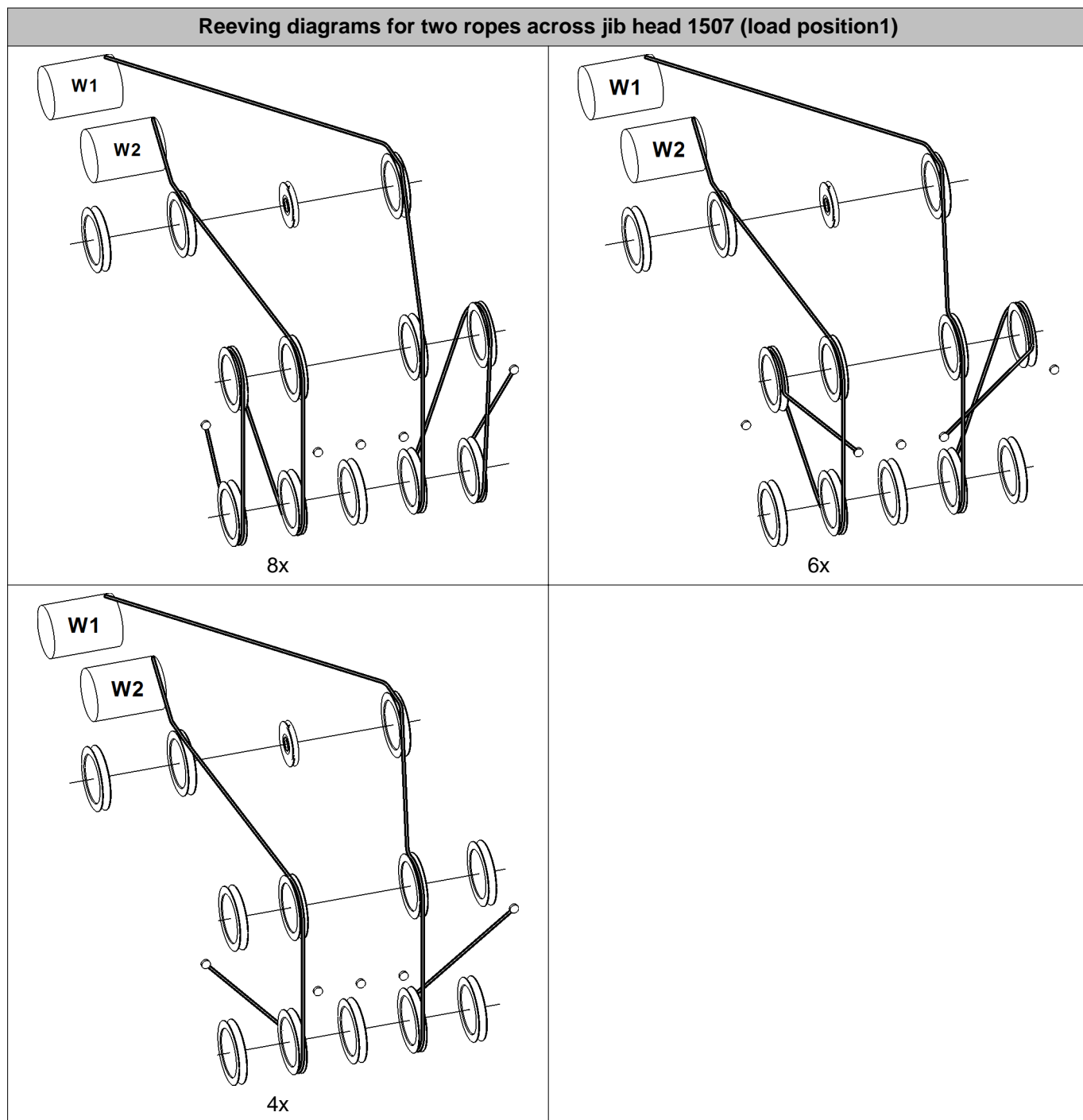


Fig. 4739: Reeving diagrams for two ropes across jib head 1507 (load position1)

- | | | | | | |
|---|--------------------------------------|---|--------------------------------------|---|------------------------------------|
| 1 | Main boom head | 4 | Winch2 | 7 | Rope fixing point (2x) of jib head |
| 2 | Gantry pulley (3x) of main boom head | 5 | Pulley for rope of jib luffing winch | 8 | Rope fixing points of pulley block |
| 3 | Winch1 | 6 | Pulley (4x) of jib head | 9 | Pulley set of pulley block |



Tab. 568: Reeving diagrams for two ropes across jib head 1507 (load position1)

7.16.9 Reeving diagrams for one rope across main boom head 2821 (load position 2)

If the main boom with jib attached is also used to lift a load, reeve main boom head 2821 as shown below.

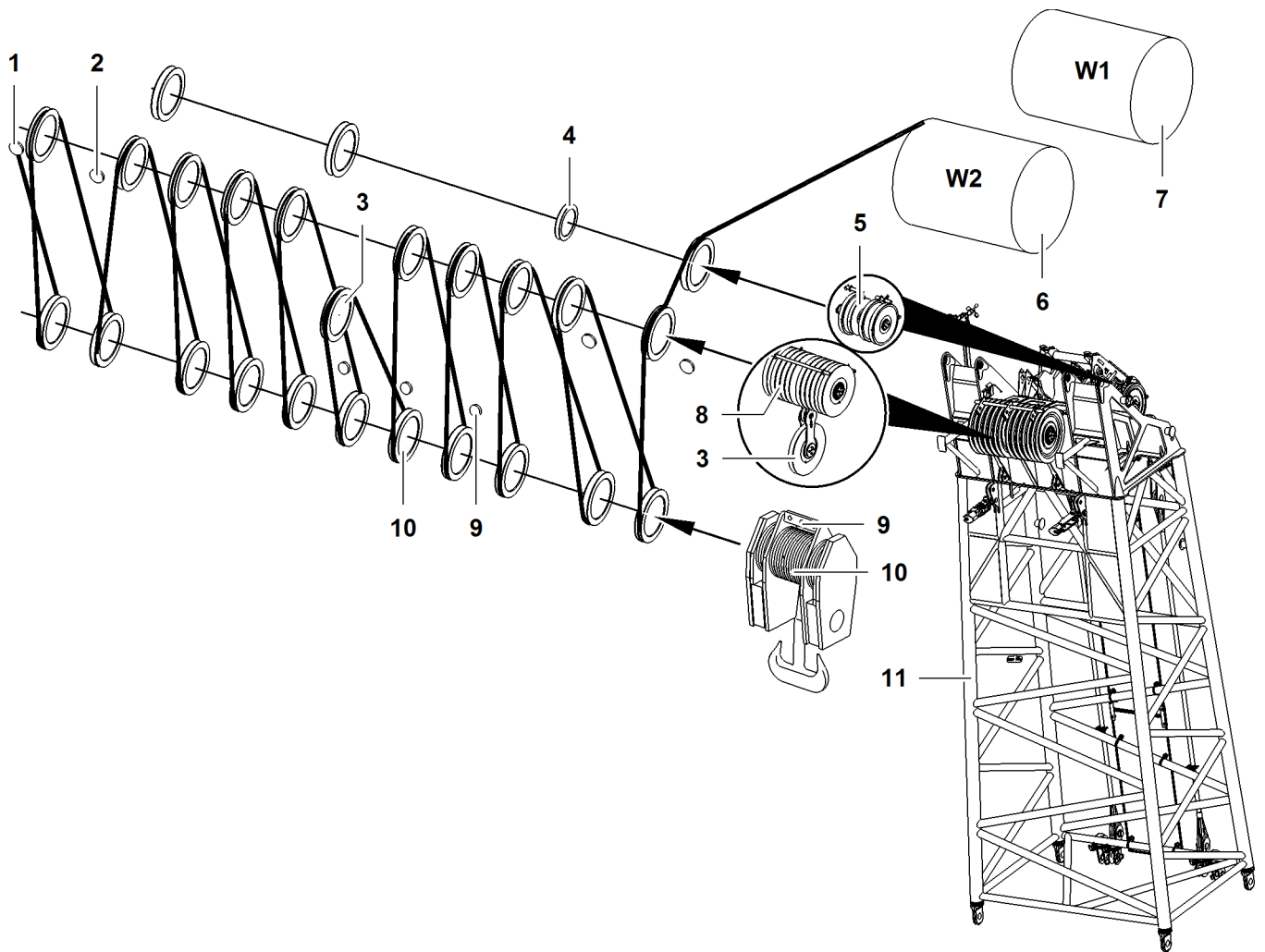


Fig. 4743: Reeving diagrams for one rope across main boom head 2821 (load position 2)

- | | | | | | |
|---|--|---|--------------------------------------|----|------------------------------------|
| 1 | Outer rope fixing point (2x) of main boom head | 5 | Gantry pulley (3x) of main boom head | 9 | Rope fixing points of pulley block |
| 2 | Inner rope fixing point (2x) of main boom head | 6 | Winch2 | 10 | Pulley set of pulley block |
| 3 | 11th rope pulley of main boom head | 7 | Winch1 | 11 | Main boom head |
| 4 | Rope pulley for rope of jib luffing winch | 8 | Rope pulley (10x) of main boom head | | |

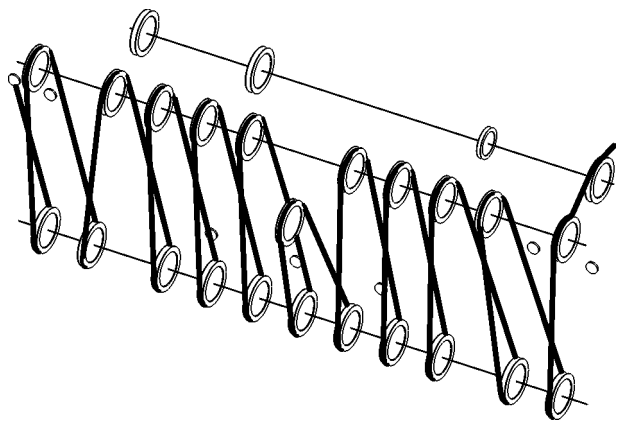


DANGER

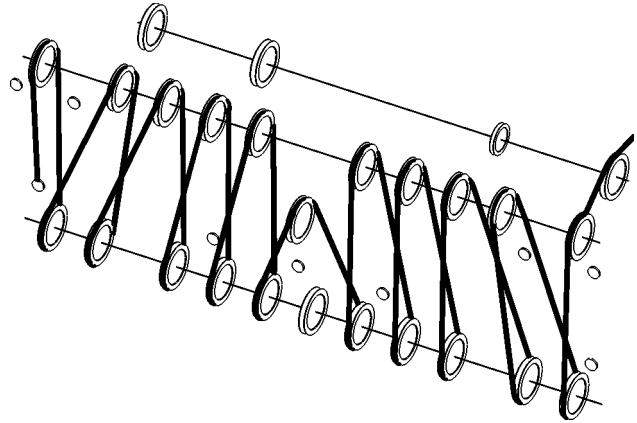
Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.

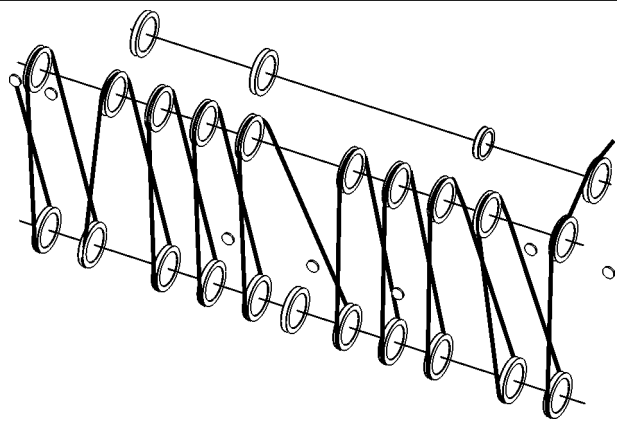
Reeving diagrams for one rope across main boom head 2821 (load position 2)



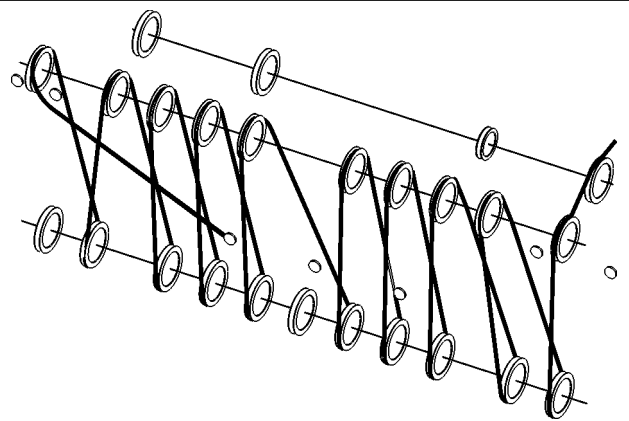
22x



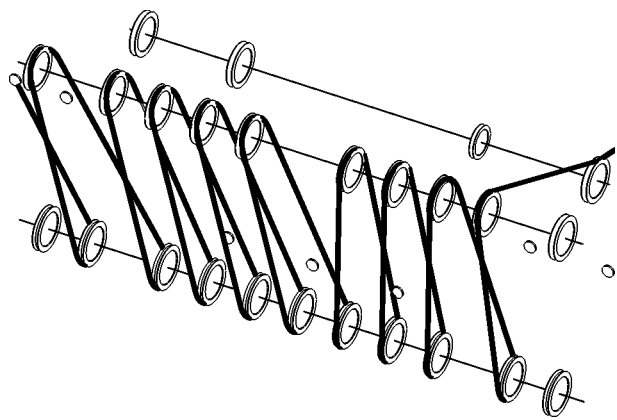
21x



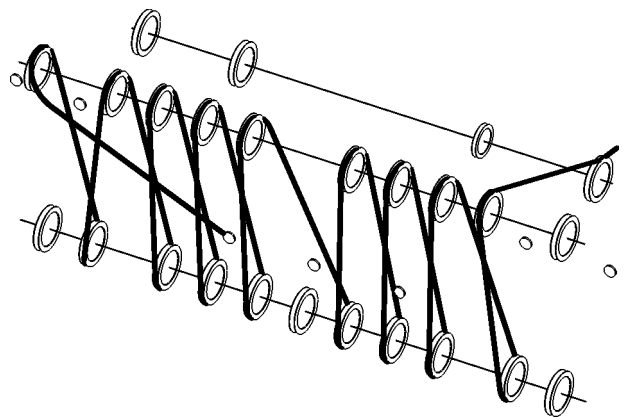
20x



19x

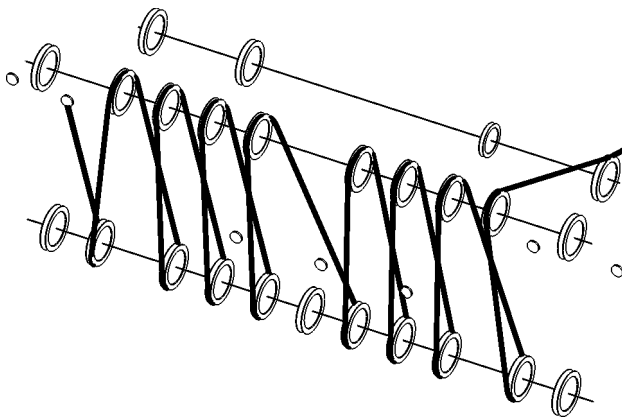


18x

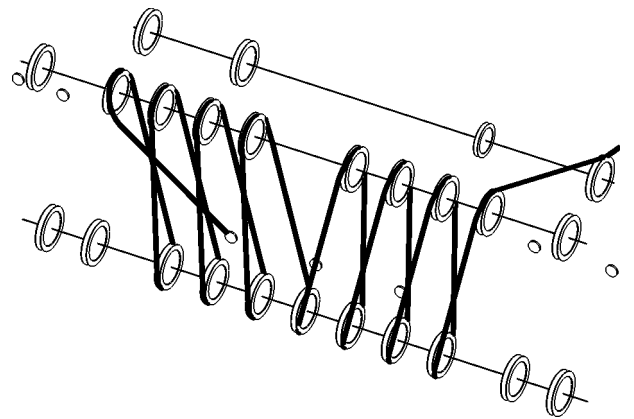


17x

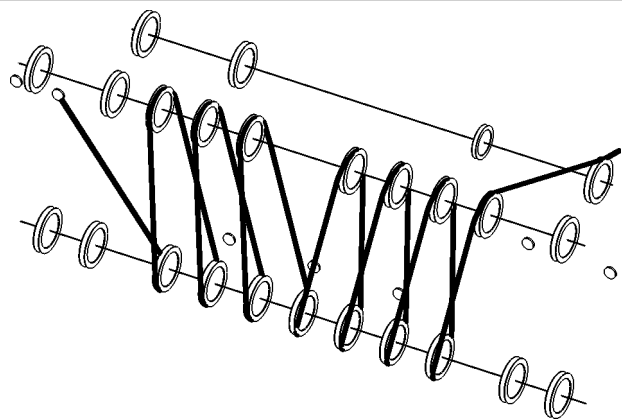
Reeving diagrams for one rope across main boom head 2821 (load position 2)



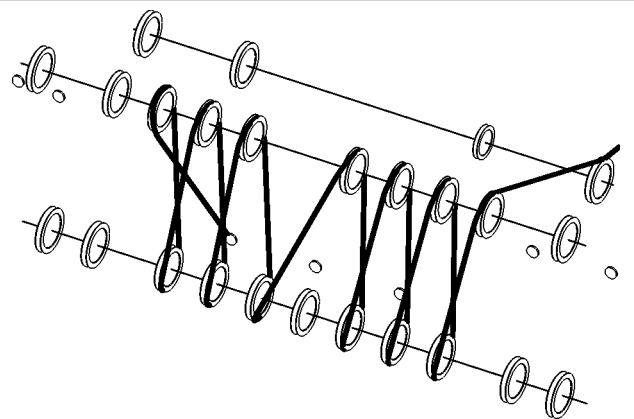
16x



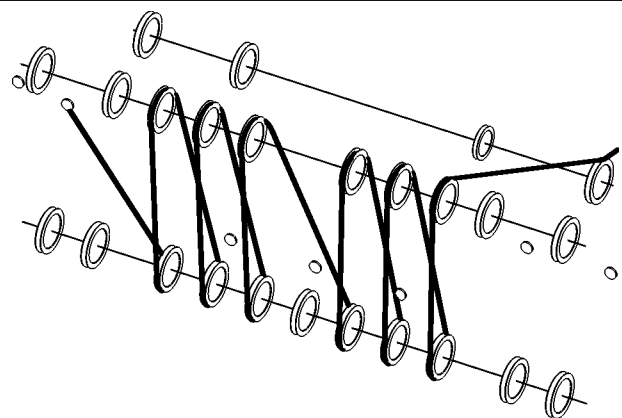
15x



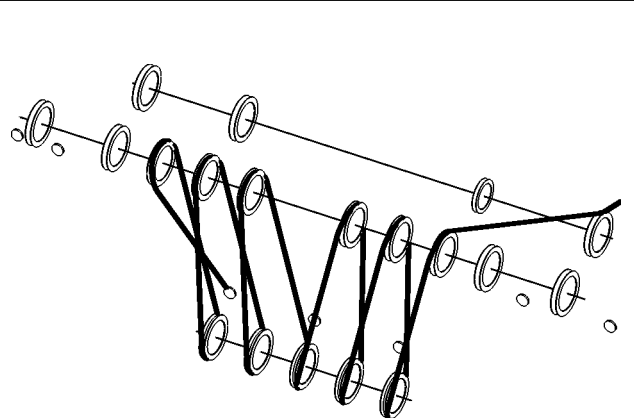
14x



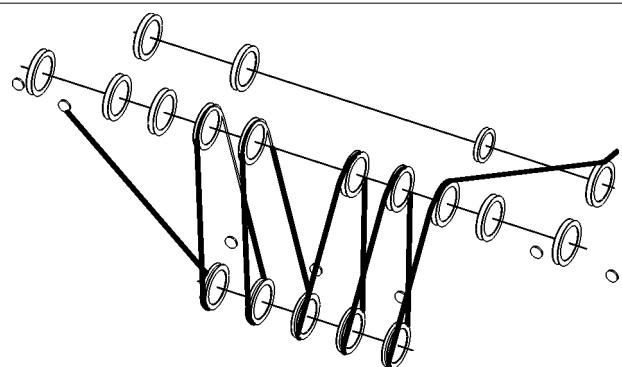
13x



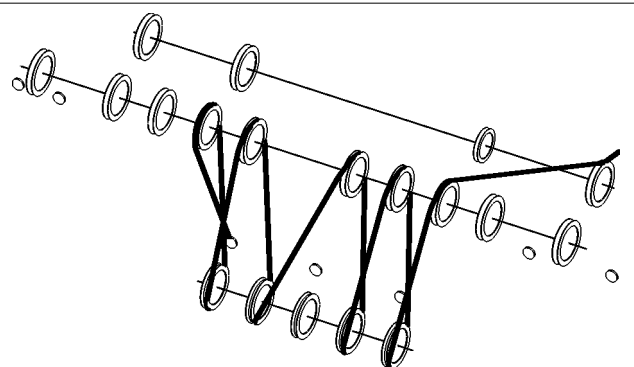
12x



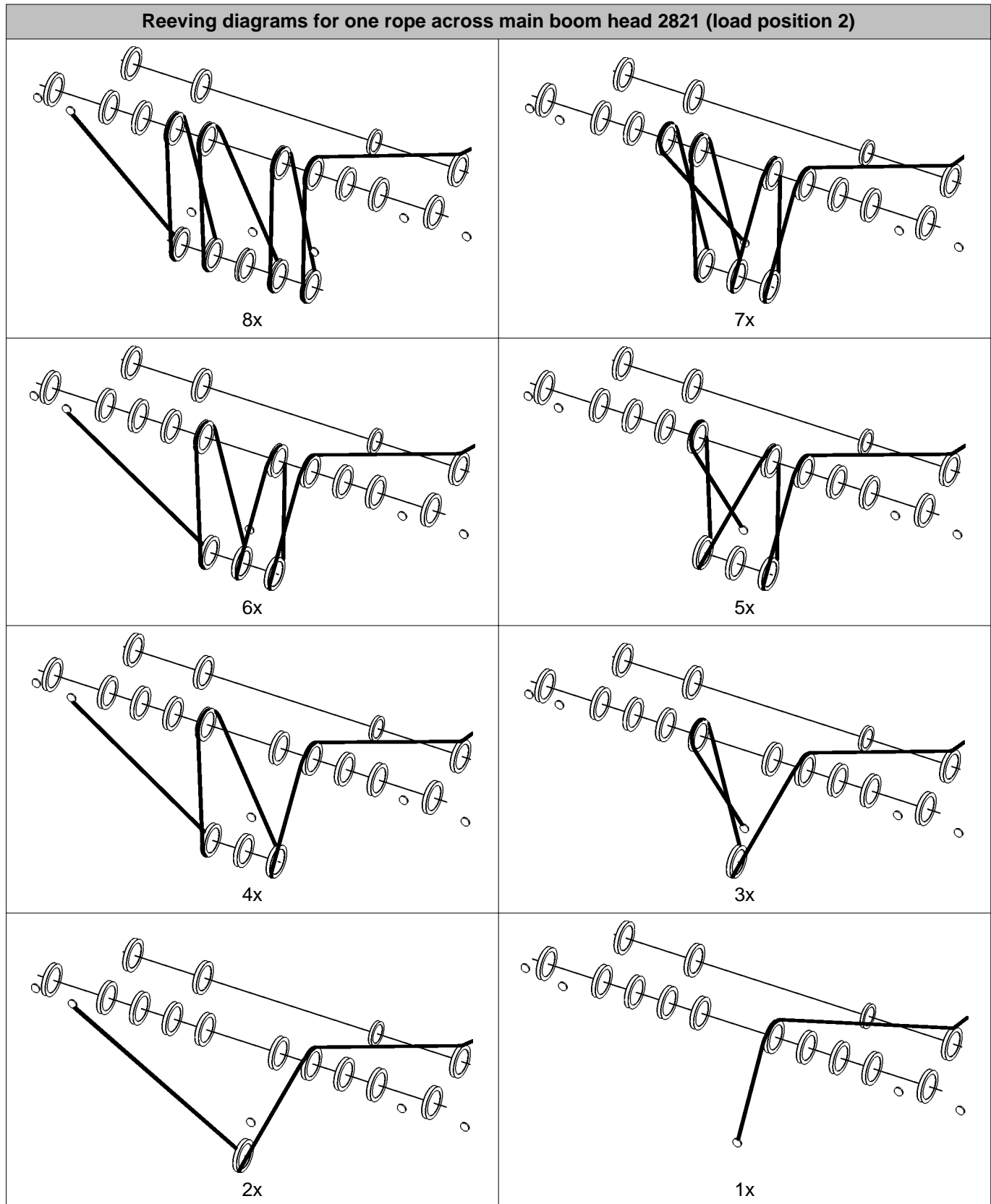
11x



10x



9x



Tab. 569: Reeving diagrams for one rope across main boom head 2821 (load position 2)

7.17 Fixed jib 1008

System-relevant information for fixed jib 1008:

- Configuration of jib
- Configuration of main boom
- Overview of pendant straps on fixed jib 1008
- Reeving diagrams for one rope across jib head 1008 (load position1)
- Reeving diagrams for two ropes across jib head 1008 (load position1)
- Reeving diagrams for one rope across main boom head 2821 (load position2)

7.17.1 Configuration of jib



DANGER

Excess length of jib!
Structural breakdown.

- ▶ Check jib length in load chart for validity.

Jib length	Configuration of jib (symbolic)
11 m 36 ft	
14 m 46 ft	
17 m 56 ft	
20 m 66 ft	
23 m 75 ft	
26 m 85 ft	

Tab. 570: Configuration of fixed jib 1008

7.17.2 Configuration of main boom



DANGER

Assembly with excessive main boom length!
Structural failure.

- ▶ Check main boom length in load chart for validity.



Note

- ▶ Information on the configuration of the main boom can be found under system-related data for the main boom ([For more information see: 7.5.1 Configuration of main boom, page 1319](#)) .

7.17.3 Overview of pendant straps on fixed jib 1008

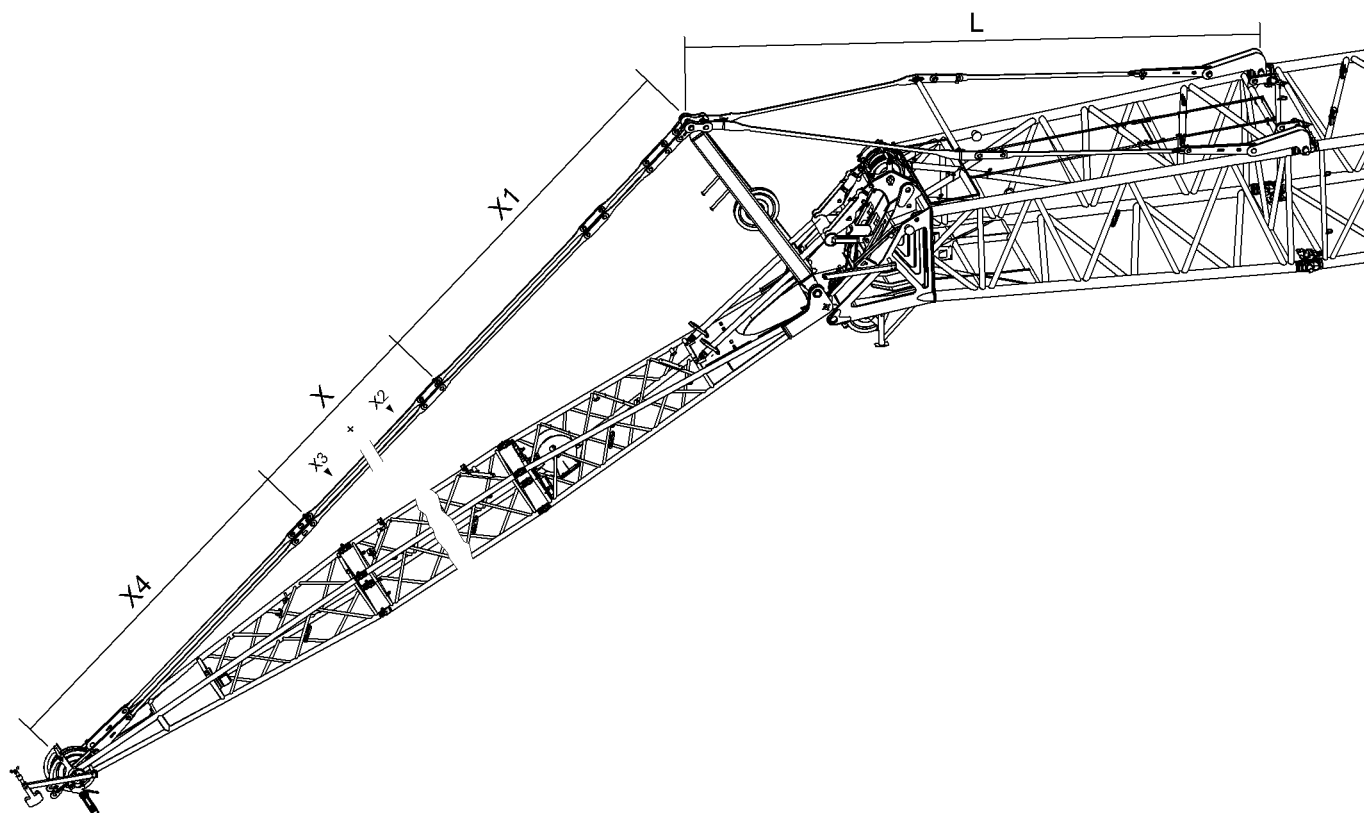


Fig. 4787: Overview of pendant straps on fixed jib 1008

Jib backstay straps A-frame2 to main boom head 2821

Name		Value
L	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap) , page 281)	at 30°
		9760 mm 32' ft-in
		at 15°
		8943 mm 29' 4" ft-in

Tab. 571: Jib backstay straps A-frame2 to main boom head 2821

Pendant straps A-frame2 to jib head 1008

Name		Value
X1	A-frame2 equalizer (jib pendant strap) (For more information see: Equalizer on A-frame2 (jib pendant strap) , page 283)	5785 mm 19' ft-in

Name		Value
X	Jib pendant straps consisting of:	
	X2	Jib pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 284)
	X3	Jib pendant strap 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft), page 285)
X4	Jib pendant strap on jib head 1008 (For more information see: Jib pendant strap on jib head 1008.20, page 286)	5515 mm 18' 1" ft-in

Tab. 572: Pendant straps A-frame2 to jib head 1008

Configuration of jib pendant straps (X):

Required number of jib pendant straps 3 m (10 ft) (X2) corresponds to number of jib sections 3 m (10 ft).

Required number of jib pendant straps 6 m (20 ft) (X3) corresponds to number of jib sections 6 m (20 ft).

**Note**

- For the admissible number of jib sections 3 m (10 ft), 6 m (20 ft), refer to the following table: ([For more information see: 7.17.1 Configuration of jib, page 1621](#))

7.17.4 Reeving diagrams for one rope across jib head 1008 (load position1)

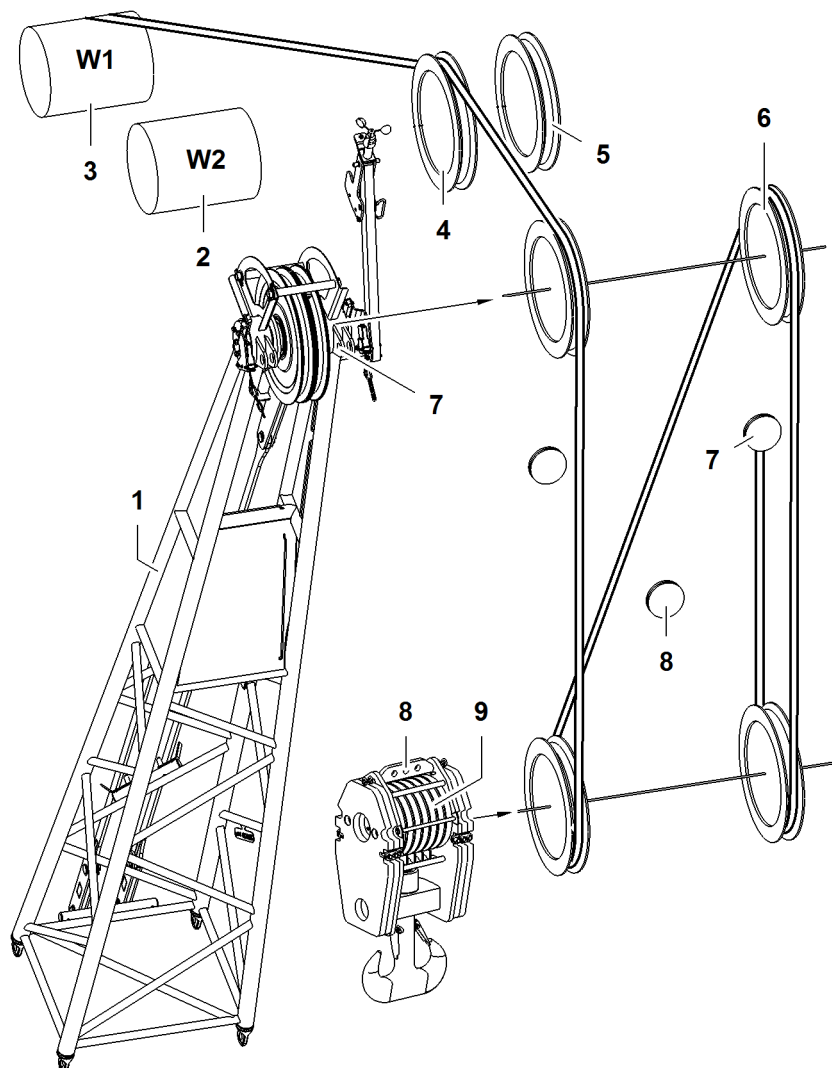


Fig. 4788: Reeving diagrams for one rope across jib head 1008 (load position1)

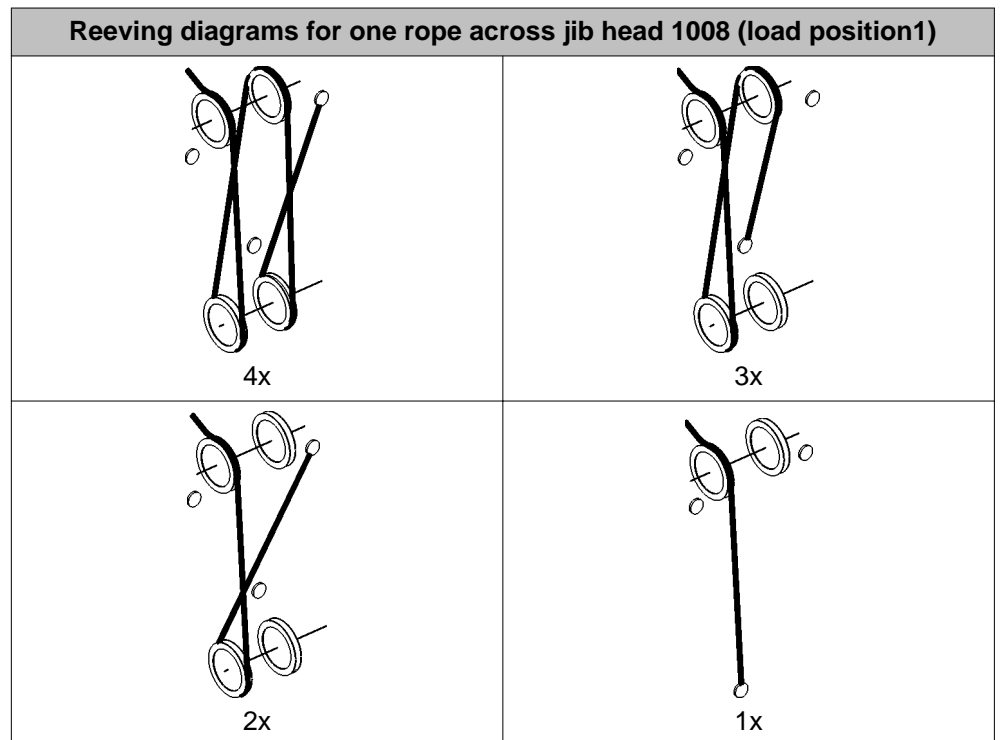
- | | | | |
|---|--|---|------------------------------------|
| 1 | Jib head | 6 | Pulley (2x) of jib head |
| 2 | Winch2 | 7 | Rope fixing point (2x) of jib head |
| 3 | Winch1 | 8 | Rope fixing points of pulley block |
| 4 | Pulley of A-frame2 | 9 | Pulley set of pulley block |
| 5 | Retrofit kit* for operation with two ropes across jib head | | |



DANGER

Incorrect number of reevings!
Structural breakdown, toppling of machine.

- ▶ Choose the correct number of reevings as per the load chart.



Tab. 573: Reeving diagrams for one rope across jib head 1008 (load position1)

7.17.5 Reeving diagrams for two ropes across jib head 1008 (load position1)



DANGER

Incorrect number of reevings!
Structural breakdown, toppling of machine.

► Choose the correct number of reevings as indicated in the load chart.

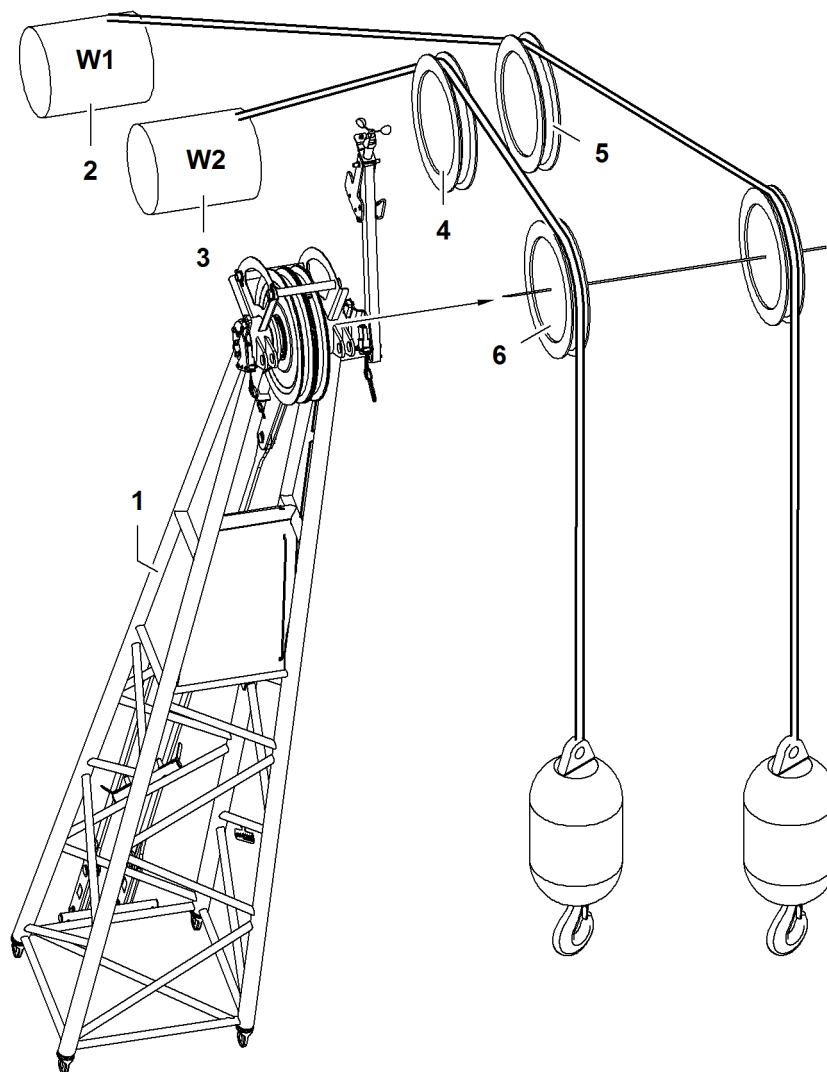


Fig. 4793: Reeving diagrams for two ropes across jib head 1008 (load position 1)

- | | | | |
|---|----------|---|--|
| 1 | Jib head | 4 | Pulley of A-frame2 |
| 2 | Winch1 | 5 | Retrofit kit* for operation with two ropes across jib head |
| 3 | Winch2 | 6 | Pulley (2x) of jib head |

7.17.6 Reeving diagrams for one rope across main boom head 2821 (load position 2)

If the main boom with jib attached is also used to lift a load, reeve main boom head 2821 as shown below.

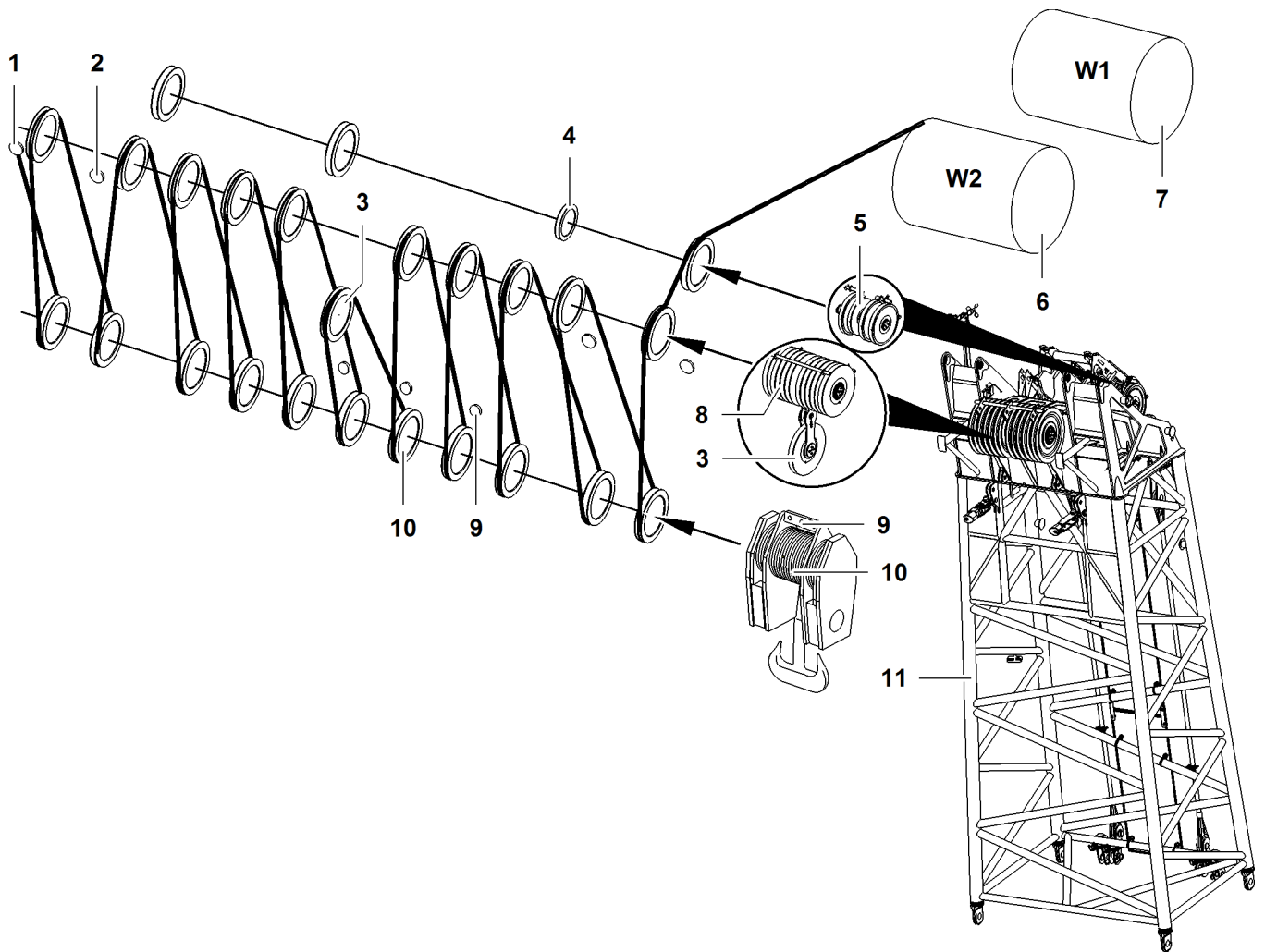


Fig. 4794: Reeving diagrams for one rope across main boom head 2821 (load position 2)

- | | | | | | |
|---|--|---|--------------------------------------|----|------------------------------------|
| 1 | Outer rope fixing point (2x) of main boom head | 5 | Gantry pulley (3x) of main boom head | 9 | Rope fixing points of pulley block |
| 2 | Inner rope fixing point (2x) of main boom head | 6 | Winch2 | 10 | Pulley set of pulley block |
| 3 | 11th rope pulley of main boom head | 7 | Winch1 | 11 | Main boom head |
| 4 | Rope pulley for rope of jib luffing winch | 8 | Rope pulley (10x) of main boom head | | |

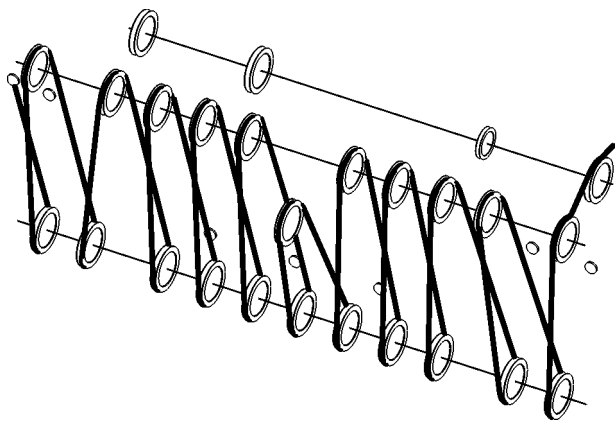


DANGER

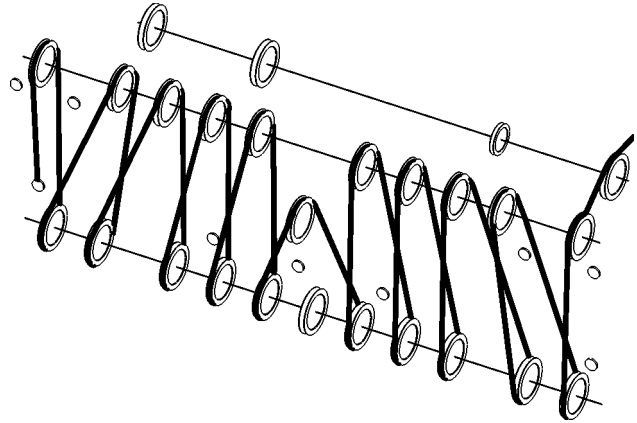
Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.

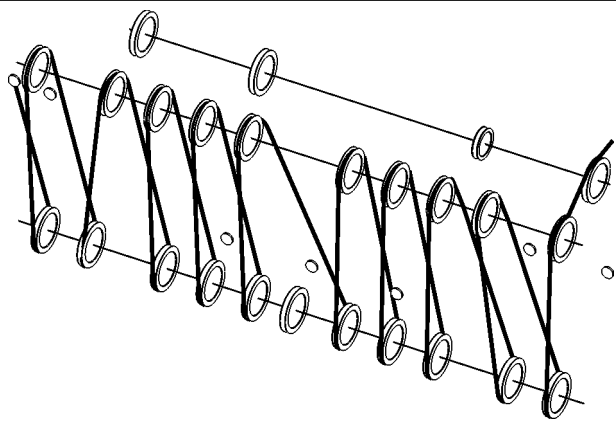
Reeving diagrams for one rope across main boom head 2821 (load position 2)



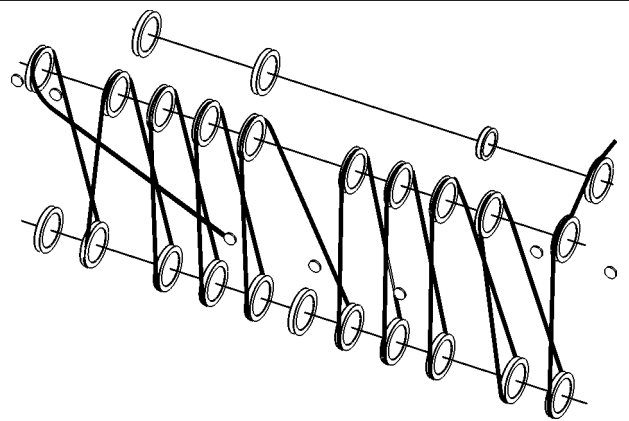
22x



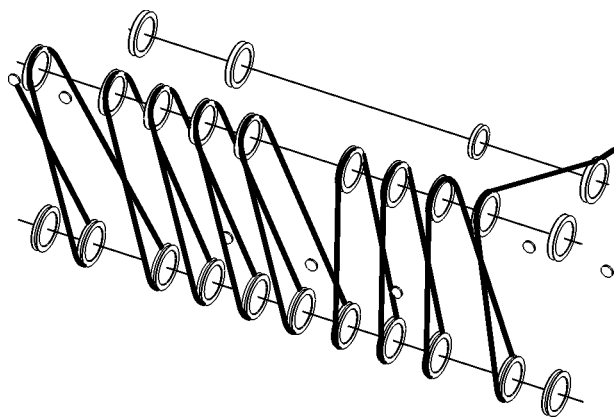
21x



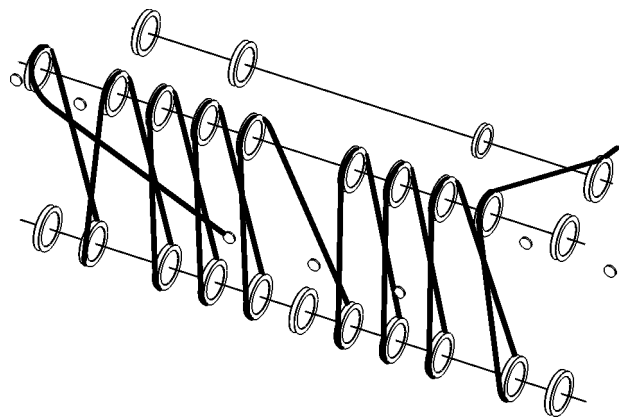
20x



19x

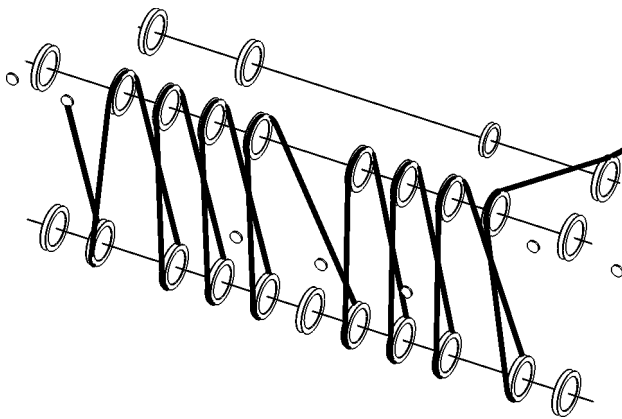


18x

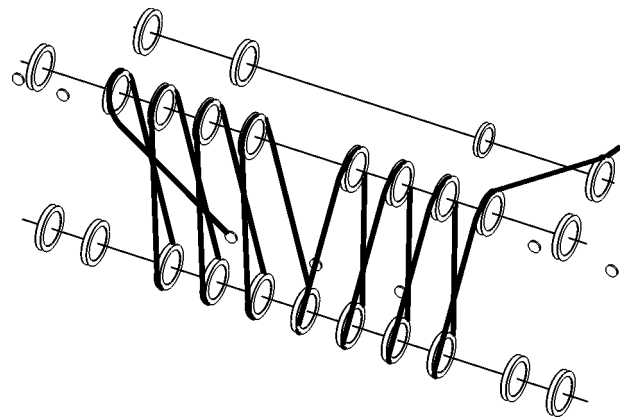


17x

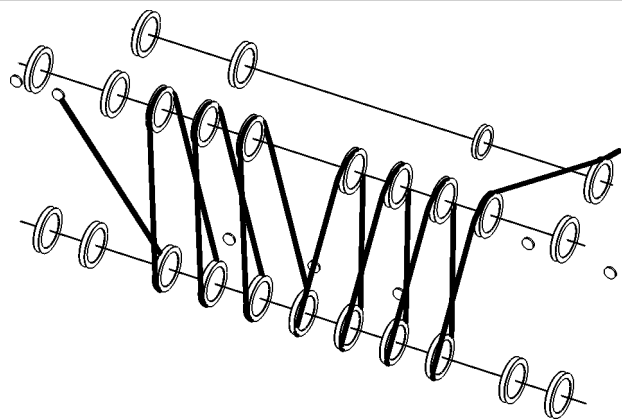
Reeving diagrams for one rope across main boom head 2821 (load position 2)



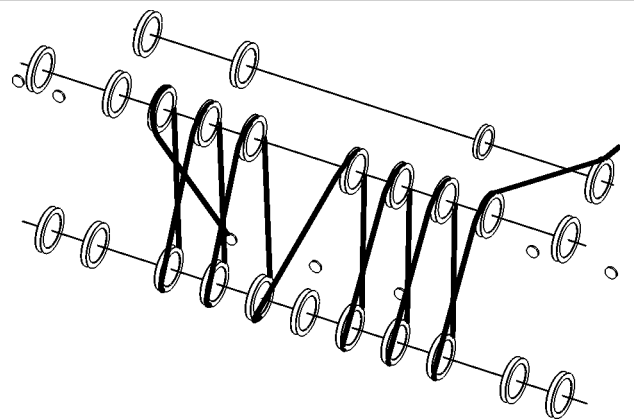
16x



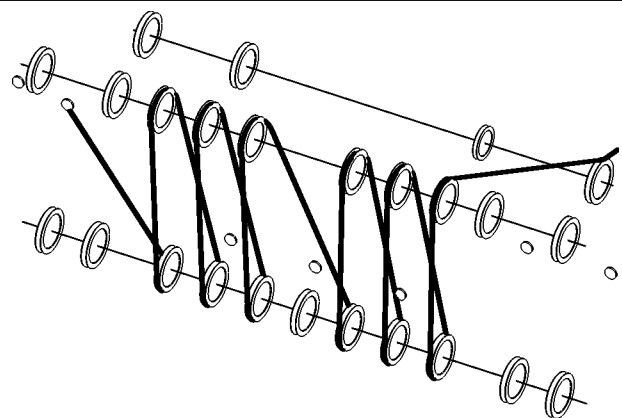
15x



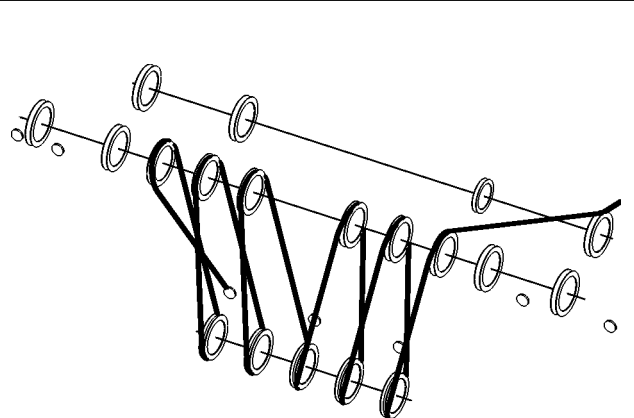
14x



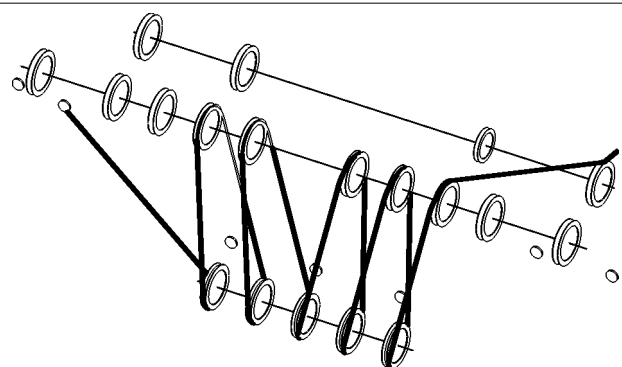
13x



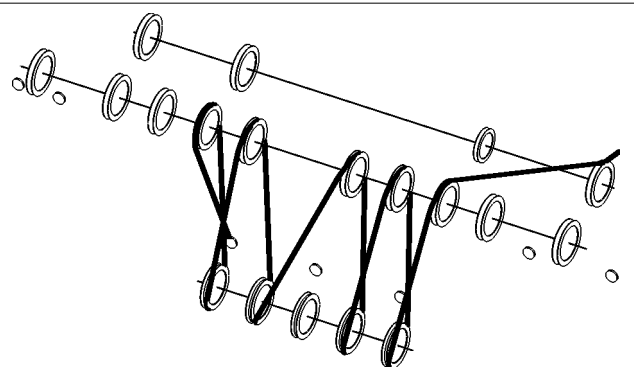
12x



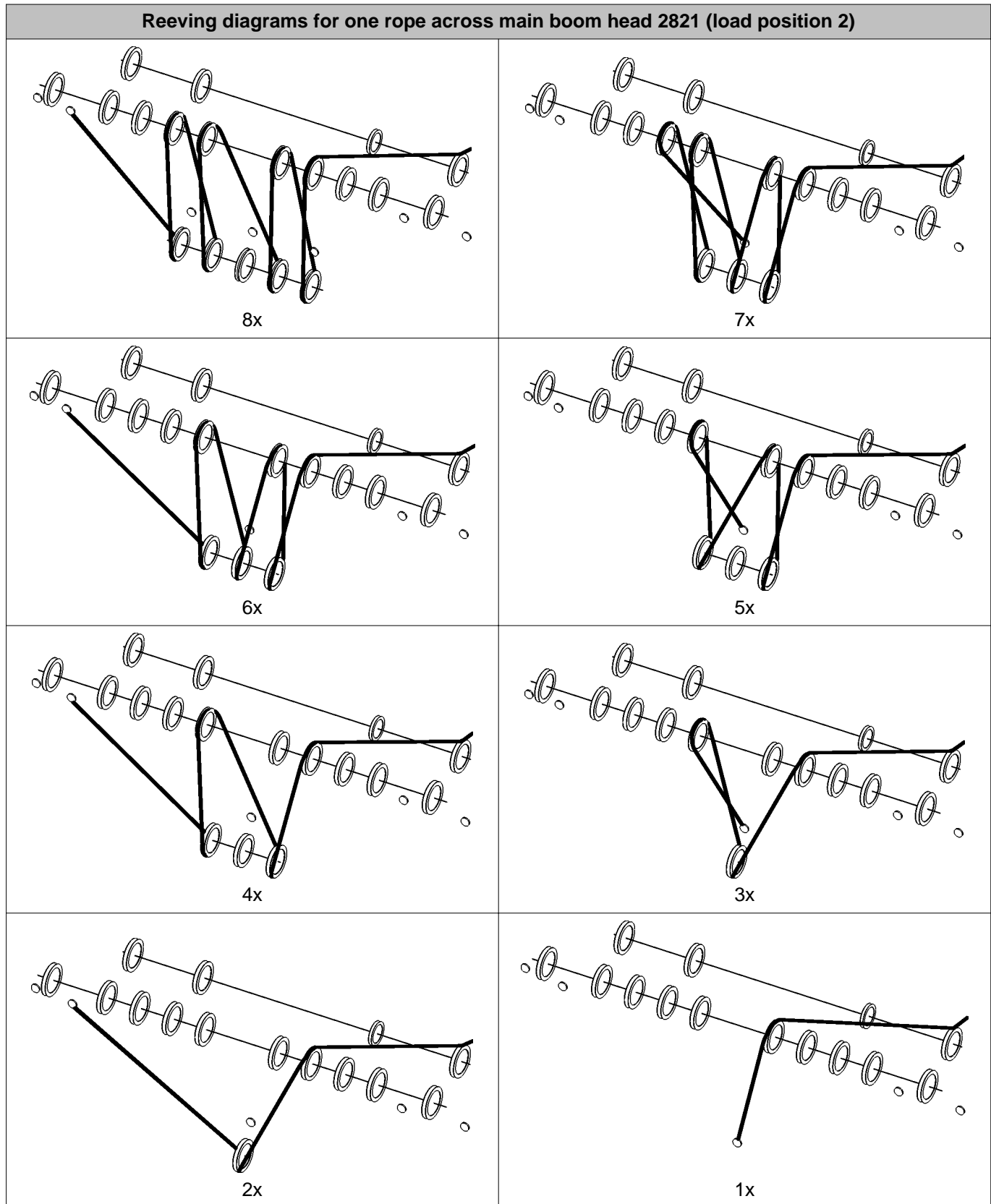
11x



10x



9x



Tab. 574: Reeving diagrams for one rope across main boom head 2821 (load position 2)

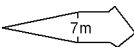
7.18 Fixed jib 0906

System-relevant information for fixed jib 0906:

- Configuration of jib
- Configuration of main boom
- Overview of pendant straps on fixed jib 0906
- Reeving diagrams for one rope across jib head 0906 (load position1)
- Reeving diagrams for two ropes across jib head 0906 (load position1)
- Reeving diagrams for one rope across main boom head 2821 (load position2)

7.18.1 Configuration of jib

The fixed jib 0906 has a fixed length of 7 m (23 ft).

Jib length	Configuration of jib (symbolic)
7 m 23 ft	

Tab. 575: Configuration of fixed jib 0906

7.18.2 Configuration of main boom



DANGER

Excess length of main boom!
Structural breakdown.

- ▶ Check main boom length in load chart for validity.



Note

- ▶ See system-relevant data of main boom for information on main boom configuration ([For more information see: 7.5.1 Configuration of main boom, page 1319](#)).

7.18.3 Overview of pendant straps on fixed jib 0906

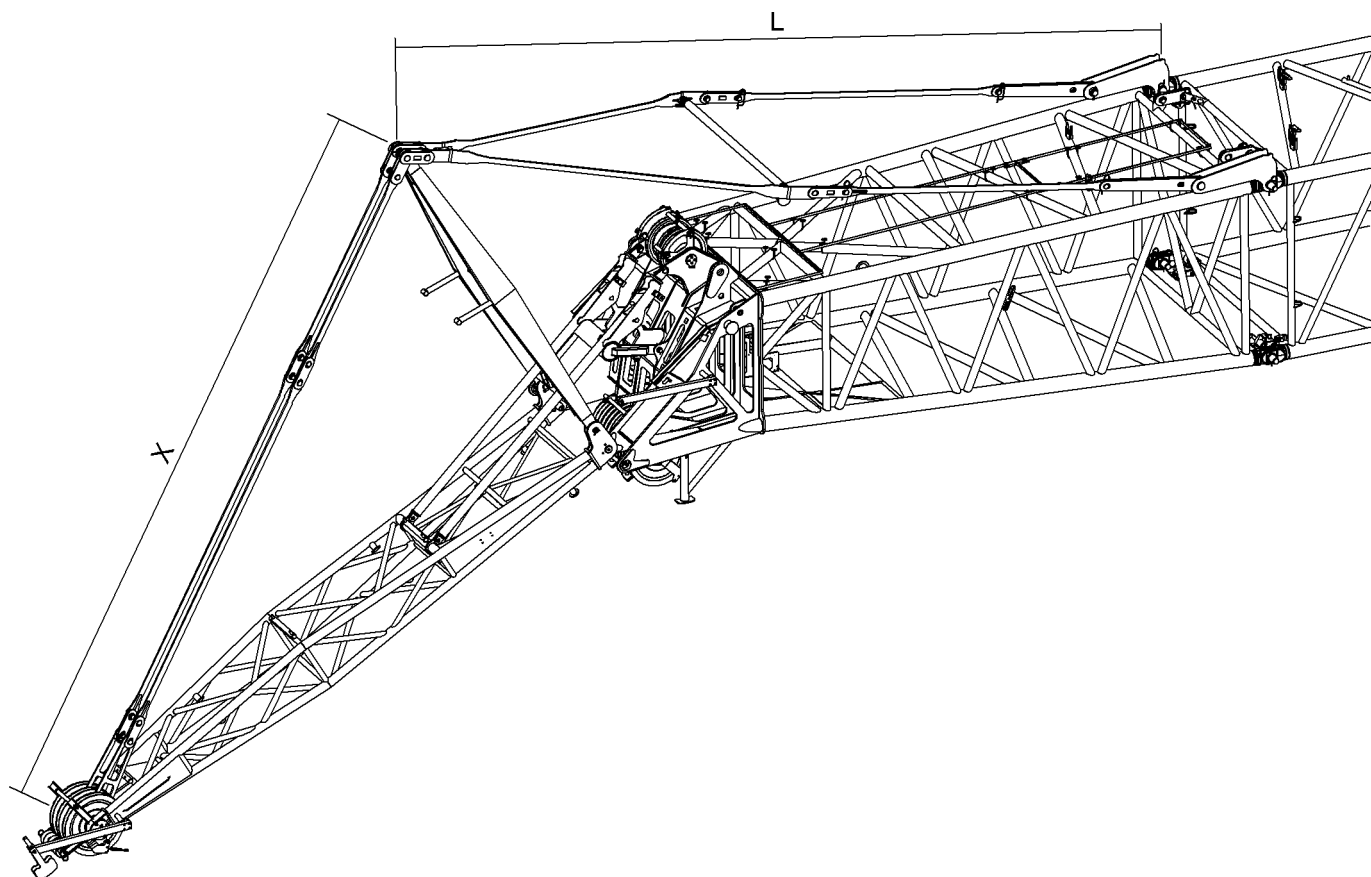


Fig. 4818: Overview of pendant straps on fixed jib 0906

Jib backstay straps A-frame2 to main boom head 2821

Name		Value
L	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap) , page 289)	at 30° 10000 mm 32' 10" ft-in

Tab. 576: Jib backstay straps A-frame2 to main boom head 2821

Pendant straps A-frame2 to jib head 0906

Name		Value
X	Jib pendant strap (A-frame2 to jib head 0906) (For more information see: Jib pendant strap (A-frame2 to jib head 0906.21) , page 291)	8235 mm 27' ft-in

Tab. 577: Pendant straps A-frame2 to jib head 0906

7.18.4 Reeving diagrams for one rope across jib head 0906 (load position1)

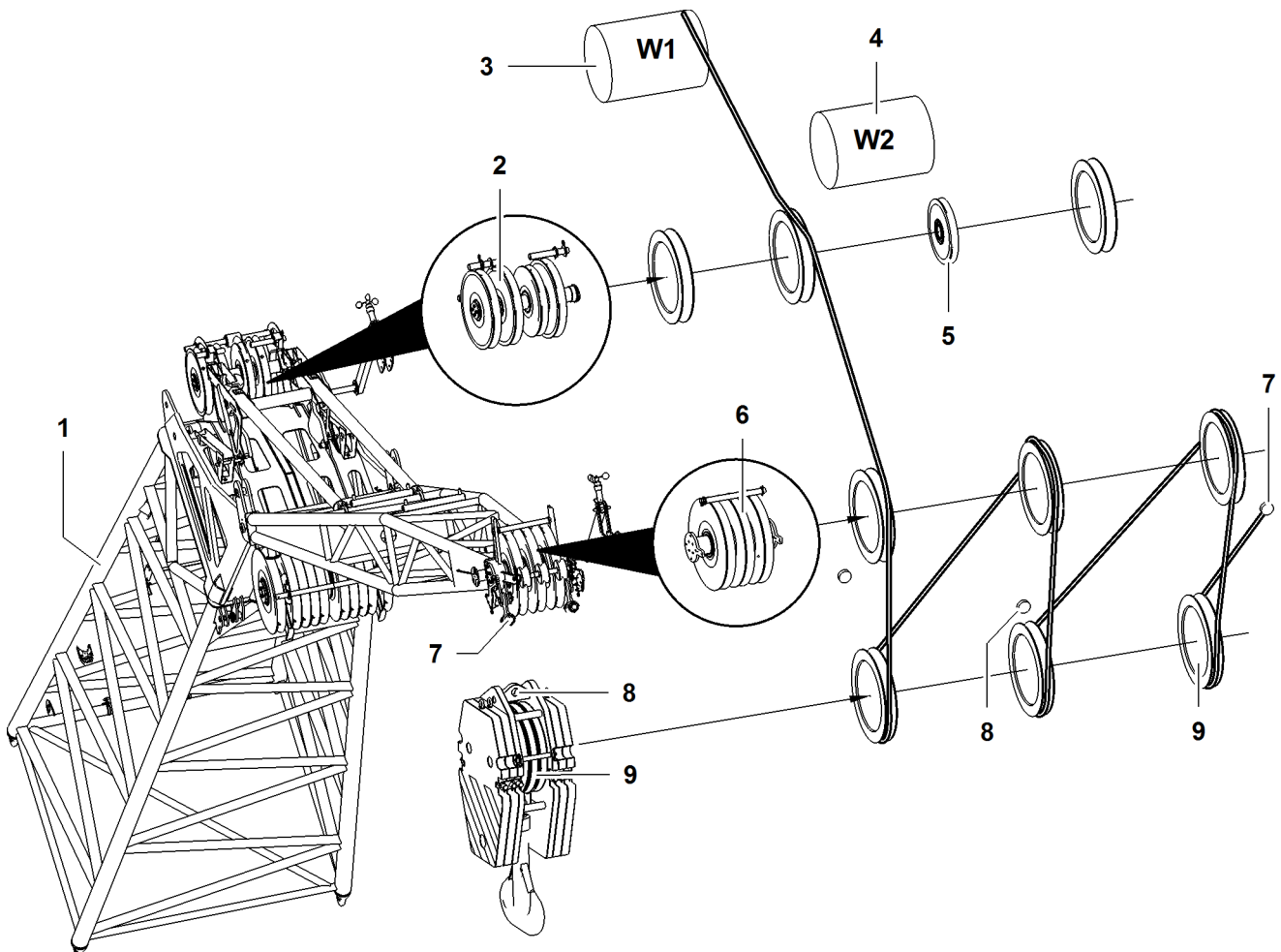


Fig. 4819: Reeving diagrams for one rope across jib head 0906 (load position1)

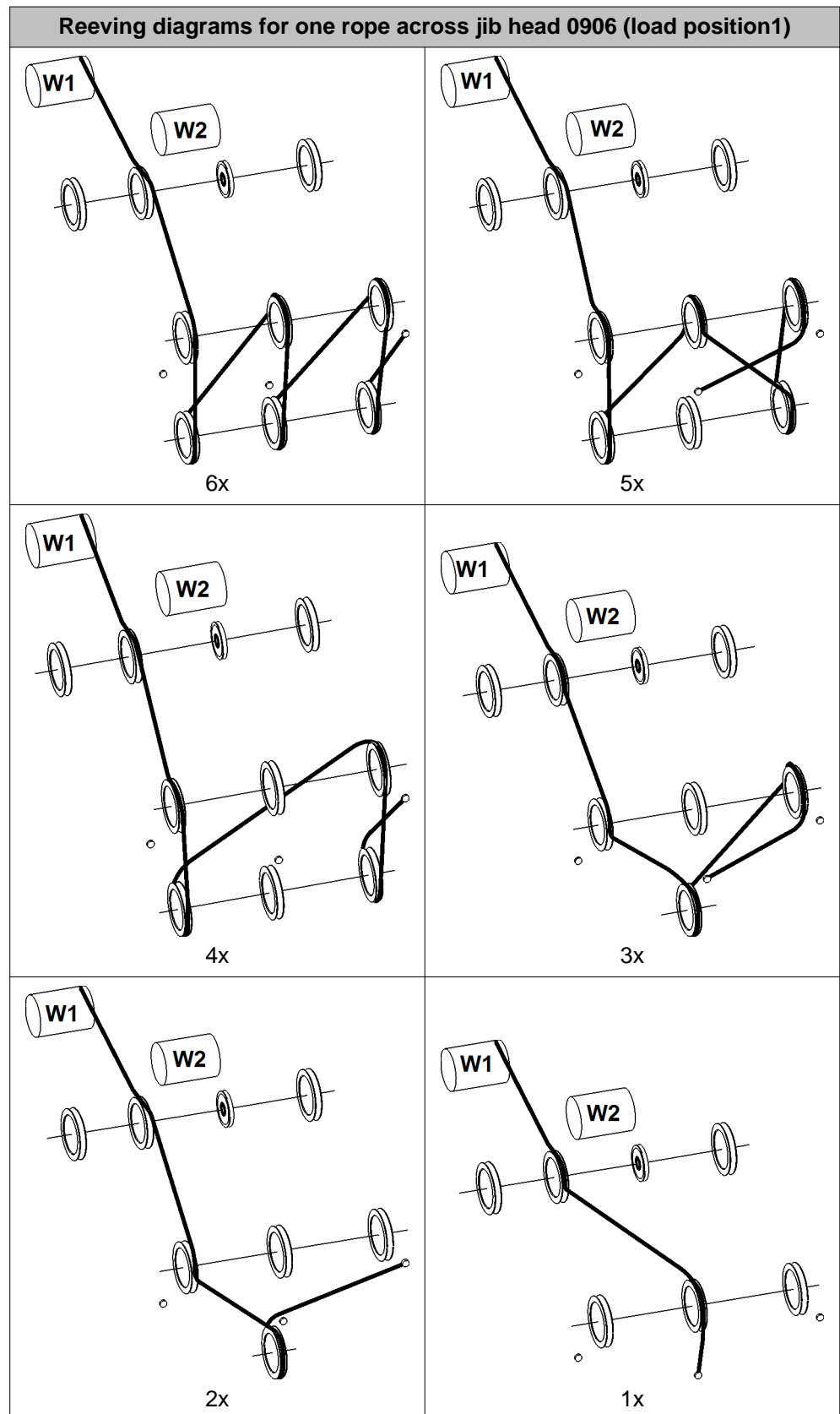
1	Main boom head	4	Winch2	7	Rope fixing point (2x) of jib head
2	Gantry pulley (3x) of main boom head	5	Pulley for rope of jib luffing winch	8	Rope fixing points of pulley block
3	Winch1	6	Pulley (3x) of jib head	9	Pulley set of pulley block



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Choose correct number of reevings as indicated in load chart.



Tab. 578: Reeving diagrams for one rope across jib head 0906 (load position1)

7.18.5 Reeving diagrams for two ropes across jib head 0906 (load position 1)



DANGER

Incorrect number of reevings!
Structural breakdown, toppling of machine.

► Choose the correct number of reevings as indicated in the load chart.

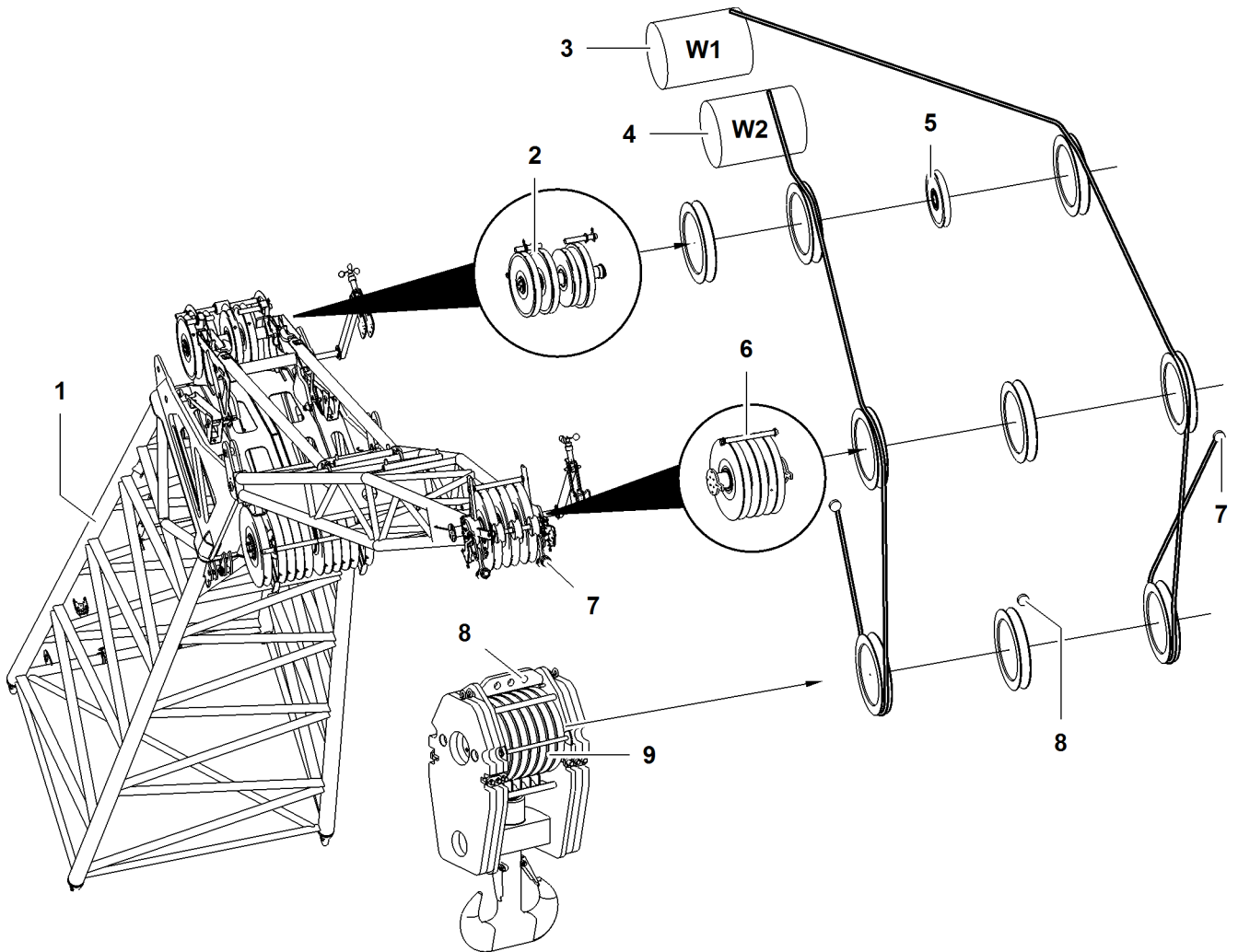


Fig. 4826: Reeving diagrams for two ropes across jib head 0906 (load position 1)

- | | | |
|--|--|--------------------------------------|
| 1 Main boom head | 4 Winch2 | 7 Rope fixing point (2x) of jib head |
| 2 Gantry pulley (3x) of main boom head | 5 Pulley for rope of jib luffing winch | 8 Rope fixing points of pulley block |
| 3 Winch1 | 6 Pulley (3x) of jib head | 9 Pulley set of pulley block |

7.18.6 Reeving diagrams for one rope across main boom head 2821 (load position 2)

If the main boom with jib attached is also used to lift a load, reeve main boom head 2821 as shown below.

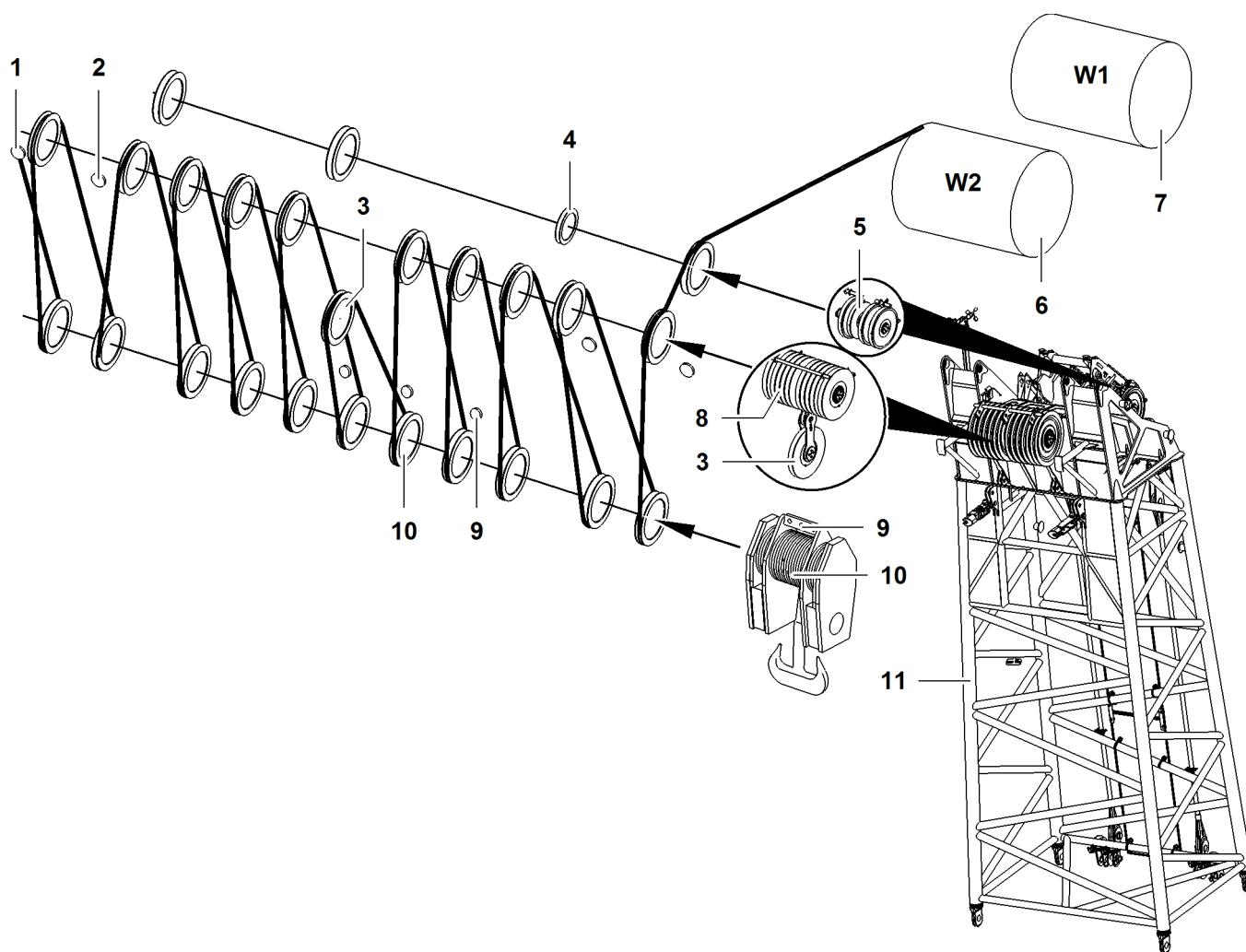


Fig. 4827: Reeving diagrams for one rope across main boom head 2821 (load position 2)

- | | | | | | |
|---|--|---|--------------------------------------|----|------------------------------------|
| 1 | Outer rope fixing point (2x) of main boom head | 5 | Gantry pulley (3x) of main boom head | 9 | Rope fixing points of pulley block |
| 2 | Inner rope fixing point (2x) of main boom head | 6 | Winch2 | 10 | Pulley set of pulley block |
| 3 | 11th rope pulley of main boom head | 7 | Winch1 | 11 | Main boom head |
| 4 | Rope pulley for rope of jib luffing winch | 8 | Rope pulley (10x) of main boom head | | |

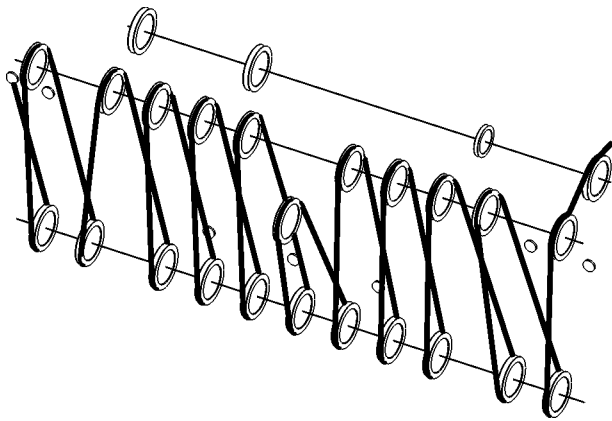


DANGER

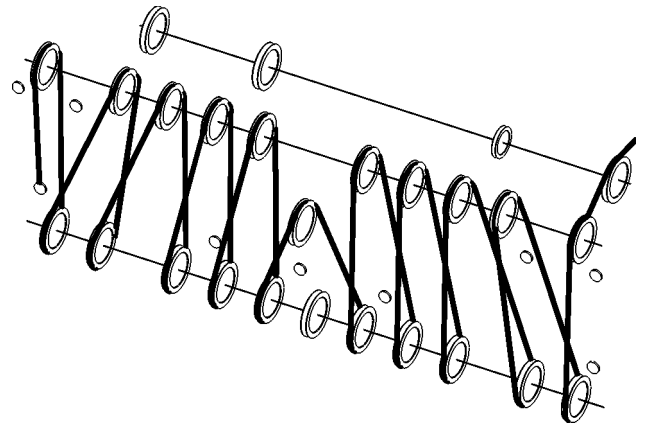
Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.

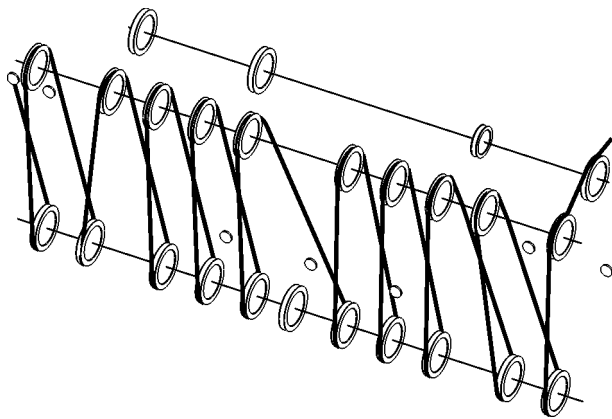
Reeving diagrams for one rope across main boom head 2821 (load position 2)



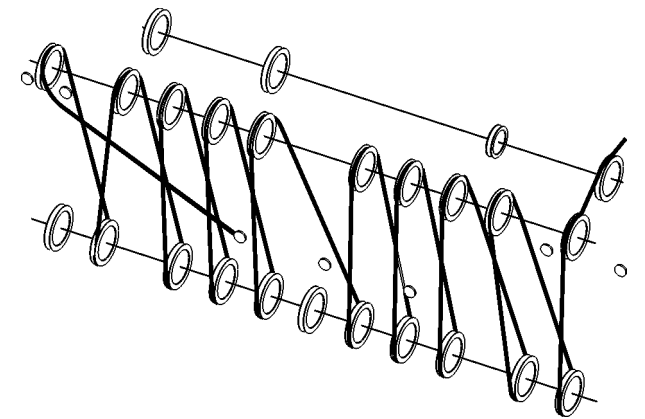
22x



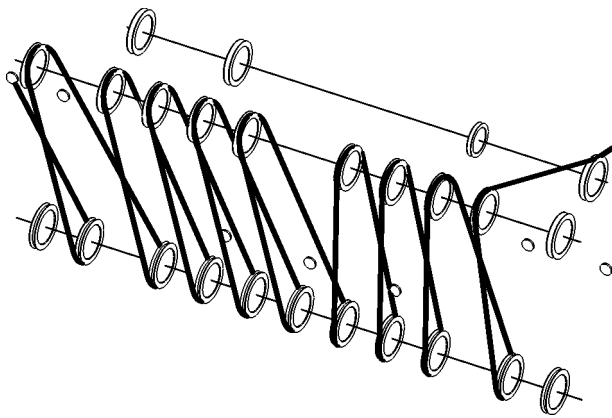
21x



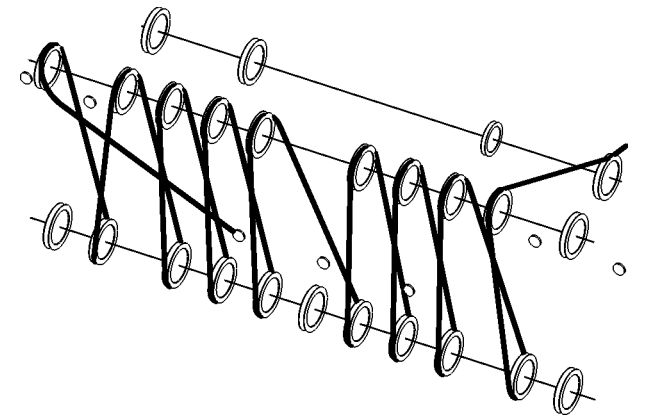
20x



19x

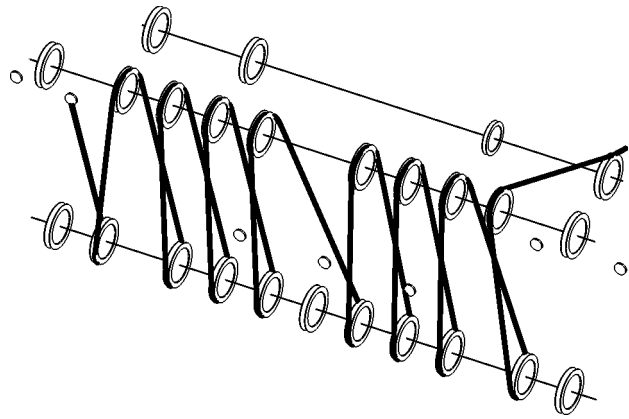


18x

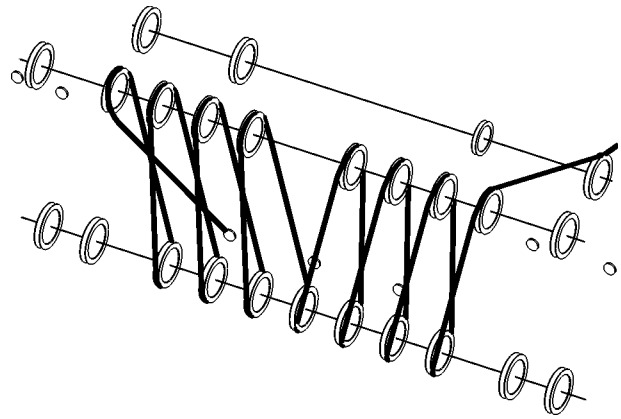


17x

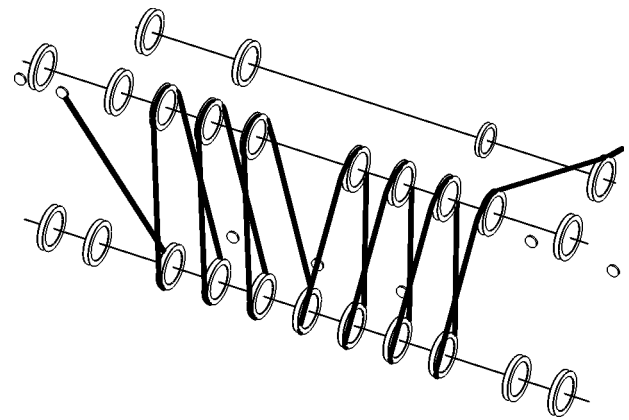
Reeving diagrams for one rope across main boom head 2821 (load position 2)



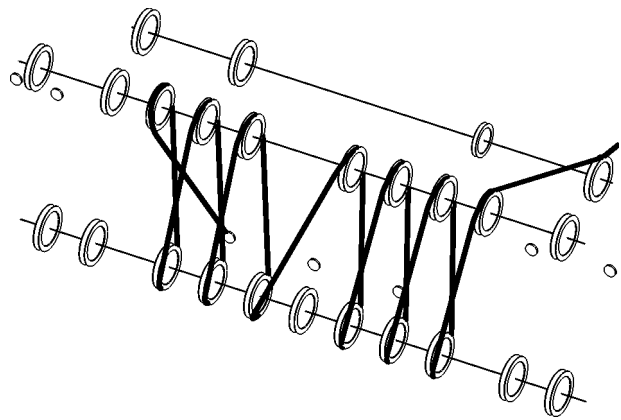
16x



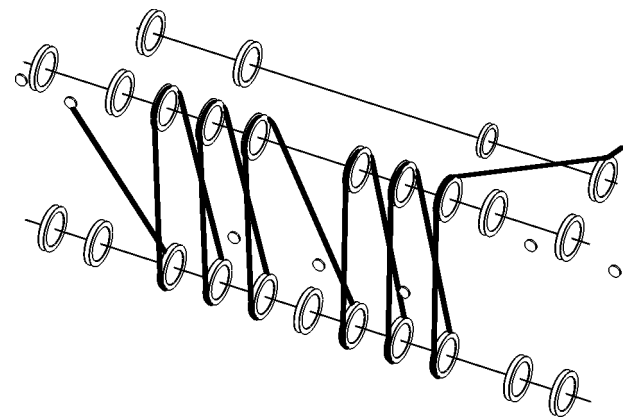
15x



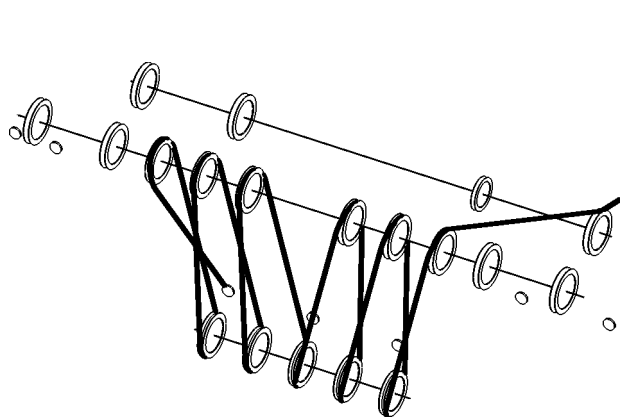
14x



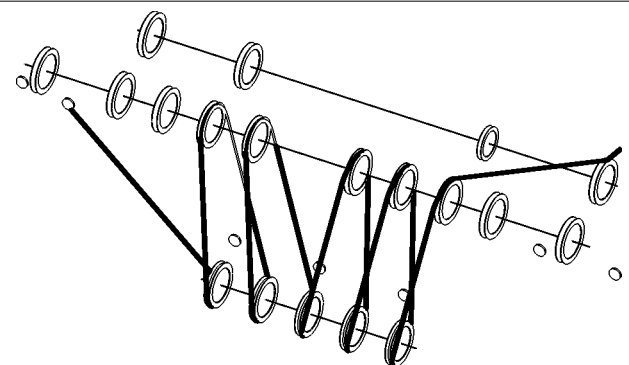
13x



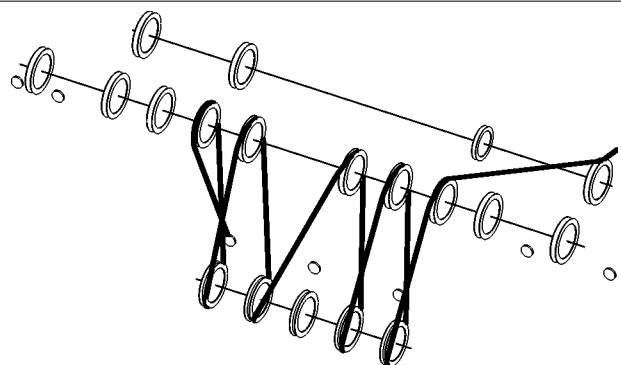
12x



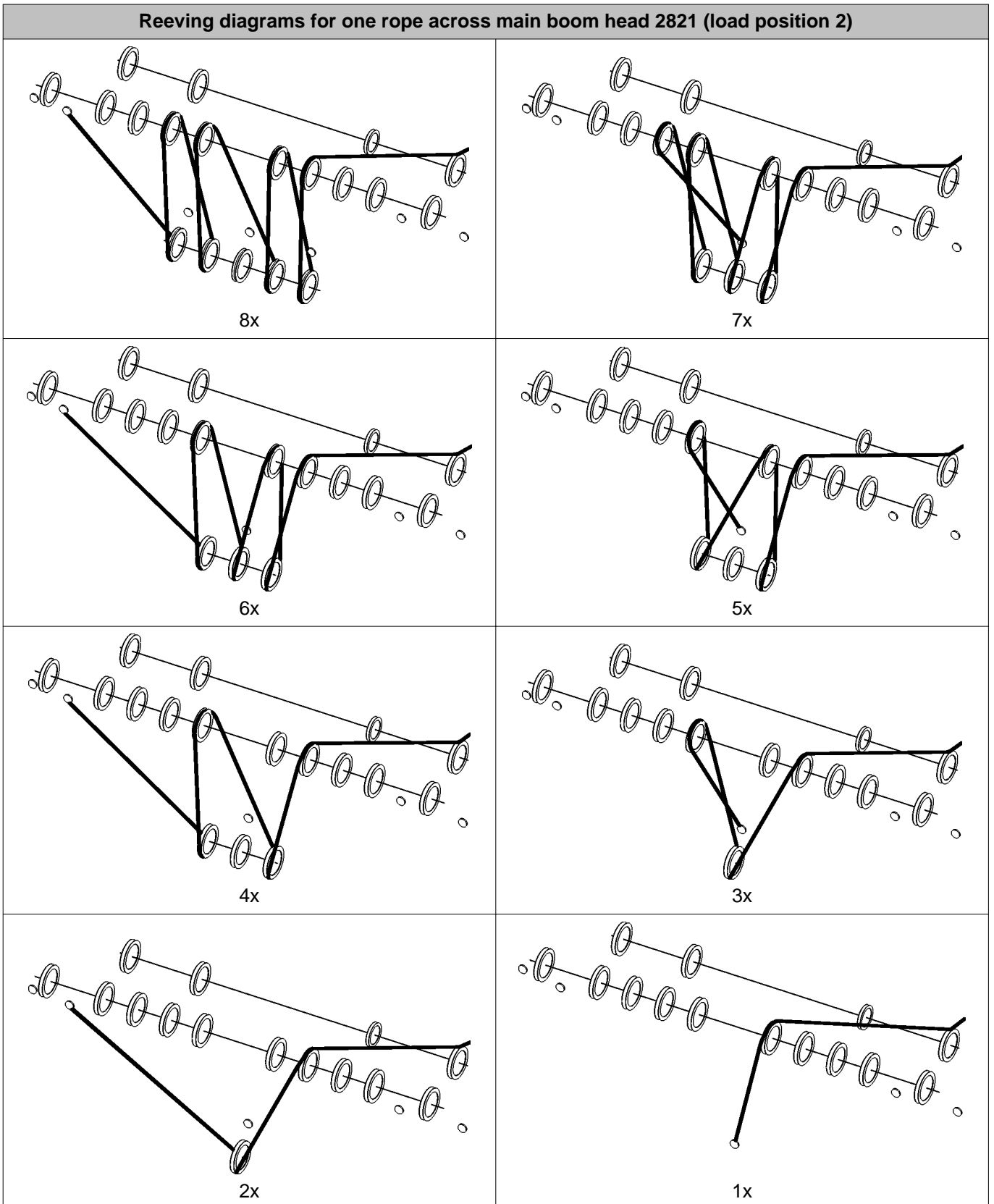
11x



10x



9x



Tab. 579: Reeving diagrams for one rope across main boom head 2821 (load position 2)

7.19 Assembling the fixed jib

Ensure that the following conditions are fulfilled:

- Assembly functions are switched on.
- The machine is ready for use as an assembly crane, or an assist crane is available.
- Work plans have been drawn up.
- The length and the order of the jib sections are known.
- Any accessories required are available.

7.19.1 Notes

The assembly of the fixed jib described below applies to all system dimensions of the fixed jib.

The illustrations have been simplified or schematically represented for reasons of uniformity and represent the principles of assembly. They do not provide a detailed representation of the components.

7.19.2 Programming the setup



DANGER

Inadmissible setup!

- ▶ Only program a setup on the machine that is in accordance with the load chart.
- ▶ Programming the setup on the machine ([For more information see: 4.13 Programming the setup, page 914](#)).

7.19.3 Unloading and positioning the jib components



DANGER

Stewing of uppercarriage with rear counterweight attached not permitted!
Machine toppling over.

- ▶ Slew the uppercarriage according to the table ([For more information see: Lifting and pinning the rear counterweight, page 1313](#)) exclusively.



DANGER

Incorrect or faulty parts/components are fit!
Structural breakdown.

- ▶ Only use original Liebherr parts/components that are in perfect condition.



DANGER

Improperly assembled boom configuration!
Structural breakdown.

- ▶ Ensure that the assembled boom configuration is compatible with the programmed setup.

**DANGER**

Incorrect jib sections arrangement!
Structural breakdown.

- ▶ Assemble the boom according to the relevant system requirements.
- ▶ A jib section measuring 6 m (20 ft) cannot be replaced with two jib sections measuring 3 m (10 ft).
- ▶ A jib section measuring 12 m (40 ft) cannot be replaced with two jib sections measuring 6 m (20 ft).

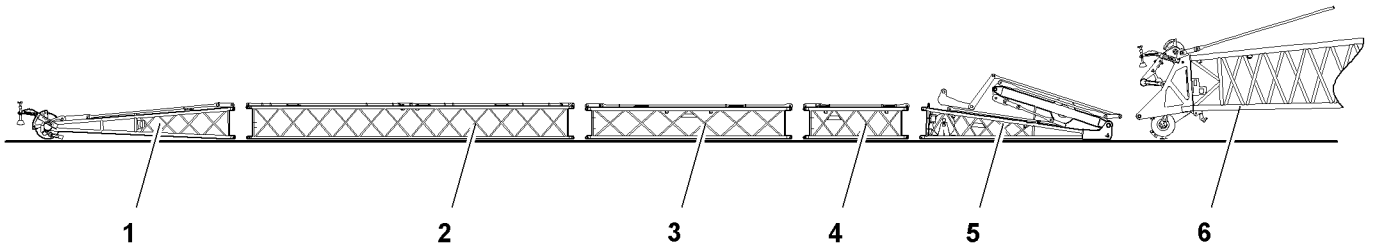


Fig. 4850: Position jib components according to relevant system instructions

1	Jib head section	3	Jib section 6 m (19' 8" ft-in)	5	Jib base section
2	Jib section 12 m (39' 4" ft-in)	4	Jib section 3 m (9' 10" ft-in)	6	Boom head section

- ▶ Direct transport vehicles with boom sections.
- ▶ Sling boom sections by attaching lifting equipment to the lifting points.
- ▶ Unload boom sections using the basic machine or assist crane and position according to the relevant system instructions.

7.19.4 Bolting the jib head section to the jib sections

**WARNING**

Getting caught inside the jib sections during assembly!
Serious injury.

- ▶ Never go inside the jib sections.

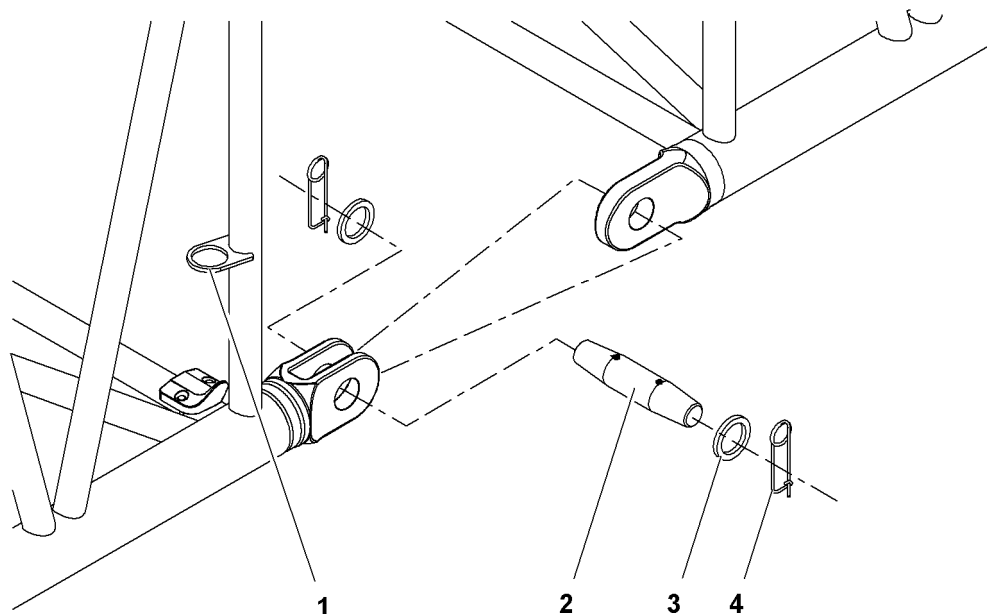


Fig. 4851: Bolting the boom

- | | | | |
|---|---|---|------------------|
| 1 | Transport brackets (4x) for double-taper pins | 3 | Washers (8x) |
| 2 | Double-taper pins (4x) | 4 | Safety pins (8x) |
- ▶ Remove the double-taper pins 2 from the transport brackets 1.



Note

- ▶ To make assembly and disassembly easier: grease the double-taper pin.
- ▶ Insert double-taper pins 2 and secure with washers 3 and safety pins 4.

7.19.5 Installing the jib base section

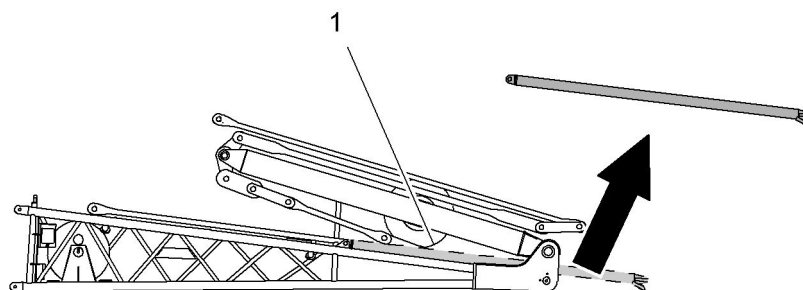


Fig. 4852: Deinstalling rigid tilting-back supports

- | | |
|---|---------------------------------|
| 1 | Rigid tilting-back support (2x) |
|---|---------------------------------|



Note

- Liebherr recommends:
- ▶ To facilitate installation of the jib base section: Deinstall rigid tilting-back support 1 of the fixed jib.

**Note**

If traverse (jib backstay strap) of the jib base section protrudes far beyond the pin connection points:

► Fold traverse (jib backstay strap) on A-frame2 forward to facilitate installation of the jib base section.

► Rig jib base section.

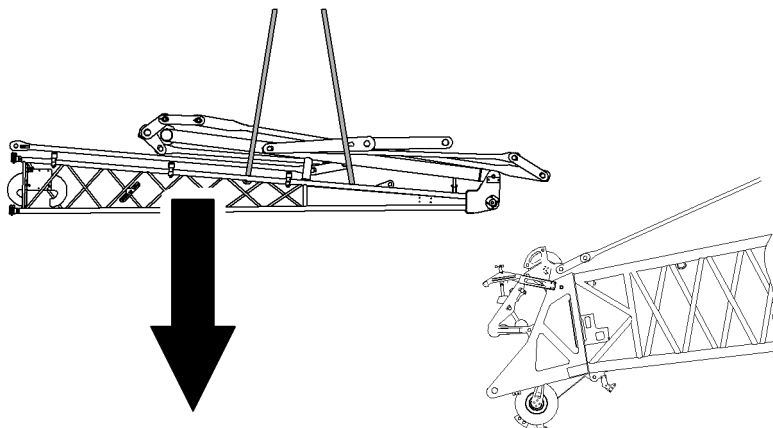


Fig. 4853: Lifting jib base section 0806 to main boom head

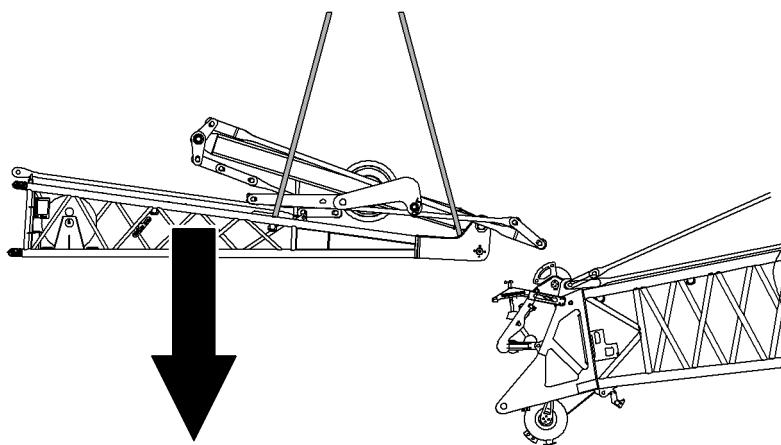


Fig. 4854: Lifting jib base section 1008 to main boom head

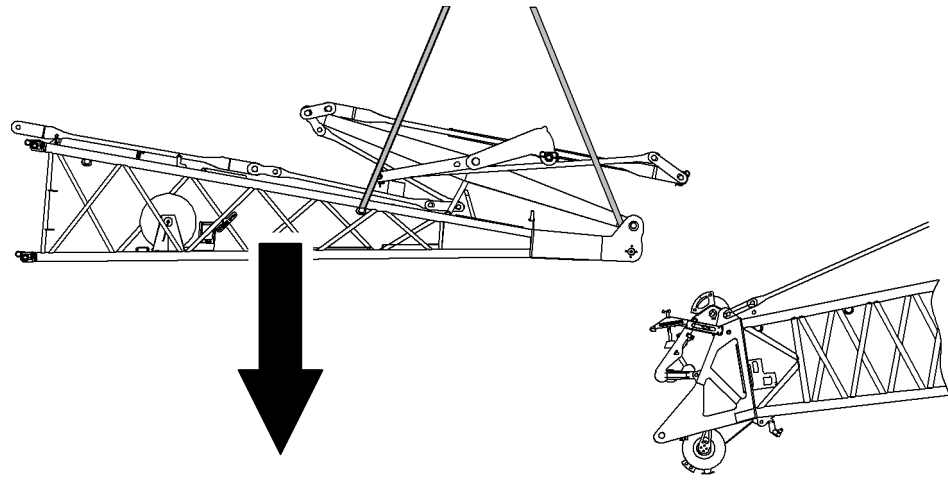


Fig. 4855: Lifting jib base section 1713 to main boom head

- ▶ Lift jib base section from above to main boom head.
- ▶ Lower jib base section further until pin connection points of jib base section align with those of the main boom head.

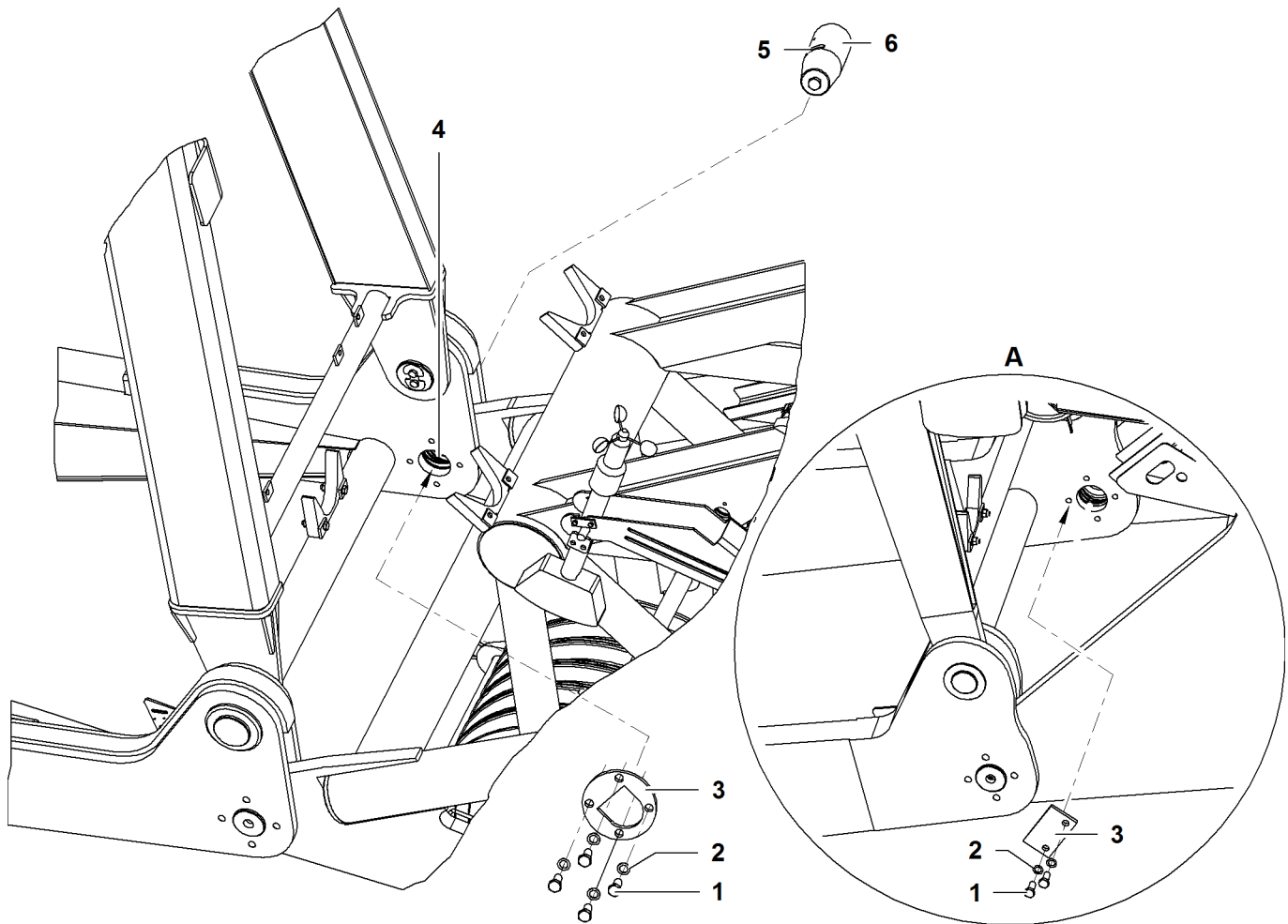


Fig. 4856: Pinning the jib base section to the main boom head

- A Detail jib base section 0906, 1507, 1713 3 Locking element 6 Pin

[See next page for continuation of the image legend](#)

- | | |
|---------------------------------------|--|
| <p>1 Screw (4x)
2 Washer (4x)</p> | <p>4 Pin connection point (2x)
5 Notch</p> |
|---------------------------------------|--|

**Note**

Liebherr recommends:

- ▶ To make assembly and disassembly easier: lubricate pins.

When the pin connection points **4** of the jib base section and the main boom head section line up:

- ▶ Pin **6** must be driven in from the outside.

**Note**

- ▶ Observe position of the notch **5** in the pin **6**.
- ▶ If necessary, turn pins with wrench into the right position.

- ▶ Slide locking element **3** over the pin **6** and place in notch **5**.

Type of jib	Torque	Screw treatment
0806	291 Nm 215 ft-lb	grease-free thread, treat with LOCTITE 243
0906	Nm ft-lb	grease-free thread, treat with LOCTITE 243
1008	291 Nm 215 ft-lb	grease-free thread, treat with LOCTITE 243
1507	Nm ft-lb	grease-free thread, treat with LOCTITE 243
1713	Nm ft-lb	grease-free thread, treat with LOCTITE 243

Tab. 580: Torque screws fixed jib

- ▶ Secure locking element **3** with screws **1** and washers **2**.
- ▶ Repeat pin connection procedure on opposite side.

7.19.6 Pinning the jib to the jib base section

- ▶ Raise the jib up to the jib base section.

When the pin connection points of the jib section and jib base section line up:

- ▶ Drive in pins from the outside in.

7.19.7 Pinning the pendant straps

- ▶ Remove safety pins from the transport brackets for pendant straps.

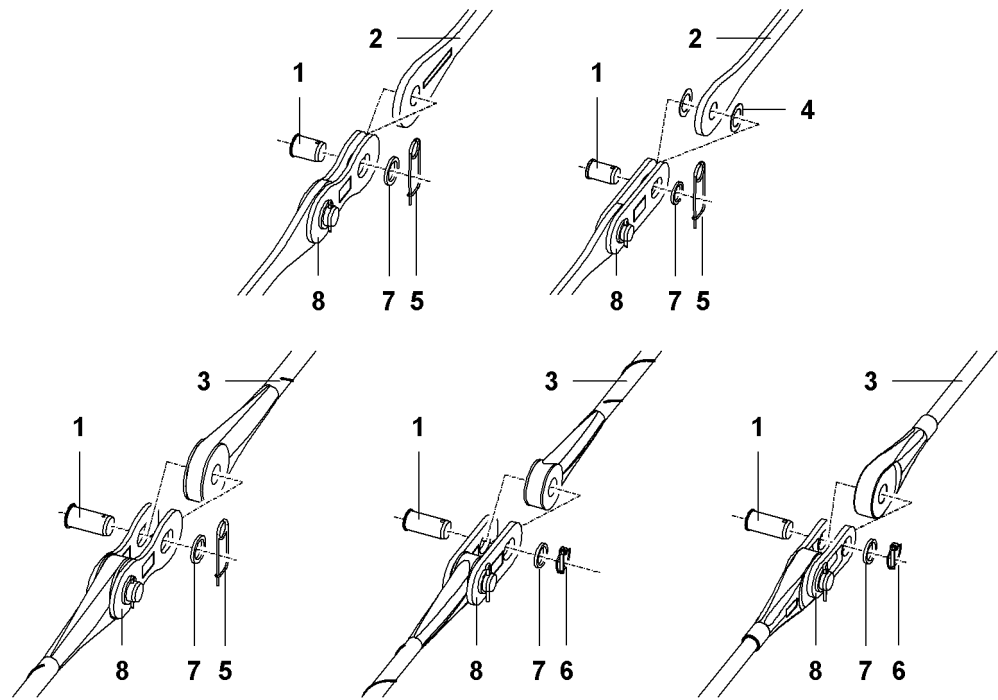


Fig. 4857: Bolt the pendant straps (schematic diagram of various pendant straps)

- | | | | |
|---|----------------------------|---|-----------------|
| 1 | Pin | 5 | Safety pin |
| 2 | Steel pendant strap | 6 | Linch pin |
| 3 | Carbon-fibre pendant strap | 7 | Washer |
| 4 | Plastic washer (2x) | 8 | Connecting link |

- ▶ Remove the pin 1 on the connecting link 8.
- ▶ Position the pendant strap 2, 3 between the two coupling links 8.
or
- If the pendant strap has plastic washers 4:
Position the pendant strap 2 with plastic washers 4 on both sides between the two connecting links 8.
- ▶ Insert pin 1 and secure with washers 7 and safety pin 5 or linch pin 6.

7.19.8 Attaching connecting links to the boom head section



WARNING

The boom will move when the upper double-taper pins on the boom head section are unpinned!
Serious injury.

- ▶ Support the main boom head section and the pinned section on wooden blocks.
 - ▶ Keep the upper double-taper pins on the boom head section free from tension.
-
- ▶ Remove the double-taper pins, safety pins and washers from the upper pin connection points on the boom head section.

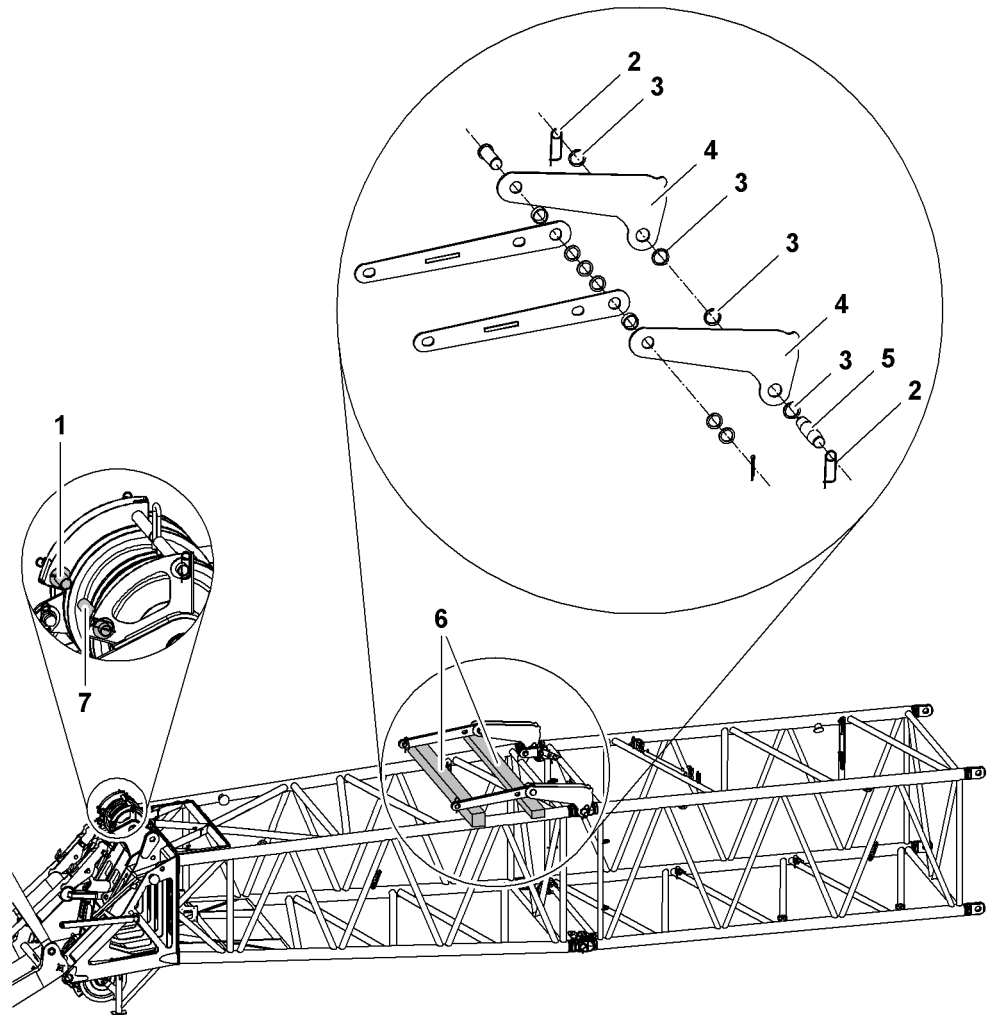


Fig. 4858: Attaching connecting links to the boom head section

- | | | | |
|---|-----------------------|---|---|
| 1 | Rope protection pipe | 5 | Double-taper pins (2x) of A-frame 2 equaliser |
| 2 | Safety pins (4x) | 6 | Wooden blocks (2x) |
| 3 | Washers (8x) | 7 | Rope protection pipe |
| 4 | Connecting links (4x) | | |

- ▶ Chock with wooden blocks 6.
- ▶ Pin connecting links 4 with double-taper pins 5 from A-frame 2 equaliser to boom head section.
- ▶ Secure the double-taper pins with washers 3 and safety pins 2.

NOTICE

Wrong rope protection pipe is used with a main boom + fixed jib configuration!
Damage to winch1/winch2 rope.

If the rope on winch1 is reeved over the jib head section:

- ▶ remove rope protection pipe 1.

If the rope on winch2 is reeved over the jib head section:

- ▶ remove rope protection pipe 7.

- ▶ remove rope protection pipes 1 + 7 if required.

7.19.9 Attaching the main boom (self-assembly system)



Note

Particular approach when using the self-assembly system!

- ▶ Attach the main boom to the basic machine.

7.19.10 Pinning A-frame2 equalizer with main boom

To pin the equalizer of A-frame2 to the connecting links on the main boom, A-frame2 must be erected using the rope of winch1/winch2 as far as necessary to enable pinning.

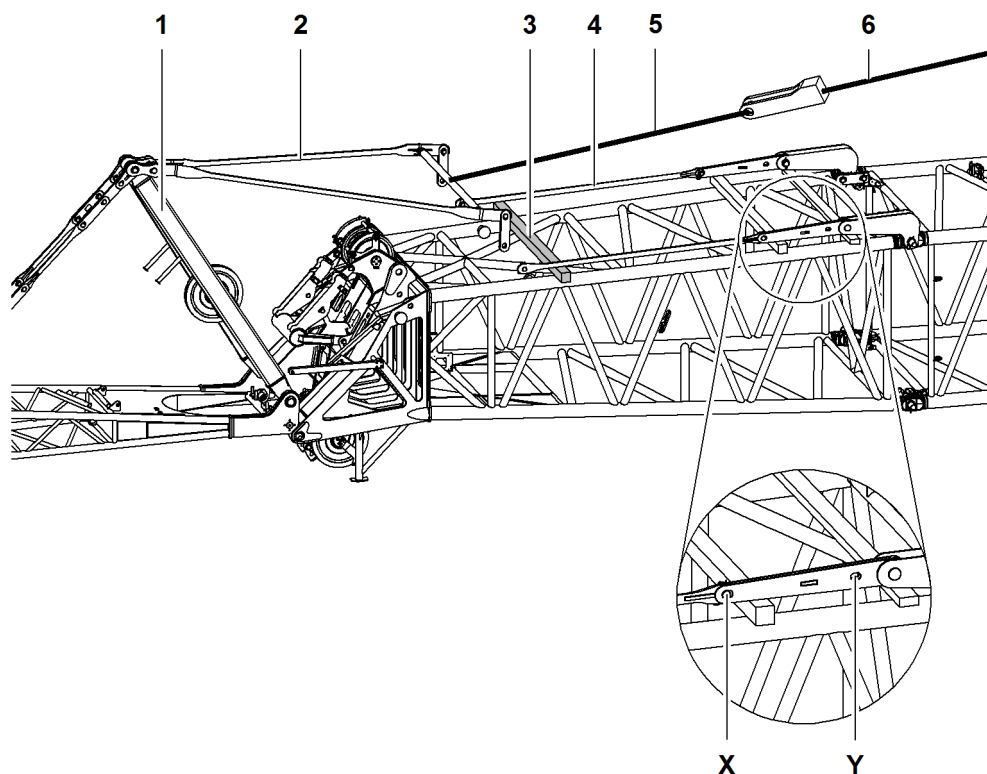


Fig. 4859: Pinning A-frame2 equalizer with main boom

- | | | | |
|---|--------------------------|---|-------------------------|
| 1 | A-frame2 | 5 | Round sling |
| 2 | A-frame2 equalizer | 6 | Rope of winch1/winch2 |
| 3 | Wooden block | X | Tensioning position 30° |
| 4 | Jib backstay straps (2x) | Y | Tensioning position 15° |

- ▶ Detach jib backstay straps 4 from A-frame2 equalizer 2.



WARNING

Wrong pinning of connecting links with jib 0906!
Tilting back of jib 0906 in crane operation.

- ▶ Only pin connecting links at tensioning position 30° X.
- ▶ Pin jib backstay straps 4 to connecting links at tensioning 15° Y or 30° X (pin jib 0906 exclusively at 30°).
- ▶ Secure pins with washers and locking springs.

- ▶ Attach winch1/winch2 rope **6** with round sling **5** and pocket lock on A-frame2 equalizer **2**.
- ▶ Reeve rope of winch1/winch2.
 - ▷ A-frame2 **1** moves backward.
- ▶ Pin jib backstay straps with A-frame2 equalizer.
- ▶ Secure pins with washers and locking springs.

**WARNING**

Tilting-back supports are missing!
Jib could topple backwards during crane operation.

- ▶ Install tilting-back supports.

- ▶ Re-install previously deinstalled tilting back supports.

If the jib backstay straps have been pinned:

- ▶ Unwind rope of winch1/winch2.
- ▶ Remove rope of winch1/winch2 from pocket lock.
- ▶ Remove pocket lock from round sling and place in temporary storage.

**Note**

If rope of winch1/winch2 is not reeved afterwards:

- ▶ Reeve rope of winch1/winch2.

7.19.11 Pinning the jib backstay straps (jib 1507)

- ▶ Remove locking springs of transport brackets for jib backstay straps.

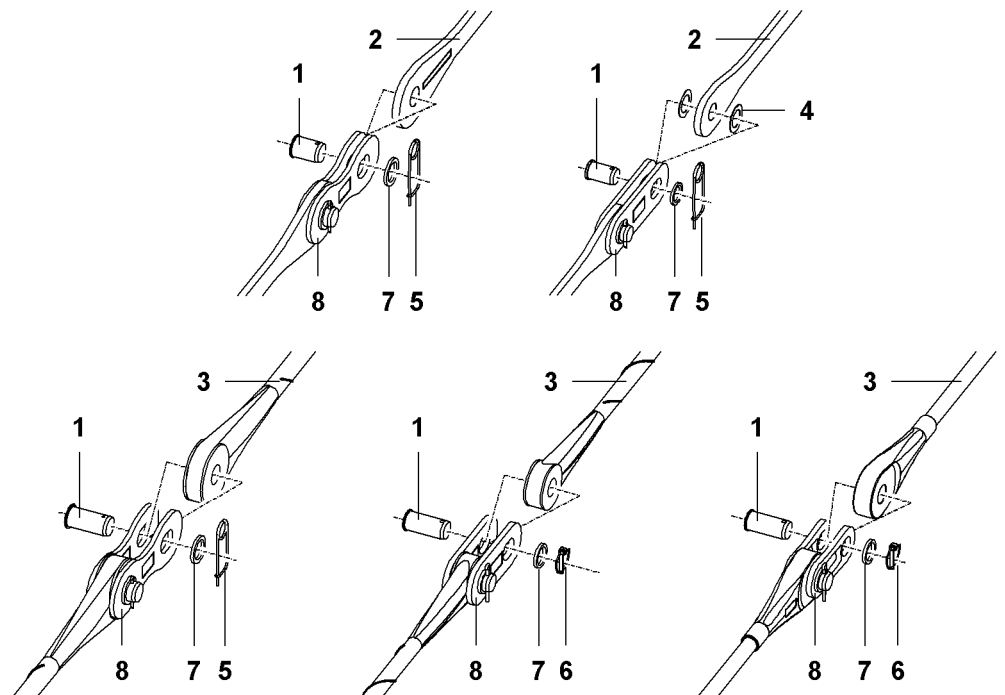


Fig. 4860: Diagram of various jib backstay straps

1 Pin

5 Locking spring

[See next page for continuation of the image legend](#)

- | | | | |
|---|----------------------------|---|-----------------|
| 2 | Jib backstay strap (steel) | 6 | Linchpin |
| 3 | Jib backstay strap (CF) | 7 | Washer |
| 4 | Plastic washers (2x) | 8 | Connecting link |

- ▶ Remove pin 1 on connecting link 8.
 - ▶ Position jib backstay strap 2, 3 between the two connecting links 8.
- If the jib backstay strap has plastic washers 4:
- ▶ Position the jib backstay strap 2 with plastic washers 4 on both sides between the two connecting links 8.
 - ▶ Insert pin 1 and secure with washers 7 and locking spring 5 or linchpin 6.

7.19.12 Installing the connecting elements and spacer brackets on jib backstay straps (jib 1507)

NOTICE

Incorrect installation positions of connecting elements and spacer brackets!
Damage to pendant straps and jib backstay straps.

- ▶ Install connecting elements and spacer brackets according to system-relevant information.

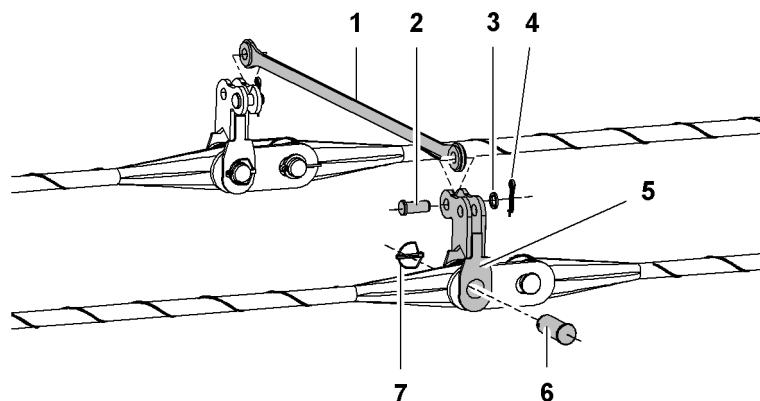


Fig. 4861: Installing connecting elements and spacer brackets on jib backstay straps

- | | | | |
|---|----------------|---|--------------------|
| 1 | Spacer bracket | 5 | Connecting element |
| 2 | Pin | 6 | Pin |
| 3 | Washer | 7 | Linchpin |
| 4 | Locking spring | | |

- ▶ Pin connecting element 5 and jib backstay strap.
- ▶ Secure pin 6 with washer and linchpin 7.
- ▶ Pin connecting element 5 and spacer bracket 1.
- ▶ Secure pin 2 with washer 3 and locking spring 4.

7.19.13 Pinning the equalizer of A-frame2 to the main boom (jib 1507)

To pin the equalizer of A-frame2 to the connecting links on the main boom, A-frame2 must be erected using the rope of winch1/winch2 as far as necessary to enable pinning.

NOTICE

Incorrect fixing of round sling to A-frame2 equalizer!
Damage to spacer bar.

- ▶ Ensure that round sling is not attached to link plate.

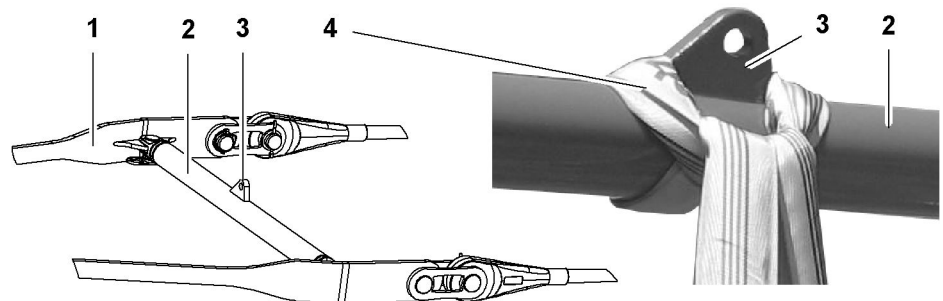


Fig. 4862: Attaching the round sling to A-frame2 equalizer

- | | | | |
|---|--------------------|---|-------------|
| 1 | A-frame2 equalizer | 3 | Link plate |
| 2 | Spacer bar | 4 | Round sling |

- ▶ Attach rope of winch1/winch2 with round sling and pocket lock to A-frame2 equalizer 1.
- ▶ Wind up rope of winch1/winch2.
 - ▷ A-frame2 moves backwards.

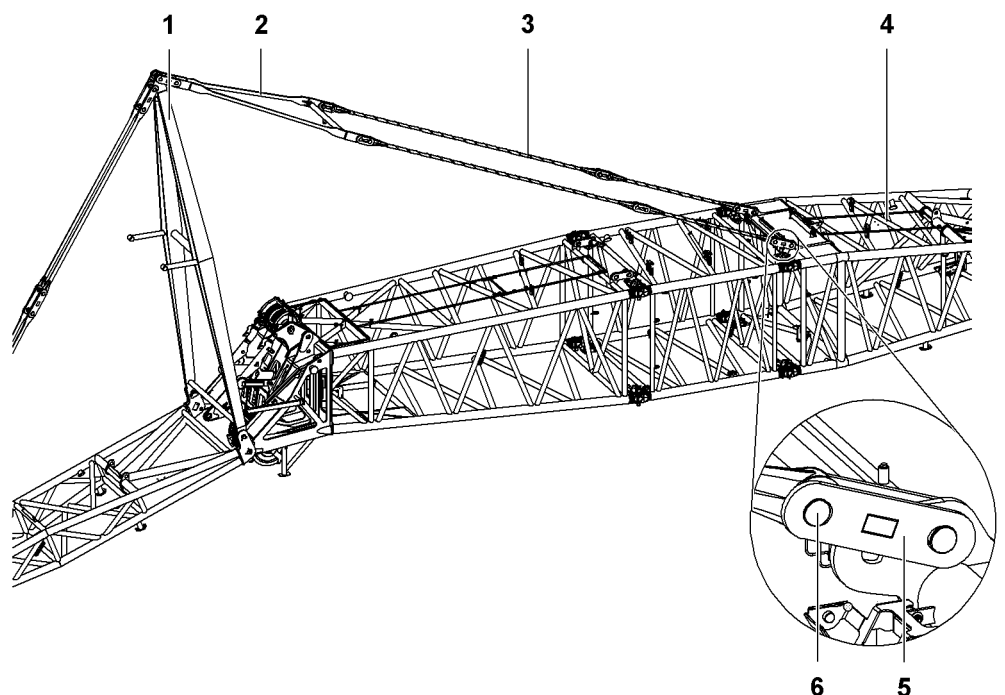


Fig. 4863: Pinning the A-frame2 equalizer with connecting links to the main boom

- | | | | |
|---|-------------------------|---|----------------------|
| 1 | A-frame2 | 4 | Jib base section |
| 2 | A-frame2 equalizer | 5 | Connecting link (2x) |
| 3 | Jib backstay strap (2x) | 6 | Pin (2x) |

- ▶ Pin jib backstay straps 3 using connecting links 5.

**WARNING**

Tilting-back supports are missing!
Jib could topple backwards during crane operation.

- ▶ Install tilting-back supports.
- ▶ Secure pins **6** with washers and locking springs.

After pinning the jib backstay straps:

- ▶ Unwind rope of winch1/winch2.
- ▶ Remove rope of winch1/winch2 from rope lock.
- ▶ Remove rope lock from round sling and place in temporary storage.

**Note**

If winch1 or winch2 rope is not reeved subsequently:

- ▶ Wind up winch1 or winch2 rope.

7.19.14 Connect the electric cables

NOTICE

Electric cables have been handled incorrectly!
Damage to electric cable and plug.

- ▶ Do not pull the electric cable over sharp-edged objects.
- ▶ Do not crush or kink the electric cable.
- ▶ Keep the plug clean.

- ▶ Disconnect the electric cable from the dummy receptacle on the jib base section.
- ▶ Connect the electric cable to the terminal box on the main boom head section and secure using retaining clips.
 - ▷ The boom head section and jib base section electric cables are connected.

The electric cable to the jib head section is rolled on the cable drum on the jib base section.

- ▶ Disconnect both electric cables from the terminal box on the jib base section.

NOTICE

Electric cable has been unwound incorrectly!
Electric cable may be damaged.

- ▶ Push the electric cable in the cable drum into the side opening of the cable drum.

- ▶ Loosen the pin on the axle of the cable drum.
- ▶ Unwind the electric cables from the cable drum and pull it inside the jib to the jib head section.
- ▶ Connect the electric cable to the terminal box on the jib head section and secure using retaining clips.

Two fixing holes are provided under the terminal box to relieve the strain on the plug.

- ▶ Clip both carabiners on the cable sock into the fixing holes.
- ▶ Fix the pin on the axle of the cable drum.
- ▶ Reconnect the electric cable in the cable drum to the terminal box on the jib base section.
 - ▷ The jib base section and jib head section electric cables are connected.

If an auxiliary jib is fitted:

- ▶ Plug the auxiliary jib electric cable into the jib head section.

7.19.15 Installing the aircraft warning light



Note

Use of the aircraft warning light is prescribed by national or regional regulations!

- ▶ Inform yourself about national and local regulations prior to using the machine.

Make sure the following conditions are met:

- Anemometer is not installed.

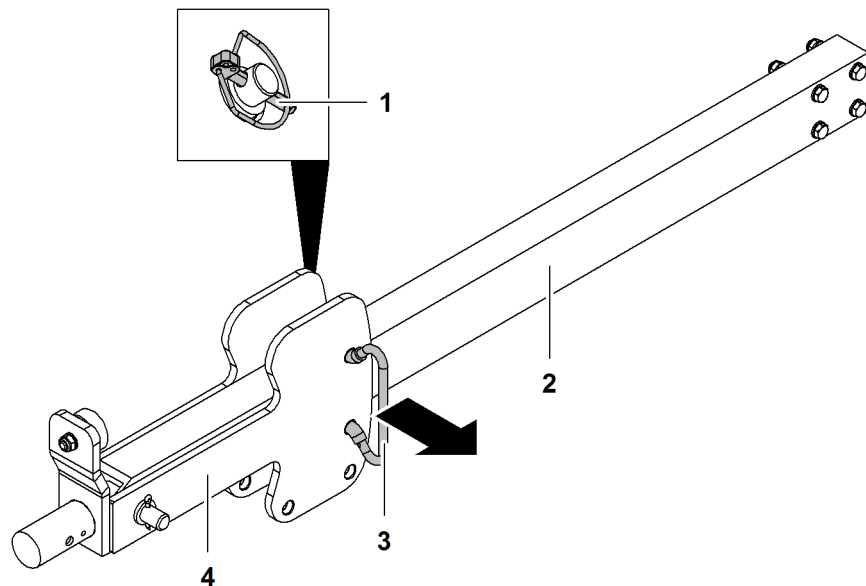


Fig. 4864: Moving the pendulum into the working position

- | | | | |
|---|---------------|---|-----------------|
| 1 | Linchpin (2x) | 3 | Locking element |
| 2 | Mount | 4 | Pendulum |

The pendulum 4 is secured on the mount 2 for machine transport.

- ▶ Remove the linchpin 1 of the locking element 3.
- ▶ Remove 3 locking element.
- ▶ Swing pendulum 4 down.
- ▶ Slide locking element 3 through pendulum 4 and secure with linchpins 1.

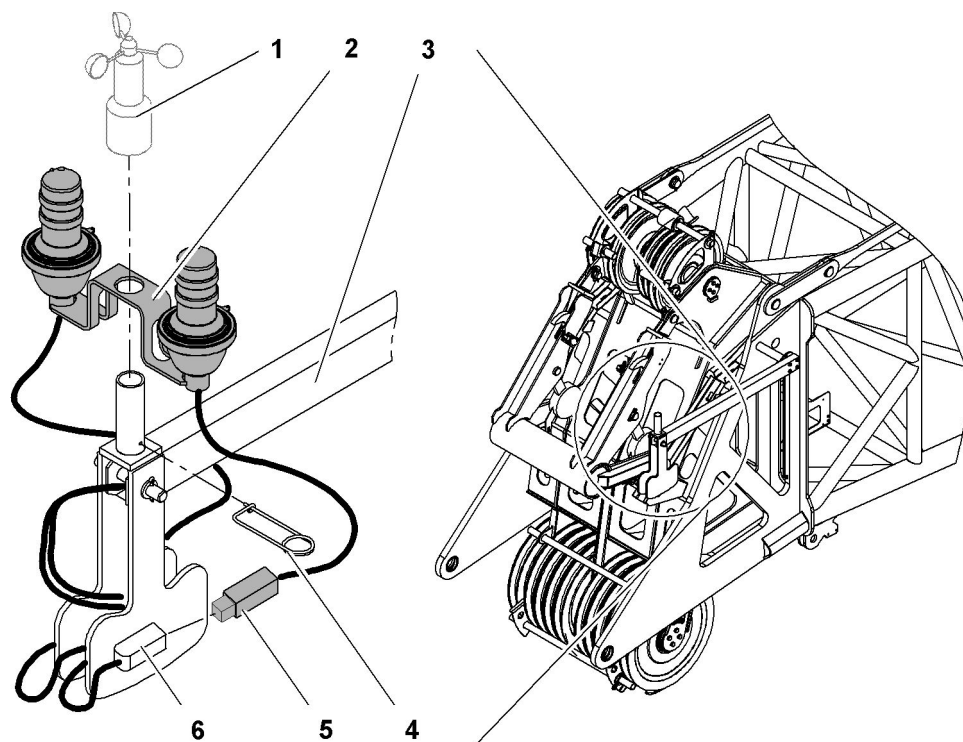


Fig. 4865: Installing the aircraft warning light

- | | | | |
|---|------------------------|---|----------------|
| 1 | Anemometer | 4 | Locking spring |
| 2 | Aircraft warning light | 5 | Plug |
| 3 | Mount | 6 | Coupling |

- ▶ Place aircraft warning light **2** on pipe.
 - ▷ Aircraft warning light is secured by the pipe and axis on the mount **3**.

NOTICE

Wrong insertion of locking spring!
Damage to electric cable.

- ▶ Carefully push through locking spring.

- ▶ Push through locking spring **4**.
 - ▷ Aircraft warning light **2** is secured.

- ▶ Connect plug **5** with coupling **6**.

- ▶ Lock plug **5**.

7.19.16 Installing anemometer

Make sure the following conditions are met:

- Aircraft warning light is installed (if available).

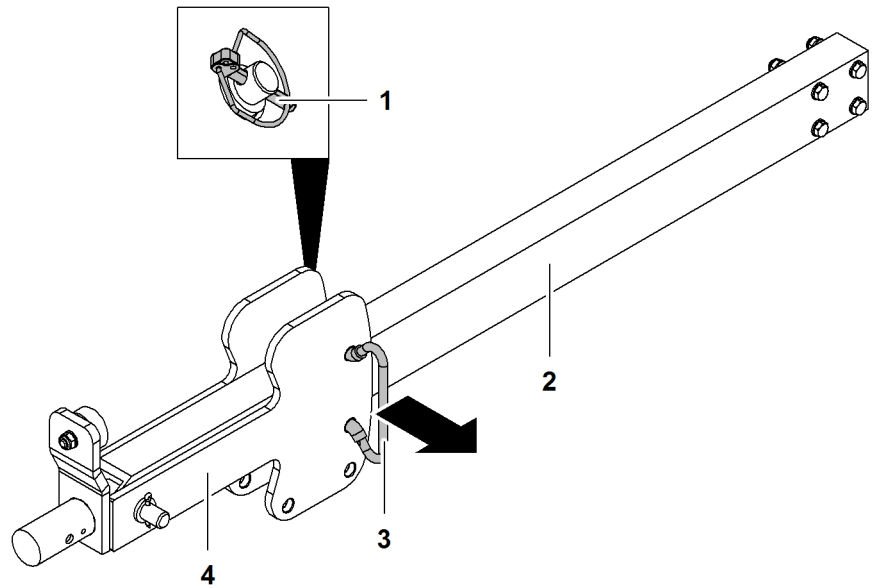


Fig. 4866: Moving the pendulum into the working position

- | | | | |
|---|---------------|---|-----------------|
| 1 | Linchpin (2x) | 3 | Locking element |
| 2 | Mount | 4 | Pendulum |

The pendulum 4 is secured on the mount 2 for machine transport.

- ▶ Remove the linchpin 1 of the locking element 3.
- ▶ Remove 3 locking element.
- ▶ Swing pendulum 4 down.
- ▶ Slide locking element 3 through pendulum 4 and secure with linchpins 1.

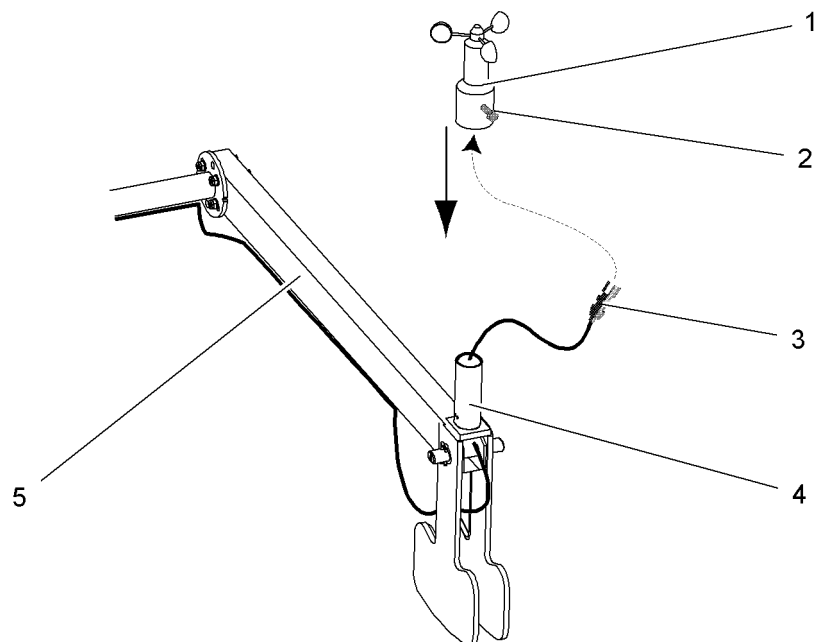


Fig. 4867: Installing anemometer

- | | | | |
|---|------------|---|-------|
| 1 | Anemometer | 4 | Pipe |
| 2 | Screw | 5 | Mount |
| 3 | Plug | | |

- ▶ Remove protective cap of plug 3.
- ▶ Plug in plug 3 on the bottom of the anemometer 1.
- ▶ Secure plug 3 with nut.

NOTICE

Improper installation of anemometer!
Damage to electric cable.

- ▶ Pull protruding electric cable through pipe before attaching anemometer.

- ▶ Mount anemometer 1 on pipe 4.
- ▶ Securing the anemometer on the mount: Tighten screw 2.

The rotor of the anemometer must be easy to turn.

- ▶ Testing the anemometer: Slightly turn rotor and watch value on monitor.
 - ▷ Wind speed value increases.

7.19.17 Moving the lightning rods* into working position

Installation position of lightning rods with fixed jib

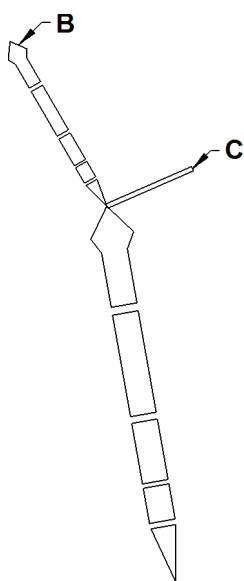


Fig. 4868: Installation position of lightning rods with fixed jib

B Fixed jib head **C** A-frame2

Boom configuration	Number of lightning rods	Installation positions
Main boom + fixed jib	2	B + C

Tab. 581: Installation position and number of lightning rods with fixed jib

Moving the lightning rods* on the fixed jib head into working position

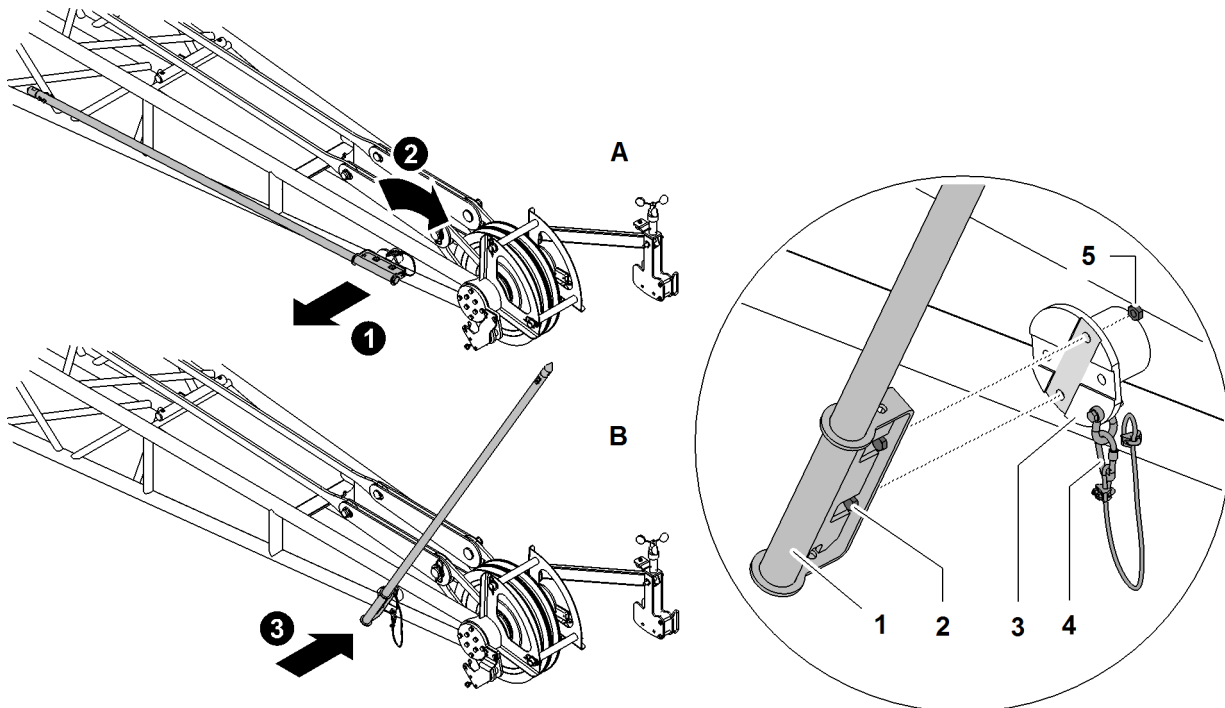


Fig. 4869: Moving the lightning rods* on the fixed jib head into working position (illustration of principle)

A	Transport position	2	Screw (2x)	5	Nut (2x)
B	Working position	3	Mounting plate		
1	Lightning rod	4	Safety rope		

- ▶ Undo safety rope 4.
- ▶ Undo nuts 5.
- ▶ Undo screws 2.
- ▶ Move lightning rod 1 from transport position A to working position B.



Note

Liebherr recommends:

- ▶ Grease threads of the screws 2.
- ▶ Attach lightning rod 1 with screws 2.
- ▶ Lock screws 2 with nuts 5.

NOTICE

Safety rope not attached!
Dropping parts.

- ▶ Ensure that safety rope 4 is attached.
- ▶ Attach safety rope 4.

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod 1 is installed.
- ▶ Ensure that the screws of the tip are tightened.

- ▶ Ensure that the tip on the lightning rod 1 is installed.
- ▶ Ensure that the screws of the tip are tightened.

Moving the lightning rods* on A-frame2 into working position

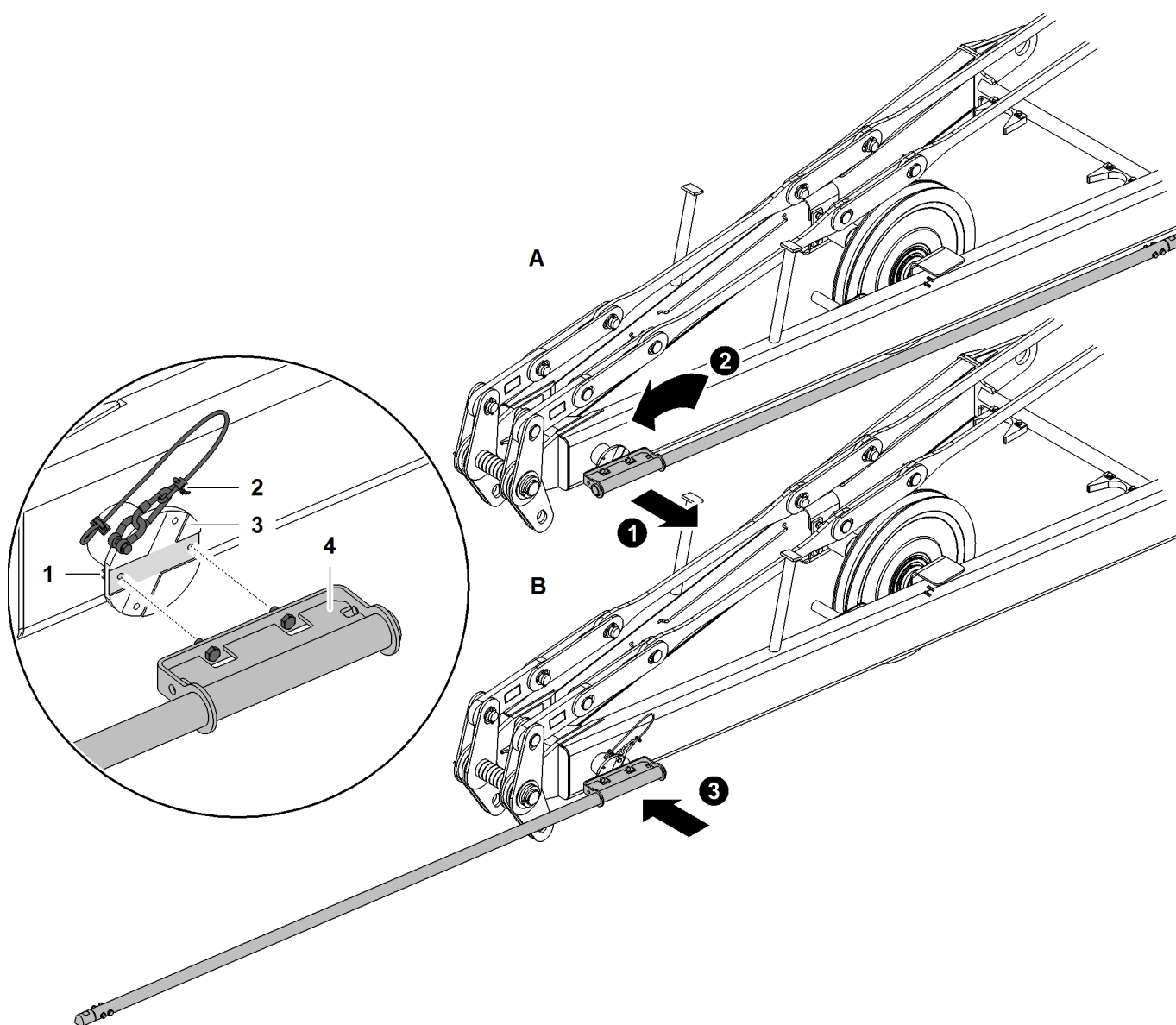


Fig. 4870: Moving the lightning rods* on A-frame2 into working position (illustration of principle)

A	Transport position	1	Nut (2x)	3	Screw (2x)
B	Working position	2	Safety rope	4	Lightning rod

- ▶ Undo safety rope **2**.
- ▶ Undo nuts **1**.
- ▶ Undo screws **3**.
- ▶ Move lightning rod **4** from transport position **A** to working position **B**.

**Note**

Liebherr recommends:

- ▶ Grease threads of the screws **3**.

- ▶ Attach lightning rod **4** with screws **3**.
- ▶ Lock screws **3** with nuts **1**.

NOTICE

Safety rope not attached!
Dropping parts.

- ▶ Ensure that safety rope **2** is attached.

- ▶ Attach safety rope **2**.

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod **4** is installed.
- ▶ Ensure that the screws of the tip are tightened.

- ▶ Ensure that the tip on the lightning rod **4** is installed.
- ▶ Ensure that the screws of the tip are tightened.

7.19.18 Reeving the rope

The rope must be reeved as specified in the rope reeving diagram according to the boom and application requirements.

**WARNING**

Unsecured walking on the boom!
Risk of falling off the boom.

- ▶ A fall arrest system must be worn when working on the boom to prevent falling.

Ensure that the following conditions are satisfied:

- Cylinder adjustment functions are on.

Reeving the rope using a rope reeving winch

Dismantling rope protection pipes

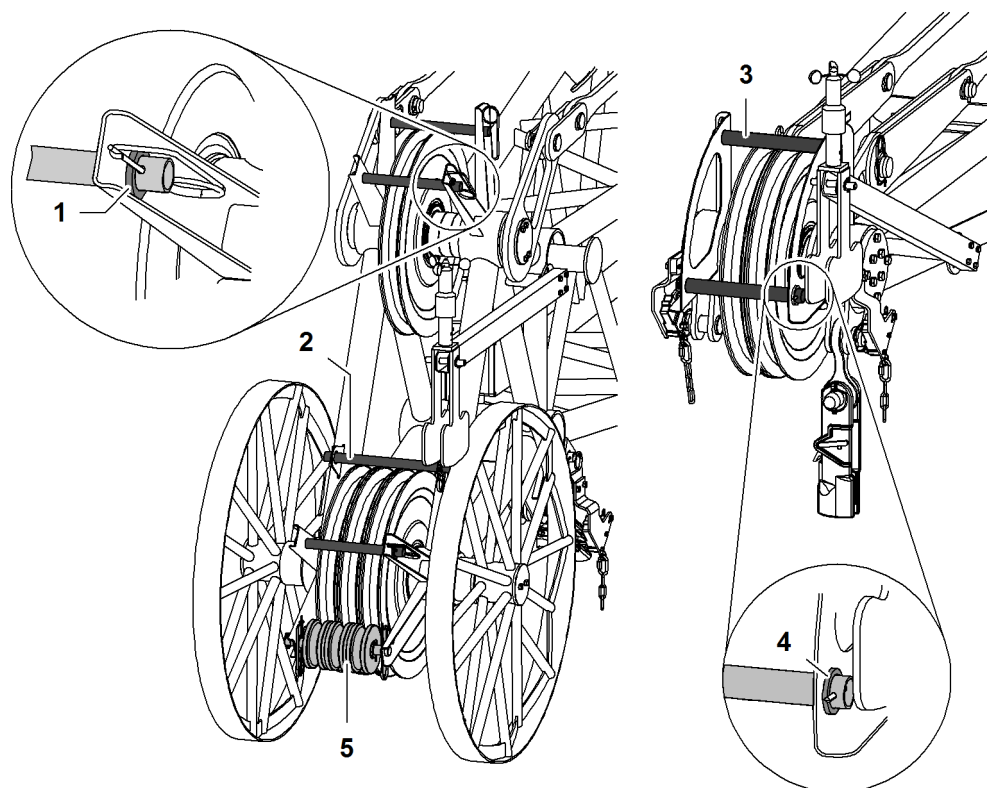


Fig. 4871: Rope protection pipes jib head section (0806, 0906, 1008, 1507, 1713)

- | | | | |
|-------|---------------------------|---|---------------------------------|
| 1 + 4 | Washer | 4 | Washer |
| 2 + 3 | Rope guard tube (4x) | 5 | Rope protection rollers package |
| 3 | Rope protection pipe (2x) | | |

The rope protection pipes are secured with a cotter pin on one side and with a safety pin on the other side.

NOTICE

Inadmissible operation of winch1/winch2 below 10° jib angle!
Damage to jib head section.

- ▶ Make sure that winch1/winch2 are not operated below 10° jib angle.

- ▶ Remove the safety pin and washer 1 + 4.
- ▶ Remove the rope protection pipes 2 + 3.

Dismantling the rope protection rollers package on the jib head section 1713

With the jib head section 1713, the rope protection rollers package must be removed as well.

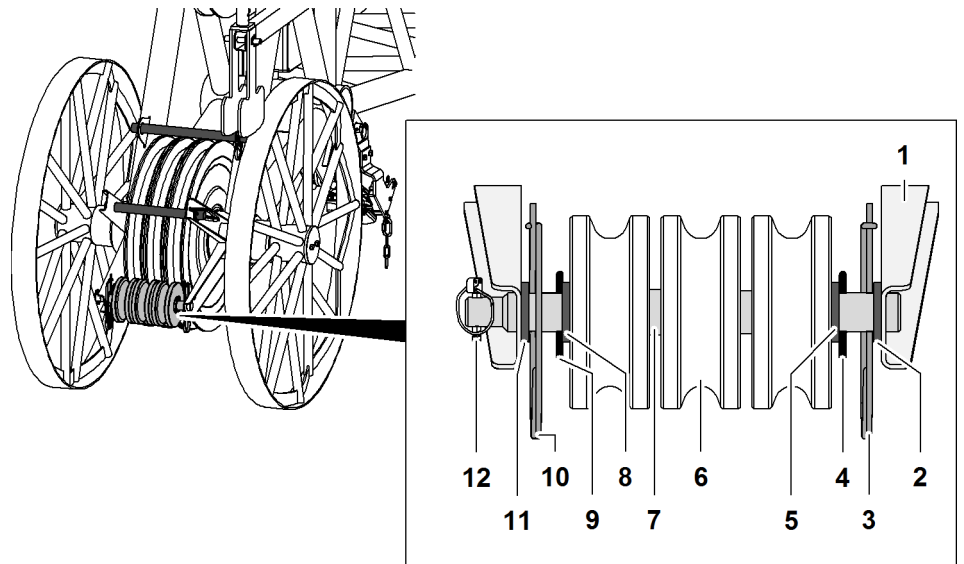


Fig. 4872: Rope protection rollers package

- | | | | |
|---|------------|----|------------|
| 1 | Mount | 7 | Shaft |
| 2 | Washer | 8 | Washer |
| 3 | Safety pin | 9 | Cotter pin |
| 4 | Cotter pin | 10 | Safety pin |
| 5 | Washer | 11 | Washer |
| 6 | Pulley | 12 | Linchpin |

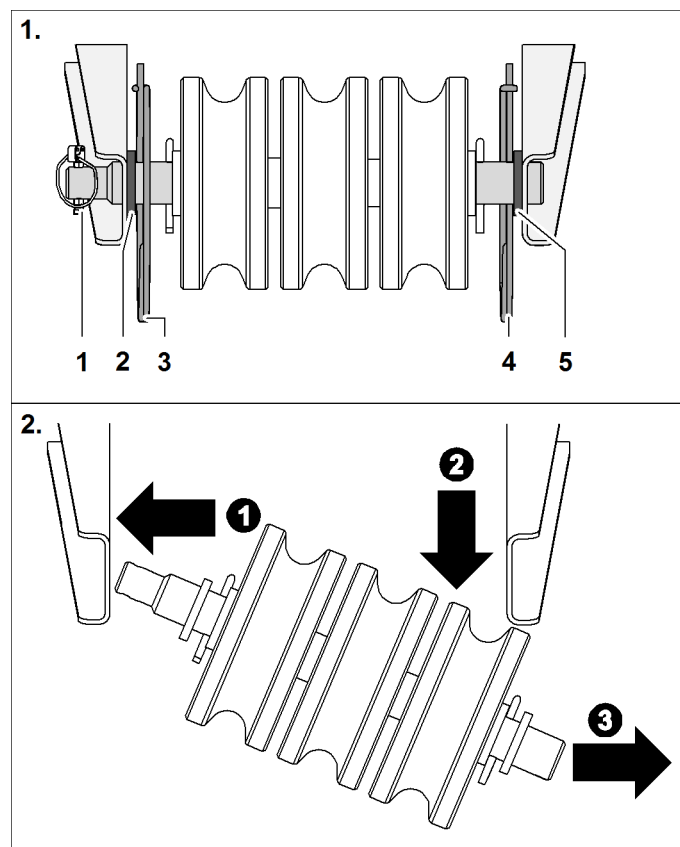


Fig. 4873: Dismantling the rope protection rollers package

- | | | | |
|---|----------|---|------------|
| 1 | Linchpin | 4 | Safety pin |
|---|----------|---|------------|

See next page for continuation of the image legend

- | | | | |
|---|------------|---|--------|
| 2 | Washer | 5 | Washer |
| 3 | Safety pin | | |

- ▶ Remove the linchpin 1.
- ▶ Remove safety pin 3 + 4.
- ▶ Take rope protection rollers package off the support.
 - ▷ Rope protection rollers package is dismantled.

Reeving the rope

- ▶ Open up the rope guide (if present).

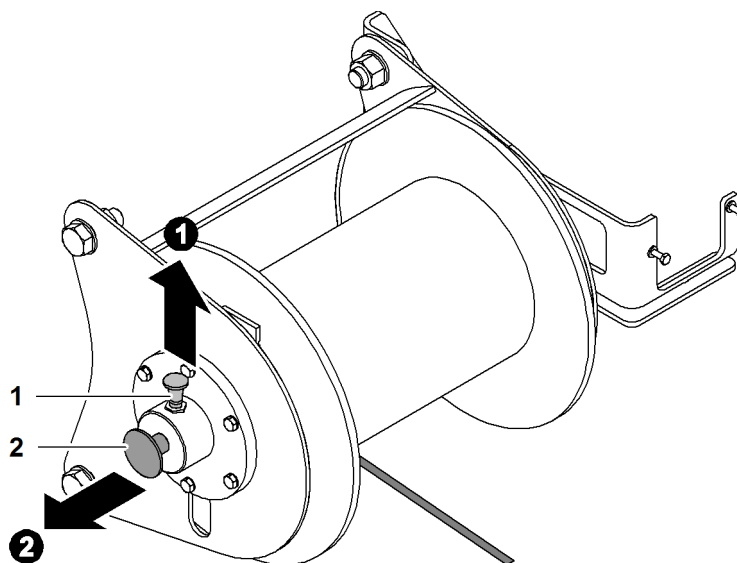


Fig. 4874: Setting the rope lug to free-wheel

- | | | | |
|---|-----------------|---|-------|
| 1 | Locking element | 2 | Shaft |
|---|-----------------|---|-------|



Note

Liebherr recommends:

- ▶ Making it easier to pull out the axle 2: move the rope reeving winch manually back and forth.
- ▶ Pull up the locking element 1 and pull out the axle 2 at the same time.
 - ▷ Rope reeving winch is set to free-wheel.

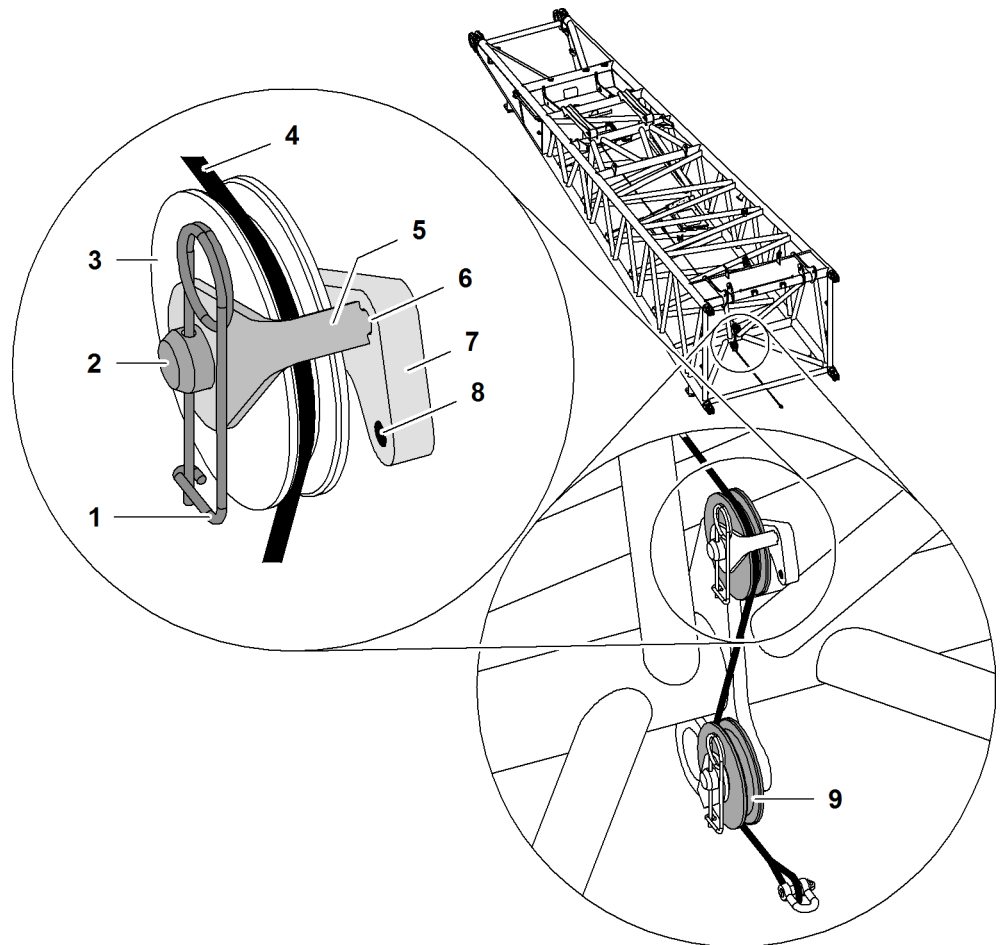


Fig. 4875: Reeving in the rope of the rope reeving winch

- | | | | |
|---|--------------------------------|---|-----------------------|
| 1 | Safety pin | 6 | Recess |
| 2 | Shaft | 7 | Support with recesses |
| 3 | Upper pulley | 8 | Recess |
| 4 | Rope of the rope reeving winch | 9 | Lower pulley |
| 5 | Locking element | | |

Depending on the machine type, the mounting **7** may have one or two recesses.

- ▶ Remove safety pins **1**.
- ▶ Remove **5** securing element.
- ▶ Place rope of the rope reeving winch **4** across the top pulley **3**.

NOTICE

Wrongly mounted locking element!
Rope of the rope reeving winch jumps out of pulley.

- ▶ Make sure that the locking element **5** is mounted in recess **6**.
-
- ▶ Attach locking element **5** to axle **2** and guide in recess **6**.
 - ▶ Attach the safety pin **1**.
 - ▶ Repeat procedure on bottom pulley **9**.
 - ▷ Rope of the rope reeving winch is guided through pulleys.
 - ▶ Pull the luffing rope under the boom to the boom head.
 - ▶ Reeve in the rope of the rope reeving winch according to reeving plan.

- ▶ Pull the luffing rope next to the boom towards the basic machine.
- ▶ Lift luffing rope onto boom.
- ▶ Connect luffing rope with rope of winch1/winch2.

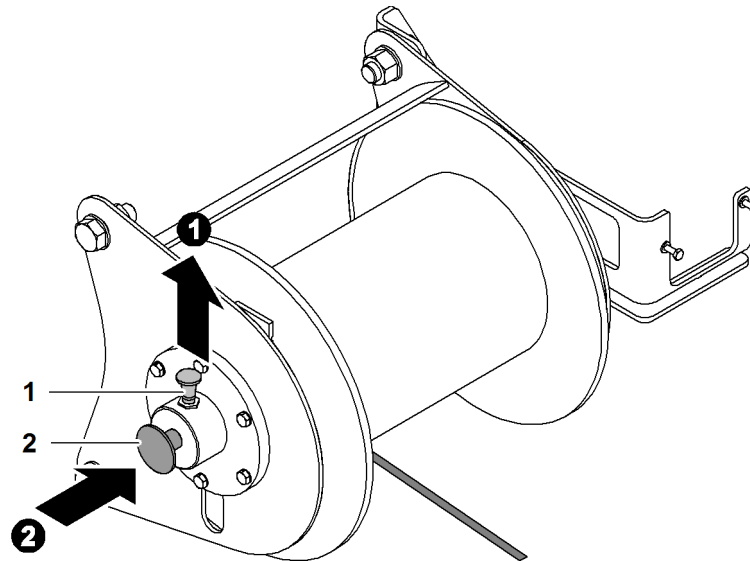


Fig. 4876: Stopping the free-wheel of the rope reeving winch

- 1 Locking element
- 2 Shaft



Note

Liebherr recommends:

- ▶ Making it easier to press in the axle **2**: move the rope reeving winch manually back and forth.

- ▶ Pull up the locking element **1** and press in the axle **2** at the same time.
 - ▷ Free-wheel of the luffing rope is deactivated.



WARNING

Never stand in the immediate vicinity of the rope reeving winch or the luffing rope!

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.



- ▶ Press and hold the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch reeves in the rope of the rope reeving winch and tensions the rope of winch1/winch2.

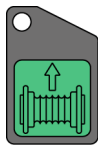


If rope of winch1/winch2 is in the 8th rope layer (only with free-fall winch 130 kN (29,230 lb.)):

- ▶
 - ▷ The 3-rope windings limit switch is bypassed.

There must be no slacking of the rope when unwinding.

- ▶ Unwind the rope of winch1/winch2 up to the rope fixing point.
- ▶ Press the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch switched off.



- ▶ Remove rope of the rope reeving winch from the rope of winch1/winch2.
- ▶ Press and hold the *Rope reeving winch* button on control panel X11.
 - ▷ Luffing rope is being reeved.
- ▶ Press the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch switched off.
- ▶ Close and secure the rope guide (if present).

Mounting the rope protection rollers package on jib head section 1713

NOTICE

Wrongly installed washers!

Rope protection rollers package falls out of the support.

Damage to jib head section.

- ▶ Ensure proper installation position of the washers.
-

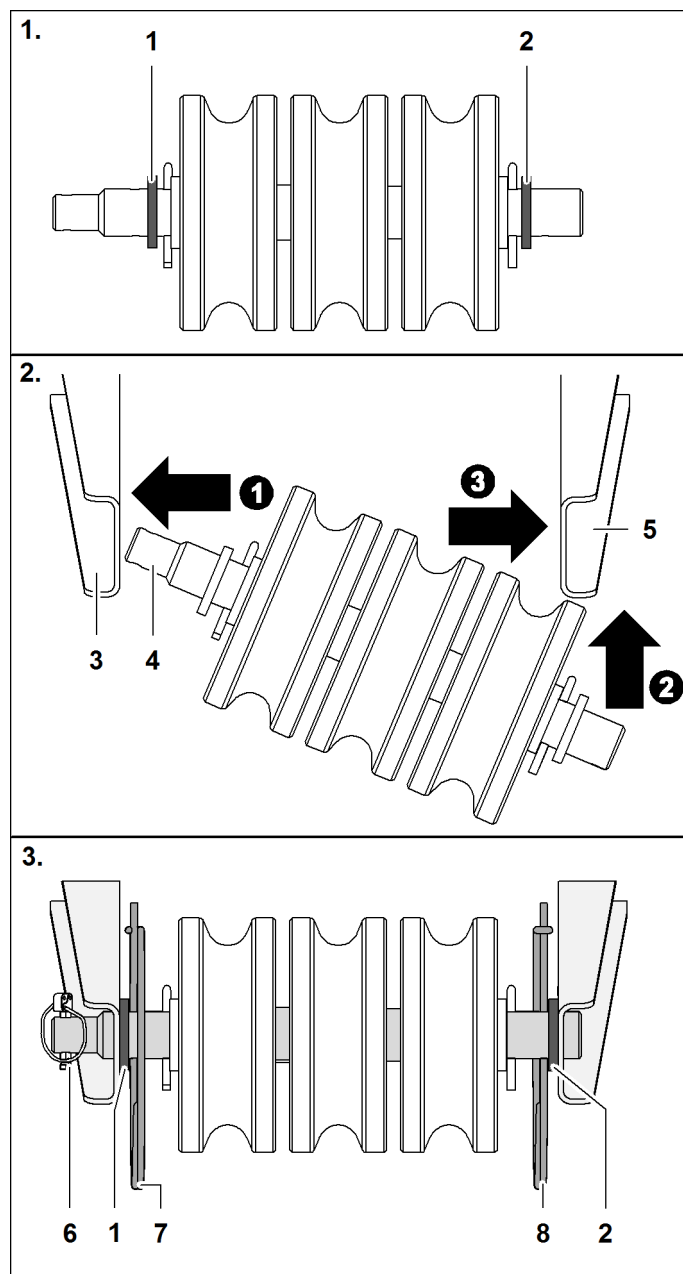


Fig. 4880: Mounting the rope protection rollers package on the jib head section

- | | | | |
|---|--------|---|------------|
| 1 | Washer | 5 | Mount |
| 2 | Washer | 6 | Linchpin |
| 3 | Mount | 7 | Safety pin |
| 4 | Shaft | 8 | Safety pin |

- ▶ Place washers 1 + 2 on axle.
- ▶ Insert axle 4 of the rope protection rollers package into support 3.
- ▶ Insert axle 4 into support 5.
- ▶ Put washers 1 + 2 into position.
- ▶ Install safety pins 7 + 8.
- ▶ Install linchpin 6.
 - ▷ Rope protection rollers package is installed.

Installing rope protection pipes

- ▶ Mount and secure rope protection pipes.

Reeving the rope without using a rope reeving winch

- ▶ Remove the rope protection pipes on the boom and the pulley block.
- ▶ Open up the rope guide (if present).
- ▶ Connect auxiliary rope with the rope of winch1/winch2.
- ▶ Pull the auxiliary rope next to the boom as far as the boom head.
- ▶ Hoist the auxiliary rope onto the boom.
- ▶ Reeve the auxiliary rope according to the rope reeving system.



If rope of winch1/winch2 is in the 8th rope layer (only with free-fall winch 130 kN (29,230 lb_i)):

- ▶ Press the *Bypass limit switch* button on control panel X23.
 - ▷ The 3-rope windings limit switch is bypassed.

There must be no slacking of the rope when unwinding.

- ▶ Unwind the rope of winch1/winch2 up to the rope fixing point.
- ▶ Remove auxiliary rope from the rope of winch1/winch2.
- ▶ Close and secure the rope guide (if present).
- ▶ Mount and secure rope protection pipes.

7.19.19 Attaching the rope fixing point



DANGER

Incorrect installation of pins and pocket lock!
Load breakaway.

- ▶ Fit pins and pocket lock as instructed.

The collar of the pins and the pocket lock openings are decisive for the installation direction of the rope fixing point.

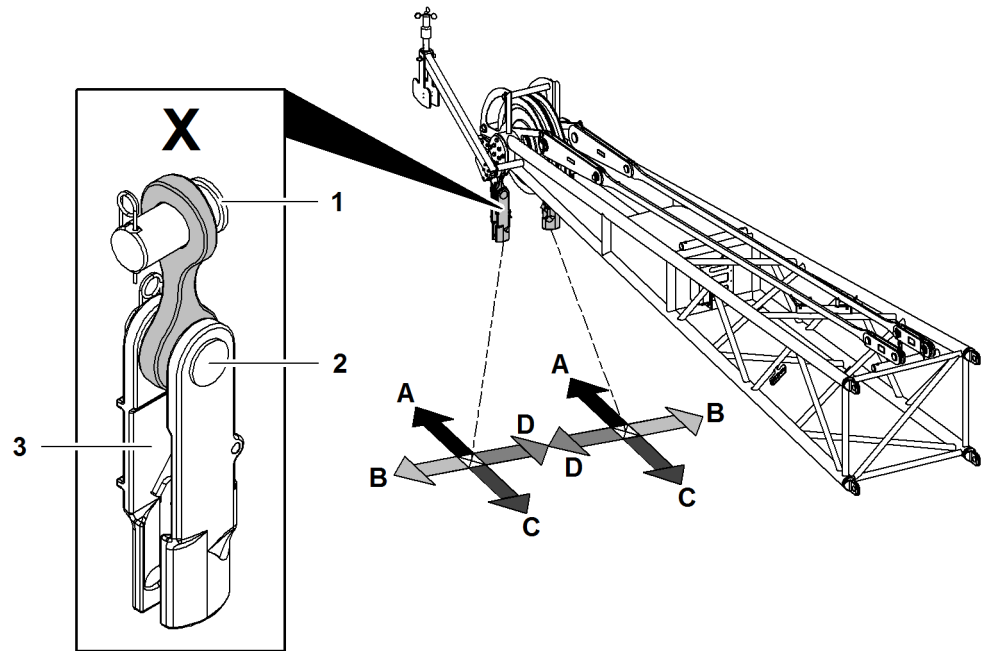


Fig. 4882: Determining the installation direction of the components of the rope fixing point of relevance for installation - fixed jib (illustration of principle)

- | | |
|---|-----------------------------------|
| X Components needed for fitting | A Direction main boom head |
| 1 Shoulder of pin on the boom | B Outside |
| 2 Shoulder of pin on the pocket lock | C Direction basic machine |
| 3 Pocket lock opening | D Inside |

Installation direction of the rope fixing point components of relevance for installation			
	Pin collar on boom	Pin collar on pocket lock	Pocket lock opening
All rope fixing points	D	C	B
Exceptions:			
Fixed jib head 0906	B	C	B
Fixed jib head 1507	B	C	B

Tab. 582: Installation direction of the rope fixing point components of relevance for installation



WARNING

Incorrectly fit swivels!
Severe injuries, damage to machine.

- ▶ Fit rope with no twists.
- ▶ Install the rope without swivels.

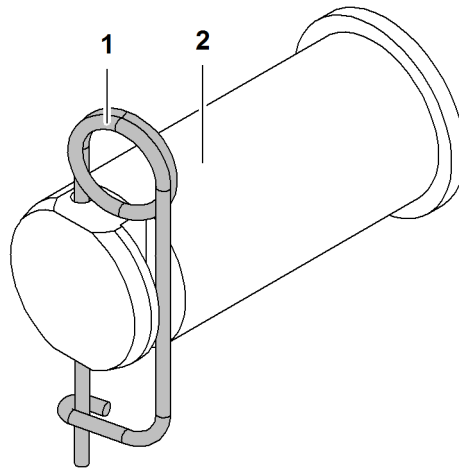


Fig. 4883: Securing the pins

1 Locking spring

2 Pin



DANGER

Pins 2 not completely secured!
Load breakaway.

- ▶ Ensure that locking spring 1 completely secures the pin 2.

Installing the rope fixing point on the boom head

- ▶ Pin cross strap with boom head.
- ▶ Secure pin with locking spring.
- ▶ Pin pocket lock with cross strap.
- ▶ Secure pin with locking spring.

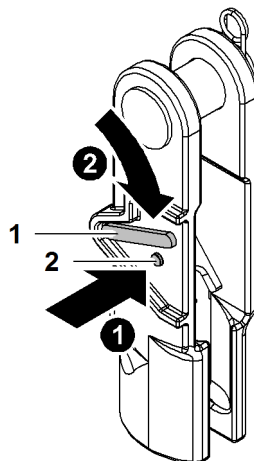


Fig. 4884: Unlocking the pocket lock

1 Safety latch

2 Locking button

- ▶ Press the locking button 2.
- ▶ Press safety latch 1 down and hold.

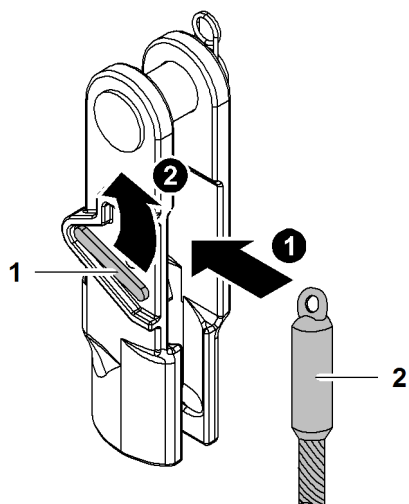


Fig. 4885: Inserting the end of rope into pocket lock and locking the pocket lock

1 Safety latch

2 End of rope

- ▶ Insert end of rope 2 in pocket lock.



DANGER

End of rope 2 not properly secured!
Load breakaway.

- ▶ Ensure that the safety latch 1 engages.

- ▶ Let go of safety latch 1.
 - ▷ Safety latch 1 engages.

Installing the rope fixing point on the hook or pulley block

- ▶ Pin pocket lock with hook or pulley block.
- ▶ Secure pin with locking spring.

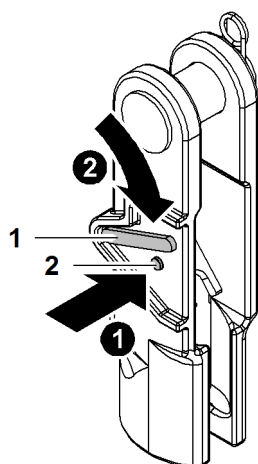


Fig. 4886: Unlocking the pocket lock

1 Safety latch

2 Locking button

- ▶ Press the locking button 2.

- ▶ Press safety latch 1 down and hold.

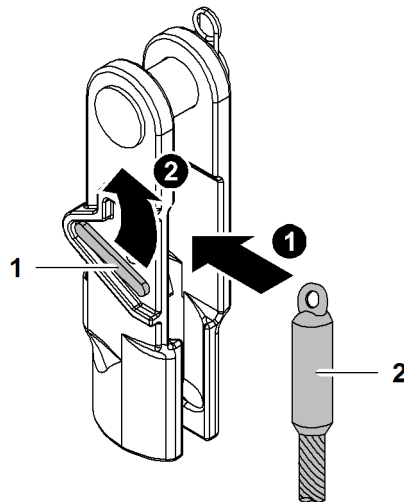


Fig. 4887: Inserting the end of rope into pocket lock and locking the pocket lock

1 Safety latch

2 End of rope

- ▶ Insert end of rope 2 in pocket lock.



DANGER

End of rope 2 not properly secured!
Load breakaway.

- ▶ Ensure that the safety latch 1 engages.

- ▶ Let go of safety latch 1.
 - ▷ Safety latch 1 engages.

7.19.20 Installing the hoist limit switch

The following can be installed on the hoist limit switch:

- Hoist limit switch weight
- Hoist limit switch bracket*

Installing the hoist limit switch weight

NOTICE

Improper installation of the hoist limit switch weight!
Damage to rope and hoist limit switch weight.

- ▶ Install hoist limit switch weight without diagonal pull.
- ▶ Always install the hoist limit switch weight on the slack rope of winch1/winch2, except with single reeving.

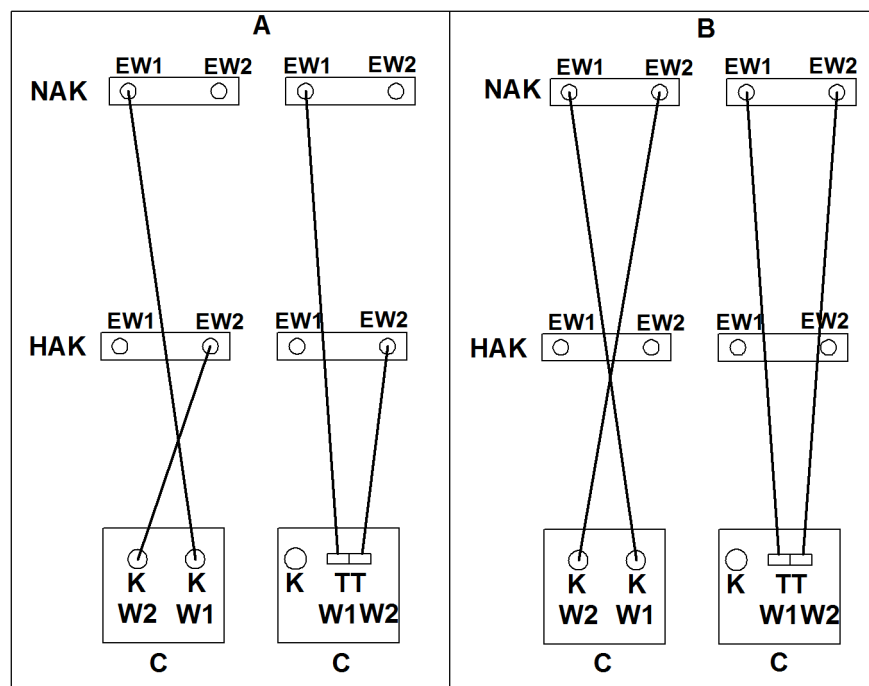


Fig. 4888: Hoist limit switch assignment depending on winch1/winch2

- | | | | |
|------------|---|------------|---------------------------------|
| A | Boom configuration main boom + fixed jib | K | Multi-directional control lever |
| B | Boom configuration main boom + fixed jib with two ropes across jib head section | NAK | Jib head section |
| C | Cabin | TT | Double T control lever |
| EW1 | Hoist limit switch winch1 | W1 | Winch1 |
| EW2 | Hoist limit switch winch2 | W2 | Winch2 |
| HAK | Main boom head | | |

NOTICE

Wrong hoist limit switch!
Hoist limit switch does not turn off.

- ▶ Make sure that the correct hoist limit switch for the correct rope of winch1/ winch2 is used.

The hoist limit switch with chain and hoist limit switch weight attached is secured to the inoperative end of the hoist rope.

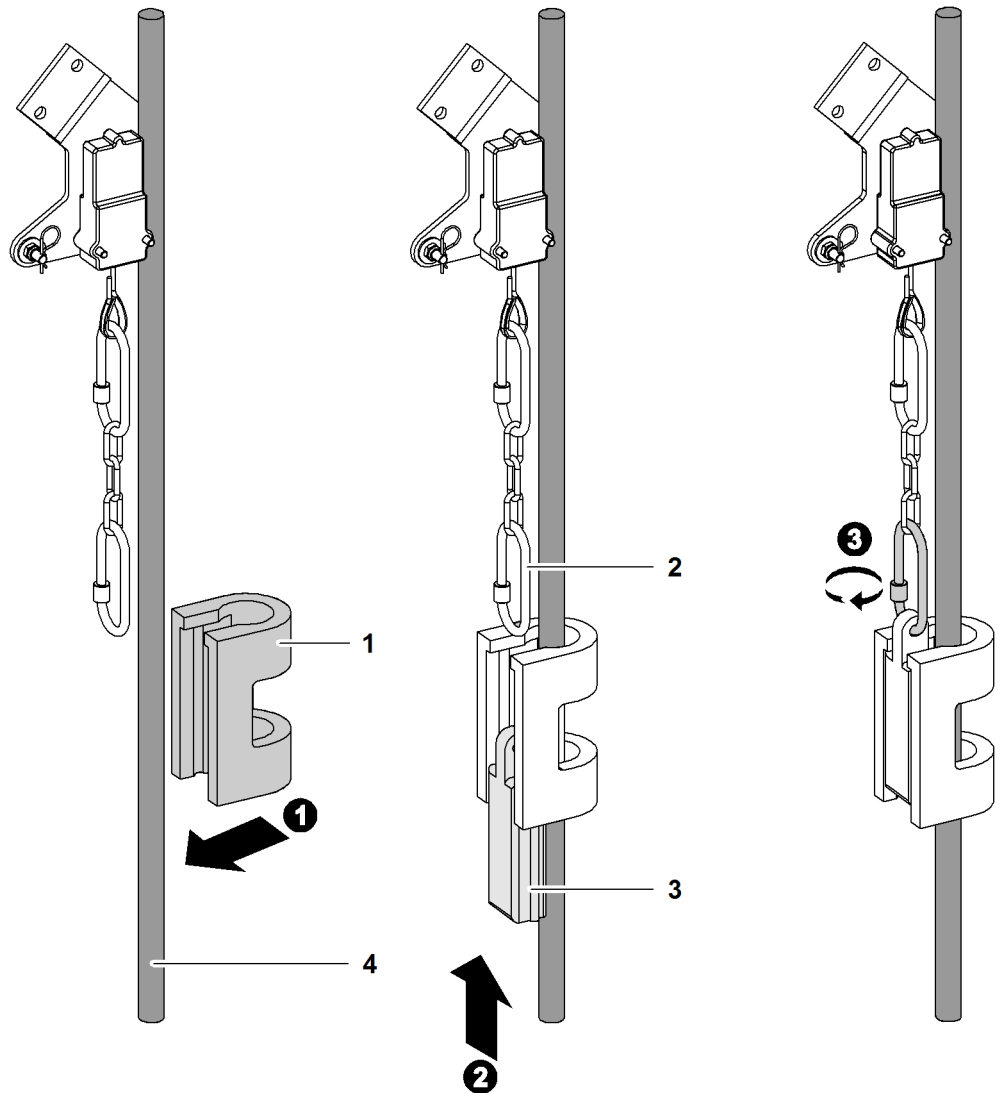


Fig. 4889: Installing the hoist limit switch weight

- | | |
|---------------------------------------|-------------------------------------|
| 1 Hoist limit switch weight (U shape) | 3 Hoist limit switch weight (wedge) |
| 2 Carabiner | 4 Rope of winch1/winch2 |

► Guide the hoist limit switch weight (U shape) 1 over the rope of winch1/winch2 4.

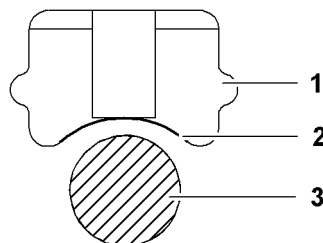


Fig. 4890: Hoist limit switch weight (wedge) view from above

- | | |
|-------------------------------------|-------------------------|
| 1 Hoist limit switch weight (wedge) | 3 Rope of winch1/winch2 |
| 2 Curvature | |

The hoist limit switch weight (wedge) 1 has a curvature 2 on one side.

NOTICE

Wrongly installed hoist limit switch weight (wedge)!
 Hoist limit switch weight (wedge) damaged with wrong installation of rope of winch1/winch2.

- ▶ Make sure that the curvature of the hoist limit switch weight (wedge) is installed in the direction of the rope of winch1/winch2.
-
- ▶ Slide the hoist limit switch weight (wedge) **1** from below into the hoist limit switch weight (U shape).
 - ▶ Attach the carabiner to the hoist limit switch weight (wedge) **1**.



Note

Liebherr recommends:

- ▶ visual inspection of the carabiner prior to installation.
- ▶ Clean dirty carabiner with a clean cloth and water.
- ▶ If necessary, re-clean with a slightly oily cloth.

NOTICE

Improper installation of carabiner!
 Damage to machine.

- ▶ Make sure that the screw of the carabiner points downwards.
- ▶ Make sure that the locking element is twisted shut.

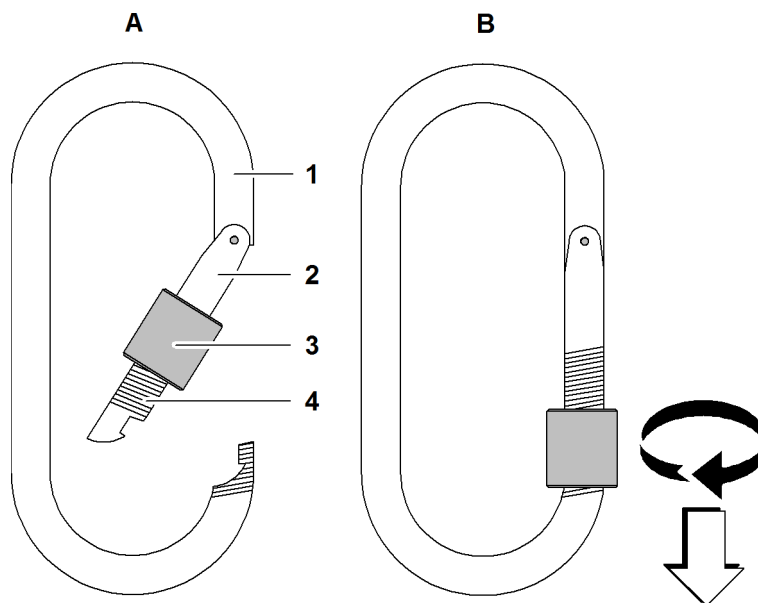


Fig. 4891: Carabiner

- | | | | |
|---|-----------------|---|------------------|
| 1 | Carabiner | 4 | Thread |
| 2 | Snapper | A | Opened carabiner |
| 3 | Locking element | B | Closed carabiner |

- ▶ Secure carabiner **1** with locking element **3**.

NOTICE

Chain on hoist limit switch weight is too short!

Hoist limit switch weight responds too late. Hook damages boom head.

- ▶ Ensure that hoist limit switch weight chain is at least 3 m (9' 10" ft-in) and at most 4.5 m (14' 9" ft-in) long.

- ▶ Attach chain between hoist limit switch weight and hoist limit switch.

Installing hoist limit switch bracket* variant 2 on jib head section

The hoist limit switch bracket replaces the hoist limit switch weight.

Single reeving

With single reeving, a transverse pipe is installed.

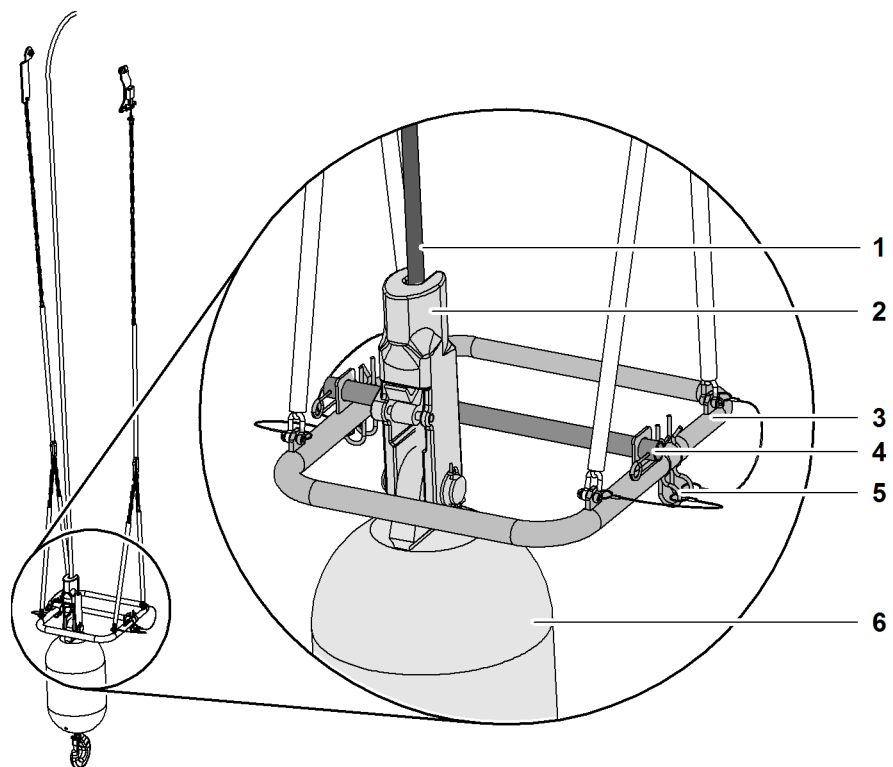


Fig. 4892: Installing hoist limit switch bracket variant 2 with multiple reeving on jib head section

- | | | | |
|---|----------------------------|---|------------------------|
| 1 | Winch1 rope | 4 | Transverse pipe |
| 2 | Pocket lock | 5 | Spring cotter pin (2x) |
| 3 | Hoist limit switch bracket | 6 | Hook |

- ▶ Position rope 1 of winch2 in front of lateral pipe 4 of hoist limit switch bracket 3.

- ▶ Mount hoist limit switch bracket 3 and secure with spring cotter pins 5.

Multiple reeving

With multiple reeving, the transverse pipe is removed.

With multiple reeving, the hoist limit switch bracket is installed turned by 180°.

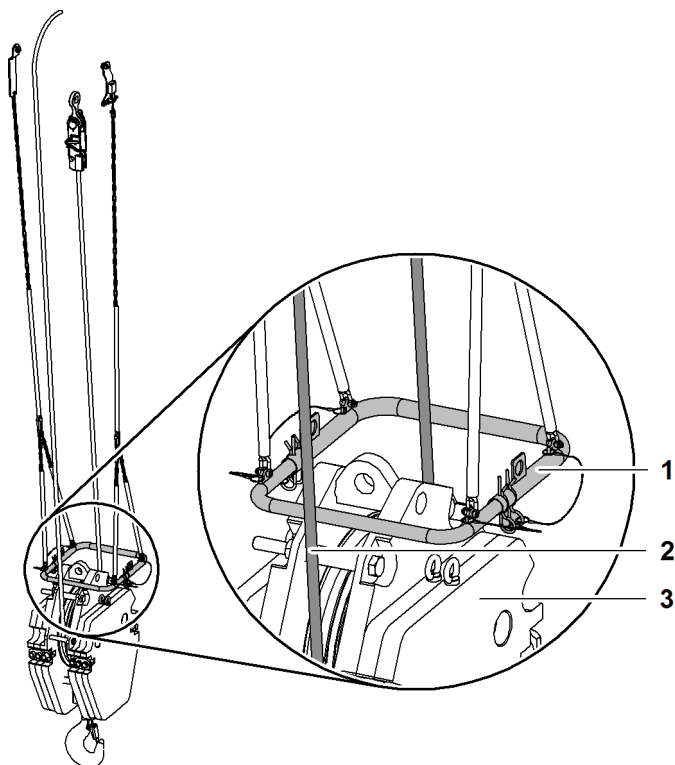


Fig. 4893: Installing hoist limit switch bracket variant 2 with multiple reeving on jib head section

- | | | | |
|---|----------------------------|---|--------------|
| 1 | Hoist limit switch bracket | 3 | Pulley block |
| 2 | Spring cotter pin (2x) | | |

- ▶ Position rear rope between rear pipe and front pipe.
- ▶ Push front pipe into rear pipe and secure with spring cotter pins 2.

Installing hoist limit switch bracket* variant 2 on main boom head

The hoist limit switch bracket replaces the hoist limit switch weight.

Single reeving

With single reeving, a transverse pipe is installed.

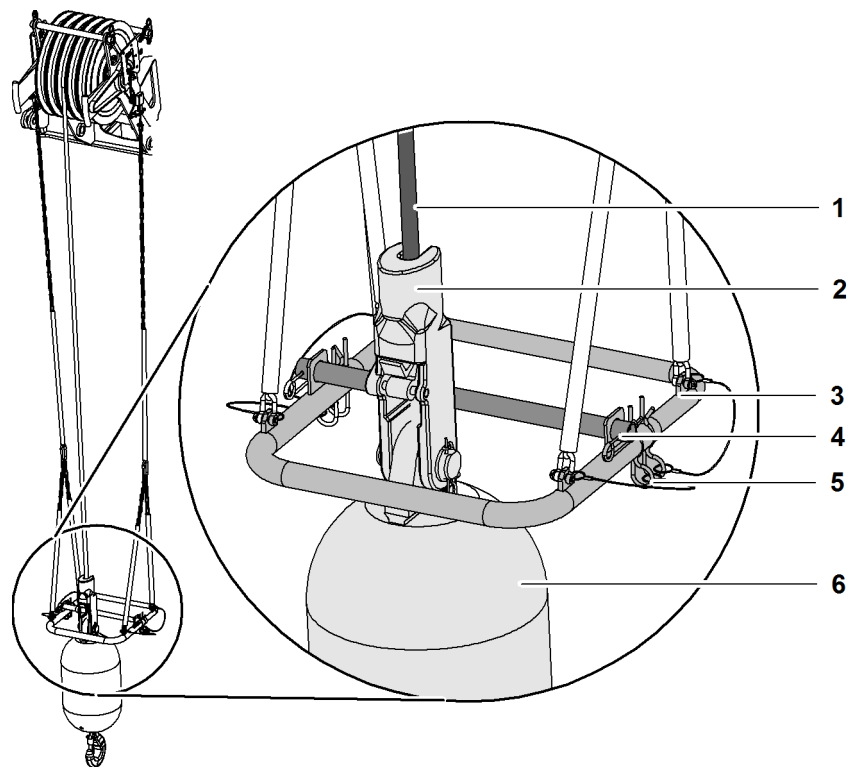


Fig. 4894: Installing hoist limit switch bracket variant 2 with single reeving on main boom head

- | | | | |
|---|----------------------------|---|------------------------|
| 1 | Winch2 rope | 4 | Spacer pipe |
| 2 | Pocket lock | 5 | Spring cotter pin (2x) |
| 3 | Hoist limit switch bracket | 6 | Hook |

- ▶ Position rope **1** of winch2 in front of spacer pipe **4** of hoist limit switch bracket **3**.
- ▶ Mount hoist limit switch bracket **3** and secure with spring cotter pins **5**.

Multiple reeving

With multiple reeving, the transverse pipe is removed.

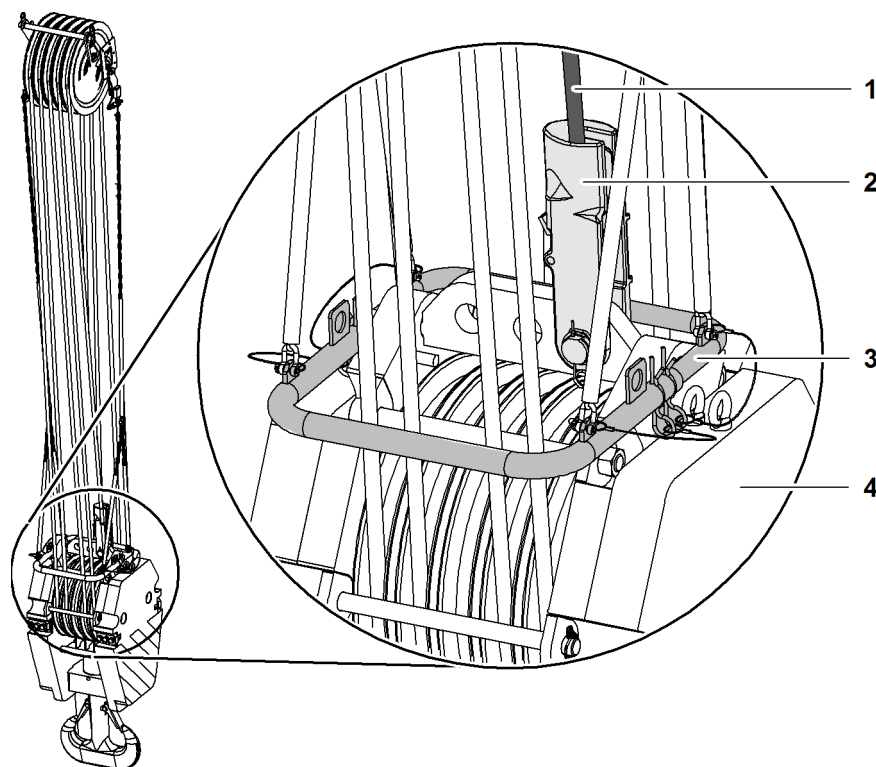


Fig. 4895: Installing hoist limit switch bracket variant 2 with multiple reeving on main boom head

- | | | | |
|---|-------------|---|----------------------------|
| 1 | Winch2 rope | 3 | Hoist limit switch bracket |
| 2 | Pocket lock | 4 | Pulley block |

- ▶ Position rear rope between rear pipe and front pipe.
- ▶ Push front pipe into rear pipe and secure with spring cotter pins.

7.19.21 Bypassing unused hoist limit switches



DANGER

Inadmissible bypassing of hoist limit switch!
Load breakaway.

- ▶ Only bypass unused hoist limit switches.

NOTICE

Wrong hoist limit switch is bypassed!
Hook damages boom head.

- ▶ Lock winch1 with left hoist limit switch.
- ▶ Lock winch2 with right hoist limit switch.

Make sure the following conditions are met:

- Only motion is performed with a rope of winch1/winch2. A hoist limit switch is not required.

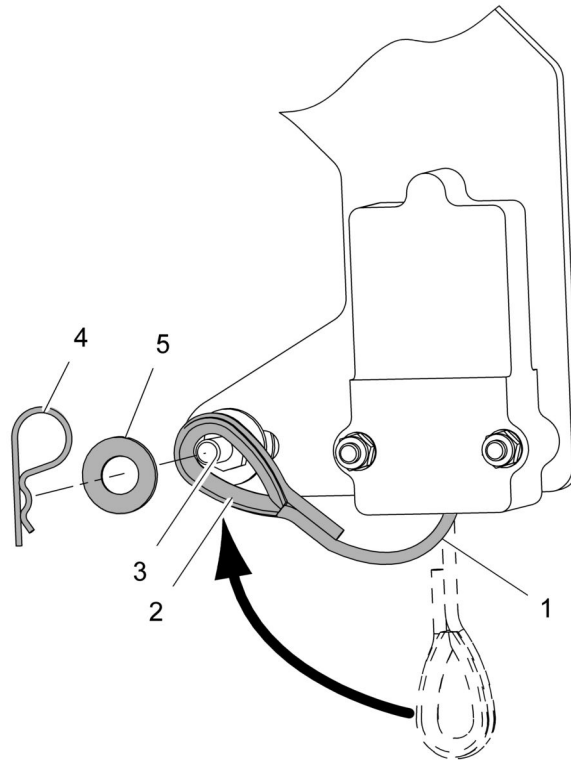


Fig. 4896: Bypassing the hoist limit switch mechanically

- | | | | |
|---|------------|---|----------------|
| 1 | Steel rope | 4 | Locking spring |
| 2 | Loop | 5 | Washer |
| 3 | Stud bolt | | |

- ▶ Pull the steel rope 1 and place the loop 2 over the stud bolt 3.
 - ▷ Hoist limit switch is bypassed.
- ▶ Protect the sling 2 from slipping off the stud bolt 3 by securing it with a washer 5 and a locking spring 4.

7.19.22 Erecting a main boom + fixed jib

Ensure that the following conditions are fulfilled:

- Boom configuration can be erected with counterweight.
- Signalmen and assistants are instructed.
- All work on the boom has been completed.
- No loose parts or tools have been left on the boom.



Note

The overall center of gravity of the machine is moved beyond the first running roller!

Sudden swinging of the boom/jib when erecting.

Liebherr recommends:

- ▶ When using long main booms and short jibs, follow the procedure for "Blocked Crawlers" ([For more information see: 4.27 Blocked crawlers*](#), page 1008) .

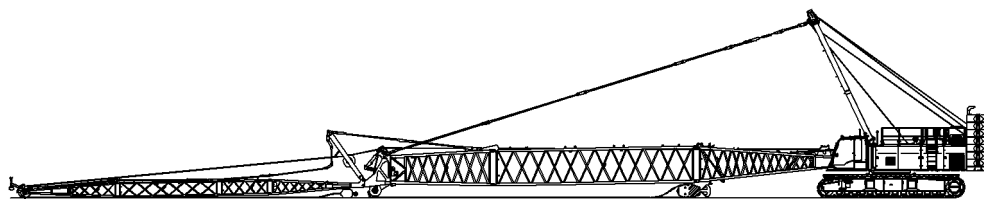


Fig. 4897: Main boom with fixed jib on the ground (illustration of principle)



DANGER

Hoist limit switch bypassed on control panel X23 in crane mode!
Load breakaway.

- ▶ Only bypass hoist limit switch on control panel X23 when assembling or disassembling the machine.



If hoist limit switch weight is on the ground:

- ▶ Press the *Bypass limit switch* button on control panel X23.
 - ▷ Hoist limit switches are bypassed.



- ▶ Press the *Load moment limiter assembly/self-lock* button on control panel X23.

No load chart exist for machines geometry:

- ▷ Function "load moment limiter assembly" is active.
- ▷ The LED on the button *Load moment limiter assembly/self-lock* lights up.
- ▷ Machine functions are enabled unlimited.
- ▷ Load Moment Limiter lamps flash orange.



DANGER

Erectability chart is not followed!
Machine toppling over.

- ▶ Only raise the boom when erection is permitted according to the erectability chart.



WARNING

Falling objects!
Severe injury.

- ▶ Any loose parts and tools must be removed from the boom.
- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.

- ▶ Lift main boom slowly.
 - ▷ The main boom pendant straps are tensioned:

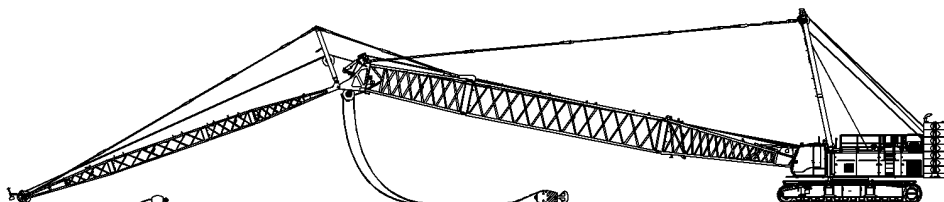


Fig. 4900: Main boom pendant straps tensioned (illustration of principle)

**WARNING**

Dangerous voltage in boom!
Sudden sideways movement when lifting boom from ground.

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.

- ▶ Lift main boom further.
 - ▷ The main boom lifts off the ground.
 - ▷ Jib head section remains on the ground and moves backwards on the pulleys.

As soon as there is a load chart for machines geometry:

- ▷ Deactivate function *load moment limiter assembly*.
- ▷ The LED in the button *Load moment limiter assembly/self-lock* goes out.
- ▷ Load moment limiter is active.
- ▷ Load moment limiter lamps light up according to the current status of the Load Moment Limiter system.

NOTICE

Incorrect erection procedure is followed!
Damage to the equipment.

- ▶ Do not drag the hook or the pulley block along the ground.
- ▶ Do not allow any slacking of the rope.

- ▶ Unwind the rope of winch1/winch2 when necessary.
 - ▷ The hook/pulley block remains on the ground.

When the maximum permitted lifting capacity is at least equal to the weight of the hook and/or pulley block:

- ▶ Raise the hook/pulley block.
- ▶ Erect the main boom until it is in the desired position.
 - ▷ Main boom with fixed jib is erected:

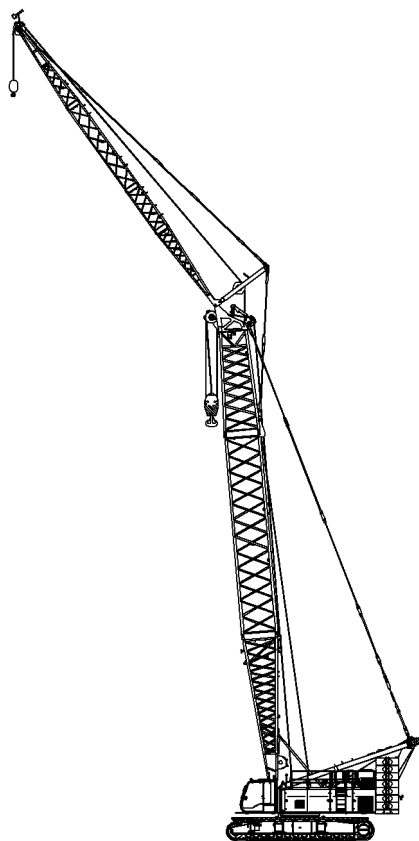


Fig. 4901: Erected main boom with fixed jib (illustration of principle)

7.19.23 Turning off assembly functions

Make sure the following conditions are met:

- Machine is readily mounted and erected.
- All limit switches are mounted and functioning.



- ▶ Press the switch *Assembly functions* on control panel X12.
 - ▷ Assembly functions are switched off.
 - ▷ The symbol *Assembly functions* is no longer displayed on the monitor.

7.19.24 Checking the main boom limit switch plate for proper adjustment

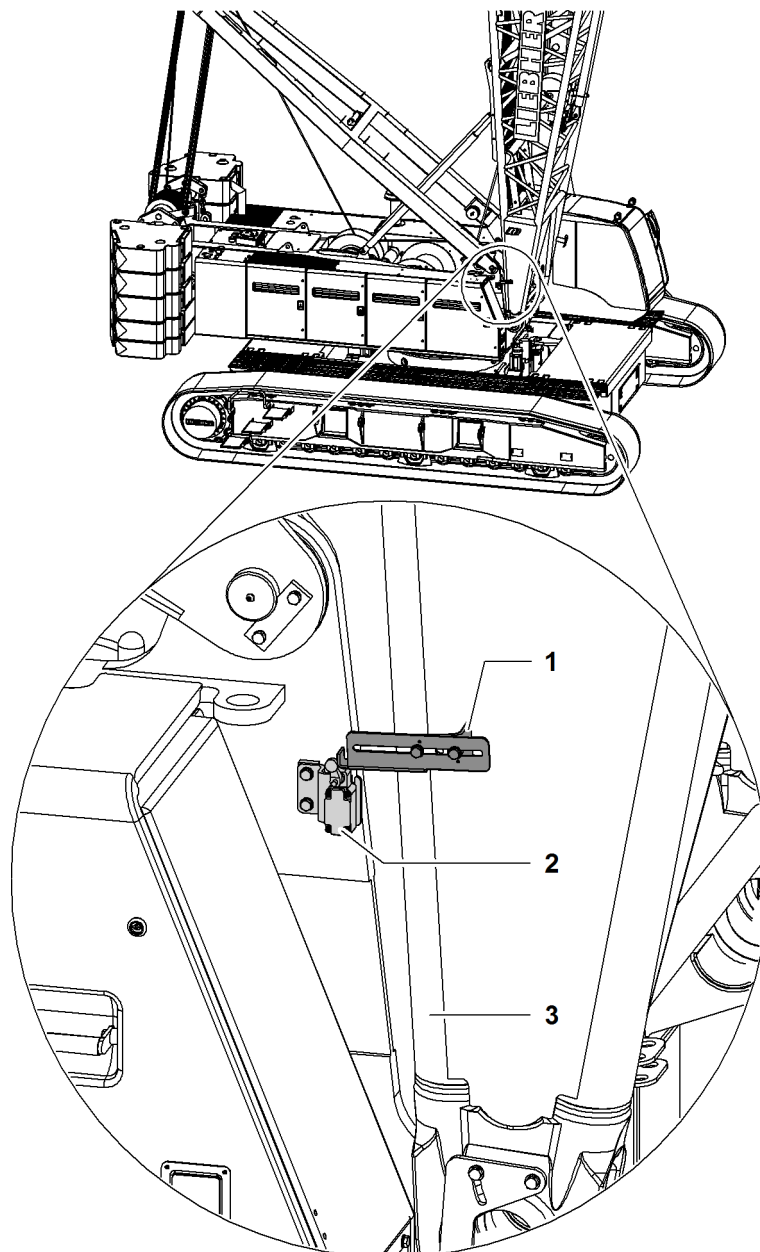


Fig. 4903: Checking the main boom limit switch plate for proper adjustment (illustration of principle)

- | | | | |
|---|--------------------|---|------------------------|
| 1 | Limit switch plate | 3 | Main boom base section |
| 2 | Limit switch | | |

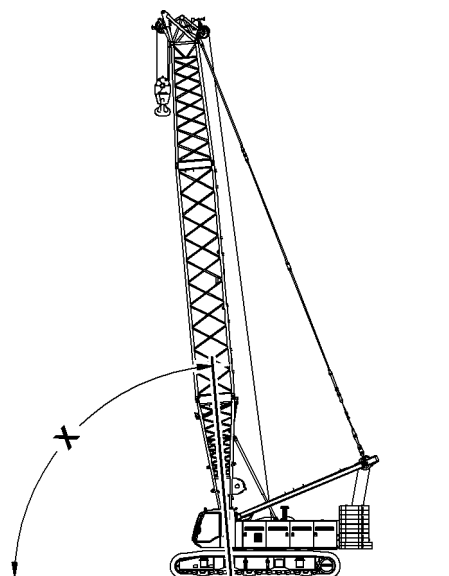


Fig. 4904: Top main boom angle (illustration of principle)

Boom configuration	Angle X
Main boom	86°
Main boom + derrick	
Main boom + reducing adapter	
Main boom + fixed jib	88°
Main boom + fixed jib + derrick	
Main boom + luffing jib	
Main boom + luffing jib + derrick	
Main boom + luffing jib + midfall	

Tab. 583: Main boom limit switch plate

NOTICE

Incorrectly calibrated main boom limit switch plate!
Damage to machine.

▶ Make sure that the main boom limit switch plate is properly calibrated.

- ▶ Erect the main boom until the *operation* screen shows the angle X.
 - ▷ Limit switch triggers.
 - ▷ Lift main boom is locked.

If the limit switch triggers too early or not at all:

- ▶ Turn machine off.
- ▶ Contact Liebherr customer service.

7.20 Luffing jib 2316

System-relevant information for luffing jib 2316:

- Configuration of jib
 - Mid-point suspensions installation positions
- Lengths of jib mid-point suspensions
- Configuration of main boom
- Overview of steel pendant straps on luffing jib 2316
- Overview of CF pendant straps on luffing jib 2316
- Reeving diagram A-frame2/A-frame3
- Reeving diagrams for one rope across jib head 2316 (load position1)
- Reeving diagrams for two ropes across jib head 2316 (load position1)
- Reeving diagrams for one rope across main boom head 2821 (load position2)
- Reeving diagrams for one rope across auxiliary jib (30 t (66.000 lb)) on jib head 2316 (load position1)

7.20.1 Configuration of jib



DANGER

Excess length of jib!
Structural breakdown.

- ▶ Check jib length in load chart for validity.

Jib length	Configuration of jib (symbolic)
20 m 66 ft	
23 m 76 ft	
26 m 85 ft	
29 m 95 ft	
32 m 105 ft	
35 m 115 ft	
38 m 125 ft	
41 m 134 ft	
44 m 144 ft	
47 m 154 ft	
50 m 164 ft	

Jib length	Configuration of jib (symbolic)
53 m 174 ft	
56 m 184 ft	
59 m 194 ft	
62 m 203 ft	
65 m 213 ft	
68 m 223 ft	
71 m 233 ft	
74 m 243 ft	
77 m 253 ft	
80 m 262 ft	
83 m 272 ft	
86 m 282 ft	
89 m 292 ft	
92 m 302 ft	
95 m 312 ft	
98 m 322 ft	
101 m 331 ft	
104 m 341 ft	
107 m 351 ft	
110 m 361 ft	
113 m 371 ft	

Tab. 584: Configuration of luffing jib 2316

X1 - Installation position mid-point suspension 1

X2 - Installation position mid-point suspension 2

7.20.2 Lengths of jib mid-point suspensions

Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
50 m 164 ft	3 m 9' 10" ft-in	
53 m 174 ft	3 m 9' 10" ft-in	
56 m 184 ft	2.6 m 8' 6" ft-in	
59 m 194 ft	2.6 m 8' 6" ft-in	
62 m 203 ft	2.1 m 6' 11" ft-in	
65 m 213 ft	5.6 m 18' 4" ft-in = 3.0 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
68 m 223 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
71 m 233 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
74 m 243 ft	4.7 m 15' 5" ft-in = 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in)	1.6 m 5' 3" ft-in
77 m 253 ft	5.6 m 18' 4" ft-in = 3.0 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	1.6 m 5' 3" ft-in
80 m 262 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
83 m 272 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	2.1 m 6' 11" ft-in

Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
86 m 282 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	2.1 m 6' 11" ft-in
89 m 292 ft	4.7 m 15' 5" ft-in = 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
92 m 302 ft	4.7 m 15' 5" ft-in = 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
95 m 312 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
98 m 322 ft	5.6 m 18' 4" ft-in = 3.0 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
101 m 331 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
104 m 341 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	2.6 m 8' 6" ft-in
107 m 351 ft	4.7 m 15' 5" ft-in = 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
110 m 361 ft	5.6 m 18' 4" ft-in = 3.0 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	2.6 m 8' 6" ft-in
113 m 371 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	2.1 m 6' 11" ft-in

Tab. 585: Lengths of jib mid-point suspensions - 2316 luffing jib

7.20.3 Configuration of main boom



DANGER

Assembly with excessive main boom length!
Structural failure.

- ▶ Check main boom length in load chart for validity.



Note

- ▶ Information on the configuration of the main boom can be found under system-related data for the main boom (For more information see: [7.5.1 Configuration of main boom, page 1319](#)).

7.20.4 Overview of steel pendant straps on luffing jib 2316

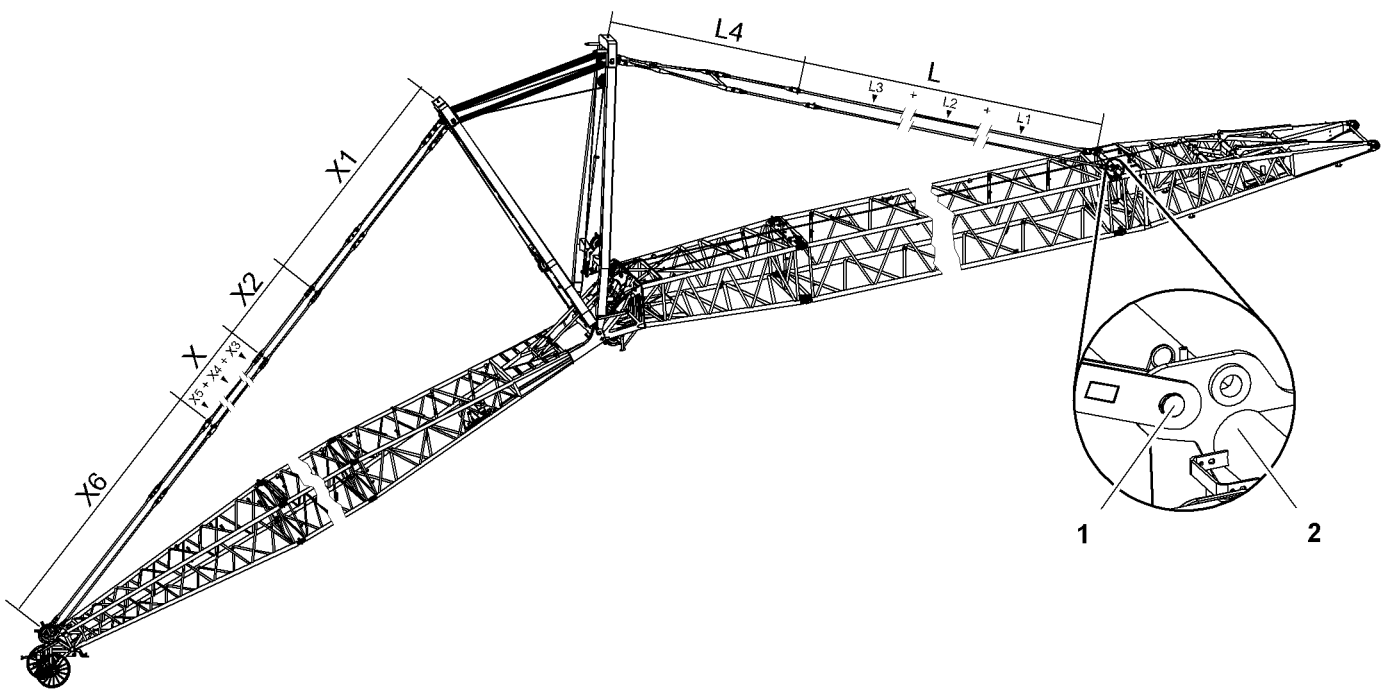


Fig. 5113: Overview of steel pendant straps on luffing jib 2316

- | | | | |
|---|--|---|------------------------|
| 1 | Pin connection point for jib backstay straps | 2 | Main boom base section |
|---|--|---|------------------------|

Jib backstay straps A-frame2 to main boom base section 2821

Name		Value
L	Jib backstay straps consisting of:	
	L1	Jib backstay strap 3 m (10 ft) (For more information see: Jib backstay strap 3 m (10 ft), page 199)
	L2	Jib backstay strap 6 m (20 ft) (For more information see: Jib backstay strap 6 m (20 ft), page 201)
	L3	Jib backstay strap 12 m (40 ft) (For more information see: Jib backstay strap 12 m (40 ft), page 203)
L4	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap), page 313)	8050 mm 26' 5" ft-in

Tab. 586: Jib backstay straps A-frame2 to main boom base section 2821

Configuration of jib backstay straps (L):

Required number of jib backstay straps 3 m (10 ft) (L1) corresponds to number of main boom sections 3 m (10 ft).

Required number of jib backstay straps 6 m (20 ft) (L2) corresponds to number of main boom sections 6 m (20 ft).

Required number of jib backstay straps 12 m (40 ft) (L3) corresponds to number of main boom sections 12 m (40 ft).



Note

- For the admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the load chart.

Pendant straps A-frame3 to jib head section 2316

Name		Value
X1	A-frame3 equalizer (jib pendant strap) (For more information see: A-frame3 equalizer (jib pendant strap), page 314)	7850 mm 25' 9" ft-in
X2	Jib pendant strap (For more information see: Jib pendant strap 3 m (10 ft), page 312)	3000 mm 9' 10" ft-in
X	Jib pendant straps consisting of:	
	X3	Jib pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 316)
	X4	Jib pendant strap 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft), page 316)
	X5	Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 317)

Name	Value
X6 Jib pendant strap on jib head section 2316 (For more information see: Jib pendant strap on jib head 2316.20, page 318)	9500 mm 31' 2" ft-in

Tab. 587: Pendant straps A-frame3 to jib head section 2316

Configuration of jib pendant straps (X):

Required number of jib pendant straps 3 m (10 ft) (X3) corresponds to number of jib sections 3 m (10 ft).

Required number of jib pendant straps 6 m (20 ft) (X4) corresponds to number of jib sections 6 m (20 ft).

Required number of jib pendant straps 12 m (40 ft) (X5) corresponds to number of jib sections 12 m (40 ft).



Note

► For the admissible number of jib sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following table: (For more information see: [7.20.1 Configuration of jib, page 1685](#))

7.20.5 Overview of CF pendant straps on luffing jib 2316

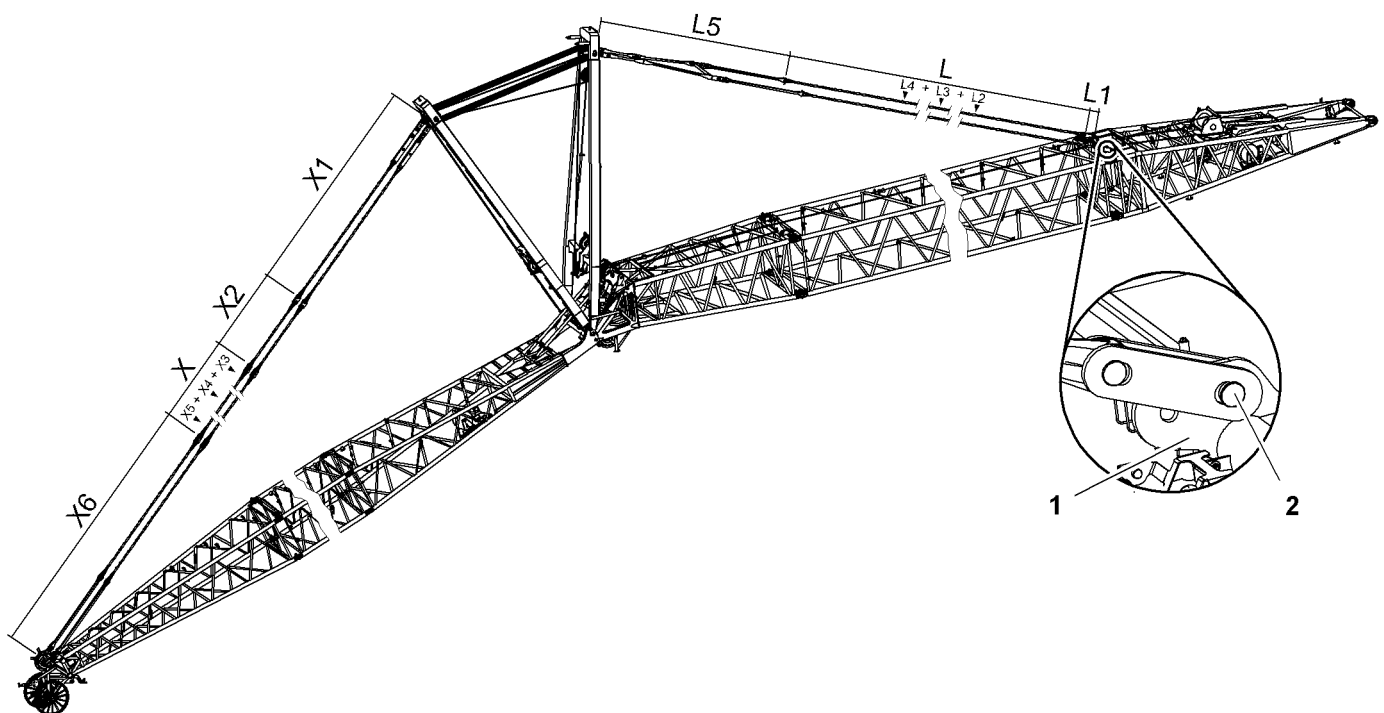


Fig. 5114: Overview of CF pendant straps on luffing jib 2316

- 1 Main boom base section 2 Pin connection point for jib backstay straps

Jib backstay straps A-frame2 to main boom base section 2821

Name		Value
L1	Connecting link (For more information see: Connecting link, page 208)	350 mm 1' 2" ft-in
L	Jib backstay straps consisting of:	Total L2 + Total L3 + Total L4
	L2 Jib backstay strap 3 m (10 ft) (For more information see: Jib backstay strap 3 m (10 ft), page 210)	
	L3 Jib backstay strap 6 m (20 ft) (For more information see: Jib backstay strap 6 m (20 ft), page 214)	
	L4 Jib backstay strap 12 m (40 ft) (For more information see: Jib backstay strap 12 m (40 ft), page 218)	
L5	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap), page 321)	8050 mm 26' 5" ft-in

Tab. 588: Jib backstay straps A-frame2 to main boom base section 2821

Configuration of jib backstay straps (L):

Required number of jib backstay straps 3 m (10 ft) (L2) corresponds to number of main boom sections 3 m (10 ft).

Required number of jib backstay straps 6 m (20 ft) (L3) corresponds to number of main boom sections 6 m (20 ft).

Required number of jib backstay straps 12 m (40 ft) (L4) corresponds to number of main boom sections 12 m (40 ft).



Note

- ▶ For the admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the load chart.

The jib backstay straps (L) may consist of generation A and generation B jib backstay straps (For more information see: [1.11.9 CF pendant straps on main boom 2821, page 206](#)). Mixing is only admissible if the number of generation B jib backstay straps only differs by at most 1 in the left and the right strand of the jib backstay straps.



DANGER

Inadmissible mixing of generation A and generation B jib backstay straps!
Structural failure.

- ▶ Ensure that the number of generation B jib backstay straps differs by at most 1 in the left and the right strand of the jib backstay straps.

Pendant straps A-frame3 to jib head 2316

Name		Value	
X1	A-frame3 equalizer (jib pendant strap) (For more information see: A-frame3 equalizer (jib pendant strap), page 323)	7850 mm 25' 9" ft-in	
X2	Jib pendant strap (For more information see: Jib pendant strap 3 m (10 ft), page 320)	3000 mm 9' 10" ft-in	
X	Jib pendant straps consisting of:		
	X3	Jib pendant straps 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 325)	Total X3 +
	X4	Jib pendant straps 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft), page 327)	Total X4 +
X5	Jib pendant straps 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 328)	Total X5	
X6	Jib pendant strap on jib head 2316 (For more information see: Jib pendant strap on jib head 2316.20, page 330)	9540 mm 31' 4" ft-in	

Tab. 589: Pendant straps A-frame3 to jib head 2316

Configuration of jib pendant straps (X):

Required number of jib pendant straps 3 m (10 ft) (**X3**) corresponds to number of jib sections 3 m (10 ft).

Required number of jib pendant straps 6 m (20 ft) (**X4**) corresponds to number of jib sections 6 m (20 ft).

Required number of jib pendant straps 12 m (40 ft) (**X5**) corresponds to number of jib sections 12 m (40 ft).



Note

- For the admissible number of jib sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following table: ([For more information see: 7.20.1 Configuration of jib, page 1685](#))

The jib pendant straps (**X**) may consist of generation A and generation B jib pendant straps ([For more information see: 1.20.8 CF pendant straps on luffing jib 2316, page 320](#)). Mixing is only admissible if the number of generation B jib pendant straps only differs by at most 1 in the left and the right strand of the jib pendant straps.



DANGER

Inadmissible mixing of generation A and generation B jib pendant straps!
Structural failure.

- Ensure that the number of generation B jib pendant straps differs by at most 1 in the left and the right strand of the jib pendant straps.

7.20.6 Reeving diagram A-frame2/A-frame3

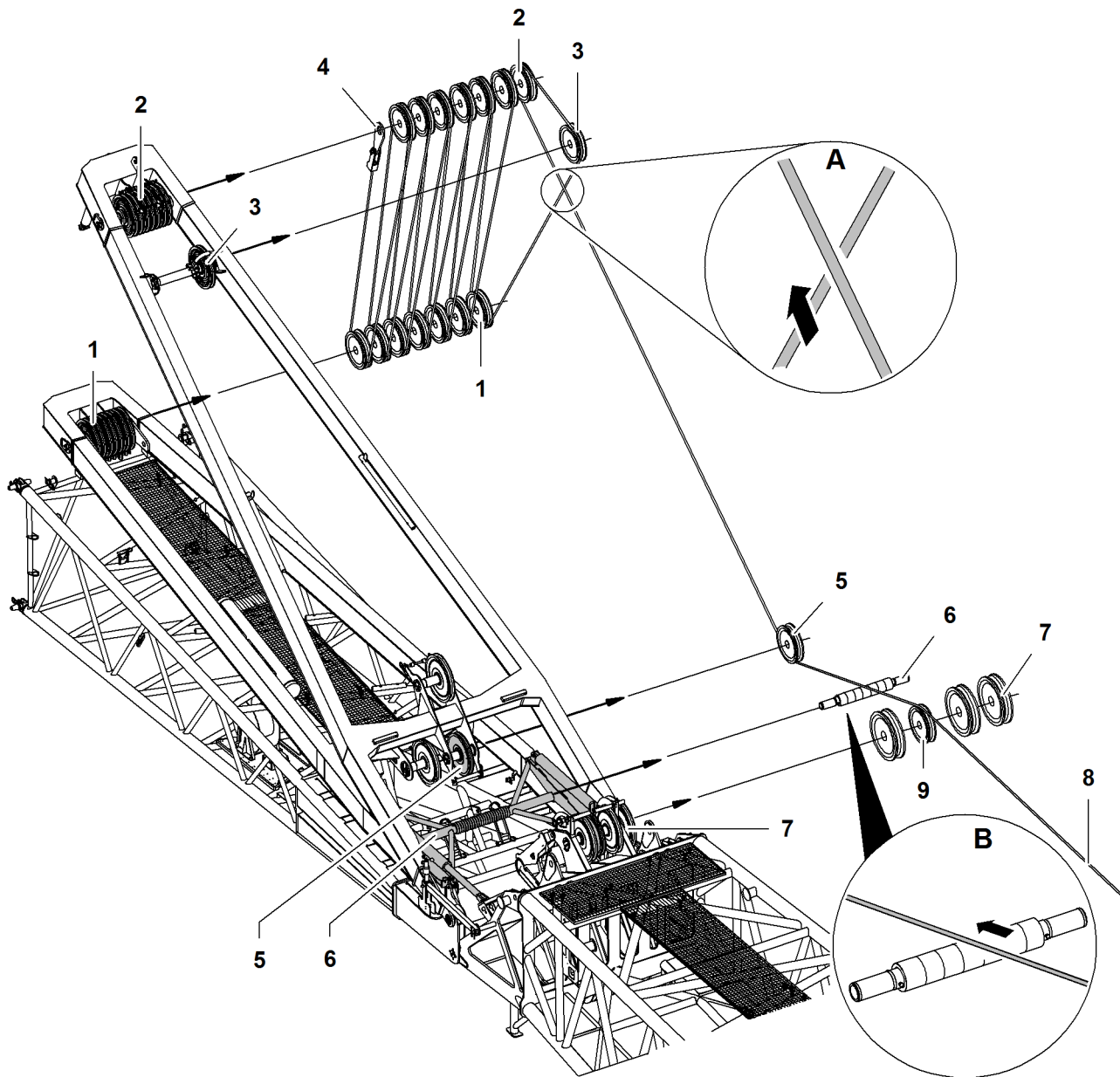


Fig. 5115: Reeving diagram A-frame2/A-frame3 - luffing jib 2316

- | | | | | | |
|---|---------------------|---|--------------------------------|---|-----------------------------------|
| 1 | Pulley set A-frame3 | 4 | Rope fixing point | 7 | Gantry pulley main boom head (3x) |
| 2 | Pulley set A-frame2 | 5 | Rope pulley in A-frame2 | 8 | Rope of jib luffing winch |
| 3 | Pulley A-frame2 | 6 | Rope protection roller support | 9 | Pulley of jib luffing winch |

Detail A:

The rope of the jib luffing winch **8** between pulley **3** and pulley set **1** runs behind the rope of the rope pulley **5** in A-frame2.

Detail B:

The rope of the jib luffing winch **8** runs over the rope protection roller **6**.

7.20.7 Reeving diagrams for one rope across jib head section 2316 (load position 1)

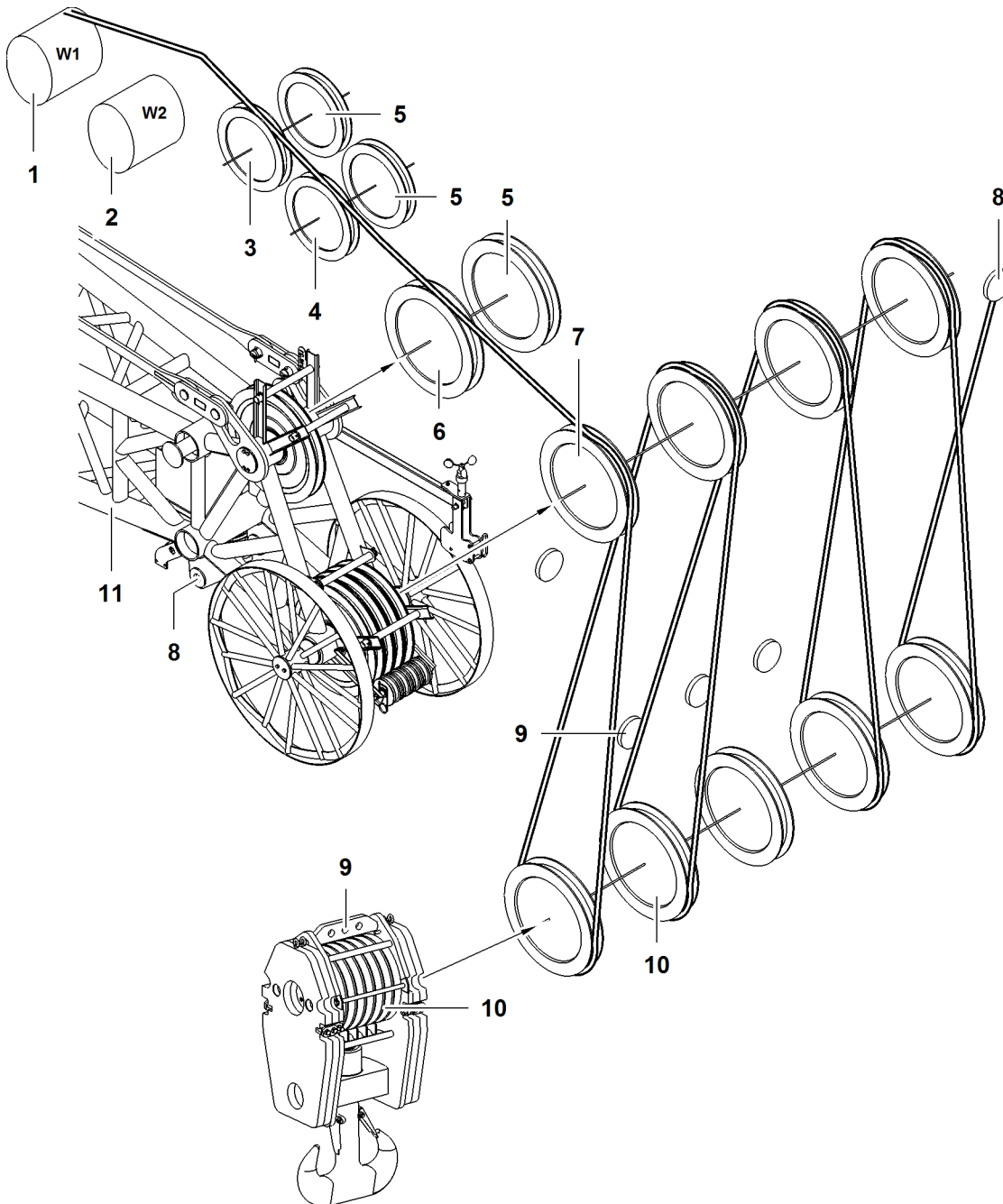


Fig. 5116: Reeving diagrams for one rope across jib head section 2316 (load position 1)

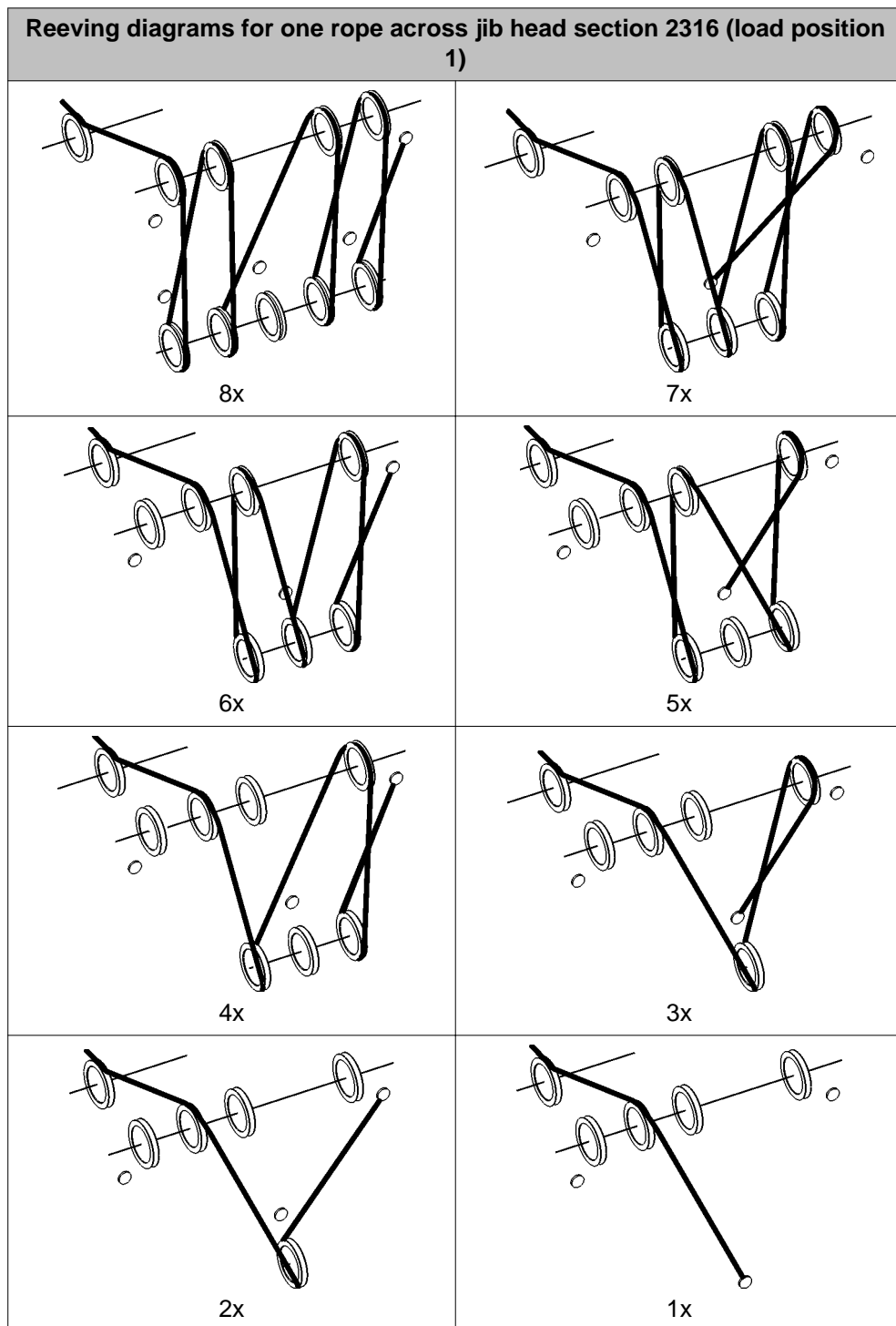
1	Winch1	5	Retrofit kit* for operation with two ropes across jib head section	9	Rope fixing points of pulley block
2	Winch2	6	Gantry pulley of jib head section	10	Pulley set of pulley block
3	Rope pulley of A-frame2	7	Rope pulley (4x) of jib head section	11	Jib head section
4	Rope pulley of A-frame3	8	Rope fixing point of jib head section		



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

- ▶ Select correct number of reevings as indicated in load chart.



Tab. 590: Reeving diagrams for one rope across jib head section 2316 (load position 1)

7.20.8 Reeving diagrams for two ropes across jib head section 2316, 1916, 1713, 1309, 1008 (load position1)



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.

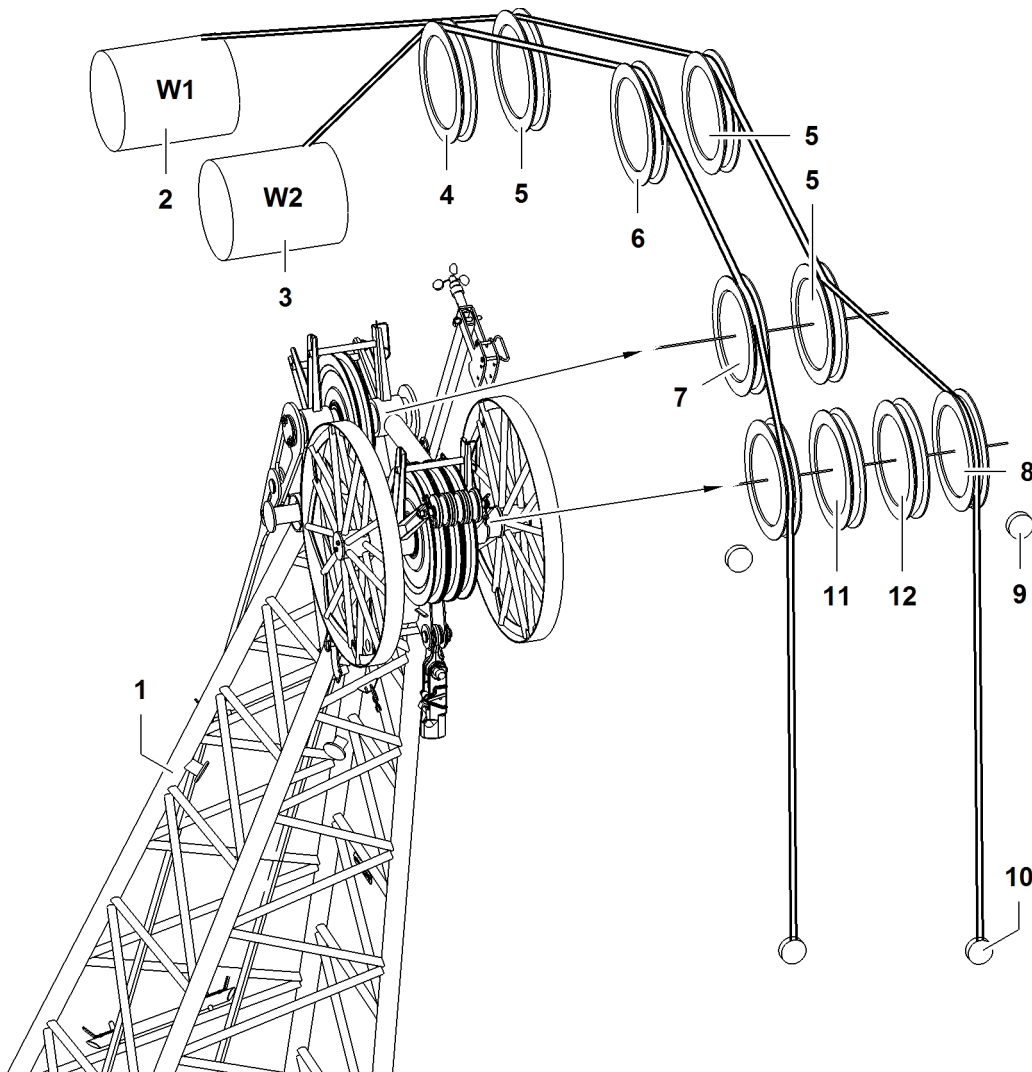


Fig. 5125: Reeving diagrams for two ropes across jib head section 2316, 1916, 1713, 1309, 1008 (load position1)

1	Jib head section	5	Retrofit kit* for operation with two ropes across jib head section	9	Rope fixing point (2x) of jib head section
2	Winch1	6	Rope pulley of A-frame3	10	Rope fixing points of pulley block
3	Winch2	7	Gantry pulleys of jib head section	11	Rope pulley (only with jib head section 2316)
4	Rope pulley of A-frame2	8	Rope pulleys of jib head section	12	Rope pulley (only with jib head section 2316, 1916, 1713)

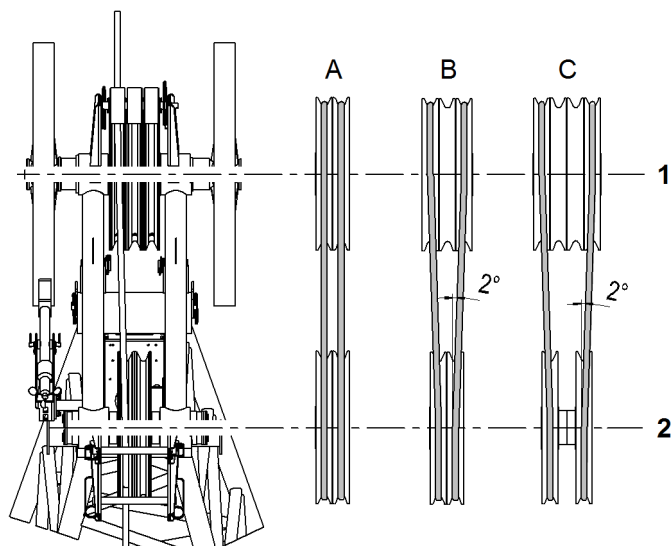


Fig. 5126: Run of the rope when two ropes pass over the jib head section

1 Rope pulleys of jib head section 2 Gantry pulleys of jib head section

Run of the rope	Type of jib
A	Luffing jib 1008
	Luffing jib 1309
B	Luffing jib 1713
	Luffing jib 1916
C	Luffing jib 2316

Tab. 591: Run of the rope when two ropes pass over the jib head section

7.20.9 Reeving diagrams for one rope across main boom head 2821 (load position 2)

If the main boom with jib attached is also used to lift a load, reeve main boom head 2821 as shown below.

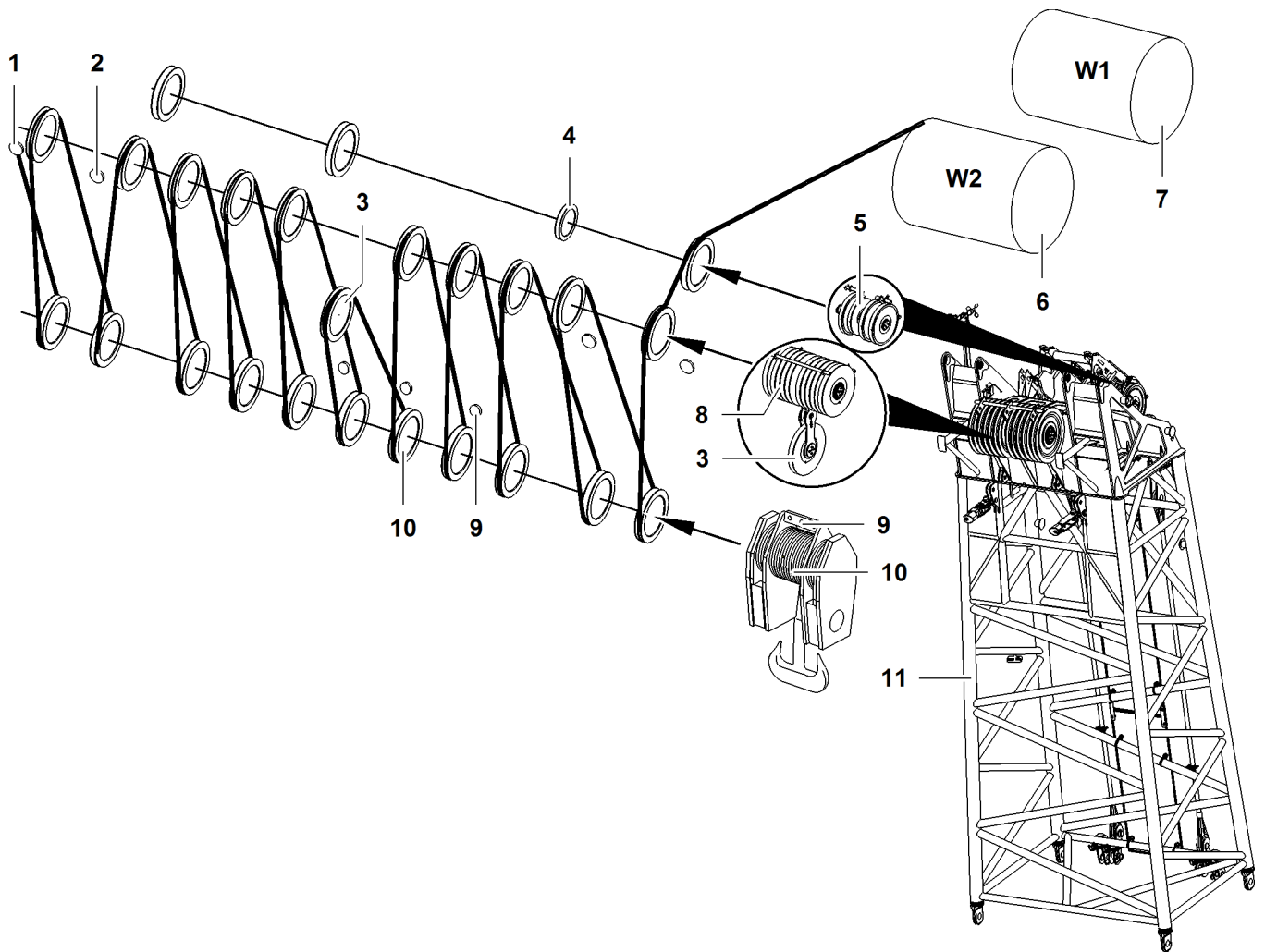


Fig. 5127: Reeving diagrams for one rope across main boom head 2821 (load position 2)

- | | | | | | |
|---|--|---|--------------------------------------|----|------------------------------------|
| 1 | Outer rope fixing point (2x) of main boom head | 5 | Gantry pulley (3x) of main boom head | 9 | Rope fixing points of pulley block |
| 2 | Inner rope fixing point (2x) of main boom head | 6 | Winch2 | 10 | Pulley set of pulley block |
| 3 | 11th rope pulley of main boom head | 7 | Winch1 | 11 | Main boom head |
| 4 | Rope pulley for rope of jib luffing winch | 8 | Rope pulley (10x) of main boom head | | |

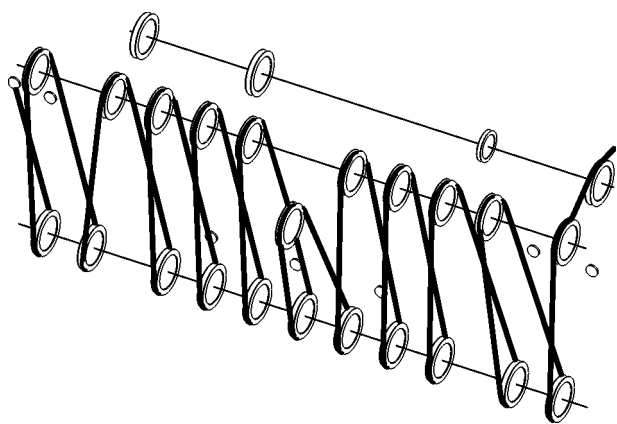


DANGER

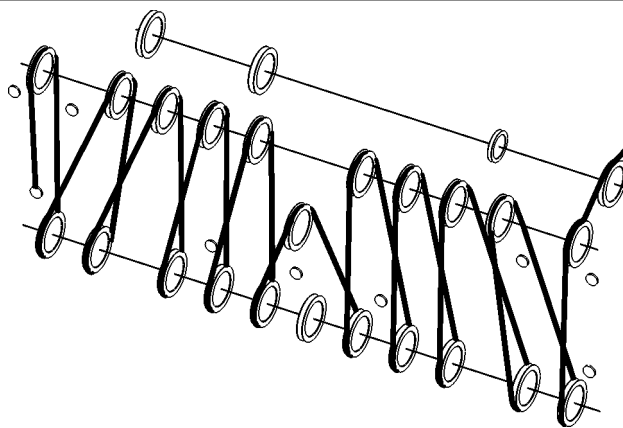
Inadmissible number of reeving!
Structural breakdown, toppling of machine.

► Select correct number of reeving as indicated in load chart.

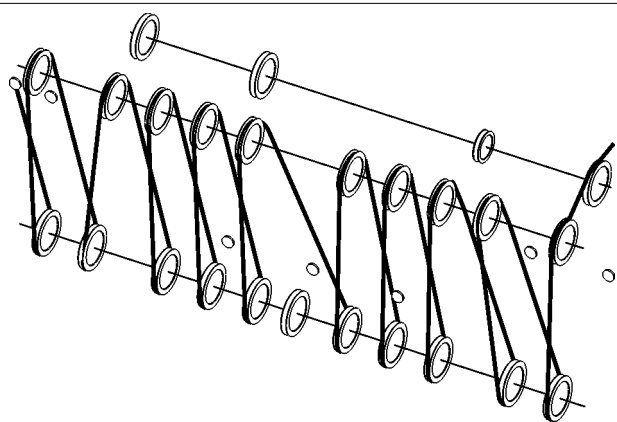
Reeving diagrams for one rope across main boom head 2821 (load position 2)



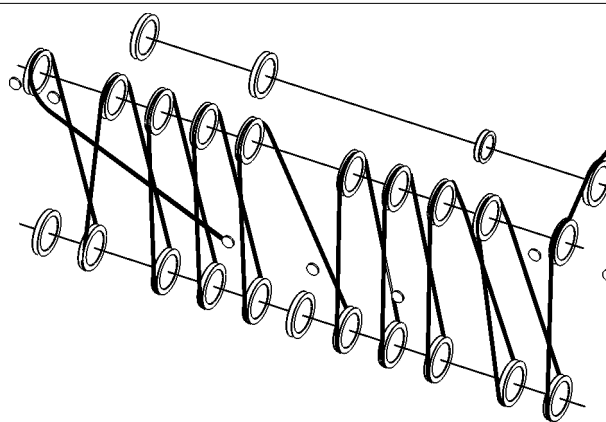
22x



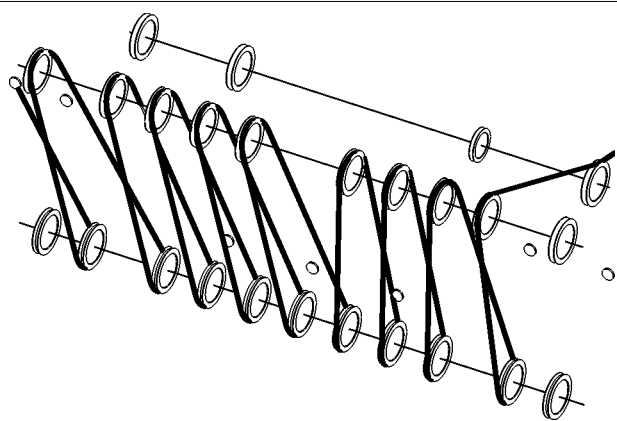
21x



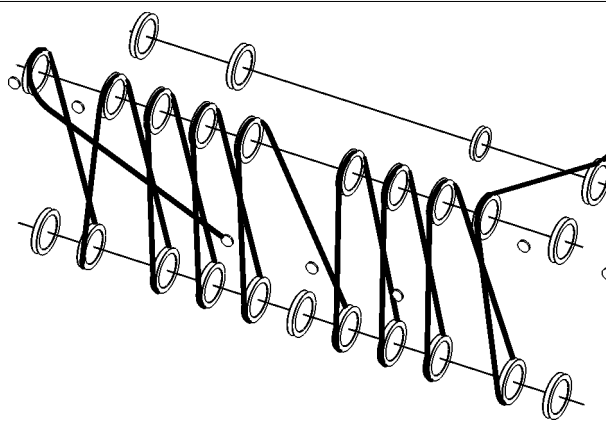
20x



19x

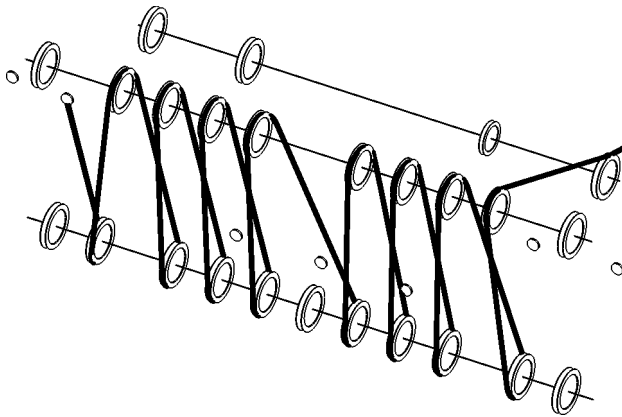


18x

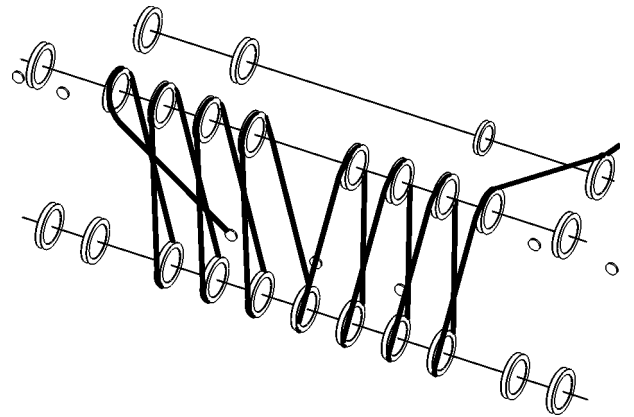


17x

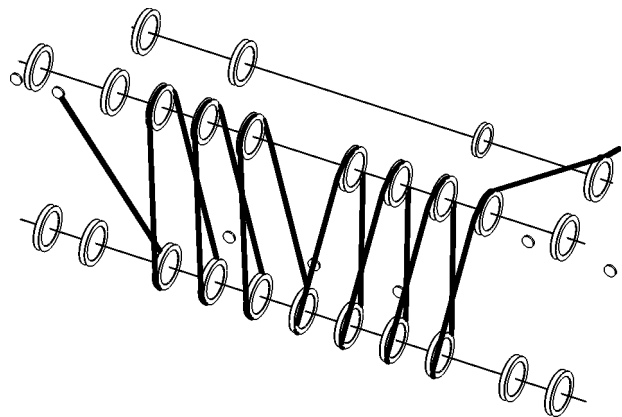
Reeving diagrams for one rope across main boom head 2821 (load position 2)



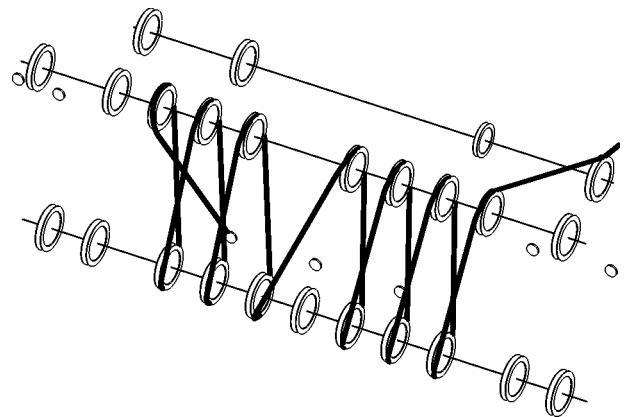
16x



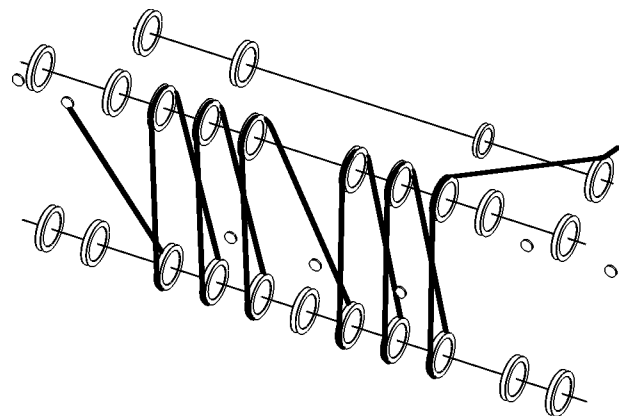
15x



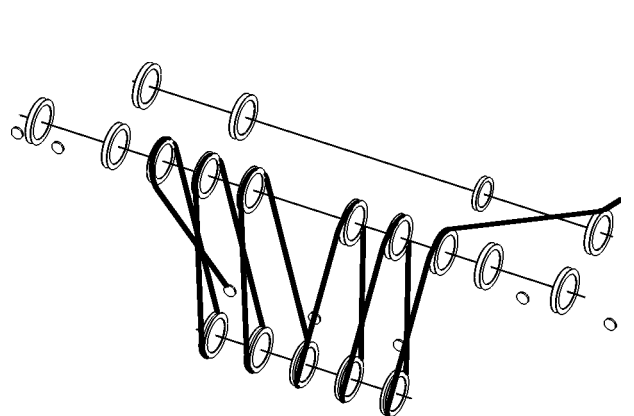
14x



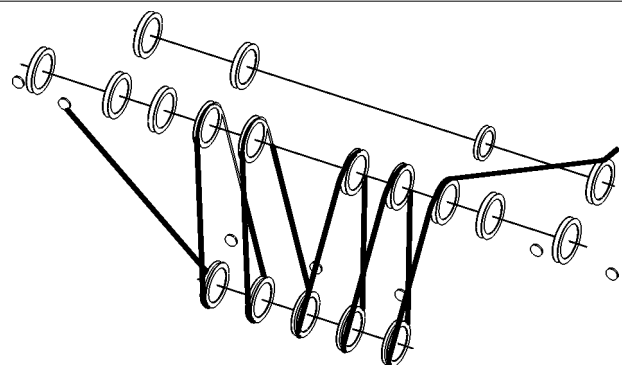
13x



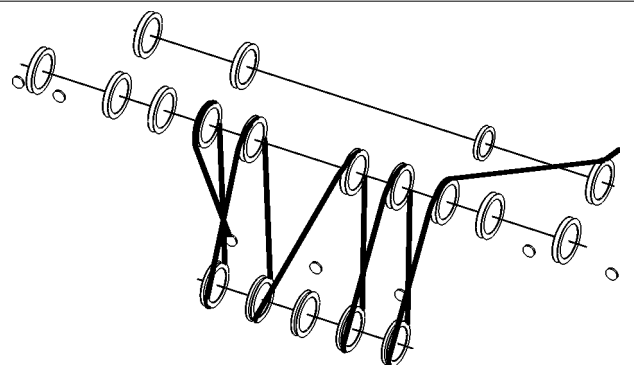
12x



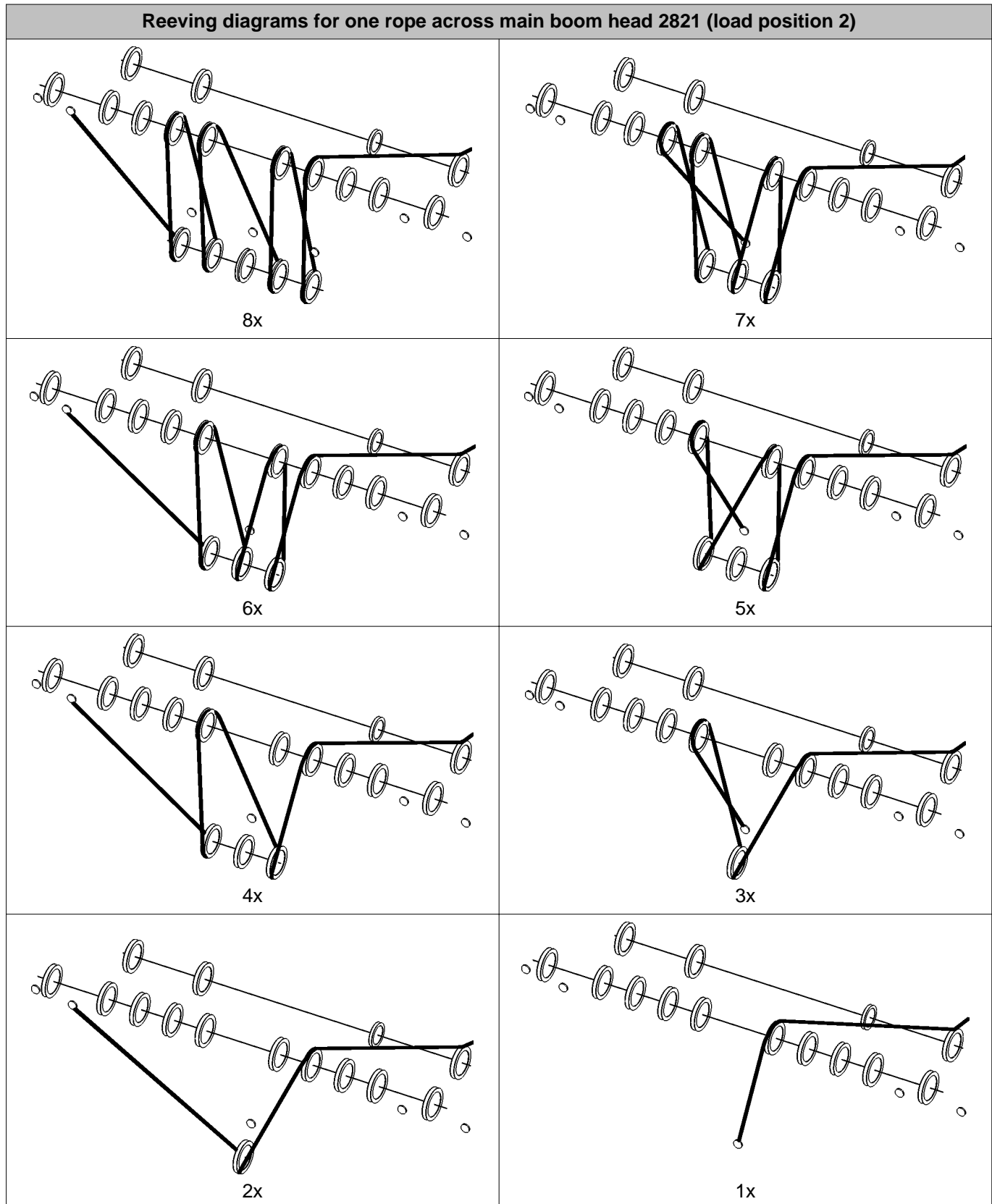
11x



10x



9x



Tab. 592: Reeving diagrams for one rope across main boom head 2821 (load position 2)

7.20.10 Reeving diagrams for one rope across auxiliary jib (30 t (66.000 lb)) to jib head section 2316 (load position 1)

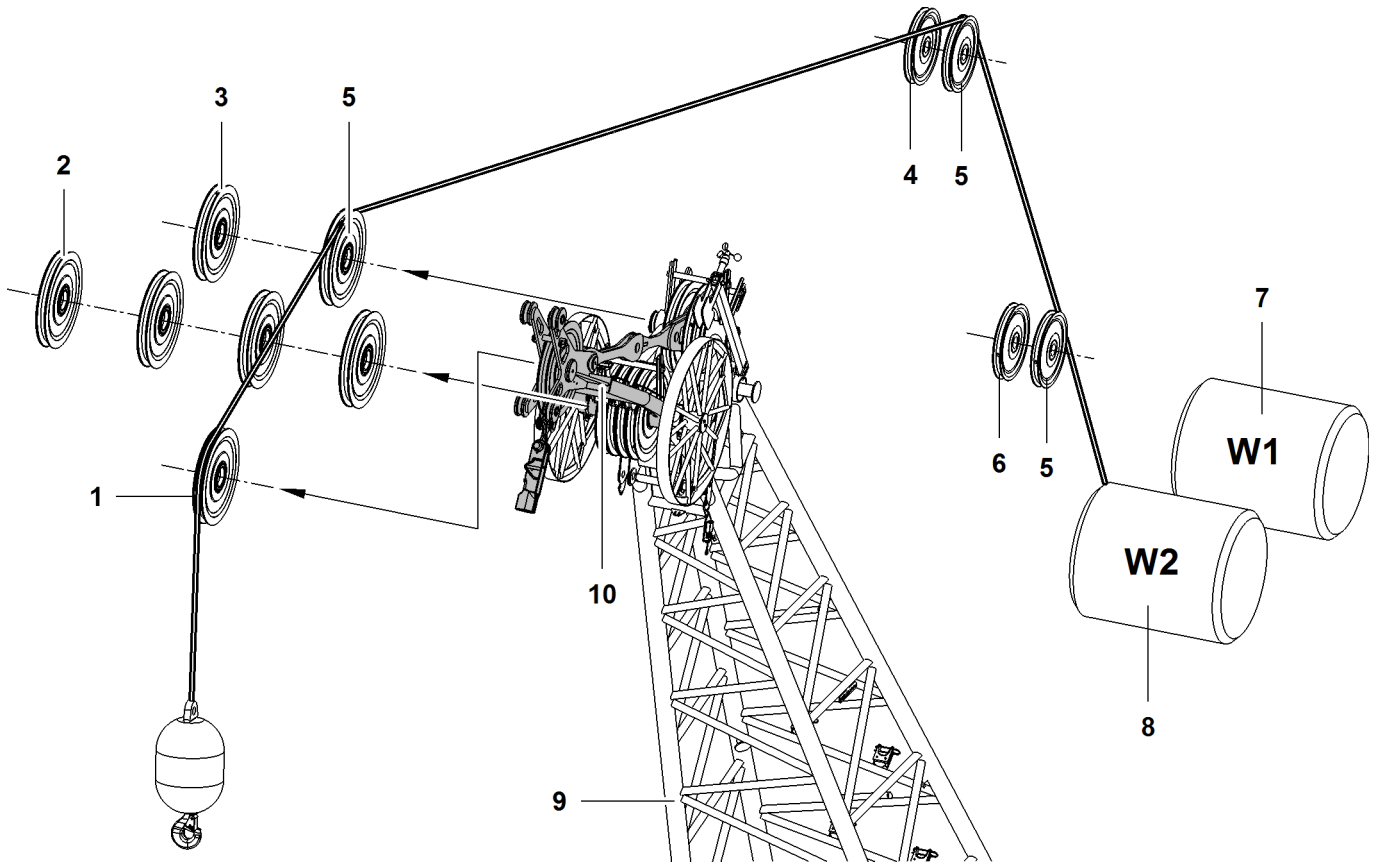


Fig. 5150: Reeving diagrams for one rope across auxiliary jib (30 t (66.000 lb)) to jib head section 2316 (load position 1)

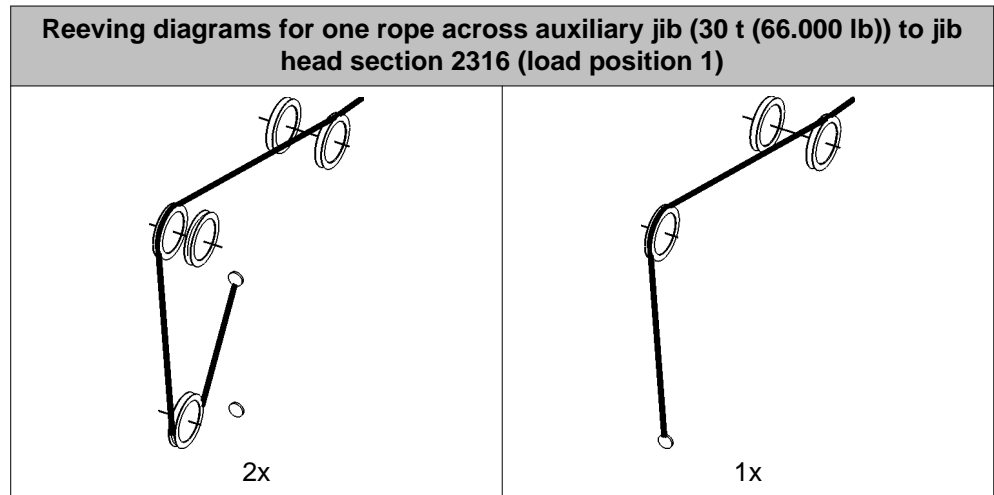
1	Rope pulley of auxiliary jib (30 t (66.000 lb))	5	Retrofit kit* for operation with two ropes across jib head section	9	Jib head section
2	Rope pulley (4x) of jib head section	6	Rope pulley of A-frame2	10	Auxiliary jib (30 t (66.000 lb))
3	Gantry pulley of jib head section	7	Winch1		
4	Rope pulley of A-frame3	8	Winch2		



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.



Tab. 593: Reeving diagrams for one rope across auxiliary jib (30 t (66.000 lb)) to jib head section 2316 (load position 1)

7.21 Luffing jib 1916

System-relevant information for luffing jib 1916:

- Configuration of jib
 - Mid-point suspensions installation positions
- Lengths of jib mid-point suspensions
- Configuration of main boom
- Overview of steel pendant straps on luffing jib 1916
- Overview of CF pendant straps on luffing jib 1916
- Reeving diagram A-frame2/A-frame3
- Reeving diagrams for one rope across jib head 1916 (load position1)
- Reeving diagrams for two ropes across jib head 1916 (load position1)
- Reeving diagrams for one rope across main boom head 2821 (load position2)
- Reeving diagrams for one rope across auxiliary jib (15 t (33.000 lb)) on jib head 1916 (load position1)

7.21.1 Configuration of jib



DANGER

Excess length of jib!
Structural breakdown.

- ▶ Check jib length in load chart for validity.

Jib length	Configuration of jib (symbolic)
20 m 66 ft	
23 m 76 ft	
26 m 85 ft	
29 m 95 ft	
32 m 105 ft	
35 m 115 ft	
38 m 125 ft	
41 m 134 ft	
44 m 144 ft	
47 m 154 ft	
50 m 164 ft	

Jib length	Configuration of jib (symbolic)
53 m 174 ft	
56 m 184 ft	
59 m 194 ft	
62 m 203 ft	
65 m 213 ft	
68 m 223 ft	
71 m 233 ft	
74 m 243 ft	
77 m 253 ft	
80 m 262 ft	
83 m 272 ft	
86 m 282 ft	
89 m 292 ft	
92 m 302 ft	
95 m 312 ft	

Tab. 594: Configuration of luffing jib 1916

X1 - Installation position mid-point suspension 1

X2 - Installation position mid-point suspension 2

7.21.2 Lengths of jib mid-point suspensions

Jib length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
47 m 154 ft	2.1 m 6' 11" ft-in	

Jib length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
50 m 164 ft	4.2 m 13' 9" ft-in = 2.6 m (8' 6" ft-in) + 1.6 m (5' 3" ft-in)	2.1 m 6' 11" ft-in
53 m 174 ft	6 m 19' 8" ft-in = 3.0 m (9' 10" ft-in) + 3.0 m (9' 10" ft-in)	2.1 m 6' 11" ft-in
56 m 184 ft	5.6 m 18' 4" ft-in = 3.0 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	1.6 m 5' 3" ft-in
59 m 194 ft	5.2 m 17' 1" ft-in = 2.6 m (8' 6" ft-in) + 2.6 m (8' 6" ft-in)	1.6 m 5' 3" ft-in
62 m 203 ft	4.7 m 15' 5" ft-in = 2.6 m (8' 6" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
65 m 213 ft	4.6 m 15' 1" ft-in = 3.0 m (9' 10" ft-in) + 1.6 m (5' 3" ft-in)	3.0 m 9' 10" ft-in
68 m 223 ft	6 m 19' 8" ft-in = 3.0 m (9' 10" ft-in) + 3.0 m (9' 10" ft-in)	2.6 m 8' 6" ft-in
71 m 233 ft	5.2 m 17' 1" ft-in = 2.6 m (8' 6" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
74 m 243 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	2.1 m 6' 11" ft-in
77 m 253 ft	4.7 m 15' 5" ft-in = 2.6 m (8' 6" ft-in) + 2.1 m (6' 11" ft-in)	2.1 m 6' 11" ft-in
80 m 262 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in

Jib length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
83 m 272 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
86 m 282 ft	5.2 m 17' 1" ft-in = 2.6 m (8' 6" ft-in) + 2.6 m (8' 6" ft-in)	1.6 m 5' 3" ft-in
89 m 292 ft	4.7 m 15' 5" ft-in = 2.6 m (8' 6" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
92 m 302 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
95 m 312 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in

Tab. 595: Lengths of jib mid-point suspensions - 1916 luffing jib

7.21.3 Configuration of main boom



DANGER

Assembly with excessive main boom length!
Structural failure.

- ▶ Check main boom length in load chart for validity.



Note

- ▶ Information on the configuration of the main boom can be found under system-related data for the main boom ([For more information see: 7.5.1 Configuration of main boom, page 1319](#)).

7.21.4 Overview of steel pendant straps on luffing jib 1916

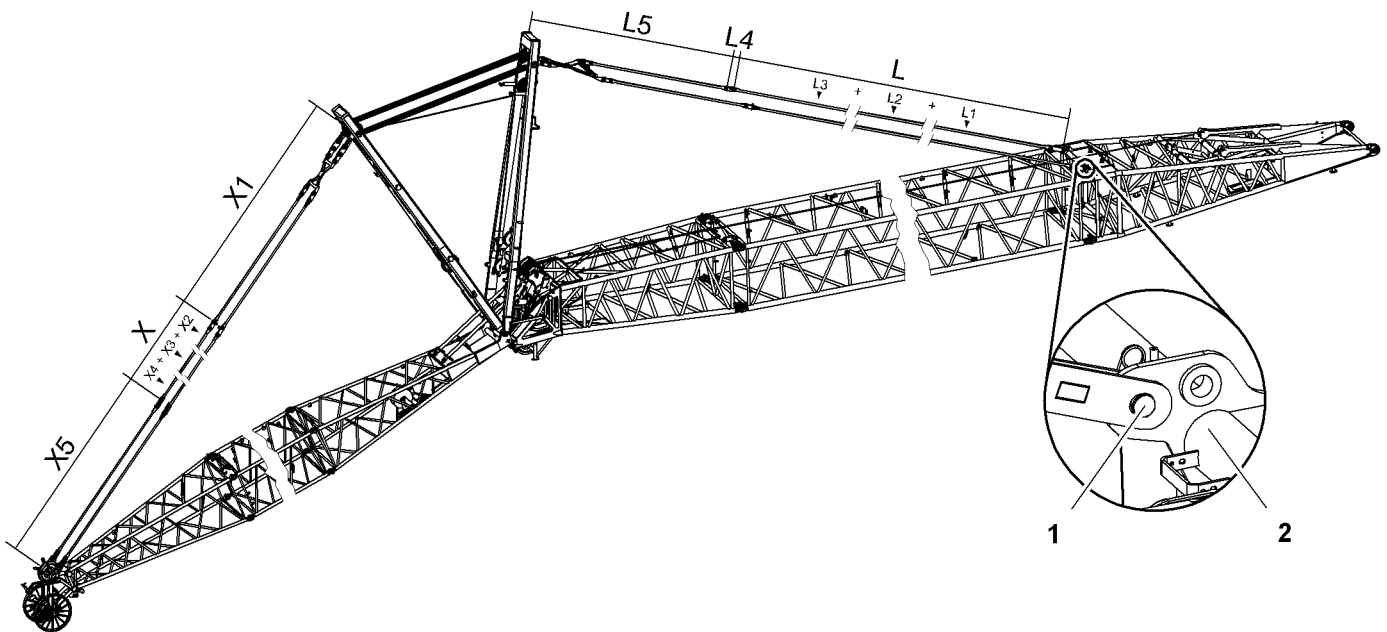


Fig. 5316: Overview of steel pendant straps on luffing jib 1916

- 1 Pin connection point for jib backstay straps 2 Main boom base section

Jib backstay straps A-frame2 to main boom base section 2821

Name		Value
Jib backstay straps consisting of:		
L	L1 Jib backstay strap 3 m (10 ft) (For more information see: Jib backstay strap 3 m (10 ft) , page 199)	Total L1
	L2 Jib backstay strap 6 m (20 ft) (For more information see: Jib backstay strap 6 m (20 ft) , page 201)	Total L2
	L3 Jib backstay strap 12 m (40 ft) (For more information see: Jib backstay strap 12 m (40 ft) , page 203)	Total L3
L4	Connecting link (conversion kit) (For more information see: Connecting link (conversion kit) , page 357)	390 mm 1' 3" ft-in
L5	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap) , page 351)	7769 mm 25' 6" ft-in

Tab. 596: Jib backstay straps A-frame2 to main boom base section 2821

Configuration of main boom pendant straps (L):

Required number of jib backstay straps 3 m (10 ft) (L1) corresponds to number of main boom sections 3 m (10 ft).

Required number of jib backstay straps 6 m (20 ft) (L2) corresponds to number of main boom sections 6 m (20 ft).

Required number of jib backstay straps 12 m (40 ft) (**L3**) corresponds to number of main boom sections 12 m (40 ft).



Note

► For the admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the load chart.

Pendant straps A-frame3 to jib head 1916

Name		Value	
X1	A-frame3 equalizer (jib pendant strap) (For more information see: A-frame3 equalizer (jib pendant strap), page 352)	7550 mm 24' 9" ft-in	
X	Jib pendant straps consisting of:		
	X2	Jib pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 354)	Total X2 +
	X3	Jib pendant strap 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft), page 355)	Total X3 +
	X4	Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 355)	Total X4
X5	Jib pendant strap on jib head 1916 (For more information see: Jib pendant strap on jib head 1916.21, page 356)	6500 mm 21' 4" ft-in	

Tab. 597: Pendant straps A-frame3 to jib head 1916

Configuration of jib pendant straps (X):

Required number of jib pendant straps 3 m (10 ft) (**X2**) corresponds to number of jib sections 3 m (10 ft).

Required number of jib pendant straps 6 m (20 ft) (**X3**) corresponds to number of jib sections 6 m (20 ft).

Required number of jib pendant straps 12 m (40 ft) (**X4**) corresponds to number of jib sections 12 m (40 ft).



Note

► For the admissible number of jib sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following table: ([For more information see: 7.21.1 Configuration of jib, page 1705](#))

7.21.5 Overview of CF pendant straps on luffing jib 1916

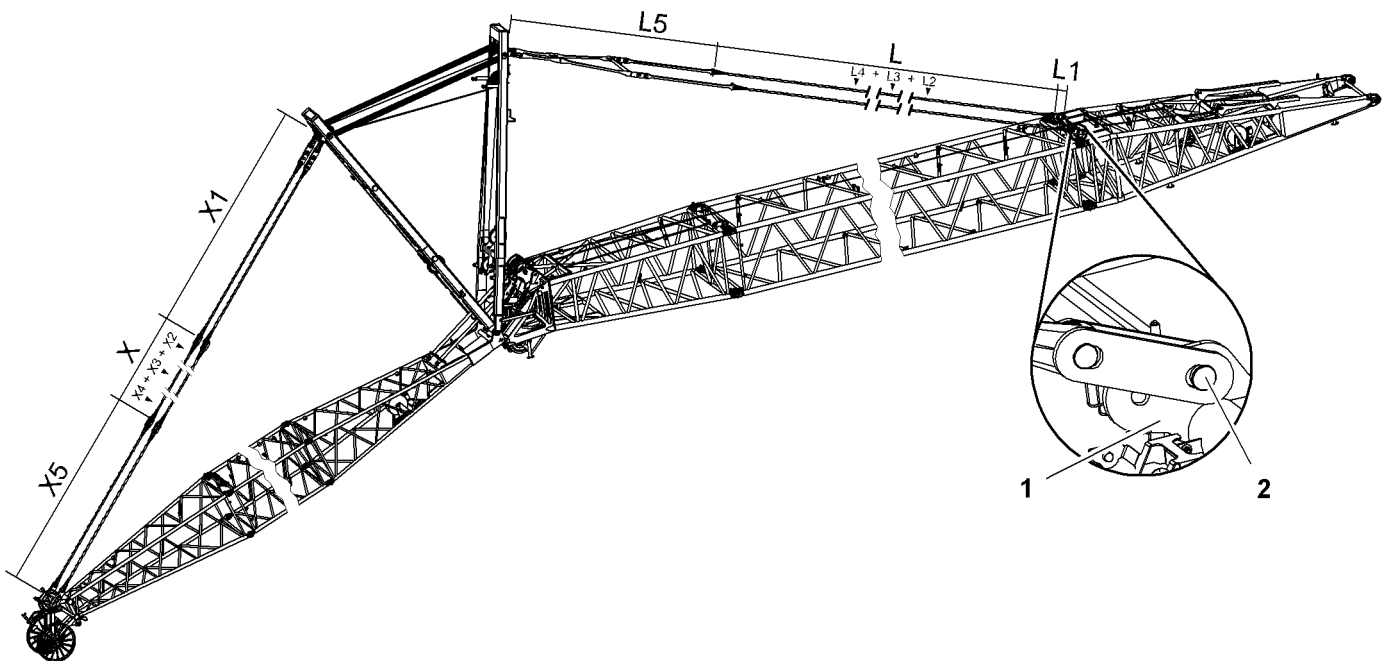


Fig. 5317: Overview of CF pendant straps on luffing jib 1916

- 1 Main boom base section
- 2 Pin connection point for jib backstay straps

Jib backstay straps A-frame2 to main boom base section 2821

Name		Value
L1	Connecting link (For more information see: Connecting link , page 208)	350 mm 1' 2" ft-in
Jib backstay straps consisting of:		
L	L2 Jib backstay strap 3 m (10 ft) (For more information see: Jib backstay strap 3 m (10 ft) , page 210)	Total L2 +
	L3 Jib backstay strap 6 m (20 ft) (For more information see: Jib backstay strap 6 m (20 ft) , page 214)	Total L3 +
	L4 Jib backstay strap 12 m (40 ft) (For more information see: Jib backstay strap 12 m (40 ft) , page 218)	Total L4
L5	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap) , page 358)	7769 mm 25' 6" ft-in

Tab. 598: Jib backstay straps A-frame2 to main boom base section 2821

Configuration of jib backstay straps (L):

Required number of jib backstay straps 3 m (10 ft) (L2) corresponds to number of main boom sections 3 m (10 ft).

Required number of jib backstay straps 6 m (20 ft) (**L3**) corresponds to number of main boom sections 6 m (20 ft).

Required number of jib backstay straps 12 m (40 ft) (**L4**) corresponds to number of main boom sections 12 m (40 ft).



Note

- ▶ For the admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the load chart.

The jib backstay straps (**L**) may consist of generation A and generation B jib backstay straps (For more information see: 1.11.9 CF pendant straps on main boom 2821, page 206) . Mixing is only admissible if the number of generation B jib backstay straps only differs by at most 1 in the left and the right strand of the jib backstay straps.



DANGER

Inadmissible mixing of generation A and generation B jib backstay straps! Structural failure.

- ▶ Ensure that the number of generation B jib backstay straps differs by at most 1 in the left and the right strand of the jib backstay straps.

Pendant straps A-frame3 to jib head 1916

Name		Value
X1	A-frame3 equalizer (jib pendant strap) (For more information see: A-frame3 equalizer (jib pendant strap), page 360)	7550 mm 24' 9" ft-in
X	Jib pendant straps consisting of:	
	X2 Jib pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 362)	Total X2 +
	X3 Jib pendant strap 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft), page 364)	Total X3 +
X4 Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 366)	Total X4	
X5	Jib pendant strap on jib head 1916 (For more information see: Jib pendant strap on jib head 1916.21, page 367)	6500 mm 21' 4" ft-in

Tab. 599: Pendant straps A-frame3 to jib head 1916

Configuration of jib pendant straps (L):

Required number of jib pendant straps 3 m (10 ft) (**X2**) corresponds to number of jib sections 3 m (10 ft).

Required number of jib pendant straps 6 m (20 ft) (**X3**) corresponds to number of jib sections 6 m (20 ft).

Required number of jib pendant straps 12 m (40 ft) (**X4**) corresponds to number of jib sections 12 m (40 ft).



Note

- ▶ For the admissible number of jib sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following table: [\(For more information see: 7.21.1 Configuration of jib, page 1705\)](#)
-

The jib pendant straps (**X**) may consist of generation A and generation B jib pendant straps [\(For more information see: 1.21.8 CF pendant straps on luffing jib 1916, page 358\)](#) . Mixing is only admissible if the number of generation B jib pendant straps only differs by at most 1 in the left and the right strand of the jib pendant straps.



DANGER

Inadmissible mixing of generation A and generation B jib pendant straps!
Structural failure.

- ▶ Ensure that the number of generation B jib pendant straps differs by at most 1 in the left and the right strand of the jib pendant straps.
-

7.21.6 Rope reeving system for A-frame 2/A-frame 3

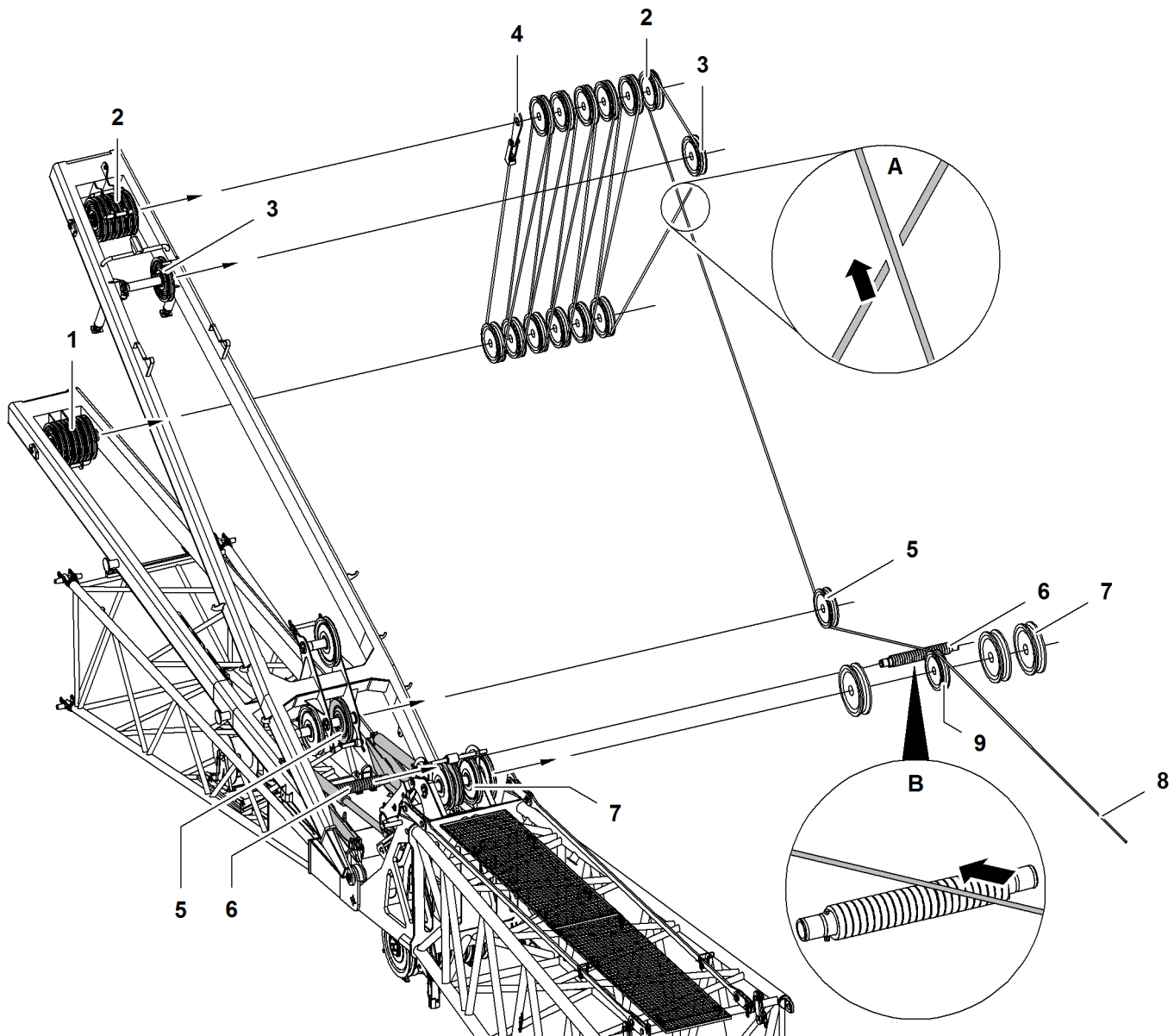


Fig. 5318: Reeving diagram for A-frame2/A-frame3 - Luffing jib 1916

- | | | | | | |
|---|---------------------|---|--------------------------------|---|-----------------------------------|
| 1 | Pulley set A-frame3 | 4 | Rope fixing point | 7 | Gantry pulley main boom head (3x) |
| 2 | Pulley set A-frame2 | 5 | Rope pulley A-frame2 | 8 | Rope of the jib luffing winch |
| 3 | Pulley A-frame2 | 6 | Rope protection roller support | 9 | Pulley of the jib luffing winch |

Detail A:

The rope of the jib luffing winch 8 between pulley 3 and pulley set 1 runs behind the rope of the rope pulley 5 in A-frame2.

Detail B:

The rope of the jib luffing winch 8 runs over the rope protection roller 6.

7.21.7 Reeving diagrams for one rope across jib head section 1916 (load position1)

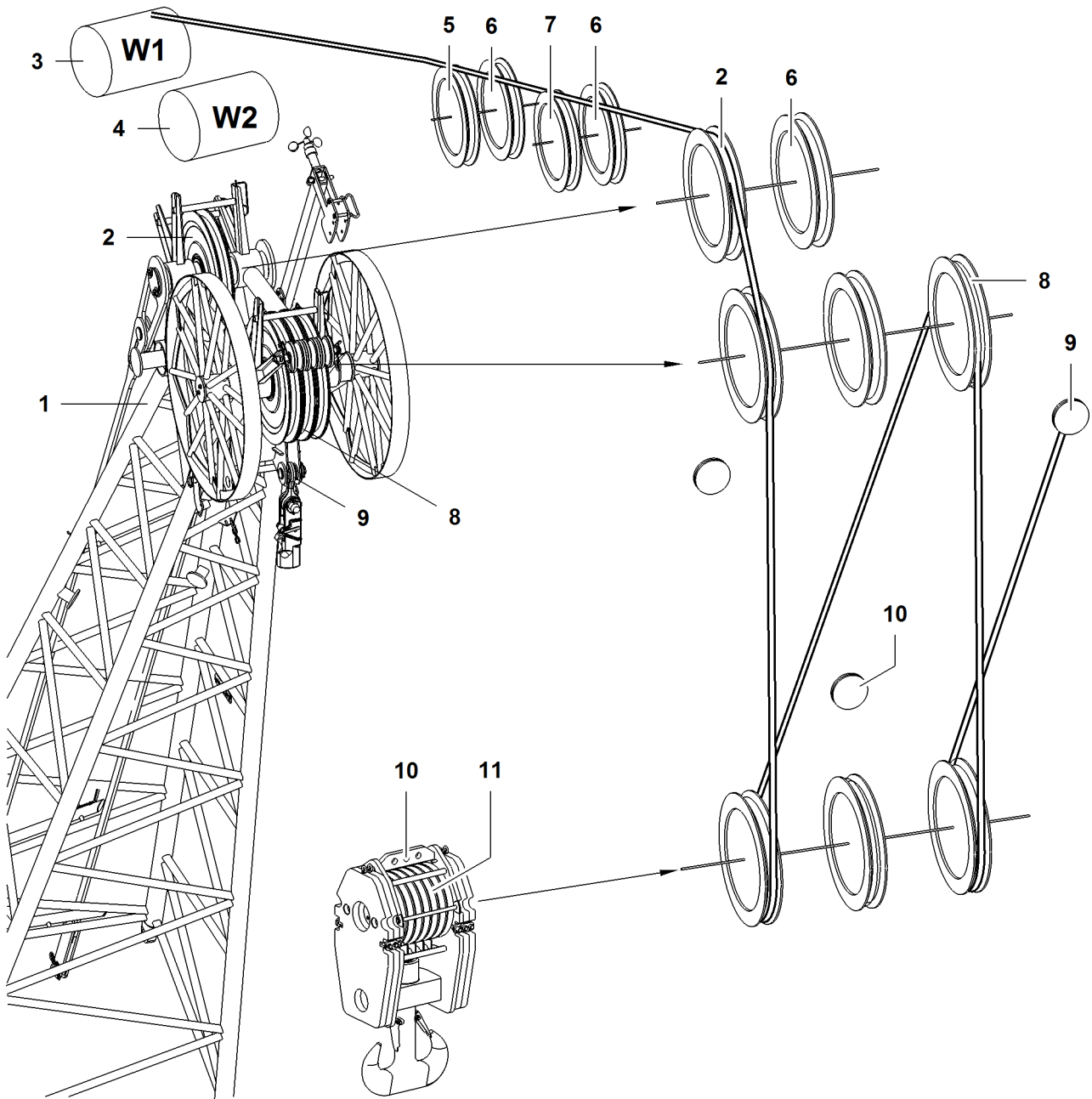


Fig. 5319: Reeving diagrams for one rope across jib head section 1916 (load position1)

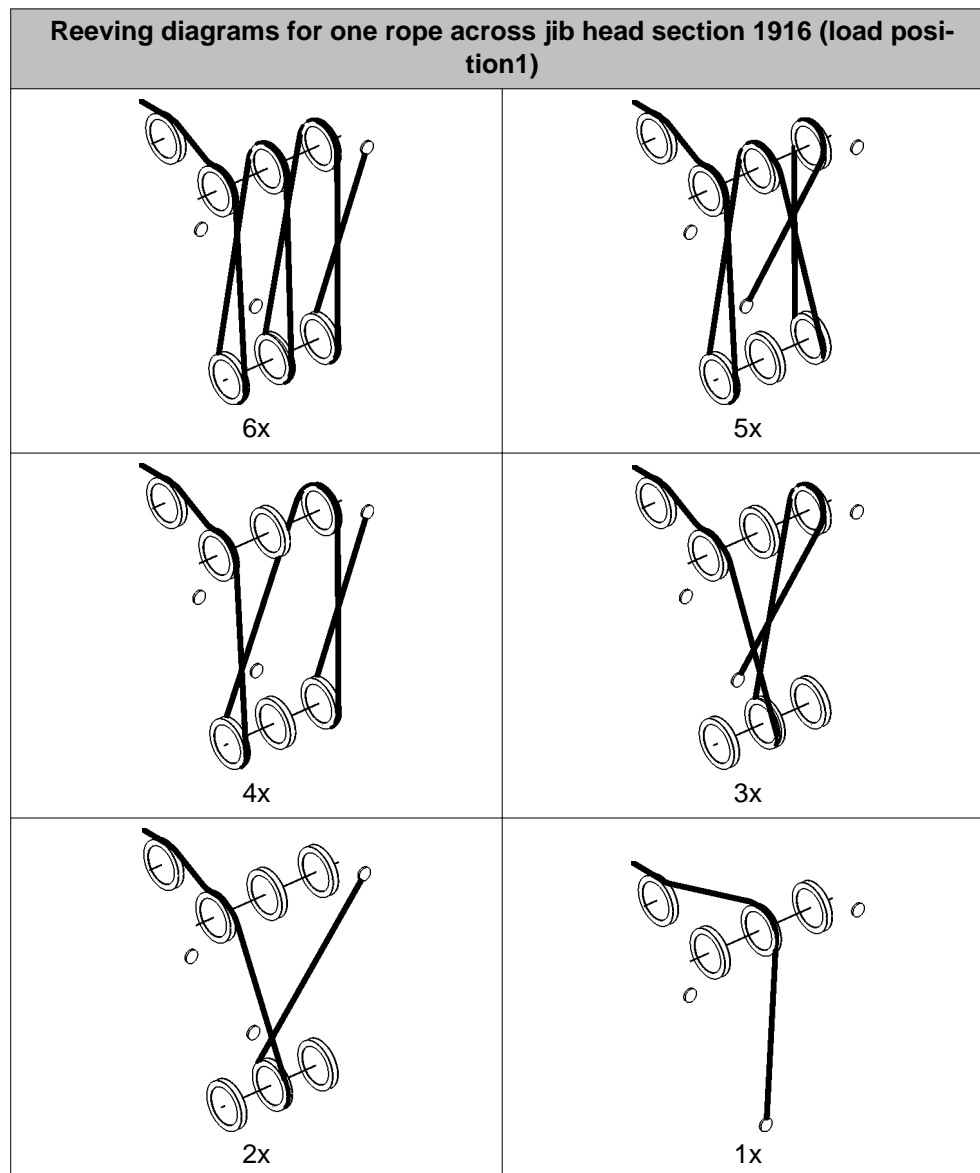
- | | | |
|--|---|--|
| <p>1 Jib head section</p> <p>2 Gantry pulley of jib head section</p> <p>3 Winch1</p> <p>4 Winch2</p> | <p>5 Rope pulley of A-frame2</p> <p>6 Retrofit kit* for operation with two ropes across jib head section</p> <p>7 Rope pulley of A-frame3</p> <p>8 Rope pulley (3x) of jib head section</p> | <p>9 Rope fixing point of jib head section</p> <p>10 Rope fixing points of pulley block</p> <p>11 Pulley set of pulley block</p> |
|--|---|--|



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

- ▶ Select correct number of reevings as indicated in load chart.



Tab. 600: Reeving diagrams for one rope across jib head section 1916 (load position1)

7.21.8 Reeving diagrams for two ropes across jib head 2316, 1916, 1713, 1309, 1008 (load position1)



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

- ▶ Choose correct number of reevings as indicated in load chart.

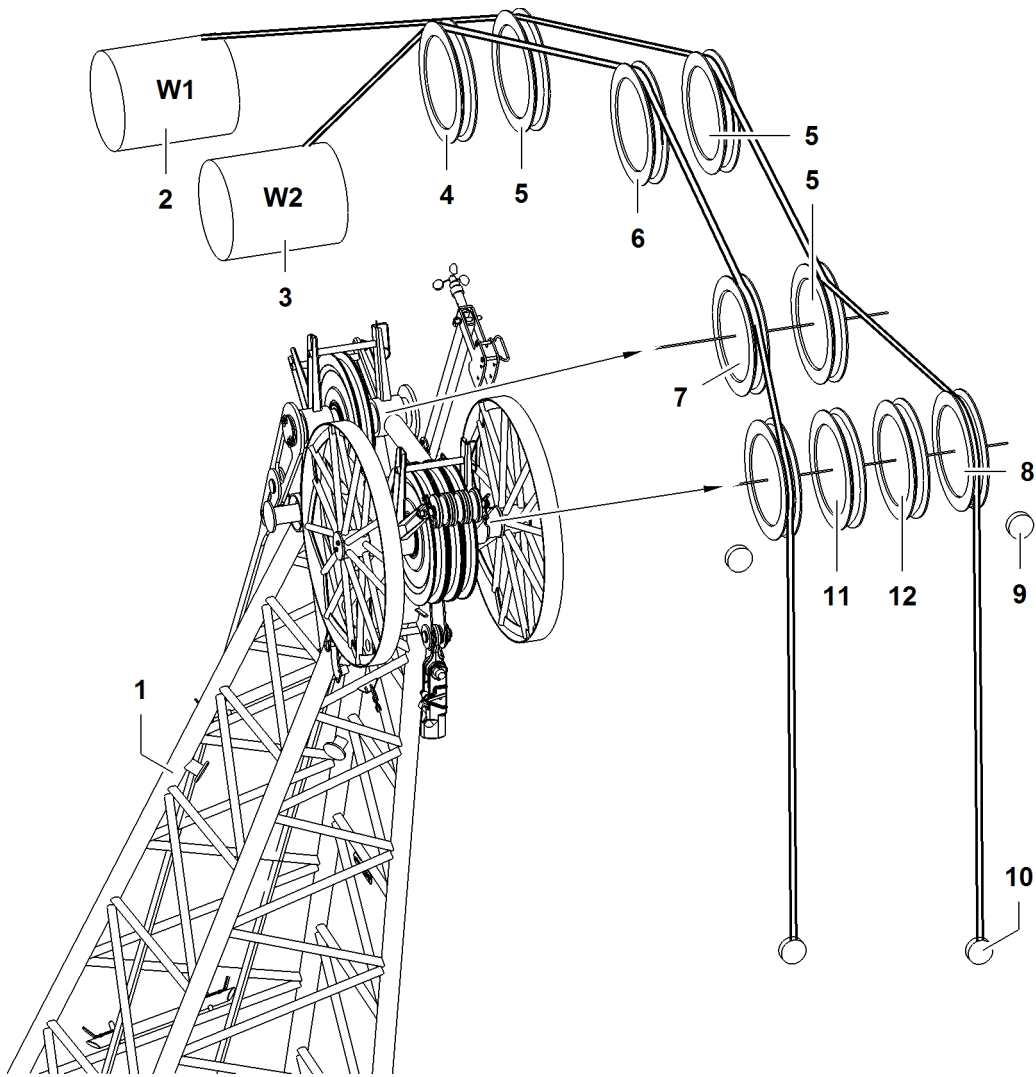


Fig. 5326: Reeving diagrams for two ropes across jib head 2316, 1916, 1713, 1309, 1008 (load position 1)

- | | | | | | |
|---|--------------------|---|--|----|--|
| 1 | Jib head | 5 | Retrofit kit* for operation with two ropes across jib head | 9 | Rope fixing point (2x) of jib head |
| 2 | Winch1 | 6 | Pulley of A-frame3 | 10 | Rope fixing points of pulley block |
| 3 | Winch2 | 7 | Gantry pulleys of jib head | 11 | Pulley (only with jib head 2316) |
| 4 | Pulley of A-frame2 | 8 | Pulleys of jib head | 12 | Pulley (only with jib head 2316, 1916, 1713) |

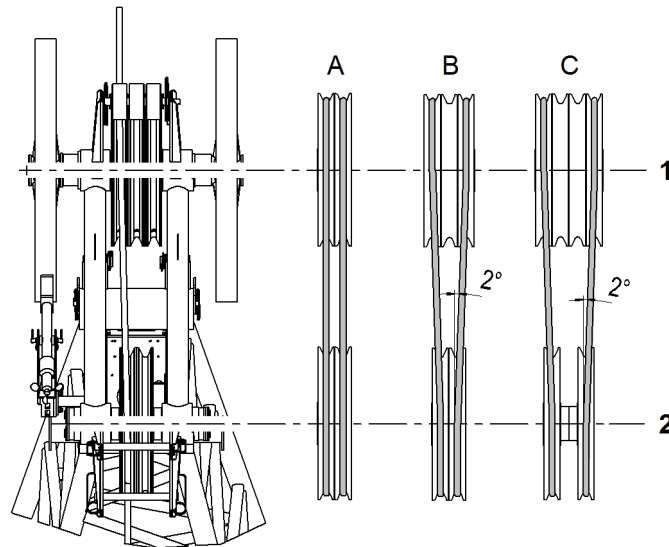


Fig. 5327: Run of the rope when two ropes pass over the jib head section

1 Pulleys of jib head

2 Gantry pulleys of jib head

Run of the rope	Type of jib
A	Luffing jib 1008
	Luffing jib 1309
B	Luffing jib 1713
	Luffing jib 1916
C	Luffing jib 2316

Tab. 601: Run of the rope when two ropes pass over the jib head

7.21.9 Reeving diagrams for one rope across main boom head 2821 (load position 2)

If the main boom with jib attached is also used to lift a load, reeve main boom head 2821 as shown below.

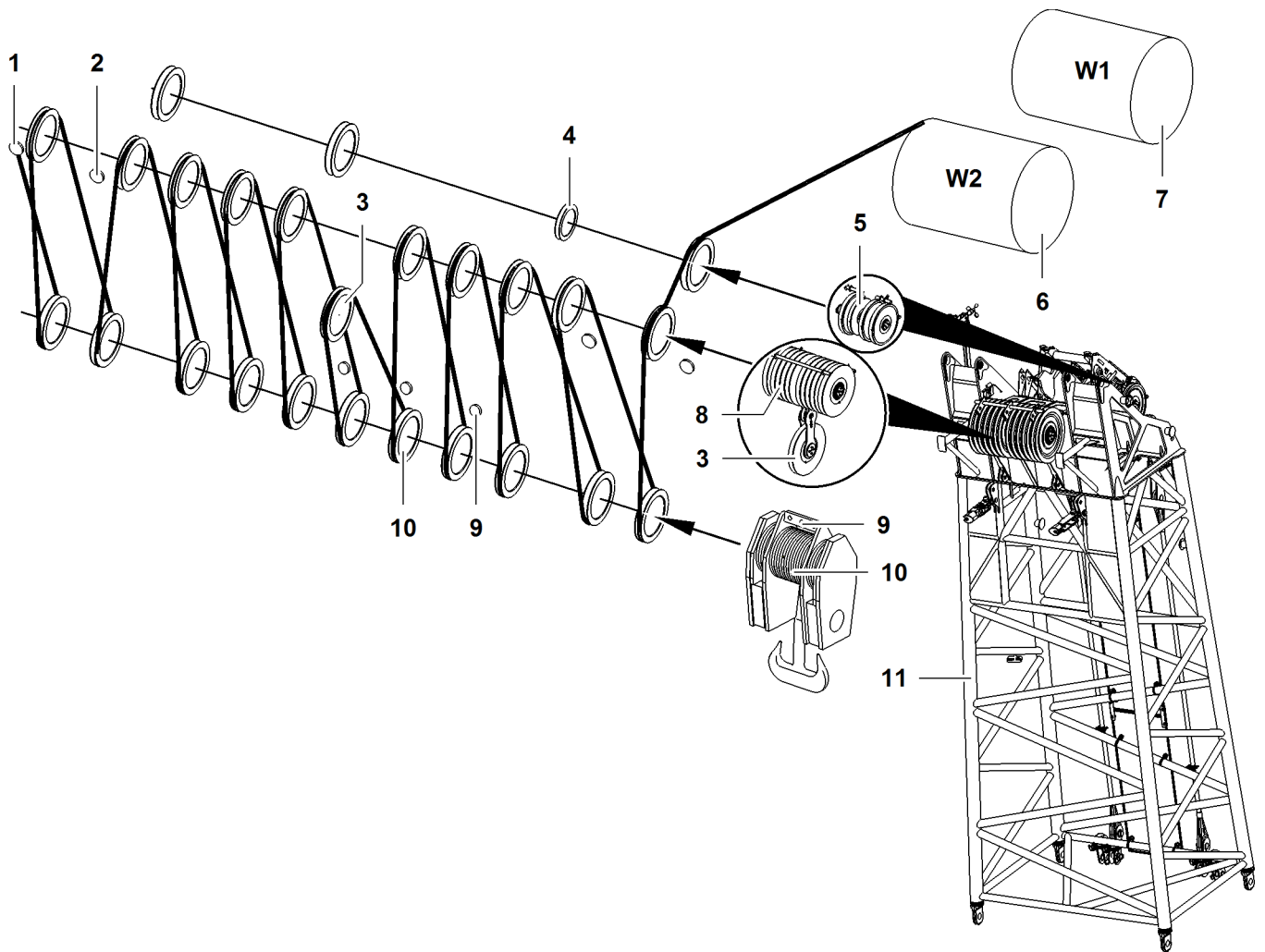


Fig. 5328: Reeving diagrams for one rope across main boom head 2821 (load position 2)

- | | | | | | |
|---|--|---|--------------------------------------|----|------------------------------------|
| 1 | Outer rope fixing point (2x) of main boom head | 5 | Gantry pulley (3x) of main boom head | 9 | Rope fixing points of pulley block |
| 2 | Inner rope fixing point (2x) of main boom head | 6 | Winch2 | 10 | Pulley set of pulley block |
| 3 | 11th rope pulley of main boom head | 7 | Winch1 | 11 | Main boom head |
| 4 | Rope pulley for rope of jib luffing winch | 8 | Rope pulley (10x) of main boom head | | |

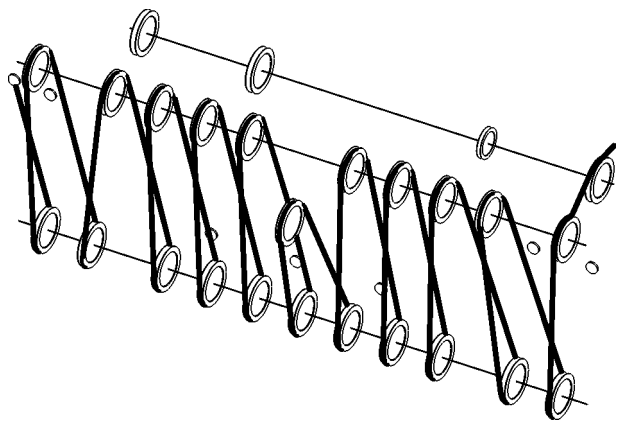


DANGER

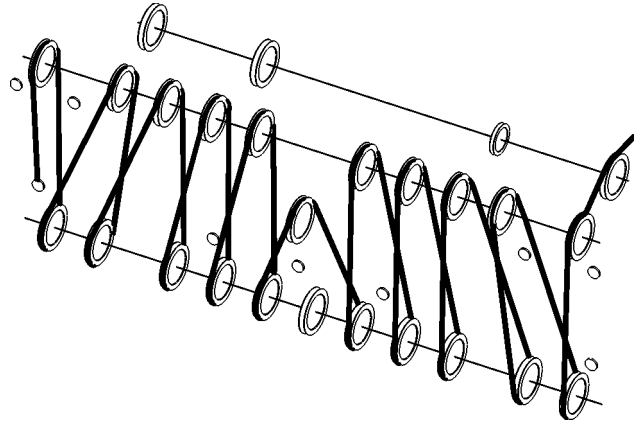
Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.

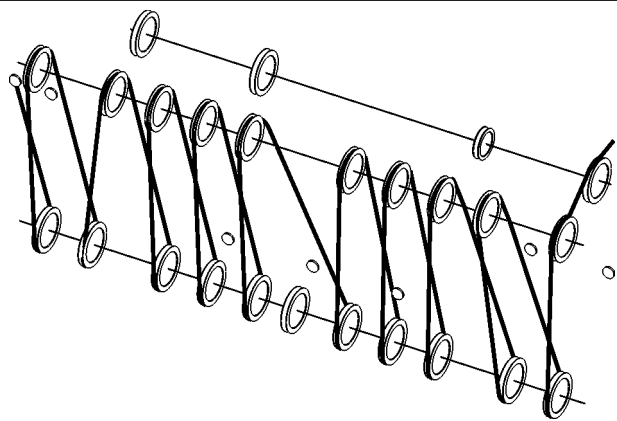
Reeving diagrams for one rope across main boom head 2821 (load position 2)



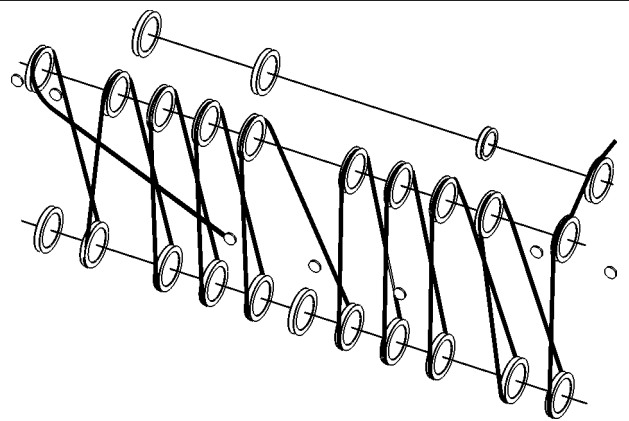
22x



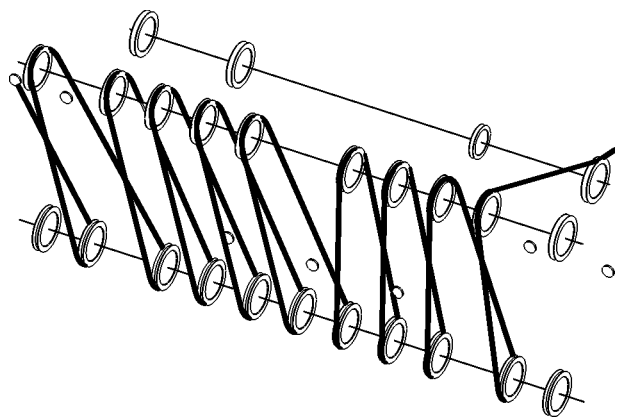
21x



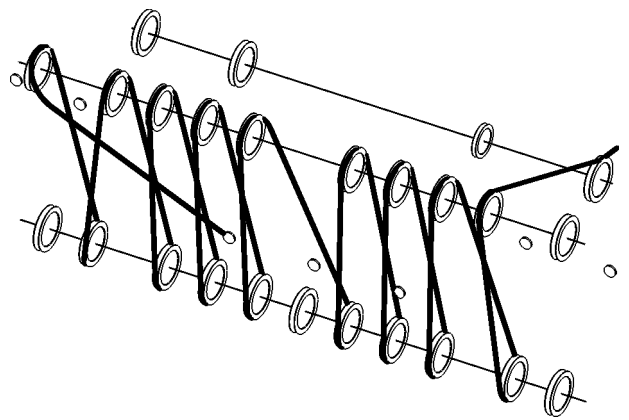
20x



19x

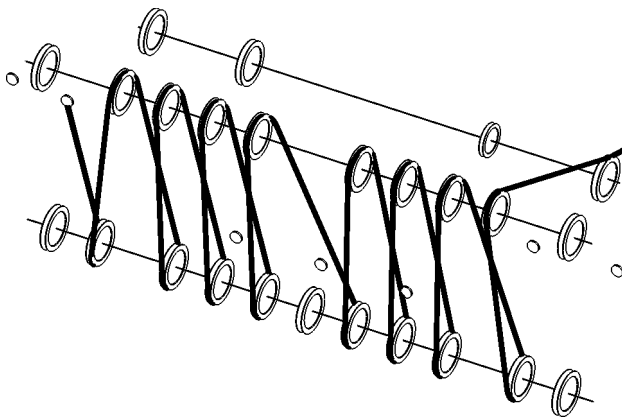


18x

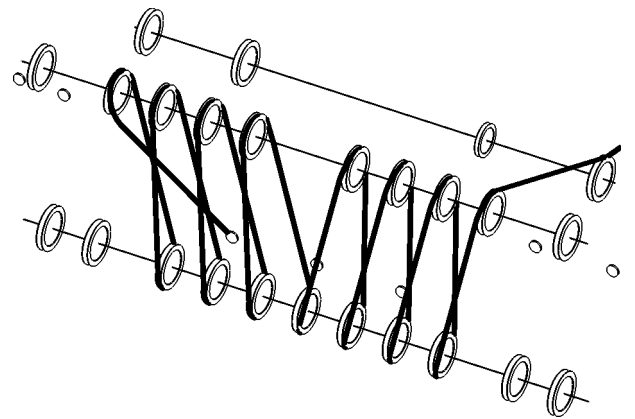


17x

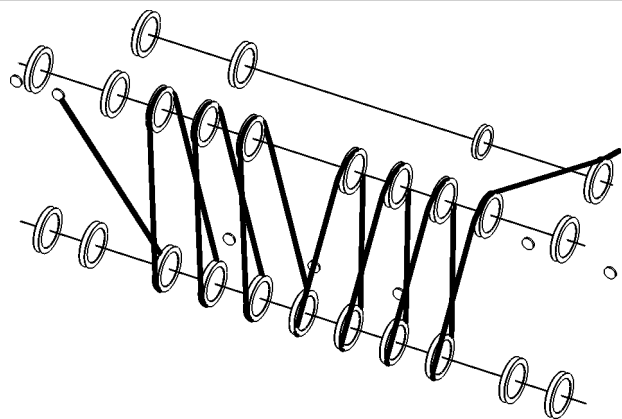
Reeving diagrams for one rope across main boom head 2821 (load position 2)



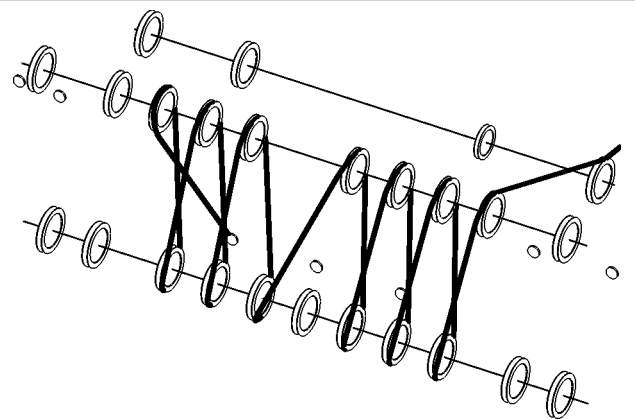
16x



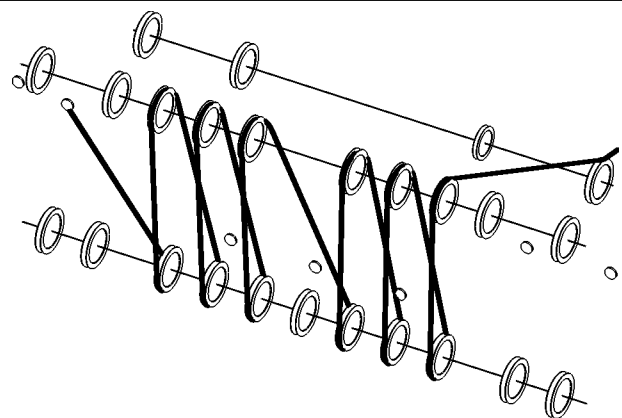
15x



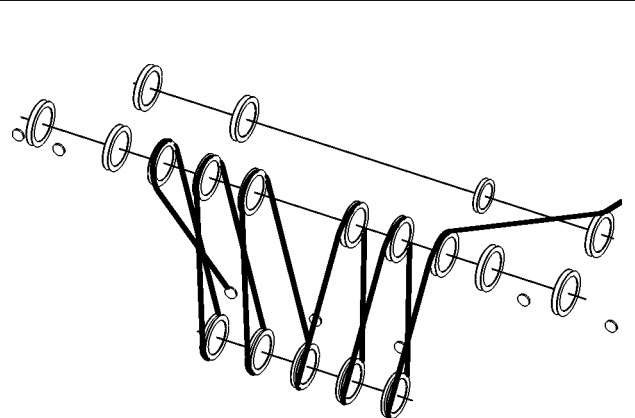
14x



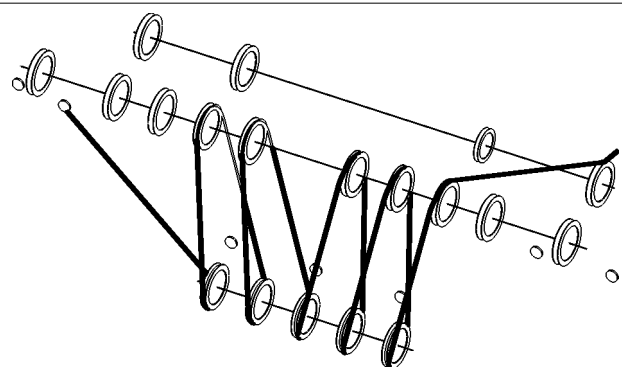
13x



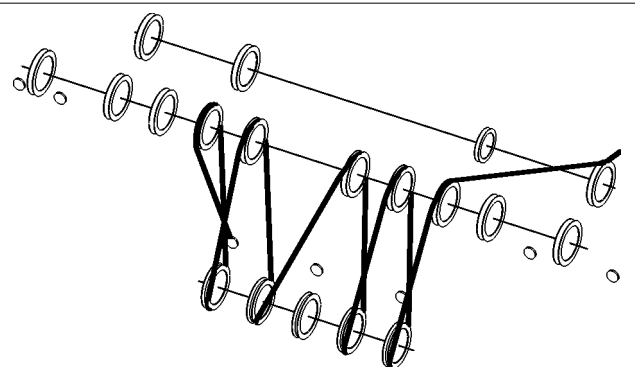
12x



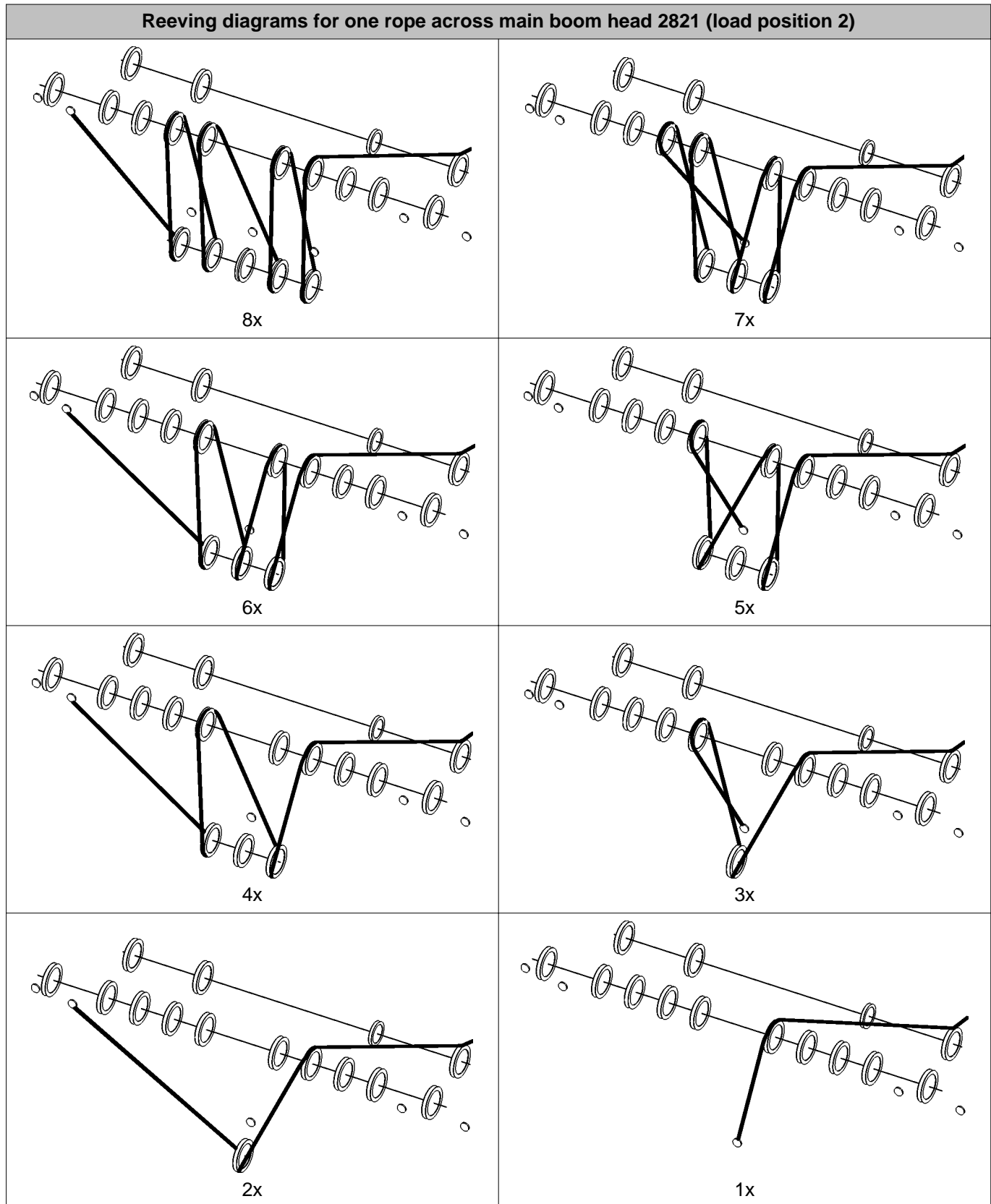
11x



10x



9x



Tab. 602: Reeving diagrams for one rope across main boom head 2821 (load position 2)

7.21.10 Reeving diagrams for one rope across auxiliary jib (15 t (33.000 lb)) to jib head section 1916, 1713, 1309, 1008 (load position 1)



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.

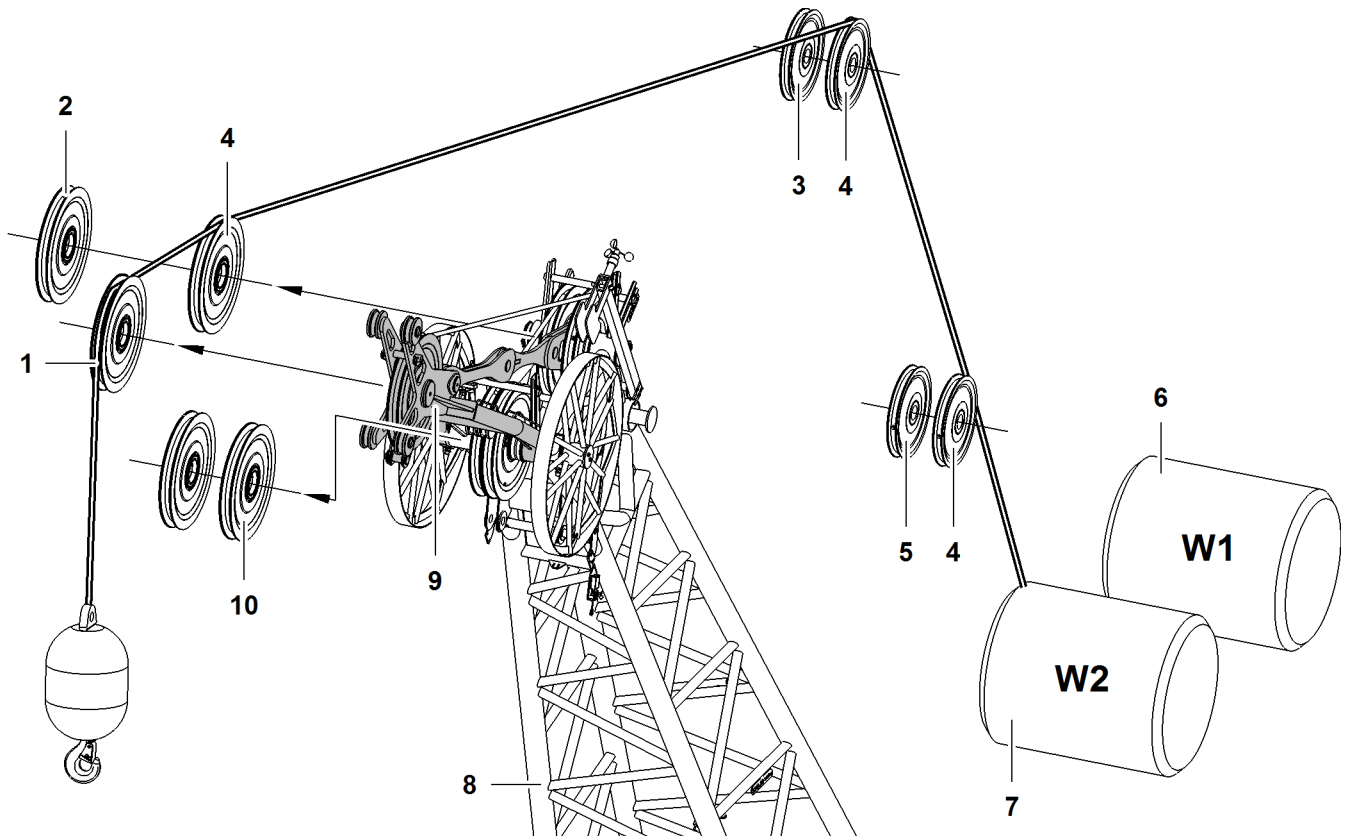


Fig. 5351: Reeving diagrams for one rope across auxiliary jib (15 t (33.000 lb)) to jib head section 1916, 1713, 1309, 1008 (load position 1) (illustration of principle)

- | | | | | | |
|---|--|---|-------------------------|----|----------------------------------|
| 1 | Rope pulley of auxiliary jib (15 t (33.000 lb)) | 5 | Rope pulley of A-frame2 | 9 | Auxiliary jib (15 t (33.000 lb)) |
| 2 | Gantry pulley of jib head section | 6 | Winch1 | 10 | Rope pulleys of jib head section |
| 3 | Rope pulley of A-frame3 | 7 | Winch2 | | |
| 4 | Retrofit kit* for operation with two ropes across jib head section | 8 | Jib head section | | |

7.22 Assemble the luffing jib

Ensure that the following conditions are fulfilled:

- Assembly functions are switched on.
- The machine is ready for use as an assembly crane, or an assist crane is available.
- Work plans have been drawn up.
- The length and the order of the jib sections are known.
- The assembly positions of the mid-point suspensions are known.
- Any accessories required are available.

7.22.1 Notes

The assembly of the luffing jib described below applies to all system dimensions of luffing jib.

The illustrations have been simplified or schematically represented for reasons of uniformity and represent the principles of assembly. They do not provide a detailed representation of the components.

7.22.2 Programming the setup



DANGER

Inadmissible setup!

- ▶ Only program a setup on the machine that is in accordance with the load chart.
 - ▶ Programming the setup on the machine ([For more information see: 4.13 Programming the setup, page 914](#)).
-

7.22.3 Unloading and positioning the jib components



DANGER

Stewing of uppercarriage with rear counterweight attached not permitted!
Machine toppling over.

- ▶ Slew the uppercarriage according to the table ([For more information see: Lifting and pinning the rear counterweight, page 1313](#)) exclusively.
-



DANGER

Incorrect or faulty parts/components are fit!
Structural breakdown.

- ▶ Only use original Liebherr parts/components that are in perfect condition.
-



DANGER

Improperly assembled boom configuration!
Structural breakdown.

- ▶ Ensure that the assembled boom configuration is compatible with the programmed setup.
-

**DANGER**

Incorrect jib sections arrangement!
Structural breakdown.

- ▶ Assemble the boom according to the relevant system requirements.
- ▶ A jib section measuring 6 m (20 ft) cannot be replaced with two jib sections measuring 3 m (10 ft).
- ▶ A jib section measuring 12 m (40 ft) cannot be replaced with two jib sections measuring 6 m (20 ft).

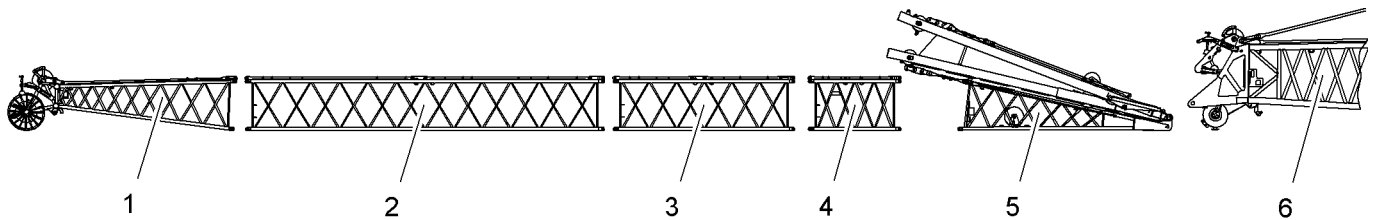


Fig. 5352: Position jib components according to relevant system instructions

1	Jib head section	3	Jib section 6 m (20 ft)	5	Jib base section
2	Jib section 11.7 m (38 ft) or 12 m (40 ft)	4	Jib section 3 m (10 ft)	6	Boom head section

- ▶ Direct transport vehicles with boom sections.
- ▶ Sling boom sections by attaching lifting equipment to the lifting points.
- ▶ Unload boom sections using the basic machine or assist crane and position according to the relevant system instructions.

7.22.4 Installing auxiliary jib (15 t (33.000 lb)) on jib head section

NOTICE

Installation of auxiliary jib to an inadmissible jib head section!
Risk of damage to components.

- ▶ Only install auxiliary jib (15 t (33.000 lb)) to jib head section 1008, 1309, 1713 or 1916.

Make sure the following conditions are met:

- Second rope pulley at A-frame² is installed.
- Second rope pulley at A-frame³ is installed.
- Second rope pulley (gantry pulley) and spacer rings for jib head section are available.

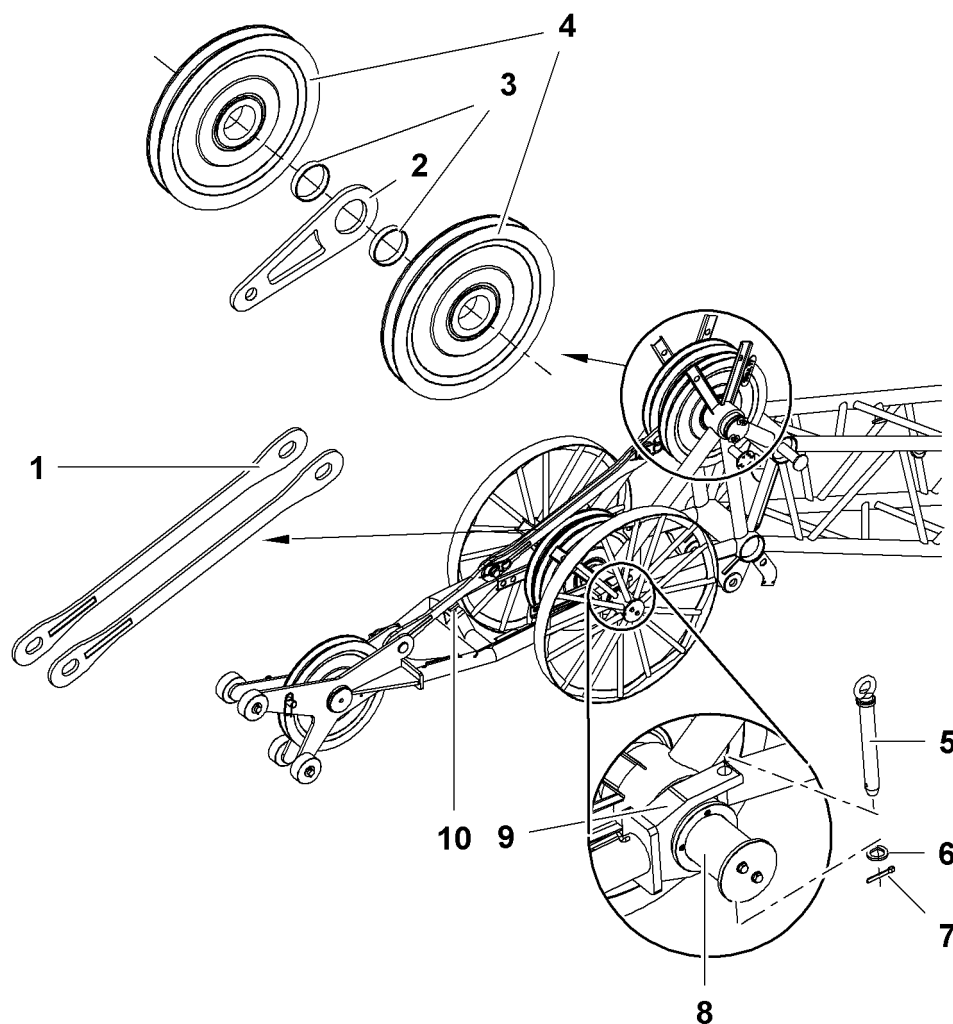


Fig. 5353: Auxiliary jib 15 t (33.000 lb)

- | | | | |
|---|---|----|-----------------|
| 1 | Connecting link (2x) | 6 | Washer (2x) |
| 2 | Connecting link | 7 | Splint pin (2x) |
| 3 | Spacer ring (Ø152 mm (5.98" in) x Ø141 mm (5.55" in) x 29 mm (1.14" in)) (2x) | 8 | Axis |
| 4 | Rope pulley (2x) | 9 | Fork (2x) |
| 5 | Pin (2x) | 10 | Limit stop |



Note

Liebherr recommends:

► To make it easier to install the auxiliary jib: remove the connecting links 1.

- Deinstall four spacer rings (Ø 152 mm (5.98" in) x Ø 141 mm (5.55" in) x 40 mm (1.57" in)) at gantry pulleys of jib head section.
- Install connecting link 2 and rope pulleys 4 with spacer rings 3.
- Lift auxiliary jib to jib head section from the front.

If forks 9 of the auxiliary jib reach into the axis 8:

- Insert pin 5 and secure with washers 6 and splint pins 7.

- ▶ Install coupling links 1.
- ▶ Set the limit stop 10 so that the connecting links 1 fold upwards when laying down the jib.

7.22.5 Installing auxiliary jib (30 t (66.000 lb)) on jib head section

NOTICE

Installation of auxiliary jib to an inadmissible jib head section!
Risk of damage to components.

- ▶ Attach auxiliary jib (30 t (66.000 lb)) exclusively to jib head 2316.
-

Make sure the following prerequisites are met:

- Second rope pulley at A-frame2 is installed.
- Second rope pulley at A-frame3 is installed.
- Second rope pulley (gantry pulley) with spacer ring and spacer washer for jib head are available.

Assemble the luffing jib

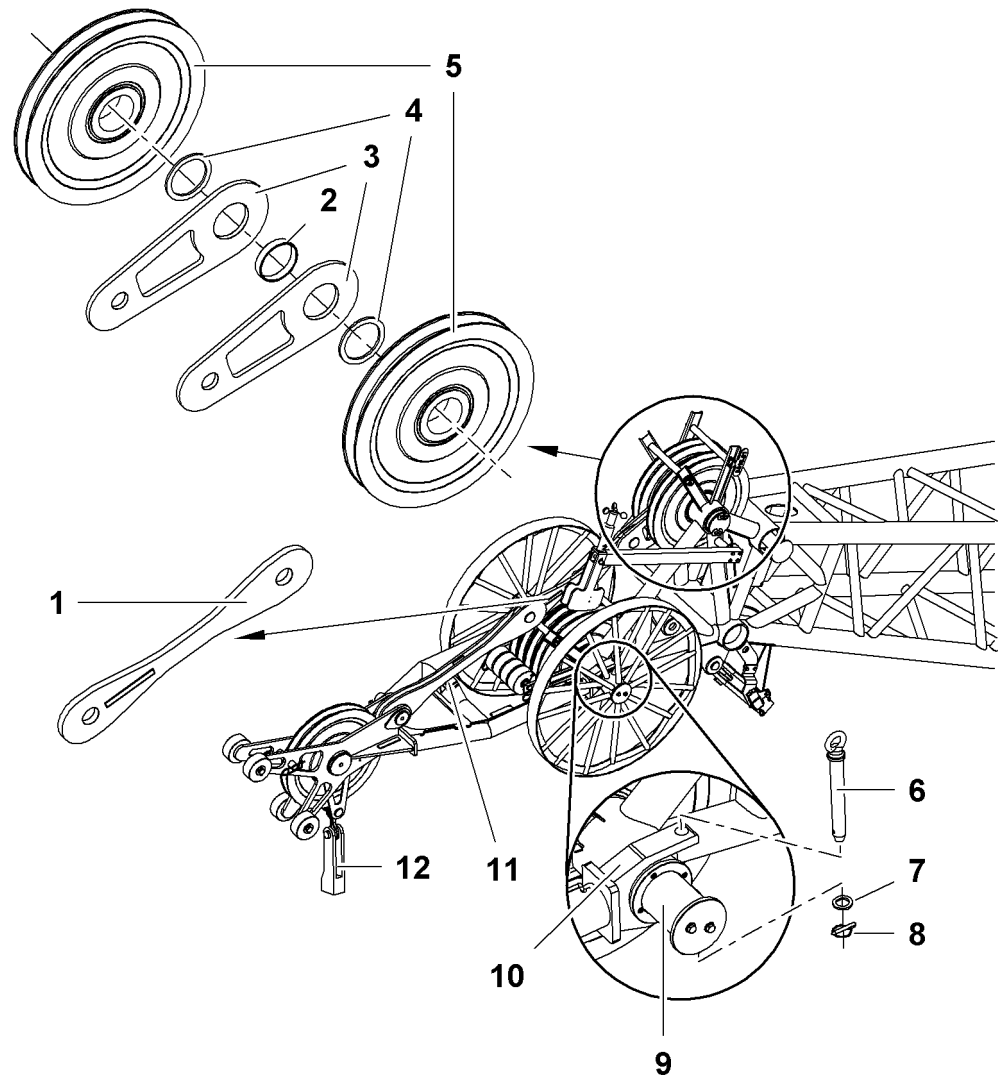


Fig. 5354: Attaching auxiliary jib (30 t (66.000 lb)) to jib head 2316

- | | | | |
|---|--|----|-------------------|
| 1 | Pendant strap | 7 | Washer (2x) |
| 2 | Spacer ring (Ø 152 mm (5.98" in) x Ø141 mm (5.55" in) x 29 mm (1.14" in)) | 8 | Linchpin (2x) |
| 3 | Connecting link (2x) | 9 | Axis |
| 4 | Spacer washer (Ø180 mm (7.09" in) x Ø142 mm (5.59" in) x 8 mm (0.31" in)) (2x) | 10 | Forks (2x) |
| 5 | Rope pulleys (2x) | 11 | Limit stop |
| 6 | Pin (2x) | 12 | Rope fixing point |



Note

- ▶ To make attaching the auxiliary jib easier: Remove pendant strap 1.
- ▶ Remove four spacer rings (Ø 160 mm (6.30" in) x Ø140 mm (5.51" in) x 40 mm (1.57" in)) at gantry pulley of jib head.
- ▶ Install connecting link 3 and rope pulley 5 with spacer ring 2 and spacer washer 4.

- ▶ Lift auxiliary jib to jib head section from the front.

If forks **10** of the auxiliary jib reach into the axis **9**:

- ▶ Insert pin **6** and secure with washers **7** and linchpin **8**.

- ▶ Install pendant strap **1**.

- ▶ Set the limit stop **11** so that pendant strap **1** fold upwards when laying down jib.

With dual reeving of auxiliary jib:

- ▶ Installing the rope fixing point **12**

7.22.6 Pinning jib head section and jib section



WARNING

Standing between jib sections during assembly!
Severe injury.

- ▶ Only stay outside the jib sections.

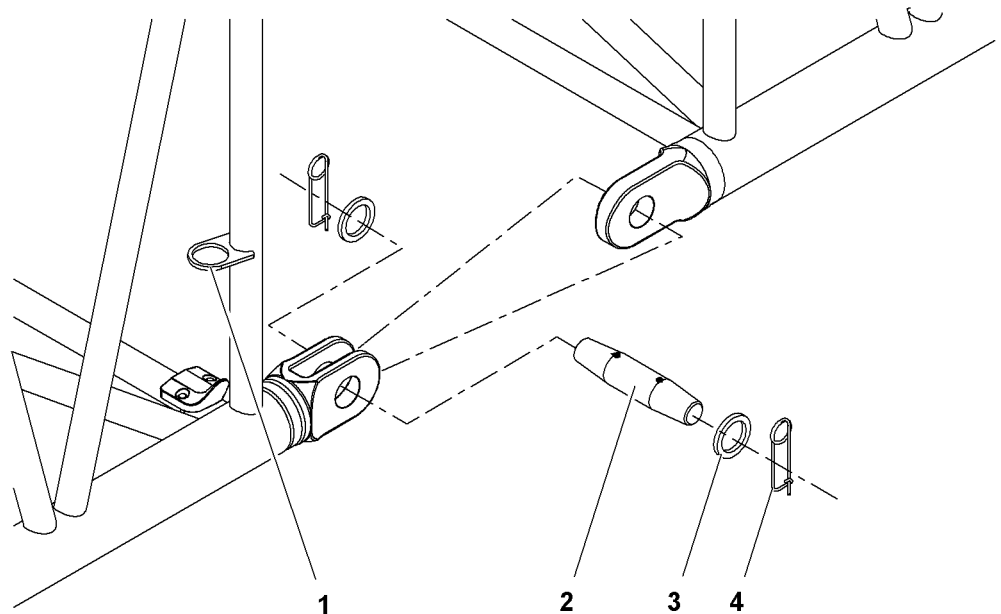


Fig. 5355: Pinning the boom

- | | |
|--|------------------------------|
| 1 Transport brackets (4x) for double-taper pins | 3 Washer (8x) |
| 2 Double-taper pin (4x) | 4 Locking spring (8x) |

- ▶ Remove double-taper pin **2** from transport bracket **1**.



Note

- ▶ To facilitate assembly and disassembly: grease double-taper pin.

- ▶ Knock in double-taper pin **2** and secure with washers **3** and locking springs **4**.

7.22.7 Attaching the jib base section

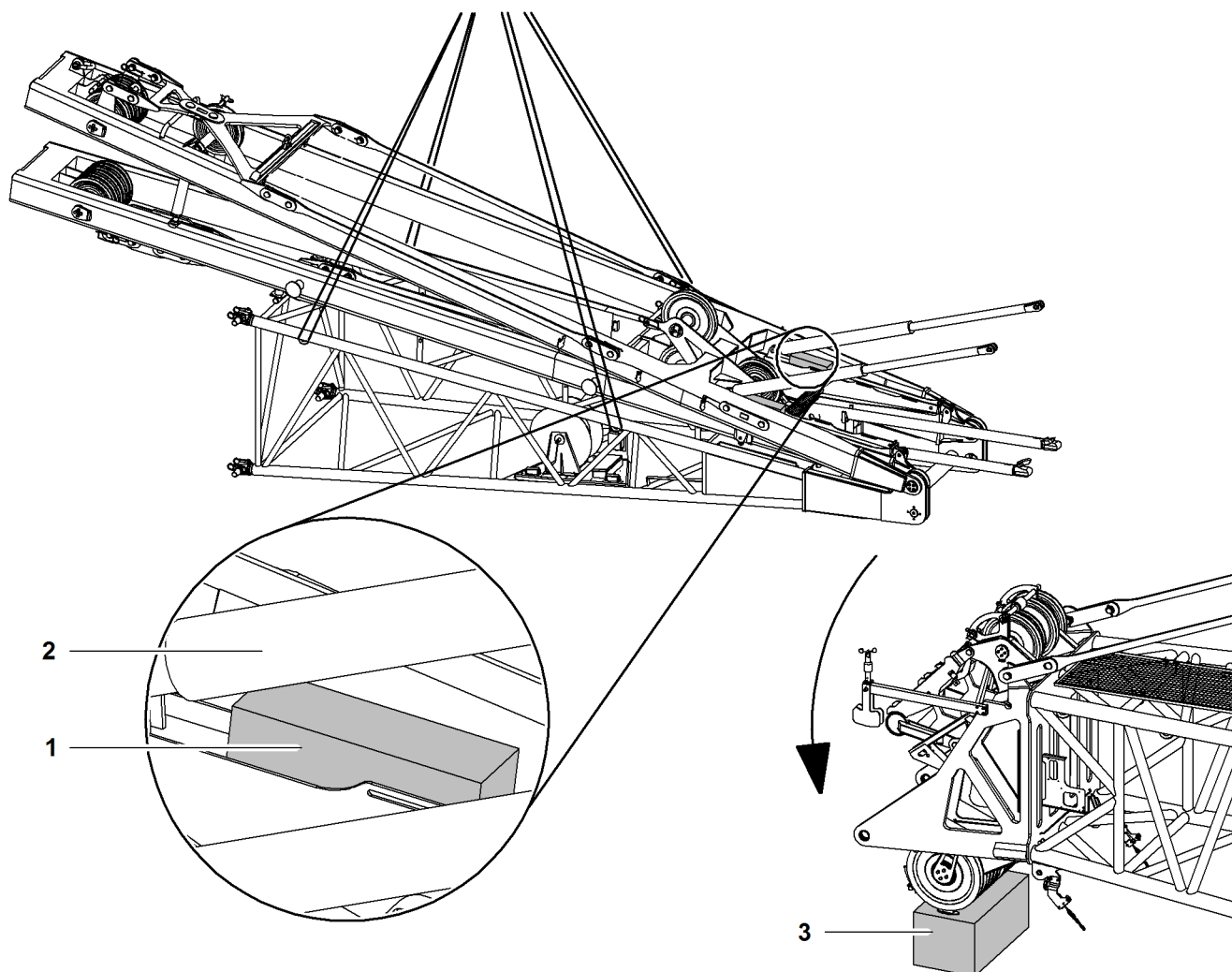


Fig. 5356: Place wooden blocks underneath and lift jib base section to main boom head

- | | | | | | |
|---|-------------------|---|-------------------------------------|---|-------------------|
| 1 | Wooden block (2x) | 2 | Hydraulic tilting-back support (2x) | 3 | Wooden block (2x) |
|---|-------------------|---|-------------------------------------|---|-------------------|



Note

Liebherr recommends:

- ▶ To facilitate installation of the jib base section: Place wooden blocks 3 beneath the feet of the main boom head.
- ▶ Chock the hydraulic tilting-back supports 2 of the luffing jib with wooden blocks 1.



Note

Special points regarding main boom head 2821.24 (LR 1006)!

- ▶ Fit the guide rails for the hydraulic tilting-back supports to the boom head section in the inner or outer position according to the jib type.
- ▶ Rig jib base section.
- ▶ Lift the jib base section from above onto the boom head section.

- ▷ Rigid and hydraulic tilting-back supports should be located in the guide rails on the boom head section.

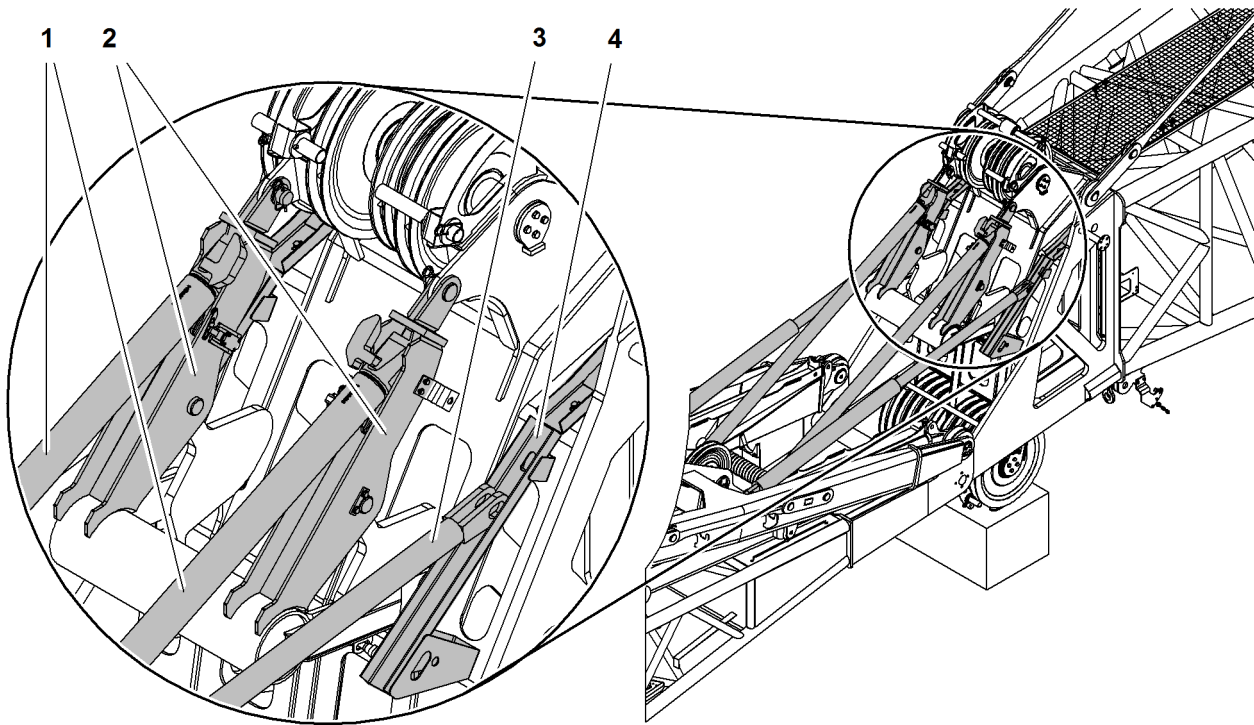


Fig. 5357: Rigid and hydraulic tilting-back supports are in the guide rails on the main boom head

- | | | | |
|---|---|---|---|
| 1 | Rigid tilting-back support (2x) | 3 | Hydraulic tilting-back support (2x) |
| 2 | Guide rail (2x) on main boom head for rigid tilting-back supports | 4 | Guide rail (2x) on main boom head for hydraulic tilting-back supports |

- ▶ Lower the jib base section further until the pin connection points of the jib base section and the boom head section line up.

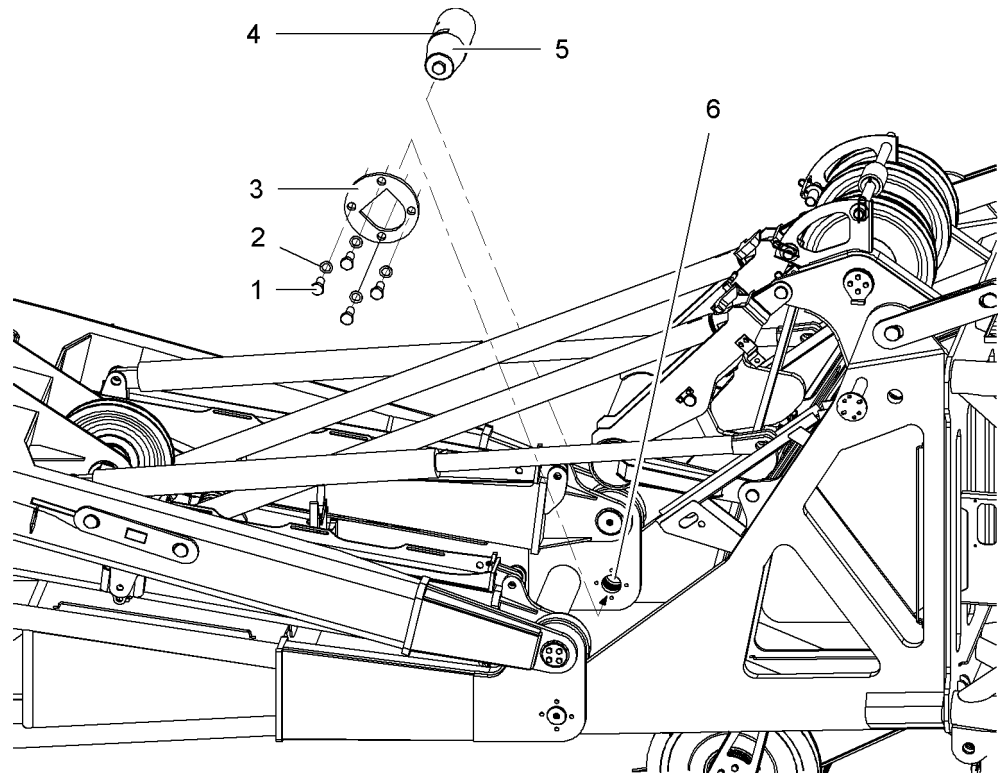


Fig. 5358: Bolting the jib base section to the boom head section

- | | | | |
|---|------------------|---|---------------------------|
| 1 | Screw (4x) | 4 | Notch |
| 2 | Washer (4x) | 5 | Pin |
| 3 | Securing element | 6 | Pin connection point (2x) |

► Lubricate pins **5**.

When the pin connection points **6** of the jib base section and the boom head section line up:

► Pin **5** must be driven in from the outside in.



Note

- Pay special attention to the position of the notch **4** in the pin **5**.
- If necessary, use a screwdriver to turn the pin into the correct position.

► Slide the locking element **3** over the pin **5** and place in the notch **4**.

Type of jib	Torque	Screw treatment
2316	239 Nm 176 ft-lb	slightly oiled thread
1916	239 Nm 176 ft-lb	slightly oiled thread
1713	291 Nm 215 ft-lb	grease-free thread and treat with LOCTITE 243
1309	291 Nm 215 ft-lb	grease-free thread and treat with LOCTITE 243

Type of jib	Torque	Screw treatment
1008	291 Nm 215 ft-lb	grease-free thread and treat with LOCTITE 243

Tab. 603: Torque screws luffing jib

- ▶ Tighten screws 1 and disks 2 with stated torque.
- ▶ Repeat the pin insertion process on the opposite side.

7.22.8 Checking the pressure in the accumulator of the hydraulic tilting-back supports

NOTICE

Incorrect pressure in the accumulator of the hydraulic tilting-back supports!
Risk of damage to components.

- ▶ Ensure that the specified pressure for the current ambient temperature is set in the accumulator.

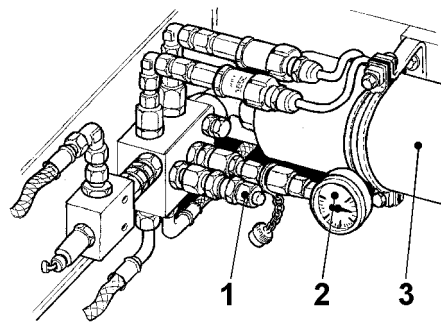


Fig. 5359: Accumulator on A-frame3

- | | |
|---|----------------------|
| <p>1 Connection for filling the accumulator</p> <p>2 Pressure gauge</p> | <p>3 Accumulator</p> |
|---|----------------------|

The table "Specified pressure in accumulator of hydraulic tilting-back supports" is located on A-frame3.

- ▶ Check pressure in accumulator with tilting-back supports fully extended prior to each assembly.

If the pressure of the accumulator does not match that shown in the table:

- ▶ Observe ambient temperatures on site and adapt the pressure.

7.22.9 Installing main boom (self-assembly system)



Note

Special procedure when using the self-assembly system!

- ▶ Install main boom on basic machine.

7.22.10 Connect A-frame2 with the rope of winch1/winch2.



WARNING

Unsecured walking on the boom!
risk of falling from the boom.

- ▶ A fall arrest system must be worn when working on booms to prevent falling.

On A-frame2 and on the crossbar a shackle and a round sling have been fit in the factory.

Ensure that the following conditions are fulfilled:

- The shackle and round sling are fitted to A-frame 2.
- The shackle and round sling are fitted to the crossbar.
- The round sling on A-frame 2 passes through the round sling on the crossbar.

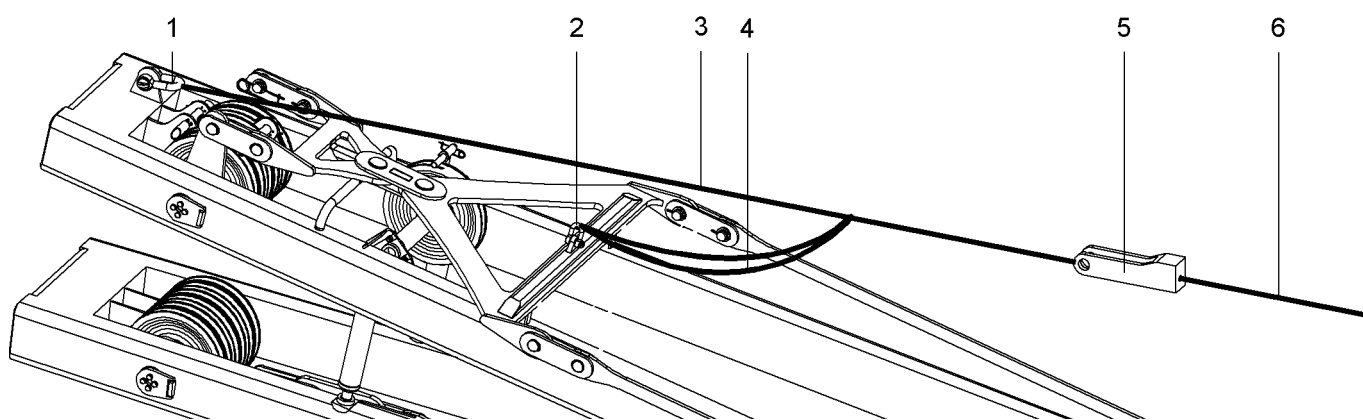


Fig. 5360: Connect A-frame2 with the rope of winch1/winch2.

- | | | | | | |
|---|----------------------|---|--------------------------|---|-----------------------|
| 1 | Shackle on A-frame 2 | 3 | Round sling on A-frame 2 | 5 | Pocket lock |
| 2 | Shackle on crossbar | 4 | Round sling on crossbar | 6 | Rope of winch1/winch2 |

To connect the rope of winch1/winch2 **6** with the round sling, use the pocket lock **5** of the main boom head.

- ▶ Attach pocket lock **5** to round sling **3** on A-frame2.
- ▶ Pull rope of winch1/winch2 **6** forward across the main boom up to the pocket lock **5**.
- ▶ Connect the rope of winch1/winch2 **6** with the pocket lock **5**.

7.22.11 Reeving A-frame 2/A-frame 3



WARNING

Unsecured walking on the boom!
risk of falling from the boom.

- ▶ A fall arrest system must be worn when working on booms to prevent falling.



WARNING

Luffing jib luffing winch is reeved incorrectly!

- ▶ Reeve in the rope of the jib luffing winch according to reeving plan.

The rope reeving plan of the jib luffing rope can be found in the relevant jib instructions.

- ▶ Open up the rope guide, if present.
- ▶ Unwind the rope of the jib luffing winch and pull forward to the jib base section.
- ▶ Connect rope of the jib luffing winch with auxiliary rope reeved in the factory.



Note

- ▶ To make reeving the rope of the jib luffing winch easier: Slightly lift A-frame2 with the rope of winch1/win2.
-
- ▶ Pull out the auxiliary rope by hand and at the same time unwind the jib luffing rope.
or
Connect the auxiliary rope to the rope of the rope reeving winch and actuate the rope reeving winch.
▷ Rope of the jib luffing winch is being reeved.
 - ▶ Remove auxiliary rope and place in temporary storage.
 - ▶ Attach rope of the jib luffing winch with pocket lock to the rope fixing point of A-frame2.
 - ▶ Close and secure the rope guide, if present.

7.22.12 Erecting A-frame2/A-frame3 with rope of winch1/win2 and pinning hydraulic tilting-back supports

NOTICE

Wrong operation of jib luffing winch!
Damage to A-frame2 and/or A-frame3.

If A-frame2 lies on A-frame3 with feet in transport position:

- ▶ Only lower jib luffing winch.
-

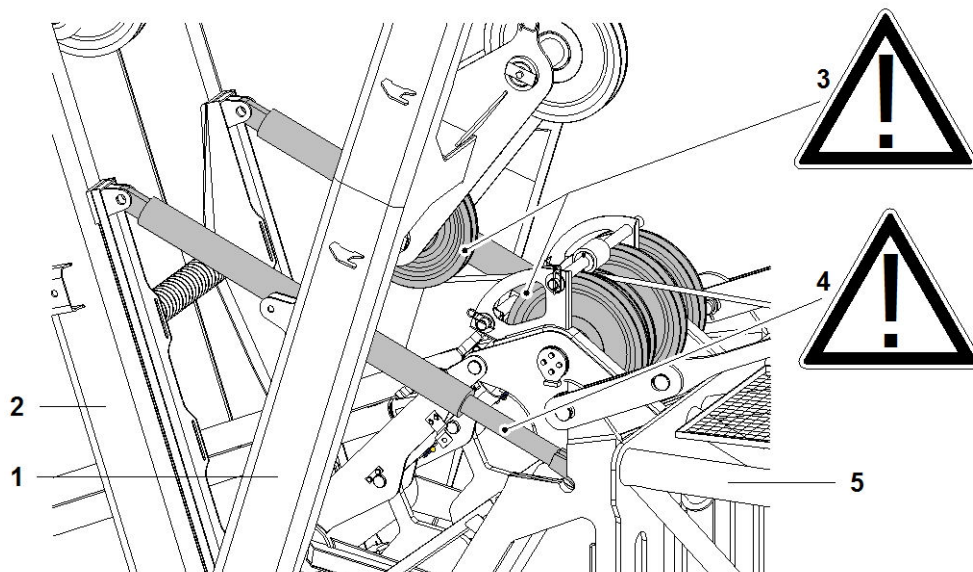


Fig. 5361: Danger spots when erecting A-frame2/A-frame3

- | | | | |
|---|---------------------------|---|---|
| 1 | A-frame2 | 4 | Minimum dimension x of the visible piston rod of the hydraulic tilting-back supports (2x) |
| 2 | A-frame3 | 5 | Main boom head |
| 3 | Collision of rope pulleys | | |

NOTICE

Collision of rope pulleys on A-frame2 and gantry pulleys on main boom head!
Damage to machine.

- ▶ Stop erection process of A-frame2 in time.



Fig. 5362: Minimum dimension x of the visible piston rod of the hydraulic tilting-back supports

- x Minimum dimension
100 mm (3.94" in)

NOTICE

Inadmissible undercutting of the minimum dimension x of the visible piston rod of the hydraulic tilting-back supports!
Damage to machine.

- ▶ Stop erection process of A-frame3 in time.
- ▶ Lower A-frame3 with jib luffing winch forward.

Make sure the following conditions are met:

- A signaller with a walkie-talkie supervises the entire process.

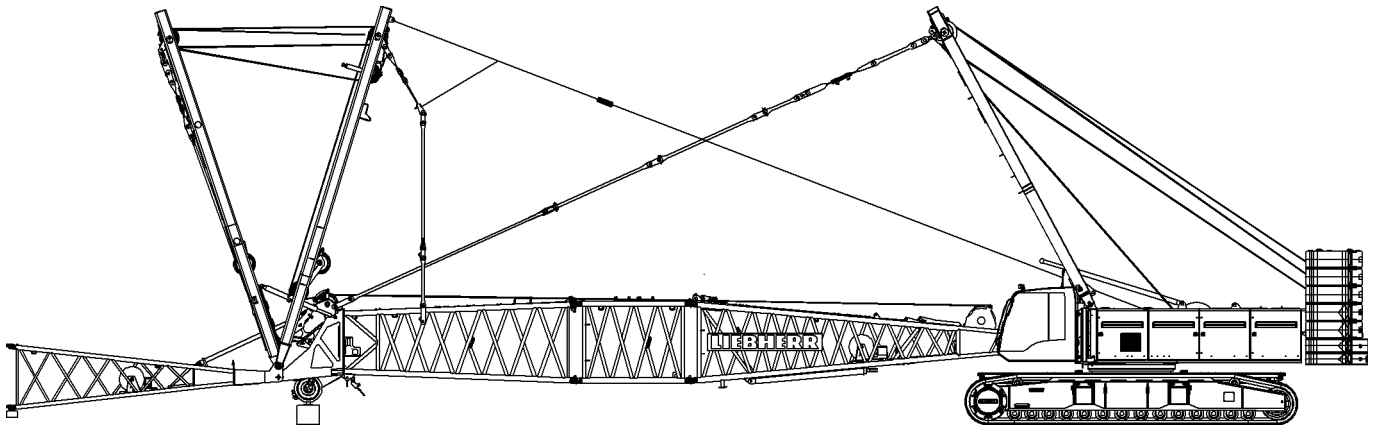


Fig. 5363: Erecting A-frame2/A-frame3 in pin connection position of the hydraulic tilting-back supports

- ▶ Erect A-frame2 with rope of winch1/winch2 and at the same time lower A-frame3 forward if necessary.
 - ▷ Hydraulic tilting-back supports slide on the guide rails towards the pin connection points on the main boom head.

If the pin connection points of the hydraulic tilting-back supports align with the pin connection points on main boom head:

- ▶ stop erection process.

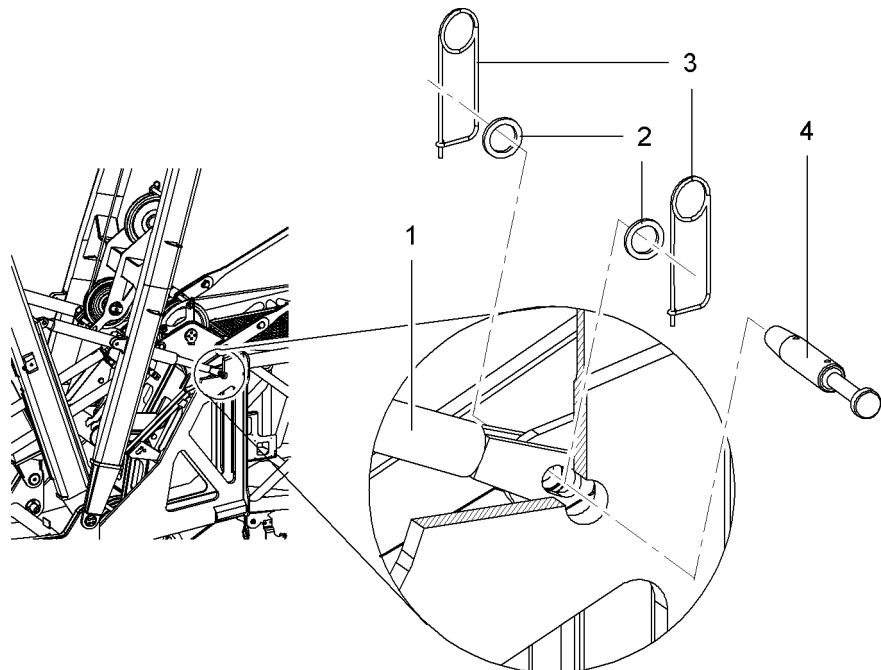


Fig. 5364: Pinning hydraulic tilting-back supports

- | | | | |
|---|--------------------------------|---|---------------------|
| 1 | Hydraulic tilting back support | 3 | Locking spring (2x) |
| 2 | Washer (2x) | 4 | Pin |

- ▶ Pin hydraulic tilting-back support 1 with pins 4 and secure with locking springs 3 and washers 2.
- ▶ Repeat pin connection procedure on opposite side.

7.22.13 Bolting the equaliser on A-frame 2 to the jib backstay straps



WARNING

Unsecured walking on the boom!
risk of falling from the boom.

- ▶ A fall arrest system must be worn when working on booms to prevent falling.

Ensure that the following conditions are fulfilled:

- A signalman with a walkie-talkie supervises the entire procedure.

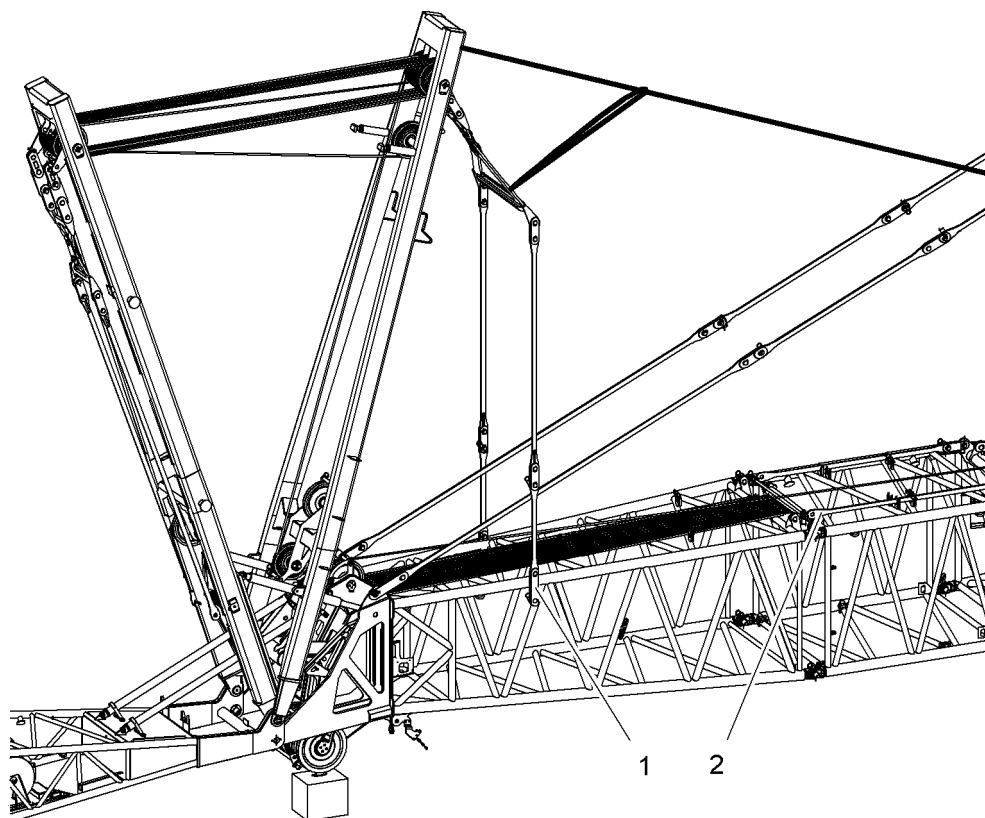


Fig. 5365: Bolting the equaliser on A-frame 2 to the jib backstay straps

- | | |
|-----------------------|------------------------------------|
| 1 A-frame 2 equaliser | 2 Jib backstay straps on main boom |
|-----------------------|------------------------------------|

NOTICE

Not following the procedure correctly!
Damage to A-frame 2 and/or A-frame 3.

- ▶ Stop the erection process of A-frame2 in good time to avoid a collision with the pulleys on A-frame2 and the gantry pulleys on the boom head section.
 - ▶ Stop the erection process of A-frame 3 in good time so as not to undercut the minimum visible dimension x of the hydraulic tilting-back supports piston rods. If required, lower A-frame 3 forwards.
-
- ▶ Erect A-frame2 using the rope of winch1/winch2 and lower A-frame3 forwards at the same time if required.
 - ▷ The equaliser of A-frame 2 moves towards the jib backstay straps.

Before the pulleys on A-frame2 collide with the gantry pulleys on the main boom:

- ▶ Stop the erection process.
- ▶ Bolt the equaliser on A-frame 2 to the jib backstay straps.
- ▶ Unwind rope of winch1/winch2.
- ▶ Remove rope of winch1/winch2 from pocket lock.
- ▶ Remove pocket lock from round sling.



Note

If the rope of winch1 is not reeved onto a hook or a pulley block:

- ▶ Wind up rope of winch1/winch2.
-

7.22.14 Connecting the equaliser on A-frame 3 to the jib base section

To bolt the jib base section to the jib, the jib base section is fastened to the equaliser of A-frame 3 with round slings. The jib base section can then be erected and moved up to the jib.



Note

Special procedure when using an assist crane!

- ▶ Lift the jib base section using an assist crane.
-

NOTICE

Not following the procedure correctly!

Damage to A-frame 3

- ▶ Stop the erection process of A-frame 3 in good time so as not to undercut the minimum visible dimension x of the hydraulic tilting-back supports piston rods. If required, lower A-frame 3 forwards.
-

Ensure that the following conditions are fulfilled:

- Approved sling gear is available ([For more information see: 6.9 Rigging equipment and/or sling gear, page 1175](#)).
- A signalman with a walkie-talkie should supervise the entire procedure.

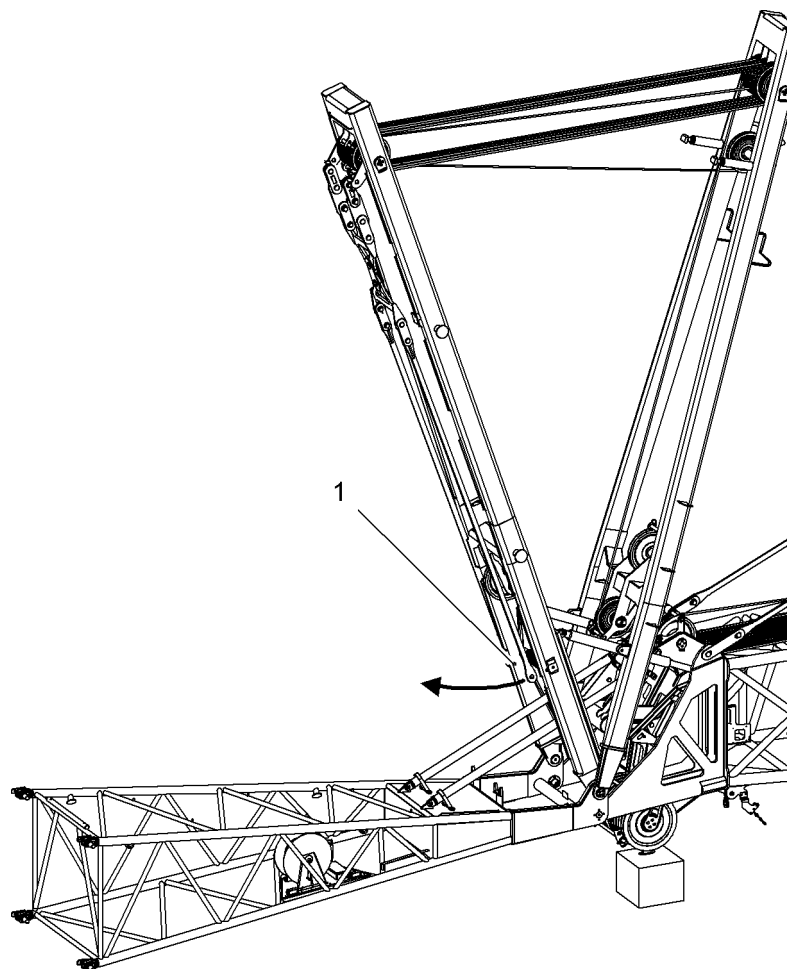


Fig. 5366: Removing the equaliser of A-frame 3 from the transport bracket

- 1 Transport brackets (2x) of the equalizer of A-frame3



CAUTION

A-frame 3 equaliser swinging down!

- ▶ Move A-frame 3 into a steep position using the jib luffing winch.
 - ▶ Leave the swing range of the equaliser of A-frame 3.
-
- ▶ Undo the safety pin and remove the equaliser of A-frame 3 from the transport bracket 1.
 - ▷ The equaliser of A-frame 3 swings downwards.

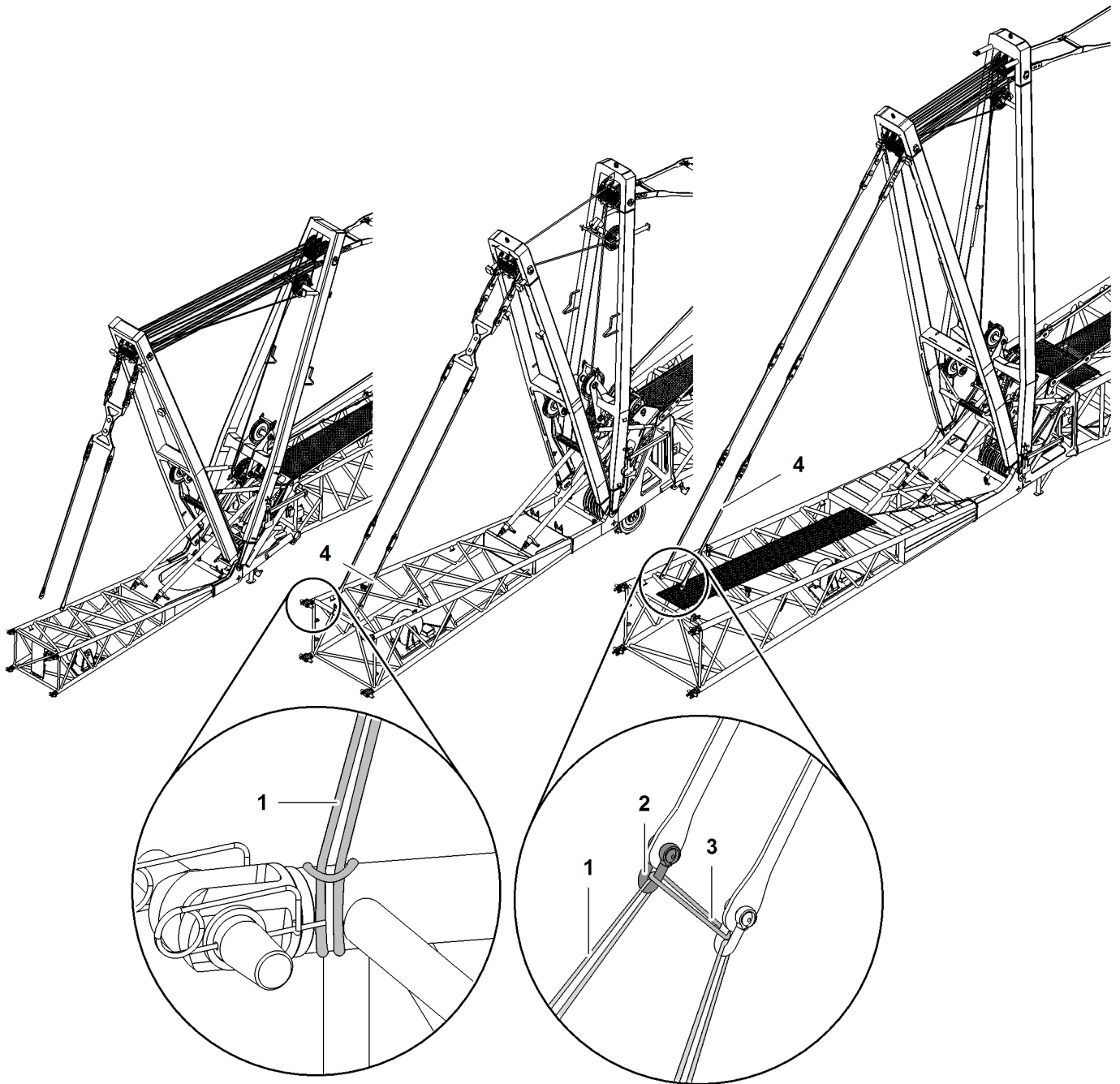


Fig. 5367: Connecting the equalizer on A-frame3 to the jib base section

- | | | | |
|---|-------------------------------------|---|---------------------------------------|
| 1 | Round sling
1.5 m (4' 11" ft-in) | 3 | Round sling 0.5 m (1' 8" ft-in) |
| 2 | Shackle (2x) | 4 | Jib pendant strap of jib base section |

Depending on the jib type, the equalizer of A-frame3 must be extended with a jib pendant strap 4 of the jib base section.

- ▶ Connect the equaliser of A-frame 3 to the jib base section as shown in the diagram.

7.22.15 Bolting the jib base section to the jib

- ▶ Wind up jib luffing winch.

- ▷ The jib base section lifts off the ground.
 - ▶ Raise the main boom with attached jib base section.
 - ▶ Move the machine forwards to enable pinning of the jib base section with the jib.
- Once the pin connection points of the jib base section and the first jib section align:
- ▶ Bolt the jib base section to the jib.

7.22.16 Bolting the equaliser on A-frame 3 to the jib pendant straps



WARNING

Unsecured walking on the boom!
risk of falling from the boom.

- ▶ A fall arrest system must be worn when working on booms to prevent falling.

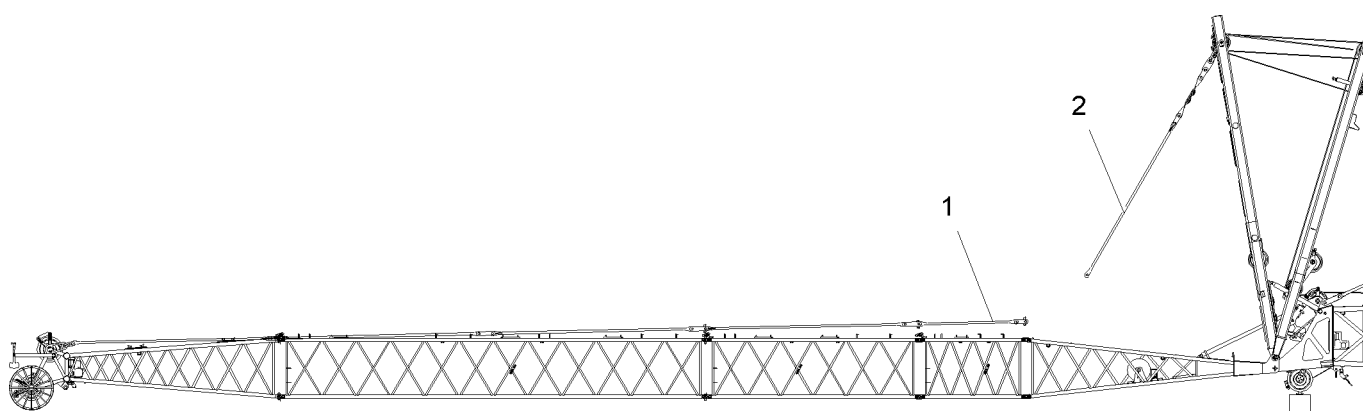


Fig. 5368: Bolting the equaliser on A-frame 3 to the jib pendant straps

1 Jib pendant straps

2 A-frame 3 equaliser

- ▶ Lower A-frame 3 forwards using the jib luffing winch.
 - ▷ The equaliser of A-frame 3 moves towards the jib.

If the shackles can be reached by hand:

- ▶ Stop the lowering process.
- ▶ Remove the shackles and round slings from the equaliser of A-frame 3 and store in a safe place.
- ▶ Continue lowering A-frame 3 forwards using the jib luffing winch.

If the equaliser of A-frame 3 can be bolted to the jib pendant straps:

- ▶ Stop the lowering process.
- ▶ Bolt the equaliser on A-frame 3 to the jib pendant straps.

7.22.17 Installing mid-point suspension

The lengths of the stay ropes and their assembly positions are shown in the relevant instructions for the boom.



DANGER

Incorrect installation of mid-point suspensions!
Structural breakdown.

- ▶ Fit mid-point suspensions according to relevant system instructions.

- ▶ Assemble required length of stay ropes in line with system-relevant details.
- ▶ Remove the safety pins and washers from both sides of the boom pin connection double-taper pin and stow away.
- ▶ Repeat procedure on opposite side.

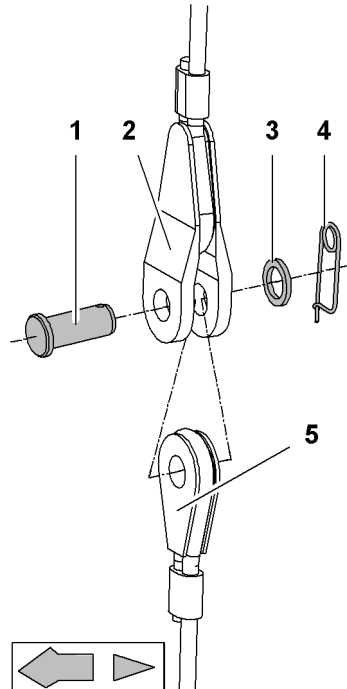


Fig. 5369: Pinning mid-point suspension stay ropes

- | | | | |
|---|---------------|---|------------------|
| 1 | Pin | 4 | Safety pin |
| 2 | Top stay rope | 5 | Bottom stay rope |
| 3 | Washer | | |

- ▶ Pin top stay rope 2 to bottom stay rope 5.
- ▶ Secure the pin 1 with washer 3 and retaining spring 4.

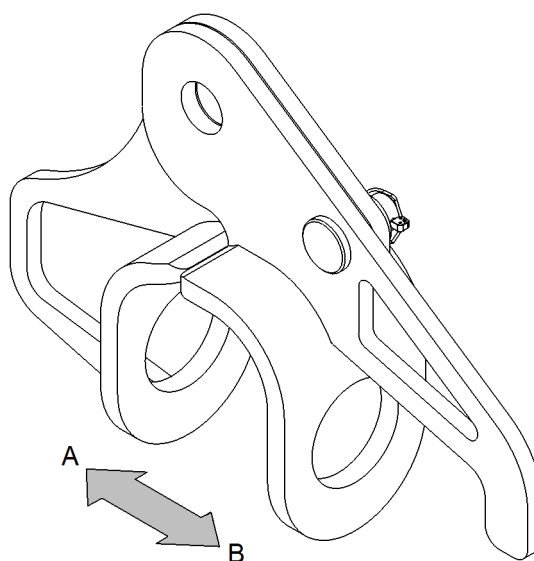


Fig. 5370: Mid-point suspension forks

- | | | | |
|---|--------------|---|--------------|
| A | Jib interior | B | Jib exterior |
|---|--------------|---|--------------|

The forks may have different shapes. The permissible shape depends on the boom configuration (For more information see: 1 Product description, page 51) .

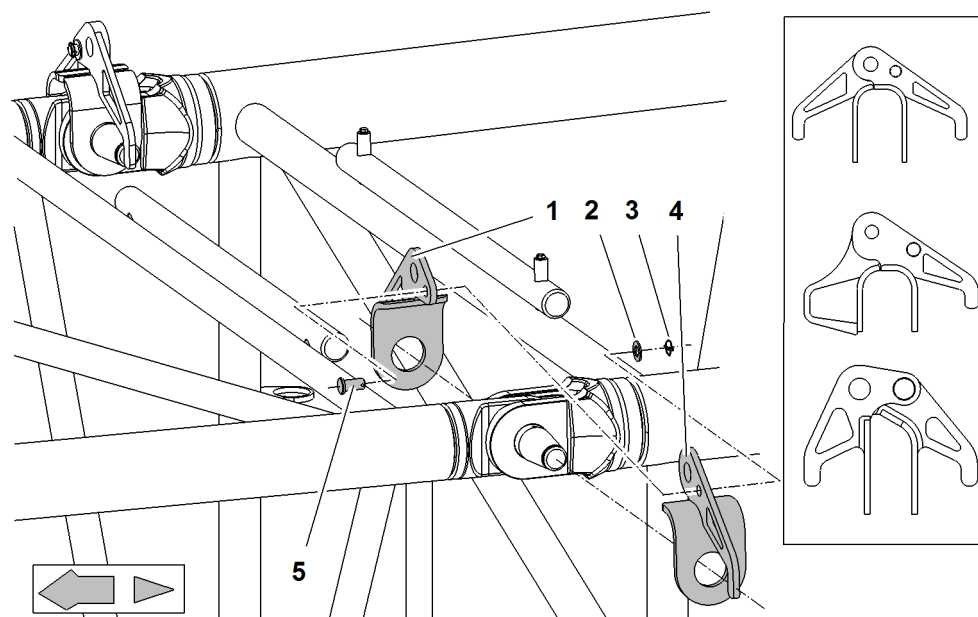


Fig. 5371: Assembling the mid-point suspension forks

- | | | | |
|---|-----------------------|---|-----------------------|
| 1 | Inner section of fork | 4 | Outer section of fork |
| 2 | Washer | 5 | Pin |
| 3 | Linch pin | | |

- ▶ Mount inner section of fork **1** on double-taper pin.
- ▶ Mount outer section of fork **4** on double-taper pin.
- ▶ Pin inner section of fork **1** to outer section of fork **4**.
- ▶ Secure pin **5** with a washer **2** and linch pin **3**.
- ▶ Repeat procedure on opposite side.

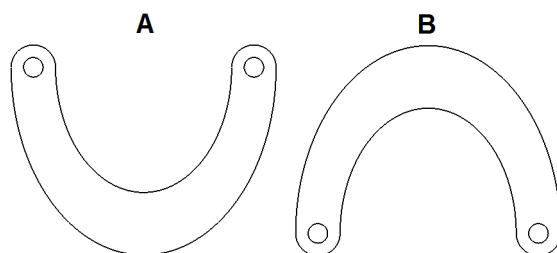


Fig. 5372: Installation position of spacer bracket with mid-point suspension on luffing jib 2316 and 1916

- | | | | |
|----------|---------------------|----------|-------------------|
| A | Spacer bracket down | B | Spacer bracket up |
|----------|---------------------|----------|-------------------|

Install spacer bracket **6** of mid-point suspension on luffing jibs 2316 and 1916 in installation position spacer bracket **B up**.

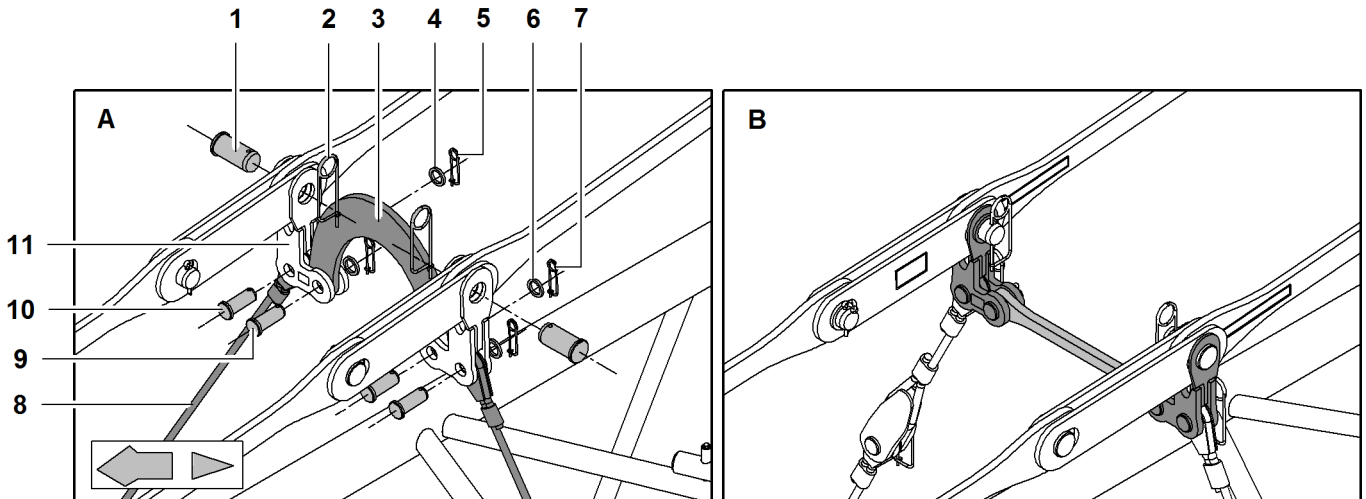


Fig. 5373: Installing the pendant straps, spacer bracket, connecting elements and mid-point suspension stay ropes

1	Pin (2x) for pendant straps	6	Washer (2x)	11	Connecting element (2x)
2	Locking spring (2x)	7	Locking spring (2x)	A	Mid-point suspension on luffing jib 2316 and 1916
3	Spacer bracket	8	Stay ropes	B	Mid-point suspension on luffing jib 1713, 1309 and 1008
4	Washer (2x)	9	Pin (2x) for spacer bracket		
5	Locking spring (2x)	10	Pin (2x) for stay ropes		

Installation of the mid-point suspension on luffing jib 2316, 1916, 1713, 1309 and 1008 is identical. Only the spacer brackets are different.

- ▶ Pin connecting elements **11** to pendant straps.
- ▶ Secure pin **1** with locking springs **2**.

NOTICE

Inadmissible run of winch1/winch2 rope on luffing jib 2316 and 1916!
Damage to winch1/winch2 rope.

- ▶ Ensure that winch1/winch2 rope runs underneath spacer bracket **3**.
- ▶ Pin connecting elements **11** to spacer bracket **3**.
- ▶ Secure pin **9** with washers **6** and locking springs **7**.
- ▶ Pin connecting elements **11** to stay ropes **8**.
- ▶ Secure pin **10** with washers **4** and locking springs **5**.

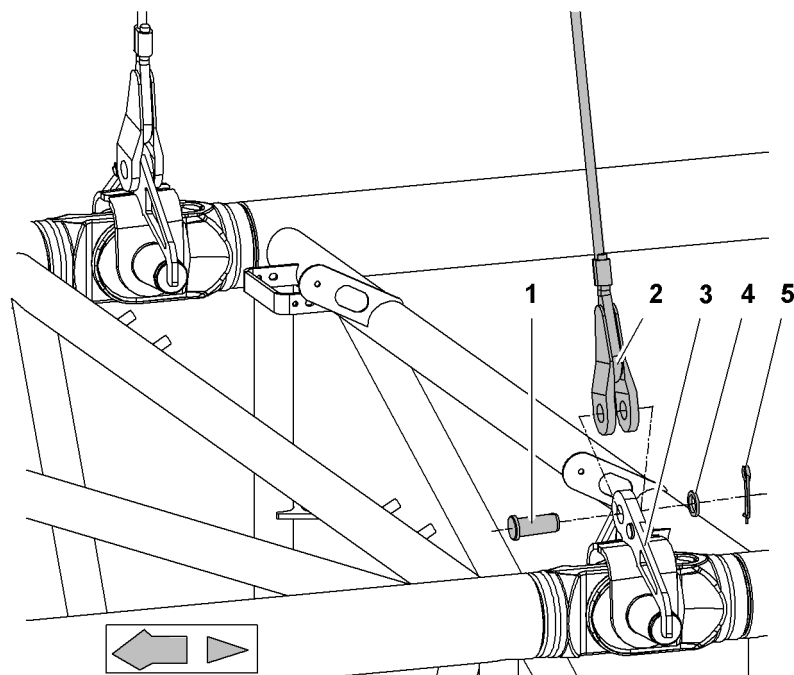


Fig. 5374: Pinning stay ropes to forks of mid-point suspension

- | | | | |
|---|-----------|---|------------|
| 1 | Pin | 4 | Washer |
| 2 | Stay rope | 5 | Safety pin |
| 3 | Fork | | |



Note

- ▶ To facilitate pinning stay ropes **2** and forks **3**: Use A-frame **1** to lift pendant straps.
- ▶ Pin stay rope **2** to fork **3**.
- ▶ Secure the pin **1** with washer **4** and retaining spring **5**.
- ▶ Repeat procedure on opposite side.

7.22.18 Pinning pendant straps

- ▶ Remove locking springs of transport brackets for pendant straps.

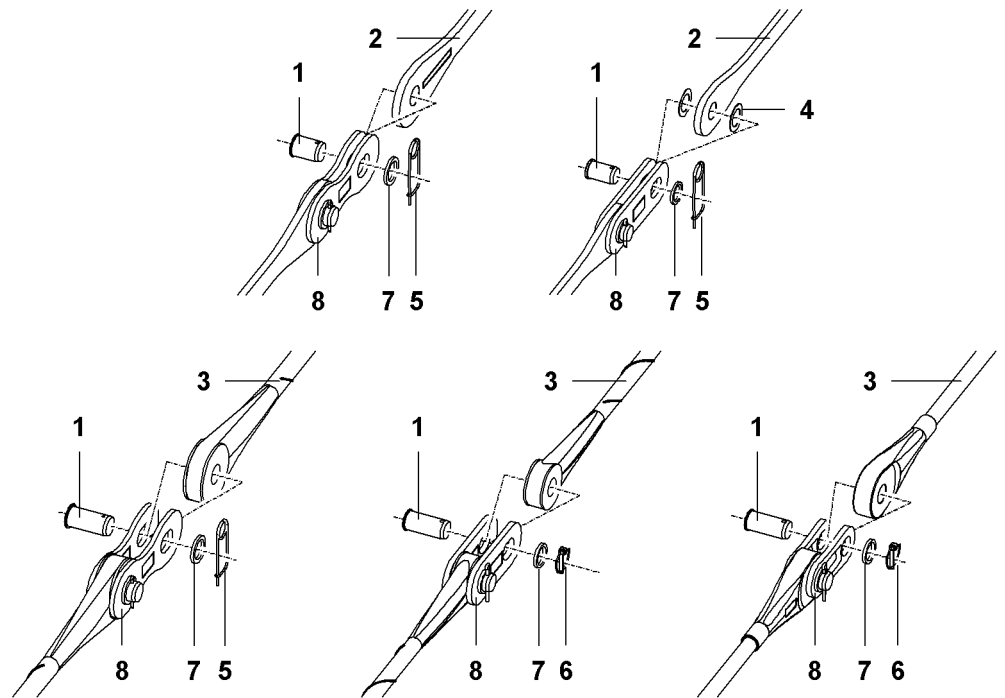


Fig. 5375: Pinning pendant straps (schematic display of different pendant straps)

1	Pin	5	Locking spring
2	Steel pendant strap	6	Linchpin
3	CF pendant strap	7	Washer
4	Plastic washer (2x)	8	Connecting link

► Remove pin 1 on connecting link 8.

► Position pendant strap 2, 3 between both connecting links 8.
or

If the pendant strap is fitted with plastic washers 4:

Position pendant strap 2 with both-sided plastic washers 4 between both connecting links 8.

► Insert pin 1 and secure with washers 7 and locking spring 5 or linchpin 6.

7.22.19 Connect the electric cables

NOTICE

Incorrect handling of electric lines!

Damage to electric line and plug.

► Do not pull electric line over sharp-edged objects.

► Do not crush or kink electric line.

► Keep the plug clean.

► Unplug electric lines on dummy socket of jib base section.

► Plug in electric line on terminal box of main boom head and lock with retaining brackets.

▷ Electric lines of main boom head and jib base section are connected.

The electric line to the jib head section is rolled up on the cable drum at the jib base section.

► Unplug both electric lines on terminal box of jib base section.

NOTICE

Improper unwinding of electric line!
Damage to electric line.

- ▶ Slide electric line into cable drum on lateral opening of cable drum.
- ▶ Undo pin on cable drum axis.
- ▶ Unwind electric line on cable drum and pull towards the jib head section through the jib.
- ▶ Plug in electric line on terminal box of jib head section and lock with retaining brackets.

There are two attachment holes beneath the terminal box for plug strain relief.

- ▶ Hinge both carabiners on cable sleeves in attachment holes.
- ▶ Fixate pin on cable drum axis.
- ▶ Plug electric line in cable drum into jib base section terminal box again.
 - ▷ Electric lines of jib base section and jib head section are connected.

If an auxiliary jib is installed:

- ▶ Insert electric cable of auxiliary jib at jib head section.

7.22.20 Installing the aircraft warning light



Note

Use of the aircraft warning light is prescribed by national or regional regulations!

- ▶ Inform yourself about national and local regulations prior to using the machine.

Make sure the following conditions are met:

- Anemometer is not installed.

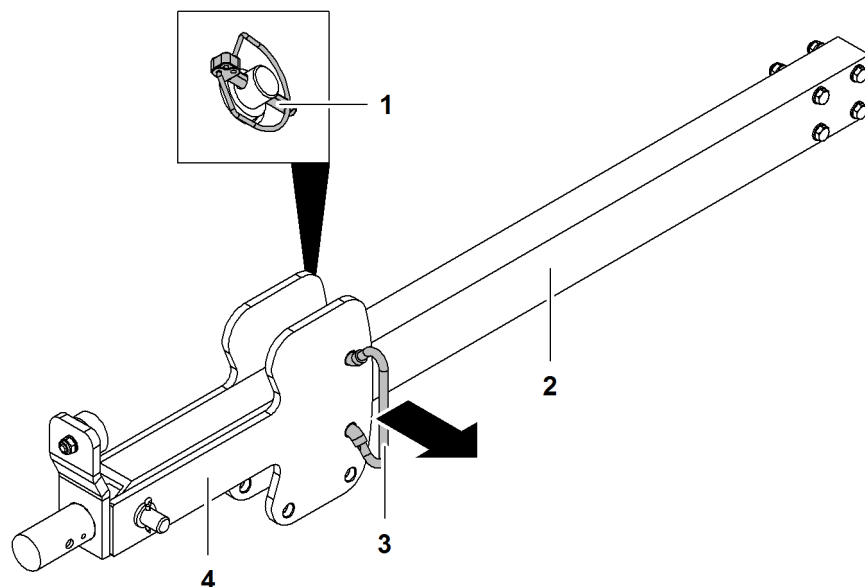


Fig. 5376: Moving the pendulum into the working position

- | | |
|-----------------|-------------------|
| 1 Linchpin (2x) | 3 Locking element |
| 2 Mount | 4 Pendulum |

The pendulum 4 is secured on the mount 2 for machine transport.

- ▶ Remove the linchpin **1** of the locking element **3**.
- ▶ Remove **3** locking element.
- ▶ Swing pendulum **4** down.
- ▶ Slide locking element **3** through pendulum **4** and secure with linchpins **1**.

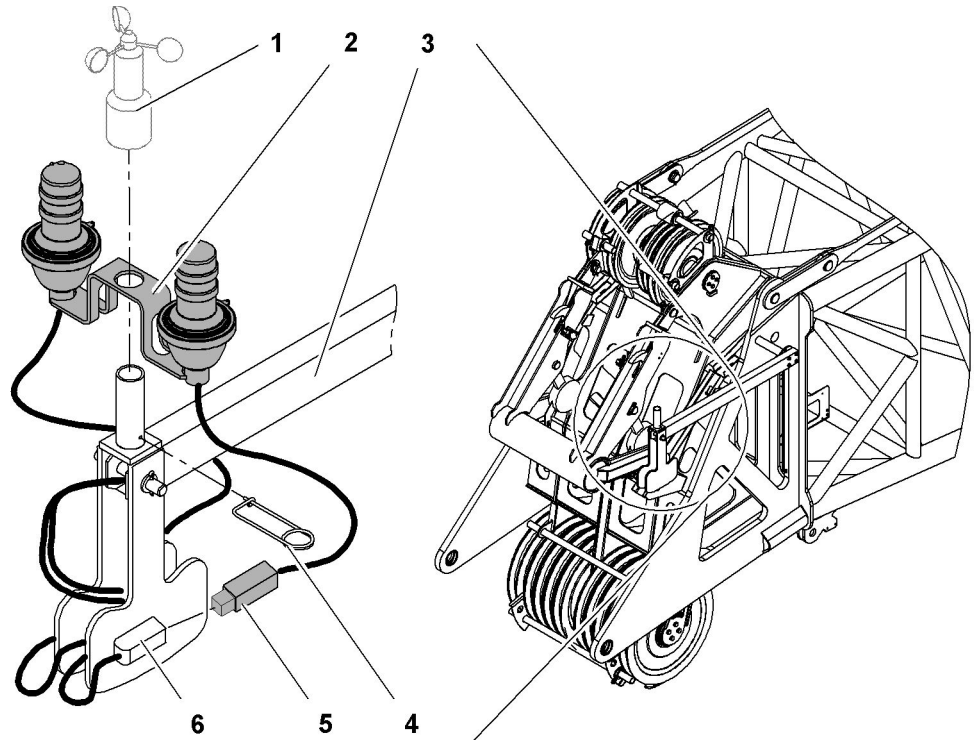


Fig. 5377: Installing the aircraft warning light

- | | | | |
|----------|------------------------|----------|----------------|
| 1 | Anemometer | 4 | Locking spring |
| 2 | Aircraft warning light | 5 | Plug |
| 3 | Mount | 6 | Coupling |

- ▶ Place aircraft warning light **2** on pipe.
 - ▷ Aircraft warning light is secured by the pipe and axis on the mount **3**.

NOTICE

Wrong insertion of locking spring!
Damage to electric cable.

- ▶ Carefully push through locking spring.

- ▶ Push through locking spring **4**.
 - ▷ Aircraft warning light **2** is secured.
- ▶ Connect plug **5** with coupling **6**.
- ▶ Lock plug **5**.

7.22.21 Installing anemometer

Make sure the following conditions are met:

- Aircraft warning light is installed (if available).

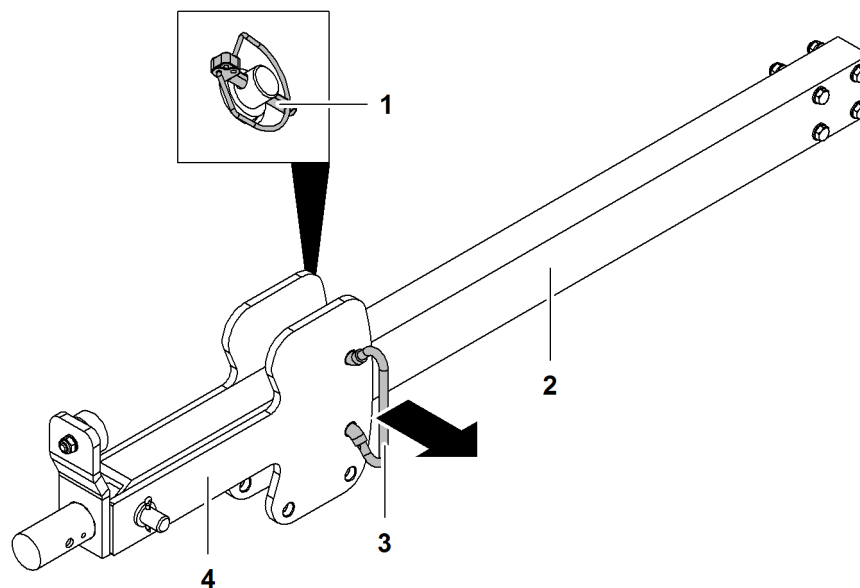


Fig. 5378: Moving the pendulum into the working position

- | | | | |
|---|---------------|---|-----------------|
| 1 | Linchpin (2x) | 3 | Locking element |
| 2 | Mount | 4 | Pendulum |

The pendulum 4 is secured on the mount 2 for machine transport.

- ▶ Remove the linchpin 1 of the locking element 3.
- ▶ Remove 3 locking element.
- ▶ Swing pendulum 4 down.
- ▶ Slide locking element 3 through pendulum 4 and secure with linchpins 1.

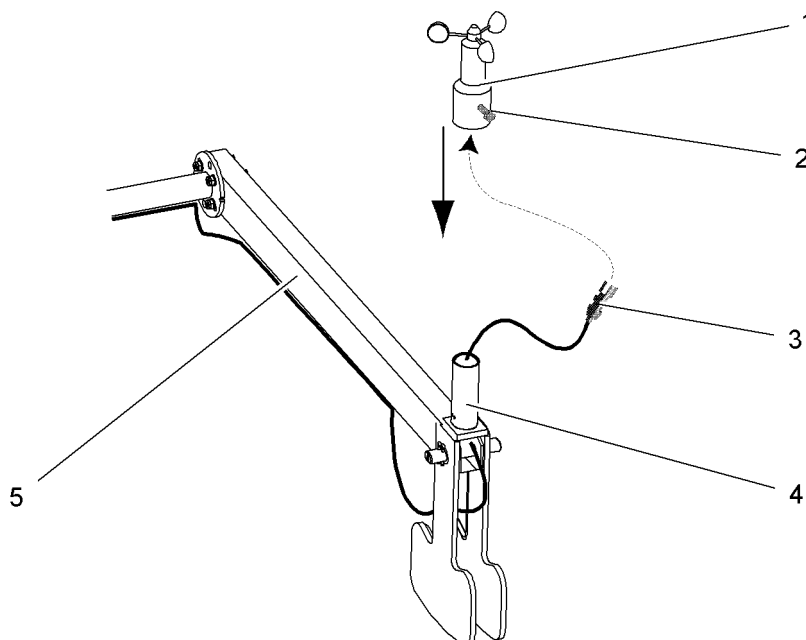


Fig. 5379: Installing anemometer

- | | | | |
|---|------------|---|-------|
| 1 | Anemometer | 4 | Pipe |
| 2 | Screw | 5 | Mount |
| 3 | Plug | | |

- ▶ Remove protective cap of plug 3.
- ▶ Plug in plug 3 on the bottom of the anemometer 1.
- ▶ Secure plug 3 with nut.

NOTICE

Improper installation of anemometer!
Damage to electric cable.

- ▶ Pull protruding electric cable through pipe before attaching anemometer.

- ▶ Mount anemometer 1 on pipe 4.
- ▶ Securing the anemometer on the mount: Tighten screw 2.

The rotor of the anemometer must be easy to turn.

- ▶ Testing the anemometer: Slightly turn rotor and watch value on monitor.
 - ▷ Wind speed value increases.

7.22.22 Moving the lightning rods* into working position

Installation position of lightning rods on luffing jib

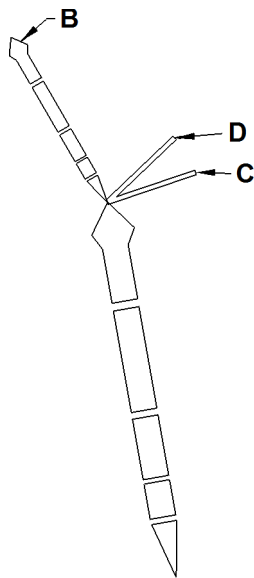


Fig. 5380: Installation position of lightning rods on luffing jib

- | | | | |
|----------|------------------|----------|----------|
| B | Luffing jib head | D | A-frame3 |
| C | A-frame2 | | |

Boom configuration	Number of lightning rods	Installation positions
Main boom + luffing jib	3	B + C + D
Main boom + luffing jib + midfall	3	B + C + D

Tab. 604: Installation position and number of lightning rods on luffing jib

Moving the lightning rods* on the luffing jib head into working position

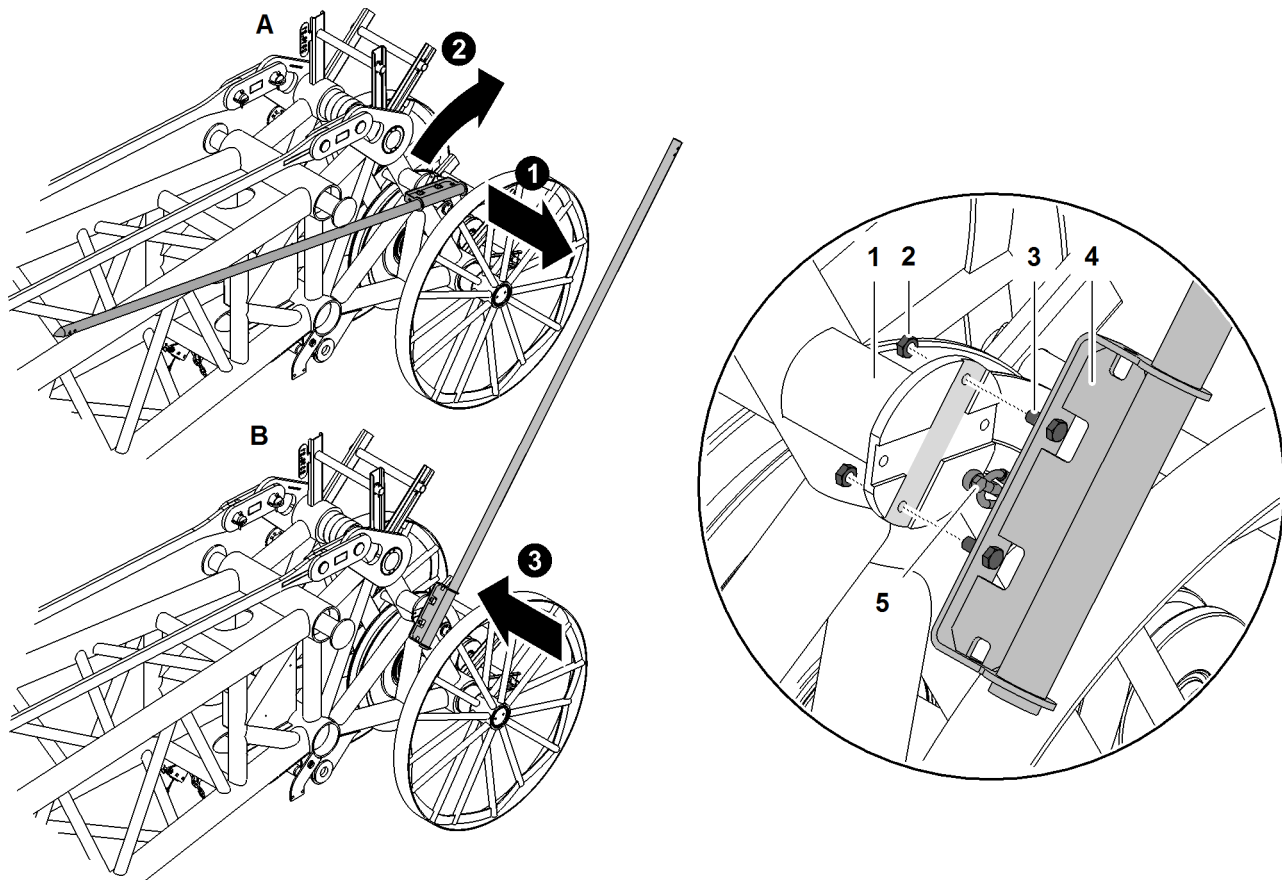


Fig. 5381: Moving the lightning rods* on the luffing jib head into working position (illustration of principle)

A	Transport position	2	Nut (2x)	5	Safety rope
B	Working position	3	Screw (2x)		
1	Mounting plate	4	Lightning rod		

- ▶ Undo safety rope 5.
- ▶ Undo nuts 2.
- ▶ Undo screws 3.
- ▶ Move lightning rod 4 from transport position A to working position B.



Note

Liebherr recommends:

- ▶ Grease threads of the screws 3.

- ▶ Attach lightning rod 4 with screws 3.
- ▶ Lock screws 3 with nuts 2.

NOTICE

Safety rope not attached!
Dropping parts.

- ▶ Ensure that safety rope 5 is attached.

- ▶ Attach safety rope 5.

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod 4 is installed.
 - ▶ Ensure that the screws of the tip are tightened.
-
- ▶ Ensure that the tip on the lightning rod 4 is installed.
 - ▶ Ensure that the screws of the tip are tightened.

Moving the lightning rods* on A-frame2 and A-frame3 into working position

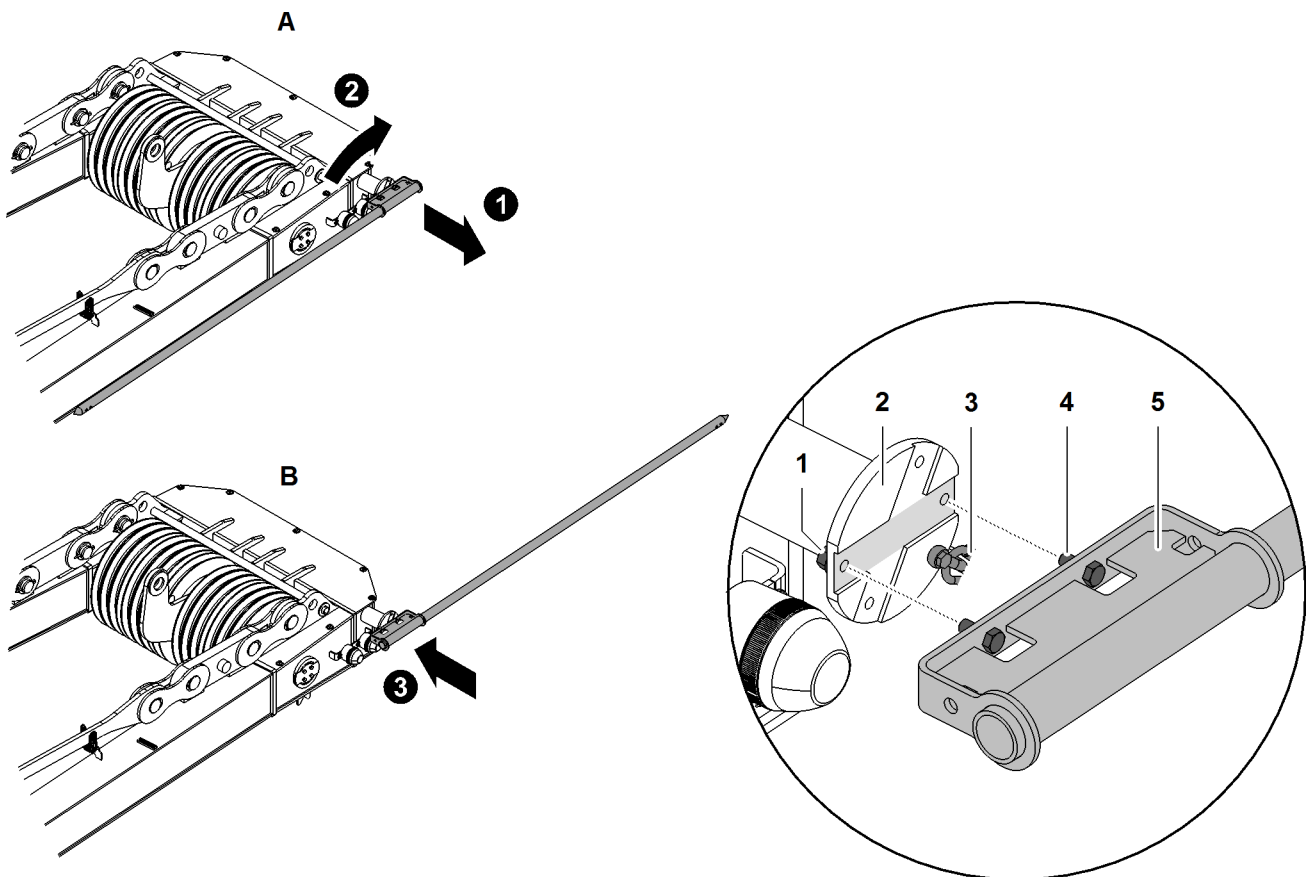


Fig. 5382: Moving the lightning rods* on A-frame2 and A-frame3 into working position (illustration of principle)

A	Transport position	2	Mounting plate	5	Lightning rod
B	Working position	3	Safety rope		
1	Nut (2x)	4	Screw (2x)		

- ▶ Undo safety rope 3.
- ▶ Undo nuts 1.
- ▶ Undo screws 4.
- ▶ Move lightning rod 5 from transport position A to working position B.

**Note**

Liebherr recommends:

- ▶ Grease threads of the screws **4**.
- ▶ Attach lightning rod **5** with screws **4**.
- ▶ Lock screws **4** with nuts **1**.

NOTICE

Safety rope not attached!
Dropping parts.

- ▶ Ensure that safety rope **3** is attached.

- ▶ Attach safety rope **3**.

NOTICE

Tip not installed!
Improperly deflected current.
Dropping parts.

- ▶ Ensure that the tip on the lightning rod **5** is installed.
- ▶ Ensure that the screws of the tip are tightened.

- ▶ Ensure that the tip on the lightning rod **5** is installed.
- ▶ Ensure that the screws of the tip are tightened.

7.22.23 Reeving the rope

The rope must be reeved as specified in the rope reeving diagram according to the boom and application requirements.

**WARNING**

Unsecured walking on the boom!
Risk of falling off the boom.

- ▶ A fall arrest system must be worn when working on the boom to prevent falling.

Ensure that the following conditions are satisfied:

- Cylinder adjustment functions are on.

Reeving the rope using a rope reeving winch

Dismantling rope protection pipes

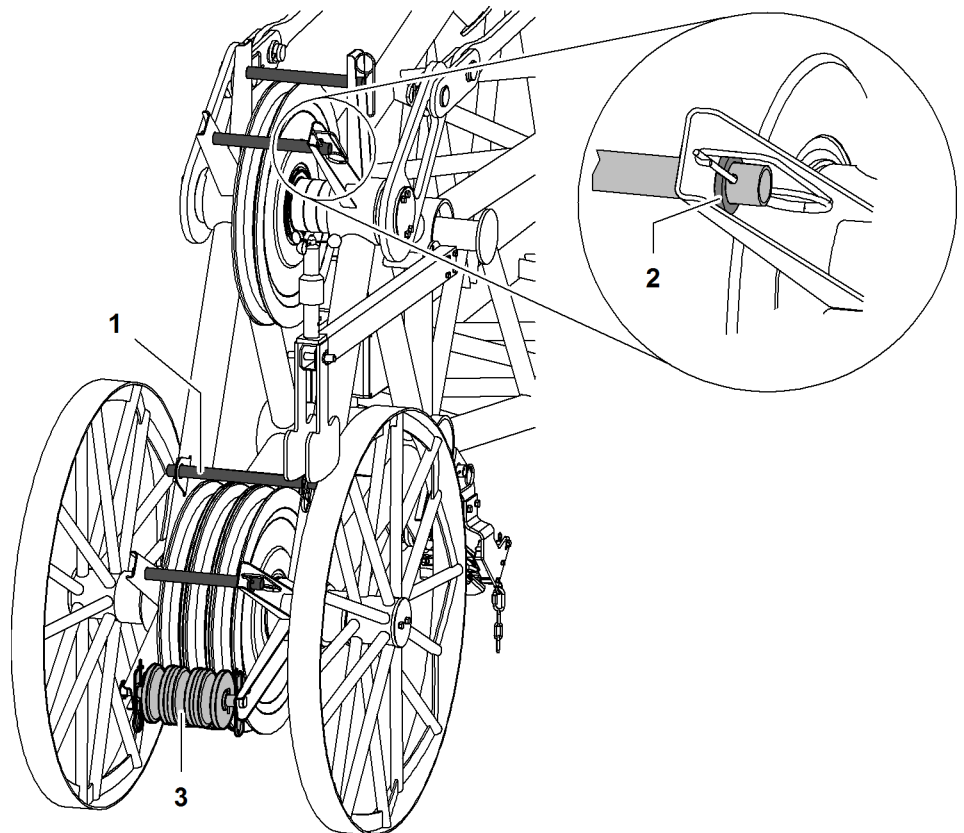


Fig. 5383: Rope protection pipes jib head section (1008, 1309, 1713, 1916, 2316)

- | | | | |
|---|----------------------|---|---------------------------------|
| 1 | Rope guard tube (4x) | 3 | Rope protection rollers package |
| 2 | Washer | | |

The rope protection pipes are secured with a cotter pin on one side and with a safety pin on the other side.

NOTICE

Inadmissible operation of winch1/winch2 below 10° jib angle!
Damage to jib head section.

- ▶ Make sure that winch1/winch2 are not operated below 10° jib angle.
-

- ▶ Remove the safety pin and washer 2.

- ▶ Remove the rope protection pipes 1.

Dismantling the rope protection rollers package

The number of rope protection rollers corresponds to the number of pulleys of the jib head.

Assemble the luffing jib

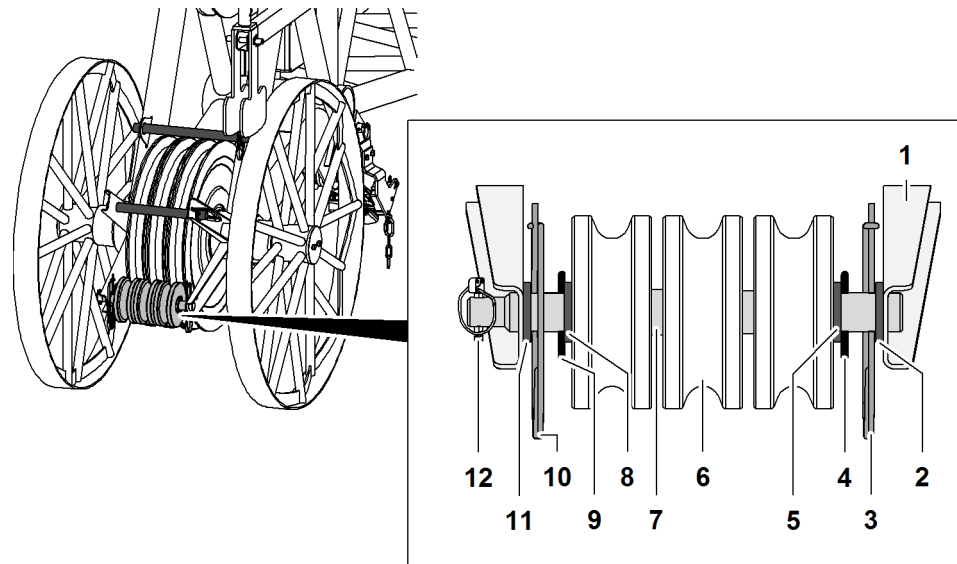


Fig. 5384: Rope protection rollers package

- | | | | |
|---|------------|----|------------|
| 1 | Mount | 7 | Shaft |
| 2 | Washer | 8 | Washer |
| 3 | Safety pin | 9 | Cotter pin |
| 4 | Cotter pin | 10 | Safety pin |
| 5 | Washer | 11 | Washer |
| 6 | Pulley | 12 | Linchpin |

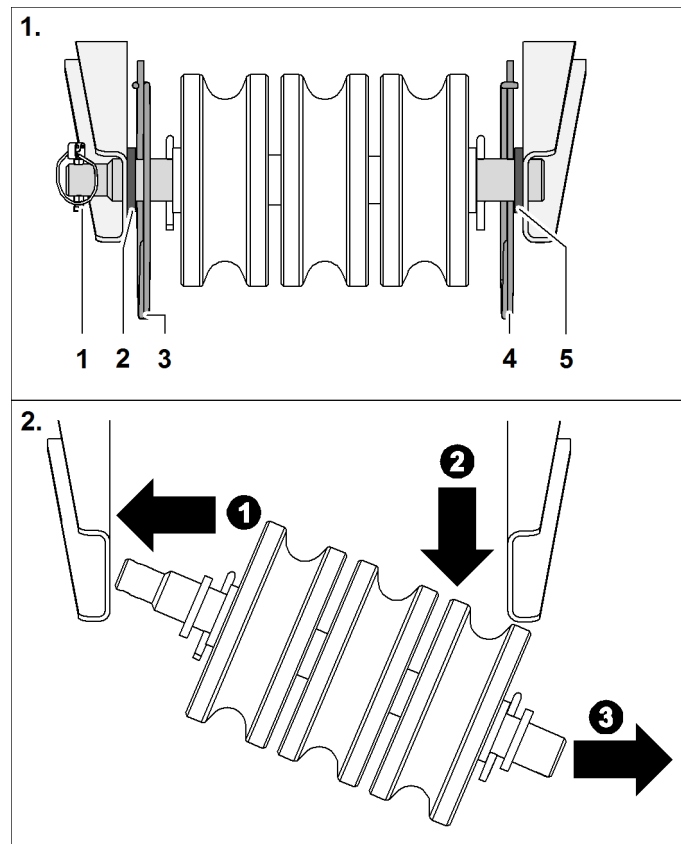


Fig. 5385: Dismantling the rope protection rollers package

- | | | | |
|---|----------|---|------------|
| 1 | Linchpin | 4 | Safety pin |
|---|----------|---|------------|

See next page for continuation of the image legend

- 2 Washer
- 3 Safety pin

- 5 Washer

- ▶ Remove the linchpin **3 + 4**.
- ▶ Remove safety pin **3 + 4**.
- ▶ Take rope protection rollers package off the support.
 - ▷ Rope protection rollers package is dismantled.

Removing the rope protection pipes on auxiliary jib

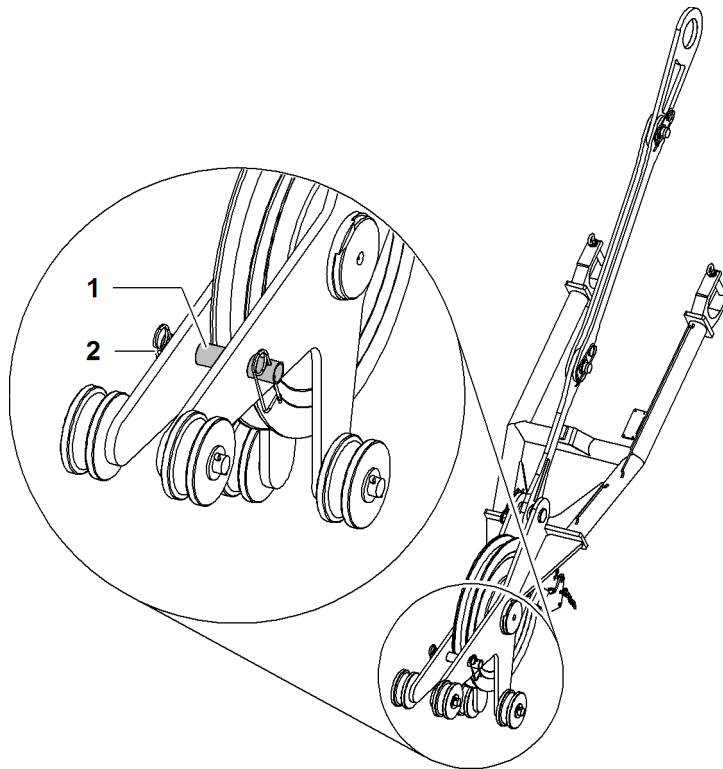


Fig. 5386: Removing the rope protection pipes on auxiliary jib

- 1 Rope protection pipe
- 2 Safety pin (2x)

- ▶ Remove rope protection pipes **1** with attached auxiliary jib.

Reeving the rope

- ▶ Open up the rope guide (if present).

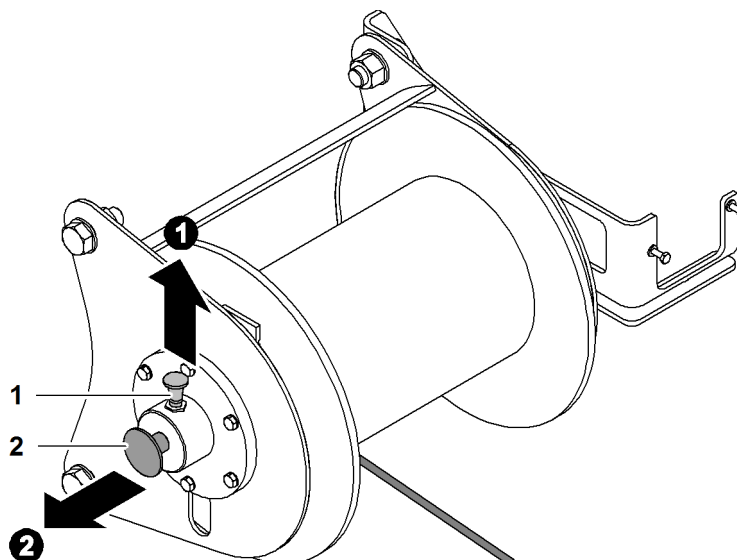


Fig. 5387: Setting the rope lug to free-wheel

1 Locking element

2 Shaft



Note

Liebherr recommends:

- ▶ Making it easier to pull out the axle 2: move the rope reeving winch manually back and forth.
- ▶ Pull up the locking element 1 and pull out the axle 2 at the same time.
 - ▷ Rope reeving winch is set to free-wheel.

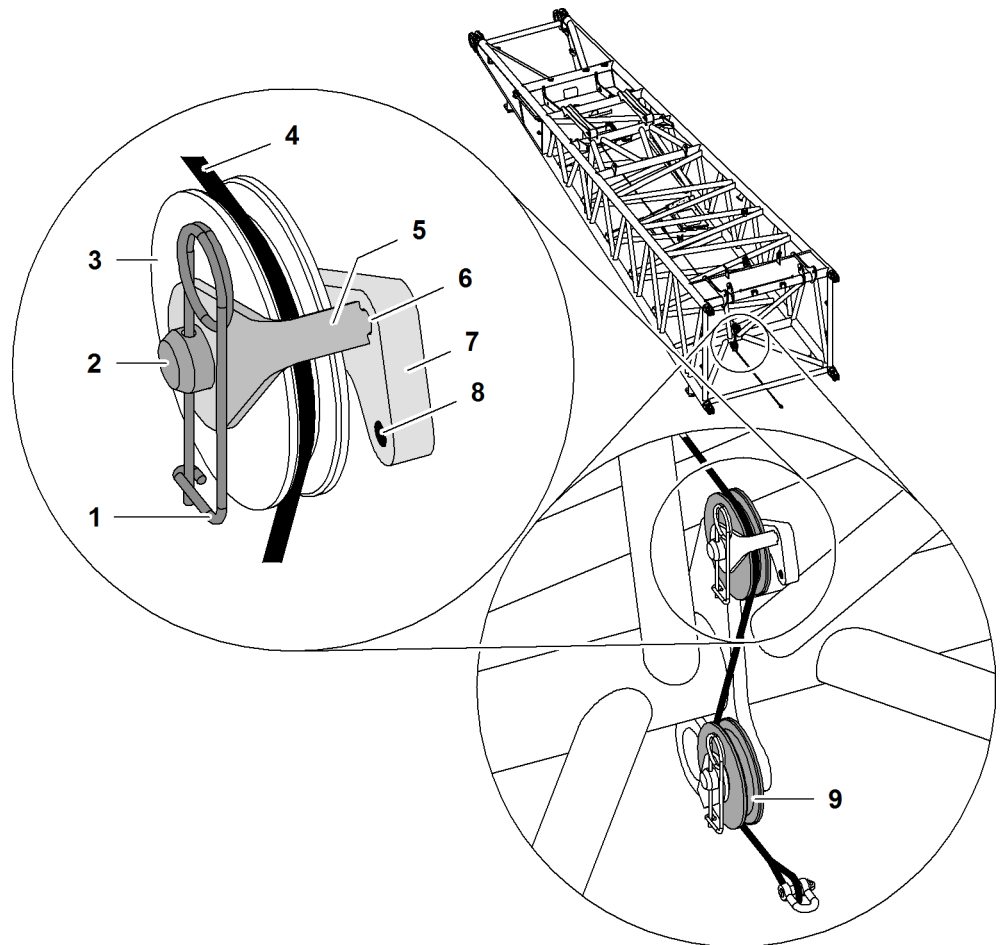


Fig. 5388: Reeving in the rope of the rope reeving winch

- | | | | |
|---|--------------------------------|---|-----------------------|
| 1 | Safety pin | 6 | Recess |
| 2 | Shaft | 7 | Support with recesses |
| 3 | Upper pulley | 8 | Recess |
| 4 | Rope of the rope reeving winch | 9 | Lower pulley |
| 5 | Locking element | | |

Depending on the machine type, the mounting 7 may have one or two recesses.

- ▶ Remove safety pins 1.
- ▶ Remove 5 securing element.
- ▶ Place rope of the rope reeving winch 4 across the top pulley 3.

NOTICE

Wrongly mounted locking element!
Rope of the rope reeving winch jumps out of pulley.

- ▶ Make sure that the locking element 5 is mounted in recess 6.
-
- ▶ Attach locking element 5 to axle 2 and guide in recess 6.
 - ▶ Attach the safety pin 1.
 - ▶ Repeat procedure on bottom pulley 9.
 - ▷ Rope of the rope reeving winch is guided through pulleys.
 - ▶ Pull the luffing rope under the boom to the boom head.
 - ▶ Reeve in the rope of the rope reeving winch according to reeving plan.

- ▶ Pull the luffing rope next to the boom towards the basic machine.
- ▶ Lift luffing rope onto boom.
- ▶ Connect luffing rope with rope of winch1/winch2.

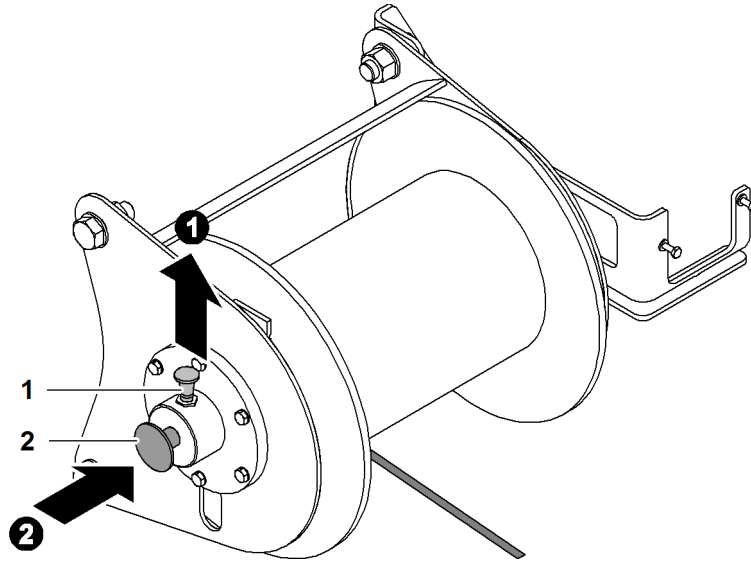


Fig. 5389: Stopping the free-wheel of the rope reeving winch

- | | |
|-------------------|---------|
| 1 Locking element | 2 Shaft |
|-------------------|---------|



Note

Liebherr recommends:

- ▶ Making it easier to press in the axle **2**: move the rope reeving winch manually back and forth.

- ▶ Pull up the locking element **1** and press in the axle **2** at the same time.
 - ▷ Free-wheel of the luffing rope is deactivated.



WARNING

Never stand in the immediate vicinity of the rope reeving winch or the luffing rope!

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.



- ▶ Press and hold the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch reeves in the rope of the rope reeving winch and tensions the rope of winch1/winch2.

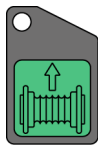


If rope of winch1/winch2 is in the 8th rope layer (only with free-fall winch 130 kN (29,230 lb.)):

- ▶ Press the *Bypass limit switch* button on control panel X23.
 - ▷ The 3-rope windings limit switch is bypassed.

There must be no slacking of the rope when unwinding.

- ▶ Unwind the rope of winch1/winch2 up to the rope fixing point.
- ▶ Press the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch switched off.



- ▶ Remove rope of the rope reeving winch from the rope of winch1/winch2.
- ▶ Press and hold the *Rope reeving winch* button on control panel X11.
 - ▷ Luffing rope is being reeved.
- ▶ Press the *Rope reeving winch* button on control panel X11.
 - ▷ Rope reeving winch switched off.
- ▶ Close and secure the rope guide (if present).

Mounting the rope protection rollers package

NOTICE

Wrongly installed washers!

Rope protection rollers package falls out of the support.

Damage to jib head section.

- ▶ Ensure proper installation position of the washers.
-

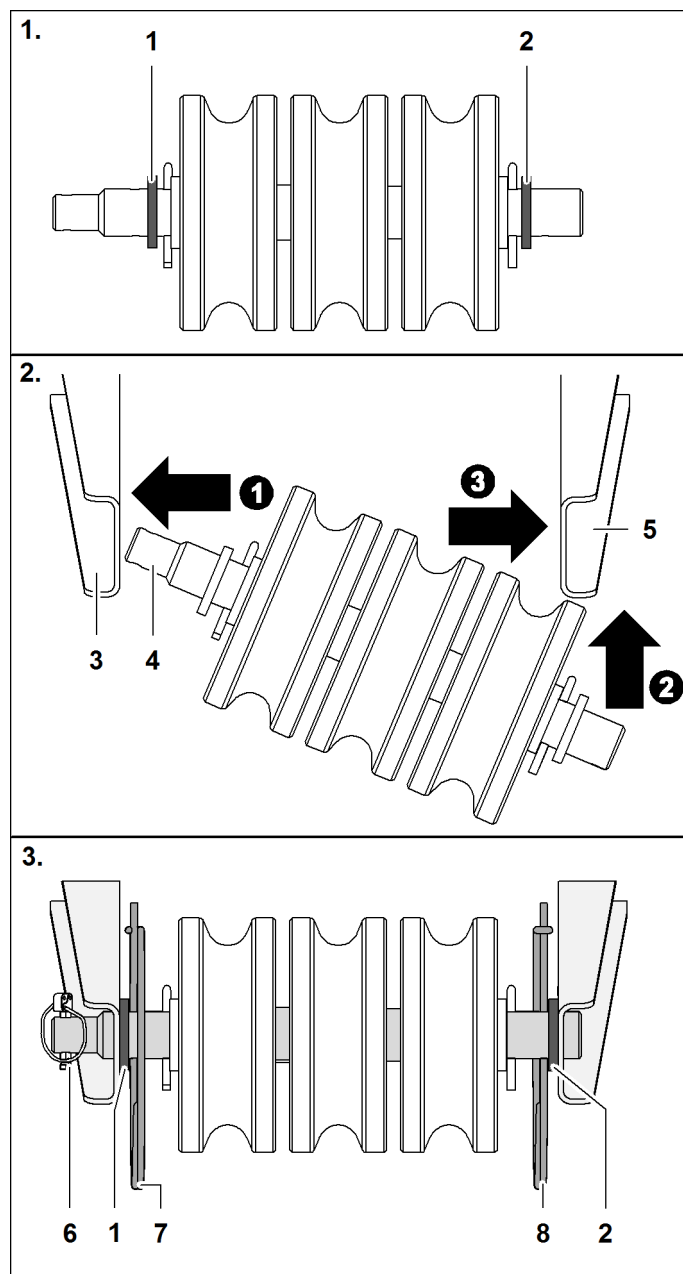


Fig. 5393: Mounting the rope protection rollers package on the jib head section

- | | | | |
|---|--------|---|------------|
| 1 | Washer | 5 | Mount |
| 2 | Washer | 6 | Linchpin |
| 3 | Mount | 7 | Safety pin |
| 4 | Shaft | 8 | Safety pin |

- ▶ Place washers 1 + 2 on axle.
- ▶ Insert axle 4 of the rope protection rollers package into support 3.
- ▶ Insert axle 4 into support 5.
- ▶ Put washers 1 + 2 into position.
- ▶ Install safety pins 7 + 8.
- ▶ Install linchpin 6.
 - ▷ Rope protection rollers package is installed.

Installing rope protection pipes

- ▶ Mount and secure rope protection pipes on jib head section and (if available) on auxiliary jib.

Reeving the rope without using a rope reeving winch

- ▶ Remove the rope protection pipes on the boom and the pulley block.
- ▶ Open up the rope guide (if present).
- ▶ Connect auxiliary rope with the rope of winch1/winch2.
- ▶ Pull the auxiliary rope next to the boom as far as the boom head.
- ▶ Hoist the auxiliary rope onto the boom.
- ▶ Reeve the auxiliary rope according to the rope reeving system.



If rope of winch1/winch2 is in the 8th rope layer (only with free-fall winch 130 kN (29,230 lb_t)):

- ▶ Press the *Bypass limit switch* button on control panel X23.
 - ▷ The 3-rope windings limit switch is bypassed.

There must be no slacking of the rope when unwinding.

- ▶ Unwind the rope of winch1/winch2 up to the rope fixing point.
- ▶ Remove auxiliary rope from the rope of winch1/winch2.
- ▶ Close and secure the rope guide (if present).
- ▶ Mount and secure rope protection pipes.

7.22.24 Installing the rope fixing point

Mounting rope fixing point on jib head section



DANGER

Wrong installation of pin and pocket lock!
Load breakaway.

- ▶ Install pins and pocket lock according to specifications.

The collar of the pins and the pocket lock openings are decisive for the installation direction of the rope fixing point.

Assemble the luffing jib

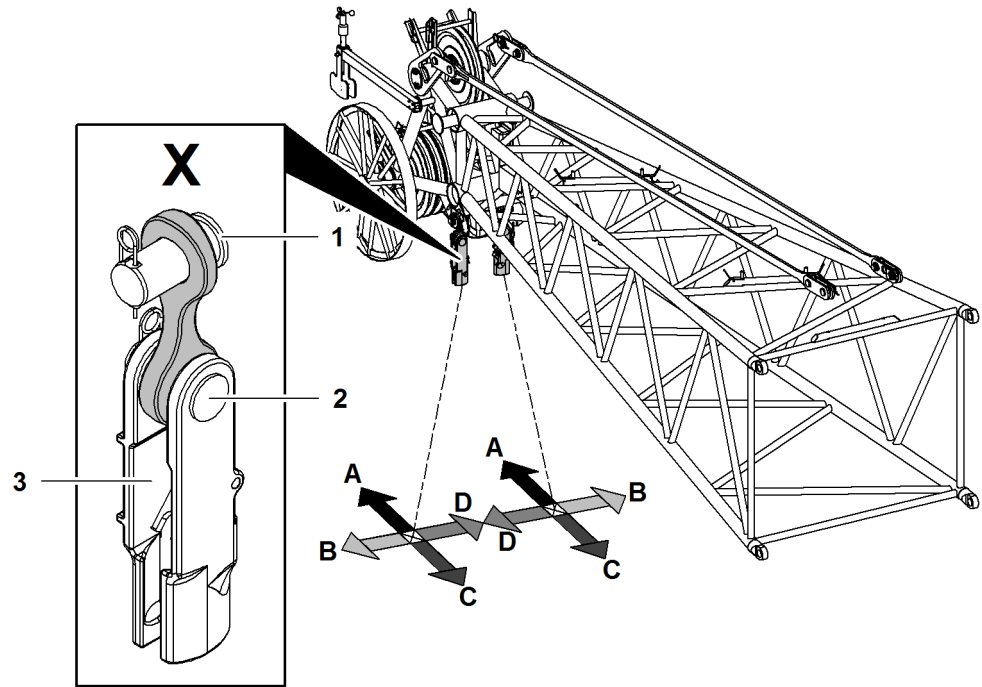


Fig. 5395: Determining the installation direction of the components of the rope fixing point of relevance for installation - luffing jib (illustration of principle)

- | | | | |
|---|----------------------------|---|--|
| 1 | Collar of pin on boom head | B | Outside |
| 2 | Pin collar on pocket lock | C | Direction basic machine |
| 3 | Pocket lock opening | D | Inside |
| A | Direction main boom head | X | Components of relevance for installation |

Installation direction of the rope fixing point components of relevance for installation			
	Collar of pin on boom head	Pin collar on pocket lock	Pocket lock opening
All rope fixing points	D	C	B
Exceptions:			
Fixed jib head section 0906	B	C	B
Fixed jib head section 1507	B	C	B

Tab. 605: Installation direction of the rope fixing point components of relevance for installation



WARNING

Inadmissible installation of swivels!
Severe injuries, damage to machine.

- ▶ Install rope with no twists.
- ▶ Install rope without swivels.

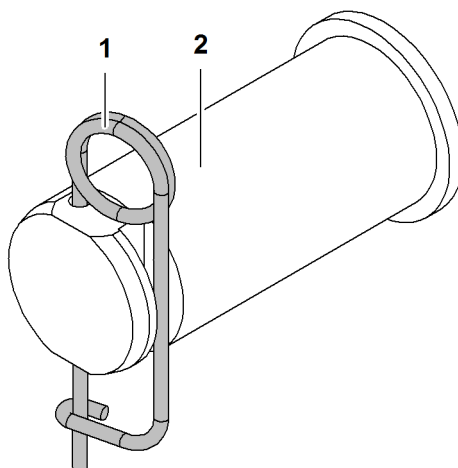


Fig. 5396: Securing pins

1 Locking spring

2 Pin



DANGER

Pins 2 not completely secured!
Load breakaway.

- ▶ Ensure that locking spring 1 completely secures the pin 2.
-

Mounting rope fixing point on auxiliary jib on jib head section



DANGER

Wrong installation of pin and pocket lock!
Load breakaway.

- ▶ Install pins and pocket lock according to specifications.
-

The collar of the pins and the pocket lock openings are decisive for the installation direction of the rope fixing point.

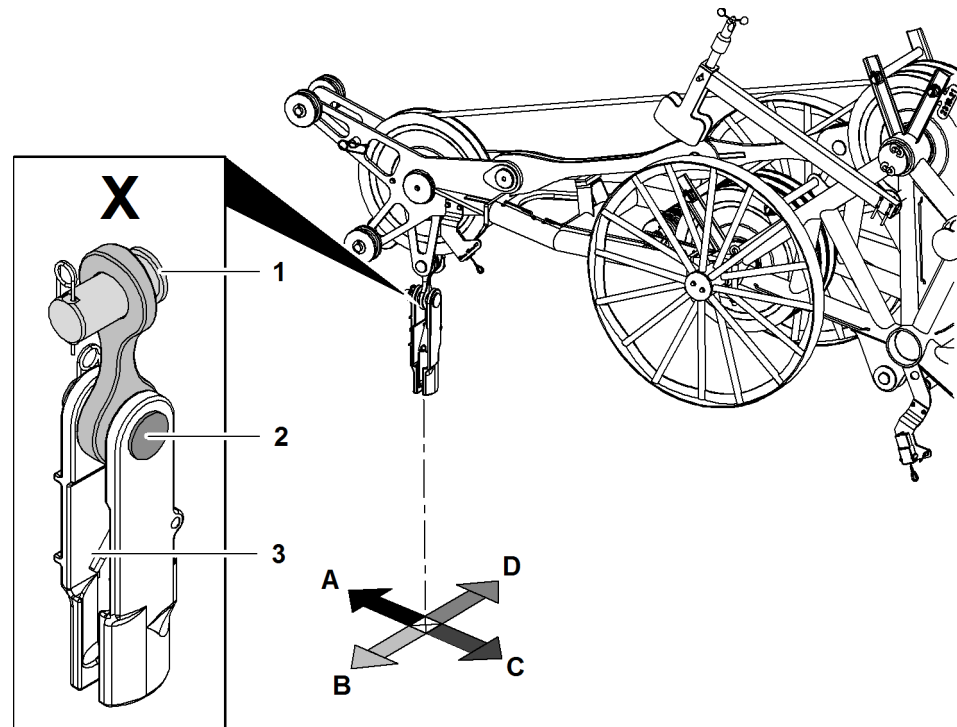


Fig. 5397: Determining the installation direction of the components of the rope fixing point of relevance for installation - auxiliary jib on jib head section (illustration of principle)

- | | | | |
|---|----------------------------|---|--|
| 1 | Collar of pin on boom head | B | Outside |
| 2 | Pin collar on pocket lock | C | Direction basic machine |
| 3 | Pocket lock opening | D | Inside |
| A | Direction main boom head | X | Components of relevance for installation |

Installation direction of the rope fixing point components of relevance for installation			
	Collar of pin on boom head	Pin collar on pocket lock	Pocket lock opening
All rope fixing points	D	C	B

Tab. 606: Installation direction of the rope fixing point components of relevance for installation



WARNING

Inadmissible installation of swivels!
Severe injuries, damage to machine.

- ▶ Install rope with no twists.
- ▶ Install rope without swivels.

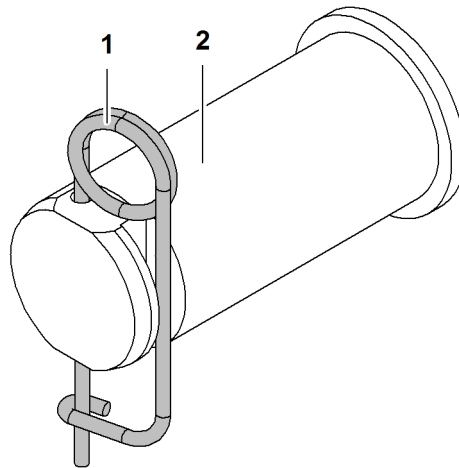


Fig. 5398: Securing pins

1 Locking spring

2 Pin

**DANGER**

Pins 2 not completely secured!
Load breakaway.

- ▶ Ensure that locking spring 1 completely secures the pin 2.

Mounting rope fixing point on boom head

- ▶ Pin cross strap with boom head.
- ▶ Secure pin with locking spring.
- ▶ Pin pocket lock with cross strap.
- ▶ Secure pin with locking spring.

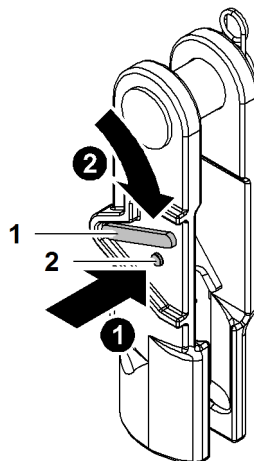


Fig. 5399: Unlocking the pocket lock

1 Safety latch

2 Safety button

- ▶ Press Safety button 2.
- ▶ Press safety latch 1 down and hold.

- ▶ Press safety latch **1** down and hold.

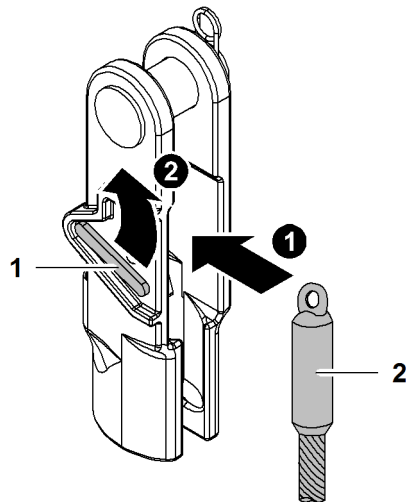


Fig. 5402: Inserting the end of rope into pocket lock and locking the pocket lock

1 Safety latch

2 End of rope

- ▶ Insert end of rope **2** in pocket lock.



DANGER

End of rope **2** not properly secured!
Load breakaway.

- ▶ Ensure that the safety latch **1** engages.

- ▶ Let go of safety latch **1**.
 - ▷ Safety latch **1** engages.

7.22.25 Installing the hoist limit switch

The following can be installed on the hoist limit switch:

- Hoist limit switch weight
- Hoist limit switch bracket*

Installing the hoist limit switch weight

NOTICE

Improper installation of the hoist limit switch weight!
Damage to rope and hoist limit switch weight.

- ▶ Install hoist limit switch weight without diagonal pull.
- ▶ Always install the hoist limit switch weight on the slack rope of winch1/winch2, except with single reeving.

Assemble the luffing jib

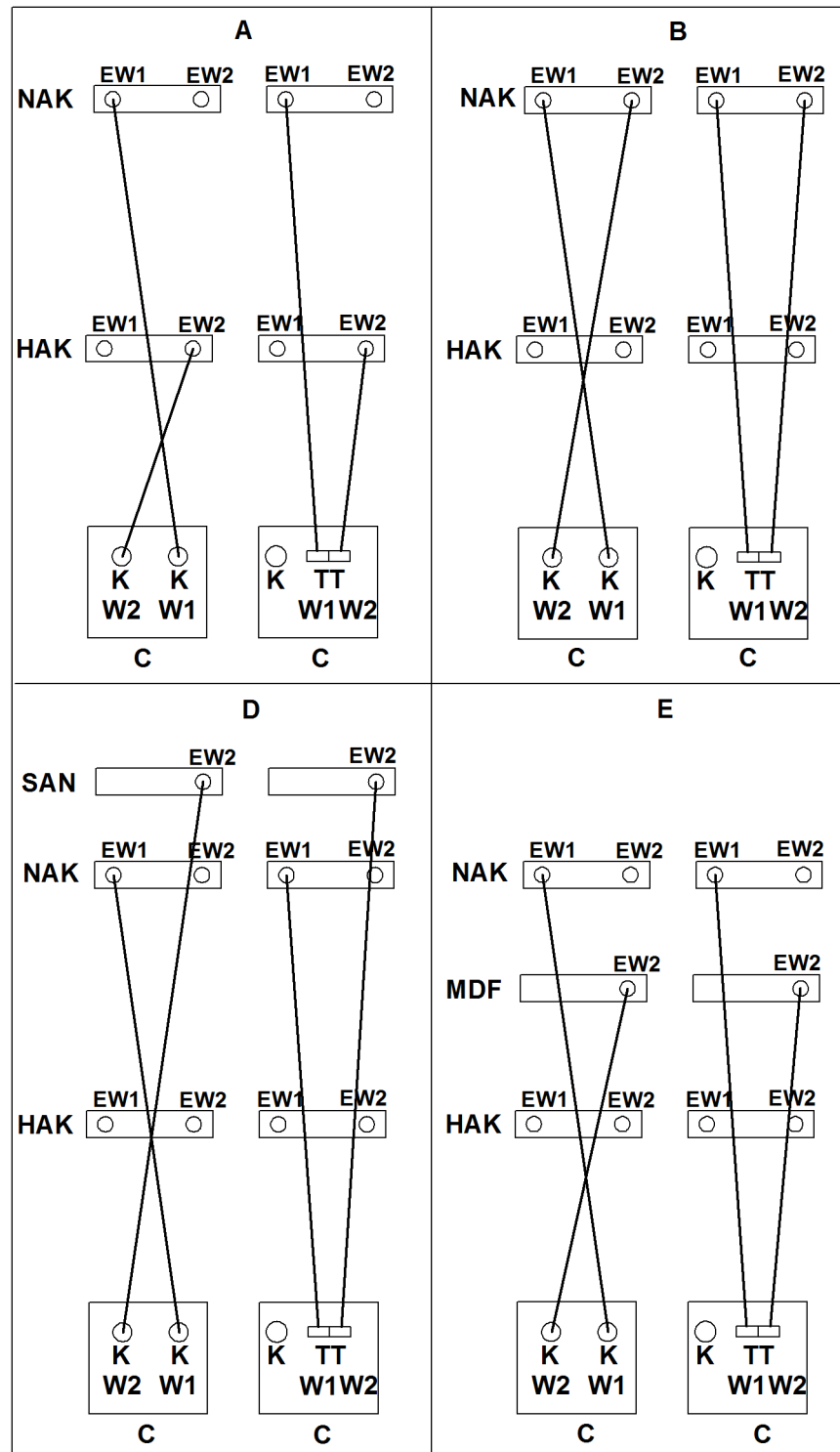


Fig. 5403: Hoist limit switch assignment depending on winch1/winch2

- A** Boom configuration main boom + luffing jib
- B** Boom configuration main boom + luffing jib with two ropes across jib head section
- D** Boom configuration main boom + luffing jib with auxiliary jib on jib head section
- K** Multi-directional control lever
- MDF** Midfall
- NAK** Jib head section

See next page for continuation of the image legend

- | | |
|---|--|
| E Boom configuration main boom + luffing jib + midfall | SAN Auxiliary jib on jib head section |
| C Cabin | TT Double T control lever |
| EW1 Hoist limit switch winch1 | W1 Winch1 |
| EW2 Hoist limit switch winch2 | W2 Winch2 |
| HAK Main boom head | |

NOTICE

Wrong hoist limit switch!
Hoist limit switch does not turn off.

- ▶ Make sure that the correct hoist limit switch for the correct rope of winch1/ winch2 is used.

The hoist limit switch with chain and hoist limit switch weight attached is secured to the inoperative end of the hoist rope.

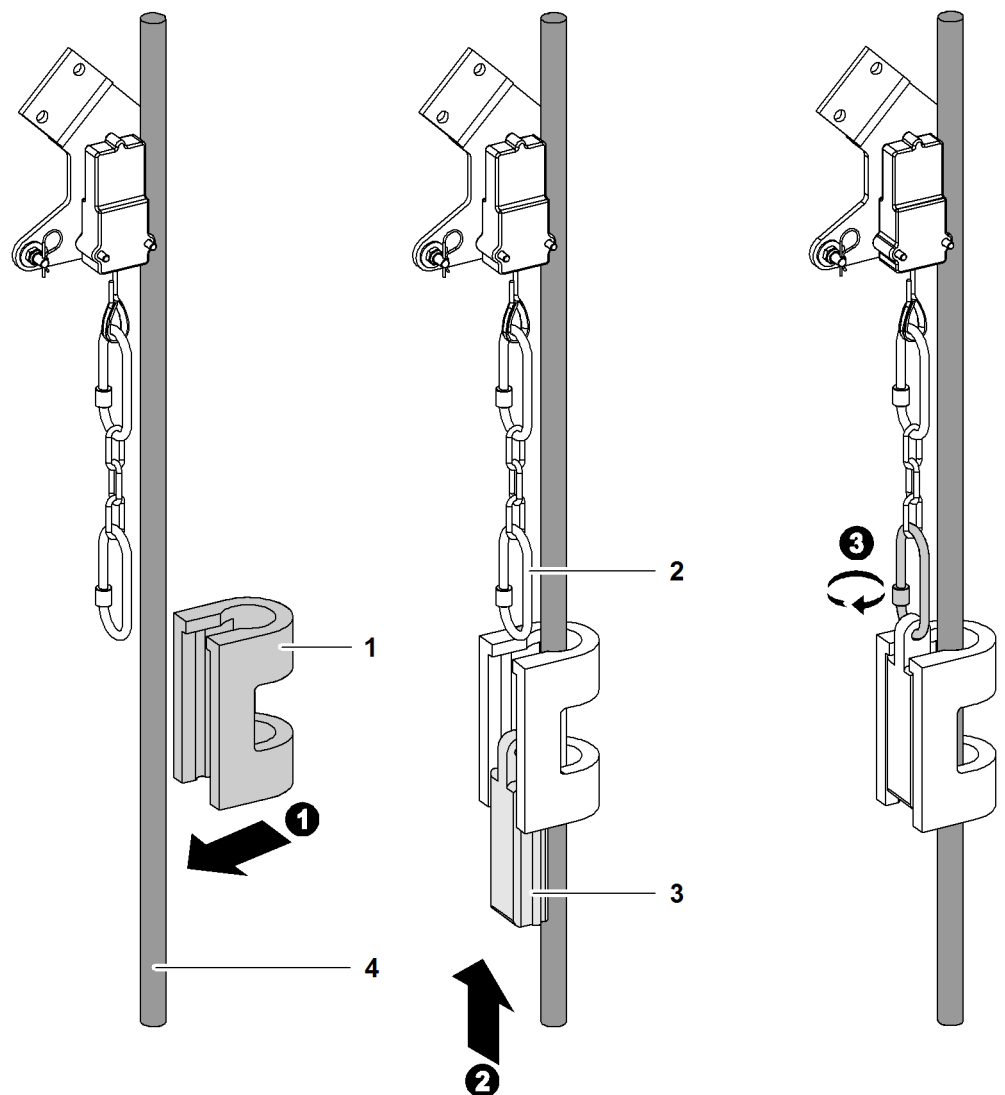


Fig. 5404: Installing the hoist limit switch weight

- | | |
|--|--|
| 1 Hoist limit switch weight (U shape) | 3 Hoist limit switch weight (wedge) |
| 2 Carabiner | 4 Rope of winch1/winch2 |

- ▶ Guide the hoist limit switch weight (U shape) 1 over the rope of winch1/ winch2 4.

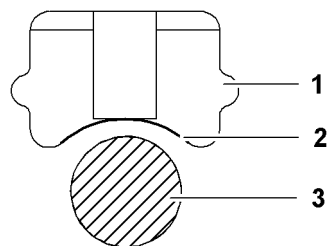


Fig. 5405: Hoist limit switch weight (wedge) view from above

- 1 Hoist limit switch weight (wedge) 3 Rope of winch1/winch2
 2 Curvature

The hoist limit switch weight (wedge) 1 has a curvature 2 on one side.

NOTICE

Wrongly installed hoist limit switch weight (wedge)!
 Hoist limit switch weight (wedge) damaged with wrong installation of rope of winch1/winch2.

- ▶ Make sure that the curvature of the hoist limit switch weight (wedge) is installed in the direction of the rope of winch1/winch2.
-
- ▶ Slide the hoist limit switch weight (wedge) 1 from below into the hoist limit switch weight (U shape).
 - ▶ Hinge carabiners on hoist limit switch weight (wedge) 1.



Note

Liebherr recommends:

- ▶ visual inspection of the carabiner prior to installation.
- ▶ Clean dirty carabiner with a clean cloth and water.
- ▶ If necessary, re-clean with a slightly oily cloth.

NOTICE

Improper installation of carabiner!
 Damage to machine.

- ▶ Make sure that the screw of the carabiner points downwards.
 - ▶ Make sure that the locking element is twisted shut.
-

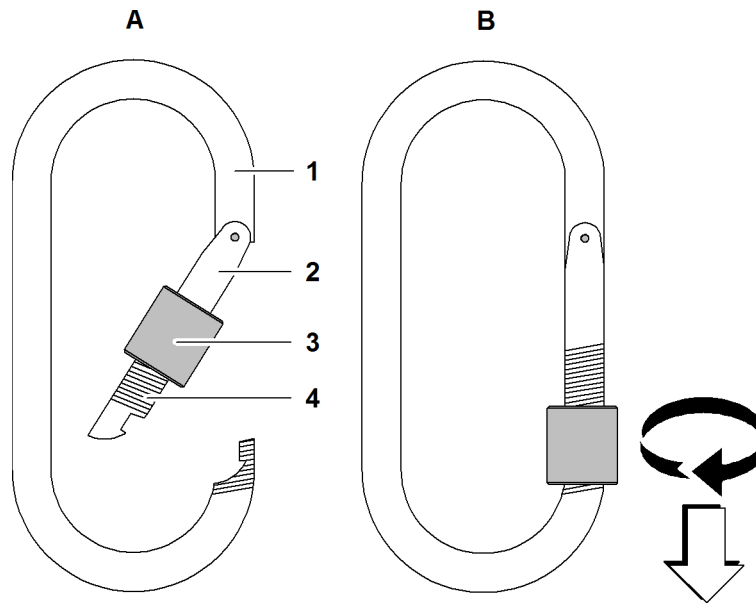


Fig. 5406: Carabiner

- | | | | |
|---|-----------------|---|------------------|
| 1 | Carabiner | 4 | Thread |
| 2 | Snapper | A | Opened carabiner |
| 3 | Locking element | B | Closed carabiner |

- ▶ Secure carabiner 1 with locking element 3.

NOTICE

Chain on hoist limit switch weight is too short!

Hoist limit switch weight responds too late. Hook damages boom head.

- ▶ Ensure that hoist limit switch weight chain is at least 3 m (9' 10" ft-in) and at most 4.5 m (14' 9" ft-in) long.

- ▶ Attach chain between hoist limit switch weight and hoist limit switch.

Installing hoist limit switch bracket* variant 2 on jib head section

The hoist limit switch bracket replaces the hoist limit switch weight.

Single reeving

With single reeving, a transverse pipe is installed.

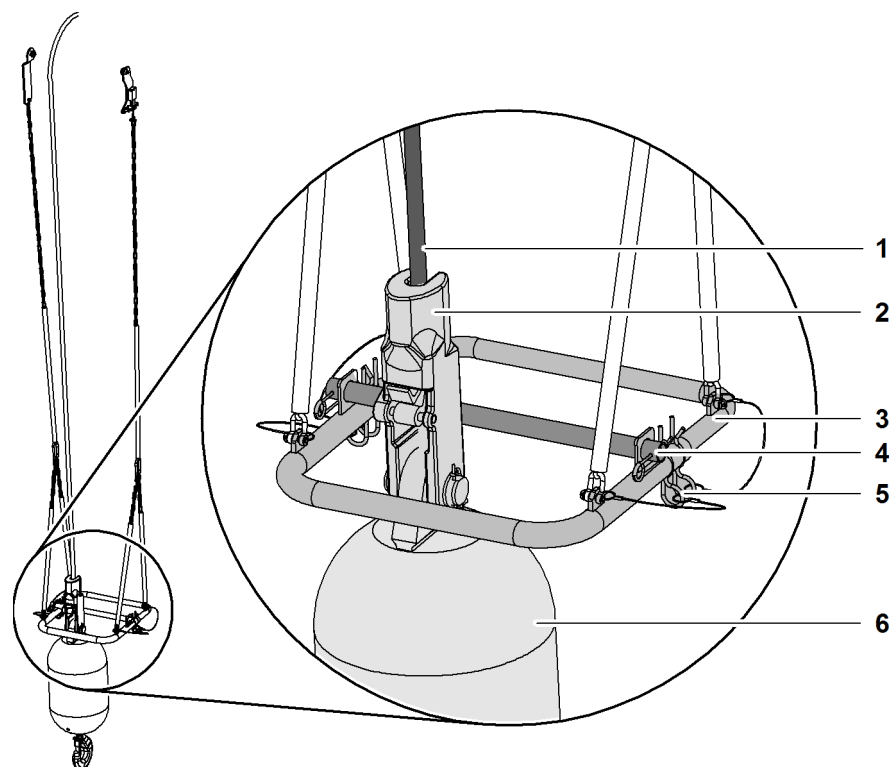


Fig. 5407: Installing hoist limit switch bracket variant 2 with single reeving on jib head section

- | | | | |
|---|----------------------------|---|------------------------|
| 1 | Winch1 rope | 4 | Transverse pipe |
| 2 | Pocket lock | 5 | Spring cotter pin (2x) |
| 3 | Hoist limit switch bracket | 6 | Hook |

- ▶ Position rope 1 of winch1 in front of lateral pipe 4 of hoist limit switch bracket 3.
- ▶ Mount hoist limit switch bracket 3 and secure with spring cotter pins 5.

Multiple reeving

With multiple reeving, the transverse pipe is removed.

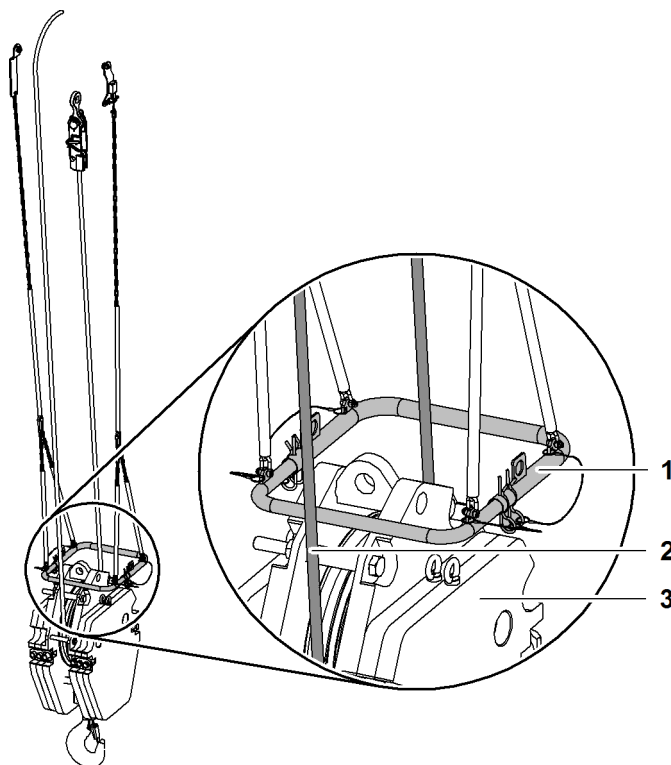


Fig. 5408: Installing hoist limit switch bracket variant 2 with multiple reeving on jib head section

- | | | | |
|---|----------------------------|---|--------------|
| 1 | Hoist limit switch bracket | 3 | Pulley block |
| 2 | Spring cotter pin (2x) | | |

- ▶ Position rear rope between rear pipe and front pipe.
- ▶ Push front pipe into rear pipe and secure with spring cotter pins 2.

Installing hoist limit switch bracket* variant 2 on main boom head

The hoist limit switch bracket replaces the hoist limit switch weight.

Single reeving

With single reeving, a transverse pipe is installed.

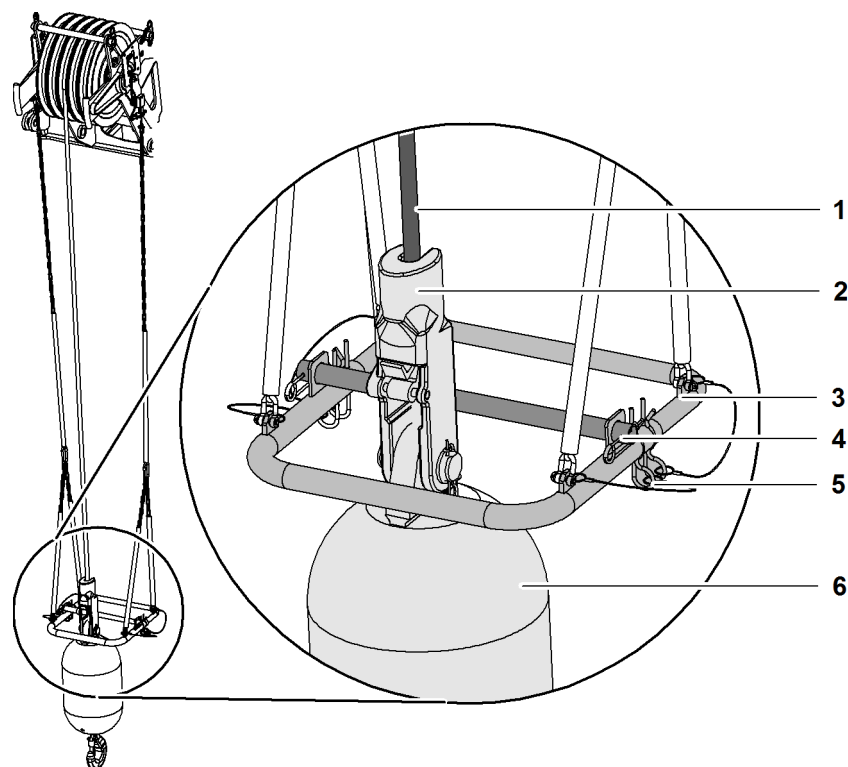


Fig. 5409: Installing hoist limit switch bracket variant 2 with single reeving on main boom head

- | | | | |
|---|----------------------------|---|------------------------|
| 1 | Winch2 rope | 4 | Spacer pipe |
| 2 | Pocket lock | 5 | Spring cotter pin (2x) |
| 3 | Hoist limit switch bracket | 6 | Hook |

- ▶ Position rope 1 of winch2 in front of spacer pipe 4 of hoist limit switch bracket 3.
- ▶ Mount hoist limit switch bracket 3 and secure with spring cotter pins 5.

Multiple reeving

With multiple reeving, the transverse pipe is removed.

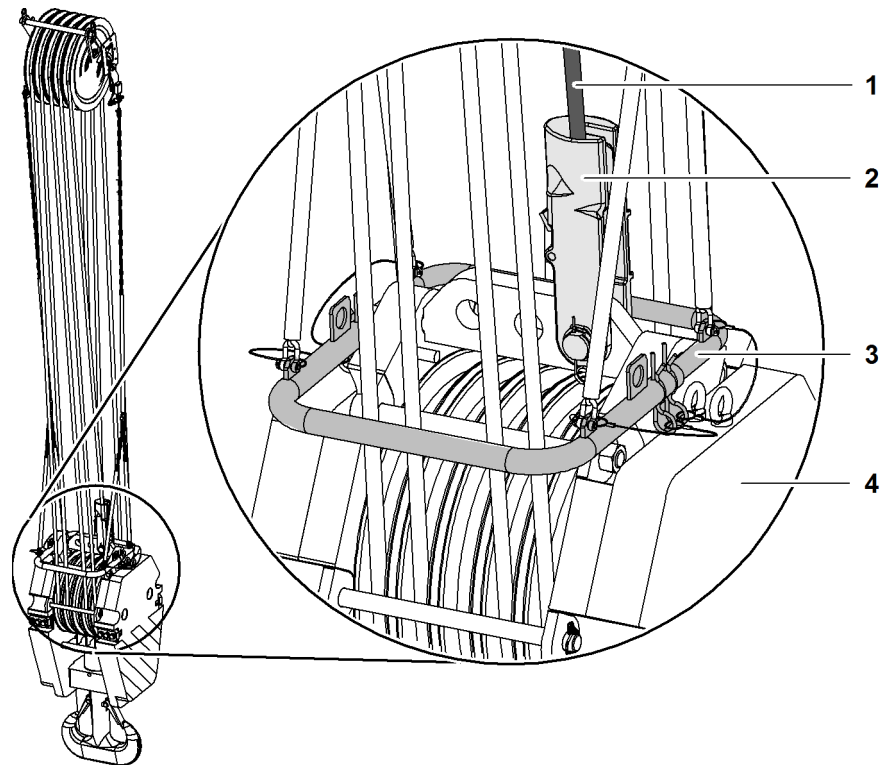


Fig. 5410: Installing hoist limit switch bracket variant 2 with multiple reeving on main boom head

- | | | | |
|---|-------------|---|----------------------------|
| 1 | Winch2 rope | 3 | Hoist limit switch bracket |
| 2 | Pocket lock | 4 | Pulley block |

- ▶ Position rear rope between rear pipe and front pipe.
- ▶ Push front pipe into rear pipe and secure with spring cotter pins.

7.22.26 Bypassing unused hoist limit switches



DANGER

Inadmissible bypassing of hoist limit switch!
Load breakaway.

- ▶ Only bypass unused hoist limit switches.

NOTICE

Wrong hoist limit switch is bypassed!
Hook damages boom head.

- ▶ Lock winch1 with left hoist limit switch.
- ▶ Lock winch2 with right hoist limit switch.

Make sure the following conditions are met:

- Only motion is performed with a rope of winch1/winch2. A hoist limit switch is not required.

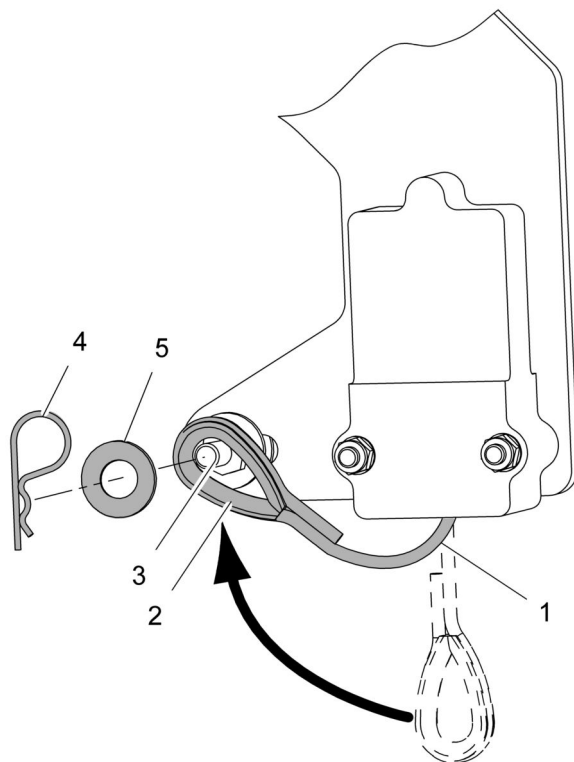


Fig. 5411: Bypassing the hoist limit switch mechanically

- | | | | |
|---|------------|---|----------------|
| 1 | Steel rope | 4 | Locking spring |
| 2 | Loop | 5 | Washer |
| 3 | Stud bolt | | |

- ▶ Pull the steel rope 1 and place the loop 2 over the stud bolt 3.
 - ▷ Hoist limit switch is bypassed.
- ▶ Protect the sling 2 from slipping off the stud bolt 3 by securing it with a washer 5 and a locking spring 4.

7.22.27 Erecting the main boom + luffing jib

Ensure that the following conditions are fulfilled:

- Boom configuration can be erected with counterweight.
- Signalmen and assistants are instructed.
- All work on the boom has been completed.
- No loose parts or tools have been left on the boom.



Note

The overall center of gravity of the machine is moved beyond the first running roller!
Sudden swinging of the boom/jib when erecting.

Liebherr recommends:

- ▶ When using long main booms and short jibs, follow the procedure for “Blocked Crawlers” ([For more information see: 4.27 Blocked crawlers*, page 1008](#)) .

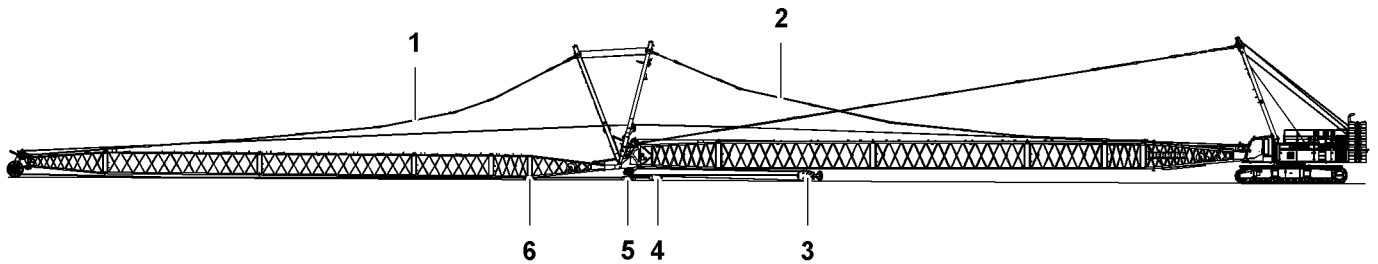


Fig. 5412: Main boom with luffing jib on the ground (illustration of principle)

1	Jib pendant straps	3	Pulley block	5	Timber
2	Jib backstay straps	4	Hook	6	Timber



DANGER

Hoist limit switch bypassed on control panel X23 in crane mode!
Load breakaway.

- ▶ Only bypass hoist limit switch on control panel X23 when assembling or disassembling the machine.



If hoist limit switch weight is on the ground:

- ▶ Press the *Bypass limit switch* button on control panel X23.
 - ▷ Hoist limit switches are bypassed.



- ▶ Press the *Load moment limiter assembly/self-lock* button on control panel X23.

No load chart exist for machines geometry:

- ▷ Function "load moment limiter assembly" is active.
- ▷ The LED on the button *Load moment limiter assembly/self-lock* lights up.
- ▷ Machine functions are enabled unlimited.
- ▷ Load Moment Limiter lamps flash orange.



DANGER

Erectability chart is not followed!
Machine toppling over.

- ▶ Only raise the boom when erection is permitted according to the erectability chart.



WARNING

Falling objects!

- ▶ Any loose parts and tools must be removed from the boom.
- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.

- ▶ Slowly lift main boom.
 - ▷ The main boom pendant straps are tensioned.



DANGER

Main boom and jib are lifted at the same time!
Machine toppling over.

- ▶ Do not lift jib together with main boom out of horizontal position.



WARNING

Dangerous voltage in boom!
Sudden sideways movement when lifting boom from ground.

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.

NOTICE

Incorrect erection procedure is followed!
Damage to the equipment.

- ▶ Do not drag the hook or the pulley block along the ground.
- ▶ Do not allow any slacking of the rope.
- ▶ Make sure that the lightning rod* on the jib head does not scrape on the ground.

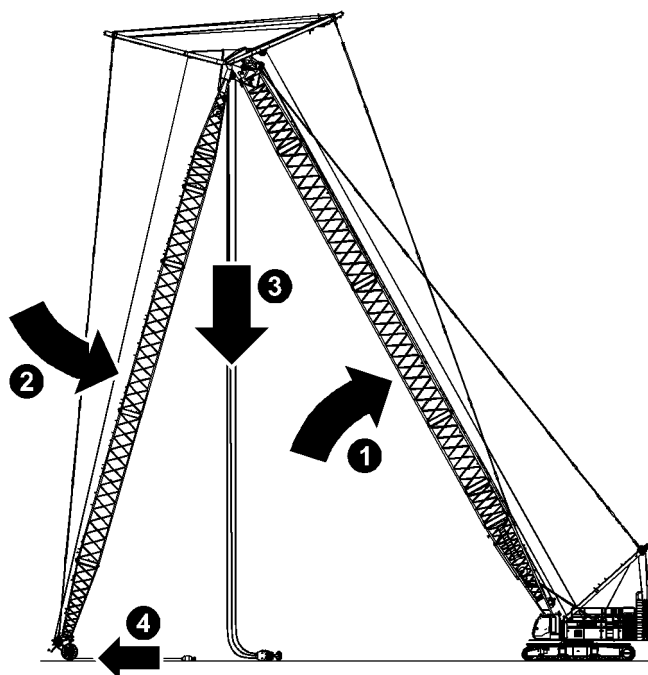


Fig. 5415: Lifting the main boom and lowering the jib at the same time (illustration of principle)

If the jib is shorter than the main boom, the lower jib limit switch triggers before the main boom reaches an angle of 85°.

If the jib is longer than the main boom, the main boom reaches an angle of 85° before the jib limit switch triggers.

The jib pendant straps must be clearly slack when erecting.

- ▶ Lift main boom and lower jib at the same time until main boom reaches an angle of 85° or the bottom jib limit switch triggers.
 - ▷ Main boom lifts off the ground.
 - ▷ Jib head runs backwards on guide rollers.
- ▶ Unwind rope of winch1/winch2 on main boom if necessary.
- ▶ Reeve rope of winch1/winch2 on jib if necessary.

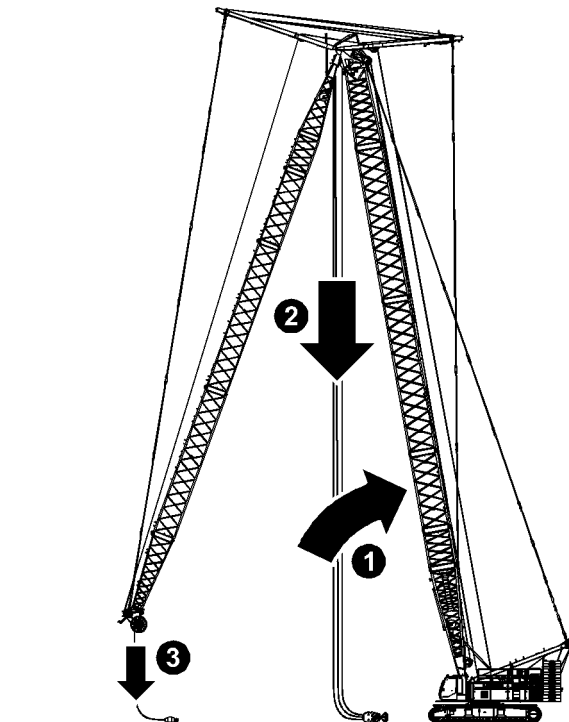


Fig. 5416: Lifting the main boom until main boom has reached an angle of 85° (illustration of principle)

When the bottom jib limit switch triggers:

- ▶ Lift main boom until main boom has reached an angle of 85°.
 - ▷ Jib head lifts off the ground.

NOTICE

Incorrect erection procedure!
Damage to equipment.

- ▶ Do not drag hook or pulley block along the ground.
 - ▶ Prevent slack rope.
-
- ▶ Unwind rope of winch1/winch2 on main boom if necessary.
 - ▶ Reeve rope of winch1/winch2 on jib if necessary.

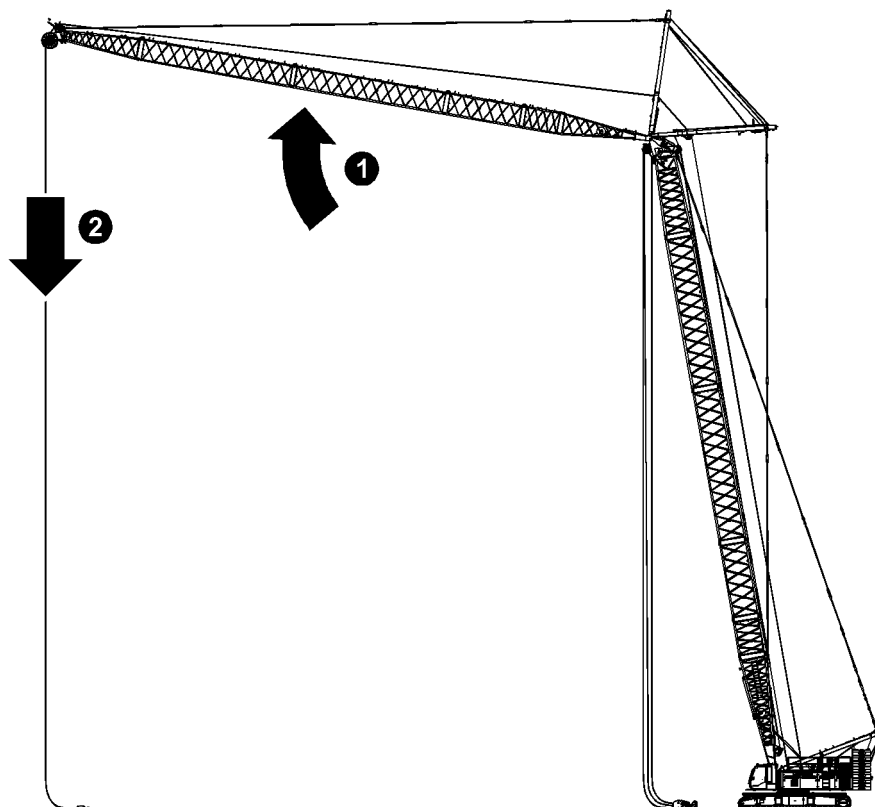


Fig. 5417: Lifting the jib

- ▶ Lift jib.
 - As soon as there is a load chart for machines geometry:
 - ▷ Deactivate function "load moment limiter assembly".
 - ▷ The LED on the button *Load moment limiter assembly/self-lock* goes out.
 - ▷ Load moment limiter is active.
 - ▷ Load moment limiter lamps light up according to the current status of the Load Moment Limiter system.

Troubleshooting

Jib cannot be lifted?

With boom configurations with long jibs, the line pull of the jib luffing winch is not sufficient to lift the jib.

- ▶ Lift main boom until jib head lifts off the ground.
- ▶ Lift jib.

NOTICE

Incorrect erection procedure!

Damage to equipment.

- ▶ Do not drag hook or pulley block along the ground.
- ▶ Prevent slack rope.

- ▶ Unwind rope of winch1/winch2 on jib if necessary.

When the maximum permitted lifting capacity is at least equal to the weight of the hook and/or pulley block:

- ▶ Raise the hook/pulley block.

- ▶ Erect jib until it is in the desired position.
 - ▷ Main boom with luffing jib is erected:

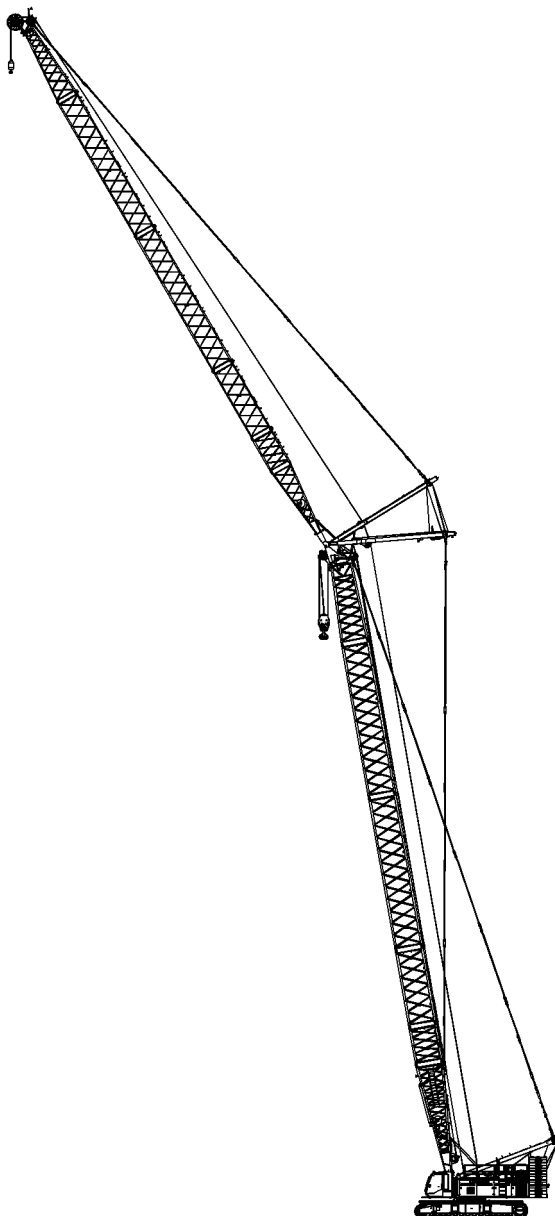


Fig. 5418: Main boom with luffing jib is erected

7.22.28 Turning off assembly functions

Make sure the following conditions are met:

- Machine is readily mounted and erected.
- All limit switches are mounted and functioning.



- ▶ Press the switch *Assembly functions* on control panel X12.
 - ▷ Assembly functions are switched off.
 - ▷ The symbol *Assembly functions* is no longer displayed on the monitor.

7.22.29 Checking the top jib limit switch for function

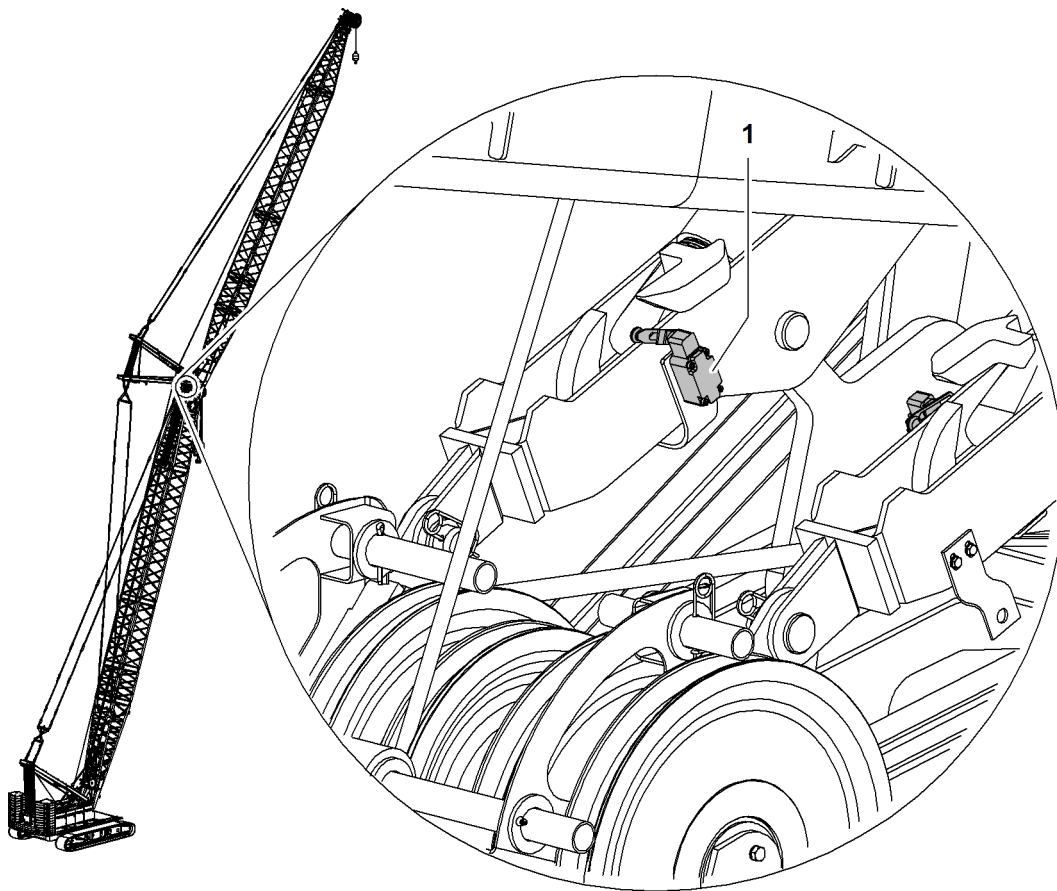


Fig. 5420: Checking the top jib limit switch for function

1 Top jib limit switch (2x)

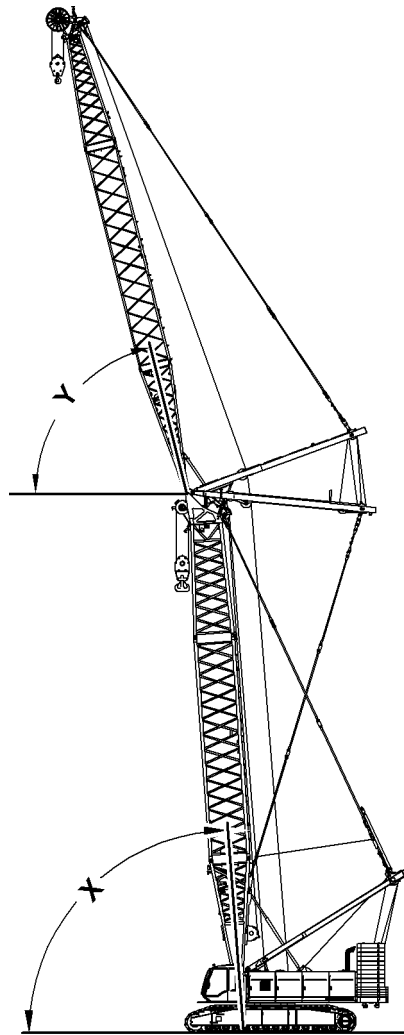


Fig. 5421: Top jib angle

Boom configuration	Angle X	Angle Y
Main boom + luffing jib	88°	78°
Main boom + luffing jib + midfall		

Tab. 607: Jib limit switch

NOTICE

Wrongly adjusted jib limit switch!
Damage to machine.

► Make sure that the jib limit switch is properly adjusted.

- Erect the jib until the screen *Operation* shows the angle **X**.
 - ▷ Limit switch triggers.
 - ▷ Lift jib is locked.

If the limit switch triggers too early or not at all:

- Switch off machine.
- Contact Liebherr service department.

7.22.30 Checking the jib limit switch plate for proper adjustment

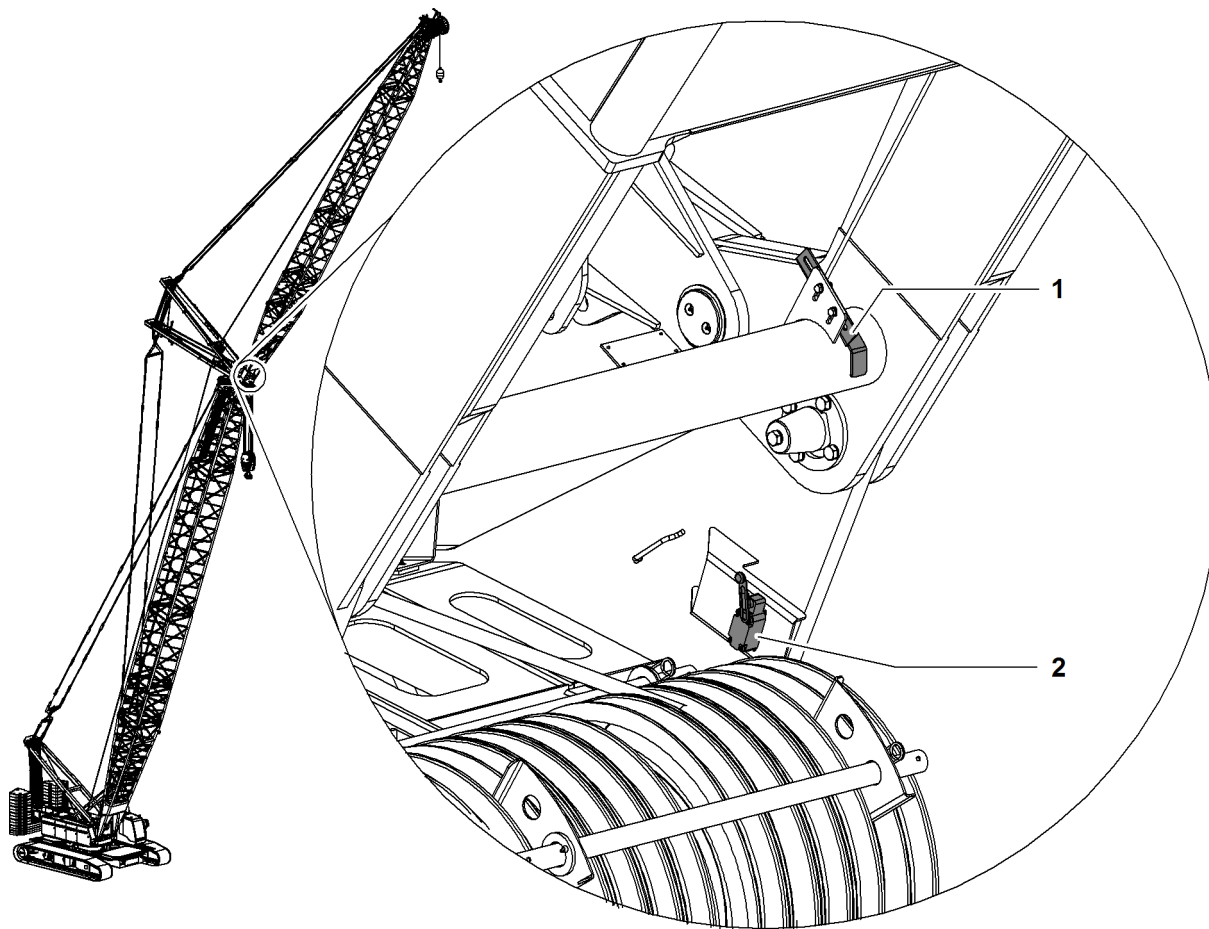


Fig. 5422: Checking the jib limit switch plate for proper adjustment

- 1 Jib limit switch plate
- 2 Jib limit switch

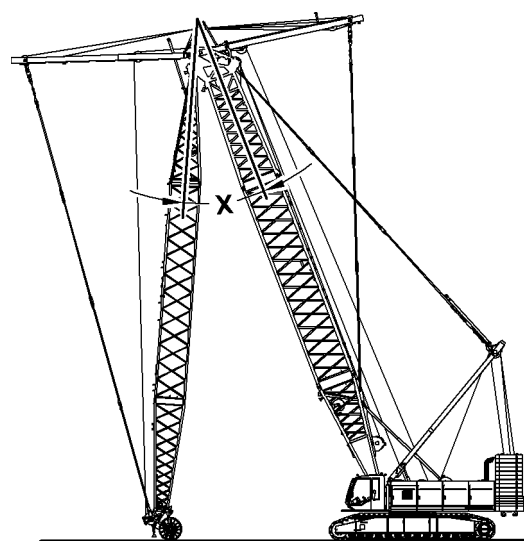


Fig. 5423: Bottom jib angle

Boom configuration	Angle X
Main boom + luffing jib	30° difference to main boom
Main boom + luffing jib + midfall	

Tab. 608: Jib limit switch plate

NOTICE

Incorrect calibration of the jib limit switch plate!
Damage to machine.

▶ Make sure that the jib limit switch plate is properly adjusted.

-
- ▶ Lower the jib until the screen *Operation* shows the angle **X**.
- ▷ Limit switch triggers.
 - ▷ Lower jib is locked.

If the limit switch triggers too early or not at all:

- ▶ Switch off machine.
- ▶ Contact Liebherr service department.

7.23 Luffing jib 2316 + midfall 2316

System-relevant information for luffing jib 2316 + midfall 2316:

- Configuration of jib
 - Mid-point suspensions installation positions
- Lengths of jib mid-point suspensions
- Configuration of main boom
- Overview of steel pendant straps on luffing jib 2316 + midfall 2316
- Overview of CF pendant straps on luffing jib 2316 + midfall 2316
- Reeving diagrams for one rope across jib head 2316 (load position1)
- Reeving diagrams for one rope across midfall 2316 (load position3)

7.23.1 Configuration of jib



DANGER

Excess length of jib!
Structural breakdown.

- ▶ Check jib length in load chart for validity.

Jib length	Position of midfall	Configuration of jib (symbolic)
38.5 m 126 ft	16 m 52' 6" ft-in	
41.5 m 136 ft	19 m 62' 4" ft-in	
44.5 m 146 ft	22 m 72' 2" ft-in	
47.5 m 156 ft	25 m 82' ft-in	
50.5 m 166 ft	28 m 91' 10" ft-in	
53.5 m 176 ft	31 m 101' 8" ft-in	
56.5 m 185 ft	22 m 72' 2" ft-in	
59.5 m 195 ft	25 m 82' ft-in	
62.5 m 205 ft	28 m 91' 10" ft-in	
65.5 m 215 ft	31 m 101' 8" ft-in	
68.5 m 225 ft	34 m 111' 7" ft-in	
71.5 m 235 ft	37 m 121' 5" ft-in	

Jib length	Position of midfall	Configuration of jib (symbolic)
74.5 m 244 ft	40 m 131' 3" ft-in	
77.5 m 254 ft	43 m 141' 1" ft-in	
80.5 m 264 ft	34 m 111' 7" ft-in	
83.5 m 274 ft	37 m 121' 5" ft-in	
86.5 m 284 ft	40 m 131' 3" ft-in	
89.5 m 294 ft	43 m 141' 1" ft-in	
92.5 m 304 ft	46 m 150' 11" ft-in	
95.5 m 313 ft	49 m 160' 9" ft-in	
98.5 m 323 ft	52 m 170' 7" ft-in	
101.5 m 333 ft	55 m 180' 5" ft-in	
104.5 m 343 ft	46 m 150' 11" ft-in	
107.5 m 353 ft	49 m 160' 9" ft-in	
110.5 m 363 ft	52 m 170' 7" ft-in	

Tab. 609: Configuration of luffing jib 2316 + midfall 2316

X1 - Installation position mid-point suspension 1

X2 - Installation position mid-point suspension 2

7.23.2 Lengths of jib mid-point suspensions

Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
50.5 m 166 ft	3 m 9' 10" ft-in	
53.5 m 176 ft	3 m 9' 10" ft-in	
56.5 m 185 ft	2.6 m 8' 6" ft-in	
59.5 m 195 ft	2.6 m 8' 6" ft-in	

Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
62.5 m 205 ft	2.1 m 6' 11" ft-in	
65.5 m 215 ft	5.6 m 18' 4" ft-in = 3.0 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
68.5 m 225 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
71.5 m 235 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
74.5 m 244 ft	4.7 m 15' 5" ft-in = 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in)	1.6 m 5' 3" ft-in
77.5 m 254 ft	5.6 m 18' 4" ft-in = 3.0 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	1.6 m 5' 3" ft-in
80.5 m 264 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
83.5 m 274 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	2.1 m 6' 11" ft-in
86.5 m 284 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	2.1 m 6' 11" ft-in
89.5 m 294 ft	4.7 m 15' 5" ft-in = 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
92.5 m 304 ft	4.7 m 15' 5" ft-in = 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in

Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
95.5 m 313 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
98.5 m 323 ft	5.6 m 18' 4" ft-in = 3.0 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
101.5 m 333 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
104.5 m 343 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	2.6 m 8' 6" ft-in
107.5 m 353 ft	4.7 m 15' 5" ft-in = 2.1 m (6' 11" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
110.5 m 363 ft	5.6 m 18' 4" ft-in = 3.0 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	2.6 m 8' 6" ft-in

Tab. 610: Lengths of jib mid-point suspensions - 2316 luffing jib + 2316 Midfall

7.23.3 Configuration of main boom



DANGER

Assembly with excessive main boom length!
Structural failure.

- ▶ Check main boom length in load chart for validity.



Note

- ▶ Information on the configuration of the main boom can be found under system-related data for the main boom ([For more information see: 7.5.1 Configuration of main boom, page 1319](#)).

7.23.4 Overview of steel pendant straps on luffing jib 2316 + midfall 2316

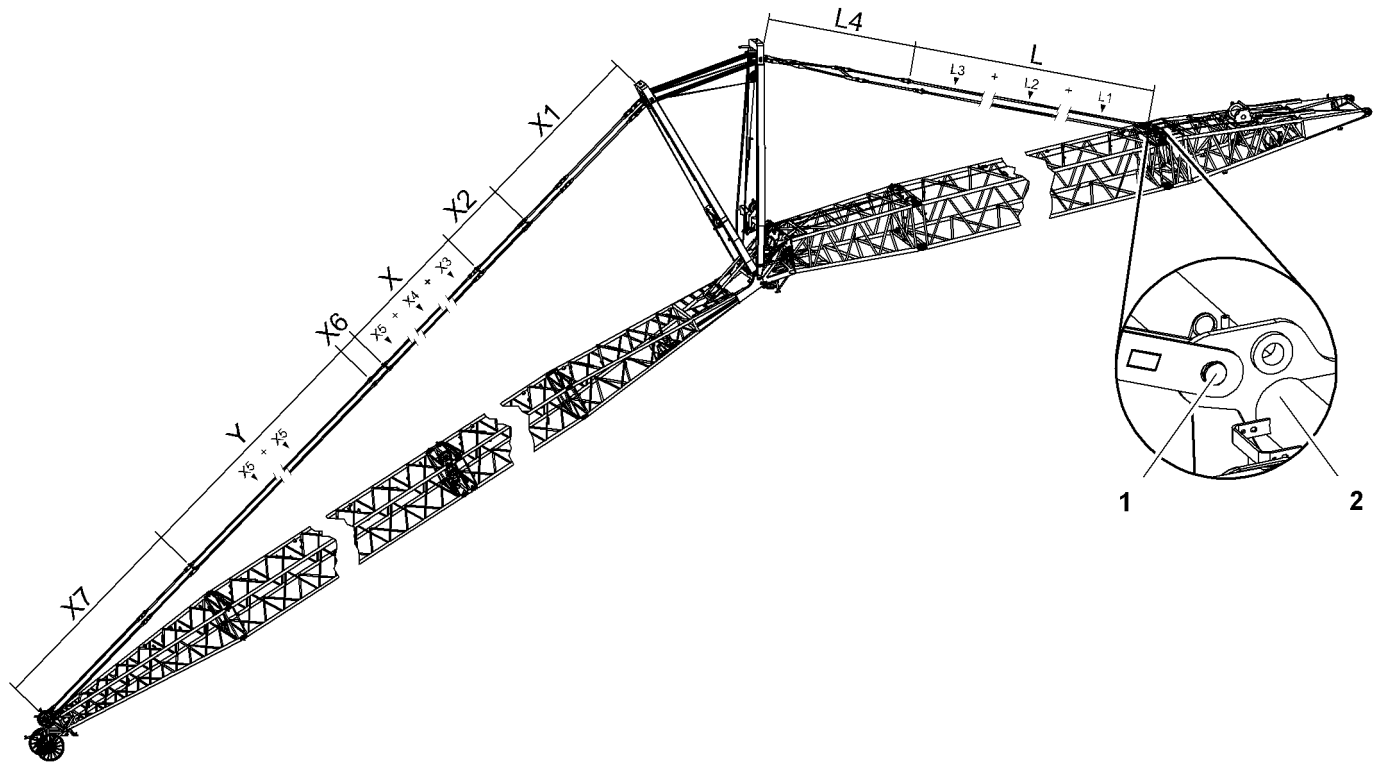


Fig. 5627: Overview of steel pendant straps on luffing jib 2316 + midfall 2316

- 1 Pin connection point for jib backstay straps
- 2 Main boom base section

Jib backstay straps A-frame2 to main boom base section 2821

Name		Value
L	Jib backstay straps consisting of:	
	L1	Jib backstay strap 3 m (10 ft) (For more information see: Jib backstay strap 3 m (10 ft), page 199)
	L2	Jib backstay strap 6 m (20 ft) (For more information see: Jib backstay strap 6 m (20 ft), page 201)
	L3	Jib backstay strap 12 m (40 ft) (For more information see: Jib backstay strap 12 m (40 ft), page 203)
L4	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap), page 313)	8050 mm 26' 5" ft-in

Tab. 611: Jib backstay straps A-frame2 to main boom base section 2821

Configuration of jib backstay straps (L):

Required number of jib backstay straps 3 m (10 ft) (L1) corresponds to number of main boom sections 3 m (10 ft).

Required number of jib backstay straps 6 m (20 ft) (**L2**) corresponds to number of main boom sections 6 m (20 ft).

Required number of jib backstay straps 12 m (40 ft) (**L3**) corresponds to number of main boom sections 12 m (40 ft).



Note

- For the admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the load chart.

Pendant straps A-frame3 to jib head section 2316

Name		Value
X1	A-frame3 equalizer (jib pendant strap) (For more information see: A-frame3 equalizer (jib pendant strap) , page 314)	7850 mm 25' 9" ft-in
X2	Jib pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft) , page 312)	3000 mm 9' 10" ft-in
X	Jib pendant straps consisting of:	Total X3 + Total X4 + Total X5
	X3 Jib pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft) , page 316)	
	X4 Jib pendant strap 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft) , page 316)	
X5 Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft) , page 317)		
X6	Midfall connecting link (For more information see: Midfall connecting link , page 373)	920 mm 3' ft-in
Y	Jib pendant straps consisting of:	Total X5
	X5 Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft) , page 317)	
X7	Jib pendant strap on jib head section 2316 (For more information see: Jib pendant strap on jib head 2316.20 , page 318)	9500 mm 31' 2" ft-in

Tab. 612: Pendant straps A-frame3 to jib head section 2316

Configuration of jib pendant straps (X):

Required number of jib pendant straps 3 m (10 ft) (**X3**) corresponds to number of jib sections 3 m (10 ft).

Required number of jib pendant straps 6 m (20 ft) (**X4**) corresponds to number of jib sections 6 m (20 ft).

Required number of jib pendant straps 12 m (40 ft) (**X5**) corresponds to number of jib sections 12 m (40 ft).



Note

► For the admissible number of jib sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following table: (For more information see: 7.23.1 Configuration of jib, page 1788)

7.23.5 Overview of CF pendant straps on luffing jib 2316 + midfall 2316

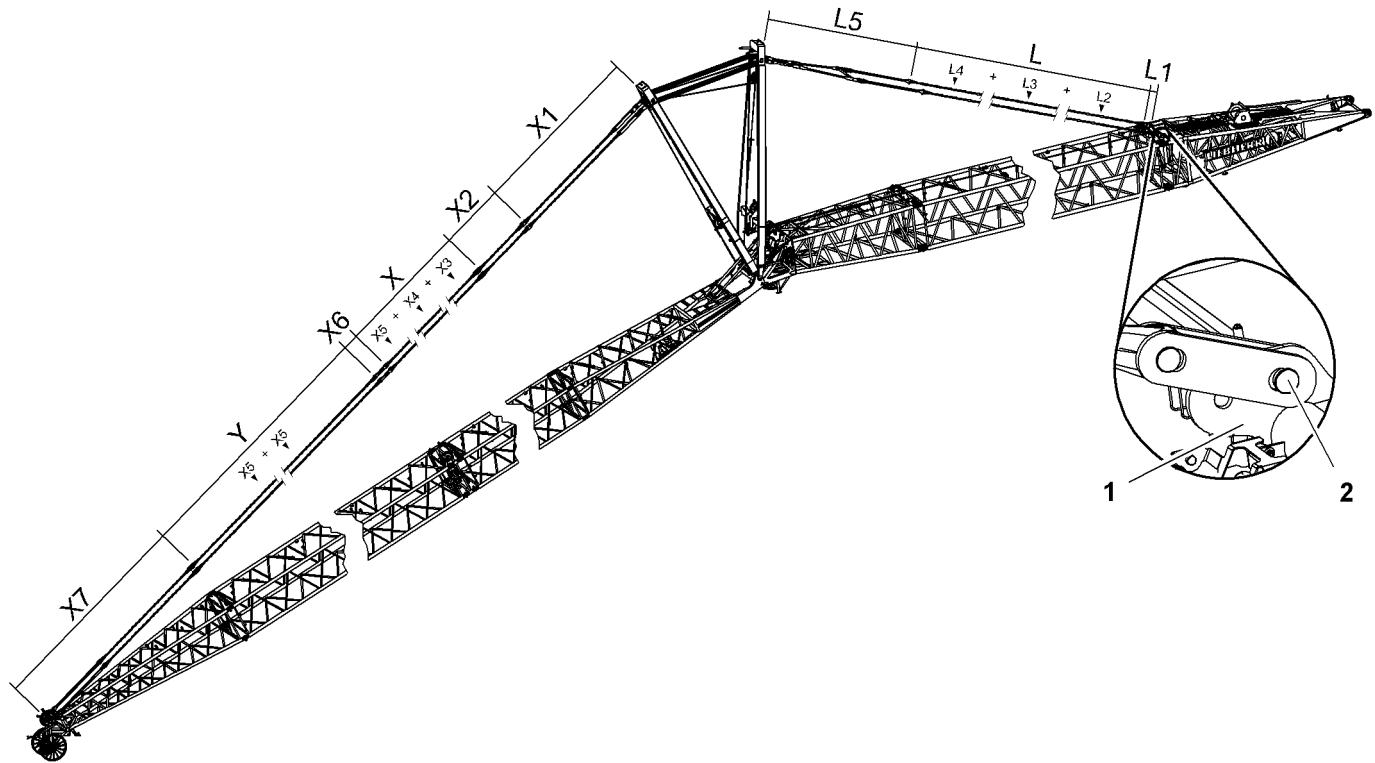


Fig. 5628: Overview of CF pendant straps on luffing jib 2316 + midfall 2316

- 1 Main boom base section
- 2 Pin connection point for jib backstay straps

Jib backstay straps A-frame2 to main boom base section 2821

Name		Value
L1	Connecting link (For more information see: Connecting link , page 208)	350 mm 1' 2" ft-in
Jib backstay straps consisting of:		Total L2 + Total L3 + Total L4
L2	Jib backstay strap 3 m (10 ft) (For more information see: Jib backstay strap 3 m (10 ft) , page 210)	
L3	Jib backstay strap 6 m (20 ft) (For more information see: Jib backstay strap 6 m (20 ft) , page 214)	
L4	Jib backstay strap 12 m (40 ft) (For more information see: Jib backstay strap 12 m (40 ft) , page 218)	

Name		Value
L5	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap), page 321)	7769 mm 25' 6" ft-in

Tab. 613: Jib backstay straps A-frame2 to main boom base section 2821

Configuration of jib backstay straps (L):

Required number of jib backstay straps 3 m (10 ft) (**L2**) corresponds to number of main boom sections 3 m (10 ft).

Required number of jib backstay straps 6 m (20 ft) (**L3**) corresponds to number of main boom sections 6 m (20 ft).

Required number of jib backstay straps 12 m (40 ft) (**L4**) corresponds to number of main boom sections 12 m (40 ft).

**Note**

- For the admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the load chart.

The jib backstay straps (**L**) may consist of generation A and generation B jib backstay straps (For more information see: [1.11.9 CF pendant straps on main boom 2821, page 206](#)). Mixing is only admissible if the number of generation B jib backstay straps only differs by at most 1 in the left and the right strand of the jib backstay straps.

**DANGER**

Inadmissible mixing of generation A and generation B jib backstay straps!
Structural failure.

- Ensure that the number of generation B jib backstay straps differs by at most 1 in the left and the right strand of the jib backstay straps.

Pendant straps A-frame3 to jib head 2316

Name		Value	
X1	A-frame3 equalizer (jib pendant strap) (For more information see: A-frame3 equalizer (jib pendant strap), page 323)	7850 mm 25' 9" ft-in	
X2	Jib pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 320)	3000 mm 9' 10" ft-in	
X	Jib pendant straps consisting of:		
	X3	Jib pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 325)	Total X3 +
	X4	Jib pendant strap 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft), page 327)	Total X4 +
	X5	Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 328)	Total X5

Name		Value
X6	Midfall connecting link (For more information see: Midfall connecting link, page 374)	700 mm 2' 4" ft-in
Y	Jib pendant straps consisting of:	Total X5
	X5 Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 328)	
X7	Jib pendant strap on jib head 2316 (For more information see: Jib pendant strap on jib head 2316.20, page 330)	9540 mm 31' 4" ft-in

Tab. 614: Pendant straps A-frame3 to jib head 2316

Configuration of jib pendant straps (X):

Required number of jib pendant straps 3 m (10 ft) (**X3**) corresponds to number of jib sections 3 m (10 ft).

Required number of jib pendant straps 6 m (20 ft) (**X4**) corresponds to number of jib sections 6 m (20 ft).

Required number of jib pendant straps 12 m (40 ft) (**X5**) corresponds to number of jib sections 12 m (40 ft).



Note

- ▶ For the admissible number of jib sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following table: ([For more information see: 7.23.1 Configuration of jib, page 1788](#))

The jib pendant straps (**X**) may consist of generation A and generation B jib pendant straps ([For more information see: 1.20.8 CF pendant straps on luffing jib 2316, page 320](#)). Mixing is only admissible if the number of generation B jib pendant straps only differs by at most 1 in the left and the right strand of the jib pendant straps.



DANGER

Inadmissible mixing of generation A and generation B jib pendant straps!
 Structural failure.

- ▶ Ensure that the number of generation B jib pendant straps differs by at most 1 in the left and the right strand of the jib pendant straps.

7.23.6 Reeving diagrams for one rope across jib head section 2316 (load position 1)

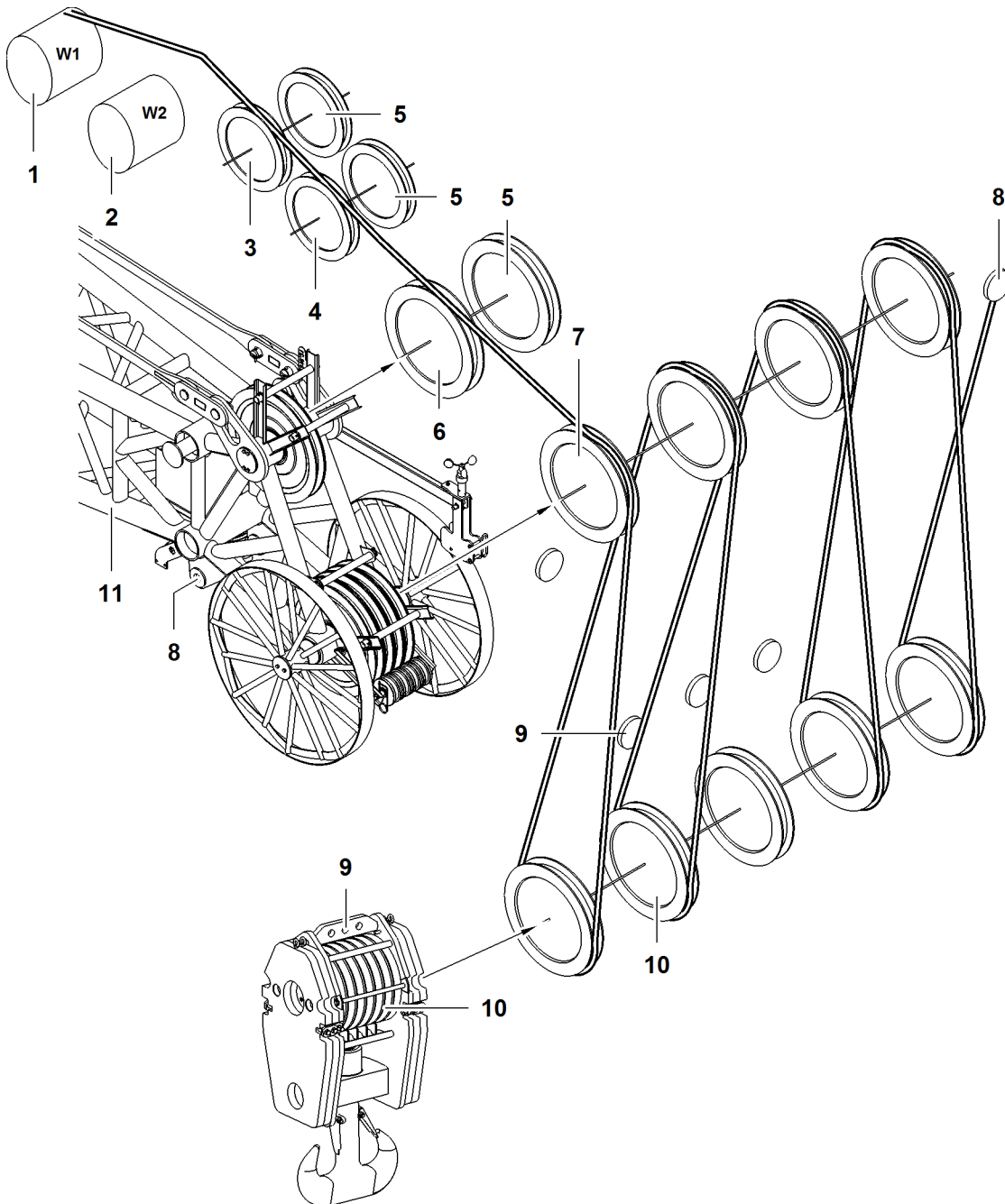


Fig. 5629: Reeving diagrams for one rope across jib head section 2316 (load position 1)

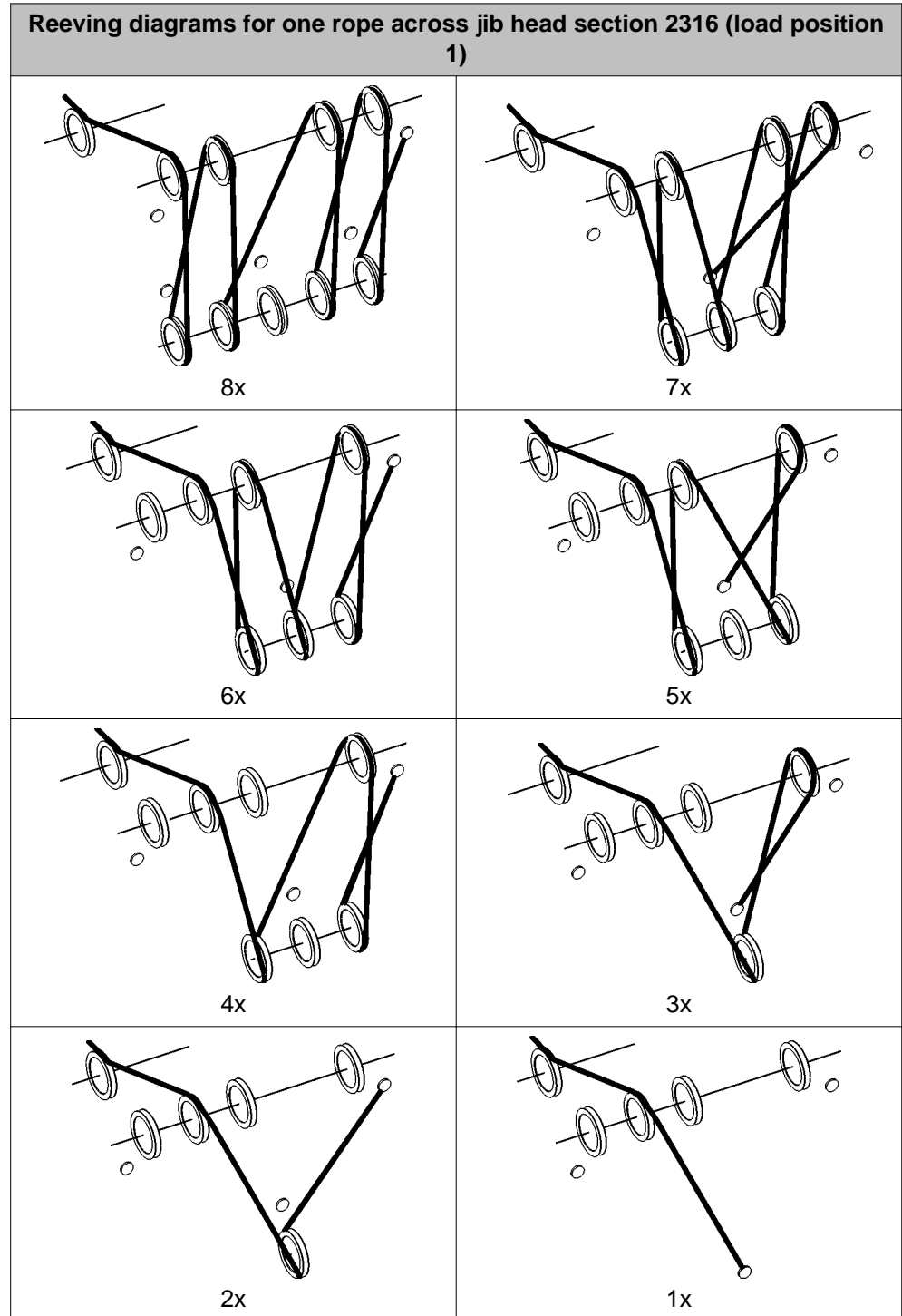
1	Winch1	5	Retrofit kit* for operation with two ropes across jib head section	9	Rope fixing points of pulley block
2	Winch2	6	Gantry pulley of jib head section	10	Pulley set of pulley block
3	Rope pulley of A-frame2	7	Rope pulley (4x) of jib head section	11	Jib head section
4	Rope pulley of A-frame3	8	Rope fixing point of jib head section		



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

- ▶ Select correct number of reevings as indicated in load chart.



Tab. 615: Reeving diagrams for one rope across jib head section 2316 (load position 1)

7.23.7 Reeving diagrams for one rope across midfall 2316 (load position3)

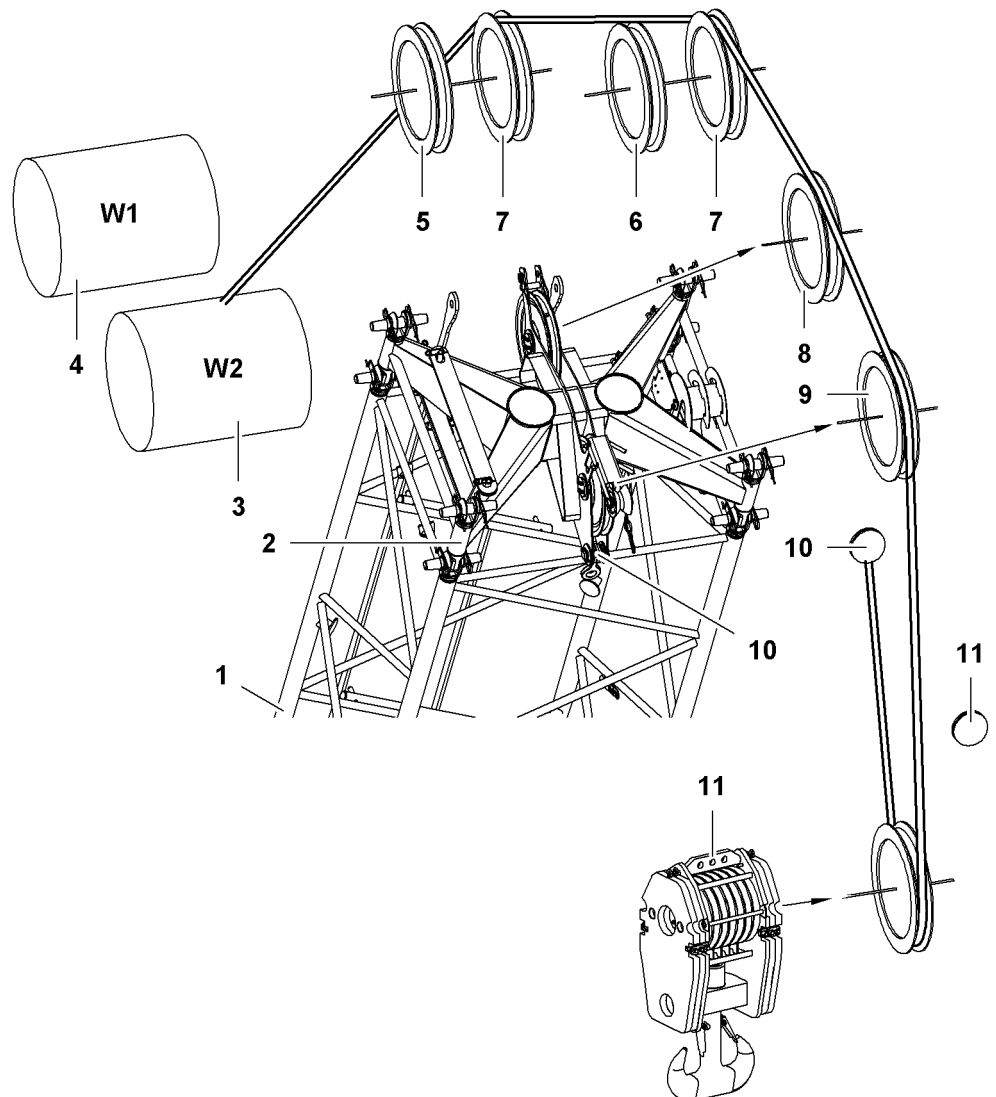


Fig. 5638: Reeving diagrams for one rope across midfall 2316 (load position3)

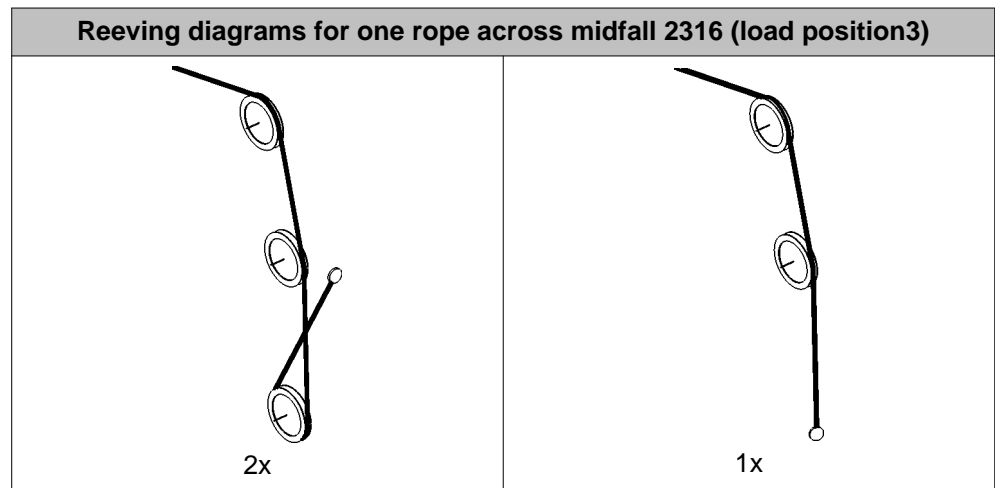
- | | | | |
|---|-------------------------|----|--|
| 1 | Jib | 7 | Retrofit kit* for operation with two ropes across jib head section |
| 2 | Midfall | 8 | Top rope pulley of midfall |
| 3 | Winch2 | 9 | Bottom rope pulley of midfall |
| 4 | Winch1 | 10 | Rope fixing point of midfall |
| 5 | Rope pulley of A-frame2 | 11 | Rope fixing points of pulley block |
| 6 | Rope pulley of A-frame3 | | |



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

► Select correct number of reevings as indicated in load chart.



Tab. 616: Reeving diagrams for one rope across midfall 2316 (load position3)

7.24 Luffing jib 1916 + midfall 1916

System-relevant information for luffing jib 1916 + midfall 1916:

- Configuration of jib
 - Mid-point suspensions installation positions
- Lengths of jib mid-point suspensions
- Configuration of main boom
- Overview of steel pendant straps on luffing jib 1916 + midfall 1916
- Overview of CF pendant straps on luffing jib 1916 + midfall 1916
- Reeving diagrams for one rope across jib head 1916 (load position1)
- Reeving diagrams for one rope across midfall 1916 (load position3)

7.24.1 Configuration of jib



DANGER

Excess length of jib!
Structural breakdown.

► Check jib length in load chart for validity.

Jib length	Position of midfall	Configuration of jib (symbolic)
32.5 m 107 ft	13 m 42' 8" ft-in	
35.5 m 116 ft	16 m 52' 6" ft-in	
38.5 m 126 ft	19 m 62' 4" ft-in	
41.5 m 136 ft	22 m 72' 2" ft-in	
44.5 m 146 ft	25 m 82' ft-in	
47.5 m 156 ft	28 m 91' 10" ft-in	
50.5 m 166 ft	19 m 62' 4" ft-in	
53.5 m 176 ft	22 m 72' 2" ft-in	
56.5 m 185 ft	25 m 82' ft-in	
59.5 m 195 ft	28 m 91' 10" ft-in	
62.5 m 205 ft	31 m 101' 8" ft-in	
65.5 m 215 ft	34 m 111' 7" ft-in	

Jib length	Position of midfall	Configuration of jib (symbolic)
68.5 m 225 ft	37 m 121' 5" ft-in	
71.5 m 235 ft	40 m 131' 3" ft-in	
74.5 m 244 ft	43 m 141' 1" ft-in	
77.5 m 254 ft	34 m 111' 7" ft-in	
80.5 m 264 ft	37 m 121' 5" ft-in	
83.5 m 274 ft	40 m 131' 3" ft-in	
86.5 m 284 ft	43 m 141' 1" ft-in	
89.5 m 294 ft	46 m 150' 11" ft-in	
92.5 m 304 ft	49 m 160' 9" ft-in	
95.5 m 313 ft	52 m 170' 7" ft-in	

Tab. 617: Configuration of luffing jib 1916 + midfall 1916

X1 - Installation position mid-point suspension 1

X2 - Installation position mid-point suspension 2

7.24.2 Lengths of jib mid-point suspensions

Jib length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
47.5 m 156 ft	2.1 m 6' 11" ft-in	
50.5 m 166 ft	4.2 m 13' 9" ft-in = 2.6 m (8' 6" ft-in) + 1.6 m (5' 3" ft-in)	2.1 m 6' 11" ft-in
53.5 m 176 ft	6.0 m 19' 8" ft-in = 3.0 m (9' 10" ft-in) + 3.0 m (9' 10" ft-in)	2.1 m 6' 11" ft-in
56.5 m 185 ft	5.6 m 18' 4" ft-in = 3.0 m (9' 10" ft-in) + 2.6 m (8' 6" ft-in)	1.6 m 5' 3" ft-in

Jib length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
59.5 m 195 ft	5.2 m 17' 1" ft-in = 2.6 m (8' 6" ft-in) + 2.6 m (8' 6" ft-in)	1.6 m 5' 3" ft-in
62.5 m 205 ft	4.7 m 15' 5" ft-in = 2.6 m (8' 6" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
65.5 m 215 ft	4.6 m 15' 1" ft-in = 3.0 m (9' 10" ft-in) + 1.6 m (5' 3" ft-in)	3.0 m 9' 10" ft-in
68.5 m 225 ft	6.0 m 19' 8" ft-in = 3.0 m (9' 10" ft-in) + 3.0 m (9' 10" ft-in)	2.6 m 8' 6" ft-in
71.5 m 235 ft	5.2 m 17' 1" ft-in = 2.6 m (8' 6" ft-in) + 2.6 m (8' 6" ft-in)	2.1 m 6' 11" ft-in
74.5 m 244 ft	5.1 m 16' 9" ft-in = 3.0 m (9' 10" ft-in) + 2.1 m (6' 11" ft-in)	2.1 m 6' 11" ft-in
77.5 m 254 ft	4.7 m 15' 5" ft-in = 2.6 m (8' 6" ft-in) + 2.1 m (6' 11" ft-in)	2.1 m 6' 11" ft-in
80.5 m 264 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
83.5 m 274 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
86.5 m 284 ft	5.2 m 17' 1" ft-in = 2.6 m (8' 6" ft-in) + 2.6 m (8' 6" ft-in)	1.6 m 5' 3" ft-in
89.5 m 294 ft	4.7 m 15' 5" ft-in = 2.6 m (8' 6" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in

Jib length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
92.5 m 304 ft	4.2 m 13' 9" ft-in = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in
95 m 312 ft	= 4.2 m (13' 9" ft-in) = 2.1 m (6' 11" ft-in) + 2.1 m (6' 11" ft-in)	1.6 m 5' 3" ft-in

Tab. 618: Lengths of jib mid-point suspensions - 1916 luffing jib + 1916 Midfall

7.24.3 Configuration of main boom



DANGER

Assembly with excessive main boom length!
Structural failure.

- ▶ Check main boom length in load chart for validity.



Note

- ▶ Information on the configuration of the main boom can be found under system-related data for the main boom ([For more information see: 7.5.1 Configuration of main boom, page 1319](#)).

7.24.4 Overview of steel pendant straps on luffing jib 1916 + midfall 1916

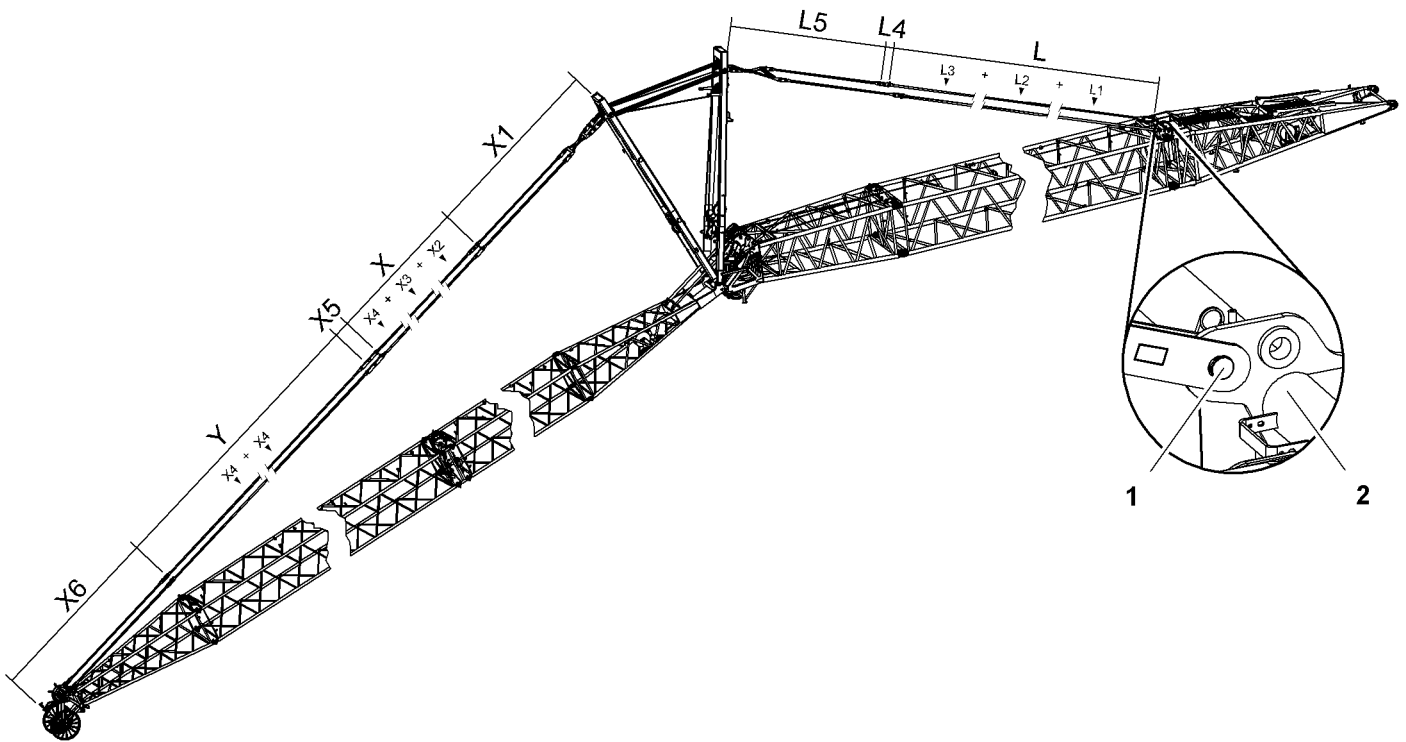


Fig. 5812: Overview of steel pendant straps on luffing jib 1916 + midfall 1916

- 1 Pin connection point for jib backstay straps
- 2 Main boom base section

Jib backstay straps A-frame2 to main boom base section 2821

Name		Value
L	Jib backstay straps consisting of:	
	L1	Jib backstay strap 3 m (10 ft) (For more information see: Jib backstay strap 3 m (10 ft), page 199)
	L2	Jib backstay strap 6 m (20 ft) (For more information see: Jib backstay strap 6 m (20 ft), page 201)
	L3	Jib backstay strap 12 m (40 ft) (For more information see: Jib backstay strap 12 m (40 ft), page 203)
L4	Connecting link (conversion kit) (For more information see: Connecting link (conversion kit), page 357)	390 mm 1' 3" ft-in
L5	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap), page 351)	7409 mm 24' 4" ft-in

Tab. 619: Jib backstay straps A-frame2 to main boom base section 2821

Configuration of jib backstay straps (L):

Required number of jib backstay straps 3 m (10 ft) (**L1**) corresponds to number of main boom sections 3 m (10 ft).

Required number of jib backstay straps 6 m (20 ft) (**L2**) corresponds to number of main boom sections 6 m (20 ft).

Required number of jib backstay straps 12 m (40 ft) (**L3**) corresponds to number of main boom sections 12 m (40 ft).



Note

► For the admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the load chart.

Pendant straps A-frame3 to jib head 1916

Name		Value	
X1	A-frame3 equalizer (jib pendant strap) (For more information see: A-frame3 equalizer (jib pendant strap), page 352)	7190 mm 23' 7" ft-in	
X	Jib pendant straps consisting of:		
	X2	Jib pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 354)	Total X2 +
	X3	Jib pendant strap 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft), page 355)	Total X3 +
	X4	Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 355)	Total X4
X5	Midfall connecting link (For more information see: Midfall connecting link, page 378)	890 mm 2' 11" ft-in	
Y	Jib pendant straps consisting of:		Total X4
	X4	Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 355)	
X6	Jib pendant strap on jib head 1916 (For more information see: Jib pendant strap on jib head 1916.21, page 356)	6500 mm 21' 4" ft-in	

Tab. 620: Pendant straps A-frame3 to jib head 1916

Configuration of jib pendant straps (X):

Required number of jib pendant straps 3 m (10 ft) (**X2**) corresponds to number of jib sections 3 m (10 ft).

Required number of jib pendant straps 6 m (20 ft) (**X3**) corresponds to number of jib sections 6 m (20 ft).

Required number of jib pendant straps 12 m (40 ft) (**X4**) corresponds to number of jib sections 12 m (40 ft).



Note

► For the admissible number of jib sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following table: (For more information see: 7.24.1 Configuration of jib, page 1801)

7.24.5 Overview of CF pendant straps on luffing jib 1916 + midfall 1916

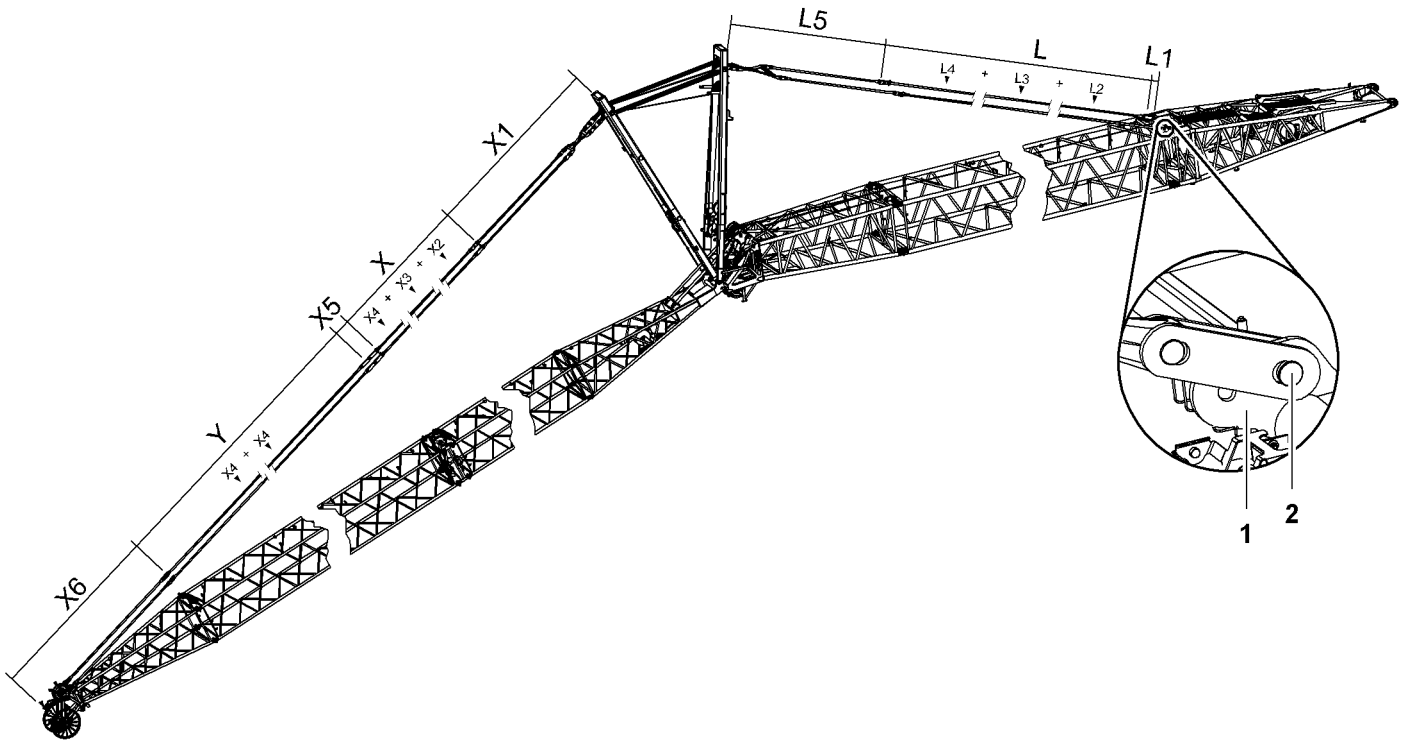


Fig. 5813: Overview of CF pendant straps on luffing jib 1916 + midfall 1916

- 1 Main boom base section
- 2 Pin connection point for jib backstay straps

Jib backstay straps A-frame2 to main boom base section 2821

Name		Value
L1	Connecting link (For more information see: Connecting link , page 208)	270 mm 10.63" in
Jib backstay straps consisting of:		
L	L2 Jib backstay strap 3 m (10 ft) (For more information see: Jib backstay strap 3 m (10 ft) , page 210)	Total L2 +
	L3 Jib backstay strap 6 m (20 ft) (For more information see: Jib backstay strap 6 m (20 ft) , page 214)	Total L3 +
	L4 Jib backstay strap 12 m (40 ft) (For more information see: Jib backstay strap 12 m (40 ft) , page 218)	Total L4

Name		Value
L5	A-frame2 equalizer (jib backstay strap) (For more information see: Equalizer A-frame2 (jib backstay strap), page 358)	7769 mm 25' 6" ft-in

Tab. 621: Jib backstay straps A-frame2 to main boom base section 2821

Configuration of jib backstay straps (L):

Required number of jib backstay straps 3 m (10 ft) (**L2**) corresponds to number of main boom sections 3 m (10 ft).

Required number of jib backstay straps 6 m (20 ft) (**L3**) corresponds to number of main boom sections 6 m (20 ft).

Required number of jib backstay straps 12 m (40 ft) (**L4**) corresponds to number of main boom sections 12 m (40 ft).



Note

- ▶ For the admissible number of main boom sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the load chart.

The jib backstay straps (**L**) may consist of generation A and generation B jib backstay straps (For more information see: [1.11.9 CF pendant straps on main boom 2821, page 206](#)). Mixing is only admissible if the number of generation B jib backstay straps only differs by at most 1 in the left and the right strand of the jib backstay straps.



DANGER

Inadmissible mixing of generation A and generation B jib backstay straps!
Structural failure.

- ▶ Ensure that the number of generation B jib backstay straps differs by at most 1 in the left and the right strand of the jib backstay straps.

Pendant straps A-frame3 to jib head 1916

Name		Value	
X1	A-frame3 equalizer (jib pendant strap) (For more information see: A-frame3 equalizer (jib pendant strap), page 360)	7550 mm 24' 9" ft-in	
X	Jib pendant straps consisting of:		
	X2	Jib pendant strap 3 m (10 ft) (For more information see: Jib pendant strap 3 m (10 ft), page 362)	Total X2 +
	X3	Jib pendant strap 6 m (20 ft) (For more information see: Jib pendant strap 6 m (20 ft), page 364)	Total X3 +
	X4	Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 366)	Total X4
X5	Midfall connecting link (For more information see: Midfall connecting link, page 379)	700 mm 2' 4" ft-in	

Name		Value
Y	Jib pendant straps consisting of:	
	X4	Jib pendant strap 12 m (40 ft) (For more information see: Jib pendant strap 12 m (40 ft), page 366)
X6	Jib pendant strap on jib head 1916 (For more information see: Jib pendant strap on jib head 1916.21, page 367)	6500 mm 21' 4" ft-in

Tab. 622: Pendant straps A-frame3 to jib head 1916

Configuration of jib pendant straps (X):

Required number of jib pendant straps 3 m (10 ft) (**X2**) corresponds to number of jib sections 3 m (10 ft).

Required number of jib pendant straps 6 m (20 ft) (**X3**) corresponds to number of jib sections 6 m (20 ft).

Required number of jib pendant straps 12 m (40 ft) (**X4**) corresponds to number of jib sections 12 m (40 ft).

**Note**

- For the admissible number of jib sections 3 m (10 ft), 6 m (20 ft), 12 m (40 ft), refer to the following table: ([For more information see: 7.24.1 Configuration of jib, page 1801](#))

The jib pendant straps (**X**) may consist of generation A and generation B jib pendant straps ([For more information see: 1.21.8 CF pendant straps on luffing jib 1916, page 358](#)). Mixing is only admissible if the number of generation B jib pendant straps only differs by at most 1 in the left and the right strand of the jib pendant straps.

**DANGER**

Inadmissible mixing of generation A and generation B jib pendant straps!
Structural failure.

- Ensure that the number of generation B jib pendant straps differs by at most 1 in the left and the right strand of the jib pendant straps.

7.24.6 Reeving diagrams for one rope across jib head section 1916 (load position1)

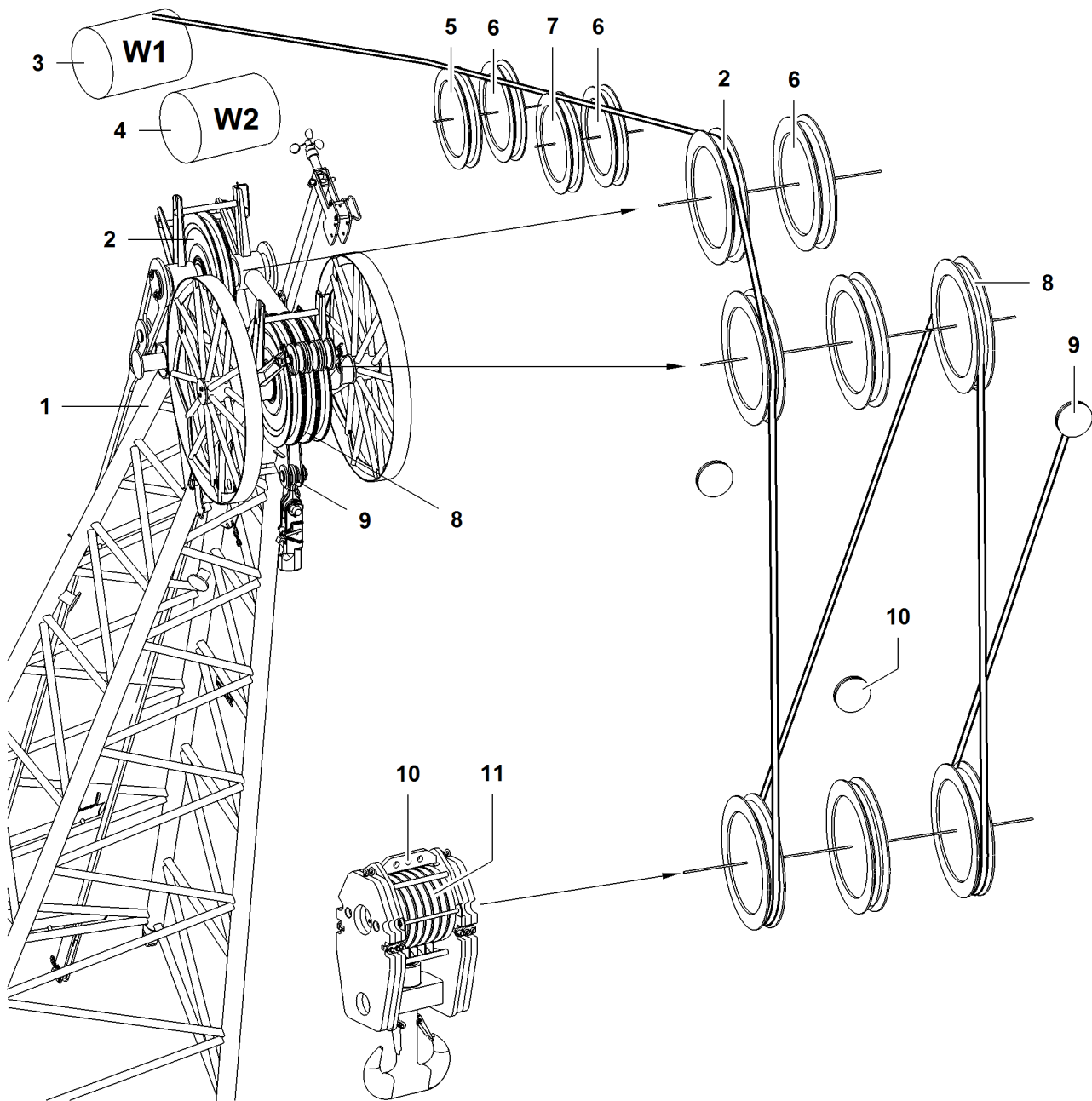


Fig. 5814: Reeving diagrams for one rope across jib head section 1916 (load position1)

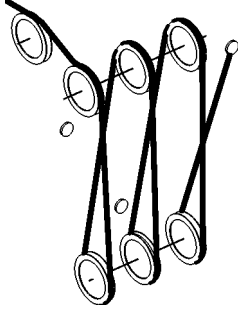
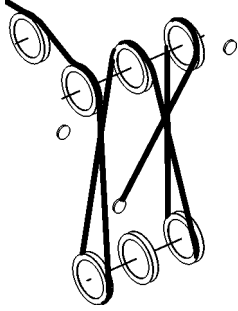
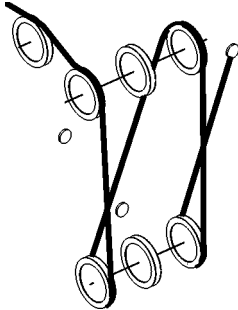
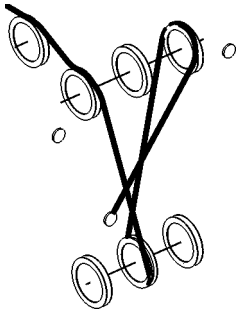
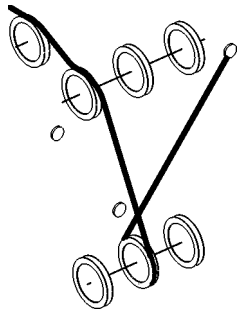
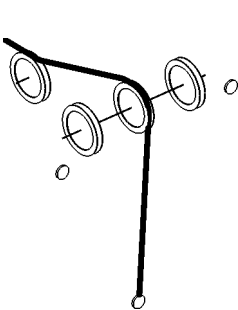
- | | | | | | |
|---|-----------------------------------|---|--|----|---------------------------------------|
| 1 | Jib head section | 5 | Rope pulley of A-frame2 | 9 | Rope fixing point of jib head section |
| 2 | Gantry pulley of jib head section | 6 | Retrofit kit* for operation with two ropes across jib head section | 10 | Rope fixing points of pulley block |
| 3 | Winch1 | 7 | Rope pulley of A-frame3 | 11 | Pulley set of pulley block |
| 4 | Winch2 | 8 | Rope pulley (3x) of jib head section | | |



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

- Select correct number of reevings as indicated in load chart.

Reeving diagrams for one rope across jib head section 1916 (load position1)	
 6x	 5x
 4x	 3x
 2x	 1x

Tab. 623: Reeving diagrams for one rope across jib head section 1916 (load position1)

7.24.7 Reeving diagrams for one rope across midfall 1916 (load position3)

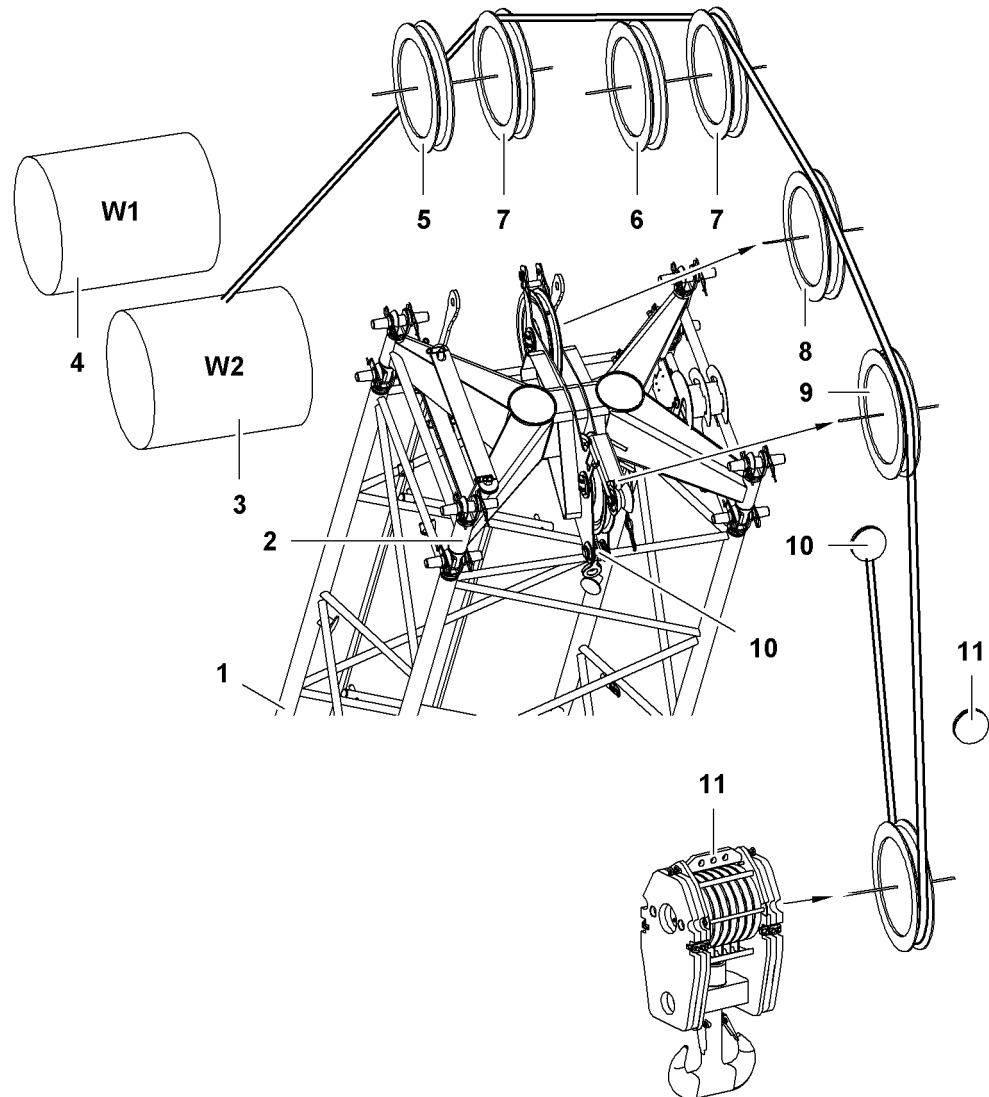


Fig. 5821: Reeving diagrams for one rope across midfall 1916 (load position3)

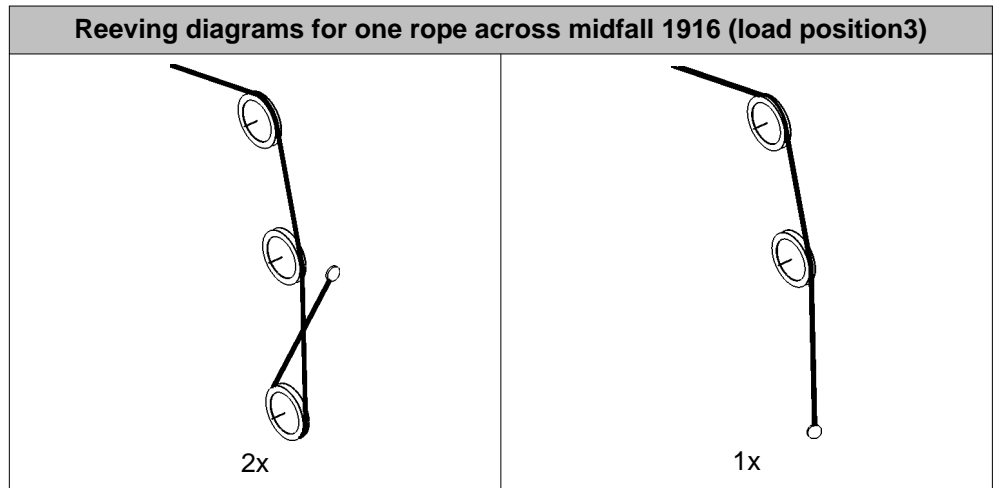
- | | | | |
|---|-------------------------|----|--|
| 1 | Jib | 7 | Retrofit kit* for operation with two ropes across jib head section |
| 2 | Midfall | 8 | Top rope pulley of midfall |
| 3 | Winch2 | 9 | Bottom rope pulley of midfall |
| 4 | Winch1 | 10 | Rope fixing point of midfall |
| 5 | Rope pulley of A-frame2 | 11 | Rope fixing points of pulley block |
| 6 | Rope pulley of A-frame3 | | |



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

- ▶ Select correct number of reevings as indicated in load chart.



Tab. 624: Reeving diagrams for one rope across midfall 1916 (load position3)

7.25 Assembling the luffing jib + Midfall

Ensure that the following conditions are fulfilled:

- Assembly functions are switched on.
- The machine is ready for use as an assembly crane, or an assist crane is available.
- Work plans have been drawn up.
- The assembly position of the Midfall is known.
- Any accessories required are available.

7.25.1 Notes

The installation of the Midfall described below applies to all midfall system dimensions.

The illustrations have been simplified or schematically represented for reasons of uniformity and represent the principles of assembly. They do not provide a detailed representation of the components.

7.25.2 Installing the midfall

The installation steps are identical with the installation steps of the luffing jib without midfall. Only specific information about the installation of the midfall are listed in the following. The remaining work steps must be performed as described previously for the assembly of the luffing jib.



DANGER

Installation of midfall at impermissible installation position!
Structural failure.

- ▶ Refer to the load chart for the midfall installation position.
-

Replacing the connecting links

- ▶ Install and pin midfall at the specified position.
-

**WARNING**

Wrong coupling links with pendant straps!

- ▶ Replace coupling links of jib pendant straps with midfall coupling links.
-

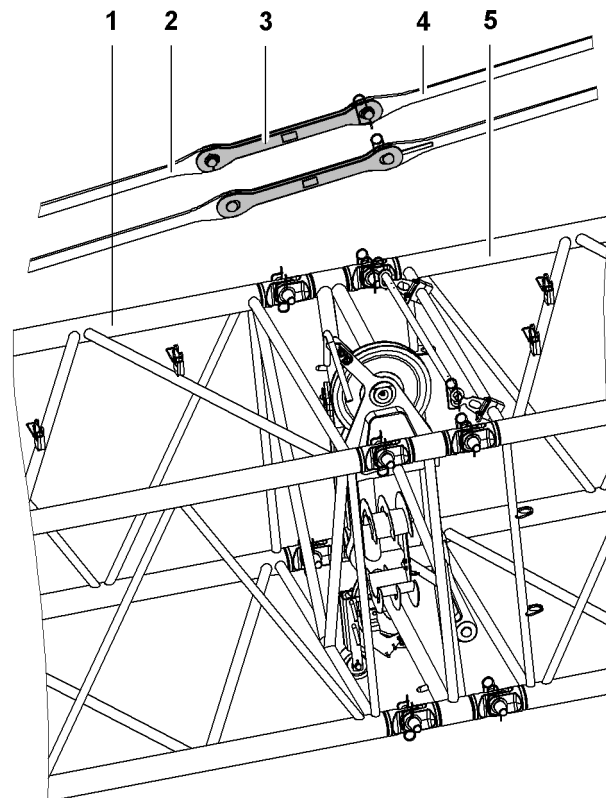


Fig. 5824: Replacing the midfall connecting links

- | | | | |
|---|-------------------------|---|-------------------|
| 1 | Jib section | 4 | Jib pendant strap |
| 2 | Jib pendant strap | 5 | Jib section |
| 3 | Midfall connecting link | | |

- ▶ Remove first coupling links of the first jib pendant straps **2** behind installation position of midfall.
- ▶ Attach deinstalled coupling links at storage position on midfall.
- ▶ Install the midfall connecting links **3** and pin to the jib pendant straps **2 + 4**.
- ▶ Pull forward electric line from jib base section to jib head section and plug in.
- ▶ Unwind electric line from midfall cable holder.
- ▶ Pull forward electric line from midfall to jib head section and plug in.

Installing the mid-point suspension

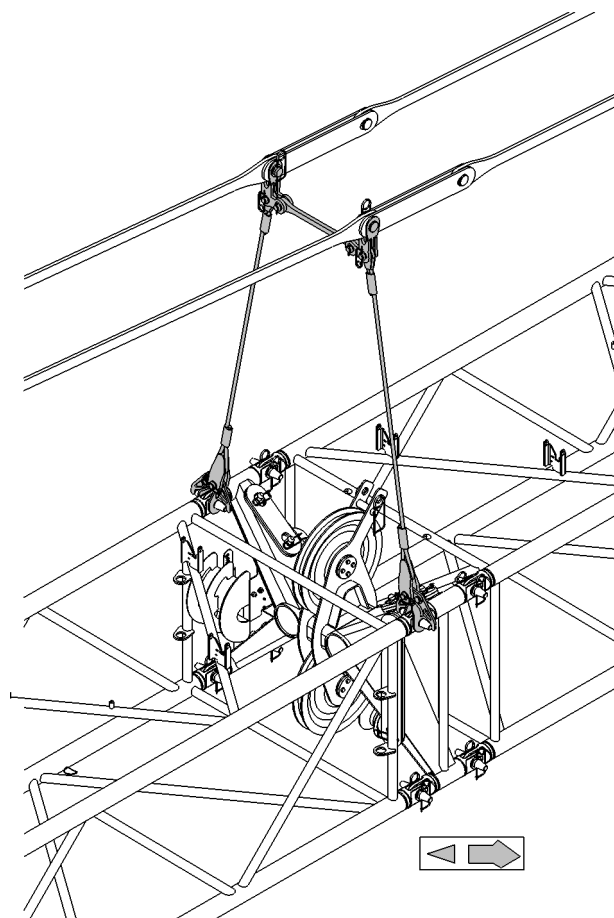


Fig. 5825: Installing the mid-point suspension (illustration of principle)

The mid-point suspension on the midfall is identical with the mid-point suspension on the luffing jib.

- ▶ Install mid-point suspension on the midfall using the same procedure as with mid-point suspension on luffing jib ([For more information see: 7.22.17 Installing mid-point suspension, page 1742](#)).

Dismantling rope protection pipes

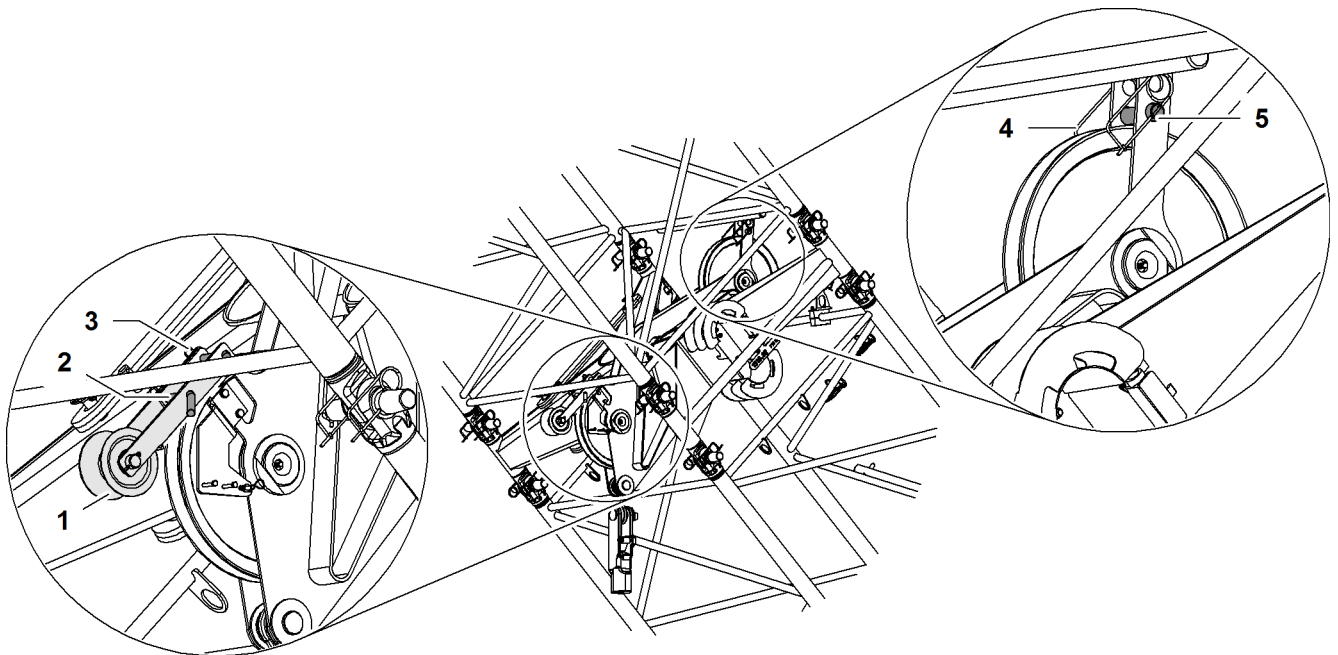


Fig. 5826: Rope bypass pulley and rope protection pipe on midfall

- | | | | | | |
|---|--------------------|---|---------------------|---|----------------------|
| 1 | Rope bypass pulley | 3 | Locking spring (2x) | 5 | Rope protection pipe |
| 2 | Pin (2x) | 4 | Locking spring (2x) | | |

- ▶ Remove all locking springs **3 + 4**.
- ▶ Remove rope protection pipe **5**.
- ▶ Remove both pins **2**.
- ▶ Remove rope bypass pulley **1**.
- ▶ Reeve rope over top and bottom rope pulley.
 - ▷ Rope reeved at midfall.
- ▶ Insert both pins **2** at the rope bypass pulley **1**.
- ▶ Install rope protection pipe **5**.
- ▶ Install all locking springs **3 + 4**.
 - ▷ Midfall is reeved and rope protection pipes installed.

Installing the rope fixing point



DANGER

Inadmissible number of reevings!
Structural breakdown, toppling of machine.

- ▶ Select correct number of reevings as indicated in load chart.



DANGER

Incorrect installation of pins for pocket lock!
Load breakaway.

- ▶ Install pins for pocket lock as instructed.

The collar of the pin for the pocket lock is decisive for the installation direction of the rope fixing point.



WARNING

Inadmissible installation of swivels!
Severe injuries, damage to machine.

- ▶ Install rope with no twists.
- ▶ Install rope without swivels.

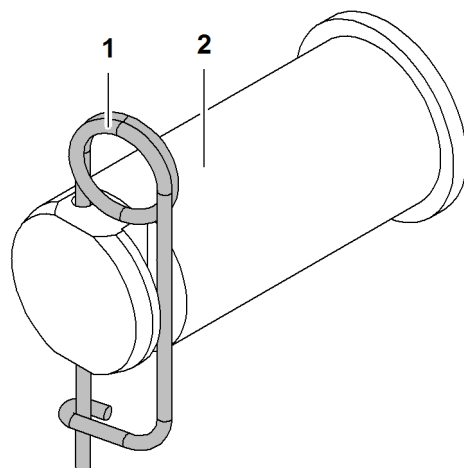


Fig. 5827: Securing the pins

- | | |
|------------------|-------|
| 1 Locking spring | 2 Pin |
|------------------|-------|



DANGER

Pins 2 not completely secured!
Load breakaway.

- ▶ Ensure that locking spring 1 completely secures the pin 2.

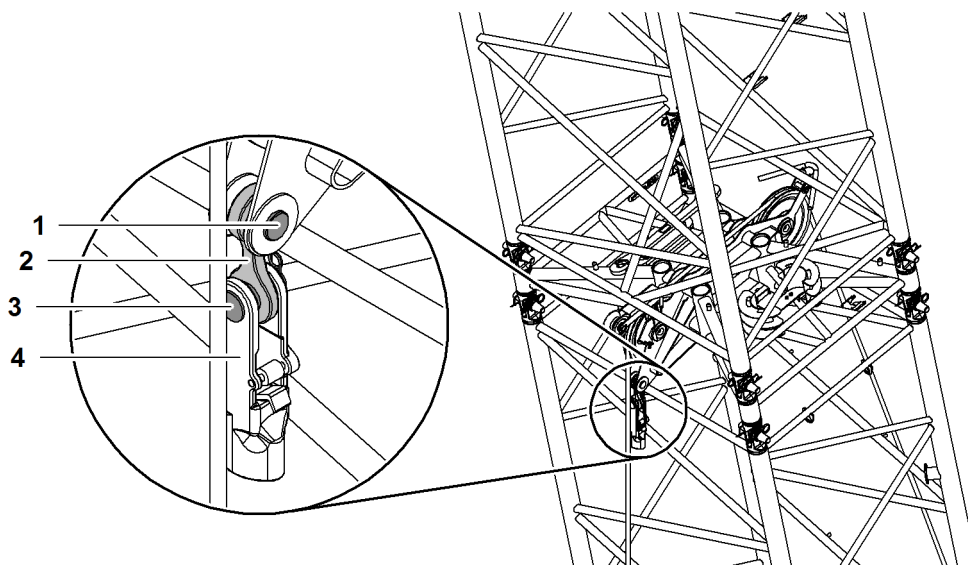


Fig. 5828: Rope fixing point on midfall

- | | |
|-----------------------------|------------------------|
| 1 Pin for rope fixing point | 3 Pins for pocket lock |
| 2 Cross link | 4 Pocket lock |

- ▶ Pin cross strap **2** with midfall.
- ▶ Secure pin **1** with locking spring.

The collar of the pin **3** for the pocket lock **4** must point towards the jib head section.

- ▶ Pin pocket lock **4** with cross strap **2**.
- ▶ Secure pin **3** with locking spring.

7.26 Adjusting the track

Wide track is mandatory for crane mode and assembly and disassembly.

Medium and narrow track is solely intended for traveling with a lateral tilt of max. 1 % with no load on the hooks or pulley block.



DANGER

Inadmissible setup!
Toppling of machine.

- ▶ Ensure that the set up track width coincides with the track width selected on the screen *Setup - basic machine*.
- ▶ Ensure that crawler side frames are pinned in the selected track width.



DANGER

Inadmissible slewing of uppercarriage with medium or narrow track!
Toppling of machine.

- ▶ Ensure that uppercarriage is parallel to crawler side frames.



WARNING

Incorrect track width adjustment process!
Crushing of body parts.

- ▶ Ensure that only installation personnel performs the track adjustment.

Ensure the following conditions are met:

- Subsoil is level and provides sufficient load-bearing capacity.
- Uppercarriage is parallel to crawler side frames.
- Machine operator remains in cabin throughout the entire process.
- Installation personnel is available for track adjustment.

7.26.1 Converting from wide track to medium or narrow track

Move machine's center of gravity to the center of the rotation axis

NOTICE

Twisting of crawler side frames!
Damage to machine.

- ▶ Shift machine's center of gravity to center of rotation axis with boom adjuster.
- ▶ Observe ground pressure indicator.

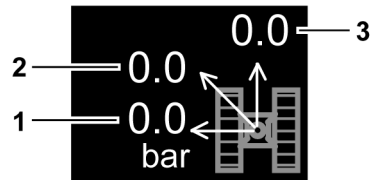


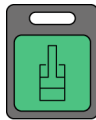
Fig. 5829: Screen section Ground pressure

- | | |
|---|--|
| <p>1 Maximum ground pressure to the side</p> <p>2 Maximum ground pressure across one edge</p> | <p>3 Maximum ground pressure forward</p> |
|---|--|

Machine's center of gravity is located at the center of the of the rotation axis when all three values of the ground pressure indicator are identical.

- ▶ Move machine's center of gravity to the center of the rotation axis: adjust boom.

Extending and pinning the track width adjusting cylinder



- ▶ Press button *Cylinder adjustment functions* on control panel X23.

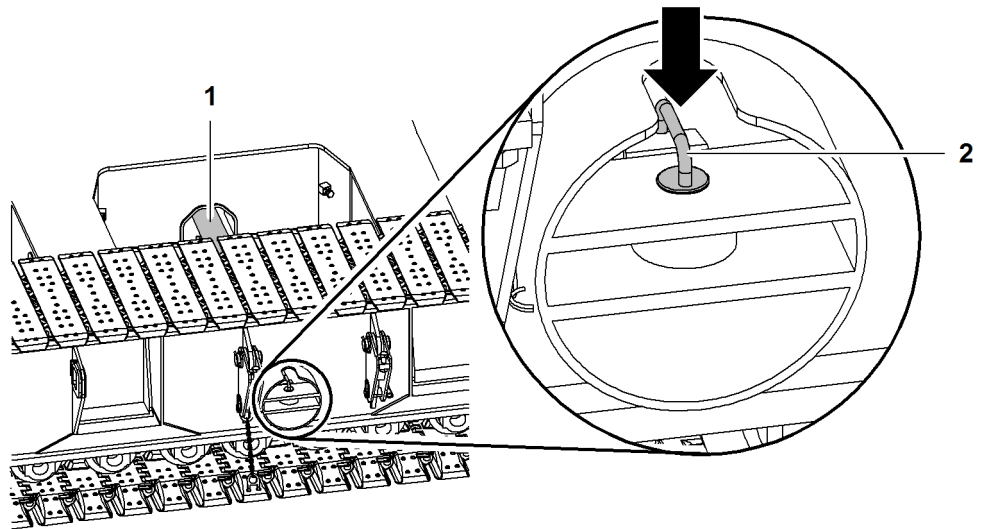


Fig. 5831: Extending and pinning the track width adjusting cylinder

- | | |
|---|--------------|
| <p>1 Track width adjusting cylinder</p> | <p>2 Pin</p> |
|---|--------------|
- ▶ Plug in the cable remote control on the undercarriage.
 - ▶ Extend track width adjusting cylinder 1 with cable remote control.
 - ▶ Pin track width adjusting cylinder 1 to crawler side frame with pins 2.
 - ▶ Repeat process with second track width adjusting cylinder 1.

Undoing strut mountings

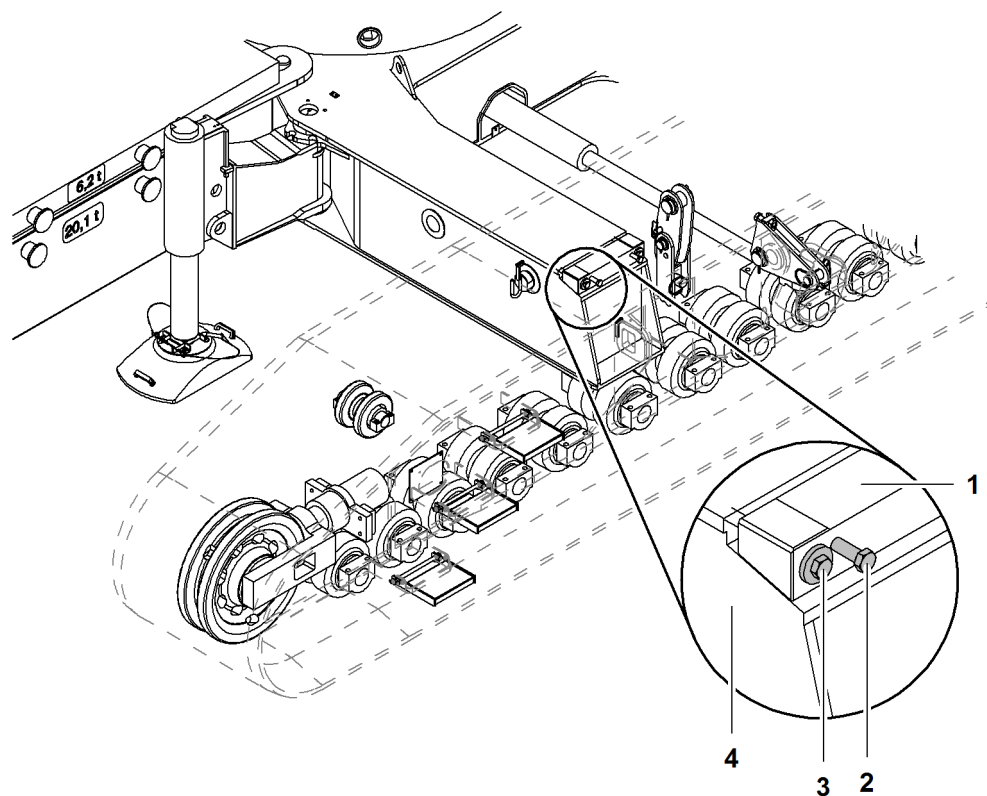


Fig. 5832: Undoing strut mountings

- | | | | |
|---|------------|---|--------------------|
| 1 | Wedge | 3 | Locking screw (2x) |
| 2 | Screw (2x) | 4 | Strut |

The two outer locking screws **3** must be turned almost completely out of the struts **4** so that the wedge **1** is located as close as possible to the end of the strut.

- ▶ Loosen screws **2** of the strut mounting.
- ▶ Loosen locking screws **3** of strut mounting and twist out almost all the way.
- ▶ Turn in screws **2** of strut mounting.
 - ▷ Wedge **1** loosens.
- ▶ Clean strut **4** and evenly grease the slide face.
- ▶ Repeat process on all strut mountings.

Preparing the crawler side frame

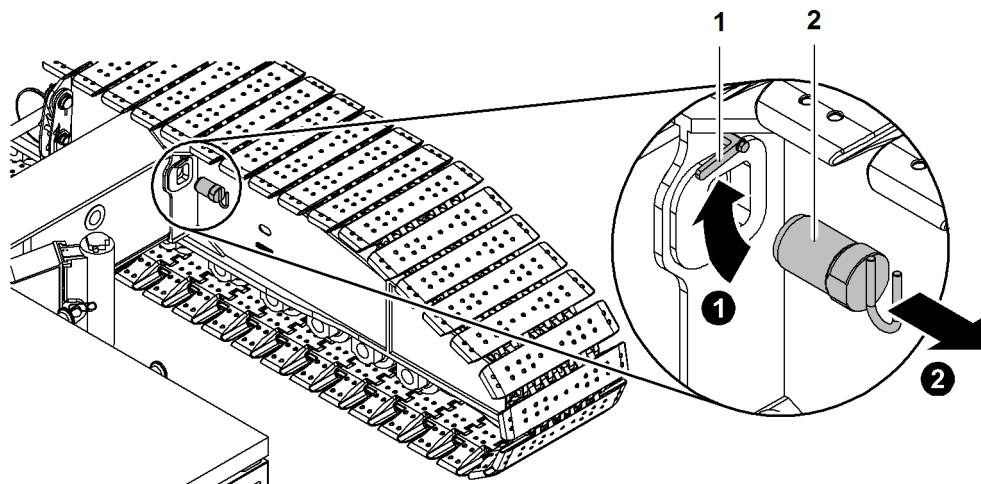


Fig. 5833: Preparing the crawler side frame

1 Safety lever

2 Pin

- ▶ Undo safety lever 1 screw.
- ▶ Fold up the safety lever 1.
- ▶ Remove pin 2.
- ▶ Repeat process on all crawler side frame pin connection points.

Supporting the machine

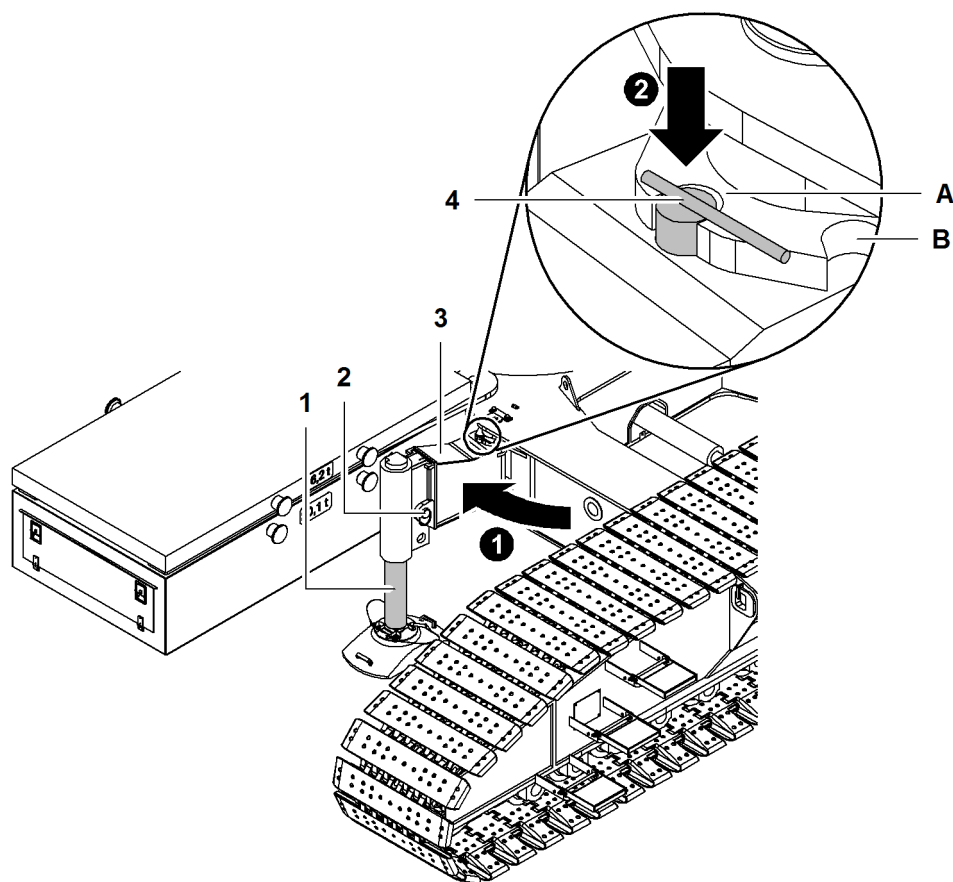


Fig. 5834: Supporting the machine

- | | | | |
|---|--------------------------|---|---|
| 1 | Support cylinder | 4 | Pin |
| 2 | Top pin connection point | A | Pin connection point of support position for narrow track |
| 3 | Slewing bracket | B | Pin connection point of support position for wide track |

- ▶ Remove pin 4 on pin connection point B of wide track support position.
- ▶ Swing slewing bracket 3 into narrow track support position.



DANGER

Slewing brackets 3 not pinned!
Toppling of machine.

- ▶ Pin slewing brackets 3 in narrow track support position.
-
- ▶ Insert pin 4 at pin connection point A of narrow track support position.
 - ▶ Pin support cylinders 1 at top pin connection point 2 (For more information see: [Adjusting the support height of support cylinder, page 1254](#)).
 - ▶ Repeat process with all support cylinders 1.

**DANGER**

Incorrect jack-up process!
Toppling of machine.

- ▶ Ensure that all four support cylinders are always in contact with the ground.
- ▶ Extend support cylinders alternately at the front and the rear.
- ▶ Observe spirit level.

If guide rollers lift out of the crawler chains:

- ▶ Stop jack-up process.

The support cylinders **1** are operated with the toggle switches of the cable remote control (For more information see: [3.26.2 Cable remote control on undercarriage, page 826](#)).

**Note**

Liebherr recommends:

- ▶ Always extend two support cylinders **1** at the same time.
- ▶ Move the corresponding toggle switches on cable remote control forward.
 - ▷ Support cylinder **1** extend.

Retracting the track width adjusting cylinders and pinning the crawler side frames

Adjusting the track width adjusting cylinder to medium track

**CAUTION**

Do not access adjusting range of crawler side frames!
Crushing of body parts.

- ▶ Leave danger zone.

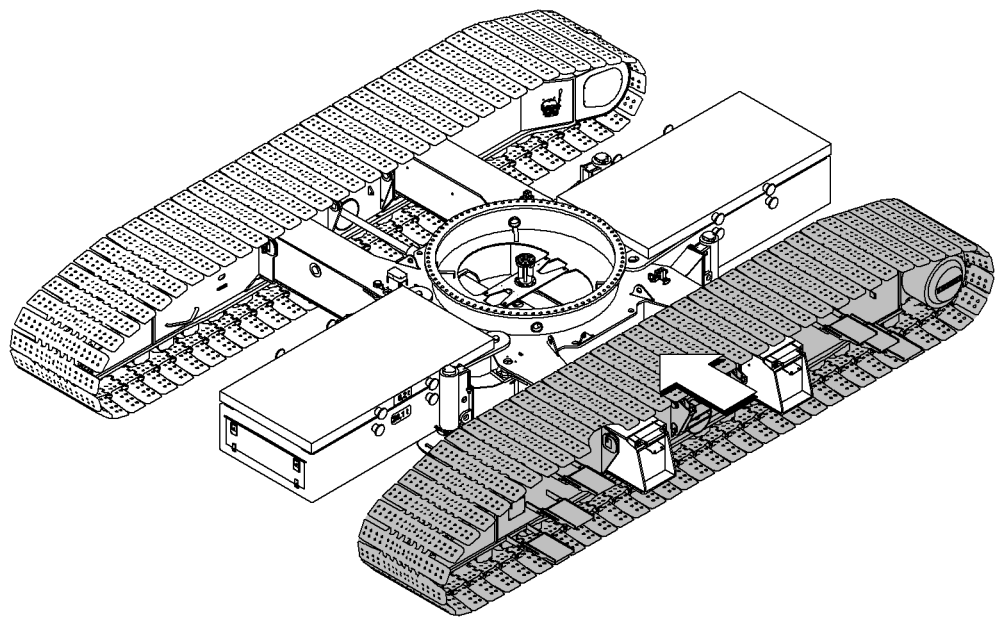


Fig. 5835: Adjusting the track width adjusting cylinder to medium track

- ▶ Retract first track width adjusting cylinder with cable remote control.
- ▶ Retract second track width adjusting cylinder with cable remote control.

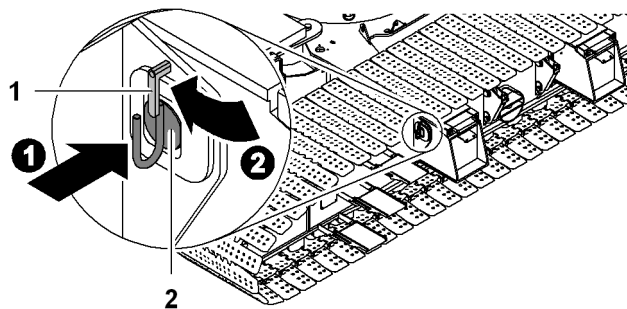


Fig. 5836: Pinning the crawler side frame in medium track

- | | |
|----------------|-------|
| 1 Safety lever | 2 Pin |
|----------------|-------|

- ▶ Insert pins 2.
- ▶ Pull down safety lever 1.
- ▶ Tighten safety lever 1 screw.
- ▶ Repeat process on all crawler side frame pin connection points.

Adjusting the track width adjusting cylinder to narrow track



CAUTION

Do not access adjusting range of crawler side frames!
Crushing of body parts.

- ▶ Leave danger zone.

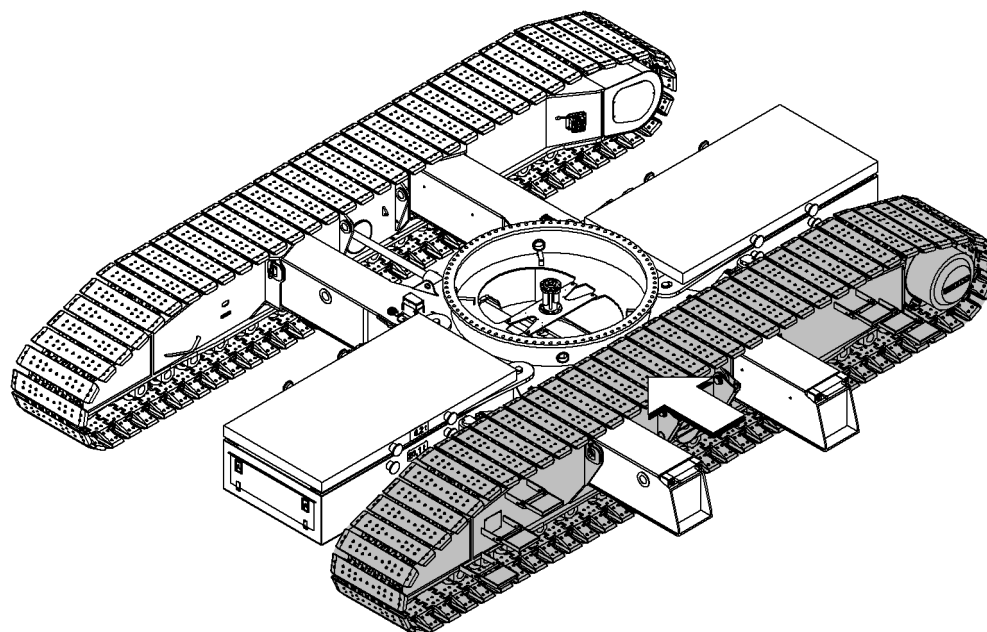


Fig. 5837: Adjusting the track width adjusting cylinder to narrow track

- ▶ Retract first track width adjusting cylinder with cable remote control.
- ▶ Retract second track width adjusting cylinder with cable remote control.

Mounting uppercarriage ladder for narrow track

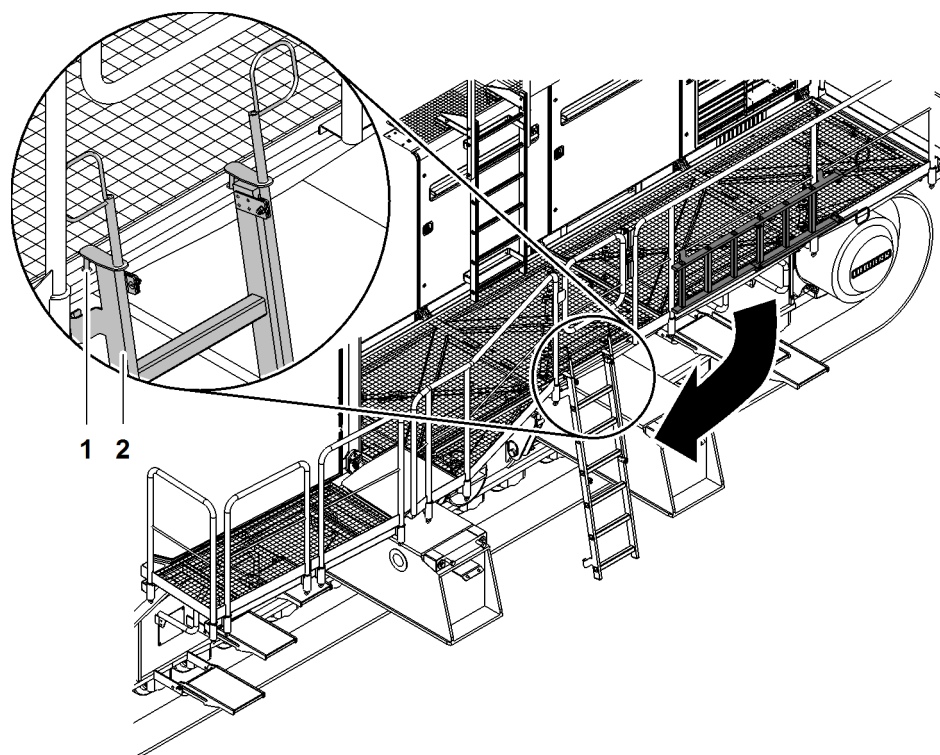


Fig. 5839: Mounting uppercarriage ladder for narrow track

1 Suspension equipment (2x) **2** Uppercarriage ladder

- ▶ Take uppercarriage ladder **2** out of mount on handrail.
- ▶ Place suspension device **1** below access in the intended openings.

7.26.2 Converting from medium or narrow track to wide track

Changing from medium or narrow track to wide track is performed in the same way in reverse as changing from wide track to medium or narrow track (For more information see: [7.26.1 Converting from wide track to medium or narrow track](#), page 1820) .

7.27 Hydraulic cab elevation*

7.27.1 Erecting and bolting the mast



WARNING

Improper erection of the mast!
Serious injury.

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.
- ▶ Make sure that there are no tools and no loose objects on the mast.

Ensure that the following conditions are fulfilled:

- Diesel engine is switched on.
- Cylinder adjustment functions on.
- Cab is in transport position.

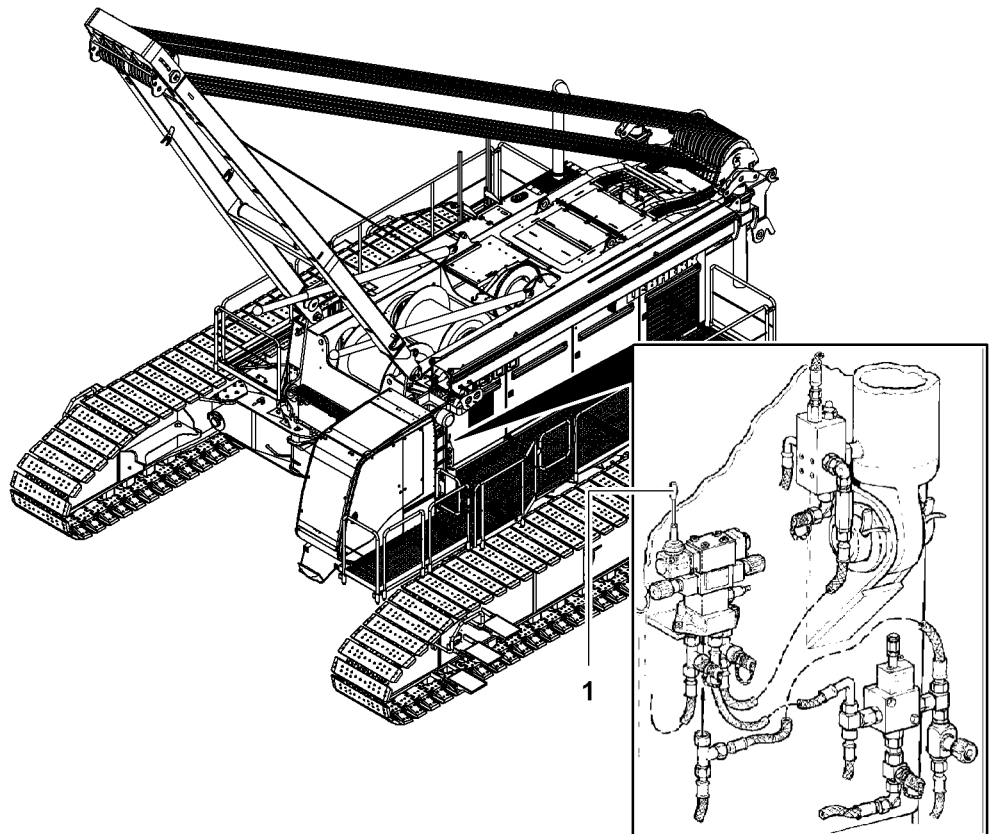


Fig. 5840: Erecting the mast

- 1 Adjustment lever
- ▶ Actuate adjustment lever 1.
 - ▷ Mast erects itself:

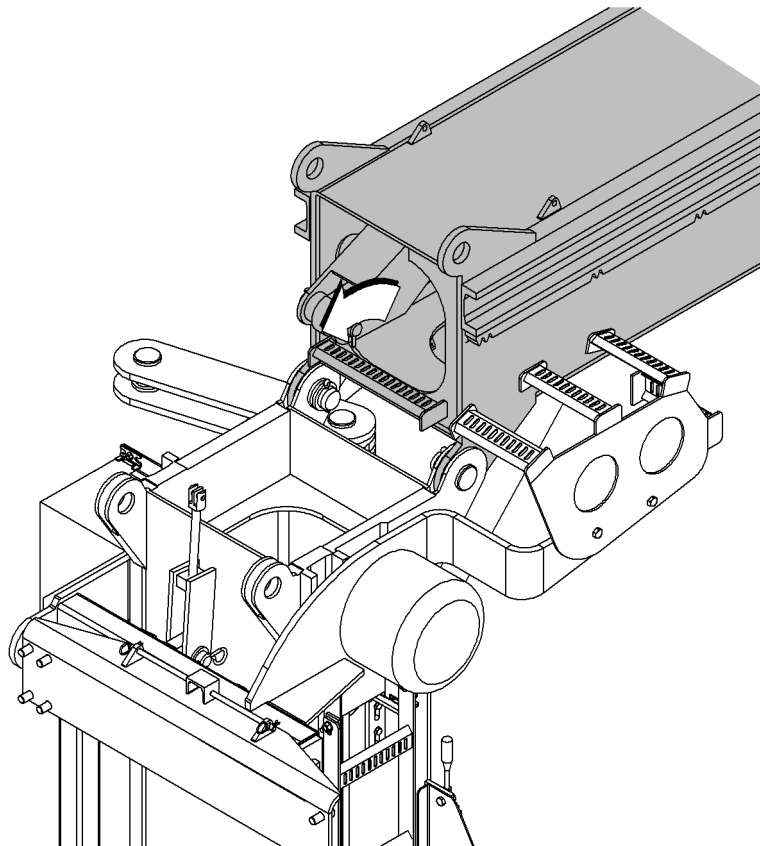


Fig. 5841: Mast erects itself

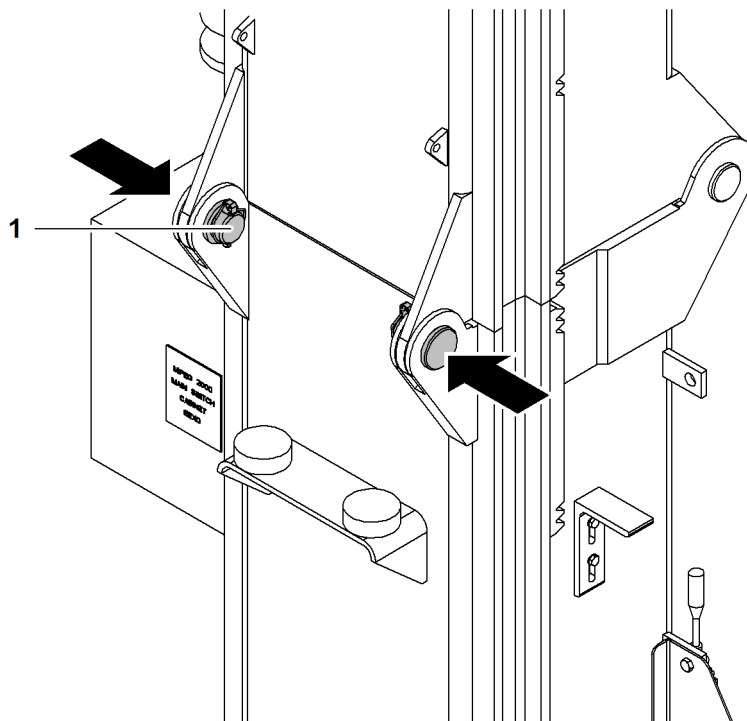


Fig. 5842: Pinning the mast

1 Pin (2x)

► Bolt the mast.

► Secure pin 1 with washers and linchpin.

7.27.2 Setting the cab in the working position and bolting in place

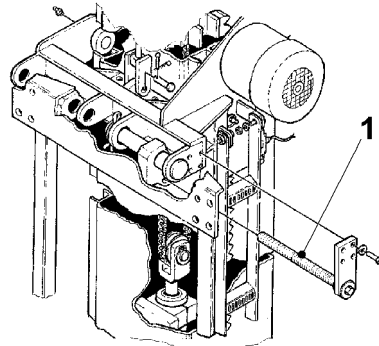


Fig. 5843: Setting the cab into the working position

1 Threaded bar

The threaded bar 1 functions as a spindle and moves the cabin in or out.

► Use the threaded bar 1 to move the cabin out as far as it will go.

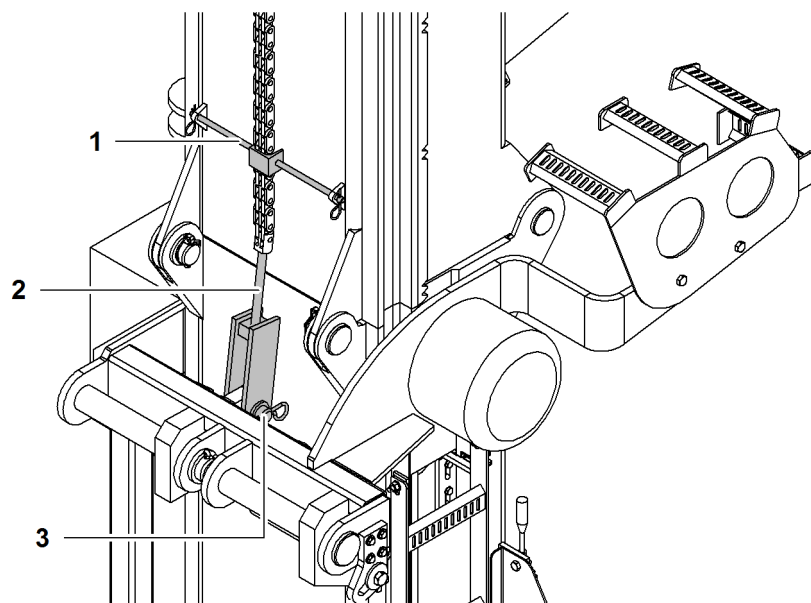


Fig. 5844: Pinning the chain

1 Chain guide

2 Chain

3 Pin

► Remove chain guide 1 and place in temporary storage.

► Pin chain 2 to cabin frame.

► Secure pin 3 with split pin.

7.27.3 Dismantling



WARNING

Improper disassembling!
Serious injury.

- ▶ Make sure that no-one is standing in the danger area.
 - ▶ Leave the danger area.
 - ▶ Do not remain on the uppercarriage while the mast is lowered.
-

NOTICE

Improper disassembling!
Damage to machine.

- ▶ Unbolt the chain from the cab.
 - ▶ Attach the chain guide.
 - ▶ Do not trap the hose kit.
 - ▶ Dismantle the railings on the uppercarriage.
 - ▶ Dismount ladder on uppercarriage.
-

Summary of the of disassembly steps

- ▶ Lower the cab completely.
- ▶ Unbolt the chain from the frame of the cab.
- ▶ Use a chain guide to secure the chain to the mast.
- ▶ Placing the cabin in transport position: Push all the way in with threaded bar.
- ▶ Unbolt both pins of the mast fixing.
- ▶ Lay down the mast using the control lever on the mast.

7.28 Vertical Line Finder* assistance system

7.28.1 Installing the Vertical Line Finder on the main boom head

Make sure the following prerequisites are met:

- Rope of winch1/winch2 is completely reeved on main boom head.
- Bracket of the Vertical Line Finder is installed on main boom head.
- No jib is installed on the main boom.

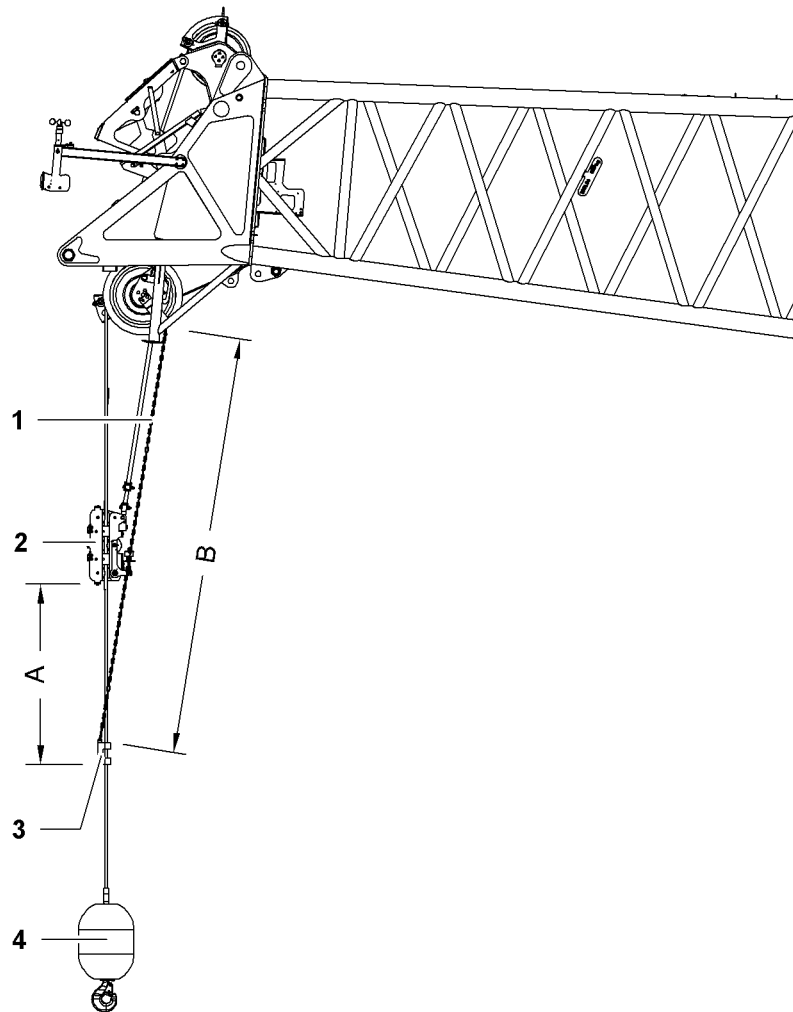


Fig. 5845: Installing the Vertical Line Finder on the main boom head

- | | | | |
|---|--------------|---|---------------------------|
| 1 | Chain | 3 | Hoist limit switch weight |
| 2 | Rope opening | 4 | Hook |

NOTICE

Improper installation of Vertical Line Finder with single or double reeving!
 Damage to Vertical Line Finder and main boom head.

- ▶ Make sure that the distance between the rope opening **2** and the hoist limit switch weight **3** is at least 2000 mm (6' 7" ft-in).
- ▶ Make sure that the chain **1** of the hoist limit switch has a length of 4500 mm (14' 9" ft-in).

Name		Value
A	Minimum distance rope opening to hoist limit switch weight	2000 mm 6' 7" ft-in
B	Length of chain	4500 mm 14' 9" ft-in

Tab. 625: Installing the Vertical Line Finder with single or double reeving

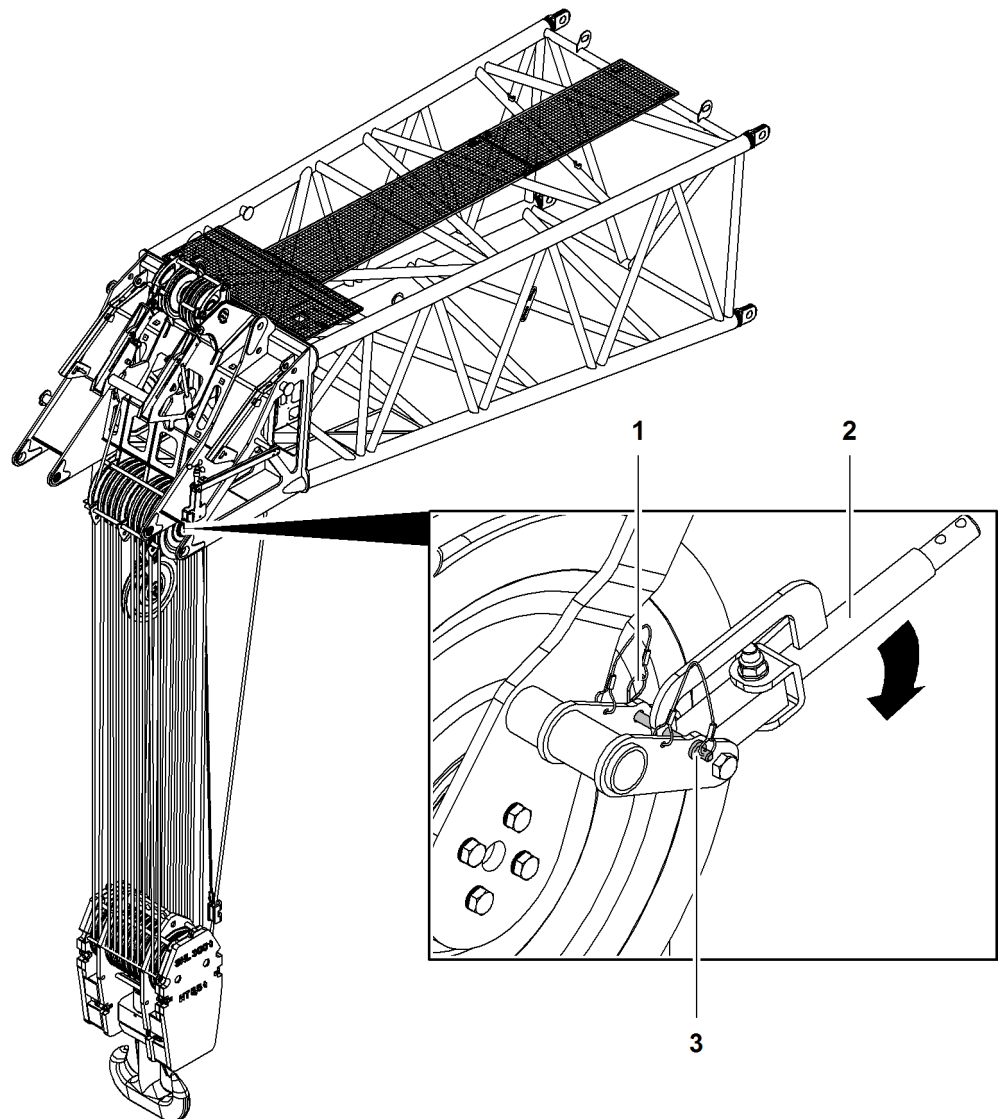


Fig. 5846: Placing the bracket of Vertical Line Finder in working position

- | | | | |
|----------|-------------------|----------|-----|
| 1 | Spring cotter pin | 3 | Pin |
| 2 | Bracket | | |

- ▶ Remove spring cotter pin 1.
- ▶ Remove pin 3.
 - ▷ Bracket 2 folds down.
- ▶ Insert pins 3.
- ▶ Secure pin 3 with spring cotter pin 1.
- ▶ Repeat procedure on opposite side.

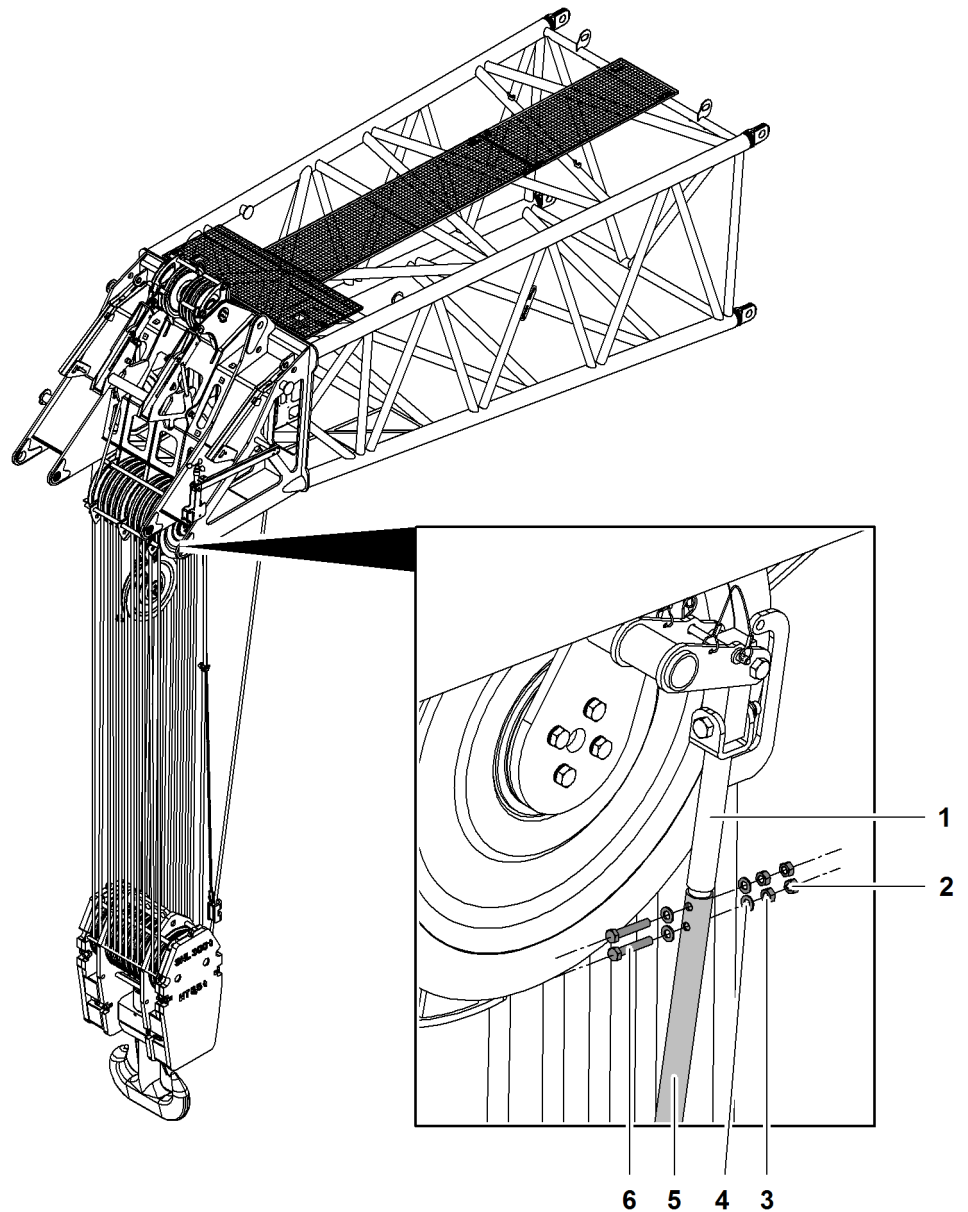


Fig. 5847: Connecting the vertical pipe with bracket

- | | | | |
|---|------------------|---|---------------|
| 1 | Bracket | 4 | Washer (4x) |
| 2 | Counter nut (2x) | 5 | Vertical pipe |
| 3 | Nut (2x) | 6 | Screw (2x) |

- ▶ Stick vertical pipe 5 on bracket 1.
- ▶ Insert screws 6 with washers 4 in borings.
- ▶ Secure screws 6 with washers 4 and nuts 3.
- ▶ Secure nuts 3 with counter nuts 2.

► Repeat procedure on opposite side.

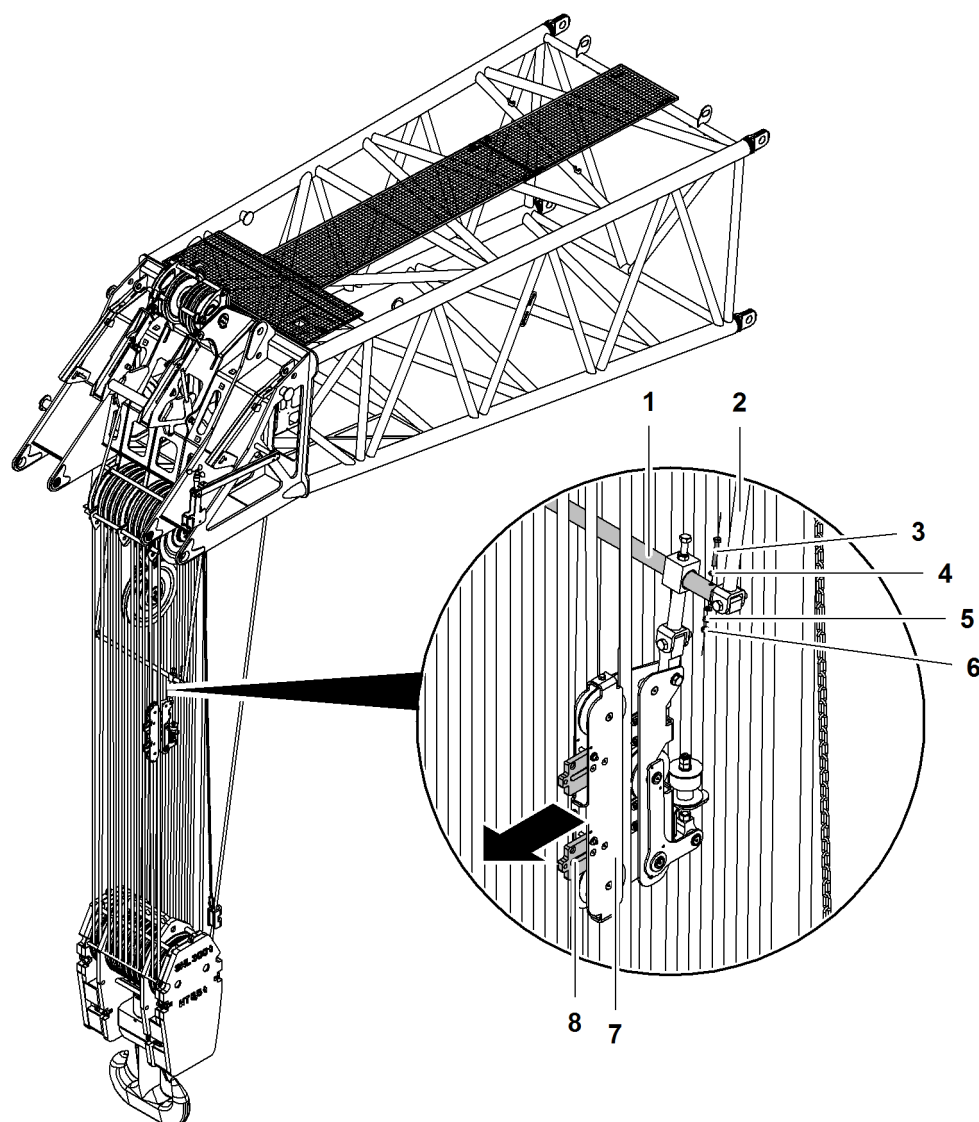


Fig. 5848: Connecting transverse pipe with vertical pipes

- | | | | |
|---|--------------------|---|----------------|
| 1 | Transverse pipe | 5 | Nut |
| 2 | Vertical pipe (2x) | 6 | Counter nut |
| 3 | Screw | 7 | Rope opening |
| 4 | Washer (2x) | 8 | Rope lock (2x) |

- Stick transverse pipe 1 with rope opening 7 on vertical pipes 2.
- Insert screw 3 with washer 4 in boring.
- Secure screw 3 with washer 4 and nut 5.
- Secure nut 5 with counter nut 6.
- Repeat procedure on opposite side.
- Remove pins of rope locks 8.
- Pull rope locks 8 outward.

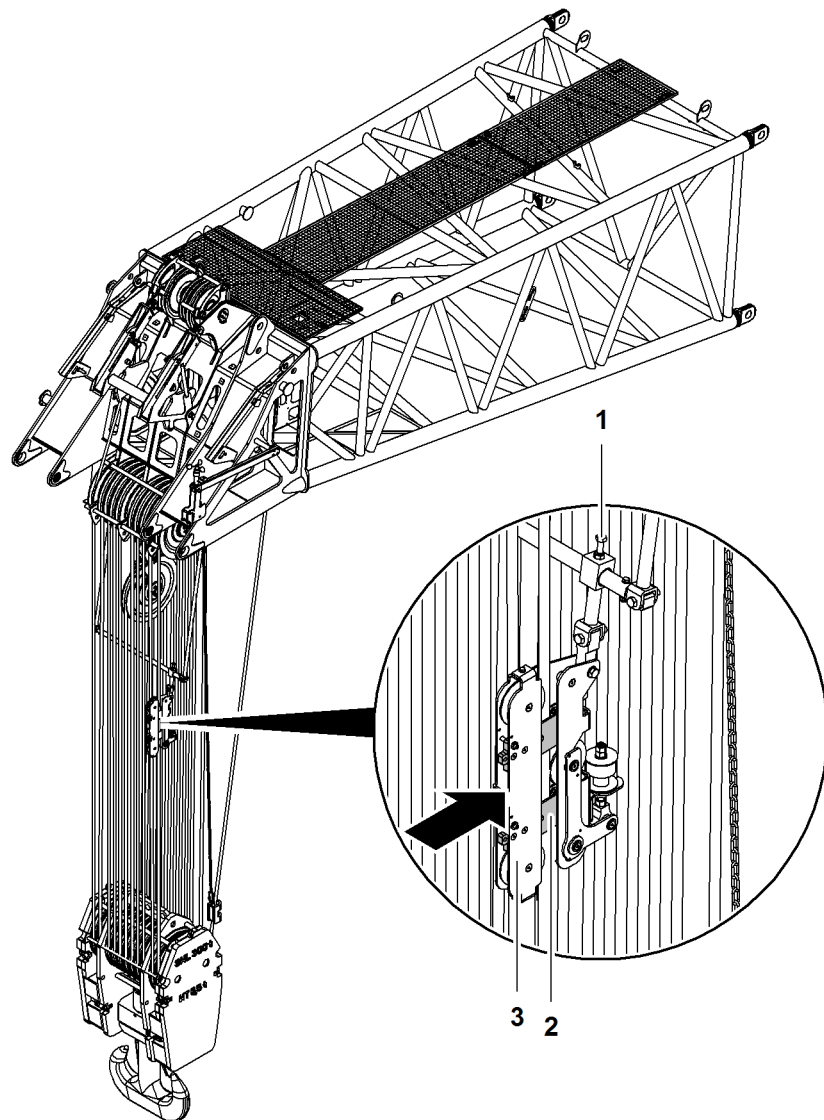


Fig. 5849: Positioning rope opening and inserting the rope

- | | | | |
|---|----------------|---|--------------|
| 1 | Screw | 3 | Rope opening |
| 2 | Rope lock (2x) | | |

The rope opening **3** must be installed on the outer rope that is closest to the rope fixing point of the main boom head.

- ▶ Position rope opening **3**.
- ▶ Secure rope opening **3** with screw **1**.
- ▶ Place rope in rope opening **3**.
- ▶ Slide rope locks **2** inward.
- ▶ Secure rope locks **2** with pins.

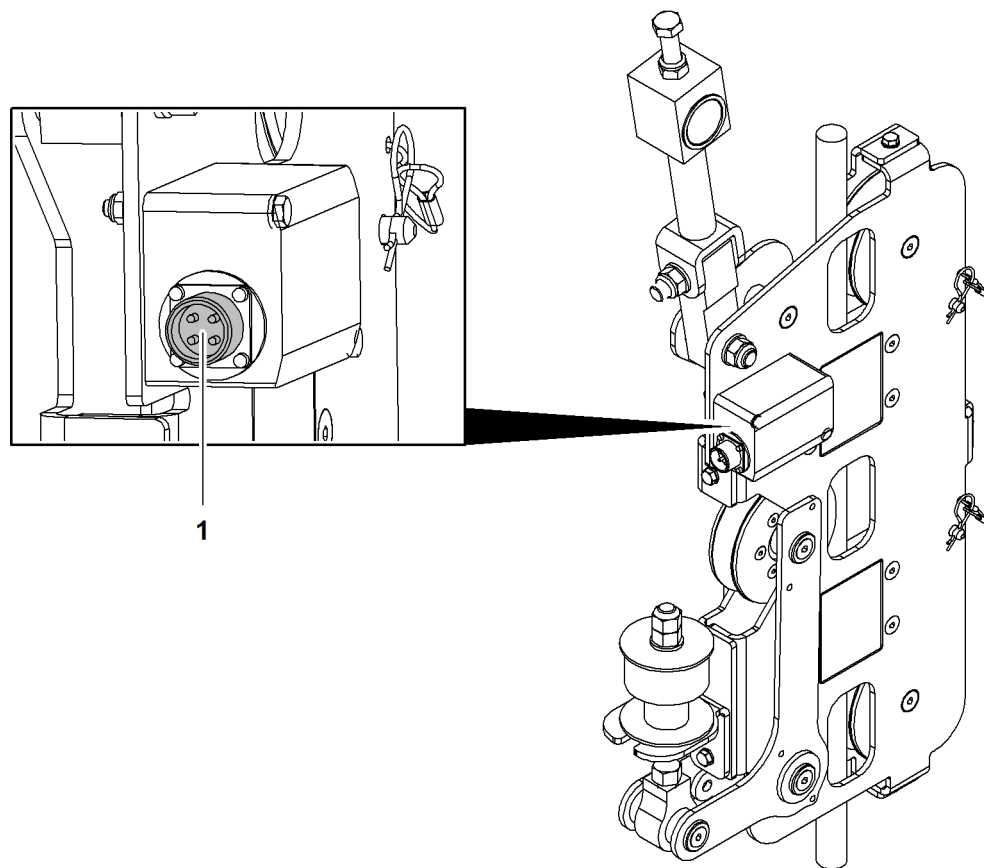


Fig. 5850: Connecting the electric line of the Vertical Line Finder

1 Bush

- ▶ Insert electric line of Vertical Line Finder at bush 1.
- ▶ Insert electric line of Vertical Line Finder on terminal box of main boom head.
 - ▷ Vertical Line Finder is ready for operation.

7.28.2 Installing the Vertical Line Finder on the jib head

Make sure the following prerequisites are met:

- Rope of winch1/winch2 is completely reeved on jib head.
- Vertical Line Finder components on the main boom head are deinstalled.
- Bracket of Vertical Line Finder on main boom head is secured in parked position.
- There is no auxiliary jib installed on the jib.

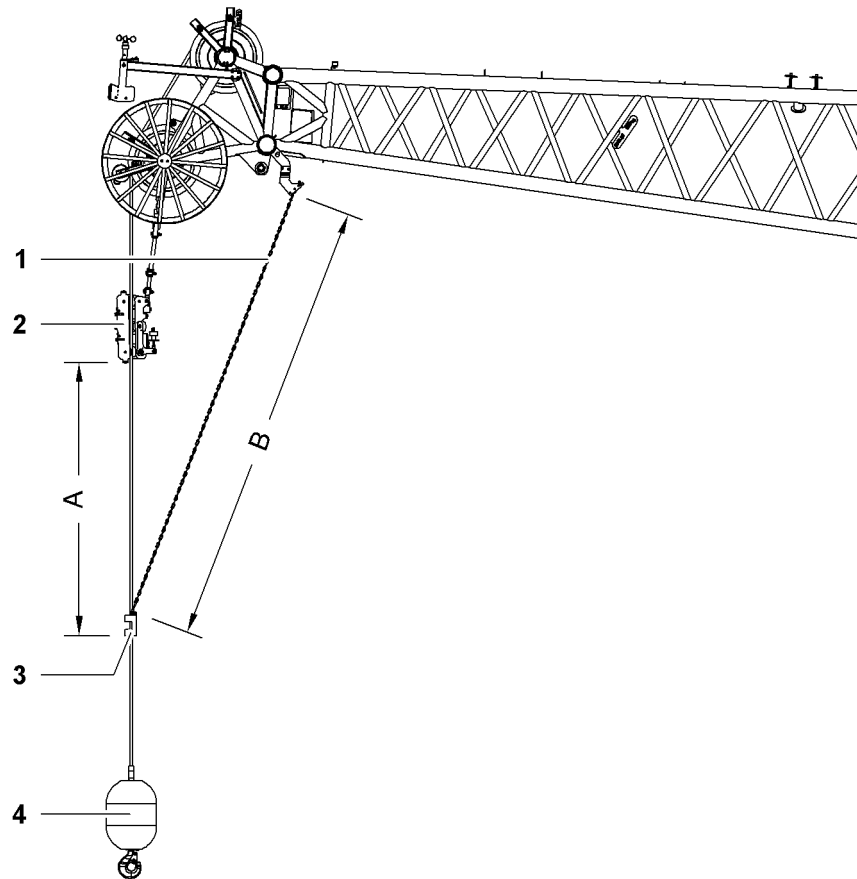


Fig. 5851: Installing the Vertical Line Finder on the jib head

- | | | | |
|---|--------------|---|---------------------------|
| 1 | Chain | 3 | Hoist limit switch weight |
| 2 | Rope opening | 4 | Hook |

NOTICE

Improper installation of Vertical Line Finder with single reeving!
 Damage to Vertical Line Finder and jib head.

- ▶ Make sure that the distance between the rope opening 2 and the hoist limit switch weight 3 is at least 2000 mm (6' 7" ft-in).
- ▶ Make sure that the chain 1 of the hoist limit switch has a length of 3250 mm (10' 8" ft-in).

Name		Value
A	Minimum distance rope opening to hoist limit switch weight	2000 mm 6' 7" ft-in
B	Length of chain	3250 mm 10' 8" ft-in

Tab. 626: Installation of Vertical Line Finder with single reeving!

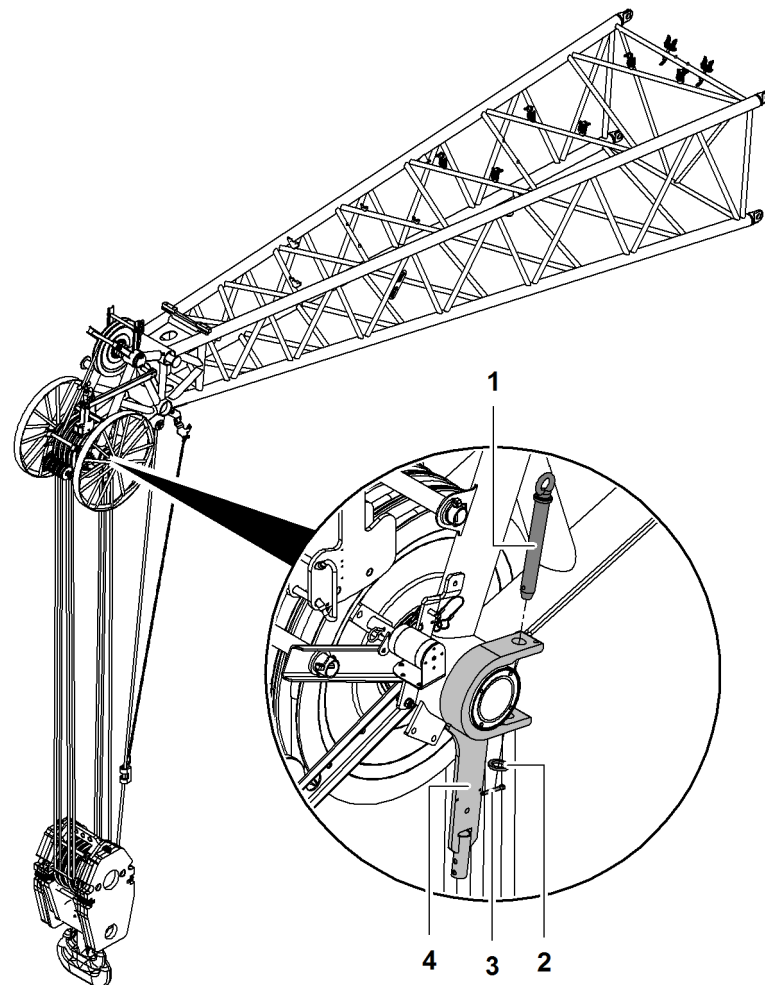


Fig. 5852: Installing the bracket of the Vertical Line Finder

- | | | | |
|---|--------|---|-----------|
| 1 | Screw | 3 | Split pin |
| 2 | Washer | 4 | Bracket |

- ▶ Position bracket 4 on jib head axis.
- ▶ Secure bracket 4 with screw 1, washer 2 and split pin 3.
- ▶ Repeat procedure on opposite side.

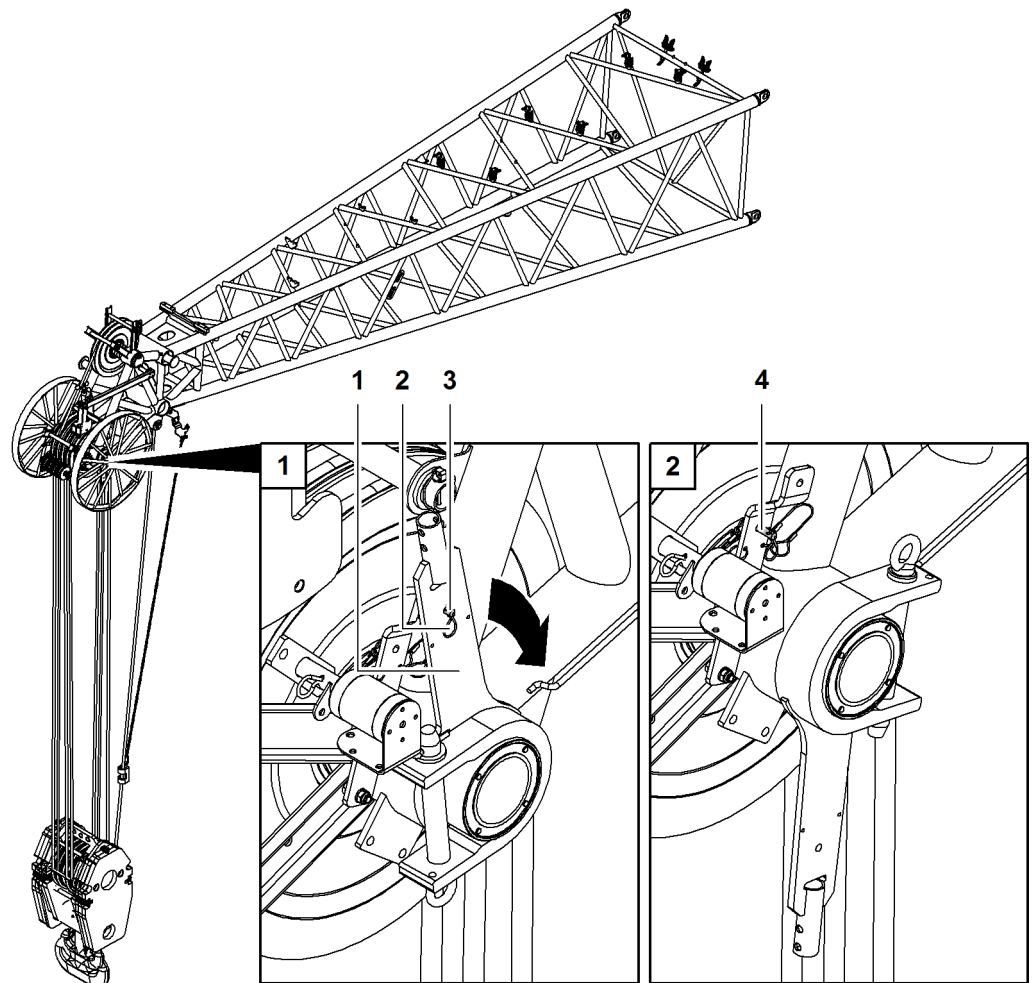


Fig. 5853: Placing the bracket of Vertical Line Finder in working position

- | | | | |
|---|-------------------|---|------------------|
| 1 | Bracket | 3 | Pin |
| 2 | Spring cotter pin | 4 | Removal position |

If the bracket of the Vertical Line Finder is already installed on the jib head, it must be put into working position for use.

- ▶ Remove spring cotter pin 2.
- ▶ Remove pin 3.
- ▶ Fold down bracket 1.
- ▶ Insert pin 3 in pinning position 4.
- ▶ Secure pin 3 with spring cotter pin 2.
- ▶ Repeat procedure on opposite side.

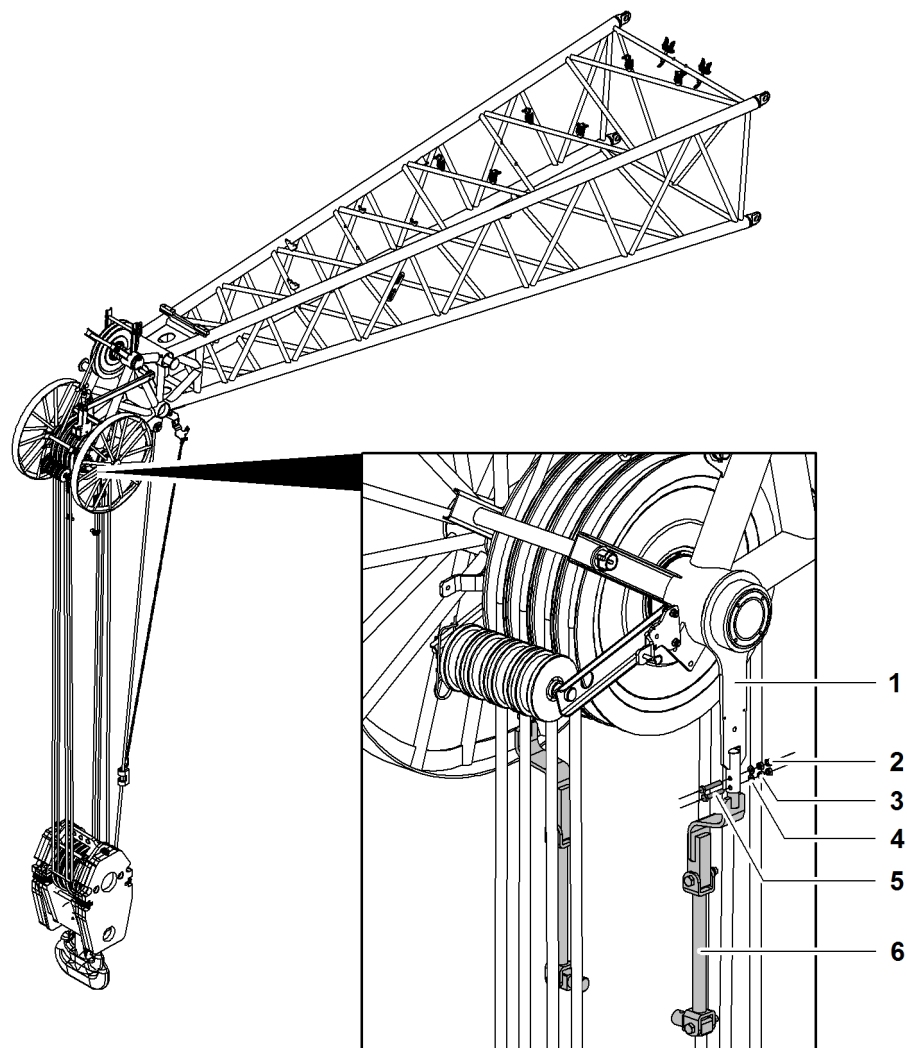


Fig. 5854: Connecting the vertical pipe with bracket

1	Bracket	4	Washer (2x)
2	Counter nut (2x)	5	Screw (2x)
3	Nut (2x)	6	Vertical pipe

- ▶ Stick vertical pipe **6** on bracket **1**.
- ▶ Insert screws **5** in borings.
- ▶ Secure screws **5** with washers **4** and nuts **3**.
- ▶ Secure nuts **3** with counter nuts **2**.
- ▶ Repeat procedure on opposite side.

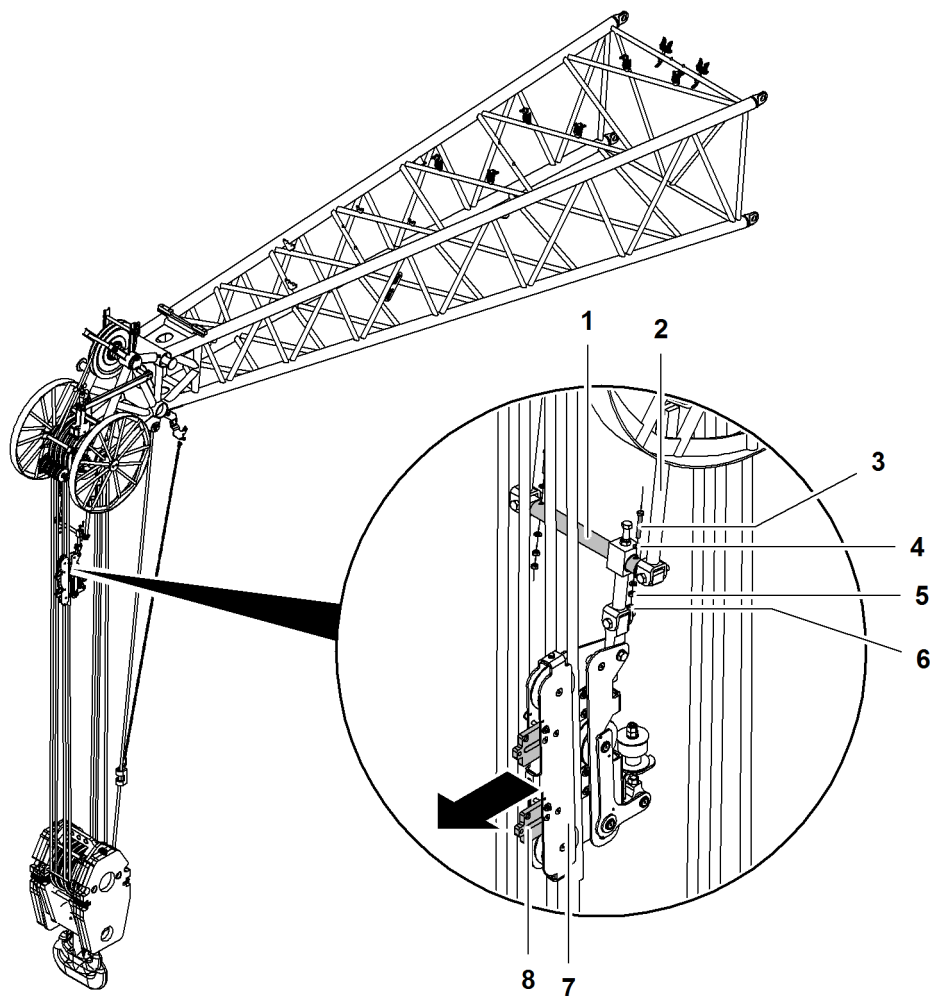


Fig. 5855: Connecting transverse pipe with vertical pipes

1	Transverse pipe	5	Nut
2	Vertical pipe (2x)	6	Counter nut
3	Screw	7	Rope opening
4	Washer (2x)	8	Rope lock (2x)

- ▶ Stick transverse pipe 1 with rope opening 7 on vertical pipes 2.
- ▶ Insert screw 3 with washer 4 in boring.
- ▶ Secure screw 3 with washer 4 and nut 5.
- ▶ Secure nut 5 with counter nut 6.
- ▶ Repeat procedure on opposite side.
- ▶ Remove pins of rope locks 8.
- ▶ Pull rope locks 8 outward.

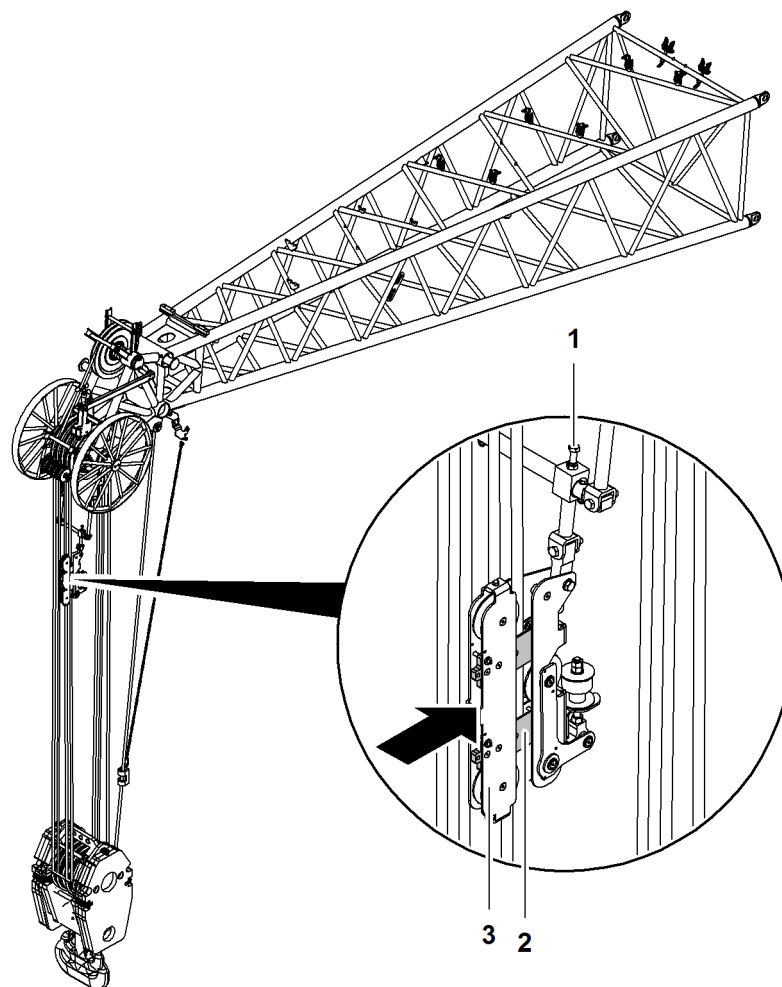


Fig. 5856: Positioning rope opening and inserting the rope

- | | | | |
|---|----------------|---|--------------|
| 1 | Screw | 3 | Rope opening |
| 2 | Rope lock (2x) | | |

The rope opening **3** must be installed on the outer rope that is closest to the rope fixing point of the jib head.

- ▶ Position rope opening **3**.
- ▶ Secure rope opening **3** with screw **1**.
- ▶ Place rope in rope opening **3**.
- ▶ Slide rope locks **2** inward.
- ▶ Secure rope locks **2** with pins.

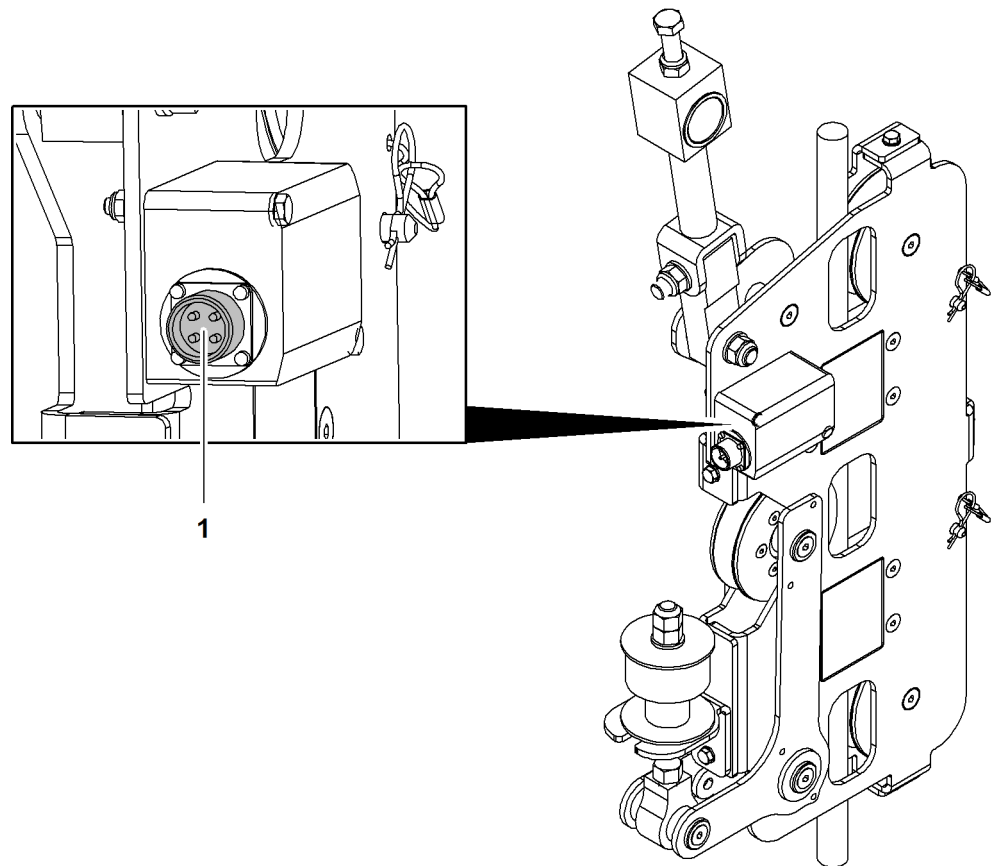


Fig. 5857: Connecting the electric line of the Vertical Line Finder

1 Bush

- ▶ Insert electric line of Vertical Line Finder at bush **1**.
- ▶ Insert electric line of Vertical Line Finder on terminal box of jib head.
 - ▷ Vertical Line Finder is ready for operation.

7.29 Vandalism protection*

7.29.1 Installing the vandalism protection

Ensure that the following conditions are fulfilled:

- Cabin is prepared for installation of the vandalism protection.

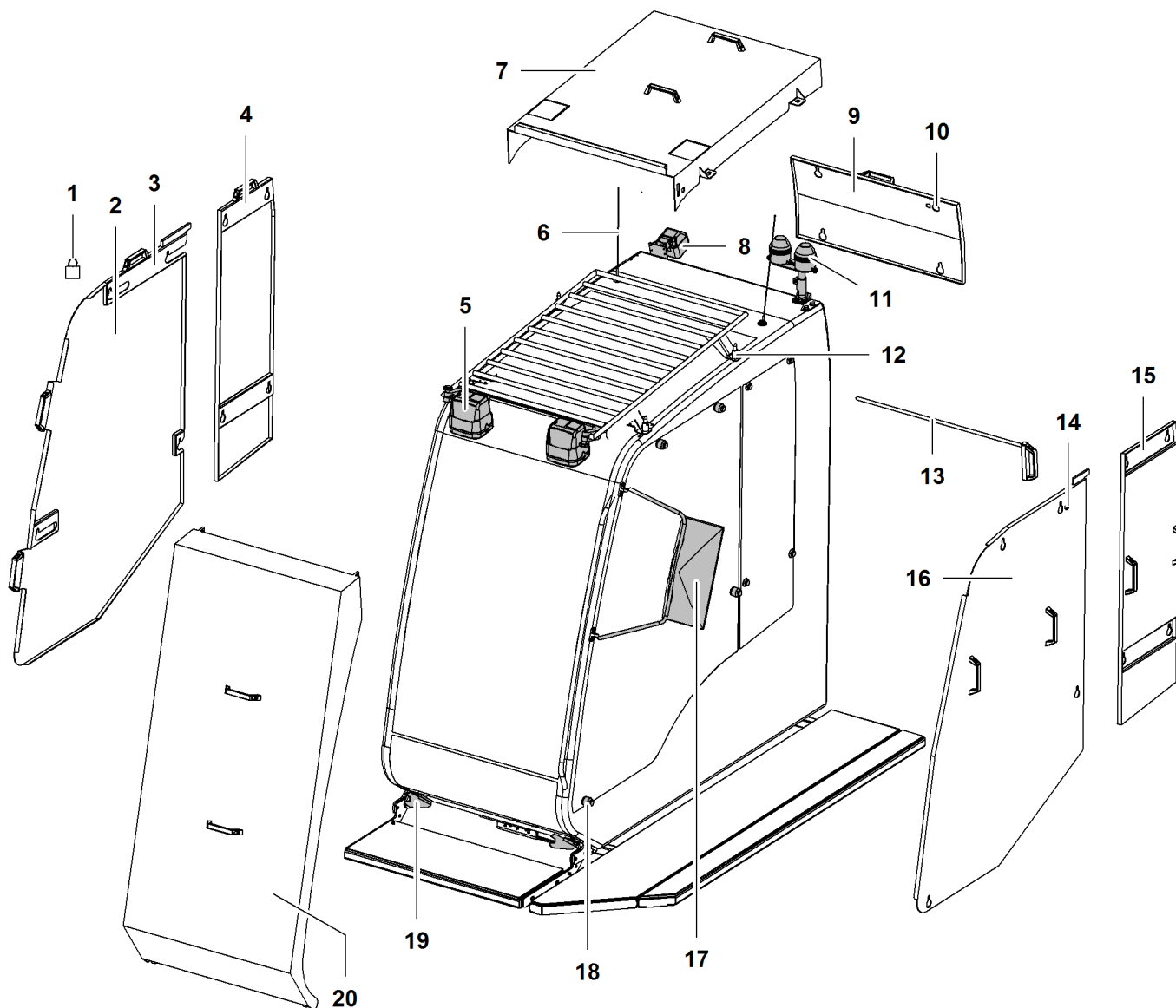


Fig. 5858: Installing the vandalism protection

- | | | | | | |
|---|-----------------------|----|---|----|------------------------------|
| 1 | Padlock | 8 | Rear floodlight | 15 | Left rear cover |
| 2 | Right front cover | 9 | Rear cover | 16 | Left front cover |
| 3 | Lock | 10 | Lock | 17 | Side mirror |
| 4 | Right rear cover | 11 | Flashing light/load moment limiter lamp | 18 | Suspension equipment (8x) |
| 5 | Front floodlight (2x) | 12 | Bracket (4x) for top cover | 19 | Bracket (2x) for front cover |
| 6 | Antenna (2x) | 13 | Barrier rod | 20 | Front cover |
| 7 | Top cover | 14 | Lock | | |

► Fold antennas 6 down.

- ▶ Fold flashing light/load moment limiter lamp **11** down.
- ▶ Deinstall side mirror **17**.
- ▶ Fold down front floodlight **5** and rear floodlight **8**.
- ▶ Insert top cover **7** at the brackets **12** of the cabin roof protection guard.
- ▶ Suspend rear cover **9** in the suspension equipment **18**.
- ▶ Close lock **10**.
 - ▷ Rear cover **9** is installed and secured.
- ▶ Suspend right rear cover **4** in the suspension equipment **18**.
- ▶ Suspend right front cover **2** in the suspension equipment **18**.
- ▶ Close lock **3**.
 - ▷ Right covers **2 + 4** are installed and secured.
- ▶ Suspend left rear cover **15** in the suspension equipment **18**.
- ▶ Suspend left front cover **16** in the suspension equipment **18**.
- ▶ Close lock **14**.
 - ▷ Left covers **15 + 16** are installed and secured.
- ▶ Insert front cover **20** at the brackets **19**.
- ▶ Fold front cover **20** back.
- ▶ Insert barrier rod **13** at the front cover **20** and top cover **7**.
- ▶ Secure barrier rod **13** with padlock **1**.
 - ▷ Vandalism protection is installed.

7.30 Jib luffing winch*

With boom configurations with fixed jibs, a jib luffing winch is required. If no jib luffing winch is installed on the main boom base section, the following steps must be performed.

Ensure that the following conditions are satisfied:

- Auxiliary crane with a working load of 1.5 t (3,307 lb) is available.
- Approved lifting equipment is available.
- Any accessories required are available.

7.30.1 Fixing rope end

To prevent the rope reeving of the jib luffing winch from coming loose, the rope end must be fixated prior to installation.

- ▶ Attach auxiliary rope to the rope end of the jib luffing winch rope.
- ▶ Wrap auxiliary rope around jib luffing winch.
- ▶ Secure auxiliary rope.

7.30.2 Lashing the jib luffing winch



WARNING

Improper lashing of the jib luffing winch!
Unforeseeable load rotation.

- ▶ Use approved rigging exclusively.
- ▶ Use prescribed lifting points.

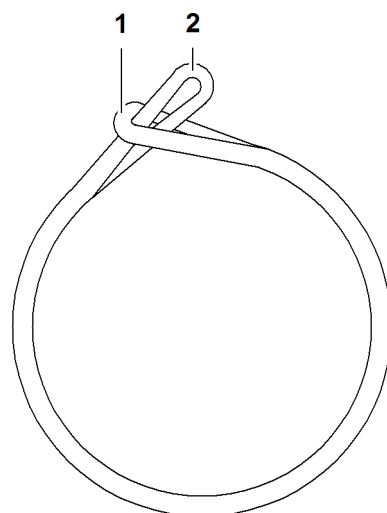


Fig. 5859: Loop

- | | |
|--|--|
| <p>1 Loop that pulls in</p> <ul style="list-style-type: none"> ▶ Form two loops from lifting equipment. ▶ Place loops left and right around rope drum of the jib luffing winch. ▶ Lash loop 2 onto auxiliary crane. | <p>2 Loop lashed to auxiliary crane</p> |
|--|--|

- ▶ Slightly tighten loop by lifting.
- ▶ By turning the loops of the jib luffing winch, align it in such a way that the jib luffing winch can be installed in the main boom base section.
 - ▷ Jib luffing winch is lashed.
- ▶ Secure hydraulic lines of the jib luffing winch with cable ties against sliding.
- ▶ Secure electric cable of the jib luffing winch with cable ties against sliding.
- ▶ If required, de-install pins of the jib luffing winch.
- ▶ Grease bolts.
- ▶ Provide securing material.
 - ▷ Jib luffing winch ready for installation.

7.30.3 Installation of jib luffing winch

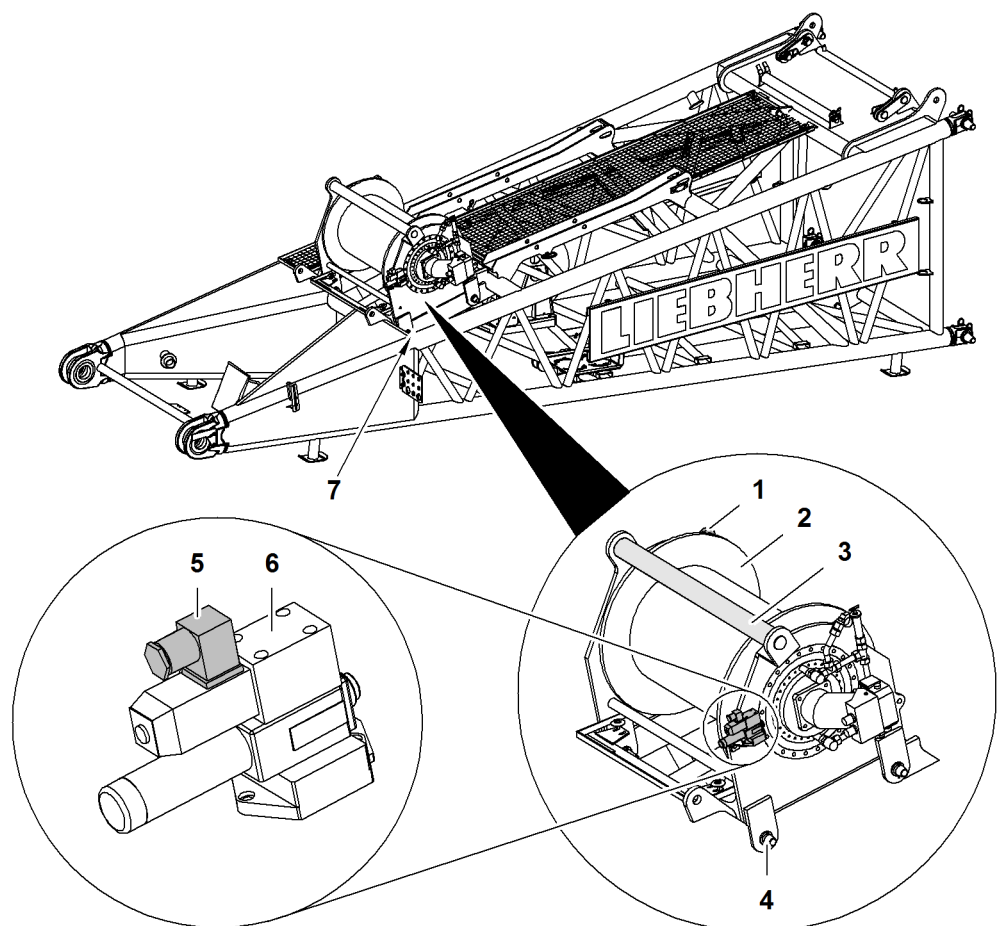


Fig. 5860: Overview installation of jib luffing winch

- | | |
|--|---|
| 1 Attachment point for rope pressure roller (2x) | 5 Electrical plug +4E-Y06 for brake valve |
| 2 Luffing jib luffing winch | 6 Brake valve |
| 3 Rope protection roller | 7 Position electrical plug |
| 4 Pin (4x) | |

- ▶ Lift jib luffing winch 2 with auxiliary crane into main boom base section.
- ▶ Bolt jib luffing winch 2 with main boom base section.
- ▶ Secure all pins 4 with cotter and washer.
 - ▷ Jib luffing winch installed in main boom base section.

7.30.4 Connect hydraulic lines

Ensure that the following conditions are satisfied:

- Hydraulic connections are clean.
- All protective covers of the hydraulic connections are in place.
- Diesel engine is turned off.

NOTICE

Dirty hydraulic connections!
Damage to the hydraulic system.

- ▶ Clean hydraulic connections prior to connection.

-
- ▶ Connect all plug-type connections.
 - ▶ Check whether plug-tape connections are completely latched.
 - ▶ Plug protective covers into each other.

NOTICE

Improper tightening of the screw connections!
Damage to thread.

- ▶ Only tighten screw connections by hand.



Note

Liebherr recommends:

- ▶ Undo screw couplings with damaged threads with filter strap wrench.
-
- ▶ Connect all screw connections.
 - ▶ Screw protective covers into each other.

7.30.5 Connect the electric cables

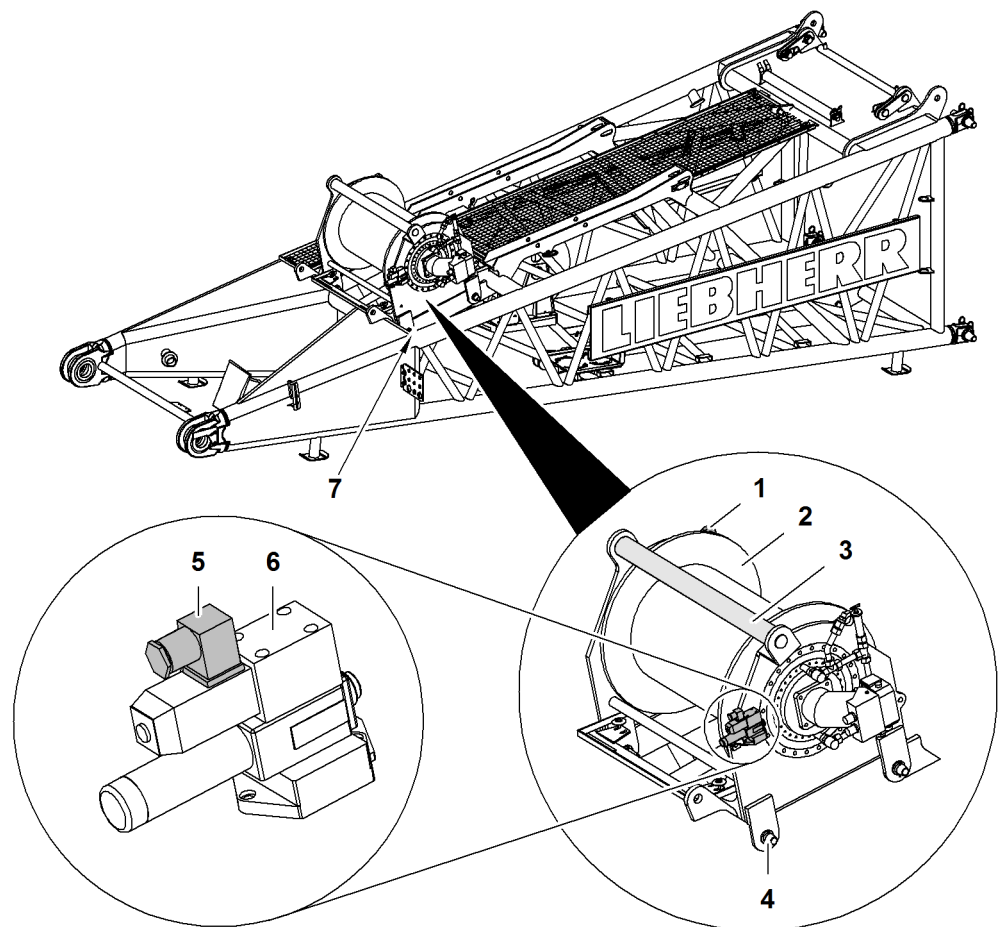


Fig. 5861: Overview installation of jib luffing winch

- | | | | |
|---|--|---|---|
| 1 | Fastening point for wire rope pressure roller (2x) | 5 | Electrical plug +4E-Y06 for brake valve |
| 2 | Luffing jib luffing winch | 6 | Brake valve |
| 3 | Rope protection roller | 7 | Position electrical plug |
| 4 | Pin (4x) | | |

The brake valve of the jib luffing winch must be supplied with power. Upon delivery of the machine without jib luffing winch, the electrical plug +4E-Y06 5 is located in the position electrical plug 6.

- ▶ Plug electrical plug +4E-Y06 5 on brake valve 6.
- ▶ Tighten screw connection.
- ▶ Attach electric line with cable tie outside of danger zone.
 - ▷ Jib luffing winch ready for operation.

7.31 Conversion to permanent auxiliary jib operation

If only auxiliary jib 36 t (79300 lb) is used on main boom head for hoisting work, the machine can be converted to permanent auxiliary jib operation. Permanent auxiliary jib operation takes strain off the pulley bearings and optimizes the diagonal rope pull.

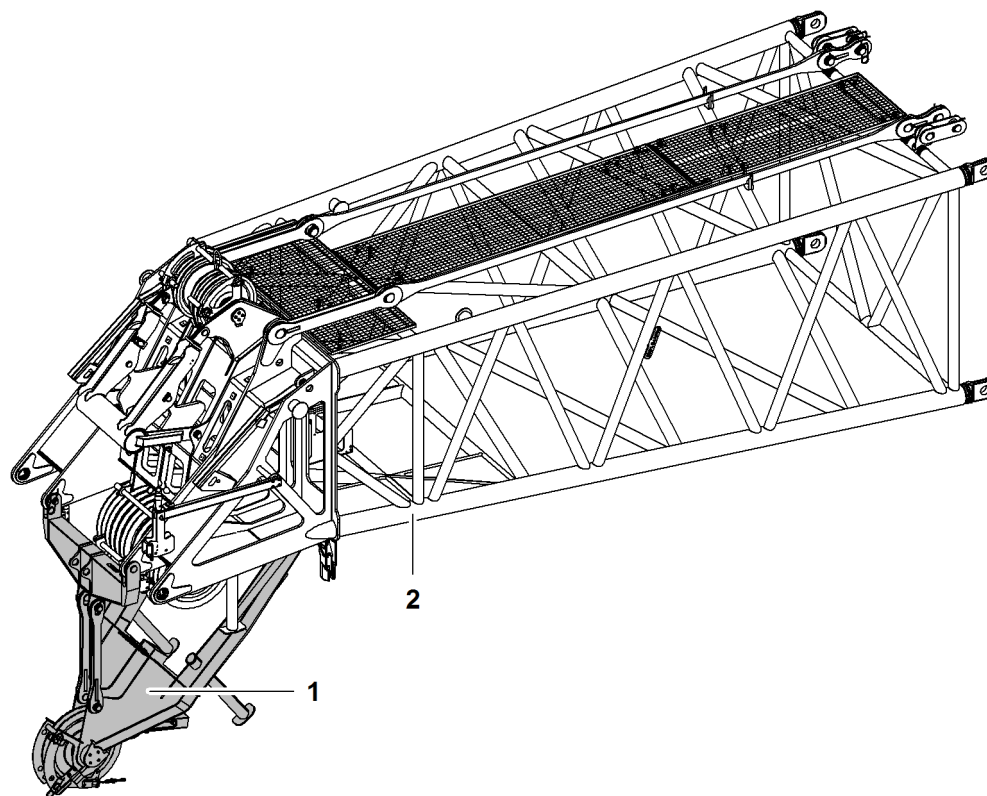


Fig. 5862: Conversion to permanent auxiliary jib operation

1 Auxiliary jib 36 t (79300 lb) 2 Main boom head

Make sure the following prerequisites are met:

- Auxiliary jib 36 t (79300 lb) is reeved at most twice.
- There is no jib installed on the main boom.

7.31.1 Converting auxiliary jib 36 t (79300 lb)

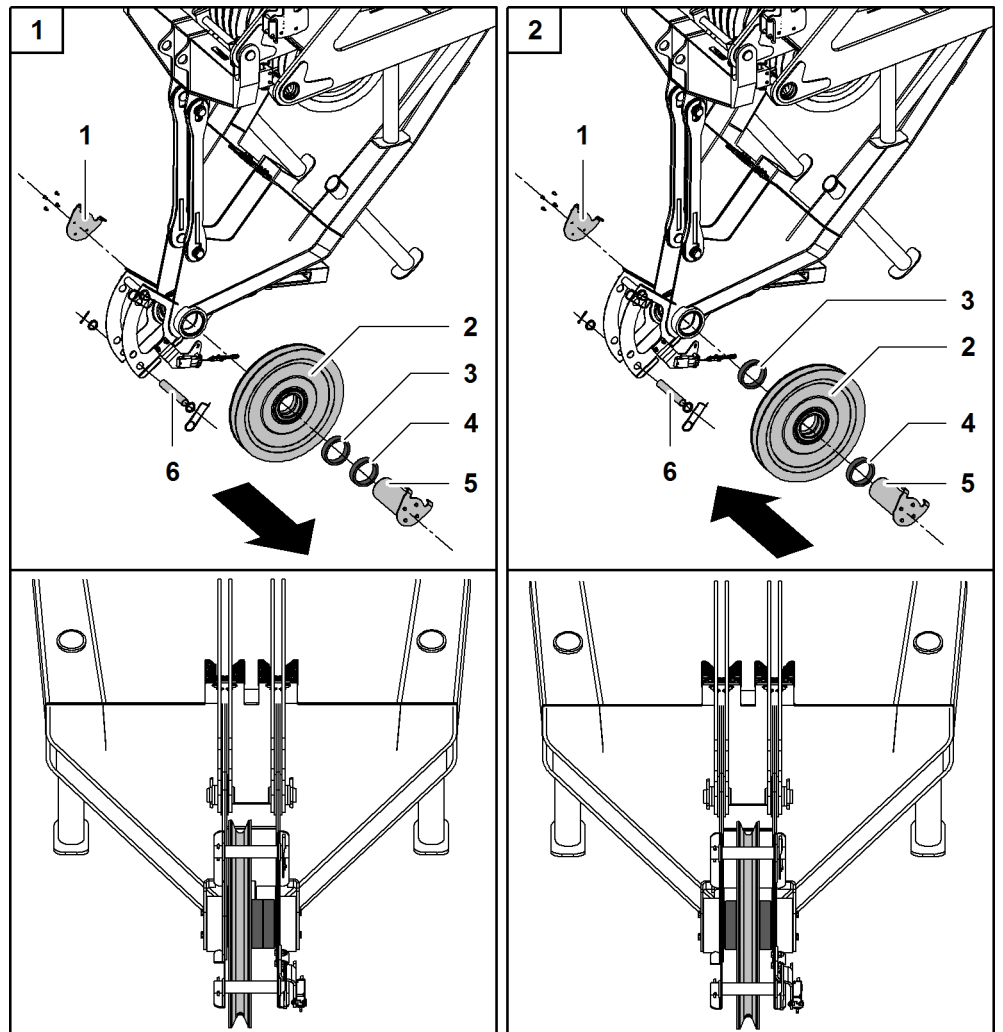


Fig. 5863: Converting auxiliary jib 36 t (79300 lb)

1	Cover plate	4	Bush
2	Pulley	5	Pin
3	Bush	6	Rope protection pipe

- ▶ Remove rope protection pipe 6.
- ▶ Loosen the screws of the cover plate 1.
- ▶ Remove cover plate 1.
- ▶ Pull pin 5 out.
- ▶ Remove pulley 2, bush 3 and bush 4.
- ▶ Reposition bush 3 so that pulley 2 is in the center.
- ▶ Insert bush 3, pulley 2 and bush 4.
- ▶ Insert pins 5.
- ▶ Insert cover plate 1 and secure with screws.
- ▶ Install and secure rope protection pipe 6.

7.31.2 Converting the main boom head

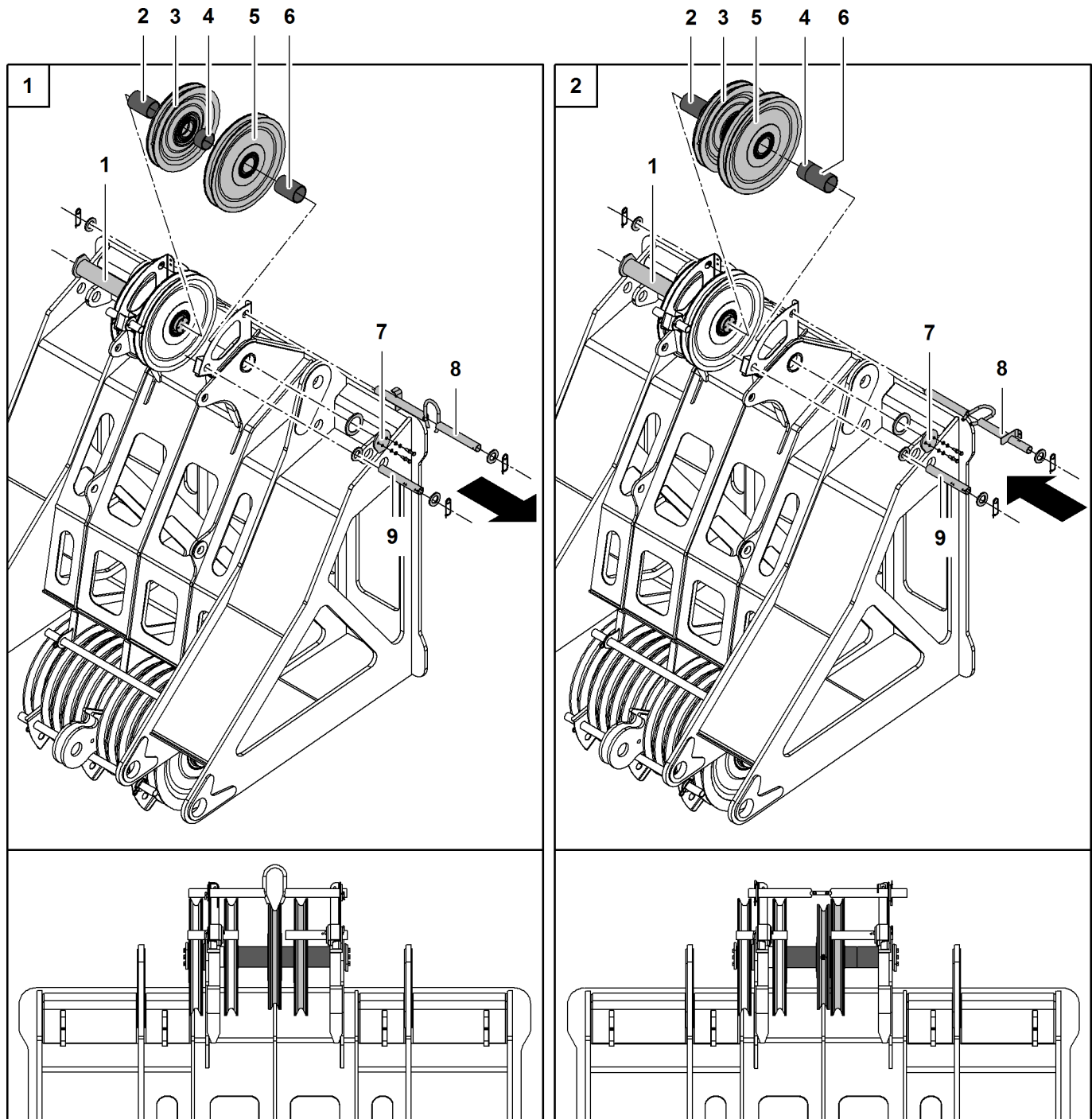


Fig. 5864: Converting the main boom head

- | | | |
|--|--|------------------------|
| 1 Pin | 4 Bush | 7 Cover plate |
| 2 Bush | 5 Pulley (500 mm (1' 8" ft-in) x 15 mm (0.59" in) x 90 mm (3.54" in) | 8 Rope protection pipe |
| 3 Pulley (450 mm (1' 6" ft-in) x 11 mm (0.43" in) x 90 mm (3.54" in) | 6 Bush | 9 Rope protection pipe |

► Remove rope protection pipe 8.

- ▶ Remove rope protection pipe 9.
- ▶ Loosen the screws of the cover plate 7.
- ▶ Remove cover plate 7.
- ▶ Pull out pin 1 so that pulley 3 and pulley 5 can be removed.
- ▶ Remove pulley 3, bush 4, pulley 5 and bush 6.
- ▶ Place bush 4 next to bush 6.
- ▶ Insert pulley 3, pulley 5, bush 4 and bush 6.
- ▶ Insert pins 1.
- ▶ Insert cover plate 7 and secure with screws.

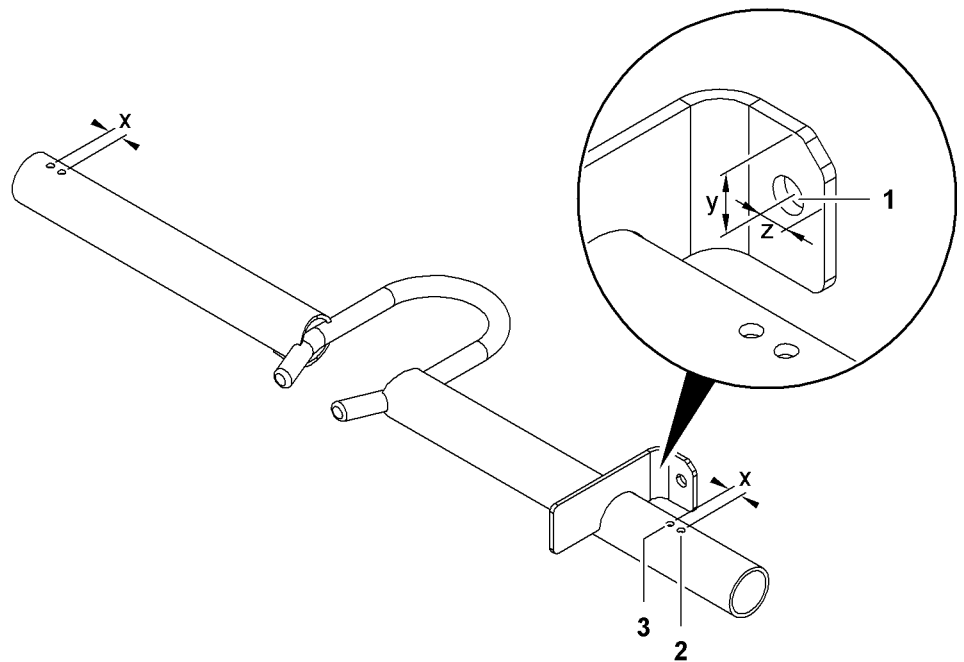


Fig. 5865: Preparing the top rope protection pipe

- | | |
|--|--|
| <p>1 Boring $\text{\O}11$ mm (0.43" in) for attachment on main boom head</p> <p>2 New boring $\text{\O}6$ mm (0.24" in) (2x)</p> | <p>3 Present boring $\text{\O}6$ mm (0.24" in) (2x)</p> |
|--|--|

The top rope protection pipe must be prepared before installation.

Name		Value
x	Distance of borings	12 mm 0.47" in
y	Distance of boring to top edge of steel plate	20 mm 0.79" in
z	Distance of boring to side edge of steel plate	8.5 mm 0.33" in

Tab. 627: Preparing the top rope protection pipe

- ▶ Make new borings 2 with distance x to present borings 3.
- ▶ Make boring 1 for attachment on main boom head.

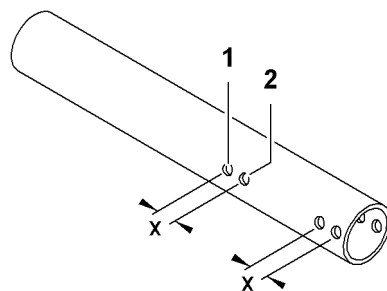


Fig. 5866: Preparing the bottom rope protection pipe

- 1 Present boring Ø6 mm (0.24" in) (2x)
- 2 New boring Ø6 mm (0.24" in) (2x)

The bottom rope protection pipe must be prepared before installation.

Name		Value
x	Distance of borings	15 mm 0.59" in

Tab. 628: Preparing the bottom rope protection pipe

- Make new borings 2 with distance x to present borings 1.

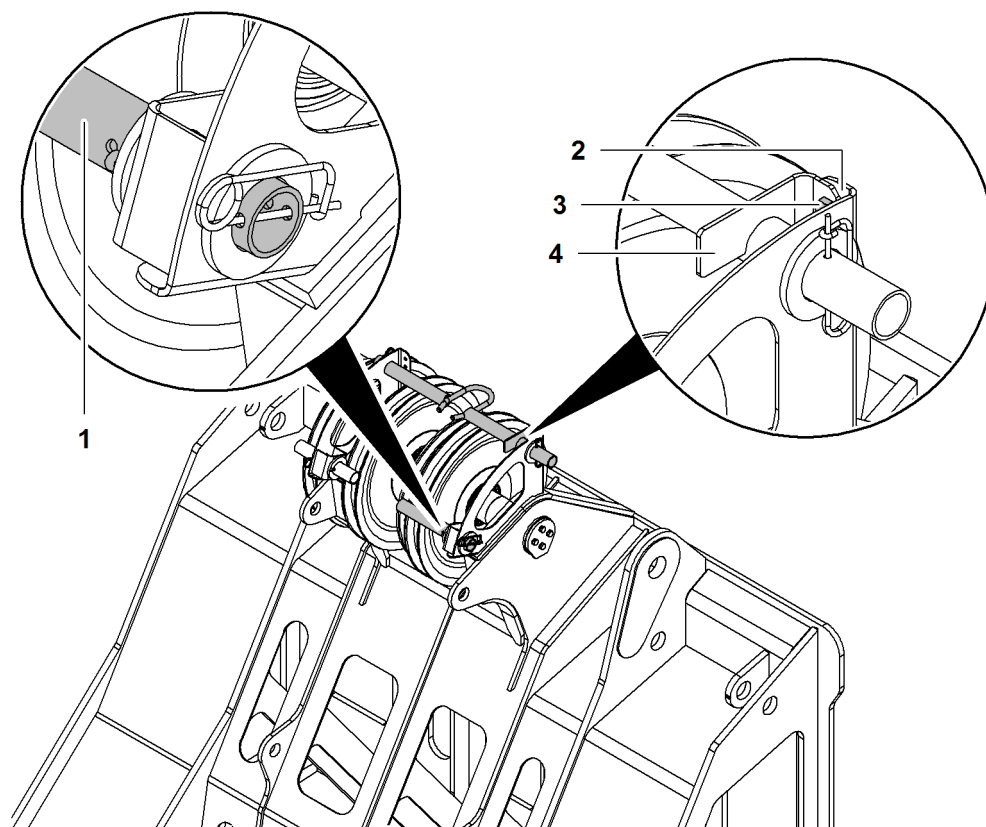


Fig. 5867: Installing rope protection pipes

- 1 Bottom rope protection pipe
- 2 Main boom head
- 3 Screw M10 with nut
- 4 Top rope protection pipe

- Install bottom rope protection pipe 1 and secure on new borings.
- Install top rope protection pipe 4 turned by 180° and secure on new borings.

- ▶ Turn top rope protection pipe **4** by 90° until top rope protection pipe **4** can be screwed to main boom head **2**.
- ▶ Insert M10 screw **3** and lock with nut.

7.32 Time-saving reconfiguring of the main boom

An auxiliary crane can be used to shorten or extend the main boom without having to dismantle it.

Ensure that the following conditions are fulfilled:

- Changing the main boom length is permissible.
- The applicable load chart for the new main boom length is available.
- Jib is not attached.
- Sufficient space is available for re-configuring.
- An auxiliary crane with sufficient working load is available.
- Appropriate rigging is available for the hoisting operations to be carried out by the auxiliary crane.
- Sufficient wooden blocks are available for support.
- The assembly positions of the rope guide and the mid-point suspensions are known.

7.32.1 Reconfiguring the main boom



WARNING

Laying down the main boom incorrectly!

- ▶ Follow the instructions for laying down the main boom .

NOTICE

Main boom is skewed!
Damage to the main boom.

- ▶ Set down the main boom on wooden blocks horizontally.

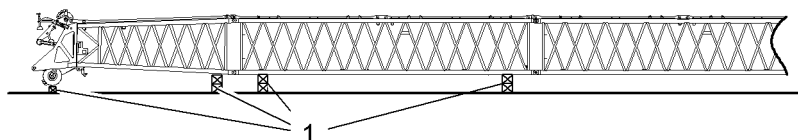


Fig. 5868: Main boom on wooden blocks

1 Wooden blocks

- ▶ Set down the main boom on wooden blocks 1.
- ▶ Lower A-frame 1 forwards until the main boom pendant straps are resting on the main boom.
- ▶ Separate the main boom pendant straps from A-frame1 equalizer.
- ▶ Bolt the assembly cylinder to the boom base section.
- ▶ Disconnect and pull back the electric cable from the terminal box on the boom head section.

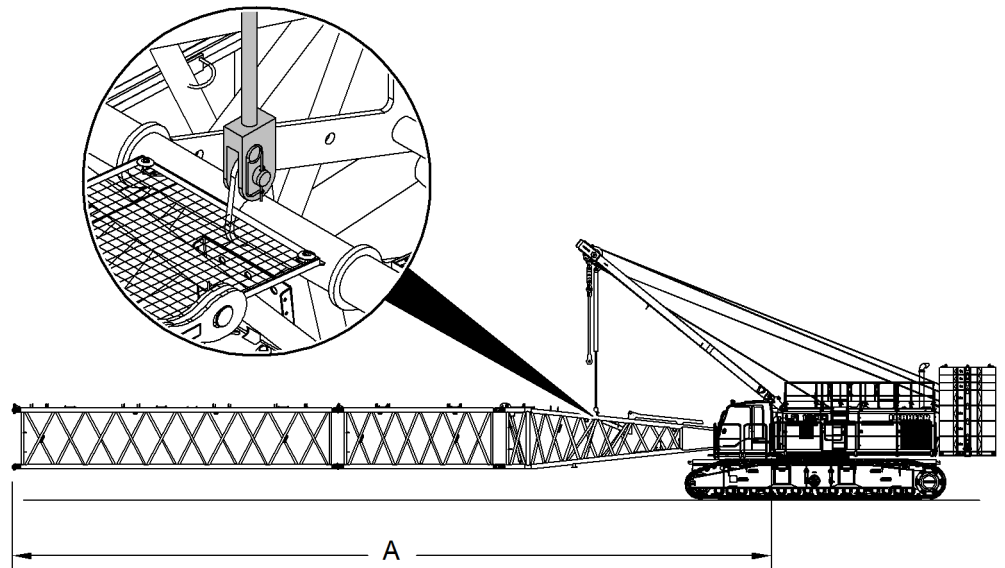


Fig. 5869: Maximum maneuverable main boom length with time-saving reconfiguration

A Maximum maneuverable main boom length

NOTICE

Maximum maneuverable main boom length **A** exceeded!
Risk of damage to the main boom and assembly cylinder.

- ▶ Maximum manoeuvrable main boom length (boom base section + boom section 6 m (20 ft) + boom section 12 m (40 ft)) must not be exceeded.
- ▶ Unbolt the main boom and main boom pendant straps at the extension point.

NOTICE

Dynamic movements when manoeuvring!
Damage to the main boom and assembly cylinder.

- ▶ Manoeuvre carefully with basic machine.
- ▶ If necessary, maneuver with the basic machine.

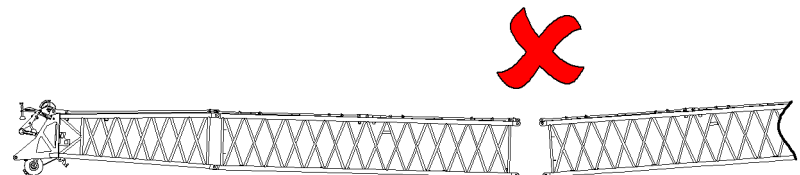


Fig. 5870: Incorrect reconfiguration

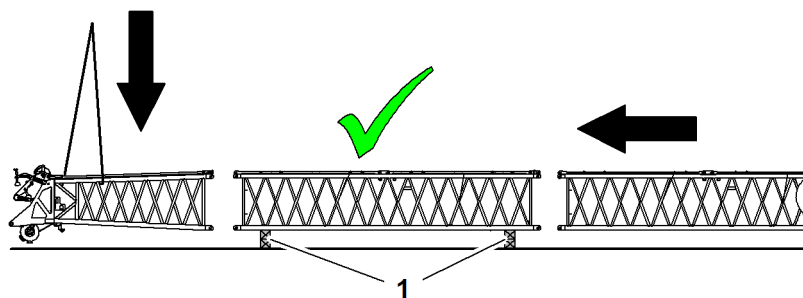


Fig. 5871: Correct reconfiguration

1 Wooden blocks

NOTICE

Boom sections lifted incorrectly!
Damage to boom sections.

- ▶ Always lift the boom sections one at a time at the lifting points provided.
- ▶ Fit and remove the boom sections using an auxiliary crane.
- ▶ Bolt on boom sections and main boom pendant straps.
- ▶ Approach the main boom carefully with the basic machine.
- ▶ Bolt on boom sections and main boom pendant straps.
- ▶ Detach assembly cylinder from main boom base section.
- ▶ Pin main boom pendant straps to A-frame¹ equalizer.
- ▶ Connect the electric cable to the terminal box on the boom head section and secure using retaining clips.



DANGER

Incorrect installation of mid-point suspensions!
Structural breakdown.

- ▶ Note changes to the assembly positions and rope lengths of the mid-point suspensions.
- ▶ Check assembly positions and rope lengths of mid-point suspensions.

NOTICE

Incorrect assembly of the rope guide!
Damage to main boom and rope of winch¹/winch².

- ▶ Note changes to the assembly position of the rope guide.
- ▶ Check assembly position of rope guide.

Now proceed as follows:

7.33 Assembling the machine without a self-assembly system

This chapter does not cover the entire assembly procedure for a machine without a self-assembly system. It only covers the specific differences to the assembly procedure for a machine with such a system.

The following components may be missing from a machine that does not have a self-assembly system:

- Jack
- Counterweight hoisting cylinder
- Assembly cylinder on A-frame 1

Ensure that the following conditions are fulfilled:

- Assist crane with sufficient radius and load-bearing capacity for loading the basic machine is available .
- Required crossbar and sling gear for loading the basic machine are available .
- 3 and 4-strand sling gear, which can be shortened, and round slings are available.

7.33.1 Specific procedure in case of missing jacks

Unloading the machine and attaching the crawler side frames

Ensure that the following conditions are fulfilled:

- Rear counterweight and carbody counterweight are not attached.
- Cabin is turned to working position.
- Cabin is tilted upwards.

Permitted crossbar and sling gear for all process steps: .

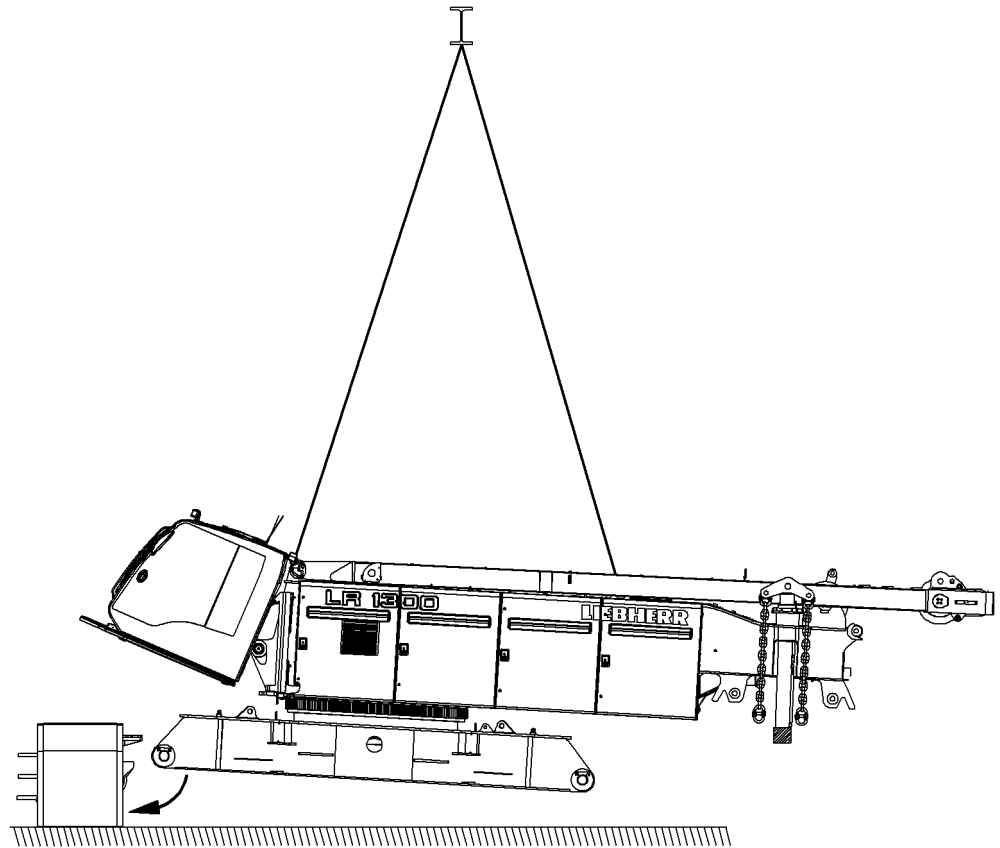


Fig. 5872: Unloading the machine and attaching the first crawler side frame without a self-assembly system

- ▶ Position first crawler side frame on the ground.
- ▶ Raise the basic machine onto the first crawler side frame.
- ▶ Bolt the basic machine to the crawler side frame.

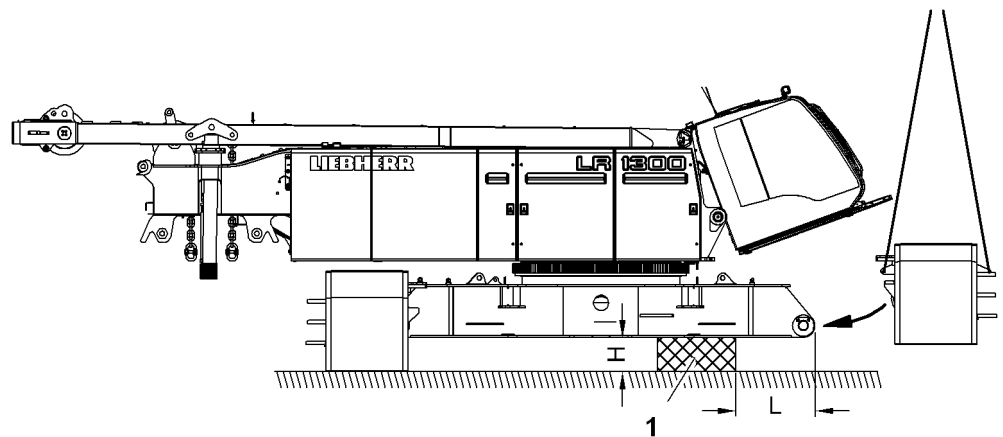


Fig. 5873: Attaching the second crawler side frame without a self-assembly system

- 1** Support
- L** At least 500 mm (1' 8" ft-in)
- H** Approx. 700 mm (2' 4" ft-in)

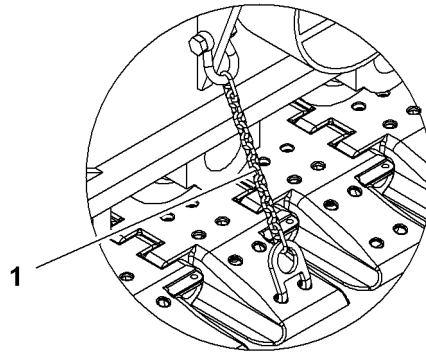


Fig. 5874: Transport bracket with crawler side frame

1 Transport bracket



Note

Liebherr recommends:

- ▶ To minimize the requisite support height: ensure that the transport bracket is installed on the crawler side frame.
- ▶ Support the basic machine.
- ▶ Remove sling gear from basic machine.
- ▶ Slew the uppercarriage through 180°.
- ▶ Raise the basic machine onto the second crawler side frame.
- ▶ Bolt the basic machine to the crawler side frame.

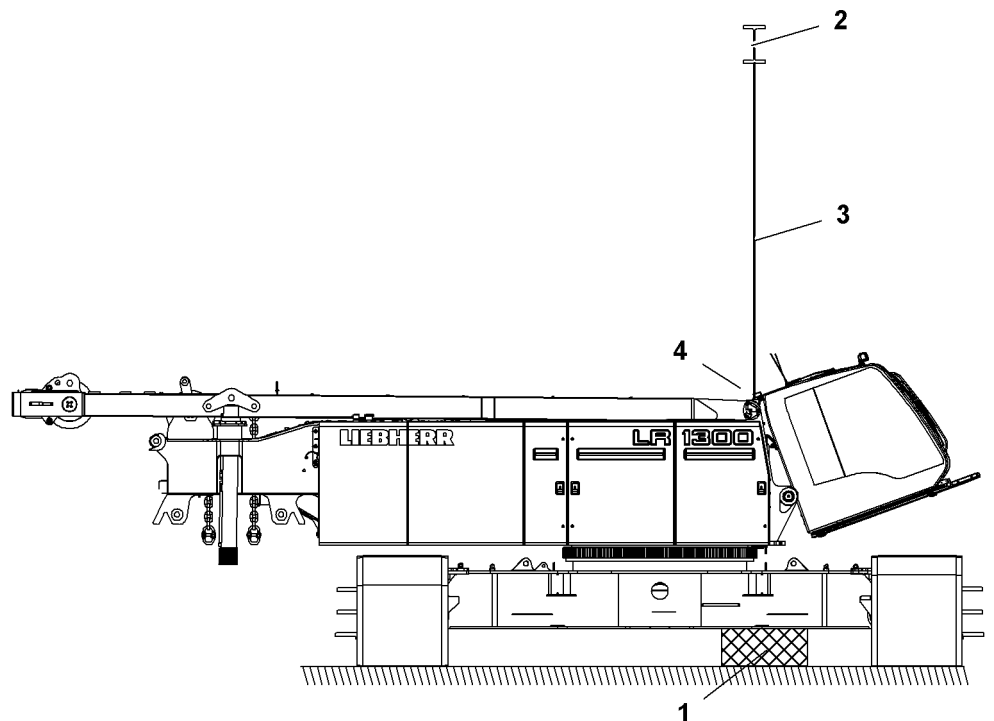


Fig. 5875: Raising the basic machine on one side to remove the support

1 Support

3 Round sling (2x) min.
400 kN (89,920 lb_f)

See next page for continuation of the image legend

Assembling the machine without a self-assembly system

- 2 Crossbar
- 4 Shackle (2x) min.
550 kN (123,650 lb_f)

- ▶ Only attach sling gear to the front rigging points of the basic machine.
- Only lift the basic machine as far as is needed to remove the support 1.
- ▶ Raise the basic machine and remove the support 1.

7.33.2 Specific procedure in case of missing counterweight hoisting cylinders

Attaching the basic machine to the rear counterweight



DANGER

Slewing of uppercarriage with rear counterweight attached not permitted!
Machine toppling over.

- ▶ Slew the uppercarriage according to the table ([For more information see: Lifting and pinning the rear counterweight, page 1313](#)) exclusively.

Ensure that the following conditions are fulfilled:

- The requisite carbody counterweight is in place.
- The rear counterweight ballast slab configuration is known.
- The uppercarriage is parallel to the crawler side frames.

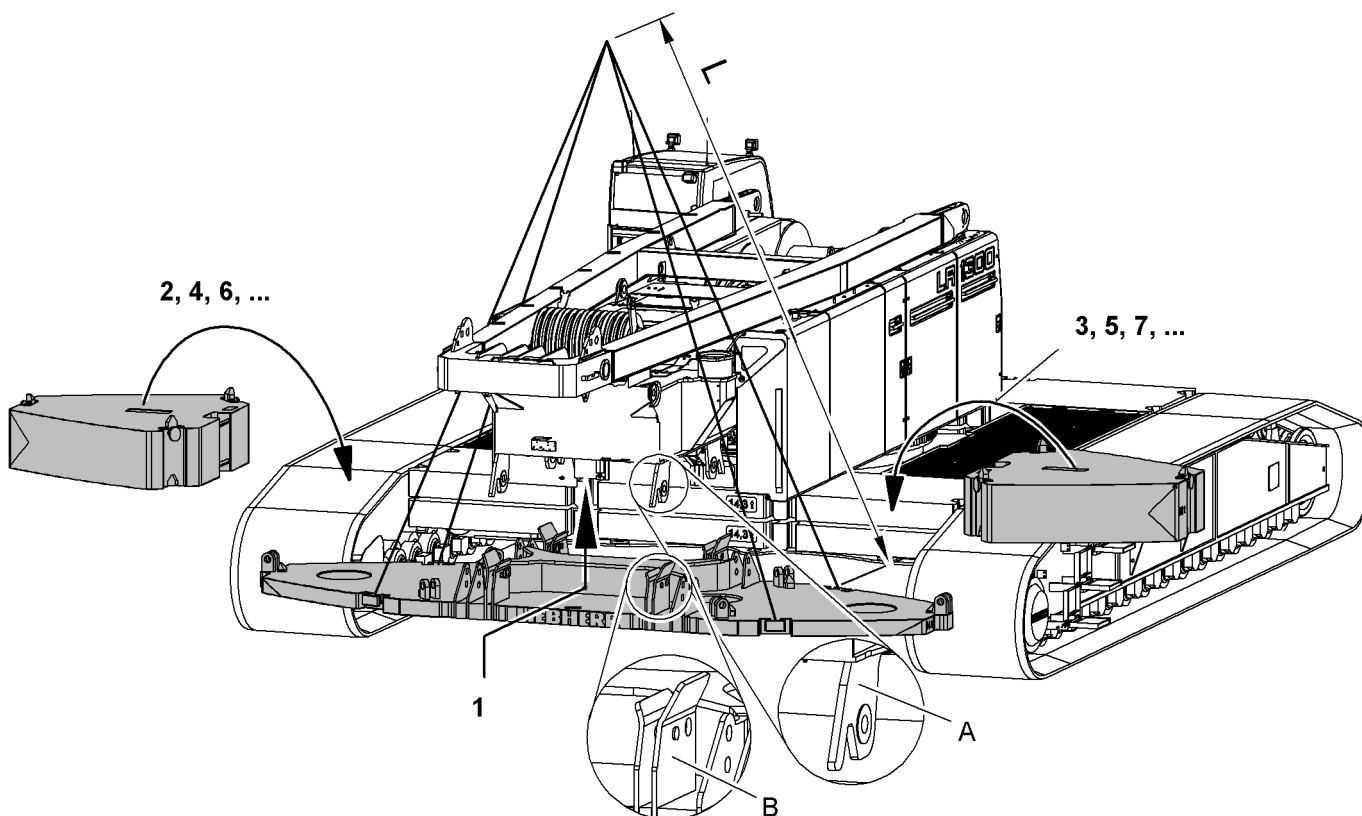


Fig. 5876: Attaching the basic machine to the rear counterweight

- A Pin connection point (4x) on rear counterweight
- L Minimum length of sling gear
- 2,... Attach left-hand ballast slabs

[See next page for continuation of the image legend](#)

- B** Pin connection point (4x) with locking devices **1** Installation of basic counterweight slab 14 t (30,864 lb) **3,...** Attach right-hand ballast slabs

Minimum length **L** of sling gear is 6000 mm (19' 8" ft-in).

- ▶ Lift basic counterweight slab 14 t (30,864 lb) from underneath to basic machine.



DANGER

Incorrect bolting of the rear counterweight!
Machine toppling over.

- ▶ Pin rear counterweight to basic machine.
- ▶ Secure pins.

- ▶ Pin basic counterweight slab 14 t (30,864 lb) with basic machine.
- ▶ Secure the pin with safety pins.

NOTICE

Unevenly stacked ballast slabs!
Damage to machine.

- ▶ Stack a left counterweight slab **2, 4, 6, ...** and a right counterweight slab **3, 5, 7, ...** alternately onto the basic counterweight slab 14 t (30,864 lb).
- ▶ Stack required counterweight slabs 10 t (22,046 lb) and counterweight slabs 5 t (11,023 lb) onto basic counterweight slab 14 t (30,864 lb).



DANGER

Incorrect lashing of the rear counterweight!
Dropping rear counterweight slabs.
Toppling of machine.

- ▶ Lash rear counterweight according to specifications ([For more information see: Tying down the rear counterweight, page 1307](#)).



CAUTION

Climbing aids are not secured or the rear counterweight is climbed onto!
Risk of falling.

- ▶ Secure climbing aids.
- ▶ Take precautions against falling when using climbing aids or climbing onto the rear counterweight.
- ▶ Lash the rear counterweight.

7.33.3 Specific procedure in case of missing assembly cylinder

When assembling the machine, use the auxiliary crane for all lifting operations.

A complete fixed or luffing jib can be attached after the main boom has been attached to the uppercarriage.

Attaching the main boom to the uppercarriage

Ensure that the following conditions are fulfilled:

- The requisite carbody counterweight is in place.
- The requisite rear counterweight is in place.
- ▶ The main boom is completely assembled.

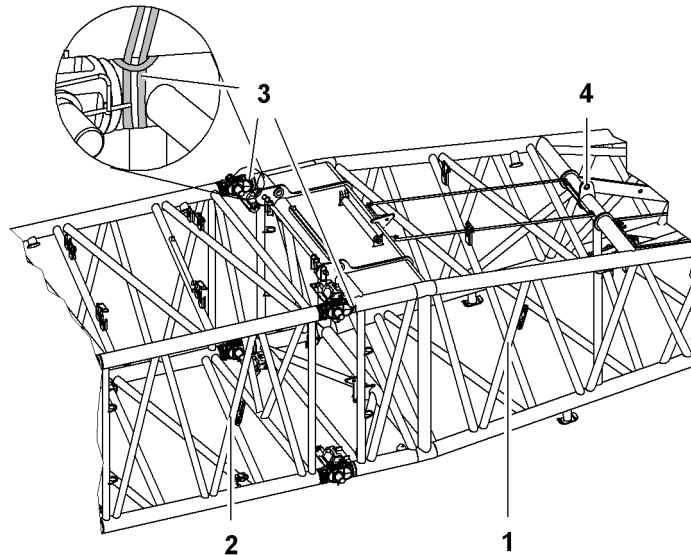


Fig. 5877: Slings the main boom

- | | |
|---|--|
| <p>1 Boom base section</p> <p>2 Main boom section</p> | <p>3 Round slings around the fork</p> <p>4 Pin connection point on assembly cylinder</p> |
|---|--|

NOTICE

Incorrect slinging work!
Risk of damage to main boom base section.

- ▶ Only sling the boom base section directly behind the fork on the chord pipe at the assembly cylinder pin connection point.
 - ▶ Only use textile round slings on the fork.
-

The following shackles are permitted for rigging at the assembly cylinder pin connection point:

- Main boom lengths up to 80 m (262' 6" ft-in): Shackles with capacity of at least 17 t (37,478 lb)
- Main boom lengths exceeding 80 m (262' 6" ft-in): Shackles with capacity of at least 25 t (55,115 lb)

- ▶ Rig round sling 3 directly behind the fork on the belt pipe.
- or**

Rig shackle and round sling 3 on pin connection point 4 on the assembly cylinder.

- ▶ Lift the main boom.
- ▶ Approach with basic machine and pin main boom section 2 to uppercarriage.

7.34 Disassembling the luffing jib + Midfall



DANGER

Incorrect disassembly of the machine!

- ▶ Erectability chart, critical angles and boom radius limitations must be observed.

The luffing jib + midfall must be disassembled in the reverse order to assembly.

Ensure that the following conditions are fulfilled:

- There must be sufficient space available to lay down the assembled booms.
- The signalmen and assistants have received instructions.
- The necessary tools and approved lifting equipment is available.
- Wooden blocks are available for placement.

7.34.1 Brief summary

The luffing jib + midfall are disassembled in exactly the same way as the luffing jib
(For more information see: [7.35 Deinstalling the luffing jib, page 1868](#)) .

7.35 Deinstalling the luffing jib



DANGER

Incorrect disassembly of machine!
Toppling of machine, structural breakdown.

- ▶ Observe erectability chart, critical angles and boom radius limitations.
-

The luffing jib must be disassembled in the reverse order to assembly.

Ensure that the following conditions are fulfilled:

- Sufficient space is available to lay down the assembled booms.
- Signalmen and assistants are instructed.
- The necessary tools and approved lifting equipment are available.
- Wooden blocks are available for placement.

7.35.1 Preparing the machine



Note

Liebherr recommends:

- ▶ Place pulley block or hook on timber.
-

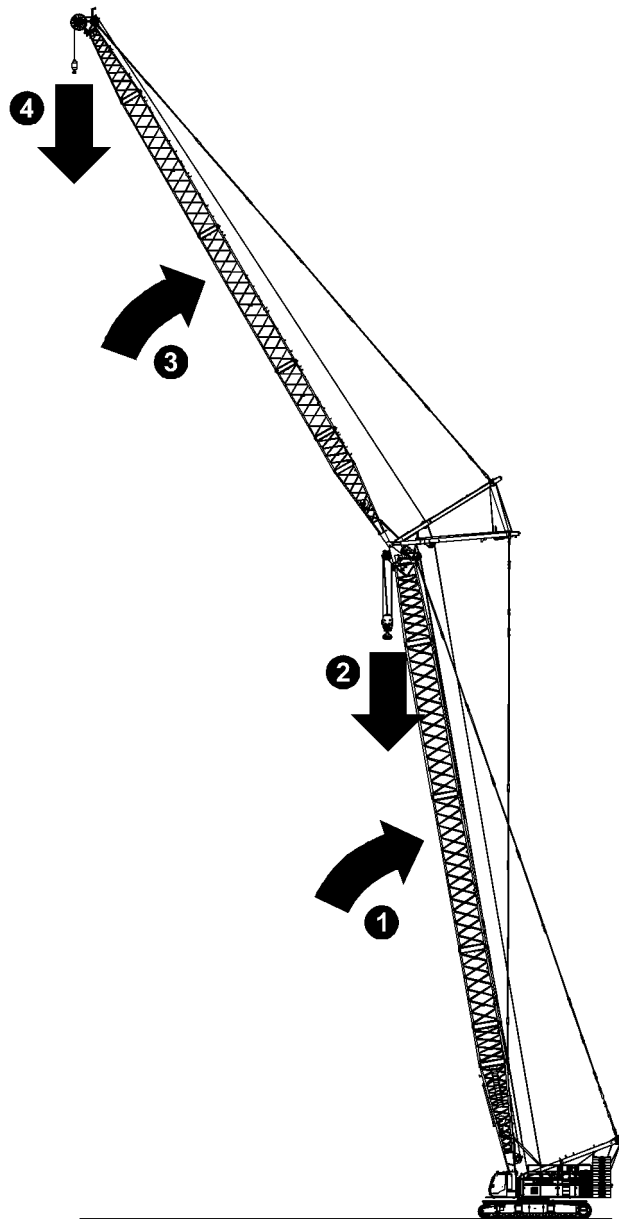


Fig. 5878: Preparing the machine (illustration of principle)



Note

The total center of gravity of the machine is moved beyond the first guide roller! Sudden swinging of the boom/jib during the laying down operation.

Liebherr recommends:

- ▶ For boom configurations with long main booms and short jibs, follow the procedure for "Blocked Crawlers" ([For more information see: 4.27 Blocked crawlers*, page 1008](#)).
- ▶ Set main boom to an 85° angle.
- ▶ Lower main boom pulley block or hook to the ground and lay down.
- ▶ Set jib to an angle of 70°.
- ▶ Lower pulley block or jib hook to the ground and lay down.

7.35.2 Lowering the jib up to load moment limiter stop



DANGER

Erectability chart is not followed!
Toppling of machine.

- ▶ Only lay down boom if erection is permitted according to the erectability chart.

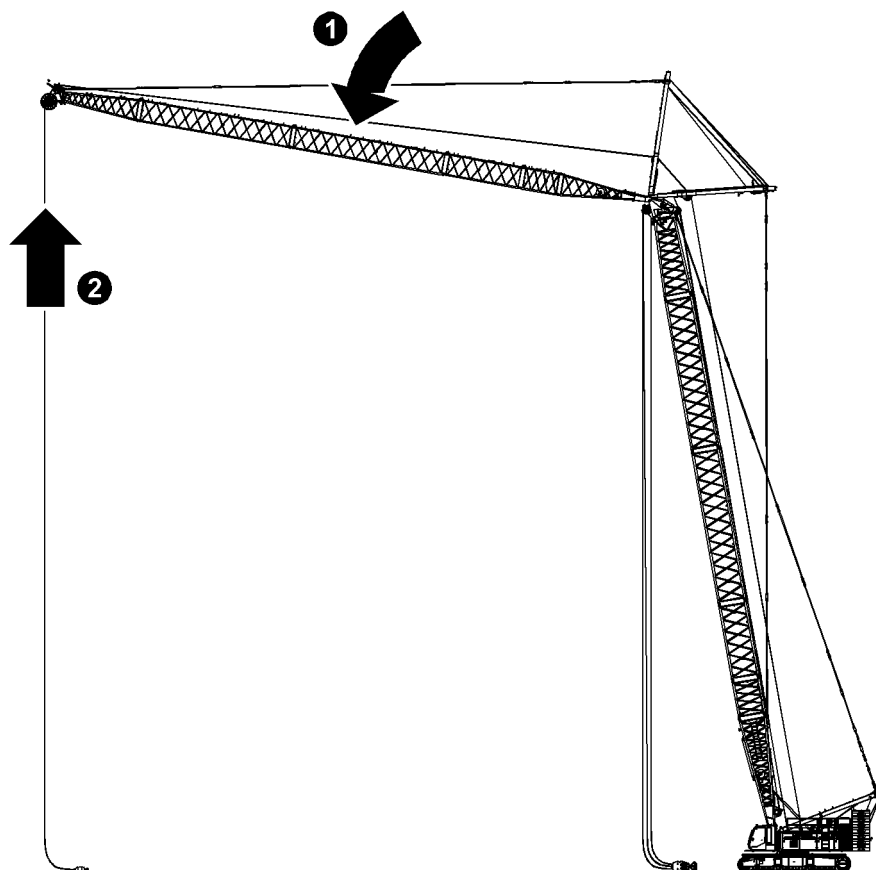


Fig. 5879: Lowering the jib up to the load moment limiter stop (illustration of principle)

- ▶ Lower jib.

NOTICE

Incorrect laying down procedure!
Damage to equipment.

- ▶ Do not drag hook or pulley block along the ground.
- ▶ Prevent slack rope.

- ▶ Reeve rope of winch1/winch2 on jib if necessary.

If a load moment limiter stop is triggered:

- ▶ Press the *Load moment limiter assembly/self-lock* button on control panel X23.



No load chart exist for machines geometry:

- ▷ Function "load moment limiter assembly" is active.
- ▷ The LED in the button *Load moment limiter assembly/self-lock* is lit.

- ▷ Machine functions are enabled without restriction.
- ▷ Load moment limiter lamps flash orange.



- ▶ Press the *Assembly functions* switch on control panel X12.

The following buttons have to be pressed additionally with machine types LR 1003, LR 1004, LR 1006:



- ▶ Press the *Cylinder adjustment functions* button on control panel X23.



- ▶ Press the *Extend A-frame1 cylinder* button on control panel X23.

7.35.3 Lowering the jib until wheels touch the ground or bottom jib limit switch is triggered

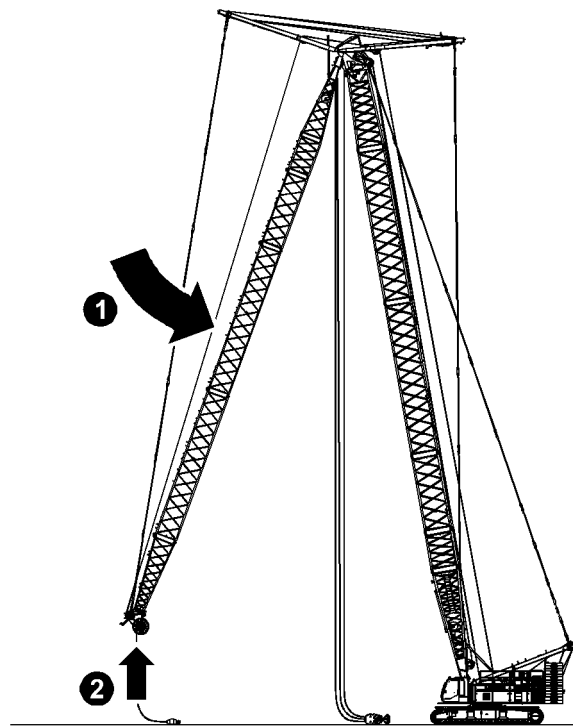


Fig. 5884: Lowering the jib until wheels touch the ground or bottom jib limit switch is triggered (illustration of principle)

If the jib is shorter than the main boom, the lower jib limit switch triggers before the wheels set down on the ground.

If the jib is longer than the main boom, the wheels set down on the ground before the jib limit switch triggers.

- ▶ Lower jib until wheels touch the ground or bottom jib limit switch is triggered.

If an attached auxiliary jib touches the ground:

- ▶ Ensure that auxiliary jib pendant straps fold up.

If the lightning rod* on the jib head touches the ground:

- ▶ Move lightning rod* on the jib head into transport position.

NOTICE

Incorrect laying down procedure!
Damage to equipment.

- ▶ Do not drag hook or pulley block along the ground.
- ▶ Prevent slack rope.

-
- ▶ Reeve rope of winch1/winch2 on jib if necessary.

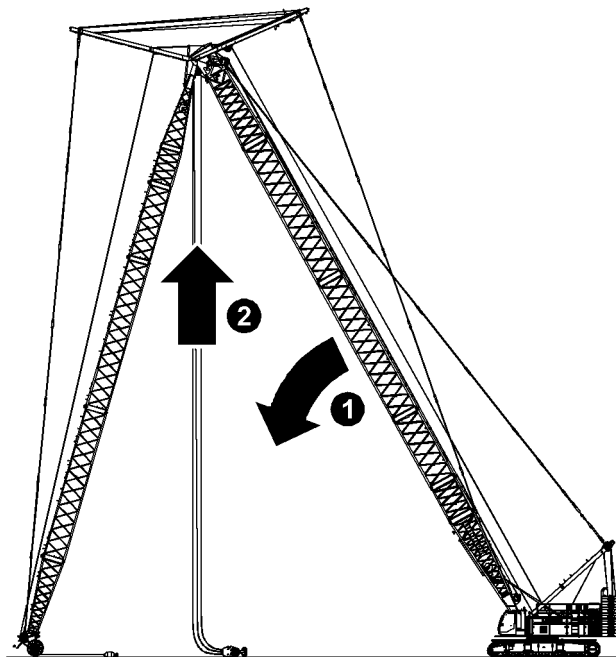


Fig. 5885: Lowering the main boom until the wheels touch the ground (illustration of principle)

NOTICE

Inadmissible jib angle!
Toppling of jib tilting-back supports.
Damage to jib.

- ▶ Make sure that jib tilting-back supports do not tilt forward.
 - ▶ Lift jib if necessary.
-

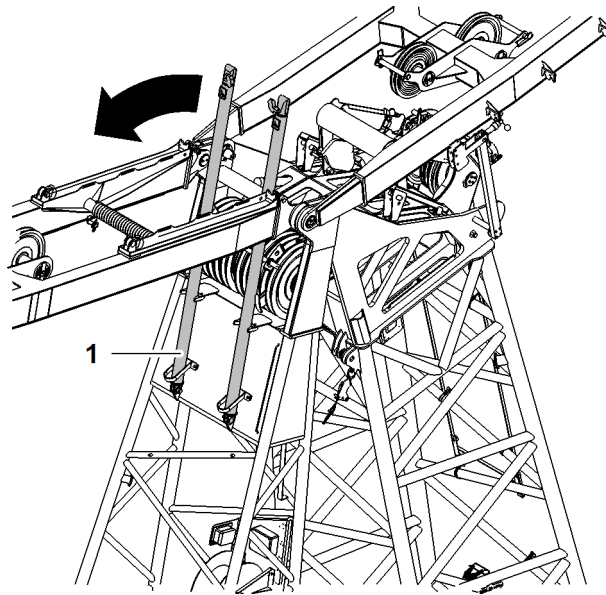


Fig. 5886: Jib tilting-back supports tilt forward

1 Jib tilting-back support (2x)

When the bottom jib limit switch triggers:

- ▶ Lower main boom and at the same time raise jib until wheels set down on the ground.

If an attached auxiliary jib touches the ground:

- ▶ Ensure that auxiliary jib pendant straps fold up.

If the lightning rod* on the jib head touches the ground:

- ▶ Move lightning rod* on the jib head into transport position.

NOTICE

Incorrect laying down procedure!
Damage to equipment.

- ▶ Do not drag hook or pulley block along the ground.
- ▶ Prevent slack rope.

- ▶ Reeve rope of winch1/winch2 on main boom if necessary.
-

7.35.4 Lowering the main boom and jib all the way to the ground



DANGER

Jib backstay straps and jib pendant straps under tension!
Toppling of machine.

- ▶ Ensure that Jib backstay straps and jib pendant straps are slightly slack.
-



DANGER

Mid-point suspension under tension!
Toppling of machine.

- ▶ Ensure that mid-point suspension ropes are slightly slack.
-

NOTICE

Obstacles when laying down jib!
Damage to boom components.

- Ensure that jib can roll forwards unhindered when it is laid down.

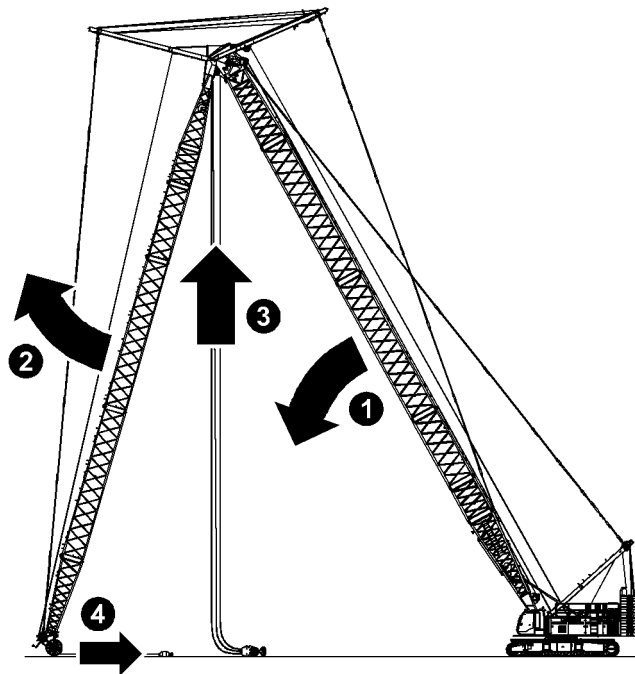


Fig. 5887: Lowering the main boom and jib all the way to the ground (illustration of principle)

NOTICE

Collision between A-frame2 and A-frame3!
Damage to A-frame2 and A-frame3.

- Do not completely move A-frame2 and A-frame3 together.

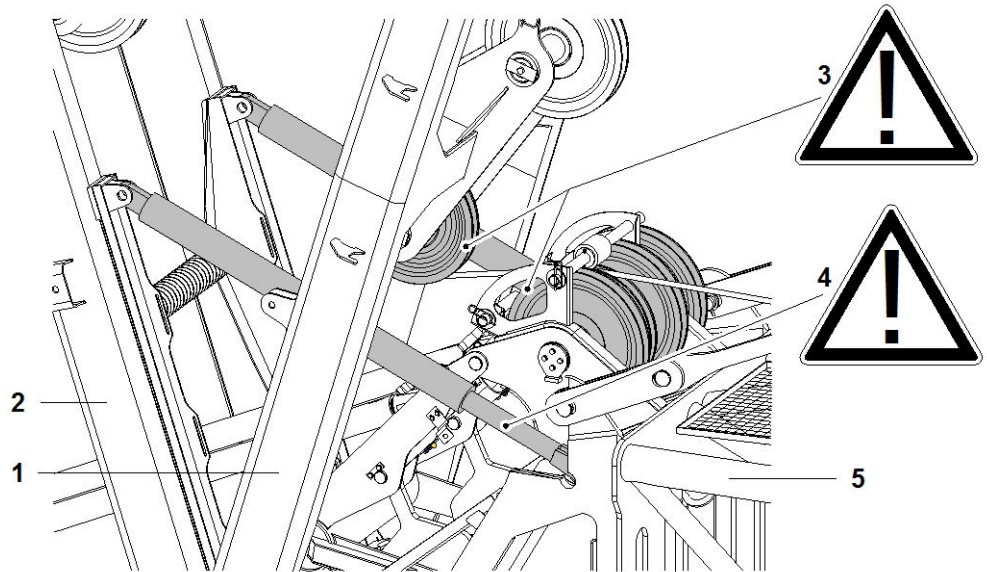


Fig. 5888: Dangers when laying down A-frame2/A-frame3

- | | | | |
|---|----------------------------|---|--|
| 1 | A-frame2 | 4 | Minimum dimension x of the visible piston rod of the hydraulic tilting-back support (2x) |
| 2 | A-frame3 | 5 | Main boom head |
| 3 | Collision point of pulleys | | |

▶ Lower main boom and lift jib at the same time.

NOTICE

Incorrect laying down procedure!
Damage to equipment.

- ▶ Do not drag hook or pulley block along the ground.
- ▶ Prevent slack rope.

- ▶ Reeve rope of winch1/winch2 on main boom if necessary.
- ▶ Reeve rope of winch1/winch2 on jib if necessary.



If hoist limit switch weight is on the ground:

- ▶ Press the *Bypass limit switch* button on control panel X23.
- ▷ Hoist limit switches are bypassed.

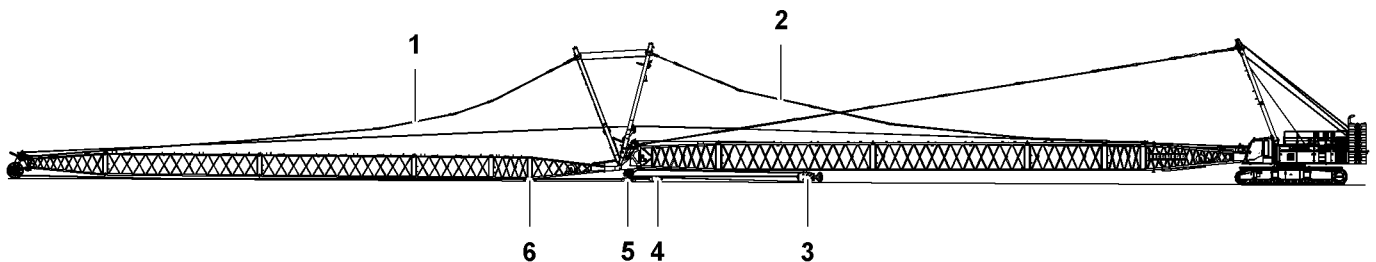


Fig. 5890: Main boom with luffing jib on the ground (illustration of principle)

- | | | | | | |
|---|---------------------|---|--------------|---|--------|
| 1 | Jib pendant straps | 3 | Pulley block | 5 | Timber |
| 2 | Jib backstay straps | 4 | Hook | 6 | Timber |

Deinstalling the luffing jib

- ▶ Remove rope protection pipes from jib head and jib base section.
- ▶ Detach rope of winch1/winch2 from jib and reeve.
- ▶ Detach rope of winch1/winch2 from main boom and pull back to main boom head.

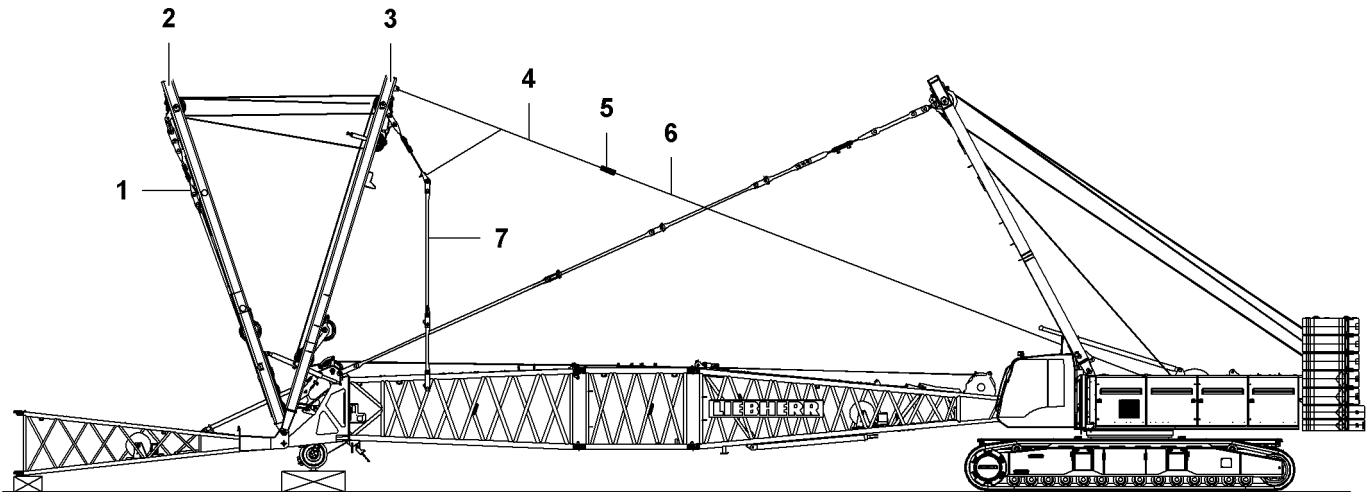


Fig. 5891: Laying down A-frame2/A-frame3 (illustration of principle)

- | | | | | | |
|---|--------------------|---|-----------------------|---|--------------------|
| 1 | A-frame3 equalizer | 4 | Belt | 7 | A-frame2 equalizer |
| 2 | A-frame3 | 5 | Pocket lock | | |
| 3 | A-frame2 | 6 | Rope of winch1/winch2 | | |

- ▶ Attach rope 6 of winch1/winch2 of main boom to belt 5 of A-frame2 3 with pocket lock 4.
- ▶ Tension rope 6 of winch1/winch2 from main boom.
- ▶ Lower A-frame3 2 with jib luffing winch until jib pendant straps rest on jib.
- ▶ Detach jib pendant straps from A-frame3 equalizer 1.



Fig. 5892: Minimum dimension x of the visible piston rod of the hydraulic tilting-back supports

- x Minimum dimension
100 mm (3.94" in)

NOTICE

Inadmissible undercutting of the minimum dimension x of the visible piston rods of the hydraulic tilting-back supports!
Damage to machine.

- ▶ Stop erection process of A-frame3 in time.

- ▶ Erect A-frame3 2 with jib luffing winch.
- ▶ Secure A-frame3 equalizer 1 in transport position.
- ▶ Lower A-frame3 2 using jib luffing winch until hydraulic tilting-back support are completely extended.

NOTICE

Collision of pulleys on A-frame2 and gantry pulleys on main boom head!
Damage to machine.

- ▶ Stop erection process of A-frame2 in time.
-
- ▶ Erect A-frame2 **3** and A-frame3 **2** using the rope **6** of winch1/winch2 of the main boom until jib backstay straps rest on main boom.
 - ▶ Detach jib backstay straps from A-frame2 equalizer **7**.
 - ▶ Lower A-frame2 **3** and A-frame3 **2** using the rope **6** of winch1/winch2 of the main boom until hydraulic tilting-back supports are no longer under stress.
 - ▶ Remove pins of the hydraulic tilting-back supports from main boom head.
 - ▶ Erect A-frame2 **3** using the rope **6** of winch1/winch2 of the main boom and at the same time hold A-frame3 **2** in position with the jib luffing winch, until the feet of A-frame2 **3** are about 20 cm (7.87" in) from A-frame3 **3**.
 - ▶ Lower A-frame2 **3** and A-frame3 **2** using the rope **6** of winch1/winch2 of the main boom until A-frame3 **3** rests on jib base section.

**Note**

Liebherr recommends:

- ▶ Reeve supplied auxiliary rope.
-
- ▶ Remove rope protection pipes.
 - ▶ Pull out and reeve jib luffing winch rope.
 - ▶ Lower A-frame2 **3** using the rope **6** of winch1/winch2 of the main boom until A-frame2 **3** rests on A-frame3 **3**.
 - ▶ Remove rope **6** of winch1/winch2 of main boom from belt **4** of A-frame2 **3**.
 - ▶ Reinstall rope protection pipes on jib head and jib base section.
 - ▶ Remove and reeve electric lines.
 - ▶ Move lightning rods* on A-frame2 **3** and A-frame3 **3** into transport position.
 - ▶ Separate jib components and jib pendant straps.
 - ▶ Unpin jib base section and remove from main boom head.
 - ▶ Load jib components.
 - ▶ Dismantle main boom and basic machine as described below.

7.36 Dismantling the fixed jib



DANGER

Incorrect disassembly of the machine!
Toppling of machine, structural breakdown.

- ▶ Erectability chart, critical angles and boom radius limitations must be observed.

The fixed jib must be disassembled in the reverse order to assembly.

Ensure that the following conditions are fulfilled:

- There must be sufficient space available to lay down the assembled booms.
- The signalmen and assistants have received instructions.
- The necessary tools and approved lifting equipment is available.
- Wooden blocks are available for placement.

7.36.1 Brief summary

The following list provides you with a short overview of the steps to be taken when dismantling the fixed jib:

- ▶ Lay down pulley blocks/hooks.



Note

The overall center of gravity of the machine is moved beyond the first running roller!

Sudden swinging of the boom/jib during the laying down operation.

Liebherr recommends:

- ▶ When using long main booms and short jibs, follow the procedure for "Blocked Crawlers" ([For more information see: 4.27 Blocked crawlers*, page 1008](#)).

- ▶ Lower main boom.



If a load moment limiter stop is triggered:

- ▶ Press the button *Load moment limiter assembly/self-lock* on control panel X23.

No load chart exist for machines geometry:

- ▷ Function "load moment limiter assembly" is active.
- ▷ The LED in the button *Load moment limiter assembly/self-lock* is lit.
- ▷ Machine functions are enabled without restriction.
- ▷ Load moment limiter lamps flash orange.



- ▶ Press the switch *Assembly functions* on control panel X12.

The following buttons have to be pressed additionally with machine types LR 1003, LR 1004, LR 1006:



- ▶ Press the *Cylinder adjustment functions* button on control panel X23.



- ▶ Press the *Extend A-frame1 cylinder* button on control panel X23.



DANGER

Obstacles in the way when laying down the jib!
Structural failure.

- ▶ Make sure that when being laid down, the jib can roll forwards unhindered.
-

If the lightning rod* on the jib head touches the ground:

- ▶ Move lightning rod* on the jib head into transport position.
- ▶ Lower further until main boom and jib are completely on the ground.
- ▶ Loosen rope of winch1/winch2 from jib and reeve.
- ▶ Remove the rope of winch1/winch2 from the main boom and pull it back to the boom head section.
- ▶ Attach the rope of winch1/winch2 of the main boom with pocket lock on A-frame2.
- ▶ Undo jib pendant straps from A-frame2.
- ▶ Pull A-frame 2 backwards to relieve the strain on the jib backstay straps.
- ▶ Detach the jib backstay straps from the connecting links.
- ▶ Lay down A-frame 2 forwards.
- ▶ Remove and wind up the electric cables.
- ▶ Move lightning rod* on A-frame2 into transport position.
- ▶ Disconnect jib components and jib backstay straps.
- ▶ Remove the rigid tilting-back supports.
- ▶ Unpin the jib base section and remove it from the boom head section.
- ▶ Re-fit the rigid tilting-back supports.
- ▶ Load jib components.
- ▶ Dismantle the main boom and basic machine as described below.

7.37 Disassembling main boom + reducing piece



DANGER

Incorrect disassembly of the machine!

- ▶ Erectability chart, critical angles and boom radius limitations must be observed.
-

The main boom + reducing adapter must be disassembled in the reverse order to assembly.

Ensure that the following conditions are fulfilled:

- There must be sufficient space available to lay down the assembled booms.
- The signalmen and assistants have received instructions.
- The necessary tools and approved lifting equipment is available.
- Wooden blocks are available for placement.

7.37.1 Brief summary

The main boom + reducing adapter are disassembled in exactly the same way as the main boom .

7.38 Disassembling the main boom



DANGER

The machine has been disassembled incorrectly!
Toppling of machine, structural breakdown.

- ▶ Erectability chart, critical angles and boom radius limitations must be observed.

The main boom must be disassembled in the reverse order to assembly.

Ensure that the following conditions are fulfilled:

- There must be sufficient space available to lay down the assembled booms.
- The signalmen and assistants have received instructions.
- The necessary tools and approved lifting equipment is available.
- Wooden blocks are available to place under the boom.

7.38.1 Brief summary

The following list provides you with a short overview of the steps to be taken when disassembling the main boom:

- ▶ Lay down the pulley block/load hook.
- ▶ Lower the main boom.



If a load moment limiter stop is triggered:

- ▶ Press the button *Load moment limiter assembly/self-lock* on control panel X23.

No load chart exist for machines geometry:

- ▷ Function "load moment limiter assembly" is active.
- ▷ The LED in the button *Load moment limiter assembly/self-lock* is lit.
- ▷ Machine functions are enabled without restriction.
- ▷ Load moment limiter lamps flash orange.



- ▶ Press the switch *Assembly functions* on control panel X12.

The following buttons have to be pressed additionally with machine types LR 1003, LR 1004, LR 1006:



- ▶ Press the button *cylinder adjustment functions* on control panel X23.



- ▶ Press the *Extend A-frame1 cylinder* button on control panel X23.



DANGER

Obstacles when laying down the main boom!
Structural failure.

- ▶ Make sure that the auxiliary jib (if present) can roll forwards unhindered when it is laid down.

- ▶ Continue to lower the main boom until it is just above the ground.
- If an attached auxiliary jib touches the ground:
- ▶ Ensure that auxiliary jib pendant straps fold up.

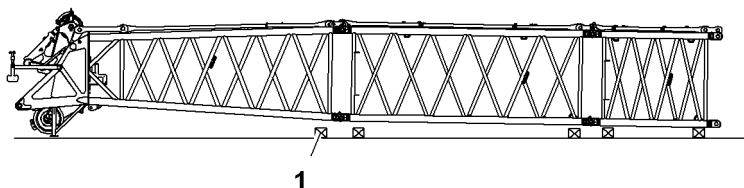


Fig. 5901: Supporting the main boom with wooden blocks (illustration of principle)

1 Wooden blocks

- ▶ Place wooden blocks to the left and right of the pin connection points underneath the chord pipe of the main boom sections.



WARNING

Impermissible voltage build-up in main boom!
Serious injury.

- ▶ Ensure that boom head section can slide in a longitudinal direction.
- ▶ If necessary install a layer of suitable support material under the feet of the main boom head section.

- ▶ Lower main boom until main boom rests on wooden blocks.
- ▶ Loosen rope of winch1/winch2 from main boom and reeve.
- ▶ Remove and wind up the electric cables from the main boom.
- ▶ Move the lightning rods* into transport position.
- ▶ Connecting the equalizer on A-frame1 to the main boom base section.



WARNING

Never stand in the inside of the main boom sections during disassembly!
Serious injury.

- ▶ Never go inside the main boom sections.



WARNING

Incorrect slacking of the rope on the main boom winch!
Main boom falls into slack rope after unpinning of the lower double-taper pins.

- ▶ Ensure that there is no slack rope on the main boom winch.
- ▶ Remove the first, bottom double-taper pin from the main boom base section.



WARNING

Impermissible voltage in main boom!
Sudden movement of main boom whilst unpinning the second, lower double-taper pin from the main boom base section.

- When the first, lower double-taper pin on the main boom base section is unpinned:
- ▶ Visually check that the pin connection points are aligned.

- ▶ Make sure that pin connection points are aligned correctly.
- ▶ Remove the second, bottom double-taper pin from the main boom base section.
- ▶ Unwind the main boom luffing winch.
 - ▷ The main boom and main boom base section fold out at the bottom pin connection point.
 - ▷ The main boom is lowered onto wooden blocks.
 - ▷ Main boom head section moves slightly forwards.
- ▶ Remove the top double-taper pins from the main boom base section.
- ▶ Drive the basic machine to the main boom head section.
- ▶ Lash rigging to main boom on the pin connection point between the main boom head section and the first main boom section with rigging.
- ▶ Remove bottom double-taper pins from main boom head.
- ▶ Lower lifting equipment.
 - ▷ Main boom and main boom head fold out at the bottom pin connection point.
 - ▷ The main boom is lowered onto wooden blocks.
- ▶ Remove the upper double-taper pins from the main boom head section.
- ▶ Load the main boom head section.
- ▶ Unpin the main boom sections.
- ▶ Load main boom sections.
- ▶ Dismantle the basic machine as described below.

7.39 Disassembling the basic machine



DANGER

Incorrect disassembly of the machine!
Toppling of machine, structural breakdown.

- ▶ Observe all critical angles and boom radius limitations as described under "Assembly".

The basic machine must be disassembled in the reverse order to assembly.

7.39.1 Brief summary

The following list provides you with a short overview of the steps to be taken when disassembling the basic machine.

- ▶ Switch on assembly mode functions.
- ▶ Switch on cylinder adjustment functions.
- ▶ Lower the rear counterweight.
- ▶ Remove the counterweight hoisting cylinder chains from the rear counterweight.
- ▶ Remove slinging plates from rear counterweight.
- ▶ Undo rear counterweight lashing links and remove.
- ▶ Disassemble rear counterweight using the specified sling gear and load the counterweight slabs.
- ▶ Remove platforms on the undercarriage.
- ▶ Remove and load the carbody counterweight slabs.
- ▶ Swing the jack swing brackets into the support position and bolt them.
- ▶ Lay the support plates under the jacks.
- ▶ Attach the transport safety with crawler side frames.
- ▶ Raise the basic machine using the jacks.
- ▶ Disconnect the hydraulic lines from the crawler side frames.
- ▶ Remove and load the crawler side frames.
- ▶ Position the transport vehicle under the basic machine.
- ▶ Place the basic machine on the transport vehicle.
- ▶ Fully retract the jack.
- ▶ Stow the support plates away.
- ▶ Swing the jack swing brackets into the transport position and bolt them.
- ▶ Lash basic machine on transport vehicle.
- ▶ Lay down A-frame1 backwards.



When A-frame1 triggers the limit switch *A-frame1, rear limit switch*:

- ▶ Press and hold the button *Retract A-frame1 cylinder* on control panel X23 until A-frame1 is in transport position.

- ▶ Retract the tilting back support cylinders.

- ▶ Switch off machine.



CAUTION

Hot exhaust components!
Risk of burns.

- ▶ Only touch the exhaust pipe when it is cold.
-
- ▶ Remove the intermediate exhaust section and put on the offset.
 - ▶ Fold the railing on the uppercarriage down.
 - ▶ Remove the ladder.
 - ▶ Remove platforms on the uppercarriage.
 - ▶ Use the uppercarriage locking device to prevent the uppercarriage from turning.
 - ▶ Move the cabin's platforms into transport position.
 - ▶ Swing the cabin into transport position and bolt it.
 - ▶ Close the cabin and secure the machine against unauthorized start-up.
 - ▶ Switch off the battery main switch.

8 Transport

8 Transport

This section deals with the following subjects:

- Transporting the machine
- Transporting the components



WARNING

Prohibited or improper procedure!
Severe injuries, damage to machine.

If the information in the operation manual is insufficient:

- ▶ contact Liebherr customer service.
-

8.1 Loading the basic machine with an assist crane

There are four different variants in which the basic machine can be loaded:

- without crawler side frame, carbody counterweight and rear counterweight
- with crawler side frame
- with crawler side frame and carbody counterweight
- with crawler side frame, carbody counterweight and rear counterweight

Ensure that the following conditions are fulfilled:

- A signalman is available.
- Equipment is secured against accidental movement.
- An adequate safety distance from electrical power lines or contact lines is maintained.
- Transport vehicle is secured against accidental movement.
- Adequate lighting is available for working in poor light.

8.1.1 Loading basic machine with undercarriage with fixed track width

Loading the basic machine without crawler side frame, carbody counterweight and rear counterweight



DANGER

Machine loaded incorrectly!
Toppling of machine, damage to machine.

- ▶ Only use lifting equipment and crossbars that meet the minimum requirements (see: tab. 629, page 1891) .
-

Loading the basic machine with an assist crane

Make sure the following prerequisites are met:

- Crawler side frame, carbody counterweight and rear counterweight are detached from the basic machine.
- Main boom base section is detached from basic machine.
- Cabin is lowered, swung into transport position and secured.
- Counterweight hoisting cylinders are retracted.
- Tilting-back supports are retracted.
- A-frame1 is folded back in transport position and A-frame1 cylinders are retracted.
- Jacks on the undercarriage are pinned in transport position and retracted.
- Additional floodlights* (if available) are deinstalled.
- All loose parts are secured to prevent slippage and falling.
- A crossbar with a suitable capacity is available.
- Lifting equipment is in good condition and approved for use.

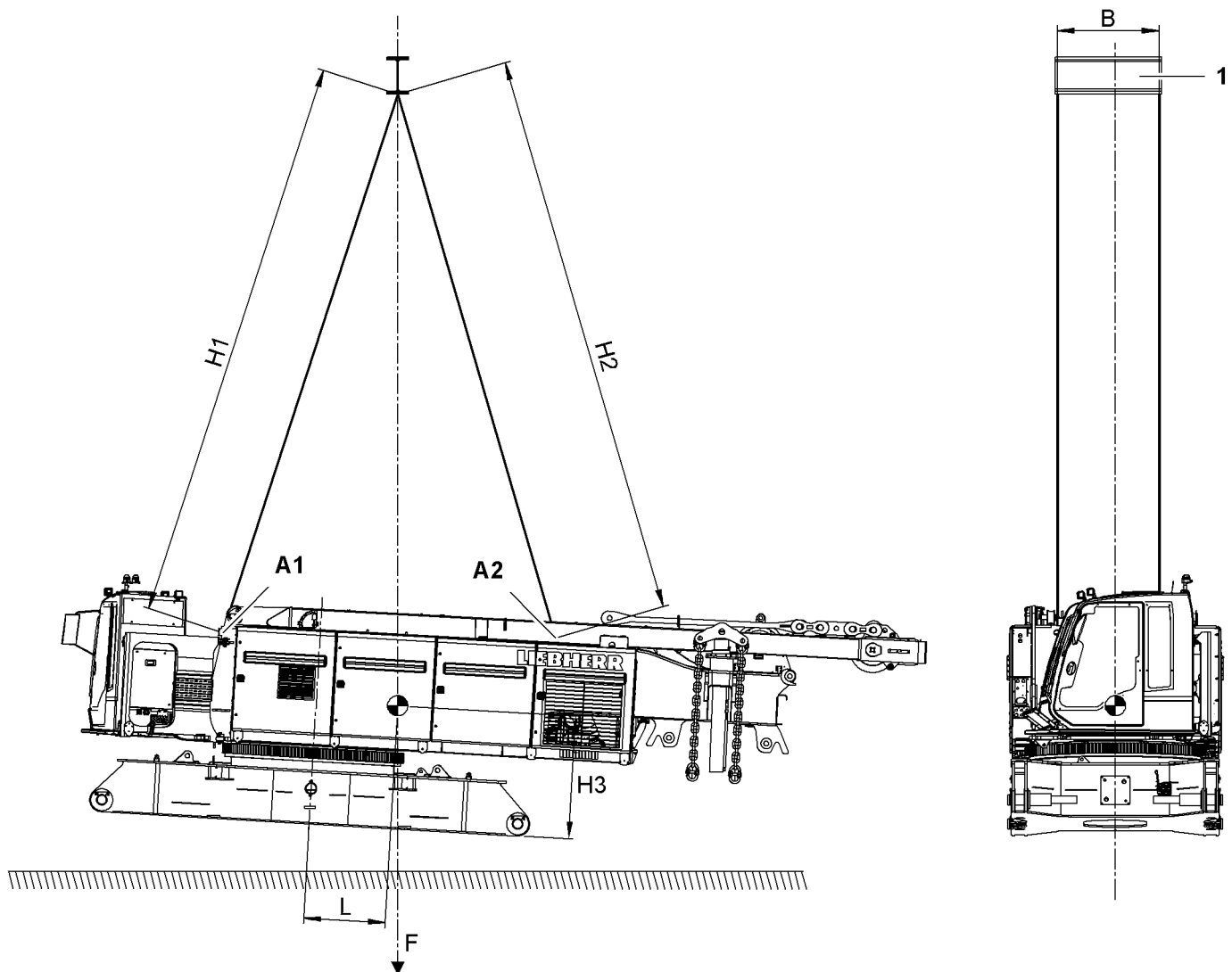


Fig. 5903: Loading the basic machine without crawler side frame, carbody counterweight and rear counterweight - overview

1 Crossbar

The mass and center of gravity may deviate from the values shown below depending on the as-delivered configuration, the liquid level in the tanks, and generally accepted tolerances.

Name		Value
H1	Length of front round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity of front round slings	min. 30000 kg (66,138 lb)
H2	Length of rear round slings	min. 8000 mm (26' 3" ft-in)
	Capacity of rear round slings	min. 30000 kg (66,138 lb)
A1	Load-bearing capacity of front shackles	min. 35000 kg (77,161 lb)
A2	Load-bearing capacity of rear shackles	min. 35000 kg (77,161 lb)
B	Distance from rigging points on crossbar	1360 mm (4' 6" ft-in) to 1520 mm (5' ft-in)
H3	Distance center of gravity to bottom edge of center part	1741 mm 5' 9" ft-in
L	Distance from center of gravity to rotation axis	1153 mm 3' 9" ft-in
F	Transport weight	48000 kg 105,820 lb

Tab. 629: Technical data for loading the basic machine without crawler side frame, carbody counterweight and rear counterweight

Loading the basic machine with an assist crane

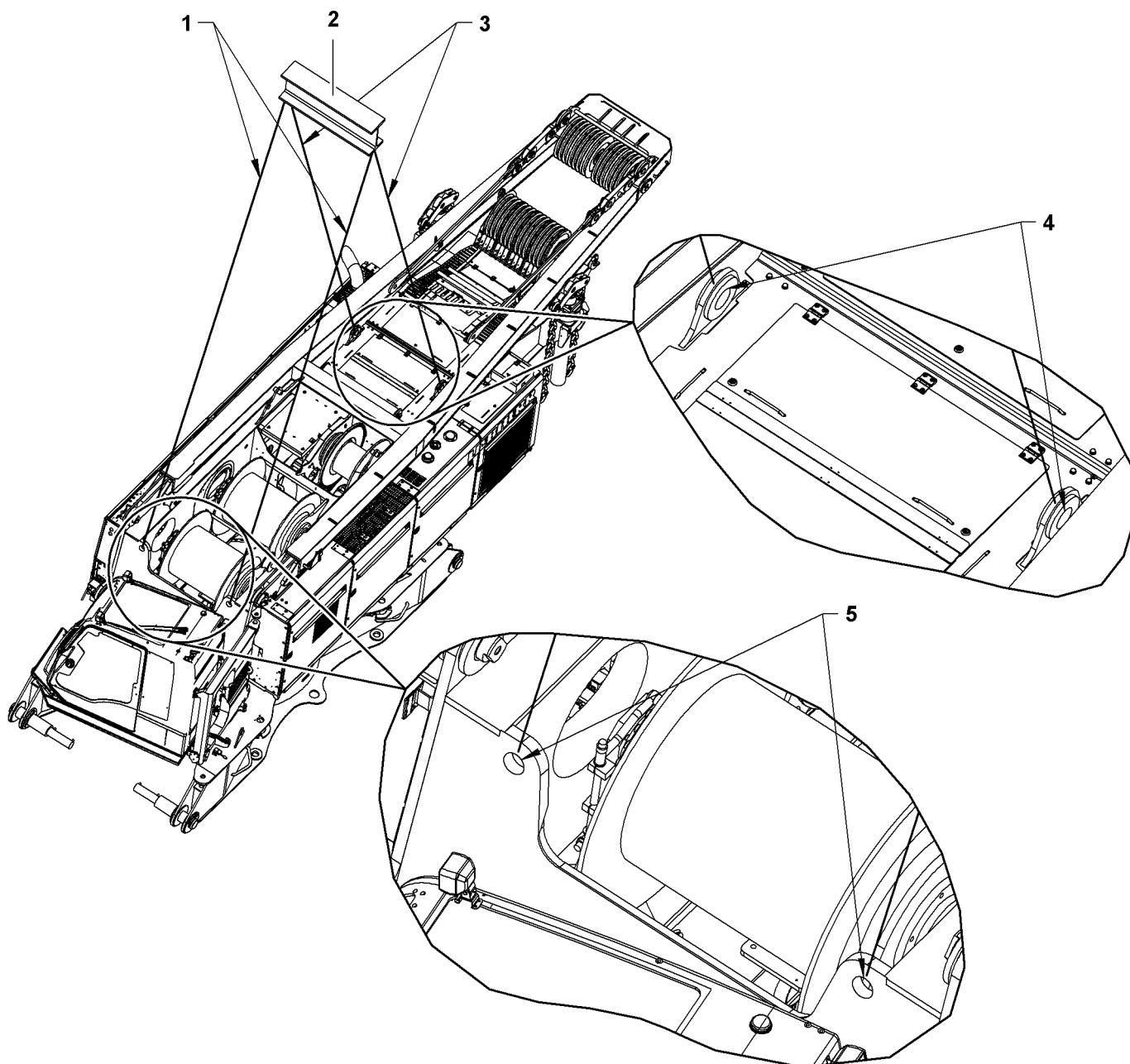


Fig. 5904: Loading the basic machine without crawler side frame, carbody counterweight and rear counterweight - rigging points

1 Front round slings
2 Crossbar

3 Rear round slings
4 Rear rigging points

5 Front rigging points

- ▶ Lash front round slings **1** to the rigging points **5** using shackles.
- ▶ Lash rear round slings **3** to the rigging points **4** using shackles.
- ▶ Carefully raise and load the basic machine.

Loading the basic machine with crawler side frame



DANGER

Machine loaded incorrectly!
Toppling of machine, damage to machine.

- ▶ Only use lifting equipment and crossbars that meet the minimum requirements (see: tab. 630, page 1894) .

Make sure the following prerequisites are met:

- Carbody counterweight and rear counterweight are detached from basic machine.
- Main boom base section is detached from basic machine.
- Cabin is lowered, swung into transport position and secured.
- Counterweight hoisting cylinders are retracted.
- Tilting-back supports are retracted.
- A-frame1 is folded back in transport position and A-frame1 cylinders are retracted.
- Jacks on the undercarriage are pinned in transport position and retracted.
- Additional floodlights* (if available) are deinstalled.
- All loose parts are secured to prevent slippage and falling.
- A crossbar with a suitable load-bearing capacity is available.
- Sling gear is in good condition and approved for use.

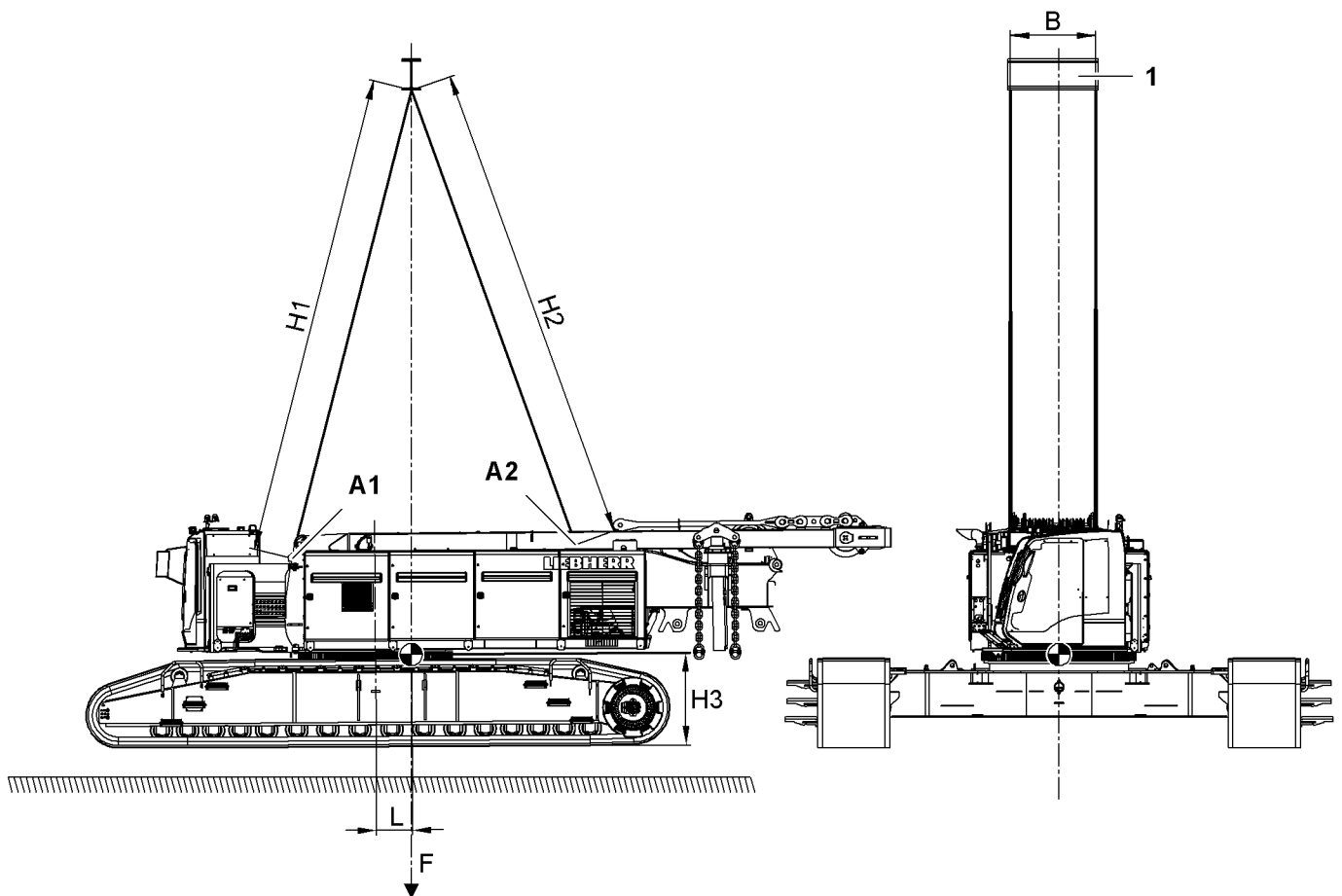


Fig. 5905: Loading the basic machine with crawler side frame - overview

1 Crossbar

The mass and center of gravity may deviate from the values shown below depending on the as-delivered configuration, the liquid level in the tanks, and generally accepted tolerances.

Name		Value
H1	Length of front round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity of front round slings	min. 40000 kg (88,184 lb)
H2	Length of rear round slings	min. 8000 mm (26' 3" ft-in)
	Capacity of rear round slings	min. 40000 kg (88,184 lb)
A1	Load-bearing capacity of front shackles	min. 55000 kg (121,252 lb)
A2	Load-bearing capacity of rear shackles	min. 55000 kg (121,252 lb)
B	Distance from rigging points on crossbar	1340 mm (4' 5" ft-in) to 1500 mm (4' 11" ft-in)
H3	Distance from center of gravity to bottom edge of crawler side frame	1527 mm 5' ft-in
L	Distance from center of gravity to rotation axis	592 mm 1' 11" ft-in
F	Transport weight	92000 kg 202,822 lb

Tab. 630: Technical data for loading the basic machine with crawler side frame

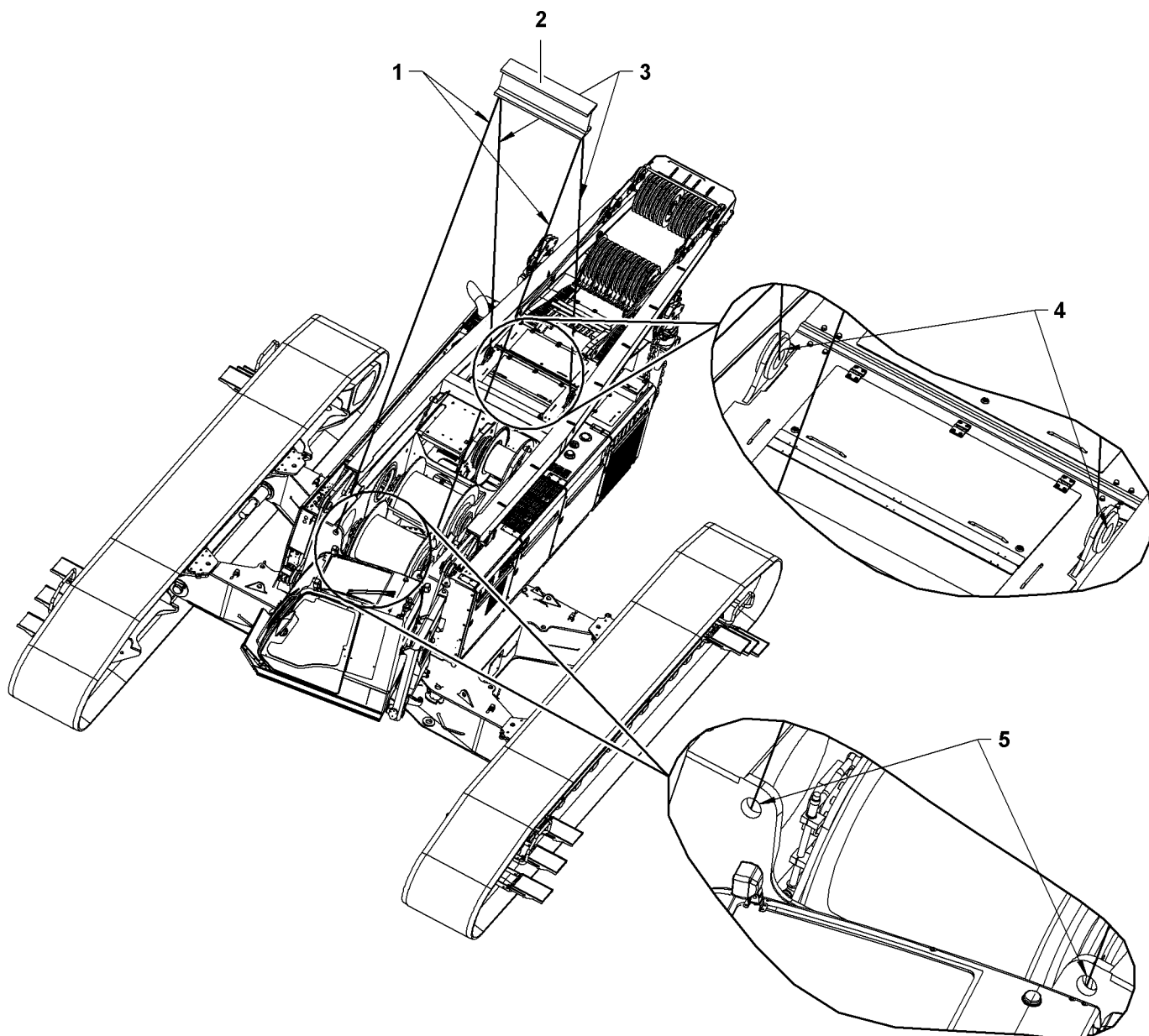


Fig. 5906: Loading the basic machine with crawler side frame - rigging points

- | | | | | | |
|---|--------------------|---|---------------------|---|----------------------|
| 1 | Front round slings | 3 | Rear round slings | 5 | Front rigging points |
| 2 | Crossbar | 4 | Rear rigging points | | |

- ▶ Lash front round slings 1 to the rigging points 5 using shackles.
- ▶ Lash rear round slings 3 to the rigging points 4 using shackles.
- ▶ Carefully raise and load the basic machine.

Loading the basic machine with crawler side frame and carbody counterweight



DANGER

Machine loaded incorrectly!
Toppling of machine, damage to machine.

- ▶ Only use lifting equipment and crossbars that meet the minimum requirements (see: tab. 631, page 1897).

Make sure the following prerequisites are met:

- The rear counterweight is removed from the basic machine.
- Main boom base section is detached from basic machine.
- Cabin is lowered, swung into transport position and secured.
- Counterweight hoisting cylinders are retracted.
- Tilting-back supports are retracted.
- A-frame¹ is folded back in transport position and A-frame¹ cylinders are retracted.
- Jacks on the undercarriage are pinned in transport position and retracted.
- Additional floodlights* (if available) are deinstalled.
- All loose parts are secured to prevent slippage and falling.
- A crossbar with a suitable load-bearing capacity is available.
- Sling gear is in good condition and approved for use.

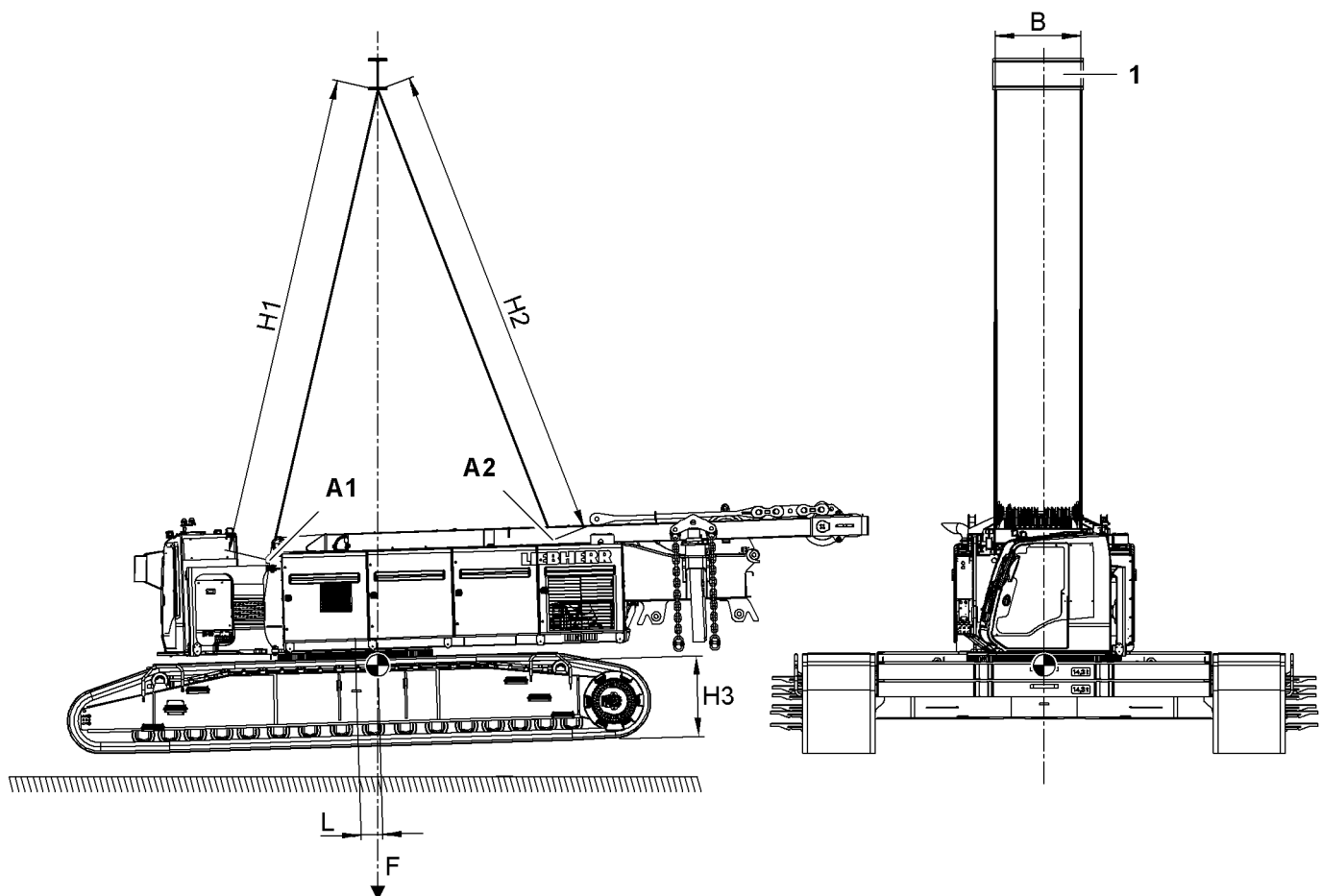


Fig. 5907: Loading the basic machine with crawler side frame and carbody counterweight - overview

1 Crossbar

The mass and center of gravity may deviate from the values shown below depending on the as-delivered configuration, the liquid level in the tanks, and generally accepted tolerances.

Name		Value
H1	Length of front round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity of front round slings	min. 80000 kg (176,367 lb)
H2	Length of rear round slings	min. 8000 mm (26' 3" ft-in)
	Capacity of rear round slings	min. 50000 kg (110,230 lb)
A1	Load-bearing capacity of front shackles	min. 85000 kg (187,390 lb)
A2	Load-bearing capacity of rear shackles	min. 55000 kg (121,252 lb)
B	Distance from rigging points on crossbar	1340 mm (4' 5" ft-in) to 1500 mm (4' 11" ft-in)
H3	Distance from center of gravity to bottom edge of crawler side frame	1335 mm 4' 5" ft-in
L	Distance from center of gravity to rotation axis	365 mm 1' 2" ft-in
F	Transport weight	150000 kg 330,688 lb

Tab. 631: Technical data for loading the basic machine with crawler side frame and carbody counterweight

Loading the basic machine with an assist crane

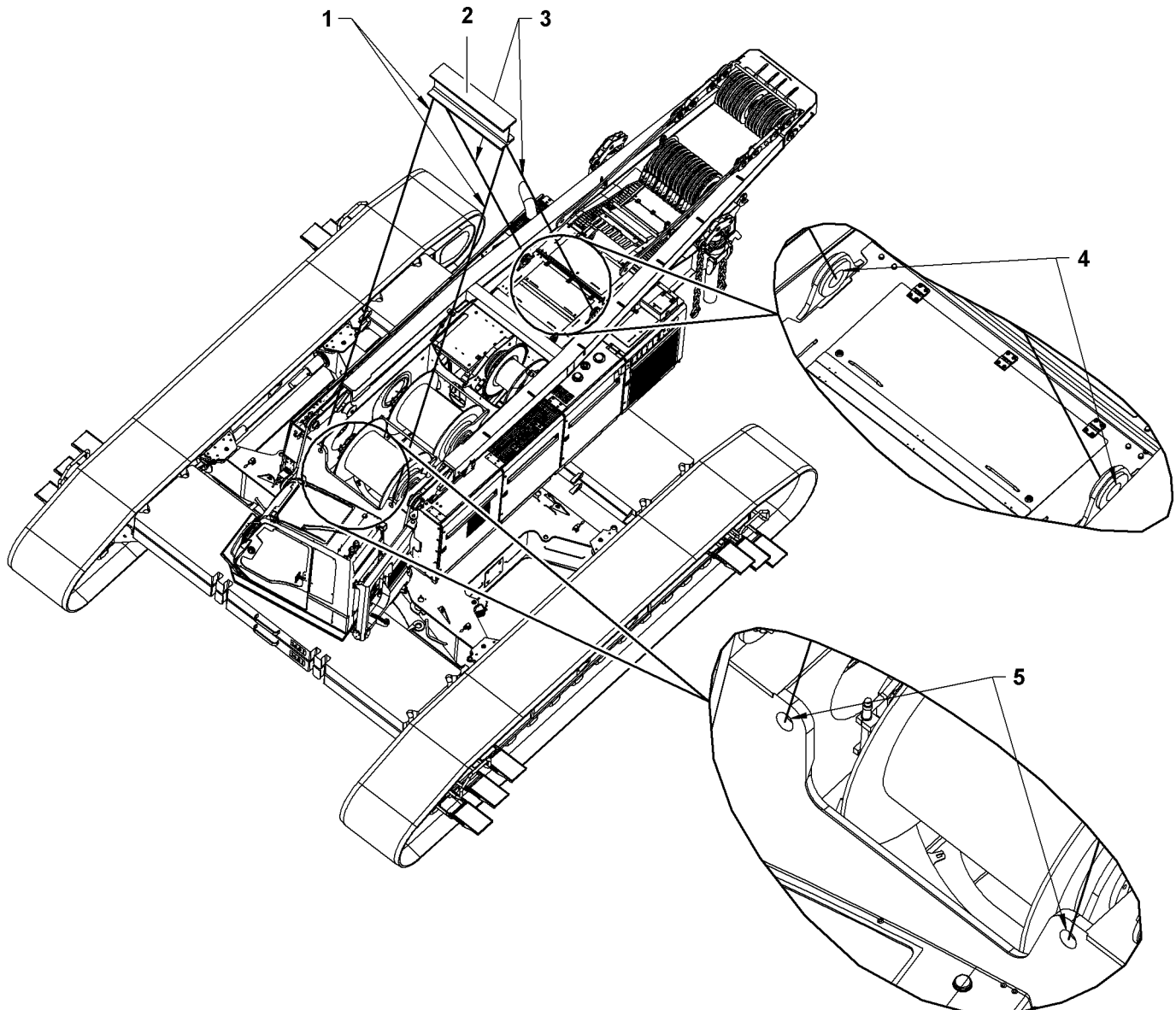


Fig. 5908: Loading the basic machine with crawler side frame and carbody counterweight - rigging points

1 Front round slings
2 Crossbar

3 Rear round slings
4 Rear rigging points

5 Front rigging points

- ▶ Lash front round slings 1 to the rigging points 5 using shackles.
- ▶ Lash rear round slings 3 to the rigging points 4 using shackles.
- ▶ Carefully raise and load the basic machine.

Loading the basic machine with crawler side frame, carbody counterweight and rear counterweight



DANGER

Machine loaded incorrectly!
Toppling of machine, damage to machine.

- ▶ Only use lifting equipment and crossbars that meet the minimum requirements (see: tab. 632, page 1899) .

Make sure the following prerequisites are met:

- Main boom base section is detached from basic machine.
- Cabin is lowered, swung into transport position and secured.
- Counterweight hoisting cylinders are retracted.
- Tilting-back supports are retracted.
- A-frame1 is folded back in transport position and A-frame1 cylinders are retracted.
- Jacks on the undercarriage are pinned in transport position and retracted.
- Additional floodlights* (if available) are deinstalled.
- All loose parts are secured to prevent slippage and falling.
- A crossbar with a suitable load-bearing capacity is available.
- Sling gear is in good condition and approved for use.

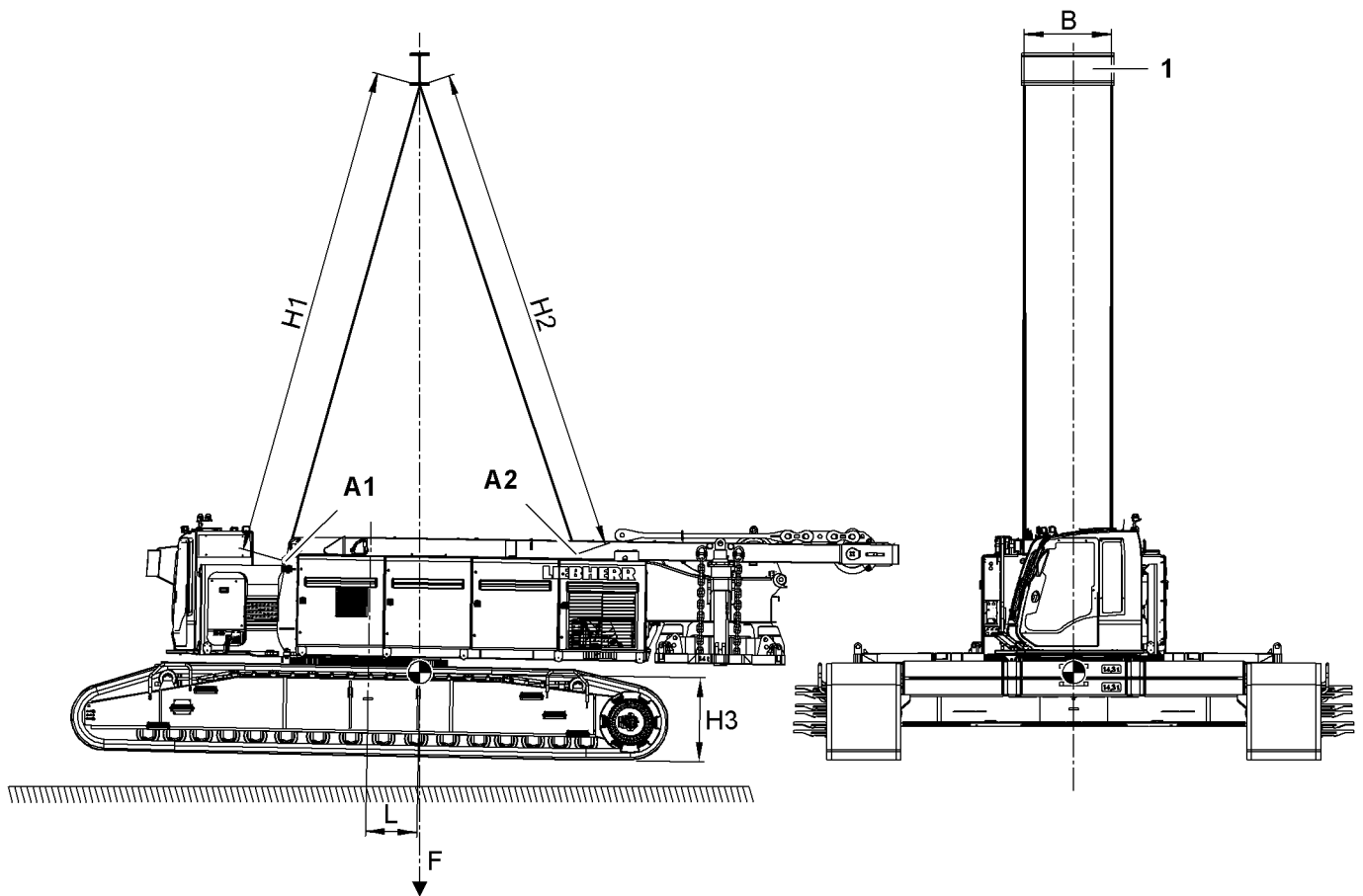


Fig. 5909: Loading the basic machine with crawler side frame, carbody counterweight and rear counterweight - overview

1 Crossbar

The mass and center of gravity may deviate from the values shown below depending on the as-delivered configuration, the liquid level in the tanks, and generally accepted tolerances.

Name		Value
H1	Length of front round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity of front round slings	min. 80000 kg (176,367 lb)
H2	Length of rear round slings	min. 8000 mm (26' 3" ft-in)
	Capacity of rear round slings	min. 60000 kg (132,275 lb)

Loading the basic machine with an assist crane

Name		Value
A1	Load-bearing capacity of front shackles	min. 85000 kg (187,390 lb)
A2	Load-bearing capacity of rear shackles	min. 55000 kg (121,252 lb)
B	Distance from rigging points on crossbar	1340 mm (4' 5" ft-in) to 1500 mm (4' 11" ft-in)
H3	Distance from center of gravity to bottom edge of crawler side frame	1366 mm 4' 6" ft-in
L	Distance from center of gravity to rotation axis	831 mm 2' 9" ft-in
F	Transport weight	165000 kg 363,757 lb

Tab. 632: Technical data for loading the basic machine with crawler side frame, carbody counterweight and rear counterweight

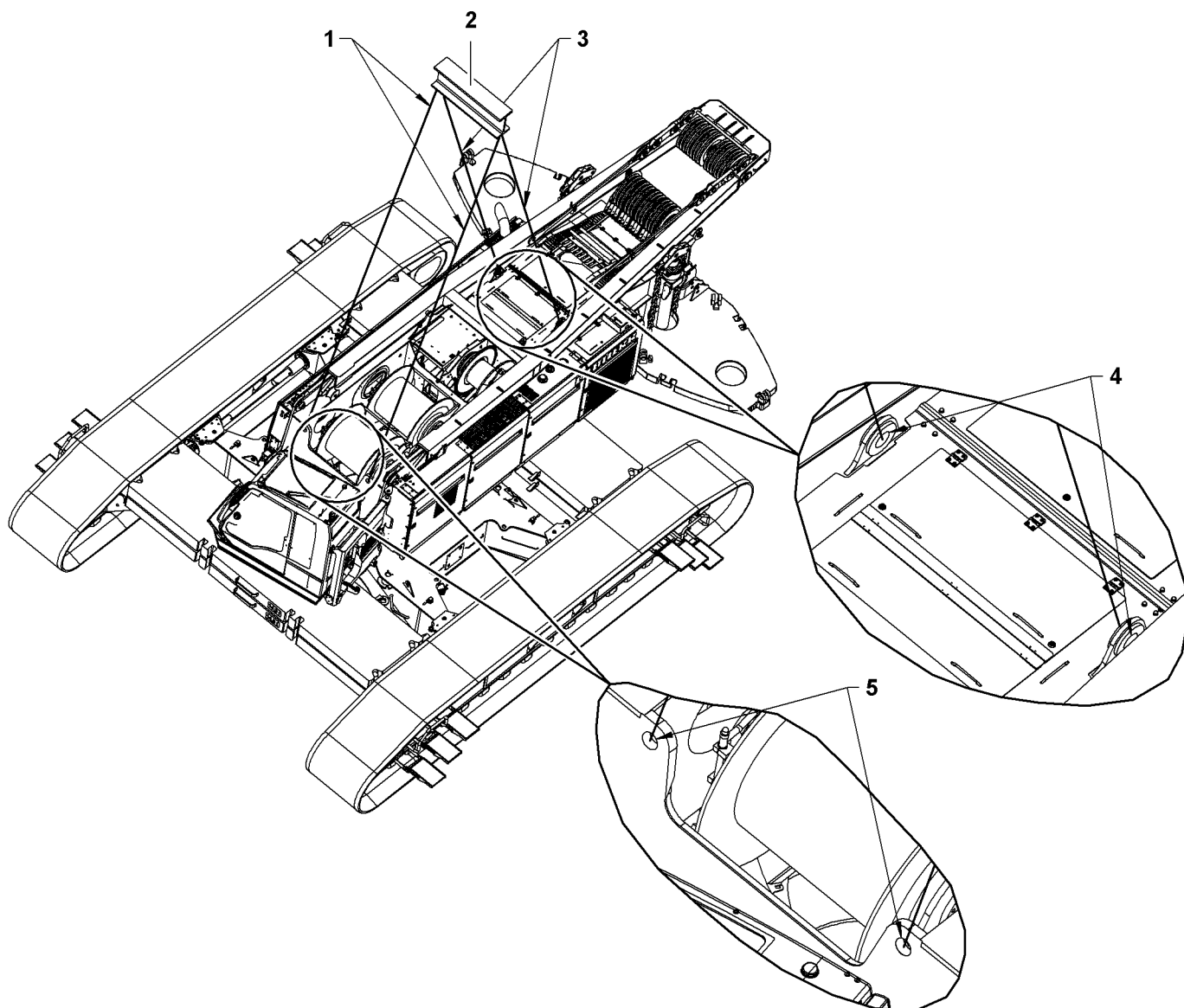


Fig. 5910: Loading the basic machine with crawler side frame, carbody counterweight and rear counterweight - rigging points

1 Front round slings
2 Crossbar

3 Rear round slings
4 Rear rigging points

5 Front rigging points

- ▶ Lash front round slings 1 to the rigging points 5 using shackles.
- ▶ Lash rear round slings 3 to the rigging points 4 using shackles.
- ▶ Carefully raise and load the basic machine.

8.1.2 Loading basic machine with undercarriage with adjustable track width

Loading basic machine without crawler side frame, carbody counterweight and rear counterweight



DANGER

Improper loading of machine!
Toppling of machine, damage to machine.

- ▶ Only use sling gear and crossbars that meet the minimum requirements (see: [tab. 633, page 1903](#)).
-

Make sure the following prerequisites are met:

- Crawler side frame, carbody counterweight and rear counterweight are detached from the basic machine.
- Main boom base section is detached from basic machine.
- Cabin is lowered, swung into transport position and secured.
- Counterweight hoisting cylinders are retracted.
- Tilting-back supports are retracted.
- A-frame¹ is folded back in transport position and A-frame¹ cylinders are retracted.
- Jacks on the undercarriage are pinned in transport position and retracted.
- Additional floodlights* (if available) are uninstalled.
- All loose parts are secured to prevent slippage and falling.
- A crossbar with a suitable load-bearing capacity is available.
- Sling gear is in good condition and approved for use.

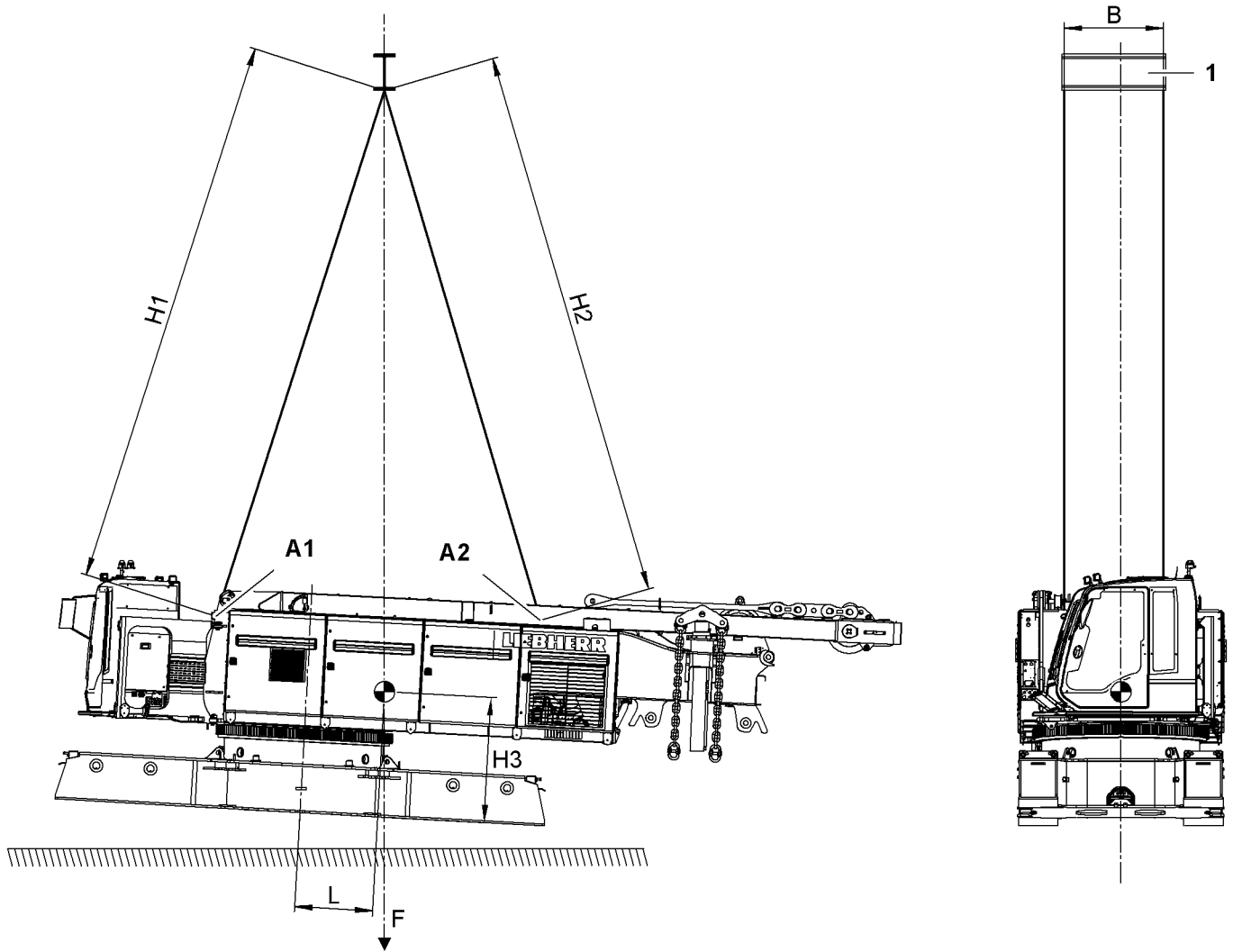


Fig. 5911: Loading basic machine without crawler side frame, carbody counterweight and rear counterweight - overview

1 Crossbar

The mass and center of gravity may deviate from the values shown below depending on the as-delivered configuration, levels in the tanks, and generally accepted tolerances.

Name		Value
H1	Length front round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity front round slings	min. 30000 kg (66,138 lb)
H2	Length rear round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity rear round slings	min. 30000 kg (66,138 lb)
A1	Load-bearing capacity front shackles	min. 35000 kg (77,161 lb)
A2	Load-bearing capacity rear shackles	min. 35000 kg (77,161 lb)
B	Distance rigging points on crossbar	1360 mm (4' 6" ft-in) to 1520 mm (5' ft-in)
H3	Distance center of gravity to bottom edge of center part	1814 mm 5' 11" ft-in

Loading the basic machine with an assist crane

Name		Value
L	Distance from center of gravity to rotation axis	1129 mm 3' 8" ft-in
F	Transport weight	46000 kg 101,411 lb

Tab. 633: Technical data loading basic machine without crawler side frame, carbody counterweight and rear counterweight

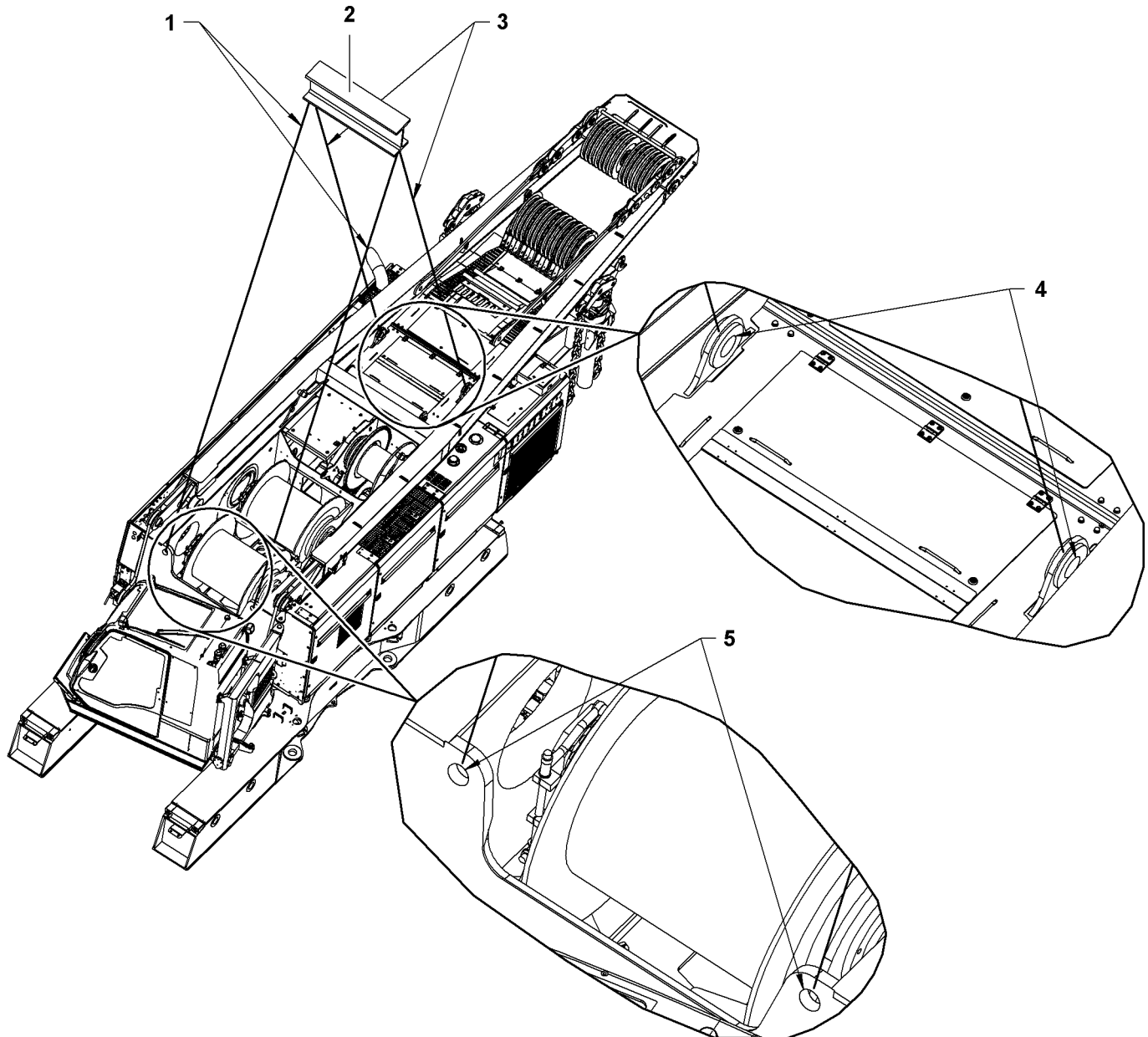


Fig. 5912: Loading basic machine without crawler side frame, carbody counterweight and rear counterweight - rigging points

- 1 Front round slings
- 2 Crossbar
- 3 Rear round slings
- 4 Rear rigging points
- 5 Front rigging points

▶ Lash front round slings 1 to the rigging points 5 using shackles.

- ▶ Lash rear round slings **3** to the rigging points **4** using shackles.
- ▶ Carefully lift and load basic machine.

Loading basic machine with crawler side frame



DANGER

Improper loading of machine!
Toppling of machine, damage to machine.

- ▶ Only use sling gear and crossbars that meet the minimum requirements (see: [tab. 634, page 1906](#)) .

Make sure the following prerequisites are met:

- Carbody counterweight and rear counterweight are detached from basic machine.
- Main boom base section is detached from basic machine.
- Cabin is lowered, swung into transport position and secured.
- Counterweight hoisting cylinders are retracted.
- Tilting-back supports are retracted.
- A-frame1 is folded back in transport position and A-frame1 cylinders are retracted.
- Jacks on the undercarriage are pinned in transport position and retracted.
- Additional floodlights* (if available) are uninstalled.
- All loose parts are secured to prevent slippage and falling.
- A crossbar with a suitable load-bearing capacity is available.
- Sling gear is in good condition and approved for use.

Loading the basic machine with an assist crane

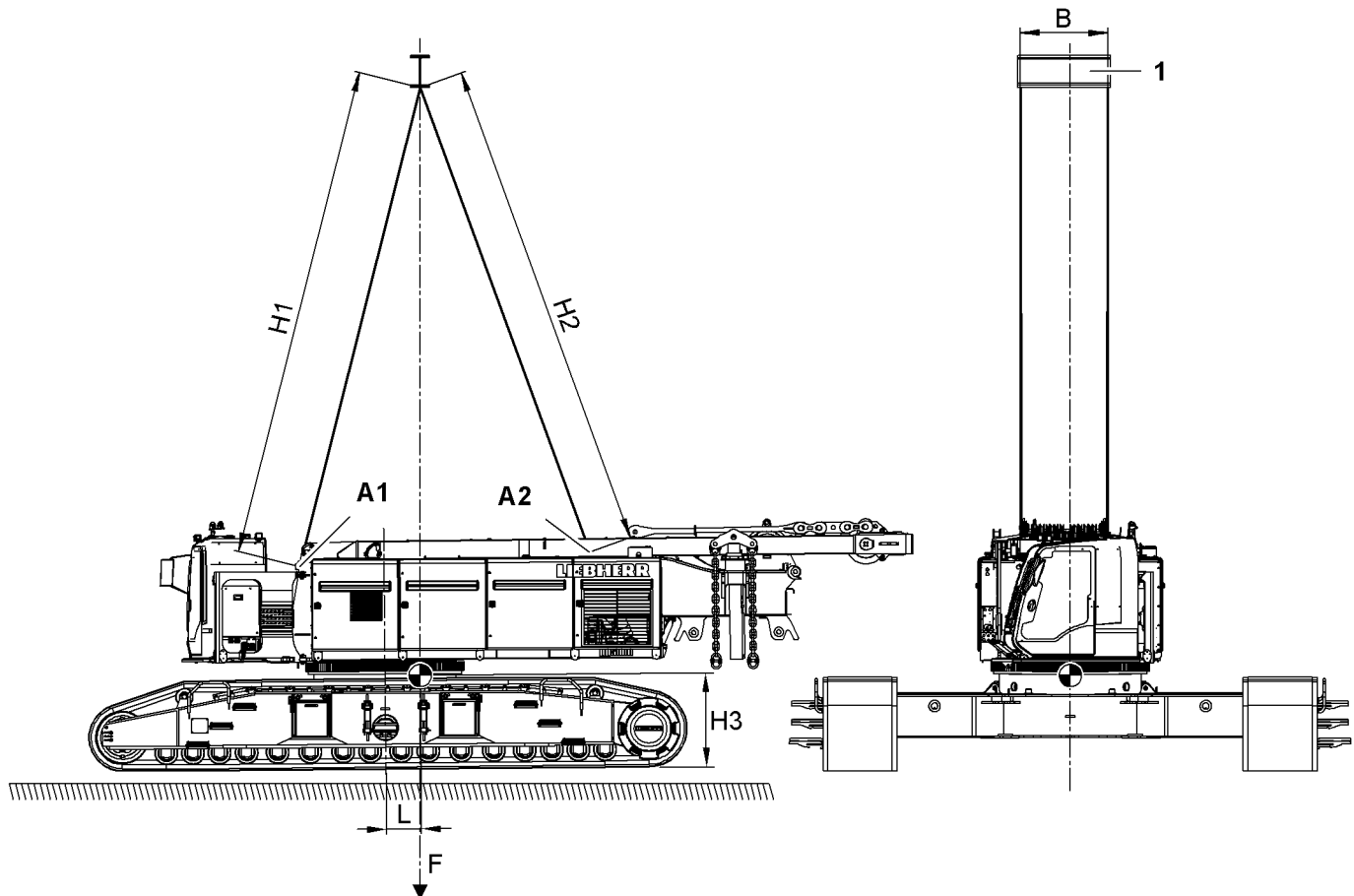


Fig. 5913: Loading basic machine with crawler side frame - overview

1 Crossbar

The mass and center of gravity may deviate from the values shown below depending on the as-delivered configuration, levels in the tanks, and generally accepted tolerances.

Name		Value
H1	Length front round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity front round slings	min. 40000 kg (88,184 lb)
H2	Length rear round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity rear round slings	min. 30000 kg (66,138 lb)
A1	Load-bearing capacity front shackles	min. 55000 kg (121,252 lb)
A2	Load-bearing capacity rear shackles	min. 35000 kg (77,161 lb)
B	Distance rigging points on crossbar	1340 mm (4' 5" ft-in) to 1500 mm (4' 11" ft-in)
H3	Distance from center of gravity to bottom edge of crawler side frame	1519 mm 5' ft-in
L	Distance from center of gravity to rotation axis	568 mm 1' 10" ft-in
F	Transport weight	91000 kg 200,618 lb

Tab. 634: Technical data loading basic machine with crawler side frame

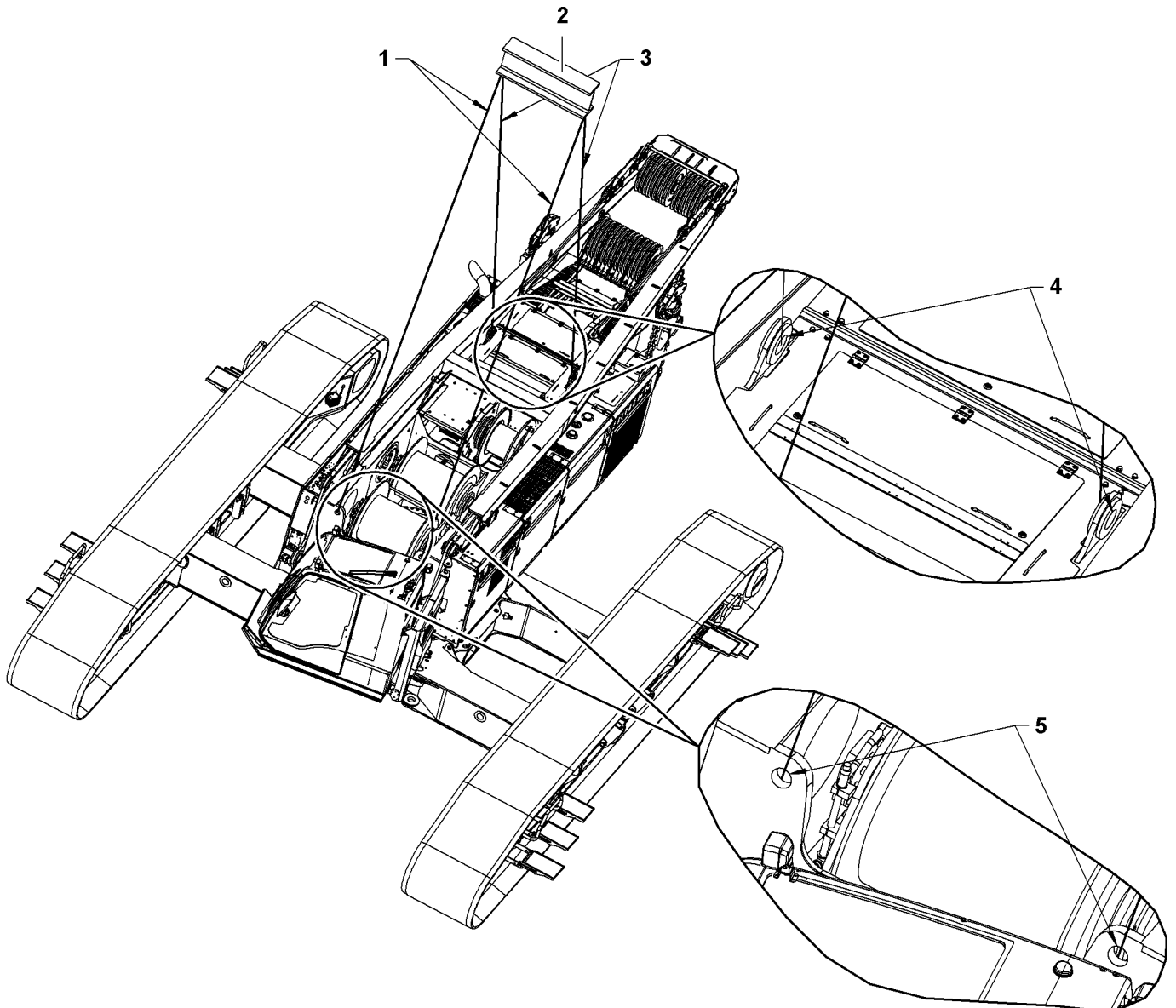


Fig. 5914: Loading basic machine with crawler side frame - rigging points

- | | | | | | |
|---|--------------------|---|---------------------|---|----------------------|
| 1 | Front round slings | 3 | Rear round slings | 5 | Front rigging points |
| 2 | Crossbar | 4 | Rear rigging points | | |

- ▶ Lash front round slings 1 to the rigging points 5 using shackles.
- ▶ Lash rear round slings 3 to the rigging points 4 using shackles.
- ▶ Carefully lift and load basic machine.

Loading basic machine with crawler side frame and carbody counterweight



DANGER

Improper loading of machine!
Topping of machine, damage to machine.

- ▶ Only use sling gear and crossbars that meet the minimum requirements (see: [tab. 635, page 1908](#)).

Make sure the following prerequisites are met:

- The rear counterweight is removed from the basic machine.
- Main boom base section is detached from basic machine.
- Cabin is lowered, swung into transport position and secured.
- Counterweight hoisting cylinders are retracted.
- Tilting-back supports are retracted.
- A-frame1 is folded back in transport position and A-frame1 cylinders are retracted.
- Jacks on the undercarriage are pinned in transport position and retracted.
- Additional floodlights* (if available) are uninstalled.
- All loose parts are secured to prevent slippage and falling.
- A crossbar with a suitable load-bearing capacity is available.
- Sling gear is in good condition and approved for use.

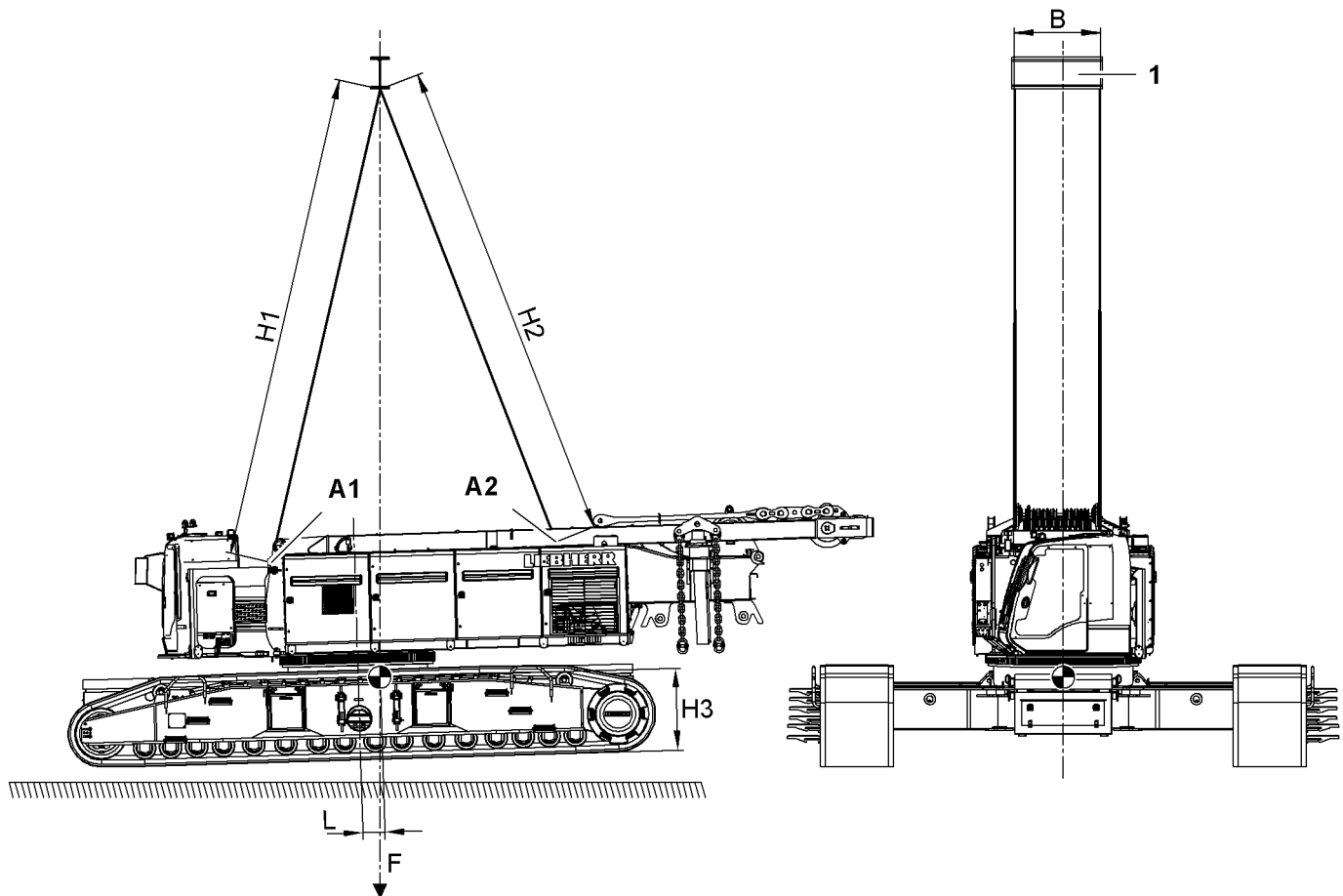


Fig. 5915: Loading basic machine with crawler side frame and carbody counterweight - overview

1 Crossbar

The mass and center of gravity may deviate from the values shown below depending on the as-delivered configuration, levels in the tanks, and generally accepted tolerances.

Name		Value
H1	Length front round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity front round slings	min. 80000 kg (176,367 lb)
H2	Length rear round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity rear round slings	min. 50000 kg (110,230 lb)

Name		Value
A1	Load-bearing capacity front shackles	min. 85000 kg (187,390 lb)
A2	Load-bearing capacity rear shackles	min. 55000 kg (121,252 lb)
B	Distance rigging points on crossbar	1340 mm (4' 5" ft-in) to 1500 mm (4' 11" ft-in)
H3	Distance from center of gravity to bottom edge of crawler side frame	1349 mm 4' 5" ft-in
L	Distance from center of gravity to rotation axis	359 mm 1' 2" ft-in
F	Transport weight	143500 kg 316,359 lb

Tab. 635: Technical data for loading basic machine with crawler side frame and carbody counterweight

Loading the basic machine with an assist crane

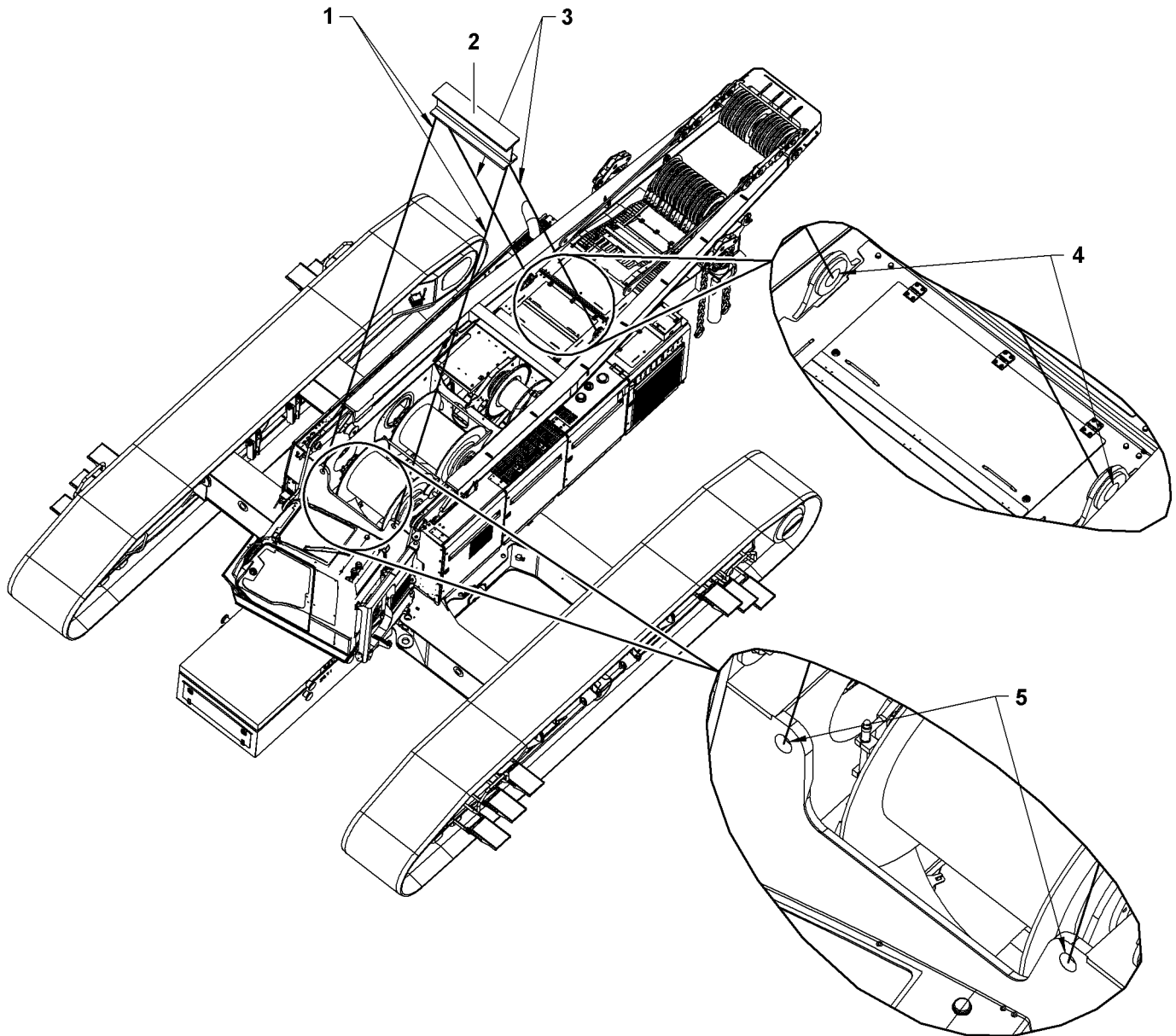


Fig. 5916: Loading basic machine with crawler side frame and carbody counterweight - rigging points

- | | | | | | |
|---|--------------------|---|---------------------|---|----------------------|
| 1 | Front round slings | 3 | Rear round slings | 5 | Front rigging points |
| 2 | Crossbar | 4 | Rear rigging points | | |

- ▶ Lash front round slings 1 to the rigging points 5 using shackles.
- ▶ Lash rear round slings 3 to the rigging points 4 using shackles.
- ▶ Carefully lift and load basic machine.

Loading basic machine with crawler side frame, carbody counterweight and rear counterweight



DANGER

Improper loading of machine!
Toppling of machine, damage to machine.

- ▶ Only use sling gear and crossbars that meet the minimum requirements (see: [tab. 636, page 1911](#)).

Make sure the following prerequisites are met:

- Main boom base section is detached from basic machine.
- Cabin is lowered, swung into transport position and secured.
- Counterweight hoisting cylinders are retracted.
- Tilting-back supports are retracted.
- A-frame1 is folded back in transport position and A-frame1 cylinders are retracted.
- Jacks on the undercarriage are pinned in transport position and retracted.
- Additional floodlights* (if available) are uninstalled.
- All loose parts are secured to prevent slippage and falling.
- A crossbar with a suitable load-bearing capacity is available.
- Sling gear is in good condition and approved for use.

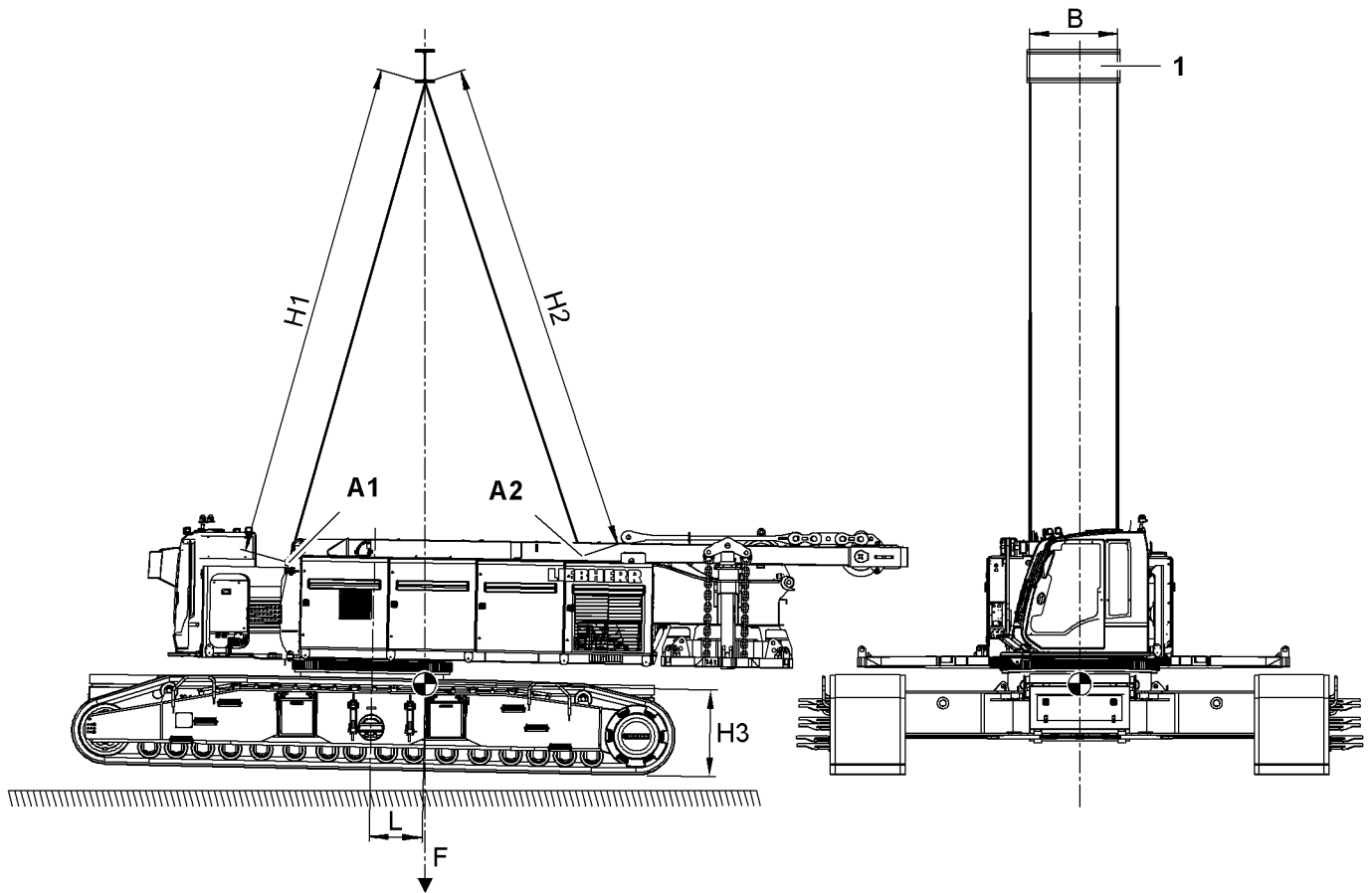


Fig. 5917: Loading basic machine with crawler side frame, carbody counterweight and rear counterweight - overview

1 Crossbar

The mass and center of gravity may deviate from the values shown below depending on the as-delivered configuration, levels in the tanks, and generally accepted tolerances.

Name		Value
H1	Length front round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity front round slings	min. 80000 kg (176,367 lb)
H2	Length rear round slings	min. 8000 mm (26' 3" ft-in)
	Load-bearing capacity rear round slings	min. 60000 kg (132,275 lb)

Loading the basic machine with an assist crane

Name		Value
A1	Load-bearing capacity front shackles	min. 85000 kg (187,390 lb)
A2	Load-bearing capacity rear shackles	min. 55000 kg (121,252 lb)
B	Distance rigging points on crossbar	1340 mm (4' 5" ft-in) to 1500 mm (4' 11" ft-in)
H3	Distance from center of gravity to bottom edge of crawler side frame	1395 mm 4' 7" ft-in
L	Distance from center of gravity to rotation axis	850 mm 2' 9" ft-in
F	Transport weight	158000 kg 348,325 lb

Tab. 636: Technical data for loading basic machine with crawler side frame, carbody counterweight and rear counterweight

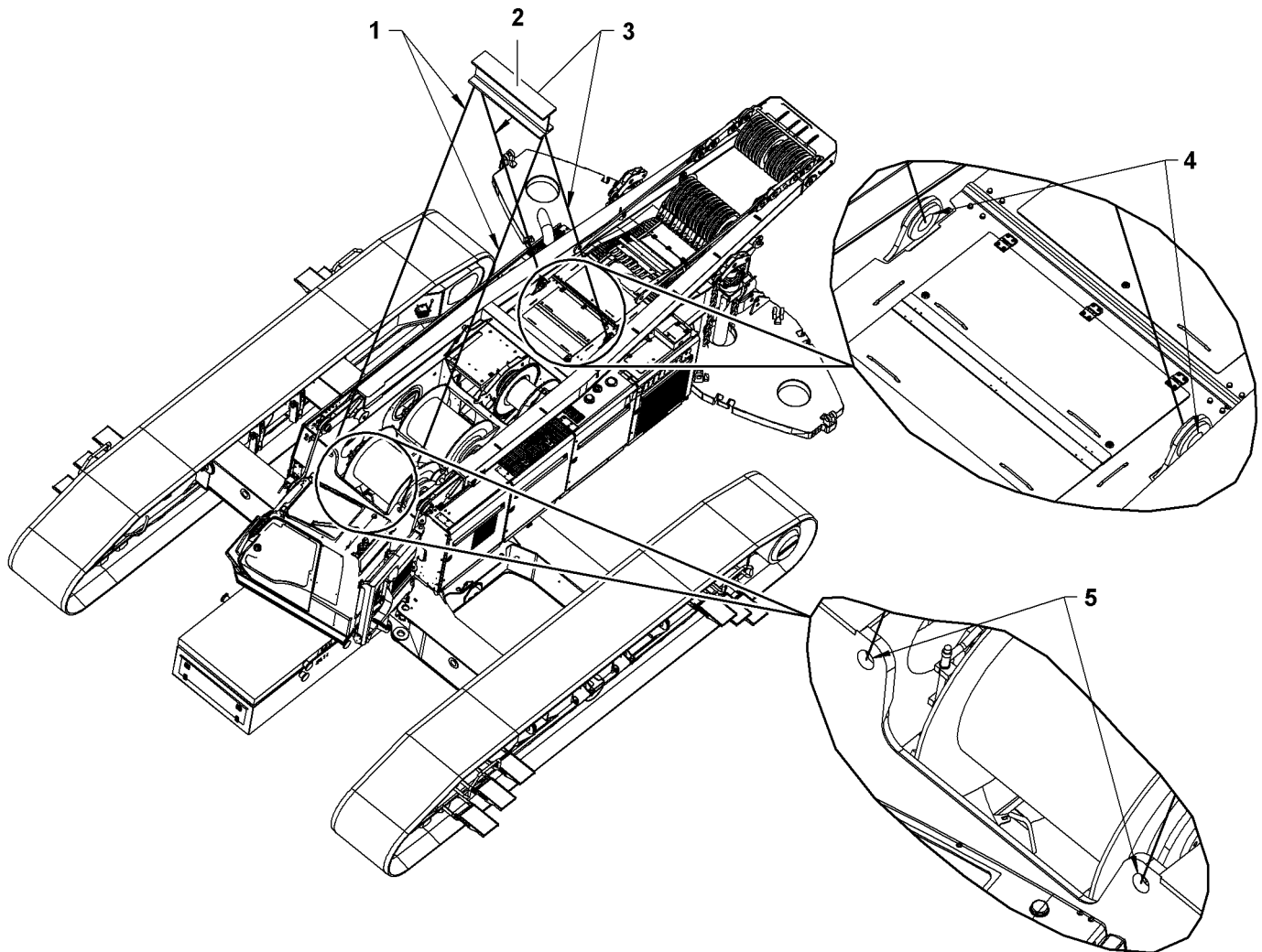


Fig. 5918: Loading basic machine with crawler side frame, carbody counterweight and rear counterweight - rigging points

- 1 Front round slings
- 2 Crossbar
- 3 Rear round slings
- 4 Rear rigging points
- 5 Front rigging points

► Lash front round slings 1 to the rigging points 5 using shackles.

- ▶ Lash rear round slings **3** to the rigging points **4** using shackles.
- ▶ Carefully lift and load basic machine.

8.2 Transporting the basic machine with a transport vehicle



Note

- ▶ Always observe national traffic regulations and local bylaws.

Ensure that the following conditions are fulfilled:

- Crawler side frame, carbody counterweight and rear counterweight are detached from the basic machine.
- Main boom base section is detached from basic machine.
- Cabin is lowered, swung into transport position and secured.
- Counterweight hoisting cylinders are retracted.
- Tilting-back supports are retracted.
- A-frame¹ is folded back in transport position and A-frame¹ cylinders are retracted.
- Jacks on the undercarriage are pinned in transport position and retracted.
- Additional floodlights* (if available) are deinstalled.

8.2.1 Transporting basic machine with undercarriage with fixed track width with a transport vehicle

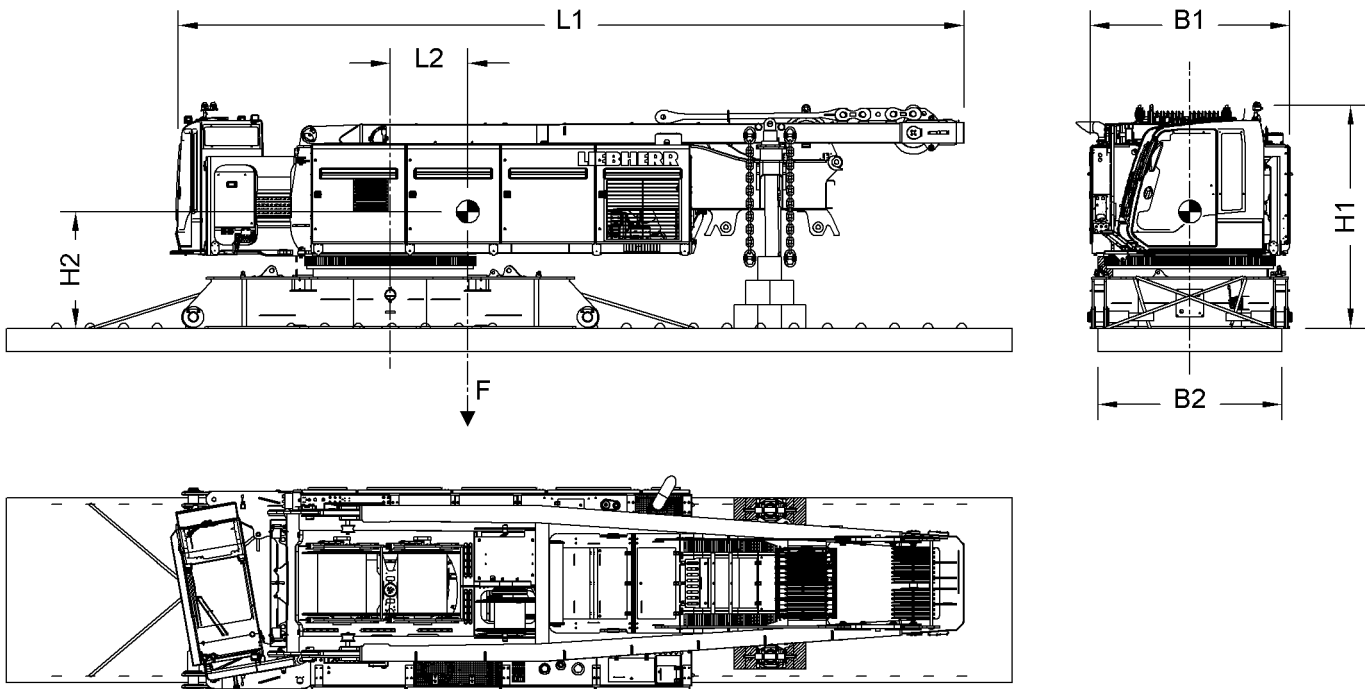


Fig. 5919: Dimensions transporting basic machine with undercarriage with fixed track width with a transport vehicle



DANGER

Machine not transported correctly!
Machine toppling over.

- ▶ Only use transport vehicle with minimum width **B2** (see: tab. 637, page 1915) .

The mass and center of gravity may deviate from the values shown below depending on the as-delivered configuration, the liquid level in the tanks, and generally accepted tolerances.

Name		Value
L1	Length basic machine	11850 mm 38' 11" ft-in
L2	Distance from center of gravity to rotation axis	1153 mm 3' 9" ft-in
B1	Width basic machine	2990 mm 9' 10" ft-in
B2	Width transport vehicle	min. 1578 mm (5' 2" ft-in)
H1	Height basic machine	3400 mm 11' 2" ft-in
H2	Distance center of gravity to bottom edge of center part	1741 mm 5' 9" ft-in
F	Transport weight	48000 kg 105,820 lb

Tab. 637: Technical data transporting basic machine with undercarriage with fixed track width with a transport vehicle



DANGER

None or wrong anti-slide mats on transport vehicle!
Basic machine slides out of position on transport vehicle.

- ▶ Never use anti-slide mats with a friction coefficient below 0.6.
- ▶ Lay out anti-slide mats on the transport vehicle.
- ▶ Loading basic machine onto transport vehicle ([For more information see: 8.1.1 Loading basic machine with undercarriage with fixed track width, page 1889](#)).

Transporting the basic machine with a transport vehicle

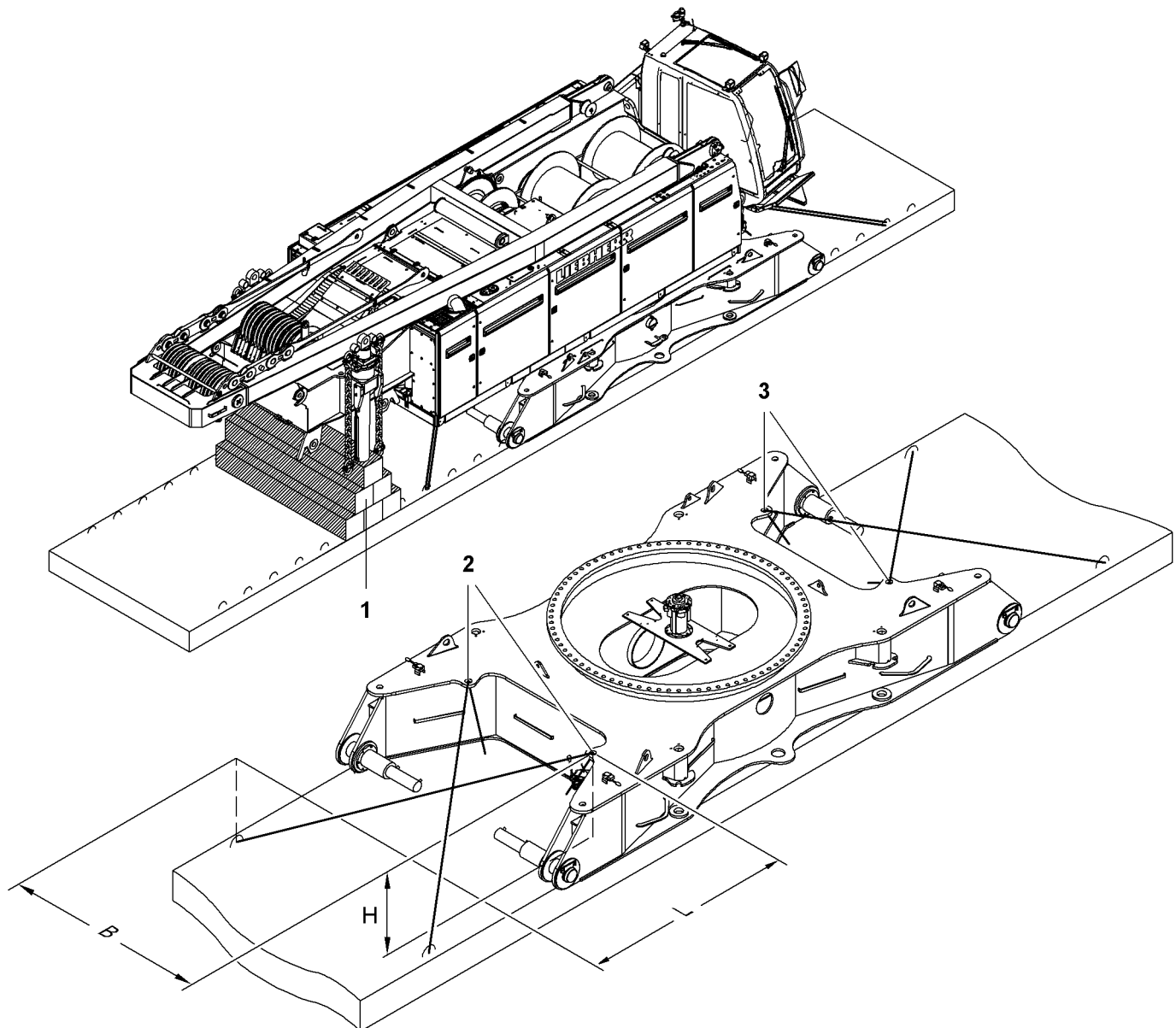


Fig. 5920: Lashing points transporting basic machine with undercarriage with fixed track width with a transport vehicle

- | | | | | | |
|---|---------------------|---|--|---|---|
| 1 | Wooden blocks | 3 | Front lashing points | B | Lateral distance between lashing points |
| 2 | Rear lashing points | L | Longitudinal distance between lashing points | H | Lashing point height |

- ▶ Underlay both counterweight hoisting cylinders with wooden blocks 1.
- ▶ Lock the operator's cab and all side doors on the uppercarriage.

**DANGER**

Incorrect lashing of machine on the transport vehicle!
Machine toppling over.

- ▶ Ensure that the lashing capacity (LC) of the chain is at least 200 kN (44,960 lb_f) (2 x 100 kN (22,480 lb_f)).
 - ▶ Make sure that chain length is at least the same as the height of the lashing point **H**.
 - ▶ Longitudinal distance between lashing points **L** must be at least 0.268 x lateral distances between lashing points **B**.
-
- ▶ Use the front **3** and rear lashing points **2** to lash the basic machine in a cross pattern on the transport vehicle.

**DANGER**

Turning of uppercarriage during transportation!
Machine toppling over.

- ▶ Secure uppercarriage to prevent it from distortion.
-
- ▶ Use the uppercarriage locking device to prevent the uppercarriage from turning.
 - ▶ The lashing should be checked continuously throughout the entire transportation process; retighten as necessary.

8.2.2 Transporting basic machine with undercarriage* with adjustable track width with a transport vehicle

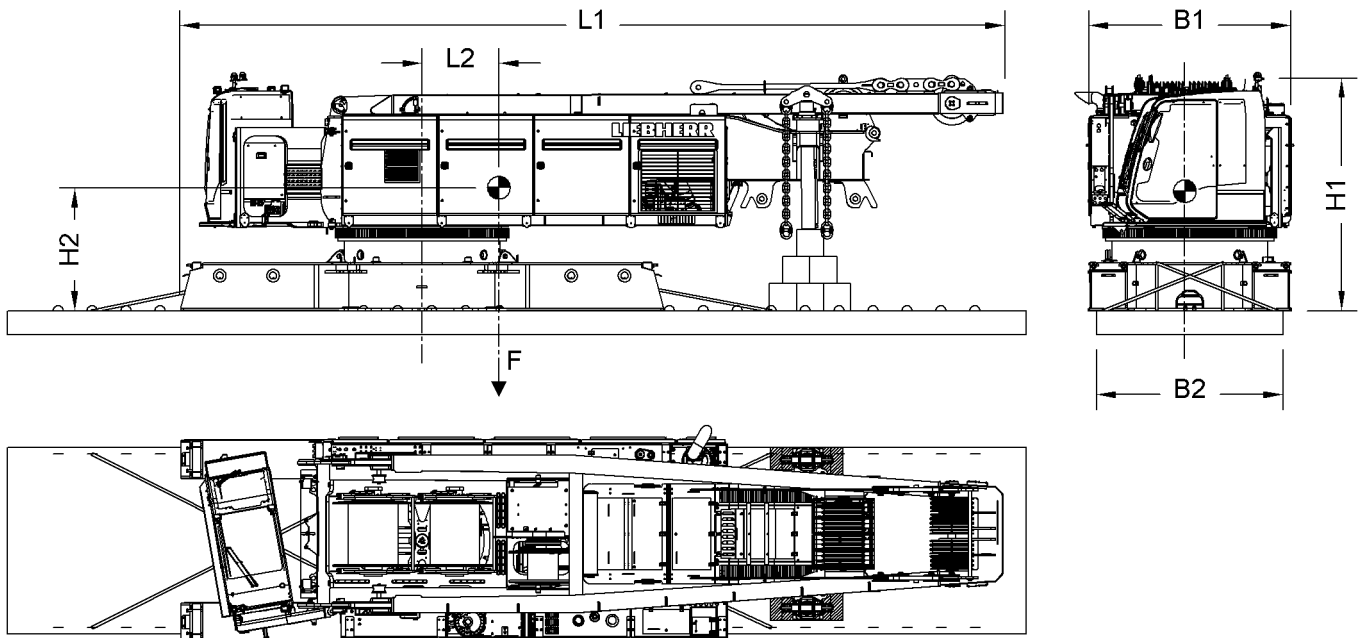


Fig. 5921: Dimensions transporting basic machine with undercarriage* with adjustable track width with a transport vehicle

**DANGER**

Improper transport of machine!
Toppling of machine.

- ▶ Only use transport vehicle with minimum width **B2** (see: tab. 638, page 1918) .

The mass and center of gravity may deviate from the values shown below depending on the as-delivered configuration, levels in the tanks, and generally accepted tolerances.

Name		Value
L1	Length basic machine	12300 mm 40' 4" ft-in
L2	Distance from center of gravity to rotation axis	1129 mm 3' 8" ft-in
B1	Width basic machine	3000 mm 9' 10" ft-in
B2	Width transport vehicle	min. 1714 mm (5' 7" ft-in)
H1	Height basic machine	3500 mm 11' 6" ft-in
H2	Distance center of gravity to bottom edge of center part	1814 mm 5' 11" ft-in
F	Transport weight	46000 kg 101,411 lb

Tab. 638: Technical data transporting basic machine with undercarriage* with adjustable track width with a transport vehicle

**DANGER**

None or wrong anti-slide mats on transport vehicle!
Basic machine slides out of position on transport vehicle.

- ▶ Never use anti-slide mats with a friction coefficient below 0.6.
- ▶ Lay out anti-slide mats on the transport vehicle.
- ▶ Load basic machine onto transport vehicle (For more information see: [8.1.2 Loading basic machine with undercarriage with adjustable track width, page 1902](#)) .

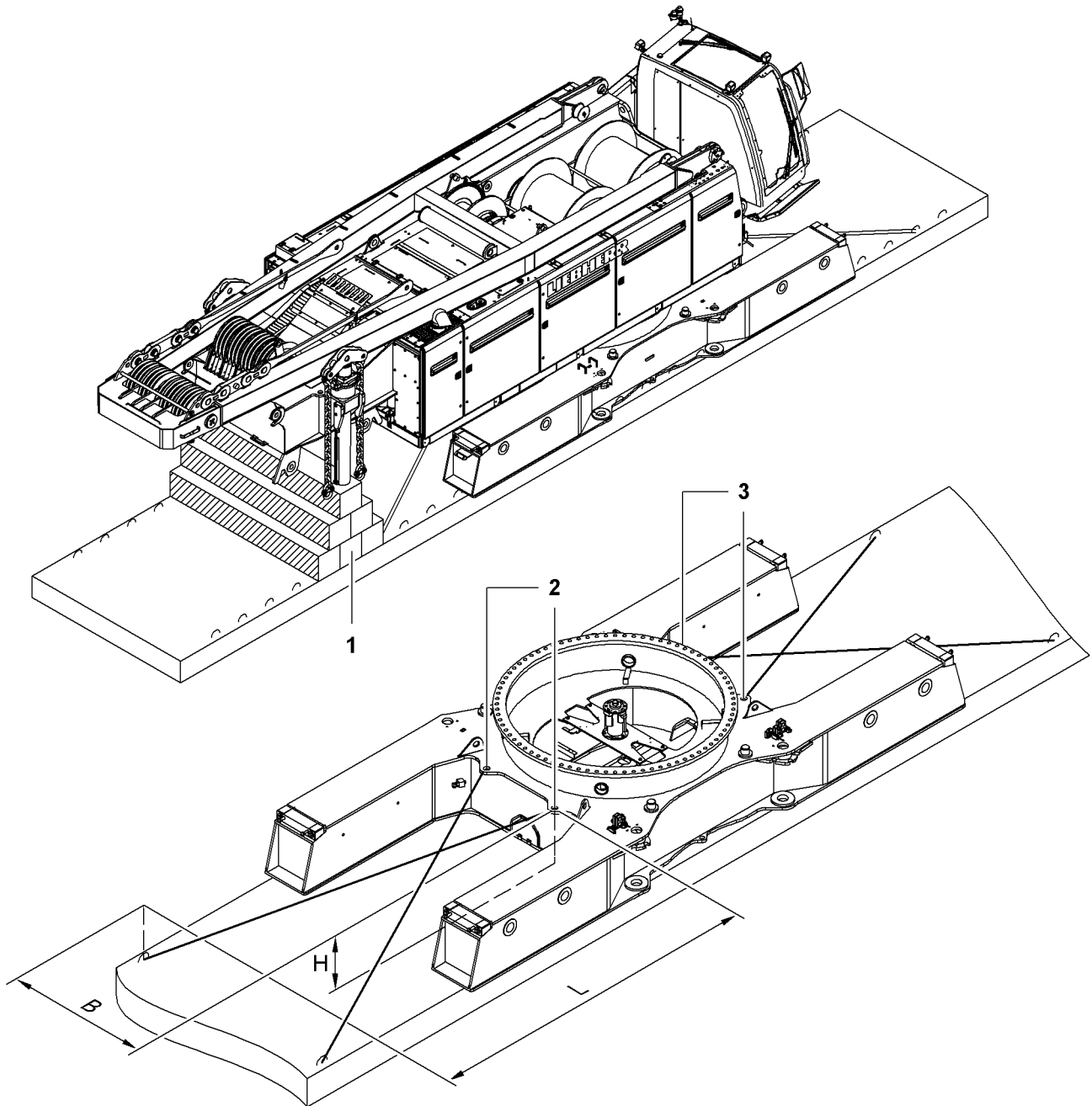


Fig. 5922: Lashing points transporting basic machine with undercarriage* with adjustable track width with a transport vehicle

- | | | | | | |
|---|---------------------|---|--|---|---|
| 1 | Wooden blocks | 3 | Front lashing points | B | Lateral distance between lashing points |
| 2 | Rear lashing points | L | Longitudinal distance between lashing points | H | Lashing point height |

- ▶ Underlay both counterweight hoisting cylinders with wooden blocks **1**.
- ▶ Lock the cabin and all side doors on the uppercarriage.

**DANGER**

Incorrect lashing of machine on the transport vehicle!

Toppling of machine.

- ▶ Ensure that the lashing capacity (LC) of the chain is at least 200 kN (44,960 lb,) (2 x 100 kN (22,480 lb_i)).
- ▶ Ensure that chain length is at least the same as the height of the lashing point **H**.
- ▶ Longitudinal distance between lashing points **L** must be at least 0.287 x lateral distance between lashing points **B**.

- ▶ Use the front **3** and rear lashing points **2** to lash the basic machine in a cross pattern on the transport vehicle.

**DANGER**

Turning of uppercarriage during transportation!

Toppling of machine.

- ▶ Secure uppercarriage to prevent twisting.
- ▶ Use the uppercarriage lock to prevent twisting of uppercarriage.
- ▶ Lashing should be checked continuously throughout the entire transport process; retighten as necessary.

8.3 Transporting the boom sections

NOTICE

Floodlights left on the boom sections contrary to instructions!
Floodlights damaged.

► Remove the floodlights (if fitted).

The floodlight traverse may remain on the jib head during transport.

8.3.1 Adjusting and mounting the transport brackets for steel pendant straps

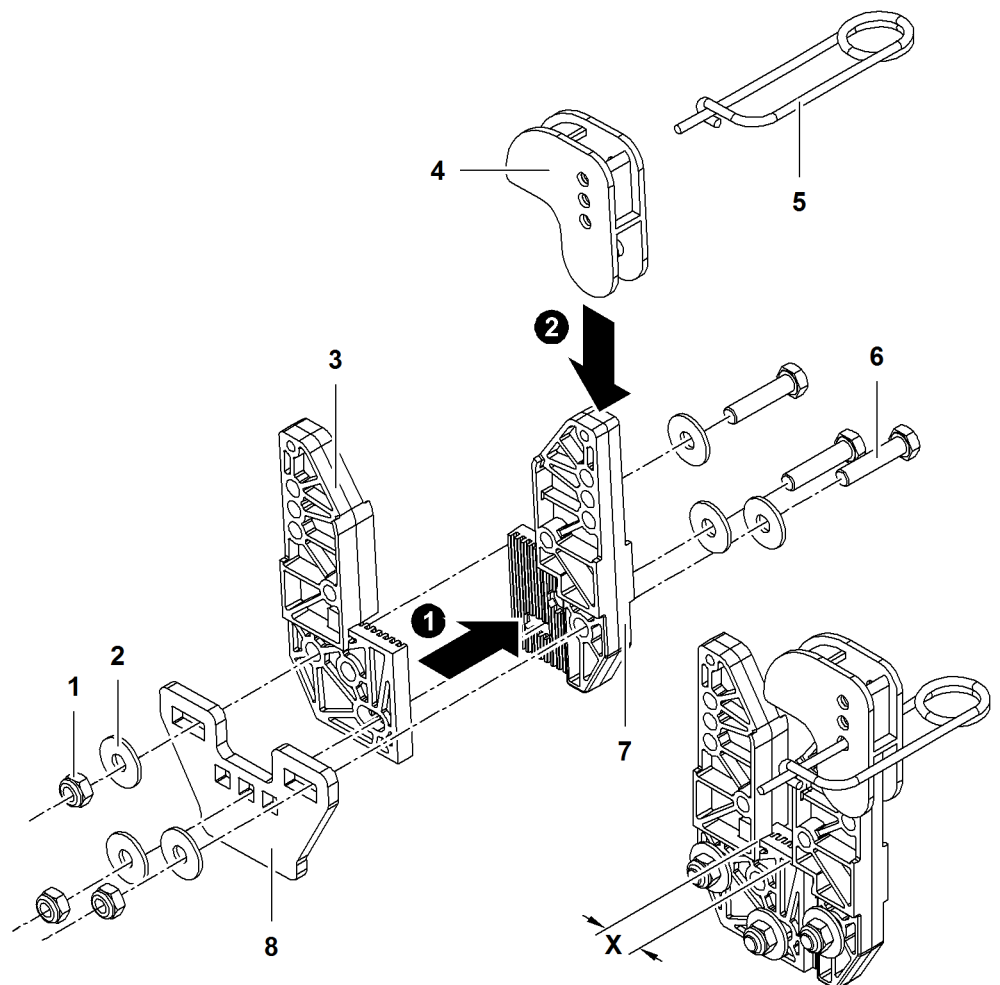


Fig. 5923: Adjusting and mounting the transport brackets for steel pendant straps

- | | | | |
|---|------------------------------|---|---|
| 1 | Nut (3x) | 6 | Screw (3x) |
| 2 | Washer (6x) | 7 | Element of transport bracket |
| 3 | Element of transport bracket | 8 | Fitting sheet |
| 4 | Securing element | X | Required width for steel pendant straps |
| 5 | Locking spring | | |
- Set required width X.

- ▶ Insert element **3** at element **7**.
- ▶ Position washers **2** on screws **6**.
- ▶ Insert screws **6** in transport bracket and fitting sheet **8**.
- ▶ Secure screws **6** with washers **2** and nuts **1**.
- ▶ Place securing element **4** onto transport bracket.
- ▶ Secure securing element **4** with locking spring **5**.

8.3.2 Installing transport brackets for CF pendant straps

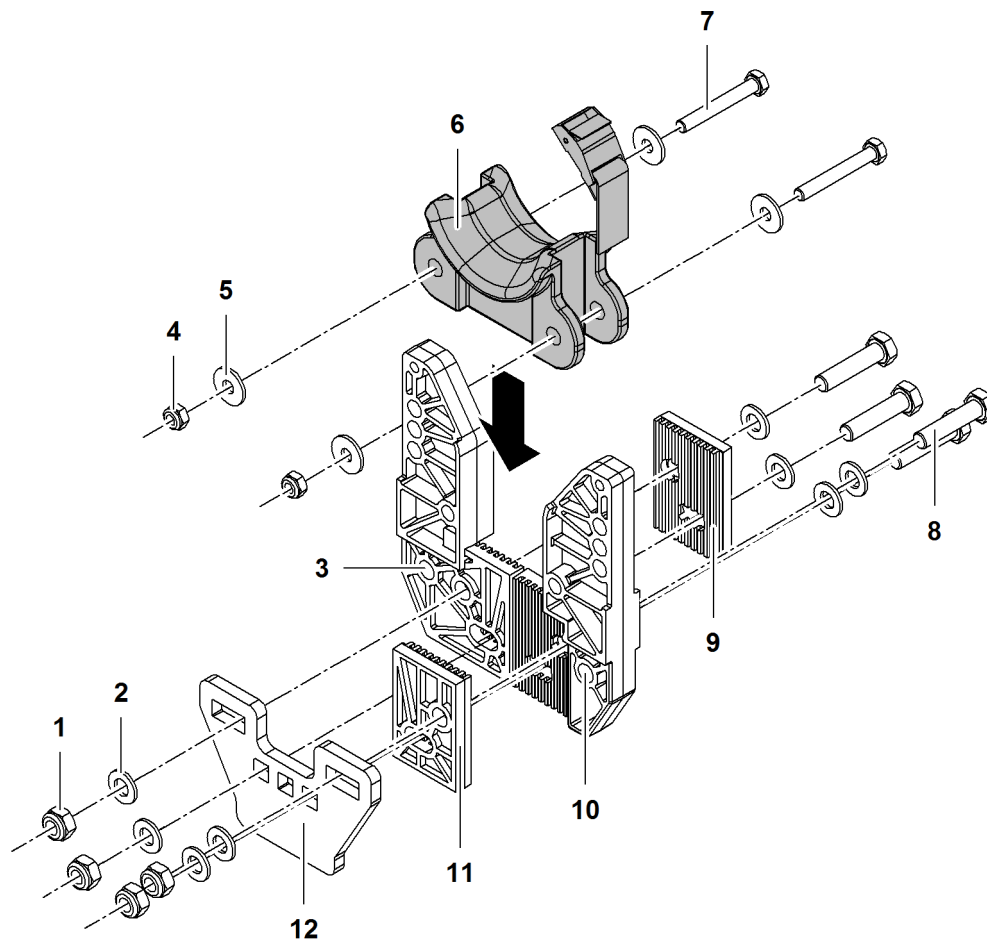


Fig. 5924: Installing transport brackets for CF pendant straps

- | | | | |
|----------|---|-----------|------------------------------|
| 1 | Nut (4x) | 7 | Screw (2x) |
| 2 | Washer (8x) | 8 | Screw (4x) |
| 3 | Element of transport bracket | 9 | Element of transport bracket |
| 4 | Nut (2x) | 10 | Element of transport bracket |
| 5 | Washer (4x) | 11 | Element of transport bracket |
| 6 | Extension element for CF pendant straps | 12 | Fitting sheet |

- ▶ Insert element **11** at element **10**.
- ▶ Insert element **9** at element **3**.
- ▶ Position washers **2** on screws **8**.
- ▶ Insert screws **8** in transport bracket and fitting sheet **12**.

- ▶ Secure screws **8** with washers **2** and nuts **1**.
- ▶ Insert extension element **6** in transport bracket.
- ▶ Position washers **5** on screws **7**.
- ▶ Insert screws **7** in transport bracket and extension element **6**.
- ▶ Secure screws **7** with washers **5** and nuts **4**.

8.3.3 Adjusting and mounting transport brackets for connecting links

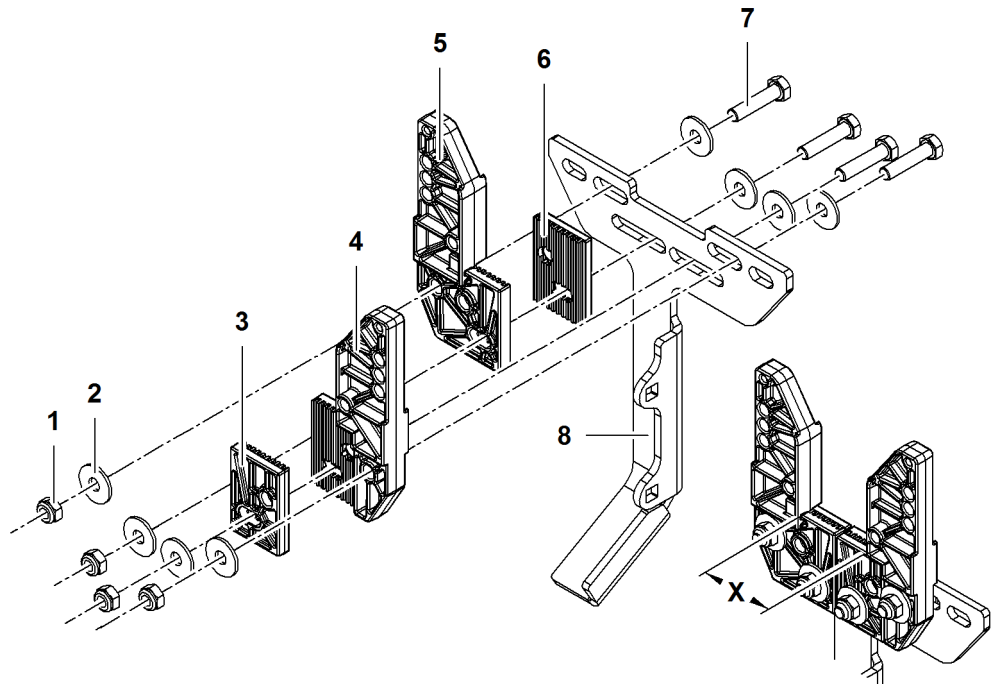


Fig. 5925: Adjusting and mounting transport brackets for connecting links

- | | | | |
|----------|------------------------------|----------|-------------------------------------|
| 1 | Nut (4x) | 6 | Element of transport bracket |
| 2 | Washer (8x) | 7 | Screw (4x) |
| 3 | Element of transport bracket | 8 | Fitting sheet |
| 4 | Element of transport bracket | X | Required width for connecting links |

5 Element of transport bracket

- ▶ Set required width **X**.
- ▶ Insert element **3** at element **4**.
- ▶ Insert element **6** at element **5**.
- ▶ Position washers **2** on screws **7**.
- ▶ Insert screws **7** in transport bracket and fitting sheet **8**.
- ▶ Secure screws **7** with washers **2** and nuts **1**.

8.3.4 Insert pendant straps in transport bracket and secure

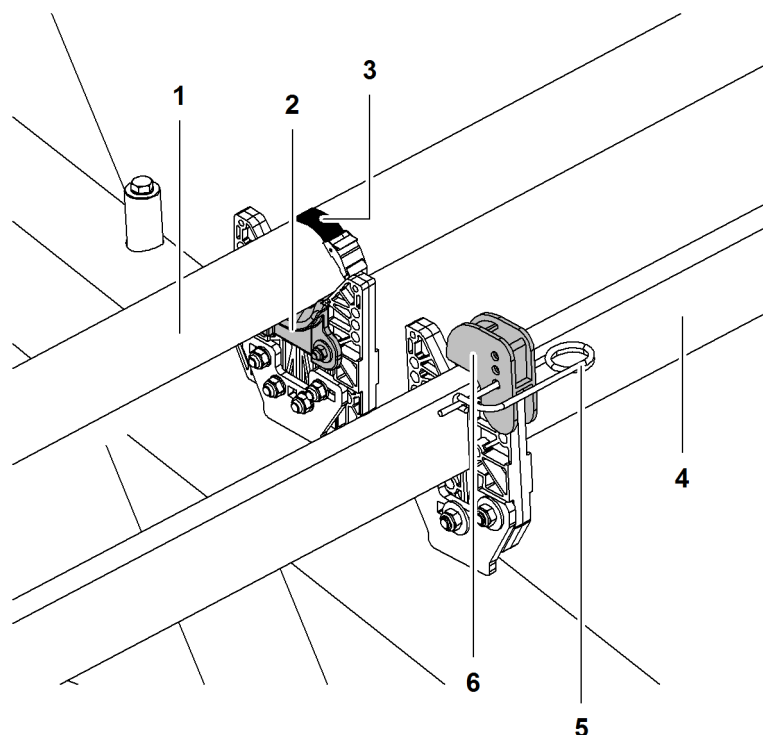


Fig. 5926: Inserting and securing pendant straps in transport bracket

1	CF pendant strap	4	Steel pendant strap
2	Extension element for CF pendant straps	5	Locking spring
3	Belt	6	Securing element

- ▶ Place steel pendant straps into transport brackets for steel pendant straps.
- ▶ Place securing element **6** onto transport bracket.
- ▶ Secure securing element **6** with locking spring **5**.
- ▶ Place CF pendant straps into transport brackets for CF pendant straps.
- ▶ Place belt **3** around CF pendant strap **1**.
- ▶ Tighten belt **3**.
- ▶ Repeat procedure with all main boom sections and jib sections.

8.3.5 Securing the pendant straps with transport bracket

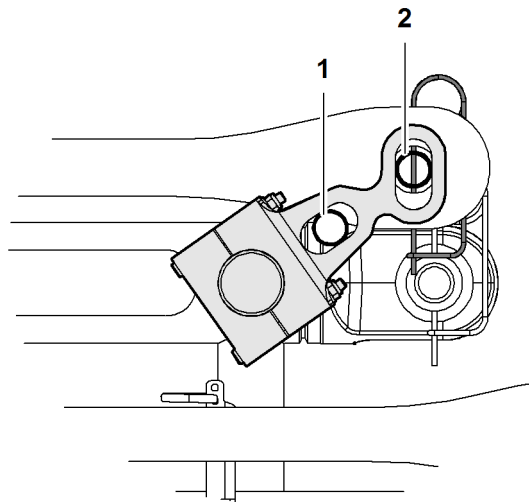


Fig. 5927: Securing the pendant straps with transport bracket

- | | | | |
|---|------------------------------------|---|--------------------------------------|
| 1 | Working position transport bracket | 2 | Transport position transport bracket |
|---|------------------------------------|---|--------------------------------------|

In crane mode, the transport bracket is located in working position 1.

- ▶ Take transport bracket out of working position 1.
- ▶ Repeat procedure with all main boom sections and jib sections.

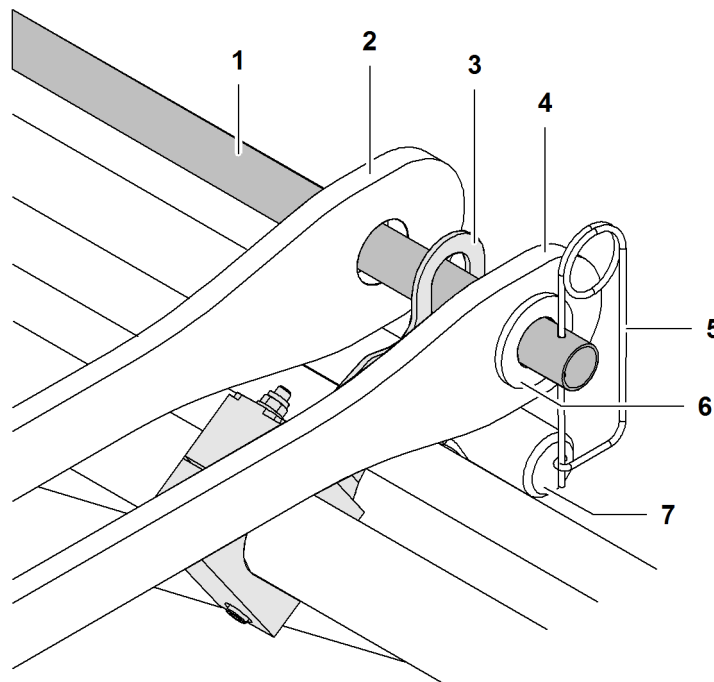


Fig. 5928: Securing the pendant straps with transport bracket

- | | | | |
|---|-------------------------|---|----------------------|
| 1 | Transport bracket | 5 | Locking spring |
| 2 | Main boom pendant strap | 6 | Washer |
| 3 | Bracket | 7 | Rope protection pipe |
| 4 | Jib backstay strap | | |

- ▶ Slide transport bracket 1 through main boom pendant strap 2, jib backstay strap 4 and bracket 3.

- ▶ Secure transport bracket **1** with washer **6** and locking spring **5**.
- ▶ Repeat procedure with all main boom sections and jib sections.
- ▶ Ensure that all loose parts are secured.

8.3.6 Preparing boom components for transport

For space-saving transport, jib sections of the same length can be pushed into main boom sections. The jib sections are pushed laterally reversed into the main boom sections.

Ensure that the following conditions are fulfilled:

- Double-taper pin is in the transport brackets.
- Locking elements are stored.
- Pins for pendant straps are secured.
- All loose parts secured.

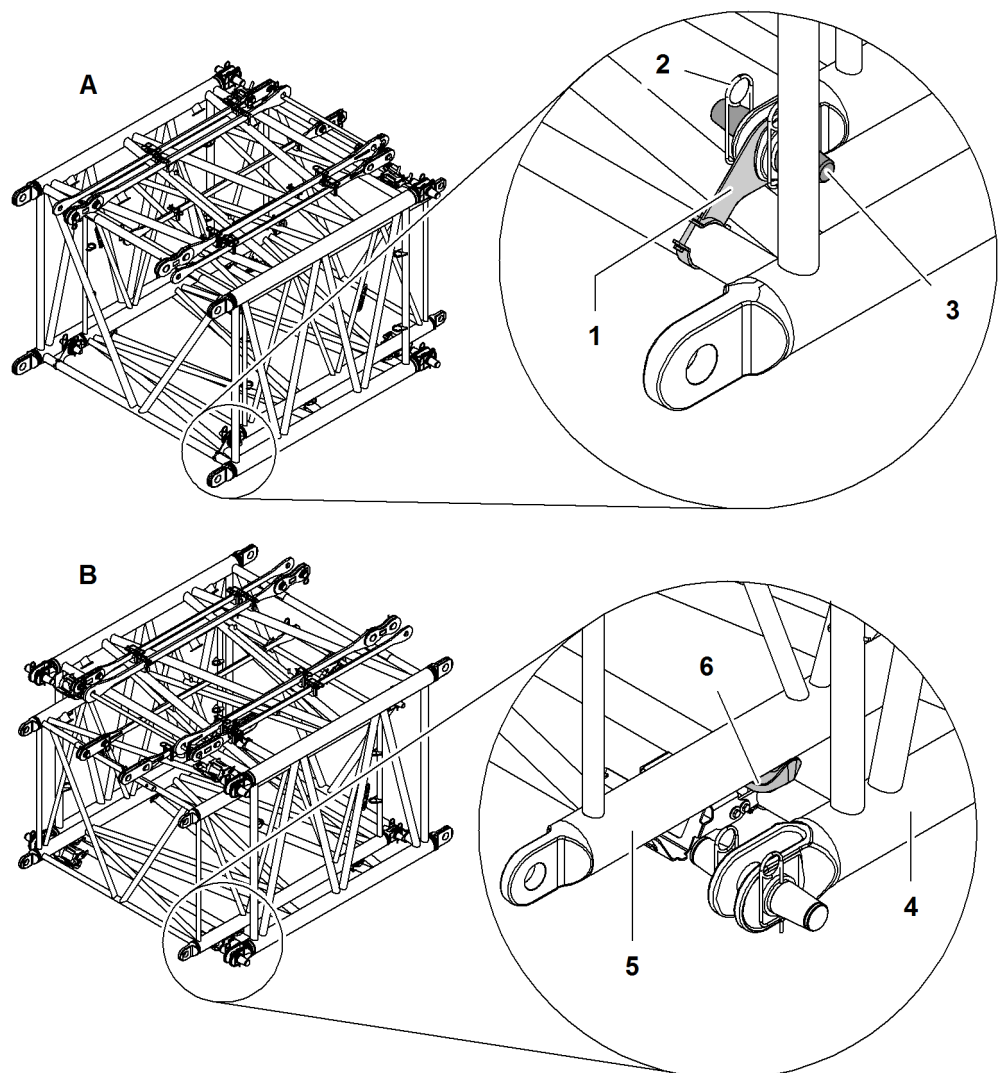


Fig. 5929: Preparing boom components for transport

- | | | | |
|----------|-----------------------|----------|---|
| 1 | Bracket (2x) | 5 | Jib section |
| 2 | Locking spring (2x) | 6 | Support (4x) for retracted jib section during transport |
| 3 | Double-taper pin (2x) | A | Rear view |
| 4 | Main boom section | B | Front view |

Jib system dimension	Distance between supports
2316	2440 mm 8' ft-in
1916	2063 mm 6' 9" ft-in
1713	1863 mm 6' 1" ft-in
1309	1440 mm 4' 9" ft-in
1008	1140 mm 3' 9" ft-in

Tab. 639: Distance between supports

- ▶ If necessary, adjust support **6** for jib section.
- ▶ Lift jib section **5** in main boom section **4** onto support **6**.
- ▶ Slide jib section **5** in until it is possible to pin the double-taper pin **3**.
- ▶ Bolt jib section **5** with bracket **1**.
- ▶ Secure pin with locking spring **2** and washers.
 - ▷ Boom components ready for transport:

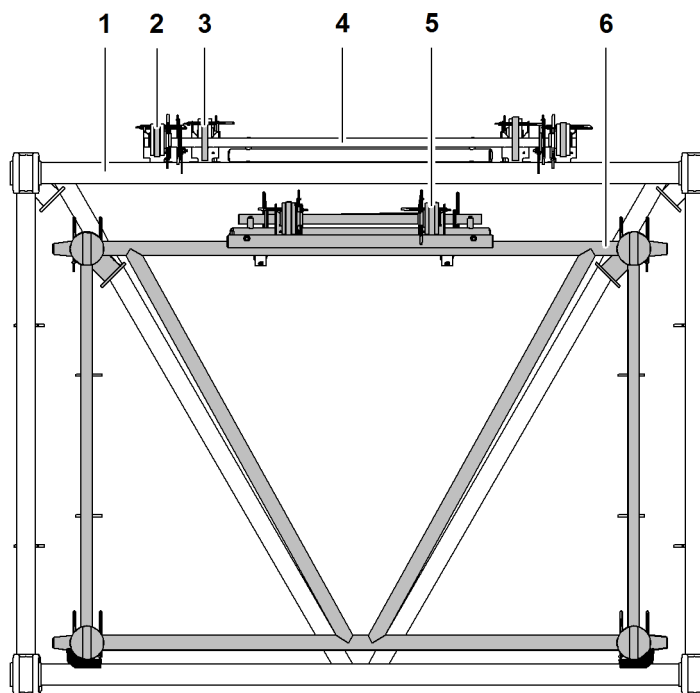


Fig. 5930: Boom components ready for transport

- | | |
|---------------------------------------|---------------------------------|
| 1 Main boom section | 4 Transport bracket |
| 2 Jib backstay strap (2x) | 5 Jib pendant strap (2x) |
| 3 Main boom pendant strap (2x) | 6 Jib section |

- ▶ Transport boom sections.

8.3.7 Transporting the pendant straps



Note

Liebherr recommends:

- ▶ Transport pendant straps on boom sections.
-

Handle pendant straps with care.

NOTICE

Pendant straps not transported correctly!
Damage to pendant straps.

If pendant straps are not transported on boom sections:

- ▶ Pack up pendant straps.
 - ▶ Store pendant straps on a soft base (e.g. wood).
-

- ▶ Transport pendant straps.

9 Maintenance

This chapter deals with the following issues:

- Maintenance and inspection of the machine
- Lubricants and consumables



WARNING

Inadmissible or improper procedure!
Severe injuries, damage to machine.

If the operation manual contains insufficient information:

- ▶ Contact Liebherr customer service.
-

9.1 Maintenance and inspection schedule

NOTICE

Improperly performed maintenance and inspection work!
Damage to machine.

- ▶ Observe the prescribed maintenance and inspection intervals according to the maintenance plan.
 - ▶ Perform all maintenance and inspection work according to specifications.
 - ▶ Observe references to manufacturer's documentation and the regulations and guidelines contained therein.
-

This chapter contains all maintenance work to be performed on the machine in table form.

The maintenance and inspection intervals are specified in operating hours and calendar times, whereby the first reached interval date is decisive.

Some maintenance work make reference to the manufacturer's documentation and must be performed in accordance with the regulations and directives of the respective manufacturer's documentation. In case of maintenance intervals and inspection intervals that diverge from the manufacturer's documentation and operation manual of the machine, however, the intervals stated in the machine's operation manual take precedence.

The maintenance work must be carried out conscientiously. The maintenance intervals must not be exceeded, but can be shortened if necessary. Shortening of intervals largely depends on the operating conditions.

The maintenance intervals must be reduced in case of the following operating conditions:

- High temperature differences on site
- Generally high temperatures
- Aggressive environment (e.g. chemical plant)
- Dirty, dusty environment (e.g. dust formation when unloading bulk goods)

Maintenance and inspection schedule

- High strains during operation

Customer:.....Machine type:.....Serial no.:..... Operating hours:.....Date:.....

Maintenance / inspection after service hours							Tasks to be performed			
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff ■ Once-only activity ● Repeat interval † If necessary * Annually before the winter	by Liebherr service personnel □ Once-only activity ○ Repeat interval † If necessary	See page
Whole machine										
								○	Checking the machine	
									◇ Visual inspection and function test of the entire machine after an exceptional situation (e.g. emergency stop, overload, collision, etc.)	
Diesel engine D934/D936/D944/D946 A7-04 (see operating manual of the engine manufacturer on CD)										
									● Checking the engine oil level (or according to oil level sensor in cabin)	
									● Performing visual inspection (no leaks, dirt or damage)	
									○ Changing diesel engine oil, oil filter insert and oil separator filter element after 1000h (with NON-Liebherr engine oil)	
									○ Changing diesel engine oil, oil filter insert and oil separator filter element after 1500h (with Liebherr 5W-30 engine oil)	
									○ Check belt drive condition and exchange if necessary	
									□ ○ Check intake and exhaust system for condition, attachment and leaks	
									○ Check that oil sump, engine bearing and diesel engine brackets are securely fit	
									* Check heating flange	
									○ Change heating flange every 10,000h	
									○ Check/adjust valve clearance	
									○ Checking the state of control device storage	
									□ ○ Checking the state of sensors, actuators, cable retainers and plugs	
Diesel engine D934/D936/D944/D946 A7-00 or D934/D936/D944/D946 A7-03 (see operating manual of the engine manufacturer on CD)										
									● Checking the engine oil level (or according to oil level sensor in cabin)	
									● Performing visual inspection (no leaks, dirt or damage)	
									○ Change diesel engine oil, oil filter insert and oil separator filter element after 125h (with sulfur content in fuel of 2000 mg/kg (2000 ppm) up to 5000 mg/kg (5000 ppm) and NON-Liebherr engine oil)	
									○ Change diesel engine oil, oil filter insert and oil separator filter element after 250h (with sulfur content in fuel of 300 mg/kg (300 ppm) up to 2000 mg/kg (2000 ppm) and NON-Liebherr engine oil)	
									○ Change diesel engine oil, oil filter insert and oil separator filter element after 500h (with sulfur content in fuel up to 300 mg/kg (300 ppm) and NON-Liebherr engine oil)	
									○ Change diesel engine oil, oil filter insert and oil separator filter element after 250h (with sulfur content in fuel of 2000 mg/kg (2000 ppm) up to 5000 mg/kg (5000 ppm) and Liebherr 5W-30 engine oil)	
									○ Change diesel engine oil, oil filter insert and oil separator filter element after 500h (with sulfur content in fuel of 300 mg/kg (300 ppm) up to 2000 mg/kg (2000 ppm) and Liebherr 5W-30 engine oil)	

Maintenance and inspection schedule

Customer:.....Machine type:.....Serial no.:.....Operating hours:.....Date:.....

Maintenance / inspection after service hours								Tasks to be performed		
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff ■ Once-only activity ● Repeat interval † If necessary * Annually before the winter	by Liebherr service personnel □ Once-only activity ○ Repeat interval † If necessary	See page
			○					Changing diesel engine oil, oil filter insert and oil separator filter element after 1000h (with sulfur content in fuel up to 300 mg/kg (300 ppm) and Liebherr 5W-30 engine oil)		
		○						Check belt drive condition and exchange if necessary		
		□	○					Check intake and exhaust system for condition, attachment and leaks		
			○					Check that oil sump, engine bearing and diesel engine brackets are securely fit		
							*	Check heating flange		
							○	Change heating flange every 10,000h		
			○					Check/adjust valve clearance		
		○						Checking the state of control device storage		
		□	○					Checking the state of sensors, actuators, cable retainers and plugs		
Fuel system (see operation manual of the engine manufacturer on CD)										
●								Check water separator on the fuel pre-filter and draining water if required		
		○						Check lubricating oil system and fuel system for leaks and condition		
		○						Change fuel pre-filter (or in case of drop in performance)		
		○						Change fuel fine filter (or in case of drop in performance)		
							◇	Ventilate the fuel system (injection lines may not be undone)		
Fuel tank (see operation manual of the engine manufacturer on CD)										
●								Draining water and bottom sediments		
		○						Changing the venting filter		
Refueling pumps										
		○						Checking refueling pumps for proper function and leaks		
Air filter system										
●								Checking the negative pressure indicator		1961
●								Cleaning the air filter dust ejector		1962
							◇	Exchanging the dry air filter main element (according to maintenance indicator/annually)		1962
							◇	Exchanging the dry air filter safety element (with each 3rd exchange of the main element/annually)		1962
Exhaust aftertreatment system* (see operating manual of the engine manufacturer on CD)										
●								Visual inspection of SCR system		
■		○						Checking the profile clamp for correct tightening torque		
●								Draining condensate from air tank		1964
					○			Changing cartridge of air dryer		1964

Customer:.....Machine type:.....Serial no.:..... Operating hours:.....Date:.....

Maintenance / inspection after service hours								Tasks to be performed		
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff ■ Once-only activity ● Repeat interval † If necessary * Annually before the winter	by Liebherr service personnel □ Once-only activity ○ Repeat interval ◇ If necessary	See page
Cooling system (see operation manual of the engine manufacturer on CD)										
●								Checking the coolant level		
		○						Checking cooling system and heating system for leaks and condition		
				○			*	Check anti-corrosive concentration and antifreeze concentration in coolant (at least 1 x a year)		
							○	Change coolant (anti-freeze OS mix) every 6,000 hours (at least every 4 years)		
Distributor gearbox										
●								Checking the gearbox oil level		1967
●								Checking the venting valve		1969
		□	○					Changing the gearbox oil		
				○				Check fastening screws for tight fit		
Swing										
	●							Checking the gearbox oil level		1970
			○					Check gearbox for leaks		
		□		○				Changing the gearbox oil		
					○			Check the fastening screws for tight fit (fastening screws may only be used for a maximum of 2 more further assembly procedures)		
			○					Visually checking the pinion and crown gear		
			○					Checking that the stopping brakes are working		
Swing connection										
		□			○			Checking the fastening screws for tight fit (exchanging fastening screws and nuts at each bearing exchange)		
●								Lubricating external teeth		1972
●								Lubricating the bearing races via the central lubrication point (preferably at the end of the shift)		1972
							◇	Measuring the bearing play		
Winch1/winch2										
	●							Checking the gearbox oil level		1974
			○					Check the winch gearbox for leaks and perform oil analysis if necessary		
		□		○				Change the gearbox oil		
		●						Checking oil level of holding brake		1975
				○				Changing hydraulic oil of the holding brake		1976
	●							Lubricate counter bearings if lubrication option is available		1979
	●							Checking the rope end fastening for tight fit		1979

Maintenance and inspection schedule

Customer:.....Machine type:.....Serial no.:.....Operating hours:.....Date:.....

Maintenance / inspection after service hours							Tasks to be performed		See page	
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff		by Liebherr service personnel
								■ Once-only activity ● Repeat interval † If necessary * Annually before the winter	□ Once-only activity ○ Repeat interval † If necessary	
			○				†	Checking 3-windings limit switch for tight fit and function (at 1,000h or when changing ropes)		
			○					Check winch for tight fit (pin clearance, pin locking)		
			○					Checking fastening screws for tight fit		
			○					Performing a visual inspection		
			○					Check holding brake for function		
			○					Checking the free-fall brake for function (if available)		
						○		Hydraulic motor and drive planetary stage: check tooth profiles for wear		
Boom luffing winches										
	●							Checking the gearbox oil level		1980
			○					Check the winch gearbox for leaks and perform oil analysis if necessary		
		□	○					Changing the gearbox oil		
	●							Lubricate counter bearings if lubrication option is available		1981
	●							Checking the rope end fastening for tight fit		1982
			○					Check winch for tight fit (pin clearance, pin locking)		
			○					Check fastening screws for tight fit		
			○					Performing a visual inspection		
			○					Check holding brake for function		
						○		Hydraulic motor and drive planetary stage: check tooth profiles for wear		
Rope reeving winch										
			○					Checking winch gearbox for leaks and if necessary carrying out an oil analysis		
							†	Change gearbox oil when changing ropes		
	●							Lubricating the counter bearing, if possible		1983
							†	Checking rope end attachment for tight fit when starting up rope reeving winch		1983
			○					Check winch for tight fit (pin clearance, pin locking)		
			○					Check fastening screws for tight fit		
Tagline winch										
	●							Checking the gearbox oil level		1984
			○					Checking winch gearbox for leaks and if necessary carrying out an oil analysis		
		□	○					Changing the gearbox oil		
	●							Lubricating the rope bracket on the boom base section and checking pulleys for damage		1985
	●							Checking the rope end fastening for tight fit		1986
			○					Check winch for tight fit (pin clearance, pin locking)		
			○					Check fastening screws for tight fit		

Customer:.....Machine type:.....Serial no.:..... Operating hours:.....Date:.....

Maintenance / inspection after service hours								Tasks to be performed		
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff ■ Once-only activity ● Repeat interval † If necessary * Annually before the winter	by Liebherr service personnel □ Once-only activity ○ Repeat interval † If necessary	See page
			○					Check holding brake (if available) for function		
Crawler										
	●							Checking the gearbox oil level		1987
		□		○				Change the gearbox oil		
			○					Check fastening screws for tight fit		
				○				Tumbler and crawler motor: Check fastening screws for tight fit		
	●							Check gearbox and hydraulic screw connections for leaks		1988
			○					Visual inspection of crawler components (carrier rollers, guide rollers, idler wheels, base plates)		
	●							Clean crawler, earlier if necessary		1988
			○					Check screws, nuts, pins for tight fit		
	●							Check locking screws of the struts on crawler side frames for tight fit on extendable undercarriages		1989
	●		○					Checking the chain guides for wear and tight fit		1989
	●							Check chain tension, earlier if necessary		1990
	●							Checking locking screws of the track pads axes		1999
			○					Checking the rope tensioning cylinder for leaks		
Lifting device										
	●		○					Check transport lashing and round slings for wear (according to EN 1492-2).		2000
	●		○					Check the round steel chains for wear and damage		2000
Hook/pulley block										
	●			○				Checking all hooks/pulley blocks for damage, wear, corrosion and widening of the hook aperture		2001
	●			○				Lubricate bearings and axels, check rope fixing point, check for ease of movement and wear of pulleys, check that rope protection and locking elements are in place and undamaged		2001
	●							Check that the safety catch is present and working properly		2002
Hydraulic system										
	●							Check the hydraulic system for leaks		2003
	●							Checking the oil cooler for contamination		2003
			○					Checking that the engines and the screw fittings are tight		
		□	○					Changing the compressed air filter		2004
Hydraulic oil tank										
							●	Carry out a hydraulic oil analysis ten hours after every oil change (reference measurement)		2006
							●	Carry out a hydraulic oil analysis after 500 hrs		2006

Maintenance and inspection schedule

Customer:.....Machine type:.....Serial no.:.....Operating hours:.....Date:.....

Maintenance / inspection after service hours							Tasks to be performed			
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff <input checked="" type="checkbox"/> Once-only activity <input checked="" type="checkbox"/> Repeat interval † If necessary * Annually before the winter	by Liebherr service personnel <input type="checkbox"/> Once-only activity <input type="checkbox"/> Repeat interval † If necessary	See page
								● Carry out a hydraulic oil analysis after 1000 hrs / 1 year		2006
								● Hydraulic oil NOT supplied by LIEBHERR must be changed after 2000 hrs / 2 years		2006
								● Change Liebherr "Hydraulik 37" oil after 4000 hrs / 4 years		2006
								● Change Liebherr "Hydraulik Plus" and "Hydraulik Plus Arctic" oil after 6000 hrs / 6 years		2006
			○					Changing the venting filter		
	●		○					Cleaning the magnetic rod in the return filter		2007
		□	○					Exchanging return filter		2010
Hydraulic oil heater										
			○					Checking that the hydraulic oil heater is working properly		
Accumulator										
			○					Check the accumulator		
					○			Changing the accumulator		
Hydraulic cylinders										
			○					Check that the hydraulic cylinder fits properly and does not leak		2012
	●							Protecting the piston rods of the hydraulic cylinders from corrosion		2012
							†	Preserving the piston rods of the hydraulic cylinders in case of longer periods of non-use		2012
Hydraulic leads										
	●							Visual inspection of hydraulic leads (hydraulic hoses, hydraulic pipes)		2013
				●				Testing of the hydraulic leads (hydraulic hoses, hydraulic pipes) by a certified and institutionally authorized person to determine if a continued use of the hydraulic leads is permissible or if they need to be replaced.		
Rotary connection										
			○					Checking that the rotary connection is firmly attached and does not leak		
Bypass filter system										
	●							Checking the bypass filter system		2014
			○					Changing the filter elements		2014
Electrical system										
							‡	Reading and analyzing the error memory		
			○					Checking cable ducts and cable connections for chafing		2017
Batteries										
			○					Cleaning battery connections, greasing with terminal grease		
			○					Checking the fluid level in the cells		2018

Customer:.....Machine type:.....Serial no.:..... Operating hours:.....Date:.....

Maintenance / inspection after service hours								Tasks to be performed		
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff ■ Once-only activity ● Repeat interval † If necessary * Annually before the winter	by Liebherr service personnel □ Once-only activity ○ Repeat interval † If necessary	See page
			○					Checking the battery pre-warming for correct function		
Lighting										
●								Checking the function of cabin lighting, floodlights and additional floodlight		2020
Rope measuring system										
●			○					Checking the rope measuring system and height adjustment of all winches (if available) for correct function		2029
							†	Readjusting layer change when changing ropes		2029
GSM/GPRS/GPS modem										
			○					Checking GSM/GPRS/GPS modem for correct function		
Vertical Line Finder* assistance system										
			○					Setting the deviation of the Vertical Line Finder to zero		
PDR*										
							‡	Checking correct function of PDE		
Limit switches										
●								Checking hoist limit switches, boom limit switches and, if necessary, limit switches of the piling and drilling rig to ensure they are working correctly		2030
Mechanical inclinometer										
●								Checking that the mechanical inclinometer is working properly		2031
Emergency stop										
	●							Checking the emergency stop		2032
Load moment limiter (LML)										
			○					Checking that the system shuts down properly		
Obstacle warning light*										
	●							Check obstacle warning light for function and damage, check mains cable and plug (if available) for damage		2033
Emergency control system										
			○					Checking emergency control system for correct function		
Fire extinguishers										
				●				Checking the seals and inspection dates on the fire extinguishers		2034
Personal protective equipment										
●								Checking that the personal protective gear is in place, intact and complete		2035
Safety signs										
	●							Checking that all required safety labels are mounted on the machine and are legible		2036

Maintenance and inspection schedule

Customer:.....Machine type:.....Serial no.:.....Operating hours:.....Date:.....

Maintenance / inspection after service hours								Tasks to be performed		
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff ■ Once-only activity ● Repeat interval † If necessary * Annually before the winter	by Liebherr service personnel □ Once-only activity ○ Repeat interval † If necessary	See page
Access systems and railings										
●								Checking ladders, steps, platforms, and ascents for wear, damage and anti-slip surfaces		2037
●								Checking latches and hand rails for wear and damage		2037
	●							Checking the spring tension of railing doors		2037
	●							Checking the function of the railing stabilization		2040
Steel structure										
●				○				Checking the machine steel structure for damage, cracks		2042
Main boom										
	●			○				Check main boom base section, main boom head and main boom sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear)		2045
	●			○				Main boom base section: Check knuckle pins and locking elements for tight fit		2046
	●							Main boom base section or A-frame1: Check function of the mechanical boom angle indicator, lubricate if necessary		2047
	●		○					Main boom head: Check screw connections and pin connections for tight fit, check rope fixing points for tears, check that rope protection and locking springs are in place and undamaged		2048
	●							Check anemometer for tight fit and function		2048
	●			○				Auxiliary jib: Check screw connections and pin connections for tight fit, check rope fixing points for tears, check that rope protection and locking springs are in place and undamaged		2049
Jib										
	●			○				Check jib base section, jib head section and jib sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear)		2050
			○					Tilting-back supports: Checking the accumulator in accordance with the German Pressurized Vessel Ordinance and for tight fit		
	●							Check locking flaps for ease of movement, additionally during every assembly/disassembly		2056
	●							Jib head section: Checking wheels for ease of movement		2057
	●							Checking the anemometer for tight fit and function		2058
			○					Checking hydraulic tilting-back supports of A-frame3 and hydraulic connections for tightness		
	●							Jib base section: Checking screw connections and pin connections for tight fit, checking that locking springs are in place and undamaged		2058
Steel pendant straps										
	●			○				Check steel pendant straps and pins for damage and wear and check that locking springs and split pins are present (cracks, notches, corrosion, plastic deformation, wear, lubrication, etc.)		2063

Customer:.....Machine type:.....Serial no.:..... Operating hours:.....Date:.....

Maintenance / inspection after service hours								Tasks to be performed		
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff ■ Once-only activity ● Repeat interval † If necessary * Annually before the winter	by Liebherr service personnel □ Once-only activity ○ Repeat interval † If necessary	See page
		○						Checking the ease of movement of pin connections in the entire pendant strap strand		2064
	●							Protecting steel pendant straps, connecting links and pins from corrosion		2064
	●			○				Checking connecting links for damage and wear		2064
	●			○				Checking tension load cells for damage and wear, checking electricity connections for tight fit		2064
Carbon-fibre pendant straps										
	●			○				Check CF pendant straps and pins for damage and wear and check that locking springs and split pins are present (cracks, notches, corrosion, plastic deformation, wear, lubrication, etc.)		2067
		○						Checking the ease of movement of pin connections in the entire pendant strap strand		2069
	●							Protecting CF pendant strap bushes, connecting links and pins from corrosion		2069
	●			○				Checking connecting links for damage and wear		2070
	●			○				Checking tension load cells for damage and wear, checking electricity connections for tight fit		2070
Pendant ropes										
	●			○				Check pendant ropes and pins for damage and wear and check that locking springs and cotter pins are present (cracks, notches, corrosion, plastic deformation, wear, lubrication, etc.)		2071
	●							Protecting pendant ropes, connecting links and pins from corrosion		2071
	●			○				Checking connecting links for damage and wear		2072
						○		Changing pendant ropes		
Counterweight										
●								Checking the screws of the rear counterweight tie-down for tight fit (with exception of LR 1001.xx.xx)		2073
	●							Checking the rear counterweight, fixing lugs and round steel chains for damage, wear and secure fit		2073
	●							Checking locking elements for availability, damage, wear and tight fit		2074
	●							Checking counterweight supports (pins, shackles) for damage and wear		2074
Lubrication system										
●								Checking the function of the central lubrication system		2075
Derrick equipment*										
	●			○				Check derrick boom base, derrick boom head and derrick boom sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear)		2077
	●							Greasing the bearing of the derrick boom base		2077

Maintenance and inspection schedule

Customer:.....Machine type:.....Serial no.:.....Operating hours:.....Date:.....

Maintenance / inspection after service hours								Tasks to be performed		
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff <input checked="" type="checkbox"/> Once-only activity <input checked="" type="checkbox"/> Repeat interval † If necessary * Annually before the winter	by Liebherr service personnel <input type="checkbox"/> Once-only activity <input type="checkbox"/> Repeat interval † If necessary	See page
	●							Greasing the extension device of the counterweight carriage (strut, uppercarriage pin connection)		2078
●								Checking the air pressure of the counterweight carriage tires		2078
●								Checking the tires of the counterweight carriage for damage		2079
	●							Lubricating the axes and swing arms of the counterweight carriage's wheel sets		2079
	●							Lubricating the drive units of the counterweight carriage's wheel sets		2080
	●							Checking the gearbox oil level in the counterweight carriage's axle gearbox		2081
			○					Checking the gearbox oil in the counterweight carriage's axle gearbox		
	●							Checking the hydraulic cylinders of the counterweight carriage's wheel sets for tightness		2084
	●							Checking the hydraulic connections on the counterweight carriage for tightness		2084
●								Checking the screws of the counterweight tie-down for tight fit		2085
Ropes										
	●							Visual inspection of the ropes for deterioration or mechanical damage		2086
	●							Checking ropes for lubrication		2086
	○							Checking ropes for end of service life		2087
Drum										
	■	●						Checking rope tensioning pulleys* of drum for wear		2116
		●						Checking the groove diameter of the drum		2116
	●							Checking drum for loose rope layers		2117
Rope pulleys										
		●						Checking the groove diameter of the pulley		2118
		●						Checking the bottom of groove diameter of the pulley		2119
		●						Checking the gap width of the pulley		2120
		●						Checking bottom of pulley groove for sharp edges		2121
		●						Checking pulleys for damage		2121
	●							Check pulley bearings		2122
	●							Check position of bearing and locking ring		2122
Rope suspension and rope fixation										
	●							Checking rope suspensions (rope clamps, rope thimbles) for wire breaks, absence of corrosion and tight fit of screw fittings		2124
	●							Checking the pocket locks		2125
	●							Checking the rope end fittings for cracks and replacing entire rope if necessary		2126

Customer:.....Machine type:.....Serial no.:.....Operating hours:.....Date:.....

Maintenance / inspection after service hours								Tasks to be performed		
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff ■ Once-only activity ● Repeat interval † If necessary * Annually before the winter	by Liebherr service personnel □ Once-only activity ○ Repeat interval † If necessary	See page
Cab										
●								Check the windows of the cab for damage		2129
●								Checking that the cab door and the door lock work properly		2130
●								Checking cabin roof protection guard or falling object protection* for damage and locking in case of foldable falling object protection		2130
	●							Lubricating the falling object protection		2131
●								Checking outside mirrors and inside mirrors for damage		2133
	●							Checking the operation of the hydraulic cab tilting device		2133
	●							Hydraulic cab tilting device: check hydraulic cylinders, hydraulic hoses and connections for leaks and damage		2133
	●							Hydraulic cabin elevation: Check acoustic warning signal for proper functioning, check operating elements (valves, display, etc.) for proper functioning, check safety chain is present and functioning properly, check the hydraulic hoses and connections for leaks and damage, check emergency descent equipment is present and functioning properly, check the suspension point on the cabin for damage, check emergency lowering, check pin connection for the presence of locking elements, check safety gear for damages and proper functioning		2134
				○			†	Cleaning or replacing the filter insert in the cabin		2135
Ventilation, heating and air-conditioning										
	●							Checking the recirculated air filter for contamination		2137
							†	Replace recirculated air filter (at least every 200h)		2141
	●							Checking fresh air filter for contamination		2146
							†	Replace fresh air filter (at least every 200h)		2147
							●	Check coolant level monthly in sight glass		2151
							◇	Filling in coolant		
							●	Check condenser monthly for contamination		2152
							●	Check condenser monthly for loose leads, loos screws and corrosion		2153
							●	Check fan on condenser for function, tight fit and damage monthly		2153
			○				*	Checking the function of the ventilation, heating and air conditioning system		
			○					Checking the air conditioning system for function and leaks		
							●	Check climate box for contamination every 200h		2154
			○					Heating circuit: Check hoses for leaks or damage		
							●	Check dryer monthly for damage and corrosion		2155
				○			◇	Replace dryer (after 4000h or after each opening of the coolant circuit)		
			○					Check A/C compressor for tight fit		
			○					Checking the drive belts of the A/C compressor for damage		

Maintenance and inspection schedule

Customer:.....Machine type:..... Serial no.:..... Operating hours:.....Date:.....

Maintenance / inspection after service hours							Tasks to be performed			
8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	By maintenance staff ■ Once-only activity ● Repeat interval † If necessary ✱ Annually before the winter	by Liebherr service personnel □ Once-only activity ○ Repeat interval † If necessary	See page
			○					Checking the condenser and vaporizer for dirt		
			○					● Starting the ventilation, heating, air conditioning, external air conditioning system* and auxiliary heating system* and ensuring that sufficient antifreeze has been added to the water circuit		2155
								✱ Reading and analyzing the error memory of the auxiliary water heating*		
								✱ Checking the electric connections of the auxiliary water heating* for contact corrosion and tight fit		
								✱ Checking exhaust pipe and flue gas pipe of auxiliary water heating* for damage and free passage		
								✱ Checking fuel line, coolant circuit and hoses of auxiliary water heating for leaks and tears		
								✱ Replacing the fuel filter of auxiliary water heating		2158
HATZ diesel engine* (see operation manual of the engine manufacturer on CD)										
								○ Change engine oil every 250h		
								○ Check and adjust valve clearance every 250h		
								○ Clean cooling air zone every 250h		
								○ Check screw connections every 250h		
		○						Changing the fuel filter		
		○						Changing the dry air filter		
			○					Cleaning the oil filter		
	●							Checking the oil level		
●								Checking the suction zone of the combustion air and cooling air		
								○ Check belt drive every 100h		2160
			○					Replacing the belt drive including vibration damper, deflection pulley and springs		2160
Function lock*										
			○					Checking that the function lock is working properly		
Machine care										
								○ Check the preservation protection (intervals from 6 months)		2162
								○ Reapply preservation protection (intervals from 2 months)		2162

9.2 Lubricants and consumables

Complying with the instructions regarding lubrication and consumables ensures the highest degree of reliability and a long service life of the machine.

Cleanliness is important when handling lubricants and consumables.



Note

Improper disposal of lubricants and consumables!
Environmental pollution.

- ▶ Dispose of lubricants and consumables in accordance with national and international directives and regulations.
-

Lubricants have three main tasks:

- Reducing friction
- Preventing corrosion
- Discharge of dirt and particles from abrasion

The higher the quality of the lubricant, the longer the service life of the components and the lower the wear. Higher-quality lubricants have less moisture content, which reduces consumption.

The stated lubrication intervals must not be exceeded, but should be shortened if necessary. Shortening of intervals depends largely on operation conditions.

NOTICE

Insufficient lubrication!
Damage to machine.

- ▶ Observe specified lubrication intervals according to lubrication diagram.
-

9.2.1 Lubrication diagram

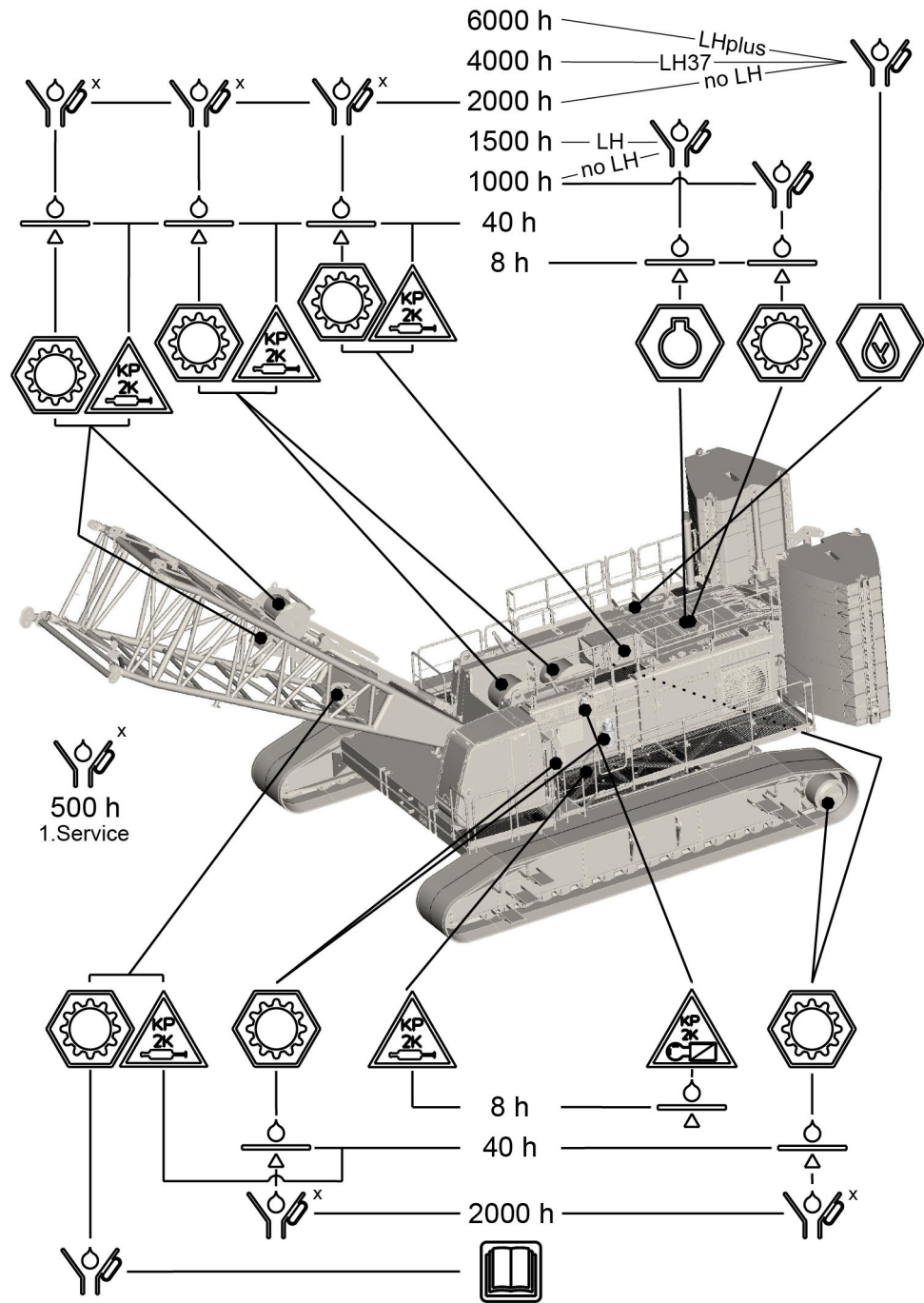


Fig. 5931: Lubrication chart

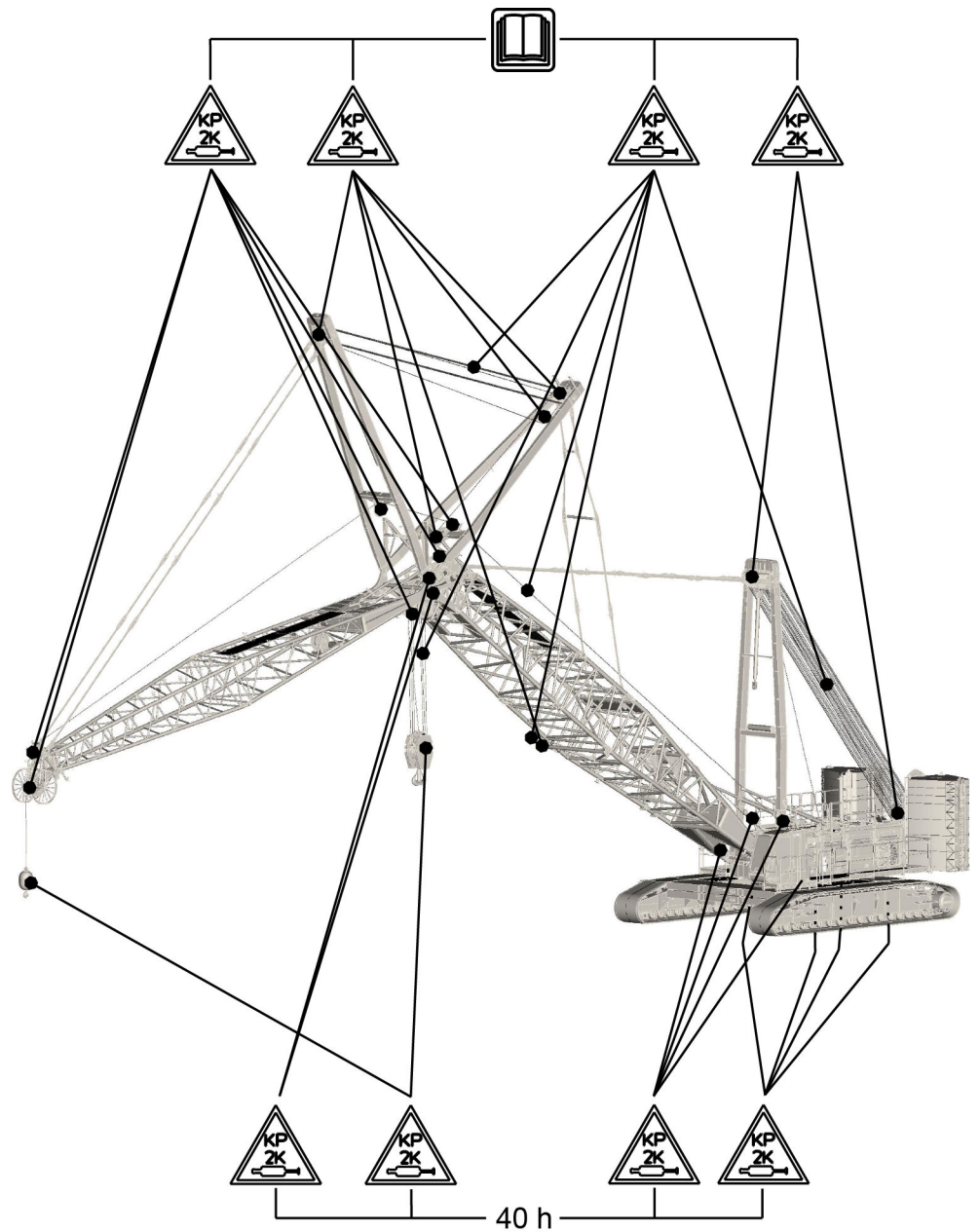
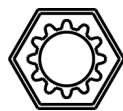


Fig. 5932: Lubrication chart

Key:



Diesel engine



gearbox



Hydraulics



Grease



Central lubrication (optional)



Changing oil



Checking and supplementing



Observe the operation manual

9.2.2 Filling capacity table

Component	Volume	Remark
Diesel engine	see operation manual of the engine manufacturer on CD	
Distribution gearbox	7 l 1.85 gal	4 power take-offs
Crawler drive	34 l 8.98 gal	per item
Swing gear	11.2 l 2.96 gal	per item
Winch1/winch2 (crane winch)	15.5 l 4.09 gal	
Winch1/winch2 (free-fall winch)	19 l 5.02 gal	
Main boom luffing winch	7.5 l 1.98 gal	
Jib luffing winch	4.8 l 1.27 gal	
Rope reeving winch	0.4 l 13.53 oz	
Hydraulic oil tank	820 l 216.62 gal	
Fuel tank	750 l 198.13 gal	
Urea tank	78 l 20.61 gal	

Tab. 640: Filling capacity table

9.2.3 Lubrication chart

No.	Lubrication spots	Outside temperature	Type	Specification	Liebherr
			ISO VG/SAE		Lubricants
1	Diesel engine stage 0 to 3B/ tier 0 to 4i	all year around down to -20 °C (-4 °F) below -20 °C (-4 °F) with pre-heating	SAE 10W-40	ACEA E4 API CF	Liebherr Motoroil 10W-40
		all year around down to -20 °C (-4 °F) below -20 °C (-4 °F) with pre-heating	SAE 10W-40 low ash	ACEA E4-99 / E6 / E7 API CF-4 / CG-4 CH-4 / CI-4	Liebherr Motoroil 10W-40 low ash required when using particulate filters
	Diesel engine stage IV/tier4f	all year around down to -30 °C (-22 °F) below -30 °C (-22 °F) with pre-heating	SAE 5W-30	ACEA E4 / E7 API CF	Liebherr Motoroil 5W-30
		all year around down to -30 °C (-22 °F) below -30 °C (-22 °F) with pre-heating	SAE 5W-30 low ash	ACEA E6 / E7	Liebherr Motoroil 5W-30 low ash required when using particulate filters
2	Mechanical gearboxes, winches and drive axles	down to -25 °C (-13 °F) down to -40 °C (-40 °F)	SAE 85W-90 ISO VG 220	API GL 5 DIN51 502	Liebherr Hypoid EP 90 Liebherr Syntogear Plus 220
		to -50 °C (-58 °F) + 30 °C (86 °F)	SAE 75W-90	API GL 4; GL 5; MT 1	Liebherr Syntogear Plus 75W-90
		3	Hydrostatic drive, hydro-steer	to -25 °C (-13 °F) + 50 °C (122 °F) ^{B)}	ISO VG 32 - 46 SAE 10W-20 ATF ^{A)}
to -25 °C (-13 °F) + 50 °C (122 °F) ^{B)}	ISO VG 46 (32-68) SAE 10W-20			DIN 51 524 / T3 HVLPD HC in acc. with CEC- L-33-A-93	Liebherr Hydraulic Plus biodegradable
to -50 °C (-58 °F) + 30 °C (86 °F)	ISO VG 15 - 46 SAE 0W-20			DIN 51 524 / T3 HVLPD HC in acc. with CEC- L-33-A-93	Liebherr Hydraulic Plus Arctic biodegradable
4	Hydraulic additive for free-fall brake			DIN 51 757 DIN 51 562	Liebherr special additive NL

No.	Lubrication spots	Outside temperature	Type ISO VG/SAE	Specification	Liebherr Lubricants
5	Roller bearings, friction bearings, ball bearing swing rings, cardan joints, other grease lubrication	to -25 °C (-13 °F) + 150 °C (302 °F) For lubrication systems	Grease, lithium saponified	DIN 51 502 KP 2 K-30 KPF 2 N-25	Liebherr Universal Grease 9900
		to -60 °C (-76 °F) + 140 °C (284 °F) For lubrication systems		DIN 51 502 KPFHC 1N-60	Liebherr Universal Grease Arctic
6	Open cogwheels and crown gears	to -25 °C (-13 °F) + 150 °C (302 °F) For lubrication systems	Lubrication and preservation	DIN 51 502 OGPF 2	Liebherr Universal Grease 9900
		to -60 °C (-76 °F) + 140 °C (284 °F) For lubrication systems		OGPF 1	Liebherr Universal Grease Arctic
		all sections		OGPF 00	Liebherr spray paste
7	Ropes	to -40 °C (-40 °F) + 50 °C (122 °F)			Liebherr WR-Lube SC
8	Telescopic boom	all sections	Special instruction	DIN 51 502 KP 2 K-30	Liebherr grease for telescopic components 9613 Plus
9	Coolant	down to -37 °C (-35 °F)		DIN 51 757/4 DIN 51 432/2	Liebherr Antifreeze OS Mix

Tab. 641: Lubrication chart

- A) The use of AFT oil is mandatory with lamella disk brakes if no Liebherr oil is being used.
 B) With activated oil pre-heating, the outside temperature may be approx. 10 °C (50 °F) lower.

**Note**

The known specifications listed in the Liebherr lubrication chart only ensure a minimum standard of oils and greases.

The high-quality Liebherr products are co-developed and co-tested. It can therefore not be guaranteed that products of a different quality perform the function of the machine to the same extent as the original products.

If the customer uses oils and grease by other manufacturers, the manufacturer and/or supplier must confirm its conformity with the required specifications to the customer. Due to the large number of lubricants and manufacturers, Liebherr is not in a position to perform this test.

The warranty is still valid if the customer uses lubricants of an equal or higher quality by a different manufacturer that meet the specifications of the Liebherr lubrication chart.

- ▶ In case of questions about Liebherr lubricants contact the Liebherr lubricant hotline +49 (0) 7354/80-6060 or lubricants@liebherr.com.

Ordering data

Engine oil

	5 l (1.32 gal) canister	20 l (5.28 gal) canister	210 l (55.48 gal) barrel	1000 l (264.17 gal) container
Liebherr engine oil 10W-40	10 29 05 06	10 33 02 39	10 33 02 46	10 28 62 79
Liebherr engine oil 10W-40 low ash	10 32 61 13	10 32 61 12	10 32 61 11	10 32 61 10
Liebherr engine oil 5W-30	10 42 57 12	10 42 57 13	10 42 57 15	10 42 57 19
Liebherr engine oil 5W-30 low ash	11 06 60 29	11 06 60 30	11 06 60 31	11 06 60 32

Tab. 642: Order note engine oil

Gear oil

	5 l (1.32 gal) canister	20 l (5.28 gal) canister	210 l (55.48 gal) barrel	1000 l (264.17 gal) container
Liebherr Hypoid 90 EP	10 66 48 74	10 66 48 75	10 66 48 76	10 44 16 36
Liebherr Syntogear Plus 75W-90	10 33 02 85	10 33 02 87	10 33 02 88	10 29 64 77
Liebherr Syntogear Plus 220	10 19 03 87	10 19 03 88	10 19 03 89	10 19 03 90

Tab. 643: Order notice gearbox oil

Hydraulic oil

	5 l (1.32 gal) canister	20 l (5.28 gal) canister	210 l (55.48 gal) drum	1000 l (264.17 gal) container
Liebherr Hydraulic 37	10 66 48 65	10 66 48 67	10 66 47 12	10 66 48 56
Liebherr Hydraulic Plus	10 29 64 80	10 33 02 72	10 33 02 76	10 29 64 81

	5 l (1.32 gal) canister	20 l (5.28 gal) canister	210 l (55.48 gal) drum	1000 l (264.17 gal) container
Liebherr Hydraulic Plus Arctic	10 29 64 79	10 33 02 77	10 33 02 78	10 29 64 78

Tab. 644: Hydraulic oil ordering data

Oil concentrate

	5 l (1.32 gal) canister	20 l (5.28 gal) canister
Liebherr special additive NL	10 51 53 00	10 51 57 52

Tab. 645: Order notice oil concentrate

Grease

	Cartridge	5 kg (11.02 lb) bucket	10 kg (22.05 lb) bucket	25 kg (55.11 lb) bucket
Liebherr Universal Grease 9900	10 29 68 16 (400 g (0.88 lb))		10 29 68 13	10 29 68 12
Liebherr Universal Grease Arctic	10 29 68 28 (400 g (0.88 lb))		10 29 68 25	10 29 68 24
Liebherr spray paste	10 33 03 08 (950 g (2.09 lb))	10 33 03 11		
Liebherr grease for telescopic components 9613 Plus				10 33 03 15
Liebherr WR-Lube SC	10 17 33 71 (600 ml (20.29 oz) aerosol)			

Tab. 646: Order note greases

Coolant

	5 l (1.32 gal) can	20 l (5.28 gal) can	210 l (55.48 gal) barrel	1000 l (264.17 gal) container
Liebherr Antifreeze OS Mix	11 65 73 89	11 65 73 90	11 65 73 91	11 65 37 92

Tab. 647: Coolant ordering information

Oil analysis kit

88 56 018 14

9.2.4 Diesel engine lubricating oil

For further information please refer to the operation manual of the engine manufacturer on CD.

9.2.5 Fuel

For further information please refer to the operation manual of the engine manufacturer on CD.

Diesel engine tier IV / Tier 4f

The machine may be operated with diesel fuel with a maximum sulfur content of 50 mg/kg (50 ppm) under the following conditions:

- Specified diesel fuel with a sulfur content of max. 15 mg/kg (15 ppm) is not available.
- Upon receipt of the specification, Liebherr approves this diesel fuel.
- The operator is aware that components (catalyst, temperature sensor, NO_x sensor) will age faster.

9.2.6 Urea solution

The required qualification of the urea solution is NO_x reduction agent AUS 32 in accordance with DIN 70070/ISO 22241.

9.2.7 Diesel engine coolant

For further information please refer to the operation manual of the engine manufacturer on CD.

9.2.8 Hydraulic oil

Initial filling

The information sign on the hydraulic tank filler neck displays the hydraulic oil with which the machine was first filled.

If the initial filling was performed by Liebherr, the machine was initially filled with a Liebherr hydraulic oil 37 or higher as standard. In exceptional cases (low-temperature package, bio application), the machine is initially filled with a special hydraulic oil.

Mixing



Note

Mixing rapidly biodegradable third-party ester-based oils with mineral oils may result in damage to the hydraulic system!

Liebherr recommends:

- ▶ do not mix rapidly biodegradable third-party oils from different manufacturers.
- ▶ Do not mix rapidly biodegradable third-party oils with mineral oils.

Third-party oils are oils from other manufacturers.

The use of rapidly biodegradable hydraulic oil must be agreed with Liebherr.

Oils on vegetable basis are inadmissible due to the adverse temperature stability.

Using Liebherr hydraulic oils ensures that none of the disadvantages listed above will occur.

Mixing of Liebherr hydraulic oils	
Liebherr mineral oils with each other	Can be mixed at any ratio
Liebherr mineral oils with biodegradable Liebherr oils	Can be mixed at any ratio To ensure biodegradability, mixing in more than 2 % mineral oil is not permitted (in accordance with the regulations in most European countries)
Liebherr oils with oils by other manufacturers	To prevent changing the characteristics of the oils, it is not permitted to mix in more than 10 % oil made by other manufacturers

Tab. 648: Mixing of Liebherr hydraulic oils

9.2.9 Preservation medium (anti-corrosion coating)



WARNING

Incorrect use of anti-corrosion coating agents!

- ▶ When not being used, store the anti-corrosive agent in a cool, dry place (storage temperature approx. 15 °C (59 °F) to 20 °C (68 °F)).
- ▶ Keep container away from naked flames, fire, sparks and other sources of ignition.
- ▶ In the event of a fire, use CO₂ extinguishers, foam or a chemical extinguisher.
- ▶ Do not use water to extinguish the fire under any circumstances!
- ▶ When fighting a fire, wear appropriate safety apparel and breathing apparatus.



Note

Liebherr recommends:

- ▶ Use the following preservatives as anti-corrosive.

Product name	ID no. (batch)	Application	Disposal
DINITROL 3650 DINITROL 3650 is a soft, waxy protective coating with excellent creep characteristics.	890036814 (20 l (5.28 gal))	Use DINITROL 3650 for preservation of layered sheeting. Apply DINITROL 3650 by immersion, brushing or spraying. Seal the preserved parts after a drying time of 24 hours with DINITROL 4010.	Remove protective film with petroleum spirit or similar solvent-containing cleaning agents.
DINITROL 4010 DINITROL 4010 is a hard, waxy protective coating.	890036914 (20 l (5.28 gal))	Apply DINITROL 4010 by brushing or by airless spraying or airmix spraying.	Within 2 weeks of application, DINITROL 4010 protective film can be removed with petroleum spirit. If left to dry for 2 weeks, DINITROL 4010 will resist a high-pressure wash containing alkaline additives.

Product name	ID no. (batch)	Application	Disposal
<p>LPS 1</p> <p>LPS 1 is a non-greasy lubricant that penetrates deeply, dries quickly and is dirt repellent and dust repellent. As it repels moisture, it is ideal for drying electrical and electronic modules.</p>	<p>861009914 (aerosol can)</p> <p>861010014 (25 l (6.6 gal))</p>	<p>Use LPS 1 on electrical and electronic systems and control cabinets. The grease-free protective film protects electrical and electronic components and does not cause short-circuits.</p>	<p>The protective film dries out and does not need to be removed.</p>
<p>LPS 2</p> <p>LPS 2 is a highly stable lubricant that loosens rusted up and stuck components. The non-drying lubricant film provides long-term protection against corrosion.</p>	<p>861009714 (aerosol can)</p> <p>861009814 (20 l (5.28 gal))</p>	<p>Use LPS 2 for door locks, hinges, joints, etc.</p>	
<p>LPS 3</p> <p>LPS 3 has extra deep penetration capabilities and repels water. LPS 3 dries to form a transparent, soft, waxy film that provides effective protection against moisture, air, acids, alkaline vapors and other corrosive media.</p>	<p>861009614 (aerosol can)</p> <p>861009514 (5 l (1.32 gal))</p> <p>861009414 (200 l (52.83 gal))</p>	<p>Use LPS 3 for fittings on pendant straps and backstay straps, pin connections, etc. LPS 3 only preserves for storage. The preservation must be applied every year. Do not use in the engine compartment.</p>	<p>The protective film dries out and does not need to be removed.</p>
<p>Denso-Tape</p> <p>Denso-Tape is a 1 mm (0.04" in) thick petrolatum tape. Its web is made of a non-rotting chemical fabric suitable for insulation and seals.</p>	<p>603231914 (roll 50 mm (1.97" in) x 10 m (32' 10" ft-in))</p> <p>693058914 (roll 100 mm (3.94" in) x 10 m (32' 10" ft-in))</p>	<p>Use Denso-Tape on exposed piston rods, valves, threaded joints of hydraulic components, etc.</p>	<p>Take off Denso-Tape and remove any residue with a degreaser or solvent-based cleaner.</p>
<p>AVILUB VCI 1411</p> <p>AVILUB VCI 1411 is a thixotropic, Low-viscosity grease preservation medium on mineral oil basis. This concentrate contains highly effective corrosion inhibitors, and does not contain any solvents or nitrite.</p>	<p>11262917 (400 ml (13.53 oz) aerosol can)</p> <p>861008614 (5 l (1.32 gal) canister)</p>	<p>Apply AVILUB VCI 1411 by brushing, rolling or spraying. Use AVILUB VCI 1411 for the piston rods of the hydraulic cylinders.</p>	<p>Remove protective coating with alkaline cleaning agents.</p>

Tab. 649: Preservation medium (corrosion protection)

**Note**

Liebherr recommends:

- ▶ Order the different preservatives directly from Liebherr using the ID number.

First-aid measures when coming into contact with DINITROL:

- Skin contact: Rinse with clear water and soap.
- Eye contact: Rinse corrosion protection medium immediately with clear water for some minutes. Contact a physician immediately.
- Ingestion: Drink milk or water. Do not induce vomiting. Contact a physician immediately.
- Inhalation: Go outside, breathe fresh air. Contact a physician immediately.

9.2.10 Liebherr oil diagnosis system

**Note**

- ▶ Do not delay first oil change of the respective unit, otherwise increased contaminations may occur during the initial break-in phase of each machine.

The Liebherr oil diagnosis system is a preventive maintenance system for the machine's main components.

The Liebherr oil diagnosis system is based on oil analyses and has the following tasks:

- Prevent machine breakdowns.
- Reduce standstills and downtimes.
- Minimize repair costs.
- Indicate abnormal wear.
- Detect possible causes of damage early.

Taking an oil sample

Make sure the following conditions are fulfilled:

- Liebherr oil analysis set (ID no. 885601814) is available.
- Machine is switched off.
- Machine is secured against unauthorized startup.
- The respective module or component has warmed up for 15 minutes (operating temperature).

The oil samples are taken either directly out of the housing of the respective module or component or from the draining oil when performing an oil change. Prior to sampling, drain at least 250 ml (8.45 oz) oil before filling the container with thoroughly mixed oil.

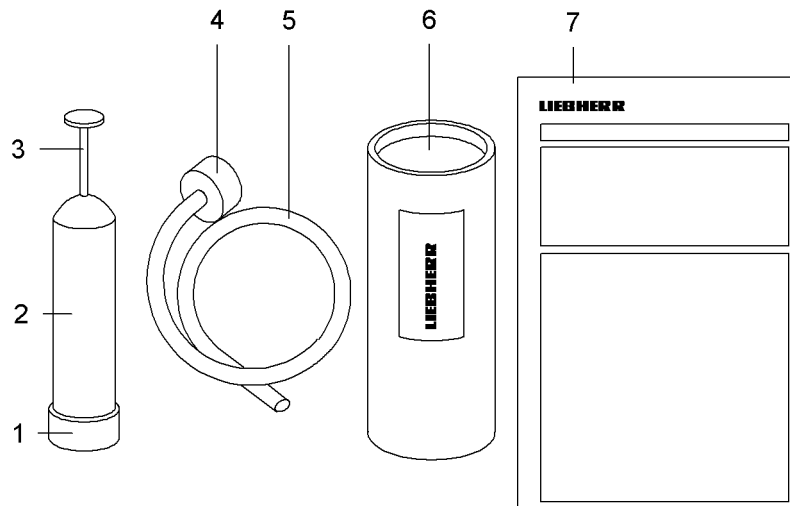


Fig. 5941: Liebherr oil analysis set (ID no. 885601814)

- | | | | |
|---|-------------------------|---|--------------------------|
| 1 | Cover syringe container | 5 | Polymer hose |
| 2 | Syringe container | 6 | Shipment box |
| 3 | Syringe neck | 7 | Sample information sheet |
| 4 | Adapter | | |

► Screw polymer hose 5 with adapter 4 onto syringe container 2.

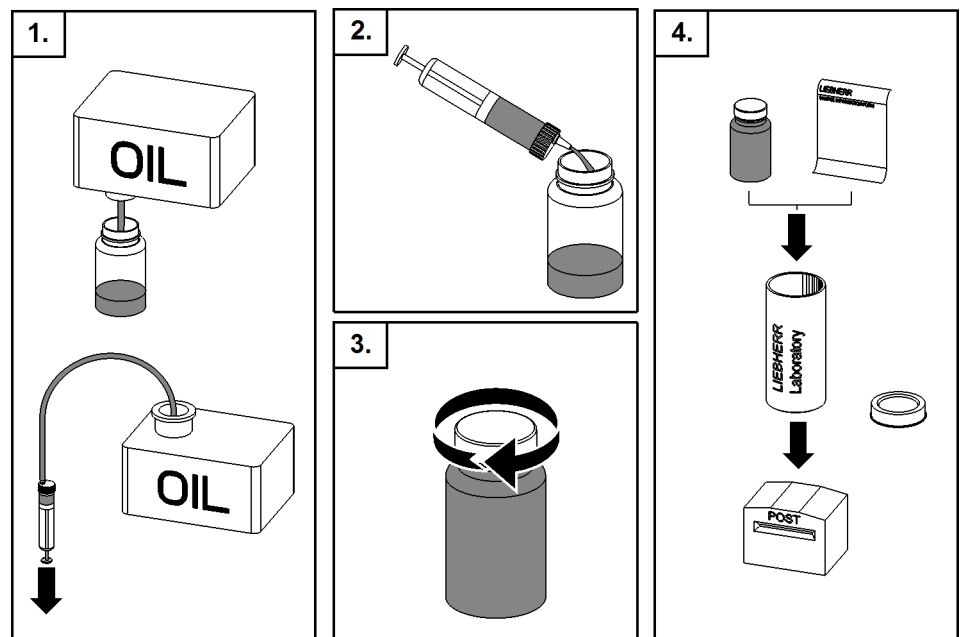






Fig. 5942: Taking an oil sample

- Take at least 200 ml (6.76 oz) oil.
- Completely fill out sample information sheet.
- Place the removed oil sample and the sample information sheet together in the shipment box and send it to the pre-printed address.

Observe oil diagnosis report

The oil diagnosis report shows the detailed result of the oil sample analysis and provides information about the measures to be taken. Four different symbols are used for this purpose:

Symbol	Meaning
	Normal
	High values, take second oil sample for counter-check
	Oil change required
	Repair required

Tab. 650: Oil diagnosis report

9.3 Work instructions for preventive maintenance

**WARNING**

Entering working range and danger zone while machine is running is not permitted!
Death, risk of crushing limbs.

- ▶ Ensure that the machine operator sits in the cabin when the machine is running.
- ▶ Carry out work on machine under visual and radio contact with machine operator.

**WARNING**

Improper preventive maintenance of machine!
Death, grave injury.

If work on machine is performed without machine operator:

- ▶ Switch off main battery switch.

If work is performed on electrical systems or if extensive maintenance work has to be performed:

- ▶ Switch off main battery switch.

**WARNING**

Inadmissible opening of uppercarriage doors!
Severe injury.

- ▶ Make sure that uppercarriage doors are only opened when the diesel engine has been switched off and if the system has cooled down and depressurized.

**WARNING**

Insufficient lighting!
Fall from machine.

- ▶ Make sure that machine is only accessed and entered in sufficient lighting.
- ▶ Make sure that preventive maintenance work on the machine is only performed in sufficient lighting.

NOTICE

Improper connection/disconnection of hydraulic lines!
Damage to machine.

- ▶ Observe hydraulic diagrams in the volume "Technical information".
- ▶ Ensure that connections are clean and intact.
- ▶ Ensure that disconnected connections are closed well and not leaking.

NOTICE

Leaked or spilt consumables (fuels, oils, fats, cleaning agents or coolants)!
Damage to machine. Damage to the environment.

- ▶ When draining or trapping consumables, use chemical-resistant containers with sufficient volume.
 - ▶ Remove spilt consumables completely. If necessary, bind or neutralize with binding agents beforehand.
 - ▶ Observe national and international regulations concerning the disposal of chemicals.
 - ▶ [\(For more information see: 2.11.14 Environment, page 623\)](#)
-

9.4 Air filter system

9.4.1 Checking the negative pressure indicator

Ensure that the following conditions are fulfilled:

- Negative pressure sensor on air intake has a tight fit.
- Negative pressure sensor on air intake is correctly connected.

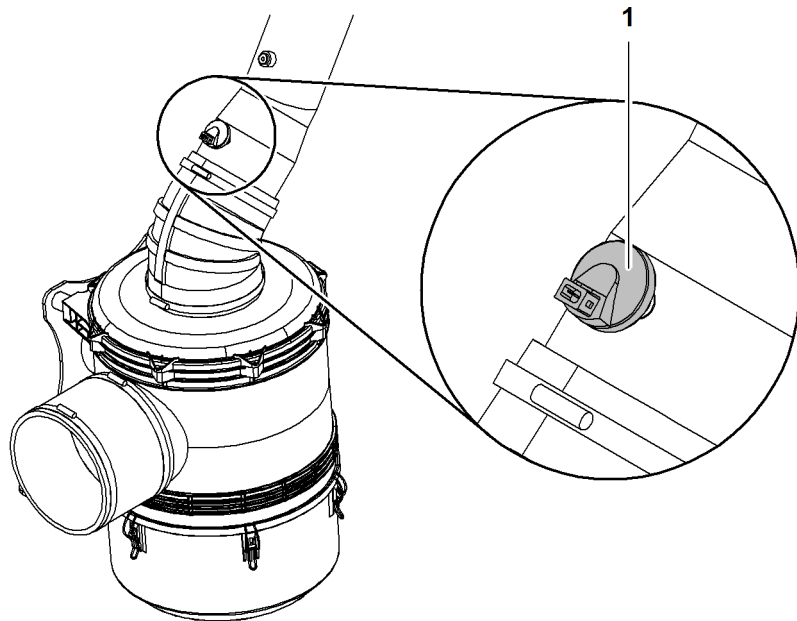


Fig. 5947: Checking the negative pressure indicator

1 Negative pressure sensor



- ▶ Press the *Error messages* button on the monitor.
 - ▷ The *Error messages* screen appears on the monitor.
- ▶ Unplug negative pressure sensor 1.
 - ▷ Error message "Air filter dirty" appears on the *Error messages* screen.

If the error message "Air filter dirty" does not appear on the screen *Error messages*:

- ▶ Contact Liebherr customer service.

9.4.2 Cleaning the air filter dust ejector

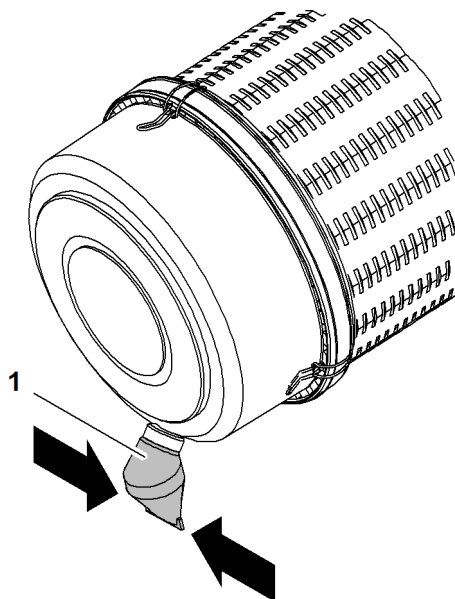


Fig. 5949: Cleaning the air filter dust ejector

1 Dust ejector

- ▶ Press the dust valve 1 together on the side.

9.4.3 Replacing the dry air filter main element and dry air filter safety element

NOTICE

Inadmissible operation without dry air filter elements!
Damage to the diesel engine.

- ▶ Only operate diesel engine with installed dry air filter main element and dry air filter safety element.
-

NOTICE

Inadmissible cleaning of dry air filter elements!
Damage to the diesel engine.

- ▶ Do not clean dry air filter main element and dry air filter safety element.
-



WARNING

Fine dust!
Risk of damage to lungs.

- ▶ To protect the respiratory tract: wear fine dust mask.
-

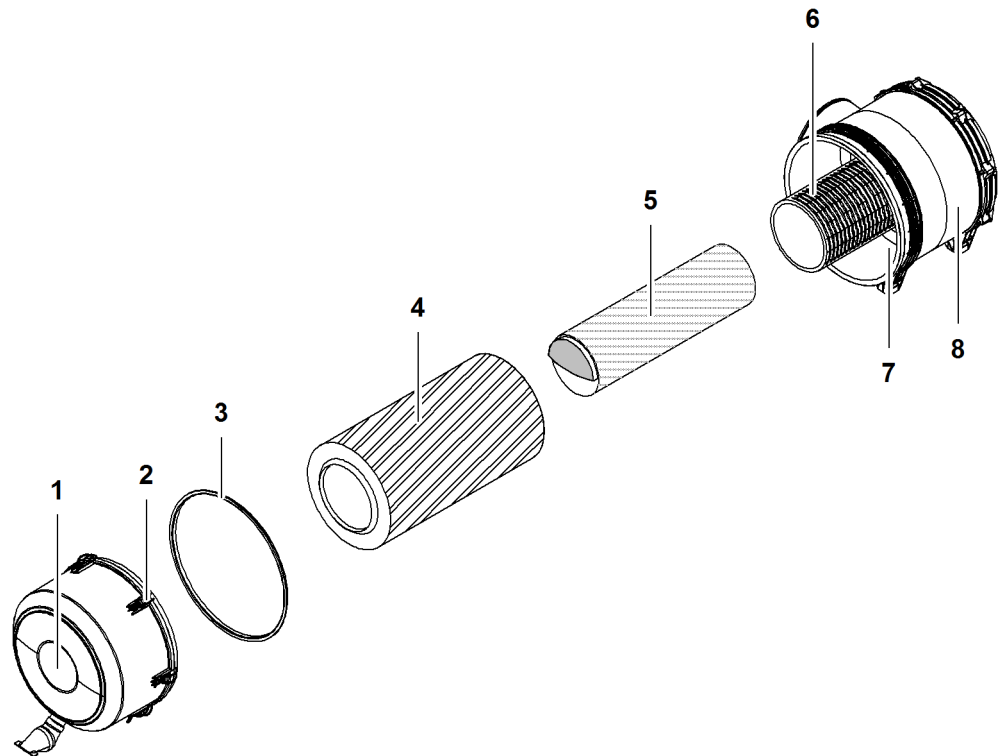


Fig. 5950: Replacing the dry air filter main element and dry air filter safety element

- | | | | |
|---|-----------------------------|---|---|
| 1 | Cover | 5 | Dry air filter safety element |
| 2 | Clamp (6x) | 6 | Bracket for dry air filter safety element |
| 3 | Seal | 7 | Bracket for dry air filter main element |
| 4 | Dry air filter main element | 8 | Air filter housing |

- ▶ Undo clamps **2** of the cover **1**.
- ▶ Remove cover **1** of air filter housing **8**.
- ▶ Turn dry air filter main element **4** and pull out at the same time.
- ▶ Pull out dry air filter safety element **5**.



Note

Environmental pollution!

- ▶ Dispose of dry air filter elements in accordance with national and international guidelines and regulations.

- ▶ Insert new dry air filter safety element **5** into bracket **6**.
- ▶ Insert new dry air filter main element **4** into bracket **7**.
- ▶ Put cover **1** on air filter housing **8**.
- ▶ Close clamps **2** of cover **1**.

Exhaust aftertreatment system* (see operating manual of the engine manufacturer on CD)

9.5 Exhaust aftertreatment system* (see operating manual of the engine manufacturer on CD)

9.5.1 Draining condensate from air tank

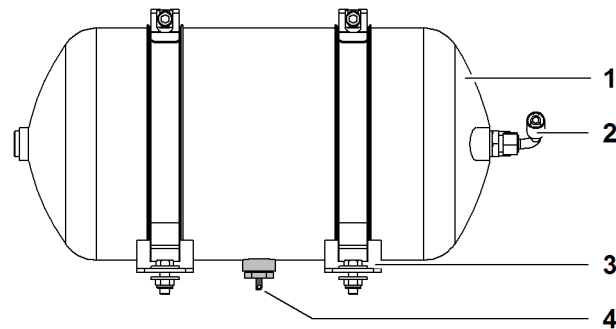


Fig. 5951: Draining condensate from air tank (illustration of principle)

- | | | | |
|---|----------------|---|---------------|
| 1 | Air tank | 3 | Fastener (2x) |
| 2 | Air connection | 4 | Drain valve |

- ▶ Press and hold drain valve 4.
 - ▷ Air and condensate are discharged from the air tank 1.

If no condensate flows out of the air container 1:

- ▶ Release drain valve 4.

9.5.2 Replacing cartridge of air dryer

Make sure the following conditions are met:

- Filter key (filter strap key or oil filter key) is available.

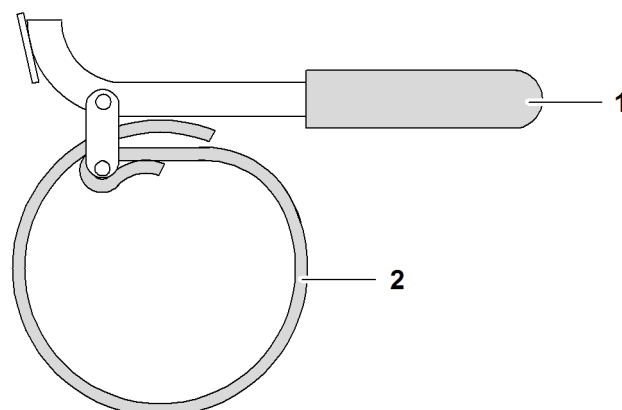


Fig. 5952: Filter key

- | | | | |
|---|------------|---|-------|
| 1 | Filter key | 2 | Strap |
|---|------------|---|-------|

The strap 2 of the filter key 1 may consist of leather or a chain.

Releasing pressure from compressed air system of the exhaust system

To be able to replace the cartridge of the air dryer, the pressure must be released from the compressed air system of the exhaust system.

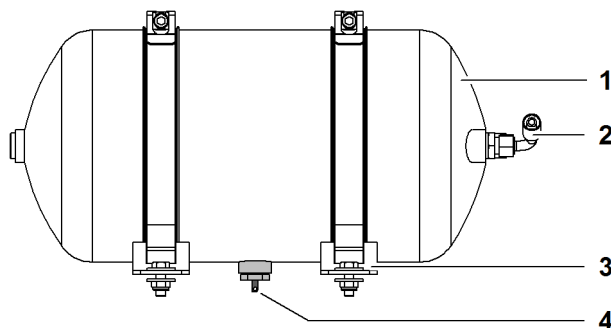


Fig. 5953: Releasing pressure from compressed air system of the exhaust system (illustration of principle)

- | | | | |
|---|----------------|---|---------------|
| 1 | Air tank | 3 | Fastener (2x) |
| 2 | Air connection | 4 | Drain valve |

- ▶ Press and hold drain valve 4.
 - ▷ Air flows out of air tank 1.

Once pressure has been released from the compressed air system of the exhaust system:

- ▶ Release drain valve 4.

Replacing cartridge of air dryer

Make sure the following conditions are met:

- New cartridge for air dryer is available.

Exhaust aftertreatment system* (see operating manual of the engine manufacturer on CD)

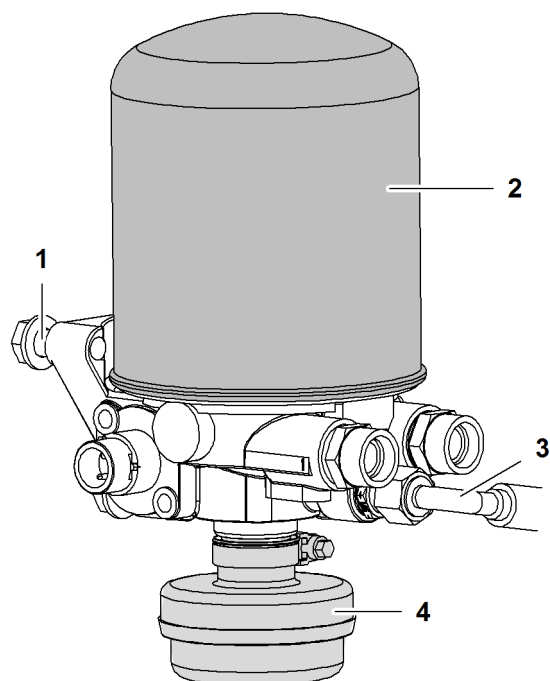


Fig. 5954: Replacing cartridge of air dryer

- | | | | |
|---|------------------------|---|----------------|
| 1 | Fastener (3x) | 3 | Air connection |
| 2 | Cartridge of air dryer | 4 | Sound muffler |

- ▶ Place filter key with leather strap or chain around cartridge **2**.
- ▶ Undoing cartridge **2** of air dryer: Turn cartridge **2** of air dryer counter-clockwise with filter key.
- ▶ Remove cartridge **2** of air dryer.
- ▶ Oil seal and thread of the new air dryer cartridge **2**.
- ▶ Hand-tighten new cartridge **2** of air dryer with 15 Nm (11 ft-lb): Turn new air dryer cartridge **2** clockwise with filter key.
 - ▷ Cartridge **2** of air dryer has been renewed.

9.6 Distributor gearbox

9.6.1 Checking the gearbox oil level

Ensure that the following conditions are fulfilled:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.



CAUTION

Hot gearbox components and gearbox oil!
Risk of burns.

- ▶ Maintenance work and inspection work must only be carried out when the distributor gearbox is switched off and the diesel engine has cooled down.
- ▶ Wear protective equipment.

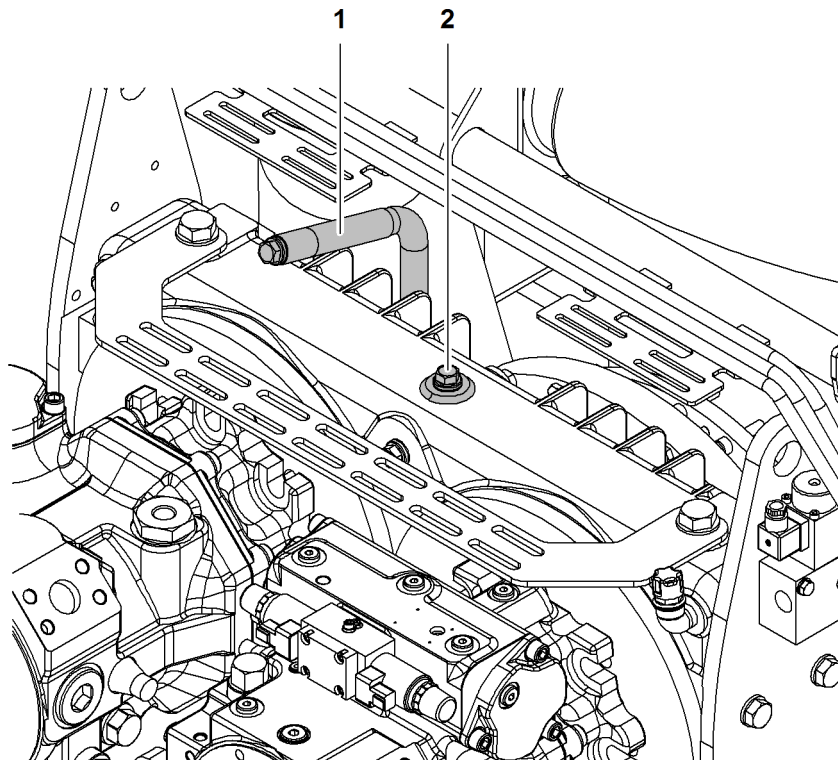


Fig. 5955: Checking the gearbox oil level

- | | |
|----------------|---------------|
| 1 Oil dipstick | 2 Filler neck |
|----------------|---------------|

- ▶ Pull out the oil dipstick 1, clean it, and reinsert it as far as it will go.
- ▶ Pull out the oil dipstick 1 again and check the oil level.

If the gearbox oil level is below the MIN mark:

- ▶ Top up using the appropriate gearbox oil according to the lubrication chart ([For more information see: 9.6.2 Topping up the gearbox oil, page 1968](#)).

If the gearbox oil level is above the MAX mark:

- ▶ Drain the gearbox oil.

9.6.2 Topping up the gearbox oil

Ensure that the following conditions are fulfilled:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.



CAUTION

Hot gearbox components and gearbox oil!
Risk of burns.

- ▶ Maintenance work and inspection work must only be carried out when the distributor gearbox is switched off and the diesel engine has cooled down.
- ▶ Wear protective equipment.

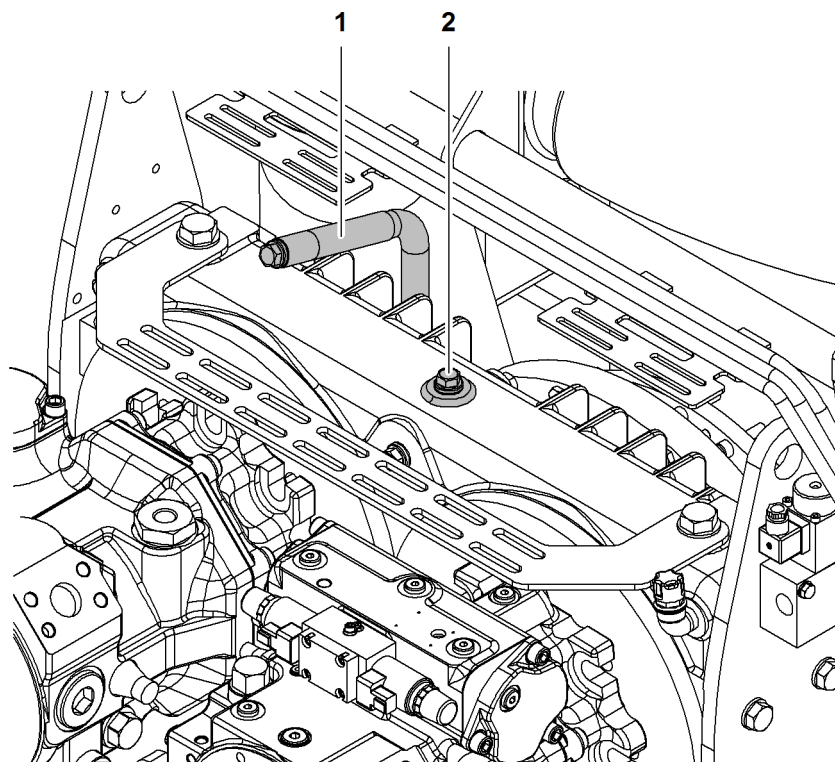


Fig. 5956: Topping up gearbox oil

1 Oil dipstick

2 Filler neck

NOTICE

Dirt and foreign bodies in the distributor gearbox!
The distributor gearbox is liable to be damaged.

- ▶ Ensure that no dirt or foreign bodies enter the filler neck 2.
- ▶ Undo the filler neck 2 screw.

NOTICE

Incorrect or contaminated gearbox oil!

The distributor gearbox is liable to be damaged.

- ▶ Top up exclusively using the appropriate gearbox oil according to the lubrication chart ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
 - ▶ Check the purity of the gearbox oil.
-

- ▶ Top up the gearbox oil until the MAX mark.
- ▶ Refit and tighten the filler neck **2** screw.
- ▶ Start the diesel engine and allow it to idle for 10 minutes.
- ▶ Switch off the diesel engine and wait 1 minute before checking the gearbox oil level again.

9.6.3 Checking the venting valve

- ▶ Check the venting valve.

If the venting valve is faulty in any way:

- ▶ Contact Liebherr after sales service.

9.7 Swing

9.7.1 Checking the gearbox oil level

Ensure that the following conditions are fulfilled:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.

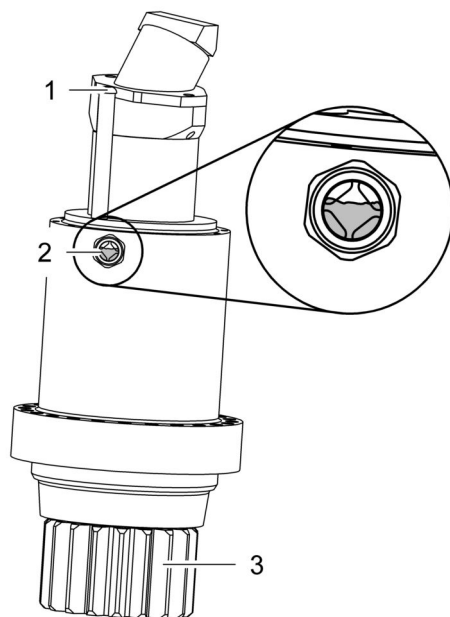


Fig. 5957: Checking the gearbox oil level

- | | | | |
|---|-------------|---|--------|
| 1 | Filler neck | 3 | Pinion |
| 2 | Sight glass | | |

- ▶ Check the gearbox oil level in the sight glass 2.

If no gearbox oil is visible in the sight glass:

- ▶ Top up using appropriate gearbox oil in accordance with the lubrication chart
(For more information see: [9.7.2 Topping up the gearbox oil, page 1970](#)).

9.7.2 Topping up the gearbox oil

Ensure that the following conditions are fulfilled:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.

NOTICE

Dirt and foreign bodies in the swing gear!
Damage to the swing gear.

- ▶ Ensure that no dirt or foreign bodies enter the filler neck.
-

- ▶ Open the cover: turn the cover counter-clockwise.

NOTICE

Incorrect or contaminated gearbox oil!
Damage to the swing gear.

- ▶ Top up using only the appropriate gearbox oil according to the lubrication chart ([For more information see: 9.2.3 Lubrication chart, page 1949](#)) .
 - ▶ Check the purity of the gearbox oil.
-

- ▶ Top up the gearbox oil up to halfway on the sight glass.
- ▶ Close the cover: turn the cover clockwise as far as it will go.
- ▶ Start the diesel engine and allow it to idle for 10 minutes.
- ▶ Move the swing in both directions.
- ▶ Switch off the diesel engine and wait 1 minute before checking the gearbox oil level again.

9.8 Swing connection

9.8.1 Lubricating external teeth

Ensure that the following conditions are fulfilled:

- The grease gun from the Liebherr tool kit is present and filled with grease (For more information see: [9.2.3 Lubrication chart, page 1949](#)).
- The machine is secured to prevent unauthorised operation.

If the swing external teeth are not lubricated by a central lubrication:

- ▶ Lubricate the outer swing teeth using the requisite grease or alternatively apply an even coating of graphite spray (For more information see: [9.2.3 Lubrication chart, page 1949](#)).

9.8.2 Lubricating the bearing races via the central lubrication point

Ensure that the following conditions are fulfilled:

- The grease gun from the Liebherr tool kit is present and filled with grease (For more information see: [9.2.3 Lubrication chart, page 1949](#)).
- The machine is secured to prevent unauthorised operation.



CAUTION

Rotating uppercarriage!
Crushing.

- ▶ Ensure that nobody enters the danger area during the lubrication process.
- ▶ Leave the danger area.

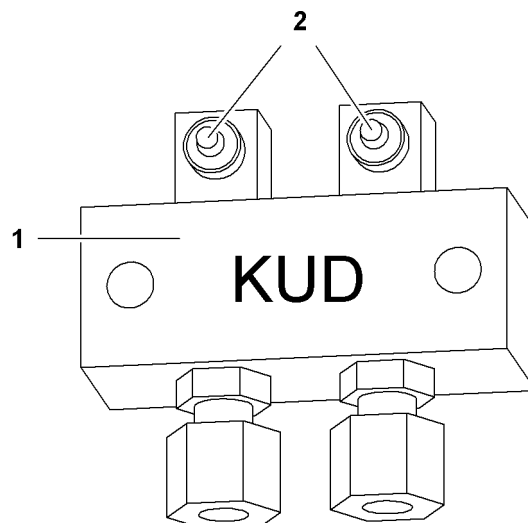


Fig. 5958: Central lubrication point

- 1 Central lubrication point 2 Grease nipple

If the swing bearing races are not lubricated by a central lubrication:

- ▶ Use the grease gun to press grease into the grease nipple **2**.

- ▶ Turn the uppercarriage by 45° after each lubrication process (per grease nipple):
 - ▷ the grease distributes itself better in the swing ring.

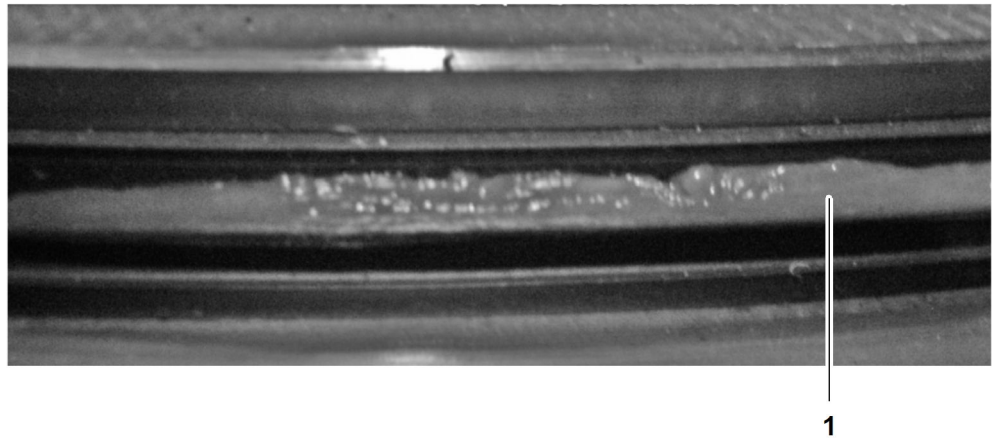


Fig. 5959: Grease collar

- ▶ Press in grease until a grease collar **1** can be seen up to the whole seal lip of the swing connection (circumference).

9.9.2 Topping up gearbox oil

Ensure the following conditions are met:

- Diesel engine has been switched off for 5 minutes.
- Machine is level.
- Machine is secured against unauthorized startup.



CAUTION

Hot winch components and hot gearbox oil!
Burns and open wounds.

- ▶ Only perform maintenance work and inspection work on winches when the machine is switched off and has cooled down.
- ▶ Wear protective equipment.

NOTICE

Dirt and foreign bodies in winch gearbox!
Damage to winch gearbox.

- ▶ Ensure that no dirt or foreign bodies enter the filler neck.

NOTICE

Inadmissible or contaminated gearbox oil!
Damage to winch gearbox.

- ▶ Top up using only appropriate gearbox oil according to lubrication chart ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
- ▶ Check purity of gearbox oil.

- ▶ Top up gearbox oil up to MAX mark.
- ▶ Reinsert oil dipstick all the way again.
- ▶ Start diesel engine and allow it to idle for 10 minutes.
- ▶ Move winch in both directions at low rotational speed.
- ▶ Switch off diesel engine and wait 1 minute before checking gearbox oil level again.

9.9.3 Checking oil level of holding brake

Ensure the following conditions are met:

- Diesel engine has been switched off for 5 minutes.
- Machine is level.
- Machine is secured against unauthorized startup.



CAUTION

Hot winch components and hot hydraulic oil!
Burns.

- ▶ Only perform maintenance work and inspection work on winches when the machine is switched off and has cooled down.
- ▶ Wear protective equipment.

NOTICE

Inadmissible or contaminated hydraulic oil!
Damage to winch.

- ▶ Top up using only appropriate hydraulic oil according to lubrication chart (For more information see: [9.2.3 Lubrication chart, page 1949](#)).
- ▶ Check purity of hydraulic oil.

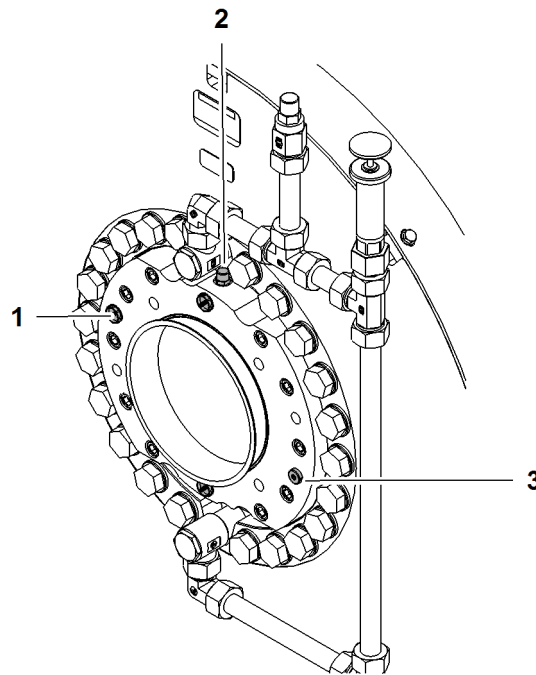


Fig. 5961: Checking oil level of holding brake

- | | | | |
|---|------------------|---|------------------------------------|
| 1 | Venting screw | 3 | Plug screw of oil level pilot hole |
| 2 | Oil filler screw | | |

- ▶ Remove plug screw **3** of oil level pilot hole

If no oil emerges from the oil level pilot hole:

- ▶ Remove oil filling screw **2**.
- ▶ Remove venting screw **1**.
- ▶ Top up using hydraulic oil in accordance with the lubrication chart until hydraulic oil emerges from oil level pilot hole.
- ▶ Twist in and tighten plug screw **3** of the oil level pilot hole.
- ▶ Twist in and tighten oil filling screw **2**.
- ▶ Twist in and tighten venting screw **1**.
- ▶ Start diesel engine and allow it to idle for 10 minutes.
- ▶ Move winch in both directions at low rotational speed.
- ▶ Switch off diesel engine and wait 1 minute before checking oil level again.

9.9.4 Changing hydraulic oil of the holding brake

Ensure the following conditions are met:

- Diesel engine has been switched off for 5 minutes.
- Machine is level.

- Machine is secured against unauthorized startup.
- Oil tray is in place.



CAUTION

Hot winch components and hot hydraulic oil!
Burns.

- ▶ Only perform maintenance work and inspection work on winches when the machine is switched off and has cooled down.
- ▶ Wear protective equipment.

NOTICE

Inadmissible or contaminated hydraulic oil!
Damage to winch.

- ▶ Top up using only appropriate hydraulic oil according to lubrication chart ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
 - ▶ Check purity of hydraulic oil.
-

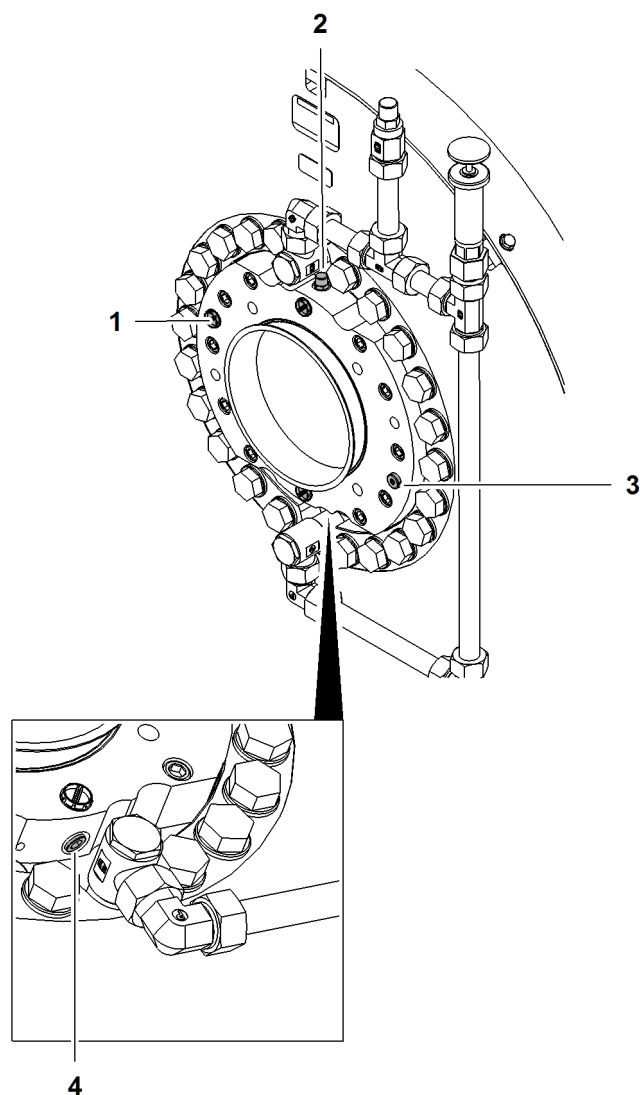


Fig. 5962: Changing hydraulic oil of the holding brake

- | | | | |
|---|------------------|---|------------------------------------|
| 1 | Venting screw | 3 | Plug screw of oil level pilot hole |
| 2 | Oil filler screw | 4 | Oil drain plug |

- ▶ Position oil tray and oil drain.
- ▶ Remove oil filling screw **2**.
- ▶ Remove venting screw **1**. If necessary, replace sealing ring of venting screw **1**.
- ▶ Remove oil drain screw **4**.
- ▶ Check sealing faces and sealing rings of oil drain screw **4**. If necessary, replace oil drain screw **4** and sealing rings.
- ▶ Drain hydraulic oil.
- ▶ Twist in and tighten oil drain screw **4**.
- ▶ Open plug screw **3** of oil level pilot hole.
- ▶ Top up using hydraulic oil in accordance with the lubrication chart until hydraulic oil emerges from oil level pilot hole.
- ▶ Twist in and tighten plug screw **3** of the oil level pilot hole.
- ▶ Twist in and tighten oil filling screw **2**.

- ▶ Twist in and tighten venting screw 1.
- ▶ Start diesel engine and allow it to idle for 10 minutes.
- ▶ Move winch in both directions at low rotational speed.
- ▶ Switch off diesel engine and wait 1 minute before checking oil level again.

9.9.5 Lubricating counter bearings

Ensure the following conditions are met:

- Grease gun from Liebherr tool kit is available and filled with correct grease (For more information see: [9.2.3 Lubrication chart, page 1949](#)).
- Machine is level.
- Machine is secured against unauthorized startup.

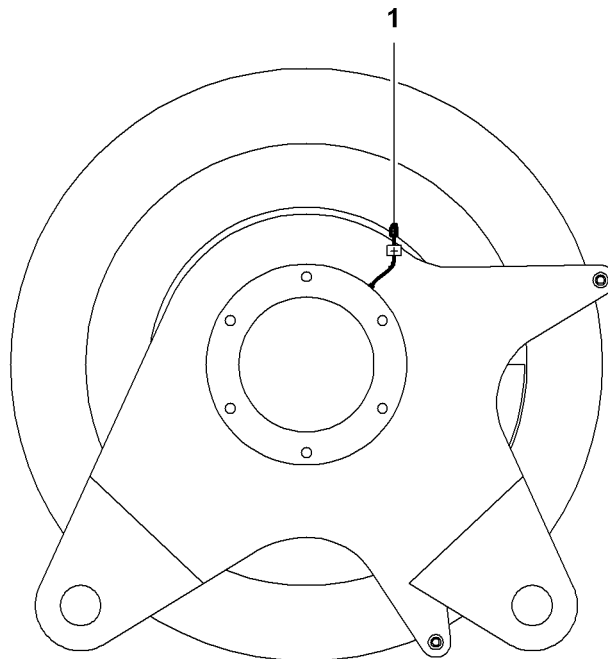


Fig. 5963: Lubricating counter bearings

1 Grease nipple

- ▶ Use grease gun to press grease in via grease nipples 1.
- ▶ Turn winch slowly.
 - ▷ The grease distributes itself better throughout the winch counter bearing.

9.9.6 Checking the rope end fastening for tight fit

- ▶ Check the rope end fastening for tight fit.

If the rope end fastening is loose:

- ▶ tighten the rope end fastening.

9.10.2 Topping up gearbox oil

Make sure the following conditions are met:

- Diesel engine has been switched off for 5 minutes.
- Machine is level.
- Machine is secured against unauthorized startup.



CAUTION

Hot winch components and hot gearbox oil!
Burns.

- ▶ Only perform maintenance work and inspection work on winches when the machine is switched off and has cooled down.
 - ▶ Wear protective equipment.
-

NOTICE

Dirt and foreign bodies in winch gearbox!
Damage to winch gearbox.

- ▶ Ensure that no dirt or foreign bodies enter the filler neck.
-

- ▶ Pull out oil dipstick.
-

NOTICE

Incorrect or impure gearbox oil is used!
Damage to winch gearbox.

- ▶ Top up using only appropriate gearbox oil according to lubrication chart ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
 - ▶ Check purity of gearbox oil.
-

- ▶ Top up gearbox oil up to MAX mark.
- ▶ Reinsert oil dipstick all the way again.
- ▶ Start diesel engine and allow it to idle for 10 minutes.
- ▶ Move winch in both directions at low rotational speed.
- ▶ Switch off diesel engine and wait 1 minute before checking gearbox oil level again.

9.10.3 Lubricating counter bearings

Make sure the following conditions are met:

- Grease gun from Liebherr tool kit is available and filled with correct grease ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
- Machine is level.
- Machine is secured against unauthorized startup.

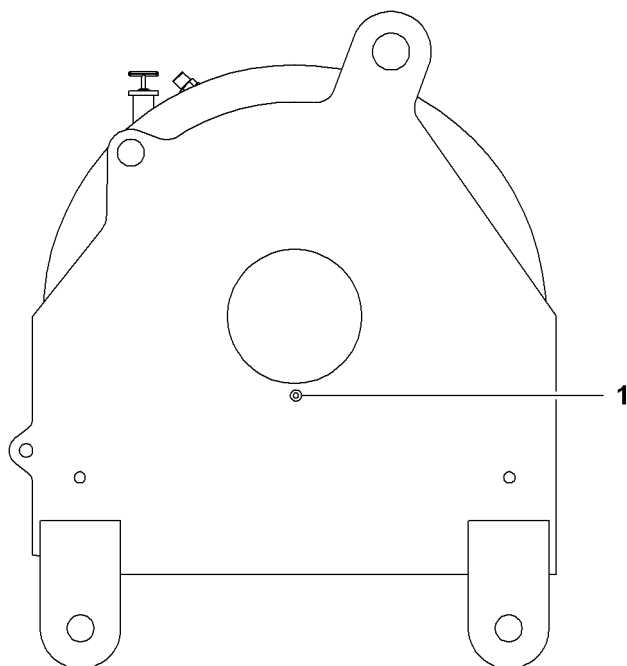


Fig. 5965: Lubricating counter bearings

1 Grease nipple

- ▶ Use grease gun to press grease in via grease nipples 1.
- ▶ Turn winch slowly.
 - ▷ The grease distributes itself better throughout the winch counter bearing.

9.10.4 Checking the rope end fastening for tight fit

- ▶ Check the rope end fastening for tight fit.

If the rope end fastening is loose:

- ▶ tighten the rope end fastening.

9.11 Rope reeving winch

9.11.1 Lubricating the counter bearing

Ensure that the following conditions are fulfilled:

- The grease gun from the Liebherr tool kit is present and filled with grease (For more information see: [9.2.3 Lubrication chart, page 1949](#)).
- Rope reeving winch is level.
- The machine is secured to prevent unauthorised operation.

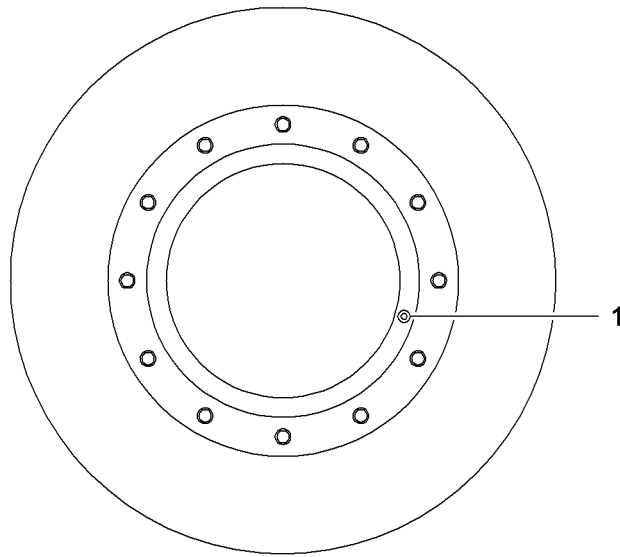


Fig. 5966: Lubricating the counter bearing

1 Grease nipple

- ▶ Use the grease gun to press grease into the grease nipple 1.
- ▶ Slowly turn the winch.
 - ▷ The grease distributes itself throughout the winch counter bearing.

9.11.2 Checking rope end attachment for tight fit when starting up rope reeving winch

- ▶ Check the rope end fastening for tight fit.

If the rope end fastening is loose:

- ▶ Tighten the rope end fastening.

9.12 Tagline winch

9.12.1 Checking the gearbox oil level

Ensure that the following conditions are fulfilled:

- Diesel engine has been switched off for five minutes.
- The tagline winch is level.
- The machine is secured to prevent unauthorised operation.



CAUTION

Hot winch components and hot gearbox oil!
Risk of burns.

- ▶ Only perform maintenance work and inspection work on winches when the machine is switched off and has cooled down.
- ▶ Wear protective equipment.

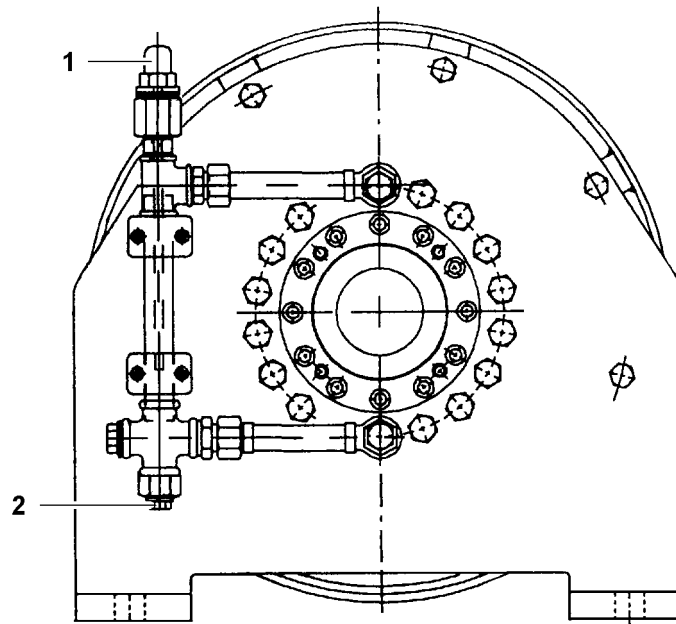


Fig. 5967: Checking the gearbox oil level

- | | |
|----------------|--------------|
| 1 Oil dipstick | 2 Drain plug |
|----------------|--------------|

- ▶ Pull out the oil dipstick **1**, clean it, and reinsert it as far as it will go.
- ▶ Pull out the oil dipstick **1** again and check the gearbox oil level.

If the gearbox oil level is below the MIN mark:

- ▶ Top up using the appropriate gearbox oil according to the lubrication chart ([For more information see: 9.12.2 Topping up the gearbox oil, page 1985](#)).

If the gearbox oil level is above the MAX mark:

- ▶ Drain the gearbox oil using the drainage screw **2**.

9.12.2 Topping up the gearbox oil

Ensure that the following conditions are fulfilled:

- Diesel engine has been switched off for five minutes.
- The tagline winch is level.
- The machine is secured to prevent unauthorised operation.



CAUTION

Hot winch components and hot gearbox oil!
Risk of burns.

- ▶ Only perform maintenance work and inspection work on winches when the machine is switched off and has cooled down.
 - ▶ Wear protective equipment.
-

NOTICE

Dirt and foreign bodies in winch gearbox!
The winch gearbox will be damaged.

- ▶ Ensure that no dirt or foreign bodies enter the filler neck.
-

- ▶ Pull out the oil dipstick.
-

NOTICE

Incorrect or impure gearbox oil is used!
The winch gearbox will be damaged.

- ▶ Top up using only the appropriate gearbox oil according to the lubrication chart ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
 - ▶ Check the purity of the gearbox oil.
-

- ▶ Top up the gearbox oil until the MAX mark.
- ▶ Reinsert the oil dipstick as far as it will go.
- ▶ Start the diesel engine and allow it to idle for 10 minutes.
- ▶ Move the winch in both directions at low speed.
- ▶ Switch off the diesel engine and wait 1 minute before checking the gearbox oil level again.

9.12.3 Lubricating the rope bracket on the boom base section and checking pulleys for damage

Ensure that grease gun from Liebherr tool kit is available and filled with correct grease ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).

9.13 Crawler

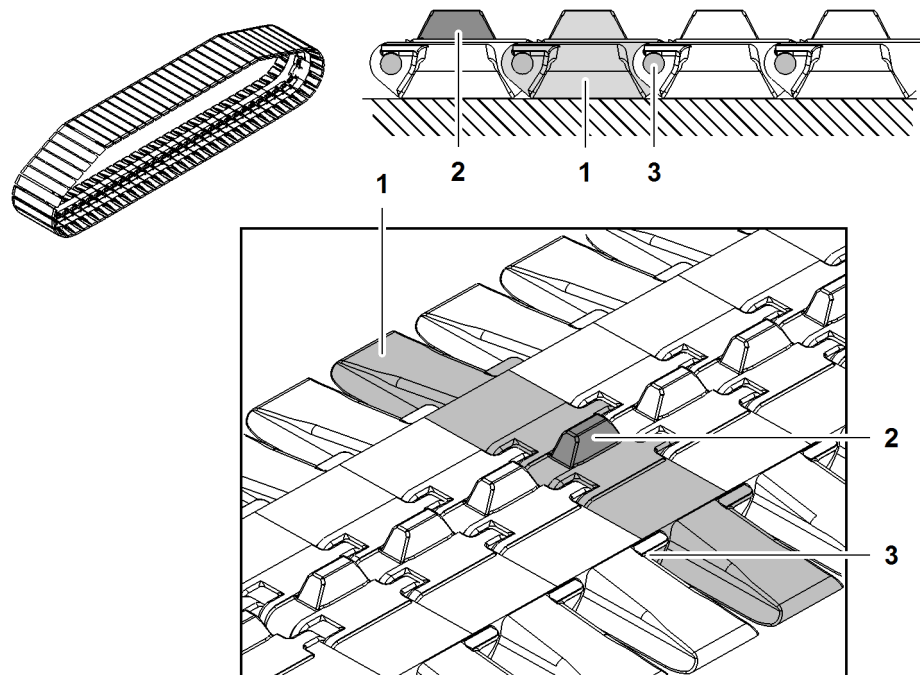


Fig. 5969: Track pad crawler

- | | | | |
|---|------------|---|----------------|
| 1 | Base plate | 3 | Pin connection |
| 2 | Guide | | |

With the track pad crawler, the individual base plates **1** of the crawler are pinned with each other. The crawler is guided with the guides **2** on the base plates.

9.13.1 Checking the gearbox oil level

Ensure the following conditions are met:

- Inspection lamp is available.
- Allen key from the Liebherr tool kit is available.
- Torque wrench 120 Nm (89 ft-lb) is available.
- Diesel engine has been switched off for 5 minutes.
- Machine is level.
- Machine is secured against unauthorized startup.
- The Liebherr lettering on the crawler drive is horizontally readable from left to right.



CAUTION

Hot crawler components and hot gearbox oil!
Burns.

- ▶ Maintenance work and inspection work on the crawlers must only be carried out when the machine is switched off and has cooled down.
- ▶ Wear protective equipment.

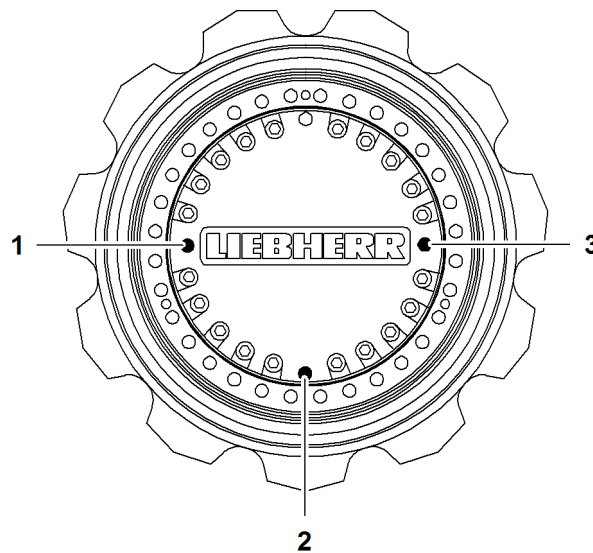


Fig. 5970: Crawler drive

- 1 Dummy socket (internal hexagon) 3 Dummy socket (internal hexagon)
 2 Drain screw (internal hexagon)

- ▶ Undo the dummy socket 1 using the Allen key.
- ▶ Check the gearbox oil level.

If the gearbox oil level does not reach the bottom edge of the opening:

- ▶ Top up with suitable gearbox oil.
- ▶ Tighten dummy socket 1 with a torque of 120 Nm (89 ft-lb).

9.13.2 Checking gearbox and hydraulic screw connections for leaks

- ▶ Check gearbox and hydraulic screw connections for leaks.

If the gearbox or the hydraulic screw connections are leaking:

- ▶ Do not operate crawler.
- ▶ Contact Liebherr customer service.

9.13.3 Cleaning the crawler

NOTICE

Dirt in crawler!

Wear due to increased chain tension.

- ▶ Ensure that crawler is kept clean.
 - ▶ Only use admissible cleaning agents.
-

- ▶ Clean crawler using a high-pressure cleaner.

9.13.4 Checking locking screws of the struts on crawler side frames for tight fit on extendable undercarriages

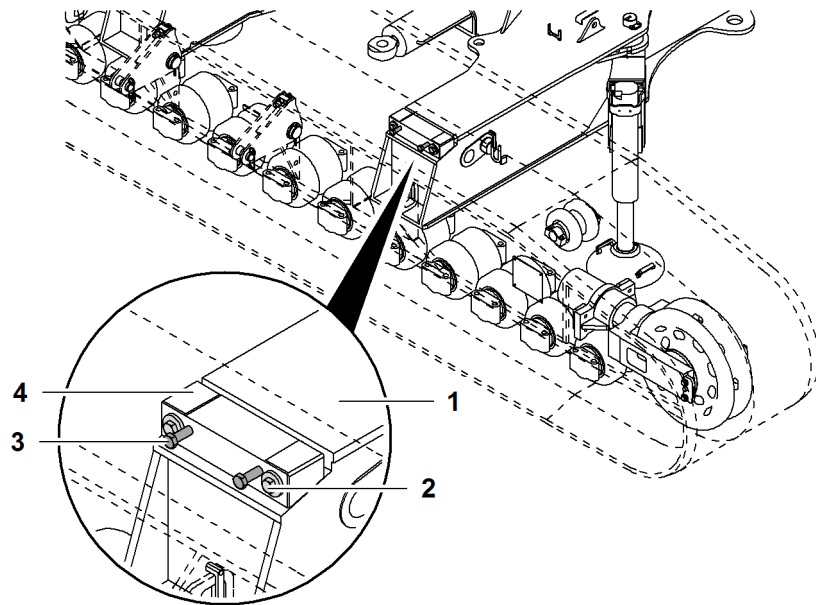


Fig. 5971: Locking screws of the struts on the crawler side frames

- | | | | |
|---|--------------------|---|------------|
| 1 | Strut | 3 | Screw (2x) |
| 2 | Locking screw (2x) | 4 | Wedge |

► Check locking screws **2** of the struts on the crawler side frames for tight fit.

If locking screws **2** of the struts on the crawler side frames are loose:

- Undo screws **3**.
- Tighten locking screw **2**.
- Tighten screws **3**.

9.13.5 Checking the chain guides for wear and tight fit

Chain guides are installed between chain and crawler side frame.

The chain guides consist of identical parts. The individual chain guides can be changed individually.

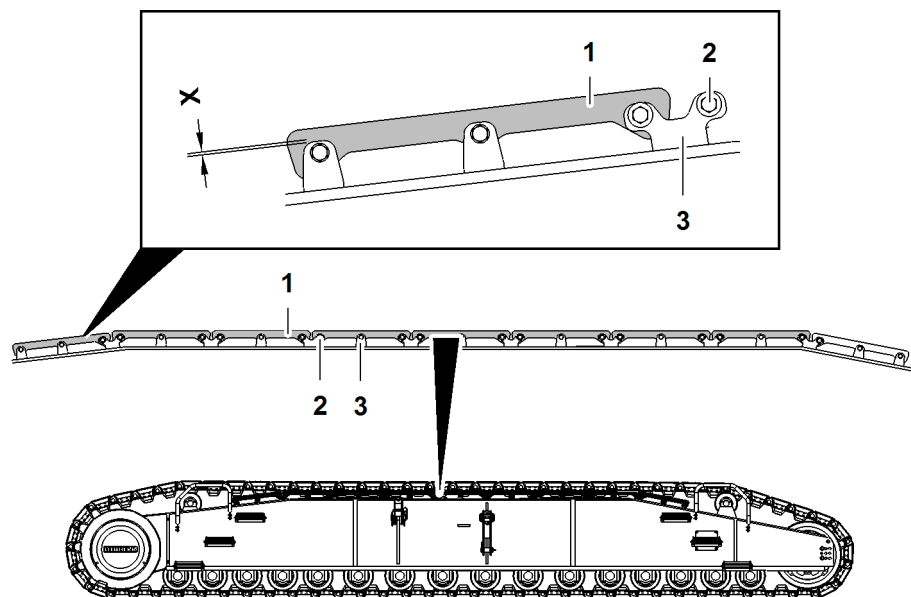


Fig. 5972: Checking the chain guides for wear and tight fit

- | | | | |
|---|------------------|---|----------------|
| 1 | Chain guide | 3 | Mount |
| 2 | Screw connection | X | Minimum height |

The minimum height **X** of the chain guide **1** must be larger than zero.

- ▶ Measure the minimum height **X** between chain guide **1** and mount **3**.

If the minimum height **X** is below the admissible range:

- ▶ Exchange chain guide **1**.

9.13.6 Checking the chain tension

Ensure the following conditions are met:

- Machine traveled one crawler side frame length backward.

9.13.7 Preparing the machine

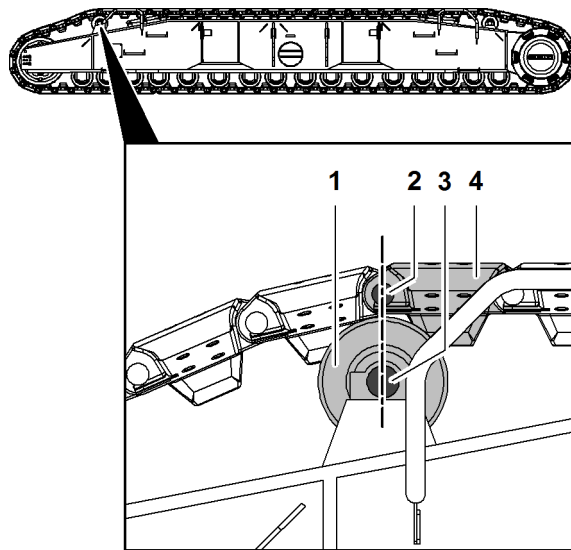


Fig. 5973: Preparing the machine

- | | | | |
|---|-------------------|---|--------------|
| 1 | Roller | 3 | Axis of roll |
| 2 | Pin of chain link | 4 | Base plate |

► Ensure that the axis of the chain link's pin 2 is located vertically above the axis 3 of the roll.

9.13.8 Measuring chain tension

There are two methods for measuring the chain tension:

- Measuring on tight side.
- Measuring on slack side.

9.13.9 Measuring chain tension on the tight side

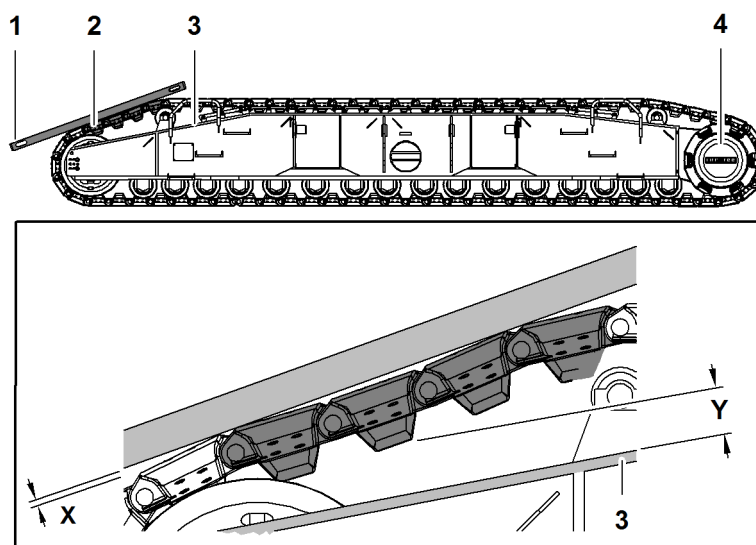


Fig. 5974: Measuring chain tension on the tight side

- | | | | |
|---|---------------|---|---------|
| 1 | Measuring rod | 4 | Tumbler |
|---|---------------|---|---------|

[See next page for continuation of the image legend](#)

2	Base plate	X	Maximum distance 30 mm (1.18" in)
3	Measuring edge	Y	Minimum distance 40 mm (1.57" in)

If the maximum distance **X** is exceeded:

▶ Tighten the chain.

If the minimum distance **Y** is exceeded:

▶ Tighten the chain.

9.13.10 Measuring chain tension on the slack side

Ensure the following conditions are met:

Crawler has been cleaned.

(For more information see: [9.13.3 Cleaning the crawler, page 1988](#))

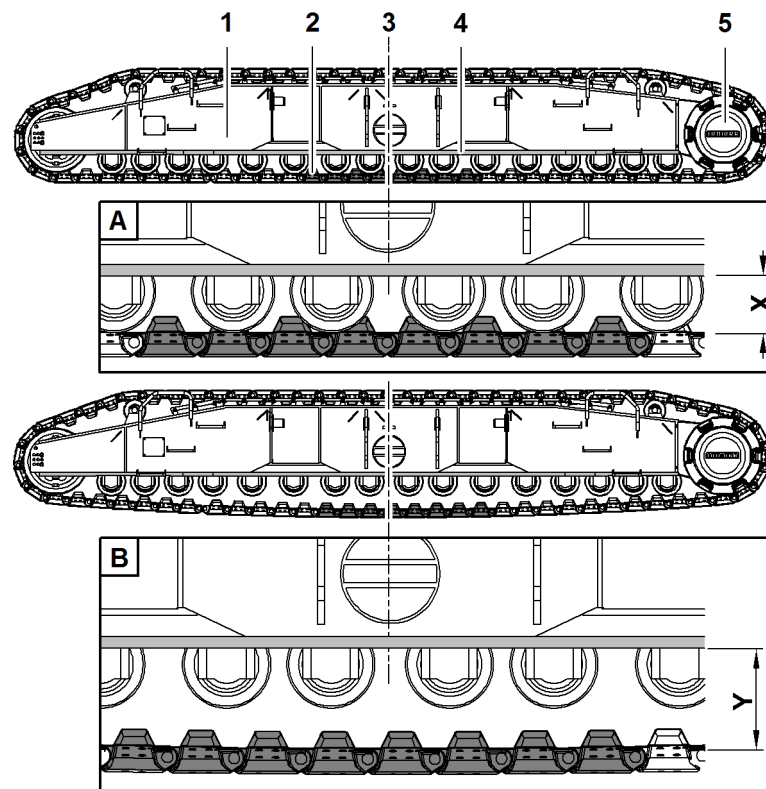


Fig. 5975: Measuring chain tension on the slack side

1	Crawler side frame	A	Crawler side frame loaded
2	Base plate	B	Crawler side frame unloaded
3	Center line of crawler side frame	X	Minimum distance 252 mm (9.92" in)
4	Measuring edge	Y	Maximum distance 422 mm (1' 5" ft-in) (tolerance is 5 mm (0.20" in))
5	Tumbler		

▶ Measure crawler side frame difference.
▷ Ideal crawler side frame difference is 170 mm (6.69" in).

9.13.11 Retightening chain

Removing pressure from hydraulic tension jack

NOTICE

Inadmissible operation of crawler!
Hydraulic oil leak.

- ▶ In case of open chain, close hydraulic feed to hydraulic tension jack.
-

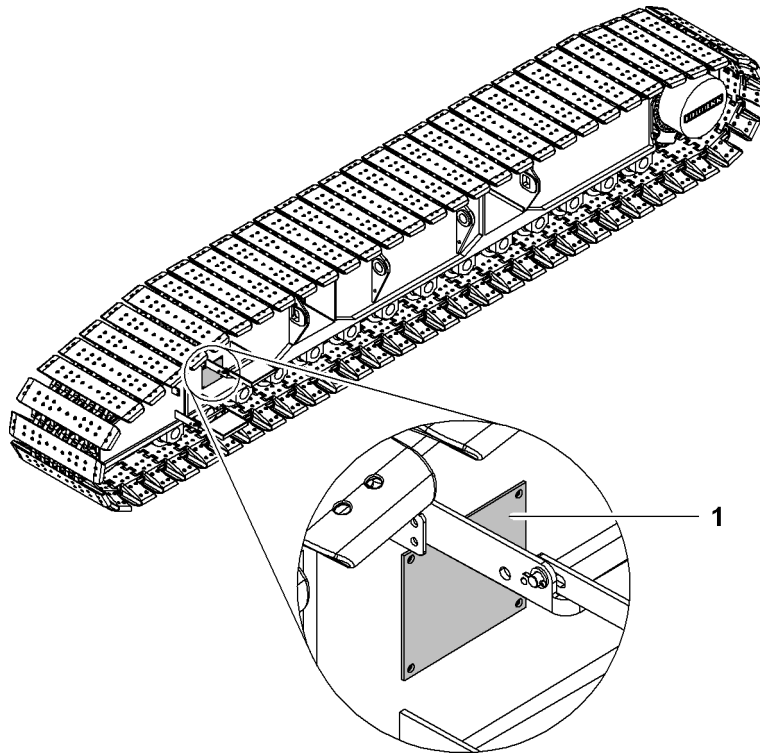


Fig. 5976: Crawler side frame cover

1 Cover

- ▶ Remove cover **1** from crawler side frame.
 - ▷ Hydraulic lines are visible.

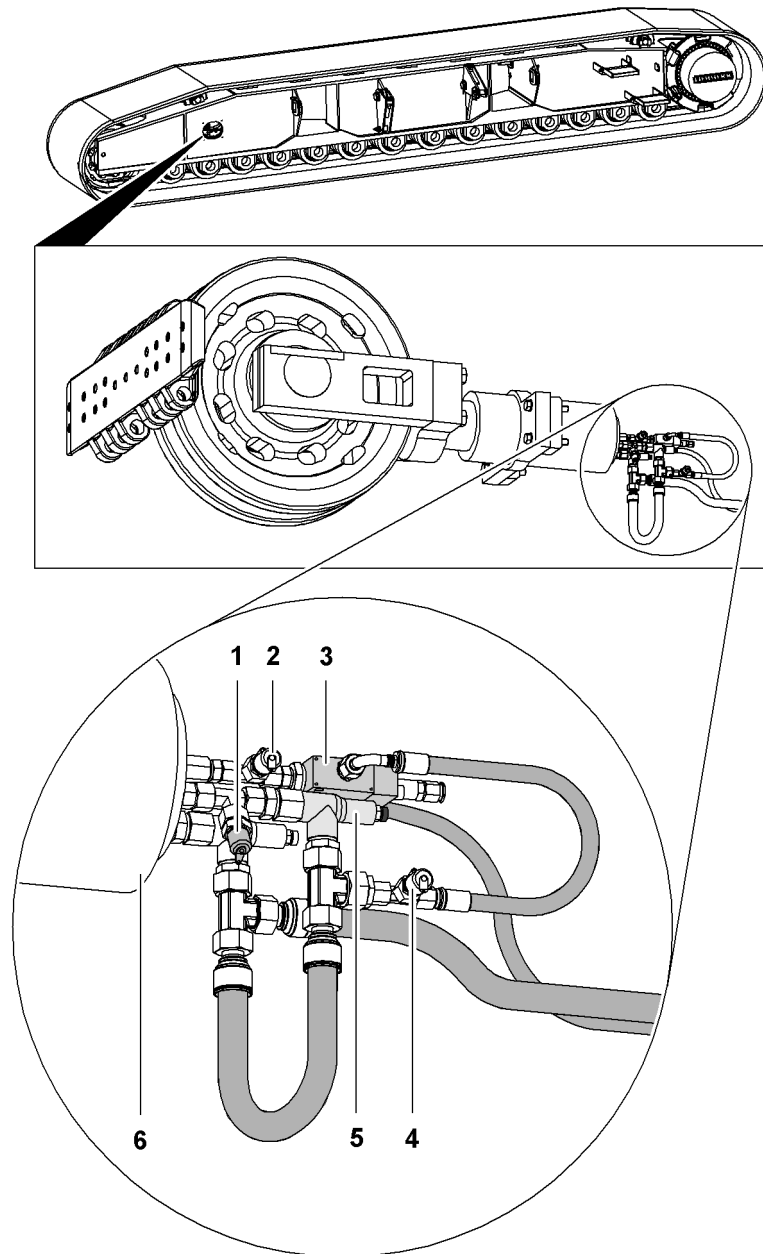


Fig. 5977: Removing pressure from hydraulic tension jack

1	Measuring connection	4	Measuring connection
2	Measuring connection	5	Pressure-relief valve
3	Pressure reducer (exclusively with LR1004)	6	Hydraulic tension jack

- ▶ Provide trap for hydraulic oil.
- ▶ Hold an end of the mini measuring line in the trap.
- ▶ Connect other end of mini measuring line with measuring connection 1.
 - ▷ Hydraulic oil escapes (approx. 0.2 l (6.76 oz)).
 - ▷ Hydraulic tension jack 6 is without pressure.
 - ▷ The hydraulic cylinder of the hydraulic tension jack 6 is pushed back through the inherent weight of the chain.
 - ▷ Stop has clearance.
- ▶ Remove mini measuring line of measuring connection 1.
- ▶ Dismantle stop.

9.13.12 Setting limit stop

Ensure the following conditions are met:

- Machine is level.
- Machine is secured against unauthorized startup.
- The required tools from the Liebherr tool kit are available.
- Hydraulic tension jack without pressure.

NOTICE

Inadmissible chain tension!

Increased wear due to excess chain tension.

Unwinding of the crawler chain due to insufficient chain tension.

- ▶ Retighten chain according to specifications.
-

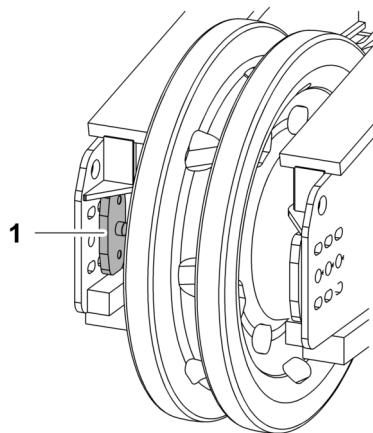


Fig. 5978: Hydraulic tension jack limit stop

- 1 Hydraulic tension jack limit stop

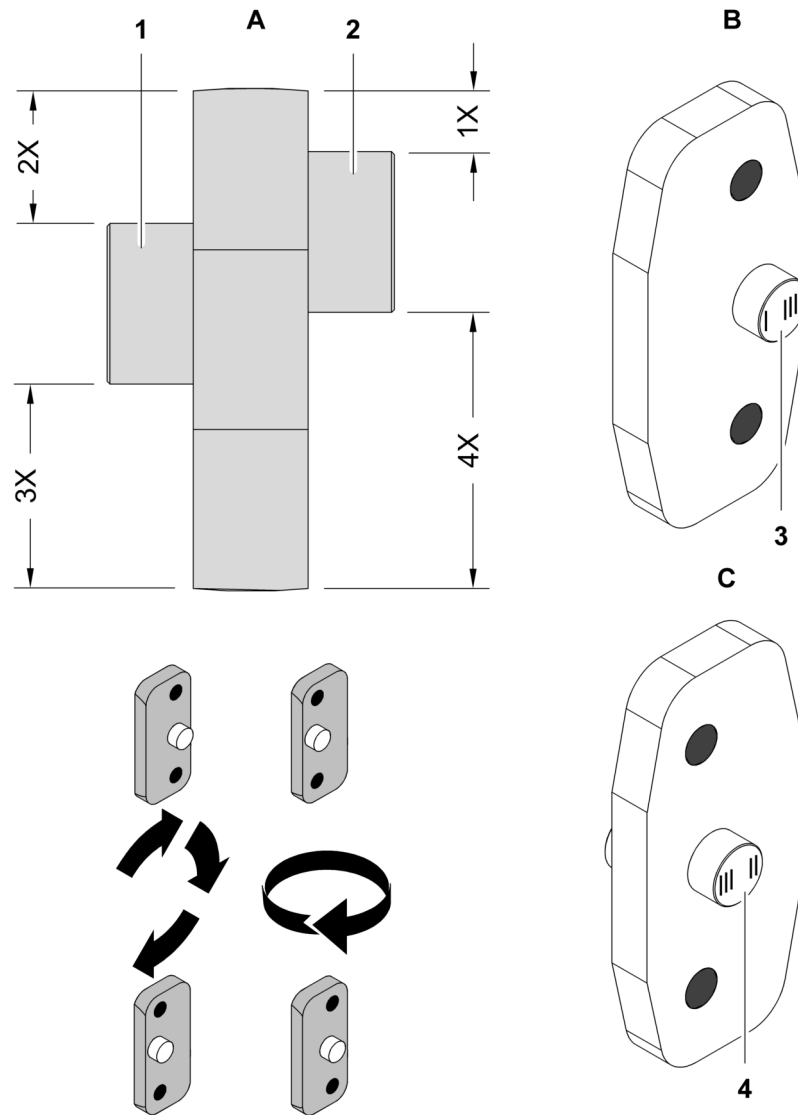


Fig. 5979: Hydraulic tension jack limit stop

- | | | | |
|---|----------------------------|---|-----------------|
| 1 | Pin on left | A | View from top |
| 2 | Pin on right | B | View from right |
| 3 | Pin on right with markings | C | View from left |
| 4 | Pin on left with markings | X | Stop path (4x) |

The limit stop is unsymmetrical. This allows the chain tension to be enlarged in steps by the stop path **X**. Lines are engraved on the pin. The marking on the crawler side frame indicates which line shows the position of the limit stop and the stop path **X**. When the chain is tightened the installation position of the limit stop must be selected so that the marking on the pin of the limit stop has one line more than the marking before the removal of the limit stop. This means one stop path **X** more. After the fourth line it is moved forward by one boring for pin **2** and re-started at first line.

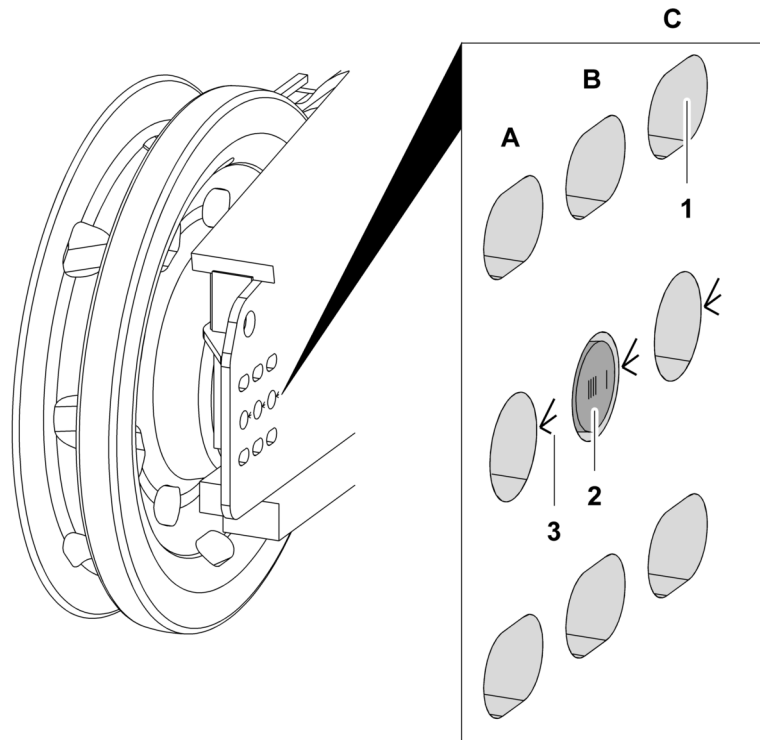


Fig. 5980: Markings on the crawler side frame

- | | | | |
|---|------------------------------------|---|-------------------------------|
| 1 | Attachment hole (6x) | A | Nearest larger distance to B |
| 2 | Stop pin with marking | B | Current installation position |
| 3 | Marking on crawler side frame (3x) | C | Nearest smaller distance to B |

The engraved markings on the stop pins 2 must point towards the marking 3. If there are no markings 3 on the crawler side frame, the valid markings on the stop pin 2 point towards the swing gear.

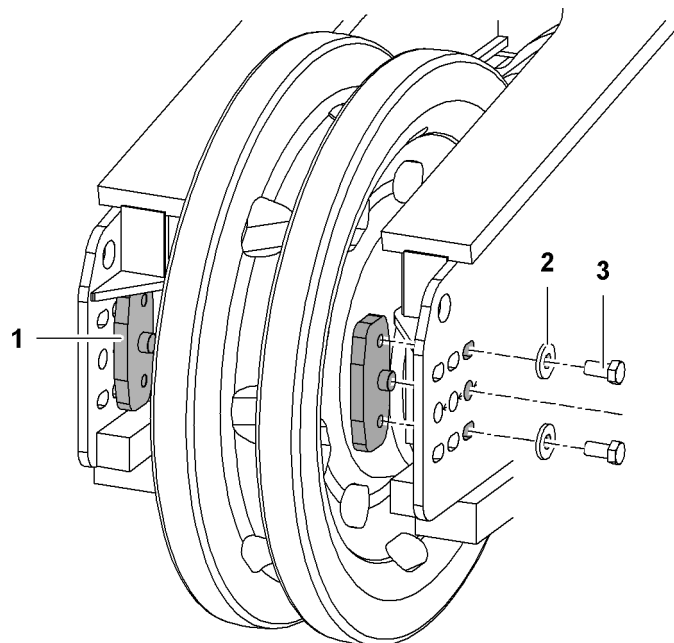


Fig. 5981: Crawler side frame limit stop

- | | | | |
|---|--|---|------------|
| 1 | Installation position of limit stop (2x) | 3 | Screw (4x) |
| 2 | Washer (4x) | | |

Note down de-installation position of the stop.

- ▶ Dismantle stop: Undo screws **3**.
- ▶ Remove washers **2**.
- ▶ Release limit stop with drift pin.

If it is not possible to remove the limit stop:

- ▶ Remove pressure from hydraulic tension jack ([For more information see: Removing pressure from hydraulic tension jack, page 1993](#)).
- ▶ Determine new installation position of the limit stop.

If the last position is reached:

- ▶ Remove a chain link.
- ▶ Twist and turn stop in such way that the stop path is enlarged by factor 1X (one line with the marking of the pin).

NOTICE

Incorrect installation of the limit stop!
Damaging of chain.

- ▶ Ensure that the limit stop on both sides of the crawler side frame is in the same position and mounted with the same marking on pins.
-

- ▶ Install limit stop on both sides of the crawler side frame.
- ▶ Insert washers **2**.
- ▶ Tighten screws **3**.
 - ▷ Chain is tightened.
- ▶ Travel machine forward 3 m (9' 10" ft-in).
- ▶ To compensate for chain play: move machine back.
- ▶ Checking the chain tension ([For more information see: 9.13.6 Checking the chain tension, page 1990](#)).

There can be different installation positions of the limit stop for the two crawler side frames.

- ▶ Repeat process with second crawler side frame.

9.13.13 Checking locking screws of the track pads axes

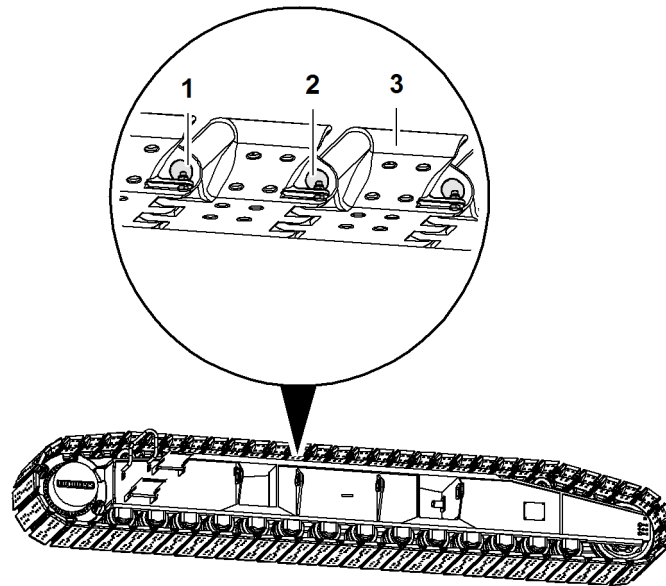


Fig. 5982: Checking locking screws of the track pads axes

- | | |
|---|--------------------|
| 1 Screw (2x) with washer and counter nut | 3 Track pad |
| 2 Axis (2x) of the track pad | |

Screws **1** prevent axis **2** from falling out. Because the axes is halved, the outer and inner side of the crawler side frame must be checked.

- ▶ Check availability of screws **1**.

If screws **1** are not available:

- ▶ Insert screws **1**.
- ▶ Check screws **1** for tight fit.

If screws **1** are loose:

- ▶ Tighten screws **1**.

9.14 Lifting device

9.14.1 Check transport lashing and round slings for wear (according to EN 1492-2).



DANGER

Incorrectly attached rigging!
Load breakaway.

▶ Check that the transport lashing and round slings have a valid type plate.

▶ Check transport lashing and round slings for wear.

If the transport lashing or round slings show signs of wear:

▶ Replace transport lashing or round slings.

9.14.2 Check the round steel chains for wear and damage



DANGER

Incorrectly attached rigging!
Load breakaway.

▶ Check that the round steel chain has a valid type plate.

When visually checking the round steel chains, pay attention to the following points:

- Type plate should be legible and valid
- There should be no cracks or notches in the chain links or hooks
- Locking elements of the hooks must be present and correct
- Chain links must not be deformed

▶ Check the round steel chains for wear and damage.

If the round steel chains show signs of wear or damage:

▶ Replace round steel chains.

9.15 Hook/pulley block

9.15.1 Checking all hooks/pulley blocks for damage, wear, corrosion and widening of the hook aperture

**DANGER**

Damaged or unauthorised rigging material is used!
Load breakaway.

► Observe the national and international regulations on the use and inspection of rigging material!

► Check all hooks/pulley blocks for signs of damage, wear, corrosion and widening of the hook aperture

If the hooks/pulley blocks are damaged in any way:

► Contact Liebherr after sales service.

9.15.2 Lubricating bearings and axels

Ensure that grease gun from Liebherr tool kit is available and filled with correct grease (For more information see: [9.2.3 Lubrication chart, page 1949](#)).

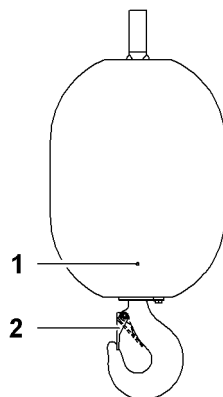


Fig. 5983: Hook

1 Grease nipple

2 Safety catch

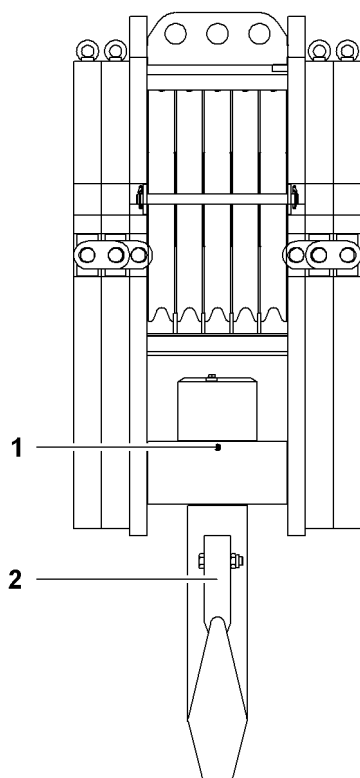


Fig. 5984: Pulley block

1 Grease nipple

2 Safety catch

- ▶ Using the grease gun, press 10 g (0.02 lb) of grease onto the grease nipple 1.
 - ▷ Optimal lubrication: During the lubrication process an even collar of fat is formed around the bearing.

9.15.3 Check that the safety catch is present and working properly



CAUTION

Self-closing safety catch!
Crushing.

- ▶ Protect your hands.

- ▶ To check the safety catch: push the safety catch back with your hand
 - ▷ The safety catch closes independently.

If the safety catch does not close by itself:

- ▶ Contact Liebherr after sales service.

9.16 Hydraulic system

9.16.1 Check the hydraulic system for leaks

Ensure that the following conditions are fulfilled:

- The machine is level.
- The machine is secured to prevent unauthorised operation.



CAUTION

Hot hydraulic oil!
Risk of burns.

- ▶ Only perform maintenance and inspection work on hydraulic system when diesel engine is switched off.
- ▶ Wear protective equipment.

-
- ▶ Check hydraulic system for leaks.

If there is a leak in the hydraulic system:

- ▶ Switch off machine.
- ▶ Contact Liebherr after sales service.

9.16.2 Checking the oil cooler for contamination

- ▶ Check oil cooler for contamination.

If oil cooler is dirty:

- ▶ clean oil cooler.

9.16.3 Changing the compressed air filter

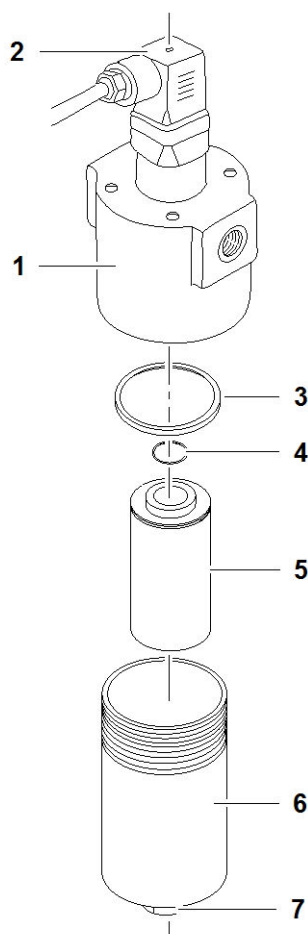


Fig. 5985: Changing the compressed air filter

1	Top part of housing	5	Filter element
2	Pressure sensor	6	Bottom part of housing
3	Sealing ring	7	Nut (welded on)
4	O-ring		

- ▶ Undo bottom part of housing **7** with nut **6** and take off.
- ▶ Carefully remove filter element **5** and dispose of remaining oil of the bottom part of housing **6**.

- ▶ Clean all parts thoroughly.
- ▶ Check O-ring **4** and sealing ring **3** for damage.

If O-ring or sealing ring are damaged:

- ▶ Exchange O-ring **4** or sealing ring **3**.
- ▶ Remove all dirt on the inside of the filter housing.
- ▶ Insert new filter element **5**.

Ensure cleanliness and correct fit of the O-ring **4** and seal ring **3**.

- ▶ Reassemble parts in reverse order.
- ▶ Tighten nut **7** of bottom part of housing **6** all the way to the stop.

- ▶ Start diesel engine and allow it to idle for 5 minutes.
- ▶ Turn off diesel engine and again tighten nut **7** of bottom part of housing **6** all the way to the stop.
- ▶ Start diesel engine and allow it to idle.
- ▶ Check hydraulic system for leaks.

If hydraulic system leaks:

- ▶ Contact Liebherr customer service.

9.17 Hydraulic oil tank

9.17.1 Carrying out a hydraulic oil analysis

(For more information see: 9.2.10 Liebherr oil diagnosis system, page 1956)

9.17.2 Filling with hydraulic oil



Note

- ▶ If replacing “mineral oil-based hydraulic oil” with “synthetic oil-based hydraulic oil”, please contact Liebherr after sales service.

Ensure that the following conditions are fulfilled:

- Torque wrench 69 Nm (51 ft-lb) (width across flats 19) is available.
- The machine is level.
- The machine is secured to prevent unauthorised operation.



CAUTION

Hot engine parts and hydraulic oil!
Risk of burns.

- ▶ Do not open the cover of the return filter unless the engine is switched off and the temperature of the hydraulic oil is 40° or less.
- ▶ Wear protective equipment.

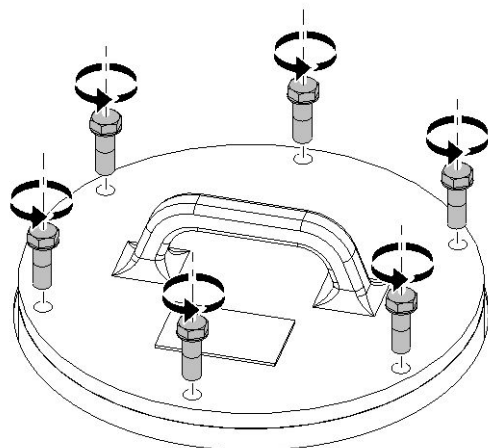


Fig. 5986: Opening the return filter

- ▶ Undo all screws.
- ▶ Remove the cover from the housing.

NOTICE

Inadmissible hydraulic oil or incorrect filling of hydraulic oil!
Damage to hydraulic system.

- ▶ Top up with suitable hydraulic oil only (For more information see: 9.2.3 Lubrication chart, page 1949) .
- ▶ Only fill in clean and water-free hydraulic oil.
- ▶ Only add approved additives or concentrates (For more information see: 9.2.3 Lubrication chart, page 1949) .
- ▶ Ensure that no dirt or foreign bodies enter the return filter.
- ▶ Only fill in pre-filtered hydraulic oil via the return filter.

- ▶ Fill with hydraulic oil.
- ▶ Replace the housing cover and align it so that the screw holes match.

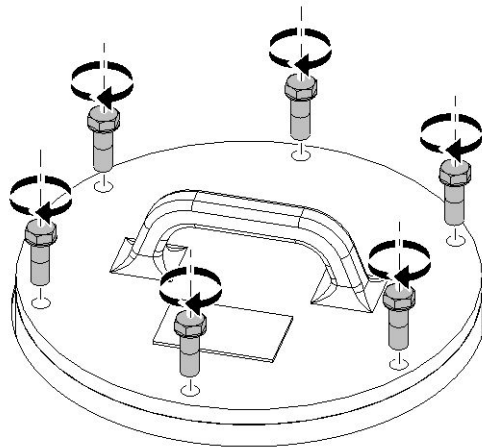


Fig. 5987: Closing the return filter

- ▶ Tighten the screws by hand.
- ▶ Tighten screws with a torque of 69 Nm (51 ft-lb).

9.17.3 Draining the hydraulic oil

**Note**

Environmental pollution!

- ▶ Fluids such as hydraulic oil, fuel and coolant must be disposed of in accordance with national and international regulations and guidelines.

At the bottom of the hydraulic oil tank is a drain valve.

- ▶ Remove the cover from the drain valve.
- ▶ Connect the oil drain hose from the Liebherr tool kit to the drain valve.
- ▶ Drain the hydraulic oil.

9.17.4 Cleaning the magnetic rod in the return filter

Ensure that a torque wrench 69 Nm (51 ft-lb) (width across flats 19) is available.

Opening the return filter



CAUTION

Hot engine parts and hydraulic oil!
Risk of burns.

- ▶ Do not open the cover of the return filter unless the engine is switched off and the temperature of the hydraulic oil is 40° or less.
- ▶ Wear protective equipment.

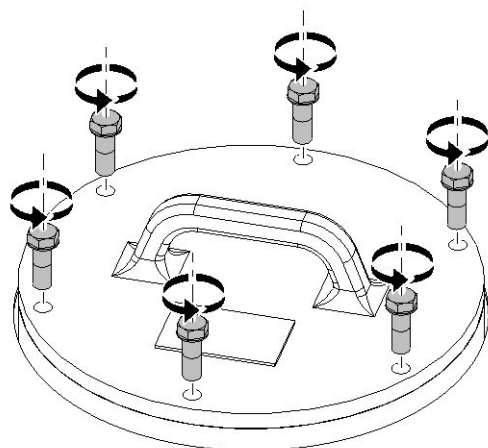


Fig. 5988: Opening the return filter

- ▶ Undo all screws.

NOTICE

Dirt and foreign bodies in return filter!
Damage to the hydraulic system.

- ▶ Ensure that no dirt or foreign bodies enter the return filter.
- ▶ Remove the cover from the housing.

Cleaning the magnetic rod

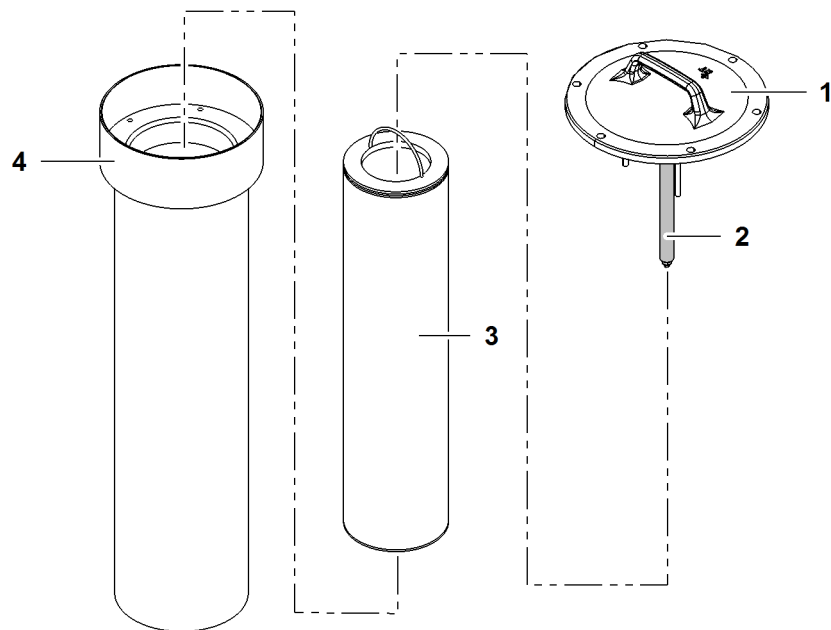


Fig. 5989: Cleaning the magnetic rod

- | | | | |
|---|--------------|---|-----------------------------------|
| 1 | Cover | 3 | Return filter |
| 2 | Magnetic rod | 4 | Housing in the hydraulic oil tank |

- ▶ Clean the magnetic rod **2** using a clean cloth.



Note

- ▶ Dispose of the oil-stained cleaning cloth according to the appropriate regulations.

Closing the return filter

- ▶ Replace the housing cover and align it so that the screw holes match.

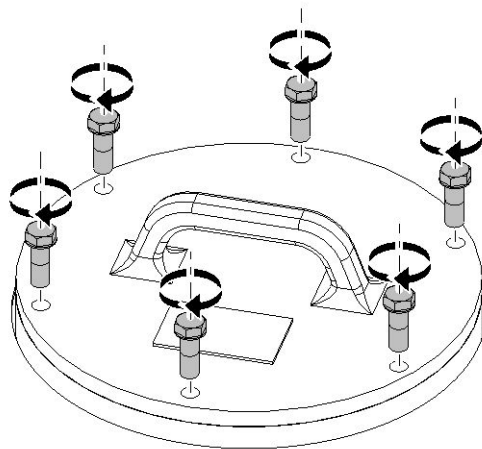


Fig. 5990: Closing the return filter

- ▶ Tighten the screws by hand.
- ▶ Torque the screws to 69 Nm (51 ft-lb).

9.17.5 Exchanging return filter

Make sure the following prerequisites are met:

- Diesel engine has been switched off for 5 minutes.
- Machine is level.
- Machine is secured against unauthorized startup.
- Torque wrench 69 Nm (51 ft-lb) (width across flats 19) is available.
- Original Liebherr return filter is available.

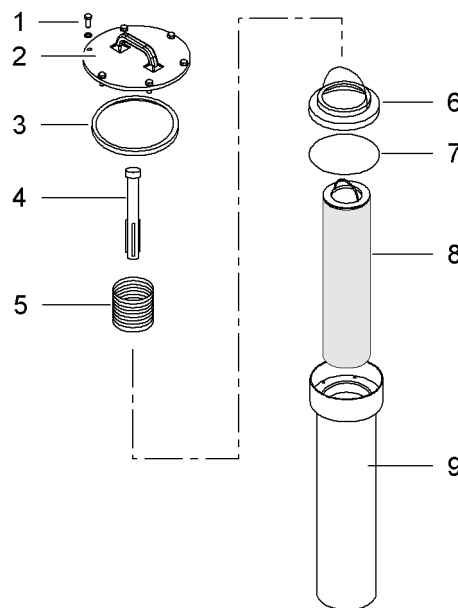


Fig. 5991: Exchanging return filter

- | | | | |
|---|-------------------------|---|--------------------|
| 1 | Screw with locking ring | 6 | Compression flange |
| 2 | Cover | 7 | O-ring |
| 3 | Sealing ring | 8 | Filter element |
| 4 | Magnetic rod | 9 | Housing |
| 5 | Pressure spring | | |



CAUTION

Hot engine parts and hot hydraulic oil!
Burns.

- ▶ Do not open the cover of the return filter unless the engine is switched off and the hydraulic oil temperature is 40° or less.
- ▶ Wear protective equipment.

- ▶ Loosen screws 1: Turn screws 1 counter-clockwise.

NOTICE

Dirt and foreign bodies in return filter!
Damage to hydraulic system.

- ▶ Make sure that no dirt or foreign bodies enter the return filter.

- ▶ Take off cover **2** and sealing ring **3**.
- ▶ Remove magnetic rod **4**, pressure spring **5**, compression flange **6**, O-ring **7** and the used filter element **8** from the housing **9**.
- ▶ Check magnetic rod **4** for metal particles.
- ▶ Clean all return filter elements with a lint-free, clean cloth.



Note

- ▶ Dispose of oil-stained cloths in accordance with the appropriate regulations.
-

- ▶ Check sealing ring **3** and O-ring **7** for damage and exchange if necessary.
- ▶ Insert original Liebherr-filter element **8** in housing **9**.
- ▶ Assemble elements in reverse order.
- ▶ Ensure cleanliness and correct fit of the O-ring **7** and sealing ring **3**.
- ▶ Place cover **2** on housing and align.
- ▶ Slightly tighten screws **1** by hand.
- ▶ Tighten screws **1** with a torque of 69 Nm (51 ft-lb).
- ▶ Start diesel engine and allow it to idle for two minutes.
- ▶ Turn off diesel engine and check hydraulic system for leaks.
- ▶ Restart diesel engine after five minutes and allow it to idle for two minutes.
- ▶ Turn off diesel engine and check hydraulic system for leaks again.

9.18 Hydraulic cylinders

9.18.1 Check that the hydraulic cylinder fits properly and does not leak

- ▶ Check that the hydraulic cylinder fits properly and does not leak.

If the hydraulic cylinder is leaking or loose:

- ▶ Contact Liebherr after sales service.

9.18.2 Protecting the piston rods of the hydraulic cylinders from corrosion

The piston rods on all hydraulic cylinders are chrome-plated. Despite this, dirty and aggressive materials can still damage the chrome coating. The chrome coating only offers a certain level of protection.

- ▶ Ensure that the piston rods are in perfect condition and clean.
- ▶ Extend and retract piston rods at least once a week.

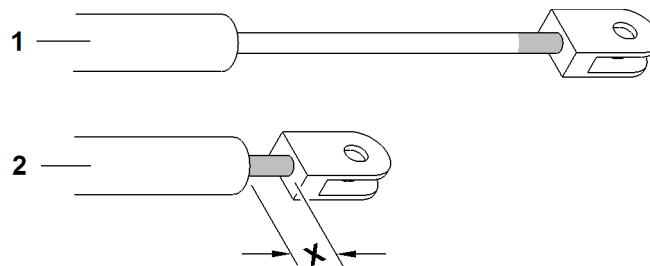


Fig. 5992: Overlap piston rod (illustration of principle)

- | | | | |
|---|----------------------|---|--------------------|
| 1 | Extended piston rod | X | Overlap piston rod |
| 2 | Retracted piston rod | | |

- ▶ Wrap piston rod protuberance X with Denso-Tape.

9.18.3 Preserving the piston rods of the hydraulic cylinders in case of longer periods of non-use

- ▶ Wrap piston rods with Denso-Tape.
or

Preserve piston rods with the AVILUB VCI 1411 protective agent.

9.19 Hydraulic leads

9.19.1 Visual inspection of hydraulic leads (hydraulic hoses, hydraulic pipes)

Hydraulic leads (hydraulic hoses and hydraulic pipes) undergo a natural aging process. The storage and service life of hydraulic leads is of limited duration.

Use at the threshold of admissible strain reduces the service life (very high or low temperatures, high pulse frequencies).



WARNING

Inadmissible repair of hydraulic leads!
Severe injuries and damage to the machine.

- ▶ Always replace hydraulic leads.
 - ▶ Use original Liebherr spare parts.
 - ▶ If in doubt, contact Liebherr after sales service.
-
- ▶ Check hydraulic leads for damage, cracks, crushing, abrasion, tight fit and leaks.
 - ▶ Check fitting and connection of hydraulic leads for damage.
 - ▶ Check hydraulic leads for deformation (delamination, blistering) when pressurized and in an unpressurized state.
 - ▶ Check hydraulic leads for expiration of the storage time or service life.
- If one of the above testing criteria is fulfilled:
- ▶ contact Liebherr customer service.

9.20 Bypass filter system

9.20.1 Checking the bypass filter system

Make sure the following prerequisites are met:

- Hydraulic oil is at operating temperature.
- ▶ Read dynamic pressure manometer on bypass flow filter.

If the dynamic pressure manometer of the bypass flow filter shows 1 bar (14.50 psi) above the initial value (normal value):

- ▶ change the filter elements.

9.20.2 Changing the filter elements

Ensure that the following conditions are fulfilled:

- Diesel engine has been switched off for 5 minutes.
- Machine is level.
- Machine is secured against unauthorized start-up.



Note

Liebherr recommends:

- ▶ If the machine is subjected to heavy work: halve the exchange interval.
-

The filter elements cannot be cleaned and must be disposed of in accordance with the national and international regulations and guidelines.

Removing filter elements

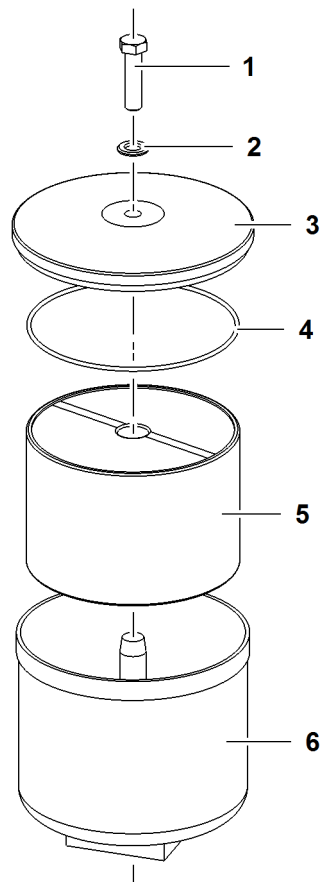


Fig. 5993: Removing filter elements

1	Screw	4	O-ring
2	Washer	5	Filter element
3	Cover	6	Filter housing



CAUTION

Hot surfaces and hot operating liquids!
Risk of burning hands.

- ▶ Only exchange filter elements **5** when the machine stands still and the hydraulic system is without pressure.
-
- ▶ Open the cover **3** of the filter housing **6**.
 - ▶ Turn filter elements **5** clockwise with the help of the carrier straps and lift at the same time.
 - ▶ Let filter element **5** drain if necessary.
 - ▶ Remove filter element **5**.
 - ▶ Check feed and discharge in the filter housing **6** for free flow.

Inserting filter elements

**Note**

The carton is a functional part of the filter!

▶ Do not remove carton wrap.

▶ Insert the filter element **5** in such a way that the lettering is legible and the protective polypropylene base is on the bottom.

▶ Replace O-ring **4**.

▶ Check washer **2**.

If washer **2** is defect:

▶ replace washer **2**.

▶ Tighten screw **1** with a torque of 49 Nm (36 ft-lb).

9.21 Electrical system



WARNING

Electric current!
Death, grave injury.

When electrical parts or components are inspected or replaced:

- ▶ Switch off the battery main switch.
-

9.21.1 Checking cable ducts and cable connections for chafing

- ▶ Check the strain relief of the electric cables.
- ▶ Check the electric cables for breaks, cuts or exposed patches.

If the electric cables or cable connections are damaged in any way:

- ▶ Contact Liebherr after sales service.
- ▶ Check that all plugs are securely locked in place.

If the plugs are loose:

- ▶ Lock the plug securely.

- ▶ Check battery fluid **1** with refractometer or acid tester **2**.
- ▶ Top up with fluid according to the test or contact Liebherr customer service.

9.22.3 Exchanging the fuses on the battery

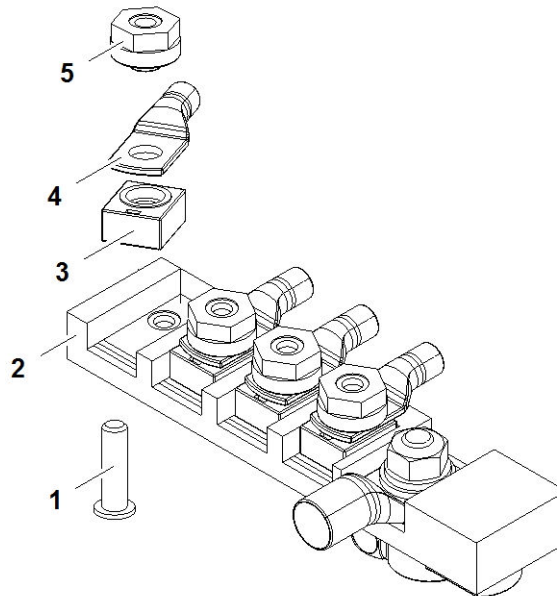


Fig. 5996: Exchanging the fuses on the battery

- | | | | |
|----------|-----------------|----------|---------------------------|
| 1 | Locking screw | 4 | Electric cable (consumer) |
| 2 | Fuse block | 5 | Insulation nut |
| 3 | Locking element | | |

Spare insulation nuts and spare fuse elements are located in the fuse box in the switch cabinet.

- ▶ Exchange insulation nuts or fuse elements when required.

9.23 Lighting

9.23.1 Checking the function of cabin lighting, floodlights and additional floodlight

The floodlight should illuminate if the appropriate button in the cabin is pressed.

- ▶ Check the function of the cabin lighting, floodlights and auxiliary floodlight.

If the cabin lighting, floodlights and auxiliary floodlight do not switch on:

- ▶ Check the fuses and electric cables.
- ▶ Change illuminant.

If the cabin lighting, floodlight and auxiliary floodlight do not switch on again:

- ▶ Contact Liebherr customer service.

9.23.2 Changing the cabin illuminant

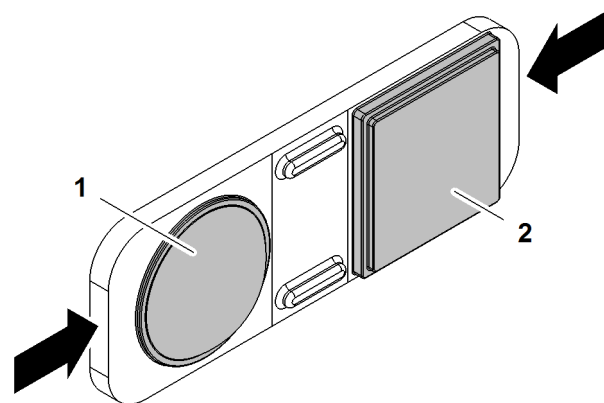


Fig. 5997: Changing the cabin illuminant

- | | |
|----------------|----------------|
| 1 Curved glass | 2 Clear screen |
|----------------|----------------|

Make sure the following conditions are met:

- New illuminant **R10W 24 V/10 W** is available.
- Main battery switch is switched off.

- ▶ Remove the clear screen **2** and curved glass **1** from the front by pressing on the sides.
- ▶ Remove defect bulb and dispose of properly.
- ▶ Insert new bulb.
- ▶ Refit the clear screen **2** and curved glass **1**.
 - ▷ Cabin lighting ready for operation.

9.23.3 Changing the bulbs of floodlight on the cabin and on the uppercarriage

The following floodlights are available:

- Halogen floodlights
- Xenon floodlights
- LED floodlights

Xenon and Halogen floodlights

Make sure the following conditions are met:

- Main battery switch is switched off.
- New illuminant is available.
 - for halogen floodlights: **H3 24 V/70 W**
 - for Xenon floodlights: **D2S 24 V/35 W**

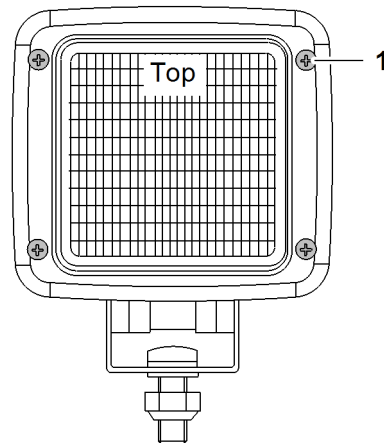


Fig. 5998: Floodlights on the cabin and on the uppercarriage

1 Screw (4x)

► Undo all screws **1**.

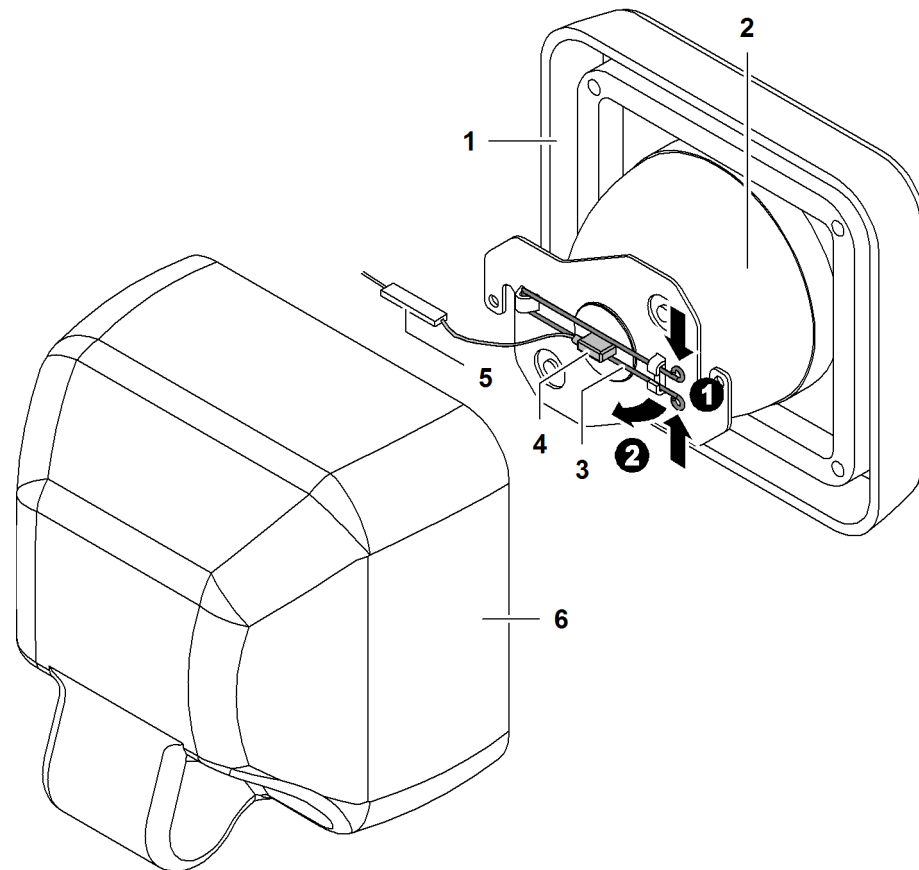


Fig. 5999: Floodlight open

- | | | | |
|---|---------------------------|---|--------------------------|
| 1 | Cover | 4 | Bulb with electric cable |
| 2 | Floodlight with reflector | 5 | Electric plug |
| 3 | Spring steel bracket | 6 | Housing |

The cover 1 has a drainage opening on the bottom.

The reflector of the floodlight 2 has a guide notch on the top.

- ▶ Take off the cover 1.
- ▶ Take out floodlight 2 with reflector.
- ▶ Press together the spring steel bracket 3 and lift.
- ▶ Unplug electric plug 5 of the bulb.
- ▶ Remove defect bulb 4 and dispose of properly.

NOTICE

Fragile illuminant!
Illuminant may be damaged.

- ▶ Do not touch the bulb directly with your fingers.
-



Note

Fingerprints on bulb!
Liebherr recommends:

- ▶ Clean bulb with a clean cloth and alcohol.
-
- ▶ Insert new bulb 4.

- ▶ Press together the spring steel bracket **3** and lower.
- ▶ Snap spring steel bracket **3** into mounts.
- ▶ Plug in electric cable of illuminant **4**.
- ▶ Insert floodlight **2** with reflector (observe installation direction).
- ▶ Put on cover (observe installation direction).
- ▶ Tighten all screws **1**.
 - ▷ Floodlight ready for operation.

LED floodlights

LED floodlights must be replaced completely.

9.23.4 Changing the bulbs of floodlight on main boom base section

The following floodlights are available:

- Xenon floodlights
- LED floodlights

Xenon floodlights

Make sure the following conditions are met:

- New bulb **xenon gas discharge lamp 24 V/42 W** is available.
- Main battery switch is switched off.



CAUTION

Hot bulb!
Risk of burning of limbs.

- ▶ Leave bulb to cool down for at least 30 minutes.



WARNING

Bulb breaking in a closed room!
Intoxication.

- ▶ Air room for at least 20 minutes.
- ▶ Leave room.



WARNING

Bulb under pressure!
Severe injury.

- ▶ Wear safety goggles and safety gloves.



WARNING

High-voltage control gear!
Electric shock.

- ▶ Turn main battery switch off a few minutes prior to changing the bulb.

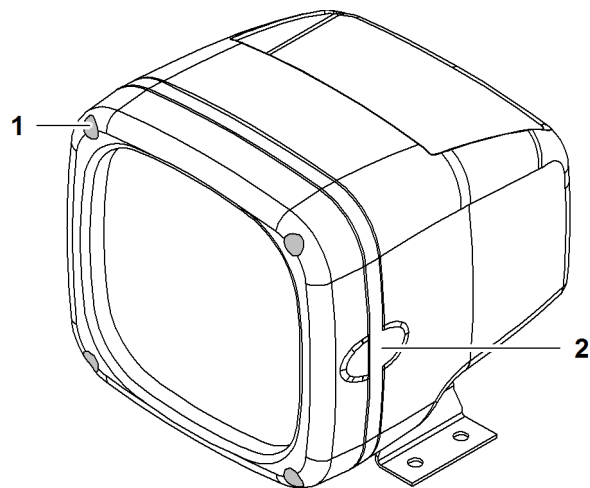


Fig. 6000: Xenon floodlights on main boom base section

1 Screw (4x)

2 Lateral marking (2x)

► Undo all screws **1**.

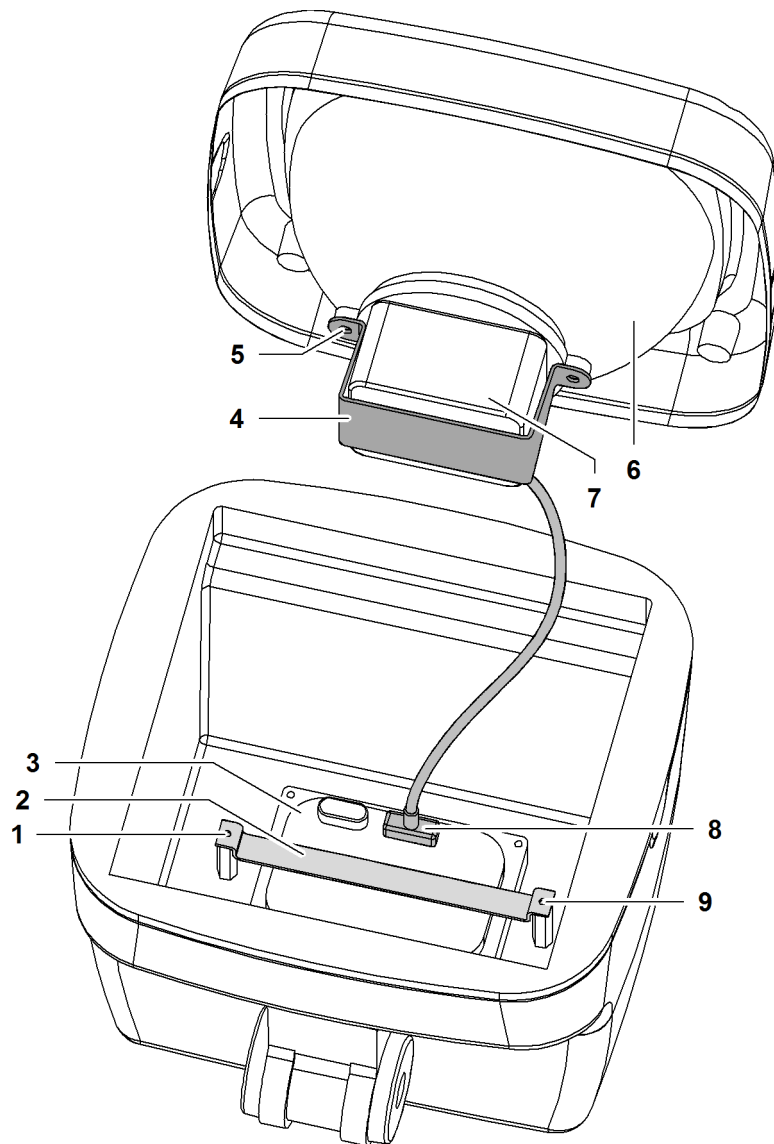


Fig. 6001: Open xenon floodlight

- | | | | |
|---|----------------------|---|---------------------------|
| 1 | Left screw | 6 | Floodlight with reflector |
| 2 | Bracket control gear | 7 | Bulb with electric cable |
| 3 | Control gear | 8 | Electric plug |
| 4 | Bracket bulb | 9 | Right screw |
| 5 | Screw (2x) | | |

The electric plug 7 is secured with a plug locking mechanism on the side of the control gear.

- ▶ Lift floodlight 6 with reflector.
- ▶ Loosen the left screw 1 of the bracket 2.
- ▶ Remove the right screw 9 of the bracket 2.
- ▶ Take off bracket 2.
- ▶ Lift control gear 3 and undo plug locking mechanism of the electric plug 8.
- ▶ Pull out electric plug 8.
- ▶ Undo both screws 5.
- ▶ Remove bracket 4.

- ▶ Remove defect bulb **7** and dispose of properly.

NOTICE

Fragile illuminant!
Illuminant may be damaged.

- ▶ Do not touch the illuminant directly with your fingers.

**Note**

Fingerprints on bulb!
Liebherr recommends:

- ▶ Clean bulb with a clean cloth and alcohol.

**Note**

Color differences in bulbs!
Liebherr recommends:

- ▶ If there are more than one bulb, exchange all bulbs to prevent color differences.

- ▶ Insert new bulb **7**.
- ▶ Tighten bracket **4** over bulb **7** with screws **5**.
- ▶ Plug in electric plug **8** of illuminant **7** until plug locking mechanism snaps into place.
- ▶ Insert bracket **2** over control gear on left screw **1**.
- ▶ Insert and tighten right screw **9**.
- ▶ Tighten left screw **1**.
- ▶ Insert floodlight **6** with reflector (observe installation direction).
- ▶ Close floodlight housing and tighten the screws.
 - ▷ Floodlight ready for operation.

LED floodlights

LED floodlights must be replaced completely.

9.23.5 Exchanging the bulbs of floodlights on main boom or jib head section

The following floodlights are available:

- High-pressure sodium vapor lamp
- LED floodlights

High-pressure sodium vapor lamp

Make sure the following conditions are met:

- New bulb **gas discharge lamp SON-T 230 V/1000 W** is available.
- Main battery switch is switched off.

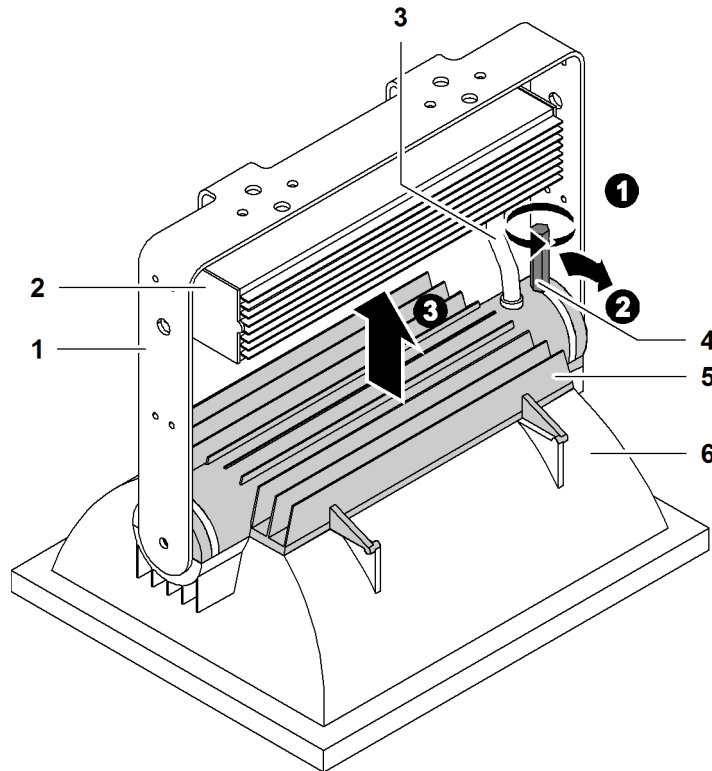


Fig. 6002: Exchanging floodlights on main boom or jib head section

- | | | | |
|---|----------------|---|----------------|
| 1 | Bracket | 4 | Lever (2x) |
| 2 | Control gear | 5 | Cover |
| 3 | Electric cable | 6 | Main reflector |

- ▶ Undo both levers 4: Turn lever 4 counter-clockwise.
- ▶ Pull down both levers 4.
- ▶ Fold the cover 5 up.
 - ▷ Bulb is visible in the cover 5.
- ▶ Twist bulb counter-clockwise.
- ▶ Dispose of defect bulb properly.

NOTICE

Fragile illuminant!
Illuminant may be damaged.

- ▶ Do not touch the bulb directly with your fingers.
-



Note

Fingerprints on bulb!
Liebherr recommends:

- ▶ Clean bulb with a clean cloth and alcohol.
-
- ▶ Insert new bulb.

**Note**

Defect electric cable!
Liebherr recommends:

- ▶ Ensure that the electric cable does not become pinched when assembling.
-
- ▶ Close cover **5**.
 - ▶ Pull up both levers **4**.
 - ▶ Tighten both levers **4** clockwise.
 - ▷ Floodlight ready for operation.

LED floodlights

LED floodlights must be replaced completely.

9.24 Rope measuring system

9.24.1 Checking the rope measuring system and height adjustment of all winches (if available) for correct function

Make sure the following prerequisites are met:

- There is no load on the hook.
- Diesel engine is switched on.

- ▶ Lower rope of winch1/winch2 until hook touches the ground.
- ▶ Press the *Settings* button on the monitor.



- ▶ Press the *Settings - components* button on the screen.



- ▶ Press the button *Set to zero* of winch1/winch2 on the monitor.



- ▶ Lift rope of winch1/winch2 until rope measuring system shows 1 m (3' 3" ft-in) on the monitor.
- ▶ Measure distance between hook and ground with suitable measuring instrument.

If the distance between the hook and the ground does not correspond to the rope measuring system value:

- ▶ Contact Liebherr customer service.

9.24.2 Readjusting layer change when changing ropes

(For more information see: [Programming layer change, page 1025](#))

9.25 Limit switches

9.25.1 Checking hoist limit switches, boom limit switches and, if necessary, limit switches of the piling and drilling rig to ensure they are working correctly

- ▶ Check the operation of the limit switches: instruct an assistant to manually trigger the limit switches.

If the activated limit switch does not register on the monitor:

- ▶ Contact Liebherr after sales service.

9.26 Mechanical inclinometer

9.26.1 Checking that the mechanical inclinometer is working properly

- ▶ Check that the mechanical inclinometer is working properly.

If the mechanical inclinometer is faulty in any way:

- ▶ contact Liebherr service department.

9.27 Emergency stop

9.27.1 Checking the emergency stop



WARNING

Unauthorized triggering of the emergency stop!
Severe injuries, damage to machine.

- ▶ The emergency stop may only be triggered when the diesel engine is running, the machine is not moving and no load is attached.

-
- ▶ Check that all emergency stops are working.

If the diesel engine does not switch off:

- ▶ Contact Liebherr customer service.

9.28 Obstacle warning light*

9.28.1 Check obstacle warning light for function and damage, check mains cable and plug (if available) for damage

- ▶ Check obstacle warning light for function and damage.

If the obstacle warning light is damaged or does not function:

- ▶ Contact Liebherr customer service.

- ▶ Check mains cable and plug (if available) for damage.

If mains cable or plug are damaged:

- ▶ Contact Liebherr customer service.

9.29 Fire extinguishers

9.29.1 Checking the seals and inspection dates on the fire extinguishers

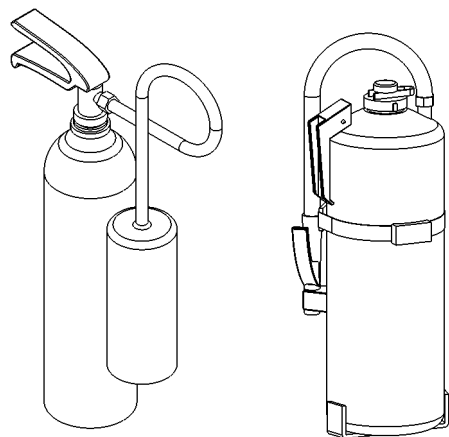


Fig. 6006: Checking seals and inspection due dates on fire extinguishers (illustration of principle)

NOTICE

Unsuitable or broken fire extinguishers!

- ▶ Note the type plate on the fire extinguisher.
 - ▶ Observe national regulations.
-

The guidelines for checking hand extinguishers are nationally regulated.

- ▶ Check the seals and inspection dates on the fire extinguishers.

If the fire extinguishers are missing or the inspection dates have been passed:

- ▶ Replace the fire extinguishers or have them inspected.

9.30 Personal protective equipment

9.30.1 Checking personal protective gear



WARNING

Inadequate protection!

- ▶ Observe the manufacturer's guidelines on care and maintenance of the protective gear.
 - ▶ Do not repair protective gear yourself.
-

- ▶ Check that the personal protective gear is in place, intact and complete ([For more information see: 2.4 Personal protective equipment, page 580](#)).

If the personal protective gear is not present, damaged, or incomplete:

- ▶ Complete the personal protective gear.
- ▶ Clean the personal protective gear.
- ▶ Have the personal protective gear cleaned.

9.31 Safety signs

9.31.1 Checking that all required safety labels are mounted on the machine and are legible

- ▶ Check safety labels to ensure they are complete and legible.

If safety labels are not complete or illegible:

- ▶ Complete the safety labels.
- ▶ Clean or replace safety labels.

9.32 Access systems and railings

9.32.1 Checking ladders, steps, platforms, and ascents for wear, damage and anti-slip surfaces



WARNING

Insufficient protection of machine operators and maintenance personnel!
Severe injury.

- ▶ Ensure that damaged or worn ladders, steps, platforms, or ascents are not used.
- ▶ Ensure that damaged or worn ladders, steps, platforms, or ascents are repaired immediately.

- ▶ Check ladders, steps, platforms, and ascents for wear, damage and anti-slip surfaces.

If wear or damage are visible on access systems:

- ▶ Repair access systems.

9.32.2 Checking latches and hand rails for wear and damage

- ▶ Check latches and hand rails for wear and damage.

If wear or damage are visible on latches or handrails:

- ▶ Repair latches and hand rails.

9.32.3 Checking the spring tension of railing doors

When releasing the completely opened railing door, the spring tension of the hinges must be strong enough so that the railing door closes on its own and the rubber buffer is pressed onto the stop with some force.



WARNING

Railing door does not close automatically!
Fall from machine.

- ▶ Increase spring tension of railing doors.



WARNING

Railing door closes too tight!
Fall from machine.

- ▶ Decrease spring tension of railing doors.

- ▶ Check spring tension of railing doors.

If the railing door does not close automatically:

- ▶ Increase spring tension of railing door.

If the railing door closes too tight:

- ▶ Decrease spring tension of railing door.

9.32.4 Setting the spring tension of railing doors

Ensure that the following conditions are fulfilled:

- Size 4 pin punch is available.

A pin punch is a tool for knocking through or knocking out split pins, pins or pegs.

Increasing the spring tension of the railing door

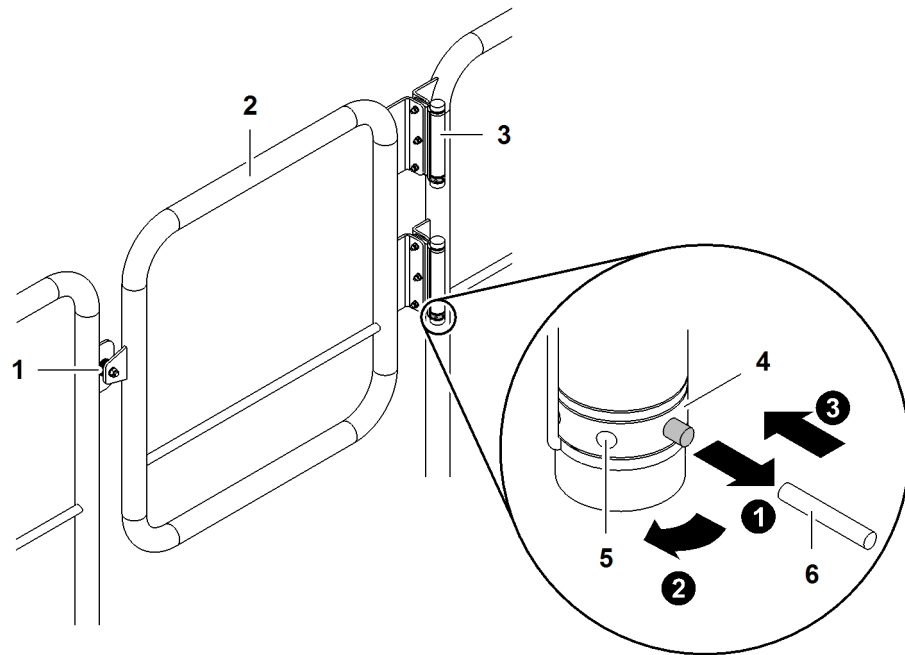


Fig. 6007: Increasing the spring tension of the railing doors

- | | | | |
|---|---------------|---|---------------------------|
| 1 | Rubber buffer | 4 | Spring adjuster ring (2x) |
| 2 | Railing door | 5 | Boring |
| 3 | Hinge (2x) | 6 | Peg |

Spring adjuster rings **3** are located on the hinges **4** and serve to adjust the spring tension.

- ▶ Insert pin punch at hinge **5** boring **3**.
- ▶ Turn spring adjuster ring **4** clockwise.
 - ▷ Peg **6** is relieved.
- ▶ Remove peg **6**.
- ▶ Turn spring adjuster ring **4** clockwise until peg **6** can be reinserted.
- ▶ Insert peg **6**.
- ▶ Remove pin punch.
- ▶ Repeat procedure on all hinges **3**.

Decreasing the spring tension of the railing door

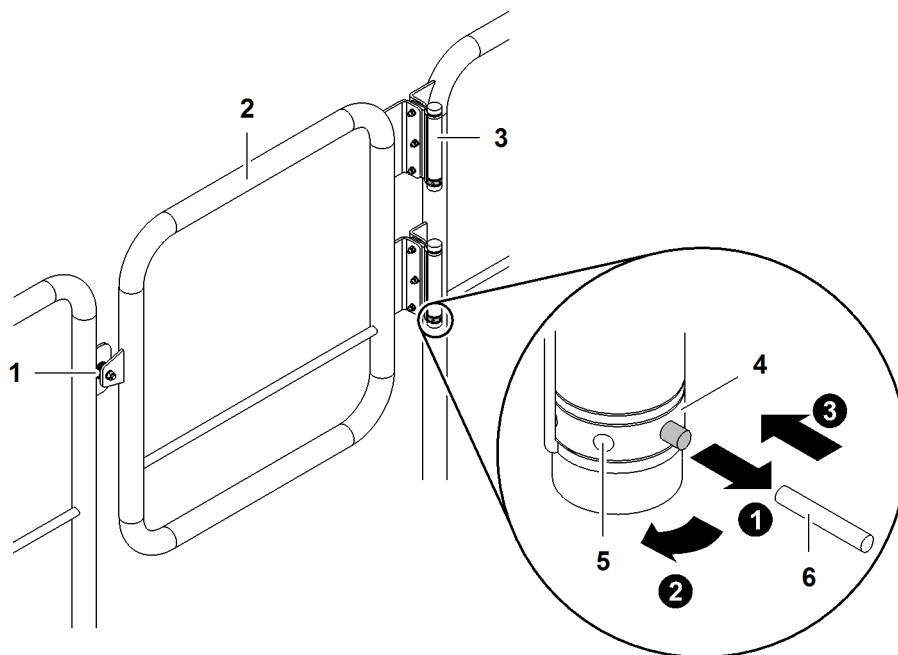


Fig. 6008: Decreasing the spring tension of the railing doors

- | | | | |
|---|---------------|---|---------------------------|
| 1 | Rubber buffer | 4 | Spring adjuster ring (2x) |
| 2 | Railing door | 5 | Boring |
| 3 | Hinge (2x) | 6 | Peg |

- ▶ Insert pin punch at hinge **5** boring **3**.
- ▶ Turn spring adjuster ring **4** clockwise.
 - ▷ Peg **6** is relieved.
- ▶ Remove peg **6**.
- ▶ Turn spring adjuster ring **4** counter-clockwise until peg **6** can be reinserted.
- ▶ Insert peg **6**.
- ▶ Remove pin punch.
- ▶ Repeat procedure on all hinges **3**.

9.32.5 Checking the function of the railing stabilization

Checking the eye bolt of the railing stabilization for tight fit

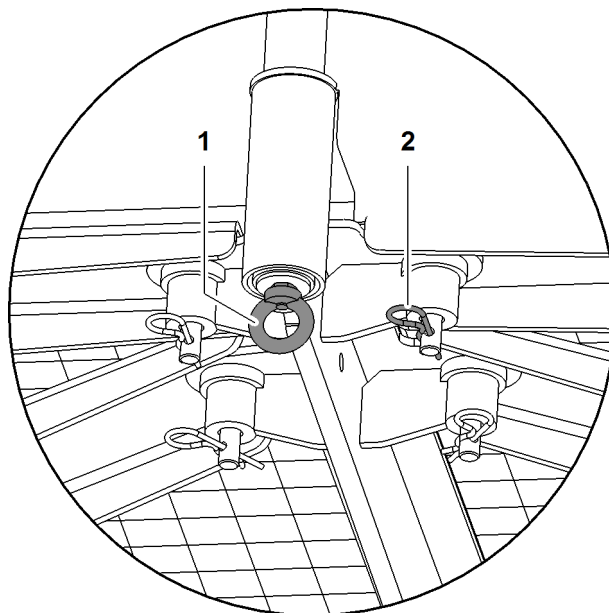


Fig. 6009: Checking the eye bolt of the railing stabilization for tight fit

1 Eye bolt for railing stabilization 2 Spring cotter pin

- ▶ Push screwdriver through eye bolt 1.
- ▶ Turn eye bolt 1 clockwise.

If the eye bolt 1 can be turned:

- ▶ Tighten eye bolt 1.
- ▶ Repeat procedure on all eye bolts 1.

Checking the availability of the spring cotter pin

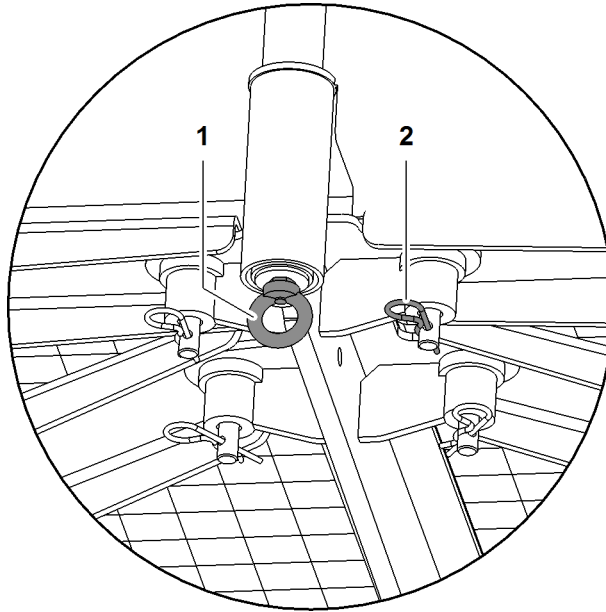


Fig. 6010: Checking the availability of the spring cotter pin

1 Eye bolt for railing stabilization 2 Spring cotter pin

▶ Checking the availability of the spring cotter pin 2.

If no spring cotter pin 2 is available:

▶ Insert spring cotter pin 2.

▶ Repeat procedure with all spring cotter pins 2.

9.33 Steel structure

9.33.1 Checking the machine steel structure for damage, cracks



DANGER

Operating the machine is not permitted if there is damage to the steel structure! Structural breakdown.

▶ Operate machine exclusively with steel structure in perfect condition.

▶ Checking the machine steel structure for damage, cracks.

If cracks or damage is visible on the steel structure of the machine:

▶ Observe instructions for repairs on steel structure ([For more information see: 9.33.2 Repairs on the steel structure, page 2043](#)).

Checking the weld seams and holes

The drawings for checking the weld seams and holes can be found in the "Technical information" volume.

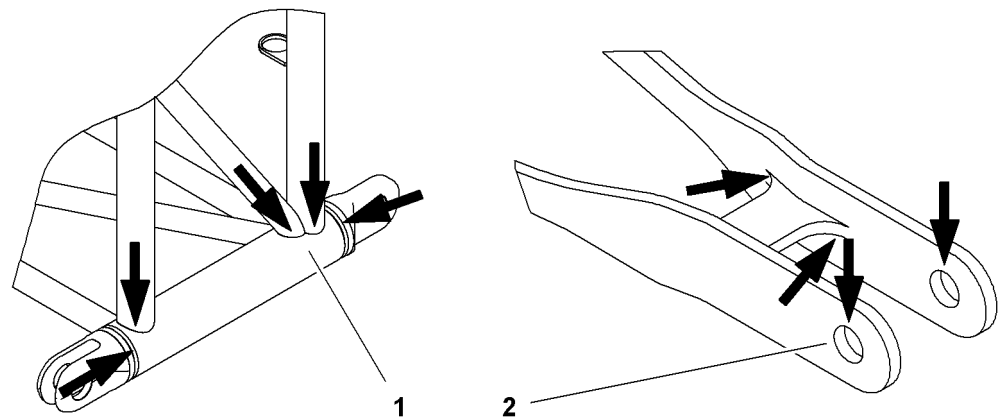


Fig. 6011: Excerpt from the drawings for checking the weld seams and holes

1 Weld seams

2 Holes

All weld seams and holes must be checked. The arrows denote the weld seams and holes that must be checked closely due to the high stresses placed on them.



DANGER

Weld seams are incorrectly or incompletely checked! Structural breakdown.

▶ Check all weld seams.

▶ Check the entire weld seam.

▶ Clean dirt from the weld seams.

▶ Visually check the weld seams for cracks.

If a crack is found:

- ▶ Observe instructions for repairs on steel structure (For more information see: [9.33.2 Repairs on the steel structure, page 2043](#)).
- ▶ Check holes and slots (e.g. on connecting links) for wear, cracks and plastic deformations.

If a hole is damaged:

- ▶ Observe instructions for repairs on steel structure (For more information see: [9.33.2 Repairs on the steel structure, page 2043](#)).

9.33.2 Repairs on the steel structure



DANGER

Inadmissible, improper or unauthorized repairs on the steel structure!
Structural breakdown.

- ▶ Make sure that only Liebherr service personnel or a certified and institutionally authorized person decides whether it is permitted to repair a steel construction. If required, contact Liebherr customer service.
- ▶ Make sure that the repair instructions are requested from the Liebherr customer service and observed.
- ▶ Make sure that only Liebherr service personnel or a certified and institutionally authorized person carries out repairs on the steel construction.

The steel structure is made of high-strength fine grained steel. Each heat treatment, e.g. welding, can alter the structure of the steel and reduce the component strength.



DANGER

Steel parts are welded to the structure without authorisation!
Structural breakdown.

- ▶ Additional parts may only be welded to the steel structure after written approval has been obtained from the manufacturer.

Repair welding requirements



DANGER

Poor welding quality!
Structural breakdown.

- ▶ Observe the international and national safety and accident prevention regulations and the "Principles for the testing of cranes by specialists and experts according to the accident prevention regulations "Cranes" BGV D6 and BGG 905" (formerly: VBG 9)".
- ▶ Repair instructions, specifying the basic material and the relevant welding consumables and auxiliary agents, must be requested from Liebherr after sales service. These instructions must be observed.
- ▶ All necessary non-destructive tests must be carried out and documented.

Ensure that the following conditions are fulfilled:

- Liebherr service personnel or a certified and institutionally authorized person who have passed the corresponding welding qualification tests laid down in EN 287-1 for the material and welding method in question are available.

- ❑ enterprises holding a major qualification certificate according to DIN 18800-7, DIN 15018 and DIN 4132 with the extension for cranes, crane tracks and the following high-strength and highest-strength fine-grained structural steel, have available:
 - Steel sheet S690QL1 W. No. 1.8988
 - Steel sheet S690QL W. No. 1.8928
 - Steel sheet S700MC W. No. 1.8974
 - Tubes S770QL W. No. 1.8938
 - Steel sheet S960QL W. No. 1.8933
 - Steel sheet S960MC W. No. -
- ❑ Manual arc welding certificate E (111) is available.
- ❑ experience in the repair of mobile and crawler cranes with the relevant materials and use of welding processes MAG (135).
- ❑ Repair welding must satisfy the requirements of EN 25817-B.
- ▶ Perform the repair welding in accordance with applicable regulations.

**Note**

- ▶ Request the necessary test loads and boom configurations from Liebherr after sales service.
-
- ▶ Subject the repaired component to a load test.
 - ▶ Document the tests performed in the crane test log.

9.34 Main boom

9.34.1 Checking main boom base section, main boom head and main boom sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear)



DANGER

Machine operation with damaged main boom is prohibited!
Structural failure.

- ▶ Operate machine exclusively with main boom in perfect state.
-

The steel structure of the main boom must undergo a thorough visual inspection according to the maintenance plan or as laid down in national regulations.

If the machine was subject to excess strain as the result of a severe impact or a large number of load cycles, the structural components must be examined immediately and the inspection intervals reduced.

Cracks on the steel structure must be inspected by a person appointed by the owner.

This can be done using the following testing procedures:

- Magnetic particle inspection
- Dye penetrant inspection

The main boom base section, the main boom head and the main boom sections must also be checked for bent or damaged boom pipes of the welded structure.

- ▶ Check main boom base section, main boom head and main boom sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear).

If main boom base section, main boom head or main boom sections are not in perfect state:

- ▶ Observe instructions for repairs on steel structure ([For more information see: 9.33.2 Repairs on the steel structure, page 2043](#)).

9.34.2 Main boom base section: Checking knuckle pins and locking elements for tight fit

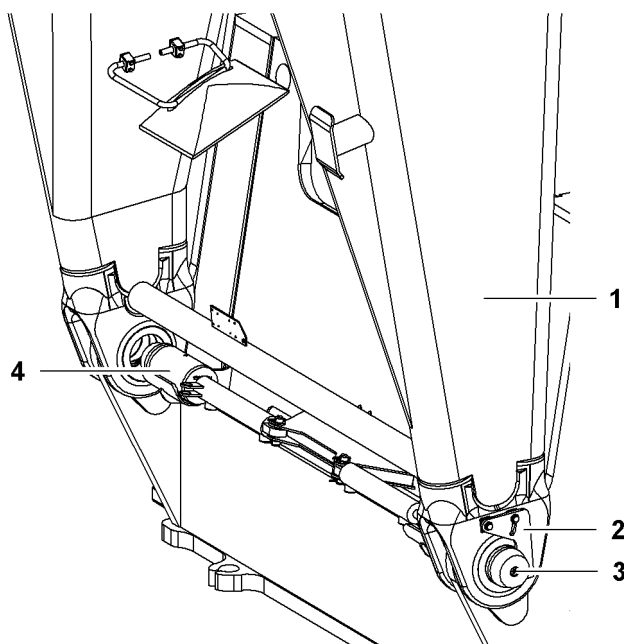


Fig. 6012: Knuckle pins and locking elements on main boom base section

- | | | | |
|---|------------------------|---|--------------------|
| 1 | Main boom base section | 3 | Grease nipple (2x) |
| 2 | Locking element (2x) | 4 | Knuckle pin (2x) |

► Check that the securing elements **2** and knuckle pins **4** fit tightly on both sides.

If locking elements or knuckle pins are loose:

► Attach locking element **2** or knuckle pins **4**.

9.34.3 Main boom base section: Lubricating knuckle pins

Make sure the following conditions are met:

- Grease gun from Liebherr tool kit is available and filled with correct grease ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).

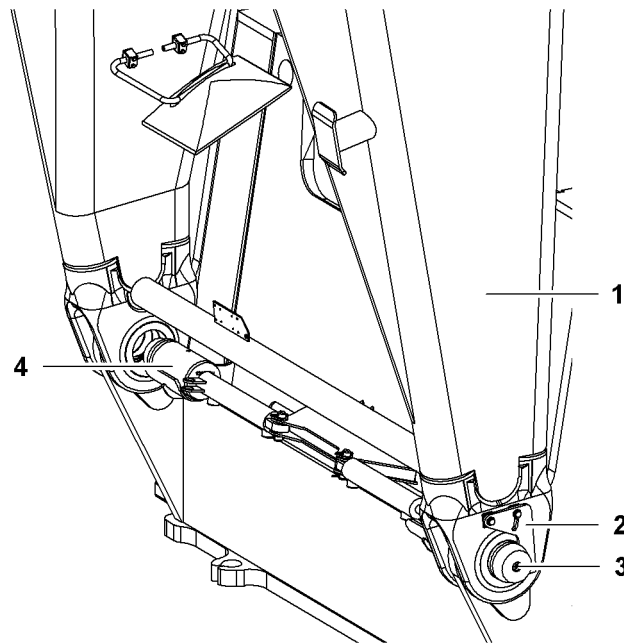


Fig. 6013: Knuckle pins and locking elements on main boom base section

- | | | | |
|---|------------------------|---|--------------------|
| 1 | Main boom base section | 3 | Grease nipple (2x) |
| 2 | Locking element (2x) | 4 | Knuckle pin (2x) |

► Use grease gun to press grease into grease nipple **3** on both sides.

9.34.4 Main boom base section or A-frame1: Checking the function of the mechanical boom angle indicator

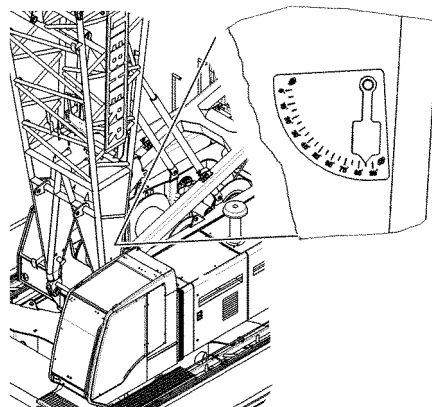


Fig. 6014: Checking the mechanical boom angle indicator on main boom base section or A-frame1

► Check that mechanical boom angle indicator on main boom base section or on A-frame1 is functional.

If the mechanical boom angle indicator is loose:

► Reattach mechanical boom angle indicator.

If the indicator does not move easily:

► Grease indicator attachment.

9.34.5 Checking the main boom head for function and damage

Checking screw connections and pin connections for tight fit

- ▶ Check screw connections and pin connections for tight fit.

If screw connections or pin connections are loose:

- ▶ Tighten screw connections and pin connections.

Checking rope fixing points for tears

- ▶ Check rope fixing points for tears.

If the rope fixing point shows tears:

- ▶ Do not use main boom.
- ▶ Contact Liebherr customer service.

Checking that rope protection and locking springs are present and not damaged

- ▶ Check that rope protection and locking springs are present and not damaged.

If the rope protection or the locking springs are damaged or not in place:

- ▶ Do not use main boom.
- ▶ Contact Liebherr customer service.

9.34.6 Checking the anemometer for tight fit and function

- ▶ Check anemometer for tight fit.

If anemometer is loose:

- ▶ Attach anemometer.

With perfect functioning of the anemometer, the current wind speed is displayed on the *Operation* screen on the monitor.



Fig. 6015: Screen section Wind speed

- ▶ Check wind speed on the *Operation* screen on the monitor.

If a wind speed of 0 m/s (0 ft/s) is permanently displayed on the monitor:

- ▶ Check anemometer for mechanical and electronic damage.

9.34.7 Checking the auxiliary jib for function and damage

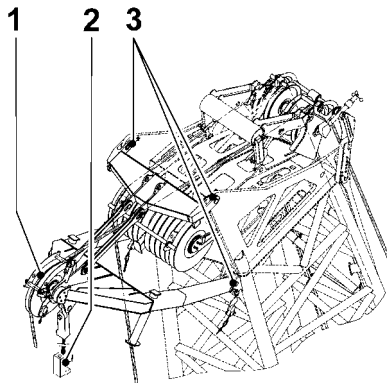


Fig. 6016: Auxiliary jib

- | | |
|---|-----------------------------------|
| <p>1 Rope pulleys</p> <p>2 Hoist limit switch</p> | <p>3 Pins and locking springs</p> |
|---|-----------------------------------|

Checking screw connections and pin connections for tight fit

- ▶ Check screw connections and pin connections for tight fit.

If screw connections or pin connections are loose:

- ▶ Tighten screw connections and pin connections.

Checking rope fixing points for tears

- ▶ Check rope fixing points for tears.

If the rope fixing point shows tears:

- ▶ Do not use auxiliary jib.
- ▶ Contact Liebherr customer service.

Checking that rope protection and locking springs are present and not damaged

- ▶ Check that rope protection and locking springs are present and not damaged.

If the rope protection or the locking springs are damaged or not in place:

- ▶ Do not use auxiliary jib.
- ▶ Contact Liebherr customer service.

9.35 Jib

9.35.1 Checking the jib base section, jib head section and jib sections for damage and wear



DANGER

Machine operation with damaged jib is prohibited!
Structural failure.

- ▶ Operate machine exclusively with jib in perfect state.
-

The steel structure of the jib must undergo a thorough visual inspection according to the maintenance plan or as laid down in national regulations.

If the machine was subject to excessive stress as the result of a severe impact or a large number of load cycles, the bearing components must be examined immediately and the inspection intervals shortened.

Cracks on the steel structure must be inspected by a person appointed by the owner.

This can be done using the following testing procedures:

- Magnetic particle inspection
- Dye penetrant inspection

The jib components should also be checked for bent or damaged tubing of the welded structure.

- ▶ Checking the jib base section, jib head section and jib sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear).

If the jib base section, the jib head section or the jib sections are not in perfect state:

- ▶ Observe instructions for repairs on steel structure ([For more information see: 9.33.2 Repairs on the steel structure, page 2043](#)).

9.35.2 Filling the accumulators for the tilting-back supports on the jib

Make sure the following conditions are met:

- Liebherr tool kit is available.
- The machine operator is in the cabin.
- A helper is available.
- Cabin is tilted downwards.
- Basic machine is next to the jib base section.
- Diesel engine is switched off.

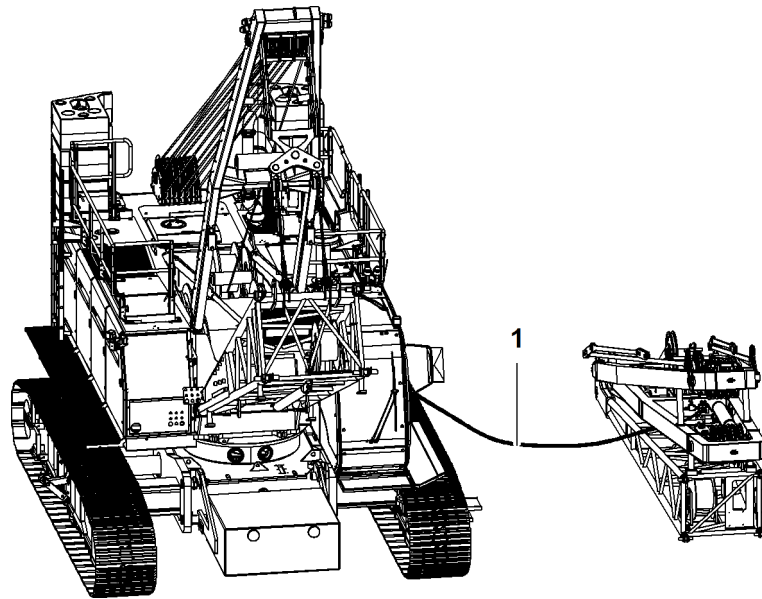


Fig. 6017: Overview filling the accumulator for the tilting-back supports on the jib

1 Hydraulic hose

Preparing the hydraulic hose

Connections of the hydraulic hose:

- Quick-action coupling
- Hydraulic connection with gate valve

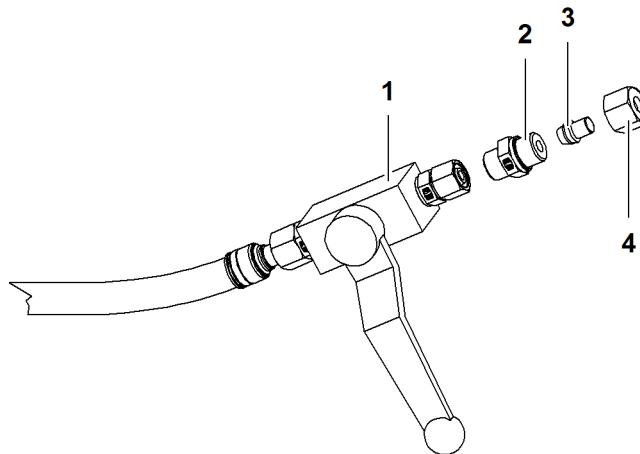


Fig. 6018: Hydraulic connection with gate valve

1 Gate valve hydraulic hose	3 Sealing element
2 Section	4 Nut

- ▶ Undo nut 4.
- ▶ Remove sealing element 3 and section 2.
 - ▷ Hydraulic hose is prepared.

Preparing the valve block of the jib base section

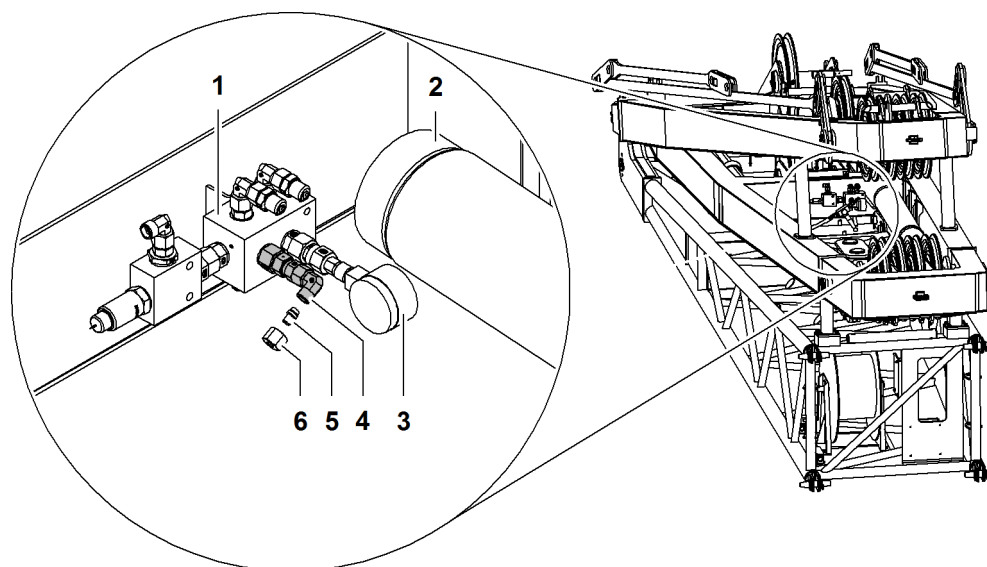


Fig. 6019: Preparing the valve block of the jib base section

- | | | | |
|---|-------------------------------------|---|-----------------|
| 1 | Valve block <i>jib base section</i> | 4 | Connection |
| 2 | Accumulator | 5 | Sealing element |
| 3 | Manometer | 6 | Nut |

- ▶ Undo nut 6.
- ▶ Remove sealing element 5.
 - ▷ Valve block *jib base section* is prepared.

Establishing the connection between the machine and the jib base section

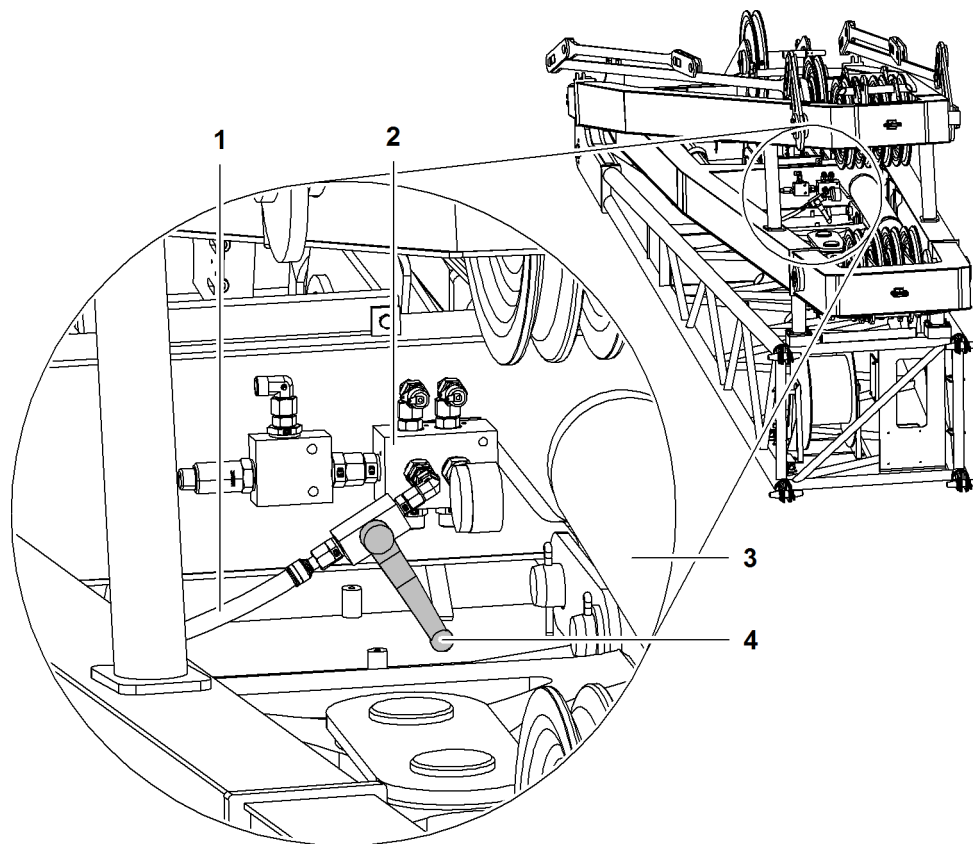


Fig. 6020: Installing the hydraulic hose on the valve block of the jib base section

- | | | | |
|---|-------------------------------------|---|----------------------------------|
| 1 | Hydraulic hose | 3 | Accumulator |
| 2 | Valve block <i>jib base section</i> | 4 | Gate valve <i>hydraulic hose</i> |

- ▶ Close gate valve *hydraulic hose* 4.
- ▶ Connect hydraulic hose 1 with valve block *jib base section* 2.

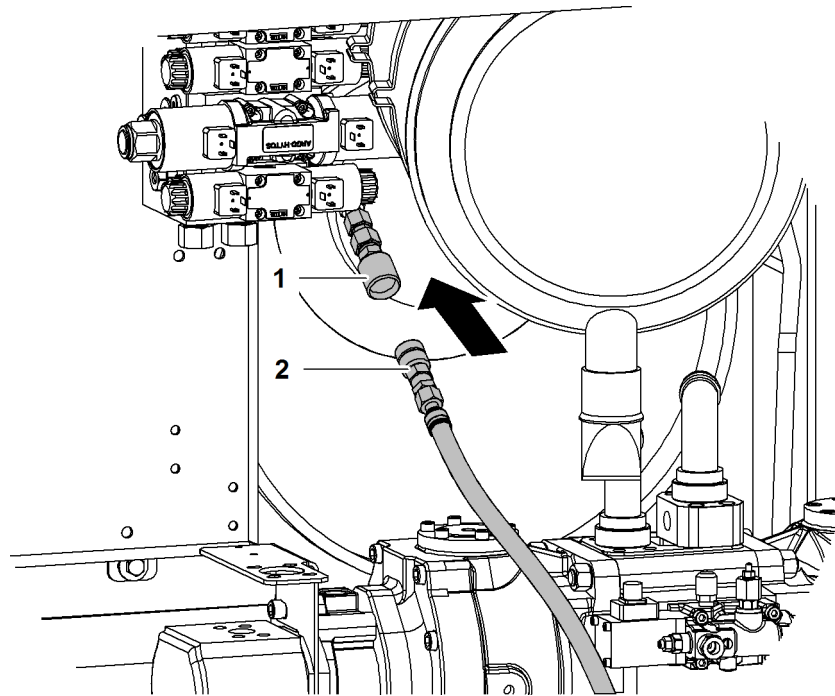
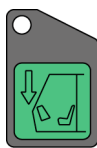


Fig. 6021: Hydraulic valve plate behind the front left uppercarriage door

- | | | | |
|---|------------|---|--------------------------------------|
| 1 | Connection | 2 | Quick-action coupling hydraulic hose |
|---|------------|---|--------------------------------------|

- ▶ Open front uppercarriage door on the left.
- ▶ Remove protective cover from connection 1.
- ▶ Remove protective cover from quick-action coupling hydraulic hose 2.
- ▶ Connect quick-action coupling hydraulic hose 2 with connection 1.
 - ▷ Connection between the machine and the jib base section established.
- ▶ Switch on the diesel engine.

Filling the accumulator



- ▶ Press and hold the button *Cab tilting device down* on control panel X11.

NOTICE

Insufficient pressure in the accumulator of the hydraulic tilting-back supports!
Risk of damage to components.

- ▶ Ensure that the specified pressure for the current ambient temperature is set in the accumulator.
-

The table "Specified pressure in accumulator of hydraulic tilting-back supports" is located on A-frame3.

- ▶ A helper carefully opens the gate valve hydraulic hose until the specified pressure is indicated on the manometer of the jib base section.

When the specified pressure is reached:

- ▶ Close gate valve hydraulic hose.

- ▶ Release the button *Cab tilting device down* button on control panel *X11*.
 - ▷ Specified pressure in the accumulator of the hydraulic tilting-back supports set.

**Note**

Displayed pressure may drop after a short while!

Liebherr recommends:

- ▶ Check the pressure in the accumulator after 1 to 2 minutes and increase the pressure again if applicable.
-

**Note**

Overpressure in the accumulator!

Liebherr recommends:

- ▶ Reduce the pressure.
 - ▶ Release the button *Cab tilting device down* on control panel *X11* when the gate valve *hydraulic hose* is open.
-

**Note**

Hydraulic hose under pressure!

Liebherr recommends:

- ▶ Let go of the button *Cab tilting device down* on control panel *X11* and briefly open gate valve *hydraulic hose*. The hydraulic hose is now without pressure.
-

**Note**

Hydraulic hose is filled with hydraulic oil!

Liebherr recommends:

- ▶ Place hydraulic hose with hydraulic connection with gate valve over a container and carefully open the gate valve *hydraulic hose*.
-

- ▶ Switch off diesel engine.
- ▶ Take off hydraulic hose on both ends.
- ▶ Dispose of hydraulic oil properly.
- ▶ Refit the nut and sealing element on the valve block of the jib base section.
- ▶ Refit nut, section and sealing element on the hydraulic hose.
- ▶ Replace protective cover on quick-action coupling *hydraulic hose*.
- ▶ Replace protective cap of the connection on the hydraulic valve plate.
- ▶ Close uppercarriage door.

9.35.3 Checking locking flaps for ease of movement

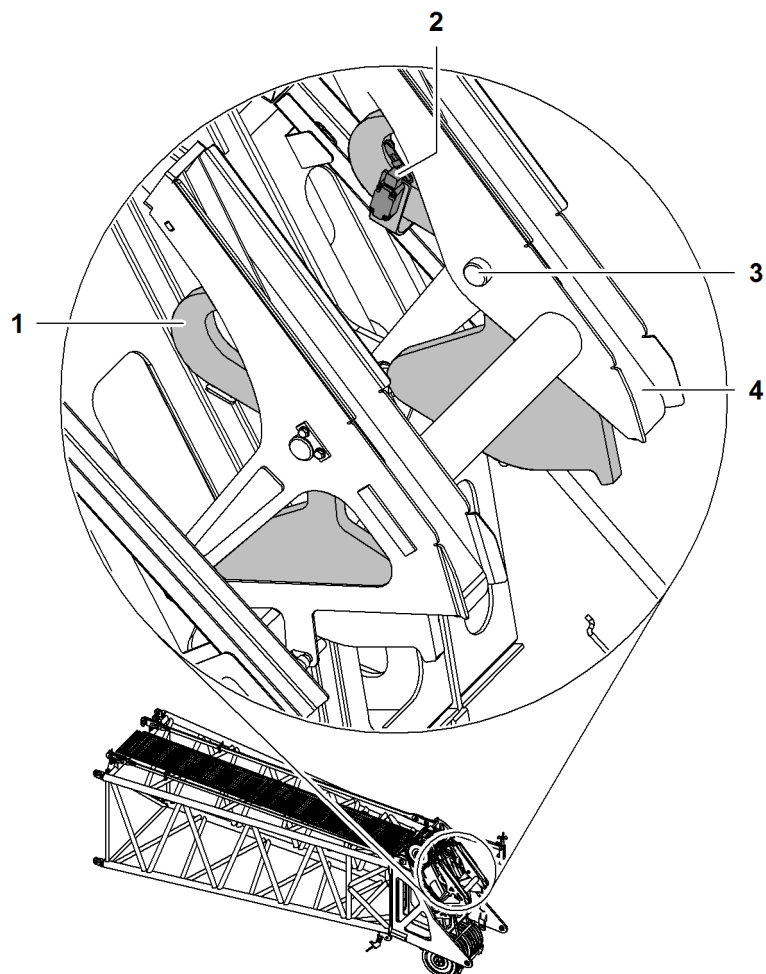


Fig. 6023: Checking locking flaps for ease of movement

- | | | | |
|----------|--|----------|---|
| 1 | Locking flaps (2x) for rigid jib tilting-back supports | 3 | Axis locking flap |
| 2 | Limit switch (2x) for rigid jib tilting-back supports | 4 | Guide rail (2x) for rigid jib tilting-back supports |

If the locking flaps are not adjusted by their inherent weight, erection of the main boom is not possible.

- ▶ Check locking flaps **1** for ease of movement.



Note

Locking flaps are not easy to move!

Liebherr recommends:

- ▶ Work on axis **3** with sandpaper.

If the locking flaps do not move easily:

- ▶ uninstall axis **3** and lubricate.

9.35.4 Jib head section: Checking wheels for ease of movement

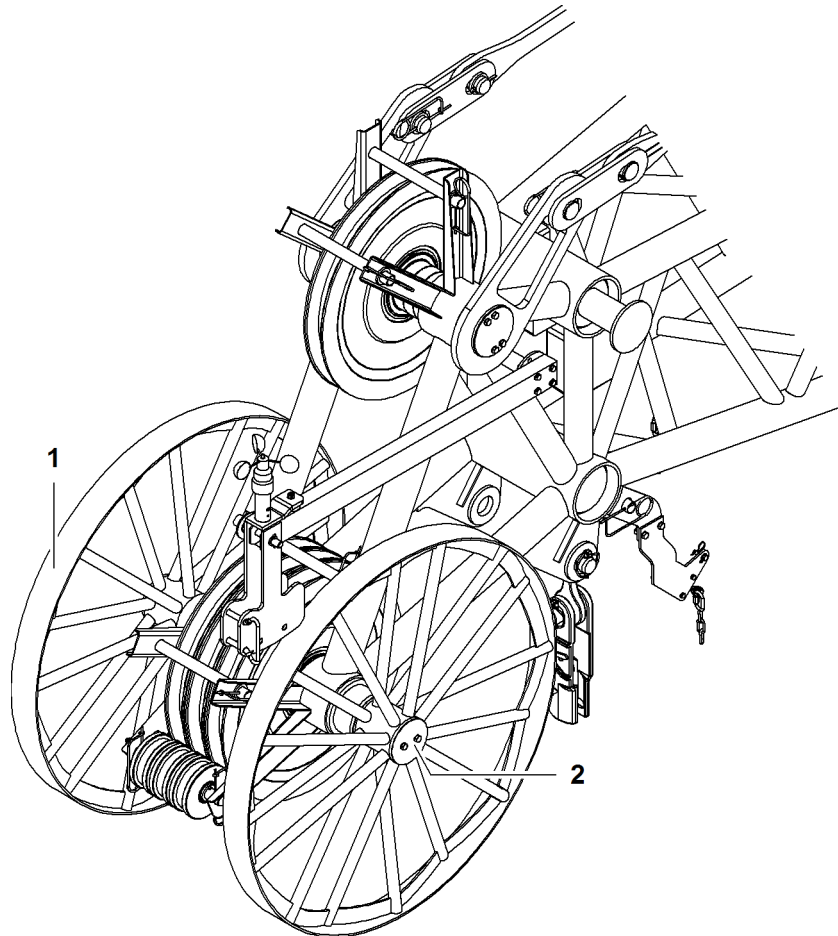


Fig. 6024: Jib head section: Checking wheels for ease of movement

1 Wheel (2x)

2 Wheel bearing

► Check jib head section wheels 1 for free running.



Note

Wheels do not move easily!

Liebherr recommends:

► Work on polymer bearings with sandpaper.

If the wheels do not move easily:

- Undo bearing 2 screws.
- Pull wheels off of polymer bearing.
- Grind out polymer bearing.
- Grease polymer bearing.
- Press wheels onto polymer bearing.

9.35.5 Checking the anemometer for tight fit and function

- ▶ Check anemometer for tight fit.

If anemometer is loose:

- ▶ Attach anemometer.

With perfect functioning of the anemometer, the current wind speed is displayed on the *Operation* screen on the monitor.



Fig. 6025: Screen section Wind speed

- ▶ Check wind speed on the *Operation* screen on the monitor.

If a wind speed of 0 m/s (0 ft/s) is permanently displayed on the monitor:

- ▶ Check anemometer for mechanical and electronic damage.

9.35.6 Jib base section: Checking screw connections and pin connections for tight fit, checking that rope protection and locking springs are in place and undamaged

Check screw connections and pin connections for tight fit

- ▶ Check screw connections and pin connections for tight fit.

If screw connections or pin connections are loose:

- ▶ Tighten screw connections and pin connections.

Checking that rope protection and locking springs are present and not damaged

- ▶ Check that rope protection and locking springs are present and not damaged.

If the rope protection or the locking springs are damaged or not in place:

- ▶ do not use jib.
- ▶ Contact Liebherr customer service.

9.36 A-frame1

A-frame 1 and its components must be checked for damage and that it is working correctly.



DANGER

Damaged A-frame 1!
Structural breakdown.

- ▶ Ensure that A-frame 1 and its components are checked by a specialist at least once a year.

As use of the machine increases, so the test cycle becomes shorter:

- ▶ Ensure that A-frame 1 and its components are checked by a specialist at more regular intervals.
- ▶ Document all results.
- ▶ Do not use the A-frame 1 under any circumstances unless it and its component parts are in perfect condition.

9.36.1 Checking A-frame 1

- ▶ Check A-frame 1 for cracks on the traverse bracings and for deformation.

If A-frame 1 shows signs of cracks on the traverse bracings or deformation:

- ▶ Switch off machine.
- ▶ Contact Liebherr after sales service.

9.36.2 Lubricating the bearings on A-frame 1

All grease nipples on A-frame 1 are present on both sides and can be accessed from the interior side.

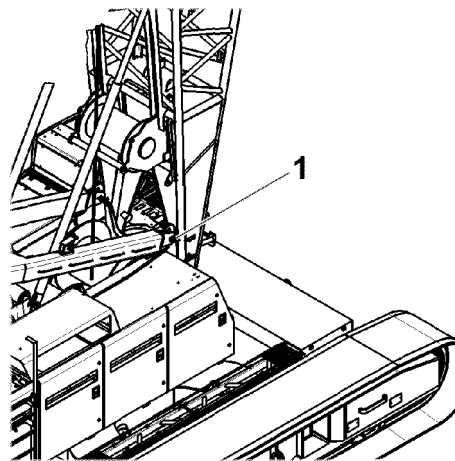


Fig. 6026: Lubricating the bearings on A-frame 1

- 1** Bearings on A-frame 1

Make sure the following prerequisites are met:

- Grease gun from Liebherr tool kit is available and filled with correct grease ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).

- ▶ Remove protective covers.
- ▶ Use the grease gun to press grease into the grease nipple on both sides.
- ▶ Put on protective covers.

9.36.3 Lubricating the bearings on the A-frame1 cylinder

The grease nipples are present on both sides.

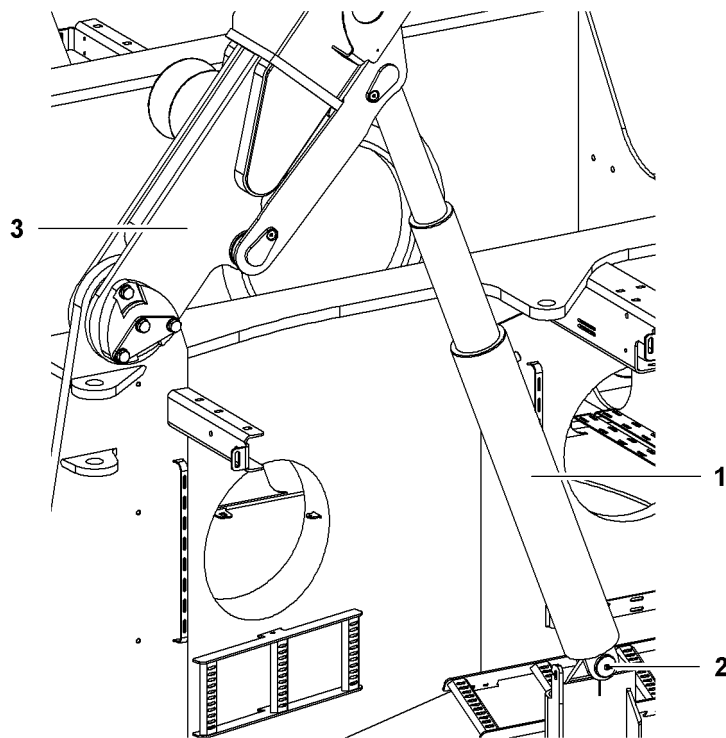


Fig. 6027: Lubricating the bearings on the A-frame1 cylinder

- | | | | |
|---|-------------------|---|----------|
| 1 | A-frame1 cylinder | 3 | A-frame1 |
| 2 | Grease nipple | | |

Make sure the following prerequisites are met:

- Grease gun from Liebherr tool kit is available and filled with correct grease ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
- ▶ Use the grease gun to press grease into the grease nipple **2** on both sides.

9.37 Tilting-back supports

9.37.1 Checking the pressure in the tilting-back support piston area

Make sure the following prerequisites are met:

- The 400 bar (5,801.48 psi) pressure gauge from the Liebherr tool kit is available.
- The machine operator is in the cab.
- The assistant is familiar with the work.
- The machine hydraulic oil is at operating temperature (approx 50 °C (122 °F) to 60 °C (140 °F)).
- The air intake hose between the filter housing and the exhaust turbocharger is in good condition.
- No load is on the hook.
- Diesel engine is switched on.
- Extend tilting-back support cylinder* switch on control panel X12 is preselected.
- The main boom is raised to approximately 75°.
- The safety lever in the cabin has been lowered.

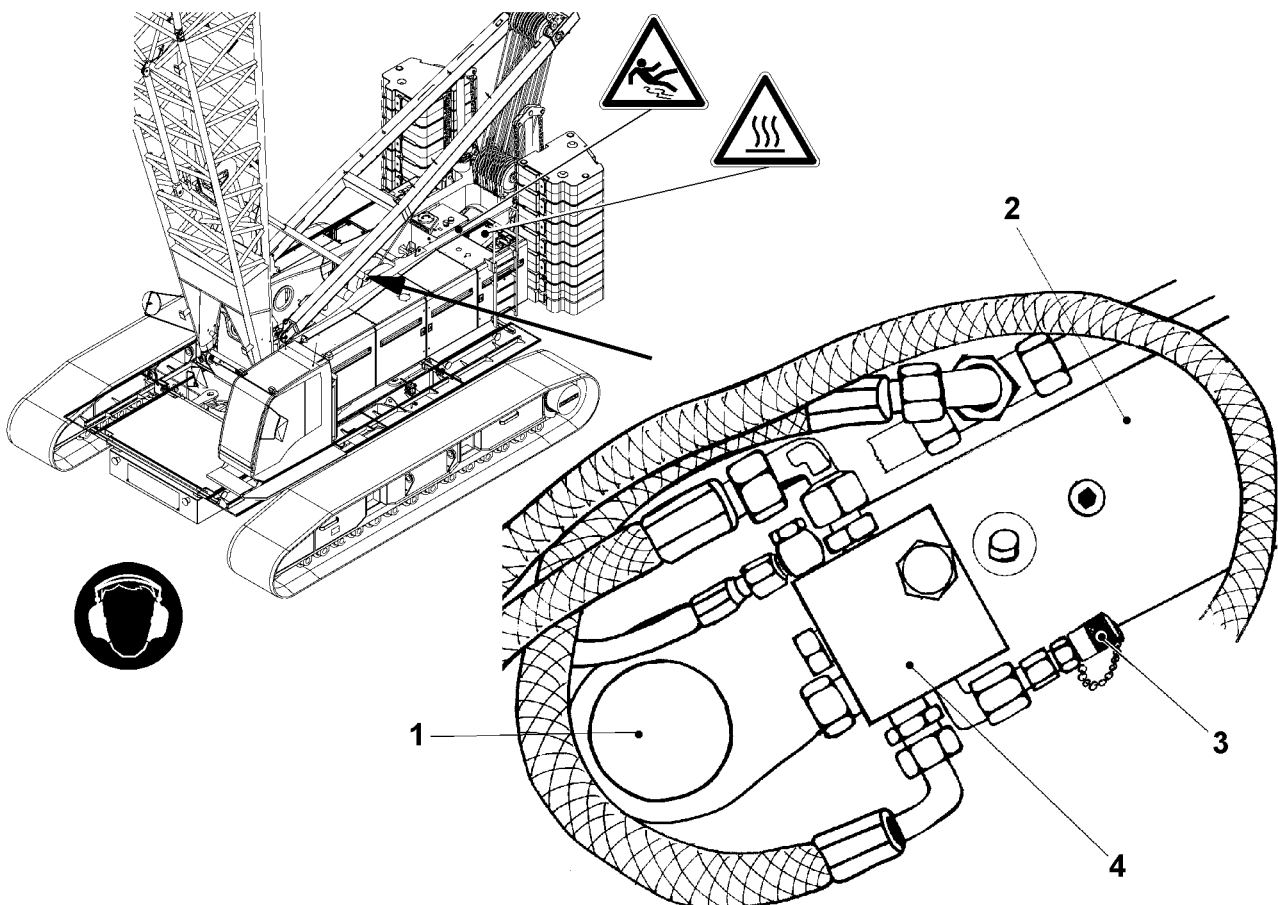


Fig. 6028: Checking the pressure in the tilting-back support piston area

- | | | | |
|---|------------------------------|---|---|
| 1 | Tilting-back support bolting | 3 | Measuring connection for pressure measurement |
| 2 | Tilting-back support | 4 | Valve block |

- ▶ To relieve the strain on the tilting-back supports **2**: lower the main boom until the tilting-back supports **2** are in the middle of the guide rails.

**WARNING**

Hot and slippery surfaces!
Risk of falling off the uppercarriage.

- ▶ Only touch hot surfaces with suitably protected body parts.
- ▶ Secure yourself against falling.

- ▶ Remove the protective cover on the measuring connection **3**.

The pressure in the tilting-back support piston area must correspond to the value stipulated in the chart. Maximum deviation of $\pm 20\%$ is admissible.

Machine type	Nominal value
LR 1002	90 bar 1,305.33 psi
LR 1003	90 bar 1,305.33 psi
LR 1004	150 bar 2,175.56 psi
LR 1005	132 bar 1,914.49 psi
LR 1006	132 bar 1,914.49 psi

Tab. 651: Stipulated pressure in the tilting-back support piston area

- ▶ Connect the pressure gauge to the measuring connection **3**.
 - ▷ The gauge displays the pressure.

**DANGER**

Tilting-back support is used with excessive/inadequate pressure in the piston area!
Wrong calculation of load moment limiter, toppling of machine, structural failure.

- ▶ Switch off machine.
- ▶ Contact Liebherr after sales service.

If the pressure displayed is outside of the permitted range:

- ▶ Switch off the machine and contact Liebherr after sales service.
- ▶ Remove the pressure gauge.
- ▶ Fit the protective cover to the measuring connection **3** again.

A measurement must be taken on each tilting-back support cylinder.

- ▶ Repeat the measurement on the opposite side.

9.38 Steel pendant straps

Steel pendant straps are sensitive components and must be checked for proper functioning and/or damage.



DANGER

Damaged steel pendant straps!
Structural breakdown.

- ▶ Make sure that a specialist checks all steel pendant straps at least once a year.

As use of the machine increases, so the test cycle becomes shorter:

- ▶ Make sure that a specialist checks all steel pendant straps additionally.
 - ▶ Document all results.
 - ▶ Only use perfectly functioning steel pendant straps.
 - ▶ Replace damaged or faulty steel pendant straps with new Liebherr steel pendant straps.
-

NOTICE

Inadmissible welding on steel pendant straps!
Damage to steel pendant straps.

- ▶ Do not weld on steel pendant straps.
-

9.38.1 Checking steel pendant straps and pins for damage and wear and check that locking springs and split pins are present

Checking steel pendant straps for damage and wear

- ▶ Check steel pendant straps for damage and wear (cracks, notches, corrosion, deformation, etc.).

If the steel pendant straps show damage or wear:

- ▶ replace steel pendant straps.
- ▶ Contact Liebherr after sales service.

Checking the pins for wear and damage

- ▶ Check the pins for damage and wear (cracks, notches, corrosion, deformation, etc.).

If the pins are damaged or show signs of wear:

- ▶ Replace pins.
- ▶ Contact Liebherr after sales service.

Checking the locking elements for wear and damage

- ▶ Check the locking elements (washers, nuts, springs) for damage and wear (cracks, notches, corrosion, deformation, etc.).

If the locking elements (washers, nuts, springs) are damaged or show signs of wear:

- ▶ Replace locking elements.
- ▶ Contact Liebherr after sales service.

9.38.2 Checking the ease of movement of pin connections in the entire pendant strap strand

- ▶ Check ease of movement of pin connections in the entire pendant strap strand.

If pin connections no longer move easily:

- ▶ Restore ease of movement of pin connections.
- ▶ Protect steel pendant straps, connecting links and pins from corrosion ([For more information see: 9.38.3 Protecting steel pendant straps, connecting links and pins from corrosion, page 2064](#)).

9.38.3 Protecting steel pendant straps, connecting links and pins from corrosion

NOTICE

Corrosion of steel pendant straps, connecting links and pins!
Damage to steel pendant straps, connecting links and pins.

- ▶ Make sure that corrosion protection of steel pendant straps, connecting links and pins is ensured.
-

Due to high strain, pay special attention to the anticorrosive coating of the contact surfaces between steel pendant strap, pin and connecting link.

- ▶ Lubricate steel pendant straps, connecting links and pins or spray with anti-corrosion spray.

9.38.4 Checking connecting links for damage and wear

- ▶ Check the connecting links for damage and wear (cracks, notches, corrosion, deformation, etc.).

If the connecting links are damaged or show signs of wear:

- ▶ Replace connecting links.
- ▶ Contact Liebherr after sales service.

9.38.5 Checking tension load cells for damage and wear, checking electricity connections for tight fit

- ▶ Check tension load cells for damage and wear (cracks, notches, corrosion, deformation, etc.).

If tension load cells show damage or wear:

- ▶ Replace tension load cells.
- ▶ Contact Liebherr customer service.
- ▶ Check electricity connections of tension load cells for tight fit.

- If electricity connections of load tension cells are loose:
- ▶ tighten electricity connections of load tension cells.

9.39 Carbon-fibre pendant straps

CF pendant straps are sensitive components and must be checked for proper functioning and/or damage.



DANGER

Damaged CF pendant straps!
Structural breakdown.

- ▶ Ensure that a specialist checks all CF pendant straps at least once a year.

As use of the machine increases, so the test cycle becomes shorter:

- ▶ Ensure that a specialist checks all CF pendant straps additionally.
 - ▶ Document all results.
 - ▶ Only use perfectly functioning CF pendant straps.
 - ▶ Replace damaged or faulty CF pendant straps with new Liebherr CF pendant straps.
-

The permanent operating temperature of the CF pendant straps is -40 °C (-40 °F) to 80 °C (176 °F).

For short periods (around 10 minutes) temperatures up to 120 °C (248 °F) are permissible.

In a steam-saturated atmosphere a temperature of 80 °C (176 °F) should not be exceeded for a prolonged period.

NOTICE

Inadmissible welding on CF pendant straps!
Damage to CF pendant straps.

- ▶ Do not weld on CF pendant straps.
-

Since 04/2010 a new generation (Generation B) of carbon-fibre pendant straps has been available.



Fig. 6029: Generation A and generation B of the CF pedant straps

A Generation A of carbon-fibre pendant straps

B Generation B of carbon-fibre pendant straps

Maintenance of all carbon-fibre pendant straps is identical.

9.39.1 Checking CF pendant straps and pins for damage and wear and check that locking springs and split pins are present

Checking CF pendant straps for wear of the protective coating and/or wire mesh hose and checking for damage to fibers

The protective sheath or wire mesh hose may be damaged by incorrect use or by being pushed against something.



Fig. 6030: Damage to the protective sheath

The CF pendant straps may be temporarily strained.

- ▶ Check CF pendant straps for wear of the protective coating and/or wire mesh hose and check for damage to fibers.

If the underlying circumferential windings are undamaged:

- ▶ Contact Liebherr after sales service.

A repair kit is available from Liebherr after sales service if the protective sheath of carbon-fiber pendant straps needs repairing.

If the CF pendant straps show damaged fibers:

- ▶ Replace CF pendant straps.
- ▶ Contact Liebherr after sales service.

Checking the bushes of CF pendant straps



Fig. 6031: Parallel flanges

The bushes must be circular on the inside and flat on the outside.

- ▶ Before assembly bushes must always be checked with a caliper gage to ensure that the flanges are parallel.

If the flanges on the bushes are not parallel:

- ▶ Replace CF pendant straps.
- ▶ Contact Liebherr after sales service.



Fig. 6032: Crack on a bush

- ▶ Before assembly, bushes must always be checked for cracks, corrosion (fretting corrosion) and deformation.

If bushes are showing signs of cracks, corrosion (fretting corrosion) or deformation:

- ▶ Replace CF pendant straps.
- ▶ Contact Liebherr after sales service.

Checking pins for damage and wear

- ▶ Check pins for damage and wear (cracks, notches, corrosion, deformation, etc.).

If pins show damage or wear:

- ▶ Replace pins.
- ▶ Contact Liebherr after sales service.

Checking locking elements for damage and wear

- ▶ Check locking elements (washer, nut, spring) for damage and wear (cracks, notches, corrosion, deformation, etc.).

If the locking elements (washers, nuts, springs) are damaged or show signs of wear:

- ▶ Replace locking elements.
- ▶ Contact Liebherr after sales service.

9.39.2 Checking the ease of movement of pin connections in the entire pendant strap strand

- ▶ Check ease of movement of pin connections in the entire pendant strap strand.

If pin connections no longer move easily:

- ▶ Restore ease of movement of pin connections.
- ▶ Protect CF pendant strap bushes, connecting links and pins from corrosion ([For more information see: 9.39.3 Protecting CF pendant strap bushes, connecting links and pins from corrosion, page 2069](#)).

9.39.3 Protecting CF pendant strap bushes, connecting links and pins from corrosion

NOTICE

Corrosion of CF pendant strap bushes, connecting links and pins!

Damage to CF pendant strap bushes, connecting links and pins.

- ▶ Make sure that corrosion protection of CF pendant strap bushes, connecting links and pins is ensured.
-

Due to high strain, pay special attention to the anticorrosive coating of the contact surfaces between the bushes of the CF pendant strap, pin and connecting link.

- ▶ Lubricate CF pendant strap bushes, connecting links and pins or spray with anti-corrosion spray.

9.39.4 Checking connecting links for damage and wear

- ▶ Check connecting links for damage and wear (cracks, notches, corrosion, deformation, etc.).

If the connecting links are damaged or show signs of wear:

- ▶ Replace connecting links.
- ▶ Contact Liebherr after sales service.

9.39.5 Checking tension load cells for damage and wear, checking electricity connections for tight fit

- ▶ Check tension load cells for damage and wear (cracks, notches, corrosion, deformation, etc.).

If tension load cells show damage or wear:

- ▶ Replace tension load cells.
- ▶ Contact Liebherr customer service.
- ▶ Check electricity connections of tension load cells for tight fit.

If electricity connections of the load tension cells are loose:

- ▶ tighten electricity connections of load tension cells.

9.40 Pendant ropes

9.40.1 Check pendant ropes and pins for damage and wear and check that locking springs and cotter pins are present (cracks, notches, corrosion, plastic deformation, wear, lubrication, etc.)

Checking pendant ropes for damage and wear

- ▶ Check pendant ropes for damage and wear (cracks, notches, corrosion, deformation, etc.).

If pendant ropes show damage or wear:

- ▶ Replace pendant ropes.
- ▶ Contact Liebherr customer service.

Checking pins for damage and wear

- ▶ Check pins for damage and wear (cracks, notches, corrosion, deformation, etc.).

If pins show damage or wear:

- ▶ Replace pins.
- ▶ Contact Liebherr customer service.

Checking locking elements for damage and wear

- ▶ Check locking elements (washer, nut, spring) for damage and wear (cracks, notches, corrosion, deformation, etc.).

If locking elements (washer, nut, spring) show damage or wear:

- ▶ Replace locking elements.
- ▶ Contact Liebherr customer service.

9.40.2 Protecting pendant ropes, connecting links and pins from corrosion

NOTICE

Corrosion of pendant ropes, connecting links and pins!

Damage to pendant ropes, connecting links and pins.

- ▶ Make sure that corrosion protection of pendant ropes, connecting links and pins is ensured.
-

Due to high strain, pay special attention to the anticorrosive coating of the contact surfaces between pendant rope, pin and connecting link.

- ▶ Lubricate pendant ropes, connecting links and pins or spray with anti-corrosion spray.

9.40.3 Checking connecting links for damage and wear

- ▶ Check connecting links for damage and wear (cracks, notches, corrosion, deformation, etc.).

If connecting links show damage or wear:

- ▶ Replace connecting links.
- ▶ Contact Liebherr customer service.

9.41 Counterweight

9.41.1 Checking the screws of the rear counterweight tie-down for tight fit (with exception of LR 1001.xx.xx)

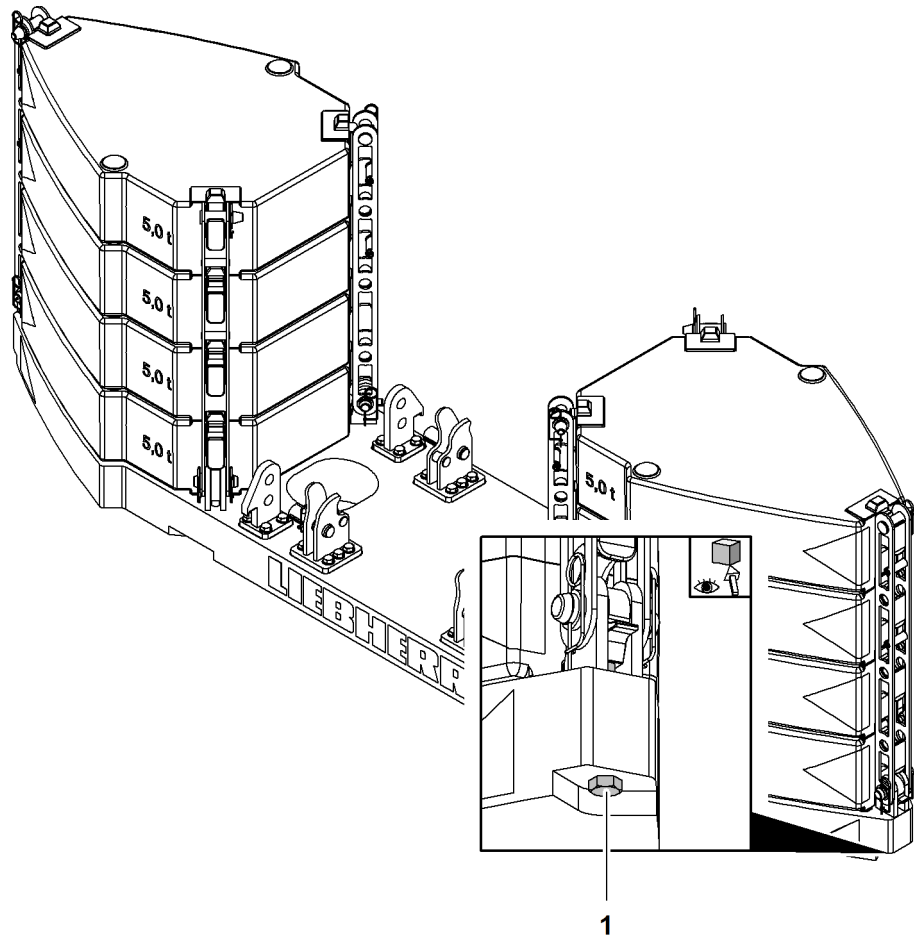


Fig. 6033: Checking the screws of the rear counterweight tie-down for tight fit (illustration of principle)

1 Screw (6x)

The screws 1 of the rear counterweight tie-down must be tightened finger-tight with a wrench.

► Check the screws 1 of the rear counterweight tie-down for tight fit.

If the screws 1 of the rear counterweight tie-down are loose:

► Tighten screws 1 hand-tight with a wrench.

9.41.2 Checking the rear counterweight, fixing lugs and round steel chains for damage, wear and secure fit

► Check rear counterweight, fixing lugs and round steel chains for damage, wear and secure fit.

If the rear counterweight, fixing lugs and round steel chains are not in perfect condition:

- ▶ Contact Liebherr customer service.

If the rear counterweight, fixing lugs and round steel chains are loose:

- ▶ Attach rear counterweight, fixing lugs and round steel chains.

9.41.3 Checking locking elements for availability, damage, wear and tight fit

- ▶ Check locking elements (washer, nut, spring) for damage and wear (cracks, notches, corrosion, deformation, etc.).

If locking elements (washer, nut, spring) show damage or wear:

- ▶ Replace locking elements.
- ▶ Contact Liebherr customer service.

9.41.4 Checking counterweight supports (pins, shackles) for damage and wear

- ▶ Check counterweight supports (pins, shackles) for damage and wear (cracks, notches, corrosion, deformation, etc.).

If counterweight supports (pins, shackles) show damage or wear:

- ▶ replace counterweight supports (pins, shackles).
- ▶ Contact Liebherr customer service.

9.42 Lubrication system

9.42.1 Checking the function of the central lubrication system

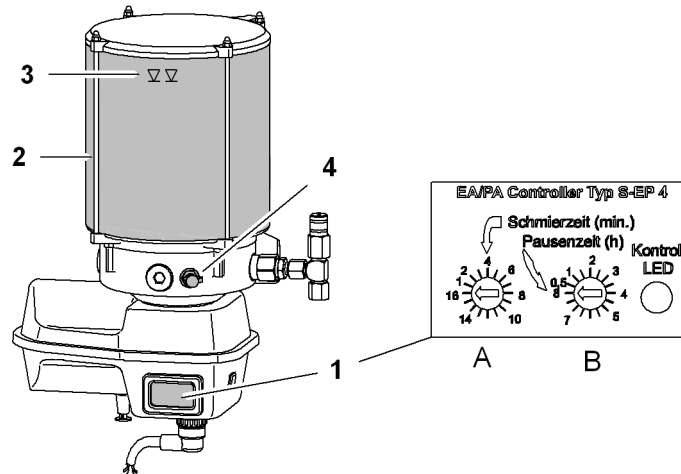


Fig. 6034: Checking the function of the central lubrication system

- | | | | |
|---|-----------------------------|---|--|
| 1 | Control unit | 4 | Filling nipple |
| 2 | Supply container | A | Set lubrication time rotary control knob |
| 3 | "Maximum fill level" marker | B | Set pause time rotary control knob |

The central lubrication system's lubricating pump is located in the uppercarriage.

Ensure that the following conditions are fulfilled:

- Safety lever is lowered.
- Free swing is switched on.

After the diesel engine is switched on, the yellow indicator light lights up for 1.5 seconds, indicating readiness for operation.

An interim lubrication at the programmed lubrication time must take place after the *Interim lubrication* button is pressed on the lubrication pump. After this lubrication time has expired, the lubrication process is switched off and the programmed pause time commences. All further lubrication processes are automatically initiated with the preset times.

- ▶ To check the operation of the central lubrication: Press the *Interim lubrication* button.

If no interim lubrication takes place after pressing the *Interim lubrication* button:

- ▶ Contact Liebherr after sales service.

9.42.2 Check fill level of the lubrication pump

Ensure that the following conditions are fulfilled:

- The grease gun from the Liebherr tool kit is present and filled with grease ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
- The machine is switched off.
- The machine is secured to prevent unauthorised operation.

NOTICE

Incorrect or impure grease!

Damage to machine.

- ▶ To prevent impurities: only fill the supply container with grease via the grease nipple.
 - ▶ Ensure the purity of the grease.
 - ▶ Top up using only the appropriate grease according to the lubrication chart ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
-

NOTICE

Empty grease supply container!

The swing ring and tooth flanks will be insufficiently lubricated and damaged.

Extensive cleaning work and venting work on central lubrication pumps.

- ▶ Ensure that supply containers are permanently topped up.
-

- ▶ Check fill level of the lubrication pump.

If the fill level lies well below the "Maximum fill level" marker:

- ▶ Top up with grease until the "Maximum fill level" marker is reached.

9.42.3 Checking the time intervals of the lubrication pump

Ensure that the following conditions are fulfilled:

- The machine is switched off.
- The machine is secured to prevent unauthorised operation.

Do not adjust the following factory-set time intervals to ensure optimum lubrication:

- Lubrication time: 2 minutes
- Break time: 1 hour

- ▶ Check time intervals of lubrication pump.

If the lubrication pump settings do not match the specifications:

- ▶ Correct the settings to match the appropriate specifications.

9.42.4 Checking the lubrication points

Ensure that the following conditions are fulfilled:

- The machine is switched off.
- The machine is secured to prevent unauthorised operation.

- ▶ Check the lubrication points for sufficient lubrication.

If no grease collars can be seen at the lubrication points:

- ▶ Check the settings of the lubrication pump.
- ▶ Check the lines for damage.
- ▶ Contact Liebherr after sales service.

9.43 Derrick equipment*

9.43.1 Check derrick boom base, derrick boom head and derrick boom sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear)



DANGER

Machine operation with damaged derrick boom is prohibited!
Structural failure.

- ▶ Operate machine exclusively with derrick boom in perfect state.
-

The steel structure of the derrick boom must undergo a thorough visual inspection according to the maintenance plan or as laid down in national regulations.

If the machine was subject to excess strain as the result of a severe impact or a large number of load cycles, the structural components must be examined immediately and the inspection intervals reduced.

Cracks on the steel structure must be inspected by a person appointed by the owner.

This can be done using the following testing procedures:

- Magnetic particle inspection
- Dye penetrant inspection

The derrick boom base, derrick boom head and the derrick boom sections must be checked for bent or damaged boom pipes of the welded structure.

- ▶ Check derrick boom base, derrick boom head and derrick boom sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear).

If the derrick boom base, the derrick boom head or the derrick boom sections are not in perfect state:

- ▶ Observe instructions for repairs on steel structure ([For more information see: 9.33.2 Repairs on the steel structure, page 2043](#)).

9.43.2 Greasing the bearing of the derrick boom base

Ensure the following conditions are met:

- Grease gun from Liebherr tool kit is available and filled with correct grease ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
- Machine is level.
- Machine is secured against unauthorized startup.

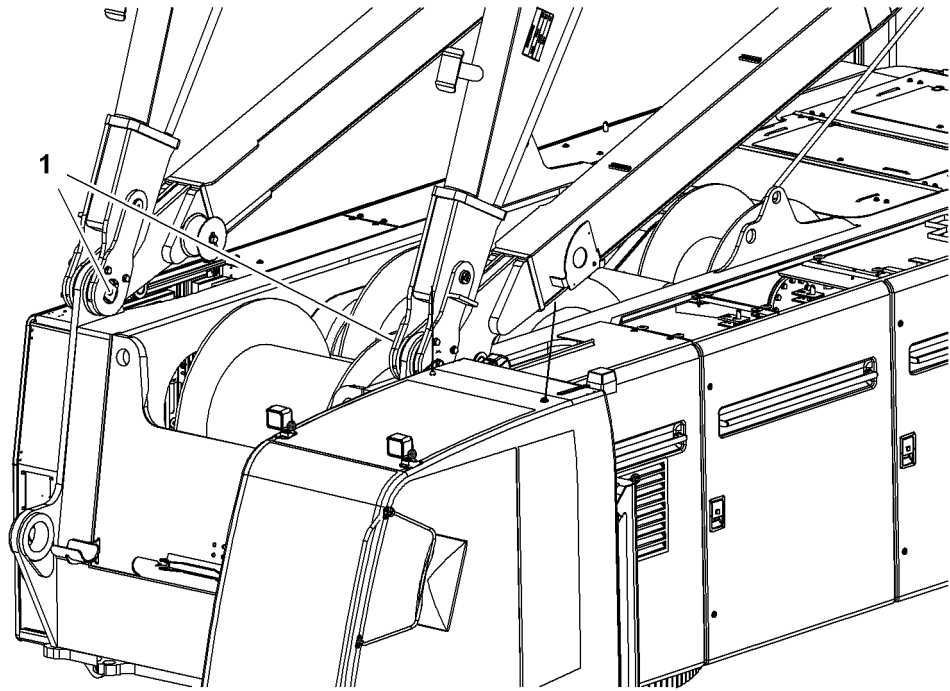


Fig. 6035: Lubricating bearings

1 Grease nipple

► Using the grease gun, press in 10 g (0.02 lb) of grease via grease nipples 1.

9.43.3 Greasing the extension device of the counterweight carriage (strut, uppercarriage pin connection)

Ensure the following conditions are met:

- Grease gun from Liebherr tool kit is available and filled with correct grease (For more information see: [9.2.3 Lubrication chart, page 1949](#)).
- Machine is level.
- Machine is secured against unauthorized startup.
- Grease strut of extension cylinder.
- Using the grease gun, press in 10 g (0.02 lb) of grease via grease nipples (2 to 4).

9.43.4 Checking the air pressure of the counterweight carriage tires

Ensure the following conditions are met:

- Machine is level.
- Machine is secured against unauthorized startup.

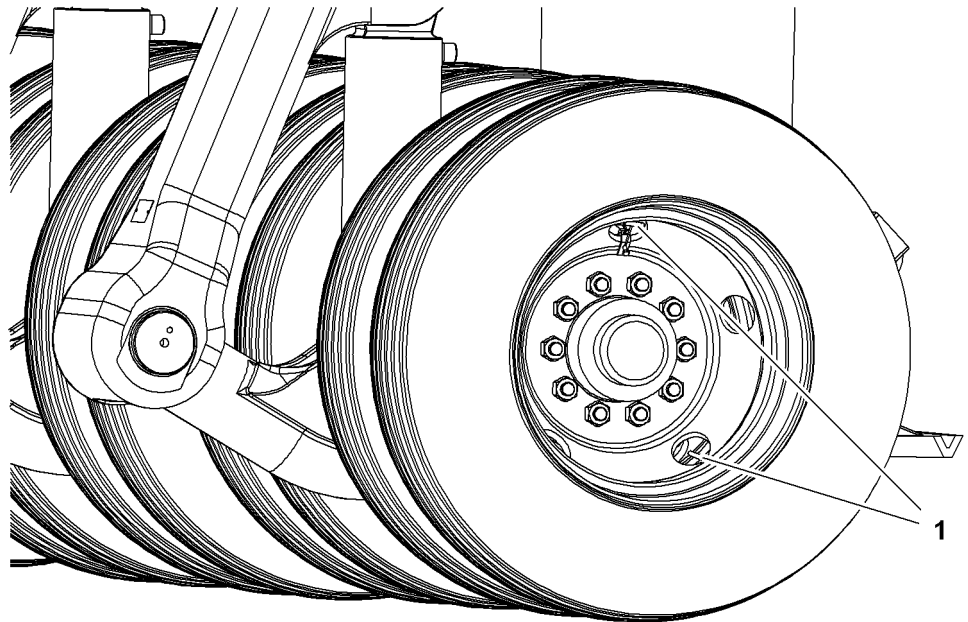


Fig. 6036: Checking the air pressure of the counterweight carriage tires

1 Valves

The tire pressure must be 10 bar (145.04 psi). The tire pressure stated on the tires can be ignored.

- ▶ Check air pressure with suitable compressor on the valves 1.

If the air pressure in the tires is too high:

- ▶ Reduce tire pressure.

If the air pressure in the tires is too low:

- ▶ Increase tire pressure.

9.43.5 Checking the tires of the counterweight carriage for damage

Ensure the following conditions are met:

- Machine is level.
- Machine is secured against unauthorized startup.
- ▶ Check tires for tears in the side wall.
- ▶ Check running surface for penetrated foreign objects.

If the tires are not in perfect state:

- ▶ Contact Liebherr customer service.

9.43.6 Lubricating the axes and swing arms of the counterweight carriage's wheel sets

Ensure the following conditions are met:

- Grease gun from Liebherr tool kit is available and filled with correct grease ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
- Machine is level.
- Machine is secured against unauthorized startup.

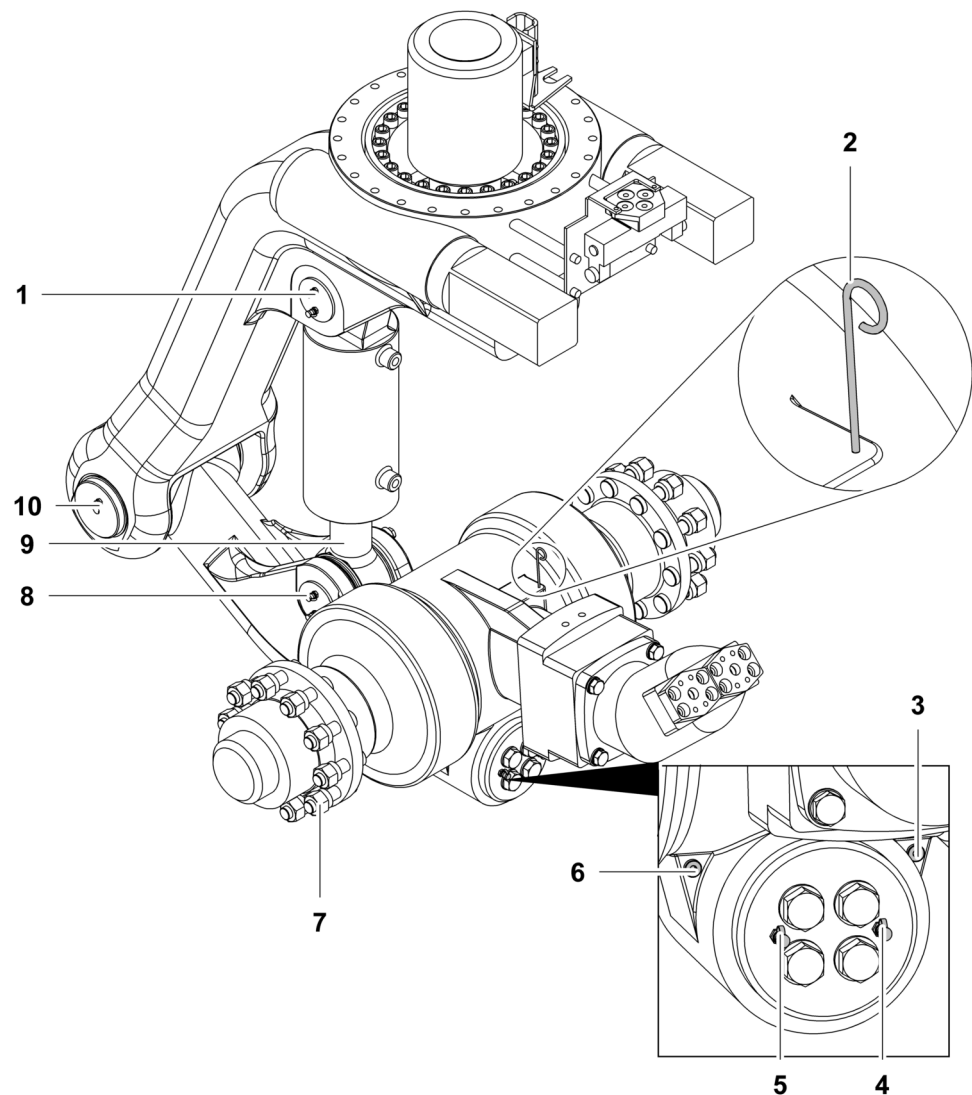


Fig. 6037: Lubricating the axes and swing arms of the counterweight carriage's wheel sets

1	Grease nipple (2x)	6	Oil drain plug
2	Oil dipstick	7	Wheel nut (20x)
3	Oil drain plug	8	Grease nipple (2x)
4	Grease nipple	9	Hydraulic cylinder
5	Grease nipple	10	Grease nipple (2x)

- Using the grease gun, press in 10 g (0.02 lb) of grease via grease nipples 1 + 4 + 5 + 8 + 10.

9.43.7 Lubricating the drive units of the counterweight carriage's wheel sets

Ensure the following conditions are met:

- Grease gun from Liebherr tool kit is available and filled with correct grease (For more information see: [9.2.3 Lubrication chart, page 1949](#)).
- Machine is level.
- Machine is secured against unauthorized startup.

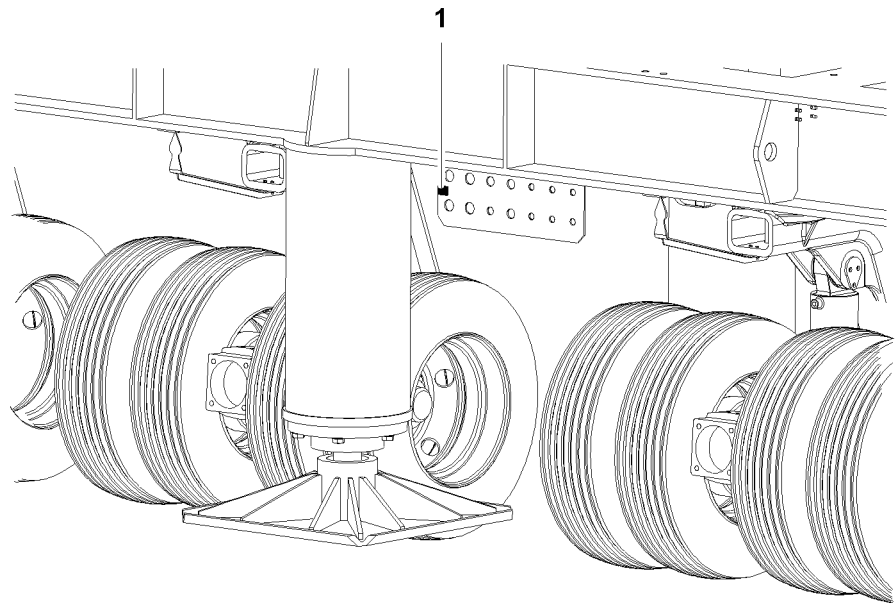


Fig. 6038: Lubricating the drive units of the counterweight carriage's wheel sets

1 Central lubrication point

- ▶ Using the grease gun 10 g (0.02 lb), press in grease through the central lubrication point 1.

9.43.8 Checking the gearbox oil level in the counterweight carriage's axle gearbox

Ensure the following conditions are met:

- Machine is level.
- Machine is secured against unauthorized startup.

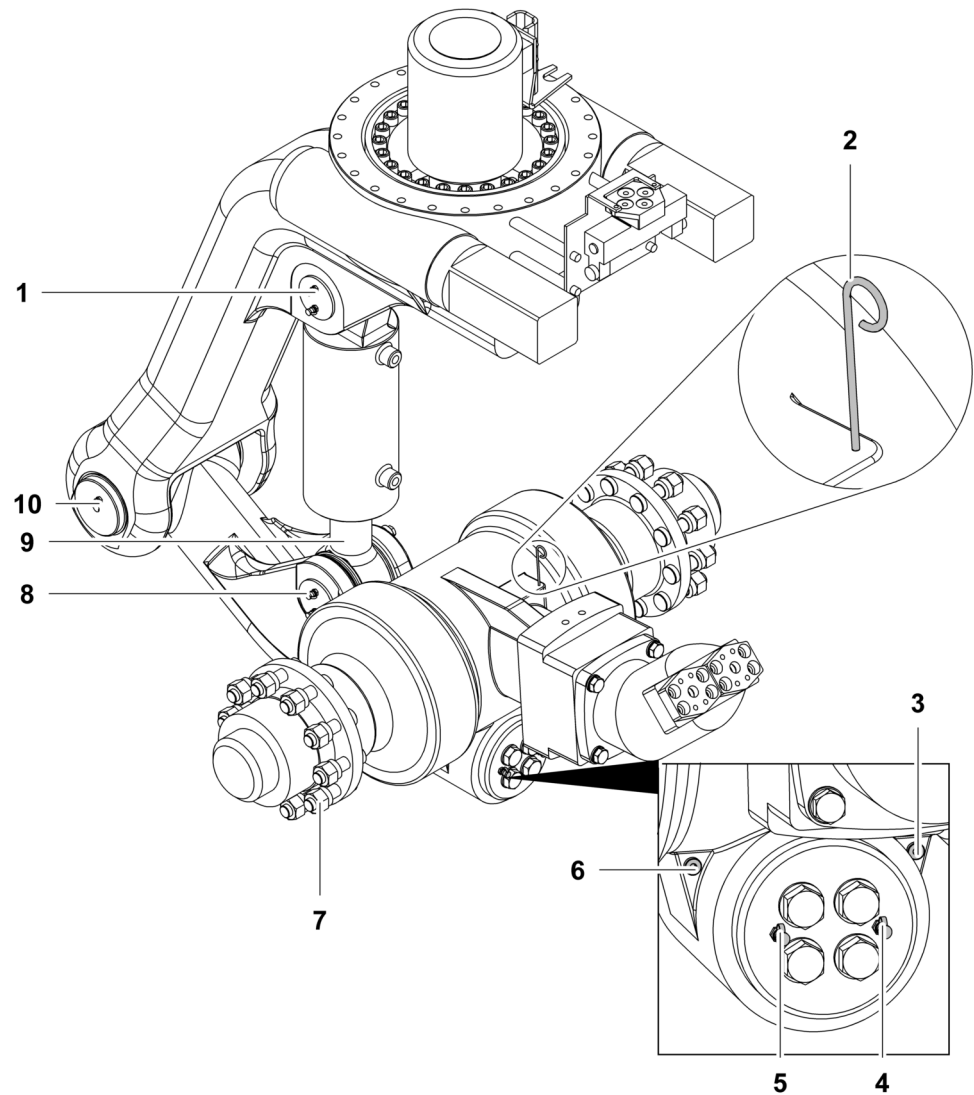


Fig. 6039: Checking the gearbox oil level in the counterweight carriage's axle gearbox

1	Grease nipple (2x)	6	Oil drain plug
2	Oil dipstick	7	Wheel nut (20x)
3	Oil drain plug	8	Grease nipple (2x)
4	Grease nipple	9	Hydraulic cylinder
5	Grease nipple	10	Grease nipple (2x)

► Pull out oil dipstick **2**, clean, reinsert all the way.

► Pull out oil dipstick **2** again and check gearbox oil level.

If gearbox oil level is below the MIN mark:

► Top up using appropriate gearbox oil in accordance with the lubrication chart
(For more information see: [9.43.9 Filling in gearbox oil at the counterweight carriage's axle gearbox, page 2083](#)).

If gearbox oil level is above the MAX mark:

► Drain gearbox oil using drain screw **3 + 6**.

9.43.9 Filling in gearbox oil at the counterweight carriage's axle gearbox

Ensure the following conditions are met:

- Diesel engine has been switched off for 5 minutes.
- Machine is level.
- Machine is secured against unauthorized startup.

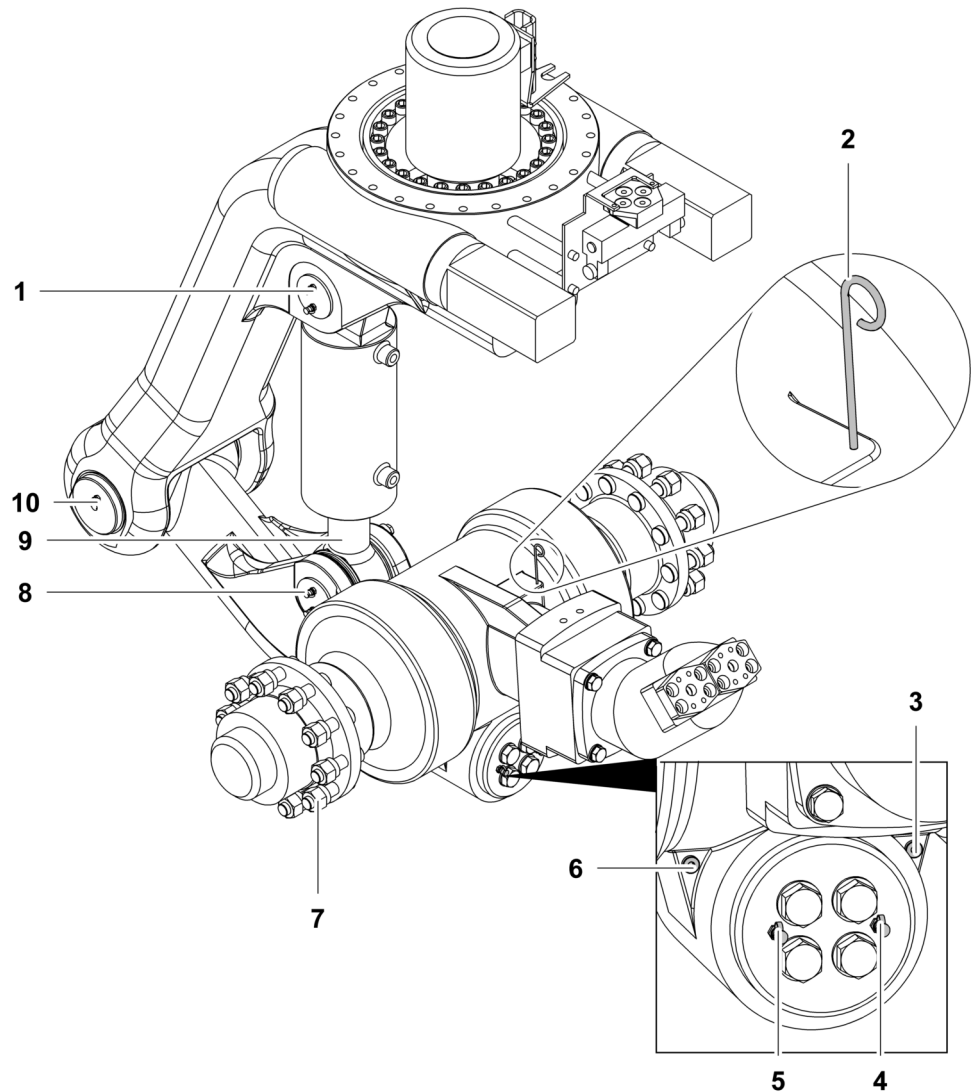


Fig. 6040: Filling in gearbox oil at the counterweight carriage's axle gearbox

- | | | | |
|----------|--------------------|-----------|--------------------|
| 1 | Grease nipple (2x) | 6 | Oil drain plug |
| 2 | Oil dipstick | 7 | Wheel nut (20x) |
| 3 | Oil drain plug | 8 | Grease nipple (2x) |
| 4 | Grease nipple | 9 | Hydraulic cylinder |
| 5 | Grease nipple | 10 | Grease nipple (2x) |

**CAUTION**

Hot gearbox components and gearbox oil!
Burns.

- ▶ Maintenance work and inspection work on axle gearboxes may only be carried out when the machine is switched off and has cooled down.
- ▶ Wear protective equipment.

NOTICE

Dirt and foreign bodies in axle gearbox!
Damage to axle gearbox.

- ▶ Ensure that no dirt or foreign bodies enter the filler neck.
- ▶ Pull out oil dipstick **2**.
- ▶ Pull out oil dipstick **2** again and check gearbox oil level.

NOTICE

Inadmissible or contaminated gearbox oil!
Damage to axle gearbox.

- ▶ Top up using only appropriate gearbox oil according to lubrication chart ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
- ▶ Check purity of gearbox oil.
- ▶ Top up gearbox oil up to MAX mark.
- ▶ Reinsert oil dipstick **2** all the way again.

9.43.10 Checking the hydraulic cylinders of the counterweight carriage's wheel sets for tightness

- ▶ Check hydraulic cylinders of the counterweight carriage's wheel sets for tightness.

If the hydraulic cylinders of the wheel sets are leaky:

- ▶ Do not operate counterweight carriage.
- ▶ Contact Liebherr customer service.

9.43.11 Checking the hydraulic connections on the counterweight carriage for tightness

- ▶ Check hydraulic connections on the counterweight carriage for tightness.

If the hydraulic connections on the counterweight carriage are not tight:

- ▶ Do not operate counterweight carriage.
- ▶ Contact Liebherr customer service.

9.43.12 Checking the screws of the counterweight tie-down for tight fit

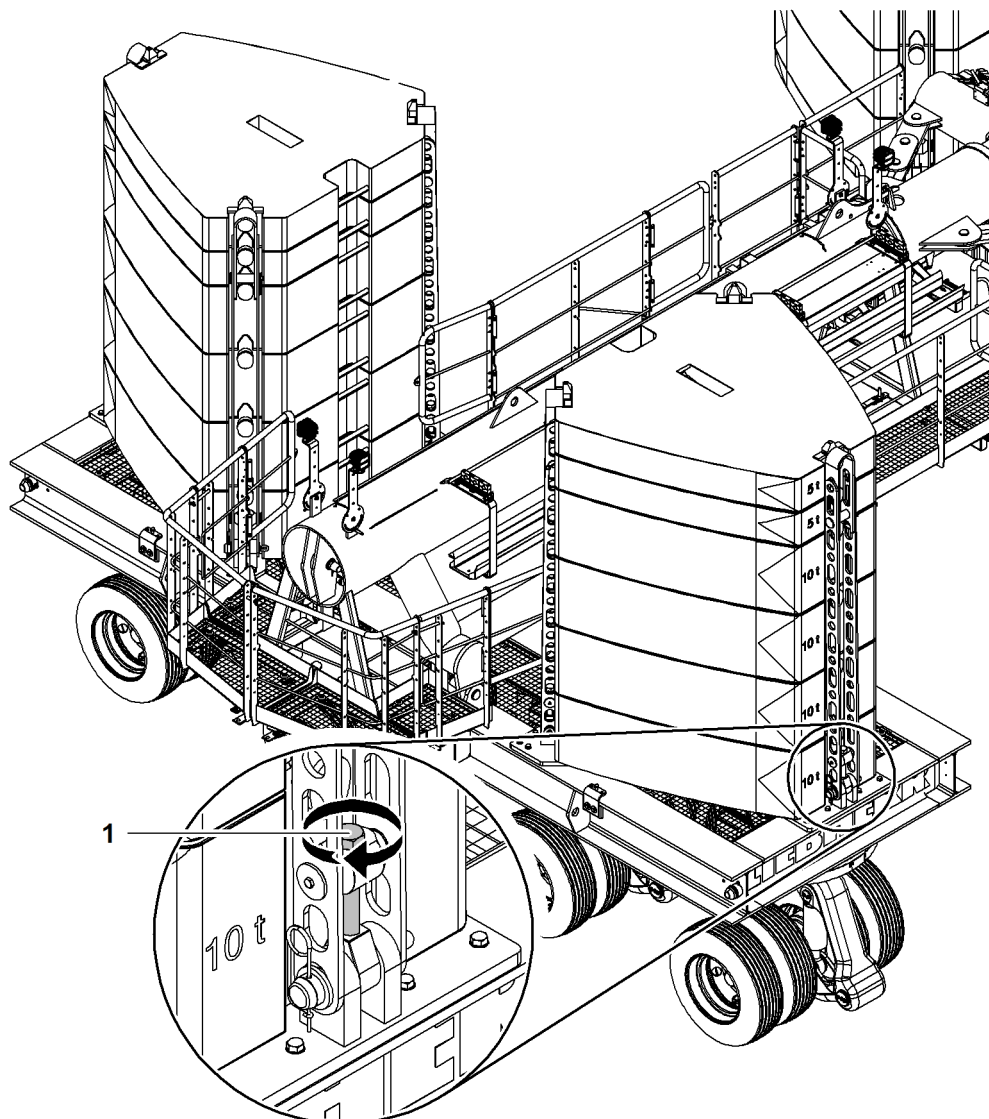


Fig. 6041: Checking the screws of the counterweight tie-down for tight fit

1 Screw (6x)

The screws **1** of the counterweight tie-down must be tightened hand-tight with a wrench.

► Check screws **1** of counterweight tie-down for tight fit.

If the screws **1** of the counterweight tie-down are loose:

► Tighten screws **1** hand-tight with a wrench.

9.44 Ropes

9.44.1 Assembly of a rope

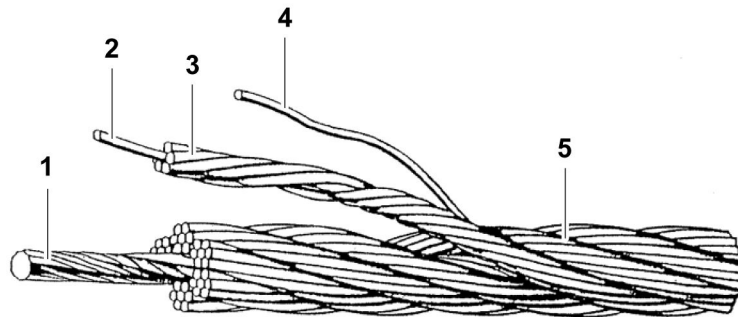


Fig. 6042: Assembly of a rope (illustration of principle)

1	Rope core	4	Wire
2	Strand core	5	Rope
3	Strand		

9.44.2 Visual inspection of the ropes for deterioration or mechanical damage

- ▶ Carry out a visual inspection of the ropes for deterioration or mechanical damage.

If you detect deterioration or mechanical damage:

- ▶ Check ropes for end of service life ([For more information see: 9.44.5 Checking ropes for end of service life, page 2087](#)).

9.44.3 Checking ropes for lubrication

Regular lubrication increases the service life of ropes. The ropes must be relubricated before they show signs of dryness or corrosion.

NOTICE

It is forbidden to operate with non-lubricated ropes!
Ropes may become damaged.

- ▶ Ensure that ropes are lubricated.
-

- ▶ Check ropes for lubrication.

If ropes are insufficiently lubricated:

- ▶ Lubricate ropes ([For more information see: 9.44.4 Rope lubrication, page 2087](#)).

9.44.4 Rope lubrication

NOTICE

Wrong lubricant!
Risk of damage to the rope.

- ▶ Only use lubricants matching the original rope lubrication ([For more information see: 9.2 Lubricants and consumables, page 1945](#)).

-
- ▶ Lubricate ropes.
 - ▶ Lubricate ropes, especially in the bending zones of the drums and pulleys.

**Note**

- ▶ Choose the lubrication intervals for the ropes based on the operating conditions.
-

9.44.5 Checking ropes for end of service life

Notes for regular inspection of the ropes

The following items are of importance for determining the inspection intervals and may shorten inspection intervals:

- National and local regulations that apply in the country of use.
- The environmental conditions to which the machine is exposed.
- The first few weeks after a rope has been put on.
- Results and experiences from previous inspections.
- The length of time the rope has already been in use



DANGER

Rope damage is not noticed!
Load breakaway.

If the machine was not operated for over three months or incidents may have caused damage to the rope:

- ▶ Check rope and end attachments.
-

- ▶ Check each rope over its entire length.

or

A person named by the operator checks the working length and at least five windings on the rope drum.

- ▶ Create a record of the rope inspection.

Crane reference						Rope application					
Rope details..... Brand name (if known) Nominal diameter.....mm Construction..... Core ^a : IWRC FC WSC Wire finish ^a : Uncoated Zinc/Gal. Direction and type of lay ^a : (Right) sZ zZ Z (Left) zS sS S Permissible number of visible broken outer wires in 6d and..... in 30d Reference diameter.....mm Permissible decrease in diameter from reference diameter mm											
Date installed (yy/mm/dd)..... Date discarded (yy/mm/dd).....											
Visible broken outer wires				Diameter			Corrosion	Damage and/or deformation		Position in rope	Overall assessment i.e. combined severity rating ^b at position indicated
Number in length of		Severity rating ^b		Measured diameter	Actual decrease from reference	Severity rating ^b	Severity rating ^b	Nature			
6d	30d	6d	30d	mm	mm						
Other observations/comments Performance to date (cycles/hours/days/months/etc.) Date of inspection (yy/mm/dd)..... Name (print) of competent personName (signature)											
^a Tick as applicable. ^b Describe degree of deterioration as: slight, medium, high, very high, or discard.											

Fig. 6043: Example of an individual report

In case of a degree of severity of 100 %, the rope must be laid down.

These rope changing criteria form part of ISO 4309. They describe the most commonly occurring types of rope wear.

Type of damage	Assessment method
Number of allowable wire breaks	Counting
Check reduction of the rope diameter (only with sections of rope wound as a single-layer on a drum and/or running on a steel pulley.)	Measuring
Strand break	Visual inspection
Corrosion	Visual inspection
Deformation	Visual inspection and measuring
Mechanical damage	Visual inspection
Heat induced damage	Visual inspection

Tab. 652: Discard criteria overview

Check the rope for number of permitted wire breaks

Make sure the following prerequisites are met:

- Machine is switched off.
- Machine is secured against unauthorized start-up.

The table below shows the permitted number of wire breaks relative to a defined control section of the rope.

Single-layer and parallel stranded ropes							
Rope category number (RCN)	Total number of load-bearing wires in the outer strand layers of the rope ^{A)}	Number of visible external wire breaks ^{B)}					
		Rope sections that run on steel sheaves and/or wind around a single-layer winding drum				Rope sections that wind around a multiple-layer winding drum ^{C)}	
		Class M1 to M4 or unknown class ^{D)}				All classes	
		Cross lay		Lang lay		Cross lay and lang lay	
		on a length of 6d ^{E)}	on a length of 30d ^{E)}	on a length of 6d ^{E)}	on a length of 30d ^{E)}	on a length of 6d ^{E)}	on a length of 30d ^{E)}
n							
01	$n \leq 50$	2	4	1	2	4	8
02	$51 \leq 75$	3	6	2	3	6	12
03	$76 \leq 100$	4	8	2	4	8	16
04	$101 \leq 120$	5	10	2	5	10	20
05	$121 \leq 140$	6	11	3	6	12	22
06	$141 \leq 160$	6	13	3	6	12	26
07	$161 \leq 180$	7	14	4	7	14	28
08	$181 \leq 200$	8	16	4	8	16	32

Single-layer and parallel stranded ropes							
Rope category number (RCN)	Total number of load-bearing wires in the outer strand layers of the rope ^{A)} n	Number of visible external wire breaks ^{B)}					
		Rope sections that run on steel sheaves and/or wind around a single-layer winding drum				Rope sections that wind around a multiple-layer winding drum ^{C)}	
		Class M1 to M4 or unknown class ^{D)}				All classes	
		Cross lay		Lang lay		Cross lay and lang lay	
		on a length of 6d ^{E)}	on a length of 30d ^{E)}	on a length of 6d ^{E)}	on a length of 30d ^{E)}	on a length of 6d ^{E)}	on a length of 30d ^{E)}
09	201 ≤ 220	9	18	4	9	18	36
10	221 ≤ 240	10	19	5	10	20	38
11	241 ≤ 260	10	21	5	10	20	42
12	261 ≤ 280	11	22	6	11	22	44
13	281 ≤ 300	12	24	6	12	24	48
	n > 300	0.04 x n	0.08 x n	0.02 x n	0.04 x n	0.08 x n	0.16 x n

PLEASE NOTE: In this table, ropes with Seale-type outer strands, which have 19 wires or less per strand (e.g. 6 □ x 19 Seale), are placed two lines above that row in which the type would normally be listed due to the number of load-bearing wires in the outer strands.

Tab. 653: Reached or exceeded number of visible wire breaks occurring in single-layer and parallel strand ropes indicating that the rope must be discarded

- A) For the purposes of this international standard, filler wires are not considered as load-bearing wires and are not contained in the value n.
- B) A broken wire has two ends (counted as one wire).
- C) The values apply for damage in the cross-over zones and overlays of windings due to deflection angles (not for rope sections that only run on pulleys and do not wind up on drums).
- D) Twice the number of broken wires listed may be applied to ropes on mechanisms of the group M5 to M8.
- E) d = nominal rope diameter.

Non-rotating ropes					
Rope category number (RCN)	Total number of load-bearing wires in the outer strands of the rope ^{A)} n	Number of visible breaks in outer wires ^{B)}			
		Rope sections that run on steel pulleys and/or wind on a single-layer winding drum (random distribution of the wire breaks)		Rope sections spooling on a multi-layer drum ^{C)}	
		over a length of 6d ^{D)}	over a length of 30d ^{D)}	over a length of 6d ^{D)}	over a length of 30d ^{D)}
21	4 strands n ≤ 100	2	4	2	4
22	3 or 4 strands n ≥ 100	2	4	4	8
	At least 11 outer strands				

Non-rotating ropes					
Rope category number (RCN)	Total number of load-bearing wires in the outer strands of the rope ^{A)} n	Number of visible breaks in outer wires ^{B)}			
		Rope sections that run on steel pulleys and/or wind on a single-layer winding drum (random distribution of the wire breaks)		Rope sections spooling on a multi-layer drum ^{C)}	
		over a length of 6d ^{D)}	over a length of 30d ^{D)}	over a length of 6d ^{D)}	over a length of 30d ^{D)}
23-1	$71 \leq n \leq 100$	2	4	4	8
23-2	$101 \leq n \leq 120$	3	5	5	10
23-3	$121 \leq n \leq 140$	3	5	6	11
24	$141 \leq n \leq 160$	3	6	6	13
25	$161 \leq n \leq 180$	4	7	7	14
26	$181 \leq n \leq 200$	4	8	8	16
27	$201 \leq n \leq 220$	4	9	9	18
28	$221 \leq n \leq 240$	5	10	10	19
29	$241 \leq n \leq 260$	5	10	10	21
30	$261 \leq n \leq 280$	6	11	11	22
31	$281 \leq n \leq 300$	6	12	12	24
	$n > 300$	6	12	12	24

PLEASE NOTE: In this table, ropes with Seale-type outer strands, which have 19 wires or less in each strand (e.g. 18 \square x 19 Seale - WSC), are placed two lines above that row in which the type would normally be listed due to the number of load-bearing wires in the outer strands.

Tab. 654: Reached or exceeded number of visible wire breaks occurring in non-rotating ropes indicating that the rope must be discarded

- A) For the purposes of this international standard, filler wires are not considered as load-bearing wires and are not contained in the value n.
- B) A broken wire has two ends (counted as one wire).
- C) The values apply for damage in the cross-over zones and overlays of windings due to deflection angles (not rope sections that only run on rope sheaves and do not wind up on drums).
- D) d = nominal rope diameter.

► Check the number of wire breaks with the values in the table.

If the number of wire breaks exceeds the number of permitted wire breaks:

- If possible determine cause of damage.
- Contact Liebherr customer service.
- Discard rope.

Check ropes for reduction of the nominal rope diameter

Calculate rope diameter

Make sure the following prerequisites are met:

- Caliper with wide jaws is available.
- Machine is switched off.
- Machine is secured against unauthorized start-up.

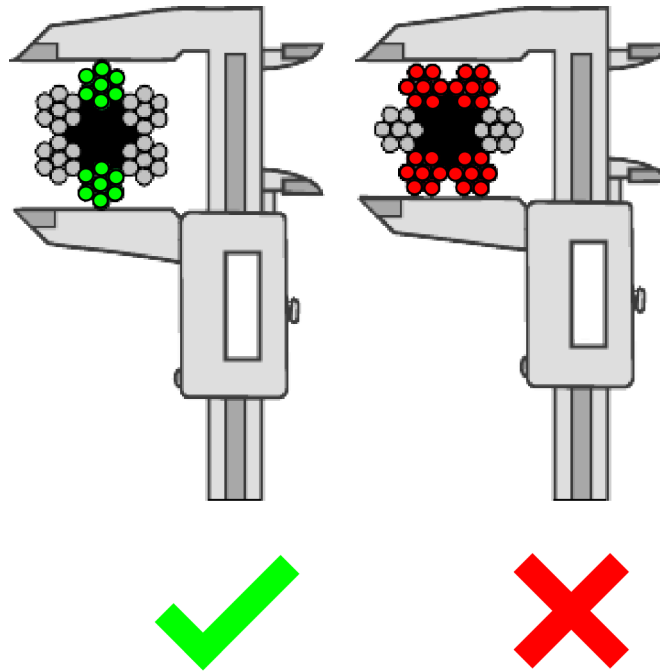


Fig. 6045: Rope diameter measured correctly (left side) and incorrectly (right side)

- ▶ Measure rope diameter between two opposite strands.
- ▶ Turn calipers by 90 ° and again measure two opposite strands in the same area.
- ▶ Measure rope diameter again in an area located at least 1 m (3' 3" ft-in) away.
- ▶ Turn calipers by 90 ° and again measure two opposite strands in the same area.

The mean value corresponds to the rope diameter.

- ▶ Calculate mean value from all four measurements.

Calculating the reduction of the rope diameter

Formula for the reduction of the rope diameter	
$\Delta d = \frac{d_{ref} - d_m}{d} \times 100 \%$	
Δd	Uniform reduction of the rope diameter.

Formula for the reduction of the rope diameter	
d_{ref}	Reference diameter of the rope in new condition. Measured after laying with no load on the rope. If reference diameter is not available, then measure rope diameter before the end connection.
d_m	Measured rope diameter in used condition.
d	Nominal diameter given by the manufacturer.

Tab. 655: Calculating the reduction of the rope diameter

► Calculating the reduction of the rope diameter.

The following table describes the evaluation criteria for a uniform reduction of the rope diameter. The values apply for rope sections wound as a single-layer on a drum and/or running on a steel pulley. The values do not apply to rope sections in cross-over zones.

Rope type	Uniform decrease in diameter (expressed as % of nominal diameter)	Rating of severity	
		Description	%
Single-layer rope with fiber core	< 6	—	0
	6 to < 7	Slight	20
	7 to < 8	Medium	40
	8 to < 9	High	60
	9 to < 10	Very high	80
	> 10	Discard	100
Single-layer rope with a steel inlay or parallel stranded rope	< 3.5	—	0
	3.5 to < 4.5	Slight	20
	4.5 to < 5.5	Medium	40
	5.5 to < 6.5	High	60
	6.5 to < 7.5	Very high	80
	> 7.5	Discard	100
Non-rotating rope	< 1	—	0
	1 to < 2	Slight	20
	2 to < 3	Medium	40
	3 to < 4	High	60
	4 to < 5	Very high	80
	> 5	Discard	100

Tab. 656: Rating criteria for even reduction of the rope diameter indicating the necessity to discard the rope

If the reduction of the rope diameter has reached the “discard” degree of severity:

- Turn machine off.
- Secure the machine against unauthorized start-up.
- Contact Liebherr customer service.
- Discard rope.

Checking ropes for strand breaks

Make sure the following prerequisites are met:

- Machine is switched off.
- Machine is secured against unauthorized start-up.

▶ Check ropes for strand breaks.


If strand breaks are present:

- ▶ If possible determine cause of damages.
- ▶ Contact Liebherr customer service.
- ▶ Discard rope.

Check ropes for corrosion

Make sure the following prerequisites are met:

- Machine is switched off.
- Machine is secured against unauthorized start-up.

Check for:	Images of damage:
<p>Corrosion: Occurs especially due to sea air and industrial air pollution. Before evaluating, clean the rope by wiping or brushing it. Corrosion reduces the rope strength and elasticity of the rope. External and internal corrosion often occur simultaneously. An increase in diameter may be an indication of corrosion inside the rope.</p>	

Tab. 657: Checking ropes for corrosion

The following table describes the evaluation criteria for corrosion.

Corrosion type	Condition	Rating of severity
External corrosion	Signs of oxidation on the surface can be wiped off.	Superficial = 0 %
	Wire surface rough to touch.	High degree = 60% ^{A)}
	Highly corroded wire surface, sagging wires ^{B)} .	Discard = 100 %
Internal corrosion	Obvious visible signs of internal corrosion, i.e. from corrosion debris exuding from the valleys between the outer strands ^{C)} .	Laying down = 100 % or, if deemed appropriate by a competent person: Inspection of internal condition of rope.

Corrosion type	Condition	Rating of severity
Friction-induced corrosion	In the case of friction-induced corrosion, fine steel particles are abraded by the wires through the constant rubbing of dry wires and strands, which then oxidize and form corrosion deposits inside the rope; this shows up as dry powder.	Signs of this should be further investigated; if there is any uncertainty about the degree of severity, the rope must be discarded (100 %).
PLEASE NOTE: Corrosion inside the rope or friction-induced corrosion can result in an increase of diameter.		

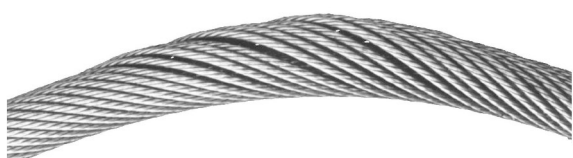
Tab. 658: Discard criteria for corrosion and intermediate severity ratings




- A) Even in the case of oxidation of galvanized wires, the wire surface may feel rough. The overall condition is possibly not as severe as in non-galvanized wires. In such cases, the person carrying out the test may consider using a lower proportion of the combined effect of the rating given in this table.
- B) For any other intermediate conditions, an assessment should be made as to its severity rating (i.e. contribution towards the combined effect).
- C) The evaluation of the corrosion inside the rope is subjective. If there is any uncertainty regarding the severity of the corrosion inside the rope, the rope must be discarded.
- ▶ Check ropes for corrosion.
- If the rope meets one of the criteria above or exhibits specific damage:
- ▶ Contact Liebherr customer service.
 - ▶ Discard rope.



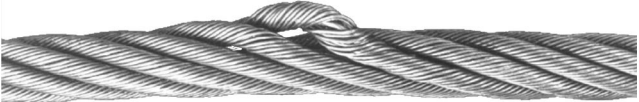

Checking rope for deformation and mechanical damage


Make sure the following prerequisites are met:

- Machine is switched off.
- Machine is secured against unauthorized start-up.

Check for:	Images of damage:
<p>Bird-caging: May occur if the outer layers of the wires have loosened or if the outer strands are longer than the inner strands. Through shifting of the outer versus the inner wire layers or strand layers, the excess length is pushed to one place.</p>	

Check for:	Images of damage:
<p>Looping: Individual wires or groups of wires penetrate out of the rope structure. In most cases, the loops are in several strands in succession.</p>	
<p>Necking: Defined as a reduction of the wire rope diameter in short stretches. Rope parts must be especially carefully checked for necking right before the final attachment. Necking is often hard to identify in these places.</p>	
<p>Knots: Are deformations of the wire rope. These are caused by pulling a loop tight which the wire rope cannot compensate by twisting its axis.</p>	

Check for:	Images of damage:
<p>Corkscrew: With this deformation, the axis of the unstrained wire rope takes on a spiral shape. This does not weaken the wire rope but may cause uneven running of the rope. Higher wear and wire brakes may be the consequences. If this deformation is more than 1/3 of the nominal rope diameter in the weakest spot, the wire rope must be exchanged.</p>	
<p>Abrasion: Abrasion may reduce both the static rope breaking force due to a reduction of the metal rope diameter, and the operational stability due to wear notches. If the rope diameter has shrunk on longer stretches by more than 10% compared to the nominal dimension, the rope must be exchanged – even if there are no wire breaks.</p>	
<p>Deformed core or strand: Core emerges between the outer strands or outer strand emerges from the rope structure.</p>	
<p>Local increase of rope diameter: Caused by deformation of the rope core or swelling of the fiber core.</p>	

Check for:	Images of damage:
<p>Flattened areas: Permanent deformation of the wire rope, caused by squeezing. The rope is damaged faster if flattened areas are present.</p>	

Tab. 659: Checking ropes for deformation

- ▶ Check rope for deformation and mechanical damage.

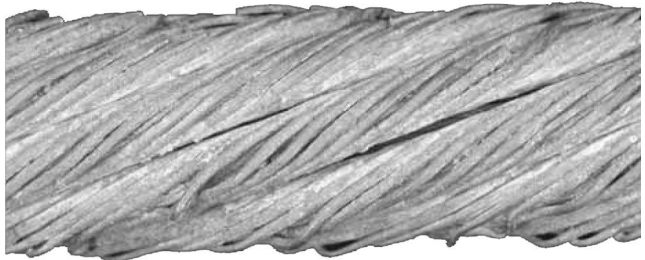
If the rope meets one of the criteria above or exhibits specific damage:

- ▶ If possible determine cause of damage.
- ▶ Contact Liebherr customer service.
- ▶ Discard rope.

Check ropes for the effects of heat

Make sure the following prerequisites are met:

- Machine is switched off.
- Machine is secured against unauthorized start-up.

Check for:	Images of damage:
<p>Heat-induced damage: Can be identified externally from respective heat discoloration on the steel wires and/or a significant loss of lubricant. A lightning strike, for example, can cause extreme heat damage.</p>	

Tab. 660: Checking ropes for heat impact



Note

- ▶ For permitted operating temperatures for ropes and end attachments, refer to EN 12385-3.

- ▶ Check ropes for significant heat damage.

If a rope shows signs of external heat damage:

- ▶ Contact Liebherr customer service.
- ▶ Discard rope.

9.44.6 Storing ropes

NOTICE

Missing label!

Confusion of ropes or rope reels.

If the label is missing or no longer clearly legible:

- ▶ Mark rope reels in accordance with the delivery documents.

-
- ▶ Make sure that the delivered ropes comply with the supplied material certificates and are the same as what you ordered.

- ▶ Store the material certificates.

NOTICE

Improper storage!

Damage to ropes.

- ▶ Store ropes properly.

-
- ▶ Wire ropes should be stored in a dry and well ventilated area.

- ▶ Protect rope and rope reel against weathering: Do not store rope and rope reel directly on the ground.

- ▶ Avoid storing outside for lengthy periods.

9.44.7 Transporting the ropes

NOTICE

Improper transport!

Damage to ropes.

- ▶ Transport ropes properly.
-

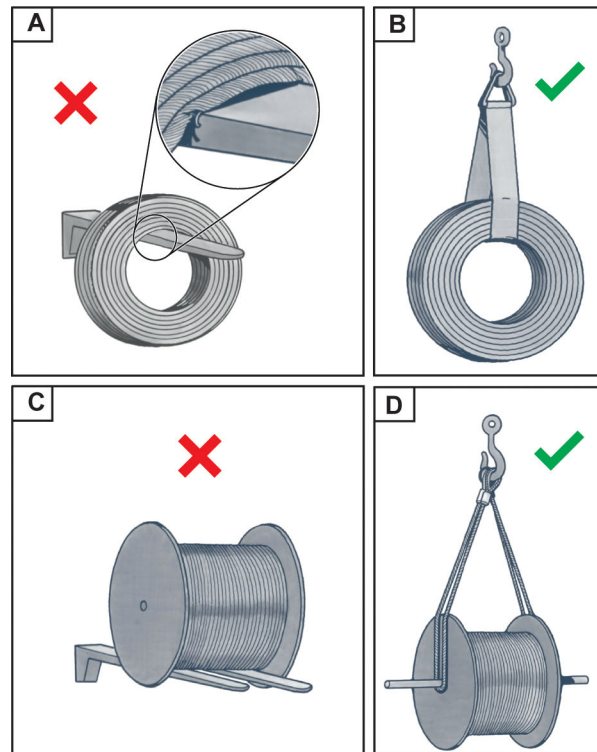


Fig. 6062: Transporting the ropes

- | | | | |
|----------|--|----------|--|
| A | Rope ring transported with metal fork | C | Rope reel transported with metal fork |
| B | Rope ring transported with lifting strap | D | Rope reel transported with shaft strap |

If the rope is wound up as a rope ring:

- ▶ Lift rope ring lift with textile sling gear (lifting straps or round slings).

If the rope is wound up on a rope reel:

- ▶ Lift the rope reel preferably from a shaft inserted in the axis hole.

9.44.8 Selecting a rope

Selection criteria for ropes

The selection of ropes depends on various criteria.

The most important selection criteria for ropes are:

- Intended use
- Torsion properties
- Minimum breaking force
- Make
- Direction of lay
- Rope inlay
- Surface finish
- Rope diameter tolerances



DANGER

Impermissible use of ropes that do not conform to the manufacturer's specifications!

Load breakaway.

- ▶ Only use ropes approved by Liebherr customer service.

**DANGER**

Incorrectly fit swivels!
Load breakaway.

- ▶ The fitting of swivels for any of the machine ropes is forbidden.
- ▶ For information about any exceptions: Contact Liebherr after sales service.

**WARNING**

Inadmissible combination of rotation-resistant ropes and swivels!
Life-threatening situation and damage to the machine.

- ▶ Swivels must not be used with rotation resistant (wire) ropes.

**WARNING**

Strain on rope ends of non-rotation-resistant ropes without rotation lock!
High turning moments.

- ▶ Fit anti-rotation devices.

**WARNING**

Inadmissible combination of non-rotation-resistant ropes with a different lay direction within a rope strand!
Load breakaway.

- ▶ Only combine ropes with the same lay direction.
- ▶ Never use these rope designs with a swivel or having one or both rope ends without an anti-rotation device.

**DANGER**

Improper use of non-rotation resistant ropes for hoist winches!
Load breakaway.

- ▶ Guide load to keep it from rotating.
- ▶ Make sure that no whorls or rotating elements are installed.
- ▶ Make sure the rope does not become twisted.

- ▶ Contact Liebherr customer service.
- ▶ Select ropes.

Determining the direction of lay

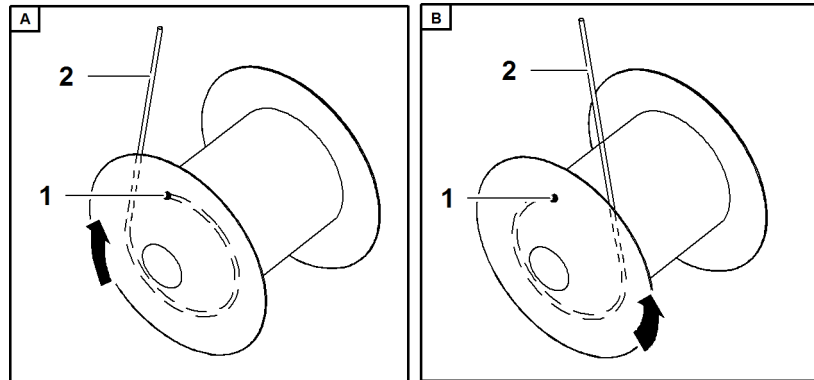


Fig. 6063: Determining the direction of lay (illustration of principle)

- | | | | |
|----------|-------------------|----------|-------------------|
| A | Left-handed rope | 1 | Rope fixing point |
| B | Right-handed rope | 2 | Unwinding rope |

- ▶ Determine on which side the rope fixing point **1** of the drum is located.
- ▶ Follow the windings of the unwinding rope **2** from the rope fixing point.

If the rope unwinds clockwise:

- ▶ Choose a left-handed rope.

If the rope unwinds counter-clockwise:

- ▶ Choose a right-handed rope.

9.44.9 Unwind rope from rope reel

Make sure the following prerequisites are met:

- Protective equipment is worn.
- Tools and auxiliary materials are at hand.

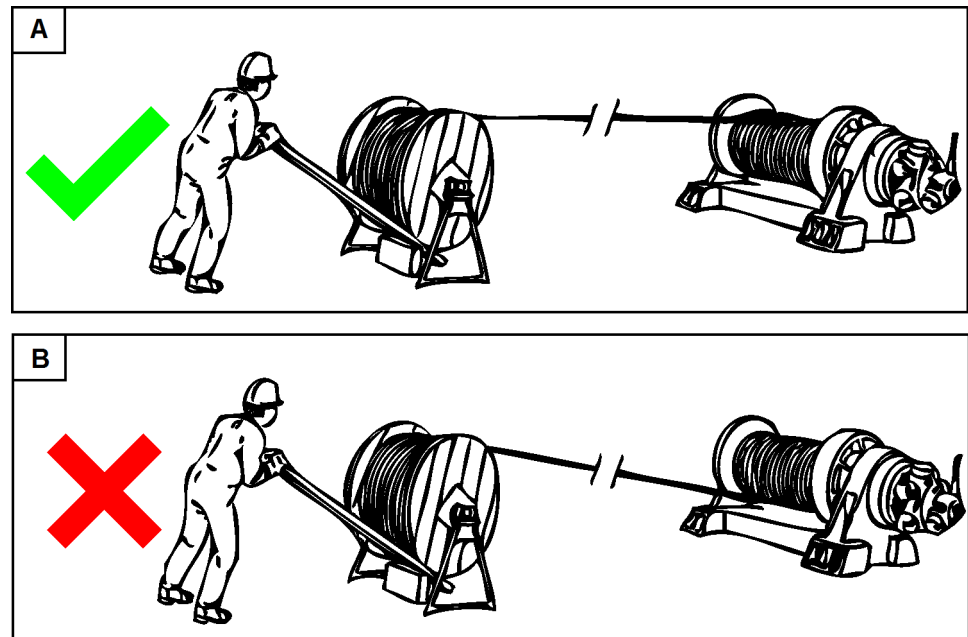


Fig. 6064: Unwind rope from rope reel

A Rope and drum with same bending direction

B Rope and drum with opposite bending direction

- ▶ Jack up rope reel.

NOTICE

Inadmissible diagonal unwinding of ropes!
Damage to rope.

- ▶ Unwind rope straight from rope reel.

NOTICE

Improper winding of rope on drum!
Damage to rope.

- ▶ Pretension rope when winding on drum. The pretension force is reached by braking the rope reel and must be 1% to 2% of the rope's minimum break force.
- ▶ Do not brake rope directly.
- ▶ Do not drag rope on ground.

- ▶ Unwind rope from braked rope reel and in the same bending direction as that of the drum.

- ▶ Check rope for damage and deformation while winding.

If the rope shows damage and deformation:

- ▶ discard rope.

9.44.10 Laying on the rope

Danger zone when luffing a rope



DANGER

Impermissible use of ropes that do not conform to the manufacturer's specifications!

- ▶ Only use ropes approved by Liebherr customer service.



DANGER

Inadmissible installation of swivels!
Load breakaway.

- ▶ Ensure that no swivels are installed on any of the ropes.
- ▶ For information about exceptions: Contact Liebherr customer service.



WARNING

Rotating winches, moving rope!
Risk of crushing of limbs, death.

- ▶ Turn off diesel engine while working on winches.
- ▶ Make sure that there is nobody in the danger zone around the winches.
- ▶ Detach/fasten ropes exclusively from the uppercarriage.
- ▶ Ensure communication between machine operator and maintenance personnel.

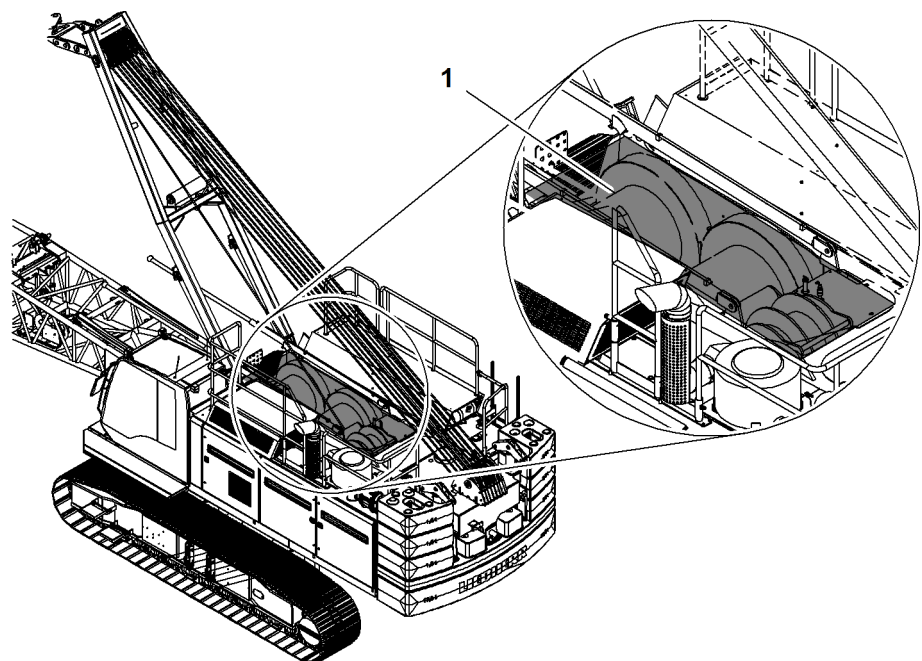


Fig. 6065: Danger zone uppercarriage (illustration of principle)

1 Danger zone

Laying on the rope of winch1 and winch2 with installed main boom

When luffing the new rope, make sure that the rope is not untwisted or twisted. The rope can be luffed using the old rope or ideally using an auxiliary rope. If an auxiliary rope is used, it must have sufficient permitted pull force (at least the weight of the rope). If the old rope is used as the luffing rope, ensure that the new rope does not become twisted.



WARNING

Impermissible changing of ropes!
Severe injury, damage to winch and rope.

- ▶ Make sure that only maintenance personnel change the rope.

Make sure the following conditions are met:

- Machine is secured against unauthorized startup.
- Boom is laid down and/or deinstalled.
- Rope is checked before luffing for damage resulting from incorrect handling or storage.
- Protective equipment is worn.
- Maintenance personnel is available.
- Tools and utilities are at hand.

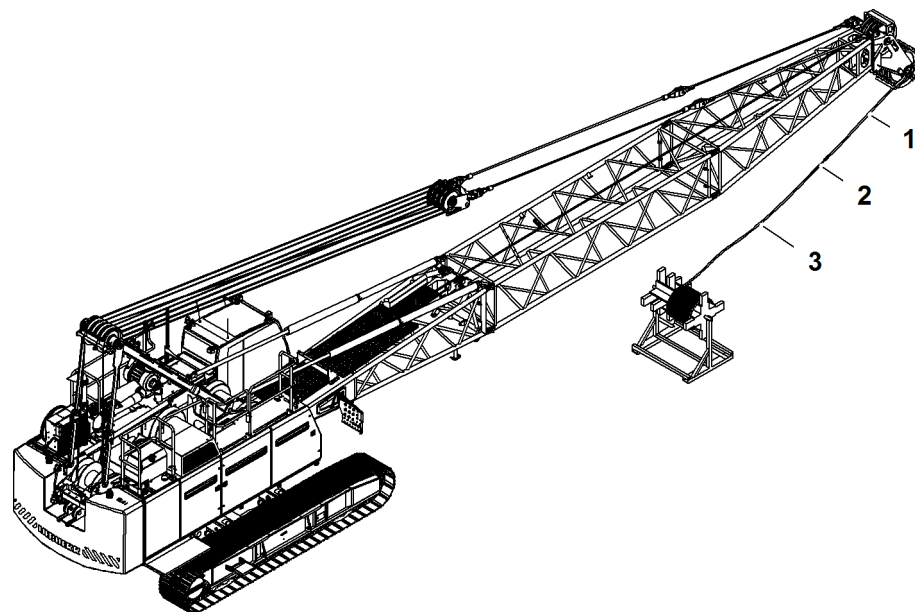


Fig. 6066: Laying on the rope of winch1 and winch2 with installed main boom (illustration of principle)

- | | | | |
|---|----------------|---|------|
| 1 | Auxiliary rope | 3 | Rope |
| 2 | Rope stocking | | |

- ▶ Positioning the reel with rope 3 laterally behind the main boom head.

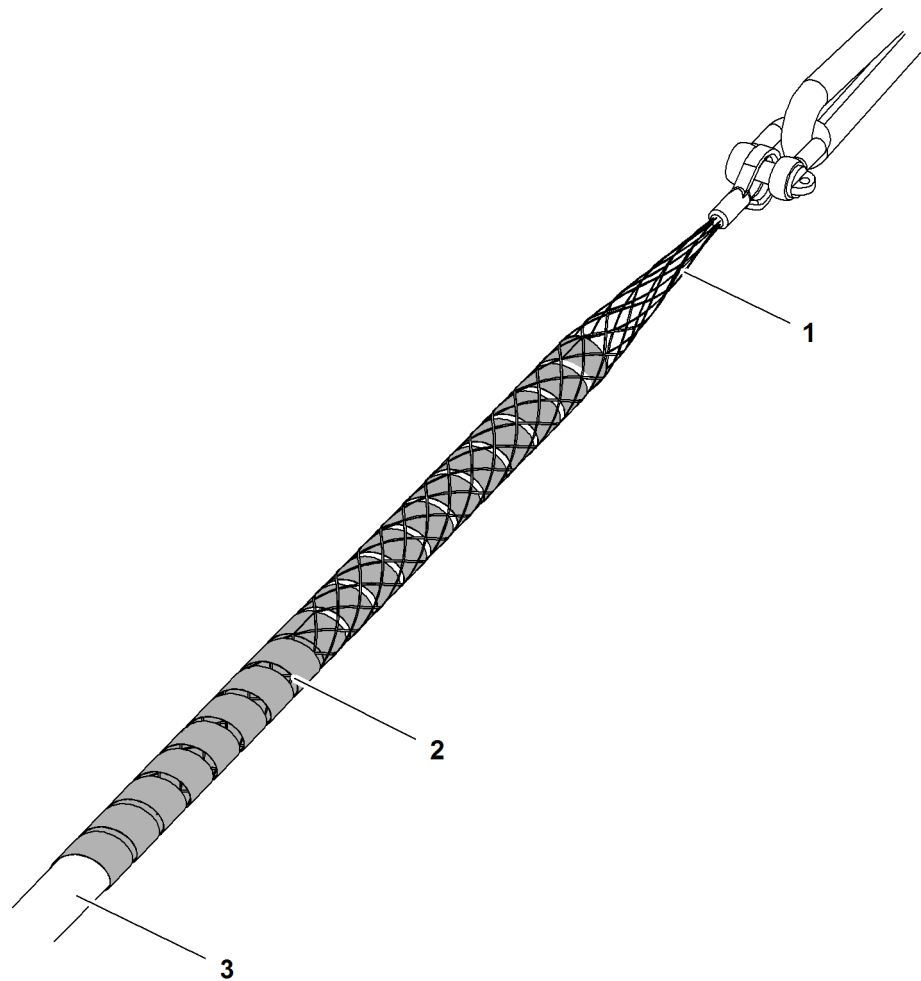


Fig. 6067: Rope stocking detail

- | | | | |
|----------|---------------|----------|------|
| 1 | Rope stocking | 3 | Rope |
| 2 | Textile tape | | |

- ▶ Wrap rope end (approximately 1 m (3' 3" ft-in)) with textile tape **2**.
- ▶ Pull rope stocking over wrapped rope end.
- ▶ Fixate rope stocking end with textile tape **2**.
 - ▷ Rope connected with auxiliary rope.
- ▶ Reeve the auxiliary rope on the main boom head.
- ▶ Rope tensioned, guide laterally along main boom to machine.
- ▶ Throw auxiliary rope onto main boom.

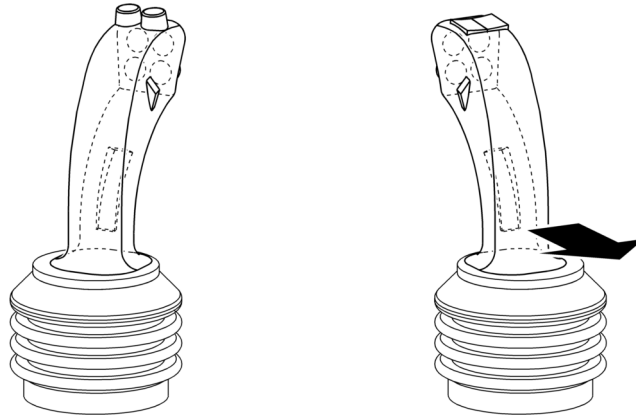
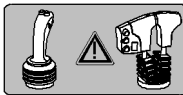


Fig. 6070: Lifting winch1

- ▶ Push right multi-directional control lever backward.
 - ▷ Auxiliary rope is reeved on winch1.
 - ▷ Vibration button on right multi-directional control lever vibrates.
- ▶ Reeve auxiliary rope on winch1 until rope is located in front of winch1.
- ▶ Loosen rope stocking and unreel auxiliary rope from winch1.



Procedure on a machine with multi-directional control lever and double T-lever

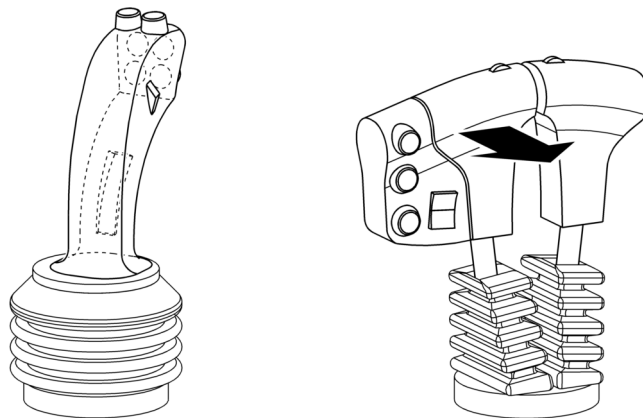


Fig. 6072: Lifting winch1

- ▶ Push inner T-control lever backward.
 - ▷ Auxiliary rope is reeved on winch1.
 - ▷ Vibration button on inner T-control lever vibrates.
- ▶ Reeve auxiliary rope on winch1 until rope is located in front of winch1.
- ▶ Loosen rope stocking and unreel auxiliary rope from winch1.



Procedure on a machine with two multi-directional control levers

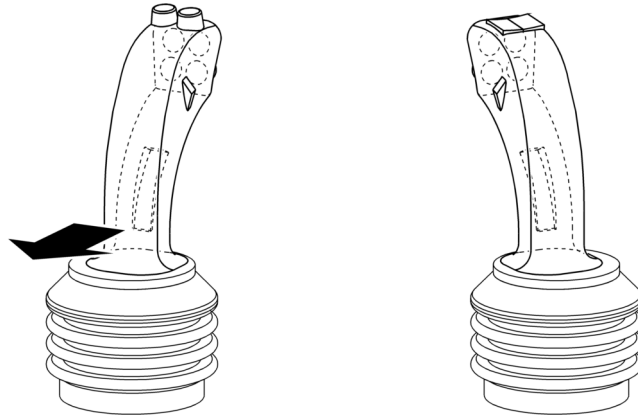
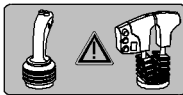


Fig. 6074: Lifting winch2

- ▶ Push left multi-directional control lever backward.
 - ▷ Auxiliary rope is reeved on winch2.
 - ▷ Vibration button on left multi-directional control lever vibrates.
- ▶ Reeve auxiliary rope on winch2 until rope is located in front of winch2.
- ▶ Loosen rope stocking and unreel auxiliary rope from winch2.



Procedure on a machine with multi-directional control lever and double T-lever

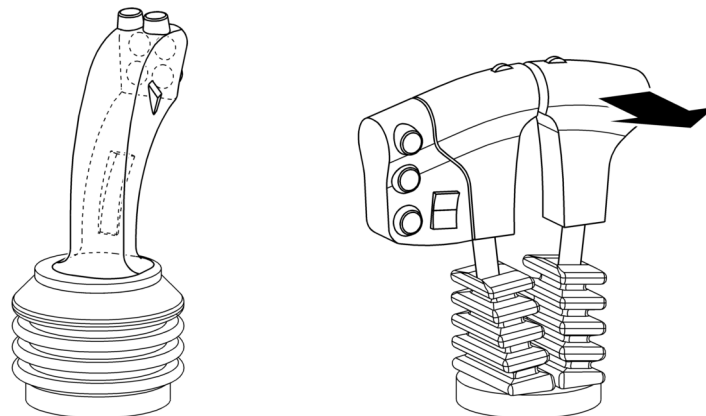


Fig. 6076: Lifting winch2

- ▶ Push outer T-control lever backwards.
 - ▷ Auxiliary rope is reeved on winch2.
 - ▷ Vibration button on outer T-control lever vibrates.
- ▶ Reeve auxiliary rope on winch2 until rope is located in front of winch2.
- ▶ Loosen rope stocking and unreel auxiliary rope winch2.

Winding up auxiliary rope with radio remote control*

Make sure the following conditions are met:

- Radio remote control is turned on.
- Radio remote control is connected with machine.

**WARNING**

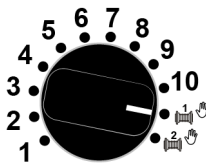
Rotating winches. Running rope.
Risk of crushing of limbs, death.

- ▶ Turn off machine while working on winches.
- ▶ Make sure that no persons are located in the danger zone.
- ▶ Ensure communication between machine operator and maintenance personnel.

**CAUTION**

Incorrect handling!
Damage to rope.

- ▶ Rope may not scrape on rope protection on the boom head or steel structure.
- ▶ Prevent slack rope on reel.



- ▶ Set rotary switch on control panel *Radio remote control* to position *Assembly function rope change winch1*.

- ▷ Symbol *Rope change winch1* is displayed on the radio remote control monitor:



Fig. 6078: Symbol *Rope change winch1*

- ▷ Symbol *Confirmation* is displayed on the monitor of the radio remote control:



Fig. 6079: Symbol *Confirmation*

- ▶ Press the button *Confirmation* on the *radio remote control* control panel.
 - ▷ Assembly function rope change winch1 is activated.
 - ▷ Only winch1 is released.
 - ▷ Rope measuring system for winch1 is displayed on the monitor of the radio remote control.
 - ▷ Bottom limit switch of winch1 is bypassed.
 - ▷ Control of winch1 is limited.

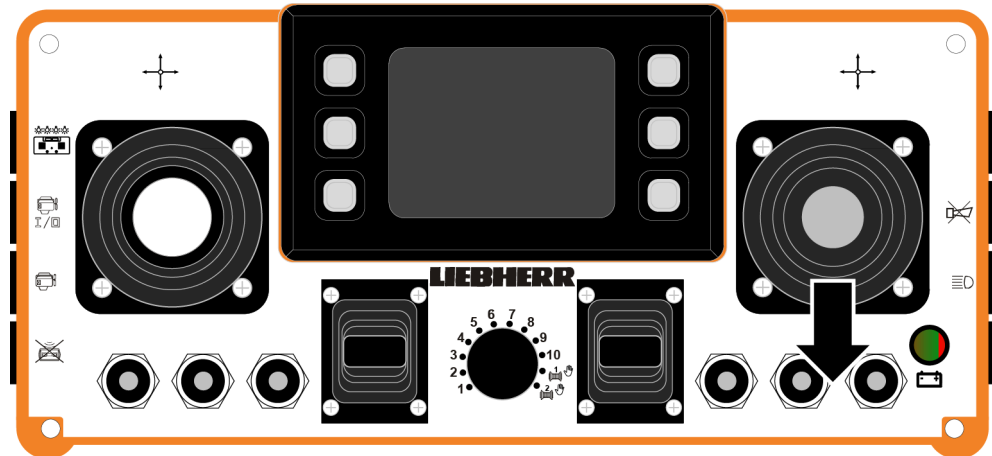
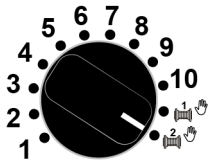


Fig. 6080: Lifting winch1

- ▶ Move right control lever backward.
 - ▷ Auxiliary rope is reeved on winch1.
 - ▷ Vibration button on outer T-control lever vibrates.
- ▶ Reeve auxiliary rope on winch1 until rope is located in front of winch1.
- ▶ Loosen rope stocking and unreel auxiliary rope winch1.
- ▶ Set rotary switch on control panel *Radio remote control* to position *Assembly function rope change winch2*.



- ▷ Symbol *Rope change winch2* is displayed on the radio remote control monitor:



Fig. 6082: Symbol Rope change winch2

- ▷ Symbol *Confirmation* is displayed on the monitor of the radio remote control:



Fig. 6083: Symbol Confirmation

- ▶ Press the button *Confirmation* on the *radio remote control* control panel.
 - ▷ Assembly function rope change winch2 is activated.
 - ▷ Only winch2 is released.
 - ▷ Rope measuring system for winch2 is displayed on the monitor of the radio remote control.
 - ▷ Bottom limit switch of winch2 is bypassed.
 - ▷ Control of winch2 is limited.

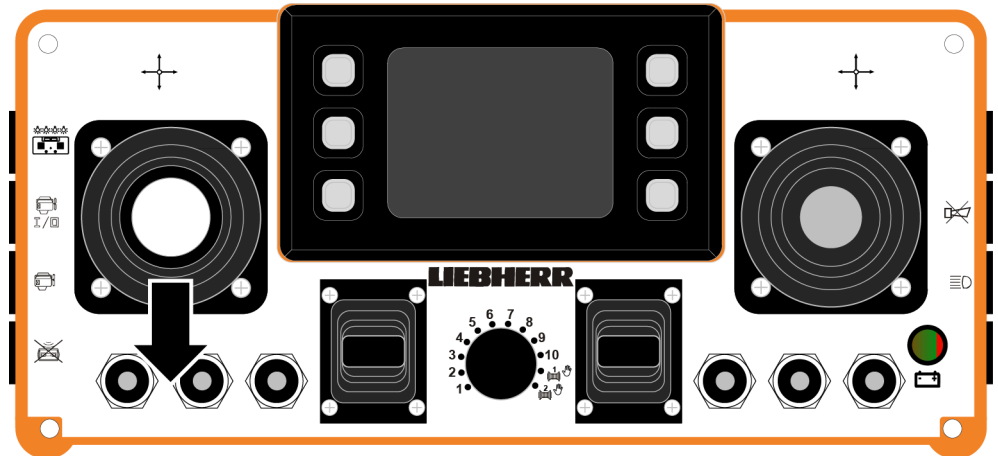
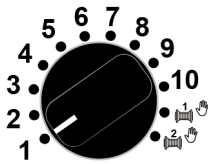


Fig. 6084: Lifting winch2

- ▶ Move left control lever backward.
 - ▷ Auxiliary rope is reeved on winch2.
 - ▷ Vibration button on outer T-control lever vibrates.
- ▶ Reeve auxiliary rope on winch2 until rope is located in front of winch2.
- ▶ Loosen rope stocking and unreel auxiliary rope winch2.

Turning off radio remote control* *Rope change assembly function*

- ▶ Set rotary switch on control panel *Radio remote control* to position "1".



- ▷ Symbol *Confirmation* is displayed on the monitor of the radio remote control:



Fig. 6086: Symbol Confirmation

- ▶ Press the button *Confirmation* on the *radio remote control* control panel.
 - ▷ Rope change assembly function is turned off.
 - ▷ All other machine functions are operable.
 - ▷ Control of winch1 and winch2 is released.

Installing the rope fixing point

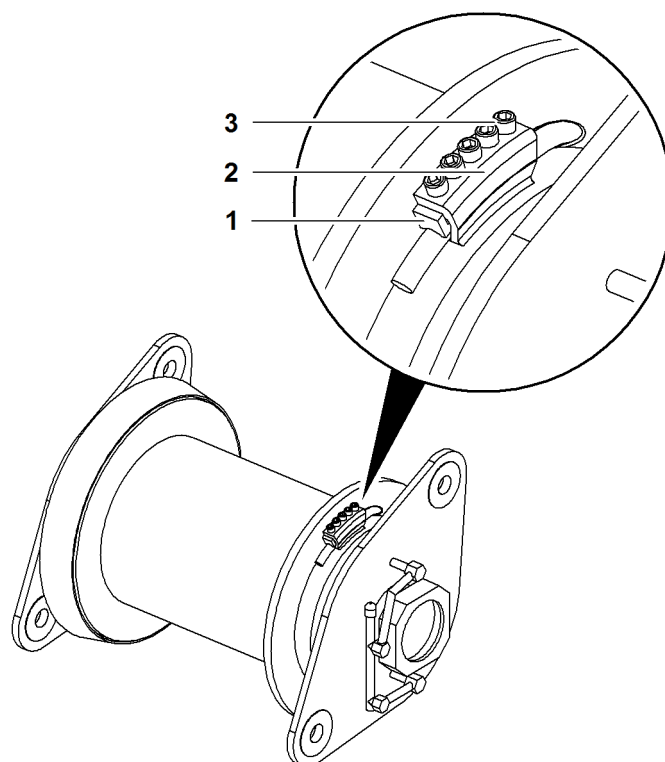


Fig. 6087: Installing the rope fixing point (illustration of principle)

- | | | | |
|---|-------------------|---|------------|
| 1 | Rope wedge | 3 | Screw (5x) |
| 2 | Rope fixing point | | |

- ▶ Remove cover on winch1 or winch2.
- ▶ Loosen screws 3 on rope fixing point 2 of winch1 or winch2.
- ▶ Remove rope wedge 1.



WARNING

Unsecured walking on boom sections!
Risk of falling off of boom sections.

- ▶ Only walk on boom sections with attached boom catwalks.
- ▶ A fall arrest system must be worn when working on the boom sections.

- ▶ Lower winch1 or winch2 until 3-windings limit switch engages.
 - ▷ Winch1 or winch2 stops.
- ▶ Bypass the 3-windings limit switch of winch1 or winch2 and move winch1 or winch2 three rotations lower.

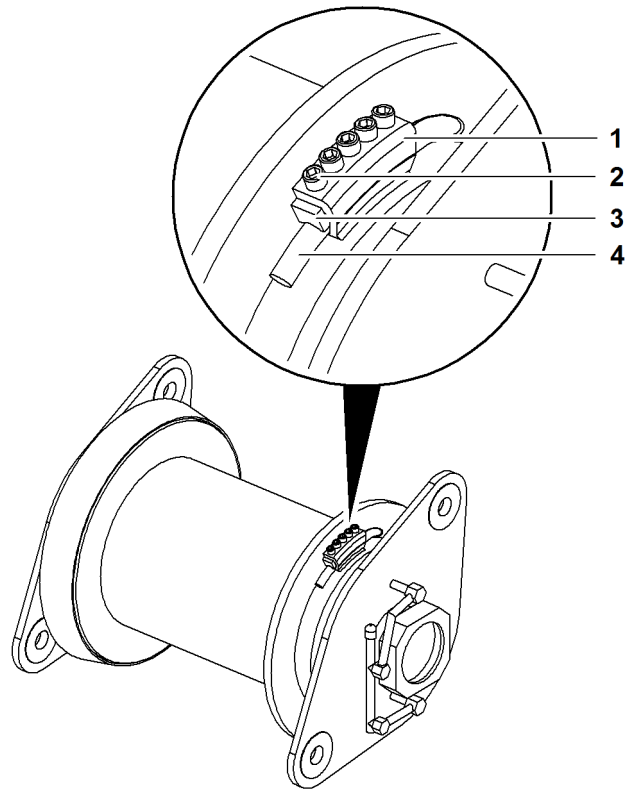


Fig. 6088: Installing the rope fixing point (illustration of principle)

- | | | | |
|----------|-------------------|----------|------------|
| 1 | Rope fixing point | 3 | Rope wedge |
| 2 | Screw | 4 | Rope |

- ▶ Slide rope **4** through rope fixing point **1** of winch1 or winch2.
- ▶ Insert rope wedge **3**.
- ▶ Tighten screw **2**.
- ▶ Reeve up one rope **4** winding on winch1 or winch2.
- ▶ Tighten all screws on rope fixing point **1**.
- ▶ Reeve rope **4** on winch1 and winch2 until 5 m (16' 5" ft-in) of rope are located in front of the main boom head.
- ▶ Install hoist limit switch and hook.
 - ▷ Main boom is ready for erecting.

9.45 Drum

9.45.1 Checking rope tensioning pulleys* of drum for wear

Make sure the following prerequisites are met:

- Machine is switched off.
- Machine is secured against unauthorized start-up.
- ▶ Check rope tensioning pulleys for wear.

If the rope tensioning pulleys are evenly worn, no further measures are required.

If the rope tensioning pulleys are not evenly worn or if rope operation does not function perfectly:

- ▶ Replace rope tension pulleys.

9.45.2 Checking the groove diameter of the drum

The grooves of the drum are checked with a groove gage for wear.

Ensure that the following conditions are fulfilled:

- Suitable groove gage is available.
- Groove is free of grease deposits.
- The machine is switched off.
- The machine is secured to prevent unauthorised operation.

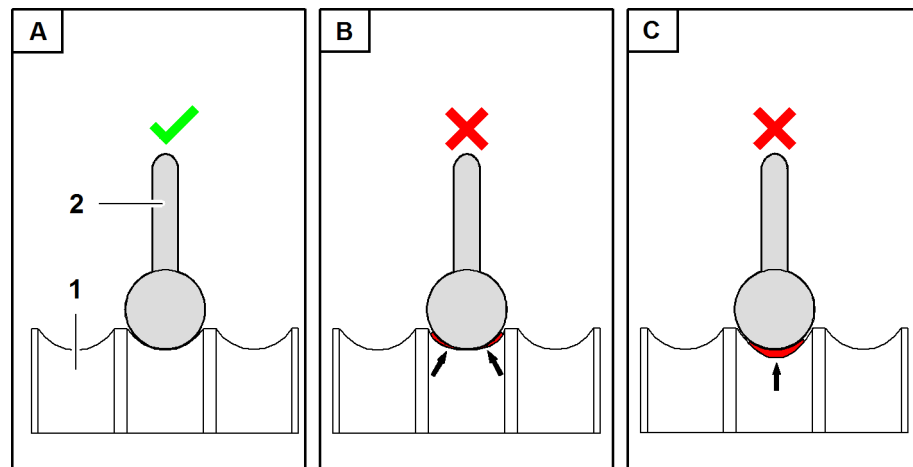


Fig. 6089: Checking the drum (illustration of principle)

- | | |
|---|--|
| <p>1 Drum</p> <p>2 Groove gage</p> | <p>B Groove gage only touches bottom of groove</p> <p>C Groove gage only touches sides of groove</p> |
| <p>A Groove gage sits with no spaces</p> | |

The groove gage **2** must be nearly identical to the bottom of drum **1** groove. The groove diameter of the drum **1** has to be 5 % to 10 % larger than the rope's nominal diameter.

- ▶ Use the groove gage **2** to check every single groove of the drum **1**.

If the groove diameter is smaller than 5 % or greater than 10 %:

- ▶ Contact Liebherr after sales service.

9.45.3 Checking drum for loose rope layers

If the working range of the rope is in the top rope layers with rope drums multi-layer winding, the bottom rope layers may become slack. Gaps result in the top rope layers that impair the winding properties and may increase the rope wear. In certain circumstances, the top rope layers may cut in between the slack rope layers and deform the bottom rope layers.

- ▶ Check drum for loose rope layers.

If loose rope layers are present:

- ▶ Unwind at least the slack rope layers. If necessary, unwind the entire rope completely down to the safety windings (bottom hoisting gear limit switch position of the winch).
- ▶ Wind up the rope again pre-tensioned (5 to 10% of the winch's maximum line pull)⁶⁹⁾.



Note

To ensure perfect winding properties with multi-layer winding, choose the rope length in such a way that the number of unused rope windings is as low as possible.

- ▶ With hoists, use rope up to the safety windings.
-

⁶⁹⁾ Depending on the rope diameter and the drum diameter, the minimum pre-tensioning force must be selected correspondingly higher (up to 20% of the winch's maximum line pull).

9.46 Rope pulleys

9.46.1 Assembly of a pulley

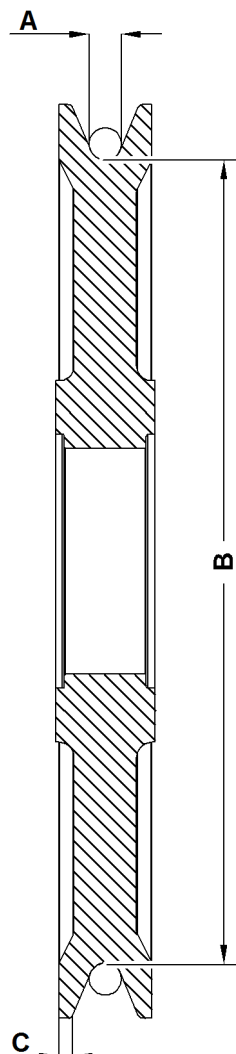


Fig. 6090: Assembly of a pulley (illustration of principle)

- | | | | |
|----------|---------------------------|----------|-----------|
| A | Groove diameter | C | Gap width |
| B | Bottom of groove diameter | | |

9.46.2 Checking the groove diameter of the pulley

According to ISO 16625, the groove diameter of the pulley must be between 5% and 10% greater than the nominal diameter of the rope.

Make sure the following prerequisites are met:

- Suitable groove gauge is available.
- Groove is free of grease deposits.
- Machine is switched off.
- Machine is secured against unauthorized start-up.

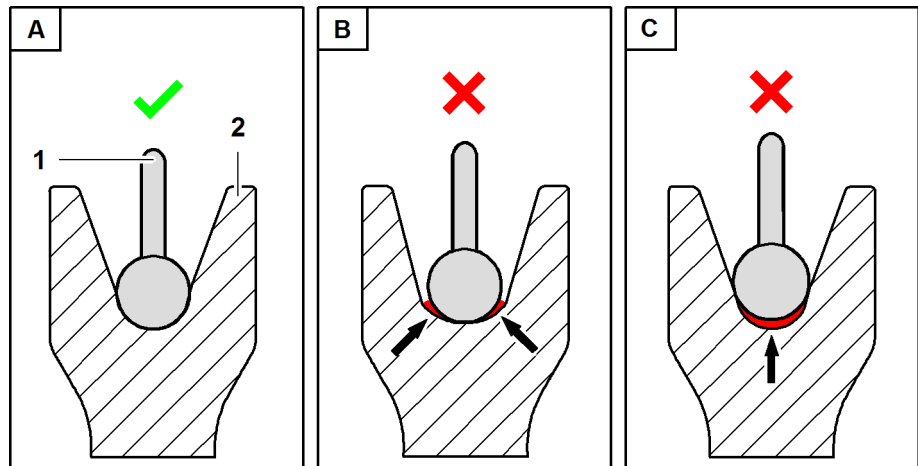


Fig. 6091: Checking the groove diameter (illustration of principle)

- | | | | |
|---|----------------------------------|---|--|
| 1 | Groove gauge | B | Groove gauge only touches bottom of groove |
| 2 | Pulley | C | Groove gauge only touches sides of groove |
| A | Groove gauge sits with no spaces | | |

The groove gauge 1 must be nearly identical to the bottom of pulley 2 groove. The groove diameter of the pulley 2 has to be 5 % to 10 % larger than the rope's nominal diameter.

► Use the groove gauge 1 to check each pulley.

If the groove diameter is smaller than 5 % or greater than 10 %:

- Contact Liebherr customer service.
- Exchange pulley.

9.46.3 Checking the bottom of groove diameter of the pulley

Ensure that the following conditions are satisfied:

- The machine is switched off.
- The machine is secured to prevent unauthorised operation.

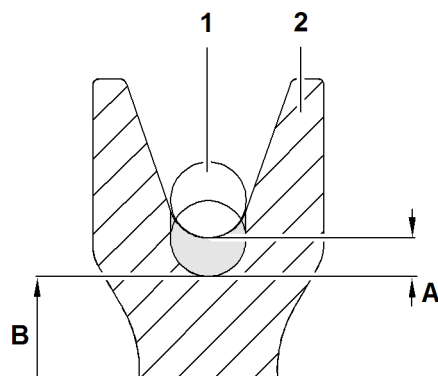


Fig. 6092: Checking the pulley for wear (illustration of principle)

- | | | | |
|---|--------|---|---------------------------|
| 1 | Rope | A | Maximum permissible wear |
| 2 | Pulley | B | Bottom of groove diameter |

Plastic pulleys: The maximum permissible wear A is 50 % of the nominal rope diameter.

Steel pulleys: The maximum permissible wear **A** is 8% of the nominal rope diameter.

▶ Measure bottom of groove diameter **B**.

If the wear exceeds the maximum permissible wear **A**:

▶ Contact Liebherr after sales service.

▶ Exchange pulley.



Note

Liebherr recommends:

▶ Measure the reference value of a comparable pulley without signs of wear.

9.46.4 Checking the gap width of the pulley

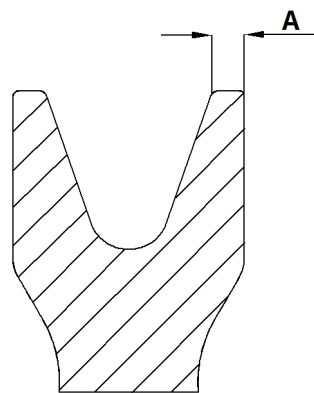


Fig. 6093: Pulley (illustration of principle)

A Gap width

▶ Check the gap width of the pulley.

If the gap width is reduced by more than 25% from the nominal dimension:

▶ Contact Liebherr customer service.

▶ Exchange pulley.



Note

Liebherr recommends:

▶ Measure the reference value of a comparable pulley without signs of wear.

9.46.5 Checking bottom of pulley groove for sharp edges

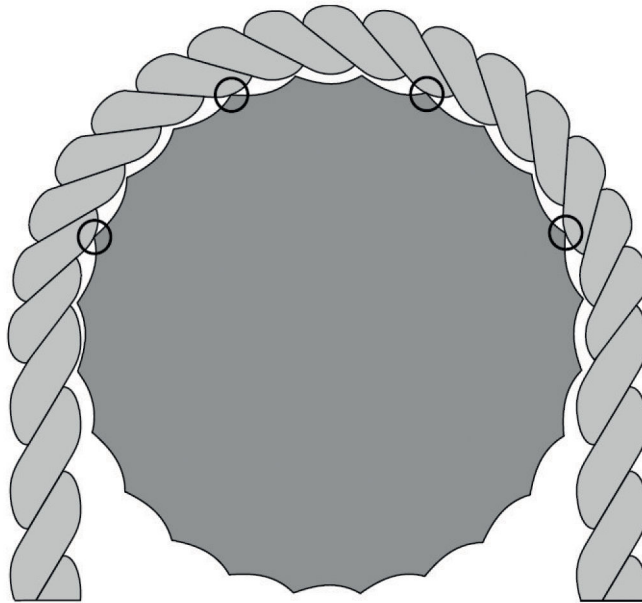


Fig. 6094: Pulley with sharp edges (illustration of principle)

- ▶ Checking bottom of groove for sharp edges.

If you can clearly see and feel any edges:

- ▶ Contact Liebherr customer service.
- ▶ Smoothen bottom of groove in the next rope change.
or
Exchange pulley.

9.46.6 Checking pulleys for damage

NOTICE

Improper laying down of pulleys on the ground!
Damage to the pulleys.

- ▶ Pulleys must only be laid on the ground with protective equipment.
-

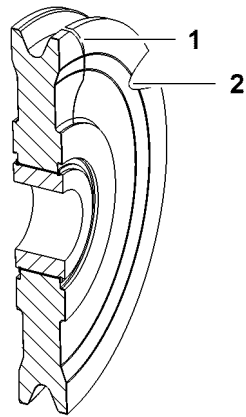


Fig. 6095: Damaged pulley

1 Crack

2 Nicks

The pulleys must align with the running direction of the rope and in perfect condition, without runouts or other damage.

- ▶ Check pulleys for damage (nicks, wobbles, cracks, notches, etc.).

If the pulley is damaged:

- ▶ Contact Liebherr after sales service.
- ▶ Replace the pulley.

9.46.7 Checking the pulley bearings

- ▶ Check bearings for smooth running.
- ▶ Check bearings for unusual sounds.
- ▶ Check lubrication of bearings.

If lubrication of bearings is not OK:

- ▶ Lubricate the pulley bearings ([For more information see: 9.46.8 Lubricating the pulley bearings, page 2122](#)).

If bearings do not function properly:

- ▶ Contact Liebherr customer service.

9.46.8 Lubricating the pulley bearings

Ensure that the following conditions are satisfied:

- Grease gun is available and filled with approved grease. ([For more information see: 9.2.3 Lubrication chart, page 1949](#)).
- The machine is switched off.
- The machine is secured to prevent unauthorised operation.
- Grease nipples are clean.
- ▶ Use the grease gun to press grease into the grease nipple.
- ▶ Press grease completely out of bearings until the new grease is visible.

9.46.9 Checking the position of bearing and locking ring

- ▶ Check the bearing for proper seating and position.

If position of bearing or locking ring are not correct:

- ▶ Correct position of bearing and locking ring.
- ▶ Contact Liebherr after sales service.

9.46.10 Cleaning plastic pulleys

NOTICE

Inadmissible operation with dirty pulleys!
Damage to the pulleys.

- ▶ Clean dirt, gum, etc. from the plastic pulleys.
-

NOTICE

Unauthorised cleaning agent!
Damage to the pulleys.

- ▶ Only clean plastic pulleys with suitable cleaning agents.
-

Plastic pulleys are resistant to:

- Mineral oil
- Petrol
- Kerosene
- Diesel

Plastic pulleys are **not** resistant or not fully resistant to:

- Concentrated mineral acids (e.g. sulphuric acid, hydrochloric acid, nitric acid)
- Concentrated organic acids (e.g. formic acid)
- Concentrated bases (e.g. sodium, caustic potash solution or corrosive potassium salts)
- Alcohol other than ethyl alcohol, methyl alcohol and propyl alcohol
- Inorganic chlorides, e.g. calcium, lithium chloride, magnesium chloride and zinc chloride

- ▶ Clean plastic pulleys with a permitted cleaning agent.

9.47 Rope suspension and rope fixation

9.47.1 Checking rope suspensions (rope clamps, rope thimbles) for wire breaks, absence of corrosion and tight fit of screw fittings

If a rope lock is being used as a rope suspension, the free rope end must be secured to prevent it being pulled through. This mechanism means that the free rope end must not be connected to the bearing rope strand in such a way that a force is transmitted.

Fitting the wire rope

The end of the new wire rope must be made up in such a way that there is absolutely no possibility of the rope structure loosening (e.g. as a result of flash-butt welding or hardening), assuming the rope structure is not separated by the type of rope fixation (e.g. splicing or casting).

NOTICE

Incorrect fitting of a new wire rope!
Risk of damage to the rope.

- ▶ No adjustments may be made, and/or attachments added, to the rope suspensions and rope fixation when laying a new wire rope.
 - ▶ The rope end should be inserted in the same way as for the original wire rope.
-
- ▶ After fitting a new wire rope, check the rope suspensions regularly for correct position of the wire rope in the fixation and to ensure that it is correctly fastened to the adjacent structure (particularly screw fastenings to the structure).
 - ▶ Check the device used to attach the rope suspension to the structure for any cracks.
 - ▶ Check the cast rope ends regularly for wire breaks and corrosion where the wire rope emerges out of the cast metal.

If the rope shows any signs of damage, deformation, wear, etc.:

- ▶ cut open the rope end and replace the cast.
- ▶ Check rope suspensions with ferrules for wire breaks near the ferrule, cracks in the ferrule material and for slippage of the wire rope.

If the rope shows any signs of damage, deformation, wear, etc.:

- ▶ Shorten the wire rope and replace the connection.
- ▶ Check detachable rope suspensions (rope lock, rope clamps, drum) for wire breaks and corrosion of the wire rope, slippage of the rope at the termination and loosening of the fastening screws.

If the rope shows sign of corrosion or wire breaks:

- ▶ shorten and refasten the rope.

If there is rope slippage at the termination and the set screws are loose:

- ▶ tighten the connection.

Checking the thimble connection

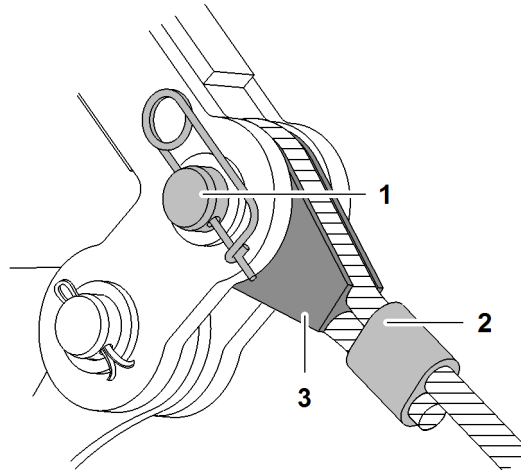


Fig. 6096: Rope thimble with ferrule

- | | | | |
|---|----------------------|---|--------------|
| 1 | Bolting | 3 | Rope thimble |
| 2 | Ferrule (wire clamp) | | |

Checking the ferrules for cracks and splitting

- ▶ Check the ferrules for cracks and splitting.

If the ferrules show signs of cracks or splitting:

- ▶ Remove the rope.
- ▶ Contact Liebherr after sales service.

Checking rope thimbles for corrosion, cracks and wire breaks

- ▶ Check rope thimbles for corrosion, cracks and wire breaks.

If the rope thimbles show any signs of corrosion, cracks or wire breaks:

- ▶ Replace the rope thimble.
- ▶ Contact Liebherr after sales service.

9.47.2 Checking the pocket locks



DANGER

Damaged pocket lock!
Load breakaway.

- ▶ Replace damaged pocket locks.
- ▶ Only use pocket locks that are in a completely flawless condition.

Immediately replace the pocket locks if the following damage is present:

- Cracks
- Corrosion
- Stiffness and sticking of the safety button
- Removability of the wire clamp or sealing sleeve

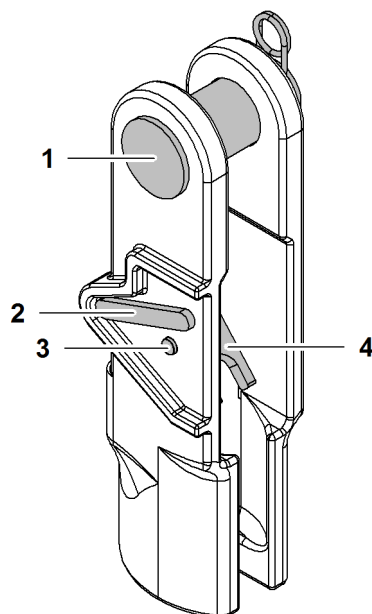


Fig. 6097: Pocket lock

- | | | | |
|---|--------------|---|----------------|
| 1 | Pin | 3 | Locking device |
| 2 | Safety latch | 4 | Safety button |

- ▶ Check the pocket lock for cracks and corrosion.
- ▶ Check the pocket lock for the correct functioning of the self-locking safety latch **2**.
- ▶ Check the ease of movement of the safety button **4** for the safety latch **2**.
- ▶ Check that the pin **1** is present.

If the pocket lock is damaged or faulty in any way:

- ▶ Replace the pocket lock.

9.47.3 Checking the rope end fittings for cracks

- ▶ Check the ferrules for cracks and splitting.

If the ferrules show signs of cracks or splitting:

- ▶ Remove the rope.
- ▶ Contact Liebherr after sales service.

9.47.4 Checking the rope fixing point

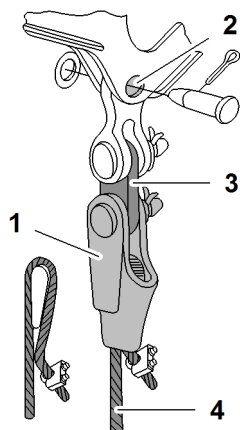


Fig. 6098: Rope lock and rope fixation

- | | | | |
|---|---------------|---|------------------------|
| 1 | Rope lock | 3 | Intermediate connector |
| 2 | Rope fixation | 4 | Hoist rope |

Checking the rope lock for damage and proper operation

- ▶ Check the rope lock for damage and proper operation.

If the rope lock is damaged or faulty in any way:

- ▶ Replace the rope lock.

Checking the rope clamp for tight fit

- ▶ Check rope clamp for tight fit.

If the rope clamp is loose:

- ▶ Remove the rope.
- ▶ Contact Liebherr after sales service.

9.48 Cab

To carry out the other listed maintenance work, it is necessary to remove or open the cabin roof protection guard or the falling object protection*.

- The cabin roof protection guard is removed.
- The fixed falling object protection is removed.
- The foldable falling object protection is opened.

9.48.1 Removing the cabin roof protection guard or fixed falling object protection*

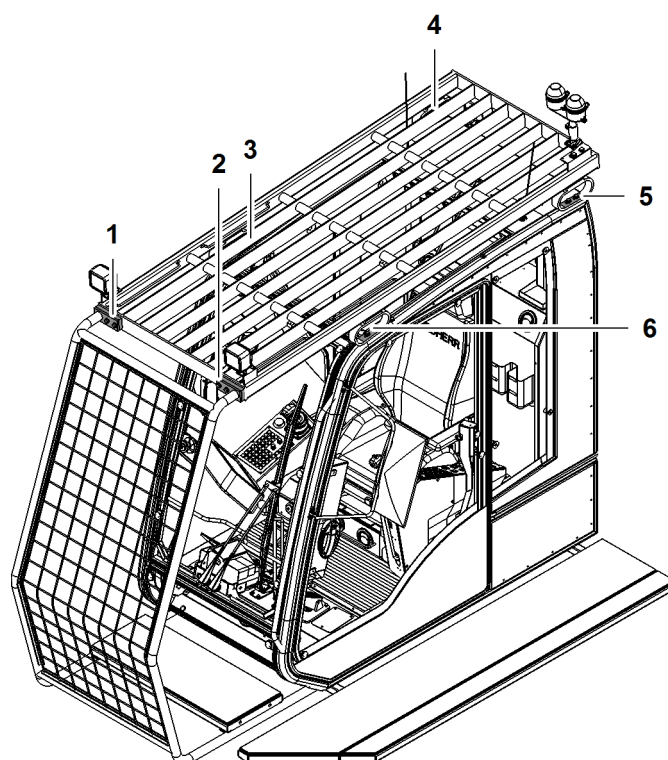


Fig. 6099: Removing the cabin roof protection guard or fixed falling object protection

1	Screw connection	4	Screw connection
2	Screw connection	5	Screw connection
3	Screw connection	6	Screw connection

- ▶ Loosen screw connections 1 - 6.
- ▶ Remove fixed falling object protection.

The cabin roof protection guard has the following screw connections:

- Screw connection 3
- Screw connection 4
- Screw connection 5
- Screw connection 6
- ▶ Loosen screw connections 3 - 6.
- ▶ Remove cabin roof protection guard.

9.48.2 Opening foldable falling object protection*

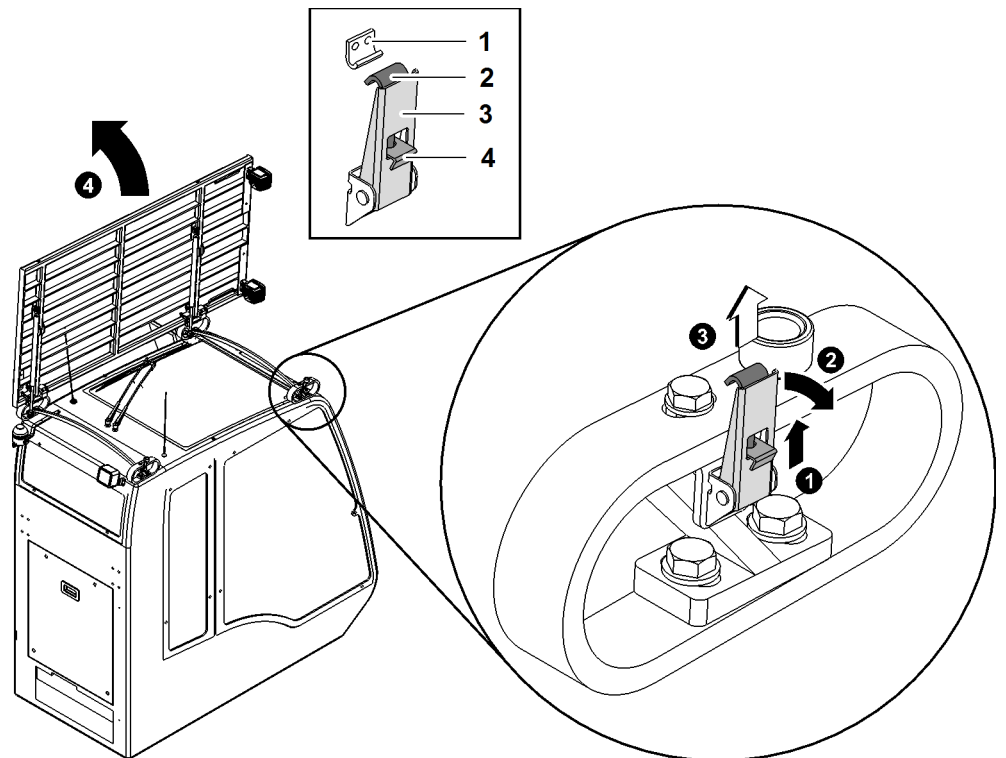


Fig. 6100: Opening foldable falling object protection

- | | | | |
|---|-----------------------|---|---------------|
| 1 | Hook on locking lever | 3 | Locking lever |
| 2 | Hook on latch | 4 | Safety latch |

There are two locking levers on the falling object protection.

- ▶ Lift safety latch 4 and hold.
- ▶ Fold down locking lever 3.
 - ▷ Locking lever hook 2 moves up.
- ▶ Unhook hook on locking lever 1 and hook on locking lever 1.
 - ▷ Latch on falling object protection is open.
- ▶ Repeat procedure on other side.
 - ▷ Open falling object protection.

9.48.3 Check the windows of the cab for damage

- ▶ Check the windows of the cab for damage.

If any of the cab windows are damaged:

- ▶ Replace cabin windows.
- ▶ Contact Liebherr after sales service.

9.48.4 Checking that the cab door and the door lock work properly

Checking the operation of the cab door

- ▶ Check the operation of the cab door.

If the cab door does not move freely or does not latch in the open position:

- ▶ Spray adhesive lubricant on hinges.
- ▶ Contact Liebherr after sales service.

Checking the operation of the door lock

- ▶ Check the operation of the door lock.

If the door lock is not operating correctly:

- ▶ Spray the locks with adhesive lubricant.
- ▶ Apply frost protection to the locks in the event of low ambient temperatures.
- ▶ Contact Liebherr after sales service.

9.48.5 Checking cabin roof protection guard or falling object protection* for damage and locking in case of foldable falling object protection

- ▶ Check cabin roof protection guard or falling object protection for damage.

If the cabin roof protection guard or the falling object protection is not in perfect condition:

- ▶ Contact Liebherr customer service.

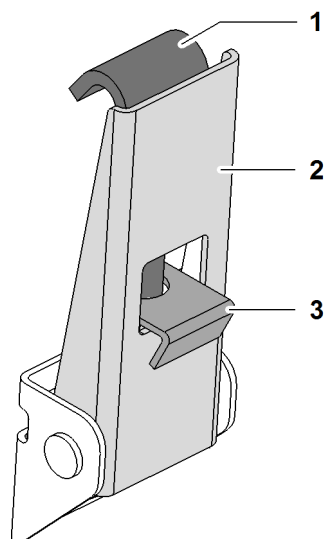


Fig. 6101: Checking locking in case of foldable falling object protection

- | | | | |
|---|--------------------|---|--------------|
| 1 | Locking lever hook | 3 | Safety latch |
| 2 | Locking lever | | |

- ▶ Lift safety latch **3** and hold.

- ▶ Fold down locking lever **2**.
 - ▷ Locking lever hook **1** moves up.
- ▶ Unhook locking lever hook **1** and hook on falling object protection.
 - ▷ Falling object protection can be folded.
- ▶ Check locking in case of foldable falling object protection.

The locking lever hook **1** is threaded.

It is not possible to close the locking lever **2** if tension is too high.

If the tension is too low, the locking lever hook **1** doesn't hang properly and the falling object protection is loose.

If locking does not function correctly with foldable falling object protection:

- ▶ Adjust the locking lever hook **1** by turning the thread in such way that the falling object protection fits tightly and the locking lever **2** closes completely.

or

Contact Liebherr customer service.

9.48.6 Lubricating the falling object protection*

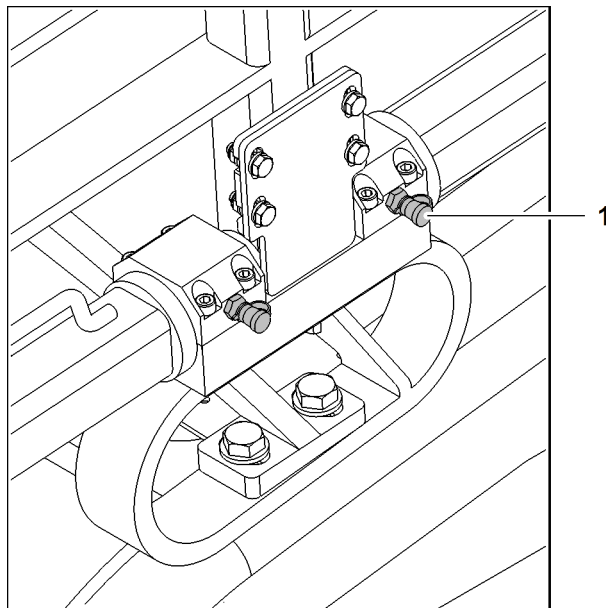


Fig. 6102: Lubricating the falling object protection

1 Grease nipple (4x)

- ▶ Use grease gun to press grease into grease nipple **1**.
- ▶ Repeat procedure with all grease nipples.

9.48.7 Replacing the windscreen wiper

Ensure that the following conditions are fulfilled:

- Ring spanner with width across flats 13 is available.
- Open spanner with width across flats 13 is available.
- New Liebherr windscreen wiper is available.

NOTICE

Incorrect maintenance!
Risk of damage to the windscreen wiper nozzles.

- ▶ Note the windscreen wiper nozzles on the windscreen wiper mount.

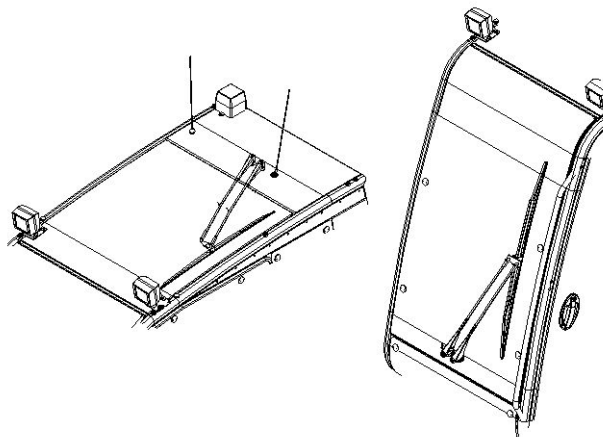


Fig. 6103: Replacing the windscreen wiper

- ▶ Hold screw with open spanner and undo nut with ring spanner.
- ▶ Replace the windscreen wiper.

Only tighten the screw by a certain degree so that the windscreen wiper can still move freely.

- ▶ Place the screw through the mount and windscreen wiper.
- ▶ Tighten nut using ring spanner.

9.48.8 Filling the windscreen cleaning system

Ensure that the following conditions are fulfilled:

- Suitable windscreen washer fluid is available.

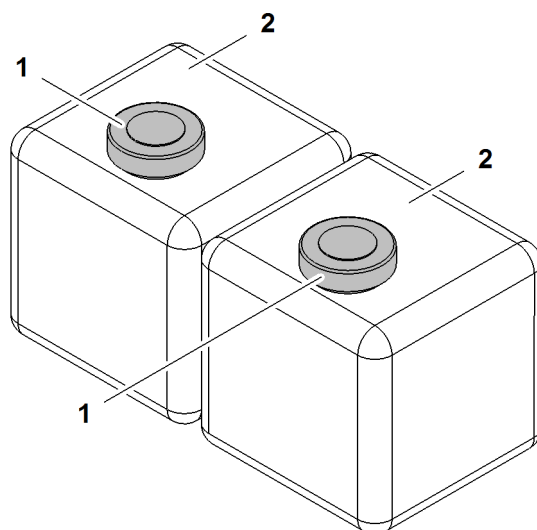


Fig. 6104: Filling the windscreen washer system

1 Cover

2 container

The containers are behind the operator's seat in the cabin.

- ▶ Open cover 1.

NOTICE

Unsuitable windscreen washer fluid!
Damage to the system.

- ▶ Fill the containers 2 with suitable windscreen washer fluid only.
-

- ▶ Fill the containers with windscreen washer fluid.
- ▶ Close cover 1.
- ▶ If necessary clean the windscreen wiper nozzles on the windscreen wipers with a needle.

9.48.9 Checking outside mirrors and inside mirrors for damage

- ▶ Check outside mirrors and inside mirrors for damage.

If mirrors are damaged or do not remain in position:

- ▶ Replace mirrors.
- ▶ Tighten the set screws.
- ▶ Contact Liebherr after sales service.

9.48.10 Checking the operation of the hydraulic cab tilting device and for damage

Checking the operation of the hydraulic cab tilting device

- ▶ To check the operation of the hydraulic cabin tilting device: press the appropriate button on control panel X11.

If the hydraulic cab tilting device is faulty in any way:

- ▶ Do not operate the hydraulic cab tilting device.
- ▶ Contact Liebherr after sales service.

Checking hydraulic cylinders, hydraulic hoses and connections for leaks and damage

- ▶ Check hydraulic cylinders, hydraulic hoses and connections for leaks and damage.

If the hydraulic cylinders, hydraulic hoses and connections are leaking or damaged:

- ▶ Do not operate the hydraulic cab tilting device.
- ▶ Contact Liebherr after sales service.

9.48.11 Checking hydraulic cabin elevation for function and damage

Checking the operation of the acoustic warning signal

When the safety lever is pulled up, the acoustic warning signal must sound if cabin is elevated.

- ▶ Check the operation of the acoustic warning signal.

If the acoustic warning signal is faulty in any way:

- ▶ Do not operate the hydraulic cab elevation (system).
- ▶ Contact Liebherr after sales service.

Checking the operation of the operating elements (valves, displays etc.)

- ▶ Check the operation of the operating elements (valves, displays etc.).

If the cab elevation (system) operating elements (valves, display, etc.) are faulty in any way:

- ▶ Do not operate the hydraulic cab elevation (system).
- ▶ Contact Liebherr after sales service.

Checking that the safety chain is present and working properly

The safety chain must prevent the machine operator from falling out of an open cab door.

- ▶ Check that the safety chain is present and working properly.

If safety chain is missing or doesn't function correctly:

- ▶ Do not operate the hydraulic cab elevation (system).
- ▶ Contact Liebherr after sales service.

Checking hydraulic hoses and connections for leaks and damage

- ▶ Check hydraulic hoses and connections for leaks and damage.

If hydraulic hoses or connections show leaks or damage:

- ▶ do not operate hydraulic cabin elevation.
- ▶ Contact Liebherr customer service.

Checking emergency descent equipment for presence and function

- ▶ Check emergency descent equipment for presence and function.

If descent equipment is missing or doesn't function correctly:

- ▶ do not operate hydraulic cabin elevation.
- ▶ Contact Liebherr customer service.

Checking cabin suspension point for damage

- ▶ Check cabin suspension point for damage.

If cabin's suspension point is damaged:

- ▶ do not operate hydraulic cabin elevation.
- ▶ Contact Liebherr customer service.

Checking the function of the emergency lowering system

- ▶ Check emergency lowering system for correct function.

If the emergency lowering system is not functioning correctly:

- ▶ do not operate hydraulic cabin elevation.
- ▶ Contact Liebherr customer service.

Checking pin connection for presence of locking elements

- ▶ Check pin connection for presence of locking elements.

If locking elements of pin connection are not in place:

- ▶ do not operate hydraulic cabin elevation.
- ▶ Replace missing locking elements.

Checking safety gear for function and damage

- ▶ Check safety gear for function and damage.

If safety gear does not function correctly or is damaged:

- ▶ Contact Liebherr customer service.

9.48.12 Cleaning or replacing the filter insert in the cabin

The cleaning intervals of the filter insert depend on the degree of contamination of the ambient air, the frequency of use and the type of contamination. The full filter inserts can be cleaned by tapping out, blowing out or rinsing in lukewarm water. If the filter insert can no longer be cleaned, it must be replaced.

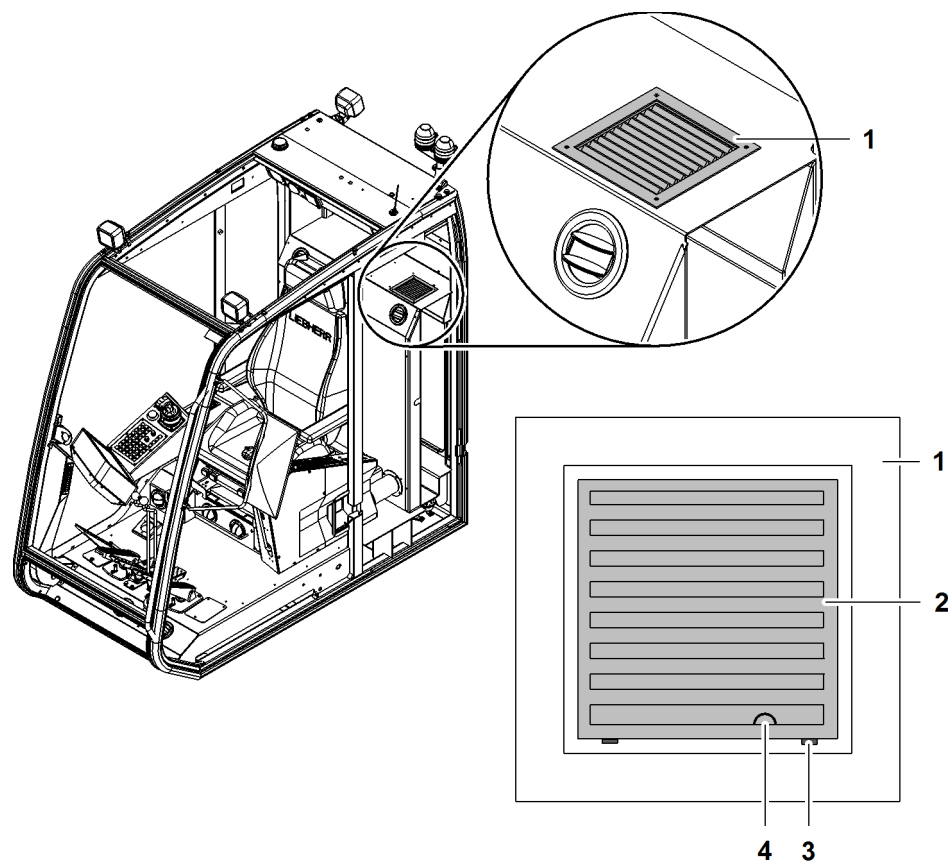


Fig. 6105: Replacing the filter insert in the cabin

- | | | | |
|---|--------------------------|---|---------|
| 1 | Fan | 3 | Recess |
| 2 | Frame with filter insert | 4 | Marking |

- ▶ Insert screwdriver in recess **3** and lift up.

The filter insert has a smooth and a coarse side. The filter insert is installed with the coarse side **facing up**.

- ▶ Replace filter insert.

The frame **2** with filter insert has a marking **4**. This marking **4** must face the operator's seat.

- ▶ Insert frame **2** with filter insert.

9.49 Ventilation, heating and air-conditioning



WARNING

Unauthorized maintenance on air conditioning system!
Poisoning, frostbite.

- ▶ Work on the air conditioning system may only be carried out by Liebherr service personnel.

9.49.1 Checking the recirculated air filter for contamination

Cleaning intervals depend on the degree of contamination of the ambient air, the frequency of use and the type of contamination.

The full filter inserts can be cleaned by tapping out, blowing out or rinsing in luke-warm water. If the filter insert can no longer be cleaned, it must be replaced.

- ▶ Fold armrests of operator's seat up.
- ▶ Fold backrest of operator's seat forward.
- ▶ Slide operator's seat forward.

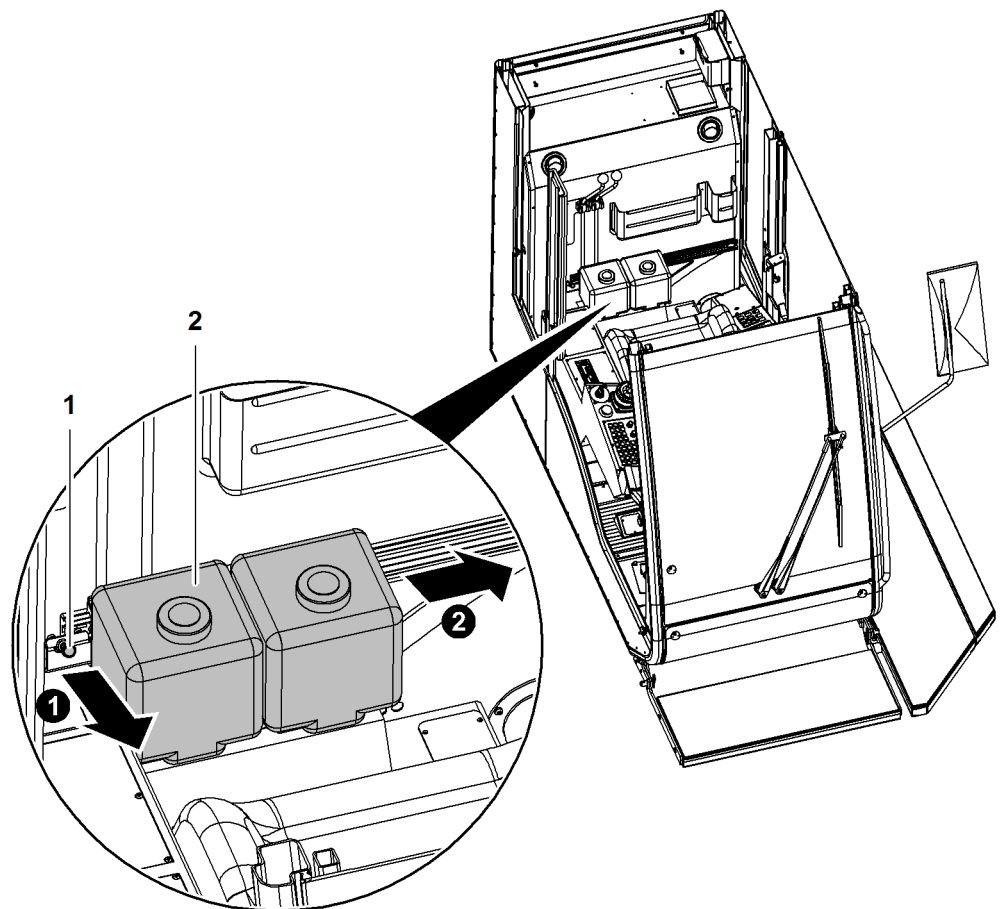


Fig. 6106: Shifting container

1 Lever

2 Container (2x) of windshield washer system

- ▶ Pull out lever 1.
- ▶ Shift container 2 to the right.

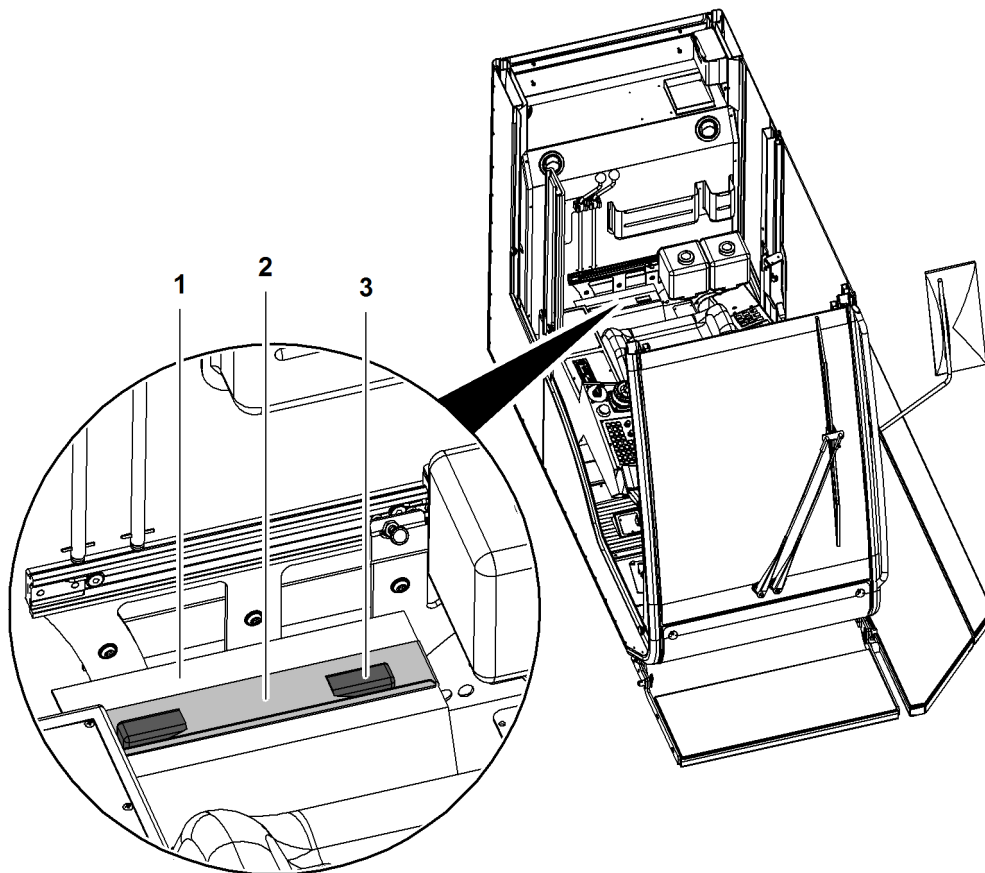


Fig. 6107: Removing cover

- | | | | |
|---|------------------------------------|---|------------|
| 1 | Housing of recirculated air filter | 3 | Clamp (2x) |
| 2 | Cover | | |

- ▶ Undo clamps 3 of cover 2.
- ▶ Remove cover 2 from housing 1.

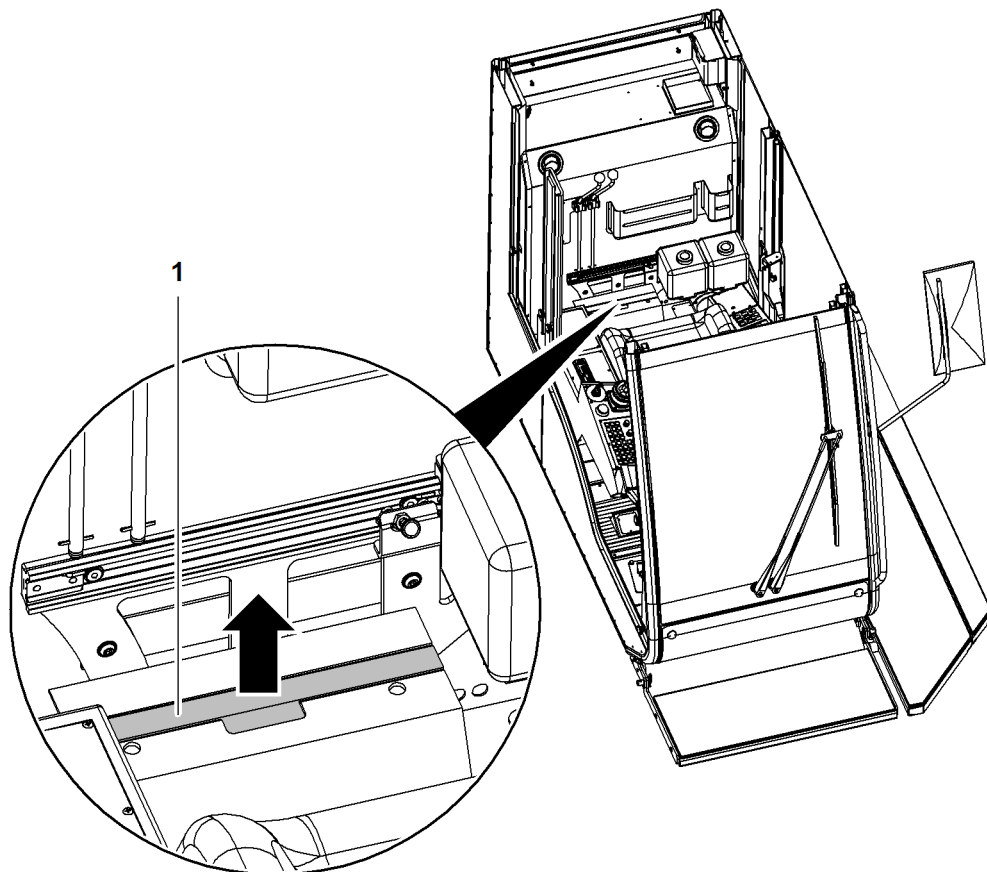


Fig. 6108: Removing recirculated air filter

1 Recirculated air filter

- ▶ Remove recirculated air filter 1.
- ▶ Check recirculated air filter 1 for contamination.



Note

Recirculated air filter 1 is wet after cleaning!

- ▶ Ensure that recirculated air filter 1 is dry before reinserting it.

If recirculated air filter 1 is dirty:

- ▶ Clean or replace recirculated air filter 1 (For more information see: [9.49.2 Replacing the recirculated air filter, page 2141](#)).

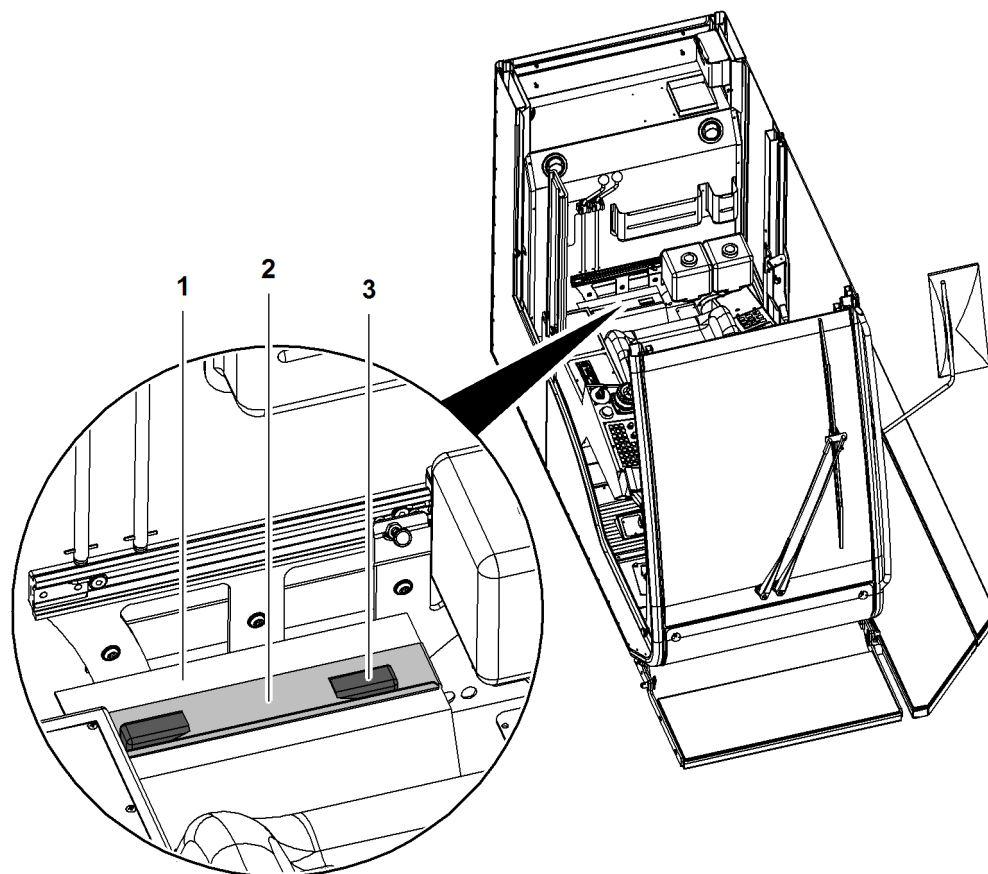


Fig. 6109: Placing cover on housing

- 1 Housing of recirculated air filter
2 Cover

- 3 Clamp (2x)

- ▶ Place cover 2 on housing 1.
- ▶ Close clamps 3 of cover 2.

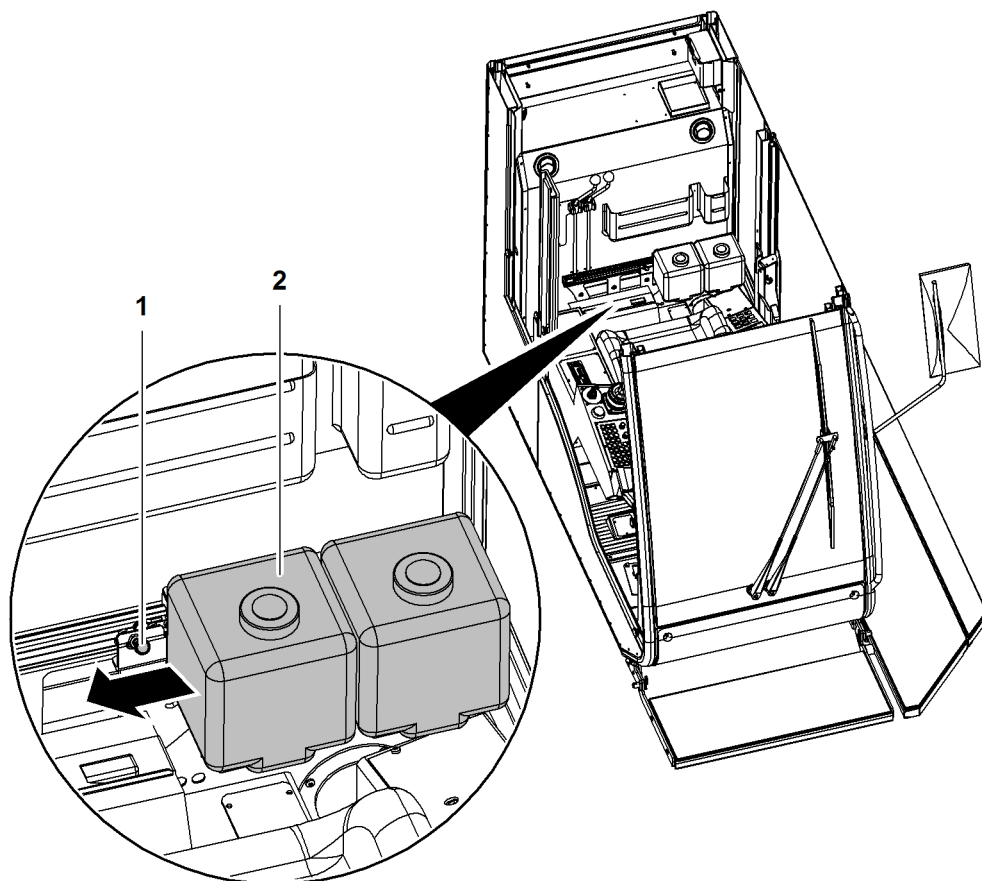


Fig. 6110: Shifting container

1 Lever

2 Container (2x) of windshield washer system

- ▶ Shift container 2 to the left until lever 1 snaps into place.

9.49.2 Replacing the recirculated air filter

- ▶ Fold armrests of operator's seat up.
- ▶ Fold backrest of operator's seat forward.
- ▶ Slide operator's seat forward.

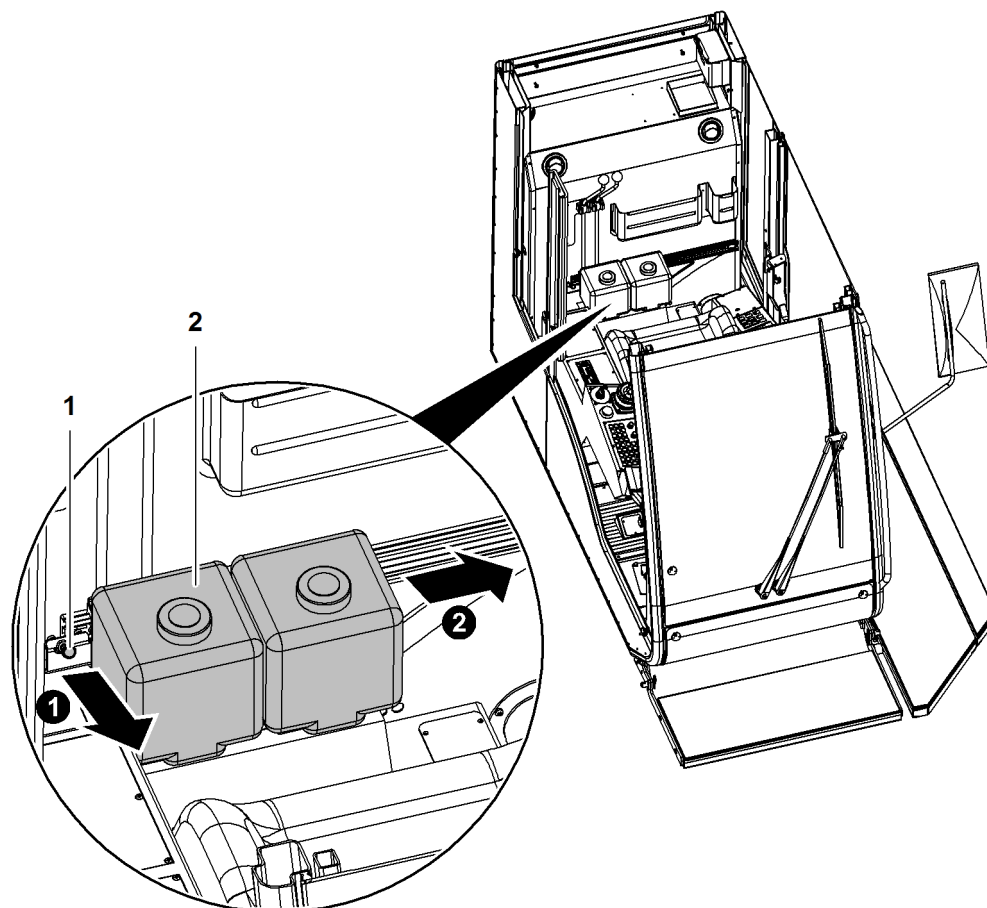


Fig. 6111: Shifting container

1 Lever

2 Container (2x) of windshield washer system

- ▶ Pull out lever 1.
- ▶ Shift container 2 to the right.

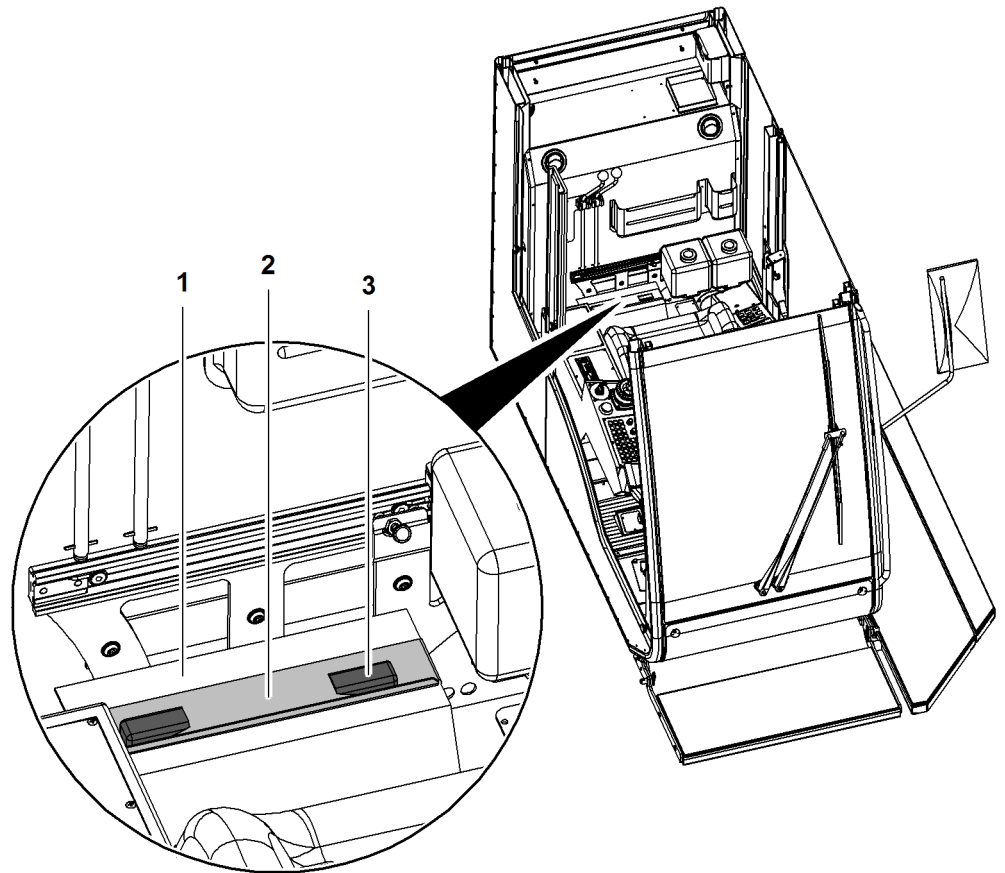


Fig. 6112: Removing cover

- | | | | |
|---|------------------------------------|---|------------|
| 1 | Housing of recirculated air filter | 3 | Clamp (2x) |
| 2 | Cover | | |
- ▶ Undo clamps 3 of cover 2.
 - ▶ Remove cover 2 from housing 1.

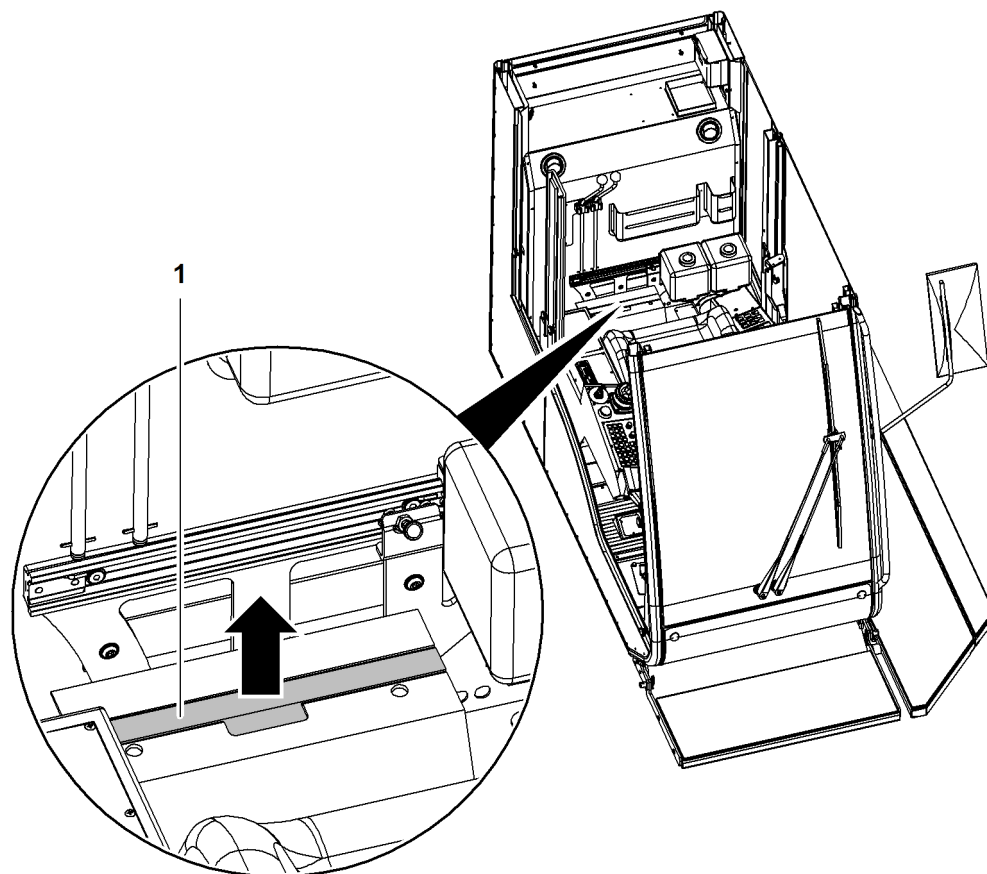


Fig. 6113: Removing recirculated air filter

1 Recirculated air filter

► Remove recirculated air filter 1.



Note

Improper installation of recirculated air filter 1!
Improperly installed recirculated air filter 1 reduces air conditioning system performance.

► Observe installation direction of recirculated air filter 1.

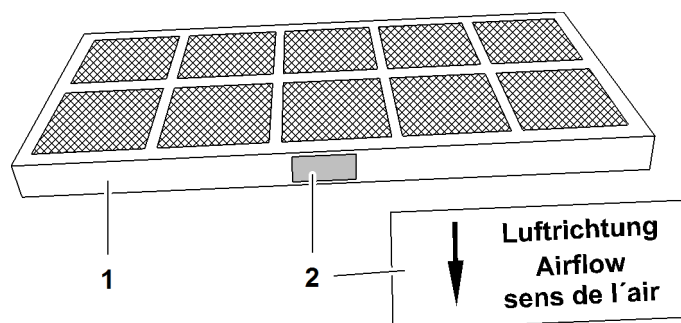


Fig. 6114: Recirculated air filter

1 Recirculated air filter

2 Sign

The arrow of the sign 2 must point toward the operator's seat when installing the recirculated air filter 1.

► Replace recirculated air filter 1.

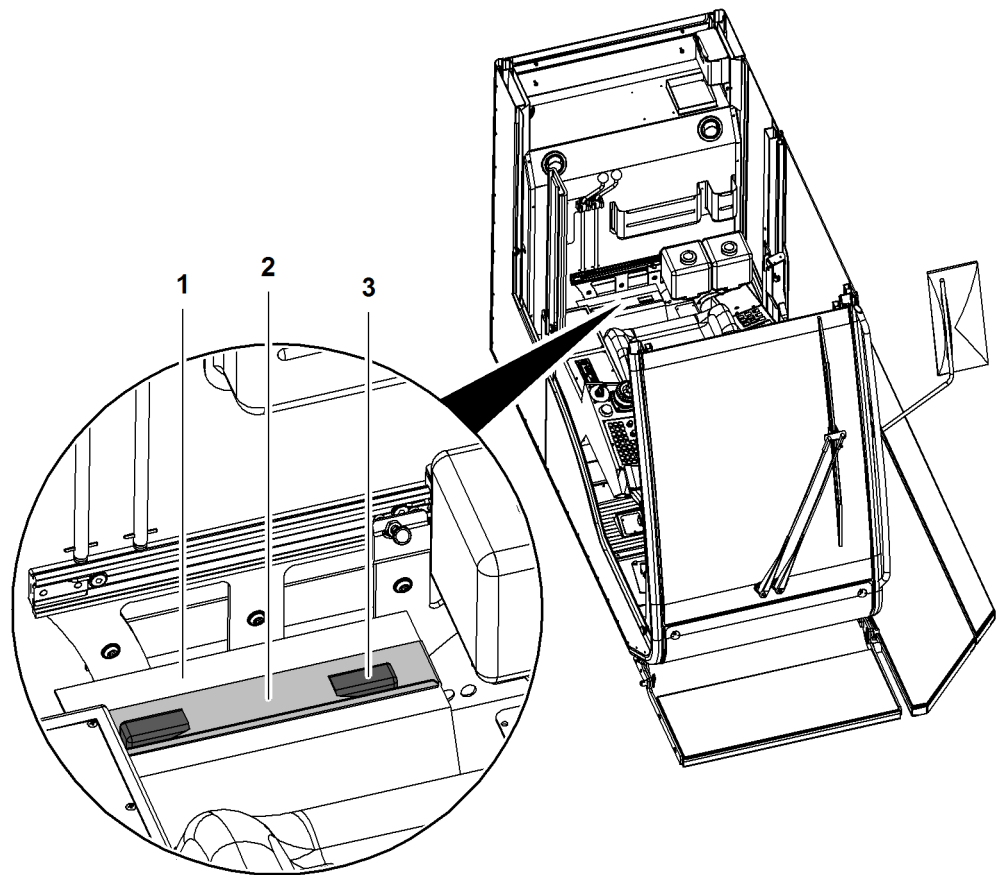


Fig. 6115: Placing cover on housing

- 1 Housing of recirculated air filter
2 Cover

- 3 Clamp (2x)

- ▶ Place cover 2 on housing 1.
- ▶ Close clamps 3 of cover 2.

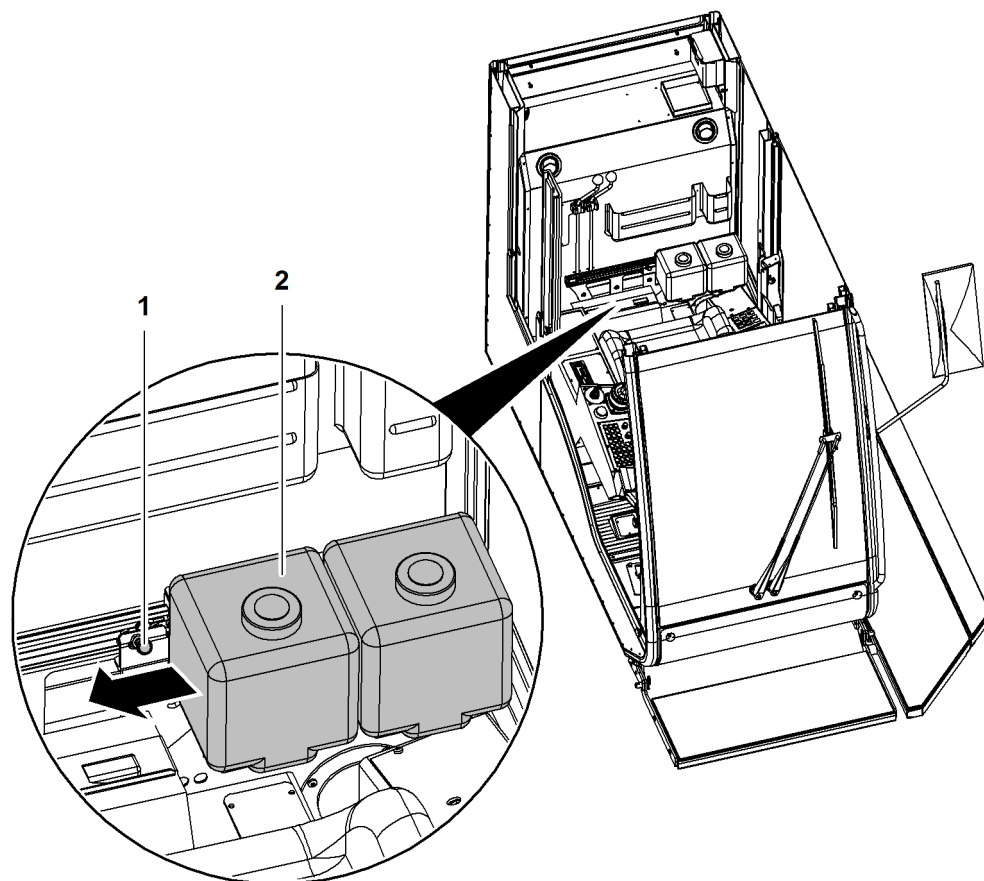


Fig. 6116: Shifting container

1 Lever

2 Container (2x) of windshield washer system

► Shift container 2 to the left until lever 1 snaps into place.

9.49.3 Checking fresh air filter for contamination

Cleaning intervals depend on the degree of contamination of the ambient air, the frequency of use and the type of contamination.

The full filter inserts can be cleaned by tapping out, blowing out or rinsing in lukewarm water. If the filter insert can no longer be cleaned, it must be replaced.

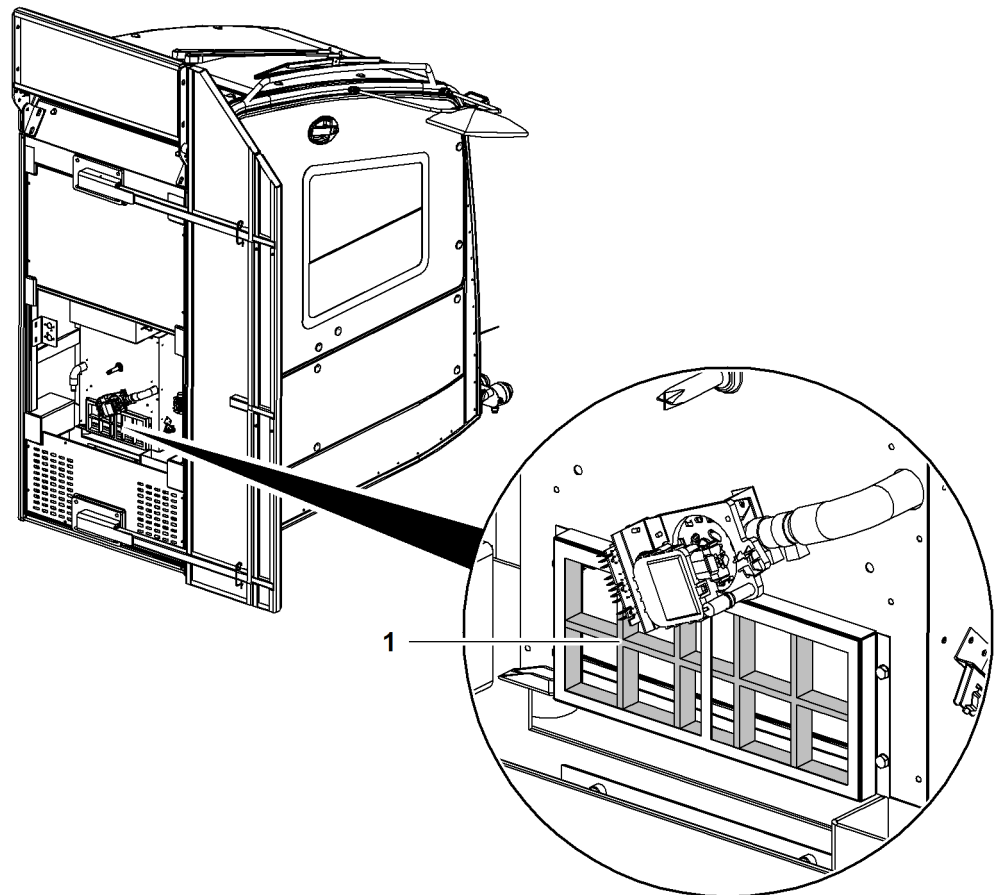


Fig. 6117: Checking fresh air filter for contamination

1 Fresh air filter

- ▶ Remove central bottom plate underneath cabin.
- ▶ Check fresh air filter 1 for contamination.



Note

Fresh air filter 1 is wet after cleaning!

- ▶ Ensure that fresh air filter 1 is dry before reinserting it.

If fresh air filter 1 is dirty:

- ▶ Clean or replace fresh air filter 1 (For more information see: [9.49.4 Replacing the fresh air filter, page 2147](#)).
- ▶ Install central bottom plate underneath cabin.

9.49.4 Replacing the fresh air filter



Note

Liebherr recommends:

- ▶ Tilting the cabin upwards.
- ▶ Turn uppercarriage.

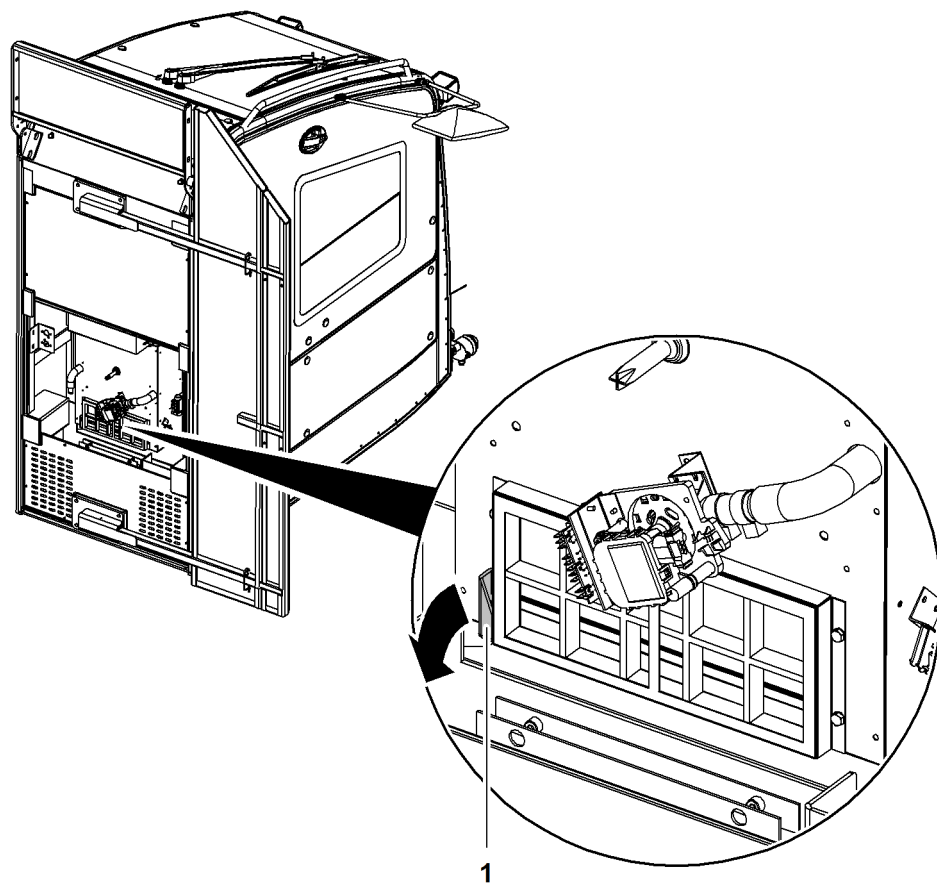


Fig. 6118: Opening housing

1 Clamp

- ▶ Remove central bottom plate underneath cabin.
- ▶ Undo clamp 1 of cover.

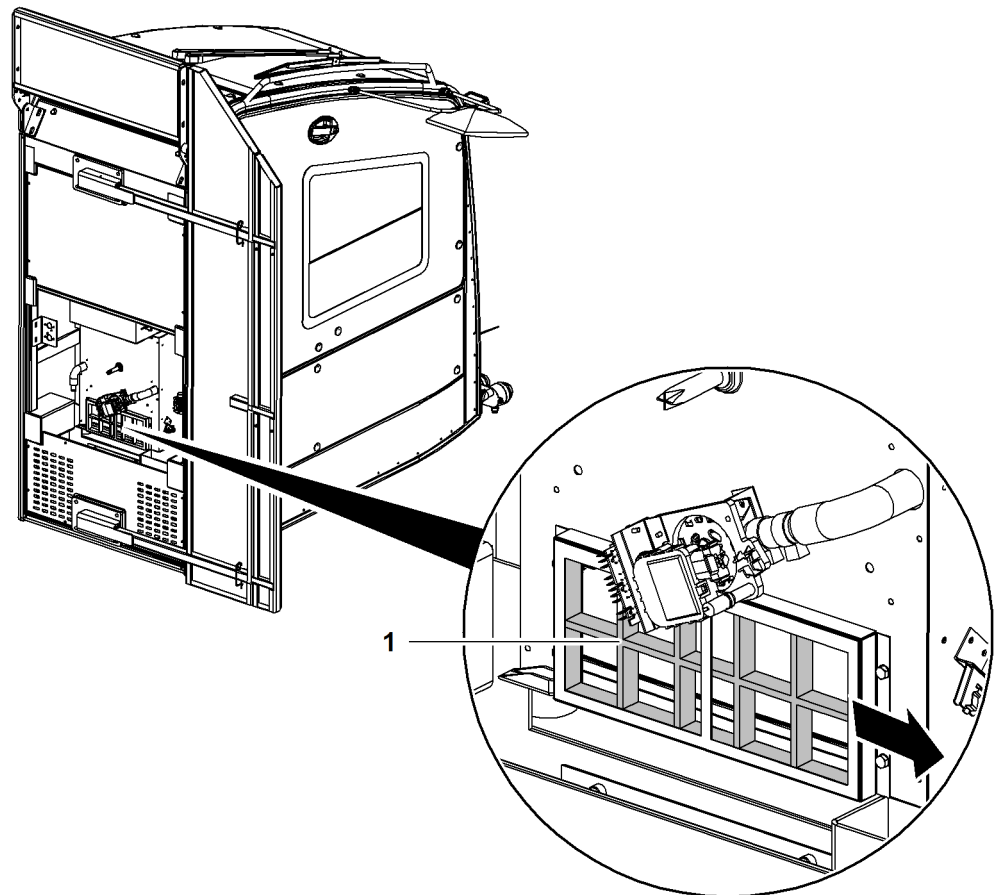


Fig. 6119: Removing fresh air filter

1 Fresh air filter

**Note**

Improper installation of fresh air filter 1!

Improperly installed fresh air filter 1 reduces air conditioning system performance.

► Observe installation direction of fresh air filter 1.

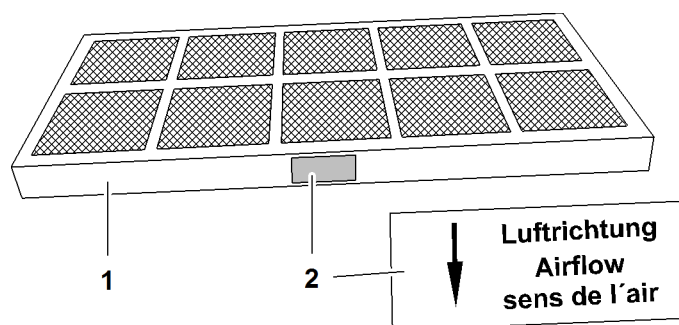


Fig. 6120: Fresh air filter

1 Fresh air filter

2 Sign

The arrow of the sign 2 must point toward the climate box when installing the fresh air filter 1.

► Insert new fresh air filter 1 into housing.

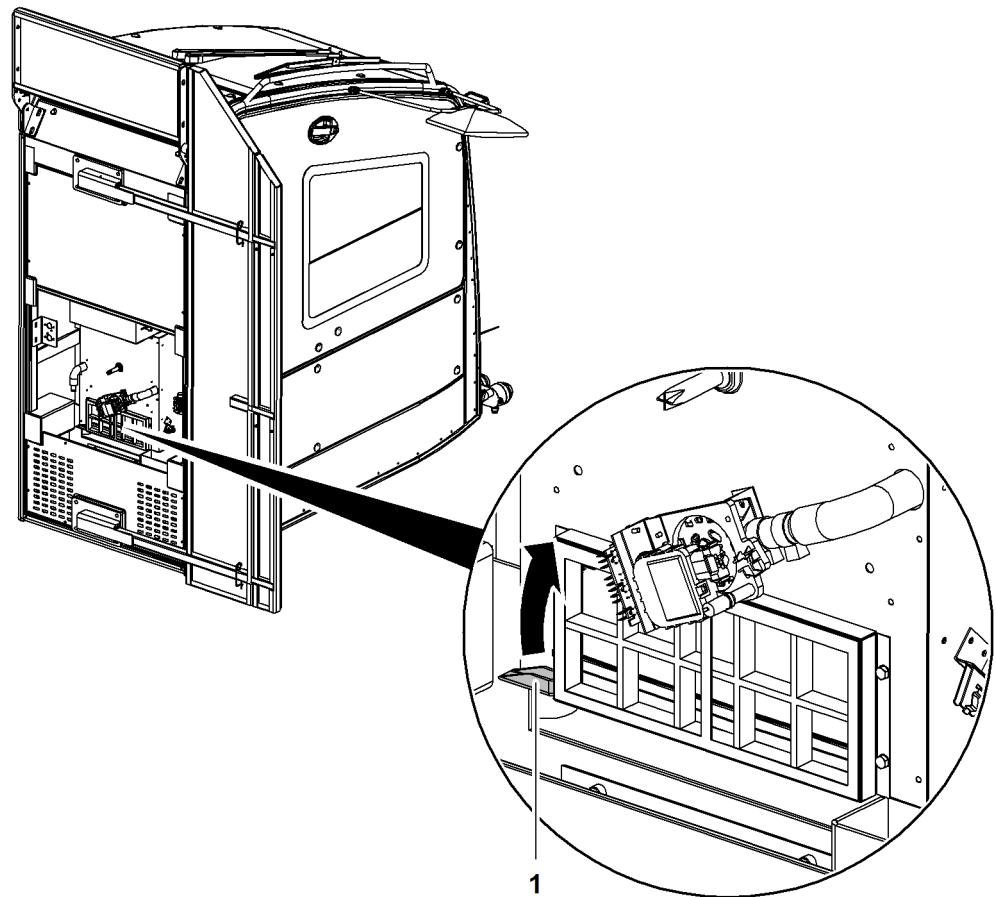


Fig. 6121: Closing housing

1 Clamp

- ▶ Close clamp 1 of housing.
- ▶ Install central bottom plate underneath cabin.

9.49.5 Checking the coolant level in the sight glass

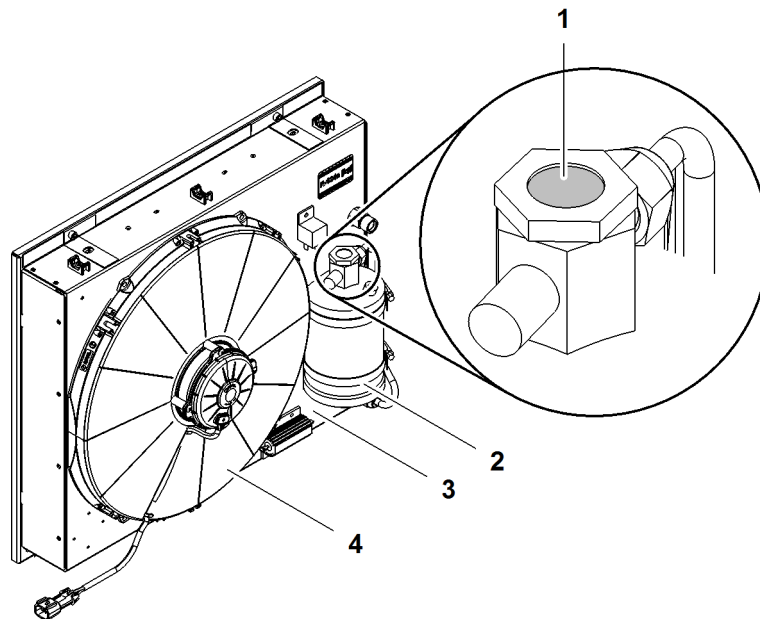


Fig. 6122: Checking the coolant level in the sight glass

- | | | | |
|---|-------------|---|-----------|
| 1 | Sight glass | 3 | Condenser |
| 2 | Dryer | 4 | Fan |

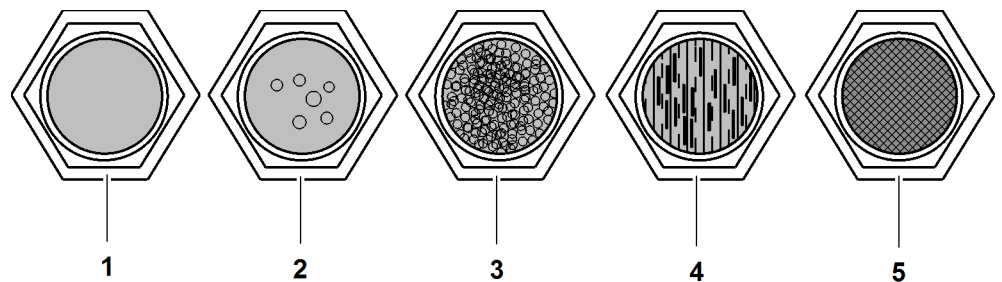


Fig. 6123: Sight glass with different coolant levels

- | | | | |
|---|--------------------|---|-------------------|
| 1 | Clear coolant | 4 | Smears in coolant |
| 2 | Bubbles in coolant | 5 | Gray coolant |
| 3 | Froth in coolant | | |

Clear coolant 1:

- Flowing coolant
- Coolant level is OK
- System working

Bubbles in coolant 2:

- Few bubbles in flowing coolant
- Level too low
- Recommendation: Top up coolant in 50 gram intervals.

Froth in coolant 3:

- Frothing coolant and no clear fluid visible
- Level too low
- Air might be in the system
- Recommendation: Top up coolant in 100 gram intervals.

Smears in coolant 4:

- Too much oil in circuit
- Wrong oil in circuit

Gray coolant 5:

- Substantial abrasion in compressor
- Oil has changed color

- ▶ Put air conditioning system into operation for at least ten minutes.
- ▶ Watch sight glass.

If coolant is not clear:

- ▶ Contact Liebherr customer service.

9.49.6 Checking the condenser for contamination

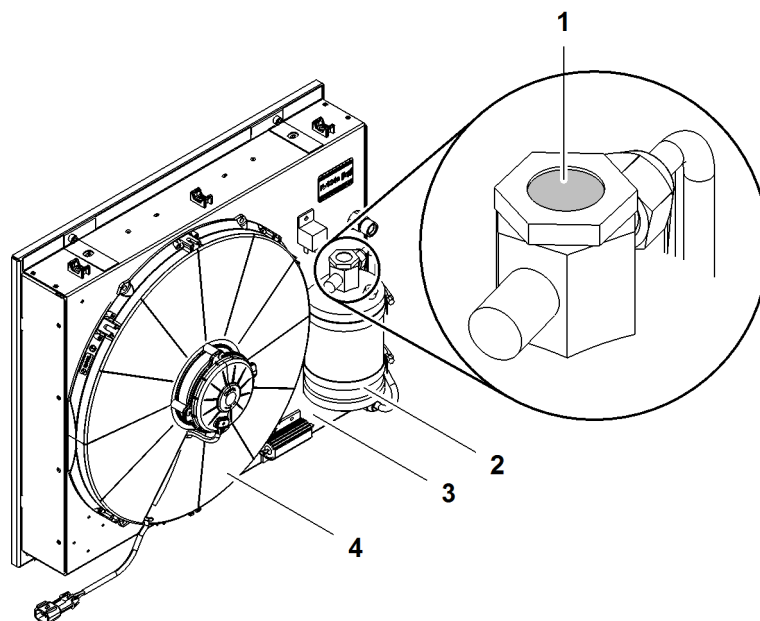


Fig. 6124: Checking the condenser for contamination

- | | | | |
|---|-------------|---|-----------|
| 1 | Sight glass | 3 | Condenser |
| 2 | Dryer | 4 | Fan |

- ▶ Check the condenser **3** for contamination.

If condenser **3** is dirty:

- ▶ Remove fan **4**.

NOTICE

Water in electric components!
Short circuit.

- ▶ Do not clean electric components with high-pressure cleaner.
-

- ▶ Clean condenser **3** with high-pressure cleaner from the inside out.

**Note**

Liebherr recommends:

- ▶ Do not set pressure of high-pressure cleaner above 120 bar (1,740.44 psi).
- ▶ Keep at least 200 mm (7.87" in) distance with high-pressure cleaner from condenser.

9.49.7 Checking the condenser for loose leads, loos screws and corrosion

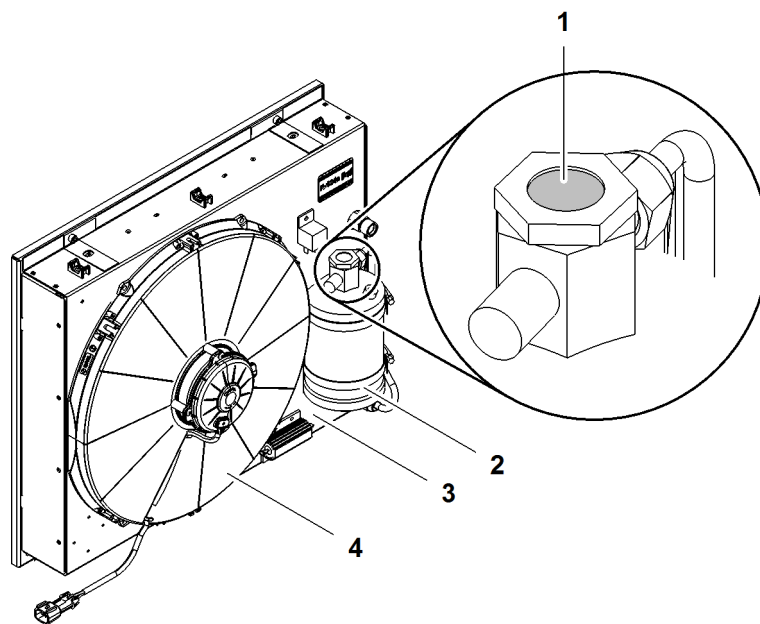


Fig. 6125: Checking the condenser for loose leads, loos screws and corrosion

1	Sight glass	3	Condenser
2	Dryer	4	Fan

- ▶ Check coolant leads for abrasion spots.
- ▶ Check coolant leads for tight fit.
- ▶ Check electric components for corrosion.
- ▶ Check electric components for tight fit.
- ▶ Check mechanic parts for tight fit.

**Note**

Oily screw connections are a sign of leakage!

Liebherr recommends:

- ▶ Observe oily screw connections.

9.49.8 Checking the fan on condenser for function, tight fit and damage

- ▶ Check fan on condenser for tight fit.

▶ Check fan on condenser for damage.

▶ Turn on air conditioning system.

If the fan on the condenser does not turn:

▶ Contact Liebherr customer service.

9.49.9 Checking the climate box for contamination

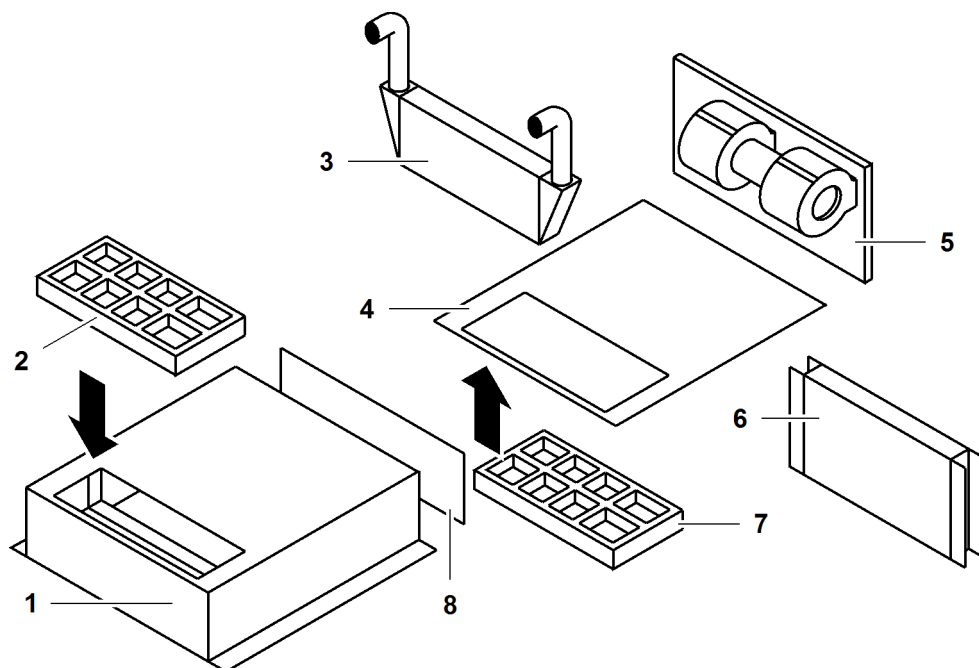


Fig. 6126: Checking the climate box for contamination (illustration of principle)

1	Climate box	4	Bottom plate of climate box	7	Fresh air filter
2	Recirculated air filter	5	Fan	8	Flap recirculated air/fresh air
3	Heat exchanger	6	Vaporizer		

When replacing the fresh air filter **7**, it is possible to check for contamination through the opening of the heat exchangers **3**.

▶ Check heat exchanger **3** for contamination.

If heat exchanger **3** is dirty:

▶ Clean heat exchanger **3**.

When replacing the recirculated air filter **2**, it is possible to check the ease of movement of the recirculated air/fresh air flap **8**.

▶ Check recirculated air/fresh air flap **8** for movement.

If the recirculated air/fresh air flap **8** cannot be moved:

▶ Contact Liebherr customer service.

9.49.10 Checking the dryer for damage and corrosion

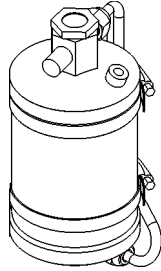


Fig. 6127: Checking the dryer for damage and corrosion

- ▶ Check dryer for damage and corrosion.

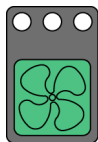
If dryer is damaged:

- ▶ Contact Liebherr customer service.

9.49.11 Starting the ventilation, heating, air conditioning, external air conditioning system* and auxiliary heating system* and ensuring that sufficient antifreeze has been added to the water circuit

Putting the ventilation system into operation

The LED of the button indicates the selected fan speed. Three different fan speeds are possible.



- ▶ Press the *Heating/air conditioning fan speed* button on control panel X11.
 - ▷ The fan blows.

Putting the heating system into operation

Make sure the following conditions are met:

- Diesel engine is switched on.
- Ventilation is switched on.
- Cabin door and windscreen are closed.



- ▶ Turn rotary control knob *Temperature heating/air conditioning system* on control panel X11 to the right (red zone).
 - ▷ Heating is turned up.



- ▶ Turn rotary control knob *Temperature heating/air conditioning system* on control panel X11 to the left (blue zone).
 - ▷ Heating is turned down.

Activating the air conditioning system



WARNING

Leaks in air conditioning coolant circuit in an enclosed space!
Risk of suffocation.

If there is a high coolant concentration in the air:

- ▶ Immediately leave the closed room (cabin).



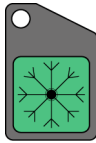
CAUTION

Rotating parts!
Risk of injury to limbs.

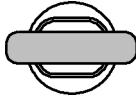
- ▶ Make sure that there are no persons in the vicinity of the fan on the condenser.

Make sure the following conditions are met:

- Diesel engine is switched on.
- Ventilation is switched on.
- ▶ Press the *Air conditioning system* button on control panel X11.
 - ▷ Air conditioning system is switched on.



Activating the external air conditioning system*



- ▶ Turn ignition key on control unit *External air conditioning system* to position "1".

- ▷ Software version is displayed for two seconds on the display of control unit *External air conditioning system*:

HATZ multiflex S 0 5 2 0 4 4 3 / 2 0 1 1

Fig. 6133: Software version

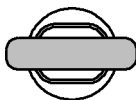
- ▷ Operating state before start is shown on the display of control unit *External air conditioning system*:

!!! OIL !!!	0,0 h
00°	0000

Fig. 6134: Operating state before start

The following parameters appear:

- Display top left: Error oil pressure indicator
- Display top right: Operating hours
- Display bottom left: Engine temperature
- Display bottom right: Diesel engine RPM



- ▶ Turn ignition key on control unit *External air conditioning system* briefly to position "2".

- ▷ Diesel engine is switched on.
- ▷ External air conditioning system is in operation.
- ▷ Operating state after start is shown on the display of control unit *External air conditioning system*.

OIL ✓	0,0 h
25°	1000

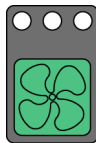
Fig. 6136: Operating state after start

The following parameters appear:

- Display top left: Oil pressure indicator OK
- Display top right: Operating hours
- Display bottom left: Engine temperature
- Display bottom right: Diesel engine RPM



- ▶ Turn rotary control knob *Temperature heating /air conditioning system* on control panel X11 to the desired temperature.



- ▶ Press the button *Fan speed heating/air conditioning system* on control panel X11 until the desired fan speed is set.
 - ▷ External air conditioning system cools down or heats up cabin to the desired temperature.

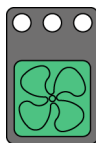
Activating auxiliary heating*

Make sure the following conditions are met:

- Ignition is turned on.



- ▶ Turn rotary control knob *Temperature heating/air conditioning system* on control panel X11 to the right (red zone).



- ▶ Press the button *Fan speed heating/air conditioning system* on control panel X11 until the lowest fan speed is set.



- ▶ Press the button *Instant heating* on control unit *Auxiliary heating*.

- ▶ Turn off auxiliary heating after ten minutes.

9.49.12 Replacing the fuel filter of auxiliary water heating

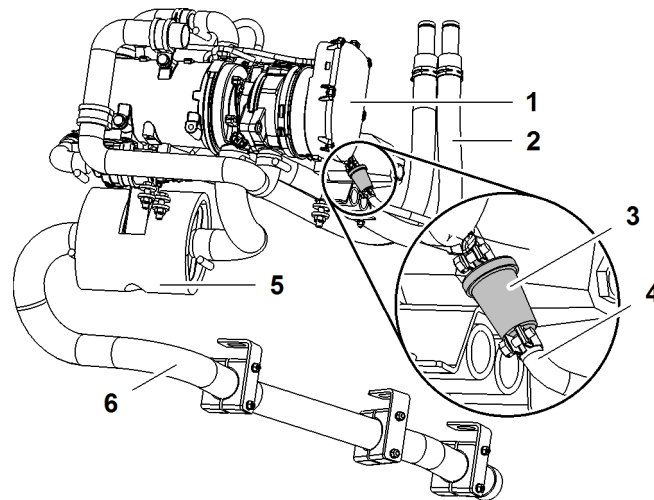


Fig. 6142: Replacing the fuel filter of auxiliary water heating (illustration of principle)

- | | | | |
|---|--------------------------|---|----------------|
| 1 | Auxiliary water heating* | 4 | Fuel line |
| 2 | Warm water pipe | 5 | Muffler |
| 3 | Fuel filter | 6 | Exhaust system |



CAUTION

Hot surface!
Risk of skin burns.

- ▶ Make sure that the exhaust system 6 of the auxiliary water heating 1 has cooled down.

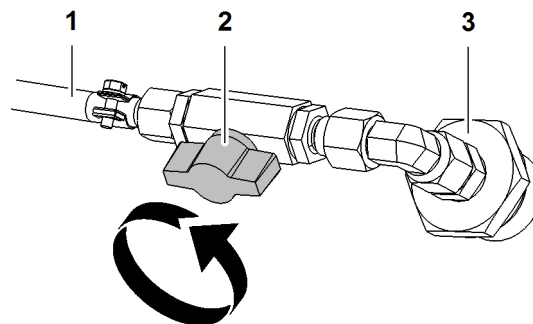


Fig. 6143: Close gate valve on fuel line

- | | | | |
|---|----------------------------|---|-------------------------|
| 1 | Fuel line | 3 | Connection of fuel tank |
| 2 | Gate valve/locking element | | |

With the fuel tank, the connection 3 of the fuel line 1 is the auxiliary water heating. A gate valve 2 is installed for each auxiliary heating system on the fuel line 1.

- ▶ Close gate valve 2 on fuel line 1.



Note

Seeping of fuel into the soil!
Risk of contamination to soil and groundwater.

- ▶ Collect fuel in trap.

- ▶ Put trap underneath.

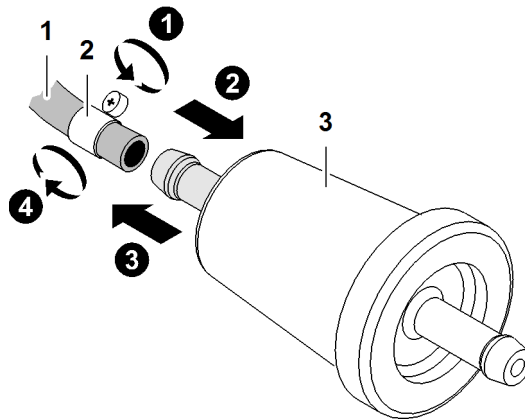


Fig. 6144: Replacing the fuel filter of auxiliary water heating

- | | | | |
|---|------------------|---|-------------|
| 1 | Fuel line | 3 | Fuel filter |
| 2 | Screw clamp (2x) | | |

- ▶ Undo screw clamps **2**.
- ▶ Remove fuel filter **3** from fuel line **1**.



Note

Environmental pollution!

- ▶ Dispose of fuel filters **3** and fuel in accordance with national and international guidelines and regulations.
- ▶ Insert new fuel filter **3** on fuel lines **1**.
- ▶ Tighten screw clamps **2**.
- ▶ Open gate valve on fuel line.

HATZ diesel engine* (see operation manual of the engine manufacturer on CD)

9.50 HATZ diesel engine* (see operation manual of the engine manufacturer on CD)

9.50.1 Checking the belt drive

Make sure the following prerequisites are met:

- HATZ diesel engine is protected from unauthorized start-up.
- ▶ Check belt drive for tension.
- ▶ Check belt drive for loose screws.
- ▶ Check belt drive for correct function.

9.50.2 Replacing the belt drive including vibration damper, deflection pulley and springs

The belt drive service kit consists of the following components:

- Belt drive
- Vibration damper
- Deflection pulley
- Spring (2x)
- ▶ Deinstall vibration damper.
- ▶ Unhook springs on generator.
- ▶ Fold generator up.
- ▶ Remove belts.
- ▶ Deinstall bearing support of deflection pulley.
- ▶ Replace deflection pulley.
- ▶ Reinstall bearing support.
- ▶ Insert new belts.
- ▶ Suspend new springs on generator.
- ▶ Install vibration damper.
- ▶ Check belt alignment.

9.51 Machine care

9.51.1 Cleaning the machine

Liebherr recommends that the external machine parts are cleaned regularly to maintain an even surface quality. This is strongly advised following work with highly corrosive materials.

NOTICE

Unsuitable cleaning agent is used!
The surfaces will be damaged.

- ▶ Do not use any aggressive cleaning agents.
 - ▶ Do not use any abrasive cleaning agents.
 - ▶ Do not use any phosphate cleaners.
 - ▶ Do not use and solvents or solvent-containing cleaning agents.
 - ▶ Only use cleaning agents with a pH value of ≤ 12 .
 - ▶ Ensure that the cleaning agent to water ratio does not exceed 3%.
 - ▶ Rinse with clear water (not salt water).
-

Make sure the following conditions are met:

- The machine is switched off and secured to prevent unauthorized startup.
- The machine has cooled down.
- Main battery switch is switched off.
- Boom is laid down.



CAUTION

Hot steam and compressed air!
Burns.

- ▶ Wear protective equipment.
-

The machine may only be cleaned with a maximum pressure of 150 bar (2,175.56 psi) and a distance of at least 40 cm (1' 4" ft-in). Do not exceed water temperature of 80 °C (176 °F).

The water jet must not be directed onto the following components:

- Intake manifold for engine cooling air
 - Machinery room
 - Electrical connectors
 - Cabin interior
- ▶ Clean the machine using a high-pressure cleaner.
-



Note

Environmental pollution!

- ▶ Dispose of the oil-stained tools and cleaning agents in accordance with national and international guidelines and regulations.
 - ▶ Cleaning water must pass through an oil separator before it enters the sewer system.
-

9.51.2 Preserving the machine

The following types of preservation are available:

- Maintaining preservation of the machine
- Preserving the machine for storage for up to 7 months
 - Preserving the machine for indoor storage
 - Preserve machine for outdoor storage
- Preserve machine for storage for more than 7 months
- Preserve machine for decommissioning
- Preserve machine for reselling

NOTICE

Insufficient or incorrect preservation agents are applied to the machine!
Damage to machine.

- ▶ Ensure that only maintenance personnel preserve the machine.
 - ▶ Ensure that inspection intervals and aftertreatment intervals are not exceeded.
-

Maintaining preservation of the machine

Climatic zones

The maintenance intervals required depend on the climatic conditions in the region where the machine is used.

The graphics below show the climatic zones. The dark markings show the regions with the climatic zone in question:

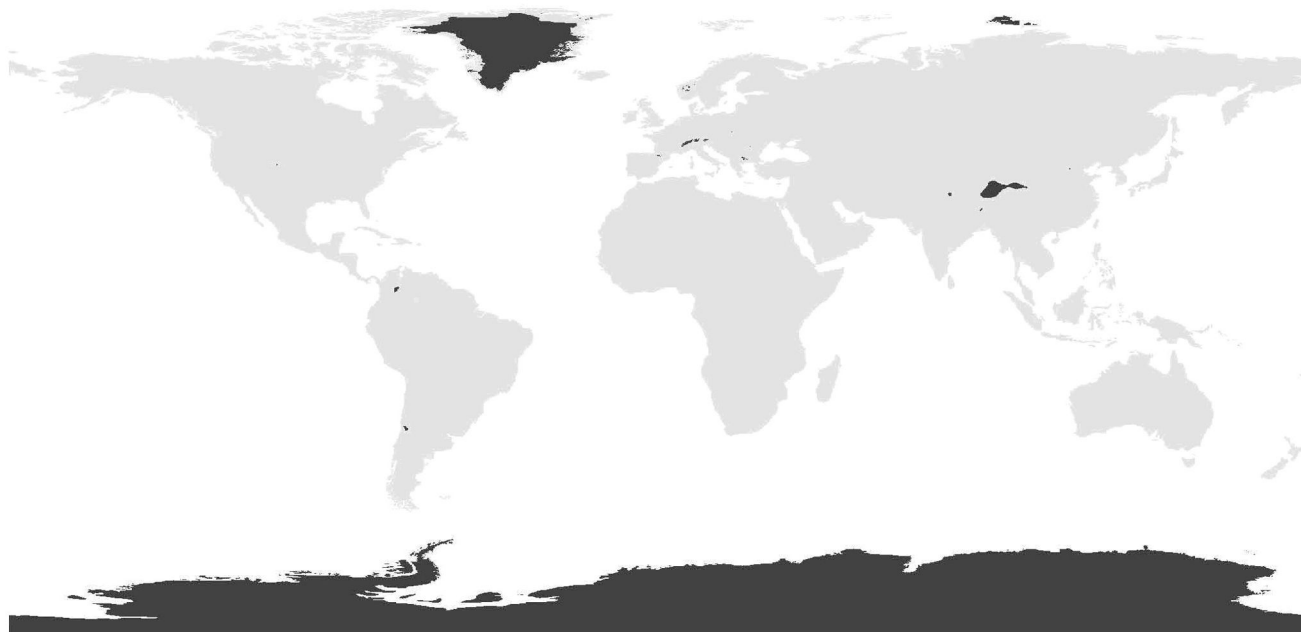


Fig. 6145: Arctic climate

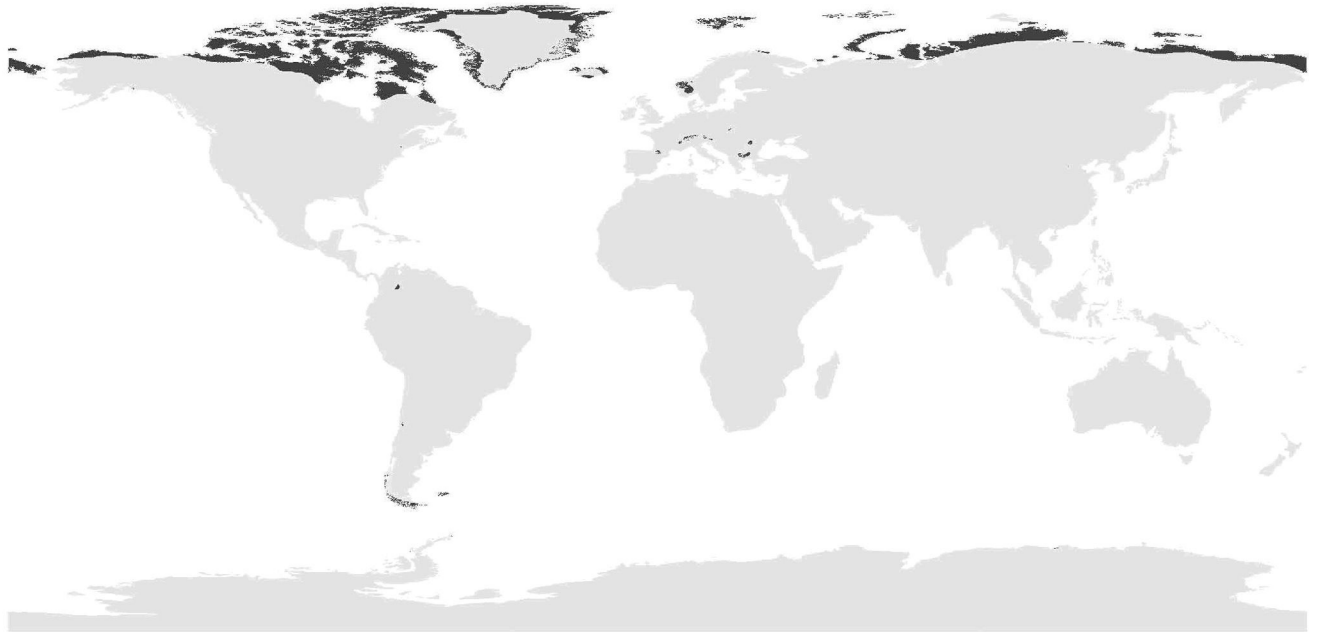


Fig. 6146: Polar climate

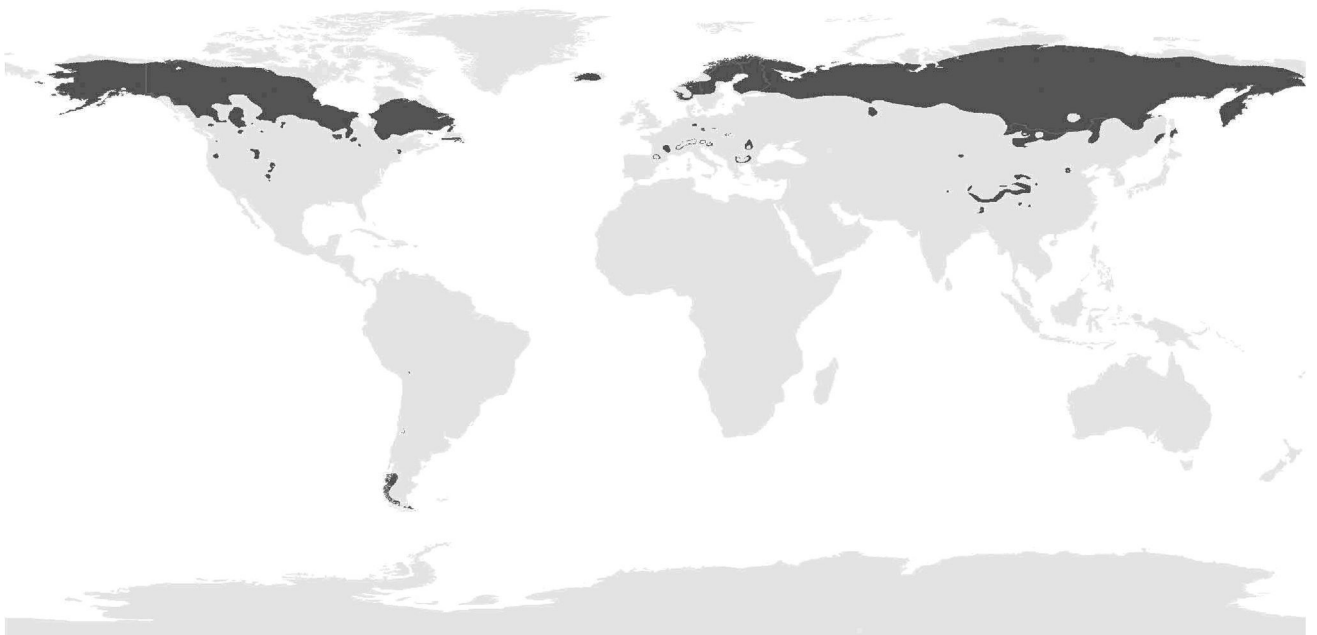


Fig. 6147: Boreal climate

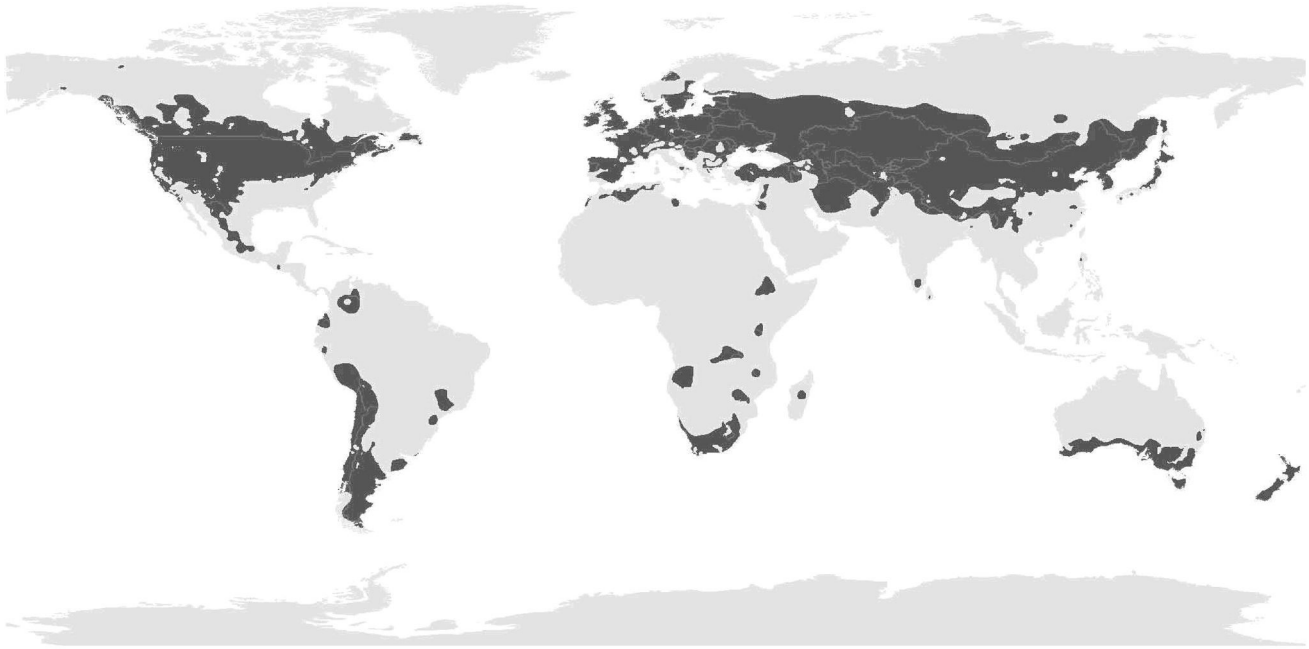


Fig. 6148: Warm temperate climate

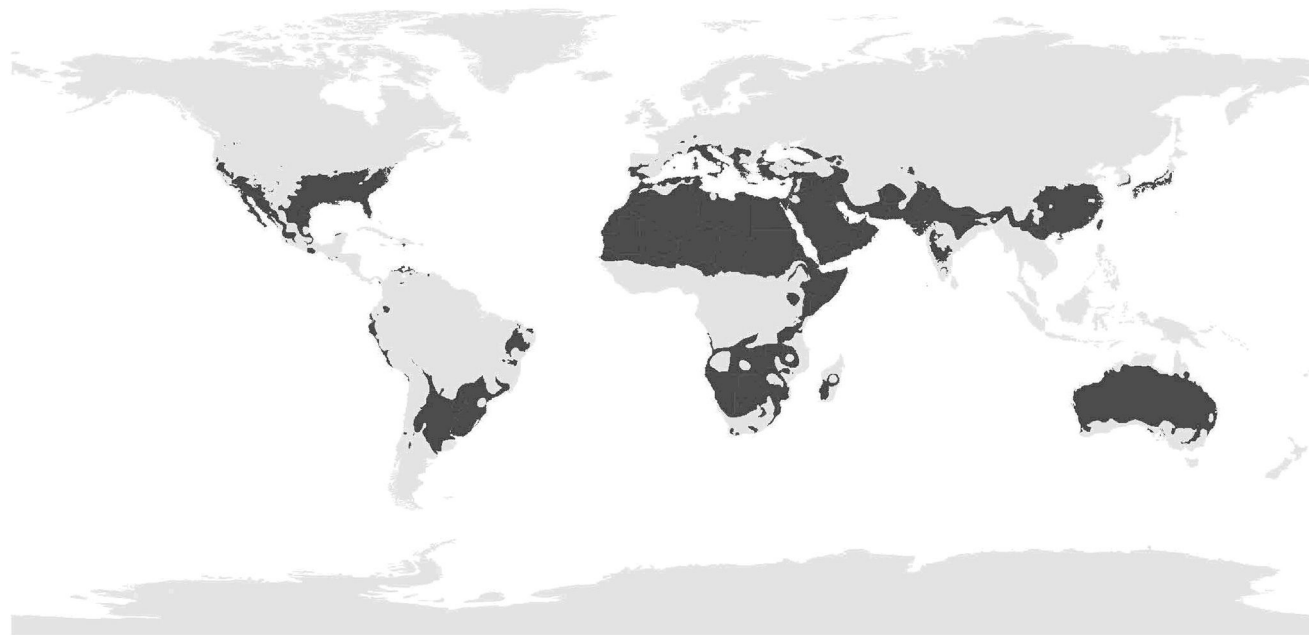


Fig. 6149: Subtropical climate

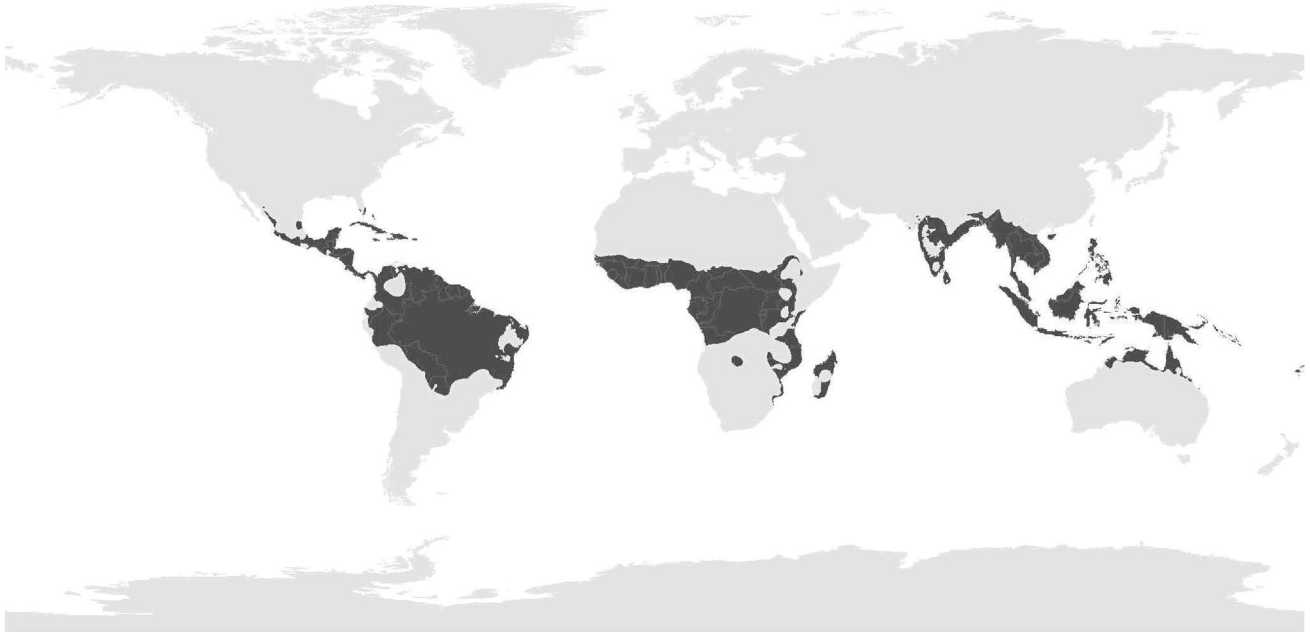


Fig. 6150: Tropical climate

Additional sub-division within climatic zones

The climatic zones are further sub-divided:

Sub-division 1

- Small fluctuations within the climatic zone
- Constant temperature
- Constant, low humidity
- High wind speeds rare

Sub-division 2

- Moderate fluctuations within the climatic zone
- Moderate temperature differences
- Moderate humidity
- Moderate fluctuations in humidity
- Occasional high wind speeds

Sub-division 3

- Strong fluctuations within the climatic zone
- Strong temperature differences
- Strong fluctuations in humidity
- Frequently high constant humidity
- Extreme wind speeds
- Highly contaminated wind (saline, aggressive media - chemicals, sand)
- Extreme UV radiation

Irrespective of the actual surroundings, sub-division 3 automatically applies to the following machine uses within the relevant climatic zone:

- Bulk handling with aggressive chemicals
- Offshore cranes (drilling platform cranes, ship cranes, machines on pontoons)

Inspection intervals

The inspection intervals for the anti-corrosion coating are shown in the table below.

Rectify any faults identified by the inspection and repair mechanical damage immediately.

Anti-corrosion coating inspection intervals in months						
	Arctic climate	Polar climate	Boreal climate	Warm temperate climate	Subtropical climate	Tropical climate
Interval	6	6	9	12	9	6

Tab. 661: Anti-corrosion coating inspection intervals in months

Reapplication intervals

Assuming there is no visible damage to the protective film, the table below shows the reapplication intervals (in months) for the anti-corrosion coating.

Anti-corrosion coating reapplication intervals in months																		
Sub-division	Arctic climate			Polar climate			Boreal climate			Warm temperate climate			Subtropical climate			Tropical climate		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Interval	-	4	2	-	4	2	9	6	3	18	12	6	6	4	2	-	4	2

Tab. 662: Anti-corrosion coating reapplication intervals in months

Make sure the following conditions are met:

- Admissible preservation agent is available in sufficient quantity ([For more information see: 9.2.9 Preservation medium \(anti-corrosion coating\), page 1954](#)).
 - The appropriate tools and accessories are available.
 - The machine is switched off and secured to prevent unauthorized startup.
 - The machine has cooled down.
 - Main battery switch is switched off.
 - Protective equipment is worn.
- ▶ Thoroughly clean the machine using a high-pressure cleaner.
 - ▶ Dry if necessary with dry, oil-free air.
 - ▶ Remove any areas of corrosion with sandpaper (60 – 80 grit) or a wheel sander.
 - ▶ Be careful not to cause damage through mechanical removal of corrosion.
 - ▶ Do not polish surfaces.



WARNING

Insufficient or incorrect preservation agents are applied to the machine!
Risk of injury to the respiratory tract, suffocation.

- ▶ Wear respirator.

- ▶ Spray all machined, but unpainted, parts external to the machine (e.g. pins that are not removed, bearings, galvanized brackets, screws, etc.) with DINITROL 4010 or LPS 3 anti-corrosion agent.
- ▶ Spray all machined, galvanized, but unpainted, parts within the machine (e.g. flanges, pins, screws, joints, casings, contact surfaces) with anti-corrosion coating agent DINITROL 4010 or LPS 3.
- ▶ Spray the entire engine compartment with DINITROL 3650 anti-corrosion coating agent.

- ▶ Allow a drying time of 24 hours then spray the entire engine compartment with DINITROL 4010 anti-corrosion coating agent.
- ▶ Spray electrical components inside switch cabinets and terminal boxes as well as connectors and limit switches with LPS 1 anti-corrosion coating agent.
- ▶ Spray screws on handrails, platforms, stairs, moving parts and floodlights with LPS 3 anti-corrosion coating agent.
- ▶ Wrap connections, threaded joints, valves of the hydraulic system with DENSO tape.
- ▶ Spray all joints (pin connections on pendant and backstay straps, equalizer, etc.) with LPS 3 anti-corrosion coating agent.
- ▶ Do not use LPS 3 anti-corrosion coating agent in the engine compartment.

Preserving the machine for storage for up to 7 months

NOTICE

Do not start up a preserved machine if it has been preserved for storage for up to/more than 7 months!

Damage to machine.

- ▶ Ensure that the machine is treated with permitted lubricants.
 - ▶ Make sure that all oil levels are correct.
-

Make sure the following conditions are met:

- Boom is laid down.
- Rear counterweight has been removed.

Preserving the machine for indoor storage

The machine is stored in a hall or shelter and is not directly exposed to environmental influences.

Preserving the ropes

Preserve the following ropes:

- Winch1 rope
 - Winch2 rope
 - Rope of main boom adjusting winch
 - Rope of jib luffing winch
 - Rope of rope reeving winch
- ▶ Unwind ropes on first layer.
 - ▶ Preserve ropes with rope grease.
 - ▶ Wind ropes up properly.

Preserving the boom

Boom sections:

- ▶ Disassemble boom sections.
- ▶ Repair damages.
- ▶ Disassemble pin connection points.
- ▶ Lubricate pin connection points.

- ▶ Assemble pin connection points.
- ▶ Preserve all machined but unpainted parts on the boom sections with DINITROL 4010.

Boom bases/boom heads:

- ▶ Repair damages.
- ▶ Disassemble pin connection points.
- ▶ Lubricate pin connection points.
- ▶ Assemble pin connection points.
- ▶ Preserve all machined but unpainted parts on the boom base / boom heads with DINITROL 4010.
- ▶ Retract hydraulic cylinder.
- ▶ Wrap jib tilting-back supports with Denso tape.

Pendant straps and backstay straps:

- ▶ Disassemble pin connections.
- ▶ Lubricate pin connections.
- ▶ Assemble pin connections.

Preserving the basic machine

A-frame¹ equalizer:

- ▶ Disassemble pin connections.
- ▶ Lubricate pin connections.
- ▶ Assemble pin connections.

Rear counterweight:

- ▶ Disassemble pin connections.
- ▶ Lubricate pin connections.
- ▶ Assemble pin connections.

Steel structure:

- ▶ Check steel structure for tears and damage. The drawings for checking weld seams and borings are located in the volume "Technical Information".
- ▶ Pre-preserve steel structure with DINITROL 3650.
- ▶ Post-preserve steel structure with DINITROL 4010.
- ▶ Lubricate lubrication points.

Hydraulic cylinders:

- ▶ Retract hydraulic cylinder.
- ▶ Wrap hydraulic cylinders that cannot be retracted with Denso tape.

Swing ring:

- ▶ Apply graphite spray to tooth flanks.
- ▶ Lubricate swing ring until grease escapes from the sealing lips. This process step can also take place with the optional central lubrication.

Batteries:

- ▶ Disconnect batteries with main battery switch.

- ▶ Remove batteries.
- ▶ Charge batteries every two months (trickle charge).

Winches:

- ▶ Lubricating winches.
- ▶ Fill winch gearbox with oil.

Crawler drive:

- ▶ Lubricate crawler drive.
- ▶ Fill crawler drive with oil.

Swing gear:

- ▶ Fill swing gear with oil.

Fuel tank:

- ▶ Fill fuel tank with winter diesel.
- ▶ Drain water in the condensation trap.

Electrics:

- ▶ Apply Vaseline to all contacts on connectors.

Load hook/pulley block:

- ▶ Lubricate load hook/pulley block.

Hydraulic oil tank:

- ▶ Fill hydraulic oil tank with oil.

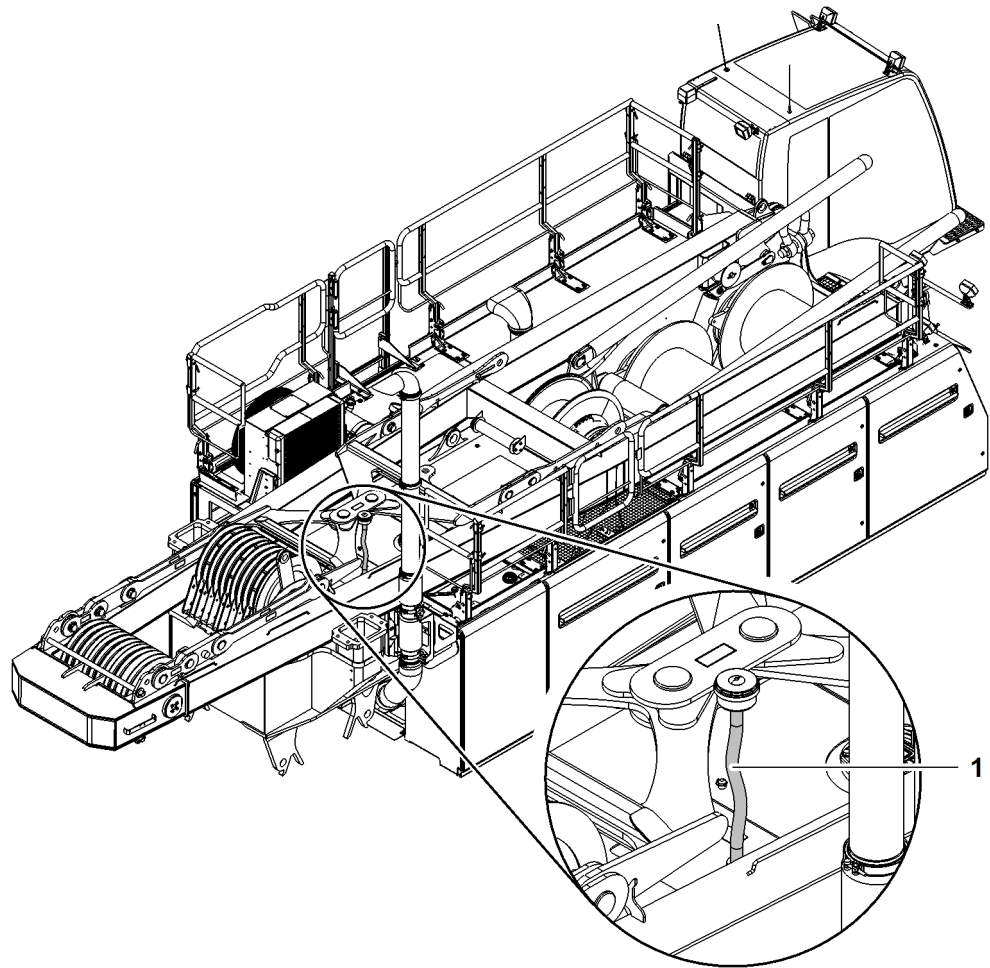


Fig. 6151: Hose on hydraulic oil tank (illustration of principle)

1 Hose with screw fittings

Because it can expand, the hose **1** prevents oil from escaping in case of temperature differences.

- ▶ Unscrew breathing filter.
- ▶ Screw on hose **1** with screw fitting.
- ▶ Screw breathing filter onto hose **1**.
- ▶ Attach hose **1** with breathing filter in vertical position using cable ties.
- ▶ Ensure that the connections are properly sealed.

Preserve machine for outdoor storage

The machine is stored outdoors and is directly exposed to environmental influences.

Preserving the ropes

Preserve the following ropes:

- Winch1 rope
- Winch2 rope
- Rope of main boom adjusting winch
- Rope of jib luffing winch
- Rope of rope reeving winch

- ▶ Unwind ropes on first layer.
- ▶ Preserve ropes with rope grease.
- ▶ Wind ropes up properly.

Preserving the boom

Boom sections:

- ▶ Disassemble boom sections.
- ▶ Disassemble catwalks.
- ▶ Repair damages.
- ▶ Disassemble pin connection points.
- ▶ Lubricate pin connection points.
- ▶ Assemble pin connection points.
- ▶ Preserve boom sections with DINITROL 4010.

Boom bases/boom heads:

- ▶ Disassemble catwalks.
- ▶ Cover rope pulleys.
- ▶ Repair damages.
- ▶ Disassemble pin connection points.
- ▶ Lubricate pin connection points.
- ▶ Assemble pin connection points.
- ▶ Preserve boom bases/boom heads with DINITROL 4010.
- ▶ Retract hydraulic cylinder.
- ▶ Wrap jib tilting-back supports with Denso tape.

Pendant straps and backstay straps:

- ▶ Disassemble pin connections.
- ▶ Lubricate pin connections.
- ▶ Assemble pin connections.

Preserving the basic machine

A-frame¹ equalizer:

- ▶ Disassemble pin connections.
- ▶ Lubricate pin connections.
- ▶ Assemble pin connections.

Rear counterweight:

- ▶ Disassemble pin connections.
- ▶ Lubricate pin connections.
- ▶ Assemble pin connections.

Steel construction:

- ▶ Check steel structure for tears and damage. The drawings for checking weld seams and borings are located in the volume "Technical Information".

- ▶ Pre-preserve steel structure with DINITROL 3650.
- ▶ Post-preserve steel structure with DINITROL 4010.
- ▶ Lubricate lubrication points.

Hydraulic cylinders:

- ▶ Retract hydraulic cylinder.
- ▶ Wrap hydraulic cylinders that cannot be retracted with Denso tape.

Swing ring:

- ▶ Apply graphite spray to tooth flanks.
- ▶ Lubricate swing ring until grease escapes from the sealing lips. This process step can also take place with the optional central lubrication.

Batteries:

- ▶ Disconnect batteries with main battery switch.
- ▶ Remove batteries.
- ▶ Charge batteries every two months (trickle charge).

Winches:

- ▶ Lubricating winches.
- ▶ Fill winch gearbox with oil.

Crawler drive:

- ▶ Lubricate crawler drive.
- ▶ Fill crawler drive with oil.

Swing gear:

- ▶ Fill swing gear with oil.

Fuel tank:

- ▶ Fill fuel tank with winter diesel.
- ▶ Drain water in the condensation trap.

Electrics:

- ▶ Apply Vaseline to all contacts on connectors.

Load hook/pulley block:

- ▶ Lubricate load hook/pulley block.

Hydraulic oil tank:

- ▶ Fill hydraulic oil tank with oil.
- ▶ Cover rope pulleys.

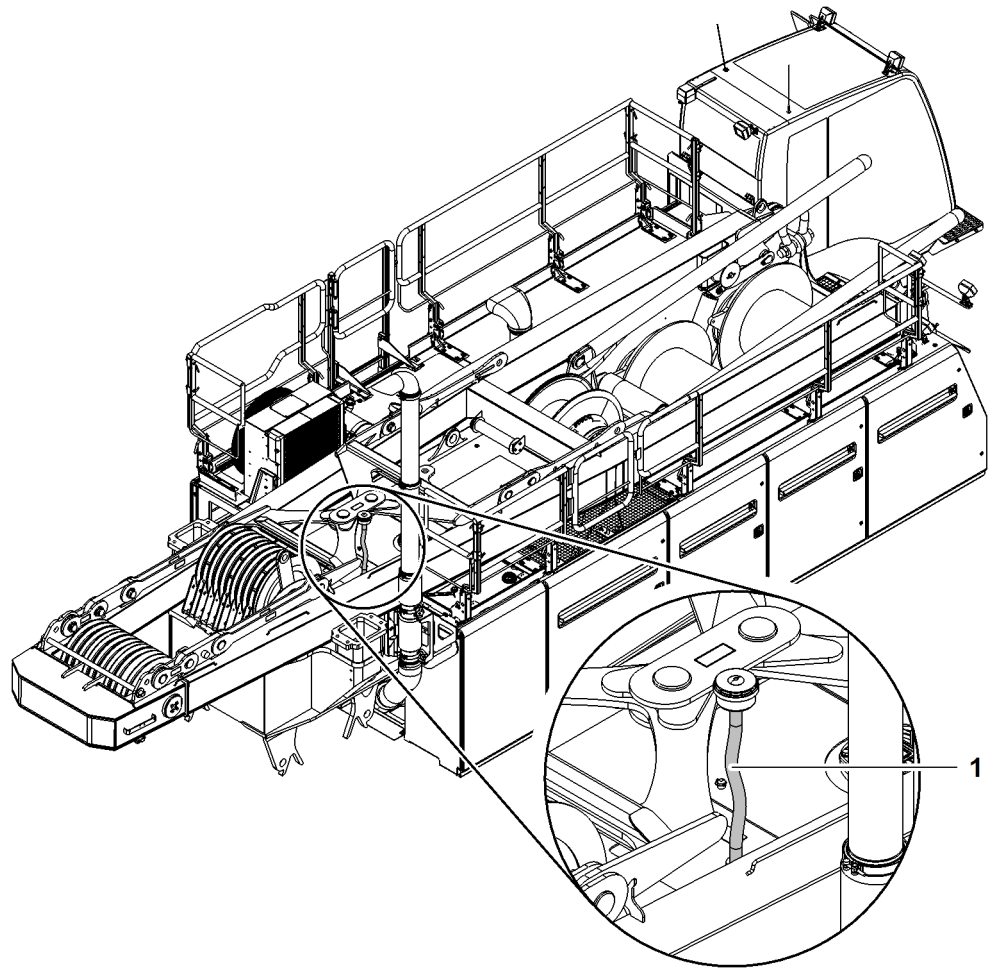


Fig. 6152: Hose on hydraulic oil tank (illustration of principle)

1 Hose with screw fittings

Because it can expand, the hose 1 prevents oil from escaping in case of temperature differences.

- ▶ Unscrew breathing filter.
- ▶ Screw on hose 1 with screw fitting.
- ▶ Screw breathing filter onto hose 1.
- ▶ Attach hose 1 with breathing filter in vertical position using cable ties.
- ▶ Ensure that the connections are properly sealed.

Preserve machine for storage for more than 7 months



Note

- ▶ Contact Liebherr customer service when storing the machine for more than 7 months.

Preserve machine for decommissioning



Note

- ▶ When decommissioning the machine, contact Liebherr customer service.

Preserve machine for reselling



Note

- ▶ When reselling the machine, contact Liebherr customer service.
-

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