



Type:

**LR 1300**

Serial number:

**138 015**



ORIGINAL

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## Product ID

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**Product designation:** LR 1300  
**Serial no.:** V006

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## Manufacturer:

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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.

Please contact Liebherr After Sales Service if the machine:

- is resold
- is purchased from a previous owner

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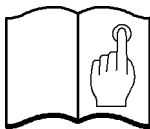
## Using the documentation

The documentation supplied with the machine is designed to enable you to:

- operate the machine safely,
- use it in all permissible situations,
- carry out routine maintenance.

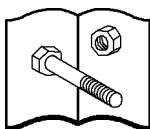
To do this, you will need to be able to find your way around the documentation, which is in several parts.

The documentation consists of:



### **Operation manual**

This contains information on starting, operating and maintaining the machine.



### **Spare parts catalog**

This contains information on procuring spare parts.



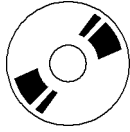
### **Technical information**

This contains information about the electrical and hydraulic systems of the machine.



### Load charts

This contains all the valid load charts for all machine setup options.



All the documentation can be found on the CD-ROM. The symbols printed on the CDs provide information on their contents.

## System requirements for use of the CD-ROM

### Hardware:

- Intel® Pentium II® running at 500 MHz or above
- At least 128 MB RAM or more
- CD-ROM drive
- Minimum resolution of 800 x 600 pixels, high-colour depth

### Software:

- Windows 2000, XP
- Internet Explorer 5.5 or later
- Acrobat Reader 7.0 or later

If you have a popup blocker, it must be disabled while you are working with Liebherr Parts. You should also be aware that the popup blocker function may be integrated within certain web browsers as well as in what are known as 'personal firewalls' (software firewalls). They can generally be switched off by means of the options in the program concerned.

## Latest version of the documentation

The supplied documentation has been specially compiled for the machine with the indicated serial number and therefore must **not** be used with other machines of the same series.

To ensure the documentation is always complete and up to date:

- Do not remove individual documents.
- Replace any missing, unreadable pages by reprinting them from the CD-ROM or request them from Liebherr after sales service.
- Insert immediately new documents supplied as a result of modifications.
- Replace amended documents and destroy the old version (particularly in the case of load charts).
- Always replace the CD-ROM whenever a new version becomes available, e.g. as a result of revision documents.
- With multilingual documents, always update **all languages**.

## Storage of documentation

The **operating manual** must always be kept ready to hand in the cab.

The **load charts** needed at any given time must be kept in the operator's cab. These can be printed out from the CD.

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

## Structure of the operating manual



The operating manual is made up of individual, serially numbered chapters.

The table of contents shows how the individual chapters are structured.

The documentation is supplied in paper form in a ring binder and in electronic form on a CD-ROM.

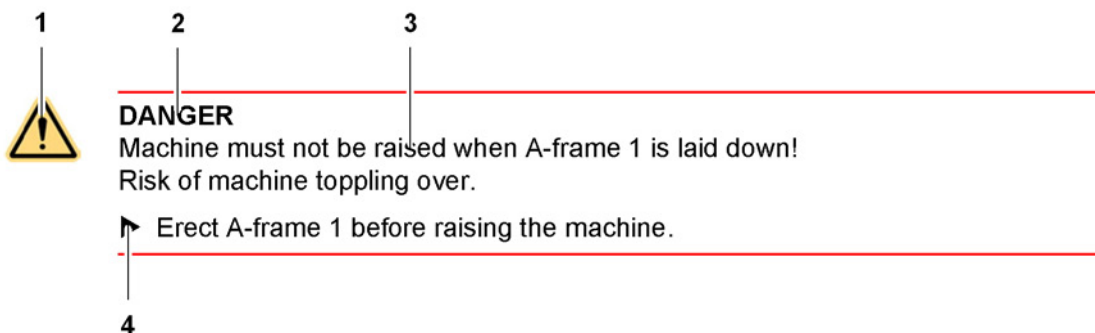
## Display conventions

### Symbols

Symbol	Meaning
*	Optional additional equipment
□	Requirement must be met
▶	Carry out task
▷	Outcome of task
	Specific characteristics or procedures on a machine with two multi-directional joysticks
	Specific characteristics or procedures on a machine with one multi-directional joystick and one double T control lever.

### Markings on warning signs

All warning signs in this operation manual conform to norm according to ANSI Z535.6.



Designation	Description
1	Warning signs
2	Signal word

Designation		Description
3	Source and results of the hazard	Explanatory notes on the hazard (correlations, consequences resulting from the non-observance and if necessary further instructions)
4	Action	Actions to be taken to prevent danger

## Signal words



### DANGER

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

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



### WARNING

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

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



### CAUTION

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

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

### NOTICE

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

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

## Additional markings



### Note

Denotes useful tips and hints.

- ▶ Refers to the current action and demonstrates how to perform tasks in a straightforward manner.

## Tryckort

### Version

The EU standards that are used are listed in the Declaration of Conformity and on the load chart cover sheets.

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.

### Copyright notice

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# 1 Product description

The product description:

- provides information about the possible uses of the machine and warns against incorrect or improper use.
- describes the components of the machine.
- lists important technical data.

The diagrams in this operation manual are for general information purposes. They are shown as schematics and do not necessarily show the current setup.

## 1.1 Type plate

The type plate is attached to the right of the cab.

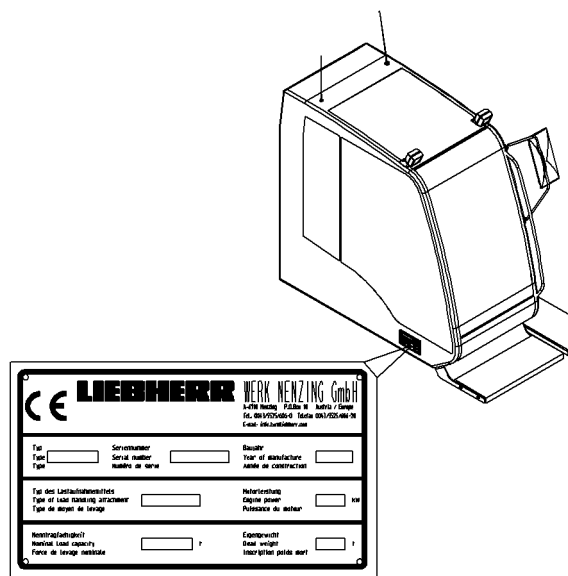


Fig. 1 Type plate

Enter the relevant data in the table below.

Type	
Serial number	
Model year	
Date of commissioning (day/month/year)	

Tab. 1 Machine data

Type plate

This information is required e.g. when ordering spare parts.

### **Certificate of origin**

This machine was designed and built by Liebherr-Werk Nenzing GmbH in Austria.

## 1.2 Declaration of conformity

If the machine is delivered to a European Union member state, the applicable Declaration of Conformity will be inserted here.

## 1.3 State-of-the-art technology

Upon delivery, the machine features technology that is currently considered state-of-the-art.

The applicable standards are cited:

- for the design, in the Declaration of Conformity, (does not apply to the US market).
- for calculating the lifting capacities, in the load charts preface.

Nevertheless, the machine can pose dangers if the safety instructions for the machine and the accessories are not or are only partially observed and implemented.

### 1.3.1 Machine classification

#### Classification principle

##### Crane group A1 - A8

Cranes are grouped into 10 classes of utilisation and 4 load spectrum classes and are divided into 8 crane groups designated by the symbols A1, A2 up to A8.

##### Class of utilisation U0 - U9

There are 10 classes of utilisation, which relate to the overall service life, and are referred to by the symbols U0, U1 up to U9.

##### Load spectrum classes Q1 - Q4

The load spectrum means the total weight of loads lifted over the entire service life of a crane.

The crawler crane is designed as an assembly crane and is dimensioned accordingly. The steel fabrication is calculated on the basis of F.E.M. 1.001.

The machine classification is based on ISO 4301 Parts 1 and 2:

- **Crane group A1**
- **Class of utilisation U2**
- **Load spectrum class Q1**

##### Crane group A1

Cranes for general hook duties, not used for continuous service

(Original text: Mobile crane group classification A1: Cranes for general hook duties, not used for continuous service)

##### Class of utilisation U2

Irregular use, (e.g. material handling operation), maximum number of load cycles: 63000

(63000 load cycles correspond to a service life of 100%)

(Original text: Class of utilization U2: Irregular use, maximum number of operating cycles: 63000)

##### Load spectrum class Q1

The SWL (Safe Working Load) is rarely hoisted. Normally only light loads are hoisted.

(Original text: State of loading Q1: Cranes which hoist the safe working load very rarely and normally, light loads)



## Explanations of terminology

**Crane operation** consists of hoisting, transporting and lowering a load with the aid of rigging (rope, chain, etc.). Human assistance (slingers/banksmen) is needed in order to attach and release the load.

The **SWL (Safe Working Load)** is the maximum permitted load for the operation in question.

The **service life** of a crane refers to the number of load cycles it carries out.

A **load cycle** corresponds to a single lifting and lowering movement between take-up and setting-down of the load.

The **service life**, which should be regarded as a benchmark, starts with the commissioning of the crane and ends with its final decommissioning.

### 1.4 Appropriate use

Possible applications are determined by the supplied equipment.

Only use the machine to carry out the operations listed and described in this operating manual.

Appropriate use of the machine depends:

- on adherence to the national and international safety requirements.
- on observance of all safety regulations in this operation manual.
- on all the necessary safety devices being present and in good working order.
- on adherence to the values in the technical information and the load charts.
- on all maintenance and inspection work being carried out fully and in good time by Liebherr service personnel.

Special operations must be discussed with the manufacturer before they are carried out and documented by both parties.

Any other use, or use of the machine beyond that which is described here, without the written consent of Liebherr after sales service, shall be regarded as **inappropriate use**.

The operator is responsible for any injury to people, animals or any damage to the machine arising from inappropriate use!

## 1.5 Inappropriate use

Inappropriate use of the machine may result in:

- Life-threatening or fatal injury.
- Serious damage to the machine and other objects as well as the environment.
- Loss of warranty entitlement.

Examples of **inappropriate use** of the machine:

- Any structural modification of the machine and equipment that affects operational safety and that has been carried out without the approval of the manufacturer.
- Start-up:
  - without carrying out a legally required national approval test.
  - by persons who are not authorised by the operating company.
  - without the requisite education or training and knowledge of the operation manual.
  - if the operation manual is incomplete (pages missing or illegible) or not in the language of the operating company.
  - if the machine operator does not understand the operation manual due to insufficient knowledge of the language.
  - by working in any way that endangers operational safety.
  - when working in assembly mode (key switch operation).
  - when the maximum permitted wind speed is exceeded.
  - while persons other than the machine operator are in the operator's cab or on the machine.
  - if the applicable local safety regulations (e.g. oil and gas industry) are not being adhered to.
- Passenger transport (unless certified through a EU prototype test in accordance with the EU Machinery Directive)
- Tearing loose of fastened loads
- Lifting a load lying on the ground with one of the boom luffing winches.
- Dragging a load
- Diagonal pull exceeding that permitted for the operation mode.
- Performing a lifting operation without the prescribed safety devices such as load moment limiter and hoist limit switch.
- Installation of spare parts and use of media not approved and authorised by the manufacturer.
- Operation outside the scope of the applicable load chart.
- Operation on a ground with insufficient load-bearing capacity.
- Tilting the machine.
- Starting-up and working in locations subject to explosion hazards, even where the atmosphere is only rarely or briefly subject to explosion hazards.
- All special modes of operation
  - Special modes of operation are prohibited, as the machine is not designed for this purpose.
  - You are expressly advised that special modes of operation may result in undefined loading conditions with high dynamic stresses and excessive diagonal pull.
  - Special modes of operation may result in excessive stress on the machine causing premature damage. Any such damage is the sole responsibility of the user.
  - All special modes of operation significantly reduce the service life of the machine.

Typical special modes of operation:

- Demolition (grab, ball, concrete cutters)

- Vibrator or hammer operation (e.g. leader-mounted vibrator and hammer, free-hanging vibrator and hammer and vibrator lances)
- Attachment of external equipment (e.g. fixed leader, swinging leader and face drilling machines)
- Material handling operation (e.g. container handling and handling with grab and magnetic systems)
- Free-fall operation
- Deployment on pontoons, ships and/or offshore platforms (sea state conditions)
- Lifting of loads that are rigged on several machines

Calculation example for service life in the material handling special mode of operation:

- 8 operating hours per day
- 200 working days per year
- 4 load cycles per hour in setup mode
- 30 load cycles per hour with 33,069 lb load and 65' 7" ft-in swing radius in material handling operation.
- 144' 4" ft-in 2821 main boom with 2821 boom head

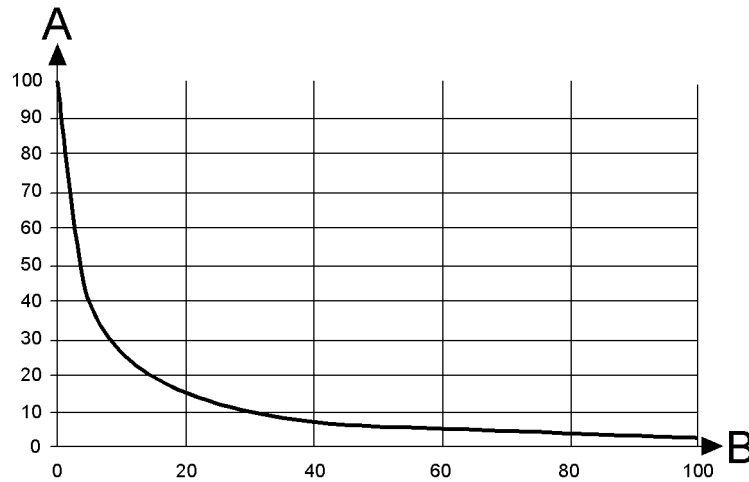


Fig. 2 Service life in material handling operation

**A** Service life [%]

**B** Working days in material handling operation [%]

When the machine works continuously in material handling operation (max. number of load cycles: 63,000), the theoretical service life drops to 3% after 100 working days (1890 load cycles).



### Note

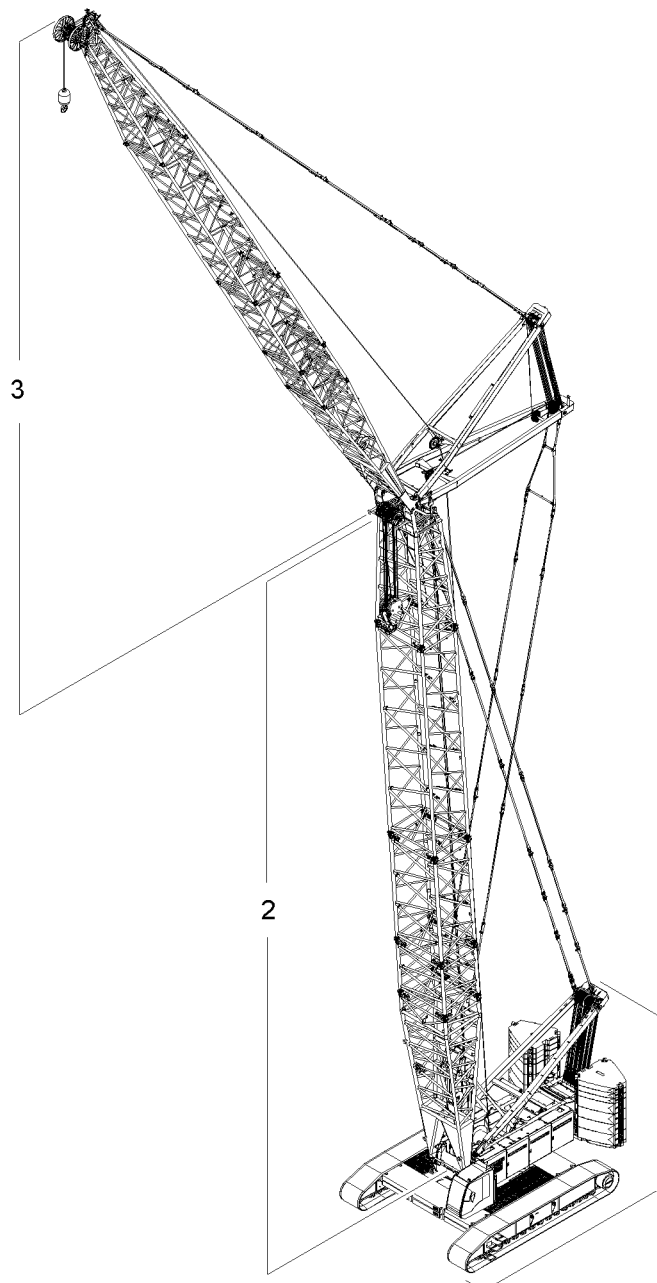
Special load charts for grab and pontoon special modes of operation are available from the manufacturer.

- For more information regarding special modes of operation: Contact Liebherr after sales service.

## 1.6 Whole machine

### 1.6.1 Whole machine overview

The diagram below provides an overview of the machine components.  
A detailed explanation of the individual components then follows.



*Fig. 3 Whole machine overview*

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

## 1.6.2 Operating weight

The operating weight is valid for the following machine configurations:

- Basic machine with crawler side frame, winch 1 and winch 2 (33,720 lb<sub>i</sub>)
- Rear counterweight 273,369 lb
- Carbody counterweight 125,662 lb (on LR1300W 115,961 lb)
- 2821 boom base section
- 2821 boom section 10 ft
- 2821 boom head section
- Pulley block (SWL 661,377 lb)

Designation	Value
Operating weight	approximately 639,331 lb

Tab. 2 Technical data for operating weight

## 1.6.3 Operating conditions

### Ambient temperatures

Designation	Value
Storage and operation mode	-4 °F to 104 °F
<b>With package:</b>	
Storage	to -40 °F
Operation	to -13 °F

Tab. 3 Technical data for ambient temperatures

### Altitude

The exhaust gas turbocharger lessens the effect of reduced air pressure on the power of the diesel engine at high altitudes. Nevertheless, some reduction in performance is to be expected if the machine is used at high altitudes above sea level and at high air temperatures.

#### NOTICE

Frequent use of the machine at altitudes greater than 6561' 8" ft-in above sea level!

Turbocharger may become damaged.

- ▶ Arrange to have the engine characteristic curve adjusted by Liebherr after sales service.

## 1.6.4 Emissions

### Exhaust gas quantity, diesel engine

Designation	Value
Exhaust gas quantity, diesel engine	3,037.06 cfm

Designation	Value
Engine exhaust emission limits in accordance with 97/68/EG/EPA/CARB, EUROMOT I	

Tab. 4 Technical data for diesel engine exhaust gas quantity

## Sound pressure level

Designation	Value
Sound pressure level at 49' 3" ft-in	111 db(A)
Sound pressure level in operator's cab	72.2 db(A)

Tab. 5 Technical data for sound pressure level

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

## Vibrations

Designation	Value
Vibrations affecting the operator's upper limbs	< 8.2 ft/s <sup>2</sup>
Vibrations affecting the operator's entire body	< 1.64 ft/s <sup>2</sup>

Tab. 6 Technical data for vibrations

## 1.6.5 Engine

Diesel engine with:

- exhaust-gas turbocharging
- charge air cooler
- electronic engine control
- automatic engine speed control to adjust power requirements of the main consumers to the current engine RPM

## Engine data

Designation	Value
Type	D 9508
Manufacturer	Liebherr Machines Bulle S.A
Control system	Electronic (EDC)
Design	Cylinders in 90 ° V-configuration
Combustion process	4-stroke, electronic diesel injection
Cylinders	8
Cubic capacity	4.27 gal
Engine idling speed	850 rpm

Designation	Value
Nominal speed	1900 rpm
Torque	maximum 2,107 ft-lb at 1500 rpm
Power	603 HP at 1900 rpm
The IFN power output (fuel stop power) has been determined in accordance with ISO/DIN 3046-1 (DIN 6271) or ISO 9249.	

Tab. 7 Technical data for engine data

## Electrical system

Designation	Value
Starter	24 V, 10 HP
Generator	28 V, 110 A
Batteries	2 batteries in serial connection, each 12 V / 170 Ah

Tab. 8 Technical data for electrical system

## Fuel, coolants and lubricants

Designation	Value
Fuel	commercial diesel fuel for vehicles
Coolant	Water with anti-corrosive and anti-freeze agents added

Tab. 9 Technical data for fuel, coolants and lubricants

Detailed information about lubricants and consumables ([For more information see: 9.2 Lubricants and consumables, page 932](#))

### 1.6.6 Hydraulic system

The diesel engine drives the hydraulic power pack.

Designation	Value
Hydraulic oil	( <a href="#">For more information see: 9.2 Lubricants and consumables, page 932</a> )
<b>Maximum working pressure in the hydraulic system:</b>	
Open hydraulic circuit (supplied by double axial piston displacement pump)	5,076.30 psi
Sealed hydraulic circuit of the swing	4,206.07 psi



Designation	Value
Sealed hydraulic circuit for winches 1 and 2	5,003.78 psi

Tab. 10 Technical data for hydraulic system

## 1.6.7 Winches

### Winch 1/Winch 2

Winch 1/Winch 2	as a crane winch	as a free-fall winch
Nominal line pull (7 th layer)	33,720 lb <sub>f</sub>	29,230 lb <sub>f</sub>
Maximum line pull (1st layer)	48,330 lb <sub>f</sub> <sup>A)</sup>	42,710 lb <sub>f</sub>
Rope Ø	1.10" in	1.10" in
Weight of the rope	2.69 lb/ft	2.69 lb/ft
Drum Ø	2' 5" ft-in	2' 5" ft-in
Average rope speed with empty hook (7th layer)	377' 4" ft-in/min	492' 2" ft-in/min

Tab. 11 Technical data for winch 1/winch 2

A) The Load Moment Limitation (LML) limits the line pull in crane operation to a nominal value of 33,720 lb<sub>f</sub>. The nominal line pull must not be exceeded.

Rope layer(s)	Winding length	Remarks
1	23' ft-in	3 safety windings
1	203' 5" ft-in	Effective length with 1 rope layer
2	442' 11" ft-in	Effective length with 2 rope layers
3	698' 10" ft-in	Effective length with 3 rope layers
4	971' 2" ft-in	Effective length with 4 rope layers
5	1256' 7" ft-in	Effective length with 5 rope layers
6	1555' 1" ft-in	Effective length with 6 rope layers
7	1873' 4" ft-in	Total effective length

Tab. 12 Technical data for winch 1/winch 2



#### WARNING

Operating winches in the 8th rope layer is not permitted!

- ▶ Only ever wind the rope to the 8th layer for transport purposes.

Winches 1 and 2 are characterised by:

- compact, low-maintenance design
- load support via hydraulic system, torque stay rod or coupling
- internal planetary gearbox running in oil
- spring loaded multi-disc holding brakes (stop brakes)

The drive for winches 1 and 2:

- is provided by high-pressure-controlled axial-piston variable displacement motors.

- exploits the maximum power output of the engine even during partial load operations by matching its speed to the current line pull.

Winches 1 and 2 as crane winches:

- are used for lifting purposes in crane operation.
- are equipped with multi-disc holding brakes.
- do not have free-fall brakes.

Winches 1 and 2 as free-fall winches:

- are intended for lowering the empty hook quickly.
- have generously dimensioned free-fall brakes, that have clutch as well as braking functions.
- are designed to be wear-resistant and maintenance-free.

### Boom winch

The boom winch is characterised by:

- an internal planetary gearbox
- an axial piston motor
- a hydraulically vented multi-disc holding brake

There is a choice between three speed ranges for the boom winch.

Designation	Value
Nominal line pull (1 st layer)	40,470 lb <sub>f</sub>
Rope Ø	0.94" in
Drum Ø	1' 7" ft-in
Rope speed, average	278' 10" ft-in/min
Rope length	1466' 6" ft-in

Tab. 13 Technical data for boom winch

### Luffing jib luffing winch

The jib luffing winch is characterised by:

- an internal planetary gearbox
- an axial piston motor
- a hydraulically vented multi-disc holding brake

There is a choice between three speed ranges for the jib luffing winch.

Designation	Value
Nominal line pull (5 th layer)	18,430 lb <sub>f</sub>
Rope Ø	0.79" in
Drum Ø	1' 7" ft-in
Drum width	2' 7" ft-in
Maximum rope speed (5 th layer)	433' 1" ft-in/min
Rope length	1263' 1" ft-in <sup>A)</sup>

Tab. 14 Technical data for luffing jib luffing winch

A) While fitting the luffing jib 1916 it is only permitted to use a jib luffing rope of 1017' 1" ft-in length if the main boom length does not exceed 232' 11" ft-in. Jib

luffing rope of 1263' 1" ft-in length is required if the main boom is longer than 242' 9" ft-in.

### 1.6.8 Swing

The swing consists of a roller-bearing swing ring with external toothing and two swing gears.

Each swing gear consists of:

- an axial piston motor with drive pinion
- planetary gearbox
- a spring-loaded, hydraulic ventable multi-disc holding brake

There is a choice between three speed ranges for the swing.

In free swing, the braking torque is controlled hydraulically.

Designation	Value
Maximum swing speed at speed level 1	0.6 rpm
Maximum swing speed at speed level 2	1.25 rpm
Maximum swing speed at speed level 3	2 rpm

Tab. 15 Technical data for swing

### 1.6.9 Crawlers

The two crawler side frames can be steered independently of each other.

There is a choice between two speed levels for the crawlers.

Designation	Value
Width of the track pads	3' 11" ft-in
	optional 4' 11" ft-in
Travel speed	up to 0 mph (normal gear)
	up to 1 mph (normal gear)
Pull force	425,570 lb <sub>f</sub>
Climbing ability with reduced lifting capacity (see load chart manual)	maximum 1 %

Tab. 16 Technical data for crawlers

When moving 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 559](#)).

### 1.6.10 Safety equipment

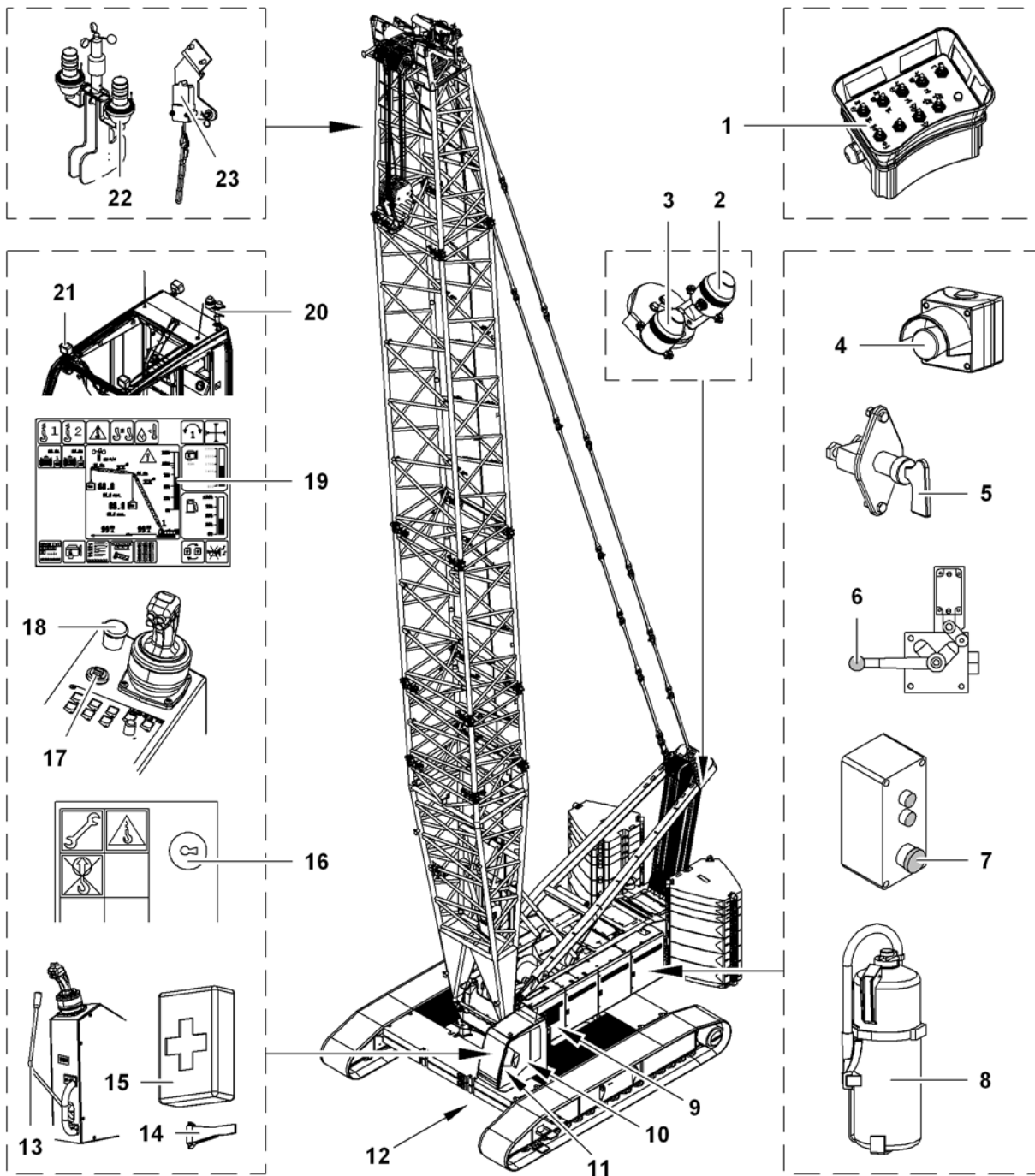


Fig. 4 Safety equipment

- |                            |   |                                   |
|----------------------------|---|-----------------------------------|
| 1 Helicopter warning light | 8 Lock for access to the switches for assembly mode, unsecured free-fall operation and LML bypass | 16 Free-fall operation gate valve |
| 2 Hoist limit switch       | 9 Safety lever  | 17 Battery main switch            |
| 3 Floodlights (6x)         | 10 Horn and acoustic signaling device   | 18 Emergency stop                 |
| 4 Flashing light           | 11 Door lock  | 19 Emergency operation control    |

<b>5</b> Electronic load moment limiter (LML)	<b>12</b> Door arrester	<b>20</b> Emergency hammer and first-aid box
<b>6</b> Emergency stop	<b>13</b> Fire extinguishers (2x)	
<b>7</b> Ignition lock (key)	<b>14</b> Emergency stop	

**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.

## Functions of the signaling devices

The flashing light **4** indicates that:

- the electronic load moment limiter (LML) has been bypassed.
- the machine is in assembly mode.
- The machine operator has sounded the horn **10**.

The front acoustic signaling device **10** responds if the electronic load moment limiter (LML) trips.

The rear acoustic signaling device responds to a travel movement by the machine or to a rotating motion of the uppercarriage.

### 1.6.11 Monitoring installations

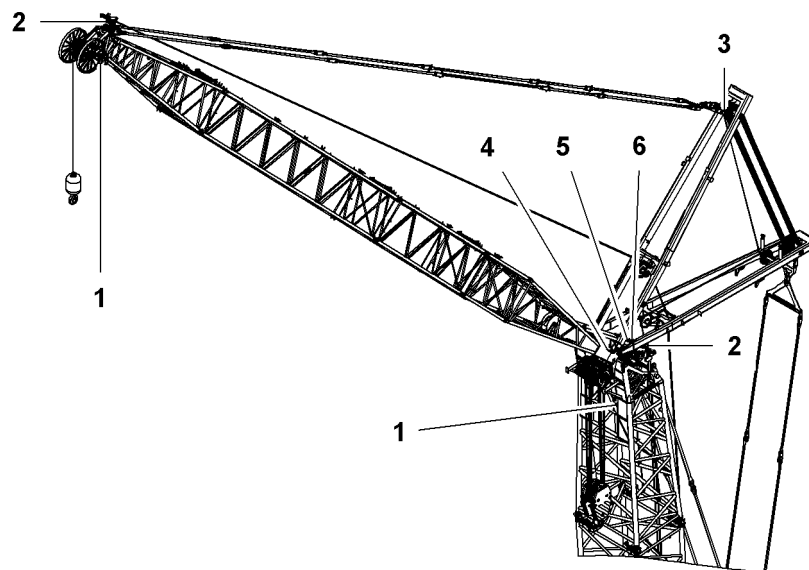
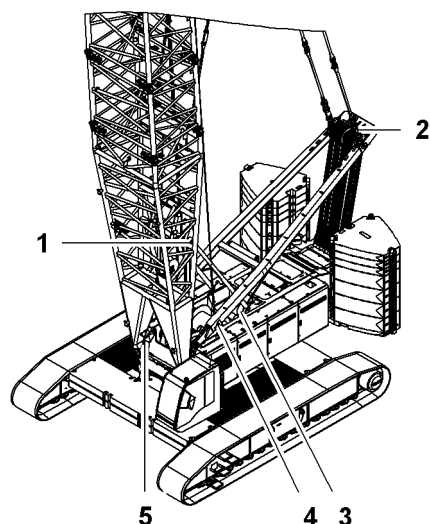


Fig. 5 Monitoring installations on the boom

<b>1</b> Hoist limit switch	<b>4</b> Lower limit switch, jib
<b>2</b> Anemometer	<b>5</b> Upper limit switch, jib
<b>3</b> Tension load cells (2x)	<b>6</b> Proximity switch on the locking pins



*Fig. 6 Monitoring installations on the basic machine*

- |   |   |   |                                 |
|---|---|---|---------------------------------|
| 1 | Control switch for tilting-back supports      | 4 | Mechanical boom angle indicator |
| 2 | Tension load cells (2x)                       | 5 | Main boom, upper limit switch   |
| 3 | 3 rope windings limit switch (on all winches) |   |                                 |

## 1.7 Basic machine

### 1.7.1 Basic machine overview

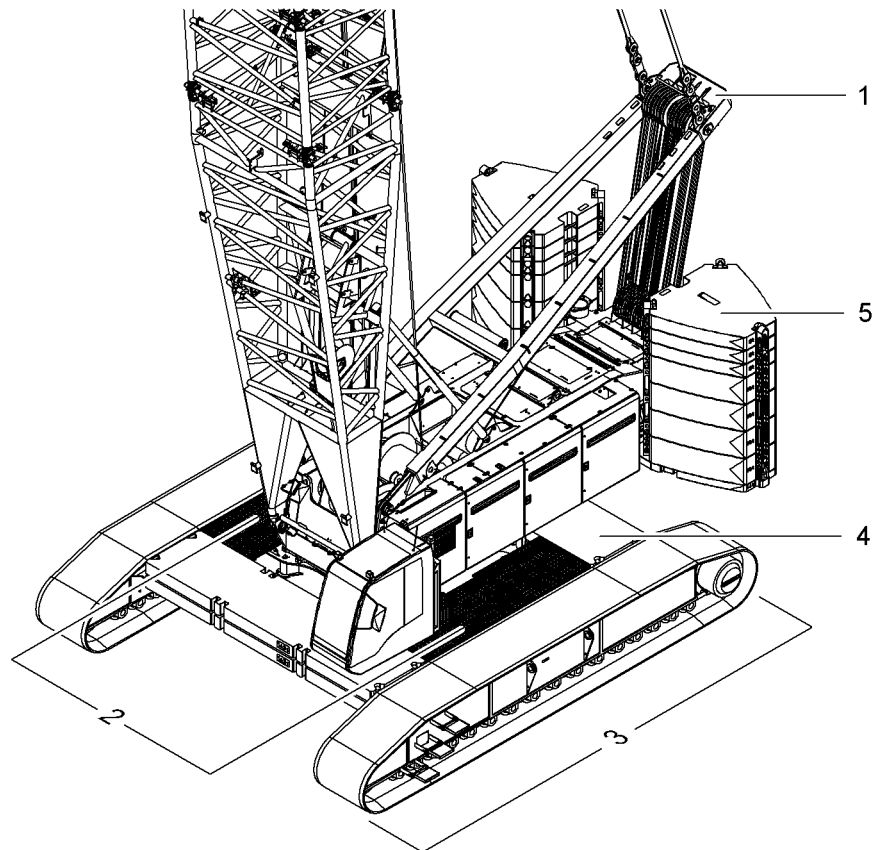


Fig. 7 Basic machine overview

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

# Product description

## Basic machine

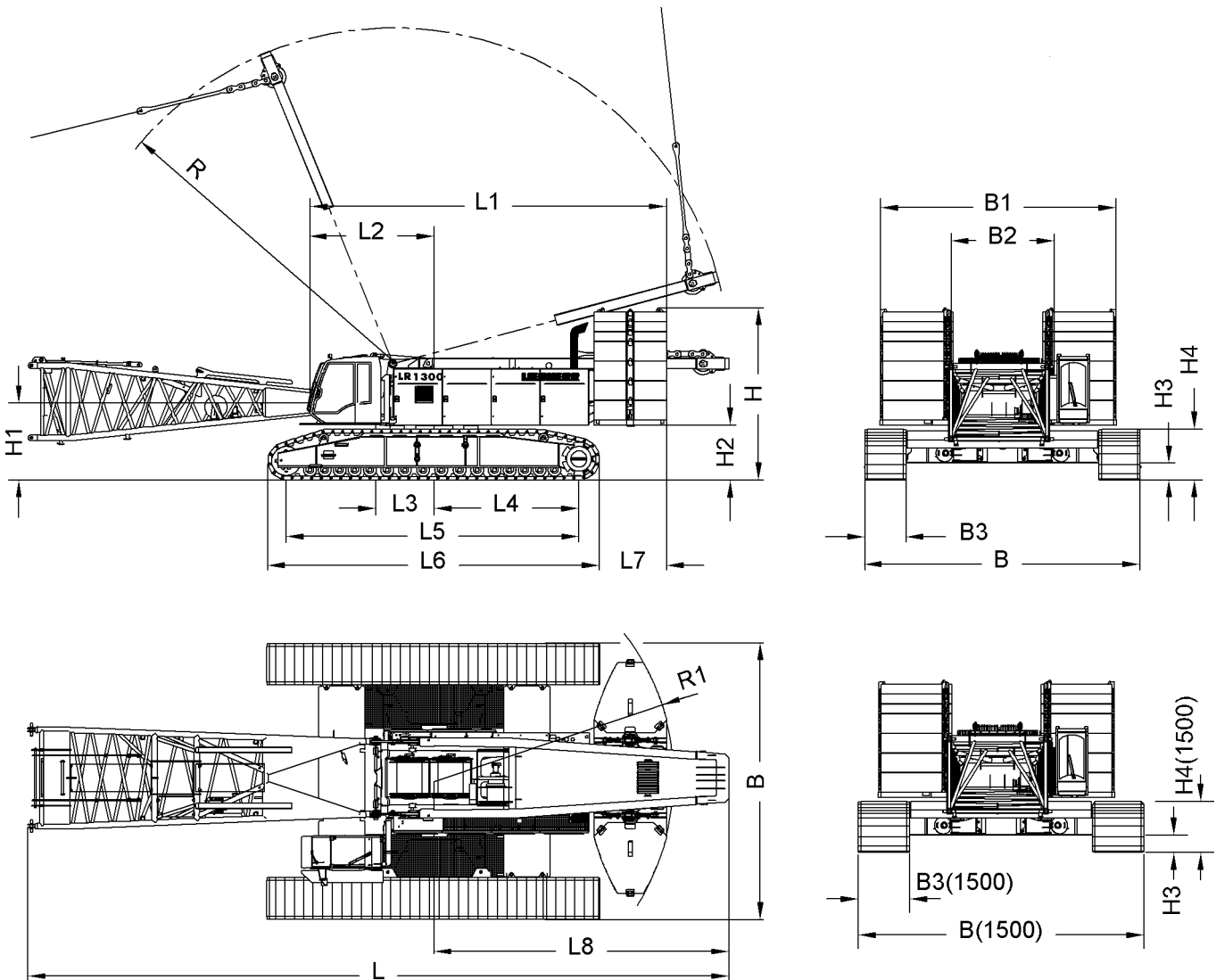


Fig. 8 Dimensions of basic machine

Designation		Value
<b>L</b>	Length of basic machine with horizontal boom base section and lowered A-frame 1	66' 10" ft-in
<b>B</b>	Width of basic machine	26' 3" ft-in
<b>H</b>	Height of basic machine with maximum rear counterweight	16' 5" ft-in
<b>Detailed dimensions:</b>		
<b>L1</b>	Length of uppercarriage with rear counterweight	33' 11" ft-in
<b>L2</b>	Rotation axis to front edge of operator's cab	11' 10" ft-in
<b>L3</b>	Rotation axis relative to the pivot point of the boom base section	5' 7" ft-in
<b>L4</b>	Rotation axis to the center of the tumbler	14' ft-in
<b>L5</b>	Wheel base (center of idler to center of tumbler)	27' 11" ft-in
<b>L6</b>	Length of crawler side frame	31' 4" ft-in



Designation		Value
L7	Rear edge of crawler side frame to rear edge of rear counterweight	6' 2" ft-in
L8	Rotation axis for A-frame 1 when set down	28' 1" ft-in
B1	Width of rear counterweight	22' 9" ft-in
B2	Width of uppercarriage	9' 10" ft-in
B3	Width of grousers	3' 11" ft-in
H1	Height of boom base section pivot point	7' 5" ft-in
H2	Ground clearance, rear counterweight	5' 3" ft-in
H3	Ground clearance, undercarriage	1' 4" ft-in
H4	Height of crawler side frame	4' 10" ft-in
R	A-frame 1 swing radius	32' ft-in
R1	Rear counterweight swing radius	22' 11" ft-in
<b>Dimensions for basic machine with 4' 11" ft-in grousers:</b>		
B(1500)	Width of undercarriage with 4' 11" ft-in grousers	27' 3" ft-in
B3(1500)	Width of 4' 11" ft-in grousers	4' 11" ft-in
H4(1500)	Height of crawler side frame with 4' 11" ft-in grousers	4' 10" ft-in

Tab. 17 Dimensions of basic machine

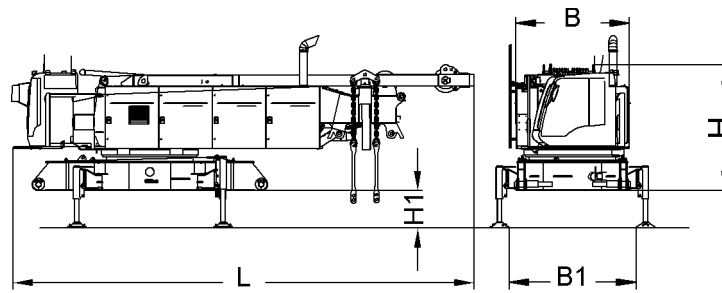


Fig. 9 Dimensions of basic machine in transport position

Designation		Value
L	Length of basic machine in transport position	40' ft-in
B	Width of basic machine in transport position	9' 10" ft-in
H	Height of basic machine in transport position	10' 10" ft-in
<b>Detailed dimensions:</b>		
B1	Width between support pads	11' ft-in
H1	Ground clearance, basic machine	3' 2" ft-in
	Ground clearance of basic machine with telescopic jack	4' 8" ft-in

Tab. 18 Dimensions of basic machine in transport position

## 1.7.2 A-frame1

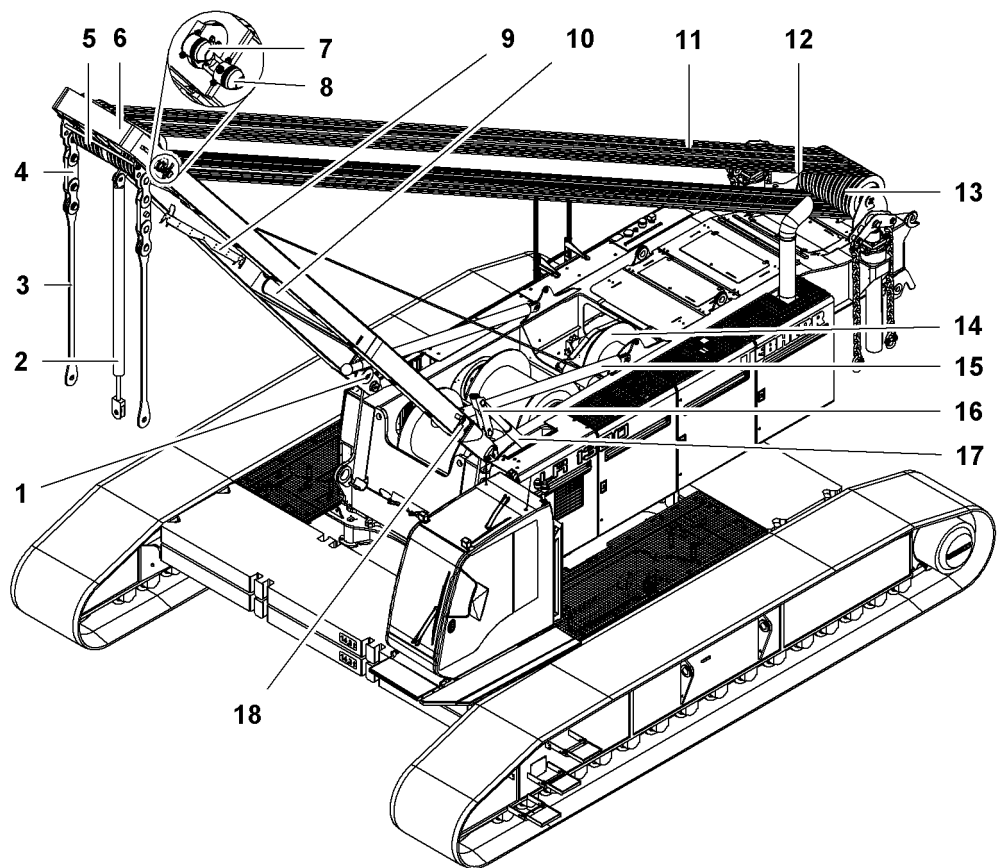


Fig. 10 A-frame1

- |   |                                |    |                                 |
|---|--------------------------------|----|---------------------------------|
| 1 | Support rollers for boom stops | 8  | Main boom luffing rope          |
| 2 | Assembly cylinder              | 9  | Boom winch                      |
| 3 | Equalizer                      | 10 | Rope fixation                   |
| 4 | Tension load cells (2x)        | 11 | Uppercarriage pulley set        |
| 5 | A-frame 1 pulley set           | 12 | Boom stops (2x)                 |
| 6 | A-frame1                       | 13 | A-frame1 erection cylinder (2x) |
| 7 | Rope protection roller         | 14 | Mechanical boom angle indicator |

Below a certain main boom angle (and when the main boom is not fit), the boom stops **12** will rest on the support rollers **1**. The boom stops **12** run in guide rails on the boom base section and prevent the main boom from tipping backwards.

The assembly cylinder **2** is employed for all lifting jobs when the self-assembly system is in use. If A-frame 1 is tilted backwards, the plastic crossbar prevents the assembly cylinder from falling through A-frame 1.

The equalizer **3** and the main boom pendant straps connect A-frame 1 to the boom head section.

### 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 transportation purposes.

The rope protection roller **7** protects A-frame 1 against damage caused by the main boom luffing rope.

The boom winch **9** moves A-frame **1**. The main boom luffing rope **8** is reeved between the uppercarriage pulley set **11**, the A-frame **1** pulley set **5** and the boom winch **9** and fastened to the rope fixation **10** on the uppercarriage.

The two A-frame **1** erection cylinders **13**

- prevent A-frame **1** from falling back onto the uppercarriage.
- in assembly mode, hoist A-frame **1** out of its transport position on the uppercarriage, or lower it into its transport position.

The mechanical boom angle indicator **14** shows the machine operator the current angular position of A-frame **1**.

### 1.7.3 Uppercarriage

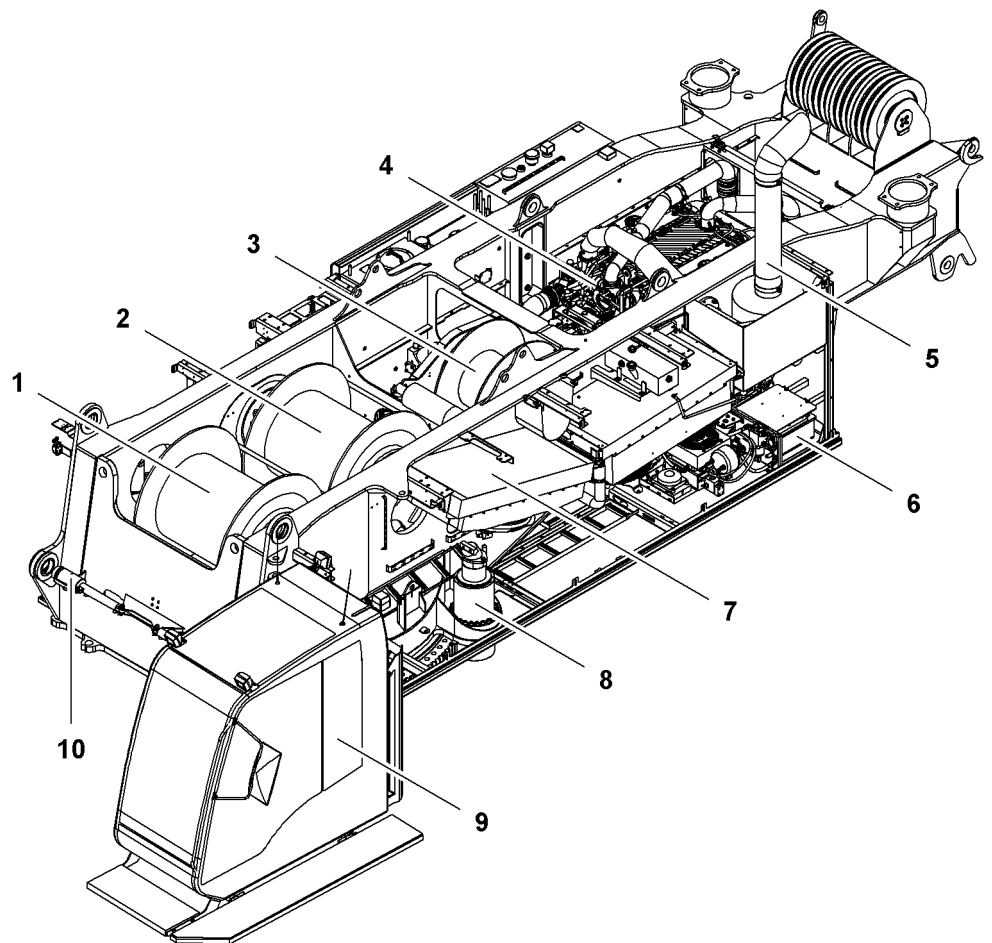


Fig. 11 Uppercarriage viewed from front left

- |                             |   |
|-----------------------------|---|
| <b>1</b> Winch 2            | <b>6</b> Batteries                                      |
| <b>2</b> Winch 1            | <b>7</b> Hydraulic oil cooler                           |
| <b>3</b> Boom winch         | <b>8</b> Swing gear (2x)                                |
| <b>4</b> Central power unit | <b>9</b> Operator's cab                                 |
| <b>5</b> Exhaust system     | <b>10</b> Pin connection cylinder for boom base section |

The uppercarriage:

- is a self-supporting, torsion-resistant construction.
- accommodates the winches, swings, the central power unit, operator's cab, A-frame **1** and the main boom.
- is connected to the undercarriage by a roller-bearing swing ring.

Winch **1** and winch **2** control the lifting/lowering of the hook/pulley block.

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

The central power unit **4**:

- is located in a sealed machinery house and is thus protected from bad weather and dirt.
- consists of a diesel engine and the hydraulic pumps of the hydraulic system.
- supplies all consumers through the hydraulic line network.

The hydraulic oil cooler **7** is cooled using a temperature-controlled hydraulic fan.

The two swing gears **8**:

- are positioned on the uppercarriage, to the left of and behind the cab.
- engage with the roller-bearing swing ring on the undercarriage.

The operator's cab **9**:

- contains all the necessary controls.
- has a large safety-glass window and is sound-proofed.
- is equipped with an ergonomic driver's seat and a convenient sliding door.
- can be tilted back by as much as 18.5° using hydraulic cylinders.
- can be folded in sideways for transportation.

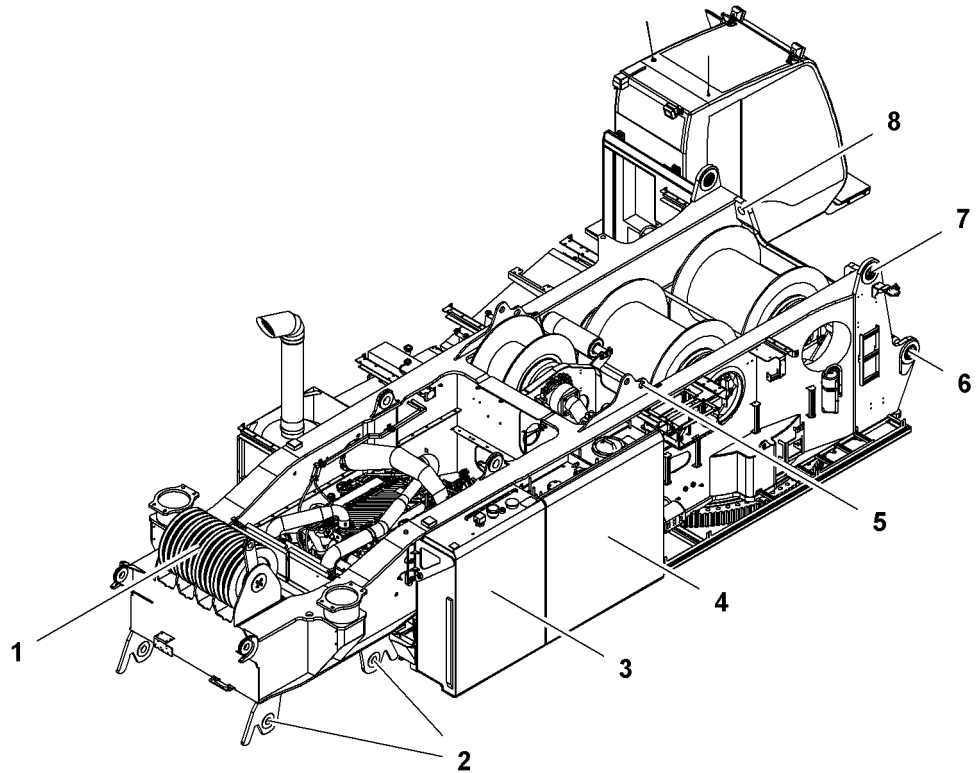


Fig. 12 Uppercarriage viewed from rear right

- |   |  |
|---|--|
| <b>1</b> Pulley set                                     | <b>5</b> Pivot points (2x), boom stops                     |
| <b>2</b> Pin connection points (4x), rear counterweight | <b>6</b> Pivot points (2x), boom base section              |
| <b>3</b> Fuel tank                                      | <b>7</b> Pivot points (2x), A-frame 1                      |
| <b>4</b> Hydraulic oil tank                             | <b>8</b> Lifting points (2x) for loading the basic machine |

The main boom luffing rope is reeved several times between the pulley set **1** and the pulleys on A-frame 1, and is attached to a rope fixing point on the pulley set.

The fuel tank 3 supplies fuel to the diesel engine. The optional refuelling pump makes it easier to fill the fuel tank.

The hydraulic oil tank 4:

- supplies the entire hydraulic system.
- is equipped with a return circuit filter and a venting filter.
- has sight glasses and an electrical level sensor for fill level monitoring.

The lifting points 8:

- are used when loading the basic machine.
- are located on the uppercarriage and on A-frame 1.

## Operator's cab

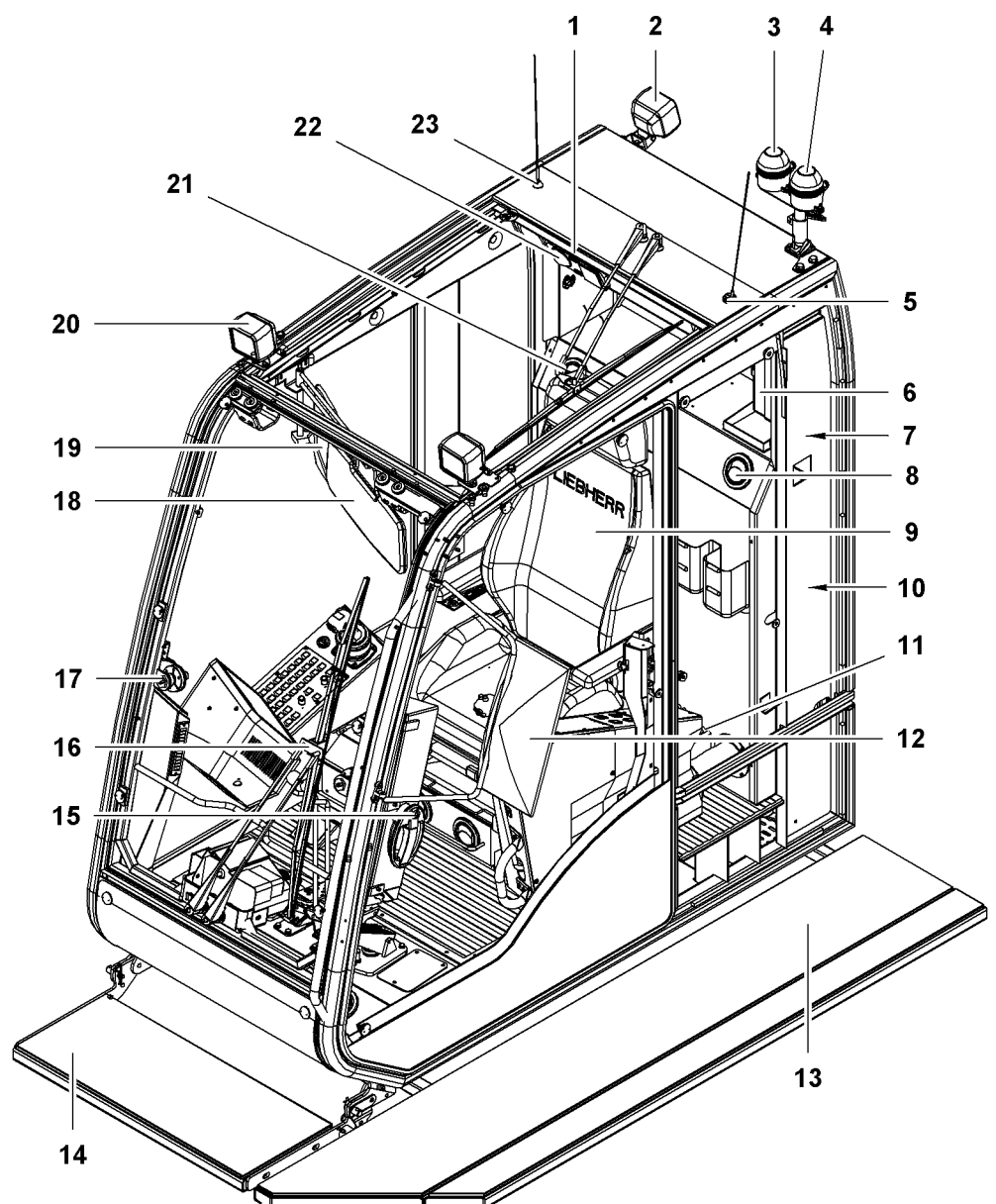


Fig. 13 Operator's cab

- |   |                           |    |                    |
|---|---------------------------|----|--------------------|
| 1 | Sun blind for roof window | 12 | Side boom walkway  |
| 2 | Rear floodlight           | 13 | Front boom walkway |
| 3 | Flashing light            | 14 | Door lock          |

- |    |                             |    |                           |
|----|-----------------------------|----|---------------------------|
| 4  | GSM antenna                 | 15 | Front windscreen wiper    |
| 5  | First-aid box               | 16 | Window lock (both sides)  |
| 6  | Emergency hammer            | 17 | Sun shield                |
| 7  | Outlet nozzles (7x)         | 18 | Internal rear-view mirror |
| 8  | Operator's seat             | 19 | Front floodlight          |
| 9  | Switch cabinet X1           | 20 | Roof window wiper         |
| 10 | Screen wash fluid tank (2x) | 21 | Reading lamp              |
| 11 | External rear-view mirror   | 22 | Radio antenna             |

## Central power unit

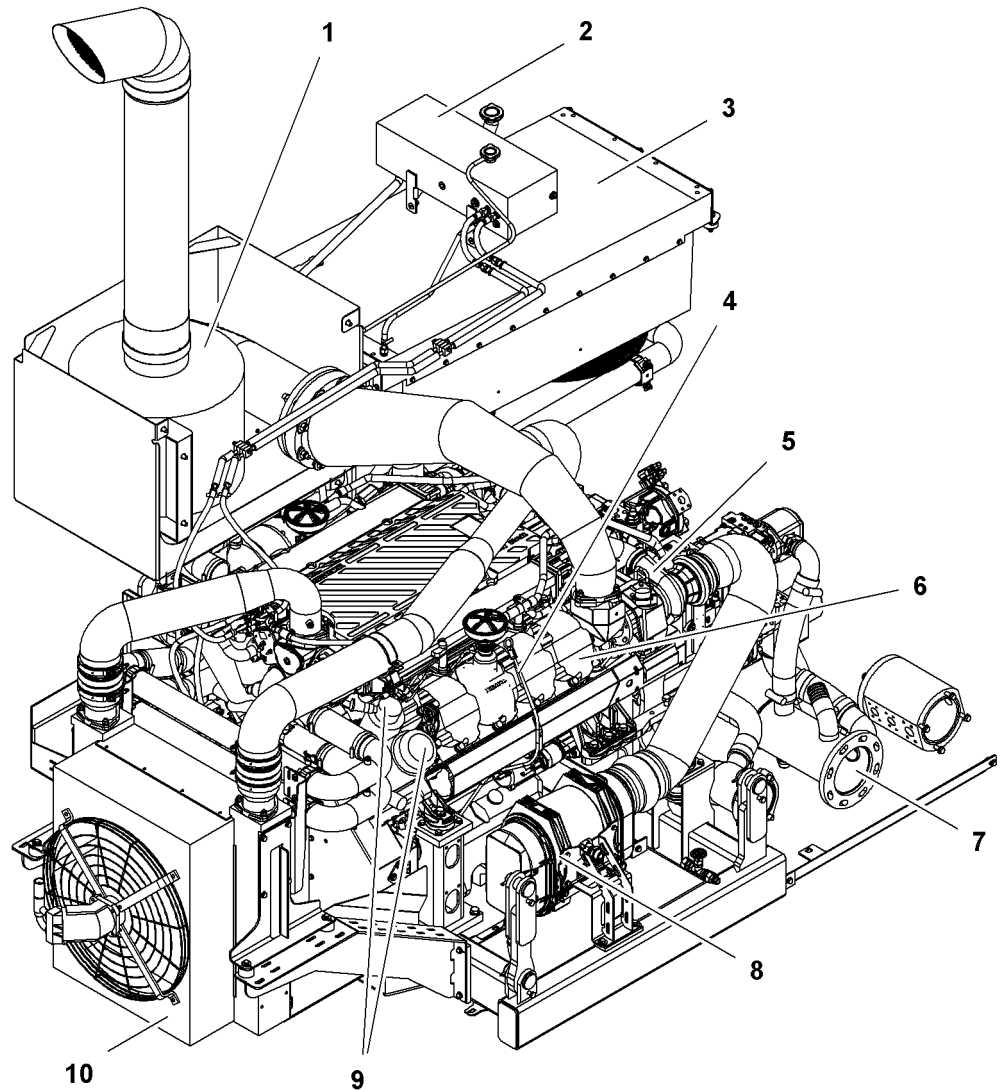


Fig. 14 Central power unit viewed from rear right

- |   |                               |    |                            |
|---|-------------------------------|----|----------------------------|
| 1 | Exhaust system                | 6  | Diesel engine              |
| 2 | Cooling water expansion tank  | 7  | Hydraulic oil suction pipe |
| 3 | Water cooler                  | 8  | Air filters (2x)           |
| 4 | Oil dipstick                  | 9  | Engine oil filter (2x)     |
| 5 | Exhaust gas turbocharger (2x) | 10 | Intercooler                |

The exhaust system **1**, with the exception of the silencer, is made from stainless steel. The upper exhaust pipe can be removed for transportation purposes. The outlet is then placed directly onto the exhaust silencer.

The cooling water expansion tank **2** has a filler neck with a safety cover, a separate positive pressure relief valve and a sight glass for fill level monitoring.

The water cooler **3** is cooled using a temperature-controlled hydraulic fan.

The exhaust gas turbochargers **5** on both sides feed cooled fresh air into the combustion chambers of the diesel engine.

The diesel engine **6** has a CAN-BUS engine module which controls and monitors engine functions in conjunction with the Litronic© control system.

The hydraulic oil suction pipe **7** uses pipelines and hydraulic hoses to connect the hydraulic oil tank and the individual hydraulic pumps.

The intercooler **10** is regulated by the speed and temperature, and cools the charge air of the exhaust gas turbocharger.

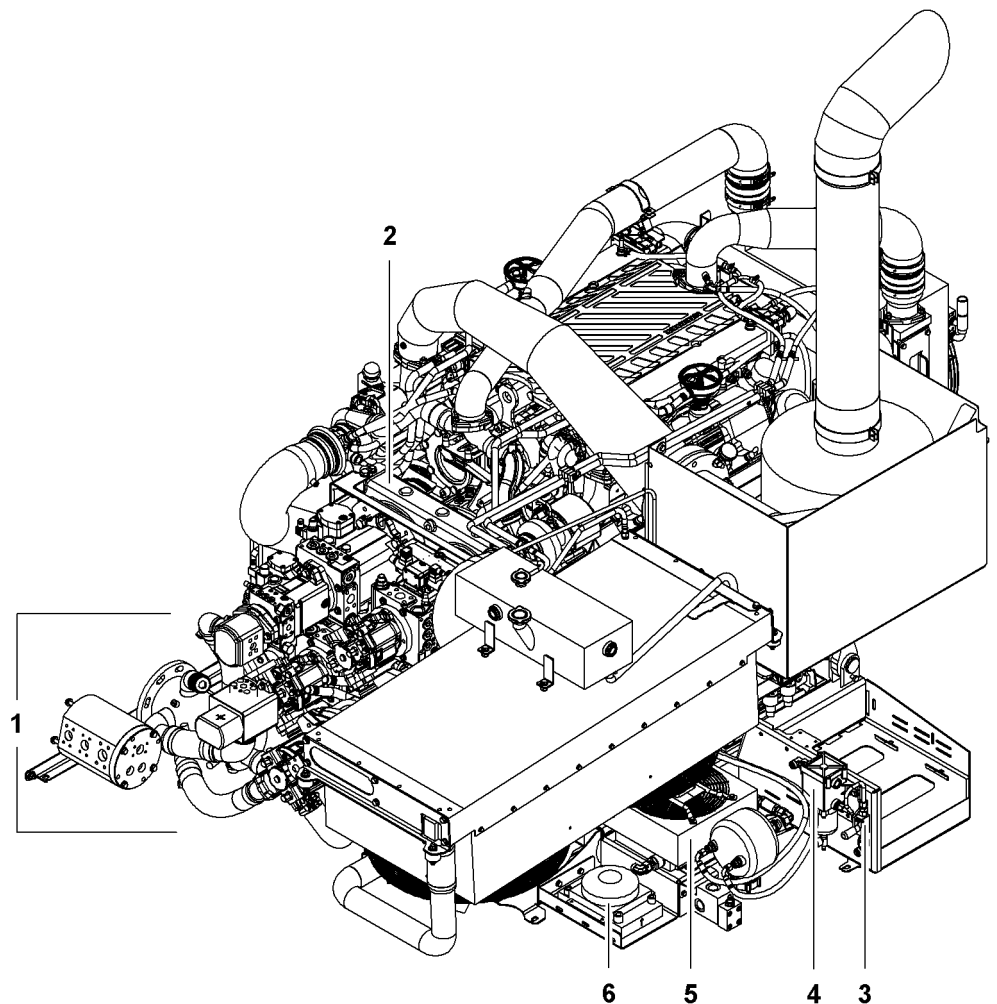


Fig. 15 Central power unit viewed from front

- |          |                      |          |                    |
|----------|----------------------|----------|--------------------|
| <b>1</b> | Pump equipment       | <b>4</b> | Fuel filter        |
| <b>2</b> | Distributor gearbox  | <b>5</b> | Fuel cooler        |
| <b>3</b> | Condensate separator | <b>6</b> | Gearbox oil cooler |

The distributor gearbox **2** is flanged onto the diesel engine, and drives most of the hydraulic pumps.

The fuel filter **4** consists of a filter and a condensate separator **3**. The condensate collects in the lower section of the sight glass.

## 1.7.4 Undercarriage

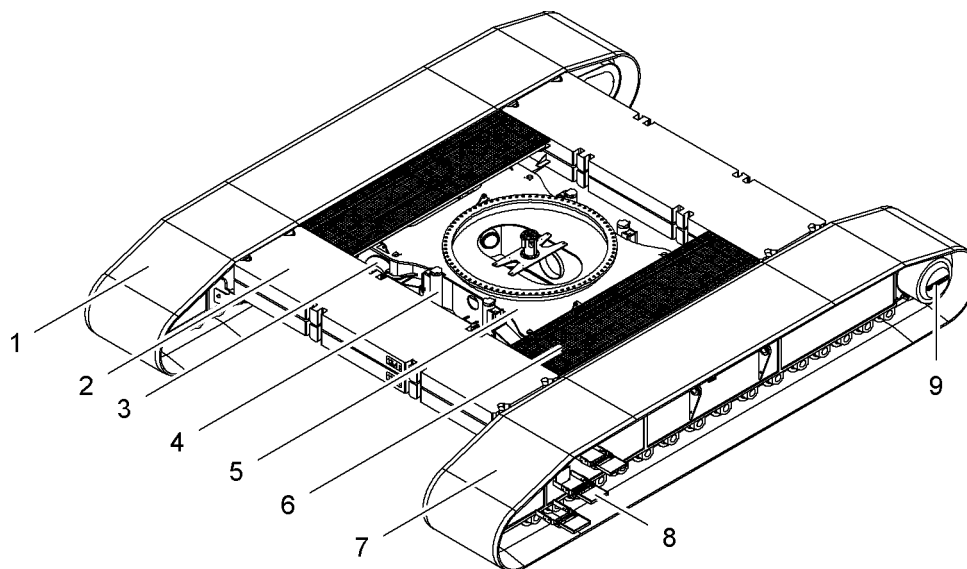


Fig. 16 Undercarriage viewed from front left

<b>1</b>	Right crawler side frame	<b>6</b>	Boom walkways
<b>2</b>	Carbody counterweight slabs (4x)	<b>7</b>	Left crawler side frame
<b>3</b>	Ground plates for jacks (4x)	<b>8</b>	Steps
<b>4</b>	Jacks (4x)	<b>9</b>	Tumbler (2x)
<b>5</b>	Center part		

The crawler side frames **1 + 7**

- are fastened to the center section by two pins at both the front and the back.
- can be detached from the center section for transportation purposes.

The four carbody counterweight slabs **2**

- are attached to the front and rear of the undercarriage.
- ensure increased stability.
- can be quickly attached and removed.

The ground plates **3** for the jacks are located on the center section.

The jacks **4** support the basic machine when necessary.

The center section **5** of the undercarriage

- is a welded structure.
- supports the swiveling uppercarriage.

The folding steps **8** and boom walkways **6** allow safe access to the operator's cab and the uppercarriage.



## Crawler side frame (crawler side frame\* with 4' 11" ft-in grousers)

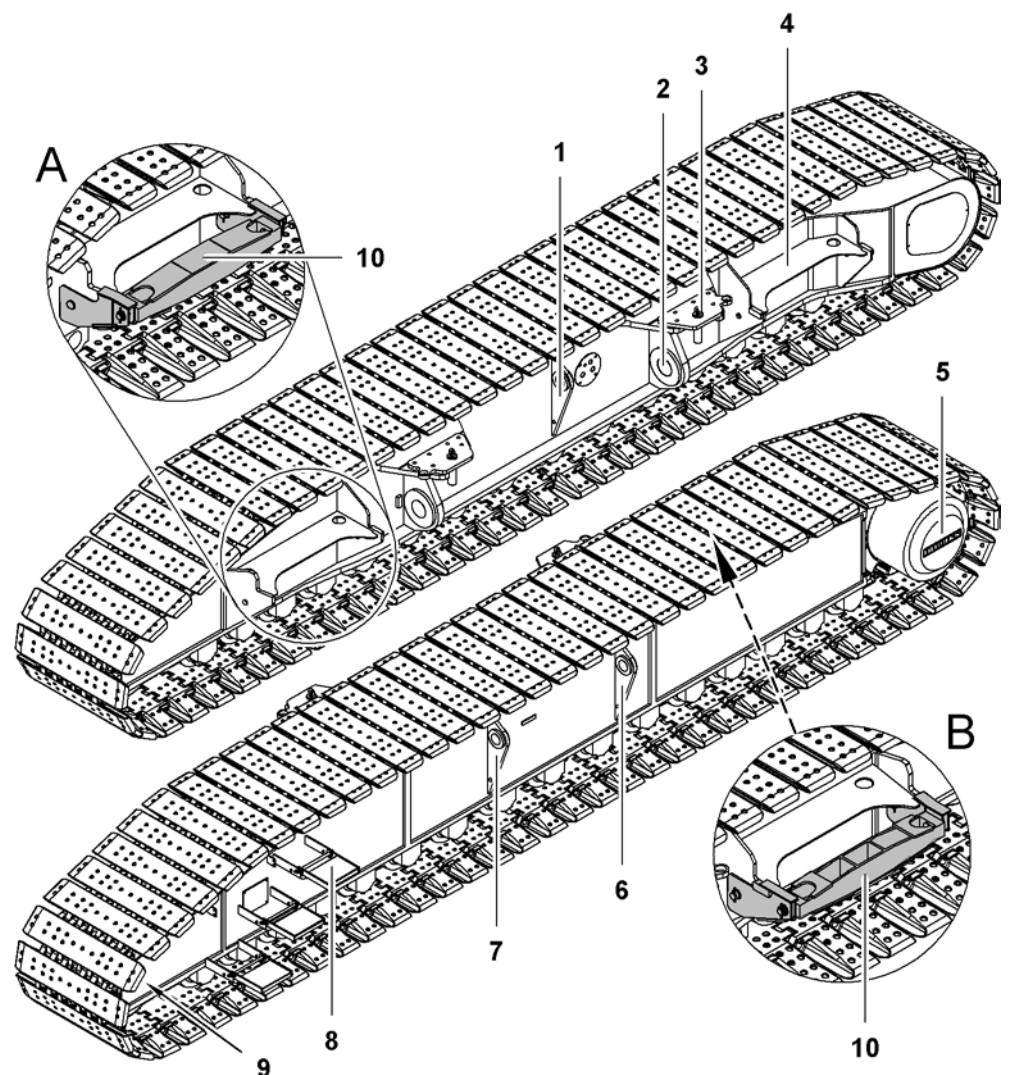


Fig. 17 Right and left crawler side frames

- |   |   |
|---|---|
| <b>A</b> Detail of right crawler side frame (4' 11" ft-in grousers) | <b>5</b> Tumbler (2x)   |
| <b>B</b> Detail of left crawler side frame (4' 11" ft-in grousers)  | <b>6</b> Pivot point for bracket  |
| <b>1</b> Pivot point for bracket                                    | <b>7</b> Pivot point for bracket  |
| <b>2</b> Pin connection points (4x) with center section             | <b>8</b> Steps (6x)   |
| <b>3</b> Pin (4x) for pinning to the center section                 | <b>9</b> Idlers (2x)  |
| <b>4</b> Supports (4x) for carbody counterweight                    | <b>10</b> Supports (4x) for carbody counterweight (4' 11" ft-in grousers) |

Detail **A + B** shows the additional supports **10** for the central ballast slabs for crawler side frames with 4' 11" ft-in grousers.

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

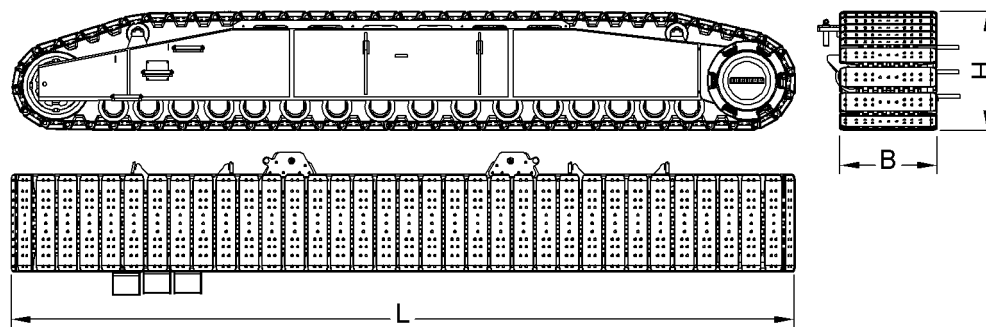


Fig. 18 Dimensions of crawler side frame

The technical data applies to each crawler side frame.

Designation		Value
L	Length	31' 9" ft-in
	Length (4' 11" ft-in grousers)	31' 10" ft-in
B	Width	3' 11" ft-in
	Width (4' 11" ft-in grousers)	4' 11" ft-in
H	Height	4' 10" ft-in
	Height (4' 11" ft-in grousers)	4' 10" ft-in
Weight		48,236 lb
Weight (4' 11" ft-in grousers)		56,662 lb

Tab. 19 Technical data for crawler side frame

### 1.7.5 Carbody counterweight

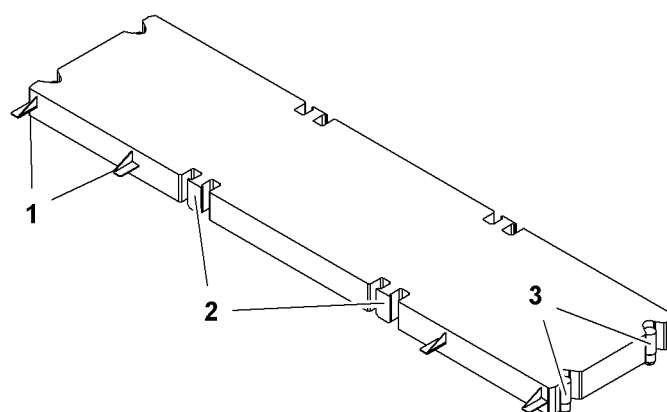


Fig. 19 Carbody counterweight slab

- 1 Supports (4x) for boom walkways
- 2 Lifting points (4x)
- 3 Locking devices (4x)

The carbody counterweight on the undercarriage consists of four carbody counterweight slabs with a total weight of 125,662 lb (118,166 lb for 4' 11" ft-in grousers).

The lifting points 2 are used to load and position the carbody counterweight between the crawler side frames.

Two carbony counterweight slabs:

- are placed at the front and the rear of the undercarriage between the crawler side frames.
- are held in place using locking devices **3**, and by their own weight.

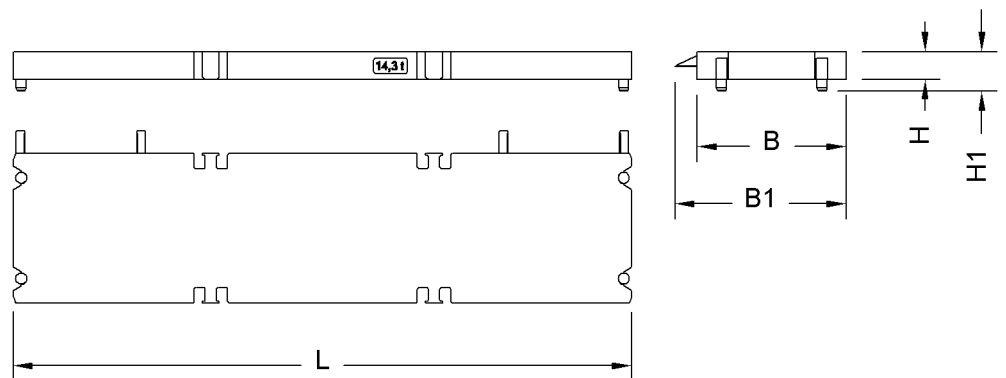


Fig. 20 Dimensions of carbony counterweight slab

Designation		Value
<b>L</b>	Length	18' 2" ft-in
	Length (for 4' 11" ft-in grousers)	17' 2" ft-in
<b>B</b>	Width	4' 5" ft-in
<b>B1</b>	Width incl. boom walkway supports	5' ft-in
<b>H</b>	Height	9.84" in
<b>H1</b>	Height incl. locking devices	1' 2" ft-in
Weight		31,415 lb
Weight (for 4' 11" ft-in grousers)		29,542 lb

Tab. 20 Technical data for carbony counterweight slab

## 1.7.6 Rear counterweight

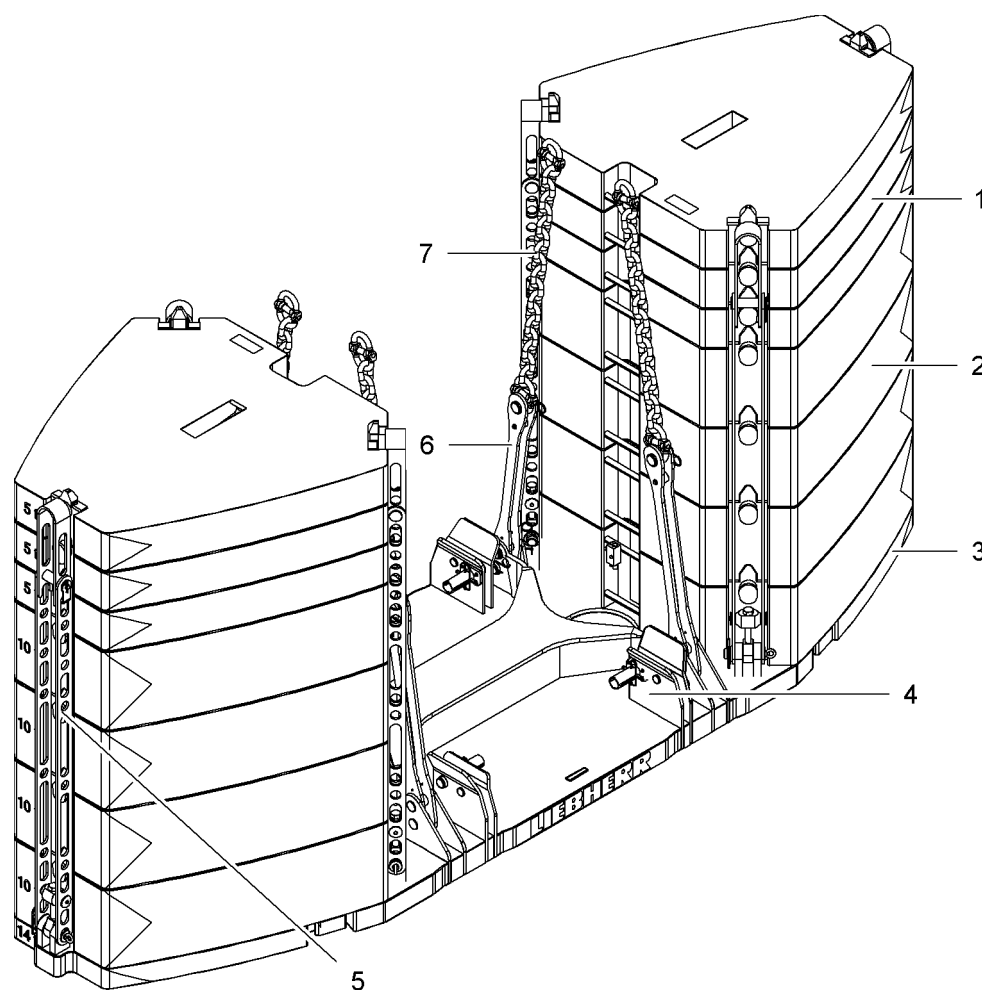


Fig. 21 Rear counterweight overview from rear left

- |   |  |   |                                       |
|---|--|---|---------------------------------------|
| 1 | Ballast slab 11,023 lb (max. 6x)                   | 5 | Counterweight tie-down (6x)           |
| 2 | Ballast slab 22,046 lb (max. 8x)                   | 6 | Slinging plates (4x)                  |
| 3 | Basic counterweight slab<br>31,085 lb              | 7 | Counterweight hoisting chains<br>(4x) |
| 4 | Pin connection points with locking<br>devices (4x) |   |                                       |

The rear counterweight:

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

## Basic counterweight slab 31,085 lb

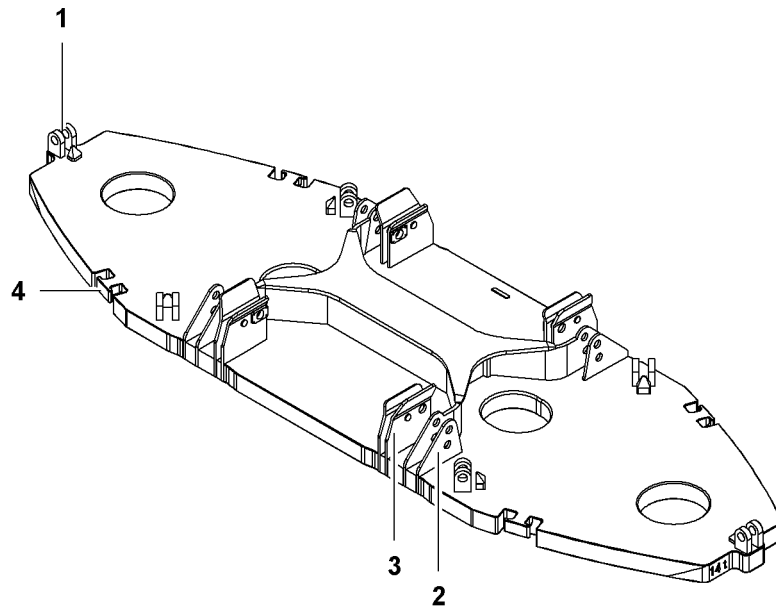


Fig. 22 Basic counterweight slab 31,085 lb

- |   |   |
|---|---|
| <p><b>1</b> Counterweight tie-down pin connection points (6x)</p> <p><b>2</b> Slinging plate pin connection points (4x)</p> | <p><b>3</b> Pin connection points with locking devices (4x)</p> <p><b>4</b> Lifting points (4x)</p> |
|---|---|

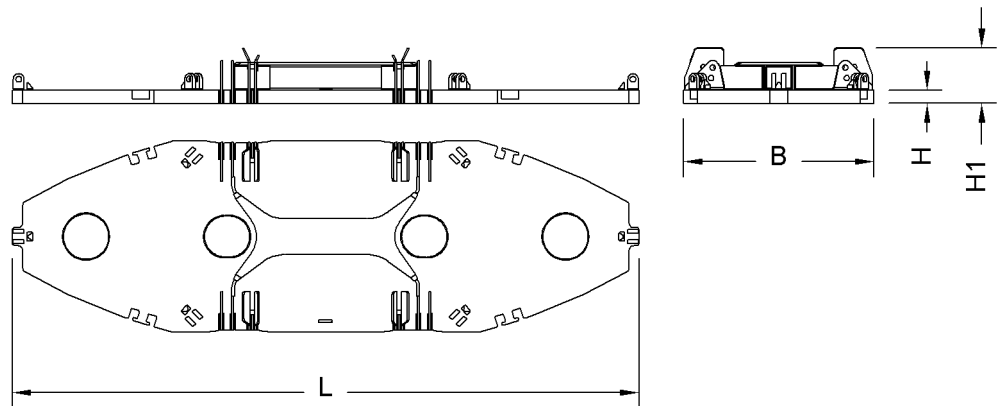


Fig. 23 Dimensions of basic counterweight slab 31,085 lb

Designation		Value
<b>L</b>	Length incl. counterweight tie-down pin connection points	22' 9" ft-in
<b>B</b>	Width	6' 11" ft-in
<b>H</b>	Height	5.91" in
<b>H1</b>	Height incl. pin connection points and locking devices	2' ft-in

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Designation	Value
Weight	31,129 lb

Tab. 21 Technical data for basic counterweight slab 31,085 lb

### 22,046 lb ballast slab

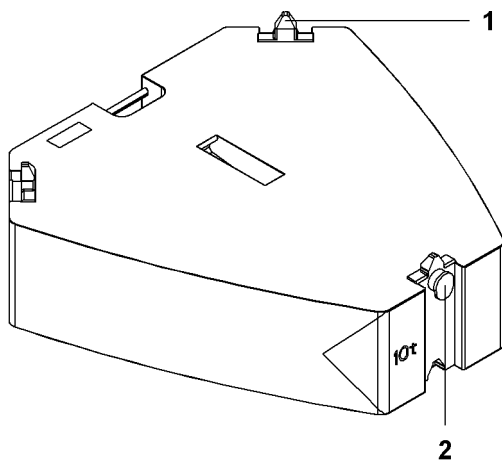


Fig. 24 22,046 lb ballast slab

- 1 Locking devices (3x)                      2 Lifting points (3x)

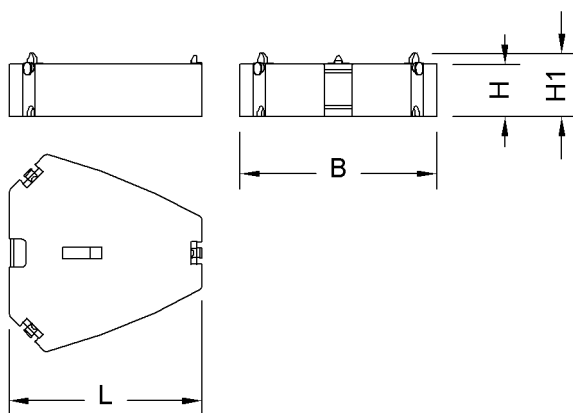


Fig. 25 Dimensions of ballast slab 22,046 lb

Designation	Value
L Length	6' 9" ft-in
B Width	6' 11" ft-in
H Height	1' 10" ft-in
H1 Height incl. locking devices	2' 3" ft-in
Weight	22,046 lb

Tab. 22 Technical data for ballast slab 22,046 lb

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### 11,023 lb ballast slab

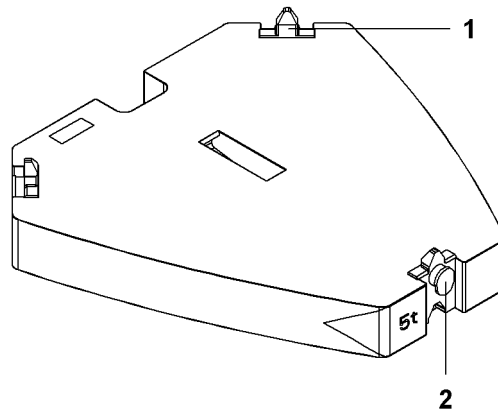


Fig. 26 11,023 lb ballast slab

- 1** Locking devices (3x)
- 2** Lifting points (3x)

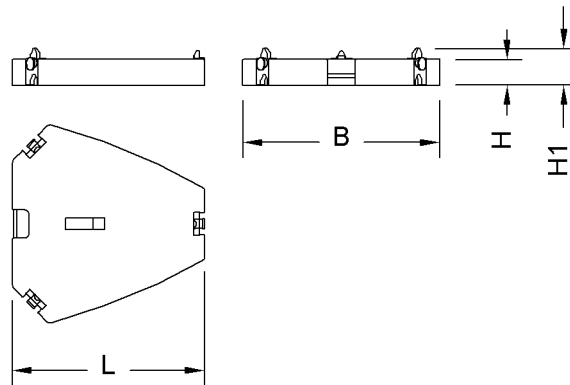


Fig. 27 Dimensions of ballast slab 11,023 lb

Designation		Value
<b>L</b>	Length	6' 9" ft-in
<b>B</b>	Width	6' 11" ft-in
<b>H</b>	Height	10.83" in
<b>H1</b>	Height incl. locking devices	1' 4" ft-in
Weight		11,023 lb

Tab. 23 Technical data for ballast slab 11,023 lb

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## 1.8 Information on boom heads

### 1.8.1 boom designation

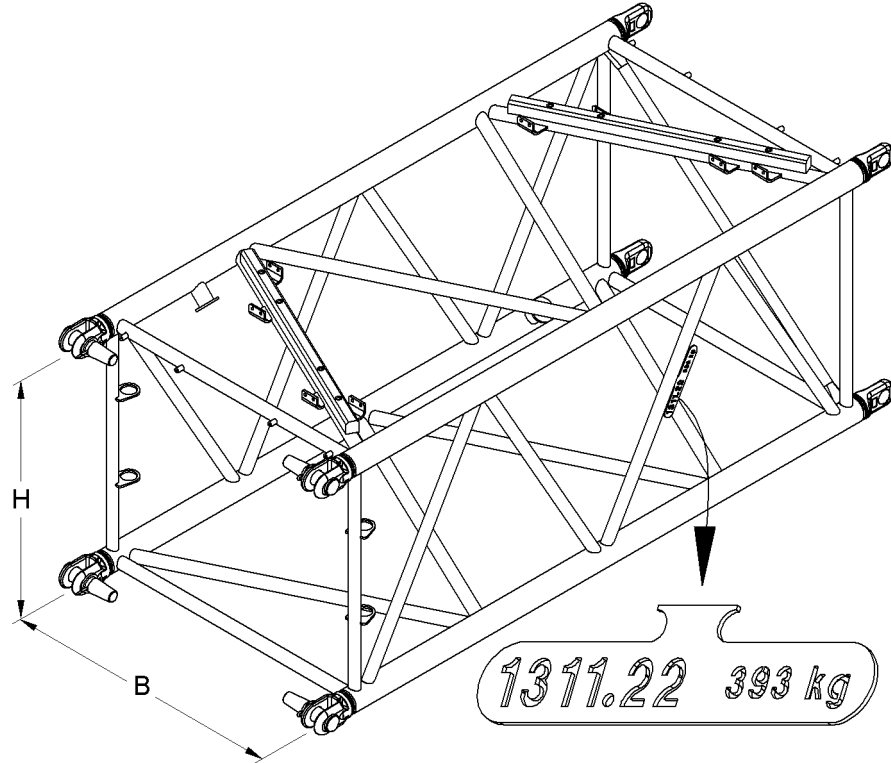


Fig. 28 Boom identification plate

**B** System width

**H** System height

The **system number** (e.g. 1311.22) designates boom sections. The system number is used to distinguish between the different boom sections in the HS or LR series.

The system number contains the following information:

e.g. system number **1311.22**

System width in [dm]	System height in [dm]	Wall thickness code
13xx.xx	xx11.xx	xxxx.22

Tab. 24 System number - boom type plate

Each boom section is marked with the system number.

The **system width B** indicates the width of the boom section.

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

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

The **system length**:

- refers to the pin connection points for the boom sections or pendant straps
- is used to calculate the total length of the boom



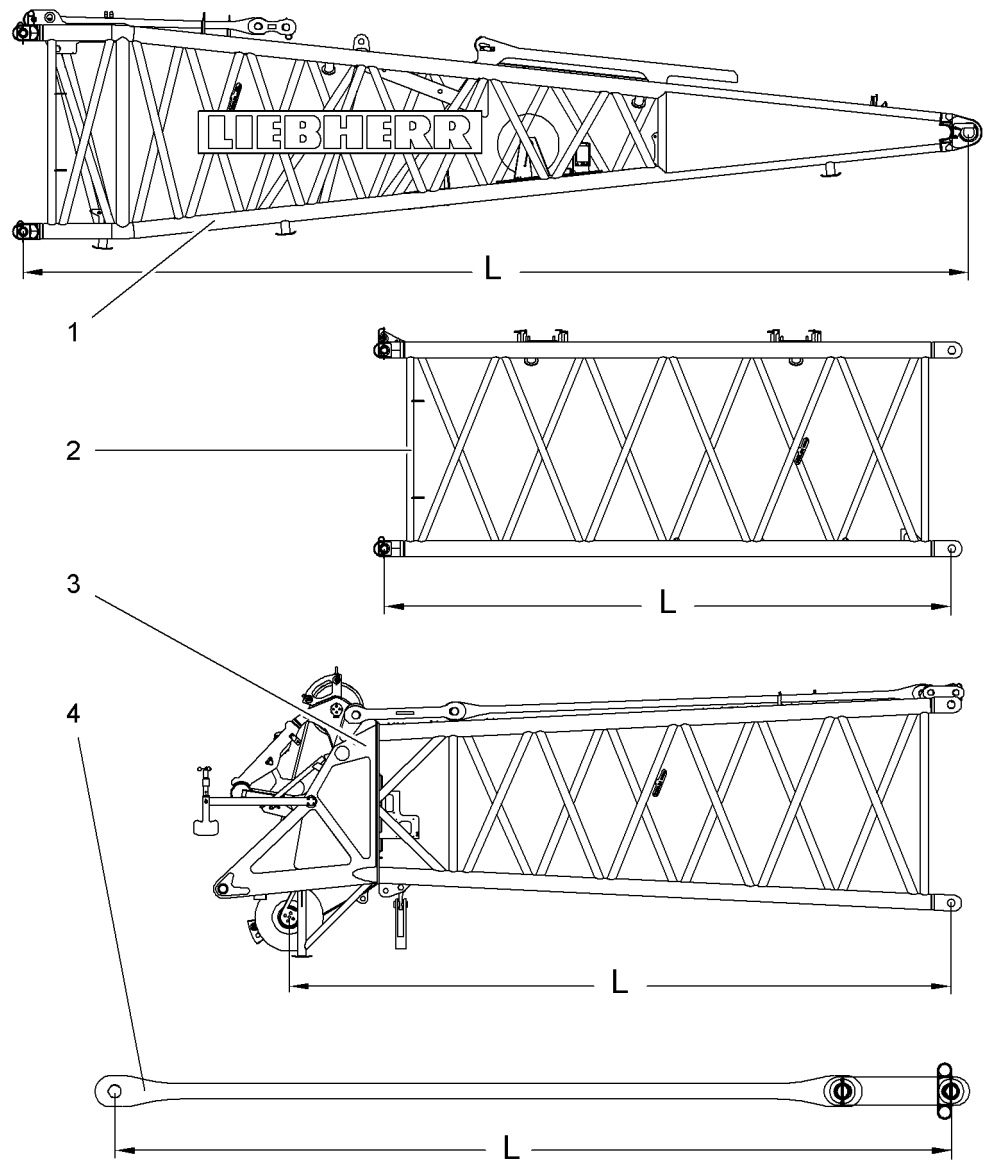


Fig. 29 System length of the boom components

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

## 1.8.2 Differentiating factors of LR 1300 and LR 1300 SX boom sections

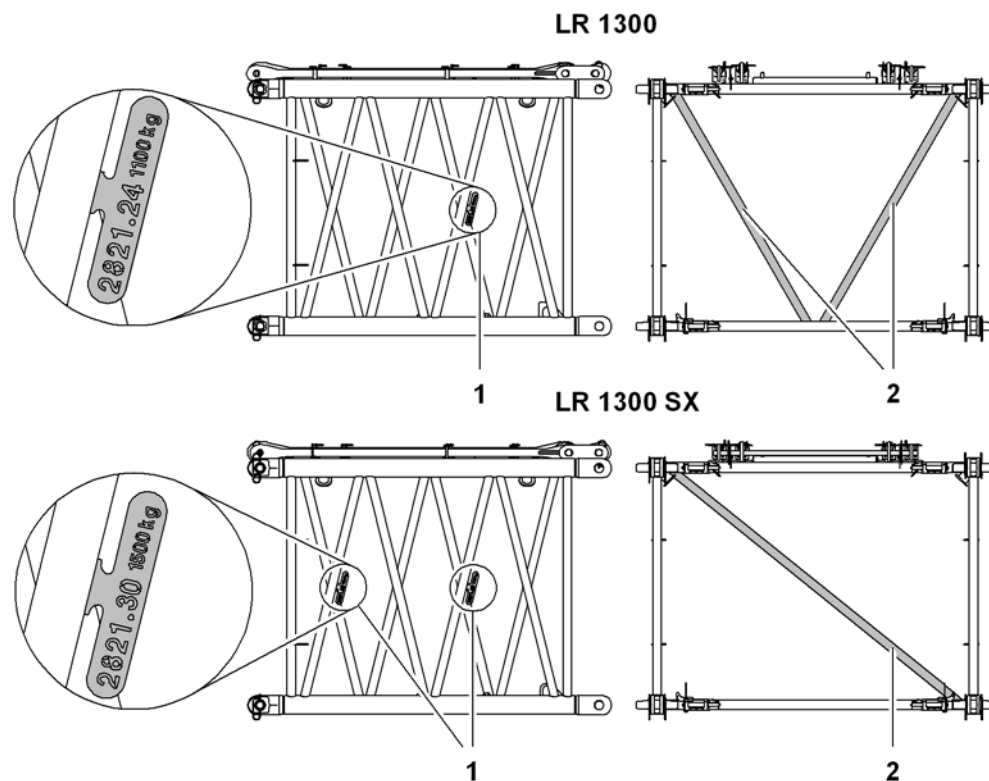
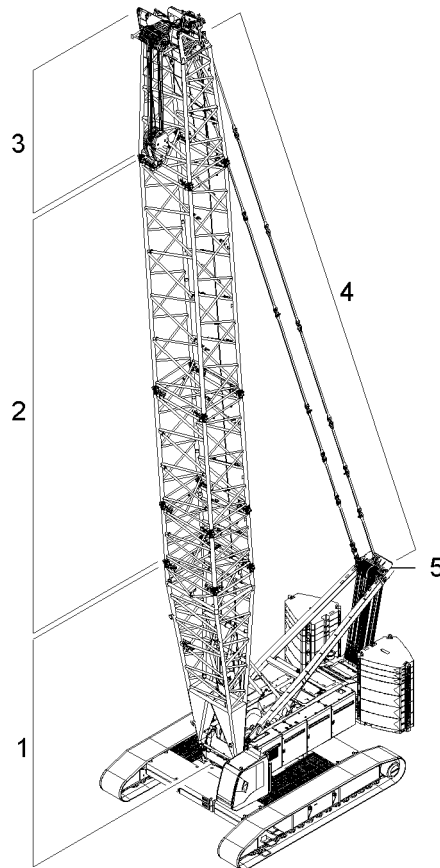


Fig. 30 Differentiating factors of LR 1300 and LR 1300 SX boom sections

1 Type plate

2 diagonal boom bracing

## 1.9 Main boom - overview



*Fig. 31 Main boom - overview*

- |          |                   |          |                          |
|----------|-------------------|----------|--------------------------|
| <b>1</b> | Boom base section | <b>4</b> | Main boom pendant straps |
| <b>2</b> | Boom sections     | <b>5</b> | A-frame1                 |
| <b>3</b> | Boom head section |          |                          |

The main boom is composed of:

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

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

## 1.10 2821 main boom

### 1.10.1 2821 boom base section

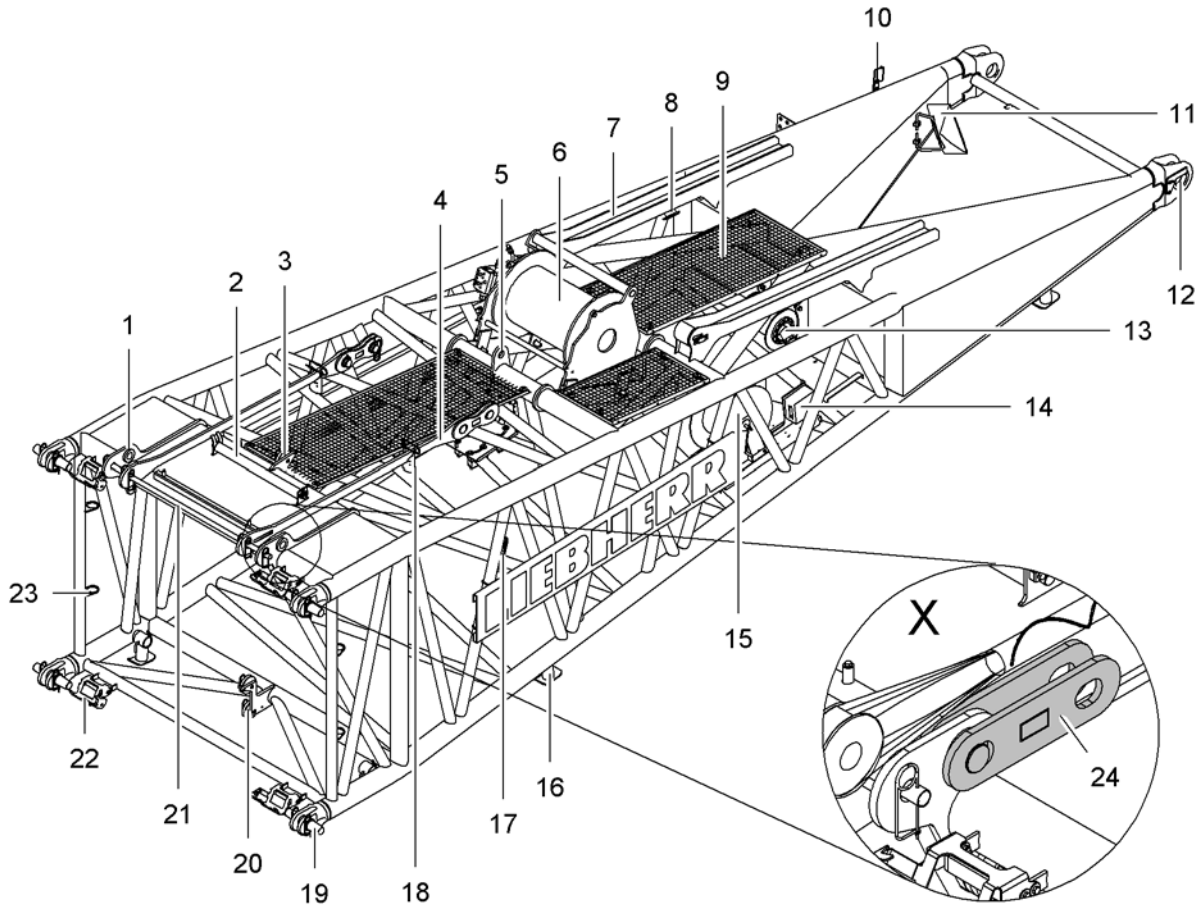


Fig. 32 2821 boom base section

- |   |   |    |   |    |   |
|---|---|----|---|----|---|
| 1 | Pivot points (2x) for jib back-stay straps          | 9  | Boom walkways (3x)  | 17 | Boom identification plate   |
| 2 | Rope protection roller                              | 10 | Limit switch plate for main boom limit switch, upper angle limitation | 18 | Transport fixations (2x) for main boom pendant straps                       |
| 3 | Deflection pulley for reeving rope                  | 11 | Mirror  | 19 | Pin connection points (4x) with double-taper pins (4x)                      |
| 4 | Transport position of main boom pendant straps (2x) | 12 | Pivot points (2x) on uppercarriage                                    | 20 | Deflection pulleys (2x) for reeving rope                                    |
| 5 | Bolting point for mounting cylinder                 | 13 | Rope reeving winch  | 21 | Transport lashing for main boom pendant straps                              |
| 6 | Luffing jib luffing winch                           | 14 | Terminal box  | 22 | Catch (4x) for double-taper pins  |
| 7 | Guide rails (2x) main boom tilting-back supports    | 15 | Cable drum  | 23 | Transport brackets (4x) for double-taper pins                               |
| 8 | Lifting points (4x)                                 | 16 | Support pods (6x, two of which hinged)                                | 24 | Connecting links (1' 2" ft-in) (2x) on LR1300 (carbon-fibre pendant straps) |

Detail X shows the connecting links (1' 2" ft-in) **24**, fitted on a LR1300 (carbon-fibre pendant straps) at the factory on a boom base section. The connecting links are part of the jib backstay straps.

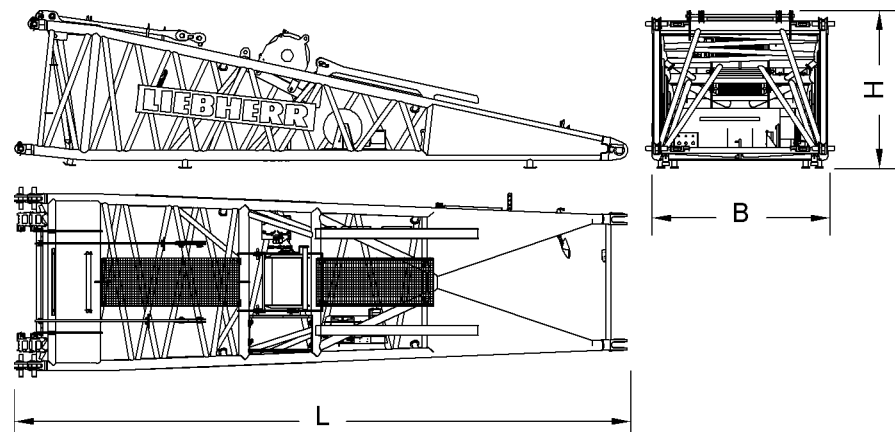


Fig. 33 Dimensions of 2821 boom base section

Designation		Value
System length		32' 10" ft-in
System width		9' 2" ft-in
System height		6' 11" ft-in
L	Length	33' 10" ft-in
B	Width	9' 9" ft-in
H	Height	8' 8" ft-in
Weight (incl. pendant straps, jib luffing winch and rope)		16,314 lb
Weight (incl. pendant straps, without jib luffing winch)		12,566 lb
Double-taper pins Ø		3.15" in

Tab. 25 2821 boom base section technical data

## 1.10.2 2821 boom section 10 ft

### 2821 boom section 10 ft for LR1300/LR1300W

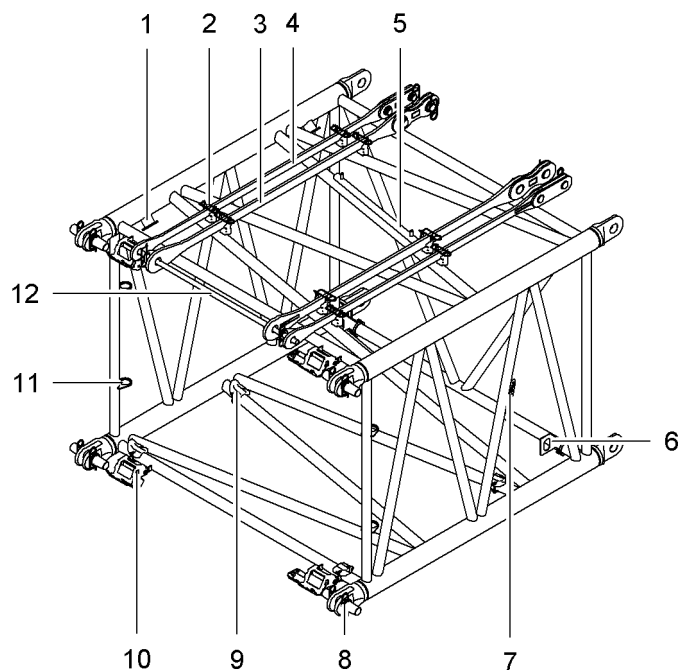


Fig. 34 2821 boom section 10 ft for LR1300/LR1300W

- |   |  |    |  |
|---|--|----|--|
| 1 | Lifting points (4x)  | 7  | Boom identification plate                              |
| 2 | Transport brackets (8x) for pendant straps                         | 8  | Pin connection points (8x) with double-taper pins (4x) |
| 3 | Transport position of main boom pendant straps 10 ft (2x)          | 9  | Supports (4x) for transporting inserted boom section   |
| 4 | Transport position of jib backstay straps 10 ft (2x)               | 10 | Catch (4x) for double-taper pins                       |
| 5 | Rope protection support  | 11 | Transport brackets (4x) for double-taper pins          |
| 6 | Pin connection points (2x) for transporting retracted boom section | 12 | Transport bracket for pendant straps                   |

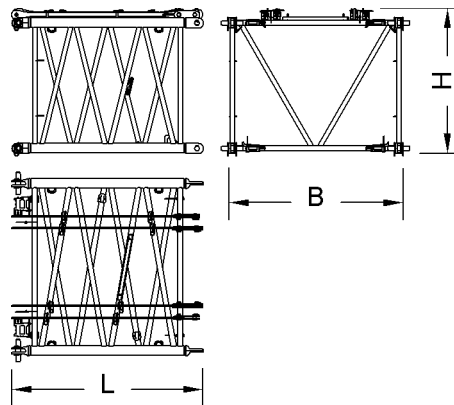


Fig. 35 2821 boom section dimensions 10 ft for LR1300/LR1300W

Designation		Value
System length		9' 10" ft-in
System width		9' 2" ft-in
System height		6' 11" ft-in
L	Length	10' 7" ft-in
B	Width	9' 9" ft-in
H	Height (incl. pendant straps)	7' 11" ft-in
Weight (incl. pendant straps)		2,712 lb
Double-taper pins Ø		3.15" in

Tab. 26 2821 boom section technical data 10 ft for LR1300/LR1300W

## 2821 boom section 10 ft for LR1300SX/LR1300SXW

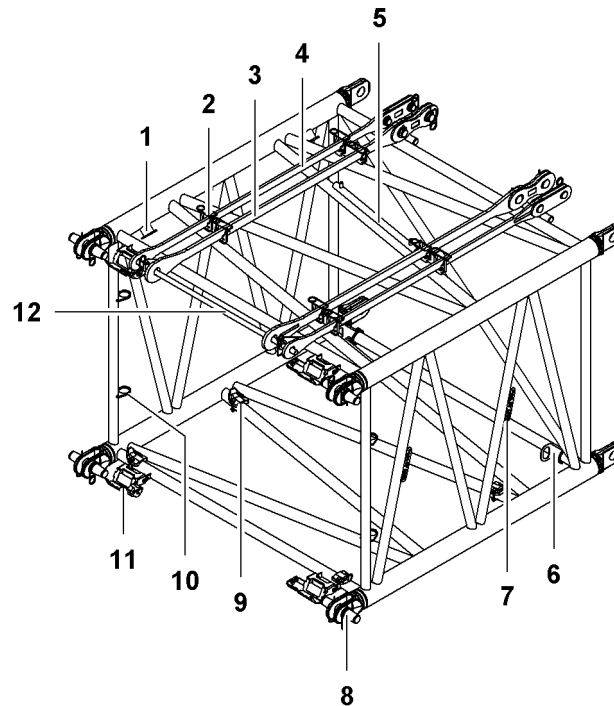


Fig. 36 2821 boom section 10 ft for LR1300SX/LR1300SXW

- |   |  |    |  |
|---|--|----|--|
| 1 | Lifting points (4x)  | 7  | Boom identification plate                              |
| 2 | Transport brackets (8x) for pendant straps                         | 8  | Pin connection points (8x) with double-taper pins (4x) |
| 3 | Transport position of main boom pendant straps 10 ft (2x)          | 9  | Supports (4x) for transporting inserted boom section   |
| 4 | Transport position of jib backstay straps 10 ft (2x)               | 10 | Transport brackets (4x) for double-taper pins          |
| 5 | Rope protection support  | 11 | Catch (4x) for double-taper pins                       |
| 6 | Pin connection points (2x) for transporting retracted boom section | 12 | Transport bracket for pendant straps                   |

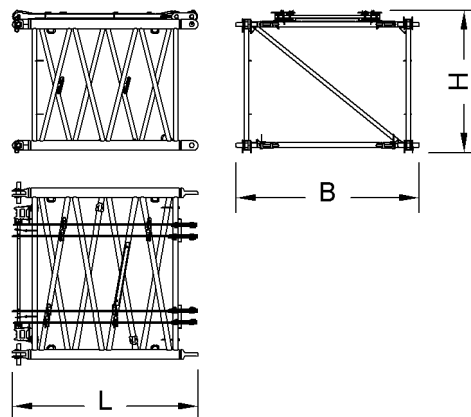


Fig. 37 2821 boom section dimensions 10 ft for LR1300SX/LR1300SXW



Designation		Value
System length		9' 10" ft-in
System width		9' 2" ft-in
System height		6' 11" ft-in
L	Length	10' 7" ft-in
B	Width	9' 9" ft-in
H	Height (incl. pendant straps)	7' 11" ft-in
Weight (incl. pendant straps)		3,254 lb
Double-taper pins Ø		3.15" in

Tab. 27 2821 boom section technical data 10 ft for LR1300SX/LR1300SXW

### 1.10.3 2821 boom section 20 ft

#### 2821 boom section 20 ft for LR1300/LR1300W

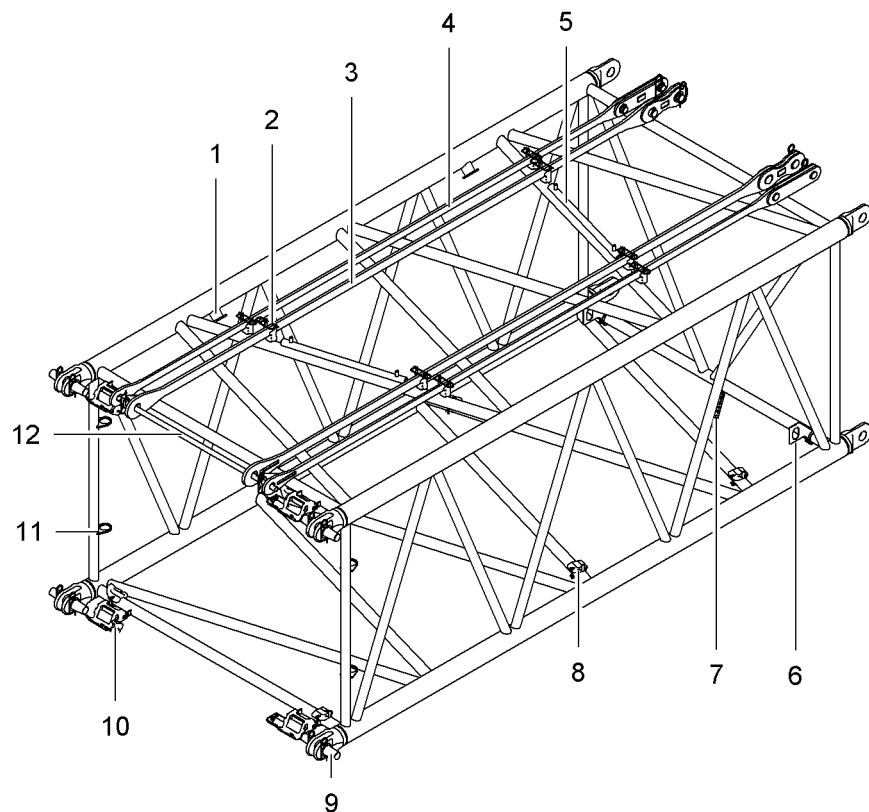


Fig. 38 2821 boom section 20 ft for LR1300/LR1300W

- |   |   |    |  |
|---|---|----|--|
| 1 | Lifting points (4x)                                       | 7  | Boom identification plate                              |
| 2 | Transport brackets (8x) for pendant straps                | 8  | Supports (4x) for transporting retracted section       |
| 3 | Transport position of main boom pendant straps 20 ft (2x) | 9  | Pin connection points (8x) with double-taper pins (4x) |
| 4 | Transport position of jib backstay straps 20 ft (2x)      | 10 | Catch (4x) for double-taper pins                       |

- 5** Rope protection supports (2x)

**6** Pin connection points (2x) for transporting retracted boom section
- 11** Transport brackets (4x) for double-taper pins

**12** Transport bracket for pendant straps

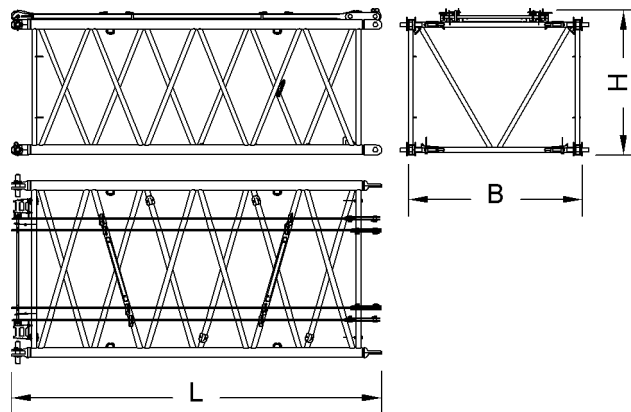


Fig. 39 2821 boom section dimensions 20 ft for LR1300/LR1300W

Designation		Value
<b>System length</b>		19' 8" ft-in
<b>System width</b>		9' 2" ft-in
<b>System height</b>		6' 11" ft-in
<b>L</b>	Length	20' 5" ft-in
<b>B</b>	Width	9' 9" ft-in
<b>H</b>	Height (incl. pendant straps)	7' 11" ft-in
Weight (incl. pendant straps)		4,211 lb
Double-taper pins Ø		3.15" in

Tab. 28 2821 boom section technical data 20 ft for LR1300/LR1300W

## 2821 boom section 20 ft for LR1300SX/LR1300SXW

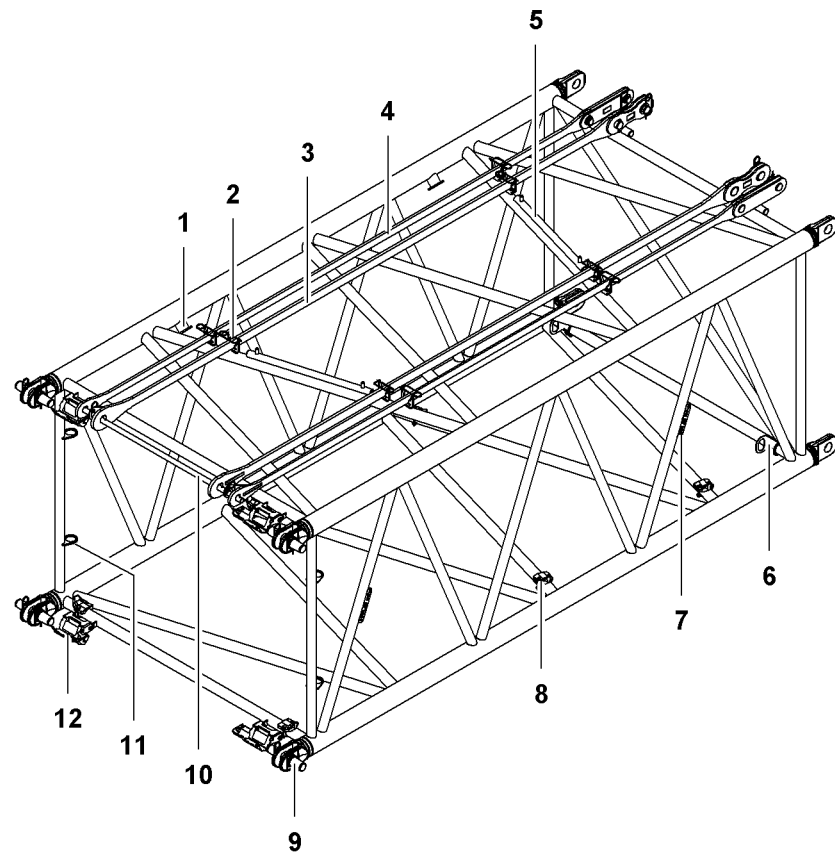


Fig. 40 2821 boom section 20 ft for LR1300SX/LR1300SXW

- |   |  |    |  |
|---|--|----|--|
| 1 | Lifting points (4x)  | 7  | Boom identification plate                              |
| 2 | Transport brackets (8x) for pendant straps                         | 8  | Supports (4x) for transporting retracted section       |
| 3 | Transport position of main boom pendant straps 20 ft (2x)          | 9  | Pin connection points (8x) with double-taper pins (4x) |
| 4 | Transport position of jib backstay straps 20 ft (2x)               | 10 | Transport bracket for pendant straps                   |
| 5 | Rope protection supports (2x)                                      | 11 | Transport brackets (4x) for double-taper pins          |
| 6 | Pin connection points (2x) for transporting retracted boom section | 12 | Catch (4x) for double-taper pins                       |

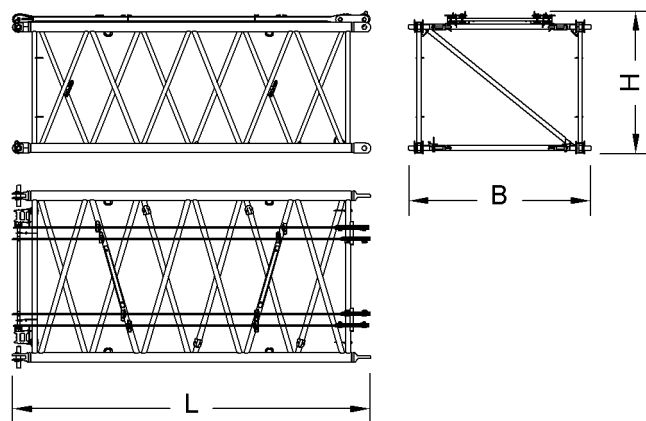


Fig. 41 2821 boom section dimensions 20 ft for LR1300SX/LR1300SXW

Designation		Value
System length		19' 8" ft-in
System width		9' 2" ft-in
System height		6' 11" ft-in
L	Length	20' 5" ft-in
B	Width	9' 9" ft-in
H	Height (incl. pendant straps)	7' 11" ft-in
Weight (incl. pendant straps)		5,079 lb
Double-taper pins Ø		3.15" in

Tab. 29 2821 boom section technical data 20 ft for LR1300SX/LR1300SXW

## 1.10.4 2821 boom section 40 ft

## 2821 boom section 40 ft for LR1300/LR1300W

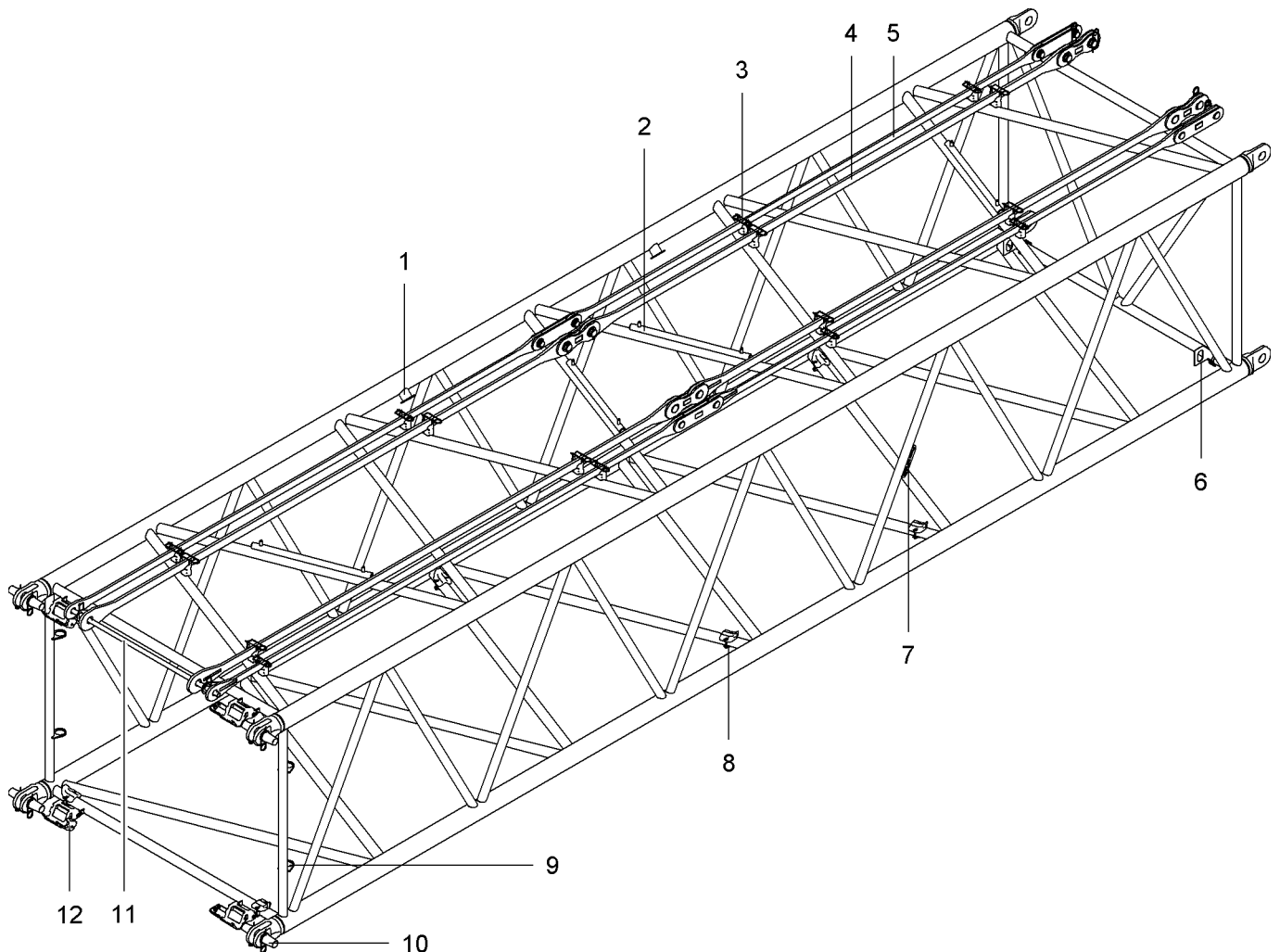


Fig. 42 2821 boom section 40 ft for LR1300/LR1300W

- |   |   |   |  |    |  |
|---|---|---|--|----|--|
| 1 | Lifting points (4x)                                       | 5 | Transport position of jib back-stay straps 40 ft (2x)              | 9  | Transport brackets (4x) for double-taper pins          |
| 2 | Rope protection supports (3x)                             | 6 | Pin connection points (2x) for transporting retracted boom section | 10 | Pin connection points (8x) with double-taper pins (4x) |
| 3 | Transport brackets (16x) for pendant straps               | 7 | Boom identification plate  | 11 | Transport bracket for pendant straps                   |
| 4 | Transport position of main boom pendant straps 40 ft (2x) | 8 | Supports (4x) for transporting inserted boom section               | 12 | Catch (4x) for double-taper pins                       |

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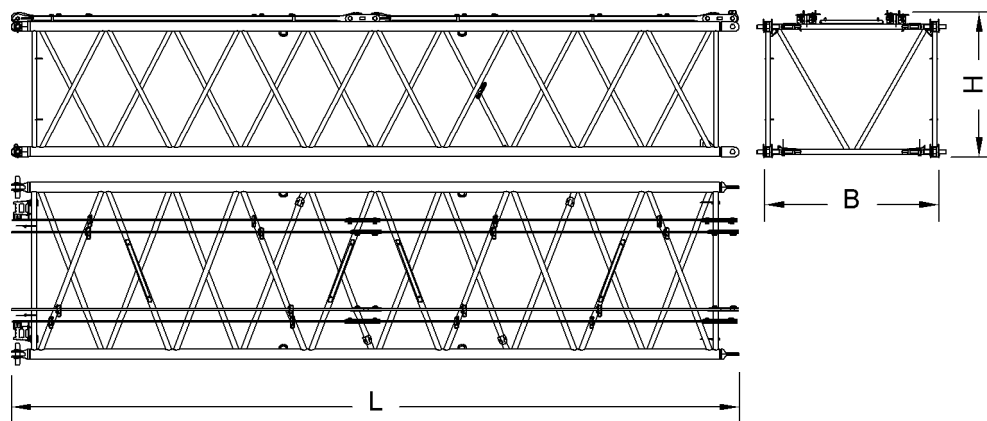


Fig. 43 2821 boom section dimensions 40 ft for LR1300/LR1300W

Designation		Value
System length		39' 4" ft-in
System width		9' 2" ft-in
System height		6' 11" ft-in
L	Length	40' 1" ft-in
B	Width	9' 9" ft-in
H	Height (incl. pendant straps)	7' 11" ft-in
Weight (incl. pendant straps)		7,399 lb
Double-taper pins Ø		3.15" in

Tab. 30 2821 boom section technical data 40 ft for LR1300/LR1300W

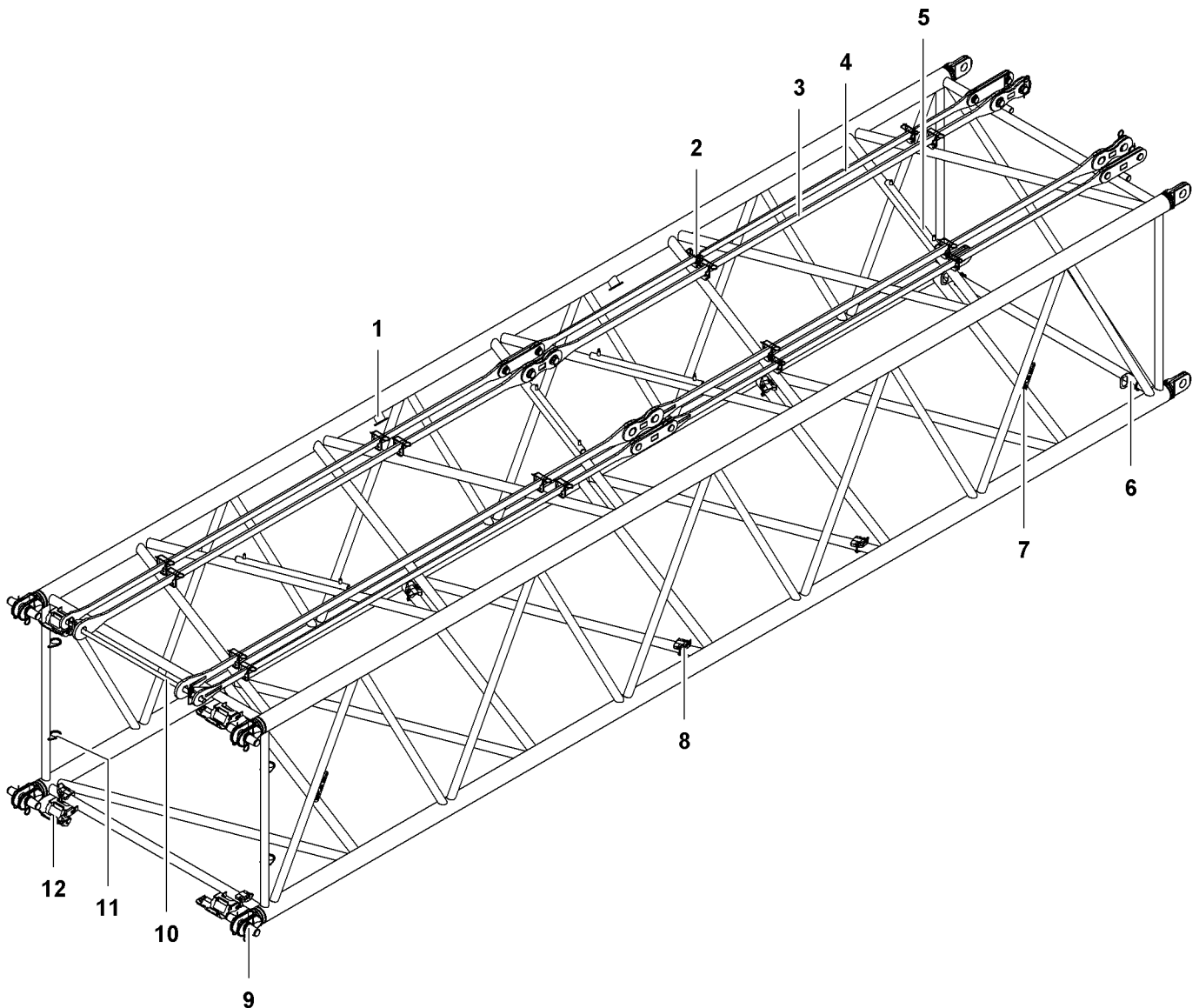
**2821 boom section 40 ft for LR1300SX/LR1300SXW**

Fig. 44 2821 boom section 40 ft for LR1300SX/LR1300SXW

- |   |   |   |  |    |  |
|---|---|---|--|----|--|
| 1 | Lifting points (4x)                                       | 5 | Rope protection supports (3x)                                      | 9  | Pin connection points (8x) with double-taper pins (4x) |
| 2 | Transport brackets (16x) for pendant straps               | 6 | Pin connection points (2x) for transporting retracted boom section | 10 | Transport bracket for pendant straps                   |
| 3 | Transport position of main boom pendant straps 40 ft (2x) | 7 | Boom identification plate  | 11 | Transport brackets (4x) for double-taper pins          |
| 4 | Transport position of jib back-stay straps 40 ft (2x)     | 8 | Supports (4x) for transporting inserted boom section               | 12 | Catch (4x) for double-taper pins                       |

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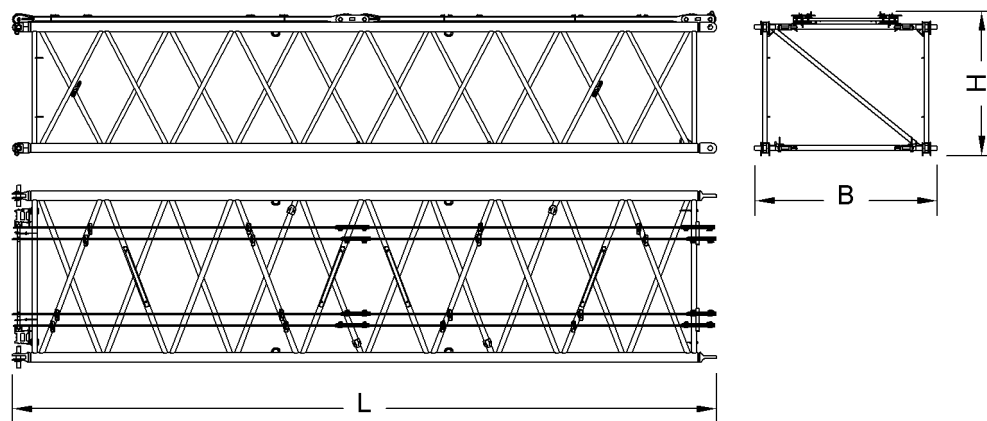


Fig. 45 2821 boom section dimensions 40 ft for LR1300SX/LR1300SXW

Designation		Value
System length		39' 4" ft-in
System width		9' 2" ft-in
System height		6' 11" ft-in
L	Length	40' 1" ft-in
B	Width	9' 9" ft-in
H	Height (incl. pendant straps)	7' 11" ft-in
Weight (incl. pendant straps)		8,911 lb
Double-taper pins Ø		3.15" in

Tab. 31 2821 boom section technical data 40 ft for LR1300SX/LR1300SXW



### 1.10.5 2821 boom head section

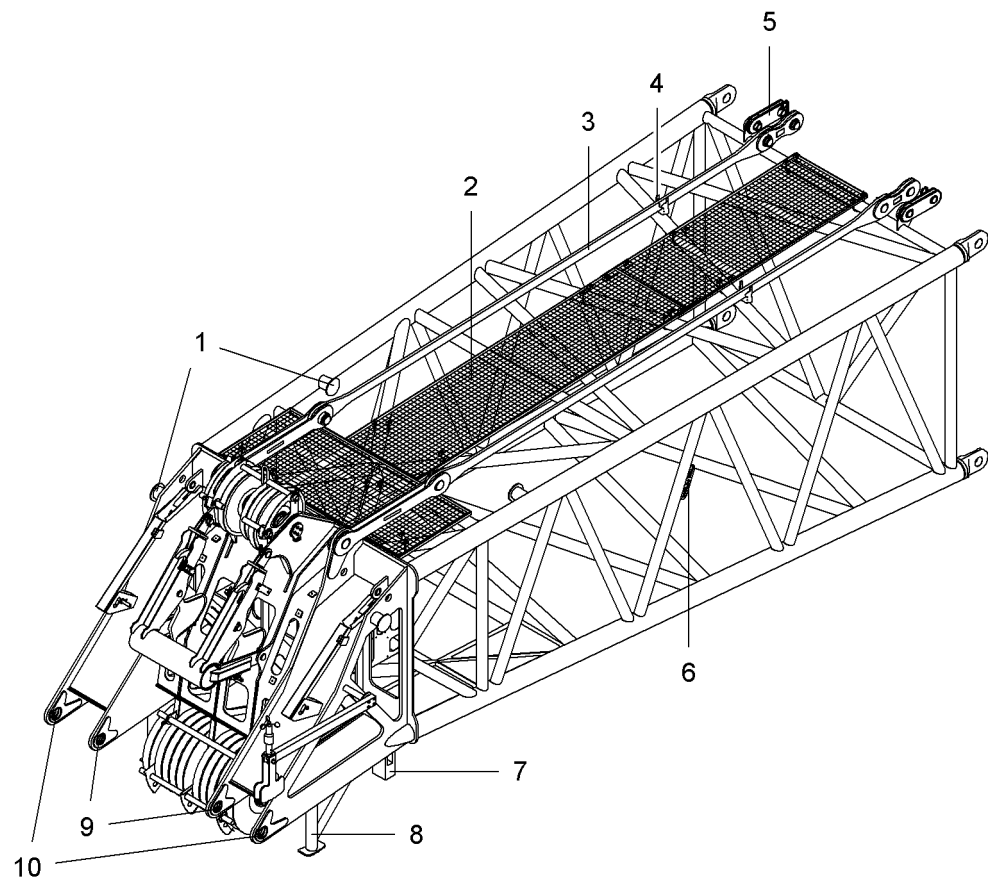


Fig. 46 2821 boom head section

- |   |   |    |   |
|---|---|----|---|
| 1 | Lifting points (4x)   | 6  | Boom identification plate                           |
| 2 | Boom walkways (3x)  | 7  | Rope fixation                                       |
| 3 | Transport position of main boom pendant straps (2x)                 | 8  | Support feet (2x)                                   |
| 4 | Transport fixations (2x) for pendant straps                         | 9  | Pin connection points (2x) for jib or auxiliary jib |
| 5 | Connecting links (2x) for jib backstay straps (if jib not attached) | 10 | Pin connection points (2x) for jib backstay straps  |

The jib backstay straps that are not required are bolted 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.

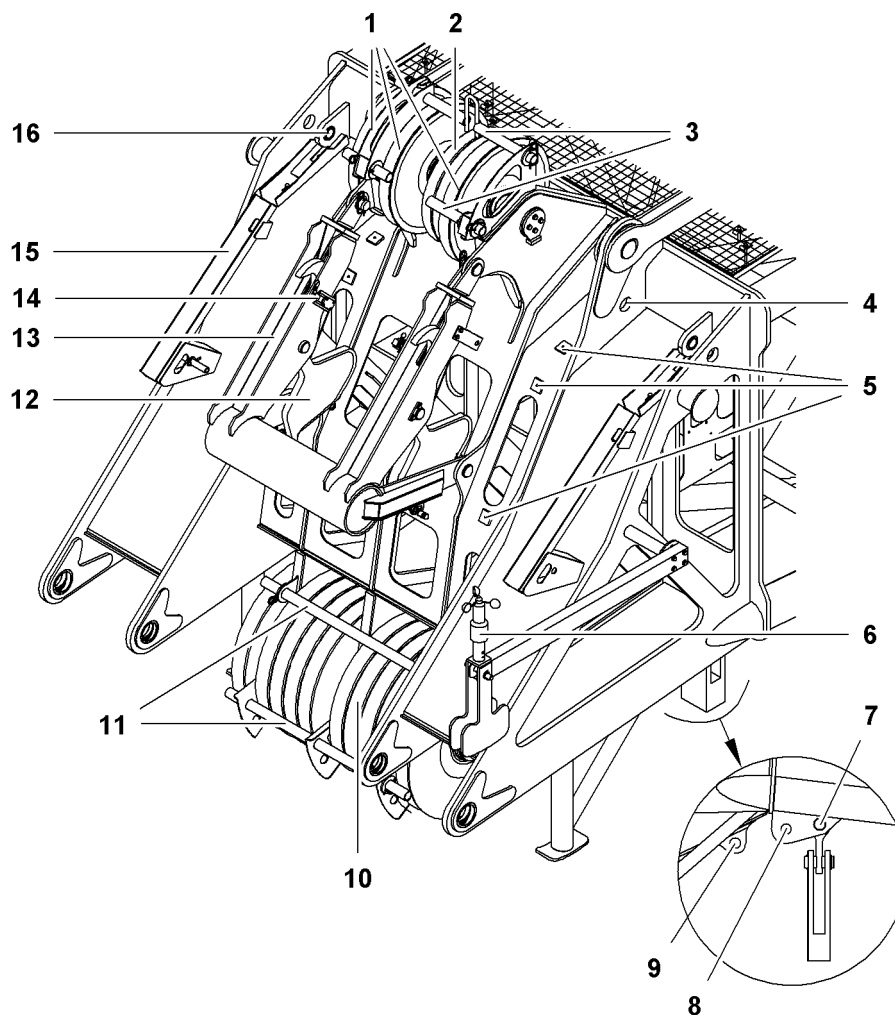


Fig. 47 Detail of 2821 boom head section

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

**NOTICE**

Hoist rope for winch 1/2 is reeved incorrectly over the gantry pulley for the jib luffing rope!  
Risk of damage to gantry pulley.

- ▶ The jib luffing rope must always be guided over the gantry pulley **2** for the jib luffing rope.

For 21-fold and 22-fold reeving, an additional pulley (11th pulley) has to be fitted to the 2821 boom head section.

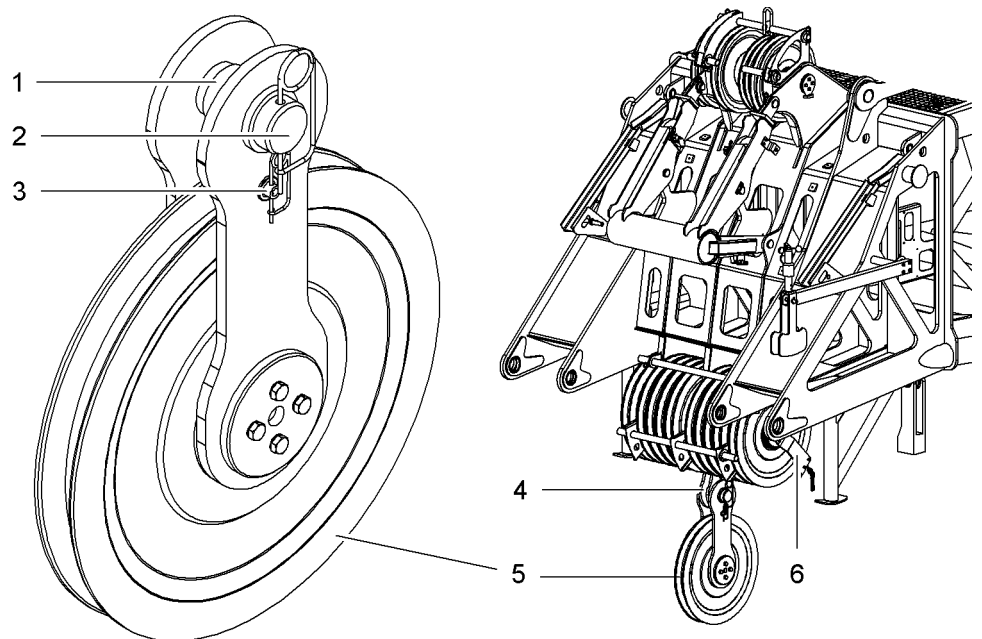


Fig. 48 11. Pulley for 21-fold and 22-fold reeving

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

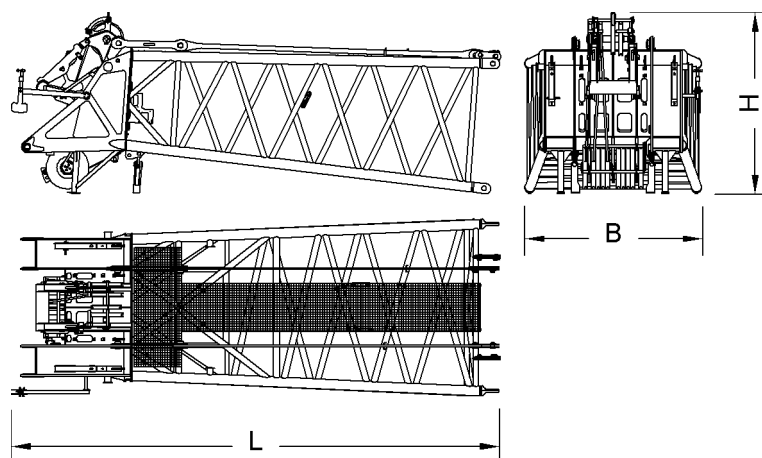


Fig. 49 Dimensions of 2821 boom head section

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Designation		Value
System length		23' ft-in
System width		9' 2" ft-in
System height		6' 11" ft-in
L	Length	26' 5" ft-in
B	Width	9' 9" ft-in
H	Height	9' 9" ft-in
Weight (incl. pendant straps)		11,905 lb

Tab. 32 2821 boom head section technical data

Designation		Value
11. Pulley Ø		2' 4" ft-in
Height (incl. brackets)		3' 2" ft-in
Weight (incl. brackets)		207 lb
Pin Ø		3.15" in

Tab. 33 11th pulley technical data

### 1.10.6 Rope guide (type A/B)

The rope guide:

- must only be installed on a main boom with a prescribed length.
- improves the spooling properties of the rope on the pulley.
- increases the service life of the rope.

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	x
2	x	
3	x	x
4	x	x
5	x	x
6		x
8		x
9		x

Tab. 34 Prescribed use of rope guide (type A) or rope guide (type B)

## Rope guide (type A)

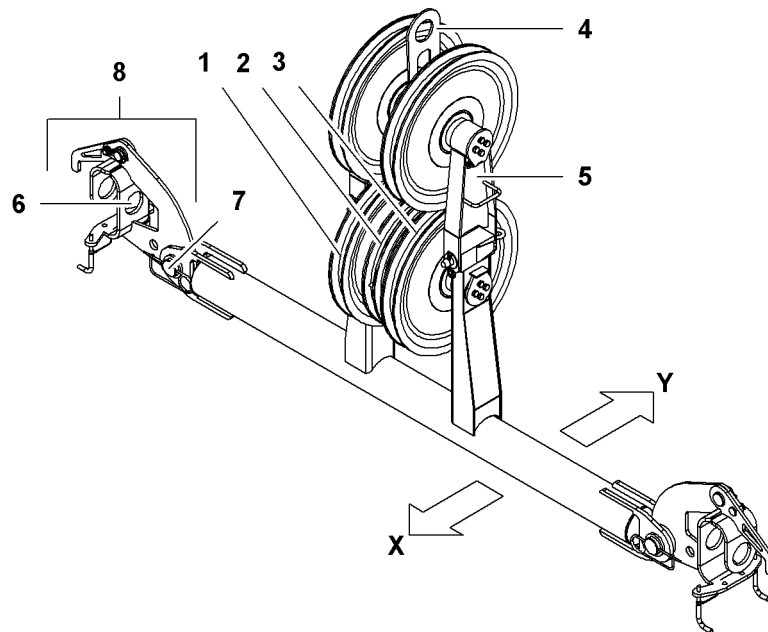


Fig. 50 Rope guide (type A)

- |   |                                   |   |   |
|---|-----------------------------------|---|---|
| 1 | Pulley for winch 1 hoist rope     | 6 | Pin connection points (2x) for rope guide forks with boom section |
| 2 | Pulley for jib luffing rope       | 7 | Pin connection points (2x) for rope guide forks with rope guide   |
| 3 | Pulley for winch 2 hoist rope     | 8 | Rope guide forks (2x)   |
| 4 | Lifting point                     | X | Direction of boom head section                                    |
| 5 | Upper part of rope guide (hinged) | Y | Towards uppercarriage   |

To help reeve the ropes, the upper part of the rope guide **5** can be folded up.

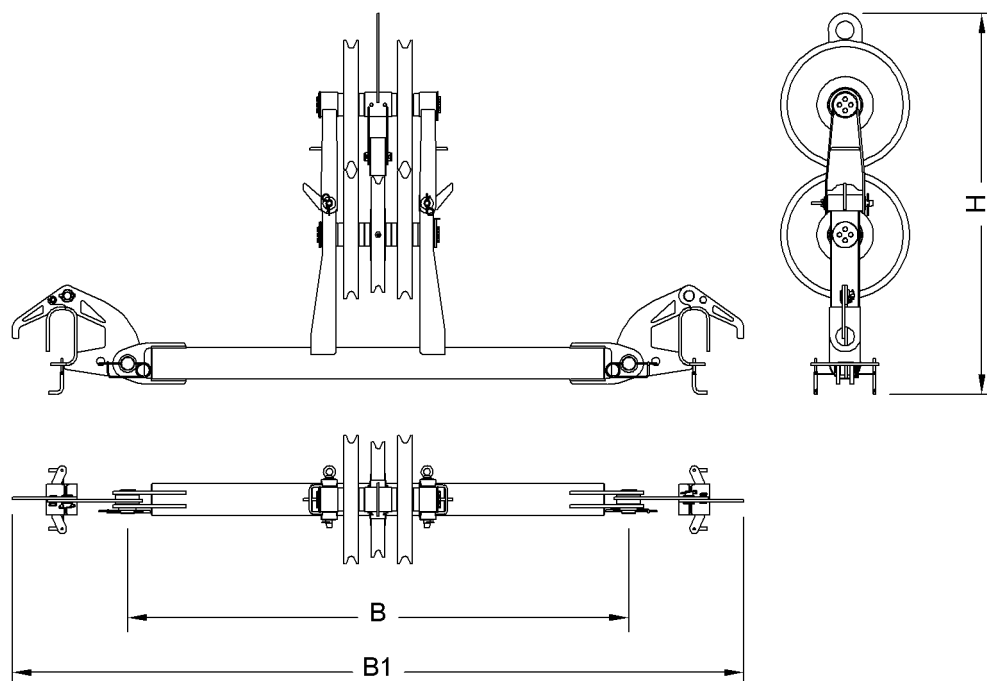


Fig. 51 Dimensions of rope guide (type A)

Designation		Value
1+3	Pulleys for winch 1 + 2 hoist ropes	1' 8" ft-in x 0.59" in x 3.54" in
2	Pulley for jib luffing rope	1' 6" ft-in x 0.43" in x 3.54" in
B	Width	7' 3" ft-in
B1	Width (boom section system size)	9' 2" ft-in
H	Height	5' 5" ft-in
Weight		553 lb

Tab. 35 Rope guide (type A) technical data

## Rope guide (type B)

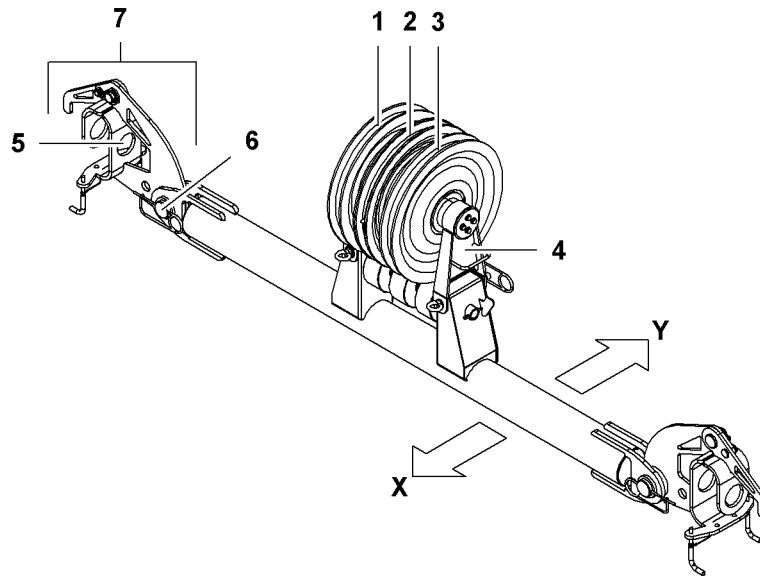


Fig. 52 Rope guide (type B)

- |   |   |   |   |
|---|---|---|---|
| 1 | Pulley for winch 1 hoist rope                                     | 6 | Pin connection points (2x) for rope guide forks with rope guide |
| 2 | Pulley for jib luffing rope                                       | 7 | Rope guide forks (2x)   |
| 3 | Pulley for winch 2 hoist rope                                     | X | Direction of boom head section                                  |
| 4 | Upper part of rope guide (hinged)                                 | Y | Towards uppercarriage   |
| 5 | Pin connection points (2x) for rope guide forks with boom section |   |   |

To help reeve the ropes, the upper part of the rope guide 4 can be folded up.

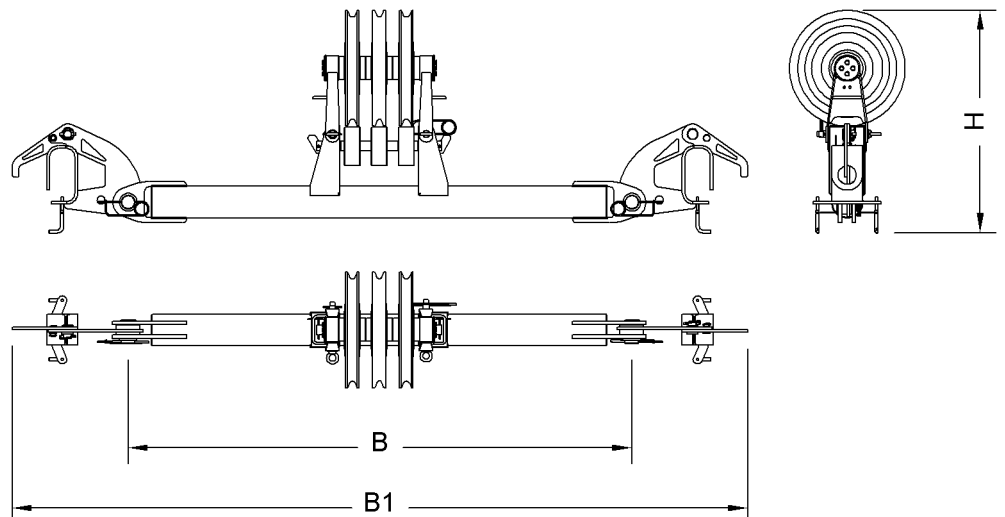


Fig. 53 Dimensions of rope guide (type B)

Designation		Value
<b>1+3</b>	Pulleys for winch 1 + 2 hoist ropes	1' 6" ft-in x 0.59" in x 3.54" in
<b>2</b>	Pulley for jib luffing rope	1' 6" ft-in x 0.43" in x 3.54" in
<b>B</b>	Width	7' 3" ft-in
<b>B1</b>	Width (boom section system size)	9' 2" ft-in
<b>H</b>	Height	3' 1" ft-in
Weight		397 lb

Tab. 36 Rope guide (type B) technical data



## 1.11 Reducing piece overview

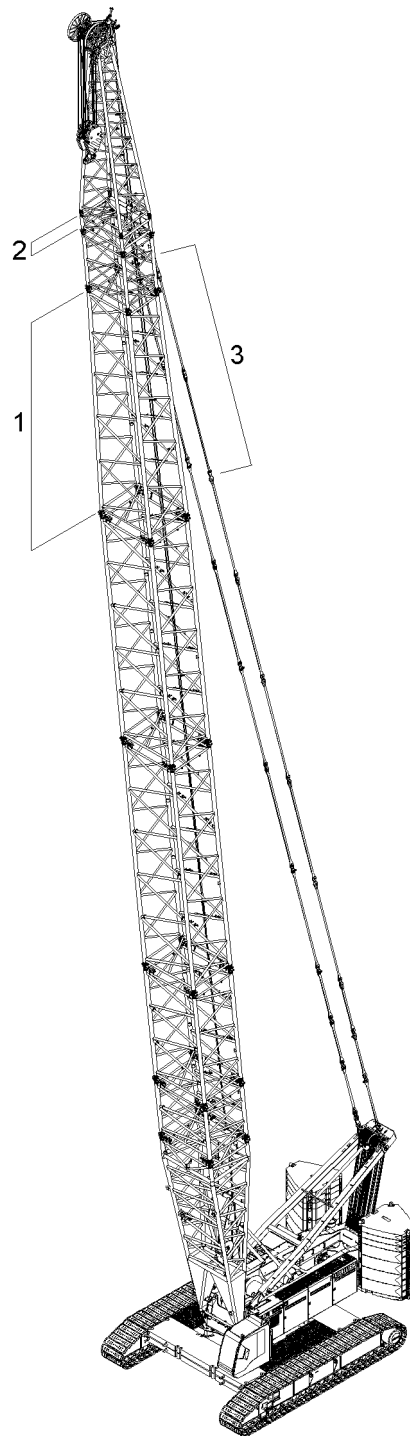


Fig. 54 Reducing piece overview

- |   |                                |   |                                    |
|---|--------------------------------|---|------------------------------------|
| 1 | 2821/2316 reducing piece 40 ft | 3 | Reducing piece pendant strap 40 ft |
| 2 | 2316 boom section 3 ft         |   |                                    |

## 1.12 2821/2316 reducing piece

### 1.12.1 2821/2316 reducing piece 40 ft

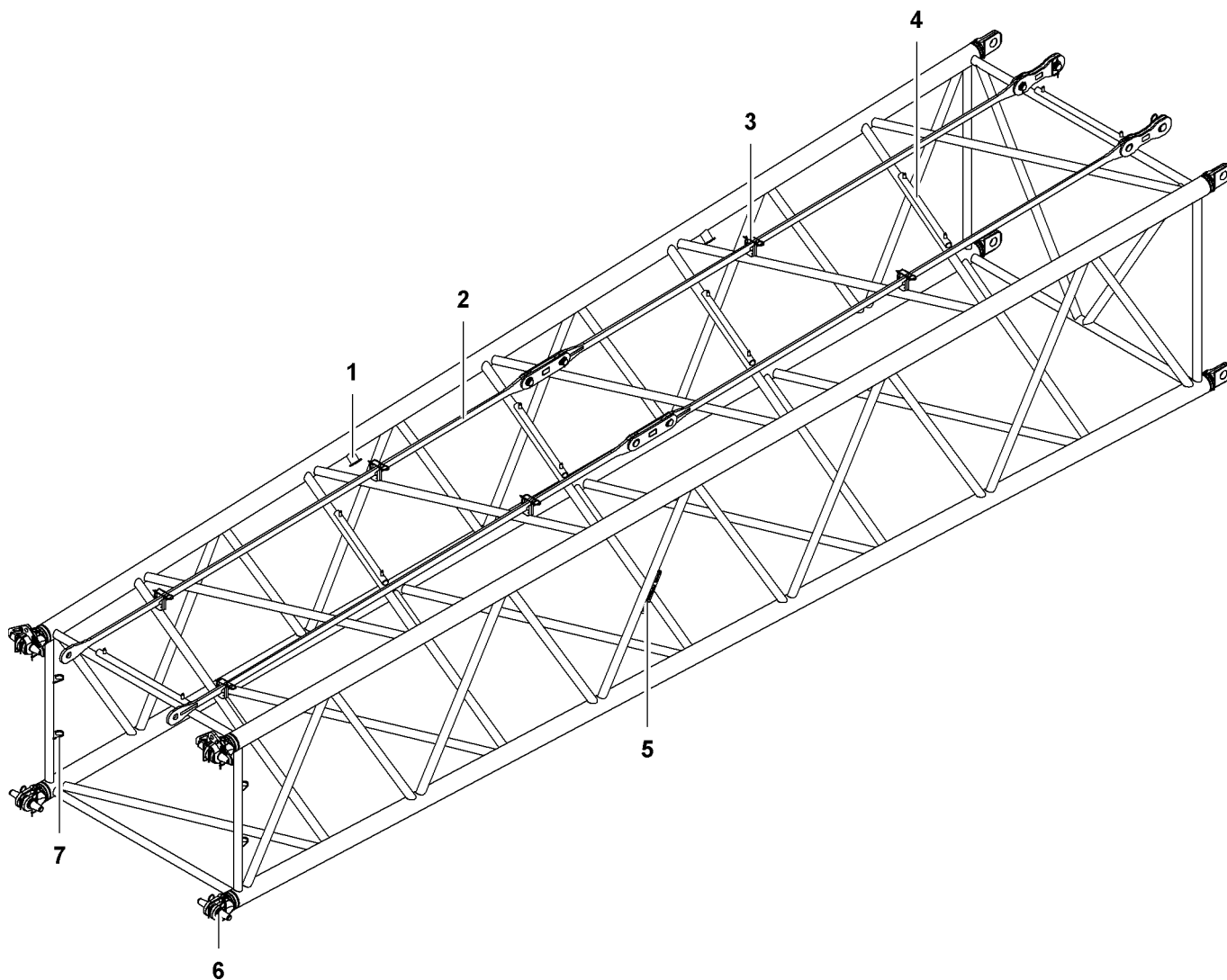


Fig. 55 2821/2316 reducing piece 40 ft

- |   |   |   |  |   |   |
|---|---|---|--|---|---|
| 1 | Lifting points (4x)                                       | 4 | Rope guard supports (6x)                               | 7 | Transport brackets (4x) for double-taper pins |
| 2 | Transport position of reducing piece pendant straps 40 ft | 5 | Boom identification plate                              |   |   |
| 3 | Transport brackets (6x) for pendant straps                | 6 | Pin connection points (8x) with double-taper pins (4x) |   |   |

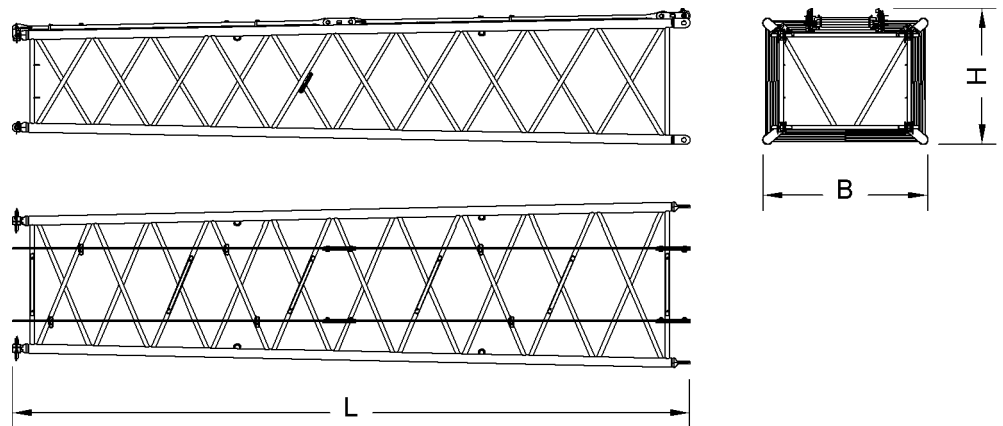


Fig. 56 Dimensions of 2821/2316 reducing piece 40 ft

Designation		Value
System length		39' 4" ft-in
System width		9' 2" ft-in/7' 6" ft-in
System height		6' 11" ft-in/5' 5" ft-in
L	Length	40' ft-in
B	Width	9' 9" ft-in
H	Height (incl. pendant straps)	8' 1" ft-in
Weight (incl. pendant straps)		8,003 lb
Double-taper pins Ø		3.15" in/2.56" in

Tab. 37 2821/2316 reducing piece technical data 40 ft

### 1.12.2 2316 boom section 3 ft

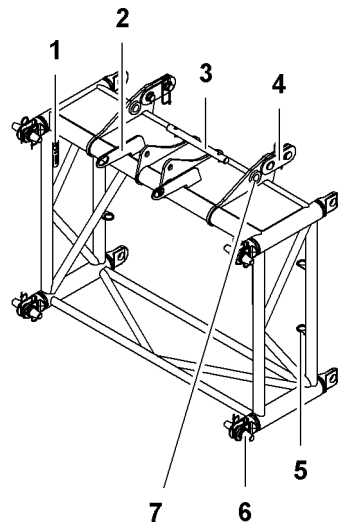


Fig. 57 2316 boom section 3 ft

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1 Boom identification plate</li> <li>2 Link plates (2x) for main boom pendant straps</li> <li>3 Rope protection support</li> <li>4 Connecting links (2x) for main boom pendant straps</li> </ul> | <ul style="list-style-type: none"> <li>5 Transport brackets (4x) for double-taper pins</li> <li>6 Pin connection points (8x) with double-taper pins (4x)</li> <li>7 Pin connection point for carbon-fibre pendant strap</li> </ul> |
|---|--|

LR1300 (steel pendant straps): Connecting links 4 are 7.87" in long and have a pin diameter of 2.17" in.

LR1300 (carbon-fibre pendant straps): Connecting links 4 are 1' 2" ft-in long and have a pin diameter of 2.36" in. The connecting links must be bolted to the pin connection points 7.

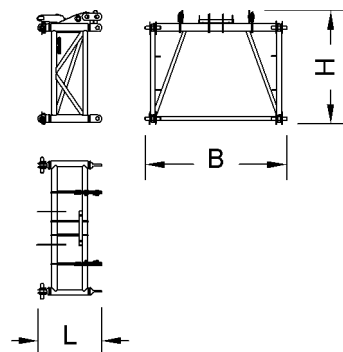


Fig. 58 Dimensions of 2316 boom section 3 ft

Designation	Value
System length	3' 3" ft-in

Designation		Value
System width		7' 6" ft-in
System height		5' 5" ft-in
L	Length	3' 9" ft-in
B	Width	8' ft-in
H	Height	6' 7" ft-in
Weight		1,415 lb
Double-taper pins Ø		2.56" in

Tab. 38 2316 boom section technical data 3 ft

## 1.13 Fixed jib - overview

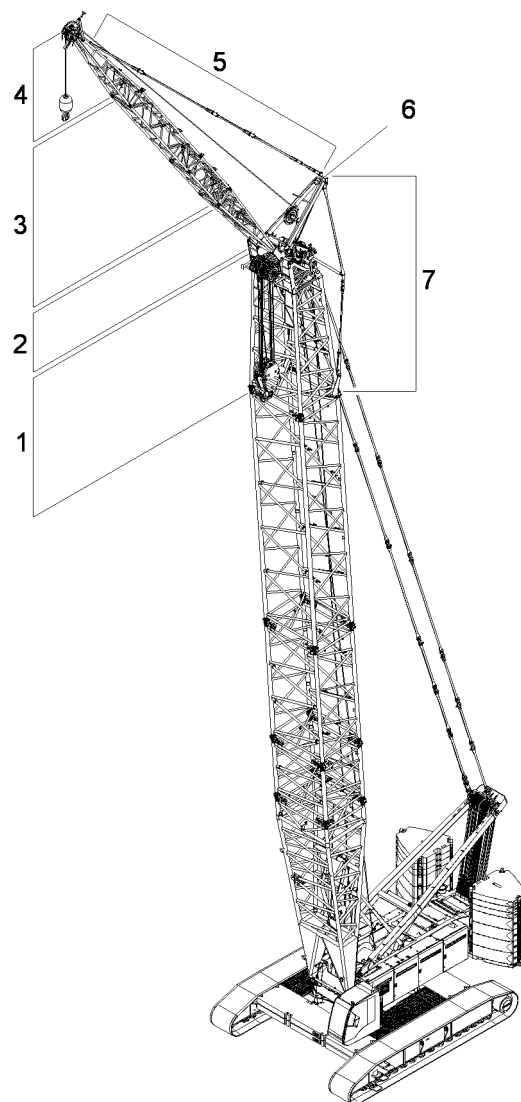


Fig. 59 Fixed jib - overview

- |   |                   |   |                     |
|---|-------------------|---|---------------------|
| 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 (10 ft, 20 ft, 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°.

## 1.14 1713 fixed jib

### 1.14.1 1713 jib base section

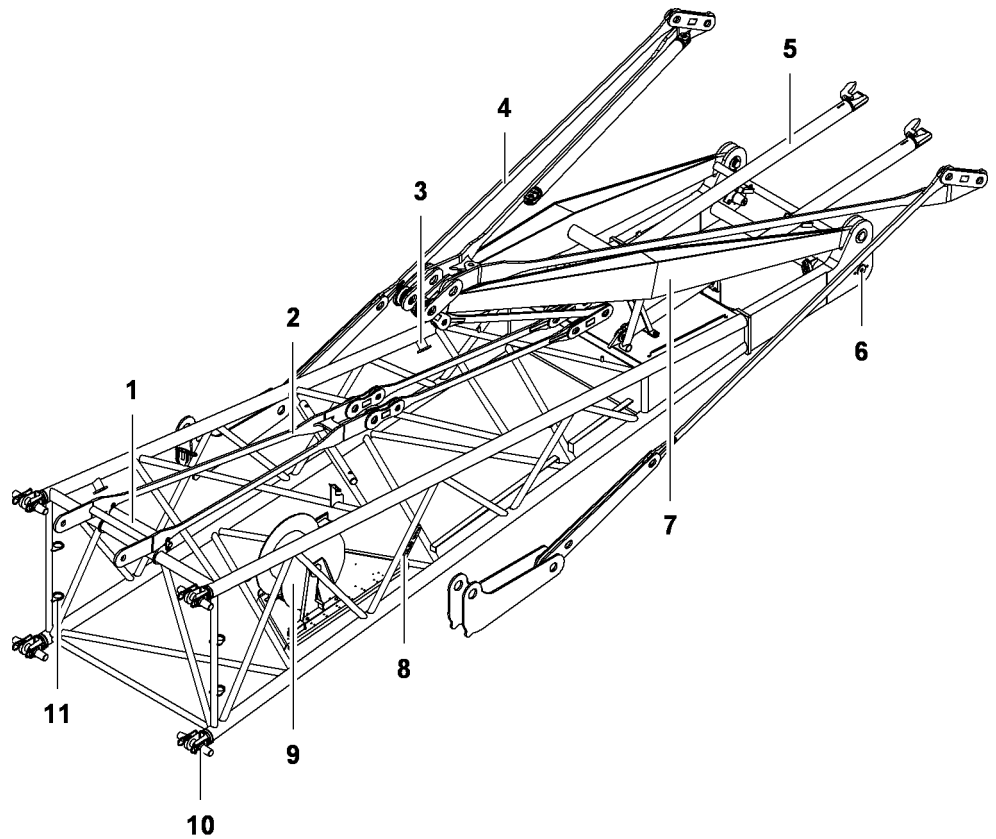


Fig. 60 1713 jib base section

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

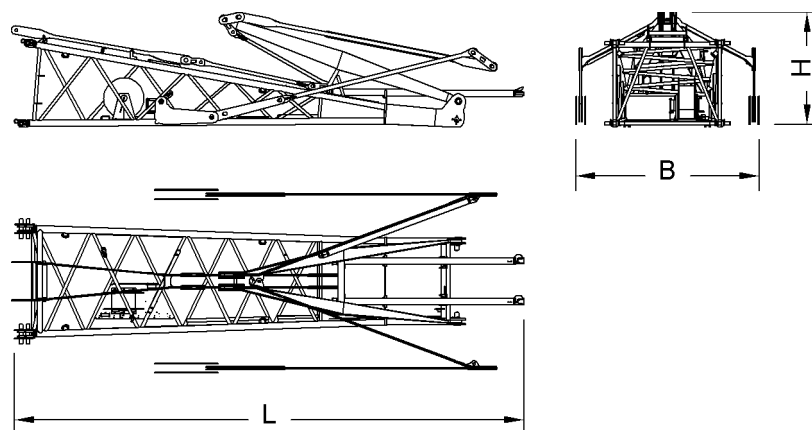


Fig. 61 Dimensions of jib base section 1713

Designation		Value
System length		23' ft-in
System width		5' 7" ft-in
System height		4' 3" ft-in
L	Length	31' 4" ft-in
B	Width	8' ft-in
H	Height	6' 3" ft-in
Weight (incl. pendant straps, tilting-back supports and backstay straps)		5,500 lb
Double-taper pins Ø		2.36" in

Tab. 39 1713 jib base section technical data



### 1.14.2 1713 jib section 10 ft

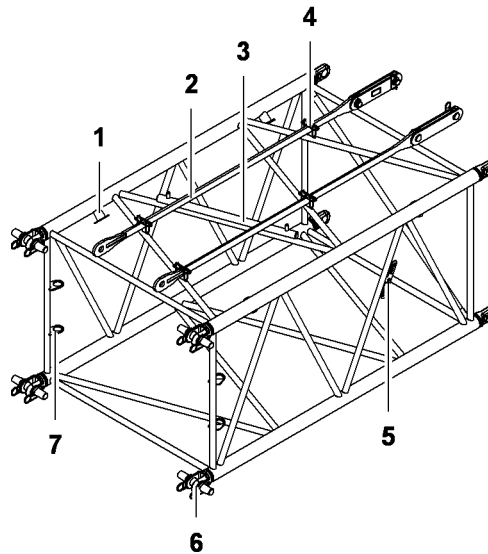


Fig. 62 1713 jib section 10 ft

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

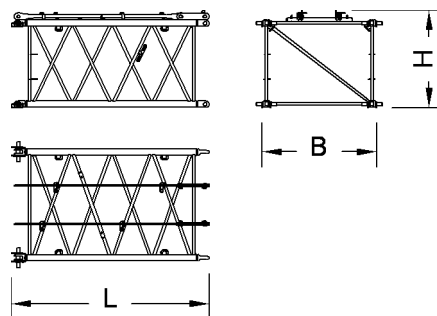


Fig. 63 Dimensions of 1713 jib section 10 ft

Designation		Value
System length		9' 10" ft-in
System width		5' 7" ft-in
System height		4' 3" ft-in
L	Length	10' 4" ft-in
B	Width	6' ft-in
H	Height (incl. pendant straps)	4' 11" ft-in
Weight (incl. pendant straps)		948 lb

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Designation	Value
Double-taper pins $\varnothing$	2.36" in

Tab. 40 Technical data for 1713 jib section 10 ft

### 1.14.3 1713 jib section 20 ft

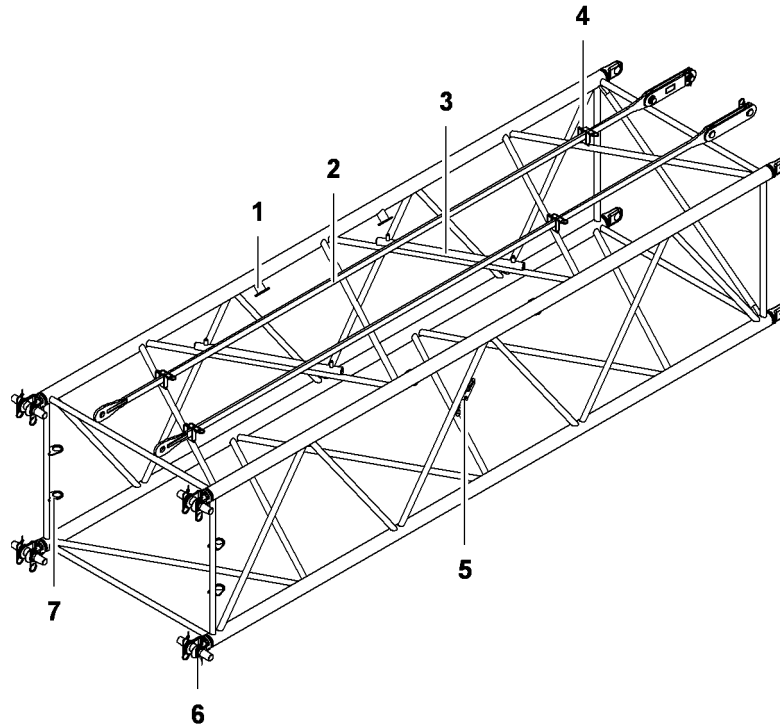


Fig. 64 1713 jib section 20 ft

- |   |   |   |  |
|---|---|---|--|
| 1 | Lifting points (4x)                                 | 5 | Boom identification plate                              |
| 2 | Transport position of jib pendant straps 20 ft (2x) | 6 | Pin connection points (8x) with double-taper pins (4x) |
| 3 | Rope protection supports (2x)                       | 7 | Transport brackets (4x) for double-taper pins          |
| 4 | Transport brackets (4x) for pendant straps          |   |  |

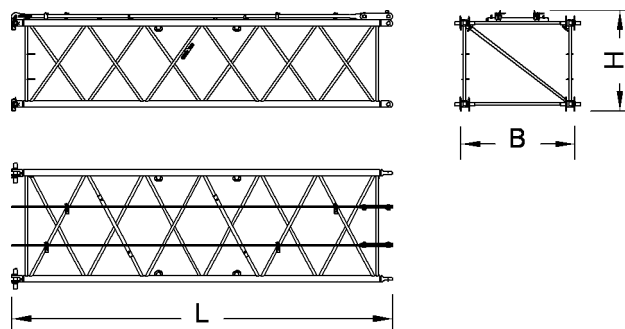


Fig. 65 Dimensions of 1713 jib section 20 ft

Designation		Value
System length		19' 8" ft-in
System width		5' 7" ft-in
System height		4' 3" ft-in
L	Length	20' 2" ft-in
B	Width	6' ft-in
H	Height (incl. pendant straps)	4' 11" ft-in
Weight (incl. pendant straps)		1,389 lb
Double-taper pins Ø		2.36" in

Tab. 41 Technical data for 1713 jib section 20 ft

### 1.14.4 1713 jib section 40 ft

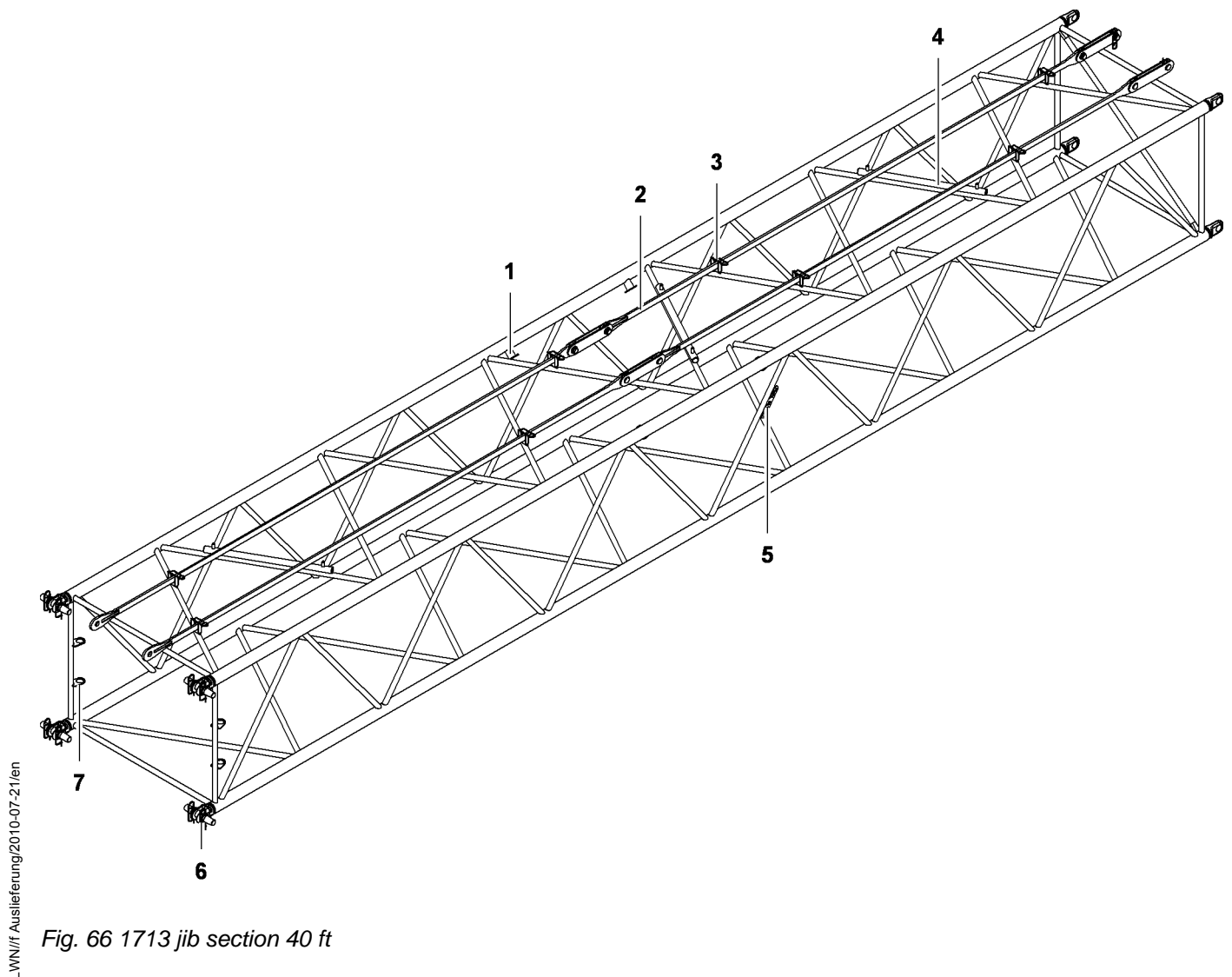


Fig. 66 1713 jib section 40 ft

- |   |   |   |                               |   |   |
|---|---|---|-------------------------------|---|---|
| 1 | Lifting points (4x)                                 | 4 | Rope protection supports (3x) | 7 | Transport brackets (4x) for double-taper pins |
| 2 | Transport position of jib pendant straps 40 ft (2x) | 5 | Boom identification plate     |   |   |

## Product description

1713 fixed jib

3 Transport brackets (8x) for pendant straps

6 Pin connection points (8x) with double-taper pins (4x)

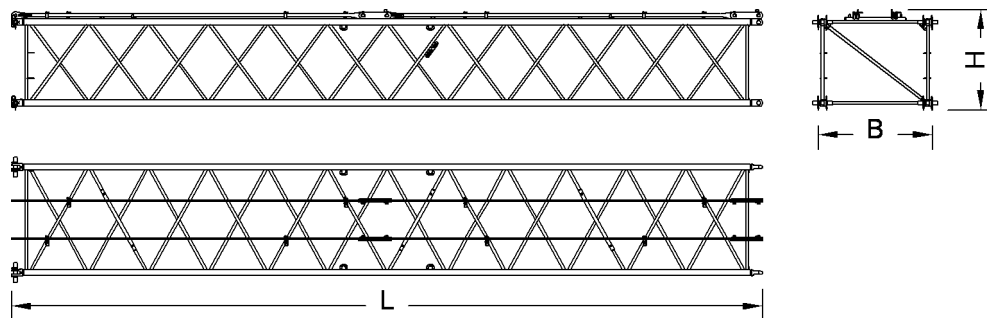


Fig. 67 Dimensions of 1713 jib section 40 ft

Designation		Value
System length		39' 4" ft-in
System width		5' 7" ft-in
System height		4' 3" ft-in
L	Length	39' 10" ft-in
B	Width	6' ft-in
H	Height (incl. pendant straps)	4' 11" ft-in
Weight (incl. pendant straps)		2,513 lb
Double-taper pins Ø		2.36" in

Tab. 42 Technical data for 1713 jib section 40 ft

### 1.14.5 1713 jib head section

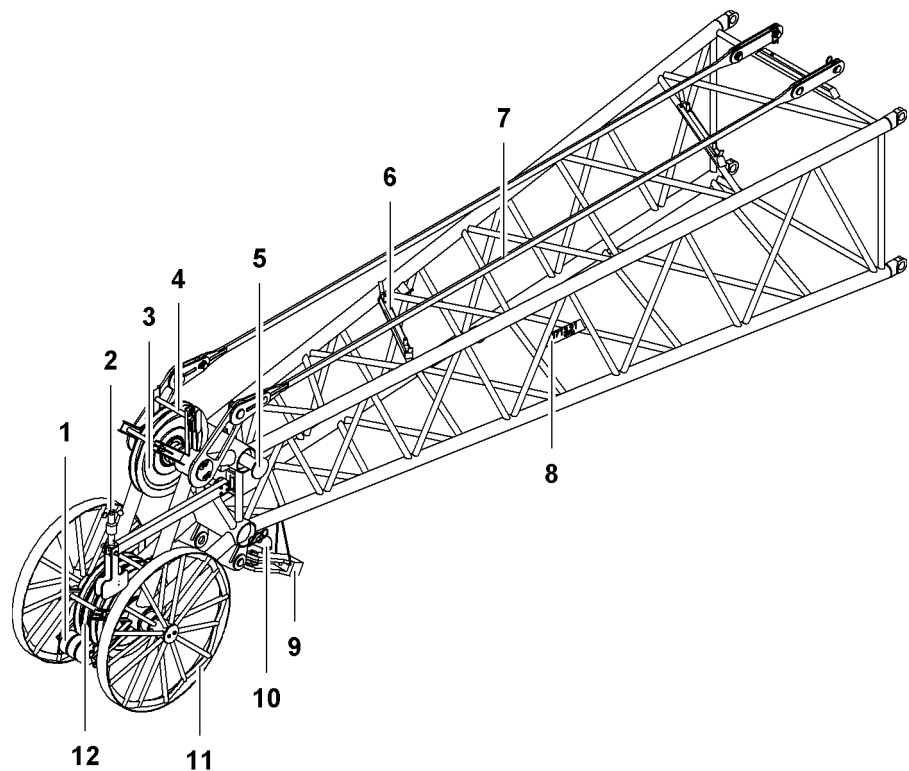


Fig. 68 1713 jib head section

- |   |                               |    |   |
|---|-------------------------------|----|---|
| 1 | Rope protection rollers (3x)  | 7  | Transport position of jib pendant straps (2x) |
| 2 | Anemometer                    | 8  | Boom identification plate                     |
| 3 | Gantry pulley                 | 9  | Rope fixation                                 |
| 4 | Rope protection pipes (2x)    | 10 | Hoist limit switches (2x)                     |
| 5 | Lifting points (4x)           | 11 | Wheels (2x)                                   |
| 6 | Rope protection supports (2x) | 12 | Rope pulleys (3x)                             |

This jib head section is designed to allow an auxiliary jib to be attached ([For more information see: 1.26 Auxiliary jib\\* \(33.000 lb\), page 149](#)).

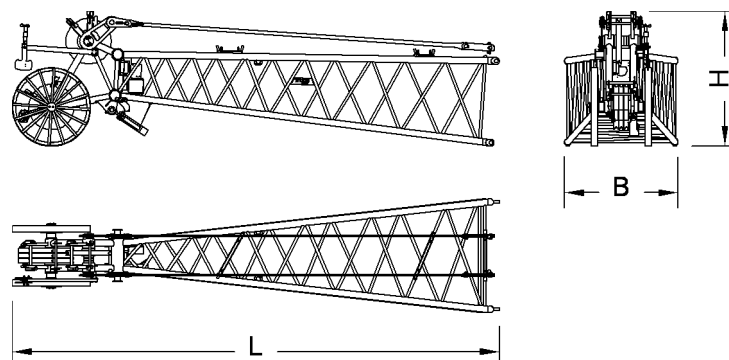


Fig. 69 1713 jib head section dimensions

Designation		Value
System length		23' ft-in
System width		5' 7" ft-in
System height		4' 3" ft-in
L	Length	25' 5" ft-in
B	Width	6' ft-in
H	Height (incl. pendant straps)	7' 1" ft-in
Weight (incl. pendant straps)		2,983 lb

*Tab. 43 1713 jib head section, technical data*

## 1.15 1507 fixed jib

### 1.15.1 Fly jib 1507

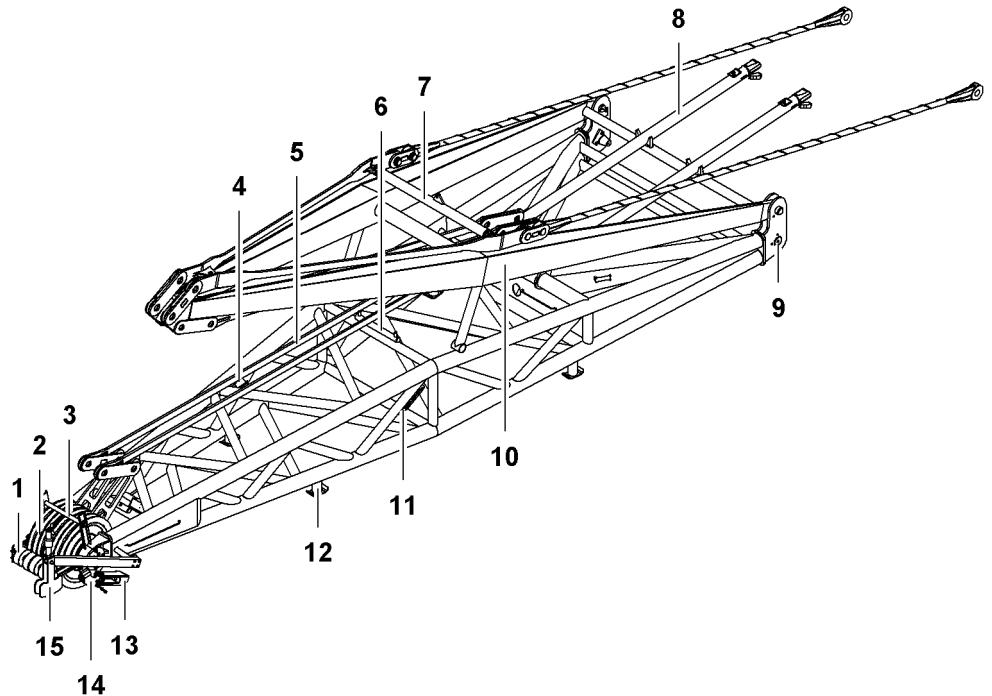


Fig. 70 Fly jib 1507

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

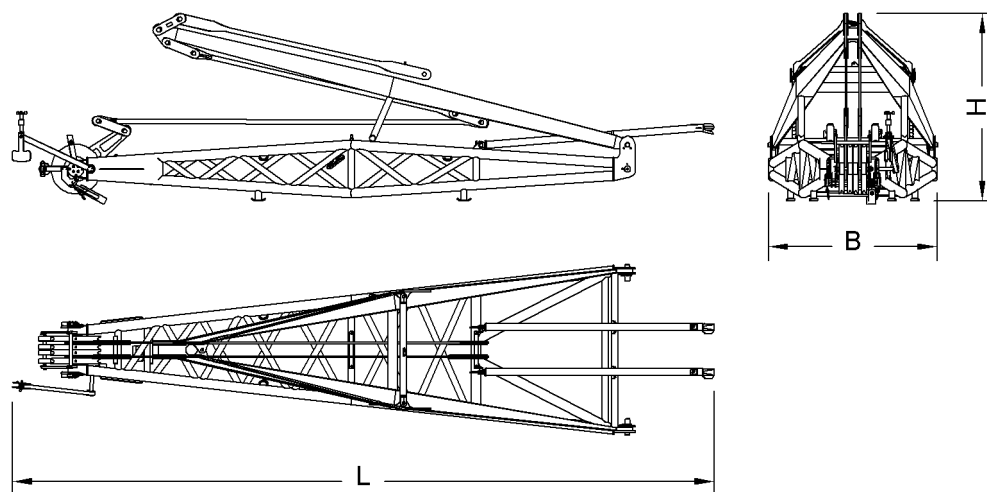


Fig. 71 Dimensions of 1507 jib

Designation		Value
System length		26' 3" ft-in
System width		4' 11" ft-in
System height		2' 4" ft-in
L	Length	33' 5" ft-in
B	Width	8' 1" ft-in
H	Height	8' 11" ft-in
Weight (incl. pendant straps, tilting-back supports and backstay straps)		6,664 lb

Tab. 44 Technical data fly jib 1507



## 1.16 1008 fixed jib

### 1.16.1 1008 jib base section

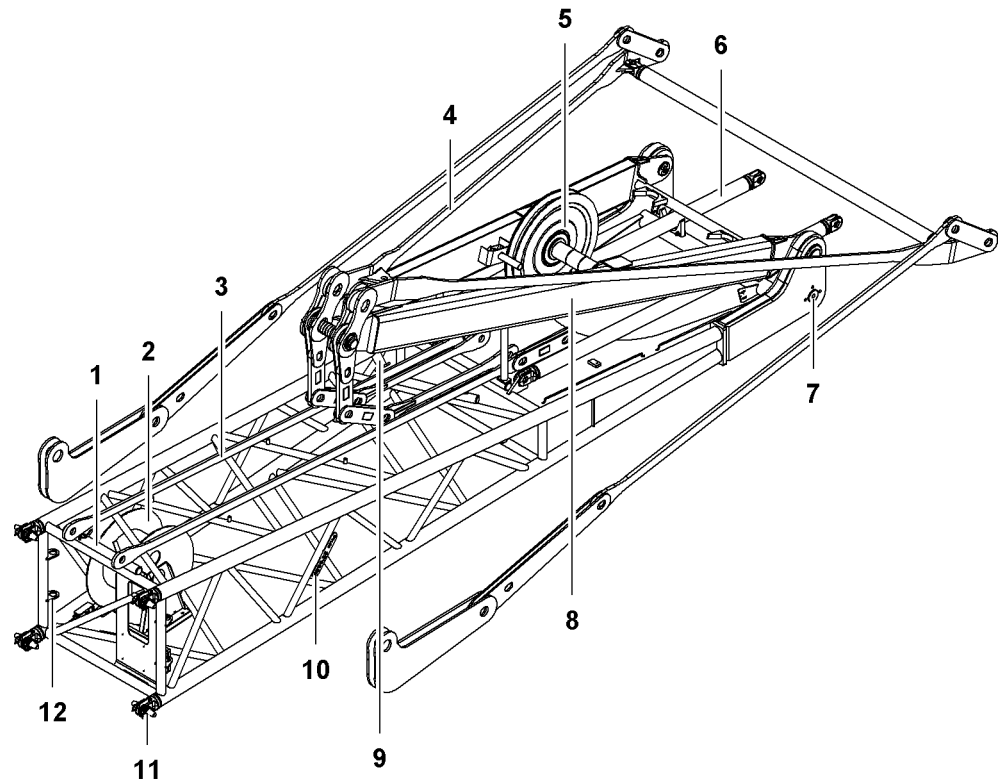


Fig. 72 1008 jib base section

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

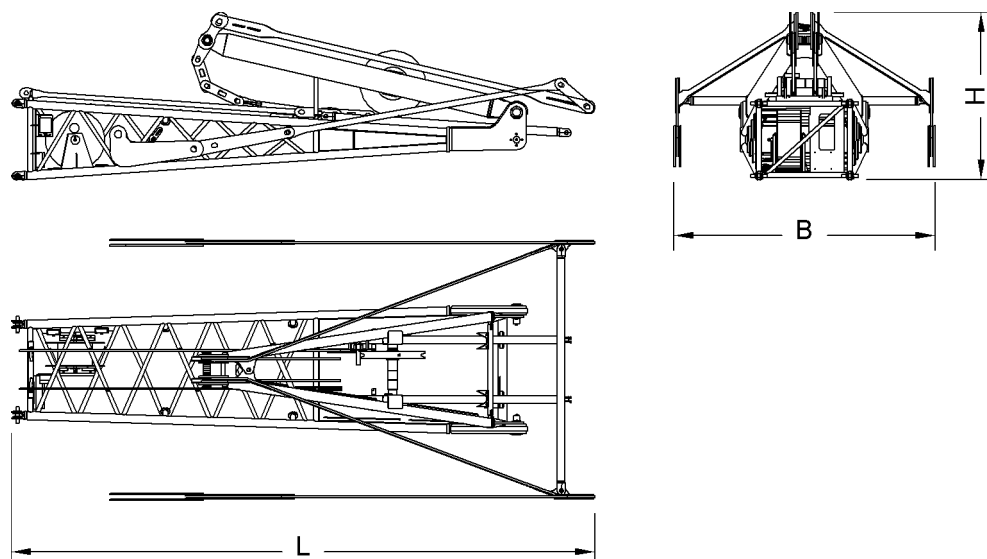


Fig. 73 Dimensions of jib base section 1008

Designation		Value
System length		18' 1" ft-in
System width		3' 3" ft-in
System height		2' 7" ft-in
L	Length	21' 9" ft-in
B	Width	7' 3" ft-in
H	Height	6' 1" ft-in
Weight (incl. pendant straps, tilting-back supports and backstay straps)		4,299 lb
Double-taper pins Ø		1.57" in

Tab. 45 1008 jib base section technical data

### 1.16.2 1008 jib section 10 ft

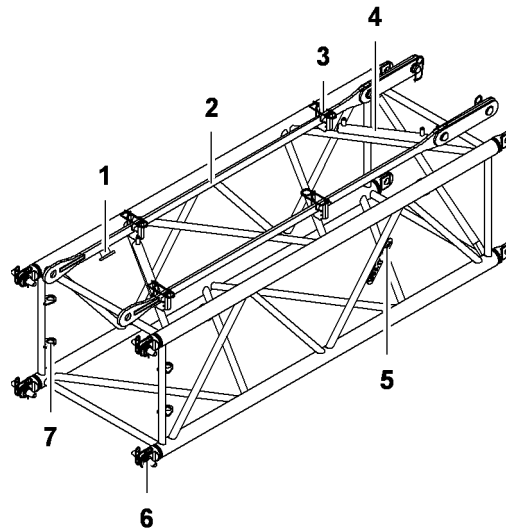


Fig. 74 1008 jib section 10 ft

- |   |   |   |  |
|---|---|---|--|
| 1 | Lifting points (4x)                                 | 5 | Boom identification plate                              |
| 2 | Transport position of jib pendant straps 10 ft (2x) | 6 | Pin connection points (8x) with double-taper pins (4x) |
| 3 | Transport brackets (4x) for pendant straps          | 7 | Transport brackets (4x) for double-taper pins          |
| 4 | Rope protection supports (2x)                       |   |  |

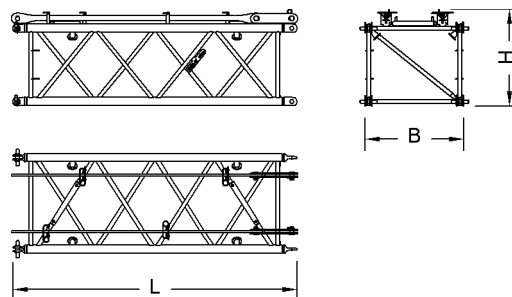


Fig. 75 Dimensions of 1008 jib section 10 ft

Designation		Value
System length		9' 10" ft-in
System width		3' 3" ft-in
System height		2' 7" ft-in
L	Length	10' 3" ft-in
B	Width	3' 7" ft-in
H	Height (incl. pendant straps)	3' 4" ft-in
Weight (incl. pendant straps)		661 lb

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Designation	Value
Double-taper pins $\varnothing$	1.57" in

Tab. 46 Technical data for 1008 jib section 10 ft

### 1.16.3 1008 jib section 20 ft

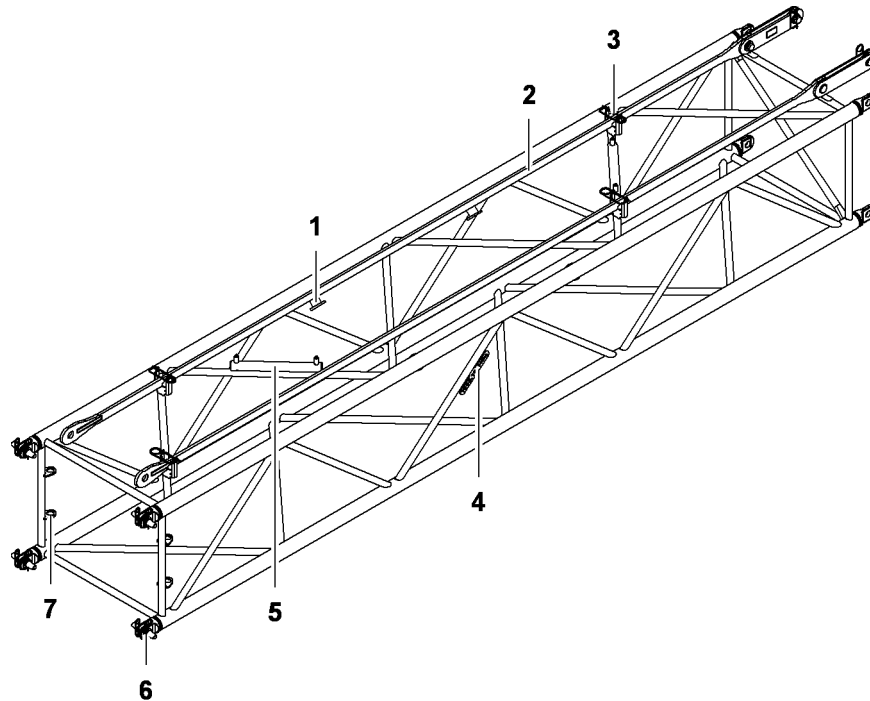


Fig. 76 1008 jib section 20 ft

- |   |  |
|---|--|
| 1 Lifting points (4x)                                 | 5 Rope protection supports (2x)                          |
| 2 Transport position of jib pendant straps 20 ft (2x) | 6 Pin connection points (8x) with double-taper pins (4x) |
| 3 Transport brackets (4x) for pendant straps          | 7 Transport brackets (4x) for double-taper pins          |
| 4 Boom identification plate                           |  |

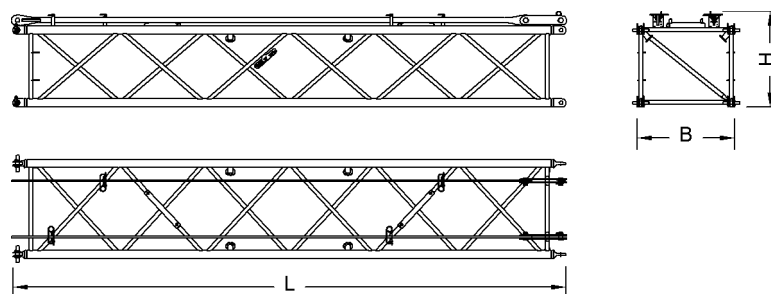


Fig. 77 Dimensions of 1008 jib section 20 ft

Designation	Value
System length	19' 8" ft-in

Designation		Value
System width		3' 3" ft-in
System height		2' 7" ft-in
L	Length	20' 1" ft-in
B	Width	3' 7" ft-in
H	Height (incl. pendant straps)	3' 4" ft-in
Weight (incl. pendant straps)		1,003 lb
Double-taper pins Ø		1.57" in

Tab. 47 Technical data for 1008 jib section 20 ft

### 1.16.4 1008 jib head section

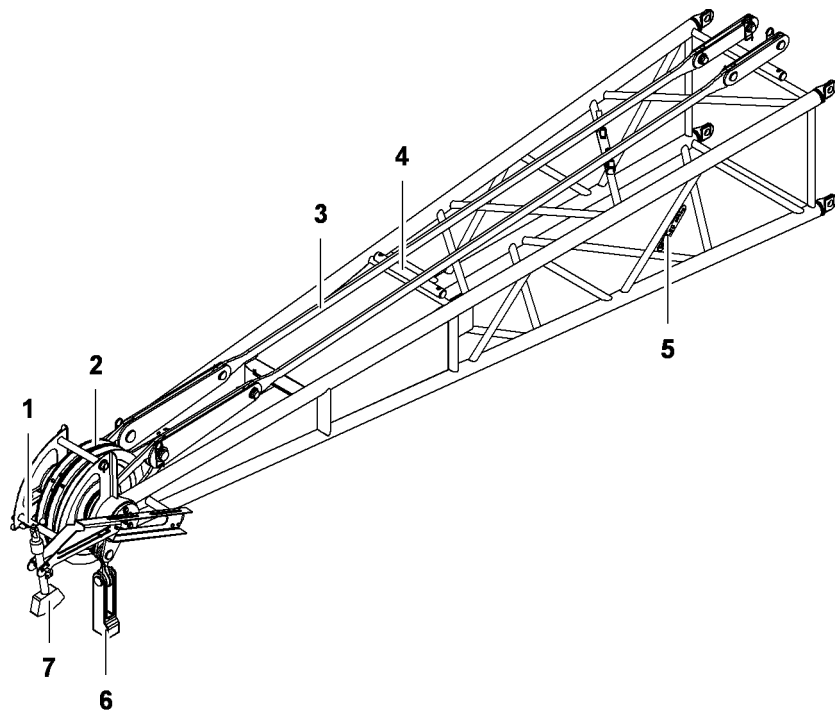


Fig. 78 1008 jib head section

- |   |   |   |                           |
|---|---|---|---------------------------|
| 1 | Rope protection pipes (2x)                    | 5 | Boom identification plate |
| 2 | Pulleys (2x)                                  | 6 | Rope fixation             |
| 3 | Transport position of jib pendant straps (2x) | 7 | Anemometer                |
| 4 | Rope protection supports (2x)                 |   |                           |

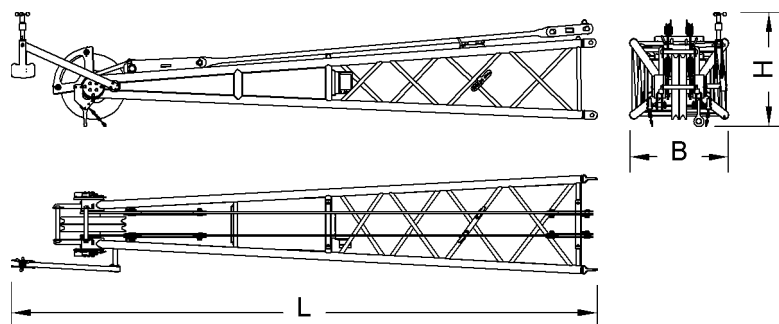


Fig. 79 1008 jib head section dimensions

Designation		Value
System length		18' 1" ft-in
System width		3' 3" ft-in
System height		2' 7" ft-in
L	Length	21' 4" ft-in
B	Width	3' 7" ft-in
H	Height	3' 4" ft-in
Weight (incl. pendant straps)		2,028 lb

Tab. 48 1008 jib head section, technical data

## 1.17 0906 fixed jib

### 1.17.1 Jib 0906

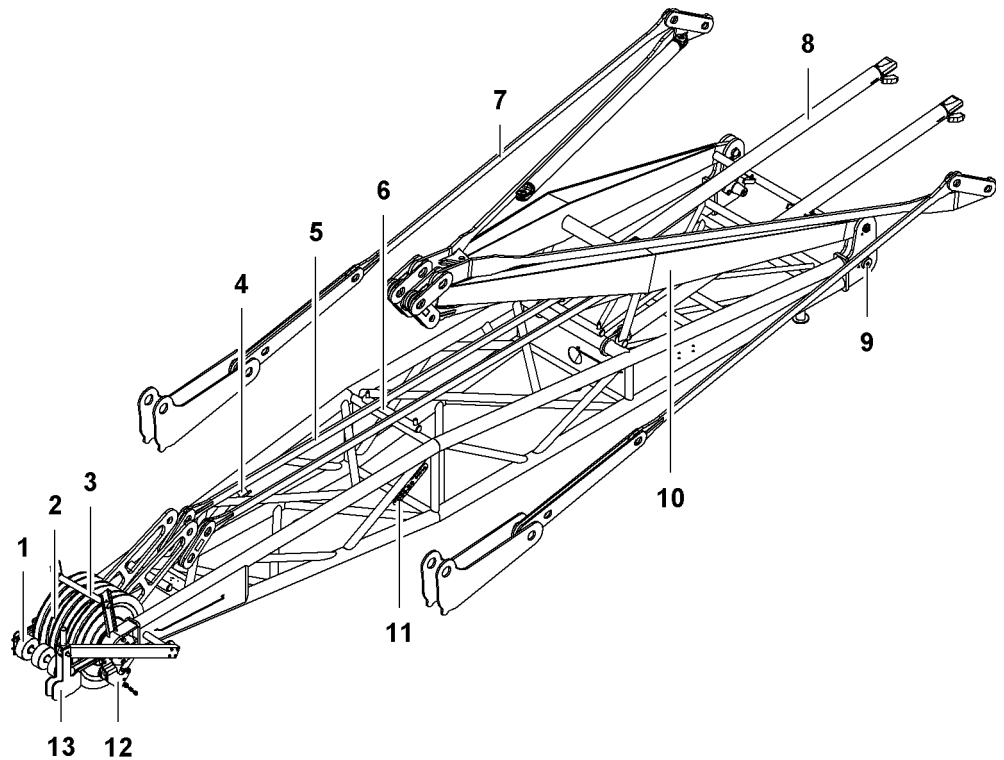


Fig. 80 Jib 0906

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

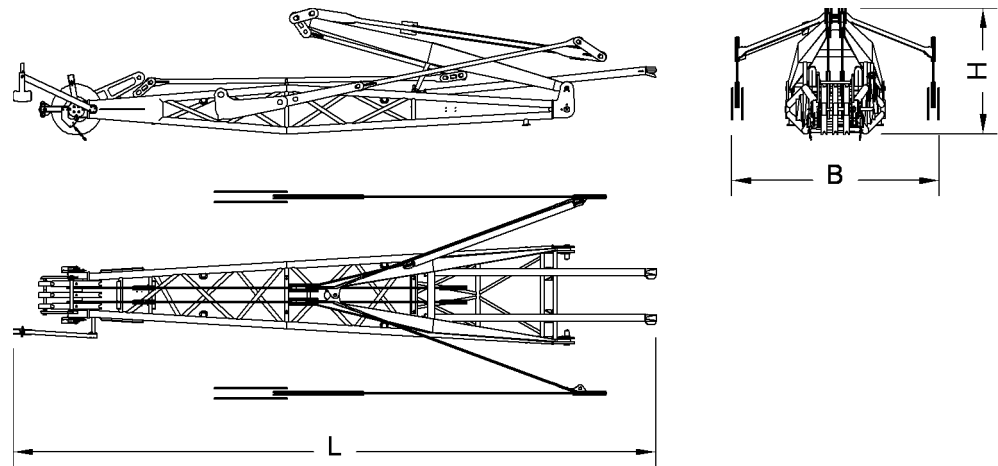


Fig. 81 0906 jib dimensions

Designation		Value
System length		23' ft-in
System width		2' 11" ft-in
System height		2' ft-in
L	Length	30' 2" ft-in
B	Width	9' 9" ft-in
H	Height	5' 11" ft-in
Weight (incl. pendant straps, tilting-back supports and backstay straps)		5,265 lb

Tab. 49 Jib 0906, technical data



## 1.18 Luffing jib - overview

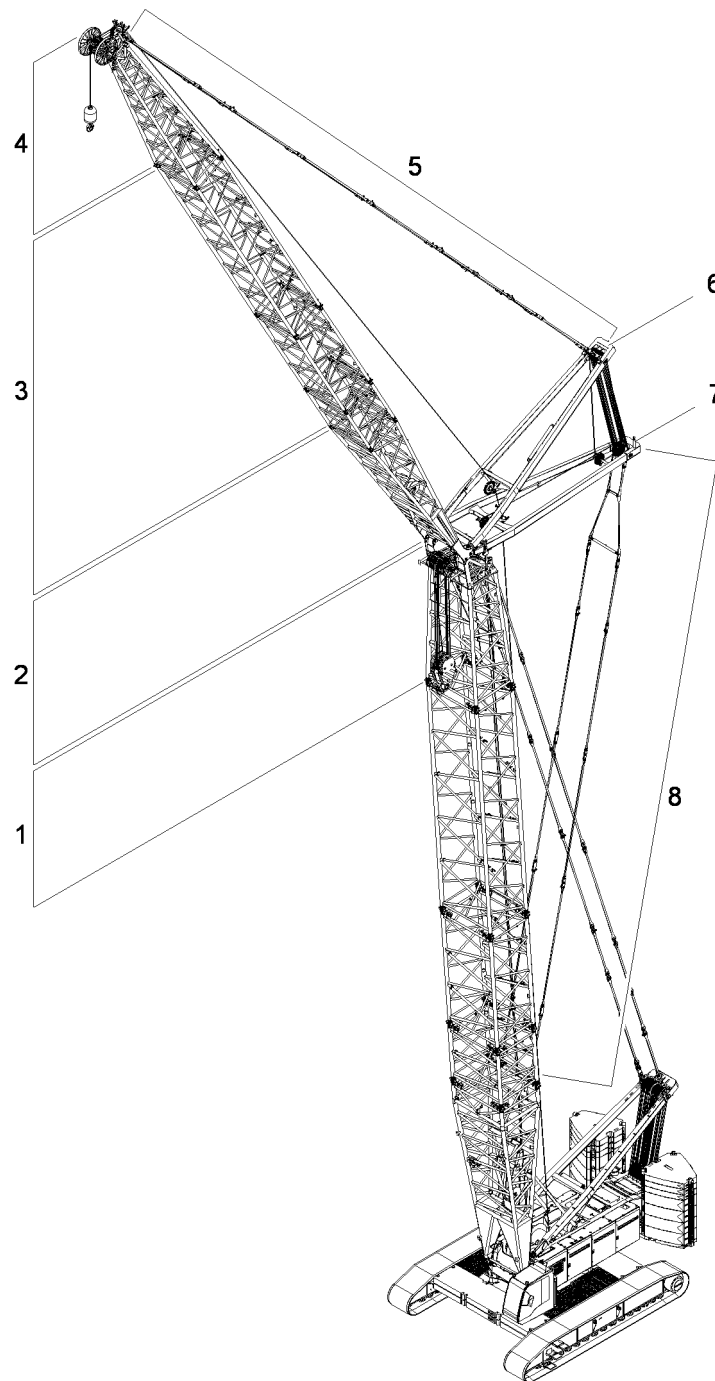


Fig. 82 Luffing jib - overview

- |   |                   |   |                     |
|---|-------------------|---|---------------------|
| 1 | Boom head section | 5 | Jib pendant straps  |
| 2 | Jib base section  | 6 | A-frame 3           |
| 3 | Jib sections      | 7 | A-frame 2           |
| 4 | Jib head section  | 8 | Jib backstay straps |

The luffing jib is composed of:

- Jib base section 2

## Product description

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### Luffing jib - overview

- Jib sections (10 ft, 20 ft, 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.

## 1.19 2316 luffing jib

### 1.19.1 2316 jib base section

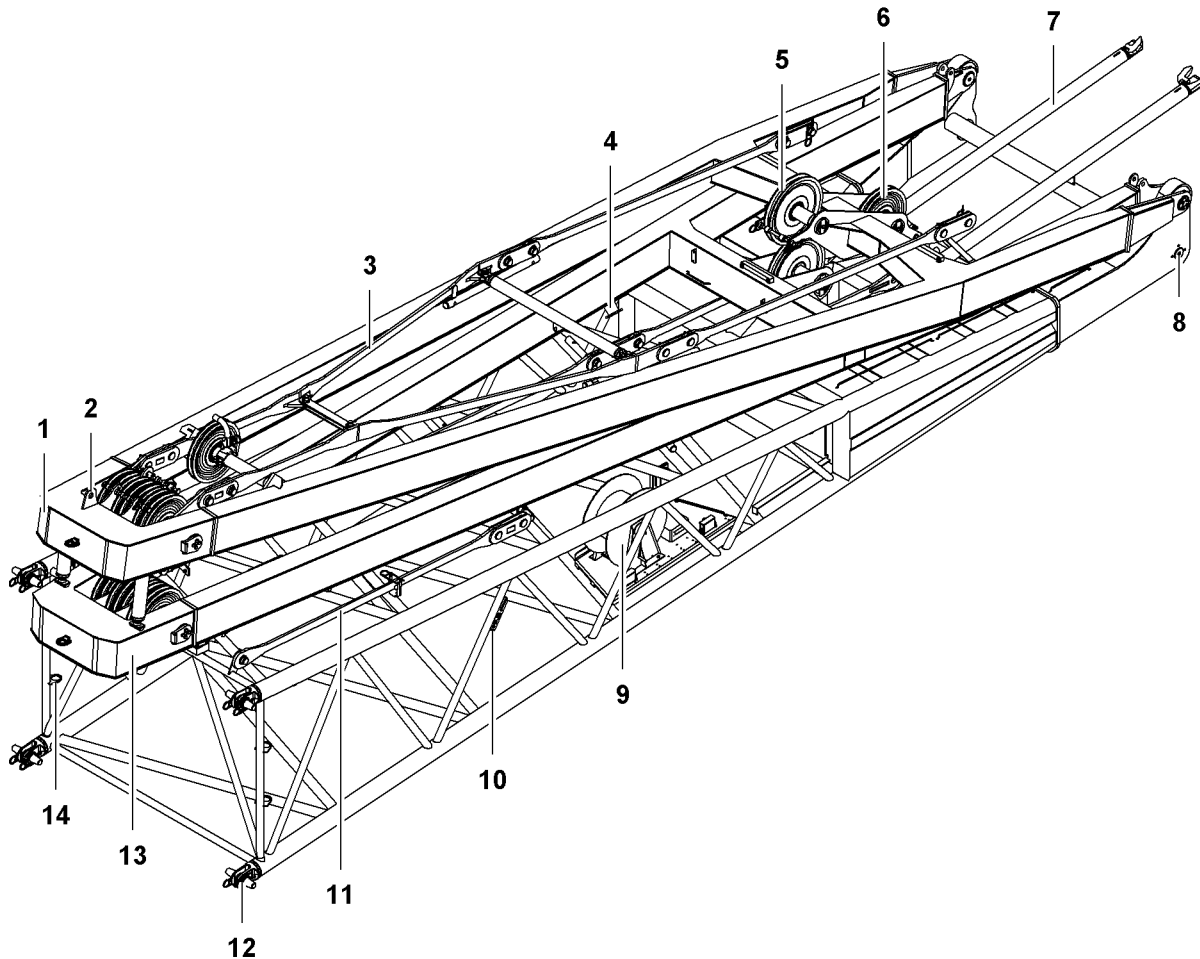


Fig. 83 2316 jib base section

- |   |   |    |   |    |  |
|---|---|----|---|----|--|
| 1 | A-frame 2   | 6  | Pulleys (2x) for jib luffing rope       | 11 | Transport position of the equalizer on A-frame 3 (jib pendant strap) |
| 2 | Pull strap  | 7  | Rigid tilting-back supports (2x)        | 12 | Pin connection points (4x) with double-taper pins (4x)               |
| 3 | Transport position of the equalizer on A-frame 2 (jib backstay strap) | 8  | Pivot points (2x) for boom head section | 13 | A-frame 3  |
| 4 | Lifting points (4x)   | 9  | Cable drum                              | 14 | Transport brackets (4x) for double-taper pins                        |
| 5 | Pulleys (2x) for hoist rope   | 10 | Boom identification plate               |    |  |

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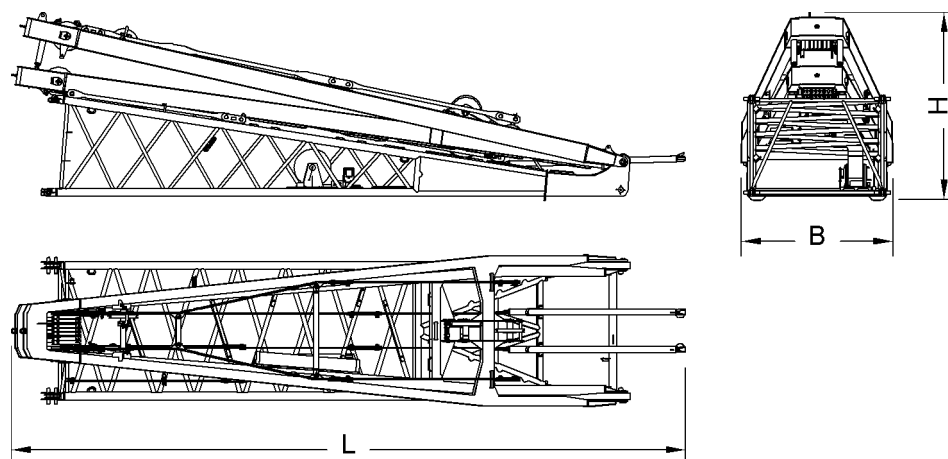


Fig. 84 Dimensions of jib base section 2316

Designation		Value
System length		32' 10" ft-in
System width		7' 6" ft-in
System height		5' 5" ft-in
L	Length	38' 5" ft-in
B	Width	8' 9" ft-in
H	Height	10' 10" ft-in
Weight (incl. pendant straps, tilting-back supports and backstay straps)		17,769 lb
Double-taper pins Ø		2.56" in

Tab. 50 2316 jib base section technical data

### 1.19.2 2316 jib section 10 ft

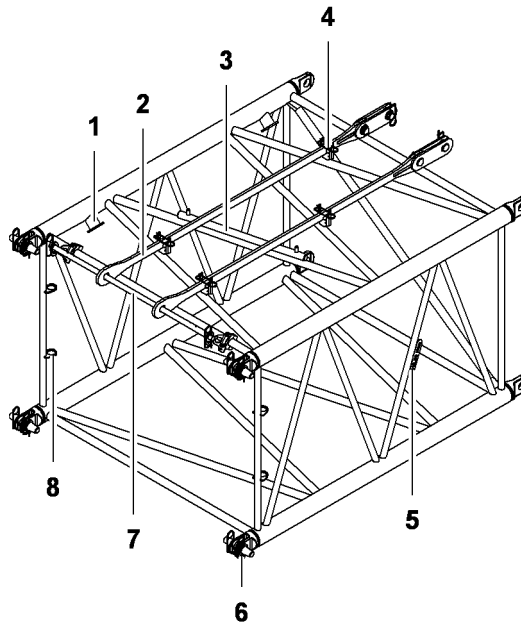


Fig. 85 2316 jib section 10 ft

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

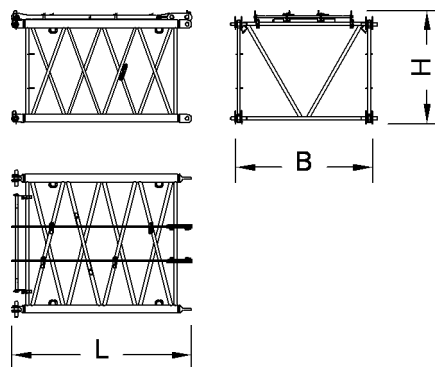


Fig. 86 Dimensions of 2316 jib section 10 ft

Designation		Value
System length		9' 10" ft-in
System width		7' 6" ft-in
System height		5' 5" ft-in
L	Length	10' 4" ft-in

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Designation		Value
B	Width	8' ft-in
H	Height (incl. pendant straps)	6' 3" ft-in
Weight (incl. pendant straps)		1,323 lb
Double-taper pins Ø		2.56" in

Tab. 51 Technical data for 2316 jib section 10 ft

### 1.19.3 2316 jib section 20 ft

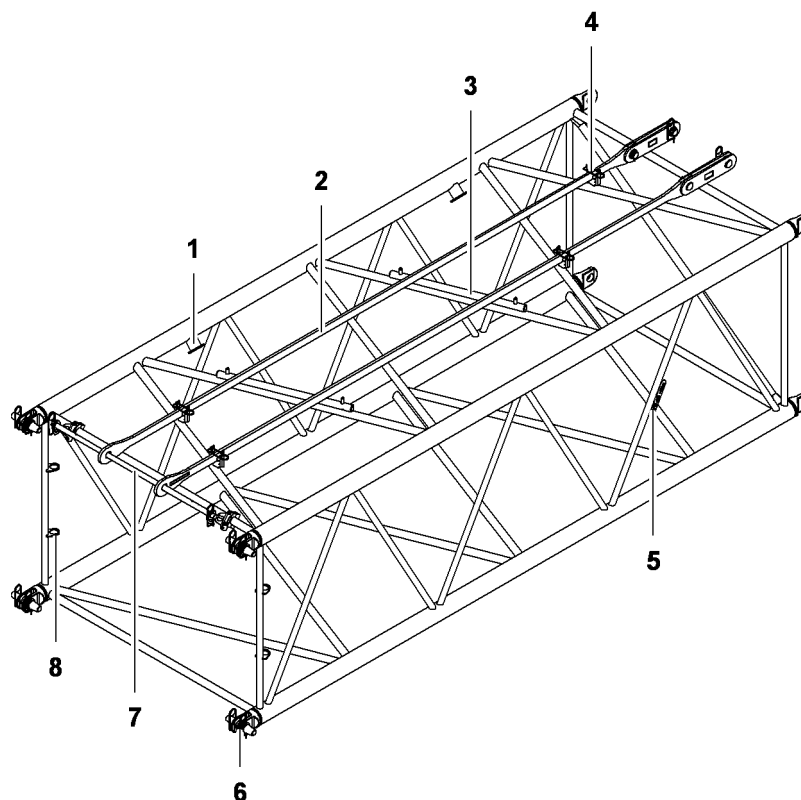


Fig. 87 2316 jib section 20 ft

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

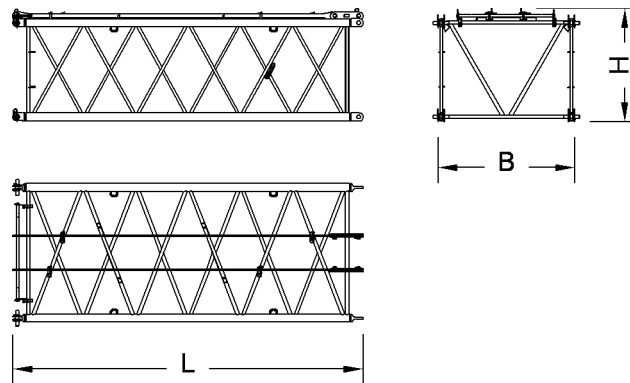


Fig. 88 Dimensions of 2316 jib section 20 ft

Designation		Value
System length		19' 8" ft-in
System width		7' 6" ft-in
System height		5' 5" ft-in
<b>L</b>	Length	20' 2" ft-in
<b>B</b>	Width	8' ft-in
<b>H</b>	Height (incl. pendant straps)	6' 3" ft-in
Weight (incl. pendant straps)		2,094 lb
Double-taper pins Ø		2.56" in

Tab. 52 Technical data for 2316 jib section 20 ft

### 1.19.4 2316 jib section 40 ft

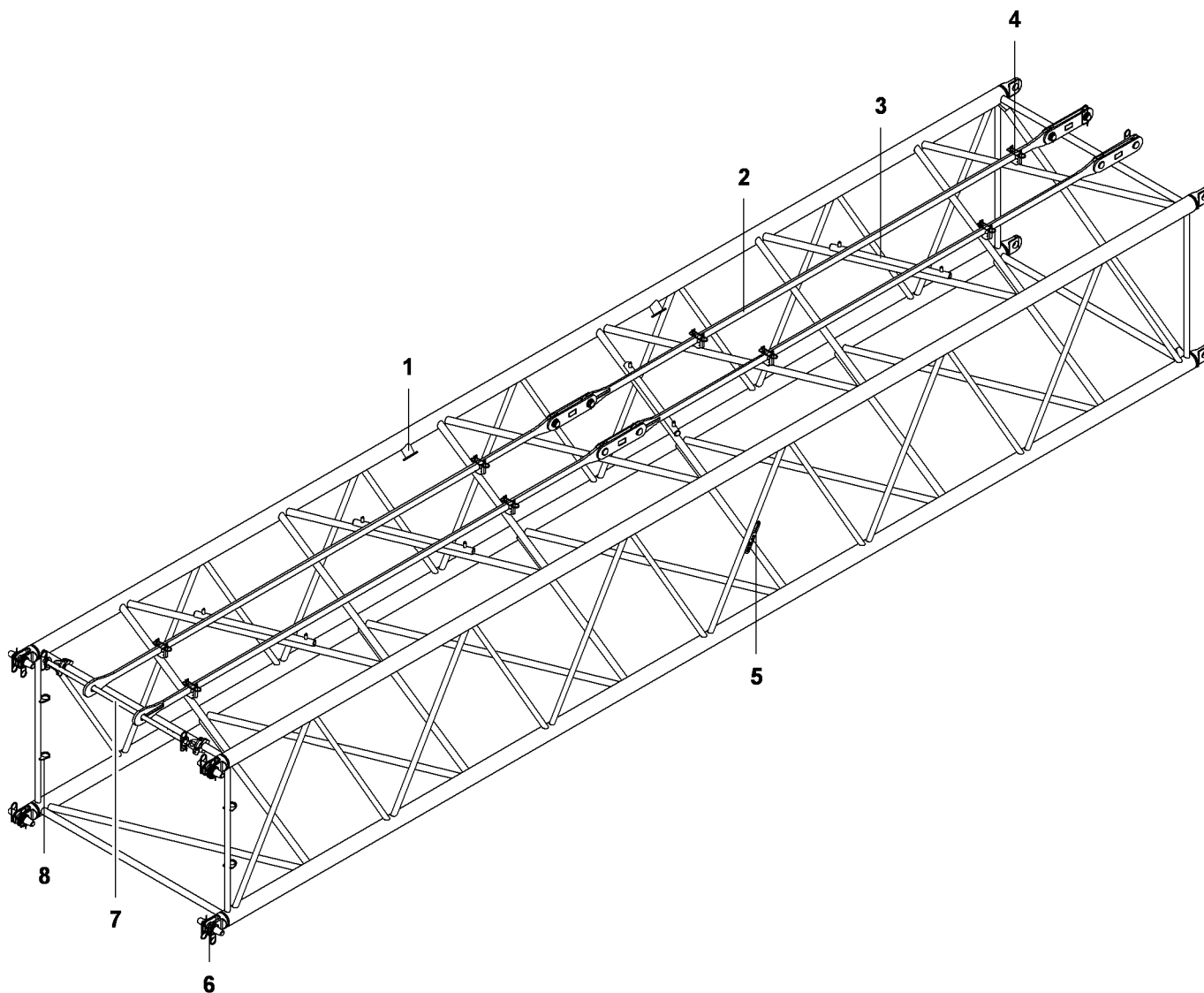


Fig. 89 2316 jib section 40 ft

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



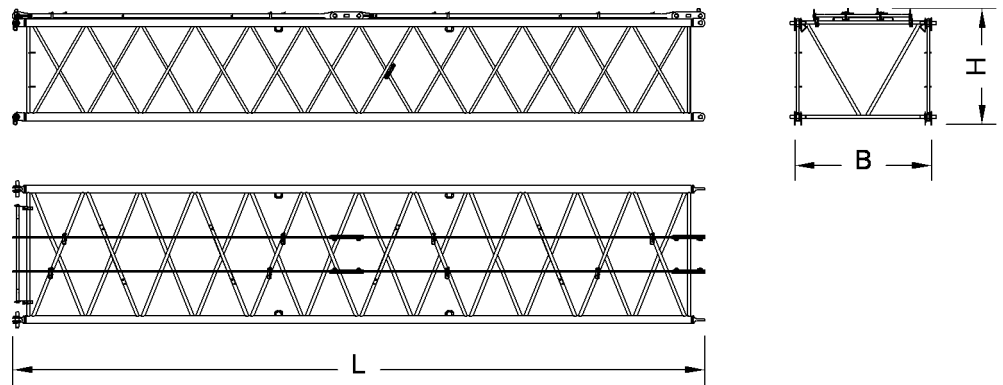


Fig. 90 Dimensions of 2316 jib section 40 ft

Designation		Value
System length		39' 4" ft-in
System width		7' 6" ft-in
System height		5' 5" ft-in
<b>L</b>	Length	39' 10" ft-in
<b>B</b>	Width	8' ft-in
<b>H</b>	Height (incl. pendant straps)	6' 3" ft-in
Weight (incl. pendant straps)		3,858 lb
Double-taper pins Ø		2.56" in

Tab. 53 Technical data for 2316 jib section 40 ft

### 1.19.5 2316 jib head section

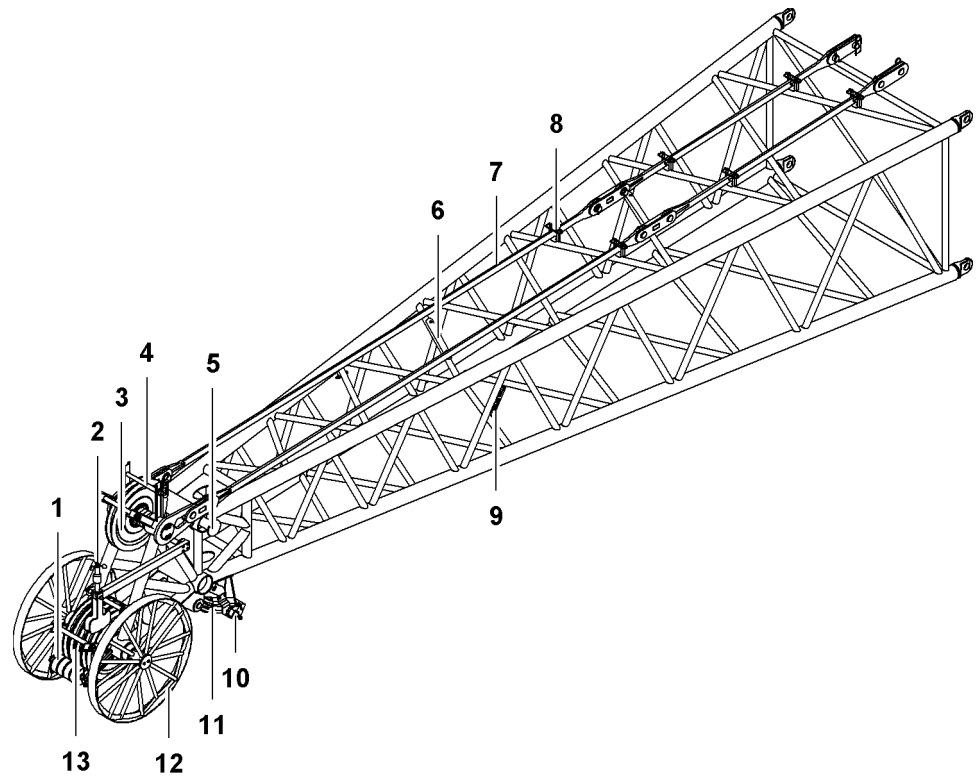


Fig. 91 2316 jib head section

- |   |   |    |  |
|---|---|----|--|
| 1 | Rope protection rollers (4x)                  | 8  | Transport brackets (6x) for pendant straps |
| 2 | Anemometer                                    | 9  | Boom identification plate                  |
| 3 | Gantry pulley                                 | 10 | Hoist limit switches (2x)                  |
| 4 | Rope protection pipes (2x)                    | 11 | Rope fixation                              |
| 5 | Lifting points (4x)                           | 12 | Wheels (2x)                                |
| 6 | Rope protection supports (2x)                 | 13 | Pulleys (4x)                               |
| 7 | Transport position of jib pendant straps (2x) |    |  |

This jib head section is designed to allow an auxiliary jib to be attached ([For more information see: 1.25 Auxiliary jib\\* \(66.000 lb\), page 147](#)).

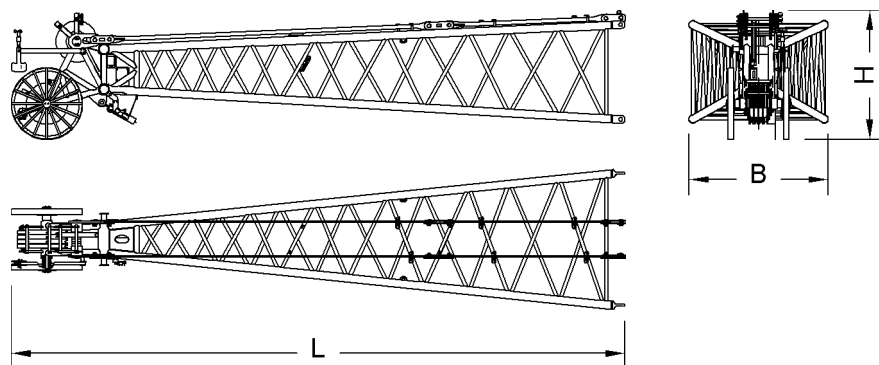


Fig. 92 2316 jib head section dimensions

Designation		Value
System length		32' 10" ft-in
System width		7' 6" ft-in
System height		5' 5" ft-in
<b>L</b>	Length	35' 3" ft-in
<b>B</b>	Width	8' ft-in
<b>H</b>	Height	7' 2" ft-in
Weight (incl. pendant straps)		5,004 lb

Tab. 54 2316 jib head section, technical data

## 1.20 1916 luffing jib

### 1.20.1 1916 jib base section

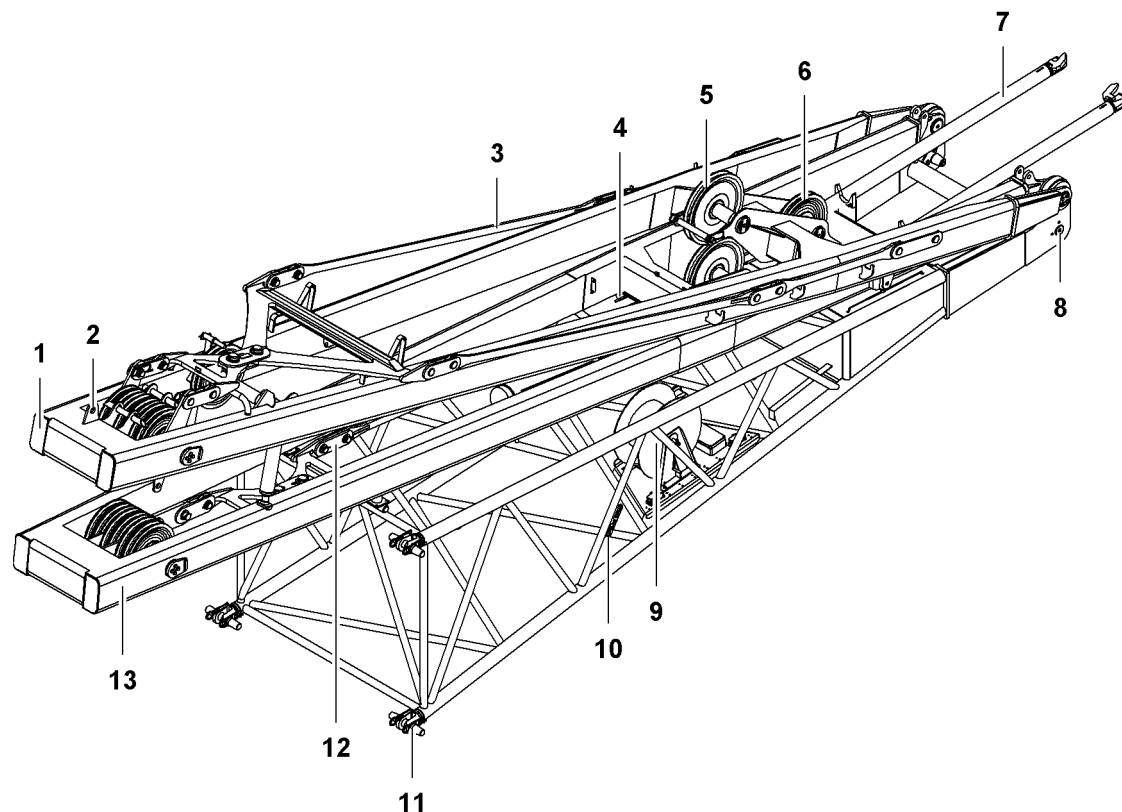


Fig. 93 1916 jib base section

- |   |   |    |   |    |  |
|---|---|----|---|----|--|
| 1 | A-frame 2   | 6  | Pulleys (2x) for jib luffing rope (2x)  | 11 | Pin connection points (4x) with double-taper pins (4x)               |
| 2 | Pull strap  | 7  | Rigid tilting-back supports (2x)        | 12 | Transport position of the equalizer on A-frame 3 (jib pendant strap) |
| 3 | Transport position of the equalizer on A-frame 2 (jib backstay strap) | 8  | Pivot points (2x) for boom head section | 13 | A-frame 3  |
| 4 | Lifting points (4x)   | 9  | Cable drum                              |    |  |
| 5 | Pulleys (2x) for hoist rope   | 10 | Boom identification plate               |    |  |

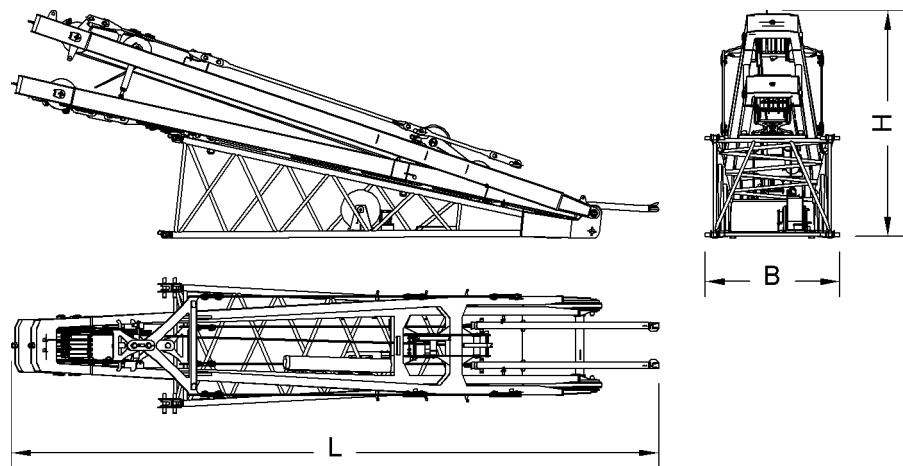


Fig. 94 Dimensions of jib base section 1916

Designation		Value
System length		23' ft-in
System width		6' 3" ft-in
System height		5' 3" ft-in
<b>L</b>	Length	35' 7" ft-in
<b>B</b>	Width	6' 7" ft-in
<b>H</b>	Height	10' 4" ft-in
Weight (incl. pendant straps, tilting-back supports and backstay straps)		13,228 lb
Double-taper pins Ø		2.36" in

Tab. 55 1916 jib base section technical data

### 1.20.2 1916 jib section 10 ft

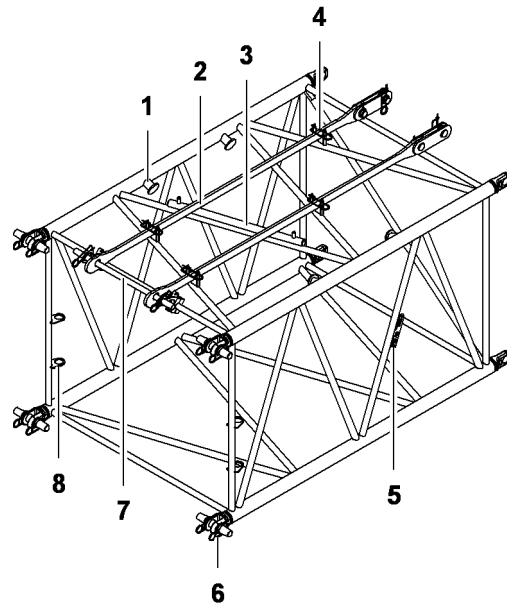


Fig. 95 1916 jib section 10 ft

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

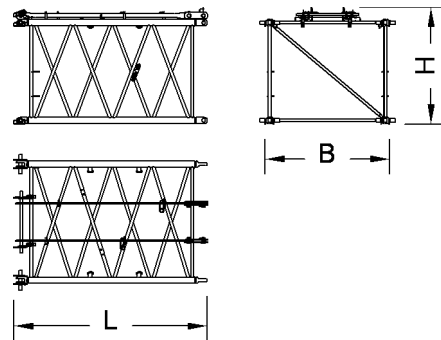


Fig. 96 Dimensions of 1916 jib section 10 ft

Designation		Value
System length		9' 10" ft-in
System width		6' 3" ft-in
System height		5' 3" ft-in
L	Length	10' 4" ft-in
B	Width	6' 7" ft-in

Designation		Value
H	Height (incl. pendant straps)	6' 1" ft-in
Weight (incl. pendant straps)		1,047 lb
Double-taper pins $\varnothing$		2.36" in

Tab. 56 Technical data for 1916 jib section 10 ft

### 1.20.3 1916 jib section 20 ft

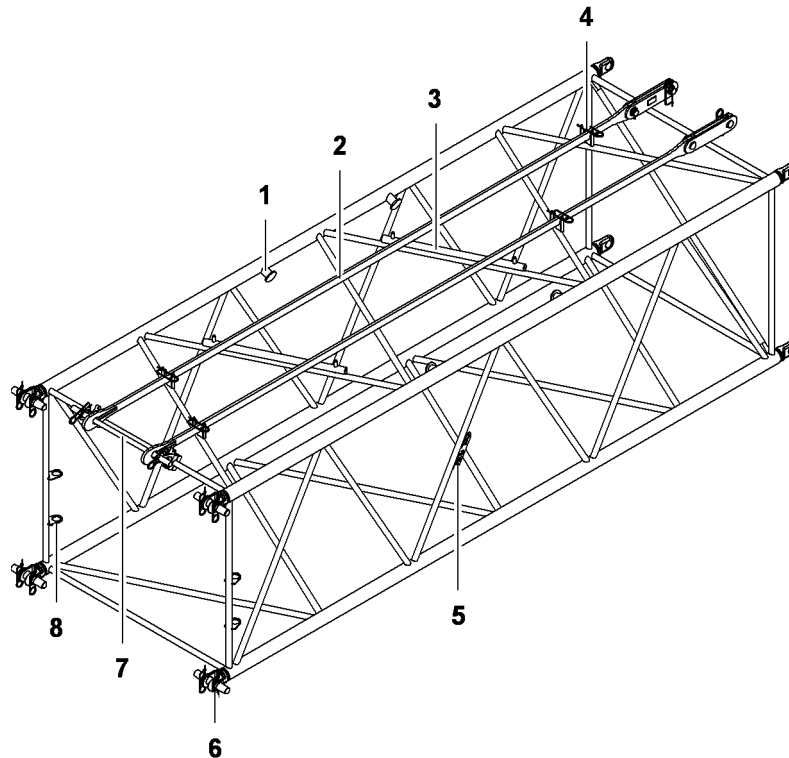


Fig. 97 1916 jib section 20 ft

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

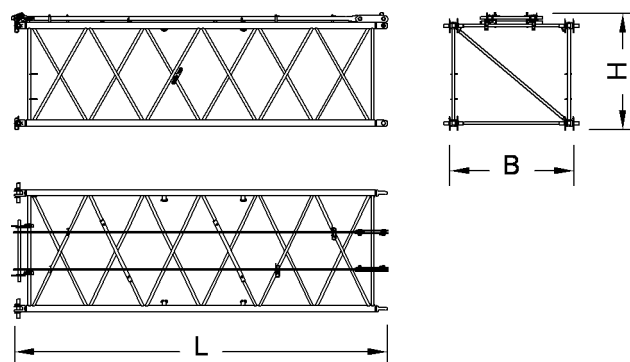


Fig. 98 Dimensions of 1916 jib section 20 ft

Designation		Value
System length		19' 8" ft-in
System width		6' 3" ft-in
System height		5' 3" ft-in
L	Length	20' 2" ft-in
B	Width	6' 7" ft-in
H	Height (incl. pendant straps)	6' 1" ft-in
Weight (incl. pendant straps)		1,521 lb
Double-taper pins Ø		2.36" in

Tab. 57 Technical data for 1916 jib section 20 ft



## 1.20.4 1916 jib section 40 ft

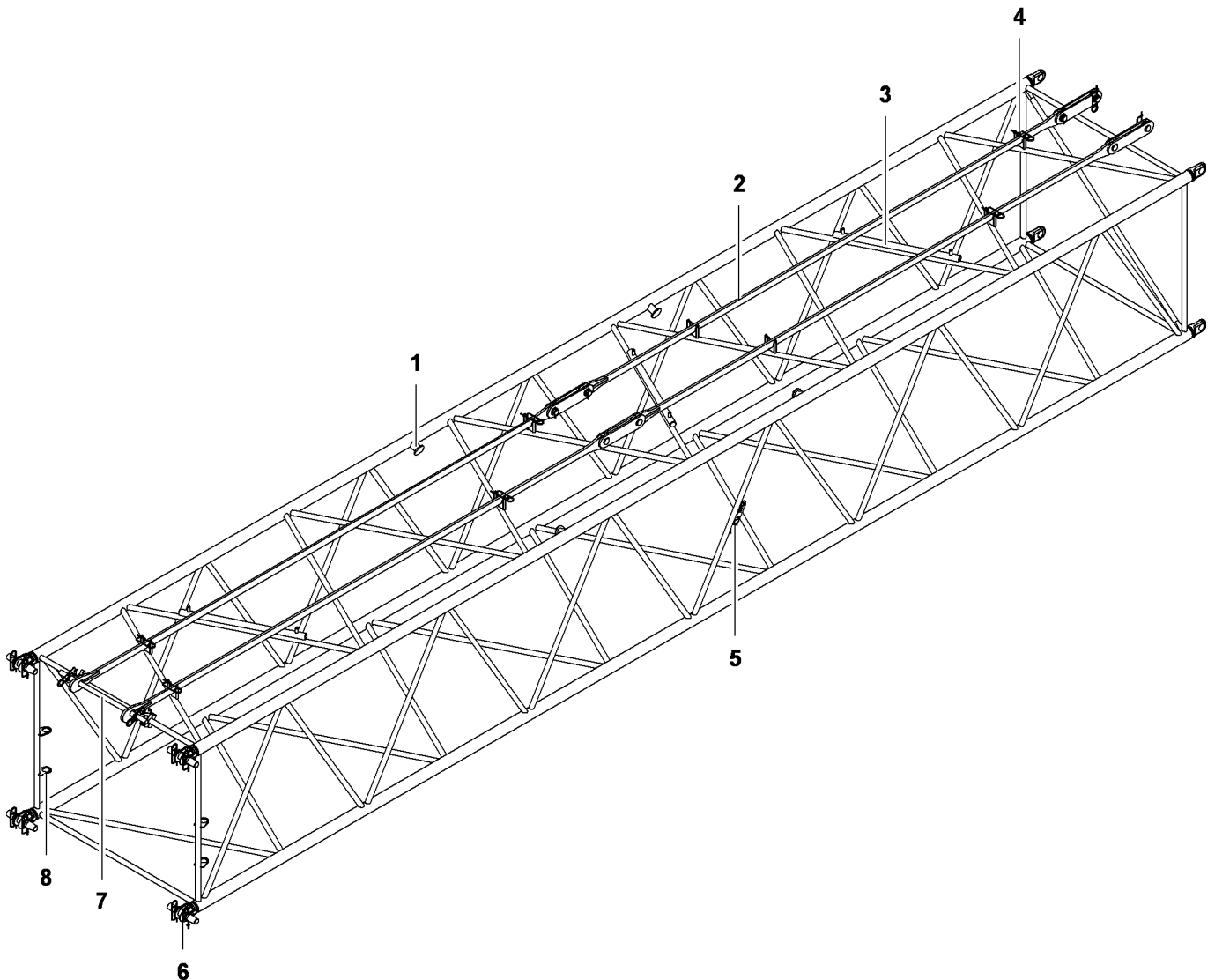


Fig. 99 1916 jib section 40 ft

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

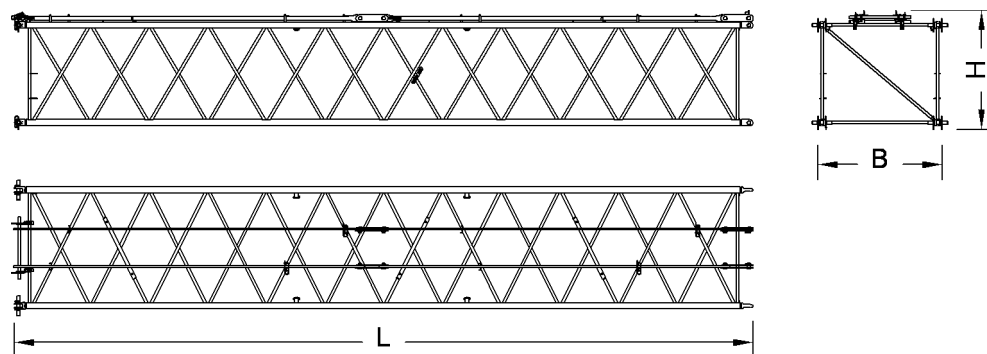


Fig. 100 Dimensions of 1916 jib section 40 ft

Designation		Value
System length		39' 4" ft-in
System width		6' 3" ft-in
System height		5' 3" ft-in
L	Length	39' 10" ft-in
B	Width	6' 7" ft-in
H	Height (incl. pendant straps)	6' 1" ft-in
Weight (incl. pendant straps)		2,756 lb
Double-taper pins Ø		2.36" in

Tab. 58 Technical data for 1916 jib section 40 ft

### 1.20.5 1916 jib head section

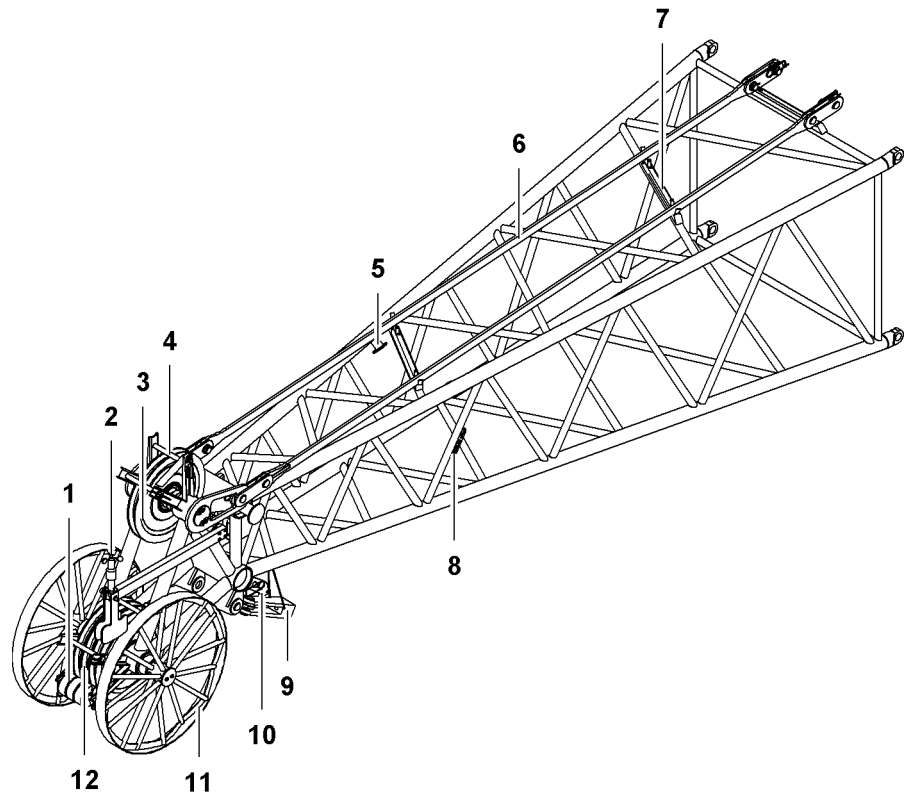


Fig. 101 1916 jib head section

- |   |   |    |                               |
|---|---|----|-------------------------------|
| 1 | Rope protection rollers (3x)                  | 7  | Rope protection supports (2x) |
| 2 | Anemometer                                    | 8  | Boom identification plate     |
| 3 | Gantry pulley                                 | 9  | Rope fixation                 |
| 4 | Rope protection pipes (2x)                    | 10 | Hoist limit switches (2x)     |
| 5 | Lifting points (4x)                           | 11 | Wheels (2x)                   |
| 6 | Transport position of jib pendant straps (2x) | 12 | Rope pulleys (3x)             |

This jib head section is designed to allow an auxiliary jib to be attached ([For more information see: 1.26 Auxiliary jib\\* \(33.000 lb\), page 149](#)).

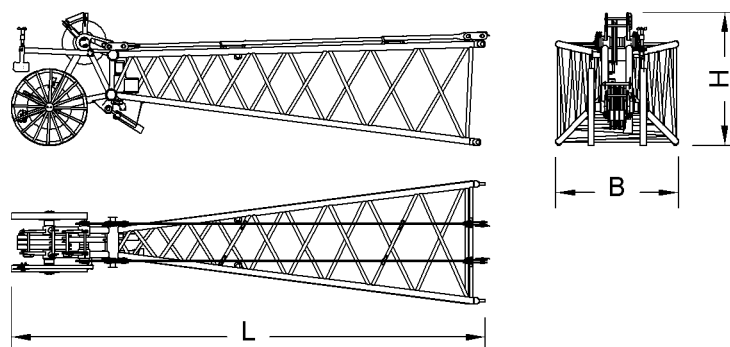
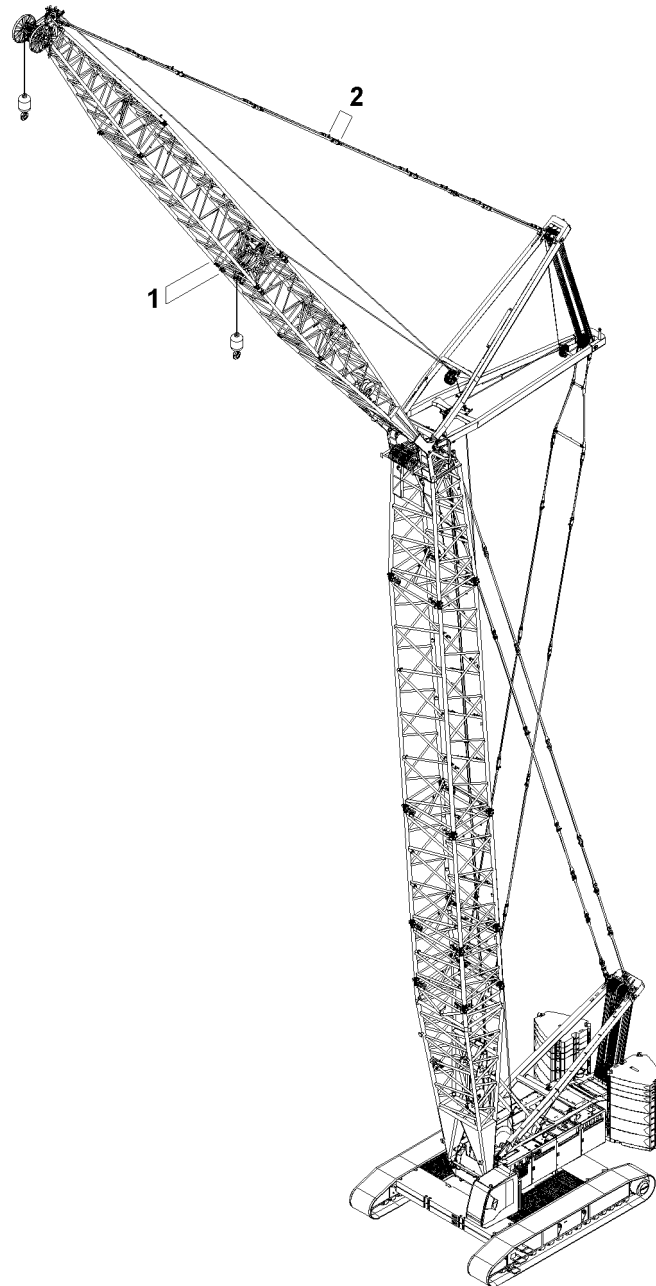


Fig. 102 1916 jib head section dimensions

Designation		Value
System length		23' ft-in
System width		6' 3" ft-in
System height		5' 3" ft-in
L	Length	25' 5" ft-in
B	Width	6' 7" ft-in
H	Height	7' 3" ft-in
Weight (incl. pendant straps)		3,131 lb

*Tab. 59 1916 jib head section, technical data*

## 1.21 Midfall overview



*Fig. 103 Midfall overview*

**1** Midfall

**2** Midfall connecting link

The Midfall connecting link **2** replaces the first connecting link of the first jib pendant strap 40 ft beyond the Midfall assembly position.

## 1.22 2316 Midfall

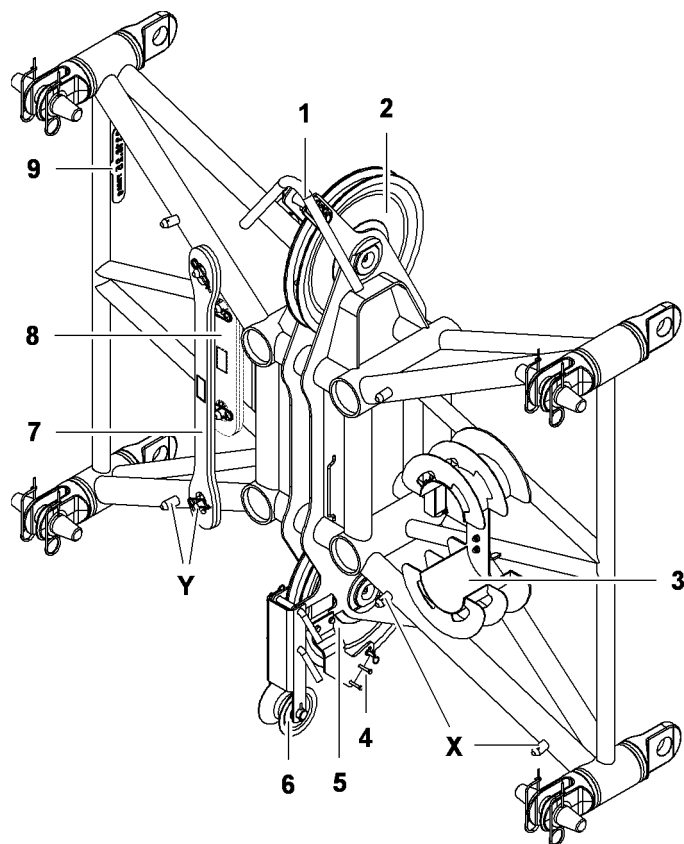


Fig. 104 2316 Midfall

- |   |                      |   |  |
|---|----------------------|---|--|
| 1 | Rope protection pipe | 7 | Transport position of the connecting links 3' ft-in (4x)   |
| 2 | Upper pulley         | 8 | Storage position of the connecting links 1' 5" ft-in (4x)  |
| 3 | Wire bracket         | 9 | Boom identification plate  |
| 4 | Hoist limit switch   | X | Transport brackets (4x) for the connecting links 2' 4" ft-in on LR1300 (carbon-fibre pendant straps) |
| 5 | Lower pulley         | Y | Storage brackets (4x) for the connecting links 7.87" in on LR1300 (carbon-fibre pendant straps)      |
| 6 | Deflection pulley    |   |  |

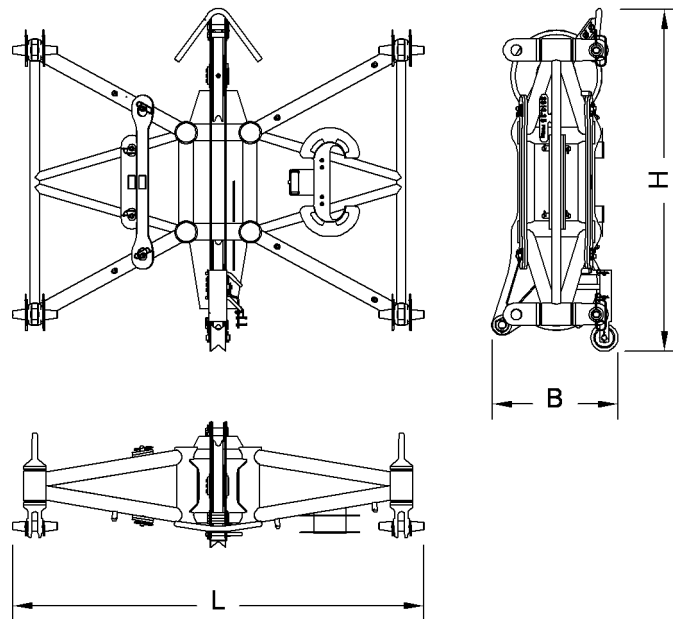


Fig. 105 Midfall 2316 dimensions

Designation		Value
System length		1' 8" ft-in
System width		7' 6" ft-in
System height		5' 5" ft-in
L	Length	8' 6" ft-in
B	Width	2' 7" ft-in
H	Height	6' 11" ft-in
Weight (incl. connecting links)		1,521 lb
Double-taper pins Ø		2.56" in

Tab. 60 Technical data 2316 Midfall

## 1.23 1916 Midfall

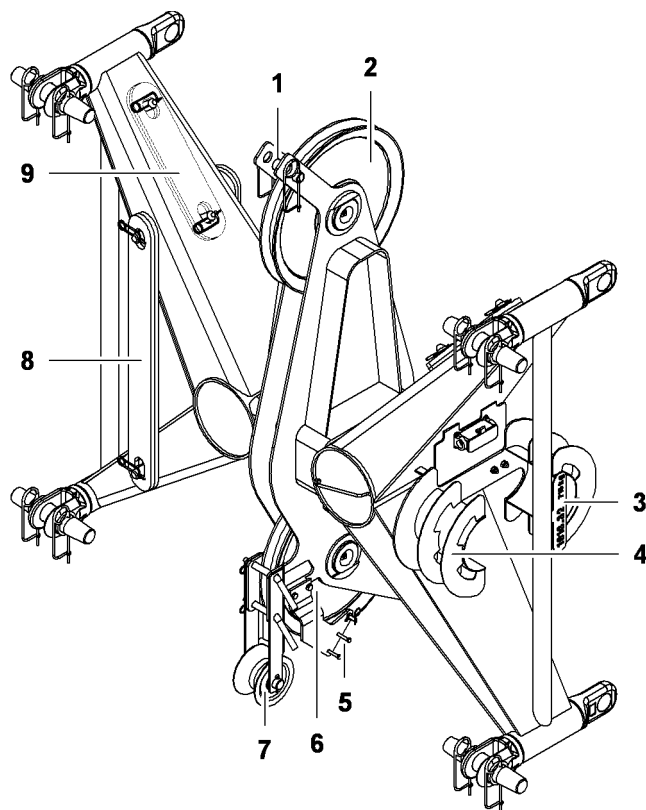


Fig. 106 1916 Midfall

- |   |                           |   |  |
|---|---------------------------|---|--|
| 1 | Rope protection pipe      | 6 | Lower pulley   |
| 2 | Upper pulley              | 7 | Deflection pulley  |
| 3 | Boom identification plate | 8 | Transport position of the connecting links 2' 11" ft-in (4x) |
| 4 | Wire bracket              | 9 | Storage position of the connecting links 1' 3" ft-in (4x)    |
| 5 | Hoist limit switch        |   |  |



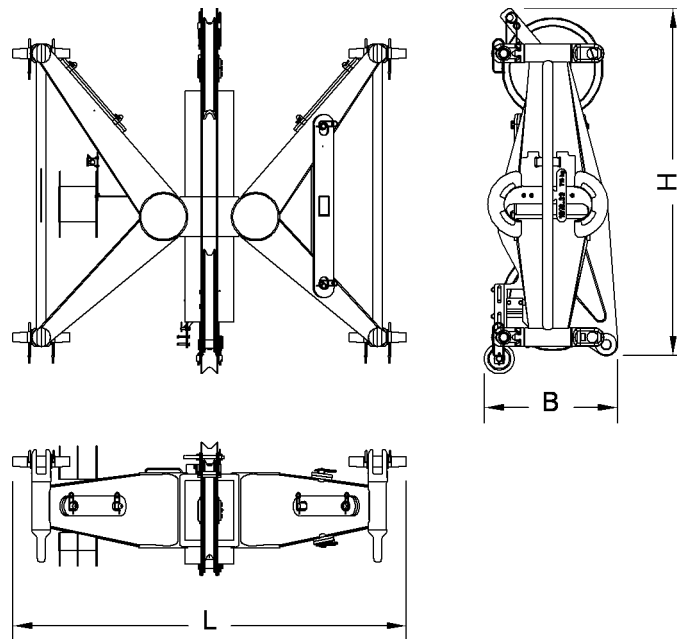


Fig. 107 Midfall 1916 dimensions

Designation		Value
System length		1' 8" ft-in
System width		6' 3" ft-in
System height		5' 3" ft-in
L	Length	6' 7" ft-in
B	Width	2' 6" ft-in
H	Height	6' 9" ft-in
Weight (incl. connecting links)		1,477 lb
Double-taper pins Ø		2.36" in

Tab. 61 Technical data 1916 Midfall

## 1.24 Auxiliary jib\* (79300 lb)

This auxiliary jib can be attached to any boom head section.

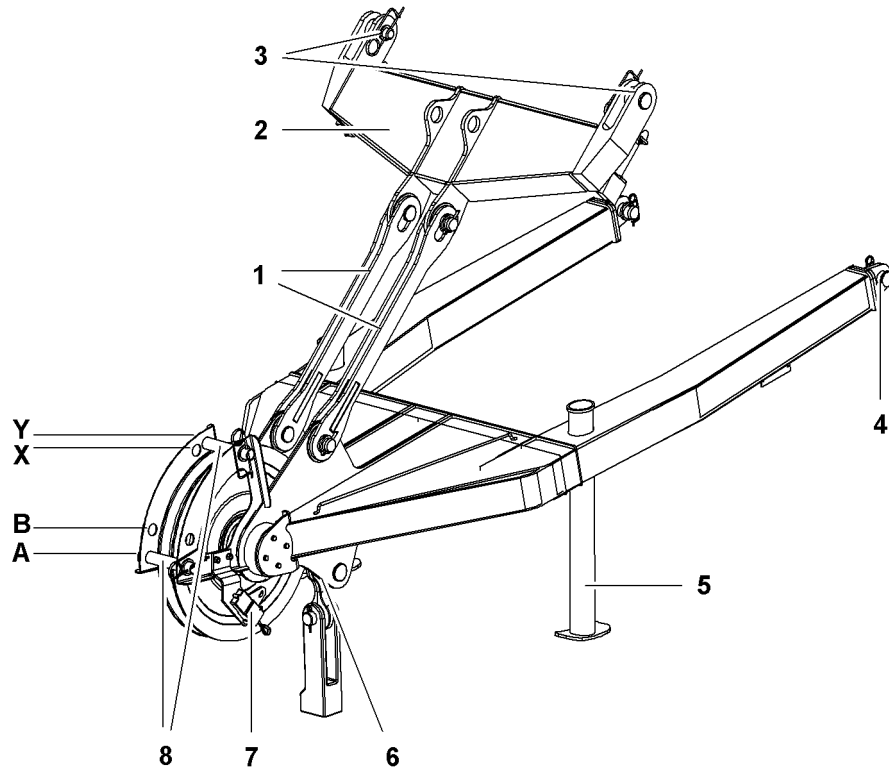


Fig. 108 Auxiliary jib (79300 lb) for the boom head section

- |   |   |   |  |
|---|---|---|--|
| 1 | Pendant straps (2x)                                   | 7 | Hoist limit switch                           |
| 2 | Crossbar  | 8 | Rope protection pipes (2x)                   |
| 3 | Upper pin connection points (2x) on boom head section | A | Assembly position A for rope protection pipe |
| 4 | Lower pin connection points (2x) on boom head section | B | Assembly position B for rope protection pipe |
| 5 | Support feet (2x)                                     | X | Assembly position X for rope protection pipe |
| 6 | Rope fixation   | Y | Assembly position Y for rope protection pipe |

The auxiliary jib is designed with a maximum lifting capacity of 79,365 lb. A second, optional pulley (3-fold reeving) is required if the maximum lifting capacity is to be achieved.

The change in radius and the increase in weight of the boom head section as a result of the auxiliary jib are taken into account by the load moment limiter (LML).

Recommended values for radius enlargement using the auxiliary jib:

Type of machine	Main boom angle			
	15°	20°	45°	86°
LR1100	4' 6" ft-in	-	6' 3" ft-in	5' 9" ft-in

Type of machine	Main boom angle			
	15°	20°	45°	86°
LR1130	4' ft-in	-	6' 2" ft-in	6' 7" ft-in
LR1160	4' ft-in	-	6' 2" ft-in	6' 7" ft-in
LR1200	4' ft-in	-	5' 10" ft-in	5' 11" ft-in
LR1280	-	4' 4" ft-in	5' 10" ft-in	5' 10" ft-in
LR1300	-	4' 4" ft-in	5' 10" ft-in	5' 10" ft-in

Tab. 62 Guideline values for radius enlargement by the auxiliary jib (79300 lb) for boom head section

Assembly positions of the rope protection pipes on the auxiliary jib depending on the main boom angle:

Type of machine	Main boom angle		
	15° to 30°	20° to 30°	30° to 86°
LR1100	B + X	-	A + Y
LR1130	B + X	-	A + Y
LR1160	B + X	-	A + Y
LR1200	-	B + X	A + X
LR1280	-	B + X	A + X
LR1300	-	B + X	A + X

Tab. 63 Assembly positions for rope protection pipes on the auxiliary jib (79300 lb) for the boom head section

#### NOTICE

Incorrectly hoisted load with the 2821 main boom and an auxiliary jib attached ( $L = 3' 5''$  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°.

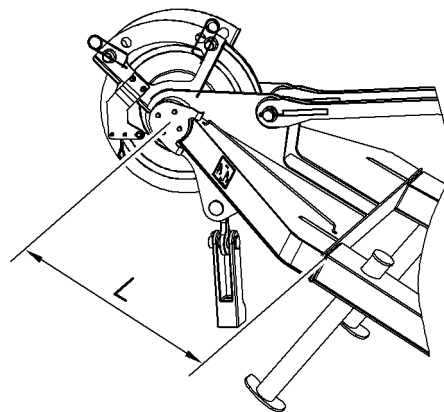


Fig. 109 Dimension L on auxiliary jib (79300 lb)

Dimension L on auxiliary jib	Is a load allowed to be hoisted with a 2821 main boom when an auxiliary jib is fitted and the main boom angle is less than 20°?
3' 5" ft-in	NO
3' 2" ft-in	YES

Tab. 64 Dimension L on auxiliary jib (79300 lb)

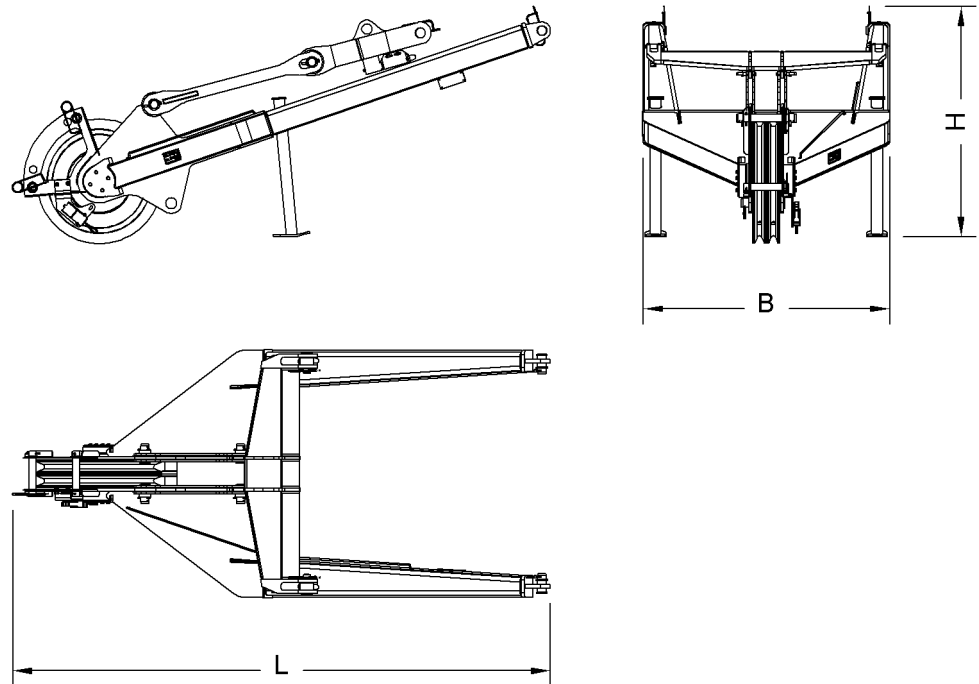


Fig. 110 Dimensions of auxiliary jib (79300 lb) for the boom head section

Designation	Value	
<b>L</b> Length	10' 6" ft-in	
<b>B</b> Width	5' ft-in	
<b>H</b> Height	4' 7" ft-in	
Weight	1,301 lb	

Tab. 65 Technical data for auxiliary jib (79300 lb) for the boom head section

## 1.25 Auxiliary jib\* (66.000 lb)

This auxiliary jib can be attached to the 2316 luffing jib head section.

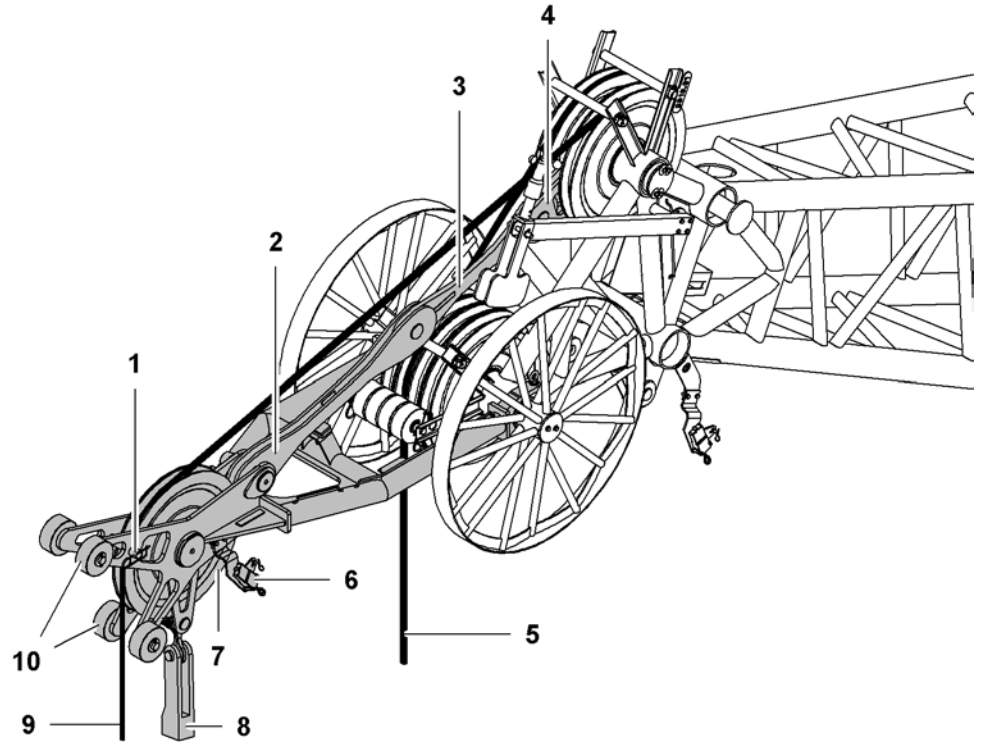


Fig. 111 Auxiliary jib (66,000 lb) for luffing jib head 2316

- |   |                            |    |                      |
|---|----------------------------|----|----------------------|
| 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 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 °	5' 10" ft-in
45 °	5' 7" ft-in
78 °	3' 7" ft-in

Tab. 66 Guideline values for radius enlargement by the auxiliary jib (66,000 lb) for luffing jib head 2316

Designation		Value
L	Length	8' 6" ft-in

## Product description

---

Auxiliary jib\* (66.000 lb)

Designation		Value
<b>B</b>	Width	2' 9" ft-in
<b>H</b>	Height	2' 6" ft-in
Weight		899 lb

*Tab. 67 Technical data: auxiliary jib for 2316 luffing jib head section*

## 1.26 Auxiliary jib\* (33.000 lb)

This auxiliary jib can be attached to the 1916, 1713, 1309, 1008 luffing jib head sections.

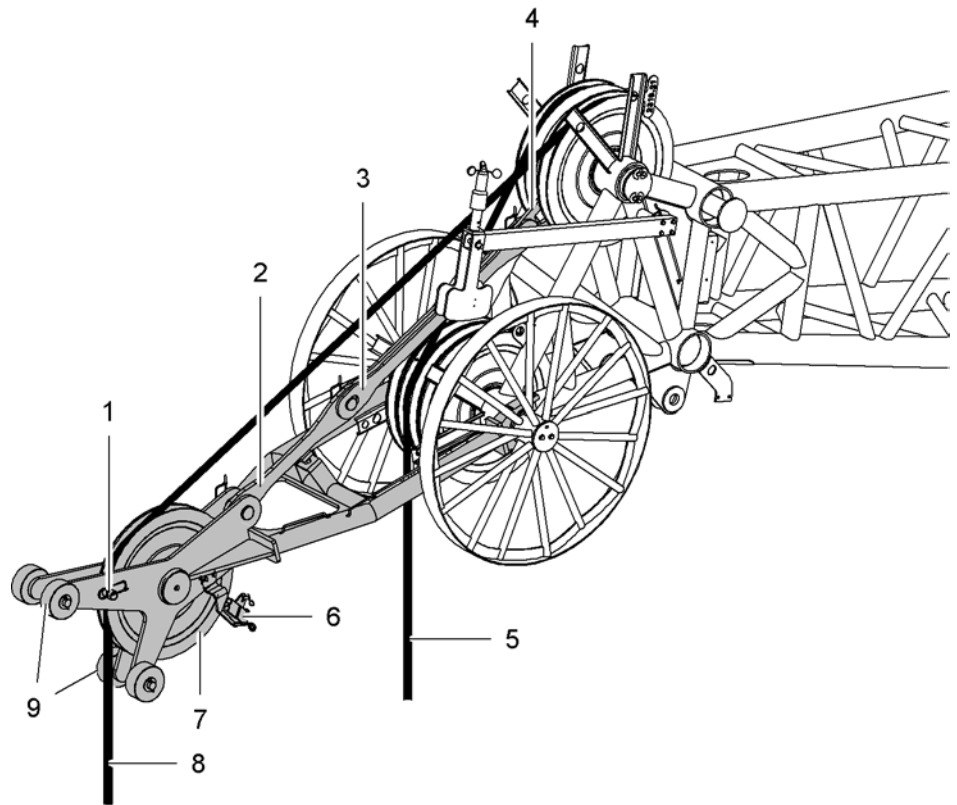


Fig. 112 Auxiliary jib (33,000 lb) for luffing jib head 1916, 1713, 1309, 1008

- |   |                       |   |                      |
|---|-----------------------|---|----------------------|
| 1 | Rope protection pipe  | 6 | Hoist limit switch   |
| 2 | Pendant strap         | 7 | Pulley               |
| 3 | Connecting links (2x) | 8 | Winch 2 hoist rope   |
| 4 | Connecting link       | 9 | Running rollers (4x) |
| 5 | Winch 1 hoist rope    |   |                      |

The auxiliary jib is designed with a maximum lifting capacity of 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 (LML).

Recommended values for radius enlargement using the auxiliary jib:

Jib angle	Radius enlargement
15 °	5' 10" ft-in
45 °	5' 7" ft-in
78 °	3' 7" ft-in

Tab. 68 Guideline values for radius enlargement by the auxiliary jib (33,000 lb) for luffing jib head 1916, 1713, 1309, 1008

## Product description

---

Auxiliary jib\* (33.000 lb)

Designation		Value
<b>L</b>	Length	8' 6" ft-in
<b>B</b>	Width	2' 4" ft-in
<b>H</b>	Height	2' 6" ft-in
Weight		772 lb

*Tab. 69 Technical data: auxiliary jib for 1916, 1713, 1309, 1008 luffing jib head sections*



## 1.27 Pendant straps - LR1300 (steel pendant straps)

This section deals with all the pendant straps that are used on an LR1300 (steel pendant straps). They are arranged according to the transport position of the pendant straps.

### 1.27.1 Pendant straps on A-frame 1

#### A-frame 1 equalizer

Assembly location in crane operation:

- 2821 main boom ([For more information see: A-frame 1 to 2821 boom head section pendant straps, page 648](#))
- 2821 main boom + 2821/2316 reducing piece ([For more information see: A-frame 1 to 2316 boom head section pendant straps, page 710](#))

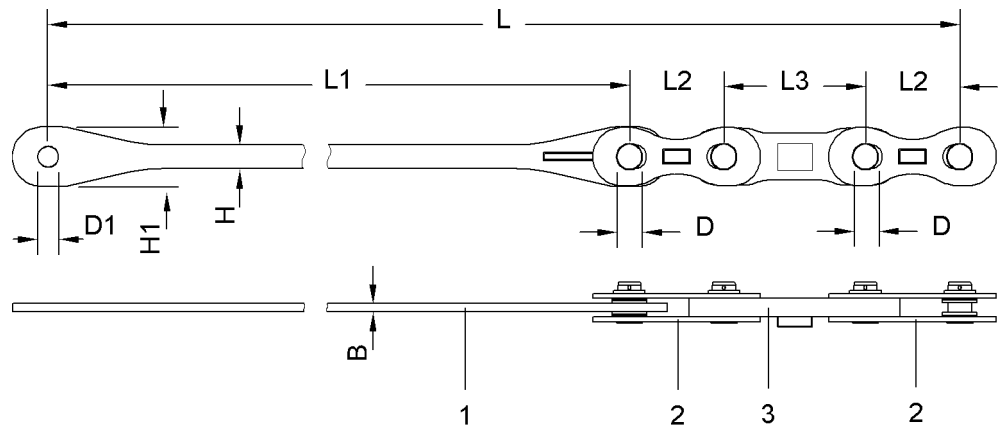


Fig. 113 Dimensions of equalizer on A-frame 1

- 1 Pendant strap 3 Tension load cell  
 2 Connecting links

Designation		Value
<b>L</b>	Length	12' 3" ft-in
<b>L1</b>	Length of the pendant strap	8' 10" ft-in
<b>L2</b>	Length of the connecting link	1' ft-in
<b>L3</b>	Length of the tension load cell	1' 6" ft-in
<b>B</b>	Width of pendant strap	0.98" in
<b>H</b>	Height of pendant strap	3.03" in
<b>H1</b>	Height 1 of pendant strap	7.48" in
<b>D</b>	Pin Ø	2.95" in
<b>D1</b>	Pin Ø	2.56" in

Designation	Value
Weight	342 lb

Tab. 70 Technical data for equalizer of A-frame 1

## 1.27.2 Pendant straps on 2821 main boom

### Pendant straps on the 2821 boom base section

#### Equalizer of 2821 boom base section

Assembly location in crane operation:

- 2821 main boom (For more information see: A-frame 1 to 2821 boom head section pendant straps, page 648)
- 2821 main boom + 2821/2316 reducing piece (For more information see: A-frame 1 to 2316 boom head section pendant straps, page 710)

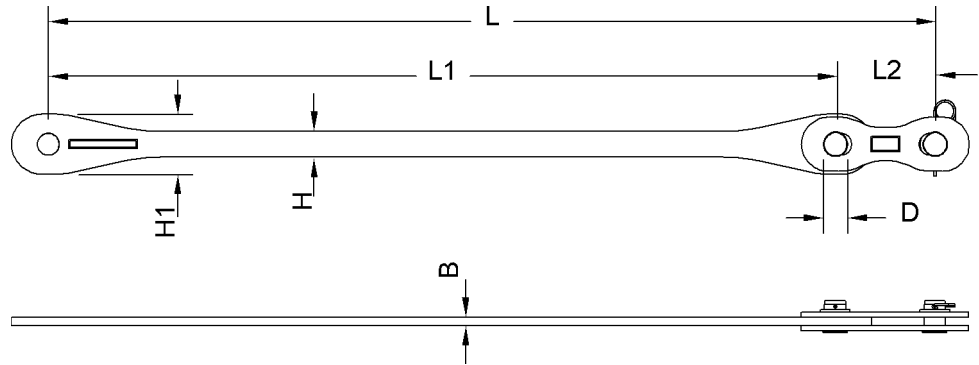


Fig. 114 Dimensions of equalizer of 2821 boom base section

Designation	Value
<b>L</b> Length	8' 9" ft-in
<b>L1</b> Length of the pendant strap	7' 9" ft-in
<b>L2</b> Length of the connecting link	1' ft-in
<b>B</b> Width of pendant strap	0.98" in
<b>H</b> Height of pendant strap	3.03" in
<b>H1</b> Height 1 of pendant strap	7.09" in
<b>D</b> Pin Ø	2.56" in
Weight	148 lb

Tab. 71 Technical data for equalizer of 2821 boom base section

### Pendant straps on 2821 boom section 10 ft

#### Main boom pendant strap 10 ft

Assembly location in crane operation:

- 2821 main boom (For more information see: A-frame 1 to 2821 boom head section pendant straps, page 648)

- 2821 main boom + 2821/2316 reducing piece (For more information see: A-frame 1 to 2316 boom head section pendant straps, page 710)

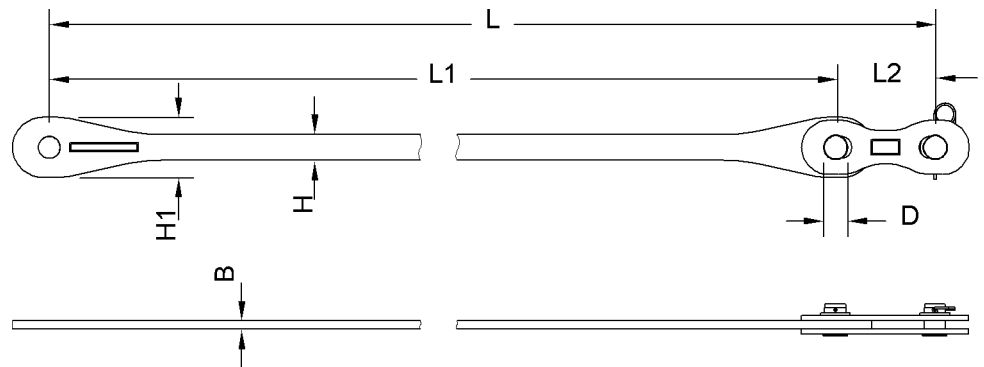


Fig. 115 Dimensions of main boom pendant strap 10 ft

Designation		Value
L	Length	9' 10" ft-in
L1	Length of the pendant strap	8' 10" ft-in
L2	Length of the connecting link	1' ft-in
H	Height of pendant strap	3.03" in
H1	Height 1 of pendant strap	7.09" in
B	Width of pendant strap	0.98" in
D	Pin Ø	2.56" in
Weight		159 lb

Tab. 72 Technical data for main boom pendant strap 10 ft

### Jib backstay strap 10 ft

This backstay strap is identical to the 10 ft jib pendant strap of the 2316 luffing jib.

Assembly location in crane operation:

- 2316 luffing jib (For more information see: Backstay straps connecting A-frame 2 to 2821 boom base section, page 785)
- 1916 luffing jib (For more information see: Backstay straps connecting A-frame 2 to 2821 boom base section, page 800)
- 2316 luffing jib + 2316 Midfall (For more information see: Backstay straps connecting A-frame 2 to 2821 boom base section, page 857)
- 1916 luffing jib + 1916 Midfall (For more information see: Backstay straps connecting A-frame 2 to 2821 boom base section, page 867)

## Product description

Pendant straps - LR1300 (steel pendant straps)

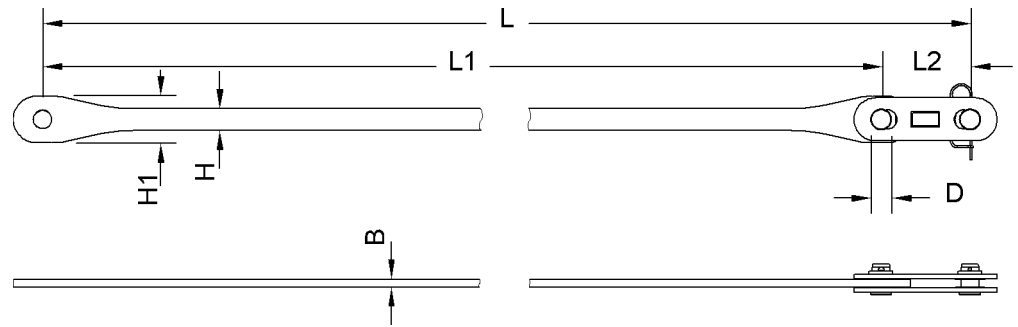


Fig. 116 Dimensions of jib backstay strap 10 ft

Designation		Value
L	Length	9' 10" ft-in
L1	Length of the pendant strap	8' 11" ft-in
L2	Length of the connecting link	10.63" in
B	Width of pendant strap	0.87" in
H	Height of pendant strap	2.60" in
H1	Height 1 of pendant strap	5.51" in
D	Pin Ø	2.17" in
Weight		117 lb

Tab. 73 Technical data for jib backstay strap 10 ft

## Pendant straps on 2821 boom section 20 ft

### Main boom pendant strap 20 ft

Assembly location in crane operation:

- 2821 main boom (For more information see: A-frame 1 to 2821 boom head section pendant straps, page 648)
- 2821 main boom + 2821/2316 reducing piece (For more information see: A-frame 1 to 2316 boom head section pendant straps, page 710)

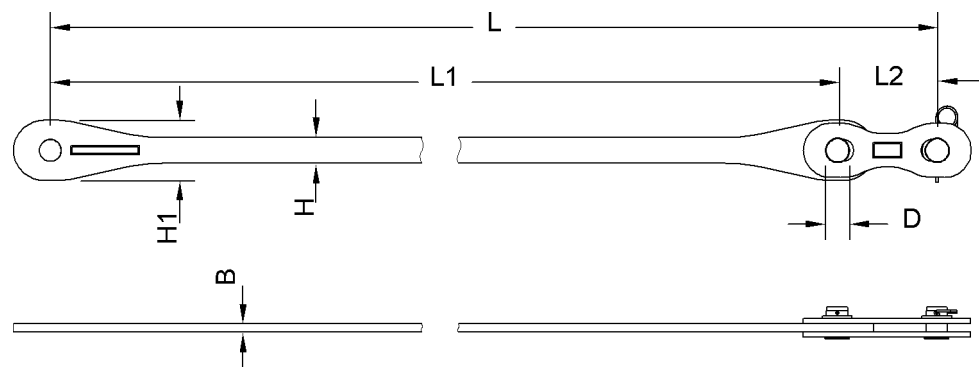


Fig. 117 Dimensions of main boom pendant strap 20 ft

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Designation		Value
<b>L</b>	Length	19' 8" ft-in
<b>L1</b>	Length of the pendant strap	18' 8" ft-in
<b>L2</b>	Length of the connecting link	1' ft-in
<b>H</b>	Height of pendant strap	3.03" in
<b>H1</b>	Height 1 of pendant strap	7.09" in
<b>B</b>	Width of pendant strap	0.98" in
<b>D</b>	Pin Ø	2.56" in
Weight		260 lb

Tab. 74 Technical data for main boom pendant strap 20 ft

### Jib backstay strap 20 ft

This backstay strap is identical to the 20 ft jib pendant strap of the 2316 luffing jib.

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 785](#))
- 1916 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 800](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 857](#))
- 1916 luffing jib + 1916 Midfall (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 867](#))

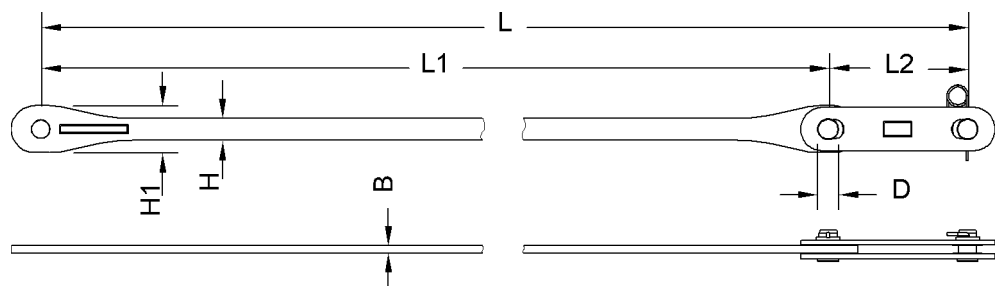


Fig. 118 Dimensions of jib backstay strap 20 ft

Designation		Value
<b>L</b>	Length	19' 8" ft-in
<b>L1</b>	Length of the pendant strap	18' 4" ft-in
<b>L2</b>	Length of the connecting link	1' 5" ft-in
<b>B</b>	Width of pendant strap	0.87" in
<b>H</b>	Height of pendant strap	2.60" in
<b>H1</b>	Height 1 of pendant strap	5.51" in
<b>D</b>	Pin Ø	2.17" in
Weight		196 lb

Tab. 75 Technical data for jib backstay strap 20 ft

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## Pendant straps on 2821 boom section 40 ft

### Main boom pendant strap 40 ft

Assembly location in crane operation:

- 2821 main boom (For more information see: [A-frame 1 to 2821 boom head section pendant straps, page 648](#))
- 2821 main boom + 2821/2316 reducing piece (For more information see: [A-frame 1 to 2316 boom head section pendant straps, page 710](#))

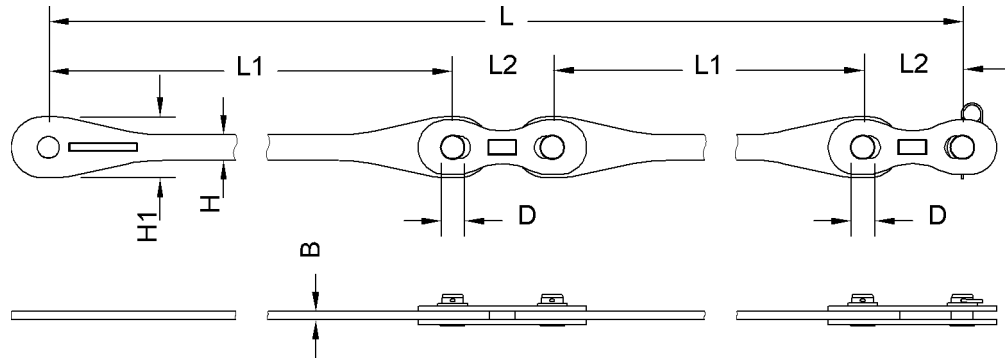


Fig. 119 Dimensions of main boom pendant strap 40 ft

Designation		Value
L	Length	39' 4" ft-in
L1	Length of the pendant strap	18' 8" ft-in
L2	Length of the connecting link	1' ft-in
B	Width of pendant strap	0.98" in
H	Height of pendant strap	3.03" in
H1	Height 1 of pendant strap	7.09" in
D	Pin Ø	2.56" in
Weight		503 lb

Tab. 76 Technical data for main boom pendant strap 40 ft

### Jib backstay strap 40 ft

This backstay strap is identical to the 40 ft jib pendant strap of the 2316 luffing jib.

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 785](#))
- 1916 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 800](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 857](#))
- 1916 luffing jib + 1916 Midfall (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 867](#))

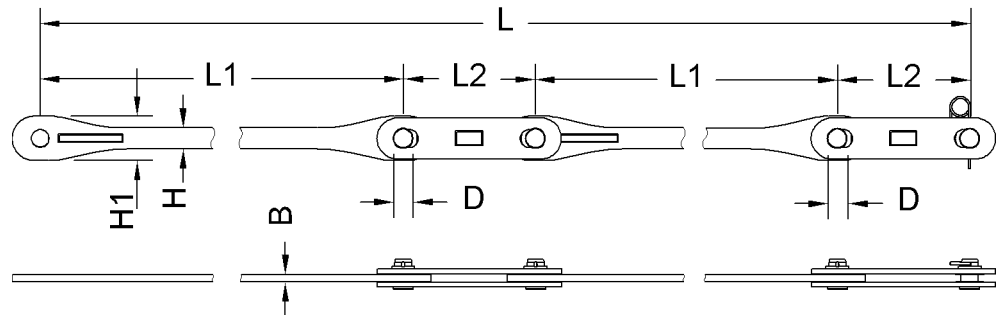


Fig. 120 Dimensions of jib backstay strap 40 ft

Designation		Value
L	Length	39' 4" ft-in
L1	Length of the pendant strap	18' 4" ft-in
L2	Length of the connecting link	1' 5" ft-in
B	Width of pendant strap	0.87" in
H	Height of pendant strap	2.60" in
H1	Height 1 of pendant strap	5.51" in
D	Pin Ø	2.17" in
Weight		392 lb

Tab. 77 Technical data for jib backstay strap 40 ft

## Pendant straps on 2821 boom head section

### Main boom pendant strap on 2821 boom head section

Assembly location in crane operation:

- 2821 main boom (For more information see: [A-frame 1 to 2821 boom head section pendant straps, page 648](#))

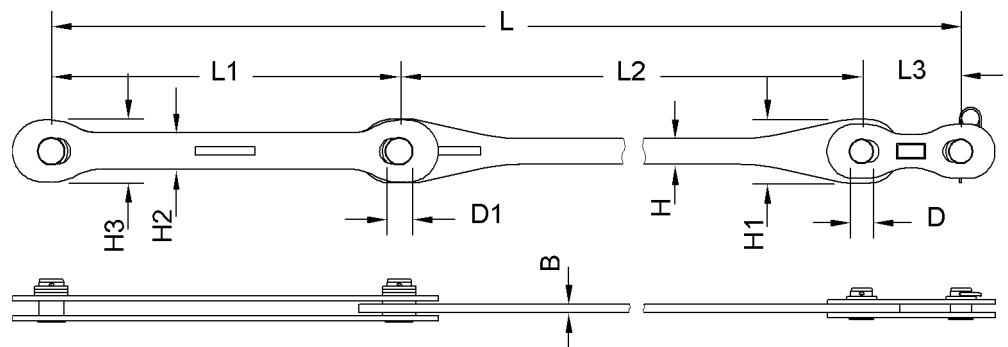


Fig. 121 Dimensions of main boom pendant strap on 2821 boom head section

Designation		Value
L	Length	20' 8" ft-in
L1	Length of the connecting link	3' 5" ft-in

Designation		Value
L2	Length of the pendant strap	16' 3" ft-in
L3	Length of the connecting link	1' ft-in
B	Width of pendant strap	0.98" in
H	Height of pendant strap	3.03" in
H1	Height 1 of pendant strap	7.09" in
H2	Height2 of connecting link	4.33" in
H3	Height3 of connecting link	7.28" in
D	Pin Ø	2.56" in
D1	Pin Ø	2.95" in
Weight		340 lb

Tab. 78 Technical data for main boom pendant straps on 2821 boom head section

### 1.27.3 Pendant straps on 2821/2316 reducing piece

#### Pendant straps on 2821/2316 reducing piece 40 ft

##### Reducing piece pendant strap 40 ft

Assembly location in crane operation:

- 2821 main boom + 2821/2316 reducing piece (For more information see: [A-frame 1 to 2316 boom head section pendant straps, page 710](#))

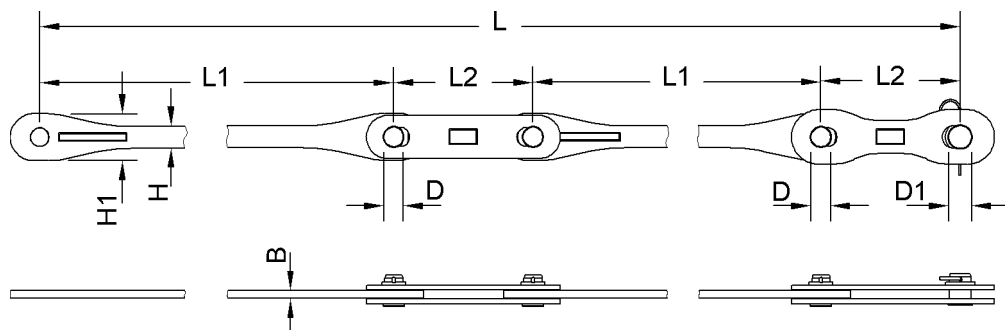


Fig. 122 Dimensions of reducing piece pendant strap 40 ft

Designation		Value
L	Length	39' 4" ft-in
L1	Length of the pendant strap	18' 4" ft-in
L2	Length of the connecting link	1' 5" ft-in
B	Width of pendant strap	0.87" in
H	Height of pendant strap	2.60" in
H1	Height 1 of pendant strap	5.51" in
D	Pin Ø	2.17" in
D1	Pin Ø	2.56" in



Designation	Value
Weight	399 lb

Tab. 79 Technical data for reducing piece pendant strap 40 ft

## Pendant straps on 2316 section 3 ft

### Connecting link

Assembly location in crane operation:

- 2821 main boom + 2821/2316 reducing piece (For more information see: [A-frame 1 to 2316 boom head section pendant straps, page 710](#))

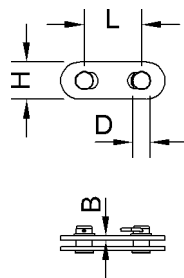


Fig. 123 Dimensions of connecting link

Designation	Value
<b>L</b> Length of the connecting link	7.87 <sup>in</sup>
<b>B</b> Width of connecting link	0.59 <sup>in</sup>
<b>H</b> Height of connecting link	5.12 <sup>in</sup>
<b>D</b> Pin Ø	2.17 <sup>in</sup>
Weight	13.23 lb

Tab. 80 Technical data for connecting link

## 1.27.4 Pendant straps on 1713 fixed jib

### Pendant straps on A-frame 2

#### Equalizer on A-frame 2 (jib backstay strap)

This equalizer of A-frame 2 (jib backstay strap) is identical to the equalizer of A-frame 2 (jib backstay strap) of the 0906 fixed jib.

Assembly location in crane operation:

- 1713 fixed jib (For more information see: [A-frame 2 to 2821 boom head section backstay straps, page 721](#))

## Product description

Pendant straps - LR1300 (steel pendant straps)

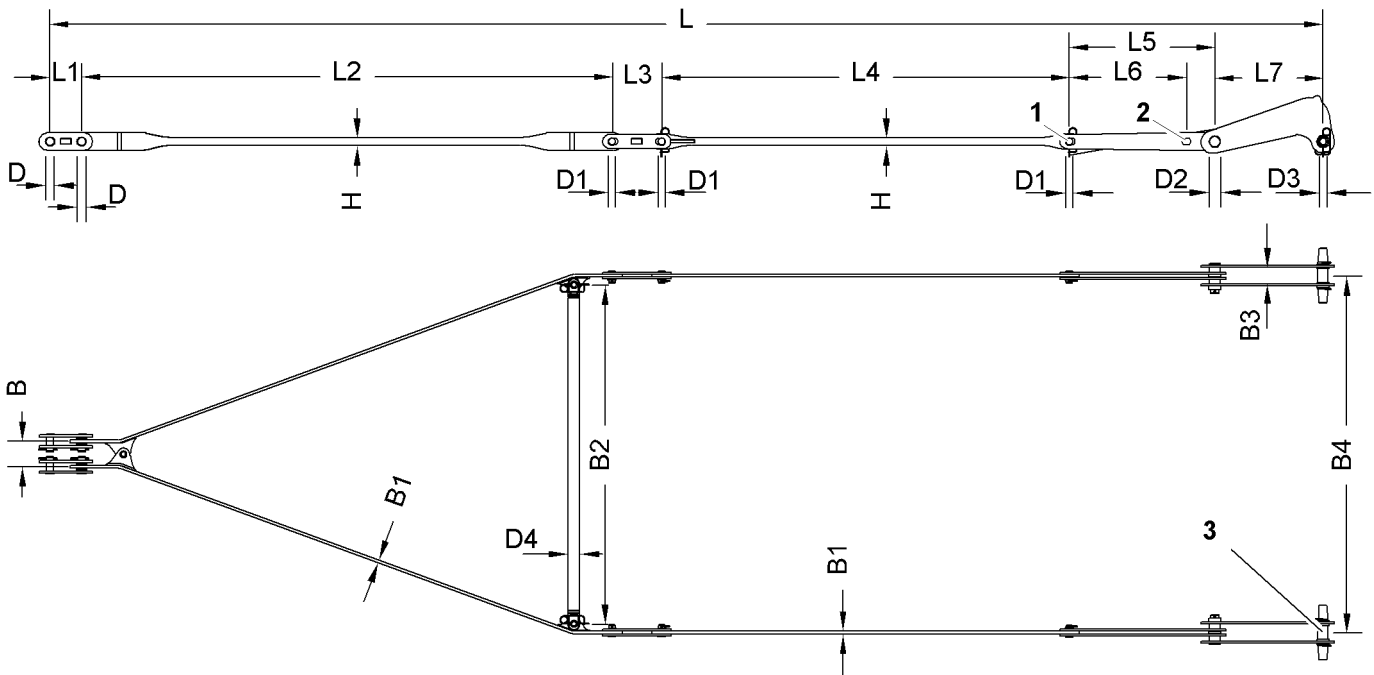


Fig. 124 Dimensions of the equalizer on A-frame 2 (jib backstay strap)

- 1 Bolting point 30 °                      2 Bolting point 15 °                      3 Double-taper pins 1' 5" ft-in/  
dia.3.15" in (2x)

The double-taper pins (1' 5" ft-in x dia.3.15" in) **3** replace the upper double-taper pins on the boom head section.

Designation		Value
L	Length	at 30 °
		32' 10" ft-in
		at 15 °
		29' 10" ft-in
L1	Length of the connecting link	9.84" in
L2	Length of crossbar	13' 8" ft-in
L3	Length of the connecting link	1' 3" ft-in
L4	Length of the pendant strap	10' 6" ft-in
L5	Length of connecting link (30 °)	3' 9" ft-in
L6	Length of connecting link (15 °)	3' ft-in
L7	Length of the connecting link	2' 9" ft-in
B	Width	7.87" in
B1	Width of pendant strap	0.87" in
B2	Width 2	8' 9" ft-in
B3	Width 3	5.20" in
B4	Width4	9' 2" ft-in
H	Height of pendant strap	2.44" in

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Designation		Value
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pin Ø	1.97" in
<b>D2</b>	Pin Ø	2.76" in
<b>D3</b>	Double-taper pins Ø	3.15" in
<b>D4</b>	Spacer bar Ø	3.54" in
Weight		1,283 lb

Tab. 81 Technical data for equalizer on A-frame 2 (jib backstay strap)

### Equalizer on A-frame 2 (jib pendant strap)

Assembly location in crane operation:

- 1713 fixed jib (For more information see: [A-frame 2 to 1713 jib head section pendant straps](#), page 722)

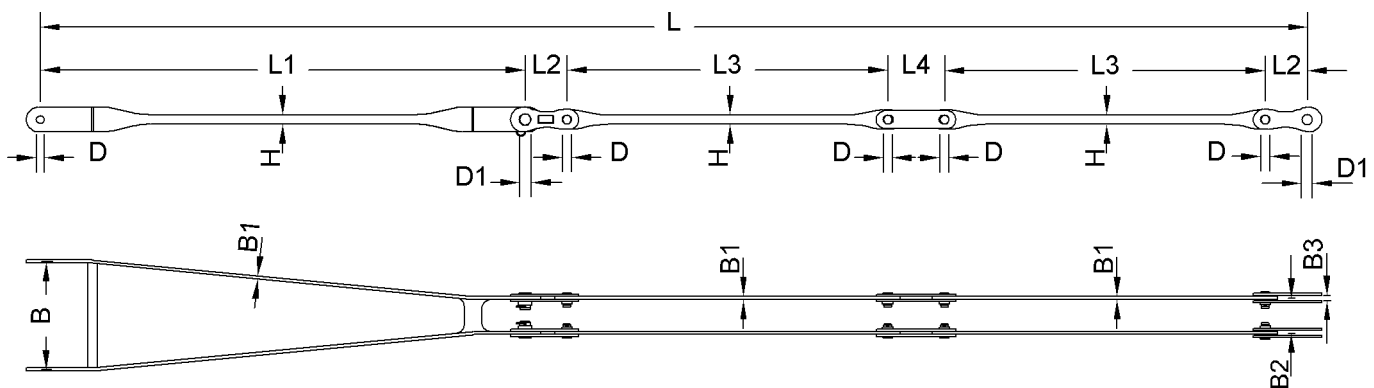


Fig. 125 Dimensions of equalizer on A-frame 2 (jib pendant strap)

Designation		Value
<b>L</b>	Length	23' 10" ft-in
<b>L1</b>	Length of crossbar	9' 2" ft-in
<b>L2</b>	Length of the connecting link	9.45" in
<b>L3</b>	Length of the pendant strap	6' 1" ft-in
<b>L4</b>	Length of the connecting link	1' 1" ft-in
<b>B</b>	Width	2' ft-in
<b>B1</b>	Width of pendant strap	0.71" in
<b>B2</b>	Width 2	7.87" in
<b>B3</b>	Width 3	1.18" in
<b>H</b>	Height of pendant strap	2.13" in
<b>D</b>	Pin Ø	1.77" in
<b>D1</b>	Pin Ø	2.36" in
Weight		437 lb

Tab. 82 Technical data for equalizer on A-frame 2 (jib pendant strap)

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## Pendant straps on 1713 jib section 10 ft

### Jib pendant strap 10 ft

This pendant strap is identical to the 10 ft jib pendant strap of the 1008 fixed jib.

Assembly location in crane operation:

- 1713 fixed jib (For more information see: [A-frame 2 to 1713 jib head section pendant straps, page 722](#))

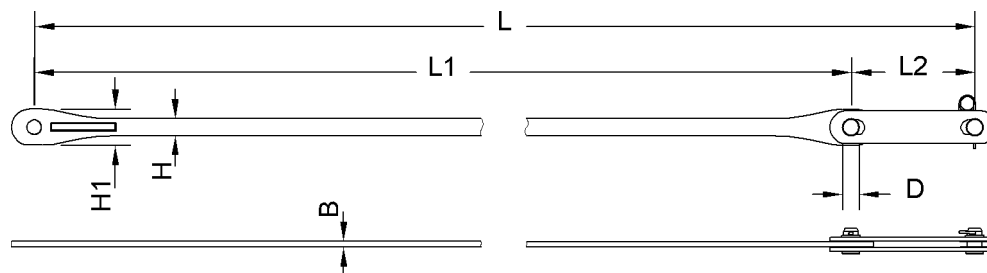


Fig. 126 Dimensions of jib pendant strap 10 ft

Designation		Value
L	Length	9' 10" ft-in
L1	Length of the pendant strap	8' 7" ft-in
L2	Length of the connecting link	1' 3" ft-in
B	Width of pendant strap	0.71" in
H	Height of pendant strap	2.13" in
H1	Height 1 of pendant strap	4.45" in
D	Pin Ø	1.77" in
Weight		106 lb

Tab. 83 Technical data for jib pendant strap 10 ft

## Pendant straps on 1713 jib section 20 ft

### Jib pendant strap 20 ft

This pendant strap is identical to the 20 ft jib pendant strap of the 1008 fixed jib.

Assembly location in crane operation:

- 1713 fixed jib (For more information see: [A-frame 2 to 1713 jib head section pendant straps, page 722](#))

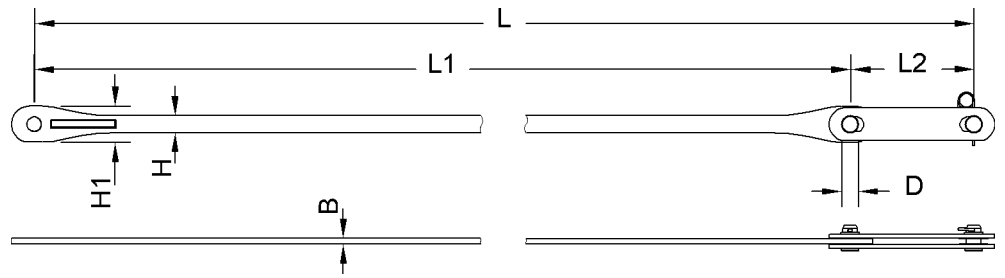


Fig. 127 Dimensions of jib pendant strap 20 ft

Designation		Value
<b>L</b>	Length	19' 8" ft-in
<b>L1</b>	Length of the pendant strap	18' 5" ft-in
<b>L2</b>	Length of the connecting link	1' 3" ft-in
<b>B</b>	Width of pendant strap	0.71" in
<b>H</b>	Height of pendant strap	2.13" in
<b>H1</b>	Height 1 of pendant strap	4.45" in
<b>D</b>	Pin Ø	1.77" in
Weight		128 lb

Tab. 84 Technical data for jib pendant strap 20 ft

## Pendant straps on 1713 jib section 40 ft

### Jib pendant strap 40 ft

This pendant strap is identical to the 40 ft jib pendant strap of the 1008 fixed jib.

Assembly location in crane operation:

- 1713 fixed jib (For more information see: [A-frame 2 to 1713 jib head section pendant straps, page 722](#))

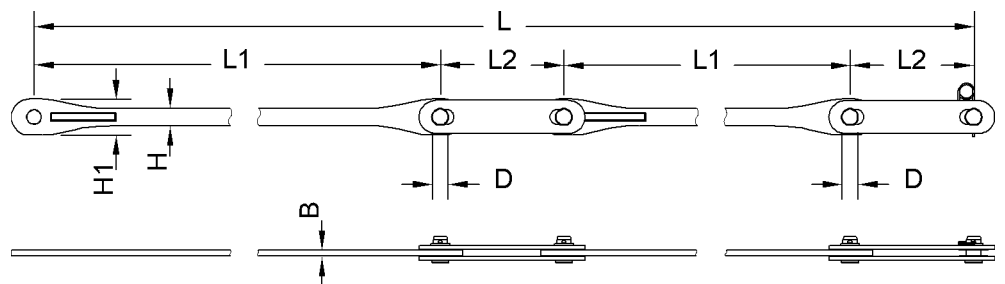


Fig. 128 Dimensions of jib pendant strap 40 ft

Designation		Value
<b>L</b>	Length	39' 4" ft-in
<b>L1</b>	Length of the pendant strap	18' 5" ft-in
<b>L2</b>	Length of the connecting link	1' 3" ft-in

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Designation		Value
<b>B</b>	Width of pendant strap	0.71" in
<b>H</b>	Height of pendant strap	2.13" in
<b>H1</b>	Height 1 of pendant strap	4.45" in
<b>D</b>	Pin Ø	1.77" in
Weight		128 lb

Tab. 85 Technical data for jib pendant strap 40 ft

## Pendant straps on 1713 jib head section

### Jib pendant strap on 1713 jib head section

Assembly location in crane operation:

- 1713 fixed jib (For more information see: [A-frame 2 to 1713 jib head section pendant straps, page 722](#))

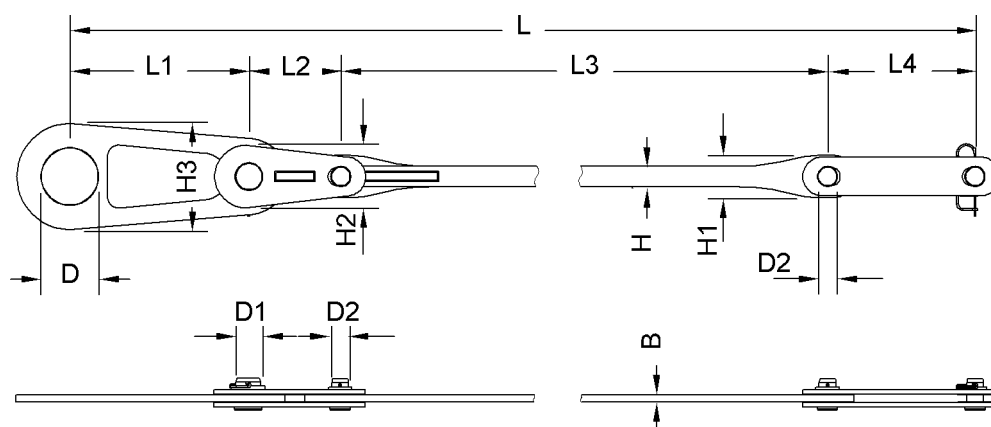


Fig. 129 Dimensions of jib pendant strap on 1713 jib head section

Designation		Value
<b>L</b>	Length	21' 4" ft-in
<b>L1</b>	Length of the connecting link	1' 7" ft-in
<b>L2</b>	Length of the connecting link	9.57" in
<b>L3</b>	Length of the pendant strap	17' 8" ft-in
<b>L4</b>	Length of the connecting link	1' 3" ft-in
<b>B</b>	Width of pendant strap	0.71" in
<b>H</b>	Height of pendant strap	2.13" in
<b>H1</b>	Height 1 of pendant strap	4.45" in
<b>H2</b>	Height of connecting link	6.54" in
<b>H3</b>	Height of connecting link	11.02" in
<b>D</b>	Pin Ø	5.91" in
<b>D1</b>	Pin Ø	2.56" in

Designation		Value
<b>D2</b>	Pin Ø	1.77" in
Weight		165 lb

Tab. 86 Technical data for jib pendant strap on 1713 jib head section

## 1.27.5 Pendant straps on 1507 fixed jib

### Pendant straps on A-frame 2

#### Equalizer on A-frame 2 (jib backstay strap)

Assembly location in crane operation:

- 1507 fixed jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section](#), page 734)

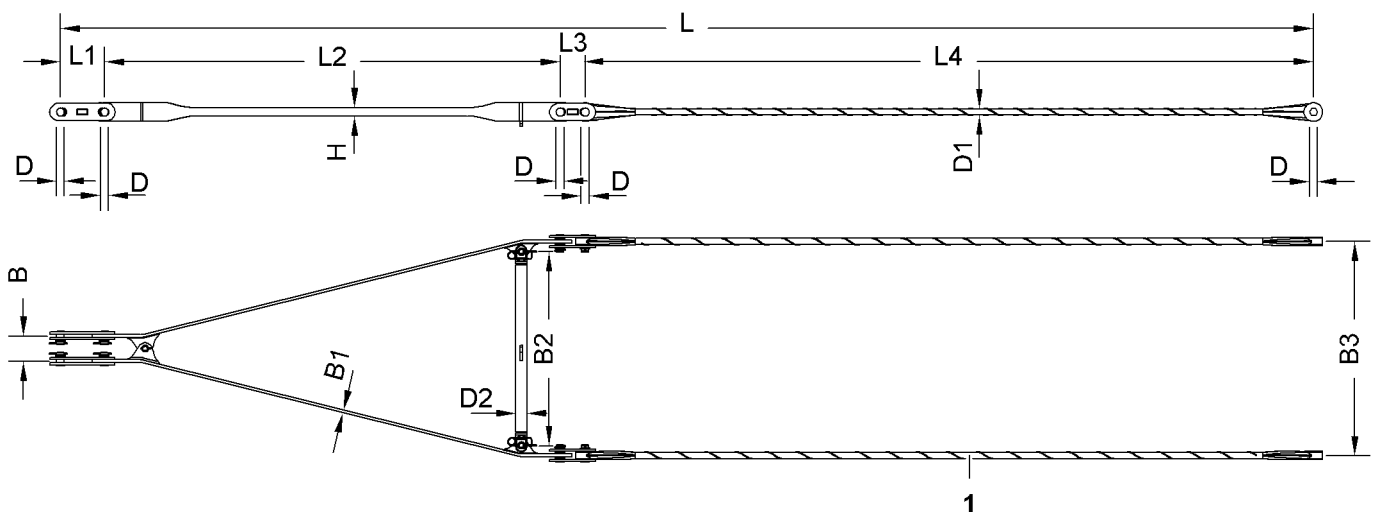


Fig. 130 Dimensions of the equalizer on A-frame 2 (jib backstay strap)

1 Carbon-fibre pendant strap

Designation		Value
<b>L</b>	Length	32' 9" ft-in
<b>L1</b>	Length of the connecting link	1' 2" ft-in
<b>L2</b>	Length of crossbar	11' 11" ft-in
<b>L3</b>	Length of the connecting link	7.87" in
<b>L4</b>	Length of the pendant strap	19' ft-in
<b>B</b>	Width	7.87" in
<b>B1</b>	Width of pendant strap	0.87" in
<b>B2</b>	Width of spacer bar	5' 1" ft-in
<b>B3</b>	Width	5' 7" ft-in
<b>H</b>	Height of pendant strap	2.60" in
<b>D</b>	Pin Ø	2.36" in

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Designation		Value
<b>D1</b>	Pendant strap $\varnothing$	1.97" in
<b>D2</b>	Spacer bar $\varnothing$	3.50" in
Weight		633 lb

Tab. 87 Technical data for equalizer on A-frame 2 (jib backstay strap)

**Jib pendant strap (A-frame 2 to 1507 jib head section)**

Assembly location in crane operation:

- 1507 fixed jib (For more information see: [A-frame 2 to 1507 jib head section pendant straps](#), page 735)

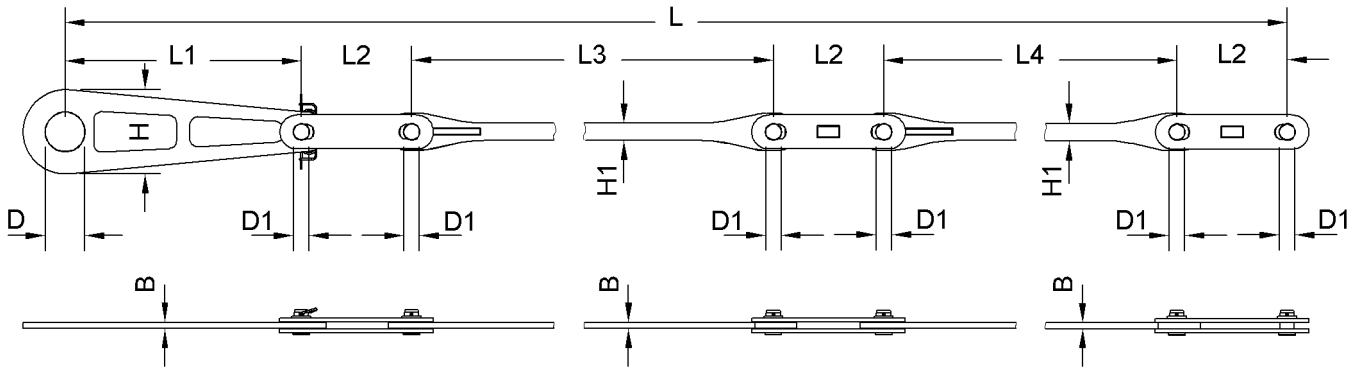


Fig. 131 Dimensions of jib pendant strap (A-frame 2 to 1507 jib head section)

Designation		Value
<b>L</b>	Length	38' 1" ft-in
<b>L1</b>	Length of the connecting link	2' 11" ft-in
<b>L2</b>	Length of the connecting link	1' 5" ft-in
<b>L3</b>	Length of the pendant strap	18' 4" ft-in
<b>L4</b>	Length of the connecting link	12' 9" ft-in
<b>B</b>	Width of pendant strap	0.87" in
<b>H</b>	Height of connecting link	1' 1" ft-in
<b>H1</b>	Height of connecting link	2.60" in
<b>D</b>	Pin $\varnothing$	5.91" in
<b>D1</b>	Pin $\varnothing$	2.17" in
Weight		428 lb

Tab. 88 Technical data for jib pendant strap (A-frame2 to 1507 jib head section)



## Additional connecting elements/1507 fixed jib spacer bracket

### Backstay strap connector on 1507 fixed jib

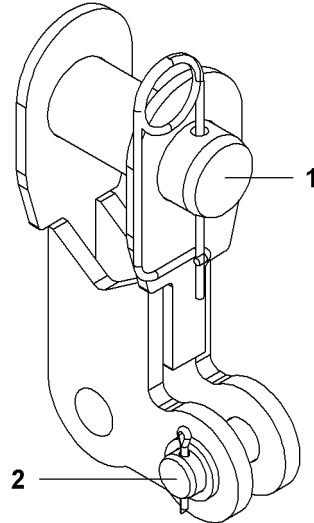


Fig. 132 Backstay strap connector on 1507 fixed jib

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

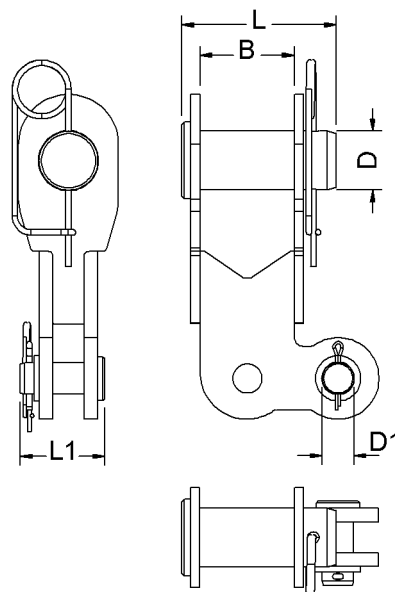


Fig. 133 Dimensions of backstay strap connector on 1507 fixed jib

Designation		Value
<b>L</b>	Length of pin	6.22" in
<b>L1</b>	Length of pins	3.35" in
<b>B</b>	Width	4.09" in

Designation		Value
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pin Ø	1.38" in

Tab. 89 Technical data for backstay strap connector on 1507 fixed jib

**Backstay strap suspension spacer on 1507 fixed jib**

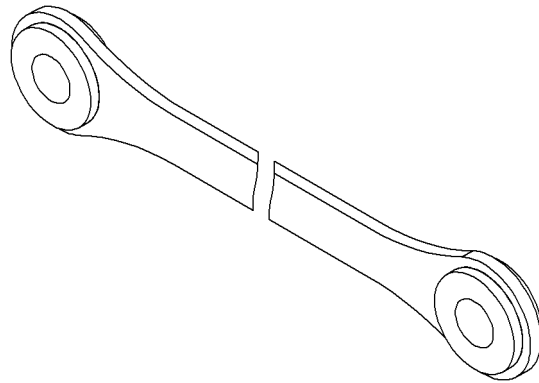


Fig. 134 Backstay strap suspension spacer on 1507 fixed jib

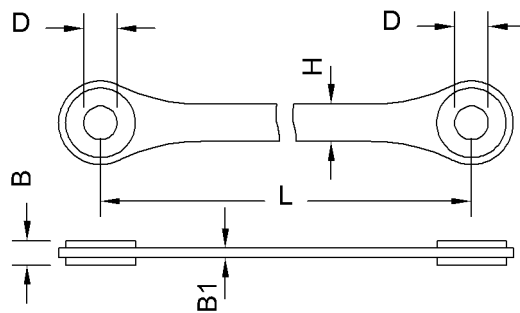


Fig. 135 Dimensions of backstay strap suspension spacer on 1507 fixed jib

Designation		Value
<b>L</b>	Spacer bracket length	4' 11" ft-in
<b>B</b>	Width	1.02" in
<b>B1</b>	Width	0.39" in
<b>H</b>	Height	1.57" in
<b>D</b>	Pin Ø	1.38" in

Tab. 90 Technical data for backstay strap suspension spacer on 1507 fixed jib

## 1.27.6 Pendant straps on 1008 fixed jib

### Pendant straps on A-frame 2

#### Equalizer on A-frame 2 (jib backstay strap)

Assembly location in crane operation:

- 1008 fixed jib (For more information see: A-frame 2 to 2821 boom head section backstay straps, page 742)

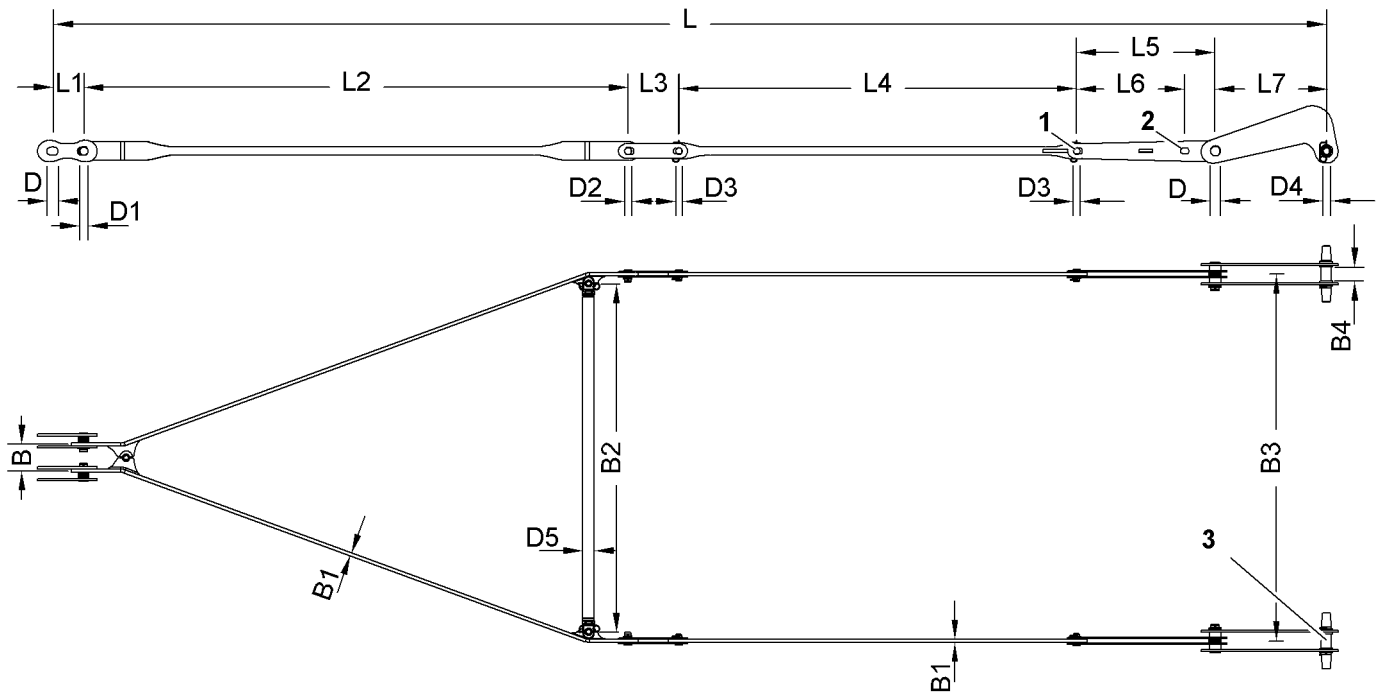


Fig. 136 Dimensions of the equalizer on A-frame 2 (jib backstay strap)

- 1 Bolting point 30 °                      2 Bolting point 15 °                      3 Double-taper pins 1' 5" ft-in/  
dia.3.15" in (2x)

The double-taper pins (1' 5" ft-in x dia.3.15" in) 3 replace the upper double-taper pins on the boom head section.

Designation		Value
L	Length	at 30 °
		32' ft-in
L1	Length of the connecting link	at 15 °
		29' 4" ft-in
L1	Length of the connecting link	9.84" in
L2	Length of crossbar	13' 8" ft-in
L3	Length of the connecting link	1' 3" ft-in
L4	Length of the pendant strap	10' ft-in
L5	Length of connecting link (30 °)	3' 6" ft-in

Designation		Value
L6	Length of connecting link (15 °)	2' 8" ft-in
L7	Length of the connecting link	2' 9" ft-in
B	Width	7.87" in
B1	Width of pendant strap	0.87" in
B2	Width 2	8' 9" ft-in
B3	Width 3	4.25" in
B4	Width4	9' 2" ft-in
H	Height of pendant strap	2.44" in
D	Pin Ø	2.56" in
D1	Pin Ø	2.36" in
D2	Pin Ø	1.97" in
D3	Pin Ø	1.77" in
D4	Double-taper pins Ø	3.15" in
D5	Spacer bar Ø	3.54" in
Weight		1,208 lb

Tab. 91 Technical data for equalizer on A-frame 2 (jib backstay strap)

## Equalizer on A-frame 2 (jib pendant strap)

Assembly location in crane operation:

- 1008 fixed jib (For more information see: [A-frame 2 to 1008 jib head section pendant straps](#), page 742)

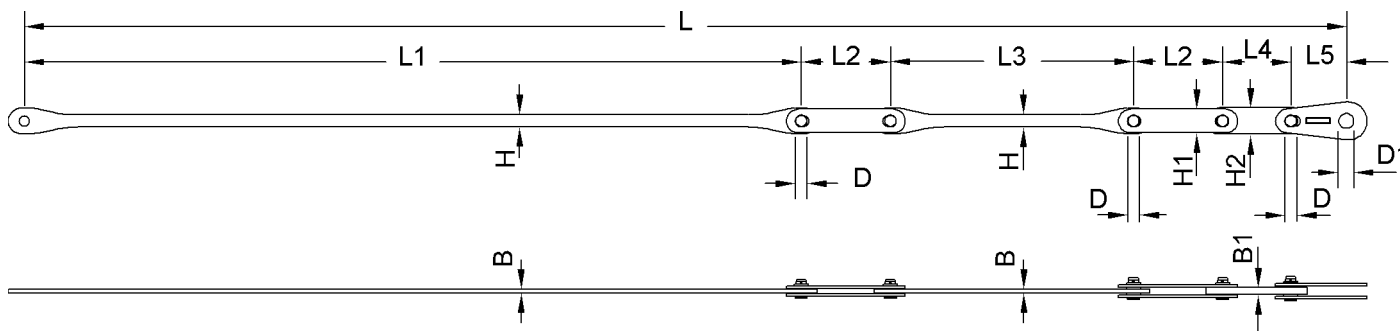


Fig. 137 Dimensions of equalizer on A-frame 2 (jib pendant strap)

Designation		Value
L	Length	19' ft-in
L1	Length of the pendant strap	11' 2" ft-in
L2	Length of the connecting link	1' 3" ft-in
L3	Length of the pendant strap	3' 6" ft-in
L4	Length of the connecting link	1' ft-in
L5	Length of the connecting link	9.57" in

Designation		Value
<b>B</b>	Width of pendant strap	0.71" in
<b>B1</b>	Width of connecting link	1.18" in
<b>H</b>	Height of pendant strap	2.13" in
<b>H1</b>	Height of connecting link	4.06" in
<b>H2</b>	Height of connecting link	4.57" in
<b>D</b>	Pin Ø	1.77" in
<b>D1</b>	Pin Ø	2.56" in
Weight		187 lb

Tab. 92 Technical data for equalizer on A-frame 2 (jib pendant strap)

## Pendant straps on 1008 jib section 10 ft

### Jib pendant strap 10 ft

This pendant strap is identical to the 10 ft jib pendant strap of the 1713 fixed jib.

Assembly location in crane operation:

- 1008 fixed jib (For more information see: [A-frame 2 to 1008 jib head section pendant straps](#), page 742)

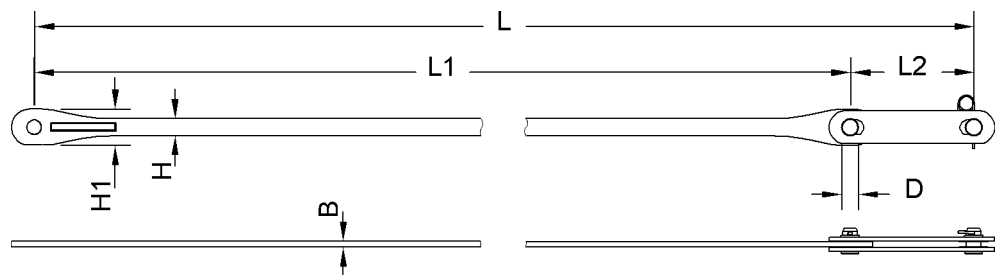


Fig. 138 Dimensions of jib pendant strap 10 ft

Designation		Value
<b>L</b>	Length	9' 10" ft-in
<b>L1</b>	Length of the pendant strap	8' 7" ft-in
<b>L2</b>	Length of the connecting link	1' 3" ft-in
<b>B</b>	Width of pendant strap	0.71" in
<b>H</b>	Height of pendant strap	2.13" in
<b>H1</b>	Height 1 of pendant strap	4.45" in
<b>D</b>	Pin Ø	1.77" in
Weight		106 lb

Tab. 93 Technical data for jib pendant strap 10 ft

## Pendant straps on 1008 jib section 20 ft

### Jib pendant strap 20 ft

This pendant strap is identical to the 20 ft jib pendant strap of the 1713 fixed jib.

Assembly location in crane operation:

- 1008 fixed jib (For more information see: [A-frame 2 to 1008 jib head section pendant straps, page 742](#))

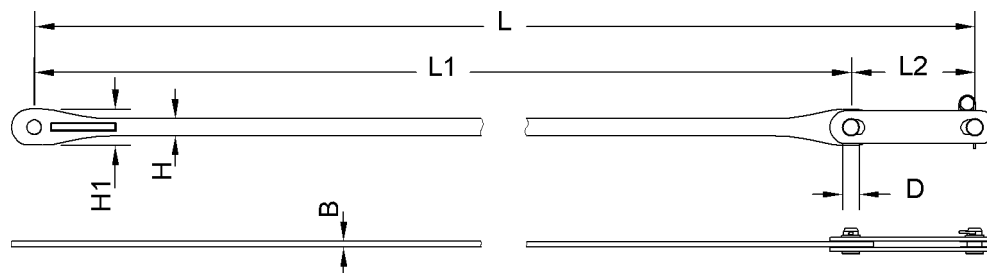


Fig. 139 Dimensions of jib pendant strap 20 ft

Designation		Value
L	Length	19' 8" ft-in
L1	Length of the pendant strap	18' 5" ft-in
L2	Length of the connecting link	1' 3" ft-in
B	Width of pendant strap	0.71" in
H	Height of pendant strap	2.13" in
H1	Height 1 of pendant strap	4.45" in
D	Pin Ø	1.77" in
Weight		128 lb

Tab. 94 Technical data for jib pendant strap 20 ft

## Pendant straps on 1008 jib head section

### Jib pendant strap on 1008 jib head section

Assembly location in crane operation:

- 1008 fixed jib (For more information see: [A-frame 2 to 1008 jib head section pendant straps, page 742](#))

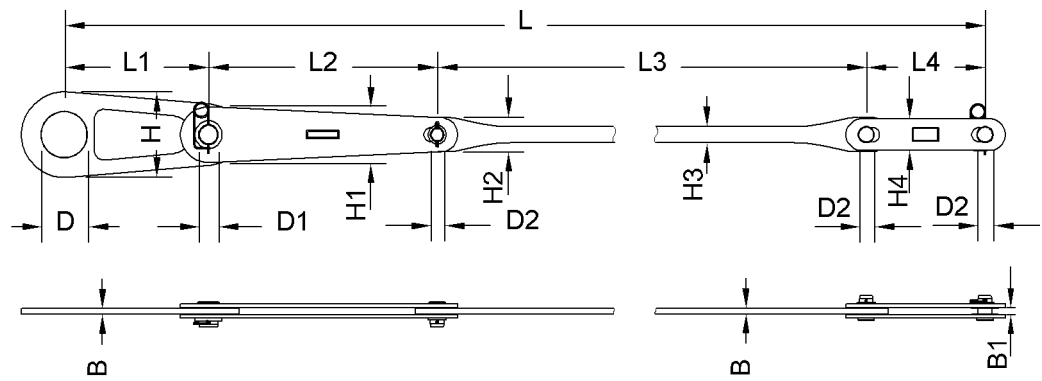


Fig. 140 Dimensions of jib pendant strap on 1008 jib head section

Designation		Value
<b>L</b>	Length	18' 1" ft-in
<b>L1</b>	Length of the connecting link	1' 7" ft-in
<b>L2</b>	Length of the connecting link	2' 6" ft-in
<b>L3</b>	Length of the pendant strap	12' 10" ft-in
<b>L4</b>	Length of the connecting link	1' 3" ft-in
<b>B</b>	Width of pendant strap	0.71" in
<b>B1</b>	Width1	0.87" in
<b>H</b>	Height of connecting link	11.02" in
<b>H1</b>	Height of connecting link	7.17" in
<b>H2</b>	Height2 of pendant strap	4.45" in
<b>H3</b>	Height of pendant strap	2.13" in
<b>H4</b>	Height of connecting link	4.06" in
<b>D</b>	Pin Ø	5.91" in
<b>D1</b>	Pin Ø	2.56" in
<b>D2</b>	Pin Ø	1.77" in
Weight		172 lb

Tab. 95 Technical data for jib pendant strap on 1008 jib head section

## 1.27.7 Pendant straps on 0906 fixed jib

### Pendant straps on A-frame 2

#### Equalizer on A-frame 2 (jib backstay strap)

This equalizer of A-frame 2 (jib backstay strap) is identical to the equalizer of A-frame 2 (jib backstay strap) of the 1713 fixed jib.

Assembly location in crane operation:

- 0906 fixed jib (For more information see: [A-frame 2 to 2821 boom head section backstay straps, page 749](#))

# Product description

Pendant straps - LR1300 (steel pendant straps)

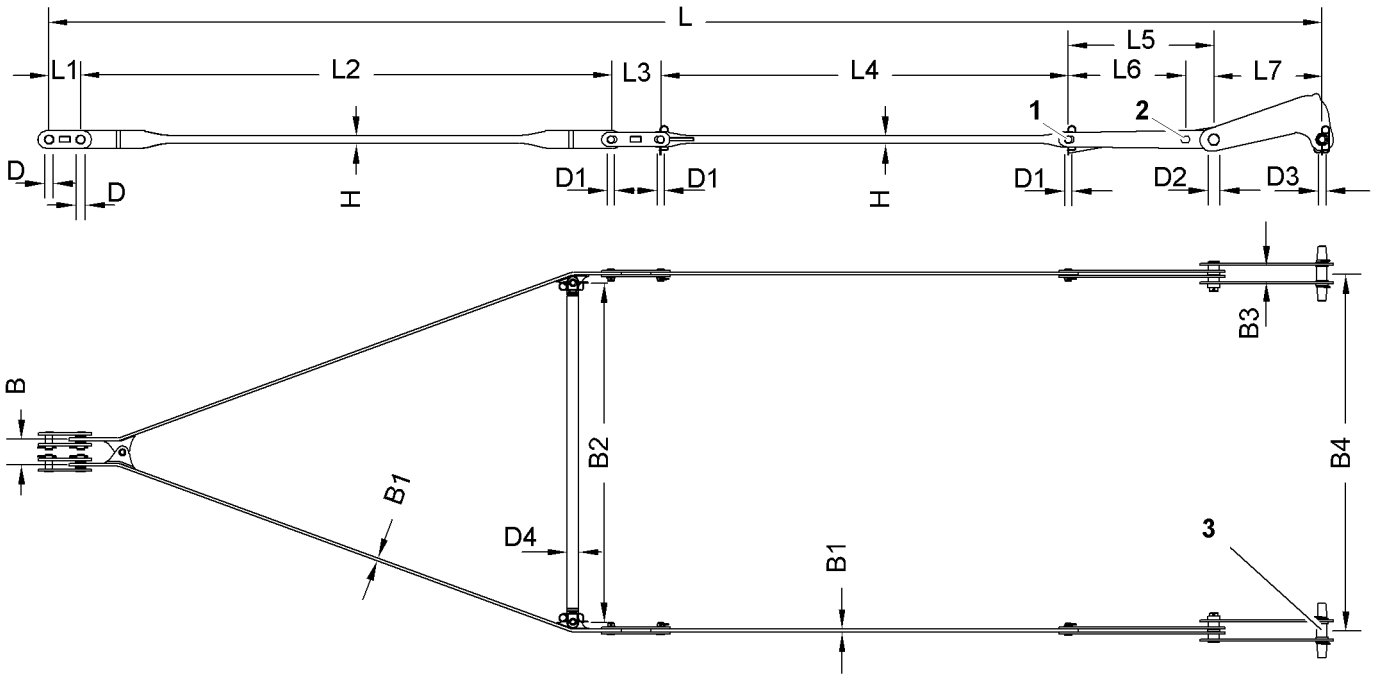


Fig. 141 Dimensions of the equalizer on A-frame 2 (jib backstay strap)

- 1 Bolting point 30 °
- 2 DO NOT use bolting point
- 3 Double-taper pins 1' 5" ft-in/  
dia.3.15" in (2x)

The double-taper pins (1' 5" ft-in x dia.3.15" in) **3** replace the upper double-taper pins on the boom head section.

Designation		Value
<b>L</b>	Length	at 30 ° 32' 10" ft-in
<b>L1</b>	Length of the connecting link	9.84" in
<b>L2</b>	Length of crossbar	13' 8" ft-in
<b>L3</b>	Length of the connecting link	1' 3" ft-in
<b>L4</b>	Length of the pendant strap	10' 6" ft-in
<b>L5</b>	Length of connecting link (30 °)	3' 9" ft-in
<b>L6</b>	Length of connecting link (DO NOT use bolting point)	3' ft-in
<b>L7</b>	Length of the connecting link	2' 9" ft-in
<b>B</b>	Width	7.87" in
<b>B1</b>	Width of pendant strap	0.87" in
<b>B2</b>	Width 2	8' 9" ft-in
<b>B3</b>	Width 3	5.20" in
<b>B4</b>	Width4	9' 2" ft-in
<b>H</b>	Height of pendant strap	2.44" in
<b>D</b>	Pin Ø	2.36" in

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Designation		Value
D1	Pin Ø	1.97" in
D2	Pin Ø	2.76" in
D3	Double-taper pins Ø	3.15" in
D4	Spacer bar Ø	3.54" in
Weight		1,283 lb

Tab. 96 Technical data for equalizer on A-frame 2 (jib backstay strap)

### Jib pendant strap (A-frame 2 to 0906 jib head section)

Assembly location in crane operation:

- 0906 fixed jib (For more information see: [A-frame 2 to 0906 jib head pendant straps, page 749](#))

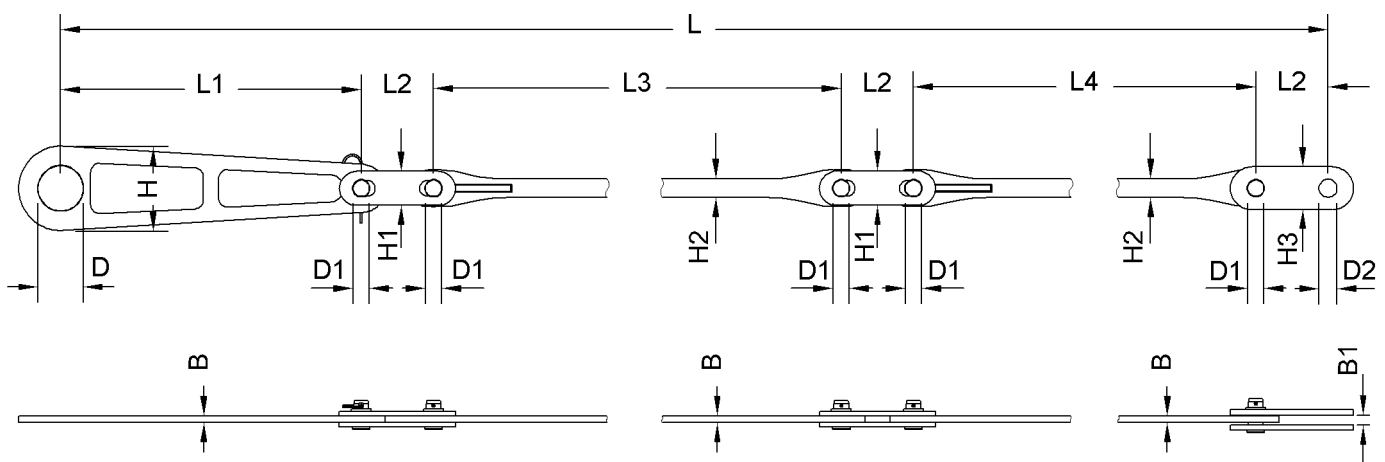


Fig. 142 Jib pendant strap dimensions (A-frame 2 to 0906 jib head)

Designation		Value
L	Length	27' ft-in
L1	Length of the connecting link	3' 3" ft-in
L2	Length of the connecting link	9.45" in
L3	Length of the pendant strap	13' 9" ft-in
L4	Length of the connecting link	7' 7" ft-in
B	Width of pendant strap	0.87" in
B1	Width	1.18" in
H	Height of connecting link	11.02" in
H1	Height of connecting link	4.45" in
H2	Height of pendant strap	2.44" in
H3	Height of connecting link	5.55" in
D	Pin Ø	5.91" in
D1	Pin Ø	1.97" in

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Designation		Value
<b>D2</b>	Pin Ø	2.36" in
Weight		295 lb

Tab. 97 Jib pendant strap technical data (A-frame 2 to 0906 jib head)

## 1.27.8 Pendant straps on 2316 luffing jib

### Pendant straps on jib base section

#### Jib pendant strap 10 ft

This pendant strap is identical to the 10 ft jib backstay strap of the 2821 main boom.

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 785](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 858](#))

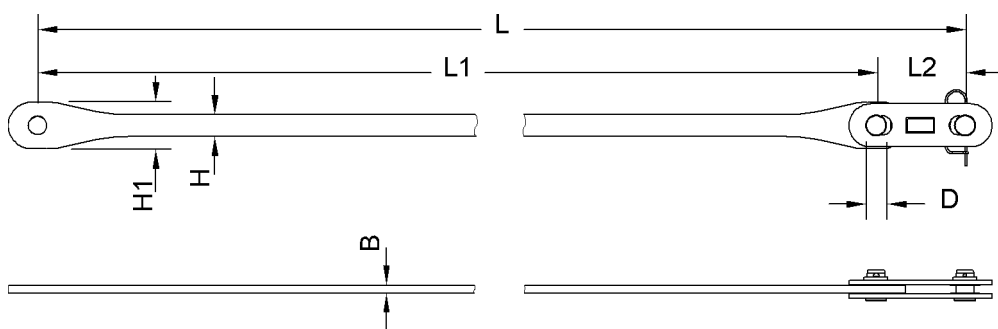


Fig. 143 Dimensions of jib pendant strap 10 ft

Designation		Value
<b>L</b>	Length	9' 10" ft-in
<b>L1</b>	Length of the pendant strap	8' 11" ft-in
<b>L2</b>	Length of the connecting link	10.63" in
<b>B</b>	Width of pendant strap	0.87" in
<b>H</b>	Height of pendant strap	2.60" in
<b>H1</b>	Height 1 of pendant strap	5.51" in
<b>D</b>	Pin Ø	2.17" in
Weight		117 lb

Tab. 98 Technical data for jib pendant strap 10 ft

## Pendant straps on A-frame 2

### Equalizer on A-frame 2 (jib backstay strap)

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 785](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 857](#))

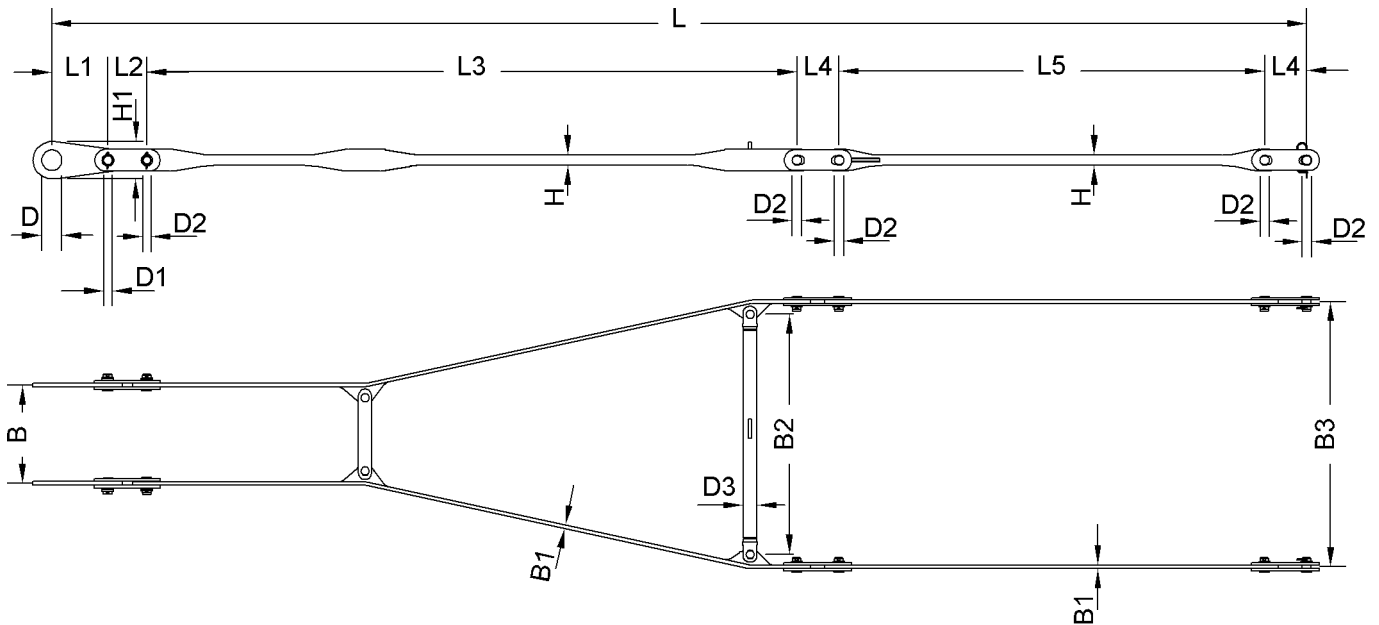


Fig. 144 Dimensions of the equalizer on A-frame 2 (jib backstay strap)

Designation		Value
<b>L</b>	Length	26' 5" ft-in
<b>L1</b>	Length of the connecting link	1' 2" ft-in
<b>L2</b>	Length of the connecting link	9.84" in
<b>L3</b>	Length of crossbar	13' 8" ft-in
<b>L4</b>	Length of the connecting link	10.63" in
<b>L5</b>	Length of the pendant strap	8' 11" ft-in
<b>B</b>	Width	2' 1" ft-in
<b>B1</b>	Width of pendant strap	0.87" in
<b>B2</b>	Width of spacer bar	5' 1" ft-in
<b>B3</b>	Width 3	5' 7" ft-in
<b>H</b>	Height of pendant strap	2.60" in
<b>H1</b>	Height of connecting link	11.06" in
<b>D</b>	Pin Ø	5.91" in
<b>D1</b>	Pin Ø	2.36" in
<b>D2</b>	Pin Ø	2.17" in

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Designation		Value
<b>D3</b>	Spacer bar Ø	3.50" in
Weight		756 lb

Tab. 99 Technical data for equalizer on A-frame 2 (jib backstay strap)

## Pendant straps on A-frame 3

### A-frame 3 equalizer (jib pendant strap)

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 785](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 858](#))

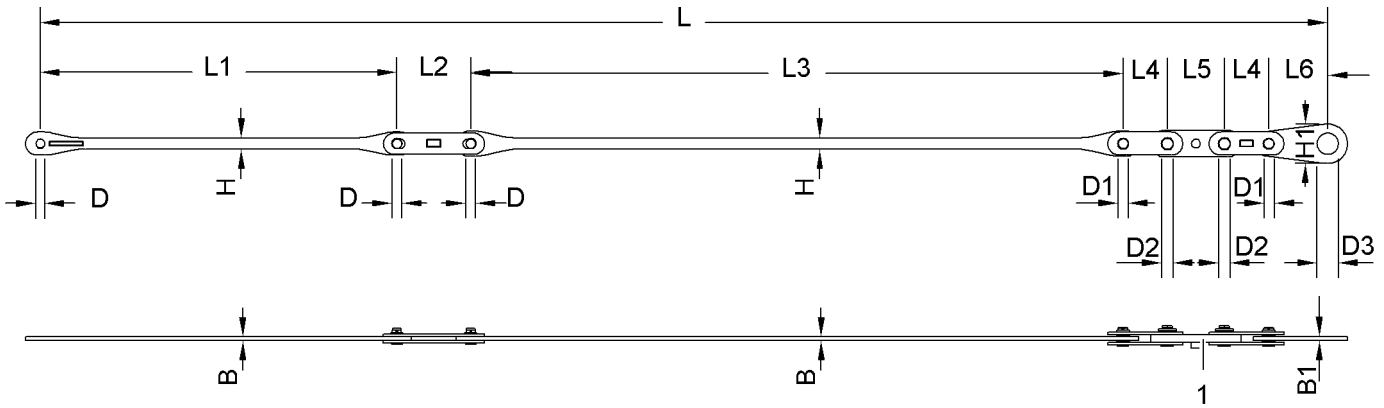


Fig. 145 Dimensions of A-frame 3 equalizer (jib pendant strap)

1 Tension load cell

Designation		Value
<b>L</b>	Length	25' 9" ft-in
<b>L1</b>	Length of the pendant strap	7' 2" ft-in
<b>L2</b>	Length of the connecting link	1' 6" ft-in
<b>L3</b>	Length of the pendant strap	13' 1" ft-in
<b>L4</b>	Length of the connecting link	10.63" in
<b>L5</b>	Length of the tension load cell	1' 2" ft-in
<b>L6</b>	Length of the connecting link	1' 2" ft-in
<b>B</b>	Width of pendant strap	0.87" in
<b>B1</b>	Width of connecting link	0.98" in
<b>H</b>	Height of pendant strap	2.60" in
<b>D</b>	Pin Ø	2.17" in
<b>D1</b>	Pin Ø	2.36" in
<b>D2</b>	Pin Ø	2.44" in

Designation		Value
<b>D3</b>	Pin Ø	5.91" in
Weight		368 lb

Tab. 100 Technical data for A-frame 3 equalizer (jib pendant strap)

## Pendant straps on 2316 jib section 10 ft

### Jib pendant strap 10 ft

This pendant strap is identical to the 10 ft jib backstay strap of the 2821 main boom.

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 785](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 858](#))

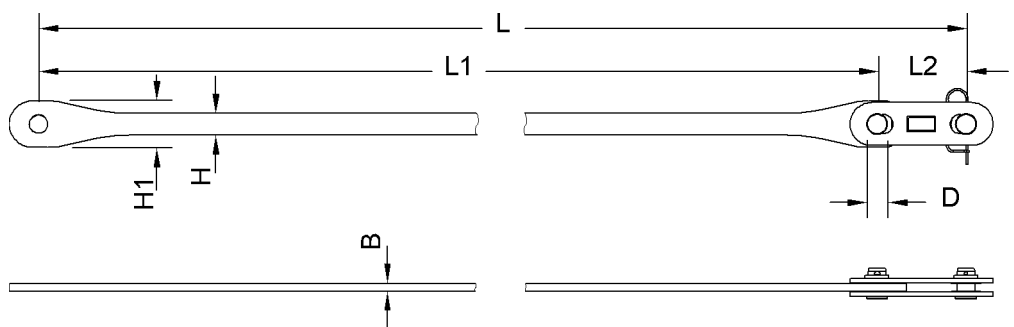


Fig. 146 Dimensions of jib pendant strap 10 ft

Designation		Value
<b>L</b>	Length	9' 10" ft-in
<b>L1</b>	Length of the pendant strap	8' 11" ft-in
<b>L2</b>	Length of the connecting link	10.63" in
<b>B</b>	Width of pendant strap	0.87" in
<b>H</b>	Height of pendant strap	2.60" in
<b>H1</b>	Height 1 of pendant strap	5.51" in
<b>D</b>	Pin Ø	2.17" in
Weight		117 lb

Tab. 101 Technical data for jib pendant strap 10 ft

## Pendant straps on 2316 jib section 20 ft

### Jib pendant strap 20 ft

This pendant strap is identical to the 20 ft jib backstay strap of the 2821 main boom.

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Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 785](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 858](#))

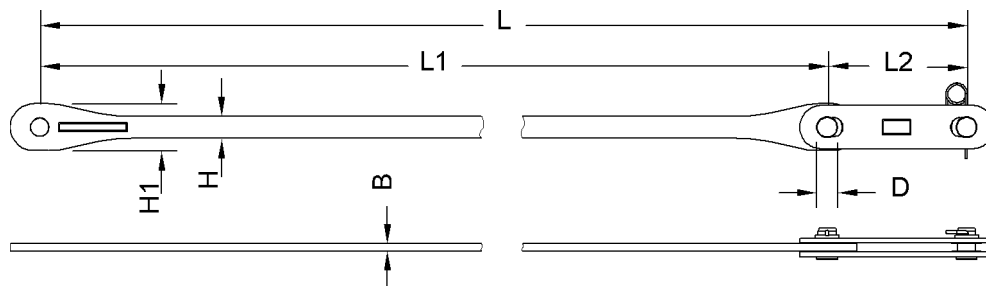


Fig. 147 Dimensions of jib pendant strap 20 ft

Designation		Value
L	Length	19' 8" ft-in
L1	Length of the pendant strap	18' 4" ft-in
L2	Length of the connecting link	1' 5" ft-in
B	Width of pendant strap	0.87" in
H	Height of pendant strap	2.60" in
H1	Height 1 of pendant strap	5.51" in
D	Pin Ø	2.17" in
Weight		196 lb

Tab. 102 Technical data for jib pendant strap 20 ft

## Pendant straps on 2316 jib section 40 ft

### Jib pendant strap 40 ft

This pendant strap is identical to the 40 ft jib backstay strap of the 2821 main boom.

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 785](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 858](#))

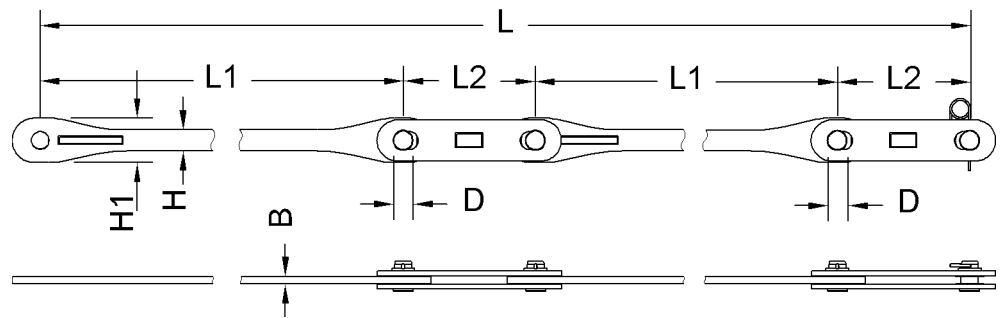


Fig. 148 Dimensions of jib pendant strap 40 ft

Designation		Value
L	Length	39' 4" ft-in
L1	Length of the pendant strap	18' 4" ft-in
L2	Length of the connecting link	1' 5" ft-in
B	Width of pendant strap	0.87" in
H	Height of pendant strap	2.60" in
H1	Height 1 of pendant strap	5.51" in
D	Pin Ø	2.17" in
Weight		392 lb

Tab. 103 Technical data for jib pendant strap 40 ft

## Pendant straps on 2316 jib head section

### Jib pendant strap on 2316 jib head section

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 785](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 858](#))

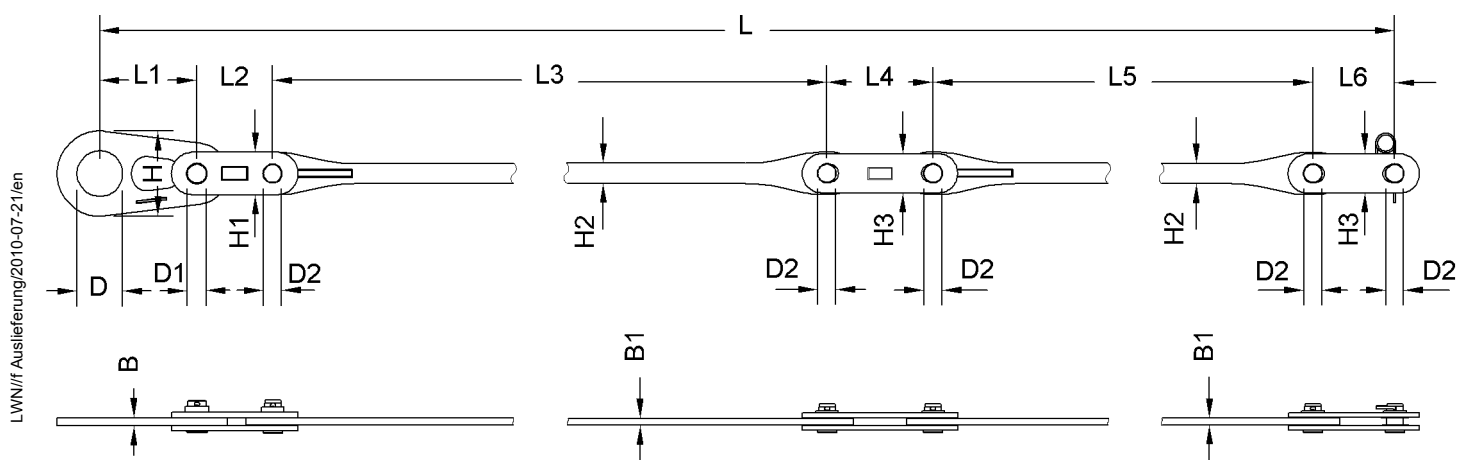


Fig. 149 Dimensions of jib pendant strap on 2316 jib head section

Designation		Value
<b>L</b>	Length	31' 2" ft-in
<b>L1</b>	Length of the connecting link	1' 1" ft-in
<b>L2</b>	Length of the connecting link	9.84" in
<b>L3</b>	Length of the pendant strap	18' 4" ft-in
<b>L4</b>	Length of the connecting link	1' 2" ft-in
<b>L5</b>	Length of the pendant strap	8' 11" ft-in
<b>L6</b>	Length of the connecting link	10.63" in
<b>B</b>	Width of connecting link	0.98" in
<b>B1</b>	Width of pendant strap	0.87" in
<b>H</b>	Height of connecting link	11.02" in
<b>H1</b>	Height of connecting link	5.12" in
<b>H2</b>	Height of pendant strap	2.60" in
<b>H3</b>	Height of connecting link	5.51" in
<b>D</b>	Pin Ø	5.91" in
<b>D1</b>	Pin Ø	2.36" in
<b>D2</b>	Pin Ø	2.17" in
Weight		716 lb

Tab. 104 Technical data for jib pendant strap on 2316 jib head section

### 1.27.9 Pendant straps on 1916 luffing jib

#### Pendant straps on A-frame 2

#### Equalizer on A-frame 2 (jib backstay strap)

Assembly location in crane operation:

- 1916 luffing jib ([For more information see: Backstay straps connecting A-frame 2 to 2821 boom base section, page 800](#))
- 1916 luffing jib + 1916 Midfall ([For more information see: Backstay straps connecting A-frame 2 to 2821 boom base section, page 867](#))



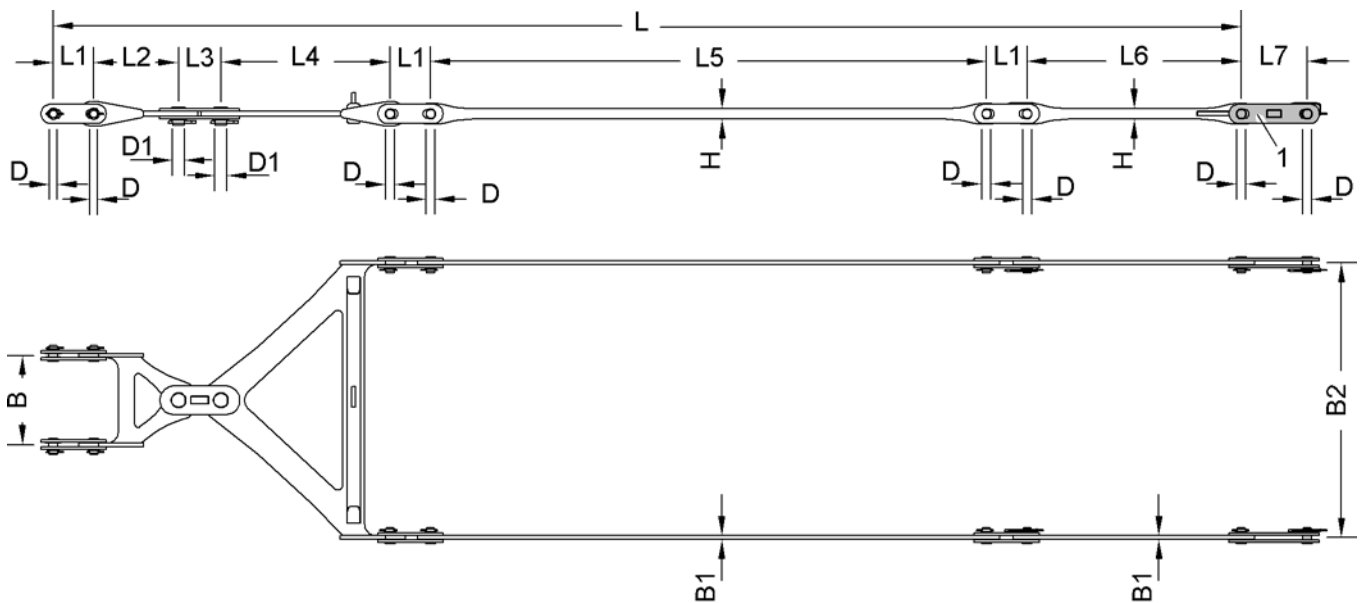


Fig. 150 Dimensions of the equalizer on A-frame 2 (jib backstay strap)

1 Connecting link

When attaching the 1916 luffing jib to an LR1300 (steel pendant straps), replace the connecting link 1 with a “connecting link (conversion kit)” (For more information see: [Connecting link \(conversion kit\), page 188](#)).

Designation		Value
L	Length	23' ft-in
L1	Length of the connecting link	9.45" in
L2	Length of rocker	1' 8" ft-in
L3	Length of connecting link	9.84" in
L4	Length of rocker	3' 3" ft-in
L5	Length of the pendant strap	10' 9" ft-in
L6	Length of the pendant strap	4' 2" ft-in
L7	Length of the connecting link	1' 3" ft-in
B	Width	1' 9" ft-in
B1	Width of pendant strap	0.87" in
B2	Width of spacer bar	5' 4" ft-in
H	Height of pendant strap	2.44" in
D	Pin Ø	1.97" in
D1	Pin Ø	2.76" in
Weight		952 lb

Tab. 105 Technical data for equalizer on A-frame 2 (jib backstay strap)

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## Pendant straps on A-frame 3

### A-frame 3 equalizer (jib pendant strap)

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 801](#))
- 1916 luffing jib + 1916 Midfall (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 868](#))

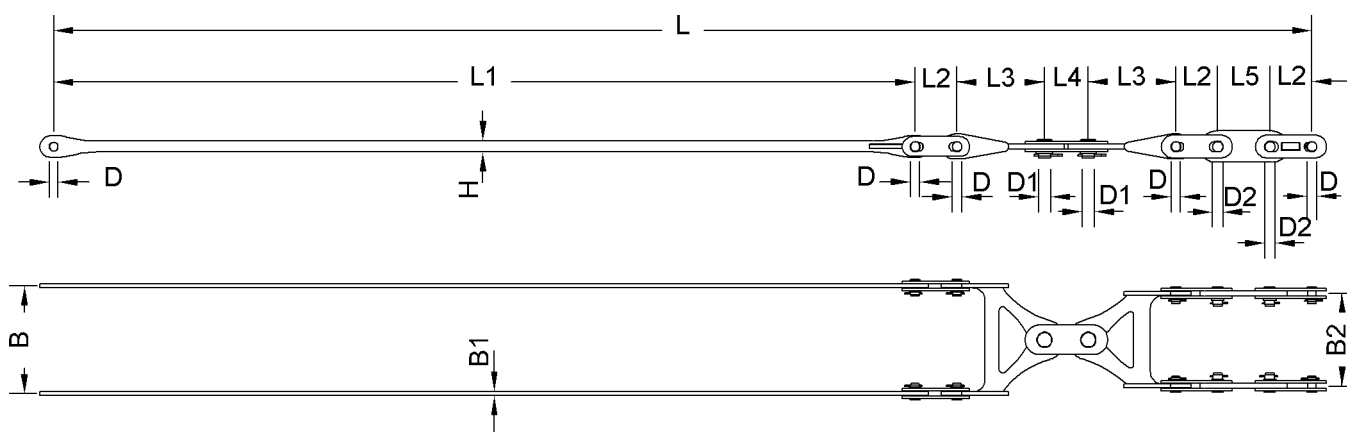


Fig. 151 Dimensions of A-frame 3 equalizer (jib pendant strap)

Designation		Value
L	Length	23' 7" ft-in
L1	Length of the pendant strap	16' 2" ft-in
L2	Length of the connecting link	9.45" in
L3	Length of rocker	1' 8" ft-in
L4	Length of the connecting link	9.84" in
L5	Length of the tension load cell	1' ft-in
B	Width	2' ft-in
B1	Width of pendant strap	0.87" in
B2	Width	1' 9" ft-in
H	Height of pendant strap	2.44" in
D	Pin Ø	1.97" in
D1	Pin Ø	2.76" in
D2	Pin Ø	2.17" in
Weight		666 lb

Tab. 106 Technical data for A-frame 3 equalizer (jib pendant strap)

## Pendant straps on 1916 jib section 10 ft

### Jib pendant strap 10 ft

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 801](#))
- 1916 luffing jib + 1916 Midfall (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 868](#))

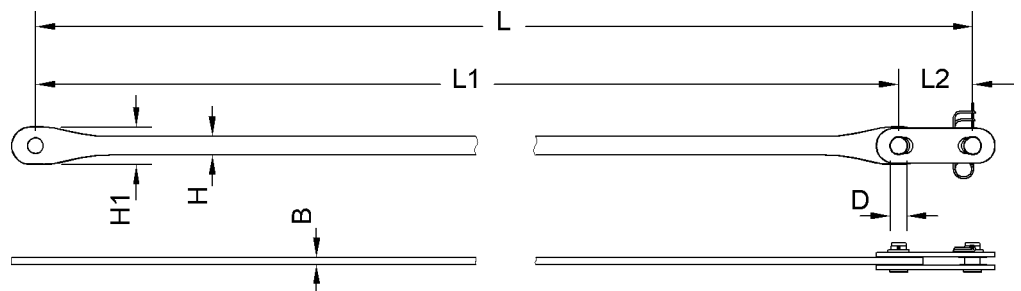


Fig. 152 Dimensions of jib pendant strap 10 ft

Designation		Value
L	Length	9' 10" ft-in
L1	Length of the pendant strap	9' 1" ft-in
L2	Length of the connecting link	9.45" in
B	Width of pendant strap	0.87" in
H	Height of pendant strap	2.44" in
H1	Height 1 of pendant strap	4.72" in
D	Pin Ø	1.97" in
Weight		101 lb

Tab. 107 Technical data for jib pendant strap 10 ft

## Pendant straps on 1916 jib section 20 ft

### Jib pendant strap 20 ft

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 801](#))
- 1916 luffing jib + 1916 Midfall (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 868](#))

# Product description

Pendant straps - LR1300 (steel pendant straps)

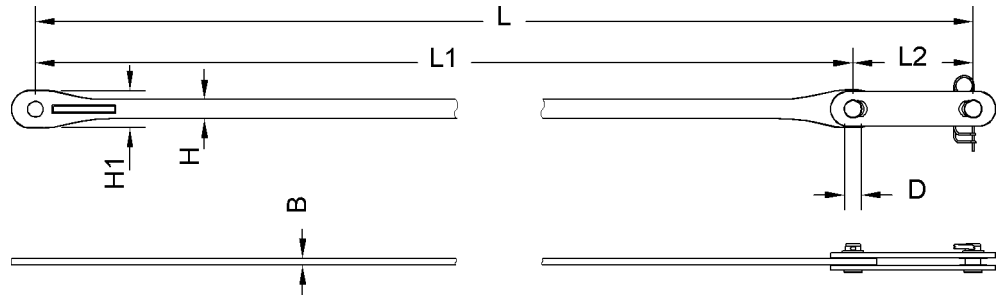


Fig. 153 Dimensions of jib pendant strap 20 ft

Designation		Value
L	Length	19' 8" ft-in
L1	Length of the pendant strap	18' 5" ft-in
L2	Length of the connecting link	1' 3" ft-in
B	Width of pendant strap	0.87" in
H	Height of pendant strap	2.44" in
H1	Height 1 of pendant strap	4.72" in
D	Pin Ø	1.97" in
Weight		176 lb

Tab. 108 Technical data for jib pendant strap 20 ft

## Pendant straps on 1916 jib section 40 ft

### Jib pendant strap 40 ft

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 801](#))
- 1916 luffing jib + 1916 Midfall (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 868](#))

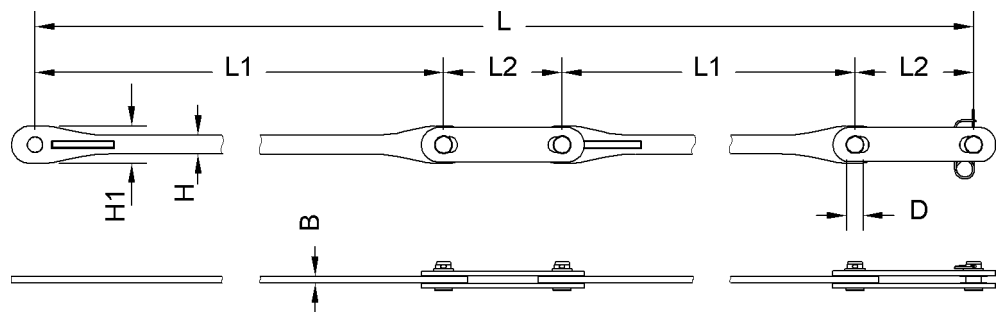


Fig. 154 Dimensions of jib pendant strap 40 ft

Designation		Value
L	Length	39' 4" ft-in

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Designation		Value
L1	Length of the pendant strap	18' 5" ft-in
L2	Length of the connecting link	1' 3" ft-in
B	Width of pendant strap	0.87" in
H	Height of pendant strap	2.44" in
H1	Height 1 of pendant strap	4.72" in
D	Pin Ø	1.97" in
Weight		353 lb

Tab. 109 Technical data for jib pendant strap 40 ft

## Pendant straps on 1916 jib head section

### Jib pendant strap on 1916 jib head section

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 801](#))
- 1916 luffing jib + 1916 Midfall (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 868](#))

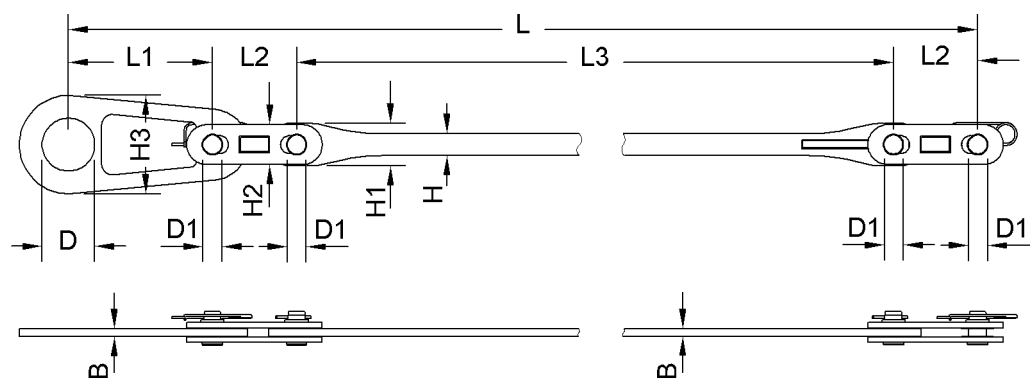


Fig. 155 Dimensions of jib pendant strap on 1916 jib head section

Designation		Value
L	Length	21' 4" ft-in
L1	Length of the connecting link	1' 4" ft-in
L2	Length of the connecting link	9.45" in
L3	Length of the pendant strap	20' ft-in
B	Width of pendant strap	0.87" in
H	Height of pendant strap	2.44" in
H1	Height 1 of pendant strap	4.80" in
H2	Height of connecting link	4.45" in
H3	Height of connecting link	9.45" in
D	Pin Ø	5.91" in

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Designation		Value
<b>D1</b>	Pin Ø	1.97" in
Weight		209 lb

Tab. 110 Technical data for jib pendant strap on 1916 jib head section

## Additional pendant straps/connecting links for 1916 luffing jib

### Connecting link (conversion kit)

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 800](#))
- 1916 luffing jib + 1916 Midfall (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 867](#))

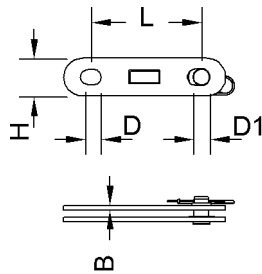


Fig. 156 Dimensions of connecting link (conversion kit)

Designation		Value
<b>L</b>	Length of the connecting link	1' 3" ft-in
<b>B</b>	Width of connecting link	0.59" in
<b>H</b>	Height of connecting link	5.12" in
<b>D</b>	Pin Ø	1.97" in
<b>D1</b>	Pin Ø	2.17" in
Weight		36.38 lb

Tab. 111 Technical data for connecting link (conversion kit)

## 1.27.10 Pendant straps on the 2316 Midfall

### Midfall connecting link

Assembly location in crane operation:

- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 858](#))

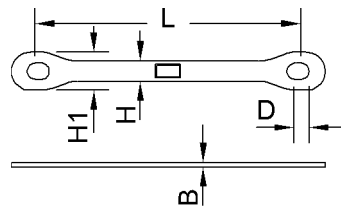


Fig. 157 Dimensions of Midfall connecting link

The Midfall connecting link replaces the first connecting link of the first jib pendant strap 40 ft beyond the Midfall assembly position.

Designation		Value
L	Length of the connecting link	3' ft-in
B	Width of connecting link	0.59" in
H	Height of connecting link	2.76" in
H1	Height of connecting link	5.12" in
D	Pin Ø	2.17" in
Weight		5.51 lb

Tab. 112 Technical data for Midfall connecting link

## 1.27.11 Pendant straps on the 1916 Midfall

### Midfall connecting link

Assembly location in crane operation:

- 1916 luffing jib + 1916 Midfall ([For more information see: Pendant straps linking A-frame 3 to 1916 jib head section, page 868](#))

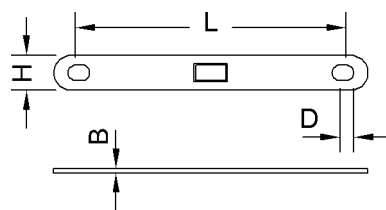


Fig. 158 Dimensions of Midfall connecting link

The Midfall connecting link replaces the first connecting link of the first jib pendant strap 40 ft beyond the Midfall assembly position.

Designation		Value
L	Length of the connecting link	2' 11" ft-in
B	Width of connecting link	0.59" in
H	Height of connecting link	4.49" in
D	Pin Ø	1.97" in

## Product description

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Pendant straps - LR1300 (steel pendant straps)

Designation	Value
Weight	7.05 lb

*Tab. 113 Technical data for Midfall connecting link*



## 1.28 Pendant straps - LR1300 (carbon-fibre pendant straps)

This section deals with all the pendant straps that are used on an LR1300 (carbon-fibre pendant straps). They are arranged according to the transport position of the pendant straps.

### 1.28.1 Pendant straps on A-frame 1

#### A-frame 1 equalizer

Assembly location in crane operation:

- 2821 main boom (For more information see: A-frame 1 to 2821 boom head section pendant straps, page 649)

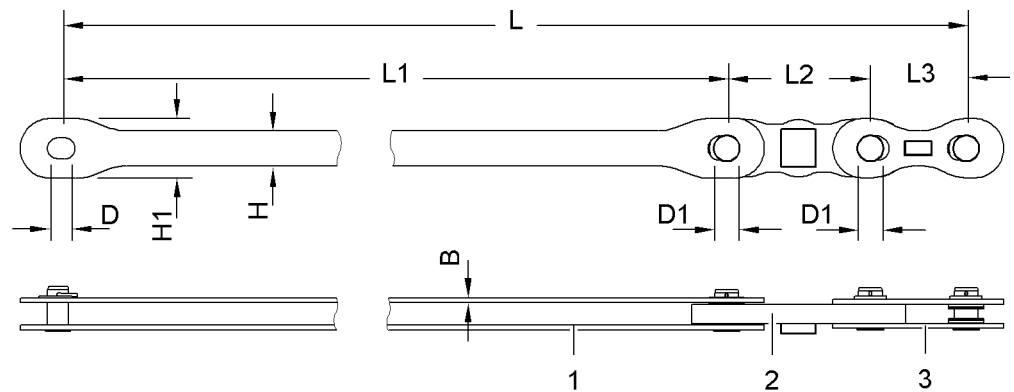


Fig. 159 Dimensions of equalizer on A-frame 1

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

Designation	Value	
<b>L</b> Length	12' 2" ft-in	
<b>L1</b> Length of the pendant strap	9' 8" ft-in	
<b>L2</b> Length of the tension load cell	1' 6" ft-in	
<b>L3</b> Length of the connecting link	1' ft-in	
<b>B</b> Width of pendant strap	0.59" in	
<b>H</b> Height of pendant strap	4.33" in	
<b>H1</b> Height 1 of pendant strap	7.28" in	
<b>D</b> Pin Ø	2.56" in	
<b>D1</b> Pin Ø	2.95" in	
Weight	269 lb	

Tab. 114 Technical data for equalizer of A-frame 1

## 1.28.2 Pendant straps on 2821 main boom

### Pendant straps on the 2821 boom base section

#### Equalizer of 2821 boom base section

Assembly location in crane operation:

- 2821 main boom (For more information see: A-frame 1 to 2821 boom head section pendant straps, page 649)
- 2821 main boom + 2821/2316 reducing piece (For more information see: A-frame 1 to 2316 boom head section pendant straps, page 712)

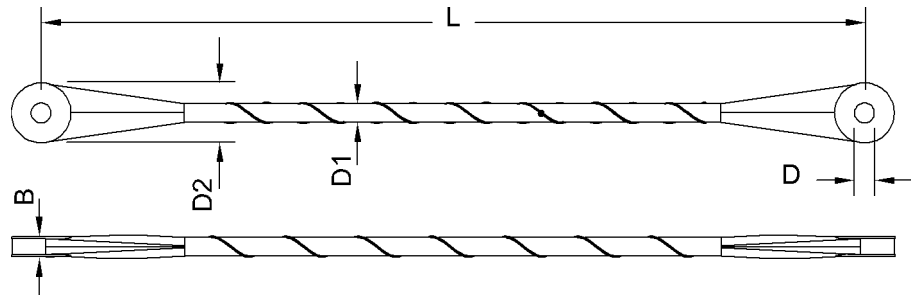


Fig. 160 Dimensions of equalizer of 2821 boom base section

Designation		Value
L	Length of the pendant strap	8' 10" ft-in
B	Width	2.60" in
D	Pin Ø	2.56" in
D1	Pendant strap Ø	2.36" in
D2	Pendant strap Ø	7.72" in
Weight		63.93 lb

Tab. 115 Technical data for equalizer of 2821 boom base section

#### Connecting link

Assembly location in crane operation:

- 1507 fixed jib (For more information see: Backstay straps connecting A-frame 2 to 2821 boom base section, page 734)
- 2316 luffing jib (For more information see: Backstay straps connecting A-frame 2 to 2821 boom base section, page 787)
- 1916 luffing jib (For more information see: Backstay straps connecting A-frame 2 to 2821 boom base section, page 802)
- 2316 luffing jib + 2316 Midfall (For more information see: Backstay straps connecting A-frame 2 to 2821 boom base section, page 859)

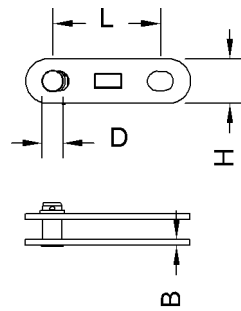


Fig. 161 Dimensions of connecting link

Designation		Value
L	Length of the connecting link	1' 2" ft-in
B	Width of connecting link	0.71" in
H	Height of connecting link	5.51" in
D	Pin Ø	2.36" in
Weight		13.23 lb

Tab. 116 Technical data for connecting link

## Pendant straps on 2821 boom section 10 ft

### Main boom pendant strap 10 ft

#### Generation A of main boom pendant strap 10 ft

Assembly location in crane operation:

- 2821 main boom (For more information see: A-frame 1 to 2821 boom head section pendant straps, page 649)
- 2821 main boom + 2821/2316 reducing piece (For more information see: A-frame 1 to 2316 boom head section pendant straps, page 712)

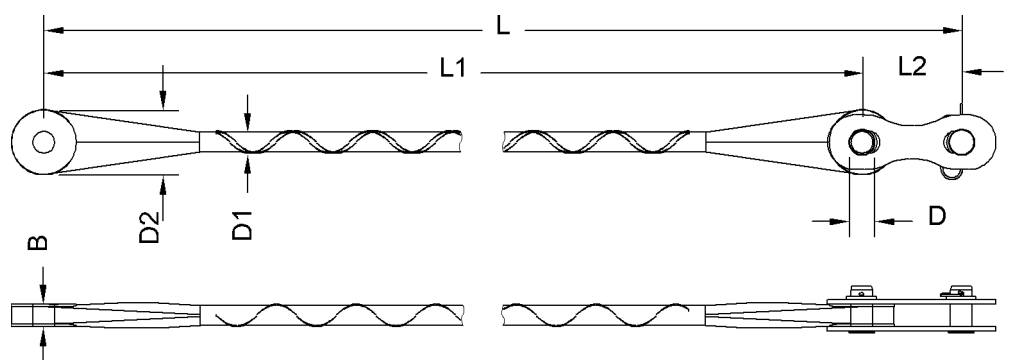


Fig. 162 Dimensions of main boom pendant strap 10 ft

Designation		Value
L	Length	9' 10" ft-in
L1	Length of the pendant strap	8' 10" ft-in

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Designation		Value
<b>L2</b>	Length of the connecting link	1' ft-in
<b>B</b>	Width	2.60" in
<b>D</b>	Pin Ø	2.56" in
<b>D1</b>	Pendant strap Ø	2.36" in
<b>D2</b>	Pendant strap Ø	7.72" in
Weight		112 lb

Tab. 117 Technical data for main boom pendant strap 10 ft

**Generation B of main boom pendant strap 10 ft:**

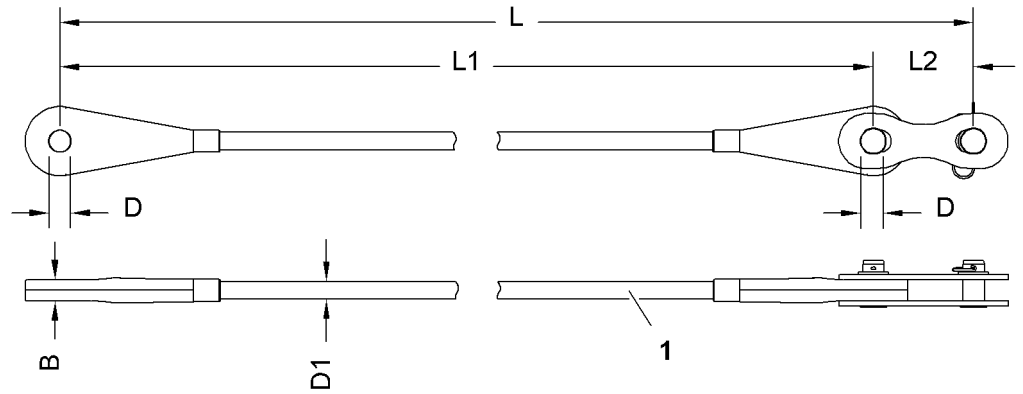


Fig. 163 Dimensions of main boom pendant strap 10 ft

- 1 Wire mesh hose as protective sheath

Designation		Value
<b>L</b>	Length	9' 10" ft-in
<b>L1</b>	Length of the pendant strap	8' 10" ft-in
<b>L2</b>	Length of the connecting link	1' ft-in
<b>B</b>	Width	2.48" in
<b>D</b>	Pin Ø	2.56" in
<b>D1</b>	Pendant strap Ø	2.05" in
Weight		112 lb

Tab. 118 Technical data for main boom pendant strap 10 ft

**Jib backstay strap 10 ft**

**Generation A of jib backstay strap 10 ft:**

This backstay strap is identical to the 10 ft jib pendant strap of the 2316 luffing jib and the 10 ft jib pendant strap of the 1916 luffing jib.

Assembly location in crane operation:

- 1507 fixed jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 734](#))

- 2316 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 787](#))
- 1916 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 802](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 859](#))

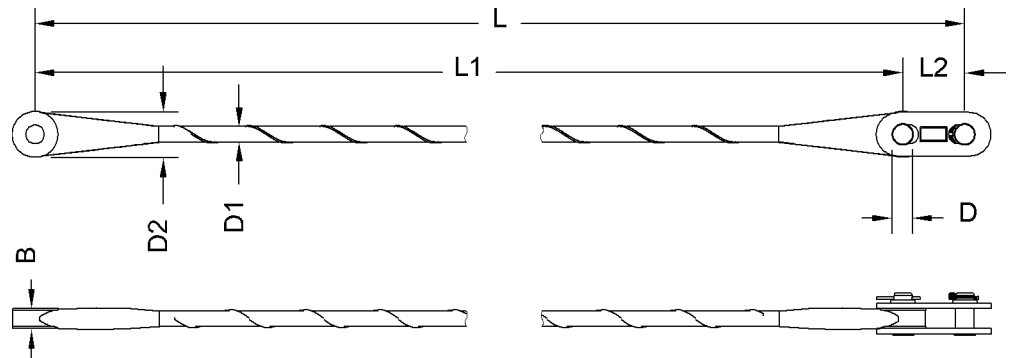


Fig. 164 Dimensions of jib backstay strap 10 ft

Designation		Value
L	Length	9' 10" ft-in
L1	Length of the pendant strap	9' 2" ft-in
L2	Length of the connecting link	7.87" in
B	Width	2.52" in
D	Pin Ø	2.36" in
D1	Pendant strap Ø	1.97" in
D2	Pendant strap Ø	5.83" in
Weight		77.16 lb

Tab. 119 Technical data for jib backstay strap 10 ft

**Generation B of jib backstay strap 10 ft:**

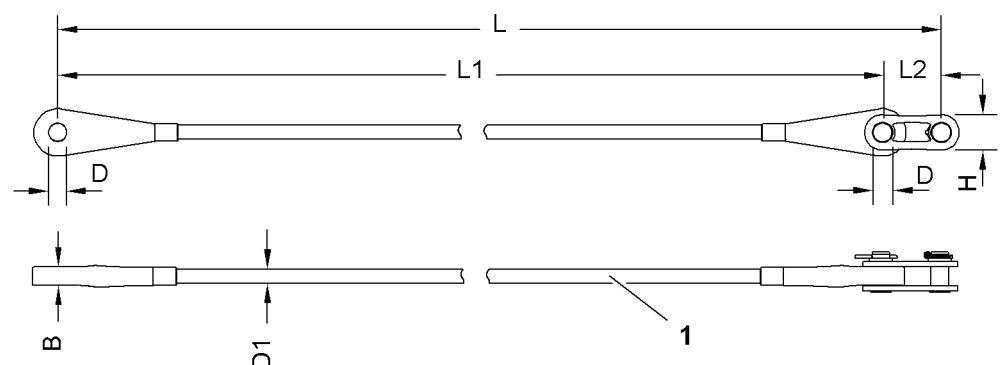


Fig. 165 Dimensions of jib backstay strap 10 ft

- 1 Wire mesh hose as protective sheath

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Designation		Value
<b>L</b>	Length	9' 10" ft-in
<b>L1</b>	Length of the pendant strap	9' 2" ft-in
<b>L2</b>	Length of the connecting link	7.87" in
<b>B</b>	Width	2.48" in
<b>H</b>	Height of connecting link	4.76" in
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pendant strap Ø	1.89" in
Weight		57.32 lb

Tab. 120 Technical data for jib backstay strap 10 ft

## Pendant straps on 2821 boom section 20 ft

### Main boom pendant strap 20 ft

#### Generation A of main boom pendant strap 20 ft

Assembly location in crane operation:

- 2821 main boom (For more information see: A-frame 1 to 2821 boom head section pendant straps, page 649)
- 2821 main boom + 2821/2316 reducing piece (For more information see: A-frame 1 to 2316 boom head section pendant straps, page 712)

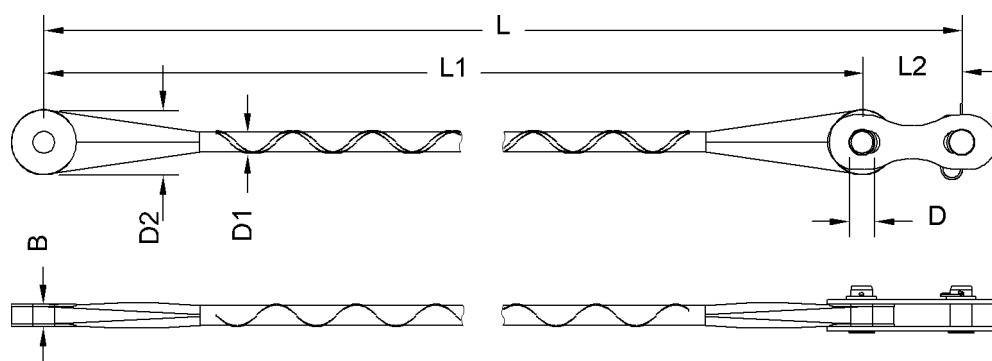


Fig. 166 Dimensions of main boom pendant strap 20 ft

Designation		Value
<b>L</b>	Length	19' 8" ft-in
<b>L1</b>	Length of the pendant strap	18' 8" ft-in
<b>L2</b>	Length of the connecting link	1' ft-in
<b>B</b>	Width	2.60" in
<b>D</b>	Pin Ø	2.56" in
<b>D1</b>	Pendant strap Ø	2.36" in
<b>D2</b>	Pendant strap Ø	7.72" in

Designation	Value
Weight	137 lb

Tab. 121 Technical data for main boom pendant strap 20 ft

**Generation B of main boom pendant strap 20 ft:**

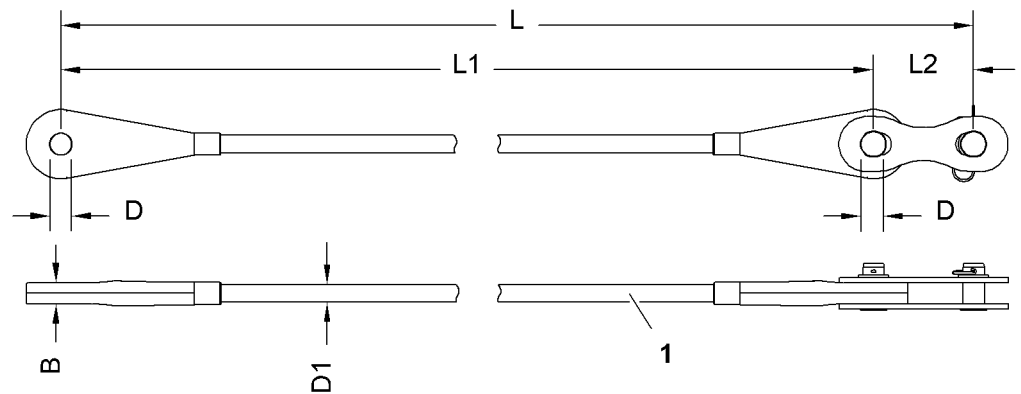


Fig. 167 Dimensions of main boom pendant strap 20 ft

- 1 Wire mesh hose as protective sheath

Designation	Value
<b>L</b> Length	19' 8" ft-in
<b>L1</b> Length of the pendant strap	18' 8" ft-in
<b>L2</b> Length of the connecting link	1' ft-in
<b>B</b> Width	2.48" in
<b>D</b> Pin Ø	2.56" in
<b>D1</b> Pendant strap Ø	2.05" in
Weight	137 lb

Tab. 122 Technical data for main boom pendant strap 20 ft

**Jib backstay strap 20 ft**

**Generation A of jib backstay strap 20 ft:**

This backstay strap is identical to the 20 ft jib pendant strap of the 2316 luffing jib and the 20 ft jib pendant strap of the 1916 luffing jib.

Assembly location in crane operation:

- 1507 fixed jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 734](#))
- 2316 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 787](#))
- 1916 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 802](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 859](#))

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# Product description

Pendant straps - LR1300 (carbon-fibre pendant straps)

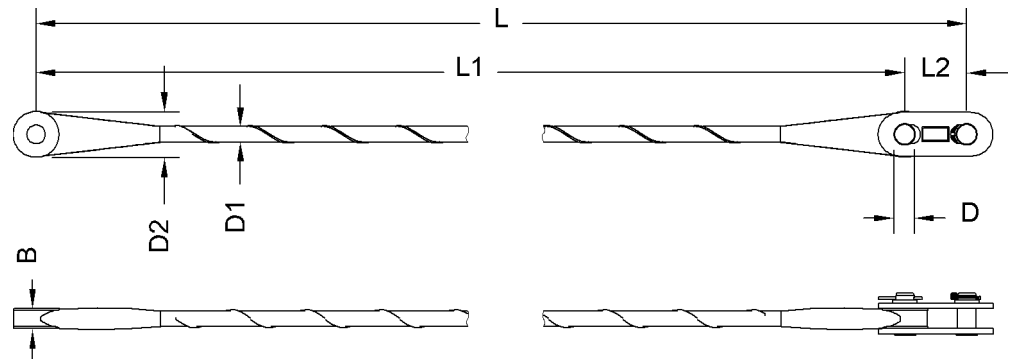


Fig. 168 Dimensions of jib backstay strap 20 ft

Designation		Value
<b>L</b>	Length	19' 8" ft-in
<b>L1</b>	Length of the pendant strap	19' ft-in
<b>L2</b>	Length of the connecting link	7.87" in
<b>B</b>	Width	2.52" in
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pendant strap Ø	1.97" in
<b>D2</b>	Pendant strap Ø	5.83" in
Weight		94.80 lb

Tab. 123 Technical data for jib backstay strap 20 ft

## Generation B of jib backstay strap 20 ft:

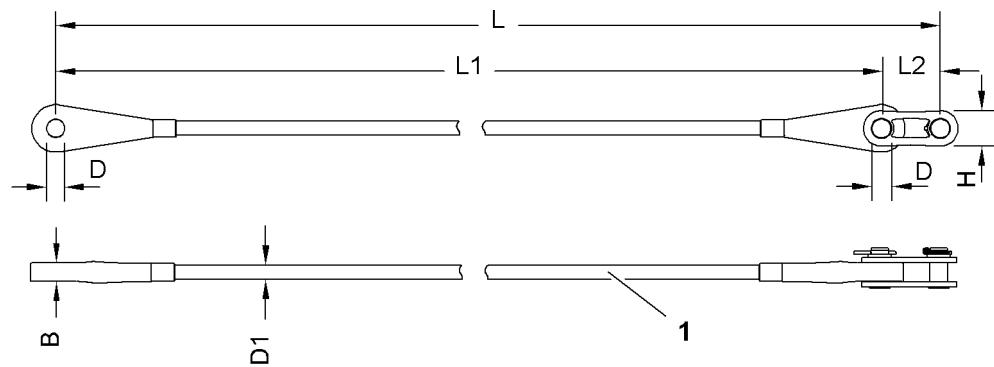


Fig. 169 Dimensions of jib backstay strap 20 ft

- 1 Wire mesh hose as protective sheath

Designation		Value
<b>L</b>	Length	19' 8" ft-in
<b>L1</b>	Length of the pendant strap	19' ft-in
<b>L2</b>	Length of the connecting link	7.87" in

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Designation		Value
<b>B</b>	Width	2.48" in
<b>H</b>	Height of connecting link	4.76" in
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pendant strap Ø	1.89" in
Weight		70.55 lb

Tab. 124 Technical data for jib backstay strap 20 ft

## Pendant straps on 2821 boom section 40 ft

### Main boom pendant strap 40 ft

#### Generation A of main boom pendant strap 40 ft

Assembly location in crane operation:

- 2821 main boom (For more information see: A-frame 1 to 2821 boom head section pendant straps, page 649)
- 2821 main boom + 2821/2316 reducing piece (For more information see: A-frame 1 to 2316 boom head section pendant straps, page 712)

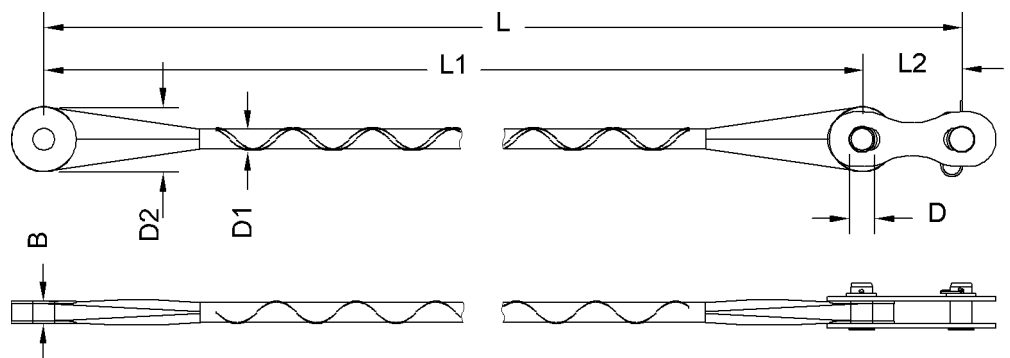


Fig. 170 Dimensions of main boom pendant strap 40 ft

Designation		Value
<b>L</b>	Length	39' 4" ft-in
<b>L1</b>	Length of the pendant strap	38' 5" ft-in
<b>L2</b>	Length of the connecting link	1' ft-in
<b>B</b>	Width	2.60" in
<b>D</b>	Pin Ø	2.56" in
<b>D1</b>	Pendant strap Ø	2.36" in
<b>D2</b>	Pendant strap Ø	7.72" in
Weight		187 lb

Tab. 125 Technical data for main boom pendant strap 40 ft

#### Generation B of main boom pendant strap 20 ft:

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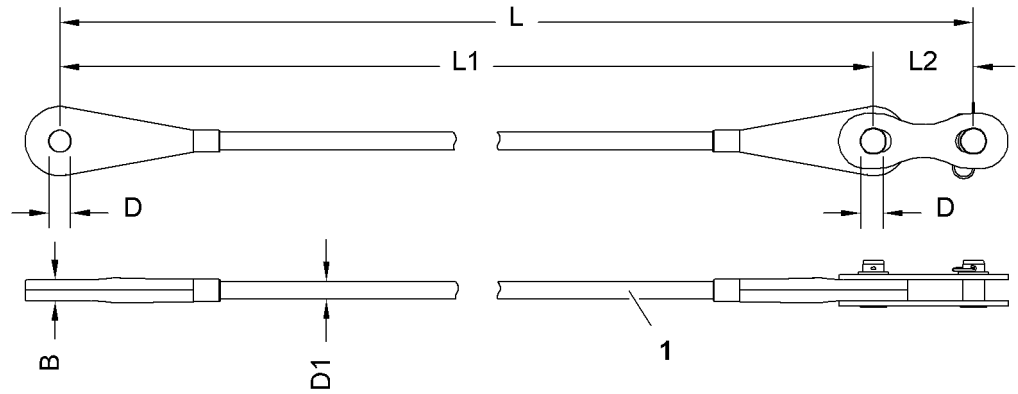


Fig. 171 Dimensions of main boom pendant strap 40 ft

- 1 Wire mesh hose as protective sheath

Designation		Value
L	Length	39' 4" ft-in
L1	Length of the pendant strap	38' 5" ft-in
L2	Length of the connecting link	1' ft-in
B	Width	2.48" in
D	Pin Ø	2.56" in
D1	Pendant strap Ø	2.05" in
Weight		187 lb

Tab. 126 Technical data for main boom pendant strap 40 ft

### Jib backstay strap 40 ft

#### Generation A of jib backstay strap 40 ft:

This backstay strap is identical to the 40 ft jib pendant strap of the 2316 luffing jib and the 40 ft jib pendant strap of the 1916 luffing jib.

Assembly location in crane operation:

- 1507 fixed jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 734](#))
- 2316 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 787](#))
- 1916 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 802](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 859](#))

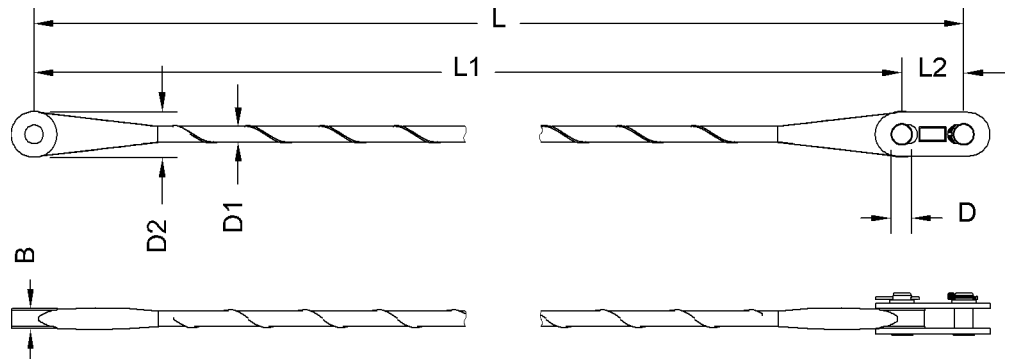


Fig. 172 Dimensions of jib backstay strap 40 ft

Designation		Value
<b>L</b>	Length	39' 4" ft-in
<b>L1</b>	Length of the pendant strap	38' 9" ft-in
<b>L2</b>	Length of the connecting link	7.87" in
<b>B</b>	Width	2.52" in
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pendant strap Ø	1.97" in
<b>D2</b>	Pendant strap Ø	5.83" in
Weight		132 lb

Tab. 127 Technical data for jib backstay strap 40 ft

**Generation B of jib backstay strap 40 ft:**

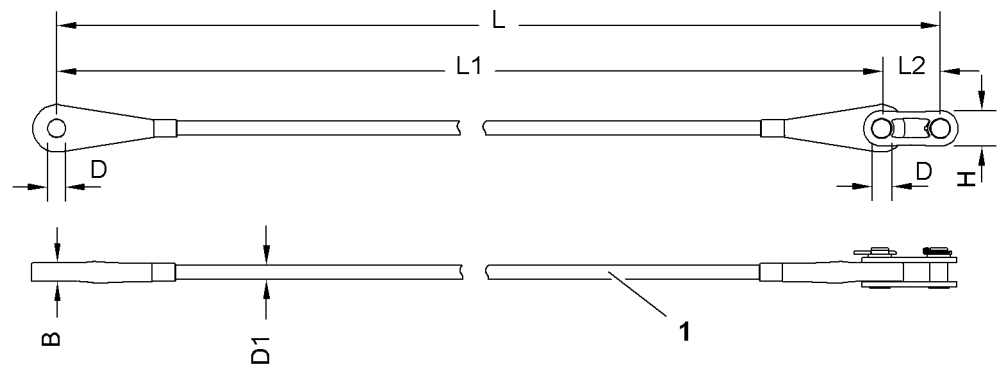


Fig. 173 Dimensions of jib backstay strap 40 ft

- 1 Wire mesh hose as protective sheath

Designation		Value
<b>L</b>	Length	39' 4" ft-in
<b>L1</b>	Length of the pendant strap	38' 9" ft-in
<b>L2</b>	Length of the connecting link	7.87" in

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Designation		Value
<b>B</b>	Width	2.48" in
<b>H</b>	Height of connecting link	4.76" in
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pendant strap Ø	1.89" in
Weight		94.80 lb

Tab. 128 Technical data for jib backstay strap 40 ft

## Pendant straps on 2821 boom head section

### Main boom pendant strap on 2821 boom head section

Assembly location in crane operation:

- 2821 main boom (For more information see: [A-frame 1 to 2821 boom head section pendant straps](#), page 649)

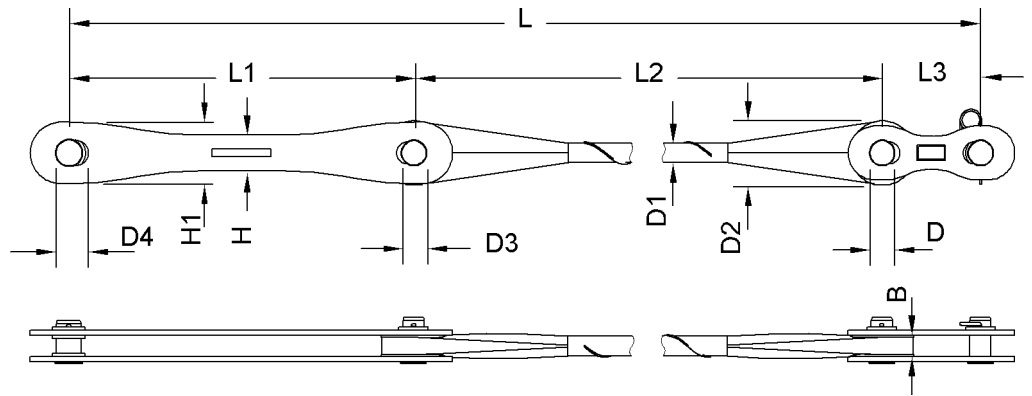


Fig. 174 Dimensions of main boom pendant strap on 2821 boom head section

Designation		Value
<b>L</b>	Length	20' 8" ft-in
<b>L1</b>	Length of the connecting link	3' 5" ft-in
<b>L2</b>	Length of the pendant strap	16' 3" ft-in
<b>L3</b>	Length of the connecting link	1' ft-in
<b>B</b>	Width of pendant strap	2.60" in
<b>H</b>	Height of connecting link	4.33" in
<b>H1</b>	Height1 of the connecting link	7.28" in
<b>D</b>	Pin Ø	2.56" in
<b>D1</b>	Pendant strap Ø	2.60" in
<b>D2</b>	Pendant strap Ø	7.68" in
<b>D3</b>	Pin Ø	2.56" in
<b>D4</b>	Pin Ø	2.95" in

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Designation	Value
Weight	240 lb

Tab. 129 Technical data for main boom pendant straps on 2821 boom head section

### 1.28.3 Pendant straps on main boom + 2821/2316 reducing piece

#### Pendant straps on 2821/2316 reducing piece 40 ft

##### Reducing piece pendant strap 40 ft

Assembly location in crane operation:

- 2821 main boom + 2821/2316 reducing piece (For more information see: A-frame 1 to 2316 boom head section pendant straps, page 712)

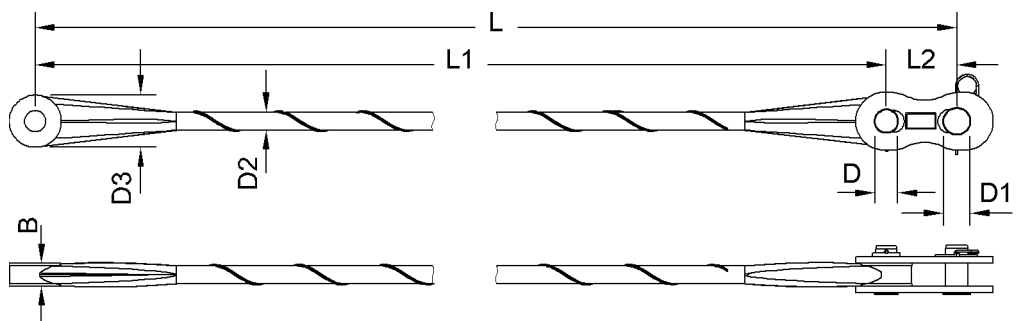


Fig. 175 Reducing piece pendant strap 40 ft

Designation	Value
<b>L</b> Length	39' 4" ft-in
<b>L1</b> Length of the pendant strap	38' 9" ft-in
<b>L2</b> Length of the connecting link	7.87" in
<b>B</b> Width	2.52" in
<b>D</b> Pin Ø	2.36" in
<b>D1</b> Pin Ø	2.56" in
<b>D2</b> Pendant strap Ø	1.97" in
<b>D3</b> Pendant strap Ø	5.83" in
Weight	137 lb

Tab. 130 Technical data for reducing piece pendant strap 40 ft

#### Pendant straps on 2316 section 3 ft

##### Connecting link

Assembly location in crane operation:

- 2821 main boom + 2821/2316 reducing piece (For more information see: [A-frame 1 to 2316 boom head section pendant straps, page 712](#))

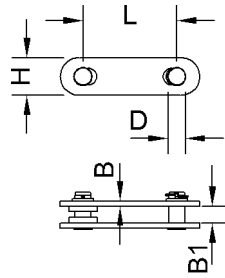


Fig. 176 Dimensions of connecting link

Designation		Value
L	Length of the connecting link	1' 2" ft-in
B	Width of connecting link	0.71" in
H	Height of connecting link	5.51" in
D	Pin Ø	2.36" in
Weight		17.64 lb

Tab. 131 Technical data for connecting link

### 1.28.4 Pendant straps on 1713 fixed jib

When attaching the 1713 fixed jib to an LR1300 (carbon-fibre pendant straps), use steel pendant straps and steel backstay straps (For more information see: [1.27.4 Pendant straps on 1713 fixed jib, page 159](#)).

### 1.28.5 Pendant straps on 1507 fixed jib

When attaching the 1507 fixed jib to an LR1300 (carbon-fibre pendant straps), use steel pendant straps and steel/carbon-fibre backstay straps (For more information see: [1.27.5 Pendant straps on 1507 fixed jib, page 165](#)).

### 1.28.6 Pendant straps on 1008 fixed jib

When attaching the 1008 fixed jib to an LR1300 (carbon-fibre pendant straps), use steel pendant straps and steel backstay straps (For more information see: [1.27.6 Pendant straps on 1008 fixed jib, page 169](#)).

### 1.28.7 Pendant straps on 0906 fixed jib

When attaching the 0906 fixed jib to an LR1300 (carbon-fibre pendant straps), use steel pendant straps and steel backstay straps (For more information see: [1.27.7 Pendant straps on 0906 fixed jib, page 173](#)).

## 1.28.8 Pendant straps on 2316 luffing jib

### Pendant straps on jib base section

#### Jib pendant strap 10 ft

This pendant strap is identical to the 10 ft jib pendant strap of the 1916 luffing jib and the 10 ft jib backstay strap of the 2821 main boom.

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 788](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 860](#))

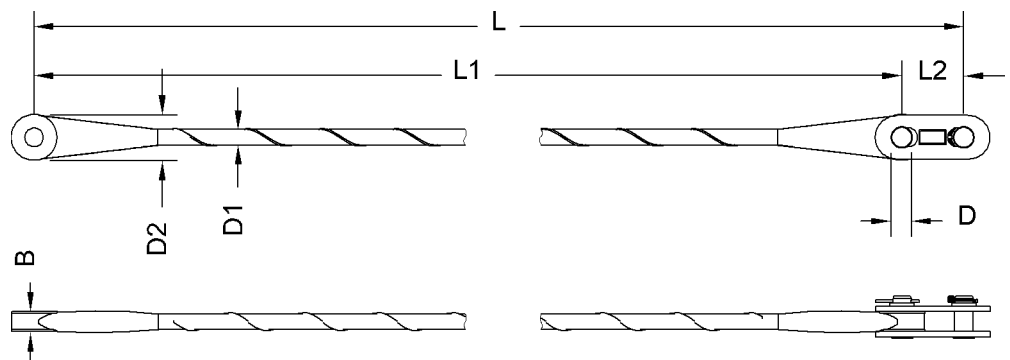


Fig. 177 Dimensions of jib pendant strap 10 ft

Designation		Value
L	Length	9' 10" ft-in
L1	Length of the pendant strap	9' 2" ft-in
L2	Length of the connecting link	7.87" in
B	Width	2.52" in
D	Pin Ø	2.36" in
D1	Pendant strap Ø	1.97" in
D2	Pendant strap Ø	5.83" in
Weight		77.16 lb

Tab. 132 Technical data for jib backstay strap 10 ft

### Pendant straps on A-frame 2

#### Equalizer on A-frame 2 (jib backstay strap)

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 787](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 859](#))

## Product description

Pendant straps - LR1300 (carbon-fibre pendant straps)

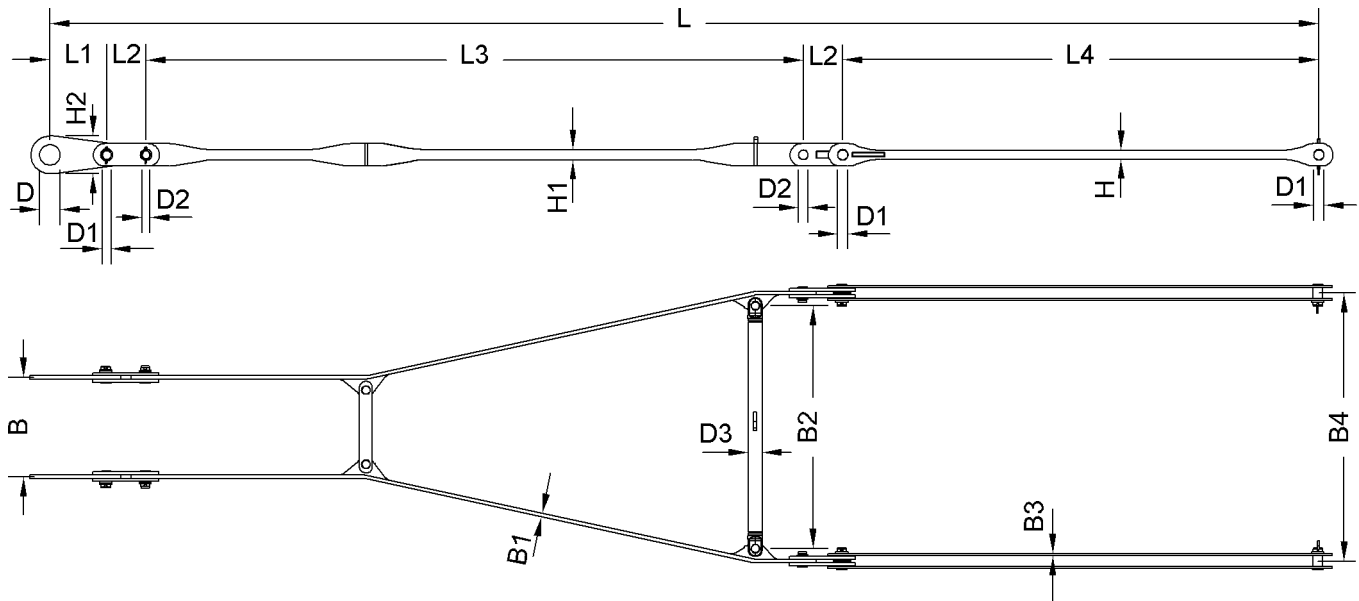


Fig. 178 Dimensions of the equalizer on A-frame 2 (jib backstay strap)

Designation		Value
<b>L</b>	Length	26' 5" ft-in
<b>L1</b>	Length of the connecting link	1' 2" ft-in
<b>L2</b>	Length of the connecting link	9.84" in
<b>L3</b>	Length of crossbar	13' 8" ft-in
<b>L4</b>	Length of the pendant strap	9' 11" ft-in
<b>B</b>	Width	2' 1" ft-in
<b>B1</b>	Width of pendant strap	0.87" in
<b>B2</b>	Width of spacer bar	5' 1" ft-in
<b>B3</b>	Width of pendant strap	0.59" in
<b>B4</b>	Width	5' 7" ft-in
<b>H</b>	Height of pendant strap	2.17" in
<b>H1</b>	Height of pendant strap	2.52" in
<b>H2</b>	Height of connecting link	9.45" in
<b>D</b>	Pin Ø	5.12" in
<b>D1</b>	Pin Ø	2.36" in
<b>D2</b>	Pin Ø	2.17" in
<b>D3</b>	Spacer bar Ø	3.50" in
Weight		789 lb

Tab. 133 Technical data for equalizer on A-frame 2 (jib backstay strap)

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## Pendant straps on A-frame 3

### A-frame 3 equalizer (jib pendant strap)

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 788](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 860](#))

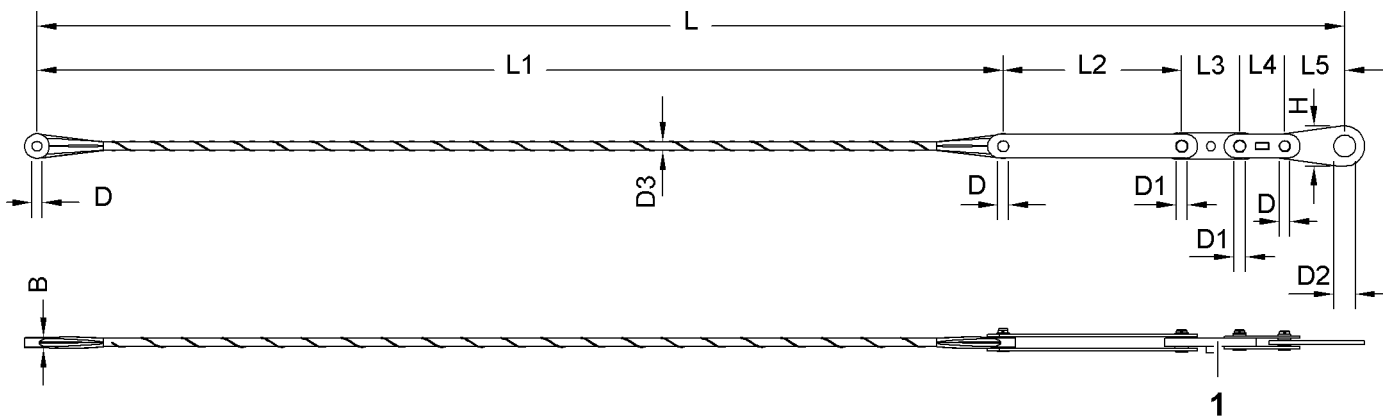


Fig. 179 Dimensions of A-frame 3 equalizer (jib pendant strap)

1 Tension load cell

Designation		Value
L	Length	25' 9" ft-in
L1	Length of the pendant strap	19' ft-in
L2	Length of the connecting link	3' 6" ft-in
L3	Length of the tension load cell	1' 2" ft-in
L4	Length of the connecting link	10.63" in
L5	Length of the connecting link	1' 2" ft-in
B	Width of pendant strap	2.52" in
H	Height of connecting link	9.45" in
D	Pin Ø	2.36" in
D1	Pin Ø	2.44" in
D2	Pin Ø	5.12" in
D3	Pendant strap Ø	1.97" in
Weight		284 lb

Tab. 134 Technical data for A-frame 3 equalizer (jib pendant strap)

## Pendant straps on 2316 jib section 10 ft

### Jib pendant strap 10 ft

This pendant strap is identical to the 10 ft jib pendant strap of the 1916 luffing jib and the 10 ft jib backstay strap of the 2821 main boom.

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 788](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 860](#))

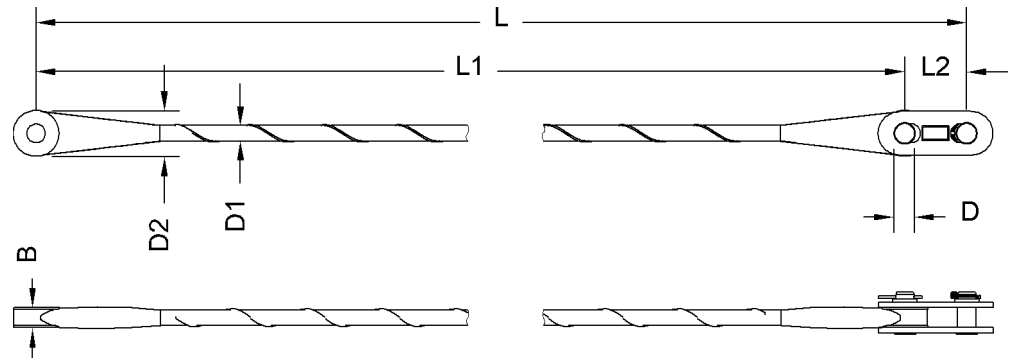


Fig. 180 Dimensions of jib backstay strap 10 ft

Designation		Value
L	Length	9' 10" ft-in
L1	Length of the pendant strap	9' 2" ft-in
L2	Length of the connecting link	7.87" in
B	Width	2.52" in
D	Pin Ø	2.36" in
D1	Pendant strap Ø	1.97" in
D2	Pendant strap Ø	5.83" in
Weight		77.16 lb

Tab. 135 Technical data for jib backstay strap 10 ft

## Pendant straps on 2316 jib section 20 ft

### Jib pendant strap 20 ft

This pendant strap is identical to the 20 ft jib pendant strap of the 1916 luffing jib and the 20 ft jib backstay strap of the 2821 main boom.

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 788](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 860](#))

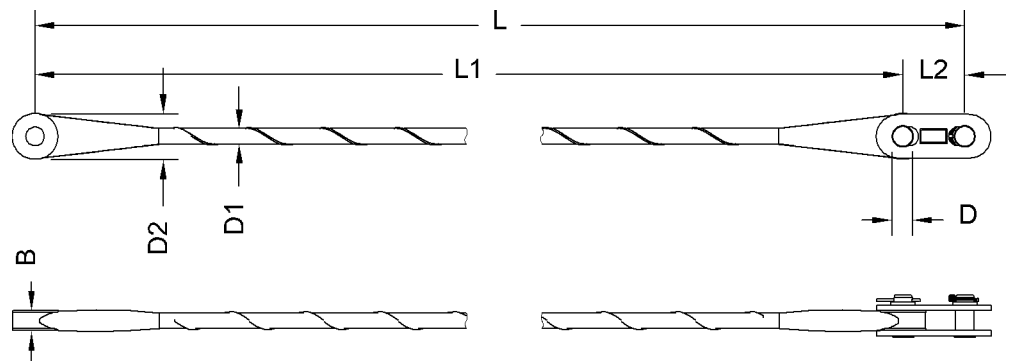


Fig. 181 Dimensions of jib backstay strap 20 ft

Designation		Value
<b>L</b>	Length	19' 8" ft-in
<b>L1</b>	Length of the pendant strap	19' ft-in
<b>L2</b>	Length of the connecting link	7.87" in
<b>B</b>	Width	2.52" in
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pendant strap Ø	1.97" in
<b>D2</b>	Pendant strap Ø	5.83" in
Weight		94.80 lb

Tab. 136 Technical data for jib backstay strap 20 ft

## Pendant straps on 2316 jib section 40 ft

### Jib pendant strap 40 ft

This pendant strap is identical to the 40 ft jib pendant strap of the 1916 luffing jib and the 40 ft jib backstay strap of the 2821 main boom.

Assembly location in crane operation:

- 2316 luffing jib ([For more information see: Pendant straps linking A-frame 3 to 2316 jib head section, page 788](#))
- 2316 luffing jib + 2316 Midfall ([For more information see: Pendant straps linking A-frame 3 to 2316 jib head section, page 860](#))

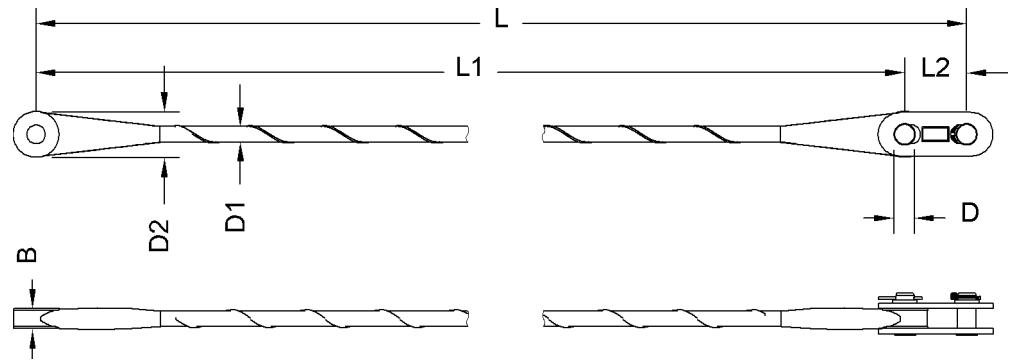


Fig. 182 Dimensions of jib backstay strap 40 ft

Designation		Value
L	Length	39' 4" ft-in
L1	Length of the pendant strap	38' 9" ft-in
L2	Length of the connecting link	7.87" in
B	Width	2.52" in
D	Pin Ø	2.36" in
D1	Pendant strap Ø	1.97" in
D2	Pendant strap Ø	5.83" in
Weight		132 lb

Tab. 137 Technical data for jib backstay strap 40 ft

## Pendant straps on 2316 jib head section

### Jib pendant strap on 2316 jib head section

Assembly location in crane operation:

- 2316 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 788](#))
- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 860](#))

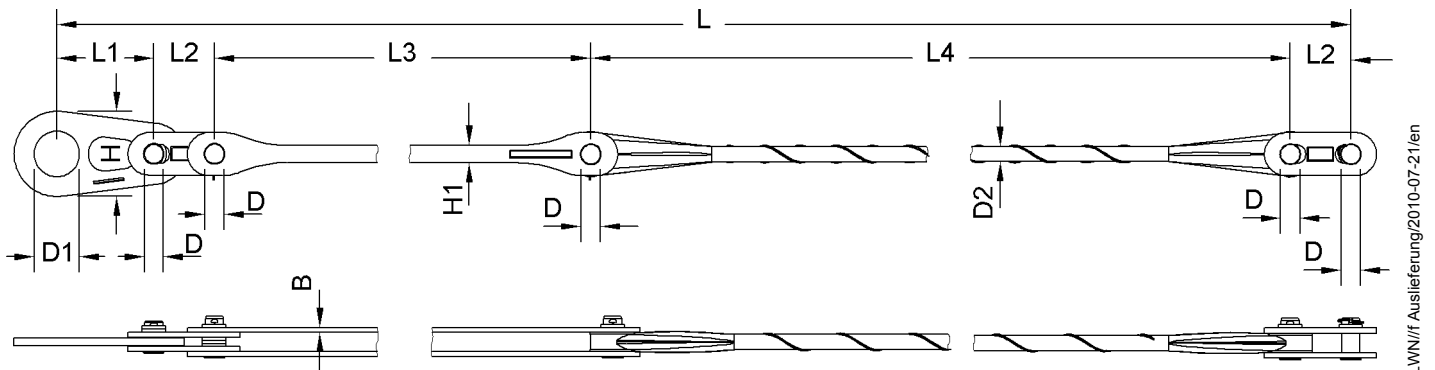


Fig. 183 Dimensions of jib pendant strap on 2316 jib head section

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Designation		Value
L	Length	31' 4" ft-in
L1	Length of the connecting link	1' 1" ft-in
L2	Length of the connecting link	7.87" in
L3	Length of the pendant strap	9' 11" ft-in
L4	Length of the pendant strap	19' 8" ft-in
B	Width of pendant strap	0.59" in
H	Height of connecting link	11.02" in
H1	Height of connecting link	2.17" in
D	Pin Ø	2.36" in
D1	Pin Ø	5.91" in
D2	Pendant strap Ø	1.97" in
Weight		262 lb

Tab. 138 Technical data for jib pendant strap on 2316 jib head section

### 1.28.9 Pendant straps on 1916 luffing jib

#### Pendant straps on A-frame 2

#### Equalizer on A-frame 2 (jib backstay strap)

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Backstay straps connecting A-frame 2 to 2821 boom base section, page 802](#))

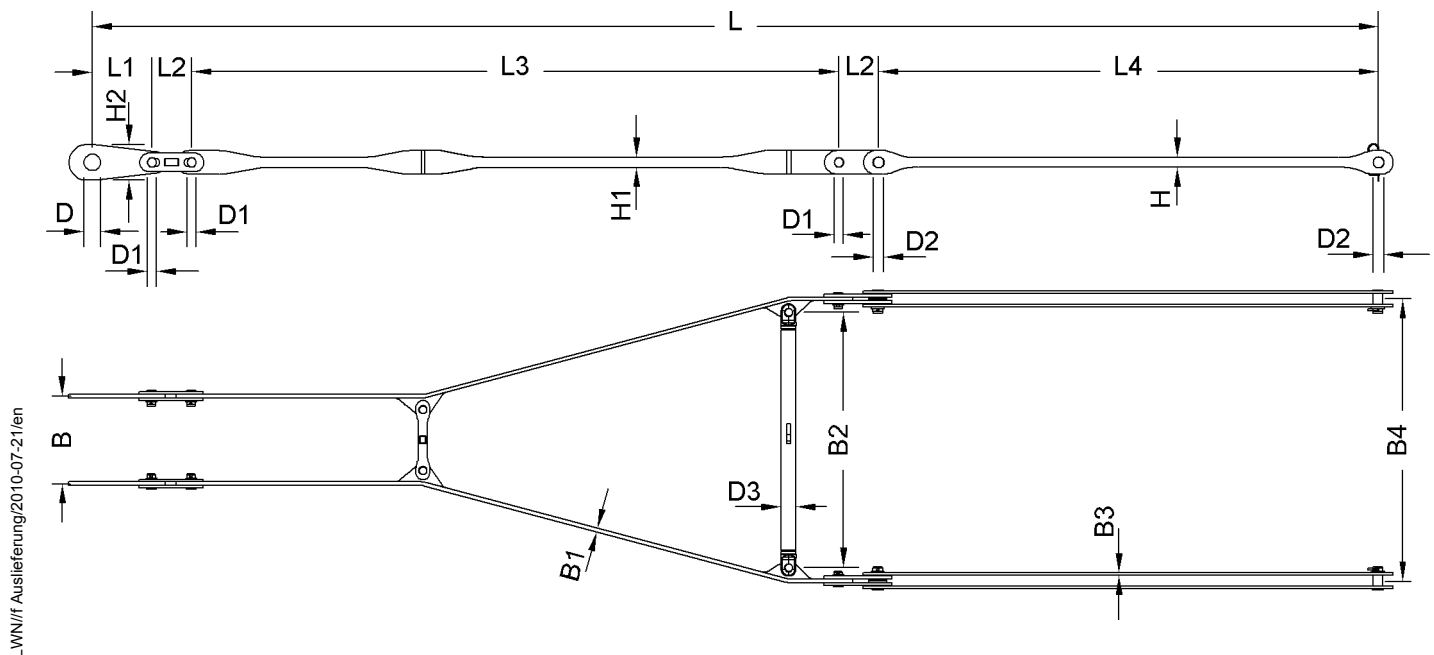


Fig. 184 Dimensions of equaliser on A-frame 2 (jib backstay strap) - LR1300 (carbon-fibre pendant strap)

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# Product description

Pendant straps - LR1300 (carbon-fibre pendant straps)

Designation		Value
L	Length	25' 6" ft-in
L1	Length of the connecting link	1' 2" ft-in
L2	Length of the connecting link	9.45" in
L3	Length of the pendant strap	12' 10" ft-in
L4	Length of the pendant strap	9' 11" ft-in
B	Width	1' 9" ft-in
B1	Width of pendant strap	0.87" in
B2	Width of spacer bar	5' 1" ft-in
B3	Width of pendant strap	0.59" in
B4	Width	5' 7" ft-in
H	Height of pendant strap	2.17" in
H1	Height of pendant strap	2.44" in
H2	Height of connecting link	11.02" in
D	Pin Ø	5.51" in
D1	Pin Ø	1.97" in
D2	Pin Ø	2.36" in
D2	Spacer bar Ø	3.54" in
Weight		421 lb

Tab. 139 Technical data for A-frame 2 equaliser (jib backstay strap) - LR1300 (carbon-fibre pendant strap)

## Pendant straps on A-frame 3

### A-frame 3 equalizer (jib pendant strap)

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section](#), page 803)

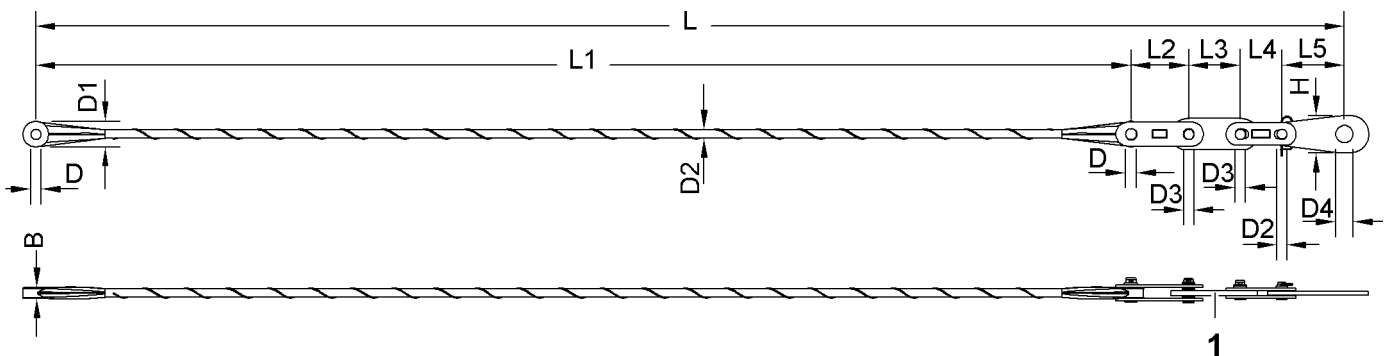


Fig. 185 Dimensions of A-frame 3 equalizer (jib pendant strap)

1 Tension load cell

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Designation		Value
L	Length	24' 9" ft-in
L1	Length of the pendant strap	20' 9" ft-in
L2	Length of the connecting link	1' 1" ft-in
L3	Length of the tension load cell	1' ft-in
L4	Length of the connecting link	9.45" in
L5	Length of the connecting link	1' 2" ft-in
B	Width	2.52" in
H	Height of connecting link	8.50" in
D	Pin Ø	2.36" in
D1	Pendant strap Ø	5.83" in
D2	Pendant strap Ø	1.97" in
D3	Pin Ø	2.17" in
D4	Pin Ø	3.94" in
Weight		452 lb

Tab. 140 Technical data for A-frame 3 equalizer (jib pendant strap)

## Pendant straps on 1916 jib section 10 ft

### Jib pendant strap 10 ft

This pendant strap is identical to the 10 ft jib pendant strap of the 2316 luffing jib and the 10 ft jib backstay strap of the 2821 main boom.

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 803](#))

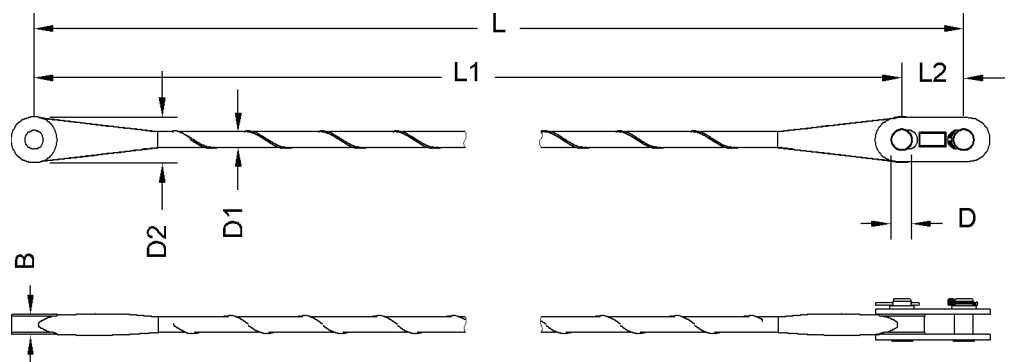


Fig. 186 Dimensions of jib backstay strap 10 ft

Designation		Value
L	Length	9' 10" ft-in
L1	Length of the pendant strap	9' 2" ft-in
L2	Length of the connecting link	7.87" in

Designation		Value
<b>B</b>	Width	2.52" in
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pendant strap Ø	1.97" in
<b>D2</b>	Pendant strap Ø	5.83" in
Weight		77.16 lb

Tab. 141 Technical data for jib backstay strap 10 ft

## Pendant straps on 1916 jib section 20 ft

### Jib pendant strap 20 ft

This pendant strap is identical to the 20 ft jib pendant strap of the 2316 luffing jib and the 20 ft jib backstay strap of the 2821 main boom.

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 803](#))

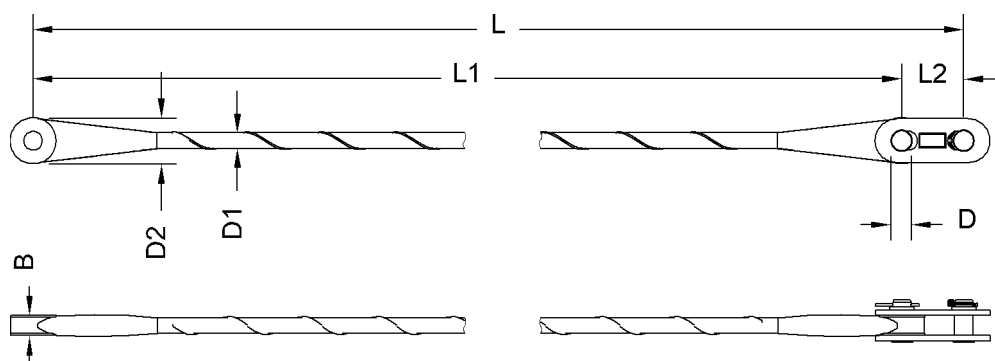


Fig. 187 Dimensions of jib backstay strap 20 ft

Designation		Value
<b>L</b>	Length	19' 8" ft-in
<b>L1</b>	Length of the pendant strap	19' ft-in
<b>L2</b>	Length of the connecting link	7.87" in
<b>B</b>	Width	2.52" in
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pendant strap Ø	1.97" in
<b>D2</b>	Pendant strap Ø	5.83" in
Weight		94.80 lb

Tab. 142 Technical data for jib backstay strap 20 ft



## Pendant straps on 1916 jib section 40 ft

### Jib pendant strap 40 ft

This pendant strap is identical to the 40 ft jib pendant strap of the 2316 luffing jib and the 40 ft jib backstay strap of the 2821 main boom.

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 803](#))

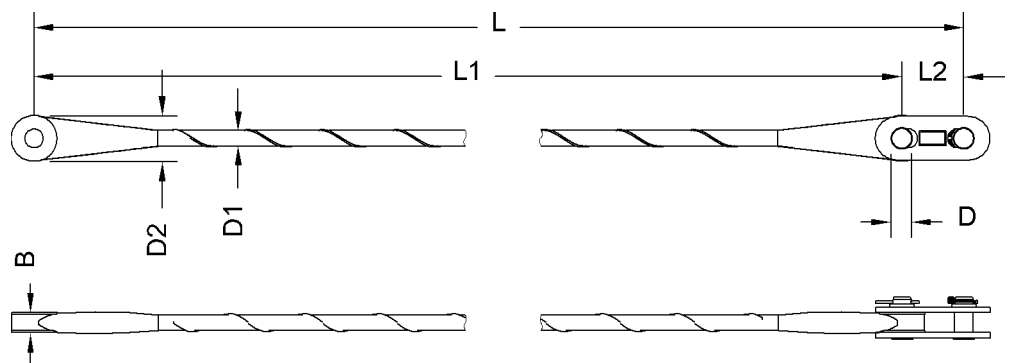


Fig. 188 Dimensions of jib backstay strap 40 ft

Designation		Value
<b>L</b>	Length	39' 4" ft-in
<b>L1</b>	Length of the pendant strap	38' 9" ft-in
<b>L2</b>	Length of the connecting link	7.87" in
<b>B</b>	Width	2.52" in
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pendant strap Ø	1.97" in
<b>D2</b>	Pendant strap Ø	5.83" in
Weight		132 lb

Tab. 143 Technical data for jib backstay strap 40 ft

## Pendant straps on 1916 jib head section

### Jib pendant strap on 1916 jib head section

Assembly location in crane operation:

- 1916 luffing jib (For more information see: [Pendant straps linking A-frame 3 to 1916 jib head section, page 803](#))

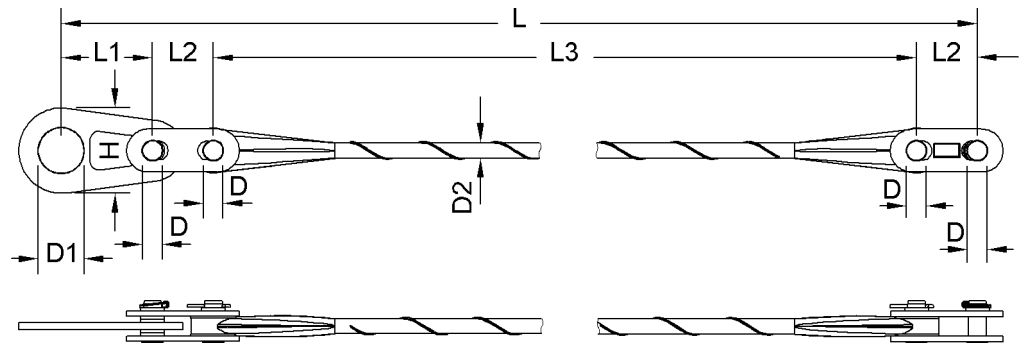


Fig. 189 Dimensions of jib pendant strap on 1916 jib head section

Designation		Value
L	Length	21' 4" ft-in
L1	Length of the connecting link	1' ft-in
L2	Length of the connecting link	7.87" in
L3	Length of the pendant strap	19' ft-in
H	Height of connecting link	11.02" in
D	Pin Ø	2.36" in
D1	Pin Ø	5.91" in
D2	Pendant strap Ø	1.97" in
Weight		152 lb

Tab. 144 Technical data for jib pendant strap on 1916 jib head section

## 1.28.10 Pendant straps on the 2316 Midfall

### Connecting link

Assembly location in crane operation:

- 2316 luffing jib + 2316 Midfall (For more information see: [Pendant straps linking A-frame 3 to 2316 jib head section, page 860](#))

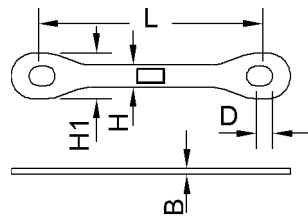


Fig. 190 Dimensions of Midfall connecting link

The Midfall connecting link replaces the first connecting link of the first jib pendant strap 40 ft beyond the Midfall assembly position.

Designation		Value
L	Length of the connecting link	2' 4" ft-in

Designation		Value
<b>B</b>	Width of connecting link	0.71" in
<b>H</b>	Height of connecting link	2.76" in
<b>H1</b>	Height of connecting link	5.59" in
<b>D</b>	Pin Ø	2.36" in
Weight		5.73 lb

Tab. 145 Technical data for Midfall connecting link

## 1.29 Mid-point suspensions

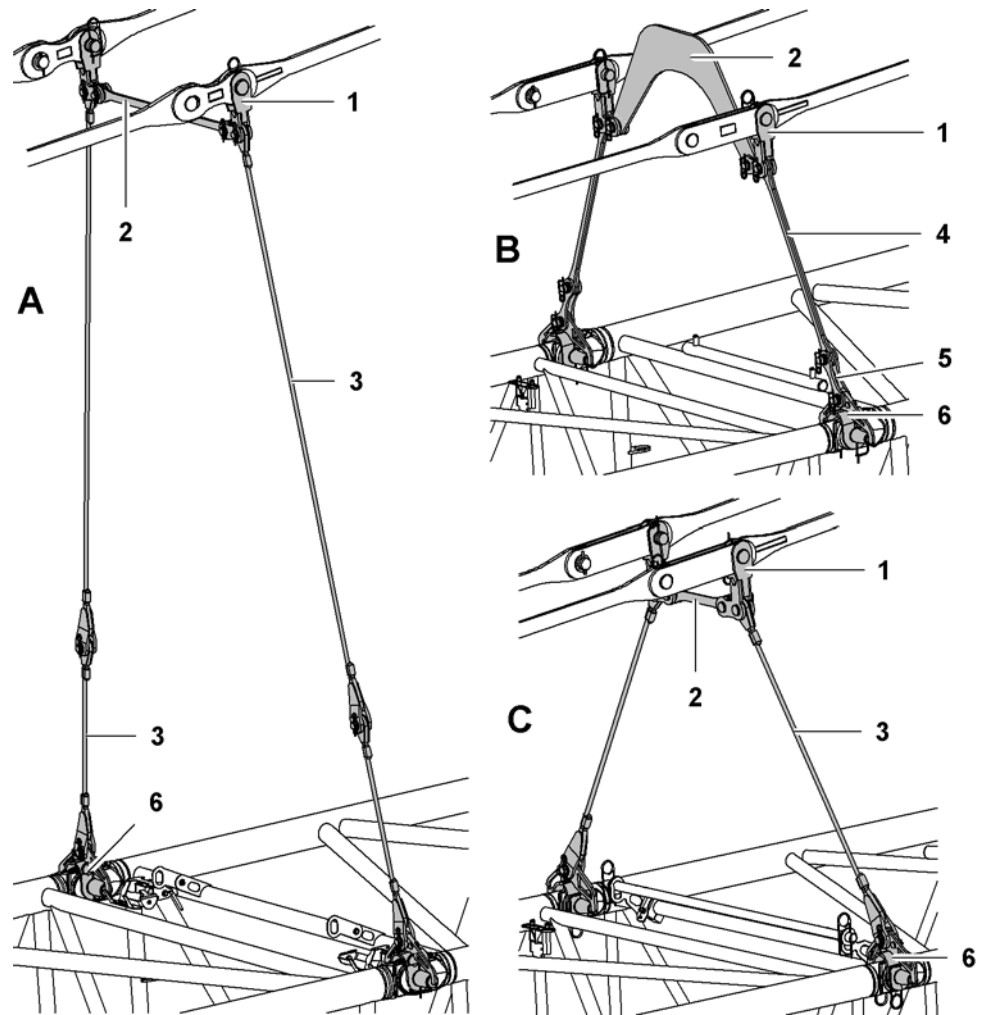


Fig. 191 Mid-point suspension examples for main boom, main boom + reducing piece, luffing jib

- |          |   |          |                             |
|----------|---|----------|-----------------------------|
| <b>A</b> | Main boom mid-point suspension                                      | <b>3</b> | Ropes                       |
| <b>B</b> | Mid-point suspension on main boom after the attached reducing piece | <b>4</b> | Backstay shackles           |
| <b>C</b> | Mid-point suspension on luffing jib                                 | <b>5</b> | Backstay shackles with pins |
| <b>1</b> | Connecting elements   | <b>6</b> | Fork                        |
| <b>2</b> | Spacer bracket  |          |                             |

## 1.29.1 Connecting elements

### Mid-point suspension connector for steel pendant straps

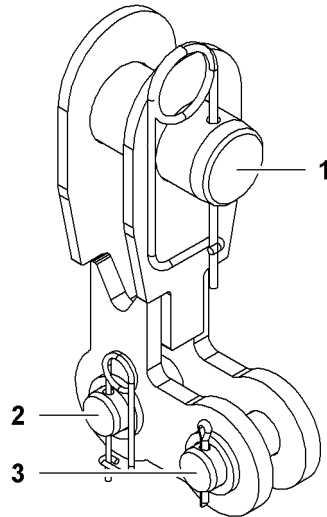


Fig. 192 Mid-point suspension connector for steel pendant straps

- |  |   |
|--|---|
| <p>1 Pin connection point with pendant strap</p> <p>2 Pin connection point with rope or link plate</p> | <p>3 Pin connection point with spacer bracket</p> |
|--|---|

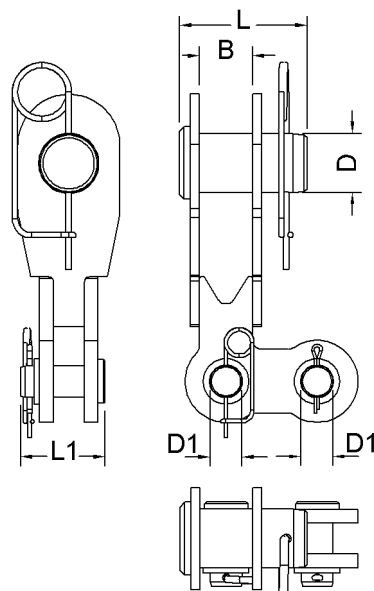


Fig. 193 Dimensions of the mid-point suspension connector for steel pendant straps

### Mid-point suspension connector on the main boom

Designation		Value
<b>L</b>	Length of pin	5.51" in
<b>L1</b>	Length of pins	3.35" in
<b>B</b>	Width	2.28" in
<b>D</b>	Pin Ø	2.56" in
<b>D1</b>	Pin Ø	1.38" in

Tab. 146 Technical data: mid-point suspension connector on the main boom

### Mid-point suspension connector on the main boom after the attached reducing piece or on luffing jib 2316

Designation		Value
<b>L</b>	Length of pin	4.72" in
<b>L1</b>	Length of pins	3.35" in
<b>B</b>	Width	2.28" in
<b>D</b>	Pin Ø	2.17" in
<b>D1</b>	Pin Ø	1.38" in

Tab. 147 Technical data: mid-point suspension connector on the main boom after the attached reducing piece or on 2316 luffing jib

### Mid-point suspension connector on 1916 luffing jib

Designation		Value
<b>L</b>	Length of pin	4.72" in
<b>L1</b>	Length of pins	3.35" in
<b>B</b>	Width	2.28" in
<b>D</b>	Pin Ø	1.97" in
<b>D1</b>	Pin Ø	1.38" in

Tab. 148 Technical data: mid-point suspension connector on 1916 luffing jib

## Mid-point suspension connector for carbon fibre pendant straps

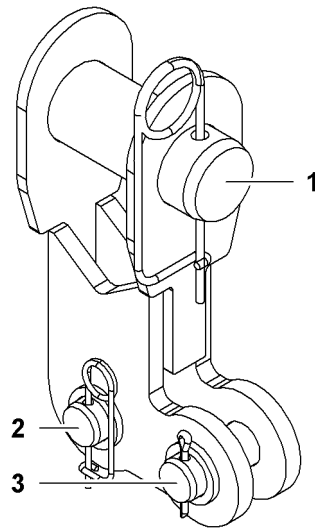


Fig. 194 Mid-point suspension connector for carbon fibre pendant straps

- |  |  |
|--|--|
| <p><b>1</b> Pin connection point with pendant strap</p> <p><b>2</b> Pin connection point with rope or link plate</p> | <p><b>3</b> Pin connection point with spacer bracket</p> |
|--|--|

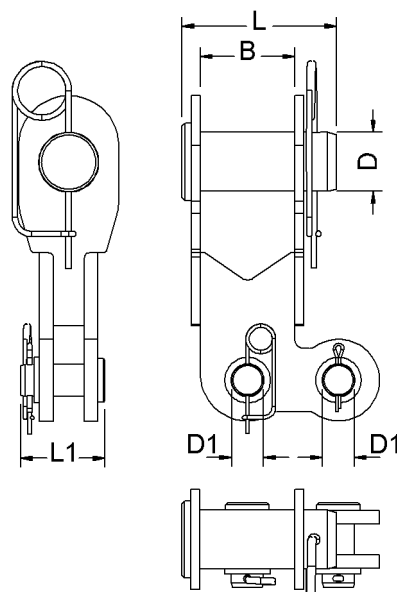


Fig. 195 Dimensions of the mid-point suspension connector for carbon fibre pendant straps

### Mid-point suspension connector on the main boom

Designation		Value
L	Length of pin	6.69" in

Designation		Value
<b>L1</b>	Length of pins	3.35" in
<b>B</b>	Width	4.09" in
<b>D</b>	Pin Ø	2.56" in
<b>D1</b>	Pin Ø	1.38" in

Tab. 149 Technical data: mid-point suspension connector on the main boom

### Mid-point suspension connector on the main boom after the attached reducing piece, on luffing jib 2316 or on luffing jib 1916

Designation		Value
<b>L</b>	Length of pin	6.22" in
<b>L1</b>	Length of pins	3.35" in
<b>B</b>	Width	4.09" in
<b>D</b>	Pin Ø	2.36" in
<b>D1</b>	Pin Ø	1.38" in

Tab. 150 Technical data: mid-point suspension connector on the main boom after the attached reducing piece, on luffing jib 2316 or on luffing jib 1916

## 1.29.2 Spacer bracket

The spacer brackets are identical regardless of whether steel pendant straps or carbon fibre pendant straps are used.

### Mid-point suspension spacer bracket on the main boom, on luffing jib 2316 or on luffing jib 1916

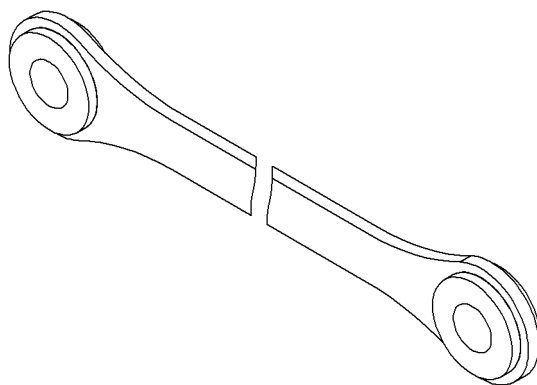


Fig. 196 Mid-point suspension spacer bracket on the main boom, on luffing jib 2316 or on luffing jib 1916



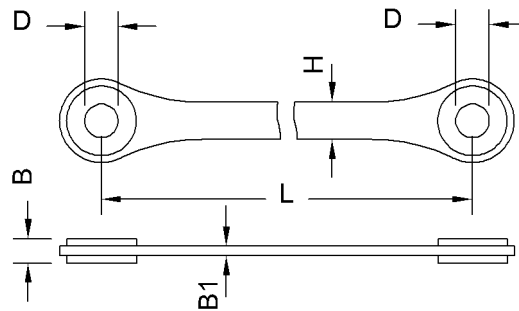


Fig. 197 Dimensions of the mid-point suspension spacer bracket on the main boom, on luffing jib 2316 or on luffing jib 1916

**Mid-point suspension spacer bracket on the main boom**

Designation		Value
L	Length of the spacer bracket	3' 7" ft-in
	Length of spacer bracket (with main boom length 262 ft, 272 ft or 282 ft and 1507 jib attached)	4' 11" ft-in
B	Width	1.02" in
B1	Width	0.39" in
H	Height	1.57" in
D	Pin Ø	1.38" in

Tab. 151 Technical data: mid-point suspension spacer bracket on the main boom

**Mid-point suspension spacer bracket on luffing jib 2316**

Designation		Value
L	Spacer bracket length	1' 4" ft-in
B	Width	1.02" in
B1	Width	0.39" in
H	Height	1.57" in
D	Pin Ø	1.38" in

Tab. 152 Technical data: mid-point suspension spacer bracket on luffing jib 2316

**Mid-point suspension spacer bracket on luffing jib 1916**

Designation		Value
L	Length of the spacer bracket	1' 4" ft-in
B	Width	1.02" in
B1	Width	0.39" in
H	Height	1.57" in
D	Pin Ø	1.38" in

Tab. 153 Technical data: mid-point suspension spacer bracket on luffing jib 1916

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### Mid-point suspension spacer bracket on main boom after the attached reducing piece

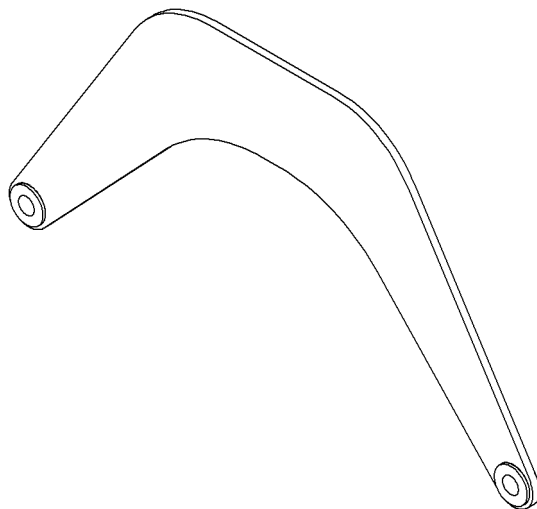


Fig. 198 Mid-point suspension spacer bracket on main boom after the attached reducing piece

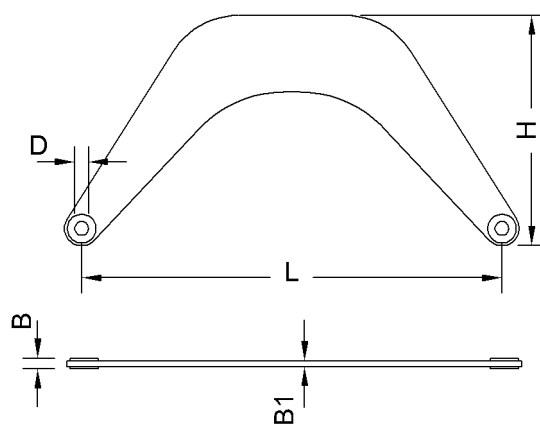


Fig. 199 Dimensions of the mid-point suspension spacer bracket on the main boom after the attached reducing piece

Designation		Value
L	Length of the spacer bracket	3' 7" ft-in
B	Width	1.06" in
B1	Width	0.59" in
H	Height	2' ft-in
D	Pin Ø	1.38" in

Tab. 154 Technical data: mid-point suspension spacer bracket on the main boom after the attached reducing piece

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### 1.29.3 Ropes

The ropes are correct for all mid-point suspensions of the the different boom configurations.

The ropes are identical regardless of whether steel pendant straps or carbon fibre pendant straps are used.

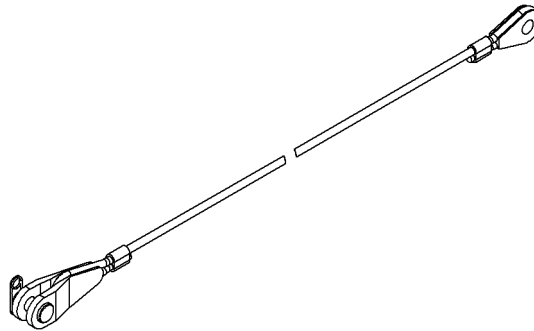


Fig. 200 Mid-point suspension ropes

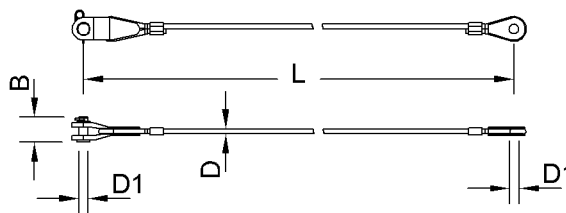


Fig. 201 Dimensions of the mid-point suspension ropes

Designation		Value
L	Lengths of the rope	3' 7" ft-in
		4' 3" ft-in
		5' 3" ft-in
		6' 11" ft-in
		8' 6" ft-in
		9' 10" ft-in
B	Pin length	3.35" in
D	Rope Ø	0.71" in
D1	Pin Ø	1.38" in

Tab. 155 Technical data: mid-point suspension ropes

### 1.29.4 Backstay shackles

The link plates are identical regardless of whether steel pendant straps or carbon fibre pendant straps are used.

## Mid-point suspension backstay shackles on the main boom after the attached reducing piece

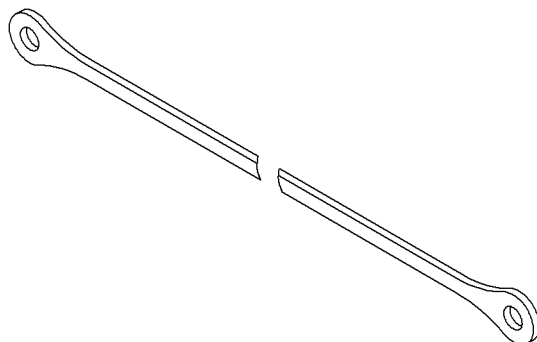


Fig. 202 Mid-point suspension backstay shackles on the main boom after the attached reducing piece

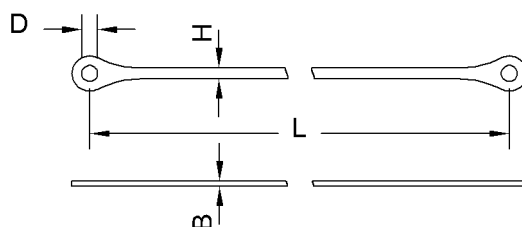


Fig. 203 Dimensions of mid-point suspension backstay shackles on the main boom after the attached reducing piece

Designation		Value
L	Length of backstay shackle	1' 5" ft-in
		1' 9" ft-in
		2' 5" ft-in
		3' 1" ft-in
B	Width of backstay shackle	0.47" in
H	Height of backstay shackle	0.98" in
D	Pin Ø	1.38" in

Tab. 156 Technical data: mid-point suspension backstay shackles on the main boom after the attached reducing piece

### Mid-point suspension backstay shackle with pins on the main boom after the attached reducing piece

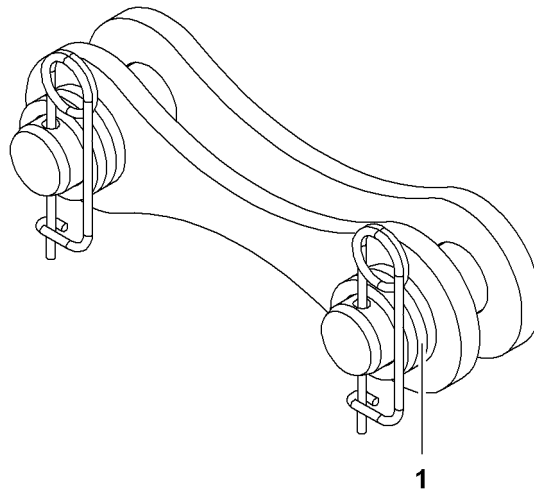


Fig. 204 Mid-point suspension backstay shackle with pins on the main boom after the attached reducing piece

1 Washers (each 3x)

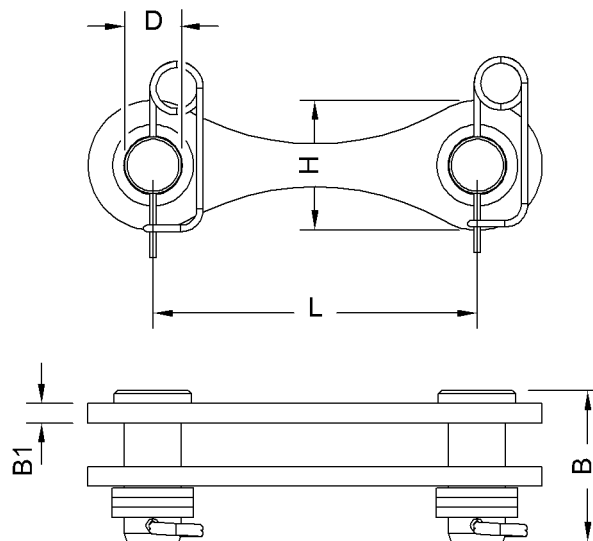


Fig. 205 Dimensions of mid-point suspension backstay shackle with pins on the main boom after the attached reducing piece

Designation		Value
L	Length of backstay shackle	7.87" in
B	Length of pin	3.35" in
B1	Width of backstay shackle	0.47" in
H	Height of backstay shackle	3.15" in

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Designation		Value
D	Pin Ø	1.38" in

Tab. 157 Technical data: mid-point suspension backstay shackle with pins on the main boom after the attached reducing piece

### 1.29.5 Fork

The forks are identical regardless of whether steel pendant straps or carbon fibre pendant straps are used.

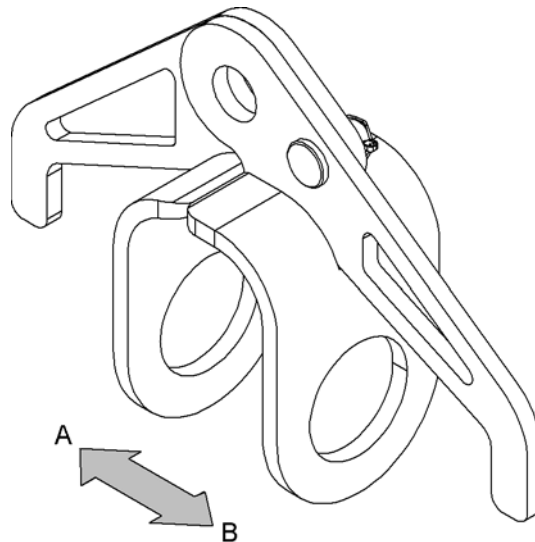


Fig. 206 Mid-point suspension fork

**A** Towards the inside of the boom      **B** Towards the outside of the boom

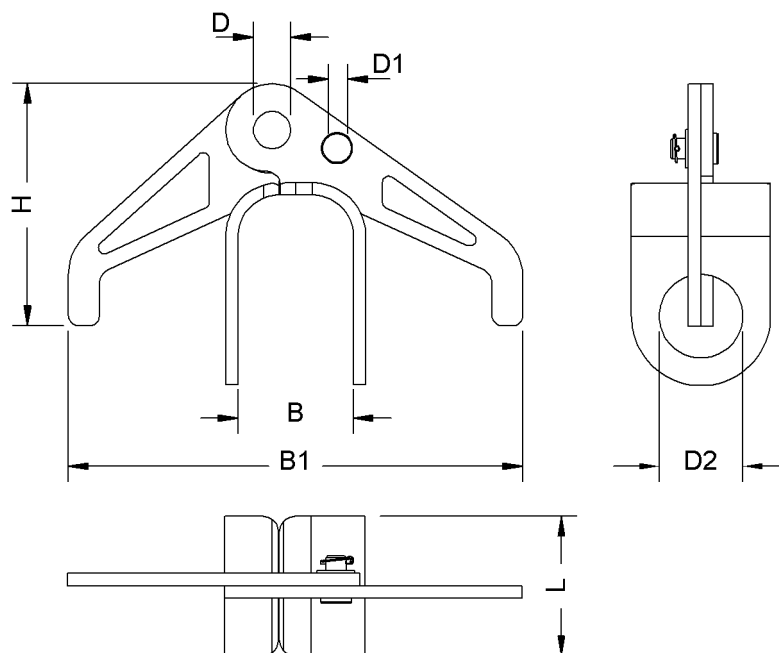


Fig. 207 Dimensions of the mid-point suspension fork

**Mid-point suspension fork on the main boom**

Designation		Value
<b>L</b>	Length of fork	5.31" in
<b>B</b>	Width	4.41" in
<b>B1</b>	Width of fork	1' 5" ft-in
<b>H</b>	Height	9.25" in
<b>D</b>	Pin Ø	1.38" in
<b>D1</b>	Pin Ø	0.79" in
<b>D2</b>	Pin Ø	3.15" in

Tab. 158 Technical data: mid-point suspension fork on the main boom

**Mid-point suspension fork on the main boom after the attached reducing piece or on luffing jib 2316**

Designation		Value
<b>L</b>	Length of fork	4.72" in
<b>B</b>	Width	3.23" in
<b>B1</b>	Width of fork	1' 2" ft-in
<b>H</b>	Height	8.66" in
<b>D</b>	Pin Ø	1.38" in
<b>D1</b>	Pin Ø	0.79" in
<b>D2</b>	Pin Ø	2.56" in

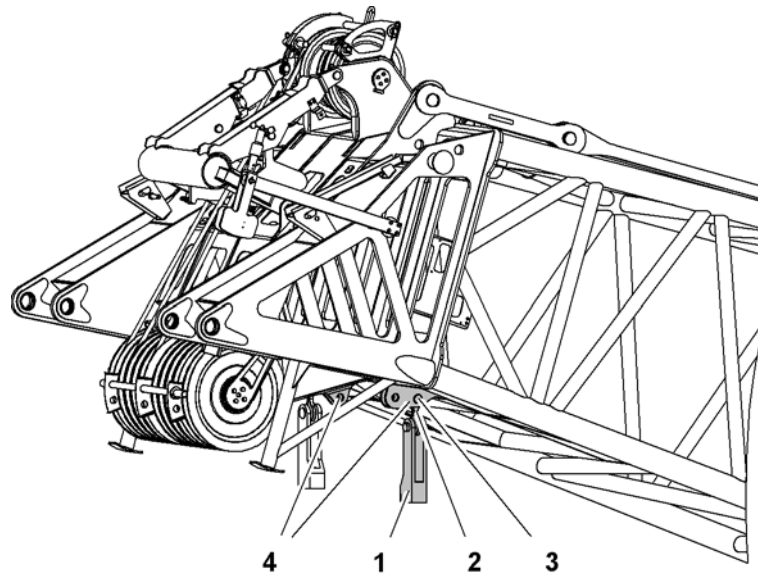
Tab. 159 Technical data: mid-point suspension fork on the main boom after the attached reducing piece or on luffing jib 2316

**Mid-point suspension fork on luffing jib 1916**

Designation		Value
<b>L</b>	Length of fork	3.94" in
<b>B</b>	Width	4.17" in
<b>B1</b>	Width of fork	1' 4" ft-in
<b>H</b>	Height	8.07" in
<b>D</b>	Pin Ø	1.38" in
<b>D1</b>	Pin Ø	0.79" in
<b>D2</b>	Pin Ø	2.36" in

Tab. 160 Technical data: mid-point suspension fork on luffing jib 1916

## 1.30 Rope fixation



*Fig. 208 Rope fixing point on 2821 boom head section*

- |   |             |   |   |
|---|-------------|---|---|
| 1 | Pocket lock | 3 | Pins for the rope fixing point              |
| 2 | Cross strap | 4 | Pivot points (4x) for the rope fixing point |

The components of the rope fixing point are identical for the boom head section and the jib head.



### 1.30.1 Pocket lock

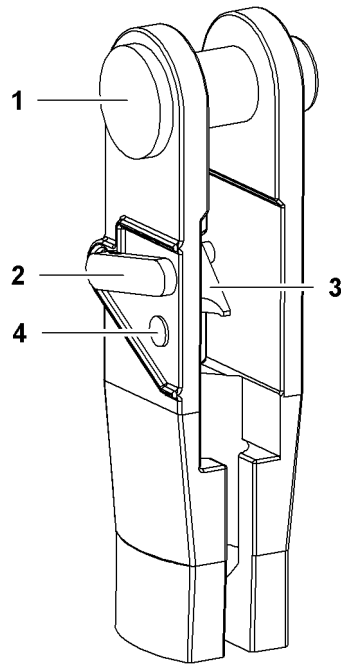


Fig. 209 Pocket lock

- |                                    |  |
|------------------------------------|--|
| <p>1 Pin</p> <p>2 Safety latch</p> | <p>3 Locking device</p> <p>4 Safety button</p> |
|------------------------------------|--|

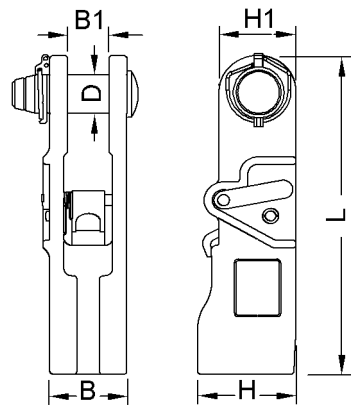


Fig. 210 Pocket lock dimensions

Designation		Value
L	Length	1' 9" ft-in
B	Width	4.21" in
B1	Width	2.24" in
H	Height	5.59" in
H1	Height	3.74" in
D	Pin Ø	2.24" in

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Designation	Value
Weight	63.49 lb
Rope Ø	1.06" in to 1.14" in

Tab. 161 Pocket lock technical data

### 1.30.2 Cross strap

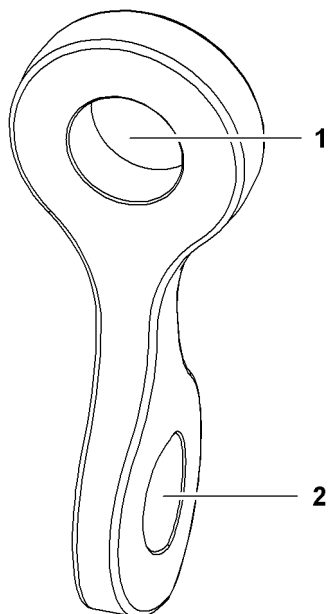


Fig. 211 Cross strap

- 1 Pivot point on boom head (Ø 2.05" in)
- 2 Pivot point on pocket lock (Ø 2.28" in)

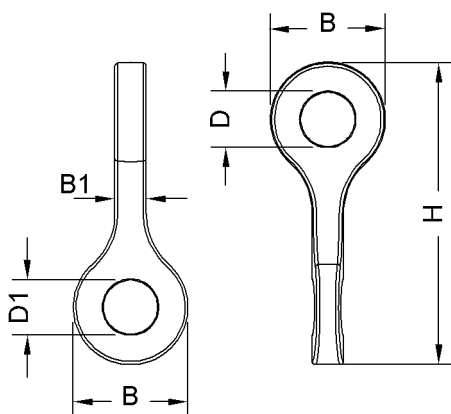


Fig. 212 Cross strap dimensions

Designation	Value
<b>B</b> Width	4.33" in
<b>B1</b> Width	1.18" in
<b>H</b> Height	11.42" in

Designation		Value
<b>D</b>	Pin Ø	2.05" in
<b>D1</b>	Pin Ø	2.28" in
Weight		10.36 lb

Tab. 162 Cross strap technical data

### 1.30.3 Pins for the rope fixing point

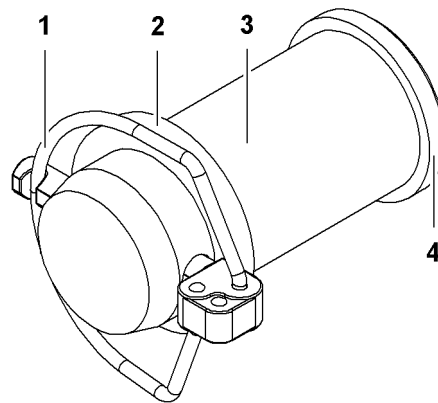


Fig. 213 Pins for the rope fixing point

- |          |           |          |              |
|----------|-----------|----------|--------------|
| <b>1</b> | Linch pin | <b>3</b> | Pin          |
| <b>2</b> | Washer    | <b>4</b> | Pin shoulder |

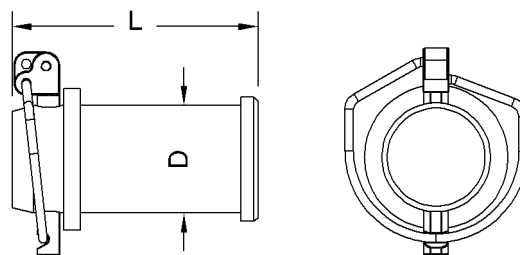


Fig. 214 Dimensions of the pins for the rope fixing point

Designation		Value
<b>L</b>	Length	4.53" in
<b>D</b>	Pin Ø	1.97" in
Weight		4.41 lb

Tab. 163 Technical data: rope fixing point pins

## 1.31 Pulley block/hook\*

### 1.31.1 Pulley block (661,377 lb)

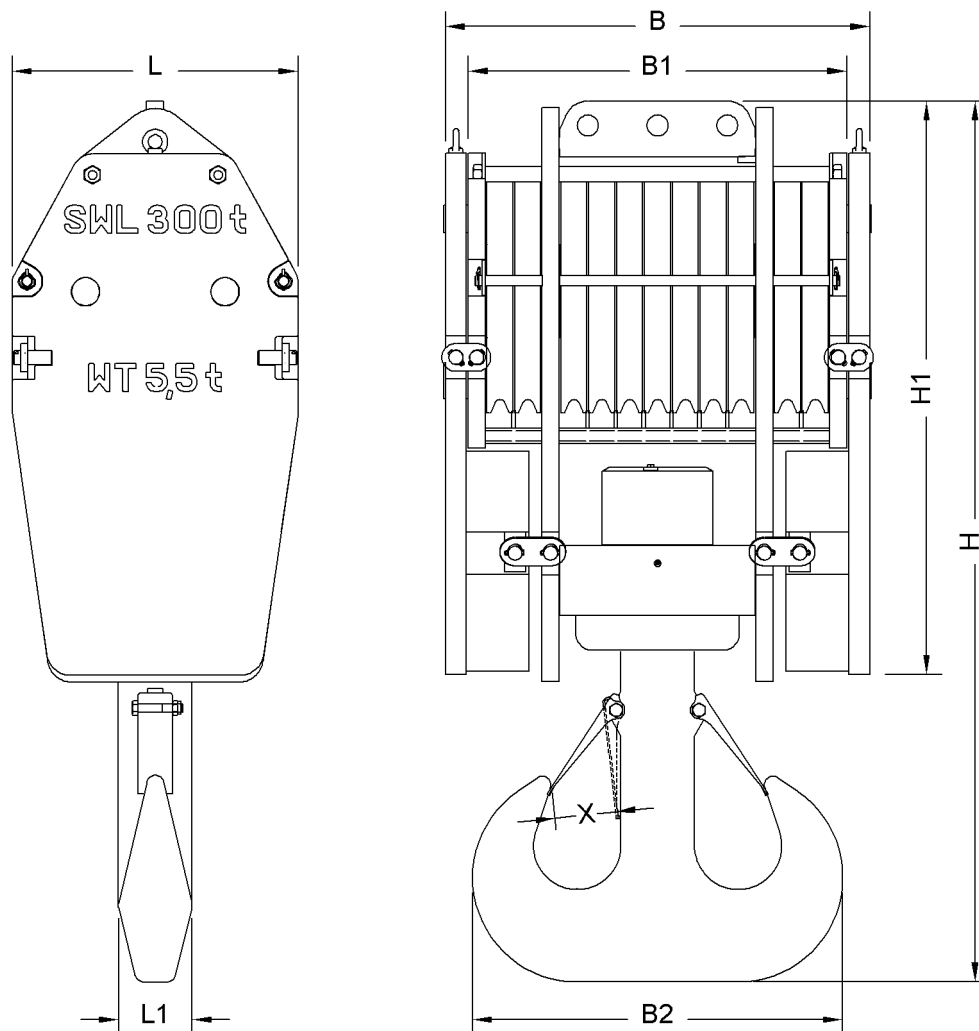


Fig. 215 Pulley block dimensions (661,377 lb)

Designation		Value
L	Pulley block length	2' 8" ft-in
L1	Hook length	8.35" in
B	Pulley block width with additional weights	4' ft-in
B1	Pulley block width without additional weights	3' 7" ft-in
B2	Hook width	3' 6" ft-in
H	Height of pulley block with hook	8' 3" ft-in
H1	Height of pulley block with no hook	5' 6" ft-in
X	Jaw width	6.89" in
Weight with additional weights		12,125 lb

Designation	Value
Weight without additional weights	7,055 lb
Maximum reeving	23
Rope Ø	1.10" in

Tab. 164 Pulley block technical data(661,377 lb)

### 1.31.2 Pulley block (352,734 lb)

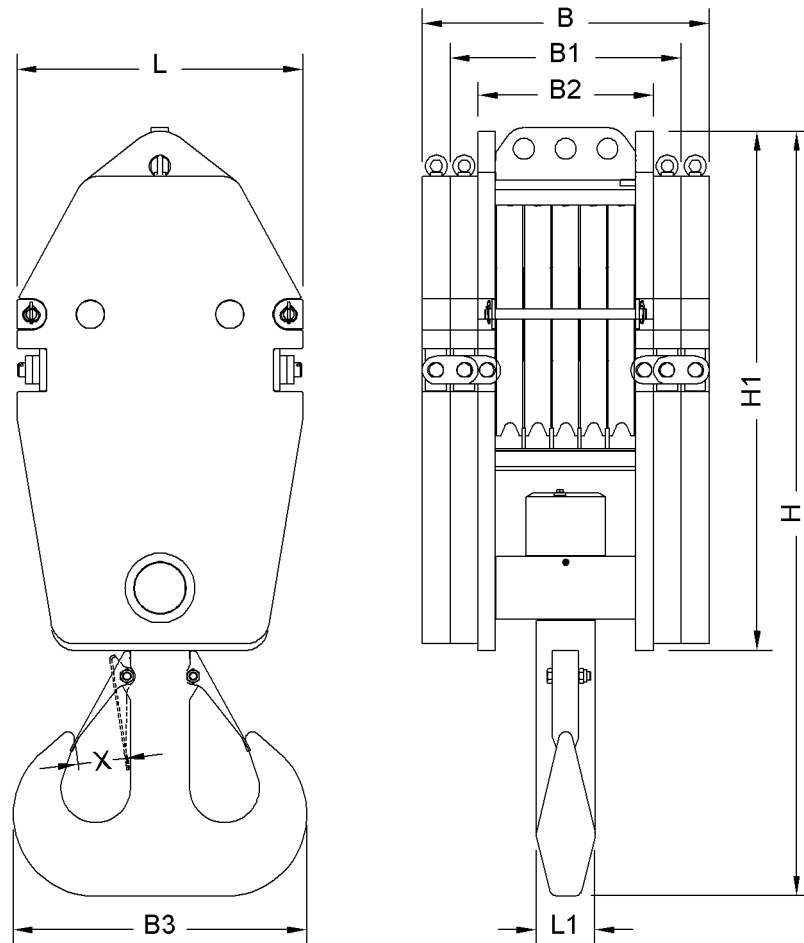


Fig. 216 Pulley block dimensions (352,734 lb)

Designation	Value
<b>L</b> Pulley block length	2' 8" ft-in
<b>L1</b> Hook length	6.69" in
<b>B</b> Width of pulley block with 4 additional weights	2' 8" ft-in
<b>B1</b> Width of pulley block with 2 additional weights	2' 2" ft-in
<b>B2</b> Pulley block width without additional weights	1' 8" ft-in
<b>B3</b> Hook width	2' 9" ft-in
<b>H</b> Height of pulley block with hook	7' 3" ft-in

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Designation		Value
<b>H1</b>	Height of pulley block with no hook	4' 11" ft-in
<b>X</b>	Jaw width	5.31" in
Weight with 4 additional weights		8,818 lb
Weight with 2 additional weights		6,173 lb
Weight without additional weights		3,527 lb
Maximum reeving		11
Rope Ø		1.10" in

Tab. 165 Pulley block technical data(352,734 lb)

### 1.31.3 Pulley block (220,459 lb)

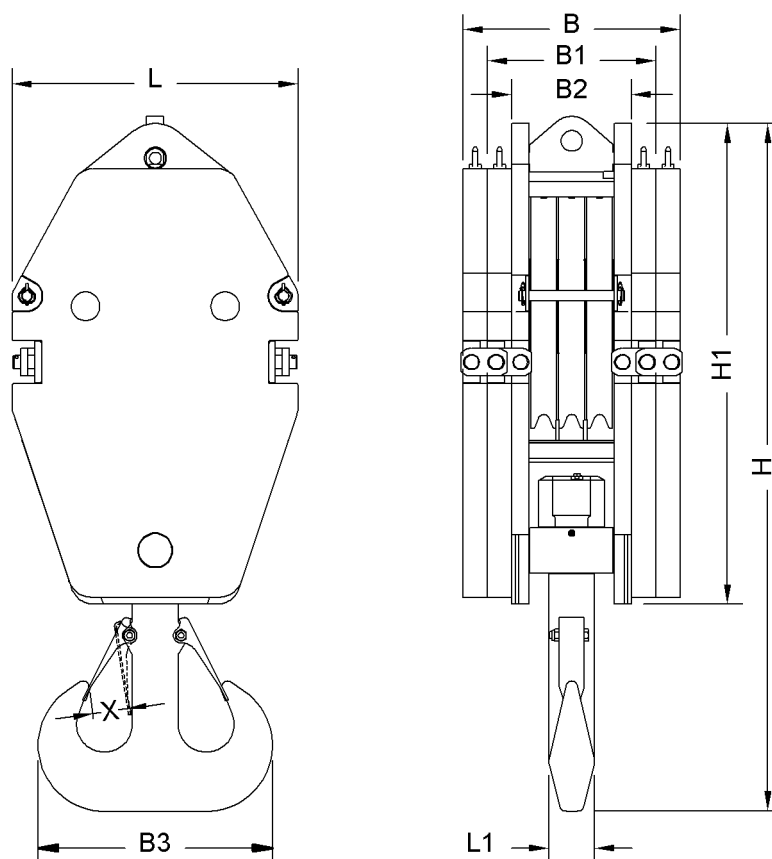


Fig. 217 Pulley block dimensions (220,459 lb)

Designation		Value
<b>L</b>	Pulley block length	2' 8" ft-in
<b>L1</b>	Hook length	5.20" in
<b>B</b>	Width of pulley block with 4 additional weights	2' 1" ft-in
<b>B1</b>	Width of pulley block with 2 additional weights	1' 7" ft-in
<b>B2</b>	Pulley block width without additional weights	1' 2" ft-in

Designation		Value
<b>B3</b>	Hook width	2' 2" ft-in
<b>H</b>	Height of pulley block with hook	6' 7" ft-in
<b>H1</b>	Height of pulley block with no hook	4' 6" ft-in
<b>X</b>	Jaw width	3.94" in
Weight with 4 additional weights		6,614 lb
Weight with 2 additional weights		4,519 lb
Weight without additional weights		2,425 lb
Maximum reeving		7
Rope Ø		1.10" in

Tab. 166 Pulley block technical data(220,459 lb)

### 1.31.4 Pulley block (110,230 lb)

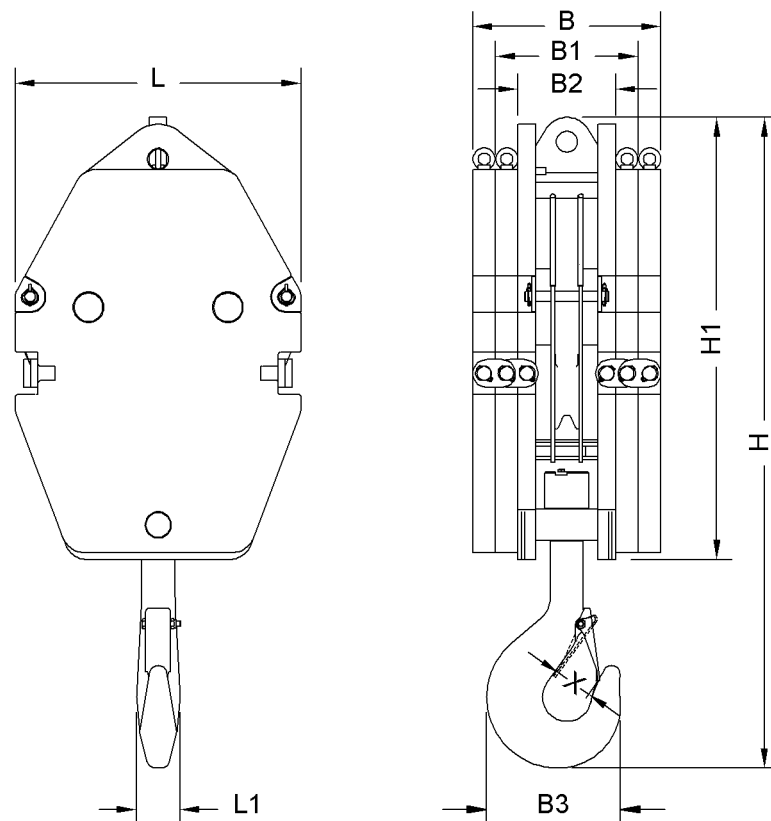


Fig. 218 Pulley block dimensions (110,230 lb)

Designation		Value
<b>L</b>	Pulley block length	2' 8" ft-in
<b>L1</b>	Hook length	4.92" in
<b>B</b>	Width of pulley block with 4 additional weights	1' 9" ft-in
<b>B1</b>	Width of pulley block with 2 additional weights	1' 4" ft-in

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Designation		Value
<b>B2</b>	Pulley block width without additional weights	11.02" in
<b>B3</b>	Hook width	1' 3" ft-in
<b>H</b>	Height of pulley block with hook	6' 1" ft-in
<b>H1</b>	Height of pulley block with no hook	4' 2" ft-in
<b>X</b>	Jaw width	3.94" in
Weight with 4 additional weights		5,291 lb
Weight with 2 additional weights		3,527 lb
Weight without additional weights		1,764 lb
Maximum reeving		3
Rope Ø		1.10" in

Tab. 167 Pulley block technical data(110,230 lb)

### 1.31.5 Hook (35,273 lb)

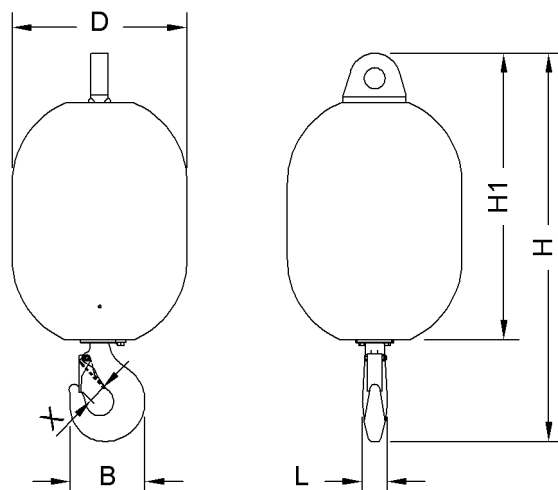


Fig. 219 Hook dimensions (35,273 lb)

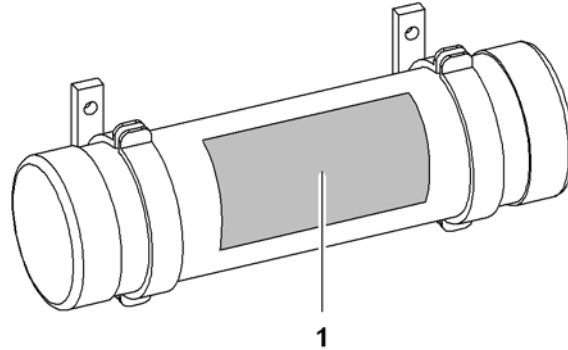
Designation		Value
<b>L</b>	Hook length	2.80" in
<b>B</b>	Hook width	8.54" in
<b>H</b>	Height of pulley block with hook	3' 8" ft-in
<b>H1</b>	Height of pulley block with no hook	2' 8" ft-in
<b>D</b>	Hook Ø	1' 8" ft-in
<b>X</b>	Jaw width	1.97" in
Weight		1,984 lb
Maximum reeving		1
Suitable for pocket lock for rope Ø		1.06" in to 1.14" in

Tab. 168 Hook technical data (35,273 lb)



## 1.32 Abseiling device\*

The abseiling device is located behind the operator's seat in the cab.



*Fig. 220 Abseiling device*

**1** Operating instructions

## 1.33 Safety barrier\*

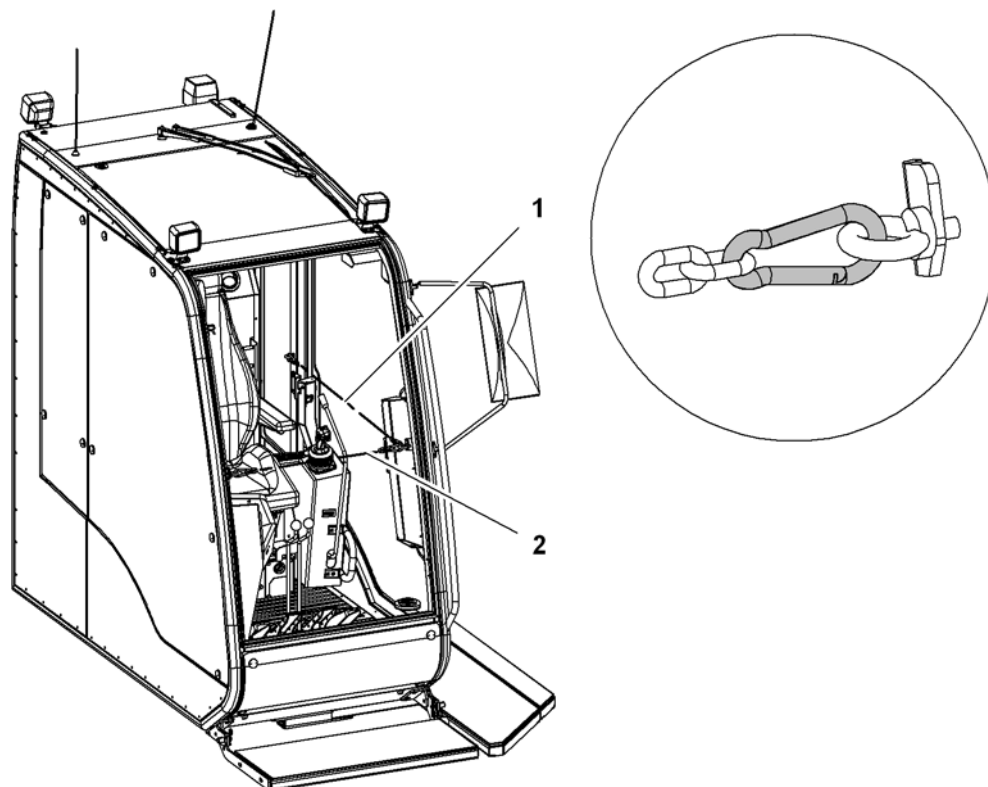


Fig. 221 Safety barrier

1 Chain

2 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 2 is fitted in front of the front windscreen.

## 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'.

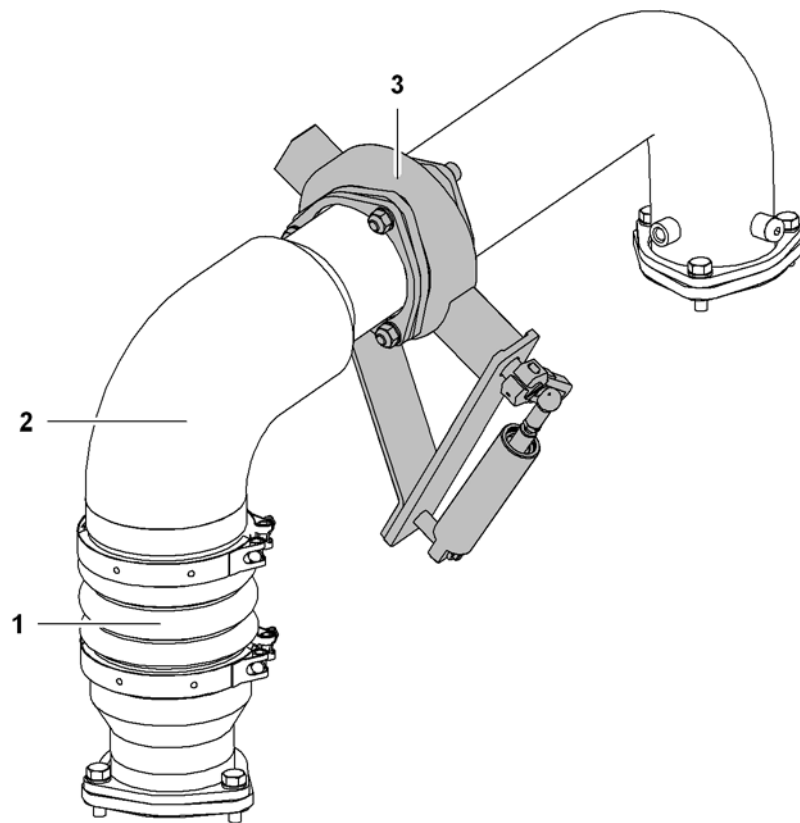


Fig. 222 Suction flap

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.

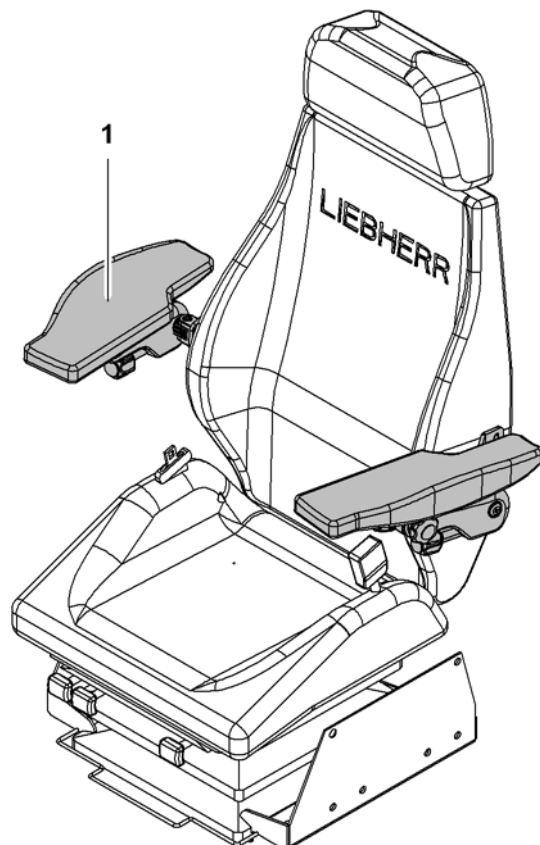


Fig. 223 Armrests for operator's seat

1 Armrests (2x)

## 1.36 Battery pre-warming\*

The battery pre-warmer uses a heating coil to warm the batteries.

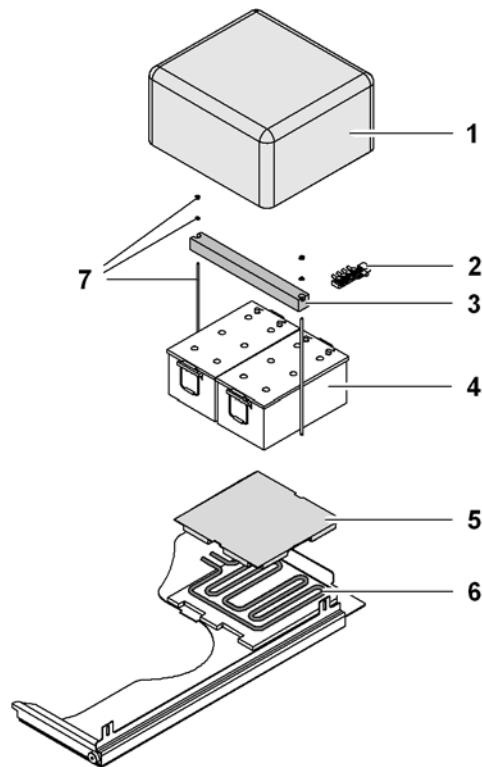


Fig. 224 Battery pre-warmer\*

- |   |             |   |                    |
|---|-------------|---|--------------------|
| 1 | Insulation  | 5 | Plate              |
| 2 | Fuse block  | 6 | Heating coil       |
| 3 | Wooden beam | 7 | Threaded bars (2x) |
| 4 | Batteries   |   |                    |

## 1.37 Tagline winch\*

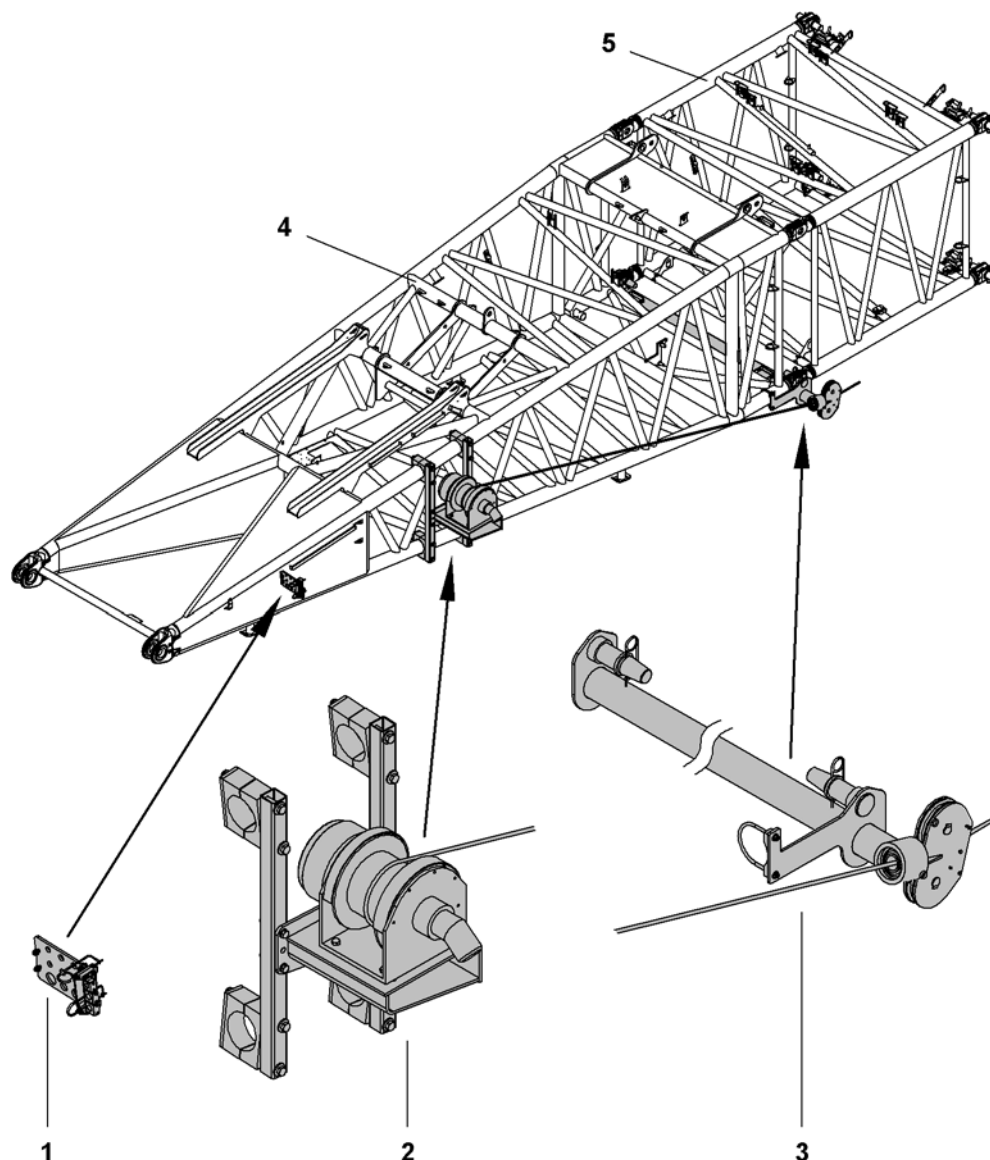


Fig. 225 Tagline winch

- |   |                |   |                   |
|---|----------------|---|-------------------|
| 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 tensile force. The tagline winch 2 dampens the swinging movements of the rigging material by winding and unwinding the tagline.

The rotatable rope mounting 3 prevents the tagline from being damaged if the rope runs unevenly.

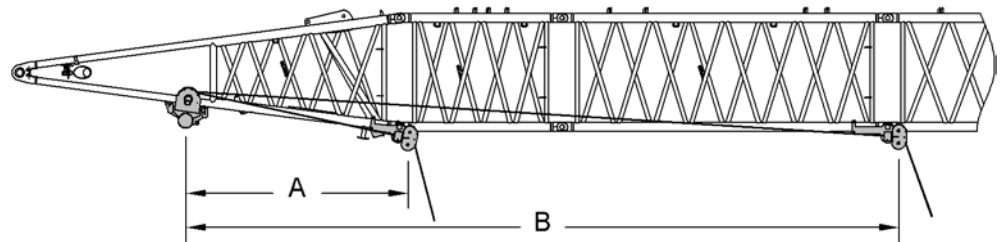


Fig. 226 Assembly position of the rope bracket (schematic diagram)

**A** Minimum distance

**B** Maximum distance

Because of the special way the winch unwinds, there is a minimum distance **A** of 12' 2" ft-in and a maximum distance **B** of 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 10 ft boom section
- after the first 20 ft boom section
- after the 10 ft boom section and the first 20 ft boom section

Designation	Value
Maximum winch line pull	3,370 lb <sub>f</sub>
Minimum constant tension	450 lb <sub>f</sub>
Rope Ø	0.55" in
Drum Ø	10.63" in
Maximum rope speed	360' 11" ft-in/min
Rope length	262' 6" ft-in

Tab. 169 Technical data for tagline winch

## 1.38 Refueling pump\*

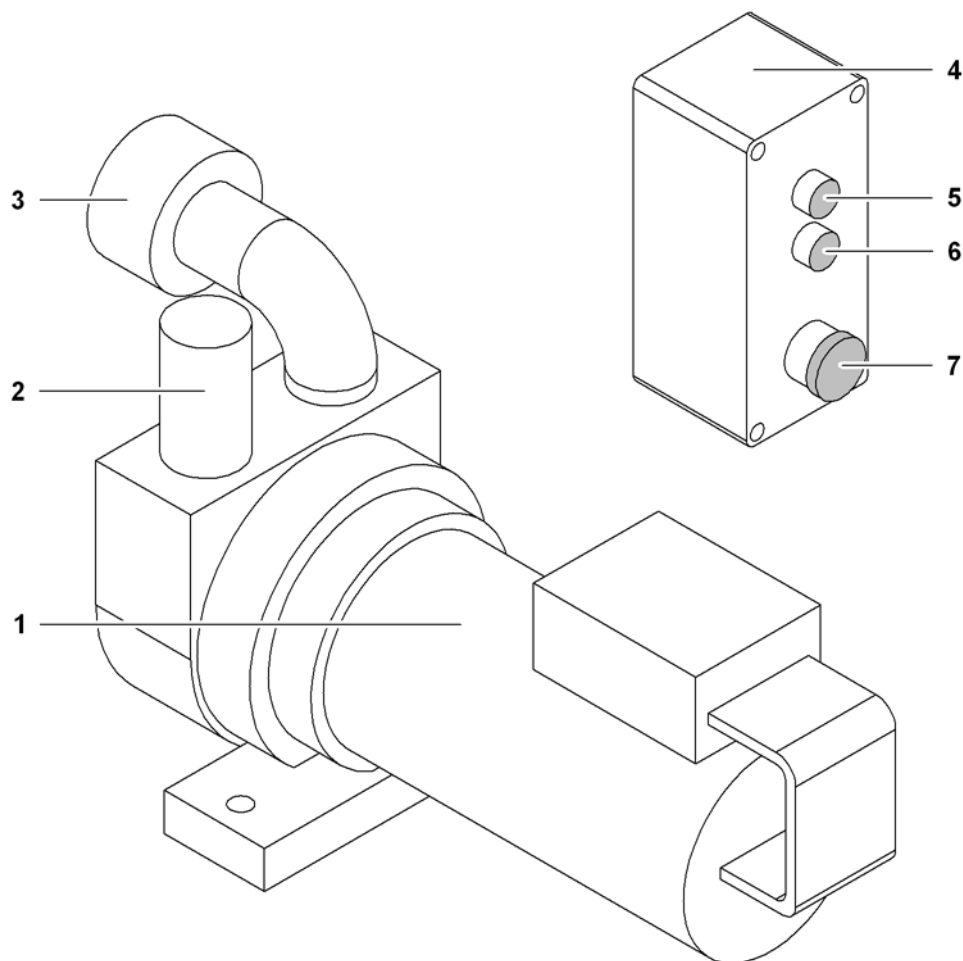


Fig. 227 Refuelling pump

- |   |                             |   |                          |
|---|-----------------------------|---|--------------------------|
| 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. 13' 1" ft-in
Delivery rate	13.21 gal/min
Operating time	max. 20 min
Idling time	max. 30 s

Tab. 170 Refueling pump technical data



## 1.39 Cab roof protection guard\*

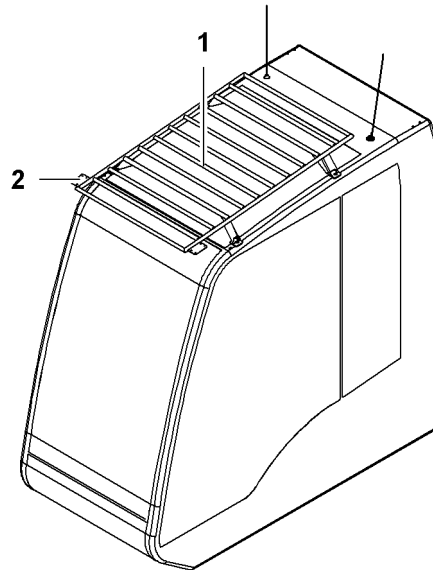


Fig. 228 Cab roof protection guard

1 Cab roof protection guard

2 Mountings (2x) for floodlights

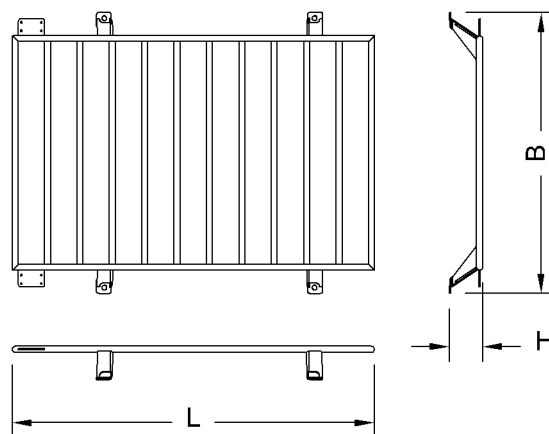


Fig. 229 Dimensions of cab roof protection guard

Designation		Value
L	Length	4' ft-in
B	Width	3' 1" ft-in
H	Height	4.41" in
Weight		66.14 lb

Tab. 171 Technical data: cab roof protection guard

## 1.40 Break-in protection\*

The break-in protection protects the operator's cab against vandalism.

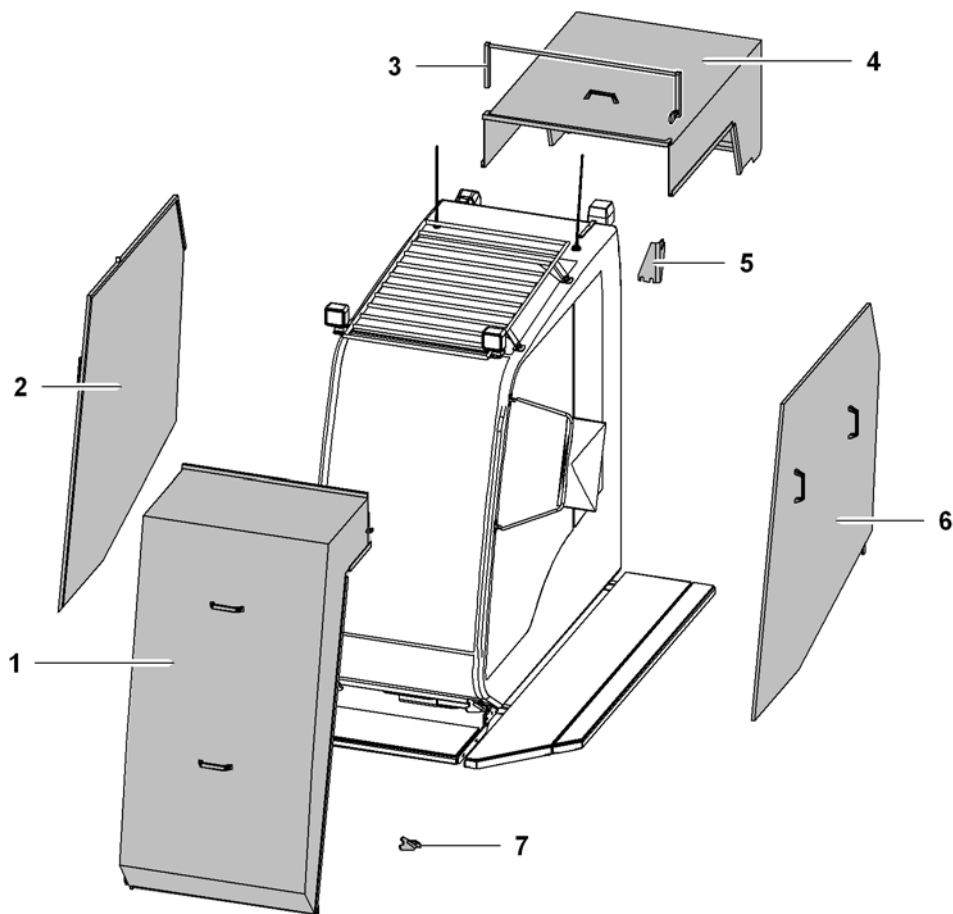


Fig. 230 Break-in protection

- |   |                  |   |                     |
|---|------------------|---|---------------------|
| 1 | Front cap        | 5 | Rear supports (2x)  |
| 2 | Right side cover | 6 | Left side cover     |
| 3 | Rod with clamp   | 7 | Front supports (2x) |
| 4 | Rear cap         |   |                     |

The front 7 and rear supports 5 are fitted to the cab when it is shipped. The caps and side covers have carrying handles that can be removed for transportation.

## 1.41 External power supply\*

The role of the external power supply is to charge, trickle charge or support the batteries when the machine is switched off.

### NOTICE

Main battery switch is OFF, batteries will not be charged!

► Do not turn off the battery main switch whilst charging is in progress.

When the ignition is switched on and the diesel engine is running, the helicopter warning light is supplied with power from the batteries and the machine's generator. With the external power supply the helicopter warning light can be operated overnight when the ignition is off and even for longer periods, e.g. over weekends.

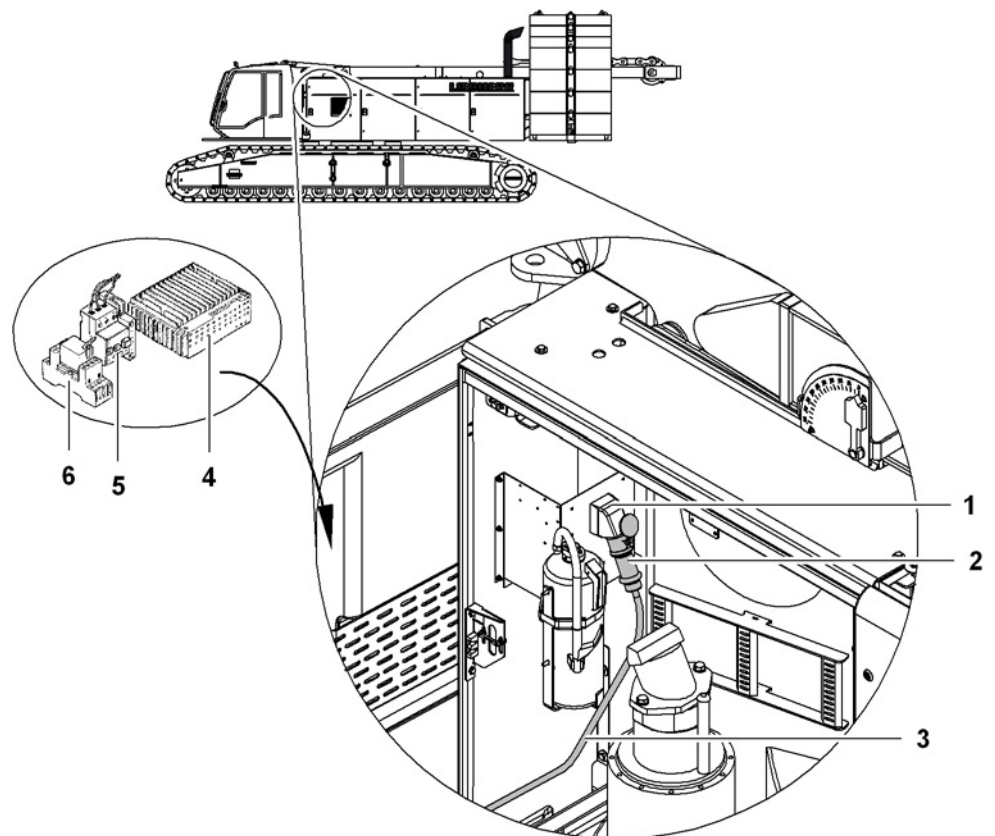


Fig. 231 External power supply

- |   |             |   |                     |
|---|-------------|---|---------------------|
| 1 | Socket      | 4 | Laddare             |
| 2 | Plug        | 5 | Motorskydds brytare |
| 3 | Power cable | 6 | Circuit breaker     |

### 1.41.1 Laddare

Designation	Value
Input voltage	AC 230 V, 50 Hz, ±15%
	AC 115 V, 60 Hz, ±15%

Designation	Value
Output voltage	DC 27.6 V
Maximum output current	10 A

Tab. 172 Technical data for charger

### 1.41.2 Power cable



---

#### **WARNING**

Faulty power cable!  
risk of electric shock.

- ▶ Arrange for a qualified electrician to make the power cable.
  - ▶ Make sure that the power cable complies with national safety regulations.
  - ▶ Make sure that the power cable is suitable for use on a construction site.
- 

The requisite power cable for external connection is not supplied with the machine. There is a suitable plug in the socket in the uppercarriage, but a suitable power cable must be procured independently.

## 1.42 Spark arrester\*

The spark arrester prevents sparks caused by hot engine exhaust gases from escaping.

It enables the machine to be used in what might otherwise be problematic applications, such as construction, agriculture and forestry, landfill sites and sluiceways, weirs, sewage treatment.

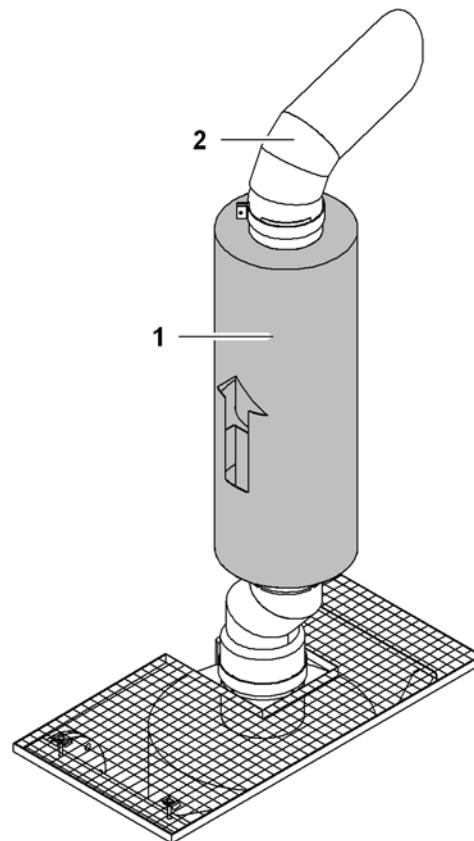


Fig. 232 Spark arrester

1 Spark arrester

2 Exhaust crank

## 1.43 Radio remote control\*

The radio transmitter is manufactured in conformance with regulations and rules laid down by BGV D6 for cranes, ZH 1/547 "Directives for operating cranes by remote control" and DIN EN 13557. The radio transmitter conforms to EMC guidelines and meets the relevant standards regarding emitted interference and interference immunity in industry.

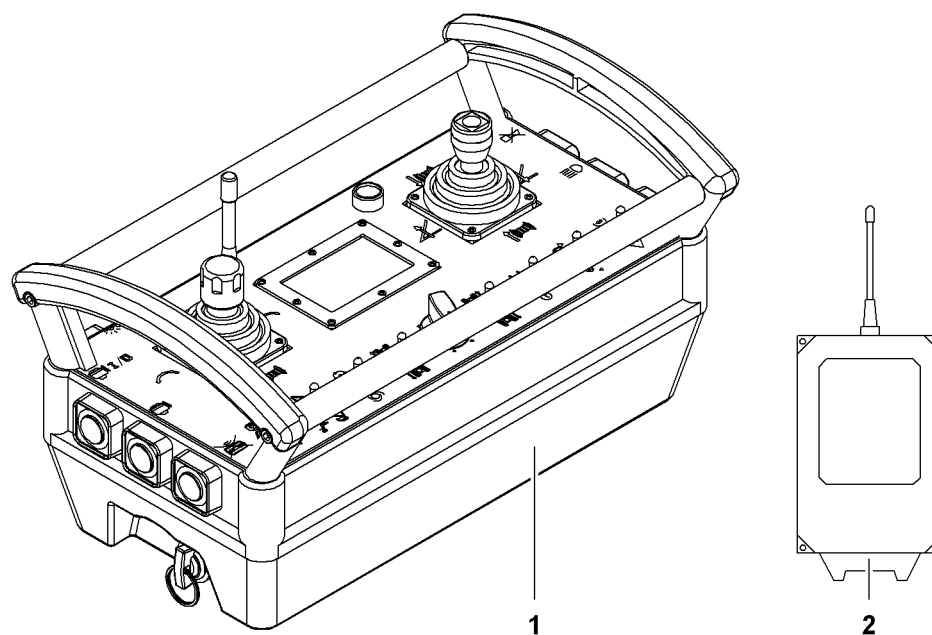


Fig. 233 Radio remote control

- 1 Control panel (radio transmitter)      2 Receiver module (radio receiver on the machine)

Designation	Value
Length	1' ft-in
Width	6.30" in
Height	6.22" in
Weight	5.73 lb
Frequency range EU <sup>A</sup>	869.72 MHz to 869.98 MHz
Frequency range US <sup>B</sup>	902 MHz to 928 MHz
Power	Typically < 10 milliwatt
Operating temperature	-13 °F to 158 °F
battery charging time	max. 4 h
Service life	Approx. 16 h at 100 % operating time

Tab. 173 Technical data – control panel (radio transmitter)

- A) Belgium, Denmark, Germany, Estonia, Finland, France, Greece, United Kingdom, Iceland, India, Israel, Croatia, Lithuania, Latvia, Luxembourg, Malaysia, Netherlands, New Zealand, Norway, Austria, Paraguay, Poland, Portugal, Rumania (license required), Scotland, Singapore, Spain, Sweden, Switzerland, Taiwan, Czech Rep., Turkey, Hungary
- B) Argentina, Brazil, Canada, Mexico, Philippines, USA

Designation	Value
Length	6.30" in
Width	4.53" in
Height	10.63" in
Weight	7.72 lb

Tab. 174 Receiver module (radio receiver on the machine) - technical data

Designation	Value
Length	1.65" in
Width	5.51" in
Height	7.32" in
Weight	1.87 lb
Operating voltage	230 V
Power consumption	12 W
Output voltage	< 10 V
output current	0.4 A
Compatible batteries	NiCd batteries, types FuB 10 AA and FuB 10 XL, NiMh batteries, type BA214061

Tab. 175 Battery charger - technical data

## 1.44 GSM/GPRS/GPS modem

A GSM/GPRS/GPS modem is connected to the Litronic control system.

The modem is located in switch cabinet X1 and works with an antenna on the cab roof. This enables the latest operating 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 organise the provision of spare parts quickly and efficiently.

Designation	Value
Frequency	850 MHz, 900 MHz, 1800 MHz, 1900 MHz
Input voltage	6.5 V to 48 V
Operating temperature	-22 °F to 158 °F
Storage temperature	-40 °F to 185 °F
Weight	1.43 lb

Tab. 176 Technical data for GSM/GPRS/GPS modem



## 1.45 Hook fixing point \*

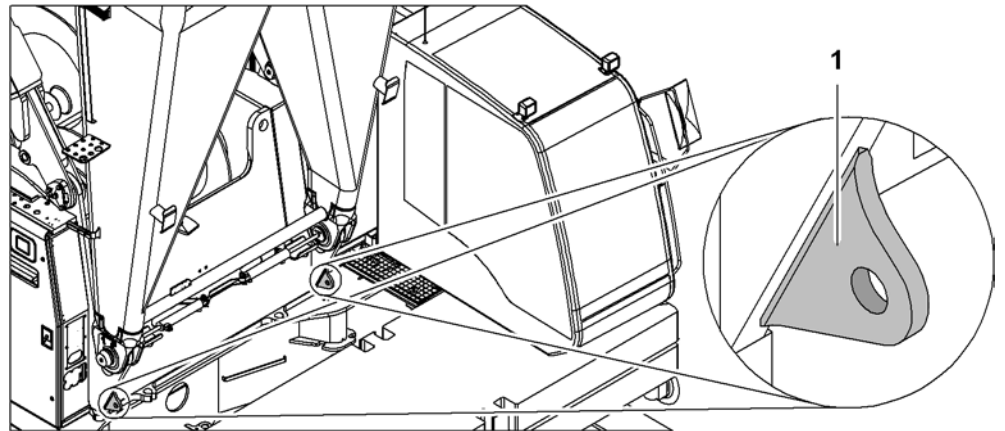


Fig. 234 hook fixing point

1 Hook fixing point brackets.

---

### NOTICE

Incorrect use of the hook fixing point brackets!  
Damage to the uppercarriage.

► The link plates must only be used as hook fixing points.

If the brackets are to be used for any other purpose:

► Contact Liebherr after sales service beforehand.

---



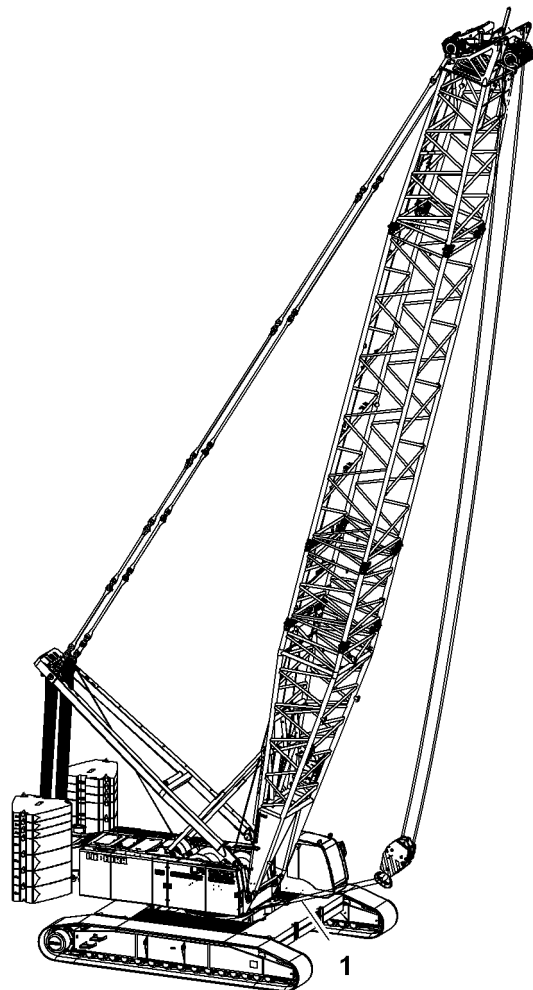
### WARNING

Incorrect procedure when using the hook fixing point!  
Severe injuries through rope rupture, damage to the structure.

► Hook fixing point must only be used in parked positions ([For more information see: 6.7.2 Parked positions for boom configurations, page 567](#)).

► Hooks must only be secured to the link plates using a safety retaining rope.

---



*Fig. 235 Application example of hook fixing point*

1 Safety retaining rope

## 1.46 Handrail\* / wide steps\*

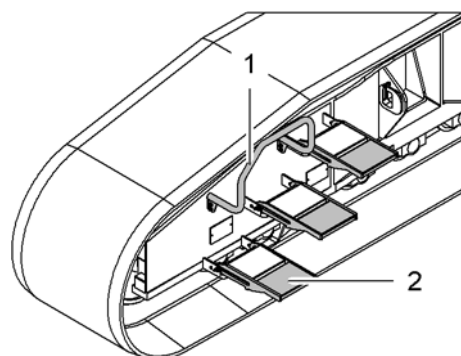


Fig. 236 Handrail / wide steps

1 handrail

2 Wide steps

The handrail **1** and the wide steps **2** allow personnel to climb onto the crawler side frame more easily.

## 1.47 Heating and air-conditioning system\*

The air conditioning is combined with the heating and ventilation systems of the operator's cab. The heating and air conditioning only work when the diesel engine is running. Cooling performance depends on the speed at which the diesel engine is running.

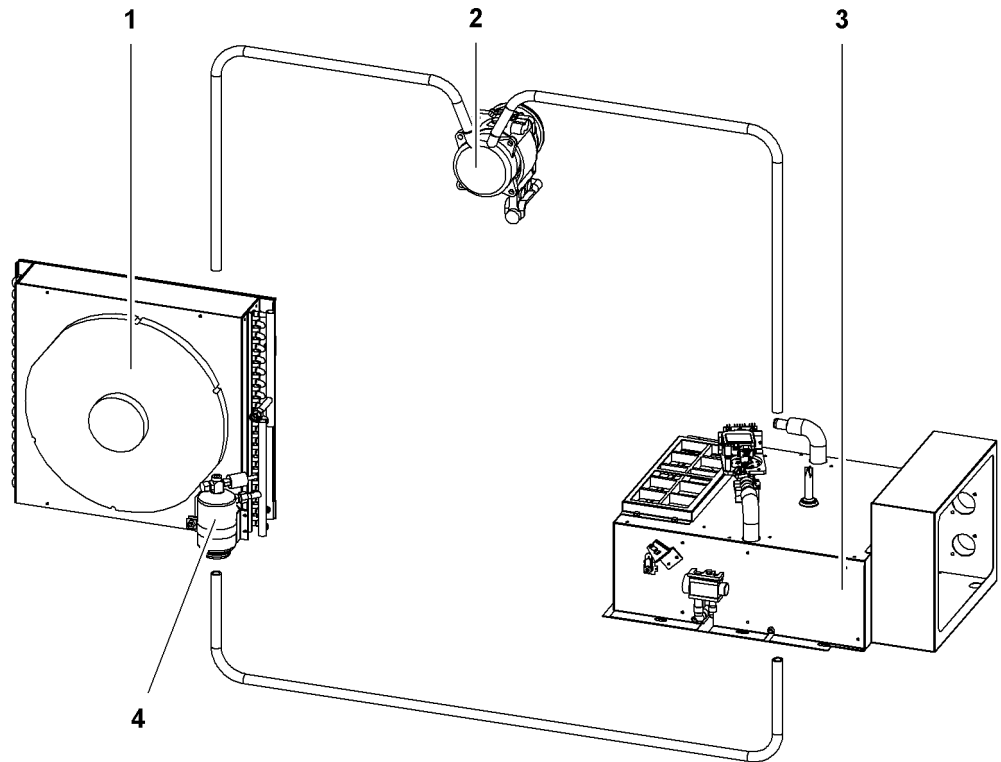


Fig. 237 Components of the air conditioning system

- |   |            |   |  |
|---|------------|---|--|
| 1 | Condenser  | 3 | Climatic box with heater and vaporiser |
| 2 | Compressor | 4 | Coolant receiver                       |

Designation	Value
Type: Air heating system with water heat exchanger and vaporiser	
Heat output	10.9 kW
Nominal voltage	24 V
Fan capacity	1,674.16 yd <sup>3</sup> /h (free blowing)
Fan motor	three settings
Refrigerant	R134 A, CFC-free

Tab. 177 Technical data, air conditioning

## 1.48 Helicopter warning light\*



### Note

The use of helicopter warning lights is mandatory according to national and local regulations!

- ▶ Before using the machine, familiarise yourself with national and local regulations.

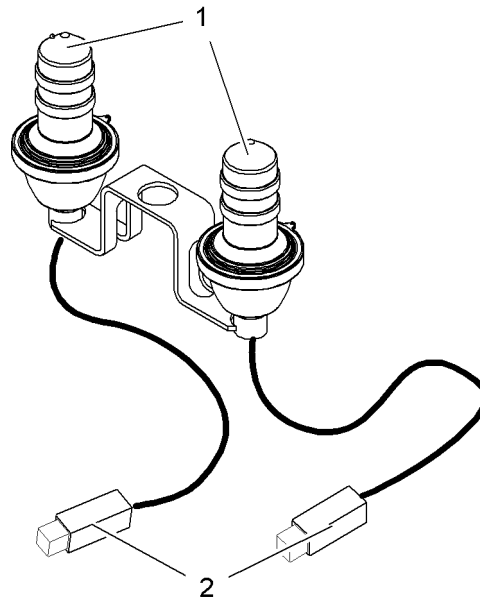


Fig. 238 Helicopter warning light

1 Helicopter warning light

2 Connecting cable

The helicopter warning light:

- is mounted on the boom head section or on the jib head section if a jib is attached.
- is attached onto the same fixture as the anemometer.
- lights up when the ignition is switched on and the engine is running.
- lights up if an external power supply is connected.

## 1.49 Hydraulic cab elevation\*

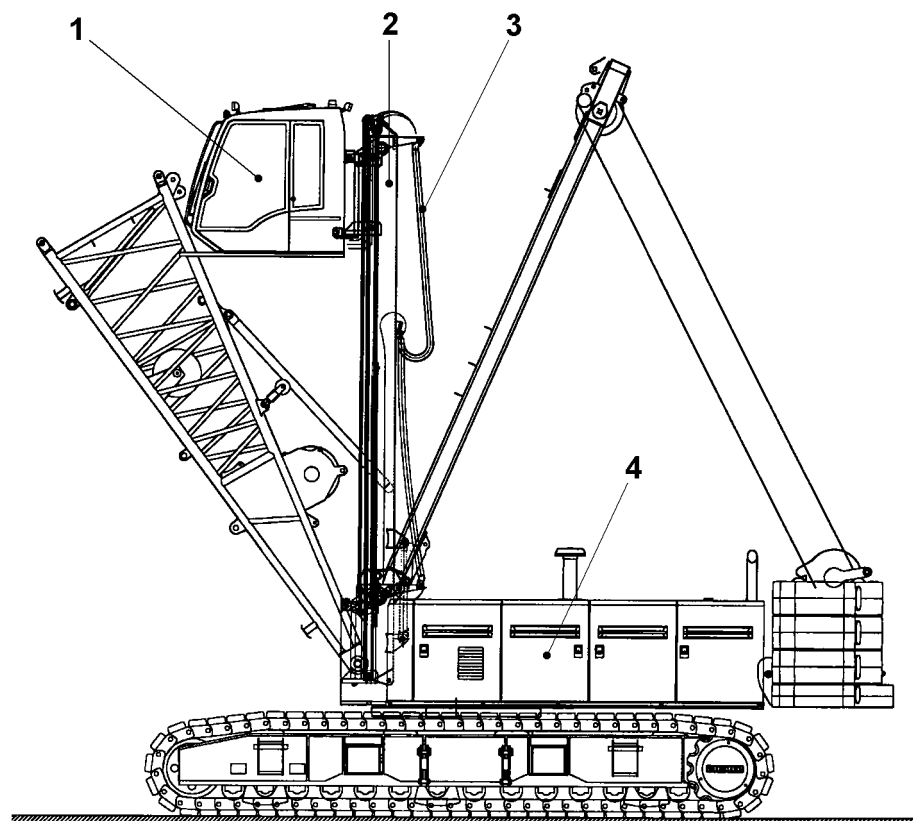


Fig. 239 Cab elevation (19' 8" ft-in) overview

- |   |      |   |               |
|---|------|---|---------------|
| 1 | Cab  | 3 | Hose kit      |
| 2 | Mast | 4 | Basic machine |

The hydraulic cab elevation system allows continuous, vertical adjustment of the cab.

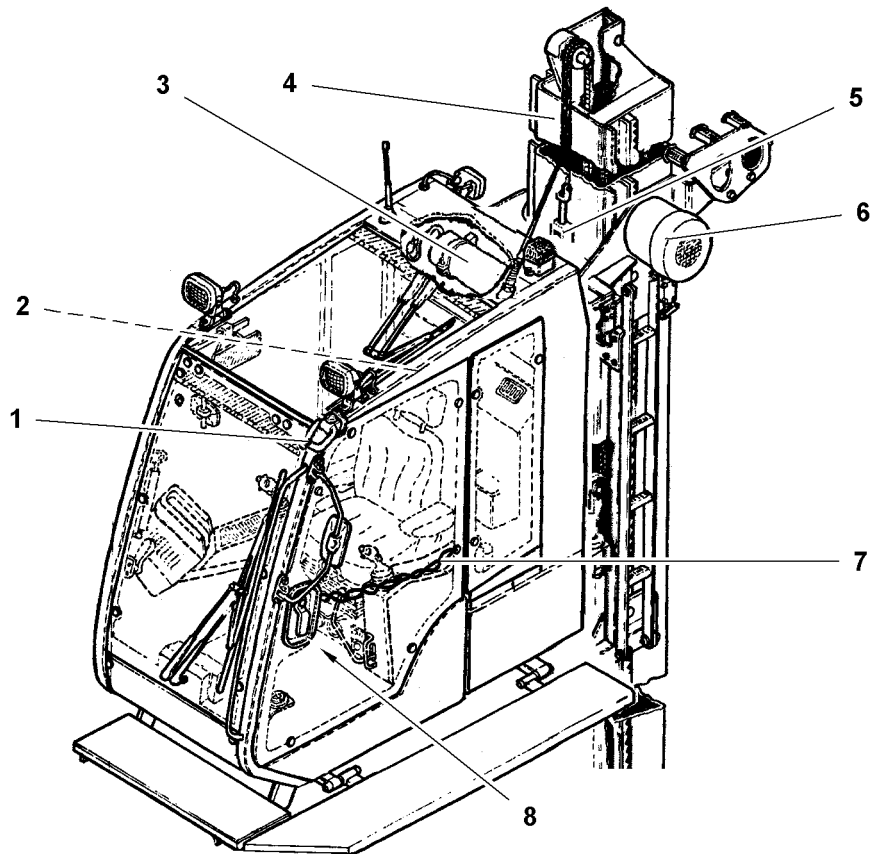


Fig. 240 Hydraulic cab elevation system

- |   |  |
|---|--|
| 1 Lowering device suspension point  | 5 Chain  |
| 2 Lowering device suspension point<br>(with the cab roof protection<br>guard mounted) | 6 Overrun brake                                      |
| 3 Abseiling device  | 7 Safety chain                                       |
| 4 Mast  | 8 Operating elements for the cab<br>elevation system |

Designation	Value
Maximum adjustable height	19' 8" ft-in
Cab elevation speed	26' 3" ft-in/min
Cab lowering speed	36' 1" ft-in/min
The overrun brake responds to the rate of fall	2.26 ft/s
The lowering speed during emergency lowering of the cab	14' 9" ft-in/min

Tab. 178 Technical data of the hydraulic cab elevation

## 1.50 Cable remote control

The purpose of cable remote control is to control the counterweight hoisting cylinders and the pin connection cylinders used for hydraulically pinning the boom base section.

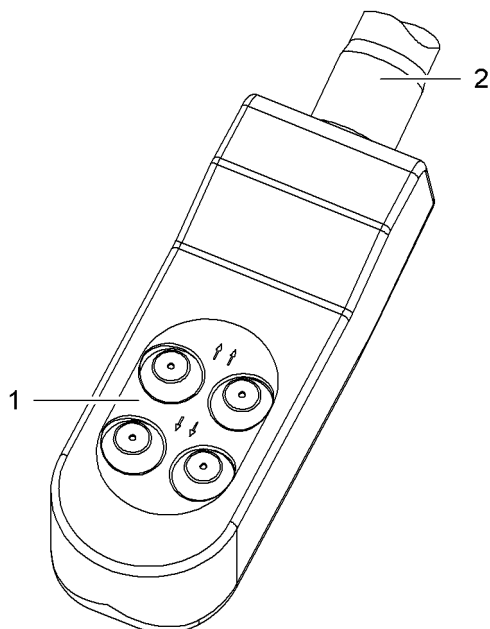


Fig. 241 Cable remote control

1 Buttons (4x)

2 Connecting cable

The continuation of the connecting cable with its connector is not shown.

Designation	Value
Length	8.66" in
Width	2.95" in
Height	2.36" in
Operating temperature	-13 °F to 158 °F
Storage temperature	-40 °F to 158 °F
Weight (without connecting cable)	2.20 lb

Tab. 179 Cable remote control - technical data



## 1.51 Fuel prefilter heating\*

The fuel pre-filter heating warms up the fuel with a built-in filter heater.

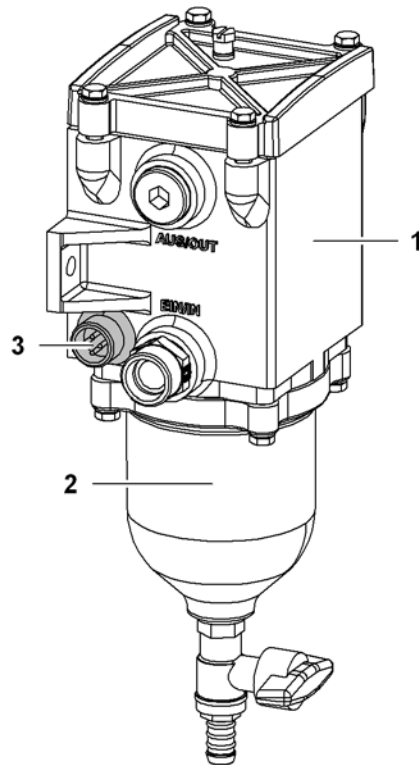


Fig. 242 Fuel pre-filter heating

- 1 Fuel pre-filter
- 2 Water separator
- 3 Filter heater power supply

## 1.52 Ladder\* for boom

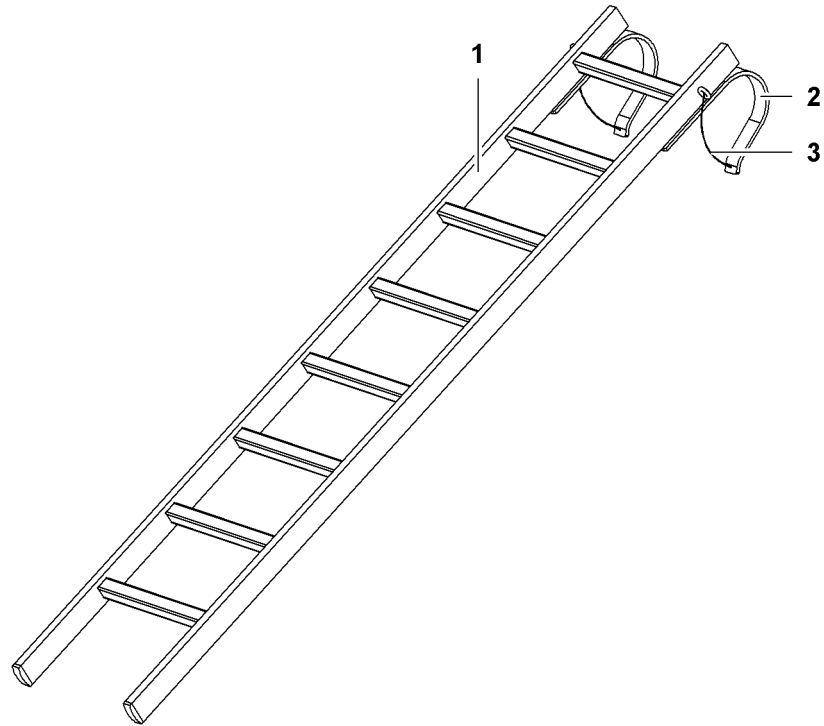


Fig. 243 Ladder for boom

- 1 Ladder
- 2 Plastic-coated ridge hooks (2x)
- 3 Safety ropes (2x)

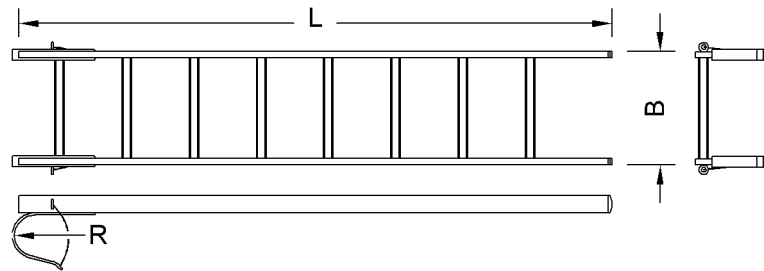


Fig. 244 Ladder for boom dimensions

Designation		Value
L	Length	8' 1" ft-in
B	Width	1' 5" ft-in
Weight		18.08 lb

Tab. 180 Ladder for boom technical data

## 1.53 Ladder\* for uppercarriage

A ladder for the uppercarriage is supplied. A second ladder can be supplied if desired to enable a ladder to be fitted on both sides of the uppercarriage.

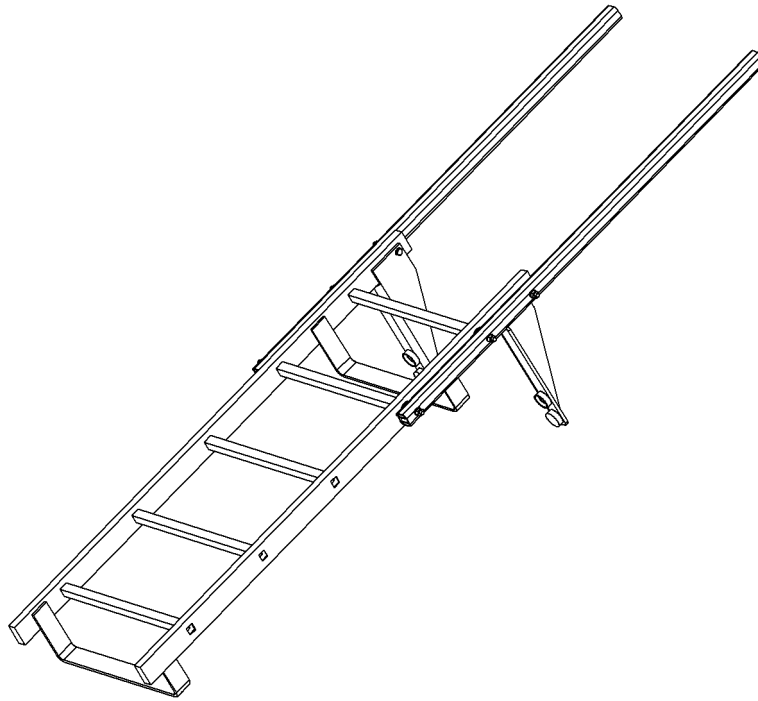


Fig. 245 Ladder for uppercarriage

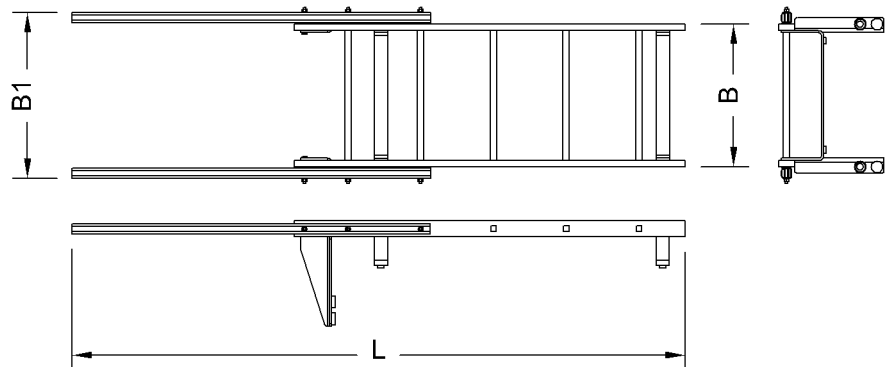


Fig. 246 Dimensions of ladder for uppercarriage

Designation		Value
<b>L</b>	Length	7' 9" ft-in
<b>B</b>	Width	1' 10" ft-in
<b>B1</b>	Width	2' 1" ft-in
Weight		31.75 lb

Tab. 181 Ladder for uppercarriage, technical data

## 1.54 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 Litronic control system with its internal VME bus conforms to ISO DIN 13766. The electrical and electronic components conform at least to EN 55022 or EN 55024.

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 mode screens, machine setups, load charts and error protocols.
  - enables a function to be selected by touching the symbols with the finger.
- Left-hand control lever for controlling the main boom and the swing
- Right-hand control lever for operating winches 1 & 2
- 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.

## 1.55 Engine pre-heater\*

The engine pre-heater uses the national mains voltage. The built-in immersion heaters in the engine's coolant circuit warm the coolant.

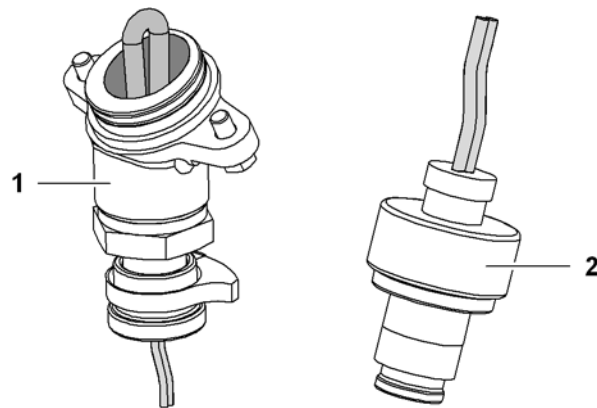


Fig. 247 Engine pre-heater

- 1 Immersion heater 1000 W                      2 Thermostat

The coolant is heated at a rate of approx. 37 °F an hour. The thermostat on the engine regulates the temperature between 122 °F and 140 °F.

## 1.56 Retrofit kits\* for operation with two ropes over the jib head section

### 1.56.1 Retrofit kit for luffing jibs 1008 / 1309 / 1713 / 1916 / 2316

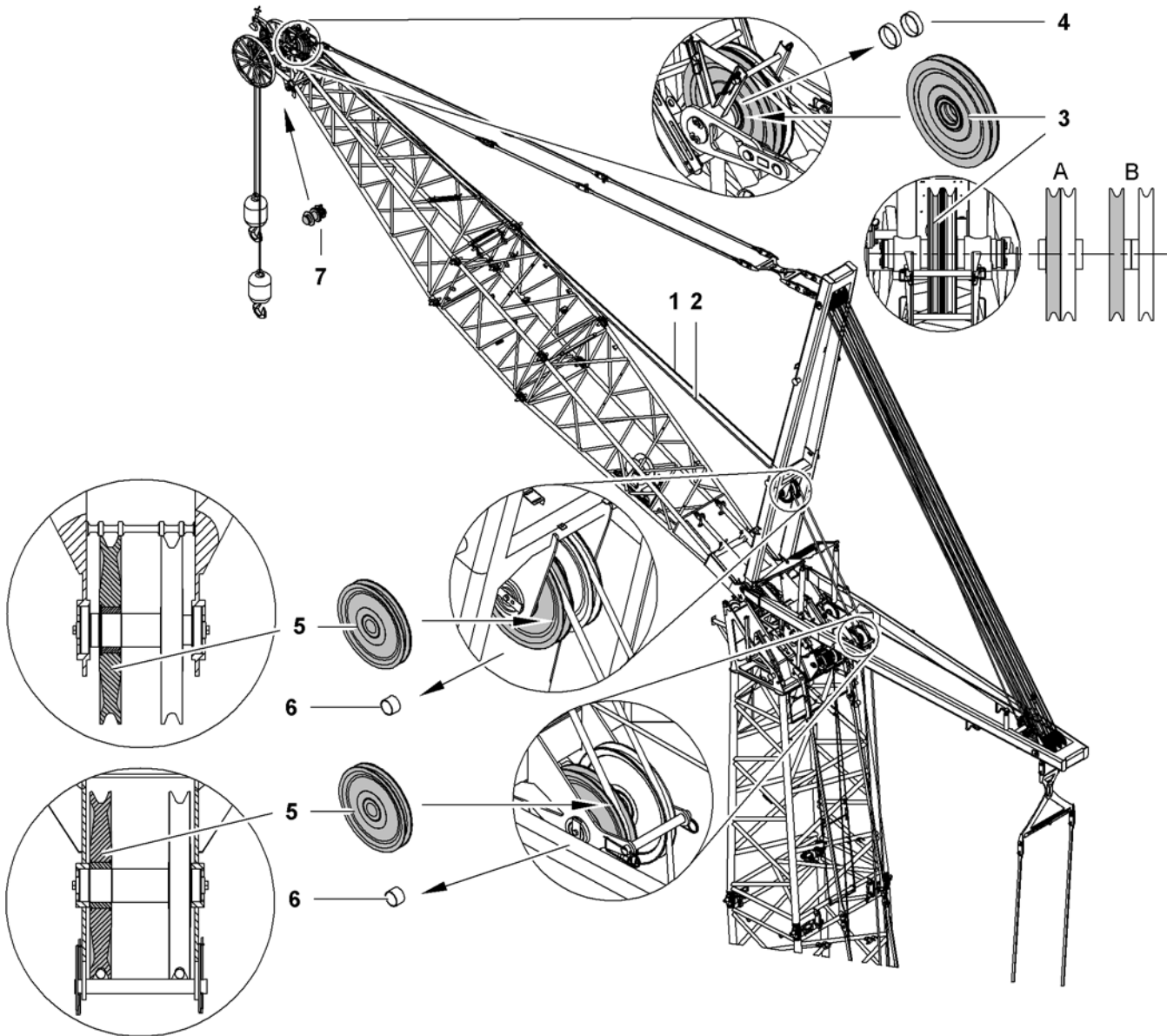


Fig. 248 Additional pulleys and rope fixing point with two ropes over luffing jib head section

<b>A</b> Assembly position A	<b>2</b> Winch 2 hoist rope	<b>5</b> Pulleys (2x)
<b>B</b> Assembly position B	<b>3</b> Pulley	<b>6</b> Bushes (2x)
<b>1</b> Winch 1 hoist rope	<b>4</b> Bushes (2x)	<b>7</b> Pins, washers and safety pins for rope fixing point

The pulley 3 (2' 1" ft-in x 0.59" in x 5.51" in) replaces the two bushes 4 (5.98" in x 5.55" in x 1.57" in).

The pulleys **5** (1' 8" ft-in x 0.59" in x 3.54" in) replace the bushes **6** (4.00" in x 3.56" in x 2.64" in).

Assembly position	Jib type
<b>A</b>	1008 luffing jib
	1309 luffing jib
	1713 luffing jib
	1916 luffing jib
<b>B</b>	2316 luffing jib

Tab. 182 Assembly position for pulley on the jib head section

### 1.56.2 Retrofit kit for 1008 fixed jib

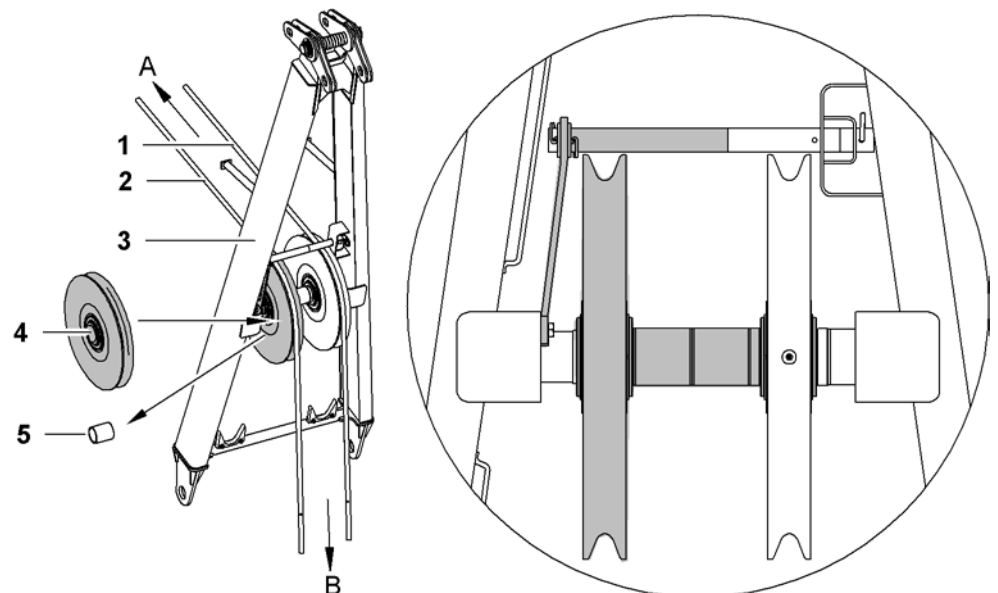


Fig. 249 Retrofit kit for 1008 fixed jib

- |  |                    |
|--|--------------------|
| <b>A</b> Direction of jib head section | <b>3</b> A-frame 2 |
| <b>B</b> Direction of main boom        | <b>4</b> Pulley    |
| <b>1</b> Winch 1 hoist rope            | <b>5</b> Socket    |
| <b>2</b> Winch 2 hoist rope            |                    |

The pulley **4** (2' 1" ft-in x 0.59" in x 5.51" in) and all the components shown in grey in the detailed drawing replace the bush **5** (4.00" in x 3.56" in x 4.72" in).

### 1.56.3 Retrofit kit for 0806 fixed jib

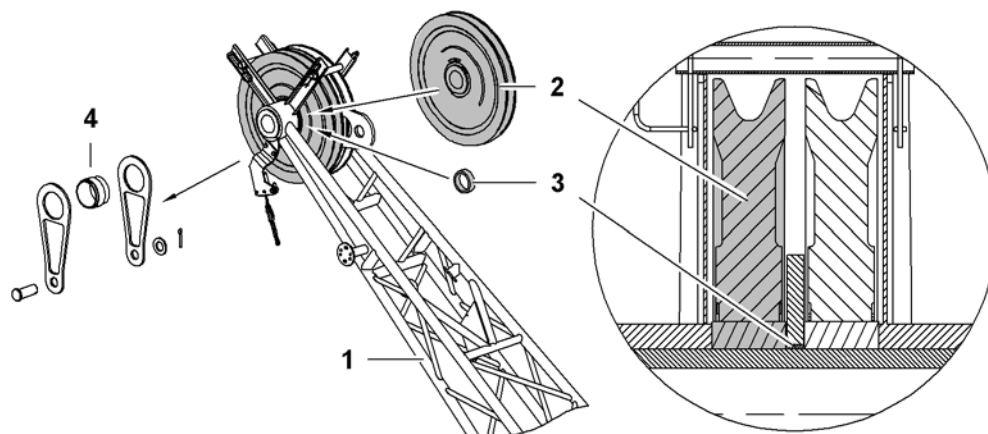


Fig. 250 Retrofit kit for 0806 fixed jib

- |   |                       |   |                              |
|---|-----------------------|---|------------------------------|
| 1 | 0806 jib head section | 3 | Socket                       |
| 2 | Pulley                | 4 | Rope fixing point components |

The pulley **2** (2' 1" ft-in x 0.59" in x 5.51" in) and the bush **3** (5.91" in x 5.51" in x 0.75" in) replace all the rope fixing point components **4**.



## 1.57 Emergency operation controller\*

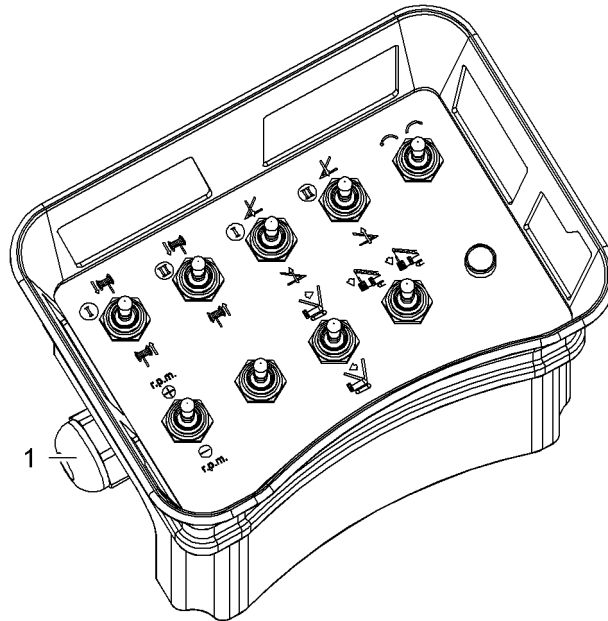


Fig. 251 Emergency operation control panel

- 1 Connecting cable on uppercarriage

The connecting cable, which consists of a 40-pin plug for the basic machine and a 16-pin plug for the derrick, and the carrying belt and waist strap are not shown.

Designation	Value
Length	5.31" in
Width	7.87" in
Height	6.57" in
Input voltage	18 V to 36 V
Operating temperature	-13 °F to 158 °F
Storage temperature	-40 °F to 176 °F
Weight (without connecting cable)	2.20 lb

Tab. 183 Emergency operation control panel technical data

## 1.58 Visual motion warning device\*

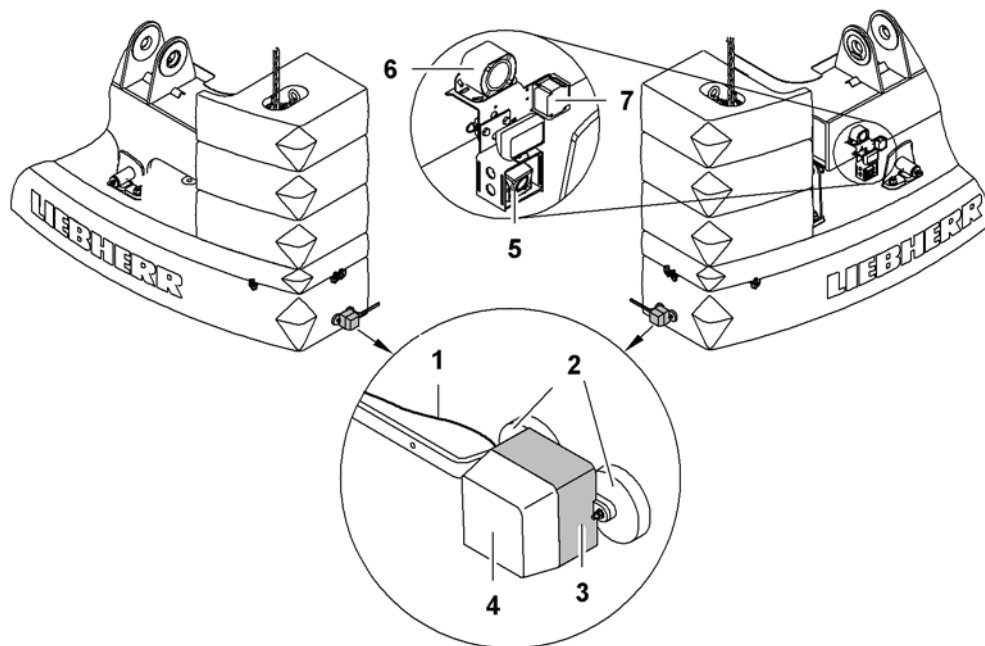


Fig. 252 Visual motion warning device on rear counterweight

- |   |                   |   |                                |
|---|-------------------|---|--------------------------------|
| 1 | Connecting cable  | 5 | reversing camera               |
| 2 | Magnets (2x)      | 6 | Acoustic motion warning device |
| 3 | Aluminium housing | 7 | Electrical socket              |
| 4 | Flashing light    |   |                                |

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 electrics are connected via the acoustic motion warning devices.

### 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 connecting 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.

Designation	Value
Lighting	Xenon
Nominal voltage	24 V
Current consumption	0.3 A

Designation	Value
Power	5 W
Flashing frequency	60 flashes per minute
temperature range	-22 °F to 122 °F

Tab. 184 Visual motion warning device technical data

## 1.59 Load moment limiter signal column\*

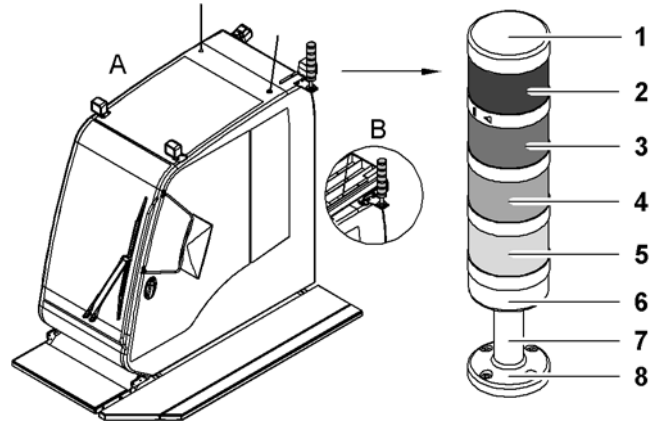


Fig. 253 Load moment limiter signal column

- |          |   |          |                                    |
|----------|---|----------|------------------------------------|
| <b>A</b> | Signal column on operator's cab                                   | <b>4</b> | LED steady light element<br>YELLOW |
| <b>B</b> | Signal column on operator's cab<br>with falling object protection | <b>5</b> | LED steady light element GREEN     |
| <b>1</b> | Lock  | <b>6</b> | Connecting element                 |
| <b>2</b> | Siren element   | <b>7</b> | Tube                               |
| <b>3</b> | LED flashing light element RED                                    | <b>8</b> | Foot                               |

The load moment limiter signal column on the operator's cab is an additional safety measure and displays the load moment utilisation visually and acoustically.

The signal column includes visual and acoustic elements. The visual elements involve a steady or flashing light.

Load moment utilisation	GREEN	YELLOW	RED	SIREN
0% - 85%	O			
85% - 95%		O		
> 95%			O	O

Tab. 185 Meaning of the load moment limiter signal column indications

If load moment limitation is bypassed (e.g. in mounting mode), the load moment limiter signal column is purely visual.

### NOTICE

Unauthorised fitting of load moment limiter signal column!  
 Damage to load moment limiter signal column.  
 Incorrect mode of operation of load moment limiter signal column.

- Ensure that only authorised personnel fit the load moment limiter signal column.

## 1.60 230 V socket\* in cab

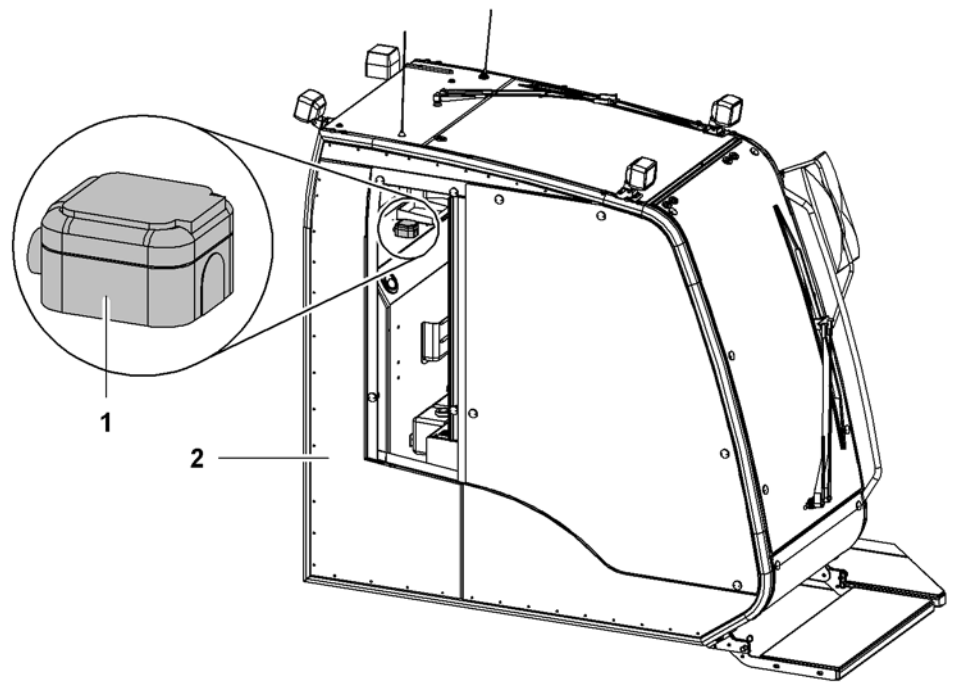


Fig. 254 230 V socket\* in cab

1 Socket

2 Cab

The mains voltage socket is installed on the rear shelf in the cab. The electric cable is laid but not connected.



### WARNING

Power lead is not connected properly!  
risk of electric shock.

► Ensure that only an authorised electrician connects the power line to the socket.

In order to use the socket in the cab the external power supply retrofit kit is also required.

## 1.61 Falling object protection\* for cab

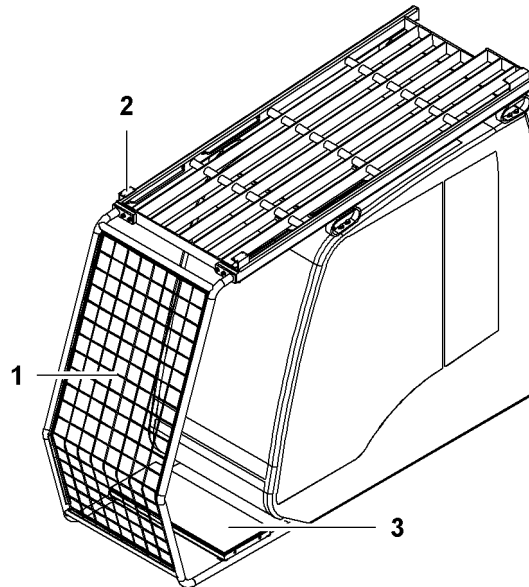


Fig. 255 Falling object protection for cab

- 1 Falling object protection
- 2 Mountings (3x) for floodlights
- 3 Platform

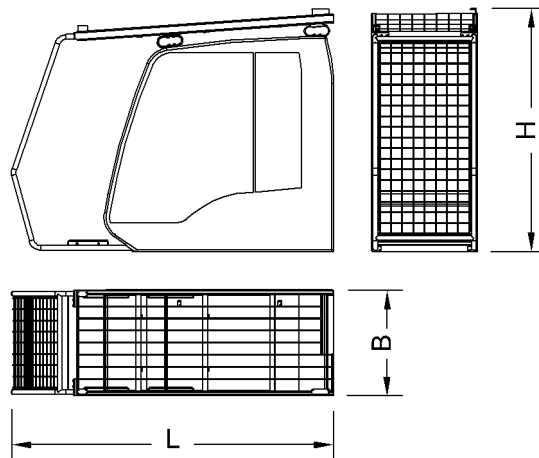


Fig. 256 Dimensions of falling object protection for cab

Designation		Value
L	Length	9' 6" ft-in
B	Width	3' 1" ft-in
H	Height	7' 2" ft-in
Weight		368 lb

Tab. 186 Technical data: falling object protection for cab

## 1.62 Video surveillance system\*

### 1.62.1 Monitor

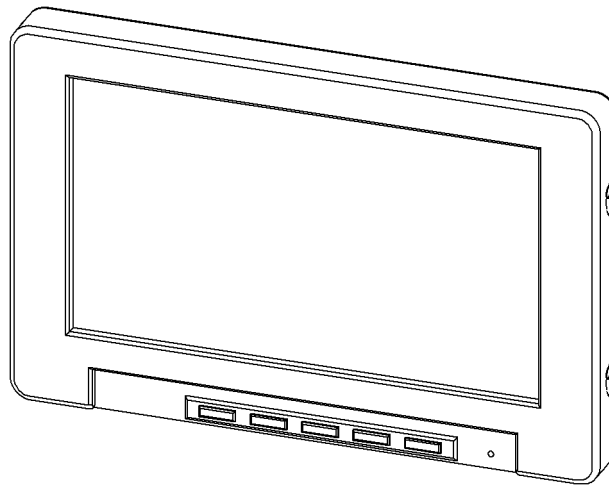


Fig. 257 Video surveillance system monitor

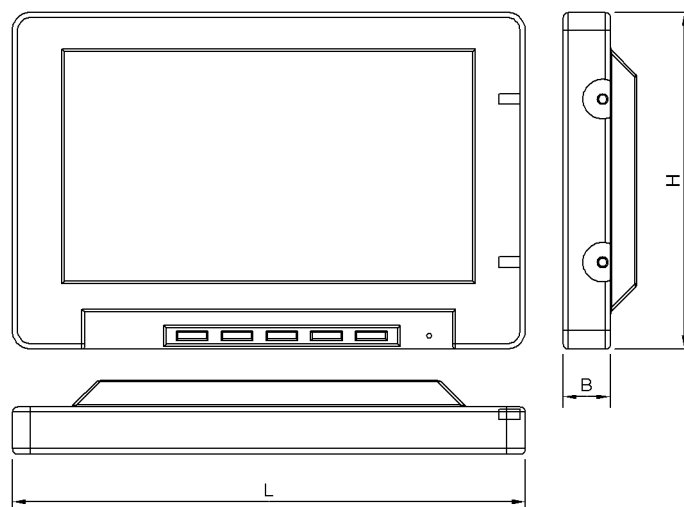


Fig. 258 Dimensions of the video monitoring system monitor

Designation		Value
<b>L</b>	Length	7.68" in
<b>B</b>	Width	1.10" in
<b>H</b>	Height	5.04" in
Screen diagonal		7.01" in
Resolution		234 (v) x 1440 (h)
Input voltage		12 V
Current consumption		max. 700 mA

Designation	Value
Protection class	IP 30
Resistance to shocks	0.18 oz
Operating temperature	-4 °F to 176 °F
Storage temperature	-22 °F to 185 °F
Weight	0.84 lb

Tab. 187 Video surveillance system monitor technical data

## 1.62.2 Control panel

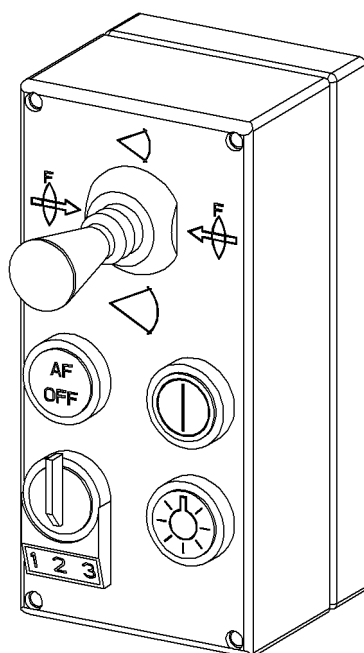


Fig. 259 Video surveillance system control panel



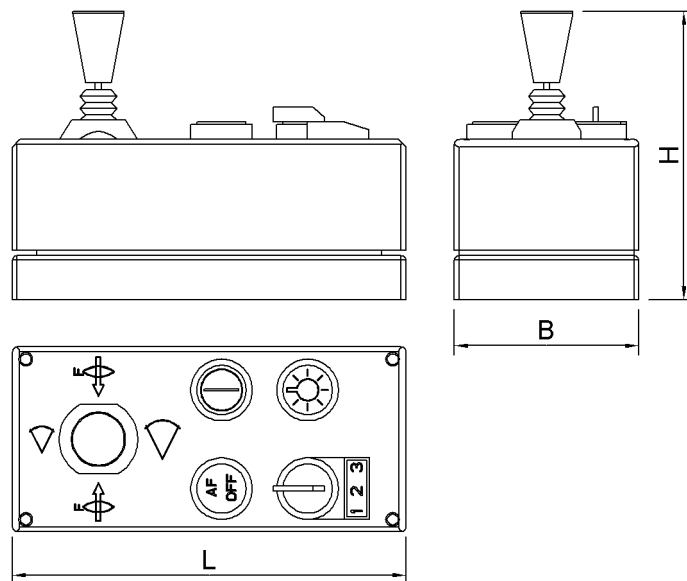


Fig. 260 Dimensions of Video surveillance system control panel

Designation		Value
<b>L</b>	Length	7.87" in
<b>B</b>	Width	3.50" in
<b>H</b>	Height	4.61" in
Input voltage		18 V to 32 V
Current consumption		max. 1 A
Protection class		IP 65
Resistance to shocks		0.18 oz
Operating temperature		-13 °F to 167 °F
Storage temperature		-40 °F to 203 °F
Weight (without connecting cable)		3.53 lb

Tab. 188 Technical data for video surveillance system control panel

### 1.62.3 Camera

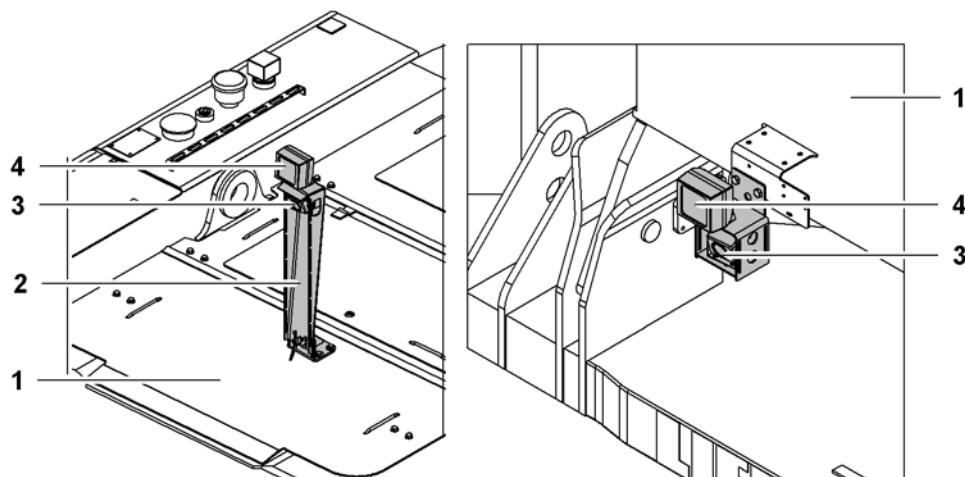


Fig. 261 Camera on uppercarriage for monitoring winches 1/2 and as reversing camera

- |   |               |   |            |
|---|---------------|---|------------|
| 1 | Uppercarriage | 3 | Camera     |
| 2 | Mount         | 4 | Floodlight |

The exact assembly position on the uppercarriage varies for each type of machine.

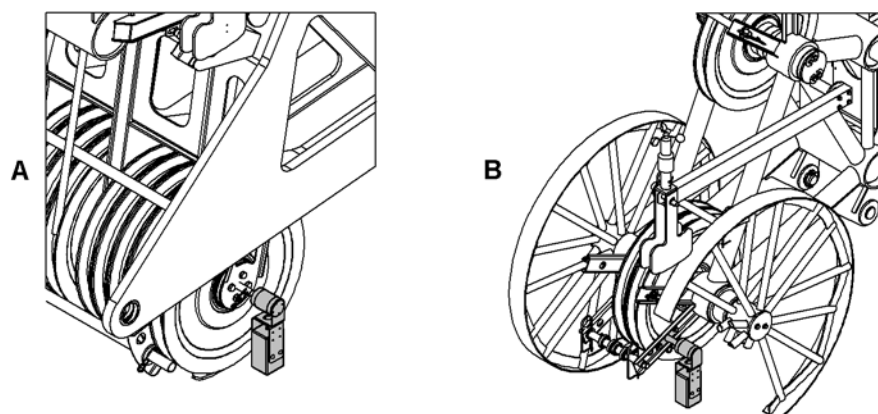


Fig. 262 Camera on main boom and on luffing jib

- |          |  |          |  |
|----------|--|----------|--|
| <b>A</b> | Camera assembly position on 1311, 2017, 2018, 2220, 2320 and 2821 main booms | <b>B</b> | Camera assembly position on 1008, 1309, 1713, 1916 and 2316 luffing jibs |
|----------|--|----------|--|

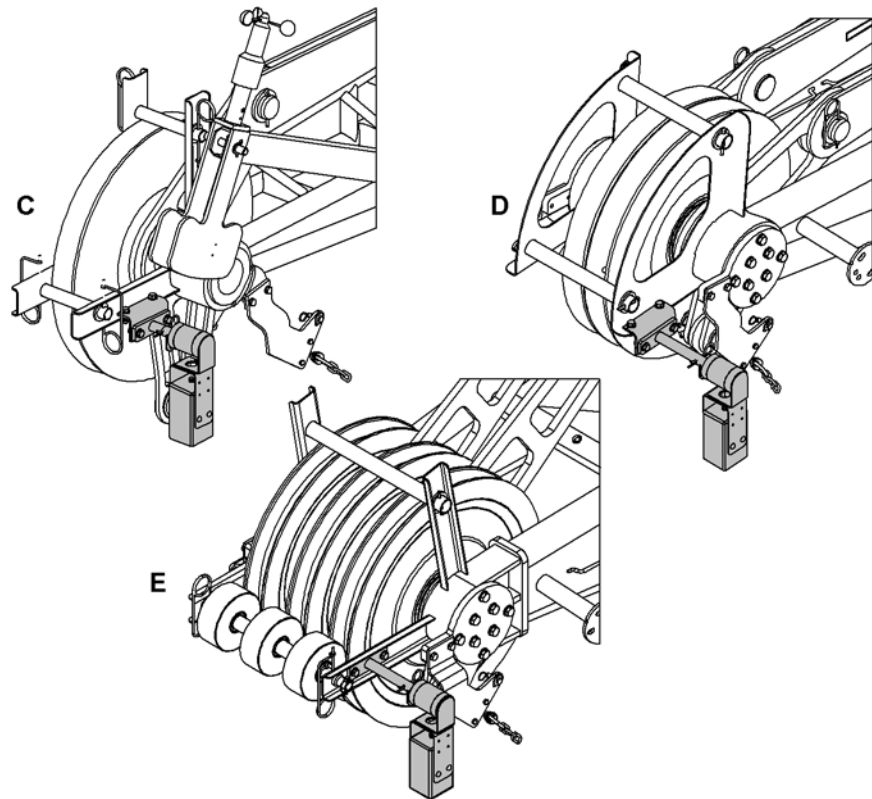


Fig. 263 Camera on fixed jib

- C** Camera assembly position on 0806 fixed jib
- D** Camera assembly position on 1008 fixed jib

- E** Camera assembly position on 0906 and 1507 fixed jibs

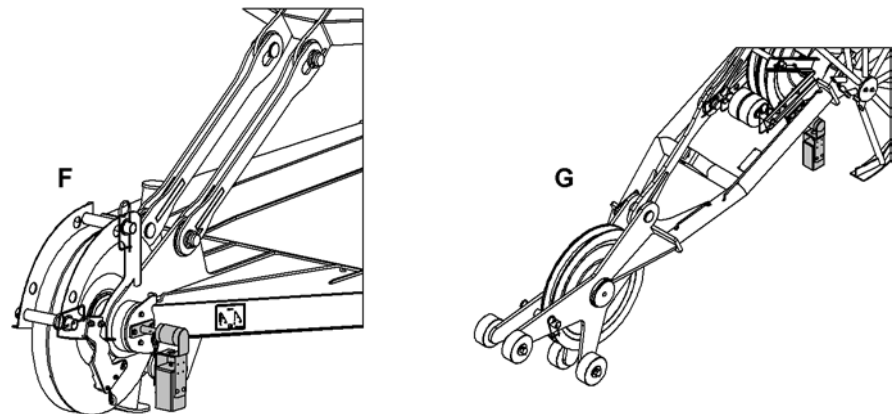


Fig. 264 Camera on auxiliary jib

- F** Camera assembly position on auxiliary jib (79300 lb)

- G** Camera assembly position on attached auxiliary jib (33,000 lb) or auxiliary jib (66,000 lb)

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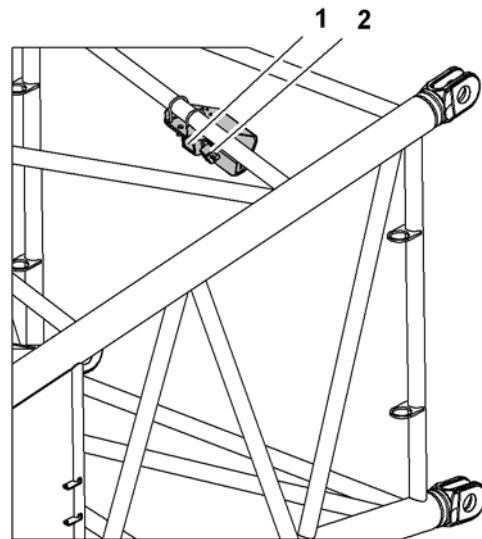


Fig. 265 Camera on the Derrick boom base section for monitoring the Derrick winch

1 Floodlight

1 Camera

## 1.63 Central lubrication\*

The central lubrication system consists of two independent, optional components:

- Central lubrication for swing ring bearing
- Central lubrication for swing ring tooth flanks

The central lubrication system lubricates the swing ring bearings and/or swing ring tooth flanks.

The central lubrication system's lubricating pumps are located in the uppercarriage.

### 1.63.1 Central lubrication for swing ring bearing

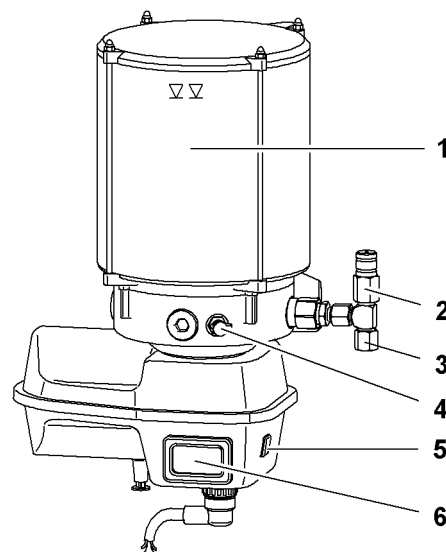


Fig. 266 Swing ring bearing lubrication pump

- |   |                                |   |                                   |
|---|--------------------------------|---|-----------------------------------|
| 1 | Supply container               | 4 | Filling nipple                    |
| 2 | Positive pressure relief valve | 5 | <i>Interim lubrication</i> button |
| 3 | Pump outlet                    | 6 | Control unit                      |

### 1.63.2 Central lubrication for swing ring tooth flanks

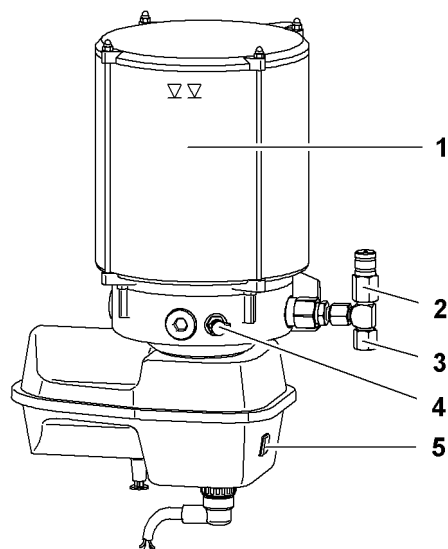


Fig. 267 Swing ring tooth flanks lubrication pump

- |   |                                |   |                            |
|---|--------------------------------|---|----------------------------|
| 1 | Supply container               | 4 | Filling nipple             |
| 2 | Positive pressure relief valve | 5 | Interim lubrication button |
| 3 | Pump outlet                    |   |                            |

The control unit for the swing ring tooth flanks lubrication pump is located in switch cabinet X1.

## 1.64 Additional floodlights\*

### 1.64.1 Floodlights on uppercarriage

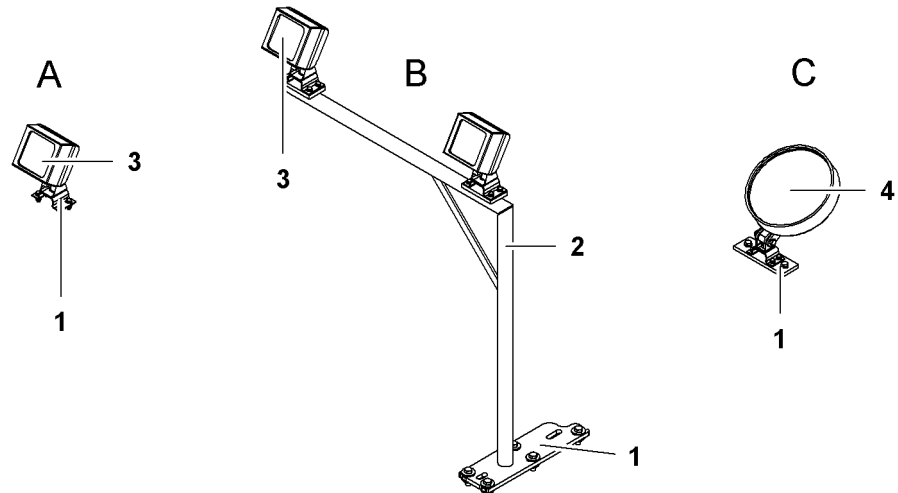


Fig. 268 Floodlights on uppercarriage

- |   |  |   |                   |
|---|--|---|-------------------|
| A | Floodlight                                   | 2 | Frame             |
| B | Floodlight with frame                        | 3 | Floodlights (3x)  |
| C | Round floodlight                             | 4 | Search-floodlight |
| 1 | Mountings (3x) for securing to uppercarriage |   |                   |

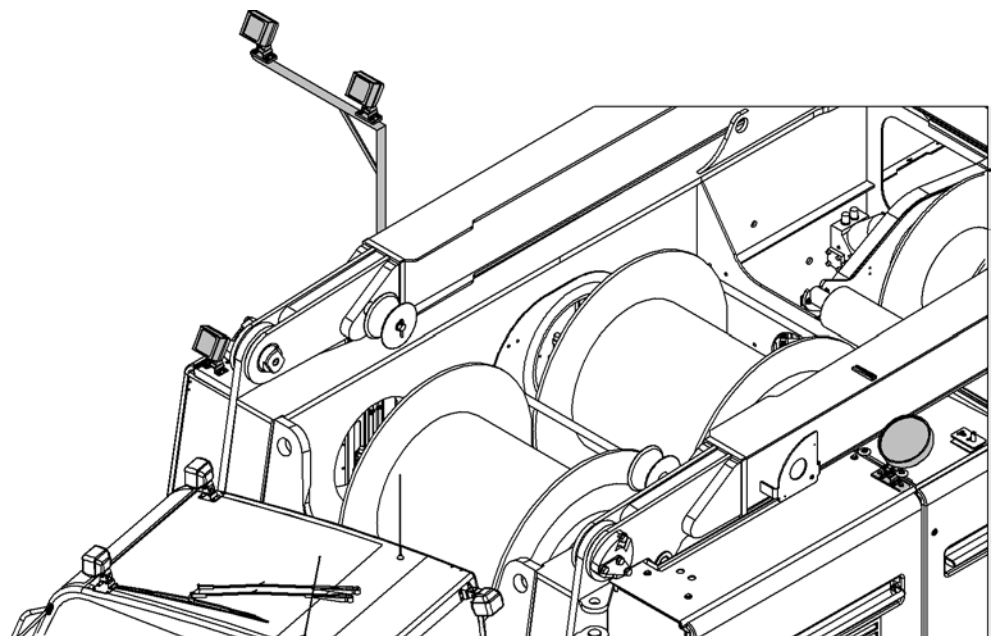


Fig. 269 Floodlights fitted on uppercarriage

The exact installation position varies according to machine type.

Designation	Value
Width of frame	2' 4" ft-in
Height of frame	2' 4" ft-in
Weight of each floodlight	1.54 lb
Lighting	Halogen bulb H3
Nominal voltage	24 V
Power consumption per floodlight	70 W

Tab. 189 Technical data for floodlight and floodlight with frame on the uppercarriage

Designation	Value
Weight	3.31 lb
Lighting	Halogen bulb H3
Nominal voltage	24 V
Power consumption	70 W

Tab. 190 Technical data for search-floodlight

### 1.64.2 Boom base section floodlights

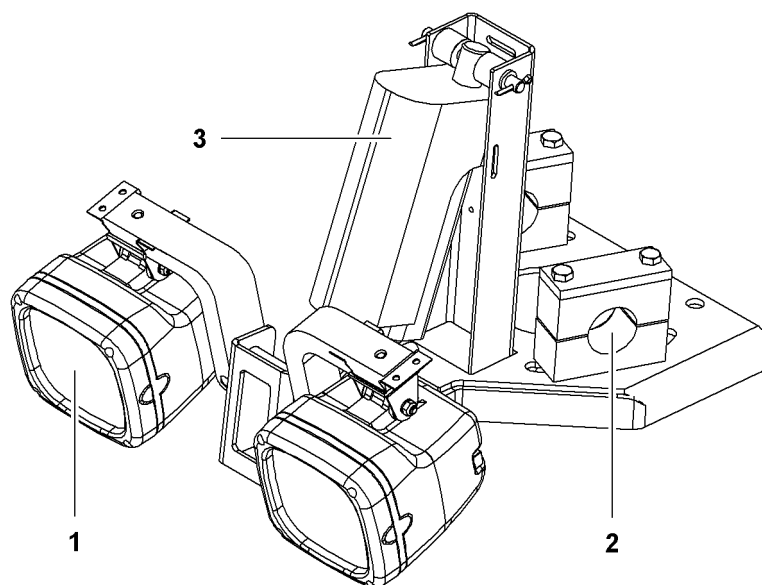


Fig. 270 Boom base section floodlights

- 1 Floodlights (2x)
- 2 Mountings (2x) for attaching to the diagonal of the boom base section
- 3 Adjustment cylinder

The adjustment cylinder 1 can be used to tilt the floodlights 3 by 141 °.



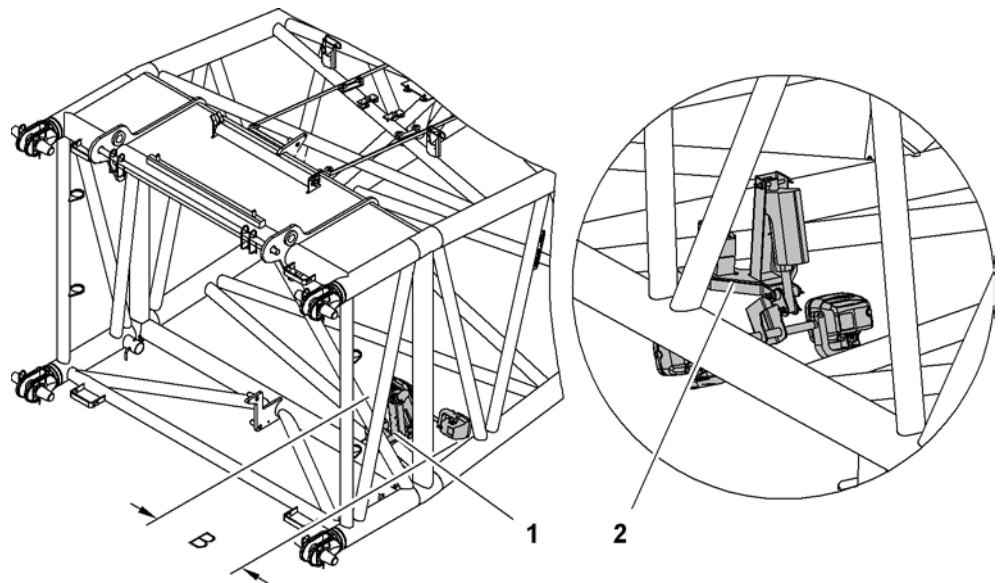


Fig. 271 Floodlights fitted to the boom base section, folded in/folded out

1 Floodlight folded in

2 Floodlight folded out

The exact installation position varies according to machine type.

Designation		Value
<b>B</b>	Width of floodlights	2' 5" ft-in
Weight		31.97 lb
Lighting		Gas discharge lamp
Nominal voltage		24 V
Power consumption		42 W

Tab. 191 Floodlights on boom base section, technical data

### 1.64.3 Floodlights on main boom

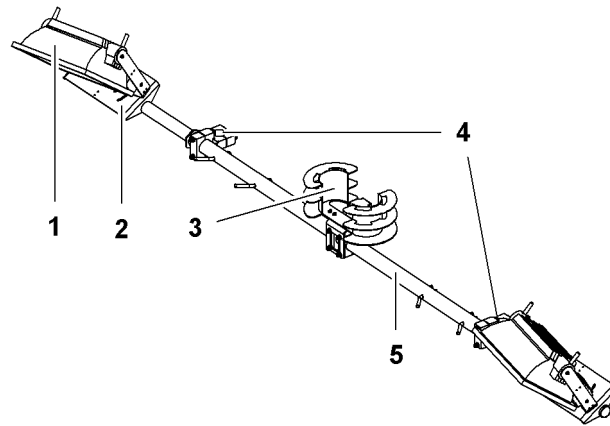


Fig. 272 Floodlights on main boom

- |  |   |
|--|---|
| <p>1 Floodlights (2x)</p> <p>2 Fixing bases (2x)</p> <p>3 Wire bracket</p> | <p>4 Mountings (2x) for attaching to the diagonals from the main boom</p> <p>5 Traverse bracing</p> |
|--|---|

The fixing bases 2 can be tilted by 60 °.

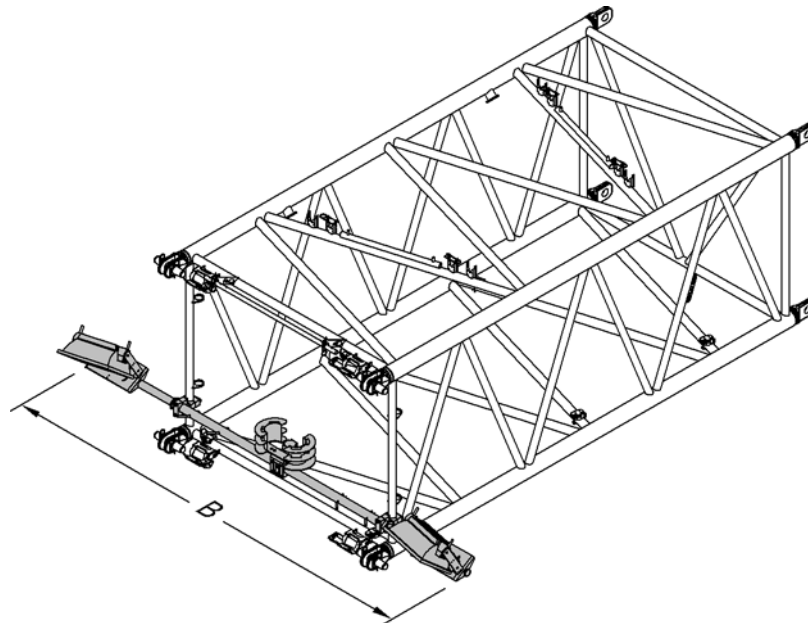


Fig. 273 Floodlights fitted on main boom

Designation		Value
B	Width of floodlights	16' 11" ft-in
Weight		223 lb
Lighting		High-pressure sodium vapour lamp

Designation	Value
Nominal voltage	230 V
Power consumption per floodlight	1000 W

Tab. 192 Floodlights on main boom, technical data

### 1.64.4 Floodlights on jib head section

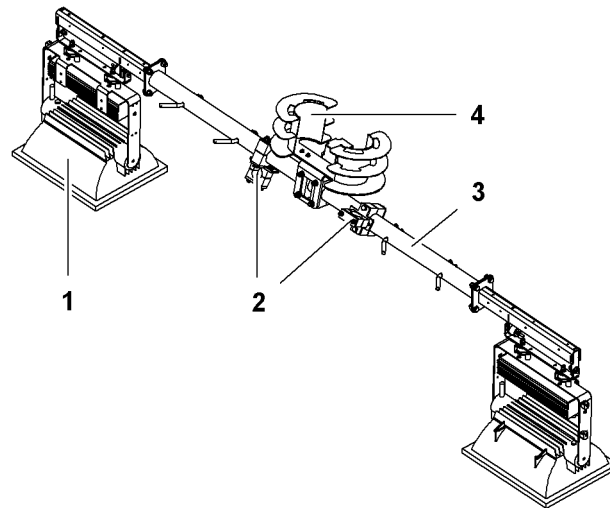


Fig. 274 Floodlights on jib head section

- |   |   |   |                  |
|---|---|---|------------------|
| 1 | Floodlights (2x) with mounting on the traverse bracing                  | 3 | Traverse bracing |
| 2 | Mountings (2x) for attaching to the diagonals from the jib head section | 4 | Wire bracket     |

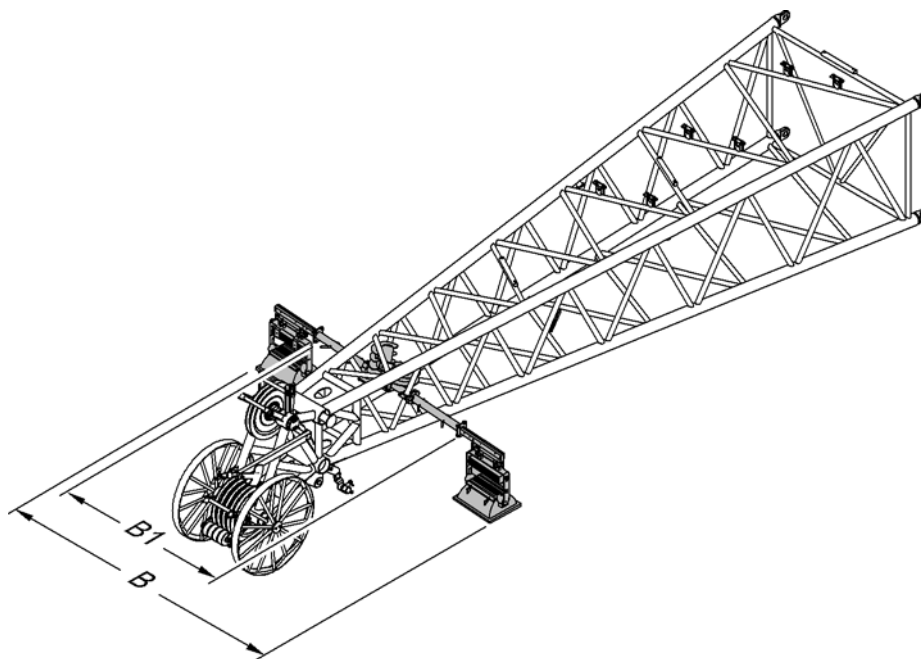


Fig. 275 Floodlights mounted on jib head section

Designation		Value
<b>B</b>	Width of floodlights	13' 3" ft-in
<b>B1</b>	Width of traverse bracing	7' 11" ft-in
Weight		514 lb
Lighting		High-pressure sodium vapour lamp
Nominal voltage		230 V
Power consumption per floodlight		1000 W

Tab. 193 Floodlight on the jib head section, technical data





# 2 Safety instructions

This section:

- Warns the user about hazards.
- Informs about hazards arising in normal use.
- Informs about how to avoid hazards.

## 2.1 Technical condition of the machine

For the machine to be operated safely, the following requirements in terms of its technical condition must be met:

- The machine must be in perfect condition
- Unauthorised conversion or modification is not permitted
- Maintenance must be performed regularly
- Safety devices must be in good working order

## 2.2 Areas of responsibility

### 2.2.1 Manufacturer

The manufacturer:

- is responsible for the technically safe condition of the machine supplied, together with accessories and documentation.
- is aware of its duty to monitor product performance and document all maintenance and repair work carried out by Liebherr service personnel.
- ensures that the machine is kept in an operational state by a worldwide maintenance and repair service.
- runs a training center and provides training for the owner's operating and maintenance personnel as a service.

### 2.2.2 Owner

The owner:

- ensures that the machine is operated and maintained by qualified personnel only.
- checks that all individuals who come into contact with the machine are fully qualified, and authorises them to work.
- specifies the skills and responsibilities of all those working with or near the machine.
- provides all necessary protective equipment to individuals working with or near the machine.

- regularly checks that personnel carry out their work in a safety-conscious manner.
- is responsible for ensuring the safe condition of the machine.
- completely removes the machine from use upon the discovery of any faults that may affect safety.
- performs inspections on the machine based on national regulations in addition to the inspections stipulated by Liebherr.
- informs the manufacturer of any accident involving the machine leading to serious injury or major damage to property.
- allows Liebherr service personnel unlimited access to the machine in order that they may fulfil their duty to monitor the product.
- carefully and conscientiously carries out work planning for the machine.
- will not carry out any alterations on the machine without first consulting the manufacturer.
- must only use original Liebherr spare parts.

## 2.2.3 Machine operator

The machine operator:

- have read and understood the operation manual.
- operates the machine for the purposes intended, within the limit values specified in the load chart and in accordance with the setup and the operation manual.
- wear personal protective equipment.
- reports to the owner any alteration to the machine that affects safety.
- halts operation immediately if safe operation is no longer possible.
- will not carry out any alterations on the machine without first consulting the manufacturer.
- must only use original Liebherr spare parts.

## 2.2.4 Rigger

The rigger:

- is responsible for the correct selection and fitting/removal of the lifting device on the load or rigging material.
- gives the approval to move and/or accompany the load.
- wear personal protective equipment.

## 2.2.5 Banksman

The banksman:

- conveys signals from the rigger to the machine operator.
- gives signals to the machine operator if he is the only person responsible.
- wear personal protective equipment.

## 2.2.6 Maintenance personnel

Maintenance personnel:

- maintain the machine to ensure that it remains in a safe and reliable condition.
- have read and understood the operation manual.
- wear personal protective equipment.
- perform all specified maintenance work.
- will not carry out any alterations on the machine without first consulting the manufacturer.
- must only use original Liebherr spare parts.



## 2.3 Requirements to personnel

### 2.3.1 Machine operator

The machine operator:

- are of the statutory minimum age.
- must be physically capable (adequate eyesight and hearing, quick reactions) of safely operating the machine.
- is authorised to operate the machine.
- is capable of accurately estimating distances, heights and clearances.
- is trained:
  - to operate this type of machine
  - in attaching and signalling
  - to operate fire extinguishing equipment
- is aware of the escape routes in the event of an emergency.
- do not suffer from any physical or psychological ailments that lower any of the specified requirements.
- are not under the influence of alcohol or drugs.

### 2.3.2 Rigger

The rigger:

- are of the statutory minimum age.
- is physically capable (adequate eyesight and hearing, quick reactions) of safely using/moving lifting devices.
- is authorised to rig loads.
- is capable:
  - of accurately estimating distances, heights and clearances
  - of accurately estimating mass and load distribution
  - of operating walkie-talkies and using them to give clear instructions
  - of guiding the load and ensuring the safe movement of the load and the machine
- is trained:
  - in attaching lifting devices
  - in signalling and knows the signal signs
  - in selecting the correct lifting device
  - in securing against unexpected detachment
  - in preventing damage to lifting devices
- do not suffer from any physical or psychological ailments that lower any of the specified requirements.
- are not under the influence of alcohol or drugs.

### 2.3.3 Banksman

The banksman:

- are of the statutory minimum age.
- are physically capable (adequate eyesight and hearing, quick reactions).
- is authorised to give signal signs.
- is capable:
  - of accurately estimating distances, heights and clearances
  - of operating walkie-talkies and using them to give clear instructions
  - of guiding the load and ensuring the safe movement of the load and the machine
- is trained in signalling and knows the signal signs.

- do not suffer from any physical or psychological ailments that lower any of the specified requirements.
- are not under the influence of alcohol or drugs.

## 2.3.4 Maintenance personnel

Maintenance personnel:

- are of the statutory minimum age.
- are physically capable (adequate eyesight and hearing, quick reactions).
- are familiar with the machine and the hazards.
- are familiar with all maintenance procedures and measures.
- are trained to perform maintenance duties, including on specialist equipment.
- do not suffer from any physical or psychological ailments that lower any of the specified requirements.
- are not under the influence of alcohol or drugs.

## 2.4 Personal protective equipment

The machine operator and maintenance personnel must take personal responsibility for:

- 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 Work area

In accordance with the EU Machinery Directive, the machine must be operated by a machine operator.

The workplace is the cab on the uppercarriage.

Ensure that the following conditions are satisfied:

- 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 operator's cab at all times.

The operating elements may only be operated from the driver's seat. Operating any operating elements through the open cab door is prohibited.

Requirements for a safe working environment:

- Keep the operator's cab clean.
- Do not place any articles on the control panels.
- Do not keep tools in the operators cab.
- Hang any clothing on the hook provided for this purpose.
- Keep the entrance to the cab clean and free of snow and ice; do not obstruct the entrance or block the escape routes.
- Keep the screens and mirrors (internal and external) clean and free of condensation and ice.

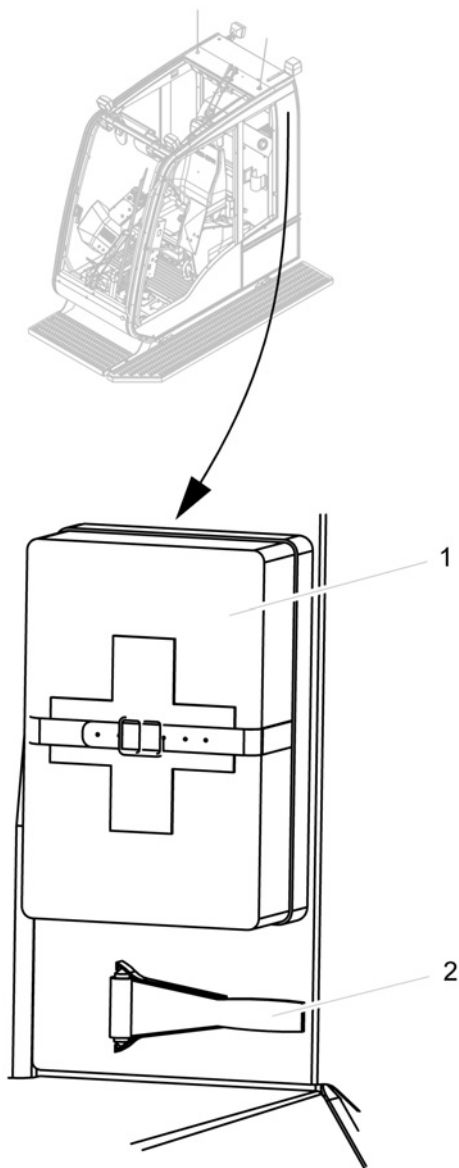


Fig. 276 Emergency devices

1 First-aid box

2 Emergency hammer

The first-aid box 1 supplied with the machine is equipped in accordance with ÖNORM V 5101.



### Note

- ▶ All sterile items and plasters are to be replaced after use or as required.
- ▶ All "First Aid" measures and national regulations are to be followed.

If the cab door will not open, use the emergency hammer 2 to break one of the windows to create an emergency exit.

## 2.6 Danger zone



### DANGER

Machine in use!

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.

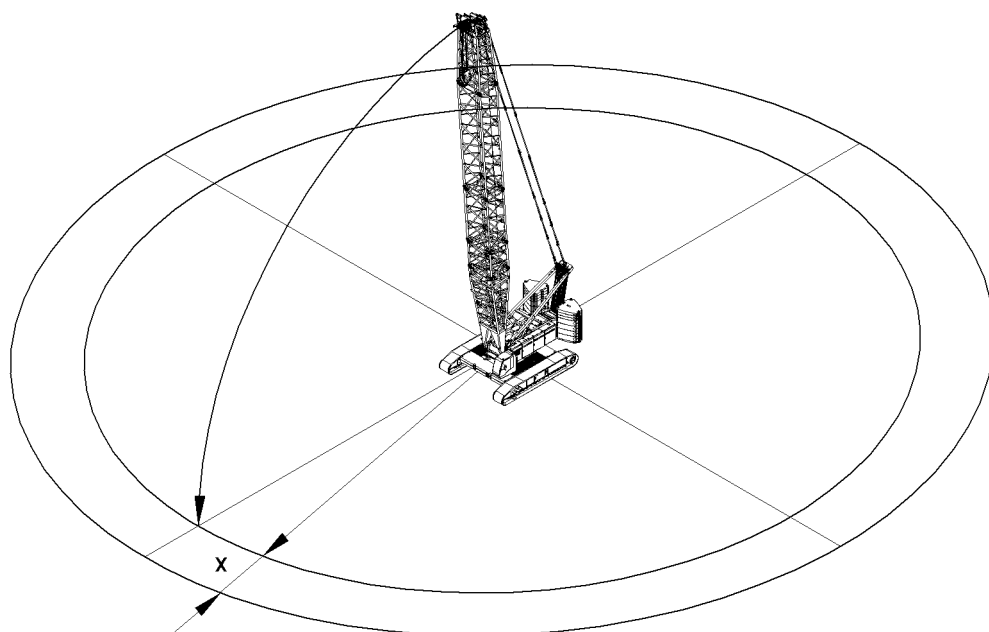


Fig. 277 Danger zone

x Travel of swinging load

Danger area = length of equipment + x

## 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.

# Safety instructions

## Safety signs on the machine

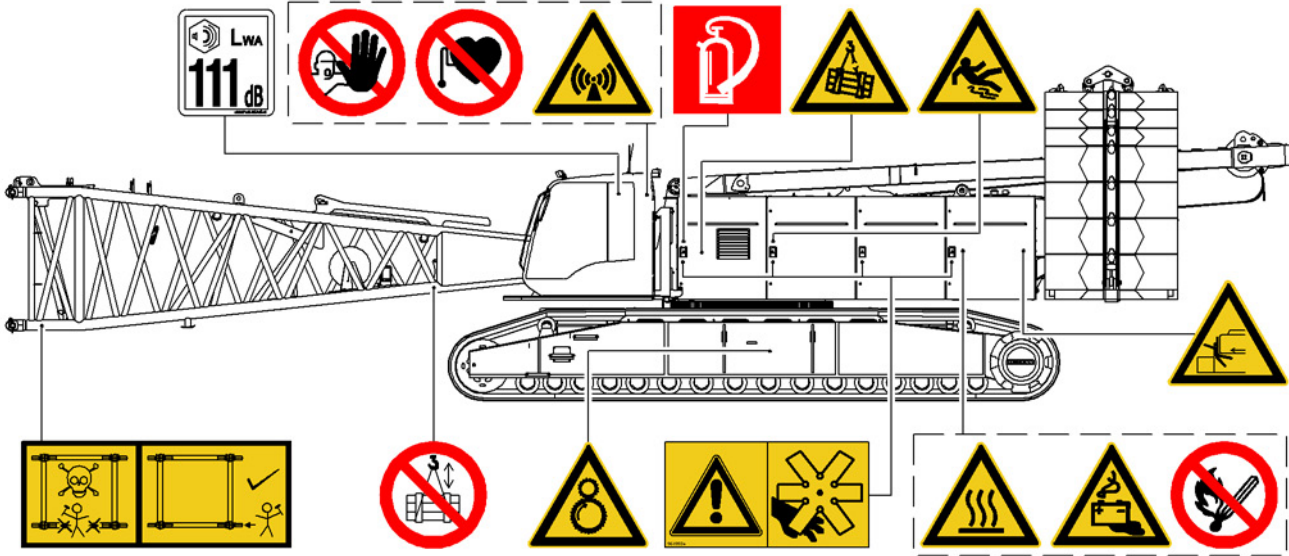


Fig. 278 Safety signs on the left-hand side of the machine

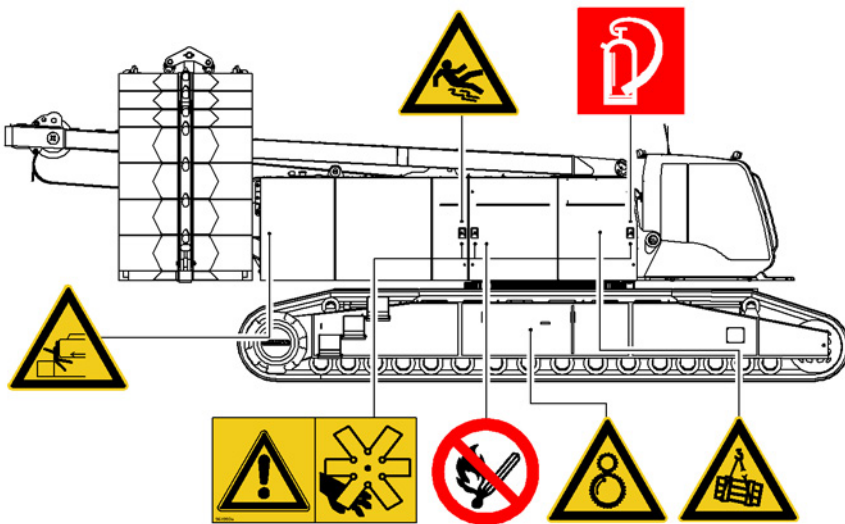


Fig. 279 Safety signs on the right-hand side of the machine

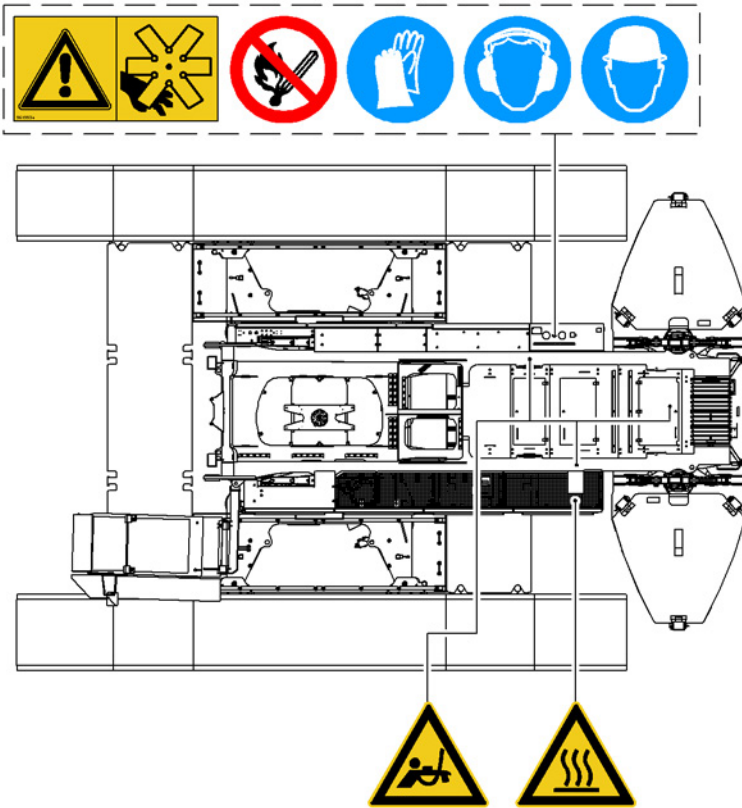


Fig. 280 Safety signs on the top of the machine

LWN// Auslieferung/2010-07-21/en

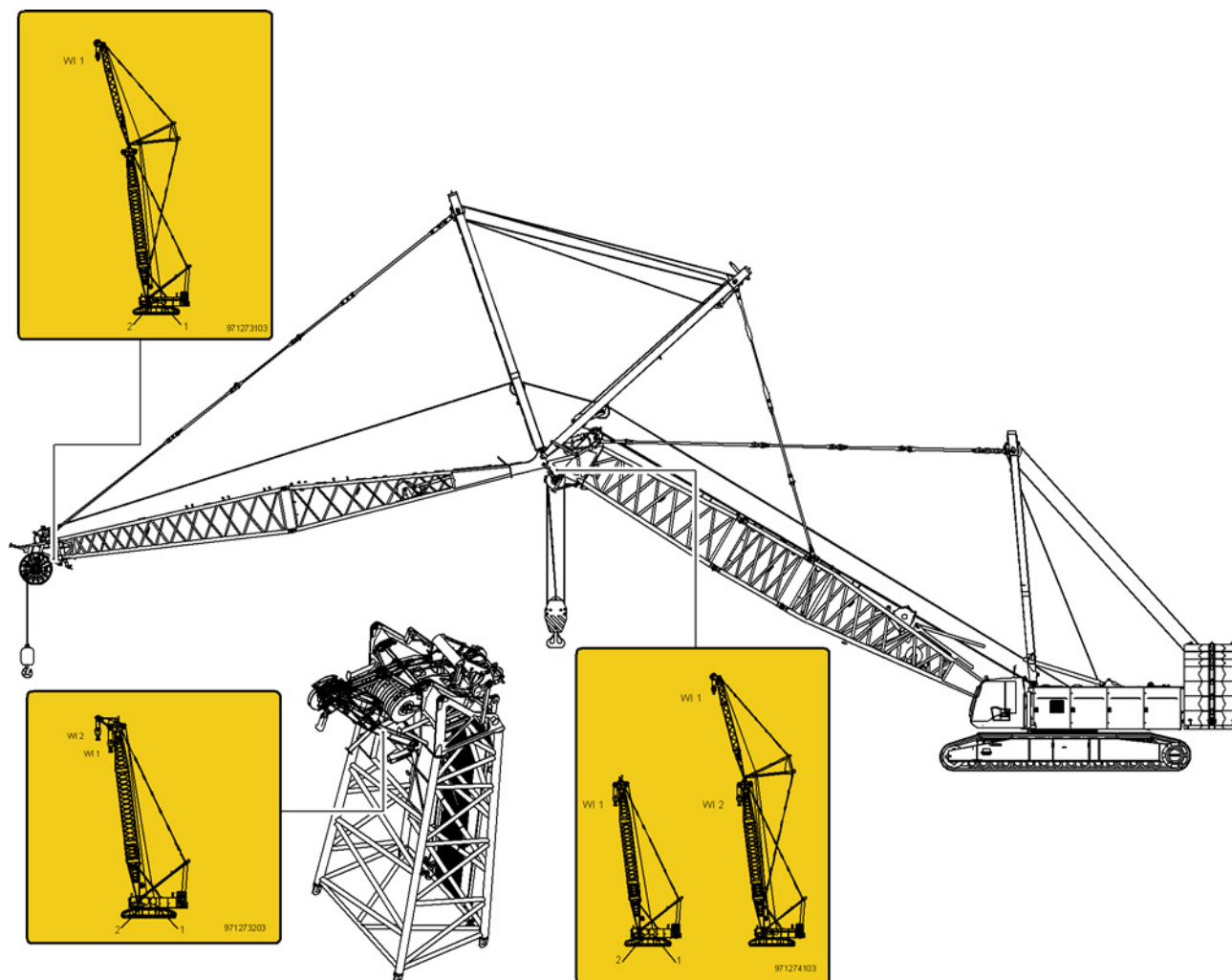


Fig. 281 Safety signs on the boom

## 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.



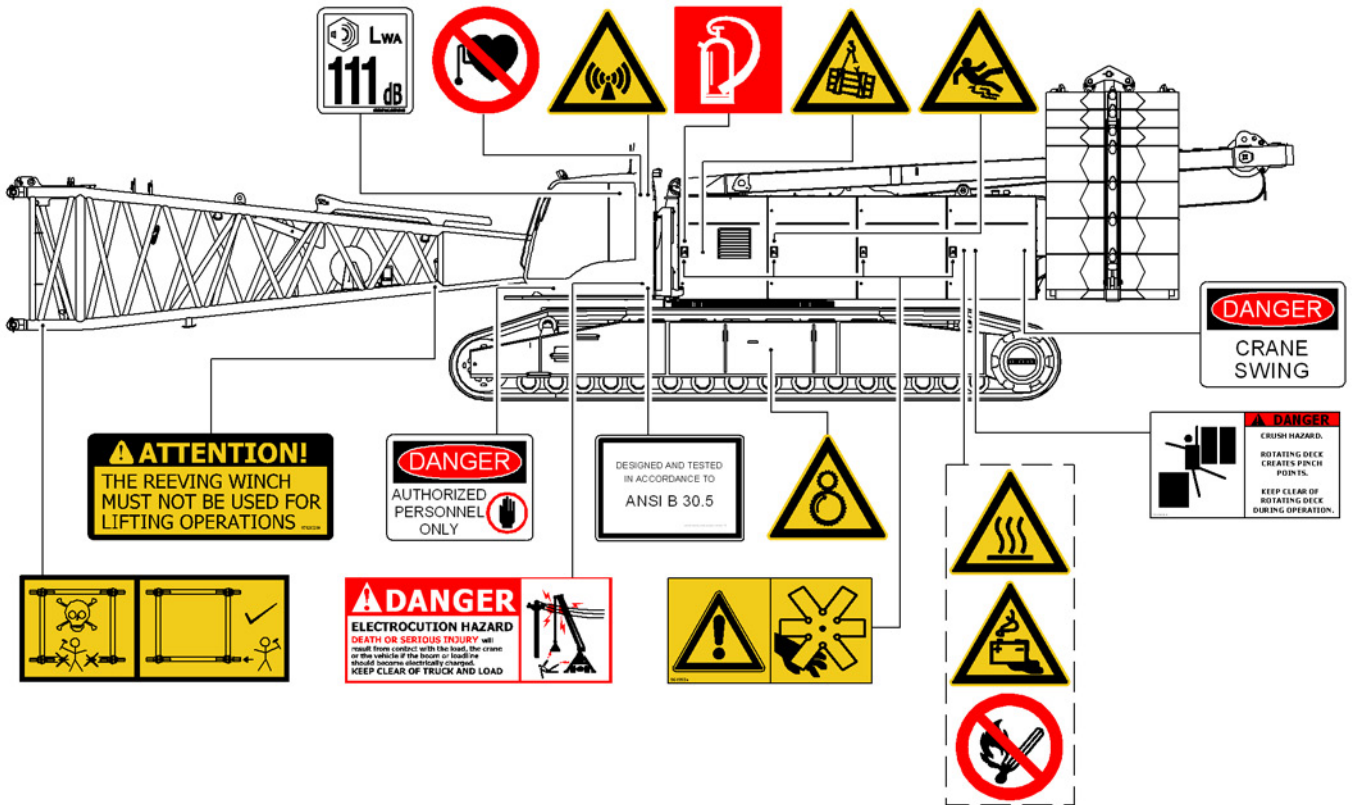


Fig. 282 Safety signs on the left-hand side of the machine

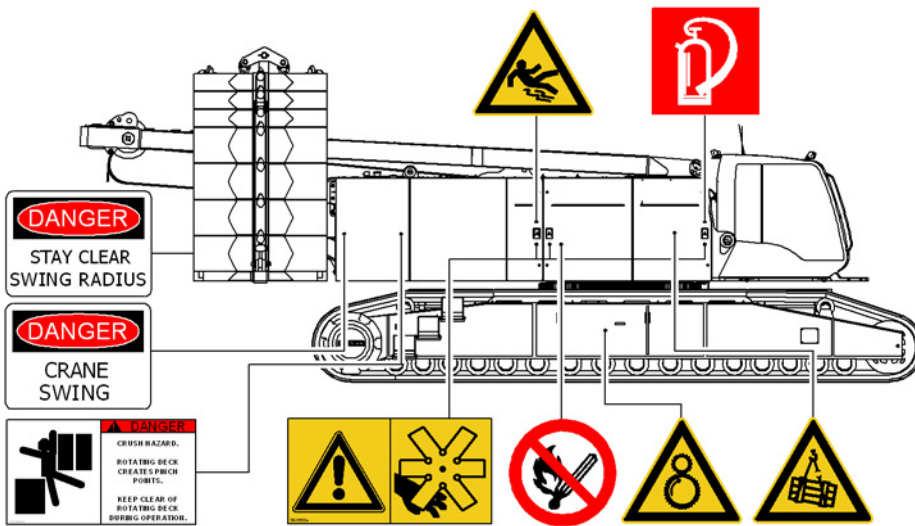


Fig. 283 Safety signs on the right-hand side of the machine

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## Safety instructions

Safety signs on the machine (US market)

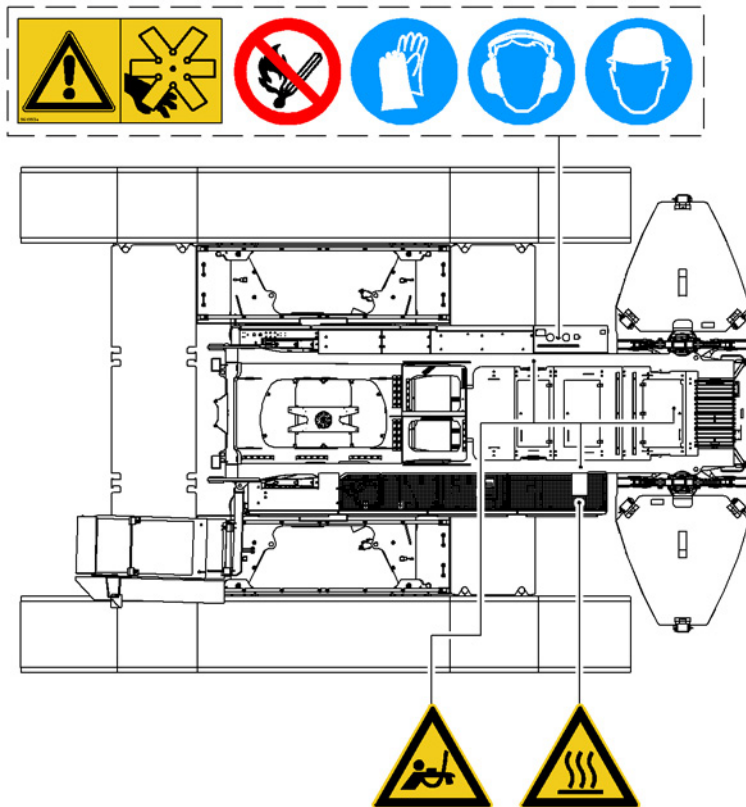


Fig. 284 Safety signs on the top of the machine

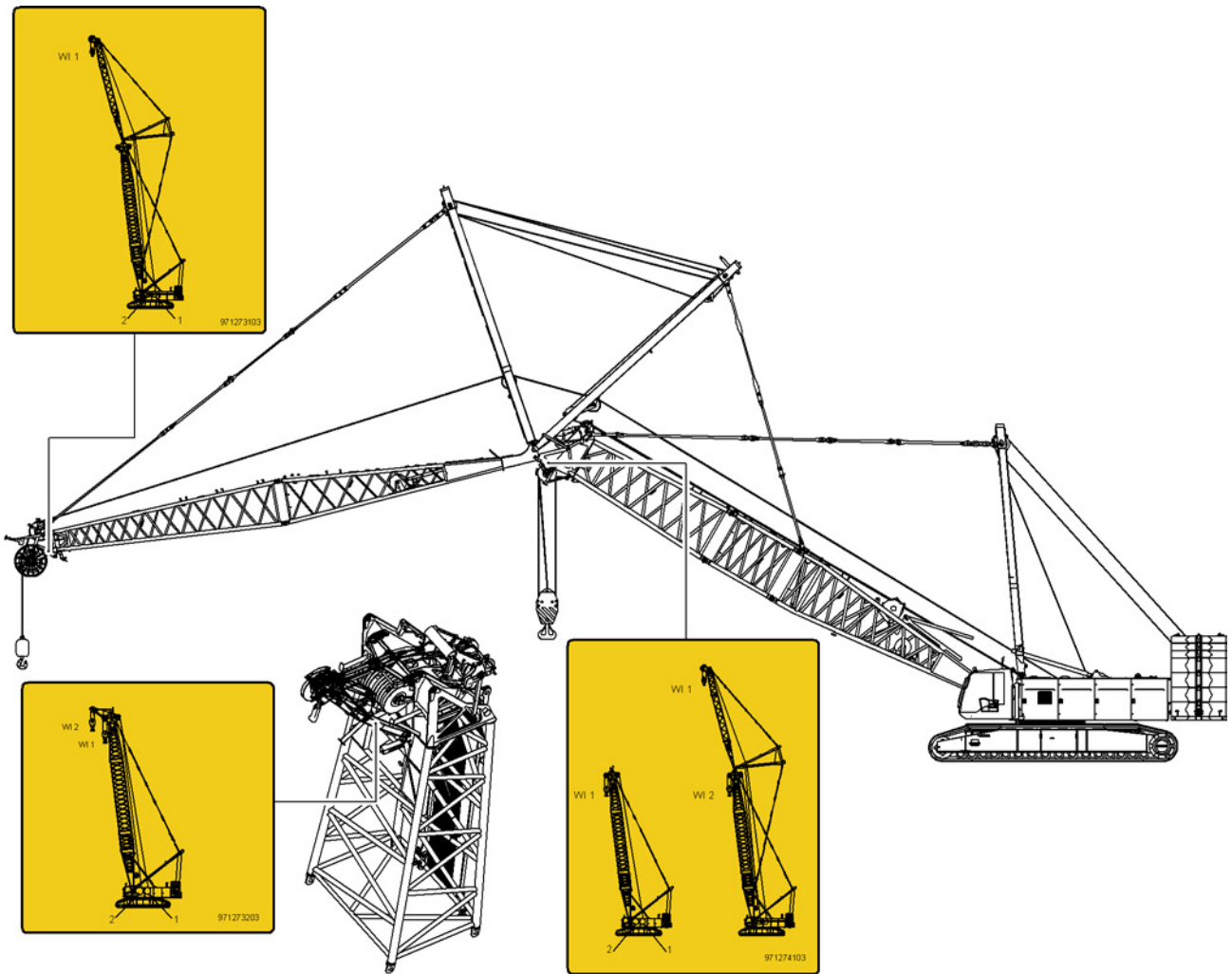


Fig. 285 Safety signs on the boom

## 2.9 Meaning of the safety signs

Safety signs are divided into different groups with different shapes and colours.

### 2.9.1 Prohibition signs

Prohibition signs are round with a red border and have a diagonal line through them. The symbol is black. Prohibition signs are located wherever a potentially dangerous action is prohibited.

No fire, naked flames or smoking





No access for unauthorised personnel



No access for persons with pacemakers



Do not step on this surface



Pedestrians forbidden



Do not switch

### 2.9.2 Warning signs

Warning signs are triangles with a yellow background and a black border. The symbol is black. Warning signs are located to warn of risks or hazards.



Danger area



Danger - high voltage



Danger - swinging load



Danger of being drawn in



Danger of being drawn in



Danger of being drawn in



Danger - hot surface



Danger - slippery surface



Danger of falling



Danger of tripping



Danger of crushing



Danger of crushing



Danger of crushing



Danger of crushing



Danger of crushing



Danger of being run over



Danger of being run over



Danger from ropes



Danger - electromagnetic waves



Danger - pressure tank



Danger - batteries

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### 2.9.3 Fire protection signs

Fire protection signs are square and have a white symbol on a red background. Fire protection signs are affixed to indicate the location of fire extinguishers or fire alarms.



Fire extinguishers



Fire extinguishers



Fire detector

### 2.9.4 Mandatory signs

Mandatory signs are round and have a white symbol on a blue background. Mandatory signs are located where certain actions are required.



General mandatory signs



Wear a safety helmet



Wear ear protection



Wear protective gloves



Wear face protection



Wear foot protection



Use a safety belt

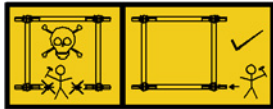


Wear a safety harness

## 2.10 Meanings of machine-specific safety signs



Warning indicating rotating machine parts



Do not stand inside the boom intermediate pieces.



Lifting loads using the rope reeving winch is prohibited



No access for unauthorised personnel



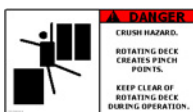
Danger of crushing



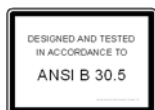
Standing within the slewing range is prohibited



Warning indicating dangerous electrical voltage



Standing within the slewing range is prohibited



Designed and tested in accordance with ANSI B 30.5



Guaranteed sound power level

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## 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 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 actions:



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 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



### 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 and situation-specific safety notes.



### Note

Observe the following safety notes:

- ▶ Repairs to hydraulic systems may only be carried out by qualified technicians with specialised knowledge and experience of hydraulics.
- ▶ 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
- ▶ Damaged hydraulic components must be replaced immediately 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 dressing.
  - 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 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
 

With first-degree burns (redness of the skin):

  - Cool the affected body part by rinsing with cold fresh water.
  - Gently cover injured area(s) with a sterile anti-bacterial bandage.

With second-degree burns (blisters on the 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.

With third-degree burns (charring of the 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 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!  
Flammable materials or any gases arising from them can cause a fire and explosion hazard.

- ▶ Observe handling and situation-specific safety notes.



### Note

Observe the following safety notes:

- ▶ Do not transport any flammable fluids with the machine unless they are in fire-proof containers.
- ▶ Only store small amounts of fuel or highly combustible or self-igniting material.
- ▶ Wipe any spilled diesel fuel off the machine and neutralise it on the ground with bonding agents
- ▶ Clean the machine with non-flammable fluids.
- ▶ Do not store cleaning cloths in the engine compartment and remove flammable residues such as oil leakages, ash and waste paper.
- ▶ Only refuel the machine in a well ventilated area or provide fresh air.
- ▶ 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.
- ▶ Do not smoke when handling flammable materials.

### Examples of fire and explosion hazards:



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
  - [\(For more information see: 2.12.3 Firefighting, page 325\)](#)
  - [\(For more information see: 2.11.4 Burns, page 310\)](#)

## 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 and situation-specific safety notes.



#### Note

Observe the following safety notes:

- ▶ Ensure adequate ventilation in the cab.
- ▶ Use breathing apparatus when working with hazardous materials.



#### Examples of poisoning and dangers of asphyxiation:

- 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 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:

- Malfunction or failure of control systems if operating the machine near transmitters, directional radio systems or radar stations.
- Environmental influence through the use of electromagnetic rigging material or integrated radio devices.

## 2.11.9 Exposure to wind



### DANGER

The effect of the wind can endanger life!  
Toppling over of the machine.

- ▶ Observe handling and situation-specific notes on safety.



### Note

Observe the following safety instructions:

Walkways fitted to the boom intermediate sections magnify the wind load.

- ▶ Observe the permitted wind speeds in the foreword to the applicable load chart.
- ▶ An anemometer on the boom head provides an accurate indication of the wind speed at this height on the screen.
- ▶ Find out and take into consideration the wind conditions at the site and the weather forecasts for the period of operation.
- ▶ The machine operator must know the weather report and the current wind velocity at the site where the machine is operating before starting work. If excessive wind speeds are expected within the next few hours, work must not start and precautions must be taken to protect against storm damage.
- ▶ Watch out for dangerous gusts of wind.
- ▶ Do not lift loads with large surface areas such as prefabricated elements.
- ▶ Reduce loads and maximum main boom angles.
- ▶ Hoist the loads slowly and carefully and do not let them become unstable.

**DANGER**

If the wind speed exceeds the maximum permitted speed (greater than specified in the foreword to the applicable load capacity chart).  
Toppling over of the machine.

- ▶ Set down and secure the load.
- ▶ Place the machine in the “parked position” bringen oder Ausleger ablegen (For more information see: [6.7 Restrictions due to wind, page 567](#)) or lay down the boom.

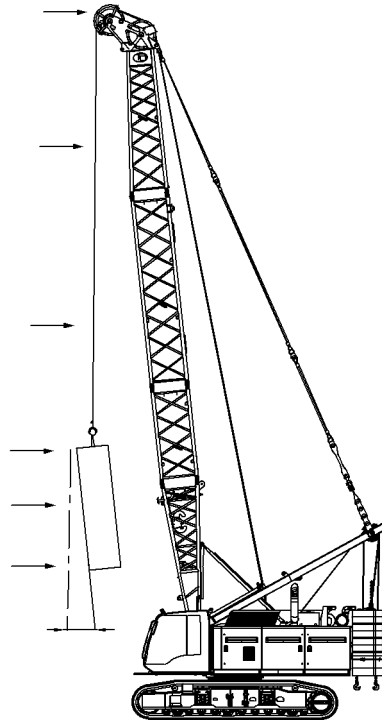
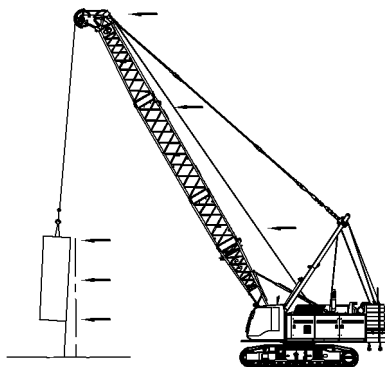


Fig. 355 Effect of wind on the front side of the machine and the lifting capacity

Effect of wind on the front side of the machine and the lifting capacity:

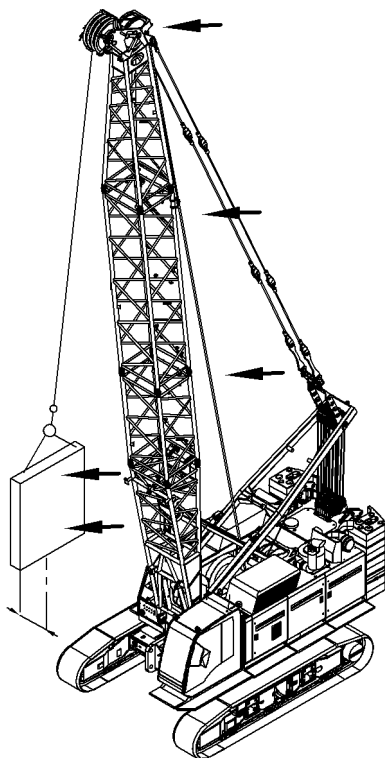
- Reduces the stability of the machine.
- Acts like an additional load on the rope hook.
- Increases the risk of the machine toppling over.
- Is particularly dangerous at maximum main boom angle without a load.
- Can overload the tilting-back supports and destroy the main boom.
- Causes the load to sway.



*Fig. 356 Effect of wind on the rear side of the machine and the lifting capacity*

Effect of wind on the rear side of the machine and the lifting capacity:

- Increases the slewing radius.
- Causes the load to sway.
- Increases the risk of the machine toppling over.
- destroys the main boom.



*Fig. 357 Effect of wind on one side of the machine and the lifting capacity*

Effect of wind on one side of the machine and the lifting capacity:

- Generates additional diagonal pull.
- Increases the risk of the machine toppling over.
- destroys the main boom.

If you do not have an anemometer fitted to the boom head, the table below will enable you to roughly estimate the wind force. The wind speed at the boom may be greater than the wind speed at or near ground level.



Wind force		Wind speed	Effect of the wind on the land
Beaufort	Designation		
0	Calm	0.66 ft/s - 0.98 ft/s	No air movement, smoke rises vertically
		1 mph	
1	Light air	0.98 ft/s - 4.92 ft/s	Almost unnoticeable, smoke drifts easily, fan and vane remain still
		1 mph - 3 mph	
2	Light breeze	5.25 ft/s - 10.83 ft/s	Leaves rustle, wind felt on face
		4 mph - 7 mph	
3	Gentle breeze	11.15 ft/s - 17.72 ft/s	Leaves and small twigs move, pennants straighten
		7 mph - 12 mph	
4	Moderate breeze	18.04 ft/s - 25.92 ft/s	Small branches move, loose paper raises
		12 mph - 17 mph	
5	Fresh breeze	26.25 ft/s - 35.1 ft/s	Bigger branches and trees in constant motion, wind can be heard clearly
		18 mph - 24 mph	
6	Strong breeze	35.43 ft/s - 45.28 ft/s	Large branches in motion, wire ropes, overhead power lines whistle
		18 mph - 30 mph	
7	Near gale	45.6 ft/s - 56.1 ft/s	Trees sway, resistance walking into the wind
		31 mph - 38 mph	
8	Gale	56.43 ft/s - 67.91 ft/s	Large trees sway, window shutters open, twigs break off trees, difficult to walk
		39 mph - 46 mph	
9	Severe gale	68.24 ft/s - 80.05 ft/s	Branches break, minor damage to houses, roof tiles and chimney tops blown off, very difficult to walk
		47 mph - 55 mph	
10	Storm	80.38 ft/s - 93.18 ft/s	Trees uprooted, tree trunks fold, major damage to houses
		55 mph - 63 mph	
11	Violent storm	93.5 ft/s - 106.96 ft/s	Strong gust, heavy storm damage, heavy damage to forrests, roofs blown off, impossible to walk
		64 mph - 73 mph	
12	Hurricane	107.28 ft/s - 121.06 ft/s	Total devastation
		73 mph - 83 mph	

Tab. 194 Wind strengths according to the Beaufort scale

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## 2.11.10 Snow and ice loads



### DANGER

Snow or ice on the machine!  
Structural breakdown.

- ▶ Observe handling and situation-specific safety notes.



### WARNING

Falling chunks of snow and ice!

- ▶ Never work with a boom that is iced up or covered in snow.



### 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 such as limit switches, guides, etc.
- ▶ Snow and ice loads increase the boom weight and the area exposed to the wind.

These factors will lead to a premature shutdown of the Load Moment Limiter (LML)  
- it will no longer be possible to work at the maximum permitted lifting capacity.

## 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.
- ▶ The ground pressure exerted by the machine in operation must be calculated when determining the load to be hoisted. The data required for this purpose must be requested from the manufacturer.
- ▶ Use crane mats if necessary.
- ▶ Reinforce the ground if necessary.

## 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 and situation-specific safety notes.



### Note

Observe the following safety notes:

- ▶ Lay down the boom before a storm breaks.
- ▶ During a storm, keep away from large, free-standing metal parts (e.g. the machine).
- ▶ Earth machines where the steel structure does not have a direct contact to ground.
- ▶ 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
  - [\(For more information see: 2.12.1 How to respond in the event of a current transfer, page 323\)](#)

## 2.11.13 Overhead power lines



### WARNING

Electrical energy and fire hazard!

Coming into contact with a direct or indirect current flow caused by a voltage flash-over or step voltage can be fatal.

- ▶ Observe handling and situation-specific safety notes.



### Note

Observe the following safety notes:

- ▶ Before starting work inform the power supply company. The power supply company representative will issue written approval for the setting up and operation of the machine!
- ▶ Maintain a safe distance as specified in national guidelines or by a representative from the power supply company.
- ▶ Inform all employees on the site where the machine is to be used about the dangers of electrical voltage.
- ▶ When operating the machine look out for uneven ground as this can reduce the clearance to the power line.
- ▶ Assign a signalman to observe the machine and the line, monitor the safe distance and maintain continuous contact with the machine operator.



### Examples of current transfer from overhead power lines:

- Coming into direct contact with an overhead power line.
- If the safety distance is not maintained, an arc will form.
- An overhead power line comes down and a dangerous resistance area forms in the ground around it.

The safety systems of the different national electricity grids react differently in the event of a fault. One may not assume that the overhead power line will be automatically and permanently shut down after a short to earth. A resistance area develops around the machine and/or the damaged overhead power line ([For more information see: 2.12.1 How to respond in the event of a current transfer, page 323](#)).



### 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 How to respond in the event of a current transfer, page 323](#))

## Guideline values for safe distances from overhead power lines

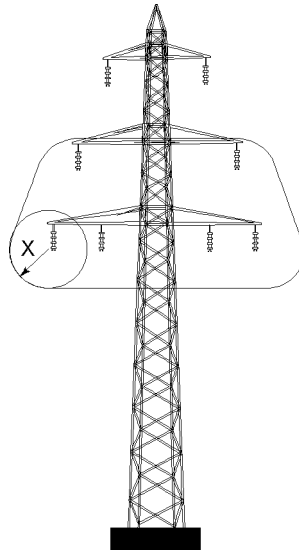


Fig. 361 Overhead power line

The necessary safe distance depends on the rated mains voltage of the power line.

Safe distances and the operation of electrical installations are laid down in EN 50110-1:2004.

These values are guidelines only and may vary from country to country.



### Note

- The power supply company can provide exact information about the rated mains voltage.

Nominal line voltage	Safe distance X
<1 kV	1' ft-in
3 kV	3' 8" ft-in
6 kV	3' 8" ft-in
10 kV	3' 9" ft-in
15 kV	3' 10" ft-in
20 kV	4' ft-in
30 kV	4' 4" ft-in
36 kV	4' 6" ft-in
45 kV	4' 10" ft-in
60 kV	5' 4" ft-in
70 kV	5' 9" ft-in
110 kV	6' 7" ft-in
132 kV	9' 10" ft-in

Nominal line voltage	Safe distance X
150 kV	9' 10" ft-in
230 kV	9' 10" ft-in
275 kV	13' 1" ft-in
380 kV	13' 1" ft-in
480 kV	20' ft-in
700 kV	27' 7" ft-in

Tab. 195 Safe distances (according to EN 50110-1:2004)

## 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 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 How to respond in the event of a current transfer

#### Resistance area, step voltage

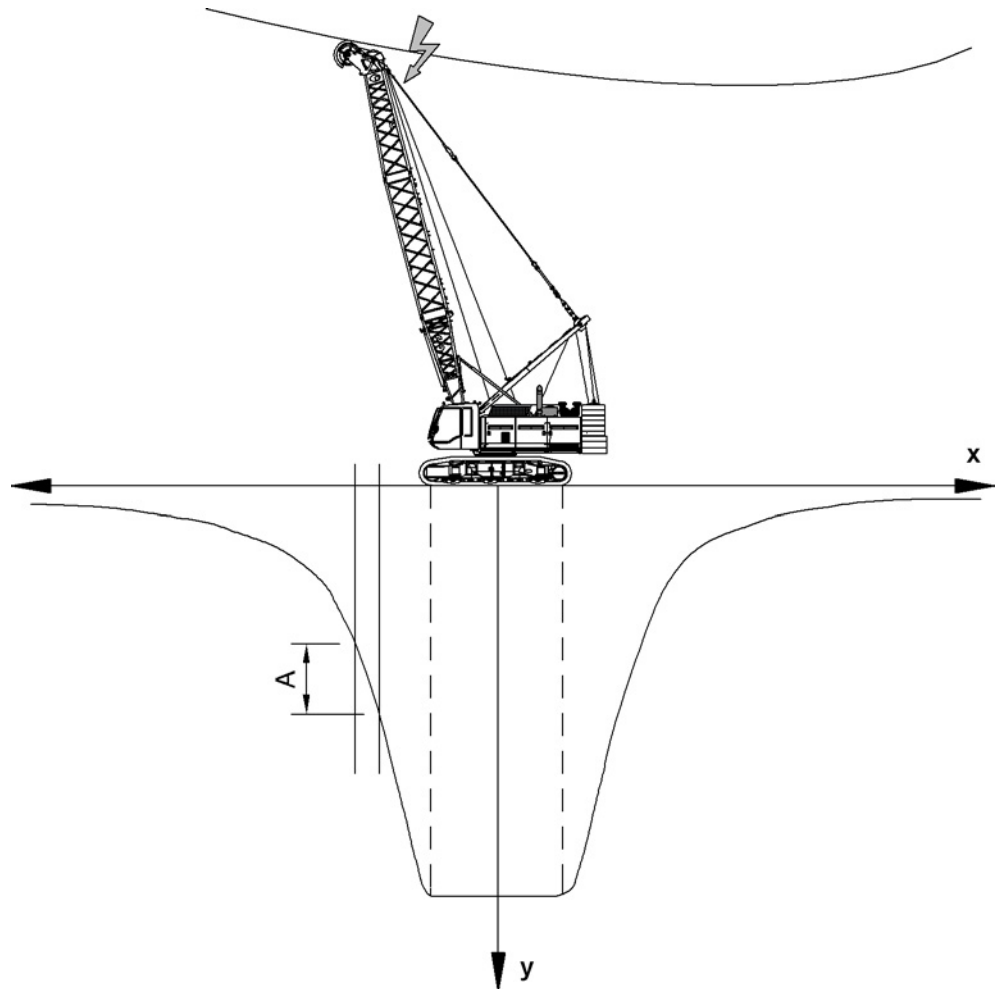


Fig. 363 Resistance area, step voltage

x Extent  
y Voltage

A Step voltage

In the event that current is conducted to the machine from coming into contact with a power line, the current is distributed from the point of entry in the earth. The voltage decreases according to a funnel-shaped curve - a resistance area is formed.

The extent of the resistance area depends on:

- Voltage
- Current
- 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 current transfer location.
- the greater the step length.

### First response to a current transfer

- Remain calm.
- Alert the relevant power supply company.

Do not leave the cab.

- It is relatively safe to remain in the closed operator's cab as it acts as a Faraday cage.
- Only evacuate the cab in the case of fire.
- If the Litronic control system is still functioning:
  - Move the machine out of the danger area.
  - Remain in the cab until current is no longer being conducted through the machine.

### Leaving the machine in cases of current transfer and fire

- Never touch live parts of the machine (hoist rope, load, crawler, etc) if you are in contact with the ground.
- Jump in a direction that avoids any contact with live parts.
- Jump to a safe distance from the machine and land on both feet at the same time.
- Land on both feet at the same time with legs closed (do not straddle).
- Never hold on to the machine or any live parts.
- Hop away on both feet with both legs pressed together.
- While hopping away, keep well clear of any live parts.



#### First aid

- Alert the emergency services.
- Personnel are to be rescued by experts only.



#### Note

- ▶ Seek medical attention after electrical accidents. The person affected may experience symptoms of an irregular heartbeat 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 310](#)).
- Only start to fight the fire if there is no risk to your personal safety ([For more information see: 2.12.3 Firefighting, page 325](#)).



**WARNING**

Risk of fire restarting!

Even if the fire appears to be extinguished, escaping fuel or oil coming in contact with hot components may reignite.

Once there is no longer any danger of the fire restarting:

- ▶ 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.

- Remove the fire extinguisher from its mount on the machine and prepare it for use (For more information see: [1.6.10 Safety equipment, page 50](#)).
- 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>Fight the fire with the wind behind you</p>	
	
<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>	

Incorrect	Correct
	
<p style="text-align: right;">Do not put the fire extinguishers back in place after use - refill them</p>	

Tab. 196 Use of the fire extinguisher

## 2.13 Hand signals

The hand signals:

- are used for communication purposes when there is visual contact between machine operator and signalman or other site personnel
- are clearly defined in national and international standards



### Note

- ▶ All persons involved must decide among themselves which hand signals are to be used.

The following overview comprises:

- hand signals in accordance with BGV A8 (Germany)
- hand signals in accordance with ASME/ANSI B30.5 (United States of America)

### 2.13.1 General hand signals in accordance with BGV A8



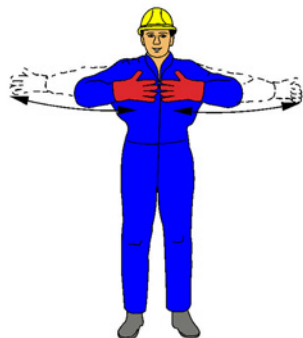
#### Warning, Start, Stop

- Hold the right arm stretched vertically upwards
- Palm facing forwards



### Stop, Interruption

- Stretch out both arms to the side horizontally
- Palms facing forwards



### Stop - Danger

- First stretch out both arms horizontally to the sides
- Palms facing forwards
- Now alternately bend in and stretch out the arms



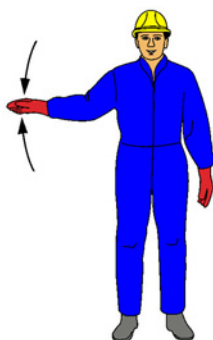
### Lift

- Bend the right arm and hold upwards
- Palm facing forwards
- The hand makes a small, circular movement



### Lower

- Stretch out the right arm downwards
- Palm facing inwards
- The hand makes a small, circular movement



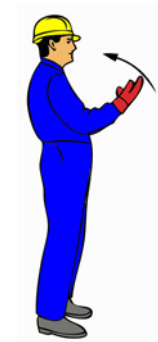
### Slowly

- Stretch out right arm horizontally
- Palm facing downwards
- Move hand slowly up and down



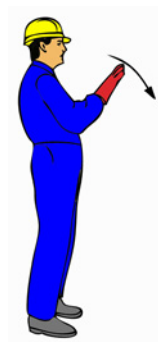
**Depart**

- Bend the right arm and hold upwards
- Palm facing forwards
- Move the arm back and forth sideways



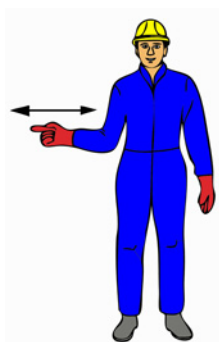
**Approach**

- Bend both arms
- Palms facing inwards
- Beckon with the forearms



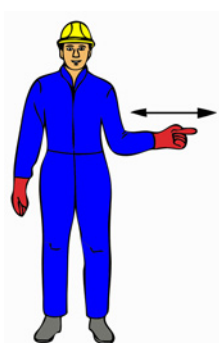
**Remove**

- Bend both arms
- Palms facing outwards
- Wave away with the forearms



**Travel right** (from the signalman's viewpoint)

- Bend right arm slightly while holding horizontal
- Move the arm back and forth sideways



**Travel left** (from the signalman's viewpoint)

- Bend left arm slightly while holding horizontal
- Move the arm back and forth sideways

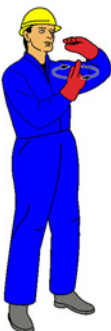
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### Indicate distance reduction

- Hold both palms parallel and move them toward each other to indicate the distance

## 2.13.2 Special hand signals for attachment operations



### Lift load slowly

- Bend the right arm and hold upwards
- The outstretched finger points upwards
- The right hand makes small, circular movements
- Stretch out the left hand and hold it over the right hand



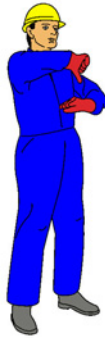
### Lower load slowly

- Hold the right arm downwards
- The outstretched finger points downwards
- The right hand makes small, circular movements
- Hold the left hand under the right hand



### Raise the main boom

- Bend the right arm and hold upwards
- The outstretched thumb points upwards
- Stretch out the left hand and hold it over the right hand



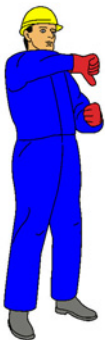
**Lower the main boom**

- Bend the right arm
- The outstretched thumb points downwards
- Stretch out the left hand and hold it under the right hand



**Lift main boom and hold load**

- Bend the right arm and hold upwards
- The outstretched thumb points upwards
- Make a fist with the left hand and hold it under the right hand



**Lower main boom and hold load**

- Bend the right arm
- The outstretched thumb points downwards
- Make a fist with the left hand and hold it under the right hand



**Raise main boom and lower load**

- Bend the right arm and hold upwards
- The outstretched thumb points upwards
- Stretch out left arm and point index finger down
- Move the left hand in circles and hold it under the right hand



**Lower main boom and lift load**

- Bend the right arm
- The outstretched thumb points downwards
- Bend left arm and point index finger up
- Move the left hand in circles and hold it under the right hand

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### Swing uppercarriage to the right

- Bend the left arm and hold it up
- The thumb points outwards in the direction of rotation
- Stretch out the right arm downwards
- Point index finger down and make circles



### Swing uppercarriage to the left

- Bend the right arm and hold it up
- The thumb points outwards in the direction of rotation
- Stretch out the left arm downwards
- Point index finger down and make circles



### Open grab

- Stretch out right arm horizontally
- Open hand downwards

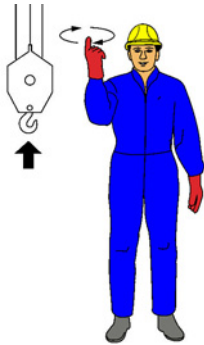


### Close grab

- Stretch out right arm horizontally
- Close the hand into a fist

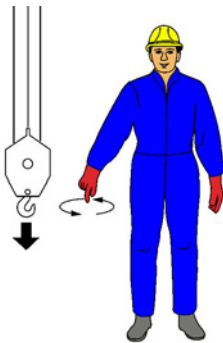


### 2.13.3 Hand signals for lifting operations in accordance with ASME/ANSI B30.5



#### Lift load

- Bend the right arm and hold upwards
- The outstretched index finger points upwards
- The hand makes a small, circular movement



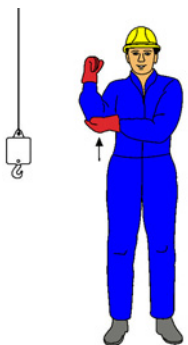
#### Lower load

- Stretch out the right arm downwards
- The outstretched index finger points downwards
- The hand makes a small, circular movement



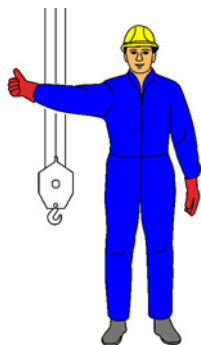
#### Use main winch

- Tap the safety helmet with the fist
- Then give further hand signals



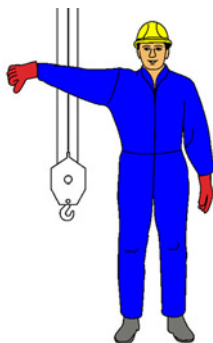
#### Use auxiliary winch

- Bend the right arm and hold upwards
- Tap the underside of the right elbow with the left hand
- Then give further hand signals



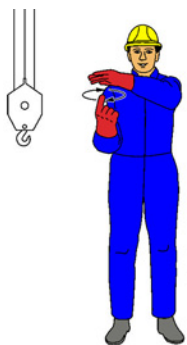
### Raise the main boom

- Stretch out right arm horizontally
- The outstretched thumb points upwards



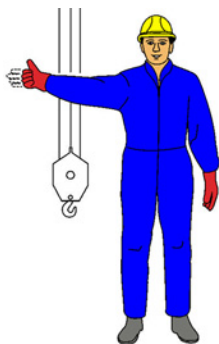
### Lower the main boom

- Stretch out right arm horizontally
- The outstretched thumb points downwards



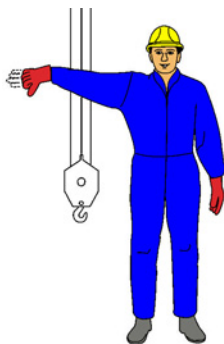
### Move slowly

- Give the appropriate signal with one hand. (e.g.: Lift load)
- Hold the other hand above or below the other hand



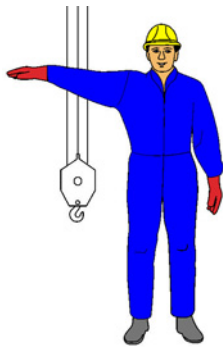
### Raise main boom and lower load

- Stretch out right arm horizontally
- The outstretched thumb points upwards
- Stretch and bend the remaining fingers alternately for as long the load has to be lowered



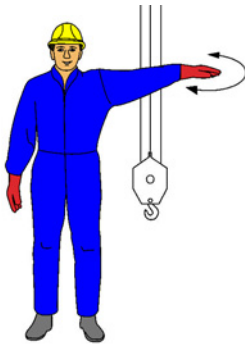
### Lower main boom and lift load

- Stretch out right arm horizontally
- The outstretched thumb points downwards
- Stretch and bend the remaining fingers alternately for as long the load has to be raised



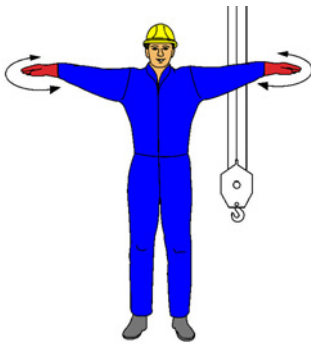
**Swing**

- Stretch out right arm horizontally
- Palm facing downwards
- The extended fingers point in the direction of rotation



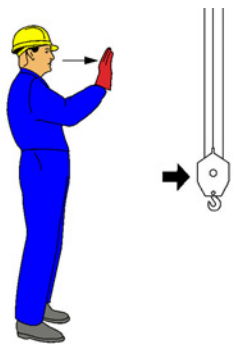
**Stop**

- Stretch out one arm horizontally
- Palm facing downwards
- Swing arm back and forth horizontally



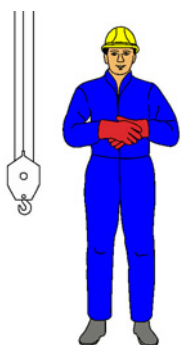
**Emergency stop**

- Stretch out both arms horizontally
- Palms facing downwards
- Swing both arms back and forth horizontally



**Drive**

- Bend one arm
- Palm facing forwards
- Make a movement in the travel direction with the open hand



**Shut down and secure machine**

- Hook your hands in front of your body

LWN// Auslieferung/2010-07-21/en



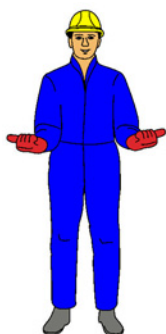
### Travel with both crawler chains

- Hold both fists in front of the body
- Indicate travel direction with circular motions



### Travelling with one crawler track

- Bend the arm and hold up a fist on the same side as the stationary crawler track
- Bend the other arm in front of the body on the side of the moving track
- Indicate the travel direction by making circular movements with the fist



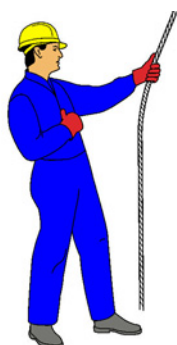
### Extend boom

- Hold both fists in front of the body
- Thumbs facing outwards



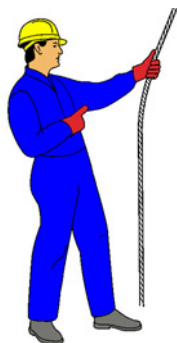
### Retract boom

- Hold both fists in front of the body
- The thumbs point towards each other



### Retract boom (one-handed signal)

- Hold one fist in front of your chest
- Your thumb points to your chest



## **Extend boom** (one-handed signal)

- Hold one fist in front of your chest
- Thumb facing outwards









# 3 Control and operating elements

The following pages describe the inspection and operating elements. Depending on their function they are located on the uppercarriage, the undercarriage or in the cab.

On the **undercarriage** are the operating elements for:

- Jack
- Pin connection cylinder

On the **uppercarriage** are the operating elements for:

- Counterweight hoisting cylinder
- Free-fall lock
- Refuelling system

The following operating elements are located in the **operator's cab**:

- LCD monitor
- various control panels
- Control lever
- Foot pedals
- PME display
- Left-hand and right-hand joysticks
- other additional lights and operating elements

### 3.1 Operating elements on the undercarriage

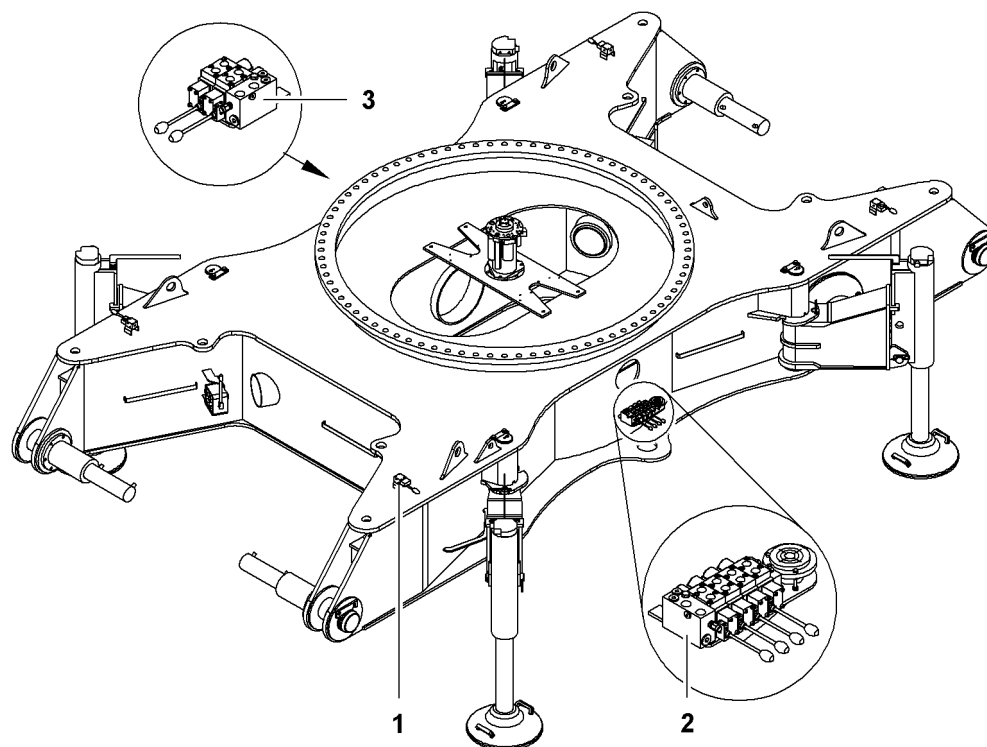


Fig. 419 Operating elements on the undercarriage

- |   |  |   |  |
|---|--|---|--|
| 1 | Control levers (4x) for crawler side frame pin connection cylinder | 3 | Control lever (2x) for hydraulic jack (optional) |
| 2 | Control lever (4x) for hydraulic jack with angle indicator         |   |  |

## 3.2 Operating elements on the uppercarriage

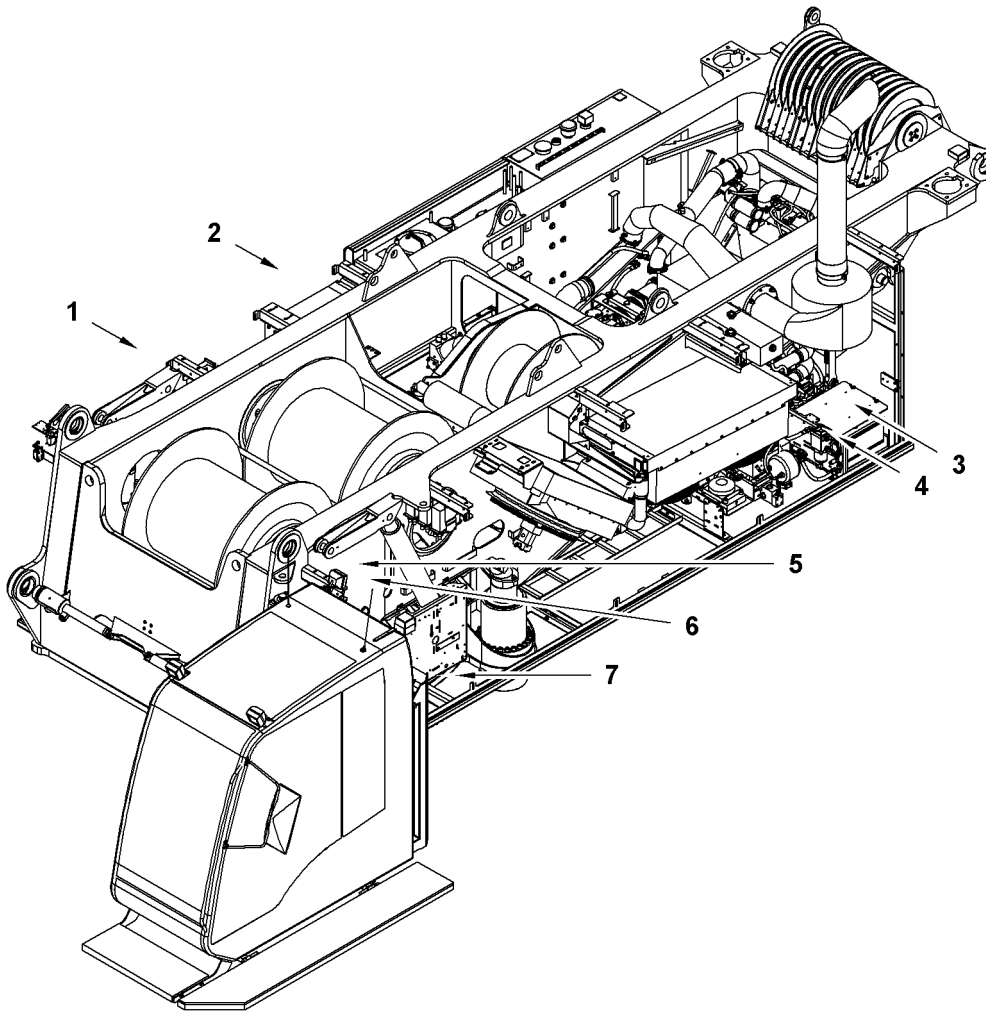


Fig. 420 Uppercarriage

- |   |  |   |   |   |  |
|---|--|---|---|---|--|
| 1 | Cable remote control connector plug for base section pin connection cylinder | 3 | Battery main switch   | 5 | Emergency control system control desk connector plug                       |
| 2 | Refuelling pump control desk   | 4 | Counterweight hoisting cylinder cable remote control connector plug | 6 | Cable remote control oddments tray / Emergency control system control desk |

### 3.3 Operator's cab

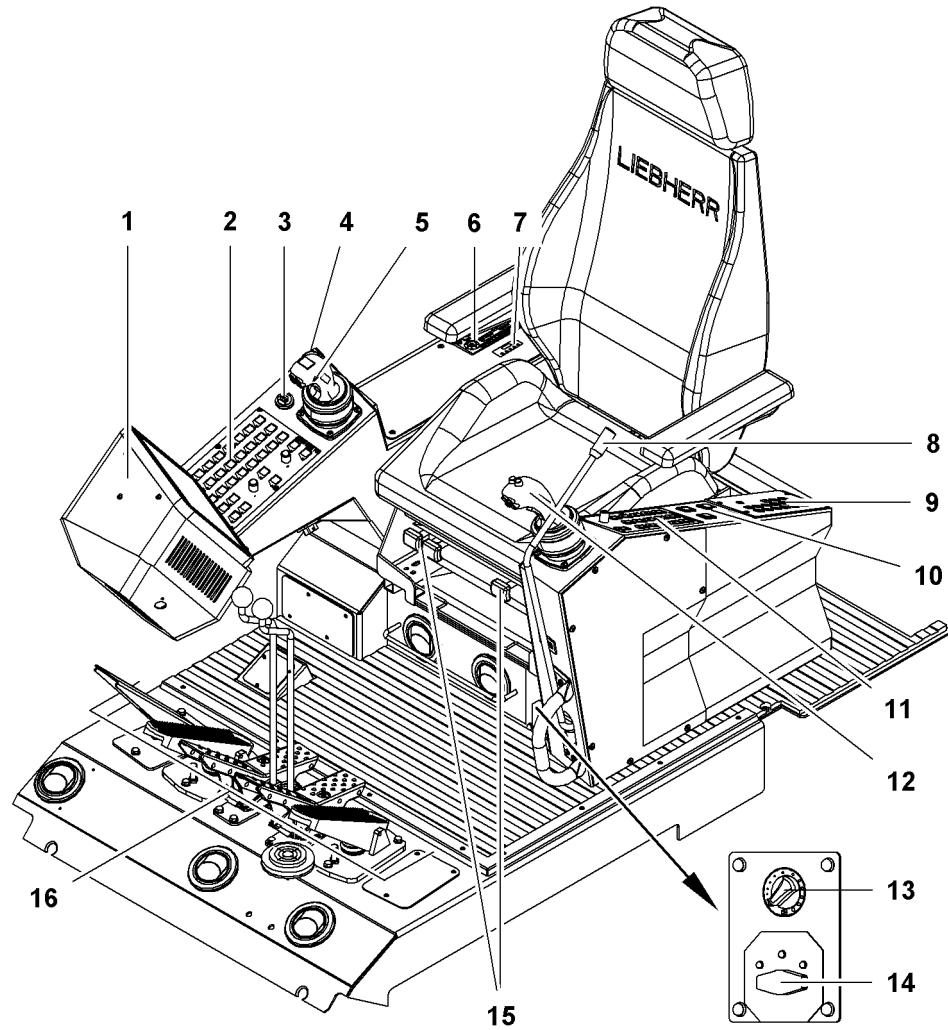


Fig. 421 Operator's cab

- |   |   |    |                                      |
|---|---|----|--------------------------------------|
| 1 | Monitor   | 9  | Control panel X12                    |
| 2 | Control panel X23   | 10 | Floodlights on boom buttons          |
| 3 | Ignition key/lock   | 11 | Control panel X11                    |
| 4 | Emergency stop  | 12 | Left-hand multi-directional joystick |
| 5 | Right-hand multi-directional joystick or right-hand double T-lever. | 13 | Recirculated air/fresh switch        |
| 6 | Radio   | 14 | Crawler deactivation switch          |
| 7 | Auxiliary heating operating element                                 | 15 | Driver's seat adjustment levers (3x) |
| 8 | Safety lever  | 16 | Foot pedals and hand levers          |

## 3.4 Left-hand control lever

### 3.4.1 Left-hand multi-directional joystick



Assigned functions of control lever on a machine with two multi-directional joysticks.

#### Assigned functions for buttons on left-hand multi-directional joystick

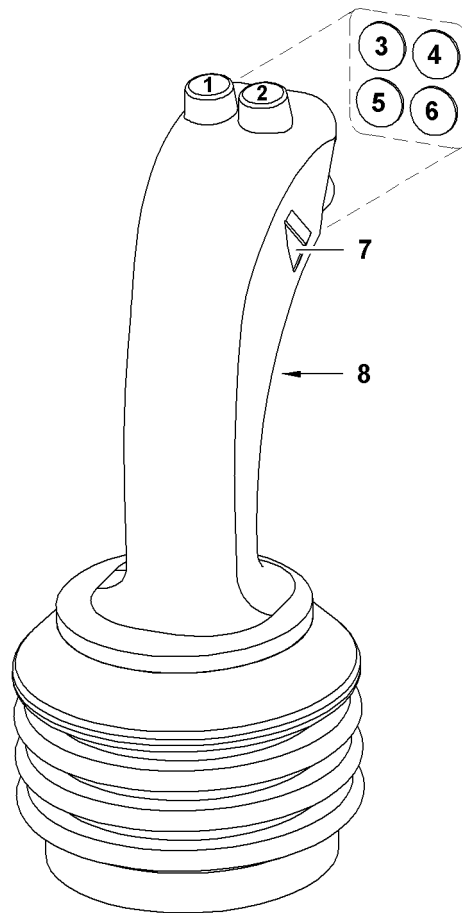


Fig. 423 Assigned functions for buttons on left-hand multi-directional joystick

- |   |  |   |  |
|---|--|---|--|
| 1 | Horn button                                    | 5 | [Not used]                                   |
| 2 | [Not used]                                     | 6 | Free swing button                            |
| 3 | Free-fall tagline winch On/Off button          | 7 | Tagline winch constant tension potentiometer |
| 4 | Tagline winch full tensile force (100%) button | 8 | [Not used]                                   |

## Assigned functions for movement directions on left-hand multi-directional joystick

Depending on the operating mode and selection, the corresponding function is carried out on the machine by moving the control lever.

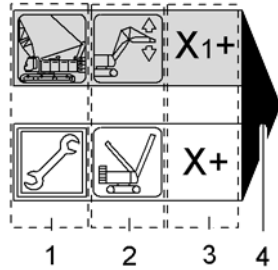


Fig. 424 Example of assigned functions

- |  |   |
|--|---|
| <p>1 Operating mode (crane operation = grey / assembly mode = white)</p> <p>2 Preselection</p> | <p>3 Function on the machine (function variable)</p> <p>4 Movement direction of control lever</p> |
|--|---|

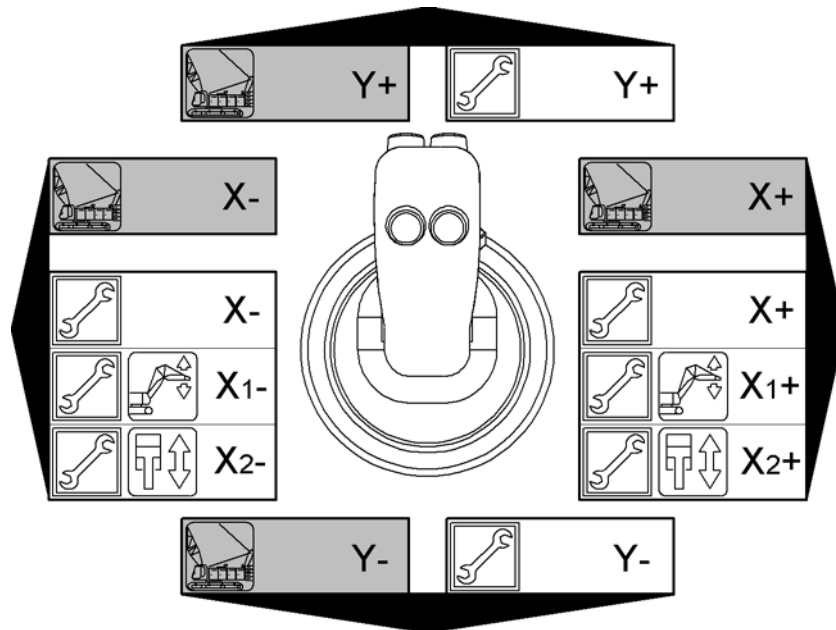


Fig. 425 Assigned functions for movement directions on left-hand multi-directional joystick

Function variable	Function	Remarks
Y+ / Y-	Lower/raise winch 2	
X+ / X-	Swing to right/left	
X1+ / X1-	Raise/lower jib	
X2+ / X2-	Extend/retract assembly cylinder	

Tab. 197 Meaning of function variables

### 3.4.2 Left-hand multi-directional joystick



Assigned functions of the control lever on a machine with a multi-directional joystick and a double T-lever.

#### Assigned functions for buttons on left-hand multi-directional joystick

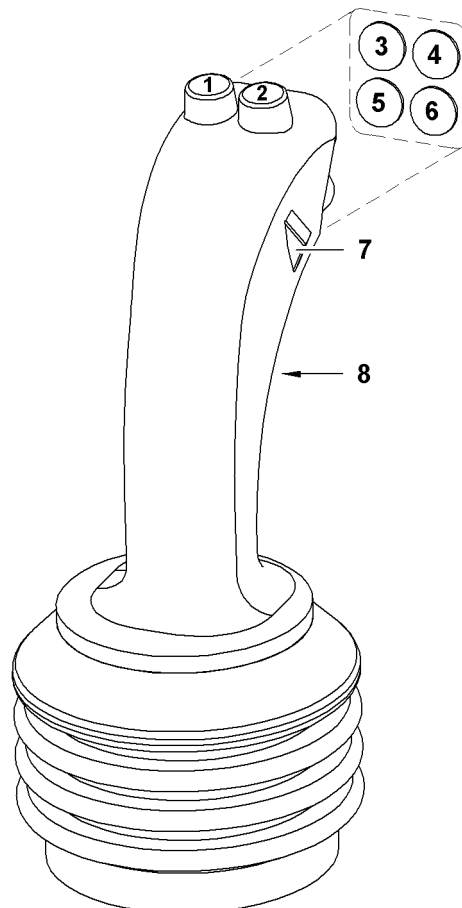


Fig. 427 Assigned functions for buttons on left-hand multi-directional joystick

- |   |  |   |  |
|---|--|---|--|
| 1 | Horn button                                    | 5 | [Not used]                                   |
| 2 | [Not used]                                     | 6 | Free swing button                            |
| 3 | Free-fall tagline winch On/Off button          | 7 | Tagline winch constant tension potentiometer |
| 4 | Tagline winch full tensile force (100%) button | 8 | [Not used]                                   |

#### Assigned functions for movement directions on left-hand multi-directional joystick

Depending on the operating mode and selection, the corresponding function is carried out on the machine by moving the control lever.

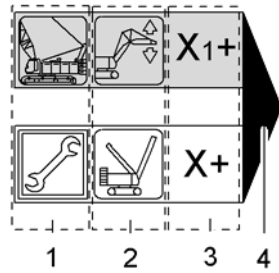


Fig. 428 Example of assigned functions

- |  |   |
|--|---|
| <p>1 Operating mode (crane operation = grey / assembly mode = white)</p> <p>2 Preselection</p> | <p>3 Function on the machine (function variable)</p> <p>4 Movement direction of control lever</p> |
|--|---|

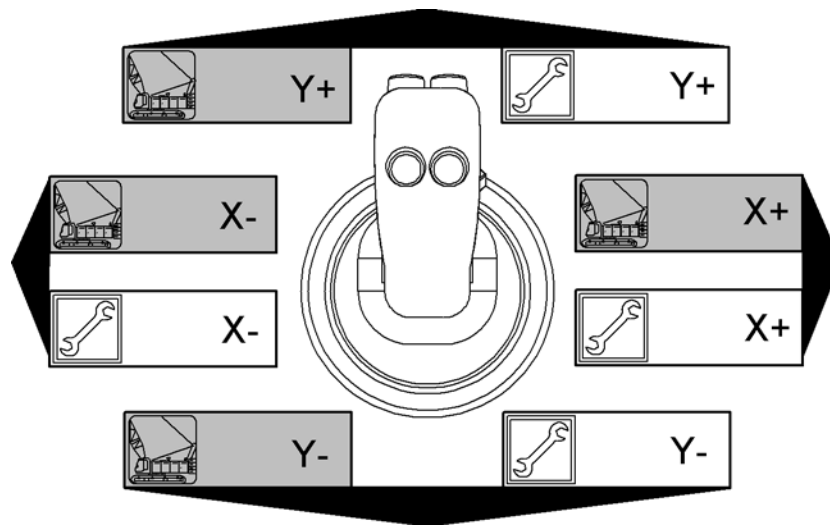


Fig. 429 Assigned functions for movement directions on left-hand multi-directional joystick

Function variable	Function	Remarks
Y+ / Y-	Lower/raise main boom	
X+ / X-	Swing to right/left	

Tab. 198 Meaning of function variables



## 3.5 Right-hand control lever

### 3.5.1 Right-hand multi-directional joystick



Assigned functions of control lever on a machine with two multi-directional joysticks.

#### Function assignment for buttons on right-hand multi-directional joystick

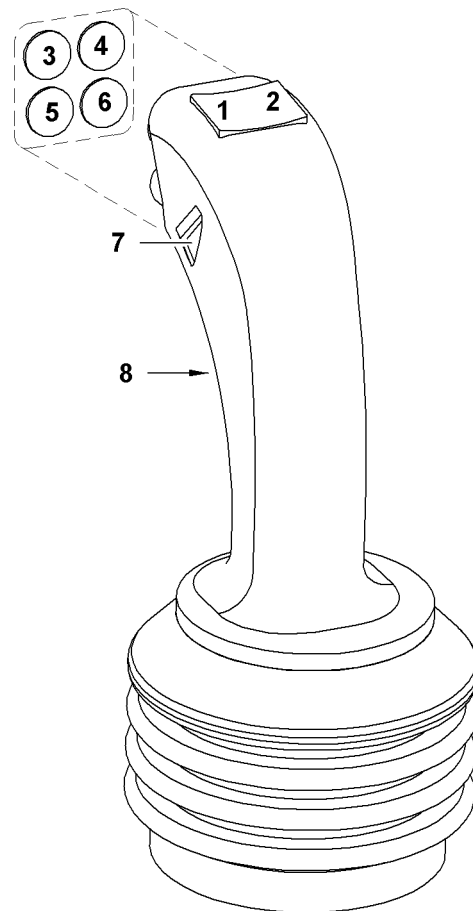


Fig. 431 Function assignment for buttons on right-hand multi-directional joystick

1	Increase engine speed button	5	[Not used]
2	Decrease engine RPM button	6	Winch synchronisation with pressure compensation button
3	Engine speed programming button	7	[Not used]
4	Switch to jib luffing winch button	8	[Not used]

## Assigned functions for movement directions on right-hand multi-directional joystick

Depending on the operating mode and selection, the corresponding function is carried out on the machine by moving the control lever.

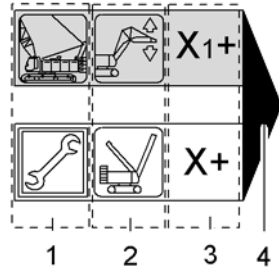


Fig. 432 Example of assigned functions

- |   |   |   |   |
|---|---|---|---|
| 1 | Operating mode (crane operation = grey / assembly mode = white) | 3 | Function on the machine (function variable) |
| 2 | Preselection  | 4 | Movement direction of control lever         |

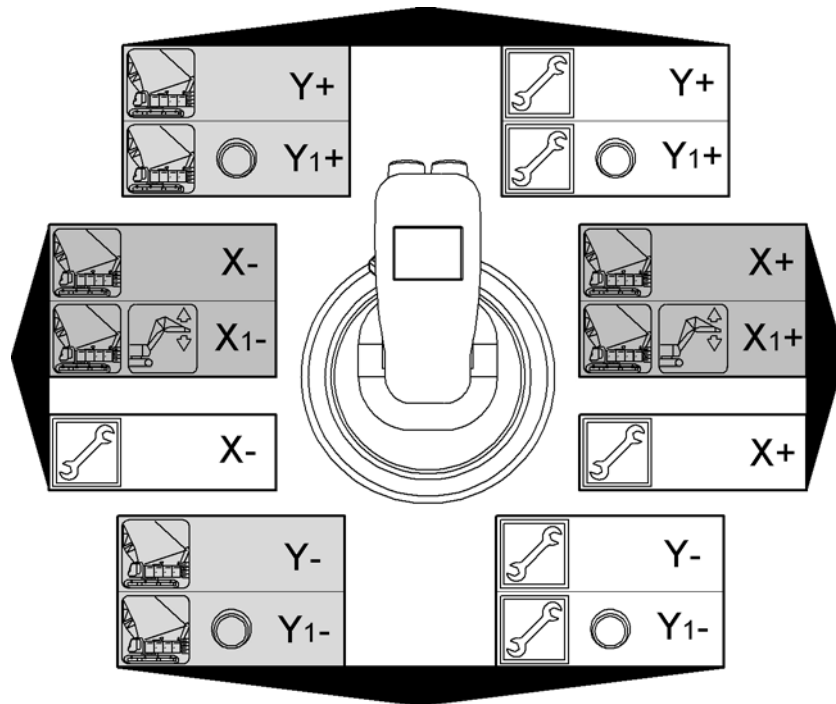


Fig. 433 Assigned functions for movement directions on right-hand multi-directional joystick

Function variable	Function	Remarks
Y+ / Y-	Lower/raise winch 1	
Y1+ / Y1-	Lower/raise winches 1+2 (winch synchronisation)	Winch synchronisation can be enabled temporarily on the control lever or enabled constantly on control panel X23.

Function variable	Function	Remarks
X+ / X-	Lower/raise main boom	In assembly mode <i>Enable cylinder functions</i> and <i>Extend A-frame cylinder</i> must be selected to make the adjustment.
X1+ / X1-	Lower/raise jib	

Tab. 199 Meaning of function variables

### 3.5.2 Right-hand double T-lever



Assigned functions of the control lever on a machine with a multi-directional joystick and a double T-lever.

#### Assigned functions for buttons on the right-hand double T-lever

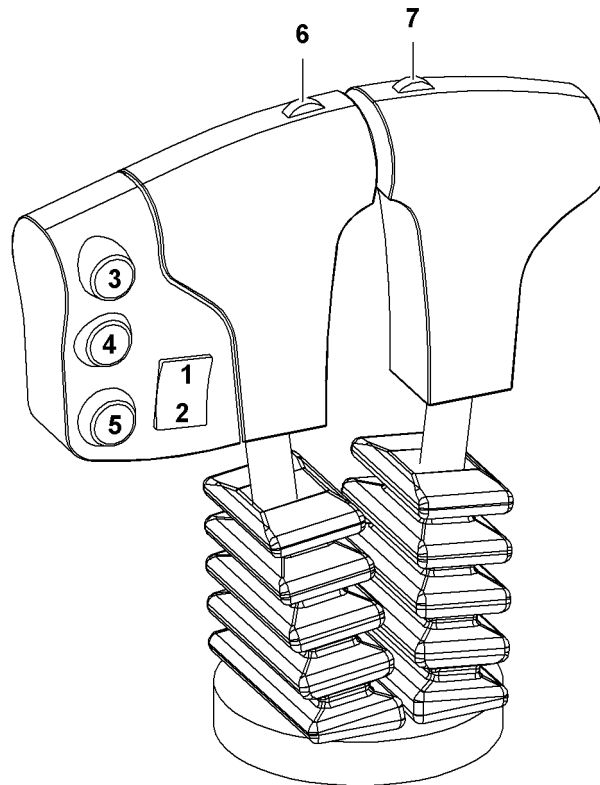


Fig. 435 Assigned functions for buttons on the right-hand double T-lever

- |   |   |   |                                 |
|---|---|---|---------------------------------|
| 1 | Increase engine speed button                            | 5 | Engine speed programming button |
| 2 | Decrease engine RPM button                              | 6 | Vibration button                |
| 3 | Switch to luffing jib luffing winch button              | 7 | Vibration button                |
| 4 | Winch synchronisation with pressure compensation button |   |                                 |

## Assigned functions for movement directions on right-hand double T-lever

Depending on the operating mode and selection, the corresponding function is carried out on the machine by moving the control lever.

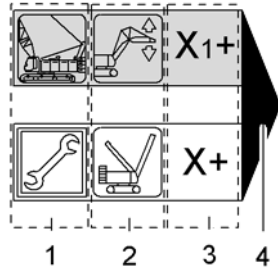


Fig. 436 Example of assigned functions

- |  |   |
|--|---|
| <p>1 Operating mode (crane operation = grey / assembly mode = white)</p> <p>2 Preselection</p> | <p>3 Function on the machine (function variable)</p> <p>4 Movement direction of control lever</p> |
|--|---|

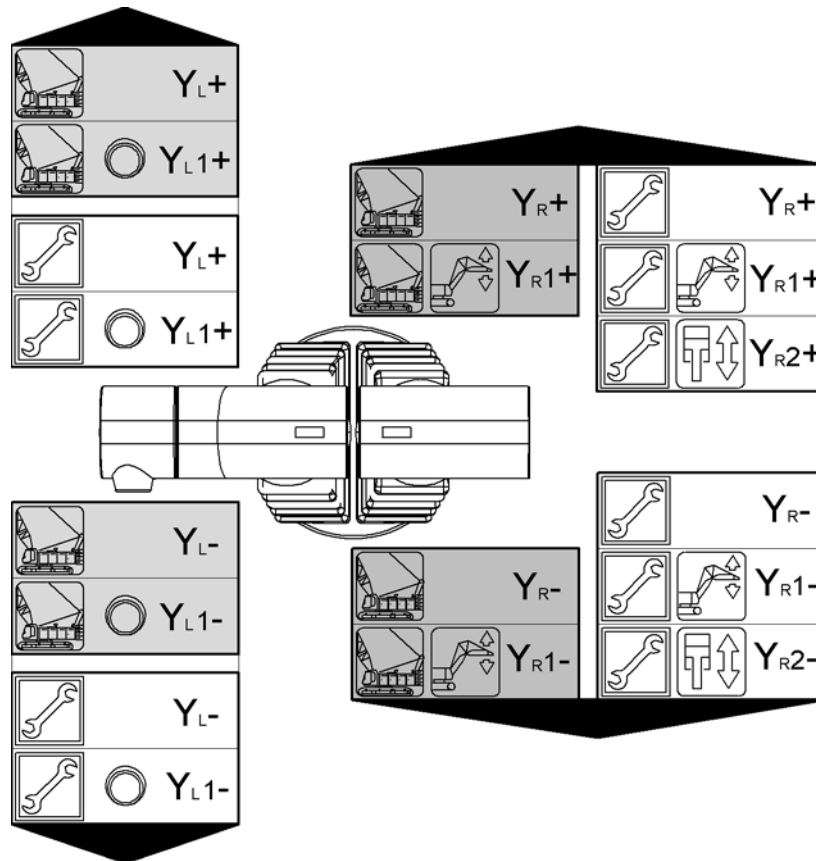


Fig. 437 Assigned functions for movement directions on right-hand double T-lever

Function variable	Function	Remarks
YL+ / YL-	Lower/raise winch 1	

Function variable	Function	Remarks
YL1+ / YL1-	Lower/raise winches 1+2 (winch synchronisation)	<i>Winch synchronisation</i> can be enabled temporarily on the control lever or enabled constantly on control panel X23.
YR+ / YR-	Lower/raise winch 2	
YR1+ / YR1-	Lower/raise jib	
YR2+ / YR2-	Extend/retract assembly cylinder	

Tab. 200 Meaning of function variables

### 3.6 Foot pedals and hand levers



Assigned functions of the foot pedals and hand lever on a machine with two multi-directional joysticks.

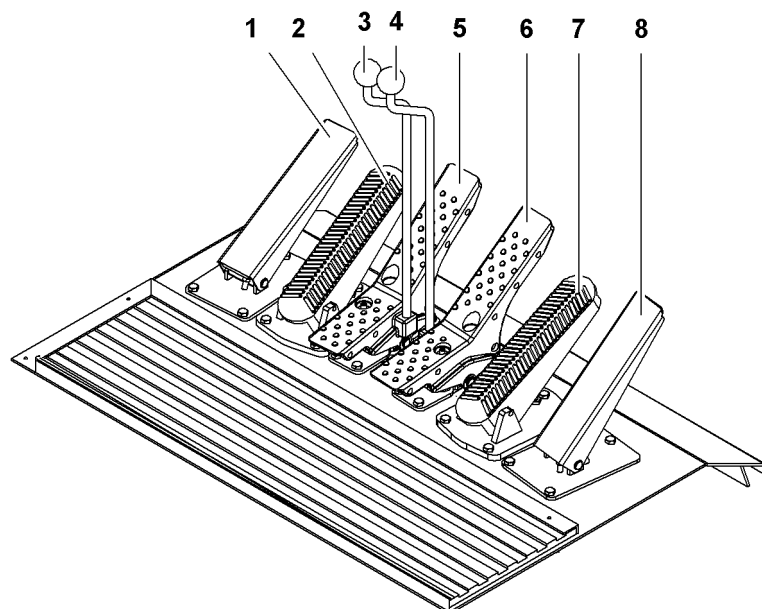


Fig. 439 Foot pedals and hand levers (multi-directional joystick)

- |   |  |   |  |
|---|--|---|--|
| 1 | Foot pedal for <i>tagline winch</i>      | 5 | Foot pedal for <i>left crawler</i>       |
| 2 | Brake pedal for <i>free-fall winch 2</i> | 6 | Foot pedal for <i>right crawler</i>      |
| 3 | Hand lever for <i>left crawler</i>       | 7 | Brake pedal for <i>free-fall winch 1</i> |
| 4 | Hand lever for <i>right crawler</i>      | 8 | Foot pedal for <i>engine RPM</i>         |



Assigned functions of the foot pedals and hand levers on a machine with a multi-directional joystick and a double T-lever.

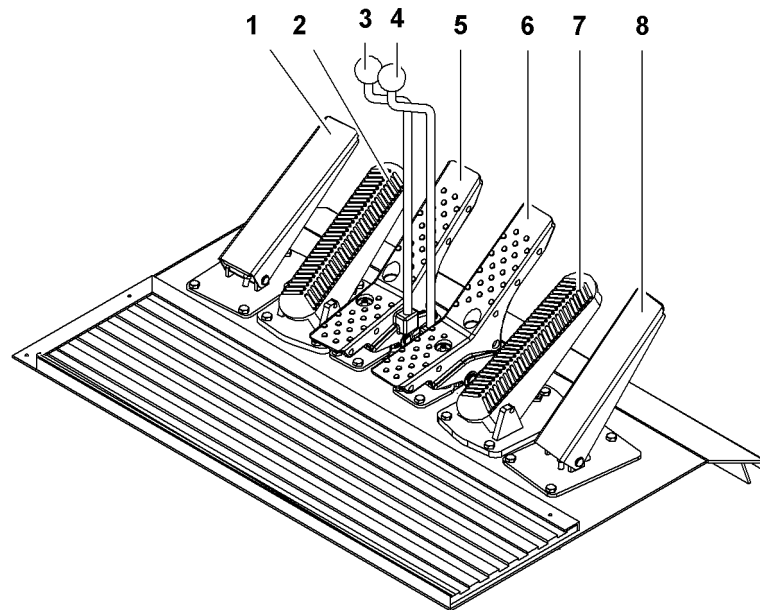


Fig. 441 Foot pedals and hand levers (double T-lever)

- |   |  |   |  |
|---|--|---|--|
| 1 | Foot pedal for <i>tagline winch</i>      | 5 | Foot pedal for <i>left crawler</i>       |
| 2 | Brake pedal for <i>free-fall winch 1</i> | 6 | Foot pedal for <i>right crawler</i>      |
| 3 | Hand lever for <i>left crawler</i>       | 7 | Brake pedal for <i>free-fall winch 2</i> |
| 4 | Hand lever for <i>right crawler</i>      | 8 | Foot pedal for <i>engine RPM</i>         |

### 3.7 Control panel X11

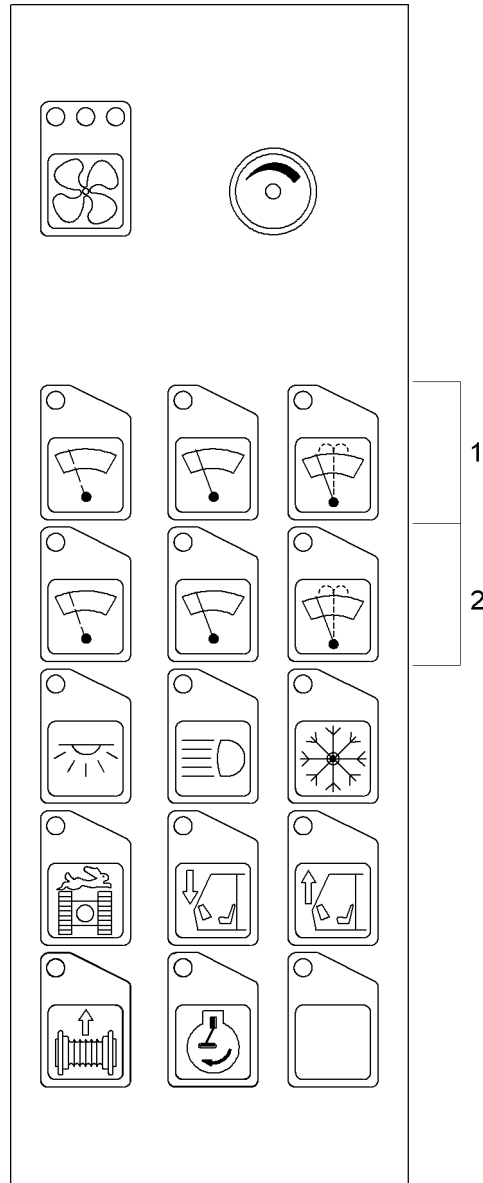
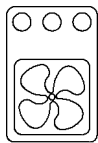


Fig. 442 Control panel X11

1 Front windscreen wiper

2 Roof window wiper

All buttons and switches contain LEDs that visibly indicate which function or settings are currently active.



**Heating/air conditioning fan speed**

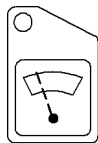
Sets the fan speed for the heating/air conditioning systems.



**Heating/air conditioning temperature**

Sets the temperature for the heating/air conditioning systems.

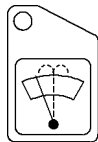


**Windscreen wiper**

Switches the associated wiper on or off.

**Intermittent windscreen wiper**

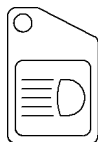
Operates the associated wiper intermittently.

**Windscreen wash system**

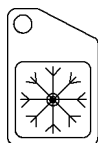
Switches the windscreen wash system on and off.

**Engine compartment lighting**

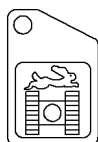
Switches the engine compartment lighting on and off.

**Floodlights on uppercarriage**

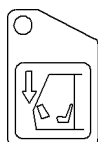
Switches the floodlights on the uppercarriage on and off.

**Air conditioning**

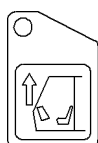
Switches the air conditioning on and off.

**Crawlers overdrive**

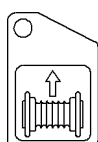
Switches crawler overdrive on and off.

**Cab tilting device down**

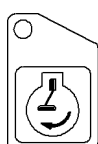
Tilts the cab down smoothly.

**Cab tilting device up**

Tilts the cab up smoothly.

**Rope reeving winch**

Switches the rope reeving winch on and off in assembly mode.

**Additional compressor**

Switches the additional compressor on and off.

## 3.8 Control panel X12



### WARNING

Unauthorized opening and operating of control panel X12!  
Safety functions may be restricted or switched off.

- ▶ Ensure that control panel X12 is locked off during operation.
- ▶ Ensure that the key is kept by an authorised person outside of the cab.

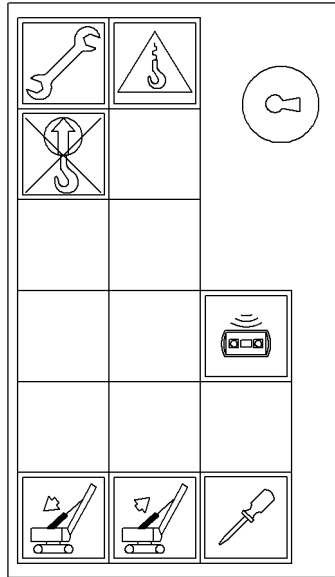


Fig. 456 Control panel X12

All buttons and switches contain a light that visibly indicates which function or settings are currently active.



#### Assembly mode

Switches assembly mode compressor on or off.



#### Unsecured free-fall operation

Switches unsecured free-fall operation for winches 1 and 2 on and off.



#### Enable load moment limiter (LML) bypass

Changes the function of the *load moment limiter (LML) bypass* switch on the control panel X23 from short to long touch.



#### Radio remote control

The function of the ignition key on the machine is replicated on the key switch on the radio remote control.



#### Extend the tilting back support cylinders.

Extends the tilting-back support cylinders for the main boom.



#### Retract the tilting back support cylinders

Extends the tilting-back support cylinders for the main boom. Manual operation is only possible in assembly mode.



**Select operating mode**

(not in use on LR)

### 3.9 Control panel X23

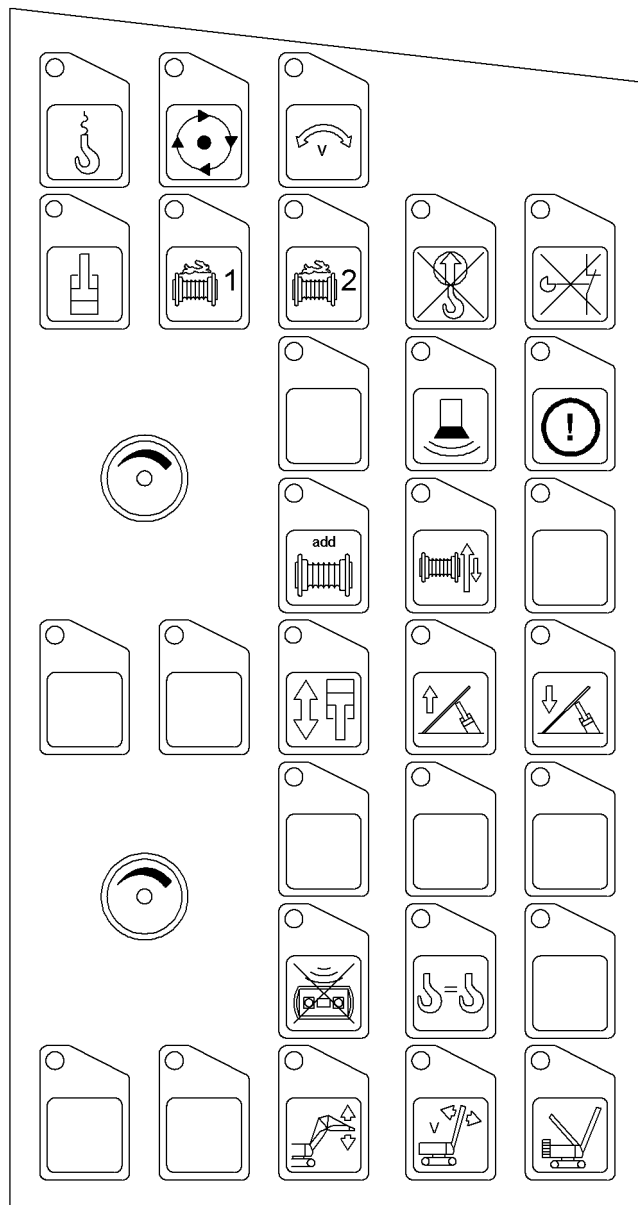
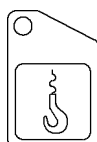


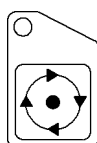
Fig. 464 Control panel X23

All buttons and switches contain LEDs that visibly indicate which function or settings are currently active.



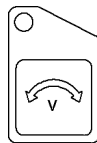
**Free fall**

Switches free-fall operation for winches 1 and 2 on and off.

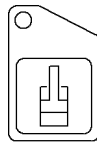


**Slewing free-wheel**

Switches free swing on or off.

**Swing speed level**

Adjusts the speed level for the swing.

**Cylinder adjustment functions on undercarriage/uppercarriage**

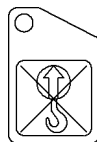
Switches the cylinder adjustment functions on the undercarriage/uppercarriage on and off.

**Winch 1 overdrive**

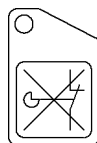
Switches winch 1 overdrive on or off.

**Winch 2 overdrive**

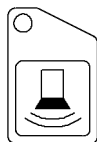
Switches winch 2 overdrive on or off.

**Bypass the load moment limiter (LML)**

Bypasses the load moment limiter (LML) during crane operation.

**Bypass limit switch**

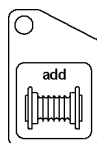
Bypasses certain limit switches during the erection, reconfiguration or disassembly of the boom in assembly mode.

**Hammer/vibratory hammer**

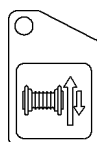
Switches the hammer/vibratory hammer on or off.

**Sensitive hoisting**

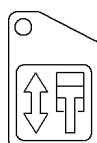
Switches the "Sensitive hoisting" function on and off.

**Auxiliary winch**

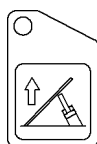
Enables adjustment of the auxiliary winch.

**Tagline winch**

Switches the tagline winch on or off.

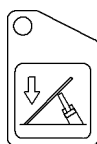
**Assembly cylinder**

Switches the assembly cylinder on the boom base section on and off.



### **Extend A-frame cylinder**

Extends the A-frame cylinder. Only works in assembly mode.



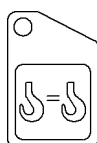
### **Retract A-frame cylinder**

Retracts the A-frame cylinder. Only works in assembly mode.



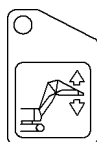
### **Take/cede control**

Take control from/cede control to the radio remote control.



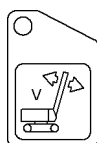
### **Winch synchronisation**

Switches winch synchronisation on and off.



### **Switching to jib luffing winch**

During crane operation, switches from the boom winch to the jib luffing winch, and in assembly mode switches from the swing to the jib luffing winch.



### **Boom luffing speed level**

Adjusts the speed level for the boom luffing.



### **Switching to derrick winch**

Switches from the boom winch to the derrick winch.

## 3.10 Monitor

The Litronic control system has an LCD (Liquid Crystal Display) "touch screen". Screens and functions can be selected by buttons.

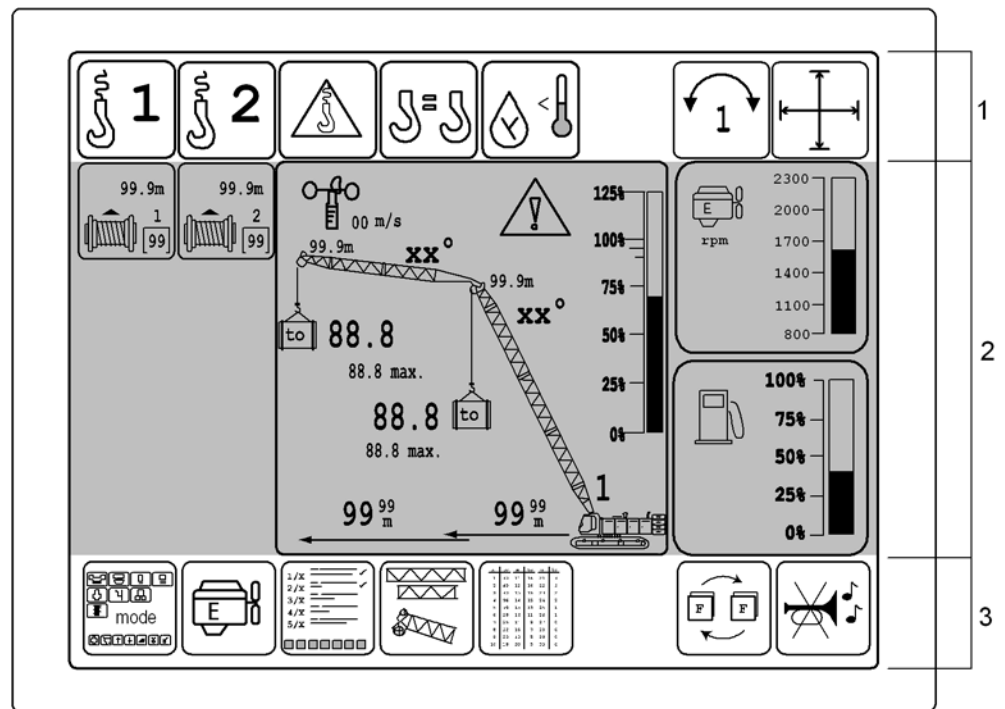


Fig. 485 Monitor sections

- |   |                                   |   |                      |
|---|-----------------------------------|---|----------------------|
| 1 | Status indicator                  | 3 | Function key symbols |
| 2 | Control displays and input fields |   |                      |

### NOTICE

Damage to the LCD screen from sharp objects!

- ▶ Only use your finger to press on the screen.

### 3.10.1 Status indicator

The different status displays appear in the upper part of the monitor as symbols.

The status display shows:

- the current preselections
- speed levels
- current operating mode
- tripped limit switches
- maximum of eight symbols next to each other

The status display does not appear on the start-up display, the setup screens or on the error display. The symbols are visible on all other screens.

### 3.10.2 Control displays and input fields

The display fields for the different operating modes appear dynamically in the center of the monitor. The fields provide information on the current values of the relevant operating mode.

### 3.10.3 Function key symbols

The function key symbols are located in the lower area of the monitor.

The function key symbols:

- depend on the screen.
- can be selected by touching the monitor.



**Back**

Changes to previous input field.



**Continue**

Goes to the next input field.



**Change value**

Changes the value in the input field.

The displayed value is incremented to the next possible value. As soon as the maximum value is reached, the displayed value jumps back to the minimum value.



**Confirm input**

Confirms the changed settings and calculates the current lifting capacity.

Flashes if the load chart needs to be recalculated.



**Change function key symbols**

Changes the function key symbols.



**Change setup**

Changes the setup ([For more information see: 3.10.5 Setup screens, page 366](#)).



**Warning buzzer**

Switches warning buzzer on or off.

### Load chart calculation



**Hourglass**

Flashes as load charts are being calculated.

If the *Confirm input* button appears again, calculation will be interrupted.



**Error LML**

Flashes if the calculation of the load chart has been interrupted due to an input error or non-acceptable setup. After an aborted calculation, the previous setup remains valid and saved.



## Rope measuring system



### Reset the rope measuring system for winch 1

Sets the rope measuring system for winch 1 to zero.



### Reset the rope measuring system for winch 2

Sets the rope measuring system for winch 2 to zero.



### Rope layer change preselection winch 1

Presets the programming of the layer change for winch 1.



### Rope layer change preselection winch 2

Presets the programming of the layer change for winch 2.



### Programme rope layer change 1-2

Programmes the rope layer change of the selected winch from the 1st to the 2nd rope layer.



### Programme rope layer change 3-4

Programmes the rope layer change of the selected winch from the 3rd to the 4th rope layer.



### Programme rope layer change 5-6

Programmes the rope layer change of the selected winch from the 5th to the 6th rope layer.

## Lifting capacity adjustment



### Taring the jib load

Tares the jib load.



### Taring the main boom load

Tares the main boom load.

## 3.10.4 Litronic service panel

The **menu bar** for the Litronic service panel is displayed on the right of the monitor following the start-up display.

The keys on are used to enter/change input values, parameters and correction values for the Litronic control system.

The Litronic service panel is on the right-hand side, next to the operator's seat, on machines manufactured before 06/2008.

## Menu bar

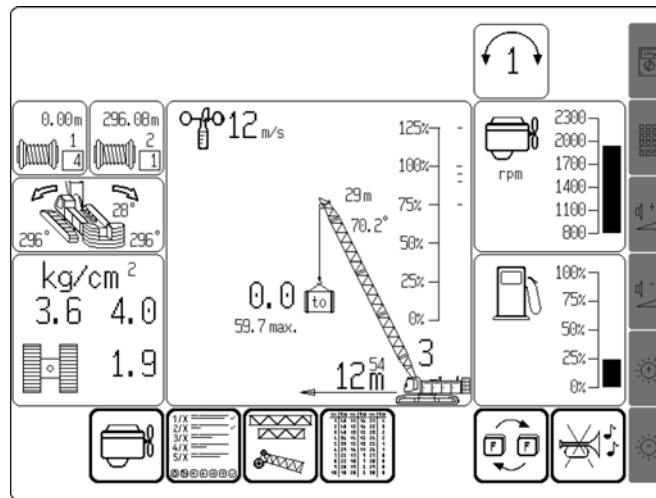
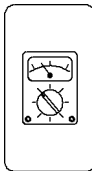
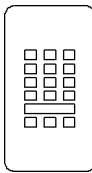


Fig. 504 Litronic service panel as a menu bar



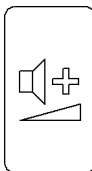
### Test system

Switches to the Litronic® testing system.



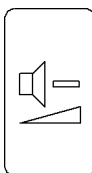
### Keyboard menu

Switches to the keyboard menu (For more information see: [Keyboard menu, page 365](#)).



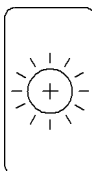
### Increase volume

Increases the volume of the warning buzzer.



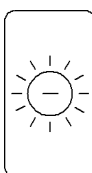
### Reduce volume

Reduces the volume of the warning buzzer.



### Increase brightness

Increases the brightness of the monitor (3 levels) or shows the screen inverse (night use).



### Reduce brightness

Reduces the brightness of the monitor (3 levels) or shows the screen inverse (night use).

## Keyboard menu

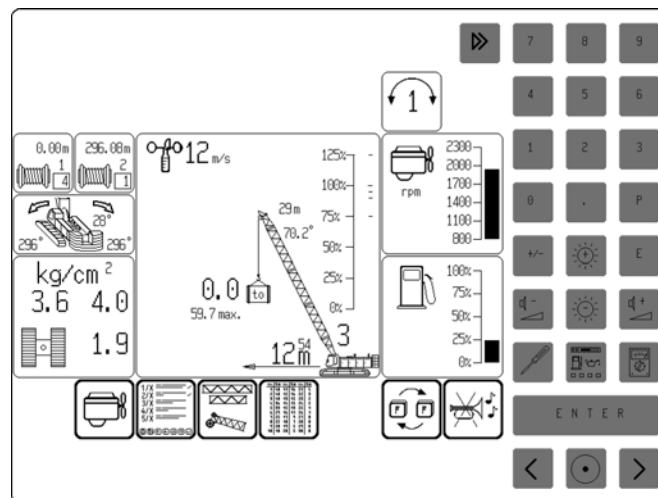
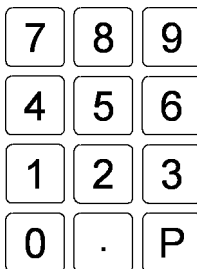


Fig. 511 Litronic service panel as keyboard menu



### Minimise

Switches to the menu bar ([For more information see: Menu bar, page 364](#)).



### Numeric keypad

Enter numerical values.



### Inverse

Inverts the numerical values.



### Exponent

Enter exponents.



### Increase brightness

Increases the brightness of the monitor (3 levels) or shows the screen inverse (night use).



### Reduce brightness

Reduces the brightness of the monitor (3 levels) or shows the screen inverse (night use).



### Increase volume

Increases the volume of the warning buzzer.



### Reduce volume

Reduces the volume of the warning buzzer.



### Correction values

Switches to the correction value program of the Litronic® testing system.



### Mode screen

Switches to the last mode screen.



### Test system

Switches to the Litronic® testing system.



### Enter

Applies entered values to the Litronic control system.



### Back

Changes to previous input field.



### Continue

Goes to the next input field.



### Testing system screen

Switches to the testing system screen.

## 3.10.5 Setup screens



The setup screen:

- appears automatically following the start-up display if there are no error messages.
- displays the current setup of the machine.
- is used for defining and confirming the setup.

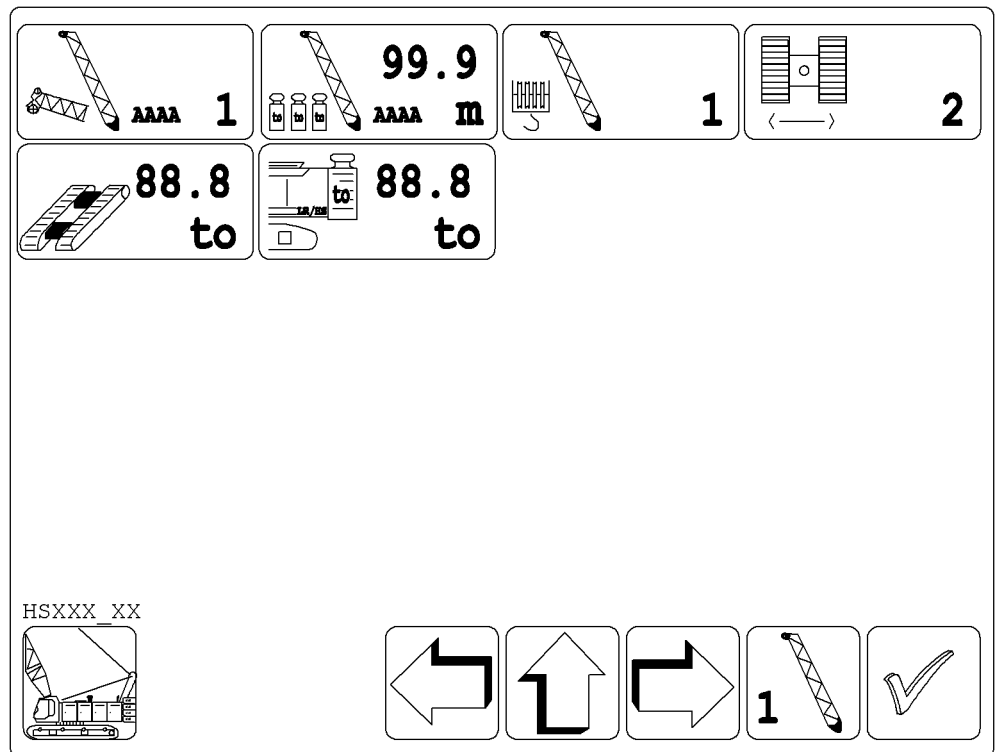







Fig. 528 Setup screen

The load moment limiter of the Litronic control system is matched to the different boom configurations of the machine. Each of the following boom configurations has its own setup screen.

Screen symbol	Boom configuration number	Designation
	1	Main boom
	2	Main boom + reducing piece
	3	Main boom + fixed jib
	4	Main boom + luffing jib
	5	Main boom + luffing jib + Midfall

Tab. 201 Boom configuration

Instead of status and control displays, the setup screens contain special input fields with the settings needed to clearly define and program the desired setup.

The possible inputs and data ranges are matched to the load charts applicable to the setup. Irrespective of this, some input fields have default values and cannot be modified.

All symbols and displays that appear in the various setup screens are described once under setup screen 1 or before.

Abbreviation	Description
AAAA	Dimensions for boom sections
BBBB	Dimensions for fixed jib sections
CCCC	Dimensions for luffing jib sections
99.9	Length specifications for relevant unit
88.8	Weight specifications for relevant unit
LRXXXX_XX; HSXXXX_XX	Designation of the relevant load charts (bottom left on LCD monitor)

Tab. 202 Meanings of abbreviations

Ending	Description
CE	for Europe
ANSI	for the USA
BC	Blocked Crawler
LI	Limited
SP	Special P
SX	Special X

Tab. 203 Possible endings for LRxxxx\_XX

The following setup screens show all dimensions, length or weight specifications using a standardised set of numbers and letters.

### Setup screen 1

Setup screen 1 describes boom configuration 1: **Main boom**

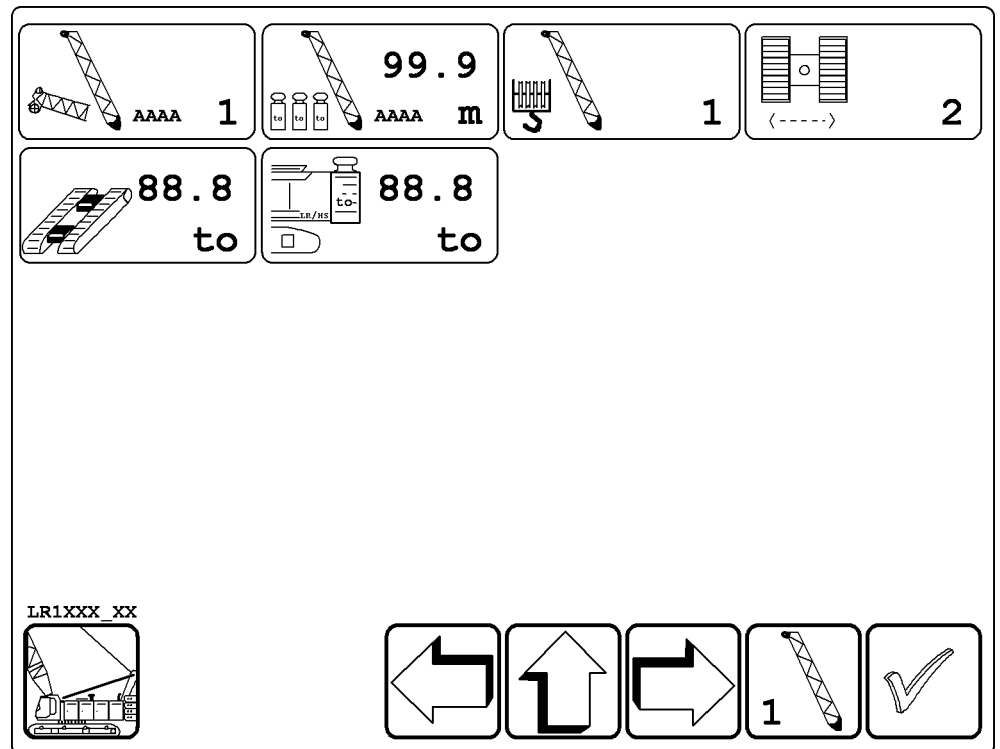
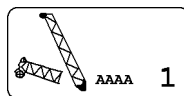
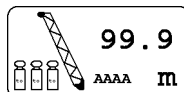


Fig. 534 Setup screen 1

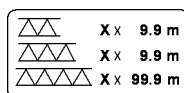
**Boom head section**

Set boom head section. The values can be found in the load charts preface.

**Total length of main boom**

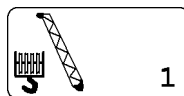
The total length includes the following lengths:

- Boom base section
- Boom sections
- Boom head section

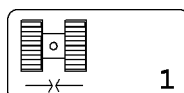
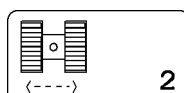
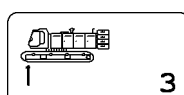
**Boom configuration**

Number of boom sections required in order to reach the preset total length.

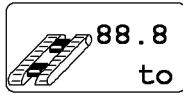
Only appears when the input field *Total length of main boom* is activated with the function key symbols.

**Boom head section hoist rope reeving**

Set hoist rope reeving for the boom head section.

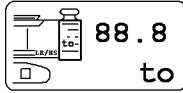
**Track width adjustment: Narrow track****Track width adjustment: Wide track****Track width adjustment: Blocked crawlers**

(For more information see: [4.26 Blocked crawlers\\*](#), page 500)



**Carbody counterweight**

Weight of carbody counterweight.



**Rear counterweight**

Weight of rear counterweight.

**Setup screen 2**

Setup screen 2 describes boom configuration 2: **Main boom + reducing piece**

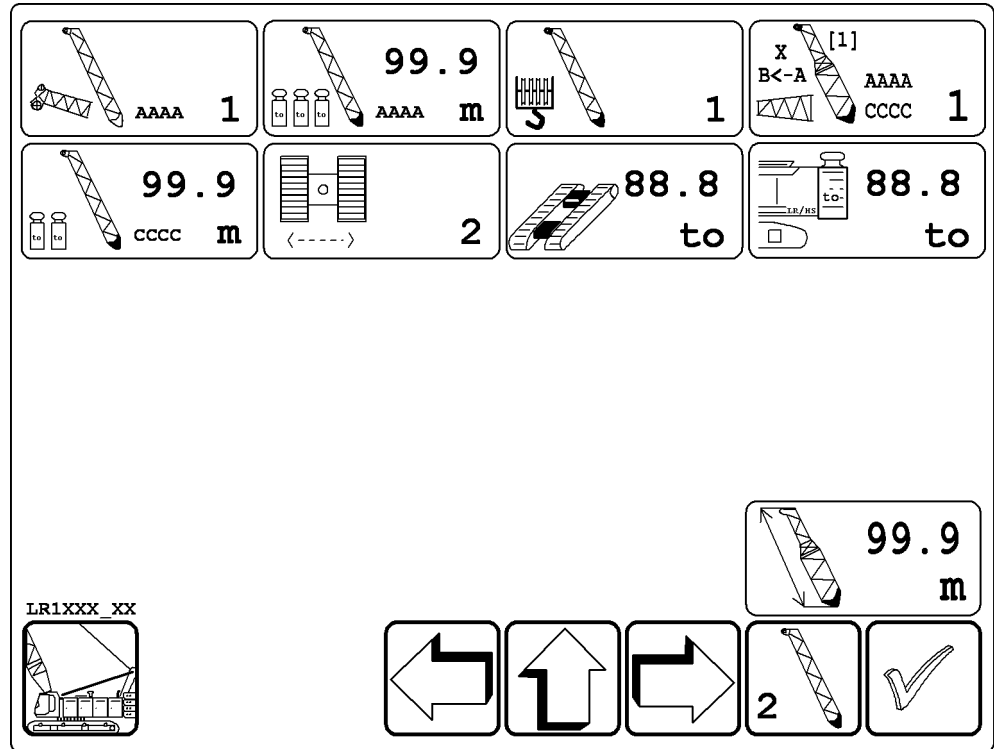
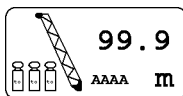


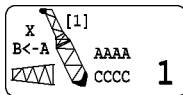
Fig. 544 Setup screen 2



**Main boom length up to reducing piece**

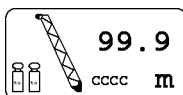
Includes the following lengths:

- Boom base section
- Boom sections



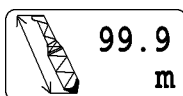
**Reducing piece**

Dimensions up to and beyond the reducing piece. The values can be found in the load charts preface.



**Main boom length beyond reducing piece**

Length of all the boom sections beyond the reducing piece.



**Total length of main boom**

The total length includes the following lengths:

- Boom base section
- Boom sections up to reducing piece
- Reducing piece



- Boom sections beyond reducing piece
- Boom head section

### Setup screen 3

Setup screen 3 describes boom configuration 3: **Main boom + fixed jib**

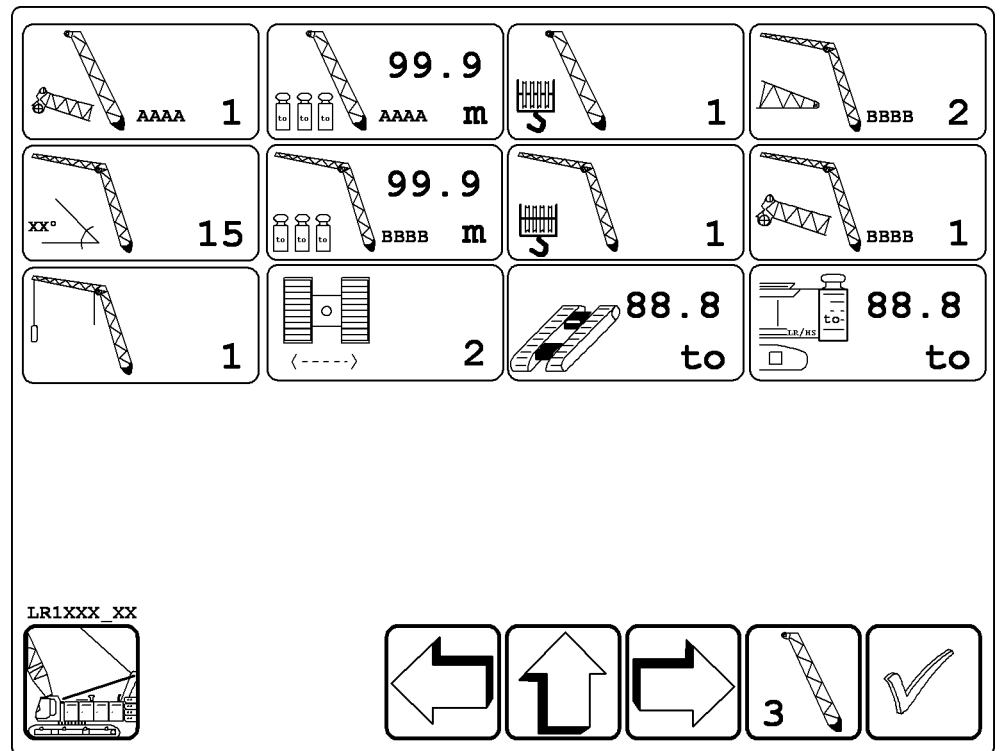
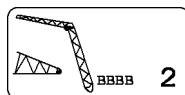
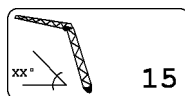


Fig. 549 Setup screen 3



#### System size of the jib

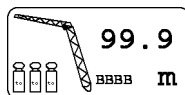
Set system size of the jib. The values can be found in the load charts preface.



The offset between jib and main boom in degrees.

Possible offset:

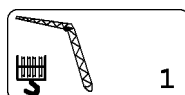
- 15 °
- 30 °



#### Total jib length

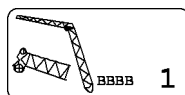
The total length includes the following lengths:

- Jib base section
- Jib sections
- Jib head section



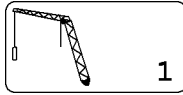
#### Hoist rope reeving of the jib head section

Set hoist rope reeving for the jib head section.

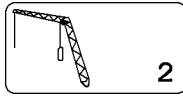


#### Jib head section

Set jib head section. The values can be found in the load charts preface.



Load position: Jib head section



Load position: Boom head section

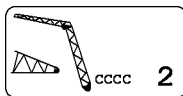
### Setup screen 4

Setup screen 4 describes boom configuration 4: **Main boom + luffing jib**

AAAA 1	99.9 to to to AAAA m	S 1	CCCC 2
99.9 to to to CCCC m	S 1	CCCC 1	1
2 <----->	88.8 to	88.8 to	

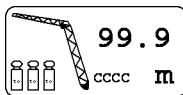
LR1XXX\_XX

Fig. 557 Setup screen 4



**System size of the jib**

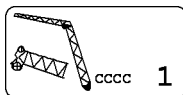
Set system size of the jib. The values can be found in the load charts preface.



**Total jib length**

The total length includes the following lengths:

- Jib base section
- Jib sections
- Jib head section



**Jib head section**

Set jib head section. The values can be found in the load charts preface.

### Setup screen 5

Setup screen 5 describes boom configuration 5: **Main boom + luffing jib + Midfall**

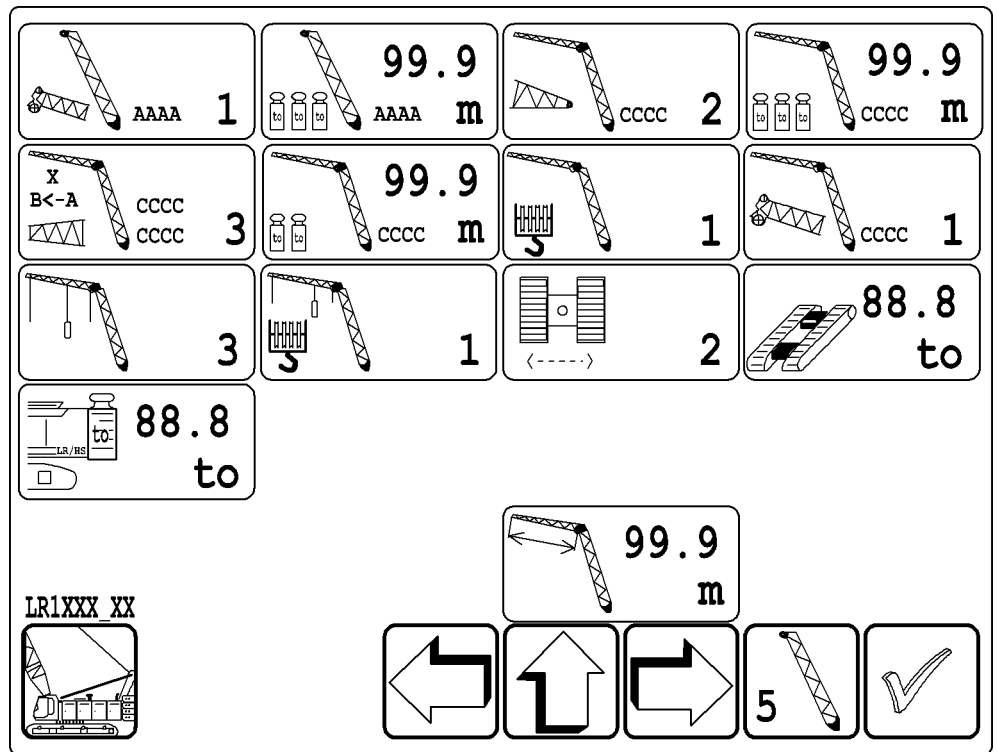
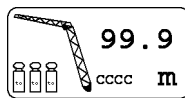


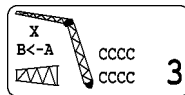
Fig. 561 Setup screen 5



**Jib length up to Midfall**

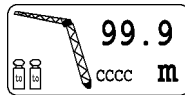
Includes the following lengths:

- Jib base section
- Jib sections



**Midfall**

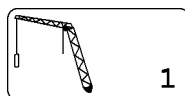
System size up to and beyond the Midfall. The values can be found in the load charts preface. The control system displays the Midfall as a reducing piece.



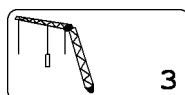
**Jib length after Midfall**

Includes the following lengths:

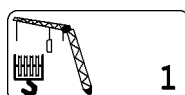
- Jib sections
- Jib head section



**Load position: Jib head section**

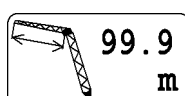


**Load position: Midfall**



**Midfall hoist rope reeving**

Set hoist rope reeving for the Midfall.



**Total jib length**

The total length includes the following lengths:

- Jib base section
- Jib sections
- Midfall

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- Jib sections
- Jib head section

### 3.10.6 Operational screen for lifting operations



- The operational screen for lifting operation:
- is the standard display during crane operation.
  - provides the machine operator with all essential information.

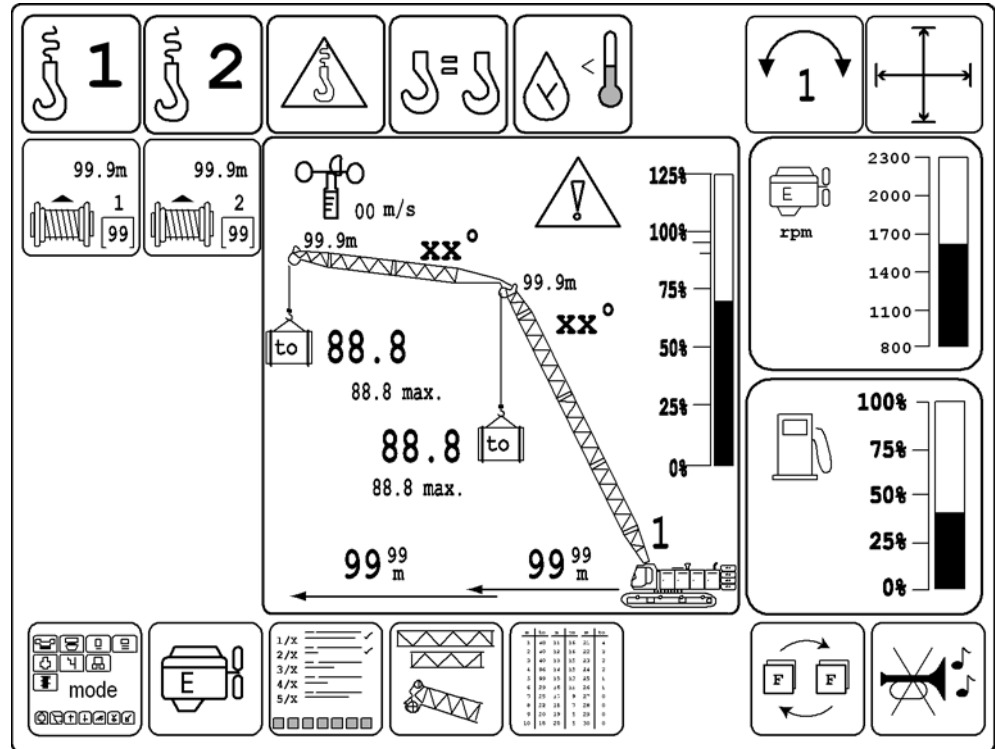


Fig. 570 Operational screen for lifting operations



**Free fall winch 1**  
Winch 1 is in free fall.



**Free fall winch 2**  
Winch 2 is in free fall.



**Secured free-fall operation**  
Secured free-fall operation selected.



**Unsecured free-fall operation**  
Unsecured free-fall operation selected.



**Slewing free-wheel**  
Free swing active and speed level 1 selected.

**Swing speed**

Free swing deactivated and speed level 1 selected.

**Preheating**

At low temperatures, the diesel engine is preheated.

**Ready to start**

The diesel engine can be started when preheating is finished.

**Winch synchronisation**

Preselects winch synchronisation.

**Main boom luffing**

Main boom luffing selected.

**Jib luffing**

Jib luffing selected.

**Wrong load position**

Flashes when a winch has been activated that is blocked for safety reasons.

**Winch 1 overdrive**

Winch 1 overdrive selected.

**Winch 2 overdrive**

Winch 2 overdrive selected.

**Rope length and reeving winch 1**

The following parameters appear:

- Winch 1 rope length
- Reeving of the hoist rope on the pulley block
- Direction of the hoist rope

**Rope length and reeving winch 2**

The following parameters appear:

- Winch 2 rope length
- Reeving of the hoist rope on the pulley block
- Direction of the hoist rope

**Coolant level too low**

Coolant level in the cooling system compensation tank has dropped below the minimum level.

**Hydraulic oil level too low**

Hydraulic oil level in the hydraulic oil tank has dropped below the minimum level.

**Hydraulic oil temperature too low**

Hydraulic oil temperature is below -4 °F. The hydraulic oil heater (if fitted) automatically raises the hydraulic oil temperature to 14 °F.



### Distributor gear box temperature too high

Gearbox oil temperature in distributor gear box is too high.



### Extend A-frame cylinders not preselected

*Extend A-frame cylinders* function has not been preselected (in assembly mode only). The “Lifting” and “Lowering” main boom functions are disabled.



### Extend the tilting back support cylinders not preselected

*Extend the tilting back support cylinders* function is not preselected. “Lift” function for main boom is blocked.



### Radio remote control passive

Radio remote control has been selected on the control panel X12. Crane is controlled from the control panel of the radio remote control.



### Radio remote control active

Radio remote control has been selected on the control panel X12. Crane is controlled from the operator's cab.

Control over the crane is suspended when the symbol flashes.



### Connection interruption

Connection is interrupted.

## Limit switch symbols



### Drive is limited

One direction of movement is initiated when several limit switches trip, if it is blocked by one activated limit switch. If only one limit switch has been triggered and a movement is initiated in the direction it has blocked, then the corresponding limit switch symbol starts flashing in the status display in place of the previous *Drive is limited* symbol.



### Winch 1, upper limit switch

Maximum lifting height of winch 1 reached. The “lifting” function of winch 1, as well as the “lowering” function of the main boom and jib, are blocked.



### Winch 1, lower limit switch

Only three windings left on the rope drum of winch 1. The “lowering” function of winch 1 is blocked.



### Winch 2, upper limit switch

Maximum lifting height of winch 2 reached. The “lifting” function of winch 2, as well as the “lowering” function of the main boom and jib, are blocked.



### Winch 2, lower limit switch

Only three windings left on the rope drum of winch 2. The “lowering” function of winch 2 is blocked.



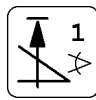
### Main boom, upper limit switch

Maximum main boom angle has been reached. “Lift” function for main boom is blocked.



### Main boom, lower limit switch

Minimum main boom angle has been reached. “Lower” main boom function is blocked.

**Main boom, upper angle limiter**

Maximum main boom angle has been reached. "Lift" function for main boom is blocked.

**Main boom, lower angle limiter**

Minimum main boom angle has been reached. "Lower" main boom function is blocked.

**Upper limit switch, jib**

Minimum radius of the jib reached. Funktion "lifting" of the jib is blocked.

**Lower limit switch, jib**

Lowest possible mechanical position of the jib reached. Funktion "lowering" of the jib is blocked.

**Locking flaps fault**

The main boom and luffing jib have been erected above a specified angle and the locking flaps are not yet in their proper position. The "Raise" function of the main boom and jib is blocked.

**Upper limit switch, auxiliary winch**

Maximum lifting height of auxiliary winch reached. The "Raise" function of the auxiliary winch is blocked.

**Lower limit switch, auxiliary winch**

Only three windings left on the auxiliary winch drum. The "Lower" function of the auxiliary winch is blocked.

**A-frame 1, lower limit switch**

A-frame 1 is at its rear end position. "Lift" function for main boom is blocked.

## Crane operation display field

The values in the following illustration are not binding for this machine, and are shown purely for the purpose of clarification.

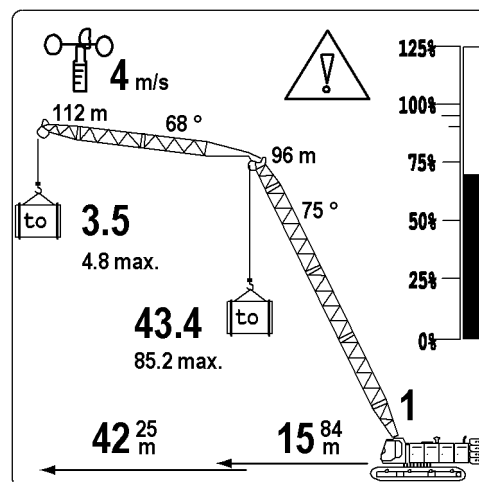


Fig. 611 Crane operation display field

Value	Designation
4 m/s	Wind speed
112 m	Lifting height on jib
68 °	Jib angle
96 m	Lifting height on main boom
75 °	Main boom angle
3.5 t	Current lifting capacity on the jib
4.8 t max.	Maximum permitted lifting capacity on the jib
43.4 t	Current lifting capacity on the main boom or Midfall
85.2 t max.	Maximum permitted lifting capacity on the main boom or Midfall
42.25 m	Radius of the lifting capacity on the jib
15.84 m	Radius of the lifting capacity on the main boom
1	Speed level for main boom and/or jib luffing
Bar display in %	Load moment utilisation

Tab. 204 Crane operation display field



**Caution**

Load moment utilisation is between 90 and 100 %.



**Stop**

Load moment utilisation exceeding 100 %.



**Danger of tilting backwards**

Machine may topple backwards due to insufficient load.



**Assembly mode**

Assembly mode selected.

**Engine RPM display field**

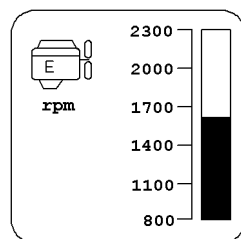


Fig. 616 Engine RPM display field

Displays the diesel engine speed.

The bar flashes if the engine speed increases by 200 rpm due to external influences.

External influences:

- Lowering of a load (load supported by the hydraulic system)
- Explosive gases sucked in by the diesel engine



## Display field fuel level

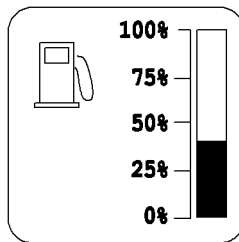


Fig. 617 Display field fuel level

Shows the fuel tank level as a percentage of the maximum capacity.

The bar flashes when the tank level falls below 15 %.

## 3.10.7 Operating modes



The "Operation mode" screen displays all the operation modes that can be selected on this machine. The currently selected operating mode is surrounded by a darker frame on the display.

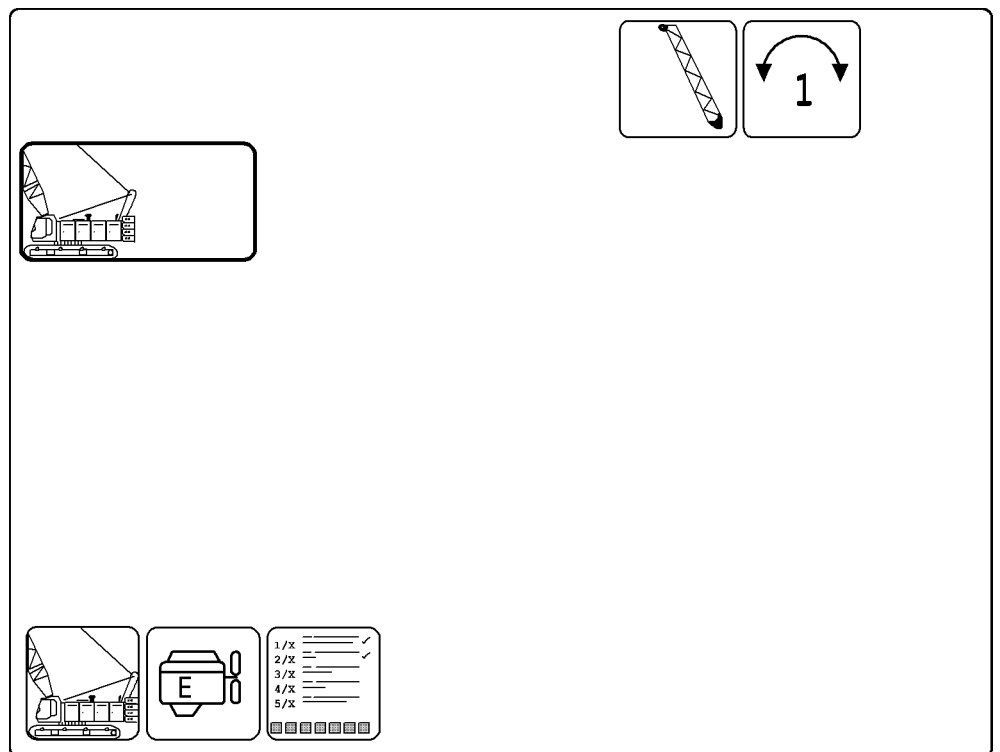
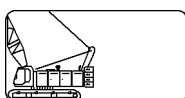


Fig. 619 Operating modes



### Crane operation

Selects the "Crane operation" mode.

### 3.10.8 engine monitoring



The engine monitoring provides information on the operating status of the main engine.

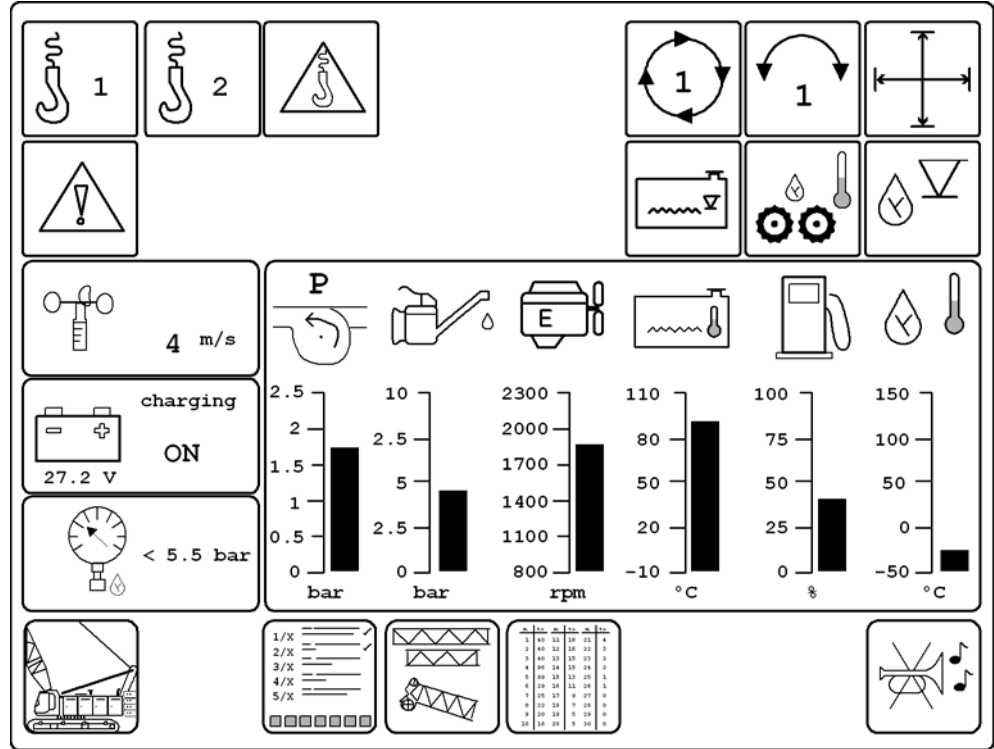
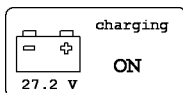
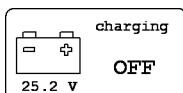


Fig. 622 engine monitoring

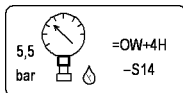


#### Charging indicator

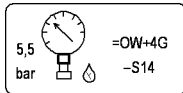
Current charge status and voltage of the battery in V.



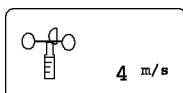
charging "ON": The generator is charging the batteries  
 charging "OFF": the generator is not charging the batteries



#### Winch 1 feed pressure too low



#### Winch2 feed pressure too low



#### Wind speed

Current wind speed in ft/s.

If an anemometer is mounted on the jib head section and on the boom head section, the Litronic control system compares the two measurements and always displays the higher wind speed.

## Display area for engine functions

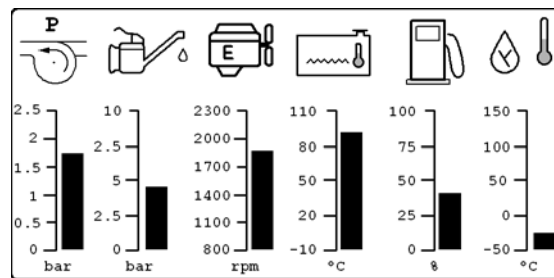


Fig. 628 Display area for engine functions



### Charge air pressure

Shows the current charge air pressure of the diesel engine in psi.



### Oil pressure

Shows the current lubrication oil pressure of the diesel engine in psi.



### Speed

Displays the current speed of the diesel engine in rpm.



### Cooling water temperature

Shows the current temperature of the coolant of the diesel engine in °F.



### Fuel tank

Displays the current level of the fuel tank for the diesel engine as a % of the maximum filling capacity.



### Hydraulic oil temperature

Shows the current temperature of the hydraulic oil in the tank in °F.

## 3.10.9 Error display



The error display:

- shows error messages as plain text in the appropriate language.
- can consist of several error pages.

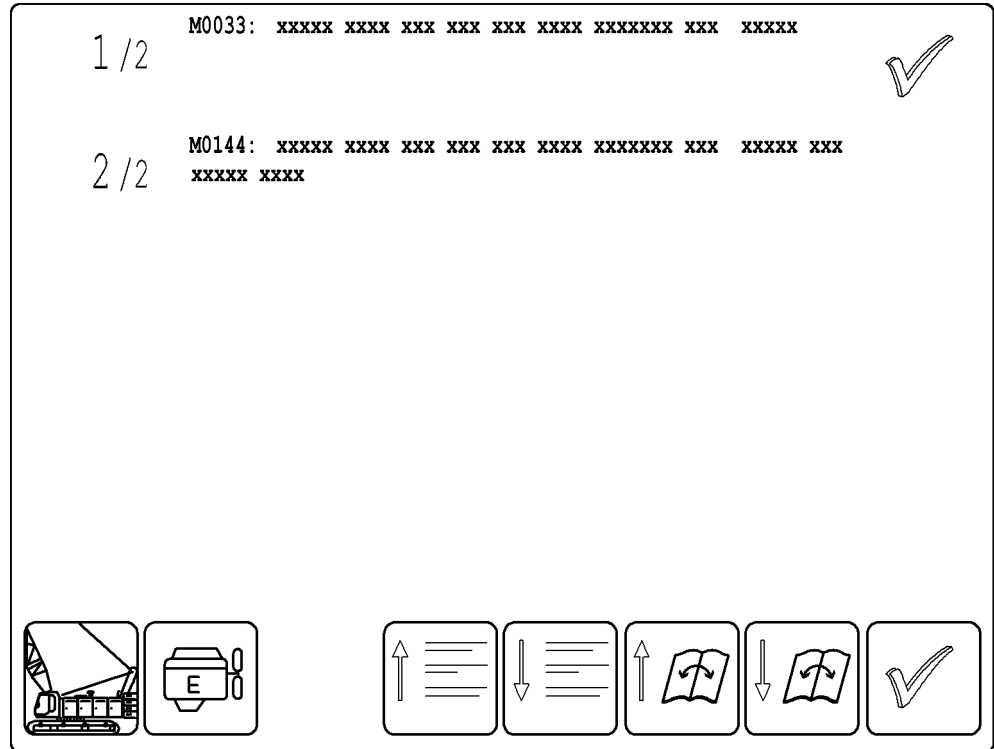


Fig. 636 Error display



**WARNING**

Working with a faulty machine!

- All error causes must be rectified and all error messages acknowledged before working with the machine. Acknowledging the error messages alone will not remedy the causes of the errors.



**Error message acknowledged**

Appears next to the error text after the error message has been acknowledged.



**Previous error message**



**Next error message**

The following two function key symbols only appear if there are five or more error messages.



**Page up**

Appears in the bottom corner of the screen if there are more error messages on the previous page(s).



**Page down**

Appears in the bottom corner of the screen if there are more error messages on the following page(s).



### Acknowledge error message

## 3.10.10 Load chart



The load chart shows the radius and corresponding lifting capacity for the programmed setup.

1		2		3		4	
Version:xxxxxxx Mxxxxx Alpha XX°							
m	to	m	to	m	to	m	to
22.3	8.5	30.0	2.8	0.0	0.0	0.0	0.0
23.0	8.5	40.0	2.6	0.0	0.0	0.0	0.0
24.0	8.4	42.0	2.4	0.0	0.0	0.0	0.0
25.0	7.8	43.0	2.1	0.0	0.0	0.0	0.0
26.0	7.2	44.0	1.9	0.0	0.0	0.0	0.0
27.0	6.8	45.0	1.7	0.0	0.0	0.0	0.0
28.0	6.3	45.0	1.5	0.0	0.0	0.0	0.0
29.0	5.9	47.0	1.2	0.0	0.0	0.0	0.0
30.0	5.1	48.0	1.1	0.0	0.0	0.0	0.0
31.0	4.8	48.0	1.0	0.0	0.0	0.0	0.0
32.0	4.5	50.0	0.9	0.0	0.0	0.0	0.0
33.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0
34.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0
35.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
36.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0
37.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0
38.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0

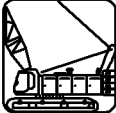


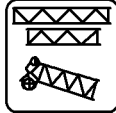





Fig. 644 Load chart

- |   |                              |   |  |
|---|------------------------------|---|--|
| 1 | Value of the smallest radius | 3 | Invalid values                           |
| 2 | Load chart version           | 4 | Main boom angle Alpha or jib angle Gamma |



### Note

- ▶ The value of the smallest radius is specified exactly. All other values are rounded to whole numbers.
- ▶ Invalid values are replaced in the table with a 0
- ▶ **Gamma** is the calculated difference in angle between main boom angle **Alpha** and jib angle **Beta**.

The value of the smallest radius is specified exactly. All other values are rounded to whole numbers.

Invalid values are replaced in the table with a 0.0.

Gamma is the calculated difference in angle between main boom angle Alpha and jib angle Beta.

## 3.11 Cable remote control

The purpose of cable remote control is to control the counterweight hoisting cylinders and the pin connection cylinders used for hydraulically pinning the boom base section.



### Note

- ▶ Controlling the counterweight hoisting cylinders: Connect the cable remote control at the rearmost right-hand door on the uppercarriage.
- ▶ Controlling the pin connection cylinders for hydraulic pinning of the boom base section: Connect the cable remote control at the front right-hand door on the uppercarriage.

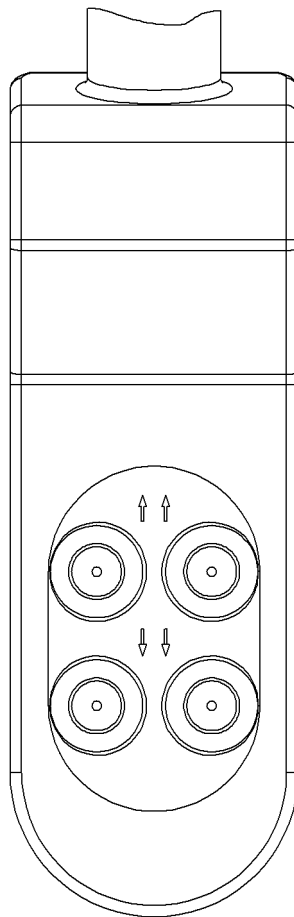
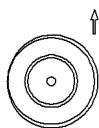
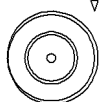


Fig. 645 Cable remote control



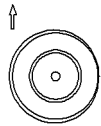
Extend the **left-hand counterweight hoisting cylinder** and **pin connection cylinder**

Extends the left-hand counterweight hoisting cylinder and pin connection cylinder.



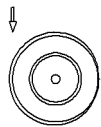
Retract the **left-hand counterweight hoisting cylinder** and **pin connection cylinder**

Retracts the left-hand counterweight hoisting cylinder and pin connection cylinder.



Extend the **right-hand counterweight hoisting cylinder** and **pin connection cylinder**

Extends the right-hand counterweight hoisting cylinder and pin connection cylinder.



Retract the **right-hand counterweight hoisting cylinder** and **pin connection cylinder**

Retracts the right-hand counterweight hoisting cylinder and pin connection cylinder.



### 3.12 Radio remote control\*

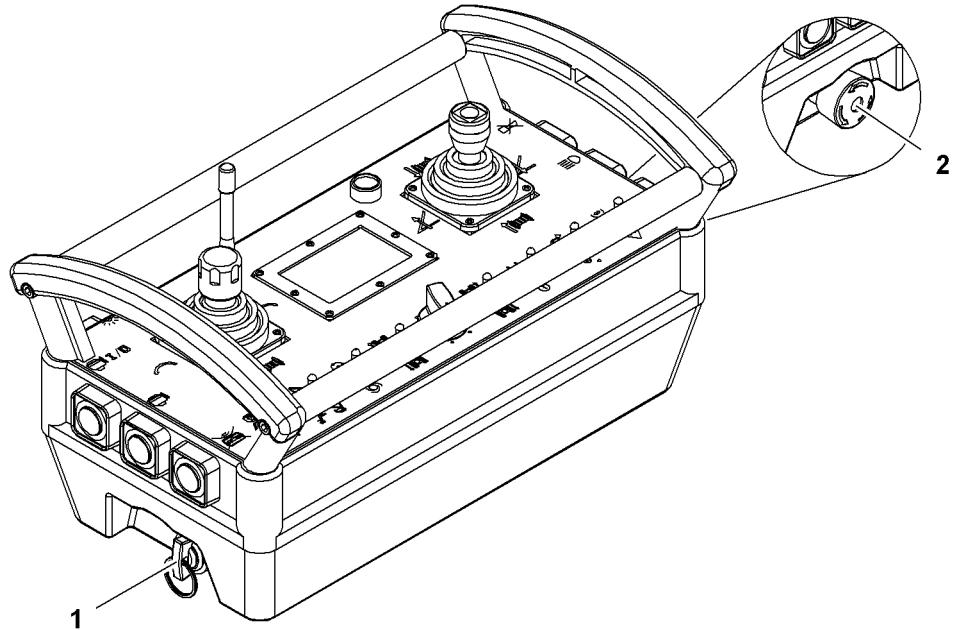


Fig. 650 Overview of radio remote control panel

1 Key switch

2 Emergency stop

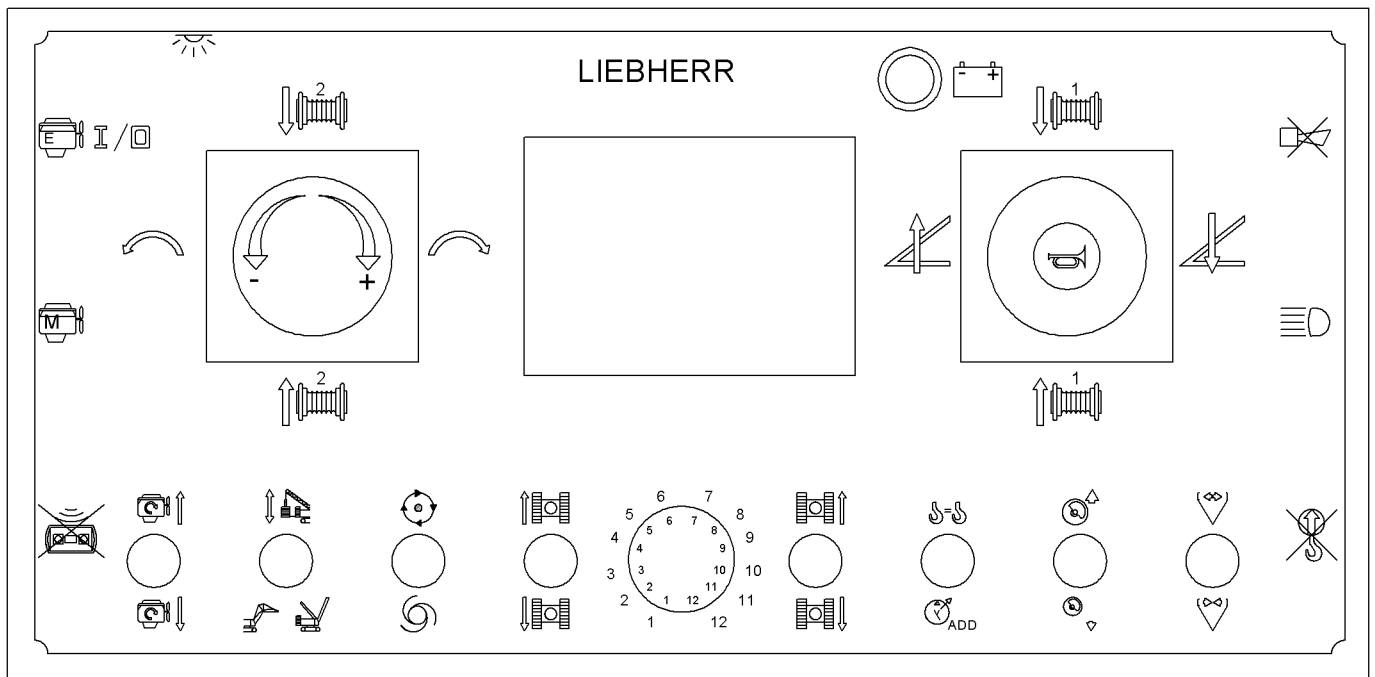
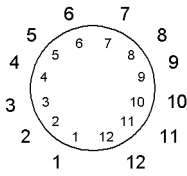


Fig. 651 Overview of radio remote control panel

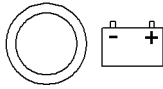
LWN// Auslieferung/2010-07-21/en

### 3.12.1 Operating elements



#### Mode screen rotary switch

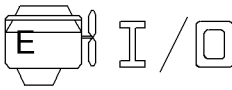
Switches between mode screen 1 and mode screen 2.  
(positions 3 - 12 not in use on LR)



#### LED battery charge condition

LED **green**: battery charge condition OK.  
LED **red**: battery charge condition low.

### Buttons on the side



#### Diesel engine

Switches the diesel engine on or off.



#### Save engine RPM

Saves the engine RPM.



#### Take/cede control

Take control from/cede control to the radio remote control.



#### Display backlight

Switches the display backlight on or off.



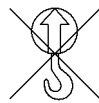
#### Floodlights on uppercarriage

Switches the floodlights on the uppercarriage on and off.



#### Acknowledge acoustic error message

Switches the acoustic error message on or off.



#### Bypass the load moment limiter (LML)

Bypasses the load moment limiter (LML) during crane operation.

### Left control lever



#### Lower winch 2

Lowers winch 2.



#### Raise winch 2

Raises winch 2.

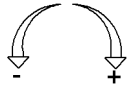


#### Swing to left

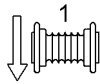
Rotates the swing to the left.

**Swing to right**

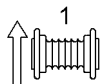
Rotates the swing to the right.

**Reduce/increase oil quantity**

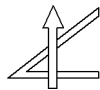
(not in use on LR)

**Right control lever****Lower winch 1**

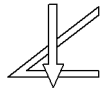
Lowers winch 1.

**Raise winch 1**

Raises winch 1.

**Lift boom**

Lifts the boom.

**Lower boom**

Lowers the boom.

**Horn**

Hoots the horn.

**Tumbler switch****Increase engine RPM**

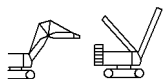
Increases the engine RPM.

**Decrease engine RPM**

Decreases the engine RPM.

**Extend/retract Derrick hoist cylinder preselect**

Applies extend/retract Derrick hoist cylinder function to left control lever (forwards/back).

**Switch between jib luffing winch and Derrick winch**

Switches between jib luffing winch and Derrick winch.

**Slewing free-wheel**

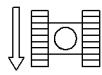
Switches free swing on or off.

**Automatic mode preselect**

(not in use on LR)

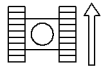
**Left-hand crawler forwards**

Moves the left crawler forwards.



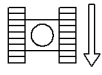
### Left-hand crawler back

Moves the left crawler backwards.



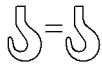
### Right-hand crawler forwards

Moves the right crawler forwards.



### Right-hand crawler back

Moves the right crawler backwards.



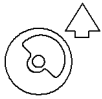
### Winch synchronisation

Switches winch synchronisation on or off.



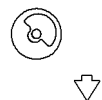
### Additional hydraulics

(not in use on LR)



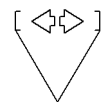
### Extend eccentric

(not in use on LR)



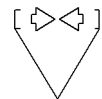
### Retract eccentric

(not in use on LR)



### Open clamp

(not in use on LR)



### Close clamp

(not in use on LR)

## 3.12.2 battery charger

The present operating status of the battery charger is shown using 3 LEDs:

- LED **red**: battery defective
- LED **yellow**: battery is being charged
- LED **green**: battery is charged

## 3.12.3 Screen pages

The *Mode screen* rotary switch in the middle of the control panel on the radio remote control is used to toggle between mode screen 1 and mode screen 2.

## Mode screen 1

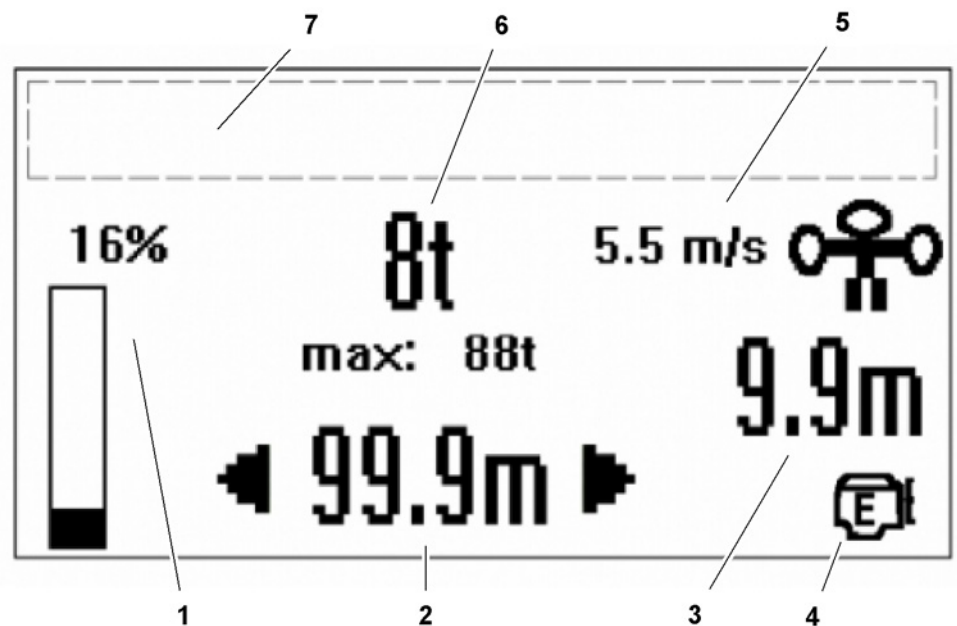


Fig. 687 Radio remote control mode screen 1

- |   |   |   |  |
|---|---|---|--|
| 1 | Current load moment utilisation in %                              | 5 | Current wind speed                     |
| 2 | Current outreach  | 6 | Current and maximum lifting capacities |
| 3 | Current lifting height  | 7 | Warnings/symbols display field         |
| 4 | Diesel engine ON (only appears when the diesel engine is running) |   |  |

## Mode screen 2

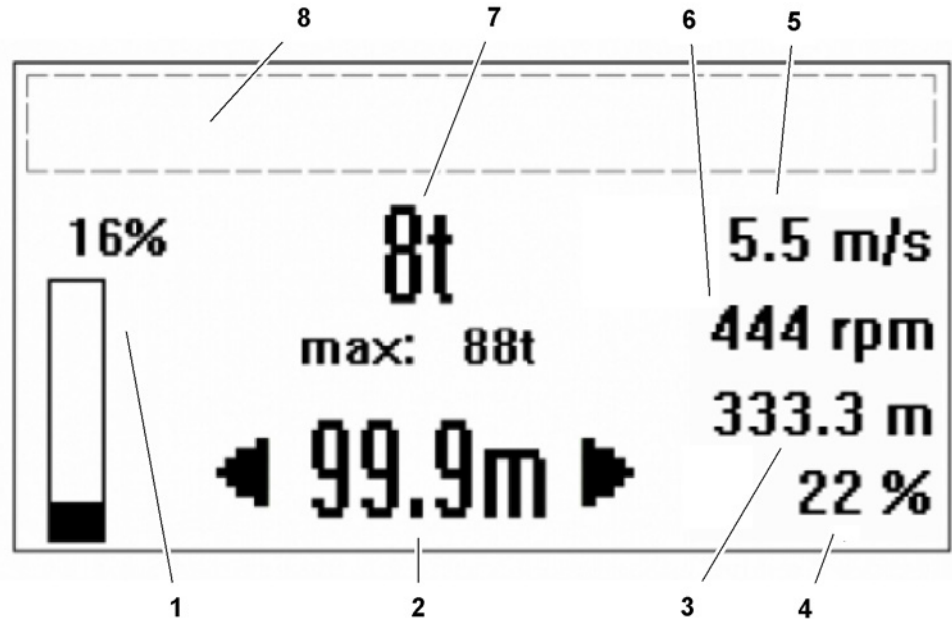


Fig. 688 Radio remote control mode screen 2

- |   |                                      |   |  |
|---|--------------------------------------|---|--|
| 1 | Current load moment utilisation in % | 5 | Current wind speed                     |
| 2 | Current outreach                     | 6 | Current engine RPM                     |
| 3 | Current rope length                  | 7 | Current and maximum lifting capacities |
| 4 | Current tank content in %            | 8 | Warnings/symbols display field         |

## Warnings/symbols display field



### Caution

Load moment utilisation is between 90 % and 100 %.



### Stop

Load moment utilisation exceeding 100 %.



### Winch synchronisation

Preselects winch synchronisation.



### Drive is limited

One direction of movement is initiated when several limit switches trip, if it is blocked by one activated limit switch.



### Diesel tank empty











### Charging indicator



### Hydraulic oil level too low



### Lubricating oil pressure too low

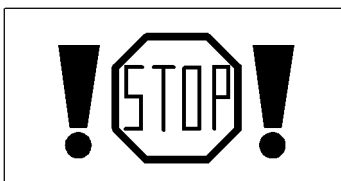
	<b>Boom winch selected</b>
	<b>Jib luffing winch selected</b>
<b>AUX</b>	<b>Auxiliary winch selected</b>
	<b>Suspended counterweight adjustment selected</b>
	<b>Load moment limiter (LML) bypassed</b>
	<b>Free swing selected</b>
	<b>Preheating</b>
	<b>Control ceded</b>
	<b>Error/fault</b>

The appropriate error is displayed on the monitor in the cab.

An additional acoustic warning tone is sounded if certain symbols/warnings are displayed at an interval of:

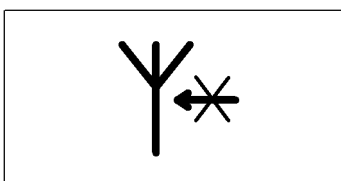
- **1.0 second tone, 1.0 second pause:** The display shows an error or (e.g.) the limit switch symbol.
- **0.3 second tone, 0.7 second pause:** Caution
- **0.7 second tone, 0.3 second pause:** Stop

## Screen pages when establishing a connection/connection interruption



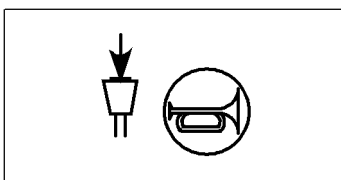
### Stop (assembly mode/free-fall operation)

The following appears on the radio remote control display when assembly mode or free-fall operation has been selected on the machine:



### Radio link established / error

Connection between radio transmitter (control panel) and radio receiver (receiver module on the machine) established, or faulty.

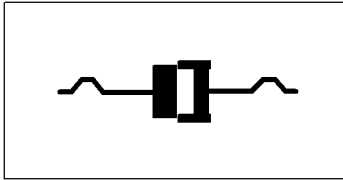


### Confirmation that link is established

Press the *Horn* button to attempt to establish a connection between the radio receiver (receiver module on the machine) and the machine control.

The symbol also appears when a connection is re-established following:

- an disconnection for more than 8 seconds.
- an emergency cut-off.



### Establishing machine control connection/ error

Connection established between radio receiver (receiver module in the machine) and machine control, or connection is faulty.



### 3.13 Emergency operation controller\*

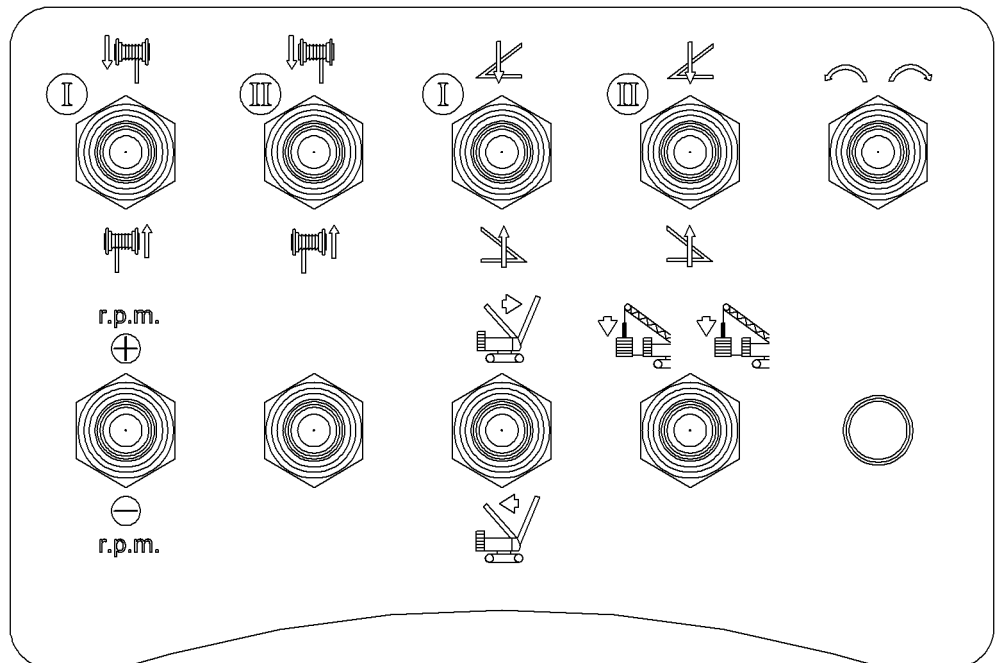
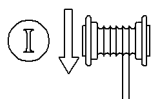
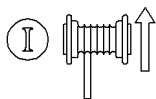


Fig. 710 Overview of emergency operation control panel

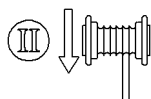
The buttons on the control panel are touch-sensitive, meaning that a function is performed for as long as the button is pressed. The engine RPM control button is a maintained-contact button.



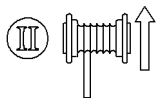
**Lower winch 1**  
Lowers winch 1.



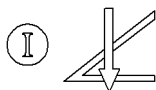
**Raise winch 1**  
Raises winch 1.



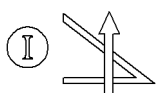
**Lower winch 2**  
Lowers winch 2.



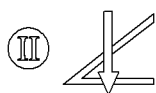
**Raise winch 2**  
Raises winch 2.



**Lower boom winch**  
Lowers the main boom.  
In derrick operation, lowers the derrick boom.

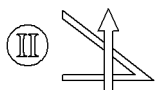


**Raise boom winch**  
Raises the main boom.  
In derrick operation, raises the derrick boom.



### Lower jib

Lowers the jib.



### Raise jib

Raises the jib.



### Swing to left

Rotates the swing to the left.



### Swing to right

Rotates the swing to the right.

r.p.m.



### Increase engine RPM

Increases the engine RPM.



### Decrease engine RPM

r.p.m.

Decreases the engine RPM.



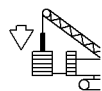
### Lower derrick winch

In derrick operation, lowers the main boom.



### Raise derrick winch

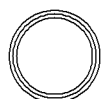
In derrick operation, raises the main boom.



### Extend derrick hoist cylinder

Lowers the suspended counterweight.

Raising the suspended counterweight is not possible during emergency operation.



### Status display (LED)

The status display (LED) lights up when the ignition is switched on.

## 3.14 Hydraulic cab elevation\*

### 3.14.1 Operating elements in the cab

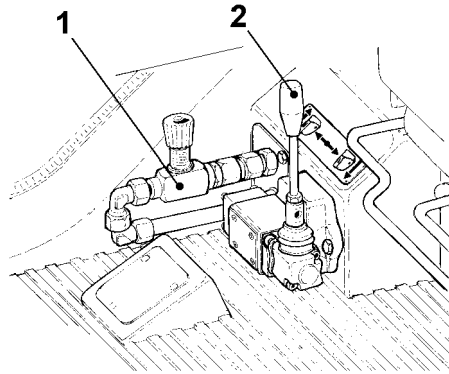
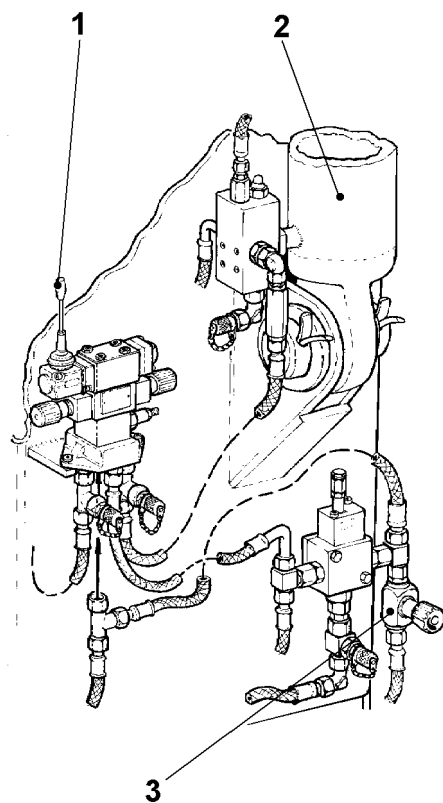


Fig. 727 Operating elements in the cab

- |   |                                      |   |                             |
|---|--------------------------------------|---|-----------------------------|
| 1 | Emergency lowering valve for the cab | 2 | Adjusting lever for the cab |
|---|--------------------------------------|---|-----------------------------|

### 3.14.2 Operating elements on the mast



*Fig. 728 Operating elements on the mast*

- |   |                                    |   |                                      |
|---|------------------------------------|---|--------------------------------------|
| 1 | Adjusting lever for the leader     | 3 | Emergency lowering valve for the cab |
| 2 | Adjustment cylinder for the leader |   |                                      |

### 3.14.3 Limit switches

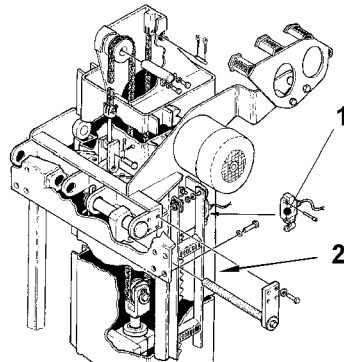


Fig. 729 Limit switches

1 Limit switches

2 Limit switches

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.

## 3.15 Auxiliary heating\*

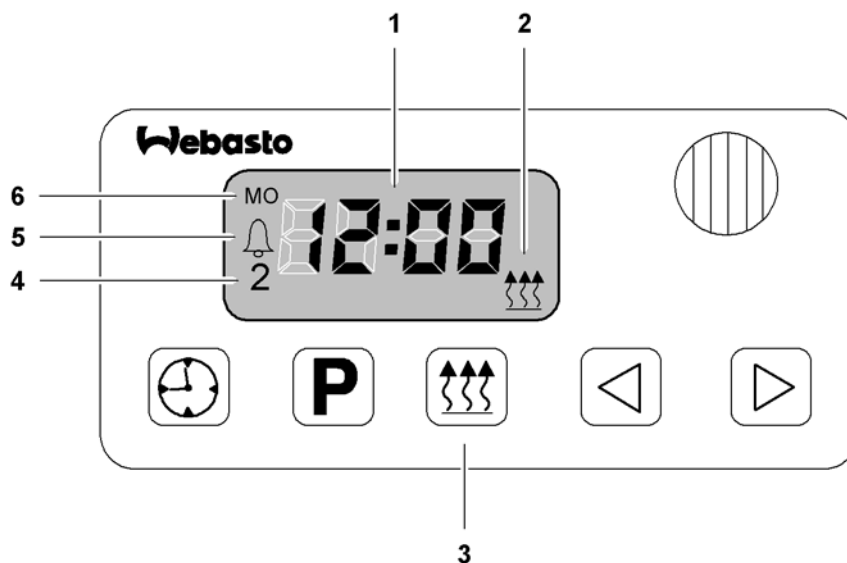


Fig. 730 Operating element "Standard clock with alarm"

- |   |                |   |                    |
|---|----------------|---|--------------------|
| 1 | Time display   | 4 | Code number memory |
| 2 | Status display | 5 | Alarm indicator    |
| 3 | Buttons        | 6 | Day                |



**Time**



**Program selection**



**Immediate heating**



**Back**



**Next**

## 3.16 Video surveillance system\*

### 3.16.1 Monitor

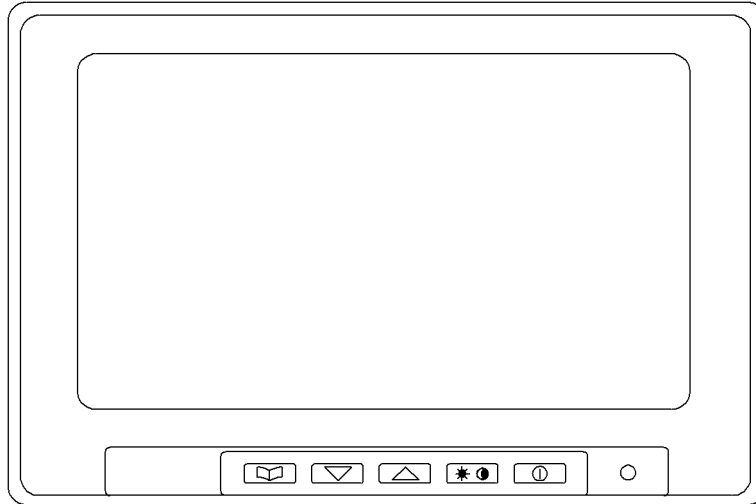


Fig. 736 Video surveillance system monitor



#### Calling up and switching the menu

Switches between colour, brightness, contrast, language and standard (resets to factory settings).



#### Minus

Reduces the value.



#### Plus

Increases the value.



#### Day/night mode

Switches the monitor between day and night mode



#### Monitor

Switches the monitor on or off.

### 3.16.2 Control panel

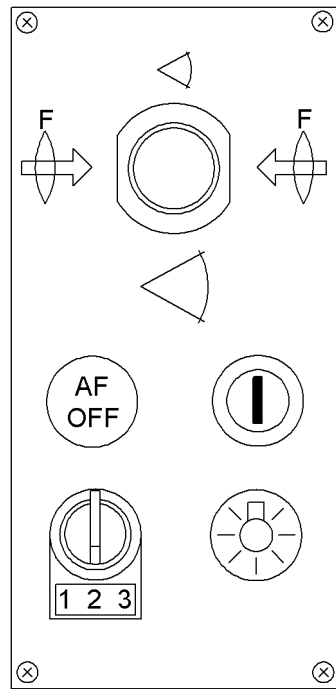


Fig. 742 Video surveillance system control panel



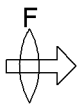
**Zoom in**

Zooms the camera image in.



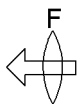
**Zoom out**

Zooms the camera image out.



**Manual focus**

Focusses the camera image.



**Manual focus**

Focusses the camera image.



**Auto-focus**

Switches the camera auto-focus mode on and off.



**Video surveillance system**

Switches the video surveillance system on and off.



**Gain**

Switches the camera gain on and off.



**Camera selector switch**

Switches between the cameras.



## 3.17 Central lubrication\*

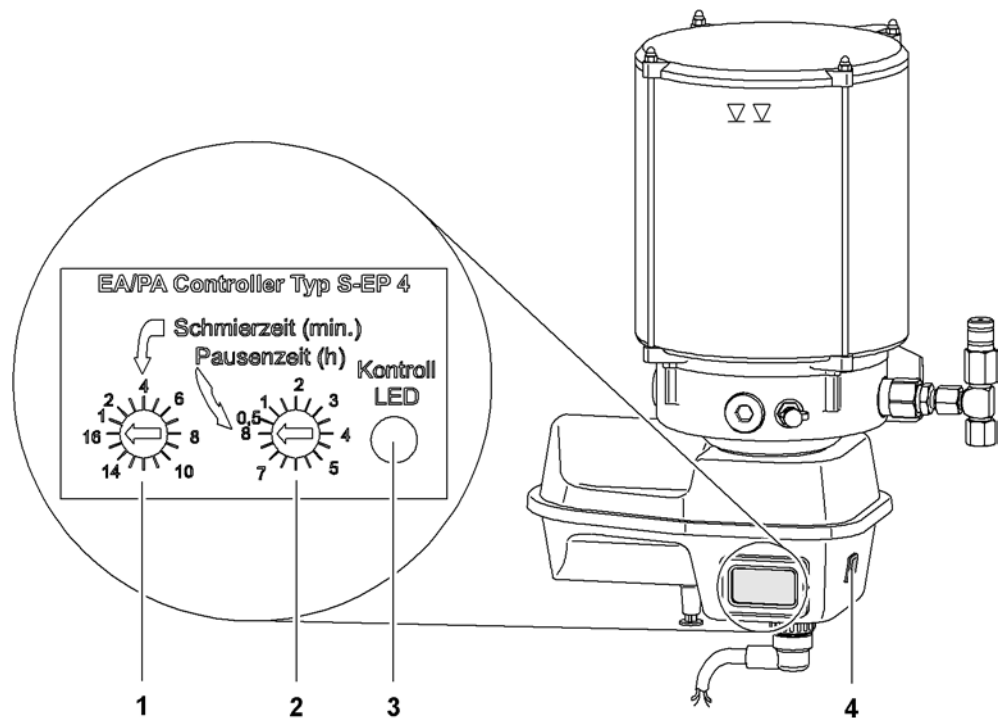
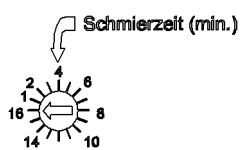


Fig. 751 Central lubrication operating elements

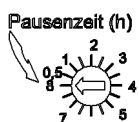
- |   |  |   |                            |
|---|--|---|----------------------------|
| 1 | Set lubrication time rotary control knob | 3 | Yellow indicator light     |
| 2 | Set pause time rotary control knob       | 4 | Interim lubrication button |

The control unit for the swing ring tooth flanks lubrication pump is located in switch cabinet X1.



### Set lubrication time

Sets the lubrication interval.



### Set pause time

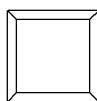
Sets the pause interval.

Kontroll  
LED



### 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

Performs an interim lubrication.

## 3.18 Floodlights on boom\*



### **Boom base section floodlights**

Switches the floodlights on the boom base section on and off.



### **Move the floodlights upwards**

Moves the boom base section floodlights higher.



### **Move the floodlights downwards**

Moves the boom base section floodlights lower.



### **Boom floodlight**

Switches all floodlights on the booms on and off.





# 4 Operation

The following pages describe the operation of the machine. The basic operating instructions at the start of the chapter are of vital importance for safe working and the service life of the machine.

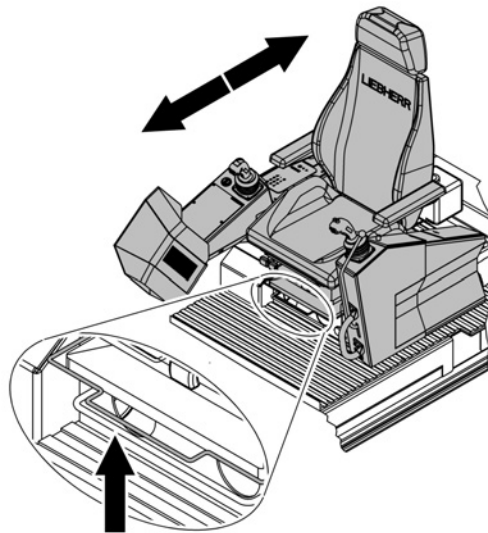
The chapter takes you through the various procedures and describes operational steps, such as e.g.:

- Safe commissioning of the machine.
- Operation of the main functions and auxiliary functions
- Safe parking of the machine.

## 4.1 Monitor, control panels

### 4.1.1 Adjusting the monitor and control panels

Make sure that the safety lever is folded up.



*Fig. 760 Adjusting the monitor and control panels*

- ▶ Lift the lever.
- ▶ Adjust the driver's seat together with the monitor and the control panels until they are in the desired position.
- ▶ Release lever.
  - ▷ The driver's seat locks automatically in place.

## 4.1.2 Adjusting control panel X25

Make sure that the safety lever is folded up.

- ▶ Adjust the position using the clamping levers.

## 4.2 Operator's seat

### 4.2.1 Adjusting the driver's seat



#### CAUTION

Incorrect seat position and incorrect movement sequences!

- ▶ Adjust the seat position and the position of the operating elements so that the controls are easy to see and reach.

When the driver's seat is correctly adjusted and properly used, it conforms to the requirements of ISO 2631-1 for protection against whole-body vibration.

Make sure that the safety lever is folded up.

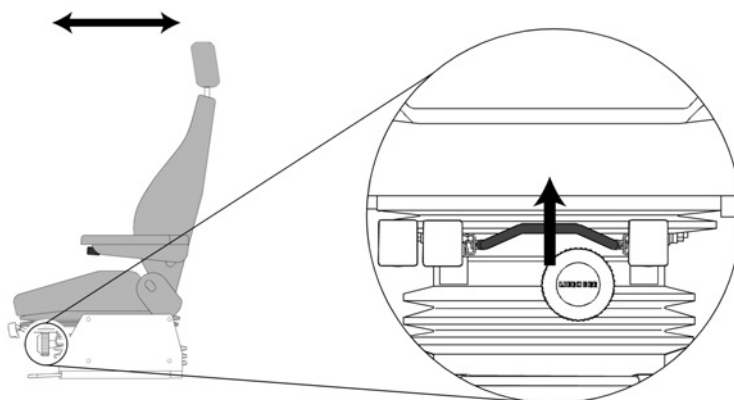


Fig. 761 Adjusting the driver's seat horizontally

- ▶ To adjust the driver's seat horizontally: press lever upwards.

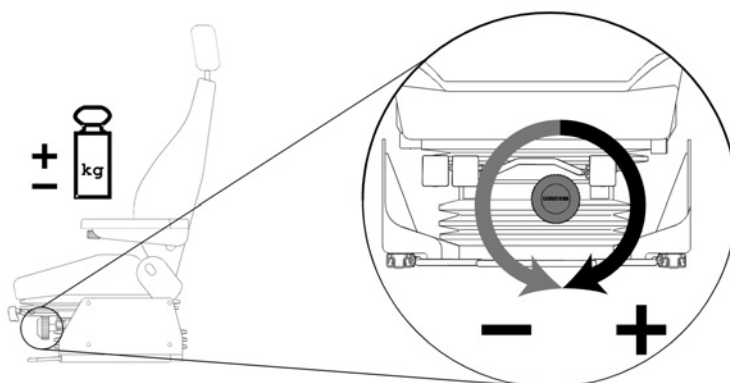
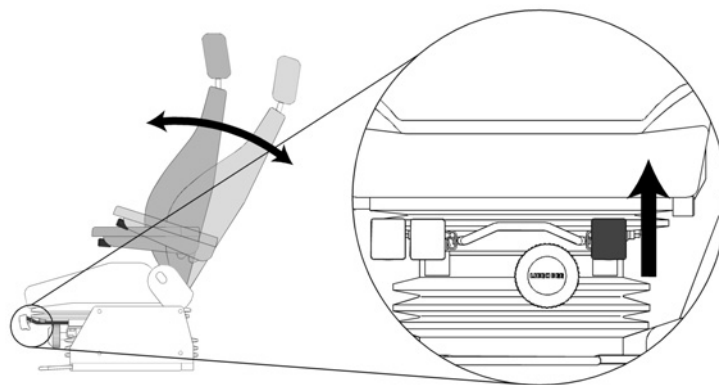


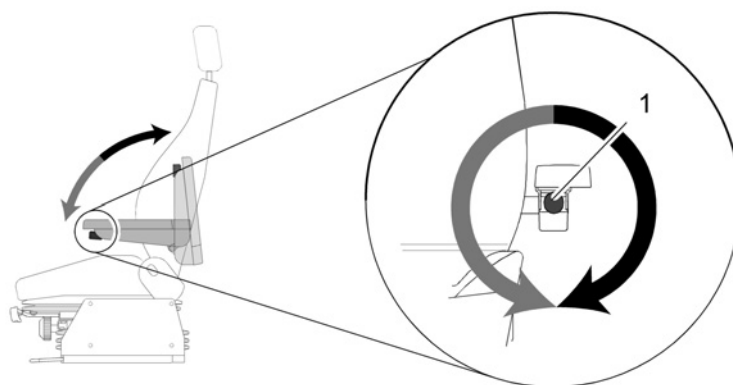
Fig. 762 Adjusting the seat suspension

- ▶ To adjust the seat suspension: turn the adjustment wheel.
  - ▷ The seat suspension is suited to your weight.



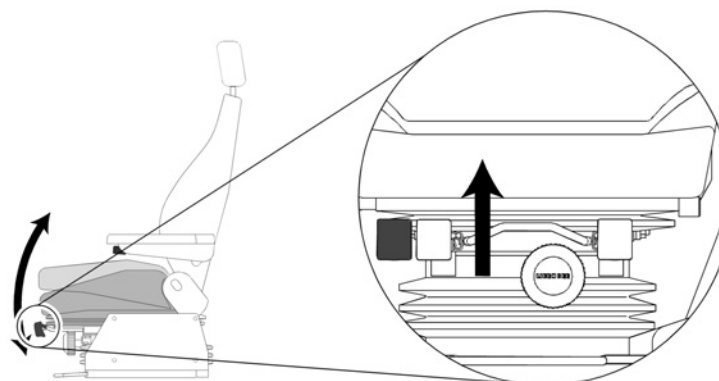
*Fig. 763 Adjusting the seat back*

- ▶ To adjust the seat back: press lever upwards.
- ▶ Press your back gently against the seat back.
  - ▷ The seat back inclines backwards.
- ▶ Press lever downwards.
  - ▷ The seat back automatically tilts forwards.



*Fig. 764 Adjusting the arm rest*

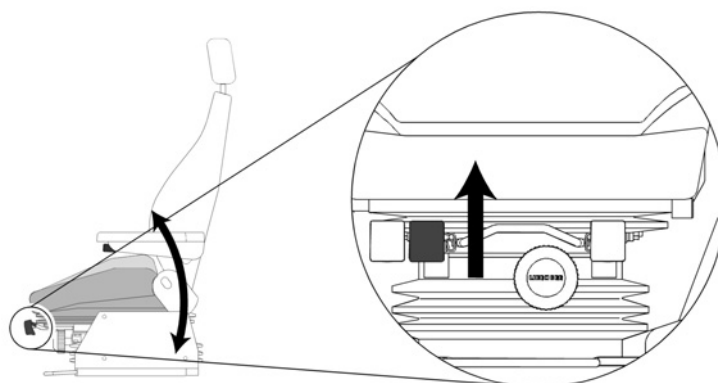
- ▶ To adjust the arm rest: twist or untwist the adjusting knobs.



*Fig. 765 Adjusting the height of the front of the seat*



- ▶ To adjust the height of the front of the seat: press lever upwards.
  - ▷ To adjust the height of the front of the seat, press on it then release the pressure.



*Fig. 766 Adjusting the height of the rear of the seat*

- ▶ To adjust the height of the rear of the seat: press lever upwards.
  - ▷ Pressing down on and relieving the back seating area adjusts its height.

## 4.3 Lighting

### 4.3.1 Operating the floodlights on the uppercarriage

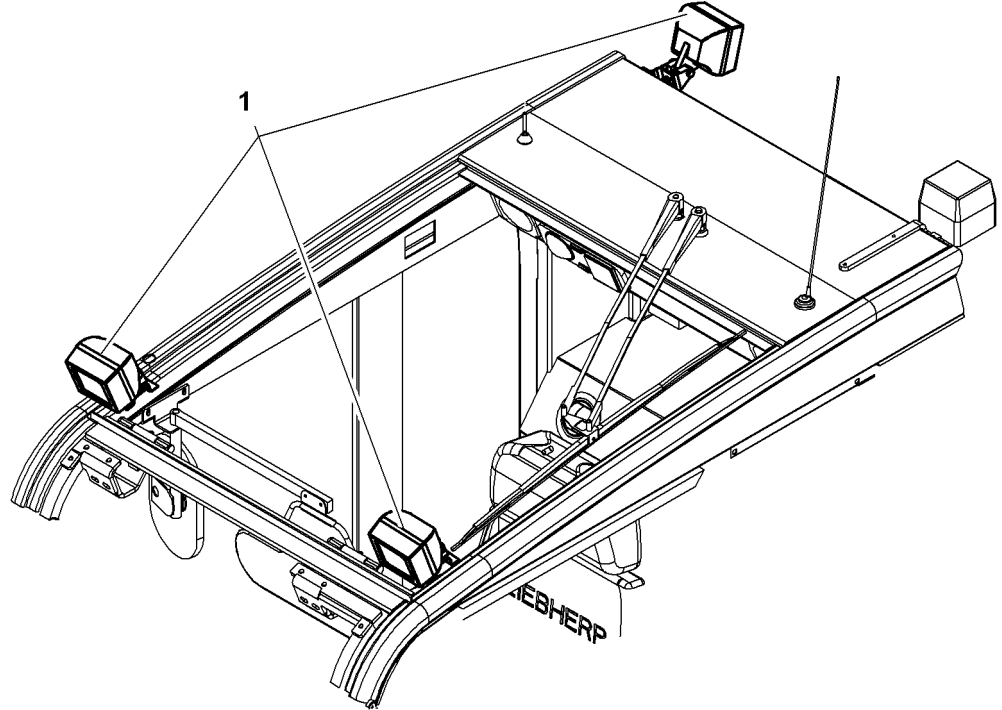


Fig. 767 Operating the floodlights on the uppercarriage

#### 1 Floodlights on uppercarriage



- ▶ Press the *Floodlights on uppercarriage* button on control panel X11.
  - ▷ Floodlights on uppercarriage 1 light up.

### 4.3.2 Operating the floodlights on the boom



#### CAUTION

Lamps are extremely bright and very hot!  
Can damage eyes and cause burns.

- ▶ Do not look directly into the light emitted by the floodlights.
- ▶ Do not touch the hot glass in front of the floodlight.

#### Operating the floodlights on the boom base section



- ▶ Press the *Boom base section floodlights* button.
  - ▷ The floodlights on the boom base section light up.



- ▶ Press the *Move the floodlights upwards* button.
- ▷ The floodlights on the boom base section move upwards.



- ▶ Press the *Move the floodlights down* button.
- ▷ The floodlights on the boom base section move down.

#### Operating all the floodlights on the boom



- ▶ Press the *Boom floodlights* button.
- ▷ All the floodlights on the boom light up.

### 4.3.3 Operating the cab lighting

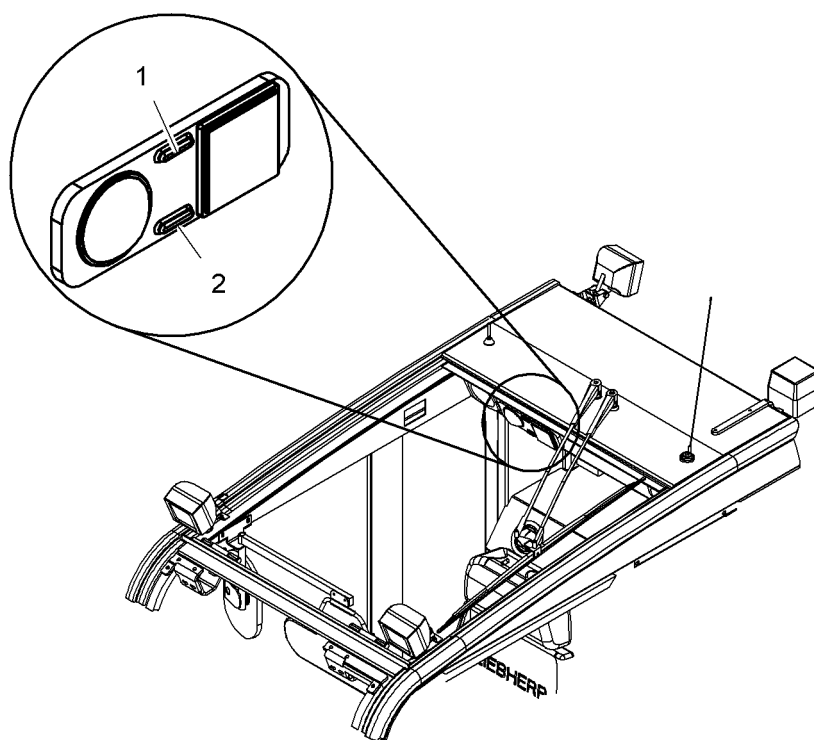


Fig. 773 Operating the cab lighting

The *interior lighting* is either set to “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.

### 4.3.4 Operating the engine compartment lighting



- ▶ Press the *Engine compartment lighting* button on control panel X11.
- ▷ The work lights in the engine compartment light up.

## 4.4 Windscreen wiper system

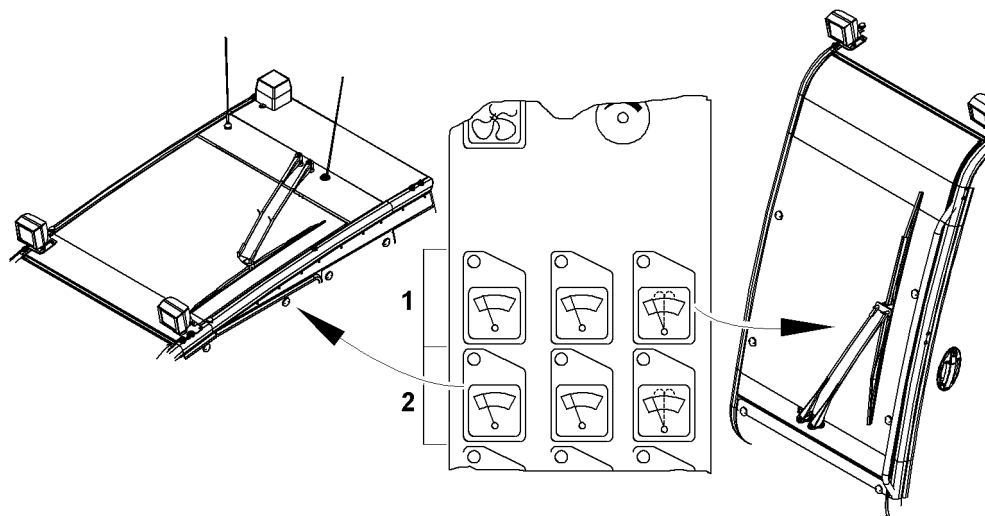
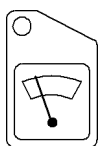


Fig. 775 Windscreen wiper system

1 Front windscreen wiper

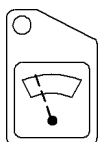
2 Roof window wiper

### 4.4.1 Operating the windscreen wipers



► Press the *Windscreen wiper* button on control panel X11.

or



Press the *Intermittent windscreen wiper* button on control panel X11.

► The windscreen wipers can operate in either continuous or intermittent mode.

## 4.4.2 Operating the windscreen washer system



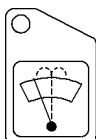
### WARNING

Flammable fluid is placed in the windscreen washer bottle!  
Risk of fire, explosion.

- ▶ The windscreen washer bottle must be filled with non-flammable fluids only.

Ensure that the following conditions are satisfied:

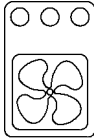
- Windscreen cleaning fluid is topped up.
- At low ambient temperatures: sufficient antifreeze for windscreen wiper system has been added.



- ▶ Press the *Windscreen washer system* button on control panel X11.
  - ▷ The windscreen wiper runs intermittently and the windscreen cleaning fluid is sprayed on.

## 4.5 Ventilation, heating and air-conditioning system\*

### 4.5.1 Operating the ventilation



- ▶ Press the *Heating/air conditioning fan speed* button on control panel X11.
  - ▷ The fan blows.

The LED on the button displays the selected speed. Three different fan speeds are possible.

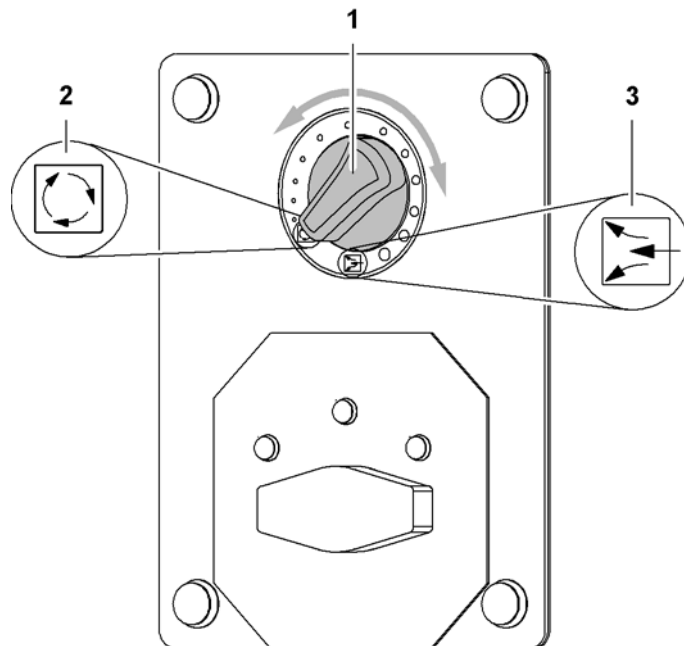


Fig. 780 Operate the Recirculated air/fresh air switch

- 1 *Recirculated air/fresh air* switch
- 2 "Recirculated air" position
- 3 "Fresh air" position

- ▶ Set *Recirculated air/fresh air* 1 switch to "Recirculated air" 2 position.
  - ▷ The air is circulated around the cab.
- ▶ Set *Recirculated air/fresh air* 1 switch to "Fresh air" 3 position.
  - ▷ The fan circulates fresh air from outside around the cab.
- ▶ Adjust the air outlet vents to suit.

## 4.5.2 Using the heater

Ensure that the following conditions are satisfied:

- Diesel engine is switched on.
- Ventilation is switched on.



- ▶ Turn the *Heating temperature/air conditioning* potentiometer on the X11 control panel to the right (red zone).
  - ▷ The heating is turned up.
- ▶ Turn the *Heating temperature/air conditioning* potentiometer on the X11 control panel to the left (blue zone).
  - ▷ The heating is turned down.



### Note

To rapidly heat the cabin:

- ▶ Turn the *Heating temperature/air conditioning* potentiometer all the way to the right (red zone).
- ▶ Press the *Heating/air conditioning fan speed* button several times until the third LED on the button lights up.
- ▶ Close sliding doors and the front windscreen.

## 4.5.3 Operating the air conditioning system



### WARNING

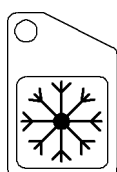
Leaks in the air conditioning coolant circuit in an enclosed space!  
Risk of suffocation.

If there is a high refrigerant concentration in the air:

- ▶ Immediately leave the closed room (cab).

Ensure that the following conditions are satisfied:

- Diesel engine is switched on.
- Ventilation is switched on.



- ▶ Press the *air-conditioning* button on control panel X11.
  - ▷ The air conditioning is switched on.



### Note

To quickly demist and defrost the windows:

- ▶ Set *Recirculated air/fresh air* switch to "Recirculated air".
- ▶ Turn the *Heating temperature/air conditioning* potentiometer all the way to the right (red zone).
- ▶ Press the *Heating/air conditioning fan speed* button several times until the third LED on the button lights up.
- ▶ Position the air outlet vents toward the windows.

## 4.6 Auxiliary heating\*

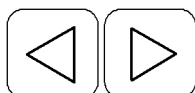
A heating start time can be preset within a 7 day period using the standard clock. Three start times may be programmed, however only one can be activated.

The standard clock also includes 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 operational.

All symbols on the the display flash after the power supply has been connected. The day and time must be set.

### Operation



The clock has been designed so that all of the flashing symbols can be set using the *Back* and *Next* buttons. The displayed time is saved if no button is pressed for a period of 5 seconds. The time-scrolling is accelerated if either the *Back* or *Next* buttons are pressed for longer than 2 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.

### 4.6.1 Switching on the auxiliary heating

#### Switching on the auxiliary heating: manually



- ▶ Press the *Immediate heating* button.
  - ▷ If ignition is off: the auxiliary heating switches on for the preset operating time.
  - ▷ If ignition is on: auxiliary heating switches on (continuous operation mode).

#### Switching on the auxiliary heating: automatically

- ▶ Program the heating start information ([For more information see: 4.6.5 Programming the heating start information, page 417](#)).

### 4.6.2 Switching off the auxiliary heating

#### Switching off the auxiliary heating: manually



- ▶ Press the *Immediate heating* button.

#### Switching off the auxiliary heating: automatically

- ▶ Program the heating operating time ([For more information see: 4.6.7 Programming the operating time, page 418](#)).

#### Switching off the auxiliary heating using the remaining operating time

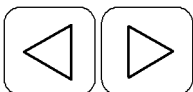
- ▶ Set the remaining operating time ([For more information see: 4.6.8 Setting the remaining operating time, page 418](#)).



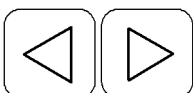
### 4.6.3 Setting the time/day



- ▶ Press the *Time* button for longer than 2 seconds.
  - ▷ The time flashes



- ▶ Set the time using the *Back* and *Next* buttons.
- ▶ Wait 5 seconds.
  - ▷ Time is saved.
  - ▷ Day flashes.



- ▶ Set the day using the *Back* and *Next* buttons.
- ▶ Wait 5 seconds.
  - ▷ Day is saved.

### 4.6.4 Displaying the time

The time and day is always on display when the ignition is switched on.



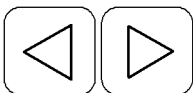
When the ignition is switched off:

- ▶ Press the *Time* button.
  - ▷ The time and day are displayed for 5 seconds.

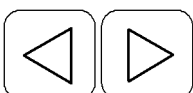
### 4.6.5 Programming the heating start information



- ▶ Press the *Program selection* button.
  - ▷ The memory code number flashes.



- ▶ Set the heating start information using the *Back* and *Next* buttons.
- ▶ Wait 5 seconds.
  - ▷ Time is saved.
  - ▷ Day flashes.



- ▶ Program the day using the *Back* and *Next* buttons.
- ▶ Wait 5 seconds.
  - ▷ Day is saved.
  - ▷ The memory code number remains on the display.
  - ▷ The auxiliary heating system is in preset mode and switches the auxiliary heater on at the preset time.

Preset time 2 or 3 can be programmed by repeatedly pressing the *Program selection* button.



- ▶ Press the *Program selection* button until the desired screen is displayed and program the preset times for memories 2 and 3.

### 4.6.6 Displaying/deleting preset times

#### Displaying preset times



- ▶ Repeatedly press the *Program selection* button until the desired memory is displayed.
  - ▷ Preset time is displayed.

## Deleting preset times



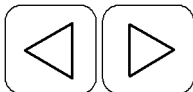
- ▶ Repeatedly press the *Program selection* button until no memories are displayed any more.
  - ▷ Time is displayed.
  - ▷ Preset times are deleted.

## 4.6.7 Programming the operating time

Ensure that the heater has been turned off.



- ▶ Press the *Back* button for 3 seconds.
  - ▷ The operating time flashes.



- ▶ Program the operating time to between 1 and 120 minutes using the *Back* or *Next* buttons.
- ▶ Wait 5 seconds.
  - ▷ The operating time is saved.

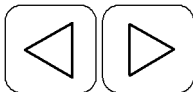
## 4.6.8 Setting the remaining operating time

Ensure that the following conditions are satisfied:

- Ignition is switched off.
- Heater is switched on.



- ▶ Press the *Back* button.
  - ▷ Remaining operating time flashes.



- ▶ Program the remaining operating time to between 1 and 120 minutes using the *Back* and *Next* buttons.
- ▶ Wait 5 seconds.
  - ▷ Remaining operating time is saved.

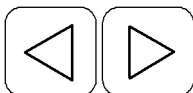
## 4.6.9 Setting the alarm

The alarm is not linked to any specific day.

The alarm switches itself off after 5 minutes, or if a button is pressed.



- ▶ Press the *Program selection* button until the bell symbol is displayed.



- ▶ Set the desired alarm time using the *Back* and *Next* buttons.

## 4.6.10 Displaying/deleting alarm time

### Displaying the alarm time



- ▶ Press the *Program selection* button until the bell symbol is displayed.
  - ▷ Alarm time is displayed.

**Deleting alarm time**

- ▶ Press the *Program selection* button until the bell symbol is no longer displayed.
- ▷ The alarm time is deleted.

## 4.7 Additional cab equipment

### 4.7.1 Using the horn



Fig. 804 Left-hand multi-directional joystick

1 Horn button

- ▶ Press the *Horn 1* button.
  - ▷ The horn sounds.

### 4.7.2 Operating the safety lever



---

#### **WARNING**

Drives may still be moving after having been switched off!

- ▶ Fold safety lever up only when drives have stopped.
-

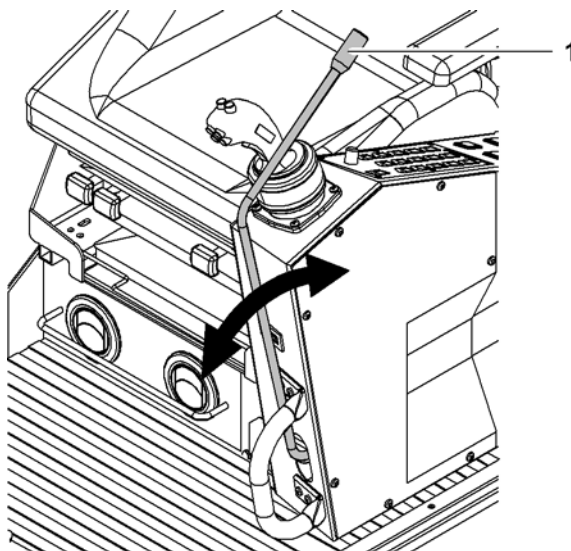


Fig. 805 Safety lever

**1** Safety lever

- ▶ Fold the safety lever **1** into the topmost position.
  - ▷ This blocks the foot pedals, control lever and buttons.

Fold the safety lever **1** up:

- when you leave the cab.
  - during breaks (even if you are still in the cab).
  - when reading the operating manual.
- ▶ To operate the machine push the safety lever **1** into the lowest position.

### 4.7.3 Operating the radio

Ensure that the ignition key is in position “1”. If not, the in-built radio **1** will not work.

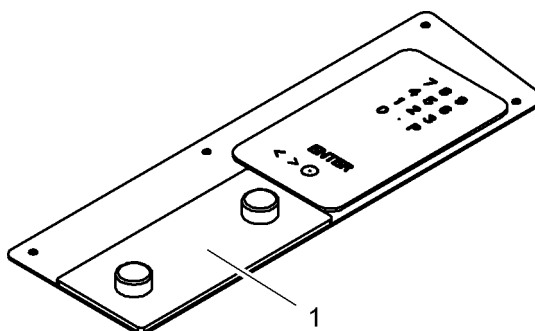


Fig. 806 Operating the radio

- ▶ Please refer to the radio **1** operating manual.

### 4.7.4 Using the ashtray



**WARNING**

Flammable waste is in the ashtray!  
Risk of fire, explosion.

- ▶ Do not place any flammable waste in the ashtray.

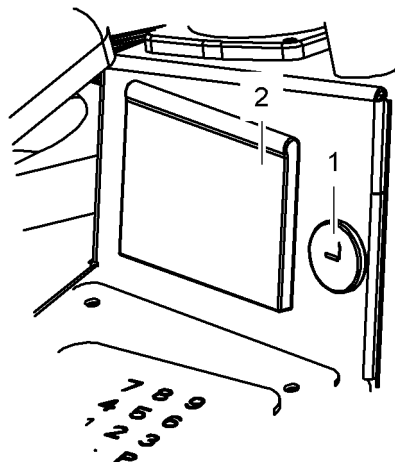


Fig. 807 Using the ashtray

- 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.

### 4.7.5 Using the cigarette lighter

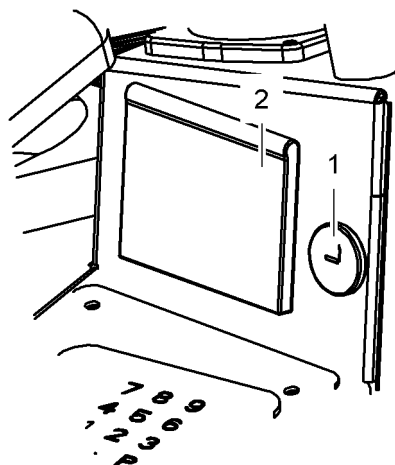


Fig. 808 Using the cigarette lighter

- 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.

## 4.8 Cab tilting device\*

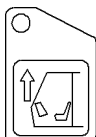


### WARNING

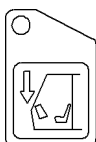
Danger if attempting to enter or leave the cab when tilted!  
Risk of falling.

- ▶ Only enter and leave the cab when it is in a horizontal or lowered position.

### 4.8.1 Operating the cab tilting device



- ▶ Press the *Tilt cab up* button on control panel X11.
  - ▷ The cab can tilt up to a maximum of 20 °.



- ▶ Press the *Tilt cab down* button on control panel X11.
  - ▷ The cab can tilt down to a maximum of 0 °.

## 4.9 Hydraulic cab elevation\*

### 4.9.1 Adjusting the operator's cab



**WARNING**

Hydraulic cab elevation system used incorrectly!

- ▶ Ensure that only the machine operator is in the cab.
- ▶ Check all the safety devices before adjusting the operator's cab.
- ▶ The machine must not be moved when the cab is elevated.



**WARNING**

Personnel or objects underneath the operator's cab when it is lowered!

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Ensure that there are no objects underneath the cab.
- ▶ Check the area under the operator's cab before lowering it.

Ensure that the following conditions are satisfied:

- Mast is erected and bolted.
- Emergency lowering valves are closed.
- The operator's cab is in the outside position.
- Chain guide is removed.
- The chain is bolted to the operator's cab.
- Crane operation is preselected.
- Diesel engine runs.
- Cylinder functions are preselected.
- The safety chain is attached.

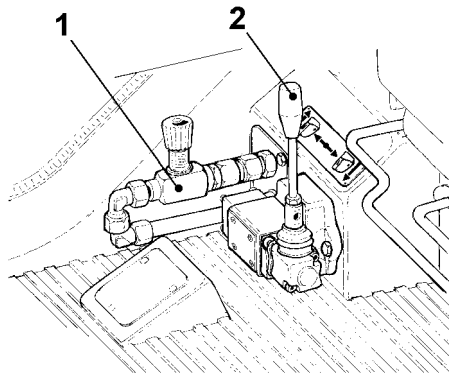


Fig. 811 Operating elements in the operator's cab

- |                            |                 |
|----------------------------|-----------------|
| 1 Emergency lowering valve | 2 Control lever |
|----------------------------|-----------------|

- ▶ Move control lever to the right.
  - ▷ The cab moves upwards.
- ▶ Move control lever to the left.
  - ▷ The cab moves downwards.



**Note**

If the operator's cab can no longer be adjusted using the control lever:

- ▶ The operator's cab can be lowered using the emergency lowering valve in the cab or on the mast.

**Abseiling device**

If the overrun brake is applied then the cab can no longer be adjusted. The machine operator in this instance must abseil down using the abseiling device.

If the operator's cab can no longer be adjusted:

- ▶ Attach the abseiling device to the attachment point on the cab.
- ▶ Abseil down as described on the lowering device.

## 4.10 Central lubrication\*

The central lubrication process of the swing ring bearing

- runs automatically according to the programmed lubrication and pause times
- starts when the diesel engine is switched on
- continues whilst the machine is in operation and the safety lever is in the 'down' position.

The central lubrication process of the swing ring tooth flanks

- runs automatically according to the programmed lubrication and pause times
- starts when the swing is actuated
- continues whilst the machine is in operation and the safety lever is in the 'down' position.

---

### NOTICE

Insufficient lubrication!

the swing ring bearings and/or swing ring tooth flanks may be damaged.

- ▶ Always remain within the lubrication and pause times set in the factory.
- 

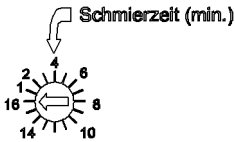
### NOTICE

Incorrect adjustment of the positive pressure relief valve!

Central lubrication system may be damaged.

- ▶ Retain manufacturer's settings on the positive pressure relief valve.
- 

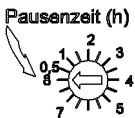
### 4.10.1 Set lubrication time



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.

### 4.10.2 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.

### 4.10.3 Interim lubrication



- ▶ Press the *Interim lubrication* button.

## 4.11 Inspections before daily commissioning



### **DANGER**

Operating a damaged machine!

- ▶ Do not use a machine that is damaged in any way.
- ▶ All defects and errors are to be reported to the relevant supervisor and to Liebherr after sales service.

Ensure that the following conditions are satisfied:

- All maintenance and inspection work has been carried out according to specifications.
- The operating manual has been read and understood.
- The operating manual is ready to hand in the cab.
- The current load chart manual needed to operate the machine is ready to hand in the cab.

### 4.11.1 Daily walk round

Before each daily start-up, an inspection of the machine must be carried out as follows:

- Check for any leaks (hydraulic, engine and gearbox oil, coolant, fuel).
- Check for any (deliberate) damage.
- Check for excess dirt on the machine.
- Check that all safety devices are in place.
- Check that all pins and screw fastenings are securely tightened.
- Check that ropes and pulleys do not show any sign of wear.
- Check that there are no obstacles in the work area.
- Check that the uppercarriage can be rotated as required.
- Check that there are no overhead power lines within range of the boom.
- Check that all safety signs are present and legible.
- Check that all fire extinguishers are present and ready for operation (seals intact, inspection dates still valid).
- Check that snow and ice have been removed from the cab, uppercarriage, boom walkways and also, where possible, from the booms.
- Check that there is good visibility from the cab. Check that all windows and mirrors are clean and properly adjusted.
- Check that the mechanical boom angle indicator on the boom base section moves freely.

### 4.11.2 Checking the engine oil level

- ▶ Check the engine oil level ([For more information see: 9.3.1 Checking the engine oil level, page 947](#)).

### 4.11.3 Checking the gearbox oil level of the distributor gear box

- ▶ Check the gearbox oil level of the distributor gear box ([For more information see: 9.8.1 Checking the gearbox oil level, page 962](#)).

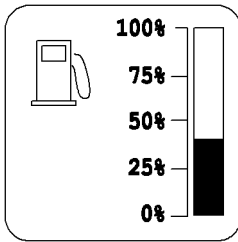
#### 4.11.4 Checking the coolant level

- ▶ Check the coolant level (For more information see: 9.7.1 Checking the coolant level, page 959)

#### 4.11.5 Checking the fuel pre-filter drain valve

- ▶ Check the fuel pre-filter drain valve (For more information see: 9.4.1 Checking the fuel pre-filter drain valve, page 950)

#### 4.11.6 Checking the fuel level



The fuel level indicator is shown on the monitor in the form of a bar display. The display begins to flash if the tank level falls below 15%.

- ▶ Check the fuel level.
- If the fuel level is not sufficient:
  - ▶ Top up with fuel.

#### 4.11.7 Checking the hydraulic oil level

- ▶ Check the level in the hydraulic oil tank using the sight glasses (For more information see: 9.19.1 Checking the level in the hydraulic oil tank using the sight glasses, page 990).

#### 4.11.8 Checking the hydraulic oil tank gate valve

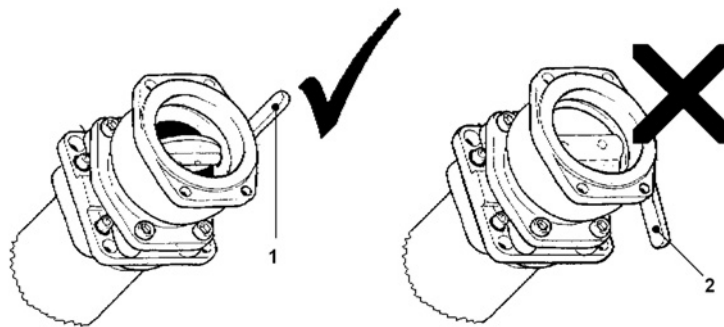


Fig. 816 Checking the hydraulic oil tank gate valve

1 Gate valve open

2 Gate valve closed

#### NOTICE

Gate valve is closed!  
Damage to the hydraulic system.

- ▶ Only operate the diesel engine when the gate valve is open.

- ▶ Check the hydraulic oil tank gate valve.

If the gate valve on the hydraulic oil tank is not open:

- ▶ Open the hydraulic oil tank shut-off valve.

## 4.11.9 Checking the battery main switch

---

### NOTICE

Battery main switch is switched off while the machine is being used!  
Damage to the electrical system.

- ▶ Only switch the battery main switch off when the machine is switched off.
- 

- ▶ Check the battery main switch.

If the battery main switch is not switched on:

- ▶ Switch on the battery main switch.

## 4.11.10 Checking the tilting-back support cylinder



The lamp on the *Extend tilting-back support cylinder* switch must light up.

- ▶ Check the *Extend tilting-back support cylinder* switch on control panel X12.

If the lamp on the *Extend tilting-back support cylinder* switch does not light up:

- ▶ Have the key for control panel X12 handed over by an authorised person.
- ▶ Unlock control panel X12.
- ▶ Press the *Extend tilting-back support cylinder* switch on control panel X12.
- ▶ Lock control panel X12 and remove the key.
- ▶ Ensure that the key is kept by an authorised person outside of the cab.

## 4.12 Daily start up

### 4.12.1 Adjusting the driver's seat

- ▶ Check the seat position and adjust if necessary.

### 4.12.2 Switching on the ignition

- ▶ Insert the ignition key in the ignition lock and turn to position 1.
  - ▷ The start-up display appears on the monitor. The setup screen appears once the Litronic control system is operational.

---

#### 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 after sales service.

### 4.12.3 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: 4.14 Programming the setup, page 438](#)).
- ▶ Confirm the setup.
  - ▷ The display changes to the operational screen for lifting operations.

## 4.12.4 Starting the diesel engine

---

### NOTICE

Starting aids containing ether!  
Damage to the diesel engine.

- ▶ Do not use any starting aids containing ether.
- 

Ensure that the following conditions are satisfied:

- Pre-start checks have been carried out.
- No one other than the machine operator is on the machine or within the danger zone around the machine.
- All emergency stops are unlocked.
- The Litronic control system is ready for operation.
- Operational screen for lifting operations is displayed on the monitor.
- Fuel is available.
- Flame start system is active.



Fig. 818 Ready to start symbol

The *Ready to start* symbol appears after the ignition is switched on. In low ambient temperatures, the diesel engine is automatically preheated by the flame start system and made ready to start. This produces the "Ready to start" status.

---

### NOTICE

Ignition process too long!  
Damage to the starter motor.

- ▶ Hold the ignition key in position 2 for a maximum of 10 seconds.
- 

- ▶ Turn ignition key briefly to position 2.

When the diesel engine has started:

- ▶ release the ignition key.
    - ▷ The *Ready to start* symbol on the monitor disappears.
- 

### Troubleshooting

The engine has not started?

- ▶ Wait for at least 20 seconds.
  - ▶ Repeat the start-up process.
-

## 4.12.5 Adjusting the engine RPM

### NOTICE

Warm-up period of the diesel engine too short!  
Damage to the diesel engine.

- ▶ The diesel engine should be allowed a short warm-up period before being subjected to full load.

The current engine RPM is shown in the operational screen for lifting operations and in the engine monitoring.

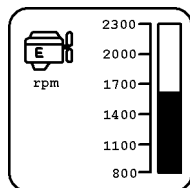


Fig. 819 Extract from operational screen for lifting operations

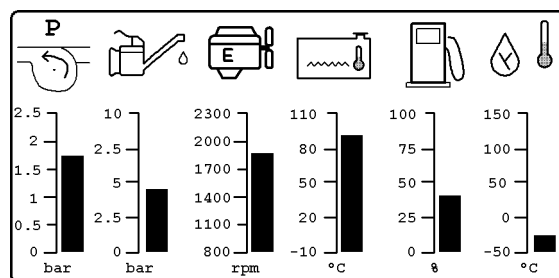


Fig. 820 engine monitoring



### Adjusting the engine RPM using the multi-directional joystick

Procedure on a machine with two multi-directional joysticks.





Fig. 822 Right-hand multi-directional joystick

- 1 Increase engine RPM button      2 Decrease engine RPM button

The *Increase engine RPM 1* and *Decrease engine RPM 2* buttons adjust the engine RPM from idle to maximum.

- ▶ Press the *Increase engine RPM 1* button.
  - ▷ The diesel engine speed increases.
- ▶ Press the *Decrease engine RPM 2* button.
  - ▷ The diesel engine speed decreases.



#### Adjusting the engine RPM using the double T-lever

Procedure on a machine with a multi-directional joystick and a double T-lever.

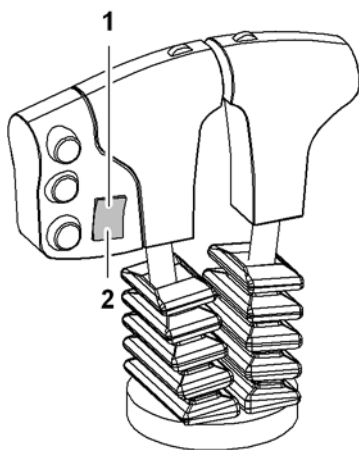


Fig. 824 Right-hand double T-lever

- 1 Increase engine RPM button      2 Decrease engine RPM button

The *Increase engine RPM 1* and *Decrease engine RPM 2* buttons adjust the engine RPM from idle to maximum.

- ▶ Press the *Increase engine RPM 1* button
  - ▷ The diesel engine speed increases.
- ▶ Press the *Decrease engine RPM 2* button.

- ▷ The diesel engine speed decreases.

**Adjusting engine RPM using foot pedal**

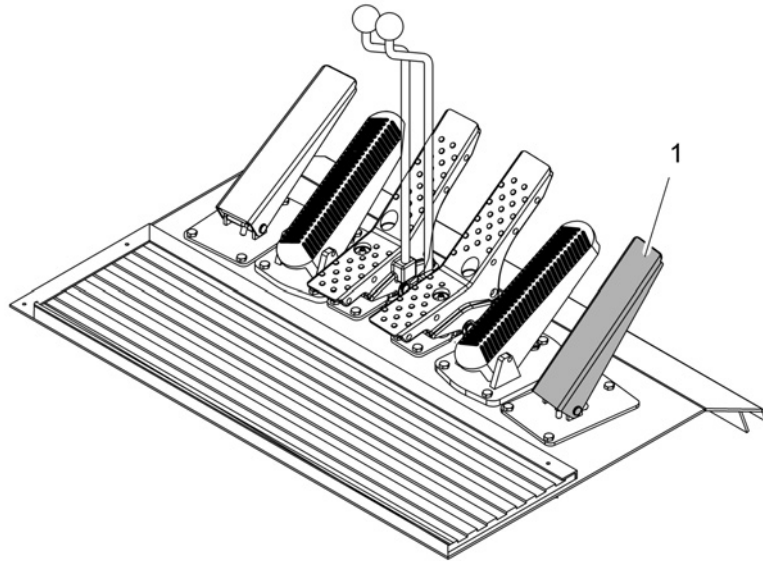


Fig. 825 Foot pedals

1 Foot pedal for *engine RPM*

The speed can be adjusted with the engine RPM *foot pedal 1* from a set constant speed (or from idle) up to maximum speed. The constant speed value remains stored in memory.

- ▶ Press the foot pedal for *engine speed 1* downwards.
  - ▷ The diesel engine speed increases.
- ▶ Release the foot pedal for *engine RPM 1*.
  - ▷ The diesel engine RPM decreases until it reaches the set constant speed value or idle.

**4.12.6 Setting the constant engine RPM**



**Note**

Efficient operation of the diesel engine:

- ▶ Ensure that the constant engine RPM is at least 1400 rpm.

A specific RPM value can be selected from across the entire speed range and stored in the memory.

**Setting a constant engine RPM using the multi-directional joystick**

Procedure on a machine with two multi-directional joysticks.



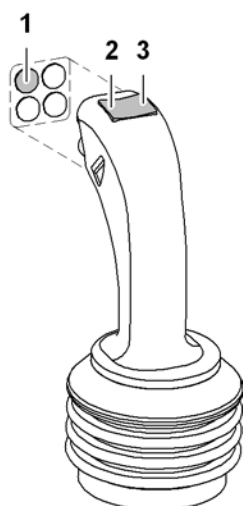


Fig. 827 Right-hand multi-directional joystick

- 1 Engine RPM programming button      3 Decrease engine RPM button  
 2 Increase engine RPM button

- ▶ Set the required RPM using the *Increase engine RPM 2* and *Decrease engine RPM 3* buttons.

Once the required RPM has been reached:

- ▶ Press the *Engine speed programming 1* button.
  - ▷ The input is confirmed by a short signal tone and is saved.

Deleting the set constant engine RPM:

- ▶ Press the *Engine speed programming 1* button again.



### Setting the constant engine RPM using the double T-lever

Procedure on a machine with a multi-directional joystick and a double T-lever.

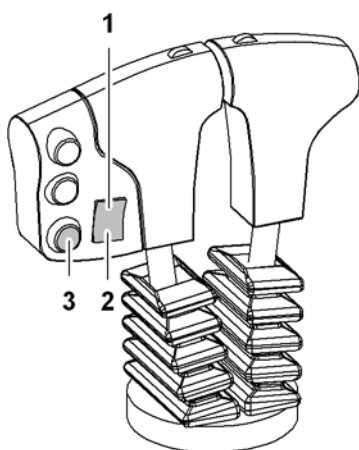


Fig. 829 Right-hand double T-lever

- 1 Increase engine RPM button      3 Engine RPM programming button  
 2 Decrease engine RPM button

- ▶ Set the required RPM using the *Increase engine RPM 1* and *Decrease engine RPM 2* buttons.

Once the required RPM has been reached:

- ▶ Press the *Engine speed programming 3* button.
  - ▷ The input is confirmed by a short signal tone and is saved.

Deleting the set constant engine RPM:

- ▶ Press the *Engine speed programming 3* button again.

### 4.12.7 Lowering the safety lever



#### WARNING

Improper use of the operating elements!

- ▶ The operating elements must only be operated from the driver's seat.

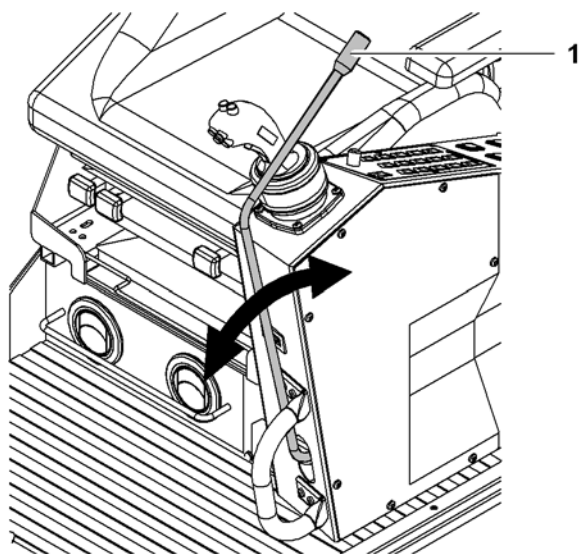


Fig. 830 Lowering the safety lever

1 Safety lever

- ▶ Remain seated while in the operator's cab.
- ▶ Lower the safety lever.
  - ▷ Operating elements in the cab will be enabled.

## 4.13 Selecting the operating mode

### 4.13.1 Selecting crane operation

Crane operation is the normal, standard operating mode of the machine. The machine is automatically in crane mode if no assembly mode or special operating mode is selected. The electronic load moment limiter (LML) and all safety devices are activated.

Ensure that the following conditions are satisfied:

- The machine has been fully set up.
- Tilting-back support cylinders are extended.

The LED in the *Assembly mode* switch lights up:

- ▶ Have the key for control panel X12 handed over by an authorised person.
- ▶ Unlock control panel X12.
- ▶ Press the *Assembly mode* switch on the control panel X12.
  - ▷ Crane operation is selected.
  - ▷ The *Assembly mode* symbol on the monitor disappears.
- ▶ Lock control panel X12.
- ▶ Ensure that the key is kept by an authorised person outside of the cab.



### 4.13.2 Selecting assembly mode

Select assembly mode exclusively when assembling, dismantling or reconfiguring the machine.



#### **DANGER**

No safety cutout by the load moment limiter (LML) in assembly mode!  
Risk of machine toppling over, structural breakdown.

- ▶ Only use assembly mode for assembling and disassembling the machine.

- ▶ Have the key for control panel X12 handed over by an authorised person.
- ▶ Unlock control panel X12.
- ▶ Press the *Assembly mode* switch on the control panel X12.



- ▷ Assembly mode is selected.
- ▷ The *Assembly mode* symbol appears on the monitor:



Fig. 833 *Assembly mode* symbol

## 4.14 Programming the setup



### DANGER

Unacceptable setup!

- ▶ 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. hoisting rope, 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 set-up screens mean ([For more information see: 3.10.5 Setup screens, page 366](#)).

### 4.14.1 Accessing the set-up screen



- ▶ Press the *Setup screen* button.
  - ▷ The *set-up screen* with the current configuration appears.



- ▶ Press button *Change set-up*.
  - ▷ The set-up screen changes to the next possible configuration.

### 4.14.2 Highlighting and editing input fields

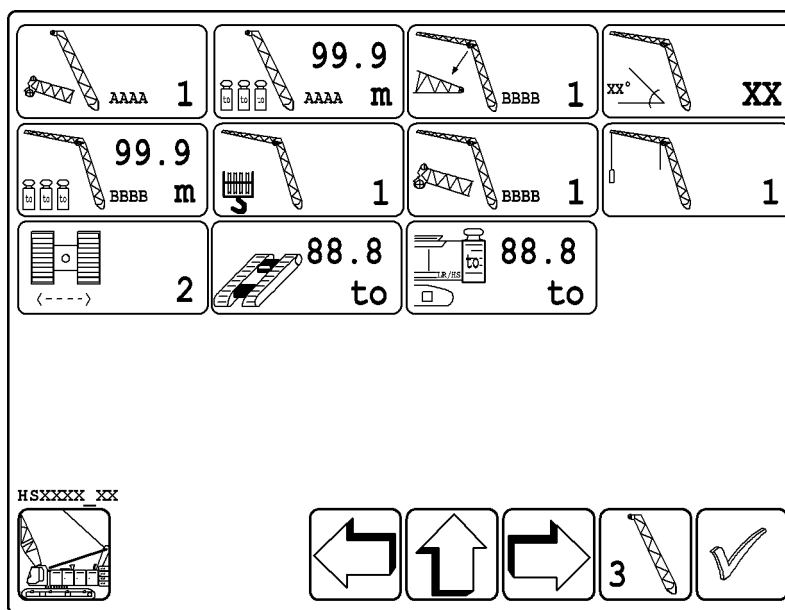


Fig. 836 Example of a set-up screen

Once the last input field has been reached, the first input field appears again.



- ▶ Press the *Next* button.
  - ▷ Next input field is highlighted.

Once the first input field has been reached, the last input field appears again.



- ▶ Press the *Back* button.
  - ▷ Previous input field is highlighted.

Once the maximum value has been reached, the value in the input field changes back to the minimum value.



- ▶ Press the *Change value* button.
  - ▷ The value in the highlighted input field is incremented by one.

### 4.14.3 Calculating the revised set-up

Do not press any function key symbol during the calculation. This will cancel the calculation.



- ▶ Press the *Confirm input* button.
  - ▷ Calculation starts.
  - ▷ During calculation, the *hourglass* symbol flashes instead of the *Confirm input* button.



Fig. 841 Hourglass symbol

- ▶ Once calculation is complete, the *Confirm input* button appears:



Fig. 842 Button Confirm input

- ▶ Button *Crane operation mode screen* flashes:

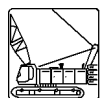


Fig. 843 Button Crane operation screen

---

## Troubleshooting

Error LML symbol appears.  
The entry was incorrect.



Fig. 844 Error LML symbol

- ▶ Search for the incorrect entry in the set-up screen and correct it.
  - ▶ Restart the calculation.
- 

### 4.14.4 Exiting the set-up screen



- ▶ To change to the *Crane operation screen* screen: Press *Crane operation screen* button.

or



- To change to the *load capacity chart* screen: Press *Load chart* button.



## 4.15 Load moment limiter (LML)

### 4.15.1 General



#### DANGER

Incorrect procedure!

Risk of machine toppling over, structural breakdown.

- ▶ The machine operator must know the weight of the load, the radius of the boom(s) and the values of the applicable load chart.
- ▶ Do not exceed the values of the applicable load chart.
- ▶ Never use the load moment limiter (LML) as a routine way of switching the machine off.

The load moment limiter (LML):

- is an electronic limiter of the load moment.
- shows a % bar as a load moment indicator on the operational screen for lifting operations.
- stops and blocks all machine movements that would increase the load moment when the maximum permitted load is reached.
- is adapted to the application in question through input of the setup.

The load moment limiter (LML) has various information displays:

- Monitor
- Flashing light on the cab roof
- Warning buzzer inside the cab
- Horn



90 % mark on the bar display of the load moment limiter (LML) on the monitor is exceeded:

- The *Caution* symbol appears top left next to the bar display.
- the warning buzzer inside the cab sounds : 0.4 seconds tone, 1 second pause).

85 % mark on the bar display of the load moment limiter (LML) on the monitor is undershot:

- The *Caution* symbol disappears.
- The warning buzzer falls silent.



100 % mark on the bar display of the load moment limiter (LML) on the monitor is exceeded:

- The *Stop* symbol appears top left next to the bar display.
- The warning buzzer inside the cab sounds : 0.4 second tone, 0.4 second pause).
- The horn sounds.
- Movements that would cause an **increase in load moment** are blocked.

110 % mark on the bar display of the load moment limiter (LML) on the monitor is exceeded:

- The *Raise main boom* function is disabled.



#### Note

- ▶ To use the *Raise main boom* function to return the load moment to under 100 %: Press the *Bypass load moment limiter (LML)* button on control panel X23.

95 % mark on the bar display of the load moment limiter (LML) on the monitor is undershot:

- The *Caution* symbol appears instead of the *Stop* symbol
- The horn sounds.
- The warning buzzer inside the cab sounds : 0.4 seconds tone, 1 second pause).



Radius is too small and the load moment limiter (LML) bar display extends beyond the 100 % mark:

- The *danger of tilting backwards* symbol appears top left next to the bar display
- The warning buzzer inside the cab sounds : 0.4 second tone, 0.4 second pause).
- The horn sounds.
- Movements that would cause a **reduction in load moment** are blocked.

### 4.15.2 Bypass the load moment limiter (LML)



#### **DANGER**

Inappropriate use of the *Briefly bypass load moment limiter (LML)* function! Machine toppling over.

- ▶ The load moment limiter (LML) may only be briefly bypassed in order to move the machine out of a dangerous area.

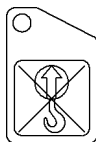


#### **DANGER**

Inappropriate use of the *Permanently bypass load moment limiter (LML)* function! Machine toppling over.

- ▶ The load moment limiter (LML) may only be permanently bypassed for checking the machine with overload. These checks may only be carried out by specialists from the national, certified testing body.

#### **Briefly bypassing the load moment limiter (LML)**



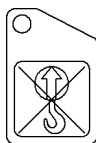
- ▶ Press and hold the *Bypass load moment limiter (LML)* button on the X23 control panel.
  - ▷ While button flashes, the function *Main boom rises* can be used also above the 110 % destination point set on the load moment limiter (LML) bar display

#### **Permanently bypassing the load moment limiter (LML)**

- ▶ Have the key for control panel X12 handed over by an authorised person.
- ▶ Unlock control panel X12.



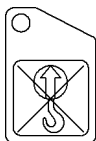
- ▶ Press the *Enable load moment limiter (LML) bypass* switch on control panel X12.
  - ▷ The lamp in the switch lights up.
  - ▷ The LED in the *Bypass load moment limiter (LML)* button will flash.



- ▶ Press the *Bypass load moment limiter (LML)* button on control panel X23.
  - ▷ The LED in the button lights up.
  - ▷ Load moment limiter (LML) is bypassed.
  - ▷ The warning light flashes on the roof of the operator's cab.
  - ▷ The horn sounds.

**Cancelling the “Permanently bypass load moment limiter (LML)” function**

Moving the safety lever resets the *Permanently bypass load moment limiter (LML)* function.



- ▶ Press the *Bypass load moment limiter (LML)* button on control panel X23.
  - ▷ The LED in the button flashes.
  - ▷ The *Permanently bypass load moment limiter (LML)* function is cancelled.



- ▶ Press the *Enable load moment limiter (LML) bypass* switch on control panel X12.
  - ▷ The lamp in the switch goes out.
- ▶ Lock control panel X12 and remove the key.
- ▶ Ensure that the key is kept by an authorised person outside of the cab.

## 4.16 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.

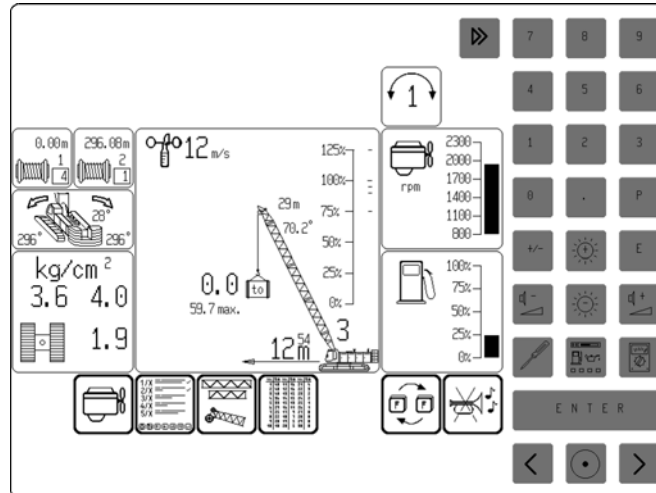


Fig. 855 Litronic service panel on the monitor

Data is entered on the Litronic service panel.

### 4.16.1 Calculating load charts

With the “main boom” and “main boom + reducing piece” boom configurations, the angles do not need to be entered.

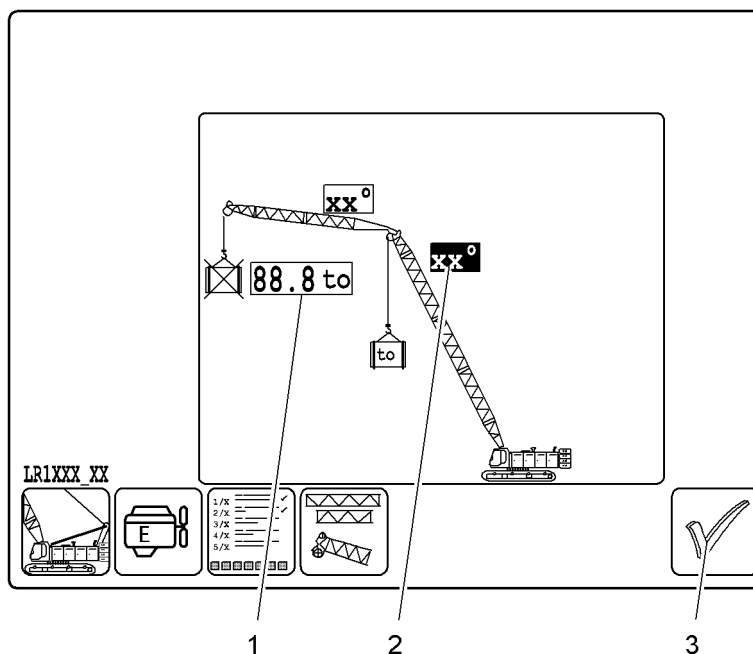


Fig. 856 Load chart calculation

- 1 Input field
- 2 Input field (highlighted)
- 3 Confirm input button



► Press *Load chart* button.

▷ The *Load chart* screen appears.



► Use the *Back* and *Continue* keys to go to the desired input field.



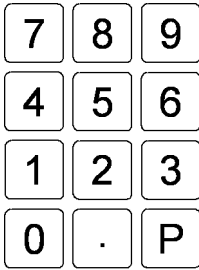
▷ Next input field is highlighted.

► Press *Enter* button.



▷ Input field activated.

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▶ Enter value using the *numeric keypad*.



▶ Press *Enter* button.



▷ Input confirmed.

▶ Repeat the process until all the values have been entered.

▶ Press the *Confirm input* button.

▷ Calculation starts.

▷ The load chart with the calculated values is displayed.

### 4.16.2 Calculating load chart in setup 4 and 5

No additional values need to be entered for setups 1 to 3.

In setups 4 and 5 a load chart can only be calculated for one main boom angle (ALPHA). The main boom angle must therefore be entered manually via the Litronic service panel before the calculation.

#### Setup 4 - load position 1

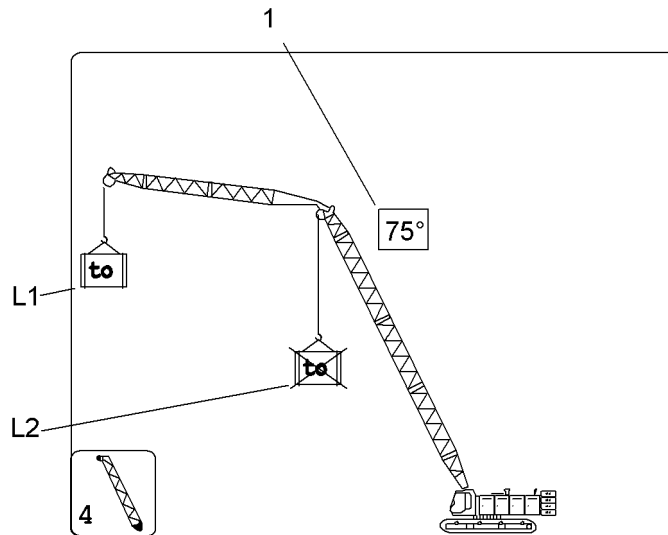


Fig. 864 Setup 4 - load position 1

1 Main boom angle (ALPHA 75 °)

L2 Load position 2

L1 Load position 1

When calling up the load chart, the display for entering the main boom angle appears first.

### Setup 4 - load position 2

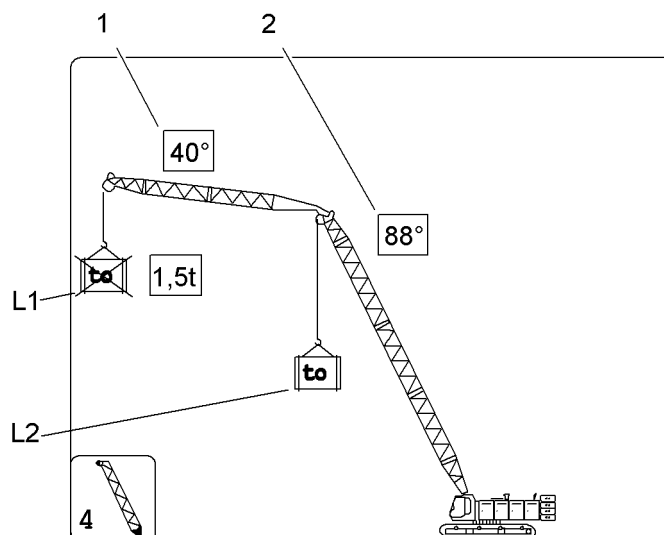


Fig. 865 Setup 4 - load position 2

- |   |                              |    |                                    |
|---|------------------------------|----|------------------------------------|
| 1 | Jib angle (BETA 40 °)        | L1 | 3,307 lb weight at load position 1 |
| 2 | Main boom angle (ALPHA 88 °) | L2 | Load position 2                    |

When calling up the load chart in setup 4 with load position 2, a screen appears in which the required main boom angle (ALPHA), jib angle (BETA) and weight on load position 1 (jib head section) can be entered.

The permitted weight values for load position 1 (jib head section) can be found in the foreword to the load chart.

### Setup 5 - load position 1

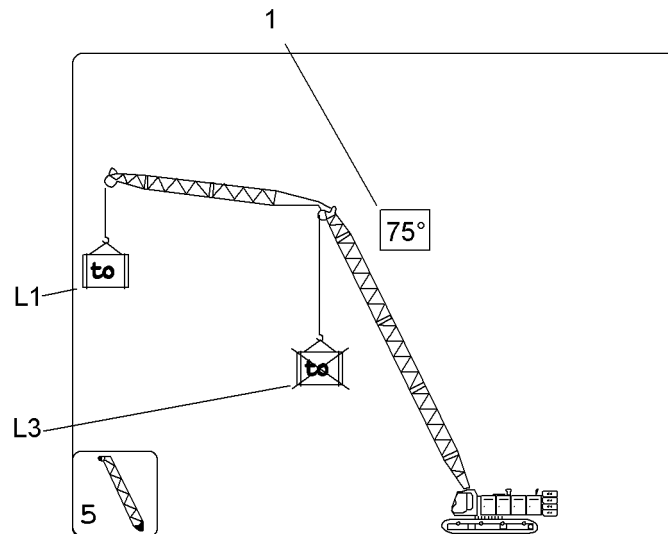


Fig. 866 Setup 5 - load position 1

- 1 Main boom angle (ALPHA 75 °)
- L1 Load position 1
- L3 Load position 3 Midfall

When calling up the load chart, the display for entering the main boom angle appears first.

### Setup 5 - load position 3

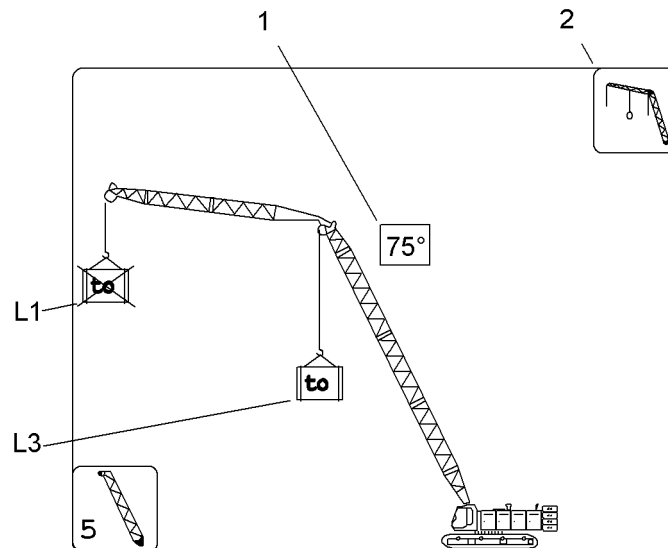


Fig. 867 Setup 5 - load position 3

- 1 Main boom angle (ALPHA 75 °)
- 2 Display load position 3 Midfall
- L1 Load position 1
- L3 Load position 3 Midfall



When calling up the load chart, the display for entering the main boom angle appears first.

## 4.17 Set the load capacity display to zero (taring)

During taring the weight of the hoisting rope and of the pulley block is set to zero so that only the actual weight of the hoisting load is displayed.

Taring of the load capacity:

- can be done at any time.
- Is best done just before slinging the hoisting load.

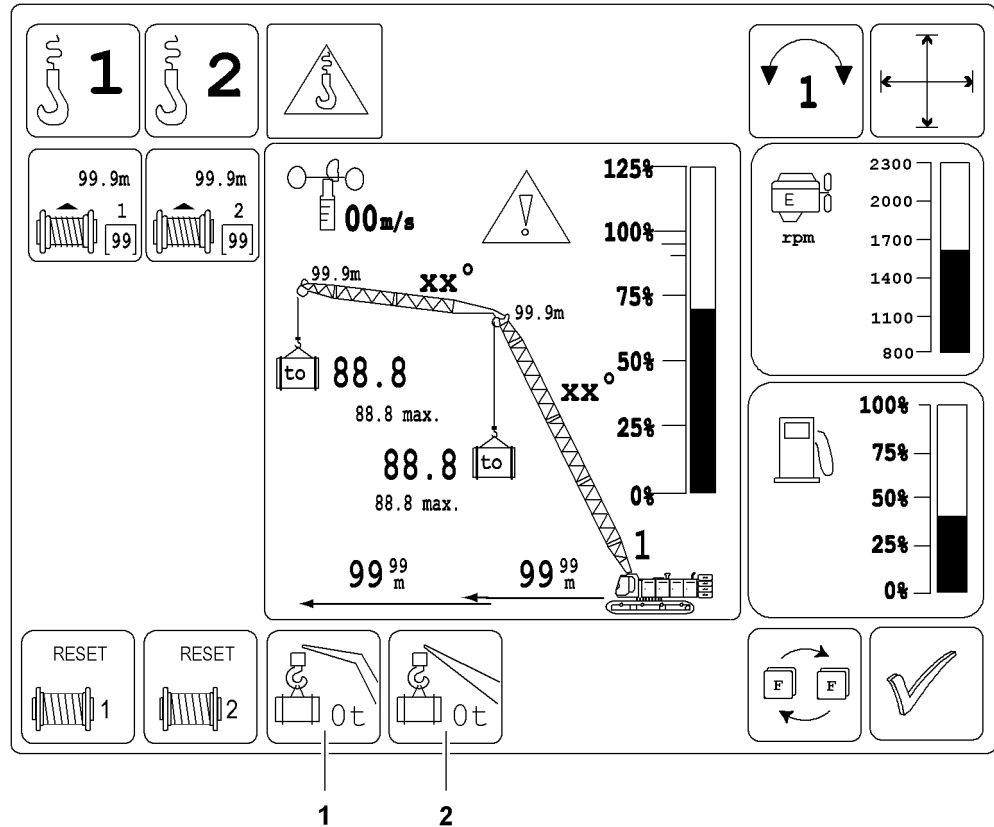


Fig. 868 Tare the load capacity display

- 1 Tare jib lifting capacity button      2 Tare main boom lifting capacity button

### 4.17.1 Taring the main boom lifting capacity



- ▶ Press the *Change function key symbols* button until the lifting capacity adjustment function key symbols appear.



- ▶ Press the *Tare main boom lifting capacity* button.
  - ▷ The main boom lifting capacity has been tared.
- ▶ Press the *Tare main boom lifting capacity* button again.
  - ▷ The main boom lifting capacity displays the total load.

## 4.17.2 Taring the jib lifting capacity



- ▶ Press the *Change function key symbols* button until the lifting capacity adjustment function key symbols appear.



- ▶ Press the *Tare jib lifting capacity* button.
  - ▷ The fly jib load capacity has been tared.
- ▶ Press the *Tare jib lifting capacity* button again.
  - ▷ The jib lifting capacity displays the total load.

## 4.18 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 operation with 1 winch on 1 hook
- Single hook operation with 2 winches on 1 hook
- Single hook operation with two winches on two hooks

Two-hook operation is permitted in the following versions:

- Two-hook operation with two hooks on two loads
- Two-hook operation with two hooks on one load

All the permitted hook operations are demonstrated on the diagrams below.



**WARNING**

Using an unauthorised hook operation!

- ▶ Only use authorised hook operations.



**WARNING**

Incorrect assembly of the hoist limit switch or bypassed without authorisation!  
Load breakaway.

- ▶ Fit the hoist limit switches to the correct ropes.
- ▶ Only ever bypass unused hoist limit switches.

**Notes on the diagrams and symbols used**

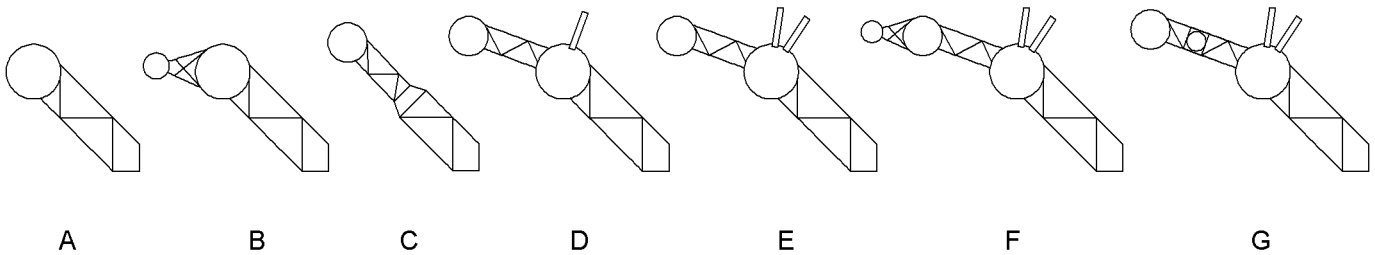
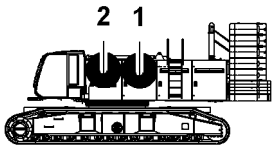







Fig. 873 Diagrams of the boom configurations

- |  |  |  |
|--|--|--|
| <b>A</b> Main boom                             | <b>D</b> Main boom + fixed jib                               | <b>G</b> Main boom + luffing jib + Midfall |
| <b>B</b> Main boom with auxiliary jib attached | <b>E</b> Main boom + luffing jib                             |  |
| <b>C</b> Main boom + reducing piece            | <b>F</b> Main boom + luffing jib with auxiliary jib attached |  |

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Symbol	Meaning
1 ②	<p>The numbers 1 or 2 denote winch 1 hoist rope or winch 2 hoist rope.</p> 
	The circle represents the hoist rope whose reeving is to be preset when programming the setup.
①=②	Preset reeving of winch 1 hoist rope or winch 2 hoist rope when programming the setup. Rope reeving is symmetrical.
①+②	Preset the total of winch 1 hoist rope and winch 2 hoist rope reeving when programming the setup.
①②	Preset the lower reeving when programming the setup.
	Preset the relevant reeving with this boom head/load position.
	Empty hook
	Load
	Empty hook with specified dead weight.
	Two-hook operation with two hooks on one load
	Single hook operation with 2 winches on 1 hook
Directional instructions are given from the machine operator's point of view in the operator's cab.	

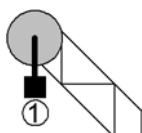
Tab. 205 Meaning of the symbols

### 4.18.1 Single hook operation with 1 winch on 1 hook

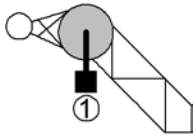
Ensure that only winch 1 hoist rope is reeved.

#### Main boom

##### Load on boom head section (winch 1 hoist rope)



- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Preset boom head section.
- ▶ Preset reeving of winch 1 hoist rope at boom head section.



## Load on boom head section (winch 1 hoist 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 distorts the load indication in the operational screen for lifting operations. The Load Moment Limiter switches off at the maximum permitted load moment.

- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Preset boom head section.
- ▶ Preset reeving of winch 1 hoist rope at boom head section.
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity with auxiliary jib attached (79300 lb):

$$SWL_{RED} = SWL_{HPT} - 2,205 \text{ lb}$$

- $SWL_{RED}$  = 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:

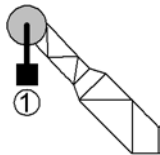
$$SWL_{RED} = \frac{SWL_{HPT} * (R_{HPT} - X) - (SWL_{SP} + m_{SP}) * (R_{HPT} - X + R_{SP})}{(R_{HPT} - X)}$$

Fig. 887 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 boom pivot point
- $SWL_{SP}$  = lifting capacity on the auxiliary jib (in this case no weight)
- $m_{SP}$  = weight of the auxiliary jib
- $R_{SP}$  = radius extension due to auxiliary jib
- ▶ Note the reductions in the valid lifting capacities due to the auxiliary jib attached.

## Main boom + reducing piece

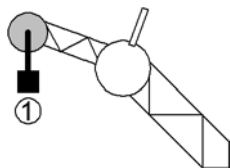
### Load on boom head section (winch 1 hoist rope)



- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Preset boom head section.
- ▶ Preset reeving of winch 1 hoist rope at boom head section.

## Main boom + fixed jib

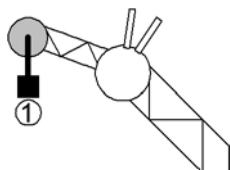
### Load on jib head section (winch 1 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Preset reeving of winch 1 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).

## Main boom + luffing jib

### Load on jib head section (winch 1 hoist rope)

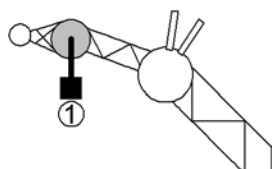


- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Preset reeving of winch 1 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).

### Load on jib head section (winch 1 hoist 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 distorts the load indication in the operational screen for lifting operations. The Load Moment Limiter switches off at the maximum permitted load moment.



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Preset reeving of winch 1 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity with auxiliary jib attached (66.000 lb):

$$SWL_{RED} = SWL_{NDL} - 1,102 \text{ lb}$$

For a rough calculation of the reduced lifting capacity with auxiliary jib attached (33.000 lb):

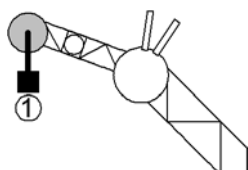
$$SWL_{RED} = SWL_{NDL} - 882 \text{ lb}$$

- $SWL_{RED}$  = 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 (winch 1 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Preset reeving of winch 1 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).

### 4.18.2 Single hook operation with 2 winches on 1 hook

The hoist rope may become too short on long main booms and with multiple reeving. Under certain circumstances it is permitted for the winch 1 hoist rope and winch 2 hoist rope to be reeved via the boom head section on a single hook.

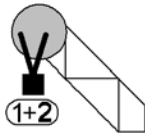


#### DANGER

Incorrect procedure followed for single hook operation with 2 winches on 1 hook!

- ▶ Use hoist ropes of the same length and quality for winch 1 and winch 2.
- ▶ Winch 1 and winch 2 hoist ropes must only be reeved according to the rope reeving systems.
- ▶ Winch 1 and winch 2 hoist ropes must only be reeved on a pulley block.
- ▶ Preset the total of winch 1 hoist rope and winch 2 hoist rope reeving with the boom head section.
- ▶ Preset the winch synchronisation on control panel X23.

#### Load on boom head section (winch 1 hoist rope + winch 2 hoist rope)



- ▶ Reeve Winch 1 and winch 2 hoist ropes according to the rope reeving systems.
- ▶ Preset boom head section.
- ▶ Preset the total of winch 1 hoist rope and winch 2 hoist rope reeving with the boom head section.
- ▶ In order to obtain an accurate rope length measurement on the operational screen for lifting operations: alter the reeving of winch 2 hoist rope to the actual number of reeves on the winch 2 hoist rope ([For more information see: 4.30 Rope measuring system\\*](#), page 516).



#### Note

The value displayed by the rope measuring system for winch 1 is incorrect.

- ▶ Pay attention only to the value displayed by the rope measuring system for winch 2.

### 4.18.3 Single hook operation with two winches on two hooks

Both hoist ropes are reeved for single hook operation with two winches on two hooks. However, the load is only moved by one hoist rope. The second hoist rope remains still.

The hoist ropes may be reeved in a non-symmetrical manner.



#### DANGER

Incorrect procedure followed for single hook operation with two winches on two hooks!

- ▶ Only move the load using one hoist rope.
- ▶ Only move with one hoist rope at any given time.

If the load is moved with the other hoist rope or the load position changes:

- ▶ Reprogram the setup.



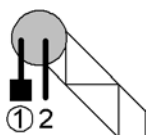
**DANGER**

Maximum permissible lifting capacity is exceeded!  
Risk of machine toppling over, structural breakdown.

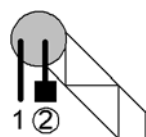
- ▶ Take into account all relevant weights as the total load.
- ▶ Do not exceed the maximum permitted lifting capacity.

The total load consists of:

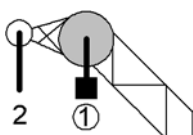
- the weight of the load to be lifted
- Weight of both hooks or pulley blocks
- The weight of all suspended ropes
- The weight of the load pick-up equipment
- Weight of the auxiliary jib (if attached)

**Main boom****Load on boom head section (winch 1 hoist rope)**

- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset boom head section.
- ▶ Preset reeving of winch 1 hoist rope at boom head section.

**Load on boom head section (winch 2 hoist rope)**

- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset boom head section.
- ▶ Preset reeving of winch 2 hoist rope at boom head section.

**Load on boom head section (winch 1 hoist 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 distorts the load indication in the operational screen for lifting operations. The Load Moment Limiter switches off at the maximum permitted load moment.

- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Guide the left winch 2 hoist rope over the boom head section and reeve onto the auxiliary jib from the right.
- ▶ Preset boom head section.
- ▶ Preset reeving of winch 1 hoist rope at boom head section.
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (79300 lb) and empty hook with 1,323 lb:

$$SWL_{RED} = SWL_{HPT} - 4,409 \text{ lb}$$

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (79300 lb) and empty hook with 3,307 lb:

$$SWL_{RED} = SWL_{HPT} - 7,165 \text{ lb}$$

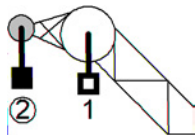
- $SWL_{RED}$  = reduced lifting capacity for hoisting with the boom head section
- $SWL_{HPT}$  = lifting capacity for hoisting with the boom head section according to the load chart

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. 897 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 boom pivot point
  - $SWL_{SP}$  = lifting capacity on the auxiliary jib, in this case the weight of the empty hook
  - $m_{SP}$  = weight of the auxiliary jib
  - $R_{SP}$  = radius extension due to auxiliary jib
- ▶ Note the reductions in the valid lifting capacities due to the auxiliary jib attached.



### Load on auxiliary jib (winch 2 hoist rope)

- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Guide the left winch 2 hoist rope over the boom head section and reeve onto the auxiliary jib from the right.
- ▶ Preset auxiliary jib.
- ▶ Preset reeving of winch 2 hoist rope at auxiliary jib.



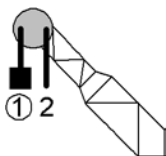
### CAUTION

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.

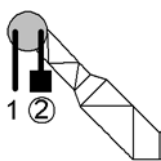
- ▶ Keep to the specified empty hook weight on the boom head section stipulated in the load charts preface.
- ▶ Keep to the specified empty hook weight on the boom head section stipulated in the load charts preface.

## Main boom + reducing piece

### Load on boom head section (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset boom head section.
- ▶ Preset reeving of winch 1 hoist rope at boom head section.

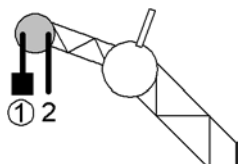


### Load on boom head section (winch 2 hoist rope)

- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset boom head section.
- ▶ Preset reeving of winch 2 hoist rope at boom head section.

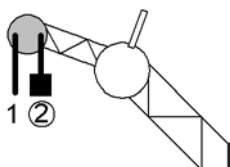
## Main boom + fixed jib

### Load on jib head section (winch 1 hoist rope)



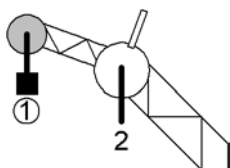
- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on jib head section from the left.
- ▶ Preset reeving of winch 1 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).

### Load on jib head section (winch 2 hoist rope)



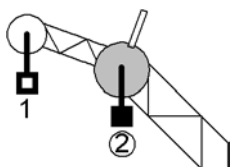
- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on jib head section from the left.
- ▶ Preset reeving of winch 2 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).

### Load on jib head section (winch 1 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset reeving of winch 1 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).

### Load on boom head section (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset reeving of winch 2 hoist rope at boom head section.
- ▶ Preset load position 2 (jib head section).



### 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 section) as stipulated in the load charts preface.
- ▶ 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: 6.5 Choosing the correct hook or pulley block, page 564](#)).

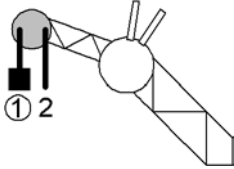


## Note

- ▶ Winch 1 is blocked.

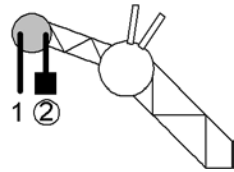
## Main boom + luffing jib

### Load on jib head section (winch 1 hoist rope)



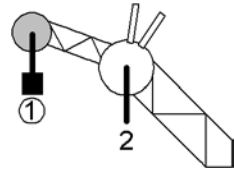
- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on jib head section from the left.
- ▶ Preset reeving of winch 1 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).

### Load on jib head section (winch 2 hoist rope)



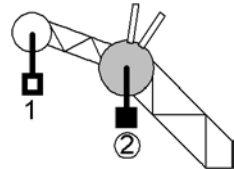
- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on jib head section from the left.
- ▶ Preset reeving of winch 2 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).

### Load on jib head section (winch 1 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset reeving of winch 1 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).

### Load on boom head section (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset reeving of winch 2 hoist rope at boom head section.
- ▶ Preset load position 2 (jib head section).



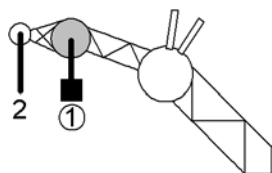
## CAUTION

Permitted empty hook weight at load position 1 (jib head section) is exceeded! 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 section) as stipulated in the load charts preface.
  - ▶ 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: [6.5 Choosing the correct hook or pulley block, page 564](#)).
- 
- ▶ Do not exceed the specified empty hook weight at load position 1 (jib head section) as stipulated in the load charts preface.

**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 (winch 1 hoist 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 empty hook distorts the load indication in the operational screen for lifting operations. The Load Moment Limiter switches off at the maximum permitted load moment.

- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Guide the left winch 2 hoist rope over the jib head section and reeve onto the auxiliary jib from the right.
- ▶ Preset reeving of winch 1 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (66.000 lb) and empty hook with 1,984 lb:

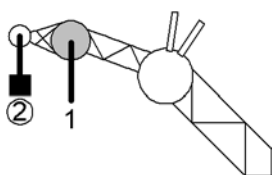
$$SWL_{RED} = SWL_{NDL} - 3,086 \text{ lb}$$

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (33.000 lb) and empty hook with 1,323 lb:

$$SWL_{RED} = SWL_{NDL} - 2,425 \text{ lb}$$

- $SWL_{RED}$  = 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 (winch 2 hoist 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 empty hook distort the load indication in the operational screen for lifting operations. The Load Moment Limiter switches off at the maximum permitted load moment.

The auxiliary jib distorts the radius indication in the operational screen for lifting operations. The auxiliary jib distorts the hoisting height display in the operational screen for lifting operations.

- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Guide the left winch 2 hoist rope over the jib head section and reeve onto the auxiliary jib from the right.
- ▶ Preset reeving of winch 2 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity with auxiliary jib attached (66.000 lb):

$$SWL_{RED} = SWL_{NDL} - 1,102 \text{ lb}$$

For a rough calculation of the reduced lifting capacity with auxiliary jib attached (33.000 lb):

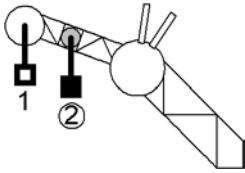
$$SWL_{RED} = SWL_{NDL} - 882 \text{ lb}$$

- $SWL_{RED}$  = 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 (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on the Midfall.
- ▶ Preset reeving of winch 2 hoist rope at Midfall.
- ▶ Preset 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 section) as stipulated in the load charts preface.
- ▶ 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: [6.5 Choosing the correct hook or pulley block, page 564](#)).

- ▶ Do not exceed the specified empty hook weight at load position 1 (jib head section) as stipulated in the load charts preface.



### Note

- ▶ Winch 1 is blocked.

## 4.18.4 Two-hook operation with two hooks on two loads

The two-hook operation with two hooks on two loads represents the main hoist + auxiliary hoist principle.



### WARNING

Maximum permissible lifting capacity is exceeded! Possible buckling of the boom or toppling over of the machine.

- ▶ Take into account all relevant weights as the total load.
- ▶ Do not exceed the maximum permitted lifting capacity.

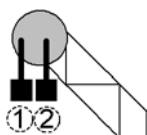
The total load consists of:

- 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)

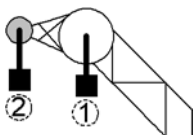
## Main boom

### Load on boom head section (winch 1 hoist rope) + load on boom head section (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset boom head section.
- ▶ Preset the lower reeving of the two hoist ropes at the boom head section.

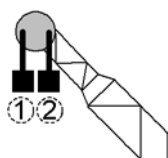
### Load on boom head section (winch 1 hoist rope) + load on auxiliary jib (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Guide the left winch 2 hoist rope over the boom head section and reeve onto the auxiliary jib from the right.
- ▶ Preset auxiliary jib.
- ▶ Preset the lower reeving of the two hoist ropes at the auxiliary jib.

## Main boom + reducing piece

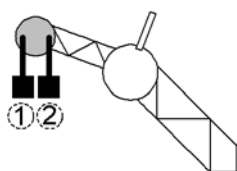
### Load on boom head section (winch 1 hoist rope) + load on boom head section (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset boom head section.
- ▶ Preset the lower reeving of the two hoist ropes at the boom head section.

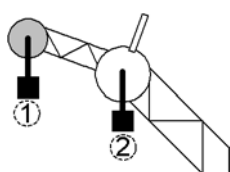
## Main boom + fixed jib

### Load on jib head section (winch 1 hoist rope) + load on jib head section (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on jib head section from the left.
- ▶ Preset the lower reeving of the two hoist ropes at the jib head section.
- ▶ Preset load position 1 (jib head section).

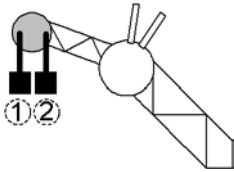
### Load on jib head section (winch 1 hoist rope) + load on boom head section (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset the lower reeving of the two hoist ropes at the jib head section.
- ▶ Preset load position 1 (jib head section).

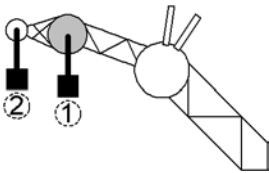
## Main boom + luffing jib

### Load on jib head section (winch 1 hoist rope) + load on jib head section (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on jib head section from the left.
- ▶ Preset the lower reeving of the two hoist ropes at the jib head section.
- ▶ Preset load position 1 (jib head section).

### Load on jib head section (winch 1 hoist rope) + load on auxiliary jib (winch 2 hoist 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 distorts the load indication in the operational screen for lifting operations. The Load Moment Limiter switches off at the maximum permitted load moment.

The auxiliary jib distorts the radius indication in the operational screen for lifting operations. The auxiliary jib distorts the hoisting height display in the operational screen for lifting operations.

- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Guide the left winch 2 hoist rope over the boom head section and reeve onto the auxiliary jib from the right.
- ▶ Preset the lower reeving of the two hoist ropes at the jib head section.
- ▶ Preset load position 1 (jib head section).
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (66.000 lb) and empty hook with 1,323 lb:

$$SWL_{RED} = SWL_{NDL} - 1,984 \text{ lb}$$

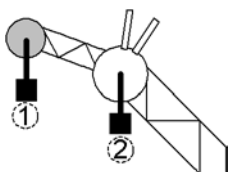
For a rough calculation of the reduced lifting capacity at auxiliary jib attached (33.000 lb) and empty hook with 1,323 lb:

$$SWL_{RED} = SWL_{NDL} - 1,764 \text{ lb}$$

- $SWL_{RED}$  = 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 (winch 1 hoist rope) + load on boom head section (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Preset the lower reeving of the two hoist ropes at the jib head section.
- ▶ Preset load position 1 (jib head section).



## 4.18.5 Two-hook operation with two hooks on one load

The two-hook operation moves a load using two hooks. The two-hook operation distorts the load indication in the operational screen for lifting operations. The Load Moment Limiter switches off at the maximum permitted load moment.

Two hooks may be used on one load.

Two hooks may be moved at the same time.

Winch synchronisation is permitted.



---

### DANGER

Incorrect procedure in two-hook operation with two hooks on one load!

- ▶ Avoid longitudinal diagonal pull.
- ▶ The lateral diagonal pull must not exceed 1%.
- ▶ Ensure that the load can be raised by the two hooks in unison.

If both hoist ropes are reeved at the same boom head/load position:

- ▶ Reeve the hoist ropes symmetrically.

If both hoist ropes are reeved at the different boom heads/load positions:

- ▶ Reeve both hoist ropes at least as often as has been preset on the relevant boom head/load position.

If winch synchronisation is used:

- ▶ Preset the winch synchronisation 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

Incorrect procedure swinging the load in two-hook operation!  
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 load hangs from the boom head/load position with the largest radius.

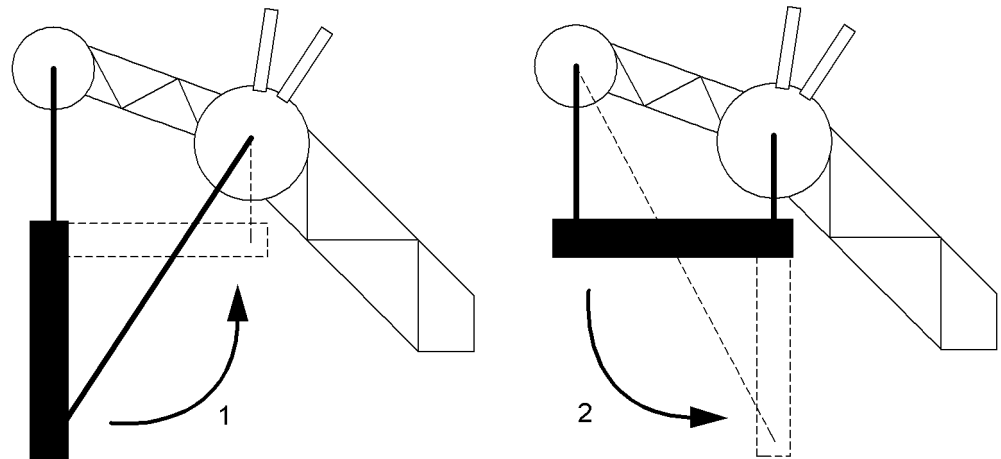
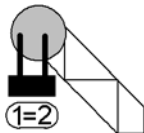


Fig. 920 Diagram of the swinging process with the lowest load moment

- |  |  |
|--|--|
| <p>1 Load swinging towards the basic machine</p> | <p>2 Load swinging towards the basic machine</p> |
|--|--|

- ▶ Only swing the load towards the basic machine.
  - ▷ The load moment is reduced.

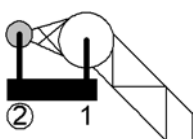
## Main boom



### Load on boom head section (winch 1 hoist rope + winch 2 hoist rope)

- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Reeve winch 2 hoist rope the same amount of times as winch 1 hoist rope.
- ▶ Preset boom head section.
- ▶ Preset reeving of winch 1 hoist rope (= reeving of winch 2 hoist rope) at boom head section.
- ▶ Preset winch synchronisation if necessary.

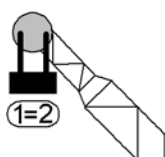
### Load on boom head section (winch 1 hoist rope) + auxiliary jib (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Guide the left winch 2 hoist rope over the boom head section and reeve onto the auxiliary jib from the right.
- ▶ Reeve winch 1 hoist rope at the boom head section at least as often as the winch 2 hoist rope on the auxiliary jib.
- ▶ Preset auxiliary jib.
- ▶ Preset reeving of winch 2 hoist rope at auxiliary jib.
- ▶ Preset winch synchronisation if necessary.

### Main boom + reducing piece

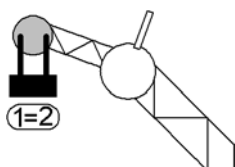
#### Load on boom head section (winch 1 hoist rope + winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on boom head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Reeve winch 2 hoist rope the same amount of times as winch 1 hoist rope.
- ▶ Preset boom head section.
- ▶ Preset reeving of winch 1 hoist rope (= reeving of winch 2 hoist rope) at boom head section.
- ▶ Preset winch synchronisation if necessary.

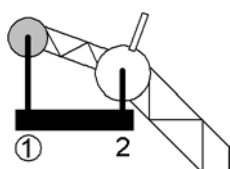
### Main boom + fixed jib

#### Load on jib head section (winch 1 hoist rope + winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on jib head section from the left.
- ▶ Reeve winch 2 hoist rope the same amount of times as winch 1 hoist rope.
- ▶ Preset reeving of winch 1 hoist rope (= reeving of winch 2 hoist rope) at jib head section.
- ▶ Preset load position 1 (jib head section).
- ▶ Preset winch synchronisation if necessary.

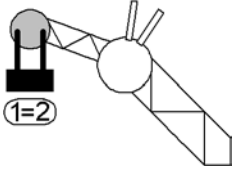
#### Load on jib head section (winch 1 hoist rope) + boom head section (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Reeve winch 2 hoist rope at the boom head section at least as often as the winch 2 hoist rope on the jib head section.
- ▶ Preset load position 1 (jib head section).
- ▶ Preset reeving of winch 1 hoist rope at jib head section.
- ▶ Preset winch synchronisation if necessary.

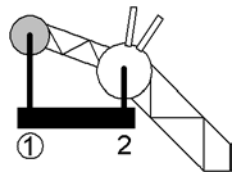
## Main boom + luffing jib

### Load on jib head section (winch 1 hoist rope + winch 2 hoist rope)



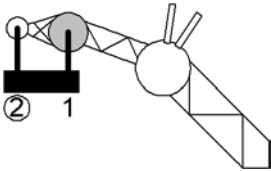
- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on jib head section from the left.
- ▶ Reeve winch 2 hoist rope the same amount of times as winch 1 hoist rope.
- ▶ Preset reeving of winch 1 hoist rope (= reeving of winch 2 hoist rope) at jib head section.
- ▶ Preset load position 1 (jib head section).
- ▶ Preset winch synchronisation if necessary.

### Load on jib head section (winch 1 hoist rope) + boom head section (winch 2 hoist rope)



- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Reeve winch 2 hoist rope on boom head section from the left.
- ▶ Reeve winch 2 hoist rope at the boom head section at least as often as the winch 2 hoist rope on the jib head section.
- ▶ Preset load position 1 (jib head section).
- ▶ Preset reeving of winch 1 hoist rope at jib head section.
- ▶ Preset winch synchronisation if necessary.

### Load on jib head section (winch 1 hoist rope) + auxiliary jib (winch 2 hoist 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 distorts the load indication in the operational screen for lifting operations. The Load Moment Limiter switches off at the maximum permitted load moment.

The auxiliary jib distorts the radius indication in the operational screen for lifting operations. The auxiliary jib distorts the hoisting height display in the operational screen for lifting operations.

- ▶ Reeve winch 1 hoist rope on jib head section from the right.
- ▶ Guide the left winch 2 hoist rope over the jib head section and reeve onto the auxiliary jib from the right.
- ▶ Reeve winch 1 hoist rope at the jib head section at least as often as the winch 2 hoist rope on the auxiliary jib.
- ▶ Preset reeving of winch 2 hoist rope at jib head section.
- ▶ Preset load position 1 (jib head section).
- ▶ Preset winch synchronisation if necessary.
- ▶ Calculate the reduced lifting capacity before every lifting operation.

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (66.000 lb) and empty hook with 1,984 lb:

$$SWL_{RED} = SWL_{NDL} - 3,086 \text{ lb}$$

For a rough calculation of the reduced lifting capacity at auxiliary jib attached (33.000 lb) and empty hook with 1,323 lb:

$$\mathbf{SWL_{RED}} = \mathbf{SWL_{NDL}} - 2,425 \text{ lb}$$

- $\mathbf{SWL_{RED}}$  = reduced lifting capacity for hoisting with the jib head section
- $\mathbf{SWL_{NDL}}$  = 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.

## 4.19 Crawlers



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### **DANGER**

Ground load-bearing capacity is not known!  
Machine toppling over.

- ▶ Only travel on ground where the load-bearing capacity is known.
  - ▶ If in doubt, contact Liebherr after sales service.
- 



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### **WARNING**

Areas that the operator cannot see when moving!

- ▶ Do not drive on areas that the driver cannot see without the aid of a signalman.
-

### 4.19.1 Operating the travel gear

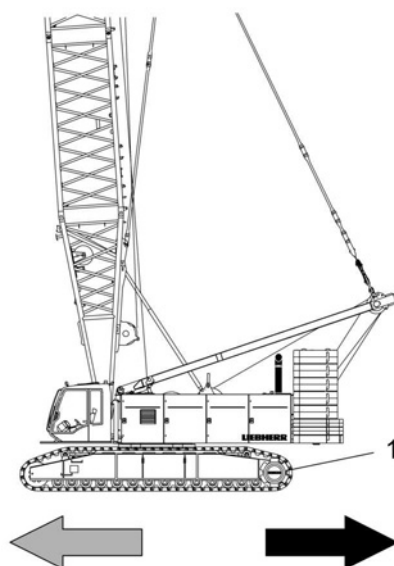


Fig. 929 Operating the travel gear

1 Crawler drive (tumbler)



#### Note

Stated movement directions apply exclusively if the crawler drives (tumbler) 1 of the crawler side frames are at the rear!

► Pay attention to the direction of travel.

Reversing (idler at the rear, tumbler in front) should, if possible, be avoided over longer distances because reversing causes higher degrees of tension in the chain, resulting in considerably increased wear.

Driving with a load on the boom is allowed exclusively with reduced lifting capacity. This reduced lifting capacity is shown in the foreword to the load chart.

## Operating the crawlers with foot pedals

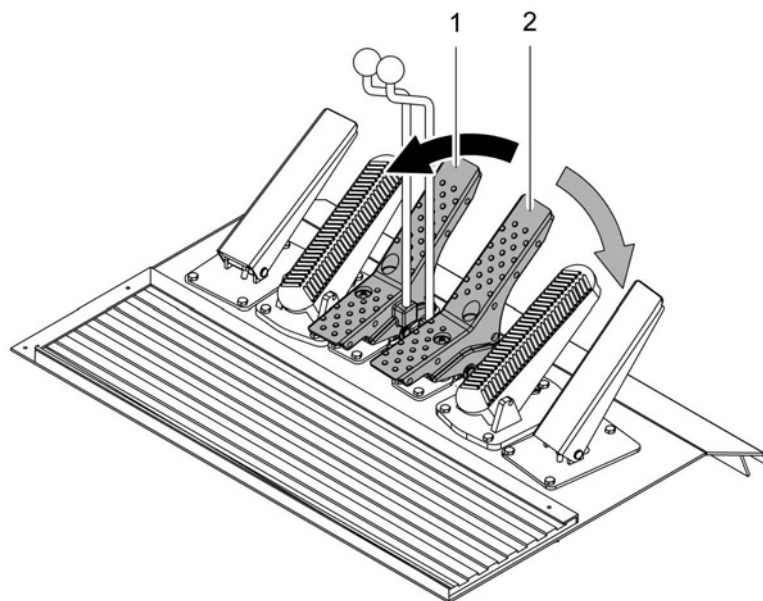


Fig. 930 Foot pedals

1 Foot pedal for *left crawler*                      2 Foot pedal for *right crawler*

- ▶ Press the *Right crawler* pedal **2** forwards.
  - ▷ The right chain moves forward.
- ▶ Press the *Left crawler* pedal **1** forwards.
  - ▷ The left chain moves forward.
- ▶ Press the *Right crawler* pedal **2** backwards.
  - ▷ The right chain moves backwards.
- ▶ Press the *Left crawler* pedal **1** backwards.
  - ▷ The left chain moves backwards.



## Operating the crawlers with hand levers

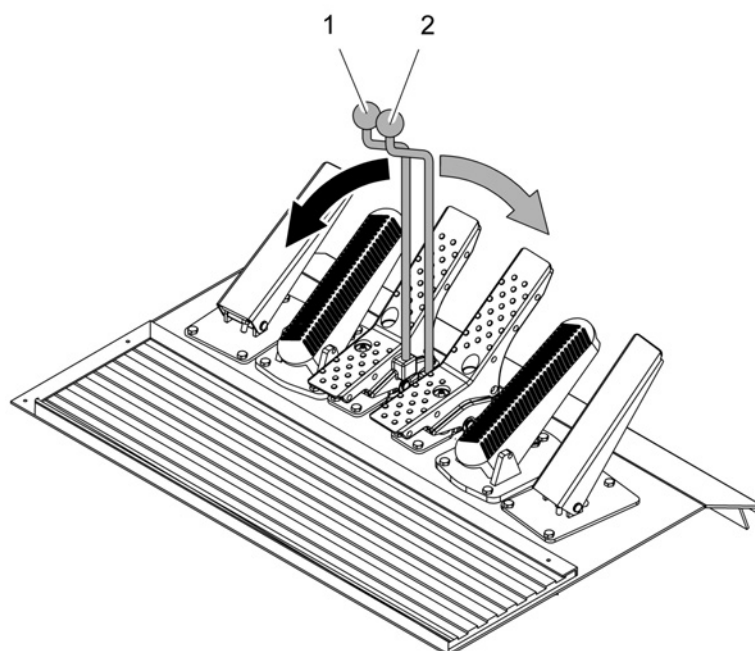


Fig. 931 Hand lever

1 Hand lever for *left crawler*

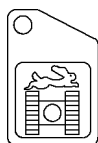
2 Hand lever for *right crawler*

Special hand levers can be screwed to the foot pedals (inside). The hand levers are operated in the same way as the foot pedals.

- ▶ Use the hand levers to control the travel movements.

### 4.19.2 Setting the crawler speed

The crawlers can be operated in normal gear or overdrive. In overdrive, the speed can be continuously controlled from 0 to 1 mph using the crawler pedals.



- ▶ Press the *Crawler overdrive* button on control panel X11.
  - ▷ Crawler overdrive selected.
  - ▷ The LED in the *Crawler overdrive* button lights up.
- ▶ Press the *Crawler overdrive* button on control panel X11 again.
  - ▷ Normal crawler gear selected.
  - ▷ The LED in the *Crawler overdrive* button goes out.

### 4.19.3 Crawler deactivation\*

The crawlers can be shut off to prevent them from being operated accidentally. The switch is located in the operator's cab, under the driver's seat at the front.

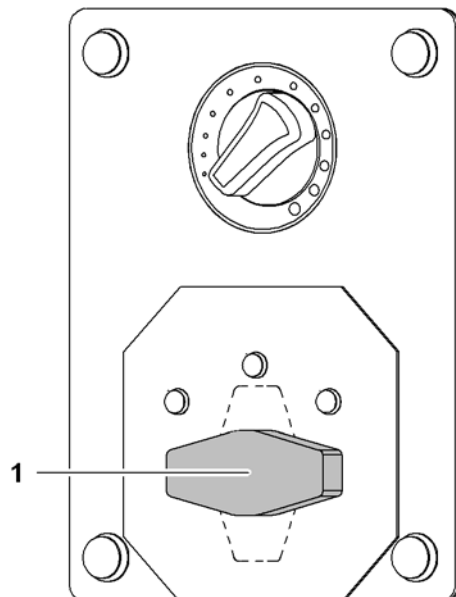


Fig. 933 Crawler deactivation

1 Crawler deactivation switch

- ▶ Move the *Crawler deactivation* switch to the vertical position.
  - ▷ Crawlers are locked.
- ▶ Move the *Crawler deactivation* switch to the horizontal position.
  - ▷ Crawlers are enabled.

## 4.20 Swing



### WARNING

People or obstacles in the swing range!

- ▶ Ensure that there are no people or obstacles in the swing range.
- ▶ Leave the danger area.

### 4.20.1 Operating the swing



### DANGER

Incorrect use of the swing!

Risk of machine toppling over, structural breakdown.

- ▶ Accelerate and brake the swing slowly.



Fig. 934 Left-hand multi-directional joystick

- ▶ Push the left multi-directional joystick to the left.
  - ▷ The uppercarriage rotates to the left (counter-clockwise).
  - ▷ The warning signal sounds.
- ▶ Move the left multi-directional joystick back to the neutral position.
  - ▷ The swing brake is engaged, the uppercarriage stops rotating.
- ▶ Move the left-hand multi-directional control lever to the right.
  - ▷ The uppercarriage rotates to the right (clockwise).
  - ▷ The warning signal sounds.
- ▶ Move the left multi-directional joystick back to the neutral position.
  - ▷ The swing brake is engaged, the uppercarriage stops rotating.

## 4.20.2 Setting the swing speed

The crawler crane has no safety devices to limit the swing speed.

The maximum swing speeds for the speed settings are shown in the technical data for the swing.



### DANGER

Excessive swing speed!

Risk of machine toppling over, structural breakdown.

- ▶ Determine the maximum permitted swing speed for the current load and radius before any swing movement.
- ▶ Check that the preset speed is appropriate before any swing movement.
- ▶ Ensure that the maximum swing speed for the selected speed setting does not exceed the maximum permissible swing speed.



### DANGER

Swing speed too fast for an emergency stop!

An emergency stop brings about additional dangers resulting from the inertia of moving masses (e.g. the load swinging).

Risk of machine toppling over, structural breakdown.

- ▶ The swing speed should be set such that an emergency stop can be performed.

The diagram below shows the maximum permitted swing speed depending on the radius.

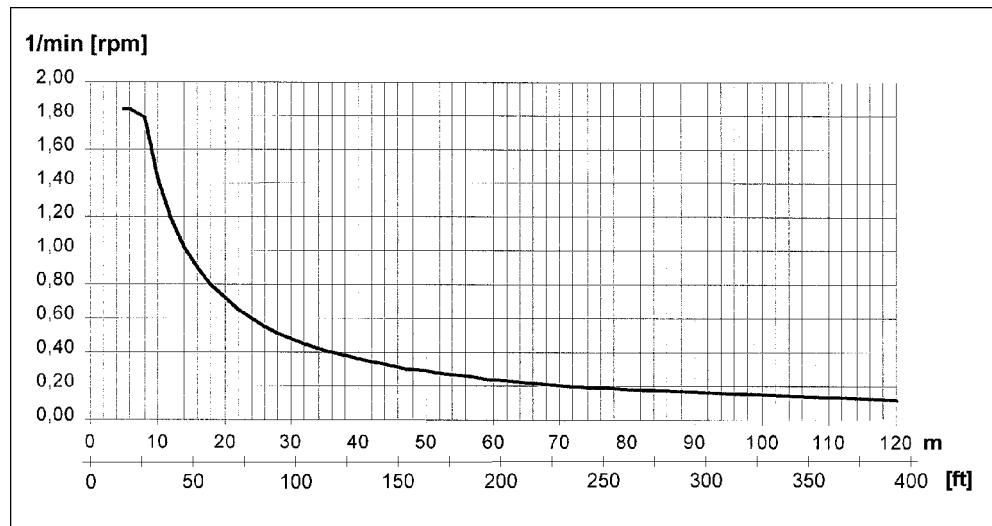
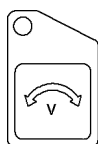


Fig. 935 Setting the swing speed

The lifting capacity must also be reduced in the following circumstances:

- Large boom lengths.
- Loads close to the maximum permitted load.
- In windy conditions; especially if the load to be lifted has a large area exposed to the wind.

The swing speed level is retained when the ignition is switched off.



- ▶ Press the *Swing speed* button.

- ▷ The *Swing speed* symbol appears in the status display of the monitor:



Fig. 937 *Swing speed* symbol

- ▶ Press the *Swing speed* button again.
  - ▷ The number in the *Swing speed* symbol changes (1–3).

### 4.20.3 Switching free swing on/off

If the free swing is switched on, the swing brake remains open.



#### **WARNING**

Open swing brake!

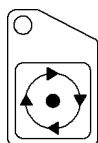
If the uppercarriage turns further than intended:

- ▶ Slow/stop the rotary movement by moving the control lever in the opposite direction.

Ensure that the following conditions are satisfied:

- Swing is stationary.
- No control lever function is active.

#### **Switching free swing on/off on control panel X23**



- ▶ Press *Free swing* button.

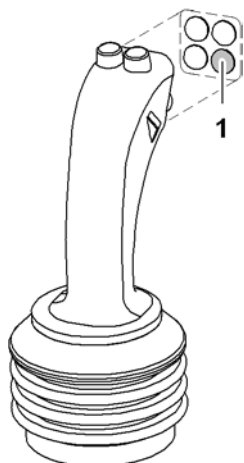
- ▷ Free swing is switched on.
- ▷ The *Free swing* symbol appears in the status display of the monitor:



Fig. 939 *Free swing* symbol

- ▶ Press the *Free swing* button again.
  - ▷ Free swing is switched off.
  - ▷ The *Free swing* symbol disappears from the monitor status display.

**Switching free swing on/off using multi-directional joystick**

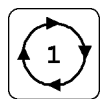


*Fig. 940 Left-hand multi-directional joystick*

**1 Free swing button**

Free swing is active for as long as you hold down the *Free swing* button.

- ▶ Press and hold the *Free swing* button.
  - ▷ Free swing is switched on.
  - ▷ The *Free swing* symbol appears in the status display of the monitor:



*Fig. 941 Free swing symbol*

- ▶ Release the *Free swing* button.
  - ▷ Free swing is switched off.
  - ▷ The *Free swing* symbol disappears from the monitor status display.

## 4.21 Main boom

The main boom is adjusted using the boom winch.

The adjustment range of the main boom can also be limited by the radius limiter, limit switch or load moment limiter.

### 4.21.1 Adjusting the main boom

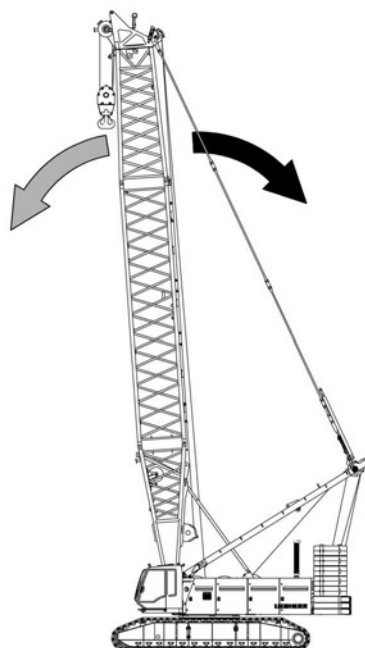


Fig. 942 Adjusting the main boom

Ensure that the following conditions are satisfied:

- No limit switch is active and blocking a movement.
- There are no persons or obstacles in the danger zone.



#### Adjusting the main boom using the multi-directional joystick

Procedure on a machine with two multi-directional joysticks.

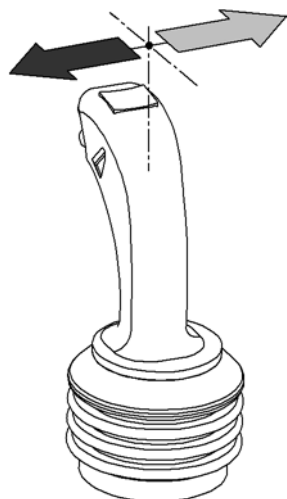


Fig. 944 Right-hand multi-directional joystick

- ▶ Push the right multi-directional joystick to the left.
  - ▷ The main boom rises.
  - ▷ The vibration button on the multi-directional joystick vibrates.
- ▶ Move the right multi-directional joystick back to the neutral position.
  - ▷ Main boom stops moving.
- ▶ Push the right multi-directional joystick to the right.
  - ▷ The main boom lowers.
  - ▷ The vibration button on the multi-directional joystick vibrates.



### Adjusting the main boom using the multi-directional joystick

Procedure on a machine with a multi-directional joystick and a double T-lever.

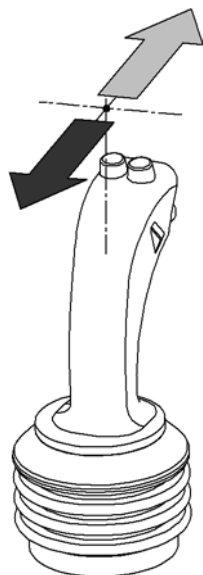


Fig. 946 Left-hand multi-directional joystick

- ▶ Push the left multi-directional joystick forwards.
  - ▷ The main boom lowers.
  - ▷ The vibration button on the multi-directional joystick vibrates.



- ▶ Move the left multi-directional joystick back to the neutral position.
  - ▷ Main boom stops moving.
- ▶ Push the left multi-directional joystick backwards.
  - ▷ The main boom rises.
  - ▷ The vibration button on the multi-directional joystick vibrates.

## 4.22 Jib

The jib is adjusted using the jib adjusting winch.

The adjustment range of the jib can also be limited by the Load Moment Limiter, boom radius limitation or limit switch.

### 4.22.1 Select jib

The selected boom is identified on the monitor by a symbol.

The selection remains stored even after the machine is restarted.



#### Preselecting the jib on the multi-directional joystick

Procedure on a machine with two multi-directional joysticks.

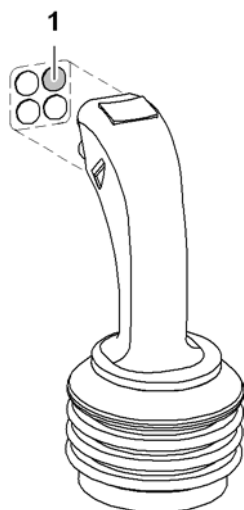


Fig. 948 Right-hand multi-directional joystick

1 Switch to luffing jib luffing winch button

- ▶ Press **Switch to luffing jib luffing winch 1** button
  - ▷ Jib luffing winch selected.
  - ▷ The *Jib luffing* symbol appears in the status display of the monitor:



Fig. 949 Jib adjustment symbol



#### Selecting jib using double T-bar control lever

Procedure on a machine with a multi-directional joystick and a double T-lever.

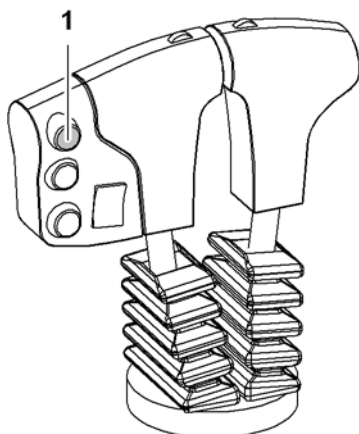


Fig. 951 Right-hand double T-lever

1 Switch to jib luffing winch button

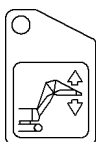
- ▶ Press Switch to luffing jib luffing winch 1 button
  - ▷ Jib luffing winch selected.
  - ▷ The *Jib luffing* symbol appears in the status display of the monitor:



Fig. 952 Jib adjustment symbol

**Select the jib on control panel X23**

- ▶ Press Switch to luffing jib luffing winch button.



- ▷ Jib luffing winch selected.
- ▷ The *Jib luffing* symbol appears in the status display of the monitor:



Fig. 954 Jib adjustment symbol

## 4.22.2 Adjusting the position of the jib

Ensure that the following conditions are satisfied:

- No limit switch is active and blocking a movement.
- There are no persons or obstacles in the danger zone.

**Adjusting the jib using the multi-directional joystick**

Procedure on a machine with two multi-directional joysticks.



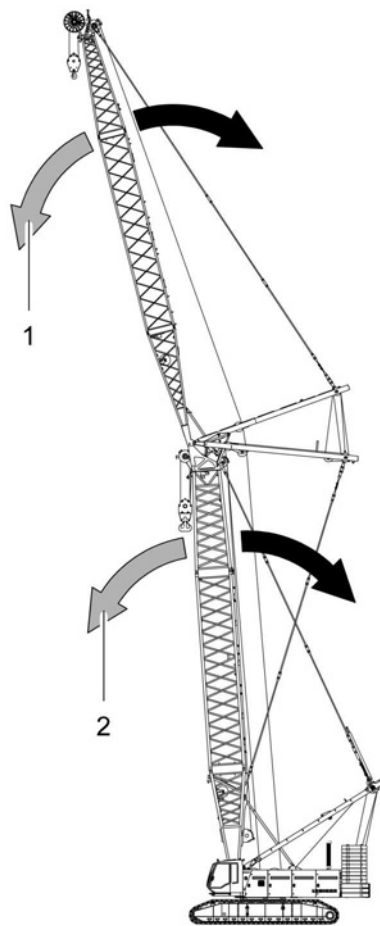


Fig. 956 Adjusting the jib or main boom

1 Jib

2 Main boom

Simultaneous adjustment of the main boom 2 and jib 1 is not possible in crane operation.

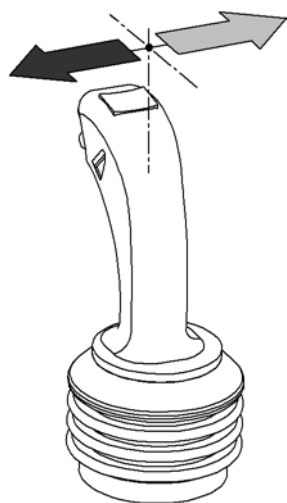


Fig. 957 Right-hand multi-directional joystick

► Push the right multi-directional joystick to the left.

- ▷ The jib starts to rise.
- ▷ The vibration button on the multi-directional joystick vibrates.
- ▶ Move the right multi-directional joystick back to the neutral position.
  - ▷ Jib stops moving.
- ▶ Push the right multi-directional joystick to the right.
  - ▷ The jib lowers.
  - ▷ The vibration button on the multi-directional joystick vibrates.



### Adjusting the jib using the double T-lever

Procedure on a machine with a multi-directional joystick and a double T-lever.

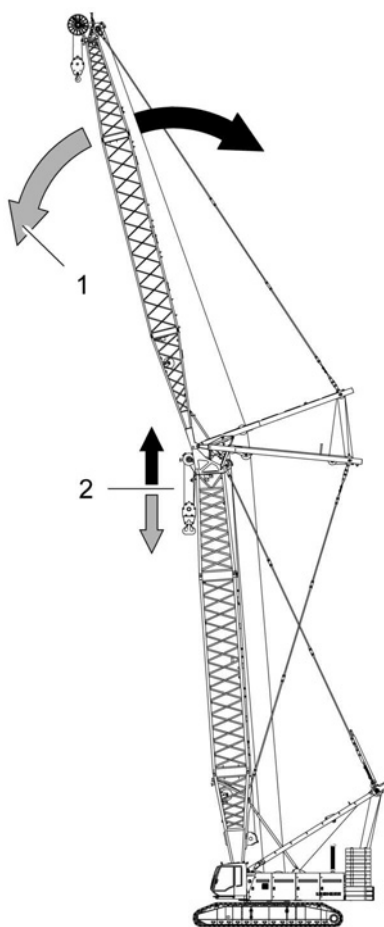
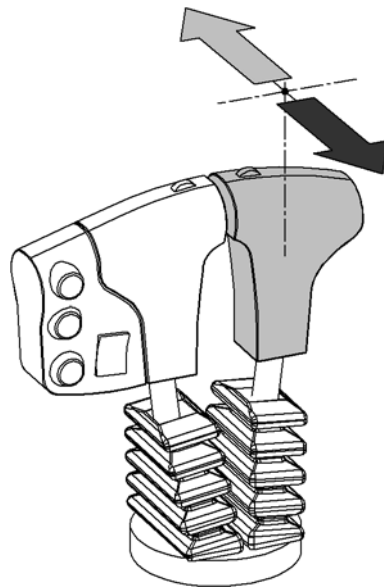


Fig. 959 Adjusting the jib or winch 2

1 Jib

2 Winch 2

Adjusting the jib 1 and winch 2 2 at the same time is not possible.



*Fig. 960 Double T control lever*

- ▶ Push the outer T-lever backwards.
  - ▷ The jib starts to rise.
  - ▷ The vibration button on the outer T-bar control lever vibrates.
- ▶ Move the outer T-lever back to the neutral position.
  - ▷ Jib stops moving.
- ▶ Push the outer T-lever forwards.
  - ▷ The jib lowers.
  - ▷ The vibration button on the outer T-bar control lever vibrates.

## 4.23 Winch 1/Winch 2

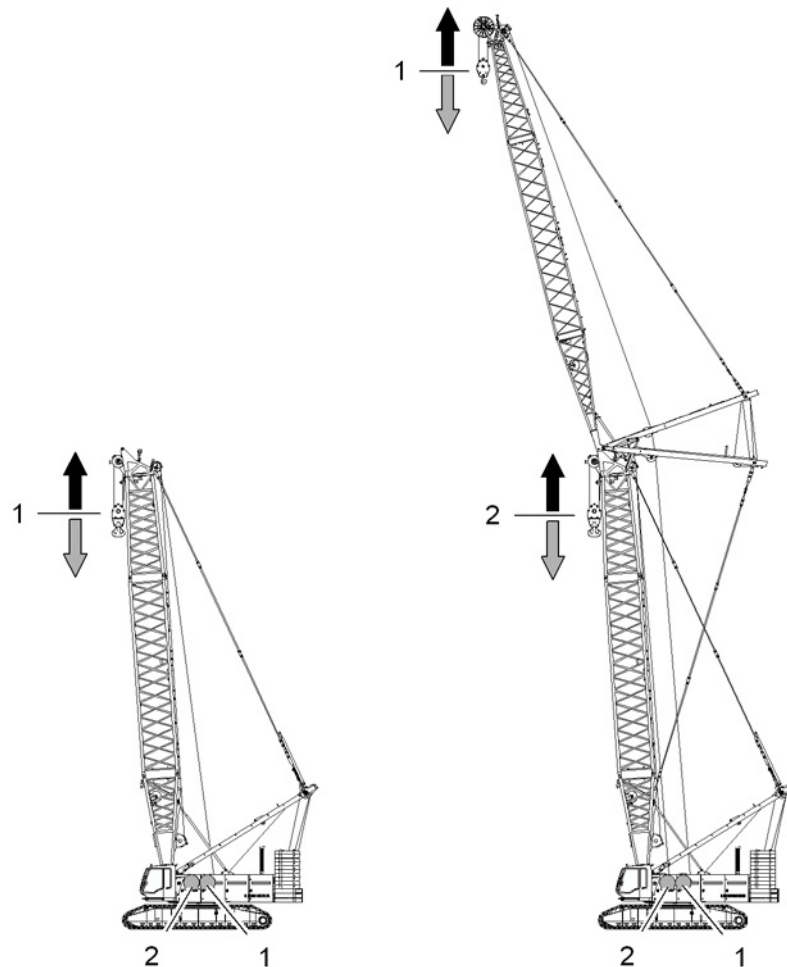


Fig. 961 Winch configuration

1 Winch 1

2 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.

### 4.23.1 Operating winch 1



#### Operating winch 1 using the multi-directional joystick

Procedure on a machine with two multi-directional joysticks.



*Fig. 963 Right-hand multi-directional joystick*

- ▶ Push the right multi-directional joystick forwards.
  - ▷ Winch 1 unwinds.
  - ▷ The vibration button on the multi-directional joystick vibrates.
- ▶ Move the right multi-directional joystick back to the neutral position.
  - ▷ Winch 1 stops moving.
- ▶ Push the right multi-directional joystick backwards.
  - ▷ Winch 1 winds up.
  - ▷ The vibration button on the multi-directional joystick vibrates.



#### Operating winch 1 using the double T-lever

Procedure on a machine with a multi-directional joystick and a double T-lever.



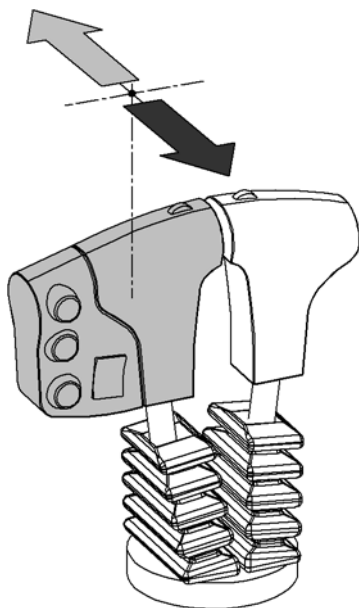


Fig. 965 Right-hand double T-lever

- ▶ Push the inner T-bar control lever forwards.
  - ▷ Winch 1 unwinds.
  - ▷ The vibration button on the inner T-bar control lever vibrates.
- ▶ Move the inner T-lever back to the neutral position.
  - ▷ Winch 1 stops moving.
- ▶ Push the inner T-bar control lever backwards.
  - ▷ Winch 1 winds up.
  - ▷ The vibration button on the inner T-bar control lever vibrates.

## 4.23.2 Operating winch 2



### Operating winch 2 using the multi-directional joystick

Procedure on a machine with two multi-directional joysticks.

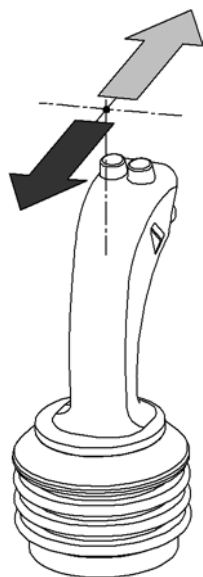


Fig. 967 Left-hand multi-directional joystick

- ▶ Push the left multi-directional joystick forwards.
  - ▷ Winch 2 unwinds.
  - ▷ The vibration button on the multi-directional joystick vibrates.
- ▶ Move the left multi-directional joystick back to the neutral position.
  - ▷ Winch 2 stops moving.
- ▶ Push the left multi-directional joystick backwards.
  - ▷ Winch 2 winds up.
  - ▷ The vibration button on the multi-directional joystick vibrates.



### Operating winch 2 using the double T-lever

Procedure on a machine with a multi-directional joystick and a double T-lever.

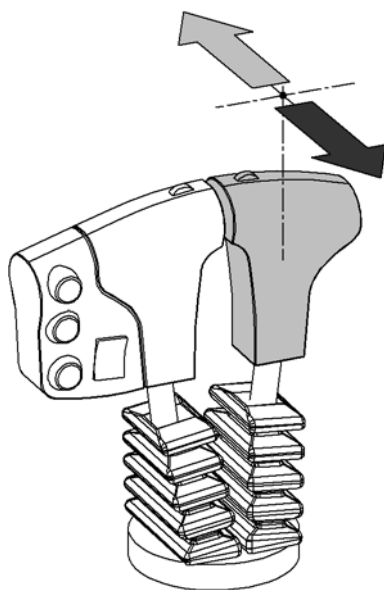


Fig. 969 Right-hand double T-lever

- ▶ Push the outer T-lever backwards.

- ▷ Winch 2 unwinds.
- ▷ The vibration button on the outer T-bar control lever vibrates.
- ▶ Move the outer T-lever back to the neutral position.
  - ▷ Winch 2 stops moving.
- ▶ Push the outer T-lever forwards.
  - ▷ Winch 2 winds up.
  - ▷ The vibration button on the outer T-bar control lever vibrates.

## 4.24 Free-fall operation\*

In free-fall operation rapid lowering of the empty hook is possible.



### DANGER

Incorrect use of free-fall operation!  
Risk of machine toppling over, structural breakdown.

- ▶ Use the free-fall operation at load position 1 (boom head section) only.
- ▶ Use free-fall operation with empty hooks only.
- ▶ All braking operations must be carried out carefully and sensitively.
- ▶ While braking the empty hook in free-fall operation, the permitted lifting capacity must not be exceeded.
- ▶ Monitor the Load Moment Limiter bar display constantly while braking.
- ▶ Ensure that free-fall operation is carried out by experienced and specially-trained personnel only.

Make sure that the machine is equipped with free-fall winches.

### 4.24.1 Switching on free-fall operation

#### NOTICE

Incorrect switching-on of the free-fall operation!  
Damage to the hydraulic system.

- ▶ Only actuate the *free-fall operation* gate valve when the diesel engine is switched off.

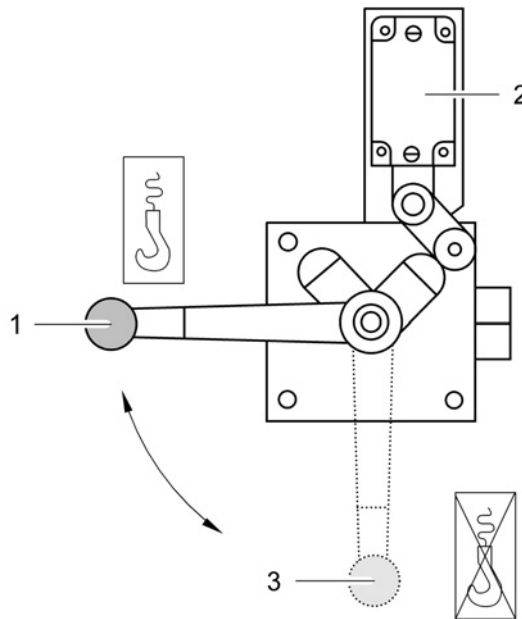


Fig. 970 Switching on free-fall operation

1 "On" position

3 "Off" position

## 2 Limit switches

- ▶ Set the *free-fall operation* gate valve to “ON”.
  - ▷ The limit switch **2** tells the Litronic control system that free-fall operation has been switched on.

### 4.24.2 Selecting free-fall operation mode

Ensure that the *free-fall operation* gate valve is in the “ON” position.

#### Selecting secured free-fall operation

Secured free-fall mode is selected by default.

- ▶ Have the key for control panel X12 handed over by an authorised person.
- ▶ Unlock control panel X12.



When the lamp in the *Unsecured free-fall operation* switch lights up:

- ▶ Actuate the *unsecured free-fall operation* switch on the control panel X12.
  - ▷ Secured free-fall mode selected.
  - ▷ The *Secured free-fall operation* symbol appears on the monitor status bar:



Fig. 972 Secured free-fall operation symbol

- ▶ Lock control panel X12 and remove the key.
- ▶ Ensure that the key is kept by an authorised person outside of the cab.

#### Selecting unsecured free-fall operation

- ▶ Have the key for control panel X12 handed over by an authorised person.
- ▶ Unlock control panel X12.
- ▶ Actuate the *unsecured free-fall operation* switch on the control panel X12.



- ▷ Unsecured free-fall mode is selected.
- ▷ The *Unsecured free-fall operation* symbol appears on the monitor status bar:



Fig. 974 Unsecured free-fall mode symbol

- ▶ Lock control panel X12 and remove the key.
- ▶ Ensure that the key is kept by an authorised person outside of the cab.

### 4.24.3 Operating free-fall operation

Ensure that the following conditions are satisfied:

- Gate valve is in the "ON" position.

The following sequence and procedure must be adhered to.

- ▶ Press and hold the *Free-fall* button on control panel X23.



Assigned functions of the foot pedals on a machine with two multi-directional joysticks.

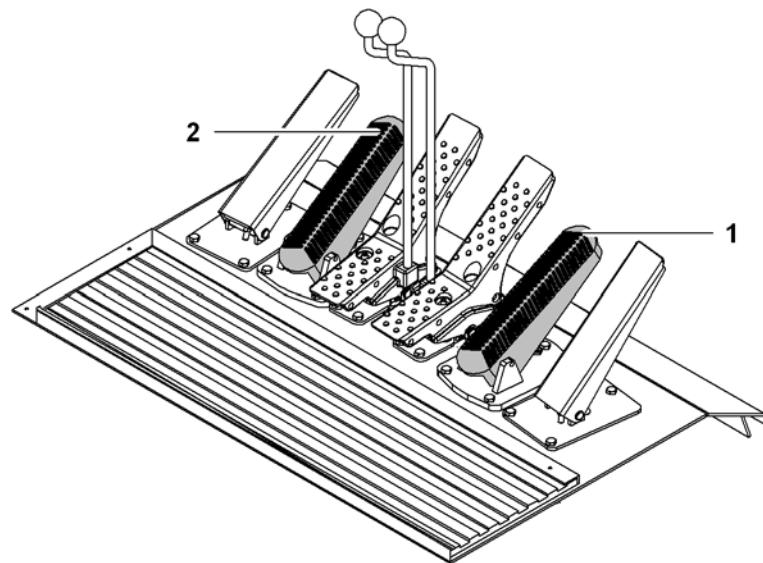


Fig. 977 Foot pedals

- 1 Brake pedal for *free-fall winch 1*      2 Brake pedal for *free-fall winch 2*



Assigned functions of the foot pedals on a machine with a multi-directional joystick and a double T-lever.

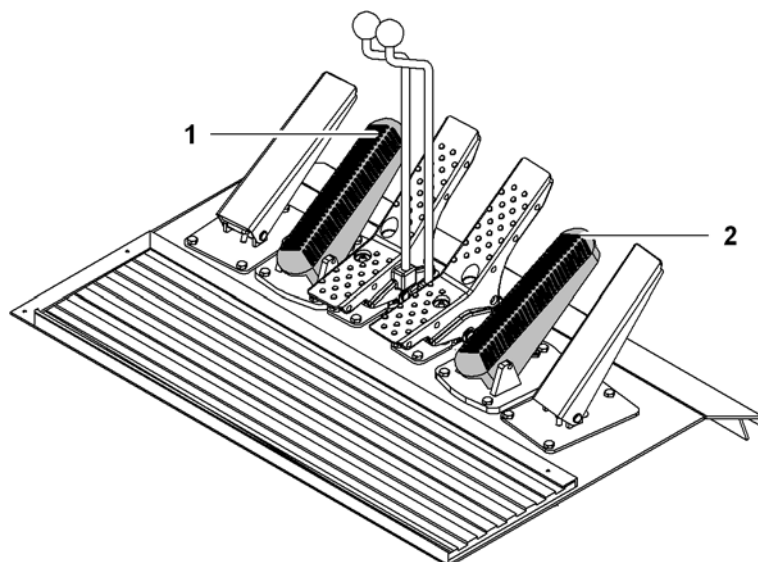


Fig. 979 Foot pedals

1 Brake pedal for *free-fall winch 1*      2 Brake pedal for *free-fall winch 2*

- ▶ Fully depress the *Free-fall winch 1* brake pedal 1.
  - ▷ The *Free-fall winch 1* symbol appears on the monitor status display:



Fig. 980 Free-fall winch 1 symbol

- ▶ Fully depress the *Free-fall winch 2* brake pedal 2.
  - ▷ The *Free-fall winch 2* symbol appears on the monitor status display:



Fig. 981 Free-fall winch 2 symbol

When one of the symbols appears on the monitor:

- ▶ Release the *Free-fall* button on control panel X23.



**WARNING**

Opened free-fall brake is in unsecured free-fall operation 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.

- ▶ Hold the empty hook in position by completely depressing the brake pedal.

Lifting an empty hook in free-fall:

- ▶ Move the appropriate control lever. The brake pedal can be released although this is not necessary.

---

## Troubleshooting

The load cannot be raised?

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 at a stop.

- ▶ Apply more pressure to the brake pedal.

If the problem persists:

- ▶ Contact Liebherr after sales service.
- 



---

## CAUTION

Hoist rope overruns!

Slacking of the rope

Loose and irregular winding on the free-fall winch.

3 rope windings limit switch and rope measuring system altered.

- ▶ Stop the free-fall winch with the appropriate brake pedal immediately the empty hook reaches the ground.
- 

To lower an empty hook in free-fall:

- ▶ Release the free-fall brake by releasing the corresponding brake pedal.

To stop an empty hook in free-fall:

- ▶ Press the brake pedal for the appropriate winch.
  - ▷ The winch is braked until it comes to a stop.

## 4.24.4 Switching off/locking free-fall operation

Ensure that the winches are completely stationary.



---

## DANGER

Winches will turn when the safety lever is moved to the 'up' position!

Free-fall operation is not locked.

- ▶ Make sure that winches are stationary before the safety lever is moved to the 'up' position.
- 

- ▶ Move the safety lever up.
- ▶ Set the *free-fall operation* gate valve to "OFF".
  - ▷ Free-fall operation is locked.
  - ▷ The free-fall operation symbols will disappear from the monitor status display.



## 4.25 Winch synchronisation\*

Winch synchronisation involves synchronising the rope speeds of winches 1 and 2.

Winch synchronisation is used:

- when two ropes are reeved on one hook.
- when working with crossbars.

Ensure that the following conditions are satisfied:

- Winch synchronisation is installed.
- There is a rope of the same length on each winch.

### 4.25.1 Switching on and operating winch synchronisation

Ensure that both winches are completely stationary.

---

#### NOTICE

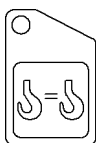
“Lowering” and “Lifting” the boom winch when winch synchronisation is switched on:

Tilting of the hook or the crossbar.

- ▶ Operate the “Lowering” or “Lifting” functions of the boom winch at the same time as the “Lifting” or “Lowering” functions of winch 1/2.
- 

#### Switching winch synchronisation on/off on control panel X23

- ▶ Press *Winch synchronisation* button.



- ▷ Winch synchronisation switched on.
- ▷ The *Winch synchronisation* symbol appears in the status display of the monitor:



Fig. 983 Winch synchronisation symbol

- ▶ Push the right-hand multi-directional joystick forwards or backwards.
  - ▷ Winches 1 and 2 will move simultaneously.

Winch synchronisation remains activated even after the winches have come to a stop.

- ▶ Press *Winch synchronisation* button again.
  - ▷ Winch synchronisation switches off.
  - ▷ The *Winch synchronisation* symbol disappears from the monitor status display.



#### Switching winch synchronisation on/off using the multi-directional joystick

Procedure on a machine with two multi-directional joysticks.

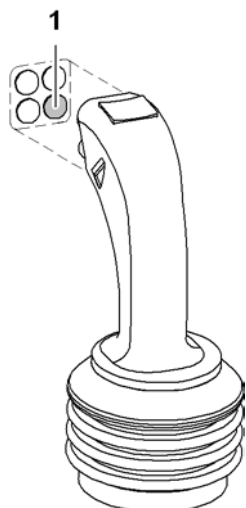


Fig. 985 Right-hand multi-directional joystick

**1** Winch synchronisation button

- ▶ Press and hold the *Winch synchronisation 1* button.
  - ▷ Winch synchronisation switched on.
  - ▷ The *Winch synchronisation* symbol appears in the status display of the monitor:



Fig. 986 Winch synchronisation symbol

- ▶ Push the right-hand multi-directional joystick forwards or backwards.
  - ▷ Winches 1 and 2 will move simultaneously.



**Note**

Winch synchronisation remains active until both winches come to a stop.

- ▶ Once the winches come to a stop, switch winch synchronisation back on by pressing the *Winch synchronisation 1* button.

- ▶ Release the *Winch synchronisation 1* button.
  - ▷ Winch synchronisation switches off.

**Switching winch synchronisation on/off using double T-lever**

Procedure on a machine with a multi-directional joystick and a double T-lever.



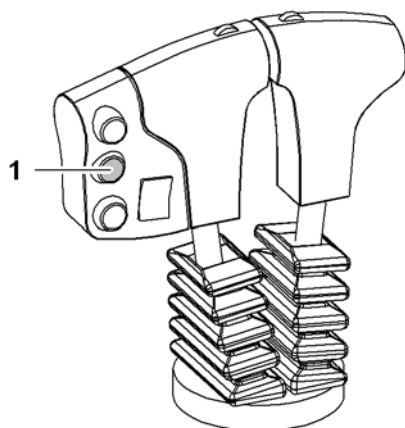


Fig. 988 Right-hand double T-lever

**1** Winch synchronisation button

- ▶ Press *Winch synchronisation 1* button.
  - ▷ Winch synchronisation switched on.
  - ▷ The *Winch synchronisation* symbol appears in the status display of the monitor:



Fig. 989 Winch synchronisation symbol

- ▶ Push the inner T-lever forwards or backwards.
  - ▷ Winches 1 and 2 will move simultaneously.



**Note**

Winch synchronisation remains active until both winches come to a stop.

- ▶ Once the winches come to a stop, switch winch synchronisation back on by pressing the *Winch synchronisation 1* button.
- 
- ▶ Release the *Winch synchronisation* button.
    - ▷ Winch synchronisation switches off.

## 4.26 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.

Blocked crawlers:

- extends the tipping line.
- increases the lifting capacity.
- limits the swing range of the uppercarriage.
- prohibits movement of the machine.
- 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).

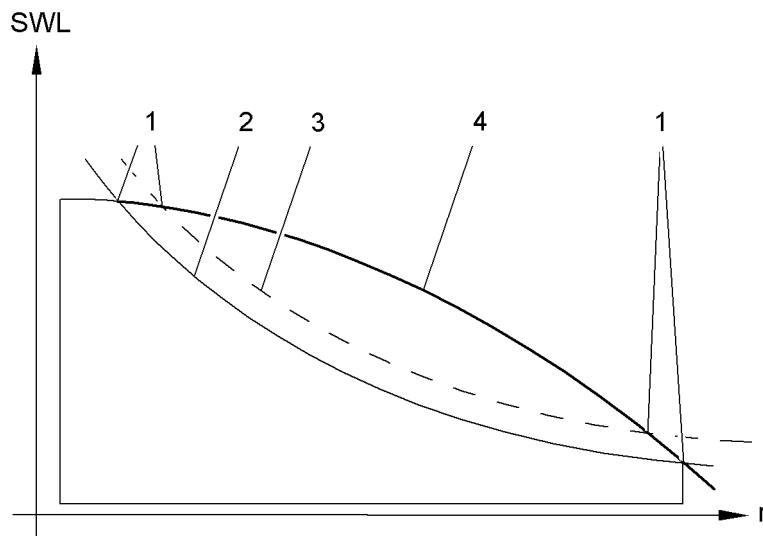


Fig. 990 Diagram

- |  |  |
|--|--|
| <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 numbers.

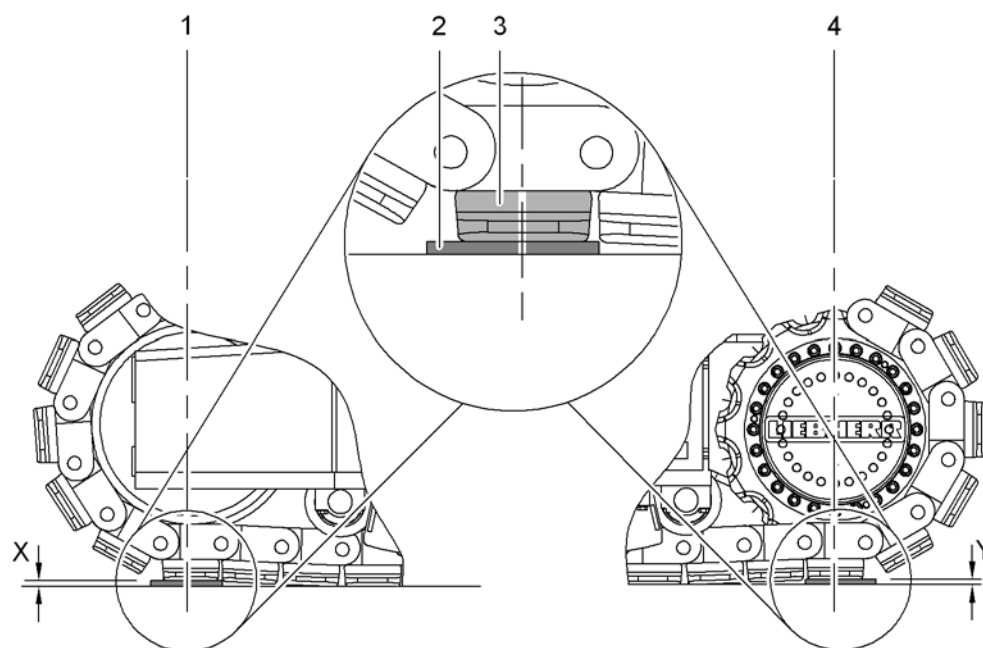


Fig. 991 Positioning of the support plates

- 1 Center line of idler
- 2 Support plate
- 3 Ground plate
- 4 Center line of tumbler

Model	Idler X	Tumbler Y
LR1100	0.79" in	0.79" in
LR1130	0.98" in	0.98" in
LR1160	0.79" in	0.79" in
LR1200	0.87" in	0.59" in
LR1280	0.87" in	0.59" in
LR1300	0.98" in	0.67" in

Tab. 206 Positioning of the support plates

### 4.26.1 Driving onto the support plates



**DANGER**

Inappropriate driving onto support plates!  
Machine toppling over.

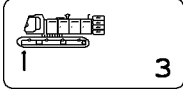
- ▶ The left and right base plates of the crawler side frames must be positioned exactly the same so they are both driven onto the support plates at the same time.
- ▶ Equalise the crawler position on both sides simultaneously. When necessary, move the crawlers towards one another.
- ▶ Place support plates in front of the crawler side frames.
- ▶ Move precisely onto the support plates (see: fig. 991, page 501) .

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- ▶ Lock and disable the crawlers (For more information see: 4.19.3 Crawler deactivation\*, page 474) .



- ▶ Press the *Setup screen* button.
  - ▷ The *Setup screen* screen page appears on the monitor.



- ▶ In the *Track width adjustment* input field, select the *Blocked Crawlers* setting.



- ▶ Press the *Confirm input* button.
  - ▷ The setup is recalculated.

## 4.26.2 Working with Blocked Crawlers

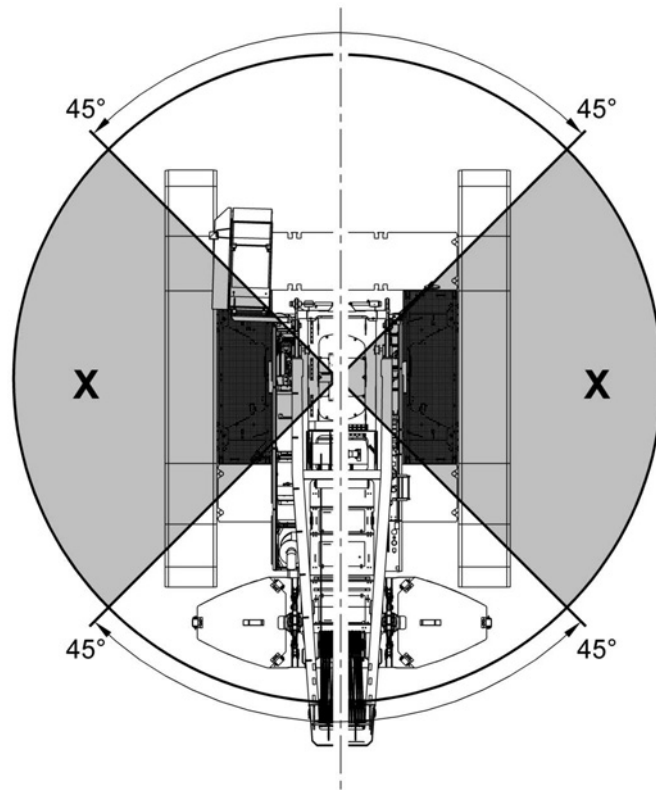


Fig. 995 Limitation of swing angle

X Blocked area



### DANGER

Uppercarriage swing angle is too great!  
Machine toppling over.

- ▶ Rotation is permitted only up to an angle of  $\pm 45^\circ$  from the direction of the crawler side frames.
- ▶ Do not move into the blocked area X.

In EU load charts, the swing movement will be automatically restricted via the swing angle transmitter.

In ANSI load charts, responsibility for rotation lies with the machine operator.

## 4.27 Assembly cylinder



### CAUTION

Individuals in the swing range of the assembly cylinder!

- ▶ Ensure that there is nobody in the swing range of the assembly cylinder.
- ▶ Leave the danger area.

### 4.27.1 Operating the assembly cylinder



#### Operating assembly cylinder using the multi-directional joystick

Procedure on a machine with two multi-directional joysticks.

- ▶ Press the *Assembly cylinder* button on control panel X23.

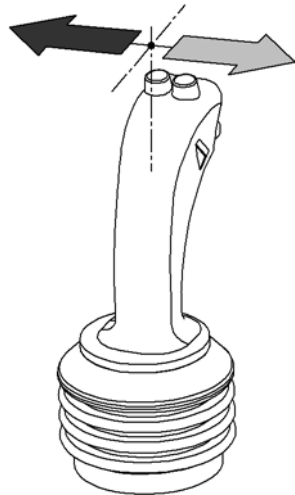
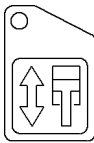


Fig. 998 Left-hand multi-directional joystick

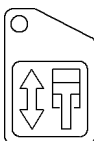
- ▶ Move the left-hand multi-directional control lever to the right.
  - ▷ The assembly cylinder retracts.
- ▶ Push the left multi-directional joystick to the left.
  - ▷ The assembly cylinder extends.



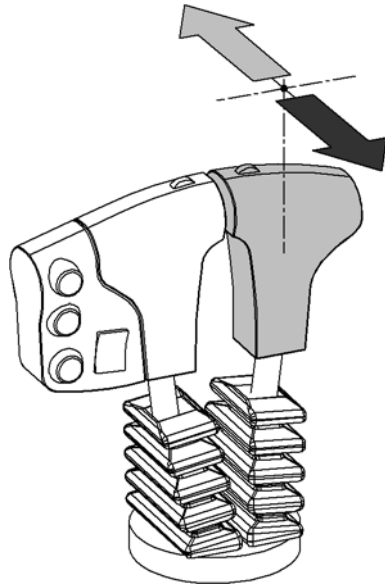
#### Operating assembly cylinder using the double T-lever

Procedure on a machine with a multi-directional joystick and a double T-lever.

- ▶ Press the *Assembly cylinder* button on control panel X23.







*Fig. 1001 Right-hand double T-lever*

- ▶ Push the outer T-lever backwards.
  - ▷ The assembly cylinder retracts.
- ▶ Push the outer T-lever forwards.
  - ▷ The assembly cylinder extends.

## 4.28 Filling the machine with fuel

### 4.28.1 Filling machines with fuel from a tanker

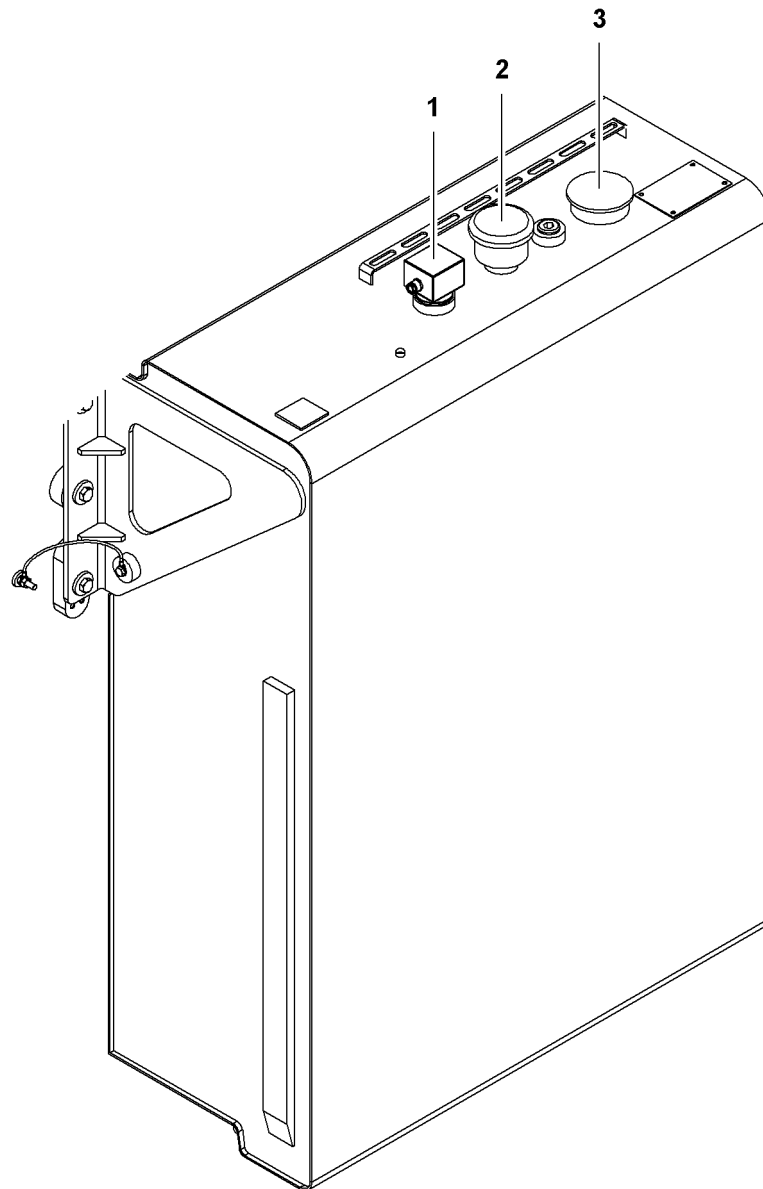


Fig. 1002 Filling the machine with fuel

- |   |                      |   |            |
|---|----------------------|---|------------|
| 1 | Fuel level indicator | 3 | Tank cover |
| 2 | Air filter           |   |            |

- ▶ Switch off the diesel engine.
- ▶ Direct the tanker to the refuelling point.
- ▶ Unlock and remove the tank cover 3.
- ▶ Check the filler screen underneath for dirt, clean and replace if necessary.

- ▶ Fill tank with the appropriate fuel according to the season (summer or winter diesel) (For more information see: 9.2.5 Fuel, page 939) .
- ▶ Replace the tank cover and relock it.

## 4.28.2 Filling the machine with fuel from a refuelling pump

---

### NOTICE

Incorrect refuelling pump is used!

Risk of damage to the refuelling pump.

- ▶ Refuelling pump must only be used for pumping fuel.
  - ▶ Use only the suction hose supplied.
  - ▶ Ensure that the refuelling pump does not run dry.
- 
- ▶ Switch off the diesel engine and then switch the ignition back on again.
  - ▶ Get the fuel tank ready for refuelling and open the middle, right-hand side door.
  - ▶ Remove the cover from the refuelling pump.
  - ▶ Attach suction hose to the refuelling pump connector.
  - ▶ Totally immerse the other end of the hose with the fuel filter in the fuel.
  - ▶ Press the *Pump ON (green)* button on the control panel.
    - ▷ Pump begins to run.
    - ▷ As soon as the maximum filling capacity is reached, the refuelling pump shuts off automatically.
  - ▶ Remove the suction hose from the refuelling pump and hold it up, allowing the remaining fuel to flow back into the fuel tank.
  - ▶ Roll up the suction hose and stow it away.
  - ▶ Replace the cover on the refuelling pump.

## 4.29 Radio remote control\*

### 4.29.1 rechargeable battery

The battery's service life depends on its age and the ambient temperature. Older batteries lose power over time. At temperatures below 32 °F the battery will not reach its full capacity.

---

**NOTICE**

Incorrect handling of rechargeable battery!  
Risk of damage to the rechargeable battery.

- ▶ Completely charge the battery before first use.
  - ▶ Only recharge the battery after it has been completely drained.
  - ▶ Protect the charger against overheating, dust and humidity.
  - ▶ Only store the charger at room temperature (68 °F).
  - ▶ When putting into storage, use the protective caps provided.
  - ▶ Charge the battery before use if it has been stored for a long time.
- 

### 4.29.2 battery charger

---

**NOTICE**

Incorrect handling of the battery charger!  
Risk of damage to the battery charger or rechargeable battery.

- ▶ Protect the charger against overheating, dust and humidity.
- ▶ Do not make any technical modifications to the charger or power cable.

If a defect occurs in the charger or power cable:

- ▶ Take the battery charger out of service immediately.
  - ▶ Ensure that repairs are carried out by qualified personnel only.
- 

### Charging the rechargeable battery with a battery charger

---

**NOTICE**

Incorrect charging of the rechargeable battery!  
Risk of damage to the battery charger or rechargeable battery.

- ▶ The FLG 11 0B battery charger must only be used for charging FuB 10 AA and FuB 10 XL type batteries.
  - ▶ Only use the battery charger at the permitted mains voltage (marking on the bottom of the battery charger).
  - ▶ Operate the charger in enclosed spaces only.
  - ▶ Only operate the charger at room temperature (68 °F).
  - ▶ Do not cover the charger while it is in use.
- 

- ▶ Plug the charger connector plug into the power source.

Double-check that the polarity of the battery is correct.

- ▶ Insert the battery into the charging slot with the writing facing outwards.
- ▷ Charging begins automatically.

### 4.29.3 Commissioning the radio remote control

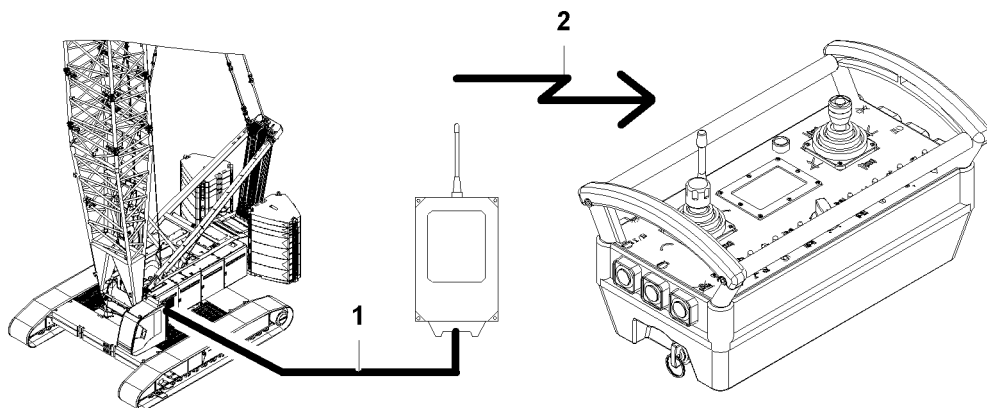


Fig. 1003 Principle of operation by remote control

- |  |  |
|--|--|
| <p><b>1</b> Connection established between radio receiver (receiver module in the machine) and machine control, or connection is faulty.</p> | <p><b>2</b> Connection between radio transmitter (control panel) and radio receiver (receiver module on the machine) established, or faulty.</p> |
|--|--|



#### WARNING

Improper use of the radio remote control!

- ▶ Select a position from where the entire working area can be seen.
- ▶ Choose a site where visual contact with the machine and the load can be maintained at all times.
- ▶ Switch off the radio transmitter during work breaks, and when work is finished.
- ▶ Do not leave a radio transmitter that is switched on lying around.
- ▶ Remain outside the danger zone.
- ▶ Ensure that only authorised and instructed persons operate the radio remote control.



#### WARNING

Malfunctions or defects when using the radio remote control will result in insufficient operational safety and reliability!

- ▶ Set the radio remote control.
- ▶ Switch off the radio transmitter.
- ▶ Ensure that the radio transmitter cannot be accessed by unauthorised persons.
- ▶ Cancel the *Radio remote control* selection on control panel X12.
- ▶ Contact Liebherr after sales service.



## WARNING

Ignoring error messages on the remote control display!

If an error message appears on the remote control display:

- ▶ Set the radio remote control.
- ▶ Read and resolve any error messages on the monitor in the operator's cab.

It normally requires some time to become accustomed to using a radio remote control unit:

- The machine's reactions will not be felt as clearly as they are from the operator's cab.
- The movement direction may be confusing depending on location and viewpoint.

Ensure that the machine operating manual, and measures and instructions relating to operational safety and points of general safety and accident prevention in particular have been read in full and understood.

## Preparing the machine for radio remote control

Ensure that the following conditions are satisfied:

- Crane operation is selected.
- Ignition is switched off.
- Safety lever is lowered.
- ▶ Have the key for control panel X12 handed over by an authorised person.
- ▶ Unlock control panel X12.
- ▶ Press the *Radio remote control* switch on the control panel X12.
  - ▷ The function of the ignition key on the machine is replicated on the key switch on the radio remote control.
  - ▷ The control levers in the cab are deactivated.
  - ▷ The monitor in the cab is activated to display any error messages that may occur.
- ▶ Lock control panel X12 and remove the key.
- ▶ Ensure that the key is kept by an authorised person outside of the cab.



## Preparing and switching on the radio remote control

Ensure that the following conditions are satisfied:

- The control panel for the radio remote control has a charged battery and is ready to use.
- All controls are in the neutral position.
- ▶ Switch on the key switch on the radio remote control.
  - ▷ Connection established between radio transmitter and radio receiver:

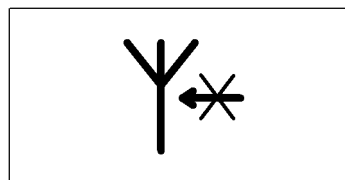


Fig. 1005 Screen page for Establishing remote connection/ error

- ▷ If a connection is successfully made, then the screen page *Remote connection confirmation* appears:

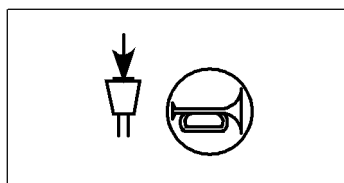


Fig. 1006 Remote connection confirmation screen page

- ▶ Press the *Horn* button.
  - ▷ The machine control is switched on.
  - ▷ Connection established between radio receiver and machine control:

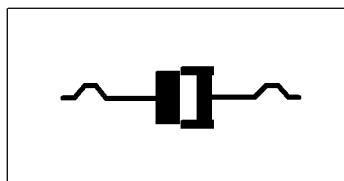


Fig. 1007 Screen page for Establishing machine control connection/ error

- ▷ If a connection is successfully made, then either mode screen 1 or mode screen 2 appears on the control panel display for the radio remote control:

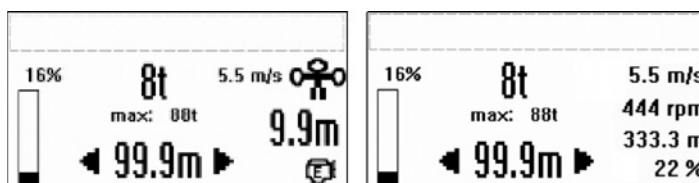


Fig. 1008 Mode screen 1 or mode screen 2 after a successful connection has been made

- ▷ The *Preheat* symbol appears on the display:



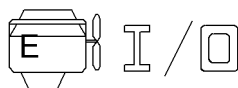
Fig. 1009 Preheat symbol

- ▶ Change the mode screen using the *mode screen* rotary switch where needed.

## Starting/stopping the diesel engine

Ensure that the *Pre-heat installation active* symbol goes out.

- ▶ Press the *Diesel engine* button.
  - ▷ The diesel engine is started.
  
- ▶ Press the *Diesel engine* button again.
  - ▷ The diesel engine is switched off.



## Taking/ceding control

Ensure that all operating elements are in the neutral position.

### Taking/ceding control on the control panel for the radio remote control



▶ Press the *Take/cede control* button on the control panel of the radio remote control.

- ▷ Control over the machine functions is suspended.
- ▷ All machine functions are stopped.
- ▷ The *Control ceded* symbol appears in the control panel display for the radio remote control:



Fig. 1012 Control ceded symbol

- ▷ The *Radio remote control active* symbol flashes on the monitor in the cab:



Fig. 1013 Radio remote control active symbol



▶ Press the *Take/cede control* button on the control panel of the radio remote control again.

- ▷ Control over the machine functions is no longer suspended and is set to the control panel of the radio remote control.
- ▷ The *Control ceded* symbol disappears from the control panel display for the radio remote control:



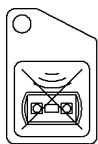
Fig. 1015 Control ceded symbol

- ▷ The *Radio remote control active* symbol appears on the monitor in the cab:



Fig. 1016 Radio remote control active symbol

### Taking/ceding control in the operator's cab



▶ Press the *Take/cede control* button on control panel X23.

- ▷ Control over the machine functions is suspended.
- ▷ All machine functions are stopped.
- ▷ The *Control ceded* symbol appears in the control panel display for the radio remote control:



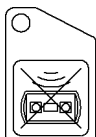


Fig. 1018 Control ceded symbol

- ▷ The *Radio remote control active* symbol flashes on the monitor in the cab:



Fig. 1019 Radio remote control active symbol



- ▶ Press the *Take/cede control* button on control panel X23 again.

- ▷ Control over the machine functions is no longer suspended and is set to the operating elements in the operator's cab.
- ▷ The *Control ceded* symbol appears in the control panel display for the radio remote control:



Fig. 1021 Control ceded symbol

- ▷ The *Radio remote control passive* symbol appears on the monitor in the cab.



Fig. 1022 Radio remote control passive symbol

## Connection interruptions

### Connection interruptions of less than 8 seconds

Control over the crane functions is from the control panel of the radio remote control.

- ▶ Radio connection is interrupted.
  - ▷ Winches, swing and crawlers are disabled.
  - ▷ Movements are braked using integration times.
  - ▷ The screen pages *Establishing remote connection/ error* or *Establishing machine control connection/ error* appear in the control panel display for the radio remote control:

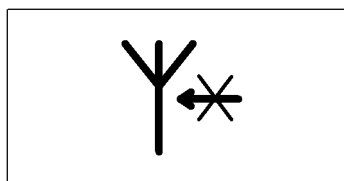


Fig. 1023 Screen page for *Establishing remote connection/ error*

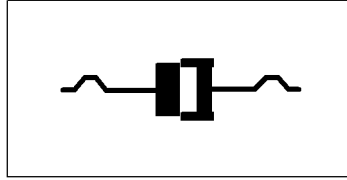


Fig. 1024 Screen page for Establishing machine control connection/ error

- ▷ The *Connection interruption* symbol flashes above the *Radio remote control active* symbol on the monitor in the cab:



Fig. 1025 Connection interruption symbol

- ▶ Radio remote control is automatically re-established within 8 seconds.
- ▶ Put all operating elements in the neutral position.
  - ▷ Machine functions are enabled.

## Interruption longer than 8 seconds

Control over the crane functions is from the control panel of the radio remote control.

- ▶ Connection interruption lasts longer than 8 seconds.
  - ▷ The radio remote control receiver triggers the emergency cut-off.
  - ▷ The screen pages *Establishing remote connection/ error* or *Establishing machine control connection/ error* appear in the control panel display for the radio remote control:

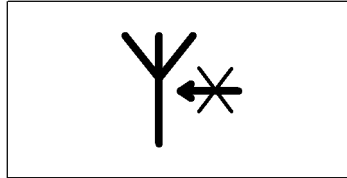


Fig. 1026 Screen page for Establishing remote connection/ error

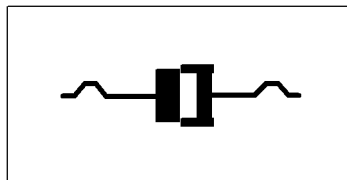


Fig. 1027 Screen page for Establishing machine control connection/ error

- ▷ The *Connection interruption* symbol flashes above the *Radio remote control active* symbol on the monitor in the cab:



Fig. 1028 Connection interruption symbol

- ▶ Radio remote control connection is automatically re-established.
  - ▷ The *Remote connection confirmation* screen page appears on the control panel display for the radio remote control:

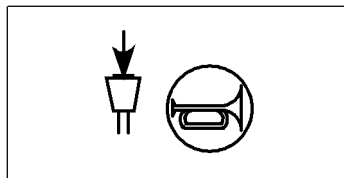


Fig. 1029 Remote connection confirmation screen page

- ▶ Press the *Horn* button.
  - ▷ The machine control is switched on.
  - ▷ Connection established between radio receiver and machine control:

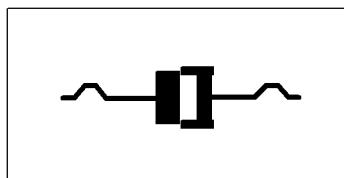


Fig. 1030 Screen page for Establishing machine control connection/ error

- ▷ If a connection is successfully made, then either mode screen 1 or mode screen 2 appears on the control panel display for the radio remote control:

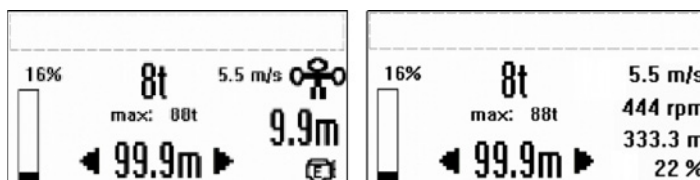
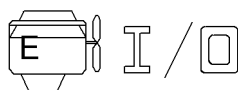


Fig. 1031 Mode screen 1 or mode screen 2 after a successful connection has been made



- ▶ Press the *Diesel engine* button.
  - ▷ The diesel engine is started.

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## 4.30 Rope measuring system\*

The rope measuring system:

- displays the calculated rope length between the boom head and the hoisted load on the crane operation screen.
- keeps the machine operator constantly informed of the exact position of the hoisted load
- is displayed separately for each winch.

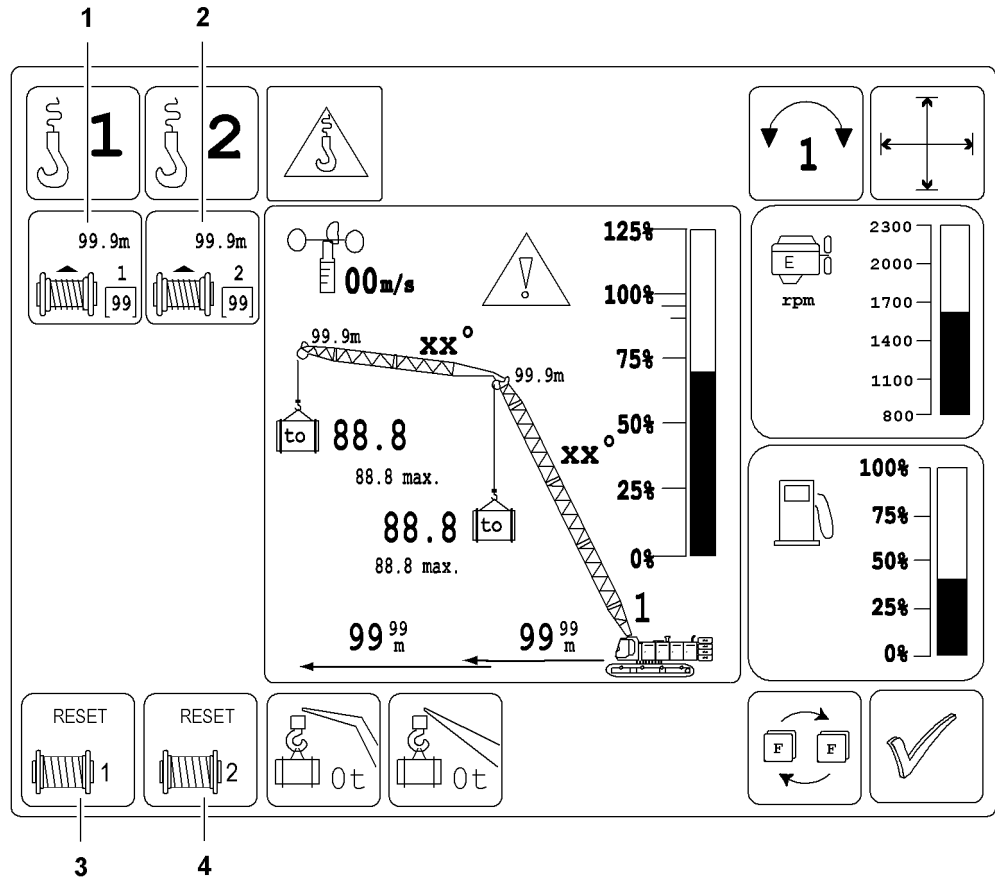


Fig. 1033 Rope measuring system

- |   |   |   |   |
|---|---|---|---|
| 1 | Symbol Rope length and reeving, winch 1 | 3 | Reset rope measuring system, winch 1 button |
| 2 | Symbol Rope length and reeving, winch 2 | 4 | Reset rope measuring system, winch 2 button |

### 4.30.1 Initialise rope measuring system



- ▶ Press the *Change function key symbols* button until the function key symbols for the rope measuring system appear.



- ▶ Press the *Reset rope measuring system, winch 1* button
  - ▷ Rope measuring system for winch 1 is initialised.



- ▶ Press the *Reset rope measuring system, winch 2* button.
- ▷ Rope measuring system for winch 2 is initialised.

### 4.30.2 Programming a 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.

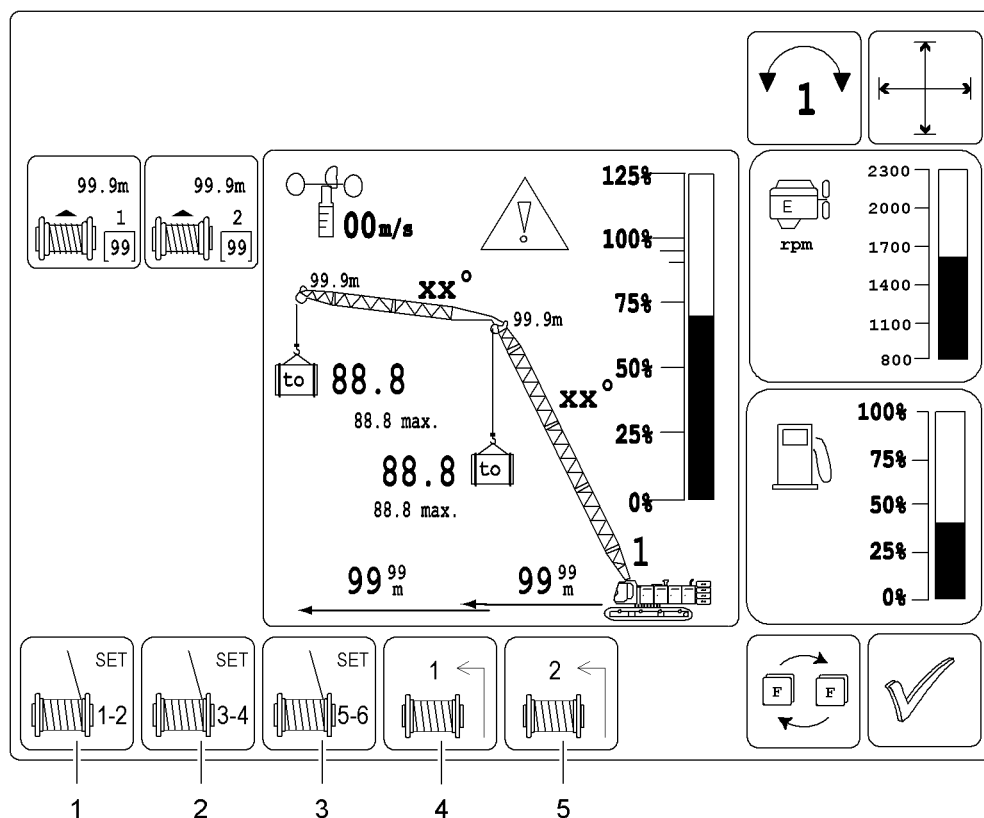


Fig. 1037 Programming a layer change

- |   |                                 |   |   |
|---|---------------------------------|---|---|
| 1 | Program layer change 1-2 button | 4 | Layer change preselection, winch 1 button |
| 2 | Program layer change 3-4 button | 5 | Layer change preselection, winch 2 button |
| 3 | Program layer change 5-6 button |   |   |

Ensure that the following conditions are satisfied:

- An assistant is available.
- Unobstructed eye contact between the assistant and the machine operator.

#### Example: Programming layer change 5-6 for winch 1



- ▶ Press the *Change function symbols* button until the layer change programming function key symbols appear.
- ▶ Operate winch 1 until the rope moves from the 5th layer to the 6th layer.



- ▶ Stop winch 1 precisely at the layer change.
- ▶ Press the *Winch 1 layer change preselection* button
  - ▷ Layer change preselection stays active for 3 seconds.



- ▶ Press *Program layer change 5-6* button.
  - ▷ The layer change is programmed.

## 4.31 Ground pressure display\*

### 4.31.1 Operating the ground pressure display



#### DANGER

Ground has a limited bearing strength!  
Machine toppling over.

- ▶ Refer to the safety guidelines and information in the “Assembly site” chapter (For more information see: 6.2 Assembly site, page 560) .
- ▶ On ground with a limited capacity, monitor the ground pressure display as the load is lifted from the ground.

The ground pressure display on the crane operation screen displays the ground pressure calculated by the control in XX psi irrespective of the position of the uppercarriage.

The values displayed are maximum values given the current load and radius:

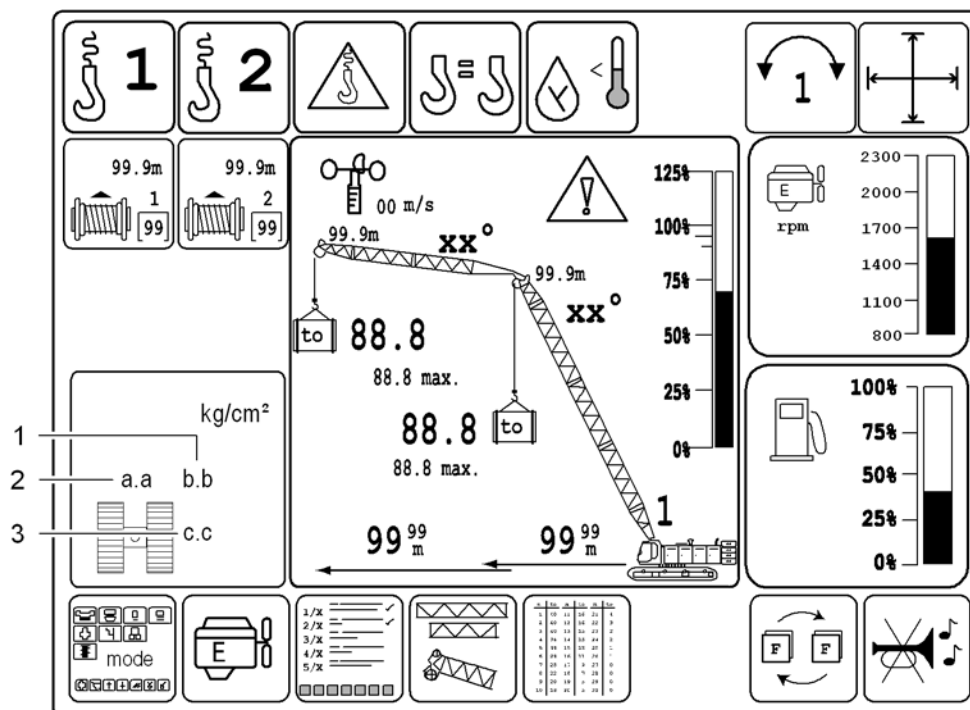


Fig. 1041 Ground pressure display

- 1 Maximum value around a corner      3 Maximum sideways value  
2 Maximum forwards value

- **a.a:** Uppercarriage swung in direction of travel or in opposite direction (0 °/ 180 °)
- **b.b:** Uppercarriage swung over one of the four corners of the undercarriage (45 °/135 °/225 °/315 °)
- **c.c:** Uppercarriage turned at right angles to the direction of travel (90 °/270 °)

## 4.32 Inclination display\*

### 4.32.1 Operating the inclinometer

The inclinometer in the operational screen for lifting operations shows the inclination of the uppercarriage relative to the x and y axes in degrees.

Values up to +/- 3 ° can be displayed.

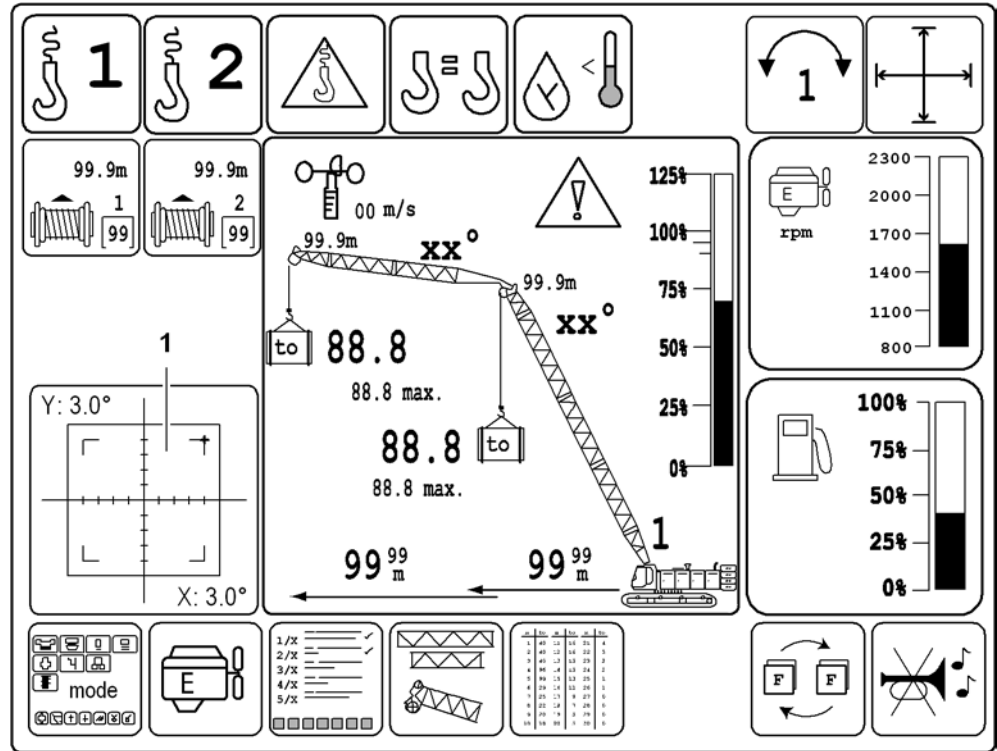


Fig. 1042 Inclination display

1 Inclination display



## 4.33 Boom radius limitation\*

The boom radius limiter limits the adjustment range of the boom in height and radius.

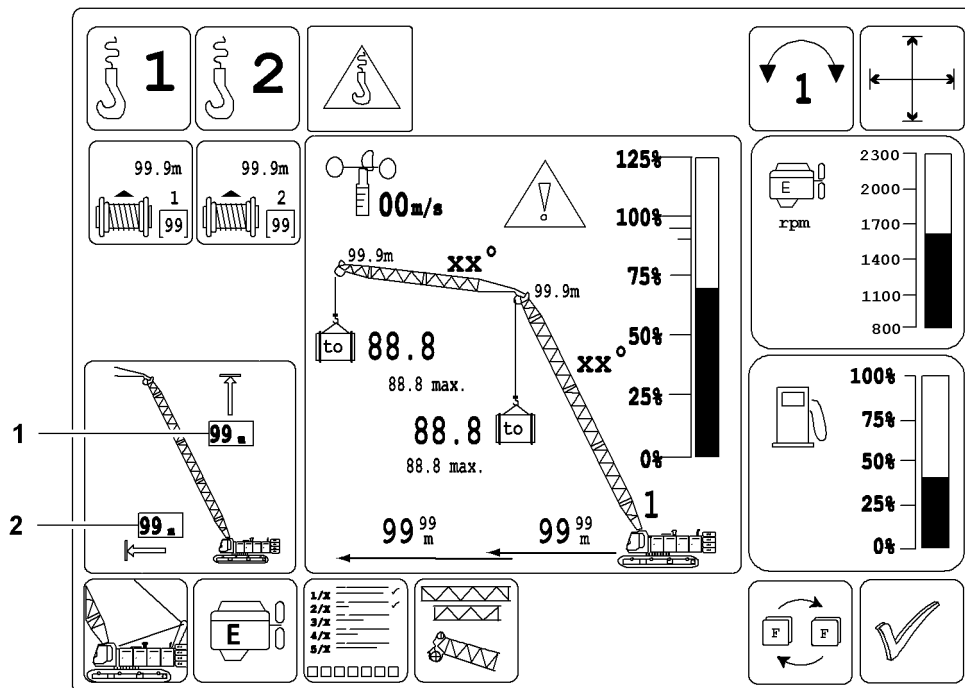


Fig. 1043 boom radius limitation

1 Height limit

2 radius limit



### WARNING

Incorrect boom radius limitation after moving the machine!

- ▶ Check boom radius limitation after each time that the machine is moved and reenter if necessary.

The boom radius limitation can be covered by the ground pressure display in the operational screen for lifting operations.

Make sure that the limits for radius and height have already been measured using a distance measuring device.

### 4.33.1 Programming the boom radius limitation

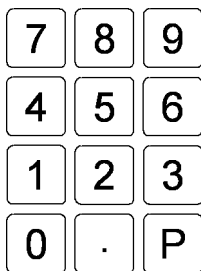
The limits are input using the Litronic service panel on the monitor (For more information see: 3.10.4 Litronic service panel, page 363).



- ▶ Touch the *Change function key symbols* button until the boom radius limiter appears on screen.



- ▶ Touch the *Cursor advance* button until the required limit field is marked black in the radius limitation.



▶ Enter the limit in m (ft).



▶ Press *Enter* button.

▷ Limit value saved. The limits remain stored even after the machine is switched off.

▶ Repeat the process for the second limit.

### 4.33.2 Checking the boom radius limitation

Make sure that an assistant is monitoring the process.

#### Example: Testing height limitation

▶ Raise boom.

▶ Approach limit value slowly.

▷ Boom stops.

▷ The boom radius limitation display appears on the operational screen for lifting operations.

▷ The height limit value flashes.

▷ The *Main boom, upper angle limitation* symbol flashes.



Fig. 1048 The main boom, upper angle limitation symbol

### 4.33.3 Cancelling boom radius limitation

To disable the boom radius limitation, the values must be set to 0.

## 4.34 Swing limitation\*

The swing limitation limits the swing range of the uppercarriage.

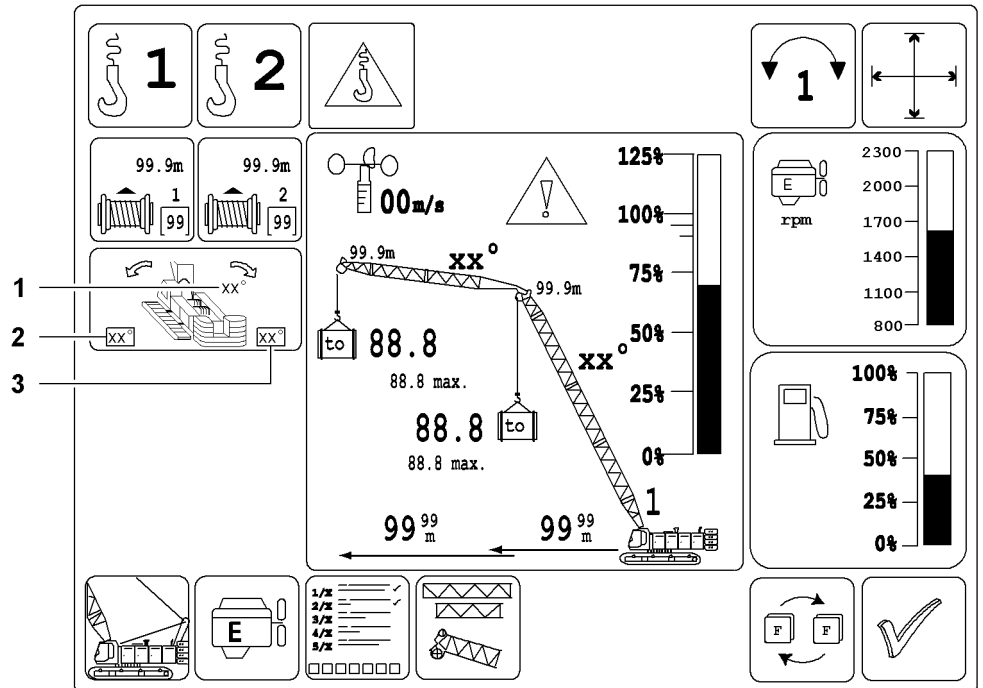


Fig. 1049 Slew gear limitation

- 1 Current swing angle
- 2 Left limit value
- 3 Right limit value



### WARNING

Incorrect swing limitation after moving the machine!

- ▶ Check swing limitation after each time that the machine is used and reenter if necessary.

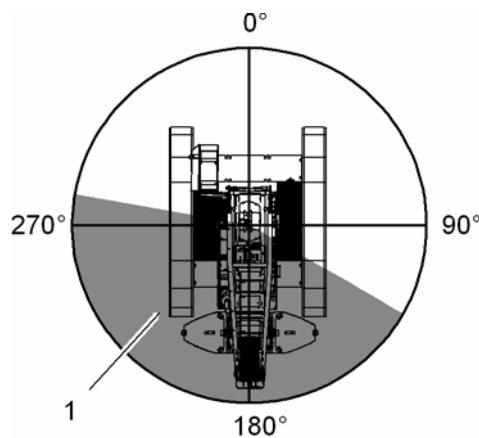


Fig. 1050 Blocked area

- 1 Blocked area

With the setting of 280 ° and 120 ° as limit angles, the area 1 marked grey is blocked.

### 4.34.1 Programming the swing limitation

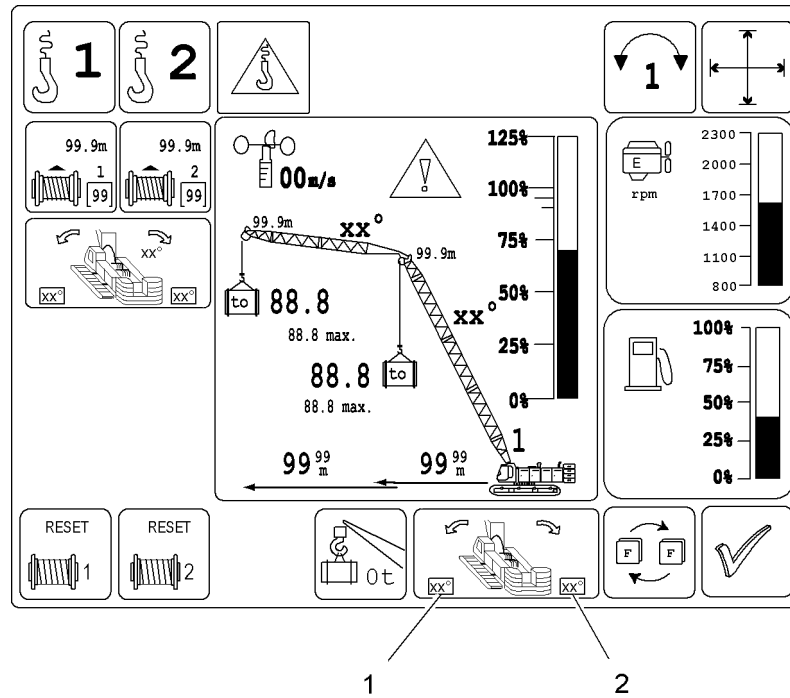


Fig. 1051 Programming the swing limitation

- 1 Left limit value
- 2 Right limit value

Make sure that an assistant is available to take over the directing and that he is in eye contact with the machine operator.

#### Teach-in procedure

In the case of the Teach-in procedure, the limit point is approached and then programmed.



- ▶ Touch the *Change function key symbols* button until the swing limiter appears on screen.

You can adjust the sequence of the programming as required.



- ▶ Rotate the uppercarriage to the left and stop before the desired limit point.
- ▶ Press the *Swing limitation left* button.

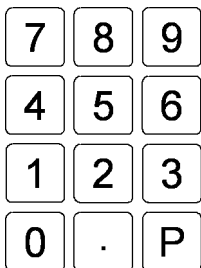


- ▶ The left limit angle is programmed.
- ▶ Rotate the uppercarriage to the right and stop before the desired limit point.
- ▶ Press the *Swing limitation right* button.
- ▶ The right limit angle is programmed.

### Angle input

The limits are input using the Litronic service panel on the monitor (For more information see: 3.10.4 Litronic service panel, page 363) .

- ▶ Establishing limit values by measuring or work planning.
- ▶ Touch the *Change function key symbols* button until the swing limiter appears on screen.
- ▶ Touch the *Cursor advance* button until the required limit field is marked black in the swing limitation.



Negative value or values above 360 ° are not permitted. If in invalid value is entered, then the earlier limit angle remains unchanged.

- ▶ Enter the limit value in degrees.
- ▶ Press *Enter* button.
  - ▷ Limit value saved. The limits remain stored even after the machine is switched off.
- ▶ Repeat the process for the second limit.

## 4.34.2 Checking the swing limitation

Make sure that an assistant is monitoring the process.

### Example: Testing the limit value



#### WARNING

Uppercarriage swing speed too high in programmed swing limitation! Sharp braking during the final 5 ° before the specified limit angle.

- ▶ Approach the swing limit slowly.
- ▶ Rotate the uppercarriage.
- ▶ Approach limit value slowly.
  - ▷ The uppercarriage will slow down over the final 5 ° before the specified limit angle.
  - ▷ The warning signal sounds.
  - ▷ The *Swing limitation* symbol flashes in the operational screen for lifting operations.

## 4.34.3 Cancelling swing limitation

To disable swing limitation, both values must be set to the same angle value.

## Cancelling swing limitation using Teach-in procedure

Ensure that the uppercarriage is not rotated between the first and second inputs.



- ▶ Touch the *Change function key symbols* button until the swing limiter appears on screen.



- ▶ Press the *Swing limitation left* button.



- ▶ Press the *Swing limitation right* button.

- ▷ Limit value disabled.

## 4.35 Tagline winch\*



### WARNING

Use of the tagline winch requires a special mode of operation!

- 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 brake is released after an emergency stop or after the diesel engine is switched off.

- Only use the tagline winch for its intended purpose.

### 4.35.1 Activities before starting up the tagline winch

Adjusting the gate valve is only required if the machine is fitted with a free-fall winch.

Ensure that the diesel engine has been turned off.

### NOTICE

Incorrect switching-on of the free-fall operation!

Damage to the hydraulic system.

- Only actuate the *free-fall operation* gate valve when the diesel engine is switched off.

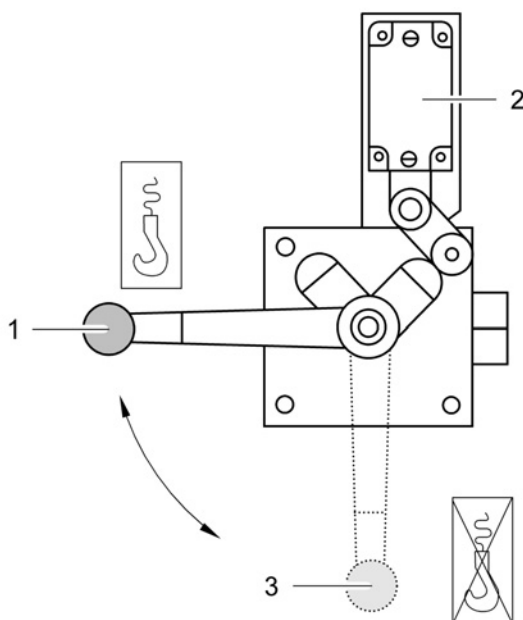


Fig. 1062 Switching on free-fall operation

- 1 "On" position
- 2 Limit switches

- 3 "Off" position

If the machine is fitted with a free-fall winch:

- ▶ Set the *free-fall operation* gate valve to “ON” 1.
  - ▷ The tagline winch is driven by hydraulic oil.
- ▶ Unwind tagline manually from the tagline winch.

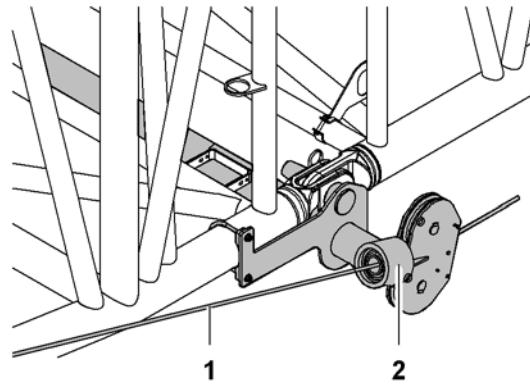


Fig. 1063 Feed tagline through rope bracket

- 1 Tagline
- 2 Rope bracket

- ▶ Feed tagline through rope bracket.

---

### NOTICE

Incorrect use of the machine with tagline winch switched off and tagline attached to the rigging material!  
Damage to the tagline winch.

When the tagline is secured to the rigging material:

- ▶ Only operate machine with tagline winch switched on.

- 
- ▶ Attach tagline properly to rigging material.
  - ▶ Check the oil level of the tagline winch

## 4.35.2 Switching the tagline winch on/off

Ensure that the *free-fall operation* gate valve is in the “ON” position.

Immediately after the tagline winch is switched on, the tagline is wound up and tensioned with the preset constant tension ([For more information see: 4.35.3 Set the constant tension of the tagline winch, page 529](#)).



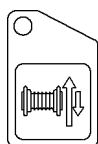
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### CAUTION

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 *Tagline winch* button.
  - ▷ The tagline winch is switched on.
- ▶ Press the *Tagline winch* button again.
  - ▷ The tagline winch is switched off.

### 4.35.3 Set the constant tension of the tagline winch

The constant tension is at least 450 lb, and no more than 50% of the maximum pull force.

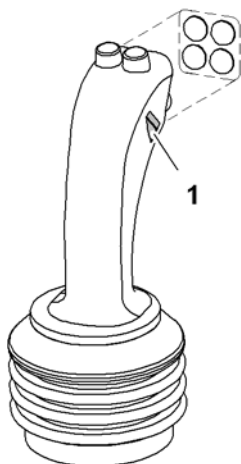


Fig. 1065 Left-hand multi-directional joystick

#### 1 *Tagline winch constant tension* potentiometer

- ▶ Move the *Tagline winch constant tension 1* potentiometer up.
  - ▷ The constant tension of the tagline winch increases to a maximum of 50% of the maximum pull force.
- ▶ Move the *Tagline winch constant tension 1* potentiometer down.
  - ▷ The constant tension of the tagline winch reduces to a minimum of the minimum pull force.

### 4.35.4 Adjust 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 tension and the maximum pull force.

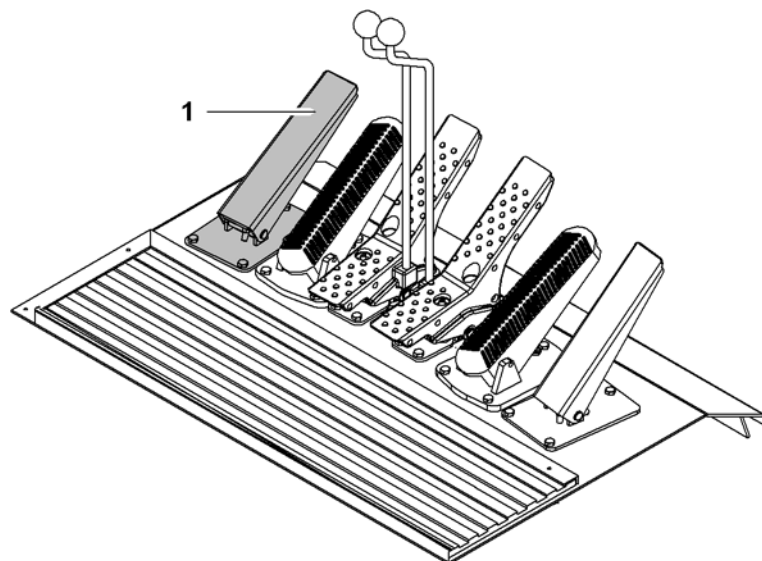


Fig. 1066 Foot pedals

1 Foot pedal for *tagline winch*

- ▶ Press *tagline winch* foot pedal forward.
  - ▷ Pull force of tagline winch is increased.
- ▶ Move *tagline winch* foot pedal backwards.
  - ▷ Pull force of tagline winch is reduced.

### 4.35.5 Select maximum pull force of the tagline winch

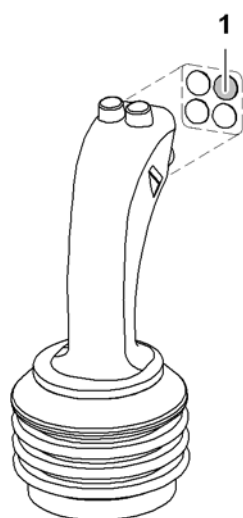


Fig. 1067 Left-hand multi-directional joystick

1 *Tugger winch* full pull force (100%) button

- ▶ Press and hold *tagline winch full pull force (100%)* button.
  - ▷ Tagline winch winds up the tagline with maximum pull force.
- ▶ Release *tagline winch full pull force (100%)* button.
  - ▷ Tagline winch winds up the tagline at the preset constant tension.

### 4.35.6 Switch on freewheeling of tagline winch

Freewheeling unwinds the tagline from the tagline winch without being braked and is used to quickly release or swing out the rigging material.

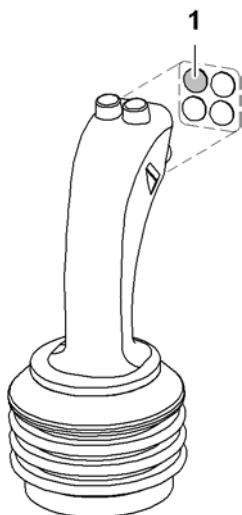


Fig. 1068 Left-hand multi-directional joystick

- 1 *Free-fall tagline winch On/Off* button

- ▶ Press and hold *tagline winch freewheeling On/Off* button.
  - ▷ 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.
- 

- ▶ Release *tagline winch freewheeling On/Off* button.
  - ▷ The tagline winch winds up the tagline at constant tension.

## 4.35.7 Activities following operation of the tagline winch

---



### WARNING

Unintended maloperation due to switched on free-fall operation!

- ▶ Immediately after operation of the tagline winch gate valve, set *free-fall operation* to “OFF” position.
- 

Ensure that the following conditions are satisfied:

- Tagline winch stops moving.
- Diesel engine is switched off.
- ▶ Move the safety lever up.
- ▶ Set the *free-fall operation* gate valve to “OFF”.
  - ▷ No more hydraulic oil is supplied to the tagline winch.

## 4.36 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 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.

### 4.36.1 Selecting sensitive hoisting

Ensure that the *free-fall operation* gate valve in the uppercarriage is set to “OFF”.



- ▶ Press the *Sensitive hoisting* button on control panel X23.

▷ The *Sensitive hoisting* symbol appears in the status display of the monitor:



Fig. 1070 Sensitive hoisting symbol

### 4.36.2 Operating sensitive hoisting

Ensure that the following conditions are satisfied:

- Speed level 1 for the swing is set.
- The boom luffing speed level is set to 1.
- ▶ Operate sensitive hoisting.

## 4.37 Abseiling device

### 4.37.1 Use abseiling device



**WARNING**

Incorrect use of the lowering device!  
risk of falling from the cab.

- ▶ Follow the operating instructions for the abseiling device.

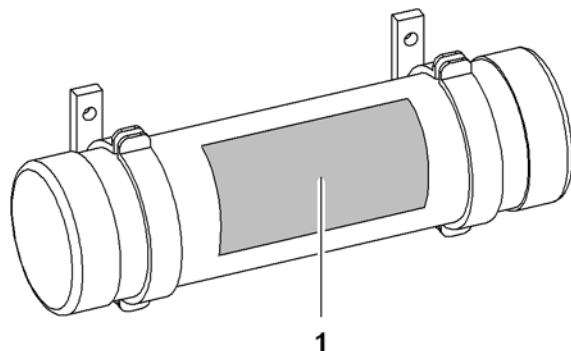


Fig. 1071 Abseiling device

1 Operating instructions

- ▶ Read the operating instructions 1 for the abseiling device.
- ▶ Open and unpack the abseiling device.
- ▶ Put on the abseiling device.
- ▶ Open the cab door.

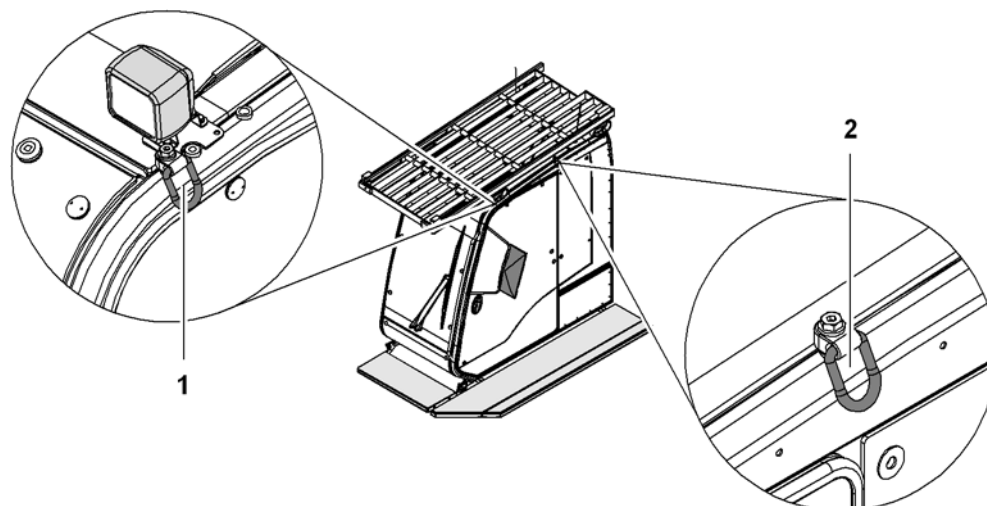


Fig. 1072 Suspension points for the lowering device

- 1 Suspension point on cab with cab roof protection guard      2 Suspension point on cab with falling object protection

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- ▶ Attach the abseiling device to the suspension point **1, 2**.
- ▶ Open the fall-arrest chain on the cab door (if one is fitted).
- ▶ Abseil down as described in the operating instructions.

## 4.38 shutdown



### WARNING

Unauthorised use of machine!

- ▶ When leaving the machine, it must be protected against unauthorised use, vandalism and any possible adverse environmental impact.

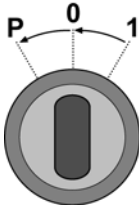
When shutting down the machine, distinguish between:

- **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.

### 4.38.1 Short work interruption

#### Machine operator remains in the operator's cab

- ▶ Set down the load.
- ▶ Fold up the safety lever.
- ▶ Turn ignition key to position **P** (parking position).
  - ▷ Diesel engine is switched off.
  - ▷ Litronic control system is switched off.

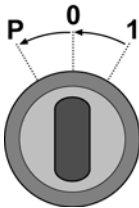


The following components continue to be supplied with power:

- ▷ Engine compartment lighting
- ▷ Cab lighting
- ▷ Windscreen wiper
- ▷ Horn
- ▷ Radio
- ▷ Heater blower
- ▷ Socket in the operator's cab
- ▷ Cigarette lighter

#### Machine operator leaves the operator's cab

- ▶ Set down the load.
- ▶ Lay down the wheeled counterweight carriage/suspended counterweight on the ground during derrick operation.
- ▶ Fold up the safety lever.
- ▶ Turn ignition key to position **0**.
  - ▷ Diesel engine is switched off.
  - ▷ Litronic control system is switched off.



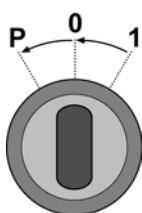
- ▶ Leave operator's cab and lock it.



## 4.38.2 Long work interruption

Ensure that the following conditions are satisfied:

- Machine is not obstructing traffic.
  - The place where the machine is left is adequately secured.
  - There is a dependable external power supply for the safety equipment (e.g. helicopter 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.
  - ▶ Lay down the wheeled counterweight carriage/suspended counterweight on the ground during derrick operation.
  - ▶ Fold up the 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.

If the auxiliary heating is not programmed:

- ▶ Switch off the battery main switch.
- ▶ Lock operator's cab and engine compartment doors.

## 4.39 Emergency stop

### 4.39.1 Using emergency stop

**DANGER**

Machine under extreme stress under load during an emergency stop!

- ▶ The emergency stop is to be used as an emergency cut-off of the machine only.

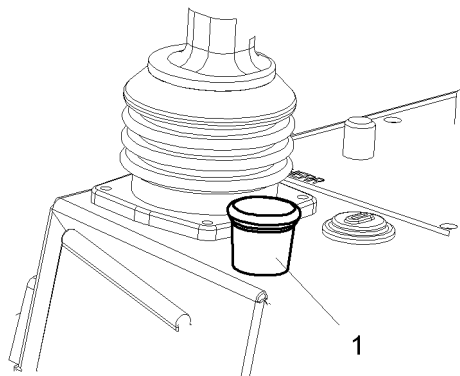


Fig. 1076 Using emergency stop

**1** Emergency stop

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.

## 4.40 Emergency operation controller\*

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

Unauthorised 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. No speeds can be adjusted at the control panel except engine RPM.

During emergency operation, continue to operate the crawlers using the foot pedals in the operator's cab.

### NOTICE

Unauthorised 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.

### 4.40.1 Using the emergency operation controller

- ▶ Switch off the machine: turn ignition key to position "0".
- ▶ Open the frontmost door on the left of the uppercarriage.

The connecting cable consists of a 40-pin plug for the basic machine and a 16-pin plug for the derrick.

- ▶ Insert and lock control panel and connecting cable plugs.



### WARNING

Unauthorised use of the emergency operation controller!

- ▶ The emergency operation controller may only be used in the operator's cab.
- ▶ Sit in the operator's cab.
- ▶ Fold down the safety lever in the operator's cab.

The status display (LED) on the emergency operation control panel lights up as soon as the ignition is switched on.

- ▶ Start the diesel engine using the ignition key.

### Emergency operation controller\*

- ▶ Use the emergency operation controller.

When the machine has been moved out of the danger area:

- ▶ Switch off machine.
- ▶ Unplug the emergency operation control panel.





# 5 Operational faults, diagnosis

The following pages describe machine malfunctions and the corresponding diagnoses.

## 5.1 Malfunctions

### 5.1.1 Identifying faults

Faults are very often caused by incorrect operation or inadequate maintenance of the machine.

- ▶ Observe all symbols and error messages on the monitor.
- ▶ Observe all acoustic warning signals from the monitor.

### 5.1.2 Error displays on the monitor

#### Operational screen for lifting operations

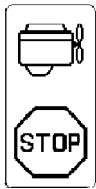
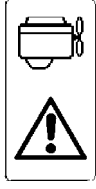
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##### NOTICE





Serious engine error messages are ignored!  
Damage to the diesel engine.

If serious engine error messages appear:

- ▶ Switch off the diesel engine.
- 

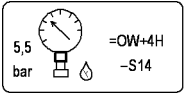
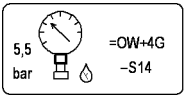
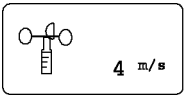
Symbol / status	Cause	Remedy
 flashing	Serious engine fault has occurred.	Carry out troubleshooting (For more information see: <a href="#">Rectifying engine error messages, page 543</a> )
 flashing	General engine fault has occurred.	Carry out troubleshooting (For more information see: <a href="#">Rectifying general engine error messages, page 543</a> )

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Symbol / status	Cause	Remedy
 flashing	Coolant level in the cooling system compensation tank has dropped below the minimum level.	Fill with coolant (For more information see: <a href="#">9.7.2 Filling with coolant, page 960</a> ).
 flashing	Hydraulic oil level in the hydraulic oil tank has dropped below the minimum level.	Fill with hydraulic oil (For more information see: <a href="#">9.19.3 Filling with hydraulic oil, page 991</a> ).
 flashing	Gearbox oil temperature in distributor gear box is too high.	Contact Liebherr after sales service.
 flashing	Connection interruption has occurred.	Carry out troubleshooting (For more information see: <a href="#">Connection interruptions, page 513</a> )

Tab. 207 Error displays - operational screen for lifting operations

## engine monitoring

Symbol / status	Cause	Remedy
 flashing	Feed pressure in the hydraulic circuit of winch 1 has fallen below 79.77 psi.	Contact Liebherr after sales service.
 flashing	Feed pressure in the hydraulic circuit of winch 2 has fallen below 79.77 psi.	Contact Liebherr after sales service.
 flashing	Wind speed has increased to more than 65.62 ft/s.	Follow wind restrictions (For more information see: <a href="#">6.7 Restrictions due to wind, page 567</a> )

Tab. 208 Error displays - engine monitoring



## 5.1.3 Troubleshooting

### Rectifying engine error messages

The cause of the error appears either on the "Engine monitoring" screen or on the "Error display" screen.

Possible error causes are:

- Coolant temperature > 219 °F
- Charge air temperature > 176 °F
- Fuel temperature > 194 °F
- Oil pressure safety curve undershot
- Coolant level too low
- Hydraulic oil level too low
- Water in fuel
- Problem with the 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 a failure indication:

- Raise winch 1 and winch 2
- Raise the crowd force
- Drilling drive
- Crawlers
- Hammer
- Grab
- Cutting wheels

- ▶ Stop the dangerous movement.
- ▶ Place the load on the ground.
- ▶ Switch off the diesel engine.
- ▶ Determine and rectify the cause of the error.

If the cause of the error cannot be determined and rectified:

- ▶ Contact Liebherr after sales service.

### Rectifying general engine error messages

- ▶ Carry out troubleshooting in the Litronic® testing system.
- ▶ Determine and rectify the cause of the error.

If the cause of the error cannot be determined and rectified:

- ▶ Contact Liebherr after sales service.

## 5.2 Litronic® testing system

### 5.2.1 Overview



---

**WARNING**

Making unauthorised alterations to the Litronic® testing system!

- ▶ Changes to the setting and/or correction values may only be carried out by Liebherr service personnel.
- 

The Litronic® testing system is a comprehensive diagnosis and service tool available on the monitor, a service notebook and also via a modem connection (if available). It is used to monitor I/O, flags, internal system variables and statuses. The Litronic® testing system can be accessed completely independently from several interfaces at the same time (e.g. monitor, service notebook, GSM modem, etc.).

The Litronic® testing system provides the following functions:

- Displays the installed software ID and version numbers
- Displays all module I/O with comments
- Displays the internal memory variables with comments
- 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

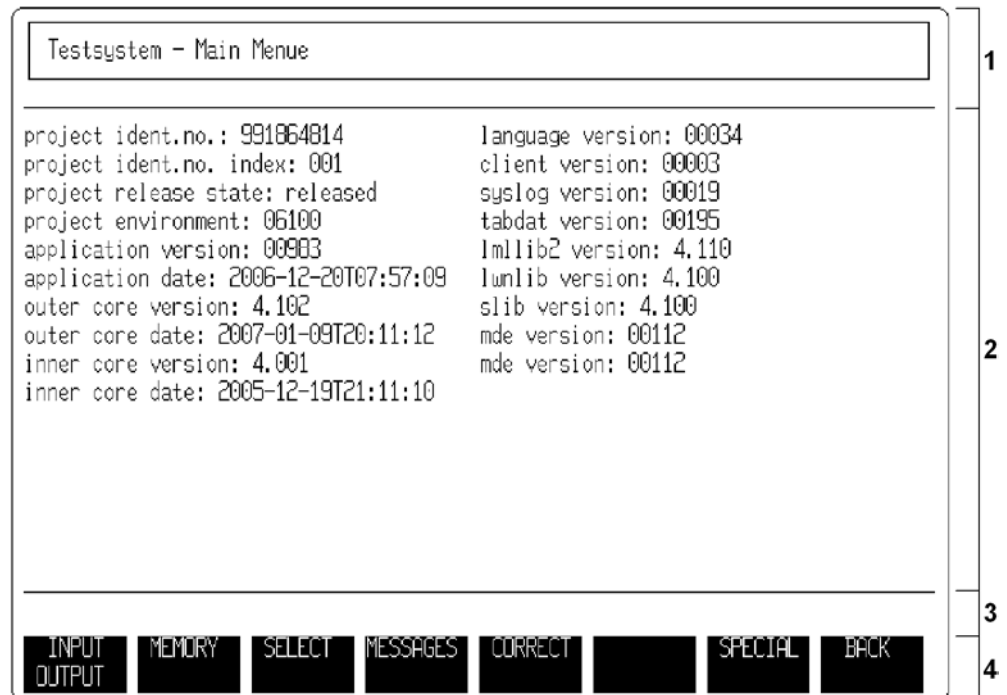


Fig. 1086 Litronic® testing system overview

- |  |   |
|--|---|
| <p><b>1</b> Header: Name of the current screen</p> <p><b>2</b> Main window: Displays information</p> | <p><b>3</b> Input line: For display and correction of entered values, display of status messages and input prompts</p> <p><b>4</b> Menu bar: Function key symbols</p> |
|--|---|

The Litronic® testing system comprises a number of screen pages; the function key symbols are used to move from page to page. Some pages have two menu bars that you can toggle between using the function key symbol *MENU 1/2*. The first menu bar is always active when a page first opens. The home page (main menu) is displayed when the Litronic® testing system is first started. On each subsequent start-up, the page that was being used when the system was exited will be 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 function key symbol. This includes *PREVIOUS* and *NEXT* for example.

## 5.2.2 Screen pages

### Main screen page

The various screen pages of the Litronic® testing system are linked from the main screen menu. Leave the current page by pressing the function key symbol *BACK*.

The following pages can be reached from the main screen page:

- INPUT/OUTPUT page
- MEMORY page
- SELECT page
- CORRECTION page
- MESSAGES page
- SPECIAL FUNCTIONS page

## INPUT/OUTPUT page

This page allows all the module I/O to be viewed.

Description of the function key symbols:

- *NEXT CAN LINE* moves to the next CAN line.
- *PREVIOUS MODULE* and *NEXT MODULE* changes between the modules on 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.
- Use *SELECT* to add the highlighted channel to the select list. If it is already selected, it will be removed from the list. The name of a channel will be displayed inverse if it is selected.
- *MENU 1/2* switches between the two menu bars.
- *DOCUMENT* displays 16 channels (inputs/outputs) with comments on a page. In digital modules (32 channels) use *PREVIOUS* and *NEXT* to switch to the second page.
- *UNDOCUM* displays all inputs and outputs on one page.
- *IDENTIFY* displays 16 inputs and outputs on one page with the identifier on one page. In digital modules (32 channels) use *PREVIOUS* and *NEXT* to switch to the second page.
- *BACK* returns to the home page.

## MEMORY page

This page is used to display the internal flags that are being used.

Description of the function key symbols:

- *NEXT SECTION* moves between the 16 flag sections: X-B-W-D, 1-2-3-4.
- *PREVIOUS PAGE* and *NEXT PAGE* move between the pages. Each page contains 16 flags from the selected section.
- *PREVIOUS* and *NEXT* move between the flags. The highlighted flag is displayed as an inverse M.
- Use *SELECT* to add the highlighted flag to the Select list. If it is already selected, it will be removed from the list. The name of a flag will be displayed inverse if it is selected.
- *MENU 1/2* switches between the two menu bars.
- *DOCUMENT* displays the flags with comments.
- *IDENTIFY* displays the flags with the identifier.
- *BACK* returns to the home page.

## SELECT page

To avoid having to always switch between the I/O and the flag menus, values can be added to the Select list. These entries can then be viewed and edited on the SELECT page at the same time. The Select list can consist of several pages. If a new value is added to the Select list when the list is already full, the oldest value is removed from the list. These Select lists can also be backed up on the memory card and reloaded again when necessary.

How to add entries to the Select list:

- Using the function symbol *SELECT* directly on the INPUT/OUTPUT-, MEMORY- or CORRECTION- page (grouping of entries).
- Using the function symbol *ADD* on the SELECT page by inputting the IEC address.
- Reading from a file using the function symbol *LOAD FROM CARD* on the SELECT page

How to delete entries from the Select list:

- Reselect a selected value using the function symbol *SELECT* directly on the INPUT/OUTPUT-, MEMORY- or CORRECTION- page
- Delete the highlighted entry using the function symbol *DELETE* on the SELECT page

Description of the function key symbols:

- *ADD* adds a new entry to the Select list. A menu bar is displayed in which the IEC address is entered.
- *DELETE* removes the highlighted entry from the list.
- *PREVIOUS* and *NEXT* move between the different Select entries. The highlighted entry is displayed as an inverse 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 and outputs or tags with the identifier.
- *DOCUMENT* displays the inputs and outputs or tags with the comments.
- *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 home page.

### Add Selection page

This page is accessed from the SELECT page using the function symbol *ADD*. This enables the IEC address of a new Select entry to be entered. The IEC address is entered in the input line using the corresponding function key symbols and the numeric keys on the Litronic service panel.

Example:

- Desired IEC address: %QW1.17.1
- %, Q and W are entered using the appropriate function key symbols.
- 1.17.1 is entered as a normal number and can be edited as necessary using function key symbol *TAKE & BACK* to accept the address.

Description of the function key symbols:

- 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 page and in doing so accepts the IEC address from the input bar.

### Select File Load page

On this page a saved Select list can be loaded from the memory card.

Description of the function key symbols:

- *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 the list. When a file is selected, its name is copied to the input bar. This is the easiest way to select the desired file.
- *LOAD* loads the file displayed in the input bar and returns to the SELECT page.
- *BACK* abandons the operation and returns to the SELECT page.

## Select File Save page

On this page a saved Select list can be saved to the memory card.

Description of the function key symbols:

- *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 the list. When a file is selected, its name is copied to the input bar.
- *SAVE* saves the select list in a file (enter file name in the input bar) and returns to the SELECT page.
- *BACK* abandons the operation and returns to the SELECT page.

## CORRECTION page

This page is used to display the correction values.

Description of the function key symbols:

- *NEXT SECTION* moves between the 4 correction value sections: X-B-W-D.
- *PREVIOUS PAGE* and *NEXT PAGE* move between the pages. Each page contains 16 correction values from 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 comments.
- *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 home page.

## MESSAGES page

This page displays the saved application messages (e.g. sensor errors) and all system errors (CAN bus, module, CPU, etc.). These application messages are buffered internally.

Description of the function key symbols:

- *ALL* lists all saved messages (max. 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 to be loaded for the messages. Messages that are not found in the selected language are displayed in English. This language change applies only to the MESSAGES page and not to the Litronic® testing system.
- *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 home page.

## Language Selection page

The language in which the messages are displayed is selected on this page.

Description of the function key symbols:

- *PREVIOUS* and *NEXT* move between the different languages.
- *SELECT* is used to select and load the highlighted language.

## SPECIAL FUNCTIONS page

Various other pages are accessed from this page. It is also possible to return to the home page by pressing the function key symbol *BACK*.

The following pages can be accessed from the SPECIAL FUNCTIONS page.

- Modem Function page
- Drive Function page
- Time Function page
- Priority Level page
- CAN Configuration page
- CAN Line Information page
- Display Configuration page
- System Language Selection page
- Sampling Trace page
- System Status page
- MDE/PDE page
- Clients page

## Modem Function page

This page is used to configure and control the GSM modem.

The current modem status (Online, Offline, False PIN etc.) may be viewed in the input bar.

Description of the function key symbols:

- *DIAL* dials a previously entered phone number.
- *HANGUP* terminates an active modem connection (hang up handset).
- *RLP ON/OFF* switches the radio link protocol for GSM modem connections on or off. These settings become active the next time the machine is switched on.
- *V32/V110* switches on the V32 or V110 protocol for GSM modem connections. These settings become active the next time the machine is switched on.
- *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 page.

## Drive Function page

This page displays information about the current drive.

Description of the function key symbols:

- *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 (but no sub-directories) on 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 page.

### Time Function page

Date and time are displayed on this screen page.

Description of the function key symbols:

- *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 page.

### Priority Level page (for Liebherr service personnel only)

The Litronic® code, which provides access to the supervisor level, is entered on this page. The supervisor level is necessary to change the time, for example.

Description of the function key symbols:

- 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 page.

### CAN Configuration page

All the CAN modules that are inserted, together with their usage status, are displayed on this page

Description of the function key symbols:

- *NEXT PAGE* moves to the next page.
- *BACK* returns to the SPECIAL FUNCTIONS page.

### CAN Line Information page

This page displays the CAN lines being used and their settings.

Description of the function key symbols:

- *MODULE INFO* switches to the CAN Configuration page.
- *BACK* returns to the SPECIAL FUNCTIONS page.

### Display Configuration page

This page allows parameters to be set for displaying the INPUT/OUTPUT page.

Description of the function key symbols:

- *ALL MODULES* displays all CAN modules (“used” and “not used”) on the INPUT/OUTPUT page.
- *ONLY USED MODULES* displays only those CAN modules which are currently set as “used” on the INPUT/OUTPUT page.
- *NUMBER STYLE* switches the inputs, outputs and flags between standard and hexadecimal display.
- *UPDATE INTERVAL* changes the update rate of the input, output and flag displays.



- *BACK* returns to the SPECIAL FUNCTIONS page.

## System Language Selection page

On this page the system language can be changed by selecting a language or loading the internal standard language.

The selected system language is only activated once the Litronic control system is switched back on.

Description of the function key symbols:

- *PREVIOUS* and *NEXT* move between the different languages.
- *SELECT* loads the highlighted language as the new system language and returns to the SPECIAL FUNCTIONS page.
- *USE DEFAULT* loads English as the new system language and returns to the SPECIAL FUNCTIONS page.
- *MENU 1/2* switches between the two menu bars.
- *BACK* abandons the operation and returns to the SPECIAL FUNCTIONS page.

## Sampling Trace page

The Sampling Trace page is used for online tracing of data from previously selected inputs/outputs. It displays "Sampling Trace" information and allows its status to be modified, and also allows the recorded data to be saved.

Description of the function key symbols:

- *SAMPLE ACTIVE* activates the "Sampling Trace" functionality once the options have been defined. This enables recording and the trigger conditions are checked.
- *TRIGGER MANUAL* simulates the trigger conditions. This function key symbol is only available if "Sampling Trace" is active and the trigger conditions are not yet satisfied.
- *END MANUAL* ends recording of the "Sampling Trace" and changes automatically to "Ready" status. This function key symbol is only available if "Sampling Trace" is active.
- *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 currently selected variables into the "Sampling Trace" list.
- *PREVIOUS* and *NEXT* move between the configuration data. The highlighted (active) entry is displayed inverse.
- *CHANGE* is used to change the highlighted entry to the value in the input bar. This only happens, however, if the value is within the permitted limits.
- *MENU 1/2* switches between the two menu bars.
- *BACK* returns to the SPECIAL FUNCTIONS page.

## System Status page

This page displays the current system status (running, stopped, etc.) and the timing of the PLC tasks (Programmable Logic Controller).

Description of the function key symbols:

- *SYSTEM TASKS* displays information about the system tasks.
- *BOARD INFO* displays information about the main board (voltage, temperature, etc.).
- *BACK* returns to the SPECIAL FUNCTIONS page.

## MDE/PDE page

This page shows the status of the MDE (Machine Data Acquisition), the PDE (Process Data Acquisition) and the data logger.

Description of the function key symbols:

- *MDE* displays the MDE data.
- *PDE* displays the PDE data.
- *SELECT GRAPHIC* lists the saved graphics (e.g. company logo) for printing the PDE data. The desired graphic can be selected.
- *LOGGER* displays the data logger data.
- *BACK* returns to the SPECIAL FUNCTIONS page.

## Clients page

This page shows the status of the individual communication interfaces (clients).

Description of the function key symbols:

- *PREVIOUS* and *NEXT* move between the interfaces.
- *BACK* returns to the SPECIAL FUNCTIONS page.

## 5.2.3 Starting the Litronic® testing system



### WARNING

No error messages from the Litronic control system may be displayed in the Litronic® testing system!

- ▶ Only carry out crane work in the operational screen for lifting operations.



- ▶ Press the *Testing system* button on the Litronic service panel.
  - ▷ 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 part of the system.

Fuse	Rating	Part of the system
F1	10 A	Main fuse: battery, control unit
F2	50 A	Main fuse: ignition
F3	50 A	Main fuse: engine, safety lever
F4	13 A	Main fuse: parked position
F5	13 A	Main fuse: engine
F6	13 A	Main fuse: input module
F7	A	Main fuse: engine control unit
F8	10 A	Main fuse: cab fan
F21	10 A	Radio, horn, camera, switch cabinet fan
F22	10 A	Cab lighting
F23	5 A	Control panel X11
F24	10 A	Cigarette lighter, windscreen washer system, heater
F25	5 A	Front windscreen wiper
F26	5 A	Upper windscreen wiper
F31	5 A	Boom electrics
F32	10 A	Counter modules
F33	10 A	CAN bus input module 33
F34	10 A	CAN bus input module 41
F35	10 A	CAN bus input module 42
F36	10 A	CAN bus input modules 34 + 43
F41	10 A	Control unit
F42	15 A	Engine electronic circuit
F43	15 A	Engine electronic circuit
F44	10 A	Safety lever
F45	10 A	CAN bus line 1 + 2
F46	10 A	CAN bus line 3 + 4
F47	5 A	Monitor
F48	10 A	Control panel X12, control panel X25, D+
F49	15 A	Floodlights on cab
F50	15 A	Floodlights on structure
F51	15 A	Floodlights on boom

Fuse	Rating	Part of the system
F52	15 A	Refuelling pump
F53	10 A	CAN bus output module 9 (last unit)
F54	10 A	Seat heater
F55	10 A	Modem, process data recording monitor and control unit
F56	10 A	Additional equipment
F71	10 A	CAN bus output module 9
F72	10 A	CAN bus output module 9
F73	10 A	CAN bus output module 9
F74	10 A	CAN bus output module 17
F75	10 A	CAN bus output module 17
F76	10 A	CAN bus output module 18
F77	10 A	CAN bus output module 18
F78	10 A	CAN bus output module 10
F79	10 A	CAN bus output module 10
F80	10 A	CAN bus output module 10
F81	10 A	CAN bus output module 10
F82	10 A	Additional equipment
F83	10 A	CAN bus output module 19
F84	10 A	CAN bus output module 19
F85	7.5 A	Safety valves, tilting-back supports, distributor gear box pressure switch
F86	15 A	Additional equipment

Tab. 209 List of fuses

Fuse	Rating	Part of the system
F10	16 A	Fuel prefilter heating
F11	10 A	Supplementary heater
F12	16 A	Supplementary heater
F13	10 A	Cab elevation
F14	6 A	Helicopter 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	Refuelling pump
F20	16 A	Floodlights on boom head section
F61	20 A	Slurry wall grab

Fuse	Rating	Part of the system
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. 210 List of fuses - optional additional equipment*

### 5.3.2 Checking the fuses

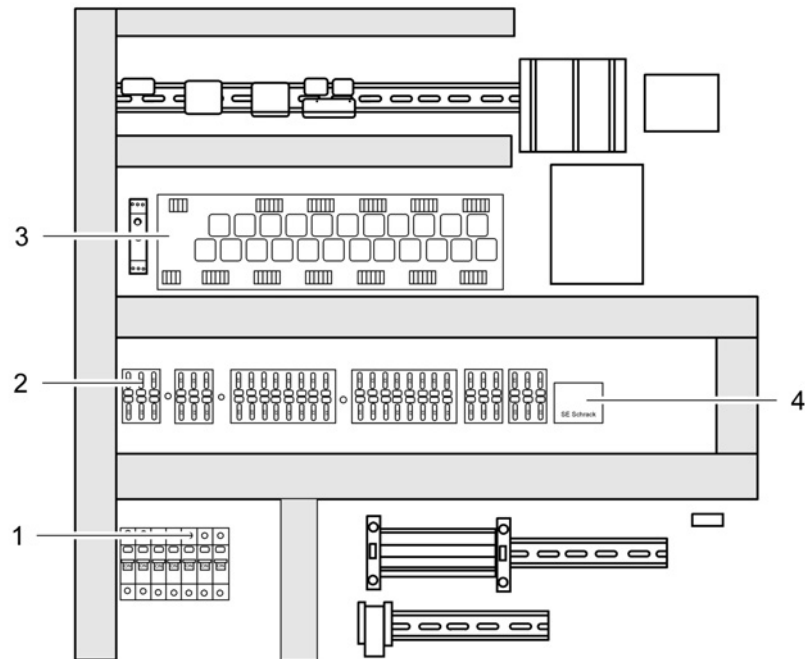


Fig. 1088 Switch cabinet

- |   |                  |   |   |
|---|------------------|---|---|
| 1 | Circuit breakers | 3 | Change-over relay                                 |
| 2 | Flat fuse links  | 4 | Fuse box with spare fuses, fuse tester and holder |

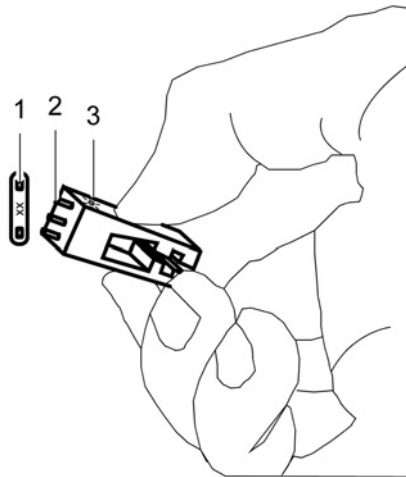


Fig. 1089 Checking the fuses

- |   |            |   |     |
|---|------------|---|-----|
| 1 | Fuse       | 3 | LED |
| 2 | Metal pins |   |     |

If the green LED on the fuse tester lights, the fuse is OK.

- ▶ To check the fuse: press the fuse tester with metal pins 2 onto the live fuse 1.

---

**Troubleshooting**

The green LED on the fuse tester does not light up?

- ▶ Replace the fuse.
- 

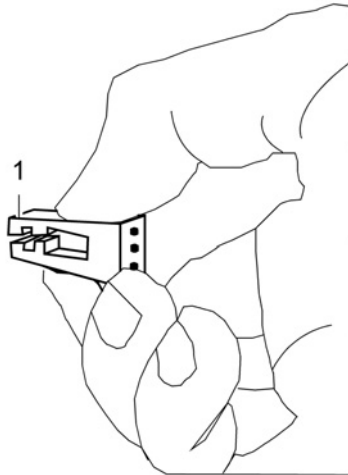
### 5.3.3 Replacing fuses

---

**NOTICE**

Wrong fuses are used!  
Damage to the electrical system.

- ▶ Switch off the battery main switch.
  - ▶ Only use fuses that have the amp rating (colour coding) prescribed by the manufacturer.
- 
- ▶ Switch off the battery main switch.
  - ▶ Remove the fuse from the fuse box.



*Fig. 1090 Replacing the fuse*

**1** Fuse holder

- ▶ To replace the fuse: use the fuse holder **1** to pull faulty fuses out of the socket.
- ▶ Use the fuse holder **1** to plug the new fuse into the socket.









# 6 Operational planning



---

## **WARNING**

Incorrect work planning!

- ▶ Always create a work plan before using the machine. Operational planning is vital for safe and problem-free operation of the machine.
- 

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 good operational planning!

## 6.1 Safe assembly and disassembly of the machine



---

## **DANGER**

Incorrect procedures followed during assembly and disassembly of the machine!

- ▶ Ensure that operators are familiar with the machine, its equipment, and the correct procedures for assembling and disassembling them.
  - ▶ Observe all the safety regulations.
-

## 6.2 Assembly site



### DANGER

Ground has a limited bearing strength!  
Machine toppling over.

- ▶ Values for permitted ground pressure must be determined by officially-certified specialist engineers.
- ▶ The ground pressure exerted by the machine in operation must be calculated when determining the load to be hoisted. The data required for this purpose must be requested from the manufacturer.
- ▶ The ground pressure being exerted by the machine in operation can be read off the optional ground pressure display.

During assembly/disassembly and when the self-assembly system is used, the following maximum ground pressures occur under the basic machine's jacks:

Type	Maximum ground pressure
LR1100, LR1130, LR1200 (SX), LR1280 W	170.68 psi
LR1160 (W)	256.02 psi
LR1280	141.80 psi
LR1300	267.40 psi

Tab. 211 Ground pressures under the basic machine's jacks

## 6.3 Tools required

We recommend the following equipment for assembling the machine:

- Wooden blocks to support boom sections
- Regular grease to lubricate the pins

### 6.3.1 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.

### 6.3.2 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: 7.22 Assembling the machine without a self-assembly system, page 883](#)).
  - ▶ Any questions or uncertainties must be referred to Liebherr after sales service for clarification.
- 

The customer is responsible for selecting the appropriate tools.

## 6.4 Required hoisting rope length

The required hoist rope length depends on the:

- boom pendant strap
- Boom length
- Minimum radius of the boom
- Reeving

The following formula is used to roughly calculate the hoisting rope length needed to lower the hook or pulley block to the ground.

### 6.4.1 Calculate hoist rope length

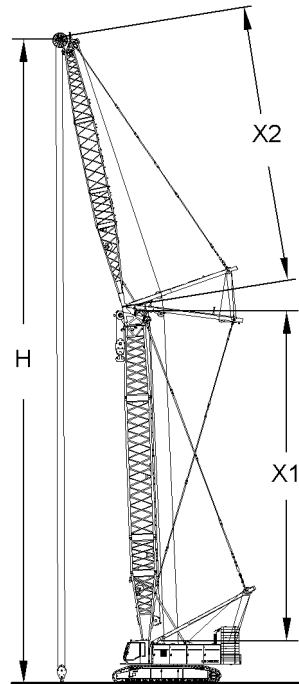


Fig. 1091 Calculate hoist rope length

$$S = X1 + X2 + (n \times H) + 3_{sw} + R$$

Abbreviations	Designation
S	Hoist rope length
X1	Main boom length
X2	Jib length
n	Number of reevings
H	Pulley height: Maximum value from the current load chart
3 <sub>sw</sub>	Safety windings: approx. 23' ft-in length of hoist rope remaining on the winch

Abbreviations	Designation
R	Reserve: allows for the rope sag and the hoisting rope lying on the rope pulleys

*Tab. 212 Explanation of the variables affecting the calculation of the hoist rope length*

## 6.5 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.
- ▶ In the case of pulley blocks or hooks with removable counterweight blocks, the weight must be selected so that the minimum weight for the boom length is attained.

Ensure that the following conditions are satisfied:

- 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.

Reeving	1	2	3	4	5	6	7	8	9	10
<b>Total boom length</b>	<b>Dead weight of the hook/pulley block</b>									
623 ft	2,535 lb	4,519 lb								
590 ft	2,205 lb	4,189 lb	6,173 lb							
558 ft	2,205 lb	3,968 lb	6,173 lb							
492 ft	1,984 lb	3,527 lb	5,511 lb							
426 ft	1,764 lb	3,086 lb	4,740 lb							
393 ft	1,543 lb	2,866 lb	4,409 lb	6,063 lb						
360 ft	1,433 lb	2,646 lb	3,968 lb	5,511 lb						
328 ft	1,323 lb	2,315 lb	3,638 lb	5,071 lb	6,504 lb					
295 ft	1,213 lb	2,094 lb	3,307 lb	4,519 lb	5,842 lb	7,275 lb				
262 ft	1,102 lb	1,874 lb	2,976 lb	4,078 lb	5,181 lb	6,393 lb	7,716 lb			
230 ft	992 lb	1,653 lb	2,646 lb	3,527 lb	4,630 lb	5,622 lb	6,834 lb	7,937 lb		
197 ft	772 lb	1,433 lb	2,205 lb	3,086 lb	3,968 lb	4,850 lb	5,842 lb	6,834 lb	7,937 lb	
164 ft	661 lb	1,213 lb	1,874 lb	2,535 lb	3,307 lb	4,078 lb	4,850 lb	5,732 lb	6,614 lb	7,606 lb
131 ft	551 lb	992 lb	1,433 lb	2,094 lb	2,646 lb	3,307 lb	3,968 lb	4,630 lb	5,291 lb	6,063 lb
98 ft	441 lb	772 lb	1,102 lb	1,543 lb	1,984 lb	2,425 lb	2,976 lb	3,527 lb	3,968 lb	4,630 lb
66 ft	331 lb	551 lb	772 lb	1,102 lb	1,323 lb	1,653 lb	1,984 lb	2,425 lb	2,756 lb	3,086 lb

Tab. 213 Selecting the hook/pulley block for reeving 1 to 10

Reeving	11	12	13	14	15	16	17	18	19	20
<b>Total boom length</b>	<b>Dead weight of the hook/pulley block</b>									
164 ft	8,598 lb	9,590 lb	10,582 lb	11,684 lb						



Reeving	11	12	13	14	15	16	17	18	19	20
<b>Total boom length</b>	<b>Dead weight of the hook/pulley block</b>									
131 ft	6,834 lb	7,716 lb	8,598 lb	9,480 lb	10,362 lb	11,354 lb				
98 ft	5,181 lb	5,842 lb	6,504 lb	7,165 lb	7,826 lb	8,598 lb	9,370 lb	10,141 lb	10,913 lb	11,795 lb
66 ft	3,527 lb	3,968 lb	4,409 lb	4,850 lb	5,291 lb	5,842 lb	6,393 lb	6,834 lb	7,385 lb	7,937 lb

Tab. 214 Selecting the hook/pulley block for reeving 11 to 20

### 6.6 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.

## 6.7 Restrictions due to wind

The current wind speed is shown on the operational screen for lifting operations on the monitor.

The following three steps describe the procedure in the event of wind:

- Reducing the lifting capacity
- Placing the boom in its parked position
- Laying down the boom

### 6.7.1 Reducing the lifting capacity

The reduction of the lifting capacity for crane operation in the event of wind can be found in the load chart manual.

### 6.7.2 Parked positions for boom configurations

The parking position of the boom applies up to the maximum wind speed. Above this speed the boom must be set down.



#### **DANGER**

Wind speed too high!  
Machine toppling over.

- ▶ Turn the boom into the wind.
- ▶ Before the maximum permitted wind speed is exceeded, place the boom in the specified parked position.
- ▶ Lay the suspended counterweight/wheeled counterweight carriage on the ground.
- ▶ Relieve the strain on the pendant ropes and/or pendant straps.
- ▶ Place the load on the ground.
- ▶ Pull up the hook.

### Parked position of the 2821 main boom (+ auxiliary jib)

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	65' 7" ft-in to 85' 4" ft-in
Main boom angle	54° to 60°

Tab. 215 Parked position of the 2821 main boom (+ auxiliary jib) (1/2)

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	95' 2" ft-in to 341' 2" ft-in
Main boom angle	72° to 80°

Tab. 216 Parked position of the 2821 main boom (+ auxiliary jib) (2/2)

### Parked position of the 2821 main boom + 2821/2316 reducing piece

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	226' 5" ft-in to 374' ft-in
Main boom angle	72° to 80°

Tab. 217 Parked position of the 2821 main boom + 2821/2316 reducing piece (1/2)

Description	Value
Maximum wind speed	65.62 ft/s
Main boom length	383' 10" ft-in to 403' 7" ft-in
Main boom angle	72° to 80°

Tab. 218 Parked position of the 2821 main boom + 2821/2316 reducing piece (2/2)

### Parked position of the 2821 main boom + 1713 fixed jib

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	all
Main boom angle	72° to 78°
Jib length	all
Jib offset	15° or 30°

Tab. 219 Parked position of the 2821 main boom + 1713 fixed jib

### Parked position of the 2821 main boom + 1507 fixed jib

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	65' 7" ft-in to 85' 4" ft-in
Main boom angle	68° to 72°
Jib offset	28°

Tab. 220 Parked position of the 2821 main boom + 1507 fixed jib (1/2)

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	95' 2" ft-in to 282' 2" ft-in
Main boom angle	72° to 78°
Jib offset	28°

Tab. 221 Parked position of the 2821 main boom + 1507 fixed jib (2/2)

**Parked position of the 2821 main boom + 1008 fixed jib**

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	65' 7" ft-in to 85' 4" ft-in
Main boom angle	68° to 72°
Jib length	all
Jib offset	15° or 30°

Tab. 222 Parked position of the 2821 main boom + 1008 fixed jib (1/2)

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	95' 2" ft-in to 282' 2" ft-in
Main boom angle	72° to 78°
Jib length	all
Jib offset	15° or 30°

Tab. 223 Parked position of the 2821 main boom + 1008 fixed jib (2/2)

**Parked position of the 2821 main boom + 0906 fixed jib**

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	65' 7" ft-in to 85' 4" ft-in
Main boom angle	68° to 72°
Jib offset	30°

Tab. 224 Parked position of the 2821 main boom + 0906 fixed jib (1/2)

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	95' 2" ft-in to 311' 8" ft-in
Main boom angle	72° to 78°
Jib offset	30°

Tab. 225 Parked position of the 2821 main boom + 0906 fixed jib (2/2)

**Parked position of the 2821 main boom + 2316 luffing jib**

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	65' 7" ft-in to 242' 9" ft-in

Description	Value
Main boom angle	80°
Jib length	65' 7" ft-in to 223' 1" ft-in
Jib angle	66° to 70°

Tab. 226 Parked position of the 2821 main boom + 2316 luffing jib (1/2)

Description	Value
Maximum wind speed	59.06 ft/s
Main boom length	65' 7" ft-in to 242' 9" ft-in
Main boom angle	80°
Jib length	232' 11" ft-in to 282' 2" ft-in
Jib angle	66° to 70°

Tab. 227 Parked position of the 2821 main boom + 2316 luffing jib (2/2)

**Note**

- ▶ All combinations with a jib length of 292' ft-in to 370' 9" ft-in must be laid down when the wind speed reaches a value at which work is no longer permitted (see load charts foreword).

## Parked position of the 2821 main boom + 1916 luffing jib

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	65' 7" ft-in to 242' 9" ft-in
Main boom angle	80°
Jib length	65' 7" ft-in to 262' 6" ft-in
Jib angle	66° to 70°

Tab. 228 Parked position of the 2821 main boom + 1916 luffing jib (1/2)

Description	Value
Maximum wind speed	59.06 ft/s
Main boom length	65' 7" ft-in to 242' 9" ft-in
Main boom angle	80°
Jib length	272' 4" ft-in to 311' 8" ft-in
Jib angle	64° to 70°

Tab. 229 Parked position of the 2821 main boom + 1916 luffing jib (2/2)

## Parked position of the 2821 main boom + 2316 luffing jib + 2316 Midfall

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	65' 7" ft-in to 232' 11" ft-in
Main boom angle	80°
Jib length	126' 4" ft-in to 214' 11" ft-in
Jib angle	66° to 70°

Tab. 230 Parked position of the 2821 main boom + 2316 luffing jib + 2316 Midfall (1/2)

Description	Value
Maximum wind speed	59.06 ft/s
Main boom length	65' 7" ft-in to 232' 11" ft-in
Main boom angle	80°
Jib length	224' 9" ft-in to 273' 11" ft-in
Jib angle	66° to 70°

Tab. 231 Parked position of the 2821 main boom + 2316 luffing jib + 2316 Midfall (2/2)



### Note

- ▶ All combinations above a jib length of 283' 10" ft-in must be laid down when the wind speed reaches a value at which work is no longer permitted (see load charts preface).

## Parked position of the 2821 main boom + 1916 luffing jib + 1916 Midfall

Description	Value
Maximum wind speed	72.18 ft/s
Main boom length	65' 7" ft-in to 242' 9" ft-in
Main boom angle	80°
Jib length	106' 8" ft-in to 254' 3" ft-in
Jib angle	66° to 70°

Tab. 232 Parked position of the 2821 main boom + 1916 luffing jib + 1916 Midfall (1/2)

Description	Value
Maximum wind speed	59.06 ft/s

Description	Value
Main boom length	65' 7" ft-in to 242' 9" ft-in
Main boom angle	80°
Jib length	264' 1" ft-in to 313' 4" ft-in
Jib angle	64° to 70°

Tab. 233 Parked position of the 2821 main boom + 1916 luffing jib + 1916 Midfall (2/2)

### 6.7.3 Laying down the 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

Wind load too high!

Risk of machine toppling over, structural breakdown.

- ▶ The entire boom must be laid down on the ground against the wind **before** the maximum permissible wind speed is reached.

If it is not possible to lay down with a boom combination including a luffing jib:

- ▶ Lay the jib head section on the ground and support the sides of the boom.

Observe the following safety guidelines and notes:

- Always lay down the entire main boom flat on the ground. Resting it across an undulation in the ground is always dangerous. If the main boom is not set down completely (but only near the ground), this may lead to the destruction of the boom or of the swing 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 the setting down has to be completed before the wind 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 crane operator and assistants will be absent, as a rule the entire boom must be placed on the ground.
- If during planning it is noticed that the boom cannot be set down completely at the site due to a lack of space and there is danger of a storm: contact the manufacturer in time to arrange special protective measures against storm damage.



#### Note

- ▶ The safest measure that can be taken is always to lay down the boom.



## 6.8 Traveling on gradients



### DANGER

Incorrect driving of machine on gradients!  
Machine toppling over.

- ▶ Take great care with every movement of the machine.
- ▶ Avoid dynamic travel movements.

The following points must be observed when traveling on gradients:

- The inclination value in % must be measured by qualified personnel and communicated to the machine operator before the machine is moved.
- Lateral gradients must be no more than 1 %.
- The machine must be fit with maximum rear counterweight and central counterweight.
- The machine must only be moved when the crawlers are in normal gear.
- The uppercarriage is parallel to the crawler side frame.
- When driving on an incline, only the fit hook and the fit pulley block may be on the boom.
- Specified boom angles:
  - are always relative to the machine's horizontal standing area.
  - should be checked and/or adjusted before an incline is negotiated.



### DANGER

Incorrect driving of machine over undulations!  
Machine toppling over.

- ▶ When traveling over undulations, all the travel gear (crawler) must be on the ground.

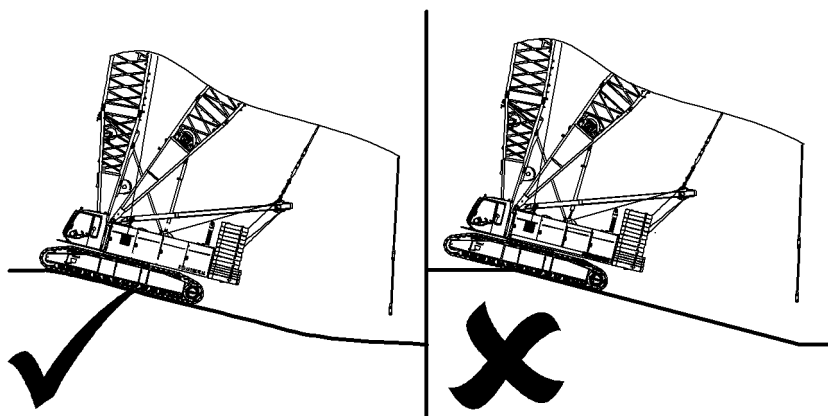


Fig. 1092 Traveling over undulations



### Note

The following diagrams are purely to illustrate the incline! The boom angle 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 this table.
- ▶ If you require values for special combinations: Contact Liebherr after sales service.

## Permitted gradient with 2821 main boom

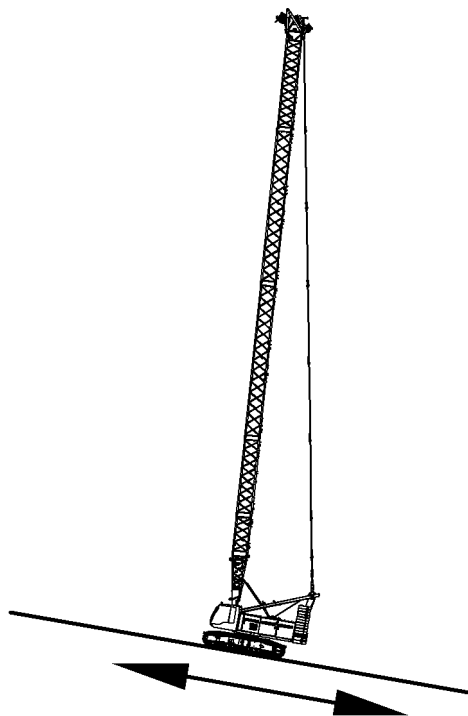


Fig. 1093 Boom travel uphill

Description	Value	
Main boom angle	40°	50°
<b>Main boom length</b>	<b>max. gradient in %, boom travel uphill</b>	
65' 7" ft-in to 173' 11" ft-in	10	-
183' 9" ft-in to 341' 2" ft-in	-	20

Tab. 234 Permitted gradient for 2821 main boom, boom travel uphill

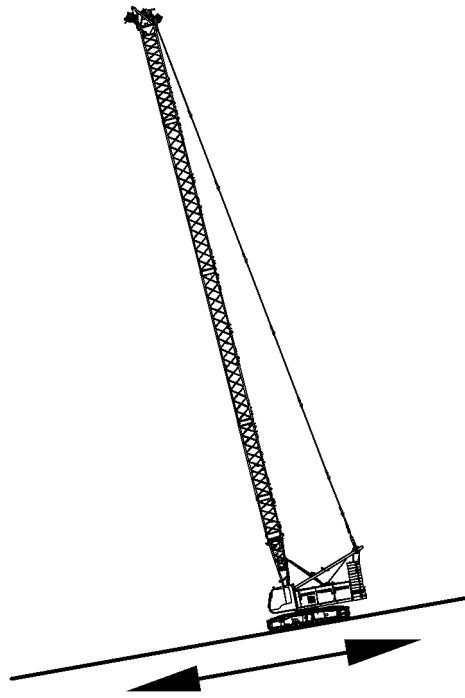


Fig. 1094 Boom travel downhill

Description	Value	
Main boom angle	86°	60°
<b>Main boom length</b>	<b>max. gradient in %, boom travel downhill</b>	
65' 7" ft-in to 173' 11" ft-in	-	30
183' 9" ft-in to 311' 8" ft-in	30	-
321' 6" ft-in to 341' 2" ft-in	20	-

Tab. 235 Permitted gradient for 2821 main boom, boom travel downhill

## Permitted gradient for 2821 main boom + 2821/2316 reducing piece

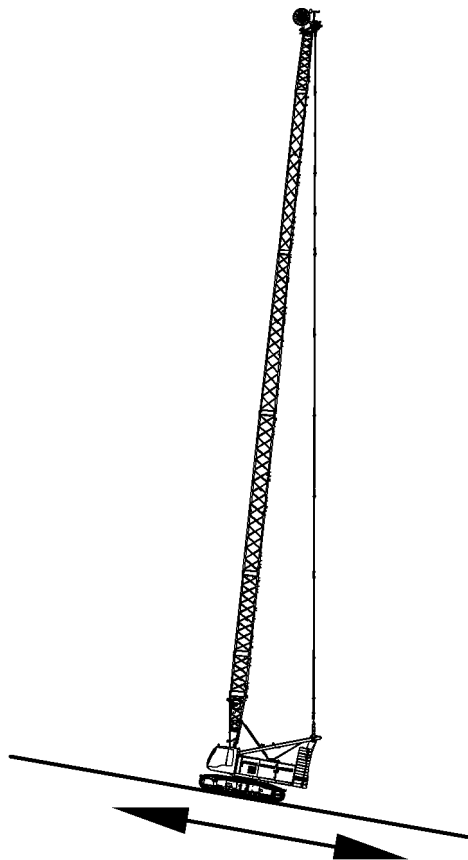


Fig. 1095 Boom travel uphill

Description	Value
Main boom angle	50°
<b>Main boom length</b>	<b>max. gradient in %, boom travel uphill</b>
226' 5" ft-in to 403' 7" ft-in	20

Tab. 236 Permitted gradient for 2821 main boom + 2821/2316 reducing piece, boom travel downhill

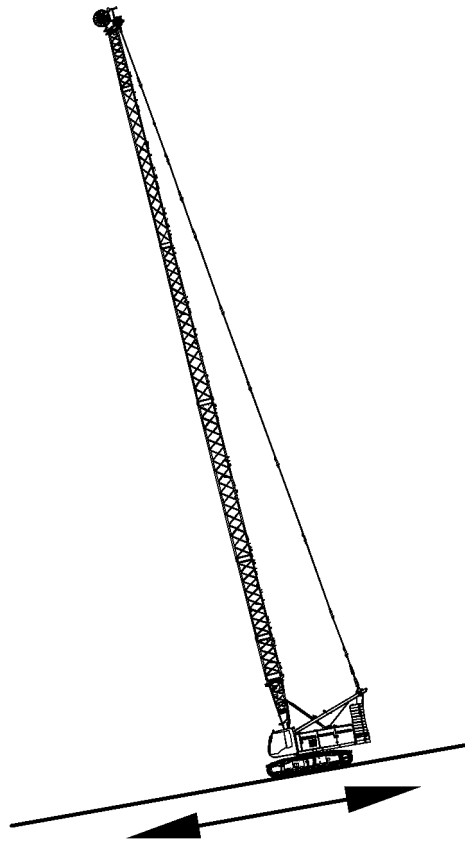


Fig. 1096 Boom travel downhill

Description	Value
Main boom angle	78°
<b>Main boom length</b>	<b>max. gradient in %, boom travel downhill</b>
226' 5" ft-in to 255' 11" ft-in	30
265' 9" ft-in to 374' ft-in	20
383' 10" ft-in to 403' 7" ft-in	10

Tab. 237 Permitted gradient for 2821 main boom + 2821/2316 reducing piece, boom travel downhill

## Permitted gradient for 2821 main boom + 1713 fixed jib

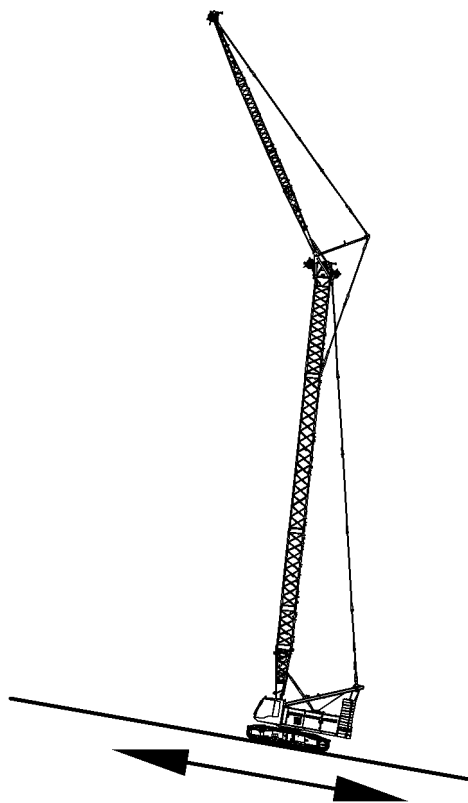


Fig. 1097 Boom travel uphill

Description	Value
Main boom angle	50°
Jib length	all
Jib offset	15° or 30°
<b>Main boom length</b>	<b>max. gradient in %, boom travel uphill</b>
65' 7" ft-in to 272' 4" ft-in	20

Tab. 238 Permitted gradient for 2821 main boom + 1713 fixed jib, boom travel uphill

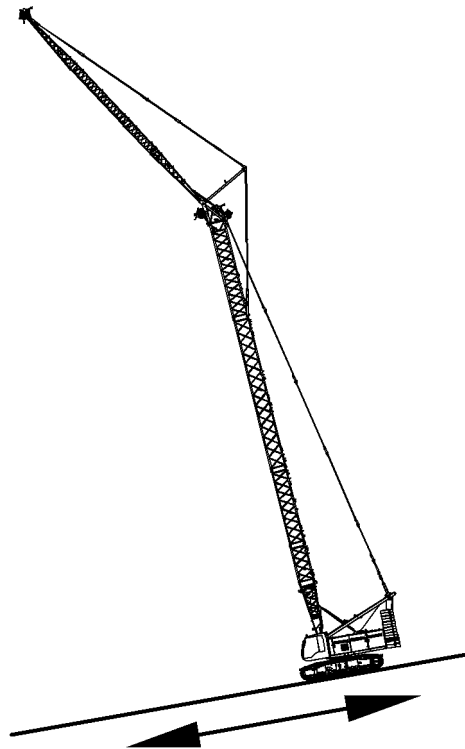


Fig. 1098 Boom travel downhill

Description	Value	
Main boom angle	80°	70°
Jib length	all	
Jib offset	15° or 30°	
<b>Main boom length</b>	<b>max. gradient in %, boom travel downhill</b>	
65' 7" ft-in to 134' 6" ft-in	-	30
144' 4" ft-in to 262' 6" ft-in	20	-
272' 4" ft-in	10	-

Tab. 239 Permitted gradient for 2821 main boom + 1713 fixed jib, boom travel downhill

## Permitted gradient for 2821 main boom + 1507 fixed jib

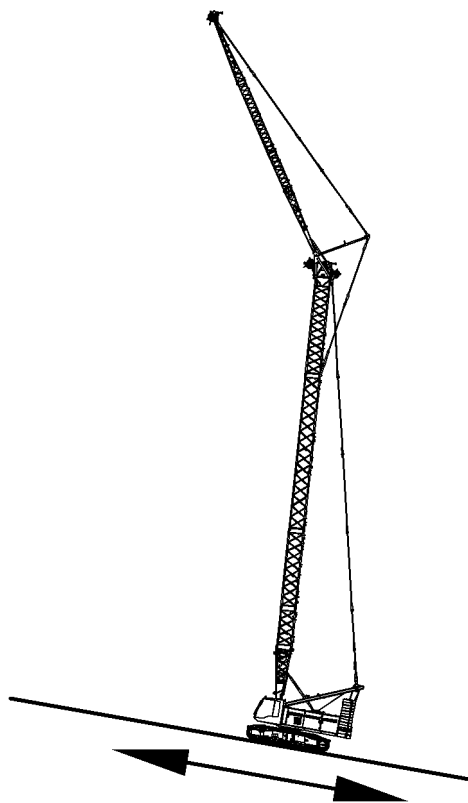


Fig. 1099 Boom travel uphill

Description	Value	
Main boom angle	40°	50°
Jib offset	28°	
<b>Main boom length</b>	<b>max. gradient in %, boom travel uphill</b>	
65' 7" ft-in to 124' 8" ft-in	20	-
134' 6" ft-in to 282' 2" ft-in	-	20

Tab. 240 Permitted gradient for 2821 main boom + 1507 fixed jib, boom travel uphill



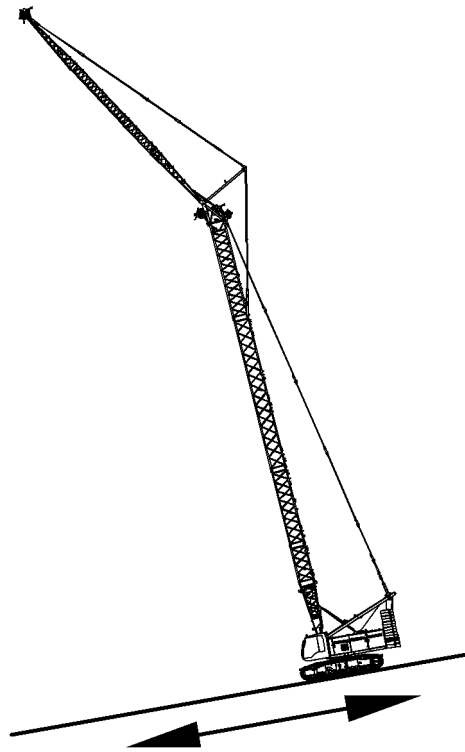


Fig. 1100 Boom travel downhill

Description	Value	
Main boom angle	80°	70°
Jib offset	28°	
<b>Main boom length</b>	<b>max. gradient in %, boom travel downhill</b>	
65' 7" ft-in to 124' 8" ft-in	-	30
134' 6" ft-in to 282' 2" ft-in	20	-

Tab. 241 Permitted gradient for 2821 main boom + 1507 fixed jib, boom travel downhill

## Permitted gradient for 2821 main boom + 1008 fixed jib

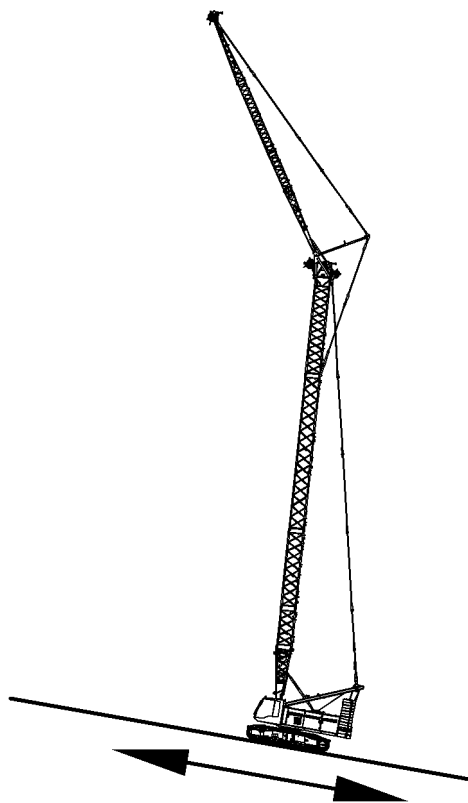


Fig. 1101 Boom travel uphill

Description	Value	
Main boom angle	40°	50°
Jib length	all	
Jib offset	15° or 30°	
<b>Main boom length</b>	<b>max. gradient in %, boom travel uphill</b>	
65' 7" ft-in to 134' 6" ft-in	20	-
144' 4" ft-in to 282' 2" ft-in	-	20

Tab. 242 Permitted gradient for 2821 main boom + 1008 fixed jib, boom travel uphill

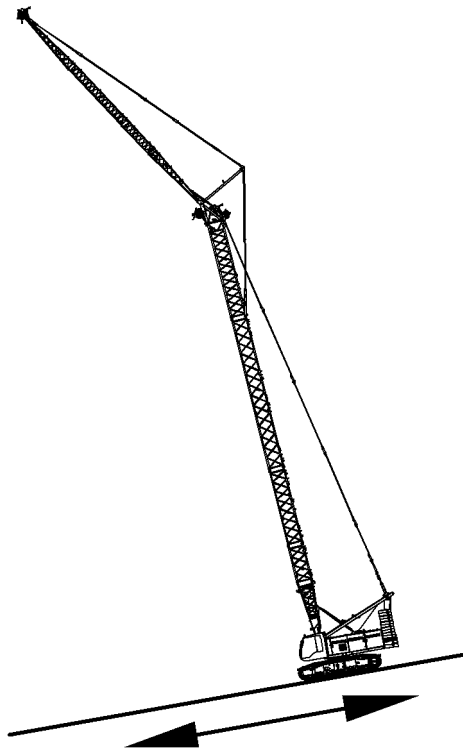


Fig. 1102 Boom travel downhill

Description	Value	
Main boom angle	80°	70°
Jib length	all	
Jib offset	15° or 30°	
<b>Main boom length</b>	<b>max. gradient in %, boom travel downhill</b>	
65' 7" ft-in to 134' 6" ft-in	-	30
144' 4" ft-in to 272' 4" ft-in	20	-
282' 2" ft-in	10	-

Tab. 243 Permitted gradient for 2821 main boom + 1008 fixed jib, boom travel downhill

## Permitted gradient for 2821 main boom + 0906 fixed fly jib

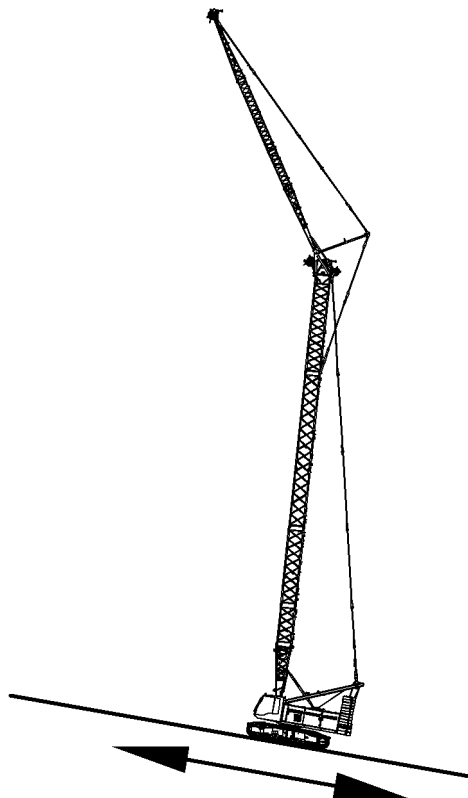


Fig. 1103 Boom travel uphill

Description	Value	
Main boom angle	40°	50°
Jib offset	30°	
<b>Main boom length</b>	<b>max. gradient in %, boom travel uphill</b>	
65' 7" ft-in to 124' 8" ft-in	20	-
134' 6" ft-in to 311' 8" ft-in	-	20

Tab. 244 Permitted gradient for 2821 main boom + 0906 fixed jib, boom travel uphill

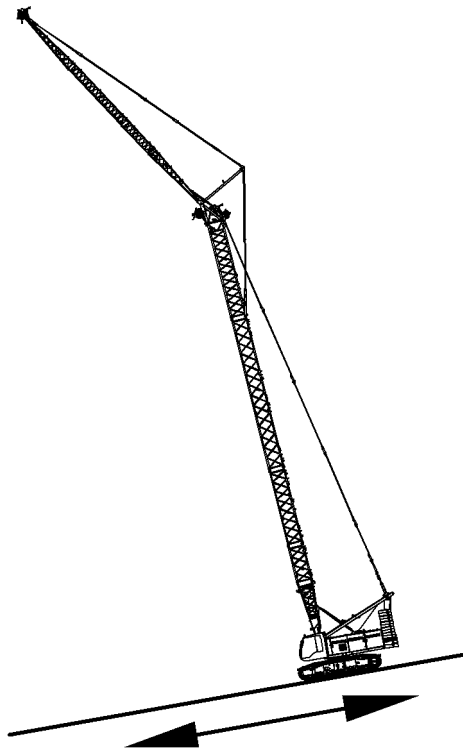


Fig. 1104 Boom travel downhill

Description	Value	
Main boom angle	80°	70°
Jib offset	30°	
<b>Main boom length</b>	<b>max. gradient in %, boom travel downhill</b>	
65' 7" ft-in to 124' 8" ft-in	-	30
134' 6" ft-in to 311' 8" ft-in	20	-

Tab. 245 Permitted gradient for 2821 main boom + 0906 fixed jib, boom travel downhill

## Permitted gradient for 2821 main boom + 2316 luffing jib (+ 2316 Midfall)

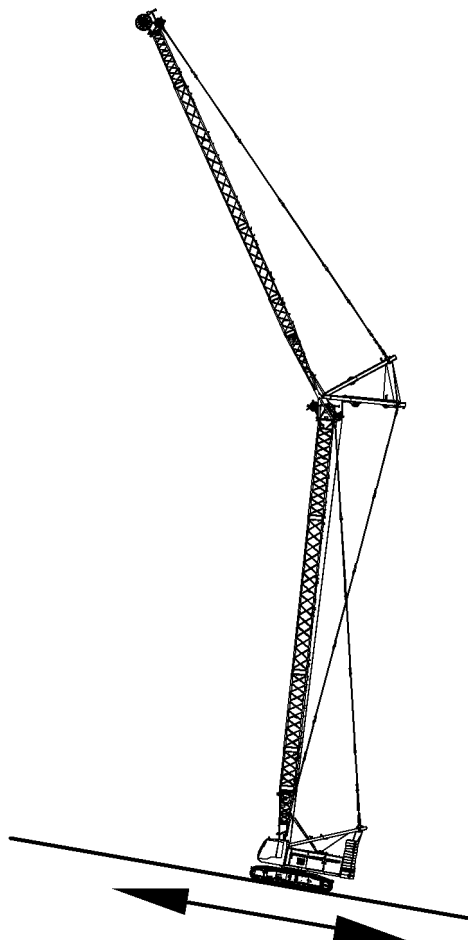


Fig. 1105 Boom travel uphill

Description	Value	
Main boom angle	45°	65°
Jib angle	15°	25°
Jib length	65' 7" ft-in to 154' 2" ft-in	164' ft-in to 370' 9" ft-in
<b>Main boom length</b>	<b>max. gradient in %, boom travel uphill</b>	
65' 7" ft-in to 232' 11" ft-in	15	20

Tab. 246 Permitted gradient for 2821 main boom + 2316 luffing jib (+ 2316 Midfall), boom travel uphill

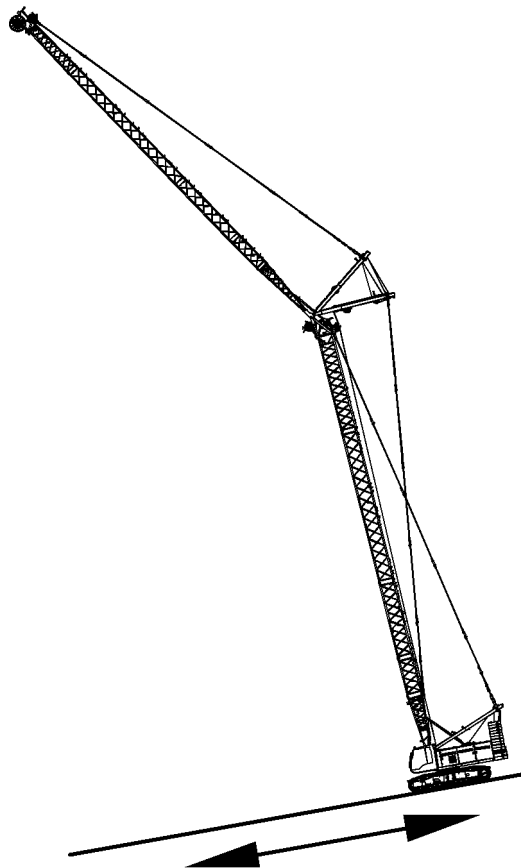


Fig. 1106 Boom travel downhill

Description	Value		
Main boom angle	83°		
Jib angle	73°		
Jib length	65' 7" ft-in to 282' 2" ft-in	65' 7" ft-in to 154' 2" ft-in	164' ft-in to 282' 2" ft-in
<b>Main boom length</b>	<b>max. gradient in %, boom travel downhill</b>		
65' 7" ft-in to 114' 10" ft-in	20	-	-
124' 8" ft-in to 232' 11" ft-in	-	20	10

Tab. 247 Permitted gradient for 2821 main boom + 2316 luffing jib (+ 2316 Midfall), boom travel downhill

## Permitted gradient for 2821 main boom + 1916 luffing jib (+ 1916 Midfall)

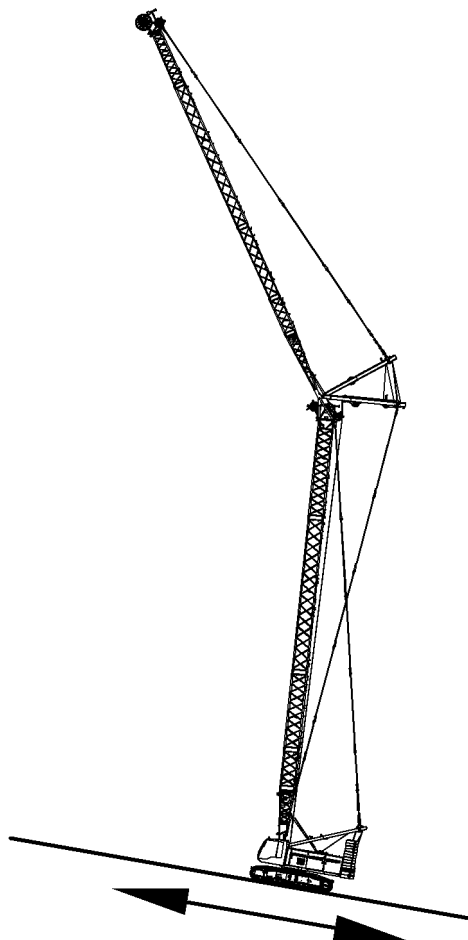


Fig. 1107 Boom travel uphill

Description	Value	
Main boom angle	45°	65°
Jib angle	15°	25°
Jib length	65' 7" ft-in to 154' 2" ft-in	164' ft-in to 311' 8" ft-in
<b>Main boom length</b>	<b>max. gradient in %, boom travel uphill</b>	
95' 2" ft-in to 242' 9" ft-in	20	20

Tab. 248 Permitted gradient for 2821 main boom + 1916 luffing jib (+ 1916 Midfall), boom travel uphill



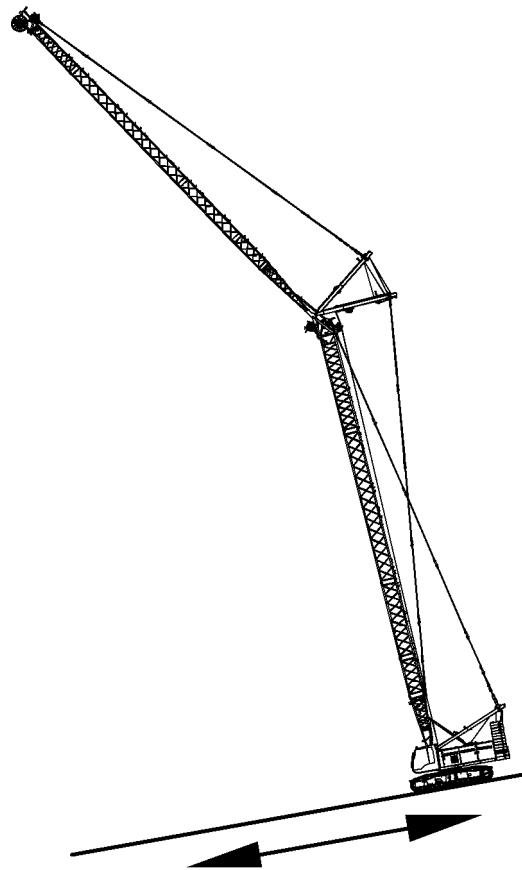


Fig. 1108 Boom travel downhill

Description	Value			
Main boom angle	75°	88°	88°	88°
Jib angle	70°	78°	78°	78°
Jib length	65' 7" ft-in to 154' 2" ft-in	65' 7" ft-in to 154' 2" ft-in	164' ft-in to 223' 1" ft-in	232' 11" ft-in to 311' 8" ft-in
<b>Main boom length</b>	<b>max. gradient in %, boom travel downhill</b>			
95' 2" ft-in to 164' ft-in	20	-	-	-
173' 11" ft-in to 242' 9" ft-in	-	20	-	-
95' 2" ft-in to 242' 9" ft-in	-	-	20	10

Tab. 249 Permitted gradient for 2821 main boom + 1916 luffing jib (+ 1916 Midfall), boom travel downhill

### 6.9 Rigging material

The machine operator must make sure that the proper rigging material is used for the transport operation concerned.

The rigging material should be selected such that when used properly the load can be safely lifted, held and set down again. It must be rated for the stresses occurring during proper use of the equipment.

The accident prevention regulations in the country of use must be read and observed.

The rigging material must not be loaded beyond its capacity.

The machine operator must know the following:

- the 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 agree the hand signals to be used with the signalman/slinger ([For more information see: 2.13 Hand signals, page 327](#))





# 7 Assembly and dismantling

This chapter describes:

- the assembly and disassembly of the machine.
- possible modifications on site.


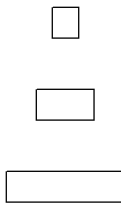




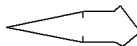
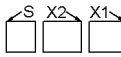
To make them simple to understand, illustrations are:

- simplified in places, as appropriate.
- not always shown with all machine components.

Directional instructions are given with reference to the position of the operator's seat.

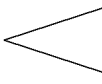
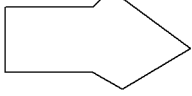
## 7.1 Explanation of symbols used

Any lengths displayed on the symbols will be quoted in metres.

Symbol	Explanation
	boom base section
	Boom intermediate pieces
	Reducing piece
	Midfall
	Boom head
	Boom head with intermediate piece 3 ft
	Jib (boom base section + boom head)
	S = Assembly position of rope guide X1 = Assembly position of mid-point suspension 1 X2 = Assembly position of mid-point suspension 2

Tab. 250 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. 251 Symbol for orientation in graphics

## 7.2 Implementation instructions for assembly and disassembly



---

### DANGER

Following incorrect procedures during assembly and disassembly!

- ▶ All activities for assembling and disassembling the machine must be carried out in the order described.
  - ▶ Questions or uncertainties must be resolved immediately with the assembly team.
- 

Use only the Liebherr tool kit provided and the assembly rigging to assemble and disassemble the machine.

Always carry out the entire assembly and disassembly of the machine in "Assembly mode".

All movements of winches, cylinders, crawlers and swing should be slow and take place at the lowest speed level.

## 7.3 Assembling the basic machine

Assembly of the basic machine in the 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 satisfied:

- The machine has been prepared for self-assembly.
- Work plans have been drawn up.
- The number of ballast weights required is known.
- The transport vehicles with the single components are coordinated to ensure that the procedure runs smoothly.
- Any accessories required are available.

### 7.3.1 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.

### 7.3.2 Swivel the cab to the working position

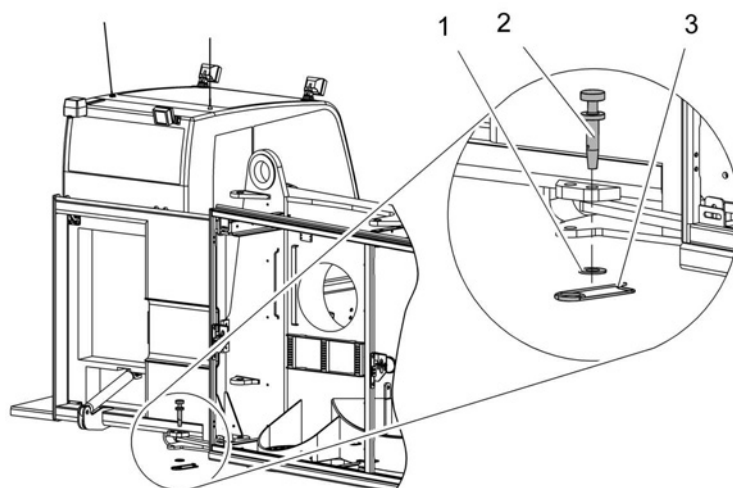


Fig. 1120 Cab in transport position

- |   |        |   |            |
|---|--------|---|------------|
| 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.



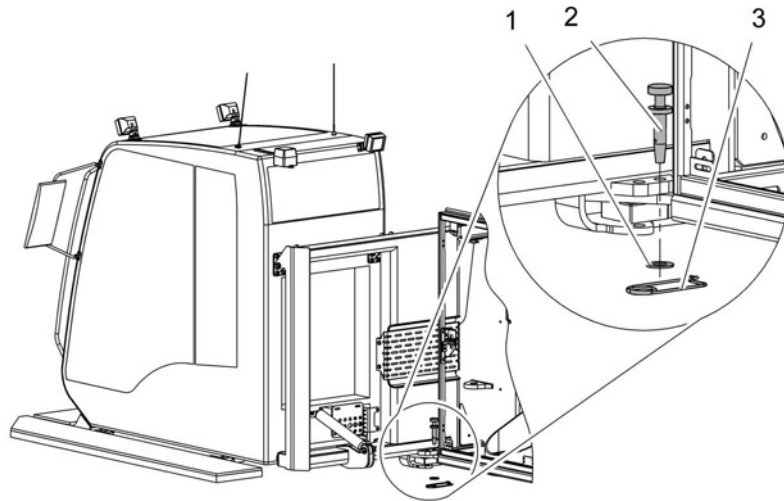


Fig. 1121 Cab in working position

1 Washer  
2 Pin

3 Safety 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).

### 7.3.3 move the cab's platform into the working position

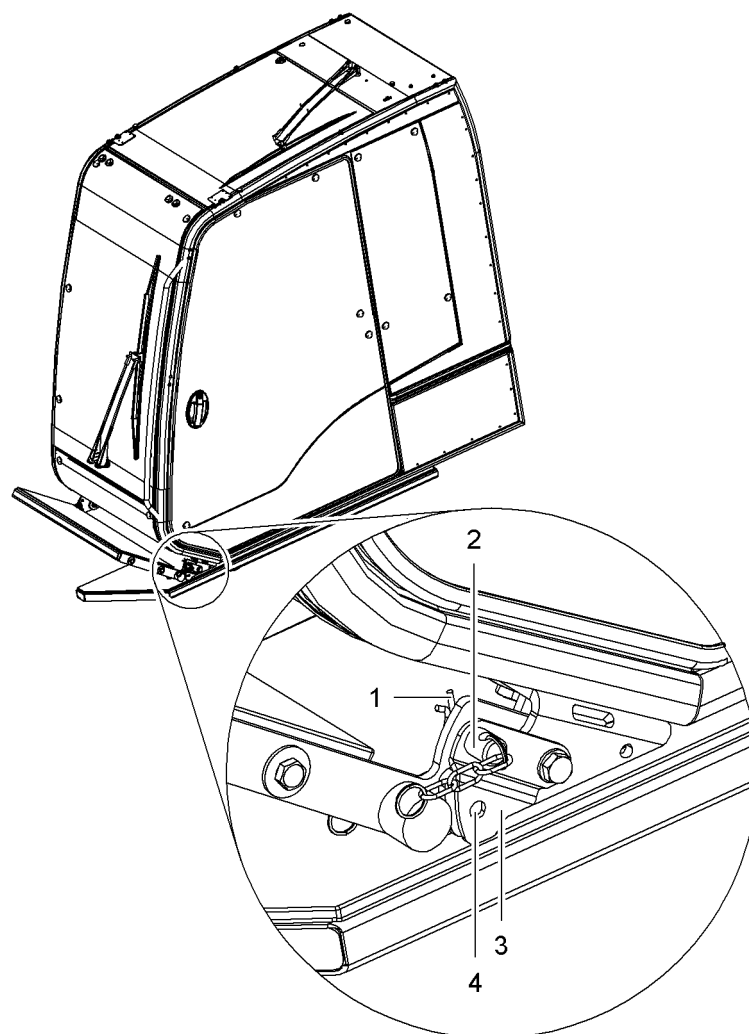


Fig. 1122 Platform in working position

- |   |            |   |               |
|---|------------|---|---------------|
| 1 | Safety pin | 3 | Locking plate |
| 2 | Pin        | 4 | Hole          |

- ▶ Pull out the safety pin 1 and remove the pin 2. Open the locking plate 3 and insert the pin 2 into the hole 4 once more.
- ▶ Pull out the side platform.
- ▶ Pull out the safety pins 1 on both sides of the front boom walkway and remove the pins 2.
- ▶ Fold down the front platform and position the locking plates on both sides, as shown in the illustration.
- ▶ Replace and secure pins.
- ▶ Insert the platform side extension.
- ▶ Secure the platform extension from below using cotter pins.

### 7.3.4 Removing the uppercarriage lock

The uppercarriage is fixed to the undercarriage for transportation.

This connection prevents the uppercarriage swinging during transportation.

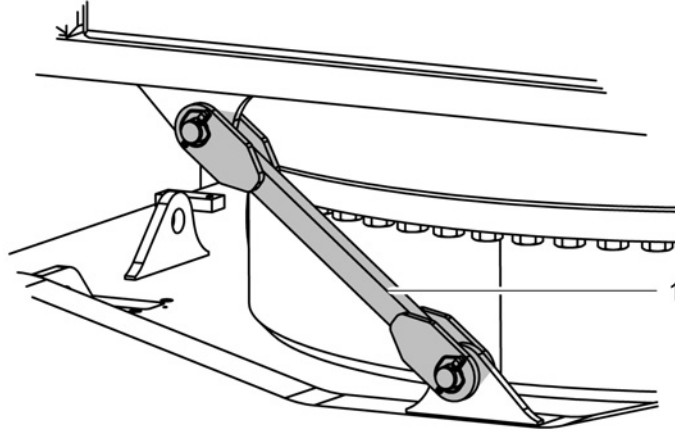


Fig. 1123 Removing the uppercarriage lock

- ▶ Remove the cotter pin and pin from the uppercarriage.
- ▶ Place the connection 1 on the uppercarriage.
- ▶ Insert the pin once more and secure with the cotter pin.

### 7.3.5 Mounting the ladder on the uppercarriage



#### CAUTION

Incorrect assembly of the ladder!  
Risk of ladder falling.

- ▶ Secure the ladder on both sides with lynch pins at the fixing pins.
- ▶ The ladder must be checked for damage and cracks before it is fitted and before it is used.

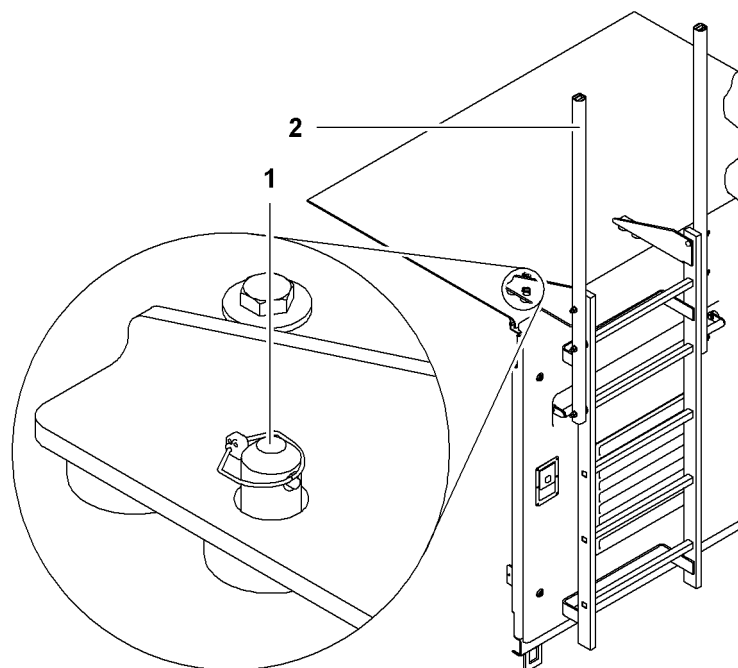


Fig. 1124 Securing the ladder

1 Linchpins (2x)

2 Ladder

- ▶ Attach the ladder 2 to fixing pins on the uppercarriage.
- ▶ Secure the ladder on both sides with the linchpins 1.

### 7.3.6 Folding up railings on the uppercarriage



#### **WARNING**

Walking on the uppercarriage without appropriate safety provisions!  
risk of falling from the uppercarriage.

- ▶ A fall arrest system must be worn when working on the uppercarriage to prevent falling.

Railings on the uppercarriage can be folded up to provide a safe working environment.

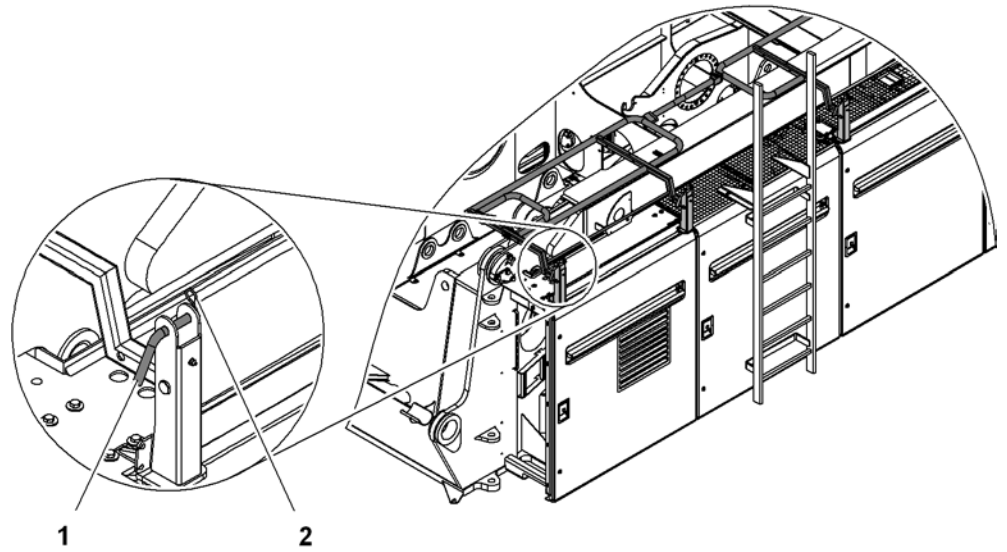


Fig. 1125 Removing pins

1 Pin

2 Safety pin

► Remove pins 1 and safety pins 2 from all positions and put in a safe place.

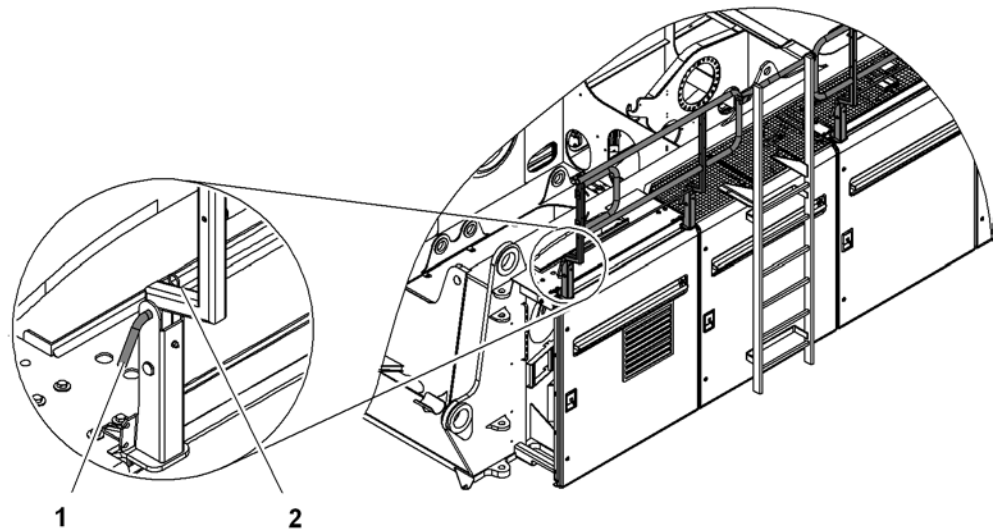


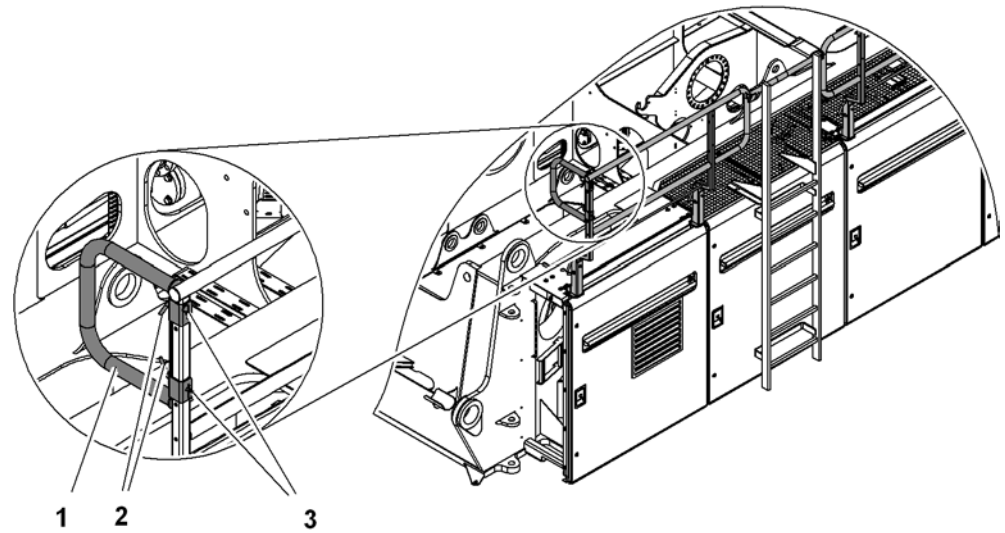
Fig. 1126 Inserting pins

1 Pin

2 Safety pin

► Insert all the pins 1 and secure with safety pins 2.

► Fold up railings.



*Fig. 1127 Turn railing end section*

- |   |                      |   |            |
|---|----------------------|---|------------|
| 1 | Railing end sections | 3 | Safety pin |
| 2 | Pin                  |   |            |

- ▶ Remove pins **2** and safety pins **3** from the front and rear railing end sections **1**.
- ▶ Turn front and rear railing end sections **1** inwards through 90 °.
- ▶ Replace and secure pins.

### 7.3.7 Fitting the exhaust pipe

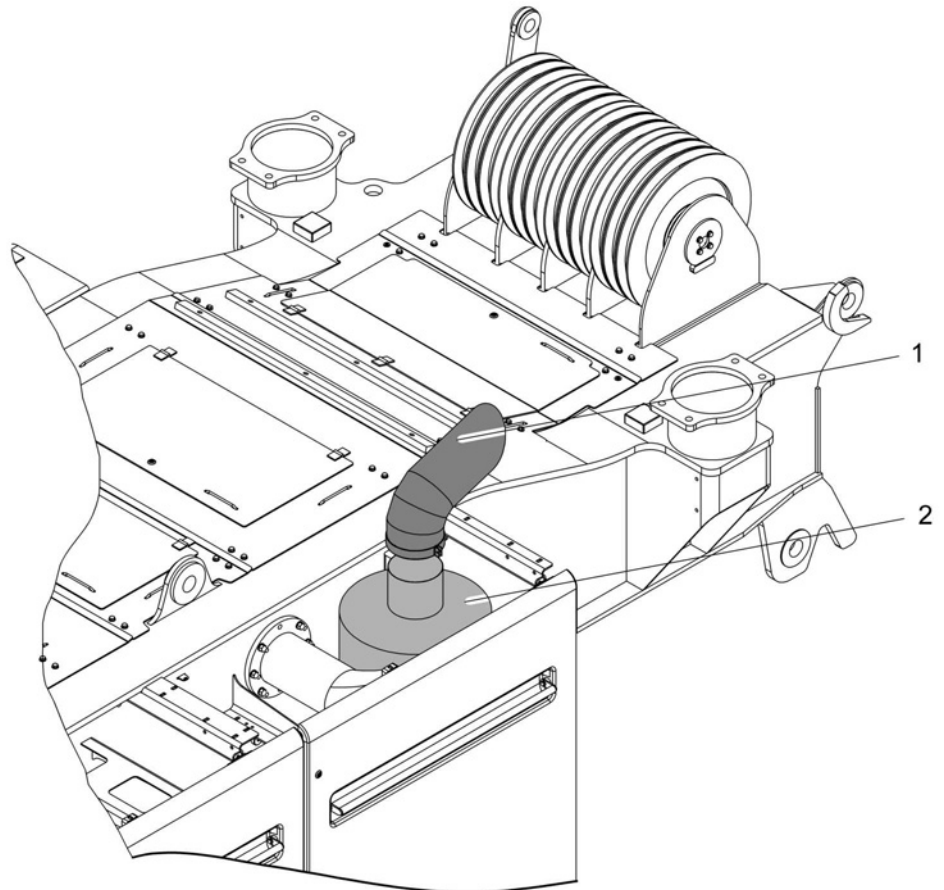
For transportation, a spacer was removed from the exhaust pipe to reduce the transport height.



**CAUTION**

Exhaust pipe hot!  
risk of burns to hands.

- ▶ Never touch the exhaust pipe before it has cooled down.



*Fig. 1128 Exhaust pipe assembly, part 1*

- 1 Exhaust crank
- 2 exhaust silencer

- ▶ Detach the pipe clamp from the exhaust crank 1.
- ▶ Detach the exhaust crank from the exhaust silencer 2 and put to one side.

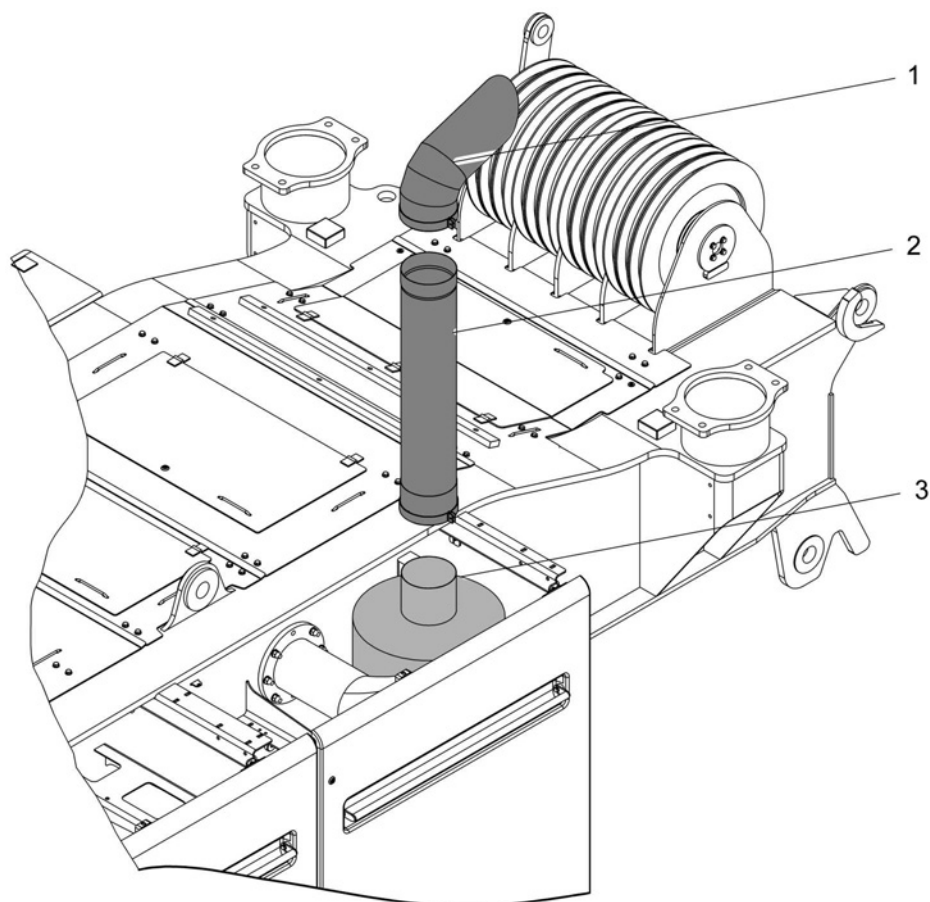


Fig. 1129 Exhaust pipe assembly, part 2

- |   |                |   |                  |
|---|----------------|---|------------------|
| 1 | Exhaust crank  | 3 | exhaust silencer |
| 2 | Extension pipe |   |                  |

- ▶ Attach the extension pipe 2 to the exhaust silencer 3.
- ▶ Tighten the pipe clamp.

### NOTICE

Incorrect angle of exhaust crank!  
Sensor lines and A-frame 1 may be damaged by hot exhaust air.

- ▶ The exhaust crank opening must be set at an angle of approx. 90 ° to the uppercarriage, turned to the left and facing outwards.
- ▶ Place the exhaust crank 1 on the extension pipe 2.
- ▶ Tighten the pipe clamp.

## 7.3.8 Selecting assembly mode



### DANGER

No safety cutout by the load moment limiter (LML) in assembly mode!  
Risk of machine toppling over, structural breakdown.

- ▶ Only use assembly mode for assembling and disassembling the machine.



## Connecting 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).

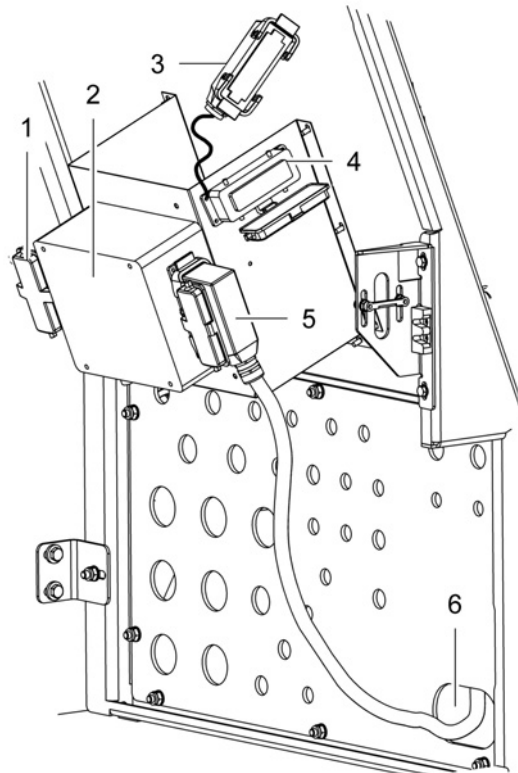


Fig. 1130 Connecting the bypass plug

- |   |  |   |  |
|---|--|---|--|
| 1 | Electric cables of the jib luffing winch and/or rope reeving winch | 4 | Dummy receptacle                         |
| 2 | Electric box   | 5 | Electric cables of the boom base section |
| 3 | Bypass plug  | 6 | Cable duct                               |

The bypass plug **3** must be plugged into the electric box **2** for assembly mode.

The electric cable **5** is still on the boom base section.

- ▶ Check the connector position.

### Troubleshooting

Wrong connector position?

- ▶ Unplug/plug in the bypass plug **3**.

## Switching on the ignition

- ▶ Insert the ignition key in the ignition lock and turn to position 1.
  - ▷ The start-up display appears on the monitor. The setup screen appears once the Litronic control system is operational.

### 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 after sales service.

## Selecting assembly mode

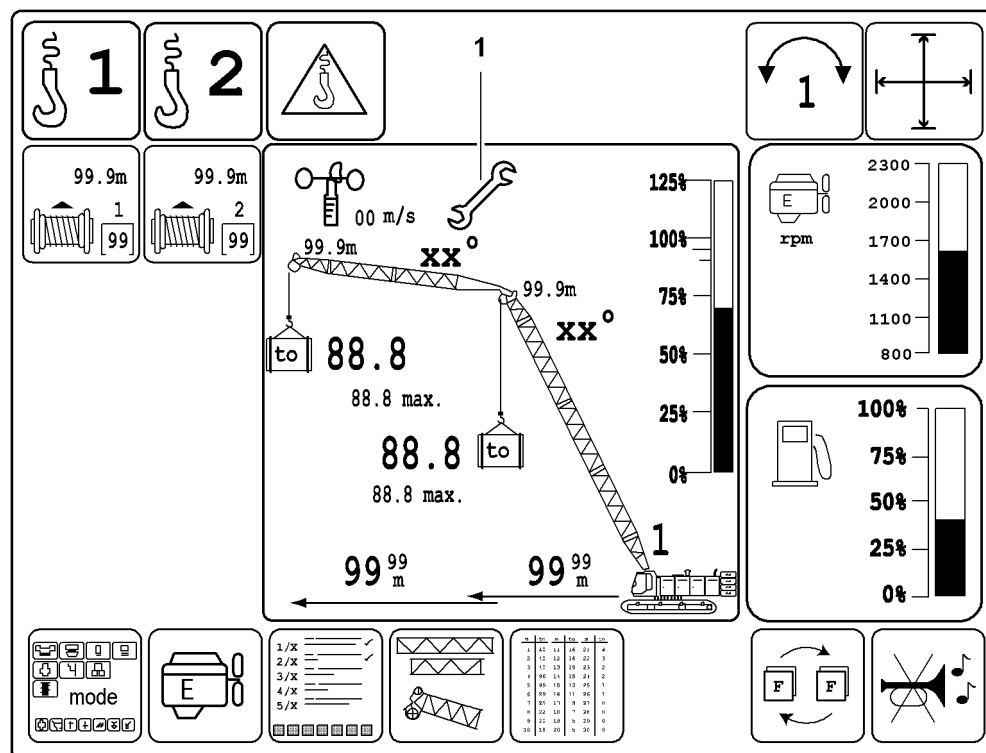


Fig. 1131 Monitor

### 1 Assembly mode symbol

The Assembly mode 1 symbol indicates whether assembly mode is switched on.

If assembly mode is not active:

- ▶ Have the key for control panel X12 handed over by an authorised person.
- ▶ Unlock control panel X12.



► Press the *Assembly mode* switch on the control panel X12.

- ▷ Assembly mode has been activated.
- ▷ The lamp in the switch lights up.
- ▷ The *Assembly mode* symbol appears on the monitor:



Fig. 1133 Assembly mode symbol

### 7.3.9 Erecting A-frame 1

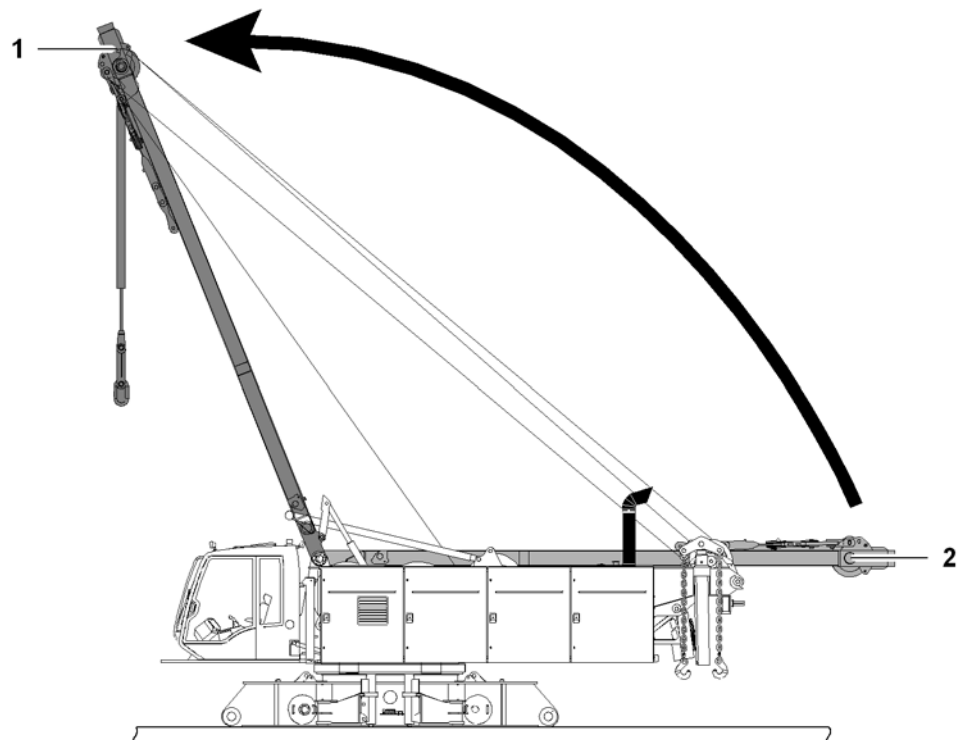


Fig. 1134 Erecting A-frame 1

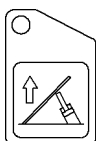
A-frame 1 is laid down backwards for transportation (Position 2).



**DANGER**

Machine must not be raised when A-frame 1 is laid down!  
Machine toppling over.

► Erect A-frame 1 before raising the machine (Position 1).



► Press the *Extend A-frame cylinders* button on control panel X23.

In cold weather when ropes are stiff only move A-frame 1 slowly to ensure that the rope does not form any slack. If slack rope does form, check the rope, the run of the rope on the pulley set, and the winding of the rope on the winch.

- Unwind the boom winch.
  - ▷ A-frame 1 erects itself.

The angle can be read on the goniometer on A-frame 1.

- ▶ Erect A-frame 1 to approx. 70 °.

### 7.3.10 Unloading the machine

In order to unload it from the low loader and assemble the crawler side frame, the machine must be supported on the ground using jacks.

All the process steps are explained only once, but they must be carried out on all jacks.



---

#### **DANGER**

Incorrect unloading of machine!

Machine toppling over.

- ▶ The machine operator must remain in the cab throughout the entire jack-up process.
  - ▶ Check the spirit level in the cab and on the undercarriage.
  - ▶ The load-bearing capacity of the ground must be tested before you start to jack up the machine.
  - ▶ Never use the jack with the rear counterweight or boom base section attached.
-

Ensure that the following conditions are satisfied:

- The machine is equipped with jacks for self-assembly.
- Pre-start checks have been carried out (For more information see: 4.11 Inspections before daily commissioning, page 427) .
- The assembly team has been instructed and all the safety measures have been followed (For more information see: 7.2 Implementation instructions for assembly and disassembly, page 593) .
- Mechanical boom angle indicator is checked to ensure it is working correctly and moving freely.
- The bypass plug is connected.
- The cab is in the working position.
- The cab's boom walkways are in the working position.
- The intermediate exhaust pipe section is attached.
- The operator's seat is set correctly.
- Assembly mode has been activated.
- All the points needed to ensure safe and cost-effective work with the machine were considered during work planning.

### Determining the jack-up height

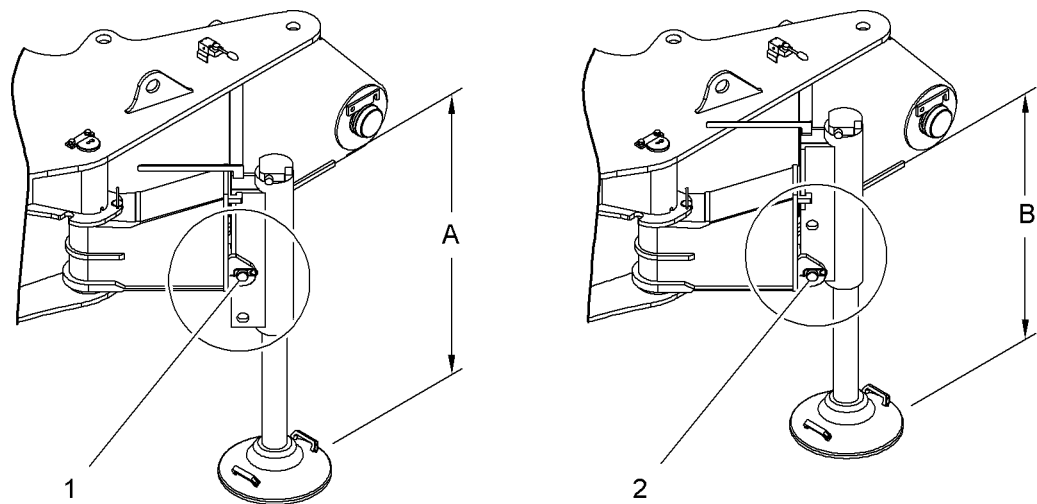


Fig. 1136 Determining the jack-up height

- 1 Jack in upper pin locking position      2 Jack in lower pin locking position

	Jack-up height A	Jack-up height B
<b>Standard cylinder</b>	3' 2" ft-in	2' 5" ft-in
<b>Telescopic cylinder</b>	4' 8" ft-in	3' 10" ft-in

Tab. 252 Determining the jack-up height

The jacks can be bolted to the swing brackets in two positions.

The jack-up height needed to unload the machine depends on the:

- height of the low-loader
- soil composition on the site
- version of the hydraulic jack (standard or telescopic)

**Example:**

- Distance from floor to loading platform of low-loader: 3' 3" ft-in
- Jack-up height of the jacks: 3' 2" ft-in

LWN// Auslieferung/2010-07-21/en

- Soil composition: Flat asphalt with adequate capacity

Result: place a 3.94" in thick bolster plate underneath.

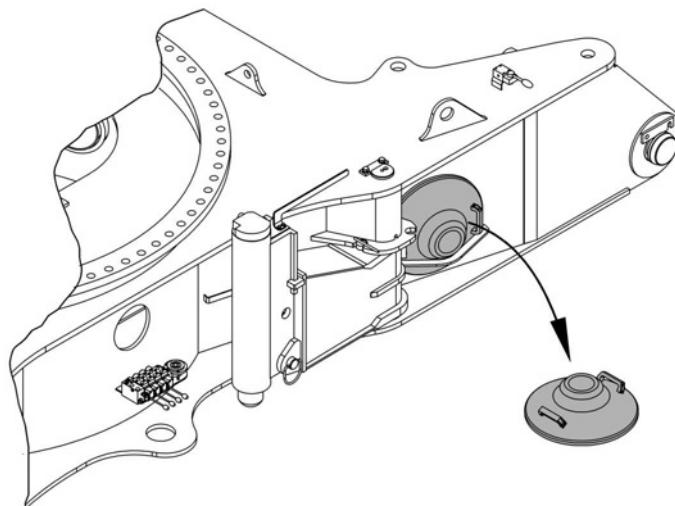
### Fitting support pads and chocks



#### **DANGER**

Incorrect use of support pads and chocks!  
Machine toppling over.

- ▶ Use the support pads fixed to the undercarriage.
- ▶ Add stable material over a sufficiently wide area under the support pads if necessary.
- ▶ Chock all support pads with the same material.
- ▶ Make sure that chocks do not protrude into the low loader's track.



*Fig. 1137 Chocking support pads*

- ▶ Take support pads from the mounts.
- ▶ Place support pads flat on the ground or on chocks.

## Placing the swing brackets in the support position

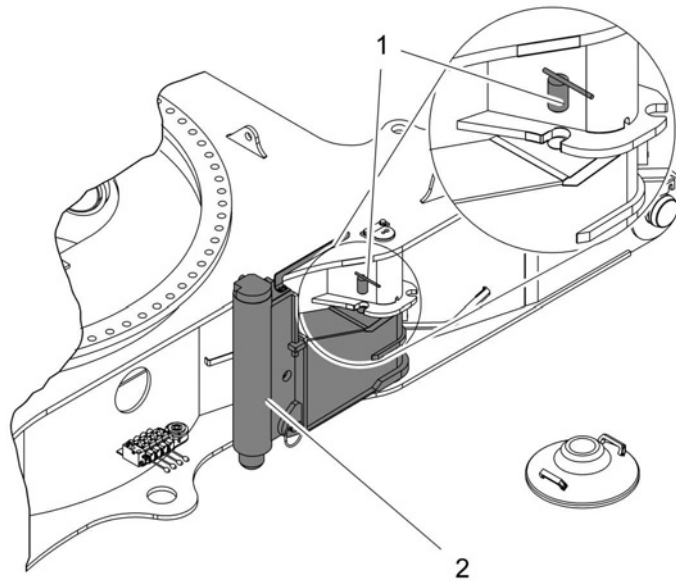


Fig. 1138 Swivelling the swing brackets into the support position

1 Pin

2 Swing bracket

- ▶ Remove the pin 1.
- ▶ Swivel the swing bracket 2 into the support position.



### **DANGER**

Non-bolted swing brackets!  
Machine toppling over.

- ▶ Bolt the swing brackets in the support position.

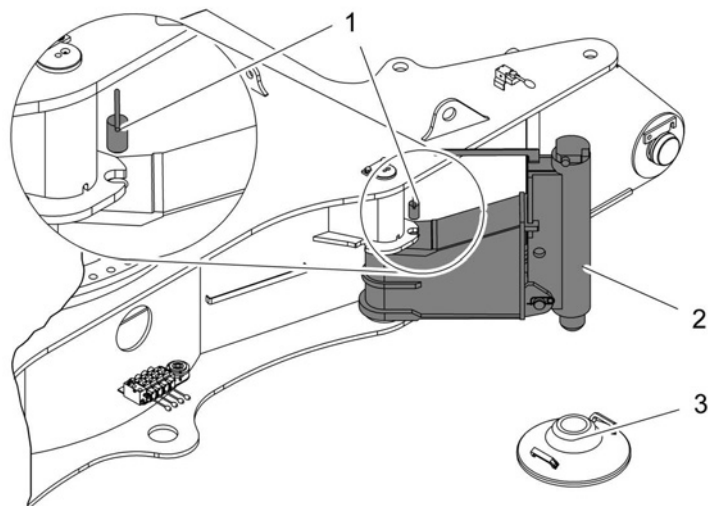


Fig. 1139 Bolting the swing brackets in the support position

- 1 Pin  
2 Swing bracket  
3 Support pads

- ▶ Insert the pin 1.
- ▶ Align the support pads 3 if necessary.

### Setting the jack-up height of the jacks

When the jack-up height was determined, if it was shown that the position of the jack needed to be changed, then the following process steps should be carried out.



#### **DANGER**

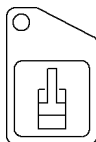
Different jack-up heights!  
Machine toppling over.

- ▶ Bolt all jacks to the same pin connection points on the swing brackets!

- ▶ Start the machine.

- ▶ Lower the safety lever.

- ▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button on control panel X23.



#### **DANGER**

Incorrect raise of the machine!  
Machine toppling over.

- ▶ Extend the jack until the strain on the pin is relieved.

- ▶ Do not raise the machine.



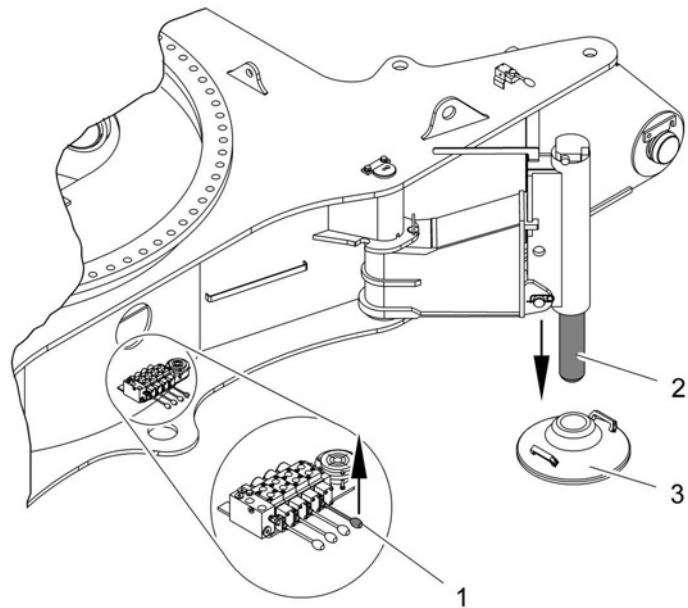


Fig. 1141 Extending the jack

- |   |               |   |              |
|---|---------------|---|--------------|
| 1 | Control lever | 3 | Support pads |
| 2 | Jack          |   |              |

- ▶ Extend the jack 2 using the appropriate control lever 1.
- ▶ Align the support pads 3 if necessary.
- ▶ Extend the jack until you can turn the pin by hand.

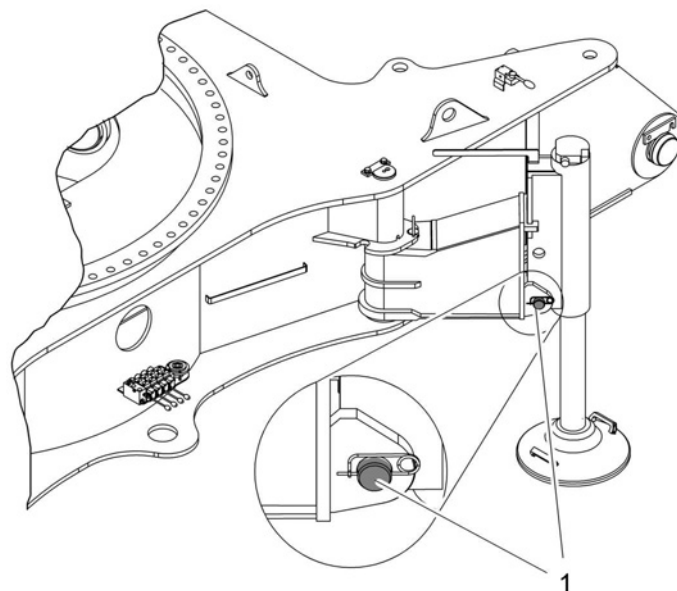


Fig. 1142 Removing pins

- |   |                    |
|---|--------------------|
| 1 | Pin and safety pin |
|---|--------------------|
- ▶ Remove the pin 1.



## CAUTION

Moving parts!  
Crushing.

- ▶ Keep all limbs well clear of moving parts.
- ▶ Visually check that the pin connection points are aligned.

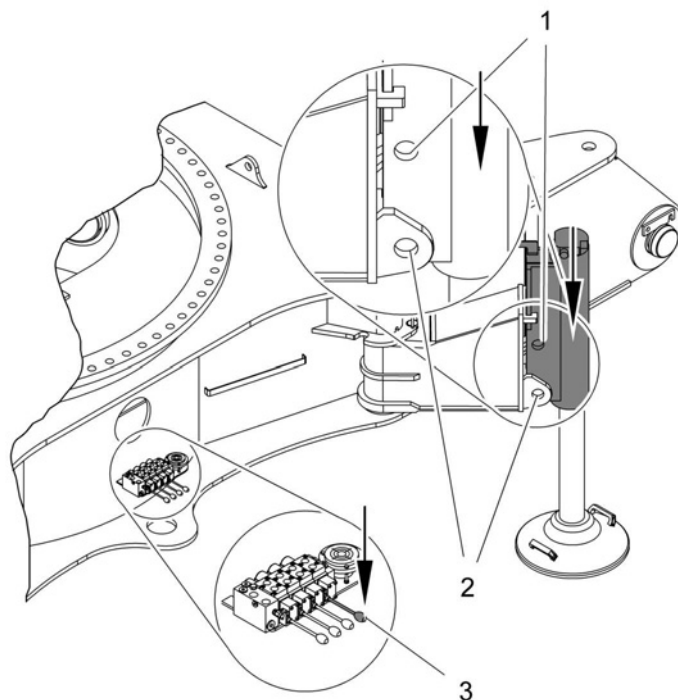


Fig. 1143 Adjusting a pin connection point

- |                 |                 |
|-----------------|-----------------|
| 1 Jack          | 3 Control lever |
| 2 Swing bracket |                 |

- ▶ Adjust jack using the appropriate control lever **3**.
  - ▷ The top part of the jack moves.

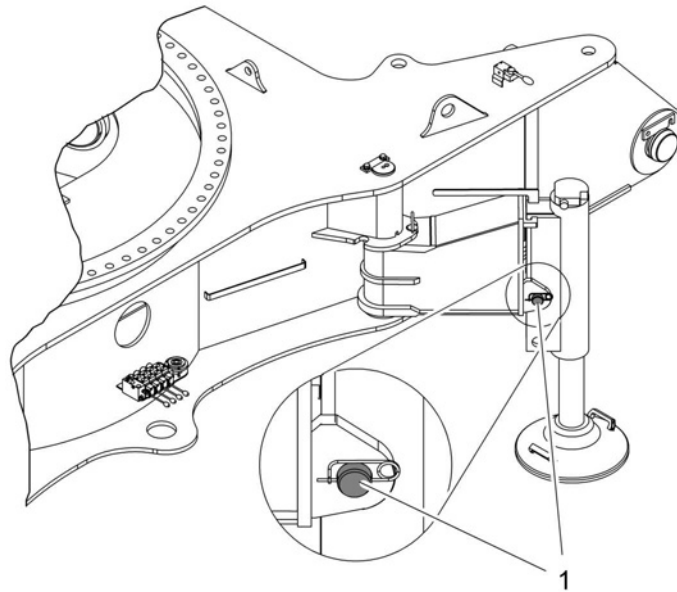


Fig. 1144 Inserting pins

1 Pin

When the pin connection point on the swing bracket is aligned with the upper pin connection point of the jack:

- ▶ Insert the pin 1 and secure with safety pin.
- ▶ Repeat the procedure for all support positions.

## Extending the jack



### DANGER

If the jacks are extended unevenly!  
Machine toppling over.

- ▶ Make sure that the air bubble in the spirit level does not cross the outer ring.

The jacks can be operated using the control levers on the undercarriage.

Several levers may be pressed at the same time.

The air bubble in the spirit level must stabilise in the innermost circle with no additional bubbles.

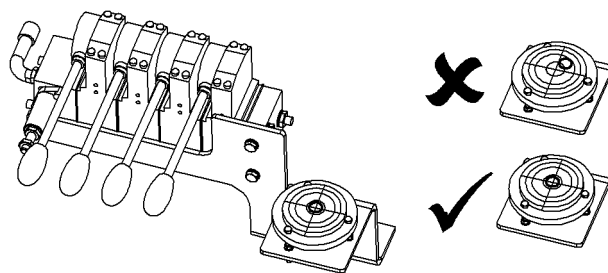


Fig. 1145 Spirit level on undercarriage

- ▶ Move control lever upwards.
  - ▷ The jacks extend.
  - ▷ The machine starts to rise.
- ▶ Move control lever downwards.
  - ▷ The jacks retract.
  - ▷ The machine lowers itself.
- ▶ Carefully and accurately level the machine.

### Driving the low loader out from underneath the machine



---

#### **DANGER**

Collision of low loader with jacks!  
Machine toppling over.

- ▶ Make sure that one or more assistants guide in the heavy goods vehicle with the low loader.
- 

Ensure that the following conditions are satisfied:

- There is a clearance of at least 3.94" in between the low loader and the machine.
- The chocks between the low loader and the machine have been removed.
- There are no obstacles on the floor (e.g. rocks) that might cause the low loader to deviate from its track.
- The low loader can drive straight out from underneath the machine.
- The steering axles on the low loader are straight.
- ▶ Drive the low loader out from underneath the machine.

### 7.3.11 Preparing the machine as an assembly crane

Two different assembly riggings are used on the assembly cylinder of A-frame 1 for assembling the individual components.

#### 4-strand round slings with four chain shortening devices

This assembly rigging is used to sling the following components:

- Rear counterweight
- Boom sections

#### 4-strand round slings

This assembly rigging is used to sling the following components:

- Crawler side frame
- Carbody counterweight

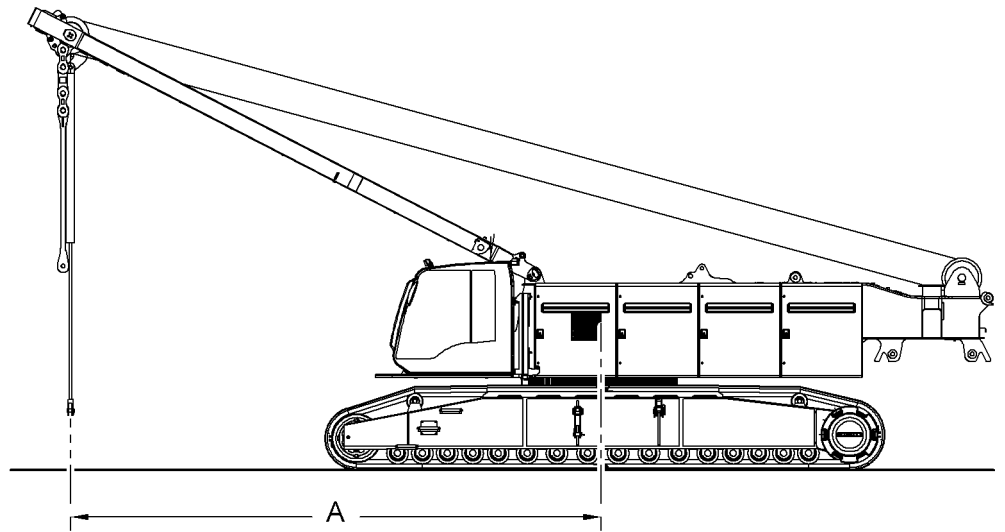


Fig. 1146 Maximum radius of the assembly crane

A Maximum radius 30' 2" ft-in



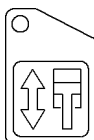
#### DANGER

Maximum radius exceeded!  
Machine toppling over.

▶ Maximum radius **A** must not exceed 30' 2" ft-in.

▶ Unwind the boom winch.  
▷ A-frame 1 will move forwards.

▶ Press the *Assembly cylinder* button on control panel X23.  
▷ This selects the assembly cylinder.



▶ Move the left-hand multi-directional control lever to the right.  
▷ The assembly cylinder extends.

▶ Remove the safety pin and pin from the assembly cylinder lug.

▶ Attach the assembly rigging.

▶ Insert the pin into the assembly cylinder lug and secure with safety pin.

### 7.3.12 Attaching the crawler side frame

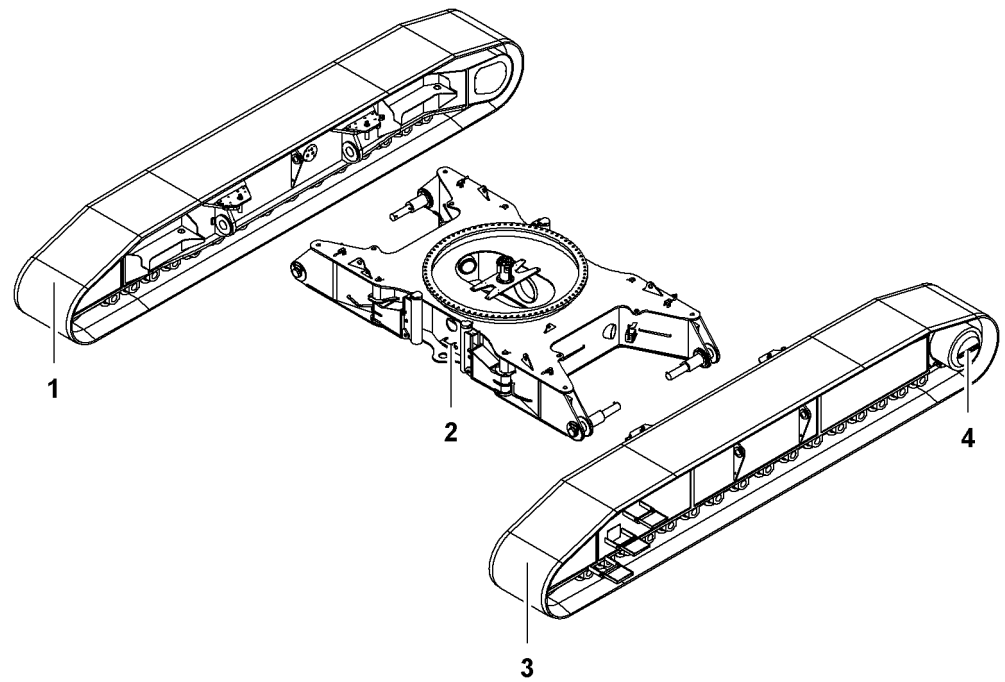


Fig. 1148 Attaching the crawler side frame

- |   |                          |   |                               |
|---|--------------------------|---|-------------------------------|
| 1 | Right crawler side frame | 3 | Left crawler side frame       |
| 2 | Control lever block      | 4 | Crawler drives (tumbler) (2x) |

Ensure that the following conditions are satisfied:

- The crawler side frames can be unloaded on the right side of the transport equipment.
- The transport vehicle can approach the machine with the crawler side frame.
- Jacks are moved so far apart that there is sufficient ground clearance to attach the crawler side frames, and it is possible to unload from the transport equipment.
- Machine is level.



**Note**

- ▶ The control lever block **2** should be used to orient and align the undercarriage or crawler side frame.

The crawler side frames can be attached in any order.

### Preparatory work on the undercarriage

All four pin connection cylinders on the undercarriage must be retracted before the crawlers are attached.

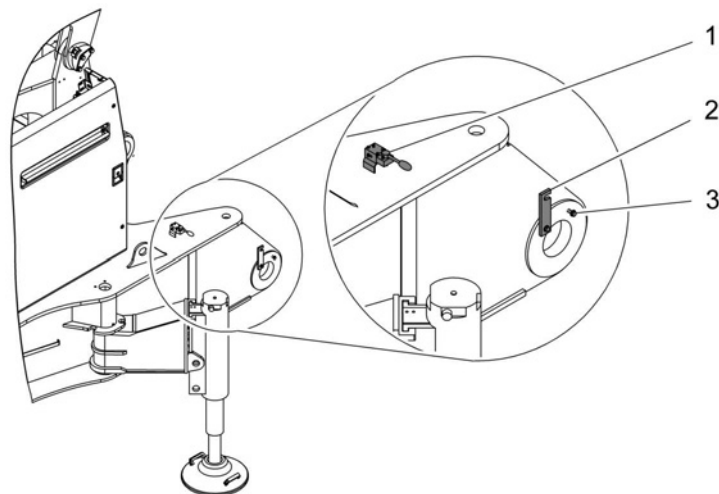
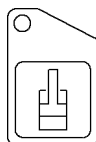


Fig. 1149 Preparatory work on the undercarriage

- |                        |                |
|------------------------|----------------|
| <b>1</b> Control lever | <b>3</b> Screw |
| <b>2</b> Locking plate |                |



- ▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button on control panel X23.
- ▶ Loosen the screw **3** on the locking plate **2**.
- ▶ Fold the locking plate **2** up.
- ▶ Use the control lever **1** to retract the pin connection cylinder
- ▶ Repeat this process on all the pin connection points on the undercarriage.

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## Sling the crawler side frame

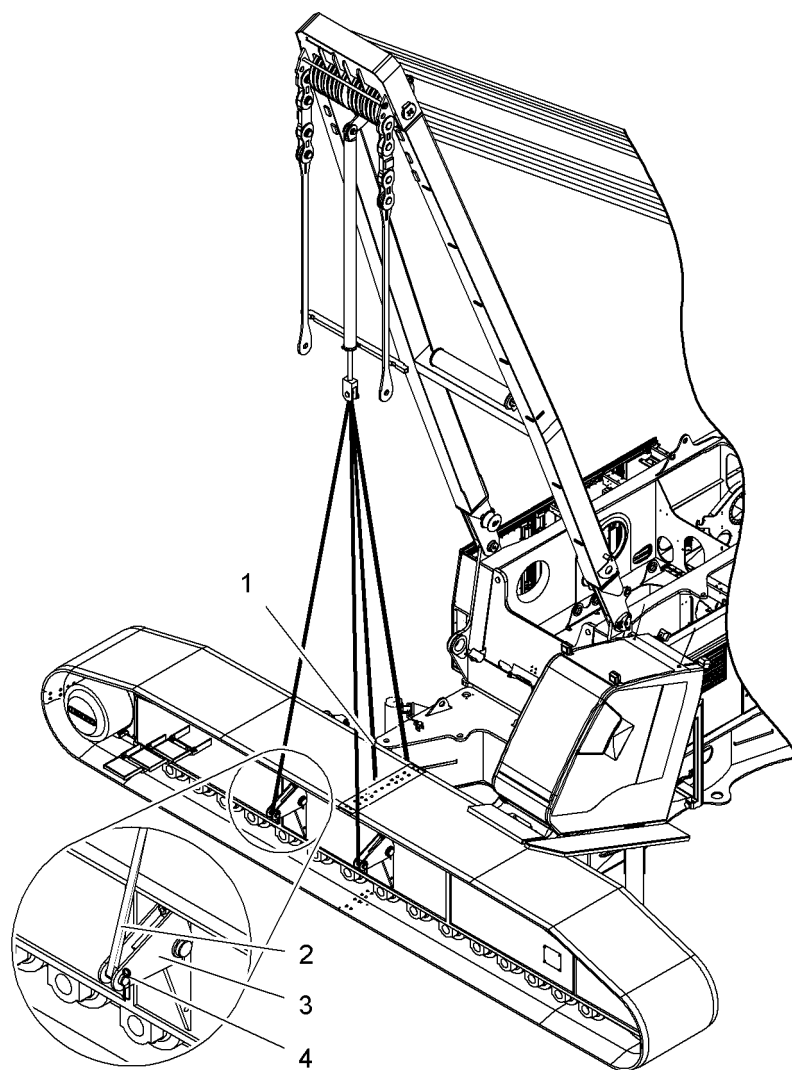


Fig. 1151 Sling the crawler side frame

- |   |                    |   |                 |
|---|--------------------|---|-----------------|
| 1 | Fourth round sling | 3 | Folding bracket |
| 2 | Round sling        | 4 | Pin             |

The crawler side frame is lashed, unloaded and fitted at three lifting points using the 4-strand round slings.

The fourth round sling 1 is not needed and should ideally be placed on the crawler side frame during assembly.



### CAUTION

Moving folding brackets!  
Crushing.

- ▶ Keep all limbs well clear of moving folding brackets.
- ▶ Manually raise the folding bracket 3.
- ▶ Remove the safety pin and pin 4.
- ▶ Lash the round sling 2 to the folding bracket 3 using the pin 4.



- ▶ Secure the pin 4 with the safety pin 4.
- ▶ Repeat this operation on all lifting points on the crawler side frames.

## Unloading and fitting the first crawler side frame



### DANGER

Maximum radius exceeded!  
Machine toppling over.

- ▶ Do not exceed the maximum radius.
- ▶ Pay attention to the mechanical boom angle indicator on A-frame 1.

The uppercarriage can be swung through 360 ° within the maximum radius!

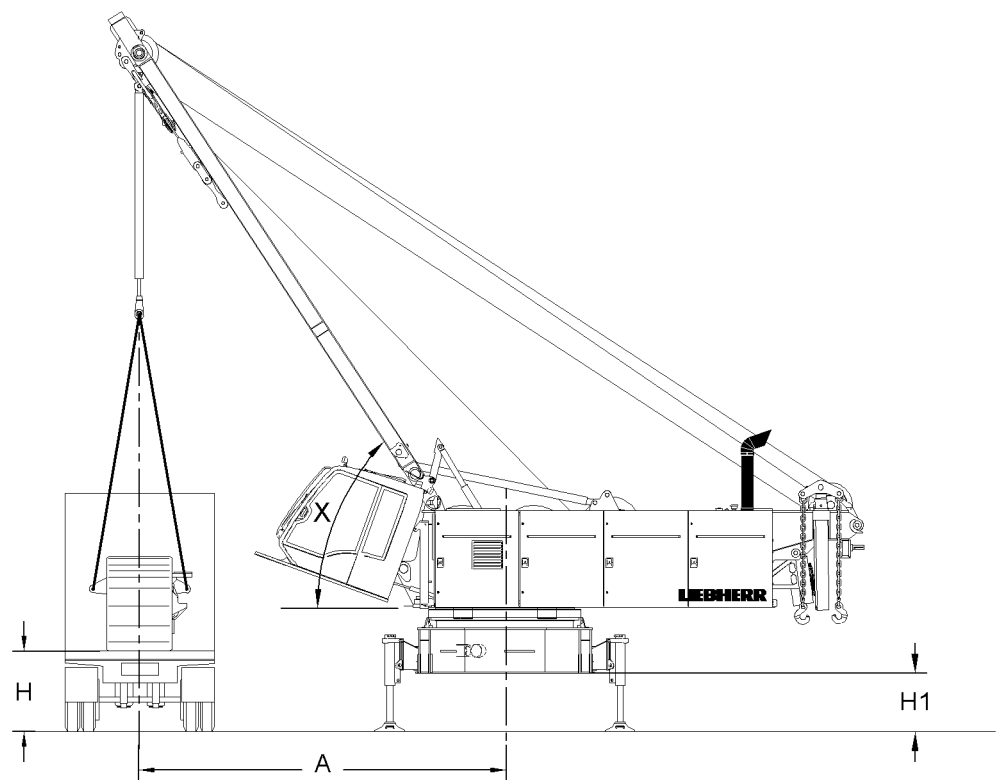


Fig. 1152 Limit values - unloading and fitting the first crawler side frame

Designation		Value
A	Maximum radius	14' 9" ft-in
H	Maximum lifting height	3' 11" ft-in
H1	Maximum jack-up height	3' 2" ft-in
X	Minimum angle for A-frame 1	70°

Tab. 253 Limit values - unloading and fitting the first crawler side frame

- ▶ Move the transport vehicle carrying the crawler side frame as close to the machine as possible.

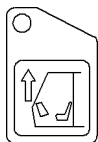
- ▶ Lash the crawler side frame.

---

### NOTICE

Horizontal cab!  
Damage to cab.

- ▶ The cab must be tilted upwards before the crawler side frame is attached.



- ▶ Press the *Tilt cab up* button on control panel X11.
  - ▷ The cab tilts upwards.

- ▶ Lifting the crawler side frames from the transport vehicle.
- ▶ Drive the transport vehicle away.



---

### 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.

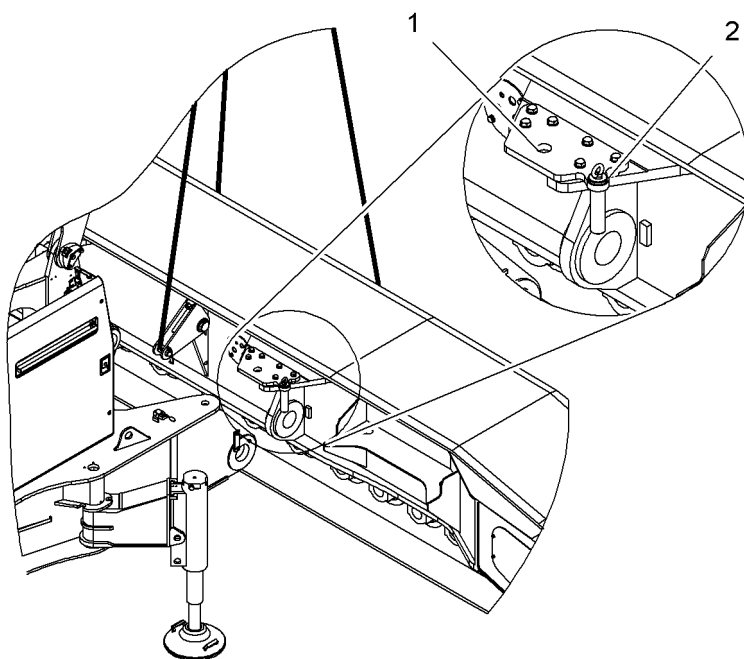


Fig. 1154 Pins in side mount

- 1 Pin locking position                      2 Mount

- ▶ If necessary, take the pins from the pin locking position 1 and place them in the side mount 2.
- ▶ With the assistance of the signalman, align the crawler side frame exactly with the pin connection points on the undercarriage.

**NOTICE**

Incorrect mounting of crawler side frames!  
Damage to machine.

▶ Offer the crawler side frame up slowly, step-by-step and evenly.

▶ Align the crawler side frames symmetrically so they can be pinned from both sides.

▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button on control panel X23.

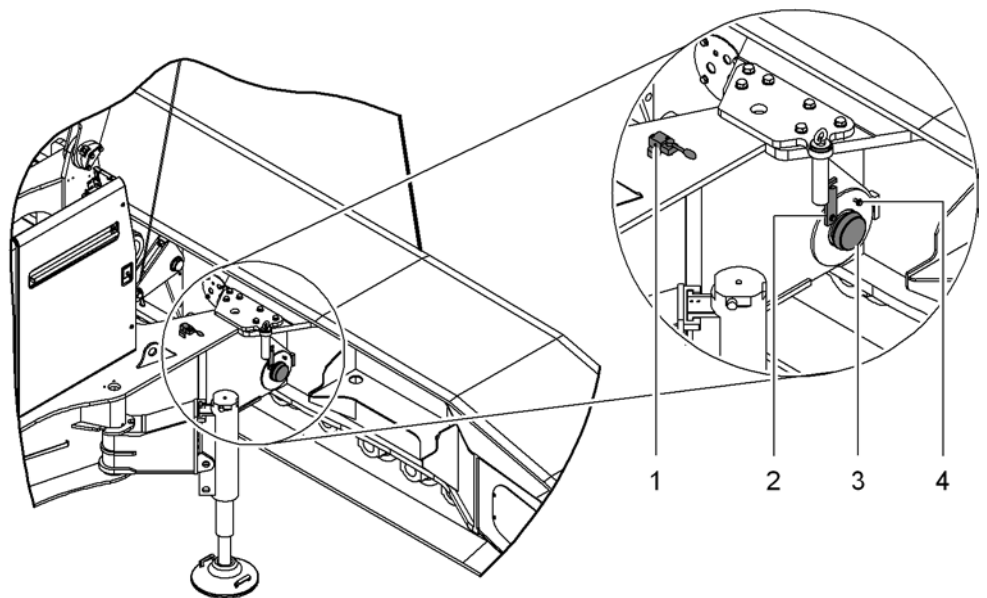
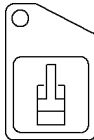


Fig. 1156 Pinning the first crawler side frame

- |   |               |   |                         |
|---|---------------|---|-------------------------|
| 1 | Control lever | 3 | Pin connection cylinder |
| 2 | Locking plate | 4 | Screw                   |

- ▶ Extend the pin connection cylinder **3** with the control lever **1**.
- ▶ Then secure the pin connection cylinder **3** to prevent accidental retraction.
- ▶ Swivel the locking plate **2** into the groove in the pin connection cylinder.
- ▶ Tighten the screw **4** and secure the locking plate **2**.

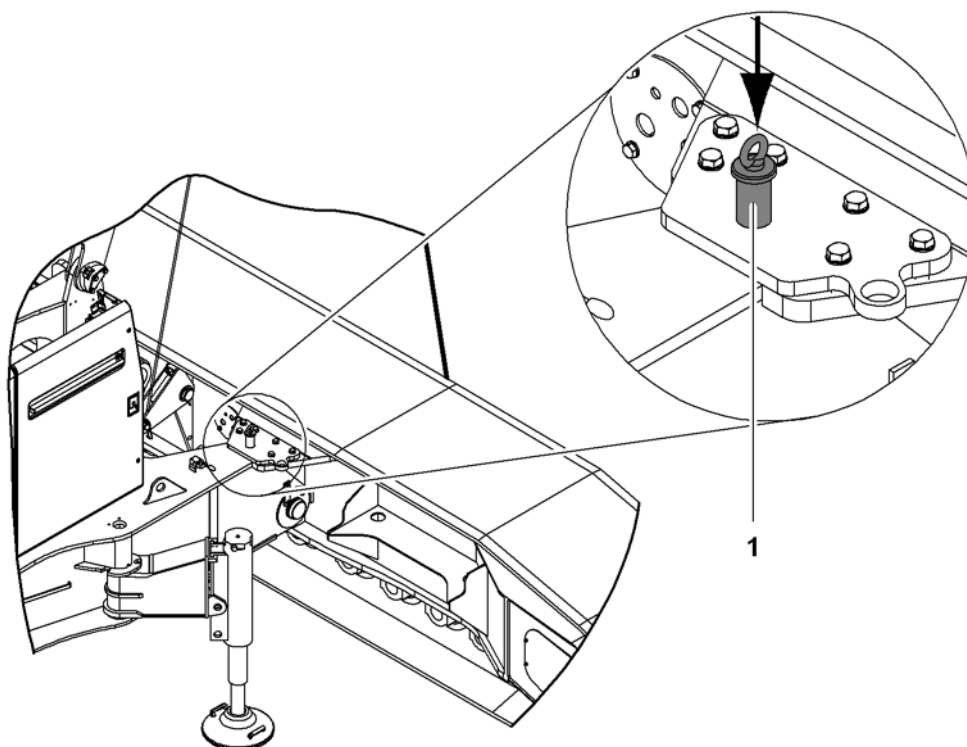


Fig. 1157 Inserting the fastening pin

1 Fastening pin

- ▶ Take the fastening pin **1** from the side mount and insert into the middle position as far as it will go.
- ▶ Repeat the pin insertion process on the opposite side.
- ▶ Lower the assembly cylinder until the round slings slacken off.
- ▶ Detach all three round slings.

## Unloading and fitting the second crawler side frame



### DANGER

Uppercarriage swing angle too great when crawler side frame is attached!  
Machine toppling over.

- ▶ When viewed from the position at which the second crawler side frame is going to be mounted, the uppercarriage may only be swung **90 °** to the left or right.

- ▶ Unload and fit the second crawler side frame in exactly the same way as the first.



### DANGER

Incorrect lowering of machine!  
Machine toppling over.

- ▶ Carefully lower the machine, keeping it level at all times.
- ▶ Lower the machine.

## Fitting the second crawler side frame where space is limited



### DANGER

Maximum radius exceeded!  
Machine toppling over.

- ▶ Do not exceed the maximum radius.
- ▶ Pay attention to the mechanical boom angle indicator on A-frame 1.

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.

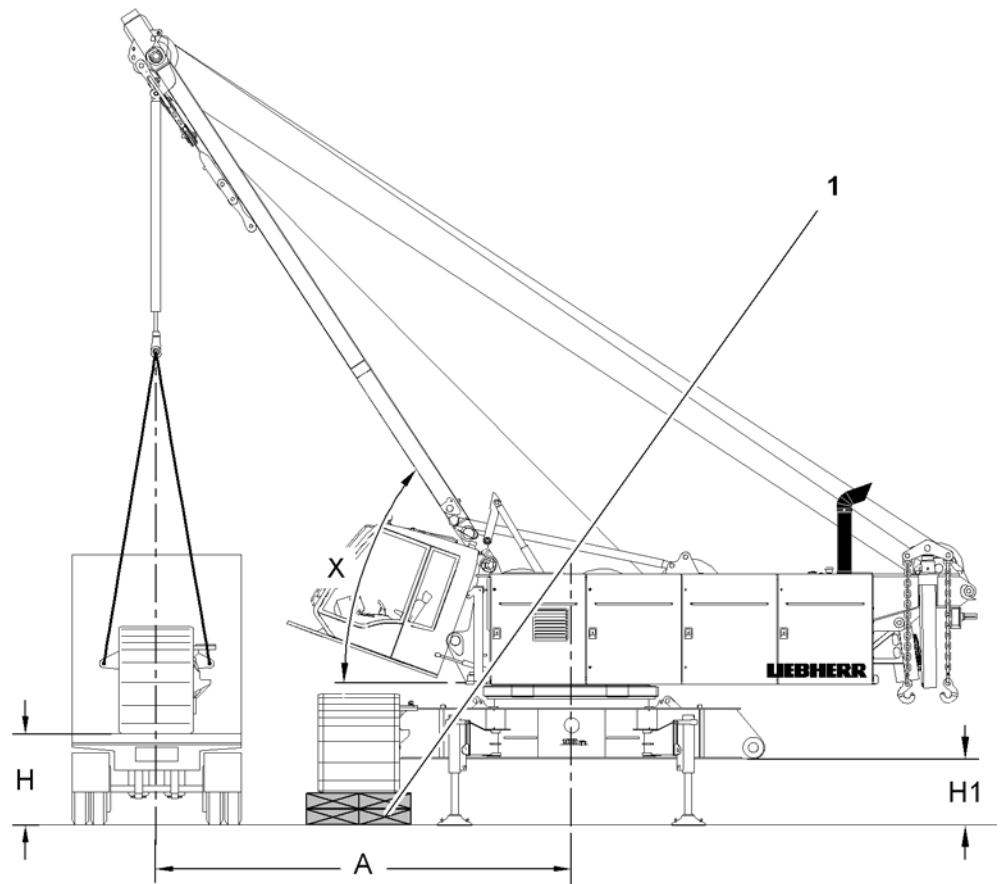


Fig. 1158 Limit values - unloading and fitting the second crawler side frame where space is limited

- 1 Base plates beneath the crawler side frame

Designation	Value
<b>A</b> Maximum radius	14' 9" ft-in
<b>H</b> Maximum lifting height	3' 11" ft-in
<b>H1</b> Maximum jack-up height	3' 2" ft-in

Designation		Value
X	Minimum angle for A-frame 1	70°

Tab. 254 Limit values - unloading and fitting the second crawler side frame where space is limited

Ensure that two base plates of at least 3' 3" ft-in x 3' 3" ft-in and 5.91" in in height are available.

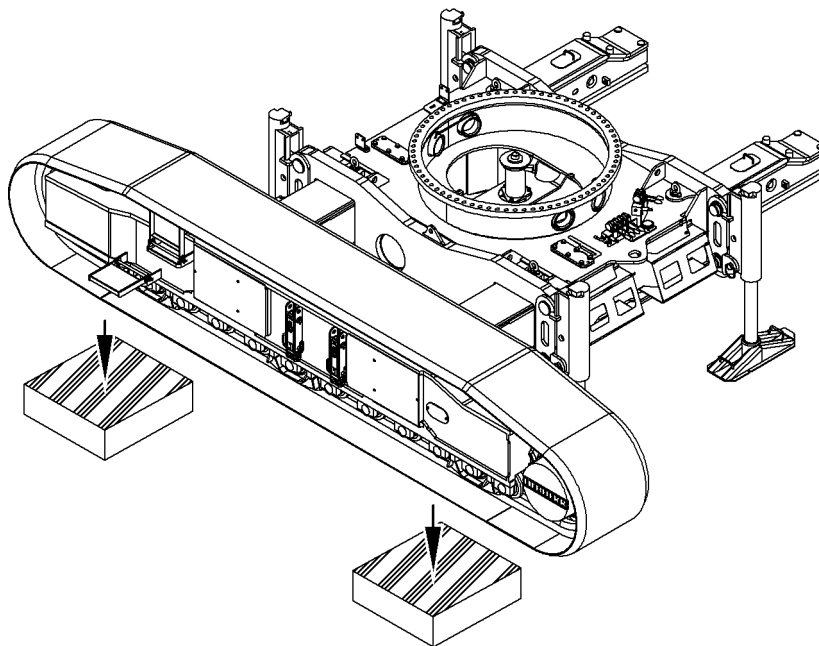


Fig. 1159 Base plates

- ▶ Slip a base plate underneath the crawler drive (tumbler) and underneath the idler of the fit crawler side frame.
- ▶ Lower the crawler side frames onto the base plates.

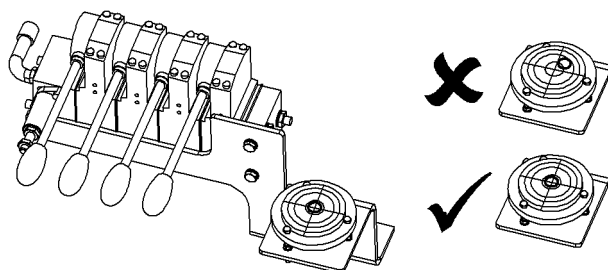


Fig. 1160 Control lever and spirit level on the undercarriage

- ▶ Level the undercarriage.
  - ▷ It is not necessary to take account of a critical angle for the radius of A-frame 1.
  - ▷ The uppercarriage can be swung as required.
- ▶ Lash the crawler side frame.
- ▶ Attach the second crawler side frame as described earlier.

- ▶ Raise the machine slightly.
- ▶ Remove the base plates.



**DANGER**

Incorrect lowering of machine!  
Machine toppling over.

- ▶ Carefully lower the machine, keeping it level at all times.

- ▶ Lower the machine.

**Removing the attachment chains**

The attachment chains are fit on both side of each crawler side frame and prevent the crawler chains sagging during loading and assembly.

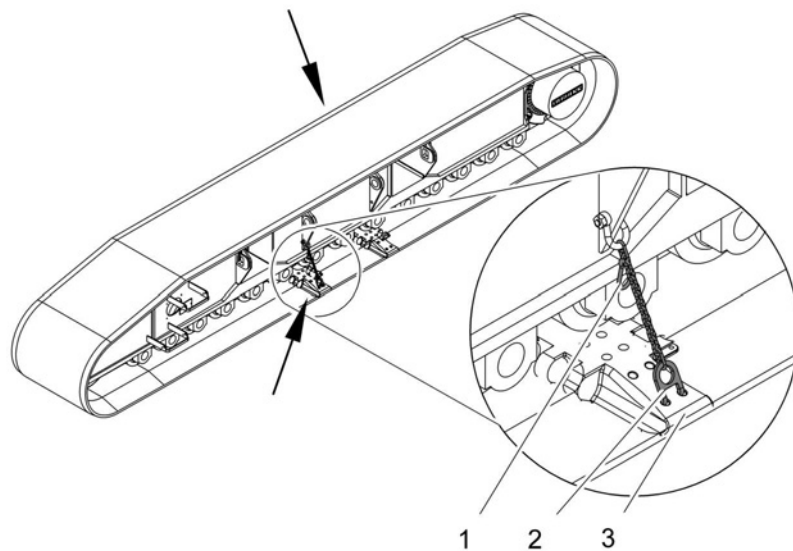


Fig. 1161 Removing the attachment chains

- |                               |                       |
|-------------------------------|-----------------------|
| <p>1 Carabiner<br/>2 Hook</p> | <p>3 Ground plate</p> |
|-------------------------------|-----------------------|

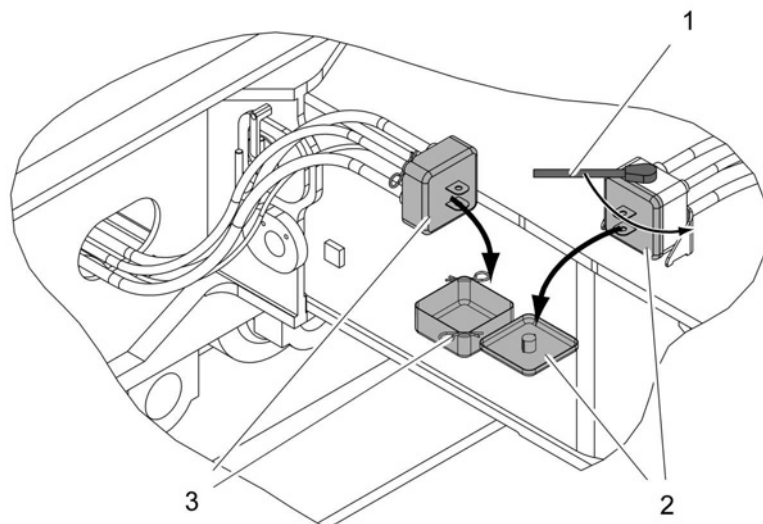
- ▶ Detach hook 2 from the ground plate 3.
- ▶ Attach hook 3 to the carabiner 1.
- ▶ Repeat the procedure on the opposite side and on the second crawler side frame.

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## Connecting the hydraulic lines on the crawlers

Ensure that the following conditions are satisfied:

- Hand lever for the multi-coupling is available.
- Diesel engine is switched off.



*Fig. 1162 Removing the multi-coupling protective cover*

- |   |                  |   |                  |
|---|------------------|---|------------------|
| 1 | Hand lever       | 3 | Protective cover |
| 2 | Protective cover |   |                  |

- ▶ Fit the hand lever **1** on the multi-coupling.
- ▶ Remove the safety pin from protective cover **3**.
- ▶ Turn hand lever **1** in the direction indicated by the arrow.
  - ▷ The protective cover **2** is loose.
- ▶ Insert the two protective covers **2 + 3** in one another and secure with the safety pin.
- ▶ Stow the protective covers away.



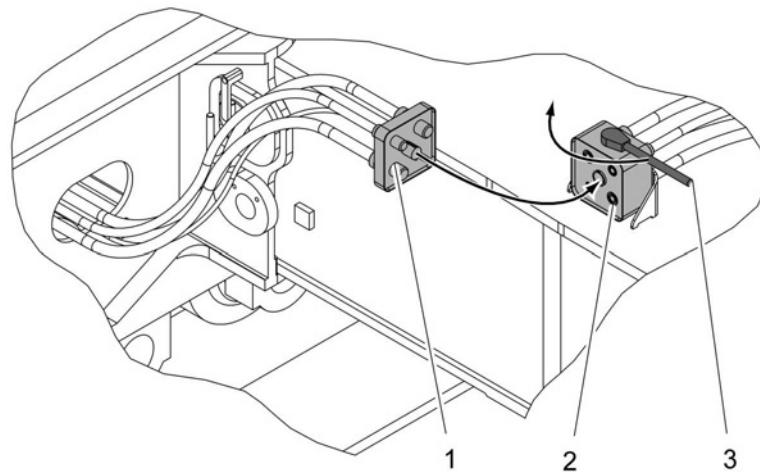


Fig. 1163 Connecting the multi-coupling

- |   |                                     |   |            |
|---|-------------------------------------|---|------------|
| 1 | Multi-coupling (undercarriage)      | 3 | Hand lever |
| 2 | Multi-coupling (crawler side frame) |   |            |

**NOTICE**

Dirty multi-couplings!  
Damage to the hydraulic system.

▶ Clean the multi-couplings before fitting them together.

- ▶ Connect the multi-couplings 1 + 2.
- ▶ Move the hand lever until the lock engages.
  - ▷ The multi-couplings are visibly and audibly pulled together.
  - ▷ The multi-coupling indicating pins stick out:

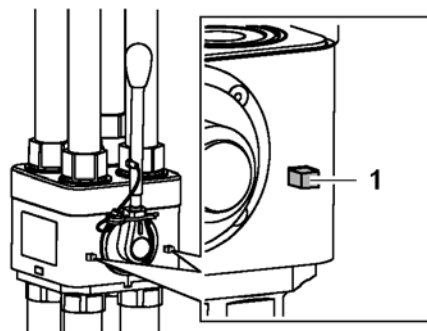


Fig. 1164 Locked multi-coupling

- 1    Indicating pins (2x)

- ▶ Disassemble the hand lever on the multi-coupling.
- ▶ Repeat the procedure for the second crawler side frame.

## 7.3.13 Move the jack into the transport position

The jack must be pinned in the transport position in order for the carbody counterweight to be attached to the machine.

All the process steps are explained only once, but they must be carried out on all jacks.

Make sure that assembly of the two crawler side frames is complete.

### Setting the jack-up height of the jacks

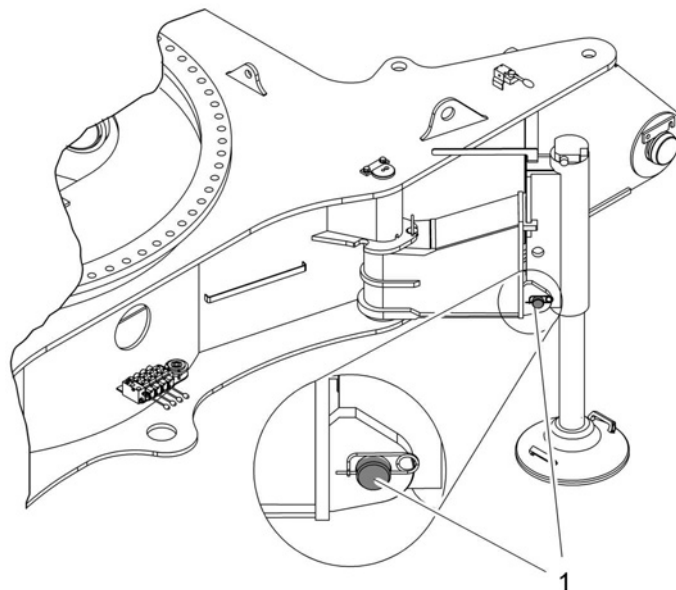


Fig. 1165 Jack in upper pin locking position

1 Upper pin locking position



#### CAUTION

Moving parts!  
Crushing.

- ▶ Keep all limbs well clear of moving parts.
- ▶ Pin the jack in the upper pin locking position 1.

## Placing the swing brackets in the transport position

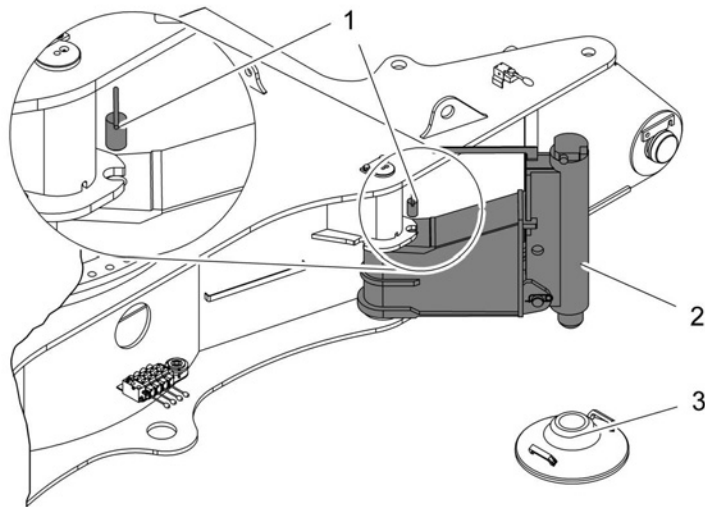


Fig. 1166 Swing brackets in the support position

- |                        |                       |
|------------------------|-----------------------|
| <b>1</b> Pin           | <b>3</b> Support pads |
| <b>2</b> Swing bracket |                       |

- ▶ Remove the pin 1.
- ▶ Swivel the swing bracket 2 into the transport position.

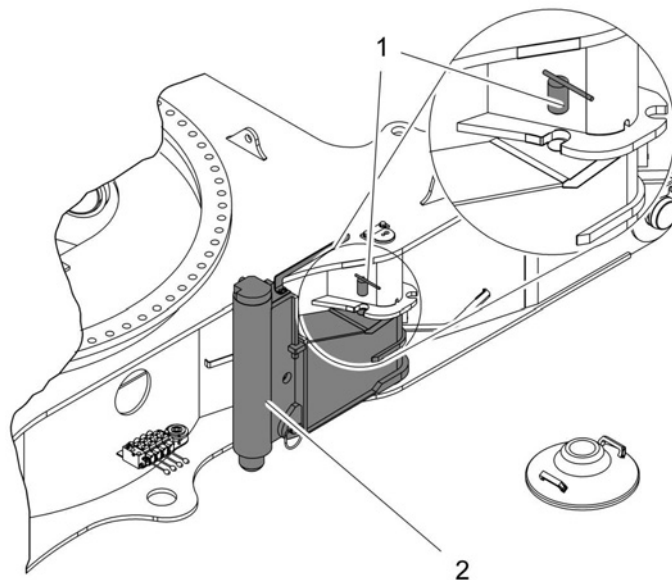


Fig. 1167 Swing brackets in transport position

- |              |                        |
|--------------|------------------------|
| <b>1</b> Pin | <b>2</b> Swing bracket |
|--------------|------------------------|

- ▶ Insert the pin 1.

## Removing support plates and chocks

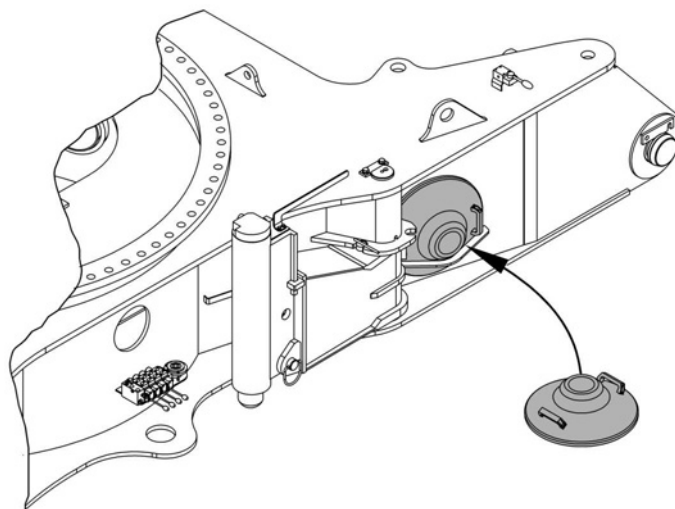


Fig. 1168 Removing the support plates

- ▶ Place support pads in their mounts.

### 7.3.14 Attach the carbody counterweight

The requirements, which can be found in the load chart, determine whether the machine is equipped with a carbody counterweight.



#### Note

The basic machine is more manoeuvrable without a carbody counterweight when used as an assembly crane.

All the boom sections have been unloaded and aligned on the ground:

- ▶ Attaching the carbody counterweight.

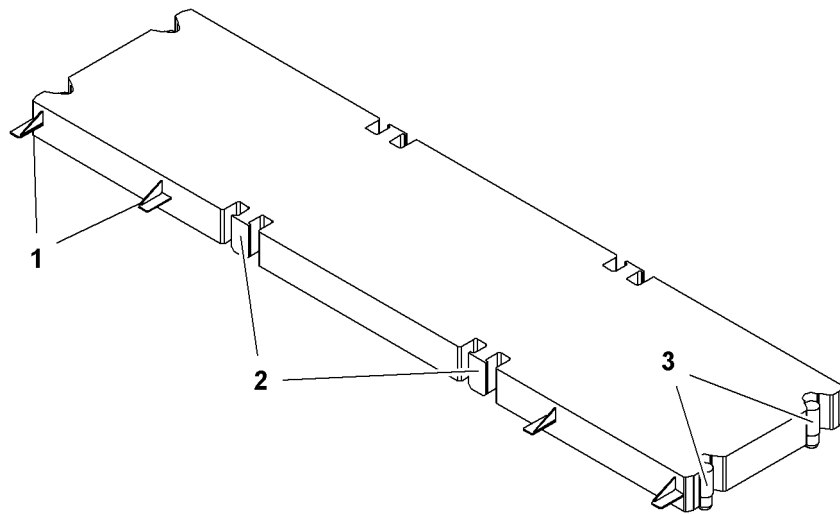


#### DANGER

Unacceptable counterweight!  
Machine toppling over.

- ▶ Attaching the carbody counterweight in accordance with the load chart.

## Lashing carbody counterweight slabs



*Fig. 1169 Carbody counterweight slabs*

- |          |                                   |          |                     |
|----------|-----------------------------------|----------|---------------------|
| <b>1</b> | Support for central counterweight | <b>3</b> | Locking device (4x) |
| <b>2</b> | Lifting points (4x)               |          |                     |

The carbody counterweight is slung, unloaded and fit at the four lifting points **2** using the 4-strand round slings.

- ▶ Place one round sling around each lifting point **2**.

## Using a carbody counterweight

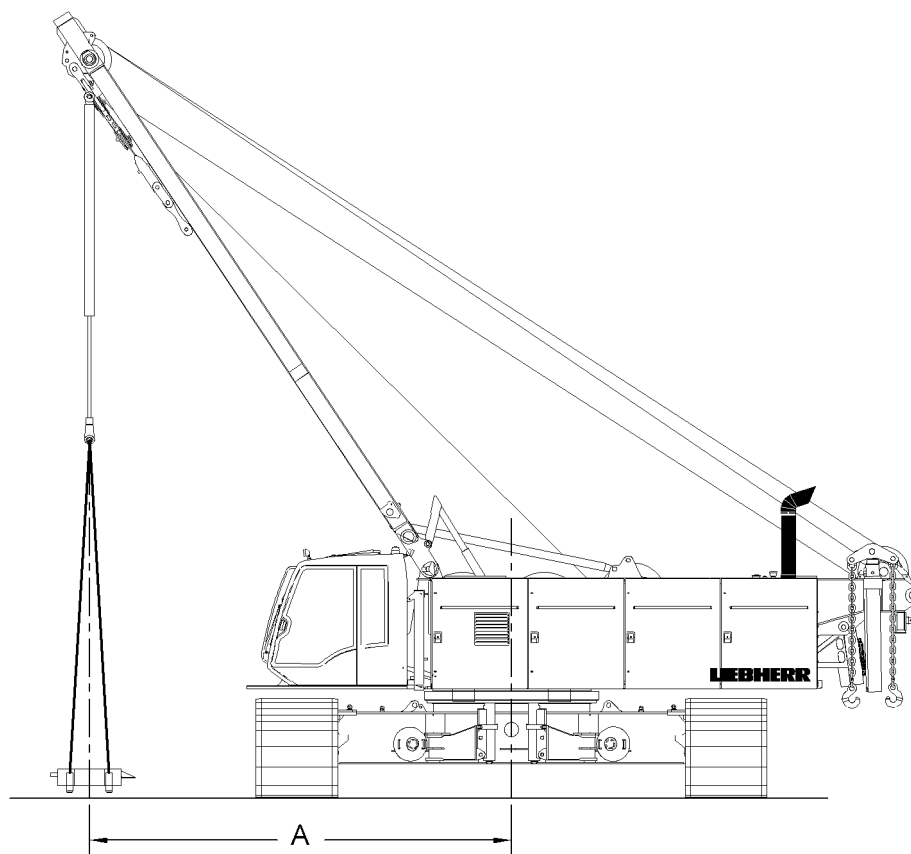


Fig. 1170 Limits when lifting the central counterweight from the floor

Designation		Value
A	Maximum radius	24' 3" ft-in

Tab. 255 Limits when lifting the central counterweight from the floor

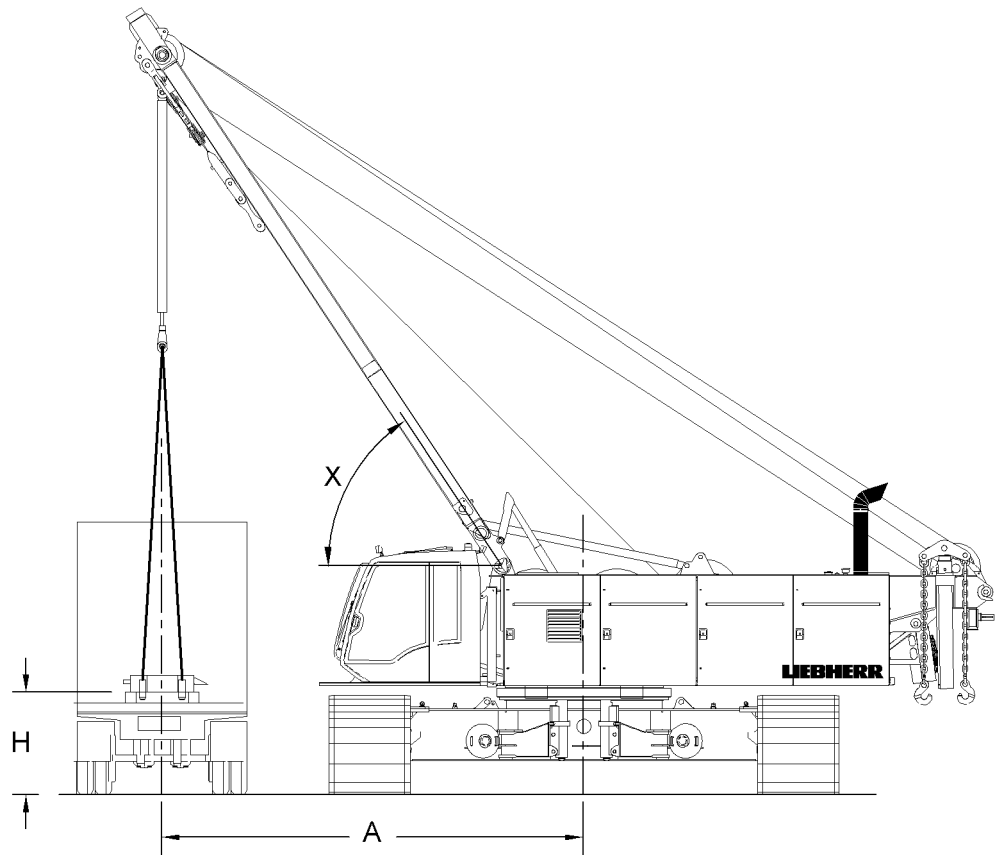


Fig. 1171 Limits when unloading the carbody counterweight from the transport vehicle

Designation		Value
A	Maximum radius	24' 7" ft-in
H	Maximum lifting height	5' 1" ft-in
X	Minimum angle for A-frame 1	46°

Tab. 256 Limits when unloading the carbody counterweight from the transport vehicle

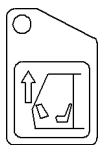
The uppercarriage may be rotated through 360 ° without restriction.

- ▶ Move the transport vehicle carrying the carbody counterweight as close to the machine as possible.
- ▶ Lash the carbody counterweight.

#### NOTICE

Horizontal cab!  
Damage to cab.

- ▶ The cab must be tilted upwards before the carbody counterweight slabs are attached.



- ▶ Press button *cab tilting device up*.
  - ▷ The cab tilts upwards.
- ▶ Lifting the carbody counterweight from the transport vehicle.
- ▶ Drive the transport vehicle away.



### 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.

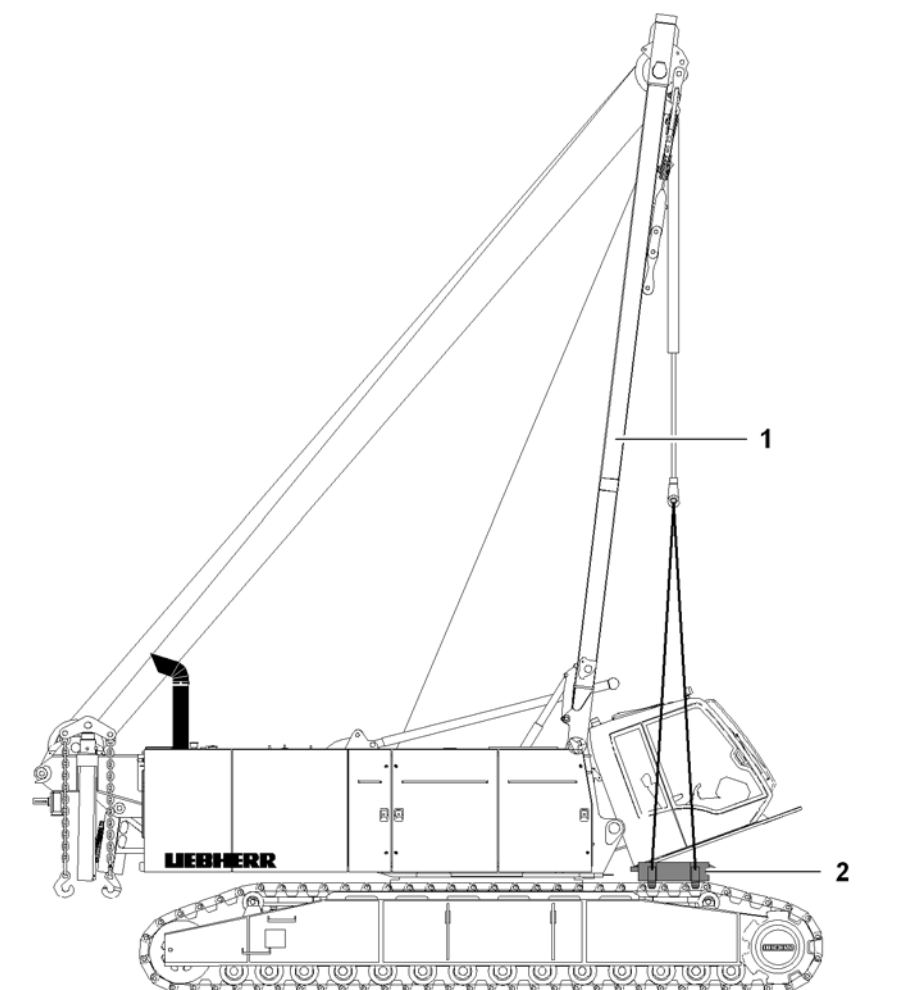


Fig. 1173 Using a carbody counterweight

1 A-frame1

2 Carbody counterweight

- ▶ Raise A-frame 1 1 until the central counterweight 2 is positioned over its assembly position.



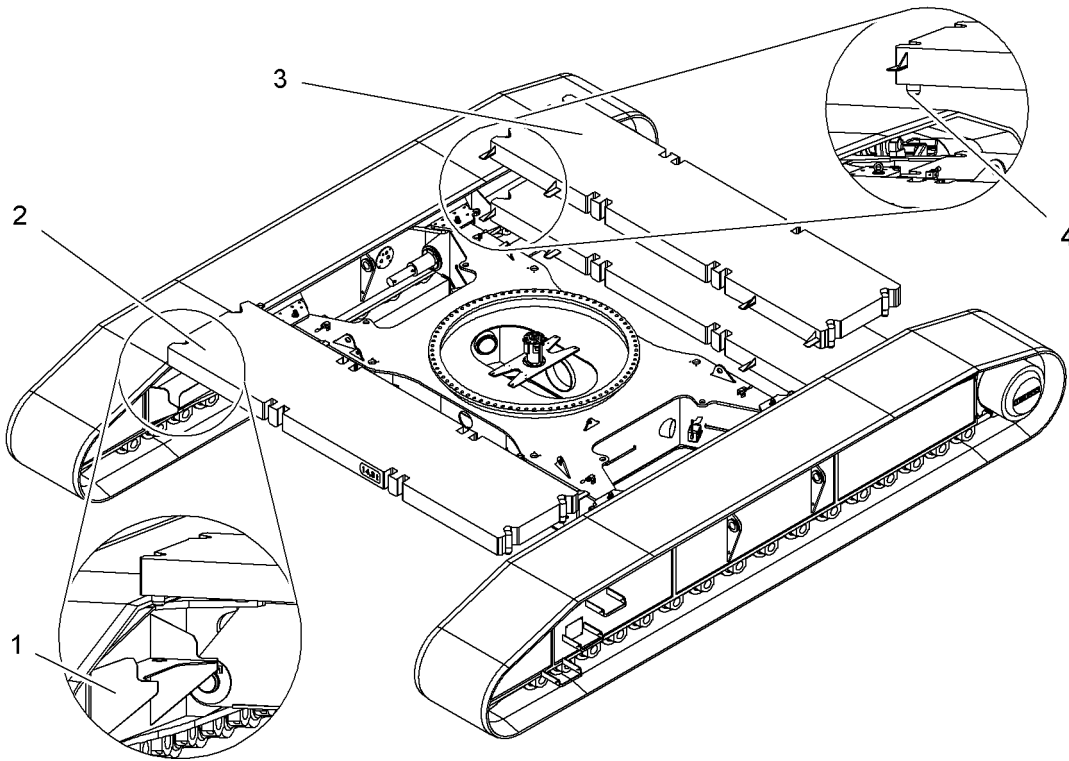


Fig. 1174 Attach the carbody counterweight

- |   |                             |   |                             |
|---|-----------------------------|---|-----------------------------|
| 1 | Support on crawler carrier  | 3 | Upper central ballast plate |
| 2 | Lower central ballast plate | 4 | Locking device              |

- ▶ Using lower central ballast plate 1 on the contact surfaces on crawler side frame 1.
- ▶ Remove the rigging.
- ▶ Repeat the procedure on the opposite side.

---

**NOTICE**

Upper carbody counterweight slab is not set down properly!  
Damage to the ballast slabs.

- ▶ Insert the upper carbody counterweight slab precisely into the locking devices 4 of the lower carbody counterweight slab.
- 
- ▶ Attach the upper central ballast plate 3 and position it on the lower central ballast plate.
  - ▶ Remove the rigging.
  - ▶ Repeat the procedure on the opposite side.

### 7.3.15 Fitting boom walkways to the undercarriage

The boom walkways on the undercarriage are placed on the mounts of the carbody counterweight.

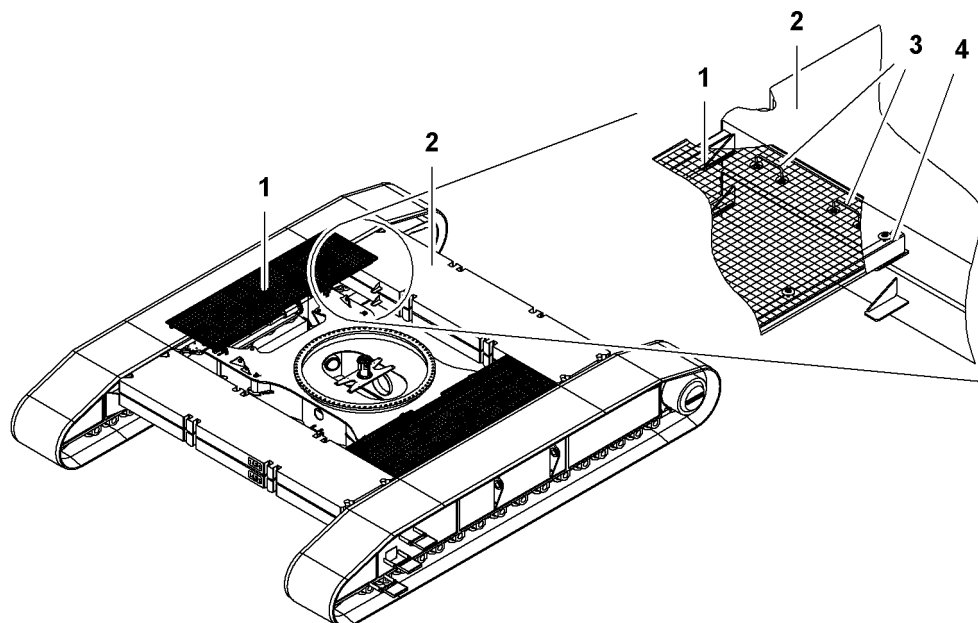


Fig. 1175 Fitting boom walkways to the undercarriage

- |   |                       |   |        |
|---|-----------------------|---|--------|
| 1 | Platform              | 3 | Handle |
| 2 | Carbody counterweight | 4 | Rests  |



#### CAUTION

No boom walkways on the undercarriage!  
Risk of falling.

- ▶ Before the walkways are fitted, be extremely careful when walking on the undercarriage.

Make sure that the central counterweight is installed.

- ▶ Align the uppercarriage parallel to the undercarriage.
- ▶ An assistant lifts the boom walkway using the handles **3** on both sides.



#### CAUTION

Boom walkways positioned incorrectly!  
Crushing.

- ▶ If the boom walkway is used, do not move limbs between the carbody counterweight and boom walkway.
- ▶ Place the boom walkway on the rests **4** on the carbody counterweight.
- ▶ Repeat the procedure on the opposite side.

### 7.3.16 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.

- ▶ Attach and then raise the basic counterweight slab or ballast slab separately.
- 

The uppercarriage can be swung through 360 ° without restriction when the rear counterweight is fitted.



---

**WARNING**

Ballast slabs dropping during assembly!

- ▶ A lifting chain with four chain shorteners and a round sling must always be used to raise the basic counterweight slab and ballast slabs.
-

Ensure that the following conditions are satisfied:

- The requisite carbody counterweight is in place.
- Lifting chain with four chain shortening devices and round slings has been fitted.
- The ballast slab configuration is known.



### Note

No solid ground available!

- ▶ To make the assembly process easier: use supports.

## Slinging and positioning the basic counterweight slab

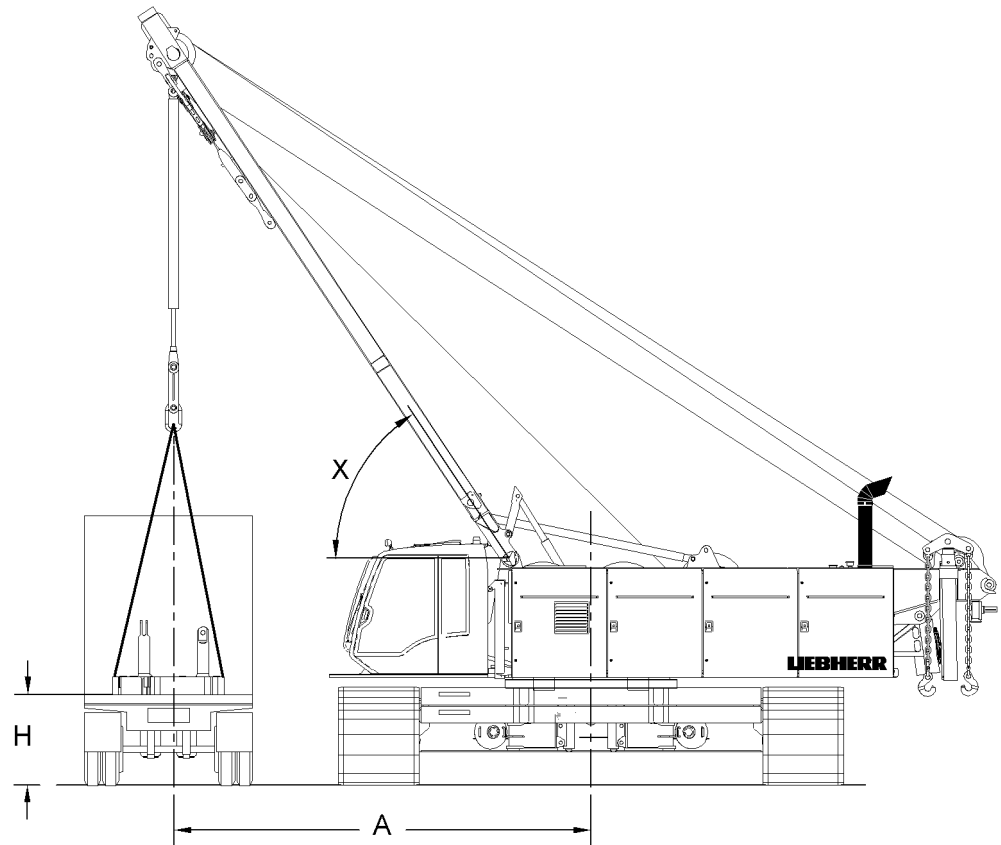


Fig. 1176 Limits when unloading the basic counterweight slab from the transport vehicle

Designation		Value
A	Maximum radius	24' 7" ft-in
H	Maximum lifting height	5' 1" ft-in
X	Minimum angle for A-frame 1	46°

Tab. 257 Limits when unloading the basic counterweight slab from the transport vehicle

- ▶ Sling and raise the basic counterweight slab.
- ▶ Swing the uppercarriage lengthways with respect to the undercarriage.
- ▶ Lower basic counterweight slab onto the ground or supports.

## Slinging and assembling the ballast slabs



### DANGER

Ballast slabs are stacked unevenly!  
Machine toppling over.

- ▶ Ballast slabs must always be stacked equally on both sides.

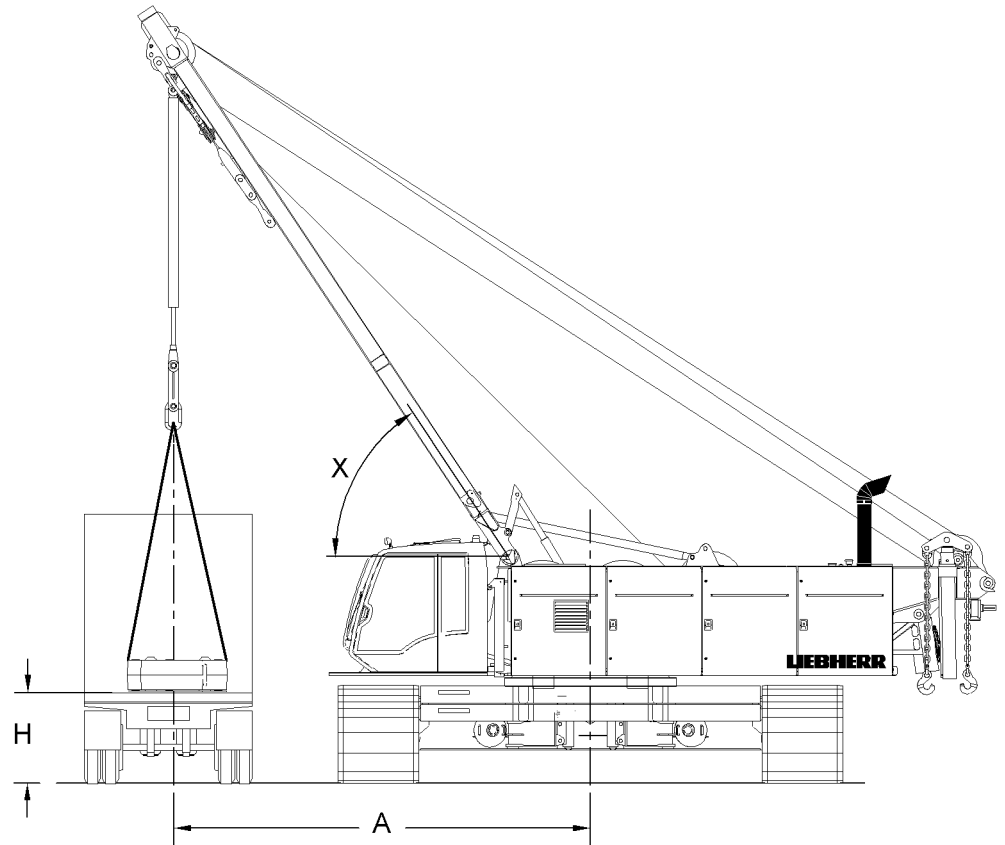
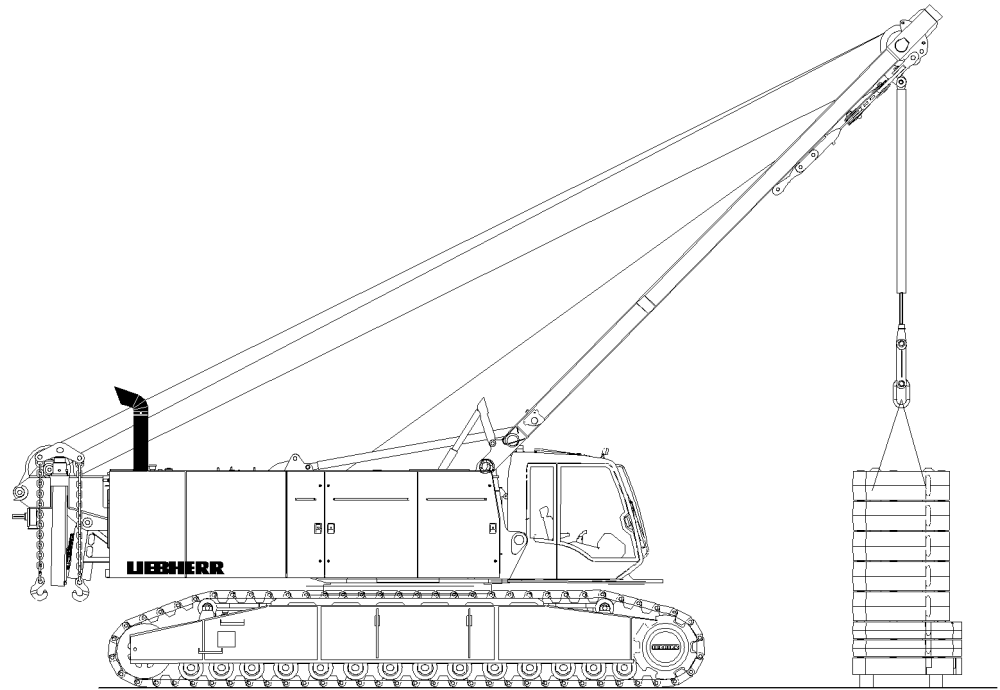


Fig. 1177 Limits when unloading the ballast slabs from the transport vehicle

Designation		Value
A	Maximum radius	20' 4" ft-in
H	Maximum lifting height	5' 1" ft-in
X	Minimum angle for A-frame 1	58°

Tab. 258 Limits when unloading the ballast slabs from the transport vehicle

- ▶ Sling and raise the ballast slab.
- ▶ Swing the uppercarriage and adjust if necessary.



*Fig. 1178 Stacking the ballast slabs*

- ▶ Lay the ballast slab onto the basic counterweight slab or the previously placed ballast slab.
- ▶ Repeat until all the necessary ballast slabs have been stacked.

## Tying down the rear counterweight

The counterweight tie-down system can be pinned in six different positions.

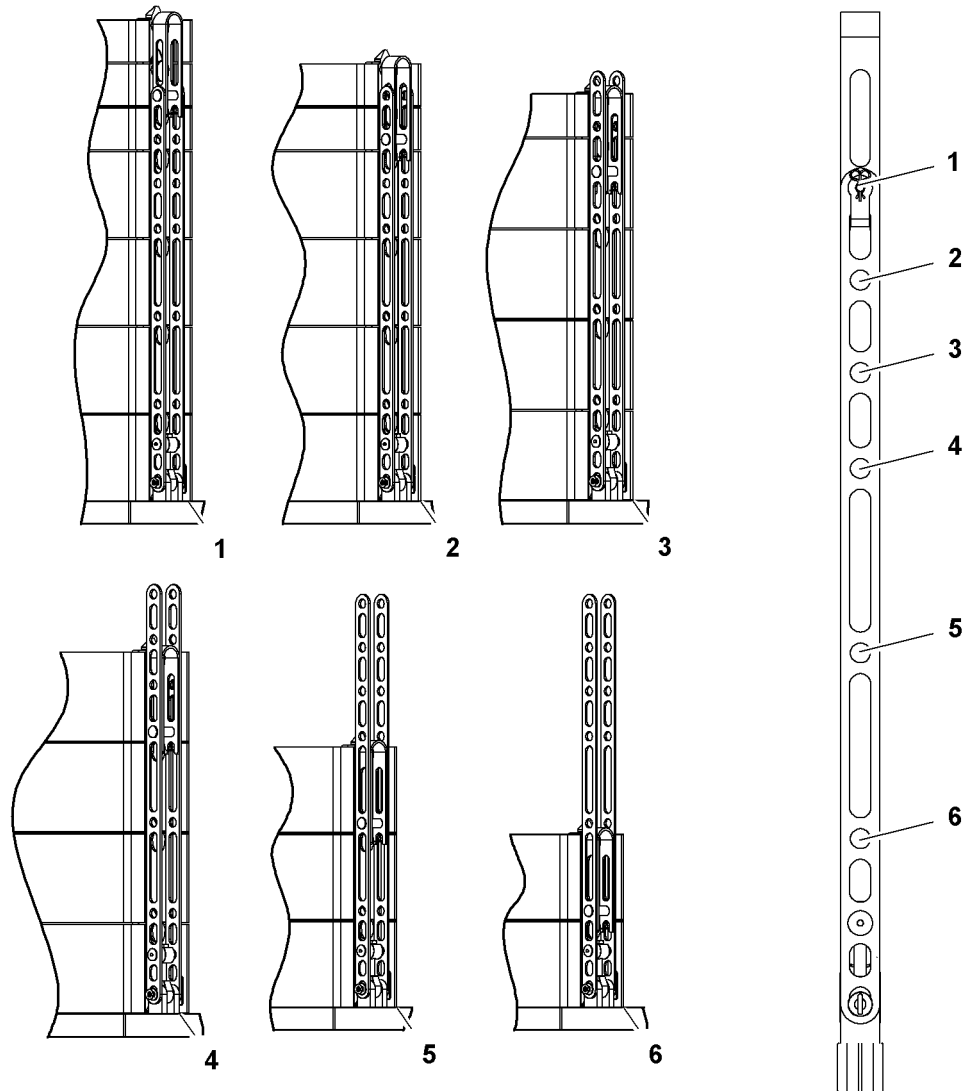


Fig. 1179 Pin locking positions for the counterweight tie-down

- |  |  |
|--|--|
| 1 Gravity of the counterweight<br>273,369 lb | 4 Gravity of the counterweight<br>207,231 lb |
| 2 Gravity of the counterweight<br>251,323 lb | 5 Gravity of the counterweight<br>163,140 lb |
| 3 Gravity of the counterweight<br>229,277 lb | 6 Gravity of the counterweight<br>119,048 lb |



### WARNING

Dropping ballast slabs!

- ▶ Tie down ballast plates as described below.
- ▶ Pin counterweight tie-down device at the right length.

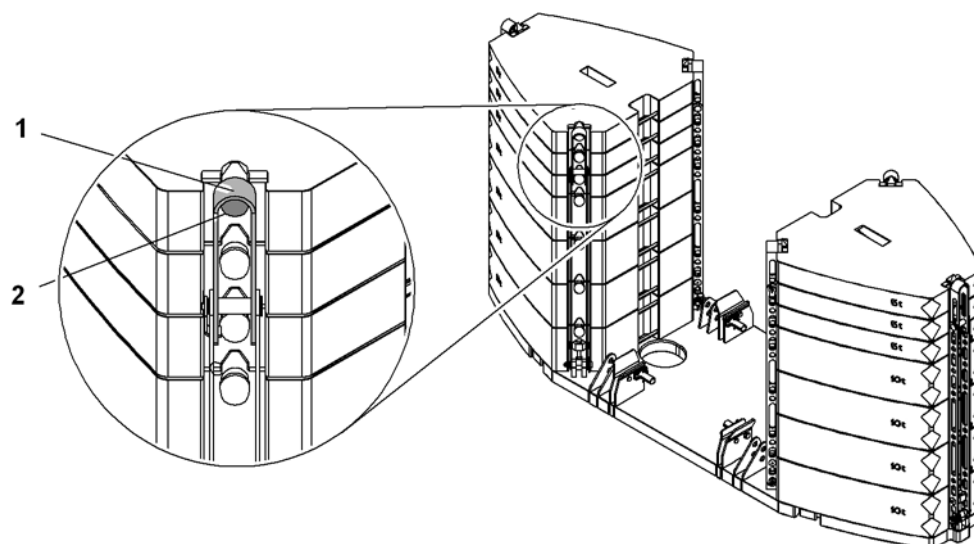


Fig. 1180 Attaching the counterweight tie-down device

- 1 Counterweight tie-down                      2 Lifting point

- ▶ Fold up the counterweight tie-down device 1 and lift using the lifting point 2 on the ballast slab.

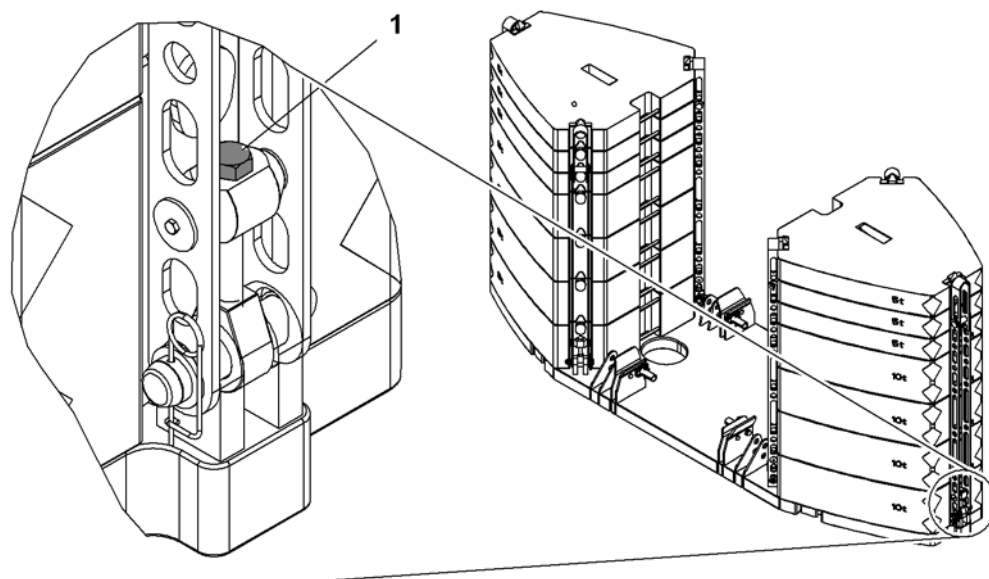


Fig. 1181 Screw on the counterweight tie-down device

- 1 Screw

- ▶ Tighten the screw 1 hand-tight.
- ▶ Tighten the screw 1 another quarter turn using a spanner.
- ▶ Repeat the procedure for the other five counterweight tie-down points.



## Mounting 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. 259, page 643) .

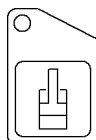
Permitted uppercarriage slewing depending on the counterweight		
Initial position: uppercarriage is parallel to the crawler side frames		
Rear counterweight	Carbody counterweight	
	0.00 lb	125,662 lb (LR1300 W: 115,961 lb)
0.00 lb	360°	360°
119,048 lb	360°	360° A)
163,140 lb	±10°	360° A)
207,231 lb	-	360°
229,277 lb	-	360°
251,323 lb	-	±10° (360° B) )
273,369 lb	-	±10°

Tab. 259 Permitted uppercarriage slewing depending on the counterweight

- A) This counterweighting can occur during assembly of the basic machine (not an acceptable setup).
- B) Only permissible if A-frame 1 is sufficiently far forward for the brackets on the A-frame 1 erection cylinders to lift up from A-frame 1.

Ensure that the following conditions are satisfied:

- The rear counterweight must be fully assembled and lashed.
- All work using the assembly cylinder on A-frame 1 has been completed.
- All the boom sections are unloaded and in position.
- Both counterweight hoisting cylinders have been retracted.
- ▶ Move the basic machine backwards to the rear counterweight until the chains hang centrally over it.
- ▶ Open rearmost uppercarriage door on the left.
- ▶ Plug in the cable remote control.
- ▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button on control panel X23.
  - ▷ Cylinder adjustment functions on.
- ▶ Attach all four counterweight hoisting cylinder chains to the slinging plates.





### **DANGER**

Incorrect mounting of the rear counterweight!  
Machine toppling over.

- ▶ When mounting the rear counterweight, align the uppercarriage parallel with the undercarriage.
- ▶ Ensure that the rear counterweight is hanging horizontally on chains.

- ▶ Using the cable remote control, slowly extend the counterweight hoisting cylinders until the chains are taut.
- ▶ Carefully raise rear counterweight and wait for any swinging motion to cease.
- ▶ Fully extend the counterweight hoisting cylinders.



### **DANGER**

Incorrect bolting of the rear counterweight!  
Machine toppling over.

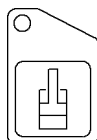
- ▶ All pins must be correctly fitted and secured.
- ▶ Lock all pins on the uppercarriage and secure with safety pins.



### **Note**

Counterweight hoisting chains remain bolted!

- ▶ Lay down counterweight hoisting chains on the basic counterweight slab.



- ▶ Fully retract the counterweight hoisting cylinders.
- ▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button on control panel X23.
  - ▷ Cylinder adjustment functions switched off.
- ▶ Remove the cable remote control and stow it away.
- ▶ Close the rearmost uppercarriage door on the left again.

## 7.4 2821 main boom

### System-relevant information for 2821 main boom:

- Configuration of main boom
  - Rope guide assembly position
  - Mid-point suspension assembly positions
- Lengths of mid-point suspensions
- Pendant straps on 2821 main boom, overview (LR1300 (steel pendant straps))
- Pendant straps on 2821 main boom, overview (LR1300 (carbon-fibre pendant straps))
- 2821 boom head section rope reeving systems (load position 1)
- Reeving diagrams of 2821 boom head section in single hook operation with 2 winches
- Auxiliary jib (79300 lb) to 2821 boom head section rope reeving systems (load position 2)

### 7.4.1 Configuration of main boom



#### 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)
66 ft	
75 ft	
85 ft	
95 ft	
105 ft	
115 ft	
125 ft	
135 ft	
144 ft	
154 ft	
164 ft	

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# Assembly and dismantling

2821 main boom

Main boom length	Configuration of main boom (symbolic)
174 ft	
184 ft	
195 ft	
203 ft	
213 ft	
223 ft	
233 ft	
243 ft	
253 ft	
262 ft	
272 ft	
282 ft	
292 ft	
302 ft	
312 ft	
322 ft	
332 ft	
342 ft	

Tab. 260 Configuration of 2821 main boom

**S** - Assembly position of rope guide

**X1** - Assembly position of mid-point suspension 1

**X2** - Assembly position of mid-point suspension 2

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### 7.4.2 Lengths of mid-point suspensions

Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
253 ft <sup>A)</sup>	12' 2" ft-in = 6' 11" ft-in + 5' 3" ft-in	
262 ft <sup>A)</sup>	10' 6" ft-in = 5' 3" ft-in + 5' 3" ft-in	
272 ft	10' 6" ft-in = 5' 3" ft-in + 5' 3" ft-in	
282 ft	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	6' 11" ft-in
292 ft	16' 9" ft-in = 6' 11" ft-in + 9' 10" ft-in	5' 3" ft-in
302 ft	16' 9" ft-in = 6' 11" ft-in + 9' 10" ft-in	5' 3" ft-in
312 ft	15' 5" ft-in = 8' 6" ft-in + 6' 11" ft-in	5' 3" ft-in
322 ft	15' 5" ft-in = 8' 6" ft-in + 6' 11" ft-in	5' 3" ft-in
332 ft	15' 1" ft-in = 9' 10" ft-in + 5' 3" ft-in	5' 3" ft-in
342 ft	13' 9" ft-in = 8' 6" ft-in + 5' 3" ft-in	6' 11" ft-in

Tab. 261 Lengths of mid-point suspensions - 2821 main boom

- A) LR1300 (carbon fibre pendant straps) with a 2821 main boom + 1916 luffing jib configuration: Install no mid-point suspensions with main boom lengths 253 ft and 262 ft.

### 7.4.3 Pendant straps on 2821 main boom, overview (LR1300 (steel pendant straps))

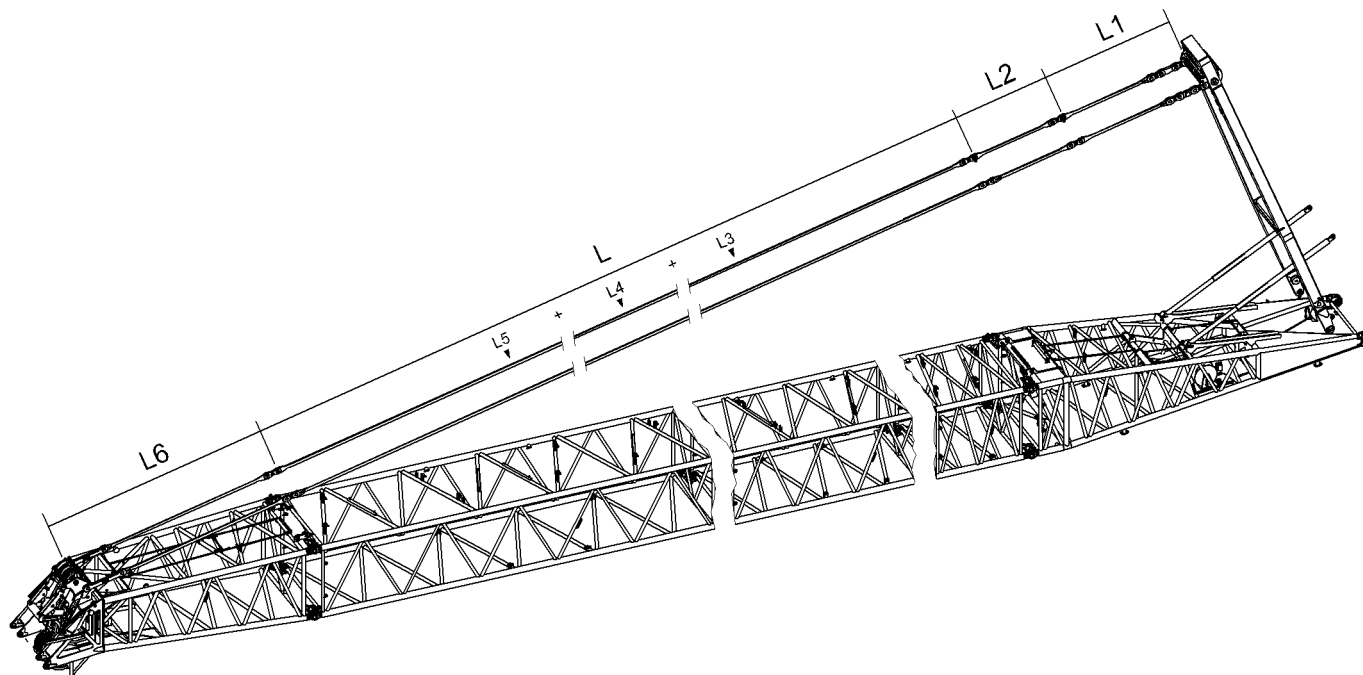


Fig. 1369 Pendant straps on 2821 main boom, overview (LR1300 (steel pendant straps))

#### A-frame 1 to 2821 boom head section pendant straps

Designation		Value
L1	<b>A-frame 1 equalizer</b> (For more information see: A-frame 1 equalizer, page 151)	12' 3" ft-in
L2	<b>Boom base section equalizer</b> (For more information see: Equalizer of 2821 boom base section, page 152)	8' 9" ft-in
<b>Main boom pendant straps</b> consisting of:		
L	<b>L3 Main boom pendant strap 10 ft</b> (For more information see: Main boom pendant strap 10 ft, page 152)	Total L3 +
	<b>L4 Main boom pendant strap 20 ft</b> (For more information see: Main boom pendant strap 20 ft, page 154)	Total L4 +
	<b>L5 Main boom pendant strap 40 ft</b> (For more information see: Main boom pendant strap 40 ft, page 156)	Total L5
L6	<b>Main boom pendant strap on 2821 boom head section</b> (For more information see: Main boom pendant strap on 2821 boom head section, page 157)	20' 8" ft-in

Tab. 262 A-frame 1 to 2821 boom head section pendant straps

#### Configuration of main boom pendant straps (L):

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Required number of main boom pendant straps 10 ft (L3) is the same as the number of boom sections 10 ft.

Required number of main boom pendant straps 20 ft (L4) is the same as the number of boom sections 20 ft.

Required number of main boom pendant straps 40 ft (L5) is the same as the number of boom sections 40 ft.



**Note**

▶ Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the following table: (For more information see: 7.4.1 Configuration of main boom, page 645)

**7.4.4 Pendant straps on 2821 main boom, overview (LR1300 (carbon-fibre pendant straps))**

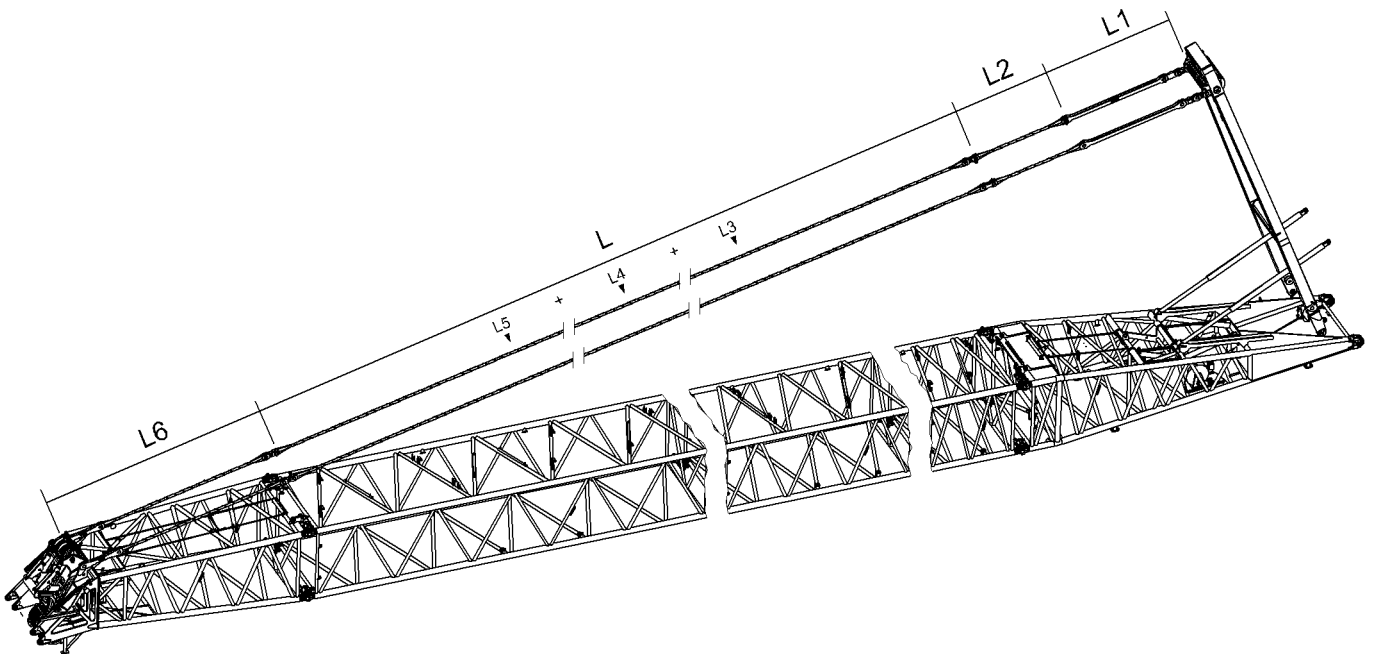


Fig. 1370 Pendant straps on 2821 main boom, overview (LR1300 (carbon-fibre pendant straps))

**A-frame 1 to 2821 boom head section pendant straps**

Designation		Value
L1	<b>A-frame 1 equalizer</b> (For more information see: A-frame 1 equalizer, page 191)	12' 2" ft-in
L2	<b>Boom base section equalizer</b> (For more information see: Equalizer of 2821 boom base section, page 192)	8' 10" ft-in

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Designation		Value
L	Main boom pendant straps consisting of:	
	L3	<b>Main boom pendant strap 10 ft</b> (For more information see: <a href="#">Main boom pendant strap 10 ft, page 193</a> )
	L4	<b>Main boom pendant strap 20 ft</b> (For more information see: <a href="#">Main boom pendant strap 20 ft, page 196</a> )
	L5	<b>Main boom pendant strap 40 ft</b> (For more information see: <a href="#">Main boom pendant strap 40 ft, page 199</a> )
L6	<b>Main boom pendant strap on 2821 boom head section</b> (For more information see: <a href="#">Main boom pendant strap on 2821 boom head section, page 202</a> )	Total L3 + Total L4 + Total L5  20' 8" ft-in

Tab. 263 A-frame 1 to 2821 boom head section pendant straps

### Configuration of main boom pendant straps (L):

Required number of main boom pendant straps 10 ft (L3) is the same as the number of boom sections 10 ft.

Required number of main boom pendant straps 20 ft (L4) is the same as the number of boom sections 20 ft.

Required number of main boom pendant straps 40 ft (L5) is the same as the number of boom sections 40 ft.



#### Note

- ▶ Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the following table: ([For more information see: 7.4.1 Configuration of main boom, page 645](#))

The main boom pendant straps (L) can be made up from generation A and generation B main boom pendant straps ([For more information see: 1.28.2 Pendant straps on 2821 main boom, page 192](#)). However, a mixture is only permissible if there is a maximum difference of 1 between the numbers of generation B main boom pendant straps in the left and right strands of the pendant straps.



#### DANGER

Impermissible mixture of generation A and B main boom pendant straps!  
Structural breakdown.

- ▶ Ensure that there is a maximum difference of 1 between the numbers of generation B main boom pendant straps in the left and right strands of the pendant straps.



### 7.4.5 2821 boom head section rope reeving systems (load position 1)

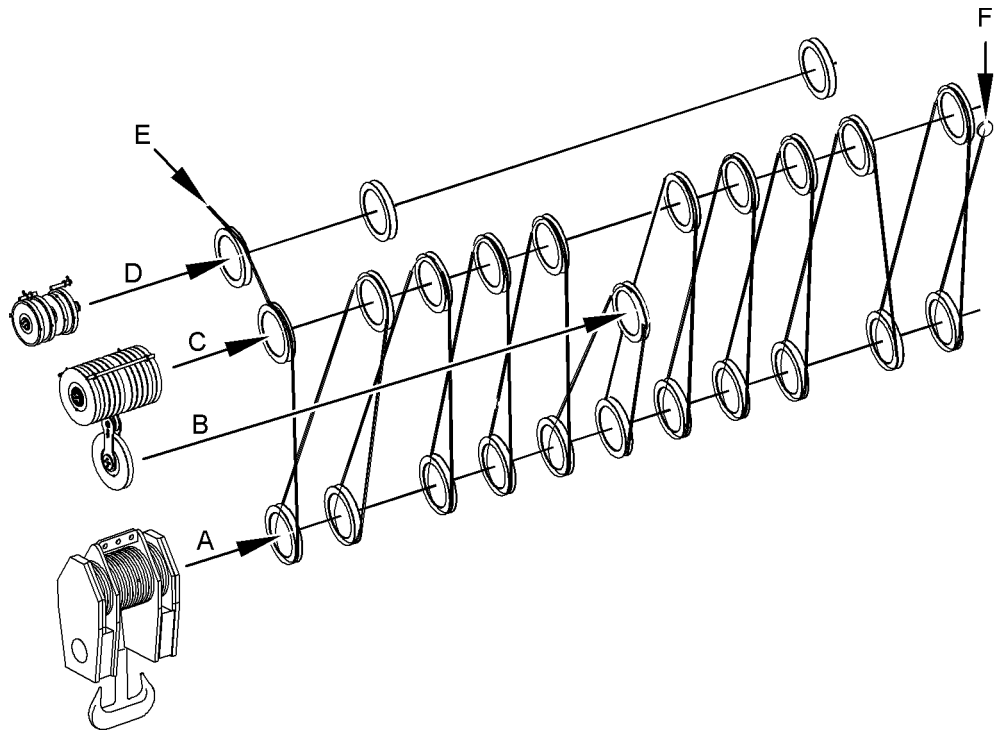


Fig. 1371 2821 boom head section rope reeving system (load position 1)

- |   |                                      |   |                                  |
|---|--------------------------------------|---|----------------------------------|
| A | Pulley block roller set              | D | Boom head section gantry pulleys |
| B | 11th pulley on the boom head section | E | Winch 1 hoist rope               |
| C | Boom head section roller set         | F | Rope fixation                    |

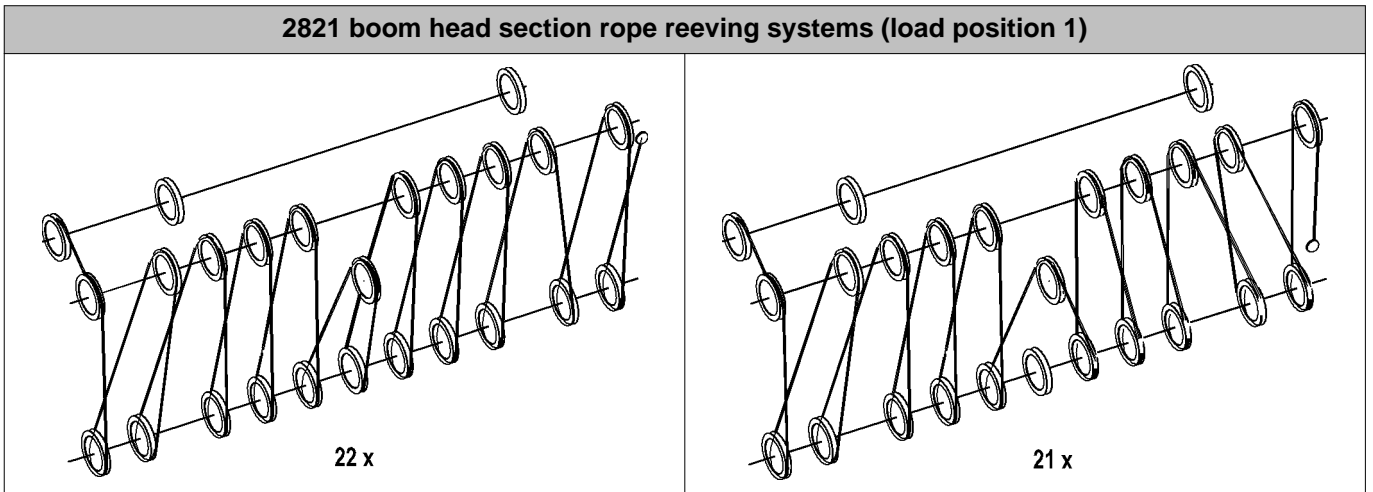


**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

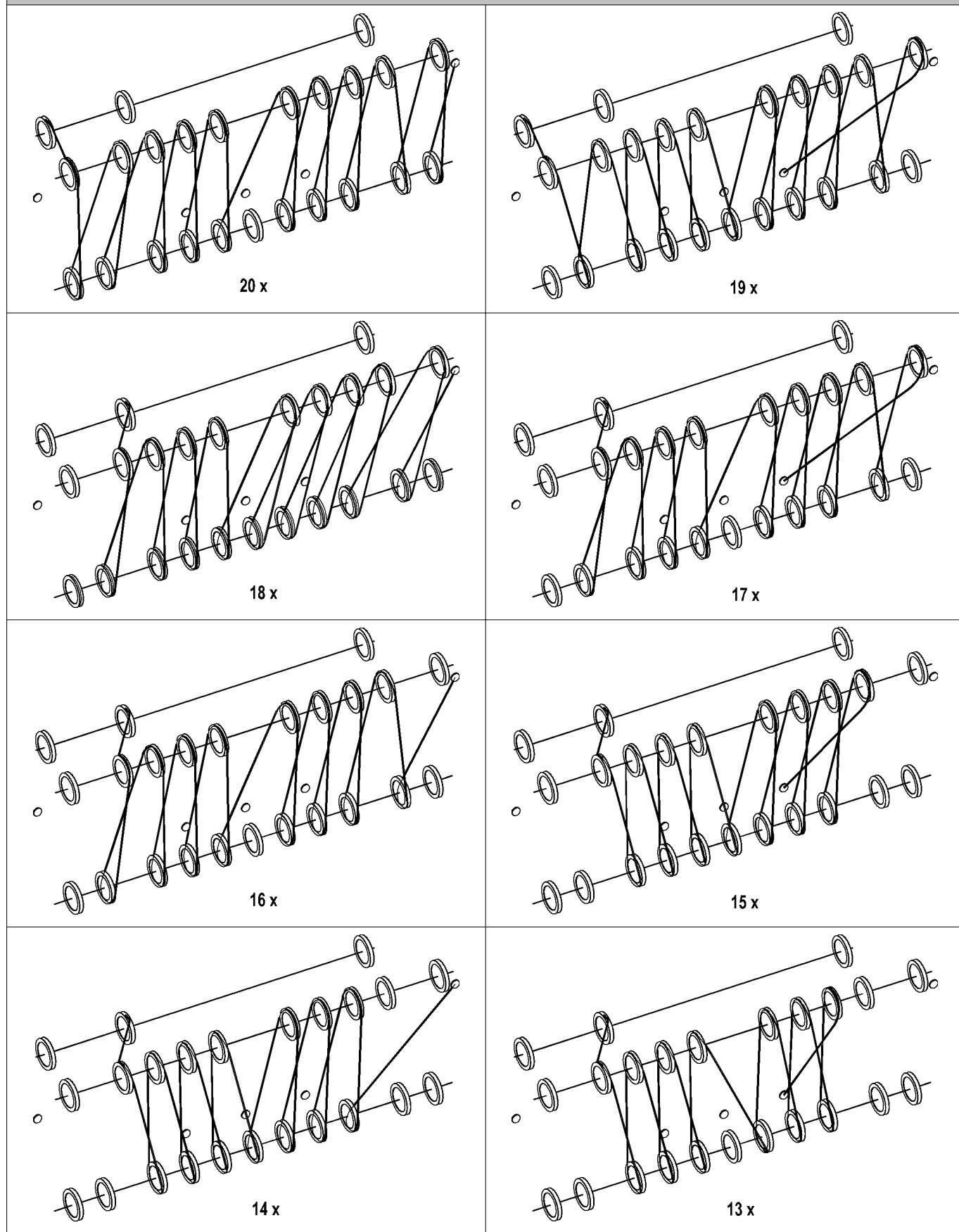
► Choose the correct number of reevings as per the load chart.

**2821 boom head section rope reeving systems (load position 1)**



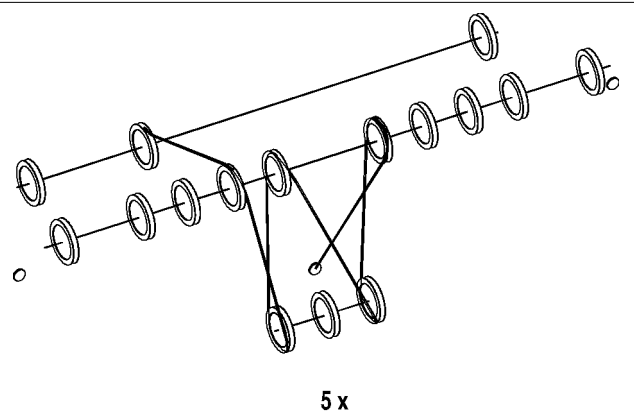
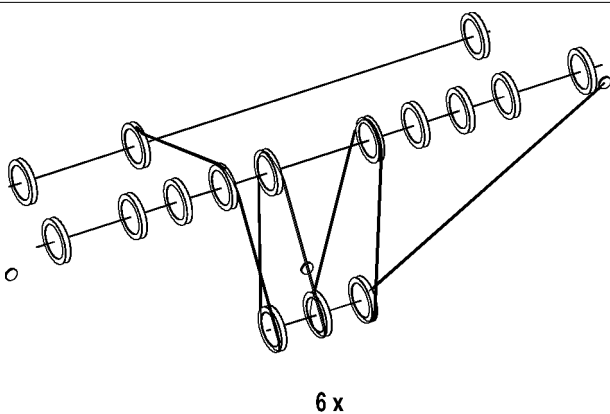
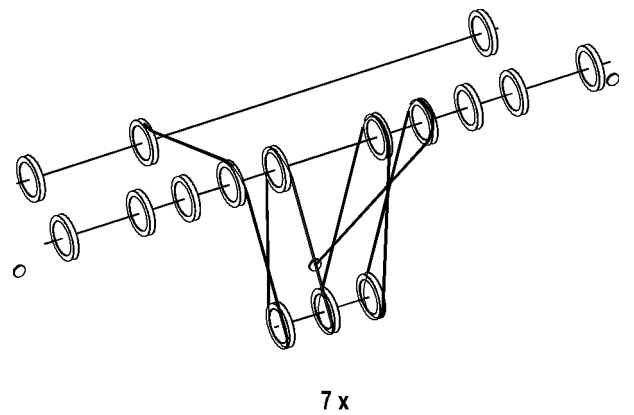
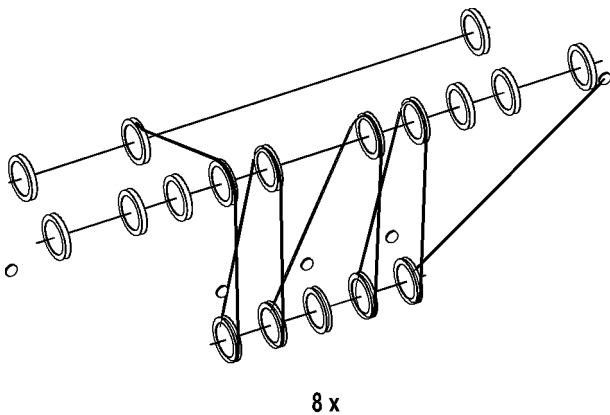
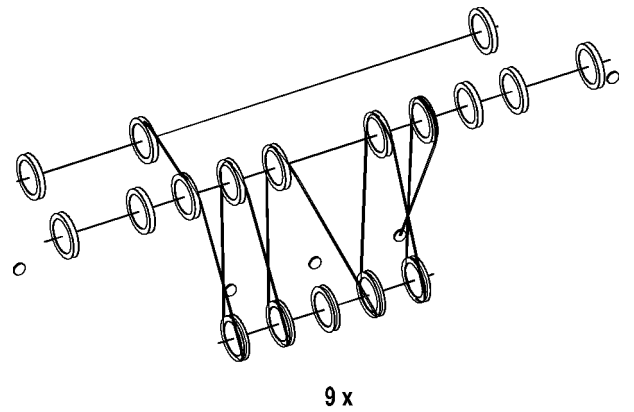
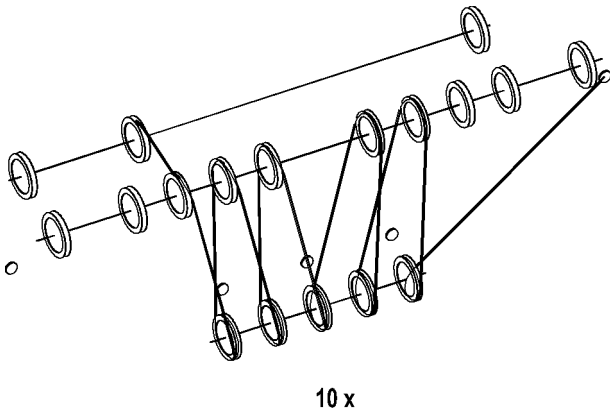
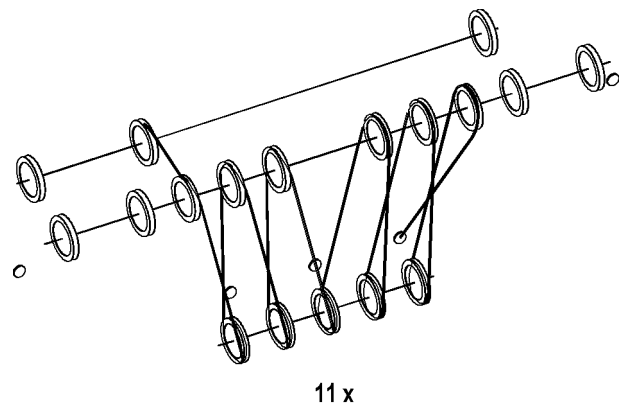
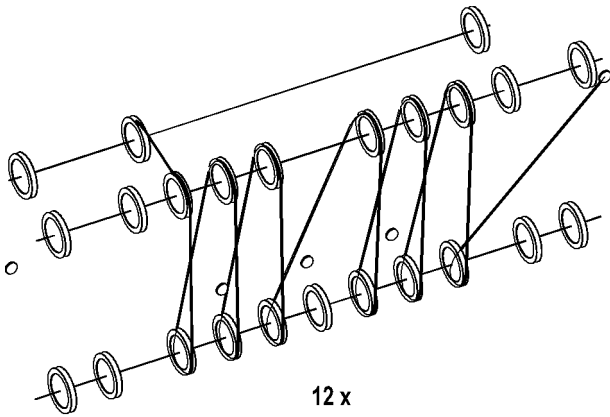
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2821 boom head section rope reeving systems (load position 1)

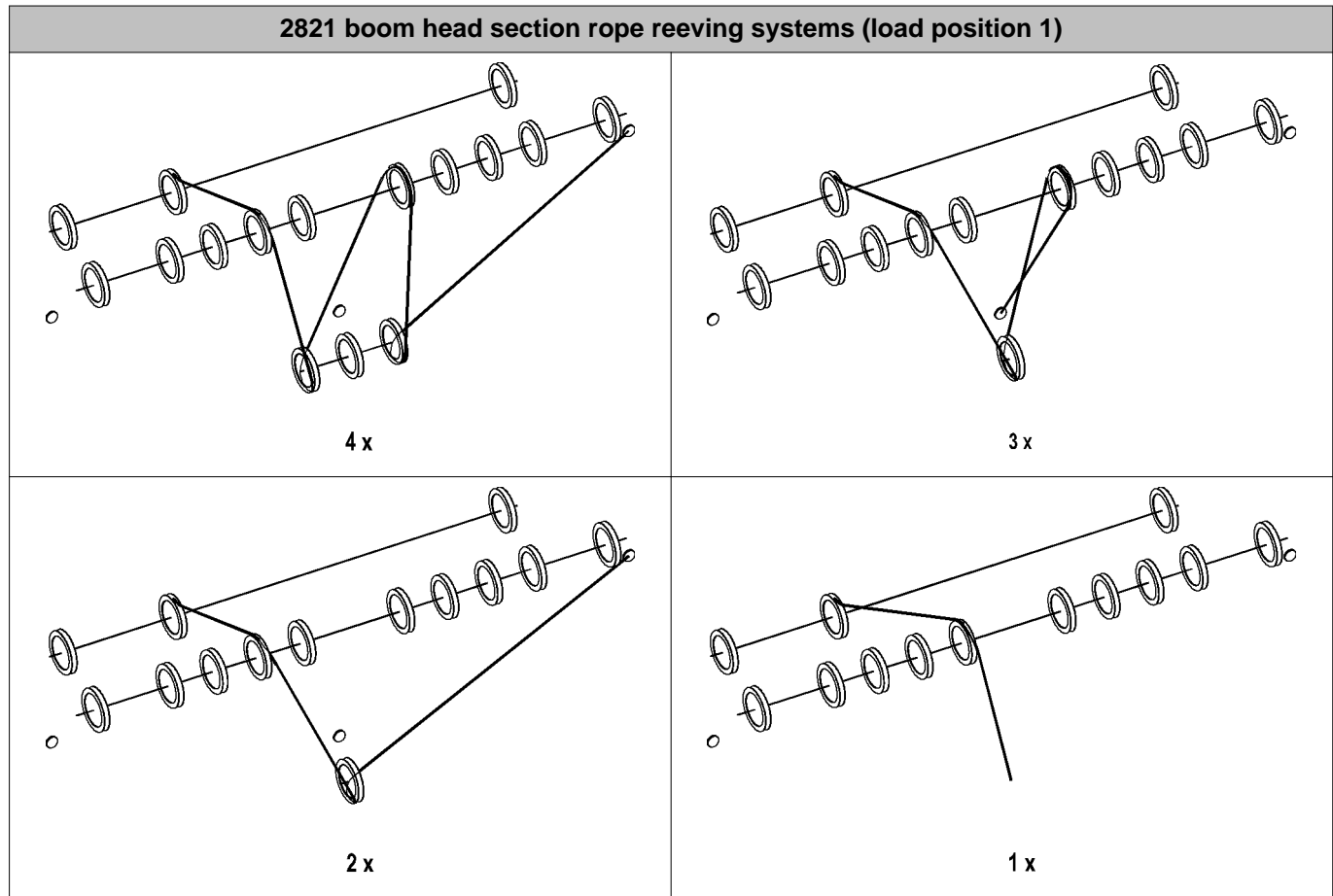


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2821 boom head section rope reeving systems (load position 1)



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Tab. 264 2821 boom head section rope reeving systems (load position 1)

### 7.4.6 Rope reeving systems for 2821 boom head section in single hook operation with 2 winches on 1 hook

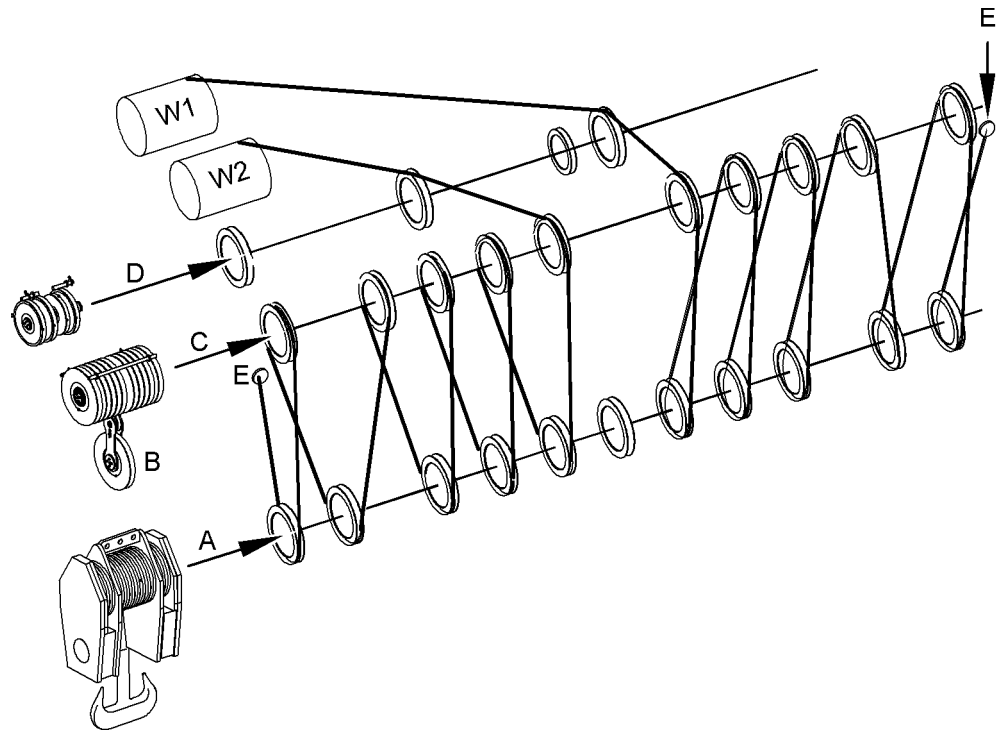
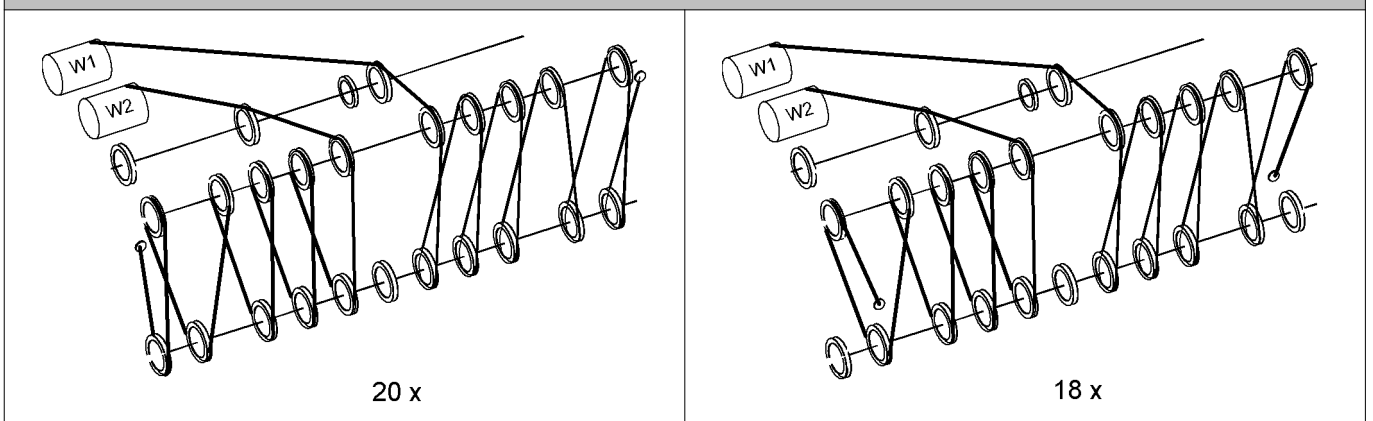


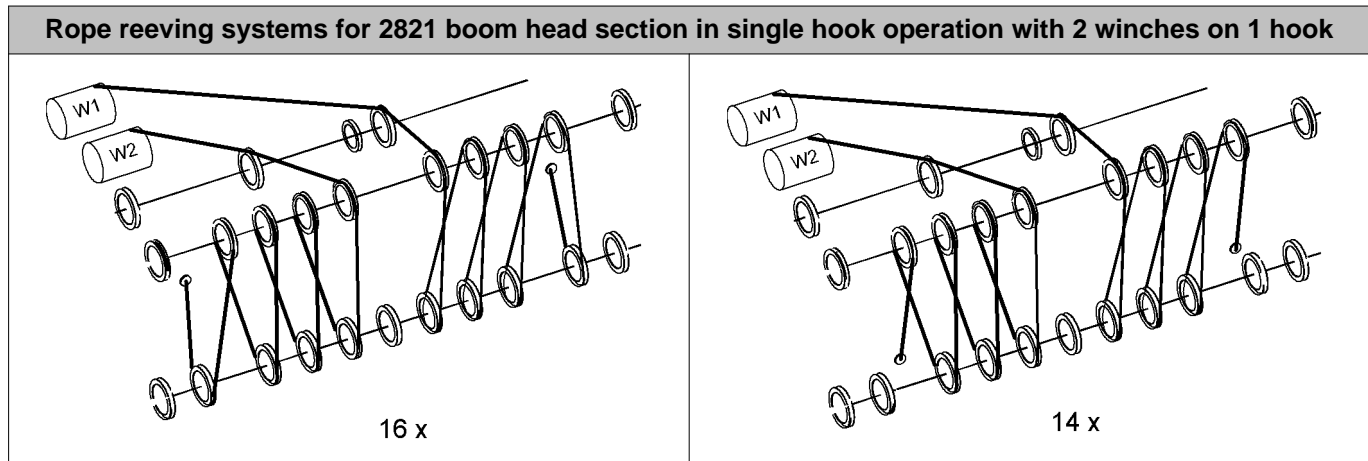
Fig. 1394 Rope reeving system for 2821 boom head section in single hook operation with 2 winches on 1 hook

- |   |                                      |    |               |
|---|--------------------------------------|----|---------------|
| A | Pulley block roller set              | E  | Rope fixation |
| B | 11th pulley on the boom head section | W1 | Winch 1       |
| C | Boom head section roller set         | W2 | Winch 2       |
| D | Boom head section gantry pulleys     |    |               |

#### Rope reeving systems for 2821 boom head section in single hook operation with 2 winches on 1 hook



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Tab. 265 Rope reeving systems for 2821 boom head section in single hook operation with 2 winches on 1 hook

### 7.4.7 Auxiliary jib (79300 lb) to 2821 boom head section rope reeving systems (load position 2)

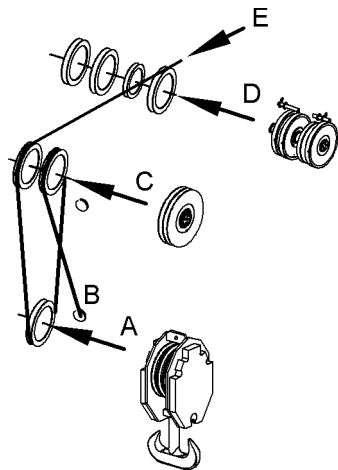


Fig. 1399 Auxiliary jib (79300 lb) to 2821 boom head section rope reeving system (load position 2)

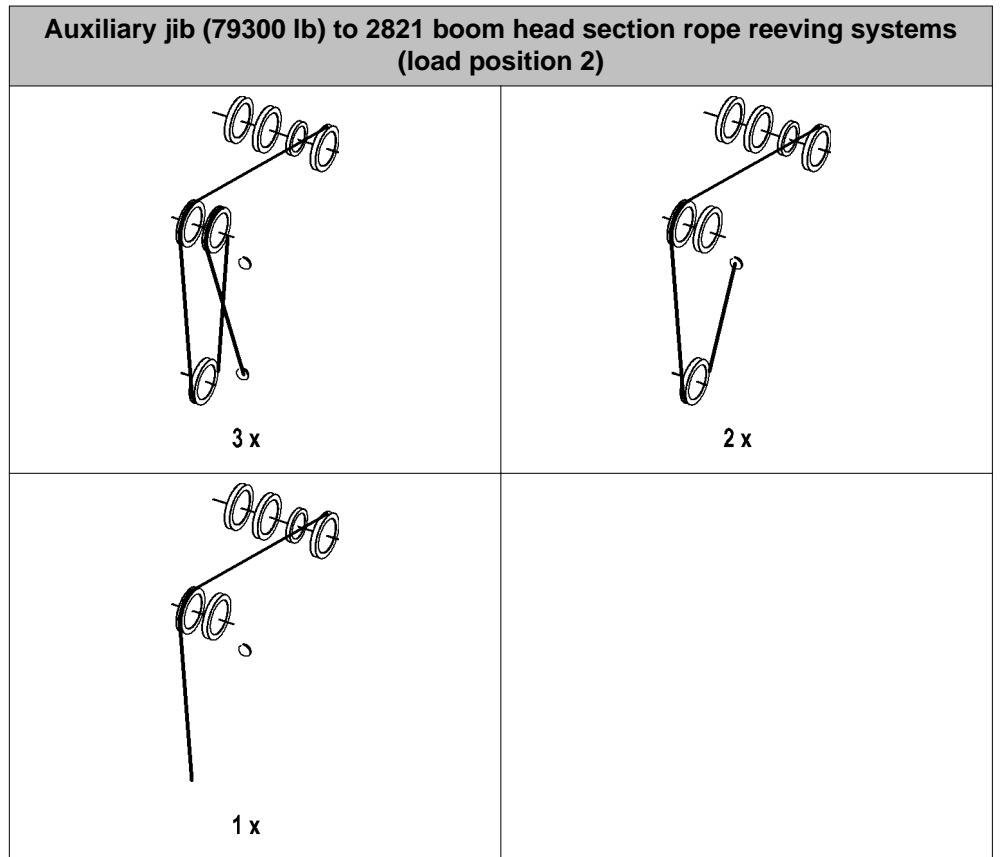
- |                                   |   |
|-----------------------------------|---|
| <b>A</b> Pulley block roller set  | <b>D</b> Boom head section gantry pulleys |
| <b>B</b> Rope fixation            | <b>E</b> Winch 2 hoist rope               |
| <b>C</b> Auxiliary jib roller set |   |



**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

- ▶ Choose the correct number of reevings as per the load chart.



Tab. 266 Auxiliary jib (79300 lb) to 2821 boom head section rope reeving systems (load position 2)

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## 7.5 Assembling the main boom

Ensure that the following conditions are satisfied:

- Assembly mode is selected.
- 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.

### 7.5.1 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.

### 7.5.2 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: 4.14 Programming the setup, page 438](#)).



### 7.5.3 Unloading and positioning the main boom section



**DANGER**

Slewing of uppercarriage with rear counterweight attached not permitted!  
Machine toppling over.

- ▶ Only slew the uppercarriage according to the table (For more information see: [Mounting and pinning the rear counterweight, page 643](#)).



**DANGER**

Incorrect or faulty parts/components are fit!  
Structural breakdown.

- ▶ Only use original Liebherr parts/components that are in perfect condition.



**DANGER**

Incorrect configuration of the boom!  
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 20 ft cannot be replaced by two boom sections of 10 ft.
- ▶ A boom section of 40 ft cannot be replaced by two boom sections of 20 ft.
- ▶ Ensure that with machine type LR 1300 exclusively boom sections with system size 2821.24 are fit (For more information see: [1.8.2 Differentiating factors of LR 1300 and LR 1300 SX boom sections, page 72](#)).
- ▶ Ensure that with machine type LR 1300 SX exclusively boom sections with system size 2821.30 are fit (see boom identification plate) (For more information see: [1.8.2 Differentiating factors of LR 1300 and LR 1300 SX boom sections, page 72](#)).

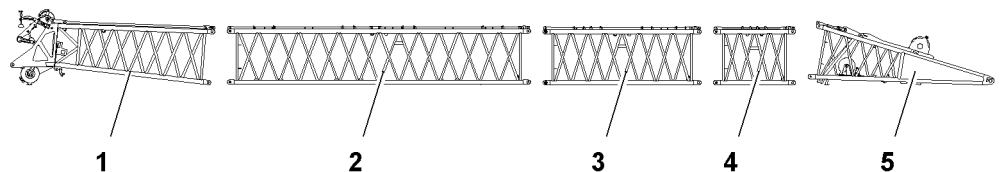


Fig. 1403 Positioning the main boom section according to the relevant system instructions

- |   |                               |   |                    |
|---|-------------------------------|---|--------------------|
| 1 | Boom head section             | 4 | Boom section 10 ft |
| 2 | Boom section 11.7 ft or 39 ft | 5 | Boom base section  |
| 3 | Boom section 20 ft            |   |                    |

- ▶ Direct transport vehicles with boom components.
- ▶ Sling main boom sections by attaching assembly rigging 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.

### 7.5.4 Bolting the boom head section to the boom sections



#### 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.

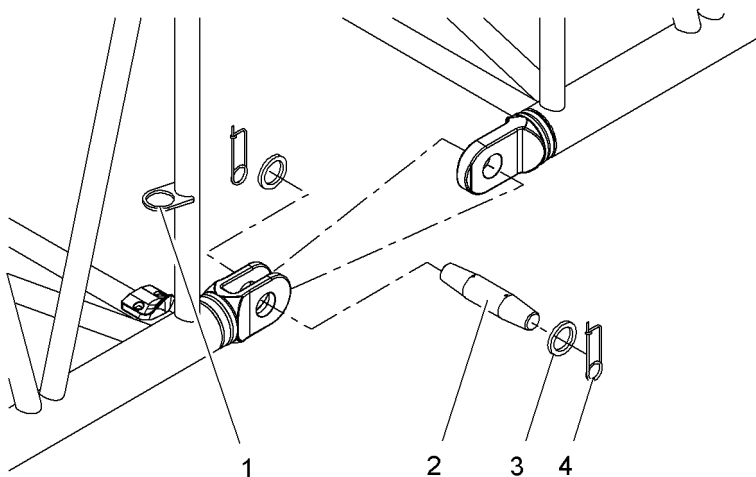


Fig. 1404 Bolting the main boom

- |   |   |   |                  |
|---|---|---|------------------|
| 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.

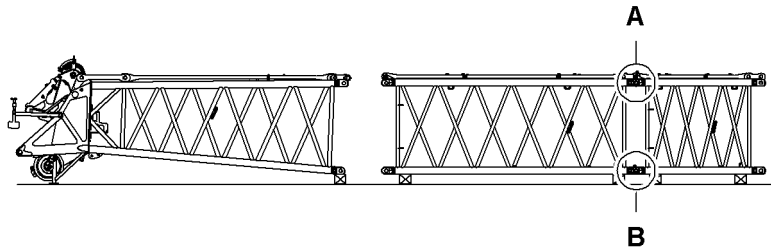


Fig. 1405 Bolting the main boom intermediate pieces

**A** Upper pin connection point (2x)      **B** Lower 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.

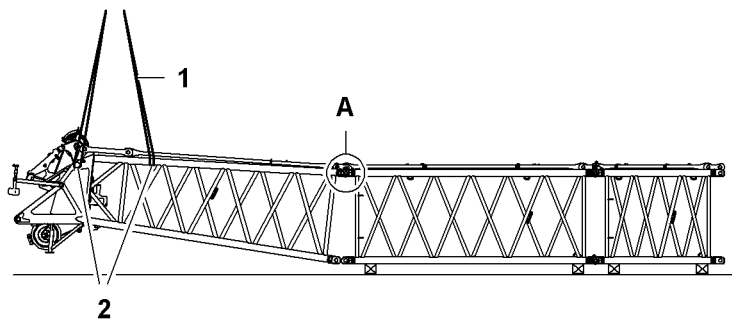


Fig. 1406 Bolting the boom head section to the boom sections at the top

**1** Round sling (4x)      **A** Upper pin connection point (2x)  
**2** Lifting point (4x)

- ▶ 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.

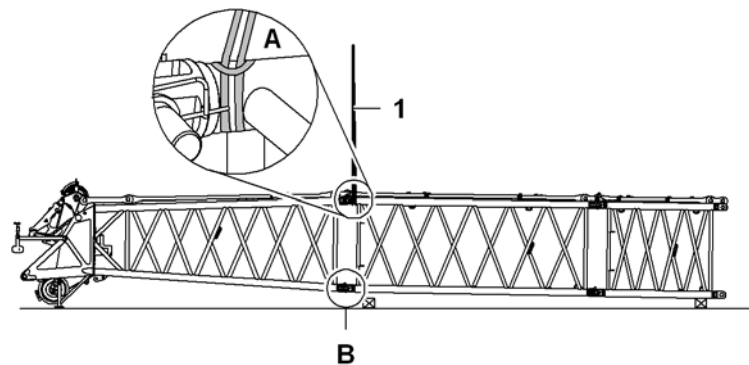


Fig. 1407 Bolting the boom head section to the boom sections at the bottom

**1** Round sling (2x)

**B** Lower pin connection point (2x)

**A** Lifting point (2x)

- ▶ Attach the boom section on the lifting points **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.

## 7.5.5 Assembling the ladder for the boom

Only use the ladder with boom sections on which the required ladder angle of 68° to 72° can be observed.



---

**CAUTION**

The ladder must not be placed under an impermissible dynamic load!

- ▶ 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.
-

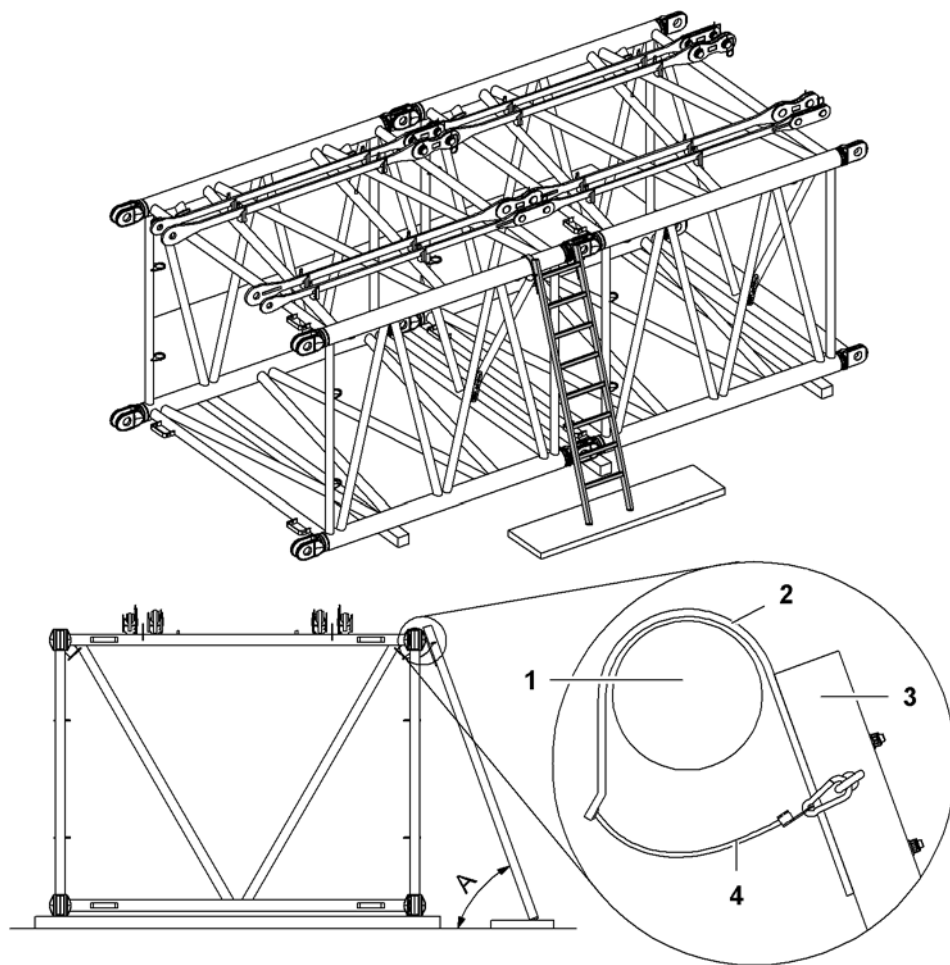


Fig. 1408 Assembling the ladder for the boom

- |          |                                 |          |                   |
|----------|---------------------------------|----------|-------------------|
| <b>A</b> | Ladder angle                    | <b>3</b> | Ladder            |
| <b>1</b> | Chord pipe                      | <b>4</b> | Safety ropes (2x) |
| <b>2</b> | Plastic-coated ridge hooks (2x) |          |                   |

- ▶ Attach ladder to chord pipe 1.
- ▶ Secure ladder with safety ropes 4.

The ladder angle **A** must remain between 68° and 72°.

- ▶ Use supports if necessary.



### CAUTION

Ladder on a boom section during crane operation!  
Ladder may fall.

- ▶ Secure the lower section of the ladder by tying it down to the boom section.

If the ladder is left on the boom when in crane operation:

- ▶ Secure the lower section of the ladder by tying it down to the boom section.

## 7.5.6 fit the rope guide

The rope guide:

- Improves the spooling properties of the rope.
- is mandatory above a predefined length.
- optimises the angle between winch and rope.
- increases the service life of the rope.

### NOTICE

Incorrect assembly of the rope guide!  
Risk of damage to the rope.

- ▶ Fit rope guide according to relevant system instructions.

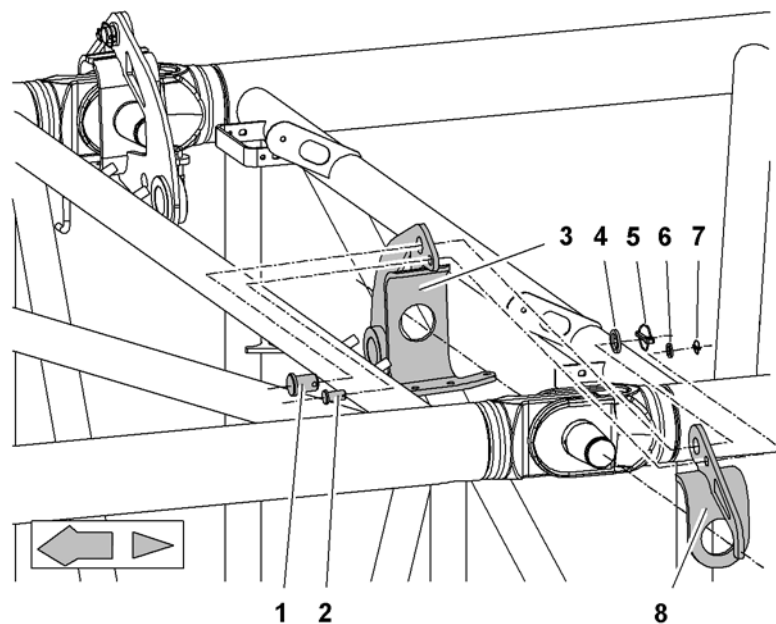


Fig. 1409 Fitting the rope guide forks

1	Pin	5	Linch pin
2	Pin	6	Washer
3	Inner section of fork	7	Linch pin
4	Washer	8	Outer section of fork

- ▶ Remove the safety pins and washers from both sides of the boom pin connection double-taper pin and stow away.
- ▶ Mount the inner and outer sections of the fork **3 + 8** on the double-taper pin.
- ▶ Pin the inner and outer sections of the **3 + 8** fork.
- ▶ Secure pin **1 + 2** with washers **4 + 6** and lynch pins **5 + 7**.

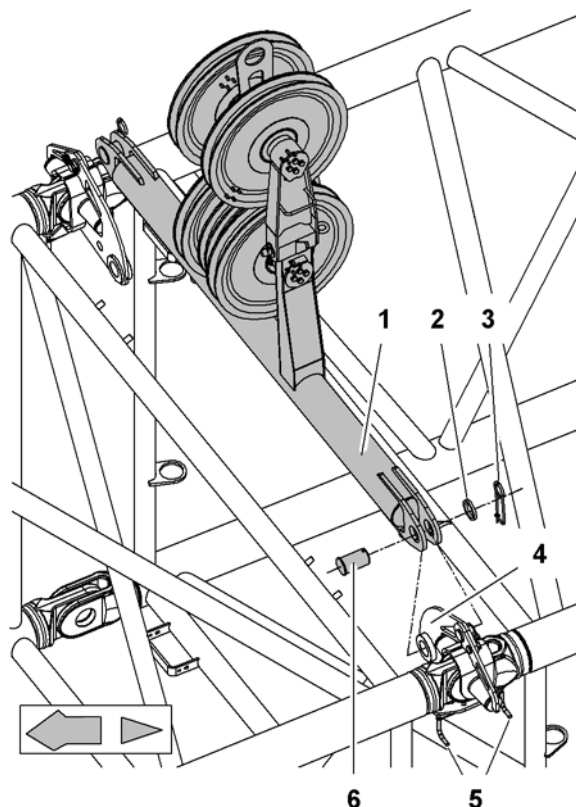


Fig. 1410 Attach rope guide

1	Rope guide	4	Fork
2	Washer	5	Screws (2x)
3	Safety pin	6	Pin

- ▶ Pin rope guide 1 to fork 4.
- ▶ Secure the pin 6 with washer 2 and retaining spring 3.

If the assembly position of the rope guide is identical to the assembly position of the mid-point suspension:

- ▶ pin the ropes on the mid-point suspension to the rope guide forks.
- ▶ Secure the pin with a washer and safety pin.

### NOTICE

The screws 5 must not be tightened before the ropes on the mid-point suspension are pinned to the rope guide forks!  
Risk of damage to the components.

Once the ropes on the mid-point suspension are pinned to the rope guide forks:

- ▶ tighten screws 5.

- ▶ Use both screws 5 to vertically align the rope guide and manually fix it in place.

## 7.5.7 Pinning the pendant straps

- ▶ Remove safety pins from the transport brackets for pendant straps.



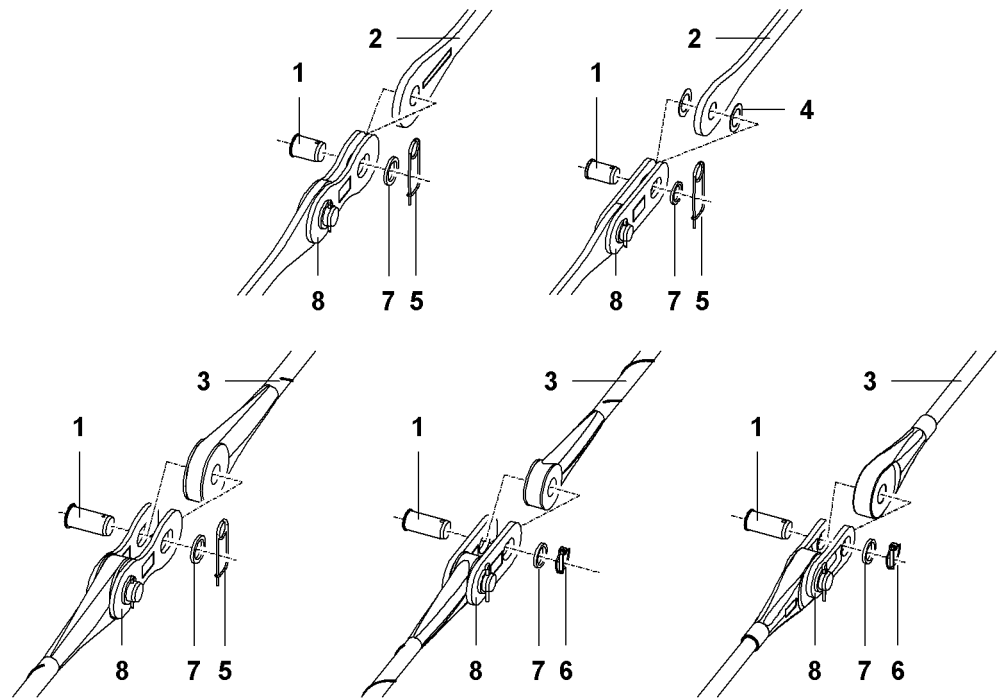


Fig. 1411 Bolt the pendant straps (schematic diagram of various pendant straps)

- |                              |                   |
|------------------------------|-------------------|
| 1 Pin                        | 5 Safety pin      |
| 2 Steel pendant strap        | 6 Linch pin       |
| 3 Carbon-fibre pendant strap | 7 Washer          |
| 4 Plastic washers (2x)       | 8 Connecting link |

- ▶ Remove the pin 1 on the connecting link 8.
- ▶ Position the pendant strap 2  **bzw.**  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.

## 7.5.8 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

Reduced lifting capacity when jib backstay straps are not removed!

- ▶ 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.

### 7.5.9 Installing mid-point suspension

The mid-point suspension:

- reduces sagging of the boom.
- is mandatory above a predefined length.
- connects the boom to the pendant straps.
- is assembled from individual ropes or backstay shackles.
- is installed at a precisely defined location.

The lengths of the ropes and backstay shackles and their assembly positions are shown in the relevant instructions for the boom.

To install the mid-point suspension on main boom lengths of 262' 6" ft-in, 272' 4" ft-in or 282' 2" ft-in with jib 1507 attached, see: [\(For more information see: 7.5.10 Installing mid-point suspension \(with main boom length 262 ft, 272 ft or 282 ft and 1507 jib attached\), page 672\)](#)



#### DANGER

Incorrect installation of mid-point suspensions!  
Boom damage.

- ▶ Fit mid-point suspensions according to relevant system instructions.

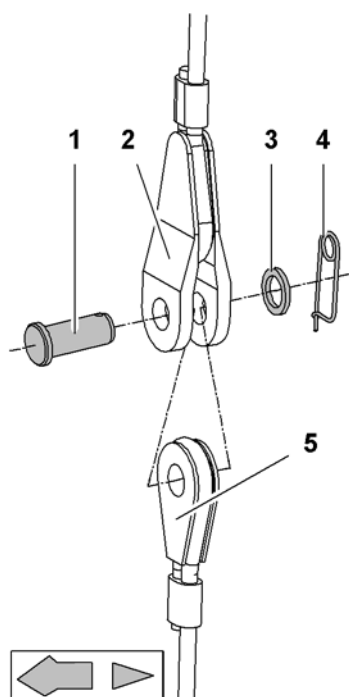


Fig. 1412 Pinning mid-point suspension ropes

- |   |            |   |            |
|---|------------|---|------------|
| 1 | Pin        | 4 | Safety pin |
| 2 | Upper rope | 5 | Lower rope |
| 3 | Washer     |   |            |

- ▶ Assemble the required rope sections according to the relevant system instructions.
- ▶ Pin the upper and lower rope 2 + 5.

- ▶ Secure the pin 1 with washer 3 and retaining spring 4.

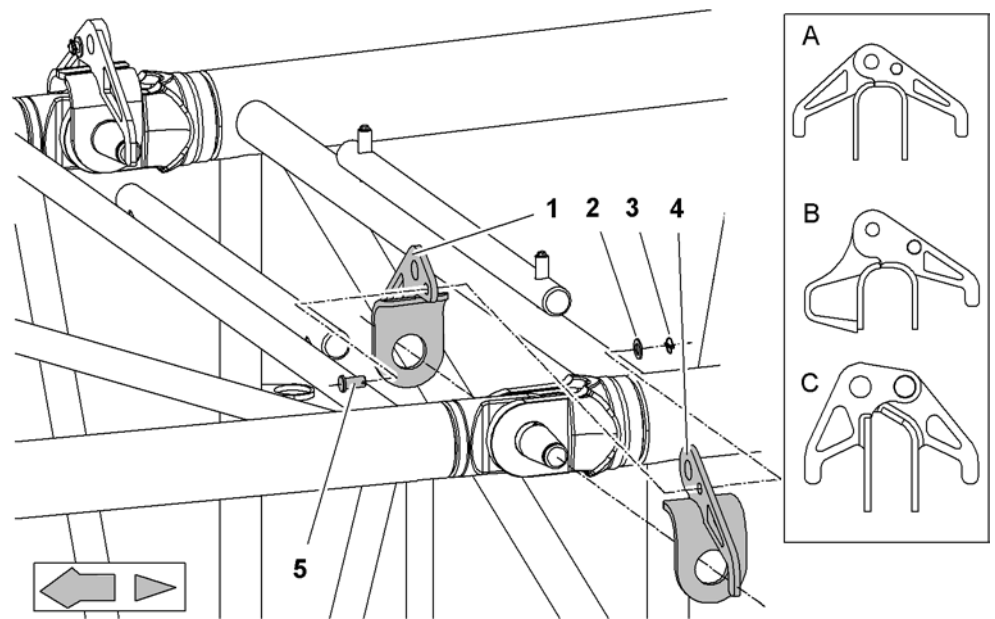


Fig. 1413 Assembling the mid-point suspension forks

- |   |                       |   |        |
|---|-----------------------|---|--------|
| 1 | Inner section of fork | 5 | Pin    |
| 2 | Washer                | A | Form A |
| 3 | Linch pin             | B | Form B |
| 4 | Outer section of fork |   |        |

The shape **A** fork is only fitted to the mid-point suspension of the 1713 luffing jib. All other mid-point suspensions require the shape **A** fork.

- ▶ Remove the safety pins and washers from both sides of the boom pin connection double-taper pin and stow away.

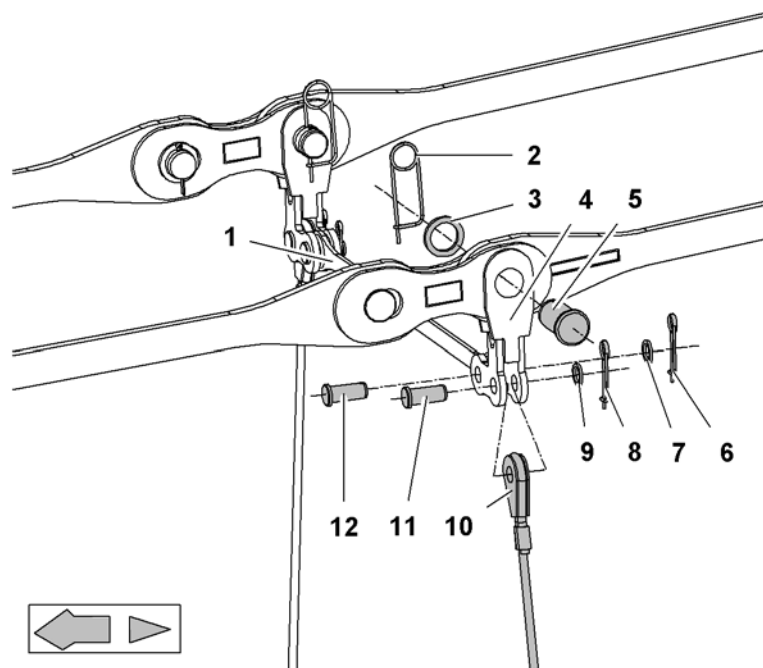


**Note**

Special assembly procedure when the mid-point suspension and rope guide are installed in exactly the same position on the main boom!

- ▶ The rope guide forks replace the mid-point suspension forks.

- ▶ Mount the inner and outer sections of the fork **1 + 5** on the double-taper pin.
- ▶ Pin the inner and outer sections of the **1 + 5** fork.
- ▶ Secure pin **5** with a washer **2** and linch pin **3**.



*Fig. 1414 Pin the pendant straps, spacer bracket, connecting elements and mid-point suspension ropes*

<b>1</b>	Spacer bracket	<b>7</b>	Washer
<b>2</b>	Safety pin	<b>8</b>	Safety pin
<b>3</b>	Washer	<b>9</b>	Washer
<b>4</b>	Connecting element	<b>10</b>	Rope
<b>5</b>	Pin	<b>11</b>	Pin
<b>6</b>	Safety pin	<b>12</b>	Pin

- ▶ Pin connecting element **4** and pendant strap.
- ▶ Secure the pin **5** with washer **3** and retaining spring **2**.
- ▶ Pin connecting element **4** and spacer bracket **1**.
- ▶ Secure the pin **12** with washer **7** and retaining spring **6**.
- ▶ Pin connecting element **4** and ropes **10**.
- ▶ Secure the pin **11** with washer **9** and retaining spring **8**.

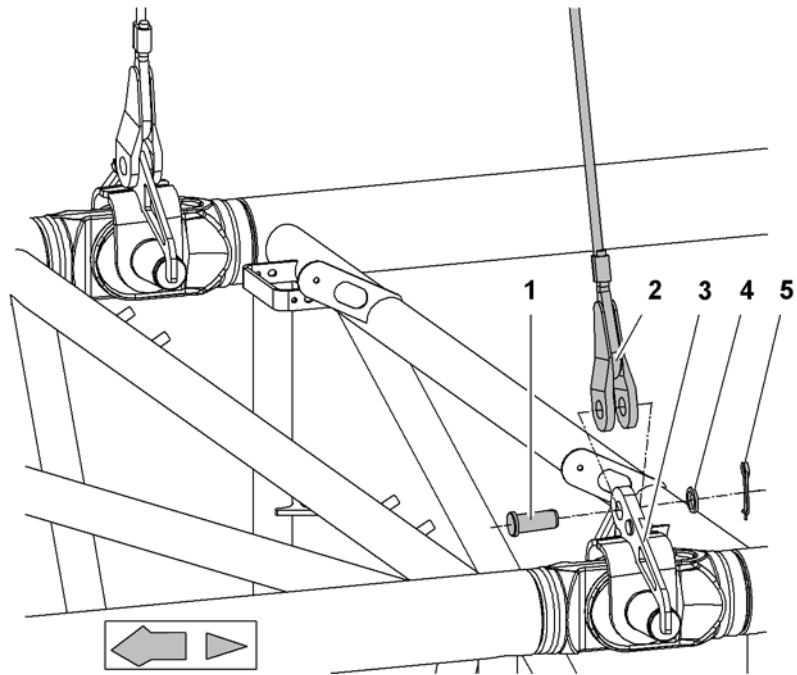


Fig. 1415 Pinning mid-point suspension ropes and forks

- |   |      |   |            |
|---|------|---|------------|
| 1 | Pin  | 4 | Washer     |
| 2 | Rope | 5 | Safety pin |
| 3 | Fork |   |            |



**Note**

- ▶ To facilitate pinning of the rope 2 and fork 3: Use A-frame 1 to raise the pendant straps.
- ▶ Pin rope 2 and fork 3.
- ▶ Secure the pin 1 with washer 4 and retaining spring 5.

## 7.5.10 Installing mid-point suspension (with main boom length 262 ft, 272 ft or 282 ft and 1507 jib attached)

With a main boom length of 262 ft, 272 ft or 282 ft and 1507 fixed jib attached, installation of the mid-point suspension represents a special case.



### DANGER

Incorrect installation of mid-point suspensions!  
Boom damage.

- ▶ Fit mid-point suspensions according to relevant system instructions.

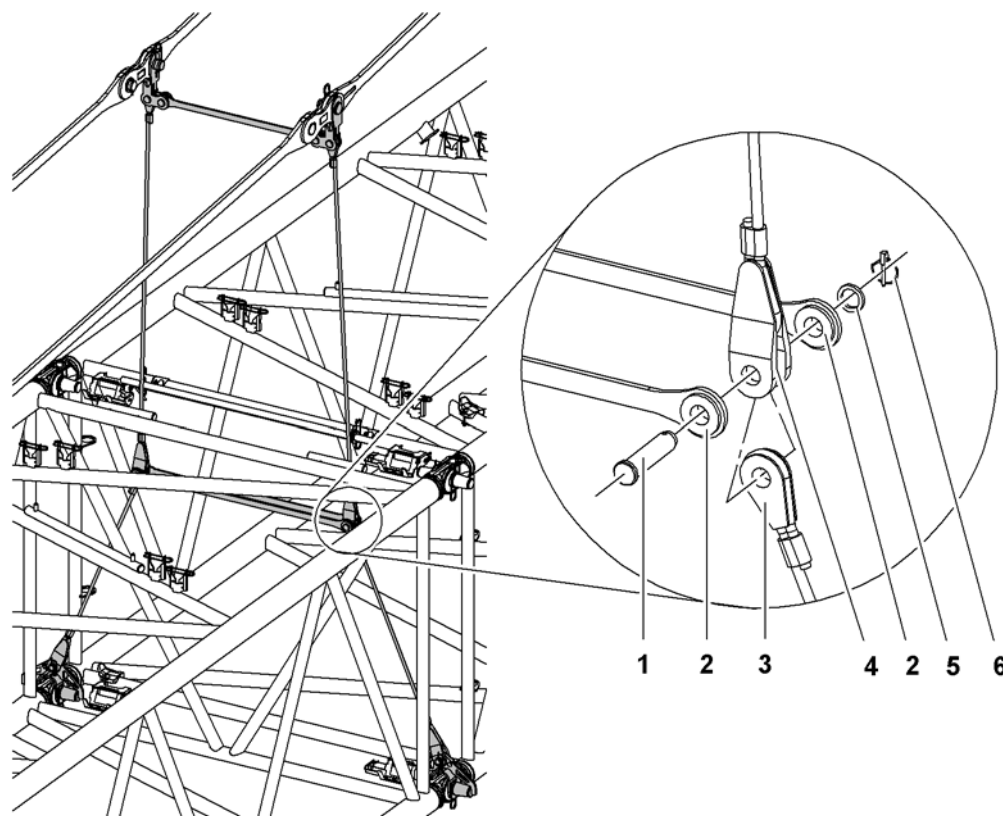


Fig. 1416 Connecting ropes and spacer brackets

- |   |                      |   |            |
|---|----------------------|---|------------|
| 1 | Pin                  | 4 | Upper rope |
| 2 | Spacer brackets (2x) | 5 | Washer     |
| 3 | Lower rope           | 6 | Linch pin  |

- ▶ Assemble the required rope sections according to the relevant system instructions.
- ▶ Pin mid-point suspension with pendant strap (For more information see: [7.5.9 Installing mid-point suspension, page 668](#)) (For more information see: [7.15.17 Installing mid-point suspension, page 833](#)) .
- ▶ Pin the upper and lower rope 3 + 4 with both spacer brackets 2.
- ▶ Secure pin 1 with a washer 5 and lynch pin 6.
- ▶ Pin mid-point suspension with boom section (For more information see: [7.5.9 Installing mid-point suspension, page 668](#)) (For more information see: [7.15.17 Installing mid-point suspension, page 833](#)) .

## 7.5.11 Rigging and raising the boom base section



### Note

If the jib has been attached using the self-assembly system:

- ▶ Assemble the fixed jib and fit it to the main boom before fitting the boom base section.
- ▶ Assemble the luffing jib and fit it to the main boom before fitting the boom base section.



### Note

- ▶ Even if an assist crane is available, the connection of the boom base section to A-frame 1 using the assembly cylinder is preferable.

Ensure that all the work of the basic machine as an assist crane has been completed.

- ▶ Shorten the front lifting chains by 10 links each.
- ▶ Attach the shortened lifting chain with round slings at the front.
- ▶ Attach the long lifting chain with round sling at the rear.

The uppercarriage may be rotated through 360 ° without restriction.

- ▶ Raise the boom base section.

## 7.5.12 Attaching the boom base section to the uppercarriage



### WARNING

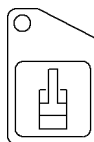
Machine swings with a suspended load!  
Crush, fatal injury.

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.

### NOTICE

Boom base section swings!  
Damage to cab.

- ▶ An assistant must help guide the boom base section when fitting.
- ▶ Open the frontmost right uppercarriage doors.
- ▶ Connect the cable remote control for the pin connection cylinder.
- ▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button on control panel X23.
  - ▷ Cylinder adjustment functions are enabled.



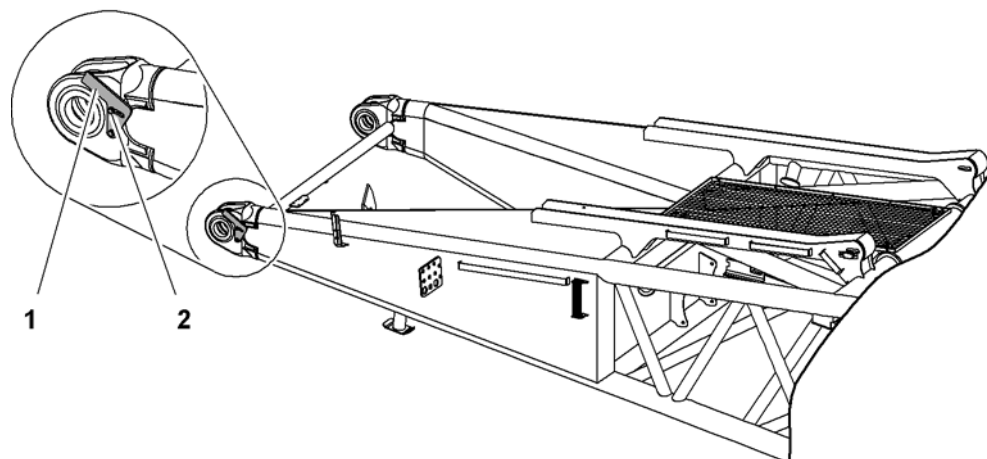


Fig. 1418 Tilting up the safety bracket

- 1 Safety bracket (2x)                      2 Screw (2x)

- ▶ Loosen the screws 2 on the safety brackets 1.
- ▶ Tilt up safety bracket 1.

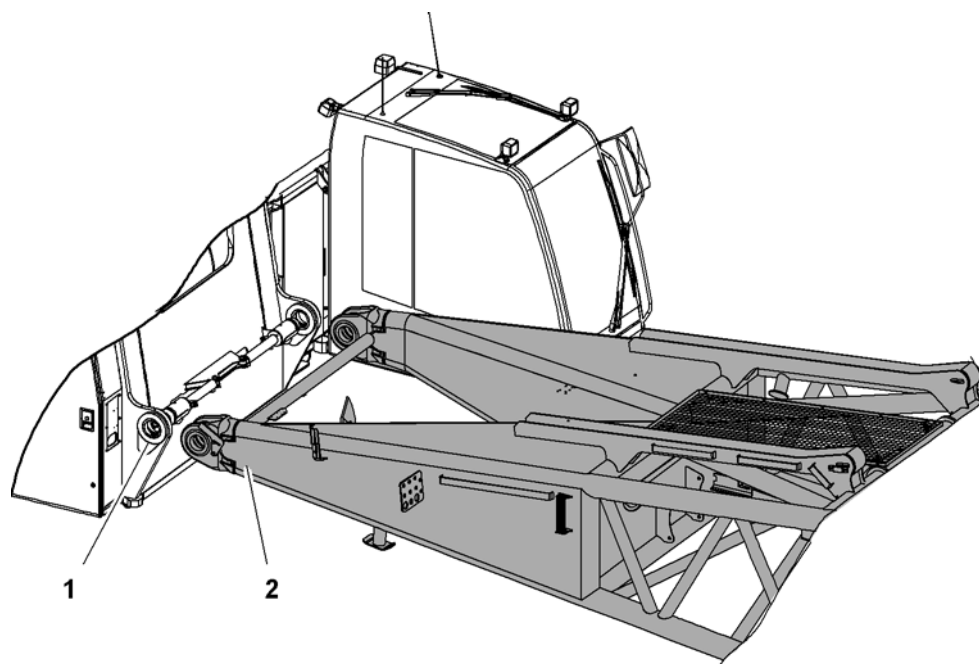


Fig. 1419 Positioning the boom base section

- 1 Suspension points (2x)                      2 Fork

- ▶ Align the fork 2 of the boom base section to the uppercarriage pivot points 1.



**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.

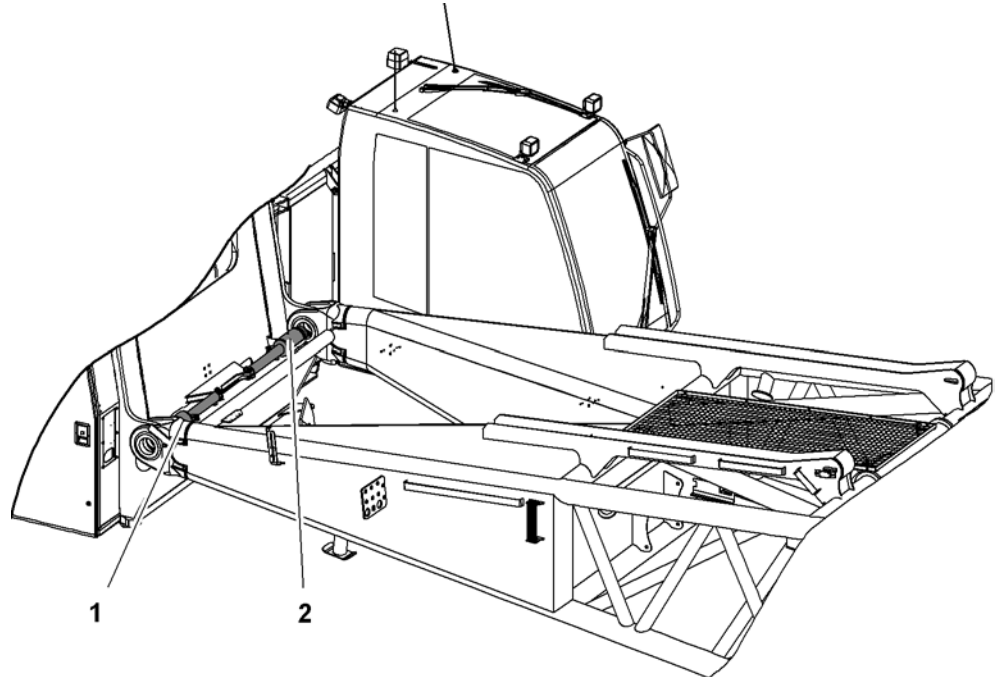


Fig. 1420 Extending the pin connection cylinder

- |   |   |
|---|---|
| <p><b>1</b> Right-hand pin connection</p> | <p><b>2</b> Left-hand pin connection cylinder</p> |
|---|---|

- ▶ Extend the left-hand **2** and right-hand **1** pin connection cylinders.

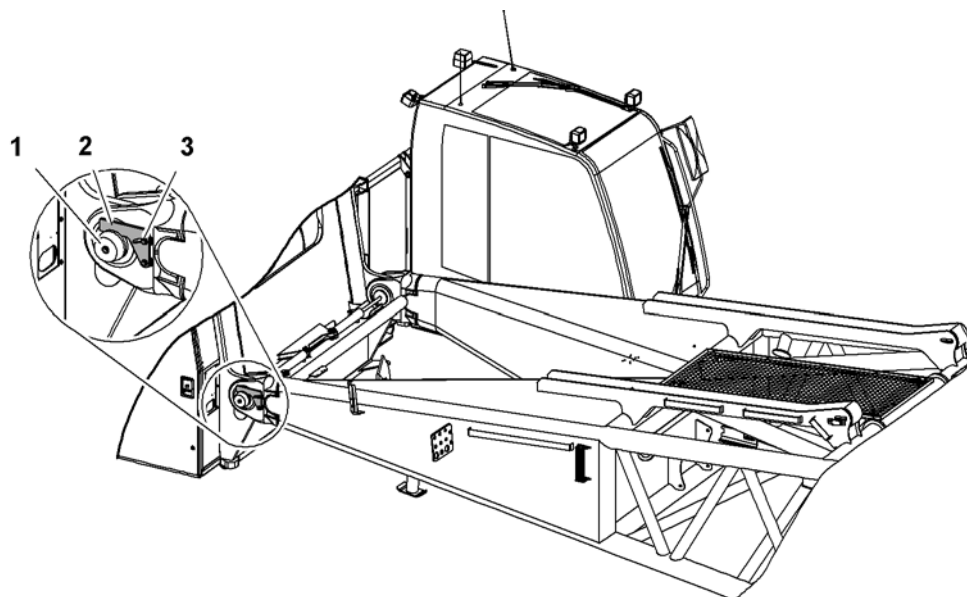


Fig. 1421 Securing the pin connection cylinder

- |   |                 |   |            |
|---|-----------------|---|------------|
| 1 | Pins (2x)       | 3 | Screw (2x) |
| 2 | Link plate (2x) |   |            |

- ▶ Swivel the link link plate 2 into the notch in the pin 1.
- ▶ Secure the link plate 2 with a screw 3.
- ▶ Repeat the procedure on the opposite side.
- ▶ Lower the boom base section to the ground or onto wooden blocks.
- ▶ Detach slings.
- ▶ Remove the assembly rigging from the assembly cylinder and stow it away.

### 7.5.13 Folding up the boom base section support feet



#### Note

- ▶ To make it easier to attach the main boom: fold up the support feet 1.

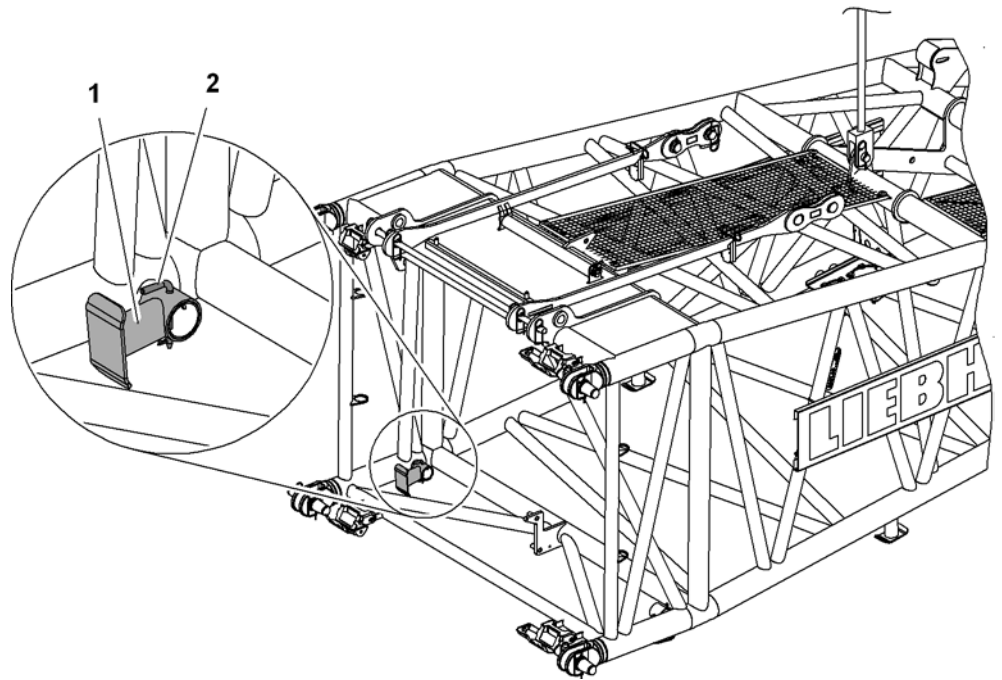


Fig. 1422 Folding up the support feet

1 Support feet

2 Pins and cotter pins

- ▶ Turn the front support feet 1 through 90 ° to the front and secure with pins and cotter pins 2.

### 7.5.14 Connecting hydraulic lines to the uppercarriage

Ensure that the following conditions are satisfied:

- Hand lever for the multi-coupling is available.
- Diesel engine is switched off.

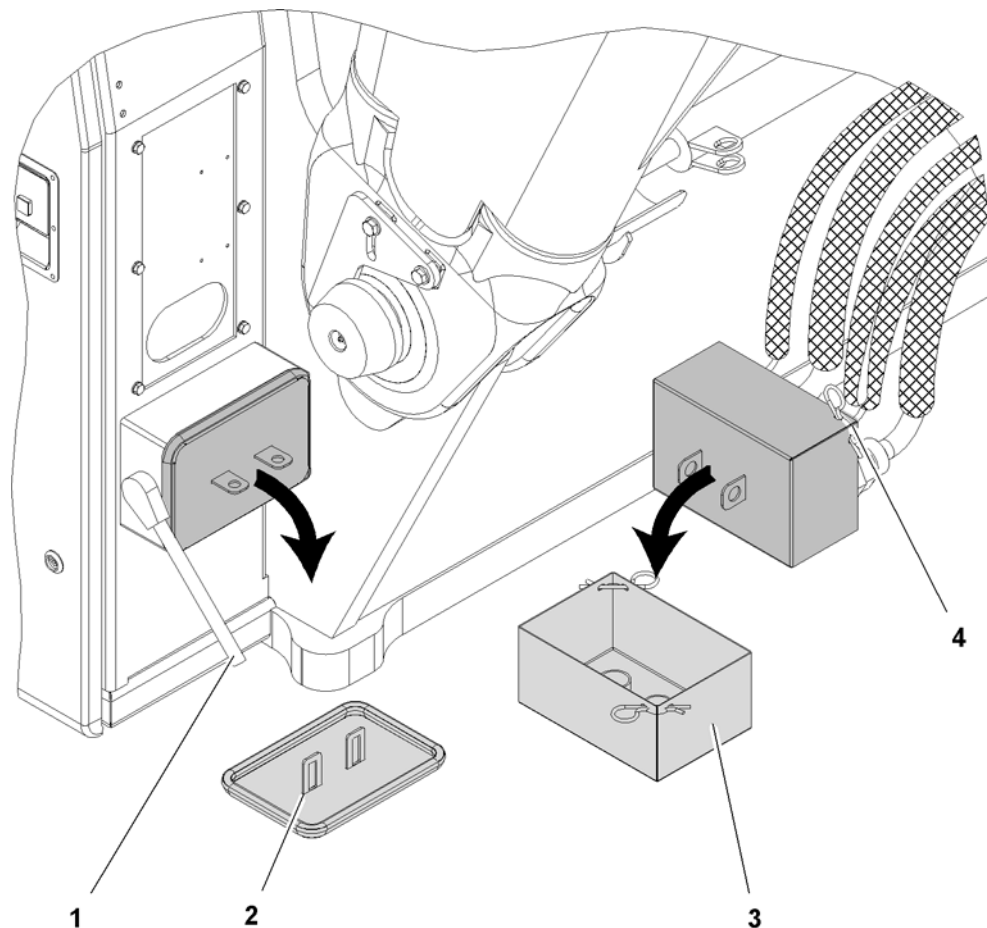


Fig. 1423 Removing the multi-coupling protective cover

- |   |                  |   |                  |
|---|------------------|---|------------------|
| 1 | Hand lever       | 3 | Protective cover |
| 2 | Protective cover | 4 | Safety pin       |

- ▶ Fit the hand lever 1 on the multi-coupling.
- ▶ Remove the safety pin 4 from the protective cover 3.
- ▶ Turn hand lever 1 in the direction indicated by the arrow.
  - ▷ The protective cover 2 is loose.
- ▶ Insert the two protective covers 2 + 3 in one another and secure with the safety pins 4.
- ▶ Stow the protective covers away.

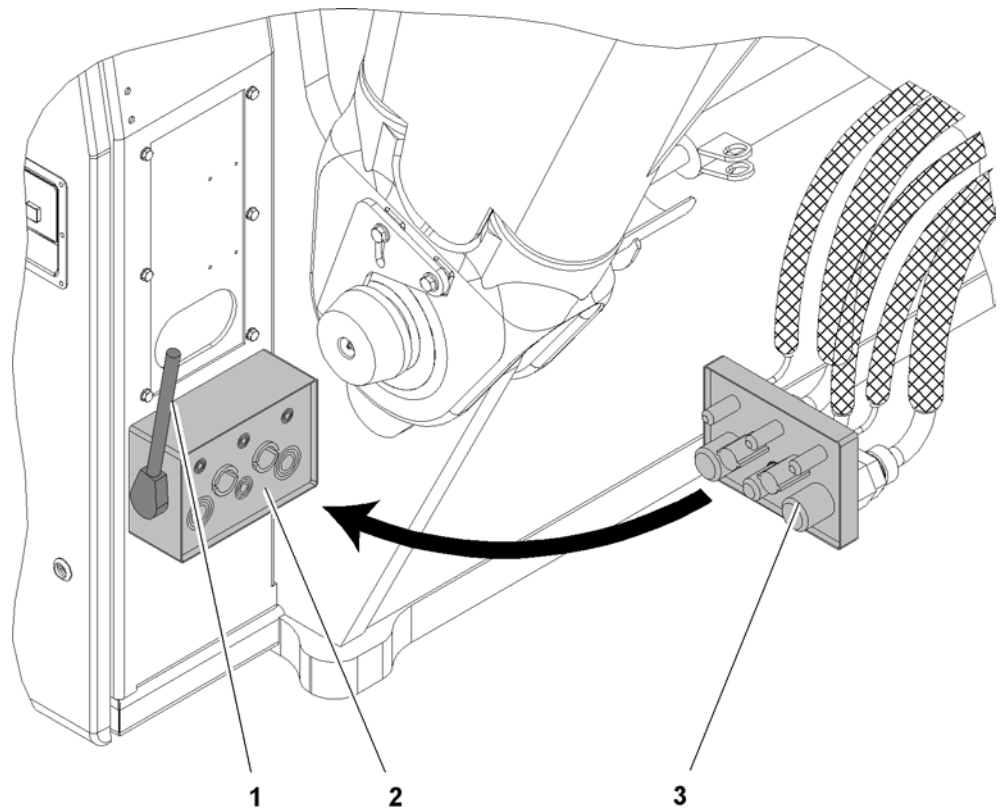


Fig. 1424 Connecting the multi-couplings

- |   |   |
|---|---|
| <p>1 Hand lever</p> <p>2 Multi-coupling (uppercarriage)</p> | <p>3 Multi-coupling (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 the hand lever until the lock engages.
  - ▷ The multi-couplings are visibly and audibly pulled together.
  - ▷ The multi-coupling indicating pins stick out:

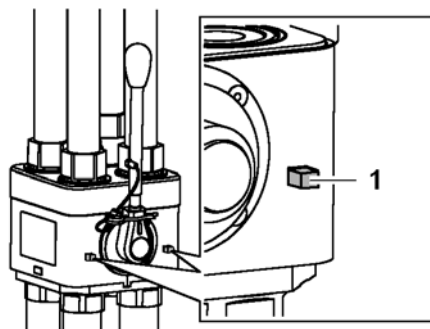


Fig. 1425 Locked multi-coupling

1 Indicating pins (2x)

► Disassemble the hand lever on the multi-coupling.

### 7.5.15 Connecting electric cables to the uppercarriage

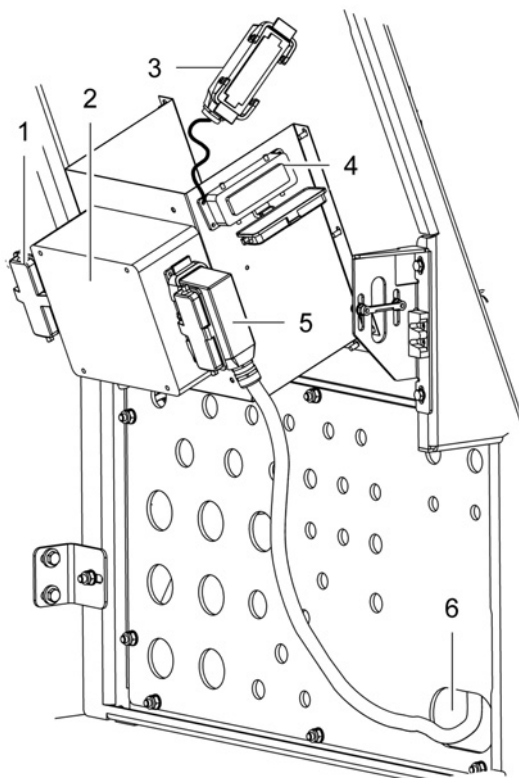


Fig. 1426 Connecting electric cables to the uppercarriage

1 Electric cables of the jib luffing winch and/or rope reeving winch

2 Electric box

3 Bypass plug

4 Dummy receptacle

5 Electric cables of the boom base section

6 Cable duct

► Open the front right side door.

- ▶ Plug the bypass plug **3** in the dummy receptacle **4** and secure it with the retaining clips.
- ▶ Guide the boom base section electric cables **5** through the cable duct **6**.
- ▶ Plug the electric cables **5** in the electric box **2** and secure it with the retaining clips.
- ▶ Guide the jib luffing winch electric cable **1** through the cable duct **6**.
- ▶ Plug the electric cables **1** in the electric box **2** and secure it with the retaining clips.

### 7.5.16 Connecting the assembly cylinder to the boom base section

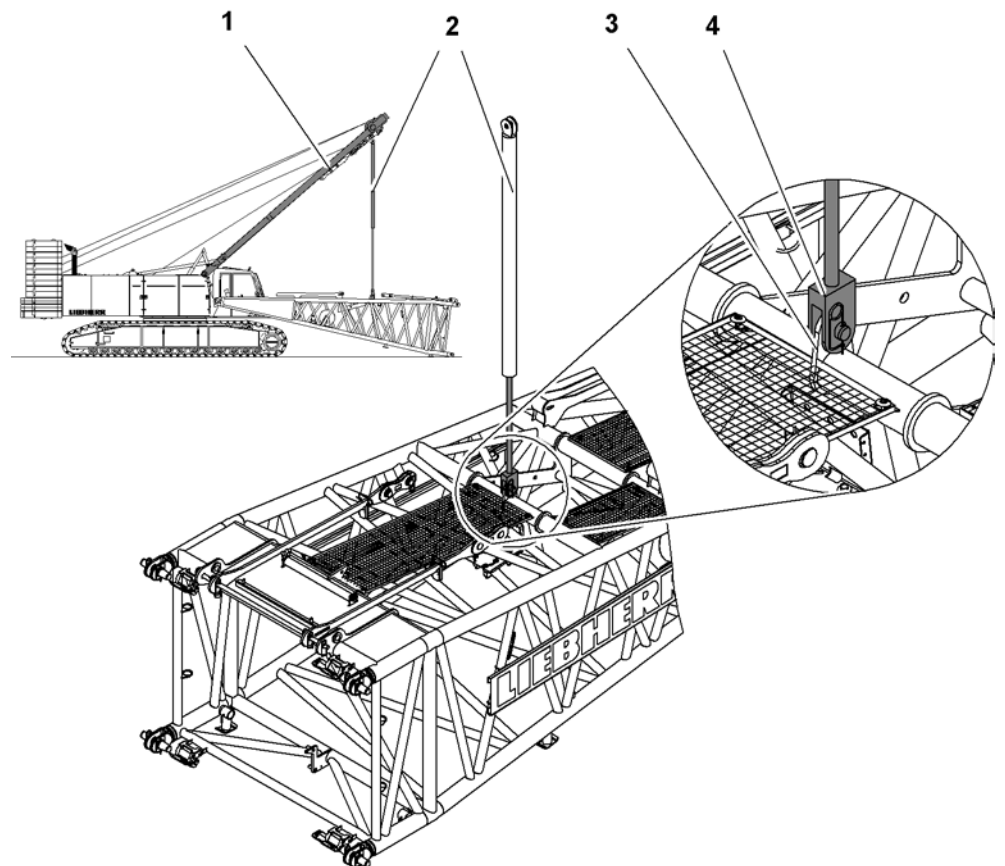


Fig. 1427 Bolting the assembly cylinder

- |                            |                            |
|----------------------------|----------------------------|
| <b>1</b> A-frame1          | <b>3</b> Boom base section |
| <b>2</b> Assembly cylinder | <b>4</b> Safety pin        |

- ▶ Unwind the boom winch.
  - ▷ A-frame **1** lowers.
- ▶ Extend the assembly cylinder **2** and bolt it to the boom base section **3**.
- ▶ Secure the pin with the safety pin **4**.
- ▶ Retract the assembly cylinder or wind up the boom winch.
  - ▷ The boom base section rises.

### 7.5.17 Bolting the boom base section to the main boom

Make sure that the two front support feet are folded up (LR1300 only).

- ▶ Maneuver the basic machine to the main boom.

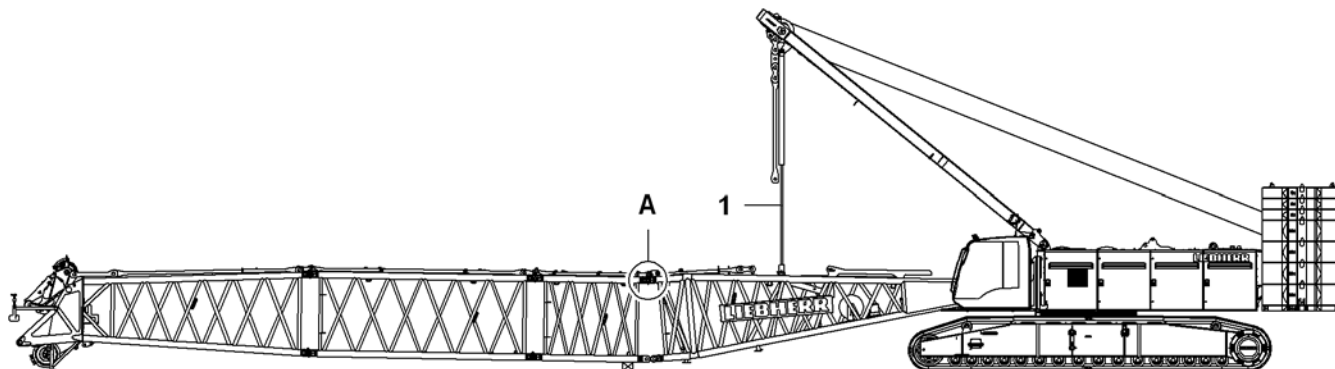


Fig. 1428 Bolting the boom base section to the main boom at the top

- |   |                   |   |                                 |
|---|-------------------|---|---------------------------------|
| 1 | Assembly cylinder | A | Upper pin connection point (2x) |
|---|-------------------|---|---------------------------------|

- ▶ Extend and retract assembly cylinders 1 until the upper pin connection points A of the main boom base section and the main boom match.
- ▶ Bolting the boom base section to the main boom on the upper pin connection points A.
- ▶ Secure the double-taper pins with washers and safety pins.

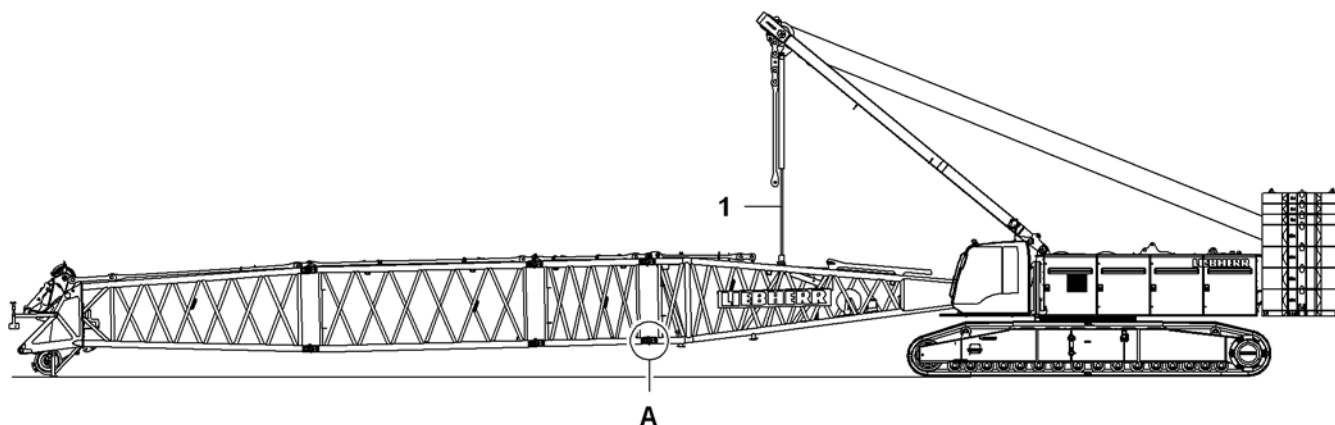


Fig. 1429 Bolting the boom base section to the main boom at the bottom

- |   |                   |   |                                 |
|---|-------------------|---|---------------------------------|
| 1 | Assembly cylinder | A | Lower pin connection point (2x) |
|---|-------------------|---|---------------------------------|

#### NOTICE

Unauthorised raising of main boom with assembly cylinder!  
Damage to the main boom and assembly cylinder.

- ▶ Exclusively retract the assembly cylinder 1 far enough to that the two lower pin connection points on the main boom base section can be bolted together.



- ▶ Retract assembly cylinders **1** until the lower pin connection points **A** of the main boom base section and the main boom match.
- ▶ Bolting the boom base section to the main boom on the lower pin connection points **A**.
- ▶ Secure the double-taper pins with washers and safety pins.
- ▶ Separate the assembly cylinder **1** from the boom base section.
- ▶ Retract assembly cylinder **1**.

### 7.5.18 Bolting the equalizer on A-frame 1 to the main boom pendant straps

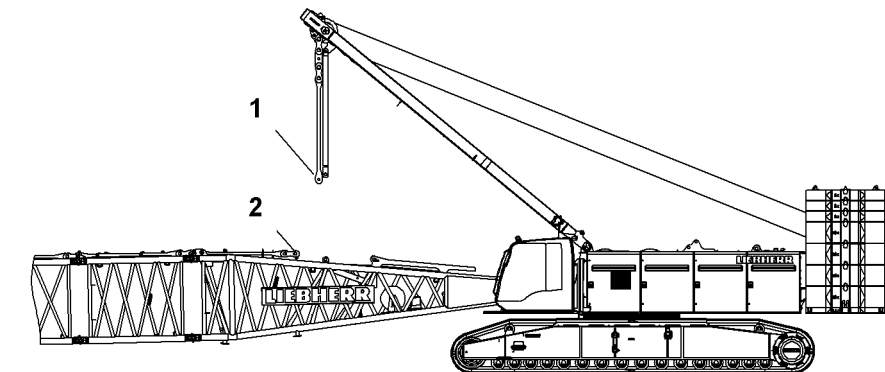


Fig. 1430 Bolting the equalizer on A-frame 1 to the main boom pendant straps

- |                              |                                   |
|------------------------------|-----------------------------------|
| <b>1</b> A-frame 1 equalizer | <b>2</b> Main boom pendant straps |
|------------------------------|-----------------------------------|

- ▶ Lower A-frame 1 until the equalizer of A-frame 1 **1** and the main boom pendant straps **2** can be bolted together.
- ▶ Bolting the equalizer on A-frame 1 **1** to the main boom pendant straps **2**.
- ▶ Secure the pins with washers and safety pins.

### 7.5.19 Attaching the auxiliary jib (79300 lb) to the boom head section

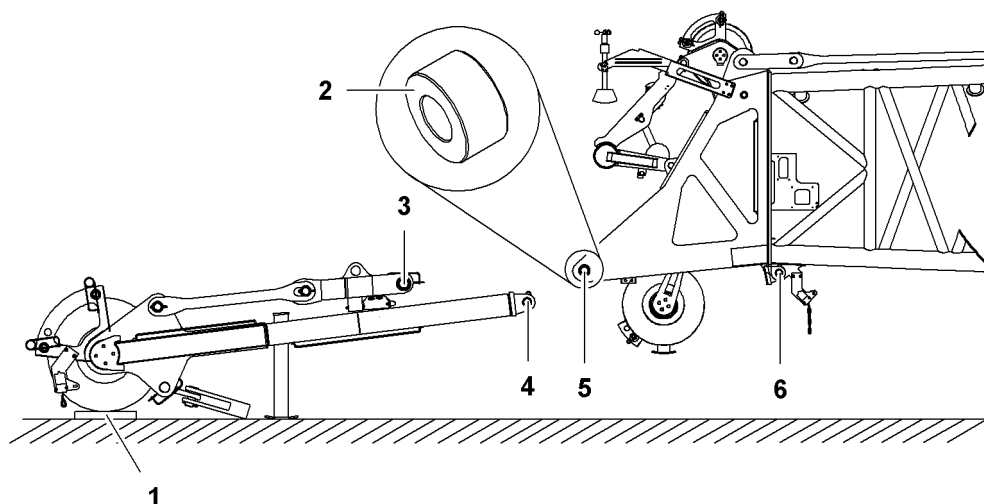


Fig. 1431 Positioning the auxiliary jib (79300 lb) in front of the boom head section and inserting bushes

1	Wooden block	4	Auxiliary jib lower pin connection point
2	Bushes (dia.3.15" in x Ø1.57" in x 1.69" in) (2x)	5	Boom head section upper pin connection point
3	Auxiliary jib upper pin connection point	6	Boom head section lower pin connection point

- ▶ Position the auxiliary jib in front of the boom head section.
- ▶ To protect the pulley: Lay a wooden block 1 under the auxiliary jib pulley.
- ▶ Insert bushes (dia.3.15" in x dia.1.57" in x 1.69" in) into the upper pin connection points of the boom head section.
- ▶ Lift the main boom and move it towards the auxiliary jib until the upper pin connection points on the auxiliary jib match those on the boom head section.

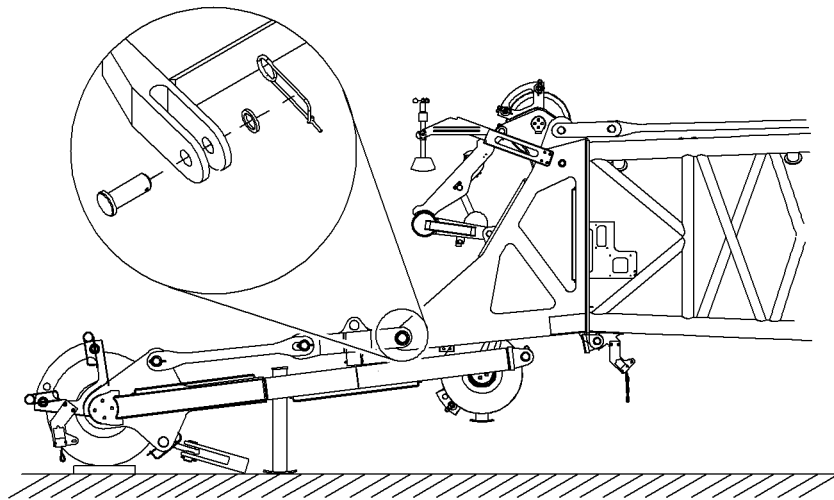


Fig. 1432 Pinning the upper pin connection points

- ▶ Pin the upper pin connection points and secure with washer and safety pin.

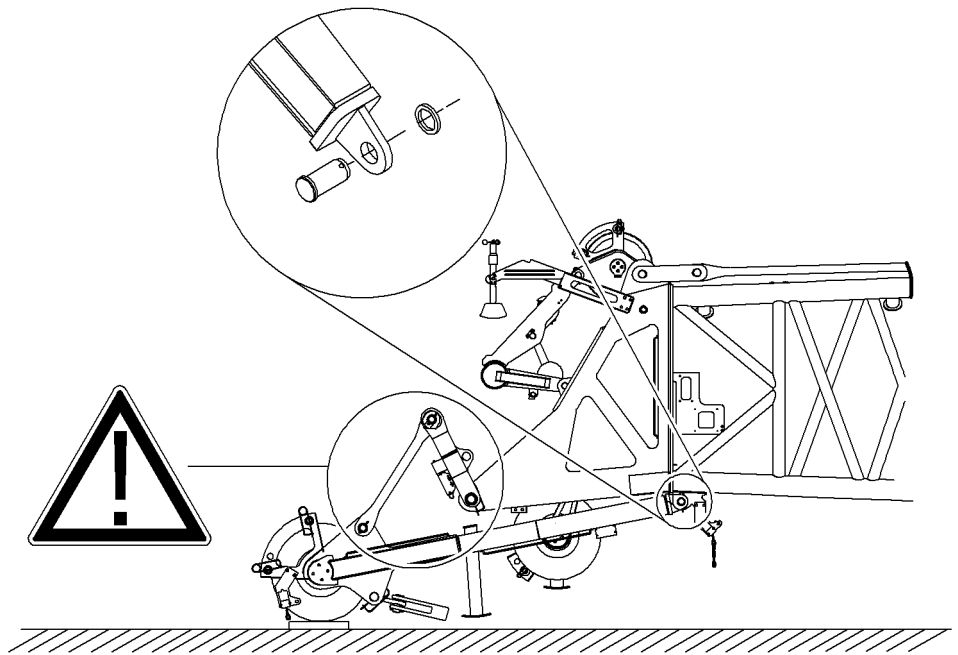


Fig. 1433 Pinning the lower pin connection points

**NOTICE**

Auxiliary jib pendant straps are positioned incorrectly!  
Risk of damage to pulleys on boom head section.

- ▶ Fold up auxiliary jib pendant straps.
- ▶ Move the main boom towards the auxiliary jib until the lower pin connection points on the auxiliary jib match the upper ones on the boom head section.

- ▶ Pin the lower pin connection points and secure with washer and safety pin.

### 7.5.20 Fitting the hoist limit switch to the auxiliary jib

The hoist limit switch is fitted to the auxiliary jib in exactly the same way as to the main boom or jib (For more information see: 7.5.28 Fitting the hoist limit switch, page 697) (For more information see: 7.12.19 Fitting the hoist limit switch, page 775) (For more information see: 7.15.24 Fitting the hoist limit switch, page 846)

#### 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.

### 7.5.21 Fold down the link plates for the 11th pulley

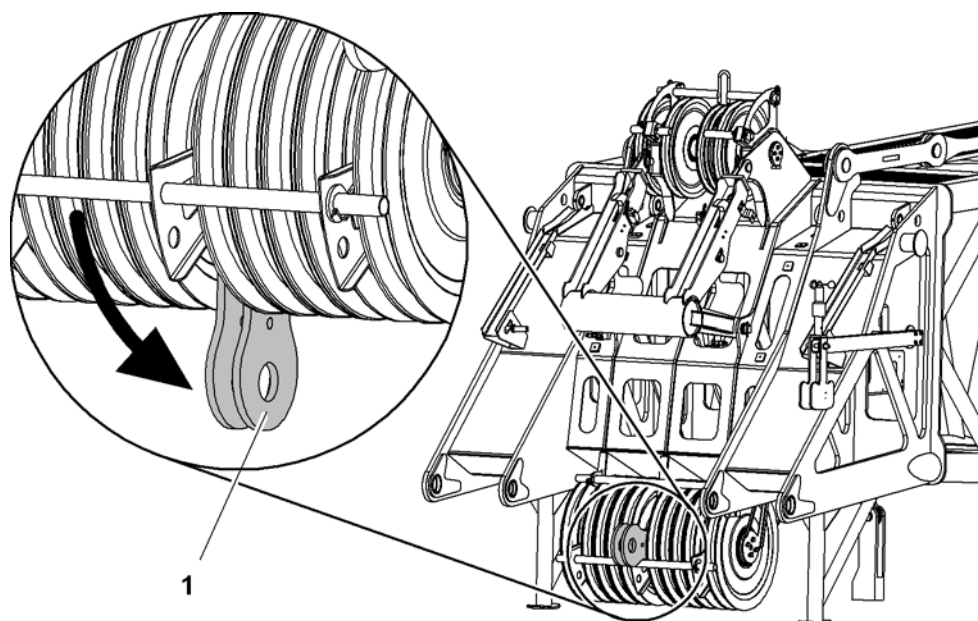


Fig. 1434 Fold down the link plates for the 11th pulley

- 1 Link plates for the 11th pulley on 2821 boom head section

#### NOTICE

If link plates for the 11th pulley on 2821 boom head section are positioned incorrectly:

Risk of damage to hoist rope on winch2.

- ▶ Fold down the link plates for the 11th pulley.

- ▶ Remove rope protection pipes from boom head section.
- ▶ Fold down the link plates for the 11th pulley.

### 7.5.22 Installing second pulley to 3-fold reeve the auxiliary jib (79300 lb)

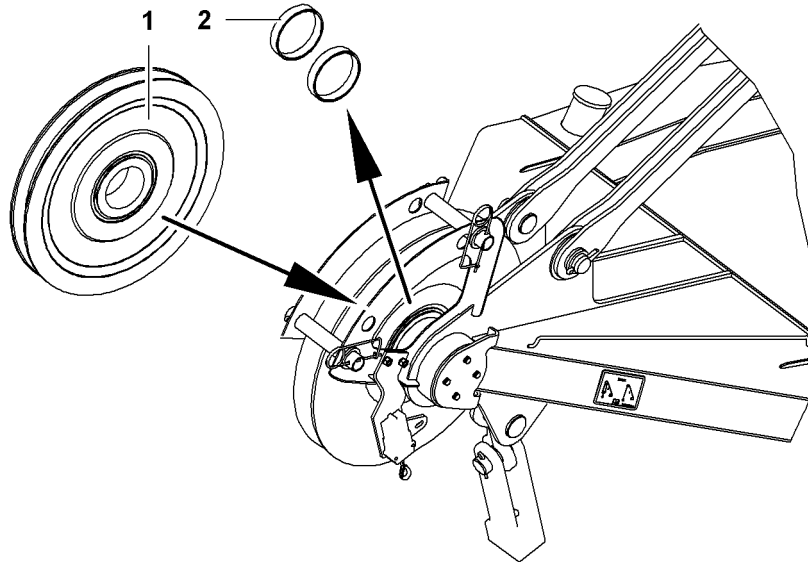


Fig. 1435 Installing second pulley to 3-fold reeve the auxiliary jib (79300 lb)

- |   |               |   |   |
|---|---------------|---|---|
| 1 | Second pulley | 2 | Bushes (dia.6.61" in x Ø5.51" in x 1.57" in) (2x) |
|---|---------------|---|---|

- ▶ Remove bushes (dia.6.61" in x dia.5.51" in x 1.57" in) 2
- ▶ Install second pulley

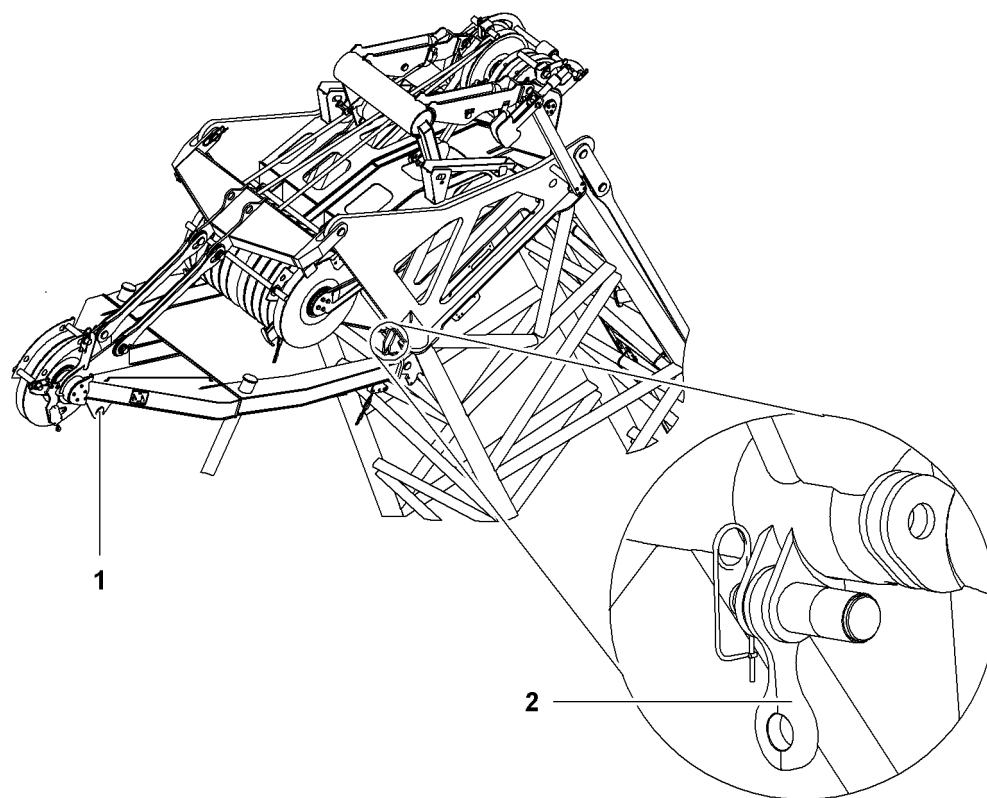


Fig. 1436 Pinning the cross strap to the boom head section

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 hoist rope on winch2.

- ▶ 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.

## 7.5.23 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 locking 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 locking pin to 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.

### 7.5.24 Fitting the helicopter warning light



#### Note

The use of helicopter warning lights is mandatory according to national and local regulations!

- ▶ Before using the machine, familiarise yourself with national and local regulations.

Ensure that the anemometer has not yet been fitted.

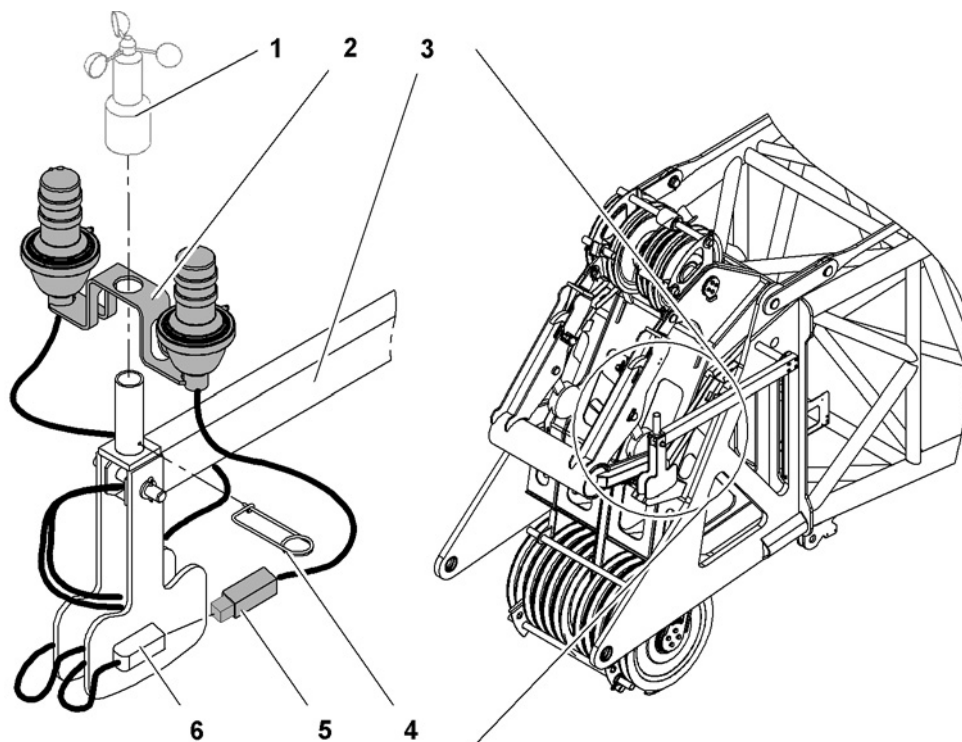


Fig. 1437 Fitting the helicopter warning light

- |   |                          |   |            |
|---|--------------------------|---|------------|
| 1 | Anemometer               | 4 | Safety pin |
| 2 | Helicopter warning light | 5 | Plug       |
| 3 | Mount                    | 6 | Coupling   |

- ▶ Place the helicopter warning light 2 on the tube.
  - ▷ The helicopter warning light locks into position on the pipe and axis on the mount 3.

#### NOTICE

Safety pin is not fit properly!  
Damage to the cable.

- ▶ Insert the safety pin carefully.
- 
- ▶ Insert the safety pin 4.
    - ▷ Helicopter warning light 2 is secured.
  - ▶ Connect the plug 5 to the coupling 6.
  - ▶ Lock the plug.



## 7.5.25 Fitting the anemometer

Ensure that the helicopter warning light (if available) is fitted.

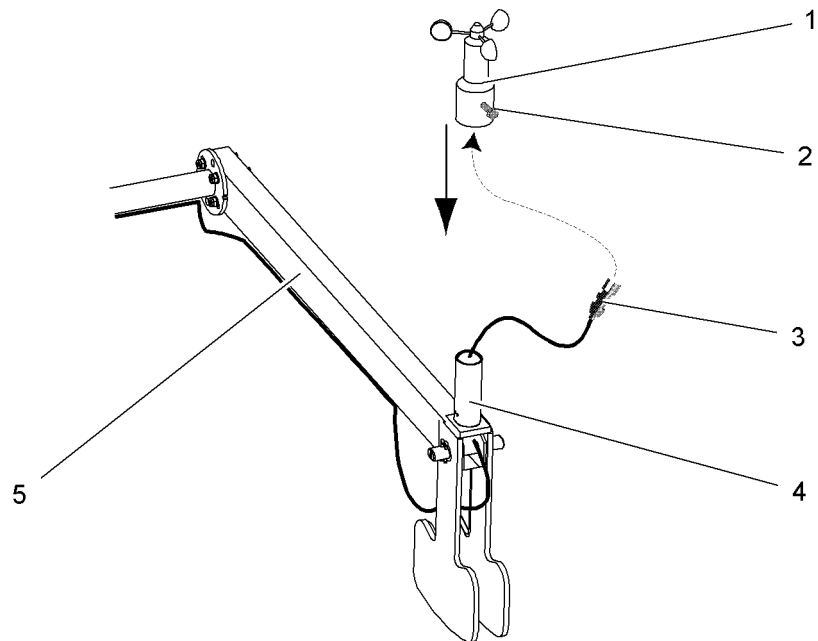


Fig. 1438 Fitting the anemometer

- |   |                    |   |       |
|---|--------------------|---|-------|
| 1 | Anemometer         | 4 | Tube  |
| 2 | Screw              | 5 | Mount |
| 3 | Circular connector |   |       |

- ▶ Remove the rubber protection cap from the circular connector 3.
- ▶ Connect the circular connector 3 to the anemometer 1 at the bottom.
- ▶ Fasten the circular connector 3 using the lock nut.

### NOTICE

Anemometer is not fit properly!  
Damage to the cable.

- ▶ Pull the cable present through the tube before pushing on the anemometer.

- ▶ Position the anemometer 1 on the tube 4.
- ▶ Secure the anemometer on the mount: tighten the screw 2 moderately.

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.

## 7.5.26 Attaching the rope fixing point



**DANGER**

Incorrect installation of pins and pocket lock!  
Load breakaway.

► Fit pins and pocket lock as instructed.

The pin shoulder and the pocket lock opening determine the fitting direction of the rope fixing point.

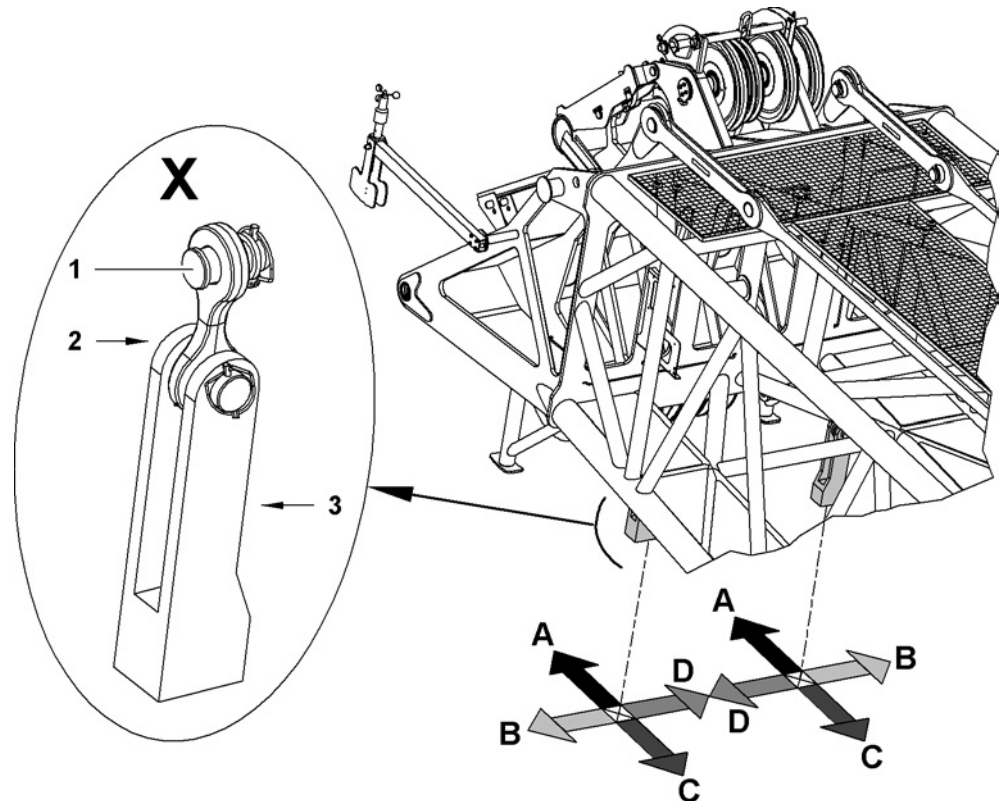


Fig. 1439 Schematic diagram for determining the fitting direction of the components needed for fitting the rope fixing point

- |   |                             |
|---|-----------------------------|
| <b>X</b> Components needed for fitting      | <b>A</b> Facing boom head   |
| <b>1</b> Shoulder of pin on the boom        | <b>B</b> Outside            |
| <b>2</b> Shoulder of pin on the pocket lock | <b>C</b> Facing the machine |
| <b>3</b> Pocket lock opening                | <b>D</b> Inside             |

Fitting direction of the components needed for fitting the rope fixing point			
	Shoulder of pin on the boom	Pin shoulder on the pocket lock	Pocket lock opening
ALL rope fixations	D	C	B
<b>Exceptions:</b>			
0906 fixed jib head section	B	C	B

Fitting direction of the components needed for fitting the rope fixing point			
	Shoulder of pin on the boom	Pin shoulder on the pocket lock	Pocket lock opening
1507 fixed jib head section	B	C	B

Tab. 267 Fitting direction of the components needed for fitting the rope fixing point



**WARNING**

Incorrectly fit swivels!

- ▶ Fit rope with no twists.
- ▶ Install the rope without swivels.

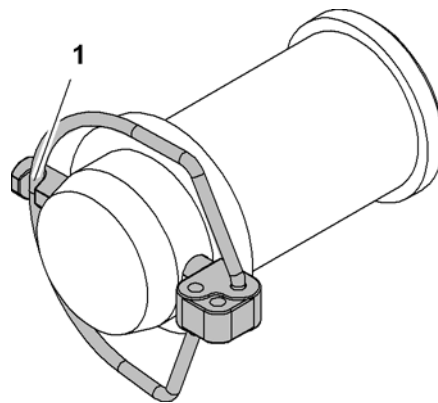


Fig. 1440 Linch pin

1 Linchpin latched



**DANGER**

Pins are not completely secure!  
Load breakaway.

- ▶ Ensure that the linchpin fasteners are properly latched.

**Rope fixing point on the boom head**

- ▶ Pin the cross strap on the boom head.
- ▶ Secure the pin with a washer and linchpin.
- ▶ Pin the pocket lock to the boom head cross strap.
- ▶ Secure pin with linchpin.

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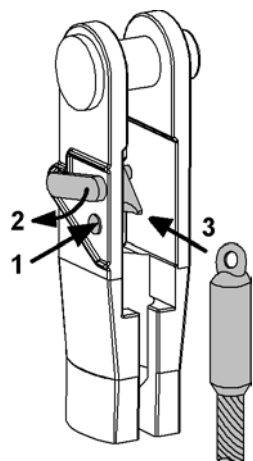


Fig. 1441 Fasten the rope termination in the pocket lock

- |   |               |   |                  |
|---|---------------|---|------------------|
| 1 | Safety button | 3 | Rope termination |
| 2 | Safety latch  |   |                  |

- ▶ Press the safety button **1**.
- ▶ Press and hold down the safety latch **2**.
- ▶ Insert the rope termination **3** into the pocket lock.



---

### **DANGER**

Rope termination not completely secure!  
Load breakaway.

- ▶ Ensure that the safety latch is engaged.
- 

- ▶ Release the safety latch.
  - ▷ The safety latch engages.

### **Rope fixing point on hook/pulley block**

- ▶ Pin the pocket lock to the hook/pulley block.
- ▶ Secure pin with linchpin.

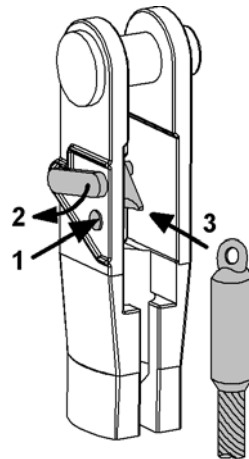


Fig. 1442 Fasten the rope termination in the pocket lock

- |  |                           |
|--|---------------------------|
| <p>1 Safety button</p> <p>2 Safety latch</p> | <p>3 Rope termination</p> |
|--|---------------------------|

- ▶ Press the safety button.
- ▶ Press and hold down the safety latch.
- ▶ Insert the rope termination into the pocket lock.



**DANGER**

Rope termination not completely secure!  
Load breakaway.

- ▶ Ensure that the safety latch is engaged.
- 
- ▶ Release the safety latch.
    - ▷ The safety latch engages.

### 7.5.27 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 from the boom.

- ▶ A fall arrest system must be worn when working on the boom to prevent falling.

**Reeving the rope using a rope reeving winch**

- ▶ Remove the rope protection pipes on the boom and the pulley block.
- ▶ Open up the rope guide (if present).
- ▶ Set the rope lug to free-wheel.
- ▶ Unwind the luffing rope and guide it through the pulleys.
- ▶ Pull the luffing rope under the boom to the boom head.
- ▶ Reeve the luffing rope according to the rope reeving system.

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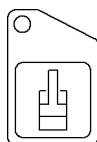
- ▶ Pull the luffing rope on the boom to the basic machine and connect to the hoist rope.
- ▶ Stop the free-wheel of the rope reeving winch.



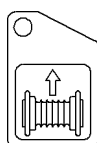
### WARNING

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.



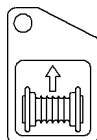
- ▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button on control panel X23.
  - ▷ Cylinder adjustment functions on.



- ▶ Press and hold down the *Rope reeving winch* button on control panel X11.
  - ▷ The rope reeving winch winds up the luffing rope and tensions the hoist rope.

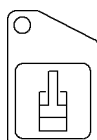
There must be no slacking of the rope when unwinding.

- ▶ Unwind the hoist rope as far as the rope fixing point.



- ▶ Press the *Rope reeving winch* button on control panel X11.
  - ▷ Rope reeving winch switched off.

- ▶ Detach the luffing rope from the hoisting rope.
- ▶ Switch the rope lug back on.
- ▶ Wind up the remaining luffing rope.
- ▶ Switch off the rope lug.



- ▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button again on control panel X23.
  - ▷ Cylinder adjustment functions switched off.

- ▶ Close and secure the rope guide (if present).
- ▶ Re-fit and secure the 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).

There must be no slacking of the rope when unwinding.

- ▶ Unwind the hoist rope and pull it to the boom head.
- ▶ Reeve the hoist rope according to the rope reeving system.
- ▶ Close and secure the rope guide (if present).
- ▶ Re-fit and secure the rope protection pipes.

## 7.5.28 Fitting the hoist limit switch

### NOTICE

The hoist limit switch weight has not been fitted properly!  
Risk of damage to the rope and the hoist limit switch weight.

- ▶ Fit the hoist limit switch weight with no diagonal pull.
- ▶ Always fit the hoist limit switch weight onto the inoperative hoist rope. The exception to this is in the event of single reeving.

### NOTICE

The chain on the hoist limit switch weight is too short!  
The hoist limit switch weight responds too late. The hook damages the boom head.

- ▶ Do not shorten the chain for the hoist limit switch weight.

The hoist limit switch with chain and hoist limit switch weight attached is secured to the inoperative end of the hoist rope.

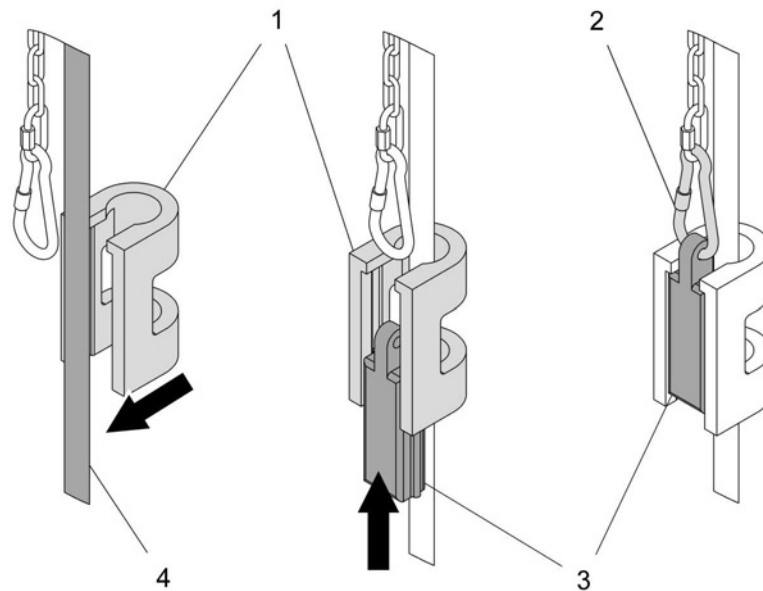


Fig. 1447 Fitting the hoist limit switch weight

- |   |                                     |   |                                   |
|---|-------------------------------------|---|-----------------------------------|
| 1 | Hoist limit switch weight (U shape) | 3 | Hoist limit switch weight (wedge) |
| 2 | Carabiner                           | 4 | Hoist rope                        |

- ▶ Route the hoist limit switch weight (U shape) 1 over the hoist rope 4.
- ▶ Insert the hoist limit switch weight (wedge) 3 from below into the hoist limit switch weight (U shape) 1.
- ▶ Attach the carabiner 2 to the hoist limit switch weight (wedge) 3.
- ▶ Attach the chain between the hoist limit switch weight and the hoist limit switch.

### 7.5.29 Bypass unused hoist limit switches.



#### DANGER

The hoist limit switch has been bypassed illegally!  
Load breakaway.

- ▶ Only ever bypass unused hoist limit switches.

#### NOTICE

Wrong hoist limit switch is bypassed!  
The hook damages the boom head.

- ▶ Lock winch 1 using the left hoist limit switch.
- ▶ Lock winch 2 using the right hoist limit switch.

Ensure that movement is made using only the one hoist rope, and that one hoist limit switch is not required.

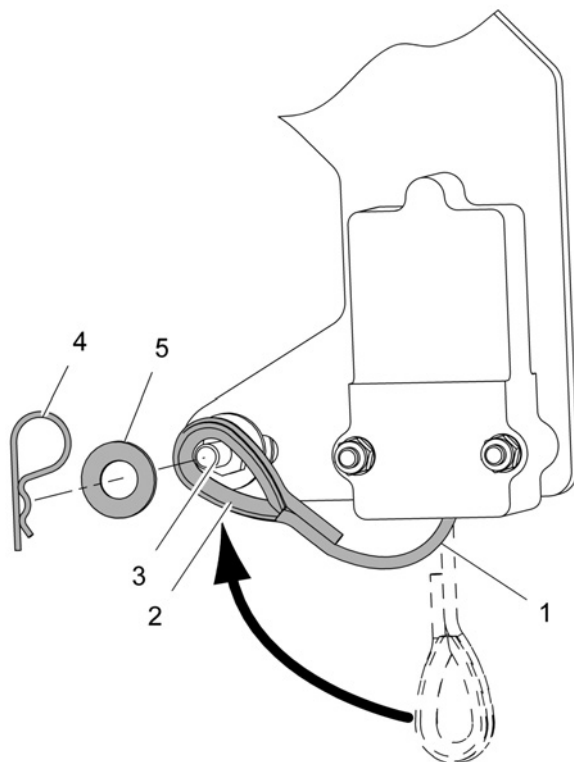


Fig. 1448 Bypassing the hoist limit switch mechanically

- |   |            |   |            |
|---|------------|---|------------|
| 1 | Steel rope | 4 | Safety pin |
| 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.
- ▶ Ensure the loop does not slip off the stud bolt by securing it with the washer 5 and safety pin 4.



### 7.5.30 Erecting the main boom



**DANGER**

Erectability chart is not followed!  
Machine toppling over.

- ▶ Only raise the boom when erection is permitted according to the erectability chart.

Ensure that the following conditions are satisfied:

- Boom configuration can be erected with counterweight.
- All work on the boom has been completed.
- No loose parts or tools have been left on the boom.



**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.

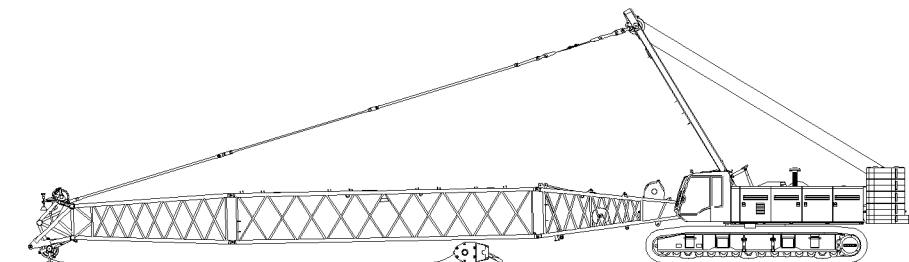


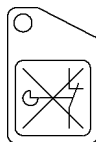
Fig. 1449 Boom on the ground



**DANGER**

Hoist limit switch bypassed on control panel X23 in crane operation!

- ▶ Only bypass hoist limit switch on control panel X23 when assembling or disassembling the machine.



When the hoist limit switch weight is lying on the ground:

- ▶ Press the *Bypass limit switch* button on control panel X23.
  - ▷ All hoist limit switches are bypassed.
- ▶ Slowly wind in the boom winch.
  - ▷ The main boom pendant straps are tensioned.

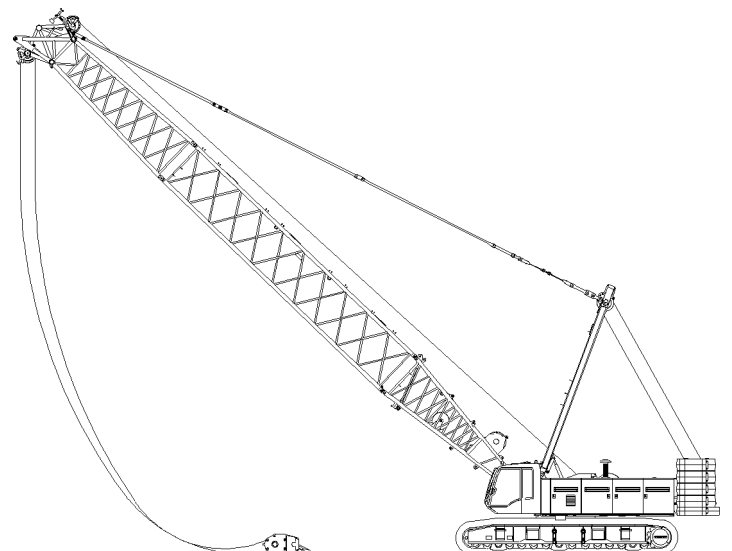


Fig. 1451 Boom raised



### WARNING

Dangerous voltage in main boom!  
Sudden sideways movement when lifting main boom from ground.

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.

- ▶ Wind up the boom winch further.
  - ▷ The main boom lifts off the ground.
  - ▷ The LML bar display on the monitor will show the current degree of capacity utilisation once the main boom angle has reached around 15 °.

### 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 hoist rope, if necessary.
  - ▷ The hook/pulley block remains on the ground.

When the maximum lifting capacity is at least equal to the weight of the hook and/or pulley block:

- ▶ Raise the hook/pulley block.

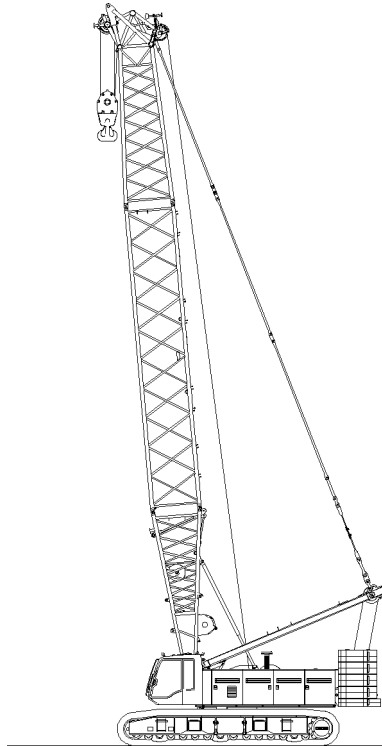


Fig. 1452 Boom erected

- ▶ Erect the boom until it is in the desired position.

### 7.5.31 Switching off assembly mode



#### **DANGER**

No safety cutout by the load moment limiter (LML) in assembly mode!  
Risk of machine toppling over, structural breakdown.

- ▶ Only use assembly mode for assembling and disassembling the machine.

Ensure that the following conditions are satisfied:

- The machine is fully assembled and erected.
- All limit switches are fitted and operational.



- ▶ Press the *Assembly mode* switch on the control panel X12.

- ▷ Assembly mode is turned off.
- ▷ The lamp in the switch goes out.
- ▷ The *Assembly mode* symbol disappears.



Fig. 1454 Assembly mode symbol

- ▶ Lock control panel X12 and remove the key.
- ▶ Ensure that the key is kept by an authorised person outside of the cab.

### 7.5.32 Checking the limit switch works

- ▶ Slowly approach the boom limit switch and hoist limit switch and check they are working correctly.

## 7.6 2821 main boom + 2821/2316 reducing piece

**System-relevant information** for 2821 main boom + 2821/2316 reducing piece:

- Configuration of main boom
  - Rope guide assembly position
  - Mid-point suspension assembly positions
- Lengths of mid-point suspensions
- Overview of 2821 main boom + 2821/2316 reducing piece pendant straps (LR1300 (steel pendant straps))
- Overview of 2821 main boom + 2821/2316 reducing piece pendant straps (LR1300 (carbon-fibre pendant straps))
- 2316 boom head section rope reeving systems (load position 1)

### 7.6.1 Configuration of main boom



**DANGER**

Erected length of main boom excessive!  
Structural breakdown.

- ▶ Check the main boom length in the load chart for validity.



**DANGER**

Installation of the reducing piece in a wrong assembly position!  
Structural breakdown.

- ▶ Only fit reducing piece at 141 ft, 151 ft or 180 ft.

**Assembly position of the reducing piece 141 ft**

Main boom length	Configuration of main boom (symbolic)
226 ft	
236 ft	
246 ft	
256 ft	
266 ft	
276 ft	
285 ft	
295 ft	

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# Assembly and dismantling

2821 main boom + 2821/2316 reducing piece

Assembly position of the reducing piece 141 ft	
Main boom length	Configuration of main boom (symbolic)
305 ft	
315 ft	
325 ft	
335 ft	
344 ft	
354 ft	
364 ft	
374 ft	
384 ft	
394 ft	
404 ft	

Tab. 268 Configuration of 2821 main boom + 2821/2316 reducing piece - assembly position of reducing piece 141 ft

**S** - Assembly position of rope guide

**X1** - Assembly position of mid-point suspension 1

**X2** - Assembly position of mid-point suspension 2

Assembly position of the reducing piece 151 ft	
Main boom length	Configuration of main boom (symbolic)
236 ft	
246 ft	
256 ft	
266 ft	
276 ft	

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Assembly position of the reducing piece 151 ft	
Main boom length	Configuration of main boom (symbolic)
285 ft	
295 ft	
305 ft	
315 ft	
325 ft	
335 ft	
344 ft	
354 ft	
364 ft	
374 ft	
384 ft	
394 ft	
404 ft	

Tab. 269 Configuration of 2821 main boom + 2821/2316 reducing piece - assembly position of reducing piece 151 ft

**S** - Assembly position of rope guide

**X1** - Assembly position of mid-point suspension 1

**X2** - Assembly position of mid-point suspension 2

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Assembly position of the reducing piece 180 ft	
Main boom length	Configuration of main boom (symbolic)
266 ft	
276 ft	
285 ft	

Assembly position of the reducing piece 180 ft	
Main boom length	Configuration of main boom (symbolic)
295 ft	
305 ft	
315 ft	
325 ft	
335 ft	
344 ft	
354 ft	
364 ft	
374 ft	
384 ft	
394 ft	

Tab. 270 Configuration of 2821 main boom + 2821/2316 reducing piece - assembly position of reducing piece 180 ft

- S** - Assembly position of rope guide
- X1** - Assembly position of mid-point suspension 1
- X2** - Assembly position of mid-point suspension 2

## 7.6.2 Lengths of mid-point suspensions

Assembly position of the reducing piece 141 ft		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
226 ft	4' 3" ft-in	
236 ft	5' 3" ft-in	
246 ft		2' 5" ft-in = 1' 9" ft-in + 7.87" in
256 ft		3' 1" ft-in = 2' 5" ft-in + 7.87" in

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Assembly position of the reducing piece 141 ft		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
266 ft	11' 2" ft-in = 6' 11" ft-in + 4' 3" ft-in	3' 1" ft-in = 2' 5" ft-in + 7.87" in
276 ft	12' 2" ft-in = 8' 6" ft-in + 3' 7" ft-in	3' 1" ft-in = 2' 5" ft-in + 7.87" in
285 ft	12' 2" ft-in = 8' 6" ft-in + 3' 7" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
295 ft	12' 2" ft-in = 8' 6" ft-in + 3' 7" ft-in	2' 5" ft-in = 1' 9" ft-in + 7.87" in
305 ft	12' 2" ft-in = 8' 6" ft-in + 3' 7" ft-in	2' 5" ft-in = 1' 9" ft-in + 7.87" in
315 ft	8' 10" ft-in = 5' 3" ft-in + 3' 7" ft-in	2' 5" ft-in = 1' 9" ft-in + 7.87" in
325 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
335 ft	12' 10" ft-in = 8' 6" ft-in + 4' 3" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
344 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
354 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
364 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
374 ft	13' 5" ft-in = 9' 10" ft-in + 3' 7" ft-in	5' 3" ft-in <sup>A)</sup>
384 ft	11' 2" ft-in = 6' 11" ft-in + 4' 3" ft-in	3' 1" ft-in = 2' 5" ft-in + 7.87" in
394 ft	11' 2" ft-in = 6' 11" ft-in + 4' 3" ft-in	3' 1" ft-in = 2' 5" ft-in + 7.87" in
404 ft	9' 6" ft-in = 5' 3" ft-in + 4' 3" ft-in	2' 5" ft-in = 1' 9" ft-in + 7.87" in

Tab. 271 Lengths of mid-point suspensions - 2821 main boom + 2821/2316 reducing piece - assembly position of reducing piece 141 ft

A) Backstay pendant

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Assembly position of the reducing piece 151 ft		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
236 ft	4' 3" ft-in	
246 ft	5' 3" ft-in	
256 ft	5' 3" ft-in	
266 ft	5' 3" ft-in	
276 ft	11' 2" ft-in = 6' 11" ft-in + 4' 3" ft-in	3' 1" ft-in = 2' 5" ft-in + 7.87" in
285 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	2' 5" ft-in = 1' 9" ft-in + 7.87" in
295 ft	12' 2" ft-in = 8' 6" ft-in + 3' 7" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
305 ft	12' 2" ft-in = 8' 6" ft-in + 3' 7" ft-in	2' 5" ft-in = 1' 9" ft-in + 7.87" in
315 ft	12' 2" ft-in = 8' 6" ft-in + 3' 7" ft-in	4' 3" ft-in <sup>A)</sup>
325 ft	8' 10" ft-in = 5' 3" ft-in + 3' 7" ft-in	2' ft-in = 1' 5" ft-in + 7.87" in
335 ft	8' 10" ft-in = 5' 3" ft-in + 3' 7" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
344 ft	9' 10" ft-in	2' ft-in = 1' 5" ft-in + 7.87" in
354 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
364 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
374 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	3' 1" ft-in = 2' 5" ft-in + 7.87" in
384 ft	11' 2" ft-in = 6' 11" ft-in + 4' 3" ft-in	3' 1" ft-in = 2' 5" ft-in + 7.87" in
394 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	2' 5" ft-in = 1' 9" ft-in + 7.87" in
404 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	2' 5" ft-in = 1' 9" ft-in + 7.87" in

Tab. 272 Lengths of mid-point suspensions - 2821 main boom + 2821/2316 reducing piece - assembly position of reducing piece 151 ft

A) Backstay pendant

Assembly position of the reducing piece 180 ft		
Main boom length	Backstay pendant (X1)	Backstay shackle (X2)
	Rope length	Shackle length
266 ft	6' 11" ft-in	
276 ft	8' 6" ft-in	
285 ft	12' 2" ft-in = 8' 6" ft-in + 3' 7" ft-in	2' ft-in = 1' 5" ft-in + 7.87" in
295 ft	12' 2" ft-in = 8' 6" ft-in + 3' 7" ft-in	2' 5" ft-in = 1' 9" ft-in + 7.87" in
305 ft	12' 2" ft-in = 8' 6" ft-in + 3' 7" ft-in	2' 5" ft-in = 1' 9" ft-in + 7.87" in
315 ft	13' 5" ft-in = 9' 10" ft-in + 3' 7" ft-in	2' 5" ft-in = 1' 9" ft-in + 7.87" in
325 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	3' 1" ft-in = 2' 5" ft-in + 7.87" in
335 ft	13' 5" ft-in = 9' 10" ft-in + 3' 7" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
344 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
354 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
364 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	3' 9" ft-in = 3' 1" ft-in + 7.87" in
374 ft	10' 6" ft-in = 6' 11" ft-in + 3' 7" ft-in	3' 1" ft-in = 2' 5" ft-in + 7.87" in
384 ft	11' 2" ft-in = 6' 11" ft-in + 4' 3" ft-in	3' 1" ft-in = 2' 5" ft-in + 7.87" in
394 ft	11' 2" ft-in = 6' 11" ft-in + 4' 3" ft-in	3' 1" ft-in = 2' 5" ft-in + 7.87" in

Tab. 273 Lengths of mid-point suspensions - 2821 main boom + 2821/2316 reducing piece - assembly position of reducing piece 180 ft

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### 7.6.3 Overview of 2821 main boom + 2821/2316 reducing piece pendant straps (LR1300 (steel pendant straps))

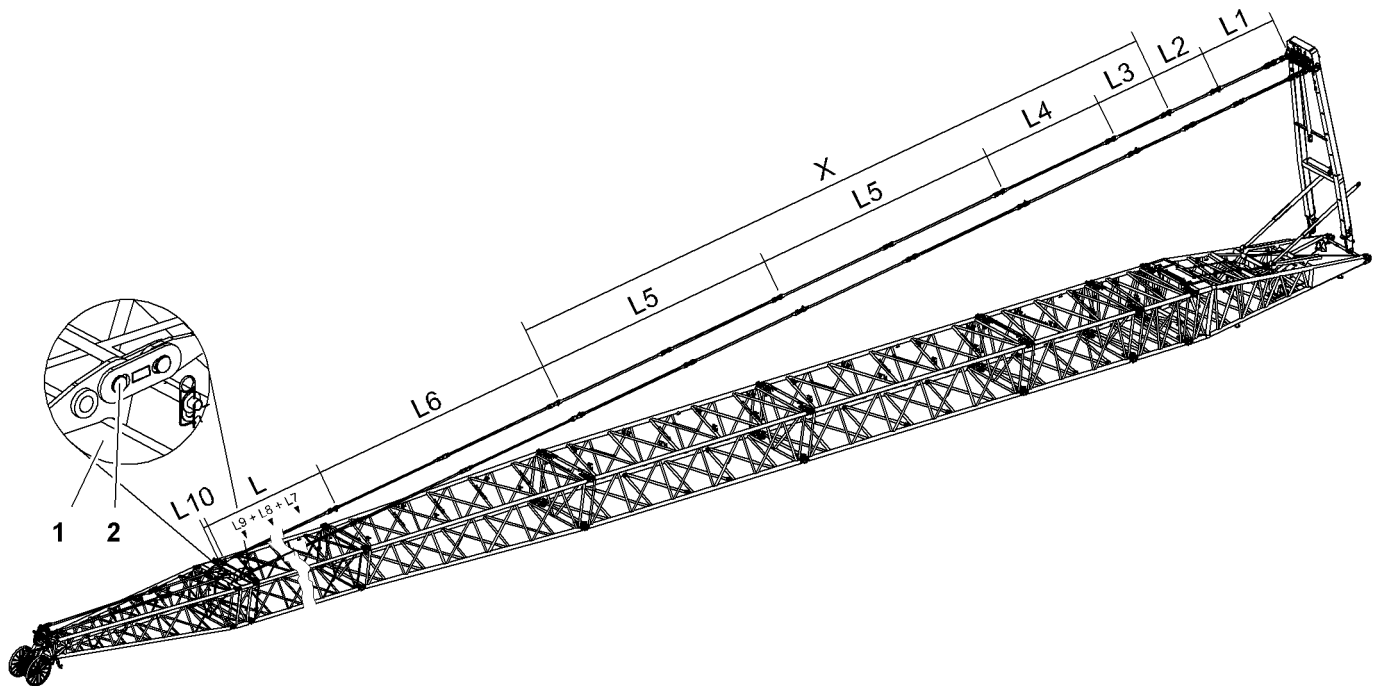


Fig. 1957 Overview of 2821 main boom + 2821/2316 reducing piece pendant straps (LR1300 (steel pendant straps))

- 1 2316 boom section 3 ft
- 2 Boom backstay straps pin connection point

#### A-frame 1 to 2316 boom head section pendant straps

Designation		Value	
L1	<b>A-frame 1 equalizer</b> (For more information see: A-frame 1 equalizer, page 151)	12' 3" ft-in	
L2	<b>Boom base section equalizer</b> (For more information see: Equalizer of 2821 boom base section, page 152)	8' 9" ft-in	
X	<b>Main boom pendant straps</b> consisting of:		
	L3	<b>Main boom pendant strap 10 ft</b> (For more information see: Main boom pendant strap 10 ft, page 152)	Total L3 +
	L4	<b>Main boom pendant strap 20 ft</b> (For more information see: Main boom pendant strap 20 ft, page 154)	Total L4 +
	L5	<b>Main boom pendant strap 40 ft</b> (For more information see: Main boom pendant strap 40 ft, page 156)	Total L5
L6	<b>Reducing piece pendant strap 40 ft</b> (For more information see: Reducing piece pendant strap 40 ft, page 158)	3' 11" ft-in	

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Designation		Value
L	Main boom pendant straps consisting of:	
	L7	Main boom pendant strap 10 ft (For more information see: Jib pendant strap 10 ft, page 179)
	L8	Main boom pendant strap 20 ft (For more information see: Jib pendant strap 20 ft, page 179)
	L9	Main boom pendant strap 40 ft (For more information see: Jib pendant strap 40 ft, page 180)
L10	Connecting link (For more information see: Connecting link, page 159)	1' 2" ft-in

Tab. 274 A-frame 1 to 2316 boom head section pendant straps

**Configuration of main boom pendant straps (X):**

Reducing piece assembly position	Configuration of main boom pendant straps (X)
141' 1" ft-in	$X = L3 + L4 + L5 + L5$
150' 11" ft-in	$X = L5 + L5 + L5$
180' 5" ft-in	$X = L3 + L4 + L5 + L5 + L5$

Tab. 275 Configuration of main boom pendant straps (X) depends on the reducing piece assembly position

**Configuration of main boom pendant straps (L):**

Required number of main boom pendant straps 10 ft (L7) is the same as the number of boom sections 10 ft.

Required number of main boom pendant straps 20 ft (L8) is the same as the number of boom sections 20 ft.

Required number of main boom pendant straps 40 ft (L9) is the same as the number of boom sections 40 ft.



**Note**

- ▶ Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the following tables: (For more information see: 7.6.1 Configuration of main boom, page 703) .

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### 7.6.4 Overview of 2821 main boom + 2821/2316 reducing piece pendant straps (LR1300 (carbon-fibre pendant straps))

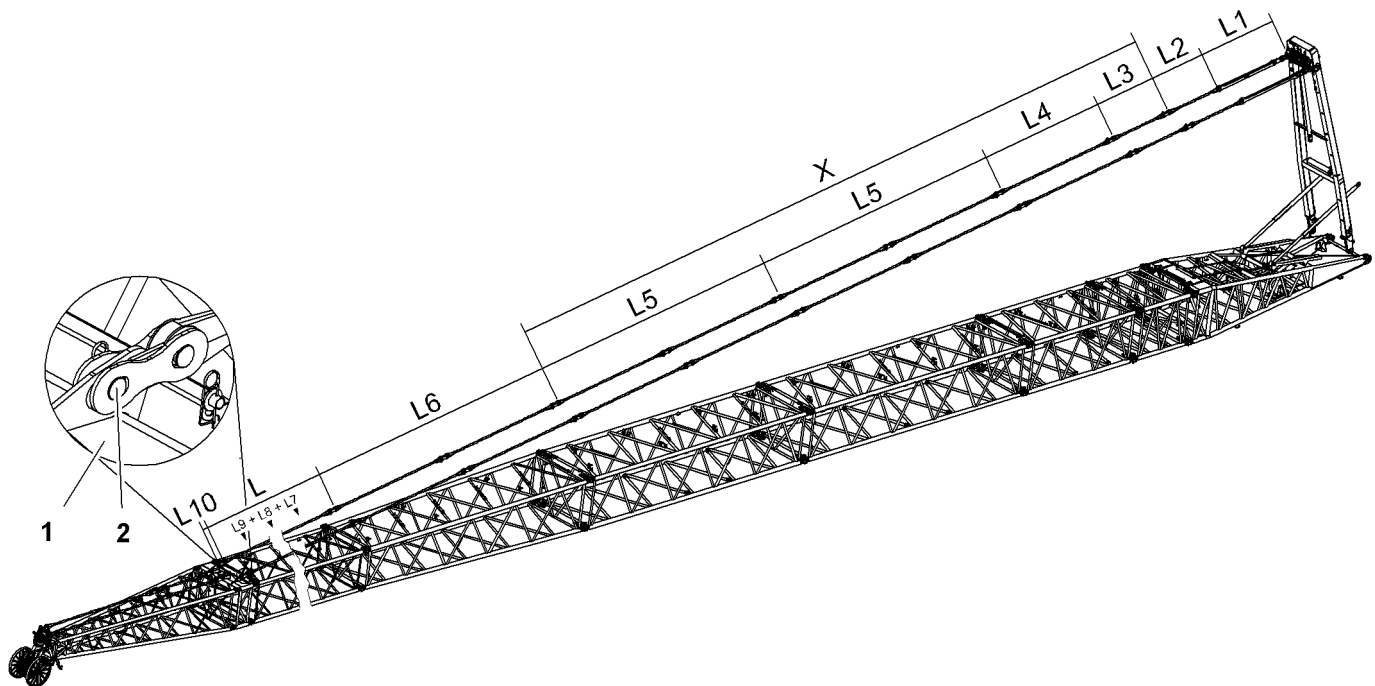


Fig. 1958 Overview of 2821 main boom + 2821/2316 reducing piece pendant straps (LR1300 (carbon-fibre pendant straps))

- 1 2316 boom section 3 ft
- 2 Boom backstay straps pin connection point

#### A-frame 1 to 2316 boom head section pendant straps

Designation		Value
L1	<b>A-frame 1 equalizer</b> (For more information see: <a href="#">A-frame 1 equalizer</a> , page 191)	12' 2" ft-in
L2	<b>Boom base section equalizer</b> (For more information see: <a href="#">Equalizer of 2821 boom base section</a> , page 192)	8' 10" ft-in
<b>Main boom pendant straps</b> consisting of:		
X	L3 <b>Main boom pendant strap 10 ft</b> (For more information see: <a href="#">Main boom pendant strap 10 ft</a> , page 193)	Total L3 +
	L4 <b>Main boom pendant strap 20 ft</b> (For more information see: <a href="#">Main boom pendant strap 20 ft</a> , page 196)	Total L4 +
	L5 <b>Main boom pendant strap 40 ft</b> (For more information see: <a href="#">Main boom pendant strap 40 ft</a> , page 199)	Total L5
L6	<b>Reducing piece pendant strap 40 ft</b> (For more information see: <a href="#">Reducing piece pendant strap 40 ft</a> , page 203)	3' 11" ft-in

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Designation		Value
L	Main boom pendant straps consisting of:	
	L7	Main boom pendant strap 10 ft (For more information see: Jib pendant strap 10 ft, page 208)
	L8	Main boom pendant strap 20 ft (For more information see: Jib pendant strap 20 ft, page 208)
	L9	Main boom pendant strap 40 ft (For more information see: Jib pendant strap 40 ft, page 209)
L10	Connecting link (For more information see: Connecting link, page 203)	1' 2" ft-in

Tab. 276 A-frame 1 to 2316 boom head section pendant straps

**Configuration of main boom pendant straps (X):**

Reducing piece assembly position	Configuration of main boom pendant straps (X)
141' 1" ft-in	$X = L3 + L4 + L5 + L5$
150' 11" ft-in	$X = L5 + L5 + L5$
180' 5" ft-in	$X = L3 + L4 + L5 + L5 + L5$

Tab. 277 Configuration of main boom pendant straps (X) depends on the reducing piece assembly position

**Configuration of main boom pendant straps (L):**

Required number of main boom pendant straps 10 ft (L7) is the same as the number of boom sections 10 ft.

Required number of main boom pendant straps 20 ft (L8) is the same as the number of boom sections 20 ft.

Required number of main boom pendant straps 40 ft (L9) is the same as the number of boom sections 40 ft.



**Note**

► Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the following tables: (For more information see: 7.6.1 Configuration of main boom, page 703) .

### 7.6.5 2316 boom head section rope reeving systems (load position 1)

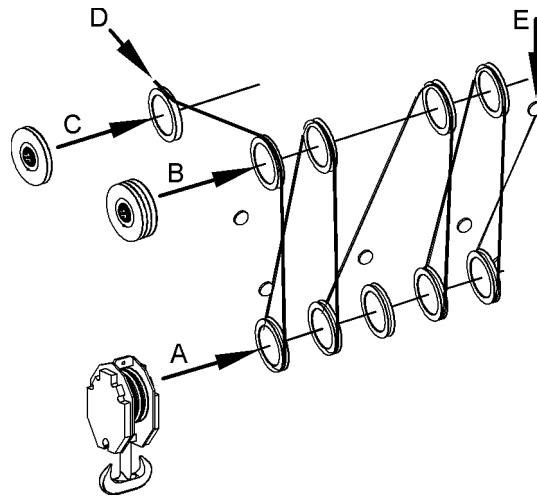


Fig. 1959 2316 boom head section rope reeving system (load position 1)

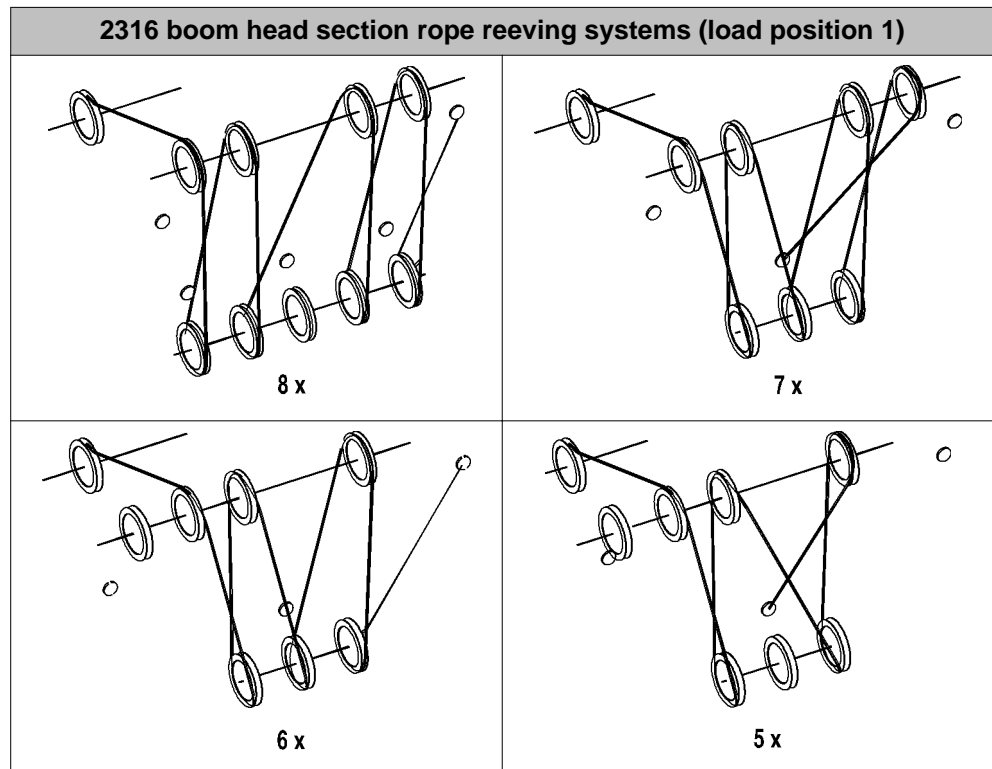
- |  |                             |
|--|-----------------------------|
| <b>A</b> Pulley block roller set         | <b>D</b> Winch 1 hoist rope |
| <b>B</b> Boom head section roller set    | <b>E</b> Rope fixation      |
| <b>C</b> Boom head section gantry pulley |                             |



**DANGER**

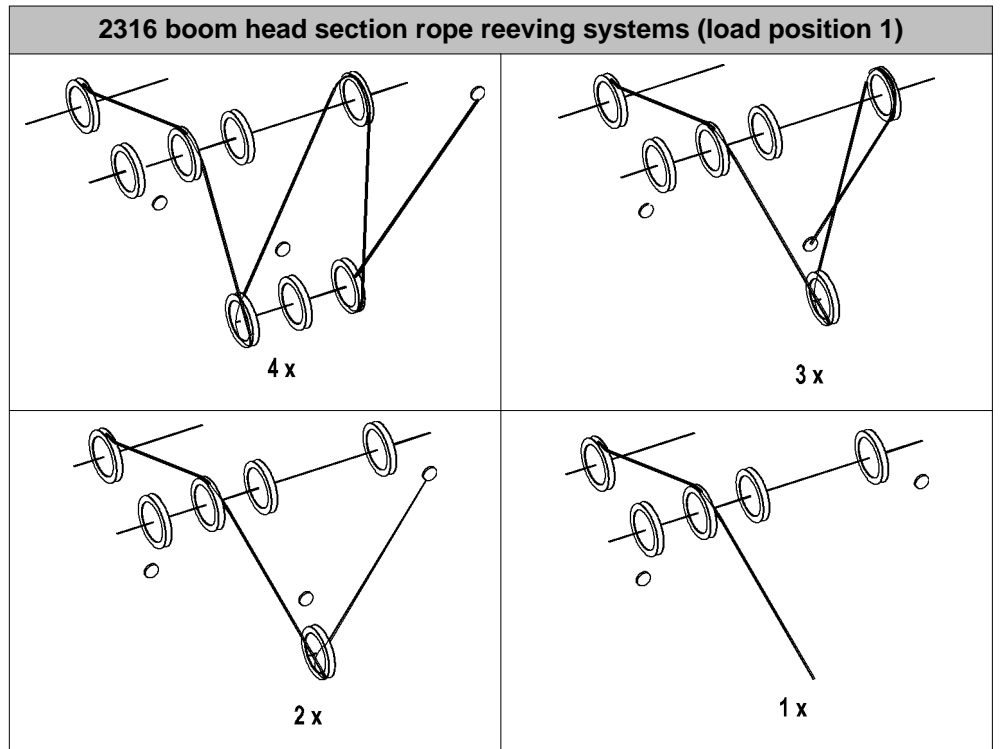
Incorrect number of reevings!  
Boom damage, machine toppling over.

- ▶ Choose the correct number of reevings as per the load chart.



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Tab. 278 2316 boom head section rope reeving systems (load position 1)

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# 7.7 Assembling the main boom + reducing piece

Ensure that the following conditions are satisfied:

- Assembly mode is selected.
- Rear and carbody counterweights are fitted according to load chart.
- 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.

## 7.7.1 Notes

The installation of the reducing piece described below applies to all sizes of reducing piece.

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.

## 7.7.2 Installing the reducing piece

The assembly stages are identical to those for the main boom without reducing piece. The following section contains information specifically for the installation of the reducing piece. The remaining operations are to be carried out as described previously in the main boom assembly section.



### **DANGER**

Installation of the reducing piece in a wrong assembly position!  
Structural breakdown.

- ▶ Only fit reducing piece at 141 ft, 151 ft or 180 ft.

- ▶ Install and bolt the reducing piece in the prescribed position.
- ▶ Bolt the reducing piece pendant straps to the main boom in the position of the reducing piece.



### **DANGER**

Incorrect assembly of the main boom!  
Structural breakdown.

If the 3 ft boom section is required according to the reducing piece's system-specific information:

- ▶ Install the 3 ft boom section between the boom head section and the last boom section.

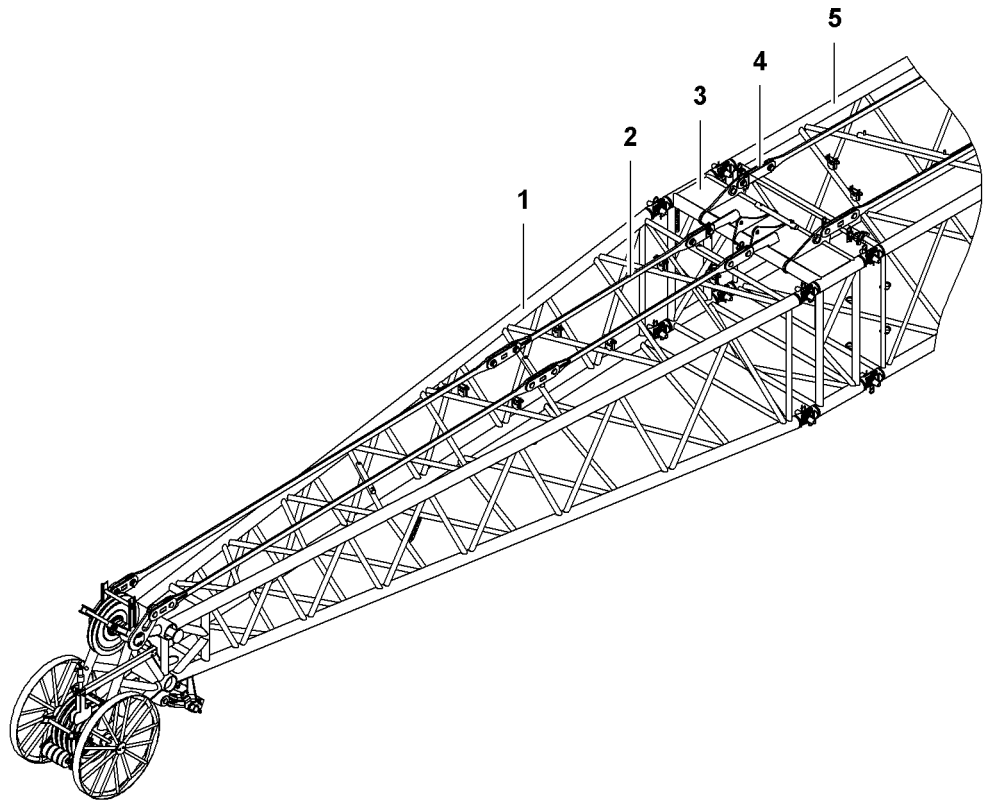


Fig. 1968 Install the 3 ft boom section

- |   |   |   |                          |
|---|---|---|--------------------------|
| 1 | Boom head section                             | 4 | Main boom pendant straps |
| 2 | Main boom pendant straps on boom head section | 5 | Main boom section        |
| 3 | Boom section 3 ft                             |   |                          |

If the 3 ft boom section **3** is required according to the reducing piece's system-specific information:

- ▶ Install the 3 ft boom section **3** between the boom head section **1** and the last boom section **5**.
- ▶ Bolt the main boom pendant straps **4** to the boom section 3 ft **3**.
- ▶ Bolt the main boom pendant straps **2** on the boom head section to the boom section 3 ft **3**.

## 7.7.3 Installing mid-point suspension

The mid-point suspension:

- reduces sagging of the boom.
- is mandatory above a predefined length.
- connects the boom to the pendant straps.
- is assembled from individual pendant ropes or backstay shackles
- is installed at a precisely defined location.

The lengths of the ropes and backstay shackles and their assembly positions are shown in the relevant instructions for the boom.



### DANGER

Incorrect installation of mid-point suspensions!  
Boom damage.

- ▶ Fit mid-point suspensions according to relevant system instructions.

The installation of mid-point suspension with pendant ropes is described in detail in "Assembling the main boom". (For more information see: [7.5.9 Installing mid-point suspension, page 668](#)) (For more information see: [7.15.17 Installing mid-point suspension, page 833](#))

The description below applies only to the installation of the mid-point suspension backstay shackles.

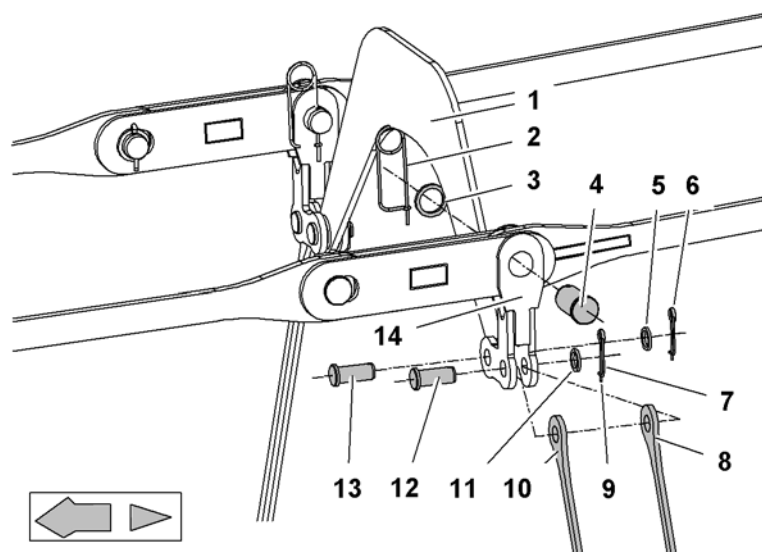


Fig. 1969 Pin the pendant straps, spacer bracket, connecting elements and mid-point suspension backstay shackles

- |   |                |    |                        |
|---|----------------|----|------------------------|
| 1 | Spacer bracket | 8  | Upper backstay shackle |
| 2 | Safety pin     | 9  | Safety pin             |
| 3 | Washer         | 10 | Upper backstay shackle |
| 4 | Pin            | 11 | Washer                 |
| 5 | Washer         | 12 | Pin                    |
| 6 | Safety pin     | 13 | Pin                    |
| 7 | Safety pin     | 14 | Connecting element     |

- ▶ Pin connecting element 14 and pendant strap.
- ▶ Secure the pin 4 with washer 3 and retaining spring 2.

- ▶ Pin connecting element 14 and spacer bracket 1.
- ▶ Secure the pin 13 with washer 5 and retaining spring 6.
- ▶ Pin connecting element 14 and upper backstay shackles 8 + 10.
- ▶ Secure the pin 12 with washer 11 and retaining spring 9.

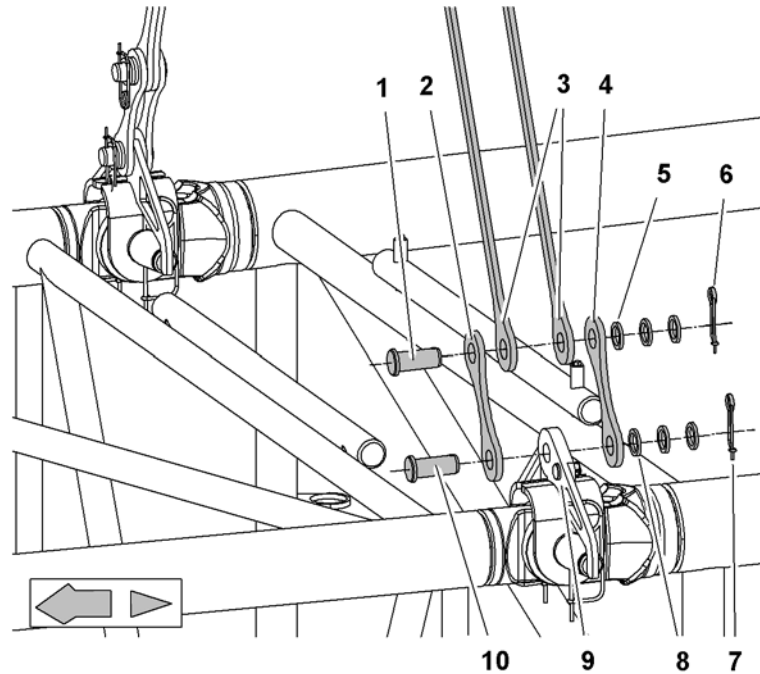


Fig. 1970 Fitting backstay shackles

- |   |                         |    |              |
|---|-------------------------|----|--------------|
| 1 | Pin                     | 6  | Safety pin   |
| 2 | Lower backstay shackle  | 7  | Safety pin   |
| 3 | Upper backstay shackles | 8  | Washers (3x) |
| 4 | Lower backstay shackle  | 9  | Fork         |
| 5 | Washers (3x)            | 10 | Pin          |



### Note

- ▶ To facilitate pinning of the lower backstay shackles 4 and fork 9: Use A-frame 1 to raise the pendant straps.

- ▶ Pin lower backstay shackles 2 + 4 to fork 9.
- ▶ Secure the pin 10 with washers 8 and a safety pin 7.
- ▶ Pin upper backstay shackles 3 to lower backstay shackles 2 + 4.
- ▶ Secure the pin 1 with washers 5 and a safety pin 6.

## 7.8 1713 fixed jib

**System-relevant information** for 1713 fixed jib:

- Configuration of jib
- Configuration of main boom
- Overview of pendant straps on 1713 fixed jib (LR1300 (steel/carbon-fibre pendant straps))
- 1713 jib head section rope reeving systems (load position 1)
- 2821 boom head section rope reeving systems (load position 2)

### 7.8.1 Configuration of jib



**DANGER**

Incorrect jib length assembled!  
Structural breakdown.

- ▶ Check the jib length in the load chart for validity.

Jib length	Configuration of jib (symbolic)
46 ft	
56 ft	
66 ft	
75 ft	
85 ft	
95 ft	
105 ft	
115 ft	

Tab. 279 Configuration of 1713 fixed jib

### 7.8.2 Configuration of main boom



**DANGER**

Erected length of main boom excessive!  
Structural breakdown.

- ▶ Check the main boom length in the 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: 7.4.1 Configuration of main boom, page 645) .

**7.8.3 Overview of pendant straps on 1713 fixed jib (LR1300 (steel/carbon-fibre pendant straps))**

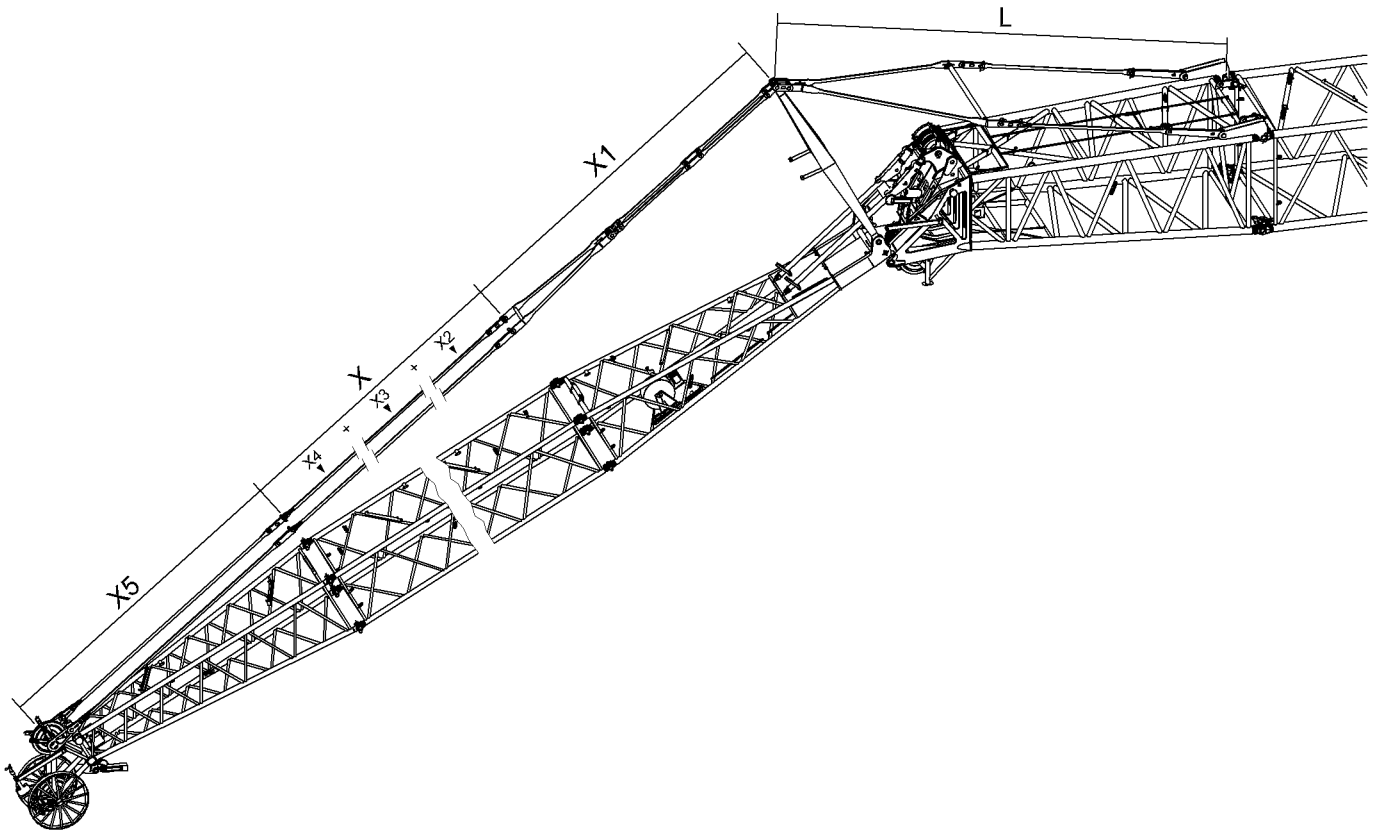


Fig. 1999 Overview of pendant straps on 1713 fixed jib (LR1300 (steel/carbon-fibre pendant straps))

**A-frame 2 to 2821 boom head section backstay straps**

Designation		Value
L	<b>Equalizer on A-frame 2 (jib backstay strap)</b> (For more information see: Equalizer on A-frame 2 (jib backstay strap), page 159)	at 30°
		32' 10" ft-in
		at 15°
		29' 10" ft-in

Tab. 280 A-frame 2 to 2821 boom head section backstay straps

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## A-frame 2 to 1713 jib head section pendant straps

Designation		Value
X1	<b>Equalizer on A-frame 2 (jib pendant strap)</b> (For more information see: <a href="#">Equalizer on A-frame 2 (jib pendant strap), page 161</a> )	23' 10" ft-in
X	<b>Jib pendant straps</b> consisting of:	Total X2 + Total X3 + Total X4
	X2 <b>Jib pendant strap 10 ft</b> (For more information see: <a href="#">Jib pendant strap 10 ft, page 162</a> )	
	X3 <b>Jib pendant strap 20 ft</b> (For more information see: <a href="#">Jib pendant strap 20 ft, page 162</a> )	
X4	<b>Jib pendant strap 40 ft</b> (For more information see: <a href="#">Jib pendant strap 40 ft, page 163</a> )	
X5	<b>Jib pendant strap on 1713 jib head section</b> (For more information see: <a href="#">Jib pendant strap on 1713 jib head section, page 164</a> )	21' 4" ft-in

Tab. 281 A-frame 2 to 1713 jib head section pendant straps

### Configuration of jib pendant straps (X):

Required number of jib pendant straps 10 ft (X2) is the same as the number of jib sections 10 ft.

Required number of jib pendant straps 20 ft (X3) is the same as the number of jib sections 20 ft.

Required number of jib pendant straps 40 ft (X4) is the same as the number of jib sections 40 ft.



### Note

► Permitted number of jib sections 10 ft, 20 ft, 40 ft can be found in the following table: ([For more information see: 7.4.1 Configuration of main boom, page 645](#))



### 7.8.4 Run of the rope when two ropes pass over the jib head section

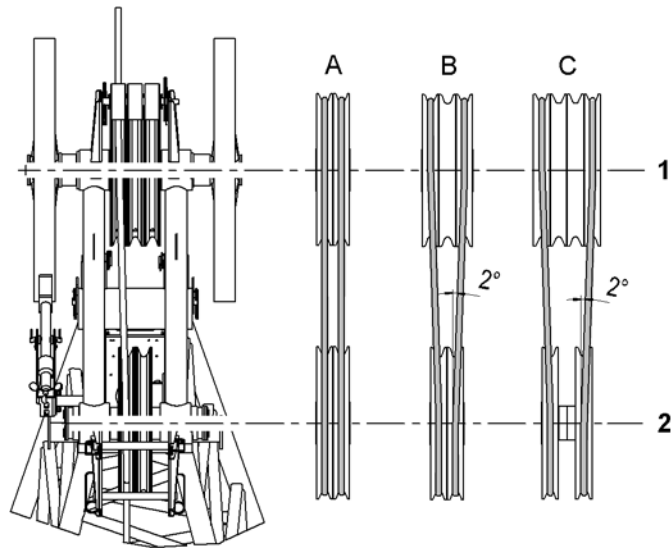


Fig. 2000 Run of the rope when two ropes pass over the jib head section

- 1 Jib head section roller set                      2 Jib head section gantry pulleys

Run of the rope	Jib type
<b>A</b>	1008 luffing jib
	1309 luffing jib
<b>B</b>	Luffing or fixed jib 1713
	1916 luffing jib
<b>C</b>	2316 luffing jib

Tab. 282 Run of the rope when two ropes pass over the jib head section

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### 7.8.5 1713 jib head section rope reeving systems (load position 1)

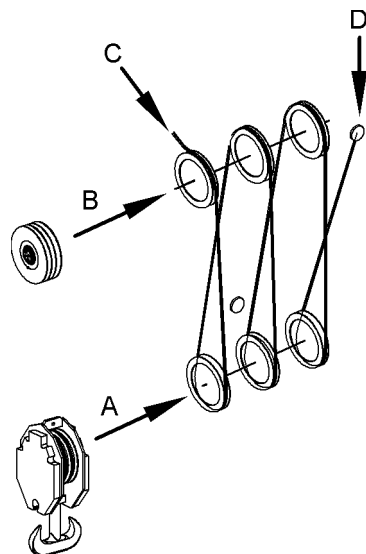


Fig. 2001 1713 jib head section rope reeving system (load position 1)

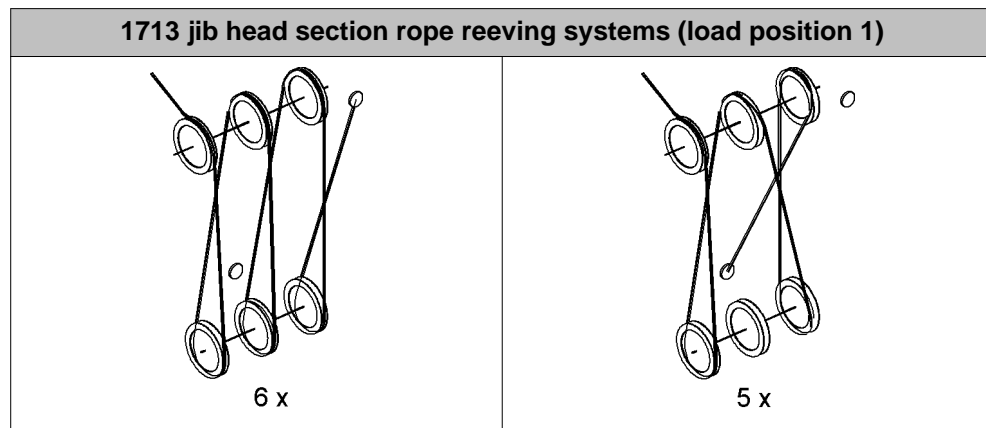
- |   |                             |   |                    |
|---|-----------------------------|---|--------------------|
| A | Pulley block roller set     | C | Winch 1 hoist rope |
| B | Jib head section roller set | D | Rope fixation      |

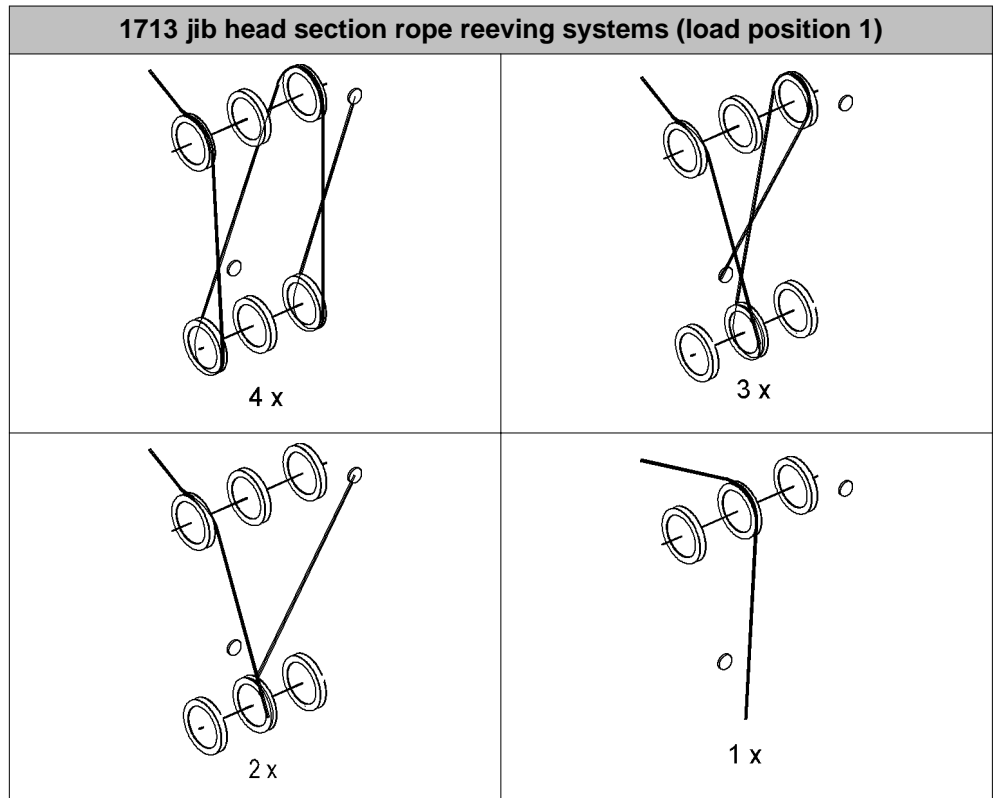


**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

► Choose the correct number of reevings as per the load chart.





Tab. 283 1713 jib head section rope reeving systems (load position 1)

### 7.8.6 2821 boom head section rope reeving systems (load position 2)

If the main boom with jib attached is used to hoist a load, then the 2821 boom head section should be reeved as shown below.

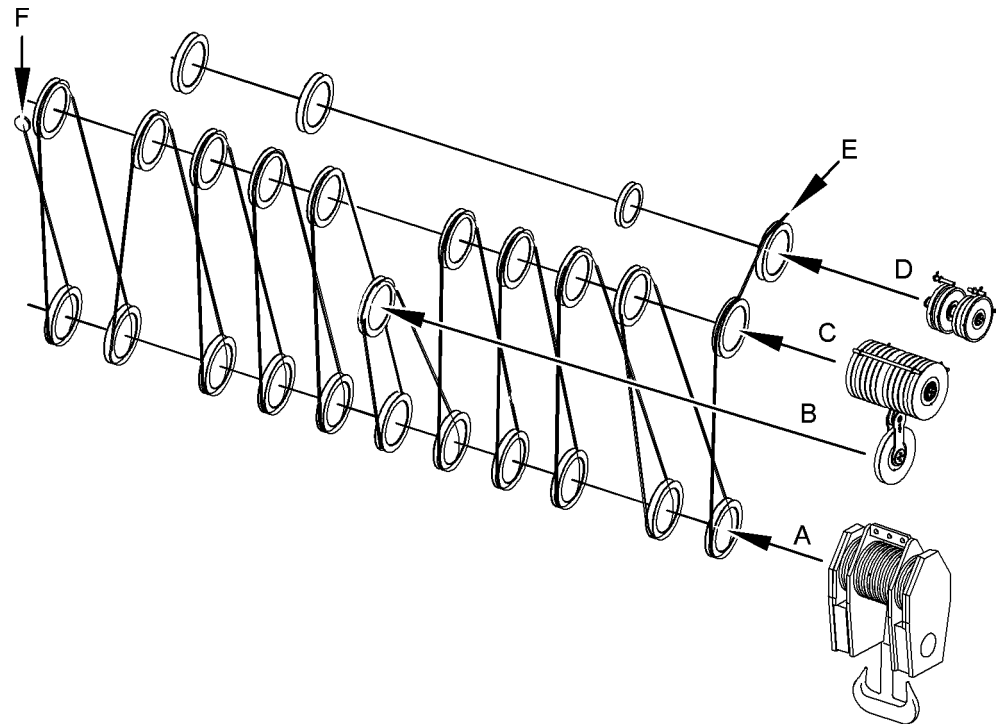


Fig. 2008 2821 boom head section rope reeving system (load position 2)

- |   |   |
|---|---|
| <b>A</b> Pulley block roller set              | <b>D</b> Boom head section gantry pulleys |
| <b>B</b> 11th pulley on the boom head section | <b>E</b> Winch 2 hoist rope               |
| <b>C</b> Boom head section roller set         | <b>F</b> Rope fixation                    |

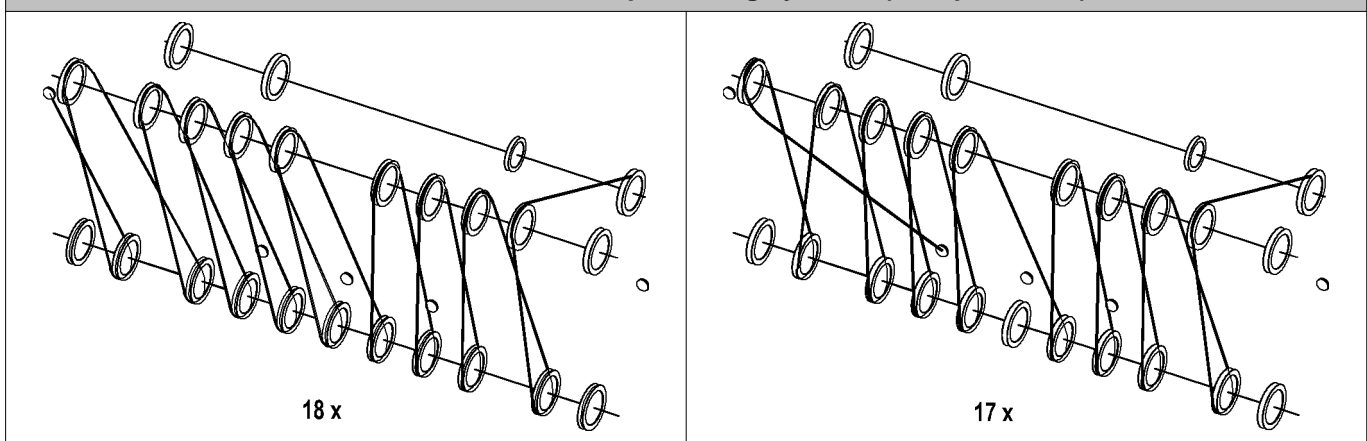


**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

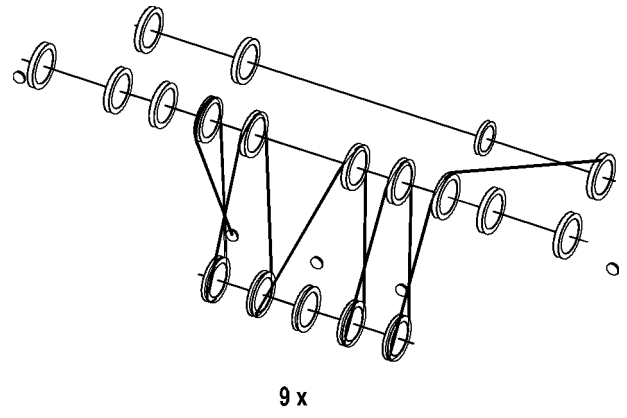
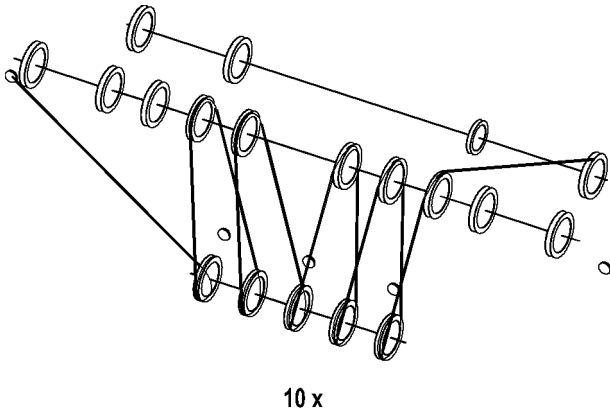
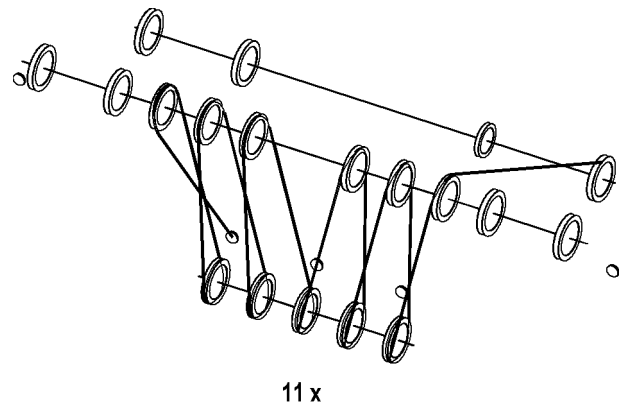
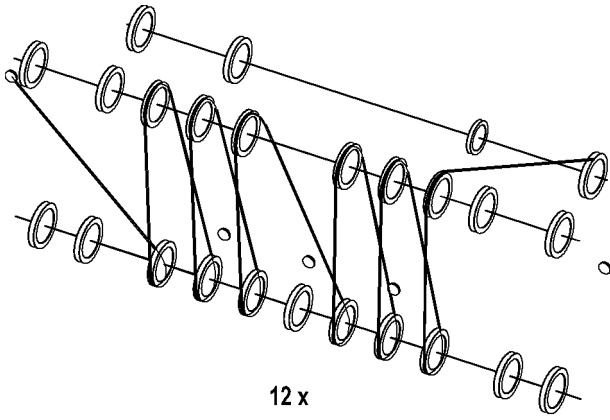
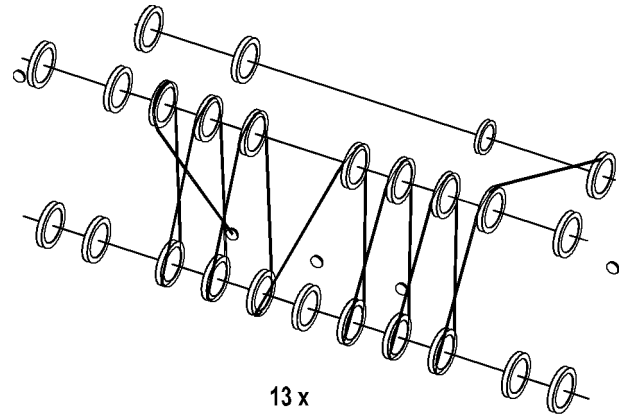
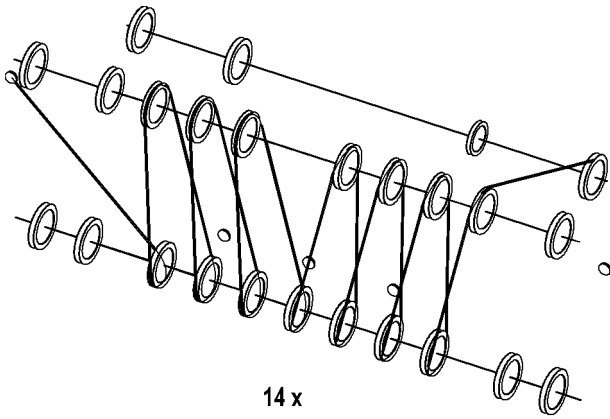
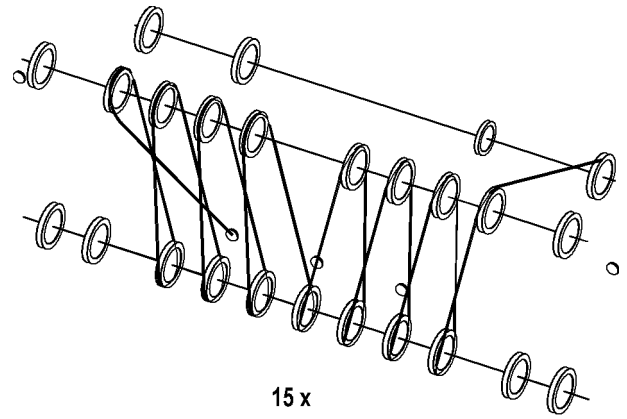
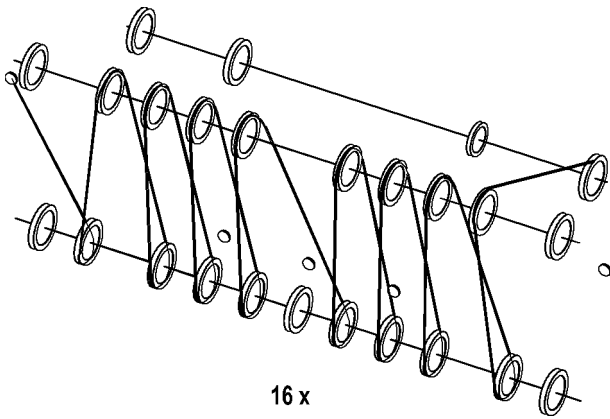
► Choose the correct number of reevings as per the load chart.

**2821 boom head section rope reeving systems (load position 2)**

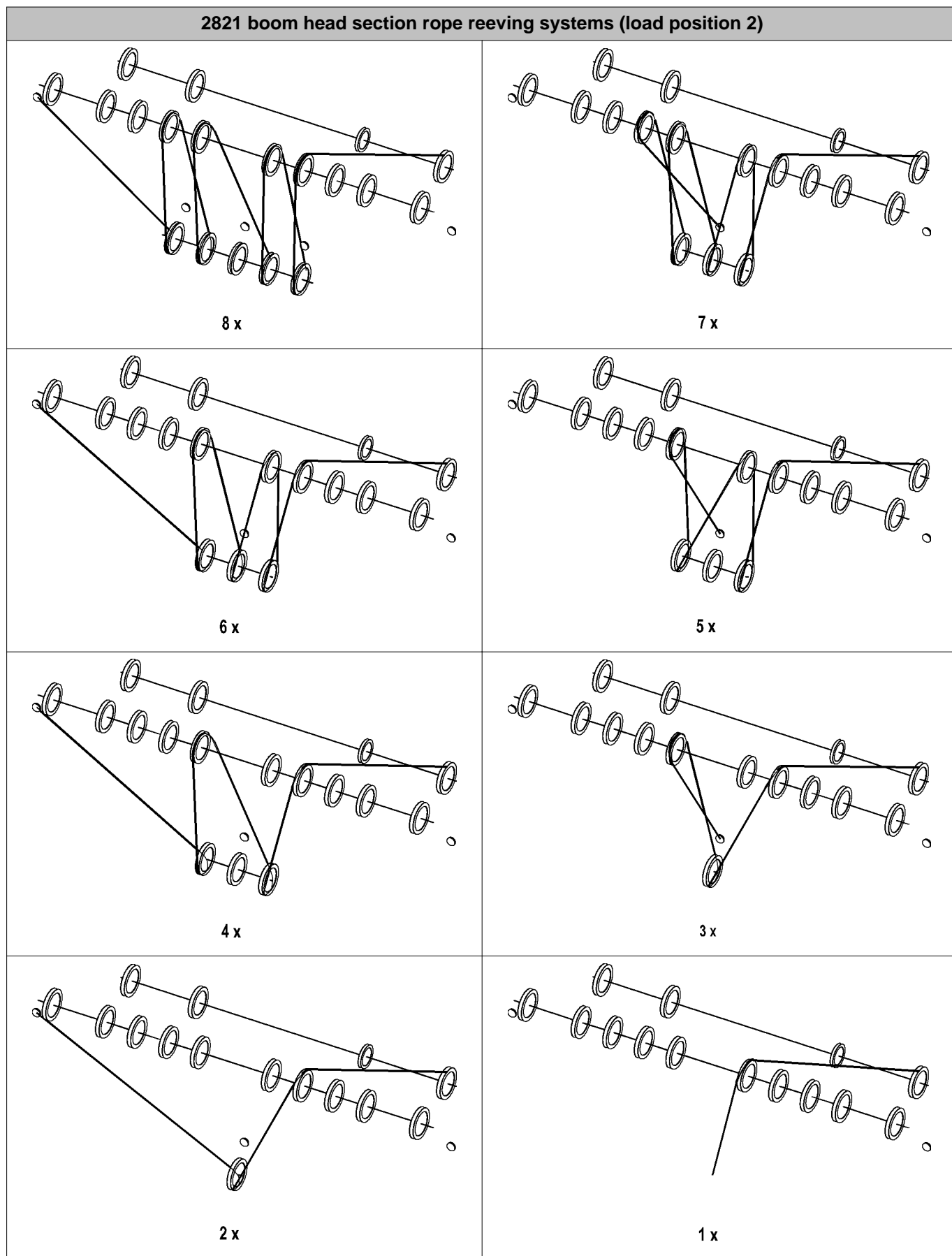


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2821 boom head section rope reeving systems (load position 2)



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LWN/f Auslieferung/2010-07-21/en

Tab. 284 2821 boom head section rope reeving systems (load position 2)

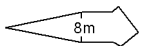
## 7.9 1507 fixed jib

### System-relevant information for 1507 fixed jib:

- Configuration of jib
- Configuration of main boom
  - Rope guide assembly position
  - Mid-point suspension assembly positions
  - Assembly position of the spacer bracket
- Lengths of mid-point suspensions
- Pendant straps on 1507 fixed jib (LR1300 (steel pendant straps/carbon-fibre pendant straps))
- 1507 jib head section rope reeving systems (load position 1)
- 2821 boom head section rope reeving systems (load position 2)

### 7.9.1 Configuration of jib

The 1507 fixed jib has a fixed length of 26 ft.

Jib length	Configuration of jib (symbolic)
26 ft	

Tab. 285 Configuration of 1507 fixed jib

### 7.9.2 Configuration of main boom with 1507 fixed jib attached

#### System-relevant information for 2821 main boom with 1507 fixed jib attached:

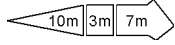
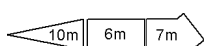
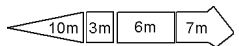
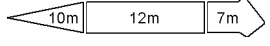
- Configuration of main boom
  - Rope guide assembly position
  - Mid-point suspension assembly positions
  - Assembly positions of the spacer bracket
- Lengths of mid-point suspensions



#### 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)
66 ft	
75 ft	
85 ft	
95 ft	

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# Assembly and dismantling

1507 fixed jib

Main boom length	Configuration of main boom (symbolic)
105 ft	
115 ft	
125 ft	
135 ft	
144 ft	
154 ft	
164 ft	
174 ft	
184 ft	
195 ft	
203 ft	
213 ft	
223 ft	
233 ft	
243 ft	
253 ft	
262 ft	
272 ft	
282 ft	

Tab. 286 Configuration of 2821 main boom with 1507 fixed jib attached

**S** - Assembly position of rope guide

**X1** - Assembly position of mid-point suspension 1

**X2** - Assembly position of mid-point suspension 2

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Y - Assembly position of spacer bracket with jib backstay straps (carbon fibre) on the 1507 fixed jib

### 7.9.3 Lengths of mid-point suspensions

Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
253 ft <sup>A)</sup>	12' 2" ft-in = 6' 11" ft-in + 5' 3" ft-in	
262 ft <sup>B)</sup>	13' 9" ft-in = 5' 3" ft-in + 8' 6" ft-in	
272 ft <sup>C)</sup>	13' 9" ft-in = 5' 3" ft-in + 8' 6" ft-in	
282 ft <sup>D)</sup>	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	13' 9" ft-in
		5' 3" ft-in + 8' 6" ft-in

Tab. 287 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 253 ft.
- B) Jib backstay straps run outside the ropes of the mid-point suspension for a main boom length of 262 ft.
- C) Jib backstay straps run outside the ropes of the mid-point suspension for a main boom length of 272 ft.
- D) Jib backstay straps run inside the ropes of the mid-point suspension on X1, but outside them on X2, for a main boom length of 282 ft.

### 7.9.4 Configuration of main boom in derrick operation with 1507 fixed jib attached

**System-relevant information** for 2821 main boom in derrick operation with 1507 fixed jib attached:

- Configuration of main boom
  - Rope guide assembly position
  - Mid-point suspension assembly positions
  - Assembly positions of the spacer bracket
- Lengths of mid-point suspensions



**DANGER**

Erected length of main boom excessive!  
Structural breakdown.

- ▶ Check the main boom length in the load chart for validity.

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Main boom length	Main boom divisions (symbolic)
134 ft	

# Assembly and dismantling

1507 fixed jib

Main boom length	Main boom divisions (symbolic)
144 ft	
154 ft	
164 ft	
174 ft	
184 ft	
195 ft	
203 ft	
213 ft	
223 ft	
233 ft	
243 ft	
253 ft	
262 ft	
272 ft	
282 ft	
292 ft	
302 ft	
312 ft	
322 ft	
332 ft	
342 ft	

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Main boom length	Main boom divisions (symbolic)
351 ft	
361 ft	
371 ft	

Tab. 288 Permissible main boom lengths in derrick operation with 1507 fixed jib attached

**S** - Assembly position of rope guide

**X1** - Assembly position of mid-point suspension 1

**Y** - Assembly position of spacer bracket with jib backstay straps (carbon fibre) on the 1507 fixed jib

### 7.9.5 Lengths of mid-point suspensions

Main boom length	Backstay pendant 1 (X1)
	Rope length
311' 8" ft-in	23' 7" ft-in = 6' 11" ft-in + 6' 11" ft-in + 9' 10" ft-in
321' 6" ft-in	22' 8" ft-in = 5' 3" ft-in + 5' 3" ft-in + 5' 3" ft-in + 6' 11" ft-in
331' 4" ft-in	22' ft-in = 5' 3" ft-in + 6' 11" ft-in + 9' 10" ft-in
341' 2" ft-in	30' 2" ft-in = 5' 3" ft-in + 5' 3" ft-in + 9' 10" ft-in + 9' 10" ft-in
351' 1" ft-in	29' 2" ft-in = 5' 3" ft-in + 6' 11" ft-in + 8' 6" ft-in + 8' 6" ft-in
360' 11" ft-in	28' 10" ft-in = 5' 3" ft-in + 6' 11" ft-in + 6' 11" ft-in + 9' 10" ft-in
370' 9" ft-in	28' 3" ft-in = 8' 6" ft-in + 9' 10" ft-in + 9' 10" ft-in

Tab. 289 Lengths of mid-point suspensions - 2821 main boom in derrick operation with 1507 fixed jib attached

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### 7.9.6 Overview of pendant straps on 1507 fixed jib (LR1300 (steel/carbon-fibre pendant straps))

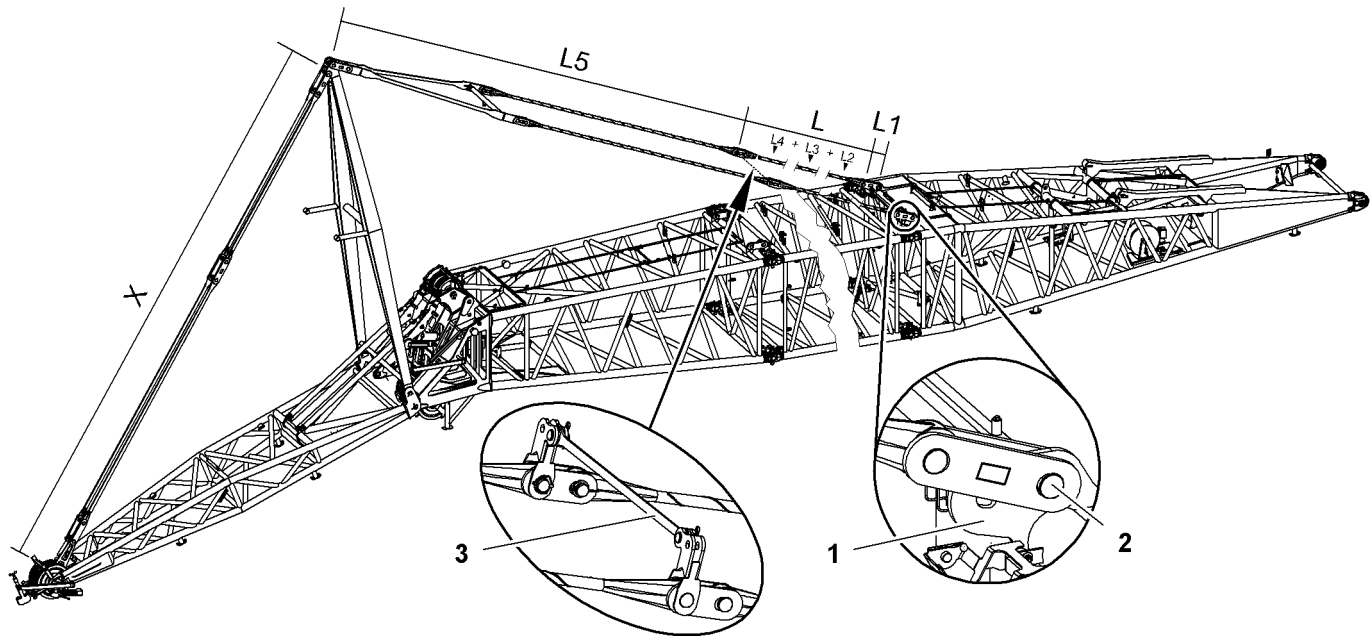


Fig. 2348 Overview of pendant straps on 1507 fixed jib (LR1300 (steel/carbon-fibre pendant straps))

- 1 Boom base section
- 2 Jib backstay straps pin connection point
- 3 Spacer bracket with connecting elements

### Backstay straps connecting A-frame 2 to 2821 boom base section

Designation		Value
L1	<b>Connecting link</b> (For more information see: <a href="#">Connecting link, page 192</a> )	1' 2" ft-in
<b>Jib backstay straps</b> consisting of:		
L2	<b>Jib backstay strap 10 ft</b> (For more information see: <a href="#">Jib backstay strap 10 ft, page 194</a> )	Total L2
L3	<b>Jib backstay strap 20 ft</b> (For more information see: <a href="#">Jib backstay strap 20 ft, page 197</a> )	+
L4	<b>Jib backstay strap 40 ft</b> (For more information see: <a href="#">Jib backstay strap 40 ft, page 200</a> )	Total L3
		+
		Total L4
L5	<b>Equalizer on A-frame 2 (jib backstay strap)</b> (For more information see: <a href="#">Equalizer on A-frame 2 (jib backstay strap), page 165</a> )	32' 9" ft-in

Tab. 290 Backstay straps connecting A-frame 2 to 2821 boom base section

#### Configuration of jib backstay straps (L):

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Required number of jib backstay straps 10 ft (L2) is the same as the number of boom sections 10 ft.

Required number of jib backstay straps 20 ft (L3) is the same as the number of boom sections 20 ft.

Required number of jib backstay straps 40 ft (L4) is the same as the number of boom sections 40 ft.



**Note**

- ▶ Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the load chart.

The jib backstay straps (L) can be made up from generation A and generation B jib backstay straps (For more information see: 1.27.5 Pendant straps on 1507 fixed jib, page 165) . However, a mixture is only permissible if there is a maximum difference of 1 between the numbers of generation B jib backstay straps in the left and right strands of the backstay straps.



**DANGER**

Impermissible mixture of generation A and B jib backstay straps!  
Structural breakdown.

- ▶ Ensure that there is a maximum difference of 1 between the numbers of generation B jib backstay straps in the left and right strands of the backstay straps.

**A-frame 2 to 1507 jib head section pendant straps**

Designation		Value
X	Jib pendant strap (A-frame 2 to 0906 jib head section) (For more information see: Jib pendant strap (A-frame 2 to 1507 jib head section), page 166)	38' 1" ft-in

Tab. 291 A-frame 2 to 1507 jib head section pendant straps

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### 7.9.7 1507 jib head section rope reeving systems (load position 1)

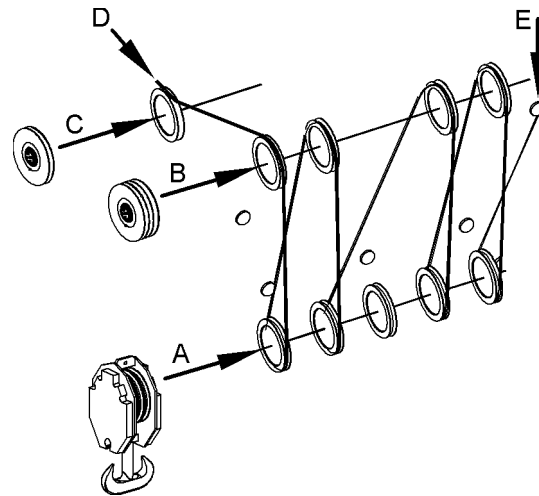


Fig. 2349 1507 jib head section rope reeving system (load position 1)

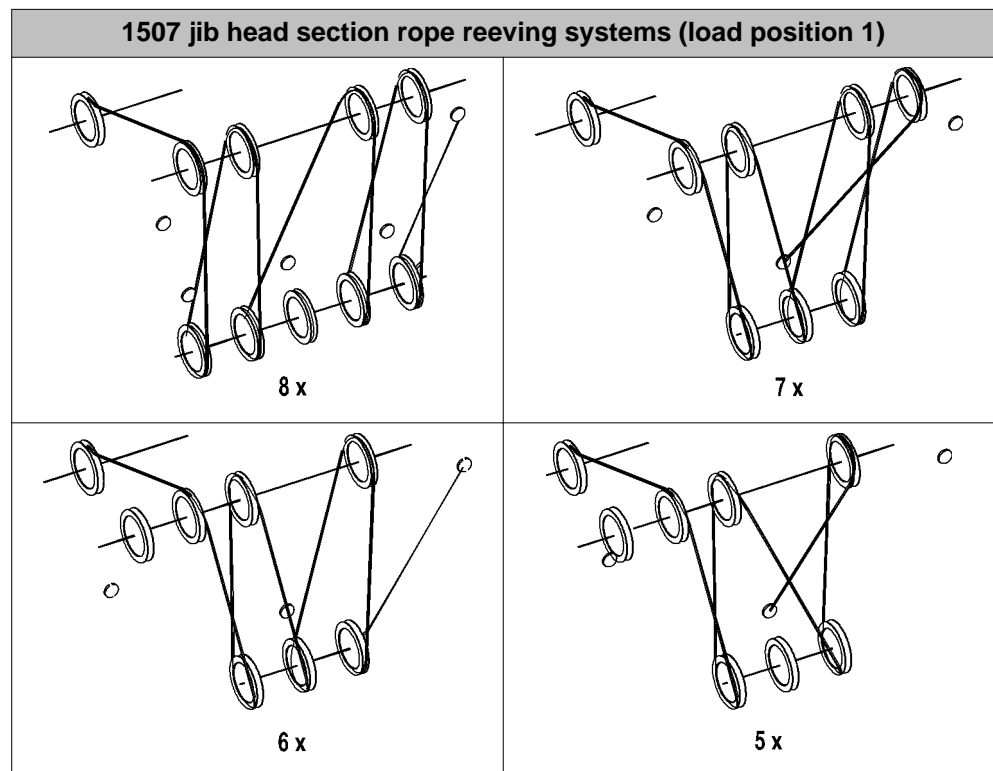
- |   |                             |
|---|-----------------------------|
| <b>A</b> Pulley block roller set        | <b>D</b> Winch 1 hoist rope |
| <b>B</b> Jib head section roller set    | <b>E</b> Rope fixation      |
| <b>C</b> Jib head section gantry pulley |                             |



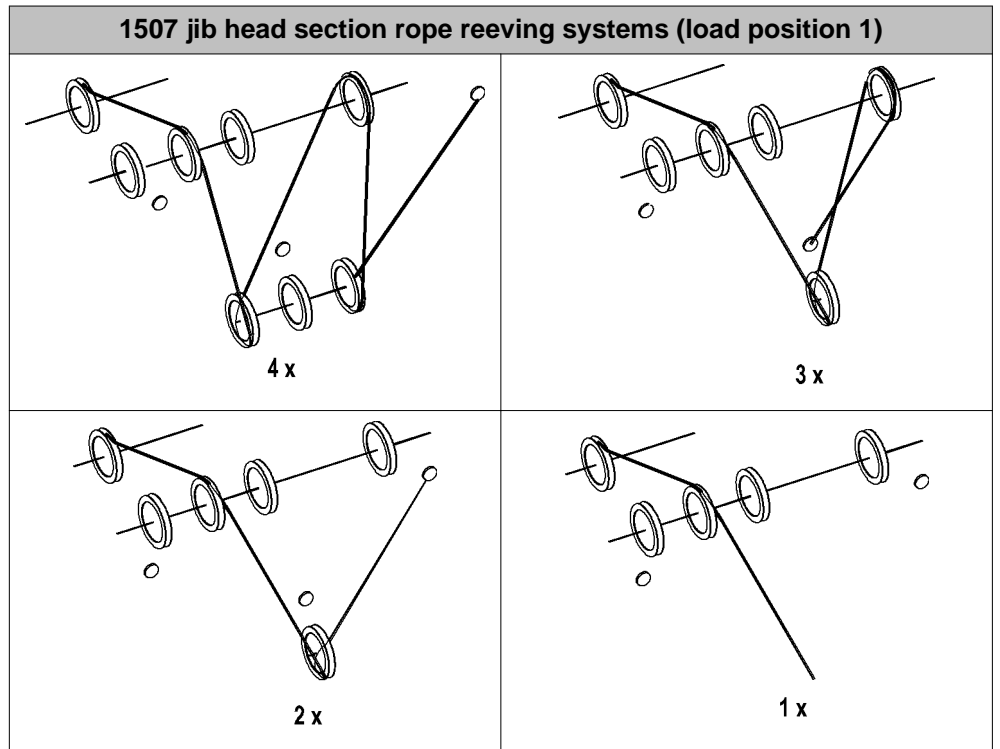
**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

- ▶ Choose the correct number of reevings as per the load chart.



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Tab. 292 1507 jib head section rope reeving systems (load position 1)

### 7.9.8 2821 boom head section rope reeving systems (load position 2)

If the main boom with jib attached is used to hoist a load, then the 2821 boom head section should be reeved as shown below.

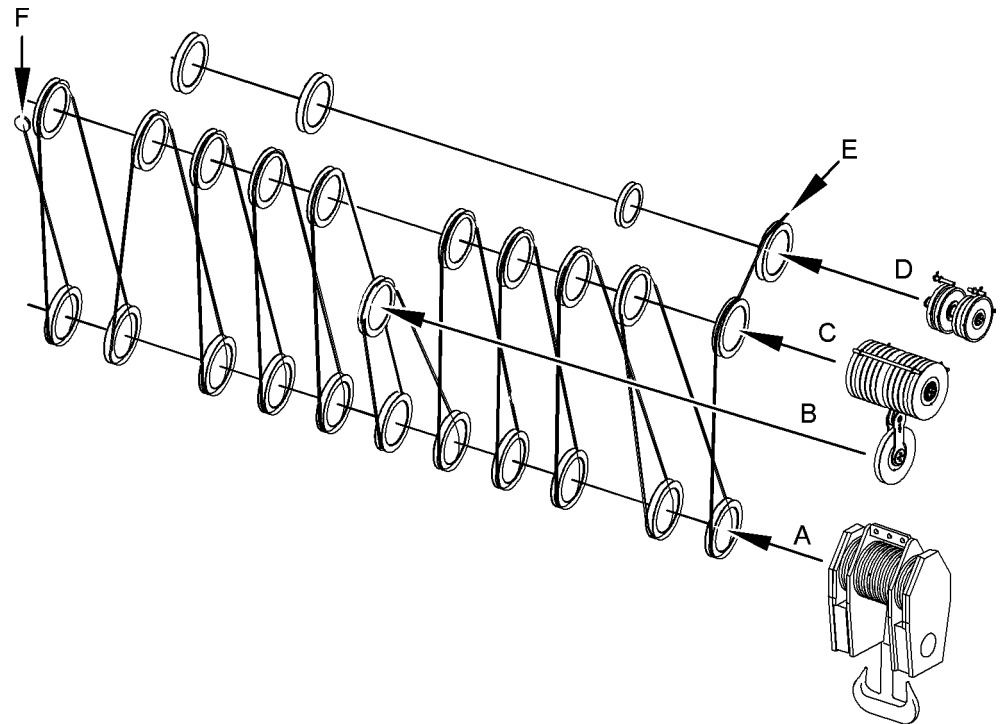


Fig. 2358 2821 boom head section rope reeving system (load position 2)

- |   |   |
|---|---|
| <b>A</b> Pulley block roller set              | <b>D</b> Boom head section gantry pulleys |
| <b>B</b> 11th pulley on the boom head section | <b>E</b> Winch 2 hoist rope               |
| <b>C</b> Boom head section roller set         | <b>F</b> Rope fixation                    |

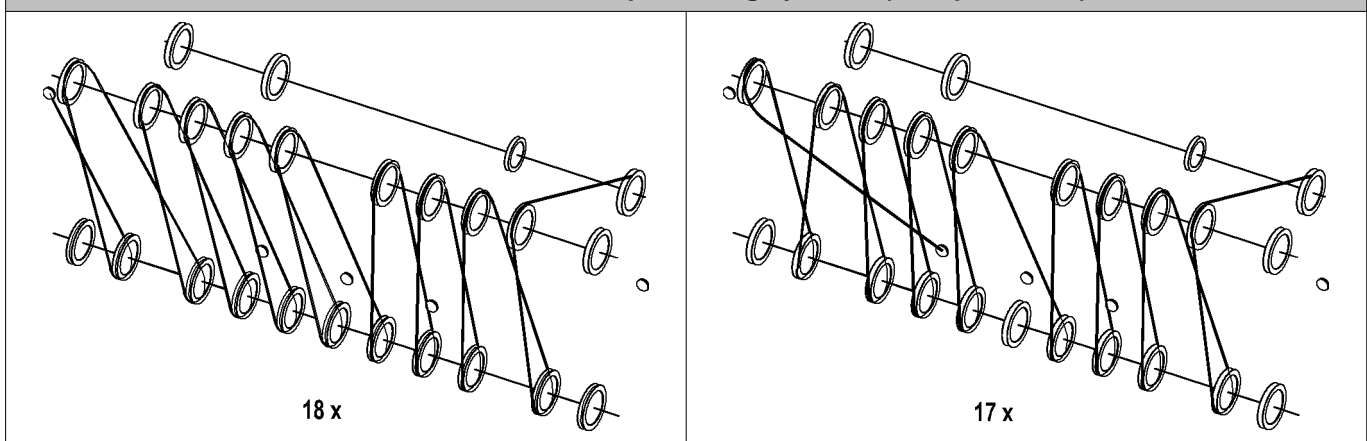


**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

► Choose the correct number of reevings as per the load chart.

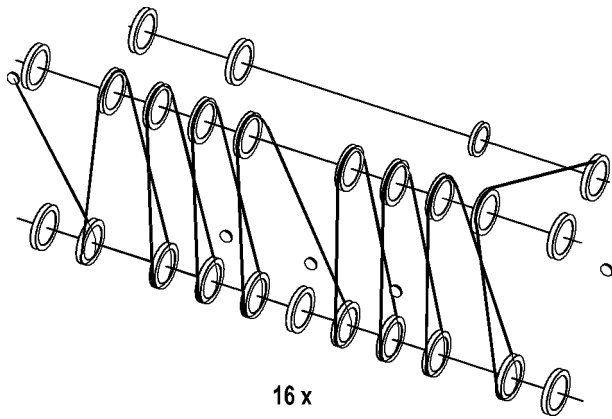
**2821 boom head section rope reeving systems (load position 2)**



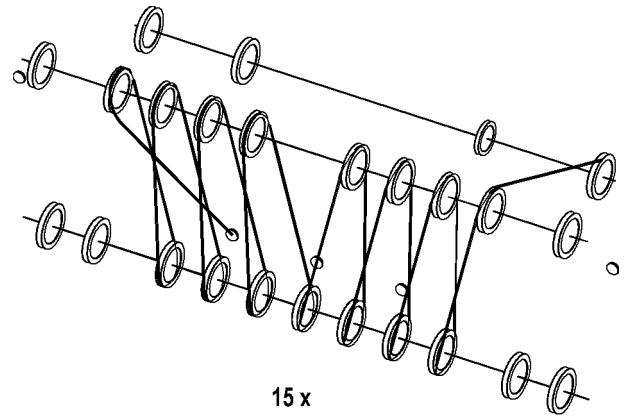
LWN/f Auslieferung/2010-07-21/en



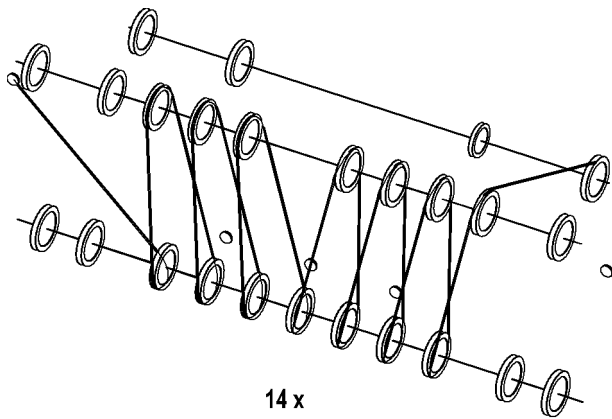
2821 boom head section rope reeving systems (load position 2)



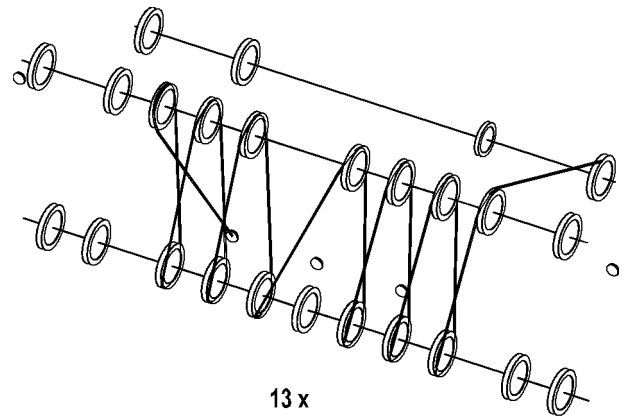
16 x



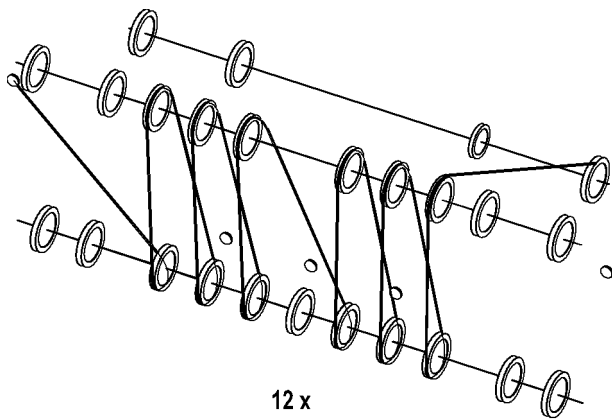
15 x



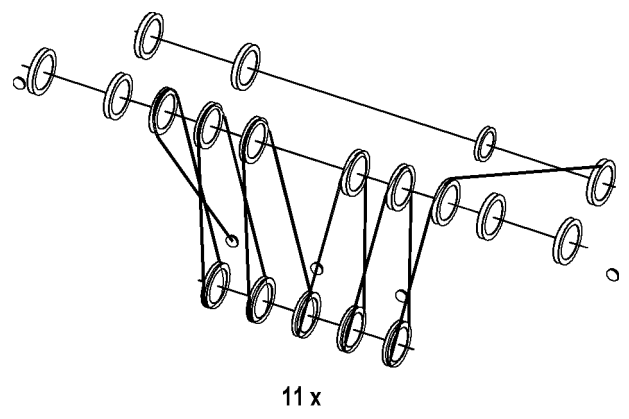
14 x



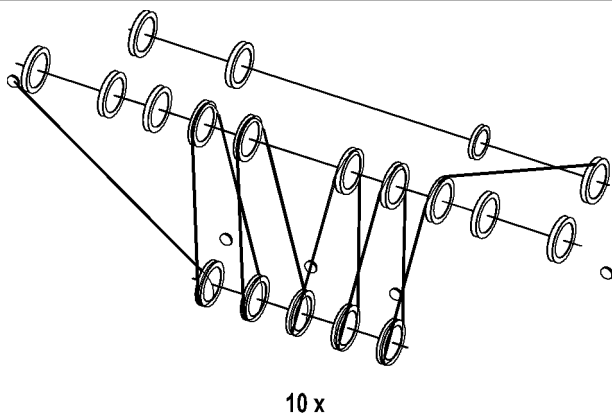
13 x



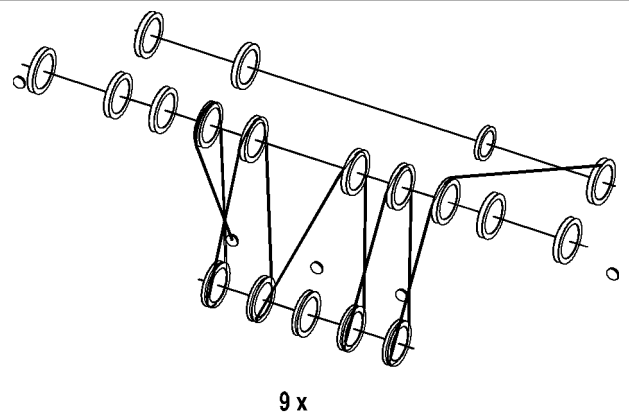
12 x



11 x

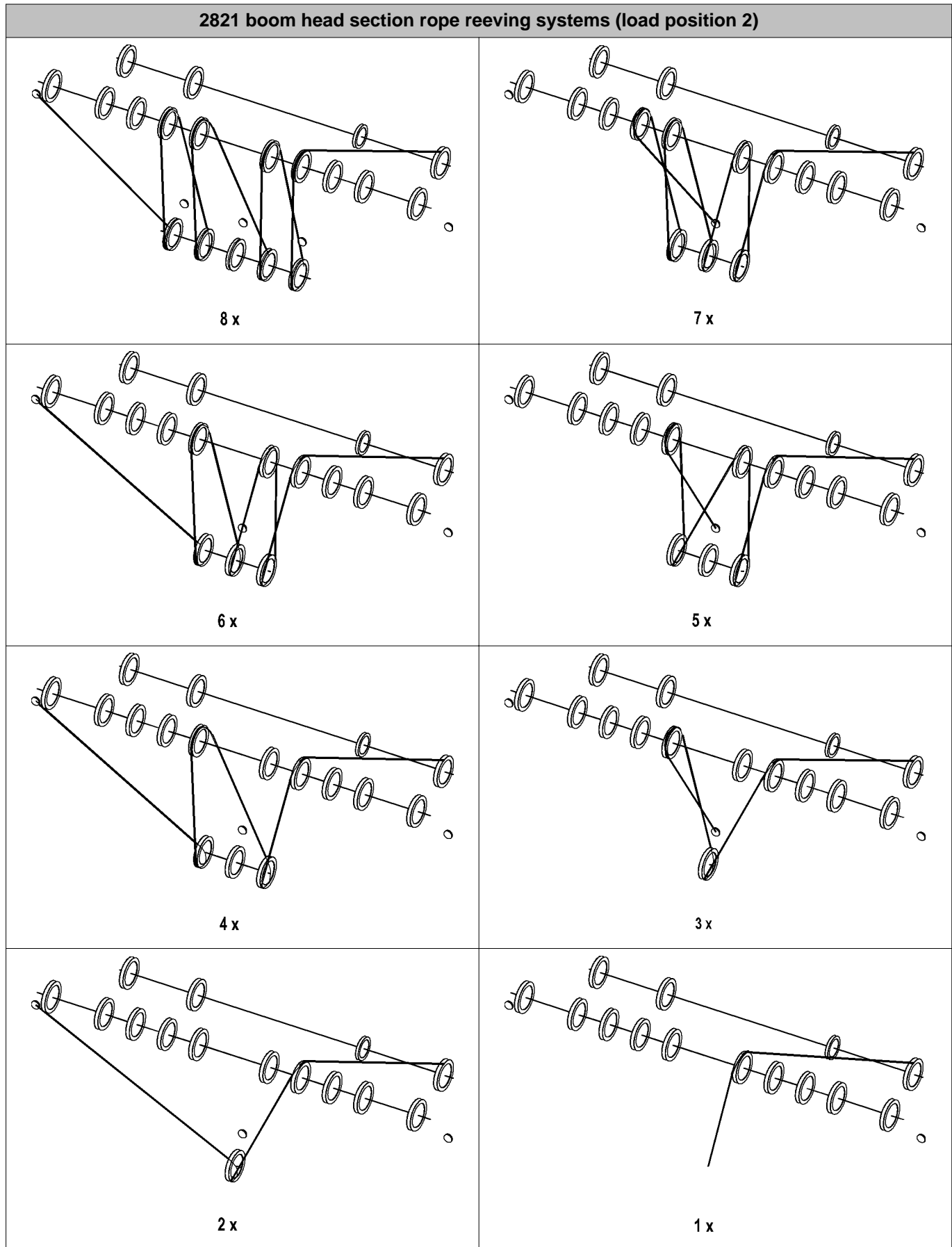


10 x



9 x

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Tab. 293 2821 boom head section rope reeving systems (load position 2)

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## 7.10 1008 fixed jib

**System-relevant information** for 1008 fixed jib:

- Configuration of jib
- Configuration of main boom
- Overview of pendant straps on 1008 fixed jib (LR1300 (steel/carbon-fibre pendant straps))
- 1008 jib head section rope reeving systems (load position 1)
- 2821 boom head section rope reeving systems (load position 2)

### 7.10.1 Configuration of jib



**DANGER**

Incorrect jib length assembled!  
Structural breakdown.

- ▶ Check the jib length in the load chart for validity.

Jib length	Configuration of jib (symbolic)
36 ft	
46 ft	
56 ft	
66 ft	
75 ft	
85 ft	

Tab. 294 Configuration of 1008 fixed jib

### 7.10.2 Configuration of main boom



**DANGER**

Erected length of main boom excessive!  
Structural breakdown.

- ▶ Check the main boom length in the 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: 7.4.1 Configuration of main boom, page 645](#)) .

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### 7.10.3 Overview of pendant straps on 1008 fixed jib (LR1300 (steel/carbon-fibre pendant straps))

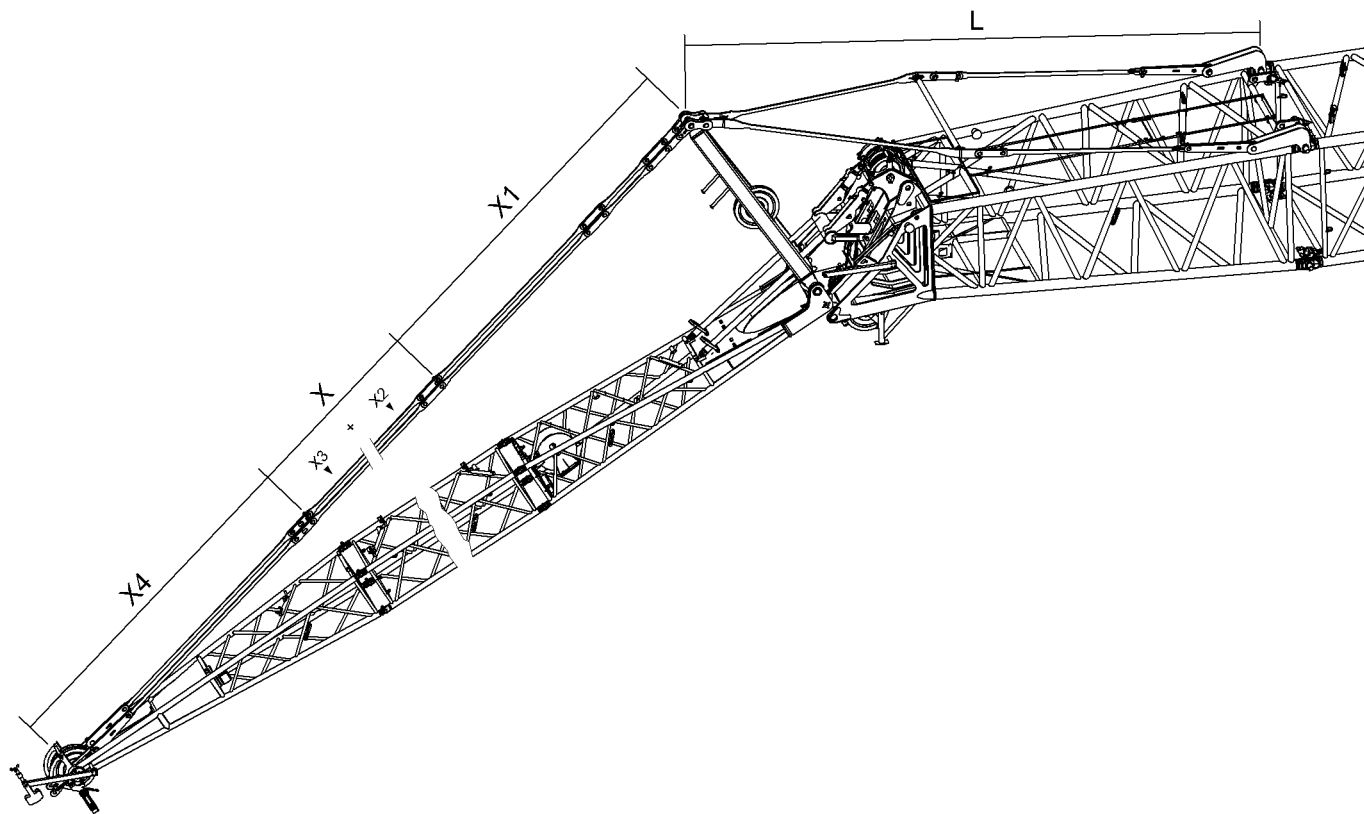


Fig. 2398 Overview of pendant straps on 1008 fixed jib (LR1300 (steel/carbon-fibre pendant straps))

#### A-frame 2 to 2821 boom head section backstay straps

Designation		Value
L	Equalizer on A-frame 2 (jib backstay strap) (For more information see: <a href="#">Equalizer on A-frame 2 (jib backstay strap)</a> , page 169)	at 30°
		32' ft-in
		at 15°
		29' 4" ft-in

Tab. 295 A-frame 2 to 2821 boom head section backstay straps

#### A-frame 2 to 1008 jib head section pendant straps

Designation		Value
X1	Equalizer on A-frame 2 (jib pendant strap) (For more information see: <a href="#">Equalizer on A-frame 2 (jib pendant strap)</a> , page 170)	19' ft-in

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Designation		Value
X	Jib pendant straps consisting of:	
	X2	Jib pendant strap 10 ft (For more information see: Jib pendant strap 10 ft, page 171)
	X3	Jib pendant strap 20 ft (For more information see: Jib pendant strap 20 ft, page 172)
X4	Jib pendant strap on 1008 jib head section (For more information see: Jib pendant strap on 1008 jib head section, page 172)	18' 1" ft-in

Tab. 296 A-frame 2 to 1008 jib head section pendant straps

**Configuration of jib pendant straps (X):**

Required number of jib pendant straps 10 ft (X2) is the same as the number of jib sections 10 ft.

Required number of jib pendant straps 20 ft (X3) is the same as the number of jib sections 20 ft.



**Note**

► Permitted number of jib sections 10 ft, 20 ft can be found in the following table:  
(For more information see: 7.10.1 Configuration of jib, page 741)

**7.10.4 1008 jib head section rope reeving systems (load position 1)**

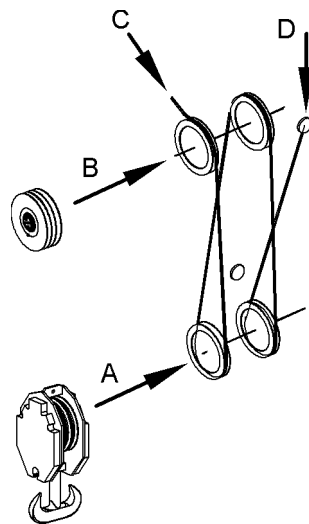


Fig. 2399 1008 jib head section rope reeving system (load position 1)

- A Pulley block roller set
- B Jib head section roller set
- C Winch 1 hoist rope
- D Rope fixation

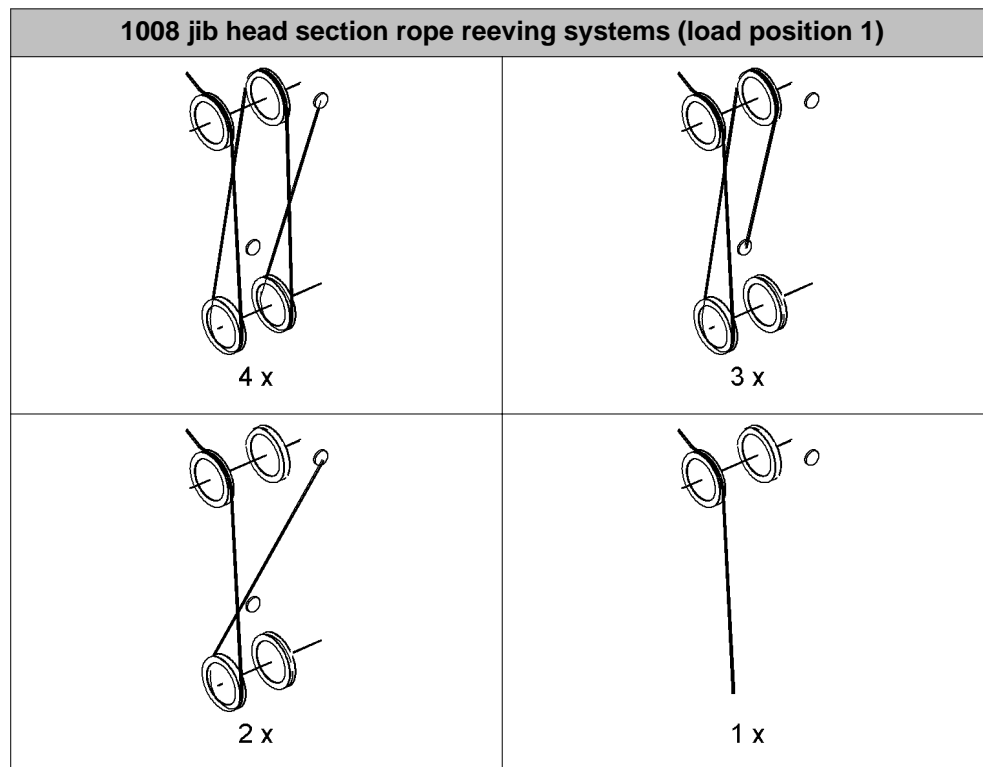
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**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

- Choose the correct number of reevings as per the load chart.



Tab. 297 1008 jib head section rope reeving systems (load position 1)

### 7.10.5 2821 boom head section rope reeving systems (load position 2)

If the main boom with jib attached is used to hoist a load, then the 2821 boom head section should be reeved as shown below.

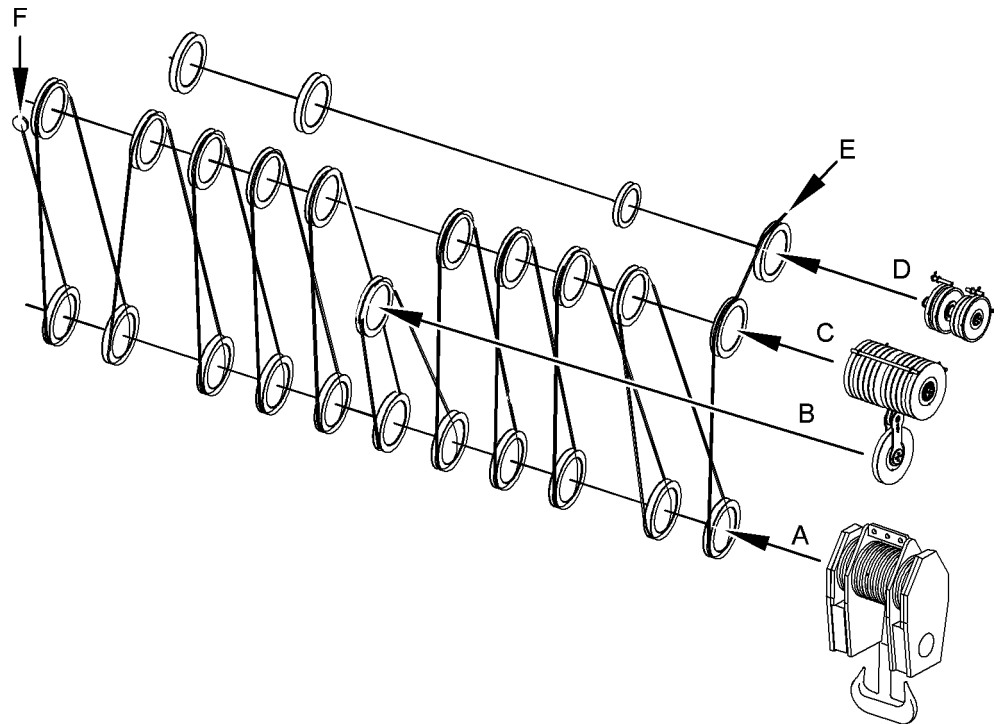


Fig. 2404 2821 boom head section rope reeving system (load position 2)

- |   |   |
|---|---|
| <b>A</b> Pulley block roller set              | <b>D</b> Boom head section gantry pulleys |
| <b>B</b> 11th pulley on the boom head section | <b>E</b> Winch 2 hoist rope               |
| <b>C</b> Boom head section roller set         | <b>F</b> Rope fixation                    |

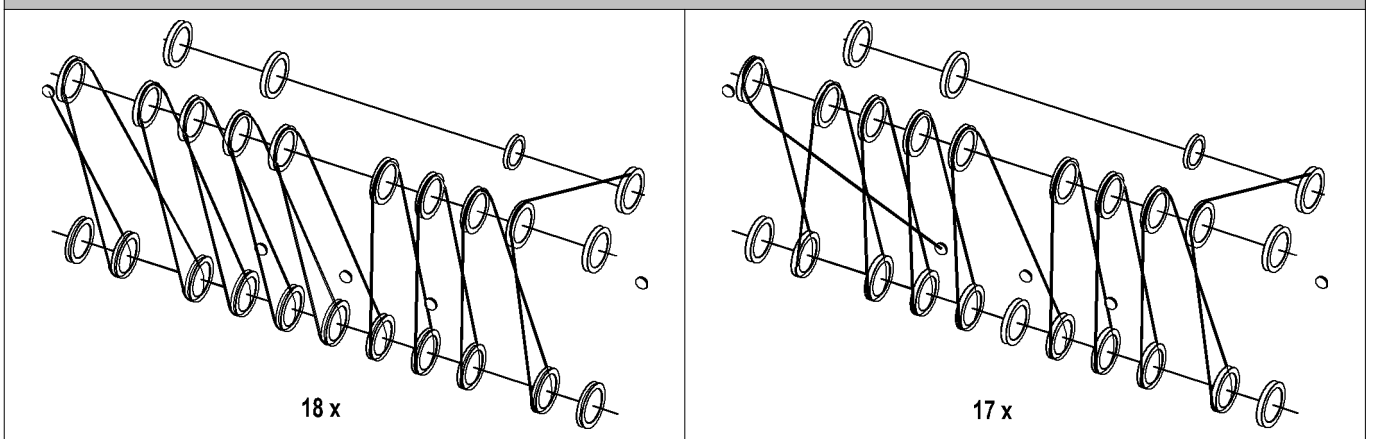


**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

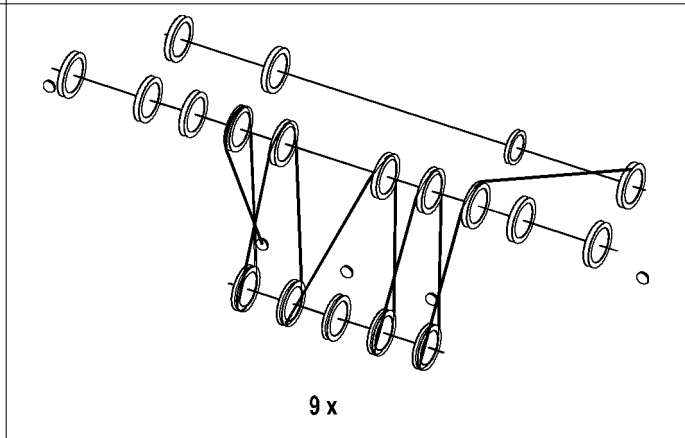
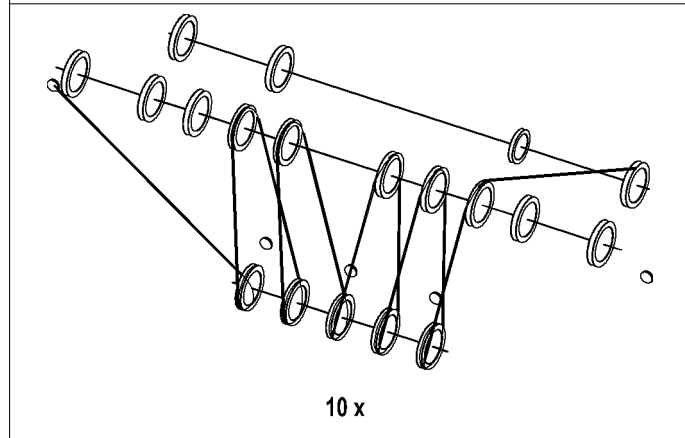
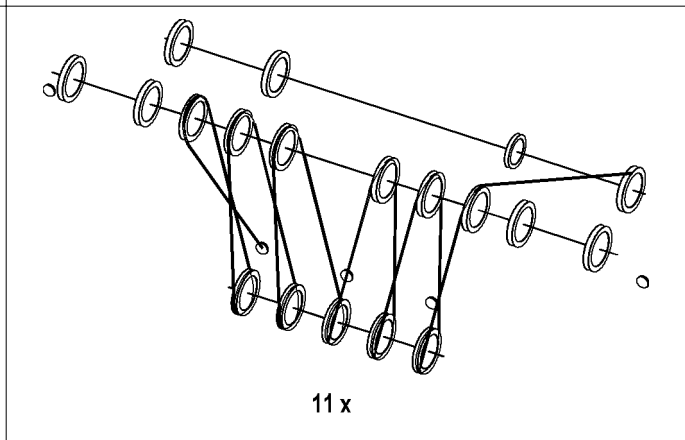
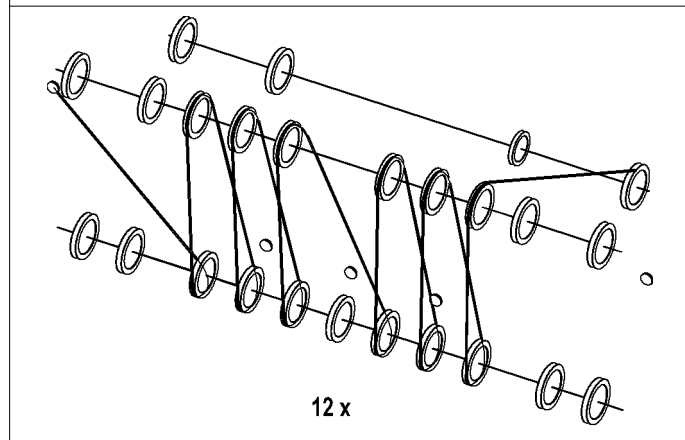
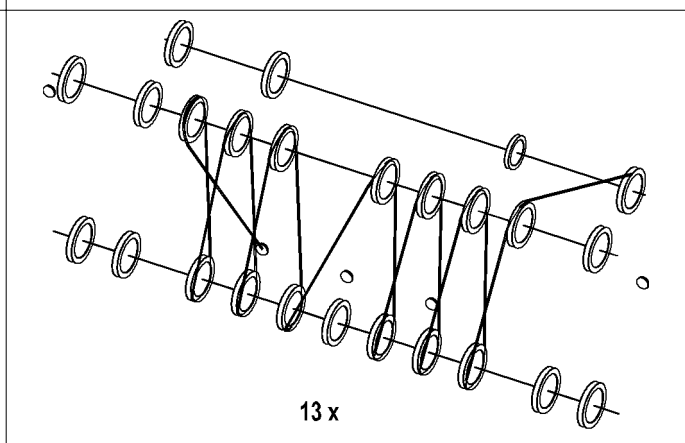
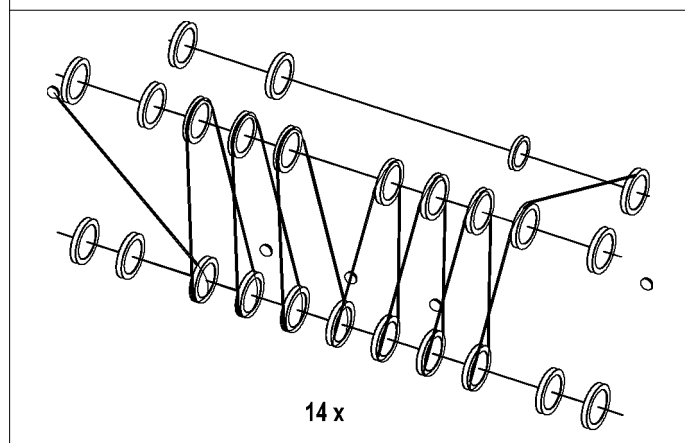
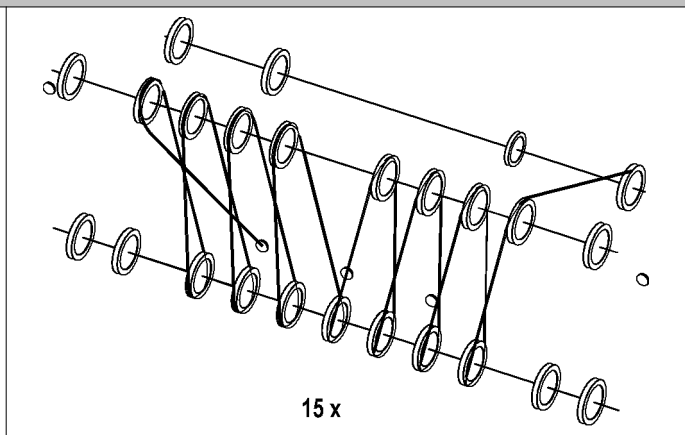
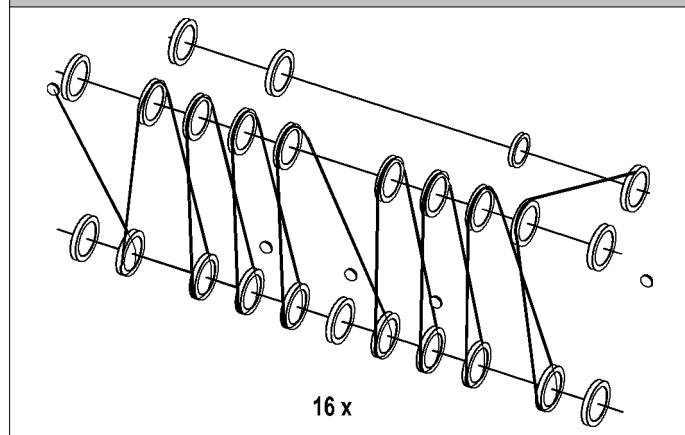
► Choose the correct number of reevings as per the load chart.

**2821 boom head section rope reeving systems (load position 2)**



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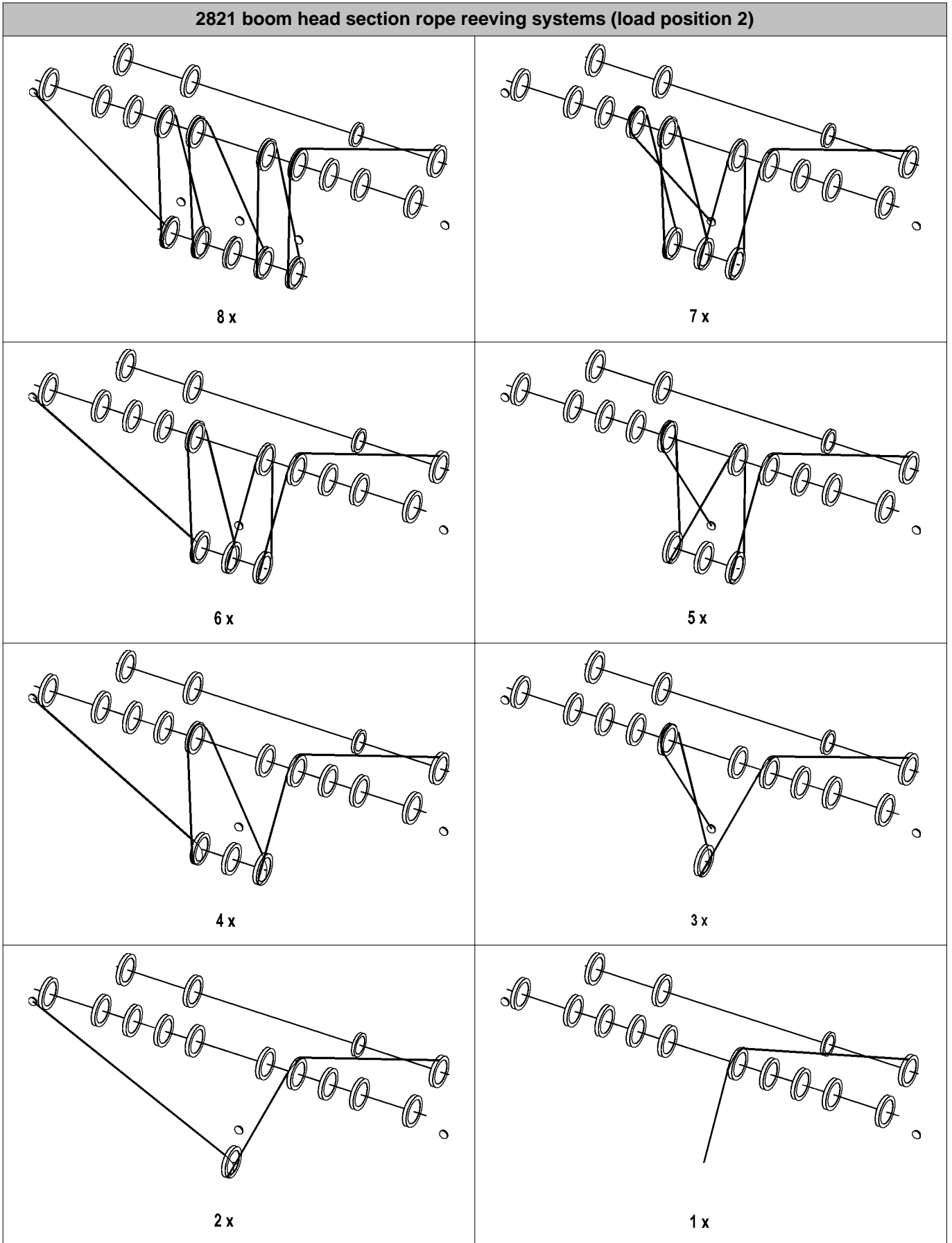
2821 boom head section rope reeving systems (load position 2)



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2821 boom head section rope reeving systems (load position 2)



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Tab. 298 2821 boom head section rope reeving systems (load position 2)

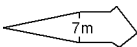
## 7.11 0906 fixed jib

**System-relevant information** for 0906 fixed jib:

- Configuration of jib
- Configuration of main boom
- Pendant straps on 0906 fixed jib (LR1300 (steel pendant straps/carbon-fibre pendant straps))
- 0906 jib head rope reeving systems (load position 1)
- 2821 boom head section rope reeving systems (load position 2)

### 7.11.1 Configuration of jib

The 0906 fixed jib has a fixed length of 23 ft.

Jib length	Configuration of jib (symbolic)
23 ft	

Tab. 299 Configuration of 0906 fixed jib

### 7.11.2 Configuration of main boom



**DANGER**

Erected length of main boom excessive!  
Structural breakdown.

- ▶ Check the main boom length in the 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: [7.4.1 Configuration of main boom, page 645](#)).

### 7.11.3 Pendant straps on 0906 fixed jib, overview (LR1300 (steel/carbon-fibre pendant straps))

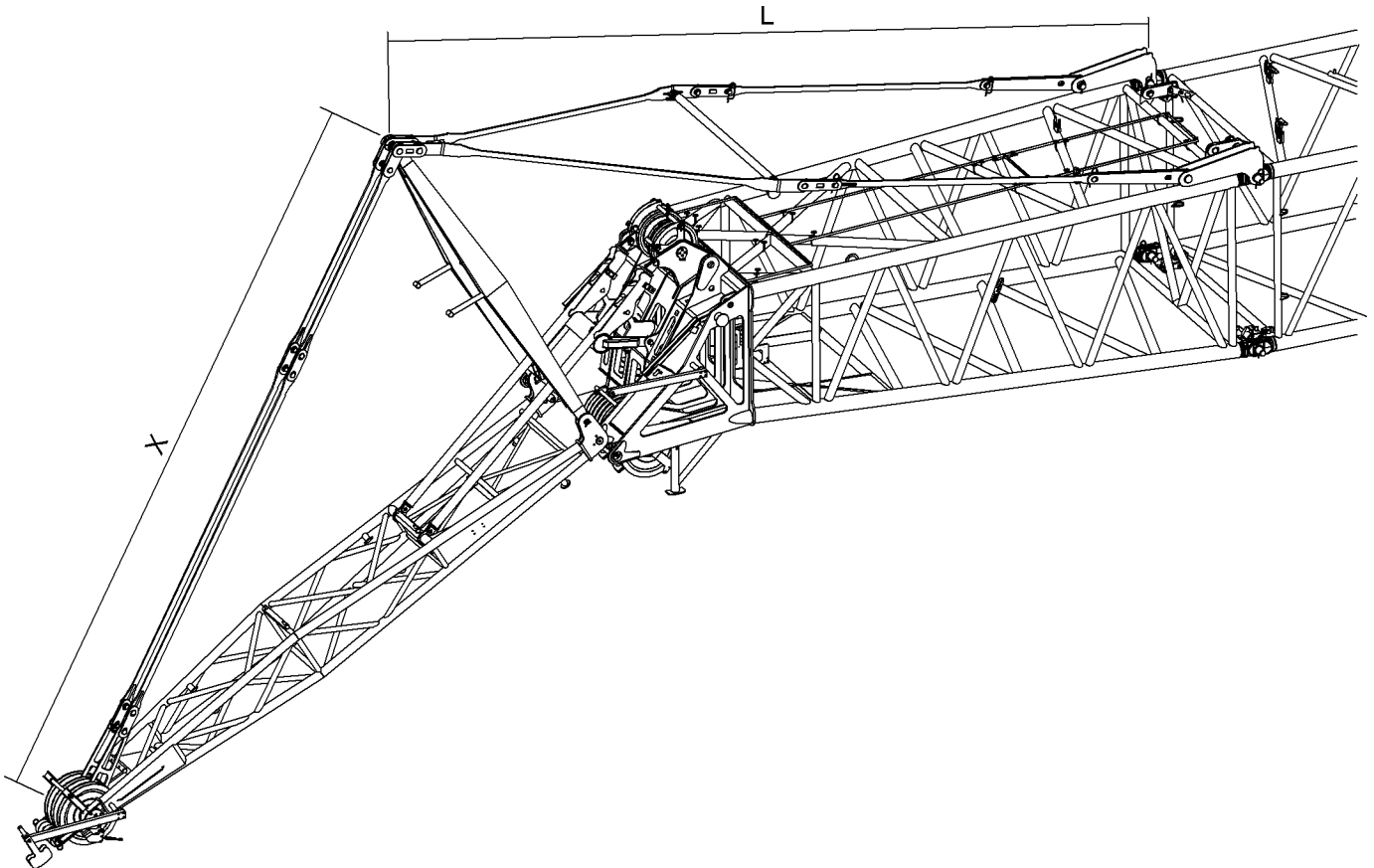


Fig. 2424 Pendant straps on 0906 fixed jib, overview (LR1300 (steel/carbon-fibre pendant straps))

### A-frame 2 to 2821 boom head section backstay straps

Designation		Value
L	Equalizer on A-frame 2 (jib backstay strap)	at 30°
	(For more information see: <a href="#">Equalizer on A-frame 2 (jib backstay strap)</a> , page 173)	32' 10" ft-in

Tab. 300 A-frame 2 to 2821 boom head section backstay straps

### A-frame 2 to 0906 jib head pendant straps

Designation		Value
X	Jib pendant strap (A-frame 2 to 0906 jib head section) (For more information see: <a href="#">Jib pendant strap (A-frame 2 to 0906 jib head section)</a> , page 175)	27' ft-in

Tab. 301 A-frame 2 to 0906 jib head pendant straps

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### 7.11.4 0906 jib head rope reeving systems (load position 1)

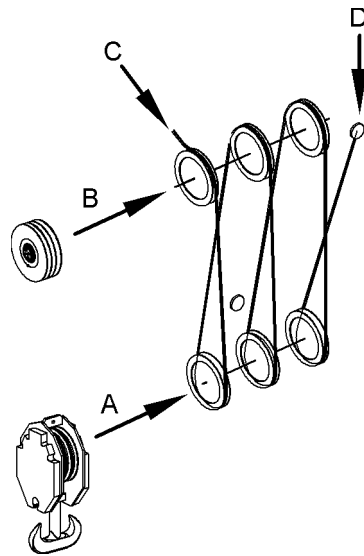


Fig. 2425 0906 jib head rope reeving system (load position 1)

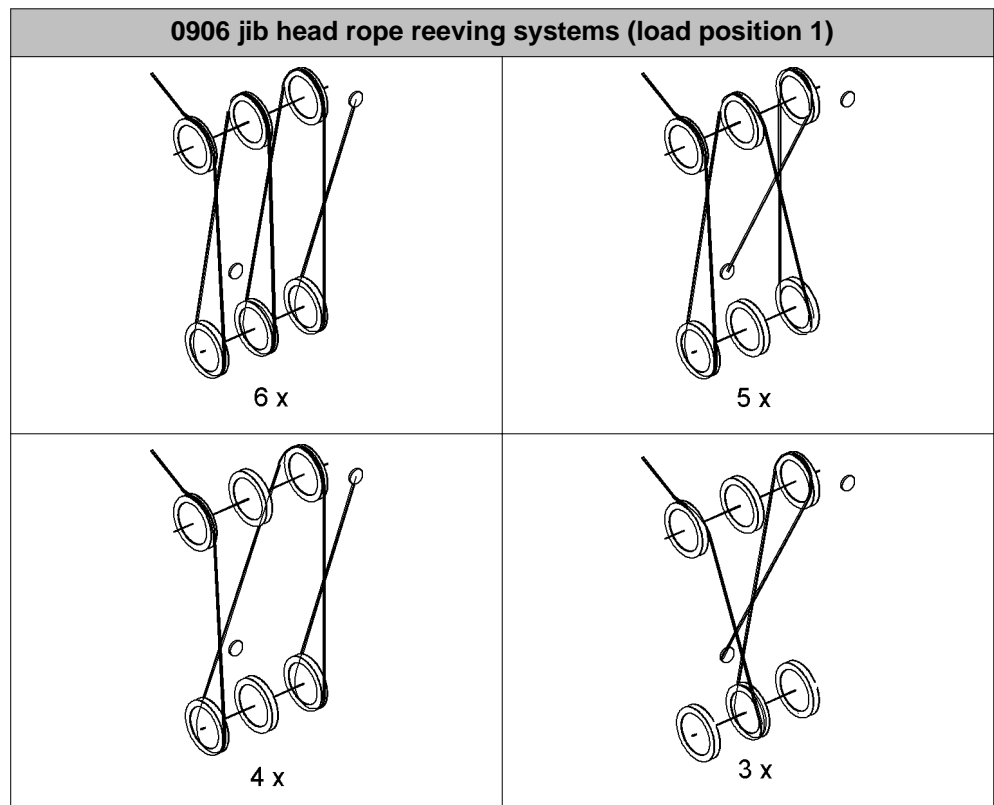
- |                                      |                             |
|--------------------------------------|-----------------------------|
| <b>A</b> Pulley block roller set     | <b>C</b> Winch 1 hoist rope |
| <b>B</b> Jib head section roller set | <b>D</b> Rope fixation      |



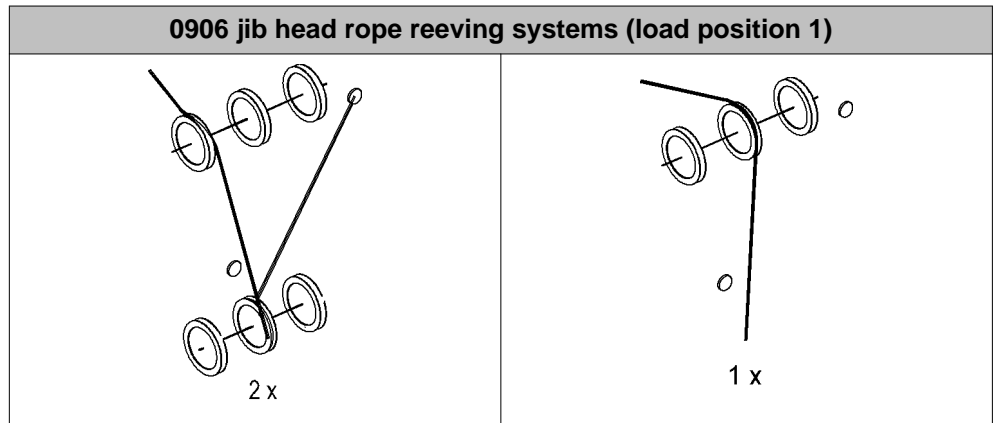
**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

- Choose the correct number of reevings as per the load chart.



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Tab. 302 0906 jib head rope reeving systems (load position 1)

### 7.11.5 2821 boom head section rope reeving systems (load position 2)

If the main boom with jib attached is used to hoist a load, then the 2821 boom head section should be reeved as shown below.

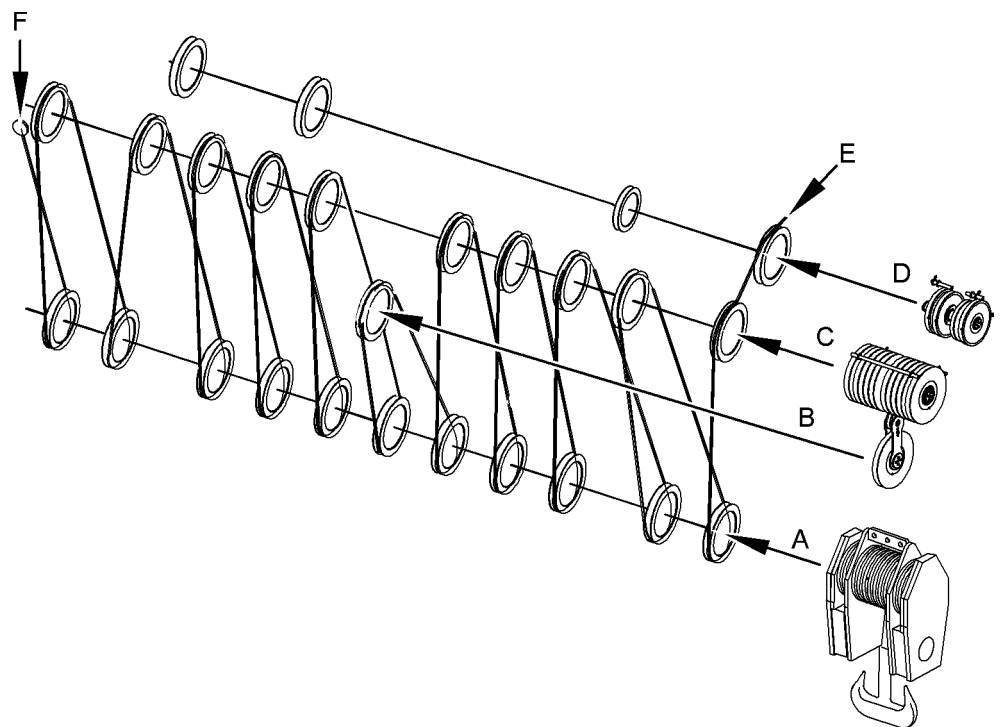


Fig. 2432 2821 boom head section rope reeving system (load position 2)

- |   |   |
|---|---|
| <b>A</b> Pulley block roller set              | <b>D</b> Boom head section gantry pulleys |
| <b>B</b> 11th pulley on the boom head section | <b>E</b> Winch 2 hoist rope               |
| <b>C</b> Boom head section roller set         | <b>F</b> Rope fixation                    |

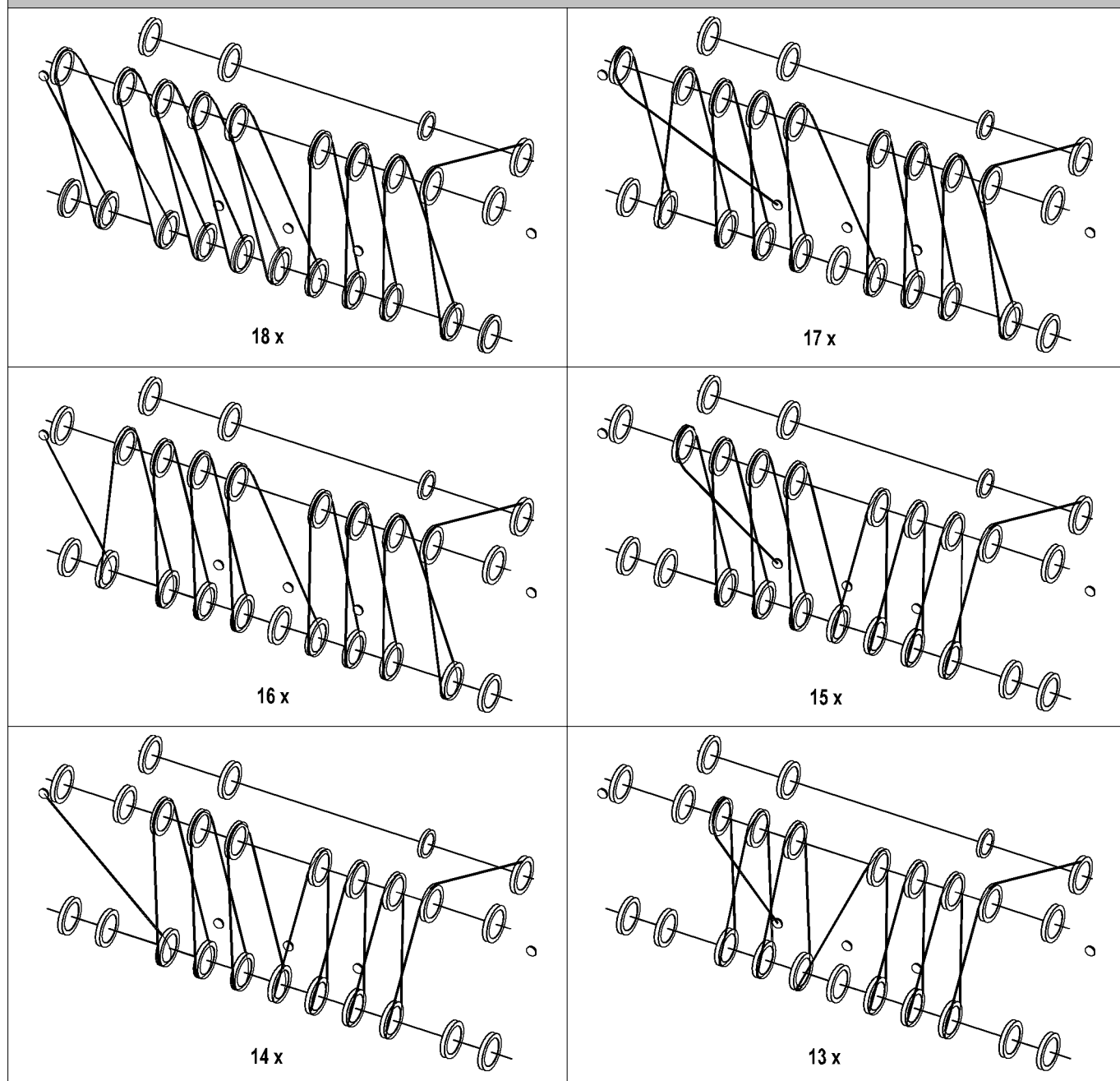


**DANGER**

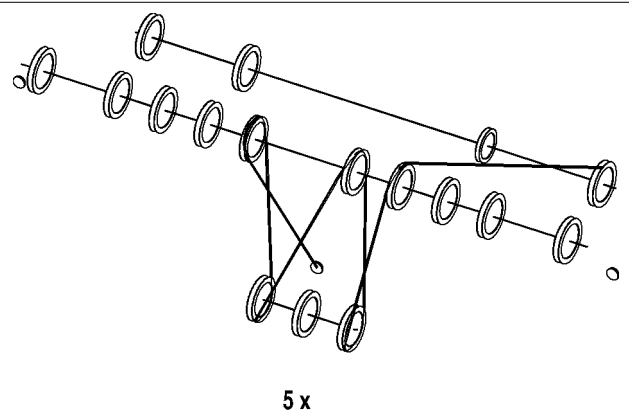
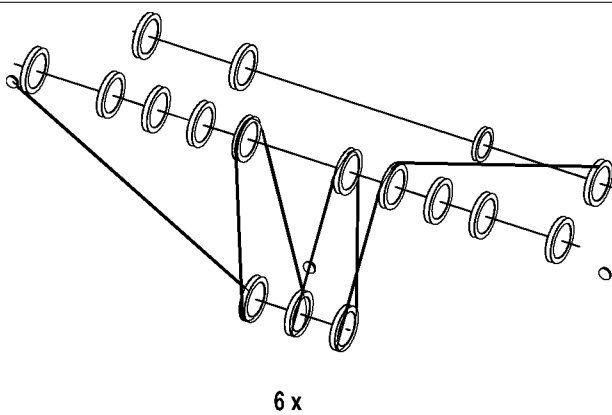
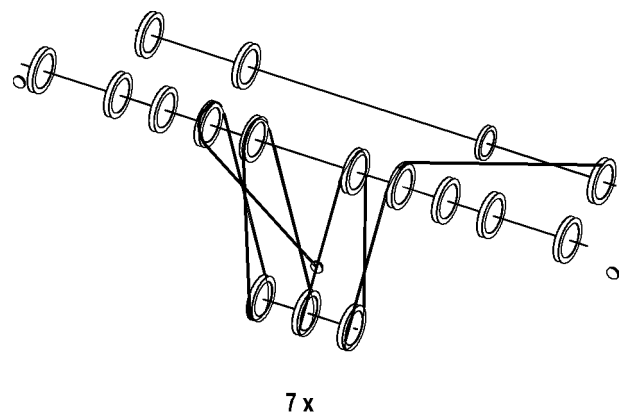
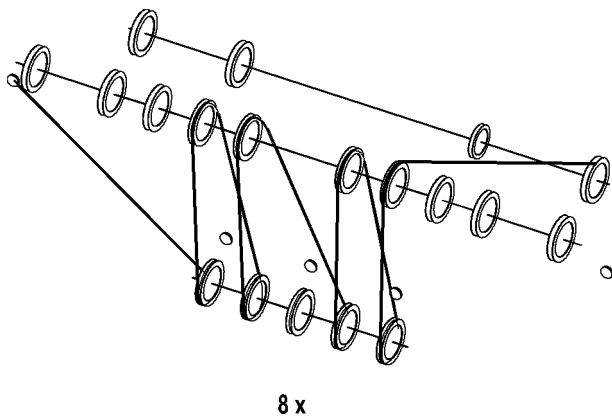
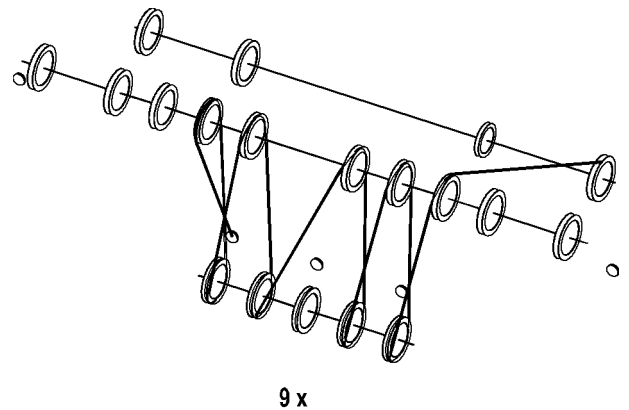
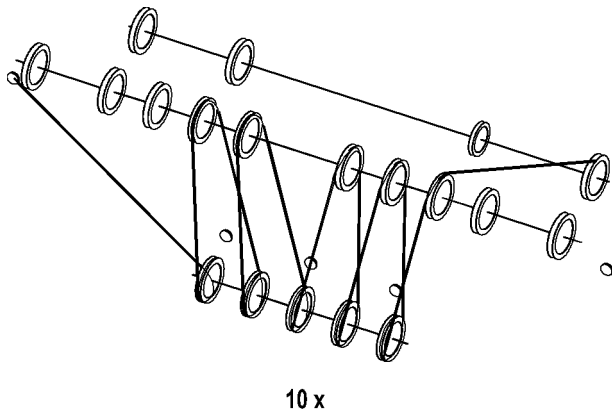
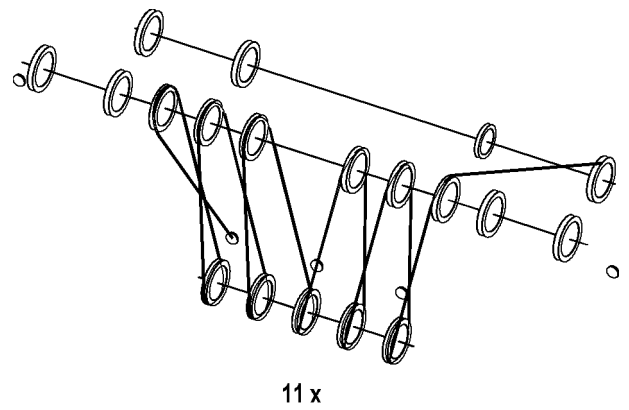
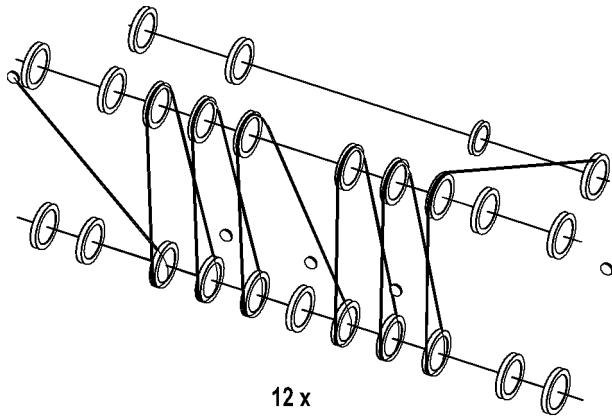
Incorrect number of reevings!  
Boom damage, machine toppling over.

- Choose the correct number of reevings as per the load chart.

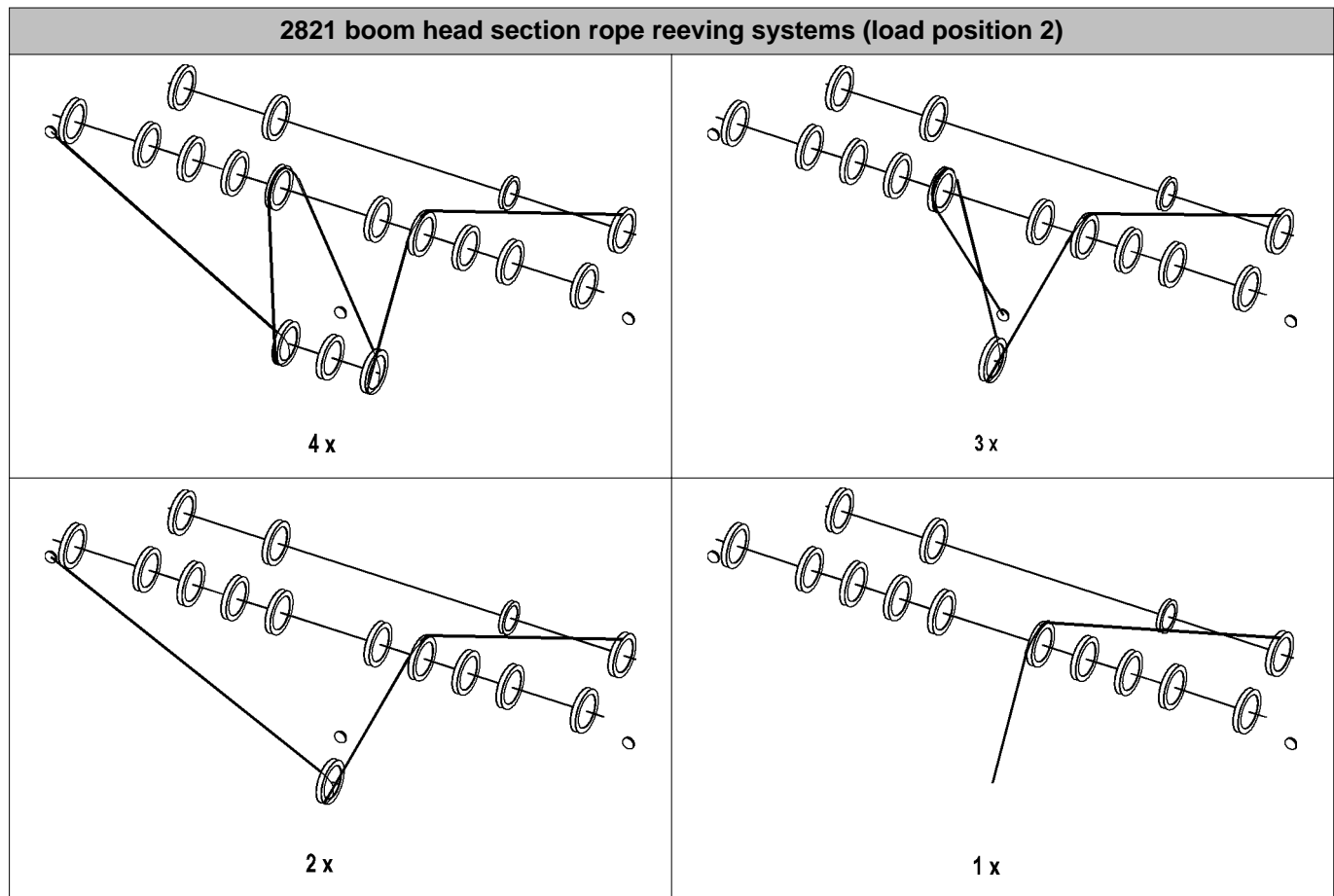
**2821 boom head section rope reeving systems (load position 2)**



2821 boom head section rope reeving systems (load position 2)



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Tab. 303 2821 boom head section rope reeving systems (load position 2)



## 7.12 Assembling the fixed jib

Ensure that the following conditions are satisfied:

- Assembly mode is selected.
- 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.

### 7.12.1 Notes

The assembly of the fixed jib described below applies to all system sizes of 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.

### 7.12.2 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: 4.14 Programming the setup, page 438](#)) .

### 7.12.3 Unloading and positioning the jib components



**DANGER**

Slewing of uppercarriage with rear counterweight attached not permitted!  
Machine toppling over.

- ▶ Only slew the uppercarriage according to the table ([For more information see: Mounting and pinning the rear counterweight, page 643](#)).



**DANGER**

Incorrect or faulty parts/components are fit!  
Structural breakdown.

- ▶ Only use original Liebherr parts/components that are in perfect condition.



**DANGER**

Incorrect configuration of the boom!  
Structural breakdown.

- ▶ Ensure that the assembled boom configuration is compatible with the programmed setup.



**DANGER**

Incorrect boom section arrangement!  
Structural breakdown.

- ▶ Assemble the boom according to the relevant system requirements.
- ▶ A boom section measuring 20 ft cannot be replaced by two boom sections measuring 10 ft.
- ▶ A boom section measuring 40 ft cannot be replaced by two boom sections measuring 20 ft.

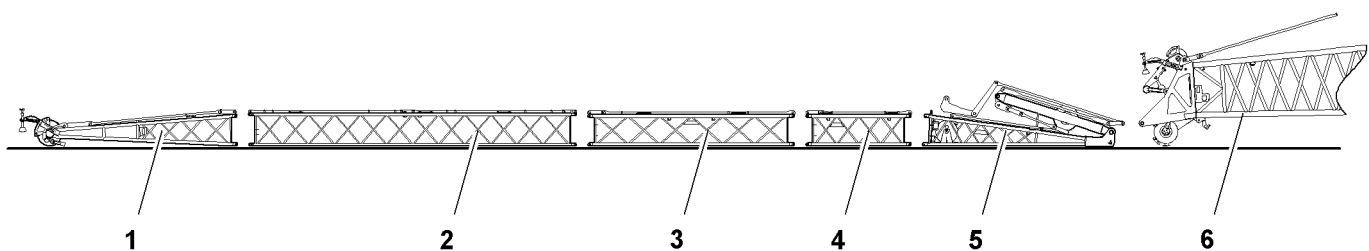


Fig. 2451 Position jib components according to relevant system instructions

- |   |                          |   |                          |   |                   |
|---|--------------------------|---|--------------------------|---|-------------------|
| 1 | Jib head section         | 3 | Jib section 19' 8" ft-in | 5 | Jib base section  |
| 2 | Jib section 39' 4" ft-in | 4 | Jib section 9' 10" ft-in | 6 | Boom head section |

- ▶ Direct transport vehicles with boom sections.
- ▶ Sling boom sections by attaching assembly rigging to the lifting points.
- ▶ Unload boom sections using the basic machine or assist crane and position according to the relevant system instructions.

## 7.12.4 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.

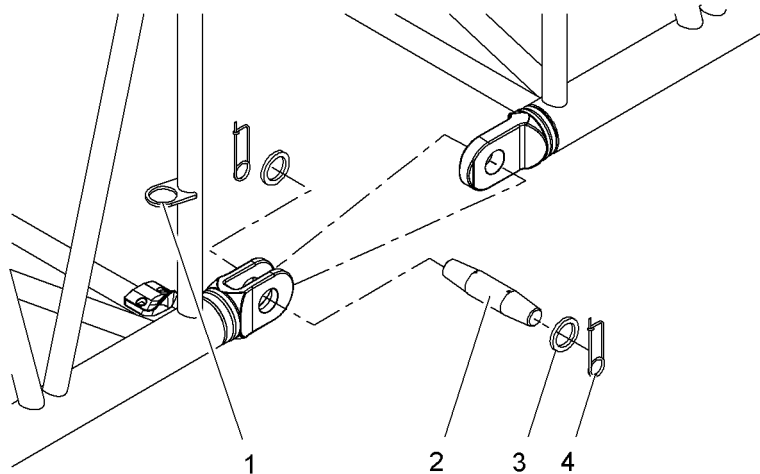


Fig. 2452 Bolting the boom

- |   |   |   |                  |
|---|---|---|------------------|
| 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.

## 7.12.5 Attaching the jib base section

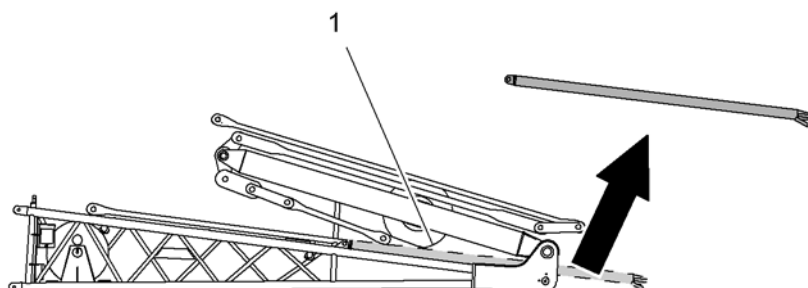


Fig. 2453 Removing rigid tilting-back supports

- |   |                                  |
|---|----------------------------------|
| 1 | Rigid tilting-back supports (2x) |
|---|----------------------------------|



### Note

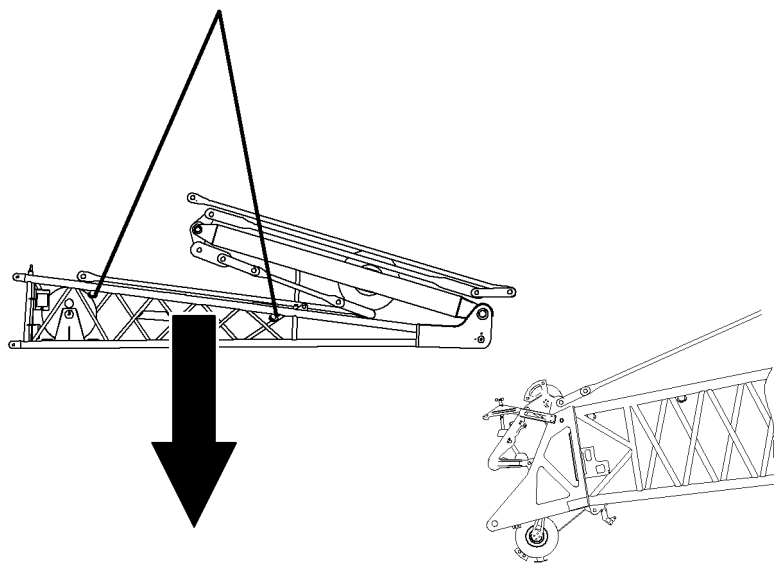
- ▶ To make it easier to attach the jib base section: remove the rigid tilting-back supports 1 of the fixed jib.



### Note

If the jib base section crossbar (jib backstay strap) extends a long way over the pin connection points:

- ▶ Fold the jib base section crossbar (jib backstay strap) on A-frame 2 to the front in order to make attaching the jib base section easier.
- ▶ Sling the jib base section by attaching assembly rigging to the lifting points.



*Fig. 2454 Lifting the jib base section to the boom head section*

- ▶ Lift the jib base section from above onto the boom head section.
- ▶ Lower the jib base section further until the pin connection points of the jib base section and the boom head section line up.

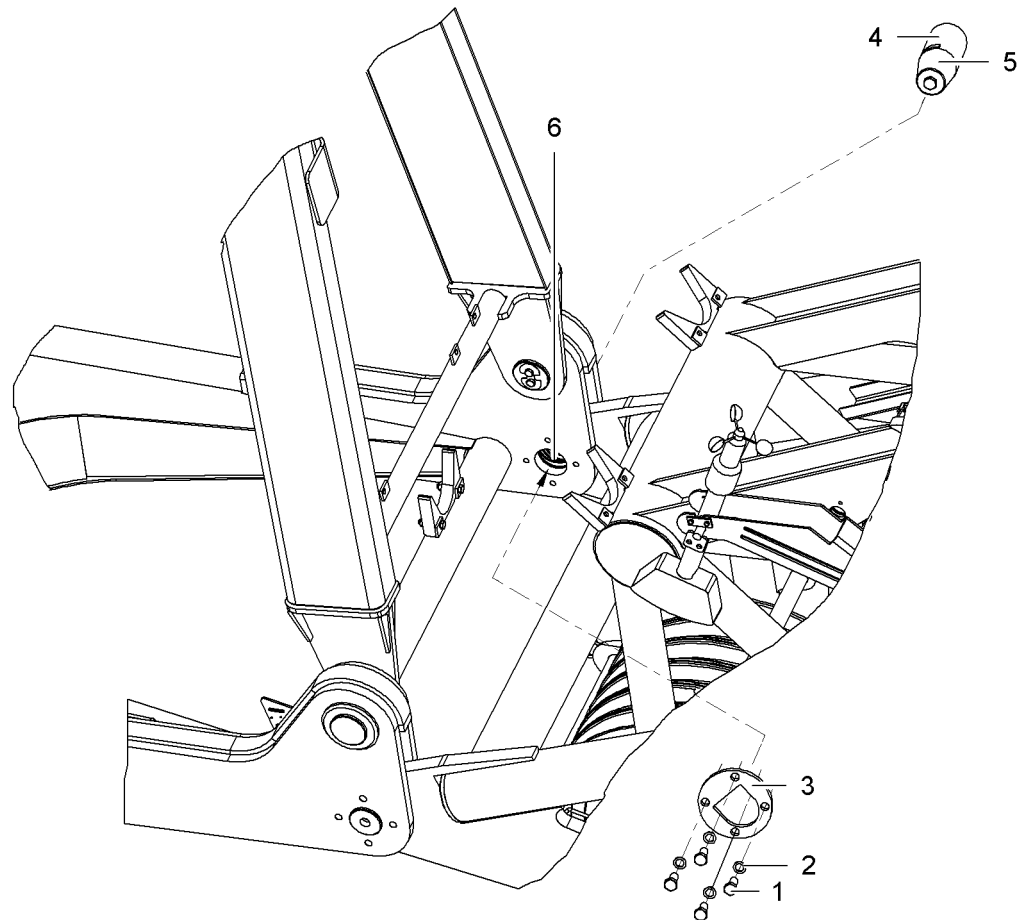


Fig. 2455 Bolting the jib base section to the boom head section

- |   |               |   |                            |
|---|---------------|---|----------------------------|
| 1 | Screws (4x)   | 4 | Notch                      |
| 2 | Washers (4x)  | 5 | Pin                        |
| 3 | Locking plate | 6 | Pin connection points (2x) |

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 plate **3** over the pin **5** and place in the notch **4**.
- ▶ Secure the locking plate **3** with pins **1** and washers **2**.
- ▶ Repeat the pin insertion process on the opposite side.

### 7.12.6 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.

### 7.12.7 Pinning the pendant straps

- ▶ Remove safety pins from the transport brackets for pendant straps.

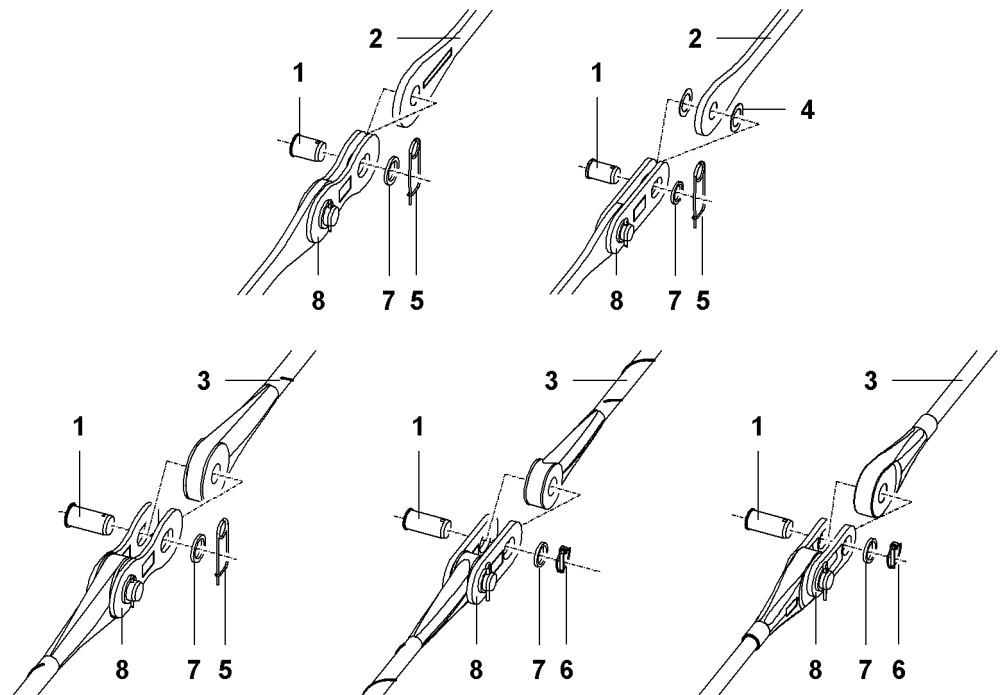


Fig. 2456 Bolt the pendant straps (schematic diagram of various pendant straps)

1 Pin	5 Safety pin
2 Steel pendant strap	6 Lynch pin
3 Carbon-fibre pendant strap	7 Washer
4 Plastic washers (2x)	8 Connecting link

- ▶ Remove the pin 1 on the connecting link 8.
- ▶ Position the pendant strap 2 **bzw.** 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.

### 7.12.8 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 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.

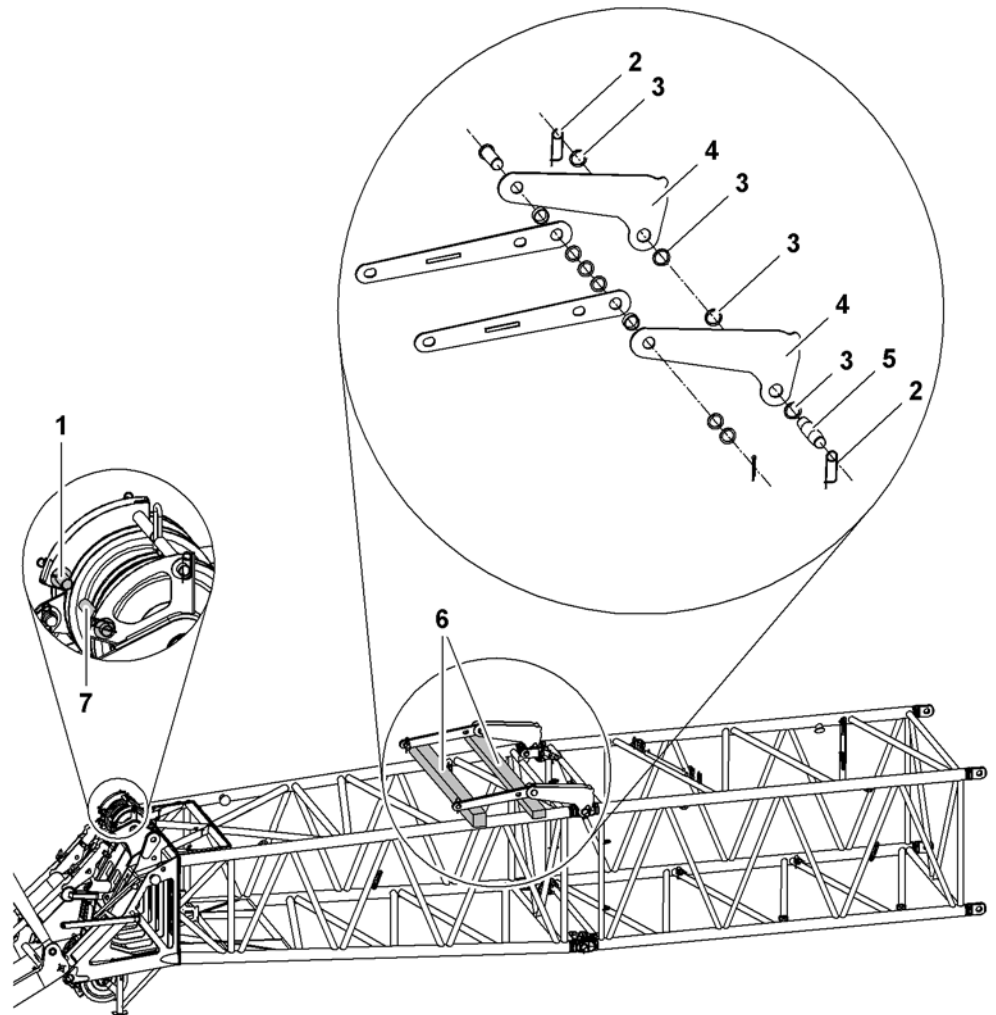


Fig. 2457 Attaching connecting links to the boom head section

- |   |                       |   |   |
|---|-----------------------|---|---|
| 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!  
Risk of damage to the hoist rope on winch1 or winch2.

If the hoist rope on winch1 is reeved over the jib head section:

- ▶ remove rope protection pipe 1.

If the hoist rope on winch2 is reeved over the jib head section:

- ▶ remove rope protection pipe 7.

- ▶ Remove rope protection pipes 1 + 7 as necessary.

### 7.12.9 Attaching the main boom (self-assembly system)



#### Note

Particular approach when using the self-assembly system!

- ▶ Attach the main boom to the basic machine.

### 7.12.10 Pinning the A-frame 2 equaliser to the main boom

To pin the equaliser of A-frame 2 to the connecting links on the main boom, A-frame 2 must be erected using the hoist rope as far as necessary to enable pinning.

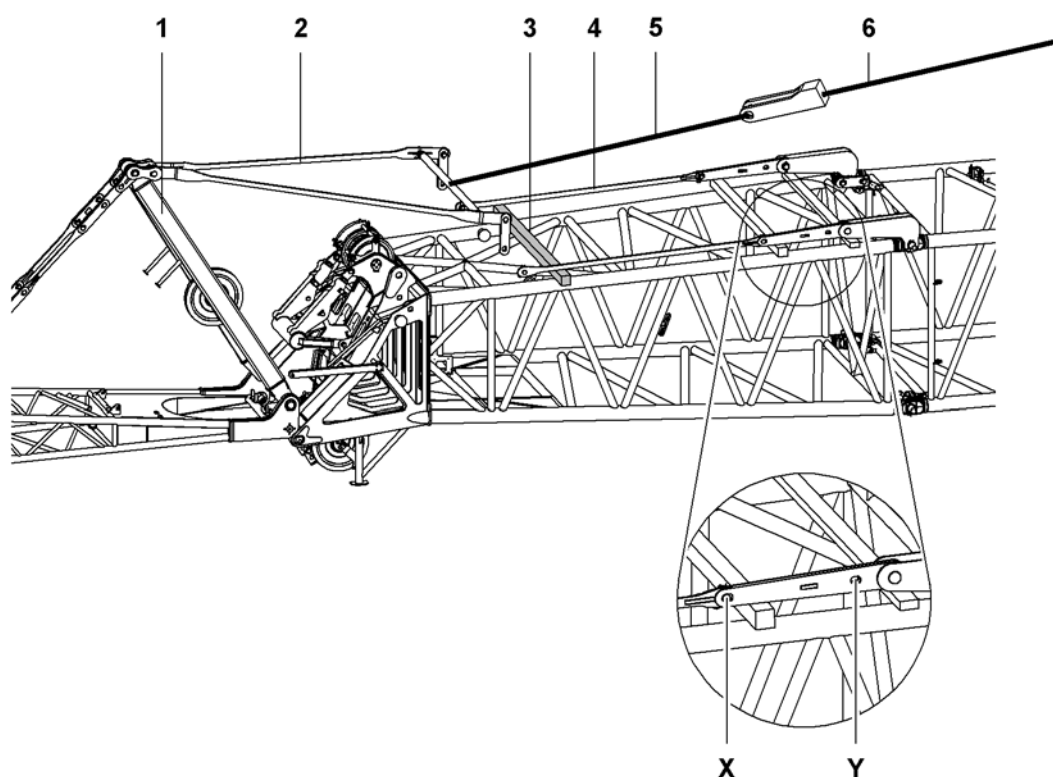


Fig. 2458 Pinning the A-frame 2 equaliser to the main boom

- |   |                          |   |                          |
|---|--------------------------|---|--------------------------|
| 1 | A-frame 2                | 5 | Round sling              |
| 2 | A-frame 2 equaliser      | 6 | Hoist rope               |
| 3 | Wooden block             | X | Tensioning position 30 ° |
| 4 | Jib backstay straps (2x) | Y | Tensioning position 15 ° |

- ▶ Separate the jib backstay straps 4 from A-frame 2 equaliser 2.



#### WARNING

Connecting links are bolted incorrectly on the 0906 jib!  
The 0906 jib could topple backwards during crane operation.

- ▶ Only pin the connecting links at the 30 ° X tensioning position.



- ▶ Pin the jib backstay straps **4** to connecting links at 15 ° **Y** or 30 ° **X** (0906 jib only at 30 °).
- ▶ Secure the pins with washers and safety pins.
- ▶ Attach the hoist rope **6** to the round sling **5** and rope lock on A-frame 2 equaliser **2**.
- ▶ Wind up the hoist rope.
  - ▷ A-frame 2 **1** will move backwards.
- ▶ Pin the jib backstay straps to the A-frame 2 equaliser.
- ▶ Secure the pins with washers and safety pins.



**WARNING**

Tilting-back supports are missing!  
The jib could topple backwards during crane operation.

- ▶ Fit tilting-back supports.

- ▶ Re-fit the tilting-back supports that were removed earlier.

After pinning the jib backstay straps:

- ▶ Unwind the hoist rope.
- ▶ Remove the hoist rope from the rope lock.
- ▶ Remove the rope lock from the round sling and place in temporary storage.



**Note**

If the hoist rope is not subsequently reeved:

- ▶ Wind up the hoist rope.

### 7.12.11 Bolt the jib backstay straps (1507 jib)

- ▶ Remove safety pins from the transport brackets for jib backstay straps.

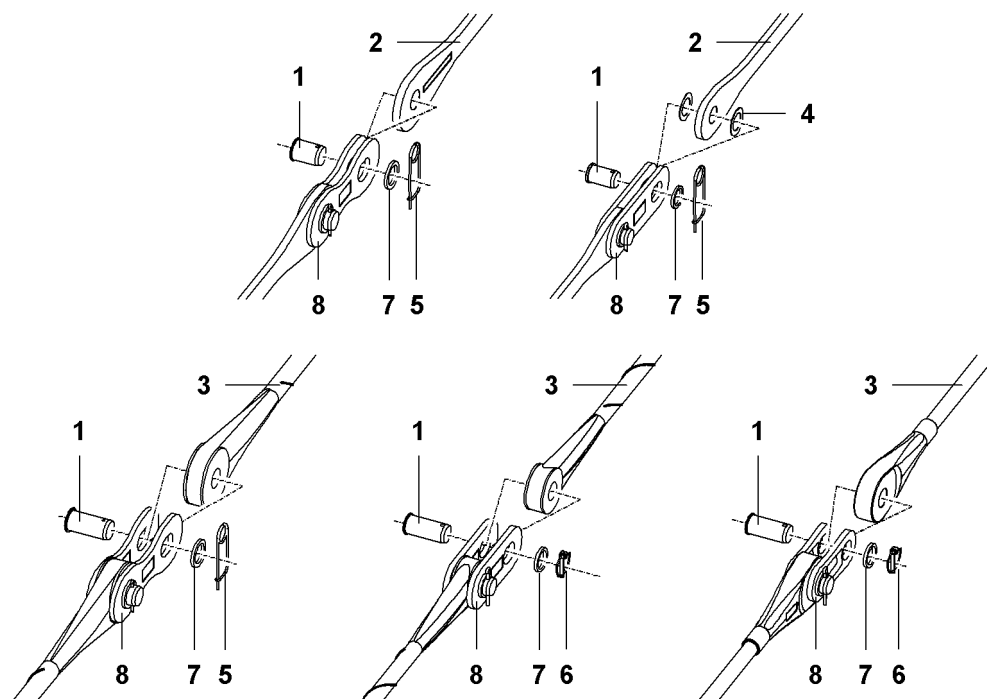


Fig. 2459 Schematic diagram of different pendant straps and backstay straps

- |   |                            |   |                 |
|---|----------------------------|---|-----------------|
| 1 | Pin                        | 5 | Safety pin      |
| 2 | Jib backstay strap (steel) | 6 | Linch pin       |
| 3 | Jib backstay strap (CFRP)  | 7 | Washer          |
| 4 | Plastic washers (2x)       | 8 | Connecting link |

- ▶ Remove the pin 1 on the connecting link 8.
- ▶ Position the jib backstay strap 2 **bwz.** 3 between the two connecting links 8.  
**or**
- 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 safety pin 5 or lynch pin 6.

### 7.12.12 Fit connecting elements and spacer brackets on the jib backstay strap (1507 jib)

#### NOTICE

Incorrect assembly positions of connecting elements and spacer brackets!  
Damage to the pendant and backstay straps.

- ▶ Fit connecting elements and spacer brackets according to relevant system instructions.

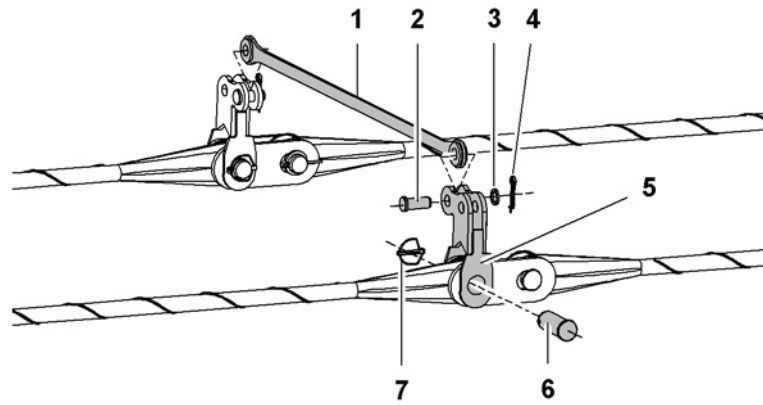


Fig. 2460 Fit connecting elements and spacer brackets on the backstay straps

- |   |                |   |                    |
|---|----------------|---|--------------------|
| 1 | Spacer bracket | 5 | Connecting element |
| 2 | Pin            | 6 | Pin                |
| 3 | Washer         | 7 | Linch pin          |
| 4 | Safety pin     |   |                    |

- ▶ Bolt the connecting element **5** and jib backstay strap.
- ▶ Secure the pin **6** with a washer and linch pin **7**.
- ▶ Pin connecting element **5** and spacer bracket **1**.
- ▶ Secure the pin **2** with washer **3** and retaining spring **4**.

### 7.12.13 Bolting the equaliser of A-frame 2 to the main boom (1507 jib)

To pin the equaliser of A-frame 2 to the connecting links on the main boom, A-frame 2 must be erected using the hoist rope as far as necessary to enable pinning.

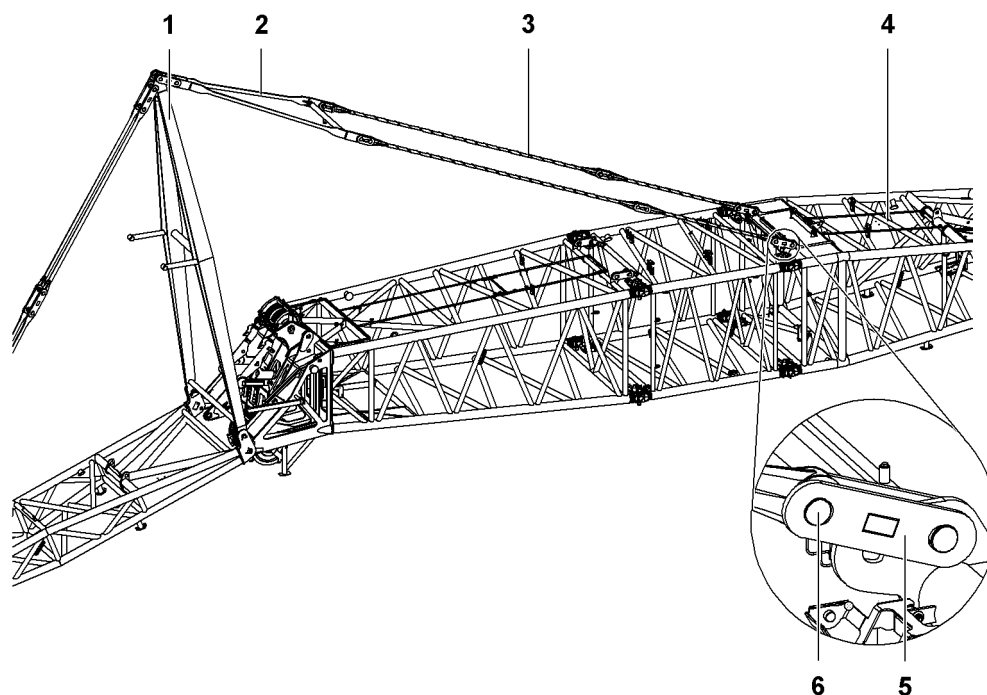


Fig. 2461 Bolting the equaliser on A-frame 2 to the main boom

1	A-frame 2	4	Jib base section
2	A-frame 2 equaliser	5	Connecting links (2x)
3	Jib backstay straps (2x)	6	Pins (2x)

- ▶ Attach the hoist rope to the round sling and rope lock on the equaliser of A-frame 2 2.
- ▶ Wind up the hoist rope.
  - ▷ A-frame 2 1 will move backwards.
- ▶ Bolt the jib backstay straps 3 using connecting links 4.



#### WARNING

Tilting-back supports are missing!  
The jib could topple backwards during crane operation.

- ▶ Fit tilting-back supports.
- 
- ▶ Secure the pins 5 with washers and safety pins.
- After pinning the jib backstay straps:
- ▶ Unwind the hoist rope.
  - ▶ Remove the hoist rope from the rope lock.
  - ▶ Remove the rope lock from the round sling and place in temporary storage.

**Note**

If the hoist rope is not subsequently reeved:

- ▶ Wind up the hoist rope.

## 7.12.14 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 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 locking 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 locking pin to 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.

## 7.12.15 Fitting the helicopter warning light



### Note

The use of helicopter warning lights is mandatory according to national and local regulations!

- ▶ Before using the machine, familiarise yourself with national and local regulations.

Ensure that the anemometer has not yet been fitted.

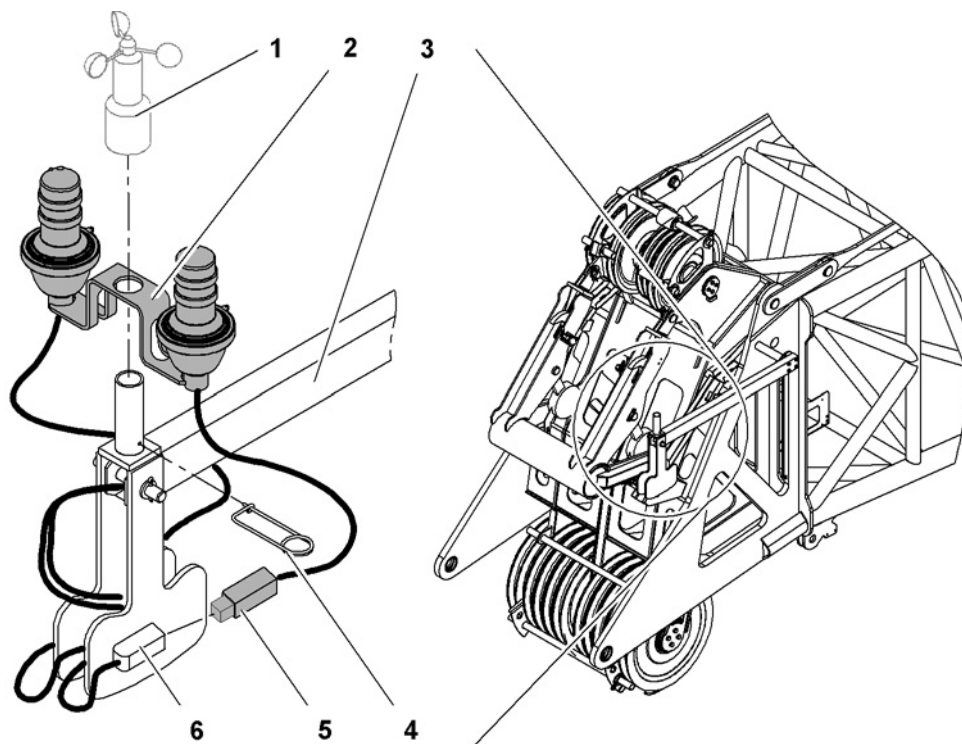


Fig. 2462 Fitting the helicopter warning light

- |   |                          |   |            |
|---|--------------------------|---|------------|
| 1 | Anemometer               | 4 | Safety pin |
| 2 | Helicopter warning light | 5 | Plug       |
| 3 | Mount                    | 6 | Coupling   |

- ▶ Place the helicopter warning light 2 on the tube.
  - ▷ The helicopter warning light locks into position on the pipe and axis on the mount 3.

### NOTICE

Safety pin is not fit properly!  
Damage to the cable.

- ▶ Insert the safety pin carefully.
- 
- ▶ Insert the safety pin 4.
    - ▷ Helicopter warning light 2 is secured.
  - ▶ Connect the plug 5 to the coupling 6.
  - ▶ Lock the plug.

## 7.12.16 Fitting the anemometer

Ensure that the helicopter warning light (if available) is fitted.

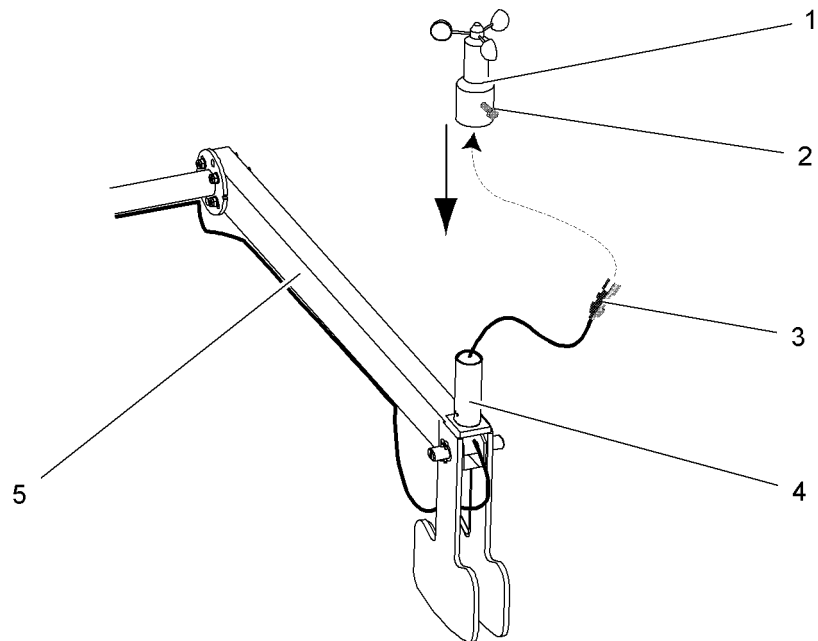


Fig. 2463 Fitting the anemometer

- |   |                    |   |       |
|---|--------------------|---|-------|
| 1 | Anemometer         | 4 | Tube  |
| 2 | Screw              | 5 | Mount |
| 3 | Circular connector |   |       |

- ▶ Remove the rubber protection cap from the circular connector 3.
- ▶ Connect the circular connector 3 to the anemometer 1 at the bottom.
- ▶ Fasten the circular connector 3 using the lock nut.

### NOTICE

Anemometer is not fit properly!  
Damage to the cable.

- ▶ Pull the cable present through the tube before pushing on the anemometer.

- ▶ Position the anemometer 1 on the tube 4.
- ▶ Secure the anemometer on the mount: tighten the screw 2 moderately.

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.

### 7.12.17 Attaching the rope fixing point



**DANGER**

Incorrect installation of pins and pocket lock!  
Load breakaway.

► Fit pins and pocket lock as instructed.

The pin shoulder and the pocket lock opening determine the fitting direction of the rope fixing point.

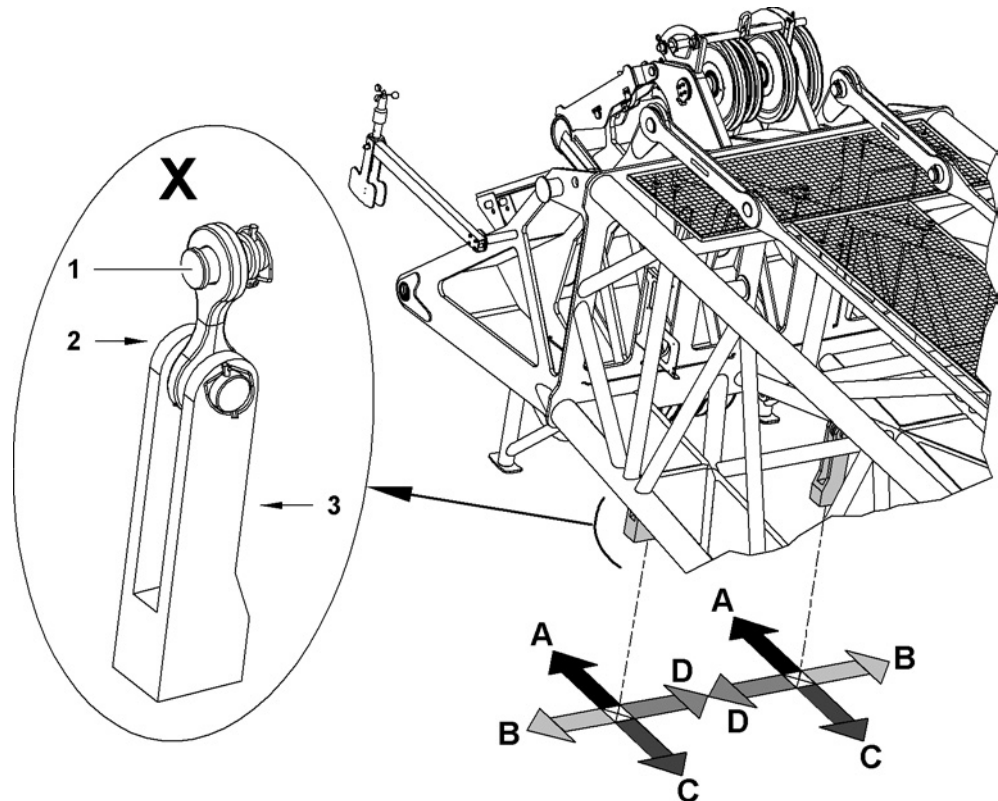


Fig. 2464 Schematic diagram for determining the fitting direction of the components needed for fitting the rope fixing point

- |   |                             |
|---|-----------------------------|
| <b>X</b> Components needed for fitting      | <b>A</b> Facing boom head   |
| <b>1</b> Shoulder of pin on the boom        | <b>B</b> Outside            |
| <b>2</b> Shoulder of pin on the pocket lock | <b>C</b> Facing the machine |
| <b>3</b> Pocket lock opening                | <b>D</b> Inside             |

Fitting direction of the components needed for fitting the rope fixing point			
	Shoulder of pin on the boom	Pin shoulder on the pocket lock	Pocket lock opening
ALL rope fixations	D	C	B
<b>Exceptions:</b>			
0906 fixed jib head section	B	C	B

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Fitting direction of the components needed for fitting the rope fixing point			
	Shoulder of pin on the boom	Pin shoulder on the pocket lock	Pocket lock opening
1507 fixed jib head section	B	C	B

Tab. 304 Fitting direction of the components needed for fitting the rope fixing point



**WARNING**

Incorrectly fit swivels!

- ▶ Fit rope with no twists.
- ▶ Install the rope without swivels.

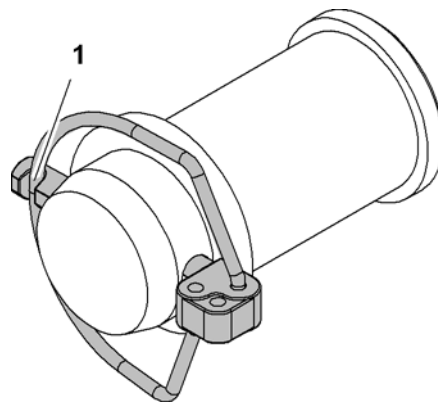


Fig. 2465 Linch pin

1 Linchpin latched



**DANGER**

Pins are not completely secure!  
Load breakaway.

- ▶ Ensure that the linchpin fasteners are properly latched.

**Rope fixing point on the boom head**

- ▶ Pin the cross strap on the boom head.
- ▶ Secure the pin with a washer and linchpin.
- ▶ Pin the pocket lock to the boom head cross strap.
- ▶ Secure pin with linchpin.

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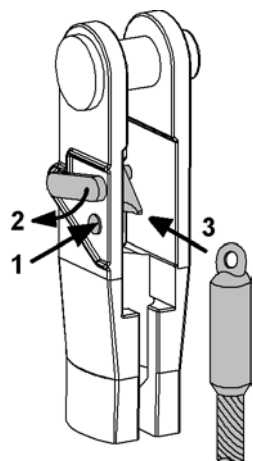


Fig. 2466 Fasten the rope termination in the pocket lock

- |   |               |   |                  |
|---|---------------|---|------------------|
| 1 | Safety button | 3 | Rope termination |
| 2 | Safety latch  |   |                  |

- ▶ Press the safety button **1**.
- ▶ Press and hold down the safety latch **2**.
- ▶ Insert the rope termination **3** into the pocket lock.



---

#### **DANGER**

Rope termination not completely secure!  
Load breakaway.

- ▶ Ensure that the safety latch is engaged.
- 

- ▶ Release the safety latch.
  - ▷ The safety latch engages.

#### **Rope fixing point on hook/pulley block**

- ▶ Pin the pocket lock to the hook/pulley block.
- ▶ Secure pin with linchpin.

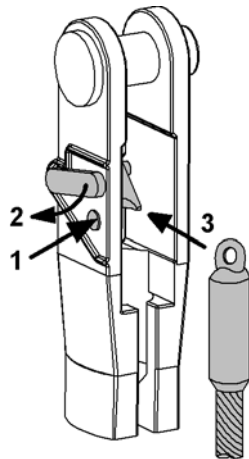


Fig. 2467 Fasten the rope termination in the pocket lock

- |  |                           |
|--|---------------------------|
| <p>1 Safety button</p> <p>2 Safety latch</p> | <p>3 Rope termination</p> |
|--|---------------------------|

- ▶ Press the safety button.
- ▶ Press and hold down the safety latch.
- ▶ Insert the rope termination into the pocket lock.



**DANGER**

Rope termination not completely secure!  
Load breakaway.

- ▶ Ensure that the safety latch is engaged.
- 
- ▶ Release the safety latch.
    - ▷ The safety latch engages.

## 7.12.18 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 from the boom.

- ▶ A fall arrest system must be worn when working on the boom to prevent falling.

**Reeving the rope using a rope reeving winch**

- ▶ Remove the rope protection pipes on the boom and the pulley block.
- ▶ Open up the rope guide (if present).
- ▶ Set the rope lug to free-wheel.
- ▶ Unwind the luffing rope and guide it through the pulleys.
- ▶ Pull the luffing rope under the boom to the boom head.
- ▶ Reeve the luffing rope according to the rope reeving system.

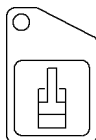
- ▶ Pull the luffing rope on the boom to the basic machine and connect to the hoist rope.
- ▶ Stop the free-wheel of the rope reeving winch.



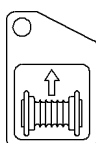
### WARNING

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.



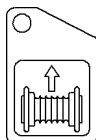
- ▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button on control panel X23.
  - ▷ Cylinder adjustment functions on.



- ▶ Press and hold down the *Rope reeving winch* button on control panel X11.
  - ▷ The rope reeving winch winds up the luffing rope and tensions the hoist rope.

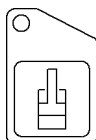
There must be no slacking of the rope when unwinding.

- ▶ Unwind the hoist rope as far as the rope fixing point.



- ▶ Press the *Rope reeving winch* button on control panel X11.
  - ▷ Rope reeving winch switched off.

- ▶ Detach the luffing rope from the hoisting rope.
- ▶ Switch the rope lug back on.
- ▶ Wind up the remaining luffing rope.
- ▶ Switch off the rope lug.



- ▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button again on control panel X23.
  - ▷ Cylinder adjustment functions switched off.

- ▶ Close and secure the rope guide (if present).
- ▶ Re-fit and secure the 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).

There must be no slacking of the rope when unwinding.

- ▶ Unwind the hoist rope and pull it to the boom head.
- ▶ Reeve the hoist rope according to the rope reeving system.
- ▶ Close and secure the rope guide (if present).
- ▶ Re-fit and secure the rope protection pipes.

## 7.12.19 Fitting the hoist limit switch

### NOTICE

The hoist limit switch weight has not been fitted properly!  
Risk of damage to the rope and the hoist limit switch weight.

- ▶ Fit the hoist limit switch weight with no diagonal pull.
- ▶ Always fit the hoist limit switch weight onto the inoperative hoist rope. The exception to this is in the event of single reeving.

### NOTICE

The chain on the hoist limit switch weight is too short!  
The hoist limit switch weight responds too late. The hook damages the boom head.

- ▶ Do not shorten the chain for the hoist limit switch weight.

The hoist limit switch with chain and hoist limit switch weight attached is secured to the inoperative end of the hoist rope.

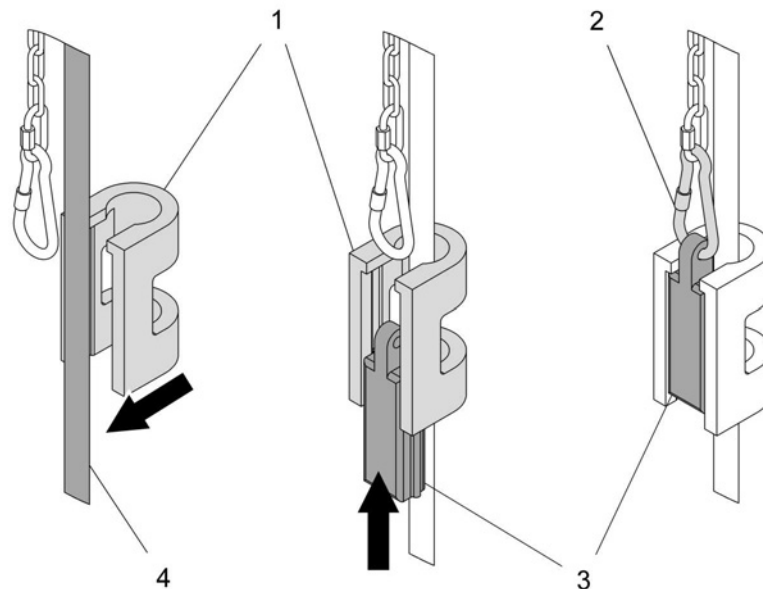


Fig. 2472 Fitting the hoist limit switch weight

- |   |                                     |   |                                   |
|---|-------------------------------------|---|-----------------------------------|
| 1 | Hoist limit switch weight (U shape) | 3 | Hoist limit switch weight (wedge) |
| 2 | Carabiner                           | 4 | Hoist rope                        |

- ▶ Route the hoist limit switch weight (U shape) 1 over the hoist rope 4.
- ▶ Insert the hoist limit switch weight (wedge) 3 from below into the hoist limit switch weight (U shape) 1.
- ▶ Attach the carabiner 2 to the hoist limit switch weight (wedge) 3.
- ▶ Attach the chain between the hoist limit switch weight and the hoist limit switch.

## 7.12.20 Bypass unused hoist limit switches.



### DANGER

The hoist limit switch has been bypassed illegally!  
Load breakaway.

- ▶ Only ever bypass unused hoist limit switches.

### NOTICE

Wrong hoist limit switch is bypassed!  
The hook damages the boom head.

- ▶ Lock winch 1 using the left hoist limit switch.
- ▶ Lock winch 2 using the right hoist limit switch.

Ensure that movement is made using only the one hoist rope, and that one hoist limit switch is not required.

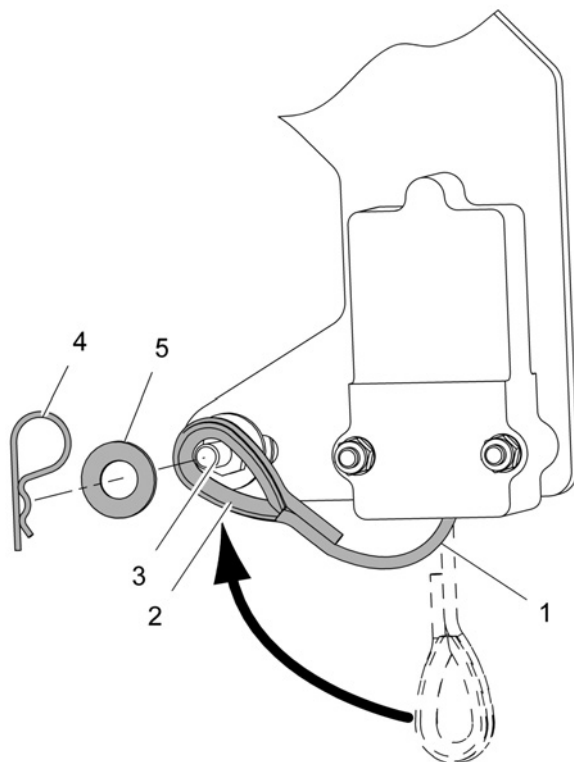


Fig. 2473 Bypassing the hoist limit switch mechanically

- |   |            |   |            |
|---|------------|---|------------|
| 1 | Steel rope | 4 | Safety pin |
| 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.
- ▶ Ensure the loop does not slip off the stud bolt by securing it with the washer 5 and safety pin 4.

## 7.12.21 Erecting a main boom + fixed jib



### DANGER

Erectability chart is not followed!  
Machine toppling over.

- ▶ Only raise the boom when erection is permitted according to the erectability chart.



### Note

The overall center of gravity of the machine is moved beyond the first running roller!

Sudden swinging of the boom/jib when erecting.

- ▶ When using long main booms and short jibs, follow the procedure for “Blocked Crawlers” (For more information see: 4.26 Blocked crawlers\*, page 500) .

Ensure that the following conditions are satisfied:

- Boom configuration can be erected with counterweight.
- All work on the boom has been completed.
- No loose parts or tools have been left on the boom.



### 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.

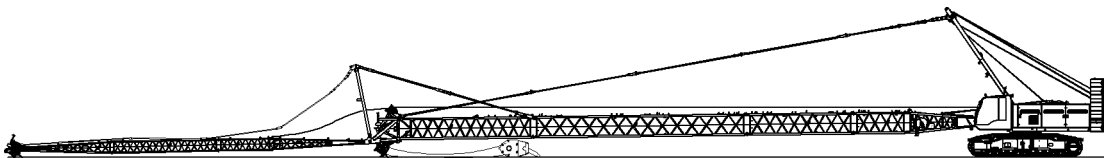


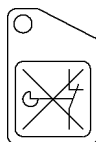
Fig. 2474 Boom on the ground



### DANGER

Hoist limit switch bypassed on control panel X23 in crane operation!

- ▶ Only bypass hoist limit switch on control panel X23 when assembling or disassembling the machine.



When the hoist limit switch weight is lying on the ground:

- ▶ Press the *Bypass limit switch* button on control panel X23.
  - ▷ All hoist limit switches are bypassed.
- ▶ Slowly wind in the boom winch.
  - ▷ The main boom pendant straps are tensioned.

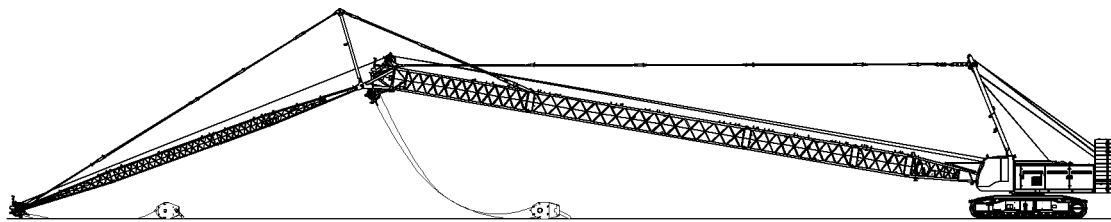


Fig. 2476 Main boom pendant straps tensioned

- ▶ Slowly wind in the boom winch.
  - ▷ The main boom lifts off the ground.
  - ▷ Jib head section remains on the ground and moves backwards on the pulleys.
  - ▷ The LML bar display on the monitor will show the current degree of capacity utilisation once the main boom angle has reached around 30 °.

---

#### 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 hoist rope, if necessary.
    - ▷ The hook/pulley block remains on the ground.



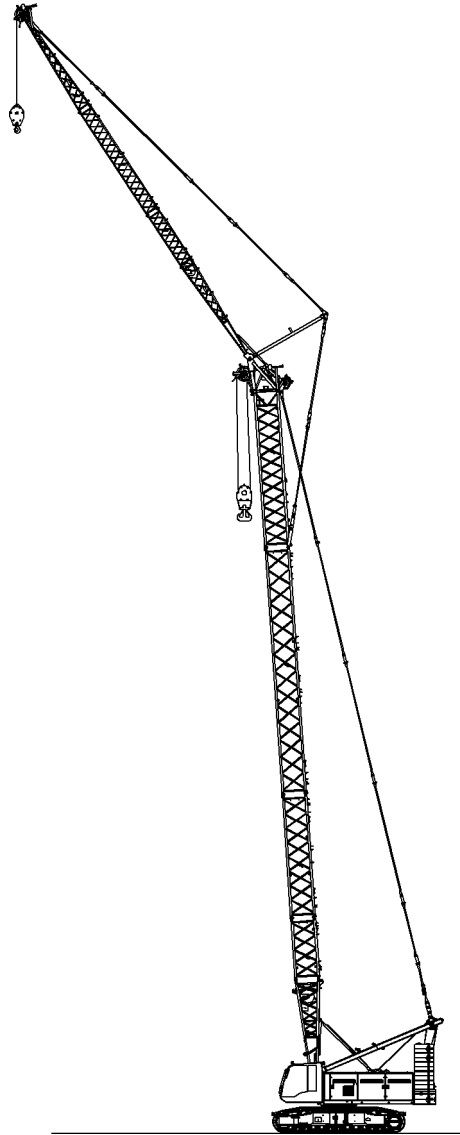


Fig. 2477 Boom erected

- ▶ Erect the boom until it is in the desired position.

## 7.12.22 Switching off assembly mode



### **DANGER**

No safety cutout by the load moment limiter (LML) in assembly mode!  
Risk of machine toppling over, structural breakdown.

- ▶ Only use assembly mode for assembling and disassembling the machine.

Ensure that the following conditions are satisfied:

- The machine is fully assembled and erected.
- All limit switches are fitted and operational.



- ▶ Press the *Assembly mode* switch on the control panel X12.

- ▷ Assembly mode is turned off.

- ▷ The lamp in the switch goes out.
- ▷ The *Assembly mode* symbol disappears.



*Fig. 2479 Assembly mode symbol*

- ▶ Lock control panel X12 and remove the key.
- ▶ Ensure that the key is kept by an authorised person outside of the cab.

### 7.12.23 Checking the limit switch works

- ▶ Slowly approach the boom limit switch and hoist limit switch and check they are working correctly.

## 7.13 2316 luffing jib

### System-relevant information for 2316 luffing jib:

- Configuration of jib
  - Mid-point suspension assembly positions
- Configuration of main boom
- Lengths of jib mid-point suspensions
- Pendant straps on 2316 fixed jib, overview (LR1300 (steel pendant straps))
- Pendant straps on 2316 fixed jib, overview (LR1300 (carbon-fibre pendant straps))
- 2316 jib head section rope reeving systems (load position 1)
- 2821 boom head section rope reeving systems (load position 2)
- Auxiliary jib rope reeving systems on 2316 jib head section (load position 2)

### 7.13.1 Configuration of jib



#### DANGER

Incorrect jib length assembled!  
Structural breakdown.

- ▶ Check the jib length in the load chart for validity.

Jib length	Configuration of jib (symbolic)
66 ft	
76 ft	
85 ft	
95 ft	
105 ft	
115 ft	
125 ft	
134 ft	
144 ft	
154 ft	
164 ft	
174 ft	

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# Assembly and dismantling

2316 luffing jib

Jib length	Configuration of jib (symbolic)
184 ft	
194 ft	
203 ft	
213 ft	
223 ft	
233 ft	
243 ft	
253 ft	
262 ft	
272 ft	
282 ft	
292 ft	
302 ft	
312 ft	
322 ft	
331 ft	
341 ft	
351 ft	
361 ft	
371 ft	

Tab. 305 Configuration of 2316 luffing jib

**X1** - Assembly position of mid-point suspension 1

**X2** - Assembly position of mid-point suspension 2

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### 7.13.2 Lengths of jib mid-point suspensions

Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
164 ft	9' 10" ft-in	
174 ft	9' 10" ft-in	
184 ft	8' 6" ft-in	
194 ft	8' 6" ft-in	
203 ft	6' 11" ft-in	
213 ft	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	6' 11" ft-in
223 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	5' 3" ft-in
233 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	5' 3" ft-in
243 ft	15' 5" ft-in = 6' 11" ft-in + 8' 6" ft-in	5' 3" ft-in
253 ft	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	5' 3" ft-in
262 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in
272 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	6' 11" ft-in
282 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	6' 11" ft-in
292 ft	15' 5" ft-in = 6' 11" ft-in + 8' 6" ft-in	6' 11" ft-in
302 ft	15' 5" ft-in = 6' 11" ft-in + 8' 6" ft-in	6' 11" ft-in
312 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in
322 ft	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	6' 11" ft-in
331 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	5' 3" ft-in
341 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	8' 6" ft-in
351 ft	15' 5" ft-in = 6' 11" ft-in + 8' 6" ft-in	6' 11" ft-in

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Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	
361 ft	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	8' 6" ft-in
371 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	6' 11" ft-in

Tab. 306 Lengths of jib mid-point suspensions - 2316 luffing jib

### 7.13.3 Configuration of main boom



**DANGER**

Erected length of main boom excessive!  
Structural breakdown.

- ▶ Check the main boom length in the 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: [7.4.1 Configuration of main boom, page 645](#)).

### 7.13.4 Pendant straps on 2316 luffing jib, overview (LR1300 (steel pendant straps))

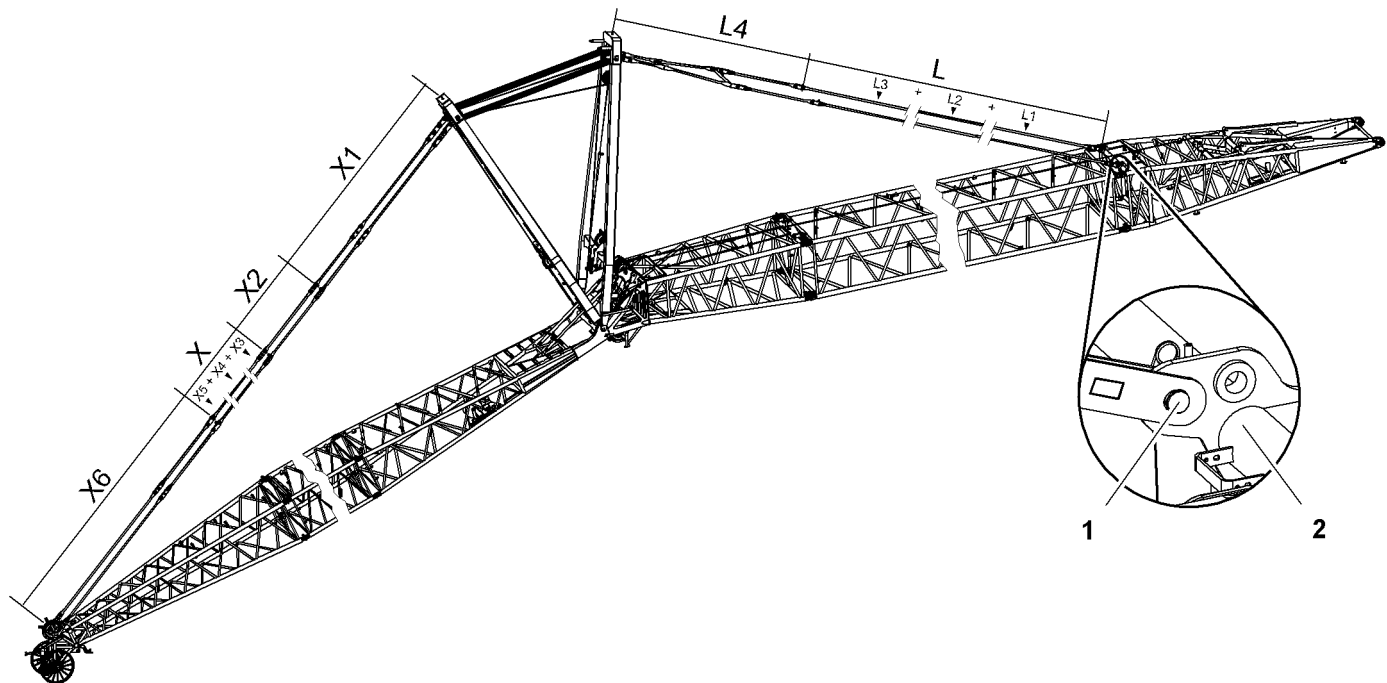


Fig. 2688 Pendant straps on 2316 luffing jib, overview (LR1300 (steel pendant straps))

- 1 Jib backstay straps pin connection point
- 2 Boom base section

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## Backstay straps connecting A-frame 2 to 2821 boom base section

Designation		Value
L	Jib backstay straps consisting of:	Total L1 + Total L2 + Total L3
	L1 Jib backstay strap 10 ft (For more information see: <a href="#">Jib backstay strap 10 ft, page 153</a> )	
	L2 Jib backstay strap 20 ft (For more information see: <a href="#">Jib backstay strap 20 ft, page 155</a> )	
	L3 Jib backstay strap 40 ft (For more information see: <a href="#">Jib backstay strap 40 ft, page 156</a> )	
L4	Equalizer on A-frame 2 (jib backstay strap) (For more information see: <a href="#">Equalizer on A-frame 2 (jib backstay strap), page 177</a> )	26' 5" ft-in

Tab. 307 Backstay straps connecting A-frame 2 to 2821 boom base section

### Configuration of jib backstay straps (L):

Required number of jib backstay straps 10 ft (L1) is the same as the number of boom sections 10 ft.

Required number of jib backstay straps 20 ft (L2) is the same as the number of boom sections 20 ft.

Required number of jib backstay straps 40 ft (L3) is the same as the number of boom sections 40 ft.



### Note

► Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the load chart.

## Pendant straps linking A-frame 3 to 2316 jib head section

Designation		Value
X1	A-frame 3 equalizer (jib pendant strap) (For more information see: <a href="#">A-frame 3 equalizer (jib pendant strap), page 178</a> )	25' 9" ft-in
X2	Jib pendant strap (For more information see: <a href="#">Jib pendant strap 10 ft, page 176</a> )	9' 10" ft-in

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Designation		Value
X	Jib pendant straps consisting of:	
	X3	Jib pendant strap 10 ft (For more information see: <a href="#">Jib pendant strap 10 ft, page 179</a> )
	X4	Jib pendant strap 20 ft (For more information see: <a href="#">Jib pendant strap 20 ft, page 179</a> )
	X5	Jib pendant strap 40 ft (For more information see: <a href="#">Jib pendant strap 40 ft, page 180</a> )
X6	Jib pendant strap on 2316 jib head section (For more information see: <a href="#">Jib pendant strap on 2316 jib head section, page 181</a> )	30' 1" ft-in

Tab. 308 Pendant straps linking A-frame 3 to 2316 jib head section

### Configuration of jib pendant straps (X):

Required number of jib pendant straps 10 ft (X3) is the same as the number of jib sections 10 ft.

Required number of jib pendant straps 20 ft (X4) is the same as the number of jib sections 20 ft.

Required number of jib pendant straps 40 ft (X5) is the same as the number of jib sections 40 ft.



### Note

- ▶ Permitted number of jib sections 10 ft, 20 ft, 40 ft can be found in the following table: ([For more information see: 7.16.1 Configuration of jib, page 854](#))



### 7.13.5 Pendant straps on 2316 luffing jib, overview (LR1300 (carbon-fibre pendant straps))

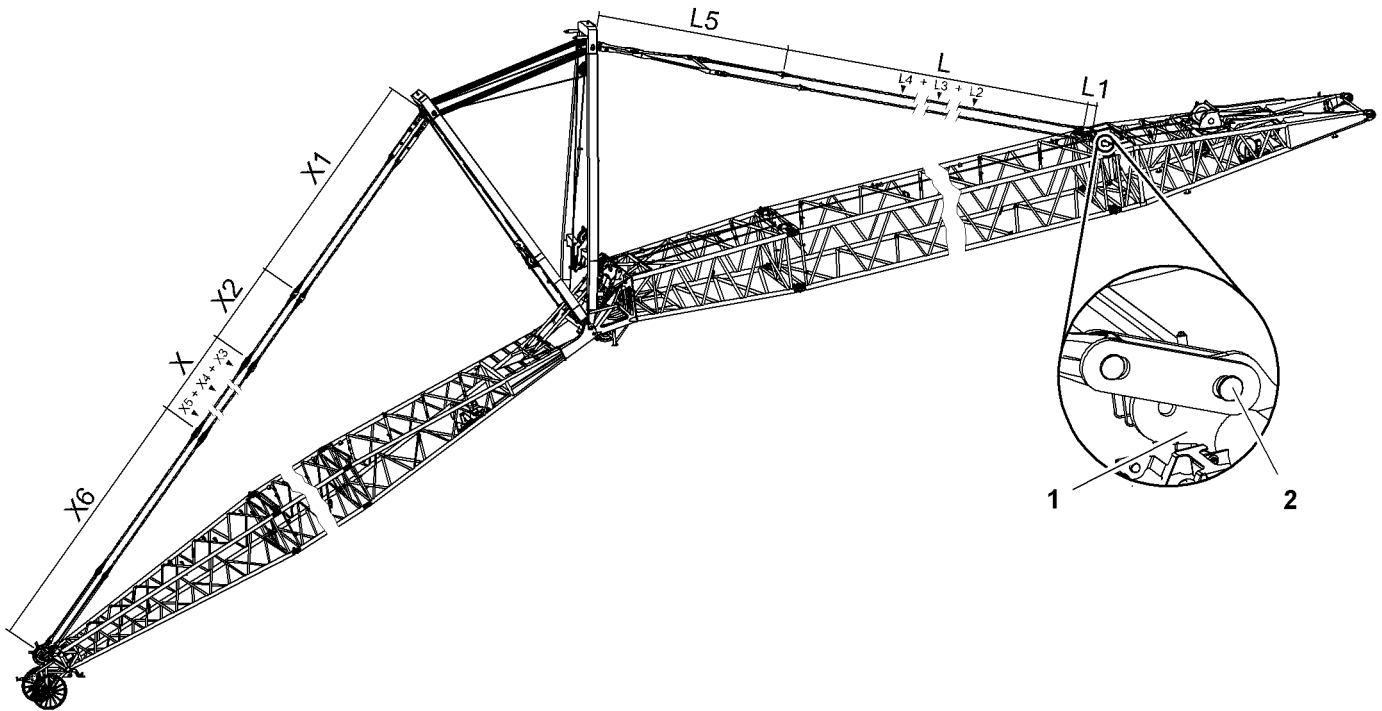


Fig. 2689 Pendant straps on 2316 luffing jib, overview (LR1300 (carbon-fibre pendant straps))

- 1 Boom base section
- 2 Jib backstay straps pin connection point

### Backstay straps connecting A-frame 2 to 2821 boom base section

Designation		Value	
L1	<b>Connecting link</b> (For more information see: <a href="#">Connecting link</a> , page 192)	1' 2" ft-in	
L	<b>Jib backstay straps</b> consisting of:		
	L2	<b>Jib backstay strap 10 ft</b> (For more information see: <a href="#">Jib backstay strap 10 ft</a> , page 194)	Total L2 +
	L3	<b>Jib backstay strap 20 ft</b> (For more information see: <a href="#">Jib backstay strap 20 ft</a> , page 197)	Total L3 +
	L4	<b>Jib backstay strap 40 ft</b> (For more information see: <a href="#">Jib backstay strap 40 ft</a> , page 200)	Total L4
L5	<b>Equalizer on A-frame 2 (jib backstay strap)</b> (For more information see: <a href="#">Equalizer on A-frame 2 (jib backstay strap)</a> , page 205)	26' 5" ft-in	

Tab. 309 Backstay straps connecting A-frame 2 to 2821 boom base section

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## Configuration of jib backstay straps (L):

Required number of jib backstay straps 10 ft (**L2**) is the same as the number of boom sections 10 ft.

Required number of jib backstay straps 20 ft (**L3**) is the same as the number of boom sections 20 ft.

Required number of jib backstay straps 40 ft (**L4**) is the same as the number of boom sections 40 ft.



### Note

► Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the load chart.

## Pendant straps linking A-frame 3 to 2316 jib head section

Designation		Value	
X1	<b>A-frame 3 equalizer (jib pendant strap)</b> (For more information see: <a href="#">A-frame 3 equalizer (jib pendant strap), page 207</a> )	25' 9" ft-in	
X2	<b>Jib pendant strap</b> (For more information see: <a href="#">Jib pendant strap 10 ft, page 205</a> )	9' 10" ft-in	
X	<b>Jib pendant straps</b> consisting of:		
	X3	<b>Jib pendant straps 10 ft</b> (For more information see: <a href="#">Jib pendant strap 10 ft, page 208</a> )	Total X3 +
	X4	<b>Jib pendant straps 20 ft</b> (For more information see: <a href="#">Jib pendant strap 20 ft, page 208</a> )	Total X4 +
	X5	<b>Jib pendant straps 40 ft</b> (For more information see: <a href="#">Jib pendant strap 40 ft, page 209</a> )	Total X5
X6	<b>Jib pendant strap on 2316 jib head section</b> (For more information see: <a href="#">Jib pendant strap on 2316 jib head section, page 210</a> )	31' 4" ft-in	

Tab. 310 Pendant straps linking A-frame 3 to 2316 jib head section

## Configuration of jib pendant straps (X):

Required number of jib pendant straps 10 ft (**X3**) is the same as the number of jib sections 10 ft.

Required number of jib pendant straps 20 ft (**X4**) is the same as the number of jib sections 20 ft.

Required number of jib pendant straps 40 ft (**X5**) is the same as the number of jib sections 40 ft.



### Note

► Permitted number of jib sections 10 ft, 20 ft, 40 ft can be found in the following table: (For more information see: [7.13.1 Configuration of jib, page 781](#))

### 7.13.6 Rope reeving system for A-frame 2/A-frame 3

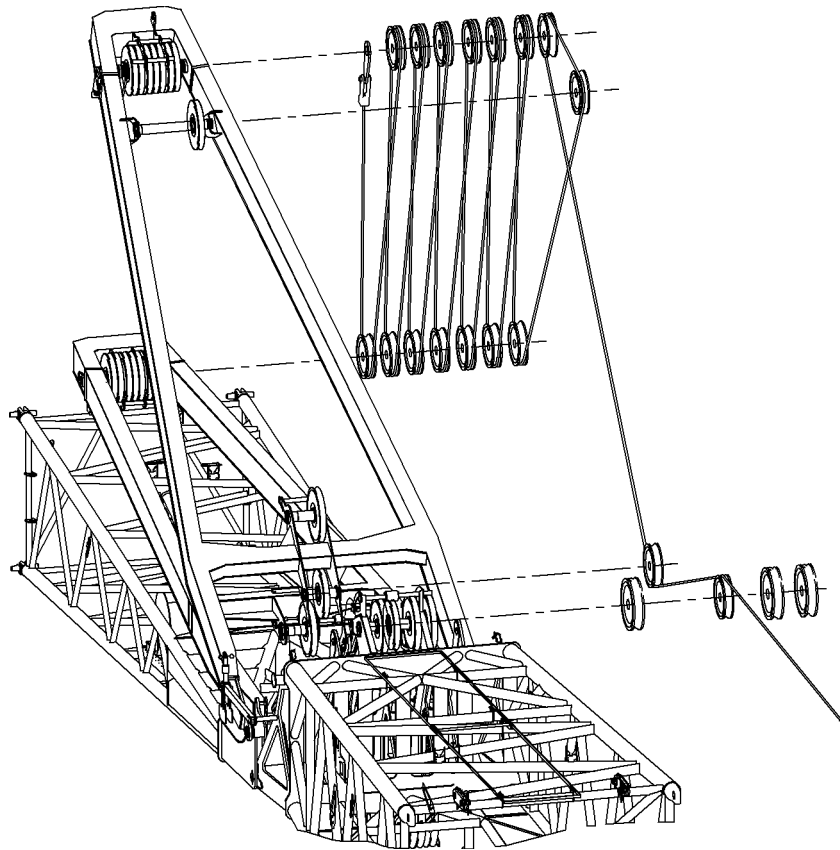


Fig. 2690 Rope reeving system for A-frame 2/A-frame 3 - 2316 luffing jib

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### 7.13.7 Run of the rope when two ropes pass over the jib head section

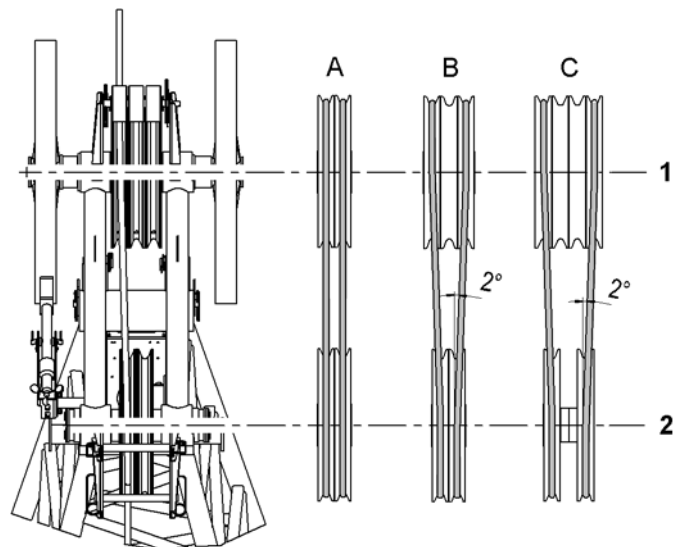


Fig. 2691 Run of the rope when two ropes pass over the jib head section

1 Jib head section roller set                      2 Jib head section gantry pulleys

Run of the rope	Jib type
A	1008 luffing jib
	1309 luffing jib
B	Luffing or fixed jib 1713
	1916 luffing jib
C	2316 luffing jib

Tab. 311 Run of the rope when two ropes pass over the jib head section

### 7.13.8 2316 jib head section rope reeving systems (load position 1)

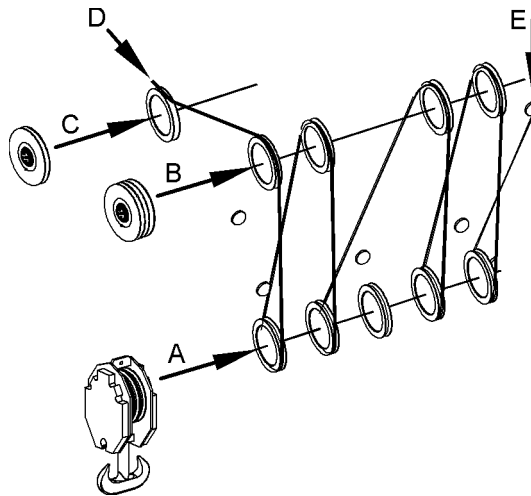


Fig. 2692 2316 jib head section rope reeving system (load position 1)

- |   |                             |
|---|-----------------------------|
| <b>A</b> Pulley block roller set        | <b>D</b> Winch 1 hoist rope |
| <b>B</b> Jib head section roller set    | <b>E</b> Rope fixation      |
| <b>C</b> Jib head section gantry pulley |                             |

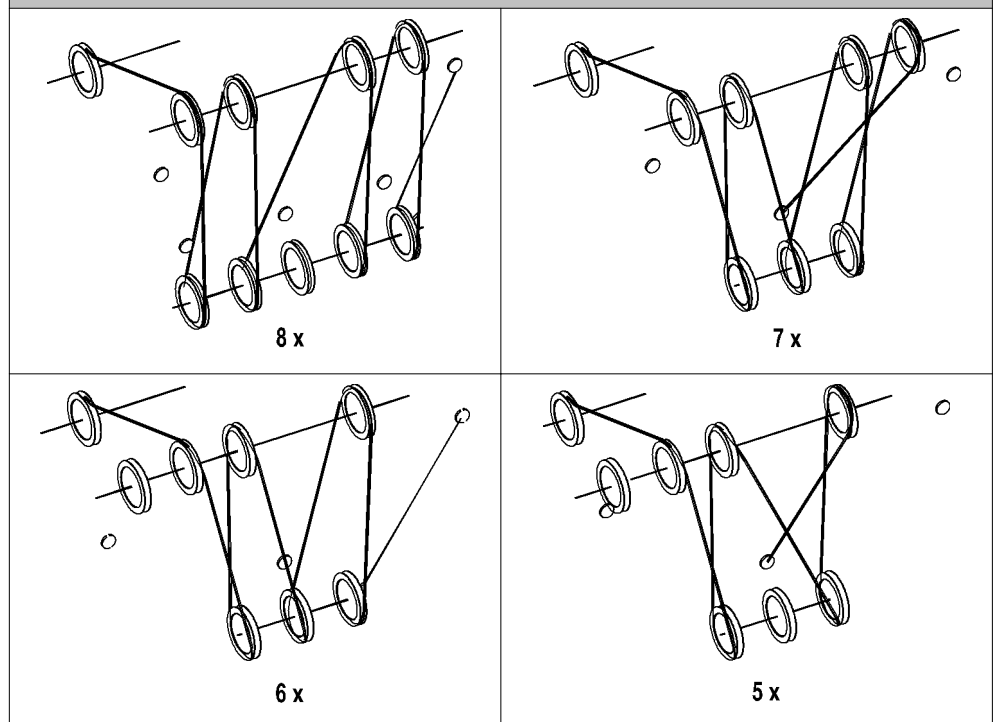


**DANGER**

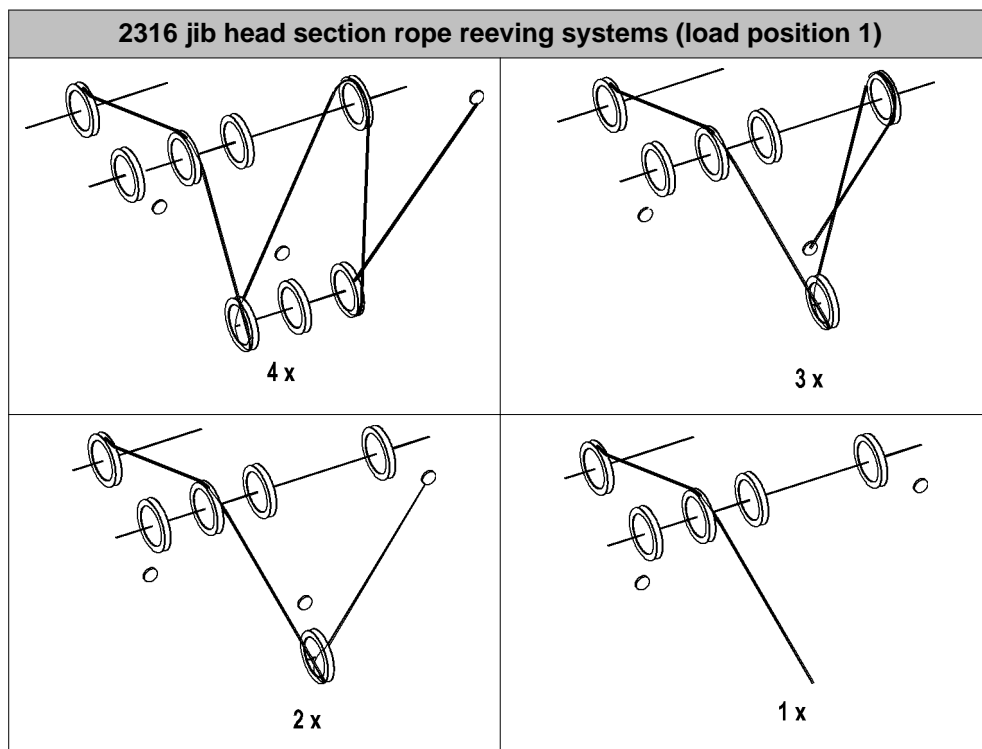
Incorrect number of reevings!  
Boom damage, machine toppling over.

► Choose the correct number of reevings as per the load chart.

**2316 jib head section rope reeving systems (load position 1)**



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Tab. 312 2316 jib head section rope reeving systems (load position 1)

### 7.13.9 2821 boom head section rope reeving systems (load position 2)

If the main boom with jib attached is used to hoist a load, then the 2821 boom head section should be reeved as shown below.

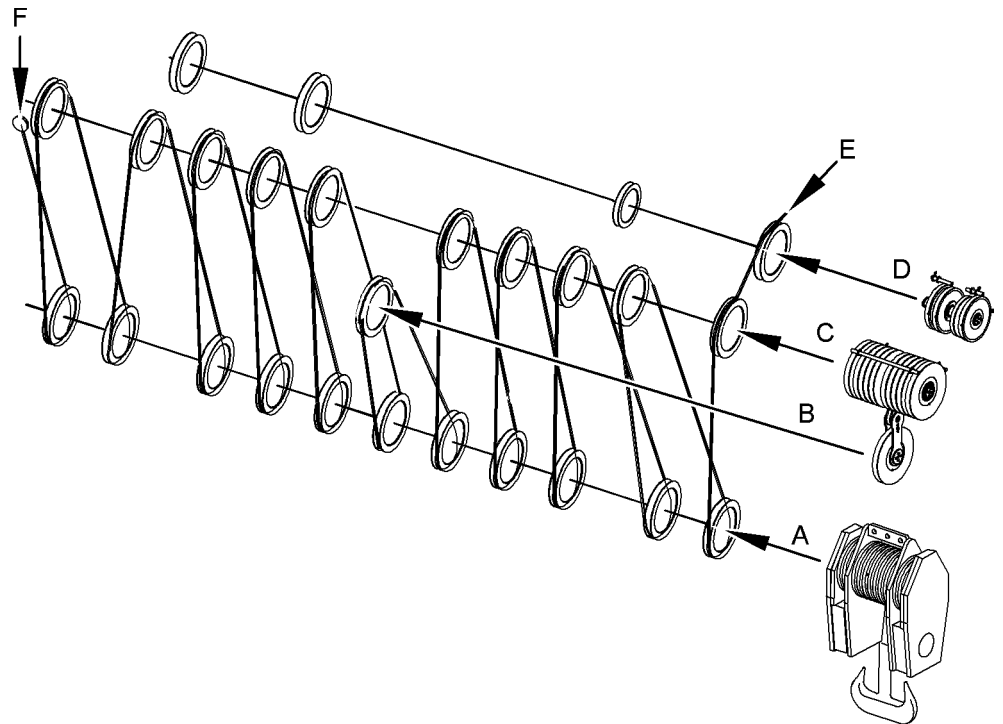


Fig. 2701 2821 boom head section rope reeving system (load position 2)

- |   |   |
|---|---|
| <b>A</b> Pulley block roller set              | <b>D</b> Boom head section gantry pulleys |
| <b>B</b> 11th pulley on the boom head section | <b>E</b> Winch 2 hoist rope               |
| <b>C</b> Boom head section roller set         | <b>F</b> Rope fixation                    |

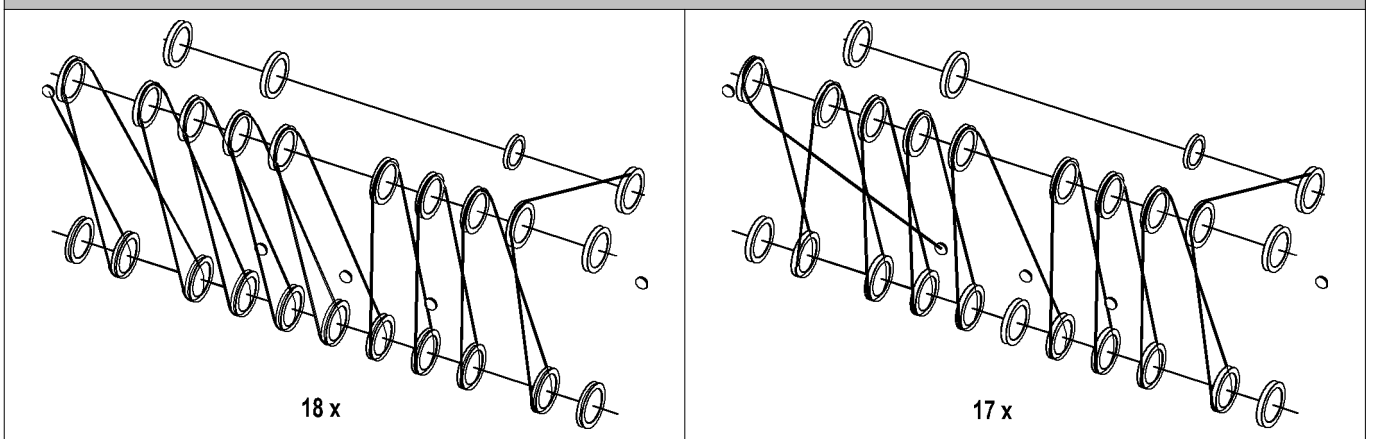


**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

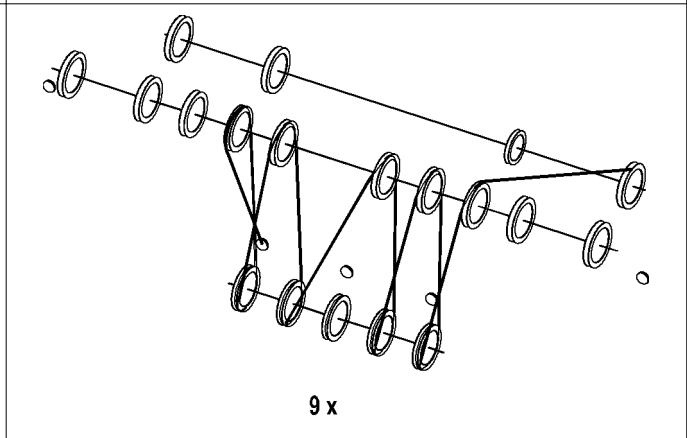
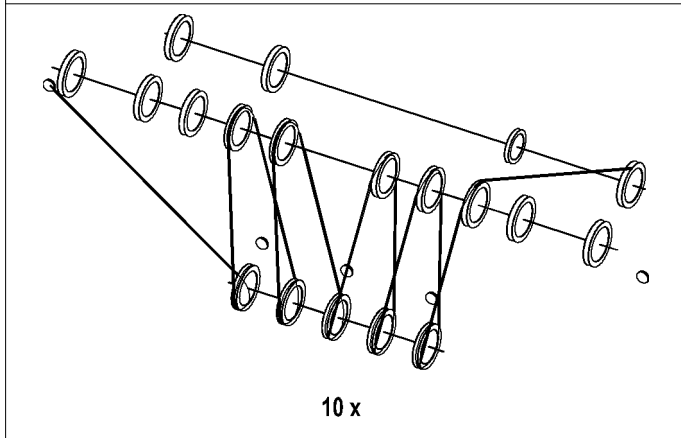
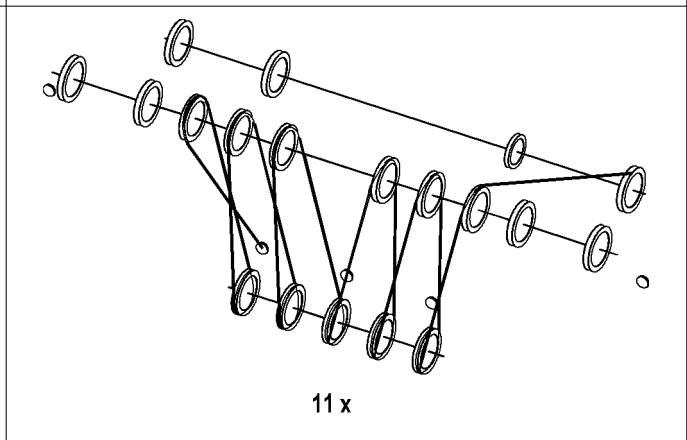
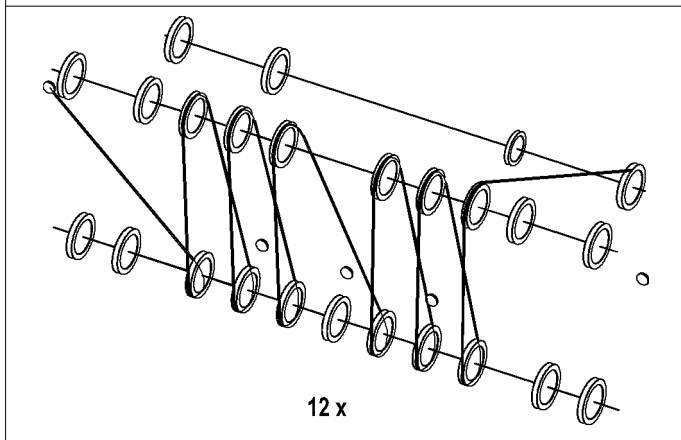
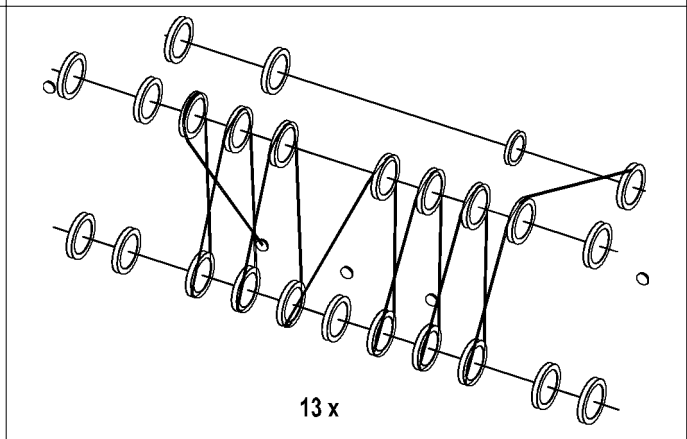
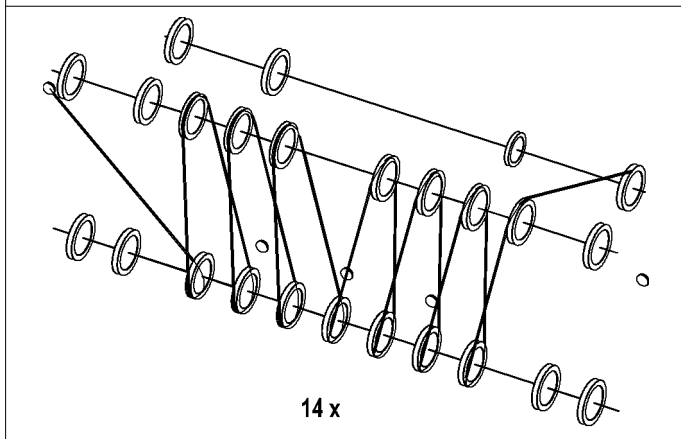
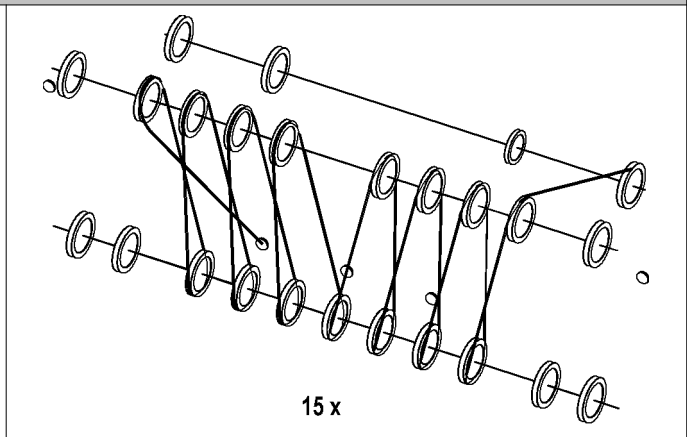
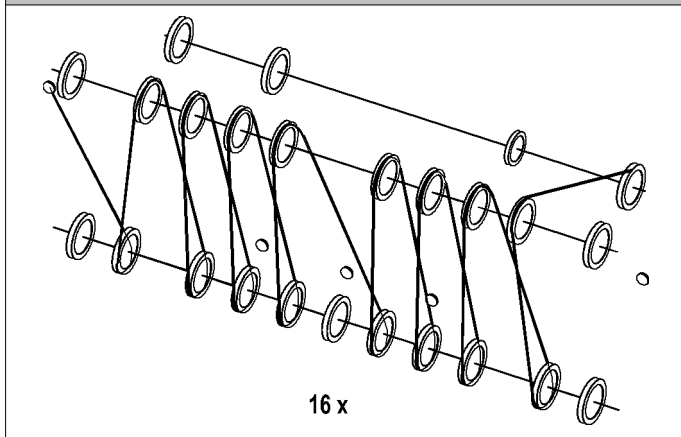
► Choose the correct number of reevings as per the load chart.

**2821 boom head section rope reeving systems (load position 2)**



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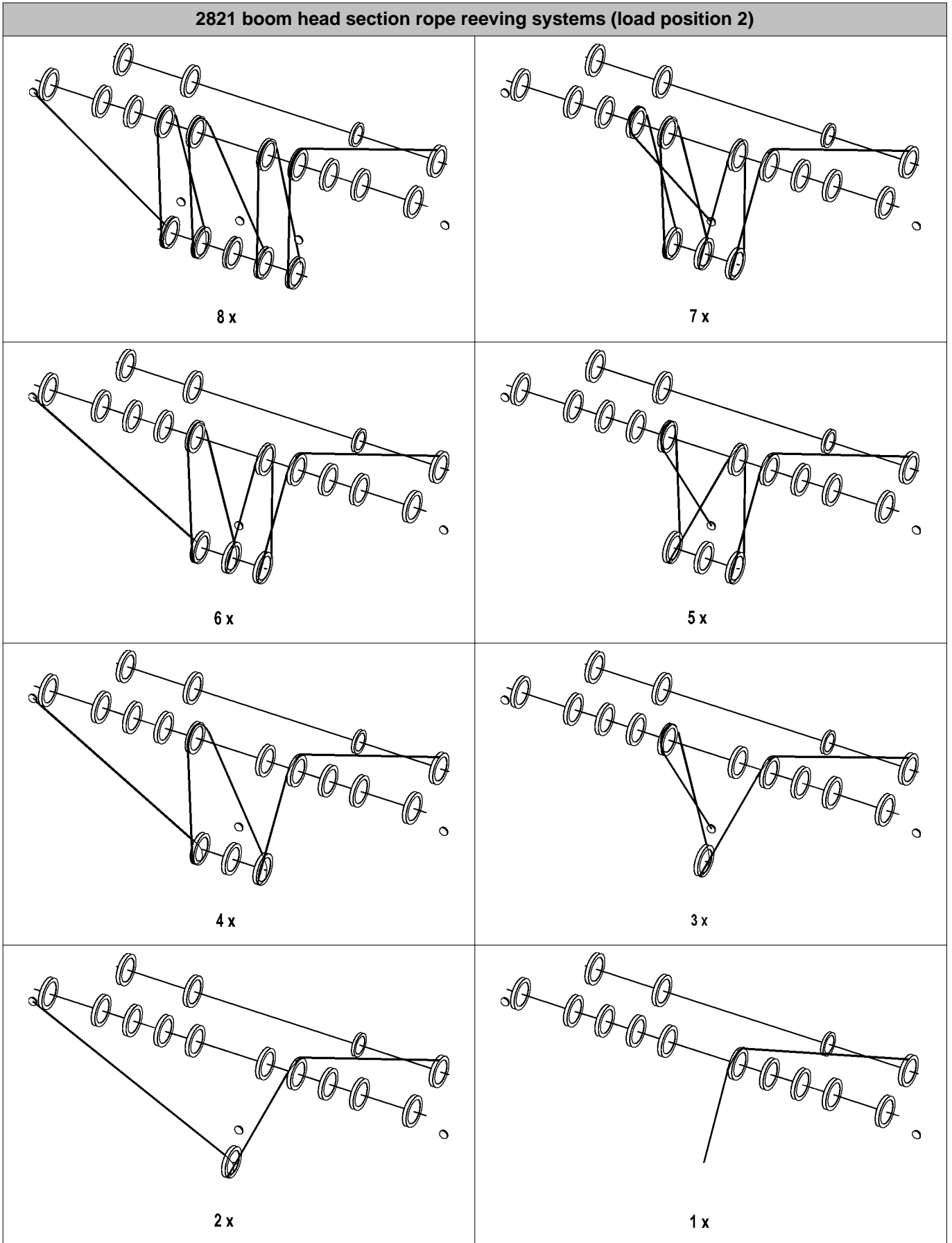
2821 boom head section rope reeving systems (load position 2)



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2821 boom head section rope reeving systems (load position 2)



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Tab. 313 2821 boom head section rope reeving systems (load position 2)

### 7.13.10 Auxiliary jib rope reeving systems on 2316 jib head section (load position 2)

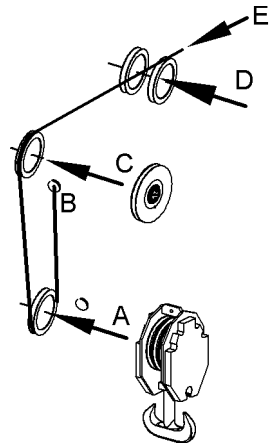


Fig. 2720 Auxiliary jib rope reeving system on 2316 jib head section (load position 2)

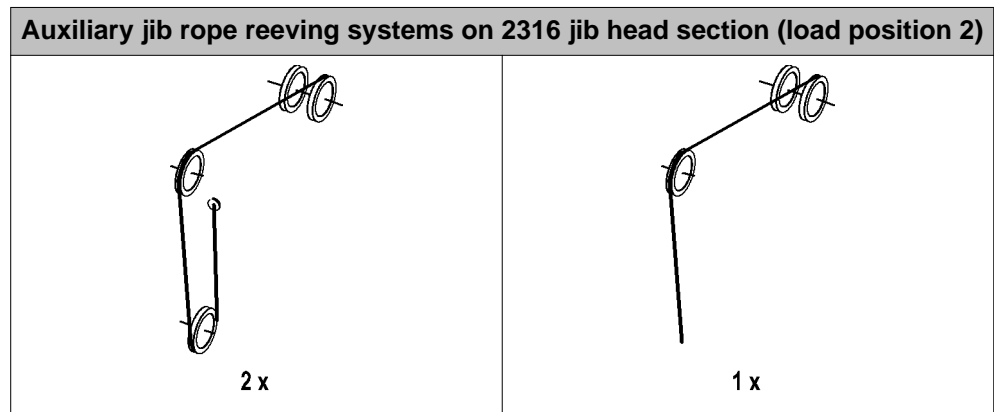
- |   |                         |   |                                 |
|---|-------------------------|---|---------------------------------|
| A | Pulley block roller set | D | Jib head section gantry pulleys |
| B | Rope fixation           | E | Winch 2 hoist rope              |
| C | Auxiliary jib pulley    |   |                                 |



**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

- ▶ Choose the correct number of reevings as per the load chart.



Tab. 314 Auxiliary jib rope reeving systems on 2316 jib head section (load position 2)

## 7.14 1916 luffing jib

### System-relevant information for 1916 luffing jib:

- Configuration of jib
  - Mid-point suspension assembly positions
- Configuration of main boom
- Lengths of jib mid-point suspensions
- Pendant straps on 1916 luffing jib (LR1300 (steel pendant straps))
- Pendant straps on 1916 luffing jib (LR1300 (carbon-fibre pendant straps))
- 1916 jib head section rope reeving systems (load position 1)
- 2821 boom head section rope reeving systems (load position 2)
- Auxiliary jib rope reeving systems on 1916 jib head section (load position 2)

### 7.14.1 Configuration of jib



#### DANGER

Incorrect jib length assembled!  
Structural breakdown.

► Check the jib length in the load chart for validity.

Jib length	Configuration of jib (symbolic)
66 ft	
76 ft	
85 ft	
95 ft	
105 ft	
115 ft	
125 ft	
134 ft	
144 ft	
154 ft	
164 ft	
174 ft	

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Jib length	Configuration of jib (symbolic)
184 ft	
194 ft	
203 ft	
213 ft	
223 ft	
233 ft	
243 ft	
253 ft	
262 ft	
272 ft	
282 ft	
292 ft	
302 ft	
312 ft	

Tab. 315 Configuration of 1916 luffing jib

**X1** - Assembly position of mid-point suspension 1

**X2** - Assembly position of mid-point suspension 2

### 7.14.2 Lengths of jib mid-point suspensions

Jib length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
154 ft	6' 11" ft-in	
164 ft	13' 9" ft-in = 8' 6" ft-in + 5' 3" ft-in	6' 11" ft-in
174 ft	19' 8" ft-in = 9' 10" ft-in + 9' 10" ft-in	6' 11" ft-in

Jib length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
184 ft	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	5' 3" ft-in
194 ft	17' 1" ft-in = 8' 6" ft-in + 8' 6" ft-in	5' 3" ft-in
203 ft	15' 5" ft-in = 8' 6" ft-in + 6' 11" ft-in	5' 3" ft-in
213 ft	15' 1" ft-in = 9' 10" ft-in + 5' 3" ft-in	9' 10" ft-in
223 ft	19' 8" ft-in = 9' 10" ft-in + 9' 10" ft-in	8' 6" ft-in
233 ft	17' 1" ft-in = 8' 6" ft-in + 8' 6" ft-in	6' 11" ft-in
243 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	6' 11" ft-in
253 ft	15' 5" ft-in = 8' 6" ft-in + 6' 11" ft-in	6' 11" ft-in
262 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in
272 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in
282 ft	17' 1" ft-in = 8' 6" ft-in + 8' 6" ft-in	5' 3" ft-in
292 ft	15' 5" ft-in = 8' 6" ft-in + 6' 11" ft-in	5' 3" ft-in
302 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in
312 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in

Tab. 316 Lengths of jib mid-point suspensions - 1916 luffing jib

### 7.14.3 Configuration of main boom



**DANGER**

Erected length of main boom excessive!  
Structural breakdown.

► Check the main boom length in the load chart for validity.

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**Note**

► Information on the configuration of the main boom can be found under system-related data for the main boom (For more information see: 7.4.1 Configuration of main boom, page 645) .

**7.14.4 Pendant straps on 1916 luffing jib, overview (LR1300 (steel pendant straps))**

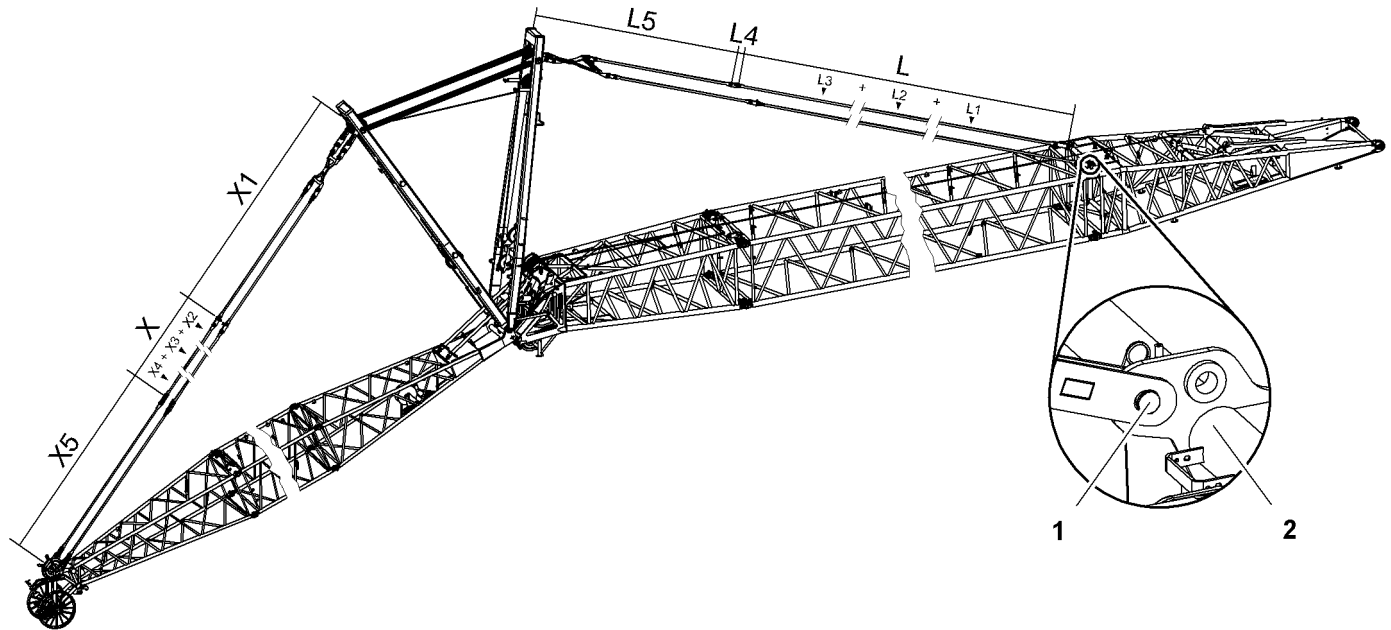


Fig. 2886 Pendant straps on 1916 luffing jib, overview (LR1300 (steel pendant straps))

- 1 Jib backstay straps pin connection point
- 2 Boom base section

**Backstay straps connecting A-frame 2 to 2821 boom base section**

Designation		Value	
L	<b>Jib backstay straps</b> consisting of:		
	L1	<b>Jib backstay strap 10 ft</b> (For more information see: Jib backstay strap 10 ft, page 153)	Total L1
	L2	<b>Jib backstay strap 20 ft</b> (For more information see: Jib backstay strap 20 ft, page 155)	Total L2
	L3	<b>Jib backstay strap 40 ft</b> (For more information see: Jib backstay strap 40 ft, page 156)	Total L3
L4	<b>Connecting link (conversion kit)</b> (For more information see: Connecting link (conversion kit), page 188)	1' 3" ft-in	

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Designation		Value
L5	<b>Equalizer on A-frame 2 (jib backstay strap)</b> (For more information see: <a href="#">Equalizer on A-frame 2 (jib backstay strap), page 182</a> )	23' ft-in

Tab. 317 Backstay straps connecting A-frame 2 to 2821 boom base section

**Configuration of main boom pendant straps (L):**

Required number of jib backstay straps 10 ft (L1) is the same as the number of boom sections 10 ft.

Required number of jib backstay straps 20 ft (L2) is the same as the number of boom sections 20 ft.

Required number of jib backstay straps 40 ft (L3) is the same as the number of boom sections 40 ft.



**Note**

▶ Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the load chart.

**Pendant straps linking A-frame 3 to 1916 jib head section**

Designation		Value
X1	<b>A-frame 3 equalizer (jib pendant strap)</b> (For more information see: <a href="#">A-frame 3 equalizer (jib pendant strap), page 184</a> )	23' 7" ft-in
<b>Jib pendant straps</b> consisting of:		
X	<b>X2 Jib pendant strap 10 ft</b> (For more information see: <a href="#">Jib pendant strap 10 ft, page 185</a> )	Total X2 +
	<b>X3 Jib pendant strap 20 ft</b> (For more information see: <a href="#">Jib pendant strap 20 ft, page 185</a> )	Total X3 +
	<b>X4 Jib pendant strap 40 ft</b> (For more information see: <a href="#">Jib pendant strap 40 ft, page 186</a> )	Total X4
X5	<b>Jib pendant strap on 1916 jib head section</b> (For more information see: <a href="#">Jib pendant strap on 1916 jib head section, page 187</a> )	21' 4" ft-in

Tab. 318 Pendant straps linking A-frame 3 to 1916 jib head section

**Configuration of jib pendant straps (X):**

Required number of jib pendant straps 10 ft (X2) is the same as the number of jib sections 10 ft.

Required number of jib pendant straps 20 ft (X3) is the same as the number of jib sections 20 ft.

Required number of jib pendant straps 40 ft (X4) is the same as the number of jib sections 40 ft.

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**Note**

► Permitted number of jib sections 10 ft, 20 ft, 40 ft can be found in the following table: (For more information see: 7.14.1 Configuration of jib, page 797)

**7.14.5 Pendant straps on 1916 luffing jib, overview (LR1300 (carbon-fibre pendant straps))**

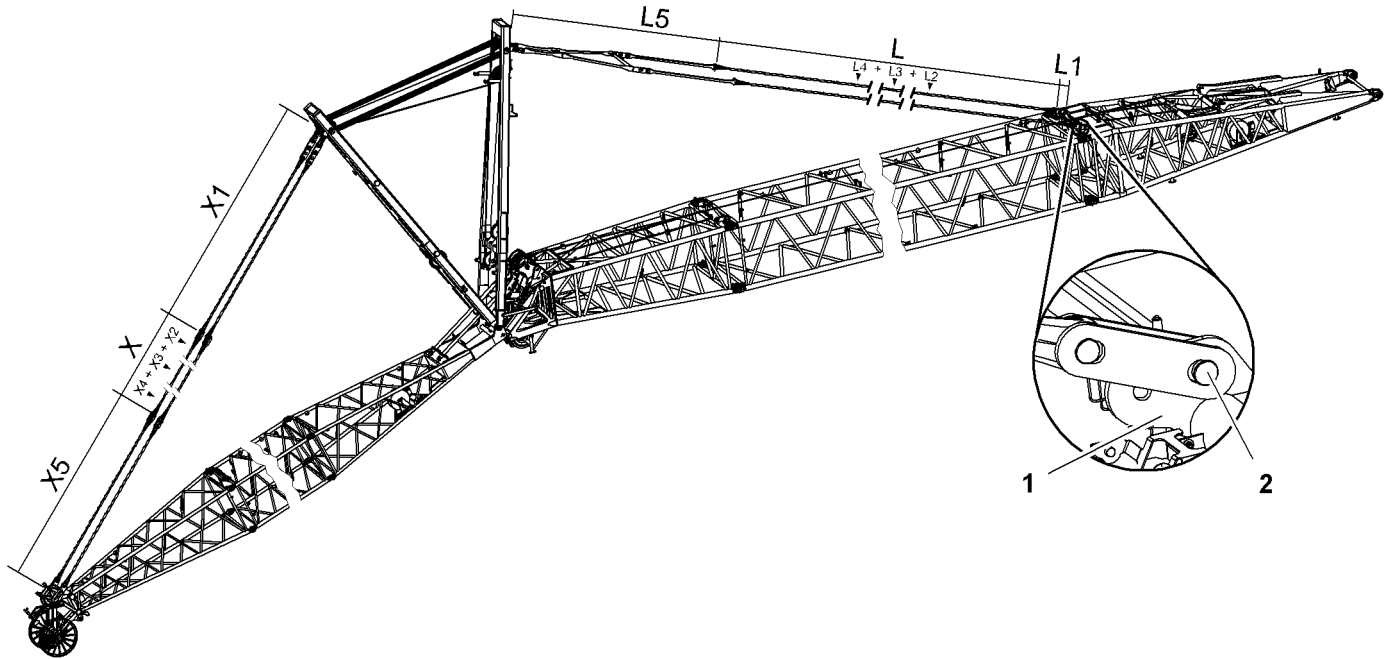


Fig. 2887 Pendant straps on 1916 luffing jib, overview (LR1300 (carbon-fibre pendant straps))

- 1 Boom base section
- 2 Jib backstay straps pin connection point

**Backstay straps connecting A-frame 2 to 2821 boom base section**

Designation		Value
L1	<b>Connecting link</b> (For more information see: <a href="#">Connecting link, page 192</a> )	1' 2" ft-in
L	<b>Jib backstay straps</b> consisting of:	Total L2 + Total L3 + Total L4
	L2 <b>Jib backstay strap 10 ft</b> (For more information see: <a href="#">Jib backstay strap 10 ft, page 194</a> )	
	L3 <b>Jib backstay strap 20 ft</b> (For more information see: <a href="#">Jib backstay strap 20 ft, page 197</a> )	
	L4 <b>Jib backstay strap 40 ft</b> (For more information see: <a href="#">Jib backstay strap 40 ft, page 200</a> )	

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Designation		Value
L5	<b>Equalizer on A-frame 2 (jib backstay strap)</b> (For more information see: <a href="#">Pendant straps on A-frame 2, page 211</a> )	25' 6" ft-in

Tab. 319 Backstay straps connecting A-frame 2 to 2821 boom base section

**Configuration of jib backstay straps (L):**

Required number of jib backstay straps 10 ft (L2) is the same as the number of boom sections 10 ft.

Required number of jib backstay straps 20 ft (L3) is the same as the number of boom sections 20 ft.

Required number of jib backstay straps 40 ft (L4) is the same as the number of boom sections 40 ft.



**Note**

▶ Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the load chart.

**Pendant straps linking A-frame 3 to 1916 jib head section**

Designation		Value	
X1	<b>A-frame 3 equalizer (jib pendant strap)</b> (For more information see: <a href="#">A-frame 3 equalizer (jib pendant strap), page 212</a> )	24' 9" ft-in	
X	<b>Jib pendant straps</b> consisting of:		
	X2	<b>Jib pendant strap 10 ft</b> (For more information see: <a href="#">Jib pendant strap 10 ft, page 213</a> )	Total X2 +
	X3	<b>Jib pendant strap 20 ft</b> (For more information see: <a href="#">Jib pendant strap 20 ft, page 214</a> )	Total X3 +
	X4	<b>Jib pendant strap 40 ft</b> (For more information see: <a href="#">Jib pendant strap 40 ft, page 215</a> )	Total X4
X5	<b>Jib pendant strap on 1916 jib head section</b> (For more information see: <a href="#">Jib pendant strap on 1916 jib head section, page 215</a> )	21' 4" ft-in	

Tab. 320 Pendant straps linking A-frame 3 to 1916 jib head section

**Configuration of jib pendant straps (L):**

Required number of jib pendant straps 10 ft (X2) is the same as the number of jib sections 10 ft.

Required number of jib pendant straps 20 ft (X3) is the same as the number of jib sections 20 ft.

Required number of jib pendant straps 40 ft (X4) is the same as the number of jib sections 40 ft.

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**Note**

► Permitted number of jib sections 10 ft, 20 ft, 40 ft can be found in the following table: [\(For more information see: 7.14.1 Configuration of jib, page 797\)](#)

### 7.14.6 Rope reeving system for A-frame 2/A-frame 3

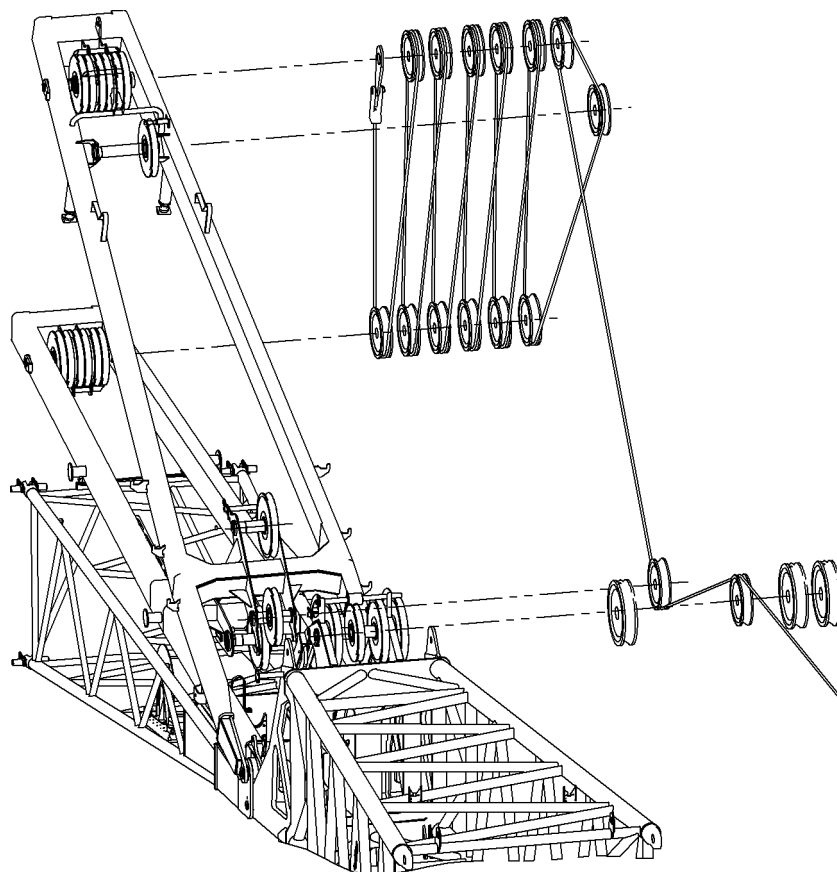


Fig. 2888 Rope reeving system for A-frame 2/A-frame 3 - 1916 luffing jib

### 7.14.7 Run of the rope when two ropes pass over the jib head section

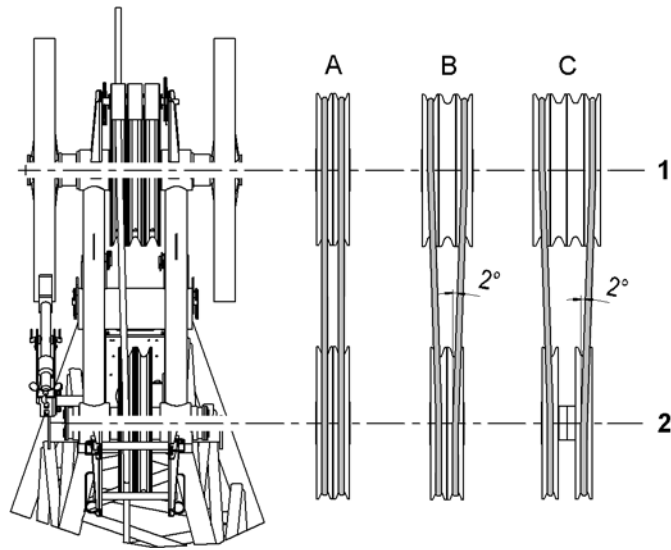


Fig. 2889 Run of the rope when two ropes pass over the jib head section

- 1 Jib head section roller set                      2 Jib head section gantry pulleys

Run of the rope	Jib type
<b>A</b>	1008 luffing jib
	1309 luffing jib
<b>B</b>	Luffing or fixed jib 1713
	1916 luffing jib
<b>C</b>	2316 luffing jib

Tab. 321 Run of the rope when two ropes pass over the jib head section

### 7.14.8 1916 jib head section rope reeving systems (load position 1)

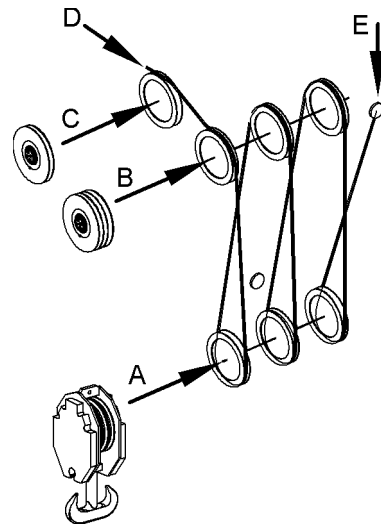


Fig. 2890 1916 jib head section rope reeving system (load position 1)

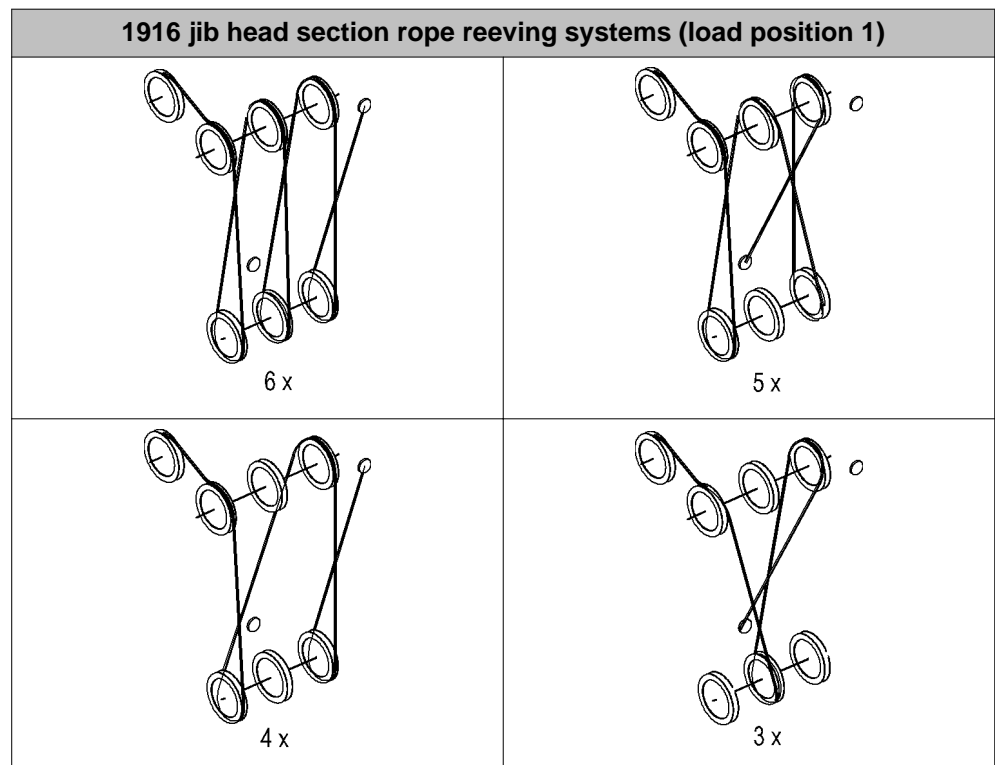
- |   |                             |
|---|-----------------------------|
| <b>A</b> Pulley block roller set        | <b>D</b> Winch 1 hoist rope |
| <b>B</b> Jib head section roller set    | <b>E</b> Rope fixation      |
| <b>C</b> Jib head section gantry pulley |                             |



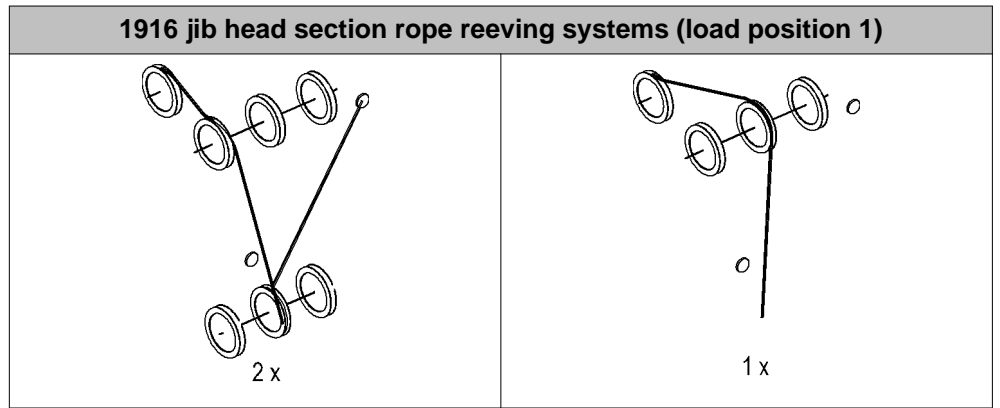
**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

► Choose the correct number of reevings as per the load chart.



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Tab. 322 1916 jib head section rope reeving systems (load position 1)

### 7.14.9 2821 boom head section rope reeving systems (load position 2)

If the main boom with jib attached is used to hoist a load, then the 2821 boom head section should be reeved as shown below.

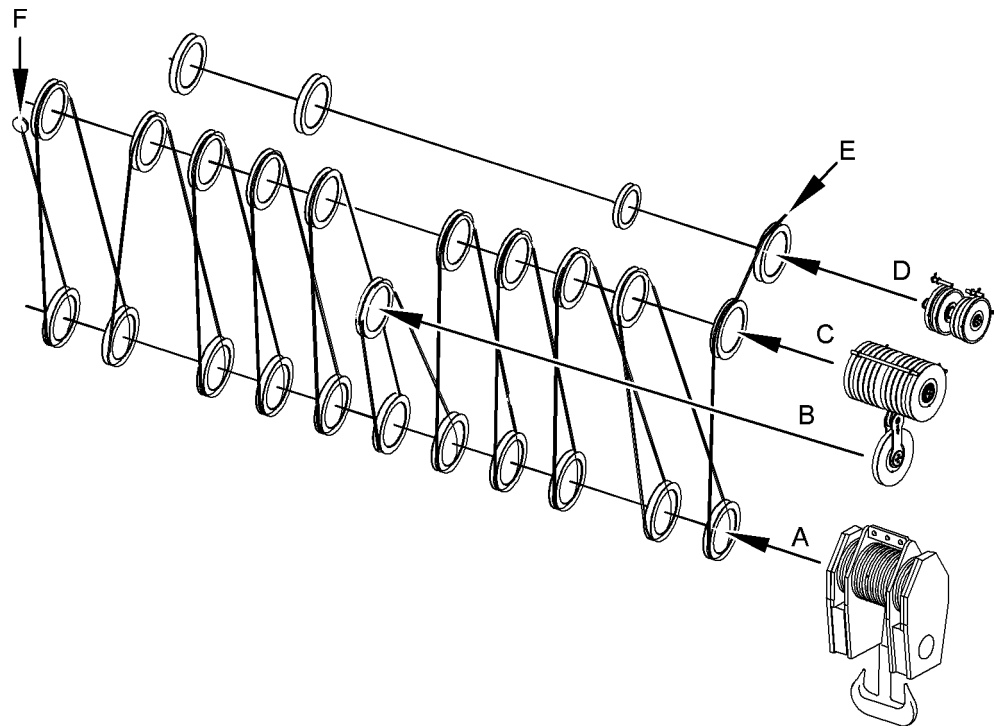


Fig. 2897 2821 boom head section rope reeving system (load position 2)

- |   |   |
|---|---|
| <b>A</b> Pulley block roller set              | <b>D</b> Boom head section gantry pulleys |
| <b>B</b> 11th pulley on the boom head section | <b>E</b> Winch 2 hoist rope               |
| <b>C</b> Boom head section roller set         | <b>F</b> Rope fixation                    |



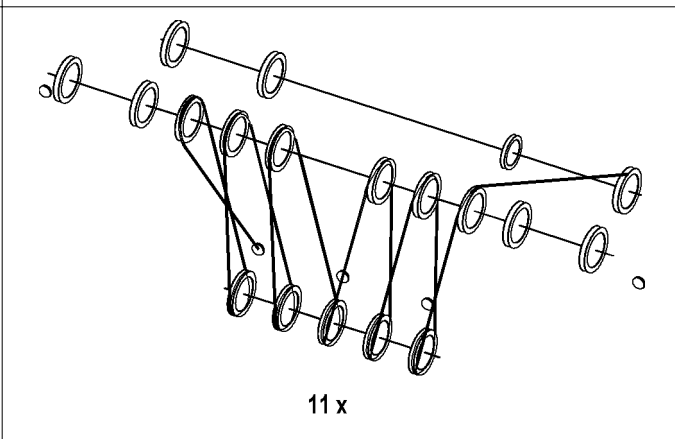
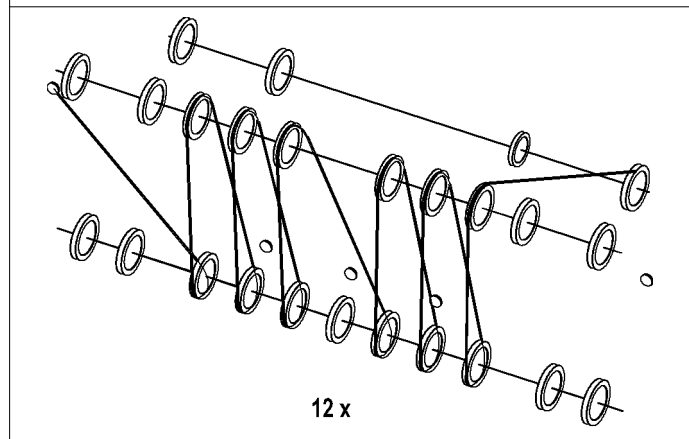
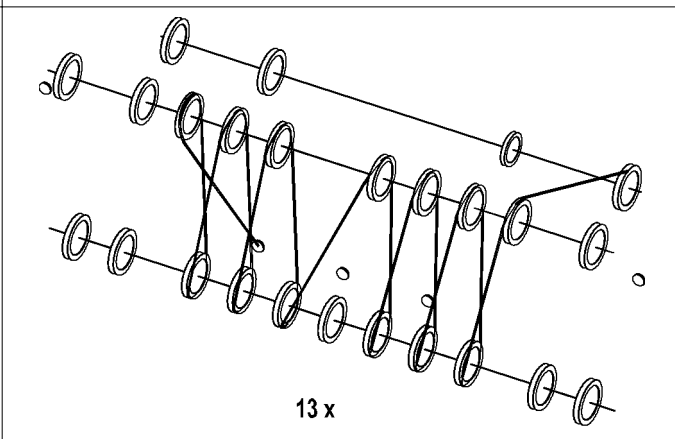
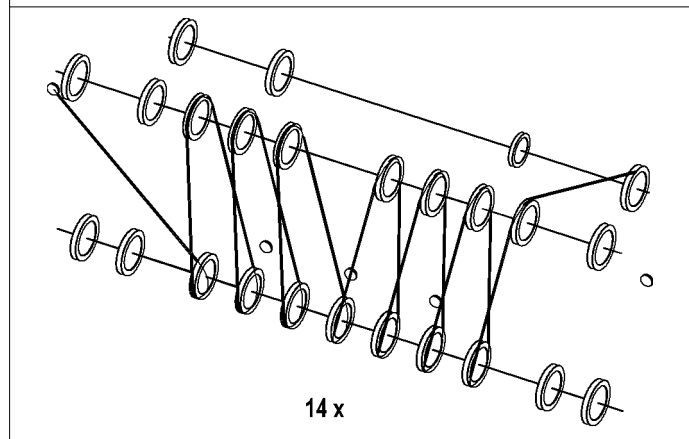
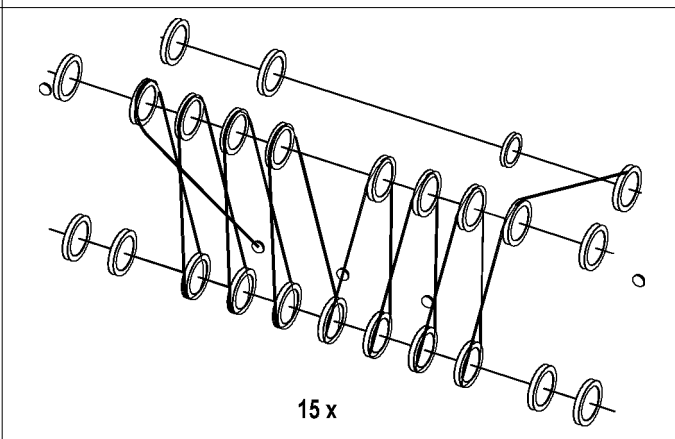
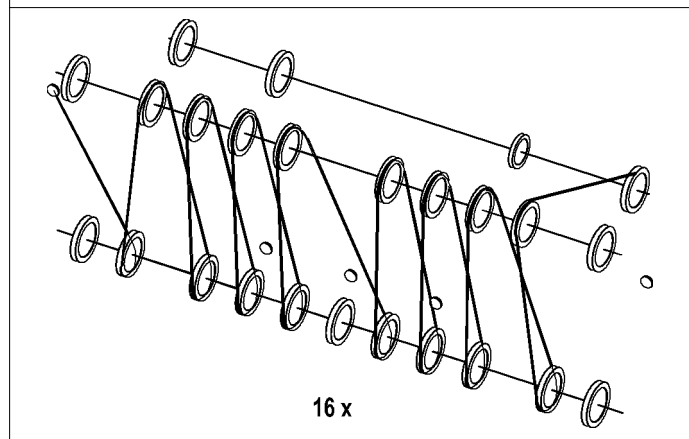
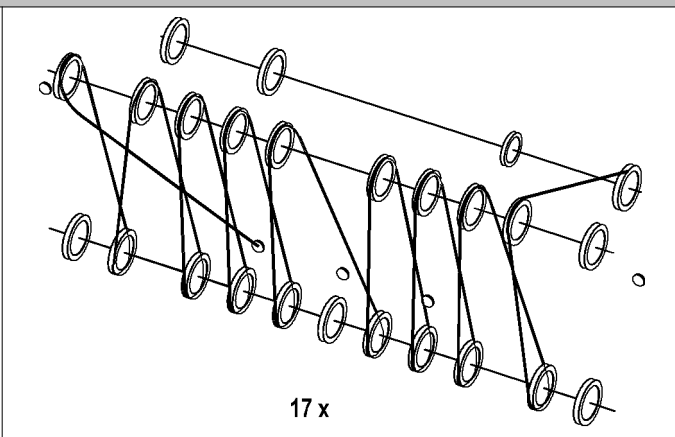
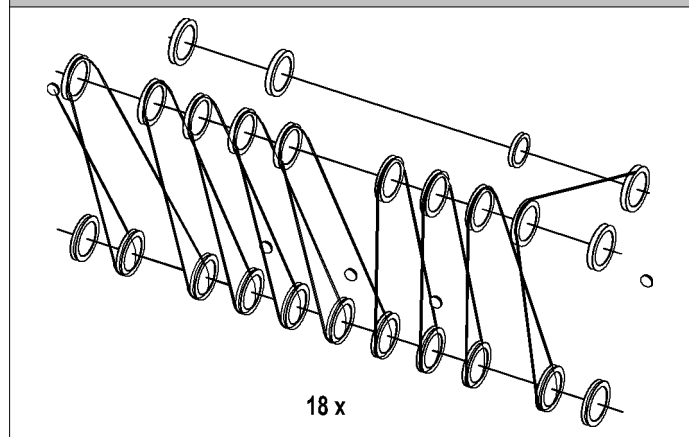
**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

► Choose the correct number of reevings as per the load chart.

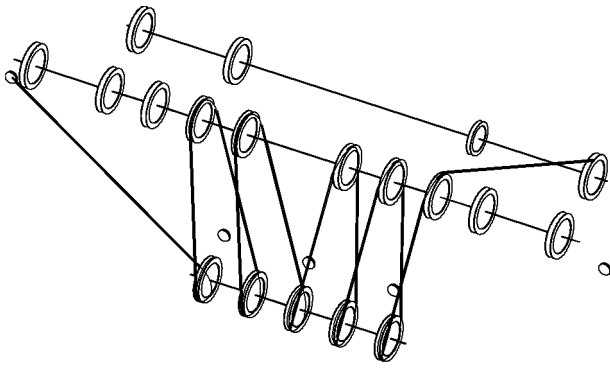
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2821 boom head section rope reeving systems (load position 2)

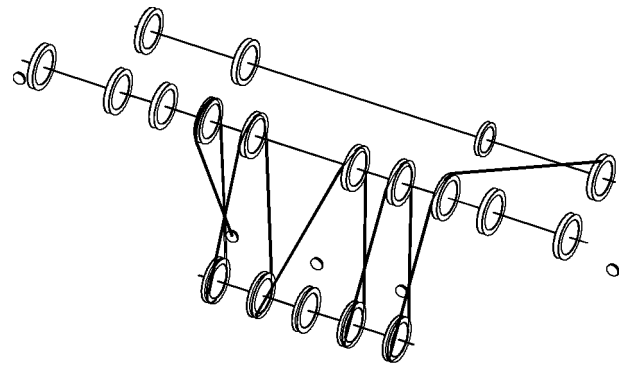


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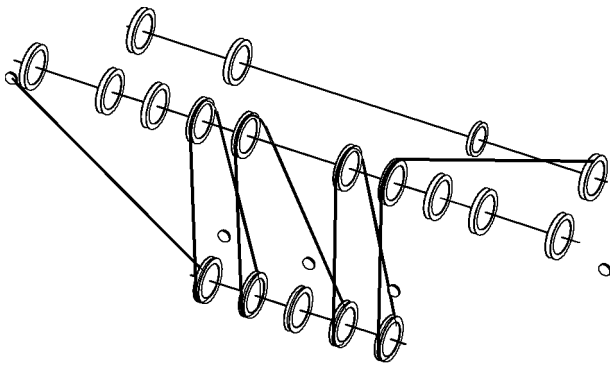
2821 boom head section rope reeving systems (load position 2)



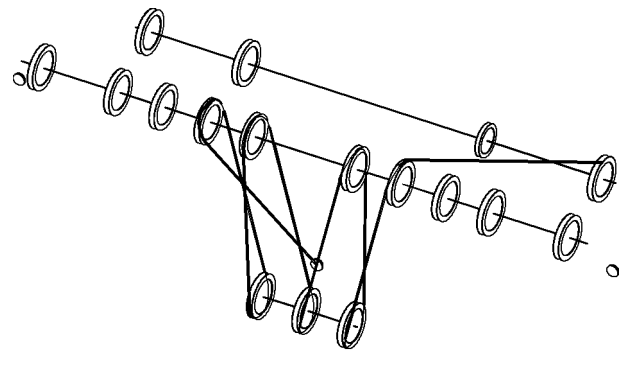
10 x



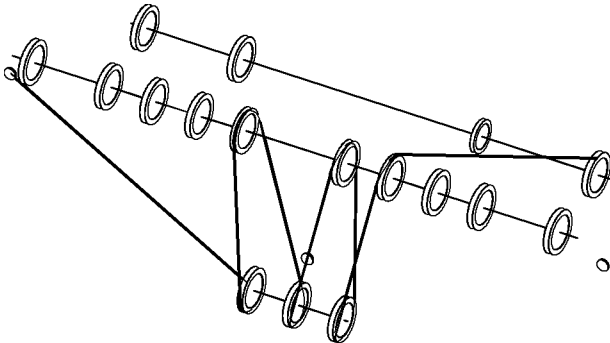
9 x



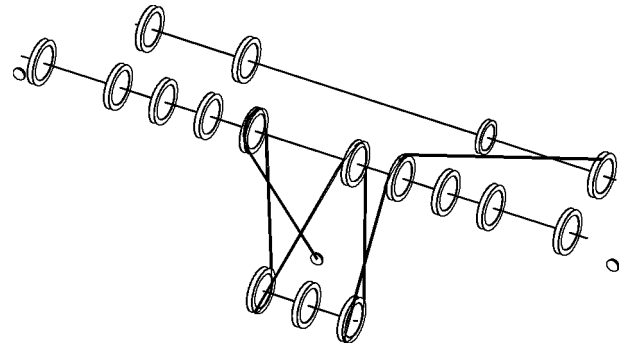
8 x



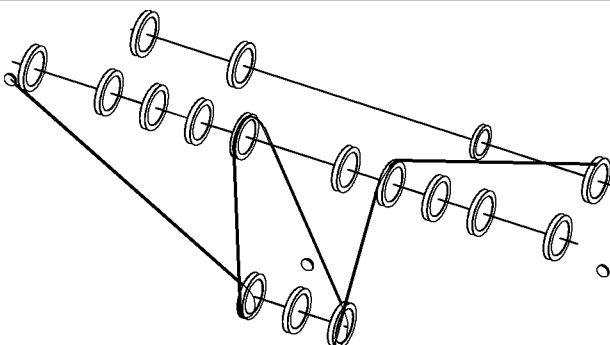
7 x



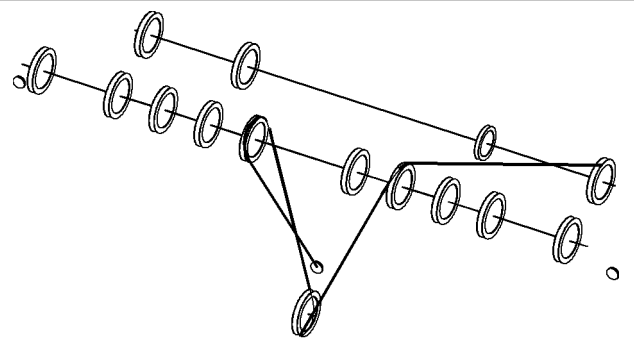
6 x



5 x

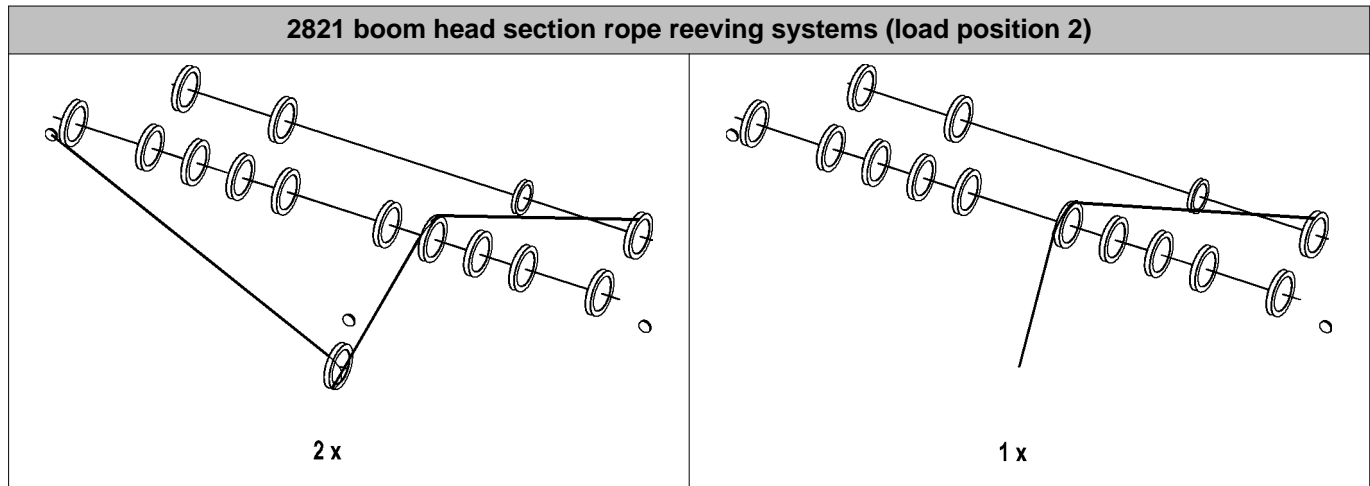


4 x



3 x

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Tab. 323 2821 boom head section rope reeving systems (load position 2)

### 7.14.10 Rope reeving systems for auxiliary jib on luffing jib head section 1916, 1713, 1309, 1008 (load position 2)

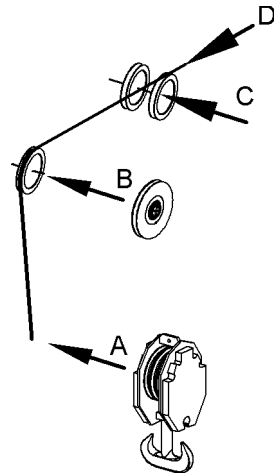


Fig. 2916 Rope reeving system for auxiliary jib on luffing jib head section 1916, 1713, 1309, 1008 (load position 2)

- |                               |  |
|-------------------------------|--|
| <b>A</b> Pulley block         | <b>C</b> Jib head section gantry pulleys |
| <b>B</b> Auxiliary jib pulley | <b>D</b> Winch 2 hoist rope              |



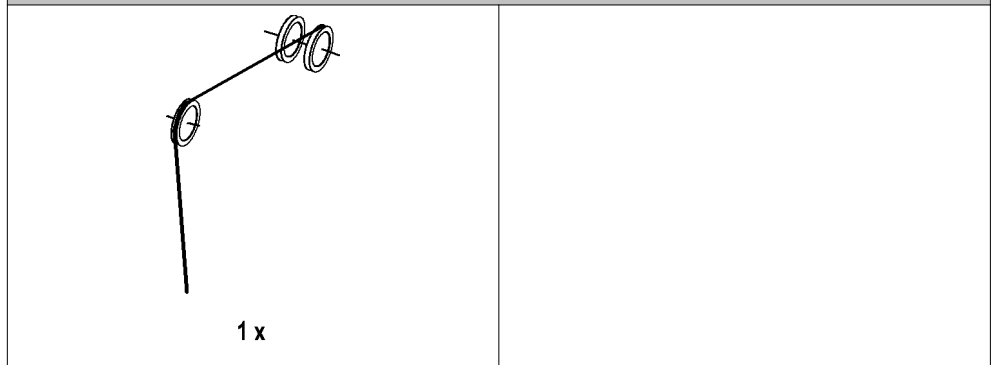
**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

- ▶ Choose the correct number of reevings as per the load chart.



**Rope reeving systems for auxiliary jib on luffing jib head section 1916, 1713, 1309, 1008 (load position 2)**



*Tab. 324 Rope reeving systems for auxiliary jib on luffing jib head section 1916, 1713, 1309, 1008 (load position 2)*

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## 7.15 Assemble the luffing jib

Ensure that the following conditions are satisfied:

- Assembly mode is selected.
- 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.

### 7.15.1 Notes

The assembly of the luffing jib described below applies to all system sizes 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.

### 7.15.2 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: 4.14 Programming the setup, page 438](#)).

### 7.15.3 Unloading and positioning the jib components



**DANGER**

Slewing of uppercarriage with rear counterweight attached not permitted!  
Machine toppling over.

- ▶ Only slew the uppercarriage according to the table (For more information see: [Mounting and pinning the rear counterweight, page 643](#)).



**DANGER**

Incorrect or faulty parts/components are fit!  
Structural breakdown.

- ▶ Only use original Liebherr parts/components that are in perfect condition.



**DANGER**

Incorrect configuration of the boom!  
Structural breakdown.

- ▶ Ensure that the assembled boom configuration is compatible with the programmed setup.



**DANGER**

Incorrect boom section arrangement!  
Structural breakdown.

- ▶ Assemble the boom according to the relevant system requirements.
- ▶ A boom section measuring 20 ft cannot be replaced by two boom sections measuring 10 ft.
- ▶ A boom section measuring 40 ft cannot be replaced by two boom sections measuring 20 ft.

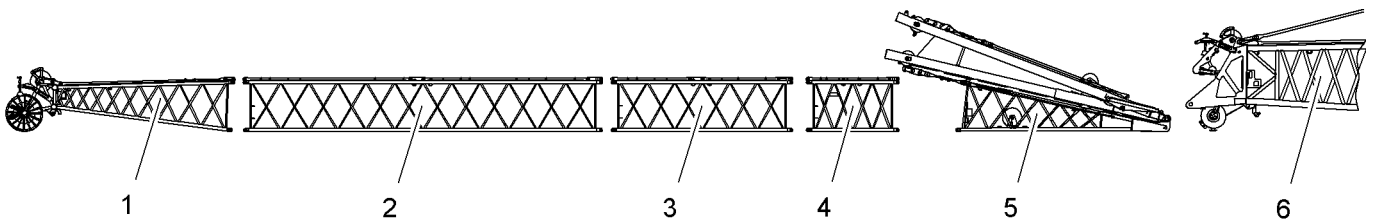


Fig. 2918 Position jib components according to relevant system instructions

- |   |   |  |
|---|---|--|
| <p>1 Jib head section</p> <p>2 Jib section 38 ft or 40 ft</p> | <p>3 Jib section 20 ft</p> <p>4 Jib section 10 ft</p> | <p>5 Jib base section</p> <p>6 Boom head section</p> |
|---|---|--|

- ▶ Direct transport vehicles with boom sections.
- ▶ Sling boom sections by attaching assembly rigging to the lifting points.
- ▶ Unload boom sections using the basic machine or assist crane and position according to the relevant system instructions.

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## 7.15.4 Attaching the auxiliary jib (33.000 lb) to the jib head section

### NOTICE

Auxiliary jib is attached to an unsuitable jib head section!  
Risk of damage to the components.

► Attach the auxiliary jib (33,000 lb) to jib head 1008, 1309, 1713 or 1916 only.

Ensure that the following conditions are satisfied:

- Second pulley by A-frame 2 is fitted.
- Second pulley by A-frame 3 is fitted.
- The second pulley (gantry pulley) and spacer rings for the jib head section are provided.

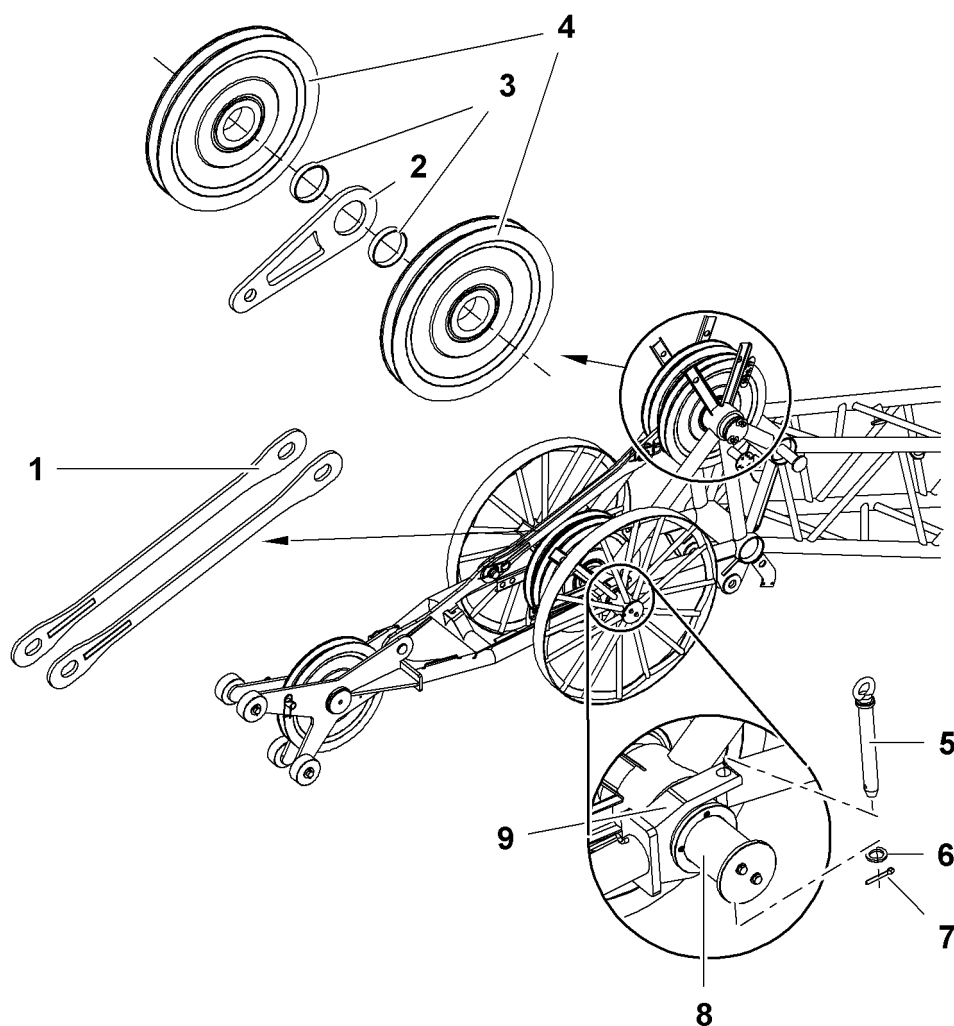


Fig. 2919 Auxiliary jib 33,000 lb

- |   |   |   |                  |
|---|---|---|------------------|
| 1 | Connecting links (2x)                                   | 6 | Washers (2x)     |
| 2 | Connecting link   | 7 | Cotter pins (2x) |
| 3 | Spacer rings (Ø5.98" in x<br>Ø5.55" in x 1.14" in) (2x) | 8 | Shaft            |
| 4 | Pulleys (2x)  | 9 | Forks (2x)       |
| 5 | Pins (2x)   |   |                  |



## Note

- ▶ To make it easier to attach the auxiliary jib: remove the connecting links **1**.
- 
- ▶ Remove the 4 spacer rings (Ø5.98" in x Ø5.55" in x 1.57" in) by the gantry pulleys from the jib head section.
  - ▶ Fit the connecting link **2** and pulleys **4** with spacer rings **3**.
  - ▶ Lift the auxiliary jib from the front onto the jib head section.
- When the forks **9** of the auxiliary jib engage the shaft **8**:
- ▶ Insert pin **5** and secure with washers **6** and cotter pins **7**.
  - ▶ Fit the connecting links **1**.

## 7.15.5 Attaching the auxiliary jib (66.000 lb) to the jib head section

### NOTICE

Auxiliary jib is attached to an unsuitable jib head section!  
Risk of damage to the components.

► Attach the auxiliary jib (66,000 lb) to jib head section 2316 only.

Ensure that the following conditions are satisfied:

- Second pulley by A-frame 2 is fitted.
- Second pulley by A-frame 3 is fitted.
- Second pulley (gantry pulley) is equipped with a spacer ring and spacer washers for the jib head section.

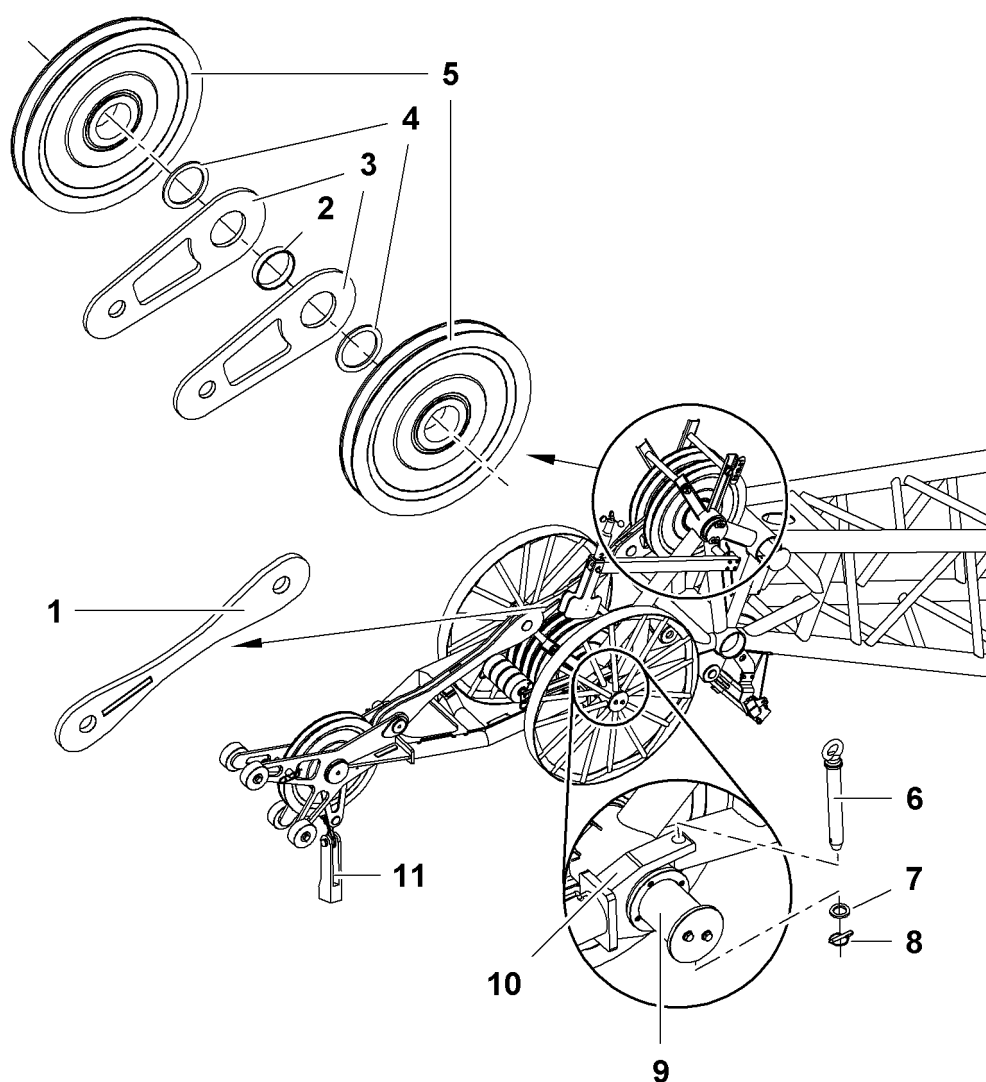


Fig. 2920 Attaching the auxiliary jib (66,000 lb) to jib head section 2316

- |   |  |   |                |
|---|--|---|----------------|
| 1 | Pendant strap                                  | 7 | Washers (2x)   |
| 2 | Spacer ring (Ø5.98" in x Ø5.55" in x 1.14" in) | 8 | Linchpins (2x) |
| 3 | Connecting links (2x)                          | 9 | Shaft          |

- |   |  |    |               |
|---|--|----|---------------|
| 4 | Spacer washers (Ø7.09" in x Ø5.59" in x 0.31" in) (2x) | 10 | Forks (2x)    |
| 5 | Pulleys (2x)   | 11 | Rope fixation |
| 6 | Pins (2x)  |    |               |



**Note**

► To make it easier to attach the auxiliary jib: remove the pendant straps 1.

► Remove the 4 spacer rings (Ø6.30" in x Ø5.51" in x 1.57" in) by the gantry pulleys from the jib head section.

► Fit the connecting links 3 and pulleys 5 with a spacer ring 2 and spacer washers 4.

► Lift the auxiliary jib from the front onto the jib head section.

When the forks 10 of the auxiliary jib engage the shaft 9:

► Insert pin 6 and secure with washers 7 and linchpins 8.

► Fit pendant strap 1.

For 2-fold reeving of the auxiliary jib:

► Attach the rope fixing point 11.

### 7.15.6 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.

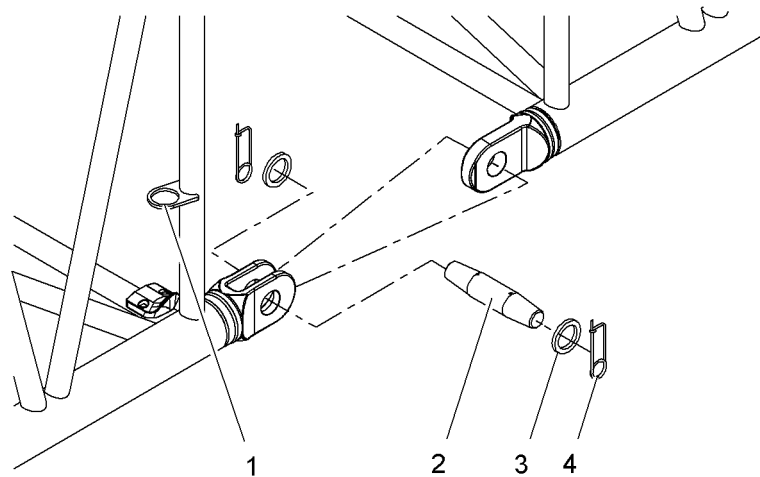


Fig. 2921 Bolting the boom

- |   |   |   |                  |
|---|---|---|------------------|
| 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**.

## 7.15.7 Attaching the jib base section

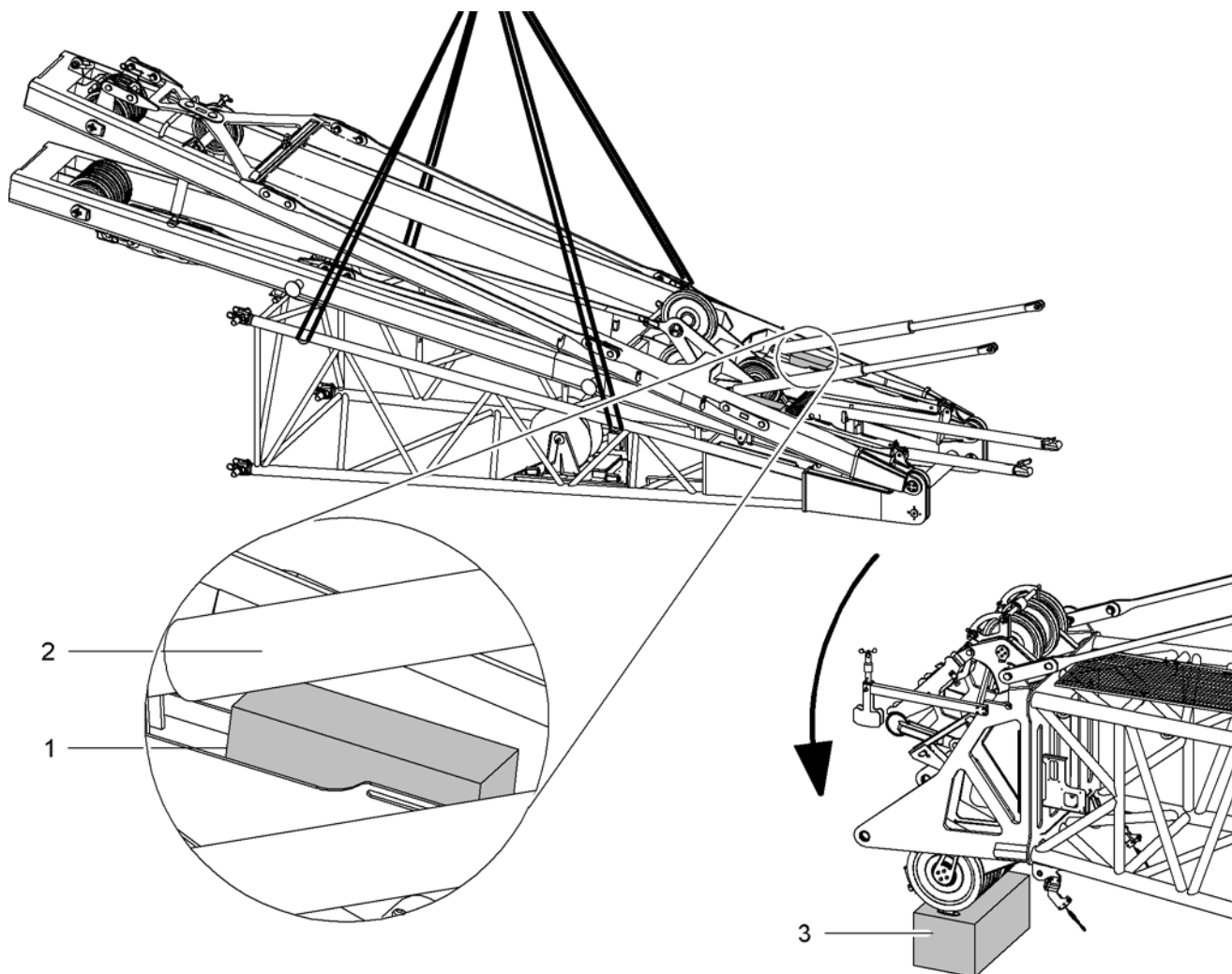


Fig. 2922 Chocking with wooden blocks and lifting the jib base section to the boom head section

- |   |                    |   |                                      |   |              |
|---|--------------------|---|--------------------------------------|---|--------------|
| 1 | Wooden blocks (2x) | 2 | Hydraulic tilting-back supports (2x) | 3 | Wooden block |
|---|--------------------|---|--------------------------------------|---|--------------|



### Note

To make it easier to attach the jib base section:

- ▶ chock the support feet of the boom head section with a wooden block **3**.
- ▶ Chock the hydraulic tilting-back supports **2** of the luffing jib with wooden blocks **1**.





**Note**

Special points regarding the 2821 boom head section (LR1300)!

- ▶ 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.
- ▶ Sling the jib base section by attaching assembly rigging to the lifting points.
- ▶ 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.

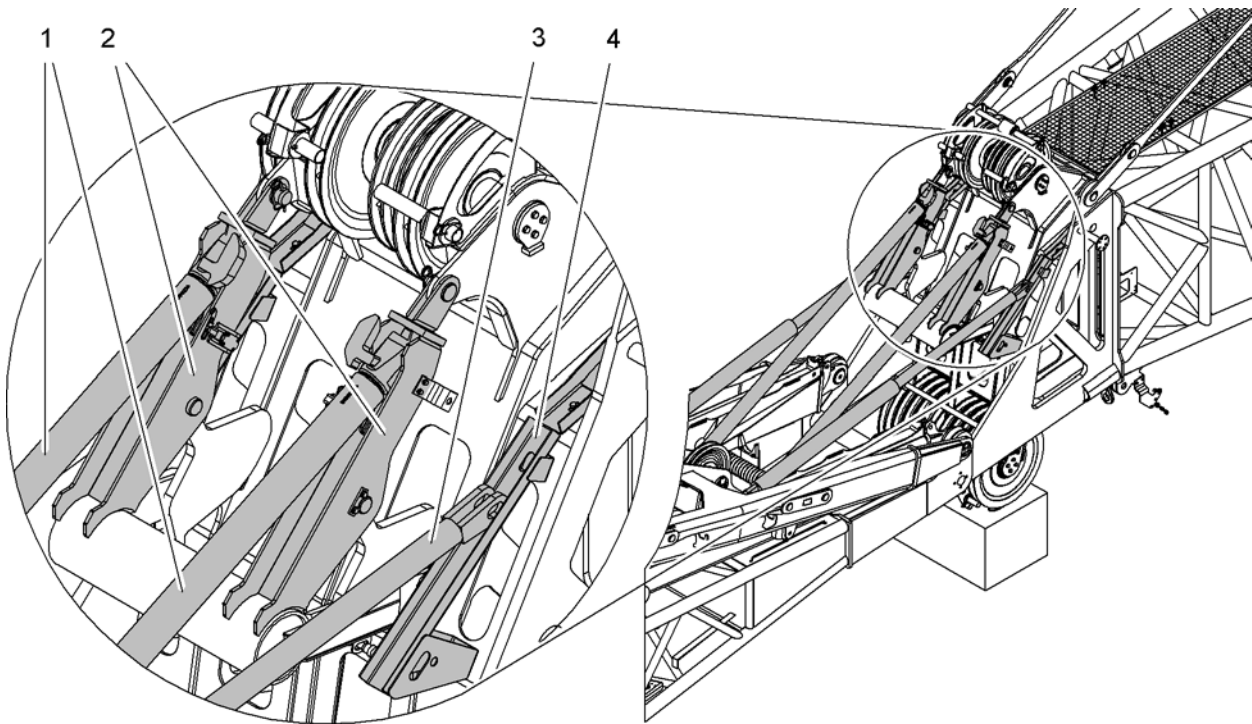


Fig. 2923 Rigid and hydraulic tilting-back supports should be located in the guide rails on the boom head section

- |  |  |
|--|--|
| <p>1 Rigid tilting-back supports (2x)</p> <p>2 Guide rails (2x) on boom head section for rigid tilting-back supports</p> | <p>3 Hydraulic tilting-back supports (2x)</p> <p>4 Guide rails (2x) on boom head section for hydraulic tilting-back supports</p> |
|--|--|

- ▶ Lower the jib base section further until the pin connection points of the jib base section and the boom head section line up.

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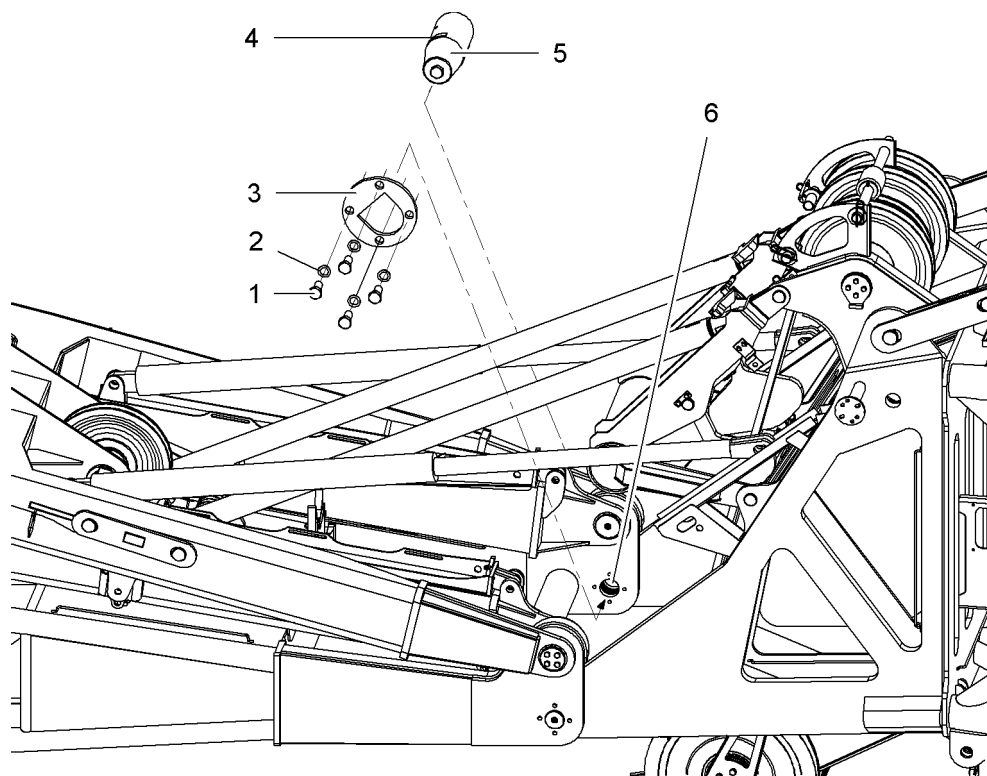


Fig. 2924 Bolting the jib base section to the boom head section

- |   |               |   |                            |
|---|---------------|---|----------------------------|
| 1 | Screws (4x)   | 4 | Notch                      |
| 2 | Washers (4x)  | 5 | Pin                        |
| 3 | Locking plate | 6 | Pin connection points (2x) |

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 plate **3** over the pin **5** and place in the notch **4**.
- ▶ Secure the locking plate **3** with pins **1** and washers **2**.
- ▶ Repeat the pin insertion process on the opposite side.

### 7.15.8 Checking the pressure in the accumulator of the hydraulic tilting-back supports



**WARNING**

Incorrect pressure in the accumulator of the hydraulic tilting-back supports!

- ▶ Every time that it is set up, check the pressure in the accumulator when the hydraulic tilting-back supports are fully extended and compare with the values in the “Prescribed pressure in the accumulator of the hydraulic tilting-back supports” table.
- ▶ Take into account the outside temperature on site and adjust the pressure if necessary.

Jib type	Temperature			
	-4 °F	32 °F	68 °F	104 °F
<b>1008</b>	1,522.89 psi	1,667.93 psi	1,885.48 psi	2,030.52 psi
<b>1309</b>	1,595.41 psi	1,740.44 psi	1,885.48 psi	2,103.04 psi
<b>1713</b>	1,595.41 psi	1,740.44 psi	1,885.48 psi	2,103.04 psi
<b>1916</b>	1,450.37 psi	1,595.41 psi	1,740.44 psi	1,885.48 psi
<b>2316</b>	1,450.37 psi	1,595.41 psi	1,740.44 psi	1,885.48 psi

Tab. 325 Prescribed pressure in the accumulator of the hydraulic tilting-back supports



**Note**

- ▶ The “Prescribed pressure in the accumulator of the hydraulic tilting-back supports” tables for each jib type can also be found on A-frame 3.

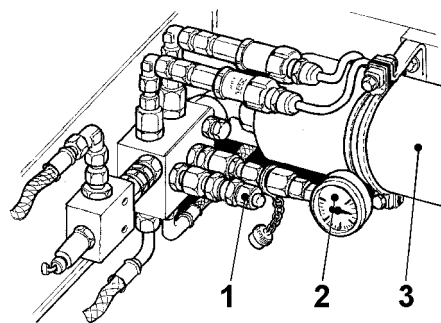


Fig. 2925 Accumulator on A-frame 3

- 1 Connection for filling the accumulator
- 2 Pressure gauge
- 3 Accumulator

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- ▶ Every time that it is set up, check the pressure in the accumulator when the hydraulic tilting-back supports are fully extended and compare with the values in the "Prescribed pressure in the accumulator of the hydraulic tilting-back supports" table.

If the pressure of the accumulator does not match that shown in the table:

- ▶ Take into account the outside temperature on site and adjust the pressure.

### 7.15.9 Attaching the main boom (self-assembly system)



#### Note

Particular approach when using the self-assembly system!

- ▶ Attach the main boom to the basic machine.

### 7.15.10 Connecting A-frame 2 and the hoist rope



#### 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-frame 2 and on the crossbar a shackle and a round sling have been fitted in the factory.

Ensure that the following conditions are satisfied:

- 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.

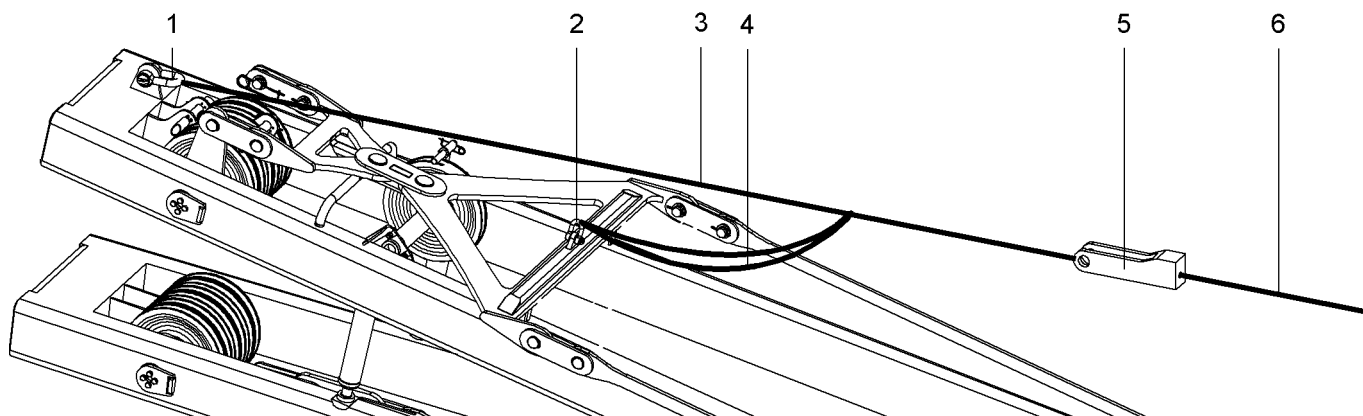


Fig. 2926 Connecting A-frame 2 and the hoist rope

- |   |                      |   |                          |   |            |
|---|----------------------|---|--------------------------|---|------------|
| 1 | Shackle on A-frame 2 | 3 | Round sling on A-frame 2 | 5 | Rope lock  |
| 2 | Shackle on crossbar  | 4 | Round sling on crossbar  | 6 | Hoist rope |

Use the rope lock on the boom head section to connect the round sling to the hoist rope.

- ▶ Attach the rope lock 5 to the round sling 3 on A-frame 2.
- ▶ Pull the hoist rope 6 forwards over the main boom to the rope lock 5.
- ▶ Connect the hoist rope 6 to the rope lock 5.

### 7.15.11 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

Incorrectly reeved jib luffing rope!

- ▶ Reeve the jib luffing rope according to the rope reeving system.

The rope reeving system of the jib luffing rope can be found in the relevant jib instructions.

- ▶ Open up the rope guide, if present.
- ▶ Unwind the jib luffing rope and pull it towards the jib base section.
- ▶ Connect the jib luffing rope to the factory-reeved auxiliary rope.



#### Note

- ▶ To make reeving the jib luffing rope easier: gently raise A-frame 2 with the hoist rope
- 
- ▶ 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 reeving rope of the rope reeving winch and actuate the rope reeving winch.  
▷ The jib luffing rope will be reeved.
  - ▶ Remove auxiliary rope and place in temporary storage.
  - ▶ Hang the jib luffing rope on the rope fixation on A-frame 2 using the rope lock.
  - ▶ Close and secure the rope guide, if present.

## 7.15.12 Erecting A-frame 2/A-frame 3 with hoist rope and bolting the hydraulic tilting-back supports

### NOTICE

Luffing jib luffing winch is operated incorrectly!  
Damage to A-frame 2 and/or A-frame 3.

If A-frame 2 is in the transport position with its feet on A-frame 3:

- ▶ Only move jib luffing winch in the "Lower" direction.

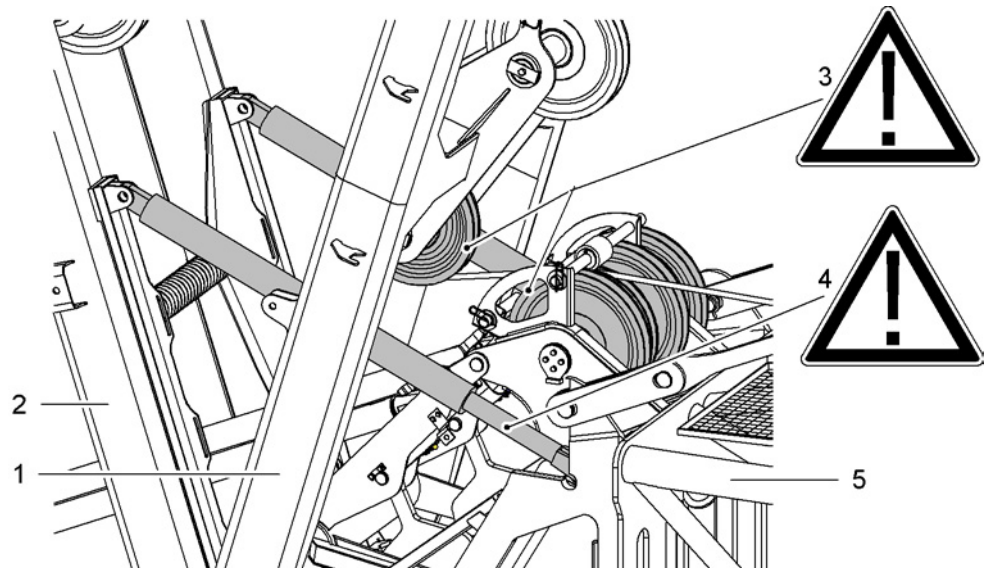


Fig. 2927 Danger points when erecting A-frame 2/A-frame 3

- |   |                        |   |   |
|---|------------------------|---|---|
| 1 | A-frame 2              | 4 | Minimum dimension x of the visible piston rod of the hydraulic tilting-back supports (2x) |
| 2 | A-frame 3              | 5 | Boom head section   |
| 3 | Pulley collision point |   |   |

### NOTICE

Pulleys on A-frame 2 collide with the gantry pulleys on the main boom!  
Damage to machine.

- ▶ Stop the A-frame 2 erection process in good time.



Fig. 2928 Minimum dimension x of the visible piston rod of the hydraulic tilting-back supports

- x Minimum dimension 3.94" in

**NOTICE**

If the minimum dimension  $x$  of the visible piston rod of the hydraulic tilting-back supports is not achieved:  
Damage to machine.

- ▶ Stop the A-frame 3 erection process in good time.
- ▶ Lower A-frame 3 forwards using the jib luffing winch.

Make sure that an assistant with a walkie-talkie is monitoring the process.

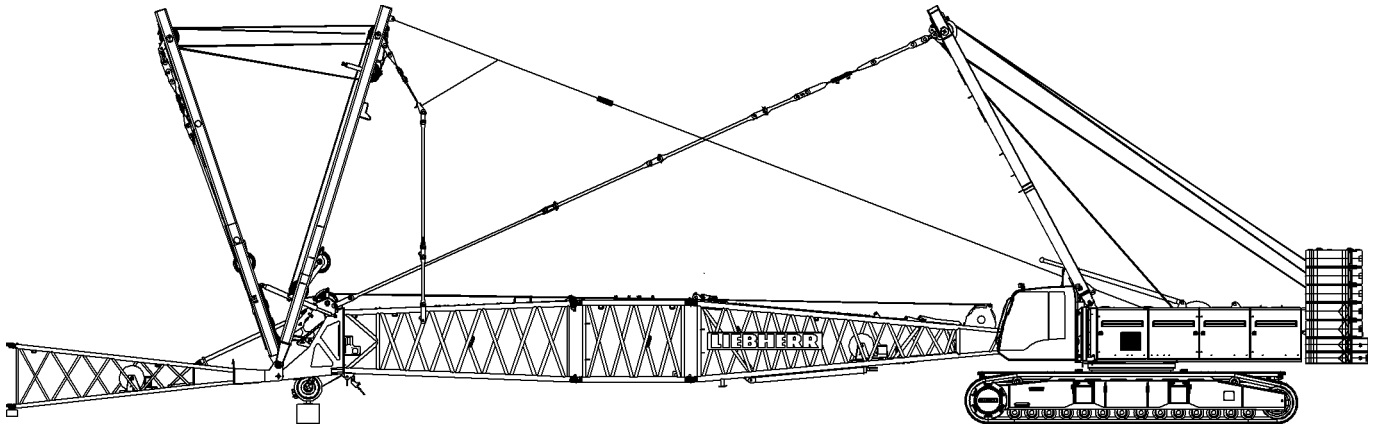


Fig. 2929 Erect A-frame 2/A-frame 3 in the bolting position of the hydraulic tilting-back supports

- ▶ Erect A-frame 2 using the hoist rope and lower A-frame 3 forwards at the same time if required.
  - ▷ The hydraulic tilting-back supports slide onto the guide rails in the direction of the pin connection points on the boom head section.

If the pin connection points on the hydraulic tilting-back supports match those on the boom head section:

- ▶ Stop the erection process.

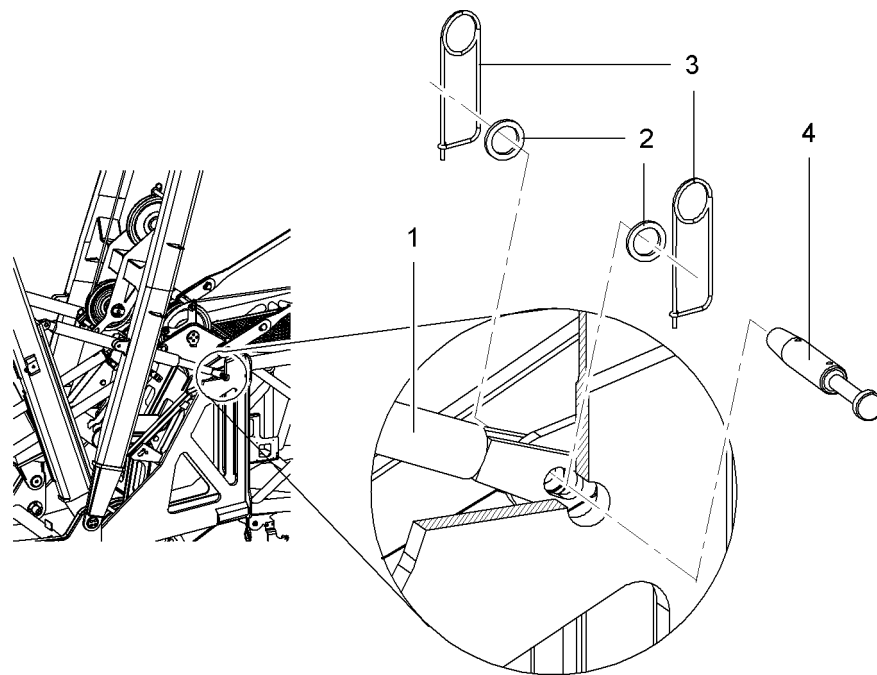


Fig. 2930 Bolting the hydraulic tilting-back supports

- |   |                                |   |                  |
|---|--------------------------------|---|------------------|
| 1 | Hydraulic tilting-back support | 3 | Safety pins (2x) |
| 2 | Washers (2x)                   | 4 | Pin              |

- ▶ Hydraulic tilting-back support **1** should be bolted with pin **4** and secured with safety pins **3** and washers **2**.
- ▶ Repeat the pin insertion process on the opposite side.



### 7.15.13 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.

Make sure that an assistant with a walkie-talkie is monitoring the process.

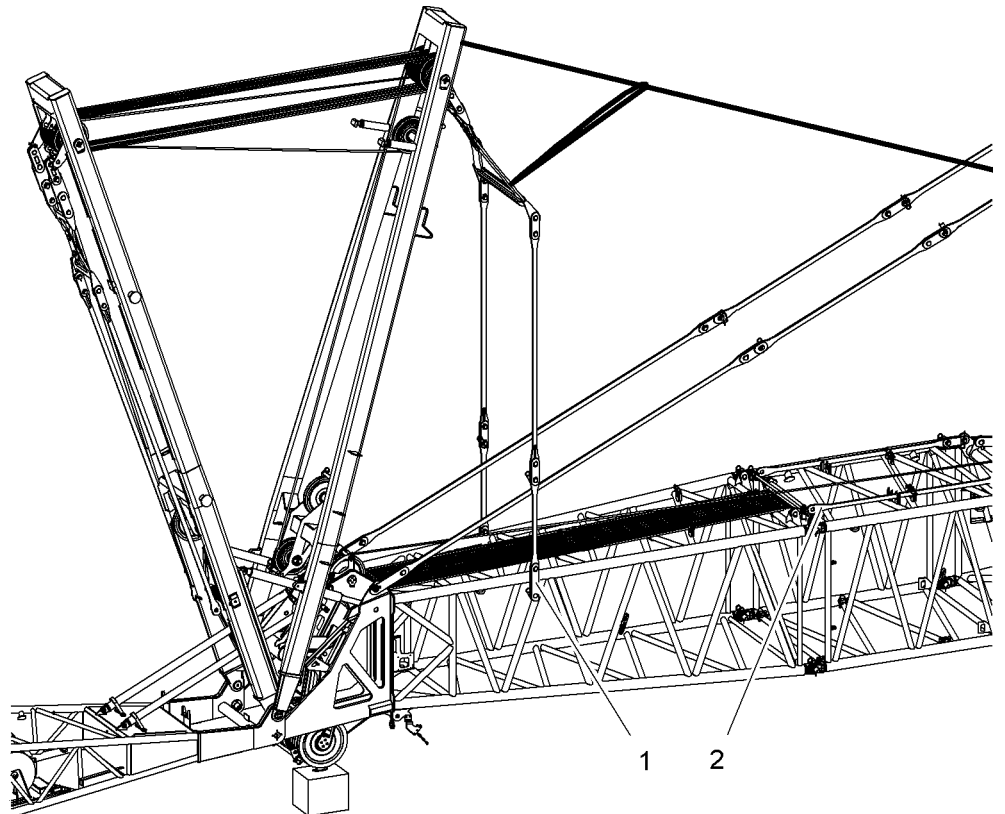


Fig. 2931 Bolting the equaliser on A-frame 2 to the jib backstay straps

- |   |                     |   |                                  |
|---|---------------------|---|----------------------------------|
| 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-frame 2 in good time to avoid a collision with the pulleys on A-frame 2 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-frame 2 using the hoist rope and lower A-frame 3 forwards at the same time if required.
  - ▷ The equaliser of A-frame 2 moves towards the jib backstay straps.

Before the pulleys on A-frame 2 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 the hoist rope.
- ▶ Remove the hoist rope from the rope lock.
- ▶ Remove the rope lock from the round sling.



### Note

If the hoist rope is not reeved onto a hook or a pulley block:

- ▶ Wind up the hoist rope.
-

## 7.15.14 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 satisfied:

- Two shackles are available.
- A 1' 8" ft-in round sling is available.
- Two 3' 3" ft-in round slings are available.
- A signaller with a walkie-talkie should supervise the entire procedure.

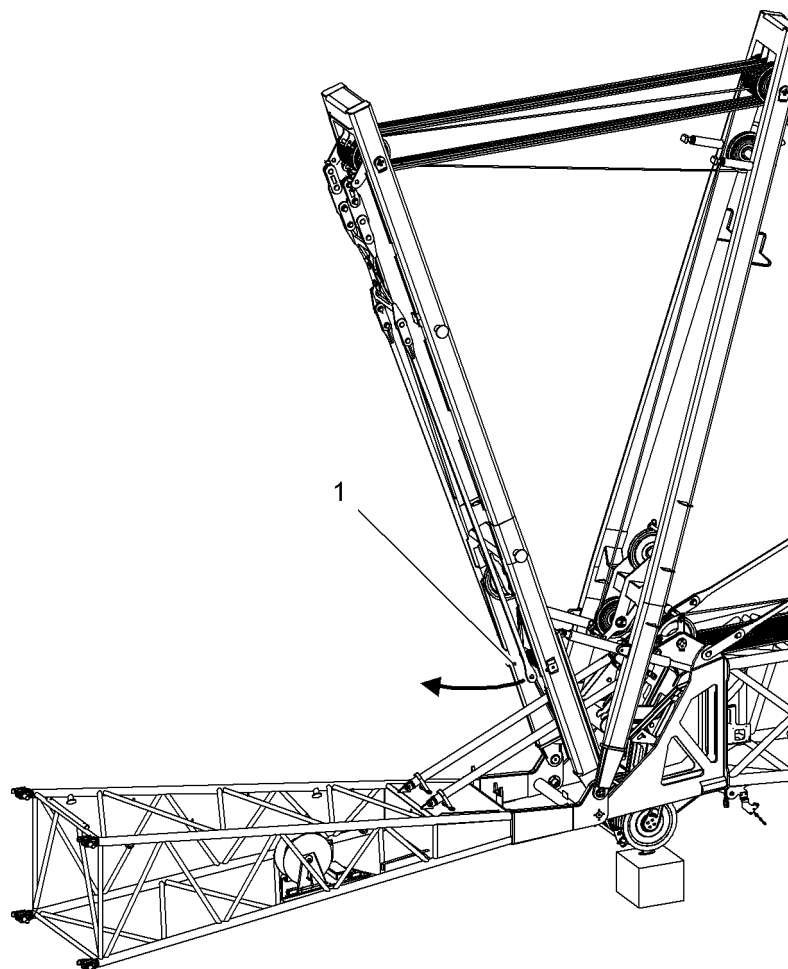


Fig. 2932 Removing the equaliser of A-frame 3 from the transport bracket

- 1 Transport brackets (2x) of the equaliser of A-frame 3



### 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.

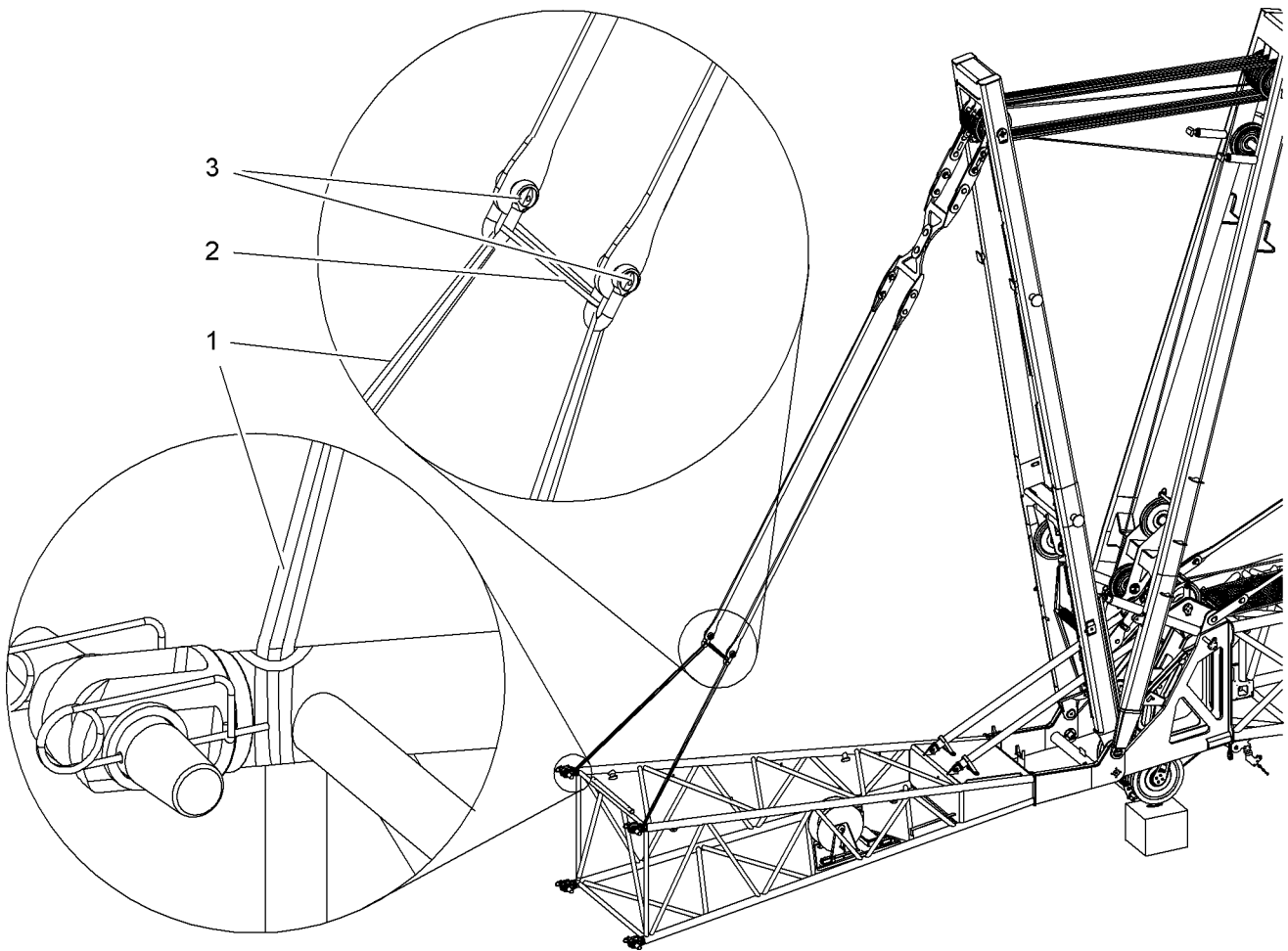


Fig. 2933 Connecting the equaliser on A-frame 3 to the jib base section

- 1 Round slings 3' 3" ft-in (2x)      2 Round sling 1' 8" ft-in      3 Shackles (2x)

- ▶ Connect the equaliser of A-frame 3 to the jib base section as shown in the diagram.

### 7.15.15 Bolting the jib base section to the jib

- ▶ Move the jib luffing winch in the "Raise" direction.
  - ▷ The jib base section lifts off the ground.



#### **WARNING**

Erectability chart is not followed!

- ▶ Only raise the boom when erection is permitted according to the erectability chart.
- ▶ Raise the main boom with attached jib base section.
- ▶ Advance with the basic machine to allow the jib base section and jib to be bolted together

When the pin connection points of the jib base section and the first jib section line up:

- ▶ Bolt the jib base section to the jib.

### 7.15.16 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.

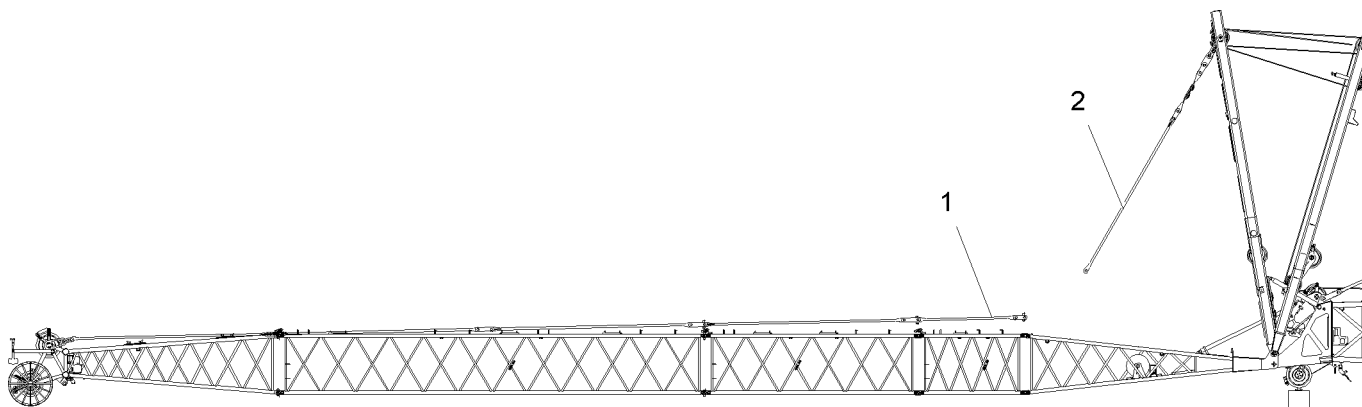


Fig. 2934 Bolting the equaliser on A-frame 3 to the jib pendant straps

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.

## 7.15.17 Installing mid-point suspension

The mid-point suspension:

- reduces sagging of the boom.
- is mandatory above a predefined length.
- connects the boom to the pendant straps.
- is assembled from individual ropes or backstay shackles.
- is installed at a precisely defined location.

The lengths of the ropes and backstay shackles and their assembly positions are shown in the relevant instructions for the boom.

To install the mid-point suspension on main boom lengths of 262' 6" ft-in, 272' 4" ft-in or 282' 2" ft-in with jib 1507 attached, see: [\(For more information see: 7.5.10 Installing mid-point suspension \(with main boom length 262 ft, 272 ft or 282 ft and 1507 jib attached\), page 672\)](#)



### DANGER

Incorrect installation of mid-point suspensions!  
Boom damage.

- ▶ Fit mid-point suspensions according to relevant system instructions.

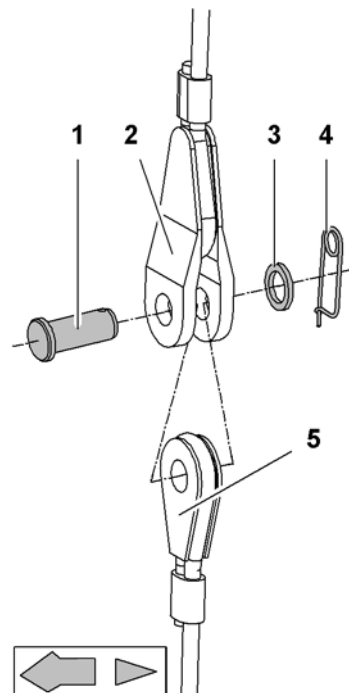


Fig. 2935 Pinning mid-point suspension ropes

- |              |              |
|--------------|--------------|
| 1 Pin        | 4 Safety pin |
| 2 Upper rope | 5 Lower rope |
| 3 Washer     |              |

- ▶ Assemble the required rope sections according to the relevant system instructions.
- ▶ Pin the upper and lower rope 2 + 5.
- ▶ Secure the pin 1 with washer 3 and retaining spring 4.

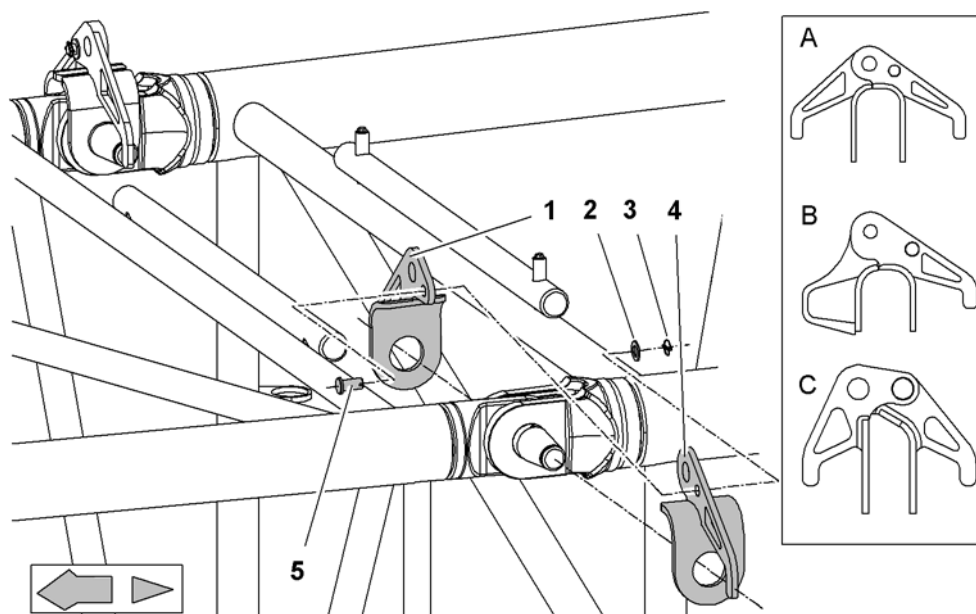


Fig. 2936 Assembling the mid-point suspension forks

- |   |                       |   |        |
|---|-----------------------|---|--------|
| 1 | Inner section of fork | 5 | Pin    |
| 2 | Washer                | A | Form A |
| 3 | Linch pin             | B | Form B |
| 4 | Outer section of fork |   |        |

The shape **A** fork is only fitted to the mid-point suspension of the 1713 luffing jib. All other mid-point suspensions require the shape **A** fork.

- ▶ Remove the safety pins and washers from both sides of the boom pin connection double-taper pin and stow away.



### Note

Special assembly procedure when the mid-point suspension and rope guide are installed in exactly the same position on the main boom!

- ▶ The rope guide forks replace the mid-point suspension forks.
- ▶ Mount the inner and outer sections of the fork **1 + 5** on the double-taper pin.
- ▶ Pin the inner and outer sections of the **1 + 5** fork.
- ▶ Secure pin **5** with a washer **2** and lynch pin **3**.



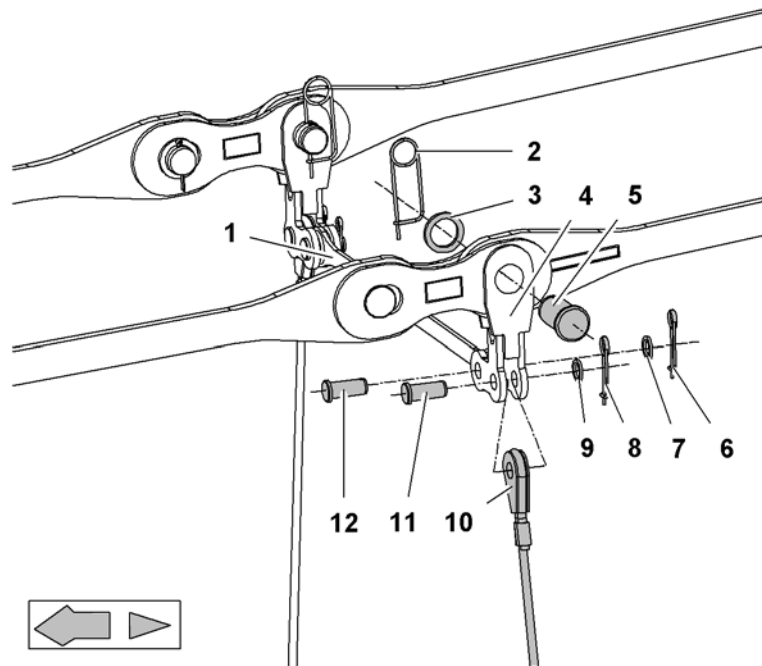


Fig. 2937 Pin the pendant straps, spacer bracket, connecting elements and mid-point suspension ropes

- |   |                    |    |            |
|---|--------------------|----|------------|
| 1 | Spacer bracket     | 7  | Washer     |
| 2 | Safety pin         | 8  | Safety pin |
| 3 | Washer             | 9  | Washer     |
| 4 | Connecting element | 10 | Rope       |
| 5 | Pin                | 11 | Pin        |
| 6 | Safety pin         | 12 | Pin        |

- ▶ Pin connecting element 4 and pendant strap.
- ▶ Secure the pin 5 with washer 3 and retaining spring 2.
- ▶ Pin connecting element 4 and spacer bracket 1.
- ▶ Secure the pin 12 with washer 7 and retaining spring 6.
- ▶ Pin connecting element 4 and ropes 10.
- ▶ Secure the pin 11 with washer 9 and retaining spring 8.

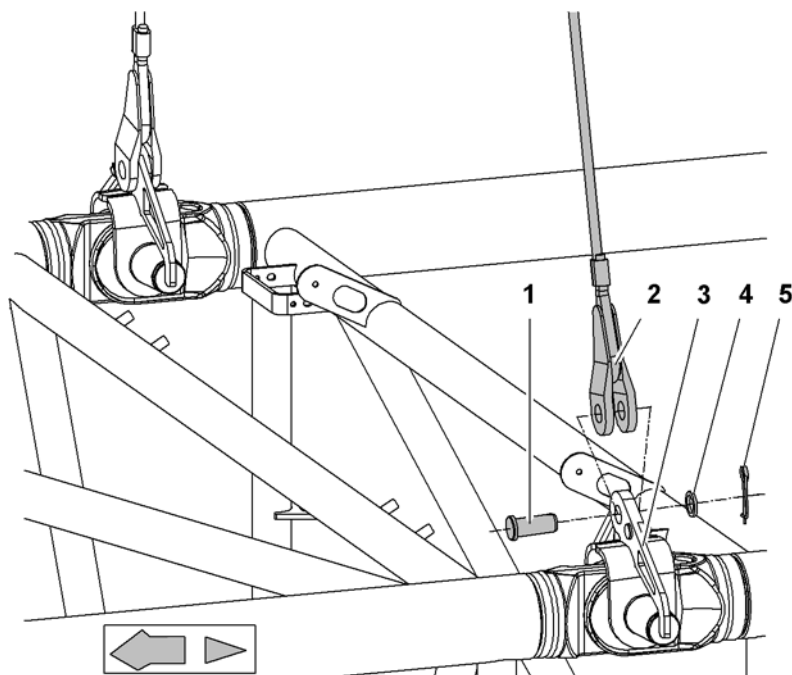


Fig. 2938 Pinning mid-point suspension ropes and forks

- |   |      |   |            |
|---|------|---|------------|
| 1 | Pin  | 4 | Washer     |
| 2 | Rope | 5 | Safety pin |
| 3 | Fork |   |            |



### Note

- ▶ To facilitate pinning of the rope 2 and fork 3: Use A-frame 1 to raise the pendant straps.
- ▶ Pin rope 2 and fork 3.
- ▶ Secure the pin 1 with washer 4 and retaining spring 5.

## 7.15.18 Pinning the pendant straps

- ▶ Remove safety pins from the transport brackets for pendant straps.

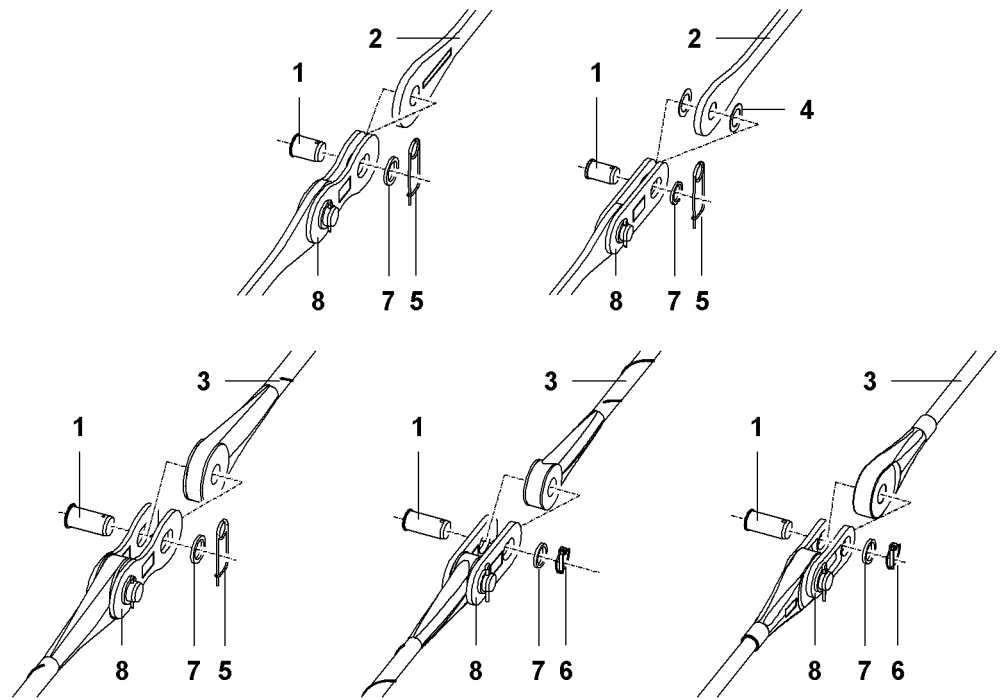


Fig. 2939 Bolt the pendant straps (schematic diagram of various pendant straps)

- |                              |                   |
|------------------------------|-------------------|
| 1 Pin                        | 5 Safety pin      |
| 2 Steel pendant strap        | 6 Lynch pin       |
| 3 Carbon-fibre pendant strap | 7 Washer          |
| 4 Plastic washers (2x)       | 8 Connecting link |

- ▶ Remove the pin 1 on the connecting link 8.
- ▶ Position the pendant strap 2  **bzw.**  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.

### 7.15.19 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 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 locking 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 locking pin to 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.

## 7.15.20 Fitting the helicopter warning light



### Note

The use of helicopter warning lights is mandatory according to national and local regulations!

- ▶ Before using the machine, familiarise yourself with national and local regulations.

Ensure that the anemometer has not yet been fitted.

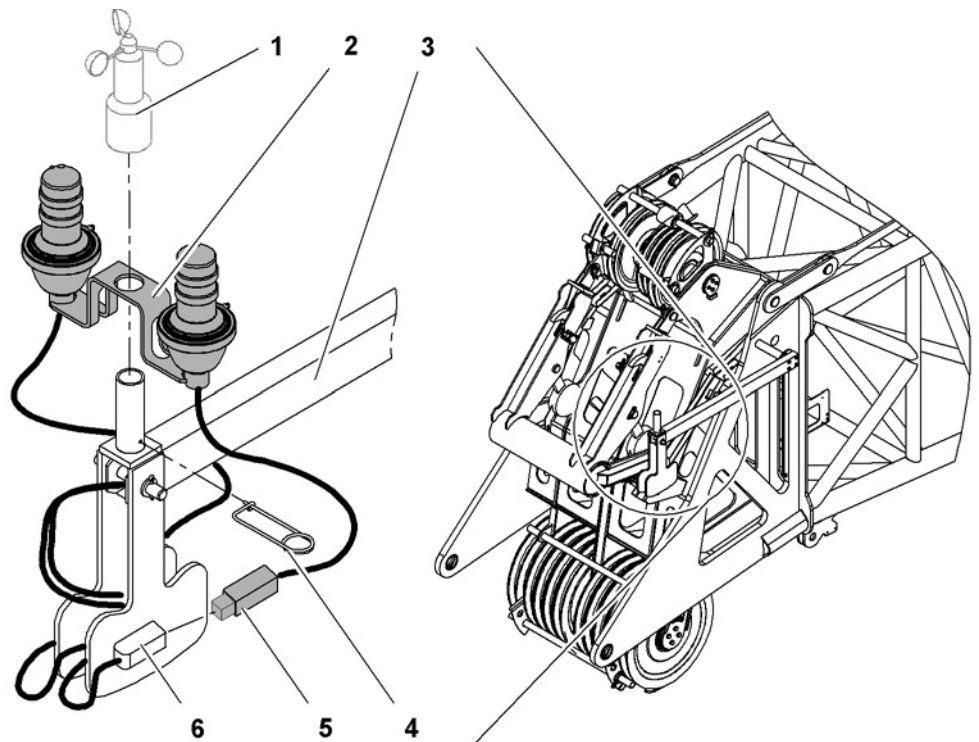


Fig. 2940 Fitting the helicopter warning light

- |   |                          |   |            |
|---|--------------------------|---|------------|
| 1 | Anemometer               | 4 | Safety pin |
| 2 | Helicopter warning light | 5 | Plug       |
| 3 | Mount                    | 6 | Coupling   |

- ▶ Place the helicopter warning light 2 on the tube.
  - ▷ The helicopter warning light locks into position on the pipe and axis on the mount 3.

### NOTICE

Safety pin is not fit properly!  
Damage to the cable.

- ▶ Insert the safety pin carefully.
- 
- ▶ Insert the safety pin 4.
    - ▷ Helicopter warning light 2 is secured.
  - ▶ Connect the plug 5 to the coupling 6.
  - ▶ Lock the plug.

## 7.15.21 Fitting the anemometer

Ensure that the helicopter warning light (if available) is fitted.

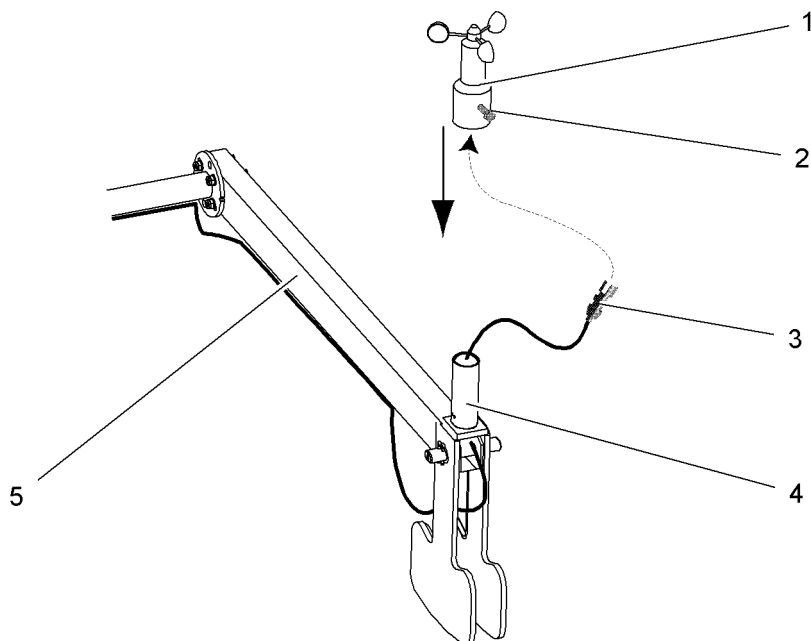


Fig. 2941 Fitting the anemometer

- |   |                    |   |       |
|---|--------------------|---|-------|
| 1 | Anemometer         | 4 | Tube  |
| 2 | Screw              | 5 | Mount |
| 3 | Circular connector |   |       |

- ▶ Remove the rubber protection cap from the circular connector 3.
- ▶ Connect the circular connector 3 to the anemometer 1 at the bottom.
- ▶ Fasten the circular connector 3 using the lock nut.

### NOTICE

Anemometer is not fit properly!  
Damage to the cable.

- ▶ Pull the cable present through the tube before pushing on the anemometer.
- 
- ▶ Position the anemometer 1 on the tube 4.
  - ▶ Secure the anemometer on the mount: tighten the screw 2 moderately.  
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.

### 7.15.22 Attaching the rope fixing point



**DANGER**

Incorrect installation of pins and pocket lock!  
Load breakaway.

► Fit pins and pocket lock as instructed.

The pin shoulder and the pocket lock opening determine the fitting direction of the rope fixing point.

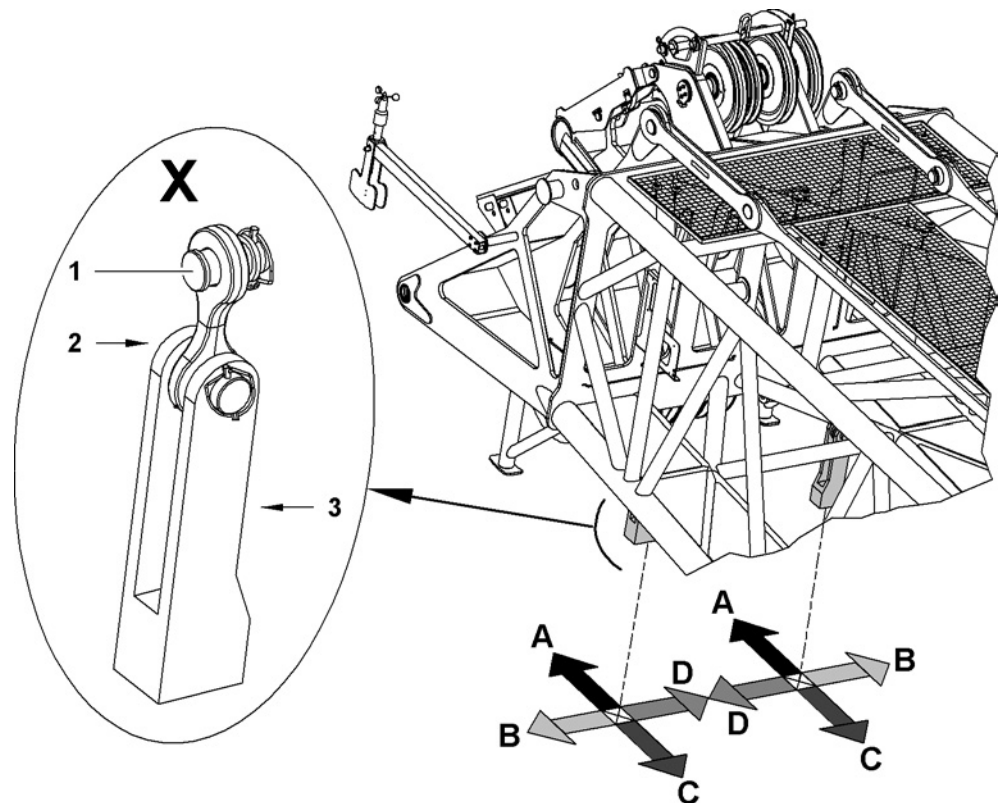


Fig. 2942 Schematic diagram for determining the fitting direction of the components needed for fitting the rope fixing point

- |   |                             |
|---|-----------------------------|
| <b>X</b> Components needed for fitting      | <b>A</b> Facing boom head   |
| <b>1</b> Shoulder of pin on the boom        | <b>B</b> Outside            |
| <b>2</b> Shoulder of pin on the pocket lock | <b>C</b> Facing the machine |
| <b>3</b> Pocket lock opening                | <b>D</b> Inside             |

**Fitting direction of the components needed for fitting the rope fixing point**

	Shoulder of pin on the boom	Pin shoulder on the pocket lock	Pocket lock opening
ALL rope fixations	D	C	B
<b>Exceptions:</b>			
0906 fixed jib head section	B	C	B

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Fitting direction of the components needed for fitting the rope fixing point			
	Shoulder of pin on the boom	Pin shoulder on the pocket lock	Pocket lock opening
1507 fixed jib head section	B	C	B

Tab. 326 Fitting direction of the components needed for fitting the rope fixing point



### WARNING

Incorrectly fit swivels!

- ▶ Fit rope with no twists.
- ▶ Install the rope without swivels.

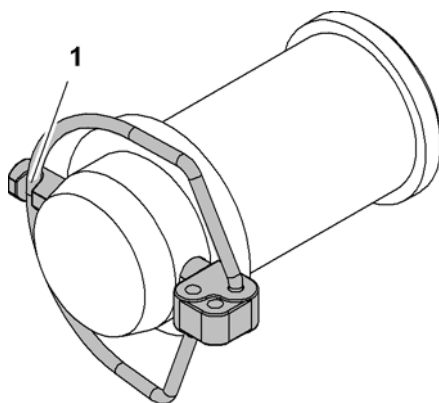


Fig. 2943 Linch pin

1 Linchpin latched



### DANGER

Pins are not completely secure!  
Load breakaway.

- ▶ Ensure that the linchpin fasteners are properly latched.

### Rope fixing point on the boom head

- ▶ Pin the cross strap on the boom head.
- ▶ Secure the pin with a washer and linchpin.
- ▶ Pin the pocket lock to the boom head cross strap.
- ▶ Secure pin with linchpin.



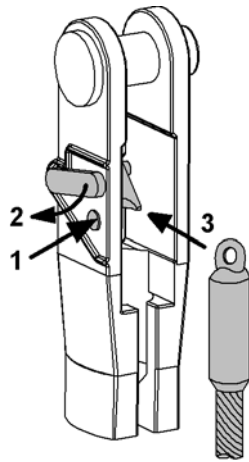


Fig. 2944 Fasten the rope termination in the pocket lock

- |   |               |   |                  |
|---|---------------|---|------------------|
| 1 | Safety button | 3 | Rope termination |
| 2 | Safety latch  |   |                  |

- ▶ Press the safety button 1.
- ▶ Press and hold down the safety latch 2.
- ▶ Insert the rope termination 3 into the pocket lock.



**DANGER**

Rope termination not completely secure!  
Load breakaway.

- ▶ Ensure that the safety latch is engaged.
- ▶ Release the safety latch.
  - ▷ The safety latch engages.

**Rope fixing point on hook/pulley block**

- ▶ Pin the pocket lock to the hook/pulley block.
- ▶ Secure pin with linchpin.

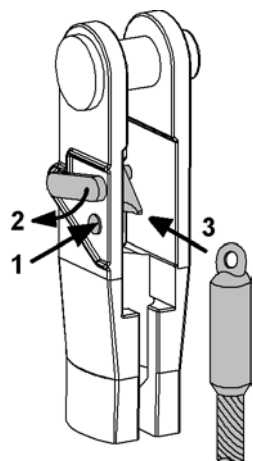


Fig. 2945 Fasten the rope termination in the pocket lock

- |   |               |   |                  |
|---|---------------|---|------------------|
| 1 | Safety button | 3 | Rope termination |
| 2 | Safety latch  |   |                  |

- ▶ Press the safety button.
- ▶ Press and hold down the safety latch.
- ▶ Insert the rope termination into the pocket lock.



### **DANGER**

Rope termination not completely secure!  
Load breakaway.

- ▶ Ensure that the safety latch is engaged.
- 
- ▶ Release the safety latch.
    - ▷ The safety latch engages.

## 7.15.23 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 from the boom.

- ▶ A fall arrest system must be worn when working on the boom to prevent falling.

### **Reeving the rope using a rope reeving winch**

- ▶ Remove the rope protection pipes on the boom and the pulley block.
- ▶ Open up the rope guide (if present).
- ▶ Set the rope lug to free-wheel.
- ▶ Unwind the luffing rope and guide it through the pulleys.
- ▶ Pull the luffing rope under the boom to the boom head.
- ▶ Reeve the luffing rope according to the rope reeving system.

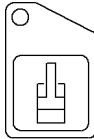
- ▶ Pull the luffing rope on the boom to the basic machine and connect to the hoist rope.
- ▶ Stop the free-wheel of the rope reeving winch.



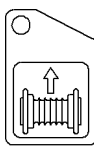
## WARNING

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.



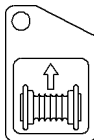
- ▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button on control panel X23.
  - ▷ Cylinder adjustment functions on.



- ▶ Press and hold down the *Rope reeving winch* button on control panel X11.
  - ▷ The rope reeving winch winds up the luffing rope and tensions the hoist rope.

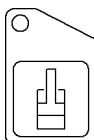
There must be no slacking of the rope when unwinding.

- ▶ Unwind the hoist rope as far as the rope fixing point.



- ▶ Press the *Rope reeving winch* button on control panel X11.
  - ▷ Rope reeving winch switched off.

- ▶ Detach the luffing rope from the hoisting rope.
- ▶ Switch the rope lug back on.
- ▶ Wind up the remaining luffing rope.
- ▶ Switch off the rope lug.



- ▶ Press the *Cylinder adjustment functions on undercarriage/uppercarriage* button again on control panel X23.
  - ▷ Cylinder adjustment functions switched off.

- ▶ Close and secure the rope guide (if present).
- ▶ Re-fit and secure the 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).

There must be no slacking of the rope when unwinding.

- ▶ Unwind the hoist rope and pull it to the boom head.
- ▶ Reeve the hoist rope according to the rope reeving system.
- ▶ Close and secure the rope guide (if present).
- ▶ Re-fit and secure the rope protection pipes.

### 7.15.24 Fitting the hoist limit switch

#### NOTICE

The hoist limit switch weight has not been fitted properly!  
Risk of damage to the rope and the hoist limit switch weight.

- ▶ Fit the hoist limit switch weight with no diagonal pull.
- ▶ Always fit the hoist limit switch weight onto the inoperative hoist rope. The exception to this is in the event of single reeving.

#### NOTICE

The chain on the hoist limit switch weight is too short!  
The hoist limit switch weight responds too late. The hook damages the boom head.

- ▶ Do not shorten the chain for the hoist limit switch weight.

The hoist limit switch with chain and hoist limit switch weight attached is secured to the inoperative end of the hoist rope.

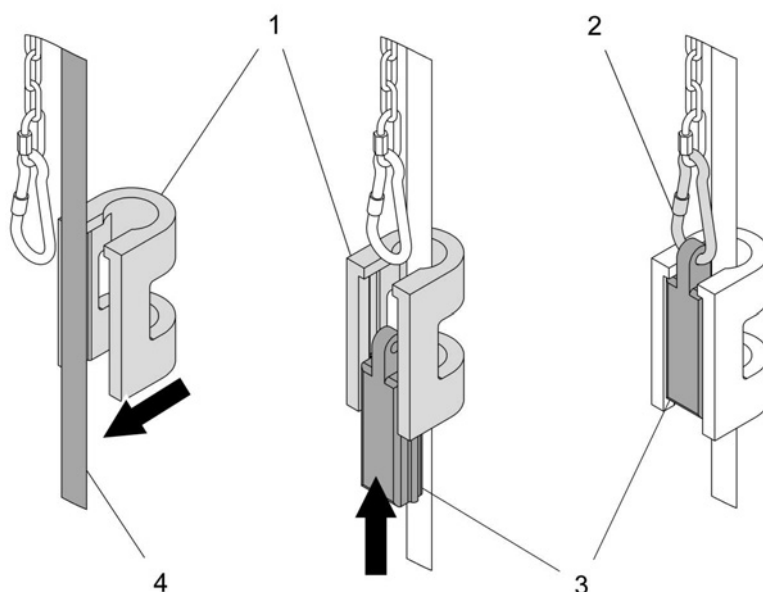


Fig. 2950 Fitting the hoist limit switch weight

- |   |                                     |   |                                   |
|---|-------------------------------------|---|-----------------------------------|
| 1 | Hoist limit switch weight (U shape) | 3 | Hoist limit switch weight (wedge) |
| 2 | Carabiner                           | 4 | Hoist rope                        |

- ▶ Route the hoist limit switch weight (U shape) 1 over the hoist rope 4.
- ▶ Insert the hoist limit switch weight (wedge) 3 from below into the hoist limit switch weight (U shape) 1.
- ▶ Attach the carabiner 2 to the hoist limit switch weight (wedge) 3.
- ▶ Attach the chain between the hoist limit switch weight and the hoist limit switch.

## 7.15.25 Bypass unused hoist limit switches.



### DANGER

The hoist limit switch has been bypassed illegally!  
Load breakaway.

- ▶ Only ever bypass unused hoist limit switches.

### NOTICE

Wrong hoist limit switch is bypassed!  
The hook damages the boom head.

- ▶ Lock winch 1 using the left hoist limit switch.
- ▶ Lock winch 2 using the right hoist limit switch.

Ensure that movement is made using only the one hoist rope, and that one hoist limit switch is not required.

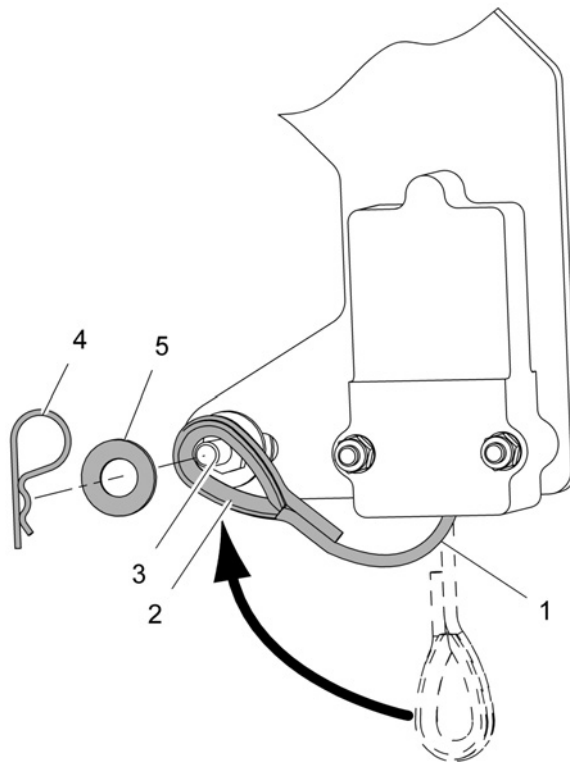


Fig. 2951 Bypassing the hoist limit switch mechanically

- |   |            |   |            |
|---|------------|---|------------|
| 1 | Steel rope | 4 | Safety pin |
| 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.
- ▶ Ensure the loop does not slip off the stud bolt by securing it with the washer 5 and safety pin 4.

## 7.15.26 Erecting the main boom + luffing jib

Critical angle during erection

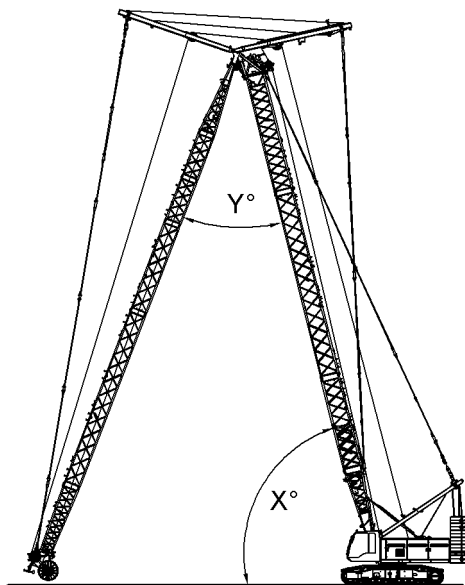


Fig. 2952 Both booms are the same length

- Erect main boom to max.  $80^\circ X$ .
- Retain a minimum angle of  $30^\circ Y$  between the main boom and jib.

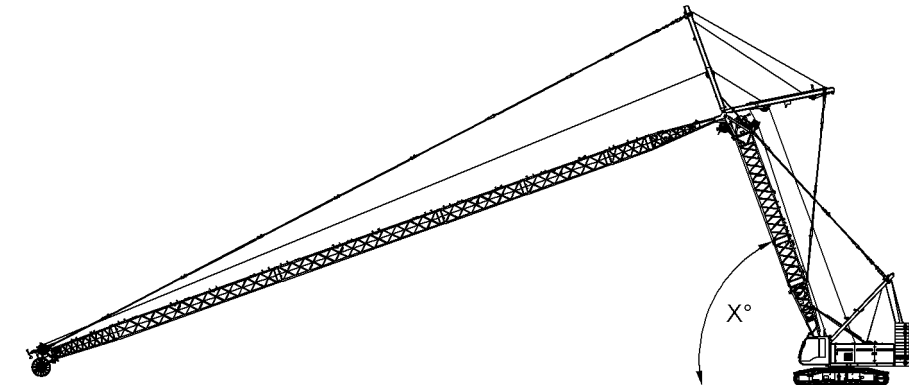


Fig. 2953 Short main boom with long jib

Erect main boom to max.  $70^\circ X$ .

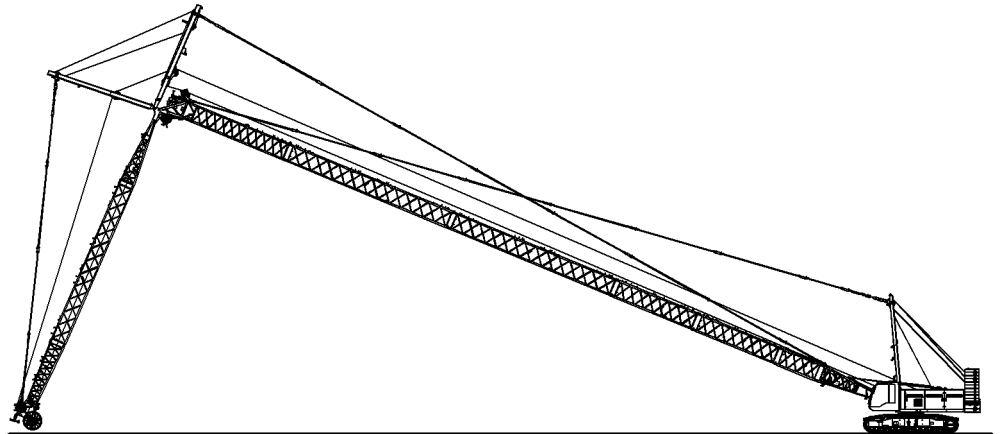


Fig. 2954 Long main boom with short jib

- In this configuration there are no critical angles to be noted.
- Ensure that the jib backstay straps remain permanently tensioned.



**DANGER**

Erectability chart is not followed!  
Machine toppling over.

- ▶ Only raise the boom when erection is permitted according to the erectability chart.



**Note**

The overall center of gravity of the machine is moved beyond the first running roller!  
Sudden swinging of the boom/jib when erecting.

- ▶ When using long main booms and short jibs, follow the procedure for “Blocked Crawlers” ([For more information see: 4.26 Blocked crawlers\\*, page 500](#)) .

Ensure that the following conditions are satisfied:

- Boom configuration can be erected with counterweight.
- All work on the boom has been completed.
- No loose parts or tools have been left on the boom.



**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.

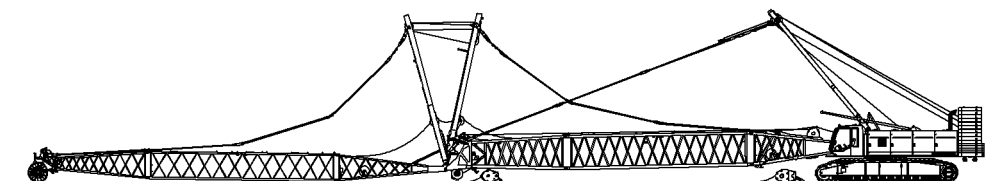


Fig. 2955 Boom on the ground



### DANGER

Critical angle is exceeded!  
Machine toppling over.

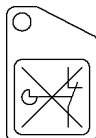
- ▶ Do not exceed critical angle during erection.



### DANGER

Hoist limit switch bypassed on control panel X23 in crane operation!

- ▶ Only bypass hoist limit switch on control panel X23 when assembling or disassembling the machine.



When the hoist limit switch weight is lying on the ground:

- ▶ Press the *Bypass limit switch* button on control panel X23.
  - ▷ All hoist limit switches are bypassed.

- ▶ Slowly wind in the boom winch.
  - ▷ The main boom pendant straps are tensioned.



### DANGER

Main boom and jib are raised at the same time!  
Machine toppling over.

- ▶ Never raise the jib from a horizontal position together with the main boom.

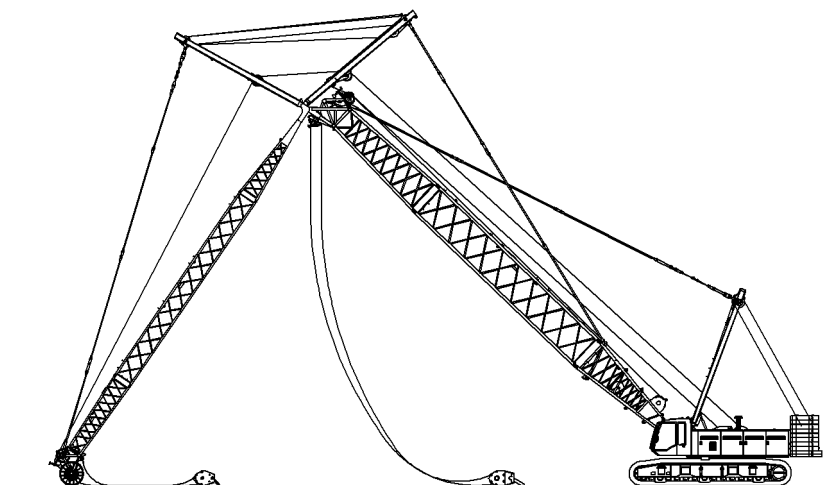


Fig. 2957 Jib head section on ground

- ▶ Slowly wind in the boom winch.
  - ▷ The main boom lifts off the ground.
  - ▷ The LML bar display on the monitor will show the current degree of capacity utilisation once the main boom angle has reached around 45 °.

The jib pendant straps must sag significantly during the erection process.

- ▶ Simultaneously unwind the jib luffing winch.
  - ▷ Jib head section remains on the ground and moves backwards on the pulleys.



**NOTICE**

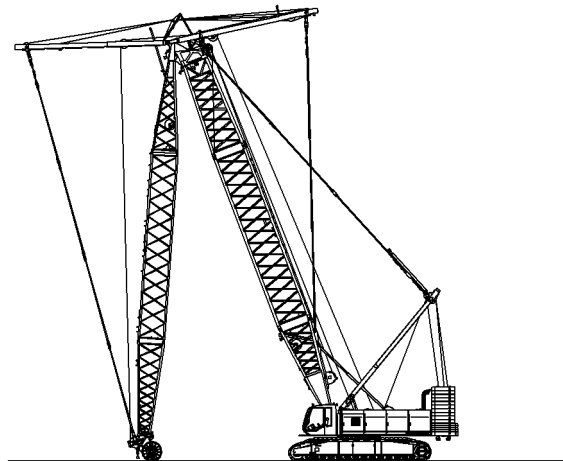
Incorrect erection procedure is followed!  
Damage to the equipment.

- ▶ Do not drag the hook or the pulley block along the ground.
- ▶ Do not allow any slacking of the rope.

- ▶ Unwind the hoist rope, if necessary.
  - ▷ The hook/pulley block remains on the ground.

If the LML bar on the monitor falls below 100 %:

- ▶ Raise the hook.



*Fig. 2958 Raising the jib head section*

- ▶ Erect the main boom until the lower limit switch of the jib trips.
- ▶ Wind up jib luffing winch.
  - ▷ The jib head section lifts off the ground.

**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 hoist rope, if necessary.
  - ▷ The hook/pulley block remains on the ground.

If the LML bar on the monitor falls below 100 %:

- ▶ Raise the hook.

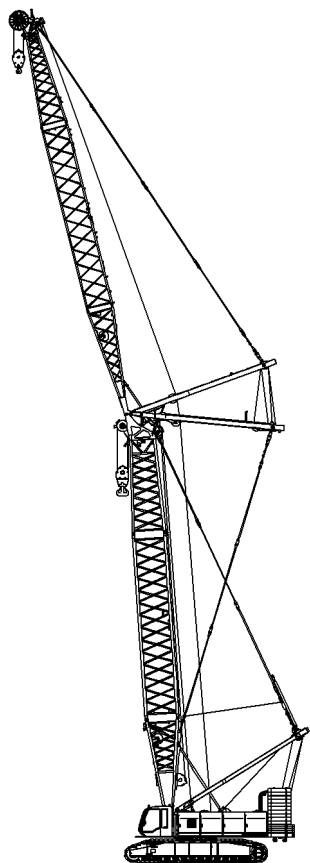


Fig. 2959 Boom erected

- ▶ Erect the boom until it is in the desired position.

### 7.15.27 Switching off assembly mode



#### **DANGER**

No safety cutout by the load moment limiter (LML) in assembly mode!  
Risk of machine toppling over, structural breakdown.

- ▶ Only use assembly mode for assembling and disassembling the machine.

Ensure that the following conditions are satisfied:

- The machine is fully assembled and erected.
- All limit switches are fitted and operational.
- ▶ Press the *Assembly mode* switch on the control panel X12.
  - ▷ Assembly mode is turned off.
  - ▷ The lamp in the switch goes out.
  - ▷ The *Assembly mode* symbol disappears.



Fig. 2961 Assembly mode symbol

- ▶ Lock control panel X12 and remove the key.
- ▶ Ensure that the key is kept by an authorised person outside of the cab.

### 7.15.28 Checking the limit switch works

- ▶ Slowly approach the boom limit switch and hoist limit switch and check they are working correctly.

## 7.16 2316 luffing jib + 2316 Midfall

**System-relevant information** for 2316 luffing jib + 2316 Midfall:

- Configuration of jib
  - Mid-point suspension assembly positions
- Configuration of main boom
- Lengths of jib mid-point suspensions
- Pendant straps on 2316 fixed jib + 2316 Midfall, overview, (LR1300 (steel pendant straps))
- Pendant straps on 2316 fixed jib + 2316 Midfall, overview, (LR1300 (carbon-fibre pendant straps))
- 2316 jib head section rope reeving systems (load position 1)
- 2316 Midfall rope reeving systems (load position 3)

### 7.16.1 Configuration of jib



**DANGER**

Incorrect jib length assembled!  
Structural breakdown.

- ▶ Check the jib length in the load chart for validity.

Jib length	Position of Midfall	Configuration of jib (symbolic)
126 ft	52' 6" ft-in	
136 ft	62' 4" ft-in	
146 ft	72' 2" ft-in	
156 ft	82' ft-in	
166 ft	91' 10" ft-in	
176 ft	101' 8" ft-in	
185 ft	72' 2" ft-in	
195 ft	82' ft-in	
205 ft	91' 10" ft-in	
215 ft	101' 8" ft-in	
225 ft	111' 7" ft-in	
235 ft	121' 5" ft-in	

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Jib length	Position of Midfall	Configuration of jib (symbolic)
244 ft	131' 3" ft-in	
254 ft	141' 1" ft-in	
264 ft	111' 7" ft-in	
274 ft	121' 5" ft-in	
284 ft	131' 3" ft-in	
294 ft	141' 1" ft-in	
304 ft	150' 11" ft-in	
313 ft	160' 9" ft-in	
323 ft	170' 7" ft-in	
333 ft	180' 5" ft-in	
343 ft	150' 11" ft-in	
353 ft	160' 9" ft-in	
363 ft	170' 7" ft-in	

Tab. 327 Configuration of 2316 luffing jib + 2316 Midfall

- X1 - Assembly position of mid-point suspension 1
- X2 - Assembly position of mid-point suspension 2

### 7.16.2 Lengths of jib mid-point suspensions

Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
166 ft	9' 10" ft-in	
176 ft	9' 10" ft-in	
185 ft	8' 6" ft-in	
195 ft	8' 6" ft-in	
205 ft	6' 11" ft-in	
215 ft	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	6' 11" ft-in

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Main boom length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
225 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	5' 3" ft-in
235 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	5' 3" ft-in
244 ft	15' 5" ft-in = 6' 11" ft-in + 8' 6" ft-in	5' 3" ft-in
254 ft	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	5' 3" ft-in
264 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in
274 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	6' 11" ft-in
284 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	6' 11" ft-in
294 ft	15' 5" ft-in = 6' 11" ft-in + 8' 6" ft-in	6' 11" ft-in
304 ft	15' 5" ft-in = 6' 11" ft-in + 8' 6" ft-in	6' 11" ft-in
313 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in
323 ft	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	6' 11" ft-in
333 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	5' 3" ft-in
343 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	8' 6" ft-in
353 ft	15' 5" ft-in = 6' 11" ft-in + 8' 6" ft-in	6' 11" ft-in
363 ft	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	8' 6" ft-in

Tab. 328 Lengths of jib mid-point suspensions - 2316 luffing jib + 2316 Midfall

### 7.16.3 Configuration of main boom



**DANGER**

Erected length of main boom excessive!  
Structural breakdown.

- ▶ Check the main boom length in the 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: 7.4.1 Configuration of main boom, page 645) .

**7.16.4 Pendant straps on 2316 luffing jib + 2316 Midfall, over-view, (LR1300 (steel pendant straps))**

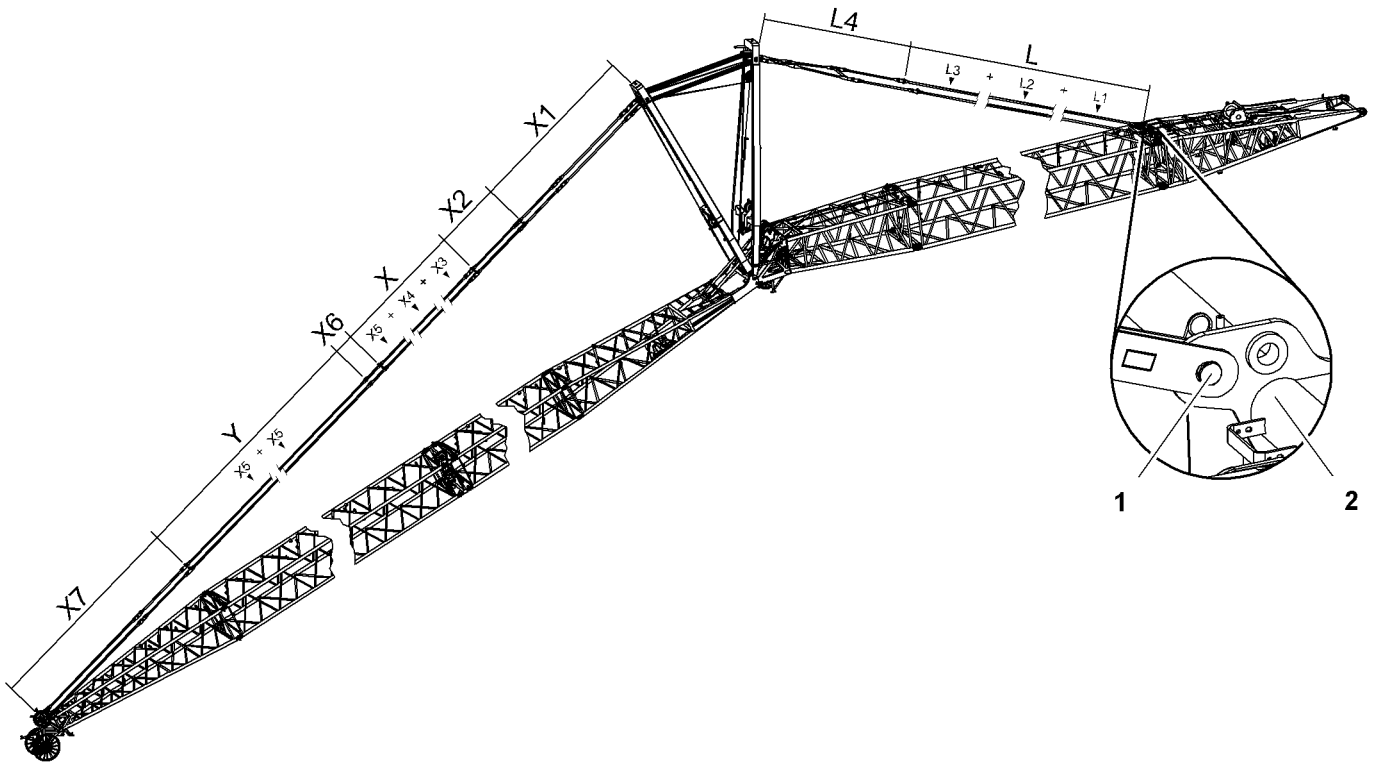


Fig. 3165 Pendant straps on 2316 luffing jib + 2316 Midfall, overview, (LR1300 (steel pendant straps))

- 1 Jib backstay straps pin connection point
- 2 Boom base section

**Backstay straps connecting A-frame 2 to 2821 boom base section**

Designation		Value
L	<b>Jib backstay straps</b> consisting of:	
	L1	<b>Jib backstay strap 10 ft</b> (For more information see: Jib backstay strap 10 ft, page 153)
	L2	<b>Jib backstay strap 20 ft</b> (For more information see: Jib backstay strap 20 ft, page 155)
	L3	<b>Jib backstay strap 40 ft</b> (For more information see: Jib backstay strap 40 ft, page 156)
		Total L1 + Total L2 + Total L3

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Designation		Value
L4	<b>Equalizer on A-frame 2 (jib backstay strap)</b> (For more information see: Equalizer on A-frame 2 (jib backstay strap), page 177)	26' 5" ft-in

Tab. 329 Backstay straps connecting A-frame 2 to 2821 boom base section

### Configuration of jib backstay straps (L):

Required number of jib backstay straps 10 ft (L1) is the same as the number of boom sections 10 ft.

Required number of jib backstay straps 20 ft (L2) is the same as the number of boom sections 20 ft.

Required number of jib backstay straps 40 ft (L3) is the same as the number of boom sections 40 ft.



### Note

► Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the load chart.

## Pendant straps linking A-frame 3 to 2316 jib head section

Designation		Value	
X1	<b>A-frame 3 equalizer (jib pendant strap)</b> (For more information see: A-frame 3 equalizer (jib pendant strap), page 178)	25' 9" ft-in	
X2	<b>Jib pendant strap 10 ft</b> (For more information see: Jib pendant strap 10 ft, page 176)	9' 10" ft-in	
X	<b>Jib pendant straps</b> consisting of:		
	X3	<b>Jib pendant strap 10 ft</b> (For more information see: Jib pendant strap 10 ft, page 179)	Total X3 +
	X4	<b>Jib pendant strap 20 ft</b> (For more information see: Jib pendant strap 20 ft, page 179)	Total X4 +
X5	<b>Jib pendant strap 40 ft</b> (For more information see: Jib pendant strap 40 ft, page 180)	Total X5	
X6	<b>Midfall connecting link</b> (For more information see: Midfall connecting link, page 188)	3' ft-in	
Y	<b>Jib pendant straps</b> consisting of:		Total X5
	X5	<b>Jib pendant strap 40 ft</b> (For more information see: Jib pendant strap 40 ft, page 180)	
X7	<b>Jib pendant strap on 2316 jib head section</b> (For more information see: Jib pendant strap on 2316 jib head section, page 181)	30' 1" ft-in	

Tab. 330 Pendant straps linking A-frame 3 to 2316 jib head section



**Configuration of jib pendant straps (X):**

Required number of jib pendant straps 10 ft (X3) is the same as the number of jib sections 10 ft.

Required number of jib pendant straps 20 ft (X4) is the same as the number of jib sections 20 ft.

Required number of jib pendant straps 40 ft (X5) is the same as the number of jib sections 40 ft.



**Note**

▶ Permitted number of jib sections 10 ft, 20 ft, 40 ft can be found in the following table: (For more information see: 7.16.1 Configuration of jib, page 854)

**7.16.5 Pendant straps on 2316 luffing jib + 2316 Midfall, overview, (LR1300 (carbon-fibre pendant straps))**

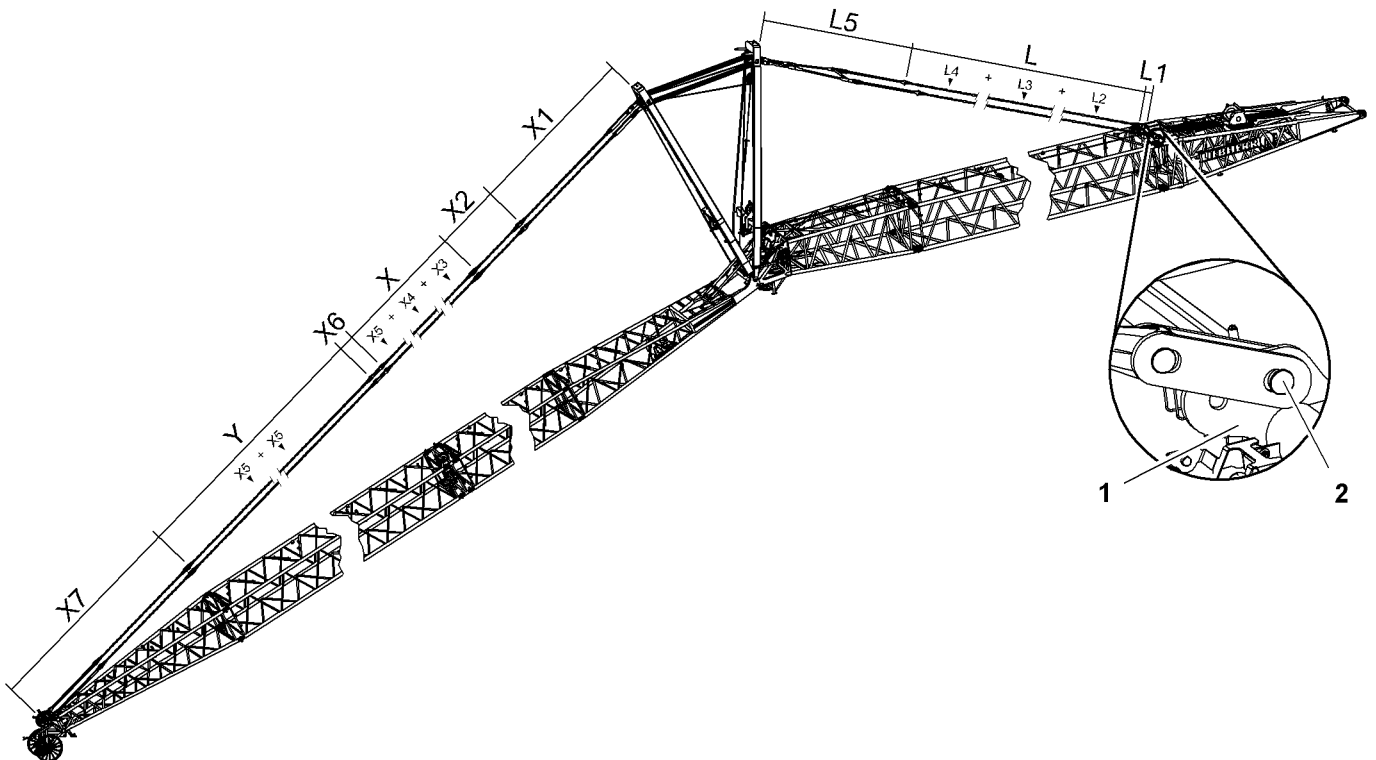


Fig. 3166 Pendant straps on 2316 luffing jib + 2316 Midfall, overview, (LR1300 (carbon-fibre pendant straps))

1 Boom base section

2 Jib backstay straps pin connection point

**Backstay straps connecting A-frame 2 to 2821 boom base section**

Designation		Value
L1	Connecting link (For more information see: Connecting link, page 192)	1' 2" ft-in

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Designation		Value	
L	Jib backstay straps consisting of:		
	L2	Jib backstay strap 10 ft (For more information see: Jib backstay strap 10 ft, page 194)	Total L2 +
	L3	Jib backstay strap 20 ft (For more information see: Jib backstay strap 20 ft, page 197)	Total L3 +
	L4	Jib backstay strap 40 ft (For more information see: Jib backstay strap 40 ft, page 200)	Total L4
L5	Equalizer on A-frame 2 (jib backstay strap) (For more information see: Equalizer on A-frame 2 (jib backstay strap), page 205)	25' 6" ft-in	

Tab. 331 Backstay straps connecting A-frame 2 to 2821 boom base section

### Configuration of jib backstay straps (L):

The required number of jib backstay straps 10 ft (L2) is the same as the number of boom sections 10 ft.

The required number of jib backstay straps 20 ft (L3) is the same as the number of boom sections 20 ft.

The required number of jib backstay straps 40 ft (L4) is the same as the number of boom sections 40 ft.



### Note

- ▶ Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the load chart.

## Pendant straps linking A-frame 3 to 2316 jib head section

Designation		Value	
X1	A-frame 3 equalizer (jib pendant strap) (For more information see: A-frame 3 equalizer (jib pendant strap), page 207)	25' 9" ft-in	
X2	Jib pendant strap 10 ft (For more information see: Jib pendant strap 10 ft, page 205)	9' 10" ft-in	
X	Jib pendant straps consisting of:		
	X3	Jib pendant strap 10 ft (For more information see: Jib pendant strap 10 ft, page 208)	Total X3 +
	X4	Jib pendant strap 20 ft (For more information see: Jib pendant strap 20 ft, page 208)	Total X4 +
	X5	Jib pendant strap 40 ft (For more information see: Jib pendant strap 40 ft, page 209)	Total X5
X6	Midfall connecting link (For more information see: Connecting link, page 216)	2' 4" ft-in	

Designation		Value
Y	Jib pendant straps consisting of:	
	X5	Jib pendant strap 40 ft (For more information see: Jib pendant strap 40 ft, page 209)
X7	Jib pendant strap on 2316 jib head section (For more information see: Jib pendant strap on 2316 jib head section, page 210)	
		Total X5
		31' 4" ft-in

Tab. 332 Pendant straps linking A-frame 3 to 2316 jib head section

**Configuration of jib pendant straps (X):**

Required number of jib pendant straps 10 ft (X3) is the same as the number of jib sections 10 ft.

Required number of jib pendant straps 20 ft (X4) is the same as the number of jib sections 20 ft.

Required number of jib pendant straps 40 ft (X5) is the same as the number of jib sections 40 ft.



**Note**

► Permitted number of jib sections 10 ft, 20 ft, 40 ft can be found in the following table: (For more information see: 7.16.1 Configuration of jib, page 854)

**7.16.6 2316 jib head section rope reeving systems (load position 1)**

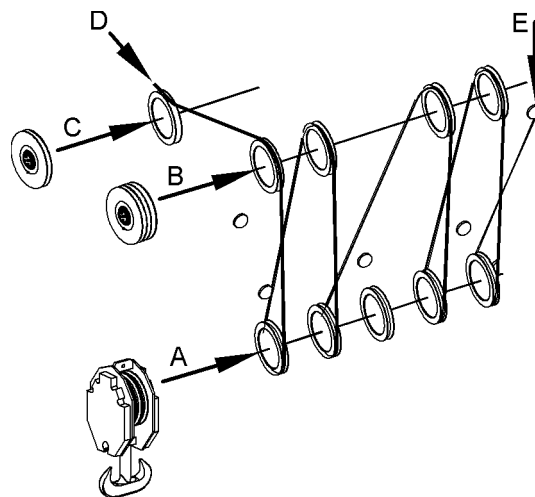


Fig. 3167 2316 jib head section rope reeving system (load position 1)

- A Pulley block roller set
- B Jib head section roller set
- C Jib head section gantry pulley
- D Winch 1 hoist rope
- E Rope fixation

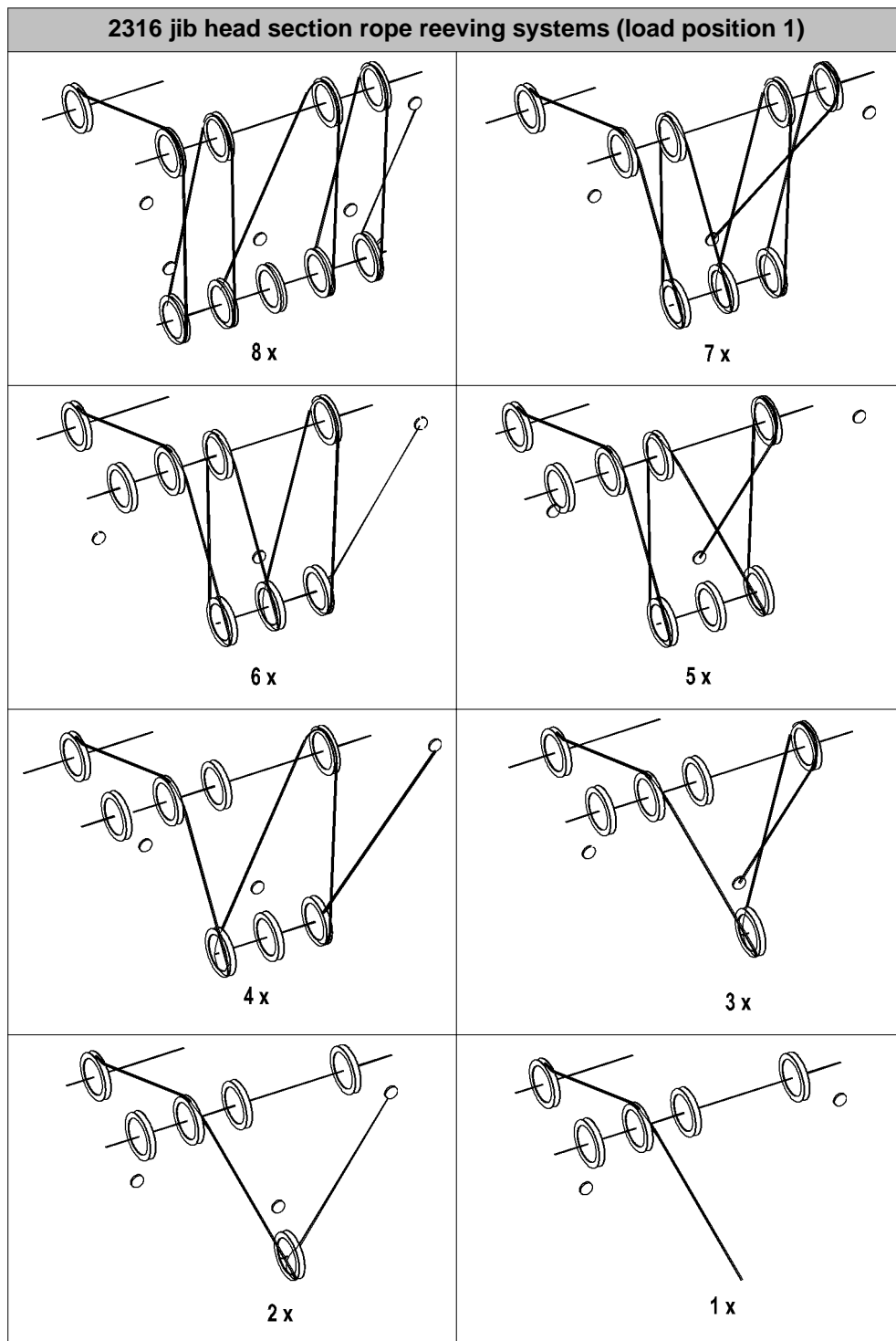
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**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

► Choose the correct number of reevings as per the load chart.



Tab. 333 2316 jib head section rope reeving systems (load position 1)

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### 7.16.7 2316 Midfall rope reeving systems (load position 3)

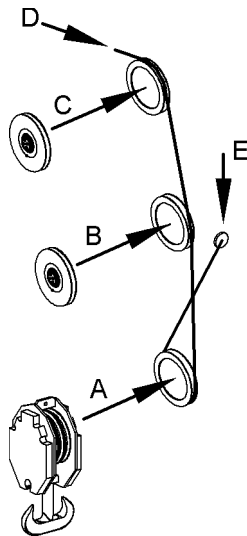


Fig. 3176 2316 Midfall rope reeving system (load position 3)

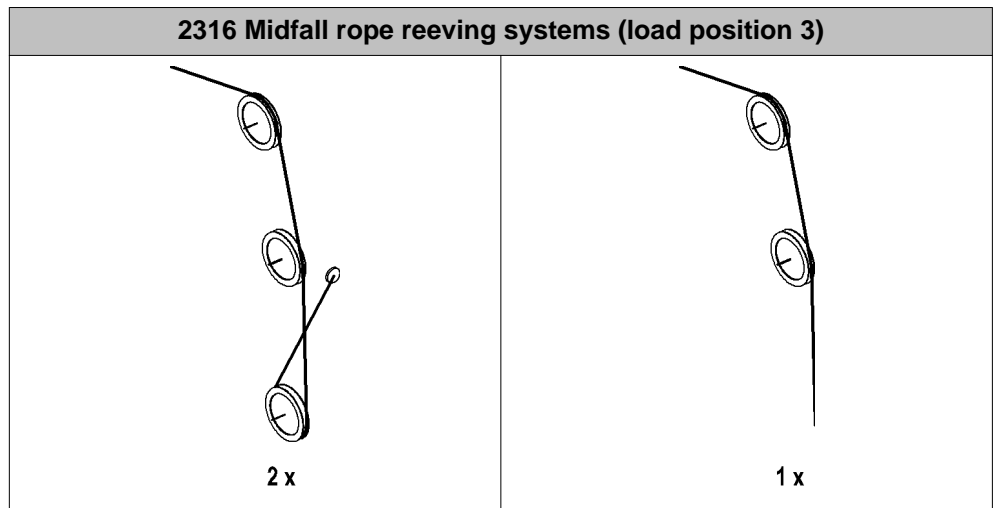
- |                                  |                             |
|----------------------------------|-----------------------------|
| <b>A</b> Pulley block roller set | <b>D</b> Winch 2 hoist rope |
| <b>B</b> Lower Midfall pulley    | <b>E</b> Rope fixation      |
| <b>C</b> Upper Midfall pulley    |                             |



**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

► Choose the correct number of reevings as per the load chart.



Tab. 334 2316 Midfall rope reeving systems (load position 3)

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## 7.17 1916 luffing jib + 1916 Midfall

**System-relevant information** for 1916 luffing jib + 1916 Midfall:

- Configuration of jib
  - Mid-point suspension assembly positions
- Configuration of main boom
- Lengths of jib mid-point suspensions
- Pendant straps on 1916 fixed jib + 1916 Midfall, overview, (LR1300 (steel pendant straps))
- 1916 jib head section rope reeving systems (load position 1)
- 1916 Midfall rope reeving systems (load position 3)

### 7.17.1 Configuration of jib



**DANGER**

Incorrect jib length assembled!  
Structural breakdown.

- ▶ Check the jib length in the load chart for validity.

Jib length	Position of Midfall	Configuration of jib (symbolic)
107 ft	42' 8" ft-in	
116 ft	52' 6" ft-in	
126 ft	62' 4" ft-in	
136 ft	72' 2" ft-in	
146 ft	82' ft-in	
156 ft	91' 10" ft-in	
166 ft	101' 8" ft-in	
176 ft	72' 2" ft-in	
185 ft	82' ft-in	
195 ft	91' 10" ft-in	
205 ft	101' 8" ft-in	
215 ft	111' 7" ft-in	

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Jib length	Position of Midfall	Configuration of jib (symbolic)
225 ft	121' 5" ft-in	
235 ft	131' 3" ft-in	
244 ft	141' 1" ft-in	
254 ft	111' 7" ft-in	
264 ft	121' 5" ft-in	
274 ft	131' 3" ft-in	
284 ft	141' 1" ft-in	
294 ft	150' 11" ft-in	
304 ft	160' 9" ft-in	
313 ft	170' 7" ft-in	

Tab. 335 Configuration of 1916 luffing jib + 1916 Midfall

X1 - Assembly position of mid-point suspension 1

X2 - Assembly position of mid-point suspension 2

### 7.17.2 Lengths of jib mid-point suspensions

Jib length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
156 ft	6' 11" ft-in	
166 ft	13' 9" ft-in = 8' 6" ft-in + 5' 3" ft-in	6' 11" ft-in
176 ft	19' 8" ft-in = 9' 10" ft-in + 9' 10" ft-in	6' 11" ft-in
185 ft	18' 4" ft-in = 9' 10" ft-in + 8' 6" ft-in	5' 3" ft-in
195 ft	17' 1" ft-in = 8' 6" ft-in + 8' 6" ft-in	5' 3" ft-in
205 ft	15' 5" ft-in = 8' 6" ft-in + 6' 11" ft-in	5' 3" ft-in

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Jib length	Backstay pendant 1 (X1)	Backstay pendant 2 (X2)
	Rope length	Rope length
215 ft	15' 1" ft-in = 9' 10" ft-in + 5' 3" ft-in	9' 10" ft-in
225 ft	19' 8" ft-in = 9' 10" ft-in + 9' 10" ft-in	8' 6" ft-in
235 ft	17' 1" ft-in = 8' 6" ft-in + 8' 6" ft-in	6' 11" ft-in
244 ft	16' 9" ft-in = 9' 10" ft-in + 6' 11" ft-in	6' 11" ft-in
254 ft	15' 5" ft-in = 8' 6" ft-in + 6' 11" ft-in	6' 11" ft-in
264 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in
274 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in
284 ft	17' 1" ft-in = 8' 6" ft-in + 8' 6" ft-in	5' 3" ft-in
294 ft	15' 5" ft-in = 8' 6" ft-in + 6' 11" ft-in	5' 3" ft-in
304 ft	13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in
312 ft	= 13' 9" ft-in = 6' 11" ft-in + 6' 11" ft-in	5' 3" ft-in

Tab. 336 Lengths of jib mid-point suspensions - 1916 luffing jib + 1916 Midfall

### 7.17.3 Configuration of main boom



#### DANGER

Erected length of main boom excessive!  
Structural breakdown.

- ▶ Check the main boom length in the 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: [7.4.1 Configuration of main boom, page 645](#)).



### 7.17.4 Pendant straps on 1916 luffing jib + 1916 Midfall, overview, (LR1300 (steel pendant straps))

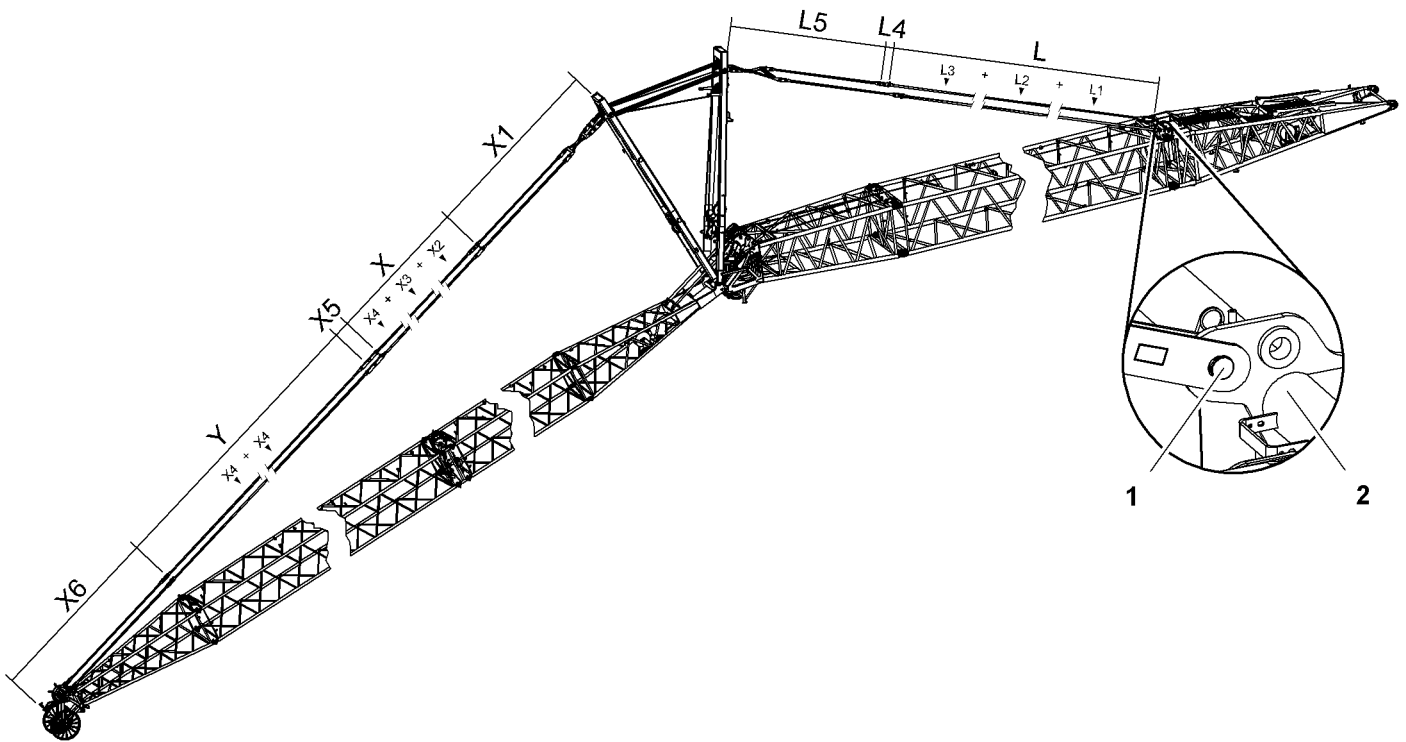


Fig. 3350 Pendant straps on 1916 luffing jib + 1916 Midfall, overview, (LR1300 (steel pendant straps))

- 1 Jib backstay straps pin connection point
- 2 Boom base section

### Backstay straps connecting A-frame 2 to 2821 boom base section

Designation		Value
L	<b>Jib backstay straps</b> consisting of:	
	L1	<b>Jib backstay strap 10 ft</b> (For more information see: <a href="#">Jib backstay strap 10 ft, page 153</a> )
	L2	<b>Jib backstay strap 20 ft</b> (For more information see: <a href="#">Jib backstay strap 20 ft, page 155</a> )
	L3	<b>Jib backstay strap 40 ft</b> (For more information see: <a href="#">Jib backstay strap 40 ft, page 156</a> )
L4	<b>Connecting link (conversion kit)</b> (For more information see: <a href="#">Connecting link (conversion kit), page 188</a> )	1' 3" ft-in
L5	<b>Equalizer on A-frame 2 (jib backstay strap)</b> (For more information see: <a href="#">Equalizer on A-frame 2 (jib backstay strap), page 182</a> )	23' ft-in

Tab. 337 Backstay straps connecting A-frame 2 to 2821 boom base section

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## Configuration of jib backstay straps (L):

Required number of jib backstay straps 10 ft (L1) is the same as the number of boom sections 10 ft.

Required number of jib backstay straps 20 ft (L2) is the same as the number of boom sections 20 ft.

Required number of jib backstay straps 40 ft (L3) is the same as the number of boom sections 40 ft.



### Note

► Permitted number of boom sections 10 ft, 20 ft, 40 ft can be found in the load chart.

## Pendant straps linking A-frame 3 to 1916 jib head section

Designation		Value	
X1	<b>A-frame 3 equalizer (jib pendant strap)</b> (For more information see: A-frame 3 equalizer (jib pendant strap), page 184)	23' 7" ft-in	
X	<b>Jib pendant straps</b> consisting of:		
	X2	<b>Jib pendant strap 10 ft</b> (For more information see: Jib pendant strap 10 ft, page 185)	Total X2 +
	X3	<b>Jib pendant strap 20 ft</b> (For more information see: Jib pendant strap 20 ft, page 185)	Total X3 +
	X4	<b>Jib pendant strap 40 ft</b> (For more information see: Jib pendant strap 40 ft, page 186)	Total X4
X5	<b>Midfall connecting link</b> (For more information see: Midfall connecting link, page 189)	2' 11" ft-in	
Y	<b>Jib pendant straps</b> consisting of:		
	X4	<b>Jib pendant strap 40 ft</b> (For more information see: Jib pendant strap 40 ft, page 186)	Total X4
X6	<b>Jib pendant strap on 1916 jib head section</b> (For more information see: Jib pendant strap on 1916 jib head section, page 187)	21' 4" ft-in	

Tab. 338 Pendant straps linking A-frame 3 to 1916 jib head section

## Configuration of jib pendant straps (X):

Required number of jib pendant straps 10 ft (X2) is the same as the number of jib sections 10 ft.

Required number of jib pendant straps 20 ft (X3) is the same as the number of jib sections 20 ft.

Required number of jib pendant straps 40 ft (X4) is the same as the number of jib sections 40 ft.



**Note**

► Permitted number of jib sections 10 ft, 20 ft, 40 ft can be found in the following table: [\(For more information see: 7.17.1 Configuration of jib, page 864\)](#)

**7.17.5 1916 jib head section rope reeving systems (load position 1)**

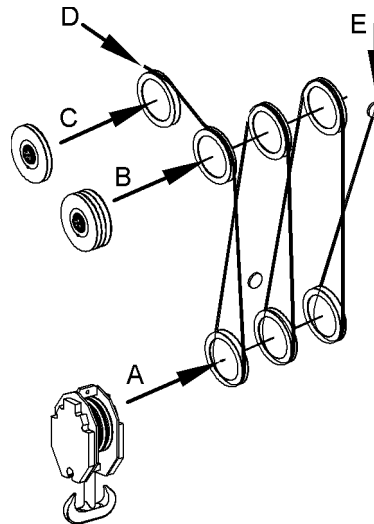


Fig. 3351 1916 jib head section rope reeving system (load position 1)

- |   |                             |
|---|-----------------------------|
| <b>A</b> Pulley block roller set        | <b>D</b> Winch 1 hoist rope |
| <b>B</b> Jib head section roller set    | <b>E</b> Rope fixation      |
| <b>C</b> Jib head section gantry pulley |                             |

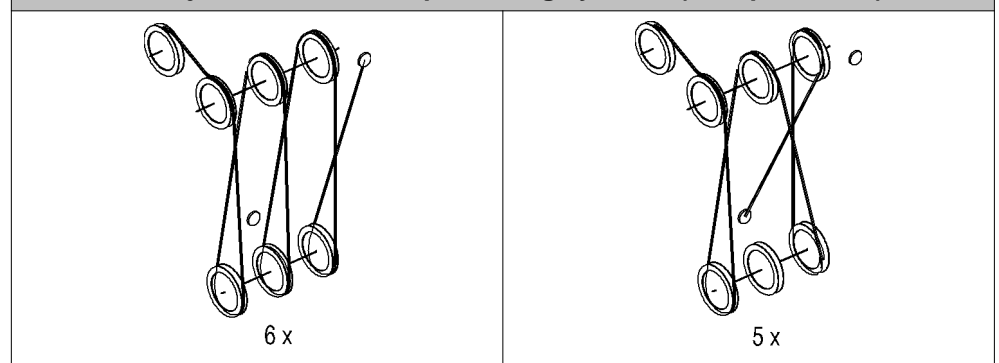


**DANGER**

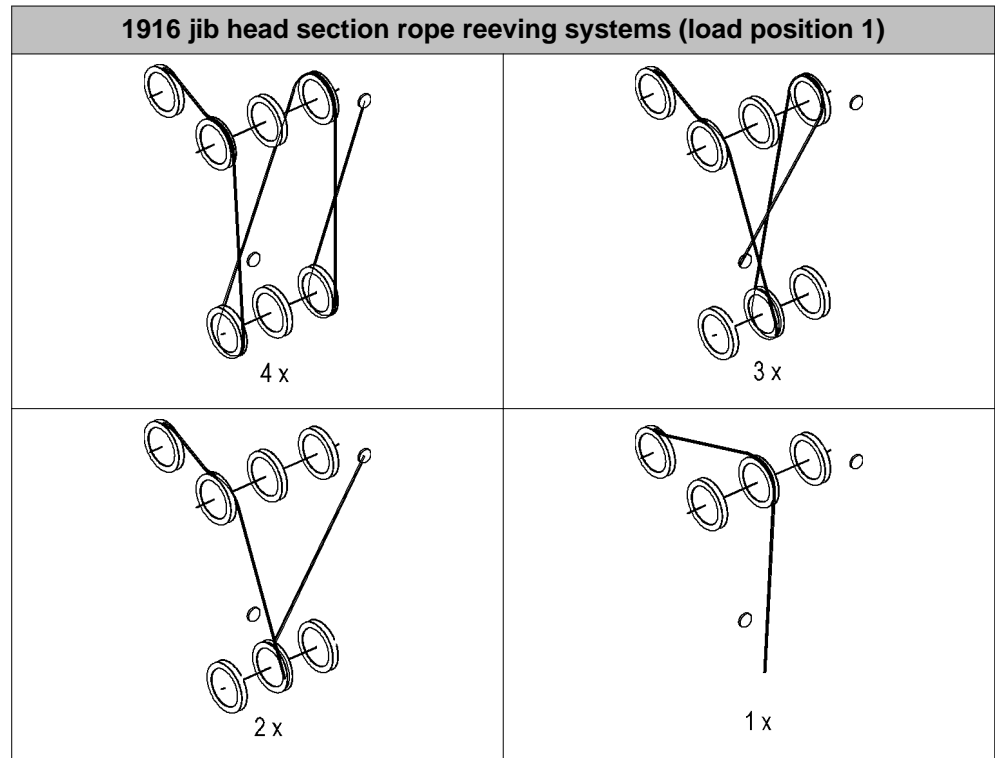
Incorrect number of reevings!  
Boom damage, machine toppling over.

► Choose the correct number of reevings as per the load chart.

**1916 jib head section rope reeving systems (load position 1)**



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Tab. 339 1916 jib head section rope reeving systems (load position 1)

### 7.17.6 1916 Midfall rope reeving systems (load position 3)

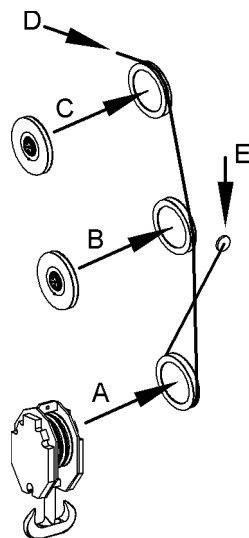


Fig. 3358 1916 Midfall rope reeving system (load position 3)

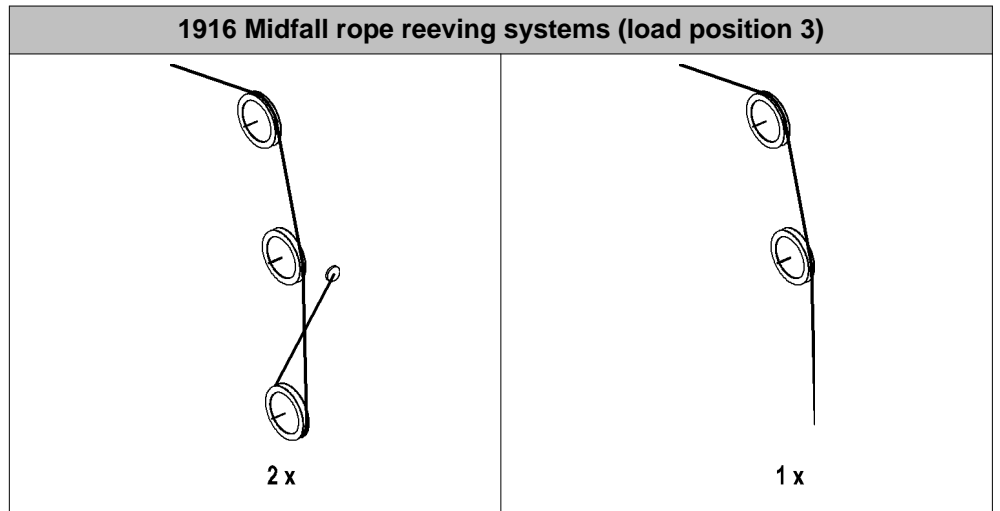
- |                                  |                             |
|----------------------------------|-----------------------------|
| <b>A</b> Pulley block roller set | <b>D</b> Winch 2 hoist rope |
| <b>B</b> Lower Midfall pulley    | <b>E</b> Rope fixation      |
| <b>C</b> Upper Midfall pulley    |                             |



**DANGER**

Incorrect number of reevings!  
Boom damage, machine toppling over.

- Choose the correct number of reevings as per the load chart.



Tab. 340 1916 Midfall rope reeving systems (load position 3)

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## 7.18 Assembling the luffing jib + Midfall

Ensure that the following conditions are satisfied:

- Assembly mode is selected.
- Rear and carbody counterweights are fitted according to load chart.
- 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 position of the Midfall is known.
- Any accessories required are available.

### 7.18.1 Notes

The installation of the Midfall described below applies to all sizes of Midfall.

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.

### 7.18.2 Installing the Midfall

The assembly steps are identical to those for the luffing jib without Midfall. The following section only contains information specific to the installation of the Midfall. The remaining operations are to be carried out as described previously in the luffing jib assembly section.



#### **DANGER**

Midfall installed in the wrong position!  
Structural breakdown.

- ▶ The assembly position for the Midfall can be found in the load chart.

- ▶ Install and bolt the Midfall in the prescribed position.



#### **WARNING**

Incorrect connecting links for pendant straps!

- ▶ Replace the connecting links of the jib pendant straps with Midfall connecting links.

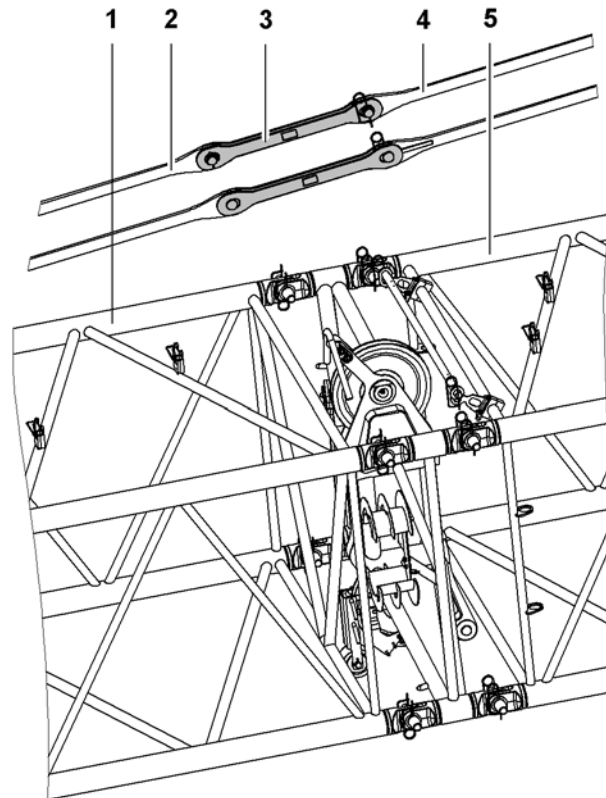


Fig. 3361 Fitting the Midfall connecting links

- |   |                         |   |                   |
|---|-------------------------|---|-------------------|
| 1 | Jib section             | 4 | Jib pendant strap |
| 2 | Jib pendant strap       | 5 | Jib section       |
| 3 | Midfall connecting link |   |                   |

- ▶ Remove the first connecting links of the first jib pendant straps **2** after the Midfall assembly position.
- ▶ Fasten the removed connecting links in the storage position on the Midfall.
- ▶ Install the Midfall connecting links and bolt to the jib pendant straps.
- ▶ Pull the electric cable from the jib base section to the jib head section and plug it in.
- ▶ Unwind the electric cable from the wire bracket on the Midfall.
- ▶ Pull the electric cable from the Midfall to the jib head section and plug it in.

## 7.19 Hydraulic cab elevation system

### 7.19.1 Erecting and bolting the mast



#### WARNING

Improper erection of the mast!

- ▶ Make sure that no-one is standing in the danger area.
- ▶ Leave the danger area.
- ▶ Remove all hoses and tools between the uppercarriage and the mast.

Ensure that the following conditions are satisfied:

- Diesel engine runs.
- Cylinder adjustment functions on undercarriage/uppercarriage are switched on.
- Cab is in transport position.

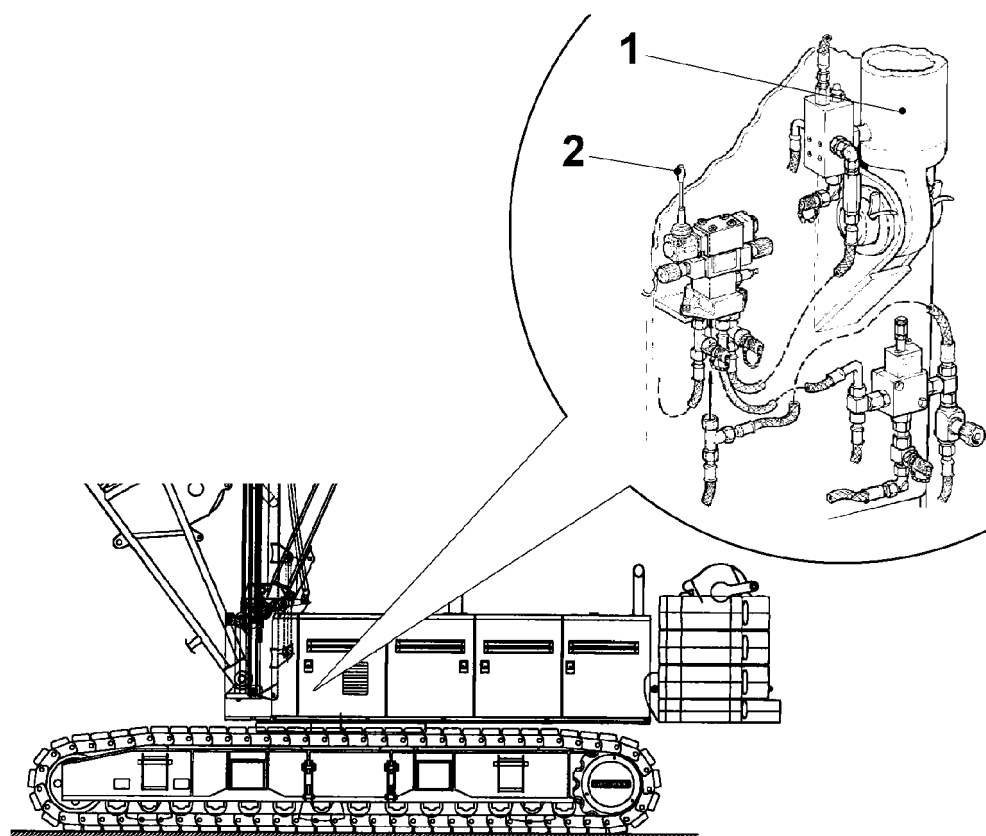


Fig. 3362 Erecting the mast

1 Adjustment cylinder

2 Control lever

- ▶ Operate the control lever.
  - ▷ Mast adjusts itself.



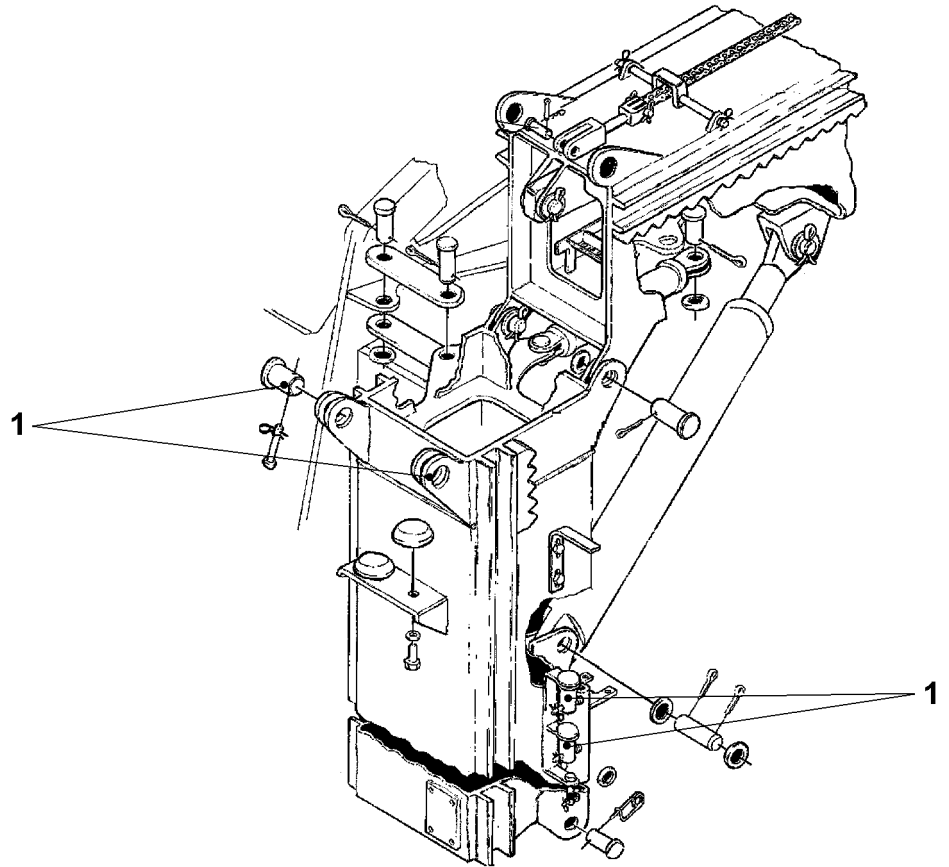
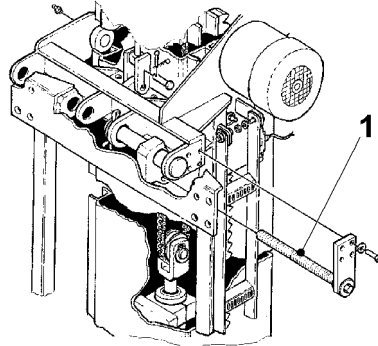


Fig. 3363 Bolting the mast

1 Pins (2x)

- ▶ Bolt the mast.
- ▶ Secure the bolt with the cotter pin.

## 7.19.2 Setting the operator's cab in the working position and bolting in place



*Fig. 3364 Moving the operator's cab into the working position*

**1** Threaded bar

The threaded bar functions as a spindle and moves the cab in or out.

► Use the threaded bar to move the cab out as far as it will go.

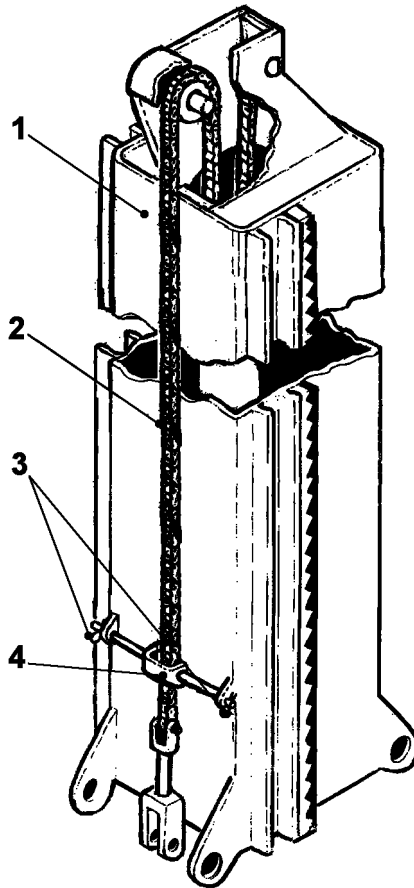


Fig. 3365 Bolting the operator's cab

- |   |       |   |                   |
|---|-------|---|-------------------|
| 1 | Mast  | 3 | Spring cotter pin |
| 2 | Chain | 4 | Chain guide       |

- ▶ Remove chain guide and place in temporary storage.
- ▶ Attach and secure chains to the frame of the cab using pins.

### 7.19.3 Dismantling



---

#### **WARNING**

Improper disassembling!

- ▶ 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!

- ▶ Unbolt the chain from the cab.
  - ▶ Attach the chain guide.
  - ▶ Do not trap the hose kit.
  - ▶ Turn the exhaust pipe on the uppercarriage towards the inside.
  - ▶ Dismantle the railings on the uppercarriage.
- 

#### **Summary of the of disassembly steps**

- ▶ Lower the operator's cab completely.
- ▶ Unbolt the chain from the frame of the operator's cab.
- ▶ Use a chain guide to secure the chain to the mast.
- ▶ Move operator's cab into the transport position: move it in as far as it will go using the threaded bar.
- ▶ Unbolt both pins of the mast fixing.
- ▶ Lay down the mast using the control lever on the mast.

## 7.20 Break-in protection

### 7.20.1 Fitting the break-in protection

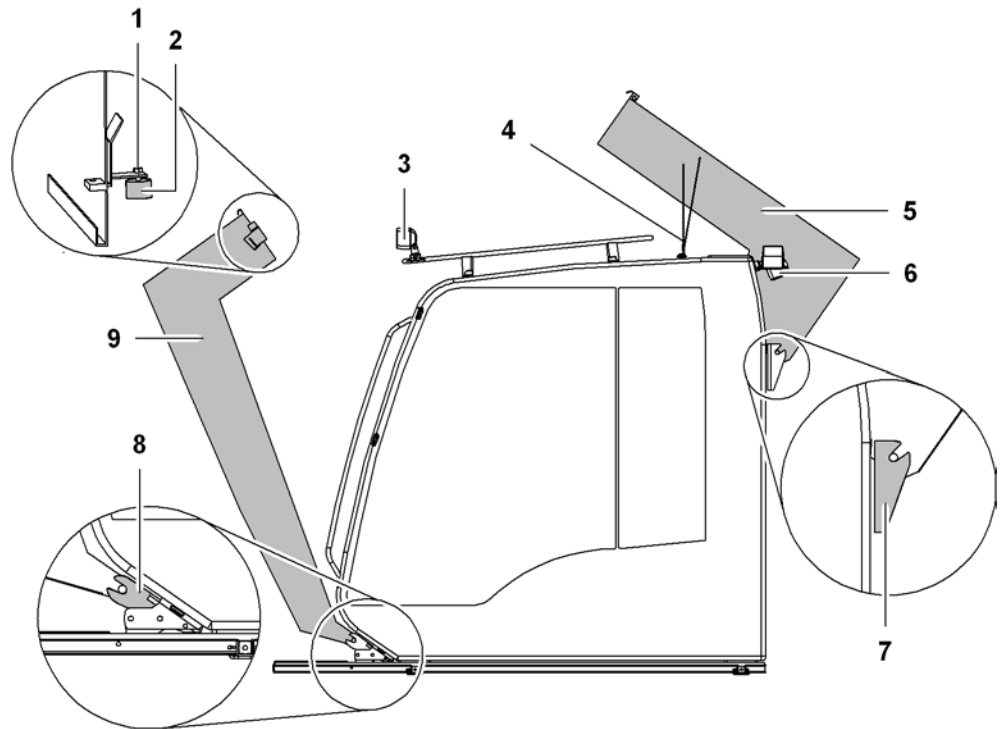


Fig. 3366 Fitting the break-in protection

- |   |                        |   |                       |
|---|------------------------|---|-----------------------|
| 1 | Adjusting screws (2x)  | 6 | Rear floodlights (2x) |
| 2 | Rubber buffers (2x)    | 7 | Rear supports (2x)    |
| 3 | Front floodlights (2x) | 8 | Front supports (2x)   |
| 4 | Antennae               | 9 | Front cap             |
| 5 | Rear cap               |   |                       |

- ▶ Fold up the antennae **4**.
- ▶ Remove the mirror.
- ▶ Fold up the front floodlights **3** and rear floodlights **6**.
- ▶ Hook the front cap **9** on the front brackets **8** and swing it up.
- ▶ Hook the rear cap **5** on the rear brackets **7** and swing it up.
- ▶ Adjust the rubber buffer **2** using the adjusting screws **1**.
  - ▷ Both caps are now aligned.
- ▶ Hook on the right side cover.
- ▶ Hook on the left side cover.
- ▶ Fold down the rod with clamp.
- ▶ Close the lock.

## 7.21 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 satisfied:

- 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 for the rope guide and mid-point suspensions have been checked and/or changed.

### 7.21.1 Reconfiguring the main boom



#### WARNING

Laying down the main boom incorrectly!

- ▶ Follow the guidelines for laying down the main boom ([For more information see: 7.27 Disassembling the main boom, page 896](#)).

#### NOTICE

Main boom is skewed!  
Damage to the main boom.

- ▶ Set down the main boom on wooden blocks horizontally.

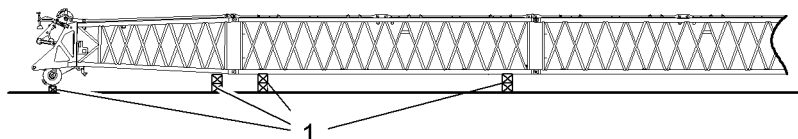


Fig. 3367 Main boom on wooden blocks

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 the equalizer of A-frame 1.
- ▶ Bolt the assembly cylinder to the boom base section.

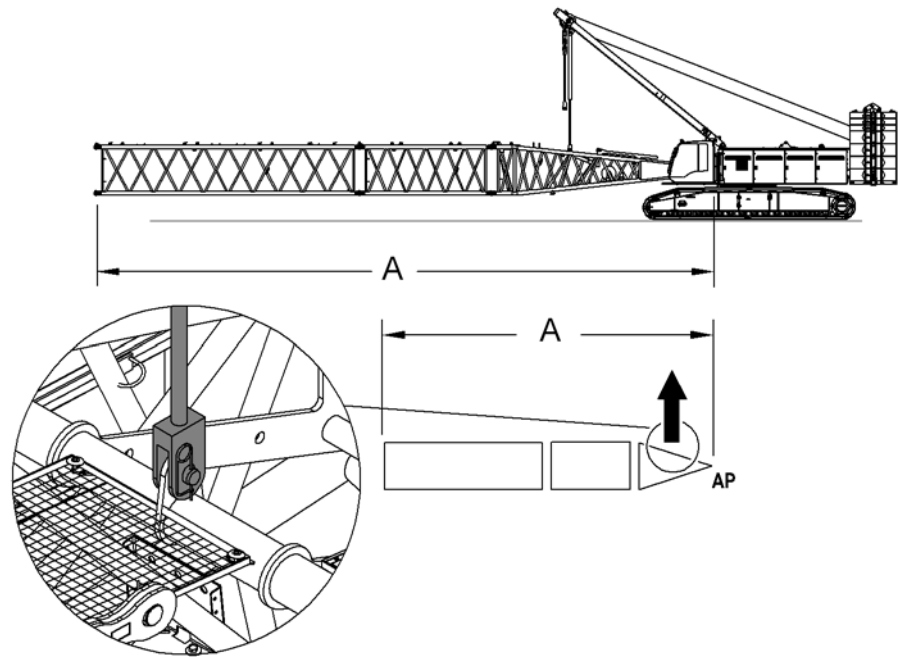


Fig. 3368 Maximum manoeuvrable main boom length with time-saving reconfiguration

**A** Maximum manoeuvrable main boom length

**NOTICE**

Maximum manoeuvrable main boom length **A** is exceeded!  
Risk of damage to the main boom and assembly cylinder.

▶ Maximum manoeuvrable main boom length (boom base section + boom section 20 ft + boom section 40 ft) must not be exceeded.

▶ Unbolt the main boom and main boom pendant straps at the extension point.

**NOTICE**

Dynamic movements when manoeuvring!  
Risk of damage to the boom and assembly cylinder.

▶ Manoeuvre carefully with basic machine.

▶ If necessary, manoeuvre with the basic machine.

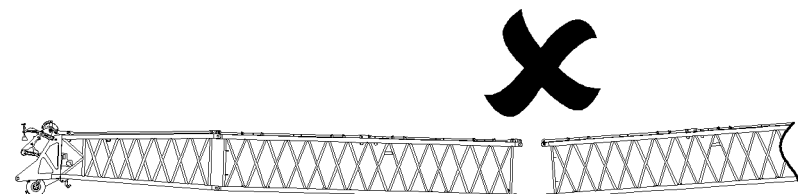


Fig. 3369 Incorrect reconfiguration

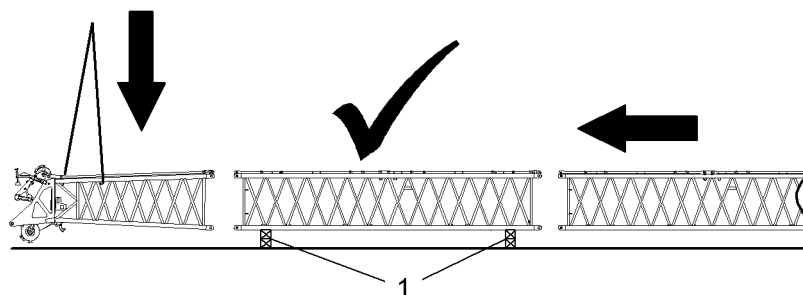


Fig. 3370 Correct reconfiguration

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.



---

### DANGER

Incorrect installation of mid-point suspensions!  
Boom damage.

- ▶ 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 the boom and hoist rope.

- ▶ Note changes to the assembly position of the rope guide.
- ▶ Check assembly position of rope guide.

**Now proceed as follows:**

(For more information see: [7.5.30 Erecting the main boom, page 699](#))



## 7.22 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 satisfied:

- An auxiliary crane with sufficient radius and capacity for unloading the basic machine is available (For more information see: [8.1 Loading the basic machine with an assist crane, page 901](#)).
- The requisite crossbar and rigging for unloading the basic machine are available (For more information see: [8.1 Loading the basic machine with an assist crane, page 901](#)).
- 3- and 4-strand rigging, which can be shortened, and round slings are available.

### 7.22.1 Specific procedure when no jacks are available

#### Unloading the machine and attaching the crawler side frames

Ensure that the following conditions are satisfied:

- The rear and carbody counterweights are not attached.
- The cab is in the working position.
- The cab is tilted upwards.



#### Note

- ▶ Permitted crossbar and rigging for all process steps: (For more information see: [8.1.2 Loading the basic machine with crawler side frame, page 905](#))

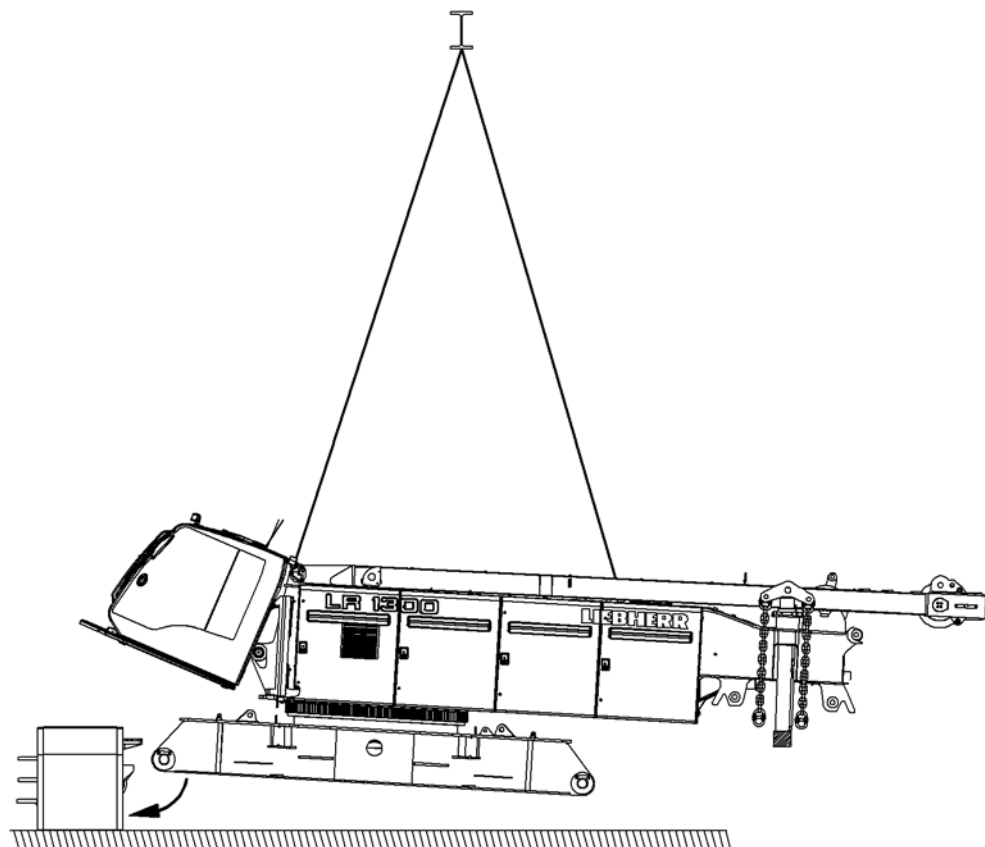


Fig. 3371 Unloading the machine and attaching the first crawler side frame without a self-assembly system

- ▶ 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.

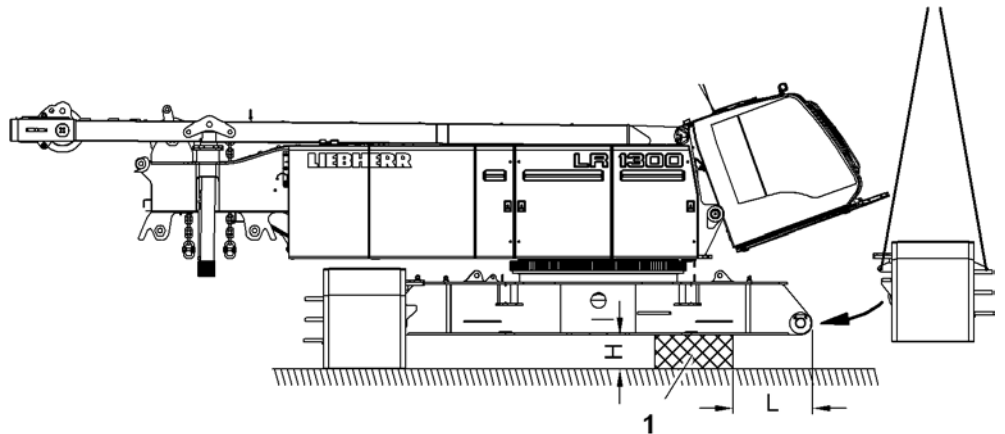


Fig. 3372 Attaching the second crawler side frame without a self-assembly system

- 1 Support
- H Approx. 2' 4" ft-in
- L At least 1' 8" ft-in

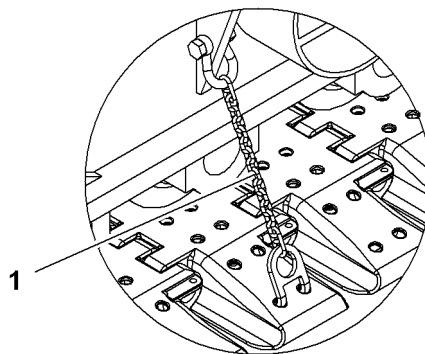


Fig. 3373 Attachment chain on crawler side frame

- 1 Attachment chain



**Note**

- ▶ To minimise the requisite height of the support, ensure that the attachment chain is fitted to the crawler side frame.
- ▶ Support the basic machine.
- ▶ Remove the rigging from the 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.

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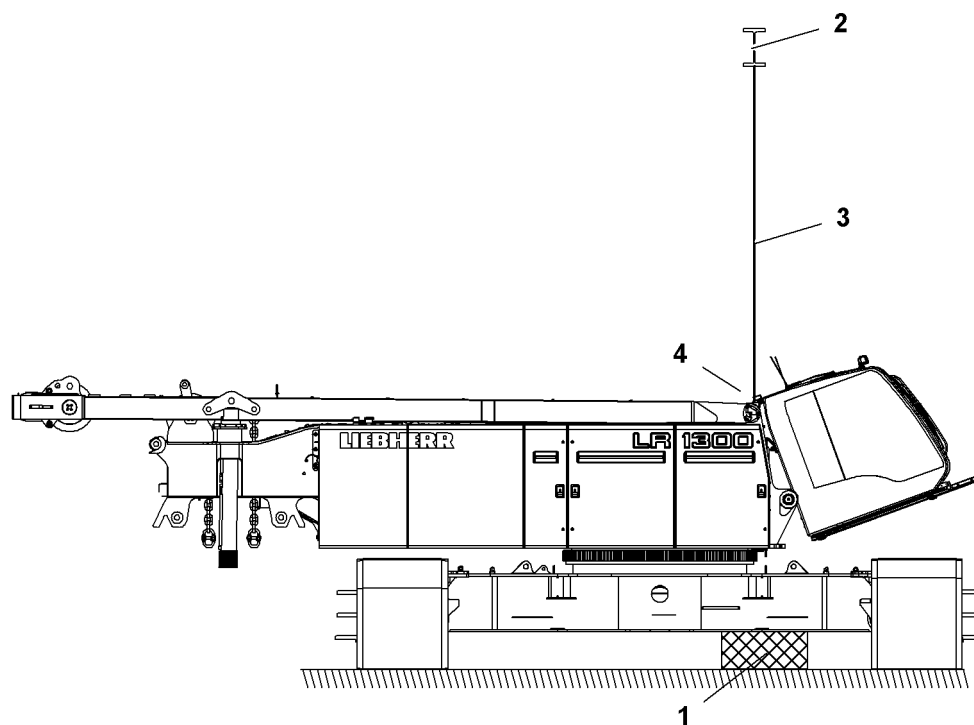


Fig. 3374 Raising the basic machine on one side to remove the support

- |   |          |   |   |
|---|----------|---|---|
| 1 | Support  | 3 | Round slings (2x) min. 89,920 lb <sub>f</sub> |
| 2 | Crossbar | 4 | Shackles (2x) min. 123,650 lb <sub>f</sub>    |

- ▶ Only attach rigging to the front lifting 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.

## 7.22.2 Specific procedure with no counterweight hoisting cylinder

### Attaching the basic machine to the rear counterweight



**DANGER**

Slewing of uppercarriage with rear counterweight attached not permitted!  
Machine toppling over.

- ▶ Only slew the uppercarriage according to the table (For more information see: [Mounting and pinning the rear counterweight, page 643](#)).

Ensure that the following conditions are satisfied:

- The requisite carbody counterweight is in place.
- The rear counterweight ballast slab configuration is known.
- The uppercarriage is parallel to the crawler side frames.

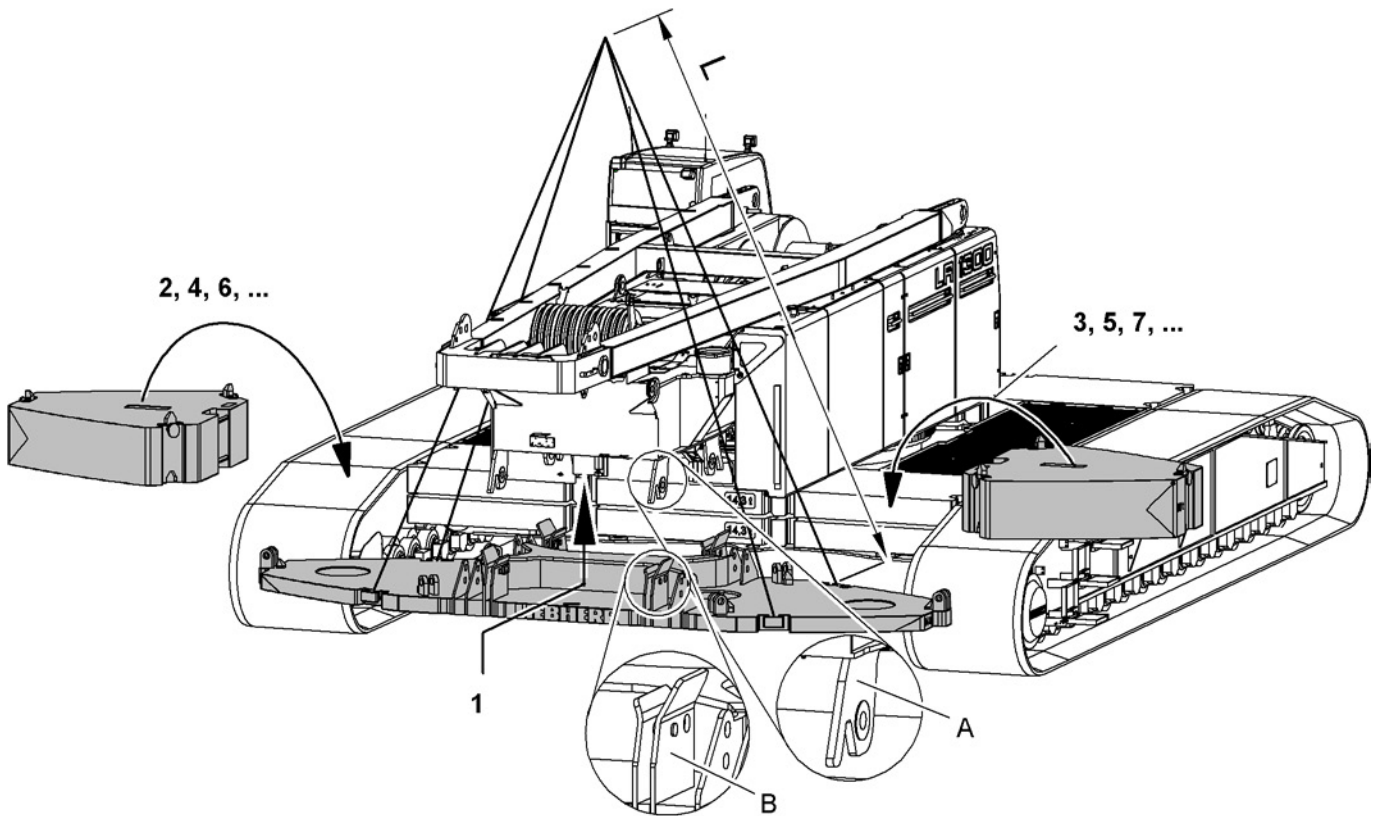


Fig. 3375 Attaching the basic machine to the rear counterweight

- |  |   |  |
|--|---|--|
| <p><b>A</b> Pin connection points (4x), rear counterweight</p> <p><b>B</b> Pin connection points (4x) with locking devices</p> | <p><b>L</b> Minimum length of the rigging</p> <p><b>1</b> Attach basic counterweight slab</p> | <p><b>2,...</b> Attach left-hand ballast slabs</p> <p><b>3,...</b> Attach right-hand ballast slabs</p> |
|--|---|--|

The minimum length **L** of the rigging is 19' 8" ft-in.

- ▶ Lift the basic counterweight slab from underneath onto the basic machine.

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### **DANGER**

Incorrect bolting of the rear counterweight!  
Machine toppling over.

- ▶ All pins must be correctly fitted and secured.
- ▶ Bolt the basic machine to the basic counterweight slab.
- ▶ Secure the pin with safety pins.

### **NOTICE**

Unevenly stacked ballast slabs!  
Damage to machine.

- ▶ Stack a left-hand ballast slab **2, 4, 6, ...** and a right-hand ballast slab **3, 5, 7, ...** alternately onto the basic counterweight slab.
- ▶ Stack the requisite 22,046 lb ballast slabs and 11,023 lb ballast slabs onto the basic counterweight slab.



### **DANGER**

Incorrect lashing of the rear counterweight!  
Risk of rear counterweight slabs falling down and machine toppling over.

- ▶ Lash the rear counterweight according to the specifications ([For more information see: Tying down the rear counterweight, page 641](#)).



### **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.

### **7.22.3 Specific procedure with no 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

### NOTICE

Incorrect slinging work!

Risk of damage to the 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 slinging at the assembly cylinder pin connection point:

- Main boom lengths up to 262' 6" ft-in: Shackles with capacity of at least 37,478 lb
- Main boom lengths exceeding 262' 6" ft-in: Shackles with capacity of at least 55,115 lb

Ensure that the following conditions are satisfied:

- The requisite carbody counterweight is in place.
- The requisite rear counterweight is in place.
- ▶ The main boom is completely assembled.

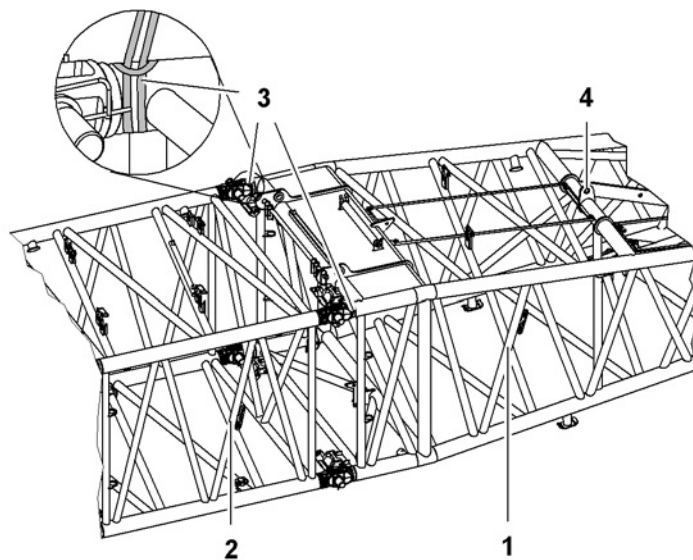


Fig. 3376 Slinging the main boom

- |   |                   |   |   |
|---|-------------------|---|---|
| 1 | Boom base section | 3 | Round slings around the fork              |
| 2 | Main boom section | 4 | Pin connection point on assembly cylinder |

- ▶ Sling the round slings directly behind the fork on the chord pipe.  
**or**  
Sling the shackle and round slings to the assembly cylinder pin connection point.
- ▶ Lift the main boom.
- ▶ Drive the basic machine forwards and bolt the boom base section to the uppercarriage.

### 7.23 Disassembling the luffing jib + Midfall



---

**DANGER**

Incorrect disassembly of the machine!

- ▶ Observe all critical angles and boom radius limitations as described under "Assembly".
- 

The machine must be disassembled in the reverse order to assembly.

#### 7.23.1 Brief summary

The luffing jib + Midfall is disassembled in exactly the same way as the luffing jib ([For more information see: 7.24 Disassembling the luffing jib, page 891](#)).



## 7.24 Disassembling the luffing jib



### DANGER

Incorrect disassembly of the machine!

- ▶ Observe all critical angles and boom radius limitations as described under "Assembly".

The machine must be disassembled in the reverse order to assembly.

Ensure that the following conditions are satisfied:

- There must be sufficient space available to lay down the assembled booms.
- The signalmen and assistants have received instructions.
- The maximum possible carbody- and rear counterweight is fit to the basic machine.
- The requisite tools and assembly rigging are available.
- Wooden blocks are available to place under the boom.

### 7.24.1 Brief summary

The following list provides you with a short overview of the steps to be taken when disassembling the luffing jib:

- ▶ Select assembly mode.
- ▶ 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.

- ▶ When using long main booms and short jibs, follow the procedure for "Blocked Crawlers" ([For more information see: 4.26 Blocked crawlers\\*, page 500](#)).



### DANGER

Obstacles in the way when laying down the jib!  
Boom damage.

- ▶ Make sure that when being laid down, the jib can roll forwards unhindered.
- ▶ Lay down the boom.
- ▶ Remove the hoist rope from the jib and wind it up.
- ▶ Remove the hoist rope from the main boom and pull it back to the boom head section.
- ▶ Secure the main boom hoist rope using the rope lock on A-frame 2.
- ▶ Undo jib pendant straps from A-frame 3.
- ▶ Pull A-frame 2/A-frame 3 back and slacken off the jib backstay straps.
- ▶ Release the jib backstay straps from A-frame 2 equaliser.
- ▶ Unpin the tilting-back supports.
- ▶ Lay down A-frame 2/A-frame 3 forwards.



---

### Note

- ▶ Luff the supplied auxiliary rope
- 
- ▶ Pull out and wind up the jib luffing rope.
  - ▶ Remove and wind up the electric cables.
  - ▶ Separate the jib sections and the jib pendant straps.
  - ▶ Unpin the jib base section and remove it from the boom head section.
  - ▶ Load the jib sections.
  - ▶ Dismantle the main boom and basic machine as described below.

## 7.25 Dismantling the fixed jib



### DANGER

Incorrect disassembly of the machine!

- ▶ Observe all critical angles and boom radius limitations as described under "Assembly".

The machine must be disassembled in the reverse order to assembly.

Ensure that the following conditions are satisfied:

- There must be sufficient space available to lay down the assembled booms.
- The signalmen and assistants have received instructions.
- The maximum possible carbody- and rear counterweight is fit to the basic machine.
- The requisite tools and assembly rigging are available.
- Wooden blocks are available to place under the boom.

### 7.25.1 Brief summary

The following list provides you with a short overview of the steps to be taken when dismantling the fixed jib:

- ▶ Select assembly mode.
- ▶ 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.

- ▶ When using long main booms and short jibs, follow the procedure for "Blocked Crawlers" ([For more information see: 4.26 Blocked crawlers\\*, page 500](#)).



### DANGER

Obstacles in the way when laying down the jib!  
Boom damage.

- ▶ Make sure that when being laid down, the jib can roll forwards unhindered.
- ▶ Lay down the boom.
- ▶ Remove the hoist rope from the jib and wind it up.
- ▶ Remove the hoist rope from the main boom and pull it back to the boom head section.
- ▶ Secure the main boom hoist rope using the rope lock on A-frame 2.
- ▶ Undo jib pendant straps from A-frame 2.
- ▶ 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.

- ▶ Separate the jib sections and the jib pendant 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 the jib sections.
- ▶ Dismantle the main boom and basic machine as described below.

## 7.26 Disassembling main boom + reducing piece



---

**DANGER**

Incorrect disassembly of the machine!

- ▶ Observe all critical angles and boom radius limitations as described under "Assembly".
- 

The machine must be disassembled in the reverse order to assembly.

### 7.26.1 Brief summary

The main boom + reducing piece is disassembled in exactly the same way as the main boom ([For more information see: 7.27 Disassembling the main boom, page 896](#)).

### 7.27 Disassembling the main boom



#### **DANGER**

Incorrect disassembly of the machine!

- ▶ Observe all critical angles and boom radius limitations as described under "Assembly".

The machine must be disassembled in the reverse order to assembly.

Ensure that the following conditions are satisfied:

- There must be sufficient space available to lay down the assembled booms.
- The signalmen and assistants have received instructions.
- The maximum possible carbody- and rear counterweight is fit to the basic machine.
- The requisite tools and assembly rigging are available.
- Wooden blocks are available to place under the boom.

#### 7.27.1 Brief summary

The following list provides you with a short overview of the steps to be taken when disassembling the main boom:

- ▶ Select assembly mode.
- ▶ Lay down the pulley block/load hook.



#### **DANGER**

Obstacles when laying down the main boom!  
Boom damage.

- ▶ Make sure that the auxiliary jib (if present) can roll forwards unhindered when it is laid down.

- ▶ Lay down the boom.



#### **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 boom head section.

- ▶ Lay wooden blocks under boom sections.
- ▶ Remove the hoist rope from the main boom and wind it up.
- ▶ Remove and wind up the electric cables from the main boom.
- ▶ Remove electrical wires and hydraulic lines from the uppercarriage.
- ▶ Connect the bypass plug to the uppercarriage.
- ▶ Bolt the assembly cylinder to the boom base section.



## WARNING

Never stand in the inside of the main boom sections during disassembly!  
Serious injury.

- ▶ Never go inside the boom sections.

## NOTICE

Unauthorized raising of main boom with assembly cylinder!  
Damage to the main boom and assembly cylinder.

- ▶ Exclusively retract the assembly cylinder far enough to enable the lower double-taper pins to be removed from the boom base section.
- ▶ Retract assembly cylinder.
- ▶ Remove the first, lower double-taper pin from the boom base section.



## WARNING

Impermissible voltage in main boom!  
Sudden movement of main boom whilst unpinning the second, lower double-taper pin from the boom base section.

When the first, lower double-taper pin on the 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, lower double-taper pin from the boom base section.
- ▶ Extend the assembly cylinder.
  - ▷ The main boom and boom base section fold out at the lower pin connection point.
  - ▷ The main boom is lowered onto wooden blocks.
  - ▷ Boom head section moves slightly forwards.
- ▶ Remove the upper double-taper pins from the boom base section.
- ▶ Unpin the assembly cylinder from the boom base section.
- ▶ Remove the boom base section from the uppercarriage using the assembly rigging and assembly cylinder, and load it.
- ▶ Attach rigging to main boom on the pin connection point between the boom head section and the first boom section.
- ▶ Remove double-taper pins from boom head section.
- ▶ Lower the rigging.
  - ▷ The main boom and boom head section fold out at the lower pin connection point.
  - ▷ The main boom is lowered onto wooden blocks.
- ▶ Remove the upper double-taper pins from the boom head section.
- ▶ Load the boom head section.
- ▶ Unpin the boom sections.
- ▶ Load boom sections.
- ▶ Dismantle the basic machine as described below.

## 7.28 Disassembling the basic machine



### DANGER

Incorrect disassembly of the machine!

- ▶ Observe all critical angles and boom radius limitations as described under "Assembly".

The machine must be disassembled in the reverse order to assembly.

### 7.28.1 Brief summary

The following list provides you with a short overview of the steps to be taken when disassembling the basic machine:

- ▶ Select assembly mode.
- ▶ Lower the rear counterweight.
- ▶ Remove the counterweight hoisting cylinder chains from the rear counterweight.
- ▶ Loosen and fold away the counterweight tie-down.
- ▶ Disassemble the rear counterweight using the appropriate assembly rigging and load the ballast slabs.
- ▶ Fold the counterweight tie-down inwards onto the basic counterweight slab.
- ▶ Load the basic counterweight slab.
- ▶ Remove cat walks from the undercarriage.
- ▶ Remove and load the carbody counterweight slabs.
- ▶ Swing the jack swing brackets into the support position and bolt them.
- ▶ Lay the support pads under the cylinder.
- ▶ 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 low-loader under the basic machine.
- ▶ Lower the basic machine onto the low loader.
- ▶ Fully retract the jack.
- ▶ Stow the support pads away.
- ▶ Swing the jack swing brackets into the transport position and bolt them.
- ▶ Fold A-frame 1 backwards.
- ▶ Bolt the swing lock between the uppercarriage and undercarriage.
- ▶ Swing the cab into the transport position and bolt it.
- ▶ Close the cab and secure the machine against unauthorised start-up.



### 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 down the uppercarriage railing.
- ▶ Remove the ladder.







# 8 Transport

The following pages describe the transportation of the machine.

## 8.1 Loading the basic machine with an assist crane

There are 4 different states 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 satisfied:

- A signalman is available.
- Equipment is secured against accidental movement.
- An adequate safety distance from electrical power 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 the basic machine without crawler side frame, carbody counterweight and rear counterweight



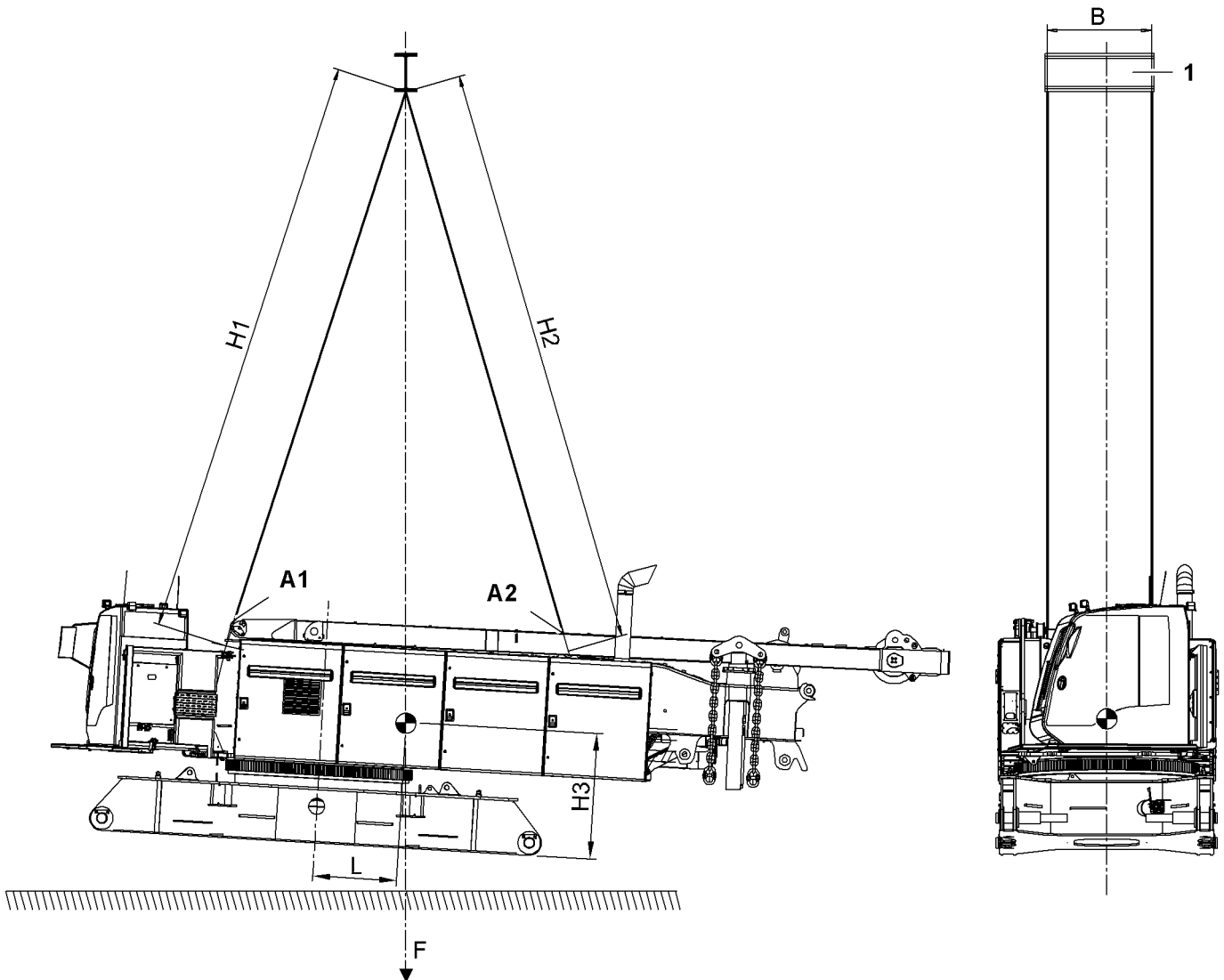
**DANGER**

Machine loaded incorrectly!

- ▶ Only use transport rigging and crossbars that meet the minimum requirements (see: tab. 341, page 903).

Ensure that the following conditions are satisfied:

- The crawler side frame, carbody counterweight and rear counterweight are detached from the basic machine.
- The boom base section is detached from the basic machine.
- Operator's cab is swung into and secured in the transport position.
- All loose parts are secured to prevent slippage and falling.
- Auxiliary floodlights (if fit) have been removed.
- A crossbar with a suitable capacity is available.
- The transport rigging is in good condition and approved for use.



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Fig. 3377 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.

Designation		Value
<b>H1</b>	Length of front round sling	min. 26' 3" ft-in
	Capacity of front round sling	min. 67,440 lb <sub>f</sub>
<b>H2</b>	Length of rear round sling	min. 26' 3" ft-in
	Capacity of rear round sling	min. 67,440 lb <sub>f</sub>
<b>A1</b>	Capacity of front shackle	min. 78,680 lb <sub>f</sub>
<b>A2</b>	Capacity of rear shackle	min. 78,680 lb <sub>f</sub>
<b>B</b>	Distance from lifting points on crossbar	4' 6" ft-in to 5' ft-in
<b>H3</b>	Distance from center of gravity to bottom edge of the central section	5' 9" ft-in
<b>L</b>	Distance from center of gravity to rotation axis	3' 9" ft-in
<b>F</b>	Transport weight	107,910 lb <sub>f</sub>

Tab. 341 Technical data for loading the basic machine without crawler side frame, carbody counterweight and rear counterweight

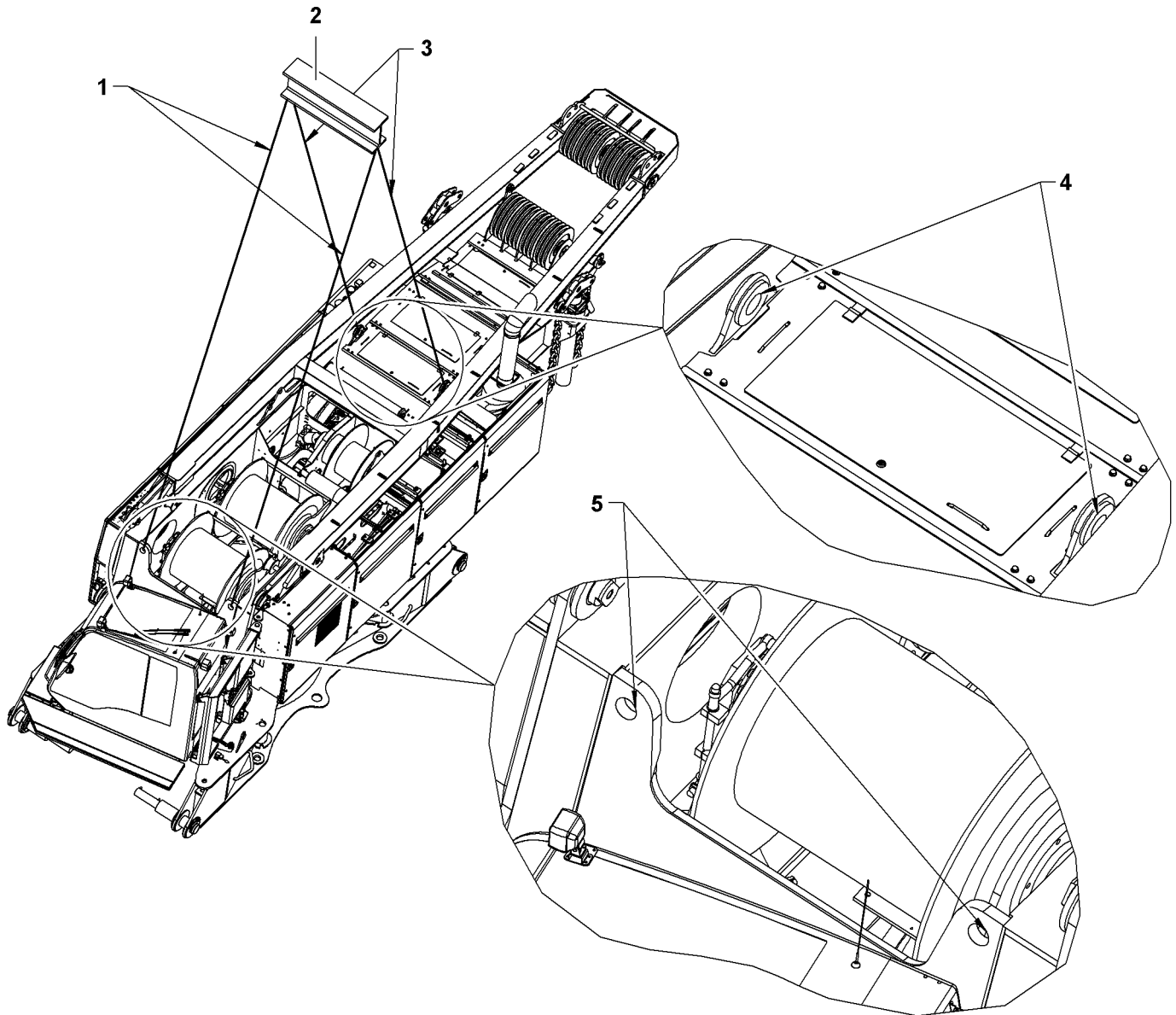


Fig. 3378 Loading the basic machine without crawler side frame, carbody counterweight and rear counterweight - lifting points

1 Front round sling  
2 Crossbar

3 Rear round sling  
4 Rear lifting points

5 Front lifting points

- ▶ Attach front round sling 1 of the transport rigging to the lifting points 5 using shackles.
- ▶ Attach rear round sling 3 of the transport rigging to the lifting points 4 using shackles.
- ▶ Carefully raise and load the basic machine.



## 8.1.2 Loading the basic machine with crawler side frame



### DANGER

Machine loaded incorrectly!

- ▶ Only use transport rigging and crossbars that meet the minimum requirements (see: tab. 342, page 906).

Ensure that the following conditions are satisfied:

- The carbody counterweight and rear counterweight are detached from the basic machine.
- The boom base section is detached from the basic machine.
- Operator's cab is swung into and secured in the transport position.
- All loose parts are secured to prevent slippage and falling.
- Auxiliary floodlights (if fit) have been removed.
- A crossbar with a suitable capacity is available.
- The transport rigging is in good condition and approved for use.

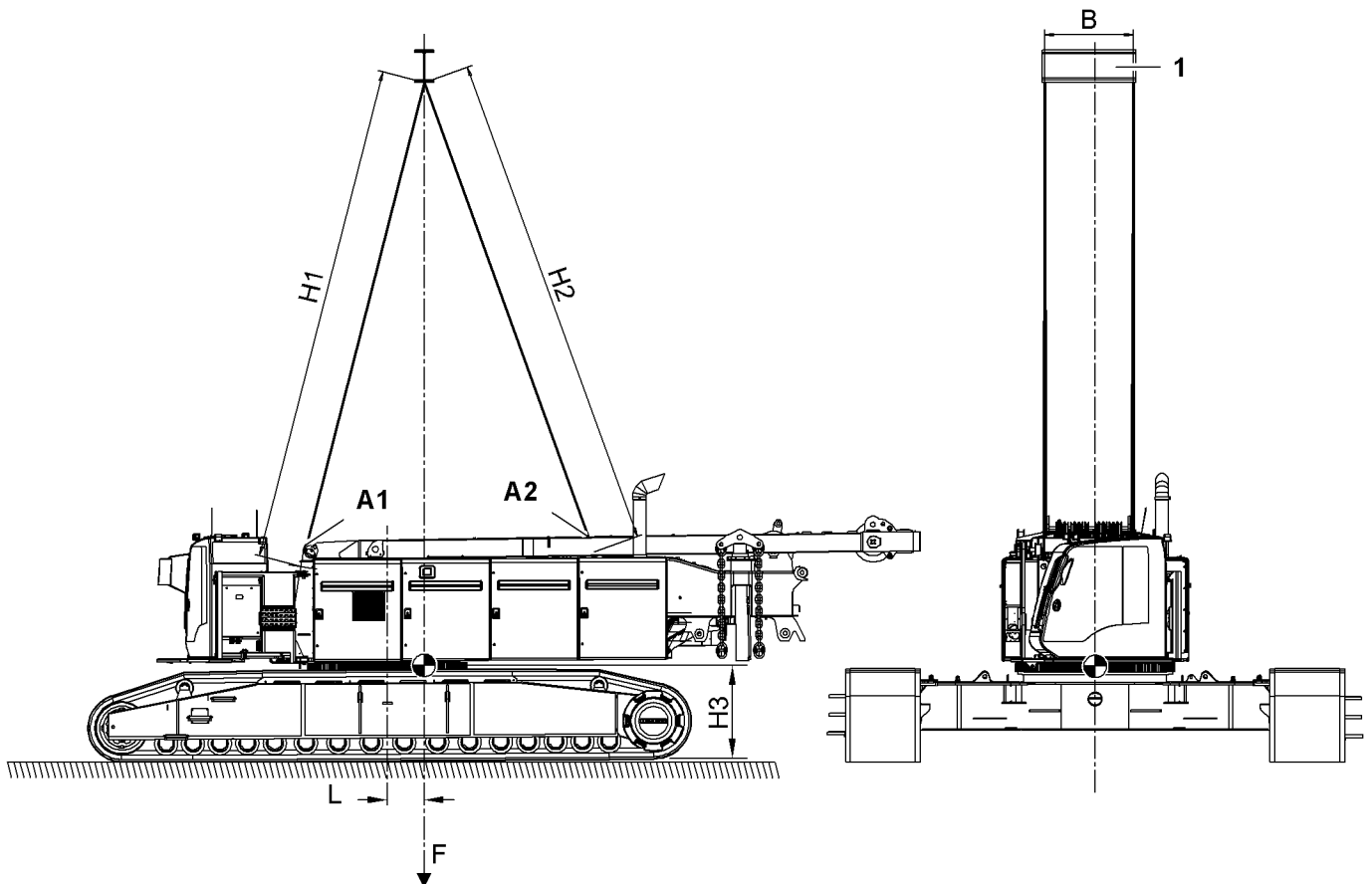


Fig. 3379 Loading the basic machine with crawler side frame - overview

### 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.

Designation		Value
<b>H1</b>	Length of front round sling	min. 26' 3" ft-in
	Capacity of front round sling	min. 89,920 lb <sub>f</sub>
<b>H2</b>	Length of rear round sling	min. 26' 3" ft-in
	Capacity of rear round sling	min. 67,440 lb <sub>f</sub>
<b>A1</b>	Capacity of front shackle	min. 123,650 lb <sub>f</sub>
<b>A2</b>	Capacity of rear shackle	min. 78,680 lb <sub>f</sub>
<b>B</b>	Distance from lifting points on crossbar	4' 5" ft-in to 4' 11" ft-in
<b>H3</b>	Distance from center of gravity to bottom edge of crawler side frame	5' ft-in
<b>L</b>	Distance from center of gravity to rotation axis	1' 11" ft-in
<b>F</b>	Transport weight	206,830 lb <sub>f</sub>

Tab. 342 Technical data for loading the basic machine with crawler side frame

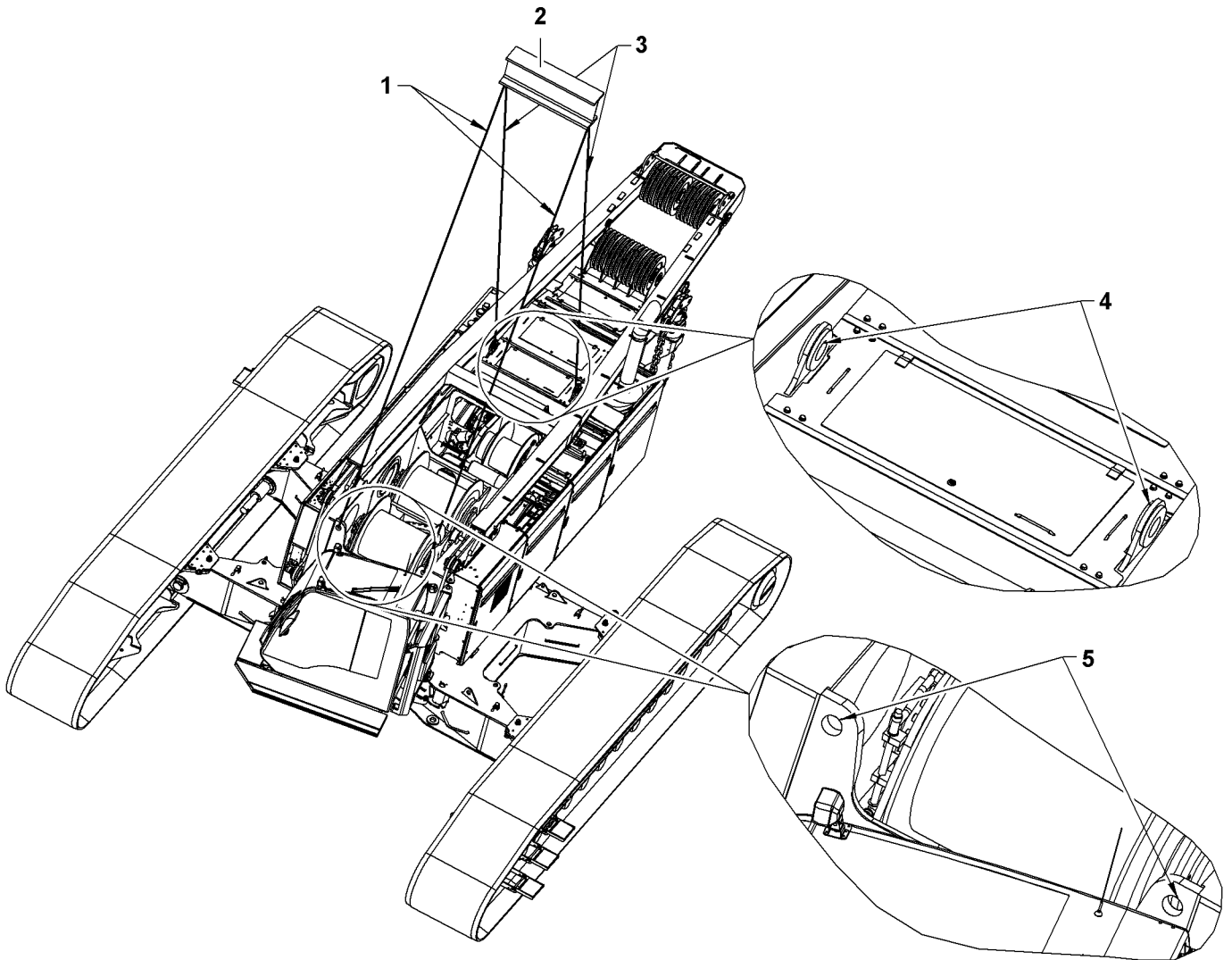


Fig. 3380 Loading the basic machine with crawler side frame - lifting points

- |   |                   |   |                     |   |                      |
|---|-------------------|---|---------------------|---|----------------------|
| 1 | Front round sling | 3 | Rear round sling    | 5 | Front lifting points |
| 2 | Crossbar          | 4 | Rear lifting points |   |                      |

- ▶ Attach front round sling **1** of the transport rigging to the lifting points **5** using shackles.
- ▶ Attach rear round sling **3** of the transport rigging to the lifting points **4** using shackles.
- ▶ Carefully raise and load the basic machine.

### 8.1.3 Loading the basic machine with crawler side frame and carbody counterweight



**DANGER**

Machine loaded incorrectly!

- ▶ Only use transport rigging and crossbars that meet the minimum requirements (see: tab. 343, page 909).

Ensure that the following conditions are satisfied:

- The rear counterweight is removed from the basic machine.
- The boom base section is detached from the basic machine.
- Operator's cab is swung into and secured in the transport position.
- All loose parts are secured to prevent slippage and falling.
- Auxiliary floodlights (if fit) have been removed.
- A crossbar with a suitable capacity is available.
- The transport rigging is in good condition and approved for use.

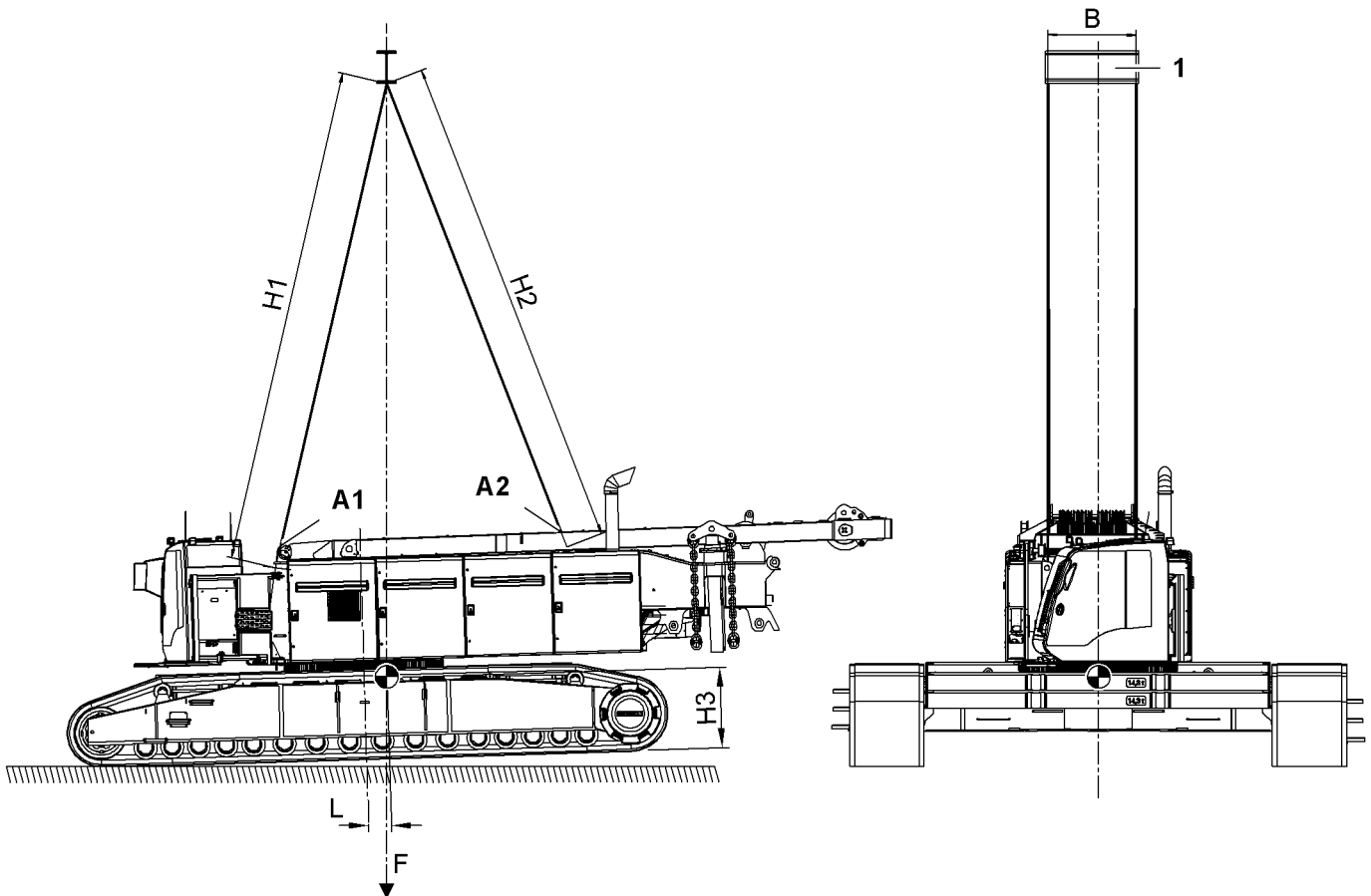


Fig. 3381 Loading the basic machine with crawler side frame and carbody counterweight - overview

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.

Designation		Value
<b>H1</b>	Length of front round sling	min. 26' 3" ft-in
	Capacity of front round sling	min. 179,850 lb <sub>f</sub>
<b>H2</b>	Length of rear round sling	min. 26' 3" ft-in
	Capacity of rear round sling	min. 112,410 lb <sub>f</sub>
<b>A1</b>	Capacity of front shackle	min. 191,090 lb <sub>f</sub>
<b>A2</b>	Capacity of rear shackle	min. 123,650 lb <sub>f</sub>
<b>B</b>	Distance from lifting points on crossbar	4' 5" ft-in to 4' 11" ft-in
<b>H3</b>	Distance from center of gravity to bottom edge of crawler side frame	4' 5" ft-in
<b>L</b>	Distance from center of gravity to rotation axis	1' 2" ft-in
<b>F</b>	Transport weight	337,220 lb <sub>f</sub>

*Tab. 343 Technical data for loading the basic machine with crawler side frame and carbody counterweight*

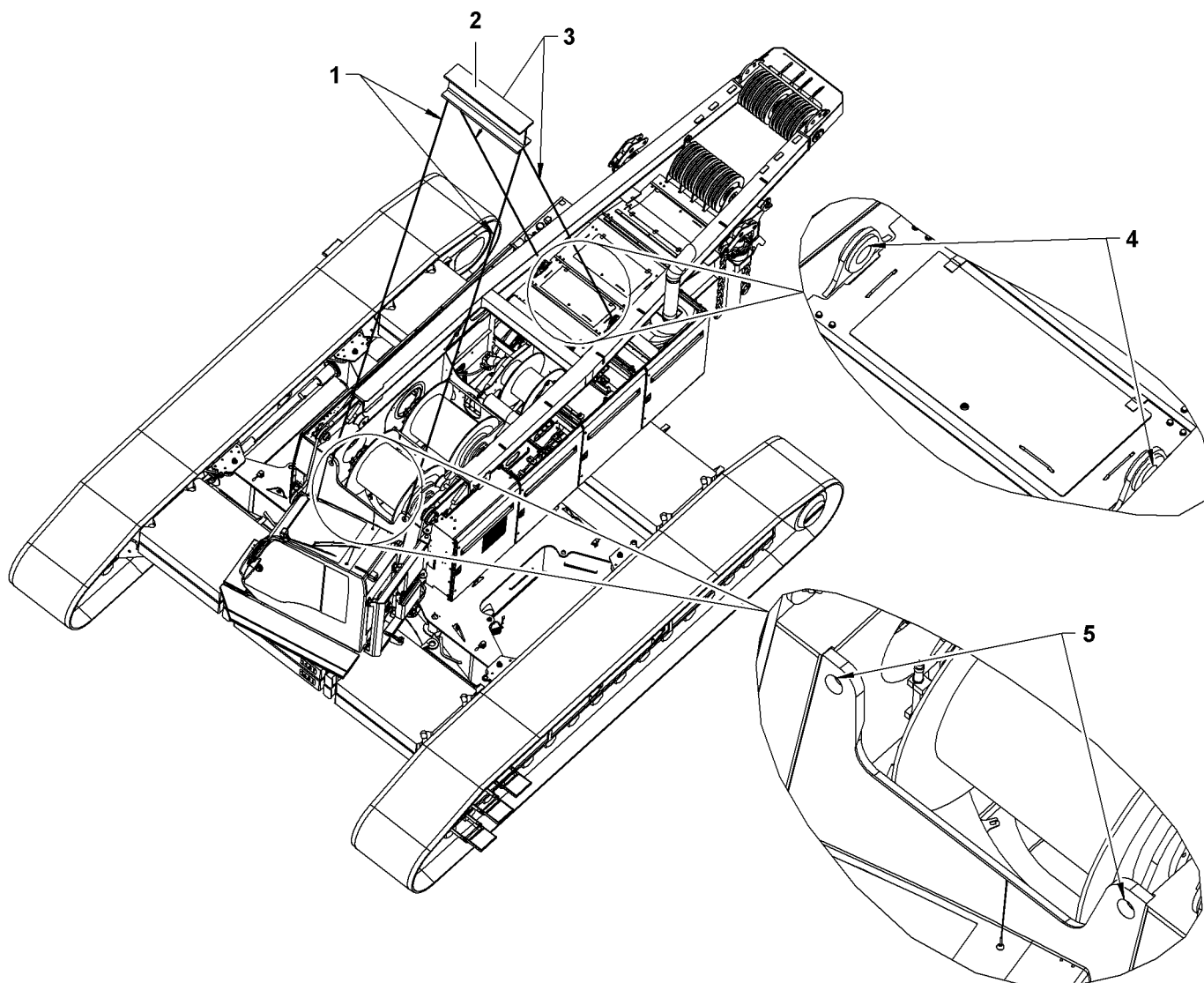


Fig. 3382 Loading the basic machine with crawler side frame and carbody counterweight - lifting points

1 Front round sling  
2 Crossbar

3 Rear round sling  
4 Rear lifting points

5 Front lifting points

- ▶ Attach front round sling 1 of the transport rigging to the lifting points 5 using shackles.
- ▶ Attach rear round sling 3 of the transport rigging to the lifting points 4 using shackles.
- ▶ Carefully raise and load the basic machine.

### 8.1.4 Loading the basic machine with crawler side frame, carbody counterweight and rear counterweight



#### DANGER

Machine loaded incorrectly!

- ▶ Only use transport rigging and crossbars that meet the minimum requirements (see: tab. 344, page 912).

Ensure that the following conditions are satisfied:

- The boom base section is detached from the basic machine.
- Operator's cab is swung into and secured in the transport position.
- All loose parts are secured to prevent slippage and falling.
- Auxiliary floodlights (if fit) have been removed.
- A crossbar with a suitable capacity is available.
- The transport rigging is in good condition and approved for use.

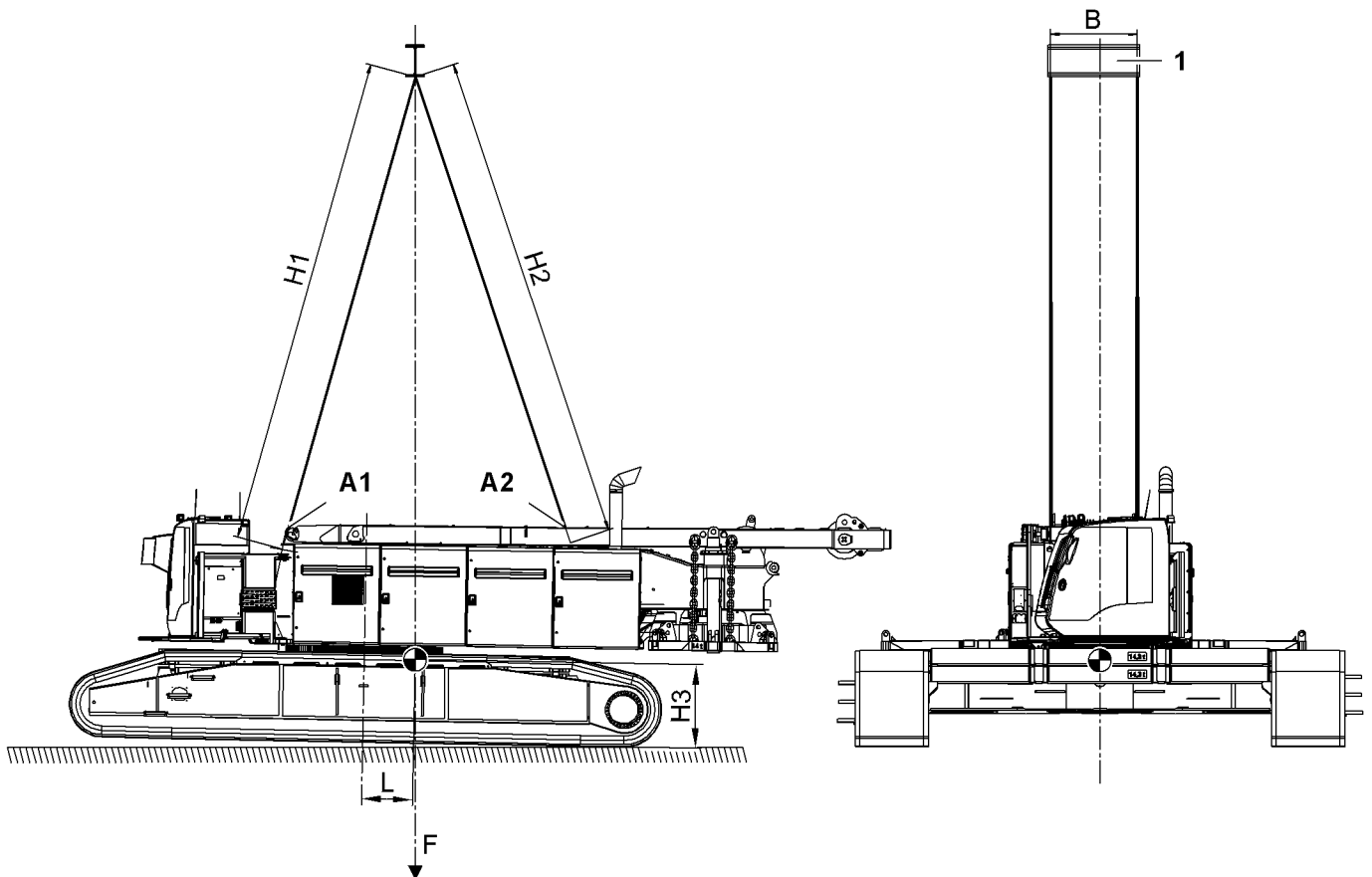


Fig. 3383 Loading the basic machine with crawler side frame, carbody counterweight and rear counterweight - overview

#### 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.

Designation		Value
<b>H1</b>	Length of front round sling	min. 26' 3" ft-in
	Capacity of front round sling	min. 179,850 lb <sub>f</sub>
<b>H2</b>	Length of rear round sling	min. 26' 3" ft-in
	Capacity of rear round sling	min. 134,890 lb <sub>f</sub>
<b>A1</b>	Capacity of front shackle	min. 191,090 lb <sub>f</sub>
<b>A2</b>	Capacity of rear shackle	min. 123,650 lb <sub>f</sub>
<b>B</b>	Distance from lifting points on crossbar	4' 5" ft-in to 4' 11" ft-in
<b>H3</b>	Distance from center of gravity to bottom edge of crawler side frame	4' 6" ft-in
<b>L</b>	Distance from center of gravity to rotation axis	2' 9" ft-in
<b>F</b>	Transport weight	370,940 lb <sub>f</sub>

*Tab. 344 Technical data for loading the basic machine with crawler side frame, carbody counterweight and rear counterweight*



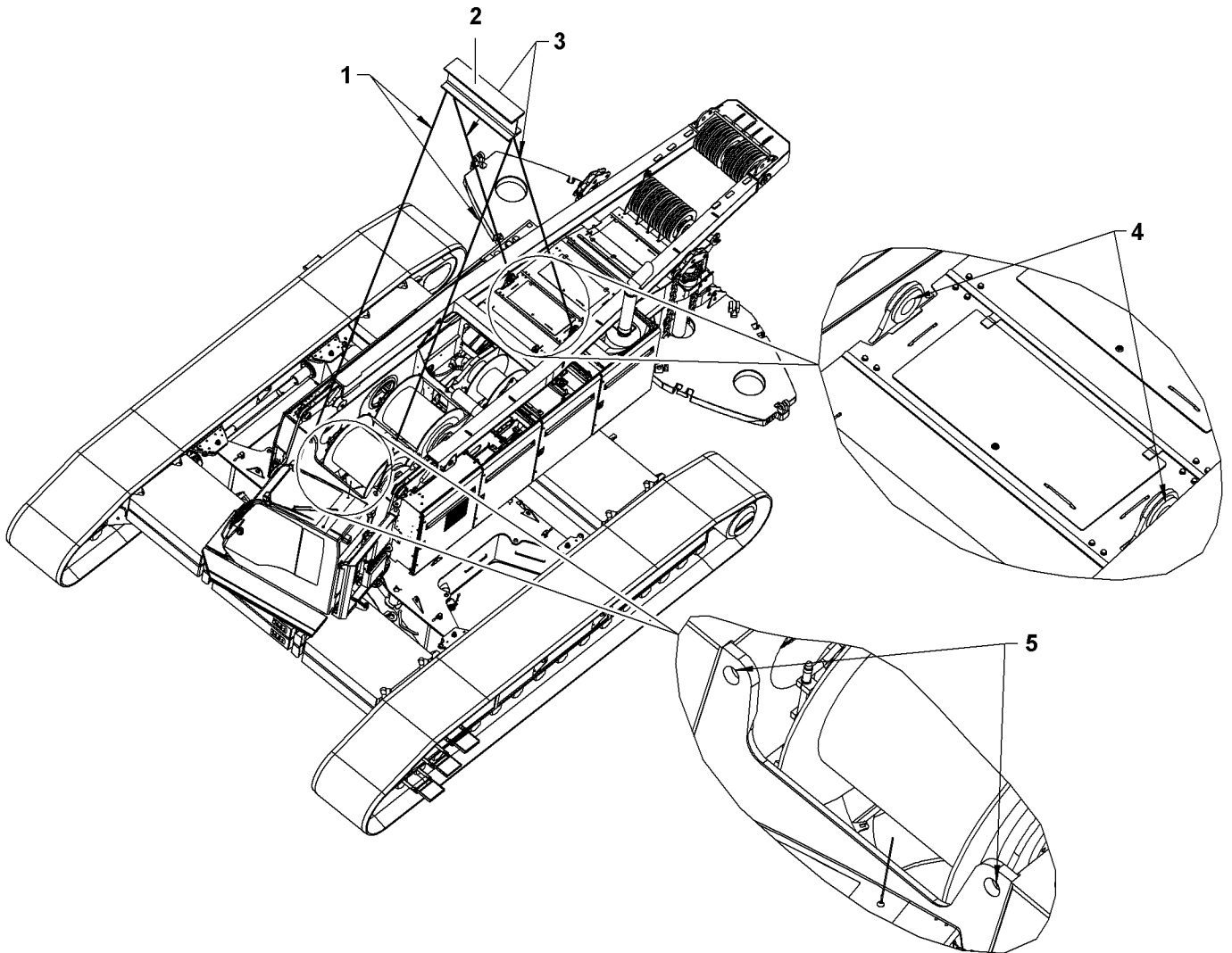


Fig. 3384 Loading the basic machine with crawler side frame, carbody counterweight and rear counterweight - lifting points

1 Front round sling  
2 Crossbar

3 Rear round sling  
4 Rear lifting points

5 Front lifting points

- ▶ Attach front round sling 1 of the transport rigging to the lifting points 5 using shackles.
- ▶ Attach rear round sling 3 of the transport rigging to the lifting points 4 using shackles.
- ▶ Carefully raise and load the basic machine.

## 8.2 Transporting the basic machine with a low loader



**Note**

► Always observe national traffic regulations and local bylaws.

Ensure that the following conditions are satisfied:

- The crawler side frame, carbody counterweight and rear counterweight are detached from the basic machine.
- Auxiliary floodlights (if fit) have been folded.
- Counterweight hoisting cylinders have been retracted.
- Jacks on the undercarriage have been pinned in the transport position and retracted.
- A-frame 1 is folded towards the rear in the transport position and the A-frame cylinders are retracted.
- The assembly cylinder is retracted.
- Tilting-back supports are retracted.
- Operator's cab is lowered, swung into and secured in the transport position.

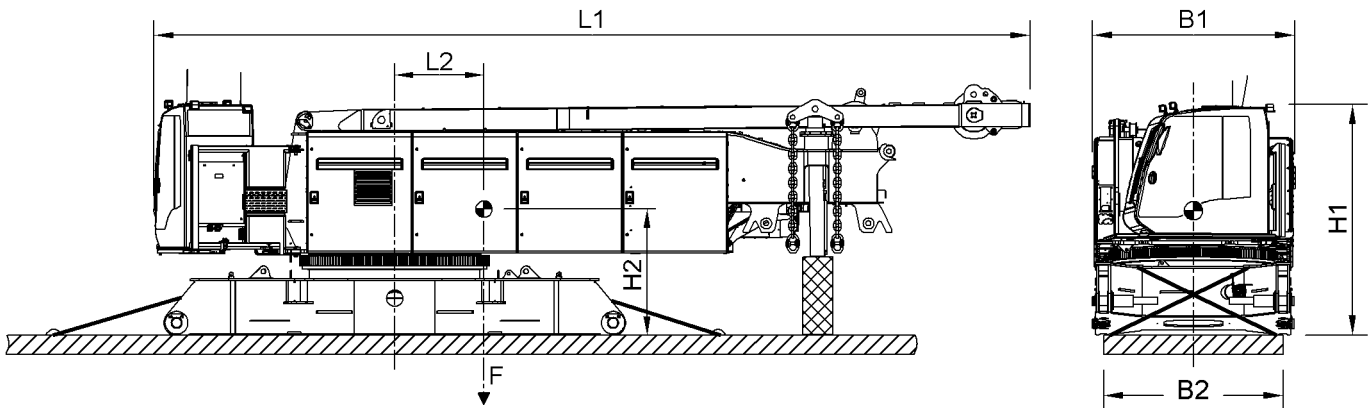


Fig. 3385 Dimensions of transporting the basic machine with a low loader



**DANGER**

Machine not transported correctly!  
Machine toppling over.

► Never use a low loader whose width is less than the minimum specified width **B2** (see: tab. 345, page 914) .

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.

Designation	Value
<b>L1</b> Basic machine length	40' ft-in
<b>B1</b> Width of basic machine	9' 10" ft-in
<b>H1</b> Height of basic machine	10' 10" ft-in

Designation		Value
<b>B2</b>	Width of low loader	min. 8' 10" ft-in
<b>L2</b>	Distance from center of gravity to rotation axis	3' 9" ft-in
<b>H2</b>	Distance from center of gravity to bottom edge of the central section	5' 9" ft-in
<b>F</b>	Transport weight	107,910 lb <sub>t</sub>

Tab. 345 Technical data for transporting the basic machine with a low loader



### DANGER

None or wrong anti-slide mats on low loader!

Basic machine slides out of position on low loader.

▶ Never use anti-slide mats with a friction coefficient below 0.6.

▶ Lay out anti-slide mats on the low loader.

▶ Load the basic machine onto the low loader ([For more information see: 8.1 Loading the basic machine with an assist crane, page 901](#)).

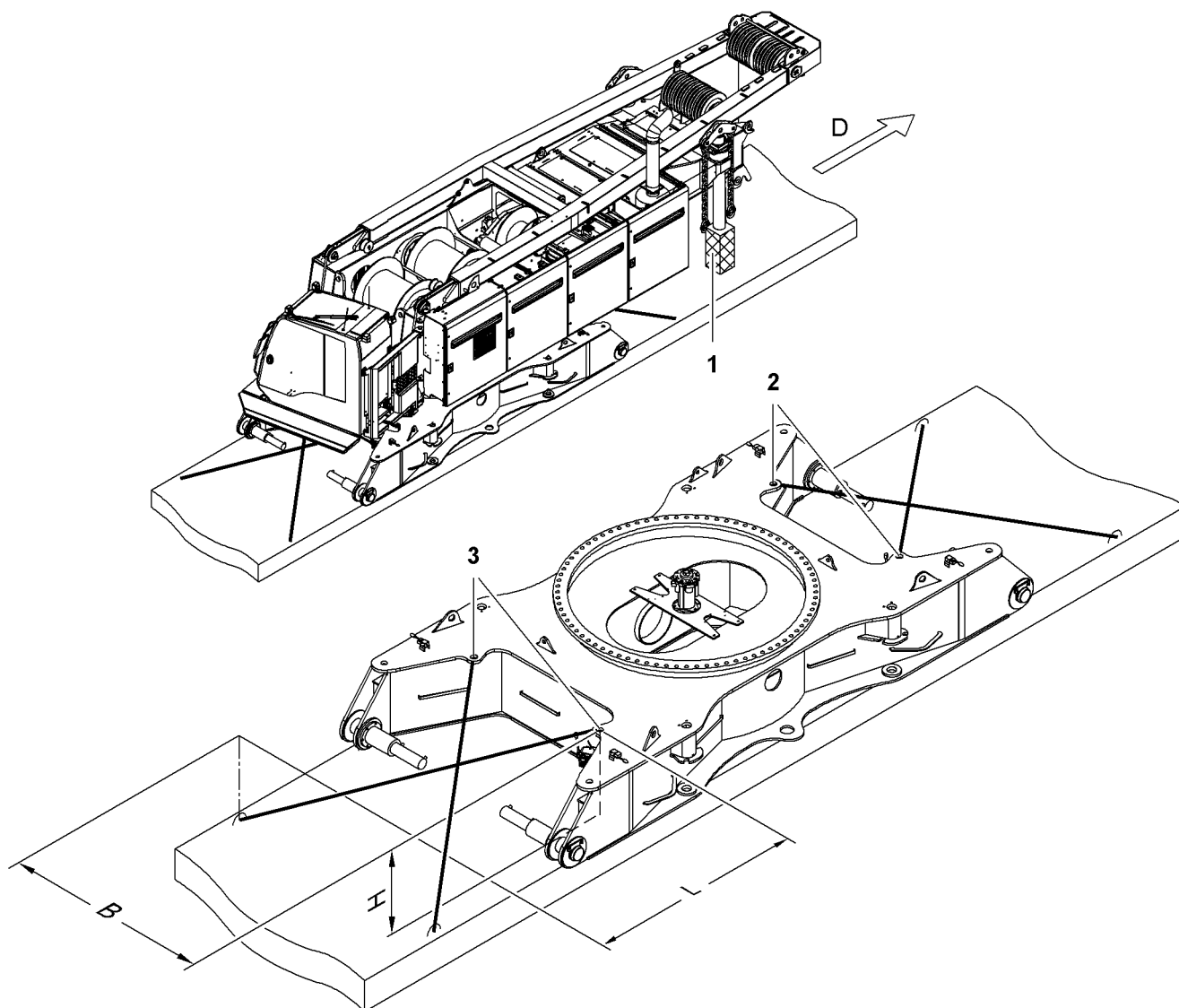


Fig. 3386 Lashing points, transporting the basic machine with a low loader

- |   |                      |   |  |   |                  |
|---|----------------------|---|--|---|------------------|
| 1 | Timber support       | L | Longitudinal distance between lashing points | D | Travel direction |
| 2 | Rear lashing points  | B | Lateral distance between lashing points      |   |                  |
| 3 | Front lashing points | H | Lashing point height                         |   |                  |

- ▶ Underlay both counterweight hoisting cylinders with timber supports **1**.
- ▶ Lock the operator's cab and all side doors on the uppercarriage.

**DANGER**

Incorrect lashing of machine on the low loader!

Machine toppling over.

- ▶ Ensure that the lashing capacity (LC) of the chain is at least 44,960 lb<sub>f</sub> (2 x 22,480 lb<sub>f</sub>).
- ▶ Make sure that chain length is at least the same as the height of the lashing point.
- ▶ Longitudinal distances between lashing points must be at least 0.268 x lateral distances between lashing points.

- ▶ Use the front **3** and rear lashing points **2** to lash the basic machine in a cross pattern on the low loader.

**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.

## 8.3 Transporting the boom sections

---

### NOTICE

Floodlights left on the boom sections contrary to instructions!  
Floodlights damaged.

- ▶ Remove the floodlights (if fitted).
- 

The floodlight traverse bracing must remain on the jib head section during transport.

- ▶ Transport the boom sections.

## 8.4 Transporting the pendant straps

Handle the pendant straps with care.

---

### NOTICE

Pendant straps not transported correctly!  
Pendant straps could be damaged.

If pendant straps are not transported on boom sections:

- ▶ Pack the pendant straps up.
  - ▶ Store the pendant straps on a soft base (e.g. wood).
- 

- ▶ Transport the pendant straps.

# Transport

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Transporting the pendant straps

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# 9 Maintenance



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## WARNING

Inadequate maintenance and inspection work!

- ▶ Maintenance and inspection work must only be carried out when the machine is switched off.
  - ▶ Secure the machine to prevent unauthorised startup.
  - ▶ Observe general safety notes ([For more information see: 2 Safety instructions, page 291](#)).
  - ▶ A fall arrest system must be worn when working on the uppercarriage to prevent falling.
- 

Make sure that the persons carrying out the maintenance on the machine:

- have read and understood this operation manual.
- have received instruction on the machine.
- have received training on this machine at the Liebherr training center.
- use only Liebherr original spare parts.

If the machine will be permanently out of operation for longer than 3 months, all exposed parts must be covered and protected against the environment. This protection must be removed before recommissioning the machine.

## Lubricants

Lubricants have 3 essential functions:

- Reducing friction
- Preventing corrosion
- Removing dirt and abrasion particles

Furthermore note that the higher the quality of the lubricant, the longer the service life of the components or the lower the amount of wear. High-quality lubricants also have a lower moisture content, which means they last longer.

The specified lubrication intervals must not be exceeded, but can be shortened if necessary. Shortening of intervals largely depends on the operating conditions.

---

## NOTICE

Insufficient lubrication!

Damage to machine.

- ▶ The prescribed lubrication intervals on the lubrication diagram must be observed.
-

## 9.1 Maintenance and inspection schedule

---

### NOTICE

Maintenance and inspection intervals are exceeded!  
Damage to machine.

- ▶ Do not exceed the prescribed maintenance and inspection intervals.
- 

This chapter contains tables listing all the maintenance work that has to be carried out on the machine.

Only the work that the machine operator is allowed to perform (after 8 and 40 operating hours respectively) is explained.

Maintenance work after 500 (and more) operating hours may only be carried out by authorised and qualified personnel.

The maintenance and inspection intervals are specified as operating hours and calendar period; whichever comes first is applicable. These intervals are complementary. This means that when the maintenance intervals with a higher hour/calendar day count become due, the work designated for the lower hour/calendar day counts should be carried out as well.

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 should be shortened if:

- There are considerable temperature differences on the site.
- Work is normally carried out at high temperatures.
- Work is carried out in a corrosive environment (e.g. chemical plant).
- Work is carried out where the air is polluted and dusty.
- Heavy loads are often lifted.

### Maintenance personnel

Well-trained personnel with the appropriate qualifications, specialist knowledge and experience, who are needed to carry out maintenance work.

### Authorised and qualified personnel

Specially trained personnel with comprehensive and in-depth knowledge of components and systems and who have been authorised by Liebherr to carry out this work. These are primarily Liebherr service personnel who have been trained and authorised by the manufacturer itself or one of its service agents.

Customer:.....Machine type:.....Serial no.:.....Service h:.....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	By authorised specialist staff
								■ Once-only activity ● Repeat interval † As necessary * Annually before the winter	□ Once-only activity ○ Repeat interval † As necessary
<b>Diesel engine</b>									
●								Checking the engine oil level	
●								Checking the engine oil pressure	
		○						Changing the engine oil; using E4, E6, E7 engine oil only	
		○						Changing the engine oil filter	
			○					Checking that the oil sump and engine support fastening screws are tight-fitting	
		○						Checking the condition and tension of v-belts	
		○						Checking the engine for leaks, damage and dirt	
		□	○					Checking that the intake and exhaust systems have no leaks and are tight-fitting	
		○						Changing the oil separator filter element	
							○	Checking the flame start system at the start of the cold season	
			○					Lubricating the crown gear on flywheel	
							○	Checking the vibration damper every 3000 hrs for deformation (on engine type D934/ D936)	
		○						Checking the charge air regulating valve/flap on the turbocharger (wastegate)	
		□	○					Checking the valve play	
							○	Checking the heating flange at the start of the cold season (except engine type D846)	
							○	Changing the heating flange every 10,000 h (except engine type D846).	
<b>Fuel system</b>									
●								Checking the fuel pre-filter drain valve	
		○						Replacing the fuel pre-filter (do this earlier in the event of an error message/drop in performance)	
		○						Replacing the fuel fine filter (do this earlier in the event of an error message/drop in performance)	
							◇	Bleeding the fuel system	
<b>Fuel tank</b>									
		○						Draining condensation water and sediments	
<b>Refuelling pump</b>									
		○						Checking that the refuelling pump works properly and does not leak	
<b>Air filter system</b>									
●								Checking the negative pressure indicator	
	●							Emptying the dust collection container (earlier, if necessary)	
		○						Changing the filter elements	
<b>Exhaust system</b>									
		○						Exhaust gas recirculation (EGR): checking the stop valve (if present)	

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# Maintenance

Maintenance and inspection schedule

Customer:.....Machine type:.....Serial no.:.....Service h:.....Date:.....

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8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	<b>By maintenance staff</b> <input checked="" type="checkbox"/> Once-only activity <input checked="" type="checkbox"/> Repeat interval † As necessary * Annually before the winter	<b>By authorised specialist staff</b> <input type="checkbox"/> Once-only activity <input type="checkbox"/> Repeat interval † As necessary
<b>Particle filter</b>									
<input checked="" type="checkbox"/>								Checking the condensate trap	
			<input type="checkbox"/>					Changing the condensate trap	
<input checked="" type="checkbox"/>								Checking cables, hoses and screw connections	
	<input type="checkbox"/>							Visually checking the particle filter system	
	<input type="checkbox"/>							Checking fixing lugs for tightening torque (9ft-lb)	
				<input type="checkbox"/>				Cleaning ash deposits and rust from filter (if Liebherr 10W40 low ash engine oil is being used)	
			<input type="checkbox"/>					Cleaning ash deposits and rust from filter (if all other permissible engine oils are being used)	
<b>Cooling system</b>									
<input checked="" type="checkbox"/>								Checking the coolant level	
	<input type="checkbox"/>							Checking antifreeze and DCA concentration (DCA-4)	
				<input type="checkbox"/>				Changing the coolant	
	<input type="checkbox"/>							Checking the cooler and fan for dirt	
				<input type="checkbox"/>				Changing the cover on the compensation tank	
			<input type="checkbox"/>			<input type="checkbox"/>		Checking the coolant pump	
<b>Distributor gearbox</b>									
<input checked="" type="checkbox"/>								Checking the gearbox oil level	
<input checked="" type="checkbox"/>								Checking the venting valve	
	<input type="checkbox"/>							Changing the gearbox oil	
			<input type="checkbox"/>					Check fastening screws for tight fit	
<b>Swing</b>									
<input checked="" type="checkbox"/>								Checking the gearbox oil level	
	<input type="checkbox"/>							Check gearbox for leaks	
	<input type="checkbox"/>	<input type="checkbox"/>						Changing the gearbox oil	
	<input type="checkbox"/>							Check the fastening screws for tight fit (fastening screws may only be used for a maximum of two more further assembly processes)	
			<input type="checkbox"/>					Visually checking the pinion and crown gear	
	<input type="checkbox"/>							Checking that the stopping brakes are working	
<b>Swing connection</b>									
	<input type="checkbox"/>							Check fastening screws for tight fit	
<input checked="" type="checkbox"/>								Lubricating external teeth	
<input checked="" type="checkbox"/>								Lubricating the bearing races via the central lubrication point (preferably at the end of the shift)	

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			<input type="checkbox"/>	<input type="radio"/>				Measuring the bearing play	
<b>Winches</b>									
	●							Checking the gearbox oil level	
		○						Checking winch gearbox for leaks and if necessary carrying out an oil analysis	
		□	○					Changing the gearbox oil	
	●							Lubricating the counter bearing, if possible	
	●							Checking the rope end fastening for tight fit	
		○						Checking the 3 rope windings limit switch for tight fit and correct operation	
		○						Checking winch for tight fit (pin clearance, retainer)	
		○						Check fastening screws for tight fit	
				○				Checking the mechanical connection hydraulic motor/gearbox or drive (pinion/sleeve) for wear	
		○						Checking the down time monitor for tight fit and correct operation	
				○				Carrying out a visual check; recording the operating hours of the winches	
		○						Checking that the stopping brakes are working	
		○						Checking that the free-fall brake is working (if present)	
		○						Checking that the constant tensioning systems for winch 1 and winch 2 are working properly (if present)	
		○						Checking that the free-wheel is working properly (if present)	
				□	○			Hydraulic motor and drive planetary stage: checking the tooth profile for wear	
		○						Checking that the line pull limitation is working properly	
						○		Checking that the line pull limitation is working properly using test weights	
<b>Tagline winch</b>									
	●							Check fixed-caliper disc brake for damage	
	●							Lubricating the rope bracket on the boom base section and checking pulleys for damage	
<b>Crawlers</b>									
		○						Checking the gearbox oil level	
		□	○					Changing the gearbox oil	
		○						Changing the gearbox oil (if the crawlers are used a lot, more than 15% of the engine operating hours)	
				○				Check fastening screws for tight fit	
				○				Tumbler wheel and crawler motor: Check fastening screws for tight fit	
	●							Check gearbox and hydraulic connections for leaks	
		○						Visually inspect crawler components (carrying rollers, running rollers, idlers, track pads)	
	●							Clean the crawlers, earlier if necessary	

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# Maintenance

Maintenance and inspection schedule

Customer:.....Machine type:.....Serial no.:.....Service h:.....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	<b>By maintenance staff</b> ■ Once-only activity ● Repeat interval † As necessary * Annually before the winter	<b>By authorised specialist staff</b> □ Once-only activity ○ Repeat interval † As necessary
		○						Checking screws, nuts and fixing pins for tight fit	
●								Checking that the crossbeam set screws on the crawler side frames are secure on telescopic undercarriages	
		○						Check chain guides for wear and tight fit	
●								Checking the chain tension, earlier if necessary	
		○						Tightening the grouser screws	
			○					Check tensioning cylinders for leaks	
<b>Lifting device</b>									
●		○						Check transport lashing and round slings for wear (according to EN 1492-2).	
●		○						Check the round steel chains for wear and damage	
<b>Hook/pulley block</b>									
	●			○				Checking all hooks/pulley blocks for damage, wear, corrosion and widening of the hook aperture	
	●							Hooks (without rollers): lubricate the swivel	
	●			○				Pulley blocks (with rollers): Lubricate the bearing and axles, check the rope fixing point, check for ease of movement and wear of the rollers, check that the rope guard and the retaining elements are present and undamaged	
●								Check that the safety catch is present and working properly	
<b>Hydraulic system</b>									
●								Check the hydraulic system for leaks	
			○					Checking the oil level in the hydraulic system	
		○						Checking the oil cooler for contamination	
		○						Checking that the engines and the screw fittings are tight	
<b>Hydraulic oil tank</b>									
●								Checking the level in the hydraulic oil tank using the sight glasses	
							●	Carry out a hydraulic oil analysis ten hours after every oil change (reference measurement)	
							●	Carry out a hydraulic oil analysis after 500 hrs	
							●	Carry out a hydraulic oil analysis after 1000 hrs / 1 year	
							●	Hydraulic oil NOT supplied by LIEBHERR must be changed after 2000 hrs / 2 years	
							●	Change Liebherr "Hydraulik 37" oil after 4000 hrs / 4 years	
							●	Change Liebherr "Hydraulik Plus" and "Hydraulik Plus Arctic" oil after 6000 hrs / 6 years	
		○						Change the venting filter	
		○						Clean the magnetic rod in the return filter every week for the first 250 operating hours	

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Maintenance / inspection after service hours								Tasks to be performed	
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<b>Hydraulic oil heater</b>									
			○					Checking that the hydraulic oil heater is working properly	
<b>Hydraulic filter</b>									
			○					Changing the hydraulic filter elements	
<b>Accumulator</b>									
			○					Check the accumulator	
						○		Changing the accumulator	
<b>Hydraulic cylinders</b>									
			○					Check that the hydraulic cylinder fits properly and does not leak	
		●						Preserving the piston rods of all exposed cylinders	
<b>Hydraulic hoses</b>									
				○				Checking the hydraulic hoses	
							○	Change all the hydraulic hoses every 12,000 hours, time interval dependent on imprinted date	
<b>Rotary connection</b>									
			○					Checking that the rotary connection is firmly attached and does not leak	
<b>Electrical system</b>									
			○					Testing the control system for any errors; reading error codes from the memory	
			○					Checking cable ducts and cable connections for chafing	
		●						Checking that the mechanical inclinometer is working properly	
<b>Switch cabinet</b>									
				○				Checking terminals for tight fit	
<b>Batteries</b>									
			○					Cleaning battery connectors and lubricating with battery grease	
			○					Checking the fluid level in the cells	
<b>Lighting</b>									
		●						Checking that the floodlights/auxiliary floodlights are working properly	
<b>Rope measuring system</b>									
			○					Checking that the rope measuring system of all winches and height adjustments are working properly	
<b>GSM service modem</b>									
			○					Checking that the GSM service modem is working properly	

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# Maintenance

Maintenance and inspection schedule

Customer:.....Machine type:.....Serial no.:.....Service h:.....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	<b>By maintenance staff</b> ■ Once-only activity ● Repeat interval † As necessary * Annually before the winter	<b>By authorised specialist staff</b> □ Once-only activity ○ Repeat interval † As necessary
<b>PDE</b>									
		○						Checking that the PDE and printer are working properly	
<b>Limit switches</b>									
●								Checking hoist limit switches, boom limit switches and, if necessary, limit switches of the piling and drilling rig to ensure they are working correctly	
<b>Emergency stop</b>									
		○						Checking the emergency stop	
<b>Load moment limiter (LML)</b>									
			○					Checking that the system shuts down properly	
<b>Helicopter warning light</b>									
		○						Checking the helicopter warning light for damage and that it is working, checking the power cable and connection plugs (if present) for damage	
<b>Emergency control system</b>									
		○						Checking that the emergency control system is working properly	
<b>Fire extinguishers</b>									
		○						Checking the seals and inspection dates on the fire extinguishers	
<b>Personal protective equipment</b>									
●								Checking that the personal protective gear is in place, intact and complete	
<b>Safety signs</b>									
		○						Checking that all required safety signs are mounted on the machine and are legible	
<b>Steel structure</b>									
●			○					Checking the machine steel structure for damage, cracks	
<b>Main boom</b>									
		○						Checking the boom base section and sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear)	
		○						Boom base section: checking that the knuckle pins and locking elements fit tightly	
		○						Boom head section: Check the screw and bolt connections for tight fit, check the rope fixation for cracks, check for ease of movement and wear of the pulleys, check that the rope guard and the retaining springs are present and undamaged	
	●							Checking the anemometer, hoist limit switch and limit switch of the jib tilting-back supports for tight fit and operation	
		○						Auxiliary jib: Check the screw and bolt connections for tight fit, check the rope fixation for cracks, check for ease of movement and wear of the pulleys, check that the rope guard and the retaining springs are present and undamaged	

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Maintenance / inspection after service hours							Tasks to be performed		
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<b>Jib</b>									
		○						Checking the jib base section and jib sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear)	
		○						Tilting-back supports: Checking the accumulator according to the Pressure Vessel Regulation and for tight fit	
		●						Checking the locking flaps for ease of movement. Do this each time assembly/dismantling takes place	
		●						Jib head section: checking wheels for ease of movement	
		●						Check the operation of the anemometer and the hoist limit switch and for tight fit	
		○						Checking the hydraulic tilting-back cylinders on A-frame 3 and the hydraulic connections for leaks	
		○						Jib pivot piece: checking that the pins and safety pins are present and for damage	
<b>Steel pendant straps</b>									
		○						Checking pendant straps and pins for damage and wear and check that the safety pins and cotter pins are present (cracks, notches, corrosion, plastic deformation, wear, lubrication, etc.)	
		○						Lubricating pendant straps and pins	
		○						Checking the connecting links of the pendant straps for damage, cracks and plastic deformation	
		○						Lubricating connecting links	
		○						Tension load cells: visually check for damage (plastic deformation, corrosion, cracks, etc.), check electrical connections for tight fit	
<b>Carbon-fibre pendant straps</b>									
		○						Checking pendant straps and pins for damage and wear and check that the safety pins and cotter pins are present (cracks, notches, corrosion, plastic deformation, wear, lubrication, etc.)	
		○						Lubricating the pendant strap bushes	
		○						Checking the connecting links of the pendant straps for damage, cracks and plastic deformation	
		○						Lubricating connecting links	
		○						Tension load cells: visually check for damage (plastic deformation, corrosion, cracks, etc.), check electrical connections for tight fit	
<b>Pendant ropes</b>									
						○		Changing the pendant ropes	
<b>Counterweight</b>									
		○						Rear counterweight: checking the fixing lugs and round steel chains for damage, wear and secure fit	

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# Maintenance

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8h/Daily	40h/Weekly	500h/Quarterly	1000h/Every six months	2000h/Annually	4000h/2 years	6000h/3 years	Special intervals	<b>By maintenance staff</b> <input checked="" type="checkbox"/> Once-only activity <input checked="" type="checkbox"/> Repeat interval <input checked="" type="checkbox"/> As necessary <input checked="" type="checkbox"/> Annually before the winter	<b>By authorised specialist staff</b> <input type="checkbox"/> Once-only activity <input type="checkbox"/> Repeat interval <input type="checkbox"/> As necessary
		<input type="checkbox"/>						Checking that the locking elements are present, and checking them for damage and secure fit	
		<input type="checkbox"/>						Rear counterweight: checking the pin connection cylinder and limit switch (if present)	
		<input type="checkbox"/>						Checking the counterweight assembly (pins/straps) for damage	
<b>Lubrication system</b>									
<input checked="" type="checkbox"/>								Checking the operation of the central lubrication for the swing ring tooth flanks	
<input checked="" type="checkbox"/>								Checking the operation of the central lubrication for the swing ring bearing	
<b>Ropes</b>									
<input checked="" type="checkbox"/>								Check that the ropes are guided correctly over the rope pulleys and that the rope winds correctly onto the drum	
	<input checked="" type="checkbox"/>							Check ropes for wear, tight fit and lubrication	
<input checked="" type="checkbox"/>								Check the feed ropes and crowd winch for wear, wire breaks, rust and adequate lubrication, particularly around the crowd winch	
		<input type="checkbox"/>						Replacing the crowd ropes and the portable winch	
		<input type="checkbox"/>						Checking the crowd ropes	
<b>Rope pulleys</b>									
	<input checked="" type="checkbox"/>							Checking all pulleys for ease of movement, signs of wear and damage	
		<input type="checkbox"/>						Lubricating all the pulleys in the lifting system (hook block, boom head, rope guides, etc.)	
			<input type="checkbox"/>					Lubricating all pulleys in the boom luffing system	
		<input type="checkbox"/>						Lubricating all pulleys in the lifting system and crowd system	
<input checked="" type="checkbox"/>								Checking rope pulley for tight fit	
<b>Rope suspension and rope fixation</b>									
	<input checked="" type="checkbox"/>							Checking the rope suspensions (rope clamps) for wire breaks	
	<input checked="" type="checkbox"/>							Checking the pocket locks	
	<input checked="" type="checkbox"/>							Checking the rope end fittings for cracks and replacing entire rope if necessary	
	<input checked="" type="checkbox"/>							Checking the thimble connection	
<b>Operator's cab</b>									
<input checked="" type="checkbox"/>								Check the windows of the cab for damage	
<input checked="" type="checkbox"/>								Checking that the cab door and the door lock work properly	
<input checked="" type="checkbox"/>								Checking the outside and inside mirrors for damage	
	<input checked="" type="checkbox"/>							Checking the operation of the hydraulic cab tilting device	
	<input checked="" type="checkbox"/>							Hydraulic cab tilting device: Checking the adjustment cylinder, hydraulic hoses and connections for leaks and damage	
	<input checked="" type="checkbox"/>							Hydraulic cab elevation system: Checking the operation of the acoustic warning signal, checking the operation of the operating elements (valves, display etc.), checking that the safety chain is present and works properly	

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Maintenance / inspection after service hours								Tasks to be performed	
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		○						Hydraulic cab elevation system: Checking hydraulic hoses and connections for leaks and damage, checking for the presence and operation of the lowering device, checking the cab suspension point for damage, checking the emergency lowering system, checking the presence and fit of the pins on the locking elements	
<b>Operator`s seat</b>									
●								Checking that the driver's seat works properly	
<b>Heating/ventilation/air conditioning</b>									
			○				*	Check the operation of the heating and ventilation system	
			○					Check that the air-conditioning works and that there are no leaks	
			○					Changing the cab fresh air filter	
			○					Hot water circuit: Checking the hoses for leaks or damage	
			○					Starting the heating system and ensuring that sufficient antifreeze has been added to the water	
			○					Check the coolant level	
			○					Check the dryer for mechanical damage and corrosion	
						○		Changing the dryer	
			○					Check refrigerant hoses and connections for leaks and damage	
			○					Check that the compressor fits properly and does not leak	
			○					Check drive belts for damage	
			○					Checking the condenser and vaporiser for leaks and dirt	
			○					Cleaning the heater/air conditioner unit	
						○		Clean the condenser and vaporiser	
							●	Activate the air conditioning every month (lubricates the system parts)	
<b>Auxiliary heating</b>									
		○						Checking that the auxiliary heating is working	
<b>Function lock</b>									
		○						Checking that the function lock is working properly	

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## 9.2 Lubricants and consumables

Obeying the guidelines for lubrication and the use of fuels guarantees maximum reliability and a long machine life.

Cleanliness is absolutely essential when using lubricants and fuels.



**Note**

Environmental pollution!

- ▶ Fluids such as hydraulic oil, fuel and cooling liquid must be disposed of in accordance with national and international regulations and guidelines.

### 9.2.1 Lubrication diagram

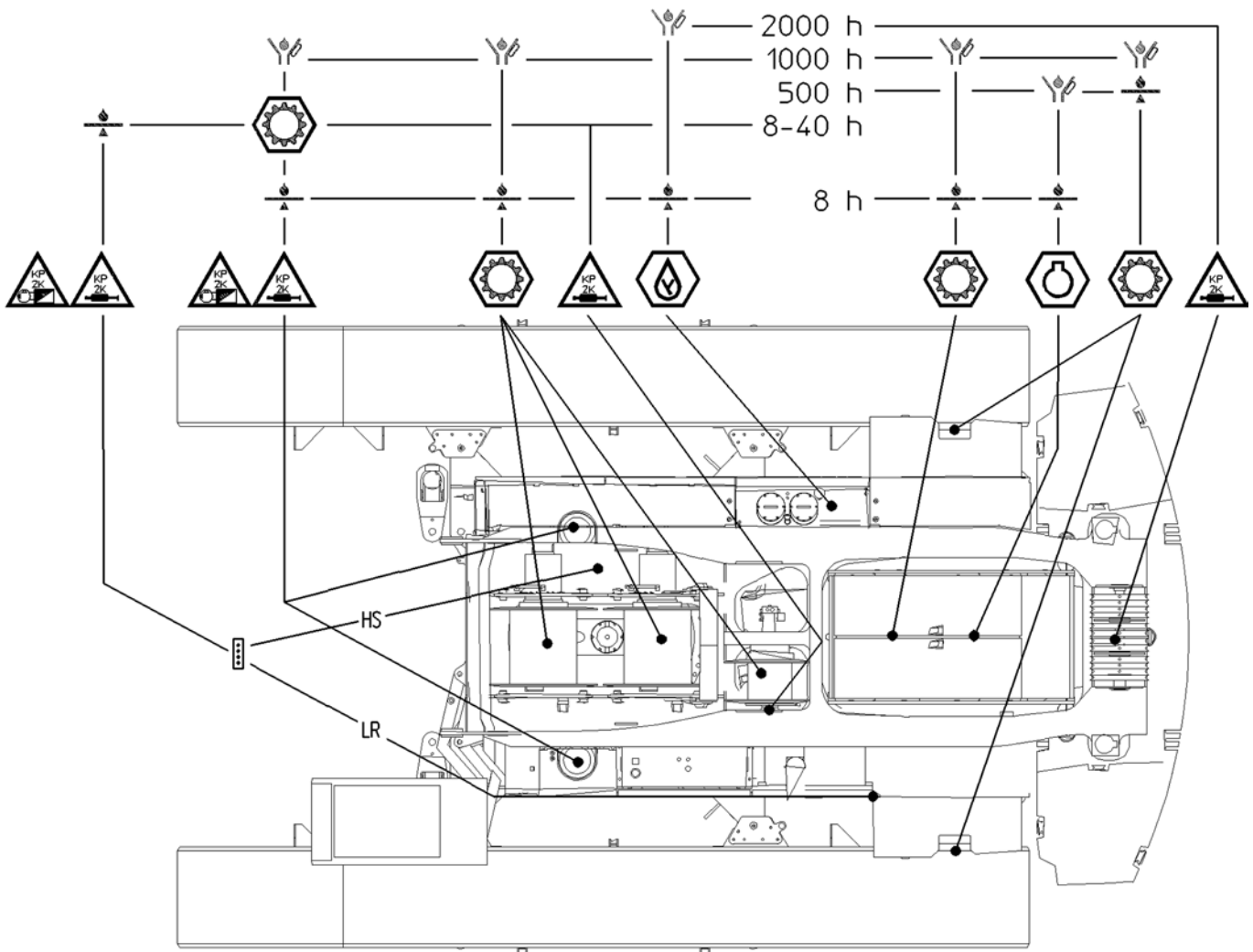


Fig. 3387 Lubrication diagram (part 1)

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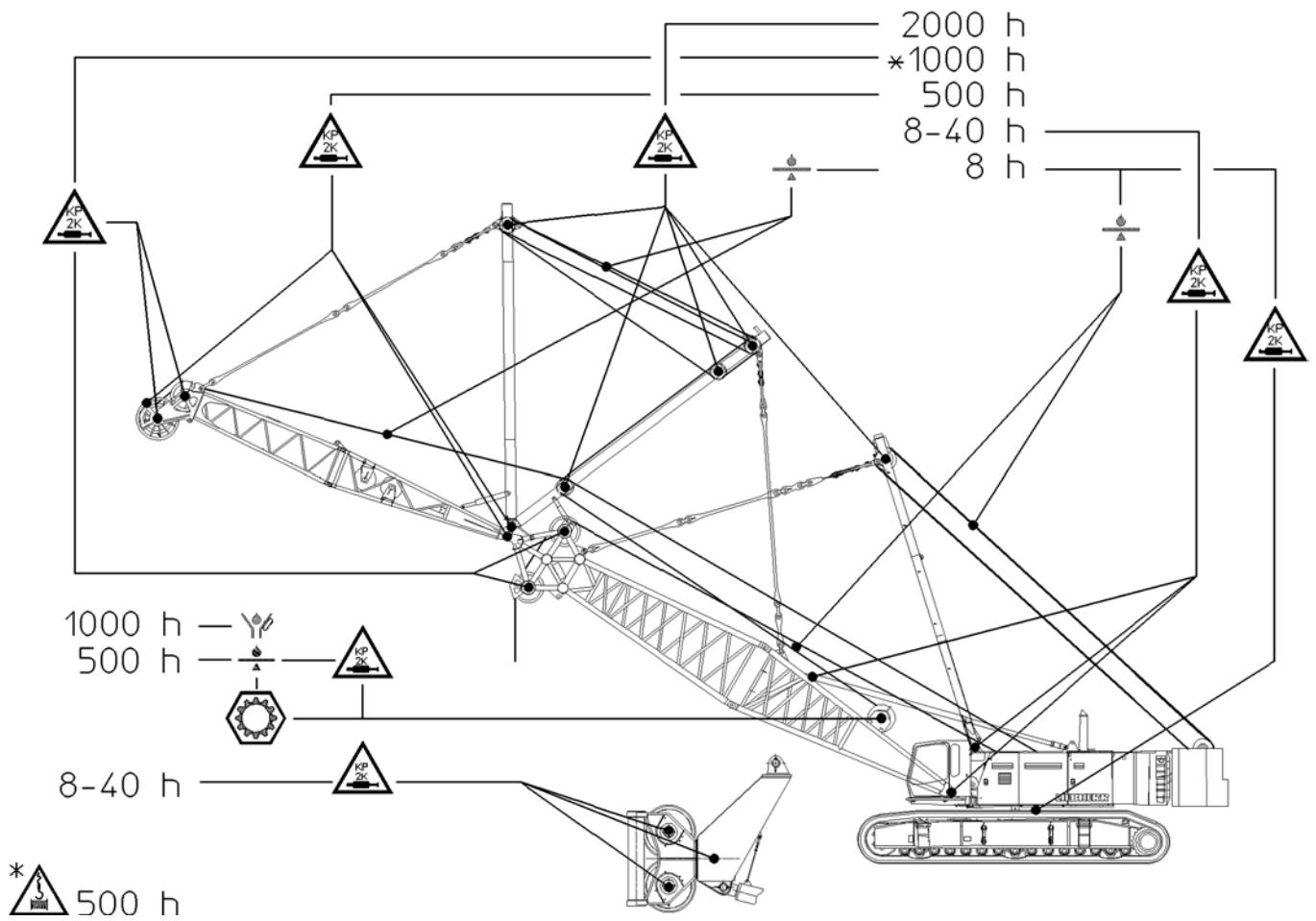








Fig. 3388 Lubrication diagram (part 2)

**Key:**

-  Diesel engine
-  gearbox
-  Hydraulics
-  Grease
-  Grease (pressurised)
-  Changing oil

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Lubricating, oiling



Free-fall operation

### 9.2.2 Filling capacities table

Komponent	Volume	Remarks
Diesel engine	18.49 gal	8 cylinders D 9508 A7
Distributor gearbox	2.19 gal	4 power take-offs
Crawler drive	8.98 gal	per item
Swing gear	2.96 gal	per item
Winch 1/Winch 2 (crane winch)	4.09 gal	
Winch 1/Winch 2 (free-fall winch)	5.28 gal	
Boom winch	1.98 gal	
Luffing jib luffing winch	1.27 gal	
Rope reeving winch	13.53 oz	
Hydraulic oil tank	237.75 gal	
Diesel tank	237.75 gal	

Tab. 346 Filling capacities table

### 9.2.3 Lubrication chart

No.	Lubrication points	Outside temperature	Type	Specification	Liebherr
			ISO VG/SAE		Lubricants
1.	Engine, oil bath air filter	throughout the year to -4 °F below -4 °F with preheating	SAE 10W-40	ACEA E4 API CF	<b>Liebherr Motoroil 10W-40</b>
		throughout the year to -4 °F below -4 °F with preheating	SAE 10W-40	ACEA E4/E6/E7 API CF-4 / CG-4 CH-4 / CI-4	<b>Liebherr Motoroil 10W-40 low ash</b> required when using a soot particle filter
		throughout the year to -22 °F below -22 °F with preheating	SAE 5W-30	ACEA E4 API CF	<b>Liebherr Motoroil 5W-30</b>
2.	Mechanical gears and winches	to -4 °F	SAE 85W-90	API GL5	<b>Liebherr Hypoid EP 90</b>

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No.	Lubrication points	Outside temperature	Type	Specification	Liebherr
			ISO VG/SAE		Lubricants
3.	Drive shafts	to -40 °F	SAE 75W-90	API GL 4; GL 5; MT 1	Liebherr Syntogear Plus 75W-90
4.	Hydrostatic drive unit, hydraulic steering	to -13 °F + 122 °F <sup>B)</sup>	ISO VG 32 - 46 SAE 10W-20 ATF <sup>A)</sup>	DIN 51 524 / T3 HVLP 1.DEXRON II D/E	Liebherr Hydraulic 37
		to -13 °F + 122 °F <sup>B)</sup>	ISO VG 46 (32-68) SAE 10W-20	DIN 51 524 / T3 HVLDP HC biodegradable in accordance with CEC-L-33-A-93	Liebherr Hydraulic Plus
		to -58 °F + 86 °F	ISO VG 15-46 SAE 0W-20	DIN 51 524 / T3 HVLDP HC biodegradable in accordance with CEC-L-33-A-93	Liebherr Hydraulic Plus Arctic
5.	Hydr. additive for free-fall brake			DIN 51,757 DIN 51,562	Liebherr special additive NL
6.	Roller bearing, friction bearing, ball/roller-bearing swing rings, cardan pivots, other grease lubrication	to -13 °F + 302 °F For lubrication system to -4 °F + 302 °F	Lubricating grease, lithium saponified	DIN 51 502 KP 2 K-30 KPF 2 N-25	Liebherr universal grease 9900
		to -76 °F + 284 °F For lubrication system to -67 °F + 284 °F		DIN 51 502 KPFHC 1N-60	Liebherr universal grease Arctic
7.	Open gear wheels and crown gears, ropes	to -13 °F + 302 °F For lubrication system to -4 °F + 302 °F	Lubrication and preservation	DIN 51 502 OGPF 2	Liebherr universal grease 9900
		to -76 °F + 284 °F For lubrication system to -67 °F + 284 °F		OGPF 1	Liebherr universal grease Arctic
		All areas		OGPF 00	Liebherr paste spray
8.	Telescopic boom	All areas	Special regulation	DIN 51 502 KP 2 K-30	Liebherr grease for telescopic components 9613 Plus
9.	Coolant	to -35 °F		DIN 51,757/4 DIN 51 432/2	Liebherr Antifreeze Mix

LWN// Auslieferung/2010-07-21/en

No.	Lubrication points	Outside temperature	Type ISO VG/SAE	Specification	Liebherr Lubricants
10.	Screenwash fluid	to -112 °F			Rala Klirr

Tab. 347 Lubrication chart

A) If Liebherr oil is not being used, ATF oil is compulsory for multi-disc brakes.

B) When the oil preheater is activated, the outside temperature may be about 50 °F lower.



### Note

The familiar specifications listed above are minimum oil grades only. High-quality Liebherr products have been developed and tested for compatibility. The correct function of the machine can only be guaranteed with original Liebherr products. Products of other grades do not carry this guarantee.

► For more information contact the Liebherr Lubricant Hotline (+49 (0) 7354 806060 or [lubricants@liebherr.com](mailto:lubricants@liebherr.com)).

## Ordering data

### Engine oil

	1.32 gal canister	5.28 gal canister	55.48 gal drum	264.17 gal container
Liebherr Motoroil 10W-40	10 29 05 06	10 33 02 39	10 33 02 46	10 28 62 79
Liebherr Motoroil 10W-40 low ash	10 32 61 13	10 32 61 12	10 32 61 11	10 32 61 10
Liebherr Motoroil 5W-30	10 42 57 12	10 42 57 13	10 42 57 15	10 42 57 19

Tab. 348 Engine oil ordering data

### Gear oil

	1.32 gal canister	5.28 gal canister	55.48 gal drum	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

Tab. 349 Gearbox oil ordering data

### Hydraulic oil

	1.32 gal canister	5.28 gal canister	55.48 gal drum	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
Liebherr Hydraulic Plus Arctic	10 29 64 79	10 33 02 77	10 33 02 78	10 29 64 78

Tab. 350 Hydraulic oil ordering data

**Oil concentrate**

	1.32 gal canister	5.28 gal canister	55.48 gal drum	264.17 gal container
Liebherr special additive NL	10 51 53 00	10 51 57 52		

Tab. 351 Oil concentrate ordering data

**Grease**

	0.88 lb cartridge	11.02 lb tub	22.05 lb tub	55.11 lb tub
Liebherr universal grease 9900	10 29 68 16		10 29 68 13	10 29 68 12
Liebherr universal grease Arctic	10 29 68 28		10 29 68 25	10 29 68 24
Liebherr paste spray	10 33 03 08 (2.09 lb)	10 33 03 11		
Liebherr grease for telescopic components 9613 Plus				86 13 036 08

Tab. 352 Grease ordering data

**Coolant**

	1.32 gal canister	5.28 gal canister	55.48 gal drum	264.17 gal container
Liebherr Antifreeze Concentrate	10 30 12 15	10 42 84 10	10 42 84 11	
Liebherr Antifreeze Mix	10 65 18 38	10 30 12 13	10 45 54 46	10 35 90 77

Tab. 353 Coolant ordering data

**Screenwash fluid**

	1.32 gal canister	5.28 gal canister	55.48 gal drum	264.17 gal container
Windscreen wash -112 °F			89 03 108 14	

Tab. 354 Screenwash fluid ordering data

**Oil analysis kit**

Oil analysis kit: 88 56 018 14

**9.2.4 Diesel engine lubricating oil****Lubricating oil specification**

Modern diesel engines only use lubricating oils with a high additive content. Such lubricating oils consist of basic oils mixed with additives. The Liebherr diesel engine lubrication guide is based on the following specifications and requirements:

Designation	Specification
ACEA (Association des constructeurs Européens de l'Automobile) classification	E4, E6, E7. Warning: Particle filter operation only permitted with E6.
API (American Petroleum Institute) classification	CH-4, CI-4. Warning: Observe shorter oil change intervals.

Tab. 355 Lubricating oil specification

### Lubricating oil viscosity

The choice of lubricating oil viscosity is based on the SAE (Society of Automotive Engineers) classification.

The critical factor for choosing the SAE class is the ambient temperature. The SAE class does not give any clue as to the quality of a lubricating oil.

If the lubricating oil is too viscous it will be difficult to start the engine, if the viscosity is too low lubricating efficiency may be lost.

The temperature ranges shown in the following chart are guideline values only. Each end of the temperature range may be violated briefly.

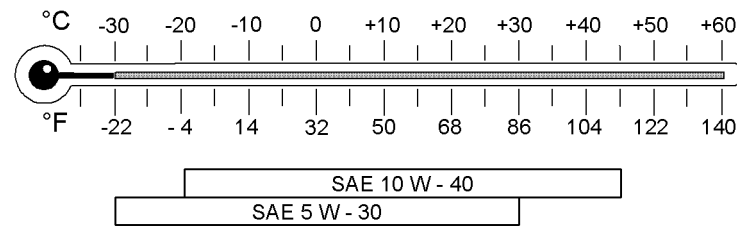


Fig. 3397 Temperature-dependent selection of SAE class

Liebherr recommends the following lubricating oils for ambient temperatures from -4 °F to 113 °F:

- Liebherr Motoroil 10W-40, ACEA E4 specification
- Liebherr Motoroil 10W-40 low ash, ACEA E6 specification

Liebherr recommends the following lubricating oil for ambient temperatures from -22 °F to 86 °F:

- Liebherr Motoroil 5W-30, ACEA E4 specification

### Lubricating oil change intervals

Lubricating oil change intervals: [\(For more information see: 9.1 Maintenance and inspection schedule, page 922\)](#) .

If the specified number of operating hours during the year is not reached: change the lubricating oil and filter at least once a year.

Various aggravating factors alter the maintenance interval.

Aggravating factors:

- Frequent cold starts
- Sulphur content in fuel
- Operating temperature

If aggravating factors are present: change the lubricating oil and filter according to the following tables.

Aggravating factor		Lubricating oil grade	
		CH-4, CI-4	E4, E7 <sup>A)</sup>
Operating temperature	Sulphur content of diesel fuel	Interval	
to 14 °F	to 0.5 %	250 h	500 h
	from 0.5 % to 1 %	125 h	250 h
below 14 °F	to 0.5 %	125 h	250 h
	from 0.5 % to 1 %	is prohibited	125 h

Tab. 356 Lubricating oil change intervals depending on aggravating factors, part 1

A) TBN at least 13 mgKOH/g

Aggravating factor		Lubricating oil grade	
		E6	
Operating temperature	Sulphur content of diesel fuel	Interval	
to 14 °F	to 0.005 %	500 h	
	from 0.005 % to 0.05 %	250 h	
	from 0.05% to 0.1%	125 h	
below 14 °F	to 0.005 %	250 h	
	from 0.005 % to 0.05 %	125 h	
	from 0.05% to 0.1%	is prohibited	

Tab. 357 Lubricating oil change intervals depending on aggravating factors, part 2

## 9.2.5 Fuel

### Fuel specifications

Fuels must satisfy the minimum requirements of the following fuel specifications.

Permitted fuel specifications:

- DIN EN 590
- ASTM D 975 (89a) 1D and 2D

### Sulphur content in fuel

Only use fuels whose sulphur content is less than 1 % (10000 ppm).

Liebherr recommends: in the case of diesel engines with external exhaust gas recirculation (eEGR), use fuels with a sulphur content of less than 0.005% (50 ppm).

If the diesel engine uses E6 engine oil and a standard lubricating oil change interval regime (500 h) is in operation: Only use fuels whose sulphur content is less than 0.005 % (50 ppm).

(For more information see: [Lubricating oil change intervals, page 938](#))

According to the HFRR (60) test, the fuel lubricity must not exceed 460 µm [lubricity of corrected wearscar "diameter" (1.4) at 140 °F]. Fuel standard ASTM D 975 does not require fuels to have passed a fuel lubricity test. A written confirmation from the fuel supplier must be provided. Additives should be added by the fuel

supplier. The fuel supplier is responsible for the quality of the fuel. The addition of secondary lubricity additives by the customer is not recommended.

### Fuel at low temperatures (winter operation)

A cetane number for fuels of at least 45 is required according to ASTM D 975. At temperatures below 32 °F, a cetane number of over 50 is required.

As the external temperature drops, paraffin crystals separate out from the fuel. Paraffin crystals increase the flow resistance in the fuel filter and restrict the supply of fuel to the diesel engine.

The addition of petroleum or regular fuel is forbidden for safety as well as technical reasons. Special fuels are available for arctic conditions. Use a starting aid (e.g. fuel filter heater) if the diesel fuel flow is sluggish or the temperature is below -4 °F.

## 9.2.6 Diesel engine coolant

### Coolant specification

The coolant is a mixture of water and anticorrosion and antifreeze additives.

Coolant:

- can be mixed with the following products.
- is available in a pre-mixed form (premix).

The cooling system only works reliably when under pressure. Keep the cooling system clean and free of leaks. The coolant shut-off and working valves must be in good working order. Maintain the required coolant level.

The antifreeze agents approved by Liebherr:

- guarantee adequate protection against freezing, corrosion and cavitation.
- do not attack seals and tubes.
- do not foam.

Coolants cause cavitation or corrosion damage in the cooling system if they contain unsuitable anticorrosion/antifreeze agents or are prepared incorrectly. Thermally-insulating deposits on heat-conducting components will result in overheating and failure of the diesel engine.

Emulsifiable anticorrosion oils are prohibited.

Anticorrosion agents without any antifreeze (e.g. DCA) are never used. Their use is possible under certain circumstances (see "Permitted anticorrosion agents (inhibitors) without antifreeze").

### Water (fresh water)

Colourless, clear, free from mechanical contamination, potable tap water with the following restricted analysis values is suitable.

Sea water, brackish water, brine or industrial waste water are not suitable.

Designation	Value
Total alkaline earths (water hardness)	60 ppm to 360 ppm
pH value at 68 °F	6.5 to 8.5
Chloride ion content	maximum 8000 ppm

Designation	Value
Sulphate ion content	maximum 10000 ppm

Tab. 358 Fresh water quality

Designation	Value
Total alkaline earths (water hardness)	60 ppm to 270 ppm
pH value at 68 °F	6.5 to 8.0
Chloride ion content	maximum 8000 ppm
Sulphate ion content	maximum 8000 ppm

Tab. 359 Fresh water quality when using DCA 4

Ask the relevant municipal authority for their water analysis results.

## Coolant mixing ratio

**Throughout the year** the coolant must contain not less than 50 % anticorrosion/antifreeze agent.

Outside temperature	Mixing ratio	
	Water	Anticorrosion/antifreeze agent
to -35 °F	50 %	50 %
to -58 °F	40 %	60 %

Tab. 360 Temperature-dependent mixing ratio of water and anticorrosion agent

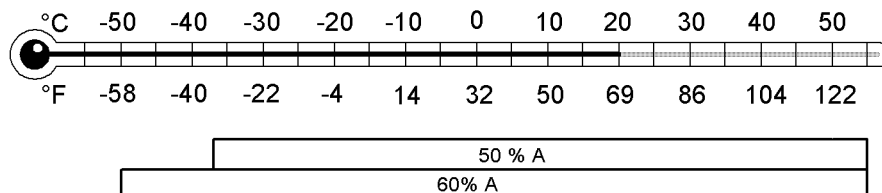


Fig. 3398 Temperature-dependent mixing ratio of water and anticorrosion agent

- A** Proportion of anticorrosion/antifreeze agent in coolant in %

## Approved anticorrosion/antifreeze agents

Product description	Manufacturer
Liebherr Antifreeze Concentrate	Liebherr

Tab. 361 Approved anticorrosion/antifreeze agents



**Note**

If Liebherr coolant is not available locally:  
 ► use a coolant that conforms to the "Coolant specification for Liebherr diesel engines 10652041" (contact after sales service).

Mixing different anticorrosion/antifreeze agents will degrade the properties of the coolant.

**Approved pre-mixed coolants**

Product description	Manufacturer
Liebherr Antifreeze Mix (ready-mixed:: 50 % water, 50 % anticorrosion/anti-freeze agent)	Liebherr

Tab. 362 Approved pre-mixed coolants



**Note**

If Liebherr coolant is not available locally:  
 ► use a coolant that conforms to the "Coolant specification for Liebherr diesel engines 10652041" (contact after sales service).

Mixing different anticorrosion/antifreeze agents will degrade the properties of the coolant.

**Approved anticorrosion agents (inhibitors) without antifreeze**

If it can be demonstrated that no approved anticorrosion agent is available: In exceptional cases and where ambient temperatures are permanently above freezing point, mix the water with the following anticorrosion agents:

- **Product DCA 4** (Diesel Coolant Additives 4)
- **Caltex / Chevron / Havoline / Total**

Change the coolant every year in this case.

Check the concentration during maintenance work.



**Note**

If changing between antifreeze and anticorrosion agents:  
 ► Drain coolant.

Product description	Manufacturer
DCA 4 Diesel Coolant Additives	Fleetguard / Cummins Filtration
Caltex XL Corrosion Inhibitor Concentrate	Chevron Texaco
Chevron Heavy Duty Extended Life Corrosion Inhibitor Nitrite Free (ELC)	Chevron Texaco
Havoline Extended Life Corrosion Inhibitor (XLI)	Chevron Texaco



Product description	Manufacturer
Total WT Supra	Total, Paris

Tab. 363 Approved anticorrosion agents (inhibitors) without antifreeze

## 9.2.7 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 carried out by Liebherr, the machine will have been filled with Liebherr Hydraulic 37 or higher grade hydraulic oil 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.

Use of a rapidly biodegradable hydraulic oil must be cleared in advance with Liebherr.

Plant-based oils must not be used because of their poor temperature stability.

Using Liebherr hydraulic oils ensures that none of the disadvantages listed above will occur.

Mixing Liebherr hydraulic oils	
<b>Liebherr mineral oils with one another</b>	Can be mixed in any ratio
<b>Liebherr mineral oils with biodegradable Liebherr oils</b>	Can be mixed in any ratio To ensure biodegradability, do not add more than 2% mineral oil (as per regulations in most European countries)
<b>Liebherr oils with third-party oils</b>	To ensure that oil properties are not altered, do not mix to a proportion higher than 10%.

Tab. 364 Mixing Liebherr hydraulic oils

## 9.2.8 Preservation medium (anti-corrosion coating)

Recommended anti-corrosive agents		
1	LPS PROCYON	Id.No.: 861010214
2	LPS 3 in spray can	Id.No.: 861009614
3	LPS 1 in drums of 6.6 gal	Id.No.: 861010014
4	MOLECULAR NATO FLUID in cans of 1.32 gal	Id.No.: 861010114

Tab. 365 Preservation medium (anti-corrosion coating)



### Note

- ▶ The various preservation media can be ordered directly from Liebherr with the corresponding identification number (Id.no.).

Store preservation media in a cool dry place. The storage temperature must be between 59 °F and 68 °F.

## 9.2.9 Liebherr oil diagnosis system



### Note

- ▶ Perform the first oil change for the relevant unit as scheduled, since increased levels of contamination are to be expected during the running-in phase.

The Liebherr oil diagnosis system is a preventive maintenance system for the main machine components. It is based on an analysis of the oil and has the following objectives:

- to prevent machine failures
- to reduce downtime
- to minimise repair costs
- Highlight abnormal wear patterns
- Identify potential damage scenarios in good time

### Taking an oil sample

Ensure that the following conditions are satisfied:

- The Liebherr analysis kit is available.
- The machine is switched off.
- The machine is secured to prevent unauthorised operation.
- The relevant module/component has been warmed up for approx. 15 minutes.

Take the oil samples either directly from the housing of the relevant module / component or from the oil that is being drained out when the oil is changed. Drain off at least a quarter of a litre of oil before taking the sample and then fill the container with well-mixed oil.

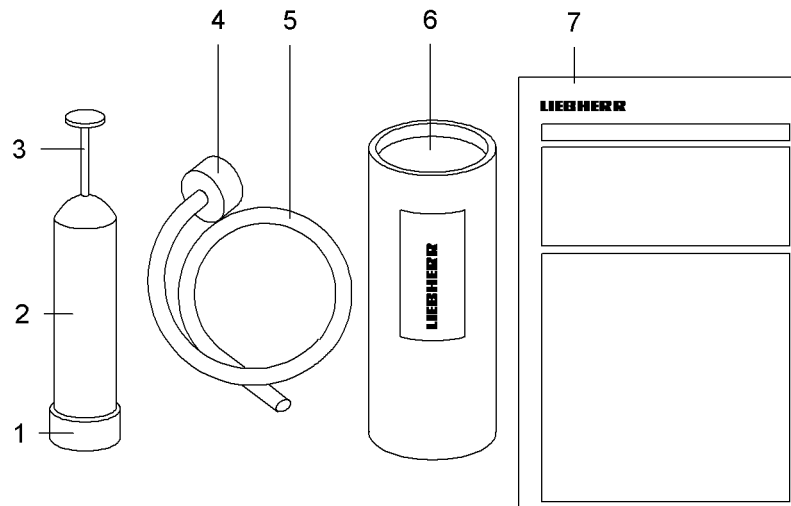


Fig. 3399 Oil analysis kit

- |   |                               |   |                   |
|---|-------------------------------|---|-------------------|
| 1 | Plastic syringe container cap | 5 | Plastic hose      |
| 2 | Plastic syringe container     | 6 | Shipping carton   |
| 3 | Syringe neck                  | 7 | Sample data sheet |
| 4 | Adapter                       |   |                   |

- Screw the plastic hose 5 with adapter 4 onto the plastic syringe container 2.

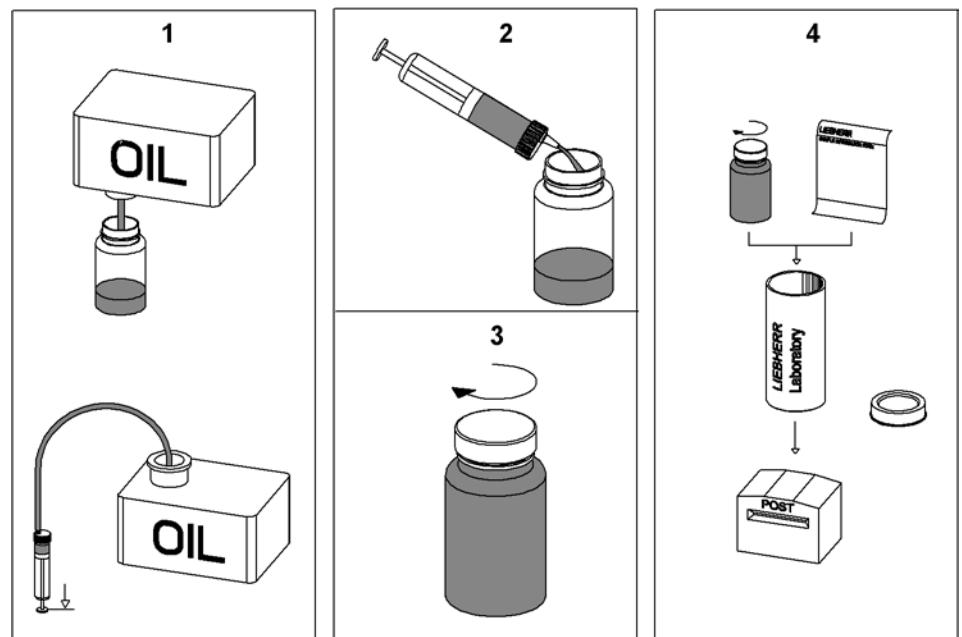






Fig. 3400 Taking an oil sample

- Take at least 6.76 oz of oil.
- Complete all sections of the sample data sheet.
- Place the oil sample and the sample data sheet into the shipping carton and send to the pre-printed address.

## Understanding the oil diagnosis report

The oil diagnosis report contains the detailed results of the oil sample analysis and provides information about any measures that need to be taken. Four symbols are used for this purpose:

Symbol	Meaning
	Normal
	High value, take a second oil sample for cross checking
	Oil change needed
	Repair needed

Tab. 366 Symbols and their meaning

## 9.3 Diesel engine

### 9.3.1 Checking the engine oil level

Ensure that the following conditions are satisfied:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.



#### CAUTION

Hot engine parts and oil!  
Risk of burns.

- ▶ Maintenance and inspection work on the diesel engine must only be carried out when the diesel engine is switched off and has cooled down.
- ▶ Wear protective equipment.

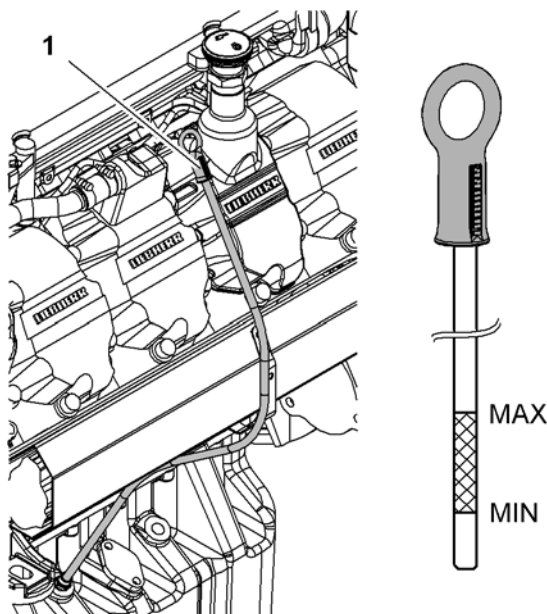


Fig. 3405 Diesel engine

1 Oil dipstick

The location of the oil dipstick 1 may vary.

- ▶ 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 engine oil level is below the MIN mark:

- ▶ Top up using the appropriate engine oil according to the lubrication chart ([For more information see: 9.3.2 Topping up the engine oil, page 948](#)).

If the engine oil level is above the MAX mark:

- ▶ Drain the engine oil.

### 9.3.2 Topping up the engine oil

Ensure that the following conditions are satisfied:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.

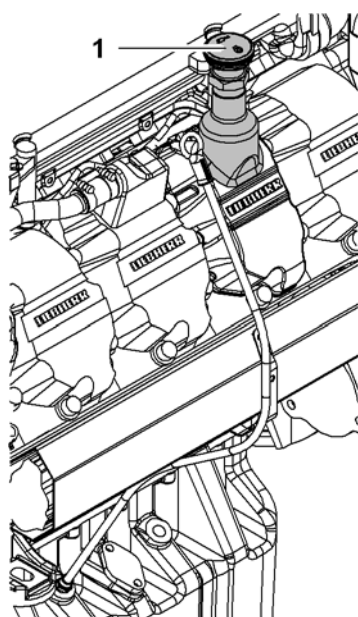


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**CAUTION**

Hot engine parts and oil!  
Risk of burns.

- ▶ Maintenance and inspection work on the diesel engine must only be carried out when the diesel engine is switched off and has cooled down.
  - ▶ Wear protective equipment.
- 



*Fig. 3406 Diesel engine*

1 Filler neck

The location of the filler neck **1** may vary.

---

**NOTICE**

Dirt and foreign bodies in the oil filler neck!  
Damage to the diesel engine.

- ▶ Ensure that no dirt or foreign bodies enter the oil filler neck.
  - ▶ Open the cover: turn the cover counter-clockwise.
-

---

**NOTICE**

Incorrect or impure engine oil is used!

Damage to the diesel engine.

- ▶ Top up using only the appropriate engine oil according to the lubrication chart (For more information see: [9.2.3 Lubrication chart, page 934](#)).
- ▶ Ensure the purity of the engine oil.

- 
- ▶ Top up the engine oil until the MAX mark.
  - ▶ Clean the cover and set it down evenly in the recesses.
  - ▶ 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.
  - ▶ Switch off the diesel engine and wait 1 minute before checking the engine oil level again.

### 9.3.3 Checking the engine oil pressure

- ▶ Start the diesel engine.

---

**NOTICE**

Incorrect engine oil pressure!

Damage to the diesel engine.

- ▶ Check the engine oil pressure.

---

The engine oil pressure must be 72.52 psi when the engine is cold and idling.

The engine oil pressure must be between 43.51 psi and 58.01 psi when the engine is warm and idling.



- ▶ Check the engine oil pressure on the *Engine monitoring* screen page.

If the engine oil pressure does not lie within the permitted range:

- ▶ Contact Liebherr after sales service.

## 9.4 Fuel system



### WARNING

Naked flame!  
Risk of fire and explosion.

- ▶ Do not use naked flames or lights when carrying out maintenance and inspection work on the fuel system.
- ▶ Maintenance and inspection work must only be carried out when the diesel engine is switched off.

### 9.4.1 Checking the fuel pre-filter drain valve

Ensure that the following conditions are satisfied:

- The machine is level.
- The machine is secured to prevent unauthorised operation.

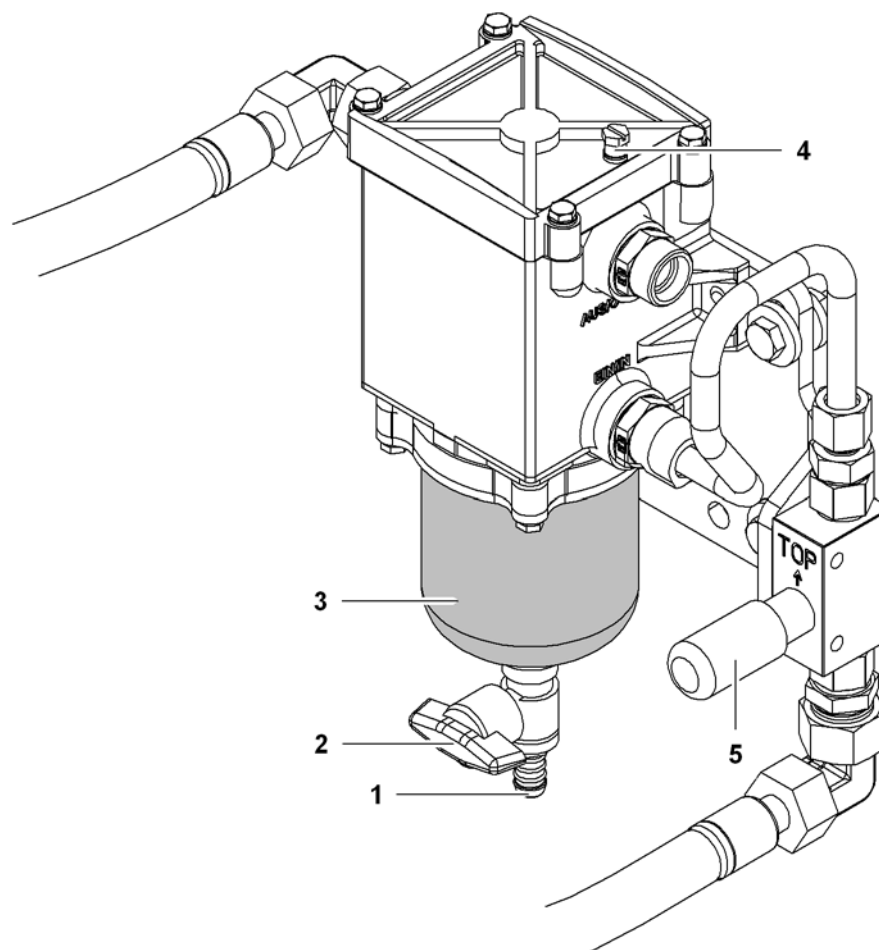


Fig. 3408 Fuel pre-filter drain valve

- |   |             |   |            |
|---|-------------|---|------------|
| 1 | drain hole  | 4 | Vent screw |
| 2 | drain valve | 5 | Hand pump  |
| 3 | Sight glass |   |            |



- ▶ Check the fuel pre-filter drain valve.

If more than just pure fuel can be seen in the sight glass 3:

- ▶ Drain off the condensate/fuel mixture (For more information see: 9.4.2 Draining off the condensate/fuel mixture, page 951).

## 9.4.2 Draining off the condensate/fuel mixture

Ensure that the following conditions are satisfied:

- A suitable collecting container for the condensate/fuel mixture is available.
- The machine is level.
- The machine is secured to prevent unauthorised operation.

### NOTICE

Condensate/fuel mixture falls on the ground!  
Risk of contamination to soil and groundwater.

- ▶ Drain and store the condensate/fuel mixture in a collecting container.
- ▶ Note the maximum filling capacity of the collecting container.
- ▶ Dispose of the condensate/fuel mixture properly.

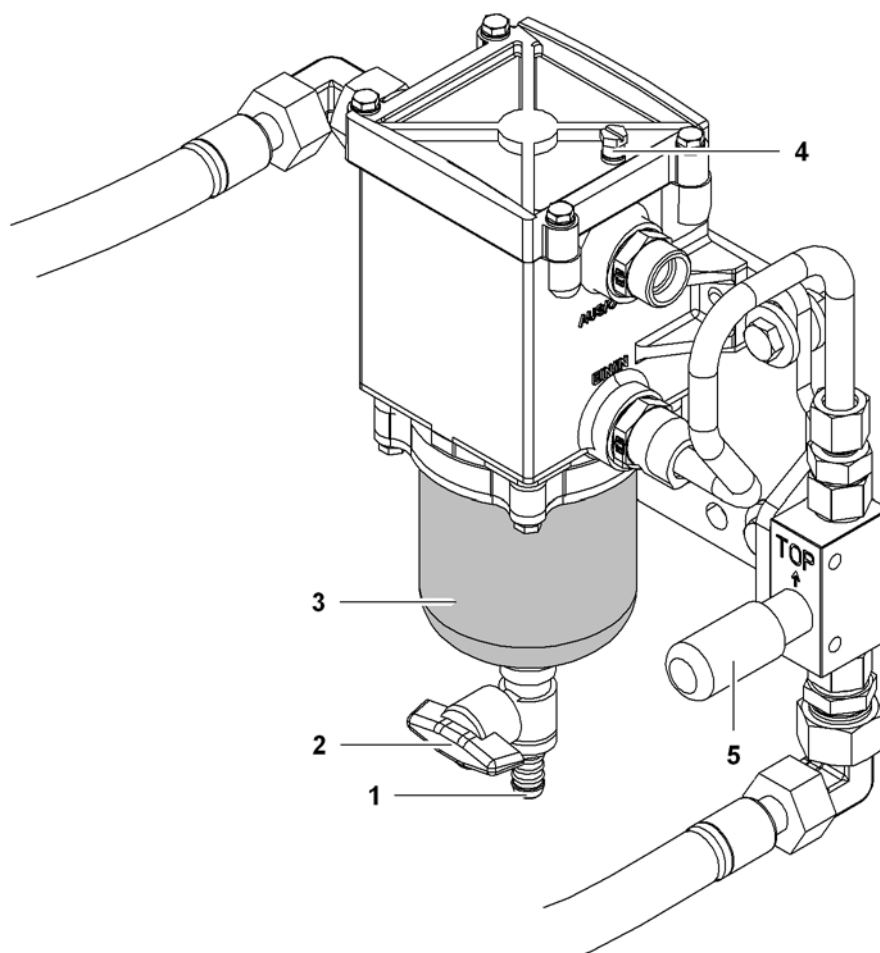


Fig. 3409 Fuel pre-filter drain valve

- |   |             |   |            |
|---|-------------|---|------------|
| 1 | drain hole  | 4 | Vent screw |
| 2 | drain valve | 5 | Hand pump  |
| 3 | Sight glass |   |            |

- ▶ Place the collecting container under the drain hole 1.



### Note

- ▶ To make draining the condensate/fuel mixture into the collecting container easier: use a drain hose.



### WARNING

Condensate/fuel mixture is toxic!  
Risk of injuries to skin, blindness.

- ▶ Protect the body from direct contact with condensate/diesel mixture.
- ▶ Wear protective equipment.

- ▶ To open the drain valve 2: turn the drain valve 2 counter-clockwise.
  - ▷ The condensate/fuel mixture drains off.

If pure fuel drains off:

- ▶ Close the drain valve 2: turn the drain valve 2 clockwise as far as it will go.

## 9.4.3 Bleeding the fuel system

Bleeding of the fuel pre-filter and low pressure fuel system is required after:

- running out of fuel
- the diesel engine is first commissioned
- replacing a filter

### NOTICE

Inadequate maintenance and inspection work!  
is liable to cause irreparable damage to the diesel engine.

- ▶ Ensure that work on components of the common rail system is carried out by authorised personnel only.



### CAUTION

Hot engine parts and oil!  
Risk of burns.

- ▶ Maintenance and inspection work must only be carried out when the diesel engine is switched off and has cooled down.
- ▶ Wear protective equipment.
- ▶ Fill the diesel tank.

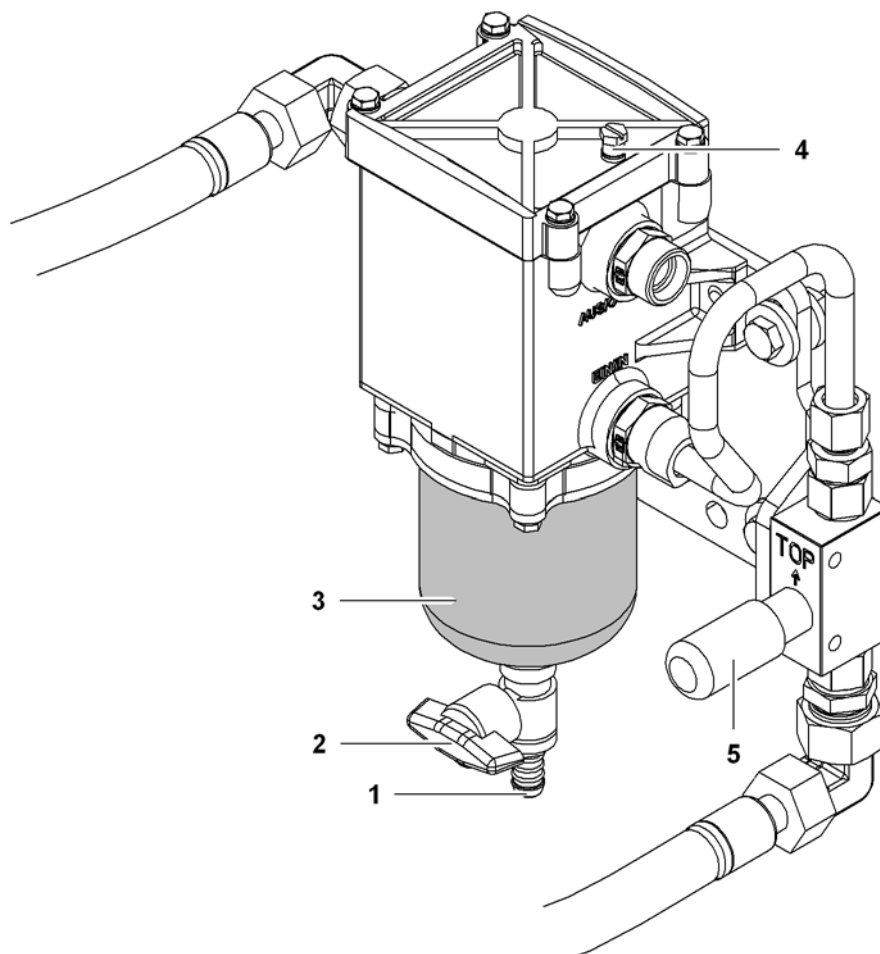


Fig. 3410 Fuel pre-filter drain valve

- |   |             |   |            |
|---|-------------|---|------------|
| 1 | drain hole  | 4 | Vent screw |
| 2 | drain valve | 5 | Hand pump  |
| 3 | Sight glass |   |            |

► Undo the venting screw 4.



#### Note

► Do not completely undo the venting screw 4.

- Repeatedly operate the handpump 5.  
 ▷ Fuel is drawn out of the diesel tank.

When the fuel comes out of the venting screw 4 silently and without bubbles:

► Tighten the venting screw 4.

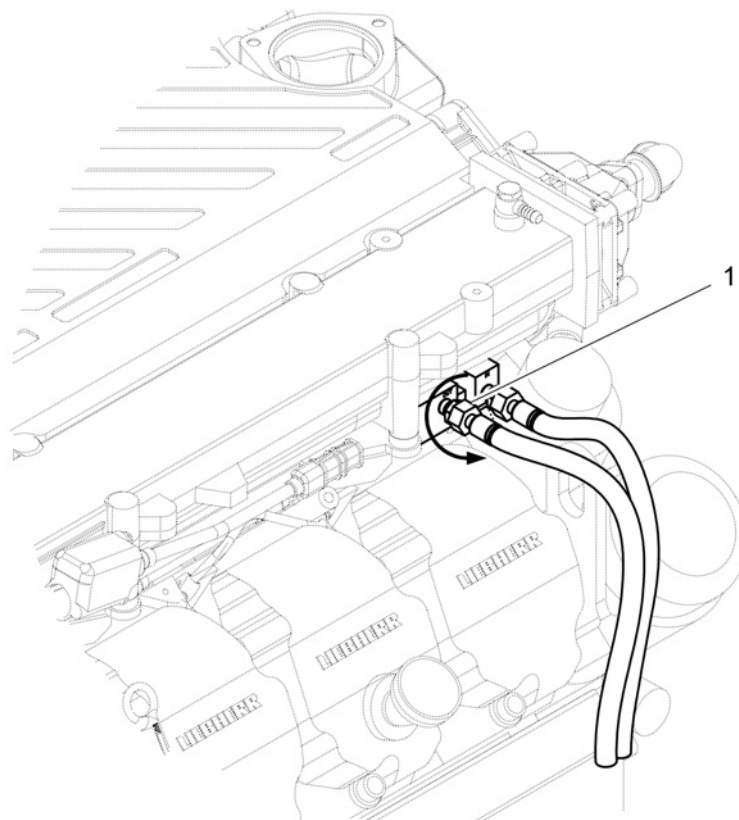


Fig. 3411 Bleeding the fuel system

1 Lock nut

- ▶ Loosen the lock nut 1 by a few thread turns.
- ▶ Repeatedly operate the handpump 5.

When the fuel comes out of the lock nut 1 silently and without bubbles:

- ▶ Tighten the lock nut 1.



---

### WARNING

Fuel coming out of the system!  
Risk of fire.

- ▶ Wipe up any escaped fuel.
- 

- ▶ Start the diesel engine.

If the diesel engine does not start:

- ▶ Repeat the venting process.

If the diesel engine still does not start following several venting processes:

- ▶ Contact Liebherr after sales service.

---

## 9.5 Air filter system

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### NOTICE

Unpermitted operation without main filter or safety element!  
Damage to the diesel engine.

- ▶ The diesel engine must only be used when the Liebherr main filter and safety element are installed.
- 

### 9.5.1 Checking the negative pressure indicator

Ensure that the following conditions are satisfied:

- Negative pressure sensor fits tightly on the air filter.
- Negative pressure sensor on the air filter is connected properly.
- ▶ Check that the negative pressure indicator is working correctly: select the error pages on the monitor.

If the "Dirty air filter" error message appears on the error pages:

- ▶ Change the filter element ([For more information see: 9.5.2 Changing the filter elements, page 955](#)).

### 9.5.2 Changing the filter elements

---

### NOTICE

Cleaning of filter elements not permitted!  
is liable to cause irreparable damage to the diesel engine.

- ▶ Do not clean the filter element or safety element.
- 



---

### WARNING

Fine dust!  
Risk of damage to lungs.

- ▶ To protect the respiratory tract: wear a fine dust mask when changing the main filter element.
-

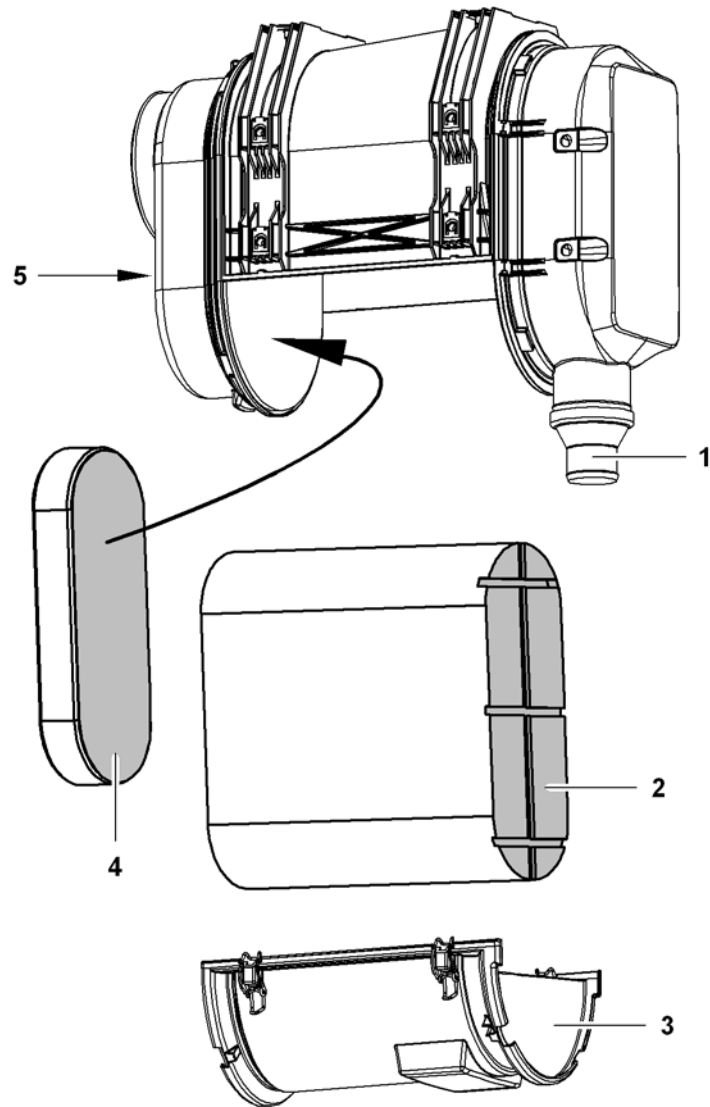


Fig. 3412 Changing the filter elements

- |   |                     |   |                          |
|---|---------------------|---|--------------------------|
| 1 | Dust ejector        | 4 | Safety element           |
| 2 | Main filter element | 5 | Negative pressure sensor |
| 3 | Housing cover       |   |                          |

- ▶ Open the housing cover **3** with the four clips on the sides and remove it from the filter housing.



**Note**

Environmental pollution!

- ▶ Dispose of the filter elements in accordance with national and international guidelines and regulations.

- ▶ Remove the main filter element **2** and safety element **4**.

If there are dents on the filter elements housing or tears on the paper below, or the seal is defective:

- ▶ Replace the main filter element **2** and safety element **4** with new filter elements.
- ▶ Place the housing cover **3** onto the filter housing and close using the four clips on the sides.

## 9.6 Particle filter

### 9.6.1 Checking the condensate trap

Ensure that the following conditions are satisfied:

- The machine is level.
- The machine is secured to prevent unauthorised operation.

The exhaust gas counter pressure is measured by a pressure pipe which is connected to the particle filter housing. This pipe has an integrated condensate trap.

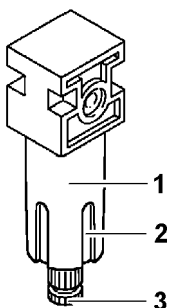


Fig. 3413 Checking the condensate trap

- |   |                 |   |            |
|---|-----------------|---|------------|
| 1 | Condensate trap | 3 | Drain plug |
| 2 | Sight glass     |   |            |

► Check 1 condensate trap.

If condensate can be seen in the sight glass 2:

- Drain off condensate ([For more information see: 9.6.2 Draining off condensate, page 958](#)).

## 9.6.2 Draining off condensate

Ensure that the following conditions are satisfied:

- A suitable collecting container for the condensate is available.
- The machine is level.
- The machine is secured to prevent unauthorised operation.

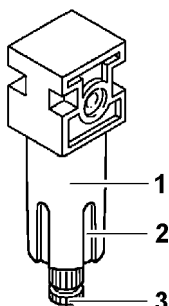


Fig. 3414 Draining off condensate

- |   |                 |   |            |
|---|-----------------|---|------------|
| 1 | Condensate trap | 3 | Drain plug |
| 2 | Sight glass     |   |            |

- ▶ Turn the drain screw **3** counterclockwise through 90° and drain the condensate into a suitable container.
- ▶ Tighten the drain screw **3** (turn clockwise).

## 9.6.3 Checking cables, hoses and screw connections

- ▶ Check cables, hoses and screw connections for damage.

If the cables, hoses or screw connections are damaged:

- ▶ Change cables, hoses or screw connections.



## 9.7 Cooling system

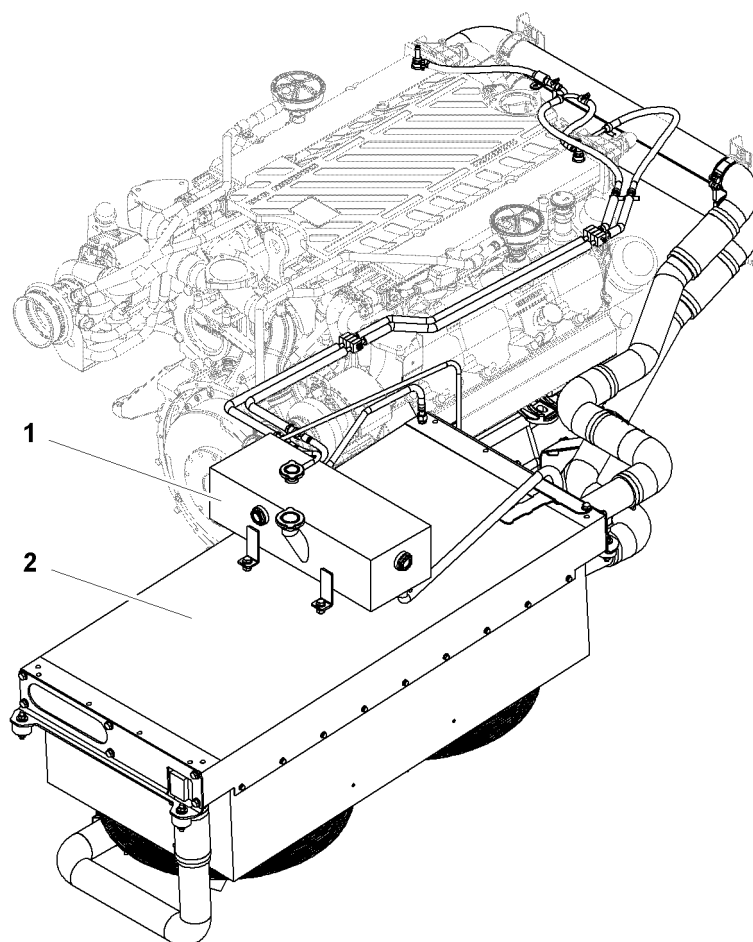


Fig. 3415 Cooling system

- 1 Cooling water compensation tank    2 Combined charge air - water cooler

### 9.7.1 Checking the coolant level

Ensure that the following conditions are satisfied:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.



#### CAUTION

Hot parts of the cooler and hot cooling liquid!  
Risk of burns.

- ▶ Maintenance and inspection work must only be carried out when the cooling system is switched off and the diesel engine has cooled down.
- ▶ Wear protective equipment.

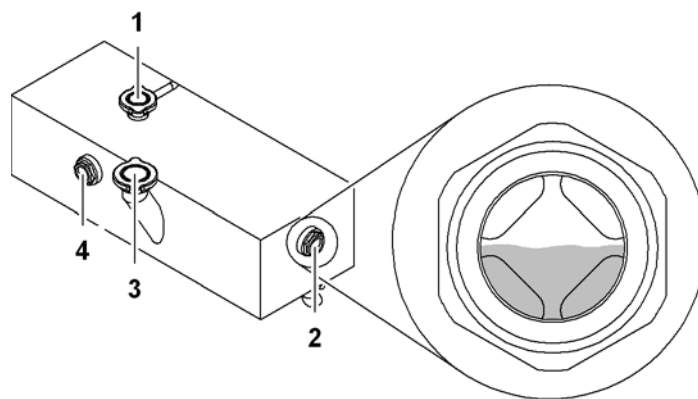


Fig. 3416 Cooling water compensation tank

- |   |             |   |             |
|---|-------------|---|-------------|
| 1 | Air vent    | 3 | Filler neck |
| 2 | Sight glass | 4 | Sight glass |

- ▶ Check the coolant level in the sight glass 2.

If no coolant is visible in the sight glass:

- ▶ Top up with suitable coolant ([For more information see: 9.7.2 Filling with coolant, page 960](#)).

## 9.7.2 Filling with coolant



### Note

- ▶ To change all the cooling liquid, please consult Liebherr after sales service.

Ensure that the following conditions are satisfied:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.



### CAUTION

Hot parts of the cooler and hot cooling liquid!  
Risk of burns.

- ▶ Maintenance and inspection work must only be carried out when the cooling system is switched off and the diesel engine has cooled down.
- ▶ Wear protective equipment.

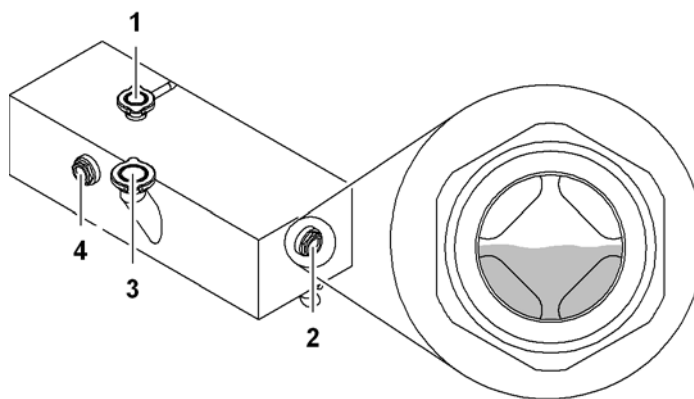


Fig. 3417 Cooling water compensation tank

- |   |             |   |             |
|---|-------------|---|-------------|
| 1 | Air vent    | 3 | Filler neck |
| 2 | Sight glass | 4 | Sight glass |

- ▶ Open the filler neck **3** cover: turn the cover counter-clockwise as far as it will go.
  - ▷ The positive or negative pressure equalises.
- ▶ Press the cover down and again turn counter-clockwise.

---

#### NOTICE

Unsuitable coolant!  
Damage to the cooling system.

- ▶ Top up with suitable coolant only ([For more information see: 9.2.6 Diesel engine coolant, page 940](#)) .
- 
- ▶ Fill with coolant
  - ▶ Set the cover down evenly in the recesses.
  - ▶ Close the cover: turn the cover clockwise as far as it will go.

## 9.8 Distributor gearbox

### 9.8.1 Checking the gearbox oil level

Ensure that the following conditions are satisfied:

- 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 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.

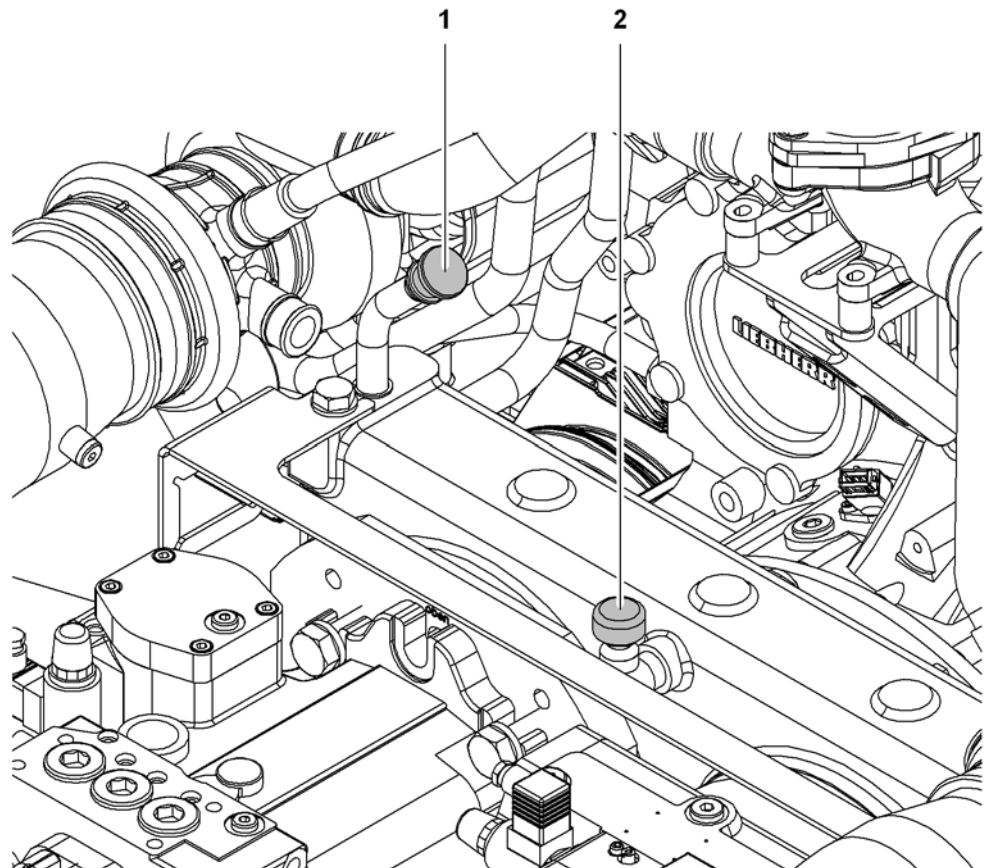


Fig. 3418 Distributor gearbox

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: 9.8.2 Topping up the gearbox oil, page 963](#)).

If the gearbox oil level is above the MAX mark:

- ▶ Drain the gearbox oil.

## 9.8.2 Topping up the gearbox oil

Ensure that the following conditions are satisfied:

- 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 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.

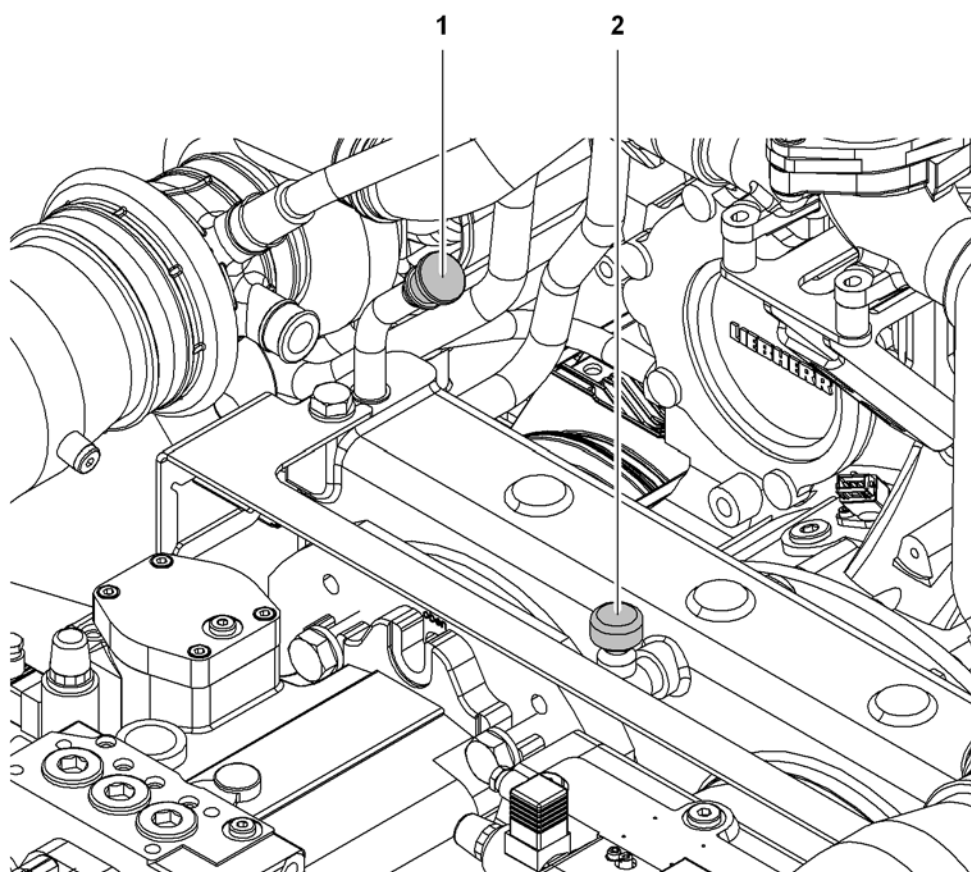


Fig. 3419 Distributor gearbox

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.
- 

- ▶ 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 934](#)).

- ▶ 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.

## 9.8.3 Checking the venting valve

- ▶ Check the venting valve.

If the venting valve is faulty in any way:

- ▶ Contact Liebherr after sales service.

## 9.9 Swing

### 9.9.1 Checking the gearbox oil level

Ensure that the following conditions are satisfied:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.

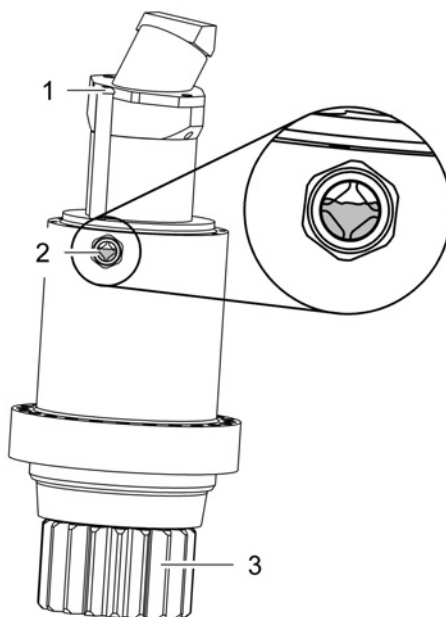


Fig. 3420 Swing gear

- |   |             |   |        |
|---|-------------|---|--------|
| 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 the appropriate gearbox oil according to the lubrication chart ([For more information see: 9.9.2 Topping up the gearbox oil, page 965](#)).

### 9.9.2 Topping up the gearbox oil

Ensure that the following conditions are satisfied:

- 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 934](#)).
  - ▶ 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.



## 9.10 Swing connection

### 9.10.1 Lubricating external teeth

Ensure that the following conditions are satisfied:

- The grease gun from the Liebherr tool kit is present and filled with grease (For more information see: [9.2.3 Lubrication chart, page 934](#)).
- The machine is secured to prevent unauthorised operation.

If the swing external teeth are not lubricated by a central lubrication:

- ▶ Lubricate the 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 934](#)).

### 9.10.2 Lubricating the bearing races via the central lubrication point

Ensure that the following conditions are satisfied:

- The grease gun from the Liebherr tool kit is present and filled with grease (For more information see: [9.2.3 Lubrication chart, page 934](#)).
- 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.

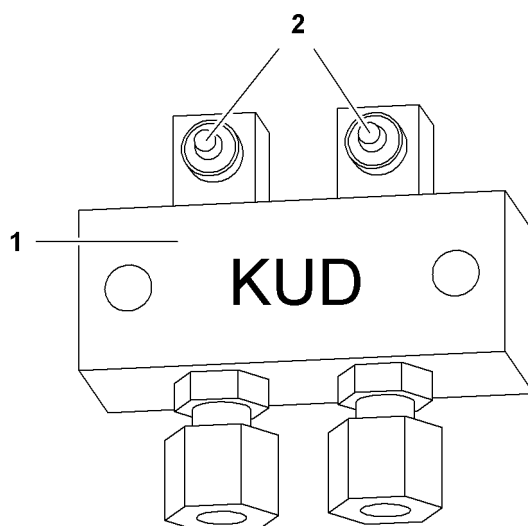


Fig. 3421 Central lubrication point

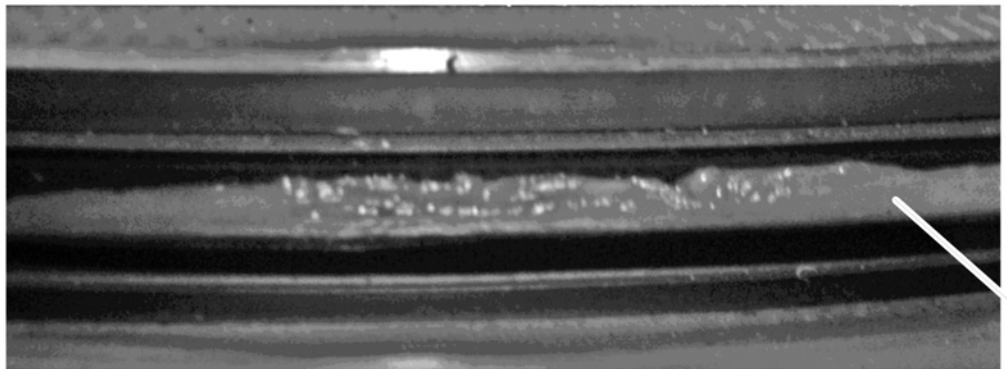
1 Central lubrication point

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. 3422 Grease collar*

- ▶ Press in grease until a grease collar **1** can be seen up to the whole seal lip of the swing connection (circumference).



## 9.11.2 Topping up the gearbox oil

Ensure that the following conditions are satisfied:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.



---

### CAUTION

Hot winch components and hot gearbox oil!  
Burns and open wounds.

- ▶ Maintenance and inspection work on the winches may only be carried out 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 contaminated gearbox oil!  
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 934](#)).
- ▶ 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.

### 9.11.3 Lubricating the counter bearing

Ensure that the following conditions are satisfied:

- The grease gun from the Liebherr tool kit is present and filled with grease (For more information see: [9.2.3 Lubrication chart, page 934](#)).
- The machine is level.
- The machine is secured to prevent unauthorised operation.

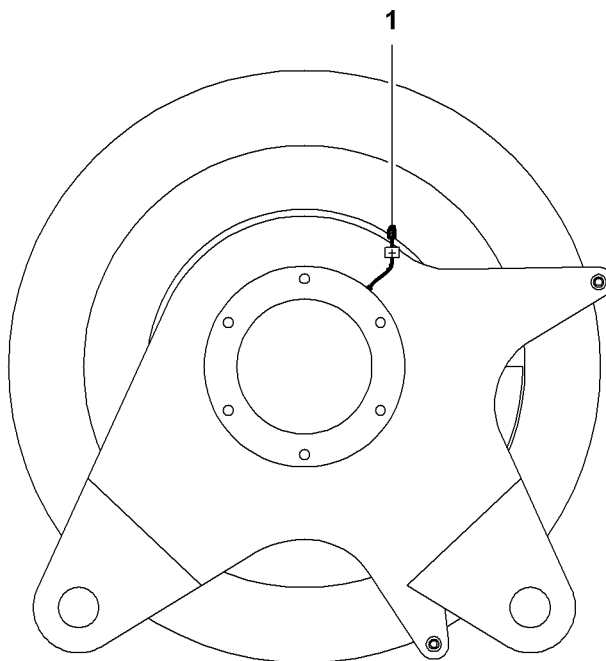


Fig. 3424 Lubricating the counter bearing

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.

### 9.11.4 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.

## 9.12 Boom luffing winches

### 9.12.1 Checking the gearbox oil level

Ensure that the following conditions are satisfied:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.



#### CAUTION

Hot winch components and hot gearbox oil!

Risk of burns.

- ▶ Maintenance and inspection work on the winches may only be carried out when the machine is switched off and has cooled down.
- ▶ Wear protective equipment.

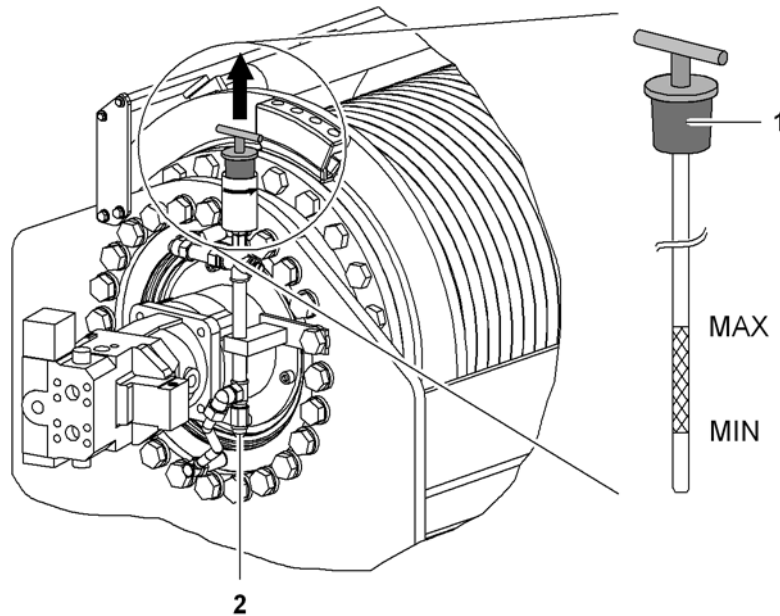


Fig. 3425 boom luffing winch

1 Oil dipstick

2 Oil drain screw

- ▶ 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 973](#)).

If the gearbox oil level is above the MAX mark:

- ▶ Drain the gearbox oil using the oil drain screw **2**.

## 9.12.2 Topping up the gearbox oil

Ensure that the following conditions are satisfied:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.



---

### CAUTION

Hot winch components and hot gearbox oil!  
Risk of burns.

- ▶ Maintenance and inspection work on the winches may only be carried out 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 934](#)).
- ▶ 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 counter bearing

Ensure that the following conditions are satisfied:

- The grease gun from the Liebherr tool kit is present and filled with grease (For more information see: [9.2.3 Lubrication chart, page 934](#)).
- The machine is level.
- The machine is secured to prevent unauthorised operation.

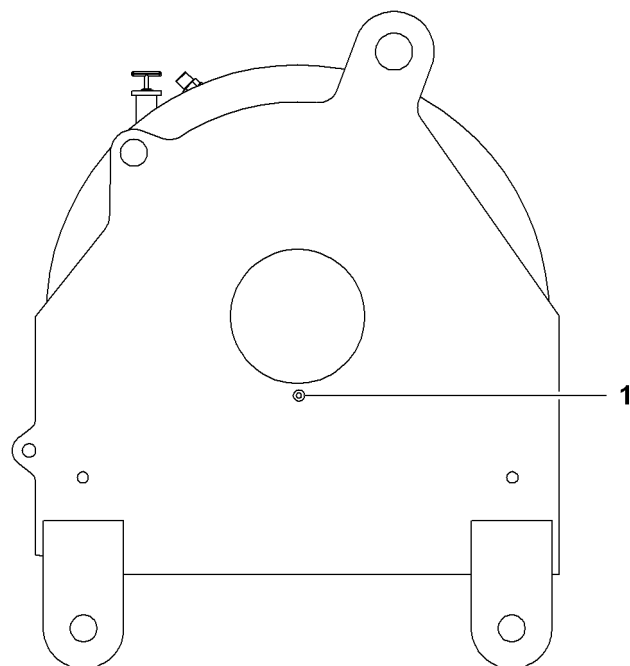


Fig. 3426 Lubricating the counter bearing

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.

### 9.12.4 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.



## 9.13 Rope reeving winch

### 9.13.1 Lubricating the counter bearing

Ensure that the following conditions are satisfied:

- The grease gun from the Liebherr tool kit is present and filled with grease (For more information see: [9.2.3 Lubrication chart, page 934](#)).
- Rope reeving winch is level.
- The machine is secured to prevent unauthorised operation.

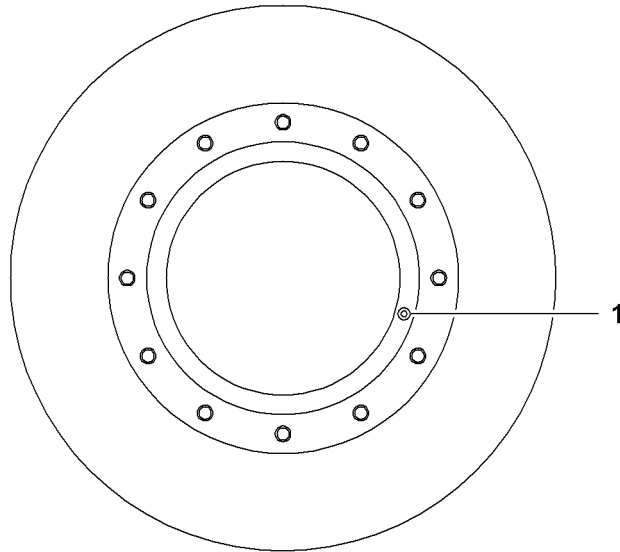


Fig. 3427 Lubricating the counter bearing

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.

### 9.13.2 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.

## 9.14 Tagline winch

### 9.14.1 Checking the gearbox oil level

Ensure that the following conditions are satisfied:

- 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.

- ▶ Maintenance and inspection work on the winches may only be carried out when the machine is switched off and has cooled down.
- ▶ Wear protective equipment.

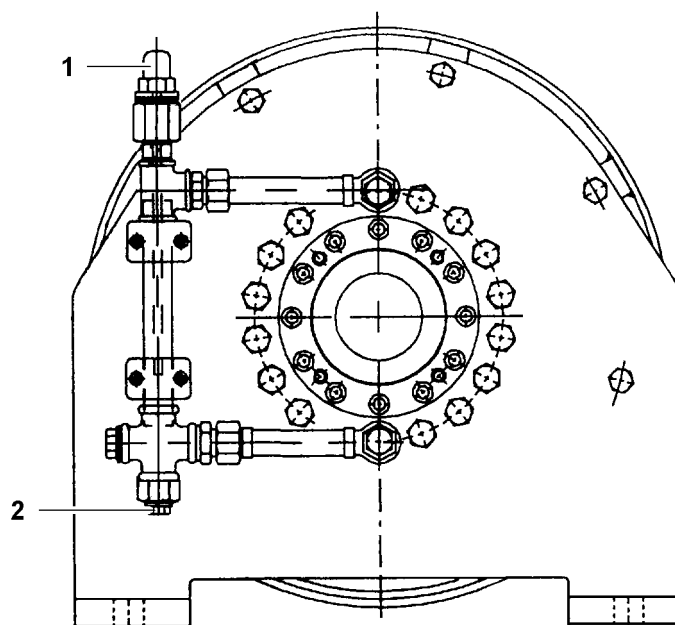


Fig. 3428 Tagline winch

- 1 Oil dipstick                      2 Oil drain screw

- ▶ 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: 9.14.2 Topping up the gearbox oil, page 977](#)).

If the gearbox oil level is above the MAX mark:

- ▶ Drain the gearbox oil using the oil drain screw 2.

## 9.14.2 Topping up the gearbox oil

Ensure that the following conditions are satisfied:

- 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.

- ▶ Maintenance and inspection work on the winches may only be carried out 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 934](#)).

- ▶ 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.

## 9.14.3 Check fixed-caliper disc brake for damage



### WARNING

Unauthorised increase of the preset brake force of the fixed-caliper disc brake!

- ▶ After every maintenance or repair activity, check the brake force of 340 lb<sub>f</sub> on the fixed-caliper disc brake and adjust if necessary.

- ▶ Check brake shoes and brake disc for damage.

If the brake shoes or the brake disc are damaged:

- ▶ Contact Liebherr after sales service.



## 9.15 Crawlers

### 9.15.1 Checking the gearbox oil level

Ensure that the following conditions are satisfied:

- Inspection lamp is available.
- Allen key from the Liebherr tool kit is available.
- Torque wrench 89 ft-lb is available.
- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.
- The Liebherr lettering on the crawler drives is horizontally readable from left to right.



#### CAUTION

Hot gearbox components and hot gearbox oil!  
Risk of burns.

- ▶ Maintenance and inspection work on the crawlers must only be carried out when the machine is switched off and has cooled down.
- ▶ Wear protective equipment.

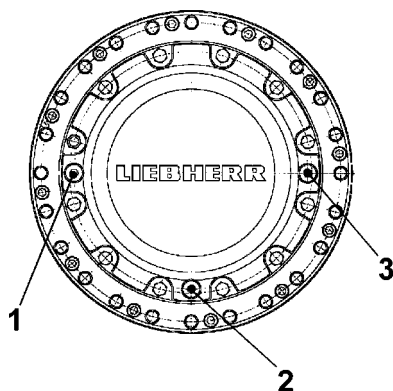


Fig. 3430 Crawler drive

- |   |                                    |   |                                 |
|---|------------------------------------|---|---------------------------------|
| 1 | Dummy socket (internal hexagon)    | 3 | Dummy socket (internal hexagon) |
| 2 | Oil 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 the dummy socket with a torque of 89 ft-lb.

### 9.15.2 Check gearbox and hydraulic connections for leaks

- ▶ Check gearbox and hydraulic connections for leaks.

- If the gearbox or the hydraulic connections are leaking:
- ▶ Do not use the crawlers.
  - ▶ Contact Liebherr after sales service.

### 9.15.3 Cleaning the crawlers

**NOTICE**

Dirt in the crawlers!

Wear due to increased chain tension.

- ▶ Ensure the crawlers are kept clean.
- ▶ Only use authorised cleaning agents.

- ▶ Clean the crawlers using a high-pressure cleaner.

### 9.15.4 Checking that the crossbeam set screws on the crawler side frames are secure on telescopic undercarriages

- ▶ Check that the crossbeam set screws on the crawler side frames are secure.

If the crossbeam set screws on the crawler side frames are loose:

- ▶ Tighten the crossbeam set screws on the crawler side frames (on the LR1100 always tighten them until there is absolutely no play).

### 9.15.5 Checking the chain tension

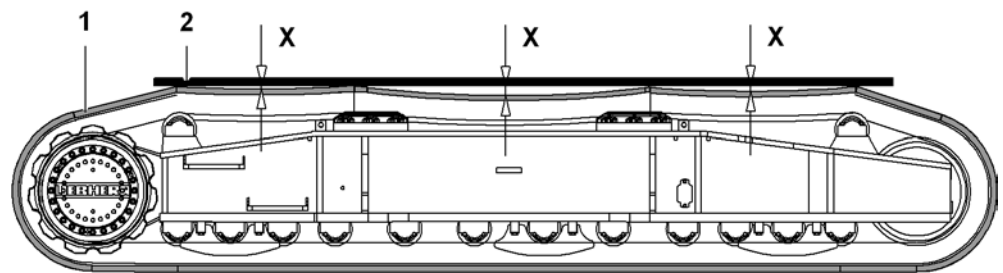


Fig. 3431 Checking the chain tension

- |         |                 |
|---------|-----------------|
| 1 Chain | 2 Measuring rod |
|---------|-----------------|

- ▶ Move the machine 9' 10" ft-in forwards.
- ▶ To compensate for chain play: move the machine back again.
- ▶ Place the measuring rod 2 on the crawler side frame.

The distance X between the chain 1 and the measuring rod 2 must be no more than 1.57" in.

- ▶ Measure the distance X between the chain 1 and the measuring rod 2.

If the distance X does not lie within the permitted range:

- ▶ Retension the chain ([For more information see: 9.15.6 Retensioning the chain, page 982](#)) .

## 9.15.6 Retensioning the chain



### CAUTION

Unauthorised repairs to nitrogen or elastomer cylinders!

- ▶ Ensure that repairs to the nitrogen or elastomer cylinders are carried out by authorised service personnel only.

Type of machine	Grease tensioner/ spring	Grease tensioner/ nitrogen cylinder	Grease tensioner/ elastomer cylinder	Hydraulic tensioner
HS 825	x			
HS 835	x			
HS 845	x			
HS 855		x		
HS 875			x	
HS 885			x	
HS 895		x		
LR 1100		x		
LR 1130			x	
LR 1160			x	
LR 1200				x
LR 1280				x
LR 1300				x
LB 16	x			
LB 20	x			
LB 24	x			
LB 28	x			
LB 36		x		
LRB 125	x			
LRB 155	x			
LRB 255	x			

Tab. 367 Overview of the crawler tensioning systems

Chains on devices with hydraulic tensioners are automatically tensioned by the crawler control.

Ensure that the following conditions are satisfied:

- The machine is level.
- The machine is secured to prevent unauthorised operation.
- The grease gun from the Liebherr tool kit is present and filled with grease (For more information see: [9.2.3 Lubrication chart, page 934](#)).



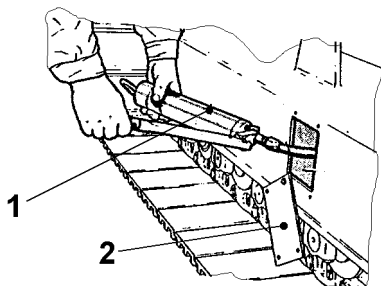
**NOTICE**

Incorrect chain tension!

Increased wear due to excessive chain tension.

Unwinding of the crawler chain due to insufficient chain tension.

- ▶ Retension the chain according to specifications.



*Fig. 3432 Retensioning the chain*

**1** grease gun

**2** Cover

- ▶ Open the cover **2** on the crawler side frame.
- ▶ Connect the grease gun **1** to the grease nipple on the idler tensioning cylinder.
- ▶ Press grease into the nipple until the pressure gauge displays a reading of 2,320.59 psi to 2,610.67 psi.
- ▶ Check the chain tension again.

### 9.15.7 Tightening the grouser screws

Type of machine	Screw	Strength grade	Torque method	Turn-angle method/ tensioning force
HS 825	M20 x 1.5	12,9	590 <sup>±30</sup> ft-lb	266 <sup>±15</sup> ft-lb
HS 835	3/4 x 16 UNF	12,9	498 <sup>±26</sup> ft-lb	251 <sup>±11</sup> ft-lb
HS 845	3/4 x 16 UNF	12,9	498 <sup>±26</sup> ft-lb	251 <sup>±11</sup> ft-lb
HS 855	7/8 x 14 UNF	12,9	797 <sup>±41</sup> ft-lb	273 <sup>±15</sup> ft-lb
HS 875	1 x 14 UNS	12,9	1,217 <sup>±59</sup> ft-lb	413 <sup>±22</sup> ft-lb
HS 885	1 1/8 x 12 UNF	12,9	1,770 <sup>±89</sup> ft-lb	597 <sup>±30</sup> ft-lb
HS 895	M30 x 2	12,9	2,117 <sup>±103</sup> ft-lb	701 <sup>±37</sup> ft-lb
LR 1100	7/8 x 14 UNF	12,9	797 <sup>±41</sup> ft-lb	273 <sup>±15</sup> ft-lb
LR 1130	1 1/8 x 12 UNF	12,9	1,770 <sup>±89</sup> ft-lb	597 <sup>±30</sup> ft-lb
LR 1160	1 1/8 x 12 UNF	12,9	1,770 <sup>±89</sup> ft-lb	597 <sup>±30</sup> ft-lb
LR 1200	-	-	-	-
LR 1280	-	-	-	-
LR 1300	-	-	-	-
LB 16	M20 x 1.5	12,9	590 <sup>±30</sup> ft-lb	266 <sup>±15</sup> ft-lb
LB 20	M20 x 1.5	12,9	590 <sup>±30</sup> ft-lb	266 <sup>±15</sup> ft-lb
LB 24	3/4 x 16 UNF	12,9	498 <sup>±26</sup> ft-lb	251 <sup>±11</sup> ft-lb
LB 28	7/8 x 14 UNF	12,9	797 <sup>±41</sup> ft-lb	273 <sup>±15</sup> ft-lb
LB 36	7/7 x 14 UNF	12,9	797 <sup>±41</sup> ft-lb	273 <sup>±15</sup> ft-lb
LRB 125	M20 x 1.5	12,9	590 <sup>±30</sup> ft-lb	266 <sup>±15</sup> ft-lb
LRB 155	3/4 x 16 UNF	12,9	498 <sup>±26</sup> ft-lb	251 <sup>±11</sup> ft-lb
LRB 255	7/8 x 14 UNF	12,9	797 <sup>±41</sup> ft-lb	273 <sup>±15</sup> ft-lb

Tab. 368 Overview of tightening torques for the ground plate screws

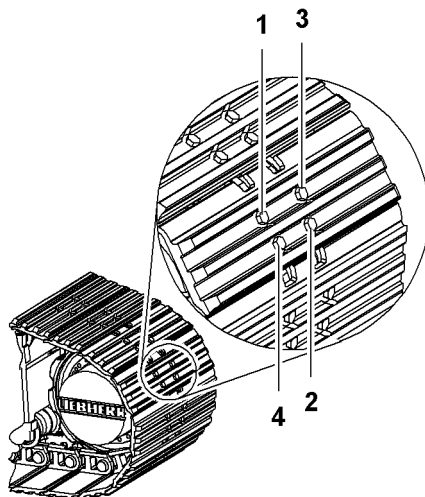


Fig. 3433 Tightening the grouser screws



#### Note

- ▶ Lightly oil the thread and contact surfaces.

#### Tightening screws with the torque method

- ▶ Tighten the screws to the prescribed tightening torque in the following order: 1, 2, 3, 4 (see: [tab. 368, page 984](#)).

#### Tightening screws with the turn-angle method

- ▶ Tighten the screws to the prescribed tensioning force in the following order: 1, 2, 3, 4 (see: [tab. 368, page 984](#)).
- ▶ To achieve the maximum level of tension: continue turning the screws through 120°.

## 9.16 Lifting device

### 9.16.1 Check transport lashing and round slings for wear (according to EN 1492-2).



**DANGER**

Incorrectly attached rigging!  
Load breakaway.

- ▶ When in crane operation, 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.

### 9.16.2 Check the round steel chains for wear and damage



**DANGER**

Incorrectly attached rigging!  
Load breakaway.

- ▶ When in crane operation, check that the round steel chains have 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.

## 9.17 Hook/pulley block

### 9.17.1 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.

### 9.17.2 Hooks (without rollers): lubricate the swivel

Ensure that the grease gun from the Liebherr tool kit is available and filled with sufficient grease (For more information see: [9.2.3 Lubrication chart, page 934](#))

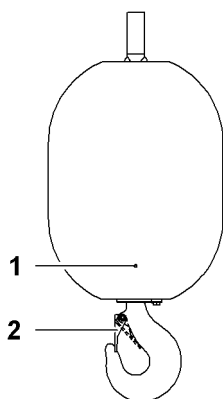


Fig. 3434 Hook

1 Grease nipple

2 Safety catch

- ▶ Using the grease gun, press 0.02 lb of grease onto the grease nipple 1.
  - ▷ Optimal lubrication: During the lubrication process an even blob of fat is formed around the bearing.

### 9.17.3 Pulley blocks (with rollers): lubricate the bearings and axles

Ensure that the grease gun from the Liebherr tool kit is available and filled with sufficient grease (For more information see: 9.2.3 Lubrication chart, page 934)

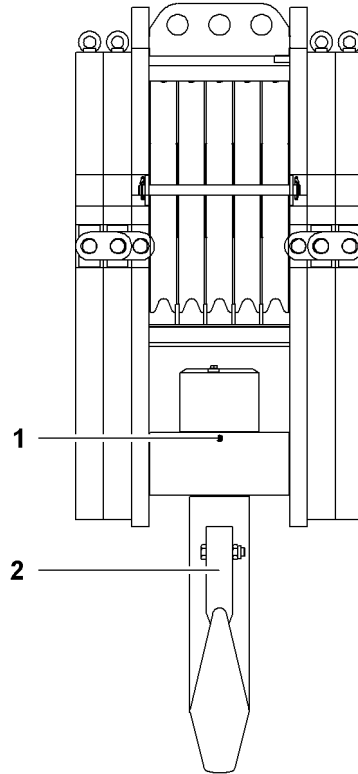


Fig. 3435 Pulley block

1 Grease nipple

2 Safety catch

- ▶ Using the grease gun, press 0.02 lb of grease onto the grease nipple 1.
  - ▷ Optimal lubrication: During the lubrication process an even blob of fat is formed around the bearing.

### 9.17.4 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.

## 9.18 Hydraulic system

### 9.18.1 Check the hydraulic system for leaks

Ensure that the following conditions are satisfied:

- The machine is level.
- The machine is secured to prevent unauthorised operation.



---

**CAUTION**

Hot hydraulic oil!  
Risk of burns.

- ▶ The diesel engine must be switched off before carrying out any maintenance or inspection work on the hydraulic system.
  - ▶ 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.

## 9.19 Hydraulic oil tank

### 9.19.1 Checking the level in the hydraulic oil tank using the sight glasses

Ensure that the following conditions are satisfied:

- Diesel engine has been switched off for five minutes.
- The machine is level.
- The machine is secured to prevent unauthorised operation.
- All hydraulic cylinders have been retracted (apart from the tilting-back support cylinder).

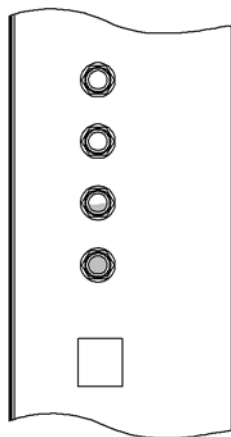


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#### CAUTION

Hot hydraulic oil!  
Risk of burns.

- ▶ Do not carry out any maintenance and inspection work on the hydraulic system until the diesel engine has been switched off and has cooled down.
  - ▶ Wear protective equipment.
- 



*Fig. 3436 Sight glasses on the hydraulic oil tank*

The number of sight glasses may vary.

- ▶ Check the hydraulic oil level in the sight glasses.

If no hydraulic oil is visible in the lowest sight glass:

- ▶ Top up using the appropriate hydraulic oil according to the lubrication chart ([For more information see: 9.2.3 Lubrication chart, page 934](#)).

### 9.19.2 Carrying out a hydraulic oil analysis

([For more information see: 9.2.9 Liebherr oil diagnosis system, page 944](#))



### 9.19.3 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 satisfied:

- Torque wrench 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.

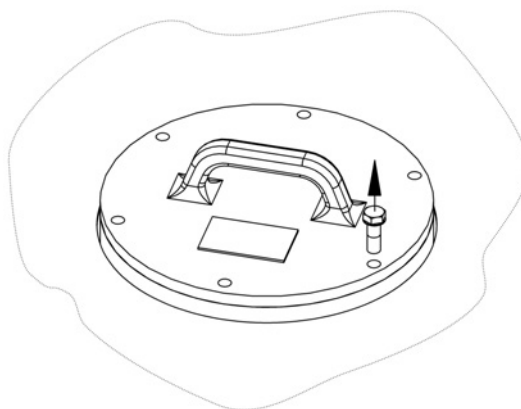


Fig. 3437 Opening the return filter

- ▶ Undo all cylinder 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 filter housing.

#### NOTICE

Hydraulic oil topped up incorrectly!

Damage to the hydraulic system.

- ▶ Only top up with hydraulic oil through the return filter.

---

**NOTICE**

Wrong hydraulic oil!  
Damage to the hydraulic system.

- ▶ Top up with suitable hydraulic oil only (For more information see: 9.2.3 Lubrication chart, page 934) .
- ▶ Do not add any additives or concentrates.

- 
- ▶ Fill with hydraulic oil.
  - ▶ Replace the filter housing cover and align it so that the screw holes match.

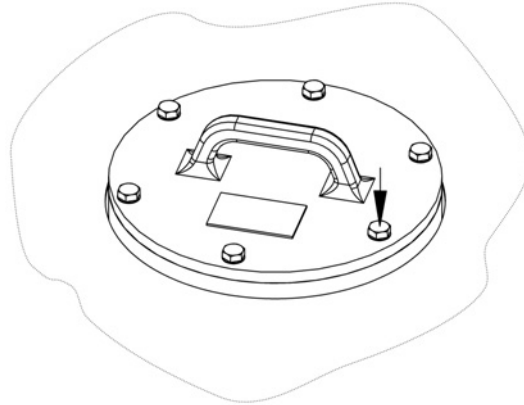


Fig. 3438 Closing the return filter

- ▶ Tighten the screws by hand.
- ▶ Torque the screws to 51 ft-lb.

### 9.19.4 Draining the hydraulic oil



---

**Note**

Environmental pollution!

- ▶ Fluids such as hydraulic oil, fuel and cooling liquid must be disposed of in accordance with national and international regulations and guidelines.

---

At the bottom of the hydraulic oil tank is an oil drain valve.

- ▶ Remove the cover from the oil drain valve.
- ▶ Connect the oil drain hose from the Liebherr tool kit to the oil drain valve.
- ▶ Drain the hydraulic oil.

## 9.19.5 Cleaning the magnetic rod in the return filter

Ensure that a torque wrench of 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.

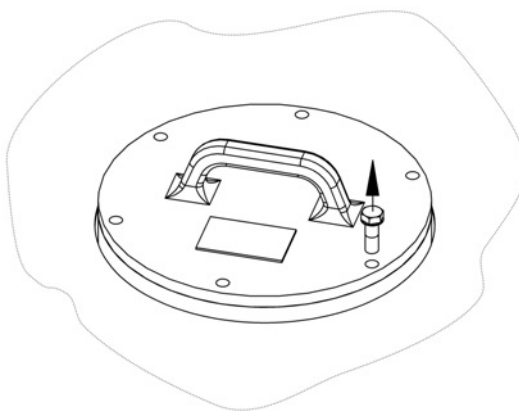


Fig. 3439 Opening the return filter

- ▶ Undo all cylinder 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 filter housing.

## Cleaning the magnetic rod

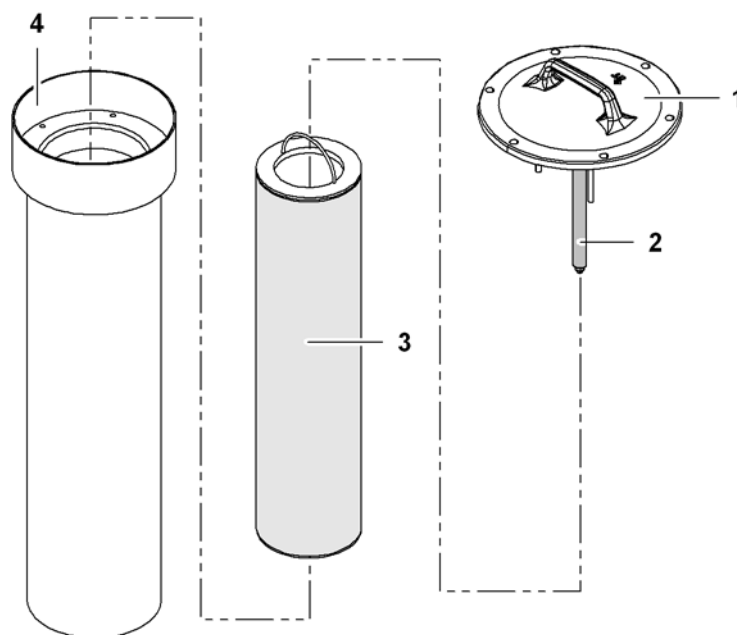


Fig. 3440 Cleaning the magnetic rod

- |   |               |   |                                   |
|---|---------------|---|-----------------------------------|
| 1 | Housing 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 filter housing cover and align it so that the screw holes match.

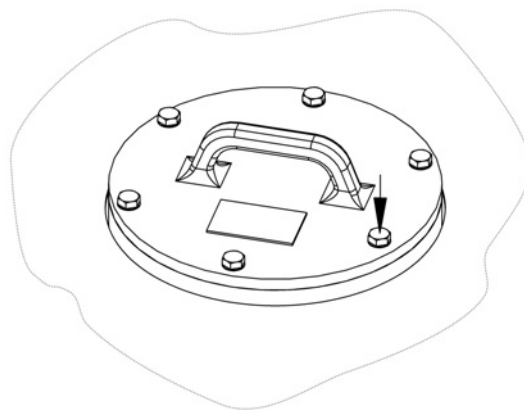


Fig. 3441 Closing the return filter

- ▶ Tighten the screws by hand.
- ▶ Torque the screws to 51 ft-lb.

## 9.20 Hydraulic filter

### 9.20.1 Changing the pressure filter

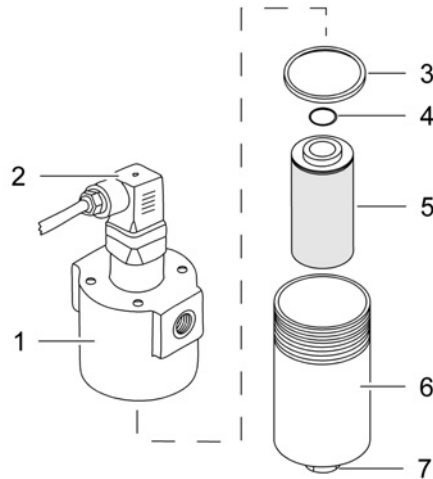


Fig. 3442 Filter overview

- |   |                       |   |                       |
|---|-----------------------|---|-----------------------|
| 1 | Upper housing section | 5 | Filter element        |
| 2 | Pressure sensor       | 6 | Lower housing section |
| 3 | Sealing ring          | 7 | Nut (welded)          |
| 4 | O-ring                |   |                       |

- ▶ Unscrew and remove the lower housing section **6** using the nut **7**.
- ▶ Carefully remove the used filter element **5** and dispose of the rest of the oil from the lower housing section **6**.
- ▶ Clean all parts thoroughly.
- ▶ Check the O-ring **4** and sealing ring **3** for damage.

If the O-ring or sealing ring is damaged:

- ▶ Replace the O-ring **4** or sealing ring **3**.
- ▶ Thoroughly clean inside the filter housing.
- ▶ Insert a new filter element.

Check to make sure the O-ring and sealing ring are clean and seated correctly.

- ▶ Reassemble the parts in the reverse order.
- ▶ Tighten the nut **7** of the lower housing section **6** as far as it will go.
- ▶ Start the diesel engine and allow it to idle for 5 minutes.
- ▶ Switch off the diesel engine and retighten the nut **7** of the lower housing section **6** as far as it will go.
- ▶ Start the diesel engine and leave it to idle.
- ▶ Check hydraulic system for leaks.

If there is a leak in the hydraulic system:

- ▶ Contact Liebherr after sales service.

## 9.21 Hydraulic cylinders

### 9.21.1 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.

### 9.21.2 Preserving the piston rods of all exposed cylinders

The piston rods on all cylinders are chromed. Despite this, dirty and aggressive materials can still damage the chrome coating. The chrome coating only offers a certain level of protection.

To prevent damage, ensure that the piston rods:

- are extended and retracted at least once a week.
- are examined and kept clean.
- ▶ Apply the protective agent CORTEC VCI 369 to the piston rods of all exposed cylinders.

## 9.22 Electrical system



### **WARNING**

Electric current!

When electrical parts or components are inspected or replaced:

- ▶ Switch off the battery main switch.

### 9.22.1 Checking cable ducts and cable connections for chafing

- ▶ Check the strain relief of the cable.
- ▶ Check the cable for breaks, cuts or exposed patches.

If the 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.

### 9.22.2 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 after sales service.



## 9.23 Batteries

### 9.23.1 Checking the fluid level in the cells

#### NOTICE

Battery contaminated and damp!  
Damage to the battery.

- ▶ Always keep batteries clean and dry.

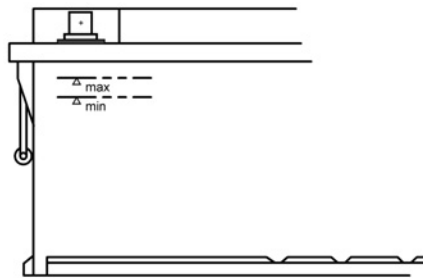


Fig. 3443 Checking the fluid level in the cells

- ▶ Check the fluid level in the cells.
- If the fluid level is below the MIN mark:
- ▶ Top up with distilled water.

### 9.23.2 Checking the battery fluid

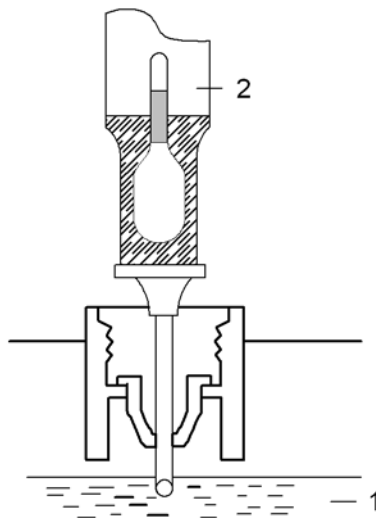


Fig. 3444 Checking the battery fluid

- 1 battery fluid
- 2 Acidimeter

- ▶ Follow the testing instruments' operating manuals.

- ▶ Check the battery fluid **1** using a refractometer or acidimeter **2**.
- ▶ Depending on the inspection, top up the fluid or contact Liebherr after sales service where appropriate.

### 9.23.3 Changing the battery fuses

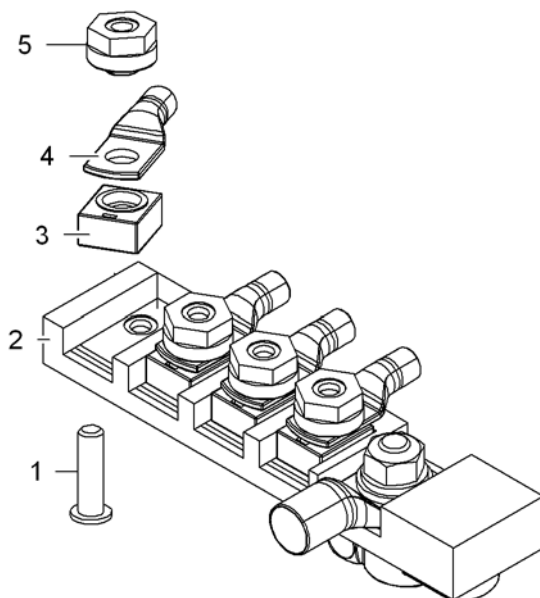


Fig. 3445 Changing the battery fuses

- |          |              |          |                  |
|----------|--------------|----------|------------------|
| <b>1</b> | Fuse screw   | <b>4</b> | Cable (consumer) |
| <b>2</b> | Fuse block   | <b>5</b> | Insulating nut   |
| <b>3</b> | Fuse element |          |                  |

Replacement insulating nuts and fuse elements can be found in the fuse box in the switch cabinet.

- ▶ Change insulating nuts or fuse elements where necessary.

## 9.24 Lighting

### 9.24.1 Checking that the floodlights/auxiliary floodlights are working properly

The floodlights should illuminate if the appropriate button in the cab is pressed.

- ▶ Check that the floodlights/auxiliary floodlights are working properly.

If the floodlights/auxiliary floodlights do not switch on:

- ▶ Check the fuses and cables.
- ▶ Change the bulbs.

If the floodlights/auxiliary floodlights still do not switch on:

- ▶ Contact Liebherr after sales service.

### 9.24.2 Changing the cab lamp light bulb

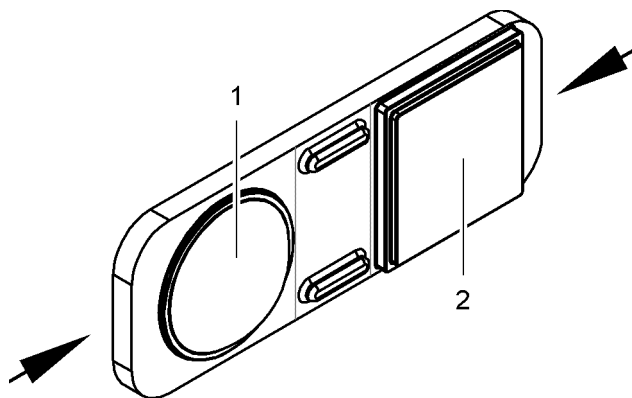


Fig. 3446 Changing the cab lamp light bulb

- |                |               |
|----------------|---------------|
| 1 Curved glass | 2 Clear plate |
|----------------|---------------|

Ensure that the following conditions are satisfied:

- A new **R10W24 V/10 W** bulb is available.
- The battery main switch is switched off.
- ▶ Remove the clear plate **2** and curved glass **1** from the front by pressing on the sides.

---

#### NOTICE

Fragile bulb!  
Bulb may be damaged.

- ▶ Do not touch the bulb directly with your fingers.
- 
- ▶ Change the bulbs.
  - ▶ Refit the clear plate **2** and curved glass **1**.

### 9.24.3 Changing the floodlights light bulb

Ensure that the following conditions are satisfied:

- A new **H324 V/70 W** bulb is available.
- The battery main switch is switched off.

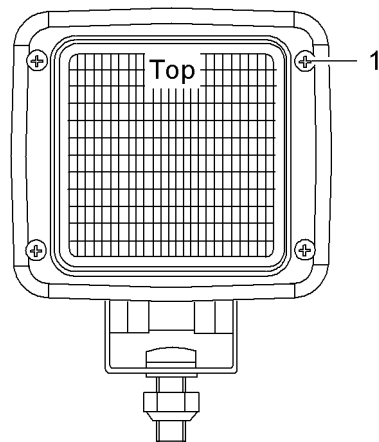


Fig. 3447 Changing the floodlights light bulb

1 Screws (4x)

- ▶ Undo the screws 1 and remove the floodlight housing.

---

#### NOTICE

Fragile bulb!  
Bulb may be damaged.

- ▶ Do not touch the bulb directly with your fingers.
- 
- ▶ Change the bulbs.
  - ▶ Refit the floodlight housing and tighten the screws.

## 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.

### 9.25.2 Checking the main boom limit switch

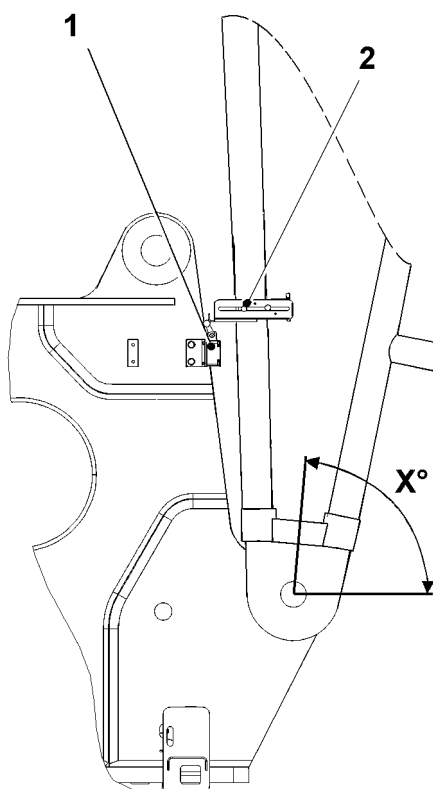


Fig. 3448 Main boom limit switch

- 1 Limit switch plate                      2 Limit switches

Boom configuration	Angle X
Main boom	86°
Main boom + reducing piece	

Boom configuration	Angle X
Main boom + fixed jib	88°
Main boom + luffing jib	
Main boom + luffing jib + Midfall	

Tab. 369 Main boom limit switch



### WARNING

Incorrect calibration of the limit switch plate!

- ▶ Switch off machine.
  - ▶ Contact Liebherr after sales service.
- 
- ▶ Erect the main boom until the angle **X** is displayed on the operational screen for lifting operations.
    - ▷ Limit switch triggers.

If the limit switch triggers too early, or not at all:

- ▶ Switch off machine.
- ▶ Contact Liebherr after sales service.

## 9.26 Emergency stop

### 9.26.1 Checking the emergency stop



---

**WARNING**

Unauthorised triggering of the emergency stop!

- ▶ The emergency stop may only be triggered when the diesel engine is running, the machine is not moving and no load is attached.
- 

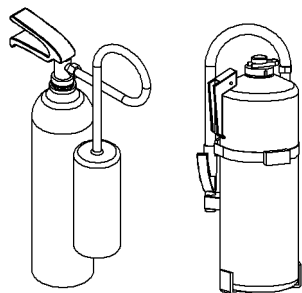
- ▶ Check the emergency stop.

If the diesel engine does not switch off:

- ▶ Contact Liebherr after sales service.

## 9.27 Fire extinguishers

### 9.27.1 Checking the seals and inspection dates on the fire extinguishers



*Fig. 3449 Fire extinguishers in uppercarriage*

---

#### **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.



## 9.28 Personal protective equipment

### 9.28.1 Checking that the personal protective gear is in place, intact and complete



---

**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 294](#)).

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.

## 9.29 Safety signs

### 9.29.1 Checking that all required safety signs are mounted on the machine and are legible

- ▶ Check safety signs to ensure they are complete and legible ([For more information see: 2.7 Safety signs on the machine, page 297](#)).

If safety signs are not complete or illegible:

- ▶ Complete the safety signs.
- ▶ Clean or replace safety signs.

## 9.30 Steel structure



---

**DANGER**

Unauthorised repairs are carried out!  
Structural breakdown.

- ▶ Ensure that repairs to the steel structure are performed by Liebherr service personnel or authorised trained personnel only. (For more information see: [9.31 Repair welding, page 1011](#))
- 

The steel fabrication 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 LWN.
-

## 9.30.1 Checking the machine steel structure for damage, cracks

### Checking the weld seams and holes

The drawings for checking the weld seams and holes can be found in the “Technical information” volume.

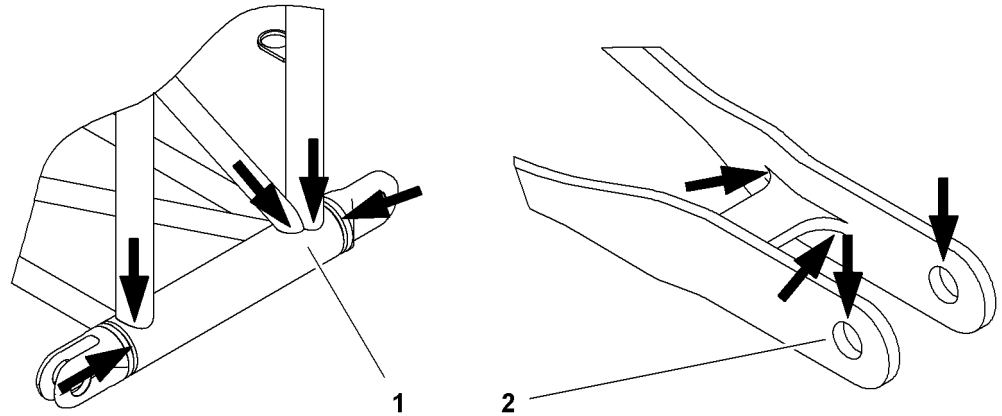


Fig. 3450 Excerpt from the drawings for checking the weld seams and holes

1 Weld seams

2 Holes

All weld seams and holes must be checked. The arrows denote only 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:

- ▶ Set crane operation.
- ▶ Contact Liebherr after sales service.
- ▶ Check holes and slots (e.g. on connecting links) for wear, cracks and plastic deformations.

If a hole is damaged:

- ▶ Set crane operation.
- ▶ Contact Liebherr after sales service.

## 9.31 Repair welding

### 9.31.1 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 satisfied:

- Qualified personnel are available.
- Liebherr service personnel 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.

## 9.32 Main boom

### 9.32.1 Checking main boom foot and sections for damage and wear



---

**DANGER**

Incorrect use of the machine with damaged main boom!  
Structural breakdown.

- ▶ Exclusively use machine with main boom that is in perfect condition.
- 

The steel structure of the main boom must undergo a thorough visual inspection according the maintenance schedule or as laid down in national regulations.

If the crane was subject to excessive loading as the result of a severe impact or a large number of load cycles ([For more information see: 1.3.1 Machine classification, page 38](#)), the bearing components must be examined immediately and the inspection intervals reduced.

Any cracks in the steel structure must be examined by qualified service personnel using the following testing procedures:

- magnetic powder test
- dye penetration test

The boom base section and sections should also be checked for bent or damaged welded boom tubing.



---

**DANGER**

Welding work has not been not performed correctly!  
Structural breakdown.

- ▶ Repairs to the boom base section or sections must only be carried out after consultation with Liebherr after sales service.
  - ▶ Welding must only be carried out by authorised qualified personnel following very precise guidelines.
- 

- ▶ Checking the boom base section and sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear).

If the boom base section or sections are not in perfect condition:

- ▶ Contact Liebherr after sales service.

### 9.32.2 Boom base section: checking that the knuckle pins and locking elements fit tightly

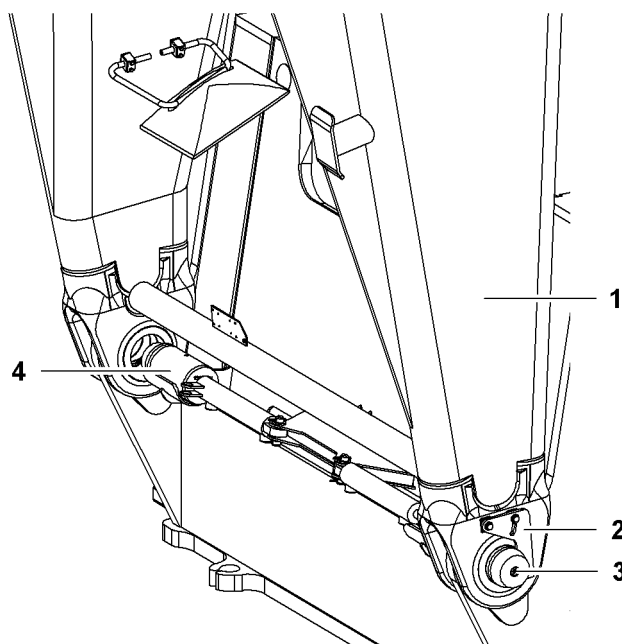


Fig. 3451 Knuckle pins and locking elements on the boom base section

- |   |                       |   |                     |
|---|-----------------------|---|---------------------|
| 1 | Boom base section     | 3 | Grease nipples (2x) |
| 2 | Locking elements (2x) | 4 | Knuckle pins (2x)   |

► Check that that the locking elements 2 and knuckle pins 4 fit tightly on both sides.

If the locking elements or knuckle pins are loose:

► Tighten the locking element 2 or knuckle pin 4.

### 9.32.3 Boom base section: lubricating knuckle pins

Ensure that the grease gun from the Liebherr tool kit is available and filled with sufficient grease (For more information see: 9.2.3 Lubrication chart, page 934)

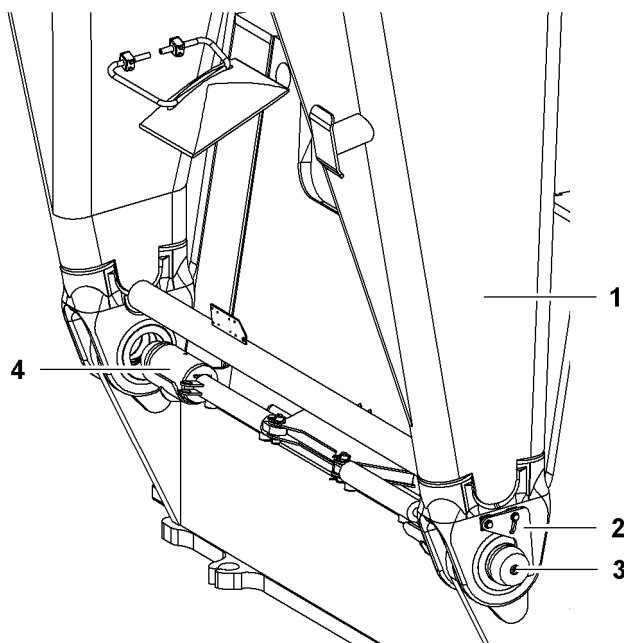


Fig. 3452 Knuckle pins and locking elements on the boom base section

- |   |                       |   |                     |
|---|-----------------------|---|---------------------|
| 1 | Boom base section     | 3 | Grease nipples (2x) |
| 2 | Locking elements (2x) | 4 | Knuckle pins (2x)   |

► Use the grease gun to press grease into the grease nipple 3 on both sides.

### 9.32.4 Boom base section or A-frame 1: checking the operation of the mechanical boom angle indicator

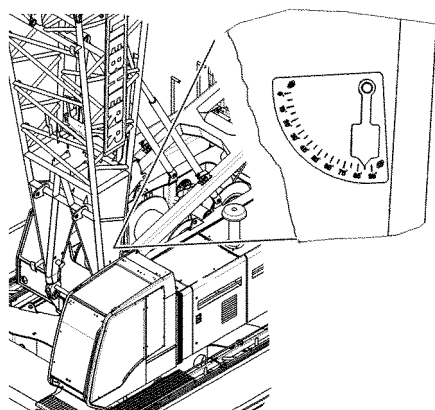


Fig. 3453 Mechanical boom angle indicator on boom base section or A-frame 1

► Checking the operation of the mechanical boom angle indicator on the boom base section or A-frame 1



If the mechanical boom angle indicator is loose:

- ▶ Secure the mechanical boom angle indicator.

If the needle cannot move easily:

- ▶ Lubricate the needle mount.

### **9.32.5 Checking the anemometer, hoist limit switch and limit switch of the jib tilting-back supports for tight fit and operation**

#### **Checking the anemometer, hoist limit switch and limit switch for tight fit**

- ▶ Check the anemometer, hoist limit switch and limit switch for tight fit.

If the anemometer, hoist limit switch or limit switch are loose:

- ▶ Secure the anemometer, hoist limit switch or limit switch.

#### **Checking the operation of the hoist limit switch**

If operating correctly, the limit switch must block the "Hoist" function of the winch and the "Lower" function of the main boom winch and jib luffing winch.

- ▶ Luff the hoist rope and carefully pull the hook against the hoist limit switch weight.

If the hoist limit switch is not operating correctly:

- ▶ Contact Liebherr after sales service.

#### **Checking the flexibility of the limit switch fittings**

- ▶ Check the flexibility of the limit switch fittings.

If the limit switch fittings are not flexible:

- ▶ Spray the hoist limit switch with adhesion lubricant.

### 9.32.6 Checking the operation of the auxiliary jib

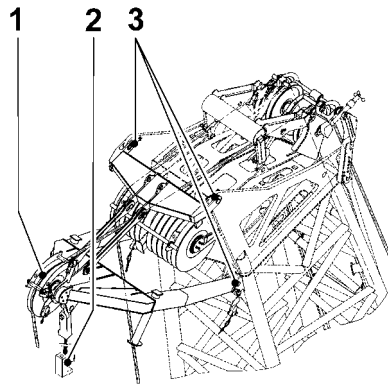


Fig. 3454 Auxiliary jib

- |   |  |
|---|--|
| <p>1 Rope pulleys</p> <p>2 Hoist limit switch</p> | <p>3 Check the connecting pins and the safety pins</p> |
|---|--|

#### Check pulleys for wear and ease of movement.

- ▶ Check pulleys 1 for wear and ease of movement.

If the pulleys are damaged or do not move easily:

- ▶ Lubricate the pulleys 1.
- ▶ If the pulleys 1 are damaged, contact Liebherr after sales service.

#### Checking the jib pivot points and rope fixing point for cracks

- ▶ Check the jib and rope fixation pivot point for cracks

If the jib pivot points or rope fixing point show signs of cracks:

- ▶ Do not use the auxiliary jib.
- ▶ Contact Liebherr after sales service.

#### Checking the anemometer and the hoist limit switch for tight fit

- ▶ Check the anemometer and the hoist limit switch 2 for tight fit.

If the anemometer or hoist limit switch are loose:

- ▶ Secure the anemometer or hoist limit switch 2.

#### Checking the operation of the hoist limit switch

If operating correctly, the limit switch must block the "Hoist" function of the winch and the "Lower" function of the main boom winch and jib luffing winch.

- ▶ Luff the hoist rope and carefully pull the hook against the hoist limit switch weight 2.

If the hoist limit switch is not operating correctly:

- ▶ Contact Liebherr after sales service.

### **Checking the flexibility of the limit switch fittings**

- ▶ Check the flexibility of the limit switch fittings.

If the limit switch fittings are not flexible:

- ▶ Spray the hoist limit switch **2** with adhesion lubricant.

### **Checking the connecting pins and safety pins for damage**

- ▶ Check the connecting pins and safety pins **3** for damage.

## 9.33 Jib

### 9.33.1 Checking jib base section and sections for damage and wear

**DANGER**

Incorrect use of the machine with damaged jib!  
Structural breakdown.

- ▶ Exclusively use machine with jib that is in perfect condition.

The steel structure of the jib must undergo a thorough visual inspection according to the maintenance schedule or as laid down in national regulations.

If the crane was subject to excessive loading as the result of a severe impact or a large number of load cycles ([For more information see: 1.3.1 Machine classification, page 38](#)), the bearing components must be examined immediately and the inspection intervals reduced.

Any cracks in the steel structure must be examined by qualified service personnel using the following testing procedures:

- magnetic powder test
- dye penetration test

The jib sections should also be checked for bent or damaged welded tubing.

**DANGER**

Welding work has not been not performed correctly!  
Structural breakdown.

- ▶ Repairs to the jib base section or jib sections must only be carried out after consultation with Liebherr after sales service.
- ▶ Welding must only be carried out by authorised qualified personnel following very precise guidelines.

- ▶ Checking the jib base section and jib sections for damage and wear (cracks, notches, corrosion, plastic deformation, wear).

If the jib base section or jib sections are not in perfect condition:

- ▶ Contact Liebherr after sales service.

### 9.33.2 Filling the accumulator for the tilting-back supports on the jib

Ensure that the following conditions are satisfied:

- Hose extension (10 m) from the Liebherr tool kit is available.
- The machine operator is in the operator's cab.
- An assistant is available.
- The cab is tilted downwards.

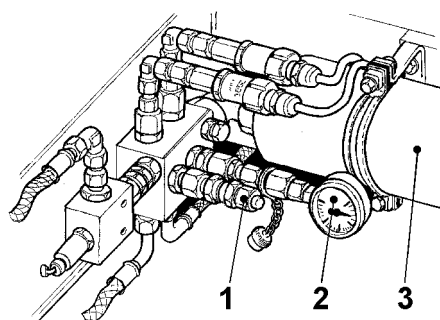


Fig. 3455 Accumulator

- |                  |               |
|------------------|---------------|
| 1 Connection     | 3 Accumulator |
| 2 Pressure gauge |               |

- ▶ Move the basic machine next to the fly jib pivot piece.
- ▶ Open the front left door.
- ▶ Remove the protective cap from the connection 1 to the hydraulic valve plate.
- ▶ Connect the hose extension (32' 10" ft-in) with gate valve to the quick coupling.
- ▶ Connect the hose extension to the connection 1.
- ▶ Press and hold down the *Tilt cab down* button on control panel X11.



Jib type	Temperature			
	-4 °F	32 °F	68 °F	104 °F
<b>1008</b>	1,522.89 psi	1,667.93 psi	1,885.48 psi	2,030.52 psi
<b>1309</b>	1,595.41 psi	1,740.44 psi	1,885.48 psi	2,103.04 psi
<b>1713</b>	1,595.41 psi	1,740.44 psi	1,885.48 psi	2,103.04 psi
<b>1916</b>	1,450.37 psi	1,595.41 psi	1,740.44 psi	1,885.48 psi
<b>2316</b>	1,450.37 psi	1,595.41 psi	1,740.44 psi	1,885.48 psi

Tab. 370 Prescribed pressure in the accumulator of the hydraulic tilting-back supports

- ▶ The assistant carefully opens the gate valve until the pressure gauge **2** reaches the required pressure.

When the required pressure is reached:

- ▶ Close the gate valve.



#### Note

- ▶ To reduce excess pressure: release the *Tilt cab down* button on control panel X11 when the gate valve is open.

- ▶ Release the *Tilt cab down* button on control panel X11.
- ▶ Remove the hose that was used for filling at both ends.
- ▶ Set the protective cap of the connection **1** to the hydraulic valve plate back in place.
- ▶ Close the door.

### 9.33.3 Checking locking flaps for ease of movement

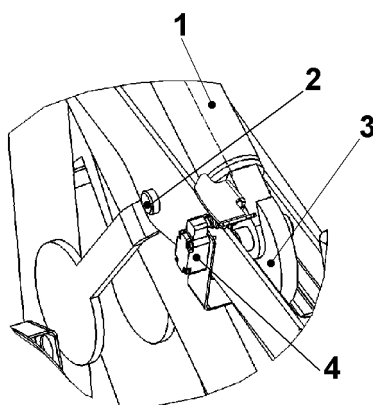


Fig. 3457 Locking flaps

- |   |                       |   |                    |
|---|-----------------------|---|--------------------|
| 1 | Tilting-back supports | 3 | Locking flaps      |
| 2 | Grease nipple         | 4 | Angle limit switch |

If the locking flaps are not adjusted by their own weight, it will not be possible to erect the main boom.

- ▶ Check locking flaps **3** for ease of movement.

If the locking flaps do not move easily:

- ▶ Lubricate the locking flaps at the grease nipple **2**.

### 9.33.4 Jib head section: checking wheels for ease of movement

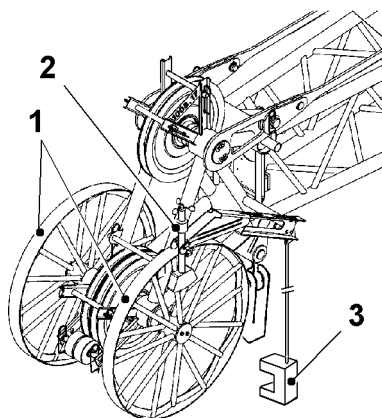


Fig. 3458 Jib head section

- |                                    |                                       |
|------------------------------------|---------------------------------------|
| <p>1 Rotor</p> <p>2 Anemometer</p> | <p>3 Hoisting limit switch weight</p> |
|------------------------------------|---------------------------------------|

► Check jib head section running wheels 1 for free running.

If the wheels do not move easily:

► Lubricate the wheel bearings.

### 9.33.5 Check the operation of the anemometer and the hoist limit switch and for tight fit

#### Checking the anemometer and the hoist limit switch for tight fit

► Check the anemometer and the hoist limit switch for tight fit.

If the anemometer or hoist limit switch are loose:

► Secure the anemometer or hoist limit switch.

#### Checking the operation of the hoist limit switch

If operating correctly, the limit switch must block the "Hoist" function of the winch and the "Lower" function of the main boom winch and jib luffing winch.

► Luff the hoist rope and carefully pull the hook against the hoist limit switch weight.

If the hoist limit switch is not operating correctly:

► Contact Liebherr after sales service.

#### Checking the flexibility of the limit switch fittings

► Check the flexibility of the limit switch fittings.

If the limit switch fittings are not flexible:

- ▶ Spray the hoist limit switch with adhesion lubricant.



## 9.34 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.
- 

### 9.34.1 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.

## 9.34.2 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.

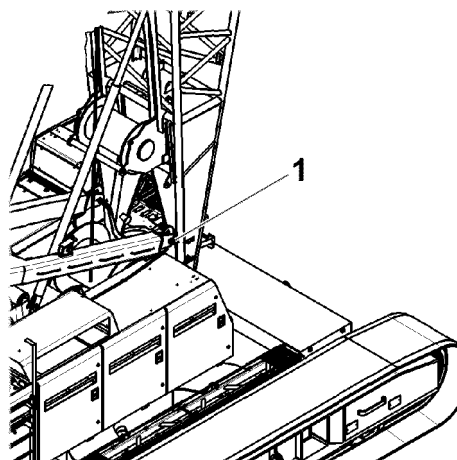


Fig. 3459 Lubricating the bearings on A-frame 1

### 1 Bearings on A-frame 1

Ensure that the grease gun from the Liebherr tool kit is available and filled with sufficient grease ([For more information see: 9.2.3 Lubrication chart, page 934](#))

- ▶ Remove the grease nipple caps.
- ▶ Use the grease gun to press grease into the grease nipple on both sides.
- ▶ Put the grease nipple caps back on.

### 9.34.3 Lubricating the bearings on the A-frame cylinder

The grease nipples are present on both sides.

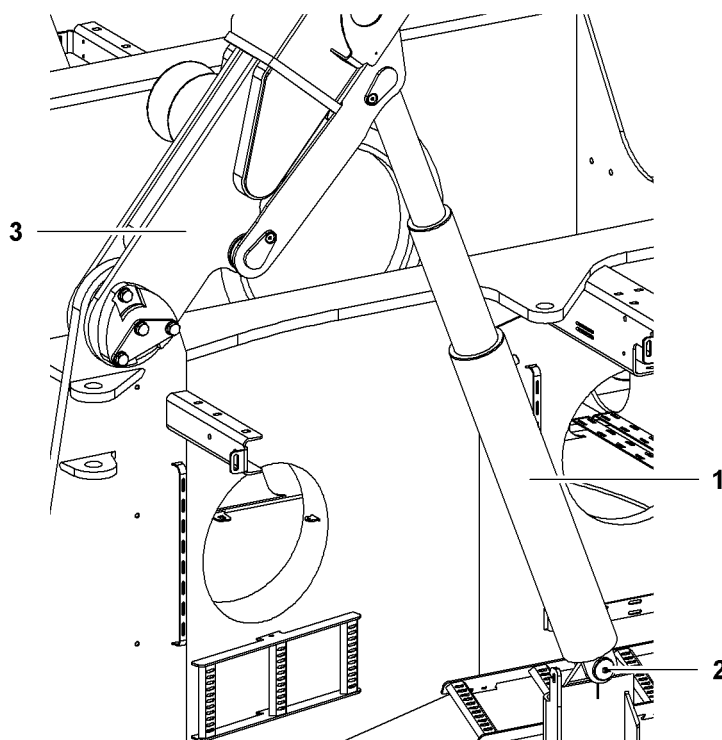


Fig. 3460 Lubricating the bearings on the A-frame cylinder

- |   |                  |   |          |
|---|------------------|---|----------|
| 1 | A-frame cylinder | 3 | A-frame1 |
| 2 | Grease nipple    |   |          |

Ensure that the grease gun from the Liebherr tool kit is available and filled with sufficient grease ([For more information see: 9.2.3 Lubrication chart, page 934](#))

- Use the grease gun to press grease into the grease nipple 2 on both sides.

## 9.35 Tilting-back supports

The valve blocks with the measuring connections are situated on the insides of the tilting-back supports near the pins.

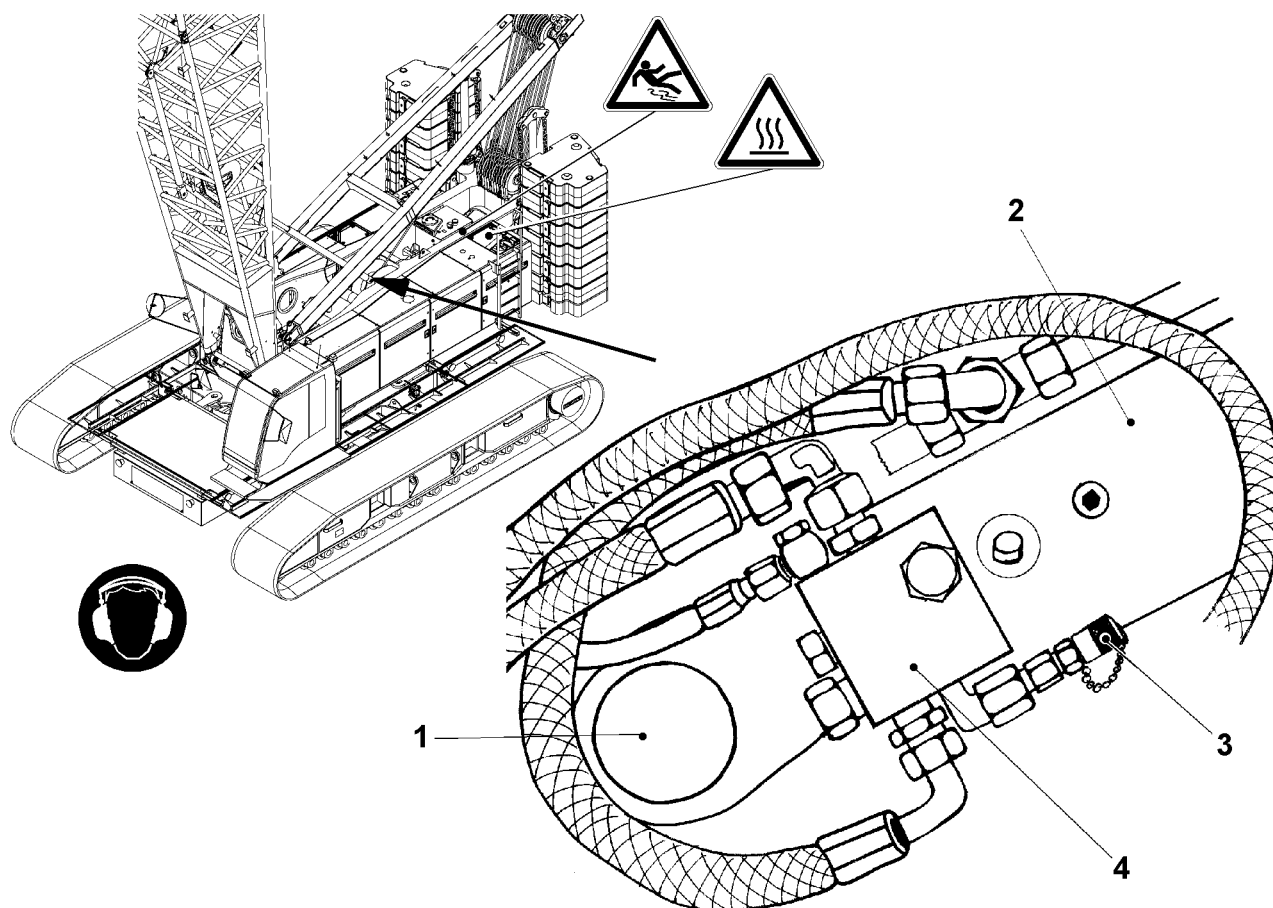


Fig. 3461 Measurement points

- |   |                              |   |   |
|---|------------------------------|---|---|
| 1 | Tilting-back support bolting | 3 | Measuring connection for pressure measurement |
| 2 | Tilting-back support         | 4 | Valve block                                   |

### 9.35.1 Checking the pressure in the tilting-back support piston area



#### DANGER

Tilting-back support is used with excessive/inadequate pressure in the piston area! Risk of incorrect Load Moment Limiter (LML) calculation, machine toppling over, structural breakdown.

- ▶ Switch off machine.
- ▶ Contact Liebherr after sales service.



#### WARNING

Hot and slippery surfaces!  
Risk of falling.

- ▶ Only touch hot surfaces with suitably protected body parts.
- ▶ Secure yourself against falling.

Ensure that the following conditions are satisfied:

- The 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 122 °F to 140 °F).
- The air intake hose between the filter housing and the turbocharger is in good condition.
- No load is on the hook.
- Diesel engine runs.
- The *Extend tilting-back support cylinder* switch on control panel X12 has been preset.
- The main boom is raised to approximately 75°.
- The safety lever in the cabin has been lowered.

Type of machine	target value
LR1100	1,522.89 psi
LR1130	1,305.33 psi
LR1160	1,305.33 psi
LR1200	2,175.56 psi
LR1280	1,740.44 psi
LR1300	1,740.44 psi

Tab. 371 Prescribed pressures in the piston area of the tilting-back supports

- ▶ To relieve the strain on the tilting-back supports: lower the main boom until the tilting-back supports are in the middle of the guide rails.
- ▶ Remove the screw cap on the measuring connection.

The pressure in the tilting-back support piston area must correspond with the value in the table. The values may deviate by a maximum of  $\pm 20\%$ .

- ▶ Connect the pressure gauge to the measuring point.
  - ▷ The gauge displays the pressure.

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 screw cap to the measuring connection again.

A measurement must be taken on each tilting-back support cylinder.

- ▶ Repeat the measurement on the opposite side.

## 9.36 Steel pendant straps

Pendant straps are sensitive components that must be checked to ensure they are working correctly and are not damaged.



### DANGER

Damaged pendant straps!  
Structural breakdown.

- ▶ Ensure that all pendant straps are checked by a specialist at least once every year.

As use of the machine increases, so the test cycle becomes shorter:

- ▶ Ensure that all pendant straps are checked again by a specialist.
- ▶ Document all results.
- ▶ Only use pendant straps that are in a completely flawless condition.
- ▶ Damaged or faulty pendant straps must be replaced with new Liebherr pendant straps.

### NOTICE

Unauthorised welding on pendant straps!  
Pendant straps could be damaged.

- ▶ Do not weld pendant straps.

### 9.36.1 Checking the pendant straps and pins for damage and wear, and checking that the safety pins and cotter pins are present

#### Checking the pendant straps for wear and damage

- ▶ Check the pendant straps for damage and wear (cracks, notches, corrosion, deformation, etc.).

If the pendant straps are damaged or show signs of wear:

- ▶ Replace the pendant straps.
- ▶ Contact Liebherr after sales service.

The pendant straps will provide long-term service if maintained, handled and used correctly.



### DANGER

Long-life pendant straps overloaded!  
Structural breakdown.

- ▶ Replace the pendant straps at the correct time.

A load cycle comprises lifting, moving (rocking, swinging) and setting down the load.

**Light installation work:** 5 cycles per hour (lighter loads) - 63,000 cycles

- ▶ Replace the pendant straps after 12,600 operating hours.

**Medium material handling operations:** 20 cycles per hour (light to medium loads) - 32,000 cycles

- ▶ Replace the pendant straps after 1600 operating hours.

### Checking the connecting pins for wear and damage

- ▶ Check the connecting pins for damage and wear (cracks, notches, corrosion, deformation, etc.).

If the connecting pins are damaged or show signs of wear:

- ▶ Replace the connecting 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 the locking elements.
- ▶ Contact Liebherr after sales service.

## 9.36.2 Lubricating pendant straps and pins

---

### NOTICE

Pendant straps and pins corroded!  
Damage to pendant straps and pins.

- ▶ Make sure that the anti-corrosion coating on the pendant straps and pins is dependable.
- 

Due to the high levels of stress, particular attention must be paid to anti-corrosion coating on the contact surfaces between pendant strap, pin and connecting link.

- ▶ Lubricate pendant straps and pins all over, or spray them with anti-corrosion spray.

## 9.36.3 Checking the connecting links of the pendant straps for damage, cracks and plastic deformation

- ▶ 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 the connecting links.
- ▶ Contact Liebherr after sales service.

Connecting links will provide long-term service if maintained, handled and used correctly.



**DANGER**

Long-life connecting links are overloaded!  
Structural breakdown.

- ▶ Replace the connecting links at the correct time.

A load cycle comprises lifting, moving (rocking, swinging) and setting down the load.

**Light installation work:** 5 cycles per hour (lighter loads) - 63,000 cycles

- ▶ Replace the connecting links after 12,600 operating hours.

**Medium material handling operations:** 20 cycles per hour (light to medium loads) - 32,000 cycles

- ▶ Replace the connecting links after 1600 operating hours.

### 9.36.4 Lubricating connecting links

**NOTICE**

Corrosion of connecting links!  
Damage to connecting links.

- ▶ Make sure that the anti-corrosion coating on the connecting links is dependable.

Due to the high levels of stress, particular attention must be paid to anti-corrosion coating on the contact surfaces between pendant strap, pin and connecting link.

- ▶ Lubricate connecting links all over, or spray them with anti-corrosion spray.

## 9.37 Carbon-fibre pendant straps

Carbon-fibre pendant straps are sensitive components that must be checked to ensure they are working correctly and are not damaged.



---

### **DANGER**

Damaged pendant straps!  
Structural breakdown.

- ▶ Ensure that all pendant straps are checked by a specialist at least once every year.

As use of the machine increases, so the test cycle becomes shorter:

- ▶ Ensure that all pendant straps are checked again by a specialist.
  - ▶ Document all results.
  - ▶ Only use pendant straps that are in a completely flawless condition.
  - ▶ Damaged or faulty pendant straps must be replaced with new Liebherr pendant straps.
- 

The long-term operating temperature range for pendant straps is -40 °F to 176 °F.

For short periods (around 10 minutes) temperatures up to 248 °F are permissible.

In a steam-saturated atmosphere a temperature of 176 °F should not be exceeded for a prolonged period.

---

### **NOTICE**

Unacceptable welding has been performed on pendant straps!  
Pendant straps could be damaged.

- ▶ Do not weld pendant straps.
- 

The fibres themselves provide long-term service. Adjacent components will provide long-term service if maintained, handled and used correctly.

Since 04/2010 a new generation (Generation B) of carbon-fibre pendant straps has been available.



Fig. 3462 Generation A and version B of carbon-fibre pendant 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.

### 9.37.1 Checking the pendant straps and pins for damage and wear, and checking that the safety pins and cotter pins are present

#### Checking pendant straps for wear to their protective sheath or wire mesh hose, and checking for any fibre damage

The protective sheath or wire mesh hose may be damaged by incorrect use or by being pushed against something.



Fig. 3463 Damage to the protective sheath

Pendant strap may be placed under load temporarily.

- ▶ Check pendant straps for wear to their protective sheath or wire mesh hose, and check for any fibre damage.

If the underlying circumferential windings are undamaged:

- ▶ Contact Liebherr after sales service.

Liebherr after sales service can supply a repair kit for repairing the protective sheath on Generation A carbon-fibre pendant straps.

If the pendant straps are exhibiting signs of fibre damage:

- ▶ Replace the pendant straps.
- ▶ Contact Liebherr after sales service.

## Checking the pendant straps bushes



*Fig. 3464 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 the pendant straps.
- ▶ Contact Liebherr after sales service.

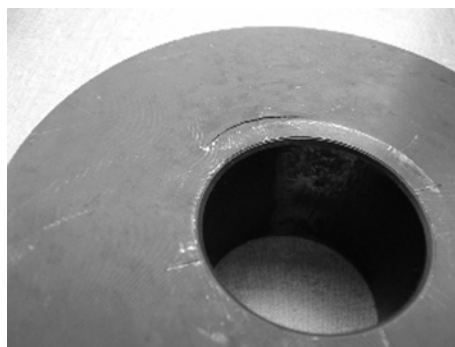


Fig. 3465 Crack on a bush

- ▶ 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 the pendant straps.
- ▶ Contact Liebherr after sales service.

### Checking the connecting pins for wear and damage

- ▶ Check the connecting pins for damage and wear (cracks, notches, corrosion, deformation, etc.).

If the connecting pins are damaged or show signs of wear:

- ▶ Replace the connecting 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 the locking elements.
- ▶ Contact Liebherr after sales service.

## 9.37.2 Lubricating the pendant strap bushes

---

#### NOTICE

Bushes corroded!  
Damage to the bushes.

- ▶ Make sure that the anti-corrosion coating on the bushes is dependable.
- 

Due to the high levels of stress, particular attention must be paid to anti-corrosion coating on the contact surfaces between pendant strap bush, pin and connecting link.

- ▶ Lubricate bushes all over, or spray them with anti-corrosion spray.

### 9.37.3 Checking the connecting links of the pendant straps for damage, cracks and plastic deformation

- ▶ 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 the connecting links.
- ▶ Contact Liebherr after sales service.

Connecting links will provide long-term service if maintained, handled and used correctly.



---

#### **DANGER**

Long-life connecting links are overloaded!  
Structural breakdown.

- ▶ Replace the connecting links at the correct time.
- 

A load cycle comprises lifting, moving (rocking, swinging) and setting down the load.

**Light installation work:** 5 cycles per hour (lighter loads) - 63,000 cycles

- ▶ Replace the connecting links after 12,600 operating hours.

**Medium material handling operations:** 20 cycles per hour (light to medium loads) - 32,000 cycles

- ▶ Replace the connecting links after 1600 operating hours.

### 9.37.4 Lubricating connecting links

---

#### **NOTICE**

Corrosion of connecting links!  
Damage to connecting links.

- ▶ Make sure that the anti-corrosion coating on the connecting links is dependable.
- 

Due to the high levels of stress, particular attention must be paid to anti-corrosion coating on the contact surfaces between pendant strap bush, pin and connecting link.

- ▶ Lubricate connecting links all over, or spray them with anti-corrosion spray.

## 9.38 Lubrication system

### 9.38.1 Checking the operation of the central lubrication for the swing ring tooth flanks

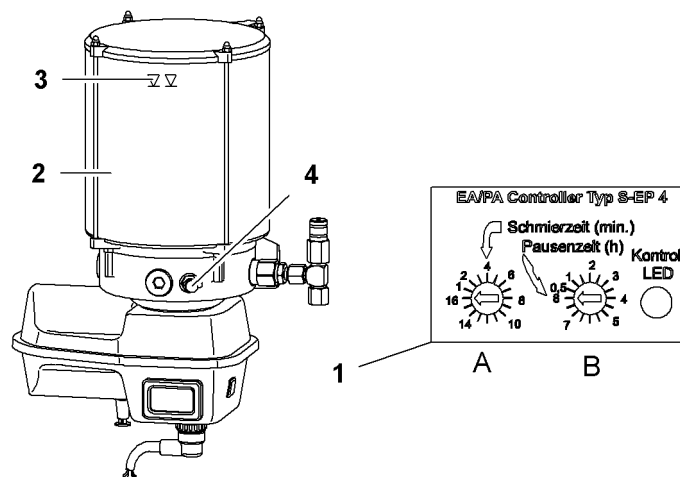


Fig. 3466 Lubrication pump

- |   |                             |   |  |
|---|-----------------------------|---|--|
| 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 control unit for the swing ring tooth flanks lubrication pump is located in switch cabinet X1.

Ensure that the following conditions are satisfied:

- 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.

### 9.38.2 Checking the operation of the central lubrication for the swing ring bearing

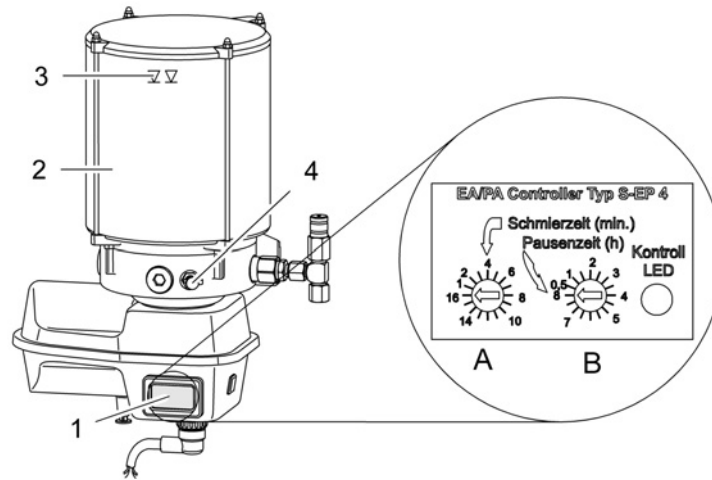


Fig. 3467 Lubrication pump

- |   |                             |   |  |
|---|-----------------------------|---|--|
| 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       |

Make sure that the safety lever is lowered.

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.



### 9.38.3 Checking the fill level of the lubrication pumps

Ensure that the following conditions are satisfied:

- The grease gun from the Liebherr tool kit is present and filled with grease ([For more information see: 9.2.3 Lubrication chart, page 934](#)).
- 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 934](#)).
- 

---

#### NOTICE

Grease supply container is empty!  
The swing ring and tooth flanks will be insufficiently lubricated and damaged.  
Ensure that the necessary cleaning and venting work is carried out on the central lubrication pumps.

- ▶ Ensure that supply containers are permanently topped up.
- 

- ▶ Check the fill level of the lubrication pumps.

If the fill level lies well below the "Maximum fill level" marker:

- ▶ Top up with grease until the "Maximum fill level" marker is reached.

### 9.38.4 Checking the time intervals of the lubrication pumps

Ensure that the following conditions are satisfied:

- 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 the time intervals of each lubrication pump.

If the lubrication pump settings do not match the specifications:

- ▶ Correct the settings to match the appropriate specifications.

### 9.38.5 Checking the lubrication points

Ensure that the following conditions are satisfied:

- 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 pumps.
- ▶ Check the lines for damage.

- ▶ Contact Liebherr after sales service.

## 9.39 Ropes

Due to the limited service life of wire ropes, ropes must be checked at regular intervals during use to correctly identify when the rope has reached the end of its service life and to remove it from service before it fails completely.

The following points are important when determining the inspection intervals and may shorten the 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 of previous inspections.
- The length of time the rope has already been in use



---

**DANGER**

Rope damage is not noticed!  
Load breakaway.

Following prolonged shutdown of the machine or incidents that could have resulted in damage to the rope:

- ▶ Check rope and end attachments.
- 

These rope changing criteria form part of ISO 4309. They describe the most commonly occurring types of rope wear.



---

**DANGER**

Incorrect maintenance of ropes!  
Load breakaway.

- ▶ All the listed criteria must be checked at the prescribed maintenance intervals.
- ▶ Check the rope in particular around the end attachment as it is subject to increased mechanical stresses at this point.

If any doubts on the operational safety of a rope exist:

- ▶ Lay down the rope or have the rope inspected by a qualified engineer.
-

Ensure that the following conditions are satisfied:

- The machine is switched off.
- The machine is secured to prevent unauthorised operation.

### 9.39.1 Check the rope for diameter shrinkage

As a result of natural wear that occurs during use, ropes gradually become thinner and must eventually be withdrawn from service. If the rope diameter has reduced over long sections by more than 10% relative to the nominal dimension as a result of internal friction, corrosion, etc., the rope must be changed regardless of whether or not wire breaks have occurred.

Ensure that the following conditions are satisfied:

- A caliper gauge with wide jaws is available.
- The machine is switched off.
- The machine is secured to prevent unauthorised operation.

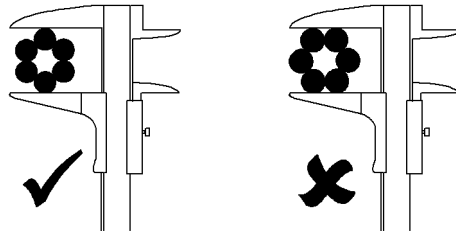


Fig. 3468 Correct (left) and incorrect measurement (right) of rope diameter

- ▶ Measure the rope diameter on two separate points at least one metre distant from each other.
- ▶ Always measure the rope diameter twice at the same point.

The average corresponds to the rope diameter. The rope diameter must measure at least 90% of the nominal rope diameter.

- ▶ Calculate the average of the four measurements.

If the rope diameter is smaller than the nominal rope diameter by more than 10%:

- ▶ Remove the rope.

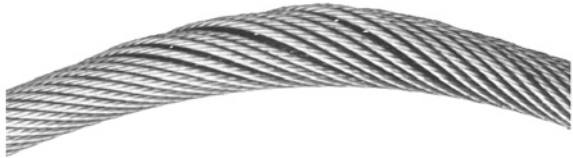






#### Note

If new ropes are to be attached:

- ▶ Check the rope drive.

### 9.39.2 Checking the ropes for deformations



Check for:	Photographs of damage:
<p><b>Pockets:</b> These can occur when the outer layer of wires loosens or the outer wire strands are longer than the inner ones. Movement of the outer wires or strands in relation to the inner ones causes movement of the excess length at a particular location.</p>	
<p><b>Loop formation:</b> Single wires or groups of wires emerge from the rope structure. The loops usually lie in a series of strands.</p>	
<p><b>Necking:</b> is reductions in the diameter of the wire rope over short lengths. Rope sections immediately before the end attachment must be checked for necking with particular care. Necking is often difficult to recognise at these points.</p>	

Check for:	Photographs of damage:
<p><b>Knots:</b> are deformations of the wire rope. They are formed when a eyelet-shaped rope loop is pulled straight without the wire rope being able to compensate by turning on its axis.</p>	
<p><b>Corkscrews:</b> With this type of deformation, the axis of the unloaded wire rope becomes helical. This does not weaken the wire rope initially, though it might prevent the rope drive from running smoothly. The resultant damage can include increased abrasion and more wire breaks. The rope must be withdrawn from service if the area of greatest deformation exceeds 1/3 of the nominal rope diameter.</p>	

Tab. 372 Checking the ropes for deformations

- ▶ Check the ropes for deformations.
- If the rope meets one of the criteria above or exhibits specific damage:
- ▶ Switch off the machine and, if possible, determine the cause of the damage.
  - ▶ Remove the rope and/or rope pair.

### 9.39.3 Check ropes for corrosion

Check for:	Photographs of damage:
<p><b>Corrosion:</b> occurs mostly in corrosive and salt water atmospheres (e.g. prolonged storage of ropes in the open air, salt water atmospheres, etc.). Two types of corrosion occur: atmospheric corrosion (causes "even" rust) and localised corrosion, such as pitting (forms deep holes in places where the protective sheath is missing or damaged). The photographs both show atmospheric corrosion.</p>	
<p>The diameter of the rope has reduced as a result of corrosion. If the rope diameter has reduced by 10% or more relative to the nominal dimension, the rope must be changed regardless of whether or not wire breaks have occurred.</p>	


Tab. 373 Check ropes for corrosion

- ▶ Check ropes for corrosion.

If the rope meets one of the criteria above or exhibits specific damage:

- ▶ Switch off the machine and, if possible, determine the cause of the damage.
- ▶ Remove the rope and/or rope pair.

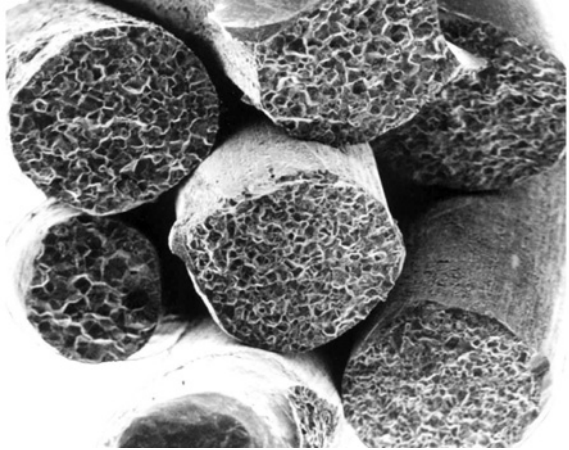
### 9.39.4 Check ropes for abrasion

Check for:	Photographs of damage:
<p><b>Abrasion:</b> reduces both the static breaking force of the rope due to reduction of the metallic cross-section and its fatigue limit due to wear grooves. If the rope diameter has reduced by 10% or more relative to the nominal dimension, the rope must be changed regardless of whether or not wire breaks have occurred.</p>	

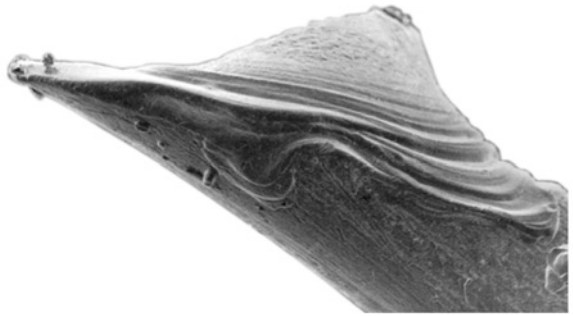
Tab. 374 Check ropes for abrasion

- ▶ Check ropes for abrasion.
- If the rope meets one of the criteria above or exhibits specific damage:
  - ▶ Switch off the machine and, if possible, determine the cause of the damage.
  - ▶ Remove the rope and/or rope pair.

### 9.39.5 Check ropes for the effects of heat

Check for:	Photographs of damage:
<p><b>Heat damage:</b> If the temperature rises above 572 °F the tensile fibre structure of the wire rope caused by cold deformation recrystallises and the wire loses around 2/3 of its original strength.</p>	



Check for:	Photographs of damage:
<p>An extreme form of heat damage is caused by lightning strike. The rope may heat up at the point of the strike to such an extent that the steel starts to melt. In all cases of exposure to high temperatures, the rope must be changed regardless of whether or not wire breaks have occurred.</p>	

Tab. 375 Check ropes for the effects of heat



#### Note

- ▶ For permitted operating temperatures for ropes and end attachments, refer to EN 12385-3.

- ▶ Check ropes for significant heat damage.

If a rope displays signs of external heat damage, such as recrystallisation, melting, etc.:

- ▶ Switch off the machine and, if possible, determine the cause of the damage.
- ▶ Remove the rope and/or rope pair.

### 9.39.6 Check the rope for number of permitted wire breaks

The table below shows the permitted number of wire breaks relative to a defined control section of the rope.

Number of bearing wires in the outer strands of the wire rope <sup>A)</sup> n	Number of wire breaks at end of service life			
	Regular lay over a length of		Lang lay over a length of	
	6 D	30 D	6 D	30 D
50	2	4	1	2
51 to 75	3	6	2	3
76 to 100	4	8	2	4
101 to 120	5	10	2	5
121 to 140	6	11	3	6
141 to 160	6	13	3	6
161 to 180	7	14	4	7
181 to 200	8	16	4	8
201 to 220	9	18	4	9
221 to 240	10	19	5	10
241 to 260	10	21	5	10
261 to 280	11	22	6	11
281 to 300	12	24	6	12
over 300 <sup>B)</sup>	0.04 x n	0.08 x n	0.02 x n	0.04 x n
In the case of ropes that have particularly thick wires in the outer layer of the outer strands, round strand ropes 6 x 19 Seal to DIN 3058 or round strand ropes 8 x 19 Seal to DIN 3062, the number of visible wire breaks at the end of the service life is 2 lines lower than the values shown in the table.				
D = diameter of wire rope				

Tab. 376 Number of wire breaks at end of service life

- A) Filler wires are not considered to be bearing wires. In the case of wire ropes with several layers of strand, only the strands in the outermost layer are deemed to be outer strands. In the case of steel ropes, the steel core functions as the inner strand.
- B) The numbers calculated should be rounded up.



**DANGER**

Unsuitable rope is used!  
Load breakaway.

If a new rope is to be attached:

- ▶ Choose a rope where the rope diameter, the breaking load and the number of bearing wires in the outer strands matches those of the original rope.
- ▶ Choose a rope that meets the applicable national and international regulations.

**Example:** if the measured diameter D is 1.18" in, this means that the number of permitted wire breaks on a control section measuring  $6 \times D = 7.09$ " in may not be higher than 9. On a control section measuring  $30 \times D = 2' 11$ " ft-in, the number may not be higher than 18.

► 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:

► Switch off the machine and, if possible, determine the cause of the damage.

► Remove the rope and/or rope pair.

### 9.39.7 Selecting a rope

When selecting a rope, make sure that only rope of the same type and strength equivalent to that originally chosen is used. Ropes from manufacturers not approved by Liebherr may only be used following consultation with the relevant manufacturer.



#### **DANGER**

Using ropes that do not conform to the machine manufacturer's specifications!  
Load breakaway.

► Always use ropes that conform to Liebherr specifications.



#### **DANGER**

Swivels have been fitted!  
Load breakaway.

► The fitting of swivels to any of the ropes that are attached to the machine is prohibited.

► Exceptions to this are only permitted after special consultation with the manufacturer.



#### **DANGER**

Incorrect nominal rope diameter!  
Load breakaway.

► Only use rope whose actual diameter is no more than 4% above the nominal rope diameter.

► Observe the rope plan for the correct arrangement of the rope lay direction.

### Rope lay direction

The correct choice of lay direction for the wire rope is critical to the correct operation of the rope drive. Under stress any wire rope will tend to untwist. For this reason the rope lay direction must be chosen so that this untwisting torque is not encouraged by the drum or the reeving, but is compensated for by them instead. For example, a rope with left-hand lay direction can be wound around a left-hand drum, a right-hand drum, however, would counteract the rope's untwisting torque.

## Rope lay direction in the case of multi-strand reeving

In the case of a multi-reeved rope drive, the influence of the deflection angle between the pulleys is greater than the influence of the drum itself. In such situations, the rope lay direction should be adapted to match the reeving. In addition, the lay direction of the reeving must always correspond to the lay direction of the drum.

### Right-hand lay direction reeving:

- Rope with left-hand lay direction

### Left-hand lay direction reeving:

- Rope with right-hand lay direction

### Determining the lay direction of the drum or reeving:

- ▶ At the anchoring point of the rope on the drum, follow, with your finger, the winding of the rope from the anchoring point to the running strand.
  - ▷ If you are moving your finger clockwise: the drum (the reeving) has a right-hand lay direction. A rope with left-hand lay direction is needed.

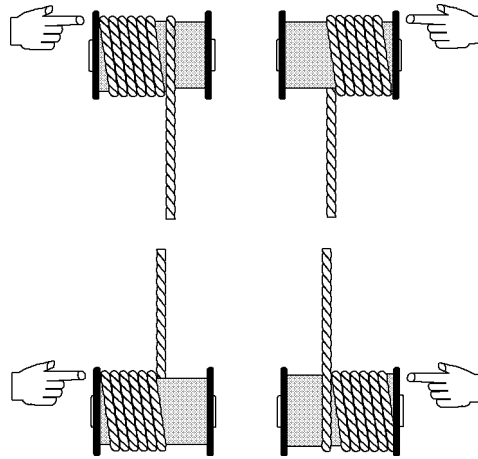


Fig. 3479 Drum with right-hand lay direction with rope with left-hand lay direction

- ▷ If you are moving your finger anti-clockwise: the drum (the reeving) has a left-hand lay direction. A rope with right-hand lay direction is needed.

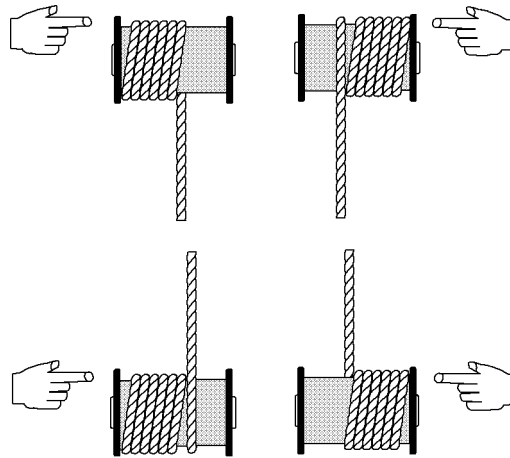


Fig. 3480 Drum with left-hand lay direction with rope with right-hand lay direction

## Rope lay direction on a single layer drum

In the case of a single layer drum the choice of lay direction must be the opposite to the lay direction of the drum.

### Right-hand lay direction drum:

- Rope with left-hand lay direction

### Drum with left-hand lay direction:

- Rope with right-hand lay direction

## Rope lay direction on a multi-layer drum

In the case of multi-layer spooling, where the lay direction of the drum changes from layer to layer, the rope lay direction must match the layer that carries out the most rope work.

### Right-hand lay direction:

- Rope with left-hand lay direction

### Left-hand lay direction:

- Rope with right-hand lay direction

## Rotation resistant (wire) ropes

Ropes described as “rotation resistant” vary considerably with regard to the turning moment or twist when under stress.

There are two types of rotation resistant (wire) ropes:

### Rotation resistant (wire) ropes

Rotation resistant (wire) ropes include ropes with two layers of strands, twisted around an inner core. The rope lay direction of the outer strands is opposite to that of the layer underneath.



### WARNING

Unauthorised use of swivels!  
Life-threatening situation and damage to the machine.

- ▶ Swivels must not be used with rotation resistant (wire) ropes.

### High performance rotation resistant ropes

The high performance rotation resistant ropes have a separate twisted steel core that is twisted in the opposite direction to the outer layer, which nowadays consists of 15 and more outer strands. Under stress, the steel core twists in one direction, while at the same time the outer strand layer twists in the opposite direction. This largely compensates for the torque that occurs in the rope when it is under stress.

Due to these special rope properties, only high performance rotation resistant ropes are used:

- for hoist winches with high lifting heights.
- when lifting unguided loads in one-fall operation.



### Note

- ▶ Despite this, the use of swivels is not recommended by Liebherr. Ropes onto which rotating parts are attached, e.g. Kelly ropes on drilling rigs, are excepted from this.

## Non-rotation resistant ropes



### WARNING

Rope ends loaded without an anti-rotation device!  
High turning moments.

- ▶ Fit anti-rotation devices.

Non-rotation resistant ropes may be used:

- for guided loads
- for paired use of similar right and left hand laid rope designs

Under these conditions non-rotation resistant ropes achieve a higher fatigue life compared with rotation resistant (wire) ropes.



### WARNING

Impermissible combination of non-rotation resistant ropes with different lay directions (e.g. with pendant straps)!

- ▶ Do not combine non-rotation resistant ropes with different lay directions.
- ▶ Never use these rope designs with a swivel or having one or both rope ends without an anti-rotation device.

### Non-rotation resistant ropes for hoist winches

In exceptional cases, non-rotation resistant ropes may be used for hoist winches in the following applications:

- Dragline bucket
- Slurry wall grab
- Handling two-rope grab (paired right and left hand laid ropes)

Distortion of max. 180° is desired with the slurry wall grab.

The pendant ropes are designed as non-rotation resistant ropes.

## Decision table

In the following decision table, which uses an example of the choice of most suitable wire rope design for the hoisting gear of a crane, the ten questions should be answered as far as possible with yes or no.

If there is no simple answer to a question then answer Yes/No.

Decision		Yes	Yes/No	No
1	Do you require a rotation resistant (wire) rope?	Special rope, rotation resistant	Special rope, rotation resistant	6, 8 or 10-strand rope
2	Is a high breaking force required?	Special rope SES, poss. sealed	SES	-
3	Is a high number of bending cycles required?	Multi-stranded, thin outer wires	Multi-stranded, thin outer wires	-
4	Is a high degree of abrasion resistance required?	Thick outer wires	Thick outer wires	-

Decision		Yes	Yes/No	No
5	Does the rope operate with multi-layer spooling?	Lang lay, sealed	-	Cross lay
6	Are structural changes expected?	Plastic intermediate layer	Plastic intermediate layer	-
7	Do large deflexion angles occur?	Plastic intermediate layer	Plastic intermediate layer	-
8	Does the drum have a left-hand lay direction?	Rope with right-hand lay direction	-	Rope with left-hand lay direction
9	Does the reeving have a left-hand lay direction?	Rope with right-hand lay direction	-	Rope with left-hand lay direction
10	Will it be used in a corrosive environment?	Galvanized version	Galvanized version	Exposed version

Tab. 377 Decision table

### 9.39.8 Storing ropes

---

#### NOTICE

Ropes are not labelled!  
Ropes/drums could be mixed up.

If the label is missing or is no longer clearly legible,

- ▶ label drums according to the delivery documents.
- 

- ▶ Check that the labeling of supplied ropes matches the material inspection documents and the order.

- ▶ Material inspection certificates should be carefully filed away.
- 

#### NOTICE

Incorrect storage!  
Ropes may become damaged.

- ▶ Ropes should be stored correctly.
- 

- ▶ Store wire ropes in a dry, well-ventilated area.

- ▶ Protect ropes and drums from the elements: Never store ropes or drums directly on the ground.

- ▶ Avoid storing them outdoors for prolonged periods.

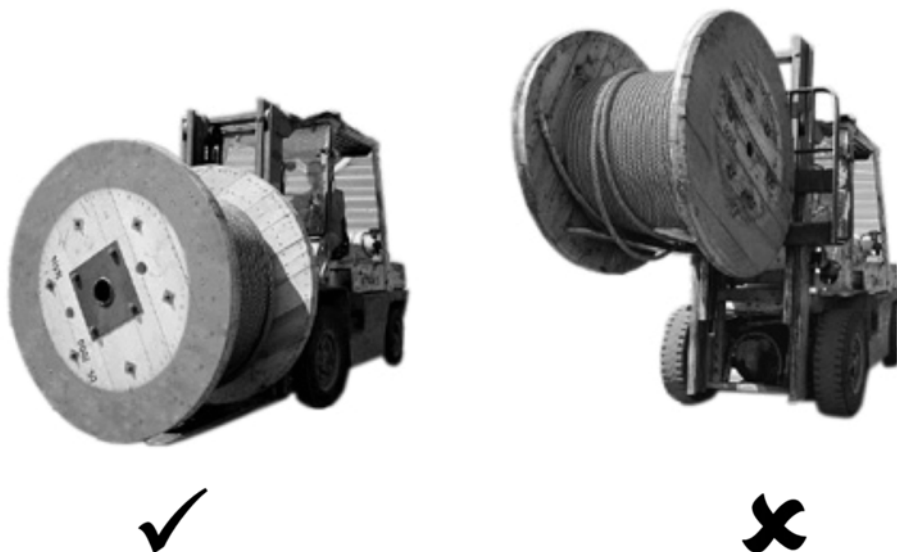
### 9.39.9 Transporting ropes

Ropes are very sensitive to external damage.

**WARNING**

Incorrect transport (loaded, unloaded)!  
Ropes may become damaged.

- ▶ Ropes should be transported correctly.



*Fig. 3481 Lifting a rope drum correctly (left) and incorrectly (right) on a forklift truck*

Correct procedures to avoid damage to ropes during transport:

- ▶ Lift drums using textile rigging (flat lifting slings or round slings).
- ▶ Ideally, drums should be lifted with a shaft pushed through their middle.
- ▶ Lift drums using forklift forks.



## 9.39.10 Winding ropes

Hoisting ropes will only work smoothly if they are laid without twisting and without external damage.

---

### NOTICE

Wire ropes are not handled correctly!  
Ropes may become damaged.

- ▶ Wind ropes in accordance with the following instructions.
- 

If the winding area of the rope is more in the upper rope layer when operating winches with multiple-layer spooling, the lower rope layer may become loose. This results in a slight ovalisation of the rope that changes the winding diameter across the width of the drum. This leads to gaps in the running rope layer, which impairs the spooling properties and increases rope wear.

---

### NOTICE

Lower rope layer loosened!  
Risk of damage to the rope.

- ▶ Improve the the spooling properties and decrease wear: completely unwind the rope at regular intervals and then wind it up again under pre-tension (1 to 2% of the rope minimum breaking force).
- 

A rope works most economically when its entire length is used. It is therefore recommended that an appropriate length of rope is used for lengthy operations.

Ensure that personal protective equipment is worn at all times.

---

### NOTICE

Incorrect handling of the rope!  
Risk of damage to the rope.

- ▶ The rope must be pulled in under pre-tension when winding up on a winch for the first time. The pre-tensioning force is achieved by braking the drum and must be between 1 to 2% of the rope minimum breaking force.
  - ▶ Do not brake the rope directly.
  - ▶ Do not pull the rope along the ground.
-

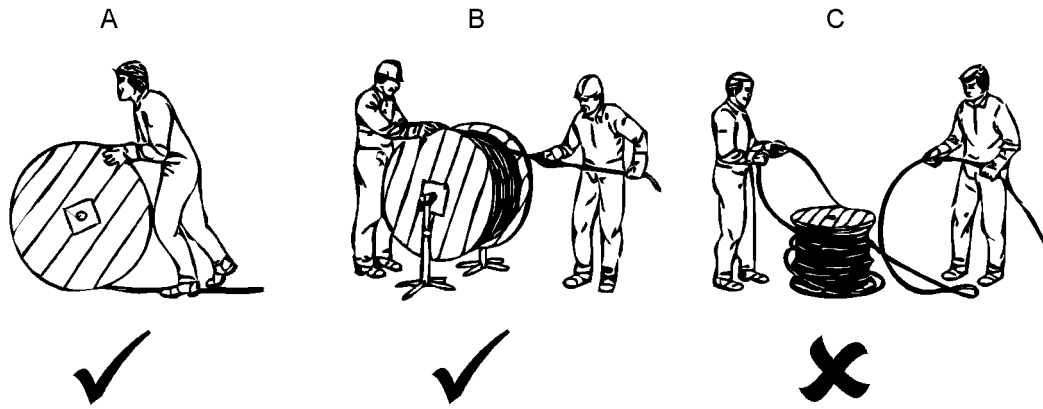


Fig. 3482 Winding ropes without brake

- ▶ Unwind ropes from the rope drum in the winding direction **A**.

Unwinding to the side causes the rope to twist until it is destroyed by kink formation.

- ▶ Unwind ropes from a jacked up drum **B**.

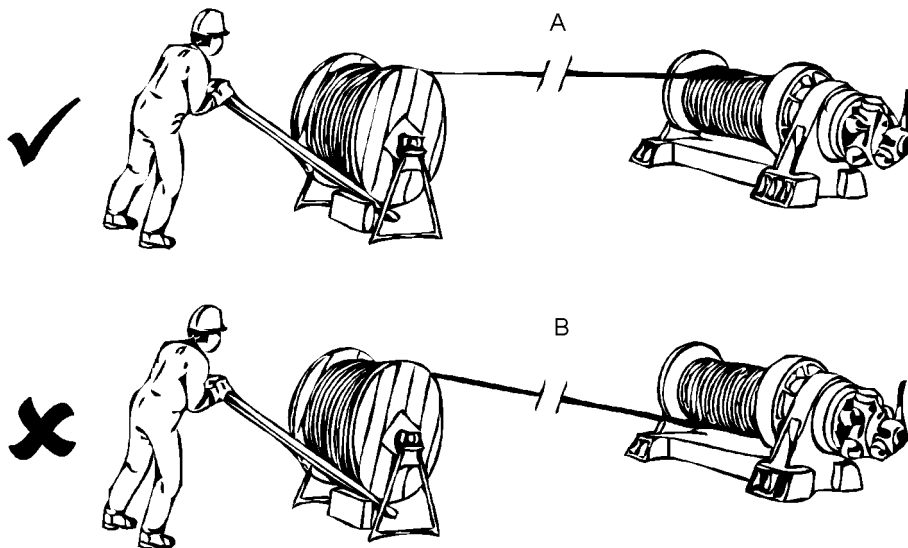


Fig. 3483 Winding ropes with brake

- ▶ Unwind ropes from a drum **A** that is braked.
- ▶ Check the ropes for damage, deformation, wear, etc. while it is unwound.

If the rope shows any signs of damage, deformation, wear, etc.:

- ▶ Remove the rope.

### 9.39.11 Luffing ropes

When luffing a new rope, ensure that the rope is not twisted or untwisted. 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 tensile 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

Ropes fused together!

Risk of breaking as they pass over rollers. Machine and rope may be damaged. Serious injury.

- ▶ Weld on eyelets to connect the two ropes.
- ▶ A rope stocking may be used (the rope stocking manufacturer's instructions must be followed).

#### NOTICE

Rope deflection angle is too large (over 4 °)!

Risk of damage to the rope.

- ▶ Position the pulley some distance away and without any lateral deflection.

Ensure that the following conditions are satisfied:

- The machine is secured to prevent unauthorised operation.
- The boom is lowered.
- The rope is checked before luffing for damage as a result of incorrect handling or storage.
- Protective equipment is worn.



#### WARNING

Sudden and violent movements as the end of the rope comes off the drum!

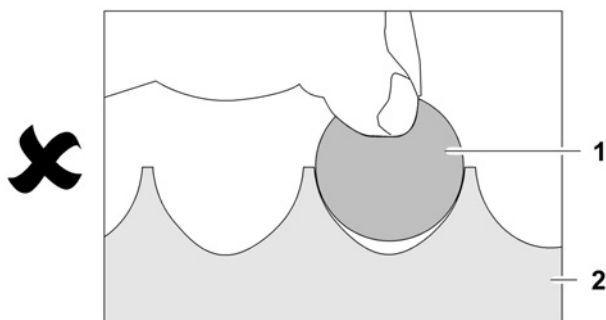
Serious injury.

- ▶ Wear protective equipment.
- ▶ Unreel the rope from the drum carefully and as slowly as possible.
- ▶ Weld on eyelets to connect the two ropes. A rope stocking may be used (the rope stocking manufacturer's instructions must be followed).
- ▶ Use an auxiliary rope or old rope to luff the rope.
- ▶ Before use, check to ensure that the newly fitted wire rope is located correctly in the grooves on drums and pulleys.
- ▶ Have the rope limit switch checked and adjusted by an authorised service engineer.
- ▶ Hoist a light load (up to 10% of full load) several times to check that the wire rope is winding onto the winch drum correctly.



**Troubleshooting**

Is the diameter of the test template not the same as the groove base of the winch drum? Is there a crescent-shaped gap between the test template and the groove base?



*Fig. 3485 Impermissible result when testing the groove base using a test template*

1 Test template

2 Winch drum

- ▶ Remove the rope.
- ▶ Smooth the surfaces of the grooves.
- ▶ Contact Liebherr after sales service.

## 9.41 Rope pulleys

### 9.41.1 Checking all pulleys for ease of movement, signs of wear and damage

#### Check all pulleys for ease of movement

- ▶ Check pulleys for ease of movement.

If the pulleys do not move easily:

- ▶ Lubricate the pulley bearings (For more information see: [9.41.2 Lubricating the pulley bearings, page 1062](#)).

#### Check all steel pulleys for wear

The steel pulleys are checked in exactly the same way as the winch drum groove base, in other words the radius of the grooves is checked using a test template.

The rope grooves often exhibit an imprint corresponding to the negative imprint of the rope in question. The impressions of the individual strands in the rope grooves are normal and not undesirable, since these produce a greater rope support surface, which increases the service life of the rope. When the rope is changed, the ridges must be removed and any sharp edges on the surface of the pulley smoothed.

Ensure that the following conditions are satisfied:

- A suitable test template is available.
- The machine is switched off.
- The machine is secured to prevent unauthorised operation.

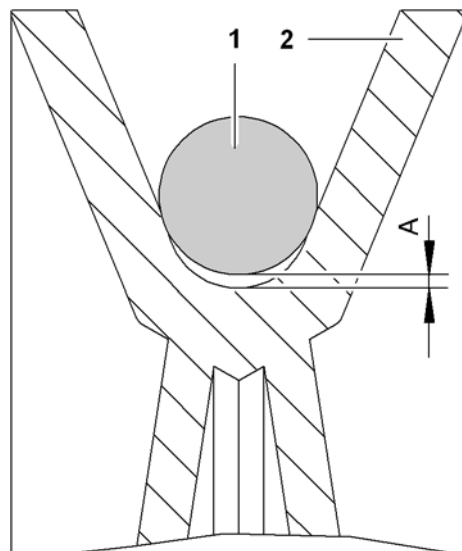


Fig. 3486 Checking steel pulleys for wear

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1 Test template</li> <li>2 Steel pulley</li> </ul> | <ul style="list-style-type: none"> <li>A Maximum permissible wear on pulley</li> </ul> |
|---|--|

The maximum permissible wear **A** is 4% of the nominal rope diameter.

► Use the test template to check the radius of the groove in the pulley.

If the actual wear exceeds the maximum permissible wear:

- Replace the pulley.
- Contact Liebherr after sales service.

## Checking all plastic pulleys for wear

The rope grooves often exhibit an imprint corresponding to the negative imprint of the rope in question. The impressions of the individual strands in the rope grooves are normal and not undesirable, since these produce a greater rope support surface, which increases the service life of the rope. When the rope is changed, the ridges must be removed and any sharp edges on the surface of the pulley smoothed.

Ensure that the following conditions are satisfied:

- A suitable test template is available.
- The machine is switched off.
- The machine is secured to prevent unauthorised operation.

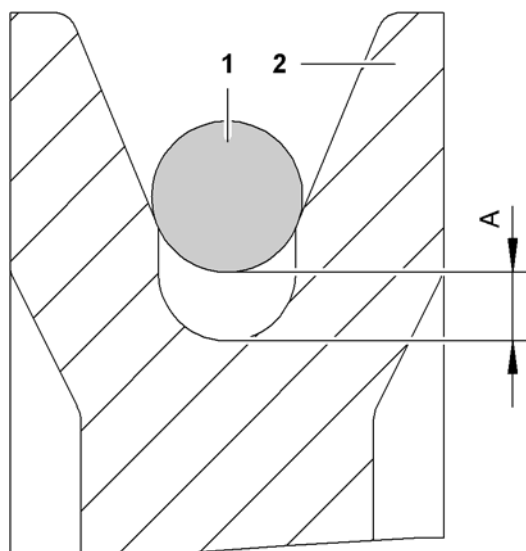


Fig. 3487 Checking plastic pulleys for wear

1 Test template

**A** Maximum permissible wear on pulley

2 Plastic pulley

The maximum permissible wear **A** is 50% of the nominal rope diameter.

► Use the test template to check the radius of the groove in the pulley.

If the actual wear exceeds the maximum permissible wear:

- Replace the pulley.
- Contact Liebherr after sales service.

## Checking all pulleys for damage

### NOTICE

Pulleys placed in the ground without protection!  
Damage to the pulleys.

- ▶ Pulleys must only be laid on the ground with protective equipment.

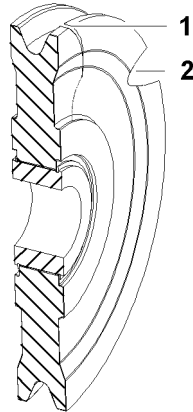


Fig. 3488 Damaged pulley

1 Crack

2 Nicks

The pulleys must be aligned with the running direction of the rope. They must also be in good condition, without wobbles or any other damage.

- ▶ Check pulleys for damage (nicks, wobbles, cracks, notches, etc.).

If the pulley is damaged:

- ▶ Replace the pulley.
- ▶ Contact Liebherr after sales service.

### 9.41.2 Lubricating the pulley bearings

Ensure that the following conditions are satisfied:

- The grease gun from the Liebherr tool kit is present and filled with grease (For more information see: [9.2.3 Lubrication chart, page 934](#)).
- The machine is switched off.
- The machine is secured to prevent unauthorised operation.
- The boom is laid down.

Ensure that the grease does not escape from or between the pulley bearings.

- ▶ Using the grease gun, press 0.02 lb of grease onto the grease nipple.

### 9.41.3 Checking the bearing for proper seating and position

- ▶ Check the bearing for proper seating and position.

If the seating and position of the bearing or circlip is not correct:

- ▶ Correct the seating and position of the bearing.
- ▶ Contact Liebherr after sales service.



### 9.41.4 Cleaning plastic pulleys

---

**NOTICE**

Using 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 rope pulleys using a cleaning cloth and authorised cleaning agents.

### 9.41.5 Checking rope pulley for tight fit

- ▶ Check rope pulley for tight fit.

If the rope pulley is loose:

- ▶ Contact Liebherr after sales service.

## 9.42 Rope suspension and rope fixation

### 9.42.1 Checking the rope suspensions (rope clamps) for wire breaks

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.

## 9.42.2 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

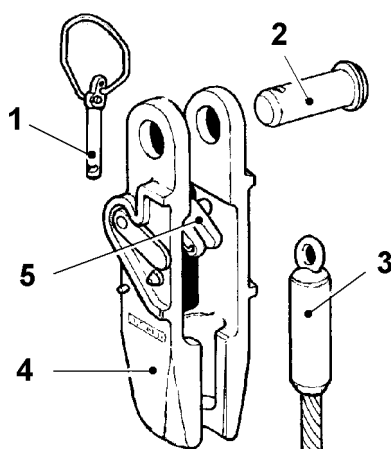


Fig. 3489 Pocket lock

- |   |                       |   |              |
|---|-----------------------|---|--------------|
| 1 | Linch pin             | 4 | Pocket lock  |
| 2 | Fastening pin         | 5 | Safety latch |
| 3 | Wire clamp or ferrule |   |              |

- ▶ Check the pocket lock 4 for cracks and corrosion.
- ▶ Check the pocket lock 4 for the correct functioning of the self-locking safety latch 5.
- ▶ Check the ease of movement of the safety button for the safety latch 5.
- ▶ Check that the fastening pin 2 is present.

If the pocket lock is damaged or faulty in any way:

- ▶ Replace the pocket lock.

### 9.42.3 Checking the rope fixing point

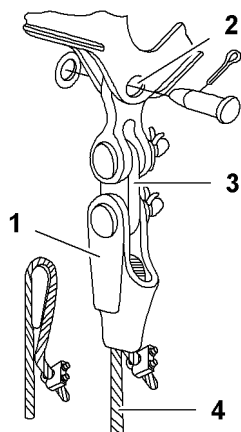


Fig. 3490 Rope lock and rope fixation

- |   |               |   |                        |
|---|---------------|---|------------------------|
| 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.

## 9.42.4 Checking the thimble connection

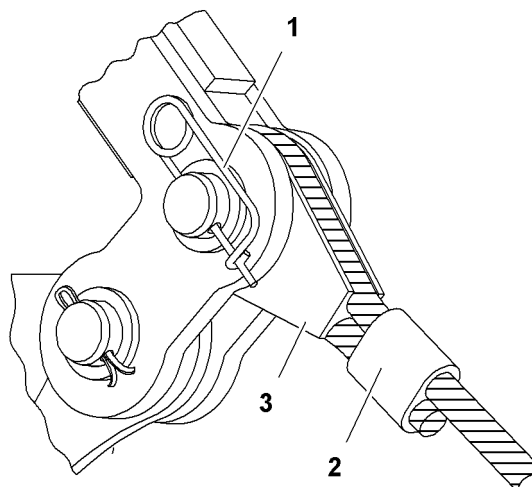


Fig. 3491 Rope thimble with ferrule

- |   |                      |   |              |
|---|----------------------|---|--------------|
| 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.

## 9.43 Operator's cab

### 9.43.1 Check the windows of the cab for damage

- ▶ Check the windows of the cab for damage.
- If any of the cab windows are damaged:
- ▶ Change the window.
  - ▶ Contact Liebherr after sales service.

### 9.43.2 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 the hinges with adhesive lubricant.
  - ▶ 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.

### 9.43.3 Changing the windscreen wipers

Ensure that the following conditions are satisfied:

- 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.
-

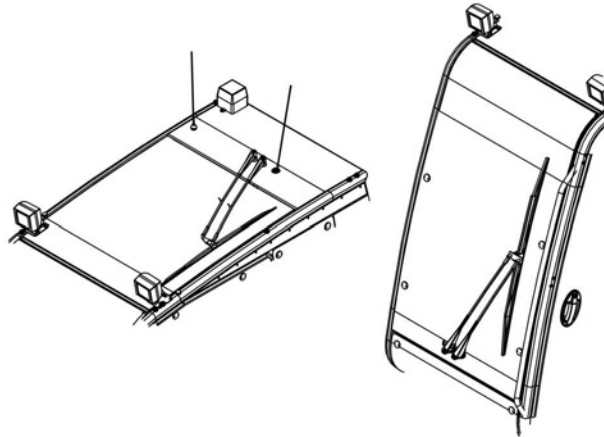


Fig. 3492 Windscreen wiper

- ▶ Hold the screw with the open spanner and undo the nut using the ring spanner.
- ▶ Change 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 the nut using the ring spanner.

### 9.43.4 Filling the windscreen cleaning system

Ensure that suitable windscreen cleaning fluid is available.

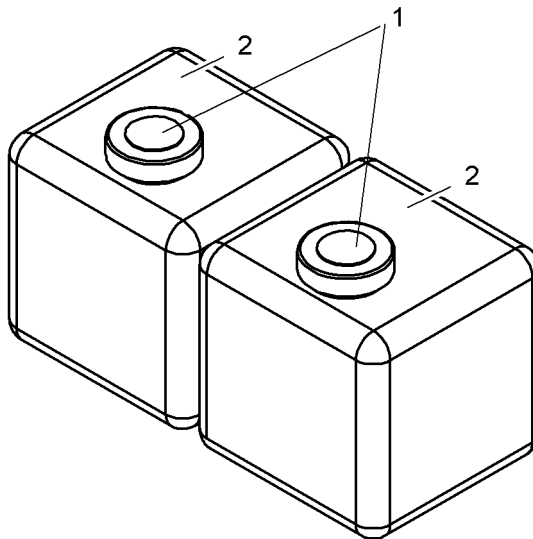


Fig. 3493 Windscreen wiper system containers

- |               |             |
|---------------|-------------|
| 1 Sealing cap | 2 container |
|---------------|-------------|

The containers are behind the operator's seat in the cab.

- ▶ Open the cover 1.

---

**NOTICE**

Unsuitable windscreen washer fluid!  
Damage to the system.

- ▶ Fill the container **2** with suitable windscreen washer fluid only.
- 

- ▶ Top up the windscreen washer fluid in the containers.
- ▶ Close the cover **1**.
- ▶ If necessary clean the windscreen wiper nozzles on the windscreen wipers with a needle.

## 9.43.5 Checking the outside and inside mirrors for damage

- ▶ Check the outside and inside mirrors for damage.

If the mirrors are damaged or do not remain fixed in position:

- ▶ Replace the mirror.
- ▶ Tighten the set screws.
- ▶ Contact Liebherr after sales service.

## 9.43.6 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 cab 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 the adjustment cylinder, hydraulic hoses and connections for leaks and damage

- ▶ Check the adjustment cylinder, hydraulic hoses and connections for leaks and damage.

If the adjustment cylinder, hydraulic hoses and connections are leaking or damaged:

- ▶ Do not operate the hydraulic cab tilting device.
- ▶ Contact Liebherr after sales service.



## 9.43.7 Checking the operation of the hydraulic cab elevation (system)

### Checking the operation of the acoustic warning signal

When the safety lever is folded up, the acoustic warning signal must sound when the cab 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 the safety chain is missing, damaged or faulty in any way:

- ▶ Do not operate the hydraulic cab elevation (system).
- ▶ Contact Liebherr after sales service.

## 9.44 Operator`s seat

### 9.44.1 Checking that the driver's seat works properly

- ▶ Check that the driver's seat works properly ([For more information see: 4.2.1 Adjusting the driver's seat, page 407](#)).

If the driver's seat is damaged or faulty in any way:

- ▶ Contact Liebherr after sales service.



## 9.46 Machine care

### 9.46.1 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  $\leq 12$ .
- 

Ensure that the following conditions are satisfied:

- The machine is switched off and secured to prevent unauthorised operation.
- The machine has cooled down.
- The battery main switch is switched off.
- The boom is laid down.



#### CAUTION

Hot steam and compressed air!  
Risk of burns.

- ▶ Wear protective equipment.
- 

The machine may only be cleaned with a maximum pressure of 2,175.56 psi at a distance of at least 1' 4" ft-in.

The water jet must not be directed onto the following components:

- Intake manifolds for drawing air to cool the engine
- machinery room
- Electrical plug-in connections
- Cab 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.
-

## 9.46.2 Preserving the machine

Ensure that the following conditions are satisfied:

- Suitable preservation agents are available in sufficient quantities ([For more information see: 9.2.8 Preservation medium \(anti-corrosion coating\), page 944](#)).
- The appropriate tools and accessories are available.
- The machine is switched off and secured to prevent unauthorised operation.
- The battery main switch is switched off.
- Protective equipment is worn.



---

### WARNING

Insufficient or incorrect preservation agents are applied to the machine!  
Risk of injury to the respiratory tract, suffocation.

▶ Wear breath protection.

---

- ▶ Spray all machined, but unpainted, parts external to the machine (e.g. pins, bearings, pivot points) with LPS PROCYON anti-corrosion coating agent.
- ▶ Spray all machined, galvanised, but unpainted, parts within the machine (e.g. flanges, pins, screws, joints, casings, contact surfaces) with MOLECULAR NATO FLUID anti-corrosion coating agent.
- ▶ Spray the entire engine compartment with MOLECULAR NATO FLUID anti-corrosion coating agent.
- ▶ Spray electrical components inside switch cabinets and terminal boxes as well as plug-in connections and limit switches with LPS 1 anti-corrosion coating agent.
- ▶ Spray all screws on railings, boom walkways, steps, moving parts and flood-lights with LPS 3 anti-corrosion coating agent.



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