en

LIEBHERR

Operator's manual

Mobile crane

LTR 1150

LTR-0307-0-000

www.liebherr.com

Document ID

	ORIGINAL OPERATOR'S MANUAL
Order number:	1030700-03-02
Author:	LWE – VDO

Product ID

Product type:	Mobile crane
Product designation:	LTR 1150
Item code:	LTR-0307-0-000

Manufacturer

Liebherr-Werk Ehingen GmbH
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Germany
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www.liebherr.com

For proper and safe use, follow these instructions!
Carry this document along within reach!

California Proposition 65

California Proposition 65 of the US state of California warns against chemicals that are known to cause cancer and birth defects or other reproductive harm.

For additional information, see the website: **www.P65Warnings.ca.gov**

Proposition 65

WARNING: This product can expose you to chemicals, which are known to the State of California to cause cancer and birth defects or other reproductive harm.

- Avoid direct contact with chemicals.
- Use personal protective equipment: Always wear protective gloves.
- After handling: Wash hands thoroughly.
- Dispose of chemicals in an environmentally acceptable manner according to local regulations.

For more information see: www.P65Warnings.ca.gov.

Example of a Proposition 65 sign for USA: Chemicals

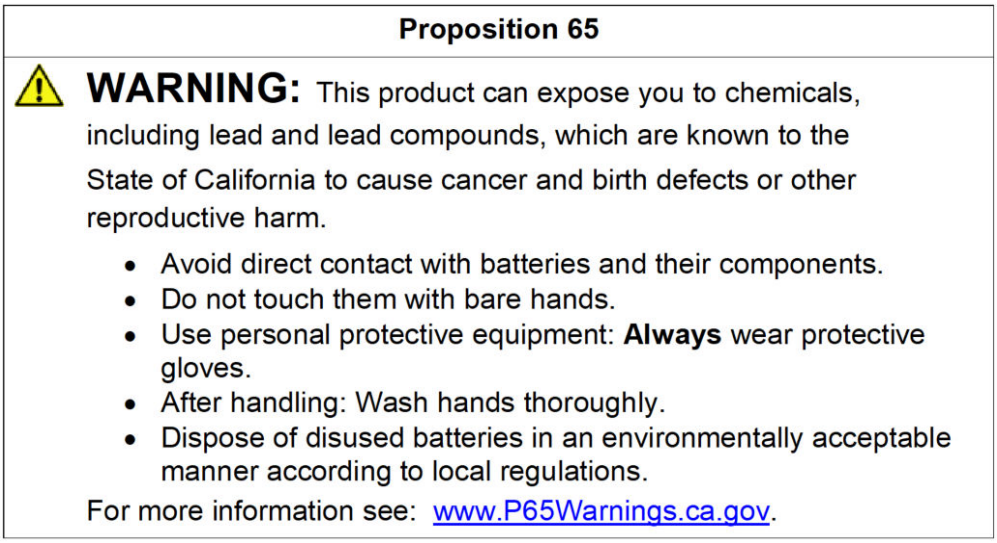
Proposition 65

WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information see: www.P65Warnings.ca.gov/diesel.

Example of a Proposition 65 sign for USA: Diesel exhaust emissions



Example of a Proposition 65 sign for USA: Lead and lead compounds

Contents

1 Intended use

Everyone who is involved in the use, operation, assembly and disassembly, maintenance and inspection of the mobile crane must read and use the crane documentation.

Only the following represents intended use:
- Lifting and lowering non-fixed loads vertically.
- Moving loads using the devices specified according to the crane documentation.
- Drive the mobile crane with a suitable view or with a guide.
- Drive the mobile crane with the equipment in place or with a suspended load only when the corresponding charts are available.

To do so, the weight, center of gravity and wind-exposed surface of the load must be known and observed. Permissible movement speeds and delay times must be observed.

The mobile crane is used as intended when the following specifications and prerequisites are observed:
- Only operate the mobile crane according to the set up configurations described in the crane documentation and that can be selected in the mobile crane control.
- The entries and settings in the mobile crane control match the set up configuration of the mobile crane.
- The crane documentation includes: Operating instructions, use of load charts, load charts, maintenance and inspection, wind speed charts, erection and take-down charts, Crane Planner, assembly plans, rod plans, reeving plans, rigging plans.
- Comply with the crane documentation and the safety regulations, conditions, prerequisites, set up conditions and work steps it contains.
- Operate the mobile crane within the permissible limit values, for example in compliance with the classification according to ISO 4301-1 and categorization according to ISO 4301-2 (→ 4.8.1 Operating and load conditions, p. 91).
- Operate the mobile crane within the permissible limit values for the ambient temperature (→ 5.13.3 Material load due to extreme temperatures, p. 191).
- Operate the mobile crane on ground that is suitable for the applied loads.
- Only allow access to the mobile crane and operation of the mobile crane by authorized and trained personnel.
- Operate the mobile crane in a safety and danger conscious manner.
- Operate the mobile crane in a perfect technical condition.
- The mobile crane does not have safety-relevant problems.
- The roles of the people located near the mobile crane are defined according to the crane documentation and known to all involved personnel.
- All involved personnel fulfill the personnel requirements according to their roles in the crane documentation.
- All involved personnel are aware of their areas of responsibility according to their roles in the crane documentation.
- All involved personnel act in a safety and danger conscious manner.
- Perform the maintenance and inspection work according to the specifications in the crane documentation. Have the required service work performed.
- Only use the equipment parts, components, spare parts and operating fluids approved in the crane documentation. This also applies for load hooks and hook blocks.
- Comply with the national and regional regulations, for example regarding periodic inspections, safety distances when working with the mobile crane, permissible travel conditions including axle loads for on-road driving.

Any other use or any use that exceeds what is indicated without the written declaration of consent from the manufacturer is unintended use.

2 Unintended use

The manufacturer is **not** liable for damage caused by unintended use or improper use of the crane. Any associated risk is the sole responsibility of the owner, the operating company, the crane operator or the responsible person appointed by the operating company.

Unintended use includes, but is not limited to, the following:
- Operating the crane in a potentially explosive atmosphere.
- Operating the crane for dynamic uses, for example soil compaction, demolition balls.
- Using the crane at sports and recreational events, for example “bungee jumping” or “Dinner in the sky®” / “suspended restaurants”.
- Unloading or loading the crane suddenly, for example: Grab or dumping operation.
- Using the crane when the weight of the load is suspended on the crane is changed, for example by filling a container suspended on the load hook.
- Operation on a floating device if the conditions in chapter “Crane on a floating device” are not fulfilled and the written release by Liebherr-Werk Ehingen GmbH is not present.
- Operation of the crane when there are additional persons in addition to the crane operator outside of the crane cab, on the crane or in the danger zone. Exceptions to this are procedures allowed in the crane documentation.
- Pushing, pulling or lifting objects with the level control, sliding beams, track width adjustments or the support cylinders.
- Rubbing or transversely pulling a load.
- Transporting personnel outside the driver's cab or in the crane cab.
- Transporting personnel with the carrying equipment or load handling equipment or on the load.
- Transporting personnel with work baskets, if the national and regional regulations are not observed, for example the responsible work safety organization.
- Transporting loads and objects on or to the side of the crane. Exceptions to this are the intended positions.

3 Notes on the documentation

3.1 Applicable documents

This document is an integral part of the crane documentation.

All other supply documents are valid only in connection with these crane operating instructions.

Note
Replacement copies of the documents can be requested from customer service.

▶ Contact Customer Service at Liebherr-Werk Ehingen GmbH.

3.2 Components of the crane documentation

Note

Content of the crane documentation supplied for the respective crane: (→ Separate document “Crane documentation content”)

Mobile crane operating instructions

Attachment to the mobile crane operating instructions
- Supplementary documents to the operating instructions
- Manufacturer attestations (declarations of conformity, for example)

Chart manuals:
- *Load charts* for all crane set up configurations and their explanation in *Use of load charts*
- Wind speed charts for cranes out of operation
- Driving charts for the crane with equipment in place
- Erection and take-down charts [1)]

Maintenance and inspection:
- Maintenance activities for maintenance personnel
- Inspection activities for the authorized inspector

Spare parts catalog

Component documentation:
- Documents for components, engine operating instructions for example

Technical information:
- Additional information about the crane, for example the wiring diagrams

[1)] Only for certain crane types

3.3 Availability of the crane documentation

Pressed

A part of the mobile crane documentation is supplied in paper form with the crane.

On the supplied data carrier

The crane documentation is stored on the provided data carrier.

Online

The crane documentation is available on MyLiebherr (www.myliebherr.com).

3.4 Current version of crane documentation

Make sure that the following specifications are adhered to:
- All involved personnel know the latest version of the crane documentation and comply with the regulations.
- All subsequently supplied information, updates and addenda for the crane documentation are enclosed and complied with.

So that the crane documentation is always complete and is up to date:
- Do not remove individual documents.
- Reprint any missing, illegible pages from the digital crane documentation and replace or request it from customer service at Liebherr-Werk Ehingen GmbH.
- Immediately integrate new documents that were sent in the case of conversion work.
- Replace the changed documents and destroy the old version (especially for load charts).
- Always replace the digital crane documentation with the new version, for example from the change documents.
- If the crane documentation is in multiple languages, update all languages to the latest version.

If there is any doubt regarding if the crane documentation is **not** up-to-date: Do **not** operate the crane. Contact Customer Service at Liebherr-Werk Ehingen GmbH.

3.5 Storing the crane documentation

Observe the following rules for storing the crane documentation:
- The crane documentation must be kept for the entire service life of the crane.
- The crane documentation required for the respective use case must be present on the crane.
- The crane documentation must be given to the next owner.

3.6 Using the crane documentation

The crane documentation, and the national and regional regulations must be observed.

The crane documentation is based on the prerequirement that the crane is used only as intended.

The crane documentation:
- Indicates how to use the crane safely
- Supports the operators in using the permissible application possibilities of the crane
- Provides information about the functionality of important components and systems

Using the crane documentation:
- **Makes it easier** to become familiar with the crane.
- **Avoids** problems due to improper operation.

Observing the crane documentation:
- **Increases** reliability of use.
- **Extends** the service life of the crane.
- **Minimizes** repair costs and downtime.

If you find any errors or if any misunderstandings arise when reading the crane documentation, contact Liebherr-Werk Ehingen GmbH immediately.

3.7 Gender note

For reasons of better legibility, gender-differentiating formulations are not used. In accordance with equal treatment, all references to persons and personal nouns apply to all genders. The language form was abbreviated for editorial reasons and is unbiased.

3.8 Display conventions

3.8.1 Illustrations

The illustrations in these operating instructions provide information and principles and do not necessarily represent the crane equipment.

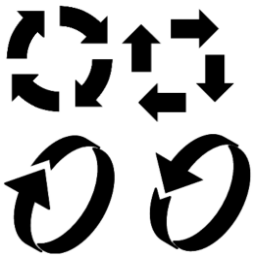
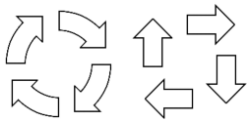
3.8.2 Icon explanation

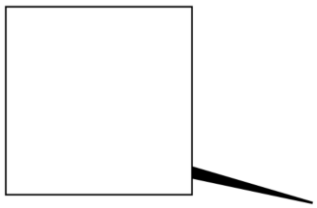
3.8.2.1 Text elements

Symbol	Meaning
*	Optional equipment and functions
❑	Prerequisite
▶	Operation / specification
▷	Result
→	Reference to another text passage or a separate document
ⓘ	Indication of useful information and tips

Tab. 1: Symbol meaning: Text elements

3.8.2.2 Graphic elements

Icons	Meaning
	Operation request: The arrow shows the movement path from-to.
	Operation result: The arrow shows the movement path from-to.
1 2 3	Operation sequence, main steps
A B C	Indicates variations.
1 2 3	Illustration within a display
X Y Z	Emphasize details within a display
❶ ❷ ❸	Operation sequence, sub-steps

Icons	Meaning
① ② ③	Operation results of the sub-steps
	Display: correct execution
	Display: incorrect execution
	Indicates a hazard area on the crane.
	Detail of a component
	Reference number for components
	Location number

Tab. 2: Symbol meaning: Graphic elements

3.9 Types of safety information

The safety messages are directed to all persons who work with the crane or are located nearby.

3.9.1 Basic safety instructions in the “Safety” chapter

The basic safety instructions provide the basis for safe and problem-free crane operation.

3.9.2 Section-related safety instructions

Section-related safety instructions supplement the basic safety instructions of the “Safety” chapter. The section-related safety instructions must also be complied with.

The section-related safety instructions are marked as follows:

⚠ **This section supplements the “Safety” chapter.**

Tab. 3: Additional safety instructions

3.9.3 Safety messages

The safety messages are categorized by the following signal words:
- **DANGER**
- **WARNING**
- **CAUTION**
- **NOTICE**

The signal words direct the attention of all people that are working with the crane or are located nearby to certain important rules of conduct.

Warning signs	Signal word	Explanation
⚠	**DANGER**	Indicates an imminent hazardous situation that, if not avoided, will lead to death or a serious injury [A)] .
⚠	**WARNING**	Indicates a possibly hazardous situation that, if not avoided, can lead to death or a serious injury [A)] .
⚠	**CAUTION**	Indicates a possibly hazardous situation that, if not avoided, can lead to minor or moderate injury [A)] .
	NOTICE	Indicates possible property damage.

Tab. 4: Structure of the safety messages

A) Property damage can also result.

3.9.4 Embedded safety messages

Embedded safety messages remind of known hazards. The danger is avoided by following the operating steps.

Embedded safety messages appear directly before the dangerous operation:

▶ Release the spring pin.

▶ Pull the spring pin down with one hand.
⚠ **Danger of crushing! The support swings!**
▶ Until the spring pin engages: Swing the support out with the other hand.
▶ Secure the spring pin.

Tab. 5: Exemplary illustration: Embedded safety message

3.10 Conversion chart

	Initial unit	Multiplication factor	Target unit
Length	mm	0.03937	in
	in	25.4000	mm
	mm	0.00328	ft
	ft	304.8	mm
	cm	0.39370	in
	in	2.5400	cm
	cm	0.0328	ft
	ft	30.48	cm
	m	39.37	in
	in	0.0254	m
	m	**3.281**	**ft**
	ft	**0.3048**	**m**
	km	0.62137	mile
	mile	1.6093	km
Area	cm^2	0.155	in^2
	in^2	6.4516	cm^2
	m^2	**10.764**	**ft^2**
	ft^2	**0.0929**	**m^2**
Volume	cm^3	0.06102	in^3
	in^3	16.387	cm^3
	m^3	35.3147	ft^3
	ft^3	0.0283	m^3
	l	0.001	m^3
	m^3	1000	l
	l	61.024	in^3
	in^3	0.016387	l
	l	0.0353	ft^3
	ft^3	28.32	l
	l	0.264178	US. liq. gal
	US. liq. gal	3.7853265	l
Weight (mass)	kg	2.20462	lb
	lb	0.45359	kg
	t	**2204.62**	**lb**
	lb	**0.0004536**	**t**
	t	1.1023	short ton US (tn. sh.)
	short ton US (tn. sh.)	0.90718	t

	Initial unit	Multiplication factor	Target unit
	t	**0.45359**	**kip**
	kip	**2.20462**	**t**
Weight/length	kg/m	0.055998	lb/in
	lb/in	17.857781	kg/m
	kg/m	0.67197	lb/ft
	lb/ft	1.48816	kg/m
Force	N	0.2248	lbf
	lbf	4.4483986	N
	kN	**224.809**	**lbf**
	lbf	**0.0044483986**	**kN**
Turning moment	Nm	8.85075	lbf·in
	lbf·in	0.112984	Nm
	Nm	0.73756	lbf·ft
	lbf·ft	1.3559	Nm
Performance	HP (DIN HP)	0.7355	kW
	kW	1.3596	HP (DIN HP)
Speed	m/s	39.37	in/s
	in/s	0.0254	m/s
	m/s	**3.28084**	**ft/s**
	ft/s	**0.3048**	**m/s**
	km/h	0.62137	mph (mi/h)
	mph (mi/h)	1.60935	km/h
	m/s	2.2369	mph (mi/h)
	mph (mi/h)	0.44704	m/s
Acceleration	m/s^2	0.1019	g
	g	9.81	m/s^2
	ft/s^2	0.03108	g
	g	32.17	ft/s^2
Pressure	kPa (kN/m^2)	0.01	bar
	bar	100	kPa (kN/m^2)
	bar	14.5038	psi
	psi	0.06895	bar
	kPa (kN/m^2)	**0.145038**	**psi**
	psi	**6.894759**	**kPa (kN/m^2)**
	N/cm^2	1.450377	psi
	psi	0.6894759	N/cm^2
	N/m^2	0.000145038	psi
	psi	6894.759	N/m^2

	Initial unit	Multiplication factor	Target unit
	t/m^2	204.81	lb/ft^2
	lb/ft^2	0.0048828	t/m^2
Load-related area	m^2/t	0.004882	ft^2/lb
	ft^2/lb	204.81	m^2/t
Temperature	**°C**	**([°C] · 1.8) + 32**	**°F**
	°F	**([°F] - 32) / 1.8**	**°C**

Tab. 6: Conversion chart

3.11 Abbreviations and technical terms

3.11.1 General abbreviations

Abbreviation	Meaning
DIN	Deutsches Institut für Normung
EN	European Standard
ISO	International Standardization Organization
LWE	Liebherr-Werk Ehingen GmbH

Tab. 7: General abbreviations

3.11.2 Crane abbreviations

Abbreviation	Meaning
HEST	High exhaust temperatures (High Exhaust System Temperature)
LEC	Liebherr error code (Liebherr Error Code)
LICCON	Liebherr Computed Controlling (mobile crane control)
LMB	Overload protection
LSB	Liebherr System Bus
MIL	Exhaust aftertreatment (Malfunction Indicator Light)
RSL	Engine stop (Red Stop Light)
WT	Net weight without auxiliary weights (Tare weight)
WT-MAX	Maximum permissible net weight

Tab. 8: Crane abbreviations

3.11.3 Technical terms

Technical term	Meaning
Main boom	Telescopic boom and telescopic boom extension
Auxiliary boom	Folding jib, special folding jib, boom nose, fixed lattice jib, luffing lattice jib, strong lattice jib, auxiliary jib
Boom system	Main boom and auxiliary boom
Equipment	The equipment items are components that can be assembled and disassembled on the mobile crane.
Attachment parts	For example, boom head camera, cable drum, airplane warning light, wind speed sensor, hoist limit switch weight with chain
Crane Planner	Software for planning crane applications.

Tab. 9: Technical terms

4 Product description

4.1 Data tag

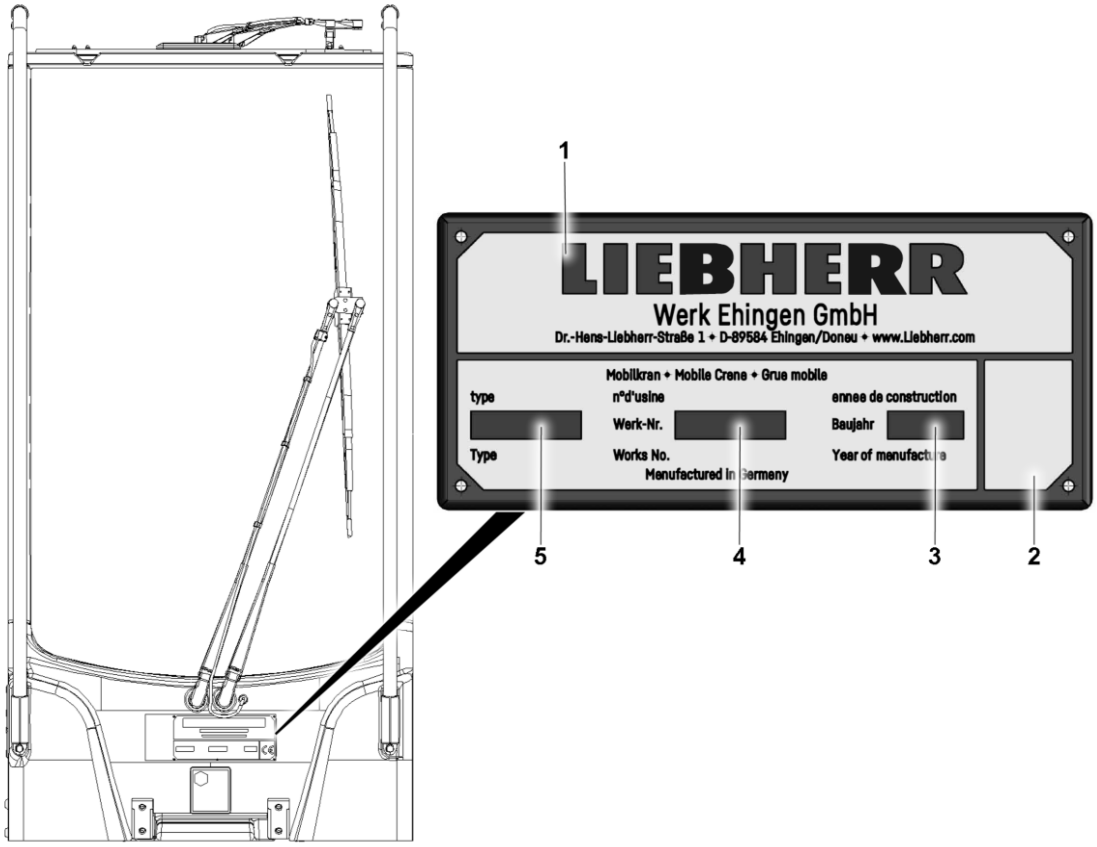


Fig. 32: Exemplary illustration: Data tag

1 Manufacturer
2 Markings
3 Year of construction
4 Plant number
5 Type

4.1.1 Possible markings on the data tag

Depending on the regulation at the moment the crane is placed on the market, the data tag contains one of the following markings:

CE marking

Combined CE and UKCA marking

EAC marking

Without marking

4.1.2 Marking

4.1.2.1 CE marking

The CE marking is a mark according to EU laws:
- Cranes with CE markings are compliant with the European Directives of the European Union (EU) applicable at the moment of placing the cranes on the market, and in particular European Machinery Directive 2006/42/EC and product standard EN 13000.
- Cranes that are operated outside the respective area of application of the European Machinery Directive do not require a CE marking.
- It is prohibited to market and operate cranes without a CE marking, and which do not meet the product-specific regulations valid in Europe, when a CE marking is specified for the country, especially in the single European market.
- European Union Directives prohibit operating cranes with a tipping load utilization of 85 % or a bypass device that does not comply with EN 13000 within the European Union or in countries that only permit a lower tipping load utilization! The local regulations apply. Cranes that do not comply with EN 13000 may not have the CE marking and may not be operated in the European Union.

4.1.2.2 UKCA marking

The UKCA marking is a mark according to the regulations of the United Kingdom (UK):
- UKCA marking (UK Conformity Assessed) is the British product marking for placing products on the market in Great Britain (England, Scotland and Wales). The CE marking still applies for North Ireland.
  Cranes with UKCA markings are compliant with the Directives of the United Kingdom applicable at the moment of placing the cranes on the market.

In the case of a combined CE/UKCA marking, a tag is applied in the crane cab with the name and address of the GB agent.

Fig. 37: Sign: Address GB authorized agent

4.1.2.3 EAC marking

The EAC marking is a mark according to the Commonwealth of Independent States (CIS):
– Cranes with EAC markings are compliant with the Directives of the GUS applicable at the moment of placing the cranes on the market.

4.1.2.4 Without marking

Cranes that are operated outside the respective area of application of the EU, CIS or UK are subject to the marking provisions applicable at the moment of placing the cranes on the market.

4.2 EU Declaration of Conformity

Upon delivery of the equipment with a CE marking, the EU Declaration of Conformity according to Directive 2006/42/EC is provided directly after the cover sheet of the crane operating instructions. The EU Declaration of Conformity is valid in the following form and language in all countries of the European Union, as well as in countries that recognize the Directives of the European Union. Keep the EU Declaration of Conformity in a safe place.

Note

- This declaration of conformity is only valid when this mobile crane meets the directives and standards stated in this EU Declaration of Conformity. This applies especially for the programming and function of the safety-relevant overload protection. The CE-marking must be removed if changes were made to the crane that do not conform to the stated directives and standards. These include in particular a tipping load utilization (85 % load charts) that are not permissible in Europe and a changed version of the bypass device for the overload protection.
- If this modified mobile crane is re-imported later into a country that is within the validity range of the EC machine directive, then the importer is responsible for the verification and the written confirmation that the condition of the mobile crane upon import into the EC meets the directives and standards stated in this declaration of conformity.
- The complete crane documentation must be complete and present in the official language of the community of the member state in which the machine is placed into service and / or where it is operated.
- For the verification and confirmation we recommend that the importer contacts the crane manufacturer or a person authorized by him.
- After written confirmation of the importer and the mobile crane manufacturer, the mobile crane may be labeled again with a CE marking and the EU Declaration of Conformity becomes valid again. Therefore the directives and standards valid at initial delivery continue to apply for this crane.

LIEBHERR

Original

EU-Declaration of Conformity

CE

If changes are made to the machinery that were not approved in writing by Liebherr-Werk Ehingen GmbH, then this EU declaration of conformity becomes invalid.
This declaration of conformity is issued under the sole responsibility of the manufacturer.

Designation:	Mobile crane
Type:	_0001_
Serial number:	_0002_
Year of construction	_0003_
Nominal power of the diesel Engine:	_0004_ [kW] / _0005_ [rpm]
Representative measured sound power level L_{WA} [1]:	_0006_ [dB]
Guaranteed sound power level L_{WA} [1]:	_0007_ [dB]

We herewith declare that the above declared machine in its delivery condition complies with all relevant provisions of the following EU directives.

1 EU Directives

1.1 Directive 2006/42/EC of the European Parliament on machinery
1.2 Directive 2005/88/EC of the European Parliament amending the Directive 2000/14/EC relating to noise emission[1]
1.3 Directive 2014/53/EU of the European Parliament relating to the making available on the market of radio equipment

Applied evaluation procedure according to Annex VIII of Directive 2000/14/EC
Notified body: TÜV SÜD Industrie Service GmbH, Westendstrasse 199, 80686 München, Germany;
Identification number: 0036

2 Applied harmonized standards

2.1 EN 13000:2010+A1:2014 Cranes – Mobile cranes

Manufacturer: Liebherr-Werk Ehingen GmbH, Dr.-Hans-Liebherr-Straße 1, 89584 Ehingen/Donau, Germany.

Person authorised to compile the technical file: Bernd Boos, Dr.-Hans-Liebherr-Straße 1, 89584 Ehingen/Donau, Germany, bernd.boos@liebherr.com.

Bernd Boos
Head of Engineering Department

Ehingen, xx.xx.xxxx

[1] during crane operation

Fig. 38: Exemplary illustration of the crane's EU Declaration of Conformity

4.3 UK Declaration of Conformity

Upon delivery of the equipment with a UKCA marking in Great Britain, the UK Declaration of Conformity according to The Supply of Machinery (Safety) Regulations 2008 is provided directly after the cover sheet of the crane operating instructions. The UK Declaration of Conformity is valid in the following form and language in Great Britain (England, Scotland and Wales). Keep the UK Declaration of Conformity in a safe place.

For cranes with CE/UKCA marking that are not delivered to Great Britain: If necessary, please request a UK Declaration of Conformity from customer service at Liebherr-Werk Ehingen GmbH.

Note

- This declaration of conformity is only valid when this mobile crane meets the directives and standards stated in this UK Declaration of Conformity. This applies especially for the programming and function of the safety-relevant overload protection. The UKCA marking must be removed if changes were made to the crane that do not conform to the stated directives and standards.

LIEBHERR

Original

UK-Declaration of Conformity

UK CA

If changes are made to the machinery that were not approved in writing by Liebherr-Werk Ehingen GmbH, then this UK-declaration of conformity becomes invalid.
This declaration of conformity is issued under the sole responsibility of the manufacturer.

Designation:	Mobile crane
Type:	_0001_
Serial number:	_0002_
Year of construction	_0003_
Nominal power of the diesel Engine:	_0004_ [kW] / _0005_ [rpm]
Representative measured sound power level L_{WA} [1]:	_0006_ [dB]
Guaranteed sound power level L_{WA} [1]:	_0007_ [dB]

We herewith declare that the above declared machine in its delivery condition complies with all relevant provisions of the following statutory requirements.

1 Statutory requirements

1.1 The Supply of Machinery (Safety) Regulations 2008, SI 2008 No. 1597
1.2 The Noise Emission in the Environment by Equipment for use Outdoors Regulations 2001, SI 2001 No. 1701
1.3 The Radio Equipment Regulations 2017, SI 2017 No. 1206

Applied evaluation procedure according to Schedule 11 of The Noise Emission in the Environment by Equipment for use Outdoors Regulations 2001, SI 2001 No. 1701[1]
Approved body: TUV SUD BABT Unlimited, Octagon House, Concorde Way, Segensworth North, Hampshire, PO15 5RL, United Kingdom; Identification number: 0168

2 Applied designated standards

2.1 EN 13000:2010+A1:2014 Cranes – Mobile cranes

Manufacturer: Liebherr-Werk Ehingen GmbH, Dr.-Hans-Liebherr-Straße 1, 89584 Ehingen/Donau, Germany.

Authorised representative of the manufacturer and person authorised to compile the technical file:
Liebherr-Great Britain Ltd., Normandy Lane, Stratton Business Park, Biggleswade, SG18 8QB, United Kingdom, contact.ukca.lgb@liebherr.com

Bernd Boos
Head of Engineering Department

Ehingen, xx.xx.xxxx

[1] during crane operation

Fig. 39: Exemplary illustration of the crane's UK Declaration of Conformity

4.4 Data logger

This crane is equipped with a data logger. The data logger is a data recording device.

The recorded data can be read with the respective software.

The following data is recorded, for example:
- Date and time
- Entered set up configuration of the crane
- Actual load
- Percentage of crane utilization
- Boom radius (working radius)
- Main boom angle, auxiliary boom angle
- Total telescopic boom length, length of each telescopic section
- Every actuation of bypass devices

4.5 Telematics modem

This crane is equipped with a telematics modem.

The crane telematics data is sent via mobile radio to the customer portal “MyLiebherr” and can be viewed there.

For activation, a free license must be requested from “MyLiebherr - Licences and Services”-Portal. The license is valid for all company cranes.

If a license is not purchased, the crane does **not** transmit telematic data.

In the case of questions: Contact Customer Service at Liebherr-Werk Ehingen GmbH.

Note

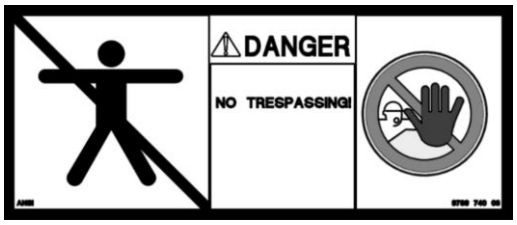
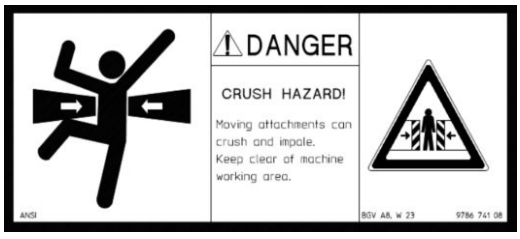
Due to technical reasons, the data transmitted by the modem can differ from the data displayed on the crane.

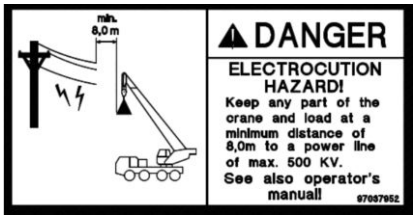
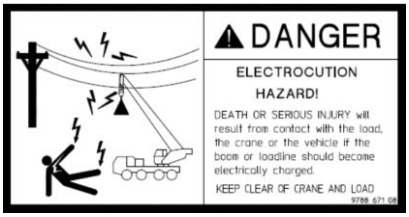
In this case the crane data apply.

4.6 Safety signs on the crane

4.6.1 Safety signs: High degree of risk

Safety signs with a high degree of risk are marked with **DANGER**.

Sign	DANGER
	**Warning:** Danger of crushing due to falling loads or crane movements. **Request:** Do **not** stay in the range of suspended loads or the crane movement range.
	**Warning:** Danger zone **Prohibition:** Access to marked area is prohibited for unauthorized personnel.
	**Warning:** Crushing danger due to moving parts. **Request:** Do **not** stand in the area of moving parts.

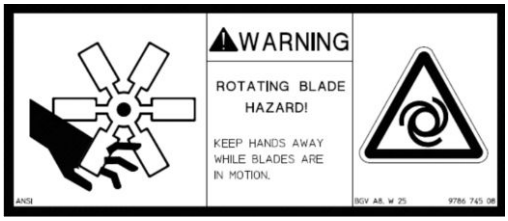
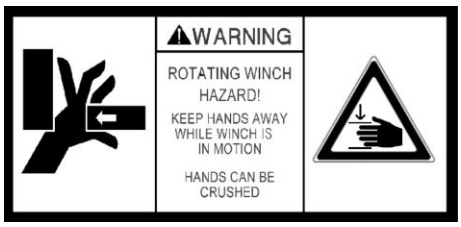
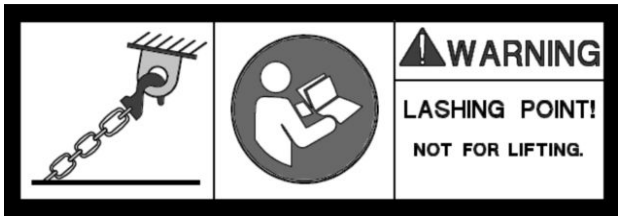
Sign	DANGER
	**Warning:** Danger of being pulled in due to rotating winches. **Request:** Do **not** stand in the area of rotating winches.
	**Warning:** Danger of falling in the marked area. The sign marks the hook positions or safety rope in the immediate vicinity. **Request:** Use a fall arrest system.
	**Warning:** Danger of fatal electric shock. **Request:** Keep a minimum distance of 8 m from current carrying parts of max 500 KV. Observe the operating instructions.
	**Warning:** Danger of fatal electric shock. **Request:** The boom of hoist rope is energized: Stay away from the crane and load.
	**Warning:** Danger of crushing due to movement of the crane cab. **Request:** Maintain a sufficient distance from the moving range of the crane cab.

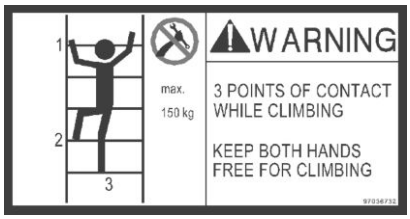
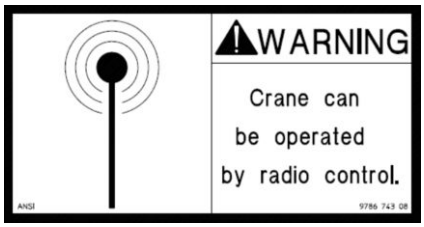
Tab. 10: Safety signs

4.6.2 Safety signs: Medium degree of risk

Safety signs with a medium degree of risk are marked with **WARNING**.

Sign	WARNING
	**Warning:** Danger zone. **Prohibition:** It is prohibited to step on marked surfaces.

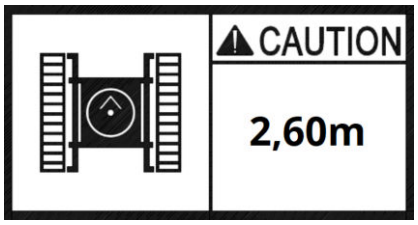
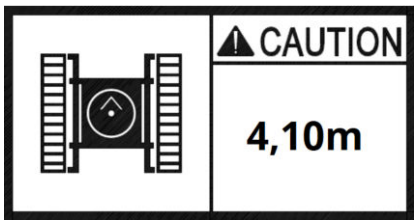
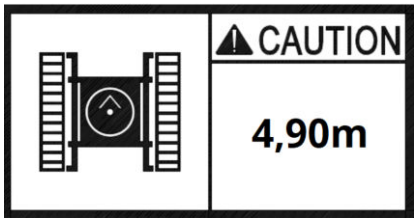
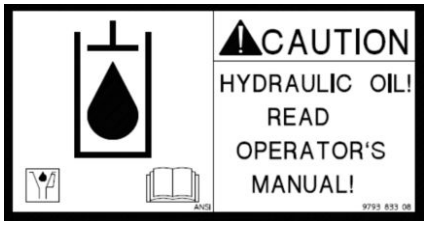
Sign	WARNING
	**Warning:** Hot surfaces in the marked area. **Request:** Do **not** touch hot surfaces.
	**Warning:** Danger of injury in the area of the fan blades. **Request:** Do **not** reach into the area of the turning fan blades.
	**Warning:** Crushing danger for hands due to moving parts. **Request:** Do **not** reach into the area of movement.
	**Warning:** Danger of falling. **Prohibition:** Stepping on the ladder is prohibited.
	**Warning:** Crushing danger for feet. **Request:** Do **not** remain in the danger zone.
	**Warning:** Crushing danger for hands due to turning winches. **Request:** Do **not** reach into the danger zone.
	**Warning:** Incorrect use and overload of the rigging point. **Prohibition:** Use the rigging point for lifting. **Command:** Comply with the information in the operating instructions. **Request:** Use the rigging point only for rigging.

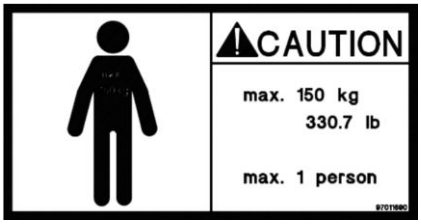
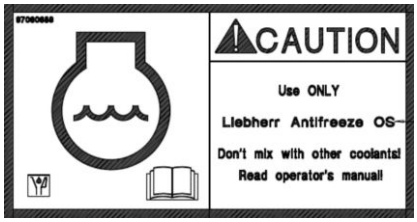
Sign	WARNING
	**Warning:** Danger of falling. **Request:** Use a 3-point support on the ladder. Subject the ladder to a maximum load of 150 kg. Do **not** carry along objects on the ladder.
	**Warning:** The crane is radio remote controlled. **Request:** Pay attention to crane movements.

Tab. 11: Safety signs

4.6.3 Safety signs: Low degree of risk

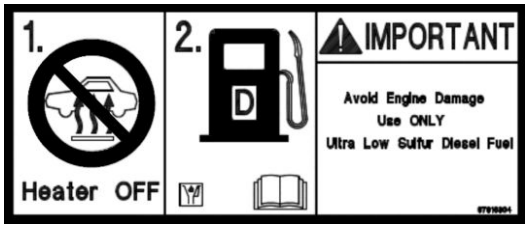
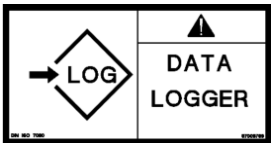
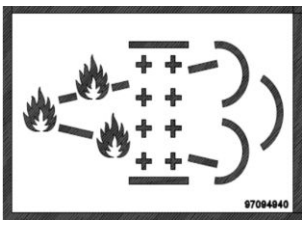
Safety signs with a low degree of risk are marked with **CAUTION**.

Sign	CAUTION
	**Warning:** Narrow track width 2.60 m. **Request:** Observe the space requirement.
	**Warning:** Reduced track width 4.10 m. **Request:** Observe the space requirement.
	**Warning:** Wide track width (4.90 m) **Request:** Observe the space requirement.
	**Warning:** Hydraulic oil. **Request:** Observe the operating instructions.

Sign	CAUTION
	**Warning:** Overload of the component. **Request:** Subject the component to the load of maximum one person and maximum 150 kg.
	**Warning:** Antifreeze fluid. **Request:** Use only Liebherr antifreeze fluid. Observe the operating instructions.

Tab. 12: Safety signs

4.6.4 Safety signs: Note

Sign	NOTE
	**Prohibition:** Of using the parking heater and auxiliary heater in areas at risk of fire. **Important note:** Refueling. **Request:** Turn the engine off before refueling. Avoid engine damage: Only use low-sulfur diesel fuel. Observe the operating instructions.
	**Important note:** Data recording device “Data Logger” available.
	**Important note:** The exhaust system is equipped with a spark catcher.
	**Important note:** Sound power level specification in decibels.

Tab. 13: Safety signs

4.7 Crane overview

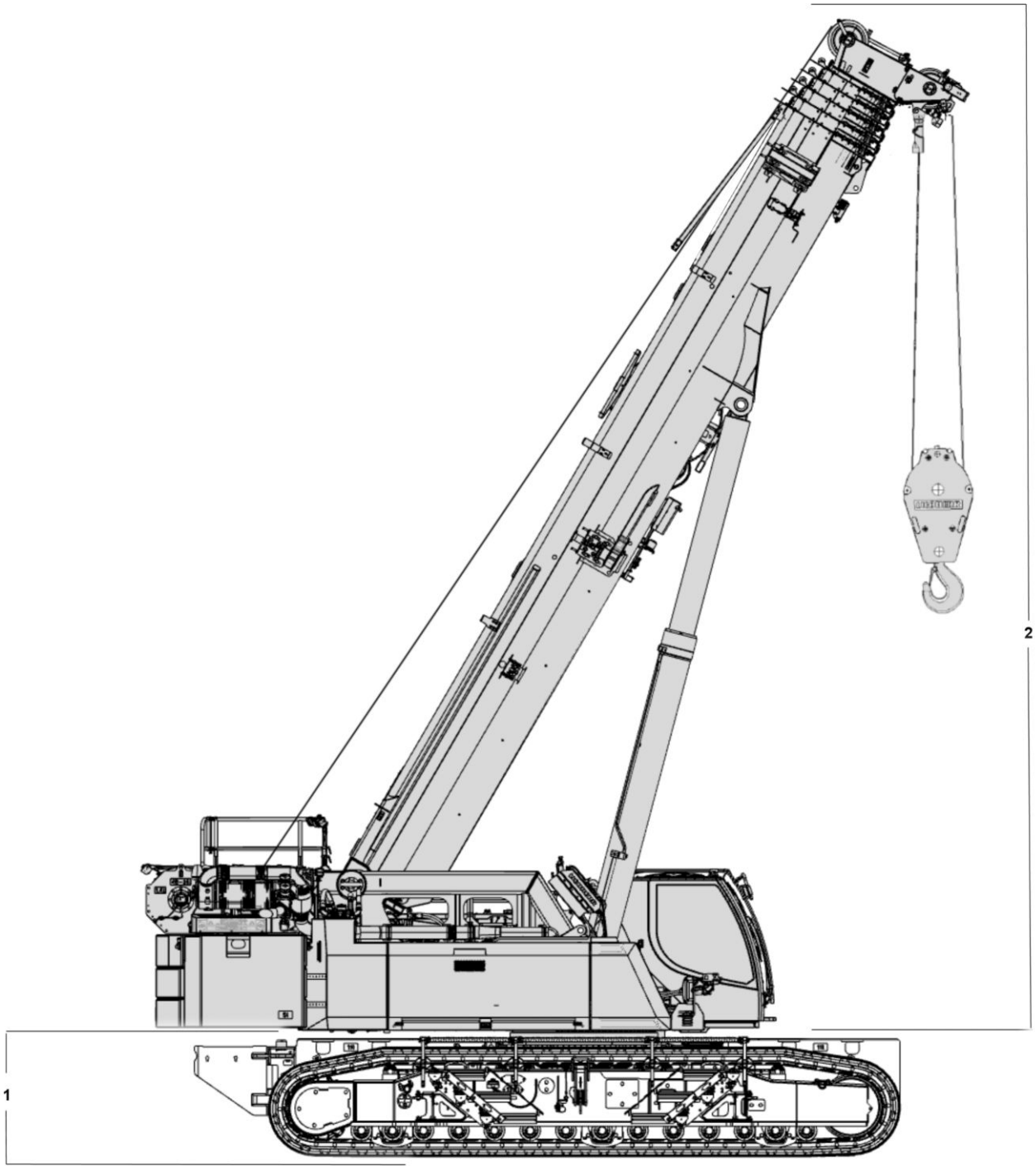


Fig. 68: Crane overview

1 Chassis

2 Superstructure

4.7.1 Chassis

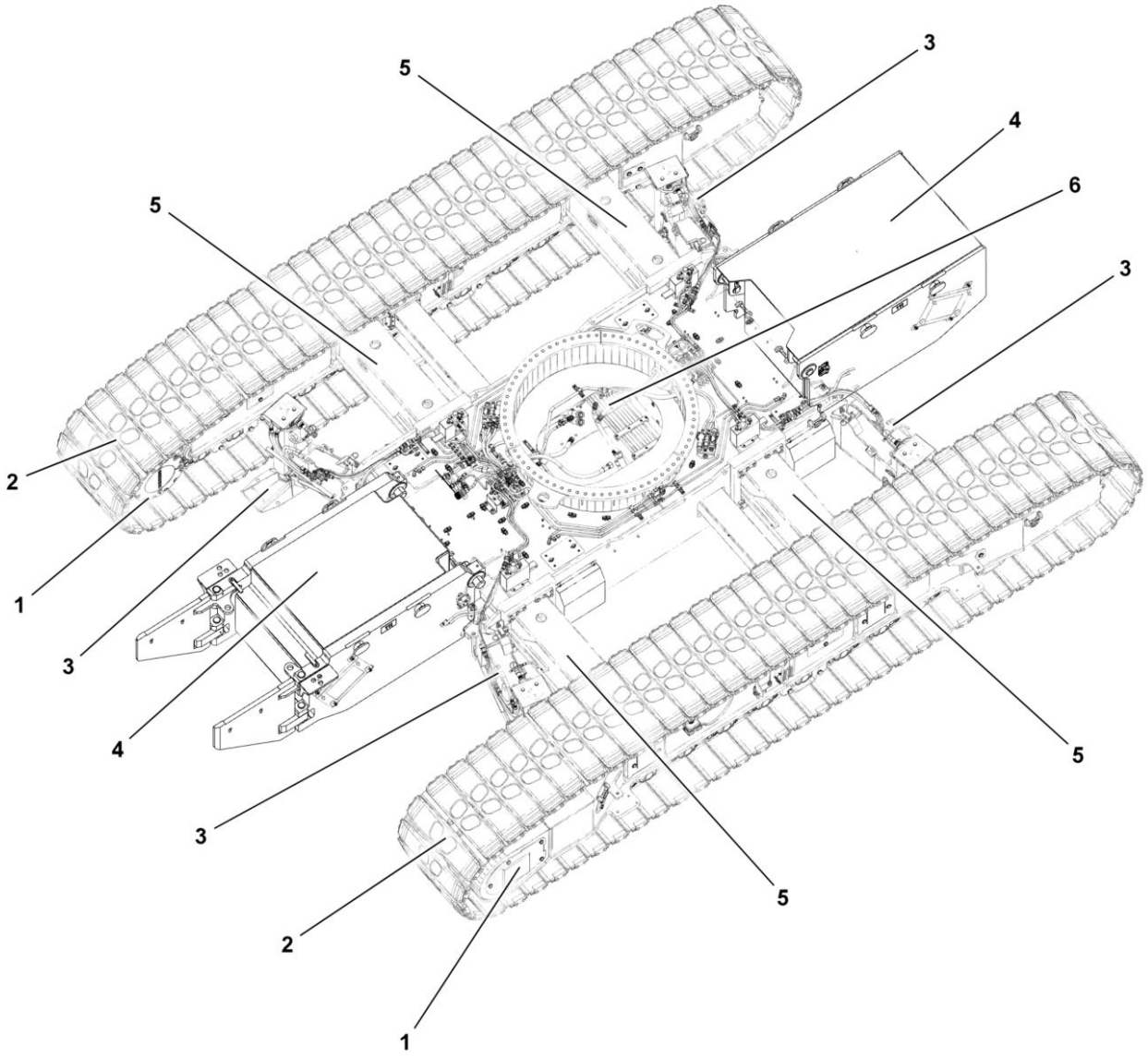


Fig. 69: Chassis

1 Travel gear
2 Crawler carrier
3 Hydraulic assembly support
4 Central ballast
5 Cross carrier
6 Crawler center section

4.7.2 Superstructure

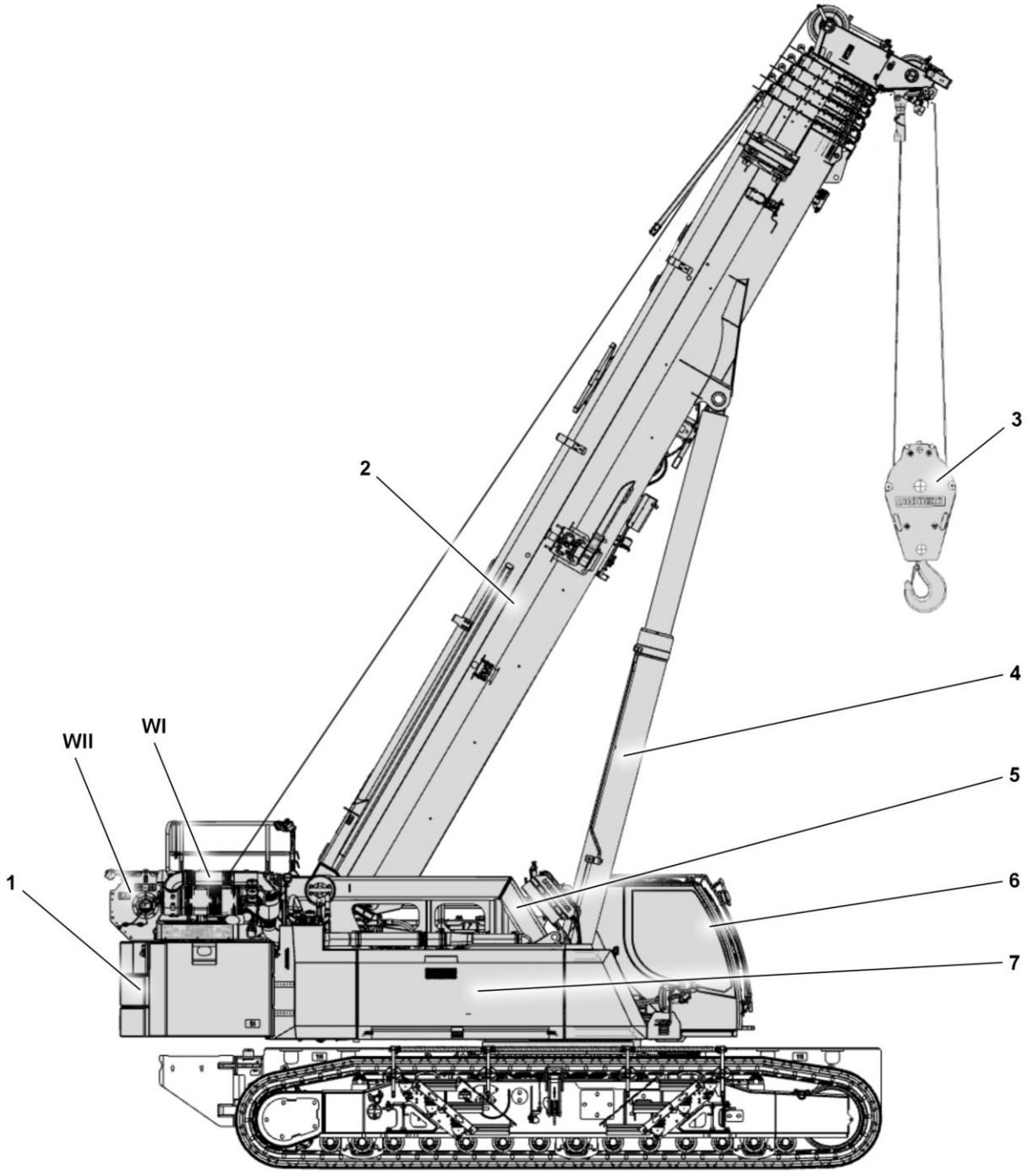


Fig. 70: Superstructure

1 Turntable ballast
2 Telescopic boom
3 Hook block or load hook
4 Luffing cylinder
5 Turntable
6 Crane cab
7 Diesel engine
WI Winch 1
WII Winch 2

4.7.3 Warning and safety equipment

4.7.3.1 Chassis

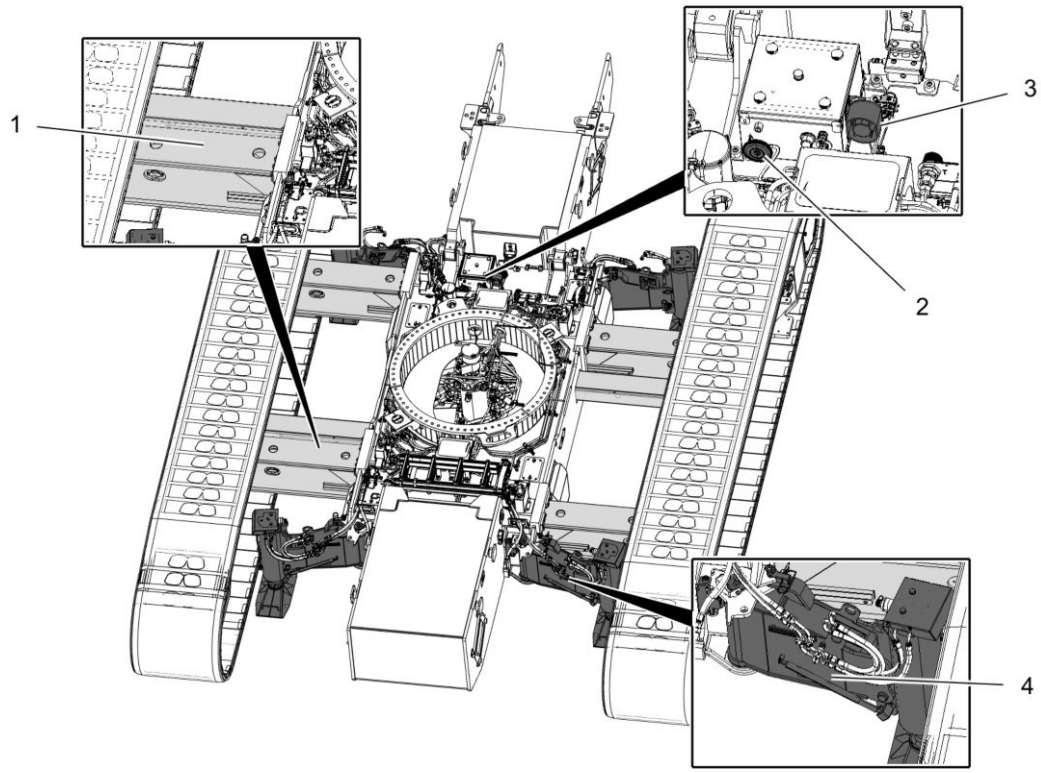
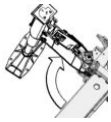


Fig. 71: Exemplary illustration: Chassis warning and safety equipment

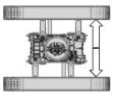
1 Track width monitoring
2 Crane remote control horn
3 Driving acoustic warning signal
4 Folding bracket monitoring

Folding bracket monitoring



Folding bracket monitoring monitors the folded out position of the folding brackets and checks continuously if the current value matches the settings in the *set up* menu.

Track width monitoring



Track width monitoring monitors the position of the track width and its pinning and continuously checks if the current value corresponds to the settings in the *set up* menu.

Track width monitoring can be configured to be a warning or a shut-off.

Note

With “EN 13000 active” track width monitoring is always configured as a shut-off.

Crane remote control horn

The horn is installed on the chassis and superstructure.

The horn can activated manually.

The horn on the superstructure is automatically activated in the following cases:
- The *load* display is shown in red.
- A special function of the overload protection is active.

Driving acoustic warning signal

The driving warning signal is an acoustic warning.

The driving warning signal is switched on with a crawler travel gear drive.

4.7.3.2 Superstructure

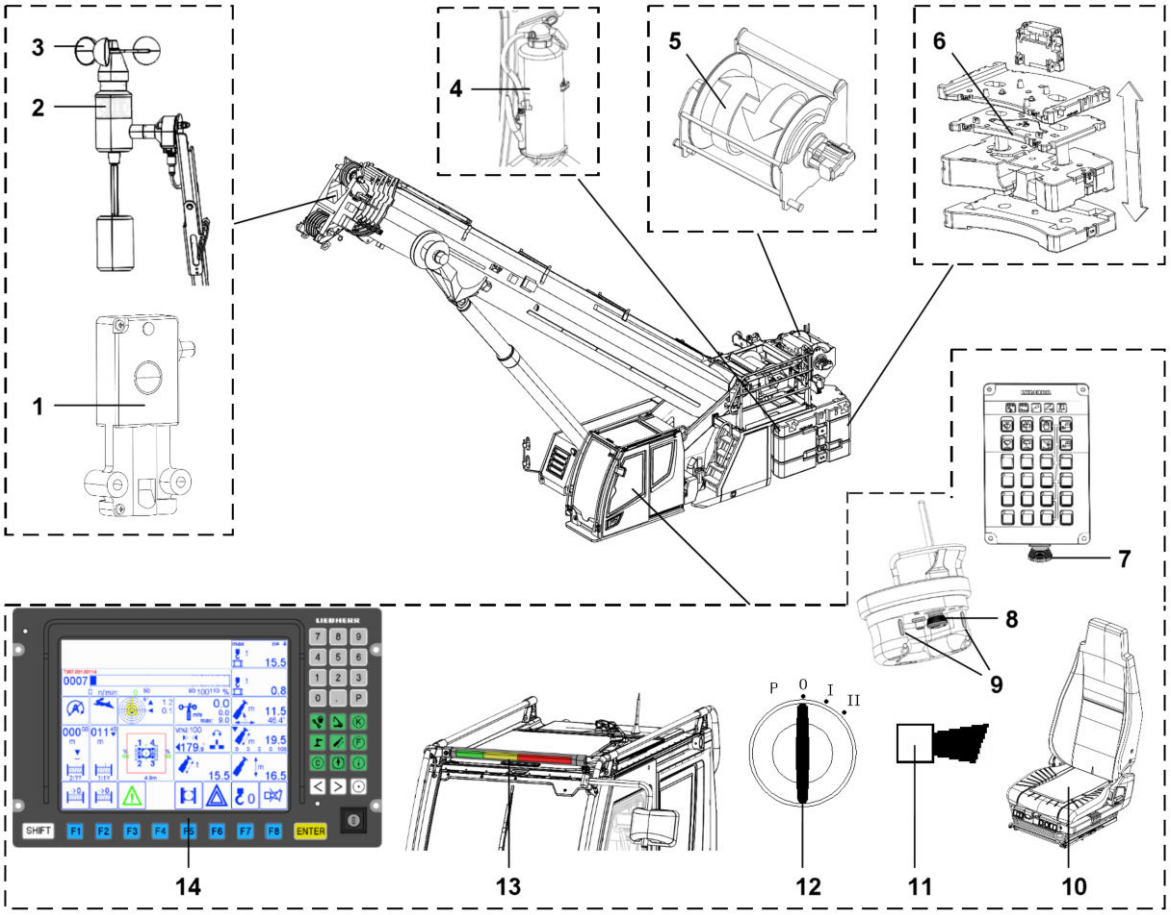
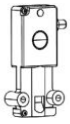


Fig. 76: Exemplary illustration: Superstructure warning and safety equipment

1 Hoist limit switch
2 Airplane warning light
3 Wind speed sensor
4 Fire extinguisher
5 Winch speed sensor
6 Ballast monitoring
7 Crane cab emergency off switch
8 Crane remote control stop switch
9 Crane remote control enable buttons
10 Seat contact button
11 Horn
12 Superstructure ignition switch
13 Overload protection light
14 Superstructure monitor

Hoist limit switch



The hoist limit switch should prevent collision between the hook block and pulley head.

A collision between the hook block and the pulley head is prevented by the hoist limit switch weight triggering as soon as the hook block lifts the hoist limit switch weight.

The following crane movements are shut off:
- Spool winch up
- Luffing the telescopic boom down
- Telescoping out

Wind speed sensor

The wind speed sensor measures the current wind speed at the highest point of the crane.

The value measured by the wind speed sensor can deviate from the actual wind speed value due to wind shadows or swirls on the telescopic boom, for example. The wind speed sensor does not replace obtaining weather forecasts and the maximum expected wind speed.

The wind speed sensor is not deactivating safety equipment.

Superstructure monitor

Working area limitation

With the working area limitation, the working area of the crane can be limited. Areas where, for example, buildings, other cranes or high voltage lines are located can be defined in advance. If the set limits are exceeded during crane operation, the working area limitation turns off the crane movements.

Superstructure monitor acoustic warning signal

Note

It is also output on the expanded crane remote control.

A short acoustic warning signal is output in the following cases:
- The *utilization* display is shown in yellow.

A long acoustic warning signal is output in the following cases:
- The *load* display is shown in red.
- A crane movement was shut off.
- A bypass is active.

Horn

The horn is installed on the chassis and superstructure.

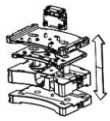
The horn can activated manually.

The horn on the superstructure is automatically activated in the following cases:
- The *load* display is shown in red.
- A special function of the overload protection is active.

Winch speed sensor

The winch speed sensor counts the winch turns and determines how many rope coils are still on the winch. The LICCON shuts off the winch automatically at four minimum rope coils. The winch speed sensor is adjusted in the factory. If used properly, readjustment is not required.

Ballast monitoring



Ballast monitoring detects the ballast installed on the crane and compares it with the ballast settings in the *set up* main menu.

Ballast monitoring can be configured to be a warning or a shut-off.

A differentiation is made between the following procedures with ballast monitoring:

- **Detecting the ballast with a pressure sensor in the ballast cylinders**
  By retracting the ballast cylinder, the lifted ballast is detected by the pressure sensor and compared with the ballast settings in the *set up* main menu.
  The weighing result is deleted when the ballast cylinders are fully extended.
- **Detecting winch 2***
  If winch 2 is installed and electrically connected, its weight is added to the installed ballast (→ 10.16 Winch 2*, p. 893).

4.7.4 Definition of directional data for cranes

Driving forward: Driving forward from the point of view of the crane operator seated in the crane cab.

Driving in reverse: Driving backward from the point of view of the crane operator seated in the crane cab.

Chassis: Front, rear, right and left always orient themselves from the position of the chain tension devices. The chain tension devices on the crawler travel gear are always at the front.

Superstructure: Front, rear, right and left refer to the direction of view of the crane operator seated in the **crane cab**. Front is always in direction of the taken down boom.

4.7.5 Assignment of the superstructure to the travel direction

The travel direction of the crane is continuously assigned to the position of the superstructure.

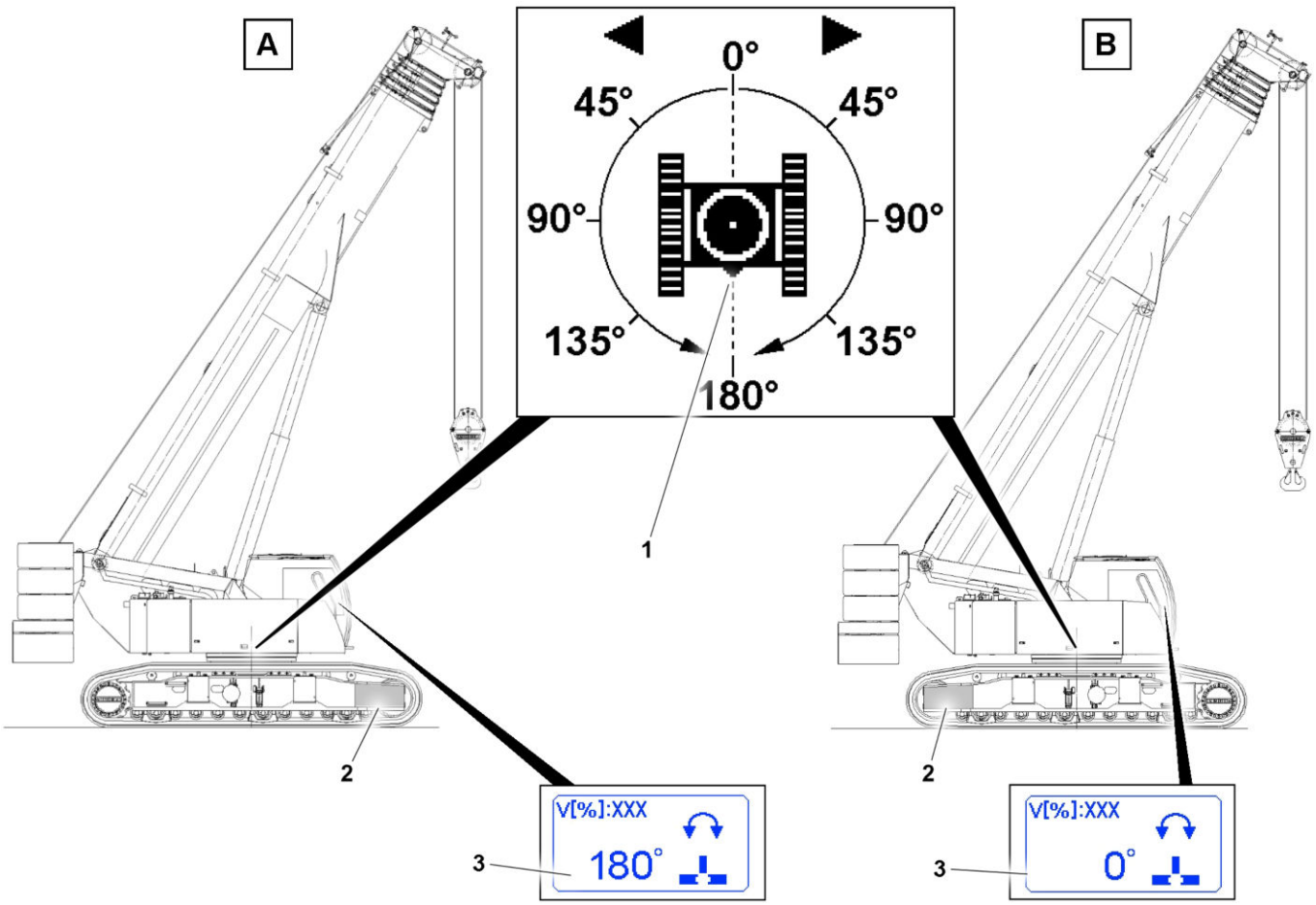


Fig. 82: Exemplary illustration: Assignment of the superstructure to the travel direction

A Superstructure turned to the front
B Superstructure turned to the rear
1 Directional triangle
2 Chain tension device
3 Slewing range display

The front on the crawler travel gear is always on the side where the chain tension device **2** for the crawler carriers is located.

In LICCON, the front side of the crawler travel gear is marked by a directional triangle **1**.

The position of the crane superstructure with respect to the crawler travel gear can be read on the slewing range display **3**:
- Slewing angle 180°: Superstructure turned to the front **A**
- Slewing angle 0°: Superstructure turned to the rear **B**

4.7.6 Upper pulley block height and boom radius

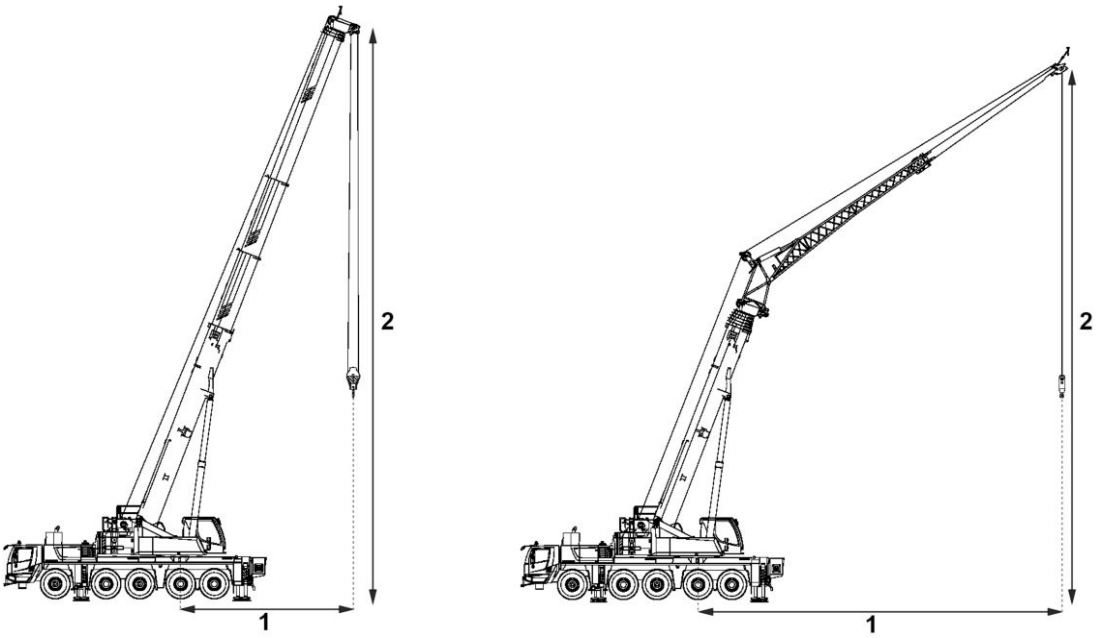


Fig. 83: Upper pulley block height and boom radius

1 Boom radius
2 Upper pulley block height

Boom radius 1: Horizontal distance from the middle of the slewing ring to the upper pulley block.

Upper pulley block height 2: Vertical distance from the upper pulley block to the crane placement surface.

4.7.7 Exterior lighting

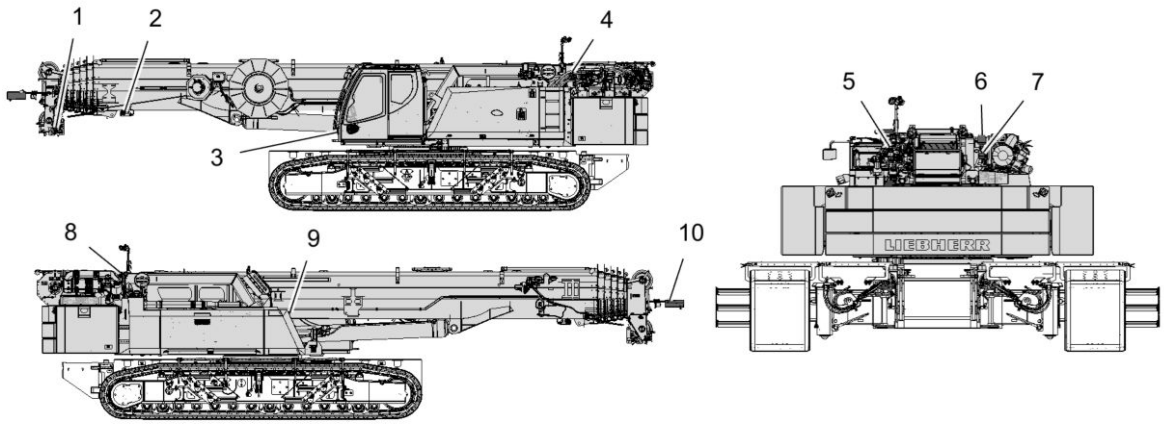


Fig. 84: Exterior lighting

1 Boom head floodlight*
2 Pivot section floodlight*
3 Crane cab floodlight
4 Left side turntable floodlight
5 Winch camera floodlight*
6 Rotating beacon
7 Rear turntable floodlight
8 Right side turntable floodlight
9 Front turntable floodlight
10 Airplane warning light

4.7.8 Heating systems

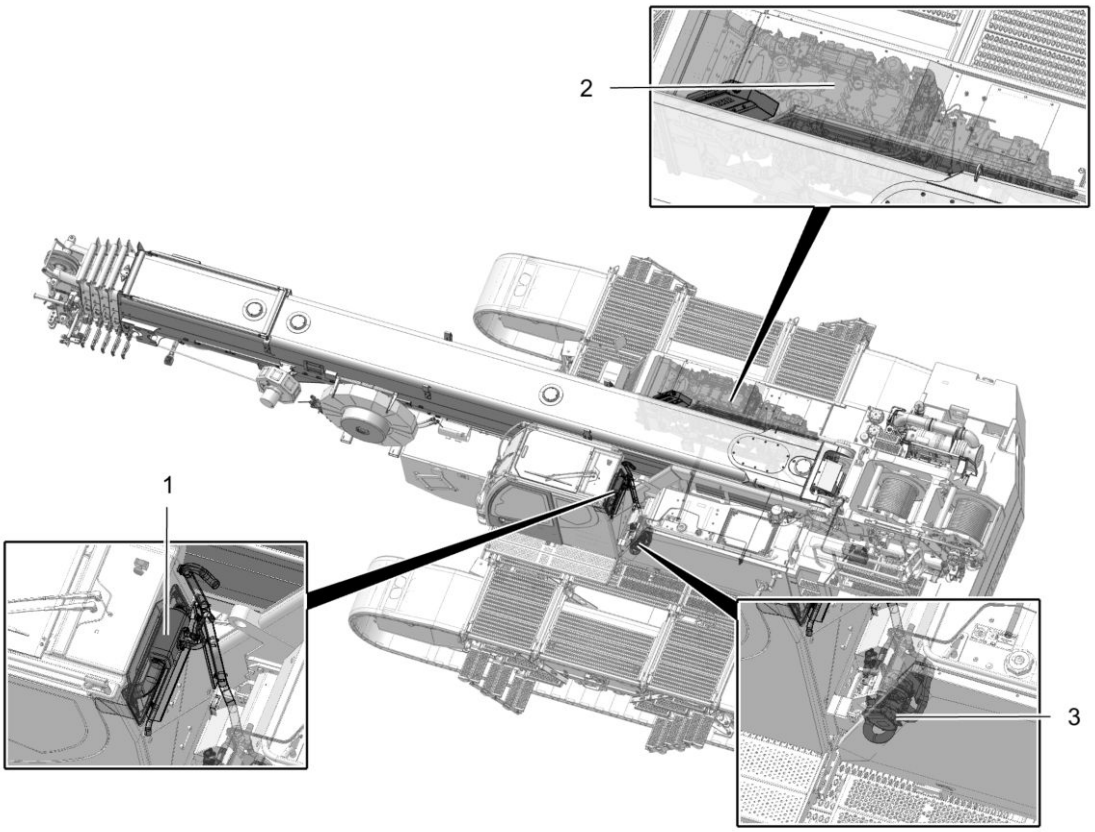


Fig. 85: Crane heating systems

1 Superstructure auxiliary heater*

2 Diesel engine

3 Superstructure parking heater*

4.7.9 Storage compartments

4.7.9.1 Storage compartment on the superstructure

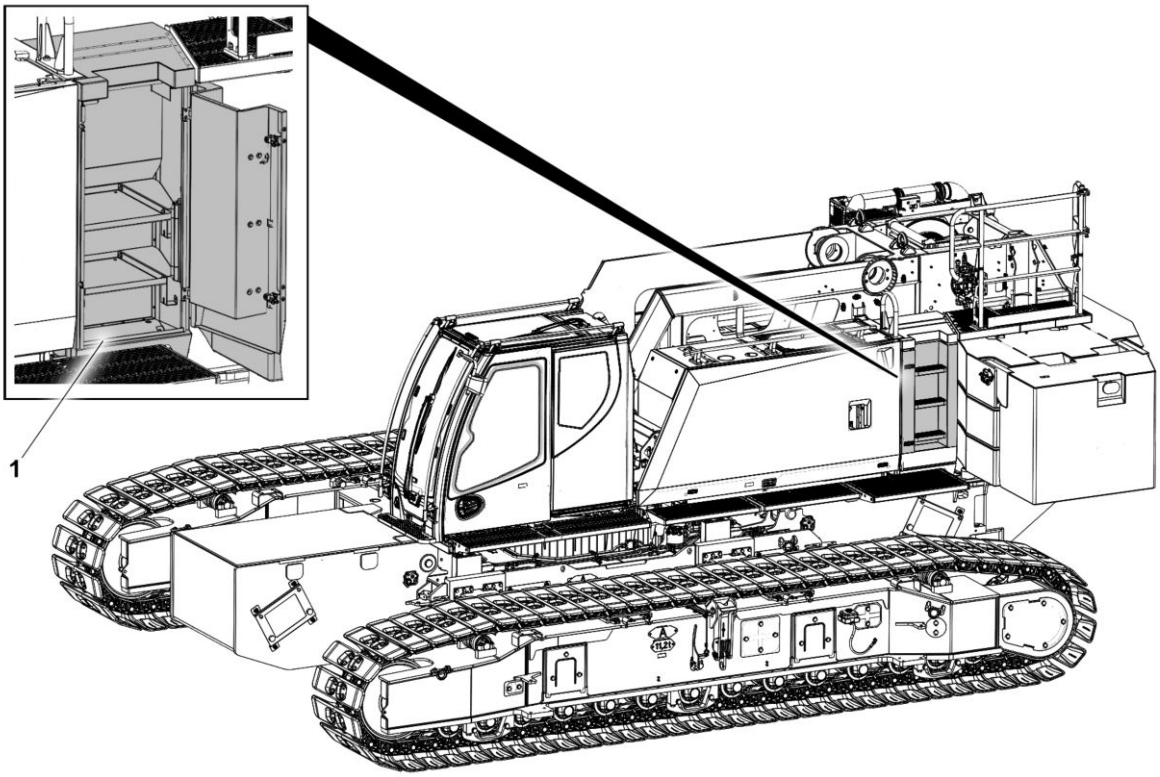


Fig. 86: Storage compartment on the superstructure

1 Storage compartment

The storage compartment **1** on the superstructure is located behind the access stairs on the turntable.

4.7.10 Hook rod

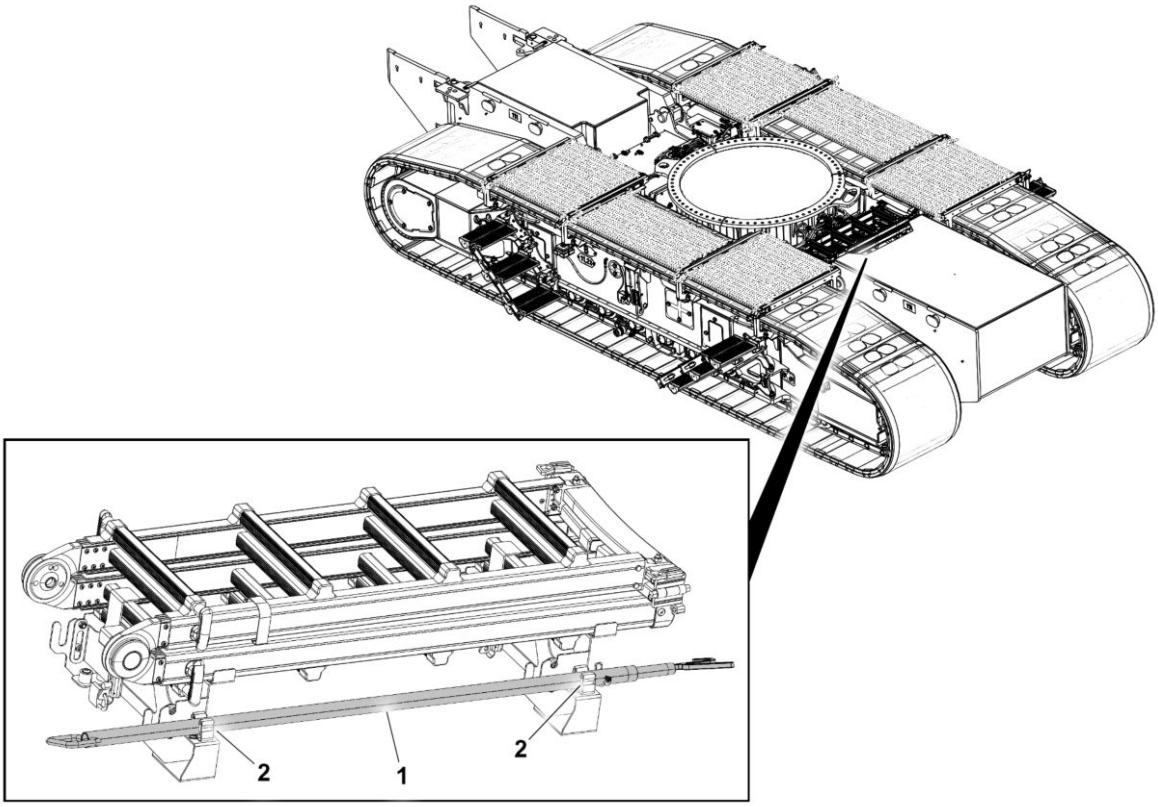


Fig. 87: Hook rod transport position

1 Hook rod

2 Retainer

4.7.11 Assembly rod

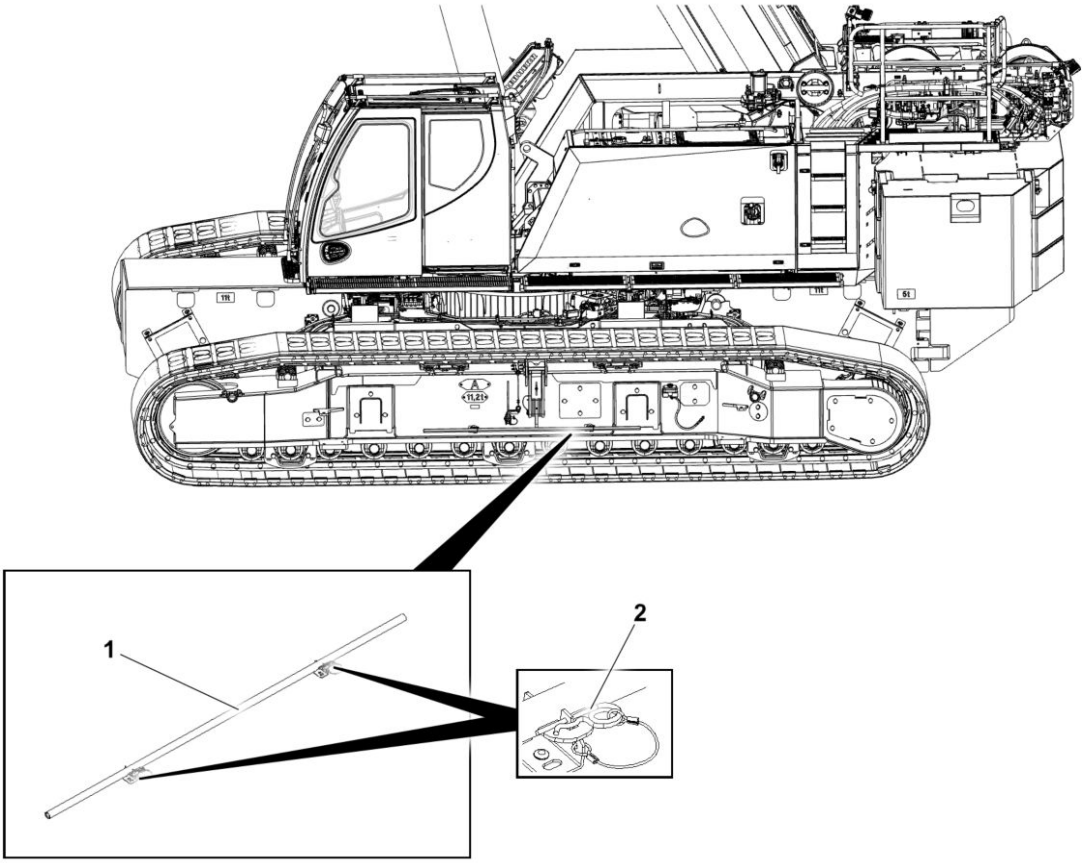


Fig. 88: Assembly rod transport position

1 Assembly rod

2 Retaining element

4.7.12 Ground connection

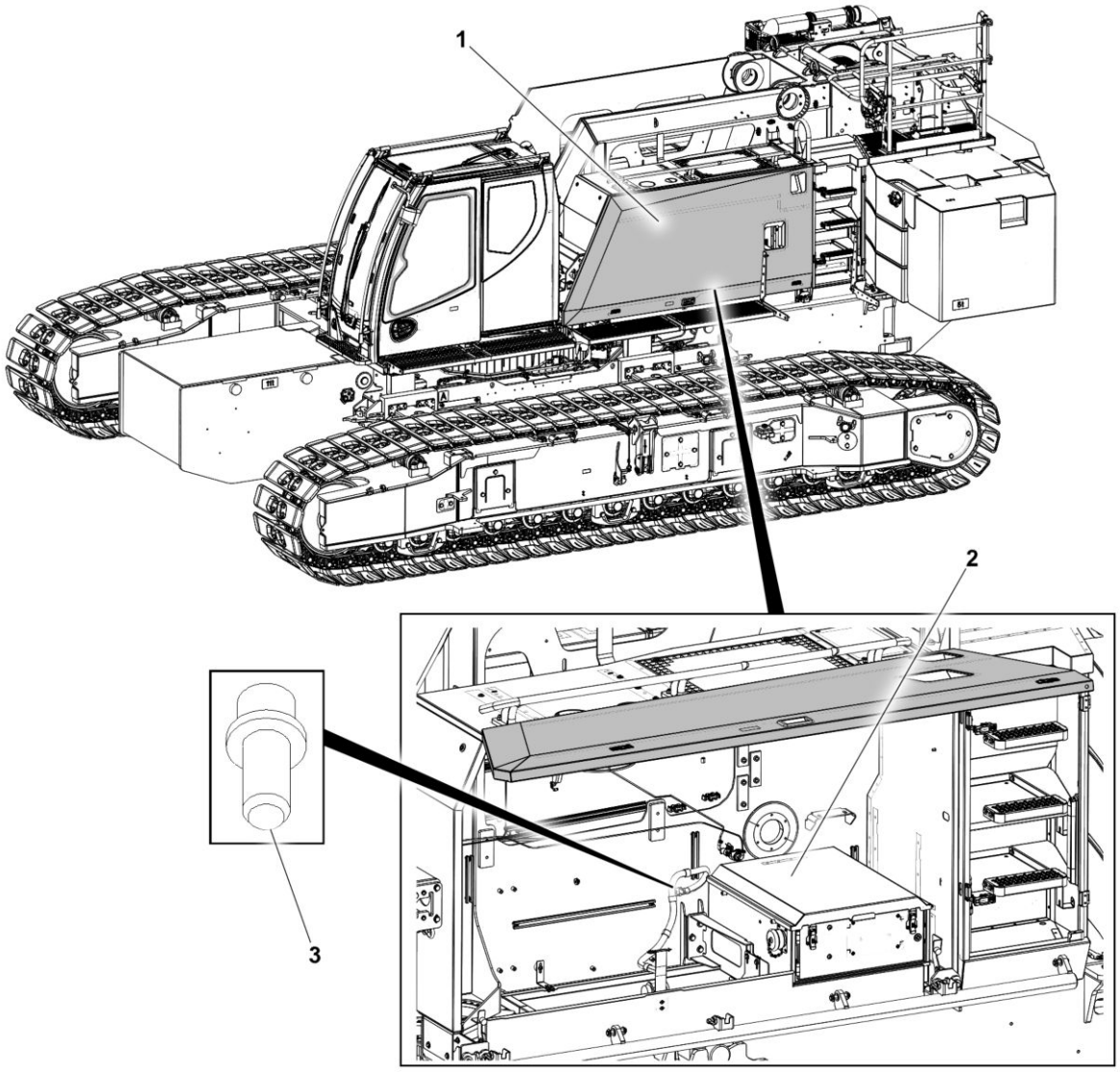


Fig. 89: Ground connection

1 Left turntable flap
2 Battery box
3 Ground connection

The ground connection **3** is located behind the open turntable cover **1** next to the battery box **2**.

4.7.13 Central lubrication system

4.7.13.1 Chassis central lubrication system

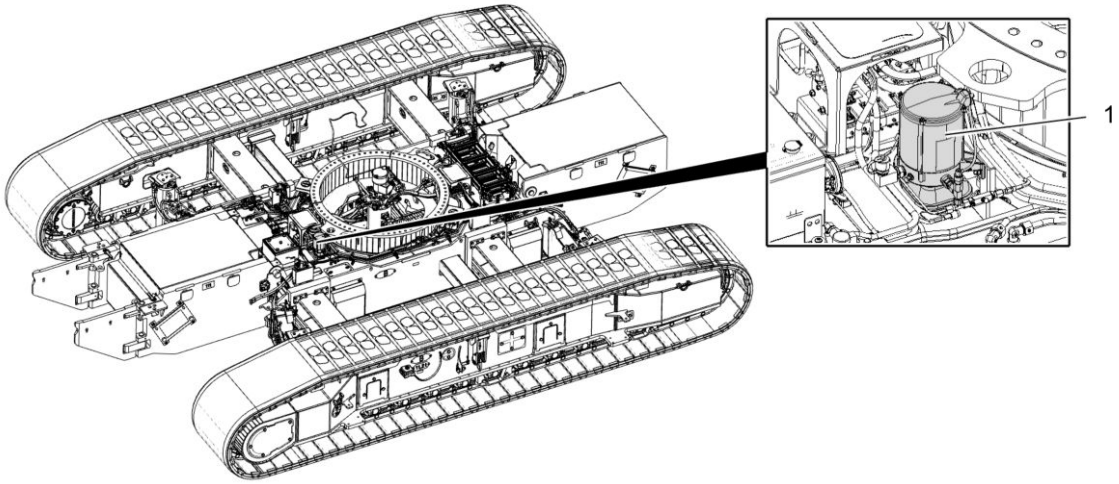


Fig. 90: Chassis grease container

1 Grease container

The following parts are supplied with the central lubrication system:
- Cross carrier for left track width adjustment
- Cross carrier for right track width adjustment

4.7.13.2 Superstructure central lubrication system

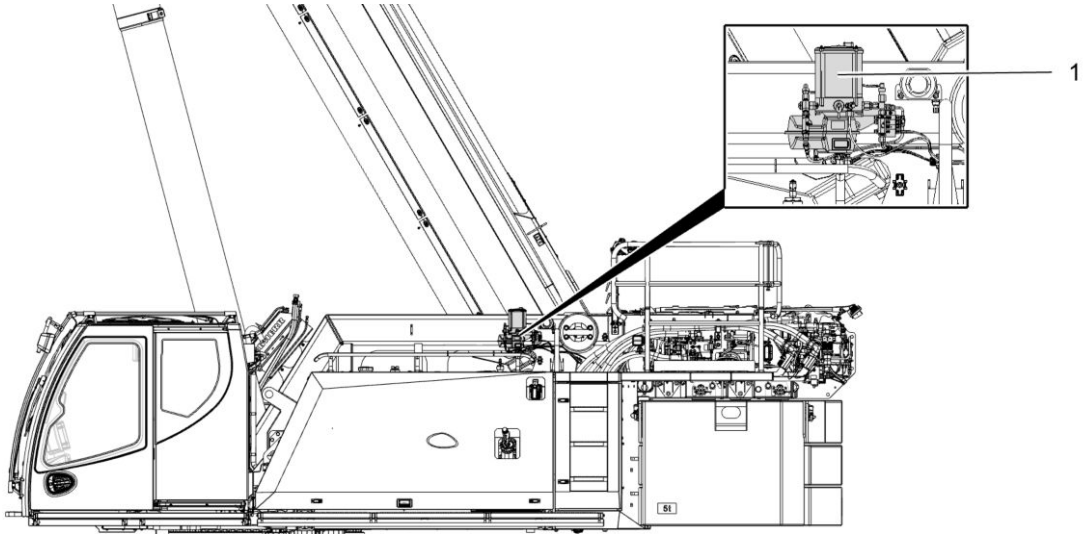


Fig. 91: Superstructure grease container

1 Grease container

The following parts are supplied with the central lubrication system:
- Telescopic boom
- Luffing cylinder
- Slewing ring connection
- Winch 1
- Winch 2*

4.7.14 230 V / 110 V* external power supply

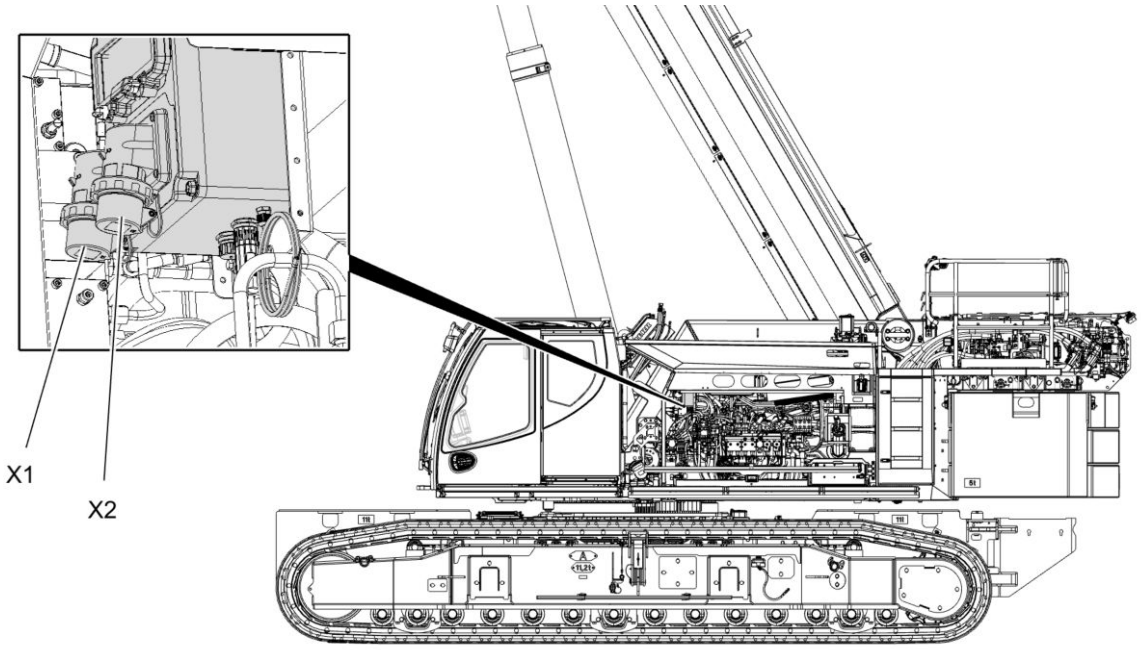


Fig. 92: 230 V / 110 V external power supply*

X1 CEE plug **X2** CEE plug

The CEE plug **X1** supplies the battery charger* and socket 230 V / 110 V* with voltage.

The CEE plug **X2** supplies electrical coolant preheating* with voltage.

4.7.15 24 V* external power supply

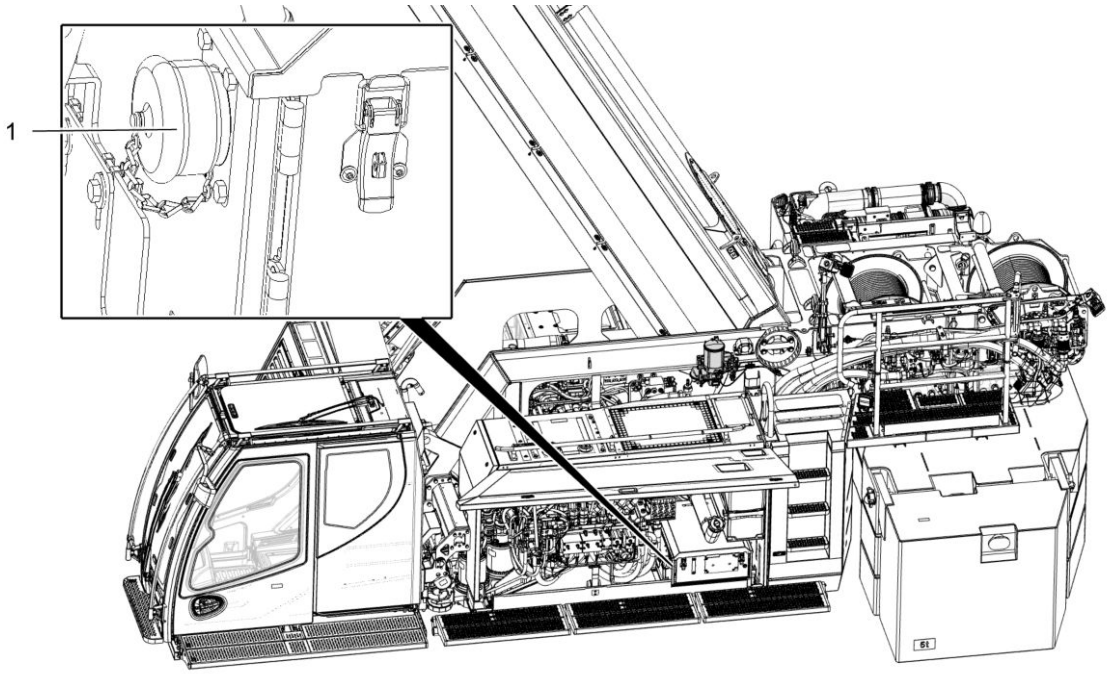


Fig. 93: 24 V external power supply*

1 24 V* external power supply

The 24 V* **1** external power supply is available as an option in the standard version and in the low temperature version.

4.8 Technical data

4.8.1 Operating and load conditions

Designation	Value
Maximum number of operation cycles (N)	63000
Class according to ISO 4301-2	A1
Collective class according to ISO 4301-1	Q_1 = light k_p = 0.125

Tab. 14: Operating and load conditions

4.8.2 Noise emissions

Designation	Value
Emission sound pressure level [L_{pA}] in the crane cab. (Door and windows closed)	72 dB(A)
Guaranteed crane sound power level [L_{WA}][A)]	108 dB(A)

Tab. 15: Noise emissions

A) A-weighted noise emissions determined according to Annex VIII of Directive 2000/14/EC

4.8.3 Vibrations

Designation	Value
Vibrations on arms	< 2.5 m/s²
Vibrations on the whole body	< 0.5 m/s²

Tab. 16: Vibrations

4.8.4 Crawler pressure

	Flat bottom pads 0.9m
Maximum crawler pressure below nominal load	1173 kN/m²

Tab. 17: Crawler pressure of flat outrigger pads

	3–grouser outrigger pads 0.9 m
Maximum crawler pressure below nominal load	1173 kN/m²

Tab. 18: Crawler pressure of 3-grouser outrigger pads

4.8.5 Support forces

Max. support force per support	Front	Rear
With nominal load	440 kN	440 kN

Tab. 19: Support forces

4.8.6 Travel speeds

Crane data	Value
Travel speeds	0 km/h to 2.25 km/h
Maximum permissible gradeability	46.6 %
Total propelling force	780 kN

Tab. 20: Travel speed / gradeability

4.8.7 Crane speeds

Drives	Infinitely variable
Winch 1	0 m/min to 112 m/min for a single strand
Winch 2*	0 m/min to 112 m/min for a single strand
Slewing gear	0 rpm to 1.38 rpm
Luffing gear	60 s for boom position -1° to 84.0°
Telescoping	336 s for boom length 11.375 m to 52 m

Tab. 21: Crane speeds

4.8.8 Lifting heights

4.8.8.1 Telescopic boom lifting heights

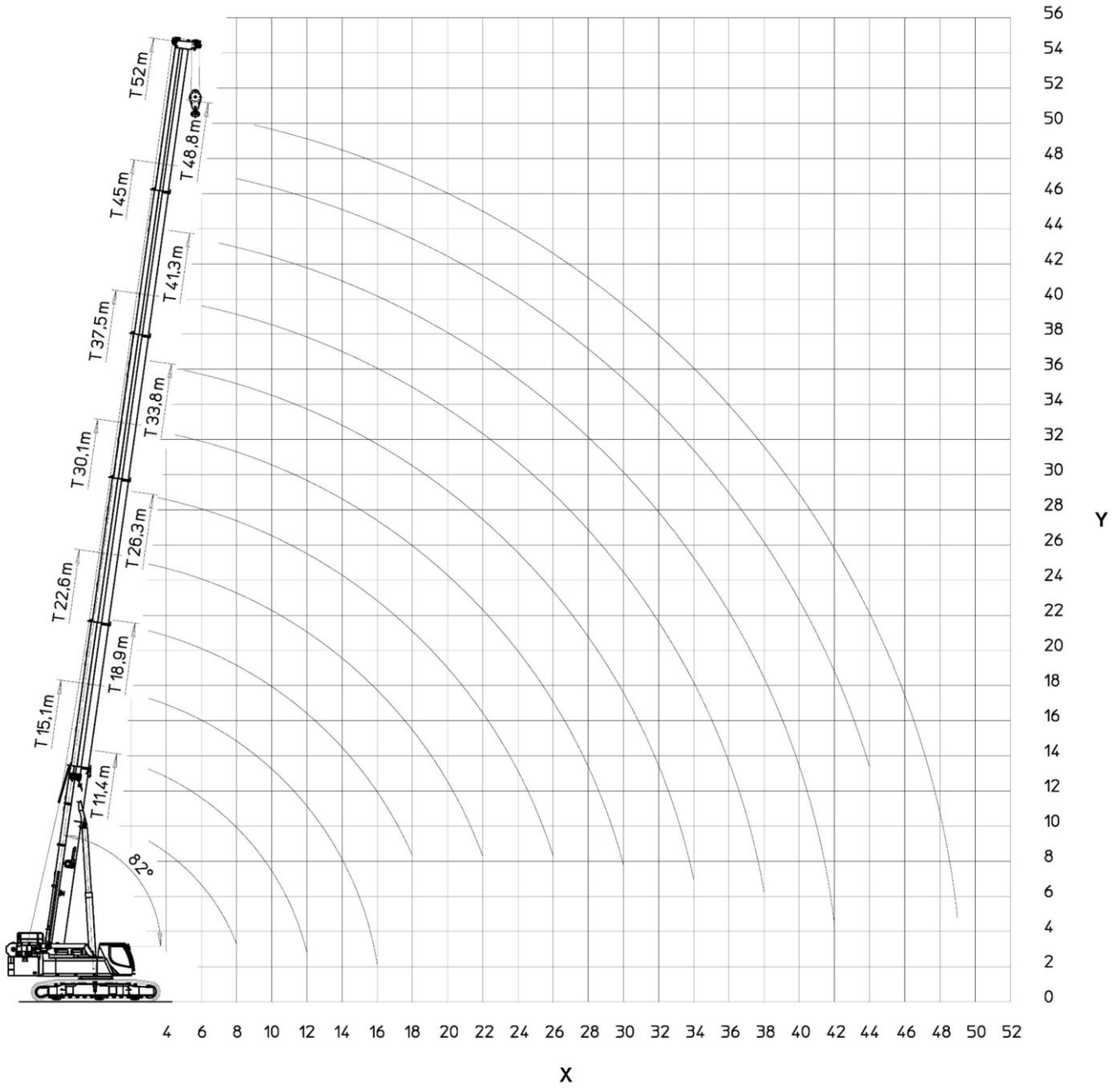


Fig. 94: Telescopic boom lifting heights

X Boom radius [m] **Y** Height [m]

4.8.8.2 Lifting height with folding jib

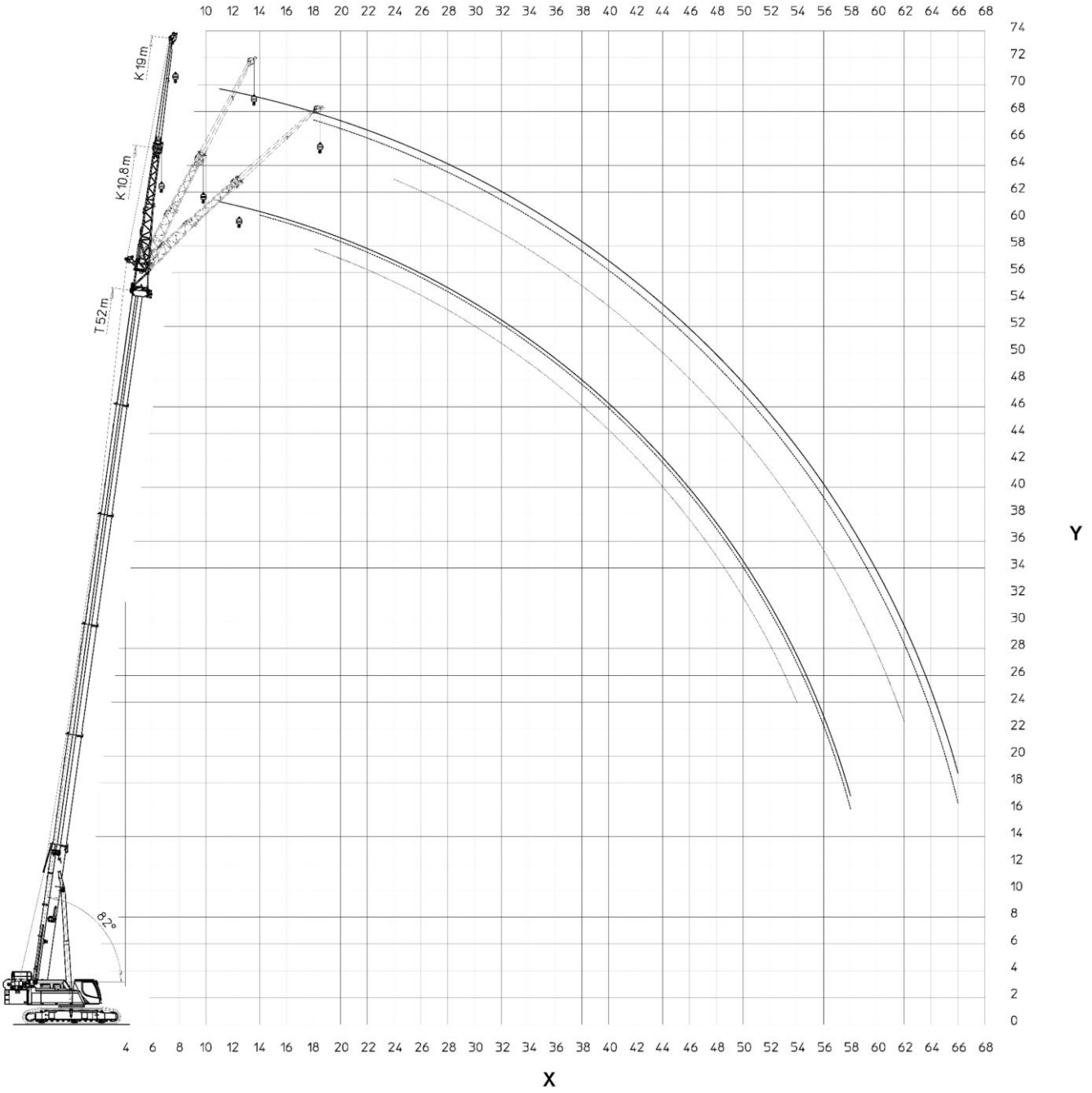


Fig. 95: Lifting heights with telescopic boom with single folding jib or double folding jib

X Boom radius [m] **Y** Height [m]

4.8.8.3 Lifting height with special folding jib

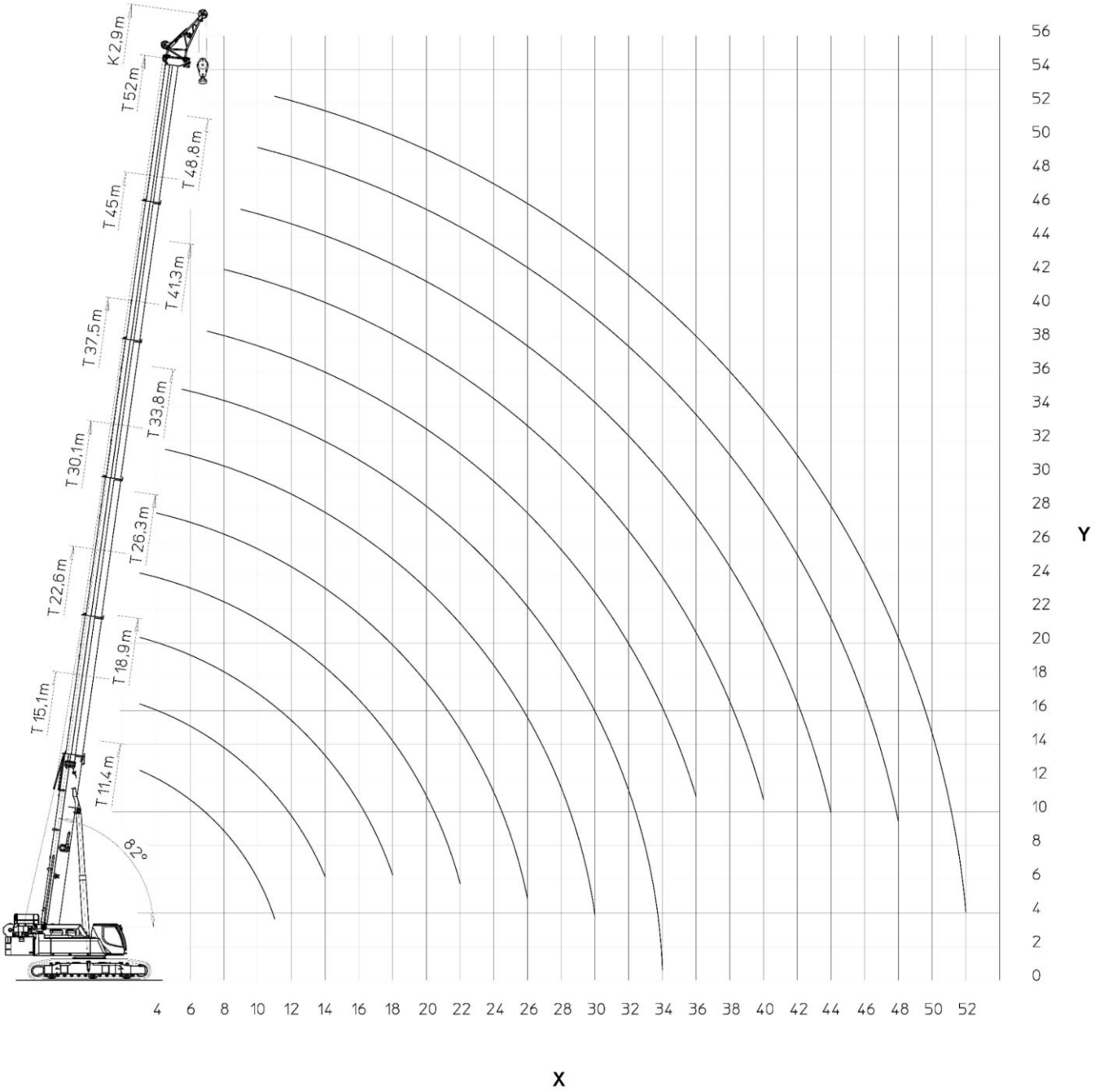


Fig. 96: Lifting heights with telescopic boom with special folding jib

X Boom radius [m] **Y** Height [m]

4.8.8.4 Lifting height with telescopic boom extension and folding jib

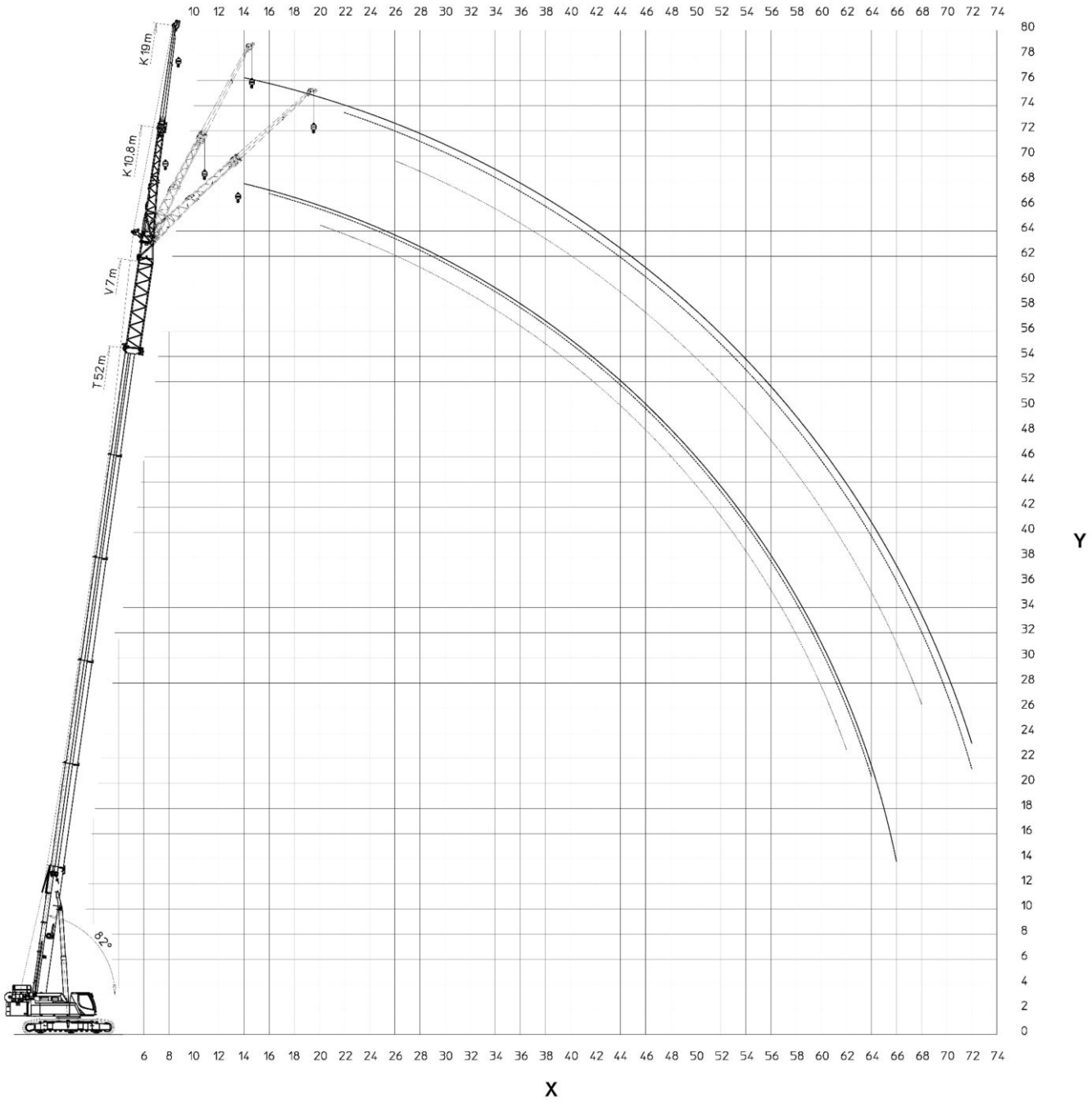


Fig. 97: Telescopic boom lifting heights with telescopic boom extension and single folding jib or double folding jib

X Boom radius [m] **Y** Height [m]

4.8.8.5 Lifting height with two telescopic boom extensions and folding jib

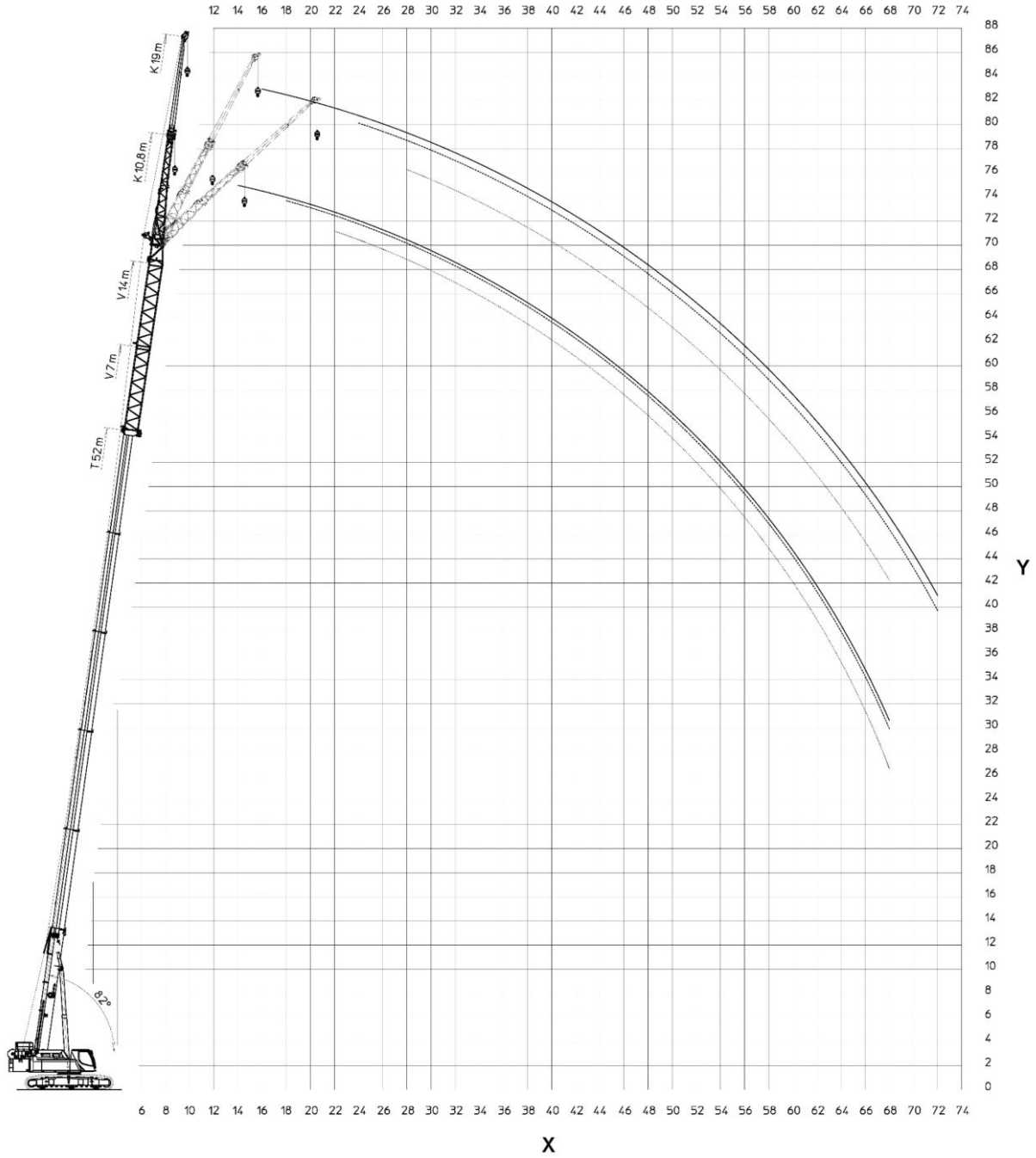


Fig. 98: Telescopic boom lifting heights with two telescopic boom extensions and single folding jib or double folding jib

X Boom radius [m] **Y** Height [m]

4.8.9 Engine

The crane is equipped with a 4-cylinder diesel engine.

The crane can be equipped with different exhaust aftertreatment systems.

Further information: (→ Separate document “Engine manufacturer’s operating instructions”)

Engine type	Manufacturer	Exhaust stage	Output	Maximum torque
D 944 A7-05	Liebherr	Stage V According to regulation (EU) 2016/1628	218 kW at 1500 rpm	1440 Nm at 1350 rpm
		Tier 4 According to EPA / CARB and ECE-R.96 performance range Q (previously Stage IV according to Directive 97/68/EC)		
D 944 A7-50	Liebherr	According to ECE R.49, K	218 kW at 1500 rpm	1440 Nm at 1350 rpm
D 944 A7-03	Liebherr	According to ECE-R.96 performance range H (previously Stage IIIA according to Directive 97/68/EC)	218 kW at 1500 rpm	1440 Nm at 1350 rpm

Tab. 22: Engine technical data

4.8.9.1 Air flap*

The air flap serves as an emergency stop in the case of engine overspeed or when pressing the emergency off switch. The air flap closes off the air supply to the engine in order to prevent the engine from **not** stopping or over-revving due to incoming flammable or explosive gases (→ 11.22 Air flap test program, p. 941).

For diesel engines with exhaust stages 05 / 50, the air flap serves as an exhaust flap.

4.9 Operating conditions

The mobile crane has the following operating conditions:
- Crane operation
- Emergency operation
- Assembly operation
- Mobile crane out of service
- Special operation

4.9.1 Crane operation

Crane operation includes the following procedures:
- Lifting of loads
- Crane movements
- Driving

4.9.2 Emergency operation

Emergency operation includes the following procedures:
- Emergency control
- Overload protection special functions

4.9.3 Assembly operation

The mobile crane is in assembly operation when certain shut-off devices are bypassed for the assembly and disassembly of equipment or procedures are not monitored by the overload protection.

The mobile crane is in assembly operation in the following cases, for example:
- If the hoist limit switch is bypassed.
- If the folding jib is swung into the operating position or transport position.
- If the track width of the crawler travel gear is misaligned.
- During assembly and disassembly of the crawler carrier.
- If the mobile crane is supported.

4.9.4 Mobile crane out of service

The mobile crane is out of service when the following conditions are fulfilled:
- The mobile crane is completely or partially set up.
- If **no** crane movement are performed.
- When there is **no** personnel (crane operator) on the mobile crane.

4.9.5 Special operation

The special operation includes procedures that require special measures or prerequisites.

Special operation includes the following procedures:
- Lifting personnel in a safety cage
- Securing personnel on shut off mobile crane
- Ram work
- Pulling sheet piles
- Magnet operation
- Operating the grab
- Handling operation

4.10 LICCON

LICCON is the crane control and monitors all crane functions.

Operation takes place using the various operating units, such as:
- Superstructure monitor
- Control lever 1 and 2
- Control pedal*
- Armrest operating units
- Side window operating unit
- Climate control operating unit
- Crane remote control
- Expanded crane remote control*

The following is controlled and monitored, for example:
- Engine
- Transmission
- Assembly support
- Crawler travel gear
- Lighting
- Climate control
- Fill levels
- Pressures
- Telescopic boom
- Ballasting
- Luffing cylinder
- Slewing gear
- Winches
- Overload protection

4.11 Overload protection

The overload protection prevents a crane overload by shutting off crane movements.

The current load is calculated based on the values determined by the sensors and the set up configuration of the crane.

4.11.1 Visual and acoustic warnings by the overload protection

If a warning occurs due to the overload protection, this is signaled by optical and acoustic warnings.

In the crane cab:
- Acoustic warning on the superstructure monitor
- Optical warning on the superstructure monitor through warning and indicator lights and *utilization* display

Outside the crane cab:
- Acoustic warning via the horn
- Optical warning via the overload protection light

4.12 Crane remote control

Fig. 99: Crane remote control

The crane remote control is a combined display and operating element for the crane.

The connection between the crane remote control and crane can also be wireless as well as via a connector cable (→ 9.4.4 Faulty crane remote control radio connection, p. 608).

4.13 Expanded crane remote control*

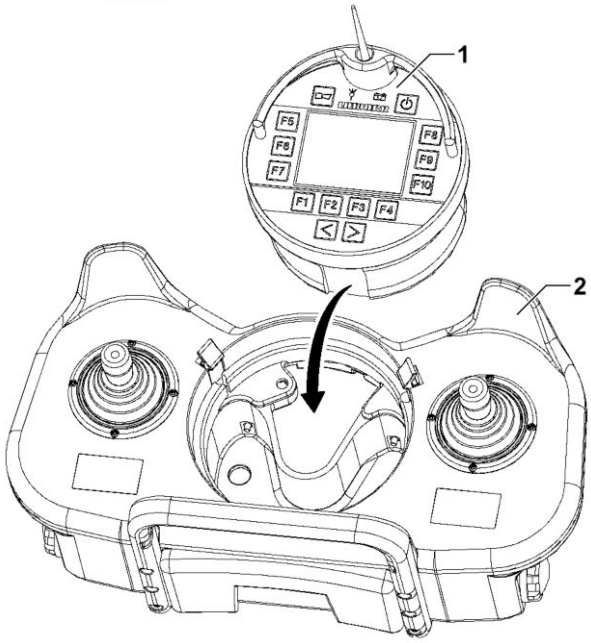


Fig. 100: Using the crane remote control in the radio remote console

1 Crane remote control **2** Remote control console

The expanded crane remote control consists of the crane remote control **1** and the remote control console* **2**.

The expanded crane remote control contains all functions of the crane remote control. In addition all crane movements can be carried out using both control levers.

4.14 Fall protection equipment

4.14.1 Hook points

4.14.1.1 Telescopic boom

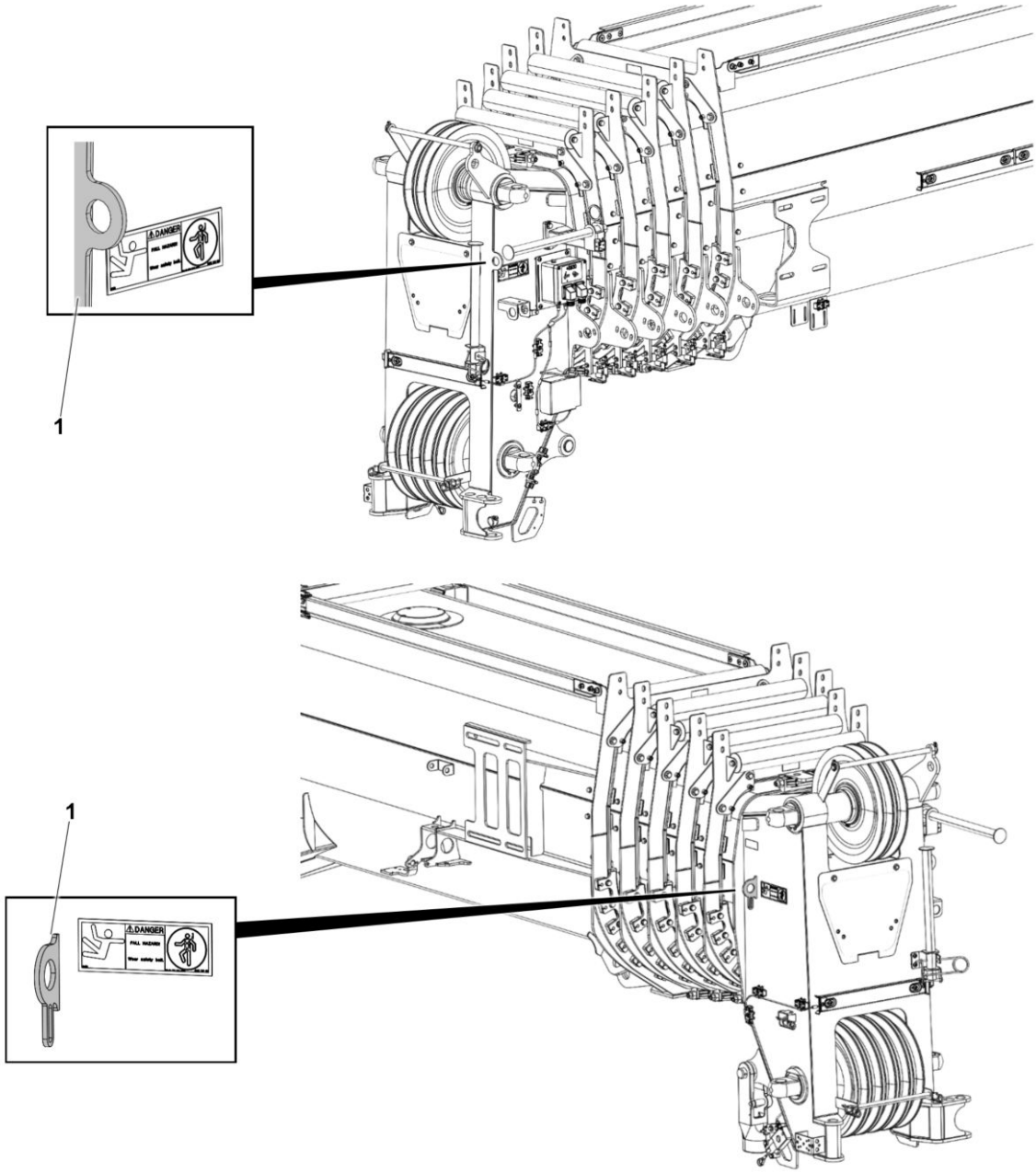


Fig. 101: Hook positions on the telescopic boom

1 Hook position

4.14.1.2 Folding jib

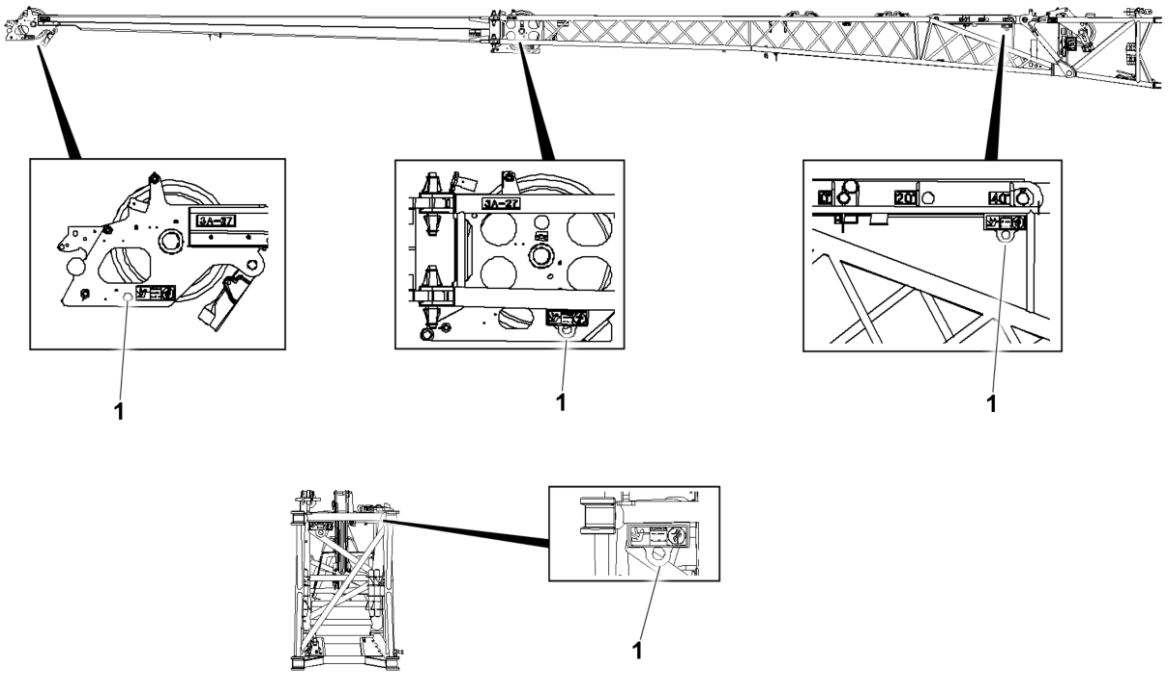


Fig. 102: Folding jib hook positions

1 Hook point

Note

If hook positions are not available, assembly personnel can also be secured to the struts of the folding jib using the fall arrest system.

4.14.1.3 Special folding jib

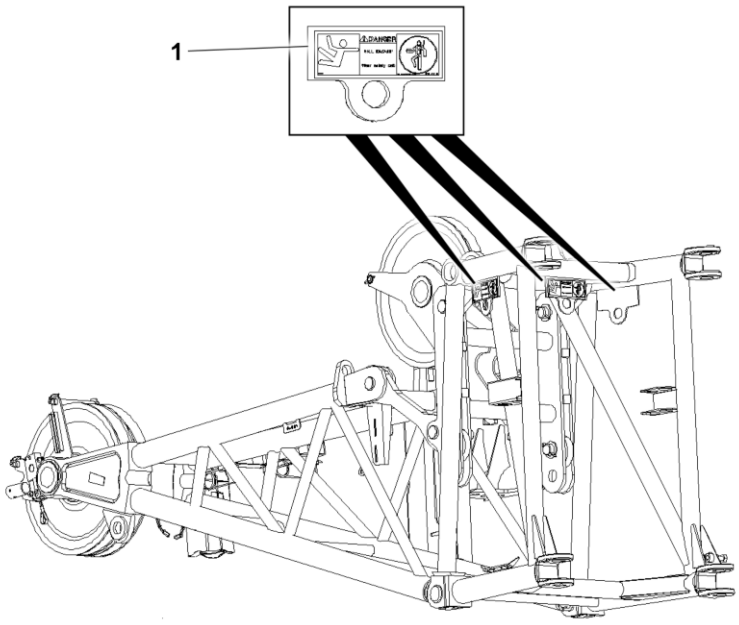


Fig. 103: Special folding jib hook positions

1 Hook position

4.14.1.4 Lattice sections

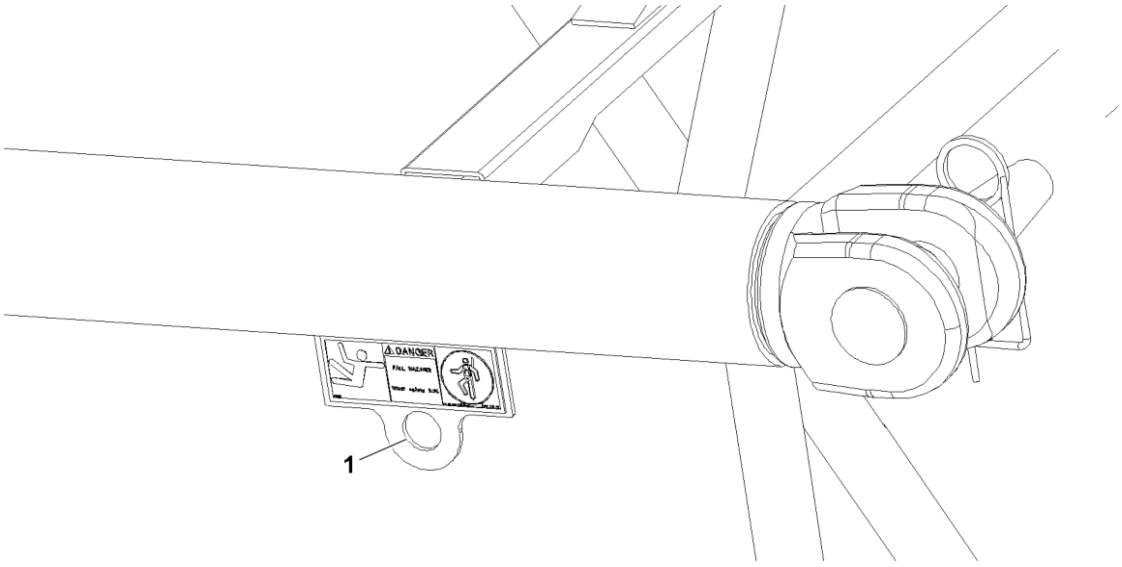


Fig. 104: Exemplary illustration: Lattice section hook position

1 Hook position

4.14.1.5 Turntable

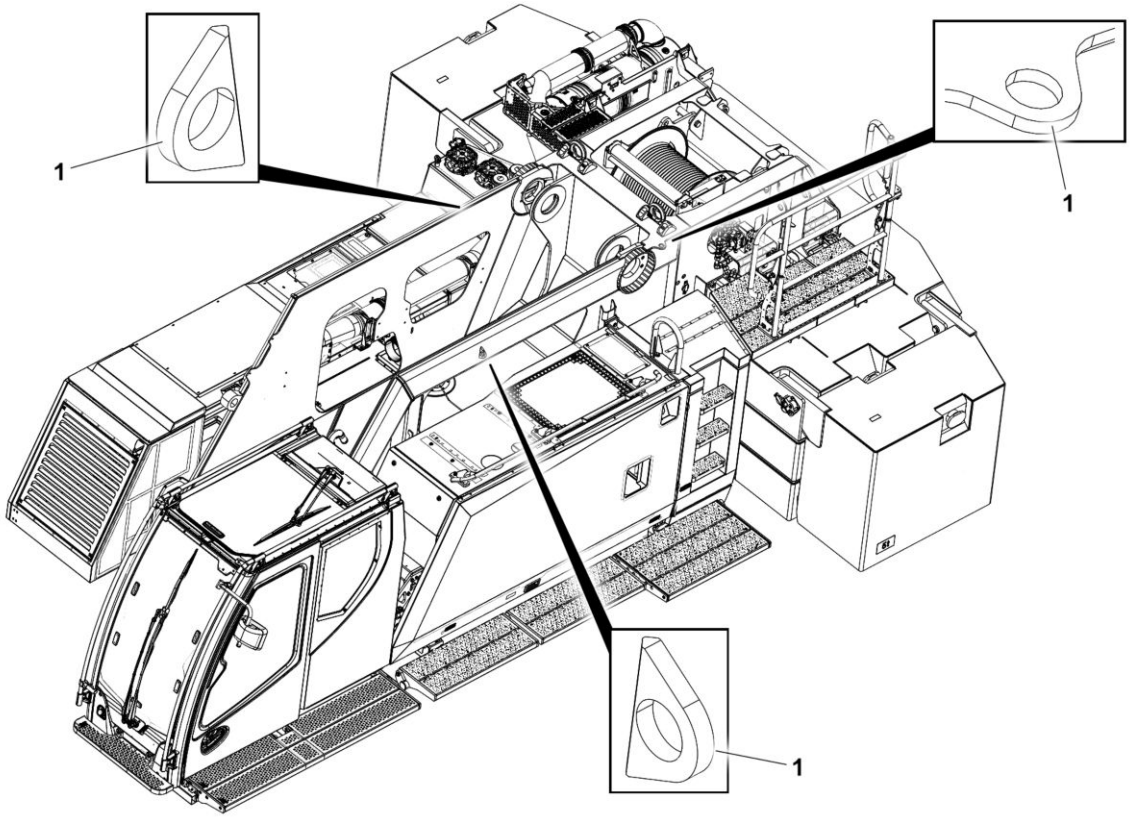


Fig. 105: Hook positions

1 Hook positions

4.14.1.6 Winch 2*

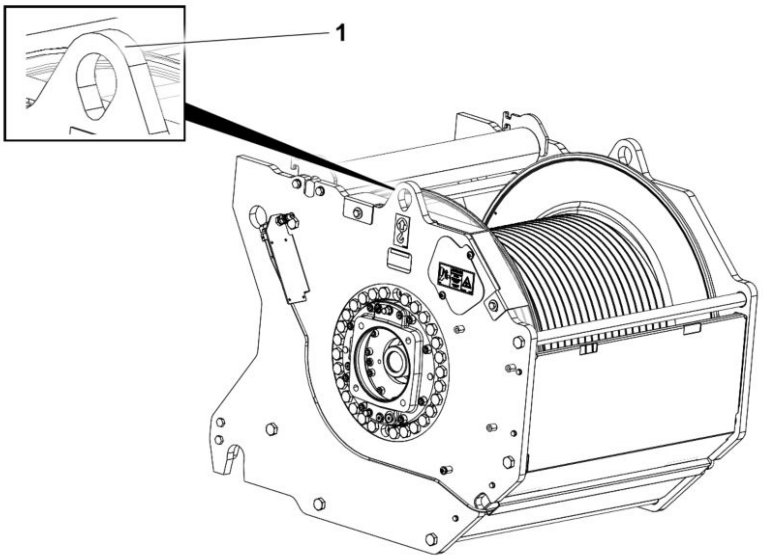


Fig. 106: Hook position

1 Hook position

When the fastening equipment is removed, the hook positions **1** in the left travel direction can be used.

4.14.1.7 Receptacle plate

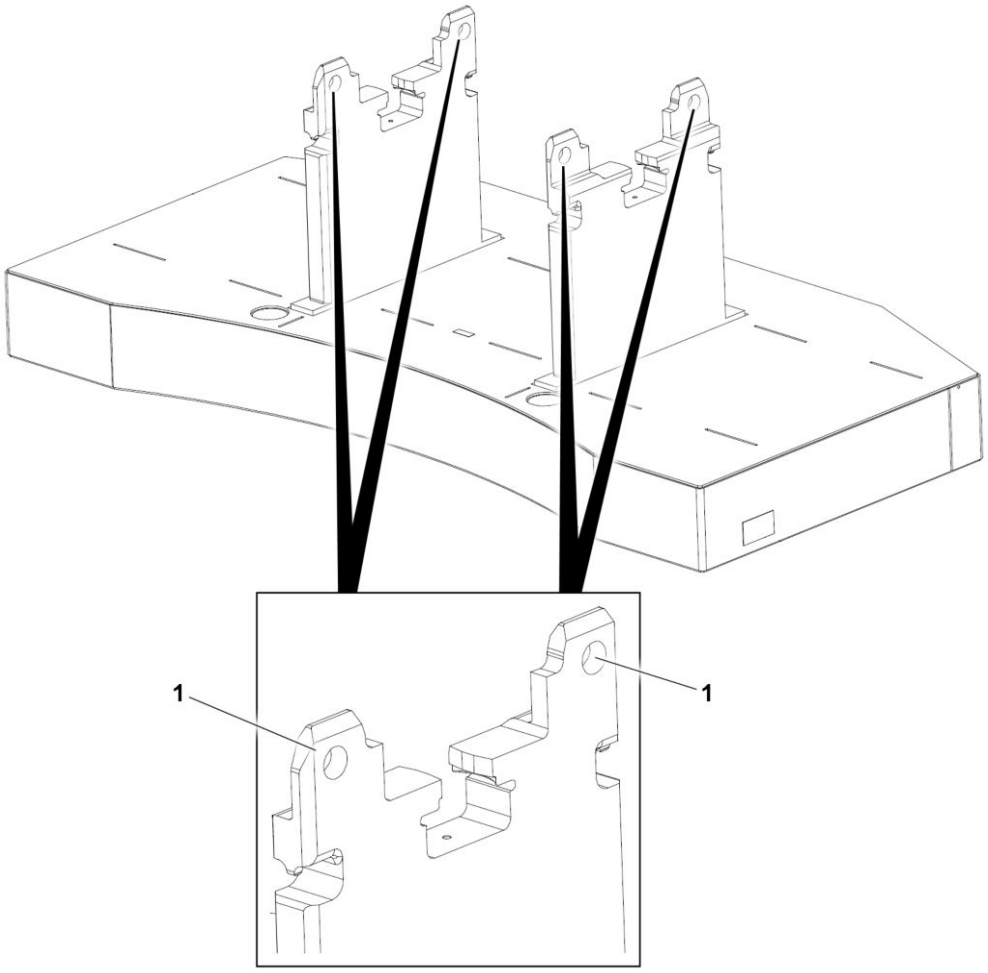


Fig. 107: Hook positions

1 Hook position

4.15 Accesses to the crane

4.15.1 Ladders

4.15.1.1 Ladder overview

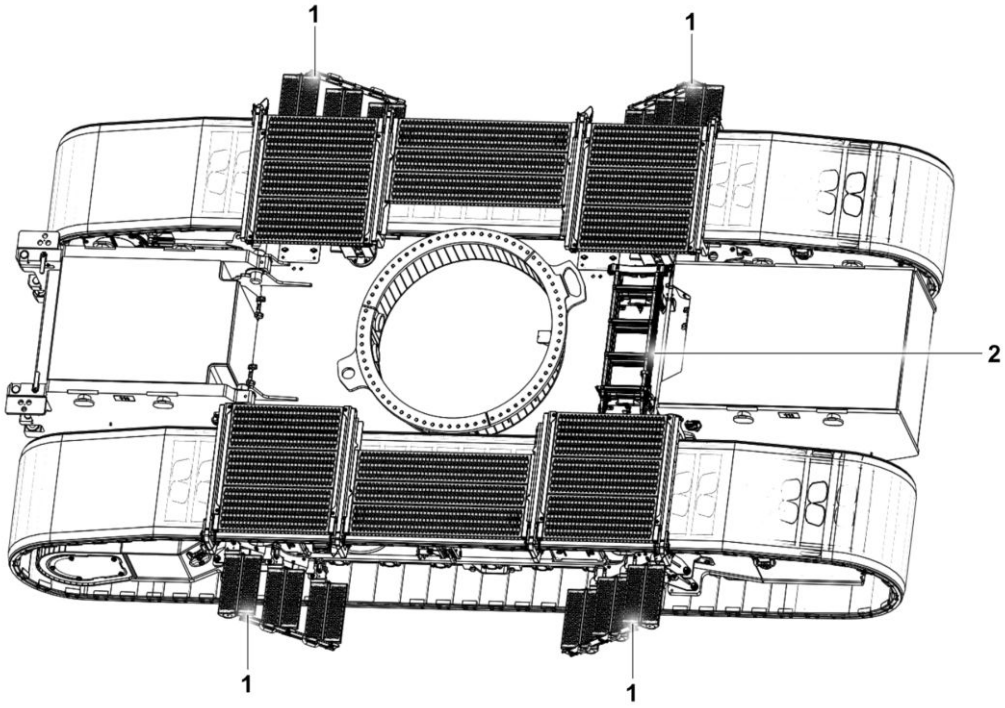


Fig. 108: Ladder overview

1 Stairs

2 Multi-purpose ladder

4.15.1.2 Multi-purpose ladder

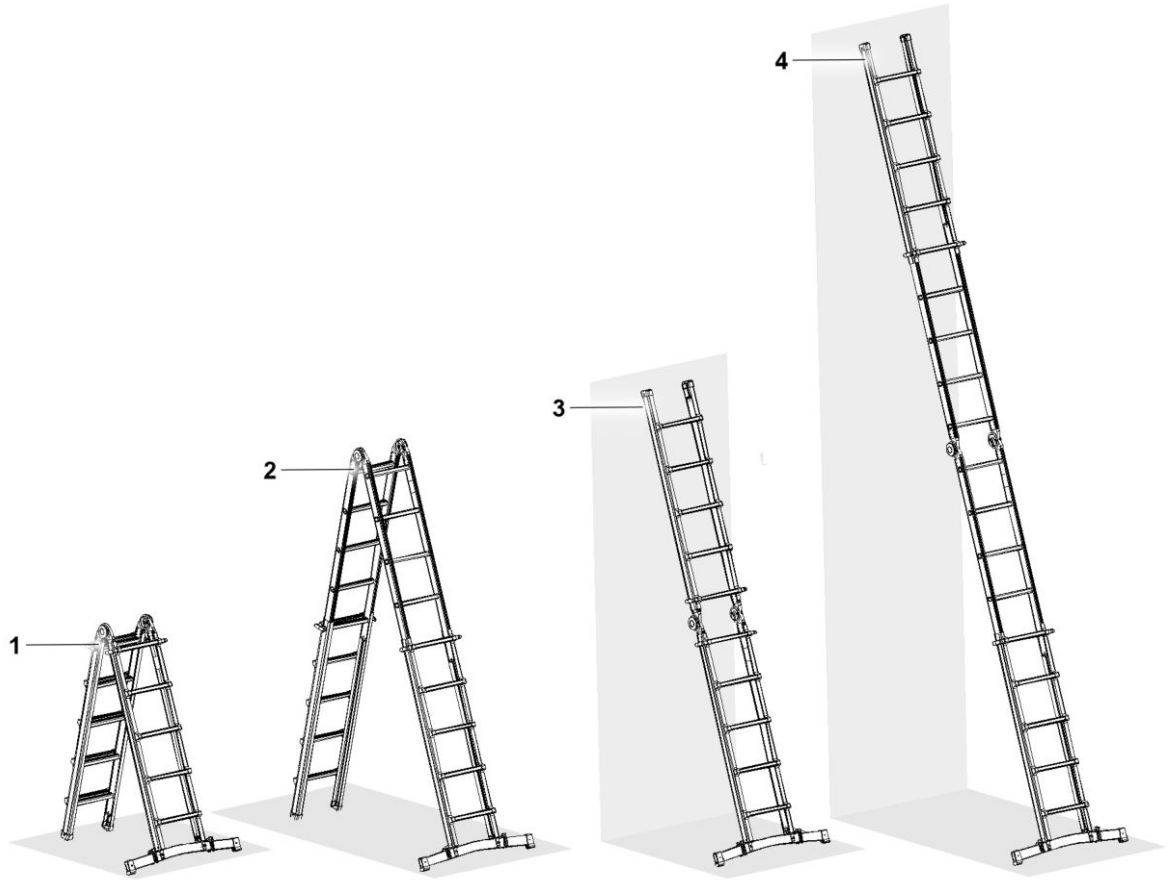


Fig. 109: Multi-purpose ladder

1 Low stepladder
2 High stepladder
3 Low leaning ladder
4 High leaning ladder

The supplied multi-purpose ladder can be used as follows:
- As a stepladder: Incremental adjustment of the height from 1.49 to 2.56 m.
- As a leaning ladder: Incremental adjustment of the length from 3.05 to 5.3 m.

Cross beam

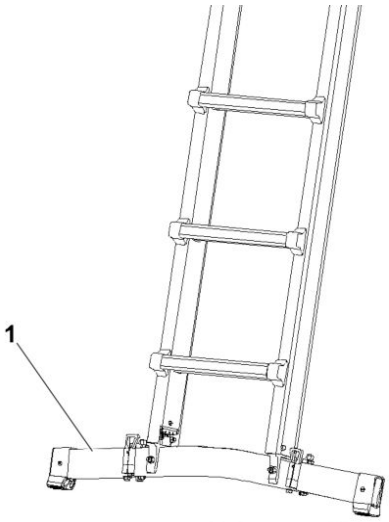


Fig. 110: Multi-purpose ladder with cross beam

1 Cross beam

The multi-purpose ladder is equipped with a cross beam **1** to increase the stability.

Signs

Danger of falling!

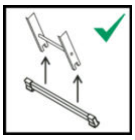
Read the operating instructions.

Maximum load

Ladder for professional use

Ladder for private use

Maximum number of users on one ladder

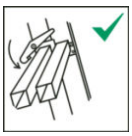


In the case of ladders that have a cross beam, the cross beam must be assembled before the first use

Correct set up angle 65° to 75°

Always keep a firm grip: When climbing up and down and when working on the ladder

Ladder overhang above the exit level



Before use: Engage the lift guards

Do **not** use a damaged ladder

Only use the ladder with the cross beam folded out

Prior to use: The hinges and locks must be engaged

Use the ladder in the correct set up direction

Only use the ladder with appropriate footwear

Do **not** use the ladder if physically impaired or under the influence of drugs or alcohol.

Do **not** use the ladder on an uneven or unsteady surface

Do **not** use the ladder on a slippery or contaminated surface

Do **not** place the ladder on unsuitable surfaces

Do **not** carry bulky objects or objects over 10 kg on the ladder

Do **not** use the top three rungs as rungs to stand on

Avoid leaning out to the side. Keep the body's center of gravity between the ladder beams

Avoid working with a side load

Climb up and down the ladder while facing it

Do **not** use a stepladder as a leaning ladder

Prior to use: Tension the safety struts on stepladders

For stepladders without a platform: Do **not** use the top two rungs as rungs to stand on

It is not permitted to step off the ladder to the side

When transporting or using the ladder, be aware of any danger due to overhead wires

Do **not** use the ladder as a bypass.

4.15.1.3 Boom head positioning points

Right direction of travel

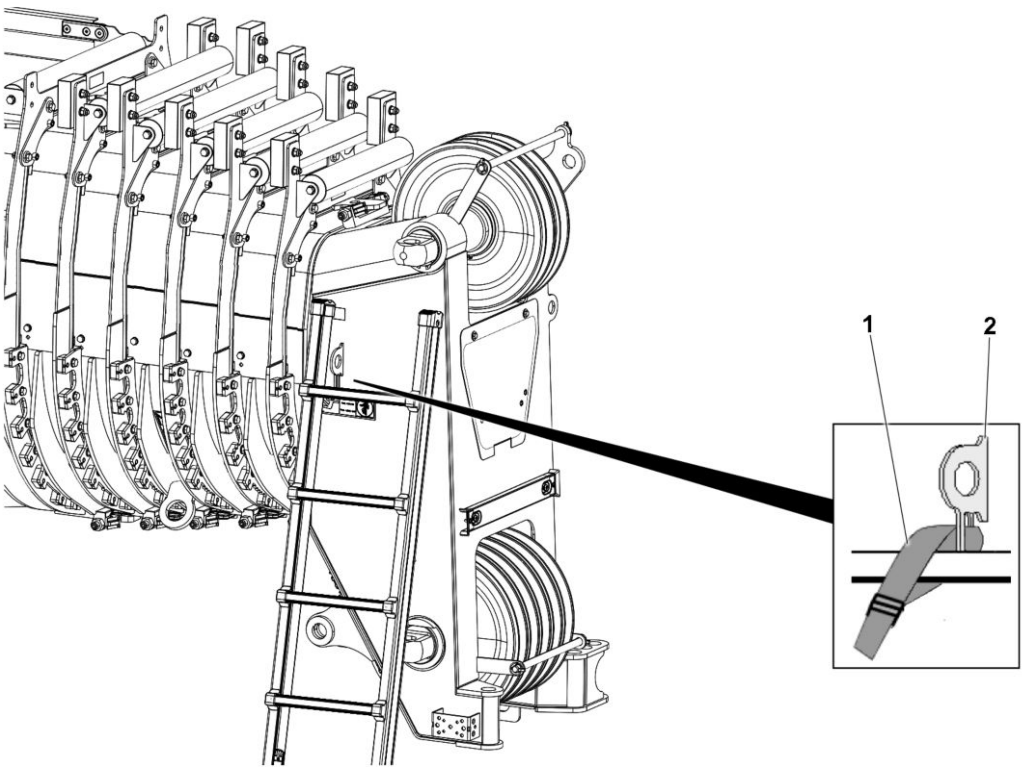


Fig. 142: Boom head, right travel direction

1 Safety belt **2** Hook point with slot

In the right direction of travel, the ladder is leaned on the boom head and secured in the slot of the hook position with a safety belt. (→ 5.10 Using the ladders correctly, p. 176).

Left direction of travel

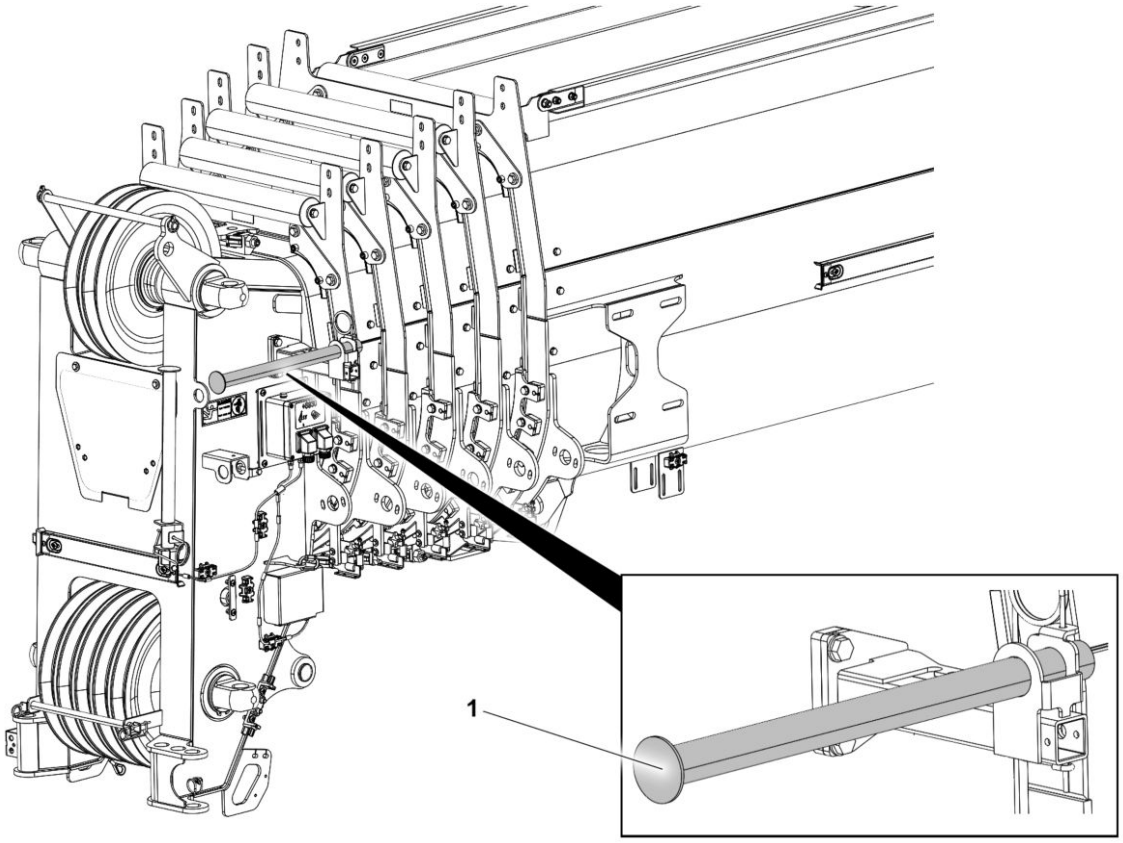


Fig. 143: Boom head, left travel direction

1 Leaning tube

In the left direction of travel, the ladder is leaned on the leaning tube **1** and secured. Assemble and disassemble the leaning tube (→ 10.1.13 Assembling the leaning tube on the telescopic boom in the operating position, p. 679).

4.15.1.4 Folding jib positioning points

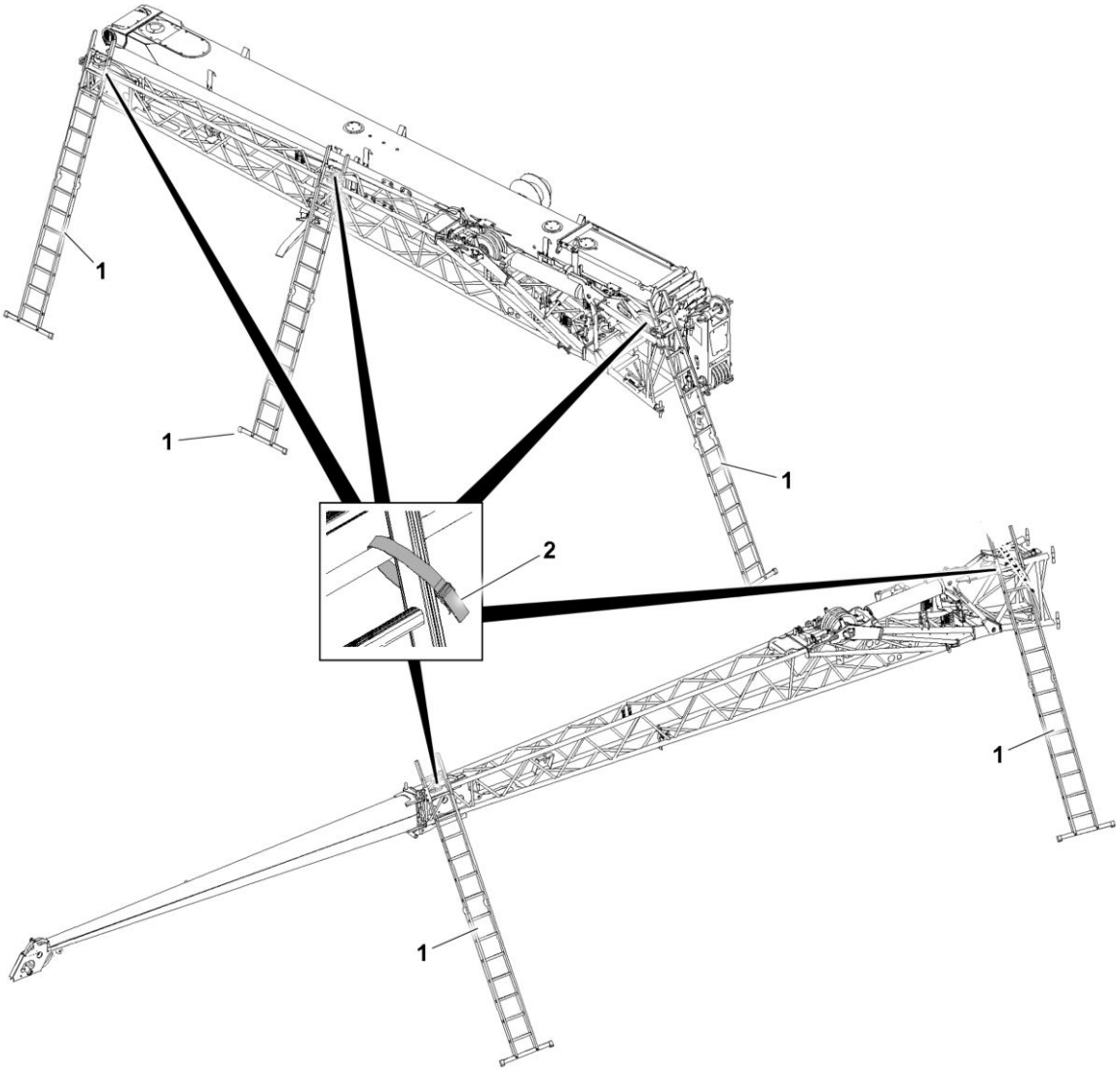


Fig. 144: Exemplary illustration: Ladder secured to the struts

1 Ladder

2 Safety belt

4.15.1.5 Special folding jib positioning point

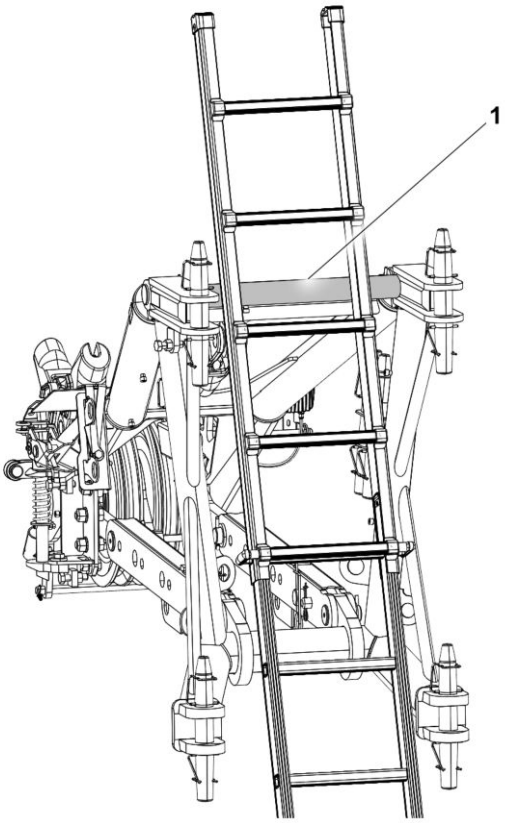


Fig. 145: Special folding jib ladder positioning point

1 Leaning tube

4.15.1.6 Turntable positioning points

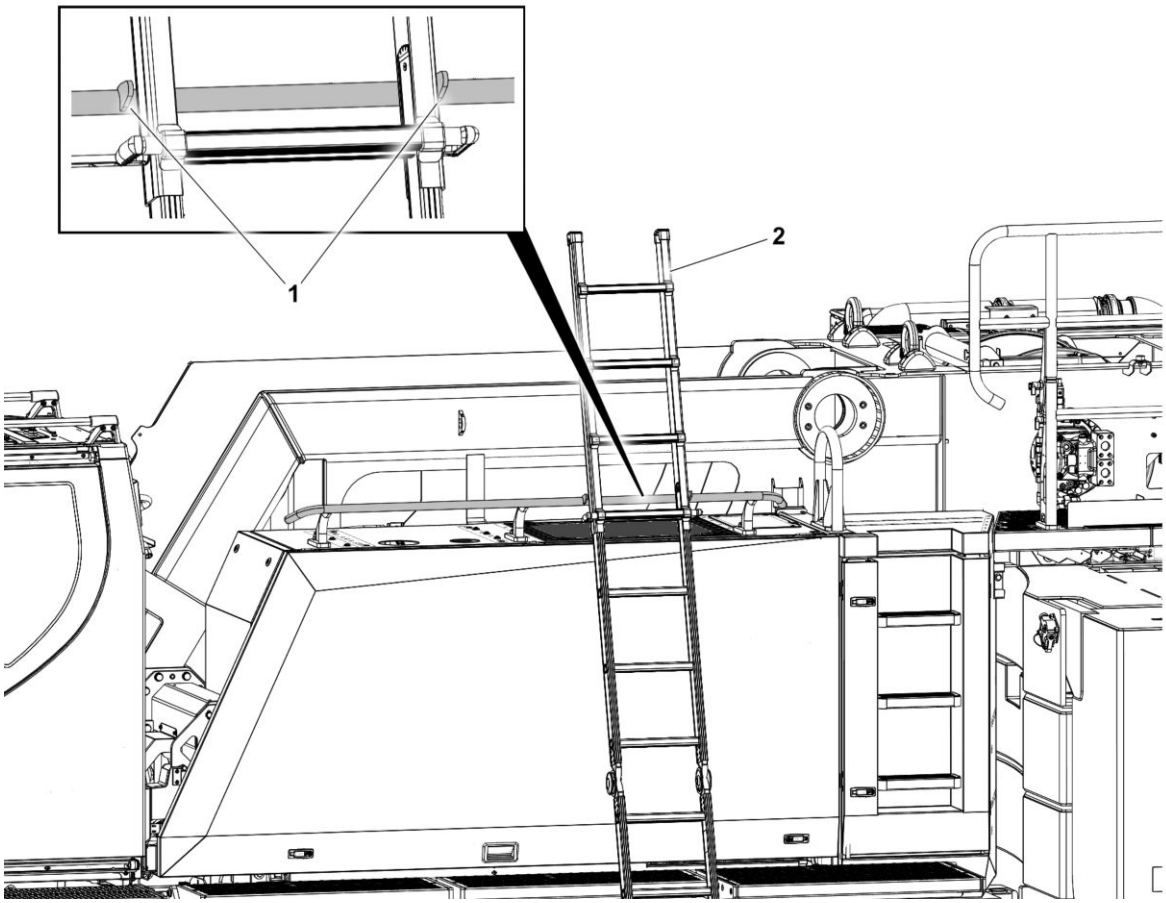


Fig. 146: Turntable positioning point

1 Ladder retainer

2 Ladder

4.15.1.7 Winch 2* positioning point

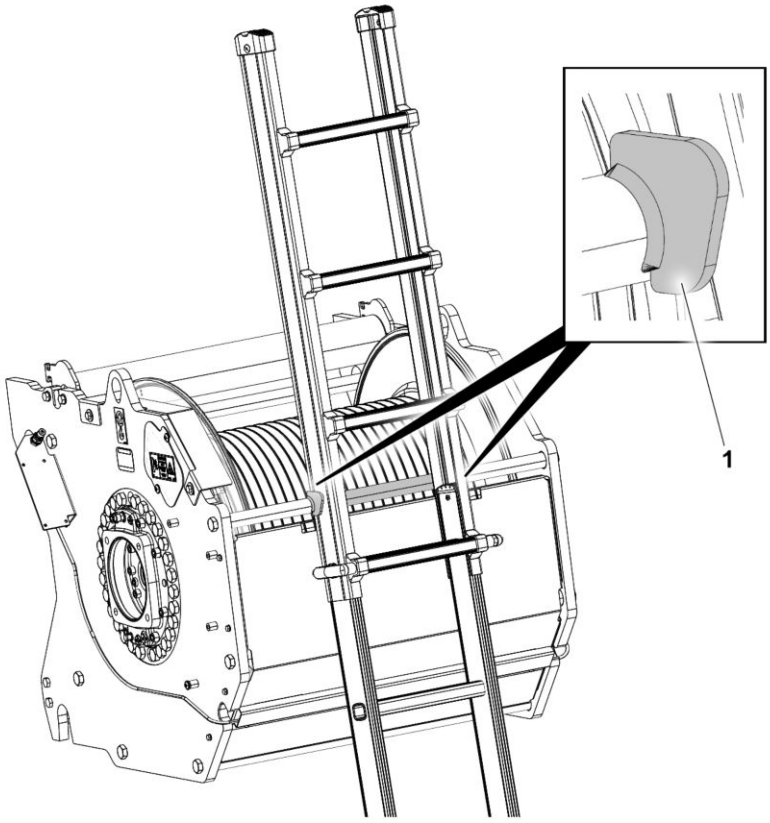


Fig. 147: Winch 2 positioning point

1 Stops

The ladder is placed on winch 2 so that the stops **1** are outside the ladder.

4.15.2 Access to the chassis

4.15.2.1 Access via the stairs

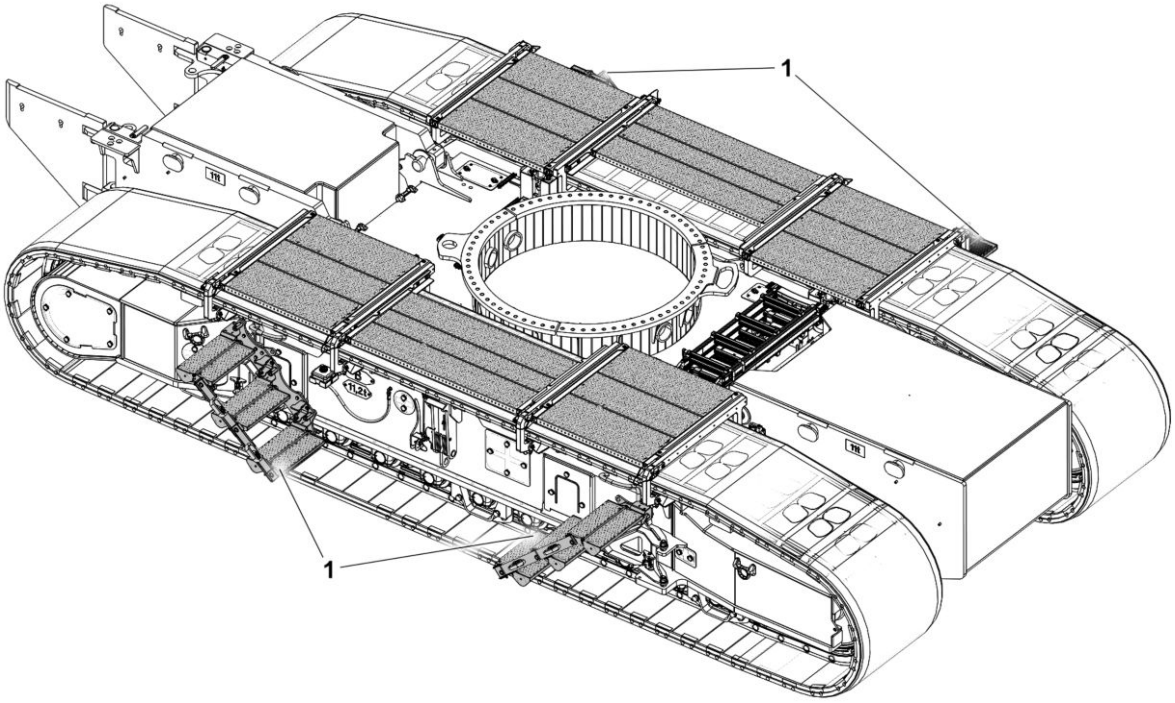


Fig. 148: Access via the stairs on the crawler carrier

1 Stairs

4.15.2.2 Access via the steps on the central ballast

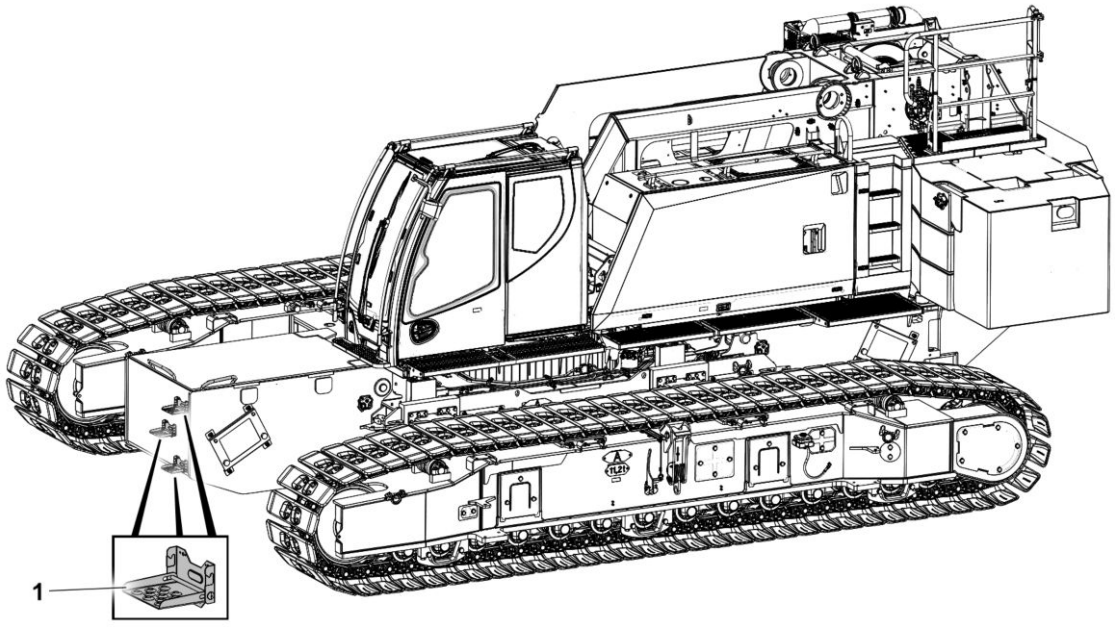


Fig. 149: Access via the steps on the central ballast

1 Step

4.15.3 Accessing the turntable

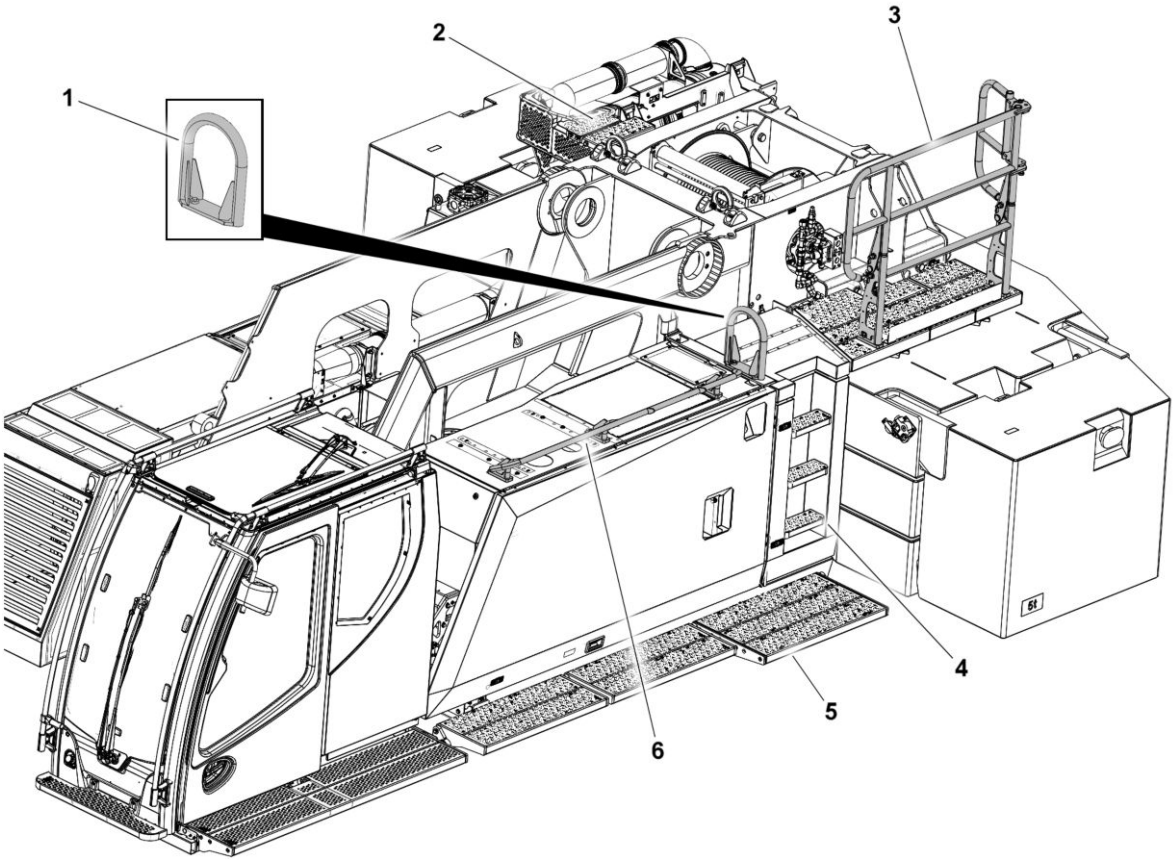


Fig. 150: Access to the turntable

1 Handle
2 Platform
3 Railing
4 Stairs
5 Platform
6 Handrail

4.15.4 Accessing the crane cab

4.15.4.1 Entering and exiting the crane cab

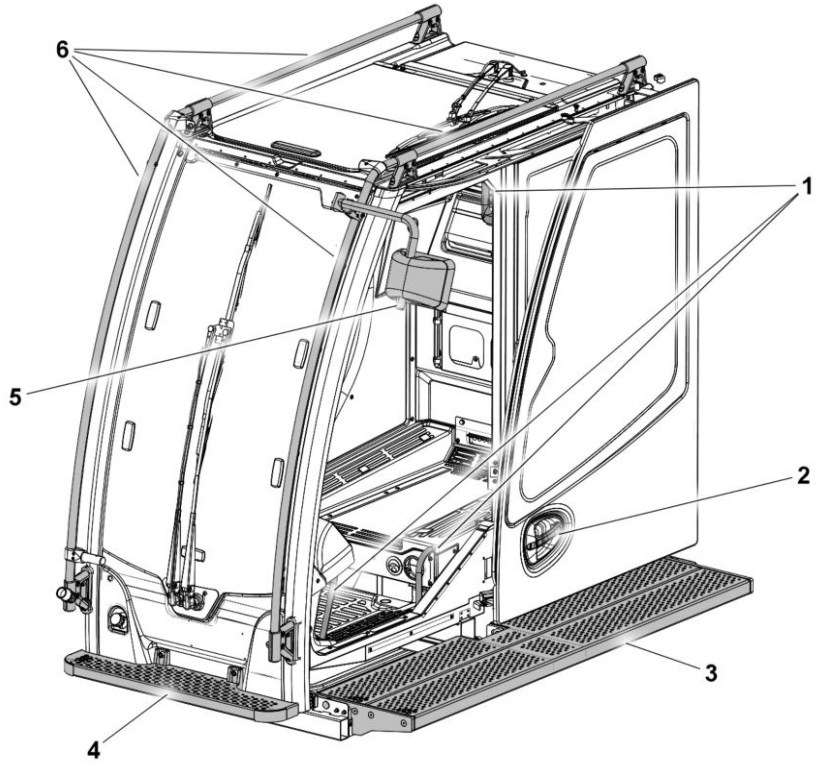


Fig. 151: Entering and exiting the crane cab

1 Handle
2 Door handle (exterior)
3 Side step (folding)
4 Front step
5 Outside mirror
6 Handrail

4.15.5 Accessing to the ballast on the chassis

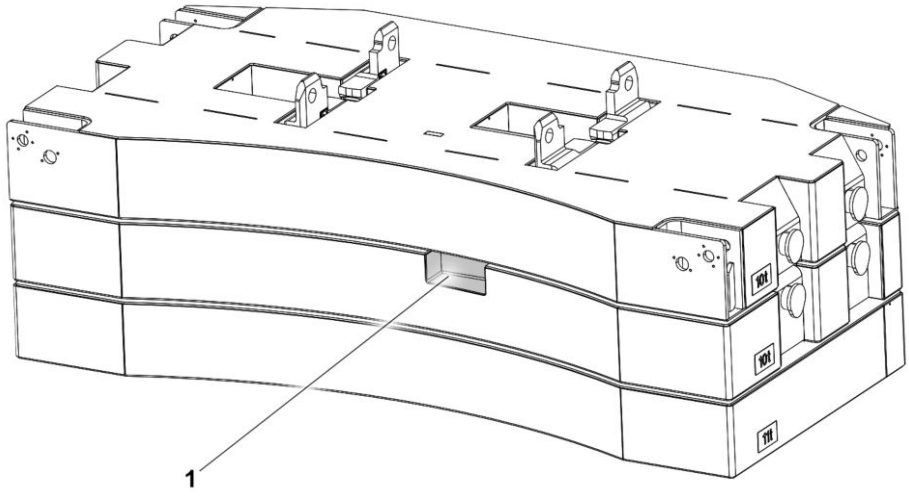


Fig. 152: Accessing to the ballast

1 Step

4.15.6 Accessible surfaces

The accessible surfaces are marked with cross hatches, as shown in the following illustrations.

Fig. 153: Accessible surfaces

Non-accessible surfaces are marked with cross hatches, as shown in the following illustrations.

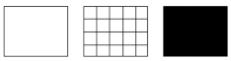


Fig. 154: Non-accessible surfaces

4.15.6.1 Chassis

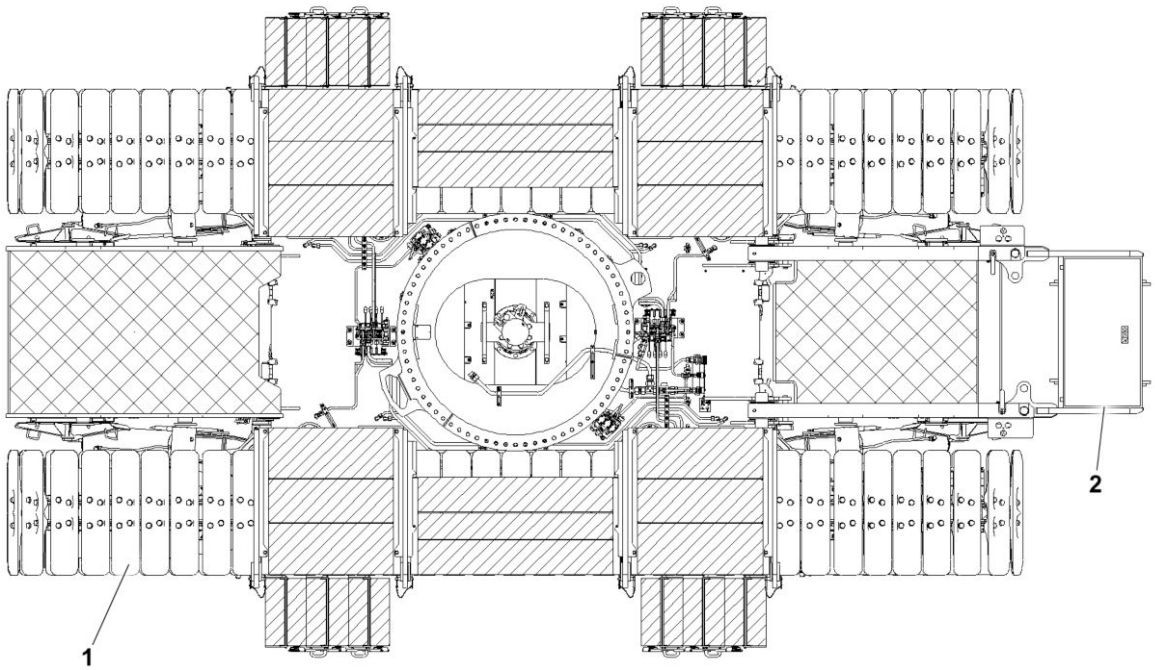


Fig. 155: Accessible chassis walking surfaces and stepping surfaces

1 Crawler travel gear **2** Storage box

The crawler travel gears **1** and storage boxes **2** may not be used as accessible surfaces.

4.15.6.2 Superstructure

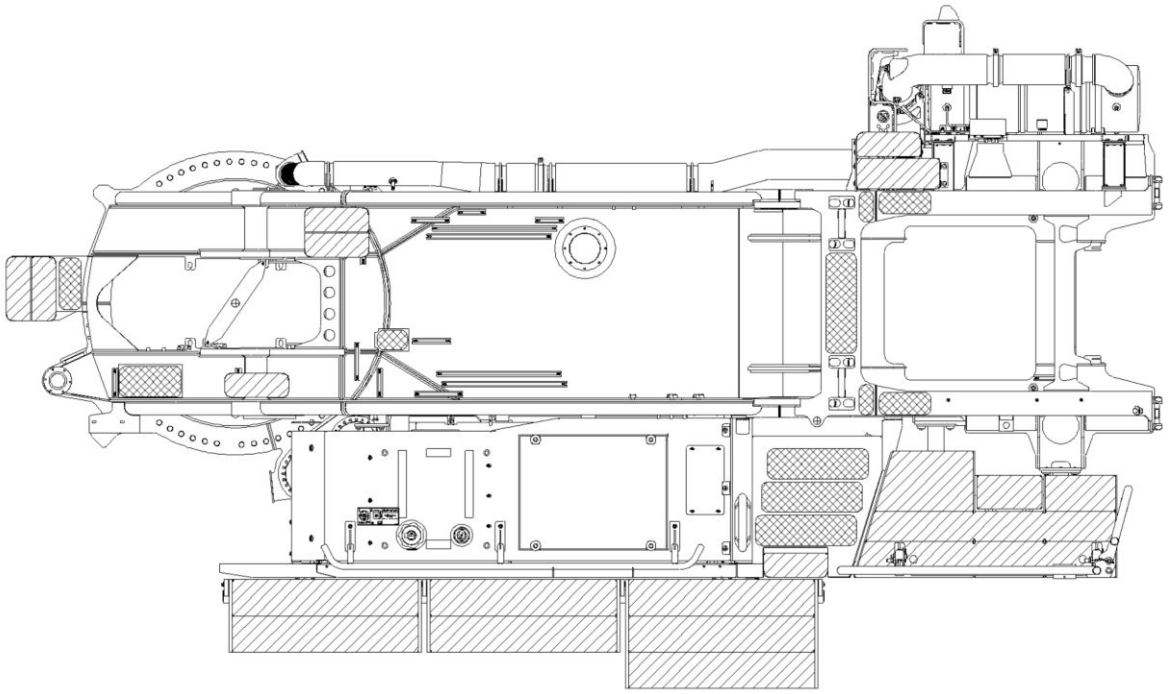


Fig. 156: Accessible superstructure walking surfaces and stepping surfaces

4.15.6.3 Ballast plates

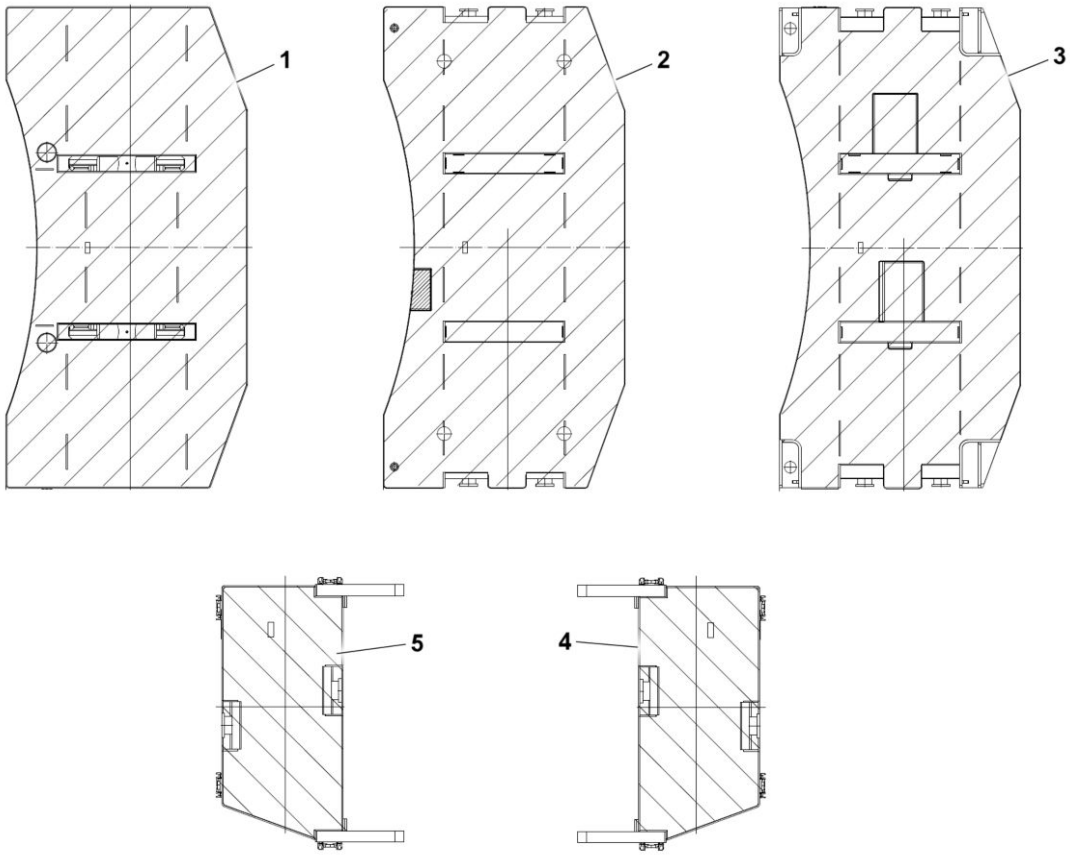


Fig. 157: Accessible ballast plate walking surfaces and stepping surfaces

1 Receptacle plate
2 Ballast plate
3 Ballast plate
4 Ballast plate*
5 Ballast plate*

4.16 Crawler travel gear track widths

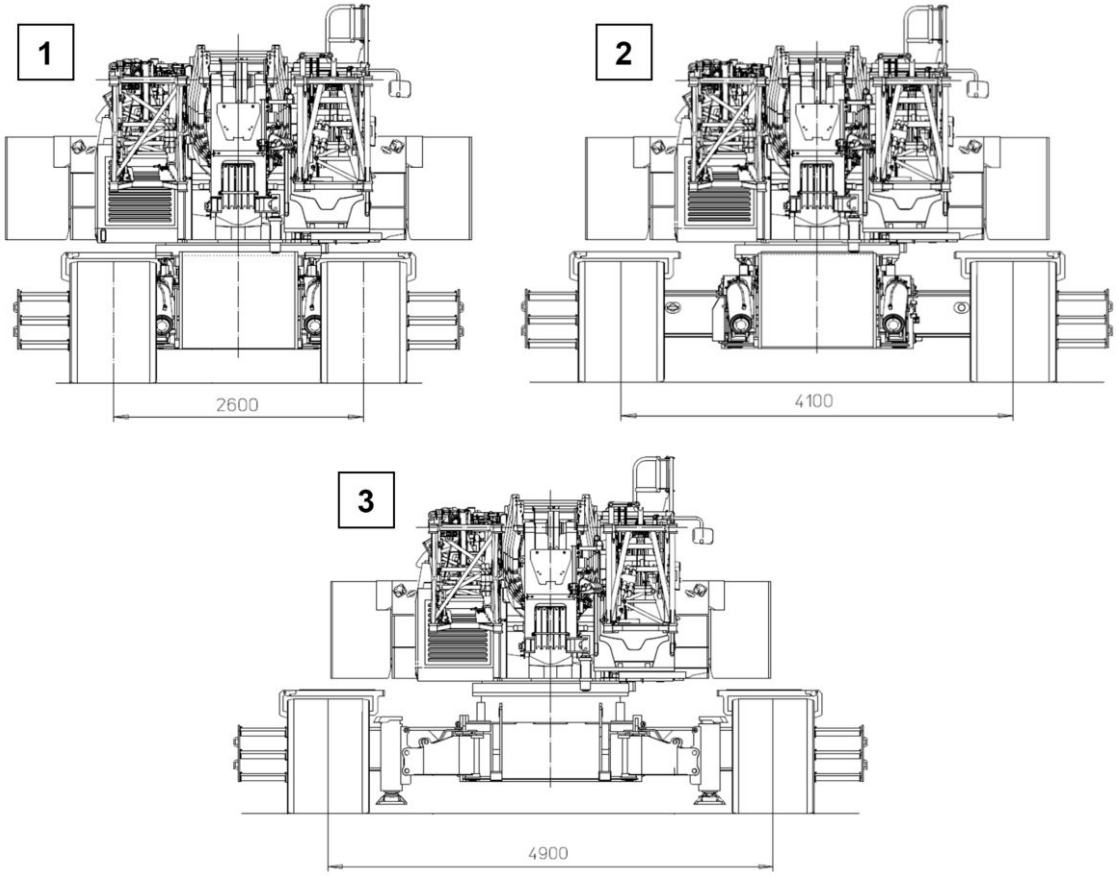


Fig. 158: Track width overview

1 Narrow track width (2.6 m)
2 Reduced track width (4.1 m)
3 Wide track width (4.9 m)

4.17 Crane cab

4.17.1 Crane cab exterior

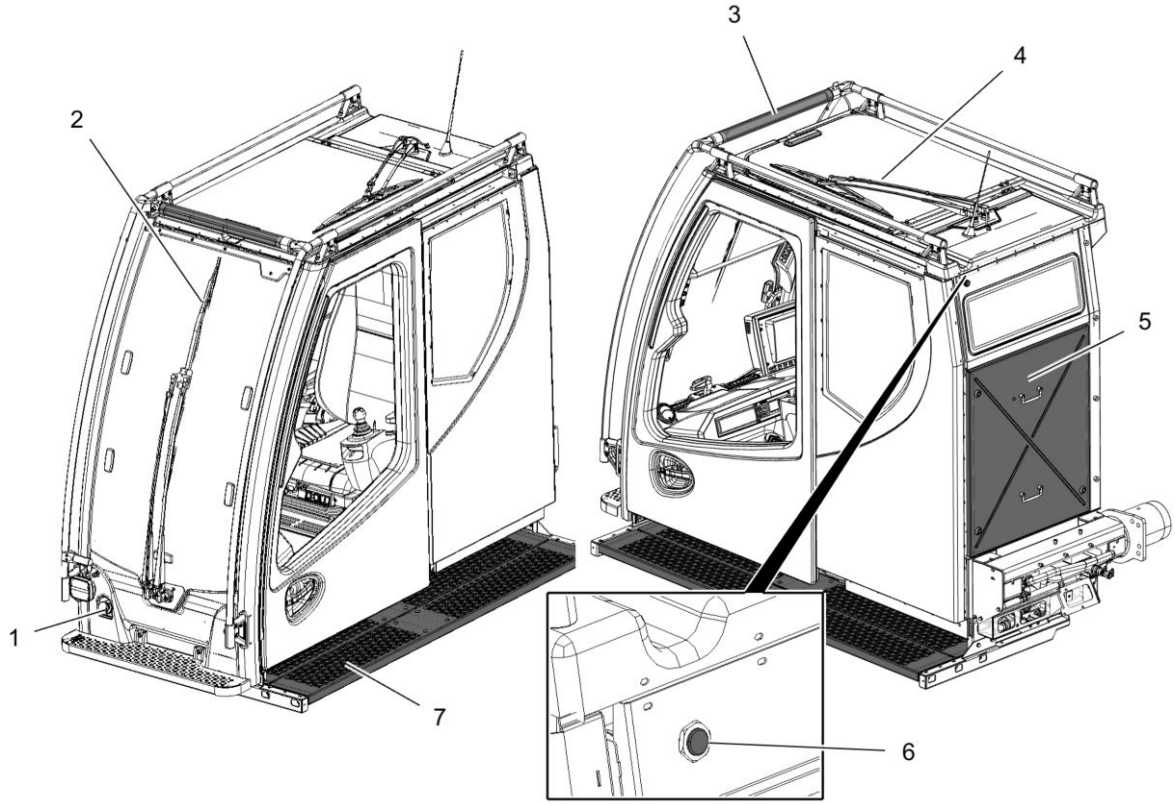


Fig. 159: Crane cab exterior

1 Window washer fluid container
2 Window wiper for front window
3 Overload protection light
4 Window wiper for roof window
5 Control cabinet
6 Overload protection special function sensor
7 Folding step

4.17.2 Crane cab interior

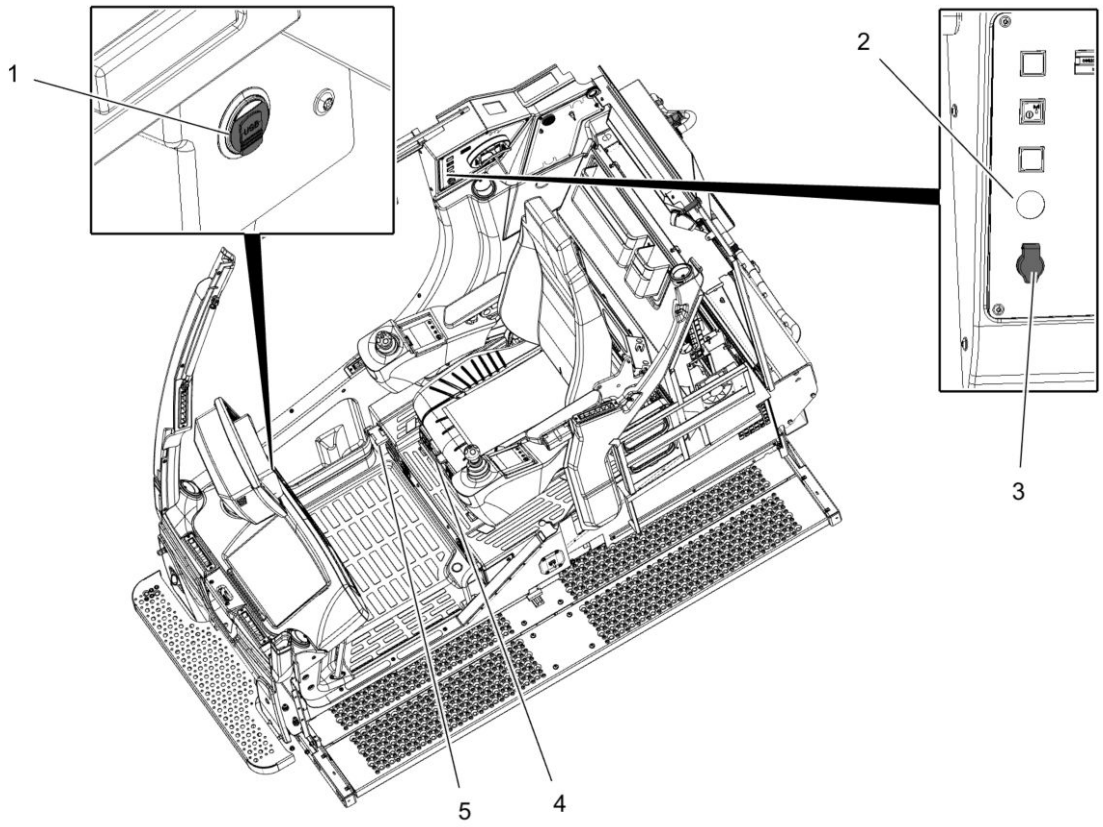


Fig. 160: Crane cab interior

1 Socket (USB) 5 V
2 Socket 12 V*
3 Socket 24 V
4 Seat adjustment
5 230 V / 110 V socket

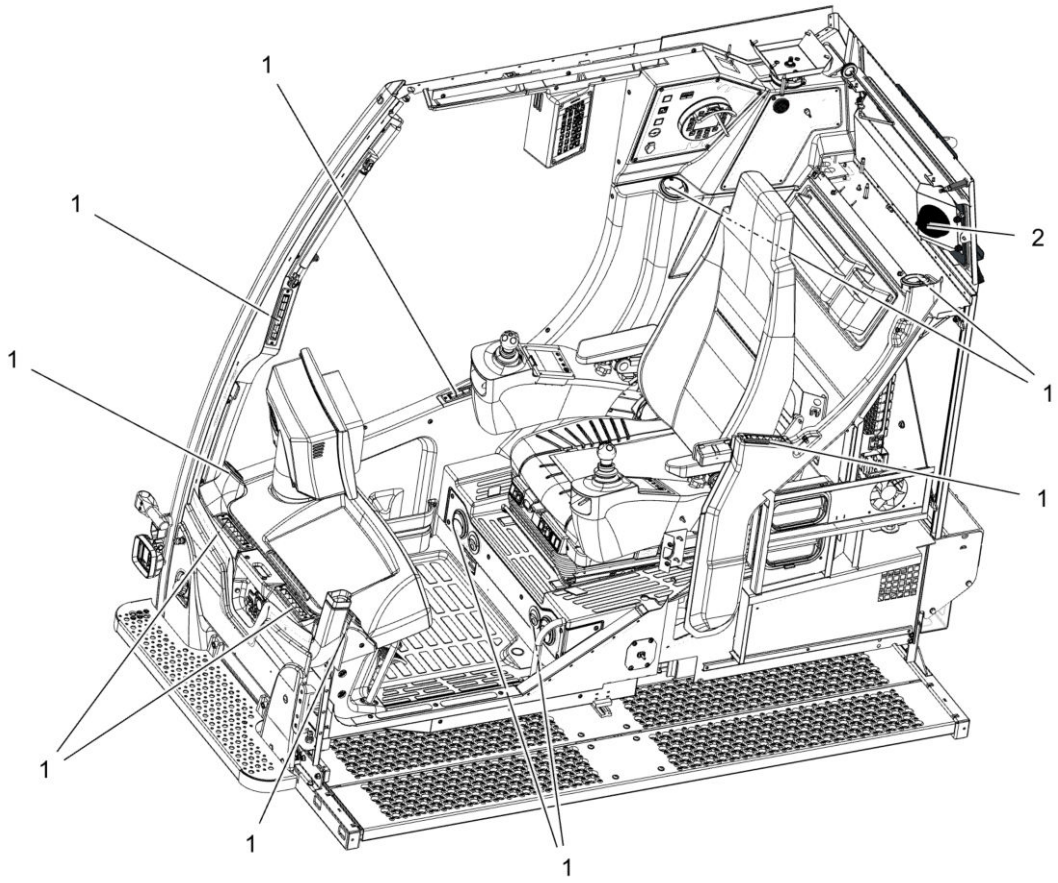


Fig. 161: Exemplary illustration: Air vents

1 Parking heater / climate control system air vents (14x)

2 Auxiliary heater air vents*

4.18 Main boom

4.18.1 Telescopic boom

All telescopic sections are hydraulically extendible, independently of each other.

Telescopic boom with Telematik-system

Boom lengths: 11.375 m to 52 m

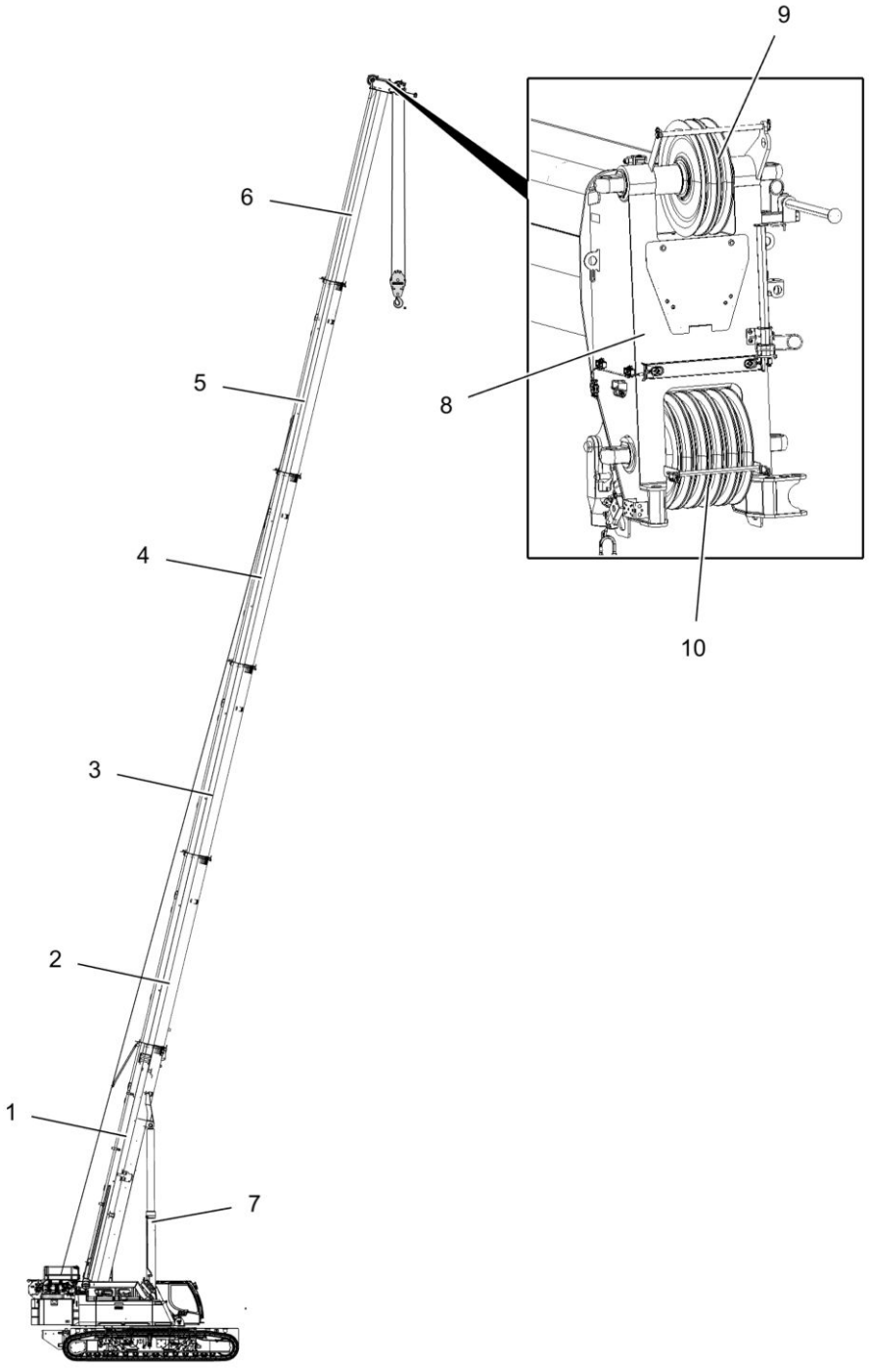


Fig. 162: Telescopic boom

1 Pivot section
2 Telescopic section 1
3 Telescopic section 2
4 Telescopic section 3
5 Telescopic section 4
6 Telescopic section 5
7 Luffing cylinder
8 Pulley head
9 Back pulleys
10 Upper pulley block

4.18.2 Telescopic boom extension*

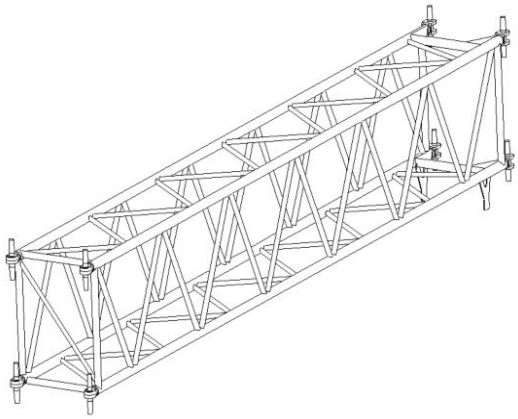


Fig. 163: Telescopic boom extension

4.18.2.1 Designation

Component	Length	Designation
Telescopic boom extension for the hydraulic folding jib	7 m	3A-14
Telescopic boom extension for the mechanical folding jib	7 m	3A-13
When using equipment from other cranes: Observe the safety instructions (→ 5.23.2 Using equipment from other cranes correctly, p. 226).		

Tab. 23: Telescopic boom extension designation

If a telescopic boom extension 3A-13 / 3A-14 should be used on a crane with LICCON3 crane control as a replacement for telescopic boom extension 3A-15 / 3A-16, a conversion kit can be retrofitted. Contact Customer Service at Liebherr-Werk Ehingen GmbH.

4.19 Auxiliary boom

4.19.1 Folding jib*

The folding jib can be equipped with a hydraulic or mechanical angle adjustment.

The folding jib with mechanical angle adjustment can be installed as follows:
- as 0° extension
- under an angle of 20°
- under an angle of 40°

The folding jib with hydraulic angle adjustment can be luffed with or without load from 0° to 40°.

4.19.1.1 Single folding jib

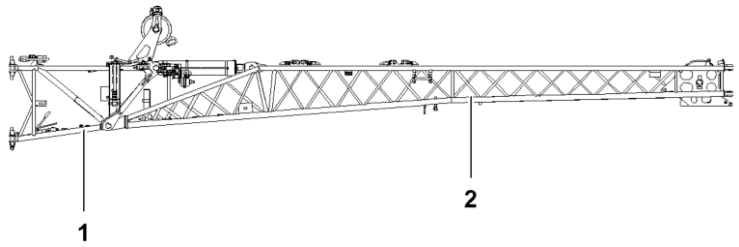


Fig. 164: Single folding jib

1 Adapter
2 Pivot section

4.19.1.2 Double folding jib

The double folding jib can also be used without the end section as a single folding jib.

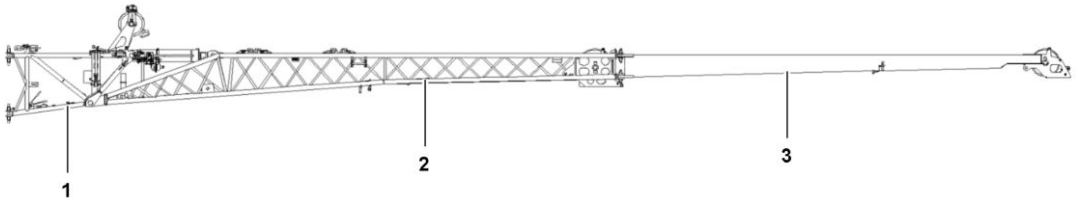


Fig. 165: Double folding jib

1 Adapter
2 Pivot section
3 End section

4.19.1.3 Designation

If a telescopic boom extension is used when operating the hydraulic folding jib (3A-26), then the hydraulic telescopic boom extension (3A-14) is required.

When operating the mechanical folding jib (3A-27), the mechanical telescopic boom extension (3A-13) or the hydraulic telescopic boom extension (3A-14) can be used.

Component	Length	Designation
Hydraulic double folding jib	19 m	3A-26
Hydraulic single folding jib	10.8 m	
Mechanical double folding jib	19 m	3A-27
Mechanical single folding jib	10.8 m	
When using equipment from other cranes: Observe the safety instructions (→ 5.23.2 Using equipment from other cranes correctly, p. 226)		

Tab. 24: Folding jib designation

Folding jibs from other crane types

Note

When using folding jibs from other crane types, the load can change depending on the weight of the folding jib.

Folding jib designation	Assembly possible	Carrying along possible	Required conversion kit without warning and test equipment	Required conversion kits with warning and test equipment
3A–1	Yes	No	-	-
3A–2	Yes	No	-	-
3A–7	Yes	Yes	1 x 9A-4	2 x 9A-4 and 1 x 9A-5
3A–8	Yes	Yes	1 x 9A-4	2 x 9A-4 and 1 x 9A-5
3A–34	Yes	No	-	-
3A–35	Yes	No	-	-

Tab. 25: Folding jibs from other crane types

Folding jibs that can be carried along according to the overview may be carried along, assembled and disassembled on the crane.

Folding jibs that may not be carried along according to the overview may be assembled and disassembled on the crane only in flying mode.

Folding jibs that require a conversion set according to the overview must be converted with the corresponding conversion set prior to use. Contact Customer Service at Liebherr-Werk Ehingen GmbH.

Folding jibs without the indicated designations can be assembled under certain circumstances with this crane type, or retrofitted with a conversion kit. In order to determine if a folding jib can be retrofitted with a corresponding conversion kit: Contact Customer Service at Liebherr-Werk Ehingen GmbH.

If several folding jibs are carried along on the crane, the transport retainers may have to be adjusted to the respective folding jib.

4.19.2 Special folding jib*

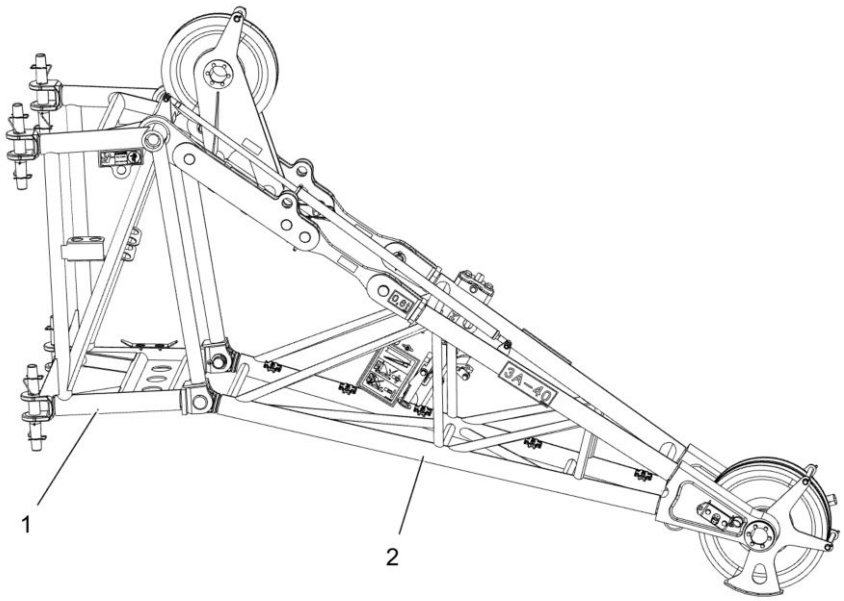


Fig. 166: Special folding jib

1 Adapter

2 Pivot section

4.19.2.1 Designation

Component	Length	Designation
Special folding jib	2.9 m	3A-40
When using equipment from other cranes: Observe the safety instructions (→ 5.23.2 Using equipment from other cranes correctly, p. 226).		

Tab. 26: Special folding jib designation

Special folding jibs from other crane types

Note

When using special folding jibs from other crane types, the load can change depending on the weight of the special folding jib.

Folding jib designation	Assembly possible	Carrying along possible	Required conversion kit without warning and test equipment	Required conversion kits with warning and test equipment
3A–24	Yes	No	1 x 9A-5	2 x 9A-5 and 1 x 9A-4

Tab. 27: Folding jibs from other crane types

Folding jibs that can be carried along according to the overview may be carried along, assembled and disassembled on the crane.

Folding jibs that may not be carried along according to the overview may be assembled and disassembled on the crane only in flying mode.

Folding jibs that require a conversion set according to the overview must be converted with the corresponding conversion set prior to use. Contact Customer Service at Liebherr-Werk Ehingen GmbH.

Folding jibs without the indicated designations can be assembled under certain circumstances with this crane type, or retrofitted with a conversion kit. In order to determine if a folding jib can be retrofitted with a conversion kit, contact customer service at Liebherr-Werk Ehingen GmbH.

If several folding jibs are carried along on the crane, the transport retainers may have to be adjusted to the respective folding jib.

4.19.3 Boom nose*

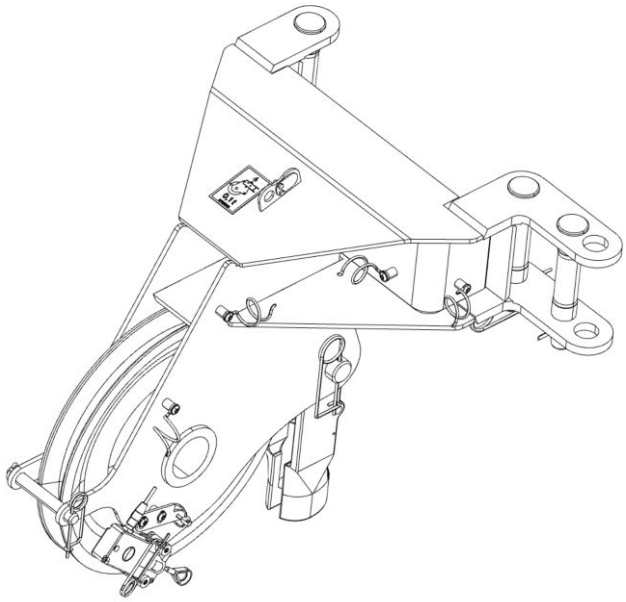


Fig. 167: Boom nose

The boom nose can be carried along on the side of the telescopic boom. The boom nose can be reeved in two times. If the boom nose is assembled, it is possible to work with single hook operation or two hook operation.

Note

No load charts are available for operation with boom nose.

4.20 Hook block and load hook

4.20.1 Components of the hook block and load hook

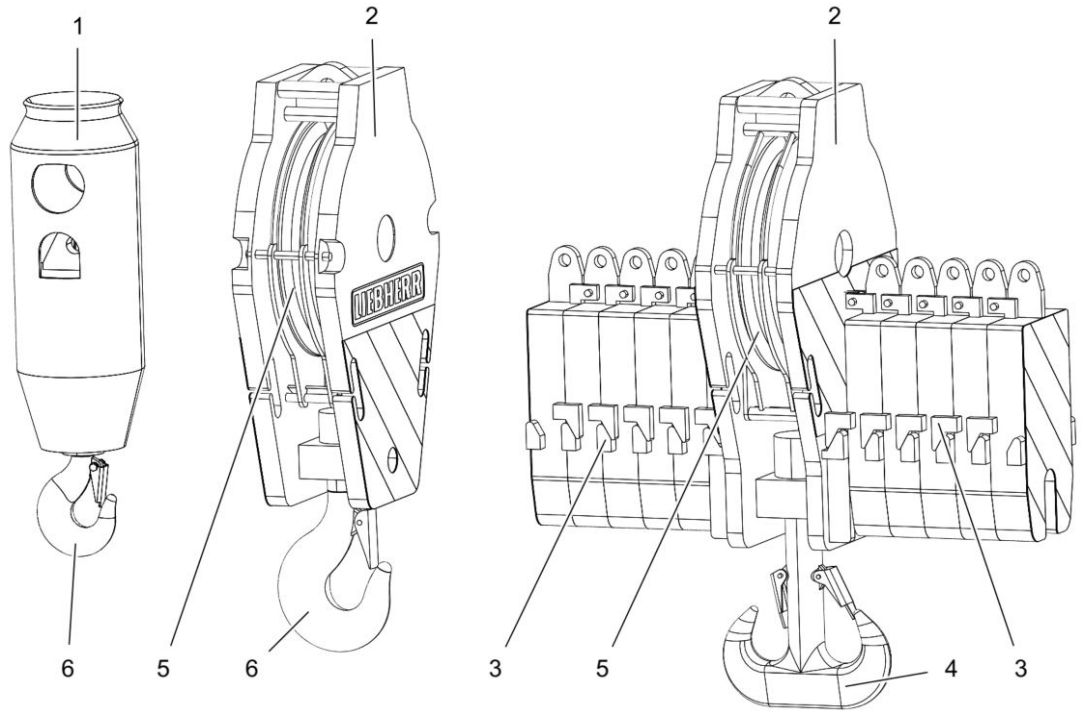


Fig. 168: Exemplary illustration: Hook blocks and load hooks

1 Load hook
2 Hook block
3 Auxiliary weights
4 Double hook
5 Roller set (lower pulley block)
6 Single hook

Hook block / load hook	Hook	Auxiliary weights
Load hook	Single hook	-
1-pulley	Single hook / double hook	max. 10 x 100 kg
3-pulley	Single hook / double hook	max. 10 x 100 kg
5-pulley	Single hook / double hook	max. 10 x 100 kg
7-pulley	Double hook	-

Tab. 28: Hook blocks and load hooks

4.20.2 Markings on the hook blocks and load hooks

The markings are stamped on the hook blocks and load hooks.

Note

For the hook blocks and load hooks approved for the crane type (→ Separate document “Use of the load charts” > “Hook block”)

When using equipment from other cranes: Adhere to the safety instructions (→ 5.23.2 Using equipment from other cranes correctly, p. 226).

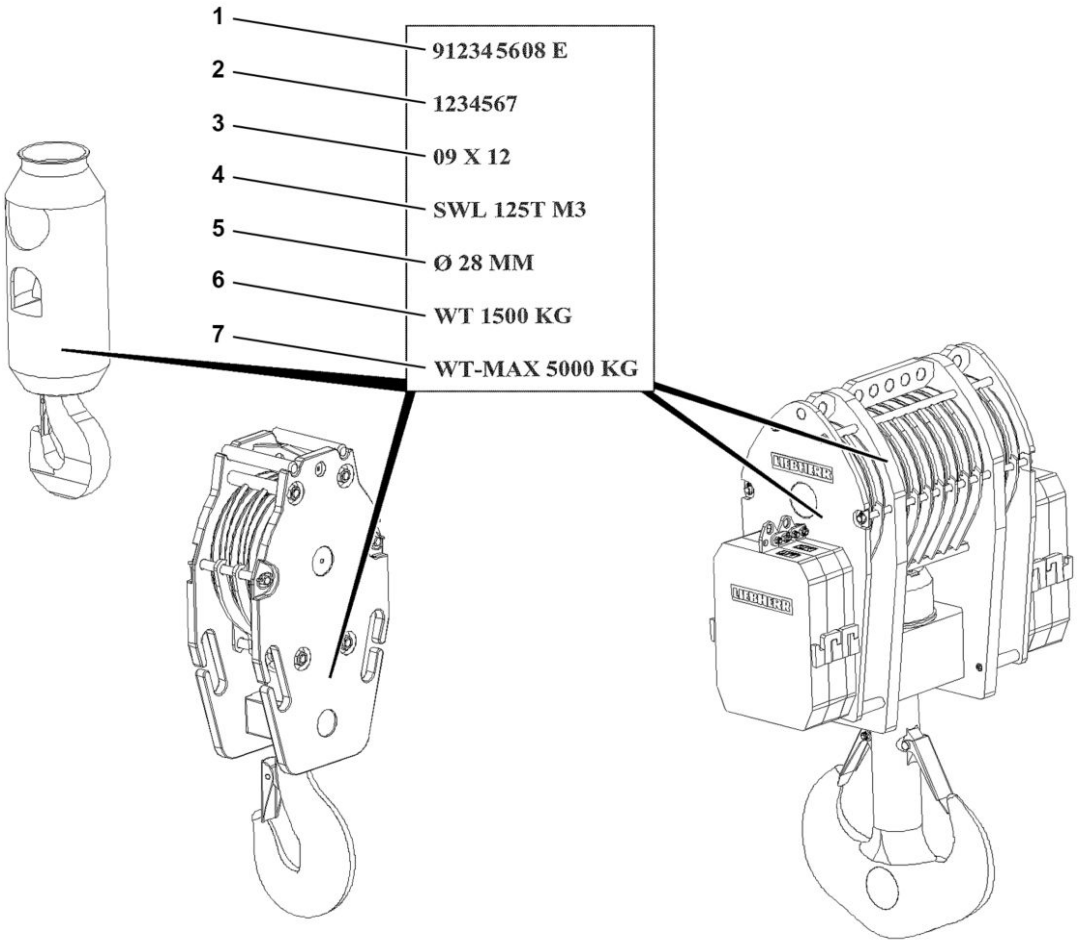


Fig. 169: Exemplary illustration: Punch area on the hook block and load hook

1 Liebherr ID no. (“E” = Entschärft (deburred))
2 Series or factory test number
3 Month of construction / supplier marks / year of construction
4 Load carrying capacity and power train group
5 Hoist rope diameter
6 Net weight
7 Maximum permissible net weight inclusive of auxiliary weights

4.20.3 Markings on the single hook or double hook

The markings are stamped on the single hook and double hook.

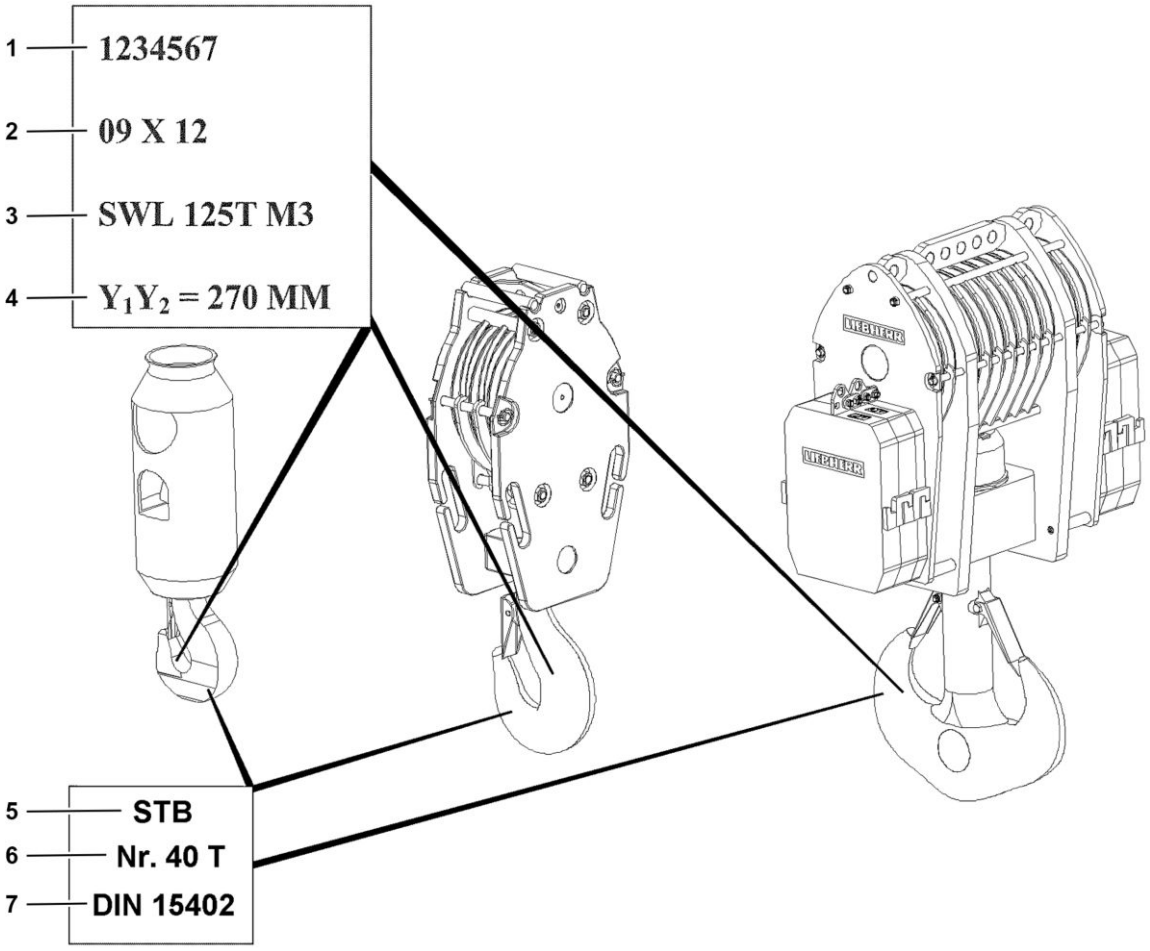


Fig. 170: Exemplary illustration: Punch areas on the single hook and double hook

1 Series or factory test number
2 Month of construction / supplier marks / year of construction
3 Load carrying capacity and power train group
4 Dimension Y or dimension Y1 and dimension Y2 according to DIN (= Test dimensions for periodic tests)
5 Hook manufacturer
6 Hook number + strength class according to DIN 15 400
7 Hook shape according to DIN 15 401 /DIN 15 402

4.20.4 Markings on auxiliary weights

The markings are stamped on the auxiliary weights.

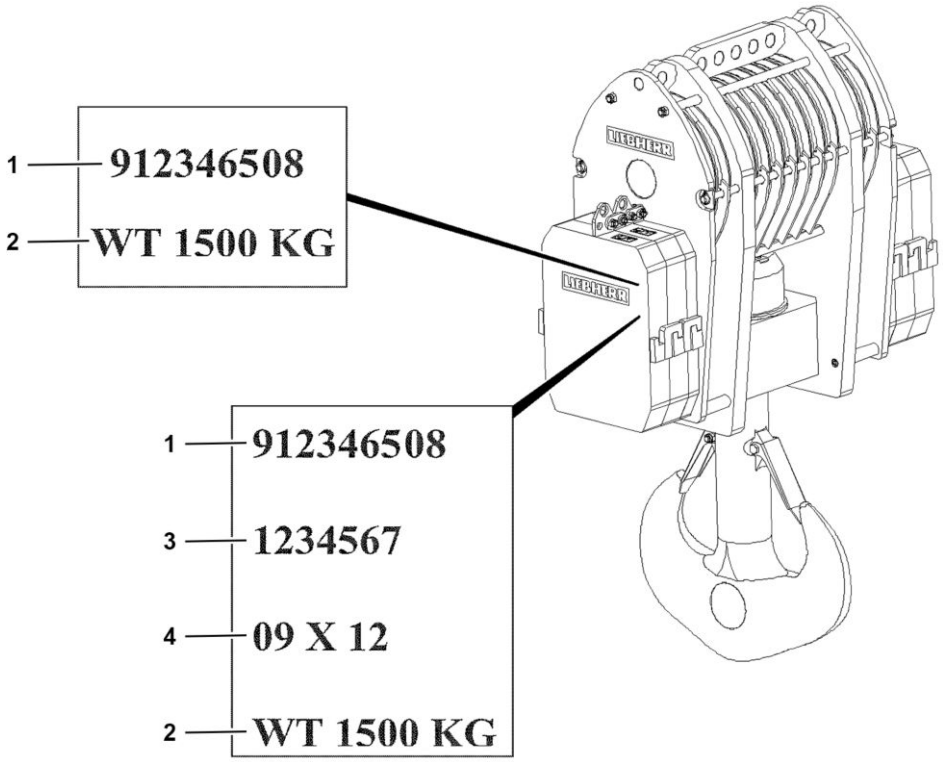


Fig. 171: Exemplary illustration: Punch areas on auxiliary weights

1 Liebherr ID no.
2 WT (Weight Tara) = Net weight of the individual auxiliary weight
3 Series or factory test number[4)]
4 Month of construction / supplier marks / year of construction[4)]

[4)] Only for the auxiliary weights ordered separately

4.21 Winches

4.21.1 Winch 1

Winch 1 is the crane's main hoist winch.

4.21.2 Winch 2*

Winch 2 can be used as a hoist winch for two hook operation over the boom nose or the folding jib.

4.21.2.1 Designation

Component	Designation
Winch 2	4B-26
When using equipment from other cranes: Observe the safety instructions (→ 5.23.2 Using equipment from other cranes correctly, p. 226)	

Tab. 29: Winch 2 designation

4.21.3 Classification

Component group	Load spectrum [L]	Power train group [M]	Operating class [T]
Winch 1	L2	M4	T4
Winch 2	L2	M4	T4

Tab. 30: Winch classification

4.22 Ropes

4.22.1 Hoist ropes

Note

Only use rotation-resistant ropes as hoist ropes.

Component group	Rope diameter	Length	Rope category number RCN
Winch 1 hoist rope	21 mm	220 m	See the rope certificate
Winch 2 hoist rope*	21 mm	220 m	See the rope certificate

Tab. 31: Hoist rope technical data

4.22.2 Rope locks and rope end connections

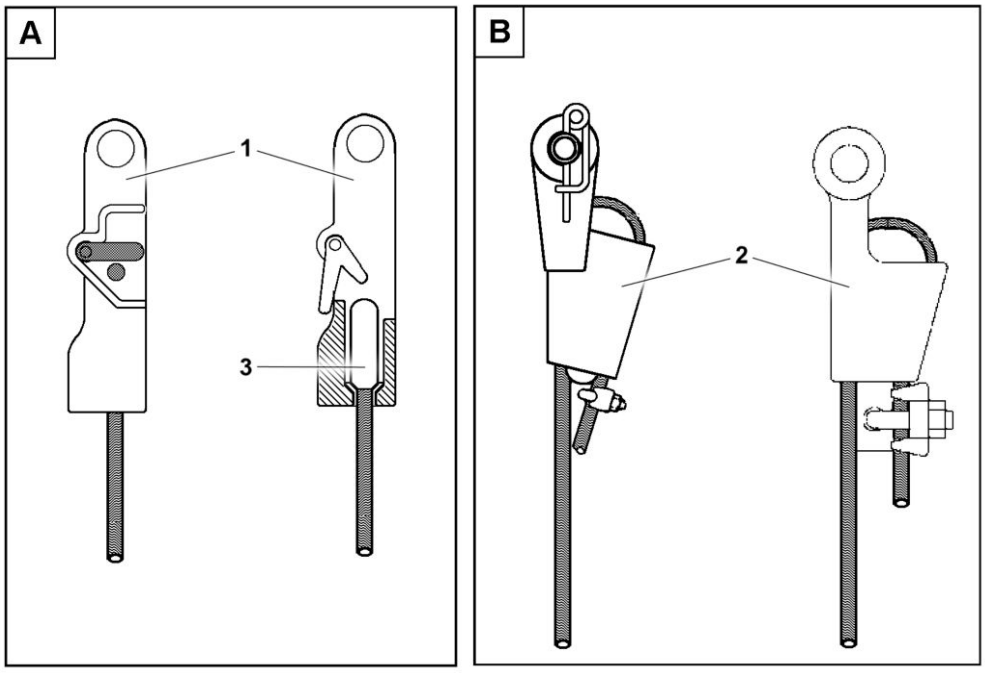


Fig. 172: Exemplary illustration: Rope locks and rope end connections

1 Lock
2 Wedge lock
3 Rope end connection

4.22.2.1 Lock

The lock **1** is a rope lock for connecting a hoist rope with a rope end connection **3** (→ 10.4.15 Assembling the lock, p. 732).

4.22.2.2 Wedge lock

The wedge lock is a rope lock for fastening a hoist rope without a rope end connection **3**. With a short hoist rope, for example (→ 10.4.17 Assembling and disassembling the wedge lock, p. 736).

4.22.2.3 Rope end connection

A distinction is made between the following types of rope end connections **3**:
- Locking clip: it is pressed onto the rope
- Locking cast sleeve: it is cast with the rope

4.23 Turntable ballast

4.23.1 Ballast combinations

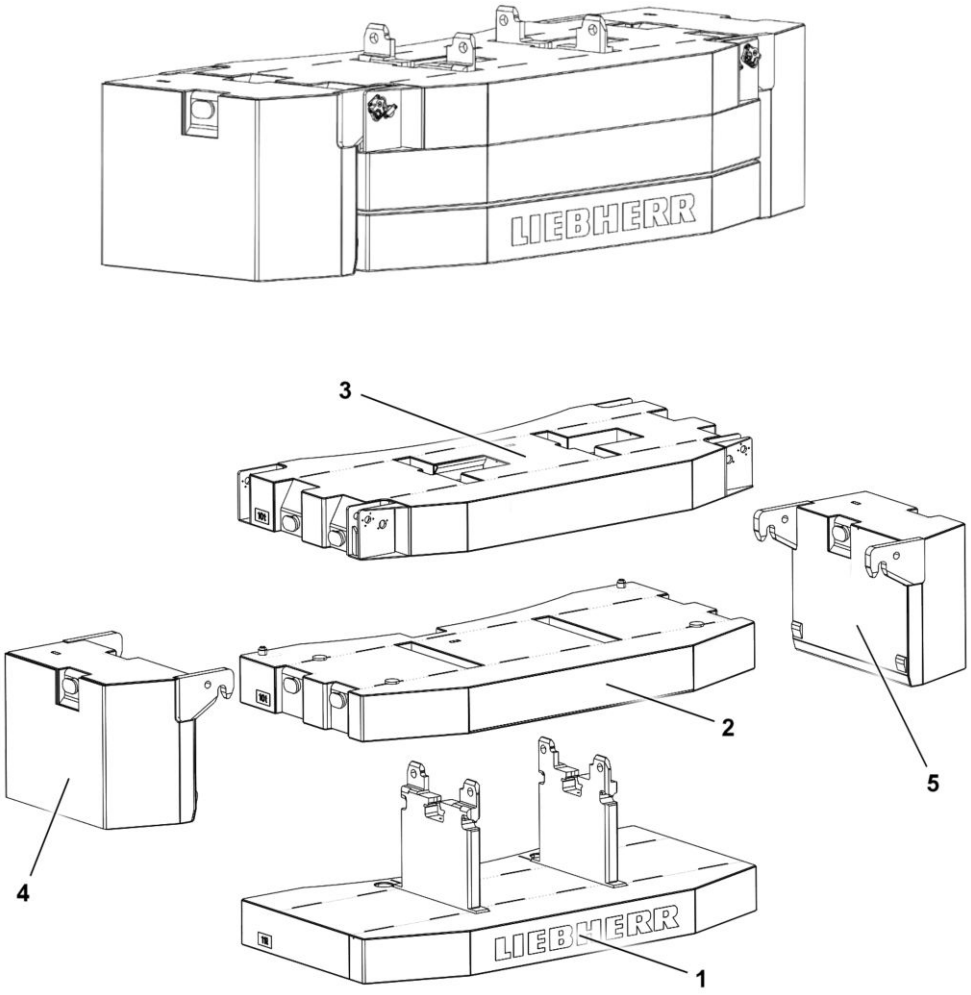


Fig. 173: Ballast overview

1 Receptacle plate 11 t
2 Ballast plate 10 t
3 Ballast plate 10 t
4 Ballast plate 5 t*
5 Ballast plate 5 t*

4.23.1.1 Ballast combination 0 t

Composition	Individual weight	Mount
No ballast	0 t	-

Tab. 32: Ballast combination 0 t

4.23.1.2 Ballast combination 11 t

Composition	Individual weight	Mount
Receptacle plate **1**	11 t	-

Tab. 33: Ballast combination 11 t

4.23.1.3 Ballast combination 21 t

Composition	Individual weight	Mount
Receptacle plate **1**	11 t	-
Ballast plate **2**	10 t	-

Tab. 34: Ballast combination 21 t

4.23.1.4 Ballast combination 31 t

Composition	Individual weight	Mount
Receptacle plate **1**	11 t	-
Ballast plate **2**	10 t	-
Ballast plate **3**	10 t	-

Tab. 35: Ballast combination 31 t

4.23.1.5 Ballast combination 41 t

Composition	Individual weight	Mount
Receptacle plate **1**	11 t	-
Ballast plate **2**	10 t	-
Ballast plate **3**	10 t	-
Ballast plate **4**	5 t	Pinned with the ballast plate **3**.
Ballast plate **5**	5 t	Pinned with the ballast plate **3**.

Tab. 36: Ballast combination 41 t

4.24 Central ballast

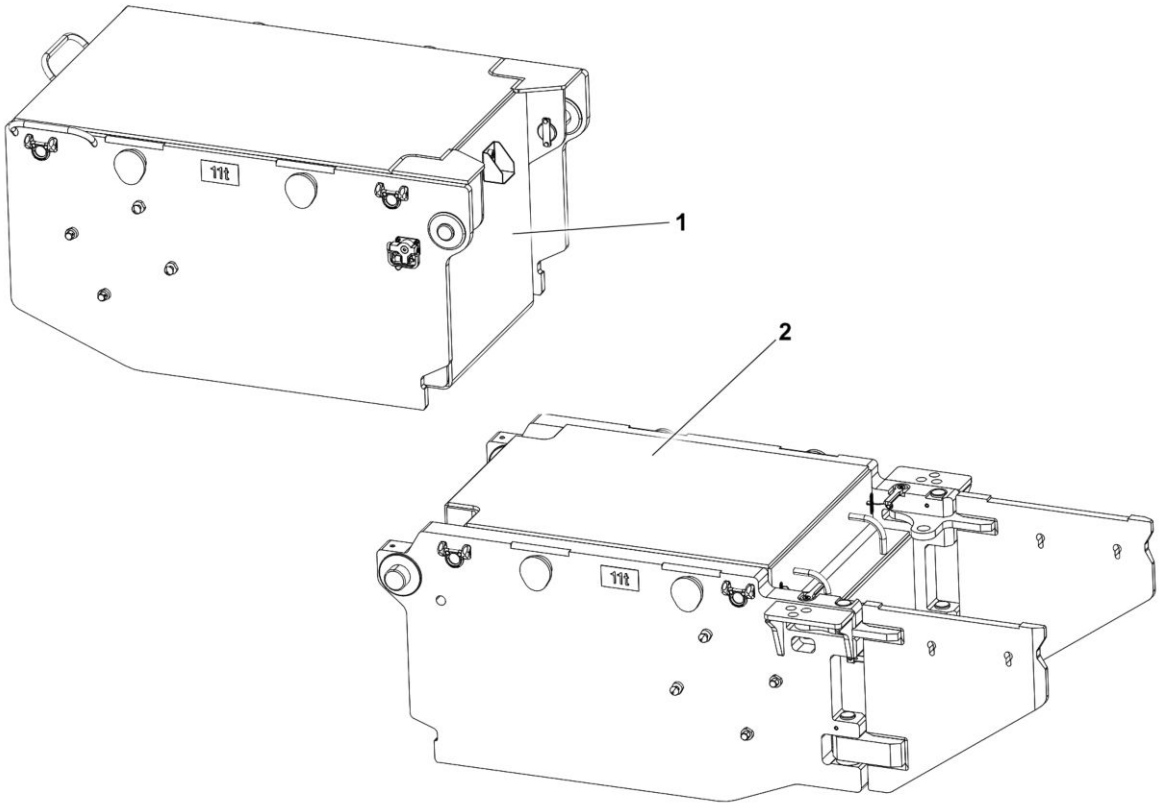


Fig. 174: Central ballast

1 Front central ballast 11.0 t

2 Rear central ballast 11.0 t

5 Safety

The Safety chapter provides the basis for safe and problem-free crane operation. In combination with the task-specific safety instructions and the safety messages integrated in the task, the residual risks resulting from crane, also when using it as intended, are indicated.

5.1 State of the art

This crane is built according to the state of technology and recognized safety technical regulations. Despite that, danger to body and life for the user and / or third parties or damage to the crane and / or other material assets is still possible.

5.2 Safe working environment

A systematic procedure for creating a safe working environment must be ensured. The procedure must be followed for all components of crane use, regardless if it concerns an individual procedure or a group of repeating procedures.

All required preparations of the job site, assembly, disassembly, maintenance and driving the crane and the equipment must be understood as components of crane use. The following points are effectively communicated to all involved parties.

The systematic procedure is as follows:

- Job planning:
  So that crane uses can be carried out safety, they must be planned in advance in consideration of all foreseeable risks. Planning is carried out by people with appropriate technical knowledge. In the case of repeated uses or routine uses, this planning is possibly required only for the first use. A check must be performed regularly if the factors of use or environmental conditions have changed. If the factors of use have changed, job planning must be performed again. The national and regional specifications on crane use must be observed. For example, the European Directive “Use of work equipment” and its implementation as a national or regional regulation, such as the “Operational safety regulation” in Germany.
- Selection, operational provision and use of suitable cranes and equipment:
  This concerns, for example, assembly tools, personal protective equipment (PPE), material for supporting the crane, load handling equipment and fastening equipment.
- Maintenance, testing and inspection of cranes and equipment:
  This concerns, for example, assembly tools, personal protective equipment (PPE), material for supporting the crane, load handling equipment and fastening equipment. Observe the national and regional regulations when checking the work equipment and cranes.
- Reasonable supervision by properly trained and competent personnel provided with the required authority.
- Provision of properly trained and competent personnel who fulfill all necessary requirements.
- Provision of properly trained and competent personnel who have received an explanation of their responsibilities and the responsibility of the others involved in crane use.
- Make sure that all required certificates and documents, such as, for example, crane test reports, qualification certifications for personnel, are valid, are available and demonstrate the required suitability.
- Cooperation with other authorities and test points for reaching the corresponding conformity with approvals.

- Cooperation with other trades and service providers with regard to crane use for preventing danger or protecting against danger, for example with additional crane contractors and machine operators.
- Make sure, at all times, that unauthorized movements or unauthorized uses of the crane are prevented.
- Ensure safety for people who are not involved with crane use. Pay attention to the warnings.
- Establish a communication system that is understood by everyone involved in crane use. For safety of crane use, all personnel must be able to communicate clearly in the same language.

5.3 Definition of roles

Safe crane operation depends, for example, on suitable personnel.

Selection of personnel:
- Training certificates and evidence of practical experience are helpful when selecting competent personnel.
- Observe the national and regional regulations concerning personnel qualification.

All personnel have the following responsibilities:
- Personnel wear the personal protective equipment necessary for the respective work procedure in accordance with the Crane documentation and national and regional regulations.
- Personnel contact their supervisors when there are questions about the crane documentation or the information in the crane documentation is not sufficient.

All personnel must fulfill the following requirements:
- Personnel are physically and psychologically suitable to fulfill their roles, in particular with regard to vision, hearing, reflexes and a short reaction time.
- Personnel are **not** impaired by alcohol, drugs or other influences. Personnel who are impaired by alcohol, drugs or other influences may **not** be used.
- Personnel are able to fulfill the tasks assigned to them in a reliable manner.
- Personnel are trained according to the requirements.
- Personnel comply with the national and regulation regulations on age. An exception to this are personnel who, for training purposes, are under the direct supervision of an authorized person.

All personnel must have the following qualifications and knowledge that are relevant for their individual scope of duties:
- Technical training and work experience.
- Knowledge of the use of suitable personnel protective equipment, especially fall protection equipment.
- Knowledge of the relevant standards, accident prevention regulations and national and regional regulations.
- Knowledge of the tasks and responsibilities of the involved persons.
- Ability to recognize and avoid possible dangers.

5.3.1 Understanding of roles

The roles in the following sections define the respective requirements and responsibilities. One person can fulfill multiple roles.

The roles of the people located near the crane must be defined at all times and be known to all involved personnel.

5.3.2 Manufacturer

The manufacturer has the following responsibilities:
- The manufacturer is responsible for the safety-related, proper condition of a new crane with accessories and crane documentation when handed over the first time to the operating company.
- The manufacturer documents all service work carried out by the manufacturer.
- The manufacturer offers training for crane operators, assembly personnel and maintenance personnel.
- The manufacturer offers services to support the operating company.

5.3.3 Operating company

The operating company can also be the owner of the crane.

The operating company has the following responsibilities:
- The operating company makes sure that the crane fulfills the national and regional regulations of the job site. If necessary, the crane must be changed, for example with signs, lighting, exhaust system, underride protection.
  When importing the crane into the United Kingdom, English crane documentation must also be provided. Examples are provided. If necessary, request them from customer service at Liebherr-Werk Ehingen GmbH.
- The operating company is responsible for the safety-related, proper condition of the crane with accessories and complete crane documentation after hand over from the manufacturer.
- The operating company provides personnel with crane documentation in a language they can understand.
- The operating company makes sure that only trained personnel are used.
- The operating company provides the necessary personal protective equipment to all involved personnel. This responsibility includes all work on the crane and with the crane.
- When personnel are being trained, they must be suitably supervised.
- The responsible individuals make sure that personnel are efficiently organized, so that safe cooperation is ensured while working.
- The operating company checks at regular intervals that personnel are working in a safety-conscious manner.
- The operating company makes sure that when driving the crane on public roads, all national and regional traffic regulations as well as those required by the manufacturer are observed.
- The operating company commissions maintenance personnel and authorized and trained service personnel according to the maintenance and inspection schedule.
- The operating company appoints an authorized inspector. The operating company appoints an authorized inspector to perform the tests and maintenance required nationally, regionally and by Liebherr-Werk Ehingen GmbH. In this way the operating company ensures the further, safe and reliable operation of the crane.
- The operating company makes sure that equipment is inspected regardless of the interval when changing to another crane.
- The operating company shall not make any alterations or repairs to load bearing or safety-relevant parts of the crane without consulting with the manufacturer and receiving written approval.
- The operating company makes sure that only original spare parts from Liebherr-Werk Ehingen GmbH are used.
- The operating company contacts customer service at Liebherr-Werk Ehingen GmbH if the information in the crane documentation is not sufficient.
- The operating company will inform the manufacturer of every safety-relevant incident that was caused directly by the crane, its components or by the crane documentation.
- The operating company makes sure that the engine or exhaust system is not altered or manipulated. If the engine or exhaust system has been altered or manipulated, crane approval is voided.

5.3.3.1 Transferring of responsibility

When the use of the crane is not carried out by the operating company, they must make sure that their areas of responsibility are contractually transferred to the organization using the crane.

5.3.3.2 Monitoring by a designated person

The operating company determines a “designated person” who is responsible for monitoring crane use.

The designated person is known to the crane operator and the involved persons located near crane use.

The designated person has the following tasks:
- The designated person assesses the use of the crane, so that the planning, selection of the crane or cranes, selection of the winch and lifting equipment, support substructure, wind planning as well as instructions and supervision are ensured for the safe performance of the task. This includes consultation with other people responsible and guaranteeing the required cooperation with any other involved organizations.
- The designated person checks that the set up configuration was assembled properly before erection of the boom.
- The designated person makes sure that the tests and inspections as well as crane and equipment maintenance required nationally, regionally and by Liebherr-Werk Ehingen GmbH are carried out.
- The designated person makes sure that an effective procedure is in place for reporting defects and events as well as for carrying out the necessary corrective measures.
- The designated person is responsible for the organization and monitoring of crane use. The designated person assigns the role of crane operator and the other roles to competent people and authorizes their activities.

The designated person receives the authority required for performance all their tasks in consultation with the crane operator. The designated person receives in particular the authority to stop operation when they believe that continuing operation could be dangerous.

5.3.4 Crane operator (crane driver)

The crane operator has the following responsibilities:
- The crane operator is responsible for the proper operation of the crane in compliance with the crane documentation and within the framework of the systematic procedure for creating a safe working environment. See section “Safe working environment” in this chapter. This concerns both the lifting of loads as well as driving at the job site, and when required driving on public roads.
- The crane operator must always react only to the signal of the slinger or the guide, except in the case of a stop signal. The slinger or guide must be clearly recognizable. See section “Slinger” and section “Guide” in this chapter.
- The crane operator has read and understood the crane documentation.
- The crane operator operates the crane as intended within the limit values of the crane, depending on the weather and wind.
- The crane operator stops operation immediately when a safe method of operation is no longer possible, for example due to the weather and wind. The crane operator immediately initiates the required measures.
- The crane operator carries out all the tasks assigned to them by their role in the manufacturer’s maintenance and inspection plan.
- The crane operator uses only original spare parts from Liebherr-Werk Ehingen GmbH.
- The crane operator shall not make any alterations or repairs to the crane without consulting with the operating company and receiving written approval.
- The crane operator observes the national and regional regulations.

- When driving on public roads, the crane operator follows the national and regional traffic regulations.
- The crane operator establishes a travel condition that complies with the locally valid rules and the definitions in the crane documentation.
- When transferring the crane to another crane operator: All data and settings for which the last crane operator is responsible must be transferred to the new crane operator.
- The crane operator informs the operating company about every unsafe change to the crane.
- The crane operator stops crane operation immediately after an accident or an impermissible crane load and reports the incident to the operating company. (→ 5.26.3 Behavior after impermissible crane load, p. 243).

The crane operator fulfills the following requirements:
- The crane operator fulfills the requirements in section “Slinger” and section “Guide”.
- The crane operator is physically capable of operating the crane in a safe manner.
- The crane operator provides the operating company with a health certificate that confirms that he is physically fit to operate the crane, if required by national or regional regulations.
- The crane operator is authorized to operate the crane.
- The crane operator is suitably trained with regard to the crane type to be operated. The crane operator has sufficient knowledge about the crane, the control and the safety equipment of the crane.
- The crane operator has the necessary knowledge to act independently in emergency situations and in the case of special events.
- The crane operator is trained in the use of and is familiar with all fire extinguishers on the crane.
- The crane operator is able to evaluate distances, heights and spaces.
- The crane operator is familiar with driving the crane from the driver's cab.
- Depending on the crane type, the crane operator is familiar with driving the crane from the crane cab.
- The crane operator is familiar with the maintenance and inspection schedule and the recommended procedures and preventive measures.
- The crane operator is familiar with the signal signs according to the regulations at the job site.

5.3.5 Slinger

The slinger has the following responsibilities:
- The slinger is responsible for fastening and loosening the load to or from the crane load carriers.
- The slinger is responsible for using the correct fastening equipment, load handling equipment and the correct equipment in compliance with the job planning for proper load handling.
- The slinger is responsible for guiding the load.
- If more than one slinger is present, at every moment only one slinger is responsible for the signal for releasing the load for the stroke.

The slinger fulfills the following requirements:
- The slinger fulfills the requirements in the section “Guide”.
- The slinger is physically able to use the load handling equipment, fastening equipment and the equipment.
- The slinger is physically able to guide the load.
- The slinger is authorized to give signal signs.
- The slinger is authorized to perform fastening operations.
- The slinger has received training in fastening techniques.
- The slinger has received training in securing against unforeseen unhooking of load handling equipment or fastening equipment.
- The slinger has received training in avoiding damage to load handling equipment and fastening equipment.

- The slinger is able to select the required load handling equipment, fastening equipment and equipment in a suitable condition for the load to be lifted.
- The slinger is aware of the weight of the load to be lifted with the dimensions and distance from the crane.
- The slinger is able to fasten balanced loads.
- The slinger is able to give precise and clear verbal instructions when audio devices are used (radio equipment, for example) and can use this equipment.

5.3.6 Guide

The guide has the following responsibilities:
- The guide is responsible for relaying the signal from the slinger to the crane operator.
- The guide is responsible for directing the crane movements, the load and travel movements. The guide must select a suitable position that ensures visual contact with the crane operator. If the guide does not have visual contact with the crane operator, the responsibility must be transferred to another guide.
  Alternatively, other suitable acoustic or visual methods can be used.
- When more than one guide is present, at every moment only one guide is responsible.
- If while the crane is being used, the responsibility for directing the crane movements, the load and the travel movements is transferred to another person, the guide must clearly notify the crane operator that the responsibility was transferred and to whom. Furthermore, the crane operator and the newly designated person must clearly indicate that they accept the transfer of the responsibility.

The guide fulfills the following requirements:
- The guide is authorized to give signal signs.
- The guide has received training in guidance and is familiar with the signal signs according to the regulations at the job site.
- The guide is able to evaluate distances, heights and spaces.
- The guide is able to safely guide the load.
- The guide is able to safely direct the crane movements, the load and the travel movements.
- The guide is aware of the hazards that can result from the crane movements, load, travel movements and conditions at the job site. The guide selects a safe working position for themselves.
- The guide is able to give precise and clear verbal instructions when audio devices are used (radio equipment, for example), and can use this equipment.

5.3.7 Assembly personnel

The assembly technician has the following responsibilities:
- The assembly technician is responsible for crane assembly and disassembly and for the equipment in compliance with the manufacturer's crane documentation.
- When two or more people are required for an activity, one person is appointed as the "responsible technician", to constantly monitor assembly and disassembly. The responsible technician is responsible for proper assembly and disassembly of the crane and the equipment.
- The assembly technician has read and understood the operating instructions, assembly plans, rod plans and all other documents necessary for assembly and disassembly.
- The assembly technician is aware of the weight of the load to be lifted and, in particular, of the crane components to be assembled, with the dimensions and distance from the crane.
- The assembly technician shall not make any alterations or repairs to the crane without consulting with the operating company and receiving written approval.
- The assembly technician carries out all the tasks assigned to them by their role in the manufacturer's maintenance and inspection plan.
- The assembly technician shall immediately clarify anything that is not clear with their supervisor.

The assembly technician fulfills the following requirements:
- The assembly technician fulfills the requirements in section “Slinger” and section “Guide”.
- The assembly technician is physically able to use the load handling equipment, fastening equipment and the equipment as well as tools and work equipment.
- The assembly technician is able to work at heights in a confident and safe manner.
- The assembly technician has received suitable training in the assembly and disassembly and in the method of operating the crane type to be set up.
- The assembly technician has received suitable training in the erection and testing of the safety equipment on the crane to be set up.
- The assembly technician is familiar with the crane that is being assembled or disassembled by the assembly technician. The assembly technician is familiar with the resulting dangers.
- The assembly technician is familiar with the procedures and precautions for assembly and disassembly.
- The assembly technician is able to select the required load handling equipment, fastening equipment and equipment. The suitable condition of the load handling equipment, fastening equipment and equipment depends on the load to be lifted, and in particular the crane components to be assembled.
- The assembly technician is able to fasten balanced loads in accordance with the crane documentation, and in particular with the crane components to be assembled.
- The assembly technician is familiar with the maintenance and inspection schedule and the recommended procedures and preventive measures.

5.3.8 Auxiliary operator

The auxiliary operator follows the instructions of the other defined roles. The activities of the auxiliary operator must be monitored by the other defined roles and checked at the end. The auxiliary operator is **not** authorized to make further decisions that go beyond the ancillary tasks assigned to them.

The auxiliary operator has the following responsibilities:
- The auxiliary operator supports the other defined roles during the work process by performing manual and supervisory tasks. These tasks include, for example, handing tools and auxiliary materials, aligning tools, connecting tool parts and auxiliary materials, as well as monitoring movements in hard to see areas.

The auxiliary operator fulfills the following requirements:
- The auxiliary operator knows the steps of the work procedure for which the auxiliary operator is providing support.
- The auxiliary operator has a technical understanding and knowledge of common tools.
- The auxiliary operator is capable of carrying out technical activities with tools and measuring equipment.
- The auxiliary operator is able to fulfill the ancillary activities assigned to them in a reliable manner.

5.3.9 Maintenance personnel

The maintenance technician has the following responsibilities:
- The maintenance technician us responsible for the assigned crane maintenance according to the maintenance and inspection schedule and for guaranteeing safe and problem-free operation.
- The maintenance technician performs all required maintenance work in compliance with the manufacturer's maintenance and inspection schedule and within the framework of a systematic procedure for creating a safe working environment. See section “Safe working environment” in this chapter.
- The maintenance technician has read and understood the operating instructions and all other necessary documents.
- The maintenance technician uses only original spare parts from Liebherr-Werk Ehingen GmbH.

The maintenance technician fulfills the following requirements:
- The maintenance technician is physically able to use the load handling equipment, fastening equipment and the equipment.
- The maintenance technician is trained personnel with qualified training, who have the technical knowledge and experience required to perform the respective maintenance operations.
- The maintenance technician is properly trained and authorized, according to the obligations of the operating company. This includes participation in corresponding courses, when special equipment is used.
- The maintenance technician is familiar with the maintenance and inspection schedule and the recommended procedures and preventive measures.
- The maintenance technician is familiar with the crane to be serviced and the resulting dangers.

5.3.10 Maintenance technician qualified for high voltage systems

Only personnel who are qualified to perform the work may work on a crane with a high voltage system.

Simple maintenance activities, such as checks, filling of operating fluids:
- Maintenance technician who is trained in the vehicle-specific properties of the crane with a high voltage system and is familiar with its intended use.

For work that goes beyond this scope, special qualifications are necessary that depend on the possible hazard potential.

Non-electrical work, such as work on mechanical or hydraulic systems for which electrical hazards are possible in the case of errors, but damage to components of the high voltage system is excluded:
- Maintenance technician qualification, see section “Maintenance technician”
- Training or instruction on the hazards and protective measures for high voltage systems, according to national and regional regulations, has been completed.
- The training is documented.

Non-electrical work where damage to the high voltage system is possible may only be performed after de-energization. After successful de-energization, the above indicated qualification requirements apply.

Electrical work and de-energization:
- Maintenance technician qualification, see section “Maintenance technician”
- Maintenance technician qualified for high voltage systems or personnel with electrical training under the control and guidance of the maintenance technician qualified for high voltage systems
- Qualification for work on high voltage systems according to national and regional regulations

5.3.11 Authorized and trained service technician

The service technician has the following responsibilities:
- The service technician is responsible for carrying out the assigned crane maintenance and repairs to guarantee safe and satisfactory operation.
- The service technician performs all required work in compliance with the manufacturer's maintenance and inspection schedule and within the framework of a systematic procedure for creating a safe working environment. See section “Safe working environment” in this chapter.
- The service technician only carries out work for which the service technician was authorized and trained to carry out by Liebherr-Werk Ehingen GmbH or a Liebherr service point.

The service technician fulfils the following requirements:
- The service technician has comprehensive detailed knowledge about the components and systems.

5.3.12 Authorized inspector

The authorized inspector has the following responsibilities according to national and regional regulations:
- The authorized inspector carries out inspections and maintenance on the crane in accordance with the manufacturer's inspection schedule to guarantee further, safe and reliable crane operation.
- The performance of these inspections and maintenance requires particular technical competency and therefore **cannot** be performed by maintenance personnel or authorized and trained service personnel.
- The authorized inspector carries out acceptances and product certifications, on behalf of a notified body, according to the applicable, valid directives and standards.
- The authorized inspector provides the operating company with permission and approval for further use of the component and / or the crane.
- The authorized inspector has the authority to prohibit further use of the component and / or the crane.
- The authorized inspector documents the test results in a suitable document.

The authorized inspector fulfils the following requirements:
- The authorized inspector has the required knowledge for inspecting the components.
- The authorized inspector has experience in inspecting the components.
- The authorized inspector has knowledge about the valid standards, directives, national and regional regulations and accident prevention regulations.
- The authorized inspector fulfills the requirements according to national and regional regulations.
- If required by national or regional regulations: The authorized inspector is appointed by an independent accreditation body or similar.

5.4 Personal protective equipment

5.4.1 Overview of personal protective equipment

Personal protective equipment is used to protect against and reduce hazards. Personal protective equipment is used when a hazard for personnel cannot be prevented through technical or organizational measures.

5.4.1.1 Supplied protective equipment

Name	Description
Fall arrest system	(→ 5.4.3 Fall arrest system, p. 157)
Height rescue system	(→ 5.4.4 Height rescue system, p. 160)

Tab. 37: Supplied protective equipment

5.4.1.2 Non-supplied protective equipment

Name	Description	Recommendation
Industrial helmet	Protection against head injuries, for example, due to: Striking, falling objects and oscillating objects	Industrial helmet with a chin strip should be preferred.
Protective gloves	Protection against pointed or sharp objects Protection against hot surfaces or operating fluids Protection against grazing, scratches	Depending on the task and the danger: Wear suitable protective gloves. For example: Puncture resistant, abrasion resistant, heat-resistant, impermeable, slip-proof
Safety shoes	Protection against falling objects or components Protection against slipping on slippery ground or accessible surfaces	Depending on the task and the danger: Wear suitable safety shoes. For example: With toe protection, anti-slip soles, antistatic properties
Safety clothing, for example: Safety vest, safety jacket, safety pants	Make personnel more visible and recognizable.	Reflecting for better detection when dark Fluorescent for better detection at a far distance during the day or in poor conditions of visibility
Safety goggles	Protection against eye injury, for example when working with a grease spraying system when greasing the boom or if other lubrication or operating fluids are sprayed.	Depending on the task and the danger: Wear suitable safety goggles. For example, protection against: Corrosive or pressurized fluids and projecting parts UV-rays and sun

Name	Description	Recommendation
Hearing protection	Protection against damage to hearing due to noise	Selection depending on the volume and the necessary protection effect
Respiratory protection	Protection against damage to health due to dirty air, for example when working with a grease spraying system when greasing the boom or other lubrication or operating fluids that are sprayed.	Selection depending on the hazardous substance and duration of the activity Respiratory protection covers mouth and nose.

Tab. 38: Non-supplied protective equipment

5.4.2 Checking and replacing the personal protective equipment

Check the personal protective equipment:
- Check personal protective equipment before use for damage and completeness.
- Product identifications must be intact and legible during use. Check the product identifications for damage.

Replace the personal protective equipment:
- Replace defective or damaged personal protective equipment immediately with functioning protective equipment.
- Replace the protective equipment when the maximum service life specified by the manufacture is reached.
- Immediately replace damaged fall arrest systems with height rescue systems and hand them over to an authorized inspector.
- Replace personal protective equipment with damaged product identification immediately.

5.4.3 Fall arrest system

Working at a height is connected with a risk of falling. Proper fall protection equipment is required when working at a height.

The fall arrest system must be used where no other fall protection equipment, such as railings, can be installed for technical reasons. Fasten the fall arrest system only to the structural fall protection equipment such as hook positions, safety ropes and fastening positions (→ 4.14 Fall protection equipment, p. 104).

The fall arrest system reduces the severity of the injuries by catching the user during a free fall and limiting the impacts on the body from being caught. A fall with a fall arrest system cannot exclude an injury.

The fall arrest system is effective from a height of 2.5 m.

The fall arrest system supplied by Liebherr-Werk Ehingen GmbH is designed in accordance with the crane structure.

Only use the fall arrest system from Liebherr-Werk Ehingen GmbH or use fall arrest systems that correspond to the specifications that are listed in the Liebherr spare parts catalog of the respective crane.

Note

If the fall arrest system is not available or is damaged:
▶ Order from Liebherr-Werk Ehingen GmbH.

5.4.3.1 Components of the fall arrest system

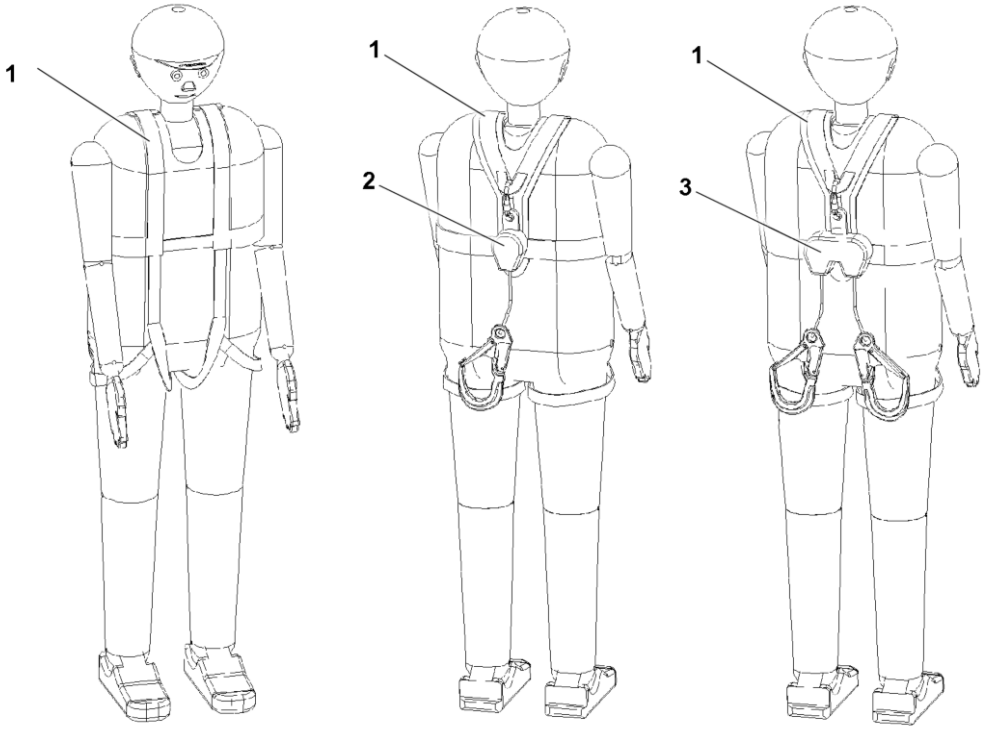


Fig. 175: Example of a safety harness with height safety equipment

1 Safety harness
2 Height safety equipment, 1-strand
3 Height safety equipment, 2-strands

The fall arrest system consists of the following components:
- Safety harness
- Height safety equipment, 1-strand or 2-strands

Component	Description	Properties
Safety harness	A safety harness is a body retaining device that is used in a fall arrest system. The safety harness holds the body of the user after being caught during a fall. A safety harness consists of belt straps, fittings, buckles and other individual parts.	It is approved according to **EN 361**.
Height safety equipment, 1-strand	A 1-strand height safety device is provided for all cranes that do not have walking surfaces with safety ropes. The height safety equipment is equipped with **one** extendable belt strap and snap hook with swivel.	It is approved according to **EN 360 Class A** (for horizontal use and sharp edges).

Component	Description	Properties
Height safety equipment, 2-strands	A 2-strand height safety device is provided for all cranes with walking surfaces and two ropes as fastening device on the left and right hand side of the walking surface, for example lattice sections, lattice booms, telescopic booms or assembly units. The height safety equipment is equipped with **two** extendable belt straps and snap hook with swivel.	It is approved according to **EN 360 Class A** (for horizontal use and sharp edges).

Tab. 39: Components of the fall arrest system

1-strand height safety device

Fasten the fall arrest system with 1-strand height safety equipment only to the structural hook positions and fastening positions.

2-strand height safety device

Fasten the fall arrest system with 2-strand height safety equipment only to the structural hook positions, safety ropes and fastening positions.

When two safety ropes are present on the booms, lattice sections or other components:
- **Only** use the height safety equipment with two belt straps.
- Per safety rope: Connect one belt strap with snap hook for the fall arrest system.
- When transferring to new safety equipment, a snap hook for the fall arrest system must **always** be connected.

5.4.3.2 Checking before use of the crane

Check the fall arrest system before crane use:
- Check the fall arrest system before use for damage, completeness and function.
- Check the product identifications for damage and legibility.

5.4.3.3 Rules for use

Personnel must be instructed at least once a year on how to correctly use the fall arrest system with practical exercises. The performance of the instruction must be documented.

The fall arrest systems must be checked at least once a year by an authorized inspector. The results must be documented in the fall arrest system inspection log book.

Use the fall arrest system:
- Make sure that the fall space is free from obstructions.
- Do **not** change the configuration of the fall arrest system.
- Do **not** lengthen or shorten the fall arrest rope.
- A fall absorber is integrated in the height safety equipment. Do **not** use an additional fall absorber.
- Do **not** use the fall arrest system as fastening equipment for loads.

5.4.3.4 Storing the fall arrest system

Protect the fall arrest system against the following external influences:
- Extreme temperatures
- Guiding the connecting devices over or around sharp edges
- Effects of chemicals
- Electrical influences
- Cuts, wear
- Climatic effects

Store the fall arrest system dry and without the effect of UV radiation in the corresponding transport bag.

5.4.3.5 Behavior in the case of a fall, damage or impairment of functionality

After every fall: Take down the fall arrest system immediately and hand it over to an authorized inspector. The results must be documented in the fall arrest system inspection log book.

In the case of damage or impairment of the functionality: Have the fall arrest systems replaced **immediately** and checked by an authorized inspector.

The fall arrest system may only be used further after written and documented approval.

Unapproved fall arrest systems may **no longer** be used. Unapproved fall arrest systems must be disposed of and replaced with new fall arrest systems.

5.4.4 Height rescue system

The height rescue system is only supplied for certain crane types.

The height rescue system is an evacuation and rescue device. If a person falls and is hanging from the fall arrest system, the supported person can be lifted with the height rescue system, unhooked from the fall arrest system and lowered with the rope.

5.4.4.1 Components of the height rescue system

The height rescue system consists of the following components:
- Rappelling rescue device
- Telescopic rod for connecting the snap hook to the safety harness

Component	Description	Properties
Rappelling rescue device	For rescuing a suspended person who cannot free themselves with their own strength.	It is approved according to **EN 341**.
Snap hook	Connecting element	Trilock lock
Telescope rod with assembled carabiner retainer	As an aid for attaching the rescue rope	Extendable

Tab. 40: Components of the height rescue system

5.4.4.2 Checking before use of the crane

Check the height rescue system before crane use:
- Check the height rescue system before use for damage, completeness and function.
- Check the product identifications for damage and legibility.

5.4.4.3 Rules for use

Personnel must be instructed at least once a year on how to correctly use the height rescue system with practical exercises. The performance of the instruction must be documented.

The height rescue system must be checked at least once a year by an authorized inspector. The results must be documented in the fall arrest system inspection log book.

Do **not** change the configuration of the height rescue system.

5.4.4.4 Storing the height rescue system.

Protect the height rescue system from external influences, for example:
- Extreme temperatures
- Effects of chemicals
- Electrical influences
- Cuts, wear
- Climatic effects

Store the height rescue system dry and without the effect of UV radiation in the corresponding transport bag.

Handling the height rescue system:
- Comply with the specifications of the operating instruction for the height rescue system.
- Do **not** change the configuration of the height rescue system.

5.4.4.5 Behavior in the case of a fall, damage or impairment of functionality

After every use: Hand the height rescue system over to authorized inspector. The results must be documented in the height rescue system inspection log.

In the case of damage or impairment of the functionality: Have the height rescue system replaced **immediately** and checked by an authorized inspector.

The height rescue system may only be used further after written and documented approval.

Height rescue systems that are not approved may **no longer** be used. Unapproved height rescue systems must be disposed of and replaced with new height rescue systems.

5.5 Hand signals for guidance

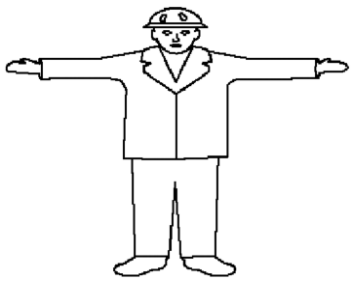
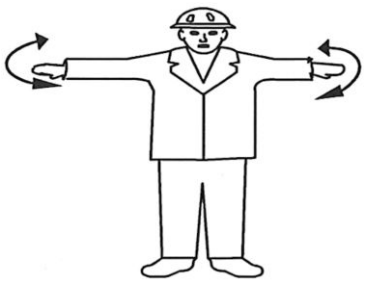
Hand signals for guidance are used to reduce hazards resulting from crane and load movements.

The crane operator must observe the load, crane hook or load handling equipment during all crane movements. If the crane operator cannot observe the load, crane hook or load handling equipment, they may only operate the crane if guided by a dedicated guide.

Rules for hand signals for guidance:
- Hand signals must be mutually agreed upon.
- Give hand signals clearly.
- Hand signals may only be given by a guide to the crane operator. The only exception is the hand sign for emergency stop (fast stopping).

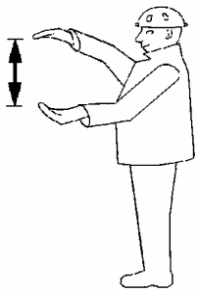
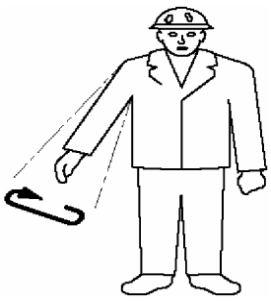
Position of the guide when guiding:
- The guide is in a safe monitoring position.
- The guide must be clearly visible for the crane operator.
- The guide must have a clear view of the load, crane hooks or load handling equipment.

5.5.1 Starting and ending operation

Hand signals	Designation	Description
	Start operation. Follow the instructions.	Both arms stretched out horizontally with hands open and palms directed to the front.
	Stop (normal stop)	Arm stretched out, palm of hand facing down, move the arm horizontally backward and forward.
	Emergency stop (quick stop)	Both arms stretched out, both hand palms facing down, move arms horizontally backward and forward.
	End operation. No longer follow instructions.	Fold hands together at chest height in front of body.
	Creeper gear or very slow movement	Rub palms together in a circular motion. After this sign, all other applicable hand signals apply.

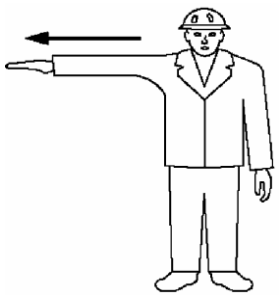
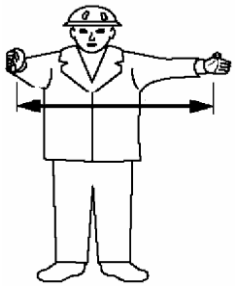
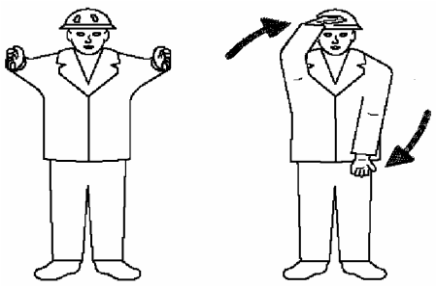
Tab. 41: Hand signals: Starting and ending operation

5.5.2 Lifting and lowering the load

Hand signals	Designation	Description
	Display of the vertical distance	Both arms stretched out in front of the body one on top of the other, with opposing palms.
	Lift or lower the load at an even speed	Lift one arm overhead with closed hand and index finger pointing upward, with small horizontal circular movements with forearm.
	Lift slowly	Give lift signal with one hand, the other palm is not moving and positioned over the hand, which gives the signal.
	Lower the load while stationary	Point one arm away from the body, downward, with hand closed and index finger pointing down. Make small circular movements with forearm.
	Lower slowly	Give the lowering signal with one hand, whereby the palm of the other hand faces downward without moving and is pointed toward the hand giving the signal.

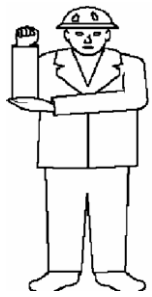
Tab. 42: Hand signals: Lifting and lowering the load

5.5.3 Moving the crane

Hand signals	Designation	Description
	Driving or turning in the specified direction	Hold stretched out arm horizontally into the desired direction, with the hand open and the palm pointing down.
	Travel from me.	Stretch out both arms simultaneously with forearms in front, with both hands open and the palms pointing down. Move the forearms repeatedly between the horizontal and vertical position up and down.
	Travel to me	Stretch out both arms simultaneously with forearms vertically, with both hands open and the palms pointing to the rear. Move the forearms repeatedly up and down.
	Display of the horizontal distance	Keep both arms stretched out horizontally in front of the body with the palms opposite each other.
	Transfer (between two cranes or two hooks)	Hold both arms stretched out to the front, parallel and horizontally and turn 90° in direction of the transfer.

Tab. 43: Hand signals: Moving the crane

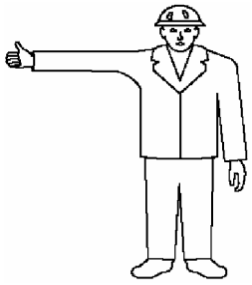
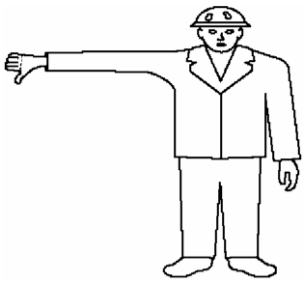
5.5.4 Main winch and auxiliary winch

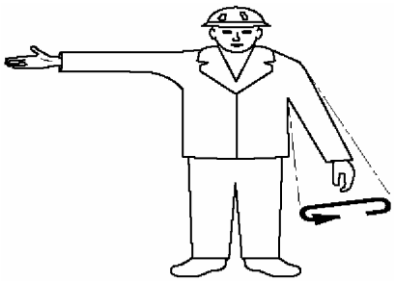
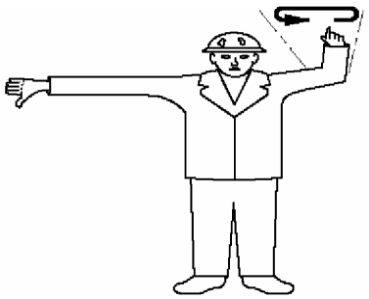
Hand signals	Designation	Description
	Lift with main winch	Place one hand on head. Hold the other arm on the side of the body. After this signal, all other hand signals apply only for the main winch.
	Lift with auxiliary winch	Hold one forearm vertically with closed hand. Touch the elbow of this arm with the other hand. After this signal all other hand signals apply only for the auxiliary winch.

Tab. 44: Hand signals: Main winch and auxiliary winch

If two or more main winches are present, then the signaler can show the number of the crane by pointing to it or signal with one finger.

5.5.5 Lift and lower boom

Hand signals	Designation	Description
	Lift the boom	Hold one arm horizontally with thumb directed upward.
	Lower the boom	Hold one arm horizontally with thumb directed downward.

Hand signals	Designation	Description
	Lift the boom. Lower the load at the same time.	Hold one arm stretched out horizontally with thumb directed upward. Stretch the other arm downward and away from the body. Make small flat circles with the forearm.
	Lower the boom. Lift the load at the same time.	Hold one arm stretched out with thumb directed downward. Stretch the other forearm up. Make small flat circles.

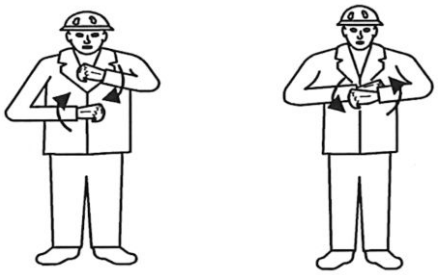
Tab. 45: Hand signals: Lift and lower the boom

5.5.6 Extending and retracting the telescopic boom

Hand signals	Designation	Description
	Extend the telescopic boom	Hold both hands (with closed fists) stretched out to the front, with both thumbs directed away from each other.
	Retract the telescopic boom	Hold both hands (with closed fists) stretched out to the front, with both thumbs directed toward each other.

Tab. 46: Hand signals: Extend retract the telescopic boom

5.5.7 Driving with the crawler chain

Hand signals	Designation	Description
	Moving both crawler chains	Turn both fists around each other in front of the body in direction of the movement (forward or reverse).
	Moving one crawler chain	Lift one fist to show blockage of chain on one side. Turn the other fist vertically in front of the body to signal movement of the opposite chain.

Tab. 47: Hand signals: Driving with the crawler chains

5.6 Safety rules for the crane cab

Safety rules:
- Maintain cleanliness.
- Do not place any objects on the control and operating elements.
- Do not place any clothing, covers or similar on the seat.
- Keep accesses clean and free of snow, ice and dirt.
- Keep the windows, mirror and cameras free of snow, ice and dirt.
- Operate the crane during crane operation from the control platform or with the expanded crane remote control.
- Operate the operating elements in the crane cab only from the crane cab seat.
- Keep escape routes and access to the crane cab free.
- Do not keep tools in the crane cab.

5.7 Danger zone

5.7.1 Crane in operation

The danger zone during crane operation consists of the moving areas of the load and the crane components.

When staying in the danger zone, people can be hit by falling or moving loads or crane components.

Observe the following rules:
- The following applies in general: **No personnel in the danger zone**.
- If necessary: Block off the danger zone.
- If the danger zone **cannot** be seen: Work with a guide.

The following rules apply when personnel are required to be present in the danger zone, for example when fastening, guiding the load or for guidance:
- When it is no longer necessary to remain in the danger zone: Leave the danger zone immediately.
- Take hazards into account due to movement of the crane, load and the load handling equipment or fastening equipment in particular and determine suitable measures.
- Make sure that personnel that are not required are located outside the danger zone.

5.7.2 Crane out of service

Out of service cranes can represent a danger for the surrounding area, especially if the telescopic boom remains erected (→ 5.19.7 Interrupting crane operation with erected telescopic boom, p. 216).

5.8 Utilized symbols

The signs on the crane consist of combinations of individual signs. The signs can be vertically or horizontally arranged.

The crane-specific signs are described in the “product description” (→ 4.6 Safety signs on the crane, p. 69).

The positions of the signs on the crane are explained in the separate “signage plan” document.

	**Prohibition signs** prohibit a behavior that could result in danger. For example: Access to marked areas is prohibited for unauthorized personnel.
	**Warning signs** warn of risks or dangers. For example: Warning of fatal electric shock.
	**Command signs** prescribe a safety-relevant behavior. For example: Use a fall arrest system.
	**Rescue signs** indicate the locations of first-aid equipment. For example: Identifies the location of first-aid equipment.
	**Fire safety signs** indicate the locations of fire alarms or fire extinguishers. For example: Identifies the location of a fire extinguisher.
	Note: Recording device (data logger) available.

Tab. 48: Exemplary illustration of the utilized signs

5.9 Safe movement on the crane

5.9.1 Rules for avoiding falls

When entering the crane, there is a danger of falling.

Observe the following rules for avoiding falls:
- Only authorized personnel may enter the crane.
- Before performing all work on the superstructure, turntable and boom: Attach an approved fall arrest system **and** personal protective equipment.
  (→ 5.4.1 Overview of personal protective equipment, p. 156)
- If railings are available: Make sure that the railings are swung in and secured in the operating position.
  (→ 10.1 Railing and accesses, p. 659)
- If railings are **not** swung in and secured in the operating position: Secure with the supplied fall arrest system to prevent falling.
- If work cannot be carried with climbing aids or from the ground: Secure with the supplied fall arrest system in the hook positions and with retaining ropes to prevent falling.
  (→ 4.14 Fall protection equipment, p. 104)
- When climbing up and down using the ladder: maintain a 3-point support.
  (→ 5.10 Using the ladders correctly, p. 176)
- Do **not** step on the crane cab roof.
- Only step on the crane on the specifically marked surfaces.
  (→ 4.15.6 Accessible surfaces, p. 123)
- If non-accessible surfaces must be stepped on, for example for maintenance purposes: Secure with the supplied fall arrest system to prevent falling.
- Avoid tripping and falling: Pay attention to crane attachment parts.
- Only enter the crane when it is horizontal and on level ground.
- The crane cab is in a horizontal position when entering and exiting.
  (→ 8.8.13 Adjust the crane cab incline, p. 455)

Observe the following rules when stepping on ladders, walking surfaces and stepping surfaces:
- Only step on ladders, walking surfaces and stepping surfaces with clean shoes.
- Only step on ladders, walking surfaces and stepping surfaces with a sufficiently clear height.
- Keep ladders, walking surfaces and stepping surfaces free of heavy dirt, snow and ice.
- Keep ladders, walking surfaces and stepping surfaces free of objects and obstacles.
- Ladders may be stepped on by only one person.
- Subject the ladders to a maximum total weight of 150 kg.
- Only step on ladders, walking surfaces and stepping surfaces that are in a perfect condition.

5.9.2 Safety equipment for avoiding falls

Use safety equipment to avoid falls.

Safety equipment includes, for example:
- Climbing aids
- Hook positions
- Accessible surfaces
- Ladder and steps
- Steps on the crane cab
- Handles
- Railings
- Safety ropes

5.9.2.1 Climbing aids

When working at a height, ladders are to be preferred as climbing aids.

Examples of climbing aids:
- Work platforms
- Scaffolding
- Assembly pedestal
- Mobile catwalk
- Platform stairs
- Platform ladder

5.9.2.2 Hook positions

Fig. 207: Exemplary illustration: Hook positions

1 Sign
2 Sign
3 Hook position

The crane is equipped with hook positions to protect against falling. Crane-specific connection positions are indicated in the “product description” (→ 4.14.1 Hook points, p. 104).

The hook positions are marked with sign **1** and sign **2**.

If necessary, fastening positions can be used for connecting the fall arrest system.

Rules for the use of hook positions:
- When moving on the crane: Secure against falling with the approved fall arrest system in the hook position **3**.
- Per hook position: Only secure one person.
- Do **not** fasten loads or objects in the hook positions.
- Do **not** use the hook positions as rigging points.

5.9.2.3 Accessible surfaces

Accessible surfaces on the crane are equipped with non-slip surfaces or an anti-slip coating. Crane-specific accessible surfaces are shown in the “product description” (→ 4.15.6 Accessible surfaces, p. 123).

Slip-proof surfaces and anti-slip coatings protect against falling.

Step on the crane **only** on the marked, accessible surfaces.

Accessible surfaces are, for example:
- Gratings
- Platforms on the crane

- Surfaces with checkered plate
- Surfaces with anti-slip coating

5.9.2.4 Ladders and steps

For safe access, the crane is equipped with various ladders and steps. Crane-specific ladders are shown in the “product description” (→ Ladder overview, p. 109).

Ladders and steps are for example:
- Ladders integrated in the crane
- Multi-purpose ladder carried along on the crane
- Folding ladder fastened to the crane
- Step for easier access to the crane cab
- Steps from the chassis on the turntable

5.9.2.5 Swiveling step on the crane cab

The swiveling step allows comfortable entry into the crane cab as well as safe exit from the crane cab to the chassis and safe access to the superstructure.

Rules for using the swiveling step:
- **No** personnel or objects are in the swiveling range when swiveling the step.
- Always swing the step out completely in the operating position or the transport position.
- After exiting the crane cab, to be able to reach the superstructure via the step: First close the crane cab door.
- When climbing up the crane cab from the superstructure via the step: Open the crane cab door just before entering the crane cab.

5.9.2.6 Handles

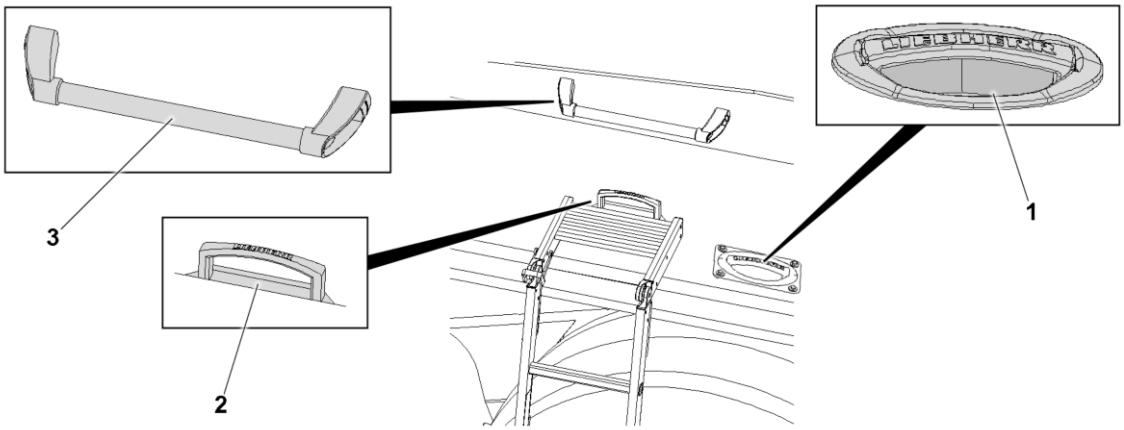


Fig. 208: Exemplary illustration: Handles

1 Handle on the chassis
2 Handle on the ladder
3 Handle on the superstructure

A safe 3-point support is ensured by handles during the following activities:
- Climb up and down the accesses
- Changing from or to ladders
- Entering and exiting the crane cab

Rules for the use of handles:
- Do **not** fasten loads or objects to the handles.
- Do **not** use handles as rigging points.
- Load the handles with a maximum of 100 kg: A person, including tools and equipment, may not exceed a total weight of 100 kg.

5.9.2.7 Railing

The crane is equipped with railings when there is enough space (→ 4.15.3 Accessing the turntable, p. 121).

Rules for the use of railings:
- If the railings are not in the operating position before or after assembly or disassembly: Personnel must connect themselves in the hook positions and to the safety ropes with an approved fall arrest system to prevent them from falling.
- If railings are present on the superstructure, the railings must be assembled and secured in the operating position for all work.

5.9.3 Entering the chassis safely

Climbing up and down from the chassis takes place using the side stairs (→ Ladder overview, p. 109).

Make sure that the following prerequisites are met:
- Personnel are wearing the personal protective equipment.
- The crane is on level ground and is horizontally aligned.
- All stairs are assembled and in the operating position.
  (→ 10.1.2 Assembling the removable stairs on the crawler carrier, p. 660)
- Distance from the ground to the first step is **not** more than 600 mm. If necessary, use the additional step.

5.9.4 Entering the crane cab safely

5.9.4.1 Danger of falling when stepping on the crane cab roof

The crane cab roof is not designed as a support surface.

If personnel step on the roof, personnel can fall down, break through the roof of slide off it.

Do **not** step on the crane cab roof.

5.9.4.2 The position of the superstructure makes it more difficult to enter the crane cab safely

If the superstructure is in a position where it is not safe to climb up and down the crane cab, personnel can fall when climbing up and down.

Observe the following rules for safely entering the crane cab
- To climb up and down safely: Change the position of the superstructure.
- If the position of the crane superstructure cannot be changed: Set up climbing aids, such as platforms or ladders.

5.9.4.3 Entering the crane cab safely

Accesses to the crane cab

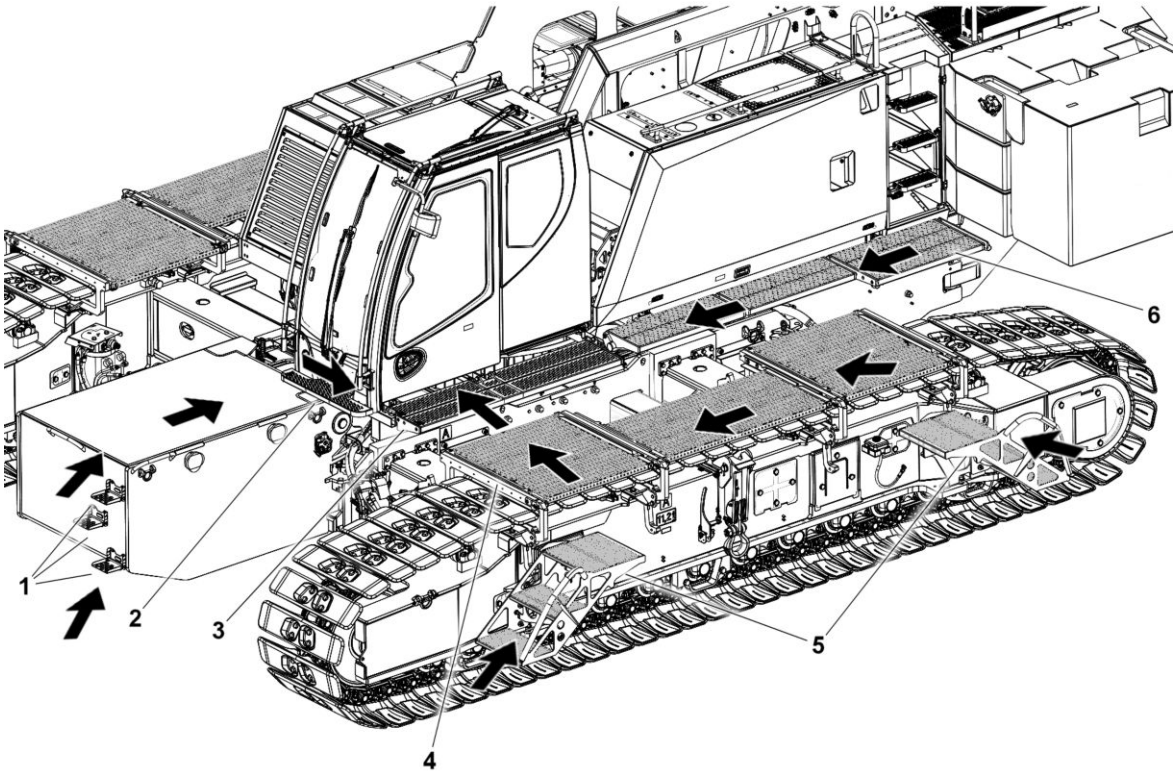


Fig. 209: Accesses to the crane cab

1	Steps on the central ballast	**4**	Platforms on the crawler carrier
2	Front step on the crane cab	**5**	Stairs on the crawler carrier
3	Folding step on the crane cab	**6**	Foldable platforms on the turntable

Make sure that the following prerequisites are met:
- The crane cab is in a horizontal position.
  (→ 8.8.13 Adjust the crane cab incline, p. 455)
- The superstructure is turned to the point where safe access to platforms of the crawler carrier is ensured.
  (→ 8.18.4 Turning the superstructure, p. 539)
- The stairs on the crawler carriers are in the operating position.
  (→ 10.1.2 Assembling the removable stairs on the crawler carrier, p. 660)
  (→ 10.1.3 Swinging the swinging steps* on the crawler carrier into the “wide track width” operating position, p. 661)
- The steps on the central ballast are in the operating position.
  (→ 10.1.6 Swinging the steps on the central ballast into the operating position, p. 667)
- The platforms on the crawler carriers are in the operating position.
  (→ 10.1.8 Pushing the platforms into the operating position , p. 669)
- The folding step on the crane cab step is in the operating position.
  (→ 10.1.9 Swinging the step on the crane cab into the operating position, p. 672)
- The turntable platforms are in the operating position.
  (→ 10.1.7 Swinging the platforms on the turntable into the operating position, p. 668)

Use the following accesses to access via the central ballast:
- Steps **1** on the central ballast
- Front step **2** on the crane cab
- Folding step **3** on the crane cab

Use the following accesses to access via the crawler carriers:
- Stairs **5** on the crawler carrier
- Platforms **4** on the crawler carrier
- Folding step **3** on the crane cab

Use the following accesses to access from the turntable:
- Platforms **6** on the turntable
- Folding step **3** on the crane cab

5.9.5 Stepping on the ballast safely

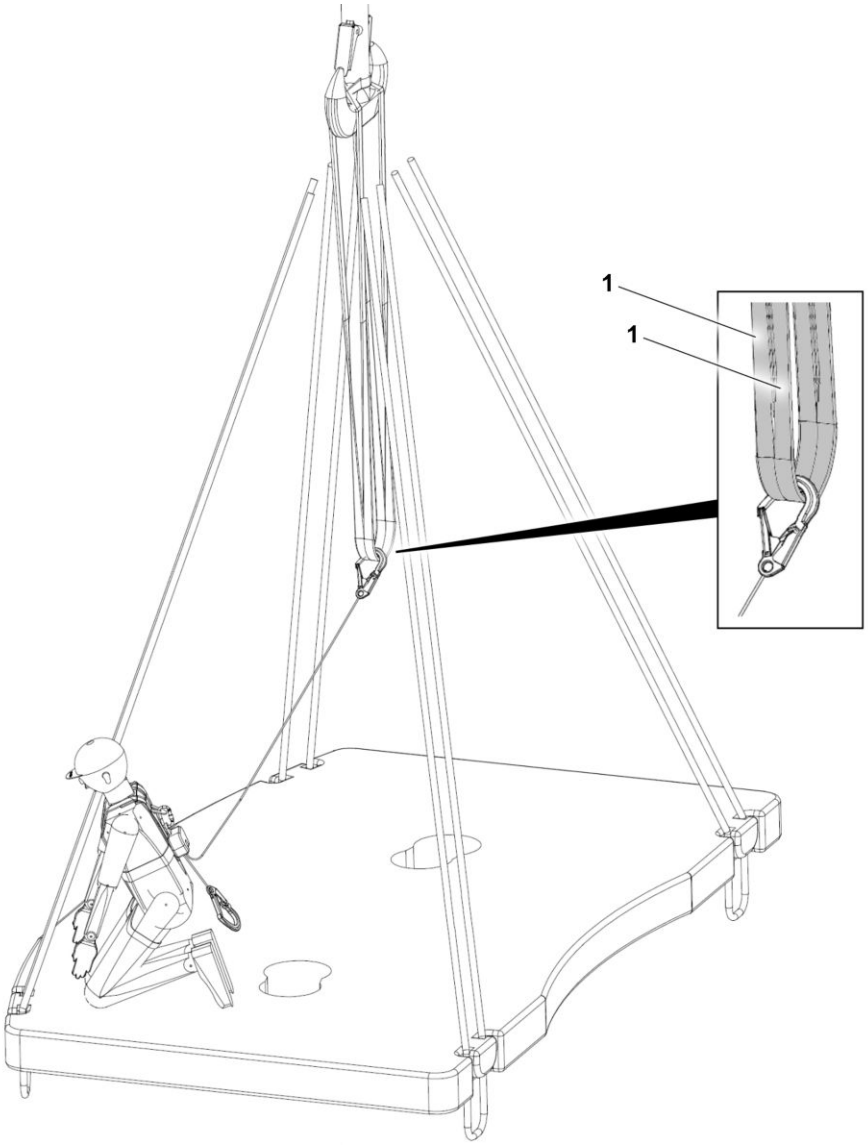


Fig. 210: Exemplary illustration: Stepping on the ballast safely

1 Safety rope

If no other hook positions are available, assembly personnel can secure themselves to the hook of the shut-down crane.

Rules for stepping on the ballast safely:
- The engine and the ignition are turned off. The crane is shut down.
- The usable length of each safety rope **1** is 2 m.
- The load bearing capacity of each safety rope **1** is at least 600 kg.
- Two safety ropes **1** are attached to the load hook.

- Assembly personnel use a fall arrest system to secure themselves to both retaining ropes **1**.
- **No** load is suspended on the crane.
- **No** load or other objects are suspended on the safety rope **1**.

5.10 Using the ladders correctly

Work on the ladder includes the risk of falling.

Incorrect use of ladders can lead to serious injuries or death due to falling.

When working at a height, working on **climbing aids** is preferred to working on ladders.

(→ 5.9.2 Safety equipment for avoiding falls, p. 169)

5.10.1 Intended use

multi-purpose ladders are mobile work equipment that can be used in different locations. Multi-purpose ladders can be used to perform minor work at heights in cases where the use of other equipment would not be appropriate.

Ladders are designated for the ascent and descent of personnel.

The manufacturer is **not** liable for damage caused by unintended use or improper use.

Changes to the structure may exclusively be made with written approval of the manufacturer.

Ladders may exclusively be used in a flawless technical condition and according to their missions as well as with constant awareness of safety and dangers.

Ladders may only be used as described. Any other use is considered unintended use and is prohibited.

5.10.2 Responsibility of the operating company

The operator company shall ensure the following:
- A risk assessment for work on ladders is carried out according to national directives and specifications on accident prevention.
- Measures for avoiding the determined hazards are implemented and documented.
- Personal protective equipment for working on ladders is provided and used correctly.
- Personnel are physically able to use a ladder.
- The ladders are suited for the respective application.
- Personnel are instructed and trained in the use of ladders.
- Ladders are inspected at least every 12 months by authorized and trained expert personnel. The results of the inspection are documented.

5.10.3 Ladder categories

Only use ladders for industrial use. Ladders for industrial use are tested according to the strictest criteria.

Ladders are marked according to their category allocation:

Ladder for industrial use

Ladder for private use

5.10.4 3-point support on the ladder

A 3-point support is ensured:
- When two hands have a safe hold and one leg is standing safely.
- When two legs are standing safely and one hand has a safe hold.
- When two legs are standing safely in straddle position on a stepladder which can be accessed from both sides, on the third respective rungs or steps from the top. The user locks the ladder with the knees.
- When two legs are standing safely and at the same time, the body is leaning on higher rungs or steps of the leaning ladder. The center of gravity of the body must always be between the two ladder beams.
- When a work positioning system (WPS: WORK POSITIONING SYSTEM) is used.

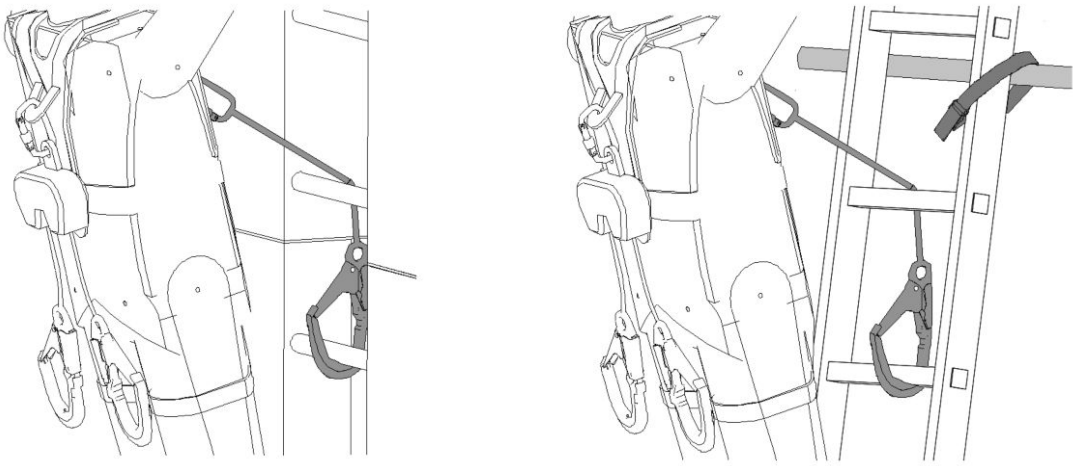


Fig. 213: Use the work positioning system on the ballast ascent or secured ladder

5.10.5 Light and heavy work on the ladder

The wearing of personal protection equipment to prevent falling depends on the type of work and type of ladder, among other factors.

Various types of light and heavy work are listed below.

Examples of light work:
- Assembling and disassembling the retaining pin or spring retainer.
- Fastening components. Disconnecting the fastening equipment.
- Pushing the transition aid out and in.
- Establishing and disconnecting the electrical or hydraulic connection between components.
- Press the hand pump for the folding jib.
- Reeving the auxiliary winch in and out.
- Setting up and taking down the folding railing.
- Carrying out maintenance and inspection work.
- Refueling the chassis and superstructure.

Examples of heavy work:
- Driving and knocking out connector pins.
- Installing and removing the wind warning.
- Reeving the hoist rope in and out.
- Assembling and disassembling the connector pins with an assembly (hydraulic cylinder or mechanical assembly tool).
- Assembling and disassembling the rope lock.

5.10.6 Using the multi-purpose ladder

The illustration of the ladders is an example. Ladders with the same functional principle may appear differently.

Before using a ladder, check if safer working equipment can be used. Select a ladder in order to reduce the risk. Prefer the use of platform ladders.

Only use the ladder as described.

Observe and adhere to the safety signs on multi-purpose ladders.

5.10.6.1 Before use

Make sure that the following prerequisites are met:
- The ladder is complete and not damaged. Do not use a damaged ladder. Replace damaged ladder immediately.
- All safety signs on multi-purpose ladders are complete and legible.
- Ladder is free of heavy dirt, snow and ice.
- Screws and connections are tightened firmly.

For multi-purpose ladders, make sure that the following additional prerequisites are met:
- The legs of the ladders are not worn.
- The cross beam is assembled and secured in the operating position.

5.10.6.2 Setting up the ladder safely

Make sure that the following specifications are adhered to:
- The ladder is set up from the ground on an even, horizontal, non-slip and non-moving surface.
- The locking devices of the ladder are secured.
- The ladder is set up so that the risk of collision with people, vehicle parts or doors is avoided.

When using as a stepladder, make sure that the following additional specifications are adhered to:
- The safety strut is tensioned.

When using as a leaning ladder, make sure that the following additional specifications are adhered to:
- The ladder is set up in the correct set up angle.
- Make sure that the ladder overhang when resting it on components is selected in such a way that the leaning ladder rests safely when subjected to load and deflection due to ascending persons.
- The ladder is used **only** on suitably stable contact surfaces with both beams.
- When the ladder is placed on components: Make sure that the components cannot move.

Restraint devices and friction locks protect against rolling off to the side.

Examples of a restraint device:
- The ladder is connected to the ladder retainer.
- The ladder is secured with a safety belt to the leaning tube, strut or slot of the hook position.
- The ladder is leaning between the notches or side stops on the component.

Examples of a friction lock:
- Rubber caps or plastic caps on the end of the ladder beam with direct placement on a surface

To secure the leaning ladder, the crane is equipped with safety equipment, for example:
- Ladder retainers
- Leaning tubes

– Notches or side stops

Correct placement angle

The correct placement angle of the leaning ladder prevents the ladder from being able to tip backward or slip downward.

Fig. 214: Ladder placed at the correct placement angle

5.10.6.3 Securing the ladder to prevent it from tipping over and sliding away

Securing the ladder to the ladder retainer

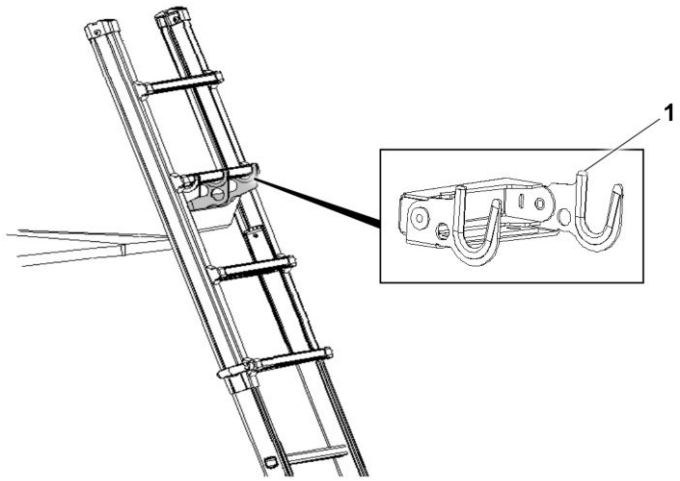


Fig. 215: Ladder secured in the ladder retainer

1 Ladder retainer

Securing the ladder with a safety belt

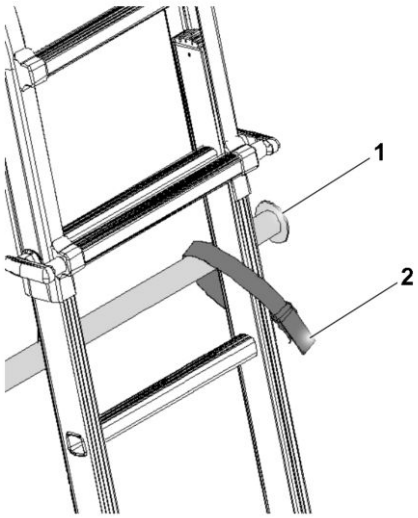


Fig. 216: Ladder secured to the leaning tube with a safety belt

1 Leaning tube **2** Safety belt

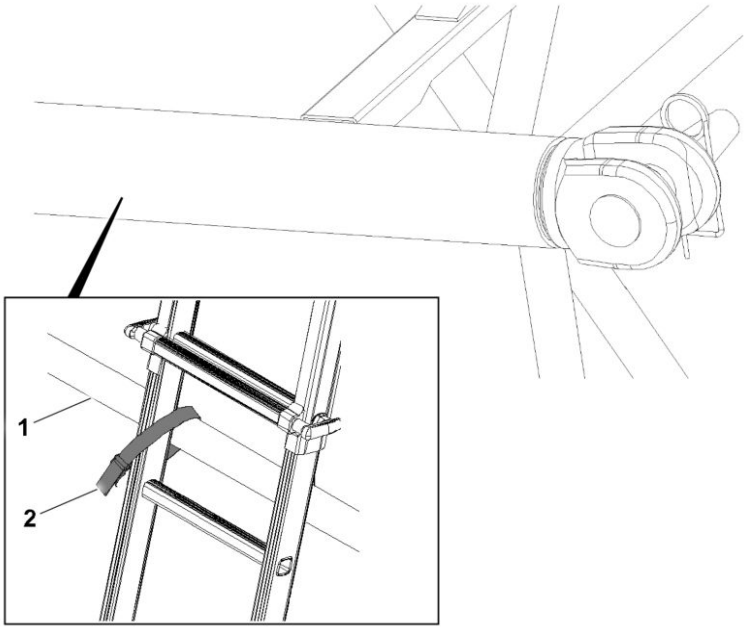


Fig. 217: Ladder secured to the struts with a safety belt

1 Strut **2** Safety belt

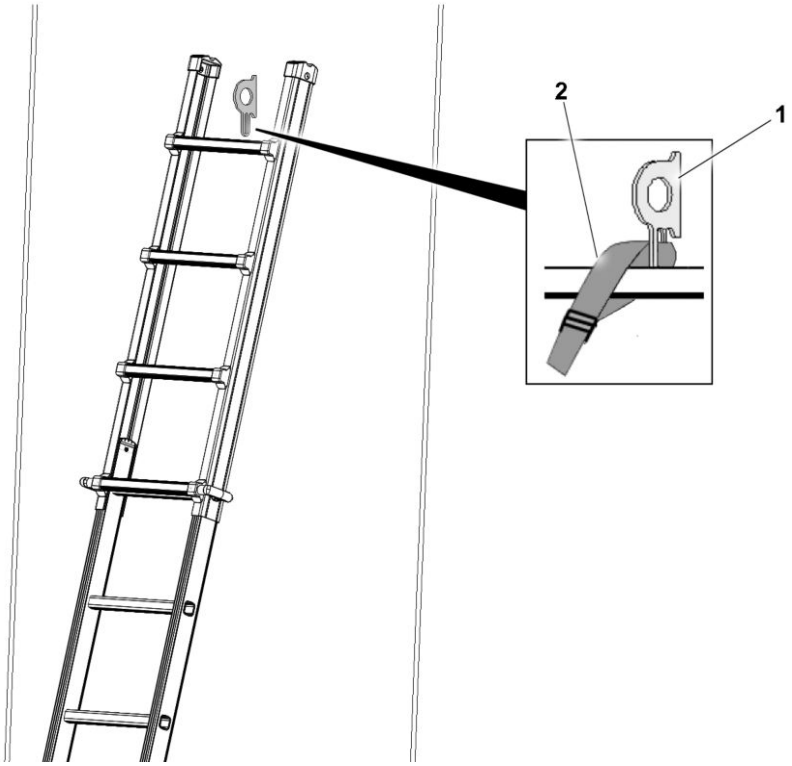


Fig. 218: Ladder secured to the slot of a hook position with a safety belt

1 Hook position **2** Safety belt

Securing the ladder in the notches or to the side stops

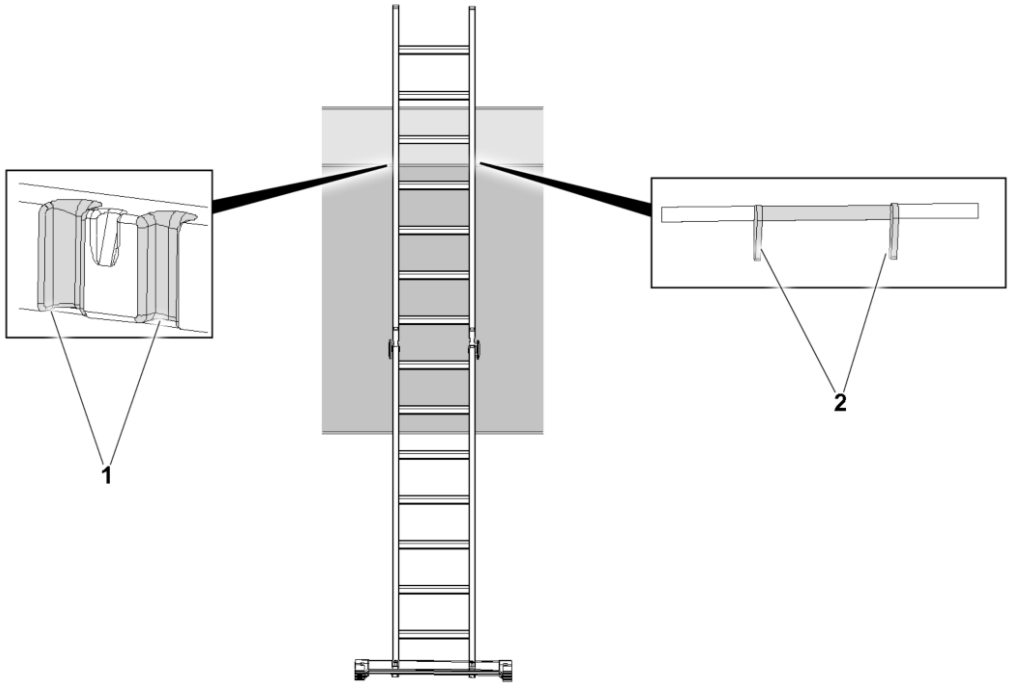


Fig. 219: Ladder secured in the notches or between stops

1 Notches **2** Stops

5.10.6.4 Using the ladder safely when working

Make sure that the following specifications are adhered to:
- Do **not** use the ladder in strong wind.
- Do **not** use the ladder as a bypass.
- The ladder is secured to prevent it from being knocked over inadvertently.
- Do **not** bring the ladder to a new position during use.
- Step on the ladder with suitable shoes.
- Climb up and down with the 3-point support.
- Climb up and down the ladder while facing it.
- When working on a ladder: Always grip it with one hand.
  If this is not possible: Take additional safety measures, such as: Use a work positioning system (WPS: WORK POSITIONING SYSTEM).
- Do **not** subject the ladder horizontally to excessive loads during side assembly work.
- Use the rungs as handles.
- Step into the rungs deep enough.
- Never subject the ladder to more than 150 kg.
- The weight of the tool carried along is a maximum of 10 kg.
- A second person is present to hand the necessary items to the person on the ladder.
- Do not work too long on the ladder without pauses. Tiredness is a safety risk.

Use as a stepladder

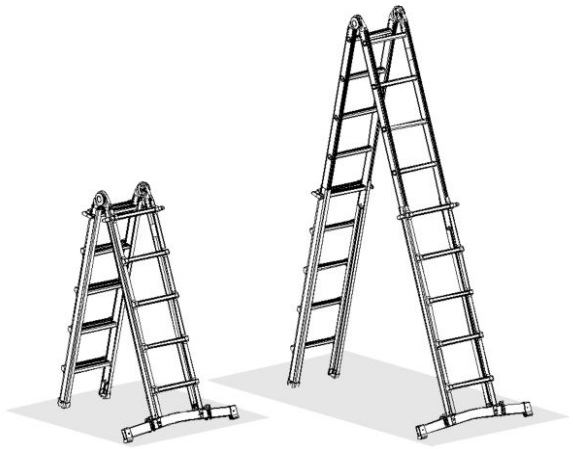


Fig. 220: Using the multi-purpose ladder as a stepladder

Access	Work
Maximum step height to the third rung or step from the top Do **not** transition from a stepladder to other components.	Maximum step height to the third rung or step from the top Do **not** transition from a stepladder to other components.
3-point support required	3-point support required
	Rise to 1 m: Personal protective equipment to prevent falling not required
	Step height above 1 to 7 m **Light work** Personal protective equipment to prevent falling not required

Access	Work
	Step height above 1 to 7 m **Heavy work** Personal protective equipment to prevent falling required

Tab. 49: Conditions for access and work on stepladders

Use as a leaning ladder

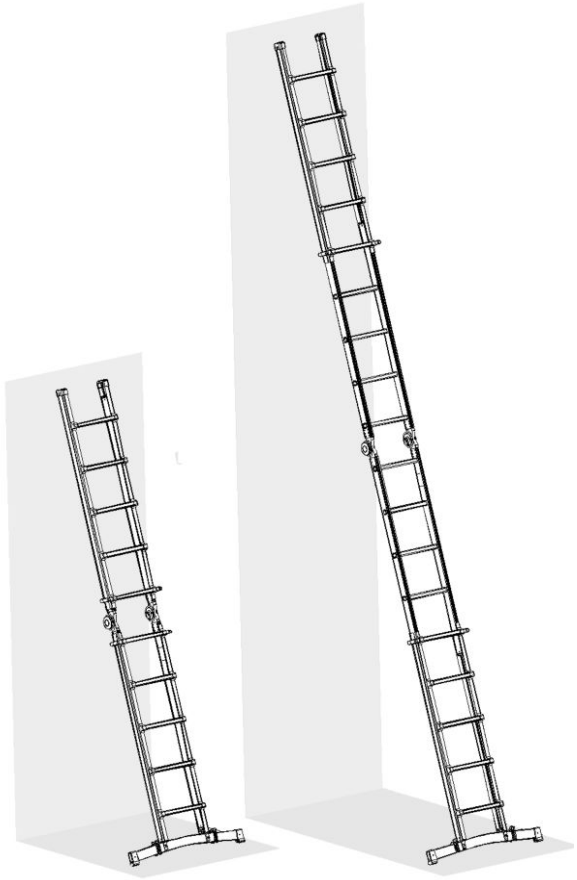


Fig. 221: Using a multi-purpose ladder as a leaning ladder

Access	Work
Maximum step height to the fourth rung and step from the top, in reference to the positioning point	Maximum step height to the fourth rung and step from the top, in reference to the positioning point
3-point support required	3-point support required
	Rise to 1 m: Ladder retainer not required Personal protective equipment to prevent falling not required

Access	Work
	Step height above 1 to 7 m **Light work** Ladder retainer required Personal protective equipment to prevent falling not required
	Step height above 1 to 7 m **Heavy work** Ladder retainer and protection to prevent it from tipping to the rear required Personal protective equipment to prevent falling required

Tab. 50: Conditions for access and work on leaning ladders

Ascending and standing on a secured leaning ladder

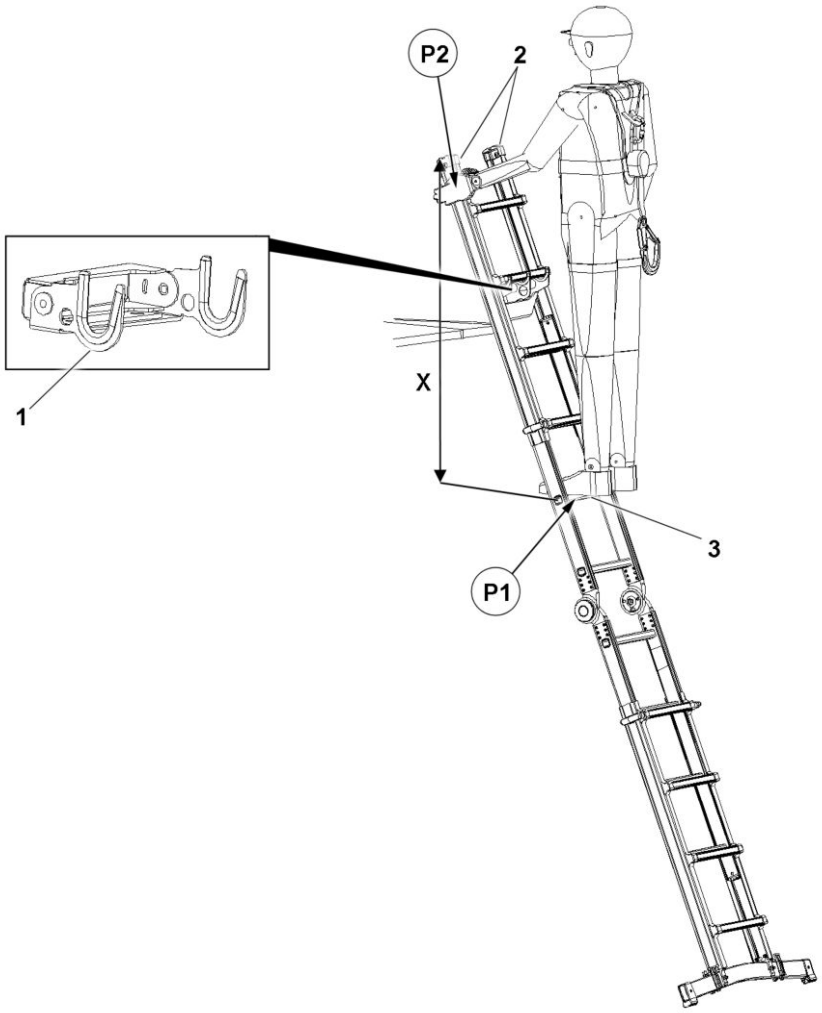


Fig. 222: Exemplary illustration: Ascending and standing on a secured leaning ladder

1 Ladder retainer
2 Ladder beam end
3 Rung
P1 Standing position
P2 Grip position
X Dimension

f the leaning ladder is connected to a ladder retainer or secured with a safety belt, make sure that the following specifications are adhered to:
- Ascend at a maximum to the last free rung **3** below the ladder retainer **1** or safety belt.
- The vertical dimension **X** between the standing position **P1** on the rung **3** and the grip position **P2** on the ladder beam end **2** must be at least 1 m.
- The personnel holds the grip position **P2** on the ladder beam end **2**.

Access	**Work**
Maximum step height up to the last free rung below the ladder retainer	Maximum step height up to the last free rung below the ladder retainer
3-point support required	3-point support required
	Rise to 1 m: Personal protective equipment to prevent falling not required
	Step height above 1 to 7 m **Light work** Personal protective equipment to prevent falling not required
	Step height above 1 to 7 m **Heavy work** Personal protective equipment to prevent falling required

Tab. 51: Conditions for access and work on the leaning ladders when connected to the ladder retainers or secured with safety belts

Safely using the leaning ladder as a transition

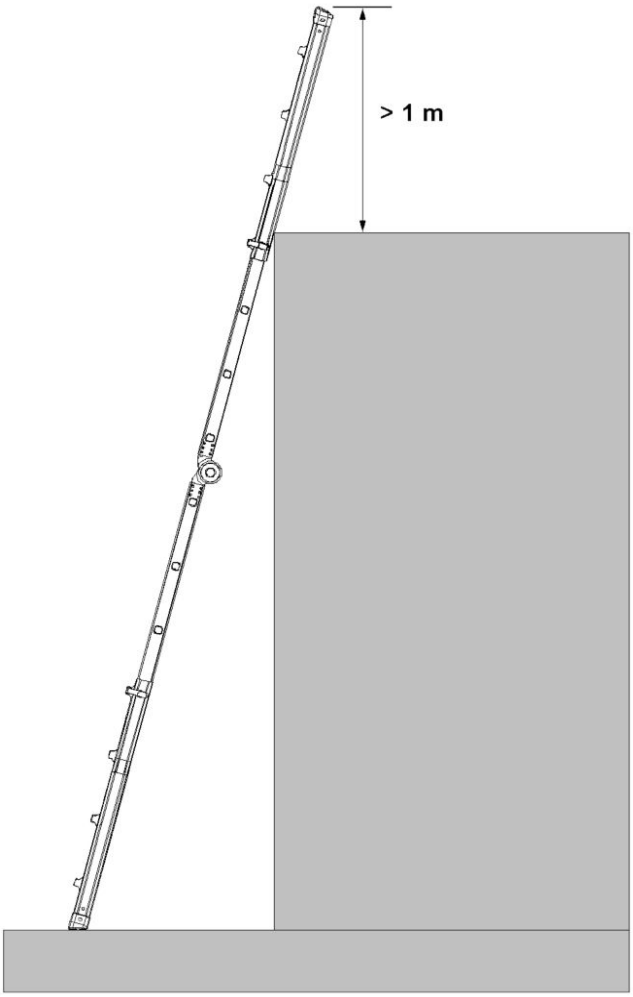


Fig. 223: Exemplary illustration: Leaning ladders with ladder overhang above the exit level

The leaning ladder can be used for transitioning.

Prerequisites for the use of a leaning ladder as a transition:
- Make sure that the leaning ladder is positioned on a level placement surface.
- Make sure that the leaning ladder is placed at an incline angle of 65° to 75° (1:4) to the horizontal.
- Make sure, for transitioning to higher work locations, when no other safehold possibilities are available, that the ladders beams of the leaning ladder go past the placement location by at least 1 m.
- Make sure that the transition area is slip-resistant.
- Make sure that the ladder position can be recognized from above.
- Make sure that the contact point of the ladder on the component is selected such that the ladder contact points will not be deformed or swing away due to the load of the person climbing up the ladder.
- Make sure that the weight of the tool carried along does not weigh more than 10 kg.

Access	Transition
Maximum step height to a rung and step below the placement edge	Maximum step height to a rung and step below the placement edge
3-point support required	3-point support required

Access	Transition
Personal protective equipment to prevent falling not required	Personal protective equipment to prevent falling not required
	Rise to 1 m: Ladder retainer not required
	Step height above 1 to 7 m Ladder retainer required

Tab. 52: Conditions for access and transition to leaning ladders with transition

5.10.6.5 After use

Make sure that the following specifications are adhered to:
- Remove heavy dirt, snow and ice from the ladder.
- If there is visible contamination: Clean the ladder, especially all moving parts.

5.10.6.6 Repair and maintenance

Make sure that the following specifications are adhered to:
- Have ladder repair and maintenance performed **only** by authorized service facilities.

5.10.6.7 Storage

Make sure that the following specifications are adhered to:
- The ladder is standing vertically or lying horizontally.

5.10.6.8 Prior to transport

Make sure that the following prerequisites are met:
- For multi-purpose ladders: The cross beam is secured in the transport position.
- The ladders are locked and secured in the transport retainers.

5.11 Hazards due to materials and substances

Liebherr-Werk Ehingen GmbH uses its best judgment to minimize the use of these hazardous materials and substances and enable the safe use of these substances.

When using the crane as intended, there is not expected to be any significant risk to human health or the environment.

5.11.1 Use of hazardous materials and substances

Materials and substances that are harmful to health are subject to various national and regional regulations in various countries, for example:
- In the European Union: REACH regulation
- In the USA: California Proposition 65. www.p65warnings.ca.gov

Based on the REACH regulation (EC) no. 1907/2006, article 33, there is an information requirement for substances of very high concern, hereafter indicated as SVHC. SVHC: Substance of Very High Concern.

According to information from suppliers and internal product information, Liebherr-Werk Ehingen GmbH is aware of SVHC that are present in more than 0.1 percent by weight in individual products of this crane.

For further information contact REACH-LWE@liebherr.com.

5.11.2 Operating fluids

Due to technical defects or improper filling, operating fluids can escape, for example:
- Hydraulic oil
- Diesel fuel
- Coolant
- Greases

Leaking operating fluids can cause damage to health and pollute the environment and endanger traffic by contaminating the road.

Avoid hazards due to leaked operating fluids:
- Have the technical defect remedied immediately.
- Fill operating fluids properly and close the tank covers.
- Avoid skin contact.
- Use personal protective equipment.
- After handling: Wash hands thoroughly.
- Use suitable containers for collection, storage, transport and disposal.
- Dispose of collected operating and cleaning fluids in an environmentally safe manner according to national and regional regulations.

Measures in case of escaped operating fluids:
- Use binding material or material for neutralizing.
- Immediately and thoroughly remove traces of operating fluids.
- In case of larger quantities, alert the responsible emergency personnel and authorities.

5.11.3 Cleaning agents

If the human body comes into contact with cleaning agents, allergic reactions, skin, eye and airway irritation can take place.

Avoid hazards:
- Avoid skin contact.
- Use personal protective equipment.
- After handling: Wash hands thoroughly.

5.11.4 Lead and lead compounds

Batteries, battery poles, battery terminals and other battery components contain lead and lead compounds. Lead and lead compounds can cause damage to health.

Avoid damage to health:
- Do not touch them with bare hands. Avoid skin contact.
- Wear personal protective equipment.
- After handling: Wash hands thoroughly.
- Dispose of disused batteries in an environmentally safe manner according to national and regional regulations.

5.11.5 Emissions

Emissions such as diesel engine exhaust emissions can cause damage to health.

Avoid damage to health:
- Always start and operate the diesel engine in properly ventilated spaces.
- In case of operation in closed spaces: Direct the exhaust outside.
- Do not convert the exhaust system or make any other changes.
- Do not idle the engine for longer than necessary.

5.12 Environmental pollution

If operating fluids or cleaning fluids reach the ground, the water supply or the sewers, the environment can be polluted.

Causes for environmental pollution:
- Leaks
- Improper filling of operating fluids
- Improper cleaning in unsuitable locations

Even very small amounts of operating fluids and cleaning agents pose a risk to the environment.

Observe the following rules, to prevent damage to the environment:
- Use suitable containers for collection, storage, transport and disposal.
- Dispose of collected operating and cleaning fluids in an environmentally safe manner according to national and regional regulations.
- In case of larger quantities, alert the responsible emergency personnel and authorities.

If operating fluids have escaped, observe the following rules:
- Use binding material or material for neutralizing escaped operating fluids. Immediately and thoroughly remove traces of operating fluids and dispose of them in an environmentally safe manner.
- In case of larger quantities, alert the responsible emergency personnel and authorities.

5.13 Danger due to environmental influences

5.13.1 Danger of toppling due to wind

The wind causes extra load on the crane.

If the maximum wind speeds are not observed, the crane can collapse or fall over.

Observe and adhere to the instructions and rules:
- Take the telescopic boom down in case of uncertain weather conditions.
- Do **not** erect the crane to measure the wind speed.
- Observe the maximum permissible wind speeds and safety instructions depending on the crane operating conditions (→ tab. 53, p. 190).
- If the maximum permissible wind speed is exceeded during crane operation: Establish the set up configuration and position of the boom system as specified in the separate document “wind speed charts for a crane out of operation”.

Operating conditions	Reference for permissible wind speed and safety instructions
Erection and take-down of various boom combinations	→ Separate document “Erection and take-down charts” [A] and “load charts”
Crane operation	→ Separate document “Use of the load charts” and “load charts”
Driving with the equipment in place	→ Separate document “Driving with the equipment in place”
Interruption of crane operation when the crane remains equipped.	→ Separate document “Wind speed charts for cranes out of operation”
Crane out of operation, when crane remains equipped.	→ Separate document “Wind speed charts for cranes out of operation”

Tab. 53: Reference for the maximum permissible wind speed and safety instructions depending on the operating condition

A) only for certain crane types and operating modes

Note

▶ If in doubt, in case of questions for further information and training regarding wind, contact customer service at Liebherr-Werk Ehingen GmbH.

5.13.2 Lightning strike during a thunderstorm

During a thunderstorm there is the danger of a lightning strike in the crane.

A lightening strike in the crane can cause accidents with serious consequences, for example:
- Lethal effect due to direct or indirect current flow through the body
- Falling when working above ground

A lightening strike can cause serious damage to the crane, for example:
- Malfunction or total failure of the control
- Damage to the electrical system
- Destruction of casings
- Scorched lines
- Smelting of metal components or local welding on bearings, for example on the slewing ring

5.13.2.1 Behavior in case of thunderstorms

Comply with the following specifications in the case of a storm with lightening strikes:
- A weather forecast for the entire period during which the crane will be used is available to be able to initiate protective measures in a timely manner.
- Work on the crane is stopped.
- The load is set down.
- If possible: The telescopic boom is telescoped in and taken down.
- Personnel is not located in the direct vicinity of the crane.
- The crane danger zone is blocked off.
- If the crane operator must stay in the crane cab: Leave the crane cab only in case of a fire.

5.13.2.2 Measures after a crane lightening strike

The crane must be checked after a lightening strike.

Inspect the crane in detail, in particular with a visual inspection for:
- Damage to plastic ropes, hoist ropes and control ropes
- Damage to cables, lines and hoses
- Damage to hydraulic cylinders

If no damage is found during the visual inspection:
- Check the functionality of the crane control. To do so, evaluate the error memory.

If no other damage is found:
- Perform a function check for unusual behavior, vibrations and noise
- Control the slewing gear and winches slowly. Pay attention to functionality and the generation of noise.
- Inspect the telescopic boom and lattice sections for damage.
- Monitor the hydraulic cylinder for a long period of time for leakage.

Do not restart crane operation if:
- Crane damage cannot be excluded.
- There is damage to the crane or components.

If there is damage: Contact Customer Service at Liebherr-Werk Ehingen GmbH.

5.13.2.3 Protecting the crane and load against a lightning strike

Protective measures regarding lightning and lightning protection for the crane and load, including optional grounding.
- Have the protective measures implemented by authorized and trained expert personnel with suitable knowledge about lightning protection.

5.13.3 Material load due to extreme temperatures

The crane is designed for an ambient temperature of -20 °C to 50 °C.

If the ambient temperature is below -20 °C the crane must be equipped with auxiliary equipment for working at low temperatures.

The use of the crane at ambient temperatures between 40 °C and 50 °C is connected with a reduction in drive performance and service life.

For safe operation, the component temperature is the determining factor, not the ambient temperature.

5.13.3.1 Low temperatures

Low temperatures lead, for example, to the follow technological changes to material properties:
- Steel or cast steel reaches its load limits much earlier.
- Operating fluids change their properties.

To ensure safe operation at low temperatures, the measures described here must be observed.

General rules for operation at low temperatures:
- Do **not** operate the crane with component temperatures below -40 °C. In the case of doubt, contact Customer Service at Liebherr-Werk Ehingen GmbH.
- Match the operating fluids in time to the ambient temperature.
- Preheat the engine.
  (→ 8.4.1 Preheating the engine, p. 407)(→ 8.12.1 Preheating the engine, p. 490)
- Maintain the battery charge when the engine is shut off. Store the batteries in a heated room if possible.
- The load bearing crane structure must be visually inspected more often at low temperatures.
- Rope pulleys and hydraulic cylinders must be visually inspected more often at low temperatures.

Temperatures below -20 °C

Additional rules for operation in the case of component temperatures of below -20 °C:
- The crane is equipped with the auxiliary equipment for working at low temperatures.
- Accelerate and decelerate crane movements sensitively and with utmost caution.
- Preheat the engine, injection pump and transmission.
  (→ 8.4.1 Preheating the engine, p. 407)(→ 8.12.1 Preheating the engine, p. 490)
- Preheat the hydraulic oil.
  (→ 8.4.2 Turning hydraulic oil preheating on and off, p. 407)
- Retract and extend all the hydraulic cylinders in an unloaded state over the entire stroke multiple times.
- Increase the rope reeving specified in the load charts to reduce rope pull.
- Increase the minimum required hook block weight by 10 %.
- All hose drums, lines and rope pulleys are easily movable.
- All fastening equipment and fastening positions are approved for the prevailing ambient temperatures.
- If moveable support plates are not assembled, the support plates must be supported on one side of the crane with greased polyamide plates.
- Before travel operation: Completely deflect the steering in both directions multiple times to warm up the hydraulic oil in the steering cylinders.

Crane components	Preheating time
Engine preheating up to start at -40 °C component temperature	60 minutes
Preheat the hydraulic system in the superstructure and the chassis	30 minutes
Preheat the crane cab and driver's cab for start up at the same time up to -5 °C	10 minutes
Total preheating time	**90 minutes**

Tab. 54: Preheating times

Temperatures below -25 °C

Crane remote control operation may be limited at temperatures below -25 °C. This can lead to dangerous situations if warnings are displayed with a delay.

In the case of falling negative temperatures, the LCD displays react increasingly slowly to changes made to images and icons on the displays.

In the case of negative temperatures below -25°C, changes made to images and icons could be displayed with a considerable delay or not at all.

Additional rules for working in the case of component temperatures of below -25 °C:
- Preheat the crane remote control.
- In the case of increasing sluggishness of the LCD displays: Reheat the crane remote control occasionally.

Temperatures below -30 °C

Additional rules for operation in the case of component temperatures of below -30 °C:
- Reduce the maximum load by 15 %.
- Increase the minimum required hook block weight by 15 %.

5.13.4 Danger due to snow and ice

The following dangers to the crane can result from snow and ice:
- Personnel can slip.
- Ice can fall down from the boom, equipment and load.
- Icy components can be damaged and fail.
- The crane can slip if there is snow or ice below the support plates.

Observe the following rules:
- Remove the snow and ice from all accesses, steps and catwalks on the crane.
- Free the piston rods, cylinder seals, rope pulleys, winches, hose drums, limit switches, ropes, hook block, load hooks and boom from snow and ice.
- Remove snow and ice from the load and load handling equipment.
- Remove the snow and ice on top and below the support plates.
- Remove the snow and ice from the windows and mirror. The view must be free.
- If ice has formed on the erected boom: Make sure that there is no danger to personnel due to falling ice.

5.13.5 Deformation of the telescopic boom due to one-side sun exposure

One-sided sun exposure lead to a temperature difference between the side facing the sun and the side facing away from the sun of the telescopic boom. The temperature difference causes telescopic boom side distortion of the telescopic boom. The deformation can reduce the load bearing capacity and cause damage to the telescopic boom.

Observe the following rules:
- If the maximum load should be fully utilized: Perform a visual inspection to ensure that there is **no** side distortion of the telescopic boom.
- If the telescopic boom is distorted on one side: Turn the crane superstructure 180° to heat up the telescopic boom evenly.

5.13.6 Corrosion in a maritime environment

Extremely salty air near the sea can cause severe corrosion on and damage to the crane.

The occurrence of increased corrosion and damage during crane use in a maritime environment is the sole responsibility of the operating company.

Due to corrosion, components can be worn and fail prematurely, for example:
- Hydraulic cylinder
- Wire ropes
- Electrical and electronic components
- Driver's cab and crane cab

Crane use in a maritime environment requires particular caution:

- Avoid direct contact of the crane and its components with salt water.
- Do **not** dip the hook block or rope in salt water.
- Corrosion protection applied regularly protects the crane against damage. (For additional information, see: “Protecting the crane against corrosion”).
- If the crane comes into contact with salt water: Clean the crane afterward (→ 11.21 Cleaning the crane, p. 939).
- The main components and structure of the crane must be checked periodically by a qualified person for premature corrosion and damage. (For additional information see the: “Maintenance and inspection schedule”).

5.14 Loads on the ground

5.14.1 Loads on the ground

The mobile crane transmits considerable forces to the ground through the crawler plates (crawler pressures) or the support plates of the assembly support (support forces).

If the load bearing capacity of the ground is insufficient, the ground can collapse and the mobile crane can topple over.

Note

▶ Take into account that on a mobile crane with high ballast, the crawler pressures with a low load can be higher than with high load.

Observe and adhere to the following rules:
- The ground must withstand the generated crawler pressures and support forces.
- If the surface area of the crawler plates or the support plates is inadequate, then they must be supported according to the load bearing capacity of the ground with suitable materials, such as wooden beams or outrigger pads.
- To obtain an even pressure distribution over the substructure surface: Place the crawler plates or support plates central, horizontal and across the full width of the substructure.
- A maximum of one support plate may be placed on each substructure.
- Calculate the necessary substructure surfaces during job planning.

5.14.2 Calculation of the crawler pressure

The crawler pressure can be calculated with the Crane Planner and job planner and is displayed additionally on the superstructure monitor on the *Crawler pressure and Center of gravity* display.

The crawler pressure is calculated and displayed under ideal conditions.

If it is not taken into consideration that under actual conditions there may be a considerably higher crawler pressure, the crane can topple over.

The following actual conditions can cause an increase in crawler pressures:
- Uneven and non-homogeneous ground
- Deformation of the boom system due to wind and sun exposure on one side
- Effect of the wind on the crane and load
- Incline position and elastic yielding of the crane structure

Note

Only the crane manufacturer of a qualified authorized inspector can calculate the crawler pressures under actual conditions.

Observe the following rules:
- Do **not** use the calculated and displayed values to determine the limit values of the crane and to utilize the crane to its tipping edge or until it sinks in.

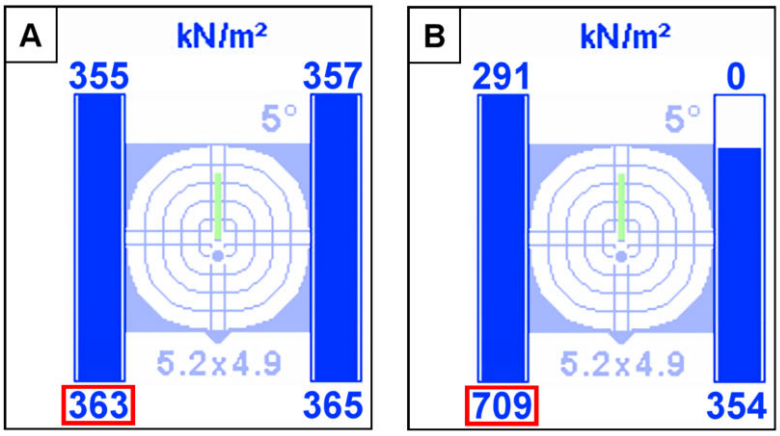


Fig. 224: Exemplary illustration: Crawler pressure display

Illustration **A**: Crawler pressure values calculated and displayed by the LICCON

Illustration **B**: Actual crawler pressure values (are **not** displayed!)

5.14.3 Monitoring the crawler pressure

If the permissible crawler pressure according to the load bearing capacity of the ground is exceeded, crane movements are **not** shut-off. The crane can topple over or collapse.

The current crawler pressure is displayed in the *crane operation* menu (→ Crawler pressure and center of gravity display, p. 293).

A warning can be set when exceeding the permissible crawler pressure (→ 8.15.7 Setting crawler pressure monitoring, p. 518).

Observe the following rules:
- Monitor the displayed crawler pressure continuously and check for plausibility.
- Keep in mind that the crawler pressure is calculated and displayed under ideal conditions (→ 5.14.2 Calculation of the crawler pressure, p. 195).
- Set a warning when exceeding the permissible crawler pressure according to the load bearing capacity of the ground (→ 5.14.4 Examples of the load bearing capacity of the ground, p. 196).

5.14.4 Examples of the load bearing capacity of the ground

Note

If there is any doubt about the load bearing capacity of the ground at the placement location, soil tests must be carried out by an authorized inspector, for example with a ram penetrometer.

	Soil type		Permissible ground pressure
1.	Organic ground:		
	a).	Peat, sludge, muck	0 kN/m²
2	Uncompacted fill:		
	a).	Construction debris	0 kN/m² to 100 kN/m²

Soil type			Permissible ground pressure
3.	Non-cohesive ground:		
	a).	Sand, gravel, rocks and mix	200 kN/m²
4.	Cohesive soil:		
	a).	Clayed silt, mixed with topsoil	120 kN/m²
	b).	Silt, consisting of poor clay and coarse clay	130 kN/m²
	c).	Plastic clay, consisting of potter's clay and fill	
		Stiff Semi-solid Solid	90 kN/m² 140 kN/m² 200 kN/m²
	d).	Mixed granular ground, clay to sand, gravel and rocky areas:	
		Stiff Semi-solid Solid	150 kN/m² 220 kN/m² 330 kN/m²

Tab. 55: Examples: Permissible ground pressure of the ground

5.15 Slopes and excavations

If the mobile crane is set up at a distance from slopes and excavations that is too short, the edge can collapse and the mobile crane can topple over.

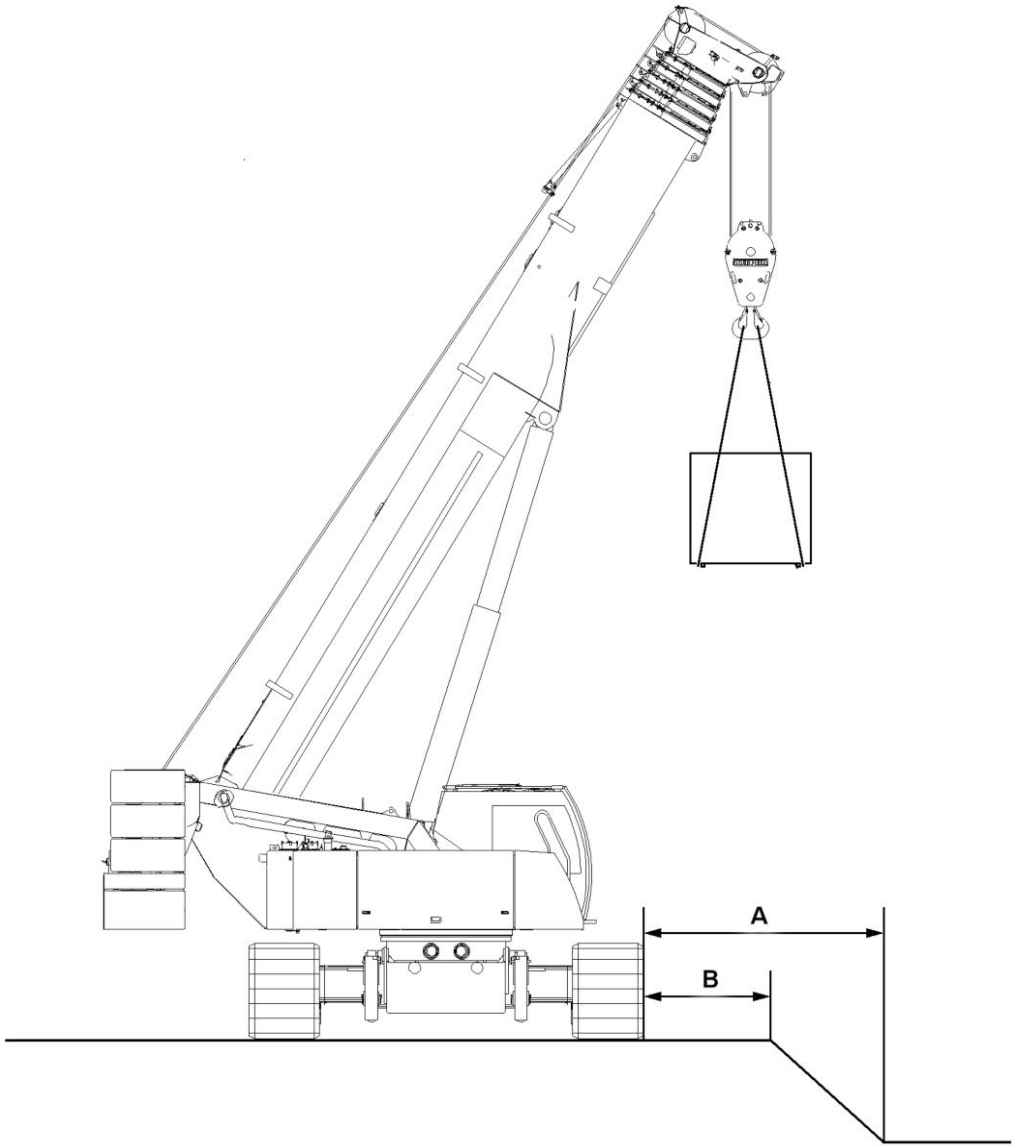


Fig. 225: Safety distances from slopes and excavations

A Distance from the bottom of excavation **B** Distance from the excavation

Observe the following rules:
- Observe a sufficient safety distance from the bottom of excavation **A** and from the excavation **B** depending on the type of soil.
- If necessary: Have the safety distance from the bottom of the excavation **A** and the excavation **B** calculated by a soil expert or geologist.

5.16 Nearby hazards

Take the following nearby hazards into consideration:
- Obstacles in the surrounding area
- Underground lines and cavities
- Overhead lines
- Transmitters
- Air traffic

5.16.1 Obstacles in the surrounding area

Obstacles in the surrounding area can limit crane work and represent a hazard.

Possible obstacles:
- Structures and buildings
- Other mobile cranes, vehicles and ships
- Stacked goods
- Publically accessible areas including roads, railways and rivers

Obstacles in the surrounding area must be taken into consideration when planning crane use.

5.16.2 Underground lines and cavities

Underground lines and cavities can collapse when loaded. The mobile crane can topple over.

Possible underground lines:
- Gas lines
- Power cable, telephone cable
- Water pipes

Possible cavities:
- Cellar rooms
- Underground parking
- Shafts

Implement precautions to ensure that the crane base is free of underground lines and cavities. If this is not possible, the lines and cavities must be sufficiently protected.

5.16.3 Electrical overhead lines

If the mobile crane comes into contact with electrical overhead lines, arcing can take place.

Current transfer can lead to death, very serious injuries and considerable damage to the mobile crane.

Observe the following rules when working in the vicinity of electrical overhead lines:
- Observe regional and national regulations.
- Maintain the required safety distances. Take into consideration line ropes, loads, load suspension and load handling equipment that swing out due to wind or stretch due to weather influences.
- Contact the network operator.
- Use a guide for monitoring the mobile crane, lines and safety distances. In an emergency, the guide notifies the emergency services. The guide warns personnel present to maintain a distance.

5.16.3.1 Safety distances

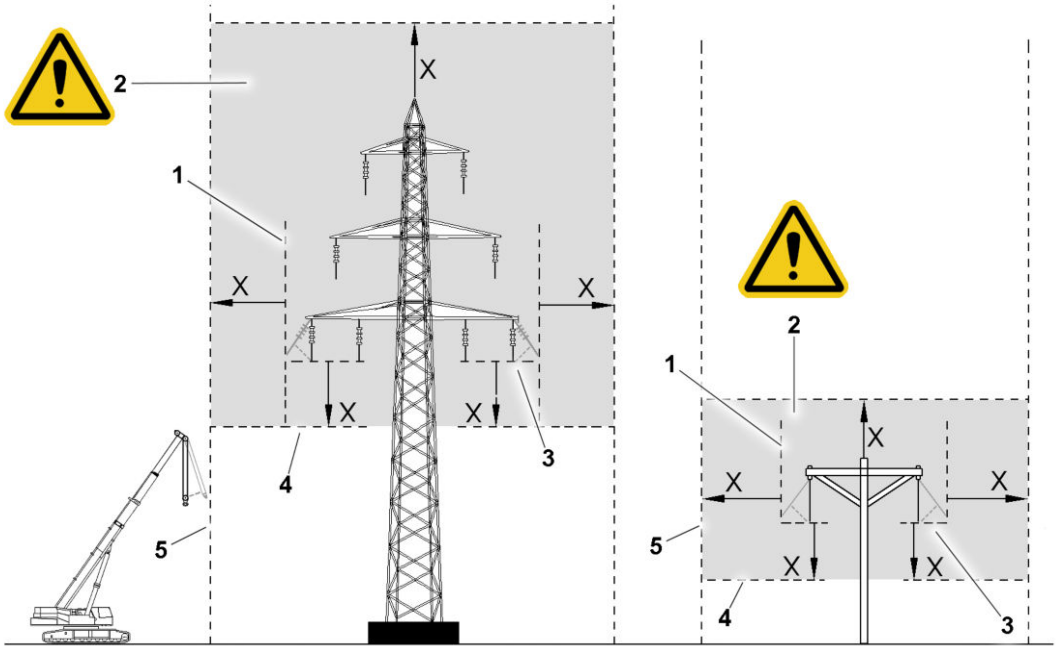


Fig. 226: Exemplary illustration: Safety distances from overhead lines

X	Safety distance from the line	**3**	Lowest point of the line
1	Maximum swing out area of the line	**4**	Maximum working height
2	Danger zone	**5**	Maximum approach

Observe the regionally and nationally required safety distances. Obtain precise information from the network operator. The necessary safety distance depends on the nominal voltage of the overhead line. These values are guidelines.

Nominal voltage	Safety distance from the danger zone	
Up to 50 kV	4 m	10 ft
Above 50 kV to 200 kV	5 m	15 ft
Above 200 kV to 350 kV	7 m	20 ft
Above 350 kV to 500 kV	8 m	25 ft
Above 500 kV to 750 kV	11 m	35 ft
Above 750 kV to 1000 kV	14 m	45 ft
Above 1000 kV	Determination by power supplier or electrician	Determination by power supplier or electrician

Tab. 56: Safety distance from the danger zone depending on the nominal voltage

5.16.4 Transmitters

The transmitters can generate strong electromagnetic fields. The mobile crane and the load can be electrostatically charged due to electromagnetic fields. If the electrically charged mobile crane or load comes into contact with people, sudden electrical discharge can take place. Personnel can be killed or seriously injured.

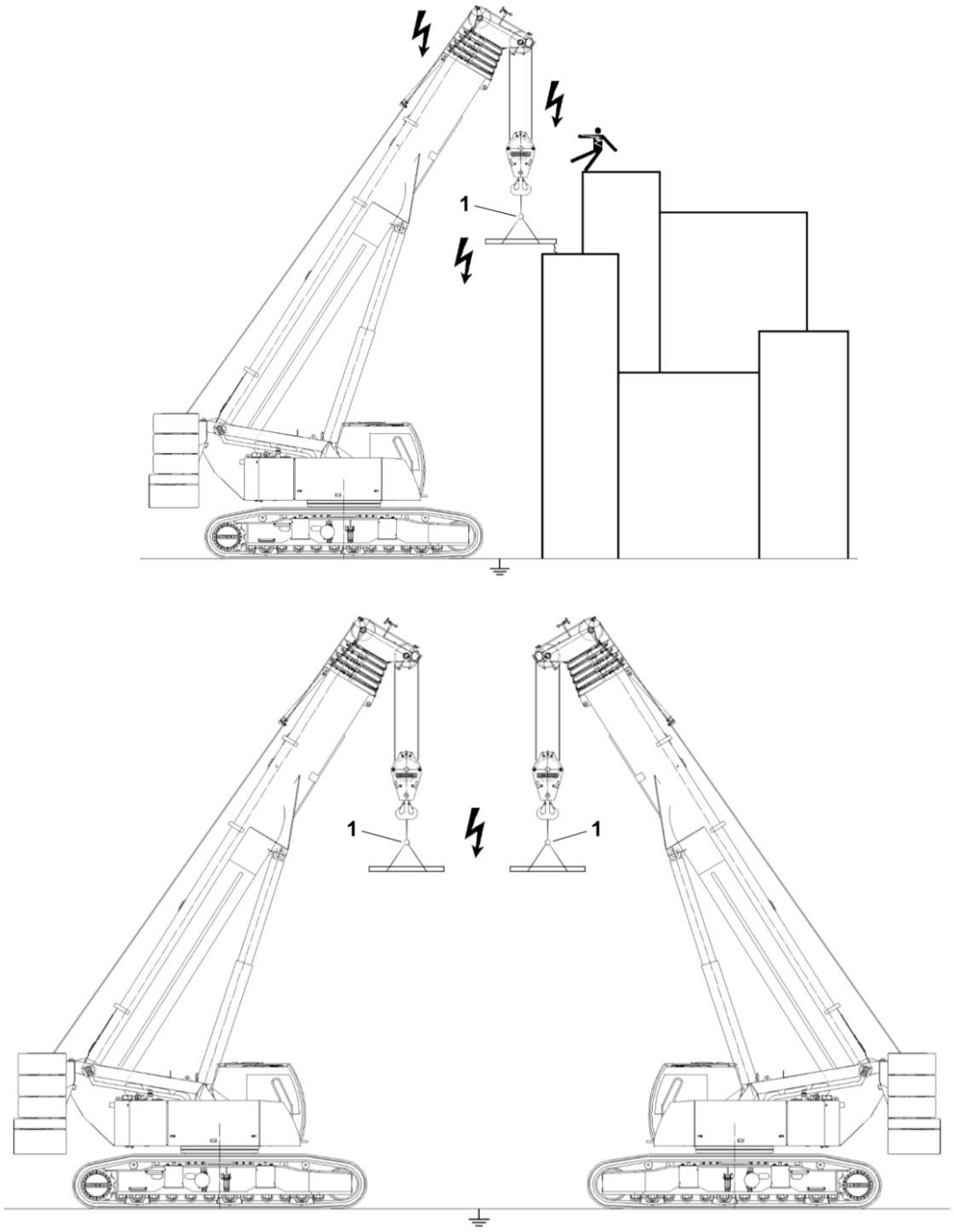


Fig. 227: Exemplary illustration: Electrostatic charge

1 Isolator

The following dangers can occur due to electromagnetic fields:
- Effect of heating on human organs
- Danger of burns or combustion due to temperature increase
- Spark or electric arc formation
- Damage to the electronic components

Before operating a crane in the vicinity of transmitters:
- Observe regional and national regulations.
- Contact Liebherr-Werk Ehingen GmbH.
- Consult with authorized and trained electricians for high frequency fields.

5.16.5 Air traffic

When working with mobile crane, heights are reached which could endanger air traffic. This applies especially to areas near airfields and airports.

If no protective measures are taken, air traffic can be endangered.

Observe the following rules during crane use in order to not endanger air traffic:
- Observe the national and regional regulations, for example, in order to identify aviation obstructions.
- Get the approval from agency responsible for air traffic.
- Carry out marking if required according to the national and regional regulations, for example with flags or warning signs.
- Install the airplane warning light on the boom head and turn it on.

Note

If the airplane warning light is operated for a longer period of time with the engine turned off, the batteries can be discharged and, as the result, the airplane warning light turns off. To prevent the battery from discharging, electrical power supply must be ensured for the battery charger*.

(→ 8.2.3 Charging the batteries, p. 403)

5.17 Measures with damaged high voltage system

If the crane is externally supplied with voltage via the 230 V / 110 V external power supply*, potential dangers arise from the resulting high voltage system.

High voltage system components include:
- Mains connection line
- 230 V / 110 V external power supply*
- Battery charger*
- Electrical coolant preheating*

The crane can be energized due to damaged high voltage lines and high voltage components. This voltage can lead to electric shock, short circuit and fault arcs.

In the event of damaged high voltage lines and high voltage components, observe the following:
- Do **not** touch the high voltage lines and high voltage components.
- Take the crane out of operation or press the emergency off switch.
- Do **not** start the crane.
- Do **not** touch the crane.
- Leave the danger zone and close it off.
- Mark the crane to prevent start up.
- Interrupt the external voltage supply.
- Have damaged high voltage lines and high voltage components replaced immediately by maintenance personnel qualified for high voltage systems.

5.18 Job planning

5.18.1 Planning crane use

The **job planning** is an important basis for safe and problem-free crane use.

Prior to crane use, determine and observe the following information:
- Type of crane operation
- Relevant national and regional regulations
- Overhead clearances and clearance widths
- Job site, distance and driving route
- Space prerequisites at the job site
- Electrical overhead lines with voltage data
- Crane movement limitations due to buildings or other obstructions
- Weight, dimensions and center of gravity of the load or loads to be lifted
- Geometric form and air resistance coefficient of the load or loads to be lifted
- Required lifting height and boom radius
- Load bearing capacity of the ground at the work site
- Distances to slopes and excavations at the work site
- Underground cavities, such as cellars or underground lines at the work site
- Required space for the assembly and disassembly
- Weather forecasts and expected wind speeds
- Number and type of personnel

The Crane Planner and Job Planner provide support when **planning crane use**.

5.18.2 Selecting the mobile crane

Select a mobile crane that safely fulfils all requirements of the planned lifting procedure.

The following must be taken into consideration when making the selection:
- Weight, dimensions and properties of the loads
- Operating speeds, boom radii, lifting heights and movement ranges
- Number, frequency and type of lifting procedures
- Usage time
- Location, ground and environmental conditions as well as limitations that result from the use of buildings that are present
- Available space for accessing the mobile crane, set up, driving, operation and disassembly.
- Other operating requirements or limitations

5.18.2.1 Selection of the equipment

Select the equipment and set up configuration to be able to lift the load safely.

Select the equipment for crane operation for example:
- Hook blocks and load hooks
- Auxiliary boom
- Fastening equipment
- Ballast
- Base materials for support plates

Note

The weight of the utilized hook block or utilized load hook as well as the fastening equipment must be deducted from the loads in the load charts.

5.18.3 Selecting the location

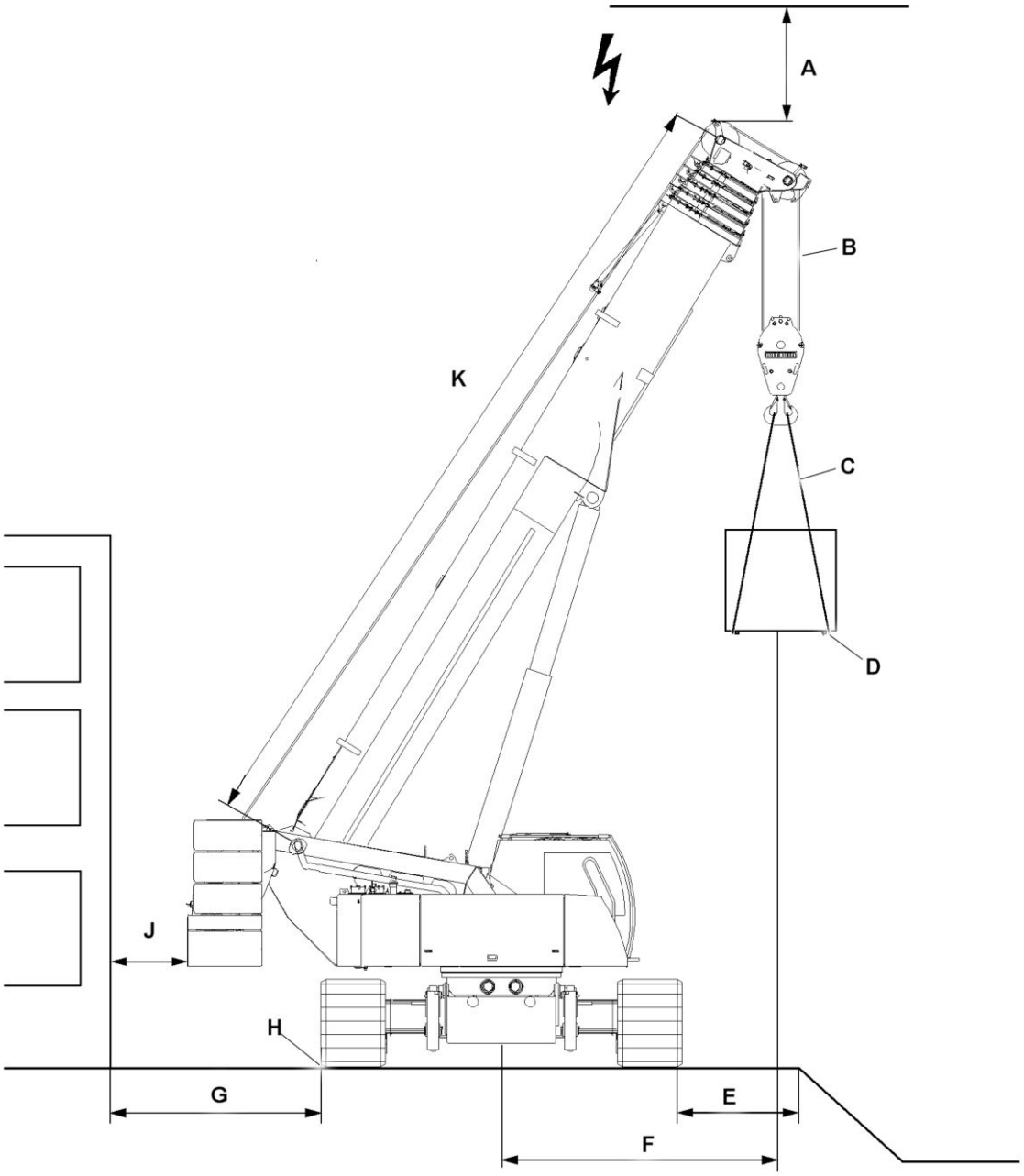


Fig. 228: Selecting the location

A Overhead lines
B Reeving
C Fastening equipment
D Load
E Slopes and excavations
F Boom radius
G Cavities
H Crawler pressure
J Buildings and other obstacles
K Telescopic boom

Sign	Factors for selecting the location
A	Maintain a safe distance from overhead electrical lines
B	Select the correct hoist rope reeving for the load case
C	Select the fastening equipment according to the weight of the load, the type of fastening and the incline angle

Sign	Factors for selecting the location
D	Pay attention to the weight and wind-exposed surface of the load
E	Maintain the safety distance from slopes and excavations or similar
F	Select the smallest boom radius possible
G	Maintain a safe distance from cavities, for example cellars, underground lines or similar
H	Support the support plates according to the load bearing capacity of the ground. Support the crawlers according to the load bearing capacity of the ground.
J	Select the location in such a way that crane movements can be carried out without collision with buildings and other obstacles and that the supports can be extended to the support base specified in the load charts. Make sure that no personnel is injured or killed. Maintain a safety distance of 0.5 m. If this is not possible, block off the danger zone.
K	Select the correct telescopic boom length for the load case.

Tab. 57: Factors for selecting the location

5.19 Crane operation

For safe crane operation, observe the rules in the following safety instructions.

In addition observe the following check lists prior to crane operation:
- “Crane operation checklist” (→ 8.1 Crane operation checklist, p. 399)

5.19.1 Overload protection

5.19.1.1 Limits of the overload protection

The overload protection **cannot** detect all conditions by itself or overcome physical limits. Careful and diligent crane operation by the crane operator is important.

The overload protection **cannot** detect the following conditions, for example:
- An incorrectly entered set up configuration
- The hooking of the load or the load handling equipment
- Excessive retarding forces
- Loads falling onto the rope
- Angular pull
- Collapsing ground
- Wind that affects the telescopic boom

Observe the following rules:
- Always adapt crane operation to the operating conditions.
- Do **not** rely completely on the displays and values of the overload protection. Monitor the displayed values continuously and check them for plausibility.

5.19.1.2 Misuse of the overload protection

If the overload protection is misused as an operational shut-off device, there is danger of accident.

Observe the following rules:
- Do **not** use the overload protection as an operational shut-off device.
- Operate the crane in such a way if possible that there is **no** shut off of crane movements by the overload protection.
- If **not** otherwise possible, approach a possible shut off of crane movements with extreme caution.

5.19.1.3 Shut-off of crane movements by overload protection

If crane movements are turned off by the overload protection, the cause of the shut-off must be determined and if possible the crane movement that caused it must be reversed (→ 9.8 Procedure for shutting-off the crane movement, p. 616).

In special cases, it may be necessary to activate a special function of the overload protection to bring the crane into a safe condition (→ 9.9 Overload protection special functions, p. 618).

5.19.1.4 Crane overload due to lowering of loads

The overload protection does **not** turn off the lowering of loads. When lowering loads, the utilization is increased due to the larger portion of the hoist rope weight.

If the increase in load due to the additional hoist rope weight is not calculated when lowering the load, the crane can be overloaded.

Observe the following rules:
- When taking on a load and then lowering the load: Do **not** utilize the crane 100 %.
- During job planning, add the higher percentage of the hoist rope weight to the load.

5.19.1.5 Overload of crane in case of the block position of the luffing cylinder

The current crane utilization is calculated using the luffing cylinder pressure. When the luffing cylinder is in the block position, the current utilization cannot be determined. The overload protection is not functioning. The crane can collapse or topple over.

Observe the following rules:
- Do **not** carry out crane operation with the luffing cylinder in the block position.

5.19.2 Working with a load safely

5.19.2.1 Description of taking on a load

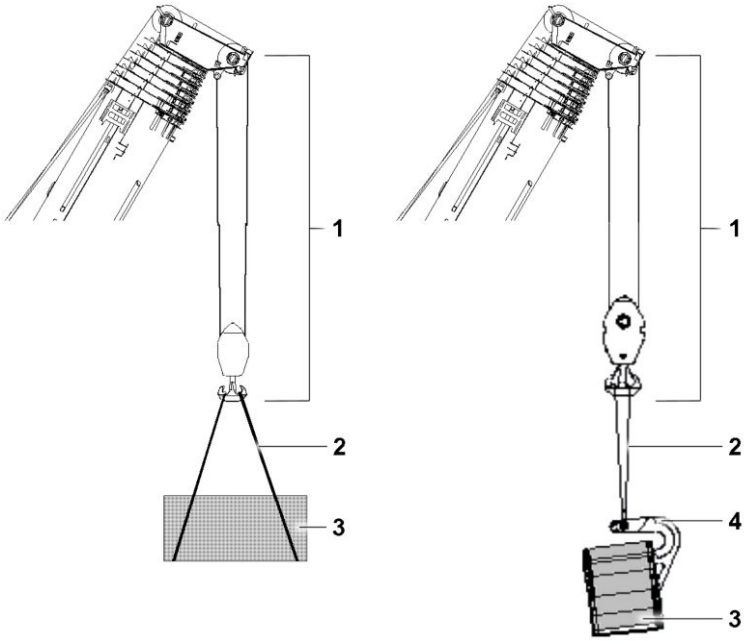


Fig. 229: Taking on a load

1 Load handling equipment
2 Fastening equipment
3 Load
4 Load handling equipment

5.19.2.2 Using the fastening equipment correctly

If fastening equipment is used incorrectly, the load can rip off.

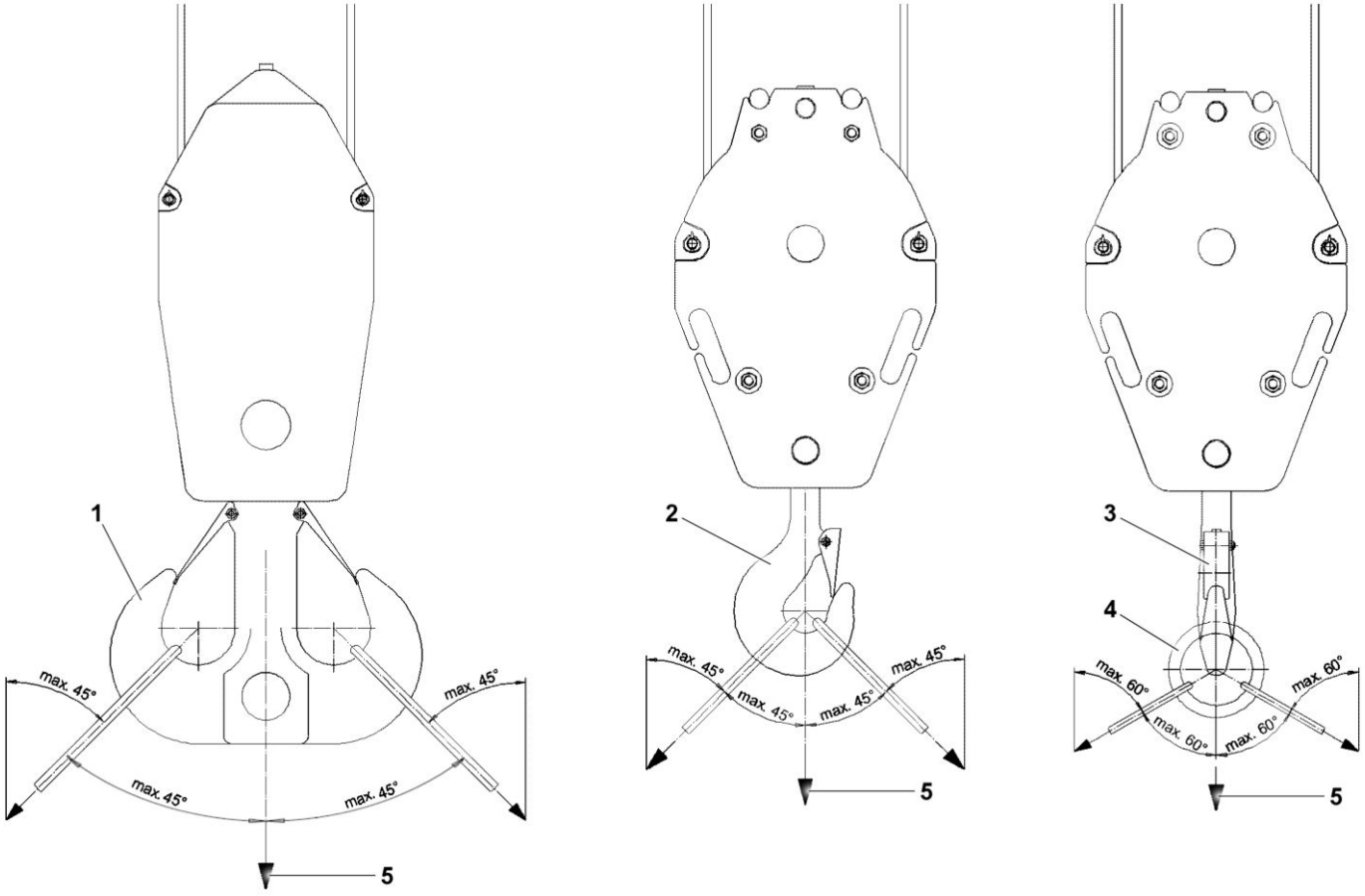


Fig. 230: Connecting the fastening equipment to the hook blocks

1 Double hook

2 Single hook (no suspension link required)

3 Single hook (suspension link required)

4 Suspension link

5 Direction of the center of gravity

Observe the following rules:
- Pay attention to and observe the load bearing capacity of the fastening equipment.
- Comply with the maximum permissible incline of 45° with single hooks **2** and double hooks **1**.
- If necessary for a single hook **3**: Use the suspension link **4**. Observe the maximum permissible incline of 60°.
- Load the hook symmetrically. Move the hook maximum ±3° from the direction of the center of gravity.
- If necessary: Use a cross beam or two cranes for taking on a load.

5.19.2.3 Fastening the load with the cross beam correctly

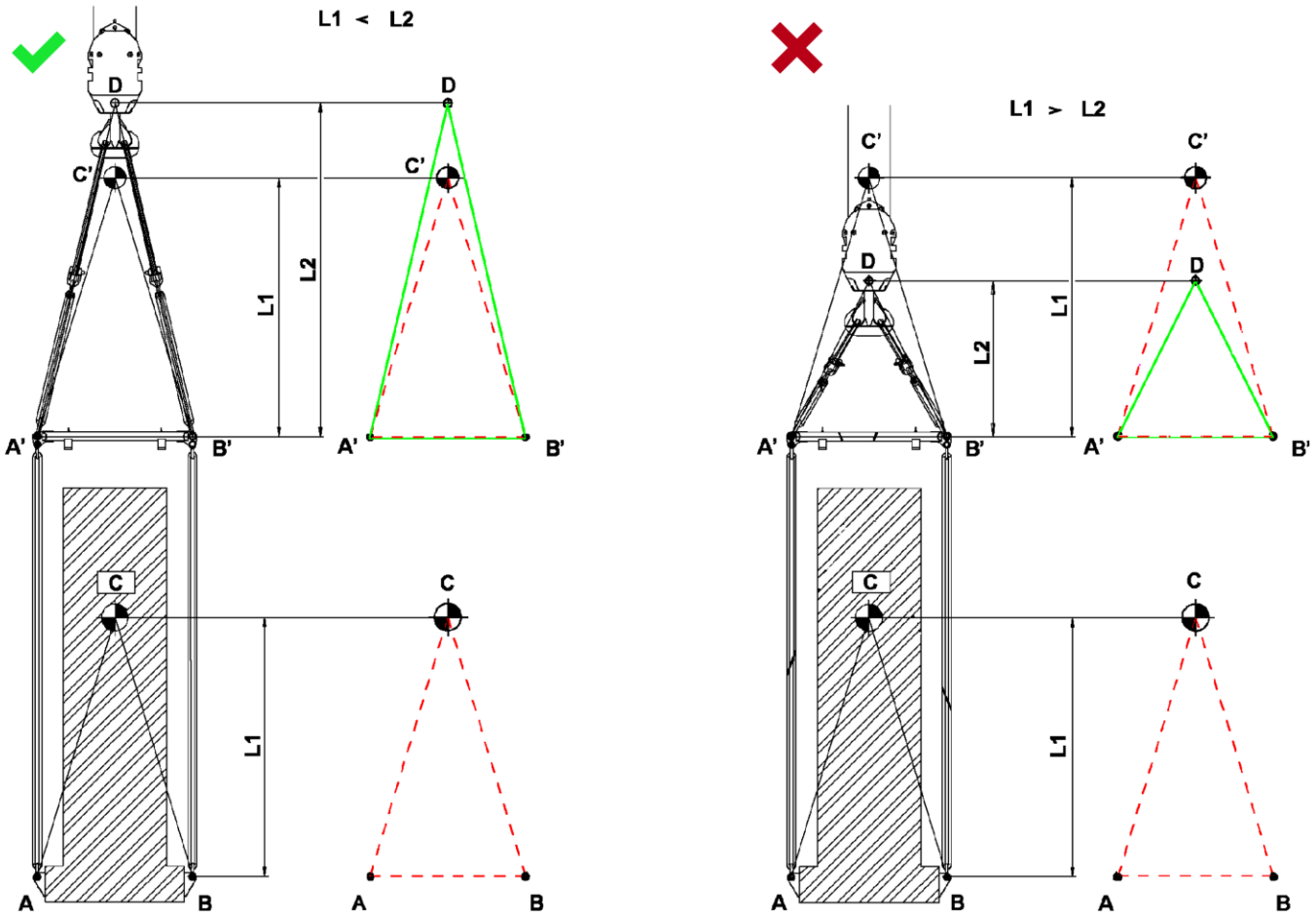


Fig. 231: Fastening the load with the cross beam

A	Load fastening position	**D**	Hook pivot point	**C'**	Load and load handling equipment overall center of gravity
B	Load fastening position	**A'**	Cross beam hinge point	**L1**	Distance from the center of gravity
C	Load center of gravity	**B'**	Cross beam hinge point	**L2**	Cross beam height

The distance of the center of gravity **L1** is the vertical dimension from the fastening positions of the load **A** and **B** to the center of gravity of the load **C**.

The cross beam height **L2** is the vertical dimension from the pivot point of the hook **D** to the next lower linkage point of the cross bar **A'** or **B'**.

If fastening ropes that are too short are used, the load center of gravity **C** lies above the hook. The load can tip to the side.

Observe the following rules:
- Make sure that the overall center of gravity **C'** lies below the hook.
- The distance from the center of gravity **L1** must be smaller than the cross beam height **L2** (L1 < L2).
- The **A'B'C'** triangle must be within the **A'B'D** triangle.

5.19.2.4 Weighing the load correctly

In order to be able to weigh the load correctly, all measurement equipment of the overload protection must function properly.

Weighing errors can occur due to tolerances in the measuring equipment.

Weighing errors are increasingly larger in the following cases
- Crane operation with low reeving
- Crane operation with a short telescopic boom
- Crane operation with a steep telescopic boom

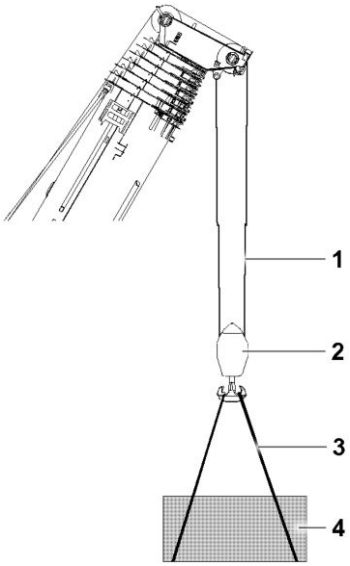


Fig. 232: Load weighing

1 Hoist rope
2 Hook block 1.5 t
3 Fastening equipment 0.5 t
4 Actual net load 48 t

For the permissible loads in the load charts, the weight of the hoist rope **1** is taken into account at nominal reeving. The weight of the hoist rope **1** is **not** displayed as a load.

The weight of the hook block **2** and the weights of the fastening equipment **3** must be subtracted from the maximum permissible load and are displayed as a load.

Calculation of the actual load capacity of the crane	Load
Maximum load according to the load charts	50 t
Hook block **2** weight	-1.5 t
Fastening equipment **3** weight	-0.5 t
Actual net load **4**	= 48 t

Tab. 58: Calculation example: Actual net load capacity of the crane

The weight of the actual load capacity **4** (the load being lifted) may not exceed **48 t** in this example.

Hoist rope weight

For the calculation of the actual load **2**, the hoist rope weight is deducted from the measured total load.

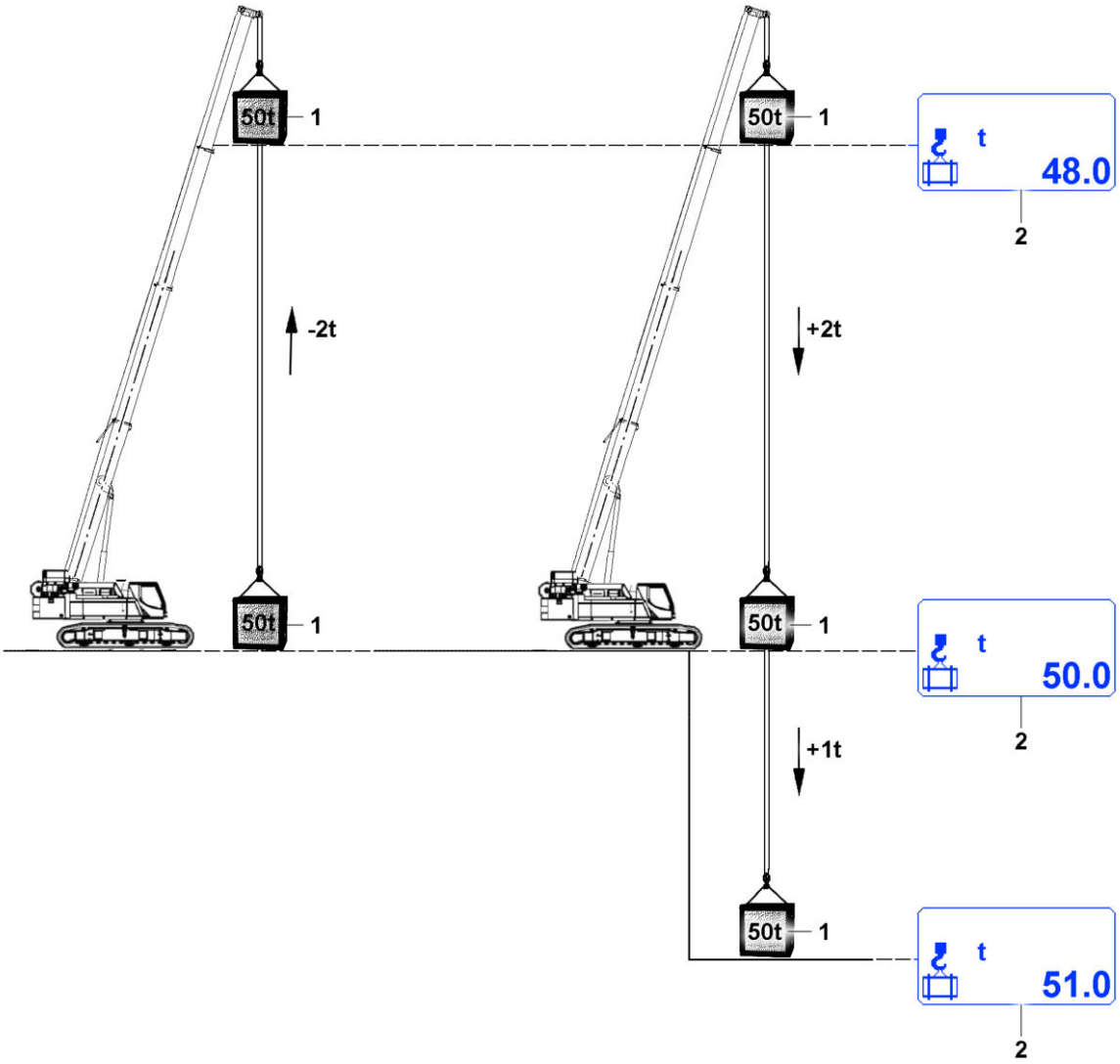


Fig. 233: Exemplary illustration: Load display when lifting and lowering a load

1 Load including hook block and fastening equipment

2 Actual load

The hoist rope weight will always be calculated for the entire length between the upper pulley block and the ground and deducted.

The actual load **2** is increased by the weight of the hoist rope as soon as the winch is spooled out.

The actual load **2** is increased by the weight of the hoist rope as soon as the winch is spooled out.

5.19.2.5 Lifting the load safely

Lifting the load off the ground safely

The load can start to swing when it is lifted off the ground.

Personnel can be crushed between the load and other possible obstacles.

Observe the following rules:
- **No** personnel in the danger zone
- **No** personnel on the load.
- **No** angular pull: Lift the load vertically from the ground.

- Do **not** lift the load only by luffing up.
- Do **not** lift a load with the assembly winch (only present for certain crane types).
- Lift the load carefully.
- Loads fastened by hand: Lift the load only when released by the slinger, guide or other authorized person.

Also observe the following rules when the fastening rope is attached to the load by a guide:
- The hands of the assistant may **not** be located between the load and fastening rope.
- Make sure that the body parts of the assistant **cannot** be crushed when lifting the load.

Dangers due to angular pull

The crane is designed only to lift loads vertically. During angular pulling, regardless of whether this is done in the same direction as the telescopic boom or laterally, horizontal forces are generated from the load in addition to the vertical forces, for which the telescopic boom is not designed.

The crane can topple over or collapse. Loads can start to swing.

Observe the following rules to avoid angular pull:
- Always fasten the hook block or load hook vertically over the center of gravity of the load
- When lifting the load: Compensate for boom deflection. The boom radius may **not** change.
- Do **not** use the slewing gear to pull or set up loads.

Danger due to breaking away of fixed loads

The crane is not designed to rip to break away fixed loads. If a fixed load releases, large forces will be suddenly freed. The crane can collapse or topple over.

Never break away a fixed load with the crane.

Observe the following rules:
- Do **not** break away a fixed load with the crane.
- If the *load display* exceeds the weight of the load: Interrupt the lifting procedure and remedy the cause.
- If a load accidently broke free, for example because the load was frozen solid: Have the crane checked by an authorized inspector.

5.19.2.6 Lifting the load safely with two cranes

If the load is not lifted or lowered exactly evenly by both cranes, then the center of gravity changes. The cranes can collapse or fall.

Observe the following rules:
- Determine the work sequence and assign a responsible supervisory person for use.
- The responsible supervisory person monitors use and is in constant contact with the crane operators.
- Perform careful and detailed job planning.
- Observe the national and regional regulations.
- The total weight and the center of gravity of the load are known.
- Avoid fastening positions below the center of gravity of the load.
- Determine the degree of utilization of the cranes in operation, depending on the complexity of the load hoist.
- Plan for sufficient safety reserves.
- When crane use makes this necessary: Set up an assembly plan and operating instructions for the operation.
- Ensure constant contact between the crane operators.
- Carry out crane movements synchronously and slowly.
- Avoid side load on the boom.

Maximum permissible crane load utilization

The following drawing shows how the center of gravity for the load changes if the load is lifted or lowered unevenly. Even a slight incline of the load can cause the crane to be overloaded.

If the load on crane 2 **(F_2)** is lowered, the load on crane 1 **(F_1)** increases. Crane 1 can thereby be overloaded.

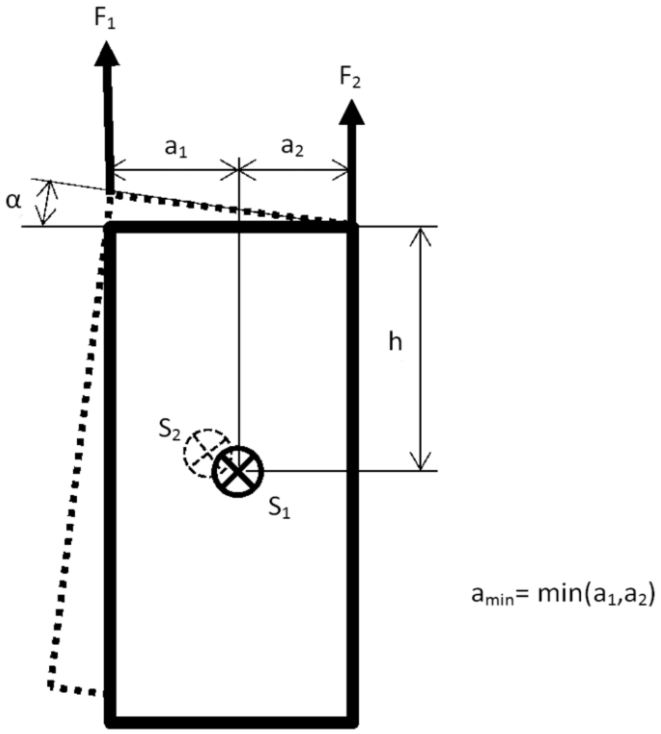


Fig. 234: Geometric conditions

F_1	Load on crane 1	**F_2**	Load on crane 2
S_1	Center of gravity of the load	**S_2**	Center of gravity of load in the incline position
h	Vertical distance between center of gravity of the load and the fastening positions	**α**	Angle of load at incline position
a_1	Horizontal distance between center of gravity of load and fastening position crane 1	**a_2**	Horizontal distance between center of gravity of load and fastening position crane 2
a_{min}	Smallest horizontal distance between the center of gravity of the load and the fastening position (minimum from a_1 and a_2)		

Tab. 59: Image legend

The following diagram shows the dependence of the ratio of h/a_{min} at a maximum permissible incline position of the load of 3° in reference to the permissible load utilization of cranes as a percentage.

Fig. 235: Maximum permissible load utilization

x Ratio of h to a_{min}

y Maximum permissible load utilization as a percentage, if α is smaller than or equal to 3°

Example: A ratio h to a_{min} of 6, when retaining the incline position of the load of maximum 3° results in a maximum permissible load utilization of both cranes of approx. 76 % each.

5.19.2.7 Moving the load safely

The following rules must be observed when there is a load on the crane hook:
- Do **not** move load over personnel.
- In the case of an emergency, stop the crane movements and set down the load if necessary.
- The crane operator may not leave the control section and must keep their hands near the control systems.
- Make sure that the load or load handling equipment does not collide with obstacles or the crane.

5.19.2.8 Setting down the load safely

The load can tip over when the load is set down.

Personnel can be struck by the load.

Observe the following rules:
- **No** personnel in the danger zone.
- Place the load vertically on the ground.
- The ground is horizontal and even.
- Set down the load carefully.

5.19.3 Working safely with the crane remote control

If the crane is operated with the crane remote control or the expanded crane remote control*, there can be danger for personnel.

Observe the following rules:
- Make sure that no persons are in the movement area of the crane or load when operating with the crane remote control or the expanded crane remote control*.
- Select the operating position so that the movement areas of the load and the crane can be seen.
- If the movement area cannot be seen: Work with a guide.

5.19.4 Calculating the center of gravity

The crane center of gravity is calculated and displayed under ideal conditions.

If it is not taken into consideration that under actual conditions the center of gravity can deviate, the crane can topple over.

The following actual conditions can cause deviations in the center of gravity:
- Uneven and non-homogeneous ground
- Deformation of the boom system due to wind and sun exposure on one side
- Effect of the wind on the load
- Incline position and elastic yielding of the crane structure

5.19.5 Spooling the hoist rope out and up correctly

5.19.5.1 Avoiding the adjustment of the winch turn sensor

The winch turn sensor is adjusted such that it turns off the winch before the minimum rope on the winch are fallen below.

If the hoist rope is **not** properly placed on or removed from the winch, this can misalign the winch turn sensor. The winch is no longer turn off in time. If the minimum rope coils is fallen below, the hoist rope can be ripped out of the winch.

Observe the following rules:
- Do **not** pull the hoist rope end through under the winch when spooling it up.
- Do **not** pull the hoist rope from a “stationary” winch.
- If adjustment of the winch turn sensor is suspected: Check the timely shut-off of the winch without load.
- When shutting off the winch, at least fur rope coils must remain on the winch.

5.19.5.2 Preventing slack rope

Slack rope is formed when the hook block is not lowered due to a low hook block weight when spooling the hoist rope out.

Observe the following rules:
- Make sure that the hoist rope is tensioned when spooling it up and out.
- Observe the minimum required hook block weight. (→ Separate document “Use of the load charts” > “Hook block weight”)
- Observe the specified hoist rope reeving according to the load charts.
(→ 9.6 Remedying slack rope formation, p. 612)

5.19.5.3 Avoid a loosely wound up hoist rope

If the hoist rope is wound too loosely in the lower rope layers, the upper rope layers can cut into the lower rope layers.

The hoist rope can be damaged. In extreme cases, the hoist rope can no longer be spooled up or spooled out.

Observe the following rules:
- Regularly restore the hoist rope pretension of the lower rope layers.

(→ 8.2.2 Pretensioning the hoist rope, p. 401)
- If the lower rope layers deform in the cross over area: Shorten the hoist rope (→ Separate document “Maintenance and inspection”)
- If only a part of the hoist rope length is used for a longer period of time: Attach the shorter hoist rope.
- Before lifting with a high rope pull and if the hoist rope was spooled up previously without a load: Restore hoist rope pretension.
  (→ 8.2.2 Pretensioning the hoist rope, p. 401)

5.19.6 Preventing collisions between the hook block and the boom system

In steep positions the hook block or the load hook can collide with the boom system.

Observe the following rules:
- Make sure that the hook block or load hook is always at a sufficient distance from the crane structure.
- Perform all crane movements and in particular the luffing of the boom system anticipatorily and at a suitable speed.

5.19.7 Interrupting crane operation with erected telescopic boom

Observe the following notes, if it is not possible to take down the telescopic boom when crane operation is interrupted, to leave the crane in a safe condition.

5.19.7.1 Danger due to environmental influences

Due to environmental influences, such as flooding, the condition of the erected crane can become unsafe.

Observe the following rules:
- Make sure that the erected crane is not placed in an unsafe condition due to environmental influences in the event of an interruption of crane operation, for example by obtaining the weather report.
  (→ 5.13 Danger due to environmental influences, p. 190)

5.19.7.2 Leaks at hydraulic cylinders

If loaded hydraulic cylinders have leaks, unintentional crane movements may occur when crane operation is interrupted. For example, the telescopic boom can luff down or the support cylinders can give way. Crane movements can also occur due to changes in the oil temperature.

Observe the following rules:
- Make sure that there is no danger to personnel, crane and surrounding area due to unintentional crane movements.

5.19.7.3 Supervision of the equipped crane

If the set up crane is unsupervised, the crane can be brought into an unsafe condition by unauthorized personnel.

Observe the following rules:
- Make sure that the crane does not get into an unsafe condition due to unauthorized access or vandalism.
- If required: Block off the danger zone.

5.20 Special operation

5.20.1 Lifting personnel safely in a safety cage

Lifting of personnel in a safety cage can be the least dangerous option for performing work in specific working situations. When doing so, special prerequisites and specific measures must be observed.

These instructions do not apply for work platforms that are attached to the crane boom and used to lift personnel. This situation is governed by international standards for mobile aerial work platforms.

Failure to observe these notes and the special prerequisites and measures indicated below can lead to accidents resulting in death or serious injuries.

5.20.1.1 Prerequisites for lifting personnel in safety cages

Lift personnel in a safety cages **only** when the following prerequisites and measures are fulfilled.

Make sure that the following prerequisites are met:
- Lifting personnel with cranes is permitted by national and regional regulations of the country.
- No personnel is present on or under the safety cage.
- No load is lifted together with the safety cage.
- The crane is **not** variably supported.
- The crane contractor, supervisor, crane operator and auxiliary operator must proceed especially carefully and safety conscious.
- A written risk assessment is available.
- Before the lifting procedure, a meeting must be held with all involved personnel.

Legal prerequisites

Make sure that the following legal prerequisites are met:
- Special arrangements were made for the use of the safety cage according to the requirements of national and regional regulations.
- If required by national and regional regulations: The use of the crane to lift personnel is reported to the state agency for occupational health and safety. The lifting procedure may possibly require a special permit.
- Before the implementation of the lifting procedure a work-specific risk analysis for the possibility of rescuing personnel in emergencies was defined with the aid of the evaluation.
- To rescue personnel in emergencies, precautionary measures must be present on the crane, if they are required by national regulations.
- The measures for safe operation near power lines, depending on the conditions on the job site and the national and regional regulations are adhered to.

Prerequisites for operation with a safety cage

Make sure that the following prerequisites are met for operation with safety cage:
- The personnel and technical prerequisites for safe use and operation of the emergency control of the crane are fulfilled.
- The emergency control for emergency rescue of the person in the safety cage is operational.
- The rope pull is limited to 50 % of the maximum rope pull.
- The crane is utilized only to 50 % of its maximum load bearing capacity of the valid load chart during operation with a safety cage.
- **Only** carry out winch spooling, superstructure turning or telescopic boom luffing crane movements.

Prerequisites for crane equipment and accessories

Make sure that the following prerequisites for crane equipment and accessories are met:
- It must be possible to use the utilized winch also in emergency operation.
- The safety cage and crane are inspected by personnel before lifting. There is no damage.
- The safety cage fulfills the requirements according to national and regional regulations.
- The safety cage is used for the defined purpose.
- If required by national and regional regulations: Every emergency rescue device is tested and the operational readiness is determined.
- The utilized hooks must be equipped with a latch. The latch prevents the hook mouth from opening. According to national and regional regulations, the latch must be manually closable or lockable or must automatically close via a spring.

Inspection of the safety cage before start up

Make sure that the following inspections are made before starting up the safety cage:
- At every new construction site and after every modification or repair: To ensure the operating safety of the safety cage and the lifting equipment, a test with 125 % of the nominal load carrying capacity of the safety cage without personnel must be carried out. During the test, the safety cage may only be lifted to just above the ground.
- A test lift with the loaded safety cage without personnel must be carried out. The weight in the safety cage for the test lift must be at least as high as the weight of the personnel and the weight with the work equipment carried along. The test lift must correspond to the course of all planned movements of the lifting procedure.
- This test lift must be carried out for every location at a construction site where personnel should be lifted in a safety cage.

Danger due to swinging of the safety cage

If the hydraulic auxiliary users are actuated by personnel in a safety cage when lifted, active crane movements could be unintentionally accelerated or decelerated.

The safety cage can start to oscillate due to unintentional acceleration or deceleration. The safety cage can strike other objects.

Observe the following rules:
- If crane movements are performed when lifting personnel: Do **not** actuate the hydraulic auxiliary users, for example *tilt crane cab*.

5.20.2 Securing personnel on the shut-down crane

Cranes are not designed to protect personnel against falling.

Subject to specific prerequisites and strict compliance with specific measures, it is possible to consider securing personnel to a shut-down crane in justified individual cases.

Failure to observe the special prerequisites and measures indicated below can lead to accidents resulting in death or serious injuries.

5.20.2.1 Prerequisites for securing personnel on the shut-down crane

Secure personnel on a shut-down crane **only** when **all** prerequisites and measures in this section have been fulfilled.

Limitations for transport and operation:
- Transporting the secured person on the crane **from** the job site and **to** the job site is permissible **only** in case of a rescue operation.
- Operation of the crane by the secured person is impermissible.

Make sure that the following prerequisites are met:
- The national and regional regulations are observed.
- In the case of a justified individual case.
- There is a project-specific written risk assessment and work procedure for the concrete application is present and is observed.
- The crane is shut down and secured against all movements.
- At least 3 people are involved: Crane operator, secured person and a supervisor.
- An effective communication must be ensured between the crane operator and the secured person.
- The supervisor monitors the safe execution of work. They may not take part in the work.
- The secured person must be trained in handling the personal protective equipment that prevents falling.
- Determination of the fastening positions and the rescue concept for the precise application are available.

Written risk assessment

The written risk assessment shows:
- Technical protective measures with at least the same protective effect are **not** available.
- The normal fastening devices can **not** be used.
- Personal protection on the shut-down crane is the safest and most useful method for carrying out this work.

The following measures must be defined based on the risk assessment:
- Special operating instructions based on which the crane operator, the person to be secured and emergency personnel must be trained before performing the task. The instructions must be documented.
- A concrete rescue concept must be defined.
- The work procedure must be determined by the employer in advance and supervised by a supervisor.
- The crane control platform must be continuously manned by the crane operator while personnel is secured.

Personal protective equipment to prevent falling, rescue equipment and tools

Make sure that the following prerequisites and measures are met:
- Only use a height safety device according to EN 360 in connection with a safety harness according to EN 361 to secure the person.
- Connecting device is suited for the occurring stress on the edges, see Manufacturer's documentation or device marking.
- Recurring inspections have been made. There are **no** visible defects.
- At least 1 m connecting device of the maximum possible extension length of the height safety device must remain in the housing.
- Fasten the height safety device with two separate connecting devices (for example securing to the crane hook and the crane pulley block).
- Position the crane in such a way that the height safety device is at least 5 m and plumb **over** the person being secured.
- Do **not** exceed the maximum permissible deflection of the height safety device.
- Keep the required clearance **below** the person being secured.
- All required objects (tools, building material) for the work are secured to prevent them from falling.

Prerequisites for the crane

Make sure that the crane is fulfils the following additional prerequisites:
- The maintenance intervals and recurring crane inspections have been adhered to. There are **no** visible defects.
- The crane load is at least 600 kg.

- Ensure a sufficient load bearing capacity: For the catching, pendular fall and possible angular pull load cases, adhere to the manufacturer's instructions.
- The crane is secured against movements and inadvertent movement: Remote control is deactivated and crane control is activated.
- The overload protection is active.

Prerequisites for the fastening device

Make sure that the fastening device fulfills the following additional prerequisites:
- The crane hook is equipped with the hook safety.
- Two connecting devices that are separated from each other can be fastened to the carrying device.
- The height safety device is redundantly fastened.
- Suitable fastening devices according to EN 795 Type B are on hand: For example: Round sling or fastening rope with steel core and belt loops.
- Textile components must be protected against greases, oils and other aggressive substances.
- Use only steel carabiners according to EN 362 with Tri-Lock function.

5.20.2.2 Carry out the rescue safely

Carry out the following measures to ensure a safe rescue operation:
- Determine the rescue plan and rescue chain at the preparation of the mission.
- Ensure the rescue of a person involved in an accident immediately with locally available means and trained personnel.
- Have the rescue mission coordinated by another person, with visual and voice contact to the crane operator, ground personnel as well as to the person who is being rescued.

5.20.3 Safe crane operation on a floating devices

Liebherr-Werk Ehingen GmbH cranes are **not** designed for special requirements according to European Standard “13852-2, Cranes - Offshore cranes” or other offshore specifications and regulations.

The crane can be operated on a floating device subject to certain prerequisites and with strict observation of the operating conditions and notes in this section.

The intended use and non-intended use specified by Liebherr-Werk Ehingen GmbH must be complied with.

Failure to observe the operating conditions and notes in this section can lead to accidents resulting in death or serious injuries.

Possible causes of accident are for example:
- The crane can topple over.
- The crane can collapse.
- Crane components can fail.
- If the floating device is in an incline position, the crane can tip or slip off the floating device.

5.20.3.1 Operating conditions

Areas of responsibility

Observe the areas of responsibility:
- The crane contractor and crane operator are responsible for ensuring that the conditions for crane operation at the job site are fulfilled. Liebherr-Werk Ehingen GmbH strongly recommends involving a shipbuilding engineer.
- The correct functional, technical and static interaction between the crane and the floating device is the sole responsibility of the crane contractor and the crane operator.

– The correct functional, technical and static interaction between the crane and the floating device must be clarified and checked before operating the crane on a floating device.

Basic requirements

Observe the following to ensure the safe operation of the crane on floating devices:
– Comply with all country-specific, legal specifications and conditions.
– Perform a risk assessment according to the Occupational Safety and Health Act to ensure safe working conditions.
– Outrigger forces or crawler pressures generated by crane operation must be safely supported by the steel construction of the floating device.
– Assemble and operate the crane according to manufacturer specifications.
– Secure the crane to prevent it from slipping and lifting up.
– The conditions when working on a floating device must correspond to the conditions on land.
– Crane operation is **only** permissible in very calm waters and therefore on very calmly moving floating devices.
– Comply with the maximum permissible ground incline according to the load charts.
– Implement precautions that permit the boom system to be taken down at any time, for example if the wind and sea start to be strong.

Floating device, supported

Observe the following additional notes to ensure the safe operation of the crane on supported floating devices:
– Lay out the supported floating device such that if the wind and sea start to be strong it will not cause the floating device to buoy upward.

Floating device, not supported

Observe the following to ensure the safe operation of the crane on a **non** supported floating device:
– Crane operation on a **non** supported floating device is only permissible in very calm waters.
– Crane operation on a **non** supported floating device is only permissible with the main boom or alternatively a boom nose. No other additions on the main boom are permissible.
– Crane operation with the main boom in combination with the derrick boom and derrick ballast are only permitted with one derrick ballast that is set down and secured.
Note: The derrick ballast must be secured in all horizontal directions. The horizontal retainer must be prevent the derrick ballast from being lifted out. Keep in mind that the superstructure turning movements are not possible.
– The incline of the floating device may **not** exceed the maximum permissible ground inclination of the crane according to the load charts.
– Before the crane is operated on the floating device: Calculate the incline of the floating device in the lateral direction and in the longitudinal direction in advance. The incline results from the interaction of the crane with the floating device.
– If the wind and sea start to be strong, the crane with the taken down boom system must also be secured against slipping and against oscillations.

5.20.4 Vibrations due to ram work or pulling sheet piles

Note

Liebherr-Werk Ehingen GmbH shall **not** be held liable for damage caused to the machine, to the used ramming and pulling equipment, on the piling element or in the surroundings (for example adjacent buildings).

When working with a free-riding vibrating unit for ramming and pulling operations, vibrations may be transmitted to the load bearing steel structure of the crane even if a vibration damper is used.

This work may only be performed on the crane in exceptional situations or when the use of machines built specially for this work is not possible.

Consequences in case of **unintended** use of the crane:
- Cracks in the crane load-bearing steel structure.
- The hook block or load hook can be damaged.
- Components can become loose and fall down.
- The expected service life of the crane can be drastically reduced.

Specifications for working with the free-riding vibrator:
- Prepare a risk assessment for the planned use.
- For the crane and the hook block or load hooks, shorter inspection intervals must be defined by an authorized inspector.
- Only use a free-riding jogging unit with integrated vibration damper or free-riding jogging unit combined with a vibration damper designed for this equipment.
- Slack rope and angular pull on the hoist rope are prohibited.
- Only turn on the vibrator if the vibrator is connected correctly with the ramming element and the ramming element is lying flat on the ground or is partially in the ground.
- Starting or stopping the vibrating unit must take place with an eccentric moment of zero (**no** vibrator vibration).
- Do **not** cause the telescopic boom to oscillate.
- Before and after all work: Carefully inspect the crane, hook block or load hook, fastening equipment and vibrating unit for damage.

Specifications for ram work and pulling sheet piles:
- Prepare a risk assessment for the planned use.
- For the crane and the hook block or load hooks, shorter inspection intervals must be defined by an authorized inspector.
- The utilization of the crane may not exceed 50 %.
- Do **not** cause the telescopic boom to oscillate.
- The utilization of the hook block or load hook may not exceed 50 %.
- Check the pull force on the hook block or load hook also with measurements.
- **Never** use operating modes with an auxiliary boom.

5.20.5 Increased wear due to magnet operation, operating the grab and handling operation

If cranes are used in magnet operation, operating the grab or handling operation, the expected service life of the crane is reduced dramatically.

This can result in premature wear in parts of the power train as well as cracks in the load-bearing steel structure.

Specifications when the crane is used in magnet operation, operating the grab or handling operation:
- The utilization of the crane may not exceed 50 %.
- For crane and the hook block / load hook, shorter inspection intervals must be defined by an authorized inspector.
- Observe the specifications for hoist rope pretensioning.
  (→ 5.19.5 Spooling the hoist rope out and up correctly, p. 215)

5.21 Malfunction and emergency operation

5.21.1 Telematik system problem

If the telematic system has a problem, the telescopic boom can telescope in by itself. The telescopic boom and telescoping cylinder can be damaged.

Observe the following rules:
- In case of problems with the Telematik system, stop crane operation immediately. Inform Customer Service at Liebherr-Werk Ehingen GmbH.
- If operation must be continued due to an emergency situation, this may only be carried out by persons who are aware of the effects of their acts in compliance with all necessary safety precautions.

Rules for bringing the telescopic boom into a safe condition:
- Retract the telescoping cylinder with locked telescope all the way.
- If a telescope is extended and locked with the telescoping cylinder: Never unlock the cylinder pinning.

5.21.2 Problems with lifted loads

If a crane problem occurs when the load is lifted, there is an increased danger of accident.

Observe the following rules:
- If possible: Always set down the load first.
- If possible: Telescope the telescopic boom in.
- If possible: Take the boom system down.
- If required: Use the emergency control.
(→ 9.11 Emergency control, p. 632)
- If the rules **cannot** be followed: Secure the danger zone extensively. Contact Customer Service at Liebherr-Werk Ehingen GmbH.

5.21.3 Independent troubleshooting without suitable expert knowledge

If an attempt is made to diagnose and remedy problems without sufficient technical knowledge, the crane can fall over of collapse.

Observe the following rules regarding error diagnostics and error remedy:
- If problems **cannot** be remedied independently: Contact Customer Service at Liebherr-Werk Ehingen GmbH.
- Have the crane repaired only by authorized and trained expert personnel.
- Prior to error diagnostics: Take the crane out of operation.
- If defects endanger operating safety: Secure the crane to prevent further operation.
- Check, diagnose and fix the crane only when it is turned off.
- Inspections, error diagnostics and repairs, for which the crane must be in operation are only permissible with extreme caution and constant visual and voice contact between all involved personnel.
- Have inspections, error diagnostics and repair work carried out exclusively by authorized and trained personnel.
- Make sure for inspections, error diagnostics and repairs of electrical systems on the crane that the power is be turned off for the duration of the work.
- After a repair: Have a test operation performed by the crane operator.

5.22 Transport and storage

5.22.1 Loading and unloading the crane safely

The crane can collide with the transport vehicle when loading and unloading. The crane can start to slip when loading and unloading.

Observe the following rules:
- Drive the mobile crane with the aid of a guide on and off the transport vehicle.
- Use a suitable transport vehicle.
- Drive the crane onto and off the transport vehicle carefully.
- The loading surface of the transport vehicle and crawler chains of the crane are free of snow, ice, grease and dirt.
- Do **not** let the crane tip over the edges.

5.22.2 Avoid loads on the crane with increased accelerations and load changes

When the crane is subjected to excessive loads during transport the crane can be damaged. Load bearing crane components can fatigue early on.

Observe the following rules:
- Do **not** exceed the maximum permissible longitudinal acceleration of 1.0 g.
- Do **not** exceed the maximum permissible lateral acceleration of 0.8 g.
- If higher accelerations are expected: Secure the crane and attachment parts separately.
- In the case of rail transport: Do **not** push off the wagon or let it run down.
- In the case of frequent dynamic load changes: Disassemble and properly secure heavy components. Have the rigging points and crane structures checked for damage by an authorized inspector.

Components with high weight are, for example:
- Ballast
- Auxiliary boom
- Equipment

5.22.3 Fastening crane components correctly

Incorrectly fastened crane components can fall down or tip over uncontrolled.

Observe the following rules:
- Fasten crane components only in the intended fastening positions.
  (→ 7 Transport and storage, p. 353)
- Carry out all crane movements with fastened crane components sensitively and with caution.
- Fasten the crane components solely with approved and sufficiently load bearing fastening equipment.
- Regularly check the fastening positions and fastening equipment and use them only in a perfect condition.
- Do **not** place the fastening equipment over sharp edges. Use edge protection if necessary.

5.22.4 Supporting the crane components correctly

If unsuitable materials or damaged anti-slip mats are used for the substructure, crane components can fall from the transport vehicle.

Observe the following rules:
- Comply with the minimum friction value, minimum load bearing capacity and minimum thickness of the anti-slip mats.
- Wood with a minimum quality of spruce is to be used.

Replace the anti-slip mats in the following cases:
- Permanent deformations or pressure marks
- Cracks
- Abrasion on the surface
- Broken out material area
- Swollen areas
- Damage due to contact with aggressive materials
- Brittleness
- Function-impairing contaminants

5.22.5 Rigging the crane and crane components correctly

An incorrectly rigged crane or crane components can fall from the transport vehicle.

Observe the following rules:
- Fasten the rigging device in the rigging points according to the corresponding rigging plans. (→ 7 Transport and storage, p. 353)
- Use a rigging device with sufficient load capacity.
- Use the rigging device in application of the respectively valid regulations for loading and load retention.
- Adhere to the angles, radii and tension surfaces according to the rigging plan.
- Use the eyehooks only for rigging the crane or crane components.
- Do **not** exceed the maximum permissible rigging forces.
- The eyehooks of the transport vehicle correspond at least to the load carrying capacity of the rigging device.
- Do **not** place the rigging device over sharp edges. Use edge protection if necessary.
- If equipment or components could tip over or slip after releasing the rigging device: Fasten equipment and components to a crane before releasing the rigging device and tension the fastening equipment.

5.22.6 Transporting the crane safely on a floating body

5.22.6.1 Areas of responsibility

Observe the areas of responsibility:
- The crane contractor is solely responsible for transporting the crane on a floating device.
- The crane contractor and crane operator are responsible for securing the crane on the floating device.

5.22.6.2 Safety

Crane transport on a floating device can have a negative impact on the structural strength, stability and the fatigue limit of the crane.

Secure the crane to the floating device so that the following is avoided:
- Damage and releasing of components on the crane
- Slipping of the crane
- Inadvertent turning (swinging) of the superstructure
- Capsizing of the floating device

Make sure that the following measures are carried out prior to “transport on a floating device”:
- Take the boom system down. Support and secure the boom system with suitable equipment.
- Disassembling the ballast plates Secure the ballast plates on the on the floating device.

Disassemble the separate ballast brackets. Secure the separate ballast brackets to the floating device.
- Observe and adhere to the specifications for transporting the crane and crane components, see section Transport and storage.

5.23 Assembling and disassembling

All work regarding assembly and disassembly may only be performed by assembly personnel (→ 5.3 Definition of roles, p. 148).

5.23.1 Clearly identifying the equipment and components

If equipment or components are not clearly identifiable based on their designation, equipment or components can be mixed up. Mixing up the equipment or components, can lead to incorrect assembly.

Observe the following rules:
- Do **not** use equipment or components if they are not clearly identifiable based on their designation.
- If there is doubt regarding the identification of equipment and components: Contact the Liebherr-Werk Ehingen GmbH Customer Service.

5.23.2 Using equipment from other cranes correctly

If equipment parts from other cranes (same crane type or another crane type) should be used, observe the following rules and notes:
- Only use the equipment that is described in the mobile crane operating instructions with a clear designation.
- If equipment with a deviating designation should be used, this is only permissible after explicit approval by Liebherr-Werk Ehingen GmbH.
- Make sure that interval-depending equipment inspection is carried out according to the crane documentation prior to first use (→ Separate document “Maintenance and inspection”).
- If equipment is used on multiple cranes, the calculated service life may be reduced. Equipment inspections must then be carried out at short intervals.
- Make sure that when using equipment from other crane types that all necessary document for using the equipment is present.
- In the case of questions: Contact Customer Service at Liebherr-Werk Ehingen GmbH.

5.23.3 Moving the equipment and components safely

If equipment and components are moved, personnel or objects can be crushed or struck.

Rules for moving equipment and components:
- Guide the equipment and components with suitable aids, for example with a rope.
- Guarantee unlimited communication between the crane operator and personnel at all times. Use a walkie-talkie if necessary.
- Perform assembly and disassembly carefully and with caution.
- Keep the folding range and slewing range of equipment free of obstacles.

No persons may remain in the danger zone.
- Do **not** remain below or on the equipment and components.
- Do **not** remain in the movement range of equipment and components.
- Do **not** remain in the slewing range or folding range of equipment and components.

- Do **not** stand between the equipment, components and crane when they are moved toward each other.

5.23.4 Turning off the equipment correctly

If the equipment is set down on uneven or insufficiently load bearing ground, equipment parts can tilt or roll off.

Persons or objects can be hit by equipment parts.

Rules for setting down equipment:
- Park the equipment on level ground of sufficient load bearing capacity.
- Secure round equipment parts, such as the load hook, from rolling off.
- Do **not** take the rope pulleys down onto the ground.
- If necessary, take the equipment down onto a suitable substructure.

5.23.5 Assembling and disassembling the equipment correctly with the auxiliary crane

If equipment is assembled using an auxiliary crane, the equipment can fall down.

Before detaching the auxiliary crane during assembly:
- Pin and secure the equipment.

Before disassembling equipment:
- Fasten the auxiliary crane to the equipment.
- Tension the hoist rope of the auxiliary crane.

5.23.6 Protecting against falling components and tools

When performing assembly work on the crane, components of the crane or tools may fall down.

Observe the following rules:
- Make sure that no one is below or directly next to the working area during assembly or disassembly.
- Block off and mark the area below the working area.

5.23.7 Protecting against rotating winches, rope pulleys and running ropes

When ropes are spooled up or spooled out, people can be caught by rotating winches, rope pulleys or running ropes.

Rules to protect yourself against rotating winches, rope pulleys and running ropes:
- Do **not** grasp running ropes. Maintain the safety distance.
- Do **not** reach into rotating winches or rope pulleys. Maintain the safety distance.

5.23.8 Assembling and disassembling the ropes safely

If ropes are installed incorrectly, accidents can occur due to the ropes tearing off the winch.

Rules for the assembly and disassembly of ropes:
- Do **not** pull the hoist rope end over the winch when spooling up. The hoist rope end must remain in front of the winch.
- Do **not** pull the hoist rope end through under the winch when spooling it up.
- Do **not** pull the hoist rope from a stationary winch.
- The winch speed sensor must be readjusted if it does not turn off at the minimum rope coil (four hoist rope coils on the winch).

– After assembly of a new hoist rope: Check the winch speed sensor

5.23.9 Correctly connecting and disconnecting the electrical lines

If the electrical lines are not correctly connected, the control may not detected and not report safety-relevant shut-offs. Crane functions can be limited or disturbed.

Rules for connecting and disconnecting electrical lines:
– Connect the electrical lines immediately after assembling the equipment parts.
– Make sure that the electrical lines are not located in the movement range of crane components after connection.
– Do **not** connect or disconnect plug connections under tension.
– Disconnect the electrical lines only at the plug connections. When disconnecting plug connections, pull the plug. Do not pull the line.
– Keep plug connections clean and dry. Protect non-utilized plug connections with dust caps. If present: Connect the dummy plug.
– If damage is suspected: Stop using the electrical lines and mark them accordingly.
– In case of defective or faulty electrical lines: Contact Customer Service at Liebherr-Werk Ehingen GmbH.

5.23.10 Correctly connecting and disconnecting the hydraulic lines

If the hydraulic lines are not connected correctly, pressure loss, leakage of hydraulic oil or malfunctions of hydraulic components can lead to accidents.

Rules for connecting and disconnecting hydraulic lines:
– After every connection, check if the quick couplings are fully coupled.
– Only disconnect the hydraulic lines with the quick couplings intended for this purpose.
– Release the pressure in the hydraulic lines before connection or disconnection.
– Wear protective gloves.
– Keep the sealing surfaces clean.
– Close off quick couplings that are not used with dust caps.
– In case of defective or faulty hydraulic lines: Contact Customer Service at Liebherr-Werk Ehingen GmbH.

5.23.11 Correctly connecting and disconnecting the pneumatic lines

If the pneumatic lines are not connected correctly, pressure loss, malfunctions of pneumatic components can lead to accidents.

Rules for connecting and disconnecting pneumatic lines:
– Check the quick couplings after assembly for correct connection.
– Only disconnect the pneumatic lines with the quick couplings intended for this purpose.
– Keep the sealing surfaces clean.
– In case of defective or faulty pneumatic lines: Contact Customer Service at Liebherr-Werk Ehingen GmbH.
– Repairs to the pneumatic system may only be carried out by authorized and trained expert personnel.

5.23.12 Using the pneumatic springs correctly

If the pneumatic springs are defective, the supporting action on the movable components is no longer provided. Components can fall down suddenly.

Observe the following rules when using the gas pressure springs:
- Check the pneumatic springs for damage before moving the corresponding components.
- Do not use components with defective pneumatic springs.
- Replace defective pneumatic springs immediately.

5.23.13 Using the pins correctly

If pins are used incorrectly, the pins can release or fail.

The equipment and load can fall down. The crane can topple over.

Rules for handling and using pins:
- **Always** secure the pins with retaining elements to keep them from loosening up by themselves.
  (→ 5.23.14 Using the retaining elements correctly, p. 231)
- Do **not** insert or unpin pins by force. Eliminate any tension before unpinning.
- When pinning lattice sections, make sure that the bores align in the connecting forks.
- When the pins are unpinned, the lifting force of the auxiliary crane must be adapted to the weight of the components being lifted.
- Sufficiently grease pins that are not supplied with grease via the central lubrication system before assembly.
- Lubricate all lube points properly according to the corresponding specified interval.
- Only use pins whose function is not impaired, for example due to damage or corrosion.
- Replace damaged pins immediately with equivalent spare parts.
- When knocking out pins, do **not** remain in the danger zone.

5.23.13.1 Collar pin

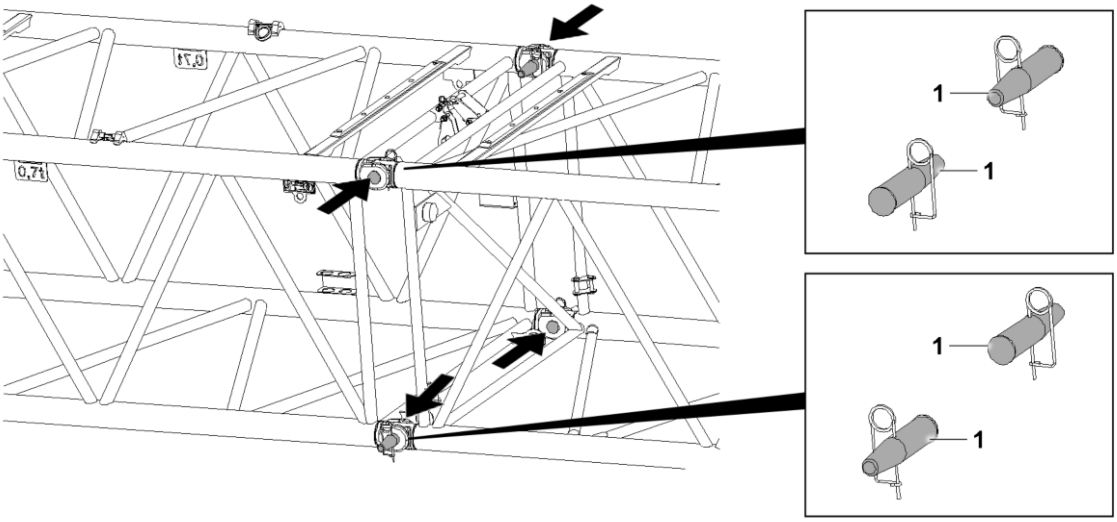


Fig. 236: Exemplary illustration: Inserting the collar pins

Observe the following rules when pinning collar pins:
- Pin or unpin both pins that lie on a horizontal level on the **left and right**.
- Pin the upper collar pin **1** from the **outside to the inside** and unpin from the **inside to the outside**.
- Insert the lower collar pin **1** from the **inside to the outside** and unpin from the **outside to the inside**.

5.23.13.2 Assembling the double cone pins horizontally

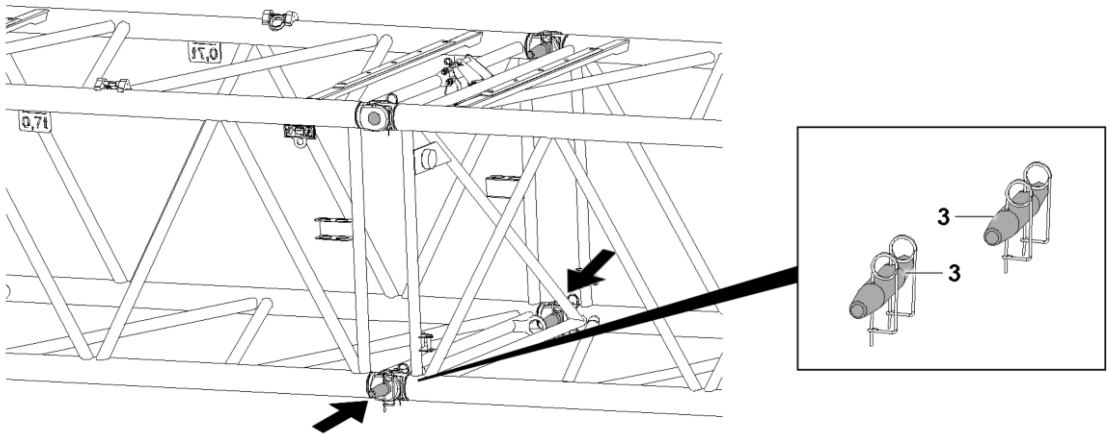


Fig. 237: Exemplary illustration: Inserting the double cone pins horizontally

Observe the following rules when pinning horizontally installed double cone pins:
- Insert or unpin both pins on the same horizontal level, i.e. **left and right**.
- Insert and unpin the horizontally installable double cone pin **3** from the **outside to the inside**.

5.23.13.3 Assembling the double cone pins vertically

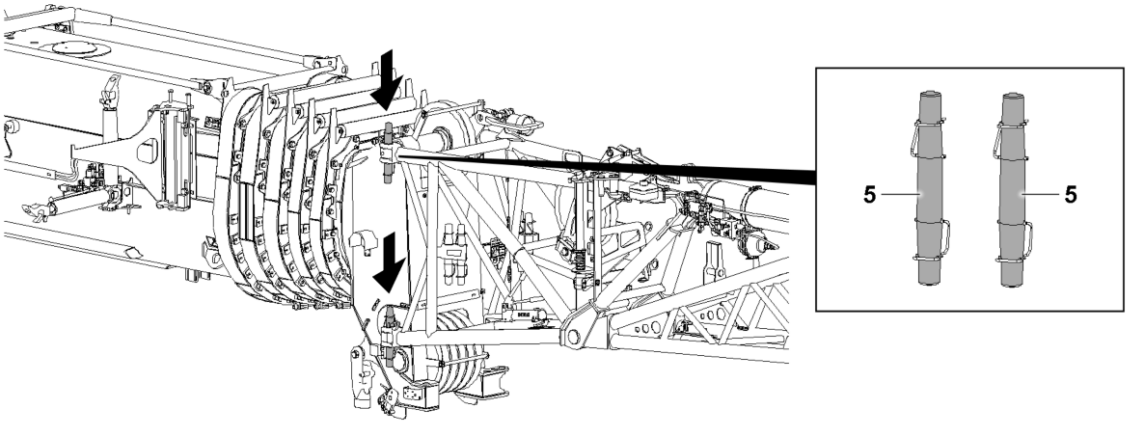


Fig. 238: Exemplary illustration: Assembling the double cone pins vertically

Observe the following rule when inserting vertically installed double cone pins:
- Pin and unpin the vertically installable double cone pin **5** from the top to the bottom.
- **Always** secure the double cone pins of the folding jib with retaining clips.

5.23.13.4 Positioning the connecting forks for pinning

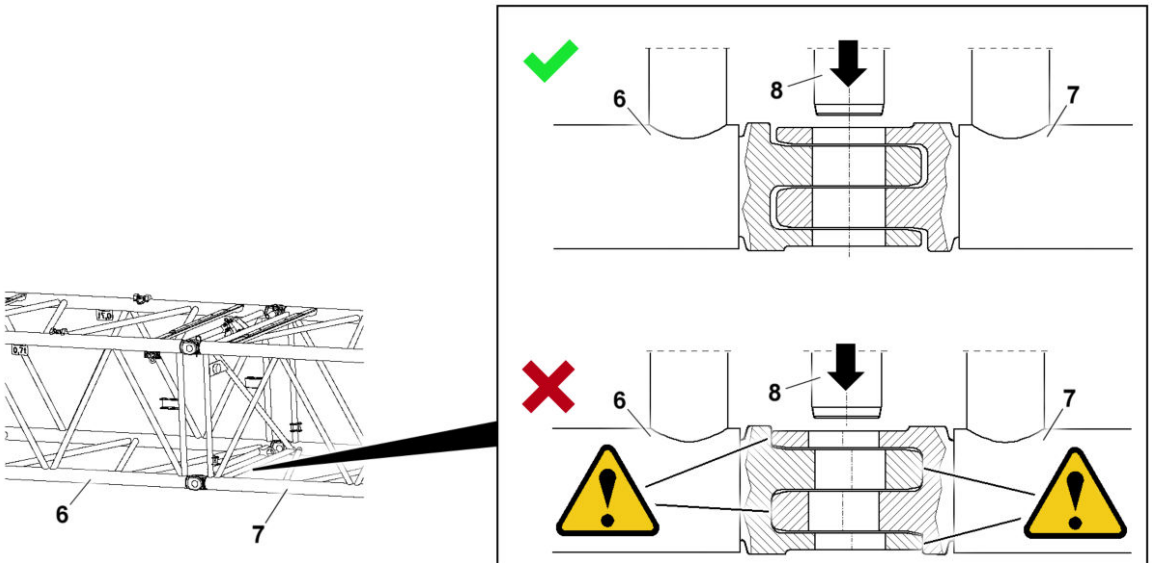


Fig. 239: Exemplary illustration: Positioning the connecting forks for pinning

Observe the following rules when positioning the connecting forks:
- Bring the lattice section **6** together with the lattice section **7** so that the bores align.
- Observe the correct direction when pinning.
- When the bores align, document the necessary force at pinning for disassembly.

5.23.14 Using the retaining elements correctly

If pin retaining elements are used incorrectly, the pins can release or fail.

The equipment and load can fall down. The crane can topple over.

Rules for handling and using retaining elements:
- **Always** secure the pin with retaining elements to keep it from loosening up by itself.
- Only use retaining elements whose function is not impaired, for example due to damage or corrosion.
- Only use retaining elements with sufficient spring force.
- Replace damaged retaining elements immediately with equivalent spare parts.

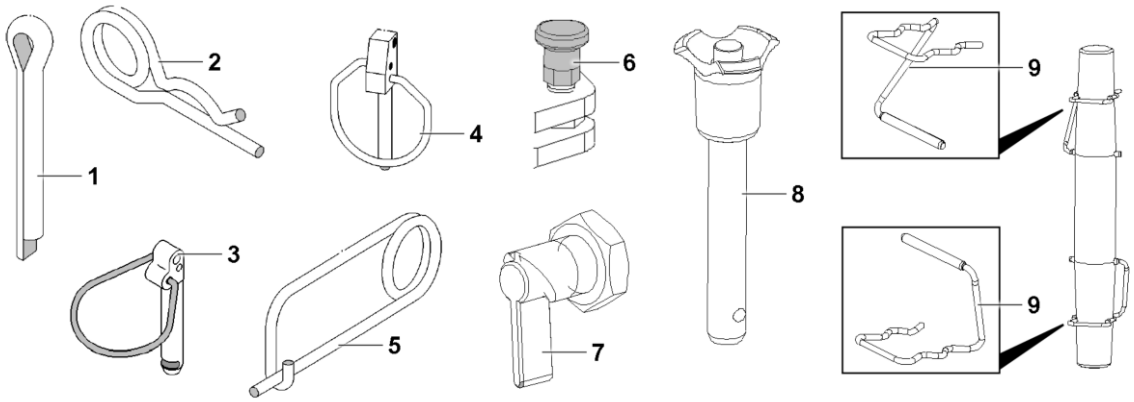


Fig. 240: Overview of the retaining elements

1 Split pin
2 Cotter pin
6 Detent pin
7 Latch

See next page for continuation of the image legend

3 Safety locking pin
4 Locking pin
5 Spring retainer
8 Ball locking pin
9 Retaining clip

5.23.14.1 Split pin

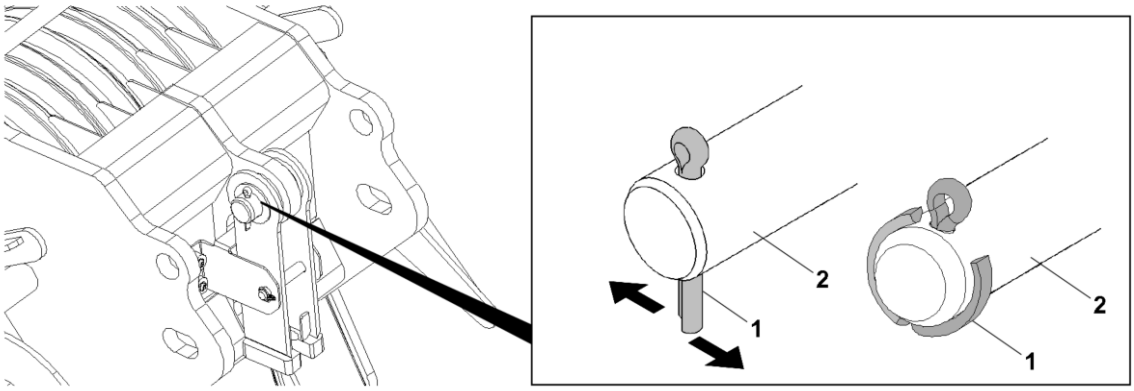


Fig. 241: Exemplary illustration: Split pin

1 Split pin
2 Pin

Observe the following rules when using a split pin **1**:
- Assemble the split pin **1** only once.
- Use a correctly sized split pin **1**.
- Insert a new split pin in the pin **2** and bend the end of the split pin **1** outward.

5.23.14.2 Cotter pin

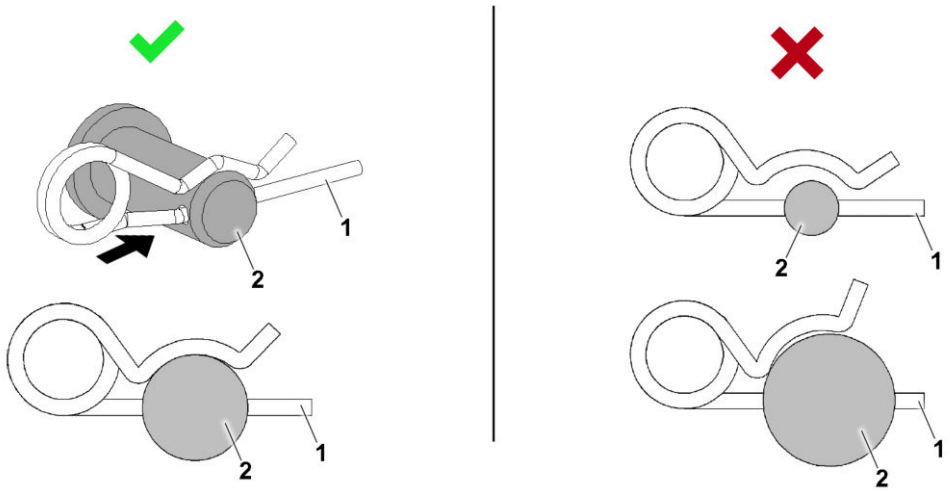


Fig. 242: Exemplary illustration: Cotter pin, correct and incorrect dimensions

1 Cotter pin
2 Pin

Observe the following rules when using a cotter pin **1**:
– Use a correctly sized cotter pin **1**.

5.23.14.3 Safety locking pin

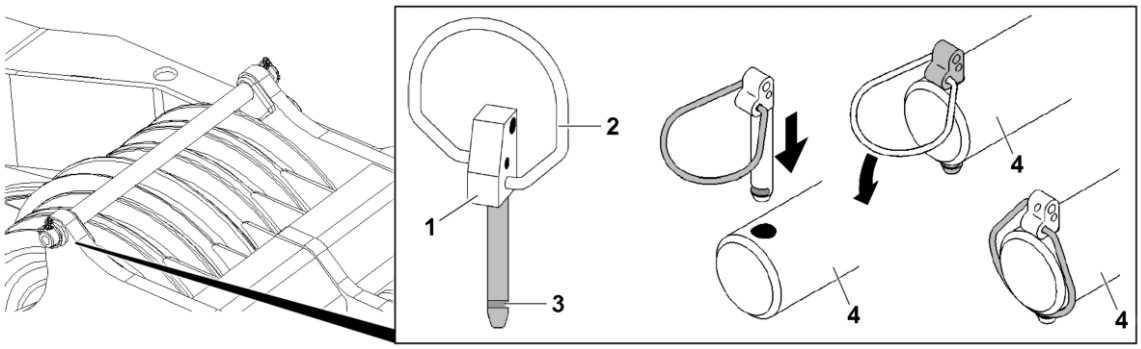


Fig. 243: Exemplary illustration: Safety locking pin

1 Safety locking pin
2 Spring clip
3 Groove
4 Pin

Increased effort is necessary for opening the safety locking pin **1**.

Observe the following rules when using a safety locking pin **1**:
– Make sure the spring clip **2** is engaged completely in the groove **3**.

5.23.14.4 Locking pin

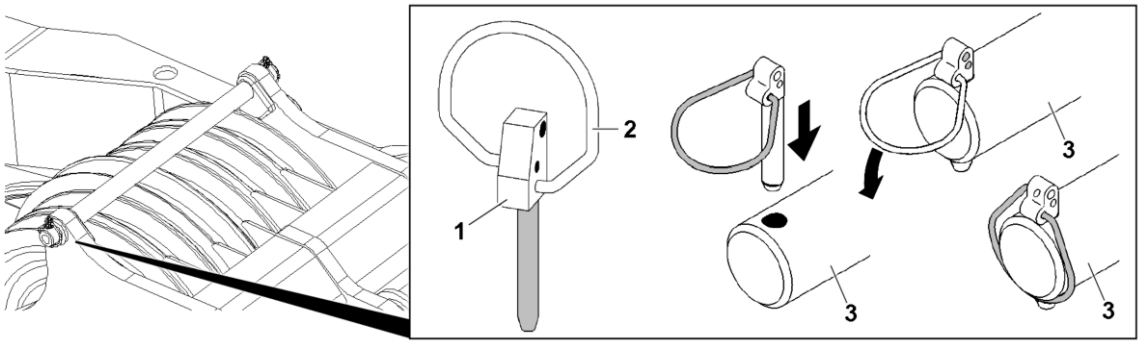


Fig. 244: Exemplary illustration: Locking pin

1 Locking pin
2 Spring clip
3 Pin

Observe the following rule when using a locking pin **1**:
– Make sure that the spring clip **2** is closed completely.

5.23.14.5 Spring retainer

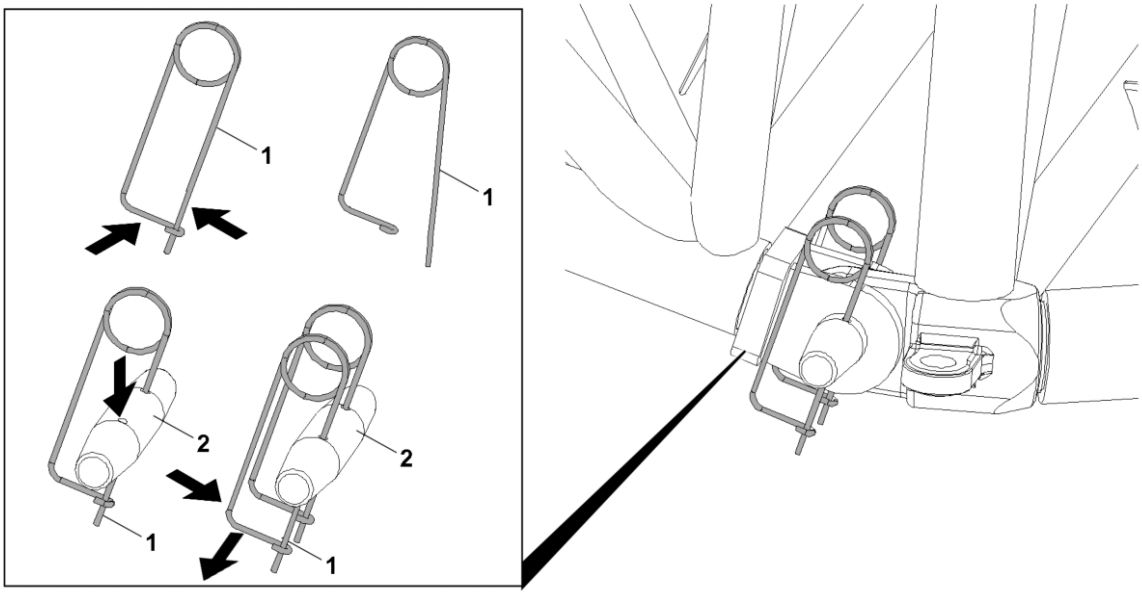


Fig. 245: Exemplary illustration: Spring retainer

1 Spring retainer **2** Pin

Observe the following rule when using a spring retainer **1**:
– Make sure that the safety spring **1** is closed.

5.23.14.6 Detent pin

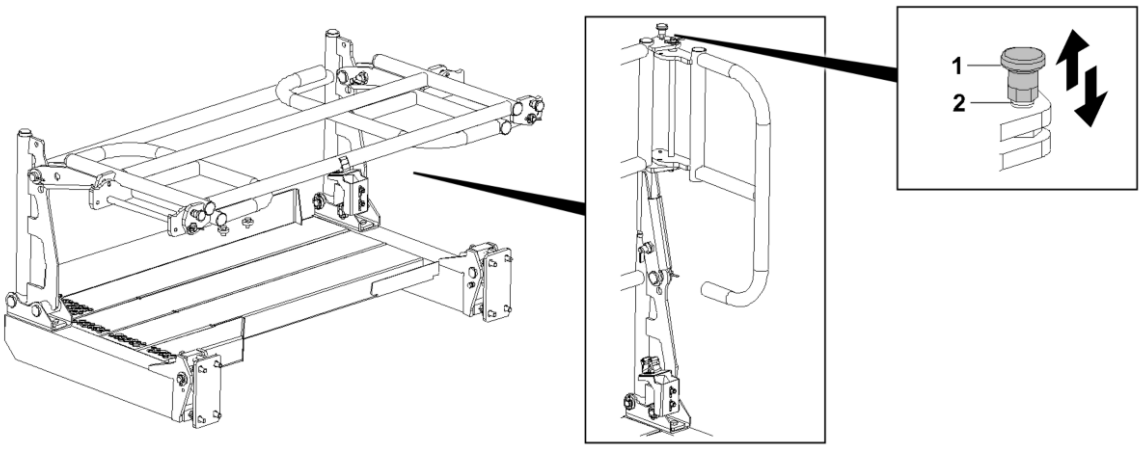


Fig. 246: Exemplary illustration: Detent pin

1 Handle **2** Detent pin

Observe the following rule when using a detent pin **2**:
– Make sure that the detent pin **2** is locked on the handle **1**.

5.23.14.7 Latch

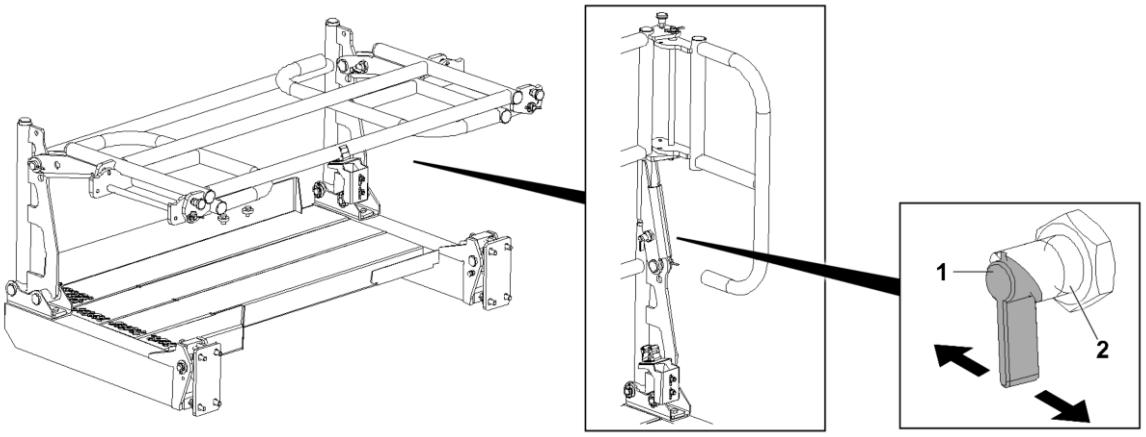


Fig. 247: Exemplary illustration: Latch

1 Lever
2 Latch

Observe the following rule when using a latch **2**:
– Make sure that the latch **2** is locked after assembly or disassembly.

5.23.14.8 Ball locking pin

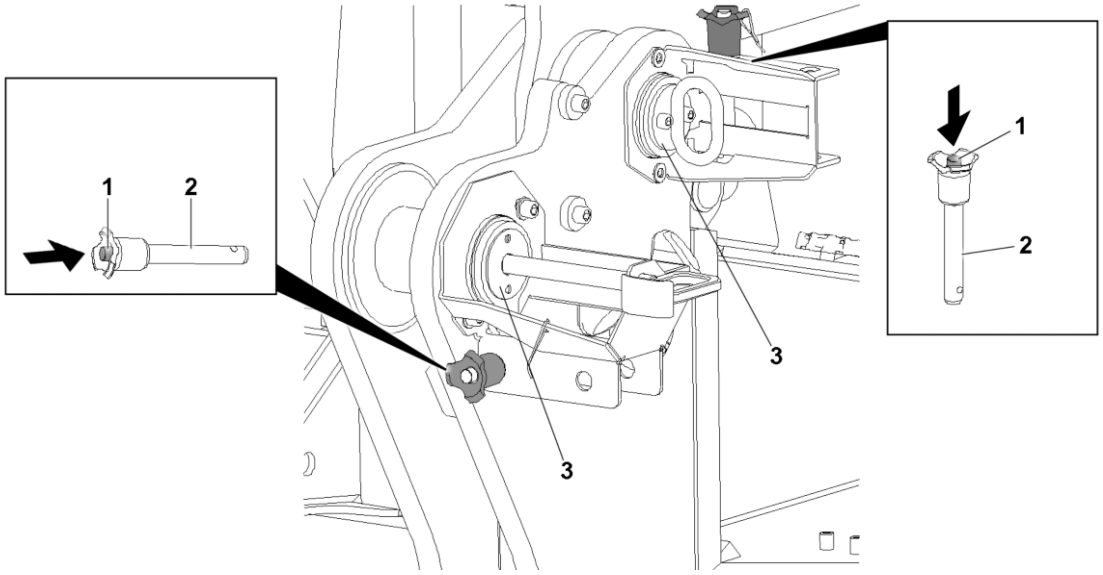


Fig. 248: Exemplary illustration: Ball locking pin

1 Press button
2 Ball locking pin
3 Pin

Observe the following rule when using a ball locking pin **2**:
- Make sure that ball locking pin **2** is locked with the push button **1**.

5.23.14.9 Retaining clips

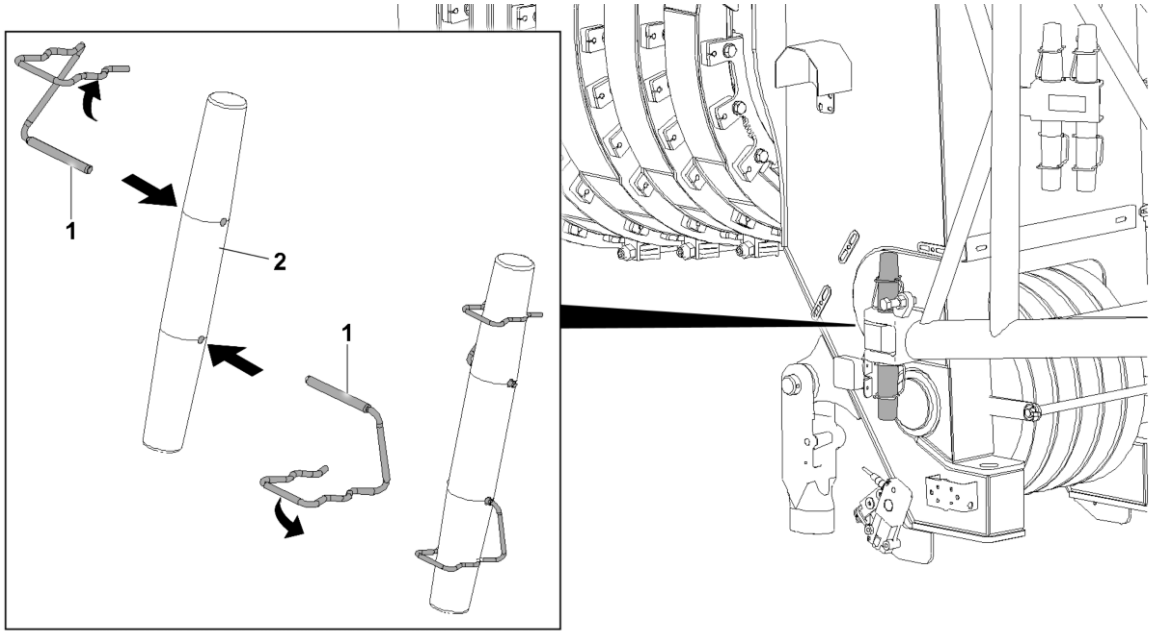


Fig. 249: Exemplary illustration: Retaining clips

1 Retaining clips **2** Pin

Observe the following rule when using a retaining clip **1**:
- Make sure that the retaining clip **1** is engaged.
- **Always** secure the double cone pins of the folding jib with retaining clips **1**.

5.23.15 Assembling and disassembling attachment parts correctly

If attachment parts are assembled or disassembled in the wrong order, attachment parts can be damaged.

Attachment parts are for example:
- Boom head camera
- Cable drum
- Airplane warning light
- Wind speed sensor
- Hoist limit switch weight with chain

Assemble the attachment parts **after** the equipment.

Disassemble the attachment parts **before** the equipment.

5.24 Maintenance

Proper crane maintenance provides the basis for safe crane function.

Maintenance by the crane operator and assembly personnel: (→ 11.1 Maintenance and inspection schedule, p. 897)

Maintenance by maintenance personnel: (→ separate document “Maintenance and inspection”)

5.24.1 Securing the crane against start up

If the crane is put into operation during maintenance tasks or repair work, there is a danger of accident.

Personnel can be injured or killed. The crane can be damaged.

Observe the following rules before and during maintenance:
- Turn off the engine before starting maintenance activities.
- Apply the parking brake before starting maintenance activities.
- Make sure that the crane is secured against start up during maintenance activities. For example by attaching tags or closing the driver's cab and crane cab and handing the key over to an authorized person.
- Observe the national regulations on markings on the crane and signs.
- Turn on the engine during maintenance tasks or repair work **only** if required in the operating instructions.

5.24.2 Preventing fires

Fuel or engine oil can escape when performing maintenance tasks or repair work on the engine and fuel system.

If fuel and engine oil escapes, there is a risk of fire.

Observe the following rules during maintenance work on the engine and fuel system:
- Do **not** smoke
- Do **not** work near open flames or other sources of ignition.
- When working on the fuel system: Disconnect the batteries.
- When working on the fuel system: Keep a functioning fire extinguisher ready.
- Do **not** let operating fluids come into contact with hot components. Let components cool off when necessary.
- Check the engine for escapes oil and fuel after maintenance activities.
- Remedy leaks.
- Replace damaged components.
- Replace sound insulation mats in the engine compartment if contaminated by operating fluids.
- Observe the safety data sheet from the operating fluid manufacturer.

5.24.3 Protecting against burns

There is danger of burns in case of contact between hot surfaces or hot operating fluids and the skin.

Observe the following rules during maintenance work to prevent burns:
- Let components and operating fluids cool off before performing maintenance tasks.
- Wear personal protective equipment.

5.24.4 Using only original spare parts

The use of **non-original** spare parts may result in malfunctions on the crane up to failure of components.

Observe the following rules:
- Operate the crane **only** with original spare parts.
- If there is any doubt about the origin of spare parts: Contact Customer Service at Liebherr-Werk Ehingen GmbH.

5.24.5 Using approved service items and lubricants

Components can be damaged or destroyed by the use of impermissible or polluted operating fluids.

Observe the following rules:
- **Only** use the specified operating fluids and lubricant.
  (→ 11.23 Specified service fluids and lubricants for Liebherr cranes, p. 942)
- Use the operating fluids and lubricant **only** in a clean state.
- Protect operating fluids and lubricants against impurities.

5.24.6 Protecting against operating fluids

Health may be endangered by contact of people with operating fluids during maintenance tasks or repair work.

Observe the following rules to protect against operating fluids:
- Make sure that personnel are aware of first aid measures.
- Use personal protective equipment depending on the operating fluid.
- Observe the safety data sheet from the operating fluid manufacturer.

5.24.7 Environmental risk

If operating fluids escape during maintenance tasks or repair work, the environment may be endangered.

Observe the following rules:
- Make sure that the operating fluids are not released in the environment.
- Collect spilled operating fluids using suitable materials.
- Observe the safety data sheet from the operating fluid manufacturer.

5.24.8 Checking and topping up operating fluids

When checking and topping up operating fluids, the covers must be removed from the aggregates. Dirt can get inside when the cover is removed.

Observe the following rules:
- Pay attention to cleanliness.
- Make sure that no dirt gets into the inside aggregates.

5.24.9 Inspection criteria not met

All inspection criteria must be met during each inspection. If an inspection criterion is not met, this can lead to malfunctions on the crane and thus to the death of persons.

If an inspection criterion is **not** met:
- Stop crane operation.
- Secure the crane against impermissible start up.
- Replace the defective or worn component. Use a component of the same grade and quality.
- If an aggregate has high oil consumption: Find the cause and remedy it.
- In the case of questions, contact Customer Service at Liebherr-Werk Ehingen GmbH.

5.25 Exiting during an emergency

If the crane is damaged, inclined or tipped over, it may not be possible to climb out normally.

Leave the crane cab as follows:
– If possible, leave the crane cab through the door or roof window.

In an emergency, it is possible to fall when climbing up due to the height over the ground.

Avoid hazards during an emergency exit as follows:
– Exit carefully in an emergency.
– If possible: Accept help from others.
– In the case of an inclined crane cab: Use a working platform, ladder or similar device to exit.

5.26 Behavior in case of an emergency

5.26.1 First aid measures

Life-threatening situations resulting from an accident or medical emergency require fast first aid measures.

The term “accident site” also includes a medical emergency.

Life-threatening situations are for example:
- Heavy bleeding
- Broken bones
- Breathing arrest
- Cardiovascular arrest
- Shock
- Severe burns
- Injuries due to falling

5.26.1.1 Measures at the site of accident

When multiple people are located at the accident site: Divide tasks.

Help the injured person as quickly as possible without endangering yourself or others.

Measures at the site of accident:
- Secure the accident site.
- Make an emergency call.
- Carry out life-saving immediate measures.
- Take care of the person until emergency services take over.

Securing the accident site

If there is still danger at the accident site:
- Secure the accident site so other persons are not endangered.
- If possible: Make people leave the hazard area of the accident site.

Making an emergency call

In the case of an emergency, it is very important to alert the rescue center as soon as possible.

The **five** important pieces of information when making the emergency call:
- **Where** did the emergency occur?
  Provide exact information about the location: City, street, house number, factory building, access path, floor, etc.
- **What** happened?
  Indicate the type of accident.
- **How many** people are involved?
- **What** are the injuries and symptoms?
  Can the people be communicated with, is there danger of fatal injury?
- **Wait** for follow-up questions!
  Only hang up when the rescue center ends the call.

Life-saving immediate measures

Until emergency personnel arrive, carry out life-saving immediate measures:
- The person is unconscious, breathes normally: Bring the person into a stable side position.
- The person is unconscious, does not breathe or breathes abnormally: Perform cardiopulmonary resuscitation.

– The person is bleeding heavily: Stop the bleeding.

Taking care of the injured person

Take care of injured person until emergency personnel arrive:
– Keep the injured person warm with a first-aid blanket, covers and jackets.
– Speak with the injured person and calm them by touching them, also if the person is unconscious.
– Always observe their breathing: If necessary, perform cardiopulmonary resuscitation.

5.26.2 Behavior in case of current transfer

If current passes from the overhead lines to the crane or persons, there is danger of fatal injury.

A current transfer in the case of overhead lines can be caused by the following:
– Direct contact with an overhead line
– Dropping below the safety distance: A electric arc with current transfer occurs.
– Overhead line falls to the ground.

The safety equipment of regional and national network operators behave differently in the case of an error.

Observe the following after a current transfer:
– **Never** assume that the current is automatically and permanently turned off.
– **Always** assume that the line is still carrying voltage and that a potential gradient has formed around the crane and the ripped off line.
– Contact the network operator.

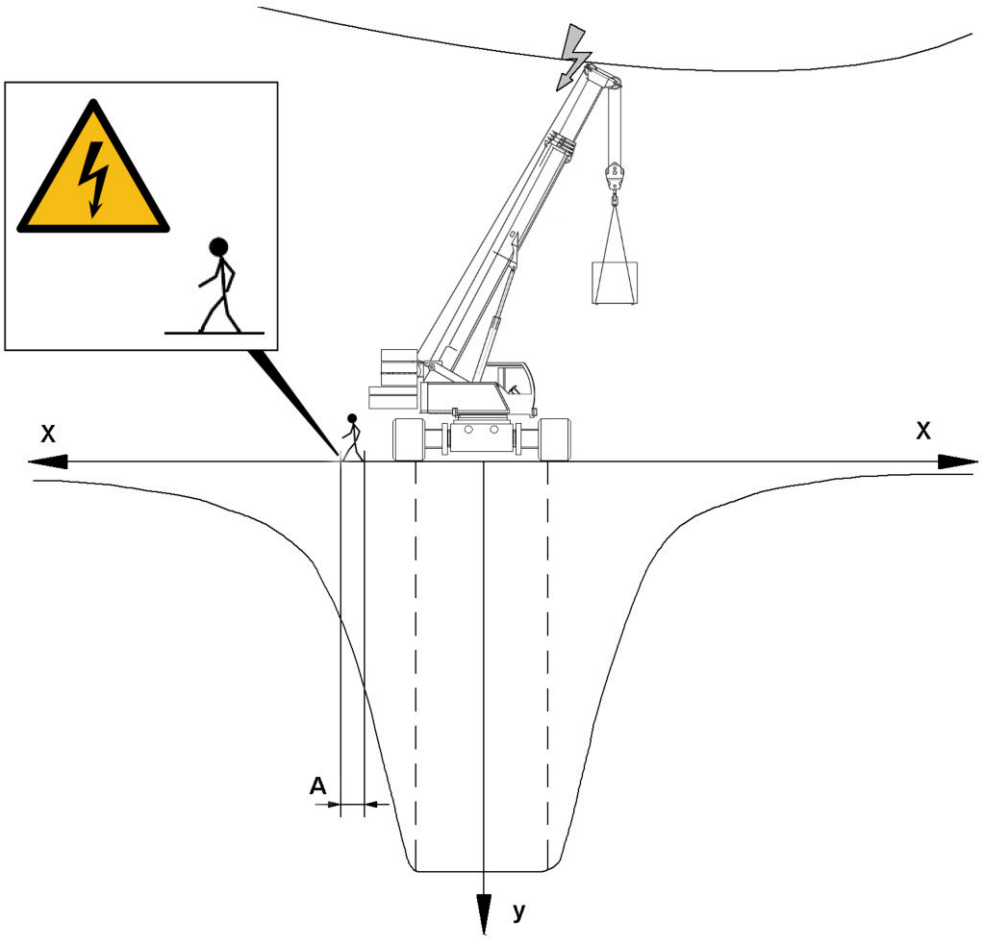


Fig. 252: Potential gradient

A Step voltage
X Elongation
y Voltage

In the case of current transfer on the crane, the current distributes itself in the entry point to the ground. The voltage is reduced according to a funnel-shaped curve: A potential gradient is created. The elongation **X** of the potential gradient depends on the voltage **y**, current strength and ground resistance.

If a person moves near the potential gradient, a voltage difference is created between their feet, the step voltage **A**. The step voltage is larger when the person is located closer to the current transfer point and the further the step distance is.

In the case of a current transfer despite having taken all necessary precautions, proceed as follows:

- Remain calm.
- If the control still functions: Drive the crane out or swing it out of the danger zone or adjust the telescopic boom. If this is not possible, do **not** leave the crane cab until the current is turned off by the network operator.
- The guide warns personnel present to observe a distance of at least 20 m and starts shutting off the current.
- In the case of contact with an overhead line, also the ground around the crane is energized. Do not move and do **not** touch the crane.

5.26.3 Behavior after impermissible crane load

If the crane is subjected to an impermissible load, load-bearing parts of the crane can be damaged and fail with the crane during subsequent operation. The crane can collapse or topple over.

Impermissible loads are the following events, for example:
- Load rip-off
- Collision of the crane or the load
- Impermissible tearing free of the load, for example if the load is frozen:
- Crane overload
- Strong impact loads
- Crane lightening strike

Observe the following rules after an impermissible load:
- Stop crane operation immediately.
- Have the crane checked by an authorized inspector.
- In the case of questions, contact Customer Service at Liebherr-Werk Ehingen GmbH.

6 Control and operating elements

6.1 Emergency off switch on the mobile crane

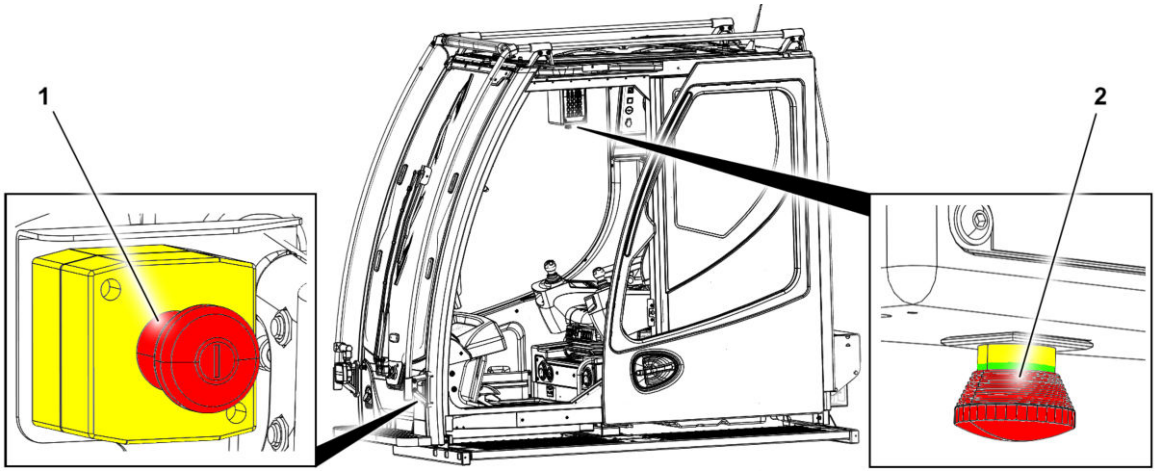


Fig. 253: Emergency off switch on the mobile crane

1 Emergency off switch on the crane cab

2 Emergency off switch on the side window operating unit

6.2 Central lubrication system

The superstructure central lubrication system and chassis central lubrication system are structured the same.

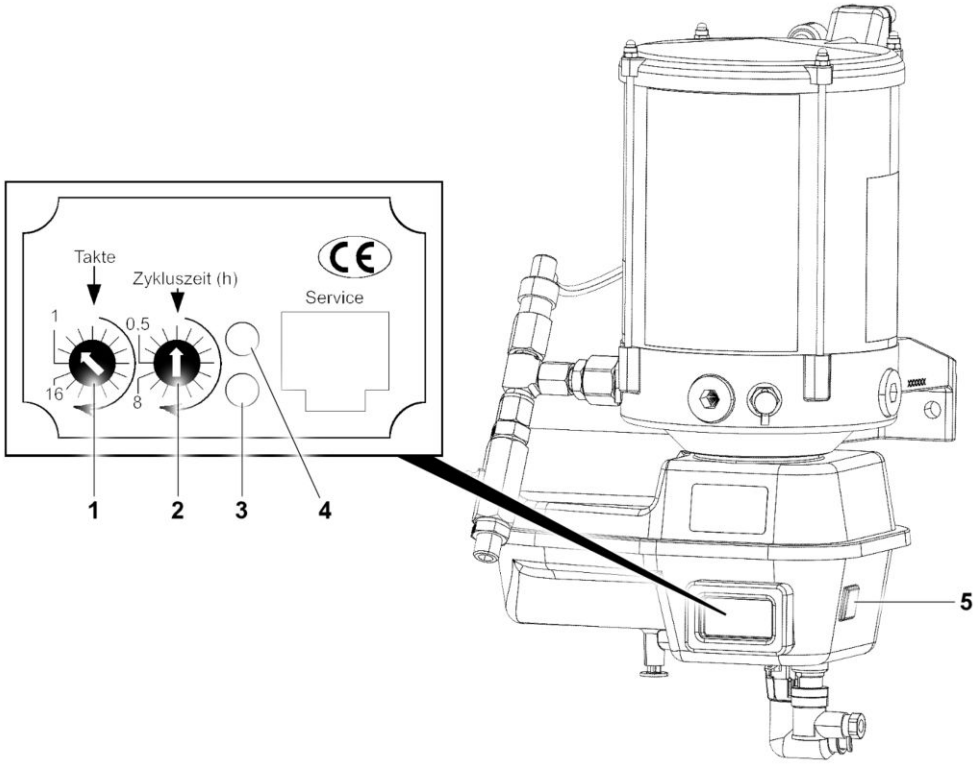


Fig. 254: Central lubrication system

1 Cycles rotary control
2 Cycle time rotary control
3 Function indicator light (green light)
4 Problem indicator light (red)
5 Intermediate lubrication button

Function *indicator light* 3 Green	*Problem* indicator light 4 Red	Operating condition
Lights up after start 1.5 seconds	Lights up after start 1.5 seconds	Ready for operation
Lights up	Does **not** light up	Lubrication active
Blinks slowly	Blinks slowly	Cycle error in the distributor
Does **not** light up	Blinks fast	Control error

Tab. 60: Central lubrication system indicator lights

6.3 Crane cab

6.3.1 Arrangement of the control and operating elements

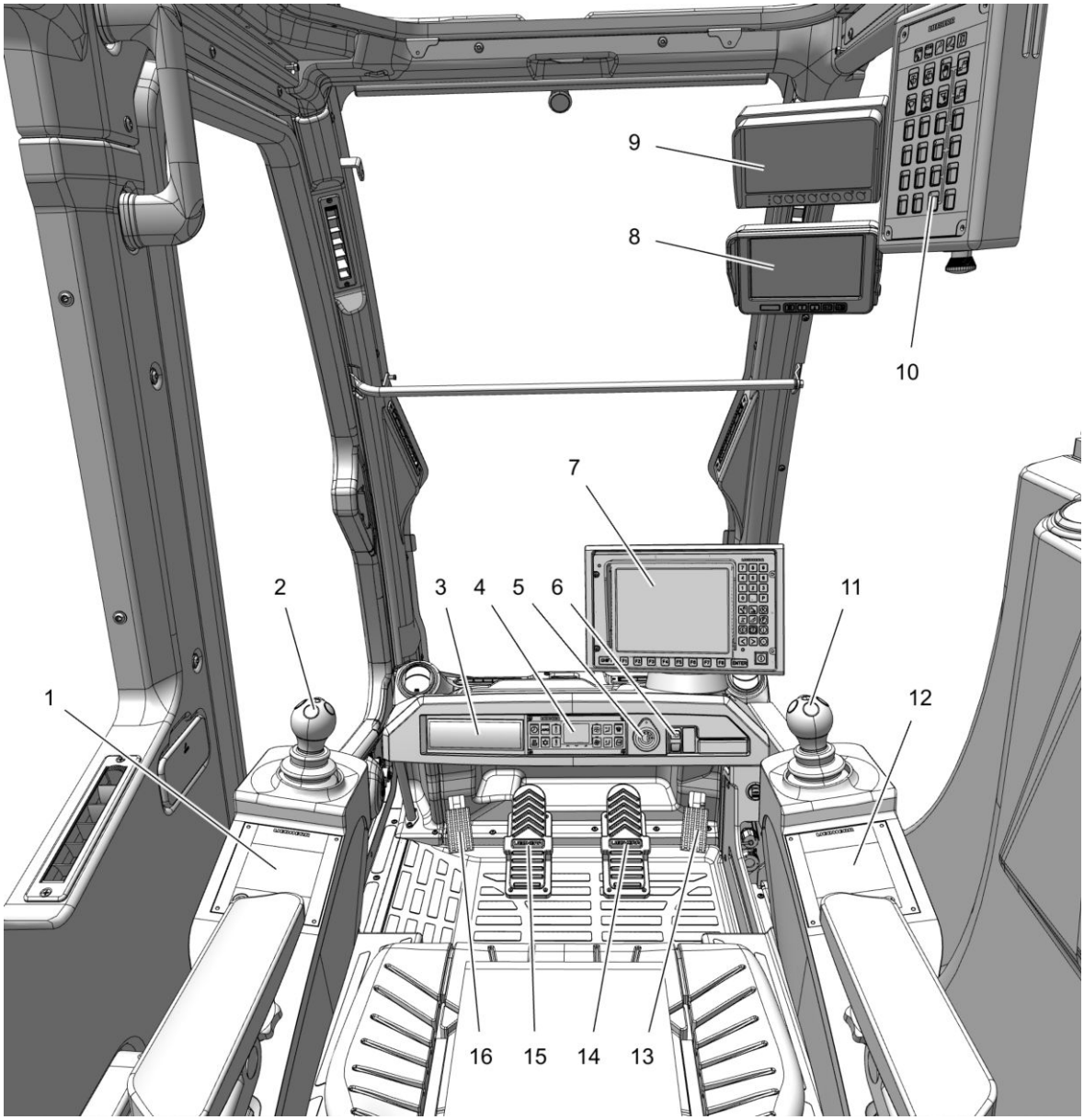


Fig. 255: Exemplary illustration: Crane cab control and operating elements

1 Left armrest operating unit 2
2 Left control lever 2
3 Radio
4 Climate control operating unit
5 Ignition switch
6 Engine stop indicator light (RSL)
7 Superstructure monitor
8 Winch 1/2* camera monitor
9 Boom head camera monitor*
10 Side window operating unit
11 Right control lever 1
12 Right armrest operating unit 1
13 Gas pedal
14 Right control pedal 1
15 Left control pedal 2
16 Slewing gear service brake

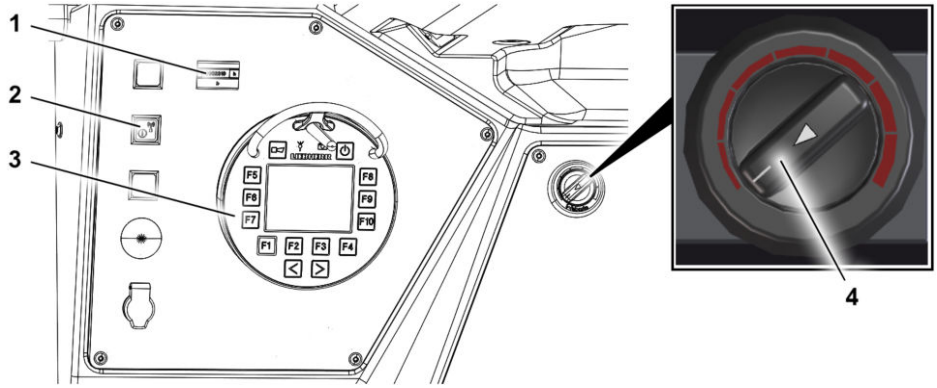


Fig. 256: Side window instrument panel

1 Operating hour meter
2 Remote diagnostics button
3 Crane remote control charging cradle
4 Auxiliary heater* rotary control

6.3.2 Overload protection light

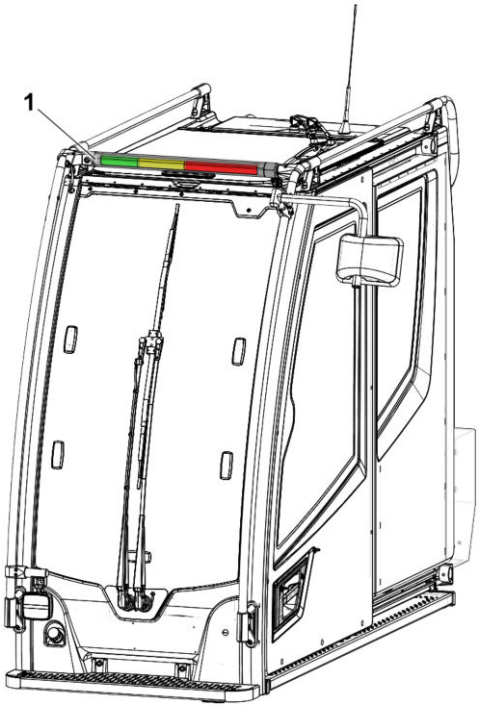


Fig. 257: Exemplary illustration: Crane cab

1 Overload protection light

Overload protection light:
- **Lights up green:** OK
- **Lights up yellow:** Warning overload protection active
- **Blinks yellow:** Shut-off bypassed
- **Lights up red:** Overload protection shut-off active
- **Blinks red:** Overload protection special functions

6.3.3 Control lever 1 and control lever 2

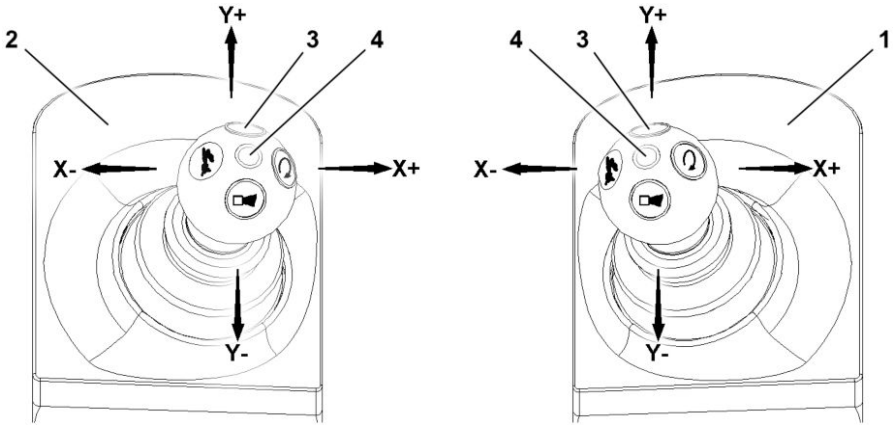


Fig. 258: Control lever

1 Right control lever 1
2 Left control lever 2
3 Special function button
4 Vibration sensor

X+ **Deflection to the right**

Function depending on the control lever assignment

X- **Deflection to the left**

Function depending on the control lever assignment

Y+ **Deflection to the front**

Function depending on the control lever assignment

Y- **Deflection to the rear**

Function depending on the control lever assignment

Rapid gear **button**

Lock the engine rpm **button**

Horn **button**

6.3.4 Control pedal 1 and control pedal 2

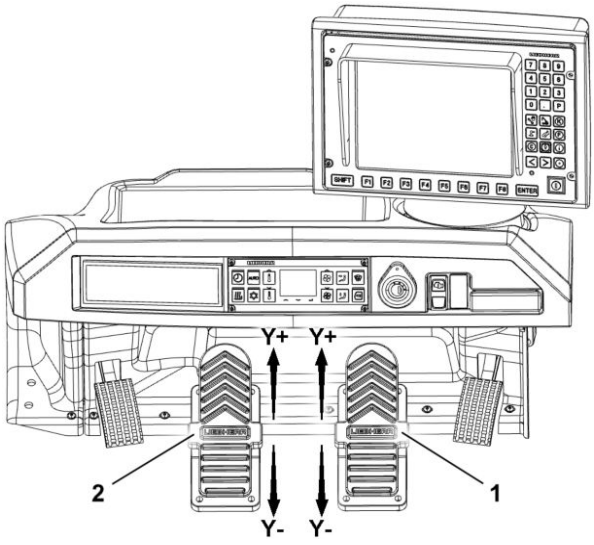


Fig. 266: Control pedal 1 and control pedal 2

1 Right control pedal 1

2 Left control pedal 2

Control pedal **1** and control pedal **2** are used for driving the crawler travel gear. The telescopic boom is telescoped with the control pedal **2** when configured correspondingly.

Y+ **Actuation direction Y+**

Y- **Actuation direction Y-**

6.3.5 Armrest operating units

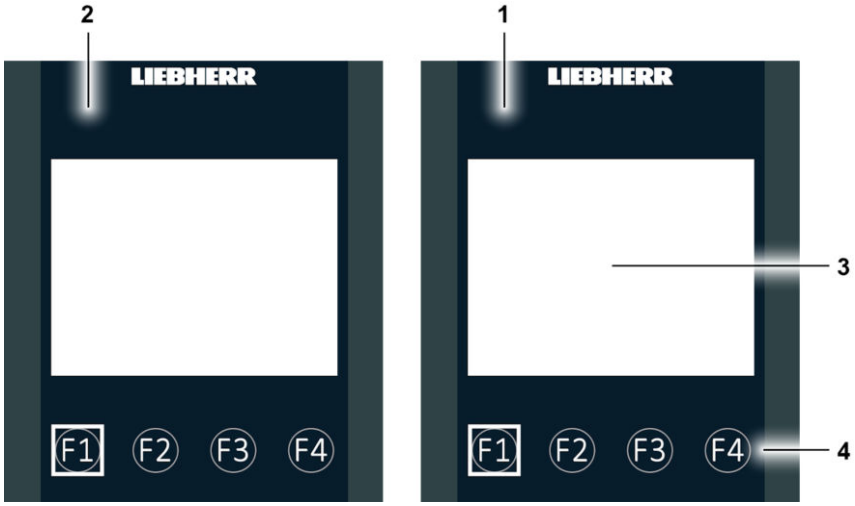


Fig. 269: Exemplary illustration: Armrest operating units

1 Right armrest operating unit 1

2 Left armrest operating unit 2

3 Touch display

4 F-buttons

6.3.5.1 Buttons

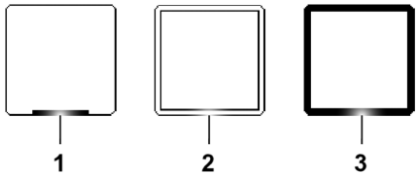


Fig. 270: Exemplary illustration: Buttons

1 Buttons with bar
2 Buttons
3 Selected buttons

The buttons with bar **1** are operated with the adjacent F-buttons.

Buttons **2** are operated by pressing them directly. The selected buttons **3** have a black border.

6.3.5.2 Error display

***Error* display**

Exemplary illustration: In case of an error, a question mark is shown on the corresponding display.

6.3.5.3 Control lever assignment menu

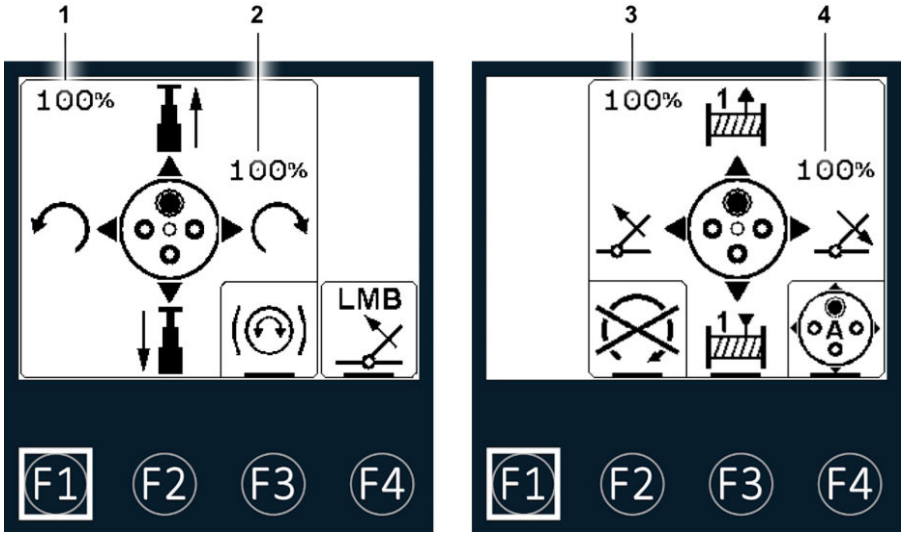


Fig. 272: Exemplary illustration: Control lever assignment menu

1 Front / rear control lever 2 speed as a % display
2 Left / right control lever 2 speed as a % display
3 Front / rear control lever 1 speed as a % display
4 Left / right control lever 1 speed as a % display

Buttons

***Slewing gear parking brake* button**

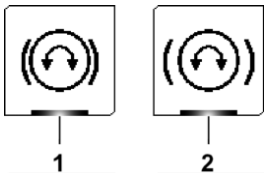


Fig. 274: Slewing gear parking brake button states

1 Slewing gear parking brake applied **2** Slewing gear parking brake released

Luffing in with suspended load **button**

Stop engine **button**

Locking / releasing winch **button**

Exemplary illustration: The number in the icon corresponds to the assignment to the winch.

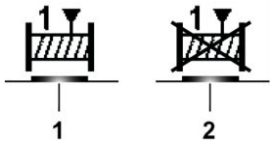


Fig. 278: Locking / releasing the winch button states

1 Winch released **2** Winch blocked

Control lever assignment button

Exemplary illustration: The letter in the icon shows the set control lever assignment.

Control lever assignments

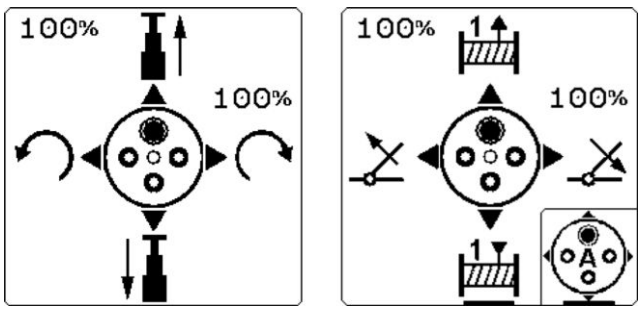


Fig. 280: Control lever assignment A

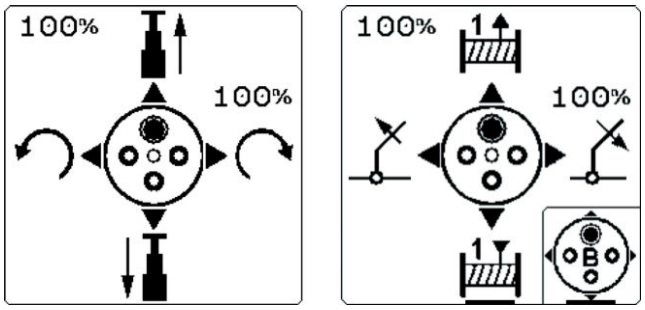


Fig. 281: Control lever assignment B

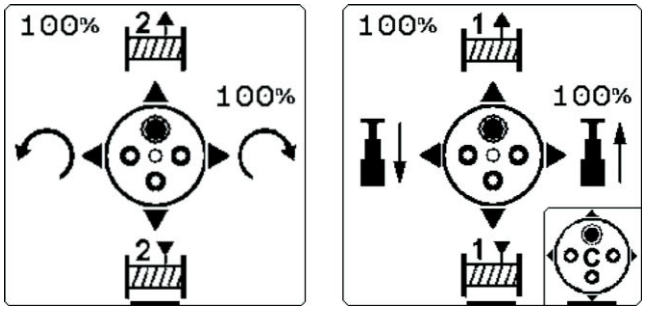


Fig. 282: Control lever assignment C

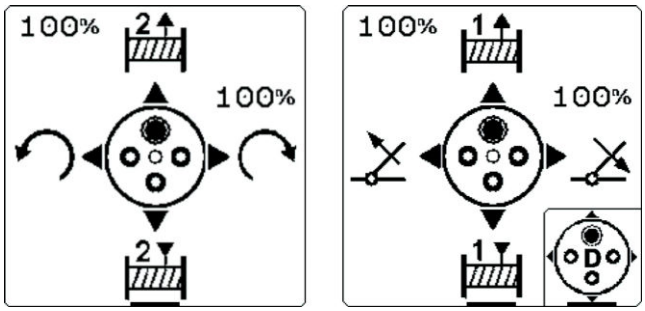


Fig. 283: Control lever assignment D

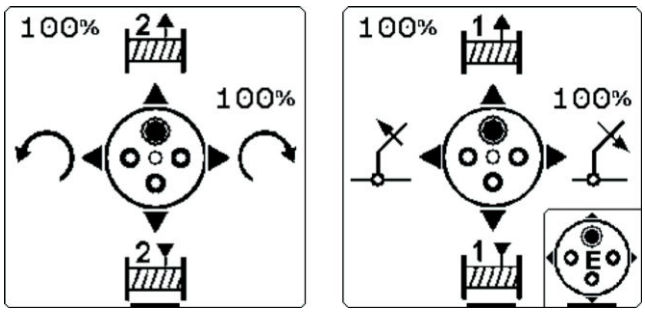


Fig. 284: Control lever assignment E

Control lever assignment *C* to *E* are only available for selecting when using winch 2.

Control lever assignment icons

Left turn **icon**

***Right turn* icon**

***Telescope out* icon**

It is hidden when telescoping is configured with control pedal 2.

***Telescope in* icon**

It is hidden when telescoping is configured with control pedal 2.

***Luff telescopic boom up* icon**

***Luff telescopic boom down* icon**

***Lower winch 1* icon**

***Lift winch 1* icon**

***Lower winch 2** icon**

***Lift winch 2** icon**

***Winch locked* icon**

Exemplary illustration

***Luff up the hydraulic auxiliary boom** icon**

***Luff down the hydraulic auxiliary boom** icon**

6.3.5.4 Armrest operating unit 1

Assembly support menu

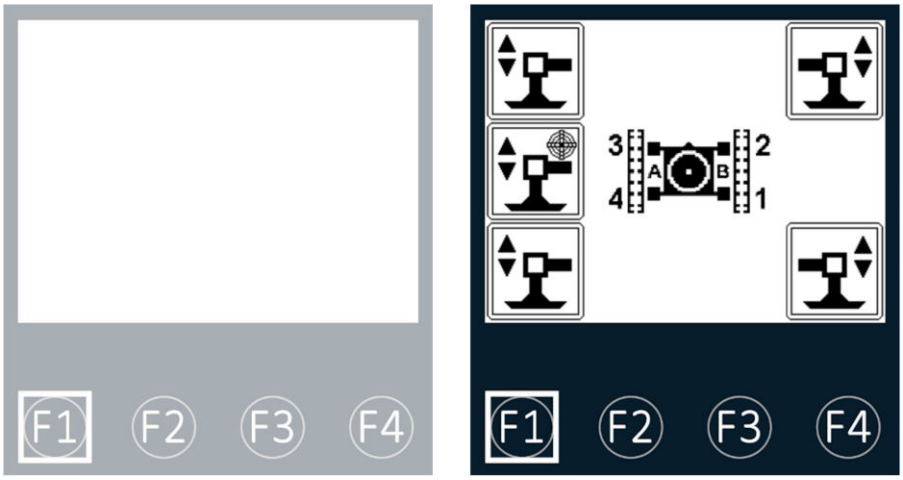


Fig. 298: Exemplary illustration: Assembly support menu

***Support cylinder* button**

Exemplary illustration: The corresponding support cylinder is selected depending on the alignment of the *assembly support* display.

***Automatic support* button**

Support the crane levelled.

Note

The *assembly support display* turns 180 ° according to the slewing angle from the superstructure to the chassis.

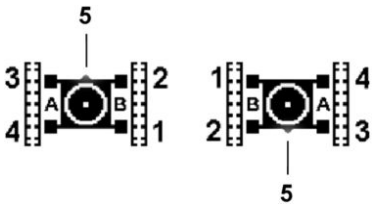


Fig. 301: Exemplary illustration: Assembly support display

1 Rear right support cylinder
2 Front right support cylinder
3 Front left support cylinder
4 Rear left support cylinder
5 Chassis front side identification
A Crawler carrier A
B Crawler carrier B

Track width adjustment menu

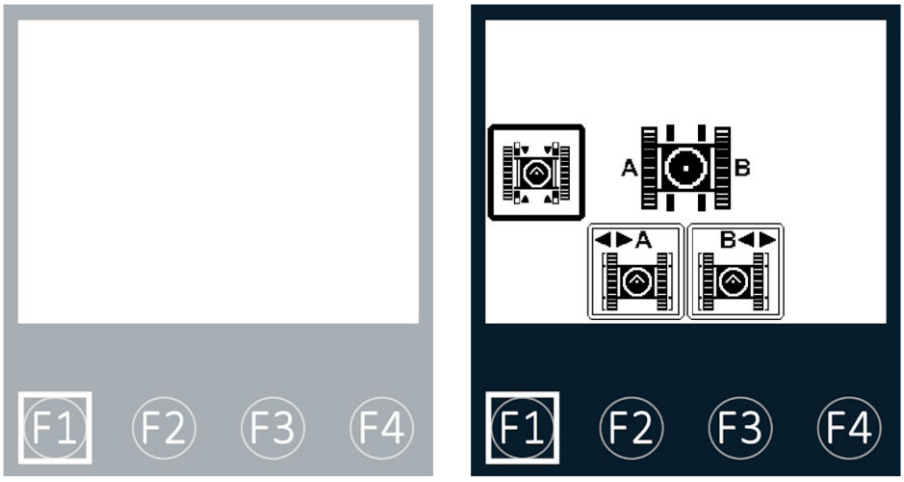


Fig. 302: Exemplary illustration: Track width adjustment menu

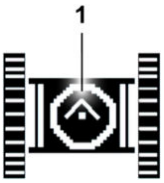


Fig. 303: Exemplary illustration: Direction of view display

1 Arrow

The arrow **1** on the buttons shows the direction of view of the crane operator in the crane cab.

***Cross carrier pinning* button**

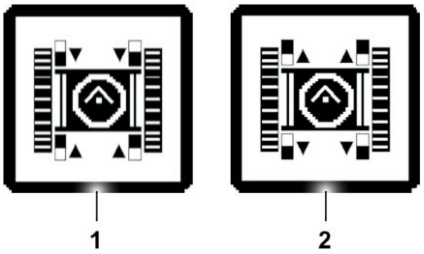


Fig. 305: Cross carrier pinning button states

1 Cross carrier pinned

2 Cross carrier unpinned

Note

The *cross carrier A* button and *cross carrier B* button adapt according to the slewing angle from the superstructure to the chassis.

***Cross carrier A* button**

***Cross carrier B* button**

Note

The *chassis* display turns 180 ° according to the slewing angle from the superstructure to the chassis.

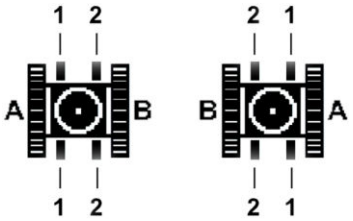


Fig. 308: Exemplary illustration: Chassis display

1 Cross carrier pinning icons A
2 Cross carrier pinning icons B
A Crawler carrier A
B Crawler carrier B

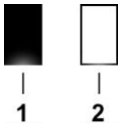


Fig. 309: Cross carrier pinning icon states

1 Cross carrier pinned
2 Cross carrier unpinned

6.3.5.5 Armrest operating unit 2

Pivot section floodlight menu

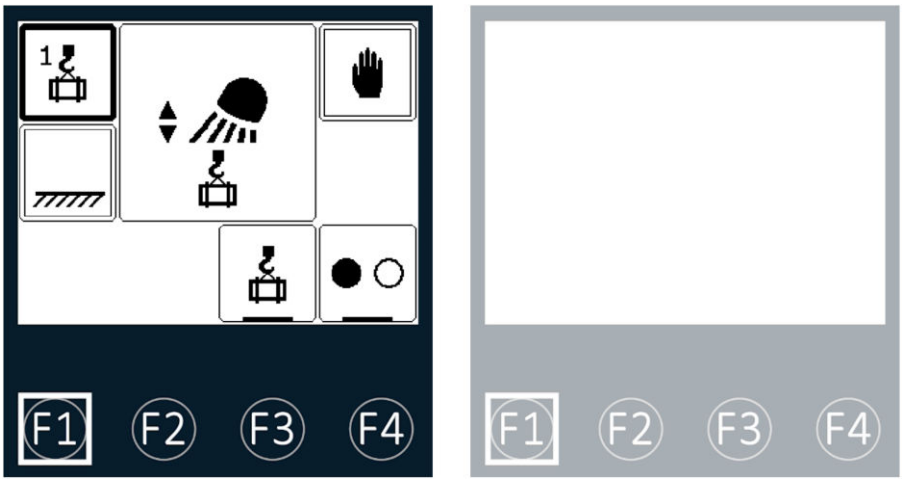
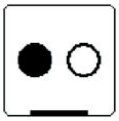


Fig. 310: Exemplary illustration: Pivot section floodlight menu



Turn the floodlight on / off button

Select load position **button**

Manual control operation **button**

Illuminate working area **button**

Load following **button**

Exemplary illustration: The number in the icon corresponds to the assignment to the load position.

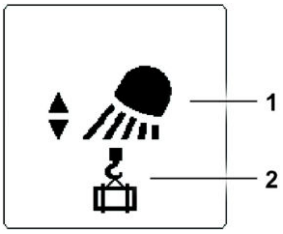


Fig. 316: Display area

1 Pivot section floodlight icon

2 Operating mode icon

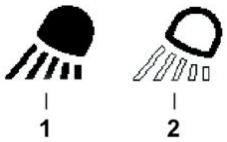


Fig. 317: Pivot section floodlight icon states

1 Floodlight turned on

2 Floodlight turned off

Fig. 318: Operating mode icon states

1 Manual control operation

2 Illuminate the working area

3 Load following

Auxiliary function menu

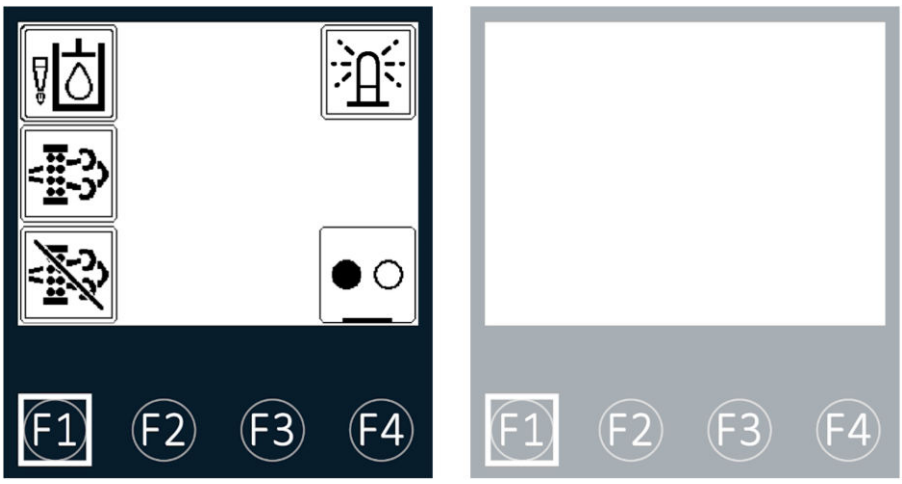
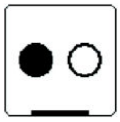


Fig. 319: Exemplary illustration: Auxiliary function menu



Turn function on / off button

Rotating beacon **button**

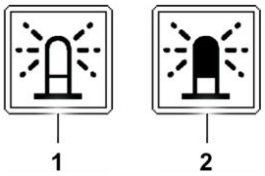


Fig. 322: Rotating beacon button states

1 Rotating beacon turned off

2 Rotating beacon turned on

Hydraulic oil preheating **button**

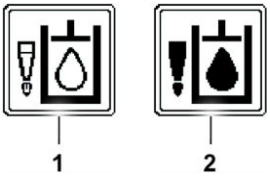
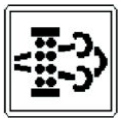


Fig. 324: Hydraulic oil preheating button states

1 Hydraulic oil preheating turned off

2 Hydraulic oil preheating turned on



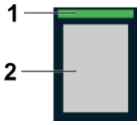
Diesel particle filter (DPF) regeneration at a standstill **button**

Disable diesel particle filter (DPF) regeneration **button**

6.3.6 Side window operating unit

Fig. 327: Side window operating unit

6.3.6.1 Indicator lights on the buttons



Green indicator light **1**

Button **2**

Indicator light:
- **Lights up:** Function turned on or active
- **Does not light up:** Function turned off or not active
- **Blinks slowly:** Function selected, but not active
- **Blinks fast:** Error

6.3.6.2 Indicator lights

Superstructure engine **indicator light**

Fig. 330: Superstructure engine indicator light states

Superstructure engine **indicator light**
- **Lights up yellow:** Engine preheating is active.
- **Blinds yellow / red alternatively (slow):** Engine ready to start
- **Flashes yellow / red alternatively (fast):** Engine preheating error
- **Lights up red:** Alternator error

Chassis engine **indicator light**

Not assigned

Superstructure central lubrication system **indicator light**

Fig. 333: Superstructure central lubrication system indicator light states

Superstructure central lubrication system **indicator light**
- **Lights up orange:**. Functional readiness (is shown after engine start for 1.5 seconds)
- **Lights up yellow:** Lubrication active
- **Lights up red:** Error or low fill level of the grease container

Telescope / telescoping cylinder pinning **indicator light**

Fig. 335: Telescope / telescoping cylinder pinning indicator light states

Telescope / telescoping cylinder pinning **indicator light:**
- **Lights up yellow:** Actuation of unpin telescoping cylinder.
- **Lights up green:** Unpin telescope actuation.

Telescoping cylinder position **indicator light**

Fig. 337: Telescoping cylinder position indicator light states

Telescoping cylinder position **indicator light**
- **Lights up yellow:** Telescoping cylinder in position

6.3.6.3 Buttons

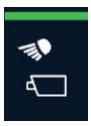
Front window washer system **button**

Roof window washer system **button**

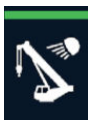
Front window wiper **button**

Roof window wiper **button**

Crane cab interior lighting **button**



Winch camera floodlight* **button**

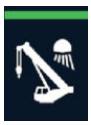


Front turntable floodlight **button**

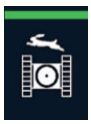
Airplane warning light **button**

Rear turntable floodlight **button**

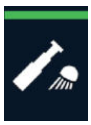
Travel mode **button**



Side turntable floodlight **button**



Rapid gear crawler travel gear **button**



Boom head* floodlight **button**

Ballast automatic **button**

Crawler travel gear parallel travel **button**

6.3.6.4 Buttons with release actuation

Enable **button**

The following buttons require a release via the *release* button:

Extend the step **button**

Not assigned

Retract the step **button**

Not assigned

Unpin the superstructure **button**

Pin the superstructure **button**

Luff up crane cab **button**

Luff down crane cab **button**

Retract the ballast cylinder **button**

Extend the ballast cylinder **button**

6.3.7 Climate control operating unit

Fig. 362: Climate control operating unit

6.3.7.1 Buttons

Timer **button**

Parking heater **button**

Automatic operation **button**

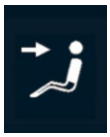
Climate control system **button**

Increase temperature **button**

Reduce the temperature **button**

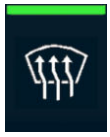
Increase blower stage **button**

Reduce blower stage **button**



Head area air distribution **button**

Floorboard area air distribution **button**



Defrost front window **button**

Recirculating air **button**

6.3.7.2 Display unit

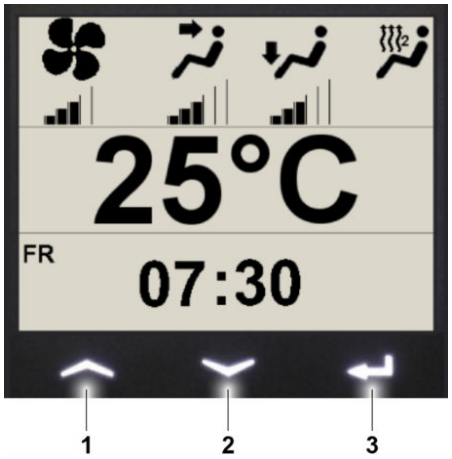


Fig. 375: Display unit

1 Up button
2 Down button
3 Confirm button

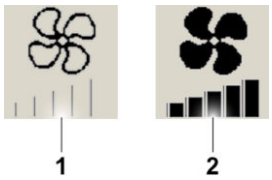


Fig. 376: Fan icon states

1 Turned off
2 Turned on

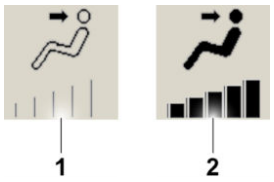


Fig. 377: Head area air distribution icon states

1 Turned off
2 Turned on

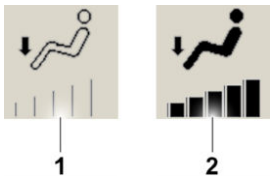


Fig. 378: Floorboard area air distribution icon states

1 Turned off
2 Turned on

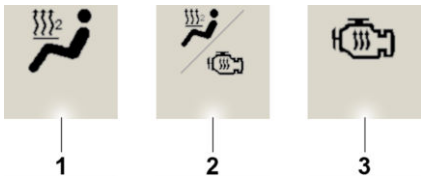


Fig. 379: Parking heater heat distribution icon states

1 Heat to the crane cab
2 Heat to the crane cab and to the engine (engine preheating*)
3 Heat to the engine (engine preheating*)

Fig. 380: Set temperature display

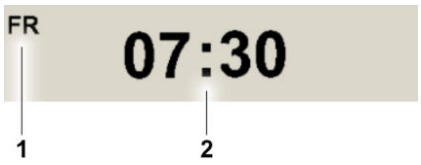


Fig. 381: Time display

1 Day of the week
2 Time

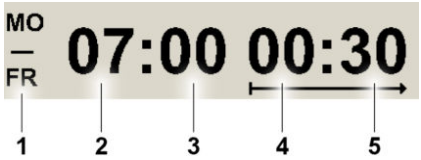


Fig. 382: Timer display

1 Turn on day
2 Turn on time: *Hour*
3 Turn on time: *Minute*
4 Turn on duration: *Hours*
5 Turn on duration: *Minutes*

The following setting options are available for the turn on day **1**:
- Single day of the week
- Daily from Monday to Friday
- Daily from Monday to Sunday

6.4 Superstructure monitor

6.4.1 Error display

***Error* display**

Exemplary illustration: In case of an error, a question mark is shown on the corresponding display.

6.4.2 Monitor areas

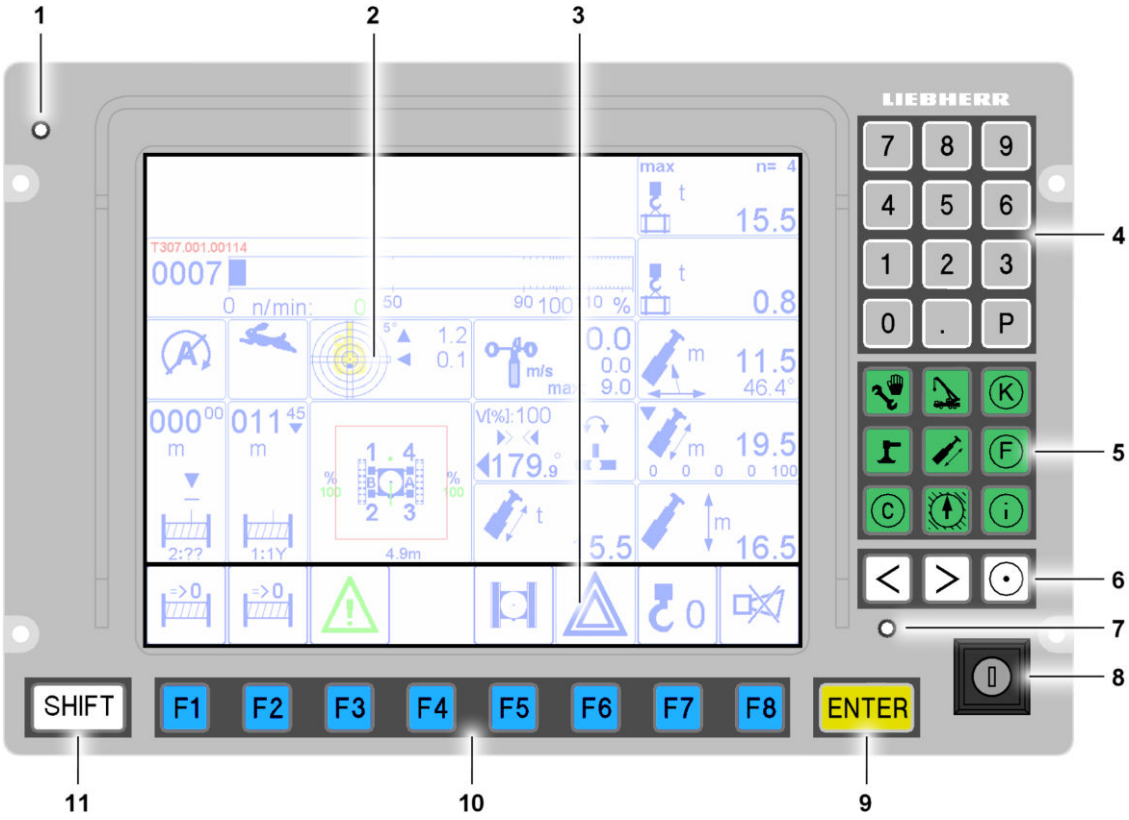


Fig. 384: Exemplary illustration: Superstructure monitor

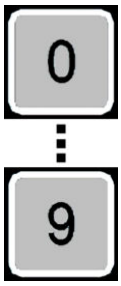
1 Brightness sensor
2 Displays
3 Menu-dependent buttons
4 Number block
5 Menu buttons
6 Setup buttons
7 Indicator light
8 Bypass key
9 ENTER button
10 F-buttons
11 SHIFT button

The menu-dependent buttons **3** are operated with the adjacent F-buttons **10**.

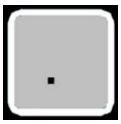
Indicator light 7:
- **Lights up:** The superstructure monitor is supplied with voltage.
- **Does not light up:** The superstructure monitor is **not** supplied with voltage.

6.4.2.1 Number block

The function of the number block is menu dependent.



***0* to *9* buttons**



***Decimal sign* button**

***P* button**

6.4.2.2 Menu buttons

***Set up menu* button**

***Crane operation menu* button**

Button **not** assigned.

Button **not** assigned.

***Telescoping menu* button**

Job Planner menu* button

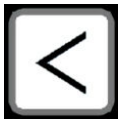
Button **not** assigned.

***Working range limitation menu** button**

Test system **button**

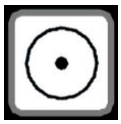
6.4.2.3 Setup buttons

The function of the setup buttons is menu dependent.



Left **button**

Right **button**



Dot **button**

6.4.3 Set up menu

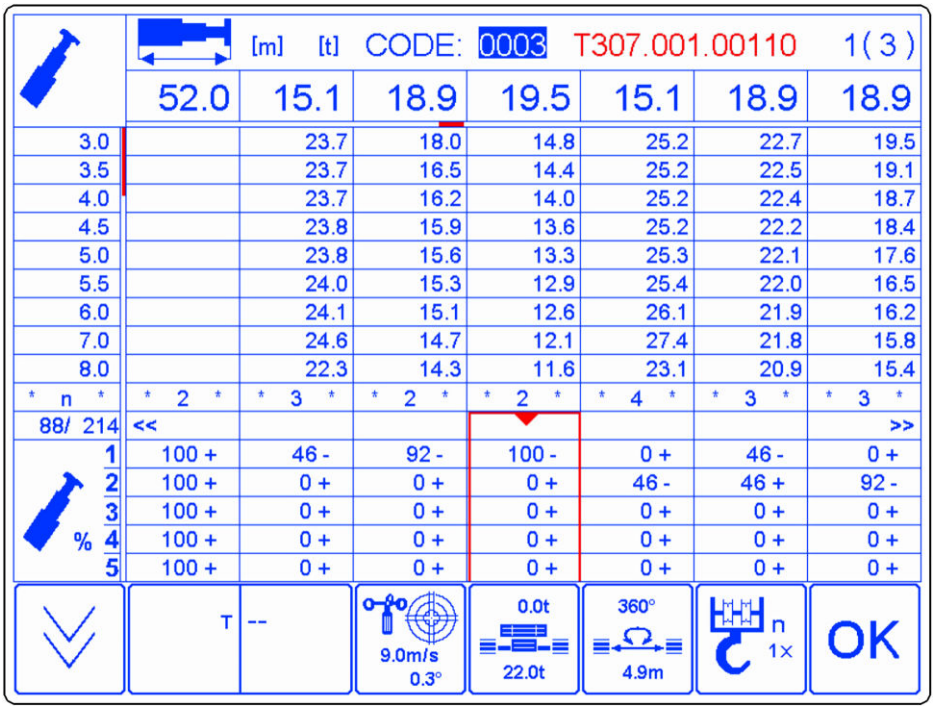


Fig. 400: Exemplary illustration: Set up menu

6.4.3.1 Buttons

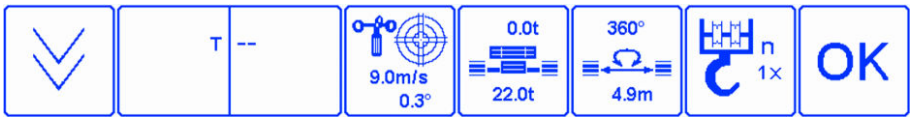


Fig. 401: Exemplary illustration: Buttons

***Page down* button**

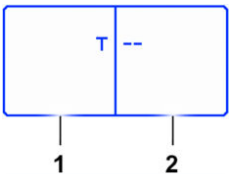


Fig. 403: Exemplary illustration: Boom system buttons

1 Main boom button **2** Auxiliary boom button

The buttons display the set up condition.

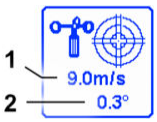
Button	Description
	Telescopic boom Telescopic boom operation
	Telescopic boom Operation with the auxiliary device
	Telescopic boom Maintenance operation
	Telescopic boom + telescopic boom extension Exemplary illustration: The number on the button corresponds to the length of the telescopic boom extension.
	Telescopic boom 66 % load chart

Tab. 61: Main boom button states

Button	Description
	**No** auxiliary boom assembled
	Special folding jib (assembled **without** use)*
	Special folding jib (with use)

Button	Description
	Folding jib Exemplary illustration: The number on the button corresponds to the length of the folding jib.
	Hydraulic folding jib Exemplary illustration: The number on the button corresponds to the length of the folding jib.

Tab. 62: Auxiliary boom button states

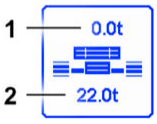


Wind speed and crane incline **button**

Exemplary illustration: The button displays the set up condition.

Maximum permissible wind speed **1**

Maximum permissible crane incline **2**

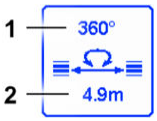


Ballast **button**

Exemplary illustration: The button displays the set up condition.

Turntable ballast **1**

Central ballast **2**

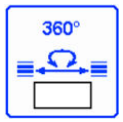
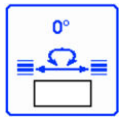


Slewing range and support base **button**

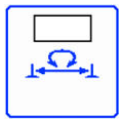
Exemplary illustration: The button displays the set up condition.

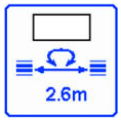
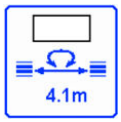
Slewing range **1**

Support base **2**

Button	Description
	Unlimited turning is possible. The maximum load is the same for the complete slewing range.
	Unlimited turning is possible. The maximum load is adjusted according to the slewing angle.
	Working area to the rear, superstructure pinned

Tab. 63: Slewing range states

Button	Support base designation	Description
	Assembly support	Only for assembly operation

Button	Support base designation	Description
	Narrow track width	Both crawler carriers 0 % extended Track width 2.6 m.
	Reduced track width	Both crawler carriers 65 % extended Track width 4.1 m.
	Wide track width	Both crawler carriers 100 % extended Track width 4.9 m.

Tab. 64: Length of the support base

***Reeving* button**

Exemplary illustration: The button displays the set up condition.

The number on the button corresponds to the reeving number.

***OK* button**

6.4.3.2 Load chart

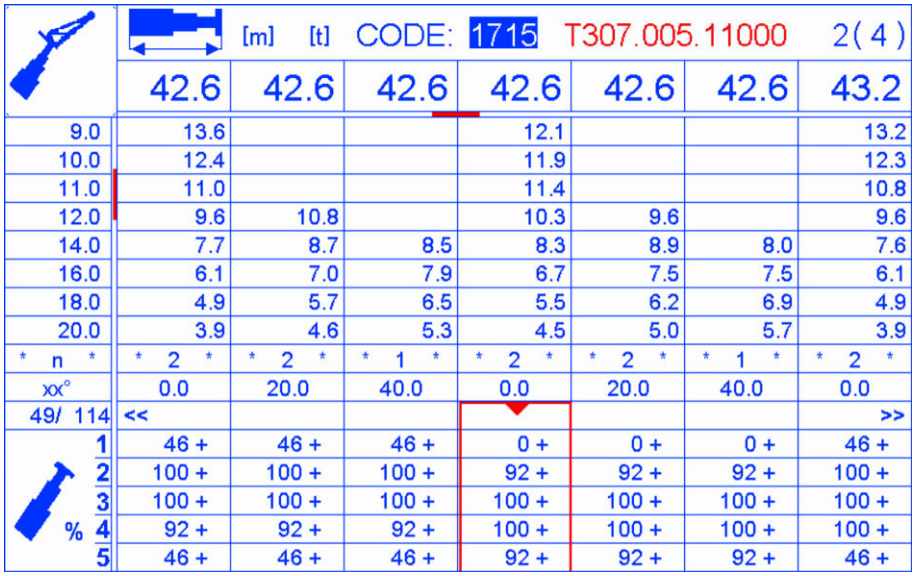


Fig. 426: Exemplary illustration: Load chart

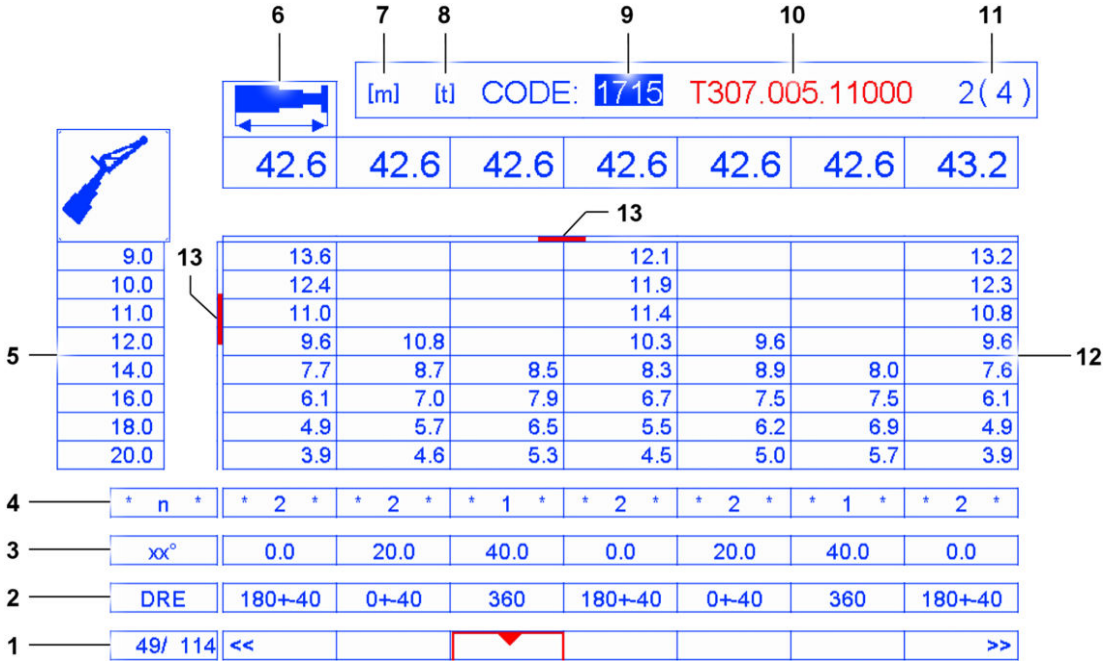


Fig. 427: Exemplary illustration: Load display

1 Selected column
2 Slewing range (only if equipped with the assembly support)
3 Auxiliary boom angle* (only if the auxiliary boom is set up)
4 Reeving
5 Boom radius
6 Telescopic boom length
7 Length unit
8 Weight unit
9 Short code
10 Chart number
11 Page counter
12 Load with corresponding boom radius and boom length
13 Scrollbars

Short code 9 display:
- **Is displayed in blue:** Set short code
- **Is displayed in green:** Active short code entry
- **Is displayed in red:** Invalid short code

***Slewing range* display 2:**
- **360:** Unlimited turning is possible.
- **0+-40:** Working area to the rear with a slewing range of +/- 40°
- **180+-40:** Working area to the front with a slewing range of +/- 40°

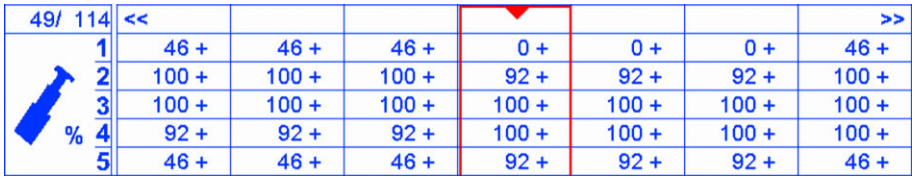
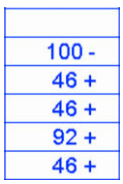


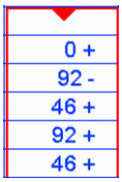
Fig. 428: Exemplary illustration: Telescoping target displays



***Telescoping target* display**

“+”: The telescope must be pinned.

“-”: The telescope can be telescoped under load to the displayed extension condition.



***Telescoping target* display**

Currently selected telescoping target

6.4.4 Crane operation menu

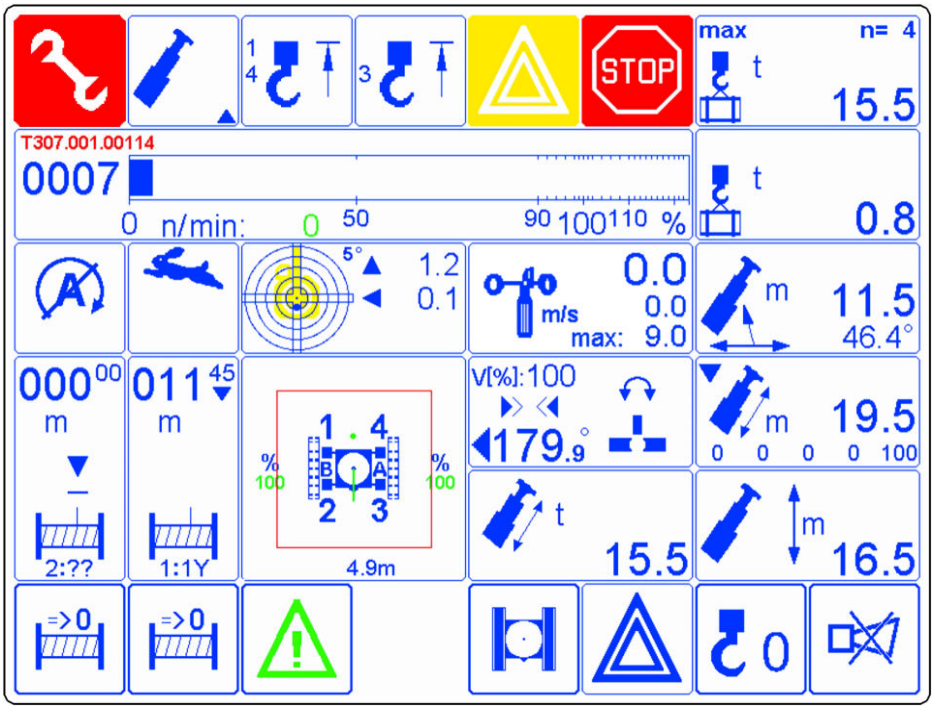


Fig. 431: Exemplary illustration: Crane operation menu

6.4.4.1 Warning and indicator lights

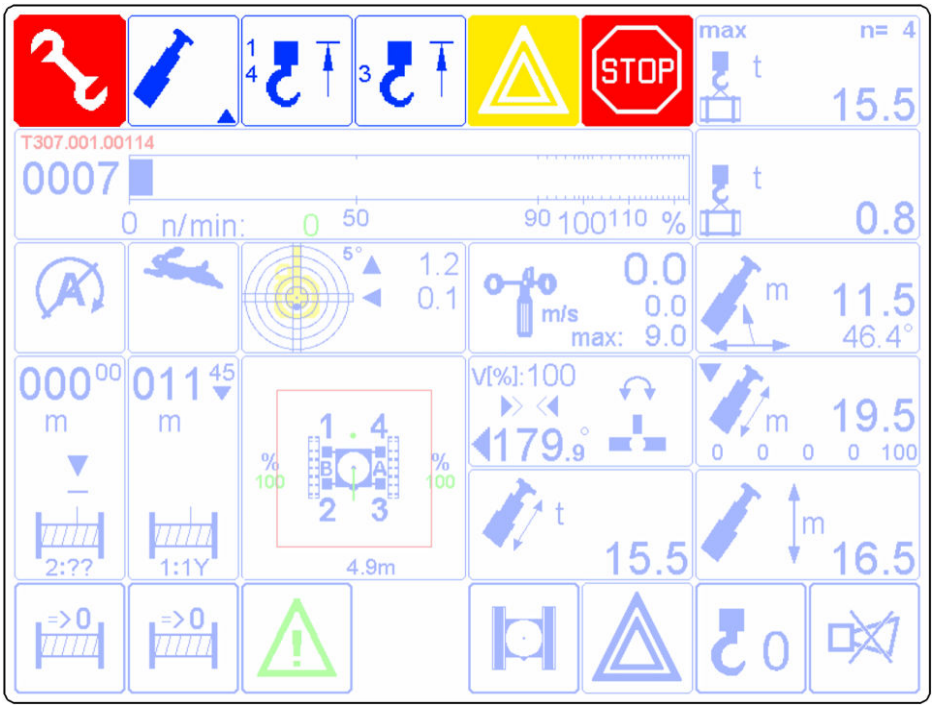


Fig. 432: Exemplary illustration: Warning and indicator lights

***Hoist limit switch* icon**

Exemplary illustration: The number in the icon corresponds to the assignment to the hoist limit switch (multiple hoist limit switches can be displayed).

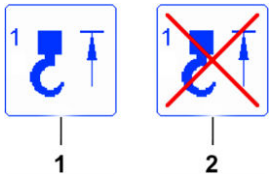


Fig. 434: Exemplary illustration: Hoist limit switch icon states

1 Hoist limit switch triggered

2 Hoist limit switch bypassed

Luffing shut-off icon

Exemplary illustration

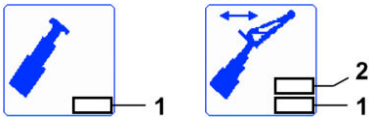


Fig. 436: Exemplary illustration: Luffing shut-off icon

1 Main boom shut-off

2 Auxiliary boom shut-off

The *luffing shut-off* icon changes according to the set up configuration.

Icon	Description
▲	*Luff up* shut-off by triggering the upper load chart limit
▼	*Luff down* shut-off by triggering the lower load chart limit
▲▲	*Luff up* shut-off by triggering the proximity switch
▼▼	*Luff down* shut-off by triggering the proximity switch (Only for auxiliary boom)
!!	Error
!!▲	Error and *luff up* shut-off
!!▼	Error and *luff down* shut-off

Tab. 65: Luffing shut-off icon states

Engine warning icon

Pay attention to the engine displays!

(→ Engine displays, p. 287)

Engine stop (RSL) icon

Observe the system error and turn off the engine immediately!

Working area limitation shut-off* icon

Overload protection warning icon

Overload protection shut-off* icon

Set overload protection warning icon

Exemplary illustration: The number in the icon corresponds to the set limit value.

Set overload protection shut-off icon

Exemplary illustration: The number in the icon corresponds to the set limit value.

Overload protection bypass icon

Overload protection bypass (assembly) icon

Overload protection emergency operation **icon**

Emergency control **icon**

Emergency operation without engine **icon**

6.4.4.2 Displays

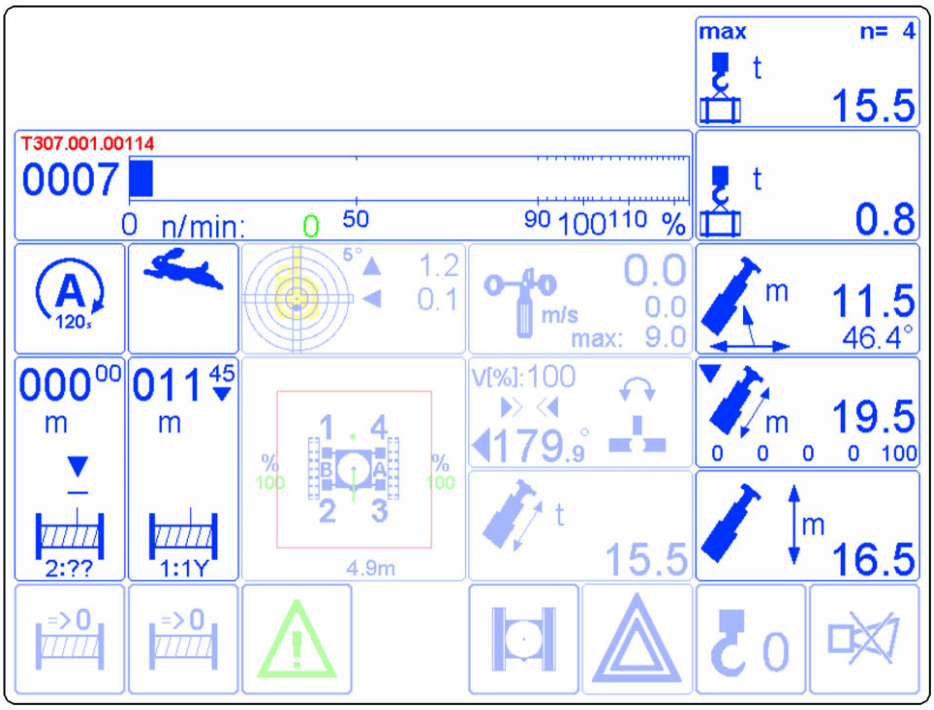


Fig. 456: Exemplary illustration: Displays

Utilization display

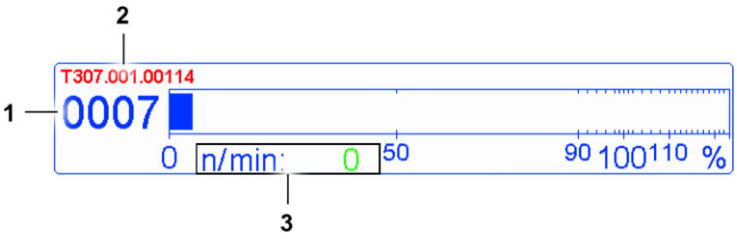


Fig. 457: Utilization display

1 Short code
2 Chart number
3 Engine rpm display

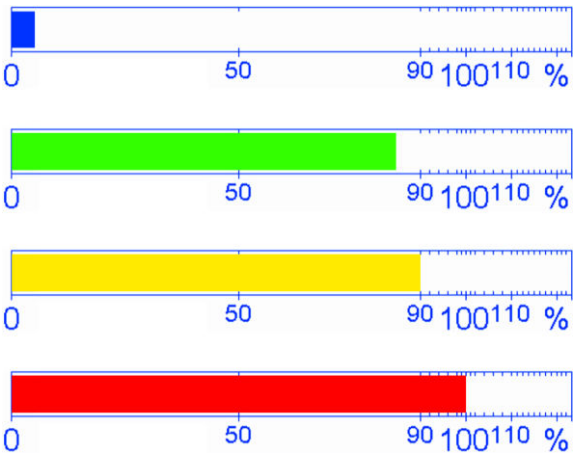


Fig. 458: Utilization display states

***Utilization* display:**
- **Is displayed in blue:** OK, the set up configuration can be changed
- **Is displayed in green:** OK
- **Is displayed in yellow:** Overload protection warning
- **Is displayed in red:** Overload protection shut-off

Fig. 459: Exemplary illustration: Engine rpm display

1	Engine rpm display	**2**	Engine rpm additional icon

Fig. 460: Engine rpm additional icon states

***Engine rpm additional icon* display:**
- **"+":** Rpm locked
- **"!":** Rpm limited

Maximum load display

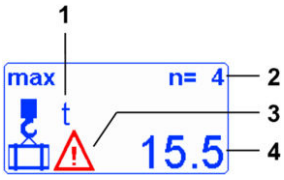


Fig. 461: Exemplary illustration: Maximum load display

1	Load unit	**3**	Maximum load invalid icon. Observe the error message!
2	Reeving	**4**	Maximum load

Actual load / net load display

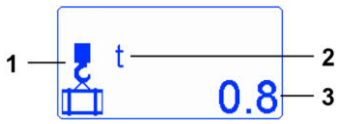


Fig. 462: Exemplary illustration: Actual load / net load display

1 Actual load / net load icon
2 Load unit
3 Actual load / net load

***Actual load* icon**

Total load including load and load handling equipment

***Net load* icon**

Load determined after taring (reset)

Boom radius and main boom angle display

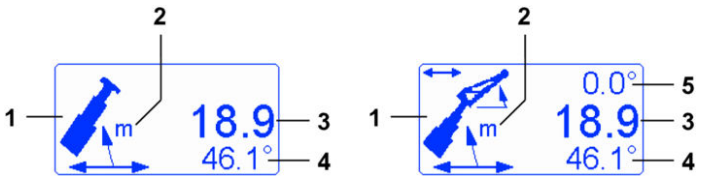


Fig. 465: Exemplary illustration: Boom radius and main boom angle display

1 Boom system icon
2 Boom radius unit
3 Boom radius
4 Telescopic boom angle
5 Auxiliary boom angle*

The *boom system* icon **1** changes according to the set up configuration.

Note

The *telescopic boom angle* **4** display shows the angle of the telescopic boom to the horizontal.

The *auxiliary boom* angle* **5** display shows the angle of auxiliary boom to the telescopic boom.

Telescopic boom length display

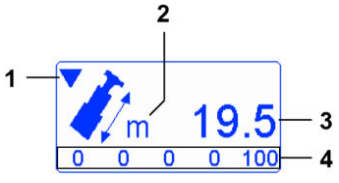


Fig. 466: Exemplary illustration: Telescopic boom length display

1 Telescope condition icon
2 Length unit
3 Telescopic boom length
4 Telescope actual extension condition

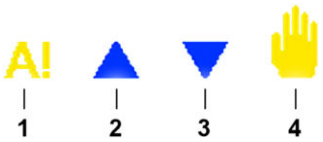


Fig. 467: Telescope condition icon states

1 Telescoping target reached
2 Telescope out request
3 Telescope in request
4 Telescoping manual operation

Upper pulley block height display

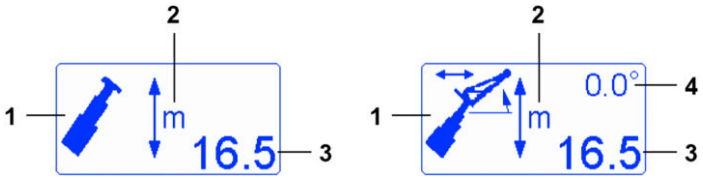


Fig. 468: Exemplary illustration: Upper pulley block height display

1 Boom system icon
2 Height unit
3 Upper pulley block height
5 Auxiliary boom angle*

The *boom system* icon **1** changes according to the set up configuration.

Note

The *auxiliary boom* angle* **5** display shows the angle of auxiliary boom to the telescopic boom.

Automatic engine stop display

Automatic engine stop display

Exemplary illustration: The number on the display corresponds to the number of seconds until the engine is turned off by the automatic engine stop.

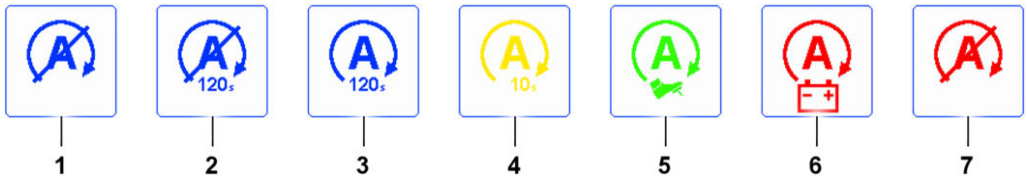


Fig. 470: Automatic engine stop display states

1 Engine turned off manually
2 Automatic engine stop **not** active
3 Automatic engine stop active
4 Engine stop is imminent (displayed in yellow)
5 Engine turned off by the automatic engine stop (displayed in green)
6 Battery voltage warning (displayed in red)
7 Automatic engine stop error (displayed in red)

The battery voltage warning **6** is displayed: The engine must be turned on. Otherwise the starting capability is no longer guaranteed due to the low battery voltage.

Rapid gear and ECO mode display

***Rapid gear and ECO mode* display**

Rapid gear icon **1**

ECO mode icon: **2**

Fig. 472: ECO mode icon states

***ECO mode* icon:**
- **Is displayed in green:** ECO mode turned on
- **Is displayed in yellow:** ECO mode turned on **but** inactive

ECO mode is inactive in the following cases:
- The engine rpm is increased manually.
- The engine rpm is locked.

Winch display

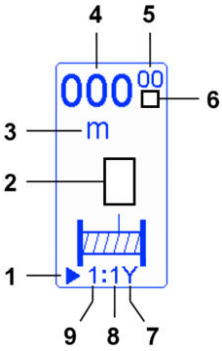


Fig. 473: Exemplary illustration: Winch display

1 Vibration sensor turned on icon
2 Winch status icon
3 Unit
4 Pre-decimal point rope path
5 Rope path decimal place
6 Hook movement direction icon
7 Deflection direction assignment of the control lever
8 Control lever assignment
9 Winch assignment

If a question mark is displayed on the *control level assignment* **8** display, no control level is assigned.

If a question mark is displayed on the *control level actuation direction assignment* **7** display, no actuation direction is assigned.

The displays and icons are identical for all winches.

***Hook movement direction* icon**

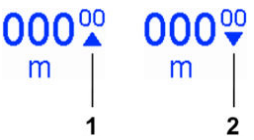
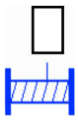


Fig. 475: Hook movement direction icon states

1 Rope path from zero point upward
2 Rope path from zero point downward



***Winch status* icon**

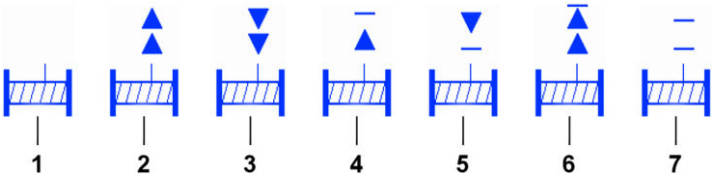


Fig. 477: Winch status icon states

1 **No** winch movement
1 Spool winch out
2 Spool winch up
3 Winch spooled out, spooling out blocked
4 Winch spooled up, spooling up blocked
5 Winch turned off in emergency
6 Error or winch locked

6.4.4.3 Crane operation auxiliary displays

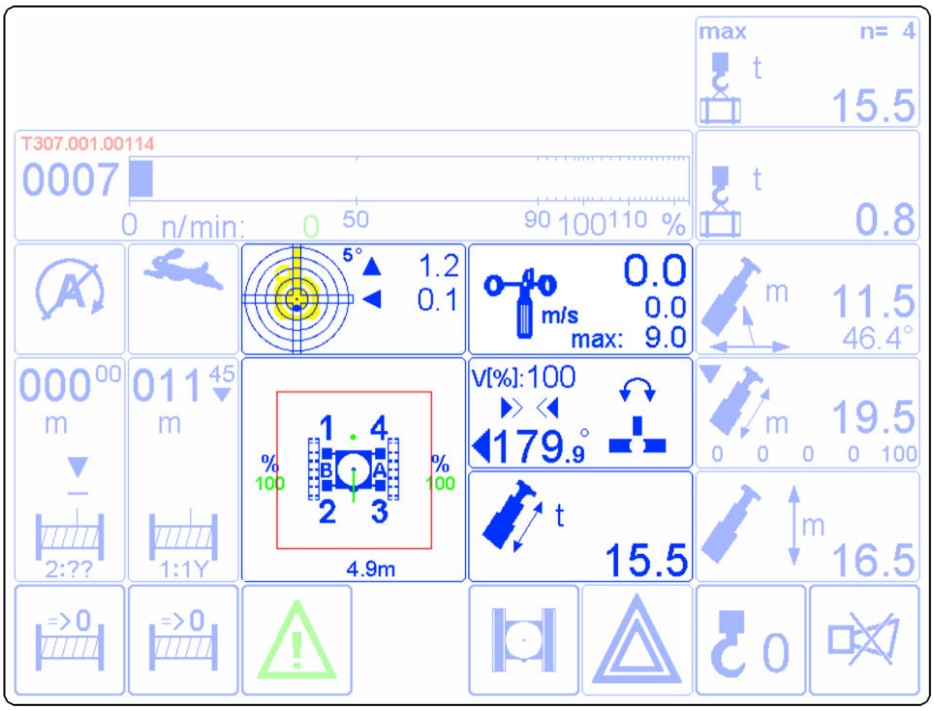


Fig. 478: Exemplary illustration: Crane operation auxiliary displays

Crane incline display

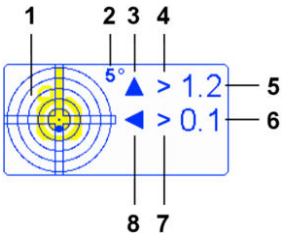


Fig. 479: Crane incline display

1 Incline indicator (graphic)
2 Incline increment 1°, 5° or 25°
3 Incline in the longitudinal direction (graphic)
4 Display range exceeded
5 Incline in the longitudinal direction (numeric)
6 Incline in the lateral direction (numeric)
7 Display range exceeded
8 Incline in the lateral direction (graphic)

Wind speed display

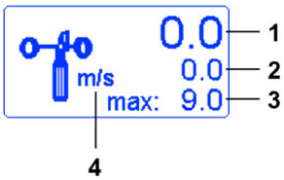


Fig. 480: Exemplary illustration: Wind speed display

1 Current wind speed wind speed sensor 1
2 Current wind speed wind speed sensor 2
3 Set maximum wind speed
4 Unit

If multiple wind speed sensors are connected, the display **2** is shown. In this case, the display **1** shows the wind speed for the wind speed sensor assembled further up and the display **2** shows the wind speed for the wind speed sensor assembled further down.

***Current wind speed* display:**
- **Is displayed in blue:** The current wind speed is smaller than the set maximum wind speed **3**.
- **Blinks red:** The current wind speed is greater than the set maximum wind speed **3**.

***Set maximum wind speed* 3 display:**
- **Is displayed in blue:** The *set maximum wind speed* display **3** shows the value that is set in the *set up* menu.
  (→ 8.6.2 Entering the set up configuration manually, p. 413)
- **Is displayed in red:** The *set maximum wind speed* display **3** shows the value that is set in the *crane operation* menu.
  (→ 8.15.6 Adjusting the wind warning manually, p. 517)

Support base display

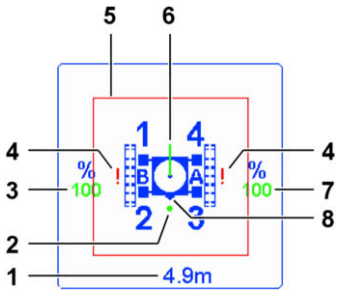


Fig. 481: Exemplary illustration: Support base display

1 Support base / track width
2 Center of gravity
3 Cross carrier B extension condition
4 Bypass icon
5 Tipping edge
6 Telescopic boom position
7 Cross carrier A extension condition
8 Chassis front side identification
A Crawler carrier A
B Crawler carrier B

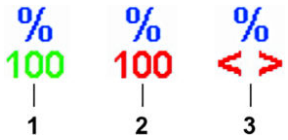


Fig. 482: Exemplary illustration: Cross carrier extension condition display states

1 Cross carrier in the set up pin position (displayed in green)
2 Cross carrier in a **not** set up pin position (blinks red)
3 Cross carrier in the intermediate position (blinks red)

The cross carriers can be pinned at **0 %**, **65 %** and **100 %** extension lengths.

Slewing gear display

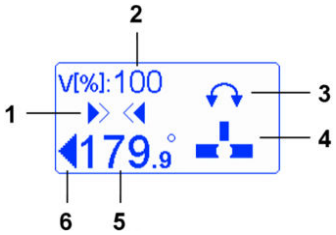


Fig. 483: Exemplary illustration: Slewing gear display

1 Slewing gear operating mode icon
2 Maximum slewing speed
3 Slewing range icon
4 Superstructure pinning icon
5 Slewing angle display
6 Direction of rotation icon (starting from 0°)

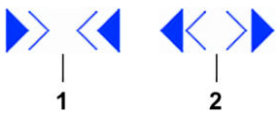


Fig. 484: Slewing gear operating mode icon states

1 Slewing gear fixed
2 Slewing gear freely rotating

Fig. 485: Slewing range icon states

***Slewing range* icon states:**
- **The arrow tip is displayed in blue:** OK
- **The arrow tip is displayed in yellow:** Turning in this direction leads to a shut-off.
- **The arrow tip is displayed in red:** Turning in this direction is shut off.

Fig. 486: Superstructure pinning icon states

1 Superstructure unpinned

2 Superstructure pinned

Telescopable load display

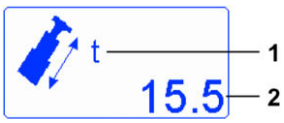


Fig. 487: Telescopable load display

1 Unit

2 Telescopable load

6.4.4.4 Engine displays

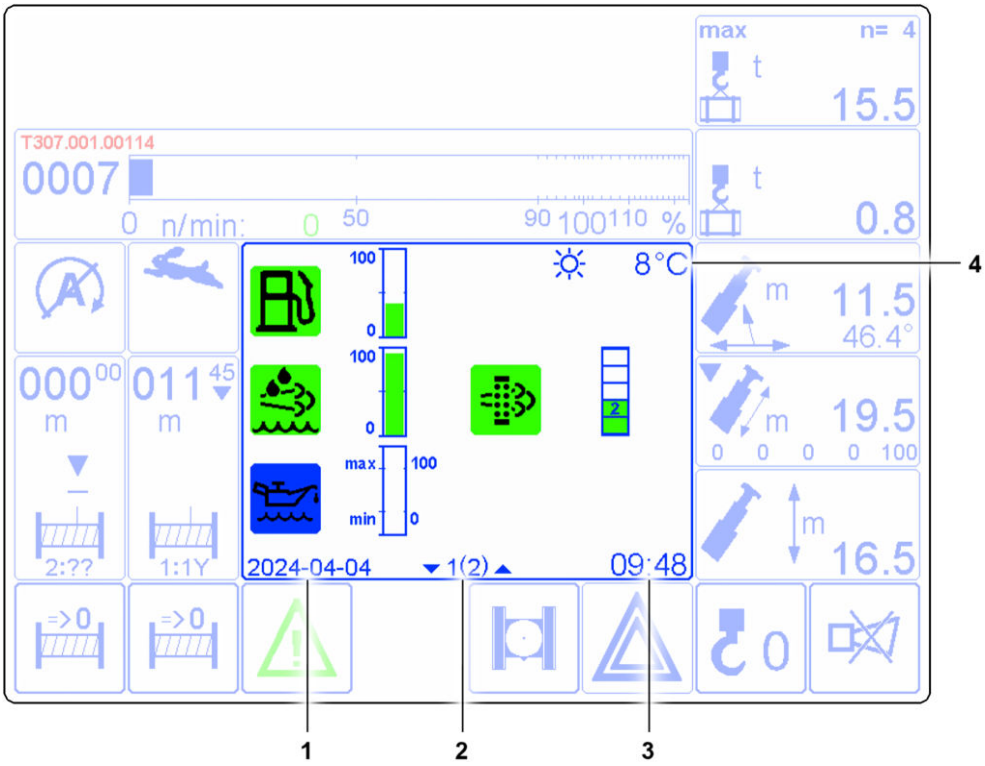


Fig. 488: Engine displays

1 Date
2 Page counter
3 Time
4 Outside temperature

Warning and indicator lights page

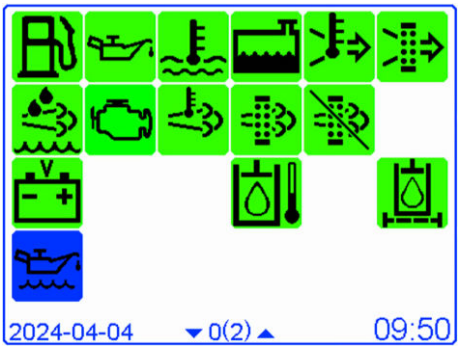


Fig. 489: Warning and indicator lights page

Fig. 490: Fuel tank level icon states

***Fuel tank level* icon:**
- **Is displayed in green:** OK
- **Is displayed in yellow:** Low
- **Is displayed in red:** Very low

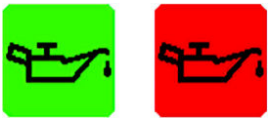


Fig. 491: Engine oil pressure icon states

***Engine oil pressure* icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too low

Fig. 492: Coolant temperature icon states

***Coolant temperature* icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too high

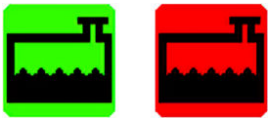


Fig. 493: Coolant expansion tank icon states

***Coolant expansion tank cover* icon:**
- **Is displayed in green:** Level ok
- **Is displayed in red:** Level too low

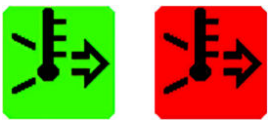


Fig. 494: Charge air temperature icon states

***Charge air temperature* icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too high

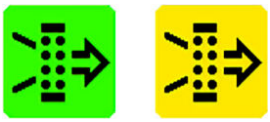


Fig. 495: Air filter icon states

***Air filter* icon:**
- **Is displayed in green:** OK
- **Is displayed in yellow:** Maintenance limit reached

Fig. 496: Urea tank level icon states*

Urea tank level* **icon:**
- **Is displayed in green:** OK
- **Is displayed in yellow:** Low
- **Is displayed in red:** Very low

Fig. 497: Exhaust aftertreatment (MIL) icon states*

Exhaust aftertreatment (MIL)* **icon:**
- **Is displayed in green:** OK
- **Is displayed in yellow:** Urea tank level low or error (low power reduction)
- **Is displayed in red:** Urea tank level very low or error (high power reduction)

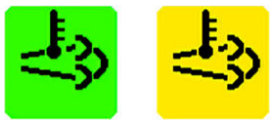


Fig. 498: Exhaust temperature (HEST) icon states

Exhaust temperature (HEST) **icon:**
- **Is displayed in green:** OK
- **Is displayed in yellow:** High (Diesel particle filter (DPF) regeneration active*)

Fig. 499: Diesel particle filter (DPF) load condition icon states*

Diesel particle filter load condition (DPF)* **icon:**
- **Is displayed in green:** Load condition OK
- **Is displayed in yellow:** Load condition increased
- **Is displayed in red:** Critical load condition

Fig. 500: Diesel particle filter (DPF) regeneration disabling icon states*

Diesel particle filter (DPF)* regeneration disabling **icon:**
- **Is displayed in green:** Regeneration **not** disabled
- **Is displayed in yellow:** Regeneration disabled

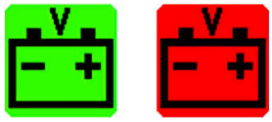


Fig. 501: Battery voltage icon states

Battery voltage **icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too low

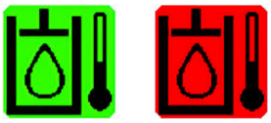


Fig. 502: Hydraulic oil temperature icon states

Hydraulic oil temperature **icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too high

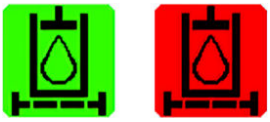


Fig. 503: Leak oil filter icon states

Leak oil filter **icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Maintenance limit reached

Fig. 504: Engine oil level icon

Fill level displays page

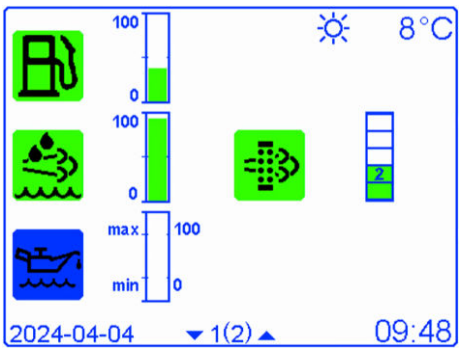


Fig. 505: Fill level displays page

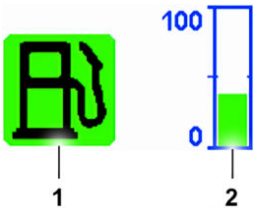


Fig. 506: Exemplary illustration: Level display

1 Icon

2 Level display

Fig. 507: Fuel tank level icon states

***Fuel tank level* icon:**
- **Is displayed in green:** OK
- **Is displayed in yellow:** Low
- **Is displayed in red:** Very low

Fig. 508: Urea tank level icon states*

***Urea tank level** icon:*
- **Is displayed in green:** OK
- **Is displayed in yellow:** Low
- **Is displayed in red:** Very low

Fig. 509: Engine oil level icon

Fig. 510: Diesel particle filter (DPF) load condition icon states*

***Diesel particle filter load condition (DPF)** icon:*
- **Is displayed in green:** Load condition OK
- **Is displayed in yellow:** Load condition increased
- **Is displayed in red:** Critical load condition

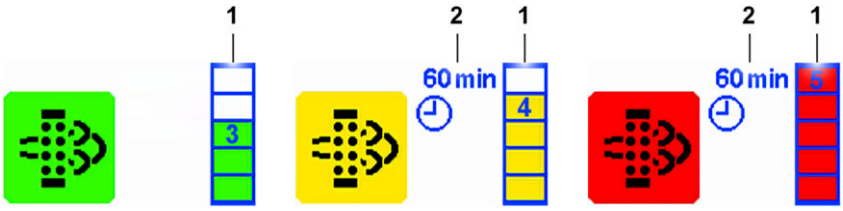


Fig. 511: Diesel particle filter load condition (DPF) display*

1 Diesel particle filter load condition (DPF)* display

2 Remaining run time display

If the *remaining run time* display **2** appears, regeneration at a standstill is active and the remaining duration of regeneration is displayed.

State displays page

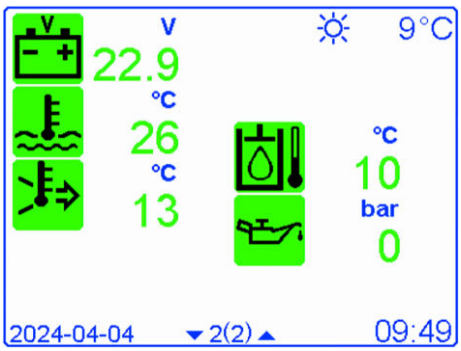


Fig. 512: State displays page

Fig. 513: Exemplary illustration: State display

1 Icon
2 Unit
3 State display

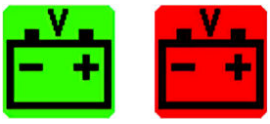


Fig. 514: Battery voltage icon states

Battery voltage **icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too low

Fig. 515: Coolant temperature icon states

Coolant temperature **icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too high

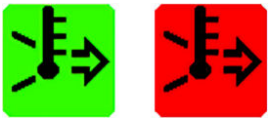


Fig. 516: Charge air temperature icon states

Charge air temperature **icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too high

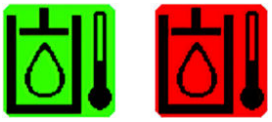


Fig. 517: Hydraulic oil temperature icon states

Hydraulic oil temperature **icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too high

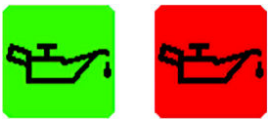


Fig. 518: Engine oil pressure icon states

Engine oil pressure **icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too low

6.4.4.5 Crawler pressure and center of gravity display

Note

The crawler pressure and center of gravity are calculated and displayed under ideal conditions.

(→ 5.14.2 Calculation of the crawler pressure, p. 195)

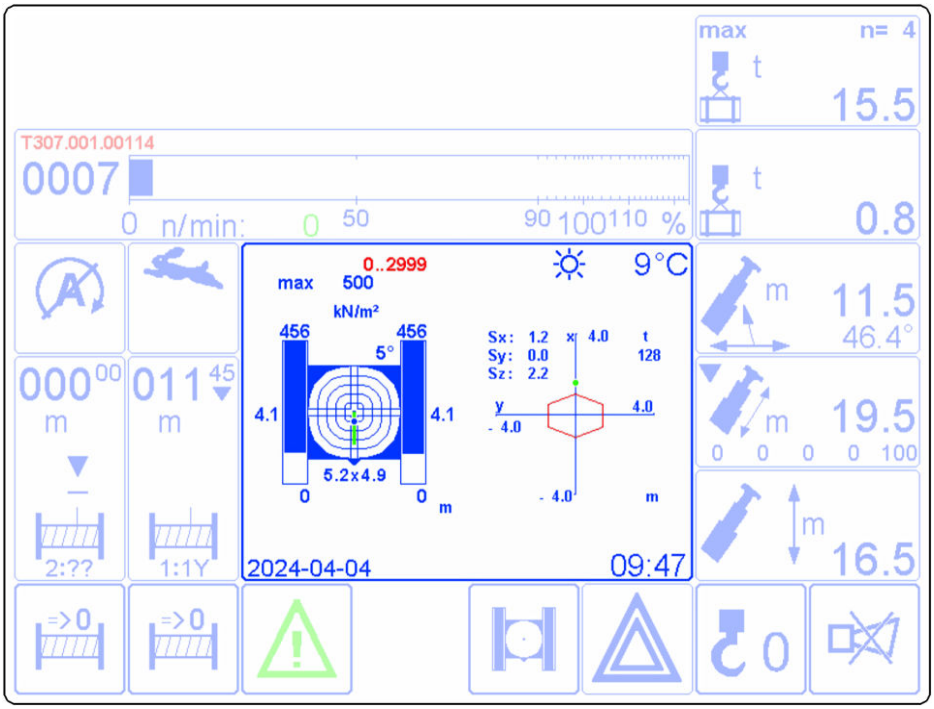


Fig. 519: Exemplary illustration: Crawler pressure and center of gravity display

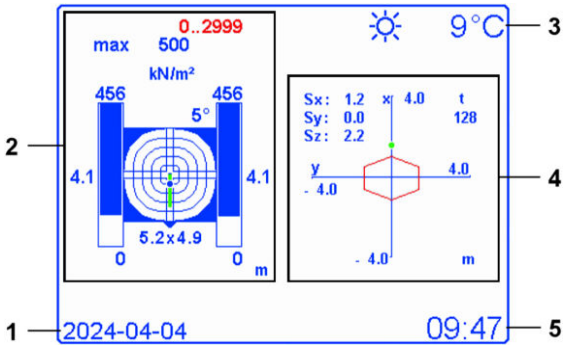


Fig. 520: Exemplary illustration: Crawler pressure and center of gravity display areas

1 Date
2 Crawler pressure display
3 Outside temperature
4 Center of gravity display
5 Time

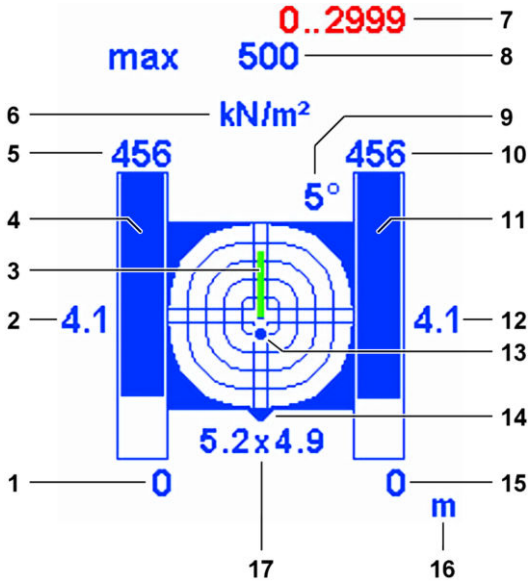


Fig. 521: Exemplary illustration: Crawler pressure display

1 Crawler pressure (at the front of crawler carrier B)
2 Crawler carrier placement surface B (numeric)
3 Telescopic boom position
4 Crawler carrier placement surface B (graphic)
5 Crawler pressure (at the rear of crawler carrier B)
6 Crawler pressure unit
7 Input area for maximum crawler pressure
8 Set maximum crawler pressure
9 Incline increment 1°, 5° or 25°
10 Crawler pressure (at the rear of crawler carrier A)
11 Crawler carrier placement surface A (graphic)
12 Crawler carrier placement surface A (numeric)
13 Crane incline
14 Chassis front side identification
15 Crawler pressure (at the front of crawler carrier A)
16 Length data unit
17 Support base / track width

***Crawler pressure* display states:**
- **Is displayed in blue:** Crawler pressure ok.
- **Is displayed in red:** Crawler pressure greater than the set maximum permissible crawler pressure.

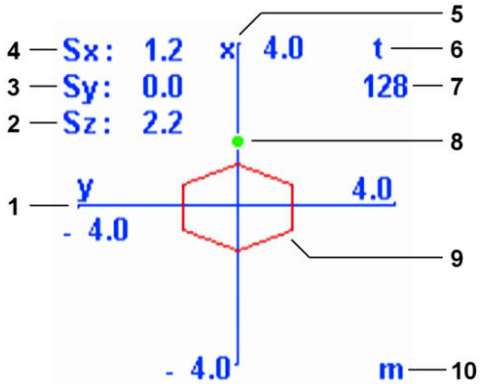


Fig. 522: Exemplary illustration: Center of gravity display

1 Y-axis
2 Center of gravity on Z-axis (numeric)
3 Center of gravity on Y-axis (numeric)
4 Center of gravity on X-axis (numeric)
5 X-axis
6 Weight unit
7 Total crane weight (including load)
8 Center of gravity (graphic)
9 Core area
10 Length data unit of center of gravity

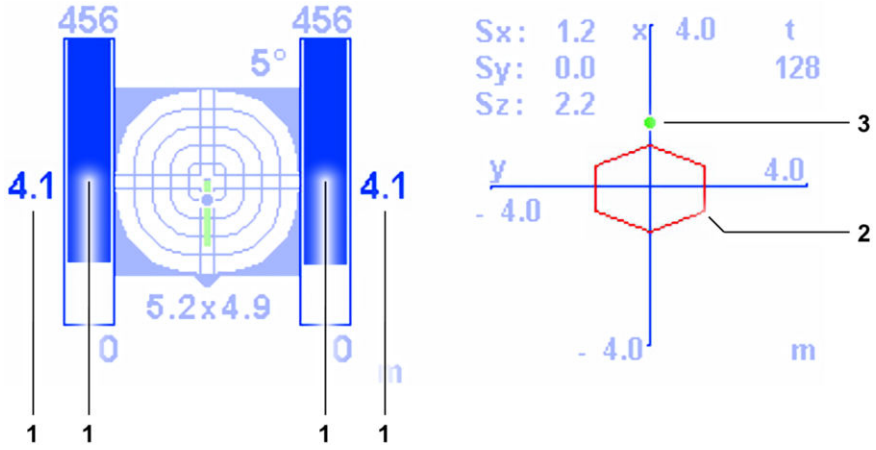


Fig. 523: Exemplary illustration: Dependency between the center of gravity and the core area

1 Crawler carrier support surface
2 Core area
3 Center of gravity

If the center of gravity **3** is inside the core area **2**, the entire crawler carrier support surface **1** is used.

If the center of gravity **3** is outside the core area **2**, the crawler carrier support surface **1** is reduced.

6.4.4.6 Overload protection limit value window

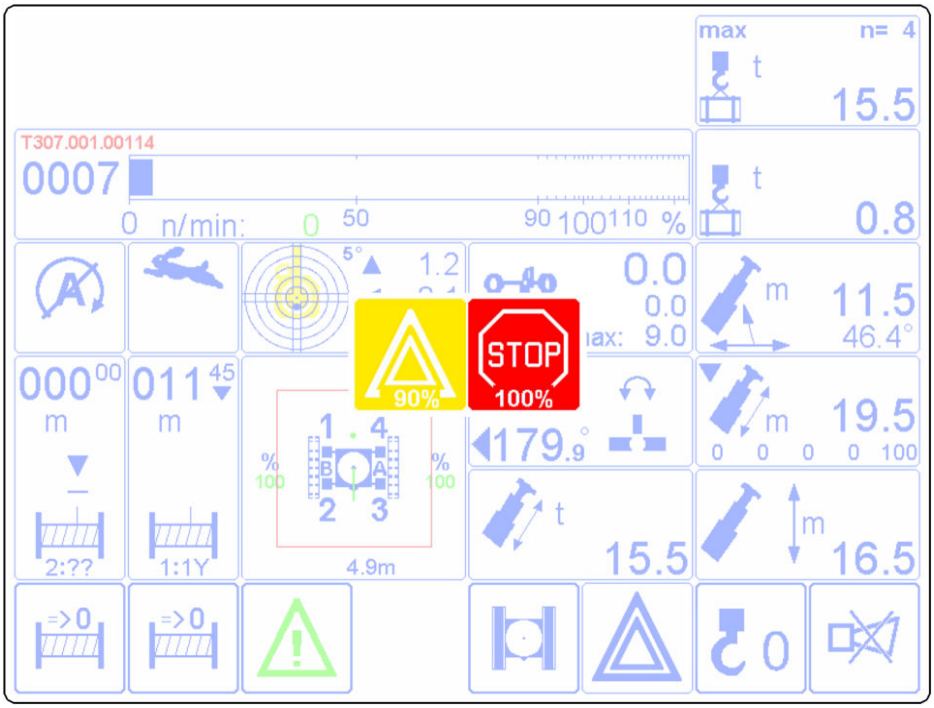


Fig. 524: Overload protection limit value window

***Set overload protection warning* display**

Exemplary illustration: The number on the display corresponds to the set limit value.

***Set overload protection shut-off* display**

Exemplary illustration: The number on the display corresponds to the set limit value.

6.4.4.7 Buttons

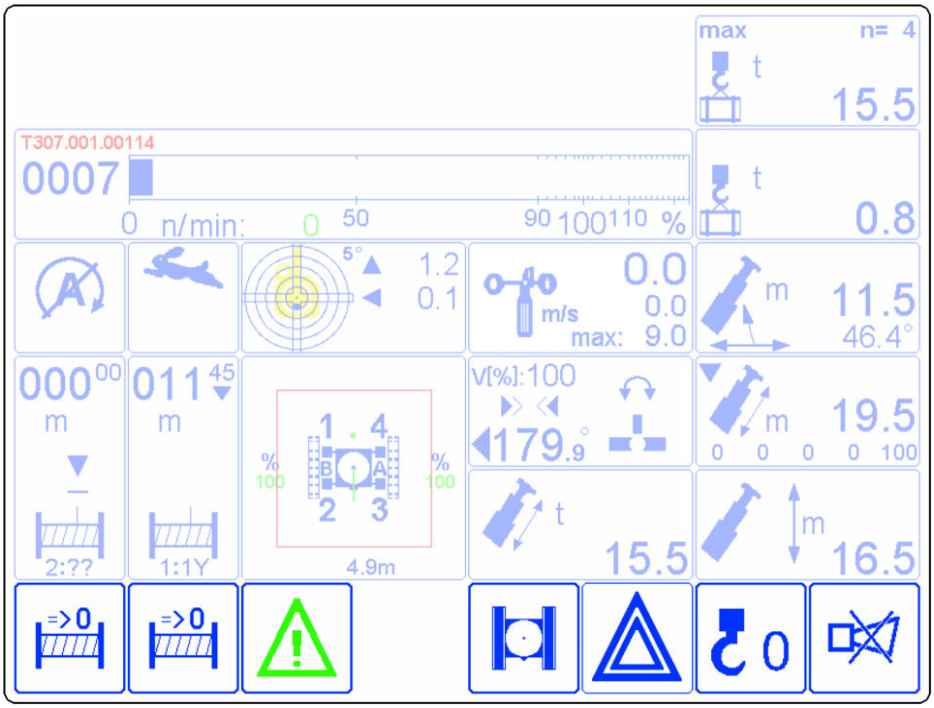
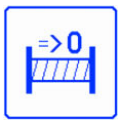


Fig. 527: Exemplary illustration: Buttons



Reset rope path **button**

Engine displays **button**

Fig. 530: Engine display button states

Engine displays **button**

- **Is displayed in green:** All displays OK
- **Is displayed in yellow:** At least one display is shown in yellow
- **Is displayed in red:** At least one display is shown in red

Down **button**

Up **button**

Crawler pressure and center of gravity display **button**

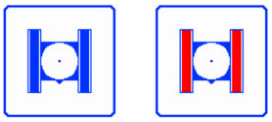


Fig. 534: Crawler pressure and center of gravity display button states

Crawler pressure and center of gravity display **button:**
- **Is displayed in blue:** Crawler pressure ok.
- **Is displayed in red:** Crawler pressure greater than the set maximum permissible crawler pressure.

Crane operation auxiliary displays **button**

Actual load taring **button**

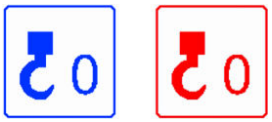


Fig. 537: Actual load taring button states

Actual load taring **button**
- **Is displayed in blue:** The actual load is displayed on the *load* display.
- **Is displayed in red:** The net load is displayed on the *load* display.

Interrupt acoustic warning **button**

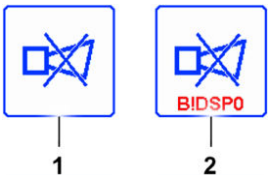


Fig. 539: Exemplary illustration: Interrupting acoustic warning button states

1 No error

2 At least one error

6.4.5 Telescoping menu

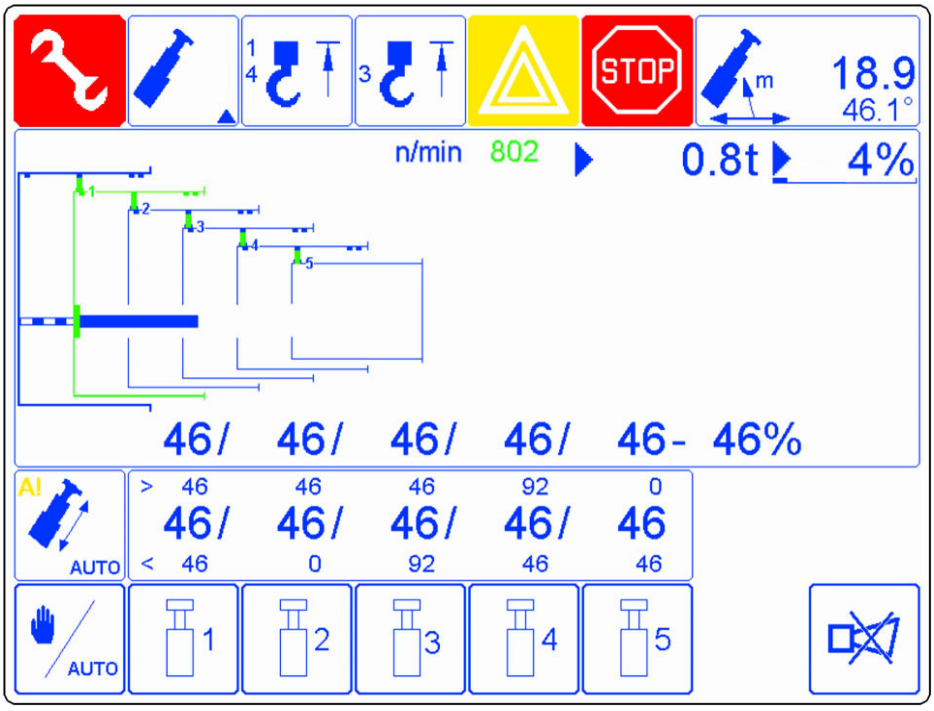


Fig. 540: Exemplary illustration: Telescoping menu

Interrupt acoustic warning **button**

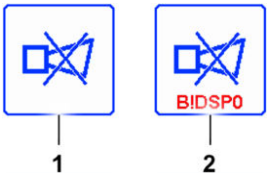


Fig. 542: Exemplary illustration: Interrupting acoustic warning button states

1 No error

2 At least one error

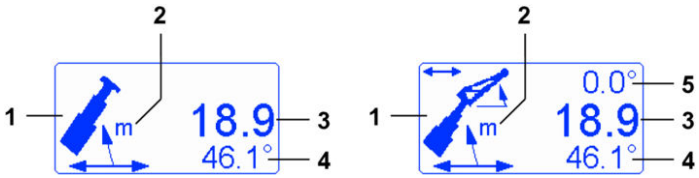


Fig. 543: Exemplary illustration: Boom radius and main boom angle display

1 Boom system icon
2 Unit
3 Boom radius
4 Telescopic boom angle
5 Auxiliary boom angle*

The *boom system* icon **1** changes according to the set up configuration.

Note

The *telescopic boom angle* display **4** shows the angle of the telescopic boom to the horizontal.

The *auxiliary boom* angle* **5** display shows the angle of auxiliary boom to the telescopic boom.

Fig. 544: Exemplary illustration: Engine rpm display

1 Engine rpm display
2 Engine rpm additional icon

Fig. 545: Engine rpm additional icon states

***Engine rpm additional icon* display:**
- **"+":** Rpm locked
- **"!":** Rpm limited

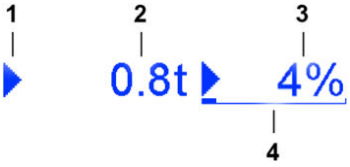


Fig. 546: Load, utilization and engine rpm display

1 Actual load / net load arrow
2 Actual load / net load display
3 Utilization display (numeric)
4 Utilization display (graphic)

Fig. 547: Exemplary illustration: Utilization display states (graphic)

***Utilization display (graphic)*:**
- **Is displayed in blue:** OK, the set up configuration can be changed
- **Is displayed in green:** OK
- **Is displayed in yellow:** Overload protection warning
- **Is displayed in red:** Overload protection shut-off

Fig. 548: Actual load / net load arrow states

***Actual load / net load* arrow:**
- **Is displayed in blue:** The actual load is displayed.
- **Is displayed in red:** The net load is displayed.

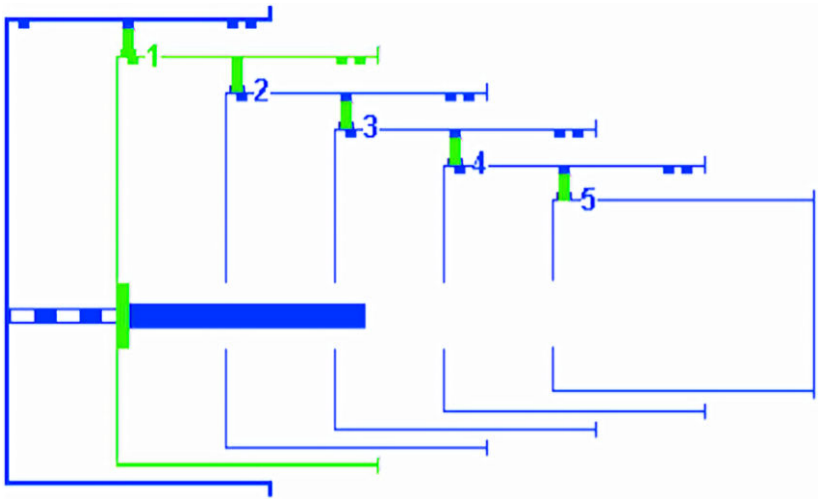


Fig. 549: Exemplary illustration: Telescoping cylinder and telescope actual state display

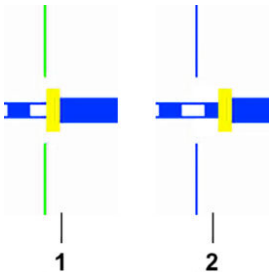


Fig. 550: Telescoping cylinder pinning positions states

1 Pin position reached (telescope displayed in green)

2 Pin position **not** reached

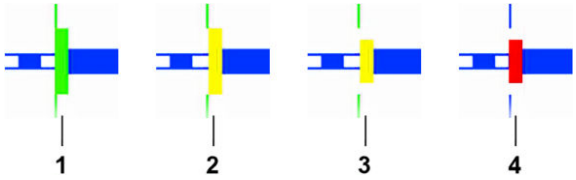


Fig. 551: Telescoping cylinder pinning actual state icons

1 Telescoping cylinder pinned (displayed in green)

2 Telescoping cylinder pinning in the intermediate position (displayed in yellow)

3 Telescoping cylinder unpinned (displayed in yellow)

4 Error (displayed in red)

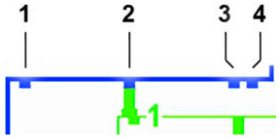


Fig. 552: Exemplary illustration: Telescope pin positions

1 Pin position 0 %

2 Pin position 46 %

3 Pin position 92 %

4 Pin position 100 %

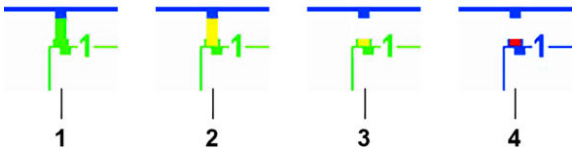


Fig. 553: Exemplary illustration: Telescope pinning actual state icons

1 Telescope pinned (displayed in green)
2 Telescope pinning in the intermediate position (displayed in yellow)
3 Telescope unpinned (displayed in yellow)
4 Error (displayed in red)

6.4.5.1 Warning and indicator lights

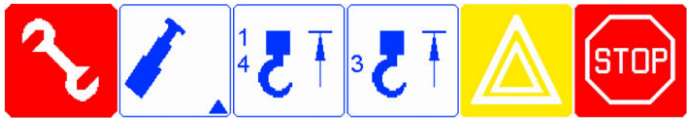


Fig. 554: Exemplary illustration: Warning and indicator lights

***Hoist limit switch* icon**

Exemplary illustration: The number in the icon corresponds to the assignment to the hoist limit switch (multiple hoist limit switches can be displayed).

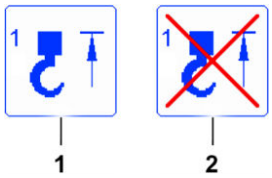


Fig. 556: Exemplary illustration: Hoist limit switch icon states

1 Hoist limit switch triggered
2 Hoist limit switch bypassed

Luffing shut-off icon

Exemplary illustration

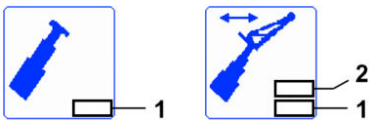


Fig. 558: Exemplary illustration: Luffing shut-off icon

1 Main boom shut-off
2 Auxiliary boom shut-off

The *luffing shut-off* icon changes according to the set up configuration.

Icon	Description
▲	*Luff up* shut-off by triggering the upper load chart limit
▼	*Luff down* shut-off by triggering the lower load chart limit
▲▲	*Luff up* shut-off by triggering the proximity switch
▼▼	*Luff down* shut-off by triggering the proximity switch (Only for auxiliary boom)

Icon	Description
	Error
	Error and *luff up* shut-off
	Error and *luff down* shut-off

Tab. 66: Luffing shut-off icon states

***Engine warning* icon**

Pay attention to the engine displays!

(→ Engine displays, p. 287)

***Engine stop (RSL)* icon**

Observe the system error and turn off the engine immediately!

***Working area limitation shut-off** icon*

***Overload protection warning* icon**

***Overload protection shut-off** icon*

***Set overload protection warning* icon**

Exemplary illustration: The number in the icon corresponds to the set limit value.

***Set overload protection shut-off* icon**

Exemplary illustration: The number in the icon corresponds to the set limit value.

***Overload protection bypass* icon**

***Overload protection bypass (assembly)* icon**

***Overload protection emergency operation* icon**

***Emergency control* icon**

Emergency operation without engine **icon**

6.4.5.2 Telescoping automatic operation

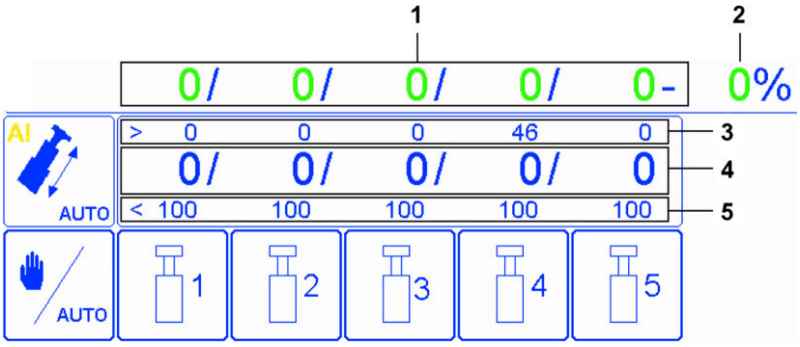


Fig. 578: Telescoping automatic operation area

1 Actual telescope extension condition display
2 Actual telescoping cylinder extension condition display
3 Next longer telescoping target display
4 Telescoping target display
5 Next shorter telescoping target display

Telescoping target **display 4:**
- **Is displayed in blue:** Telescoping target permissible
- **Is displayed in yellow:** Telescoping target **not** permissible

Telescoping operating mode **button**

Telescoping operating mode **(telescoping automatic operation) icon**

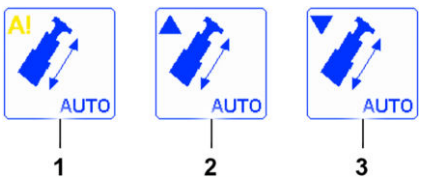


Fig. 581: Telescoping automatic operation icon states

1 Telescoping target reached
2 Telescope out request
3 Telescope in request

Set telescope extension condition **button**

Exemplary illustration: The number in the icon corresponds to the assignment to the telescope.

6.4.5.3 Telescoping manual operation

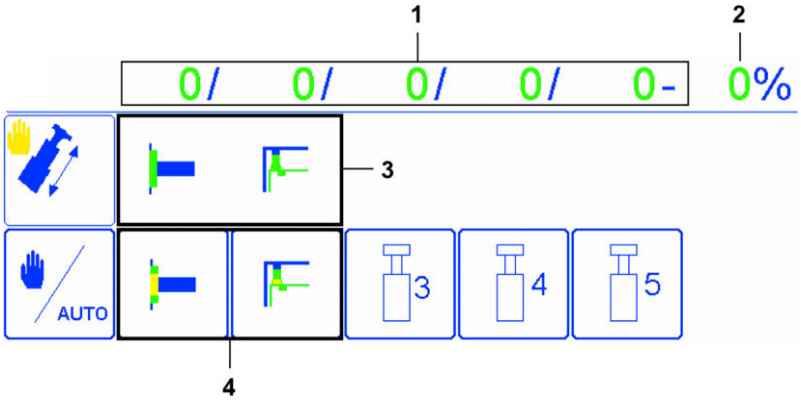


Fig. 583: Telescoping manual operation area

1	Actual telescope extension condition display	**3**	Telescoping manual operation icons
2	Actual telescoping cylinder extension condition display	**4**	Telescoping manual operation buttons

Telescoping operating mode **button**

Telescoping operating mode **(telescoping manual operation) icon**

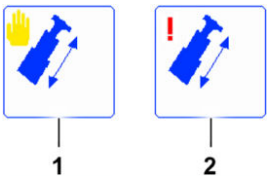


Fig. 586: Telescoping manual operation icon states

1	Telescoping manual operation	**2**	Telematik emergency operation

Telescoping cylinder pinning **button**

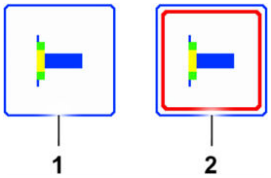


Fig. 588: Telescoping cylinder pinning button states

1	Pinning the telescoping cylinder selected	**2**	Telescoping cylinder unpinning selected

Telescoping cylinder pinning nominal state **icon**

Fig. 590: Telescoping cylinder pinning nominal state icons

1 Telescoping cylinder pinned (displayed in green)

2 Telescoping cylinder unpinned (displayed in yellow)

***Telescope pinning* button**

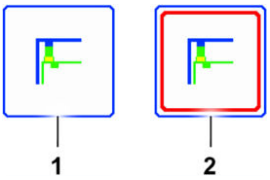


Fig. 592: Telescope pinning button states

1 Pinning the telescope selected

2 Unpinning telescope selected

***Telescope pinning nominal state* icon**

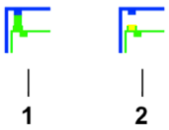


Fig. 594: Telescope pinning nominal state icons

1 Telescope pinned (displayed in green)

2 Telescope unpinned (displayed in yellow)

6.4.6 Crane function settings window

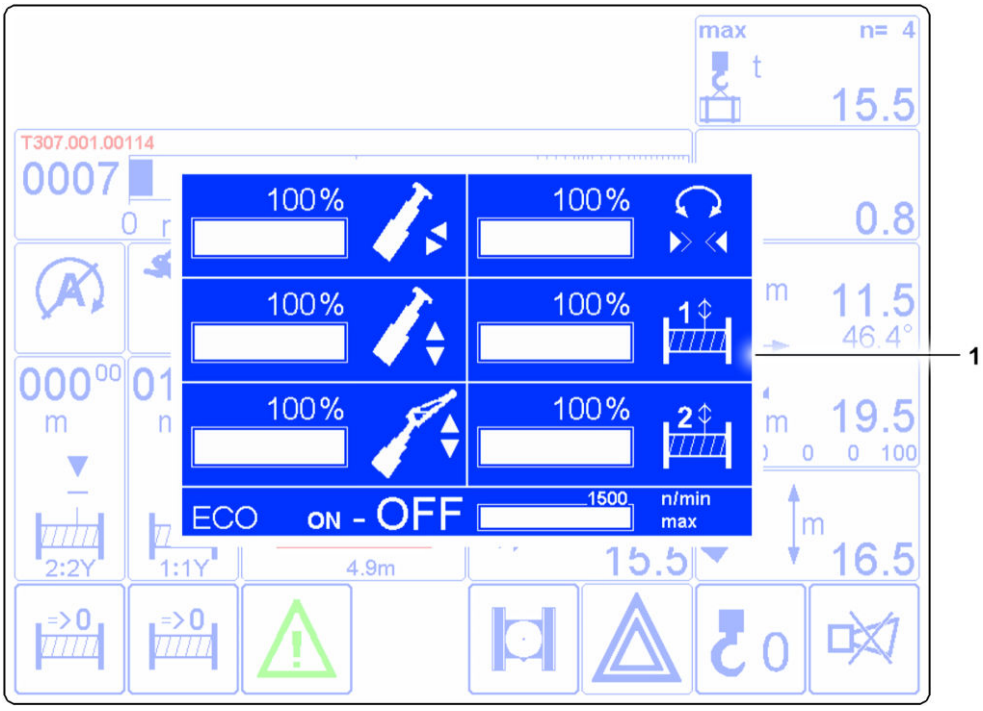


Fig. 595: Exemplary illustration: Crane function settings window

1 Crane function settings window

The *crane function settings* window **1** can be opened in the *crane operation* menu and *telescoping* menu.

6.4.6.1 Crane function displays

Fig. 596: Exemplary illustration: Crane function display

1 Speed reduction display (numeric)
2 Speed reduction display (graphic)
3 Crane function icon

Display	Designation of the display
	**Telescoping**
	**Luffing the telescopic boom**
	**Luff the auxiliary boom**

Display	Designation of the display
	**Turning** Slewing gear fixed
	**Turning** Slewing gear freely rotating
	**Spool winch 1** Rope path measurement
	**Spool winch 2** Rope path measurement

Tab. 67: Crane function displays

6.4.6.2 ECO mode display

Fig. 604: Exemplary illustration: ECO mode display

Fig. 605: ECO mode status display states

1 ECO mode turned on

2 ECO mode turned off

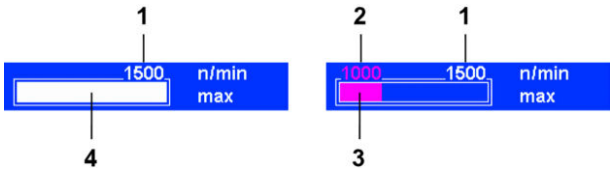


Fig. 606: Exemplary illustration: ECO mode maximum rpm display

1 Set maximum rpm (numeric)

2 Current rpm (numeric)

3 Current rpm (graphic)

4 Set maximum rpm (graphic)

6.4.7 Job planner

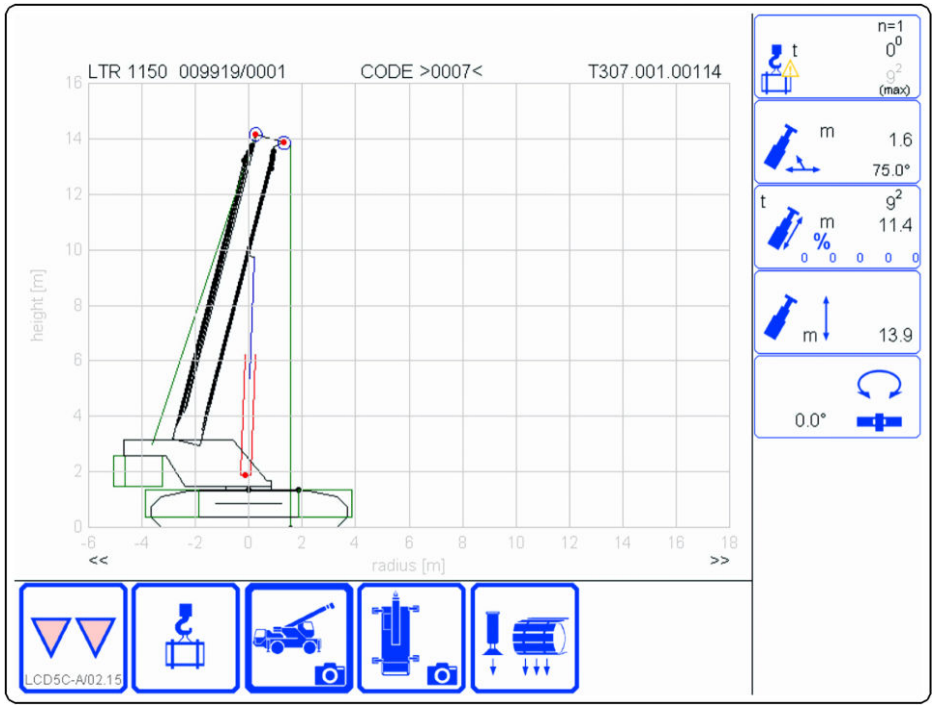


Fig. 607: Exemplary illustration: Job planner

6.4.8 Working area limitation menu

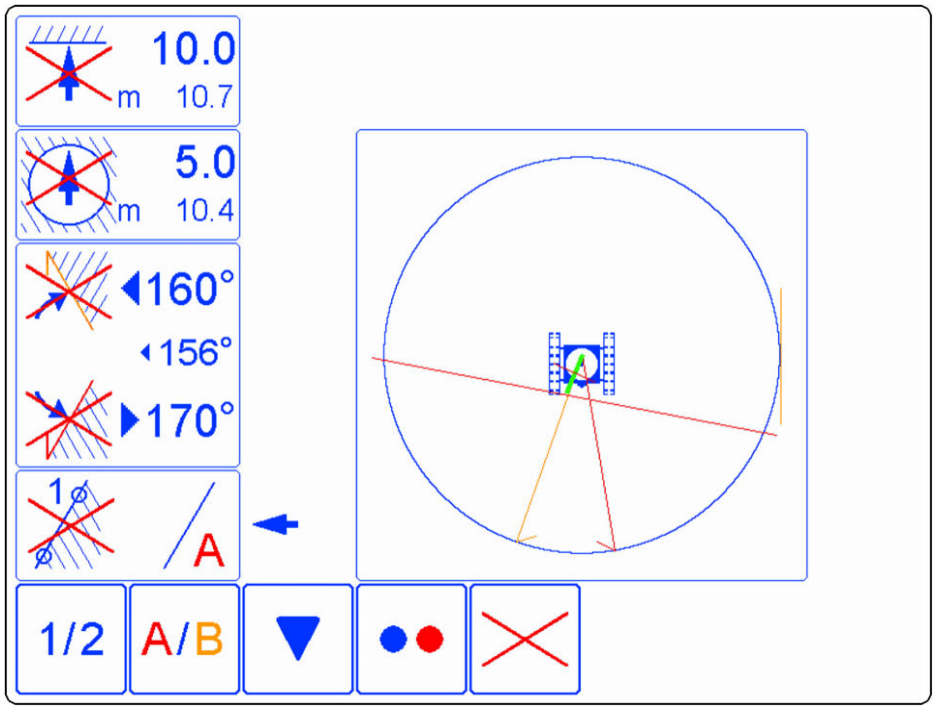


Fig. 608: Working area limitation menu

6.4.8.1 Working area limitation display

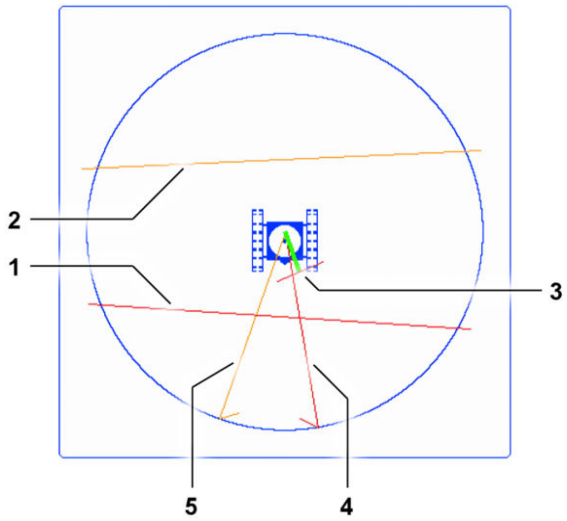


Fig. 609: Exemplary illustration: Working area limitation display

1 Edge A limit (displayed in red)
2 Edge B limit (displayed in orange)
3 Maximum boom radius limit (displayed in red)
4 Left slewing angle limit (displayed in red)
5 Right slewing angle limit (displayed in orange)

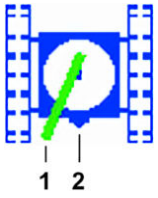


Fig. 610: Mobile crane display

1 Boom
2 Chassis front side identification

6.4.8.2 Limit displays

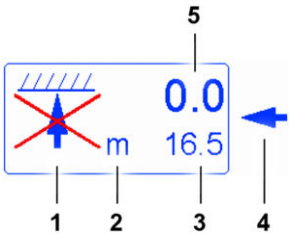


Fig. 611: Exemplary illustration: Limit display

1 Limit icon
2 Unit
3 Actual value
4 Selected limit icon
5 Limit value

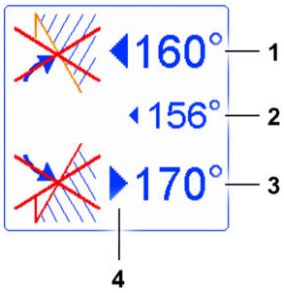


Fig. 612: Exemplary illustration: Slewing angle limit display

1 Right slewing angle limit value
2 Slewing angle actual value
3 Left slewing angle limit value
4 Direction of rotation icon (starting from 0°)

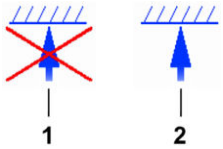
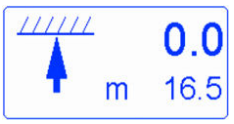
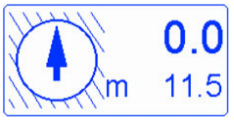
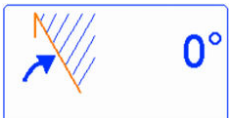
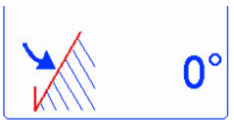
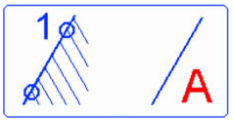
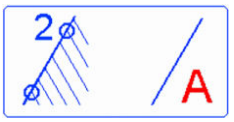
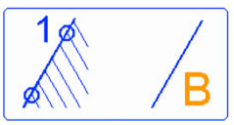
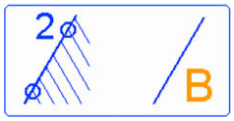


Fig. 613: Exemplary illustration: Limit icon states

1 Limit turned off
2 Limit turned on

Display	Designation of the display
	**Upper pulley block height limit**
	**Maximum boom radius limit**
	**Right slewing angle limit**
	**Left slewing angle limit**
	**Edge limit A** Point 1
	**Edge limit A** Point 2
	**Edge limit B** Point 1

Display	Designation of the display
	**Edge limit B** Point 2

Tab. 68: Limit displays

6.4.8.3 Buttons

Point 1/2 **button**

Edge A/B **button**

Down **button**

Turn limit on / off **button**

Turn off all limits **button**

6.4.9 Test system

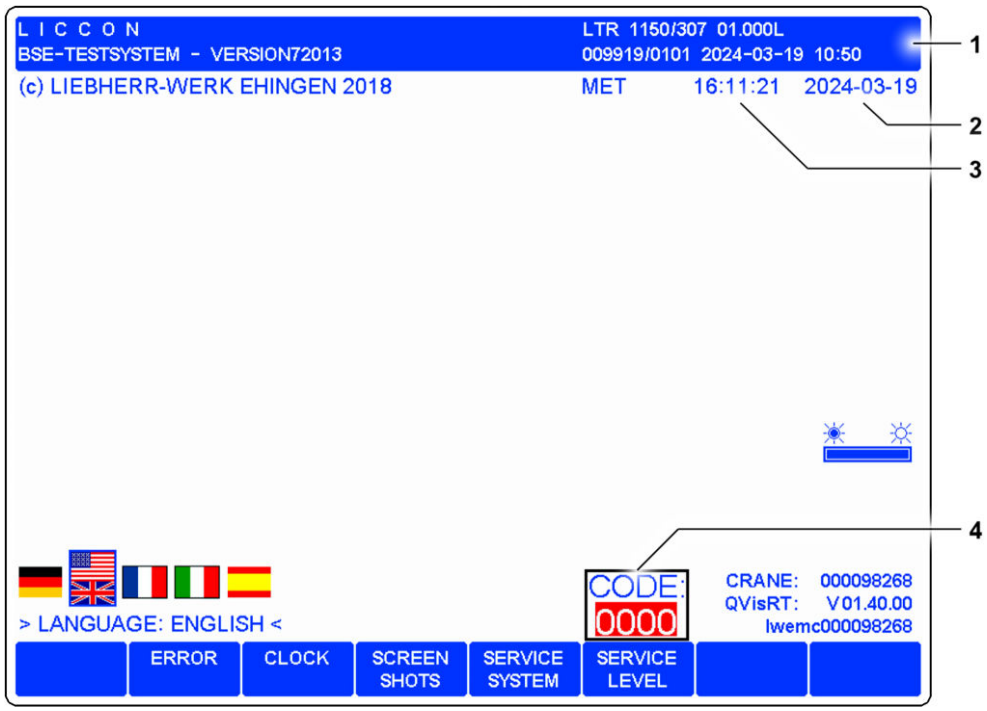


Fig. 627: Exemplary illustration: Test system

1 Header
2 Date display
3 Time display
4 Daily code entry

6.4.9.1 Header

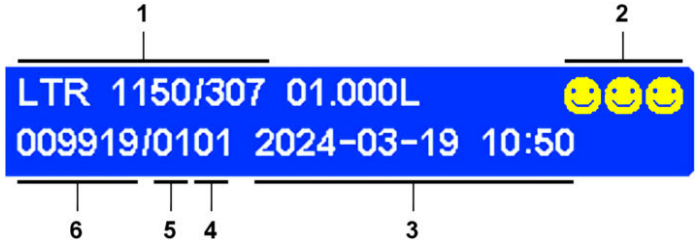


Fig. 628: Exemplary illustration: Header

1 Crane identifier
2 Service level
3 Software release date and release time
4 Muli version
5 Program counter
6 Crane number

Service level	Icon	Authorization	Daily cod required
0		Crane operator	No
1		Technician	Yes
2		Expert	Yes
3		Supervisor	Yes

Tab. 69: Service levels

It is **not** possible to change system-relevant or safety-relevant parameters or functions in service level 0.

Service level 0 authorizations:
- Change the language setting
- Display and delete errors in the *error stack*
- Display the time settings in the *Clock* menu
- Create and display screenshots

Note

Changing the time setting requires at least service level 1.

6.4.9.2 Displays

Fig. 633: Language display

Fig. 634: Brightness display states

1 Lowest brightness level
2 Middle brightness level
3 Highest brightness level

6.4.9.3 Buttons

Fig. 635: Buttons

1 Error stack button
2 Time menu button
3 Screenshots menu button
4 Service system button
5 Service level buttons

6.4.9.4 Error stack

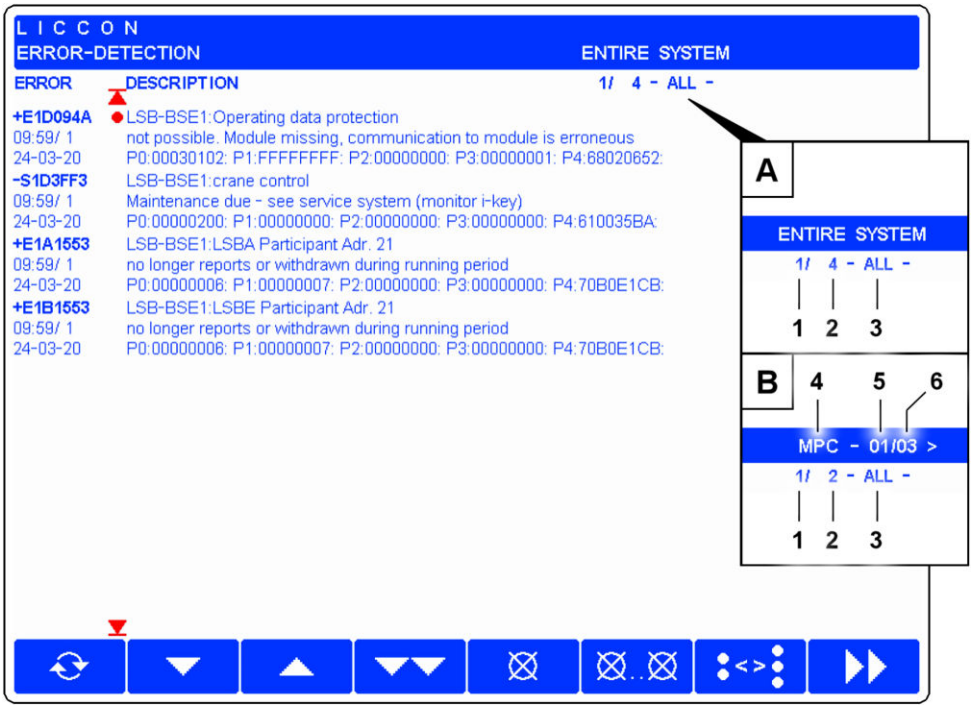


Fig. 636: Exemplary illustration: Error stack

A Total system error stack
B Module error stack
1 Number of the selected error
2 Total number of errors on the current page
3 Additional information active
4 Module designation
5 Current module
6 Total number of modules

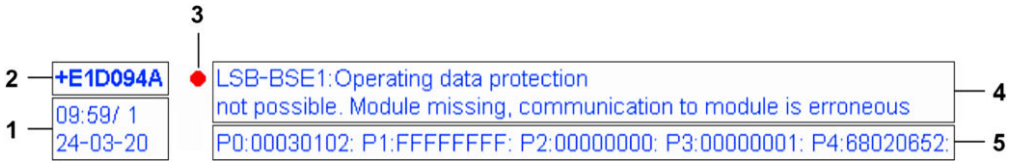


Fig. 637: Exemplary illustration: Error message

1 Date / time
2 Error code (LEC)
3 Cursor
4 Error text
5 Additional information

The cursor **3** shows which error message is selected.

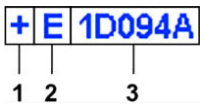


Fig. 638: Exemplary illustration: Error code display (LEC)

1 Error status
2 Type of error
3 Error number

Error status **1** states:
- **"+":** Active error
- **"-":** Inactive error

Error type **2** conditions:
- **"E":** System error
- **"B":** Operating error
- **"S":** Service message

Update **button**

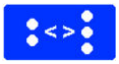
Cursor down **button**

Cursor up **button**

Page down **button**

Delete selected error **button**

Delete all errors **button**



Additional information **button**

Back **button**

6.4.9.5 Screenshots menu

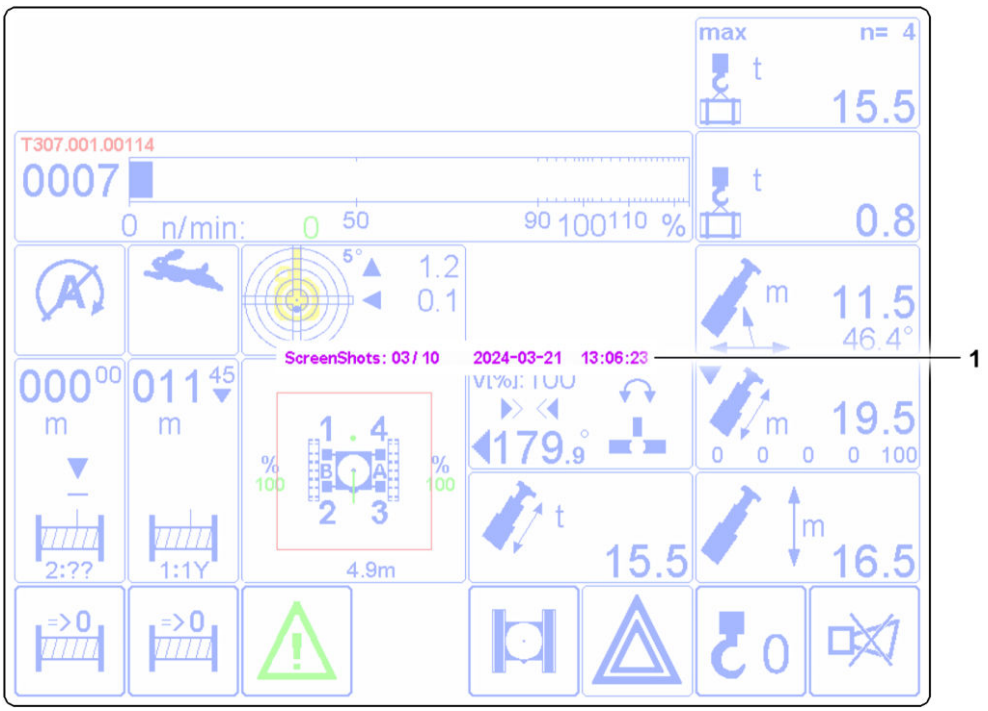


Fig. 647: Exemplary illustration: Screenshots menu

1 Screenshot information display

Fig. 648: Exemplary illustration: Screenshot information display

1	Number of the displayed screenshot	**3**	Date created
2	Total number of screenshots	**4**	Time created

6.4.9.6 Service system

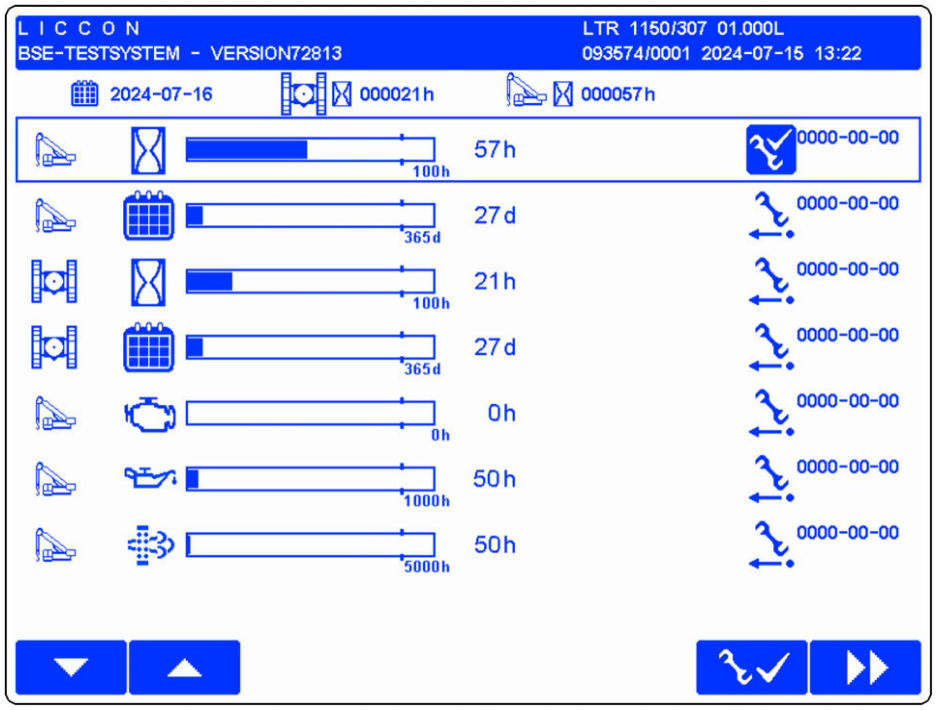


Fig. 649: Service system

Buttons

***Down* button**

***Up* button**

Reset the maintenance status button

Back button

Display area

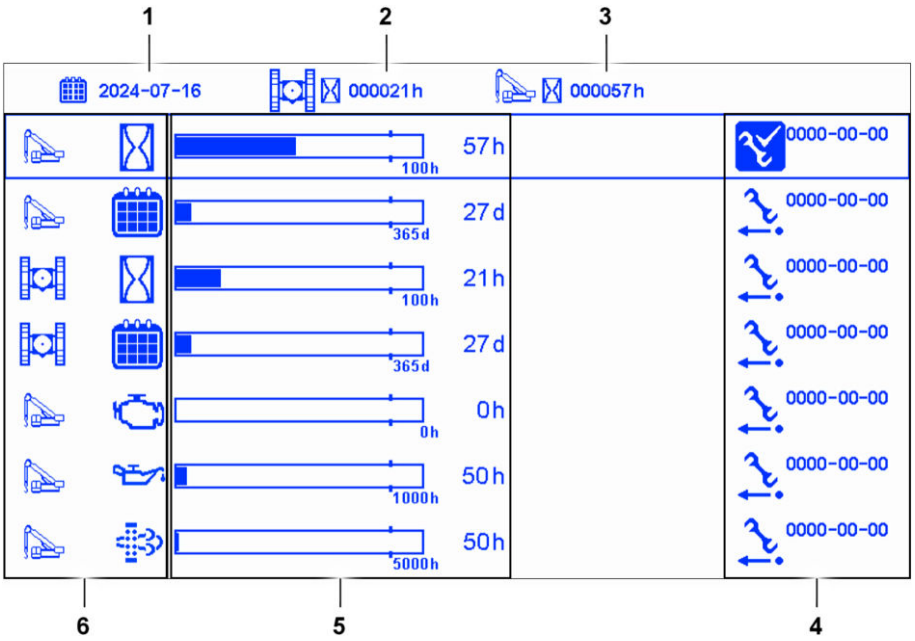


Fig. 654: Display area

1 Date
2 Chassis operating hours
3 Superstructure operating hours
4 Last maintenance column
5 Due date column
6 Range column

Areas

Symbol	Area designation
	Superstructure hours maintenance status
	Superstructure days maintenance status
	Chassis hours maintenance status
	Chassis days maintenance status
	Overall engine maintenance status
	Engine oil maintenance status
	Diesel particle filter (DPF)* maintenance status

Tab. 70: Areas

Due date display

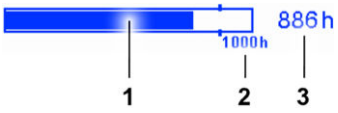


Fig. 662: Exemplary illustration: Due date display

1 Elapsed time since last maintenance (graphic)
2 Maintenance interval
3 Elapsed time since last maintenance (numeric)

***Elapsed time since last maintenance (graphic)* 1 display:**
- **Is displayed in blue:** Maintenance status OK
- **Is displayed in yellow:** Maintenance is due

Note

The *diesel particle filter (DPF)** maintenance status and *engine oil* maintenance status depend on the crane operating conditions.

Last maintenance display

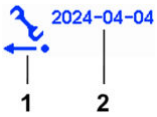


Fig. 663: Last maintenance display

1 Icon
2 Date of last maintenance

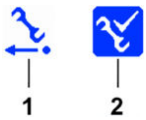


Fig. 664: Icon states

1 Maintenance status **not** selected
2 Selected maintenance status

6.4.10 Remote diagnostics system

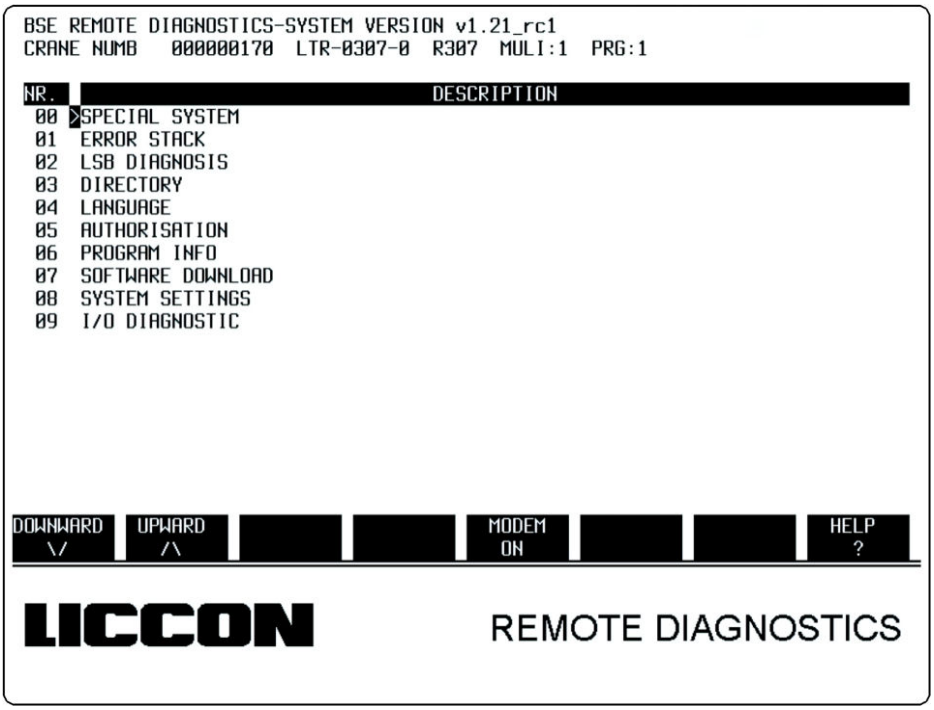


Fig. 665: Exemplary illustration: Remote diagnostics system

6.5 Crane remote control

6.5.1 Components of the crane remote control

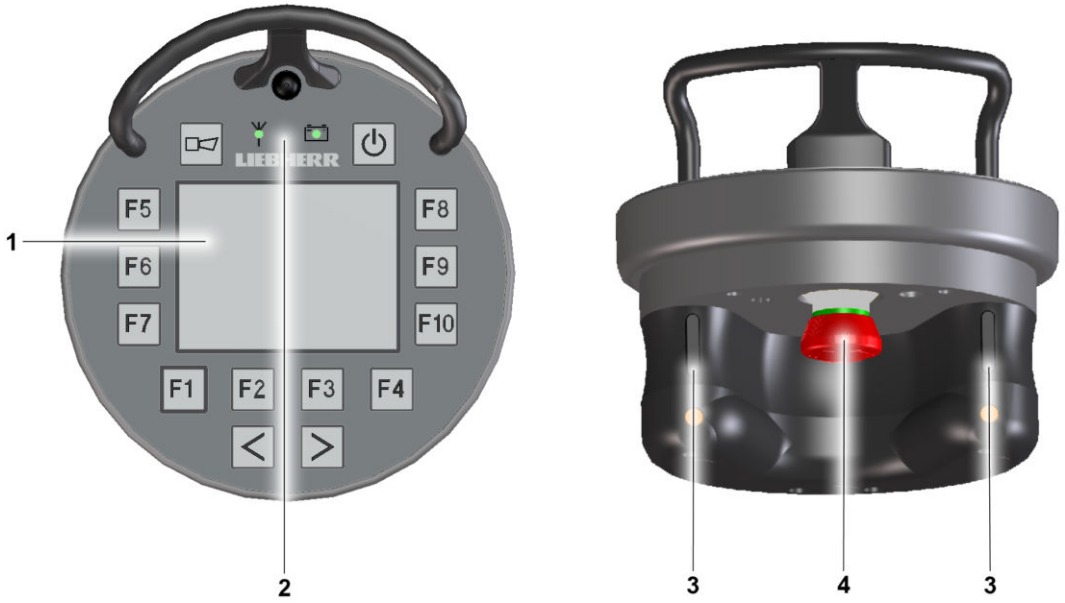


Fig. 666: Crane remote control

1 Display unit
2 Indicator lights
3 Enable buttons
4 Stop switch

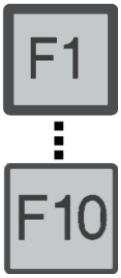
6.5.1.1 Buttons

***On / off* button**

***Horn* button**

***Page to the left* button**

***Page to the right* button**



F-buttons *F1* to *F10*

Menu-dependent functions

6.5.1.2 Indicator lights

Fig. 672: Radio signal indicator light

Radio connection **indicator light:**
- **Lights up green:** OK
- **Lights up yellow:** Weak radio signal
- **Lights up red:** No radio signal

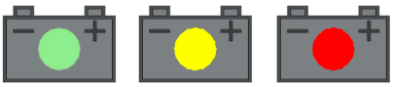


Fig. 673: Rechargeable battery state of charge indicator light

Rechargeable battery state of charge **indicator light:**
- **Lights up green:** OK
- **Lights up yellow:** Low
- **Lights up red:** Discharged

6.5.2 Error display

Error **display**

Exemplary illustration: In case of an error, a question mark is shown on the corresponding display.

6.5.3 Standby menu

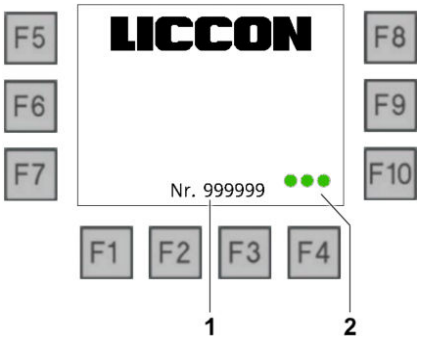


Fig. 675: Exemplary illustration: Standby menu

1 Plant number

2 Code entry symbol

Note

Crane operation from the crane cab is possible while the *standby menu* is displayed.

Fig. 676: Code entry icon states

The *code entry* symbol is shown only if there is **no** radio connection between the mobile crane and crane remote control.

***Code entry* symbol 2:**
- **All three circles are displayed in green:** Code calibration OK
- **At least one circle is displayed in red:** Code calibration incomplete or incorrect

6.5.4 Buttons and displays

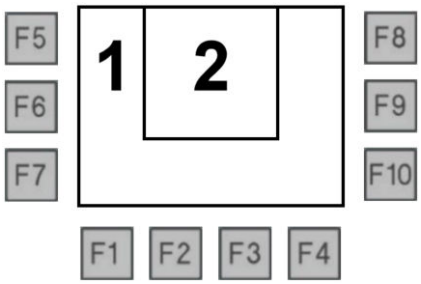


Fig. 677: Menu areas

1 Button area **2** Display area

Note

Depending on the menu, the size and content of the display area varies.

6.5.4.1 Buttons and icons

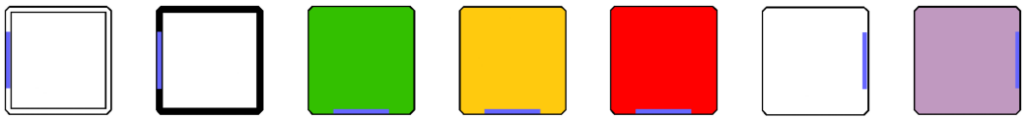


Fig. 678: Buttons

Icon with blue bar: Operate the button with adjacent F-button.

Fig. 679: Exemplary illustration: Menu button

The **icon turns white:** Button for available menu (only in the start menu).

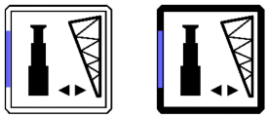


Fig. 680: Exemplary illustration: Selectable buttons

The **icon turns white with a white frame:** The function is **not** selected.

The **icon turns white with a black frame:** The function is selected.

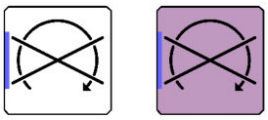


Fig. 681: Exemplary illustration: Buttons that can be enabled

The **icon turns white:** The function is **not** released.

The **icon turns purple:** The function is released.

Fig. 682: Exemplary illustration: Buttons with state indicator.

The **icon turns green, yellow or red:**. Button with state indicator.

Fig. 683: Exemplary illustration: Warning and indicator lights

The **icon turns green, yellow or red:**. Warning or indicator light.

Fig. 684: Floodlight icon

Floodlight icon not filled in: Lighting off

Floodlight icon filled in: Lighting on

6.5.5 Start menu

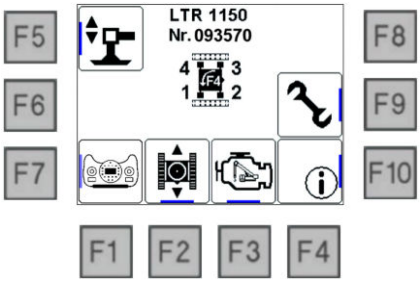


Fig. 685: Exemplary illustration: Start menu

Change operating alignment **icon**

F4 button

Crane support menu **button**

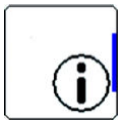
Assembly functions menu **button**

Crane operation menu **button**

Expanded crane remote control*

Track width adjustment menu button

Engine menu **button**



Error stack menu **button**

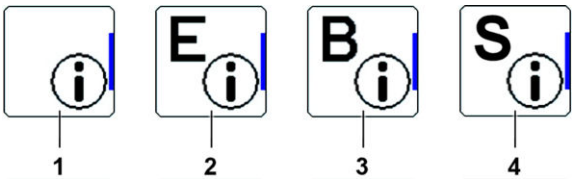


Fig. 693: Error stack menu button states

1 No error
2 System error
3 Operating error
4 Service message

6.5.6 Engine menu

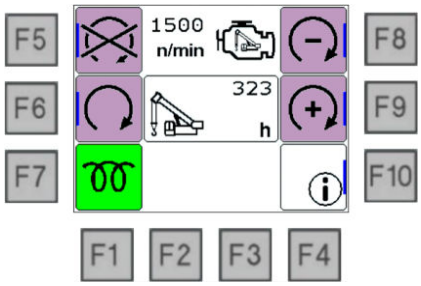


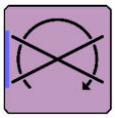
Fig. 694: Engine menu

Fig. 695: Exemplary illustration: Display in the superstructure engine menu

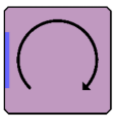
1 Engine rpm
2 Rpm unit
3 Engine status icon
4 Engine operating hours

Engine OK **icon**

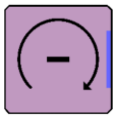
Engine error **icon**



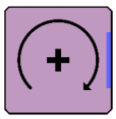
Stop engine **button**



Start engine **button**



Reduce engine rpm **button**



Increase engine rpm **button**

Starting readiness **icon**

Fig. 703: Starting readiness icon states

Starting readiness **icon:**
- **Is displayed in green:** Engine ready to start
- **Is displayed in yellow:** Engine preheating is active
- **Is displayed in red:** Error

***Error stack menu* button**

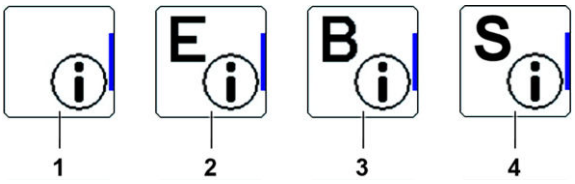


Fig. 705: Error stack menu button states

1 No error
2 System error
3 Operating error
4 Service message

6.5.7 Warning and indicator lights menu

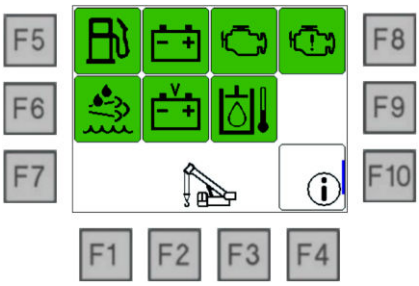


Fig. 706: Warning and indicator lights menu

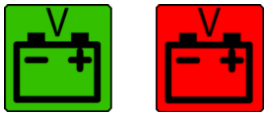


Fig. 707: Battery voltage icon states

***Battery voltage* icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too low

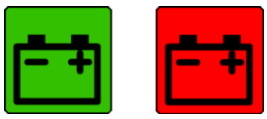


Fig. 708: Alternator charge indicator icon states

***Alternator charge indicator* icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Alternator error

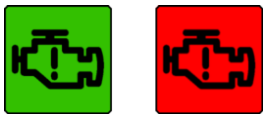


Fig. 709: Engine stop (RSL) icon states

***Engine stop (RSL)* icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Observe the error and turn off the engine immediately!

Fig. 710: Exhaust aftertreatment (MIL) icon states

***Exhaust aftertreatment (MIL)* icon:**
- **Is displayed in green:** OK
- **Is displayed in yellow:** Urea tank level low or error (low power reduction)
- **Is displayed in red:** Urea tank level very low or error (high power reduction)

Fig. 711: Urea tank level icon states

***Urea tank level* icon:**
- **Is displayed in green:** OK
- **Is displayed in yellow:** Low
- **Is displayed in red:** Very low

Fig. 712: Fuel tank level icon states

***Fuel tank level* icon:**
- **Is displayed in green:** OK
- **Is displayed in yellow:** Low
- **Is displayed in red:** Very low

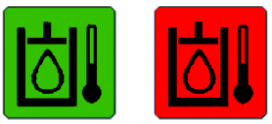


Fig. 713: Hydraulic oil temperature icon states

***Hydraulic oil temperature* icon:**
- **Is displayed in green:** OK
- **Is displayed in red:** Too high

***Error stack menu* button**

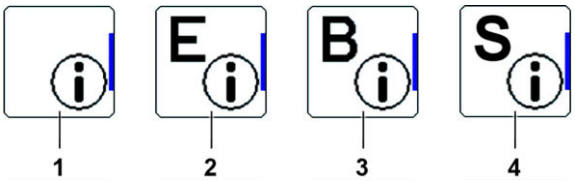


Fig. 715: Error stack menu button states

1 No error
2 System error
3 Operating error
4 Service message

6.5.8 Assembly support menu

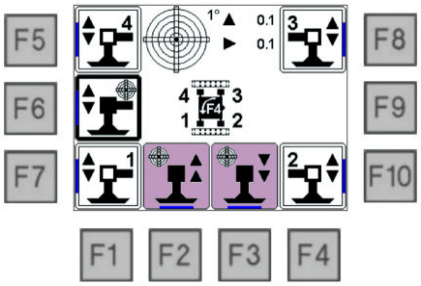


Fig. 716: Exemplary illustration: Assembly support menu

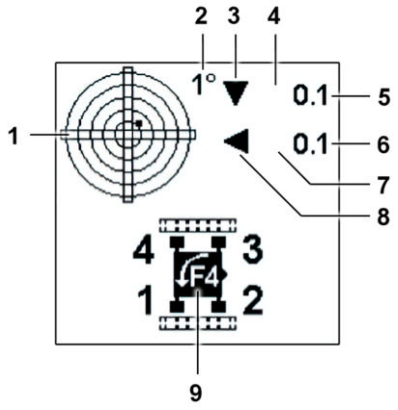


Fig. 717: Exemplary illustration: Display in the assembly support menu

1 Incline indicator (graphic)
2 Incline increment 1°, 5° or 25°
3 Lateral side incline direction
4 Display range exceeded
5 Incline in the lateral direction (numeric)
6 Incline in the longitudinal direction (numeric)
7 Display range exceeded
8 Longitudinal side incline direction
9 Operating alignment and support cylinder assignment

***Change operating alignment* icon**

F4 F-button

***Support cylinder* button**

Exemplary illustration: The number in the icon corresponds to the assignment to the support cylinder.

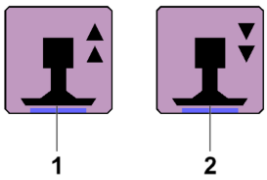


Fig. 720: Additional support cylinder buttons

1 Retract the support cylinders **2** Extend support cylinder

***Automatic support* button**

Support the crane levelled.

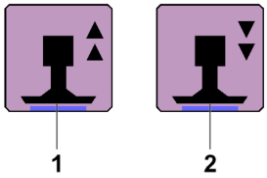


Fig. 722: Additional automatic support buttons

1 Retract the support cylinder **2** Extend support cylinder

6.5.9 Track width adjustment menu

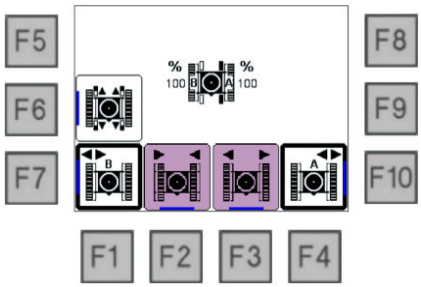


Fig. 723: Track width adjustment menu

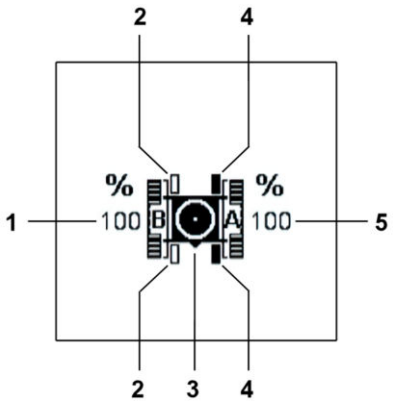


Fig. 724: Exemplary illustration: Display in the track width adjustment menu

1 Cross carrier B extension condition as a percentage (%) **4** Cross carrier pinning icon A

See next page for continuation of the image legend

2 Cross carrier pinning icon B

3 Chassis front side identification

5 Cross carrier A extension condition as a percentage (%)

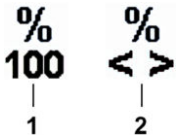


Fig. 725: Exemplary illustration: Cross carrier extension condition display states

1 Cross carrier in the pin position

2 Cross carrier in the intermediate position (blinks)

The cross carriers can be pinned at **0 %**, **65 %** and **100 %** extension lengths.

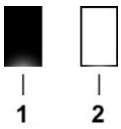
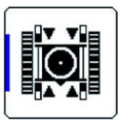


Fig. 726: Cross carrier pinning icon states

1 Cross carrier pinned

2 Cross carrier unpinned



Cross carrier pinning **button**

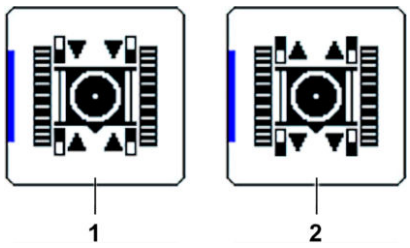
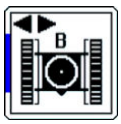


Fig. 728: Cross carrier pinning button states

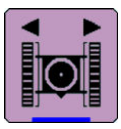
1 Cross carrier pinned

2 Cross carrier unpinned

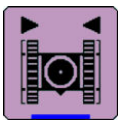
Cross carrier A **button**



Cross carrier B **button**



Extend cross carrier **button**



Retract cross carrier **button**

6.5.10 Assembly functions menu

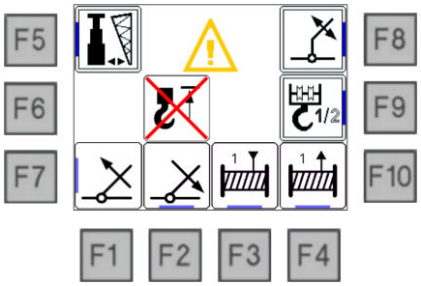


Fig. 733: Exemplary illustration: Assembly functions menu

Assembly operation warning icon

Appears when the shut-offs are bypassed (assembly operation).

Hoist limit switch triggered icon

Hoist limit switch bypassed icon

Folding jib assembly* button

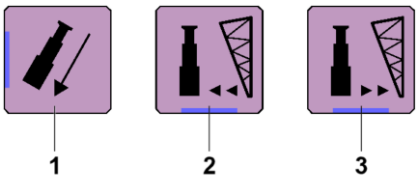


Fig. 738: Additional folding jib assembly buttons

1 Tension the telescopic boom
2 Swing the folding jib in
3 Swing the folding jib out

Hydraulic auxiliary boom luffing* button

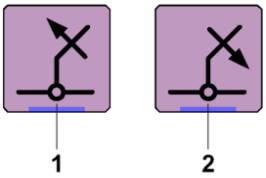


Fig. 740: Additional hydraulic auxiliary boom buttons

1 Luff the auxiliary boom up
2 Luff the auxiliary boom down

Hook block assembly button

Place holder for possible functions

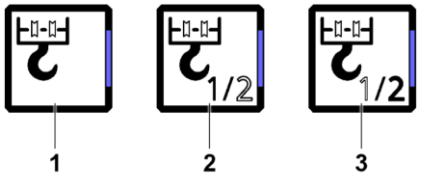


Fig. 742: Hook block assembly button functions

1 Winch 1 selected (winch 2* disassembled)
2 Winch 1 selected
3 Winch 2* selected

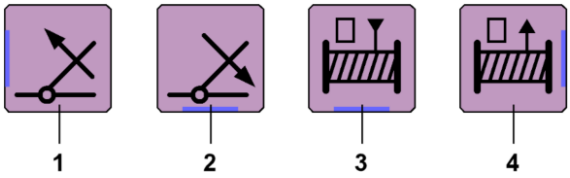


Fig. 743: Additional assembly functions menu buttons

1 Luff main boom up
2 Luff main boom down
3 Spool winch up
4 Spool winch out

6.5.11 Pivot section floodlight menu

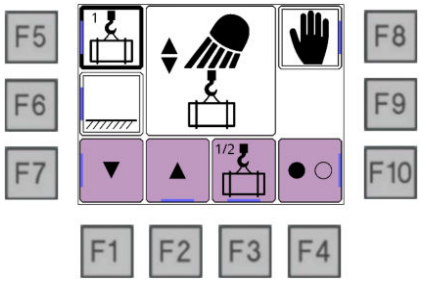


Fig. 744: Exemplary illustration: Pivot section floodlight menu

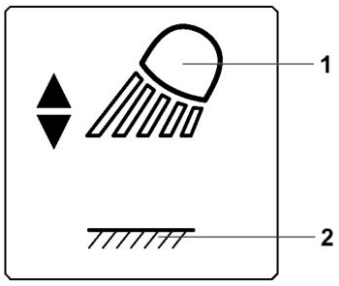
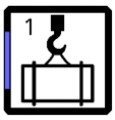


Fig. 745: Exemplary illustration: Display in the pivot section floodlight menu

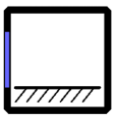
1 Pivot section floodlight icon
2 Operating mode icon



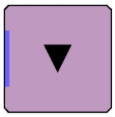
Load following **button**

Exemplary illustration: The number in the icon corresponds to the current load position.

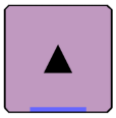
Manual control operation **button**



Illuminate working area **button**



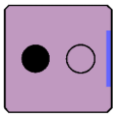
Swing the pivot section floodlight down **button**



Swing the pivot section floodlight up **button**

Change winch / load position **button**

Exemplary illustration: The number in the icon corresponds to the current load position and number of available load positions



Turn the pivot section floodlight on and off **button**

6.5.12 Diagnostics system menu

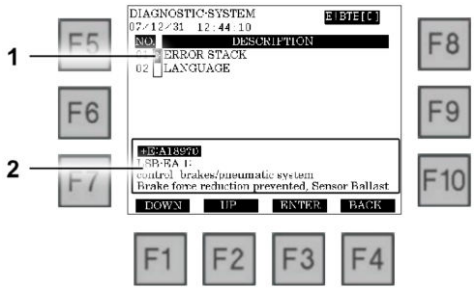


Fig. 753: Exemplary illustration: Diagnostics system menu

1 Cursor selection

2 Current error display area

DOWN ***Cursor down*** **or** ***next page*** **button**

Depending on the displayed menu

UP ***Cursor up*** **button**

ENTER ***Enter*** **button**

BACK ***Back*** **button**

MORE ***More options*** **button**

UPDATE ***Update*** **button**

DELETE ***Delete* button**

PARAM ***Additional information* button**

6.5.12.1 Error stack menu

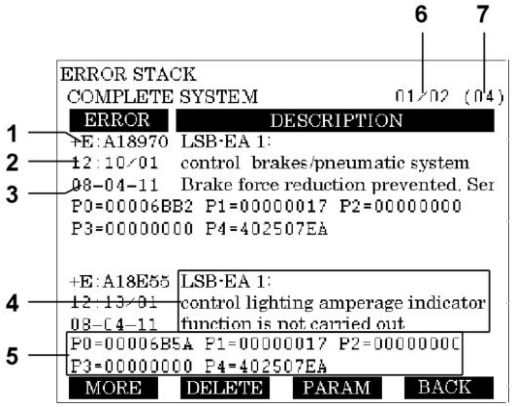


Fig. 762: Exemplary illustration: Error stack

1 Error code (LEC)
2 Time / frequency
3 Date (month / day / year)
4 Error description
5 Additional information
6 Page number
7 Error count

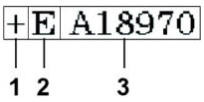


Fig. 763: Exemplary illustration: Error code (LEC) display

1 Error status
2 Type of error
3 Error number

Error status **1** states:
- **"+":** Active error
- **"-":** Inactive error

Error type **2** conditions:
- **"E":** System error
- **"B":** Operating error
- **"S":** Service message

6.5.12.2 Language setting menu

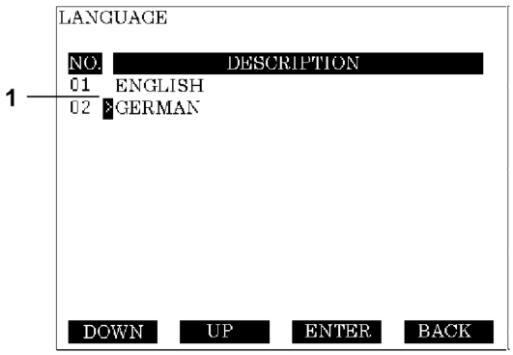


Fig. 764: Changing the language

1 Select the language

6.5.13 Settings and status displays menu

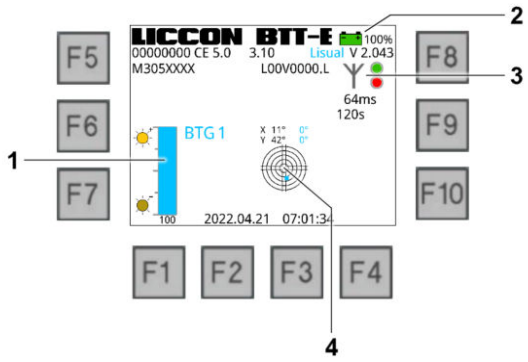


Fig. 765: Exemplary illustration: Settings and status displays menu

1 Crane remote control brightness
2 Rechargeable battery state of charge with display icon
3 Connection type icon
4 Crane remote control incline display

***Connection type* icon 3**

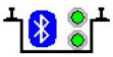
Connection via electrical line

***Connection type* icon 3**

Connection via infrared interface

***Connection type* icon 3**

Connection via radio



***Connection type* icon 3**

Connection via radio, expanded crane remote control

***Connection type* icon 3**

Neutral connection type

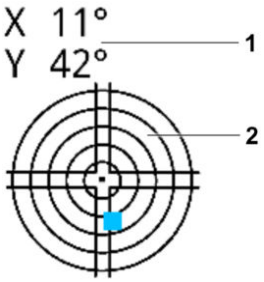


Fig. 771: Crane remote control incline display

1 Incline indicator (numeric)

2 Incline indicator (graphic)

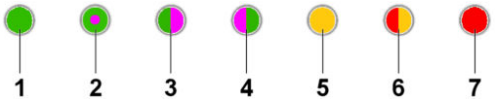


Fig. 772: Radio connection status icon states

1 Connected (displayed in green)

2 Search mode (is displayed in green with a pink dot)

3 Switching to search mode (displayed in green / pink)

4 Switch to active mode (displayed in pink / green)

5 The connection is established (displayed in yellow)

6 **Not** connected (displayed in red / yellow)

7 Crane remote control **not** coupled with the mobile crane (displayed in red)

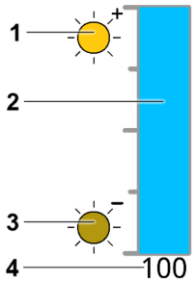


Fig. 773: Crane remote control brightness

1 Increase brightness button

2 Brightness display (graphic)

3 Reduce brightness button

4 Brightness display (numeric)

***Rechargeable battery state of charge* icon**

Fig. 775: Rechargeable battery state of charge icon states

***Rechargeable battery state of charge* icon:**

- **Is displayed in green:** OK
- **Is displayed in yellow:** Low
- **Is displayed in red:** Very low

6.5.14 Button test menu

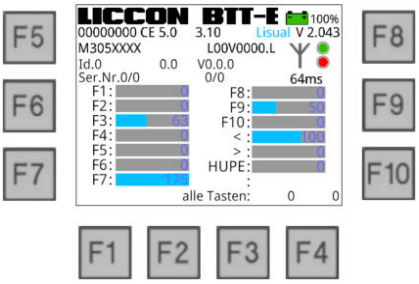


Fig. 776: Button test menu

The pressure level of every button is displayed as an analog value.

6.6 Expanded crane remote control*

6.6.1 Components of the expanded crane remote control

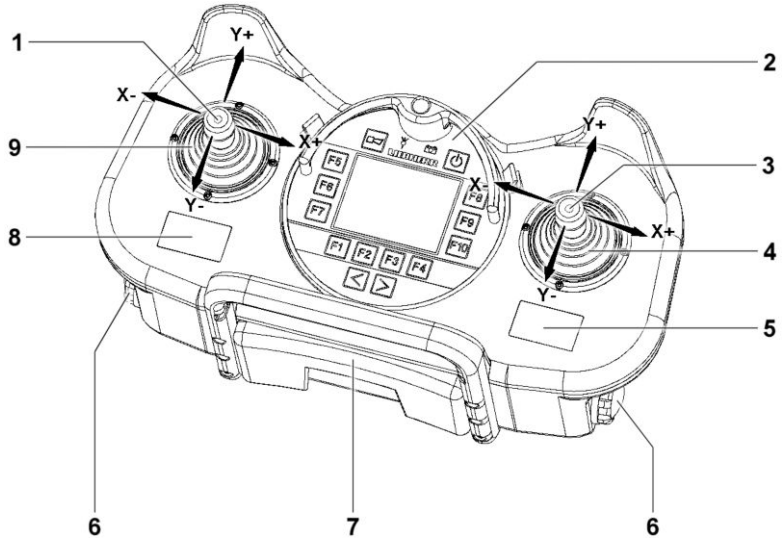


Fig. 777: Overview of expanded crane remote control

1 Speed switchover button
2 Crane remote control
3 Rapid gear button
4 Right control lever 1
5 Control lever 1 right display
6 Battery compartments
7 Remote control console*
8 Control lever 2 left display
9 Left control lever 2

X+ **Deflection to the right**

Function depending on the control lever assignment

X- **Deflection to the left**

Function depending on the control lever assignment

Y+ **Deflection to the front**

Function depending on the control lever assignment

Y- **Deflection to the bottom**

Function depending on the control lever assignment

6.6.2 Error display

? ***Error* display**

Exemplary illustration: In case of an error, a question mark is shown on the corresponding display.

6.6.3 Control lever assignment

Left turn **icon**

Right turn **icon**

Telescope out **icon**

Telescope in **icon**

Luff telescopic boom up **icon**

Luff telescopic boom down **icon**

Spool winch 1 out **icon**

Spool winch 1 up **icon**

Luff up the auxiliary boom **icon**

Luff down the auxiliary boom **icon**

Spool winch 2* out **icon**

Spool winch 2* up **icon**

***Pivot section floodlight* icon**

***Extend support cylinder* icon**

Left *control lever assignment* display

***Extend support cylinder* icon**

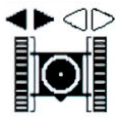
Right *control lever assignment* display

Retract *support cylinder* icon

Left *control lever assignment* display

Retract *support cylinder* icon

Right *control lever assignment* display

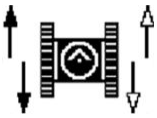


***Extend and retract the cross carrier* icon**

Left *control lever assignment* display

***Extend and retract the cross carrier* icon**

Right *control lever assignment* display

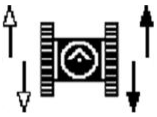


***Left crawler travel gear normal travel* icon**

Icon depending on the control lever assignment

***Left crawler travel gear normal travel* icon**

Icon depending on the control lever assignment

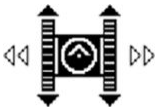


***Right crawler travel gear normal travel* icon**

Icon depending on the control lever assignment

***Right crawler travel gear normal travel* icon**

Icon depending on the control lever assignment



Crawler travel gear parallel travel icon

6.6.4 Crane operation menu

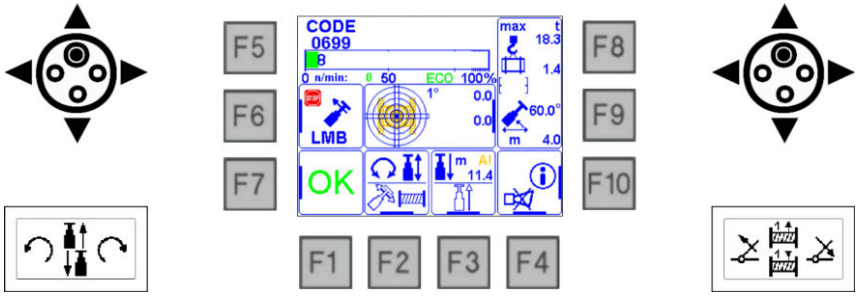


Fig. 807: Exemplary illustration: Crane operation menu

6.6.4.1 General buttons

Confirm set up configuration **button**

Fig. 809: Confirming set up configuration button conditions

Confirm set up configuration **button:**
- **Is displayed in green:** Set up configuration confirmed
- **Is displayed in yellow:** Set up configuration **not** confirmed
- **Is displayed in red:** Do **not** enter a set up configuration on the superstructure monitor

Luffing in with suspended load **button**

Telescoping **button**

Boom length unit **1**

Telescope condition icon **2**

Telescopic boom length **3**

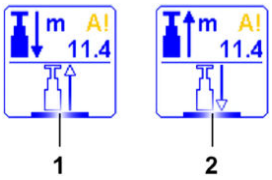


Fig. 812: Telescoping button functions

1 Telescope out button

2 Telescope in button

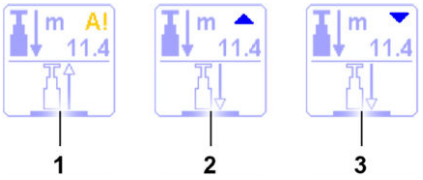


Fig. 813: Telescoping button states

1 Telescoping target reached
2 Telescope out request
3 Telescope in request

***Interrupt error stack menu / acoustic warning* button**

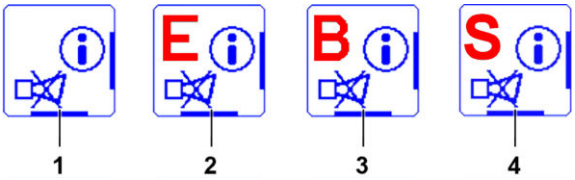


Fig. 815: Interrupting the error stack / acoustic warning menu states

1 No error
2 System error
3 Operating error
4 Service message

Control lever assignment button

Exemplary illustration. The icon changes depending on the crane condition or the turned on / turned off travel mode.

6.6.4.2 Crane geometry and load display

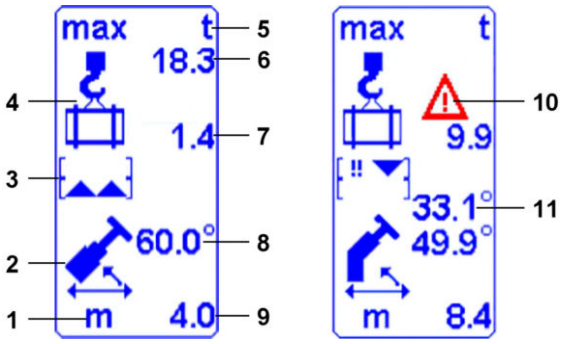


Fig. 817: Exemplary illustration: Crane geometry and load display

1 Boom radius unit
2 Boom system crane geometry icon
3 Luffing shut-off icon
4 Load icon
5 Load unit
6 Maximum load
7 Actual load
8 Telescopic boom angle
9 Boom radius
10 Maximum load invalid icon
11 Auxiliary boom angle

Icon	Description
▲	*Luff up* shut-off by triggering the upper load chart limit
▼	*Luff down* shut-off by triggering the lower load chart limit

Icon	Description
	Luff up shut-off by triggering the proximity switch
	Luff down shut-off by triggering the proximity switch (Only for auxiliary boom)
!!	Error
!!	Error and *luff up* shut-off
!!	Error and *luff down* shut-off

Tab. 71: Luffing shut-off icon states

6.6.4.3 General crane displays

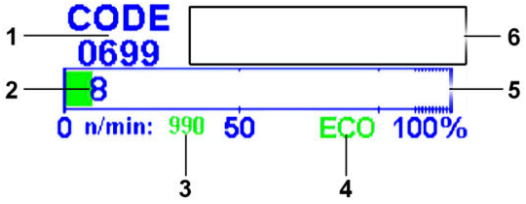


Fig. 825: General crane displays

1 Currently used set up code
2 Crane utilization (numeric)
3 Engine rpm in n/min
4 ECO mode icon
5 Crane utilization (graphic)
6 Warning and indicator lights

Fig. 826: Engine rpm states

***Engine rpm* display:**
- **Is displayed in green:** Rpm OK
- **Is displayed in yellow:** Rpm in the limit range
- **Is displayed in red:** Impermissible rpm range

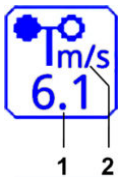
Fig. 827: Engine rpm additional icon

***Engine rpm* additional icon**
- **"+" icon:** Rpm locked
- **"!" Icon:** Rpm limited

Fig. 828: ECO mode icon states

***ECO mode* icon:**
- **Is displayed in green:** ECO mode turned on
- **Is displayed in yellow:** ECO mode turned on **but** inactive

ECO mode is inactive in the following cases:
- The engine rpm is increased manually.
- The engine rpm is locked.



Wind speed display

Wind speed **1**

Wind speed unit **2**

Hoist limit switch triggered icon

Hoist limit switch bypassed icon

***Engine warning* icon**

Observe the *warning and indicator lights* menu!

***Engine stop (RSL)* icon:**

Observe the error and turn off the engine immediately!

***Working area limitation shut-off** icon*

***Overload protection warning* icon**

***Overload protection shut-off** icon*

***Set overload protection warning* icon**

***Set overload protection shut-off* icon**

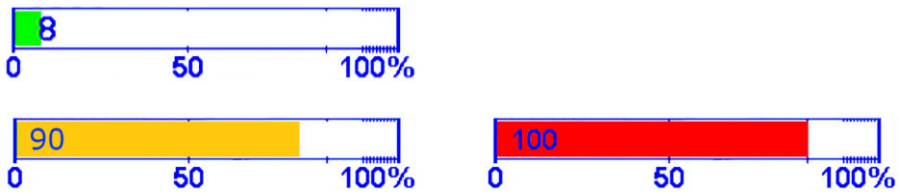


Fig. 839: Utilization display states

***Utilization* display:**

- **Is displayed in green:** OK
- **Is displayed in yellow:** Overload protection warning

– **Is displayed in red:** Overload protection shut-off

6.6.4.4 Speed reduction area

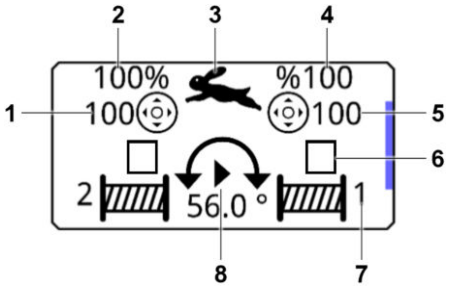


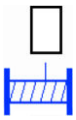
Fig. 840: Control lever speed reduction display

1 Left / right control lever 1 speed as a %
2 Front / rear control lever 1 speed as a %
3 Rapid gear icon
4 Front / rear control lever 2 speed as a %
5 Left / right control lever 2 speed as a %
6 Winch status icon
7 Winch assignment
8 Slewing gear display

Note

The displayed speed reductions apply for the displayed control lever assignment.

The displays and icons are identical for all winches.



***Winch status* icon**

Place holder for possible conditions

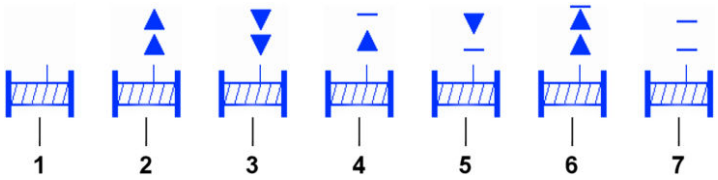


Fig. 842: Winch status icon states

1 **No** winch movement
1 Spool winch out
2 Spool winch up
3 Winch spooled out, spooling out blocked
4 Winch spooled up, spooling up blocked
5 Winch turned off in emergency
6 Error or winch locked

Fig. 843: Slewing gear display

1 Slewing range icon
2 Direction of rotation icon (starting from 0°)
3 Slewing angle display

6.6.4.5 Winch area

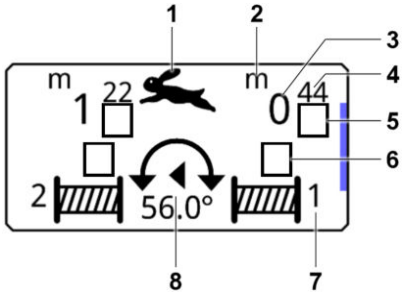


Fig. 844: Winch area

1	Rapid gear icon	**5**	Hook movement direction icon
2	Rope path / hook height unit	**6**	Winch status
3	Pre-decimal point rope path / hook height	**7**	Winch assignment
4	Rope path / hook height decimal place	**8**	Slewing gear displays

The displays and icons are identical for all winches.

***Hook movement direction* icon**

Place holder for possible conditions

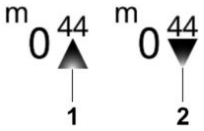
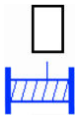


Fig. 846: Hook movement direction icon states

1	Rope path from zero point upward	**2**	Rope path from zero point downward



***Winch status* icon**

Place holder for possible conditions

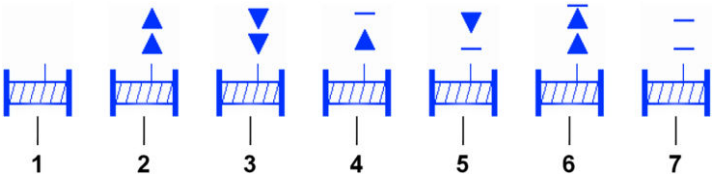


Fig. 848: Winch status icon states

1	Spool winch out	**4**	Winch spooled up, spooling up blocked
2	Spool winch up	**5**	Winch turned off in emergency
3	Winch spooled out, spooling out blocked	**6**	Error or winch locked

Fig. 849: Slewing gear display

1	Slewing range icon	**3**	Slewing angle display
2	Direction of rotation icon (starting from 0°)		

6.6.4.6 Crawler travel gear area

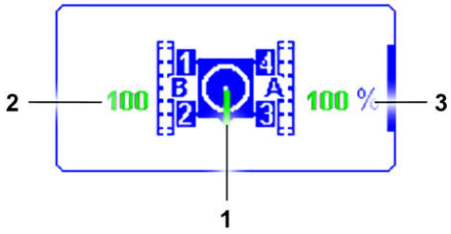


Fig. 850: Crawler travel gear area

1 Telescopic boom alignment
2 Cross carrier B extension condition
3 Cross carrier A extension condition

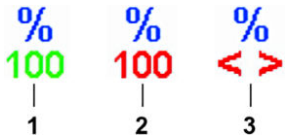


Fig. 851: Exemplary illustration: Cross carrier extension condition display states

1 Cross carrier in the set up pin position (displayed in green)
2 Cross carrier in a **not** set up pin position (blinks red)
3 Cross carrier in the intermediate position (blinks red)

6.6.4.7 Crane incline area

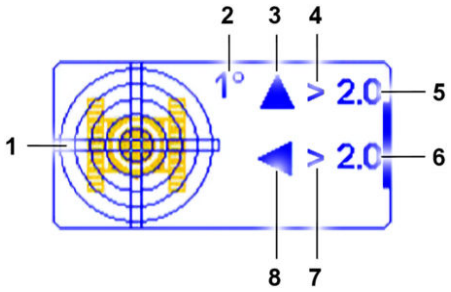


Fig. 852: Crane incline area

1 Incline indicator (graphic)
2 Incline increment 1°, 5° or 25°
3 Incline in the longitudinal direction (graphic)
4 Display range exceeded
5 Incline in the longitudinal direction (numeric)
6 Incline in the lateral direction (numeric)
7 Display range exceeded
8 Incline in the lateral direction (graphic)

6.6.5 Travel operation menu

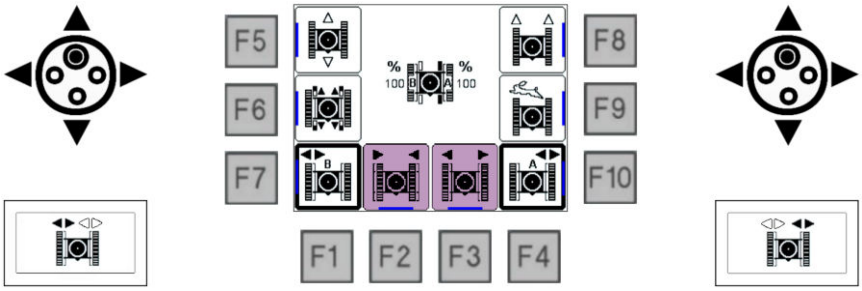


Fig. 853: Exemplary illustration: Travel operation menu

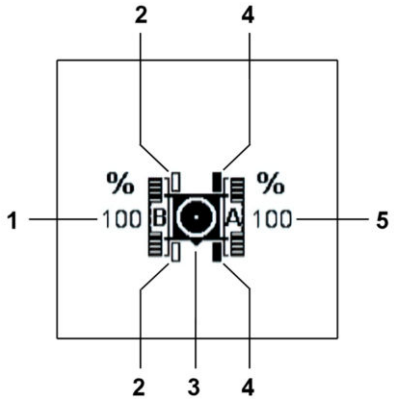


Fig. 854: Exemplary illustration: Display in the travel operation menu

1 Crawler carrier B extension condition as a percentage (%)

2 Cross carrier pinning icon B

3 Chassis front side identification

4 Cross carrier pinning icon A

5 Crawler carrier A extension condition as a percentage (%)

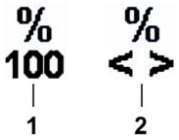


Fig. 855: Exemplary illustration: Cross carrier extension condition display states

1 Cross carrier in the pin position

2 Cross carrier in the intermediate position (blinks)

The cross carriers can be pinned at **0%**, **65 %** and **100 %** extension lengths.

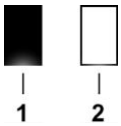
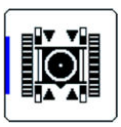


Fig. 856: Cross carrier pinning icon states

1 Cross carrier pinned

2 Cross carrier unpinned



Cross carrier pinning button

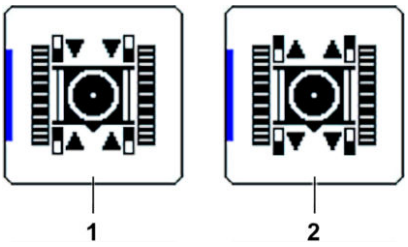
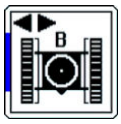


Fig. 858: Cross carrier pinning button states

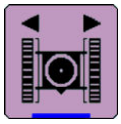
1 Cross carrier pinned

2 Cross carrier unpinned

***Cross carrier A* button**



***Cross carrier B* button**



Extend cross carrier button

Retract cross carrier button

Travel mode button

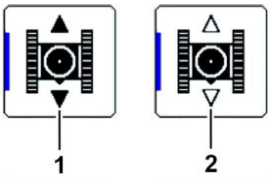


Fig. 864: Travel mode button states

1 Travel mode active

2 Travel mode is **not** active

Crawler travel gear parallel travel button

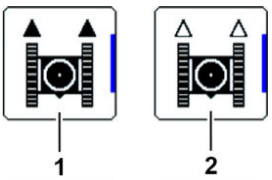


Fig. 866: Crawler travel gear parallel travel button states

1 Parallel travel active

2 Parallel travel **not** active

Crawler travel gear rapid gear button

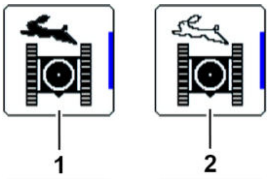


Fig. 868: Crawler travel gear rapid gear button states

1 Rapid gear active **2** Rapid gear **not** active

6.6.6 Control lever test menu

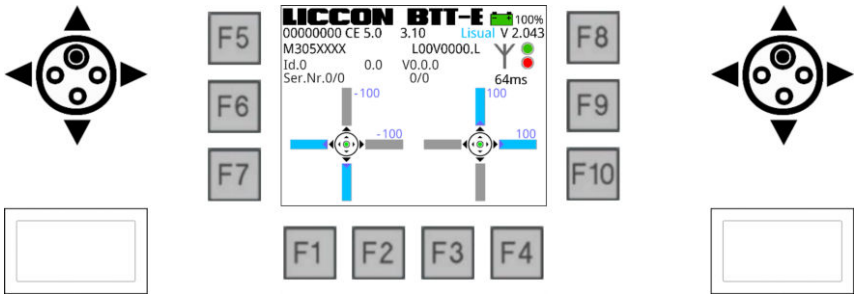


Fig. 869: Control lever test menu

The current steering of both control levers is displayed as a percentage.

6.6.7 Additional menus

The following menus are identical to crane remote control:

- Standby menu
  (→ 6.5.3 Standby menu, p. 322)
- *Start menu*
  (→ 6.5.5 Start menu, p. 324)
- *Engine* menu
  (→ 6.5.6 Engine menu, p. 325)
- *Warning and indicator lights* menu
  (→ 6.5.7 Warning and indicator lights menu, p. 327)
- *Assembly support* menu
  (→ 6.5.8 Assembly support menu, p. 329)
- *Assembly functions* menu
  (→ 6.5.10 Assembly functions menu, p. 332)
- *Pivot section floodlight* menu
  (→ 6.5.11 Pivot section floodlight menu, p. 333)
- *Error stack* menu
  (→ 6.5.12 Diagnostics system menu, p. 334)
- *Settings and status displays* menu
  (→ 6.5.13 Settings and status displays menu, p. 336)
- *Button test* menu
  (→ 6.5.14 Button test menu, p. 338)

7 Transport and storage

7.1 Crane

7.1.1 Crane dimensions and weight

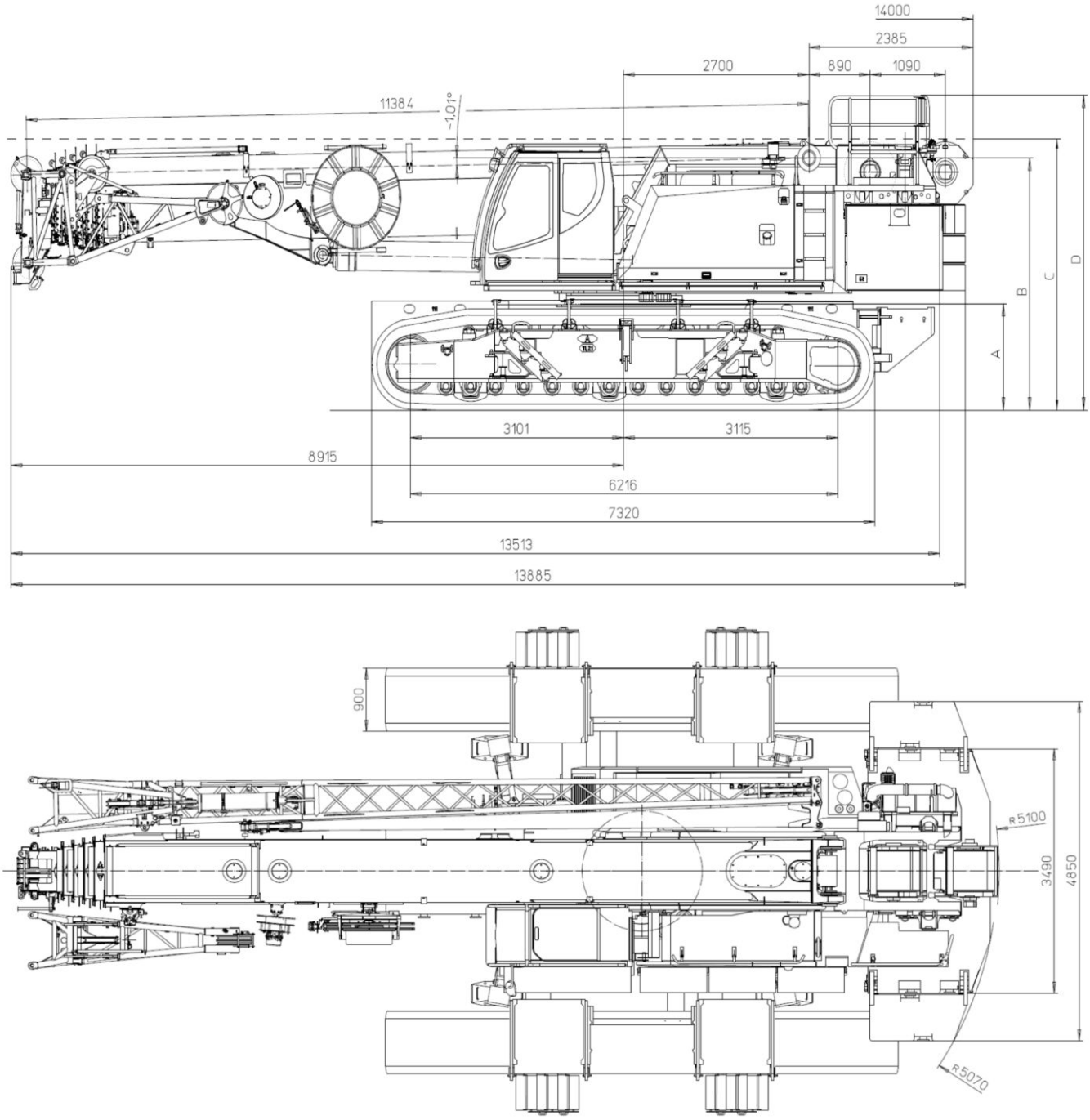


Fig. 870: Crane dimensions in millimeters (mm)

Crawler	Flat crawler plate	Grouser crawler plate	Grouser crawler plate with insertion plate
A	1334 mm	1328 mm	1308 mm
B	3159 mm	3153 mm	3133 mm
C	3400 mm	3374 mm	3394 mm
D	3945 mm	3939 mm	3319 mm

Tab. 72: Distances

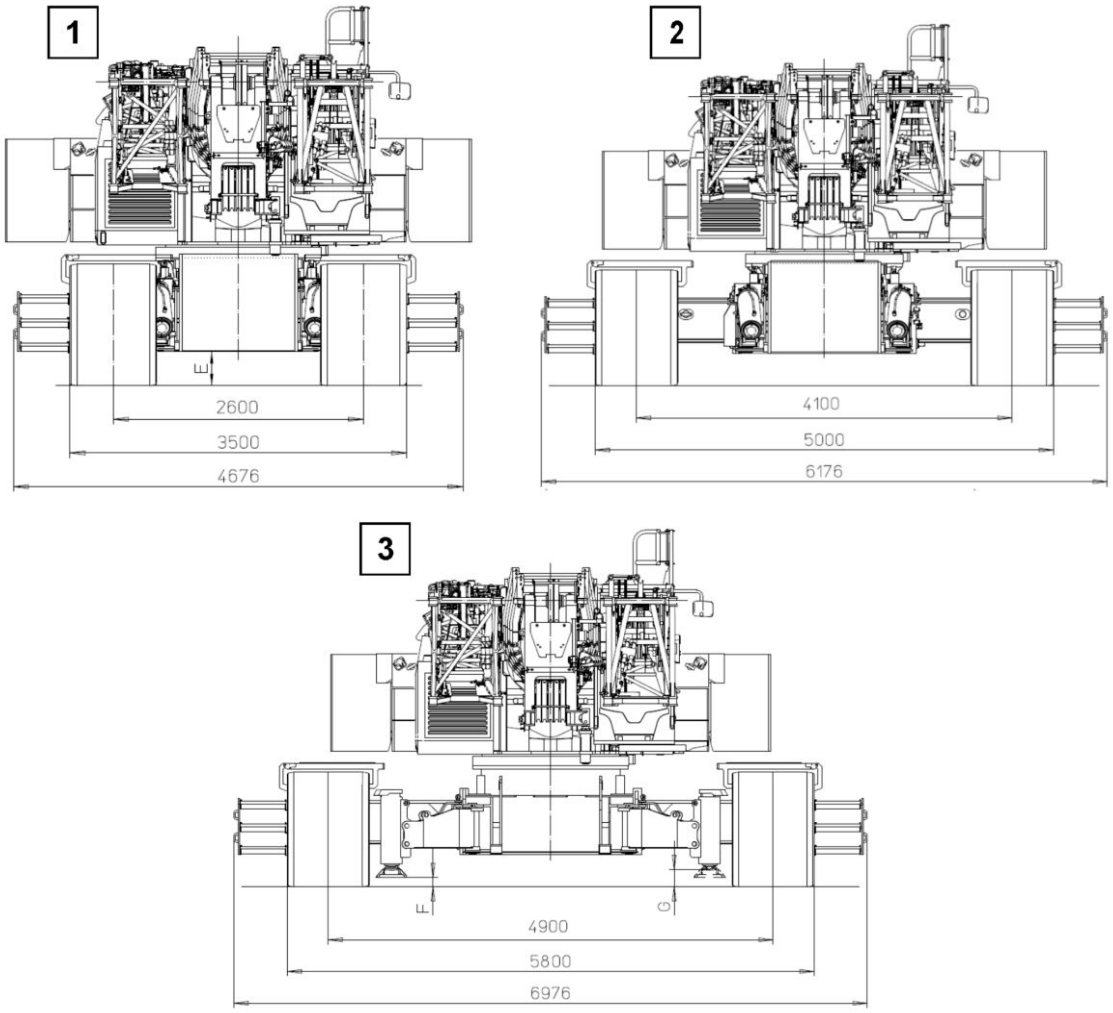


Fig. 871: Crane dimensions in millimeters (mm)

[1] Narrow track width
[2] Reduced track width
[3] Wide track width

Crawler	Flat crawler plate	Grouser crawler plate	Grouser crawler plate with insertion plate
E	365 mm	350 mm	330 mm
F	103 mm	97 mm	77 mm
G	194 mm	188 mm	168 mm

Tab. 73: Distances

7.1.2 Mobile crane rigging plan

Position in the rigging plan	Rigging point	Permissible rigging force
X	With RUD eyehook	13400 daN
Y	No RUD eyehook	10000 daN
	Area for rigging	

Tab. 74: Rigging points and permissible rigging force on the mobile crane

Condition			Center of gravity		Weight
Winch 2	Double folding jib	Special folding jib	S_x	S_y	
✓	✓	✕	1423 mm	1519 mm	62.5 t
✓	✕	✓	1452 mm	1490 mm	61.25 t
✓	✕	✕	1521 mm	1478 mm	60.65 t
✕	✓	✕	1305 mm	1485 mm	61 t
✕	✕	✓	1333 mm	1454 mm	59.8 t
✕	✕	✕	1402 mm	1441 mm	59.2 t
✓	✓	✓	1357 mm	1530 mm	63.1 t

Tab. 75: Center of gravity and weight

The mobile crane must be secured at 12 eyehooks.

The rigging devices must have a minimum tractive performance of 6300 daN.

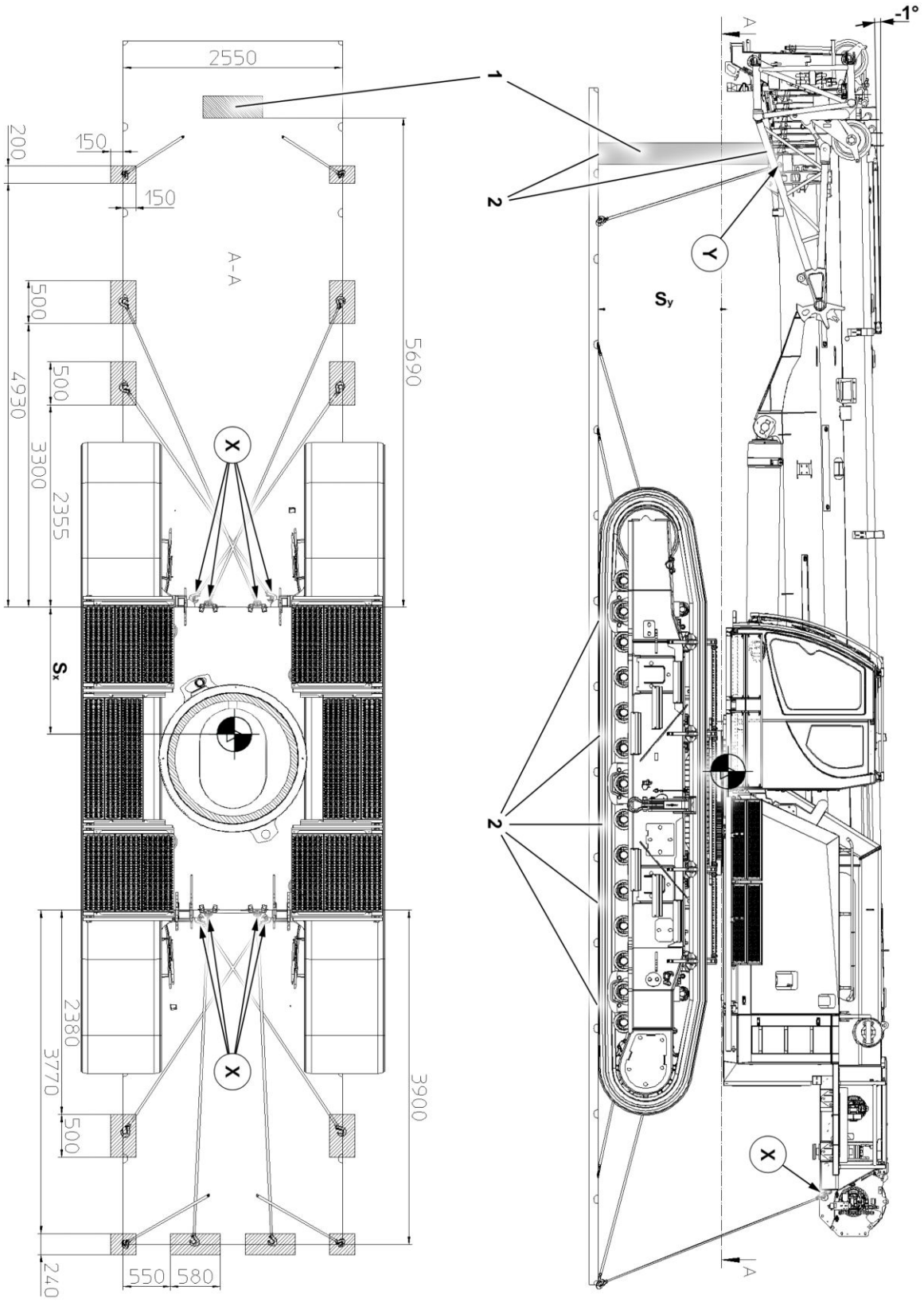


Fig. 873: Exemplary illustration: Mobile crane rigging plan with crawler carrier

1 Substructure
2 Slip-resistant mats
X Rigging point
Y Rigging point
Sx Center of gravity
Sy Center of gravity

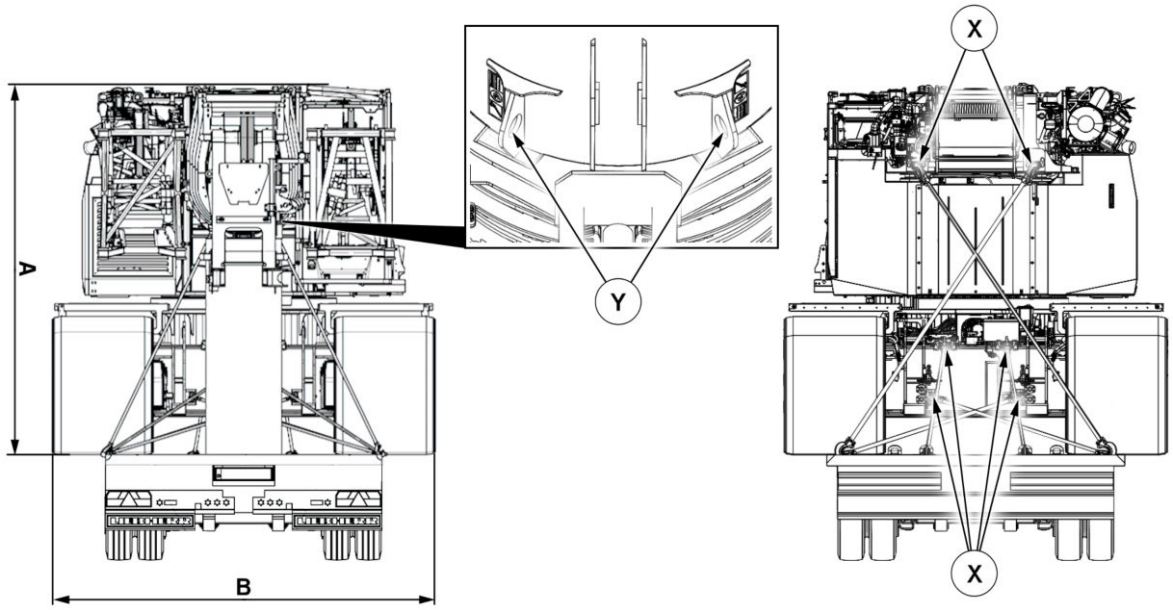


Fig. 874: Exemplary illustration: Rigging points and dimensions

A Height
B Width
X Rigging point
Y Rigging point

State	Height A	Width B
Flat crawler plate	3400 mm	3500 mm
Grouser crawler plate	3374 mm	3500 mm
Grouser crawler plate with insertion plate	3394 mm	3537 mm

Tab. 76: Transport dimensions

7.1.3 Fastening the crane with crawler carrier

Make sure that the following prerequisites are met:
- ❑ An auxiliary crane is available.
- ❑ The crane is standing on the crawler travel gear.
- ❑ The superstructure is pinned in the 0° position.
  (→ 8.16 Pinning the superstructure, p. 530)
- ❑ The telescopic boom is telescoped in all the way and pinned.
  (→ 8.18.5 Telescoping the telescopic boom, p. 545)
- ❑ The telescopic boom is luffed down to 0°.
  (→ Luffing the telescopic boom from the crane cab, p. 533)
- ❑ The turntable ballast is disassembled.
  (→ 10.7.7 Unpinning the ballast from the turntable, p. 765)
  (→ 10.7.9 Taking the ballast down, p. 766)
- ❑ The central ballast is disassembled.
  (→ 10.6.4 Disassembling the central ballast, p. 753)
- ❑ The folding jib is disassembled.
  (→ 10.8.15 Disassembling the folding jib, p. 819)
- ❑ The special folding jib is disassembled.
  (→ 10.9.12 Disassembling the special folding jib, p. 840)
- ❑ The hoist rope is reeved in twice on the hook block.
  (→ 10.4.9 Reeving the hook block in, p. 726)
  (→ 10.4.4 Use of reeving plans, p. 718)
- ❑ Suitable fastening ropes and shackles are fastened to the hooks on the auxiliary crane.

❑ A suitable ladder is available.

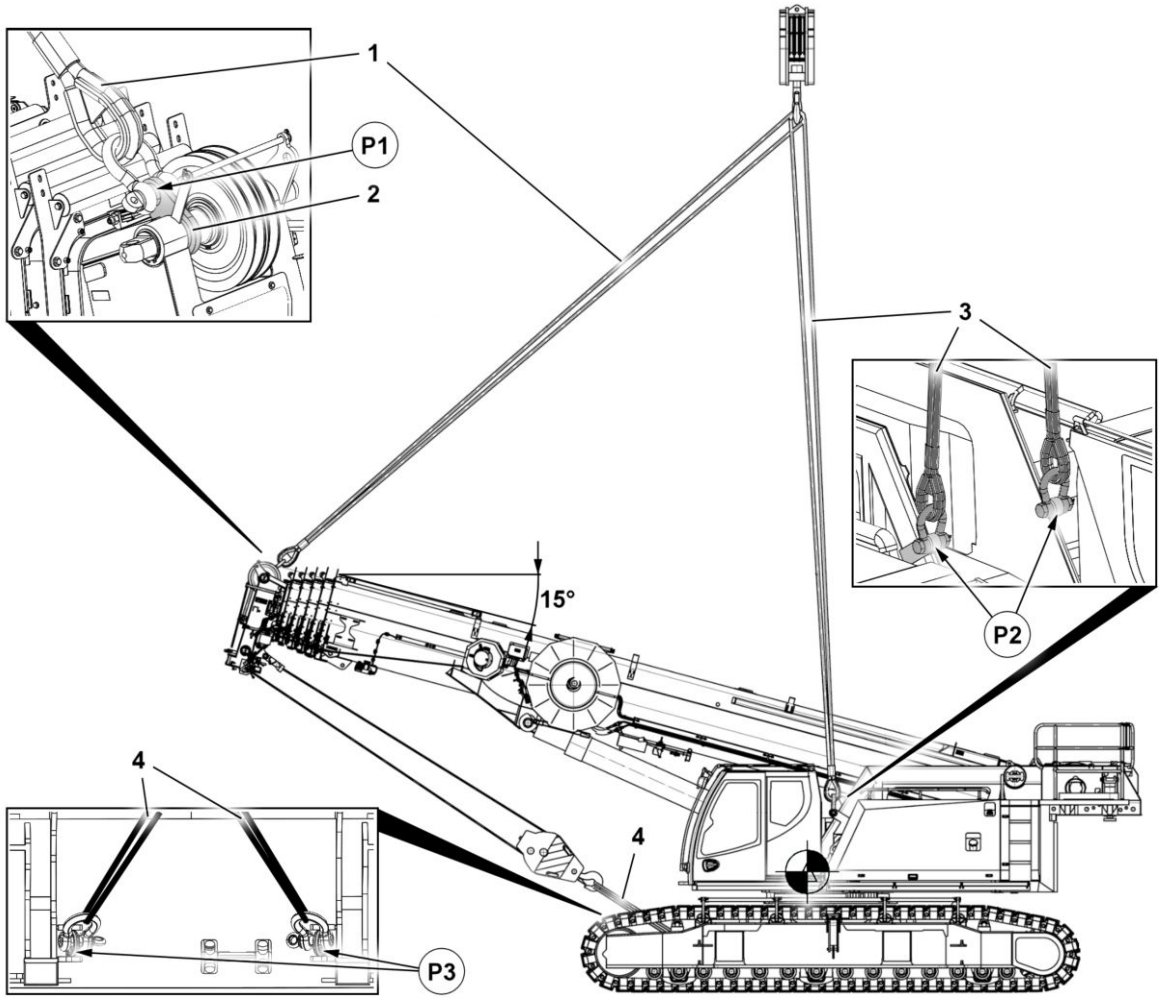


Fig. 875: Fastening the crane

1 Fastening equipment (15 t load bearing capacity and 10 m length)
2 Lashing lug
3 Fastening equipment (35 t load bearing capacity and 10 m length)
4 Fastening equipment (10 t load bearing capacity and at least 3 m length)

P1 Fastening position
P2 Fastening position
P3 Fastening position

▶ Secure the fastening equipment **1** in the fastening position **P1** of the lashing lug **2**.

▶ Until the fastening equipment **4** can be secured in the stop positions **P3**: Luff the telescopic boom up and spool the hoist rope out.

▶ Secure the fastening equipment **3** on both sides in the fastening positions **P2**.

▶ When the fastening equipment **3** is secured in the stop positions **P2**: Luff the telescopic boom down to 15° and spool the hoist rope up.

▶ Tension the hoist rope with a pull force of 2 t.

▶ Position the hook block of the auxiliary crane above the center of gravity.

▶ Tension the fastening equipment **1** and fastening equipment **3** at the same time.

▷ The crane can be lifted.

7.1.4 Loading the crane

Make sure that the following prerequisites are met:
- ❑ The superstructure is pinned with the chassis in the 0° or 180° position. (→ 8.16 Pinning the superstructure, p. 530)
- ❑ The telescopic boom is telescoped in all the way and pinned.
- ❑ The telescopic boom is luffed to an angle between 0° and 45°.
- ❑ The crawler travel gear is set to the narrow track width (2.6 m).
- ❑ The central ballast is disassembled.
- ❑ The turntable ballast is disassembled.
- ❑ The crawler chains are cleaned.
- ❑ A guide is present.
- ❑ A suitable transport vehicle is on available.
- ❑ The maximum side incline of the transport vehicle is 1°
- ❑ The maximum incline of the transport vehicle is 25°

▶ Drive the crane onto the transport vehicle carefully.

▶ Drive the crane to the rigging location carefully.

▶ Stop the crane horizontally in the rigging location.

▶ Turn the engine off and pull out the ignition key.

▶ Rigging the crane (→ 7.1.2 Mobile crane rigging plan, p. 355).

▶ Close all doors and windows.

▶ Close all covers, storage compartments and tool boxes.

7.1.5 Unloading the crane

Make sure that the following prerequisites are met:
- ❑ The superstructure is pinned with the chassis. (→ 8.16 Pinning the superstructure, p. 530)
- ❑ A guide is present.

▶ Remove all transport retainers.

▶ Drive the crane carefully off the transport vehicle.

7.1.6 Storing the crane

If the conditions in this section are observed, the crane can be stored as long as necessary.

7.1.6.1 Decommissioning

Make sure that the following prerequisites are met:
- ❑ The crane is carefully washed.
- ❑ Corrosion and paint damage on the crane have been removed.
- ❑ Worn or damaged components have been replaced.
- ❑ The crane is located in a dry hall.

▶ Remove the batteries properly.

7.1.6.2 Maintenance during storage

▶ Fill the fuel tank completely.

▶ Apply approved lubricants in all lube points.

▶ Replace all operating fluids.

▶ Check the crane for leaking fluids.

If fluids are leaking from the crane:
▶ fix the leak.

▶ Start the engine once a month.

The specified maintenance interval must be observed even if the crane is in storage.

▶ Service the crane according to the maintenance intervals.

7.1.6.3 Returning to service

Make sure that the following prerequisites are met:
❑ Permissible lubrication has been applied to the crane.
(→ 11.9.3 Servicing the central lubrication system, p. 918)
❑ The crane is in a perfect condition.

▶ Install the batteries properly.

▶ Put the crane in operation.

7.2 Mobile crane without crawler carrier

7.2.1 Dimensions and weight without crawler carrier

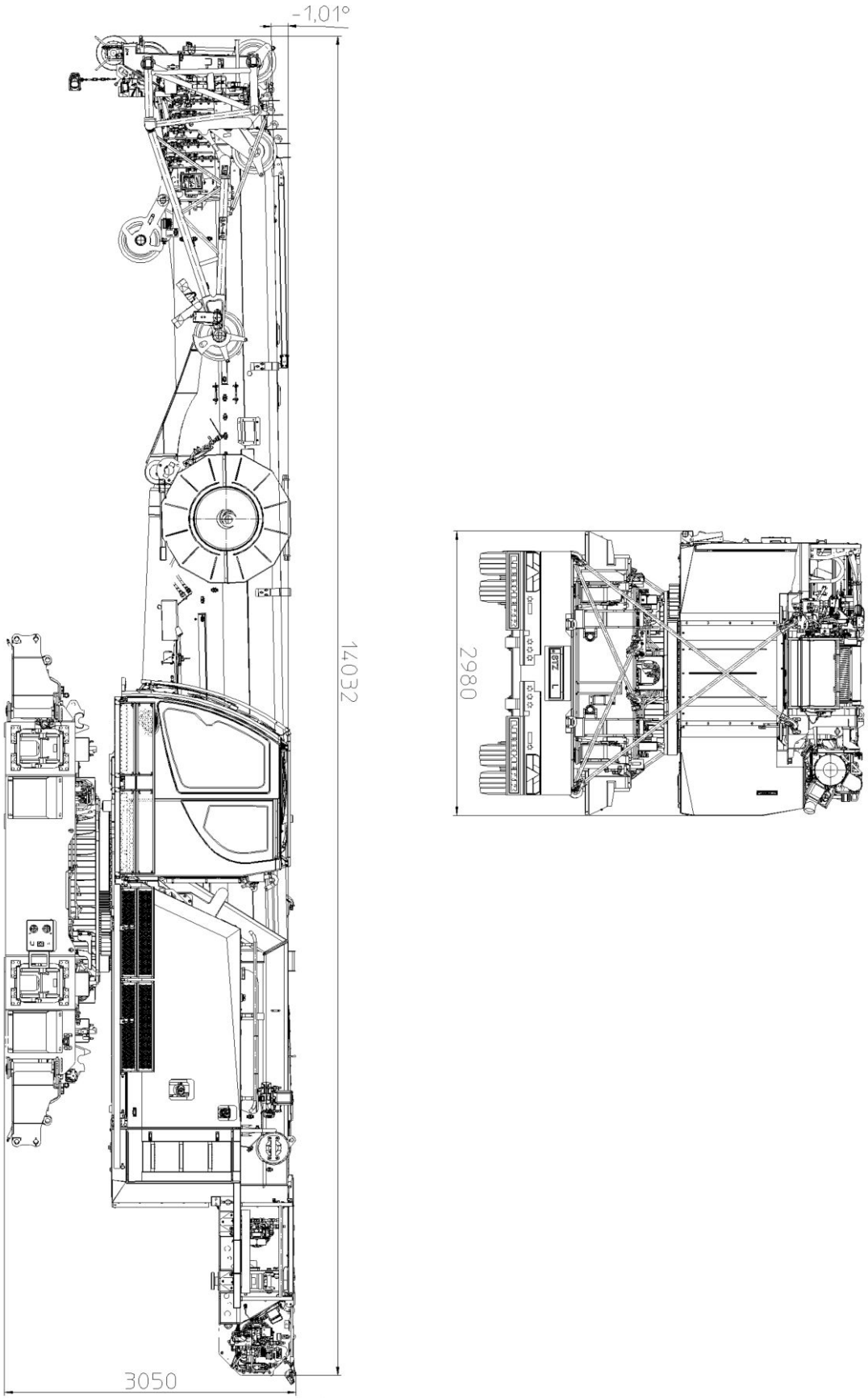


Fig. 876: Dimensions without crawler carrier

7.2.2 Mobile crane rigging plan without crawler carrier

Position in the rigging plan	Rigging point	Permissible rigging force
X	With RUD eyehook	13400 daN
Y	No RUD eyehook	10000 daN
	Area for rigging	

Tab. 77: Rigging points and permissible rigging force on the mobile crane

Condition			Center of gravity		Weight
Winch 2	Double folding jib	Special folding jib	S_x	S_y	
✓	✓	✕	1212 mm	1656 mm	40.5 t
✓	✕	✓	1251 mm	1625 mm	39.2 t
✓	✕	✕	1356 mm	1614 mm	38.6 t
✕	✓	✕	1020 mm	1620 mm	38.95 t
✕	✕	✓	1054 mm	1587 mm	37.75 t
✕	✕	✕	1160 mm	1575 mm	37.15 t
✓	✓	✓	1114 mm	1666 mm	41.05 t

Tab. 78: Center of gravity and weight

The mobile crane must be secured at 8 eyehooks.

The rigging devices must have a minimum tractive performance of 8000 daN.

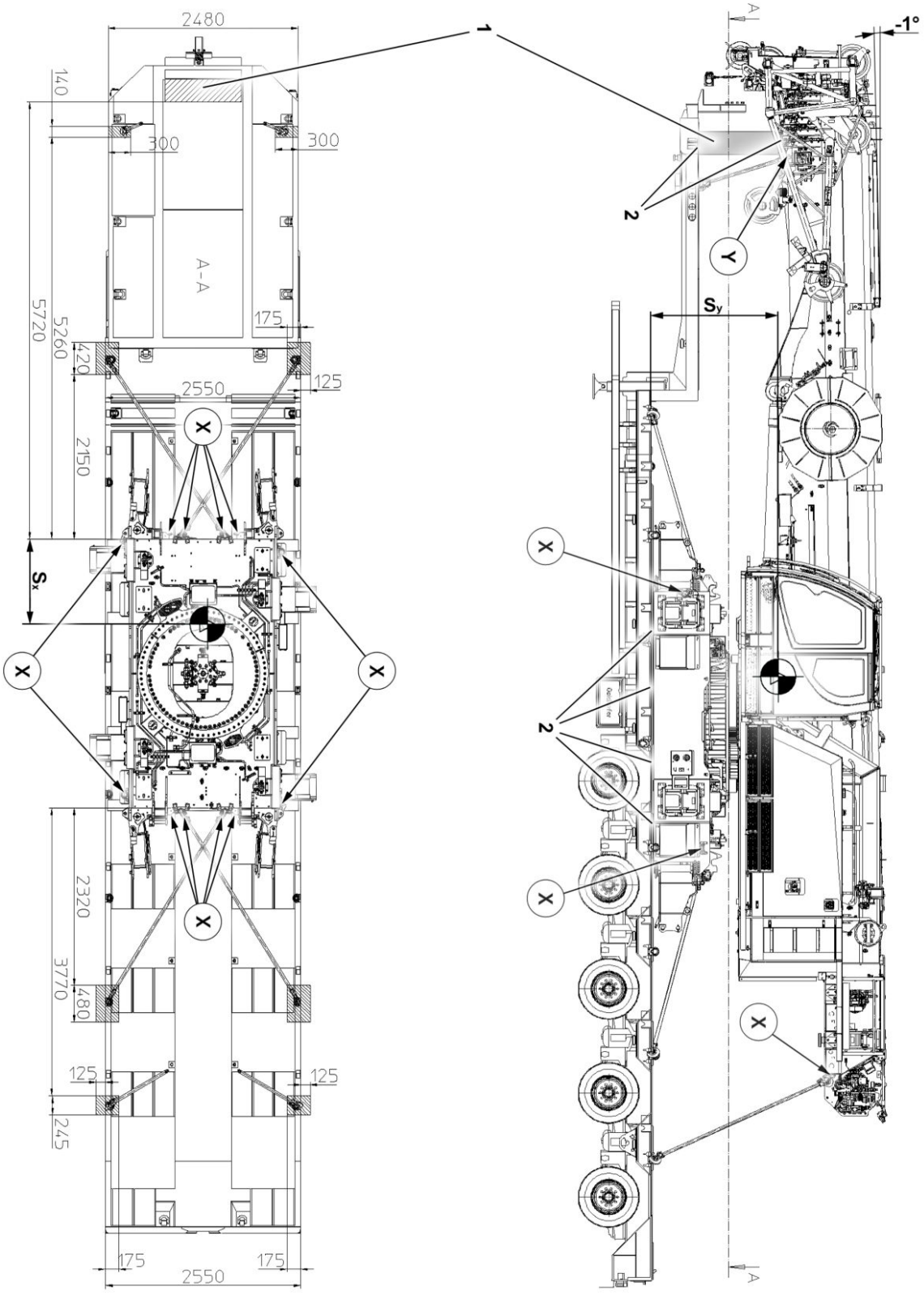


Fig. 878: Exemplary illustration: Mobile crane rigging plan without crawler carrier

1 Spacer
2 Slip-resistant mats
X Rigging point
Y Rigging point
Sx Center of gravity
Sy Center of gravity

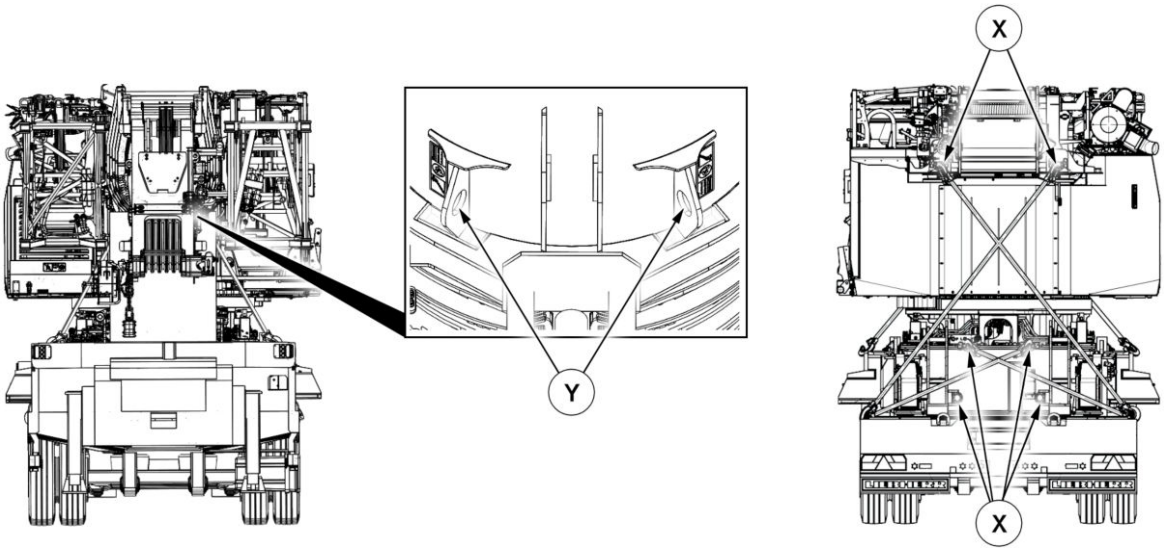


Fig. 879: Exemplary illustration: Mobile crane rigging plan without crawler carrier

X Rigging point **Y** Rigging point

7.2.3 Fastening the mobile crane without crawler carrier

Make sure that the following prerequisites are met:
- ❑ An auxiliary crane is available.
- ❑ The mobile crane is leveled.
- ❑ The superstructure is pinned in the 0° position.
  (→ 8.16 Pinning the superstructure, p. 530)
- ❑ The telescopic boom is telescoped in all the way and pinned.
  (→ 8.18.5 Telescoping the telescopic boom, p. 545)
- ❑ The telescopic boom is luffed down to 0°.
  (→ Luffing the telescopic boom from the crane cab, p. 533)
- ❑ The turntable ballast is disassembled.
  (→ 10.7.7 Unpinning the ballast from the turntable, p. 765)
  (→ 10.7.9 Taking the ballast down, p. 766)
- ❑ The central ballast is disassembled.
  (→ 10.6.4 Disassembling the central ballast, p. 753)
- ❑ The folding jib is disassembled.
  (→ 10.8.15 Disassembling the folding jib, p. 819)
- ❑ The special folding jib is disassembled.
  (→ 10.9.12 Disassembling the special folding jib, p. 840)
- ❑ The hoist rope is reeved in twice on the hook block.
  (→ 10.4.9 Reeving the hook block in, p. 726)
  (→ 10.4.4 Use of reeving plans, p. 718)
- ❑ Suitable fastening ropes and shackles are fastened to the hooks on the auxiliary crane.
- ❑ A suitable ladder is available.

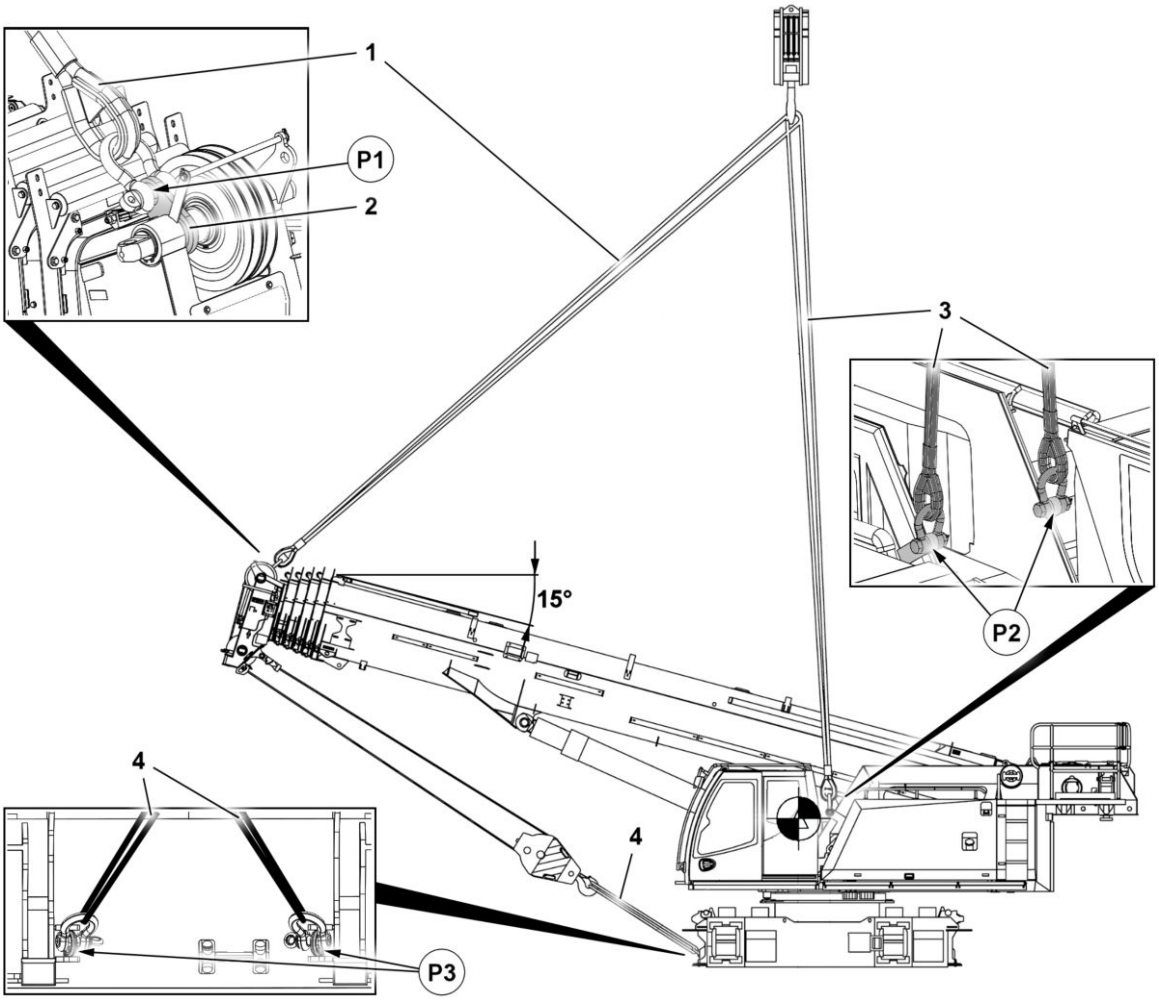


Fig. 880: Fastening the mobile crane

1 Fastening equipment (10 t load bearing capacity and 10 m length)
2 Lashing lug
3 Fastening equipment (20 t load bearing capacity and 10 m length)
4 Fastening equipment (10 t load bearing capacity and at least 3 m length)
P1 Fastening position
P2 Fastening position
P3 Fastening position

- ▶ Secure the fastening equipment **1** in the fastening position **P1** of the lashing lug **2**.
- ▶ Until the fastening equipment **4** can be secured in the stop positions **P3**: Luff the telescopic boom up and spool the hoist rope out.
- ▶ Secure the fastening equipment **3** on both sides in the fastening positions **P2**.
- ▶ When the fastening equipment **3** is secured in the stop positions **P2**: Luff the telescopic boom down to 15° and spool the hoist rope up.
- ▶ Tension the hoist rope with a pull force of 2 t.
- ▶ Position the hook block of the auxiliary crane above the center of gravity.
- ▶ Tension the fastening equipment **1** and fastening equipment **3** at the same time.

- ▷ The mobile crane can be lifted.

7.2.4 Loading the crane without crawler carrier

Make sure that the following prerequisites are met:
- ❑ The crawler center section is supported and leveled as high as possible.
  (→ 10.2.3 Extending the support cylinders, p. 695)
- ❑ The crawler carriers are disassembled.
  (→ 10.3.2 Disassembling the crawler carrier, p. 710)
- ❑ The hook block is reeved out.
  (→ 10.4.10 Reeving the hook block out, p. 728)
- ❑ The telescopic boom is luffed out.
  (→ 10.4.8 Reeving the telescopic boom out, p. 725)
- ❑ The superstructure is pinned with the chassis in the 0° or 180° position.
  (→ 8.16 Pinning the superstructure, p. 530)
- ❑ The substructure and slip-resistant mats are positioned on the transport vehicle according to the rigging plan.
  (→ 7.2.2 Mobile crane rigging plan without crawler carrier, p. 362)
- ❑ A guide is present.

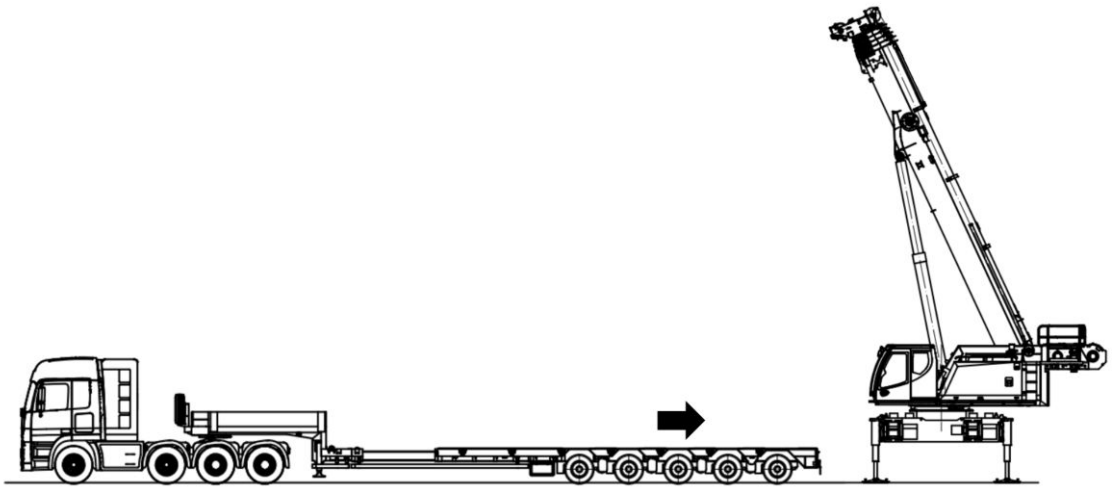


Fig. 881: Loading the crane without crawler carrier

- ▶ Until the transport vehicle can drive under the crane: Luff the telescopic boom up.
- ▶ Carefully drive the transport vehicle under the crane with a guide.
- ▶ Lower the crane on the transport vehicle (→ 10.2.4 Retracting the support cylinders, p. 702).
- ▶ Retract the cross carrier (→ 8.14 Crawler travel gear track width adjustment, p. 502).
- ▶ Swing the support cylinder into the transport position (→ 10.2.5 Swinging the support cylinder into the transport position, p. 706).
- ▶ Support the telescopic boom and take it down on the substructure.
- ▶ Rigging the crane (→ 7.2.2 Mobile crane rigging plan without crawler carrier, p. 362).

7.2.5 Unloading the crane without crawler carrier

Make sure that the following prerequisites are met:
❑ A guide is present.

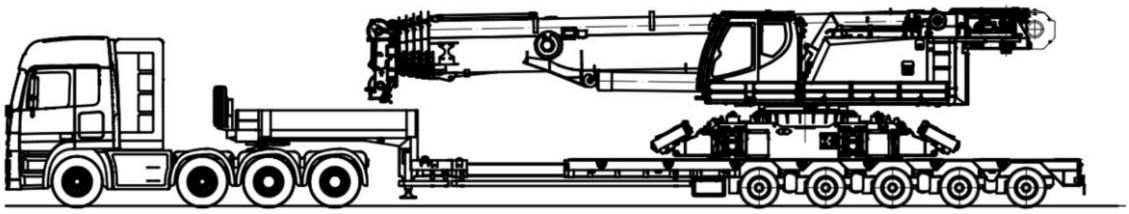


Fig. 882: Unloading the crane

- ▶ Remove the rigging device.
- ▶ Extend the cross carrier (→ 8.14 Crawler travel gear track width adjustment, p. 502).
- ▶ Swing the support cylinder pulley into the operating position (→ 10.2.2 Swinging the support cylinder pulley into the operating position, p. 693).
- ▶ Support the crawler center section as high as possible (→ 10.2.3 Extending the support cylinders, p. 695).
- ▶ Until the transport vehicle can drive out from under the crane: Luff the telescopic boom up.
- ▶ Carefully drive the transport vehicle out from under the crane with a guide.
- ▶ Remove the substructure from the transport vehicle.

Additional work:

Assemble the crawler carrier (→ 10.3.1 Assembling the crawler carrier, p. 708).

Reeve the telescopic boom in (→ 10.4.7 Reeving the telescopic boom in, p. 723).

Reeve the hook block in (→ 10.4.9 Reeving the hook block in, p. 726).

7.2.6 Crawler carrier dimensions

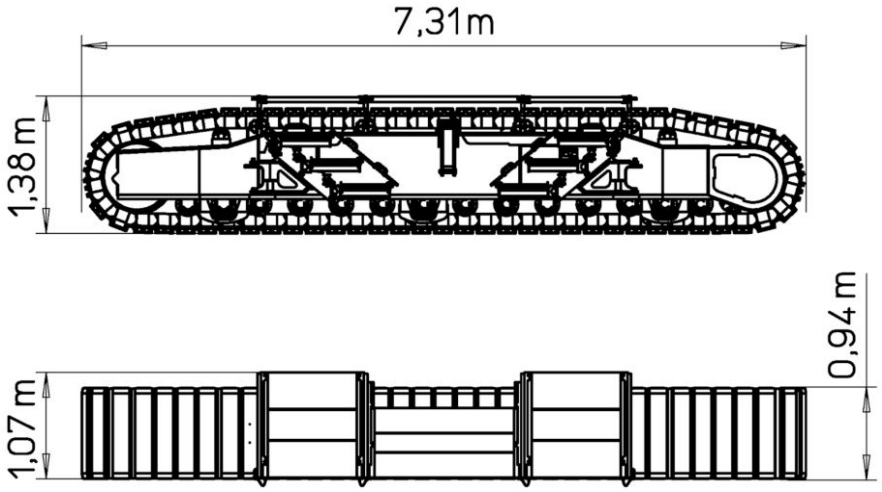


Fig. 883: Crawler carrier dimensions

7.2.7 Crawler carrier rigging plan

Position in the rigging plan	Rigging point	Permissible rigging force
X	With RUD eyehook	13400 daN
	Area for rigging	

Tab. 79: Rigging points and permissible rigging force on the crane

Condition	Center of gravity			Weight
	S_x	S_y	S_z	
Flat crawler plate	1927 mm	431 mm	609 mm	2 x 11.2 t
Grouser crawler plate	1928 mm	431 mm	609 mm	2 x 11.1 t
Grouser crawler plate with insertion plate	1926 mm	432 mm	609 mm	2 x 11.6 t

Tab. 80: Transport weight and center of gravity of the crawler carrier

Each crawler carrier must be secured at 4 eyehooks.

The rigging devices must have a minimum tractive performance of 6300 daN.

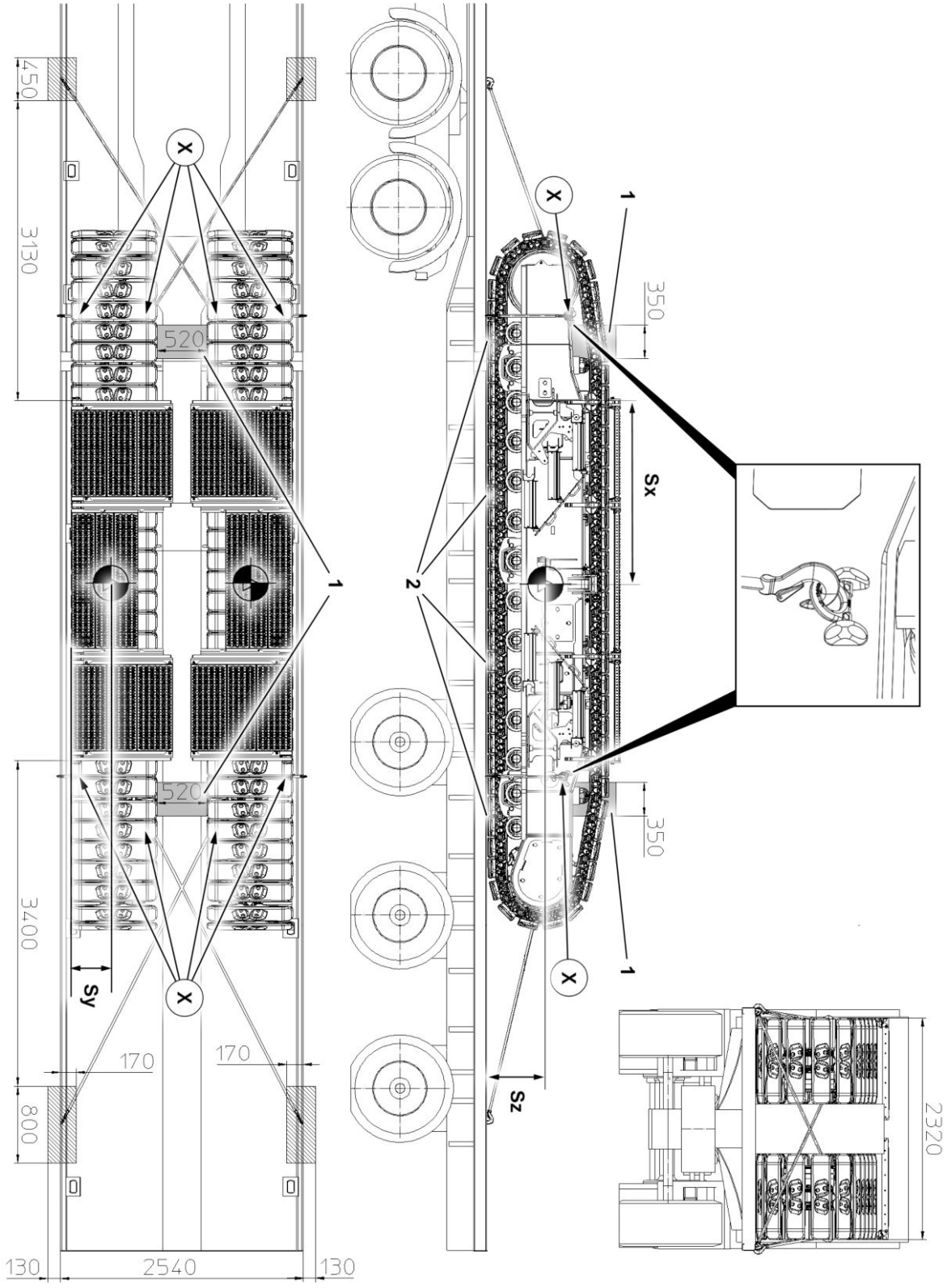


Fig. 885: Exemplary illustration: Crawler carrier rigging plan

1 Spacer
2 Slip-resistant mats
X Rigging point

7.2.8 Fastening the crawler carrier

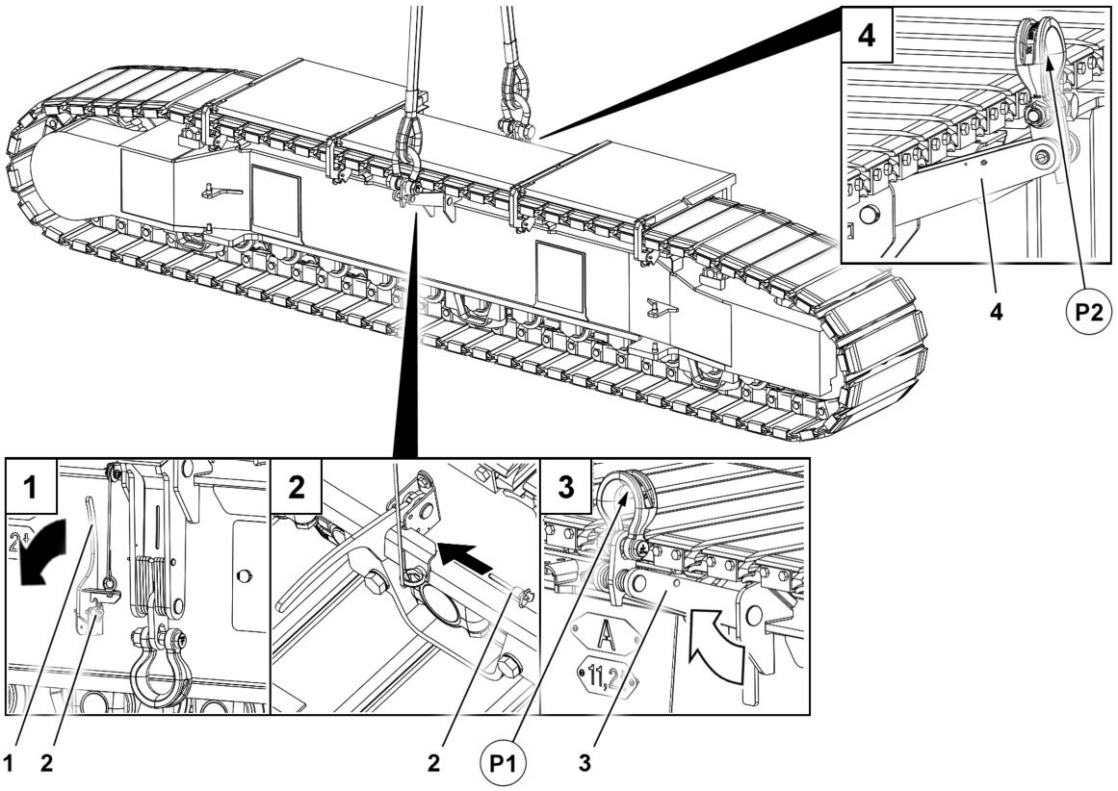


Fig. 886: Fastening the crawler carrier

1 Lever
2 Retaining element
3 Outer towing bracket
4 Inner towing bracket
P1 Fastening position
P2 Fastening position

▶ Remove the retaining element **2** and move the lever **1**.

▶ Position the lever **1** with the retaining element **2**.
▷ The inner towing bracket **4** is erected.

▶ Erect the outer towing bracket **3** and secure the fastening equipment in the fastening position **P1**.

▶ Secure the fastening equipment in the fastening position **P2**.

▷ The crawler carrier can be lifted.

7.3 Central ballast

7.3.1 Dimensions and weight

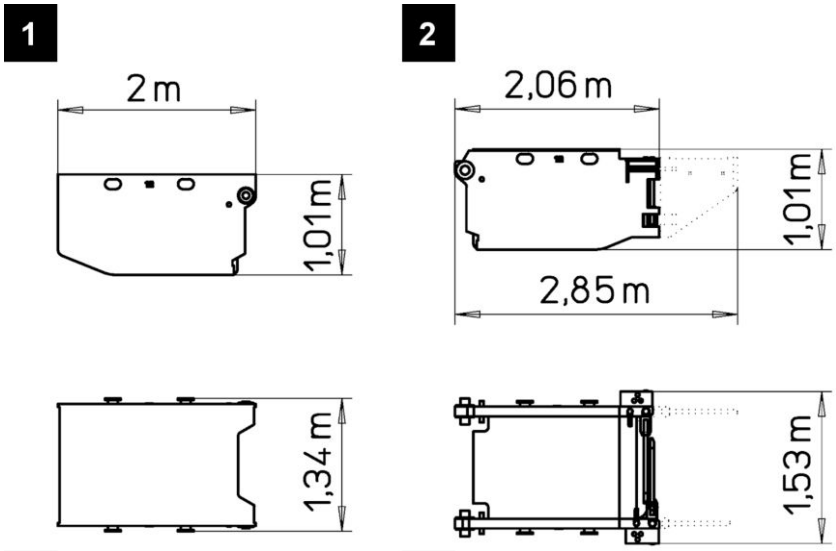


Fig. 887: Central ballast dimensions

1 Front central ballast 11 t

2 Rear central ballast 11 t

7.3.2 Fastening the central ballast

Fasten the central ballast only with the supplied and specifically approved grommets.

7.3.2.1 Fastening front central ballast 1

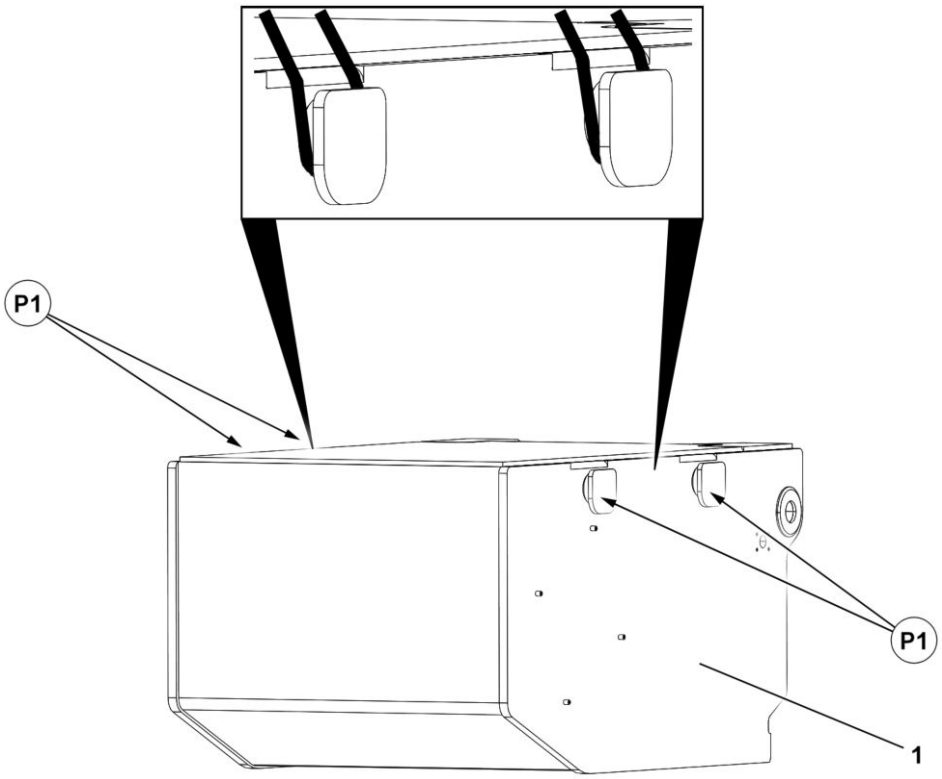


Fig. 888: Fastening front central ballast 1

1 Front central ballast **P1** Fastening position

▶ Fasten the front central ballast **1** in the fastening positions **P1**.

7.3.2.2 Fastening rear central ballast 2

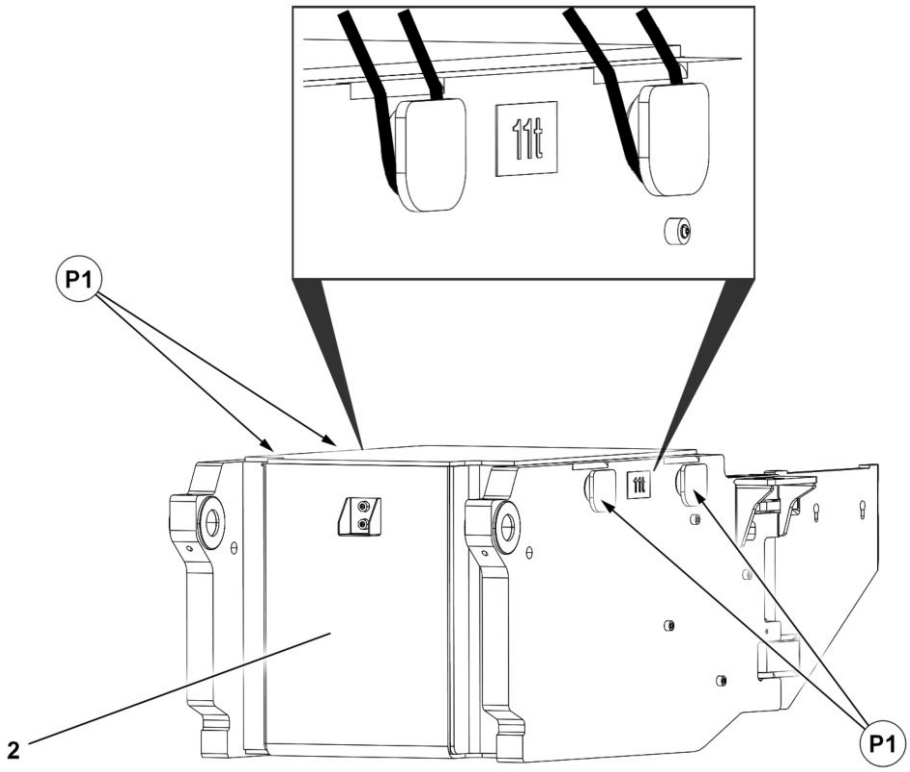


Fig. 889: Fastening rear central ballast 2

2 Rear central ballast **P1** Fastening position

▶ Fasten the rear central ballast **2** in the fastening positions **P1**.

7.3.3 Taking the central ballast down on the transport vehicle

▶ Fasten the fastening equipment (→ 7.3.2 Fastening the central ballast, p. 371).

▶ Take the ballast plates down on the transport vehicle with the own crane.

7.4 Turntable ballast

7.4.1 Dimensions and weight

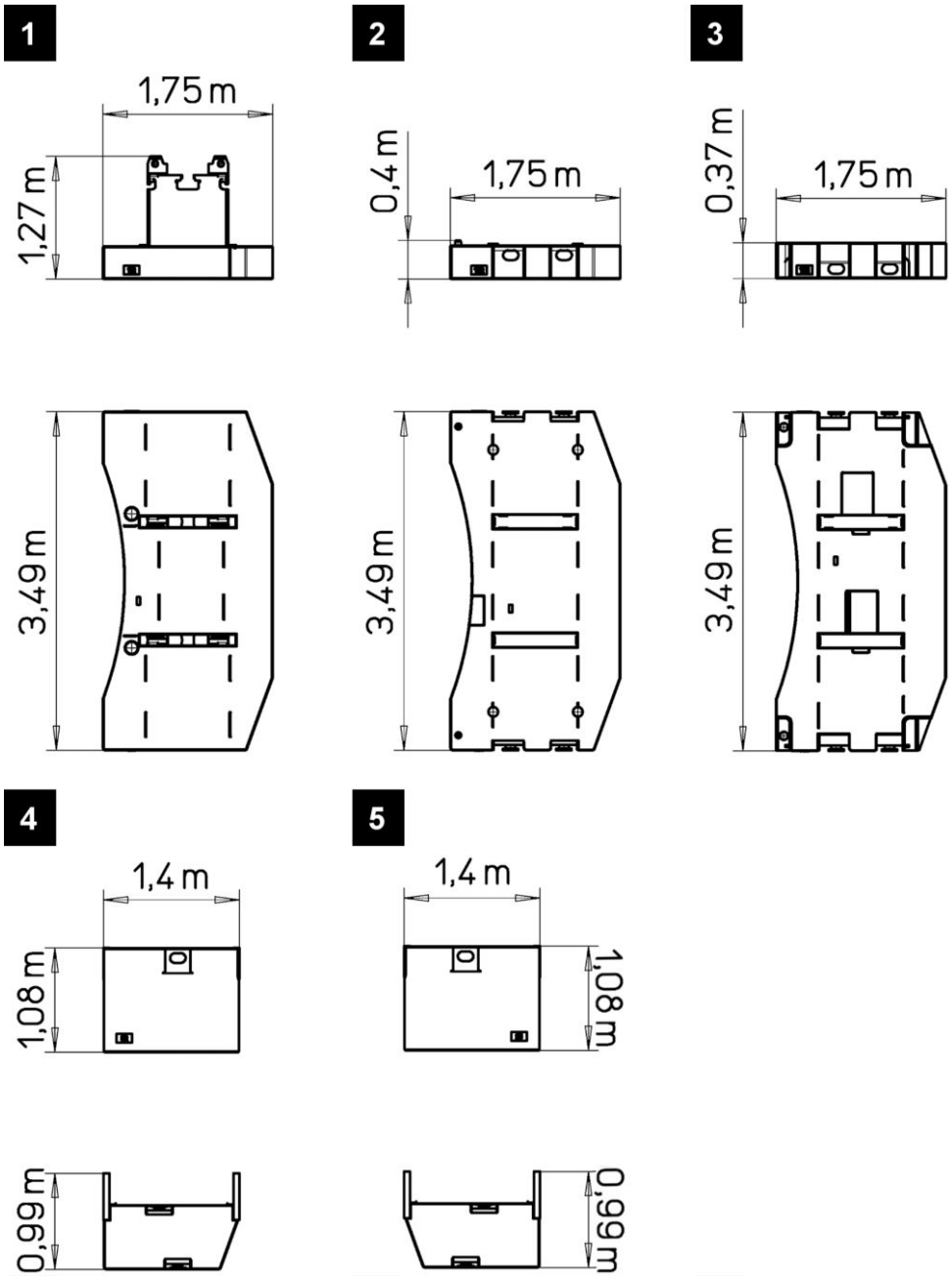


Fig. 890: Ballast plate dimensions

1 Receptacle plate 11 t
2 Ballast plate 10 t
3 Ballast plate 10 t
4 Left ballast plate 5 t
5 Right ballast plate 5 t

7.4.2 Fastening the ballast

Fasten the ballast only with the supplied and specifically approved grommets.

7.4.2.1 Fastening receptacle plate 1

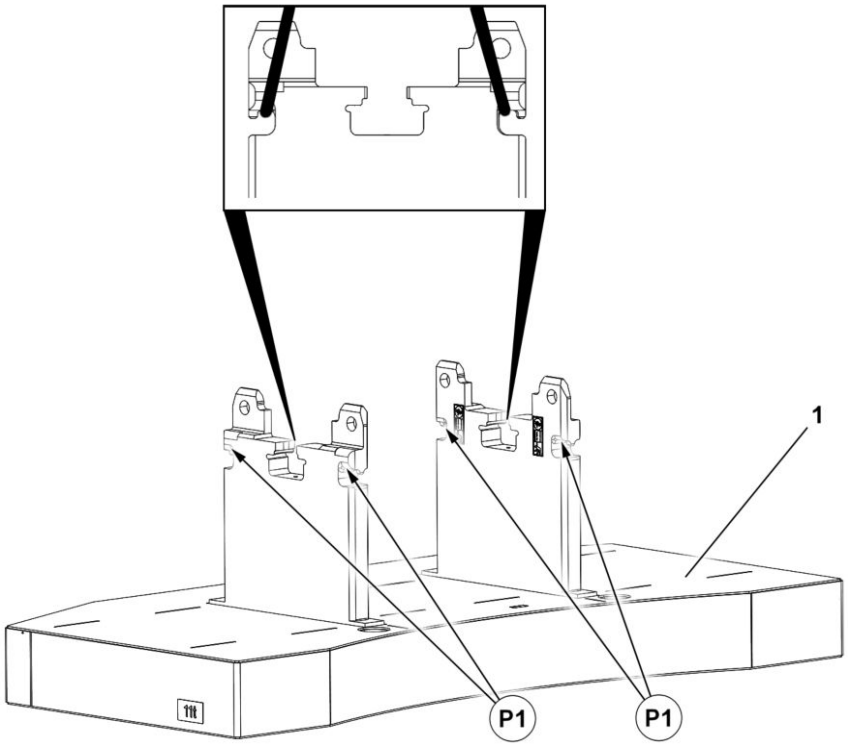


Fig. 891: Fastening receptacle plate 1

1 Receptacle plate **P1** Fastening position

▶ Fasten the receptacle plate **1** in the fastening positions **P1** with four grummets.

7.4.2.2 Fastening ballast plate 2

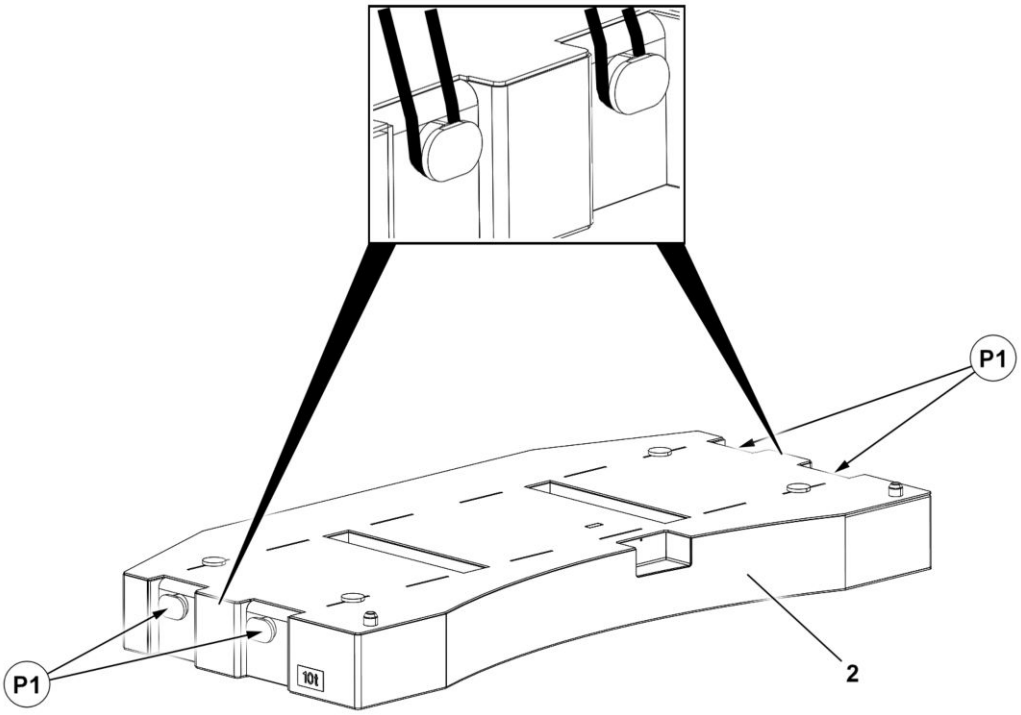


Fig. 892: Fastening ballast plate 2

2 Ballast plate **P1** Fastening position

▶ Fasten the ballast plate **2** in the fastening positions **P1**.

7.4.2.3 Fastening ballast plate 3

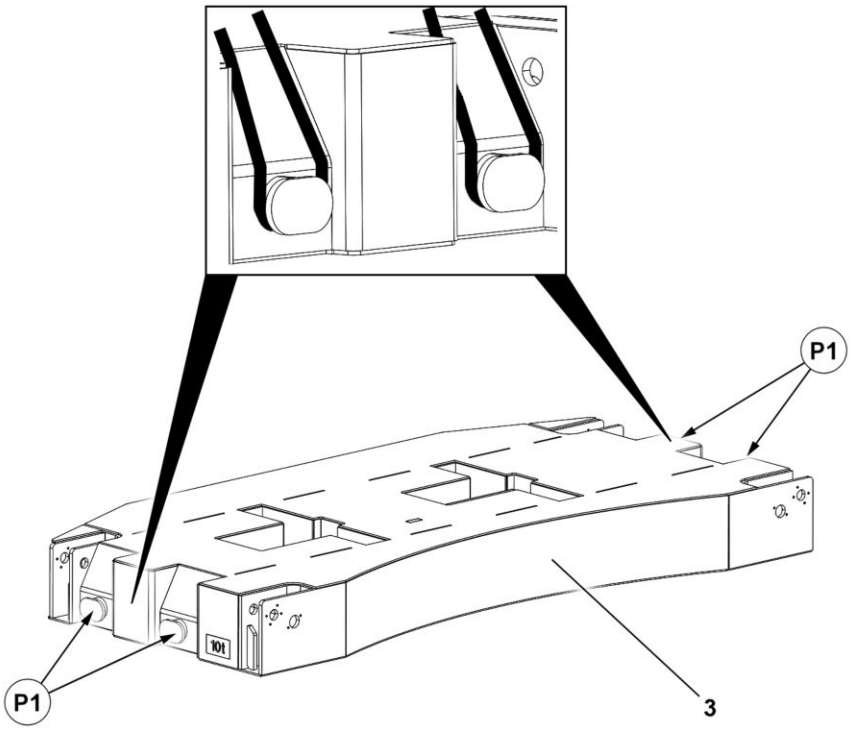


Fig. 893: Fastening ballast plate 3

3 Ballast plate **P1** Fastening position

▶ Fasten the ballast plate **3** in the fastening positions **P1**.

7.4.2.4 Fastening ballast plate 4

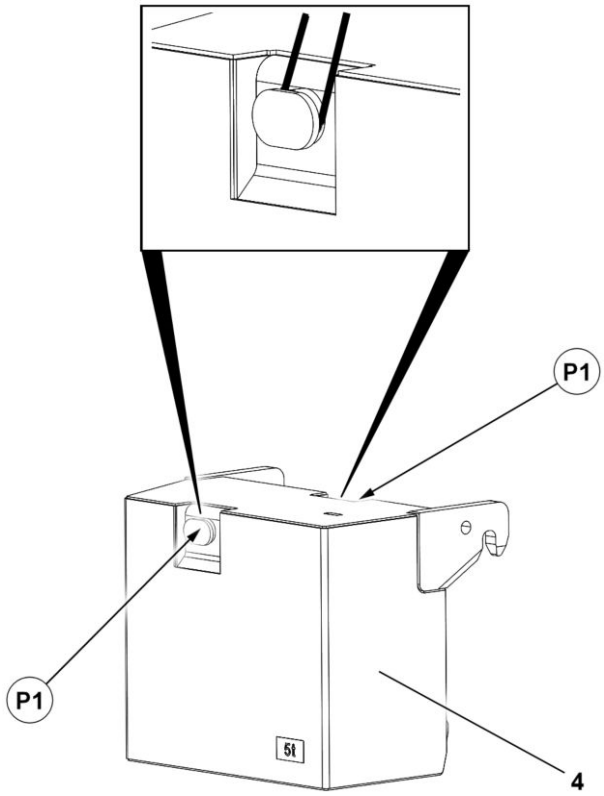


Fig. 894: Fastening ballast plate 4

4 Left ballast plate **P1** Fastening position

▶ Fasten the left ballast plate **4** in the fastening positions **P1**.

7.4.2.5 Fastening ballast plate 5

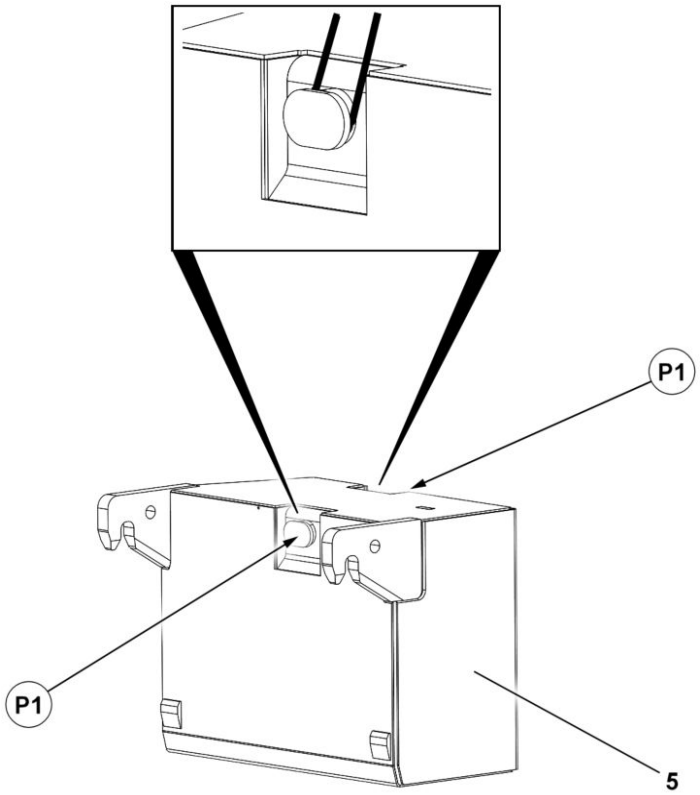


Fig. 895: Fastening ballast plate 5

5 Right ballast plate **P1** Fastening positions

▶ Fasten the right ballast plate **5** in the fastening positions **P1**.

7.4.3 Fastening ballast assemblies

Fasten the ballast only with the supplied and specifically approved grommets.

7.4.3.1 Fastening ballast assembly 20 t (10 t + 10 t)

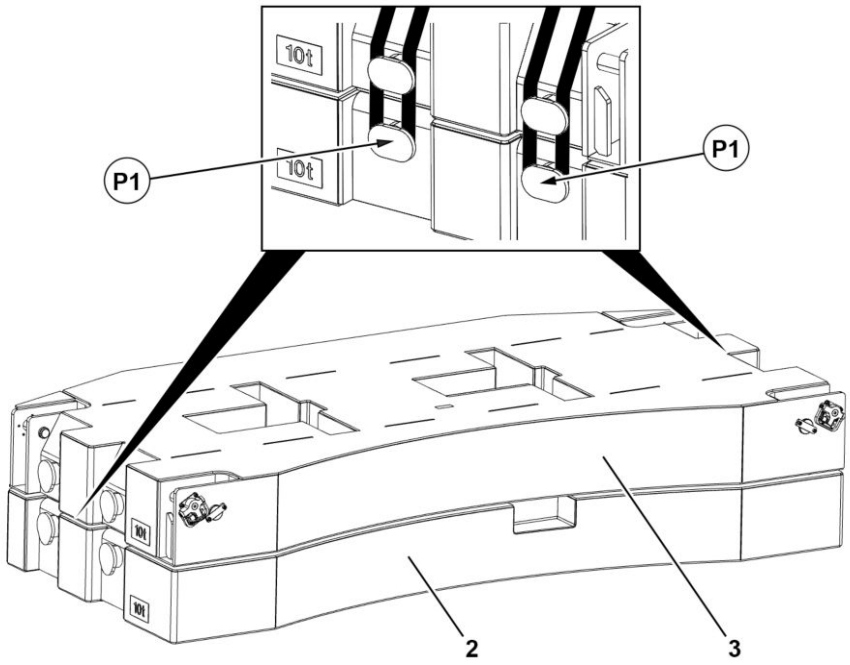


Fig. 896: Fastening ballast assembly 20 t

2 Ballast plate 10 t
3 Ballast plate 10 t
P1 Stop positions

▶ Fastening ballast assembly 20 t in the stop positions **P1**.

7.4.3.2 Fastening ballast assembly 20 t (10 t + 5 t + 5 t)

Make sure that the following prerequisites are met:
❑ The ballast plate **3** is pinned with ballast plate **4** and ballast plate **5**.

(→ 10.7.2 Pinning ballast plate 4 and ballast plate 5 with ballast plate 3, p. 756)

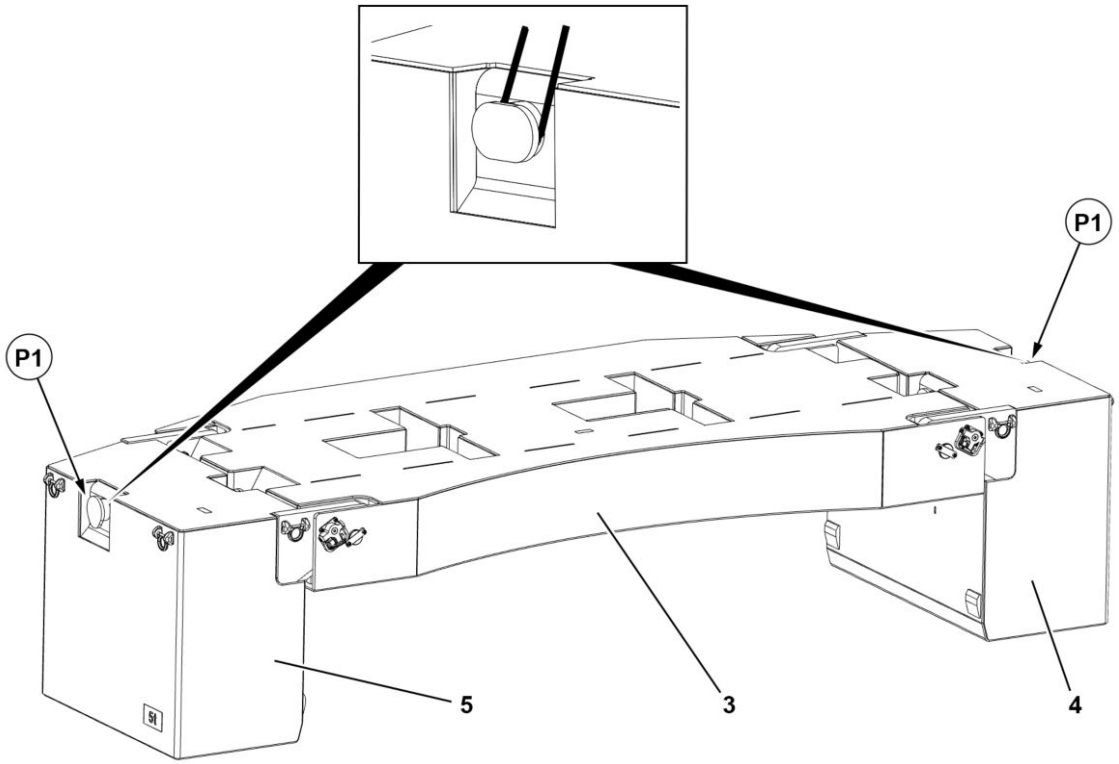


Fig. 897: Fastening ballast assembly 20 t

3 Ballast plate 10 t
4 Ballast plate 5 t
5 Ballast plate 5 t
P1 Stop positions

▶ Fasten ballast assembly 20 t in the stop positions **P1**.

7.4.3.3 Fastening ballast assembly 21 t

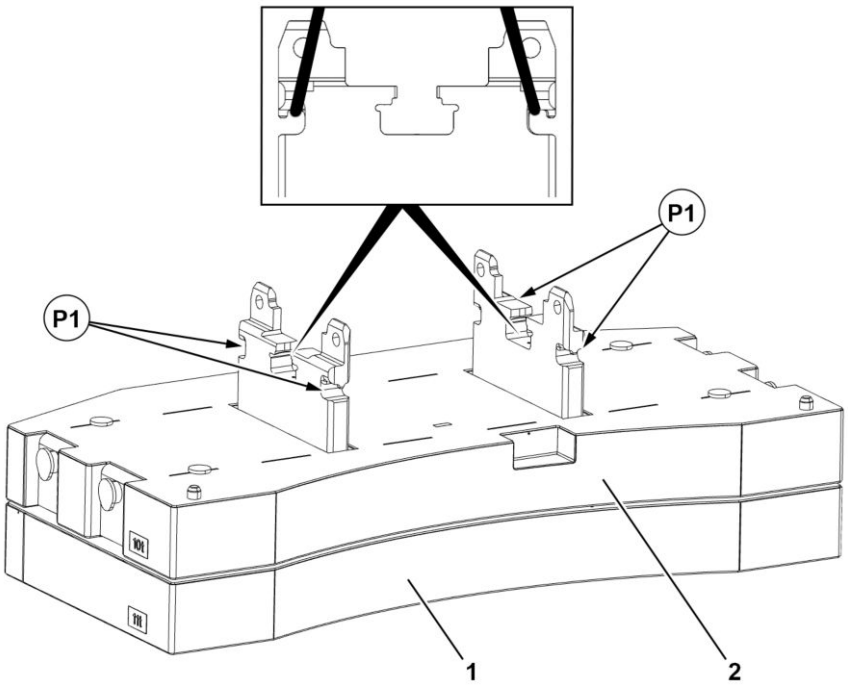


Fig. 898: Fastening ballast assembly 20 t

1 Receptacle plate 11 t
2 Ballast plate 10 t

P1 Stop positions

▶ Fasten ballast assembly 21 t in the stop positions **P1** with four grummets.

7.5 Hook block and load hook

7.5.1 Dimensions and weight

7.5.1.1 Hook block

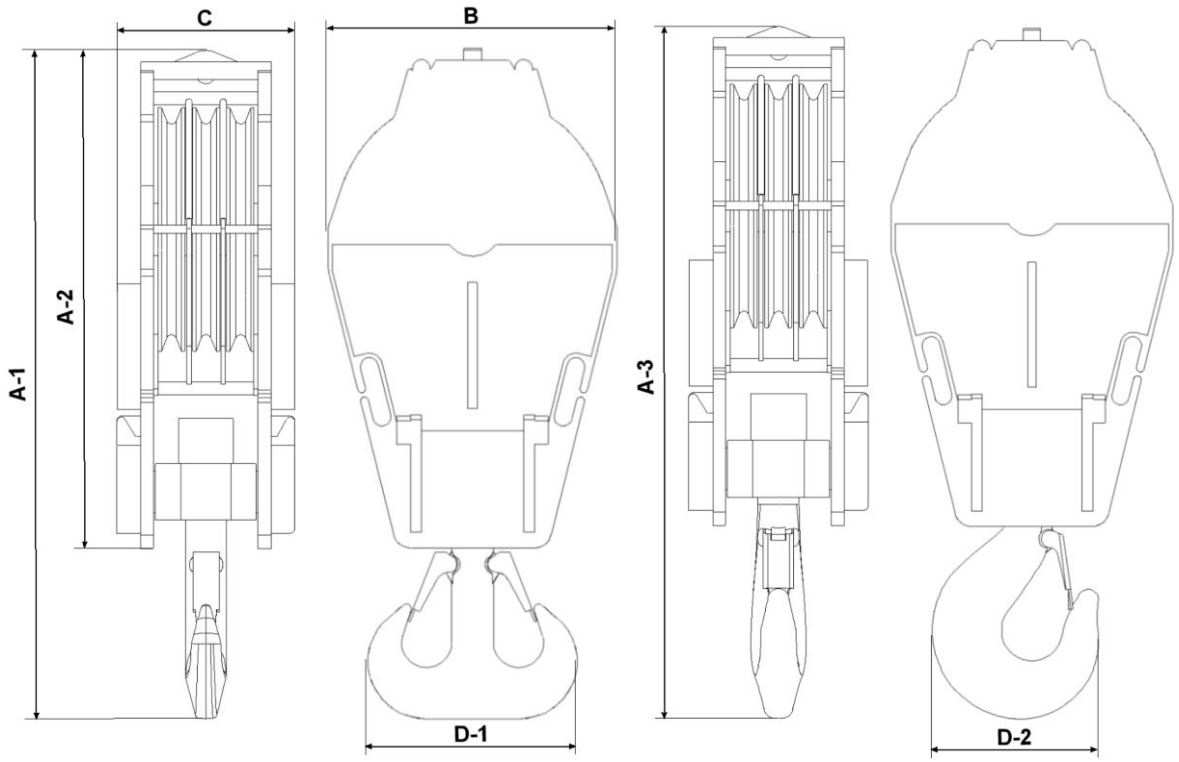


Fig. 899: Exemplary illustration: Hook block dimensions

A-1 Height with double hook
A-2 Height without hook
A-3 Height with single hook
B Width
C Depth
D-1 Double hook width
D-2 Single hook width

Hook block with single hook	Weight	A-2	A-3	B	C	D-2
1-pulley	0.65 t	1.07 m	1.56 m	0.65 m	0.36 m	0.34 m
3-pulley	0.7 t	1.07 m	1.58 m	0.65 m	0.36 m	0.38 m

Tab. 81: Hook block dimensions and weights with single hook

Hook block with double hook	Weight	A-1	A-2	B	C	D-1
1-pulley	0.65 t	1.5 m	1.07 m	0.65 m	0.36 m	0.42 m
3-pulley	0.7 t	1.52 m	1.07 m	0.65 m	0.36 m	0.47 m
5-pulley	1.3 t	1.71 m	1.19 m	0.65 m	0.51 m	0.6 m

Hook block with double hook	Weight	A-1	A-2	B	C	D-1
7-pulley	1.24 t	1.82 m	1.18 m	0.65 m	0.71 m	0.75 m

Tab. 82: Hook block dimensions and weights with double hook

7.5.1.2 Load hook

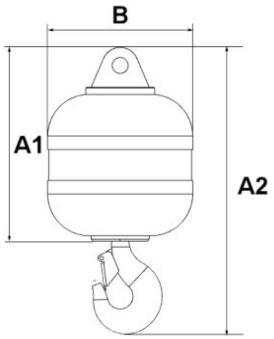


Fig. 900: Load hook dimensions

A-1 Height without hook
A-2 Height with hook
B Diameter

Component	Weight	A-1	A-2	B
Load hook	0.35 t	0.52 m	0.79 m	0.4 m

Tab. 83: Load hook weight

7.5.2 Transporting the hook block and load hook with the crane

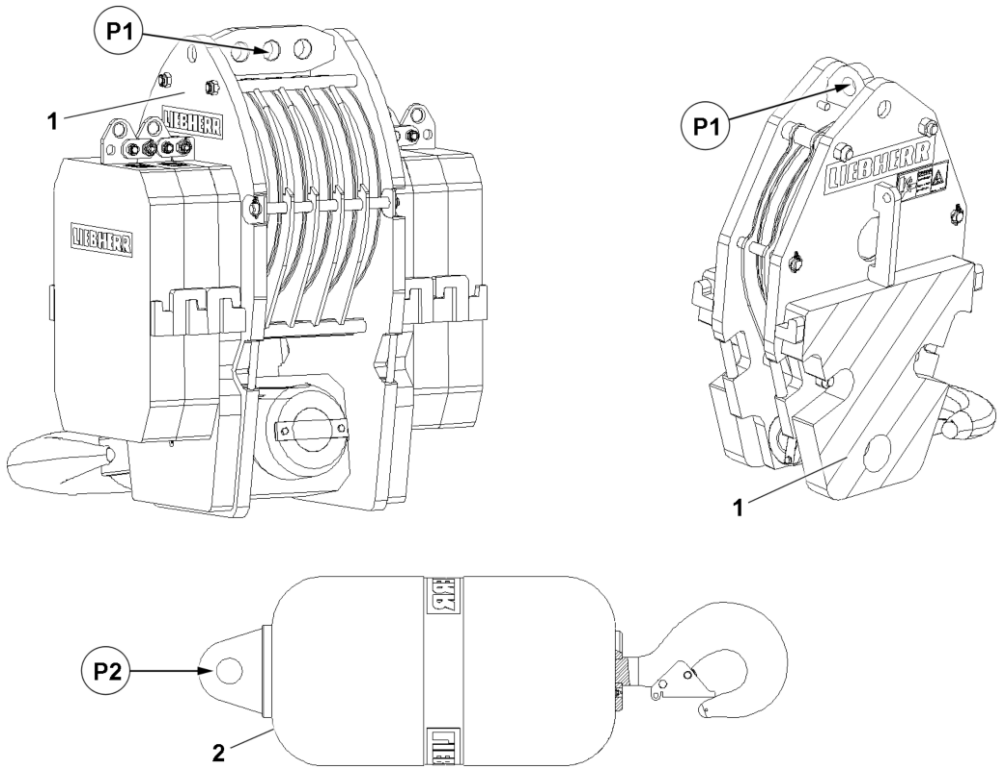


Fig. 901: Exemplary illustration: Fastening the hook block and load hook

1 Hook block
2 Load hook
P1 Hook block fastening positions
P2 Load hook fastening position

If necessary: Use a suitable shackle.

WARNING
Hook block improperly fastened!
Failure of the fastening positions, the hook block falls down.

- ▶ Fasten the hook block only centered in the correct fastening position.
- ▶ Do **not** fasten the hook block to the auxiliary weights.

Fastening the hook block

- ▶ Fasten the hook block **1** in the fastening position **P1**.

Fastening the load hook

- ▶ Fasten the load hook **2** in the fastening position **P2**.

Setting down the hook block

- ▶ When setting down: Secure the hook block to prevent it from falling.

Setting down the load hook

- ▶ Secure the load hook to prevent it from rolling off.

7.5.3 Transporting the hook block or load hook with a forklift truck

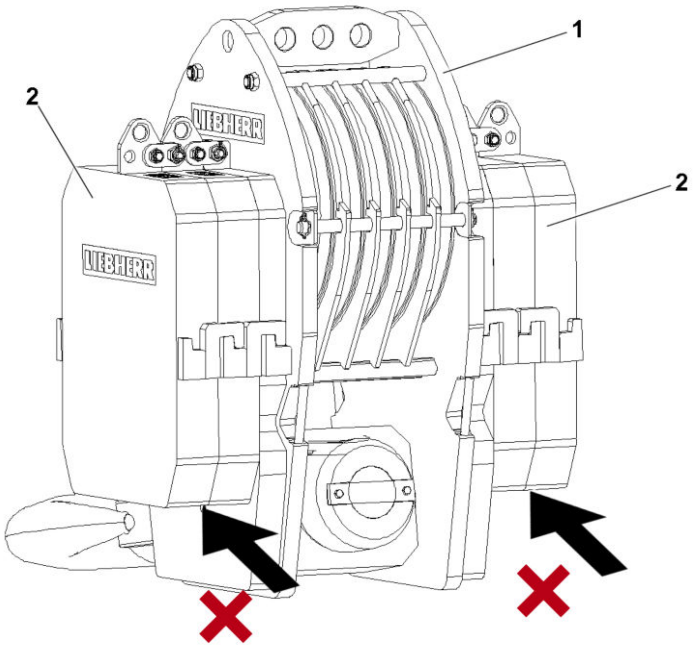


Fig. 902: Exemplary illustration: Transporting the hook block or load hook

1 Hook block **2** Auxiliary weights

WARNING
Lifting the hook block on the auxiliary weights with a forklift truck!
Failure of the auxiliary weights, the hook block falls down.

▶ Do **not** lift the hook block with a forklift truck on the auxiliary weights.

▶ Transport the hook block and load hook on a sufficiently load-bearing pallet.

7.5.4 Fastening the hook block auxiliary weights

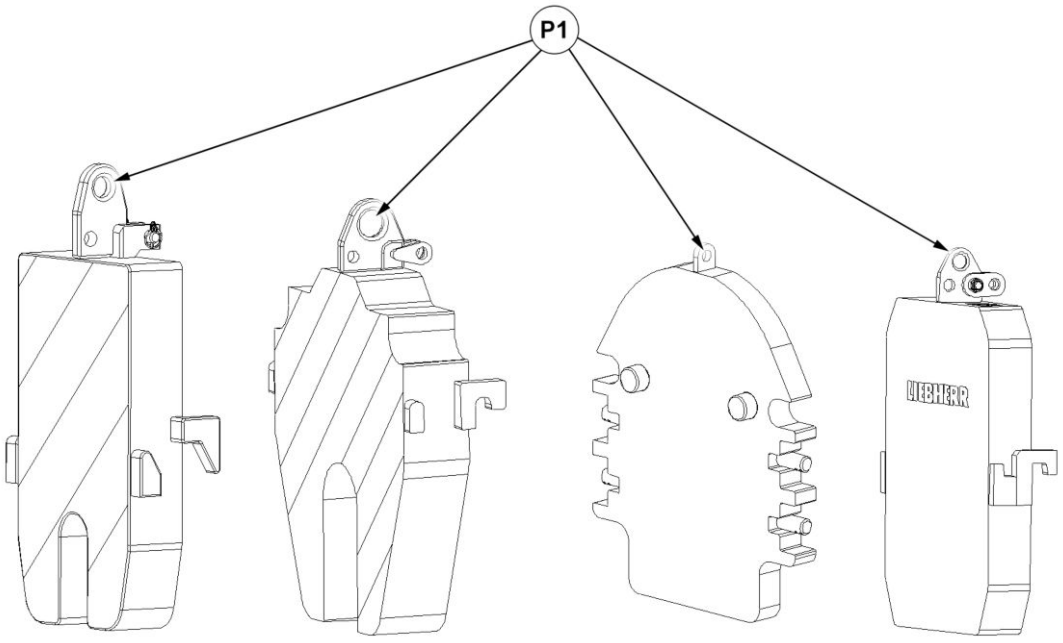


Fig. 903: Exemplary illustration: Hook block auxiliary weights fastening position

P1 Fastening position

▶ Fasten the auxiliary weights in the fastening position **P1**.

7.6 Using cable laid grommets with slider rope clip

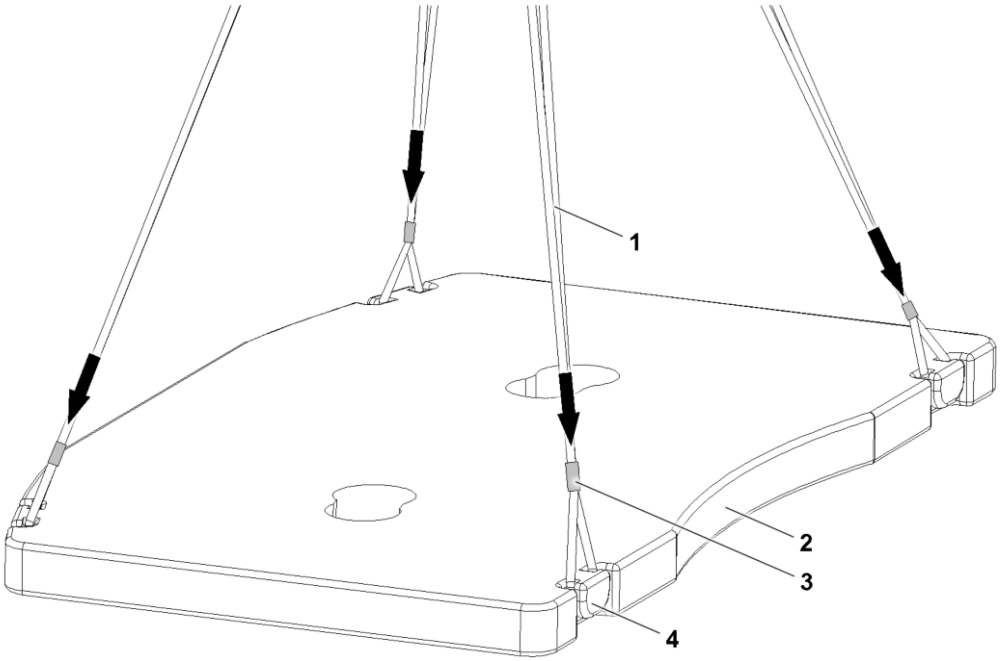


Fig. 904: Exemplary illustration: Cable laid grommets with slider rope clip

1 Cable laid grommets
2 Ballast
3 Slider rope clip
4 Bitt

WARNING
Cable laid grommets used improperly!
Cable laid grommets can fail.

- ▶ Do **not** exceed the load carrying capacity of the cable laid grommets.
- ▶ Do **not** fasten the cable laid grommets in the red marked impact points.
- ▶ Do **not** cross or twist the cable laid grommets.

Depending on the structural form of the ballast **2**, fasten two, three or four cable laid grommets **1**.

- ▶ Lay the cable laid grommets **1** around the bitts **4** of the ballast **2** to be lifted.
- ▶ Until the cable laid grommets **1** are positioned firmly on the bitts **4**: Pull the slider rope clip **3** down and close it.

7.7 Folding jib

7.7.1 Dimensions and weight

7.7.1.1 Single folding jib

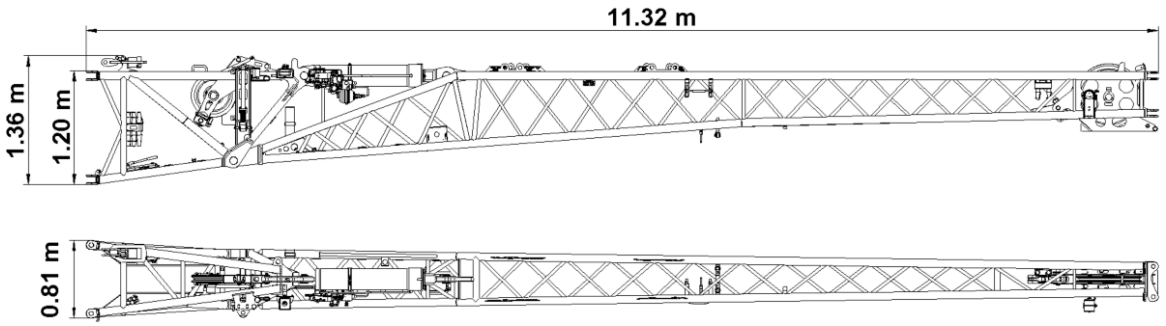


Fig. 905: Single folding jib dimensions

Component	Weight
Single folding jib (mechanical)	1.5 t
Single folding jib (hydraulic)	1.5 t

Tab. 84: Single folding jib weight

7.7.1.2 Double folding jib

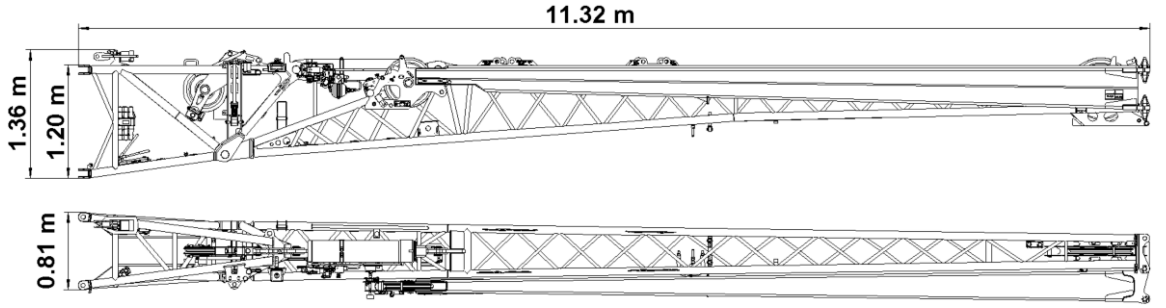


Fig. 906: Double folding jib dimensions

Component	Weight
Double folding jib (mechanical)	1.9 t
Double folding jib (hydraulic)	1.9 t

Tab. 85: Double folding jib weight

7.7.1.3 End section

Component	Weight
End section	0.5 t

Tab. 86: End section weight

7.7.2 Fastening the folding jib

Make sure that the following prerequisites are met:
- ❑ Fastening equipment has a strand length of at least 2000 mm each.

Make sure that all attachment parts have been disassembled. Attachment parts are for example:
- ❑ Boom head camera
- ❑ Airplane warning light
- ❑ Wind speed sensor
- ❑ Rope lock
- ❑ Hoist limit switch weight with chain

7.7.2.1 Fastening the single folding jib

Make sure that the following prerequisites are met:
- ❑ The pin **2** of the rope lock is inserted in the pivot section end pulley.
- ❑ All four double cone pins between the single folding jib and the telescopic boom are in the transport position.
- ❑ Four double cone pins between the end section and pivot section are disassembled.
- ❑ The folding jib is pinned and secured in the 0° position.
  (→ 10.8.10 Adjusting the mechanical folding jib angle, p. 793)
- ❑ The rope guide pulley **1** is swung into the transport position and pinned.
  (→ 10.8.11 Reeving the hoist rope out, p. 799)

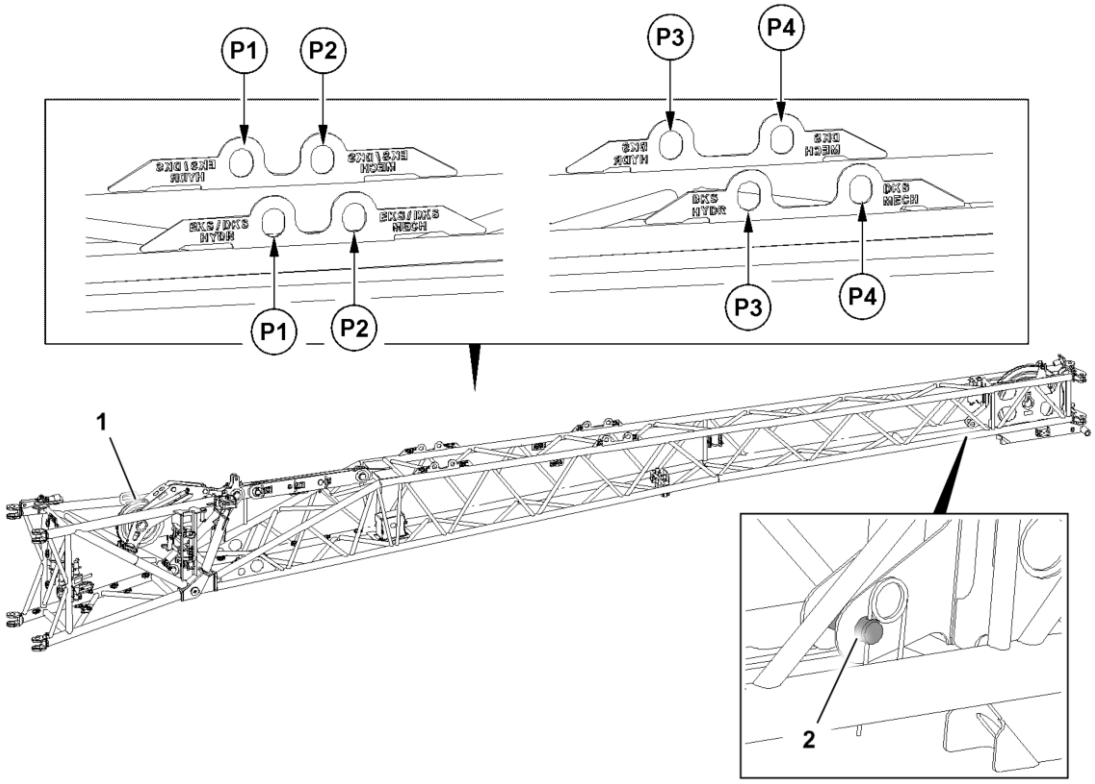


Fig. 907: Fastening the single folding jib

1 Rope guide pulley
2 Pin
P1 Fastening position
P2 Fastening position
P3 Fastening position
P4 Fastening position

Fastening positions	Abbreviation	Component
P1	EKS hydr.	Hydraulic single folding jib
P2	EKS mech.	Mechanical single folding jib

Tab. 87: Single folding jib fastening positions

Fastening the hydraulic single folding jib

▶ Fasten the hydraulic single folding jib in the fastening positions **P1**.

Fastening the mechanical single folding jib

▶ Fasten the mechanical single folding jib in the fastening positions **P2**.

7.7.2.2 Fastening the double folding jib

Make sure that the following prerequisites are met:
- ❑ The pin **2** is inserted in the end section.
- ❑ No pin is inserted in the pivot section in the pin position **P5**.
- ❑ All four double cone pins between the adapter and the telescopic boom are in the transport position.
- ❑ Two double cone pins between the end section and pivot section are in the transport position.
- ❑ The end section is folded in and secured.
- ❑ The folding jib is pinned and secured in the 0° position.
  (→ 10.8.10 Adjusting the mechanical folding jib angle, p. 793)
- ❑ The rope guide pulley **1** is swung into the transport position and pinned.
  (→ 10.8.11 Reeving the hoist rope out, p. 799)

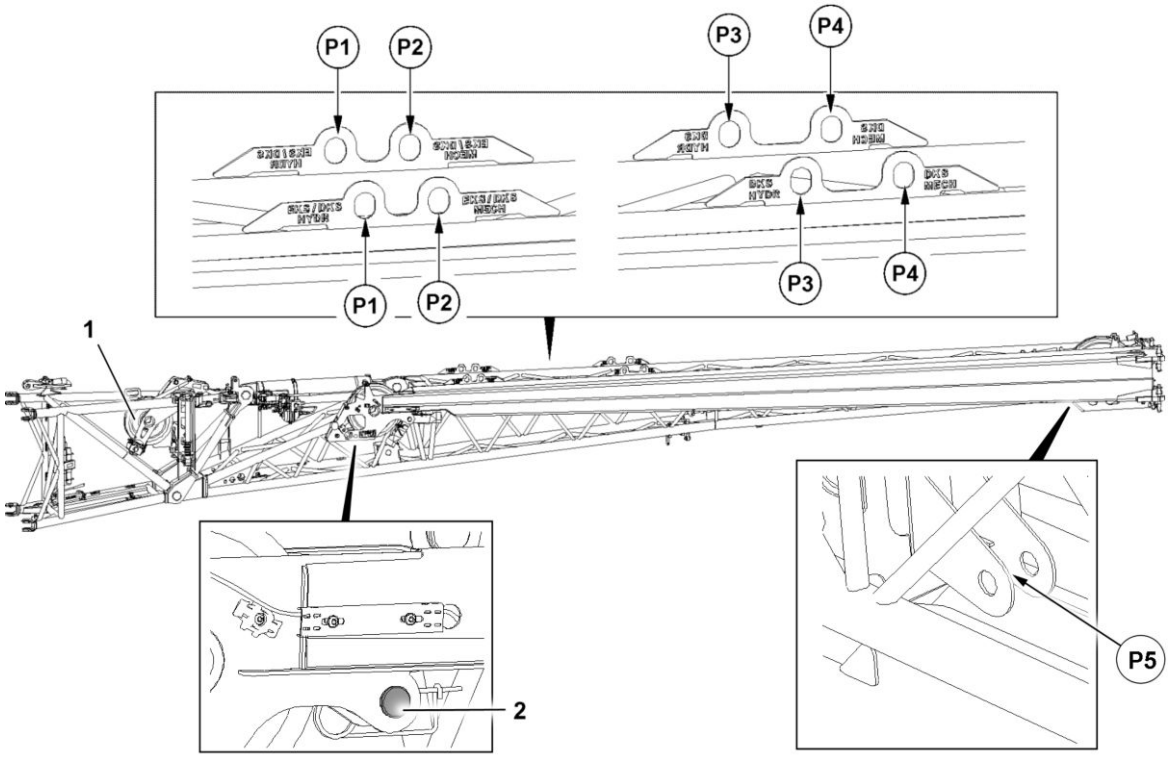


Fig. 908: Fastening the double folding jib

1 Rope guide pulley
P3 Fastening position
See next page for continuation of the image legend

2 Pin
P1 Fastening position
P2 Fastening position
P4 Fastening position
P5 Pin position

Fastening positions	Abbreviation	Component
P1 + P3	DKS hydr.	Hydraulic double folding jib
P2 + P4	DKS mech.	Mechanical double folding jib

Tab. 88: Double folding jib fastening positions

Fastening the hydraulic double folding jib

▶ Fasten the hydraulic double folding jib in the fastening positions **P1** and fastening positions **P3**.

Fastening the mechanical double folding jib

▶ Fasten the mechanical double folding jib in the fastening positions **P2** and fastening positions **P4**.

7.7.2.3 Fastening the end section

Make sure that the following prerequisites are met:
❑ The folding jib is disassembled from the crane.
❑ The folding jib is lying on the ground and is supported.

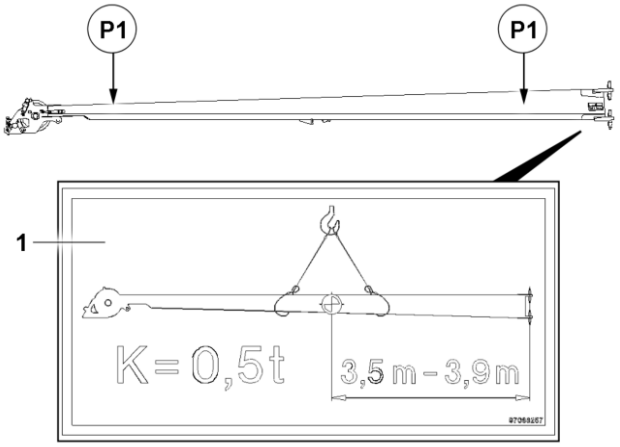


Fig. 909: End section fastening positions

1 Sign
P1 Fastening positions

If possible, fasten the end section preferably with two hooks. The center of gravity of the end section must lie within the fastening equipment. See the sign **1**.

▶ Fasten the end section with two hooks in the fastening positions **P1**.
or

If the end section is fastened with one hook:
Fasten the end section only strung and with two inclined strands. See the sign **1**.

7.8 Special folding jib

7.8.1 Dimensions and weight

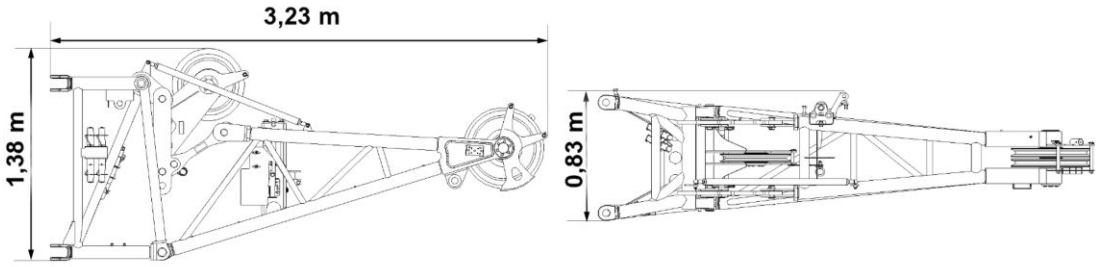


Fig. 910: Special folding jib - end section in the transport position

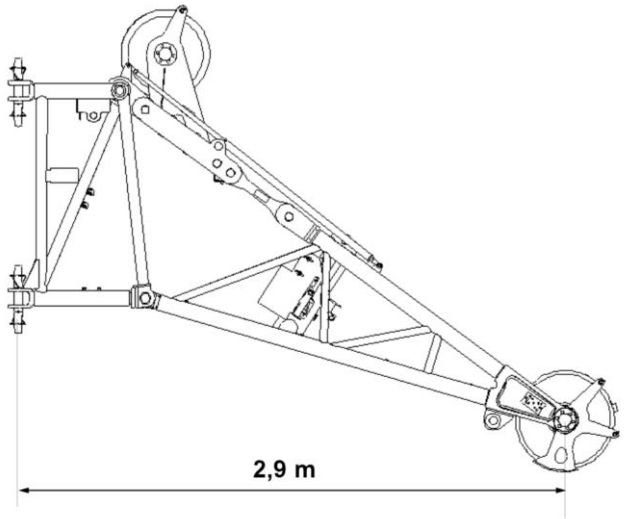


Fig. 911: Special folding jib - end section in the operating position

Component	Weight
Special folding jib	0.6 t

Tab. 89: Special folding jib weight

7.8.2 Fastening the special folding jib

Make sure that the following prerequisites are met:
- ❑ The end section is in the transport position.
  (→ 10.9.10 Swinging the end section into the transport position, p. 836)
- ❑ The double cone pins are pinned and secured in the transport position.

Make sure that all attachment parts have been removed. Attachment parts are for example:
- ❑ Boom head camera
- ❑ Airplane warning light
- ❑ Wind speed sensor
- ❑ Rope lock
- ❑ Hoist limit switch weight with chain

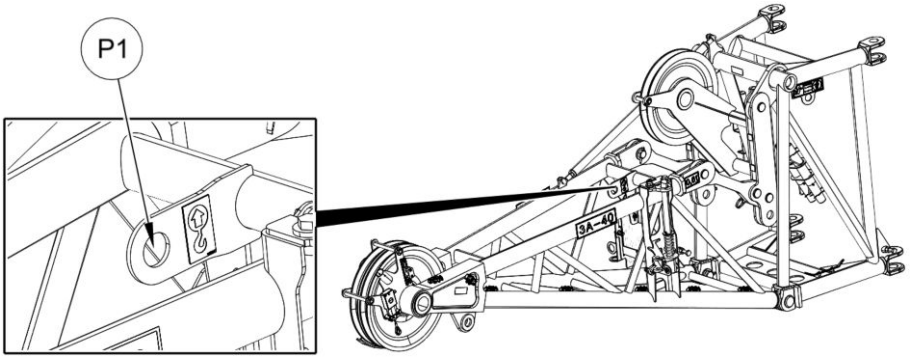


Fig. 912: Special folding jib fastening position

▶ Fasten the special folding jib in the fastening position **P1**.

7.9 Telescopic boom extension

7.9.1 Dimensions and weight

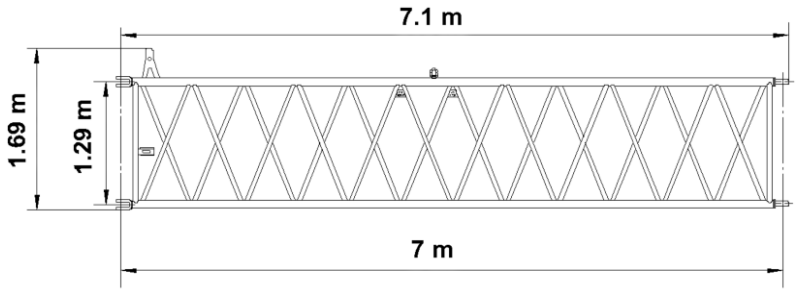


Fig. 913: Telescopic boom extension dimensions

Component	Weight	Width
Telescopic boom extension	0.7 t	0.93 m

Tab. 90: Telescopic boom extension

7.9.2 Fastening the telescopic boom extension

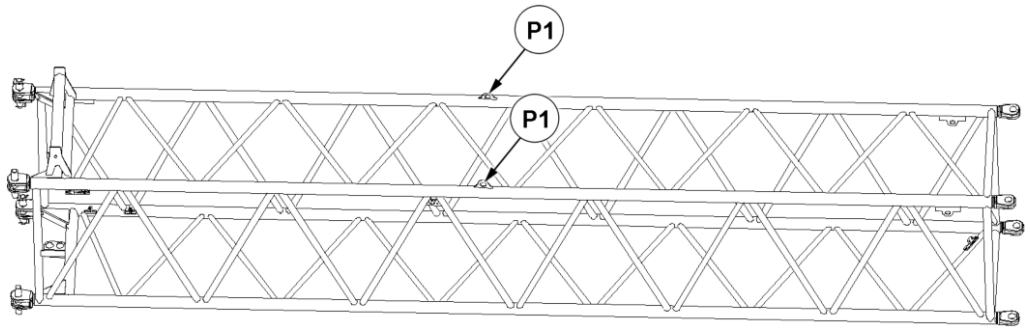


Fig. 914: Telescopic boom extension fastening positions

▶ Fasten the telescopic boom extension in the fastening positions **P1**.

7.10 Boom nose

7.10.1 Dimensions and weight

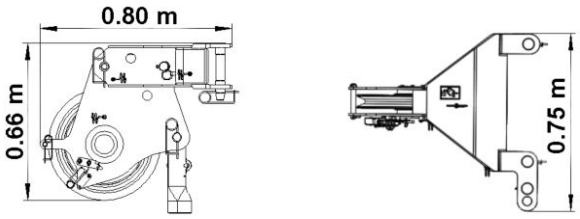


Fig. 915: Boom nose

Component	Weight
Boom nose	0.1 t

Tab. 91: Boom nose weight

7.10.2 Fastening the boom nose

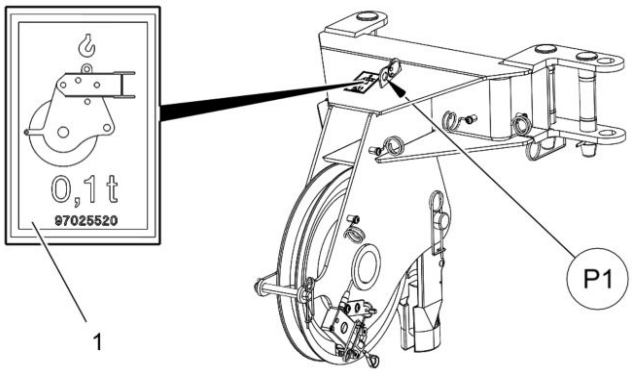


Fig. 916: Boom nose fastening position

The fastening position **P1** is marked with a sign **1**.

▶ Fasten the boom nose in the fastening position **P1**.

7.11 Hose drum

7.11.1 Dimensions and weight

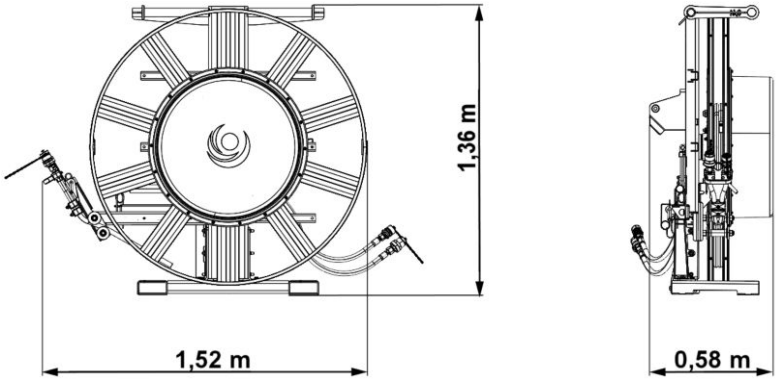


Fig. 917: Hose drum dimensions

Component	Weight
Hose drum	0.4 t

Tab. 92: Hose drum weight

7.11.2 Fastening the hose drum

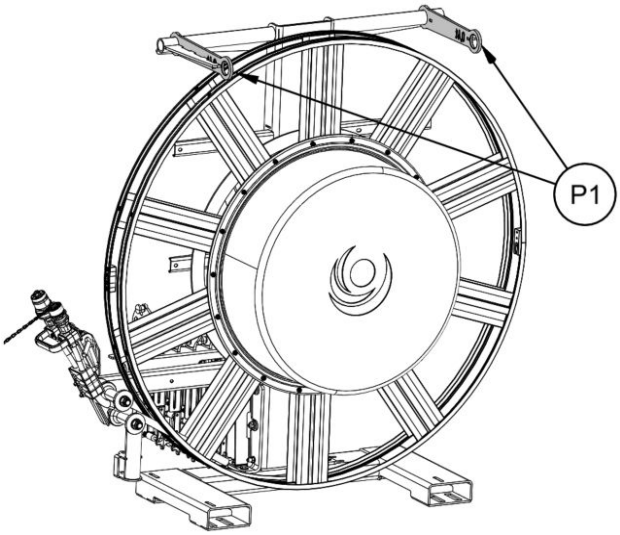


Fig. 918: Fastening positions

P1 Fastening position

▶ Fasten the hose drum in the fastening positions **P1**.

7.12 Winch 2

7.12.1 Dimensions and weight

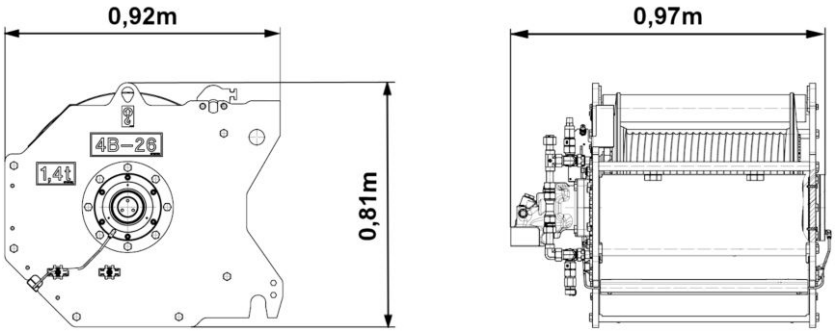


Fig. 919: Winch 2 dimensions

Component	Weight
Winch 2	1.4 t
Winch 2 without rope	0.9 t

Tab. 93: Winch 2 weight

7.12.2 Fastening winch 2

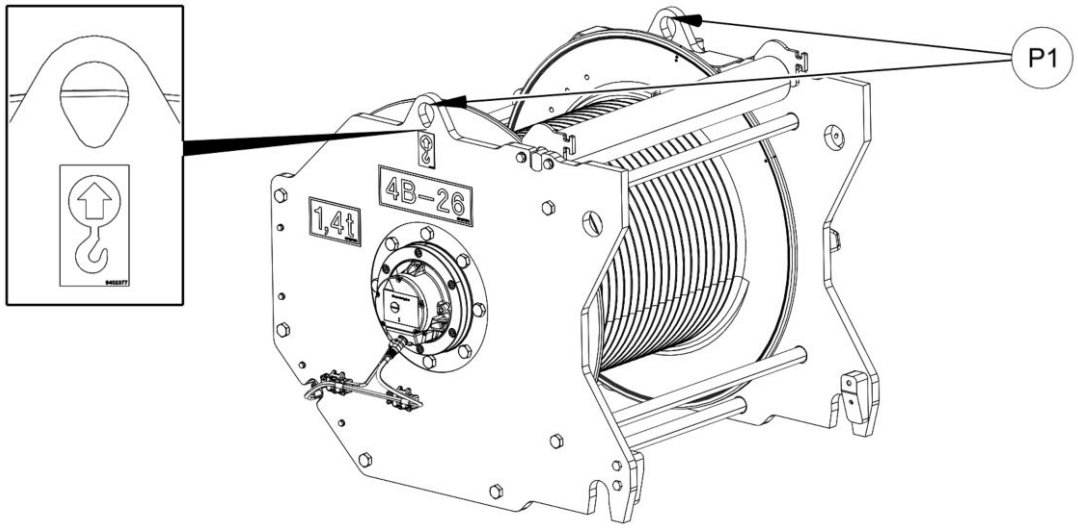


Fig. 920: Fastening winch 2

P1 Fastening position

▶ Fasten winch 2 in the fastening positions **P1**.

8 Crane operation

8.1 Crane operation checklist

Make sure that the following prerequisites are met:

Job planning

- ❑ Job planning is carried out.
  (→ 5.18.1 Planning crane use, p. 203)

Crane condition

- ❑ All covers, storage compartments and tool boxes are closed.
- ❑ Maintenance is performed according to the maintenance and inspection schedule.
  (→ 11.1 Maintenance and inspection schedule, p. 897)
- ❑ Warning and safety equipment is available, functional and correctly set.
  (→ 8.3 Checking the warning and safety equipment, p. 404)
- ❑ The crane is in a safe operating condition and is free of defects.
- ❑ The ladders, railings, platforms and stairs are in the operating position.
  (→ 10.1.10 Swinging the railing into the operating position, p. 673)(→ 10.1.3 Swinging the swinging steps* on the crawler carrier into the “wide track width” operating position, p. 661)
- ❑ The crane is set up according to the load charts.
- ❑ **No** personnel are on the crane.

Superstructure

- ❑ The mirrors and cameras are clean and correctly adjusted.
  (→ 10.12.1 Boom head camera*, p. 854)
  (→ 8.8.16 Adjusting the boom head camera* zoom, p. 464)

Crane cab

- ❑ The step on the crane cab is swung into the operating position.
  (→ 10.1.9 Swinging the step on the crane cab into the operating position, p. 672)
- ❑ The windows are free. The field of vision is **not** restricted.
  (→ 8.8.5 Operating the window wiper, p. 433)
  (→ 8.8.6 Operating the window washer system, p. 434)
- ❑ The crane cab seat is adjusted correctly.
  (→ 8.8.1 Adjusting the crane cab seat, p. 421)

Control

- ❑ The crane set up configuration is set in the *set up* menu.
  (→ 8.6 Setting up the crane, p. 412)
- ❑ The safety equipment is **not** bypassed.
- ❑ All displays are function and within a permissible range.

Equipment

- ❑ **No** loose parts on the crane.
- ❑ All crane parts are assembled properly according to the crane documentation.
- ❑ The wind speed sensor is assembled.
  (→ 10.13.1 Assembling in the operating position, p. 870)
- ❑ All necessary lines are connected.

Working environment

- ❑ The ground is level and of sufficient load carrying capacity.
  (→ 5.14 Loads on the ground, p. 195)
- ❑ The incline lies within the permissible range according to the load chart.
- ❑ The load and working area are well visible, work with a guide if necessary.

- ❑ Communication between the crane operator, slinger and guide is ensured. Clear communication signals have been agreed on.
  (→ 5.5 Hand signals for guidance, p. 161)
- ❑ **No** obstacles in the working area.
- ❑ **No** personnel in the danger zone.
  (→ 5.7 Danger zone, p. 167)

Crane control and expanded crane remote control

- ❑ During radio operation: **No** persons in the crane cab.

8.2 Preparing for crane operation

8.2.1 Potential equalization

WARNING
The crane or load is not grounded!
Danger of fatal injury due to electric shock.

▶ Have the crane and load grounded by authorized and trained expert personnel.

The crane can become electrostatically charged, especially if the crane is equipped with synthetic support mats or if the support mats are placed on insulating materials (such as dry wooden planks).

The load can become electrostatically charged, even if the crane is grounded. This applies in particular if a hook block with pulleys made of synthetic material and non-conductive fastening equipment (for example plastic or manila ropes) are used.

Potential equalization protects people who are located near the crane. Potential equalization prevents currents from flowing through people who possibly touch a charged crane or load while standing on the ground.

Potential equalization serves the purpose of protecting electronic components to prevent electrostatic charge.

Grounding for potential equalization is not designed to protect crane components against extreme external influences (such as lightning).

Examples of extremely strong magnetic fields:
- Near transmitters (radio and TV transmitters, for example).
- Near high frequency switching stations and high voltage lines.
- In case of high possibility of thunderstorms or potential thunderstorms.
  Note: As regards protecting against lightning, grounding must be considered separately.
- In case of welding work on the load, the screw clamp of the welding unit must be attached on the work piece to avoid current flow via hoist rope and crane.

8.2.2 Pretensioning the hoist rope

8.2.2.1 Restoring hoist rope pretension

To be able to restore the hoist rope pretension, the hoist rope must be spooled out and afterward spooled up with at least 10 percent of the maximum rope pull per reeving.

To be able to spool out the hoist rope all the way, a minimum reeving is required. The extension length of the telescopic boom can be freely selected.

The following formula can be used for calculating the minimum reeving:

(hoist rope length - boom length) / boom length

The following formula can be used for calculating the required load:

Maximum rope pull x reeving / 10

Make sure that the following prerequisites are met:
❑ The minimum reevings and require load are known.
❑ The hook block is reeved in correctly.
(→ 10.4.9 Reeving the hook block in, p. 726)
(→ 10.4.4 Use of reeving plans, p. 718)
❑ The required load is on hand.

The load charts for telescoping with a load must be observed (→ Telescoping under load, p. 561).

▶ Until four coils remain on the winch: Telescope out and spool winch out.

▶ Picking up a load

▶ Until the telescopic boom is fully retracted: Telescope in and hold the load just off the ground.
▷ The hoist rope pretension is restored.

▶ Set down the load.

8.2.2.2 Taking on a load at a height

The load is picked up overhead in the following application examples:
- Repowering wind power plants
- Disassembly of tower cranes

The hoist rope can cut into the loose spooled up rope layers and be damaged. The load **cannot** be lowered.

The following options are available to prevent cutting into the hoist rope when taking on a load at a height:
- Increasing the reeving number
- Increasing the hook block weight
- Pretensioning the hoist rope with pretensioning ballast * with two hook operation

A higher reeving number reduces the rope pull. A lower rope pull prevents the cutting in of the hoist rope in the lower rope layers. The maximum crane load is reduced by the higher hoist rope weight. Take a higher percentage of the hoist rope weight into account when lowering loads (→ Weighing the load correctly, p. 209).

A higher hook block weight increases the rope pull. As a result, the hoist rope is **not** spooled up loose. If the crane load is sufficient, an auxiliary weight can be connected between the load and the hook block.

Pretensioning the hoist rope with pretensioning ballast * with two hook operation

The pretensioning ballast is **not** included in the Liebherr delivery scope.

Properties of the pretensioning ballast
- Developed by Liebherr
- The weight is 4 t
- Special tow coupling

▶ Fasten the pretensioning ballast to the main hook and the auxiliary hook.

▶ Lift the pretensioning ballast with the main hook and carry the auxiliary hook along without a load.

When the required height is reached:
▶ Do **not** lift the pretensioning ballast any further.

When the pretensioning ballast is transferred to the auxiliary hook, the main hook fastening ropes release automatically.

▶ Until the pretensioning ballast is transferred completely to the auxiliary hook: Lift the auxiliary hook.
▷ The fastening ropes of the main hook are released from the pretensioning ballast.
▷ The pretensioning ballast is hanging completely from the auxiliary hook.
▷ The main hook hoist rope is pretensioned.

▶ Lower the pretensioning ballast with the auxiliary hook and place it on the ground.

8.2.3 Charging the batteries

The battery charger* is firmly fitted.

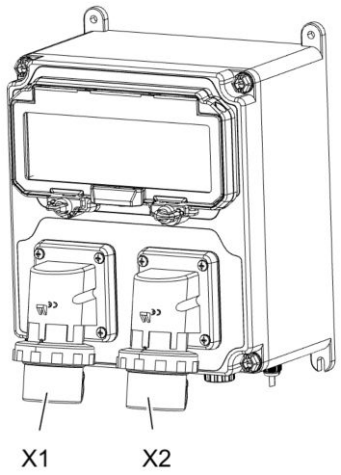


Fig. 921: 230 V / 110 V external power supply*

X1 CEE plug **X2** CEE plug

Make sure that the following prerequisites are met:
- ❑ A mains connection with 230 V / 110 V is available.
  (→ 4.7.14 230 V / 110 V* external power supply, p. 89)
- ❑ A mains connection line is available.

Turning the battery charger* on

- ▶ Remove the safety cap on the CEE plug **X1**.
- ▶ Insert the mains connection line in the CEE plug **X1**.
  - ▷ The battery charger* is supplied with voltage and the batteries are charged.
  - ▷ The 230 V / 110 V* socket is supplied with voltage (→ 4.17.2 Crane cab interior, p. 128).

Turning the battery charger* off

- ▶ Unplug the mains connection line in the CEE plug **X1**.
- ▶ Fit the safety cap on the CEE plug **X1**.

8.3 Checking the warning and safety equipment

The crane operator is obligated before every crane operation to ensure that the warning and safety equipment are functioning.

In the case of errors when checking the warning and safety equipment, contact Customer Service at Liebherr-Werk Ehingen GmbH.

8.3.1 Checking the crane geometry

Make sure that the following prerequisites are met:
- ❑ **No** load on the hook.
- ❑ The telescopic boom is telescoped in all the way.
  (→ Automatic telescoping from the crane cab, p. 551)
- ❑ The telescopic boom is luffed down to 0°.
  (→ Luffing the telescopic boom from the crane cab, p. 533)
- ❑ The *crane operation* menu is displayed on the superstructure monitor.
  (→ Opening menus, p. 439)

Note

A spirit level can be used to check in the measuring point **P1** if the telescopic boom is horizontally aligned. The telescopic boom must be horizontal with a crane incline of 0.0° over the entire slewing range of the turntable.

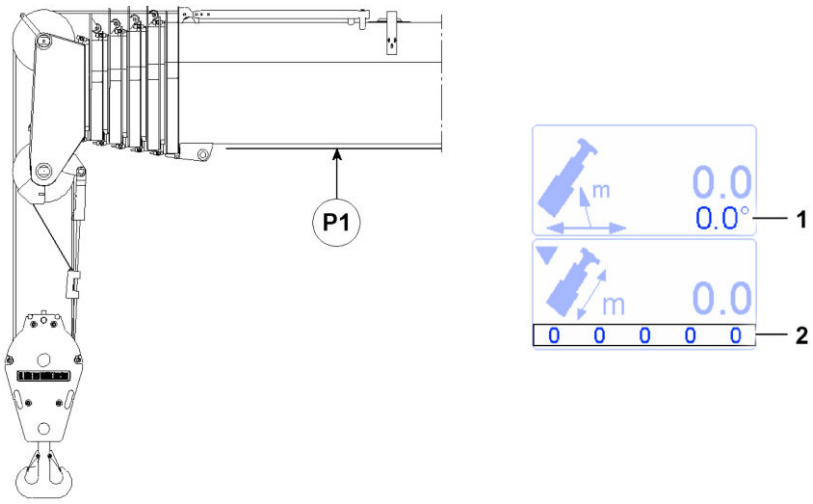


Fig. 922: Exemplary illustration: Checking the crane geometry

1 Telescopic boom angle
2 Telescope actual extension condition
P1 Measuring point

▶ Check the horizontal alignment of the telescopic boom using the spirit level in the measuring point **P1**.

8.3.2 Checking overload protection

Make sure that the following prerequisites are met:
- ❑ The crane set up configuration is set on the superstructure monitor in the *set up* menu.
  (→ 8.6 Setting up the crane, p. 412)
- ❑ The *crane operation* menu is displayed on the superstructure monitor.
  (→ Opening menus, p. 439)

Fig. 923: Exemplary illustration: Load display

▶ Lift the load with a known weight, for example a hook block or a ballast plate.

▶ Check the following on the superstructure monitor: The *load* display must be plausible.

8.3.3 Checking the hoist limit switch

The hoist limit switch is intended to prevent the hook block from running against the boom head.

Make sure that the following prerequisites are met:
❑ The hoist limit switch weight is assembled.
(→ 10.4.13 Assembling the hoist limit switch weight, p. 730)
❑ The hoist limit switch is **not** bypassed.
(→ 9.10 Bypassing the hoist limit switch, p. 630)

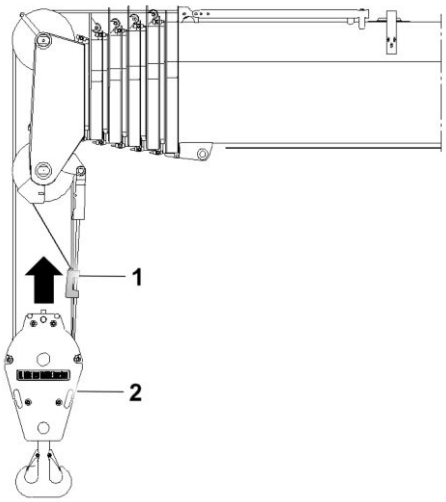


Fig. 924: Checking the hoist limit switch

1 Hoist limit switch weight **2** Hook block

▶ Until the hoist limit switch weight **1** is lifted from the hook block **2**: Spool the winch up slowly.

or

Lift the hoist limit switch weight **1** manually.

▶ Check the following on the superstructure monitor: The *Hoist limit switch triggered* icon blinks.
▷ Lifting, luffing the telescopic boom down and telescoping crane movements are locked.

8.3.4 Checking the wind speed sensor

Make sure that the following prerequisites are met:
❑ The wind speed sensor is electrically connected.

(→ 10.13.5 Connecting the electrical lines, p. 879)

Fig. 926: Exemplary illustration: Wind speed display

▶ Put the wind speed sensor in movement.

▶ Check the following on the superstructure monitor: The *wind speed* display shows a value.

8.3.5 Checking the correct adjustment of the winch speed sensor

The following must occur when shutting off the winch:
- The *winch spooled out* icon is displayed in the *crane operation* menu.
- The “spool winch out” crane movement is shut off.
- When shutting off the winch, at least 4 rope coils must remain on the winch.

8.3.6 Checking the emergency off switch

▶ Press the emergency off switch.

▶ Check if all crane movements are blocked.

8.3.7 Checking the airplane warning light*

Make sure that the following prerequisites are met:
❑ The airplane warning light is electrically connected.
(→ 10.13.5 Connecting the electrical lines, p. 879)

▶ Turn on the airplane warning light (→ 8.8.15 Turning the exterior lighting for crane operation on and off, p. 457).

▶ Check the function of the airplane warning light.

8.4 Working in low temperatures

At low temperatures, observe the safety instructions for ambient temperatures (→ 5.13.3 Material load due to extreme temperatures, p. 191).

8.4.1 Preheating the engine

At low temperatures, observe the safety instructions for ambient temperatures (→ 5.13.3 Material load due to extreme temperatures, p. 191).

Preheat the engine in the following cases:
- At outside temperatures of less than 0 °C preheat the engine.
- At ambient temperatures below -20 °C preheat the engine, the injection pump and the transmission.

Note

If the crane is designed for low temperature application, additional preheating systems can be installed. The preheating systems are additionally controlled with the parking heater.

▶ Turn on the parking heater (→ Operating the superstructure* parking heater, p. 467).

▶ Preheat the engine faster: Set the passenger compartment temperature to the minimum.

8.4.2 Turning hydraulic oil preheating on and off

Make sure that the following prerequisites are met:
❑ The auxiliary functions menu is displayed on armrest operating unit 2.
(→ Changing the menu, p. 437)
❑ The engine is running.
(→ 8.12 Engine, p. 490)

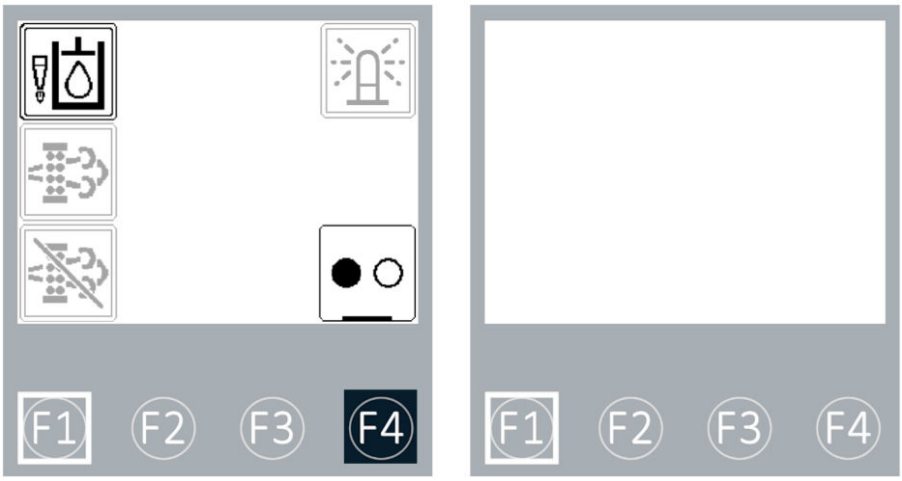


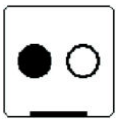
Fig. 928: Armrest operating unit 2 - auxiliary functions menu

Note

When hydraulic oil preheating is turned on, various crane movements are turned off.

Turn on hydraulic oil preheating only up to a hydraulic temperature of 25 °C.

▶ Press the *hydraulic oil preheating* button.



▶ Press the *turn function on / off* F-button.

8.4.3 Turning electrical coolant preheating* on and off

Electrical coolant preheating heats up the coolant and is used for engine preheating.

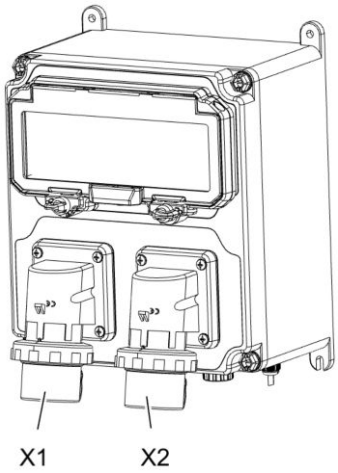


Fig. 931: 230 V / 110 V external power supply*

X1 CEE plug **X2** CEE plug

Make sure that the following prerequisites are met:
❑ A mains connection with 230 V / 110 V is available.
(→ 4.7.14 230 V / 110 V* external power supply, p. 89)
❑ A mains connection line is available.

Turning electrical coolant preheating on

▶ Remove the safety cap on the CEE plug **X2**.

▶ Insert the mains connection line in the CEE plug **X2**.
▷ Electrical coolant preheating is turned on.

Turning electrical coolant preheating off

▶ Unplug the mains connection line in the CEE plug **X2**.
▷ Electrical coolant preheating is turned off.

▶ Fit the safety cap on the CEE plug **X2**.

8.5 Opening and closing

8.5.1 Opening and closing the window

Make sure that the following prerequisites are met:
❑ When closing the window, there are no body parts or objects in the closing area.

8.5.1.1 Opening and closing the front window

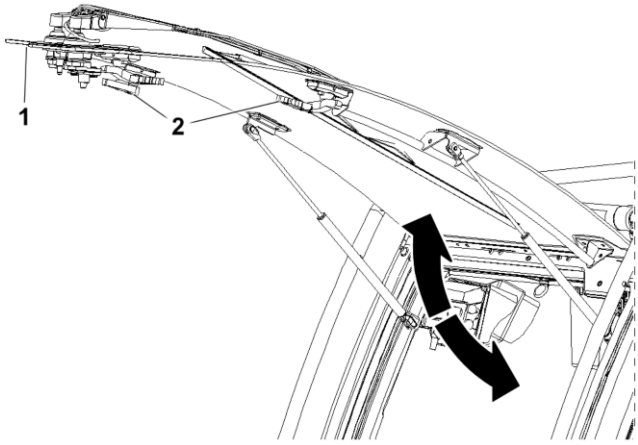


Fig. 932: Opening and closing the front window

1 Handle **2** Handle

Opening the front window

▶ Unlock the handle **1**.
▶ Unlock the handle **2** on both sides.
▶ Press out the front window.

Closing the front window

▶ Pull the front window closed.
▶ Lock the handle **2** on both sides.
▶ Lock the handle **1**.

8.5.1.2 Opening and closing the roof window

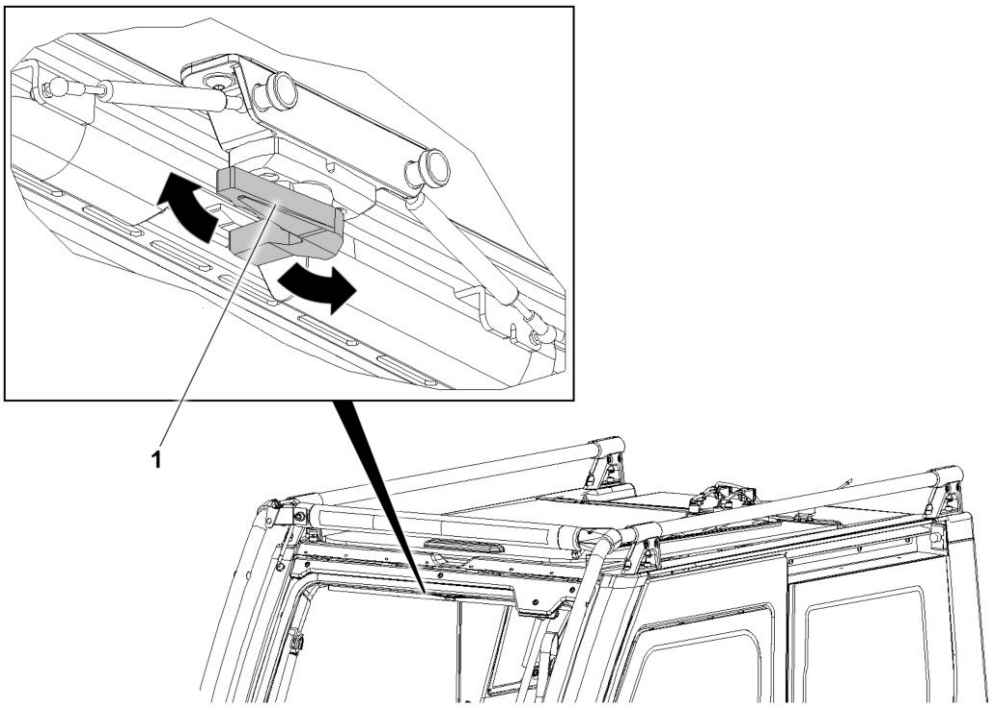


Fig. 933: Opening and closing the roof window

1 Handle

Opening the roof window

- ▶ Unlock the handle **1**.
- ▶ Push up the roof window.

Closing the roof window

- ▶ Pull down the roof window completely.
- ▶ Lock the handle **1**.

8.5.1.3 Opening and closing the roof window for an emergency exit

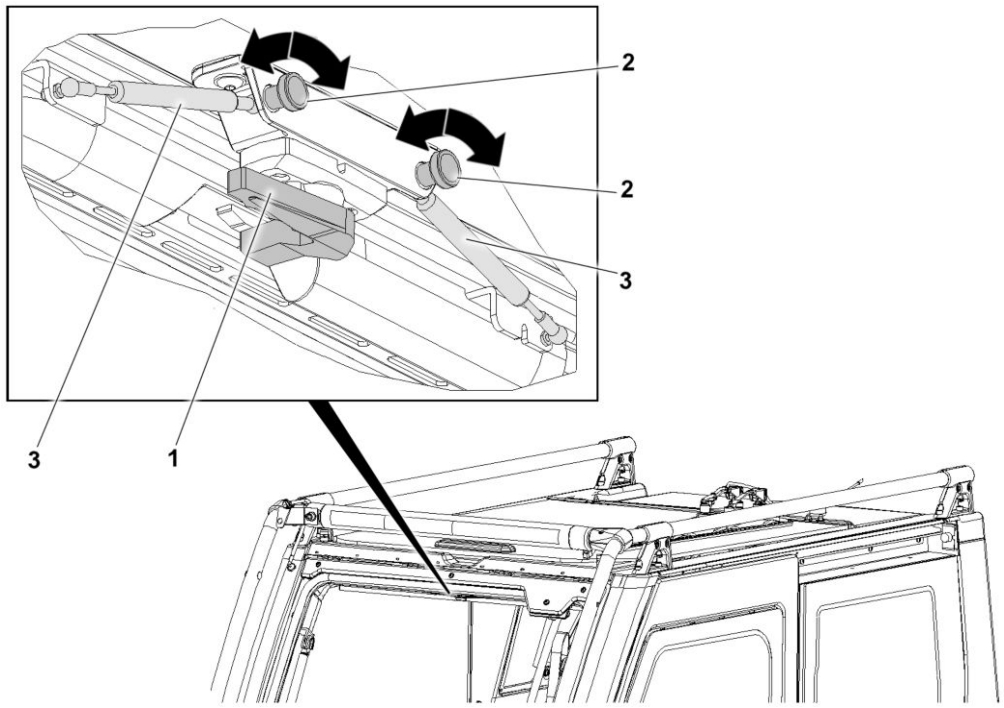


Fig. 934: Opening and closing the roof window for an emergency exit

1 Handle
2 Knob
3 Pressure spring

Opening the roof window for an emergency exit

- ▶ Unlock the handle **1**.
- ▶ Push up the roof window.
- ▶ Turn the knobs **2** on both sides counterclockwise and release.
- ▶ Disconnect the pressure spring **3** on both sides from the knobs **2**.
- ▶ Completely push up the roof window.
- ▶ Leave the crane cab through the roof window.

Closing the roof window again after an emergency exit

- ▶ Until the pressure spring **3** can be connected again: Pull down the roof window.
- ▶ Connect the compressed spring **3** to the knobs **2**.
- ▶ Turn the knobs **2** on both sides clockwise.
- ▶ Pull down the roof window completely.
- ▶ Lock the handle **1**.

8.6 Setting up the crane

In order for the overload protection to operate correctly, the mobile crane set up configuration must be entered in the *set up* menu.

The set up configuration that was set must be updated and confirmed in the following cases:
- At every LICCON system start
- As soon as the mobile crane set up configuration is changed
- When resuming operation

After the LICCON system start, the *set up* menu is always displayed with the last set up configuration that was active.

Another menu can be called up only **after** the set up configuration has been checked and confirmed.

Note

The set up configuration can only be changed during crane operation if the *utilization* display is shown in green.

8.6.1 Entering the set up configuration via the short code

The set up configuration can be set via a chart number. The short code must be determined in advance from the load charts or with the Crane Planner.

Make sure that the following prerequisites are met:
- ❑ The *set up* menu is displayed.
  (→ Opening menus, p. 439)
- ❑ A short code for the desired set up configuration is available.
- ❑ The utilization is within the permissible range.

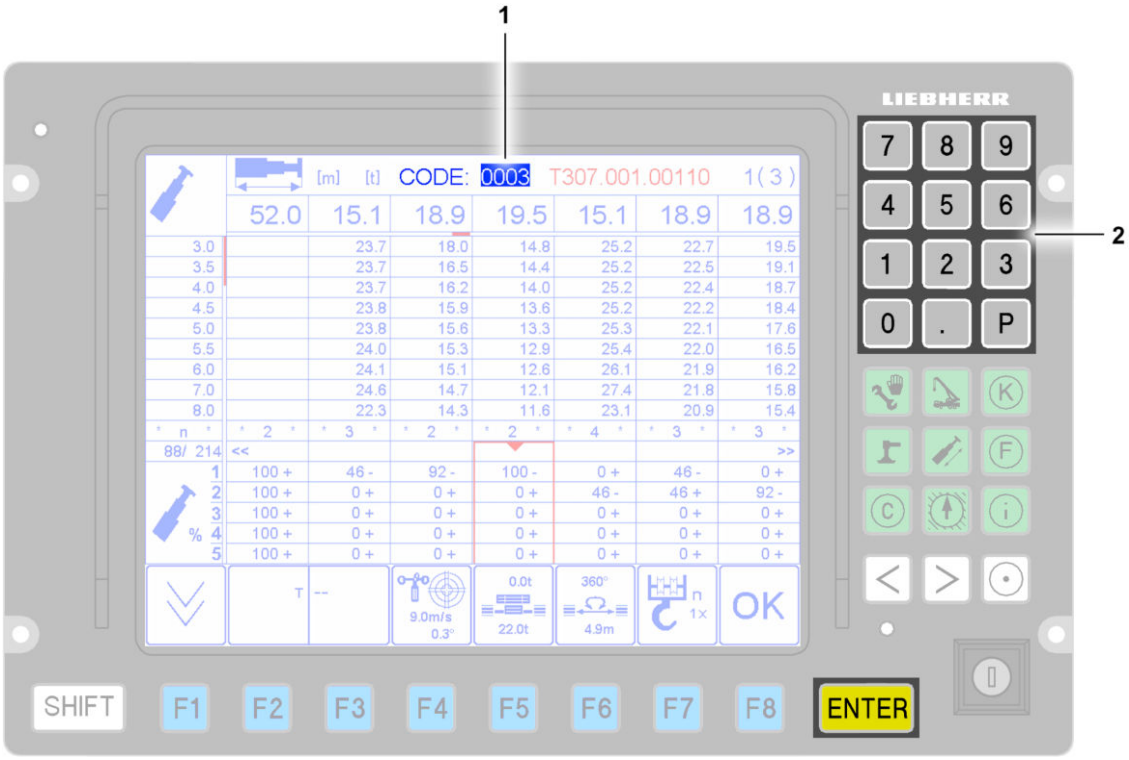


Fig. 935: Exemplary illustration: Entering the set up configuration via the short code

1 Short code **2** Number block

▶ Enter the short code **1** with the number block **2**.
▷ The load chart is hidden.

ENTER

▶ Confirm the entered short code **1** with the *ENTER* button.
▷ The entered set up configuration is displayed.
▷ The load chart is loaded.

Troubleshooting

Is the short code **1** displayed in red?
The short code is invalid.

▶ Entering a valid short code.

▶ Compare the entered set up configuration with the crane set up configuration and adjust if necessary.

8.6.2 Entering the set up configuration manually

Make sure that the following prerequisites are met:
❑ The *set up* menu is displayed.
(→ Opening menus, p. 439)
❑ The utilization is within the permissible range.

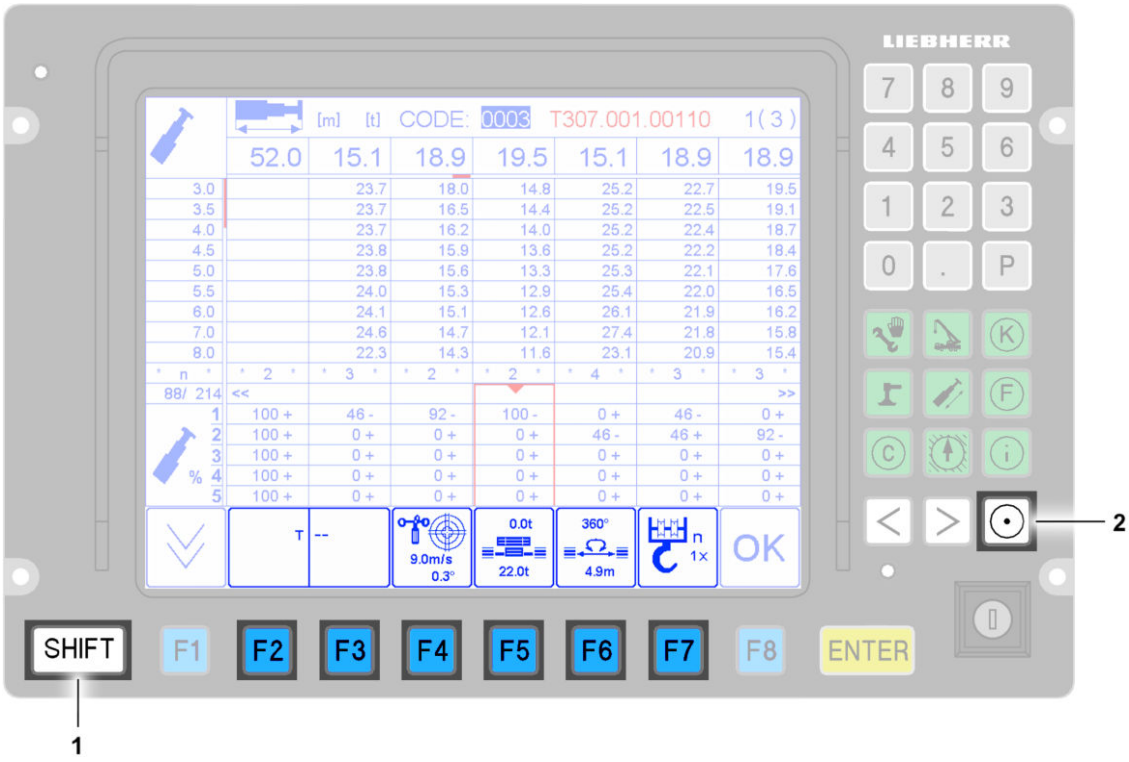


Fig. 937: Exemplary illustration: Set up menu

1 SHIFT Button **2** Dot button

8.6.2.1 Changing the set up settings

Selecting the next set up setting

▶ Press the corresponding F-button.
or

To change in groups to the next set up setting:
Press and hold the *dot* **2** button and press the corresponding F-button.

Note

Only for certain set up settings.

Selecting previous set up setting

▶ Press and hold the *SHIFT* **1** button and press the corresponding F-button.
or

To change in groups to the previous set up setting:
Press and hold the *SHIFT* **1** button and *dot* **2** button and press the corresponding F-button.

Note

Only for certain set up settings.

8.6.2.2 Setting main boom

The following set up settings can be made with the *main boom* F-buttons:
- Boom operating mode: Telescopic boom operation, operation with the auxiliary device or maintenance operation
- Main boom composition: Telescopic boom or telescopic boom with telescopic boom extension
- Operation with 66 % load chart

The adjustment of the main boom is described based on the example of a telescopic boom with a 7.0 m telescopic boom extension.

▶ Until the desired set up setting is displayed: Press the *main boom* F-button repeatedly.

▷ The desired set up setting is displayed (telescopic boom with 7.0 m telescopic boom extension for example).

8.6.2.3 Adjusting the auxiliary boom

Adjusting the auxiliary boom (with use)

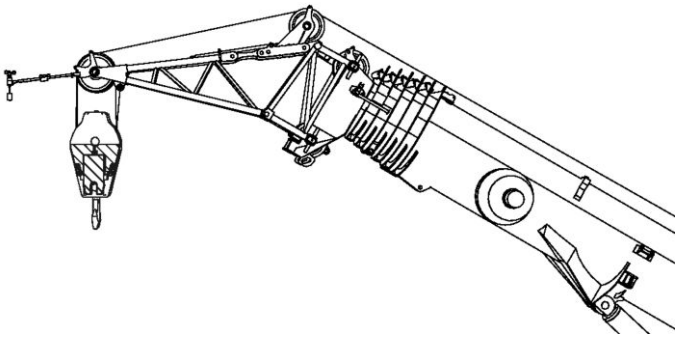


Fig. 940: Exemplary illustration: Auxiliary boom assembled and used

The auxiliary boom is assembled in this case and is used. The adjustment of the auxiliary boom is described based on the example of the special folding jib.

▶ Until the desired set up setting is displayed: Press the *auxiliary boom* F-button repeatedly.

▷ The desired set up setting is displayed (special folding jib (with use) for example).

Adjusting the auxiliary boom (assembled without use)*

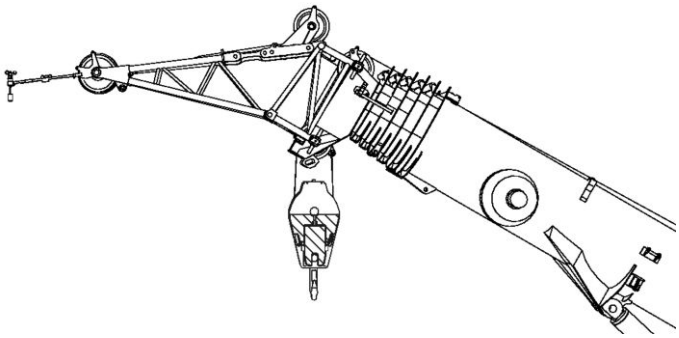


Fig. 943: Exemplary illustration: Auxiliary boom assembled and not used

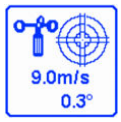
The auxiliary boom is assembled in this case but is **not** used. The adjustment of the auxiliary boom (assembled **without** use) is described based on the example of the special folding jib.

▶ Until the desired set up setting is displayed: Press the *auxiliary boom* F-button repeatedly.

▷ The desired set up setting is displayed (special folding jib (assembled **without** use) for example).

8.6.2.4 Setting the maximum permissible wind speed and crane incline

The adjustment of the maximum permissible wind speed and the crane incline is described based on the example of a 11.2 m/s wind speed and a crane incline of 4.0°.

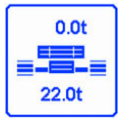


▶ Until the desired set up setting is displayed: Press the *wind speed and crane incline* F-button repeatedly.

▷ The desired set up setting is displayed (wind speed of 11.2 m/s and crane incline of 4.0° for example).

8.6.2.5 Setting the ballast

The adjustment of the ballast is described based on the example of a 41.0 t turntable ballast and a central ballast of 22.0 t.



▶ Until the desired set up setting is displayed: Press the *ballast* F-button repeatedly.

▷ The desired set up setting is displayed (turntable ballast of 41.0 t and central ballast of 22.0 t for example).

8.6.2.6 Setting the slewing range and support base

The adjustment of the slewing range and the support base is described based on the example of a slewing range of 360° and a support base of 2.6 m.

▶ Until the desired set up setting is displayed: Press the *slewing range and support base* F-button repeatedly.

▷ The desired set up setting is displayed (slewing range of 360° and support base of 2.6 m for example).

8.6.2.7 Setting the reeving

The adjustment of the reeving is described based on the example of a 5-way reeving.

▶ Until the desired set up setting is displayed: Press the *reeving* F-button repeatedly.

▷ The desired set up setting is displayed (5-way reeving for example).

8.6.2.8 Loading the load chart

The load chart is hidden as soon as a set up setting is changed.

Make sure that the following prerequisites are met:
❑ The entered set up configuration is permissible.

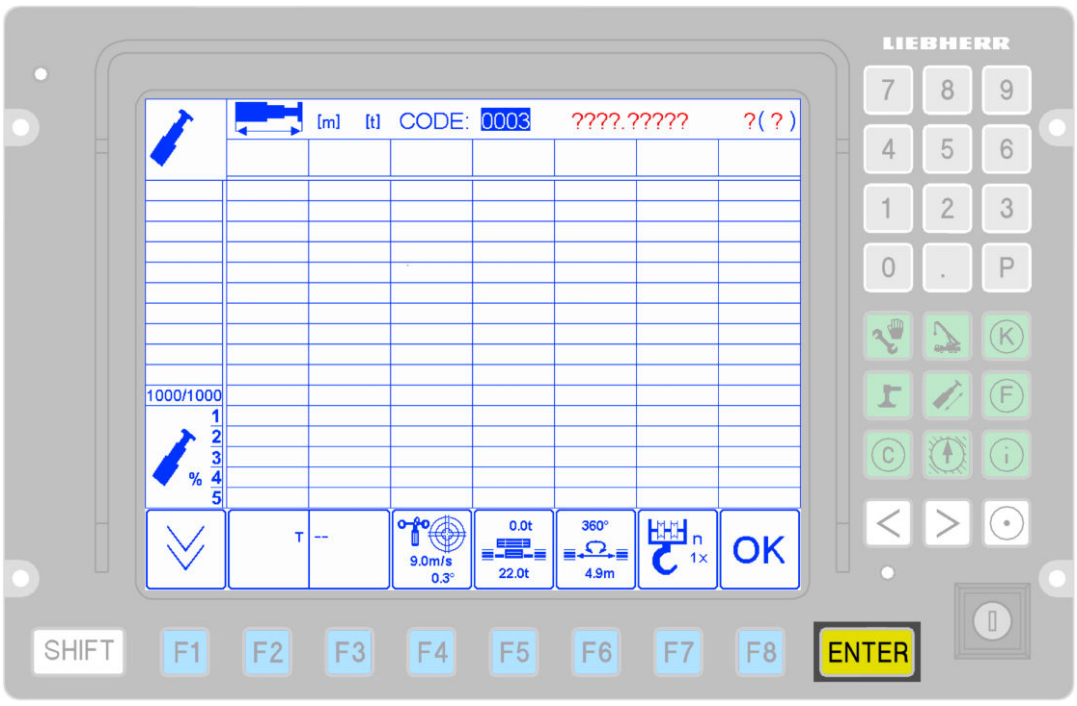


Fig. 954: Exemplary illustration: Loading the load chart

▶ Press the *ENTER button*.
▷ The load chart is loaded.

Troubleshooting

Do the set up settings change?
The set up configuration is **not** permissible.

▶ Enter the permissible set up configuration.

8.6.3 Confirming the set up configuration

Make sure that the following prerequisites are met:
❑ The set up configuration was entered correctly via the short code or manually and the load chart is loaded.
(→ 8.6.1 Entering the set up configuration via the short code, p. 412)
(→ 8.6.2 Entering the set up configuration manually, p. 413)
❑ The crane set up configuration and settings in the *set up* menu match.

DANGER
Impermissible set up configuration!
The crane can collapse or topple over.

▶ Make sure that the crane set up configuration and settings in the *set up* menu match at all times.

When the crane set up configuration is changed:
▶ Immediately adjust and confirm the settings in the *set up* menu.

When the set up configuration is completely and correctly set:
▶ Confirm the set up configuration: Press the *OK* F-button.
▷ The set up configuration is confirmed and taken over.
▷ The *crane operation* menu is displayed.

8.7 Releasing crane operation

8.7.1 Actuating the seat contact button

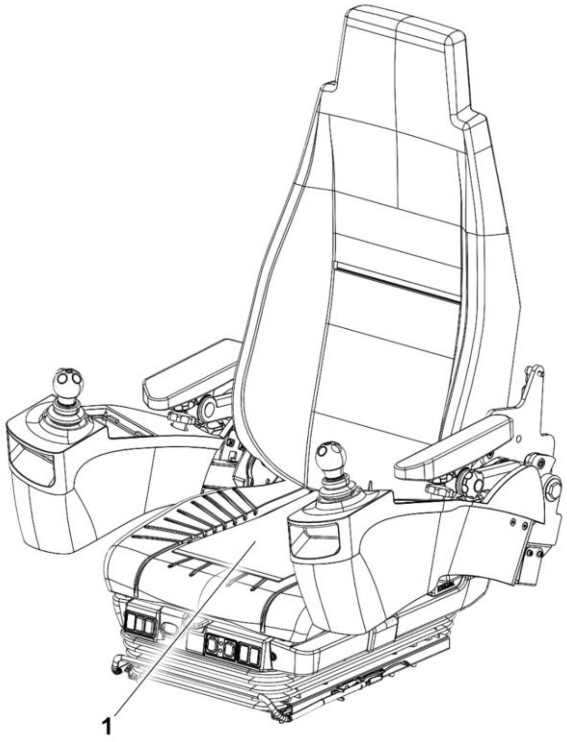


Fig. 957: Control platform

1 Seat contact button

To enable crane movements, the seat contact button **1** must be pressed continuously.

▶ Actuate the seat contact button **1**: Sit on the crane cab seat.

8.7.2 Bypassing the seat contact button

The seat contact button can be bypassed for the following cases:
- The crane operator must work standing.
- The seat contact button is defective.

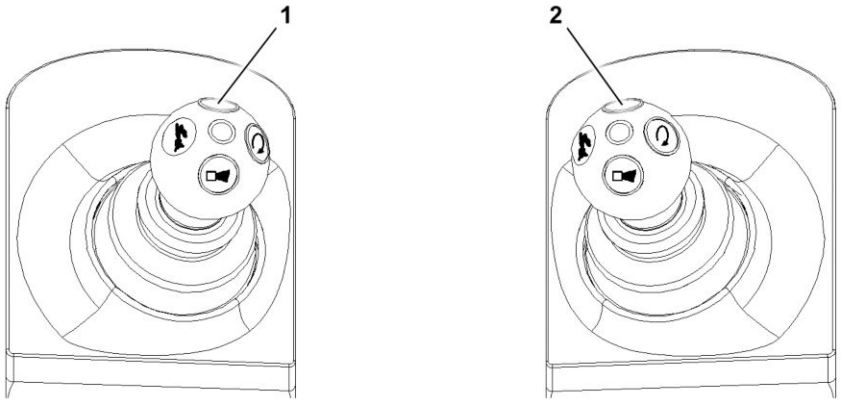


Fig. 958: Control lever

1 Special function button **2** Special function button

The *special function* button must be pressed down for the entire duration of a crane movement.

▶ Press and hold the special function button **1**.
or
Press and hold the special function button **2**.

8.7.3 Releasing crane operation with expanded crane remote control*

Make sure that the following prerequisites are met:
❑ The superstructure ignition is turned on.
(→ Turning the superstructure monitor on and off, p. 438)
❑ The set up configuration of the crane is entered and confirmed on the superstructure monitor in the *set up* main menu.
(→ 8.6.3 Confirming the set up configuration, p. 418)
❑ The *crane operation* menu is displayed.
(→ Opening the crane operation menu, p. 486)

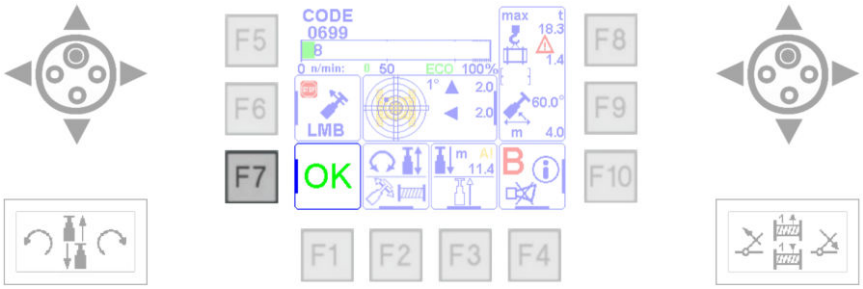


Fig. 959: Confirming the set up configuration

▶ Press the *confirm set up configuration* F-button.

▷ The *confirm set up configuration* button is displayed in green.

8.8 Crane cab work station

8.8.1 Adjusting the crane cab seat

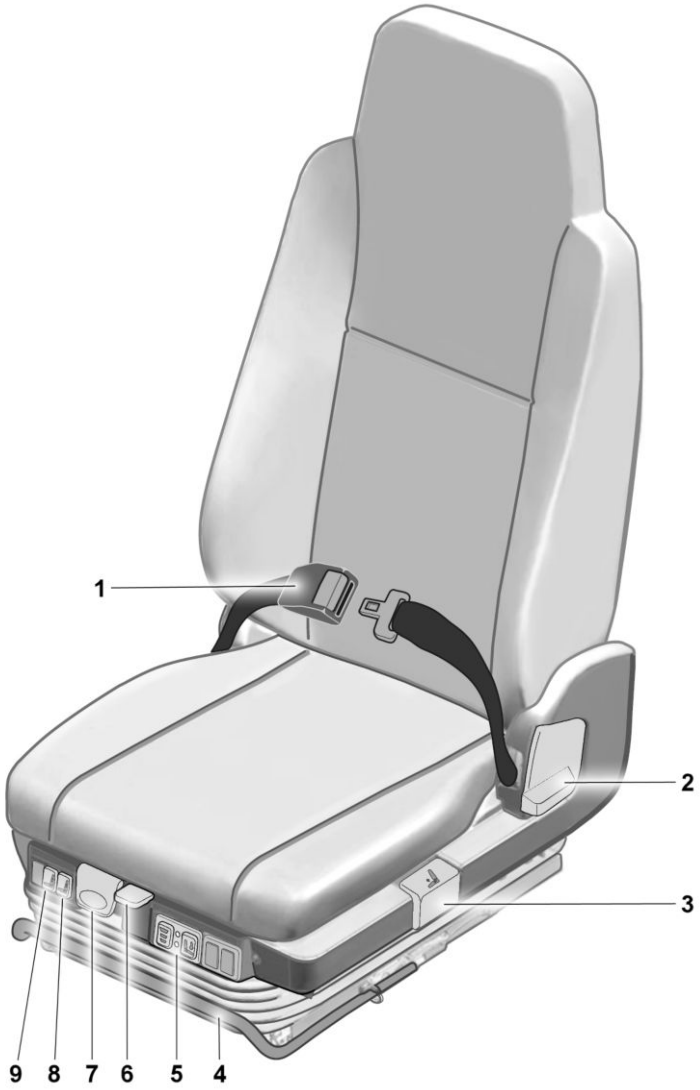


Fig. 962: Exemplary illustration: Overview of crane cab seat operating elements

1 Lap belt lock
2 Backrest incline lever
3 Seat height lever
4 Horizontal adjustment lever
5 Climate control / heater buttons
6 Seat cushion depth lever
7 Seat incline lever
8 Upper lumbar support button
9 Lower lumbar support button

WARNING
Adjusting des crane cab seat with an inclined crane cab or when driving!
The crane operator can loose control over the crane.

▶ Adjust the crane cab seat only when the vehicle is stationary and the crane cab is horizontal.

8.8.1.1 Adjusting the crane cab seat horizontally

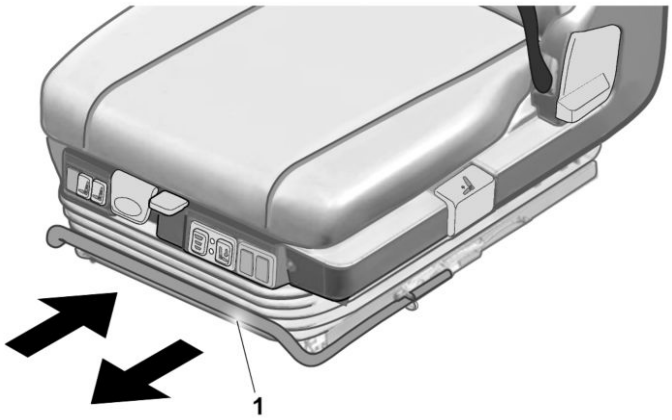


Fig. 963: Adjusting the crane cab seat horizontally

1 *Horizontal adjustment* lever

Adjust the crane cab seat horizontally so that the pedals and instruments can be reached comfortably.

▶ Pull up the *horizontal adjustment* **1** lever.

▶ Push the crane cab seat to the front or to the rear.

When the required position is reached:
▶ Let the *horizontal adjustment* **1** lever engage.

8.8.1.2 Adjusting the depth of the seat cushion

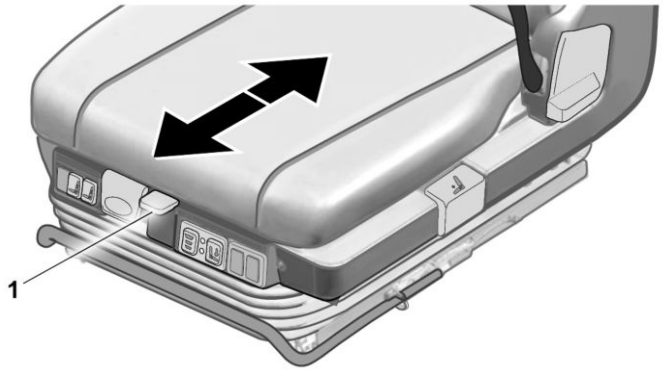


Fig. 964: Adjusting the depth of the seat cushion

1 *Seat cushion depth* lever

Adjust the depth of the seat cushion so that the space between the hollow of the knee and the front edge of the seat cushion is between two to three finger widths.

▶ Pull up the *seat cushion depth* **1** lever.

▶ Push the seat cushion forward or backward.

When the seat cushion is adjusted:
▶ Let the *seat cushion depth* **1** lever engage.

8.8.1.3 Adjusting the seat height

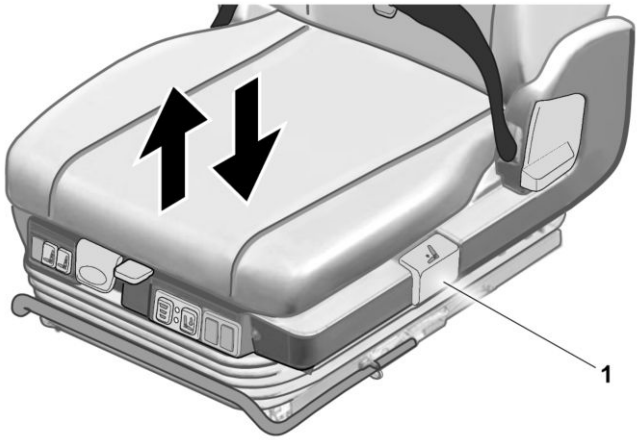


Fig. 965: Adjusting the seat height

1 *Seat height* lever

Adjust the seat height so that there is headroom and the pedals can be reached comfortably.

▶ Pull or press the *seat height* **1** lever.

When the required height is reached:
▶ Release the *seat height* **1** lever.

8.8.1.4 Adjusting the seat cushion incline

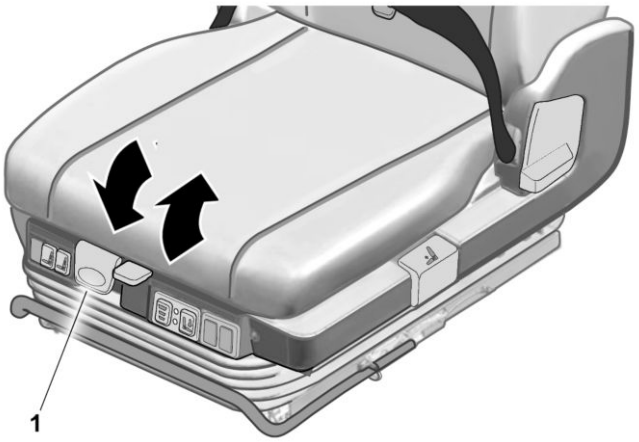


Fig. 966: Adjusting the seat cushion incline

1 *Seat incline* lever

Adjust the seat cushion incline such that the pressure is reduced below the upper thigh and in the spinal disks.

▶ Pull or press the *seat incline* **1** lever.

When the necessary incline is reached by inflating or releasing the front of the seat cushion:
▶ Let the *seat incline* **1** lever engage.

8.8.1.5 Adjusting the backrest

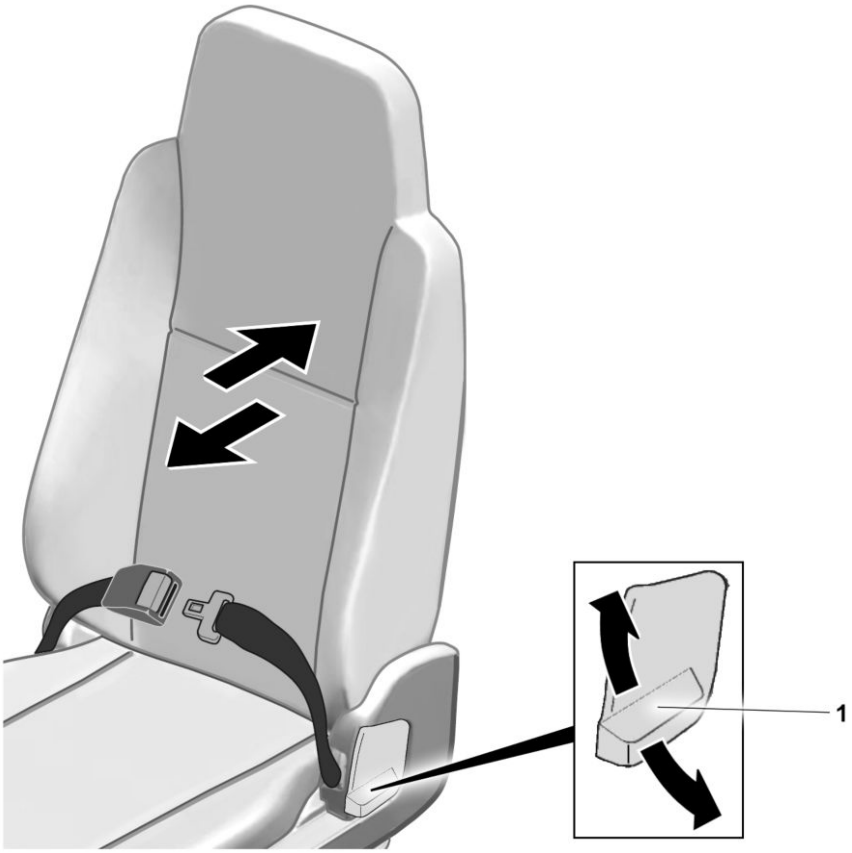


Fig. 967: Adjusting the backrest

1 *Backrest incline* lever

The backrest can be moved forward quickly when not loaded. Adjust the backrest only when the crane cab seat is occupied.

Adjust the backrest so that the instruments can be reached easily.

- ▶ Press the back slightly against the backrest.
- ▶ Pull up the *backrest incline* **1** lever completely across the entire adjustment path.
- ▶ Bring the backrest into the desired position by pushing back and forth with the back.
- ▶ Release the *backrest incline* **1** lever again.

8.8.1.6 Adjusting the backrest contour

An individual adjustment of the backrest contour promotes a proper sitting posture and prevents fatigue.

Adjusting the lower lumbar support

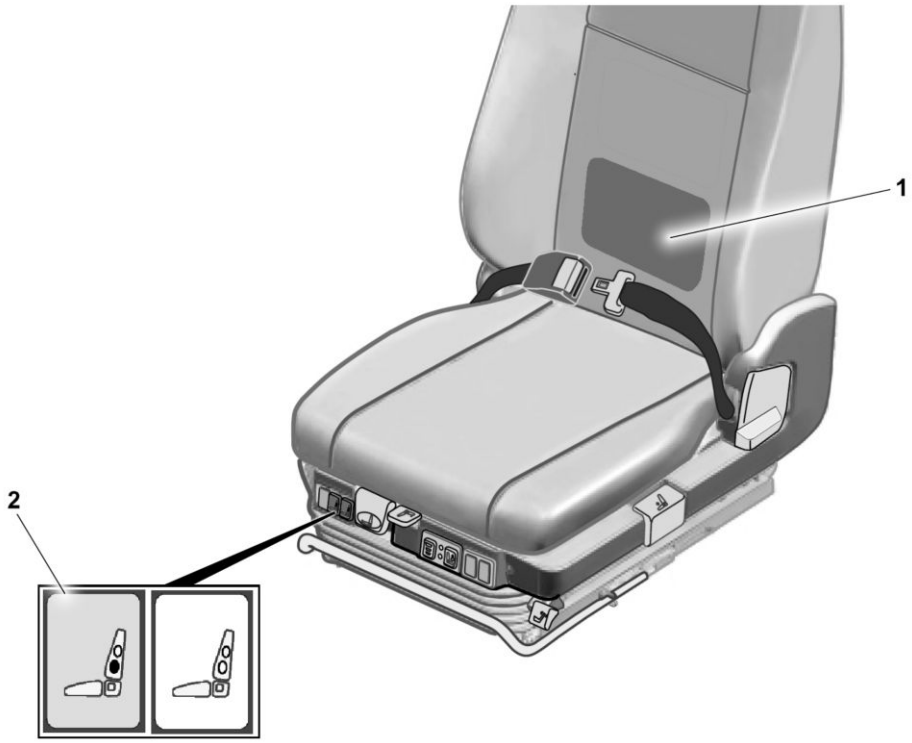


Fig. 968: Adjusting the lower lumbar support

1 Lumbar support air cushion

2 *Lumbar support* button

Fill the lumbar support air cushion **1**:

▶ Press the *lumbar support* **2** button up.

Deflate the lumbar support air cushion **1**:

▶ Press the *lumbar support* **2** button down.

Adjusting the upper lumbar support

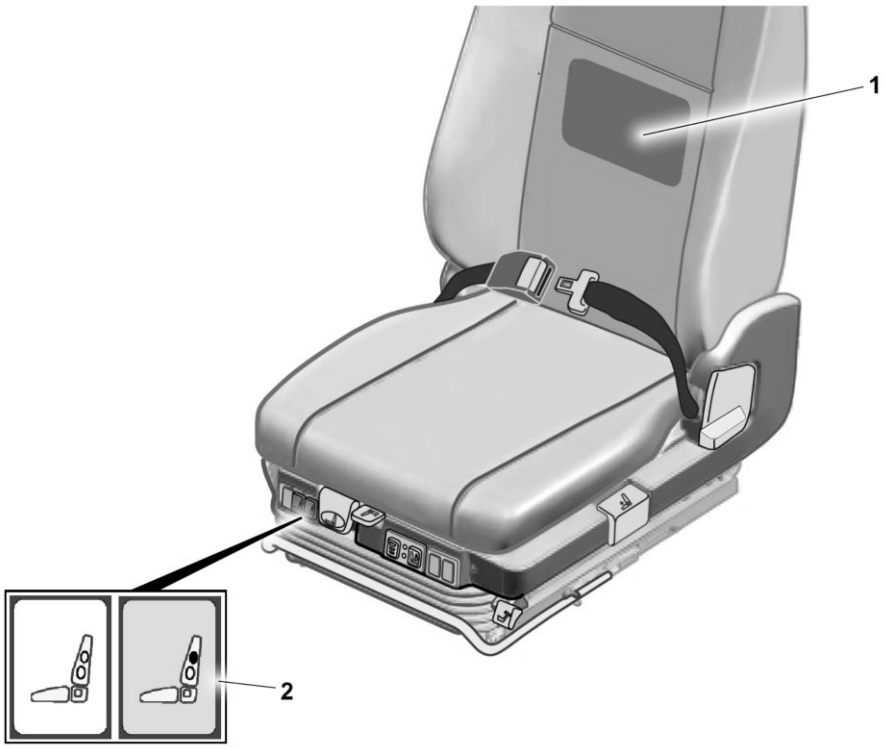


Fig. 969: Adjusting the upper lumbar support

1 Lumbar support air cushion

2 *Lumbar support* button

Fill the lumbar support air cushion **1**:

▶ Press the *lumbar support* **2** button up.

Deflate the lumbar support air cushion **1**:

▶ Press the *lumbar support* **2** button down.

8.8.1.7 Adjusting the heater and climate control

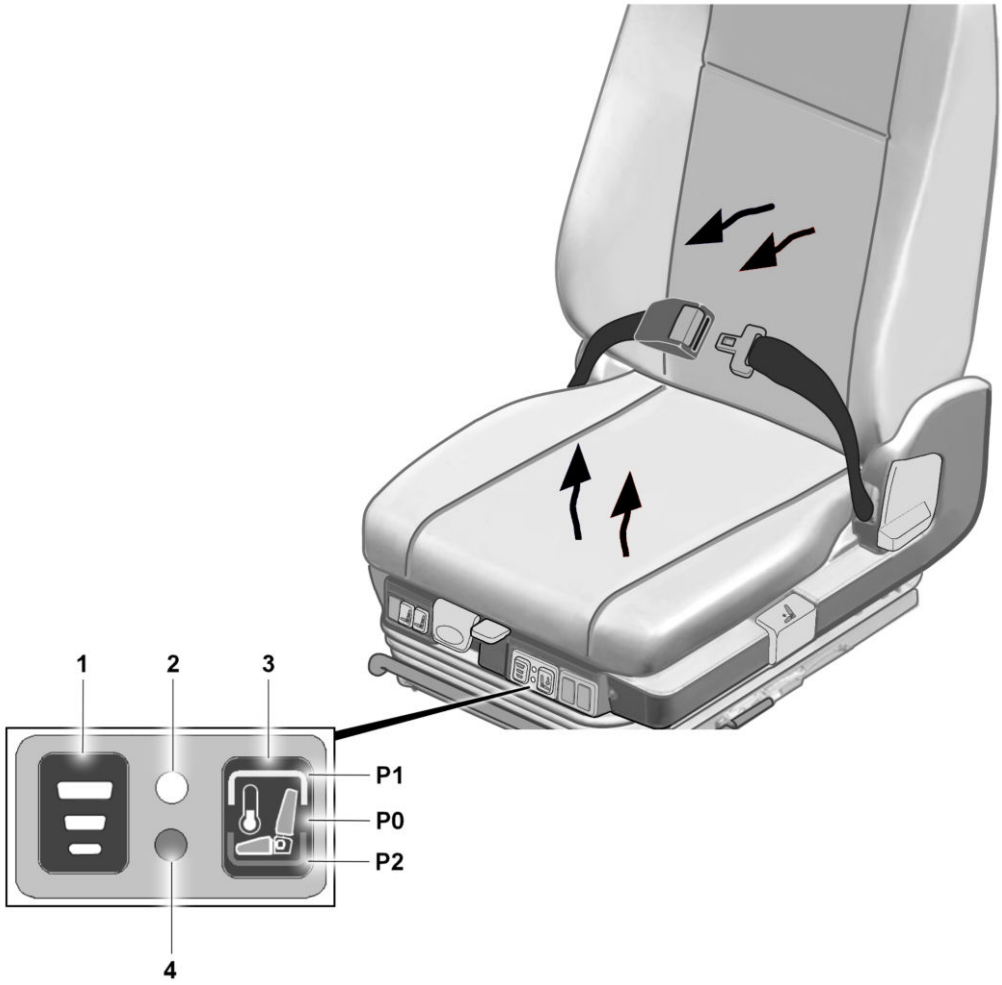


Fig. 970: Adjusting the heater and climate control

1 *Step adjustment* button
2 *Heater* indicator light
3 *Turn on / off* button
4 *Climate control* indicator light

Turn on / off button:
- Switch position **P1**: Turning on the heater
- Switch position **P0**: Turning off the heater or climate control
- Switch position **P2**: Turn on the climate control

Step adjustment button:
- Switch position up: High stage
- Switch position center: Medium stage
- Switch position down: Low stage

Heater indicator light:
- Lights up red: The heater is turned on
- Blinks red: System error

Climate control indicator light:
- Lights up blue: The climate control is turned on.

Avoid overheating or undercooling of the body:
- Do **not** use the heater or climate control in continuous operation.

Avoid overheating and damage to the seat:
- Do **not** dry wet clothing.
- Do **not** place objects such as clothing, cushions, bags on the seat.

- Do **not** use seat covers on the seat.
- Do **not** use the heater / climate control if the seat is not occupied.

Turn on the heater:

▶ Press the *turn on / off* button to switch position **P1**.

Turn on the climate control:

▶ Press the *turn on / off* button to switch position **P2**.

Set the intensity of the heater or climate control incrementally:

▶ Adjust the *step setting* button as required.

Turn off the heater or climate control:

▶ Press the *turn on / off* button to switch position **P0**.

8.8.2 Fastening and unfastening the seatbelt

Before fastening the lap belt, make sure that the following prerequisites are met:
❑ The crane cab seat is set optimally for the body size of the crane operator.
(→ 8.8.1 Adjusting the crane cab seat, p. 421)

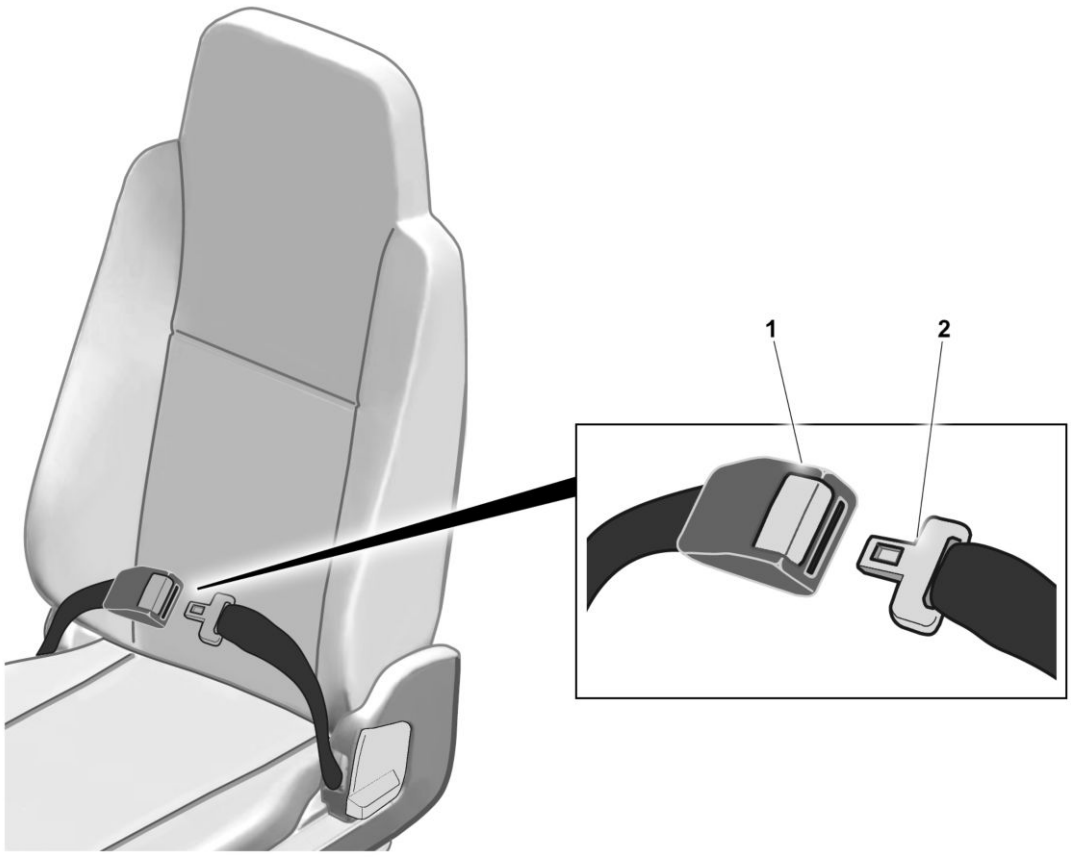


Fig. 971: Exemplary illustration: Fastening the seatbelt

1 Belt lock **2** Belt latch

Fasten the seatbelt:

▶ Engage the belt latch **2** in the belt lock **1**.

Unfastening the seatbelt:

▶ Release the belt latch **2** on the belt lock **1**.

8.8.3 Adjusting the control platform

8.8.3.1 Adjusting the console

Before climbing in and out, the left console on the seat must be swung up all the way.

During travel operation and crane operation, the left console on the seat must be swung down all the way.

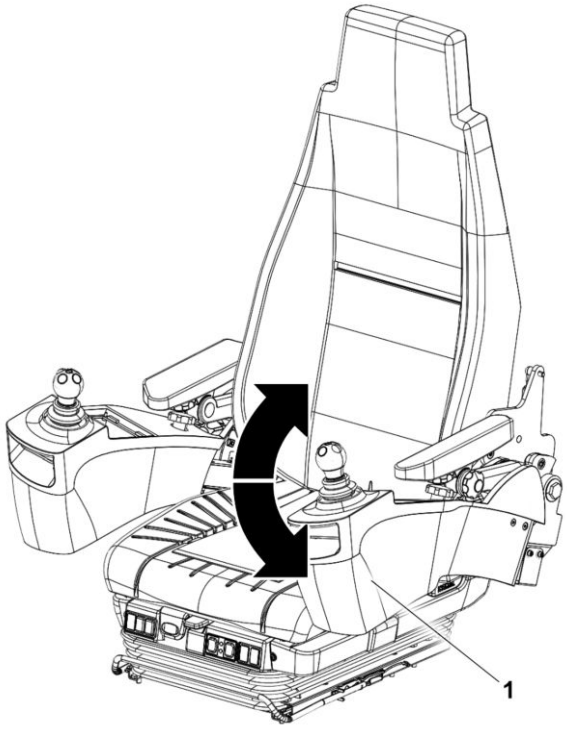


Fig. 972: Swinging the control platform console

1 Console

CAUTION
The console swings down suddenly! Danger of crushing!

▶ Hold the console when swinging.

Swing the console up for entry and exit:

▶ Until the console **1** is swung up completely: Hold the console **1** and swing it up.

Swing the consoles down for travel operation and crane operation:

▶ Until the console **1** is swung down all the way: Hold the console **1** and swing it down carefully.

8.8.3.2 Adjusting the armrest

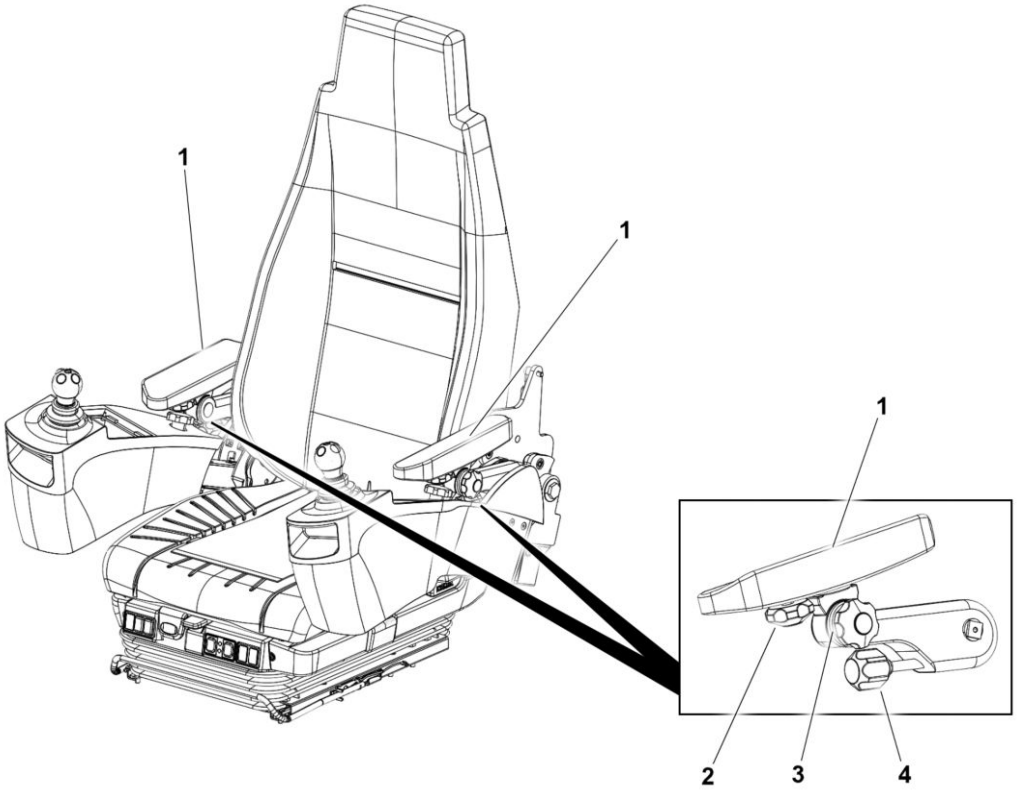


Fig. 973: Adjusting the control platform armrests

1 Armrest
2 Longitudinal direction adjustment wheel
3 Incline adjustment wheel
4 Adjustment wheel height

The longitudinal direction, tilt and height of the armrests can be adjusted.

Set the longitudinal direction:

▶ Until the desired position is reached: Turn the adjustment wheel **2**.

Adjust the incline:

▶ Until the desired position is reached: Turn the adjustment wheel **3**.

Set the height:

▶ Until the desired position is reached: Turn the adjustment wheel **4**.

8.8.4 Adjusting the sunshade

The front window of the crane cab is equipped with a sunshade.

The roof window of the crane cab is equipped with a non-transparent sunshade and a semi-transparent sunshade.

8.8.4.1 Sunshade on the front window

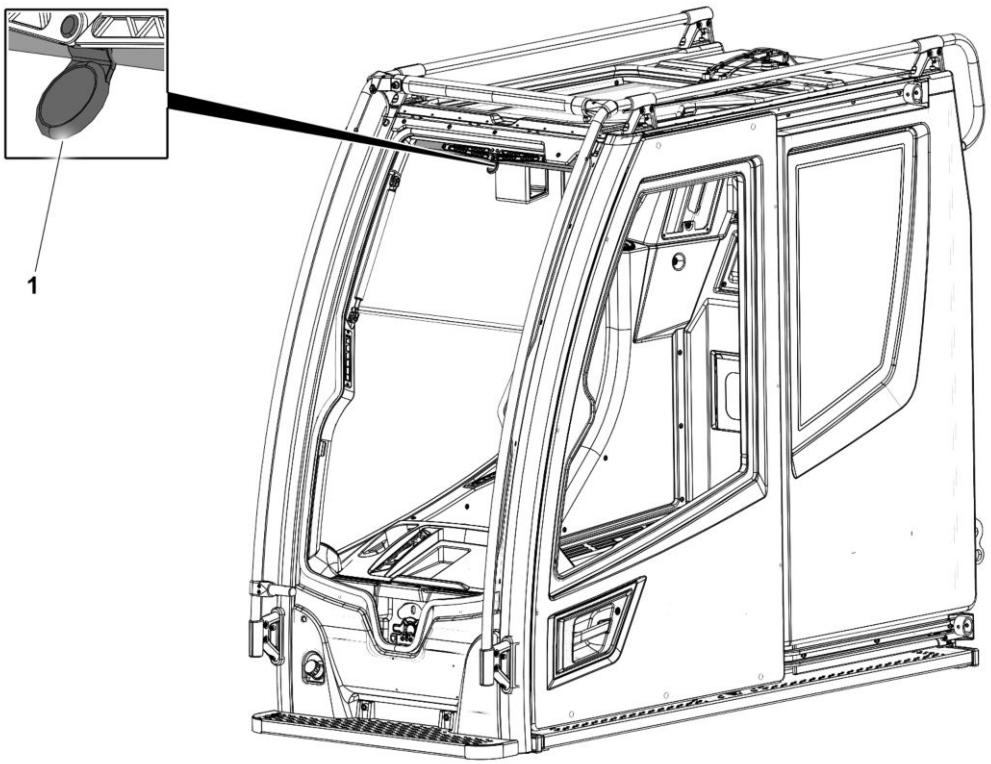


Fig. 974: Sunshade on the front window

1 Bracket

Pull out the sunshade:

▶ Pull down the sunshade on the bracket **1** along the guide rail to the desired height.

Pull the sunshade in:

▶ Tip the bracket **1** and push the sunshade along the guide rail upward.

8.8.4.2 Sunshade on the roof window

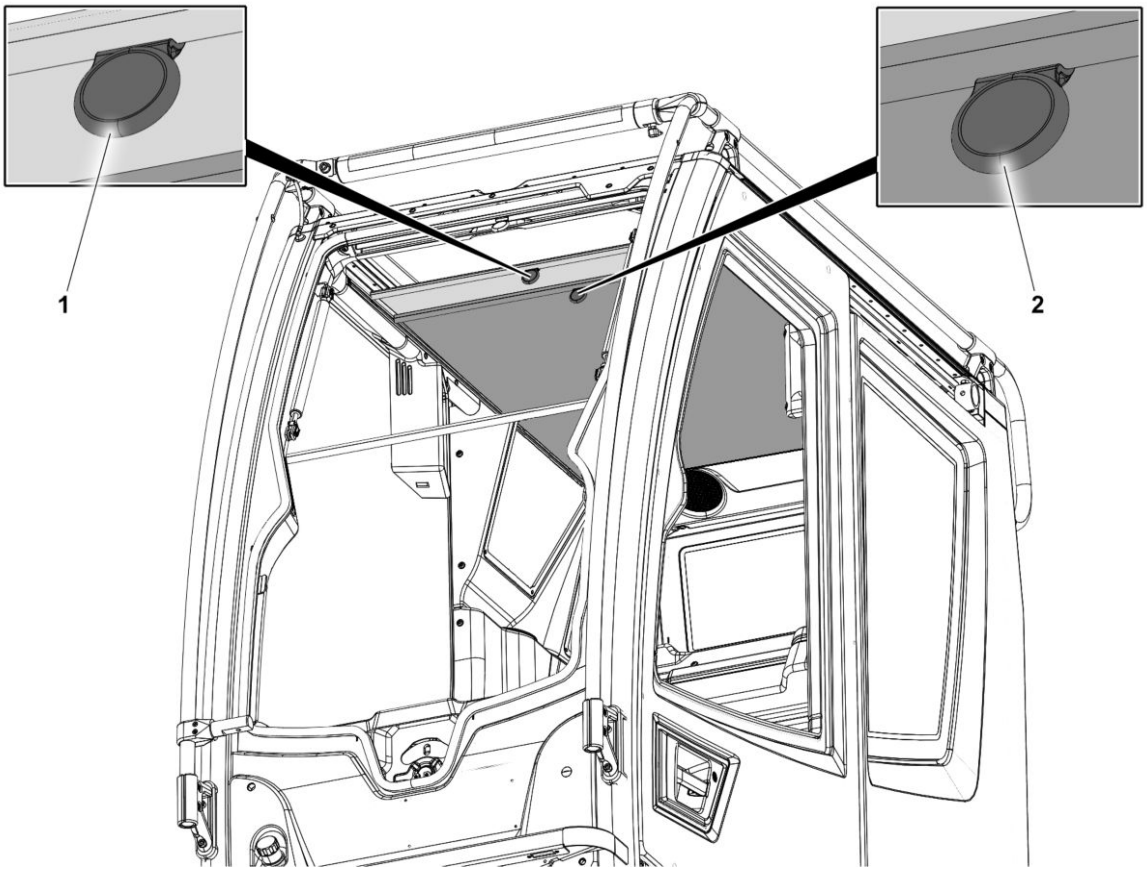


Fig. 975: Sunshade on the roof window

1 Bracket on semi-transparent sunshade

2 Bracket on the non-transparent sunshade

Both sunshades can be used independently of each other. The half-transparent sunshade can only be operated when the non-transparent sunshade is not pulled out completely.

Pull out the non-transparent sunshade or semi-transparent sunshade:

▶ Extend the corresponding sunshade on the bracket along the guide rai in direction of the front window to the desired height.

Pull in the non-transparent sunshade or semi-transparent sunshade:

▶ Tip the bracket of the sunshade and push the sunshade along the guide rails to the rear wall of the crane cab.

8.8.5 Operating the window wiper

Fig. 976: Side window operating unit

The following stages can be set by repeatedly pressing the buttons:
- Continuous operation: Wipe without pauses
- Intermittent 1: Wipe with long pauses
- Intermittent 2: Wipe with short pauses
- Wiper off

Note
The window wiper can also be turned off directly.

▶ Until a signal tone sounds: Press and hold the *window wiper* button.

Operating the front window wiper

▶ Press the *front window wiper* button.

Operating the roof window wiper

▶ Press the *roof window wiper* button.

8.8.6 Operating the window washer system

Fig. 979: Side window operating unit

Note

The corresponding window wiper is controlled together with the window washer system.

After releasing the button, three additional wipe movements of the window wiper are carried out.

Cleaning the front window

▶ Until the desired cleaning is reached: Press and hold the *front window washer system* button.

Clean the roof window

▶ Until the desired cleaning is reached: Press and hold the *roof window washer system* button.

8.8.7 Operating the horn

Operating the horn from the crane cab

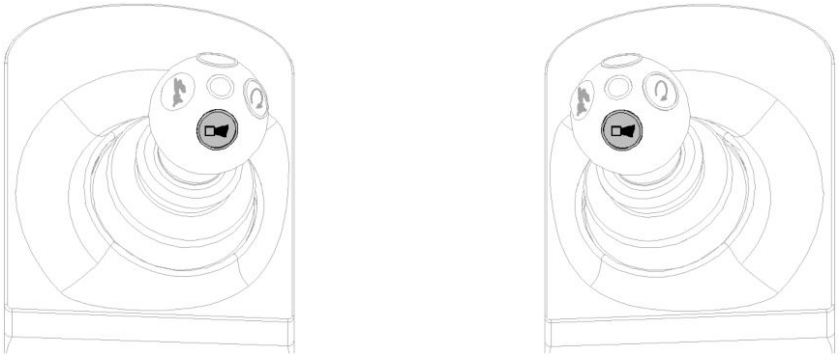


Fig. 982: Control lever

▶ Press the *horn* button on control lever 1 or control lever 2.

Operating the horn with crane remote control

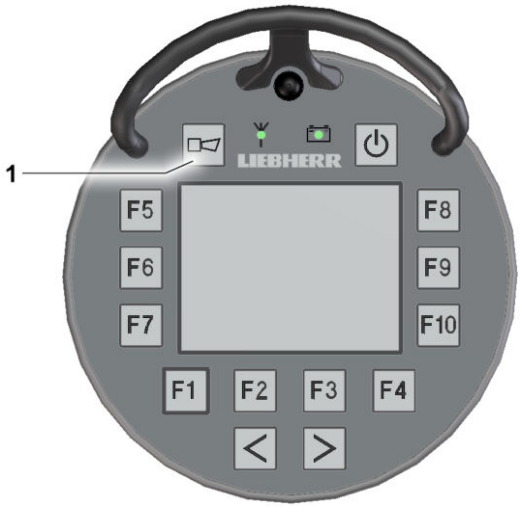


Fig. 984: Crane remote control

1 Horn button

▶ Press the *horn* button **1**.

8.8.8 Operating the armrest operating units

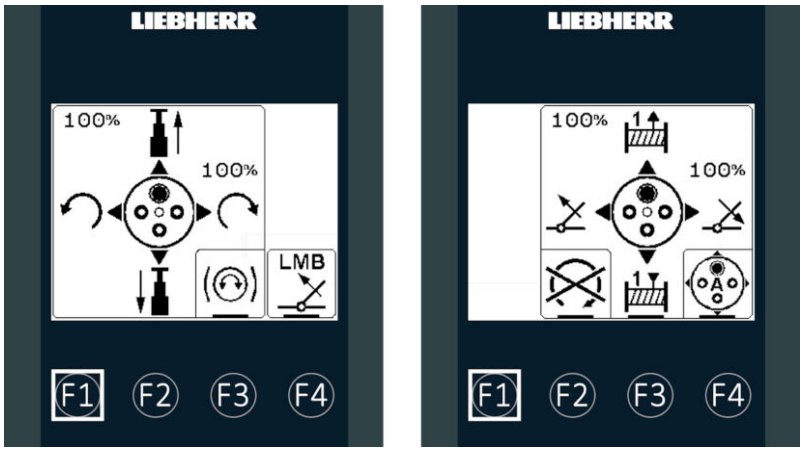


Fig. 986: Exemplary illustration: Armrest operating units

Armrest operating unit 1 and armrest operating unit 2 are operated using the touchscreen and the F-buttons.

8.8.8.1 Operating the buttons

Operating the function with the F-buttons

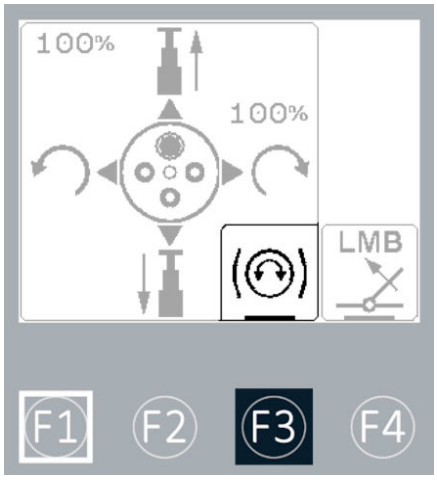


Fig. 987: Exemplary illustration: Button with bar

The buttons with bar are operated with the adjacent F-buttons.

▶ Press the F-button located next to the button
▷ The function of the button is carried out.

Operating the buttons with touchscreen

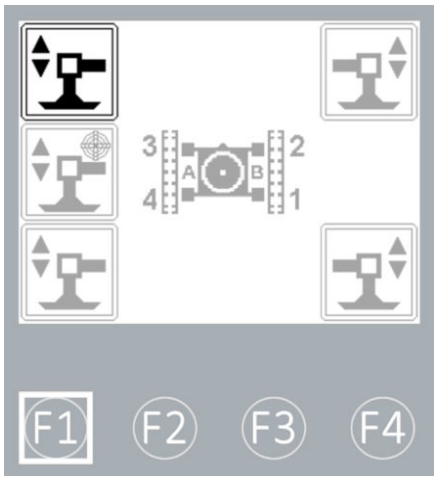


Fig. 989: Exemplary illustration: Button with frame

Buttons with frame are operated by pressing them directly.

▶ Press the button.

▷ The button is selected and the frame is displayed in black.
▷ The function of the button is carried out.

8.8.8.2 Changing the menu

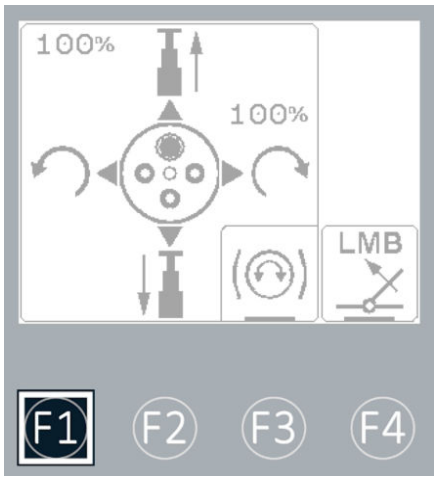


Fig. 992: Exemplary illustration: Changing the menu

▶ Until the desired menu is displayed: Press the *F1* button repeatedly.

8.8.9 Operating the superstructure monitor

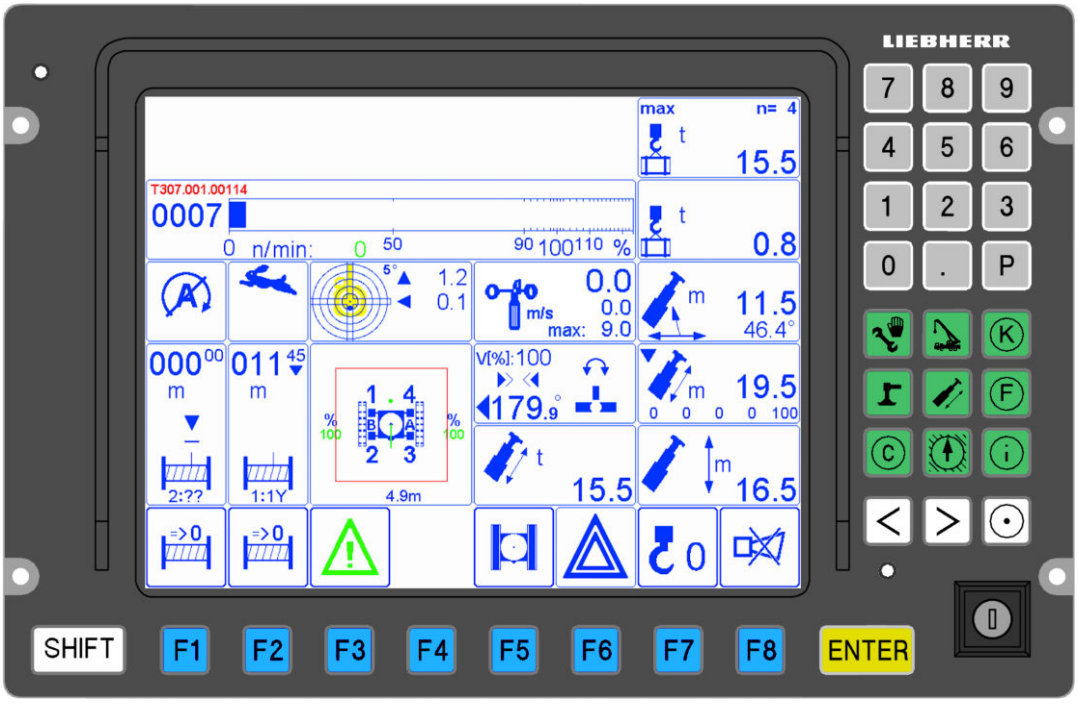


Fig. 994: Exemplary illustration: Superstructure monitor

8.8.9.1 Turning the superstructure monitor on and off

Turn the superstructure monitor on

▶ Turn the ignition switch to “I”.
  ▷ The superstructure monitor starts up.
  ▷ After a short time, the *set up* menu is displayed.

Turn the superstructure monitor off

▶ Turn the *superstructure ignition switch* to “0”.
  ▷ The superstructure monitor will be turned off after ten seconds of remaining run time.

If the superstructure monitor should be turned on:
▶ Turn the ignition switch to “I” during the remaining run time.

If the remaining run time should be reduced to five seconds:
▶ Press any button.

If the remaining run time should be reduced to zero seconds:
▶ Press any button again.

Note
With ignition turned on and the engine turned off, standby-mode is activated on the superstructure monitor after ten minutes.

If standby mode is active and the superstructure monitor should be turned off:
▶ Turn the ignition off.

To deactivate standby mode:
▶ Turn the ignition off and back on during the remaining run time.

8.8.9.2 Operating the buttons

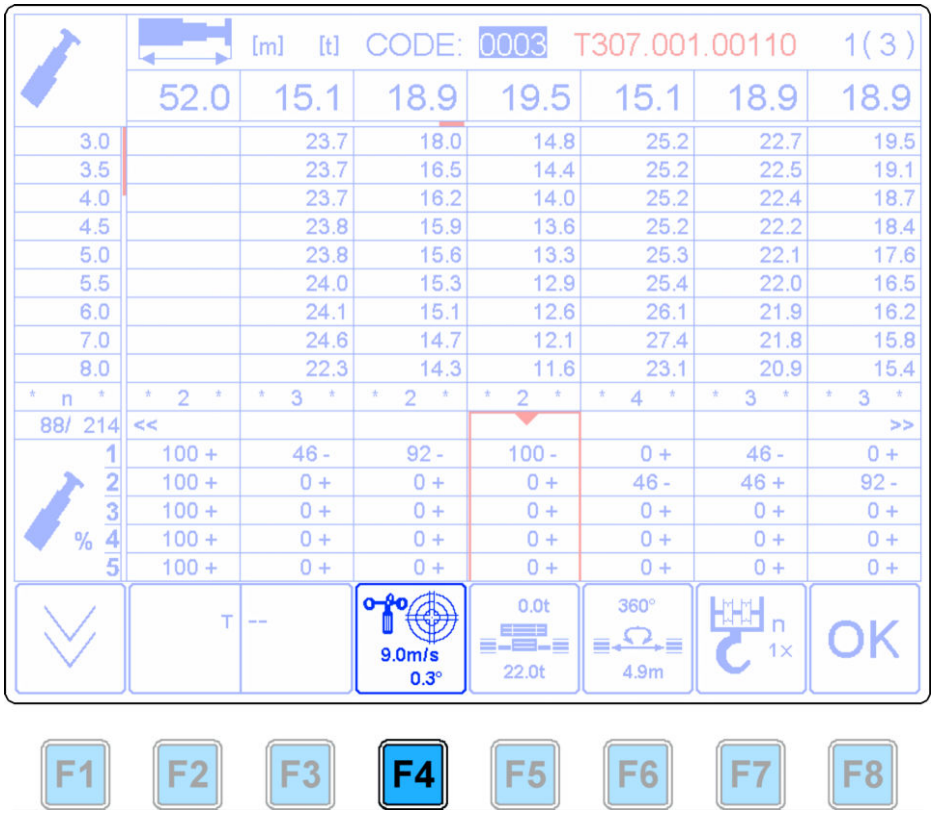


Fig. 997: Exemplary illustration: Operating the buttons

▶ Press the F-button located next to the button.
▷ The function of the button is carried out.

8.8.9.3 Opening menus

Make sure that the following prerequisites are met:
❑ The superstructure monitor is turned on.
(→ Turning the superstructure monitor on and off, p. 438)
❑ The crane set up configuration is entered correctly in the *set up* menu.
(→ 8.6 Setting up the crane, p. 412)

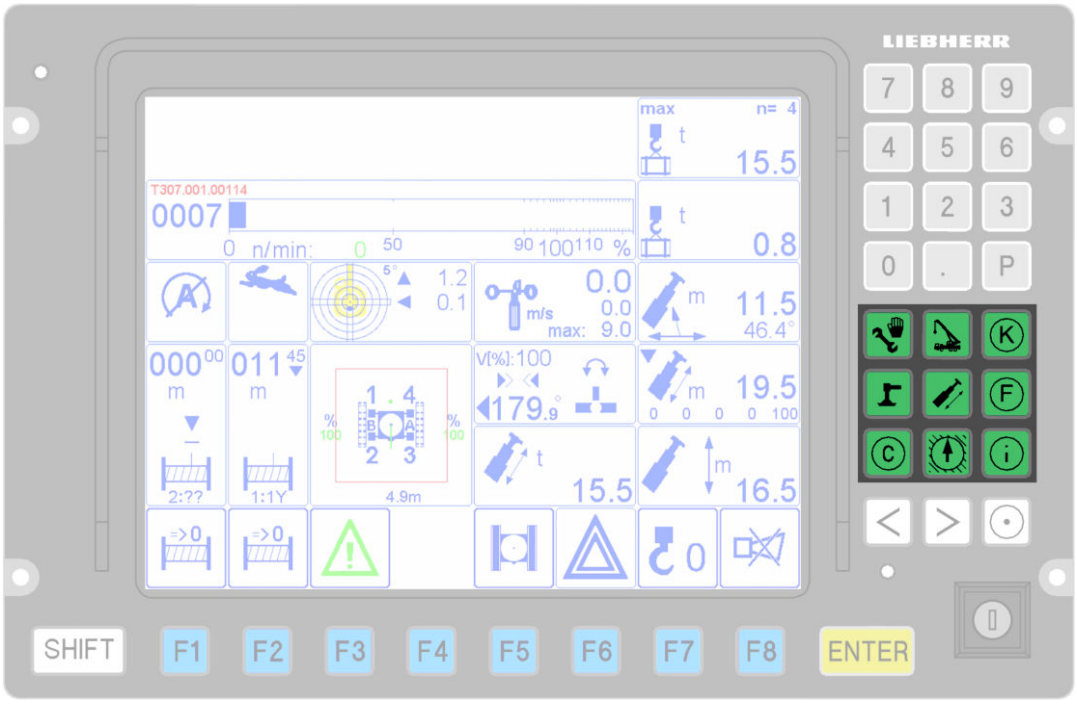
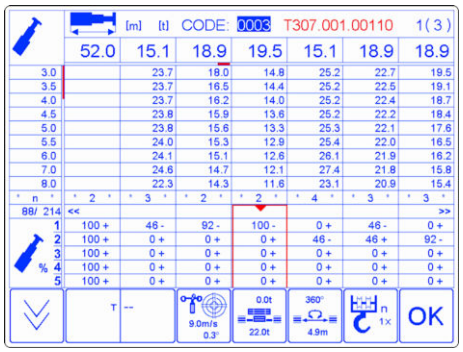


Fig. 999: Exemplary illustration: Opening menus

Opening the set up menu

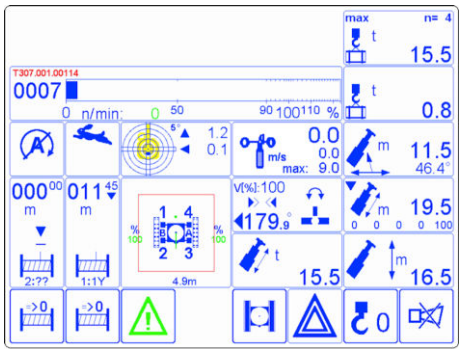
▶ Press the *set up menu* button.



▷ The *set up* menu is displayed.

Opening the crane operation menu

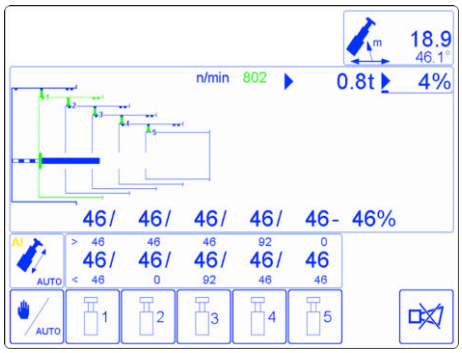
▶ Press the *crane operation menu* button.



▷ The *crane operation* menu is displayed.

Opening the telescoping menu

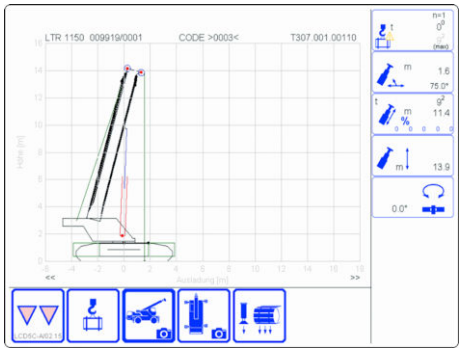
▶ Press the *telescoping menu* button.



▷ The *telescoping* menu is displayed.

Opening the Job Planner*

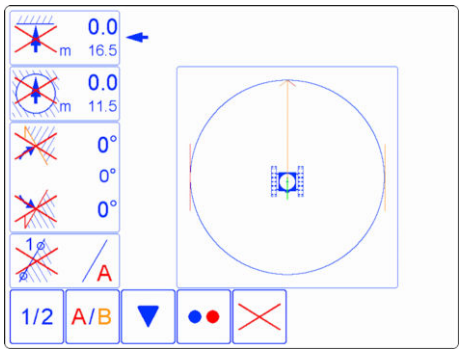
▶ Press the *Job Planner** button.



▷ The *Job Planner** is displayed.

Opening the working range limitation* menu

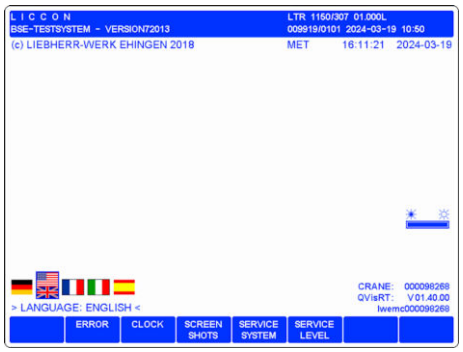
▶ Press the *working range limitation menu** button.



▷ The *working area limitation** main menu is displayed.

Opening the test system

▶ Press the *test system* button.



▷ The *test system* is displayed.

8.8.9.4 Opening the menus in the test system

Make sure that the following prerequisites are met:
❑ The test system is displayed.

(→ Opening menus, p. 439)

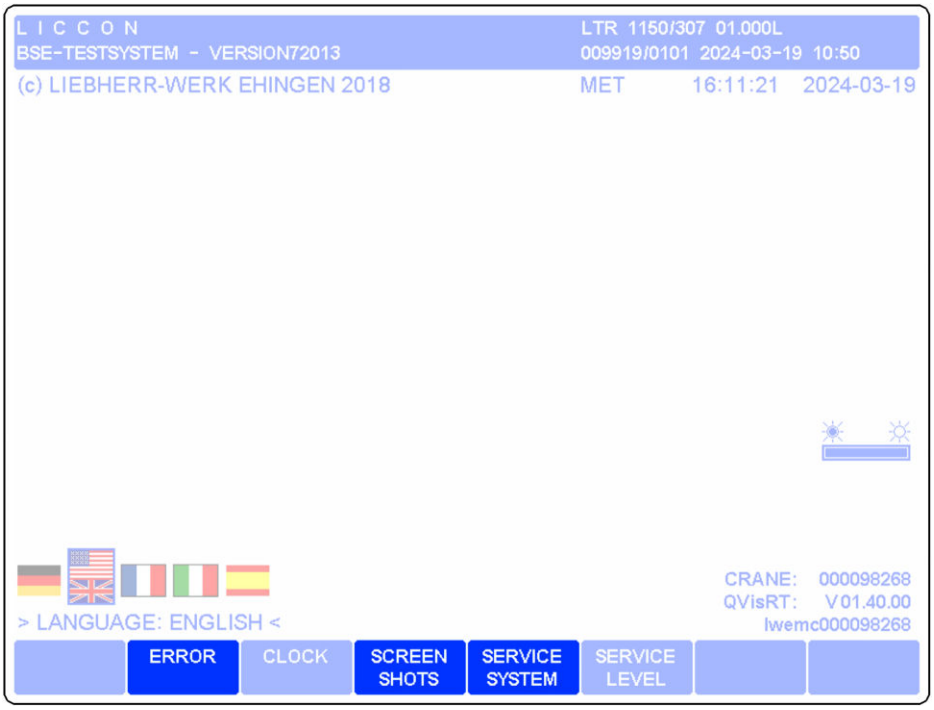


Fig. 1012: Test system

Opening the error stack

ERROR

▶ Press the *error stack* F-button.
▷ The *total system* error stack is displayed.

Note

If the *error stack* is opened in the test system, the *total system* error stack is displayed.

The *error stack* can be opened with an active error from the *crane operation* menu and *telescoping* menu. In this case the *module* error stack is displayed.

(→ 9.3 Error messages, p. 598)

Opening the screenshots menu

SCREEN SHOTS

▶ Press the *screenshots menu* F-button.
▷ The *screenshots* menu is displayed.

Opening the service system

SERVICE SYSTEM

▶ Press the *service system* F-button.
▷ The *service system* is displayed.

8.8.9.5 Show and hide the engine rpm display

Make sure that the following prerequisites are met:
❑ The *crane operation* menu is displayed.

(→ Opening menus, p. 439)

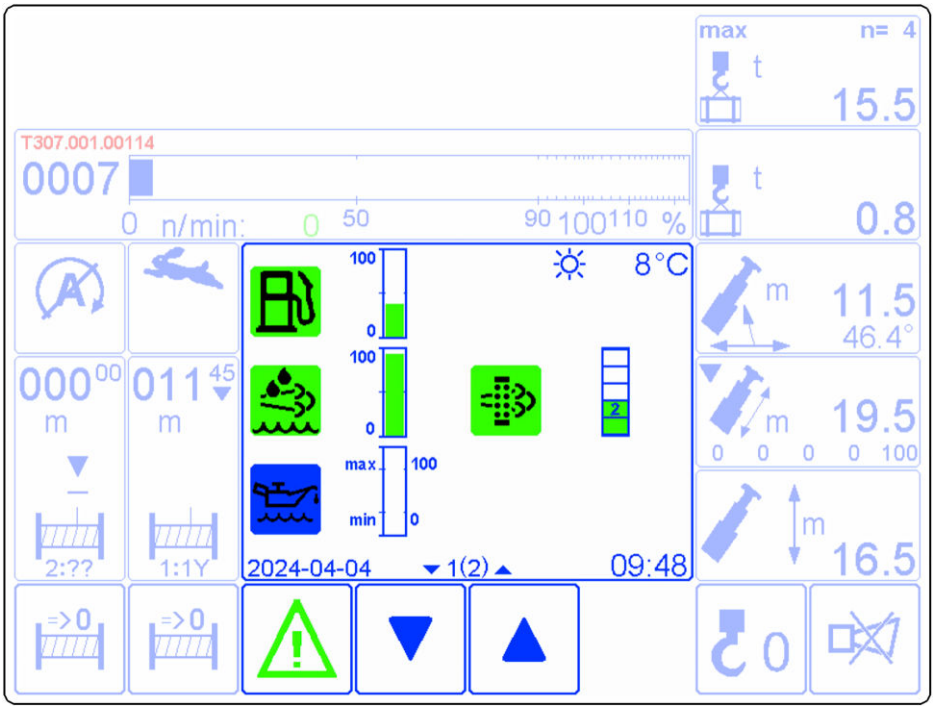
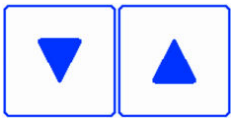


Fig. 1016: Exemplary illustration: Crane operation menu

▶ Press the *engine displays* F-button.
▷ The engine displays are shown or hidden.

If engine displays are shown, it is possible to switch between the *warning and indicator lights* page, *level* page and *state indicator* page.



▶ Until the desired page is displayed: Press the *down* F-button and the *up* F-button.

8.8.9.6 Displaying and hiding the crawler pressure and center of gravity display

Make sure that the following prerequisites are met:
❑ The *crane operation* menu is displayed.

(→ Opening menus, p. 439)

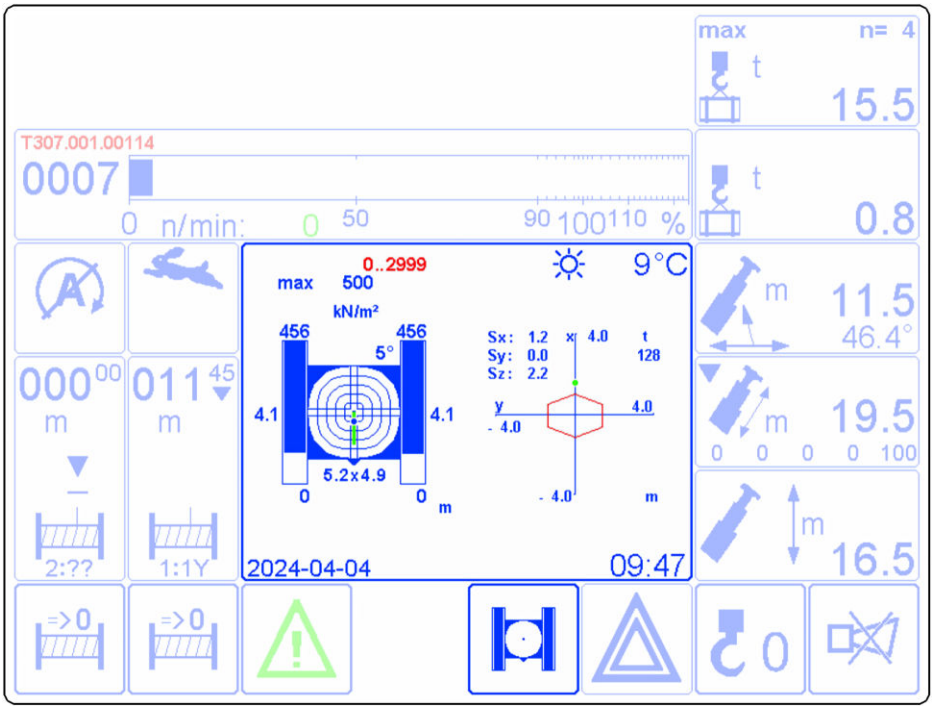


Fig. 1019: Exemplary illustration: Crane operation menu

▶ Press the *Crawler pressure and center of gravity display* F-button.
▷ The *crawler pressure and center of gravity* display is displayed or hidden.

8.8.9.7 Hiding and displaying the crane function settings window

Make sure that the following prerequisites are met:
❑ The *crane operation* menu or the *telescoping* menu is displayed.
(→ Opening menus, p. 439)
❑ All control levers are in the zero position.

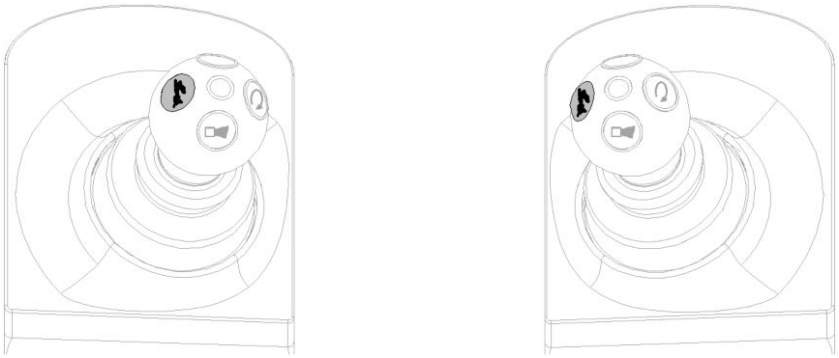
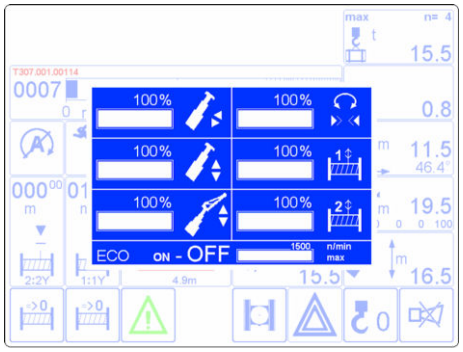


Fig. 1021: Control lever

Displaying the crane function settings window

▶ Until the *crane function settings* window can be displayed: Press and hold the *rapid gear* button on control lever 1 or control lever 2.



▷ The *crane function settings* window is displayed.

Hiding the crane function settings window

If no settings are changed in the *crane function settings* window, the *crane function settings* window is hidden automatically after ten seconds.

▶ Until the *crane function settings* window can be hidden: Press and hold the *rapid gear* button on control lever 1 or control lever 2.

8.8.9.8 Interrupting the superstructure monitor acoustic warning

If an acoustic warning sounds:
▶ Press the *interrupt acoustic warning* F-button
▷ The acoustic warning is interrupted.

8.8.9.9 Interrupting the expanded crane remote control* acoustic warning

If an acoustic warning sounds:
▶ Press the *interrupt acoustic warning* F-button
▷ The acoustic warning is interrupted.

8.8.9.10 Adjusting the screen settings

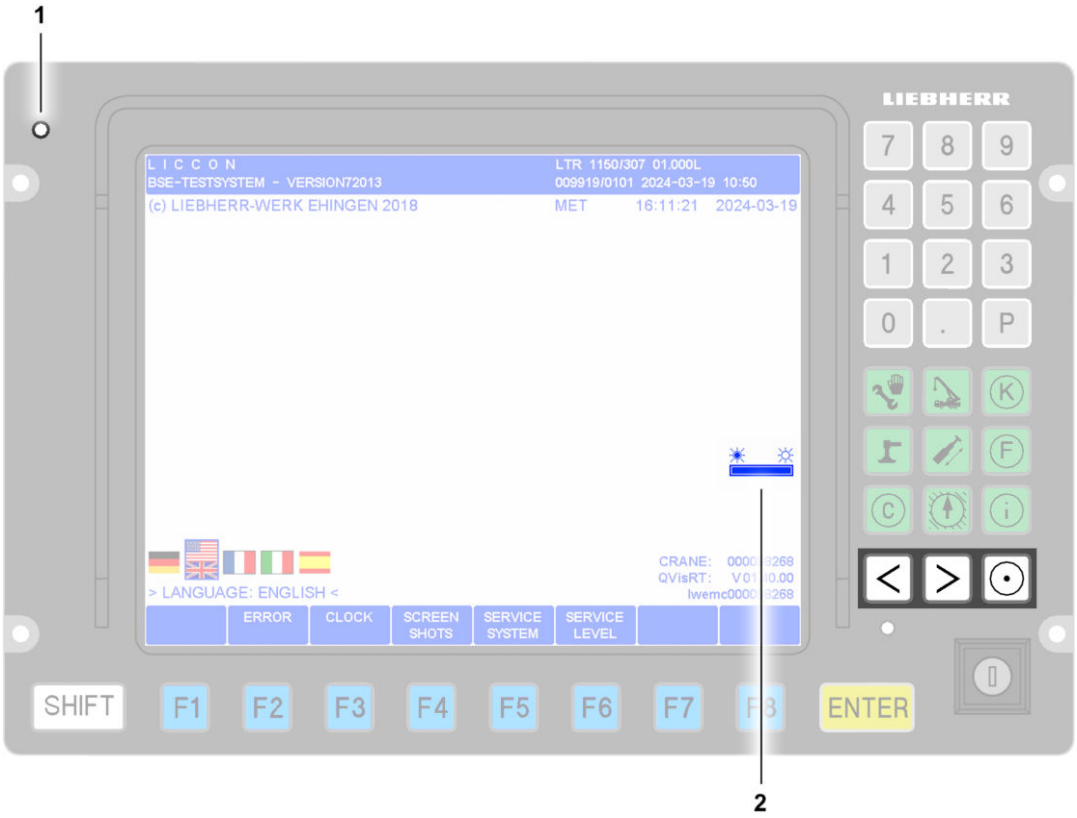


Fig. 1027: Exemplary illustration: Adjusting the screen settings

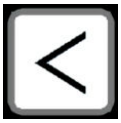
1 Brightness sensor

2 Brightness display

Setting the screen mode

Six screen modes are available for selection. They can be used for example when working at night.

▶ Press and hold the *dot* button.



▶ Until the desired screen mode is set Press the *left* button repeatedly.

Setting the brightness

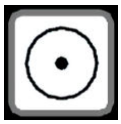
Fig. 1030: Brightness display states

1 Lowest brightness level

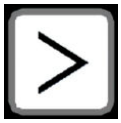
2 Middle brightness level

3 Highest brightness level

In the test system, the set brightness level is displayed on the *brightness* display. Seven brightness levels are available for selection.



▶ Press and hold the *dot* button.



▶ Until the desired brightness is set: Press the *right* button repeatedly.

Note

Automatic brightness adjustment is active as soon as a middle brightness level is selected. With automatic brightness adjustment, the brightness sensor determines the current light conditions in the crane cab and automatically adjusts the brightness.

8.8.9.11 Changing the language

The following languages are available:
- German
- English
- French
- Italian
- Spanish

Make sure that the following prerequisites are met:
❑ The test system is displayed.
(→ Opening menus, p. 439)

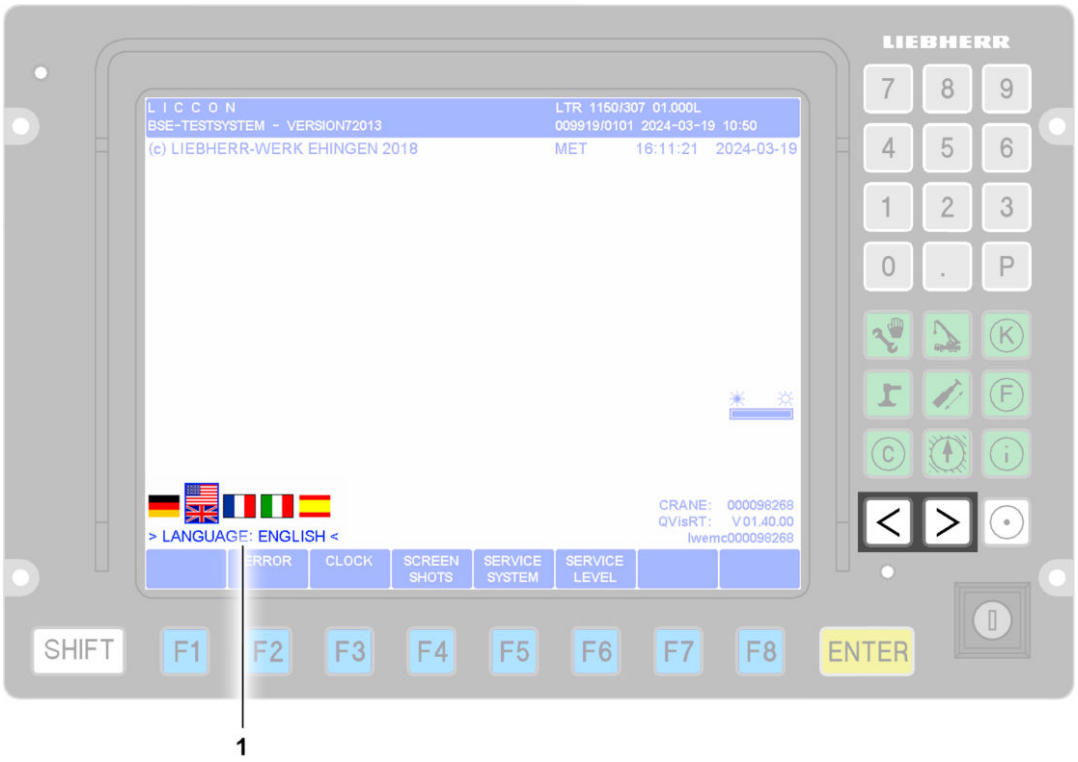
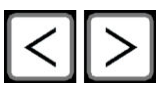


Fig. 1033: Exemplary illustration: Changing the language

1 Language display



▶ Select the desired language with the *left* button and the *right* button.

8.8.9.12 Creating and displaying screen shots

Creating a screenshot

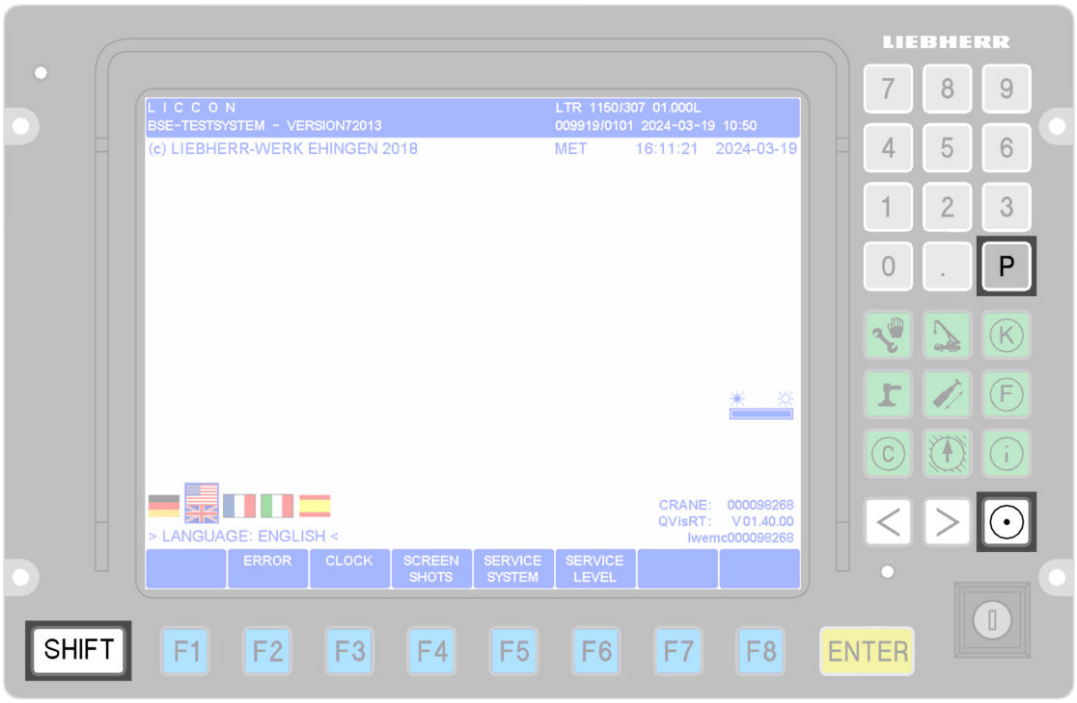


Fig. 1035: Exemplary illustration: Creating a screenshot

▶ Press the *SHIFT*, button, *dot* button and *P* button at the same time.
  ▷ A double beep sounds.
  ▷ A screenshot is created.

Note

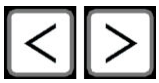
A maximum of 10 screenshots can be created. Each additional screenshot will overwrite the oldest screenshot.

Displaying screenshots

Make sure that the following prerequisites are met:
❑ The *screenshots* menu is displayed.

(→ Opening the menus in the test system, p. 442)

Fig. 1037: Exemplary illustration: Screenshots menu



▶ Until the desired screenshot is displayed: Press the *left* button or *right* button repeatedly.

8.8.9.13 Using the job planner

Description of the job planner: (→ Separate document “LICCON job planner”)

8.8.10 Operating the remote diagnostics system

8.8.10.1 Opening the remote diagnostics system

Make sure that the following prerequisites are met:
❑ The superstructure monitor is turned on.

(→ Turning the superstructure monitor on and off, p. 438)

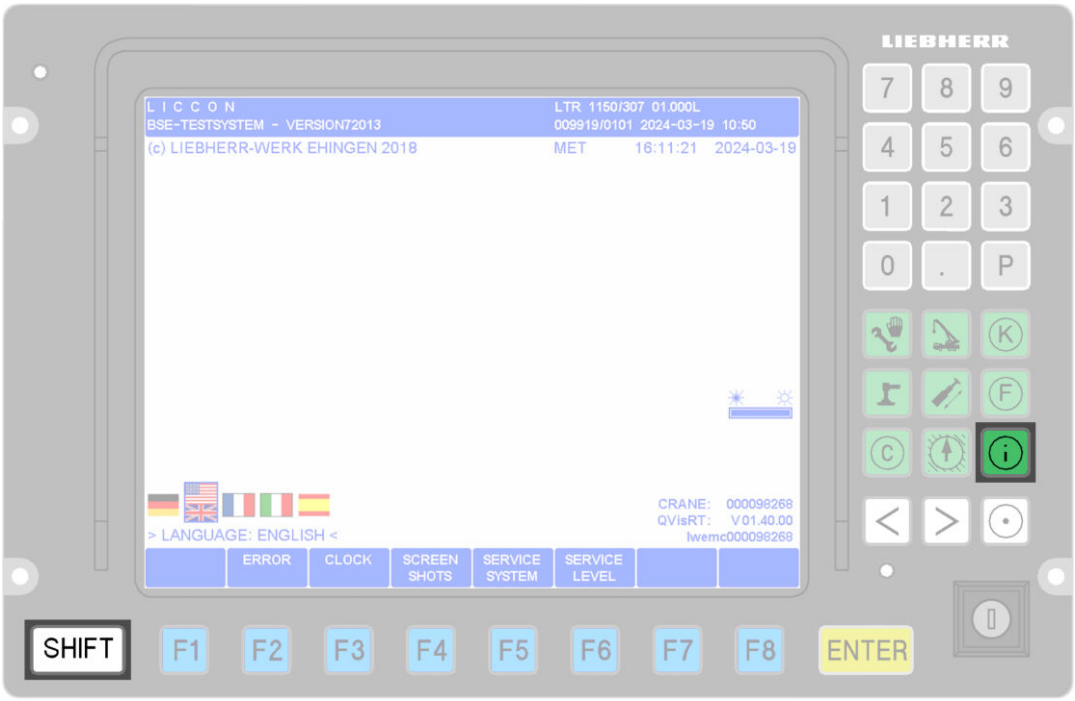


Fig. 1039: Exemplary illustration: Opening the remote diagnostics system

▶ Press the *SHIFT* button and press the *test system* button at the same time.

8.8.10.2 Navigating the remote diagnostics system

Make sure that the following prerequisites are met:
❑ The remote diagnostics system is displayed.

(→ Opening the remote diagnostics system, p. 450)

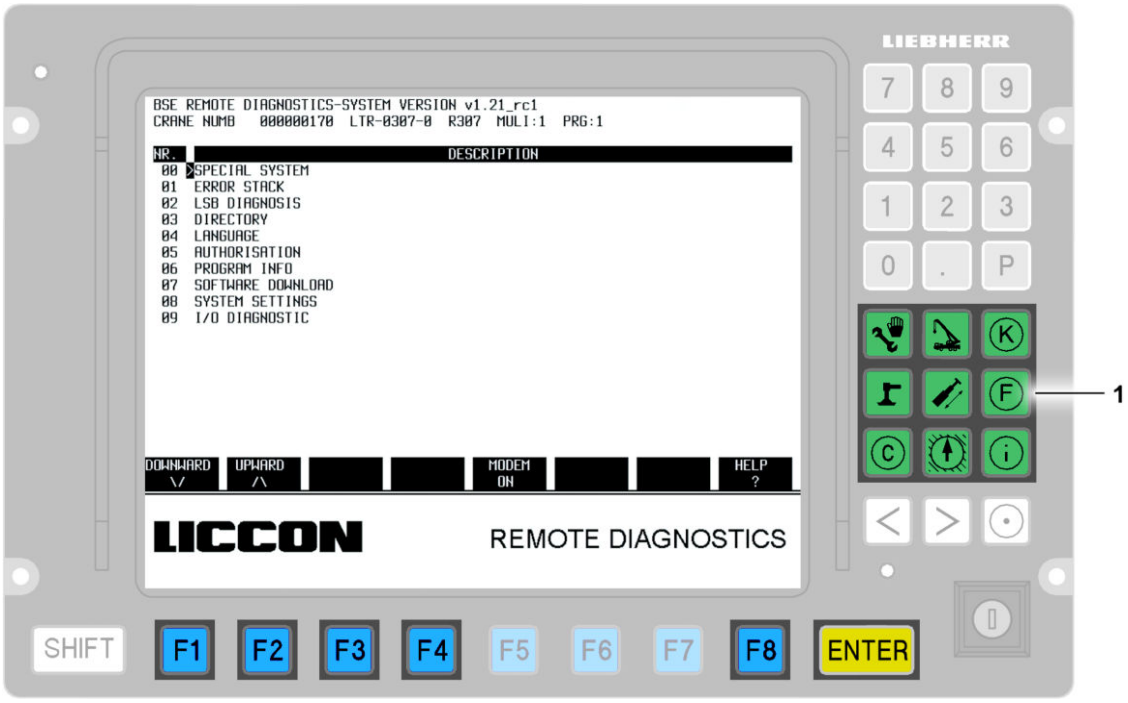


Fig. 1041: Exemplary illustration: Navigating the remote diagnostics system

1 Menu buttons

Select a menu

▶ Select the desired menu with the *down* F-button, *up* F-button, *page down* F-button and *page up* F-button.

Open a menu

▶ Press the *ENTER* button.

Switch back

▶ Press the *back* F-button.

Close the remote diagnostics system

▶ Press the desired menu button **1**.

8.8.11 Adjusting the driving settings

Make sure that the following prerequisites are met:
❑ The remote diagnostics system is displayed.

(→ Opening the remote diagnostics system, p. 450)

8.8.11.1 General settings

Make sure that the following prerequisites are met:
❑ The *General settings* menu is displayed.

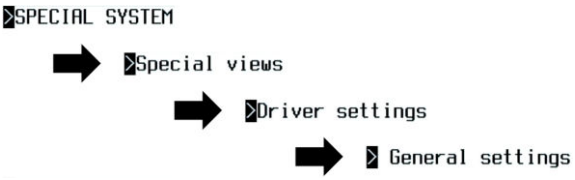


Fig. 1045: Opening the General settings menu (English language setting)

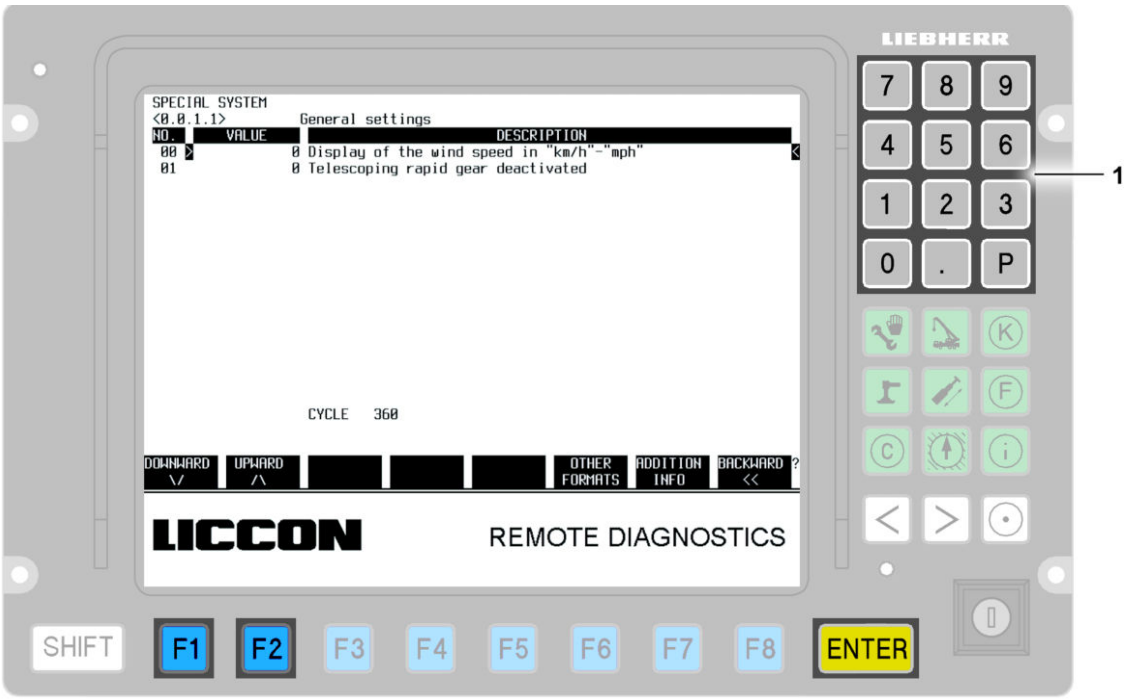


Fig. 1046: General settings menu

1 Number block

Adjusting the wind speed unit

The unit of the wind speed can be changed from m/s to km/h or from ft/s to mph.

Fig. 1047: Line Display of the wind speed in "km/h" - "mph" (language setting English)

▶ Select line *Display of the wind speed in "km/h" - "mph"*.

▶ Press the *ENTER* button.

When switching to km/h or mph:
▶ Use the number block **1** to enter the number 1 and confirm with the *ENTER* button.

When switching to m/s or ft/s:
▶ Use the number block **1** to enter the number 0 and confirm with the *ENTER* button.

Turning the telescoping rapid gear on and off

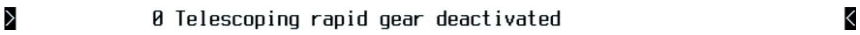


Fig. 1049: Line Telescoping rapid gear deactivated (language setting English)

▶ Select line *Telescoping rapid gear deactivated*.

▶ Press the *ENTER* button.

If the rapid gear telescoping should be turned off:
▶ Use the number block **1** to enter the number 1 and confirm with the *ENTER* button.

If the rapid gear telescoping should be turned on:
▶ Use the number block **1** to enter the number 0 and confirm with the *ENTER* button.

8.8.12 Releasing the functions on the side window operating unit

Fig. 1051: Side window operating unit

Certain functions on the side window operating unit must be first be released before they can be carried out.

Releasing functions

▶ Press the *enable* button
▷ Functions are released for 30 seconds.
▷ The indicator light on the button *release* button is illuminated.

Blocking functions

▶ Press the *enable* button
or
Do not press any button for 30 seconds.
▷ The indicator light on the *release* button is **not** illuminated.

8.8.13 Adjust the crane cab incline

8.8.13.1 Safety

This section supplements the “Safety” chapter.

Danger zone of the crane cab

Observe the additional safety instructions(→ 5.7 Danger zone, p. 167).

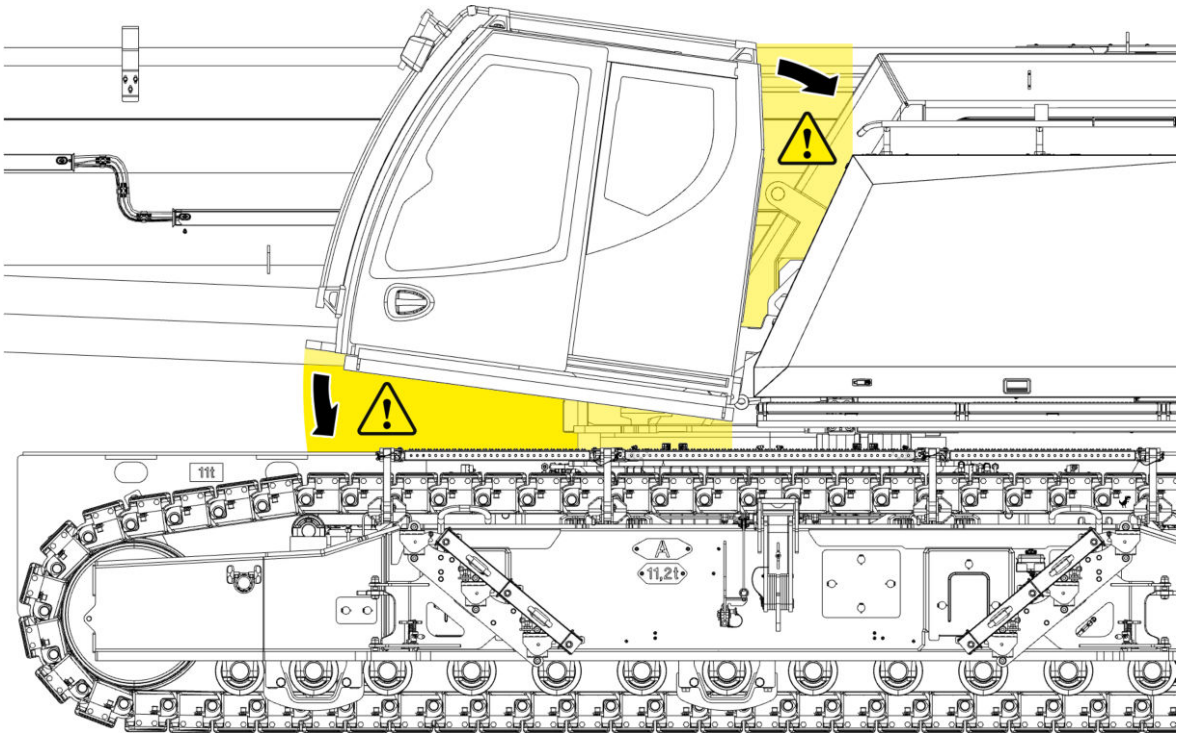


Fig. 1055: Crane cab danger zone

8.8.13.2 Adjusting the incline

Make sure that the following prerequisites are met:
- ❑ The functions on the side window operating unit are released.
  (→ 8.8.12 Releasing the functions on the side window operating unit, p. 454)
- ❑ **No** personnel or objects are on the step or within the luffing range of the crane cab.

Fig. 1056: Side window operating unit

Luff the crane cab up

To give the crane operator a better field of vision, the crane cab can be tilted upward.

WARNING
Moving back of the door when the crane cab is inclined! Danger of crushing!

▶ Only open the door when the crane cab is luffed down completely.

▶ Until the desired incline is reached: Press and hold the *luff up crane cab* button.

Luffing the crane cab down

After ending work with the crane, always set the crane cab to horizontal position.

▶ Until the crane cab is luffed down all the way: Press and hold the *luff down crane cab* button.

8.8.14 Operating the crane cab interior lighting

Fig. 1059: Side window operating unit

Turning on interior lighting

▶ Turn on: Press the *crane cab interior lighting* button.
or

When the ignition is turned off:
Press and hold the *crane cab interior light* button.

Turning off interior lighting

▶ Press and hold the *cab interior light* button.

Setting the brightness

The brightness of the interior lighting can be dimmed incrementally

▶ Set the brightness: Press the *cab interior light* button repeatedly.

8.8.15 Turning the exterior lighting for crane operation on and off

Exterior lighting for crane operation can be operated in the following control sections:
- Crane cab
- Crane remote control
- Expanded crane remote control*

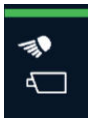
Make sure that the following prerequisites are met:
❑ The ignition is turned on.

(→ 8.12 Engine, p. 490)

8.8.15.1 Turning the exterior lighting on and off from the crane cab

Fig. 1063: Side window operating unit

Turning the winch camera* floodlight on and off



▶ Press the *winch camera floodlight* button.

Turning the front turntable floodlight on and off

▶ Press the *front turntable floodlight* button.

Turning the airplane warning light on and off

The airplane warning light can also be turned on when the ignition is turned off when the *airplane warning light* is pressed for longer than one second.

▶ Press the *airplane warning light* button.
▷ The airplane warning light lights up.

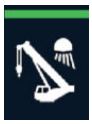
▶ Press the *airplane warning light* button again.
▷ The airplane warning light blinks.

▶ Press the *airplane warning light* button again.
▷ The airplane warning light is turned off.

Turning the rear turntable floodlight on and off

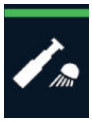
▶ Press the *rear turntable floodlight* button.

Turning the side turntable floodlight on and off



▶ Press the *side turntable floodlight* button.

Turning the boom head* floodlight on and off



▶ Press the *boom head floodlight* button.

Pivot section floodlight*

Make sure that the following prerequisites are met:
❑ The *pivot section floodlight* menu is displayed on armrest operating unit 2.
(→ Changing the menu, p. 437)

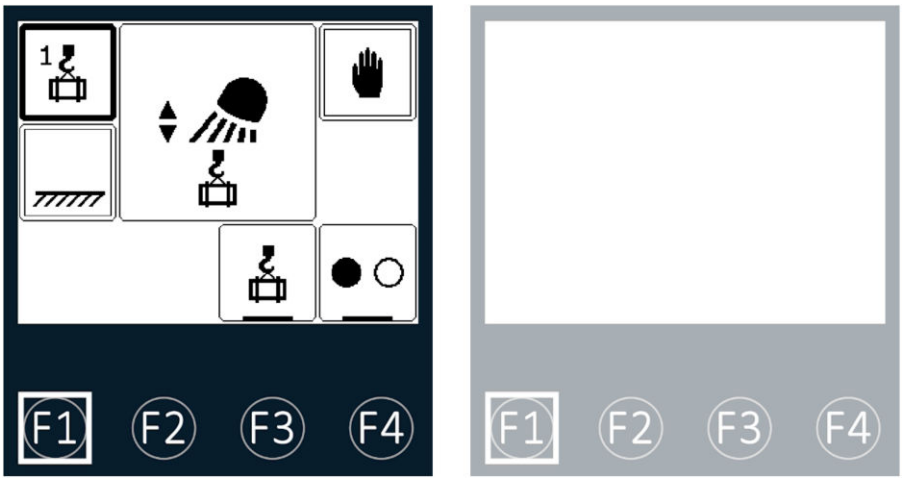
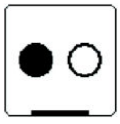


Fig. 1072: Exemplary illustration: Pivot section floodlight menu

Turning the pivot section floodlight* on and off



▶ Press the *pivot section floodlight* F-button.

Manual control operation

▶ Press the *manual control operation* button.

▶ Move control lever 2 to the front and hold.
▷ The pivot section floodlight swings down.

▶ Move control lever 2 to the rear and hold.
▷ The pivot section floodlight swings up.

Load following

▶ Press the *load following* F-button.

▶ Until the pivot section floodlight is aligned with the load: Move control lever 2 to the front and hold.

or

Until the pivot section floodlight is aligned with the load: Move control lever 2 to the rear and hold.

▷ Pivot section floodlight follows the load automatically during crane movements.

To select another load position:

▶ Until the desired load position is selected: Press the *Load following* F-button repeatedly.

Illuminate the working area

▶ Press the *illuminate working area* button.

▶ Until the pivot section floodlight is aligned with the working area: Move control lever 2 to the front and hold.

or

Until the pivot section floodlight is aligned with the working area: Move control lever 2 to the rear and hold.

▷ The pivot section floodlight always lights up the set working area automatically during crane movements.

8.8.15.2 Turning the rotating beacon on and off

Make sure that the following prerequisites are met:
❑ The *auxiliary functions* menu is displayed on armrest operating unit 2.

(→ Changing the menu, p. 437)

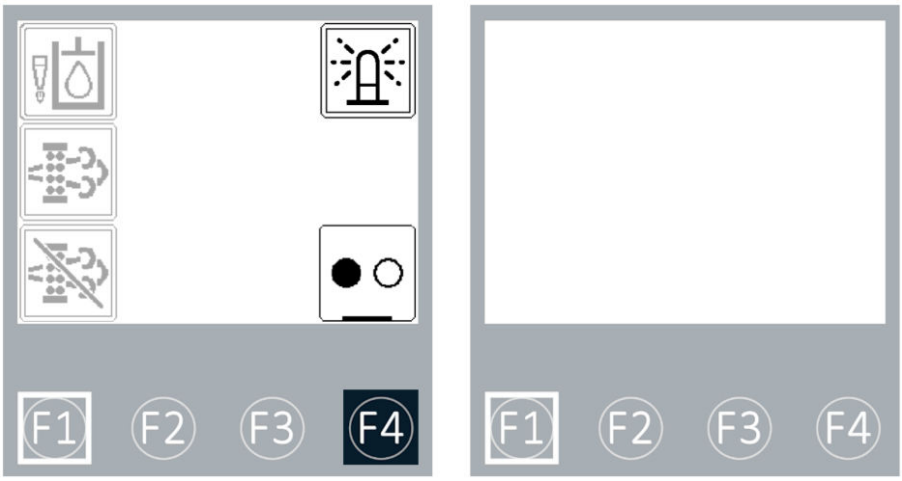
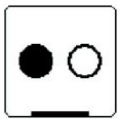


Fig. 1084: Auxiliary functions - rotating beacon menu

If the crane is operated with the crane remote control, the rotating beacon is turned on automatically.

▶ Press the *rotating beacon* button.



▶ Press the *turn function on / off* F-button

8.8.15.3 Turning the exterior lighting on and off with the crane remote control

Pivot section* floodlight

Make sure that the following prerequisites are met:
❑ The *pivot section floodlight* menu is displayed.
(→ 6.5.11 Pivot section floodlight menu, p. 333)

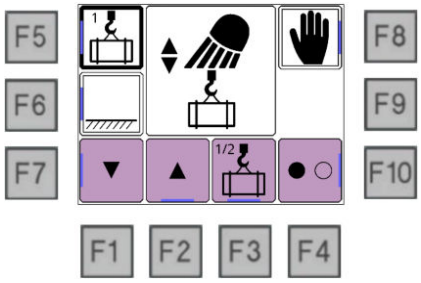
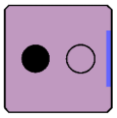


*Fig. 1087: Pivot section floodlight menu**

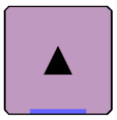
Turning the pivot section floodlight* on and off



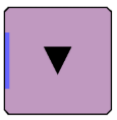
▶ Press the *turn the pivot section floodlight on and off* F-button.

Manual control operation

▶ Press the *manual control operation* F-button.

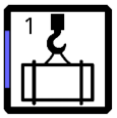


▶ Press the *swing the pivot section floodlight up* F-button.
▷ The pivot section floodlight swings up.



▶ Press the *swing the pivot section floodlight down* F-button.
▷ The pivot section floodlight swings down.

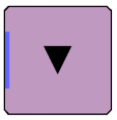
Load following



▶ Press the *load following* F-button.

▶ Until the pivot section floodlight is aligned with the load: Press and hold the *swing the pivot section floodlight up* F-button.

or



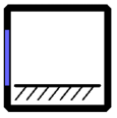
Until the pivot section floodlight is aligned with the load: Press and hold the *swing the pivot section floodlight down* F-button.

▷ Pivot section floodlight follows the load automatically during crane movements.

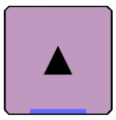
To select another load position:

▶ Until the desired load position is selected: Press the *change winch / load position* F-button repeatedly.

Illuminate the working area

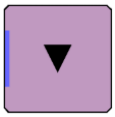


▶ Press the *illuminate working area* F-button.



▶ Until the pivot section floodlight is aligned with the working area: Press and hold the *swing the pivot section floodlight up* F-button.

or



Until the pivot section floodlight is aligned with the working area: Press and hold the *swing the pivot section floodlight down* F-button.

▷ The pivot section floodlight always lights up the set working area automatically during crane movements.

8.8.15.4 Turning the exterior lighting on and off with the expanded crane remote control*

Pivot section floodlight*

Make sure that the following prerequisites are met:
❑ The pivot section floodlight menu is displayed.
(→ Opening the pivot section floodlight menu, p. 474)

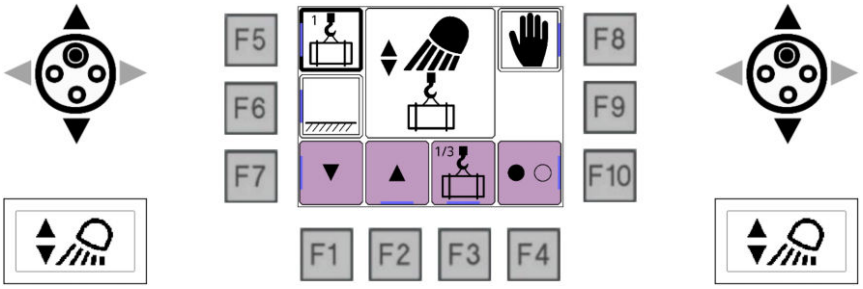
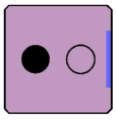


Fig. 1099: Pivot section floodlight menu

Turning the pivot section floodlight on and off



▶ Press the *turn the pivot section floodlight on and off* F-button.

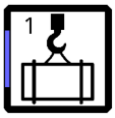
Manual control operation

▶ Press the *manual control operation* F-button.

▶ Move control lever 1 or control lever 2 to the front.
▷ The pivot section floodlight swings down.

▶ Move control lever 1 or control lever 2 to the rear.
▷ The pivot section floodlight swings up.

Load following



▶ Press the *load following* F-button.

▶ Until the pivot section floodlight is aligned with the load: Move control lever 1 or control lever 2 to the front and hold.

or

Until the pivot section floodlight is aligned with the load: Move control lever 1 or control lever 2 to the rear and hold.

▷ Pivot section floodlight follows the load automatically during crane movements.

Illuminate the working area

▶ Press the *illuminate working area* F-button.

▶ Until the pivot section floodlight is aligned with the working area: Move control lever 1 or control lever 2 to the front and hold.

or

Until the pivot section floodlight is aligned with the working area: Move control lever 1 or control lever 2 to the rear and hold.

▷ The pivot section floodlight always lights up the set working area automatically during crane movements.

8.8.16 Adjusting the boom head camera* zoom

The zoom of the boom head camera can be set using the buttons on the *boom head camera* monitor. This changes the display on the *boom head camera* monitor.

Further information: (→separate document “Operating instructions from the monitor manufacturer”)

Make sure that the following prerequisites are met:
❑ The boom head camera is assembled and connected.
(→ Assembling the camera, p. 856)
(→ Connecting the electrical lines, p. 860)
❑ The *boom head camera* monitor shows an illustration.
(→ 6.3.1 Arrangement of the control and operating elements, p. 247)

8.9 Climate control system

8.9.1 Description of the climate control system

The climate control system in the superstructure consists of:
- Heater (engine dependent)
- Parking heater*
- Auxiliary heater*
- Climate control system

The heater and the climate control system are only operational when the engine is running.

The parking heater* and auxiliary heater* are operational also with the engine turned off. If the parking heater* and auxiliary heater* are operated when the engine is turned off, the batteries can be discharged.

In the case of insufficient air supply and icy windows, the climate control system cannot work efficiently. Keep the windows, air intake and the air filter free of: Ice, snow, impurities and objects.

For efficient climate control, close the windows and doors.

Perform the following measures to prevent the windows from fogging up:
- Set the highest blower stage.
- Turn on recirculated air.
- Turn the climate control system on.
- Open the air vents and direct toward the windows.

8.9.2 Ending climate control

Fig. 1110: Climate control operating unit

Note
At very low temperatures, the display unit may not initially function.

▶ Wait until the display unit can be read.

8.9.2.1 Adjusting the temperature

▶ Increase the temperature: Press the *increase temperature* button.

▶ Reduce the temperature: Press the *decrease temperature* button.

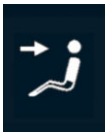
8.9.2.2 Setting the blower stage

▶ Increase the blower stage: Press the *increase blower stage* button

▶ Reduce the blower stage: Press the *reduce blower stage* button

8.9.2.3 Adjusting the air distribution

The air can be distributed as required between the head area and the floorboard area.



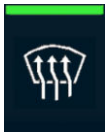
▶ Increase the air distribution in the head area: Press the *head area air distribution* button.

▶ Increase air distribution in the floorboard area: Press the *floorboard area air distribution* button.

8.9.2.4 Defrosting the front window

With the “front window defrosting” function, the fan, heater and air conditioning system are set to the highest stage. Air is guided directly toward the front window, which is therefore deiced and dried.

To be able to use the function effectively, perform the following measures:
- Turn off the *floorboard area air distribution* and *head area air distribution*.
- Open the air vents.
- Adjust the air vents toward the window.
- Turn on recirculated air.



▶ Press the *front window defrosting* button.

8.9.2.5 Turning recirculated air on and off

When recirculated air is on, the air supply from the outside is interrupted.

Switch on recirculated air in the following cases:
- To be able to cool down or heat up the inner area faster.
- To prevent bad odors and exhaust from the environment from entering the inner area.

▶ Press the *recirculating air* button.

8.9.2.6 Turning the climate control system on and off

Turn on the climate control system in the following cases:
- To cool down the cab interior.
- To reduce the air humidity in the cab interior, for example if the windows are fogged up.

To obtain maximum cooling performance:
- Set the temperature to the lowest stage.
- Set the highest blower stage.
- Turn on recirculated air.
- Open all air vents.
- Close the doors and windows.

During operation of the climate control system, a water puddle can form.

If the outside temperature is too low, the climate control system turns off automatically.

Make sure that the following prerequisites are met:
❑ The engine is running.
(→ 8.12 Engine, p. 490)

▶ Press the *climate control system* button.

8.9.2.7 Operating the superstructure* parking heater

WARNING
Toxic exhaust gas!
Danger of suffocation.

▶ Turn on the parking heater only outside of closed rooms.

WARNING
Operation of the parking heater in an environment at risk of explosion or fire!
The environment can be ignited by the parking heater.

▶ Do **not** turn on the parking heater in an environment at risk of explosion and fire.

For example, there is a danger of explosion and fires in the following locations:
- Gas stations and refueling facilities.
- Locations where vapors, gases or dust can form.
- Locations with easily flammable materials or fluids.

If the ignition is turned off while the parking heater is turned on, the parking heater continues to run with an automatic shut off delay for up to 30 minutes.

If the parking heater is turned on while the ignition is turned off, the parking heater runs until it is turned off.

Make sure that the following prerequisites are met:
❑ For devices with a fuel tank: The fuel tank contains sufficient fuel.
❑ The crane is located in an area where operation of parking heaters is permitted.

Turning the parking heater on and off with the climate control operating unit

The parking heater can also be turned on when the ignition is turned off.

▶ Press the *parking heater* button.

Adjusting the heat distribution

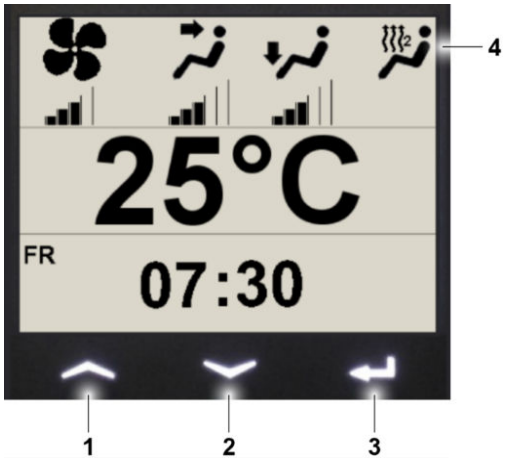


Fig. 1121: Display unit

1 Up button
2 Down button
3 Confirm button
4 Parking heater heat distribution icon

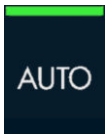
▶ Until the *parking heater heat distribution* icon **4** blinks: Press and hold the *parking heater* button.

▶ Use the *Up* button **1** and the *Down* button **2** to select the desired heat distribution and press the *Confirm* button **3**.
▷ The parking heater will be turned on with the selected heat distribution.

8.9.2.8 Turning automatic operation on and off

Automatic operation regulates the climate control by itself. The set temperature is kept constant.

Make sure that the following prerequisites are met:
❑ The engine is running.
(→ 8.12 Engine, p. 490)



▶ Press the *automatic operation* button.

8.9.2.9 Operating the timer

With the timer, the parking heater can be turned on and off automatically at any time.

Turning the timer on and off

Note

The parking heater is operated with the temperature, blower stage and air distribution that was set last.

▶ Press the *timer* button.
▷ The parking heater is turned on and off at the set time.

Setting the timer

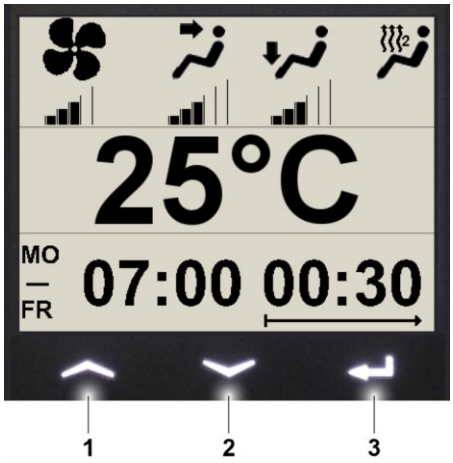


Fig. 1125: Setting the timer

1 Up button
2 Down button
3 Confirm button

▶ Until the first adjustment option blinks: Press and hold the *timer* button.

Set all setting options as follows:

▶ Use the *Up* button **1** and the *Down* button **2** to select the desired setting and press the *Confirm* button **3**.

8.9.2.10 Operating the superstructure* auxiliary heater

WARNING
Toxic exhaust gas!
Danger of suffocation.

▶ Turn on the auxiliary heater only outside of closed rooms.

WARNING
Operation of the auxiliary heater in an environment at risk of explosion or fire!
The environment can be ignited by the auxiliary heater.

▶ Do **not** turn on the auxiliary heater in an environment at risk of explosion and fire.

For example, there is a danger of explosion and fires in the following locations:
- Gas stations and refueling facilities.
- Locations where vapors, gases or dust can form.
- Locations with easily flammable materials or fluids.

Description of the auxiliary heater: (→ Separate documents “Manufacturer’s operating instructions”)

The auxiliary heater heats independently of the temperature set on the *climate control* operating unit.

Make sure that the following prerequisites are met:
❑ For devices with a fuel tank: The fuel tank contains sufficient fuel.
❑ The mobile crane is located in an area where operation of the auxiliary heater is permitted.

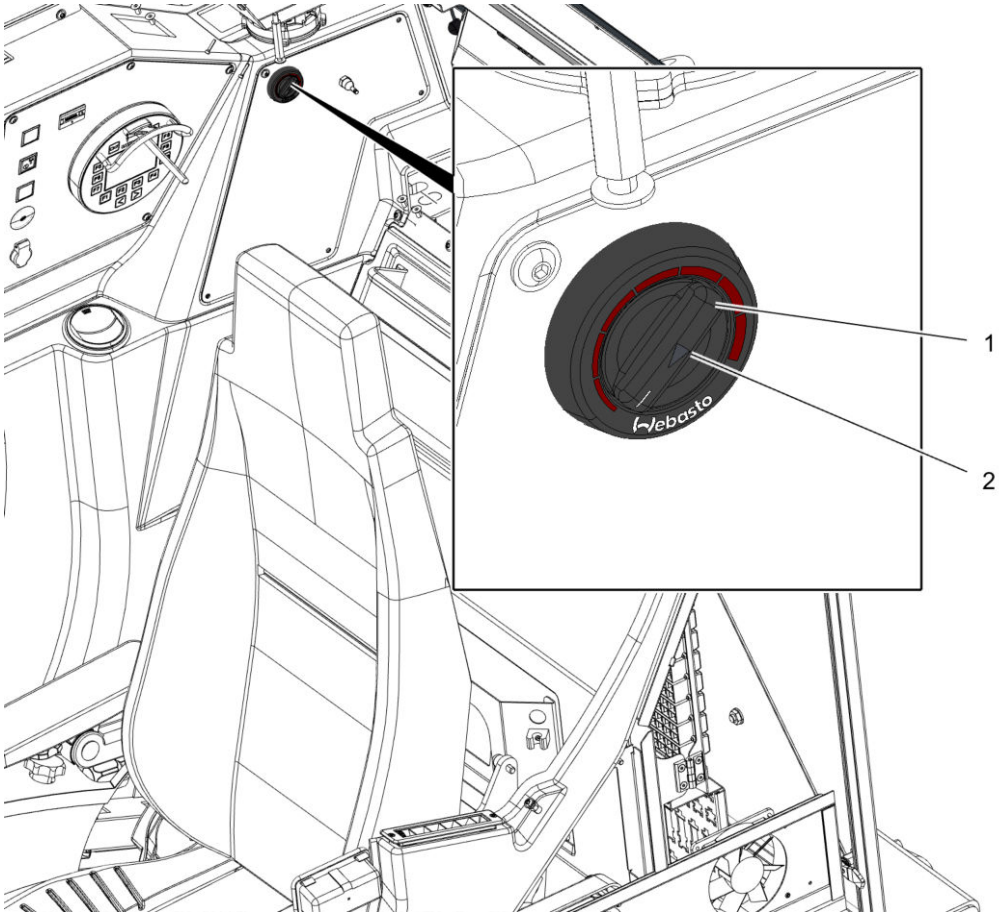


Fig. 1127: Crane cab auxiliary heater rotary control

1 Rotary control **2** Indicator light

Turning the auxiliary heater on

▶ Turn the rotary control **1** to the desired position.
▷ The indicator light **2** turns on.

Turning the auxiliary heater off

▶ Turn the rotary control **1** to the stop to the left.
▷ Indicator light **2** is turned off.

8.9.2.11 Adjusting the air vents

Adjusting the ventilation nozzles

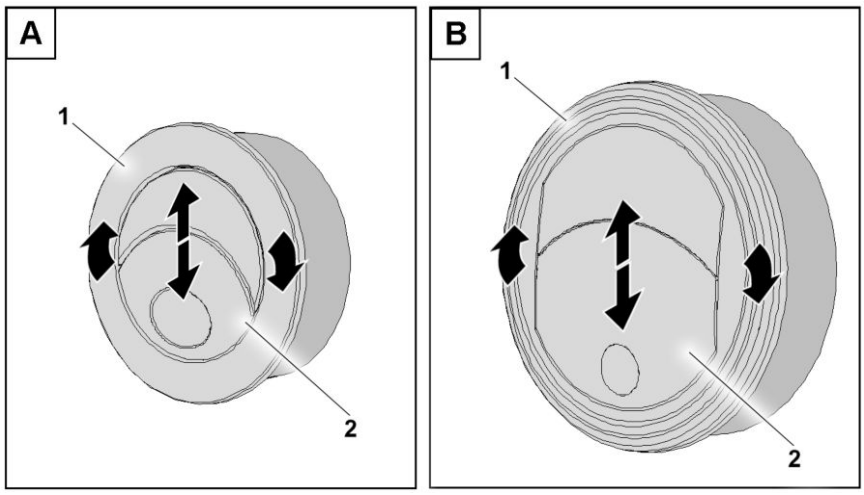


Fig. 1128: Exemplary illustration of ventilation nozzles

1 Ring
2 Flaps

Adjusting the outflow direction:

▶ Turn the ring **1** to the desired position.

▶ Set the flaps **2** in the desired position.

Adjusting the roll nozzles

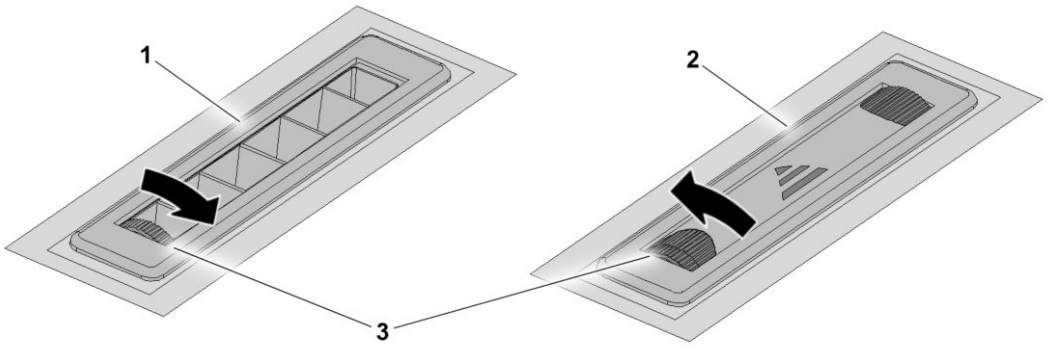


Fig. 1129: Exemplary illustration of roll nozzles

1 Roll nozzle opened
2 Roll nozzle closed
3 Handwheel

▶ Turn the handwheel **3** to the desired position.

8.10 Crane remote control

8.10.1 Safety

This section supplements the “Safety” chapter.

8.10.1.1 Using the crane remote control correctly

Improper use can lead to damage or destruction of the crane remote control.

Observe the following rules:
- Protect the crane control from direct sun exposure.
- Protect the crane control and charging cradle from dirt and moisture.
- Do **not** clean the crane remote control or the charging cradle with solvents, paint thinners, cleaning fluids or other chemical substances.

8.10.1.2 Crane vibration due to loss of the radio connection

If the radio connection between the crane remote control and crane is lost, the engine and all crane movements will be stopped abruptly. The crane can vibrate due to an abrupt stop.

The radio signal breaks down in the following cases:
- The distance between the crane remote control and the crane is too large.
- The radio is disturbed by local conditions.
- The stop switch of the crane remote control is pressed.
- The state of charge of the rechargeable battery is too low.

Observe the following rules:
- Continuously check the indicator light for the radio signal and rechargeable battery state of charge.
- Adjust the operating site in case of a weak radio signal.
- Ensure a sufficient charge condition of the rechargeable battery.
- During a change of location: Interrupt crane operation.

8.10.2 Operating the buttons

Make sure that the following prerequisites are met:
❑ If required for the function: The button block is removed.
(→ 8.10.4 Lifting the button block, p. 477)

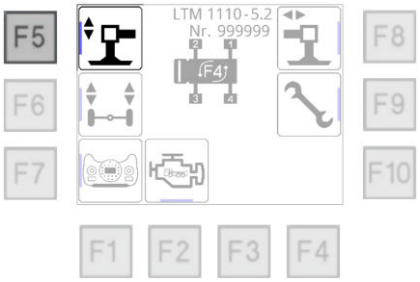


Fig. 1131: Start menu

▶ Press the F-button located next to the button
▷ The function of the button is carried out

Note

The blue bar of a button indicates the corresponding F-button.

8.10.3 Menu guide

8.10.3.1 Opening the start menu

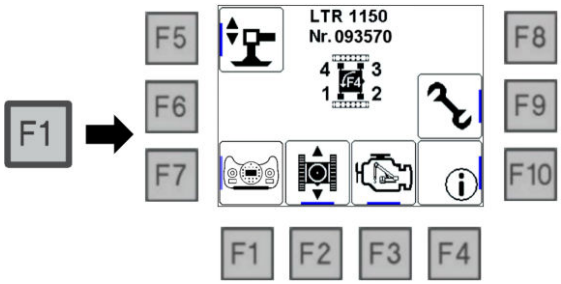


Fig. 1133: Opening the start menu

▶ Press the *F1* button
▷ The start menu is displayed.

8.10.3.2 Opening the assembly support menu

Opening the *assembly support* menu

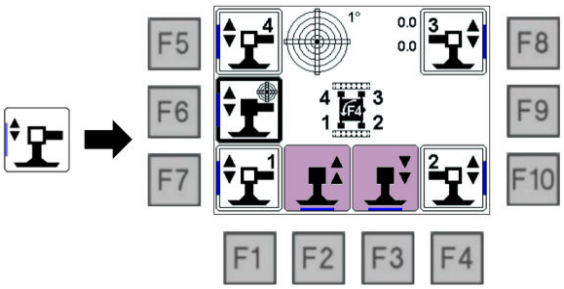


Fig. 1135: Opening the assembly support menu

When the *start menu* is displayed:
▶ Press the *Assembly support menu* F-button.
▷ The assembly support menu is displayed.

8.10.3.3 Opening the track width adjustment menu

Opening the *track width adjustment* menu

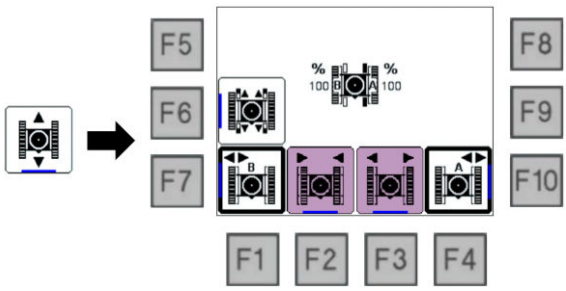


Fig. 1137: Opening the track width adjustment menu

When the *start menu* is displayed:

▶ Press the *track width adjustment menu* F-button.
▷ The track width adjustment menu is displayed.

8.10.3.4 Opening the assembly functions menu

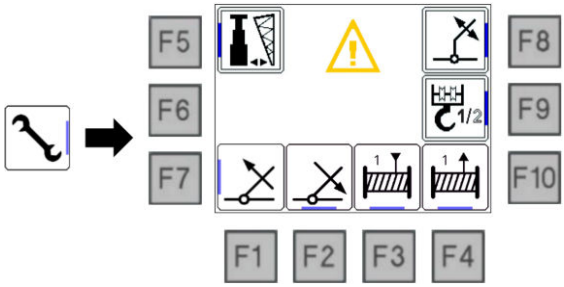


Fig. 1139: Opening the assembly functions menu

When the *start menu* is displayed:

▶ Press the *assembly functions menu* F-button.
▷ The *assembly functions menu* is displayed.

8.10.3.5 Opening the pivot section floodlight menu

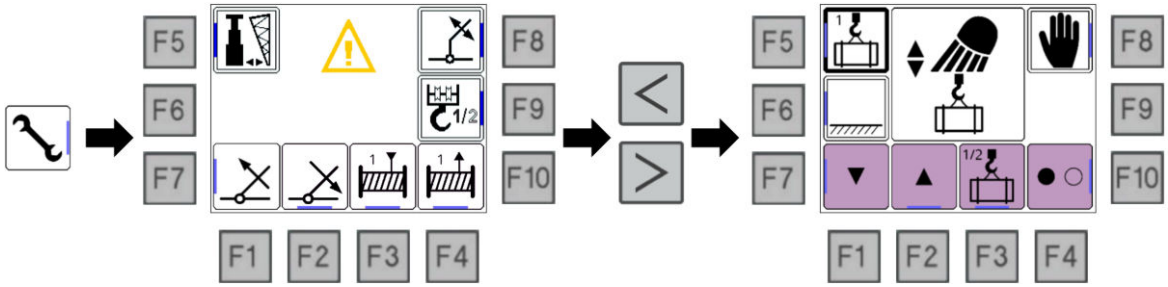


Fig. 1141: Opening the pivot section floodlight menu

If the *assembly functions* menu is displayed:

▶ Press the *page to the left* or *page to the right* button.
▷ The *pivot section floodlight* menu is displayed.

8.10.3.6 Opening the engine menu

Opening the *engine* menu from the *start menu*

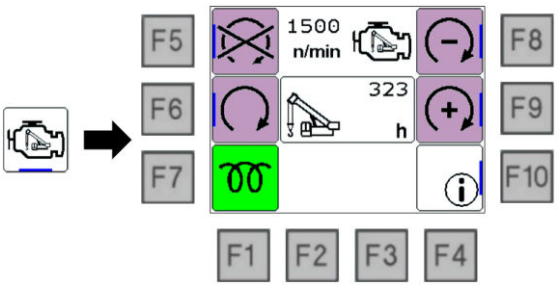


Fig. 1143: Directly opening the engine menu

When the *start menu* is displayed:

▶ Press the *engine menu* F-button.
▷ The *engine* menu is displayed.

Opening the *engine* menu from another menu

If **any** other menu is displayed:

▶ Press the *page to the left* or *page to the right* button.
▷ The *engine* menu is displayed.

8.10.3.7 Opening the warning and indicator lights menu

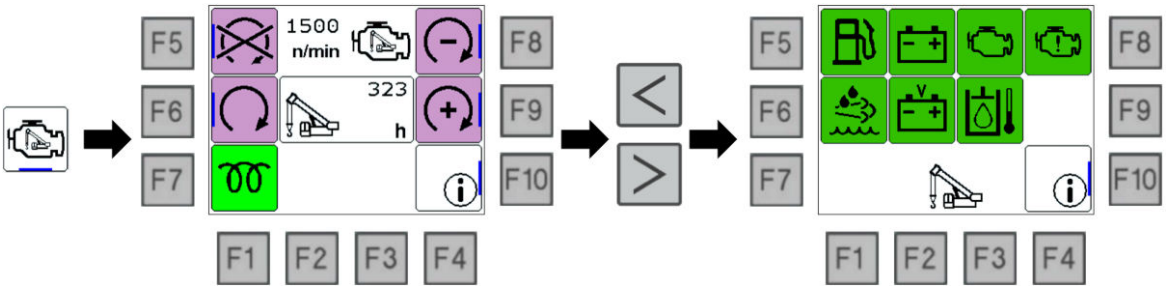


Fig. 1146: Opening the warning and indicator lights menu

When the *engine* menu is displayed:

▶ Press the *page to the left* or *page to the right* button.
▷ The *warning and indicator lights* menu is displayed.

Note

In case of a warning, the *warning and indicator lights* menu is displayed.

8.10.3.8 Opening the diagnostics system menu

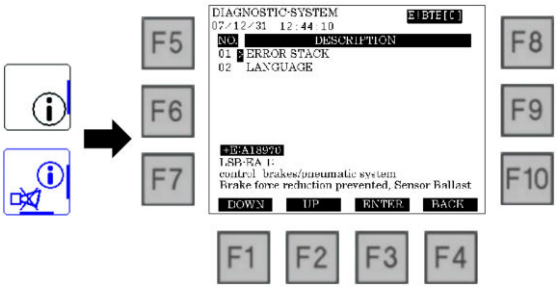


Fig. 1148: Exemplary illustration: Opening the diagnostics system

When the *start menu*, *engine* menu or *warning and indicator light* menu is displayed:
▶ Press the *diagnostics system menu* F-button.

or

If the *crane operation* menu is displayed on the expanded crane remote control*:
Press the *diagnostics system menu* F-button.

▷ The *diagnostics system* menu is displayed.

8.10.3.9 Opening the settings and status displays menu

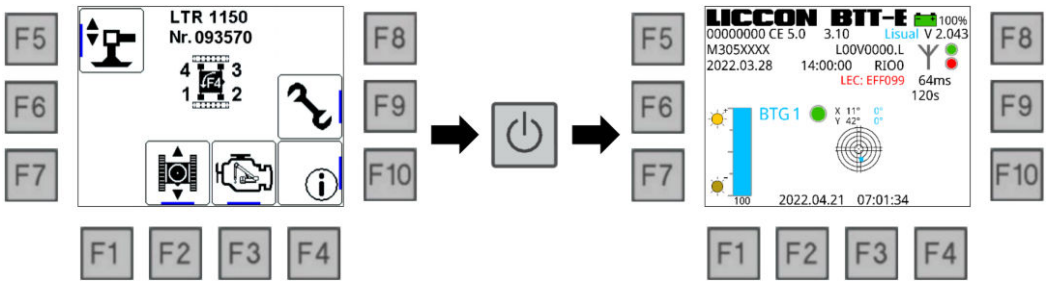


Fig. 1151: Opening the settings and status displays menu

▶ Press the *on / off* button for less than 1 second.
▷ The *settings and status displays* menu is displayed.

Note

If the *on / off* button is pressed too long, the crane remote control turns off.

8.10.3.10 Opening the button test menu

Make sure that the following prerequisites are met:
❑ The *settings and status displays* menu is displayed.

(→ Opening the settings and status displays menu, p. 476)

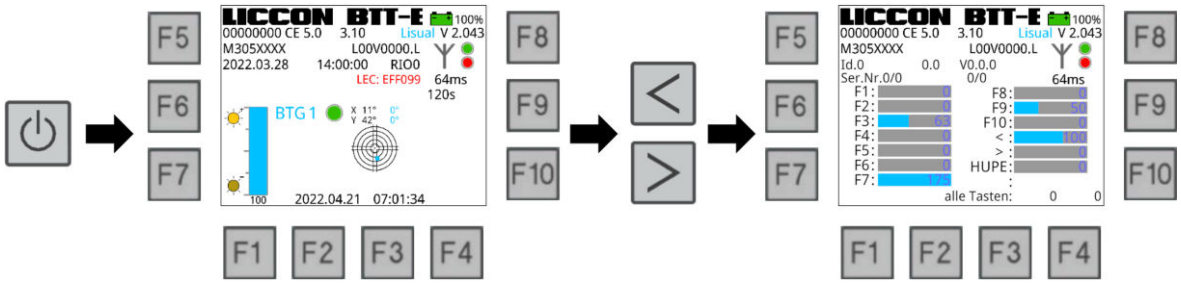


Fig. 1153: Opening the button test menu

▶ Press the *page to the left* or *page to the right* button.
▷ The *Button test* menu is displayed.

8.10.4 Lifting the button block

Functions and crane movements to be carried out are secured with a button block.

When operating with the expanded crane remote control, the button block is **not** active.

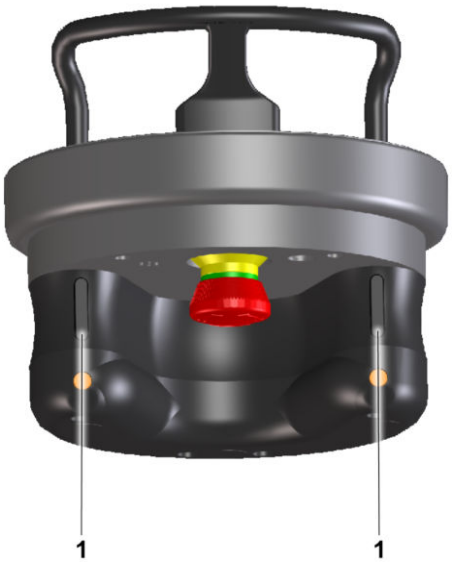


Fig. 1155: Crane remote control enable buttons

1 Enable buttons

▶ Press the enable buttons **1** on the back of the crane remote control.
▷ The button block is lifted for 30 seconds.
▷ Buttons that can be enabled turn purple.

Note

If no function is activated within 30 seconds, a signal tone sounds and the button block is active again.

8.10.5 Turning the crane remote control on and off

Make sure that the following prerequisites are met:
❑ The stop switch on the rear of the crane remote control is **not** pressed.
(→ 9.2 Operating the stop switch of crane remote control, p. 596)
❑ The charge condition of the crane remote control is sufficient.
(→ 8.10.8 Charging the crane remote control, p. 481)

8.10.5.1 Turning the crane control on and off using the ignition (ignition switch)

Make sure that the following prerequisites are met:
❑ The crane remote control is inserted in the charging cradle.
(→ 6.3.1 Arrangement of the control and operating elements, p. 247)

▶ Turn the ignition on or off.
▷ The crane remote control is turned on or off together with the ignition.

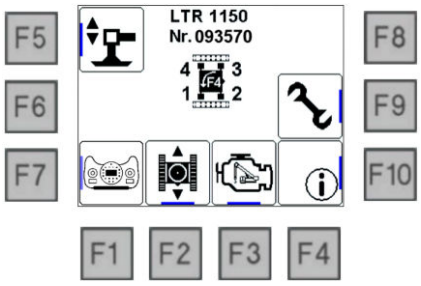
8.10.5.2 Turning the crane remote control on manually

Make sure that the following prerequisites are met:
❑ The ignition is turned off.
❑ The crane remote control is out of the charging cradle.

▶ Turn the ignition on.

▶ Press the *on / off* button.
▷ The crane remote control starts up.

▶ Press any button



▷ The *start menu* is displayed.

Troubleshooting

Is the *code entry* menu displayed?
An automatic connection **cannot** be established between the crane and crane remote control.

▶ Carry out code calibration (→ 8.10.6 Connecting the crane remote control with the crane, p. 479).

8.10.5.3 Turning the crane remote control off manually

Make sure that the following prerequisites are met:
❑ The crane remote control is out of the charging cradle.
❑ Crane operation / assembly operation has ended.
(→ 8.22 Ending crane operation, p. 594)

▶ Press and hold the *on / off* button for more than 1 second.
▷ The crane remote control turns off.

8.10.6 Connecting the crane remote control with the crane

To be able to control the crane via the crane remote control, a connection must be established between the crane remote control and the crane.

Make sure that the following prerequisites are met:
❑ The plant number on the crane data tag matches the work number displayed on the crane remote control.

The radio connection is established automatically.

8.10.6.1 Carrying out code calibration

In some countries, the automatic connection between the crane and crane remote steering may **not** be established.

In this case, code calibration must be carried out.

Note

If there is **no** radio connection between the crane and the crane remote control, the *code input* menu is displayed in the *standby menu*.

Make sure that the following prerequisites are met:
❑ The ignition is turned on.
(→ 8.12 Engine, p. 490)
❑ The *standby menu* is displayed.

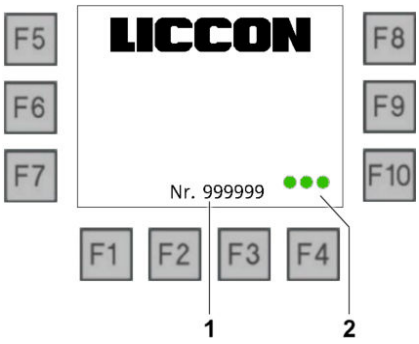


Fig. 1159: Exemplary illustration: Standby menu

1 Plant number **2** Code entry symbol

▶ Press the *page to the left* button

▶ Press the *page to the right* button

▶ Press the *F1* button

▷ All circles in the code entry icon **2** are displayed in green: Code calibration OK

If the *start menu* should be displayed:
▶ Press the *F1* button
or

If the *settings and status displays* menu should be displayed:
Press the *on / off* button for less than 1 second.

Note

If at least one circle in the code entry symbol **2** is read after code entry:
▶ Repeat code calibration.

8.10.6.2 Coupling the crane remote control with the crane

A renewal of the coupling process is only necessary if the radio connection icon does not turn green after successful code calibration. This is the case, for example, when the crane remote control is replaced or something has changed on the version of the crane software.

Make sure that the following prerequisites are met:
❑ The ignition is turned on.
(→ 8.12 Engine, p. 490)
❑ The crane remote control is turned on.
(→ 8.10.5 Turning the crane remote control on and off, p. 478)

▶ Plug the crane remote control in the charging cradle.
▷ Various connecting parameters are compared and checked for a match via an infrared interface.
▷ The coupling process is complete.

Troubleshooting

Is the coupling process **not** successful?

▶ Contact Customer Service at Liebherr-Werk Ehingen GmbH.

8.10.7 Selecting the operating alignment

Prior to operation with the crane remote control, the operating alignment must be selected according to the alignment of the operator with the chassis.

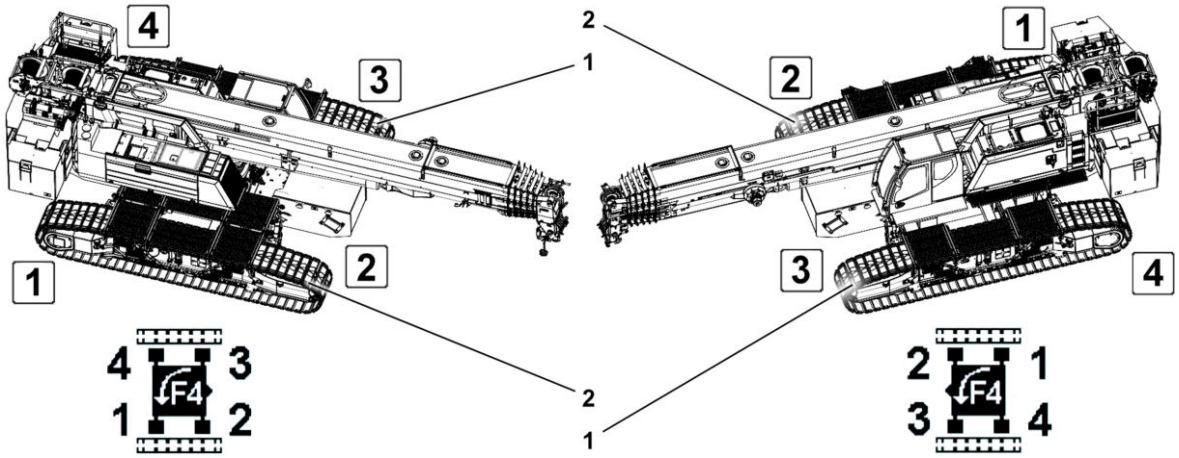


Fig. 1164: Exemplary illustration: Selecting the operating alignment

1 Crawler carrier A **2** Crawler carrier B

When the *operating alignment* icon and the actual alignment of the operator with the crane do **not** coincide:

▶ Press the *F4* button *change the operating alignment*.
  ▷ The crane *operating alignment* icon is turned 180°.
  ▷ The buttons change according to the operating alignment.

8.10.8 Charging the crane remote control

If the rechargeable battery state of charge 1 indicator light switches from green to yellow, the rechargeable battery must be charged as soon as possible.

Make sure that the following prerequisites are met:

❑ The stop switch on the rear of the crane remote control is **not** pressed.
(→ 9.1 Operating the emergency off switch, p. 595)

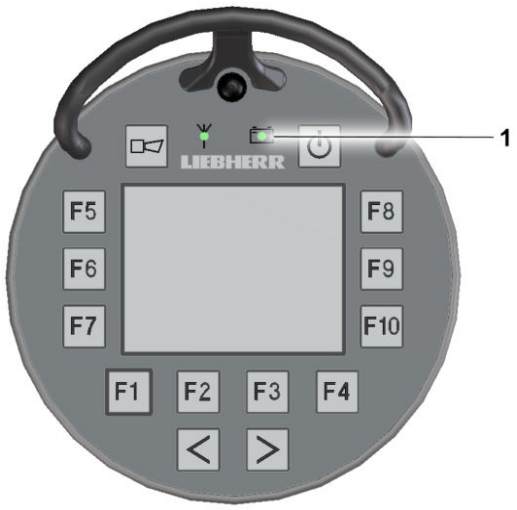


Fig. 1166: Charge condition of crane remote control

1 Rechargeable battery state of charge indicator light

Note

The exact state of charge of the rechargeable battery can be checked in the *settings and status displays* menu (→ 6.5.13 Settings and status displays menu, p. 336).

▶ Plug the crane remote control in the charging cradle.
▷ The crane remote control is charging.

8.10.9 Setting the crane remote control brightness

Make sure that the following prerequisites are met:
❑ The *settings and status displays* menu is displayed.
(→ Opening the settings and status displays menu, p. 476)

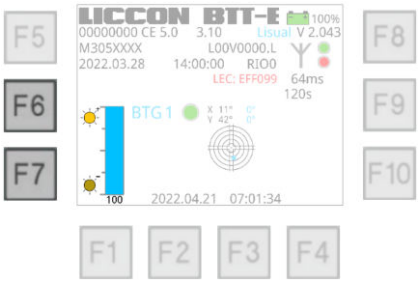
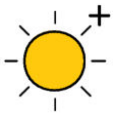


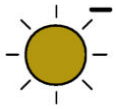
Fig. 1167: Settings and status displays menu

Increase brightness



▶ Press the *increase brightness* F-button.
▷ The display brightness is increased incrementally.

Reduce brightness



▶ Press the *reduce brightness* F-button.
▷ The display brightness is reduced incrementally.

8.10.10 Changing the crane remote control language

Make sure that the following prerequisites are met:
❑ The *open error stack* menu is displayed
(→ Opening the diagnostics system menu, p. 476)

Fig. 1170: Selecting the Language menu

DOWN ▶ Press the *DOWN* F-button.
▷ The *LANGUAGE* menu is selected.

ENTER ▶ Press the *ENTER* F-button.
▷ The *LANGUAGE* menu is opened.

Fig. 1173: Changing the language

ENTER ▶ Select the desired language and confirm with the *ENTER* F-button.
▷ The language is changed.

8.11 Expanded crane remote control*

8.11.1 Safety

This section supplements the “Safety” chapter.

8.11.1.1 Using the expanded crane remote control correctly

Improper use can lead to damage or destruction of the expanded crane remote control.

Observe the following rules:
- Protect the expanded crane remote control from direct sun exposure.
- Protect the expanded crane control and charging cradle from dirt and moisture.
- Do **not** clean the expanded crane remote control or the charging cradle with solvents, paint thinners, cleaning fluids or other chemical substances.

8.11.1.2 Crane vibration due to loss of the radio connection

If the radio connection between the crane remote control and crane is lost, the engine and all crane movements will be stopped abruptly. The crane can vibrate due to an abrupt stop.

The radio signal breaks down in the following cases:
- The distance between the expanded crane remote control and the crane is too large.
- The radio is disturbed by local conditions.
- The stop switch of the crane remote control is pressed.
- The state of charge of the rechargeable battery is too low.

Observe the following rules:
- Continuously check the indicator light for the radio signal and rechargeable battery state of charge.
- Adjust the operating site in case of a weak radio signal.
- Ensure a sufficient charge condition of the rechargeable battery.
- During a change of location: Interrupt crane operation.
- Keep the expanded crane remote control level during use.
- Only use the expanded crane remote control with a carrying belt.

8.11.1.3 Safety function of the expanded crane remote control

To prevent unwanted crane movements due to the falling down of the expanded crane remote control, all crane movements are stopped ad locked as well as the expanded crane control is inclined more than 90 ° to the horizontal. The crane can vibrate due to an abrupt stop.

Observe the following rules:
- Keep the expanded crane remote control level during use.
- Only use the expanded crane remote control with a carrying belt.

8.11.2 Using the crane remote control in the radio remote console

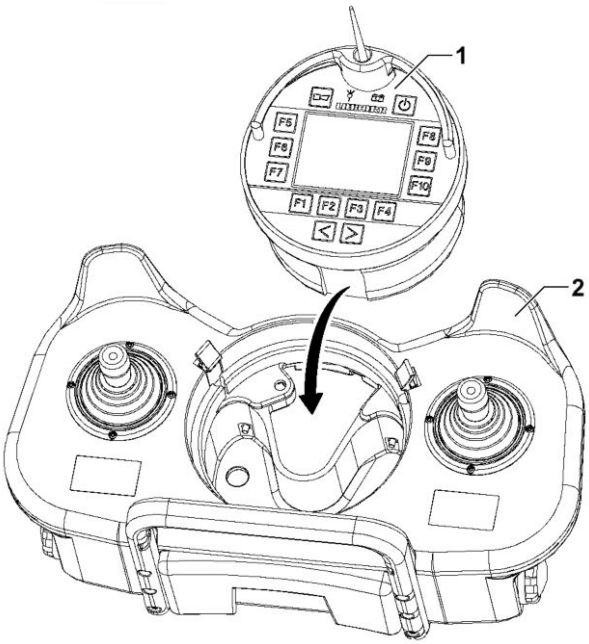


Fig. 1176: Using the crane remote control in the radio remote console

1 Crane remote control **2** Remote control console

▶ Use the crane remote control in the radio remote console.
▷ Expanded crane remote control is operational.

Note

The control levers in the crane cab are blocked during operation with the expanded crane remote control.

8.11.3 Menu guide

The following menus are opened identical to crane remove control:
- *Start menu*
  (→ Opening the start menu, p. 473)
- *Assembly support* menu
  (→ Opening the assembly support menu, p. 473)
- *Assembly functions* menu
  (→ Opening the assembly functions menu, p. 474)
- *Pivot section floodlight* menu
  (→ Opening the pivot section floodlight menu, p. 474)
- *Engine* menu
  (→ Opening the engine menu, p. 475)
- *Warning and indicator lights* menu
  (→ Opening the warning and indicator lights menu, p. 475)
- *Error stack* menu
  (→ Opening the diagnostics system menu, p. 476)
- *Settings and status displays* menu
  (→ Opening the settings and status displays menu, p. 476)
- *Button test* menu
  (→ Opening the button test menu, p. 476)

8.11.3.1 Opening the crane operation menu

Make sure that the following prerequisites are met:
❑ The crane remote control is inserted in the remote control console*.
(→ 8.11.2 Using the crane remote control in the radio remote console, p. 485)

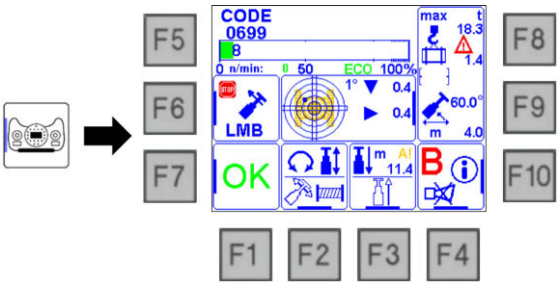


Fig. 1177: Opening the crane operation menu

Opening the crane operation menu

When the *start menu* is displayed:
▶ Press the *crane operation menu* F-button.
▷ The *crane operation* menu is displayed.

Open additional menus

The following menus can be reached directly from the crane operation menu:
- Pivot section *floodlight* menu
(→ Opening the pivot section floodlight menu, p. 474)
- *Engine* menu
(→ Opening the engine menu, p. 475)

▶ Press the *page to the left* or *page to the right* button.

8.11.3.2 Opening the travel operation menu

Make sure that the following prerequisites are met:
❑ The crane remote control is inserted in the remote control console*.
(→ 8.11.2 Using the crane remote control in the radio remote console, p. 485)

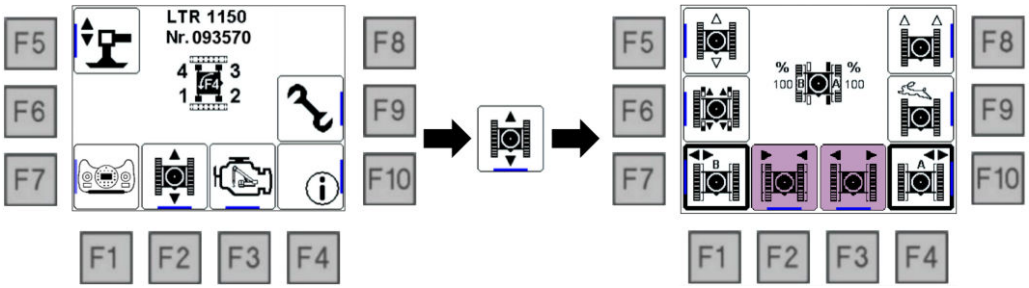


Fig. 1180: Opening the travel operation menu

Opening the travel operation menu

When the *start menu* is displayed:

▶ Press the *travel operation menu* F-button.
▷ The *travel operation* menu is displayed.

Open additional menus

The following menus can be reached directly from the crane operation menu:

- *Engine* menu
  (→ Opening the engine menu, p. 475)
- Opening the *warning and indicator lights* menu
  (→ Opening the warning and indicator lights menu, p. 475)
- Opening the *crane operation* menu
  (→ Opening the crane operation menu, p. 486)

▶ Press the *page to the left* or *page to the right* button.

8.11.3.3 Opening the control lever test menu

Make sure that the following prerequisites are met:

❑ The crane remote control is inserted in the remote control console*.
(→ 8.11.2 Using the crane remote control in the radio remote console, p. 485)
❑ The *settings and status displays* menu is displayed.
(→ Opening the settings and status displays menu, p. 476)

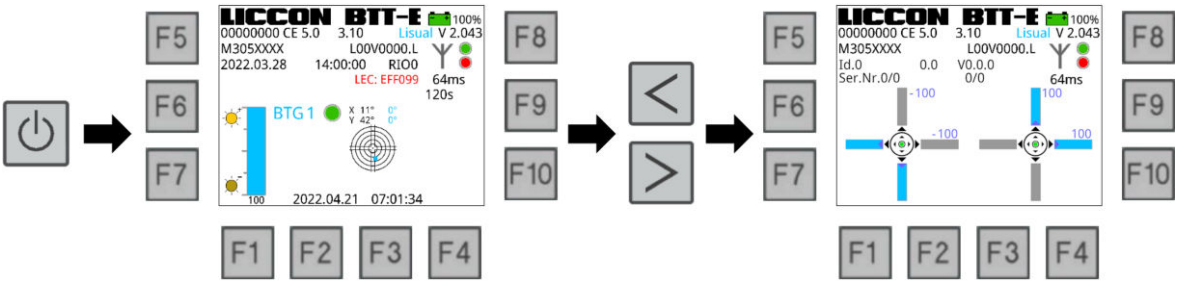


Fig. 1183: Opening the control lever test menu

▶ Press the *page to the left* or *page to the right* button.
▷ The *control lever test menu* screen is displayed.

8.11.4 Changing the display area

Make sure that the following prerequisites are met:

❑ The *crane operation* menu is displayed.

(→ Opening the crane operation menu, p. 486)

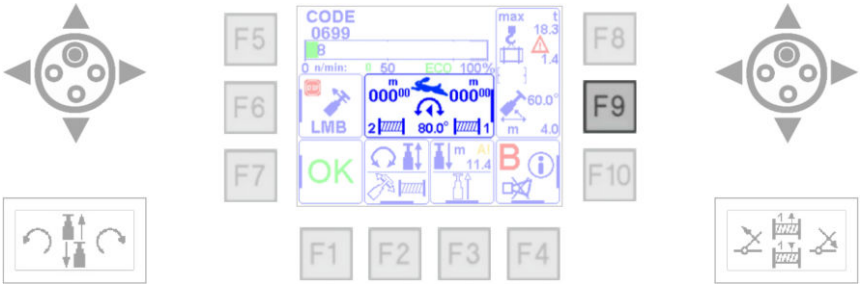


Fig. 1185: Changing the display area

▶ Press the *F9* button for less than two seconds.
▷ The next display area is displayed.

Note

If a critical value is displayed in a display area, the display area cannot be changed.

If the *F9* button is pressed longer than two seconds, the *rope path* display is reset.

8.11.5 Charging the expanded crane remote control

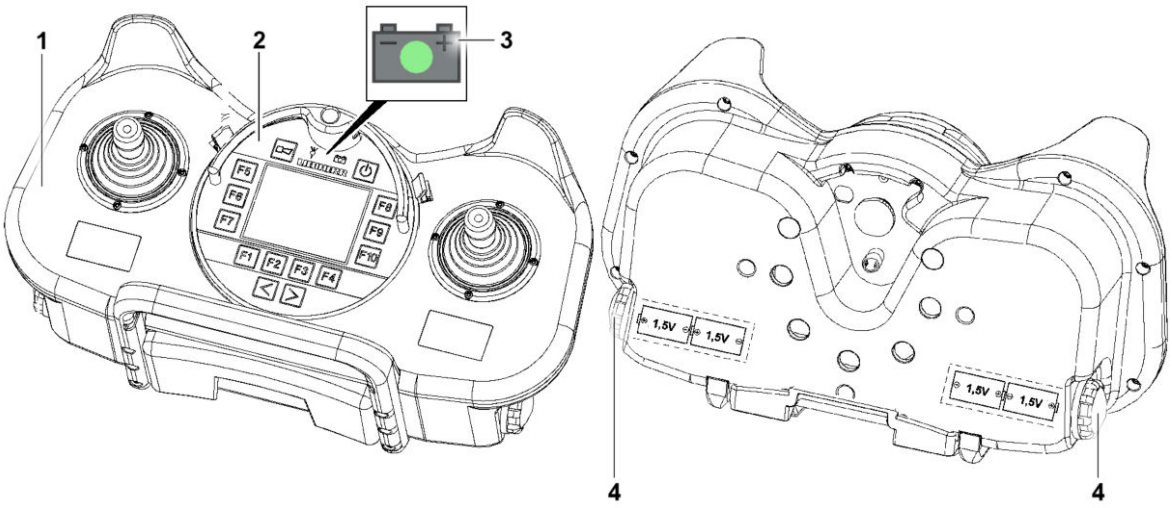


Fig. 1187: Charging the expanded crane remote control

1 Remote control console*
2 Crane remote control
3 Rechargeable battery state of charge indicator light
4 Battery compartments

The power supply for remote control console **1** is provided via crane remote control **2**. Remote control console **1** does **not** have its own rechargeable battery.

Make sure that the following prerequisites are met:
❑ The stop switch on the rear of the crane remote control is **not** pressed.

(→ 9.2 Operating the stop switch of crane remote control, p. 596)

Note

The exact state of charge of the rechargeable battery can be checked in the *settings and status displays* menu.

(→ 6.5.13 Settings and status displays menu, p. 336)

Charge the crane remote control in the charging cradle

▶ Remove the crane remote control **2** from the remote control console **1**.

▶ Plug the crane remote control **2** in the charging cradle.
▷ The crane remote control **2** is charging.

Charge the crane remote control in the radio remote console

NOTICE
Defective batteries!
Acid can emerge from batteries that were used for too long.
The expanded crane remote control can be damaged.

▶ Remove defective batteries immediately.

▶ Place four charged 1.5 V batteries (“Typ C” or “Baby” or “R14/LR14”) in the battery compartments **4**.
▷ The crane remote control is charging.

8.12 Engine

8.12.1 Preheating the engine

At low temperatures, observe the safety instructions for ambient temperatures (→ 5.13.3 Material load due to extreme temperatures, p. 191).

Preheat the engine in the following cases:
- At outside temperatures of less than 0 °C preheat the engine.
- At ambient temperatures below -20 °C preheat the engine, the injection pump and the transmission.

Note

If the crane is designed for low temperature application, additional preheating systems can be installed. The preheating systems are additionally controlled with the parking heater.

▶ Turn on the parking heater (→ Operating the superstructure* parking heater, p. 467).

▶ Preheat the engine faster: Set the passenger compartment temperature to the minimum.

8.12.2 Turning the engine on and off from the crane cab

Make sure that the following prerequisites are met:
❑ All control systems are in the zero position.

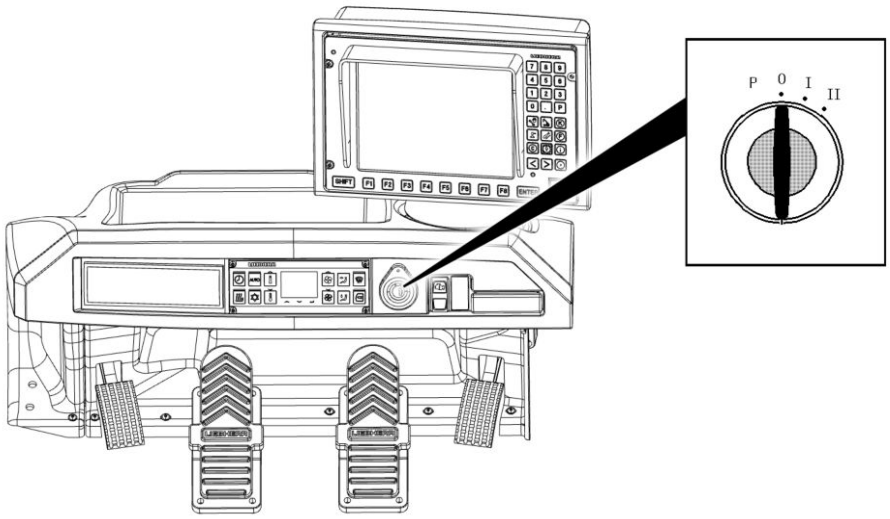


Fig. 1188: Superstructure ignition switch

0 Ignition off
I Ignition on
II Start the engine

Turn the engine on

The engine can only be subjected to a full load after the operating temperature has been reached.

▶ Turn the *superstructure ignition switch* to the ignition on **I** position.

▷ When the engine is ready to start: The *chassis engine* indicator light blinks slowly yellow.

Operate the starter motor a maximum of 30 seconds per start attempt.

If the ambient temperature is **above** -18 °C: Wait 30 seconds between start attempts.

If the ambient temperature is **below** -18 °C: Wait 120 seconds between start attempts.

Carry out a maximum of three start attempts in a row.

▶ Until the engine is turned on: Turn the *superstructure ignition switch* to the engine on **II** position and hold.

Troubleshooting

Does the engine **not** start after three start attempts?

▶ Until the next starting procedure: wait 20 minutes.

Turn the engine off

NOTICE
Engine turned off when hot!
Engine wear increases.

If the crane has been operated at full engine output or if the coolant temperature is above 95 °C:

▶ Before turning off: Allow the engine to idle without a load for 1 to 2 minutes.

▶ Turn the *superstructure ignition switch* to the ignition off **0** position.

▶ Pull out the key and store it in a safe place.

8.12.3 Turning the engine on and off with the crane remote control

Make sure that the following prerequisites are met:

❑ The ignition is turned on.
❑ The *engine* menu is displayed.
(→ Opening the engine menu, p. 475)
❑ All control systems are in the zero position.

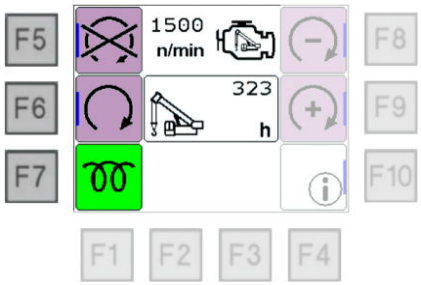


Fig. 1193: Engine menu

Turn the engine on

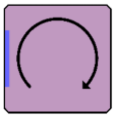
When the engine is ready to start: The *starting readiness* icon is displayed in green.

Operate the starter motor a maximum of 30 seconds per start attempt.

If the ambient temperature is **above** -18 °C: Wait 30 seconds between start attempts.

If the ambient temperature is **below** -18 °C: Wait 120 seconds between start attempts.

Carry out a maximum of three start attempts in a row.



▶ Until the engine is turned on: Press and hold the *Start engine* F-button.

Troubleshooting

Does the engine **not** start after three start attempts?

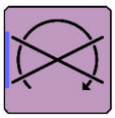
▶ Until the next starting procedure: wait 20 minutes.

Turn the engine off

NOTICE
Engine turned off when hot!
Engine wear increases.

If the crane has been operated at full engine output or if the coolant temperature is above 95 °C:

▶ Before turning off: Allow the engine to idle without a load for 1 to 2 minutes.



▶ Until the engine is turned off: Press and hold the *stop engine* F-button.

8.12.4 Operating the automatic engine stop

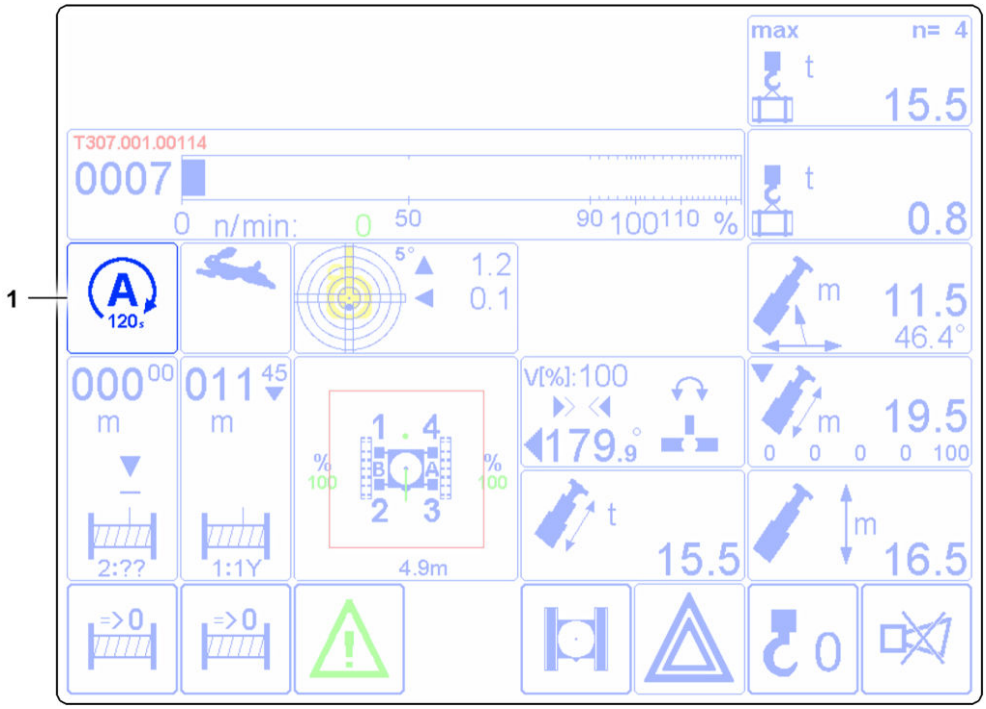


Fig. 1197: Exemplary illustration: Crane operation menu

1 Automatic engine stop display

If no function is performed when the engine is turned on, the automatic engine stop will turn off the engine automatically after a certain period of time. The *automatic engine stop* display **1** shows the time until the engine is turned off automatically.

When performing the following functions, the time of the automatic engine stop is reset to the maximum value:
- Crane movement is carried out.
- The gas pedal is pressed.
- The auxiliary user is turned on.

8.12.4.1 Turning the engine on again

Make sure that the following prerequisites are met:
❑ The engine was turned off by the automatic engine stop.

▶ Press the gas pedal.
▷ The engine is turned on.

Troubleshooting

Does the *automatic engine stop* **1** display show the *battery voltage warning* icon?
The engine must be turned on. Otherwise the starting capability is no longer guaranteed due to the low battery voltage.

▶ Turn on the engine by pressing the gas pedal.

Troubleshooting

Is standby mode active on the superstructure monitor?
In stand-by mode the engine **cannot** be turned on by pressing the gas pedal.

If standby mode is active:
▶ Turn the engine on with the ignition switch(→ 8.12 Engine, p. 490).

8.12.5 Adjusting the engine rpm

8.12.5.1 Adjusting the engine rpm from the crane cab

The gas pedal can be used to steplessly regulate the engine speed between idle and the maximum engine rpm. The engine rpm can be locked at any time using control lever 1 or control lever 2.

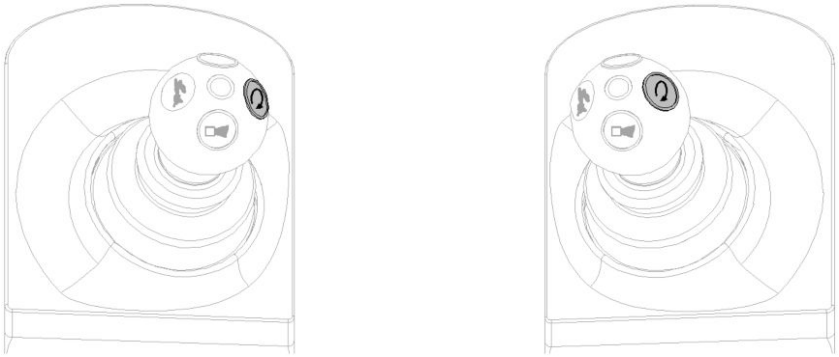


Fig. 1200: Control lever

Lock the engine rpm

▶ Until the desired engine rpm is reached: Press the gas pedal.

▶ Press the *lock engine rpm* button on control lever 1 or control lever 2.

n/min: 1000+ ▷ The *engine rpm locked* additional icon is displayed next to the engine rpm.

Reset engine rpm to idle

If the engine rpm is increased and the gas pedal is **not** pressed:
▶ Press the *lock engine rpm* button on control lever 1 or control lever 2.

8.12.5.2 Adjusting the engine rpm with the crane remote control

Make sure that the following prerequisites are met:
❑ The *engine* menu is displayed.

(→ Opening the engine menu, p. 475)

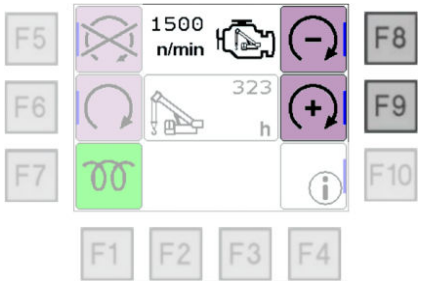
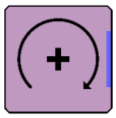


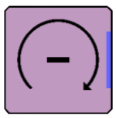
Fig. 1204: Engine menu

Increase the engine rpm



▶ Until the desired rpm is reached: Press and hold the *increase engine rpm* F-button.

Reduce the engine rpm



▶ Until the desired rpm is reached: Press and hold the *reduce engine rpm* F-button.

Note

The engine rpm is automatically adjusted for some functions.

8.12.5.3 Adjusting the engine rpm with expanded crane remote control

The engine rpm is adapted identically to the crane remote control (→ Adjusting the engine rpm with the crane remote control, p. 494).

Make sure that the following prerequisites are met:
- ❑ The *crane operation* menu is displayed.
  (→ Opening the crane operation menu, p. 486)
- ❑ Crane operation is released.
  (→ 8.7.3 Releasing crane operation with expanded crane remote control*, p. 420)

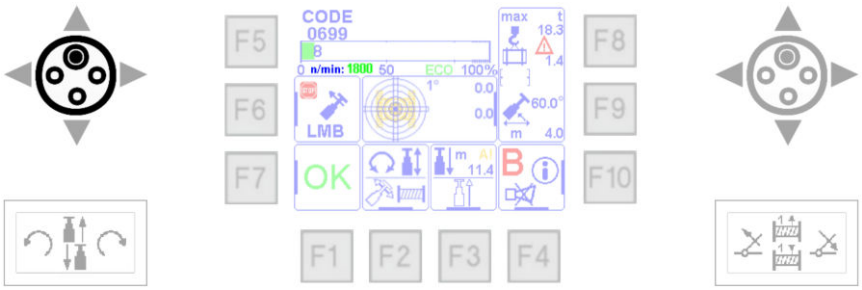
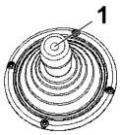


Fig. 1207: Crane operation menu

Switching between idle and the set engine rpm



▶ Press the *rpm switching* button **1** on control lever 2.

800 +

▷ When the engine rpm is increased, the *engine rpm locked* additional icon is displayed in addition to the engine rpm.

Note

If an engine rpm was not set previously, the engine switches to maximum engine rpm when pressing the *speed switching* button.

8.12.6 Exhaust system cleaning procedure

Damage to the exhaust system is prevented by the automatic cleaning procedure.

Prior to the cleaning procedure, the engine rpm is increased automatically for 10 to 20 minutes.

A corresponding error message is displayed.

Crane operation is **not** influenced by the cleaning procedure.

NOTICE
Engine turned off during the exhaust system cleaning procedure!
The exhaust system can be damaged.

If the exhaust system cleaning procedure is active:
▶ Do **not** turn off the engine.

8.13 Diesel particle filter*

Applies only for cranes whose diesel particle filter (DPF) is installed in the exhaust system.

8.13.1 Regenerating the diesel particle filter

WARNING
Regeneration in an environment with a fire hazard!
The environment can catch fire due to high exhaust temperatures.

- ▶ Disable regeneration in an environment with a fire hazard as a precaution.
- ▶ Do **not** perform generation at a standstill in an environment with a fire hazard.

8.13.1.1 Automatic regeneration

From a certain load condition, automatic regeneration is carried out automatically during engine operation. For crane operation, this means no limitation. Engine noise may change slightly during regeneration.

Regeneration is triggered when the ambient conditions (load profile) of the engine permit regeneration.

During regeneration, the engine displays on the *warning and indicator light* page display the *exhaust temperature (HEST) in yellow*.

Observe the error messages!

The engine must be operated for at least one hour to complete regeneration.

If needed, automatic regeneration can be:
- Disabled as a precaution.
  (→ Disabling regeneration, p. 499)
- Interrupted while it is being carried out.
  (→ Interrupting regeneration, p. 500)

8.13.1.2 Regeneration at a standstill

Note

The load condition of the diesel particle filter is displayed on the engine displays on the *level displays* page.

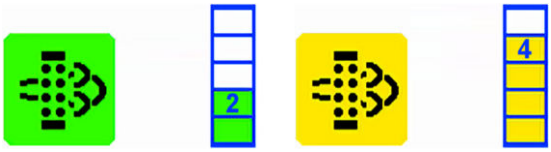


Fig. 1211: Load condition 2 and load condition 4

Regeneration at a standstill can be carried out at the earliest from load condition 2 and at the latest by load condition 4.

Note

- ▶ During regeneration at a standstill: Do **not** operate the crane.

Starting regeneration at a standstill

Make sure that the following prerequisites are met:
- ❑ The crane is at a standstill.
- ❑ Load condition 2, load condition 3 or load condition 4 is reached.
- ❑ The *auxiliary functions* menu is displayed on armrest operating unit 2.
  (→ Changing the menu, p. 437)

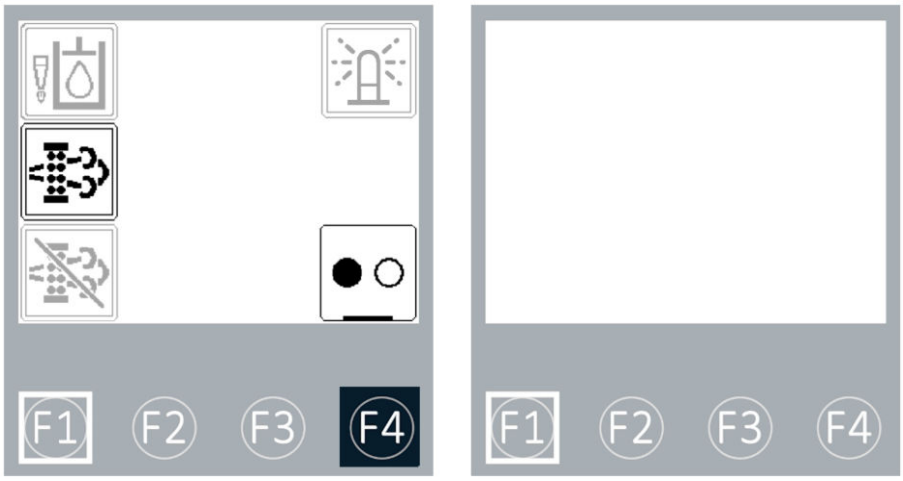
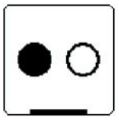


Fig. 1212: Auxiliary functions menu

▶ Press the *Diesel particle filter (DPF) regeneration at a standstill* button.



▶ Press and hold the *turn function on / off* F-button.

▷ The remaining run time of regeneration at a standstill is displayed on the engine displays on the *level display* page on the *diesel particle filter (DPF) load condition* display.

▶ Wait until the remaining run time has elapsed.
▷ After successful regeneration at a standstill, a permissible load condition is displayed.

Troubleshooting

Is load condition 5 reached and generation at a standstill can no longer be started?

▶ Turn the engine off

▶ Contact Customer Service at Liebherr-Werk Ehingen GmbH.

8.13.1.3 Disabling regeneration

Make sure that the following prerequisites are met:
❑ The *auxiliary functions* menu is displayed on armrest operating unit 2.
(→ Changing the menu, p. 437)

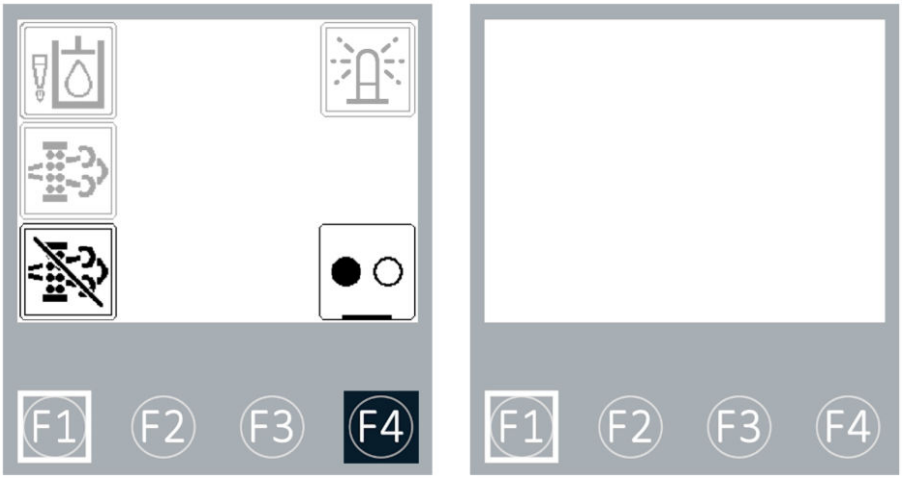
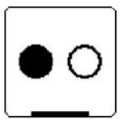


Fig. 1217: Auxiliary functions sub menu

Disabling regeneration

▶ Press the *disable diesel particle filter (DPF) regeneration* button.



▶ Press and hold the *turn function on / off* F-button.

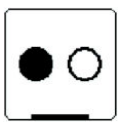
▷ The engine displays on the *warning and indicator lights* page display the *diesel particle filter (DPF) regeneration disabling* icon in yellow.

If regeneration is disabled:
▶ Monitor the *diesel particle filter (DPF) load condition* display on the engine displays on the *fill level* page.

When the *diesel particle filter (DPF) load condition* icon is displayed in yellow:
▶ Liebherr-Werk Ehingen GmbH recommends carrying out regeneration at a standstill as soon as possible (during the work day).

Canceling the disabling of regeneration

▶ Press the *disable diesel particle filter (DPF) regeneration* button.



▶ Press and hold the *turn function on / off* F-button.

▷ The engine displays on the *warning and indicator lights* page display the *diesel particle filter (DPF) regeneration disabling* icon in green.

8.13.1.4 Interrupting regeneration

NOTICE
The engine is turned off during regeneration!
Diesel particle filter (DPF) will be destroyed.

▶ Do **not** turn off the engine during regeneration.

Make sure that the following prerequisites are met:
❑ The *auxiliary functions* menu is displayed on armrest operating unit 2.
(→ Changing the menu, p. 437)

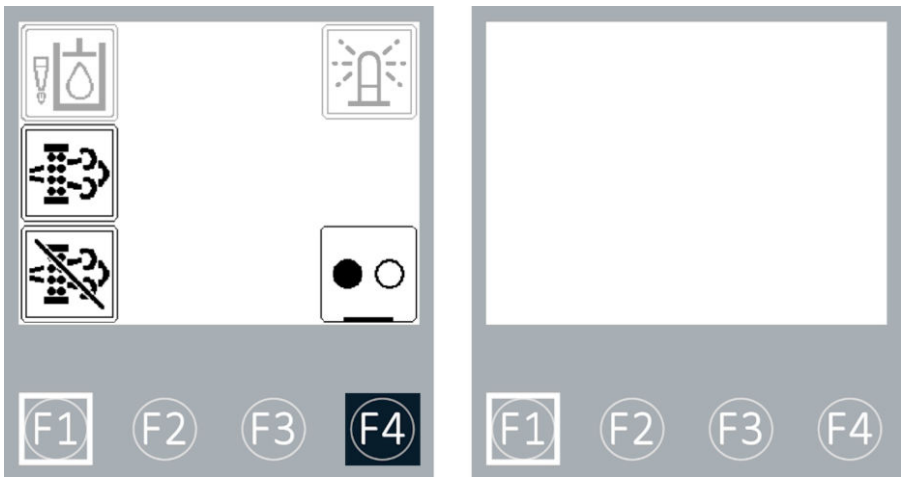
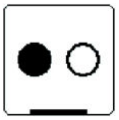


Fig. 1225: Auxiliary functions sub menu

Interrupting automatic regeneration

▶ Press the *disable diesel particle filter (DPF) regeneration* button.



▶ Press and hold the *turn function on / off* F-button.
▷ Regeneration is interrupted and the exhaust temperature is lowered in a controlled manner.

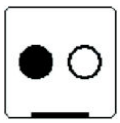
If the engine displays the on *warning and indicator light* page display the *exhaust temperature (HEST)* in green:
▶ The engine can be turned off.

Interrupting regeneration at a standstill

▶ Press the *Diesel particle filter (DPF) regeneration at a standstill* button.

or

Press the *disable diesel particle filter (DPF) regeneration* button.



▶ Press and hold the *turn function on / off* F-button.
▷ Regeneration is interrupted and the exhaust temperature is lowered in a controlled manner.

If the engine displays the on *warning and indicator light* page display the *exhaust temperature (HEST)* in green:
▶ The engine can be turned off.

8.14 Crawler travel gear track width adjustment

8.14.1 Safety

This section supplements the “Safety” chapter.

8.14.1.1 Danger zone when adjusting the track width

Observe the additional safety instructions (→ 5.7 Danger zone, p. 167).

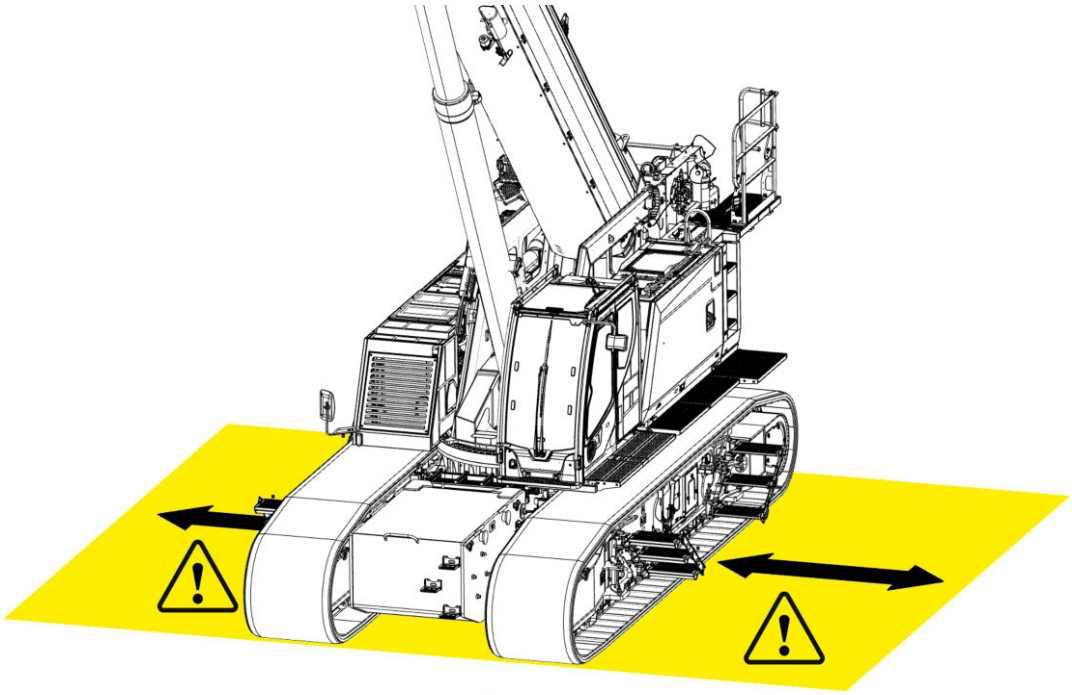


Fig. 1234: Danger zone when adjusting the track width

It is possible that the other crawler carrier is pushed away instead when extending a crawler carrier.

The space requirement can double on one side.

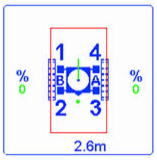
Both sides of the double sliding range of the crawler carrier are considered a danger zone.

8.14.1.2 Track width adjustment on the assembly support

Track width adjustment on the assembly support is only permissible with the crawler carriers disassembled for transport purposes.

8.14.1.3 Set up configuration with track width adjustment

If the track width is decreased, the crane load is reduced.



The crane must be retracted within a permissible range according to the load chart (2.6 m) **before** the track width adjustment.

Support base on the display: The center of gravity is located between the crawler carriers.

When reducing the track width: The settings in the *set up* menu must be changed before adjusting the track width to the **smaller** track width.

When increasing the track width: Adjust the settings in the *set up* menu only when the larger track width has been reached.

8.14.1.4 Eyehooks in the park position

If the eyehooks **1** are positioned incorrectly, this can lead to damage when reducing the track width.

Before adjusting the track width, make sure that the eyehooks **1** are secured in the park position.

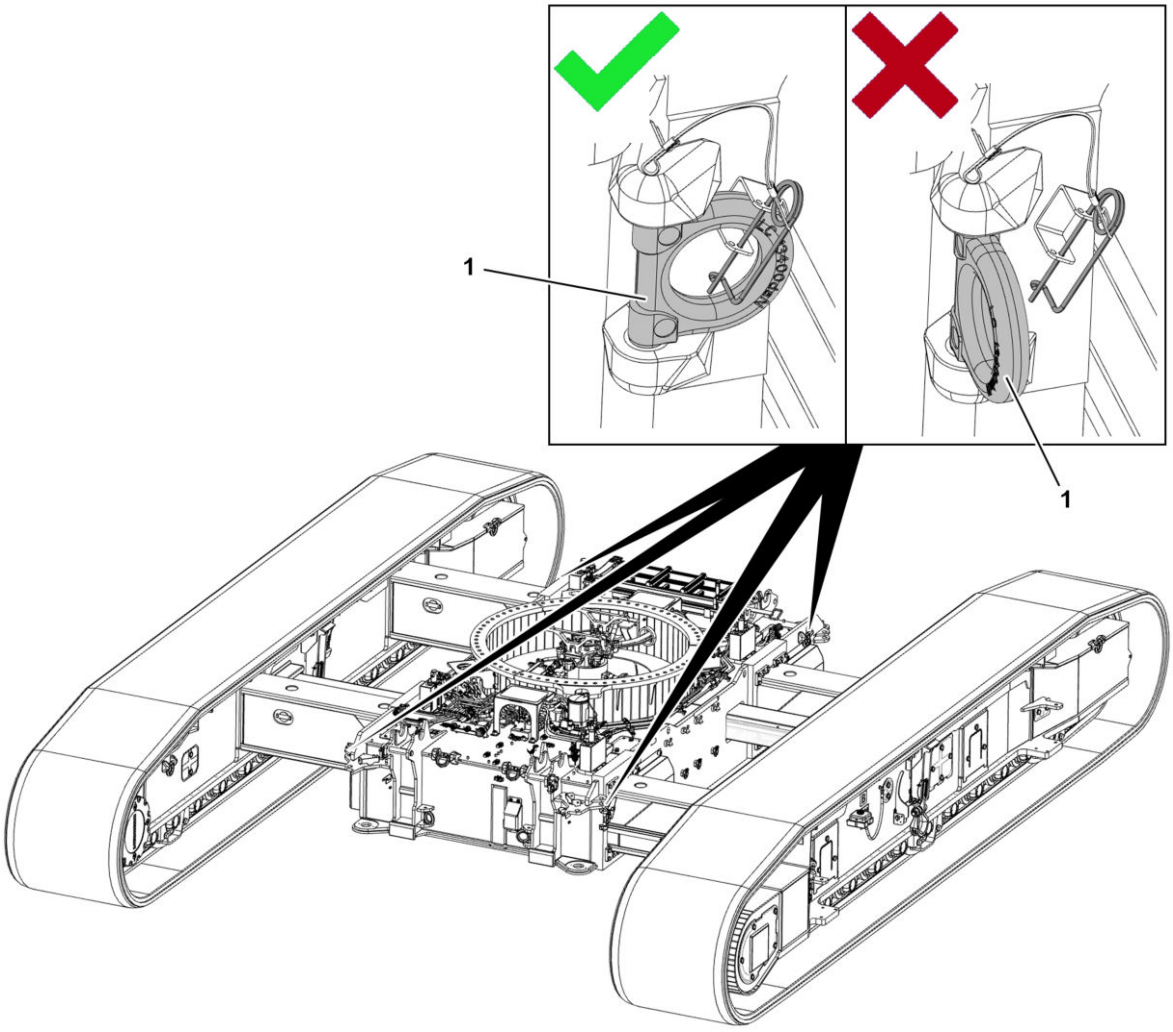


Fig. 1236: Eyehooks for track width adjustment - correct and incorrect

1 Eyehooks (4x)

8.14.1.5 Checking the crawler carrier towing brackets

If the towing brackets **1** are positioned incorrectly, this can lead to damage when reducing the track width.

Before adjusting the track width, make sure that the towing brackets **1** are hanging down completely.

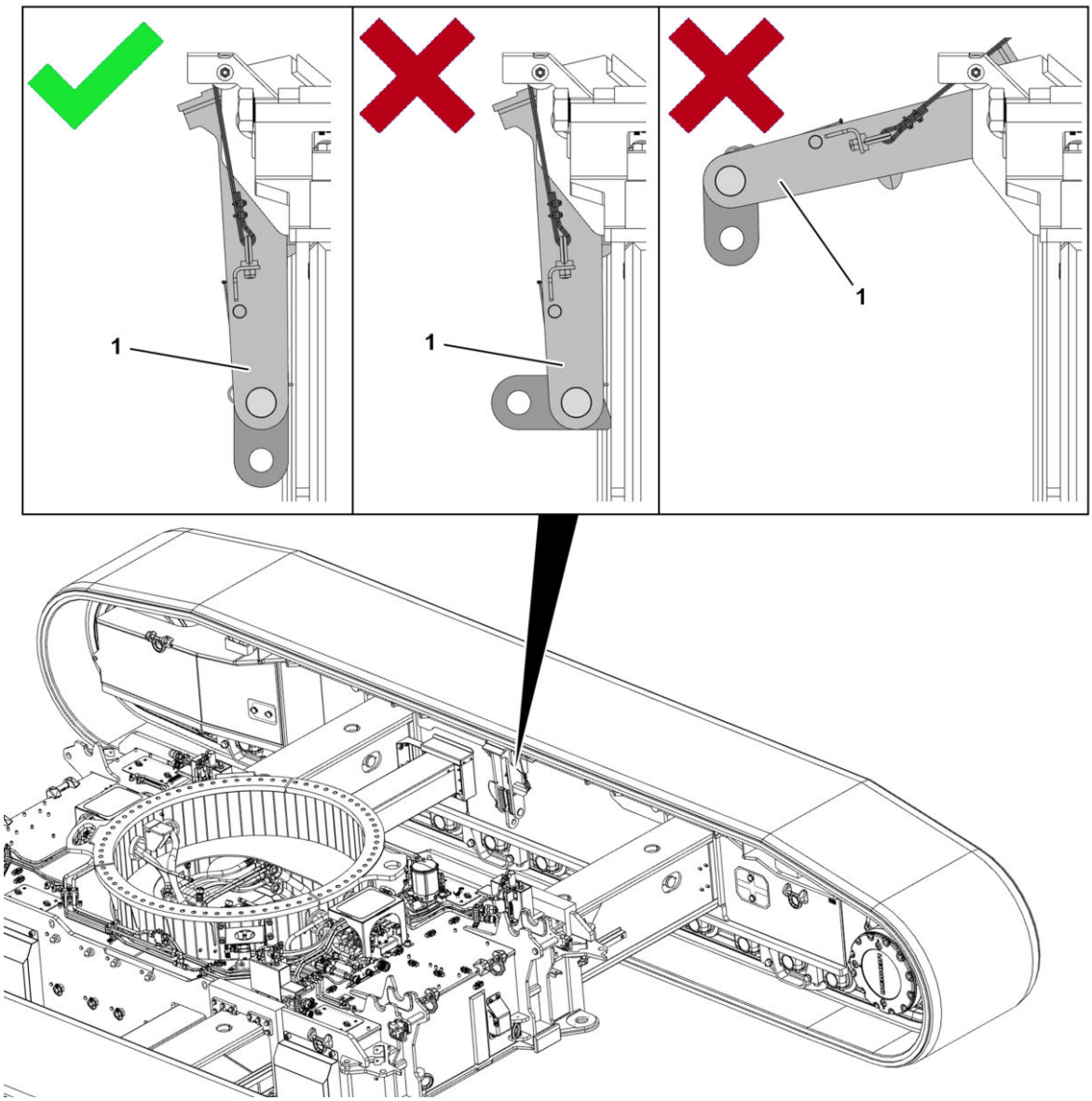


Fig. 1237: Towing brackets for track width adjustment - correct and incorrect

1 Towing brackets

8.14.2 Adjusting the track width at a standstill

Depending on the condition of the ground, a track width adjustment may be necessary in order to reduce the crawler pressure.

The following options are available for reducing the crawler pressure:
- Turn the superstructure to the side to move the center of gravity.
- Disassemble the turntable ballast.

Make sure that the following prerequisites are met:
- ❑ The crane is retracted within a permissible track width range according to the load chart (2.6 m).
- ❑ If the track width is increased: The crane set up configuration is set in the *set up* menu.
- ❑ If the track width is reduced: The settings in the *setup* menu are set to the **smaller** track width.
- ❑ The support cylinders are in the transport position.
  (→ 10.2.5 Swinging the support cylinder into the transport position, p. 706)

- ❑ The telescopic boom is telescoped in all the way.
- ❑ There is **no** load on the hook.

Track width adjustment by moving the center of gravity

Note

It is **not** possible when track width monitoring is configured to be a shut-off.

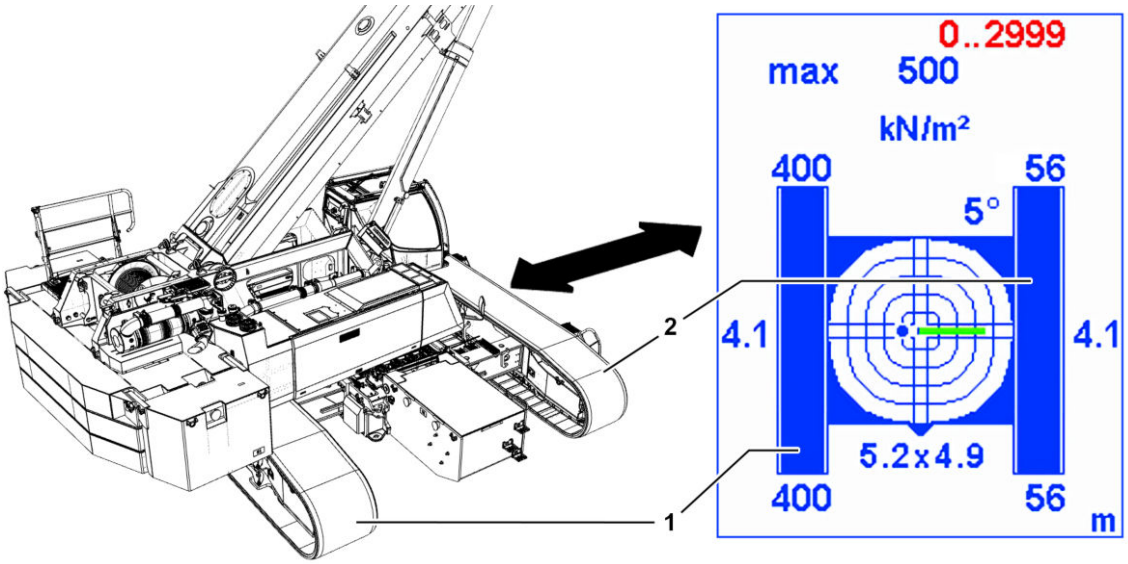


Fig. 1238: Exemplary illustration: Crawler carrier a relieved

1 Crawler carrier B (heavily loaded) **2** Crawler carrier A (less loaded)

A crawler carrier can be relieved by changing the center of gravity.

The crane center of gravity can be changed by the following crane movements:
- Luff the boom system.
- Turn the superstructure.

▶ Establish the condition in which the crawler carrier is relieved.

▶ Retract or extend the relieved crawler carrier from the crane cab (→ 8.14.4 Adjusting the track width from the crane cab, p. 506).

or

Retract or extend the relieved crawler carrier with the crane remote control (→ 8.14.5 Adjusting the track width with the crane remote control, p. 508).

or

Retract or extend the relieved crawler carrier with the expanded crane remote control (→ 8.14.6 Adjusting the track width with expanded crane remote control, p. 509).

▶ Repeat the procedure for the second crawler carrier.

If the cross carriers are pinned to the new track width:

▶ Adjust the settings to the crane set up configuration in the *set up* menu.

Track width adjustment by disassembling the turntable ballast

▶ Disassemble the turntable ballast and take it down on the ground.

▶ Pin the superstructure with the chassis at 0° or 180°.

▶ Retract or extend the crawler carrier from the crane cab (→ 8.14.4 Adjusting the track width from the crane cab, p. 506).

or

Retract or extend the crawler carrier with the crane remote control (→ 8.14.5 Adjusting the track width with the crane remote control, p. 508).

or

Retract or extend the crawler carrier with the expanded crane remote control (→ 8.14.6 Adjusting the track width with expanded crane remote control, p. 509).

If the cross carriers are pinned to the new track width:
▶ Adjust the settings to the crane set up configuration in the *set up* menu.

8.14.3 Adjusting the track width while driving

The track width adjustment can be operated when driving only from the crane cab.

Make sure that the following prerequisites are met:
❑ The crane is retracted within a permissible track width range according to the load chart (2.6 m).
❑ If the track width is increased: The crane set up configuration is set in the *set up* menu.
❑ If the track width is reduced: The settings in the *setup* menu are set to the **smaller** track width.
❑ The support cylinders are in the transport position. (→ 10.2.5 Swinging the support cylinder into the transport position, p. 706)
❑ The specifications for driving from the crane cab are observed. (→ 8.19 Driving from the crane cab, p. 562)
❑ The superstructure is pinned with the chassis at 0° or 180°. (→ 8.16 Pinning the superstructure, p. 530)
❑ The telescopic boom is telescoped in all the way.
❑ There is **no** load on the hook.
❑ Travel mode is turned on. (→ 8.19.5 Turning travel mode on and off, p. 568)
❑ The crawler travel gear rapid gear is turned off. (→ 8.19.6 Turning the crawler travel gear rapid gear on and off, p. 568)
❑ Crawler travel gear parallel travel is turned on. (→ 8.19.7 Turning the crawler travel gear parallel travel on and off, p. 569)

NOTICE
Load movements during track width adjustment!
The crawler travel gear can be damaged.

▶ Only drive straight when adjusting the track width.

▶ Drive the crane straight (→ 8.20.8 Driving, p. 581).

▶ While driving: Retract or extend the crawler carrier (→ 8.14.4 Adjusting the track width from the crane cab, p. 506).

If the cross carriers are pinned to the new track width:
▶ Adjust the settings to the crane set up configuration in the *set up* menu.

8.14.4 Adjusting the track width from the crane cab

Make sure that the following prerequisites are met:
❑ The *track width adjustment* menu is displayed on armrest operating unit 1. (→ Changing the menu, p. 437)
❑ The support plates are **not** in the transport position on the crawler center section.

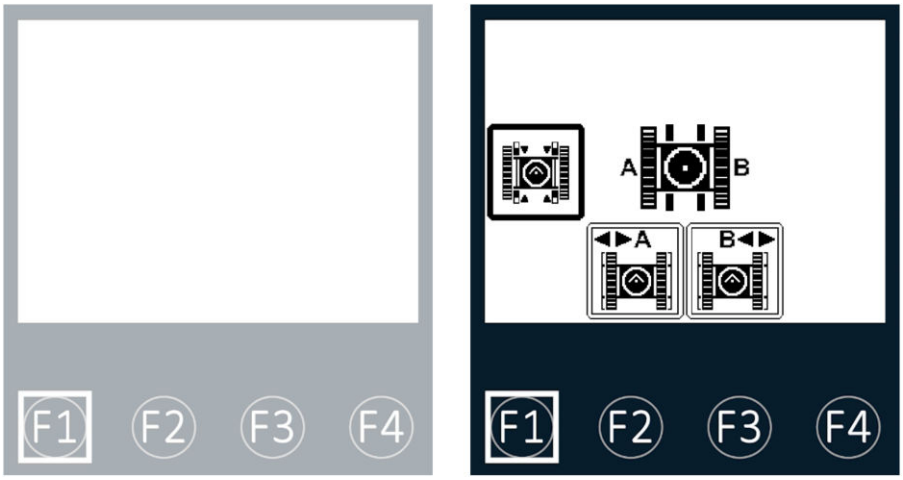


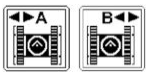
Fig. 1239: Track width adjustment menu

If the cross carriers are pinned:

▶ Press the *cross carrier pinning* button.

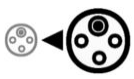
▷ The *cross carrier unpinned* button is displayed.
▷ The cross carriers are unpinned when selecting a cross carrier.

The cross carriers can be moved individually or together.



▶ Press the button for the desired cross carrier.
▷ The selected cross carriers are unpinned:

▶ Press and hold the *special function* button on control lever 1.



▶ **Retract** the selected cross carrier: Move control lever 1 to the left and hold.

or

Extend the selected cross carrier: Move control lever 1 to the right and hold.

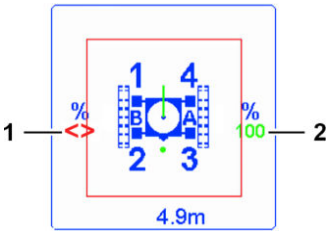


Fig. 1246: Exemplary illustration: Support base display

1 Cross carrier in the intermediate position **2** Cross carrier in the pin position

The cross carriers can be pinned at 0 %, 65 % and 100 % extensions lengths. The extension length of the cross carriers is displayed on the superstructure monitor in the crane operation menu.

If **both** cross carriers are at the desired track width:
▶ Press the *cross carrier pinning* button.

▷ The cross carriers are pinned.

Troubleshooting

Are the cross carriers not unpinned / pinned?
The pinning jams or the cross carrier is not in the pin position.

▶ Until the pins are unpinned or pinned: Retract or extend the corresponding cross carriers carefully.

8.14.5 Adjusting the track width with the crane remote control

Make sure that the following prerequisites are met:
❑ The *track width adjustment* menu is displayed.
(→ Opening the track width adjustment menu, p. 474)
❑ The support plates are **not** in the transport position on the crawler center section.

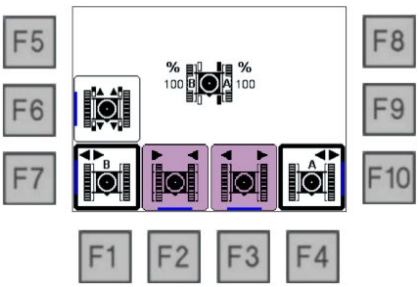
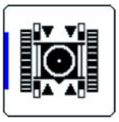


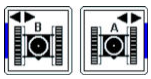
Fig. 1248: Track width adjustment menu



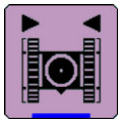
If the cross carriers are pinned:
▶ Press the *cross carrier pinning* F-button.

▷ The *cross carrier unpinned* F-button is displayed.
▷ The cross carriers are unpinned when selecting a cross carrier.

The cross carriers can be moved individually or together.

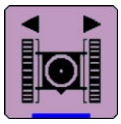


▶ Press the F-button for the desired cross carrier.
▷ Additional buttons are displayed.
▷ The selected cross carriers are unpinned.



▶ **Retract** the selected cross carrier: Press and hold the *retract cross carrier* F-button.

or



Extend the selected cross carrier: Press and hold the *extend cross carrier* F-button.

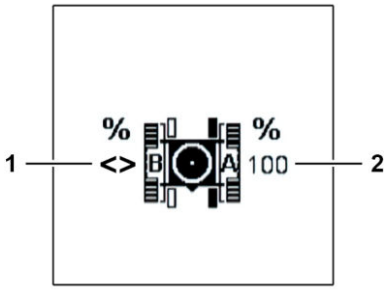


Fig. 1254: Exemplary illustration: Display in the track width adjustment menu

1 Cross carrier in the intermediate position **2** Cross carrier in the pin position

The cross carriers can be pinned at 0 %, 65 % and 100 % extensions length.

If **both** cross carriers are at the desired track width:

▶ Press the *cross carrier pinning* F-button.

▷ The cross carriers are pinned.

Troubleshooting

Are the cross carriers not unpinned / pinned?
The pinning jams or the cross carrier is not in the pin position.

▶ Until the pins are unpinned or pinned: Retract or extend the corresponding cross carriers carefully.

8.14.6 Adjusting the track width with expanded crane remote control

Make sure that the following prerequisites are met:

❑ The *travel operation* menu is displayed.
(→ Opening the travel operation menu, p. 486)

❑ The support plates are **not** in the transport position on the crawler center section.

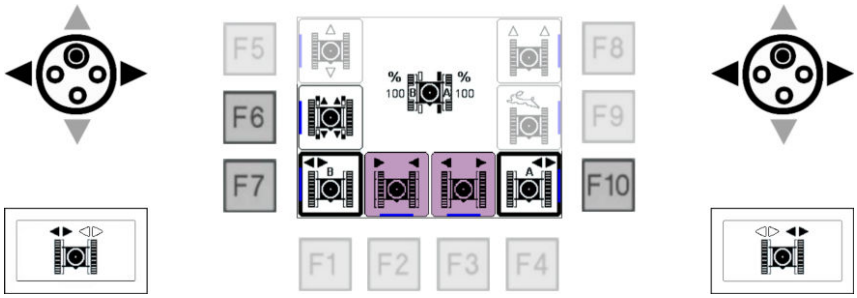


Fig. 1256: Travel operation menu

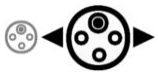
If the cross carriers are pinned:

▶ Press the *cross carrier pinning* F-button.

▷ The *cross carrier unpinned* F-button is displayed.
▷ The cross carriers are unpinned when selecting a cross carrier.

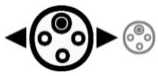
The cross carriers can be moved individually or together.

▶ Press the F-button for the desired cross carrier.
▷ Additional buttons are displayed.
▷ The selected cross carriers are unpinned.



If **cross carrier A** should be driven:
▶ Move control lever 1 in the desired direction and hold.

or



If **cross carrier B** should be driven:
Move control lever 2 in the desired direction and hold.

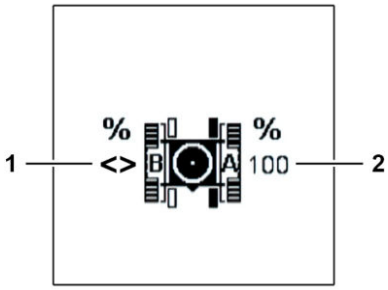


Fig. 1262: Exemplary illustration: Display in the travel operation menu

1 Cross carrier in the intermediate position **2** Cross carrier in the pin position

The cross carriers can be pinned at 0 %, 65 % and 100 % extension lengths.

If **both** cross carriers are at the desired track width:
▶ Press the *cross carrier pinning* F-button.

▷ The cross carriers are pinned.

Troubleshooting

Are the cross carriers not unpinned / pinned?
The pinning jams or the cross carrier is not in the pin position.

▶ Until the pins are unpinned or pinned: Retract or extend the corresponding cross carriers carefully.

8.15 Crane operation settings

8.15.1 Setting the overload protection limit values

For the warning and shut-off of the overload protection, the factory set limit values can be reduced.

Factory settings:
- Warning limit value: 90 %
- Shut-off limit value: 100 %

The difference between the limit values must be at least 1/10 of the shut-off limit value.

With a reduced shut-off limit value, the maximum load can not be reached and crane movements can shut off prematurely.

When transferring the crane to another crane operator, inform the crane operator of the changed limit value of the overload protection.

Make sure that the following prerequisites are met:
❑ The *crane operation* menu is displayed.
(→ Opening menus, p. 439)

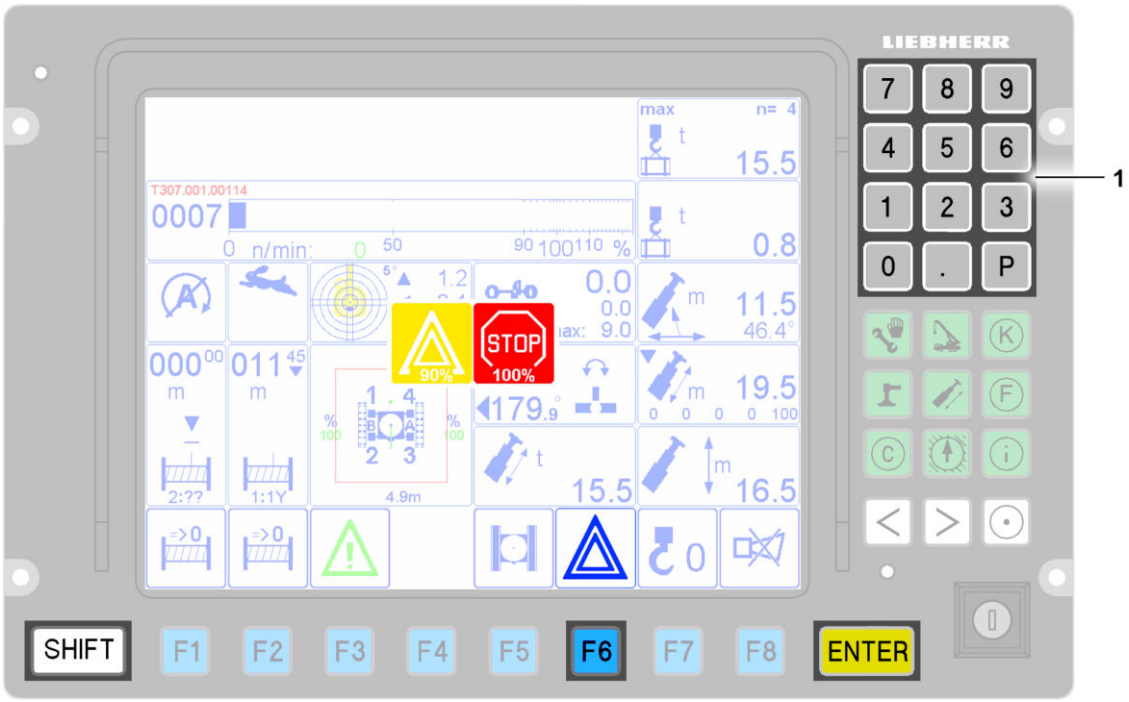
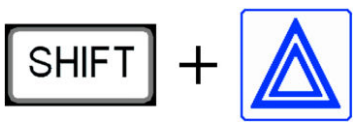


Fig. 1264: Exemplary illustration: Crane operation menu

1 Number block

8.15.1.1 Opening and closing the overload protection limit value window



▶ Press the *SHIFT* button and press the *crane operation auxiliary displays* F-button at the same time.
▷ The *overload protection limit value window* is opened and closed.

Note

After a short period of time, the *overload protection limit value* window closes.

8.15.1.2 Setting the overload protection warning

Make sure that the following prerequisites are met:
❑ The cursor is on the *set overload protection warning* display.

▶ Enter the desired limit value with the number block **1** and confirm with *ENTER*.

8.15.1.3 Setting overload protection shut-off

Make sure that the following prerequisites are met:
❑ The cursor is on the *set overload protection shut-off* display.

▶ Enter the desired limit value with the number block **1** and confirm with *ENTER*.

8.15.2 Turning the vibration sensor on and off

By turning on the vibration sensor, a crane movement can be detected due to the vibration of the control lever. The vibration sensor is only actuated when the movement is carried out. The further the control lever is deflected, the faster the vibration sensor cycles.

The vibration sensor can only be activated for winch1, winch2* and the slewing gear. The vibration sensor can only be assigned to one crane function per control lever.

Make sure that the following prerequisites are met:
❑ The seat contact button is actuated.
(→ 8.7.1 Actuating the seat contact button, p. 419)
❑ The *control lever assignment* menu is displayed on armrest operating unit 1 and armrest operating unit 2.
(→ Changing the menu, p. 437)

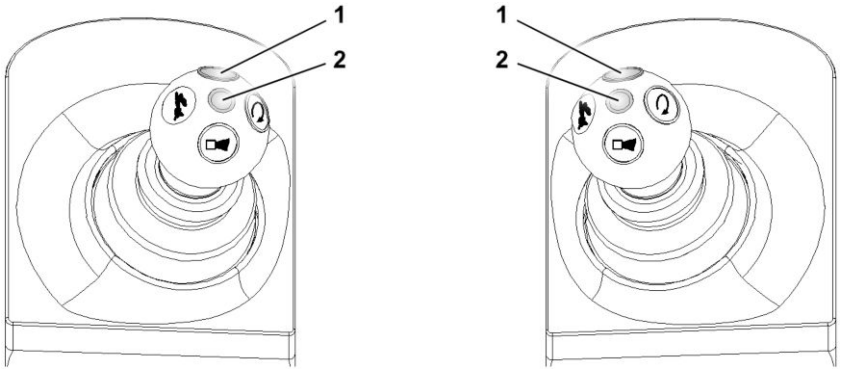


Fig. 1270: Control lever

1 Special function button

2 Vibration sensor

8.15.2.1 Turning the vibration sensor on

Make sure that the following prerequisites are met:
❑ The desired crane function is displayed on the armrest 1 operating unit or the left armrest 2 operating unit in the *control lever assignment* menu.

Note

If the vibration sensor **2** on the corresponding control lever is ready for another crane function, the vibration sensor **2** must first be turned off.

▶ Press the *special function* button **1** on the corresponding control lever.

▶ Move the corresponding control lever for the desired crane function.
▷ The vibration sensor **2** is turned on for this crane function.

8.15.2.2 Turning the vibration sensor off

Make sure that the following prerequisites are met:
❑ The vibration sensor **2** is turned on on the corresponding control lever.

▶ Press the *special function* button **1** on the corresponding control lever.
▷ The vibration sensor **2** is turned off on this control lever.

8.15.3 Turning the rapid gear on and off

8.15.3.1 Description of the rapid gear

The following crane movements increase the speed with the rapid gear switched on:
- Luff the telescopic boom.
- Luff the auxiliary boom.
- Spool the winch.

Note

A dedicated rapid gear is available for telescoping the telescopic boom.

The telescoping rapid gear is turned on in the factory and is active only in telescoping automatic operation.

Telescoping rapid gear be turned off in the remote diagnostics system.

(→ 8.8.11 Adjusting the driving settings, p. 452)

8.15.3.2 Safety

If the rapid gear is used with high utilization, the crane can be overloaded.

If utilization is greater than 50 % and less than 4x is reeved in: Do **not** use the rapid gear.

8.15.3.3 Turning the rapid gear on and off from the crane cab

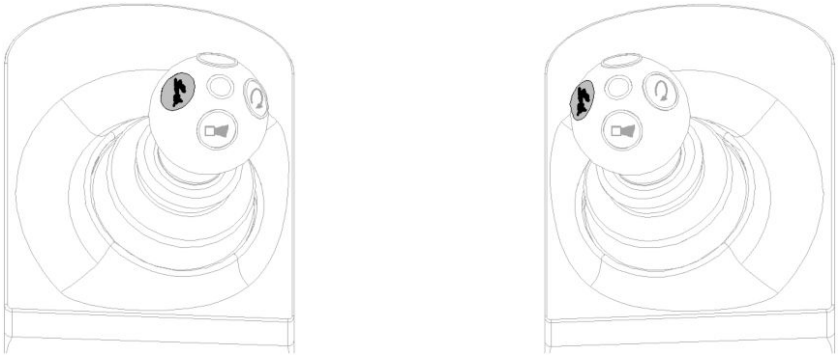


Fig. 1272: Control lever

▶ Press the *rapid gear* button on control lever 1 or control lever 2.

8.15.3.4 Turning the rapid gear on and off with the expanded crane remote control*

Make sure that the following prerequisites are met:
❑ The *crane operation* menu is displayed.
(→ Opening the crane operation menu, p. 486)
❑ Crane operation is released.
(→ 8.7 Releasing crane operation, p. 419)

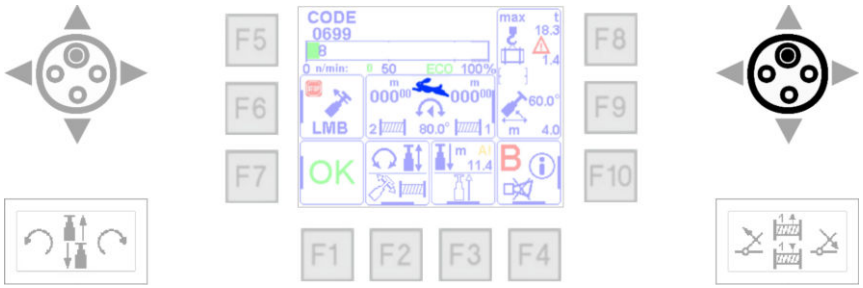
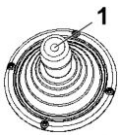


Fig. 1274: Crane operation menu



▶ Press the *rapid gear* **1** button on control lever 1.

8.15.4 Adjusting the speed reductions

The maximum speed of the individual crane functions can be set with the speed reduction.

Make sure that the following prerequisites are met:
❑ The *control lever assignment* menu is displayed on armrest operating unit 1 and armrest operating unit 2.
(→ Changing the menu, p. 437)
❑ The required crane functions are displayed in the *control lever assignment* menu.
❑ The *crane function settings* window is displayed on the superstructure monitor.

(→ Hiding and displaying the crane function settings window, p. 445)

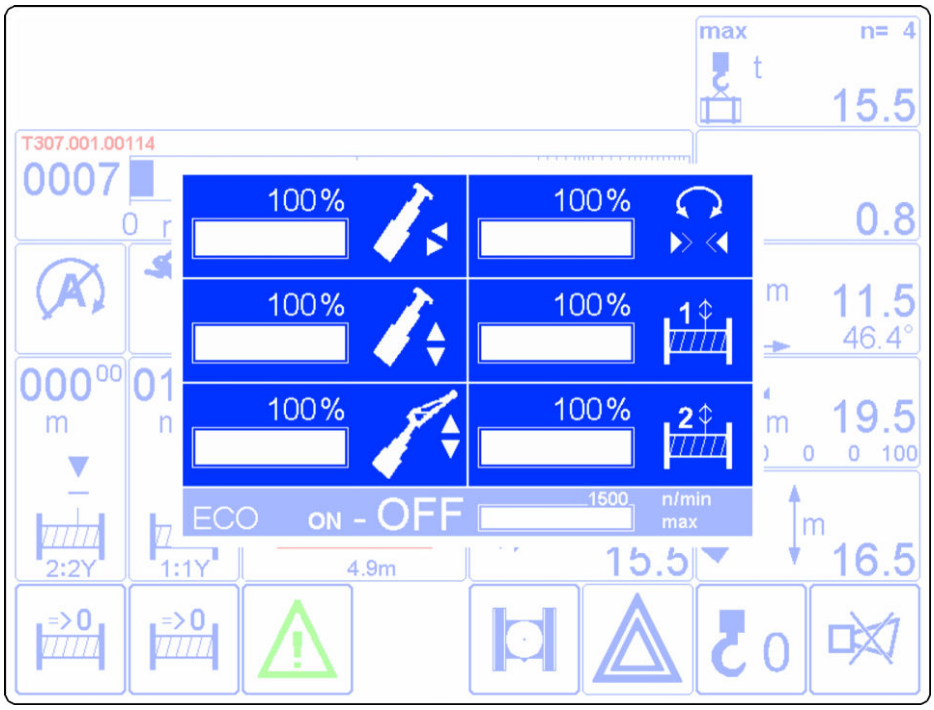


Fig. 1276: Crane function settings window

If the crane function is located on the X-axis of the control lever:

▶ Until the desired speed reduction is set: Move the corresponding control lever to the left or right and hold.

If the crane function is located on the Y-axis of the control lever:

▶ Until the desired speed reduction is set: Move the corresponding control lever to the front or rear and hold.

8.15.5 Adjusting the control lever assignment

8.15.5.1 Adjusting the control lever assignment with the armrest operating units

Make sure that the following prerequisites are met:

❑ The *control lever assignment* menu is displayed on armrest operating unit 1 and armrest operating unit 2.
(→ Changing the menu, p. 437)

❑ All control levers are in the zero position.

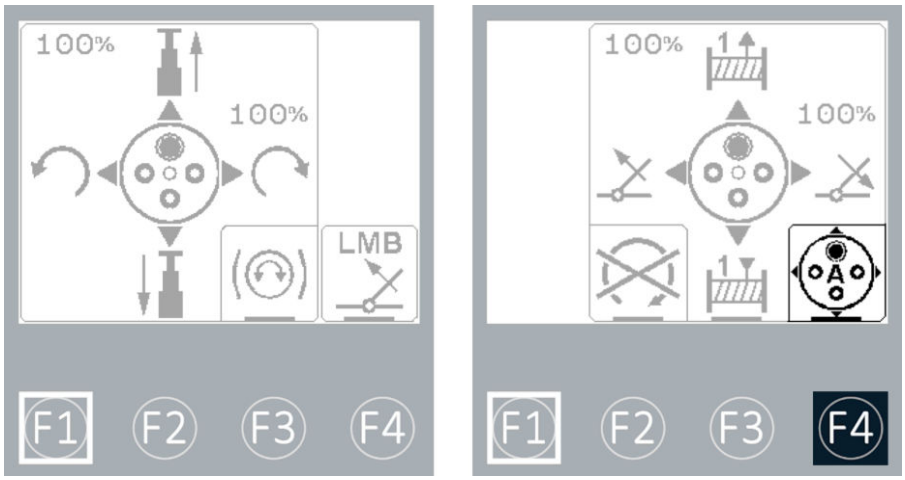


Fig. 1279: Control lever assignment menu

▶ Until the desired control lever assignment is displayed: Press the *control lever assignment* F-button repeatedly.

8.15.5.2 Adjusting the control lever assignment with expanded crane remote control*

Make sure that the following prerequisites are met:
❑ The *crane operation* menu is displayed.
(→ Opening the crane operation menu, p. 486)

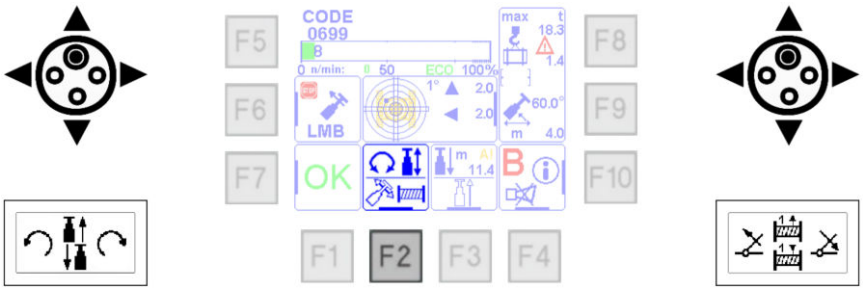


Fig. 1281: Crane operation menu

Note

Various control lever assignments are available depending on the crane condition or if the travel mode is turned on / off.

Different icons are displayed on the *control lever assignment* button.

▶ Until the desired control lever assignment is displayed: Press the *control lever assignment* F-button repeatedly.

8.15.6 Adjusting the wind warning manually

If the load to be lifted has a larger wind-exposed surface than taken into account according to the load chart, the maximum permissible wind speed must be determined. (→ separate document “Use of the load charts” > “Wind influences for crane operation”)

Make sure that the following prerequisites are met:

- ❑ The *crane operation* menu is displayed.
  (→ Opening menus, p. 439)
- ❑ The wind speed sensor is assembled and electrically connected.
  (→ 10.13 Wind speed sensor and airplane warning light*, p. 870)

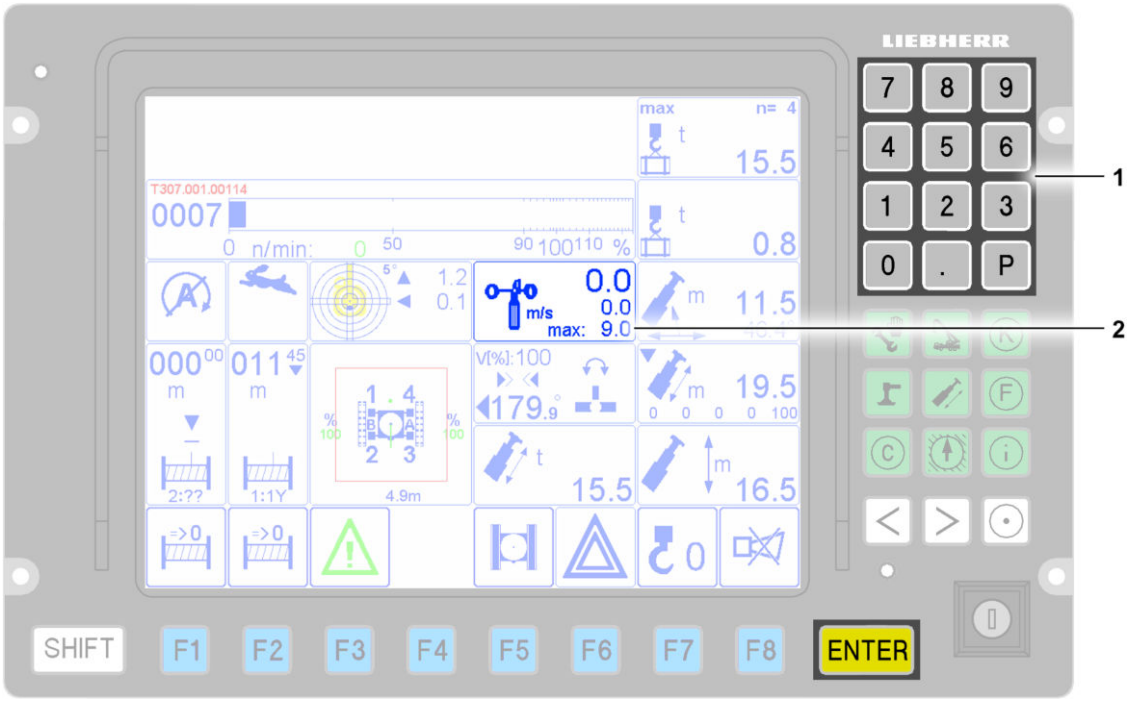


Fig. 1283: Exemplary illustration: Crane operation menu

1 Number block **2** Set maximum wind speed display

ENTER

▶ Press the *ENTER button*.

▶ Enter the desired value for the maximum permissible wind speed with the number block **1**.

ENTER

▶ Confirm the entered value with the *ENTER* button.

Fig. 1286: Wind speed display

1 Set maximum wind speed

▷ The *set maximum wind speed* **1** is displayed in red.

Note

If the manual wind warning setting should be cancelled:
▶ Enter the zero value during the setting procedure.

8.15.7 Setting crawler pressure monitoring

Crawler pressure monitoring provides a warning if the crawler pressure is too high. A shut-off does **not** occur when exceeding the maximum set crawler pressure.

The set maximum crawler pressure must match the conditions of the ground.

Note

A warning that the crawler pressure is too high can be detected only in the *crane operation* menu.

Note

The crawler pressure is calculated and displayed under ideal conditions.

(→ 5.14.2 Calculation of the crawler pressure, p. 195)

Make sure that the following prerequisites are met:
❑ The *crawler pressure and center of gravity* display is shown.
(→ Displaying and hiding the crawler pressure and center of gravity display, p. 444)

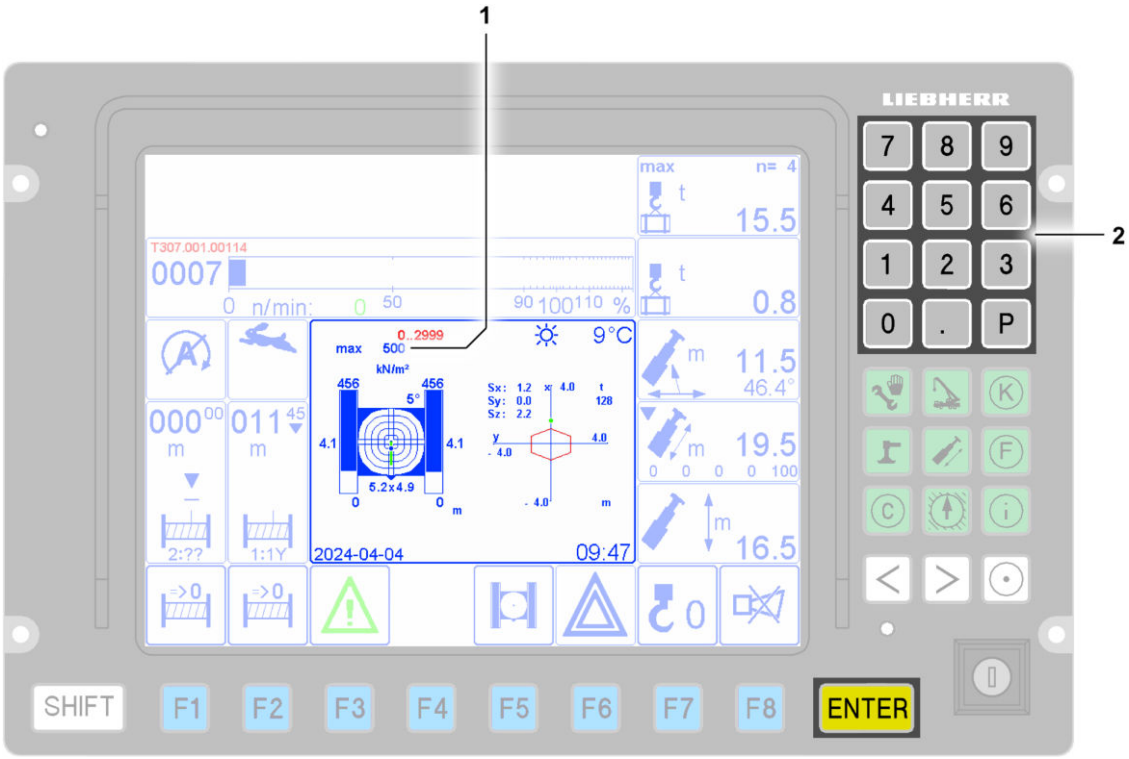


Fig. 1287: Crawler pressure and center of gravity display

1 Set maximum crawler pressure **2** Number block

ENTER

▶ Enter the desired maximum crawler pressure with the number block **2** and confirm with the *ENTER* button.

8.15.8 ECO mode

With ECO mode, fuel can be saved and noise emissions can be reduced.

When ECO-mode is activated, the optimal engine rpm is calculated and adjusted for the actuated crane movement.

The engine rpm can be increased by pressing the gas pedal also with ECO mode turned on. As long the engine rpm is increased or locked manually, ECO mode is inactive and the engine rpm is not adjusted by ECO mode.

8.15.8.1 Adjusting ECO mode

Make sure that the following prerequisites are met:
- ❑ The engine is idling.
  (→ 8.12.5 Adjusting the engine rpm, p. 494)
- ❑ The *crane function settings* window is displayed.
  (→ Hiding and displaying the crane function settings window, p. 445)

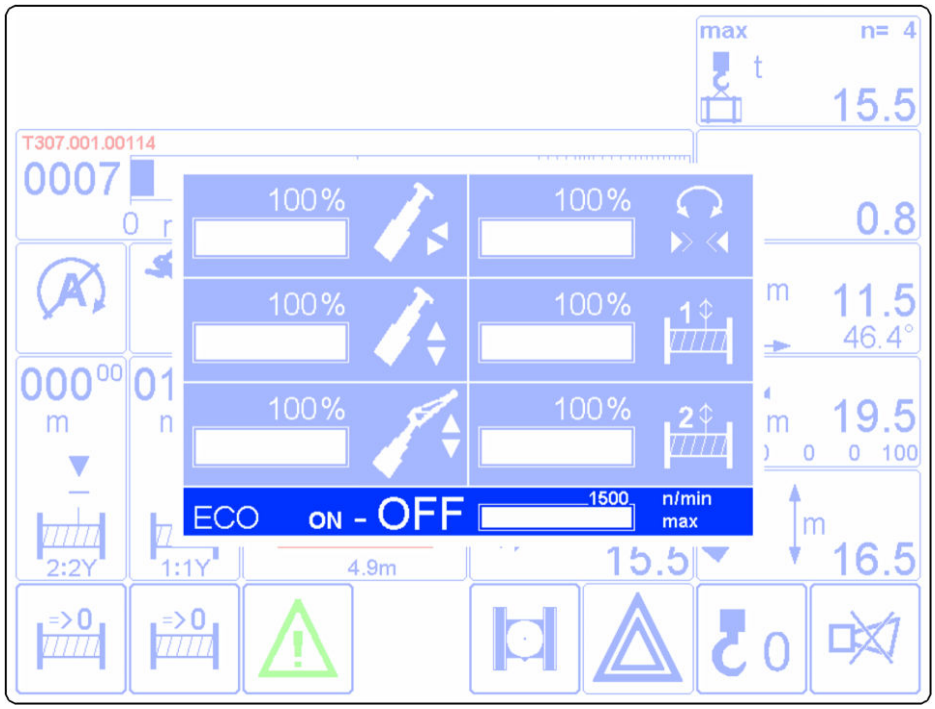


Fig. 1289: Crane function settings window

Turning ECO mode on and off

▶ Press the *lock engine rpm* button on control lever 1 or control lever 2.

Setting the maximum engine rpm

▶ Press the gas pedal.

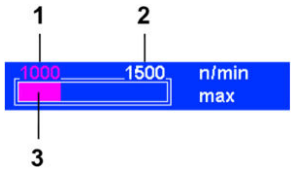


Fig. 1291: Exemplary illustration: ECO mode maximum rpm display

1 Current rpm (numeric)
2 Set maximum rpm (numeric)
3 Current rpm (graphic)

▷ The current rpm is displayed in purple.

▶ Select the desired maximum rpm with the gas pedal.

▶ Press the *lock engine rpm* button on control lever 1 or control lever 2.

▷ The current rpm is set as the maximum rpm.

n/min: 1000 !

▷ The *engine rpm limited* additional icon is displayed next to the engine rpm.

Note

If the maximum engine rpm should be restored:
▶ Select the highest possible rpm with the gas pedal during the setting procedure.

8.15.9 Setting the working area limitation

8.15.9.1 Description of the working range limitation

With the working area limitation, the crane operator can flexibly limit the working area of the crane. For example, when working near houses or other obstacles.

The following shut-off limits can be freely set:
- Maximum upper pulley block height
- Maximum boom radius
- Maximum rotation angle, left and right
- Edges

The working area limitation does **not** detect if the crane location has changed. If the crane is moved, the working area limitation must be readjusted.

The working area limitation does **not** detect if the boom system has changed. If the boom system is changed, the working area limitation must be readjusted.

8.15.9.2 Safety

This section supplements the “Safety” chapter.

Danger of collision due to telescopic boom deformation

The telescopic boom is distorted when picking up or setting down the load. The crane boom radius increases when picking up a load. The height of the upper pulley block increases when setting down the load.

If the load is picked up or set down in the immediate vicinity of obstacles, a danger of collision results if increasing the boom radius or increasing the height of the upper pulley block.

The working range limitation can **not** detect the deformation of the telescopic boom and the crane movements are **not** automatically turned off.

Observe the following rules:
- Never pick up or set down loads during or in the close proximity of a shut-off due to the working area limitation.
- When picking up a load: Take the increased crane boom radius into consideration.
- When setting down a load: Take the reduction of the crane boom radius and the increase in height of the upper pulley block into account.

Minimum distance from obstacles

If the minimum distances are **not** observed, the crane can collide with obstacles in spite of the working area limitation.

Observe the following rules:
- Maintain a minimum distance of 3 % of the length of the utilized boom system, with a minimum distance of 50 cm from obstacles.

For special obstacles such as high-voltage lines, entry lanes near airports, transmitters and similar obstacles, additional guidelines may apply (→ 5.16 Nearby hazards, p. 198).

Examples for the calculation of minimum distances:
- Telescopic boom 60 m with folding jib 29 m: **(60 m + 29 m) * 0.03 = 2.67 m**
  Minimum distance = **2.7 m**
- Telescopic boom 13.2 m: **13.2 m * 0.03 = 0.39 m**
  Minimum distance = **0.5 m**

8.15.9.3 Setting the working area limit

Make sure that the following prerequisites are met:
❑ The *working area limitation* main menu is displayed.

(→ Opening menus, p. 439)

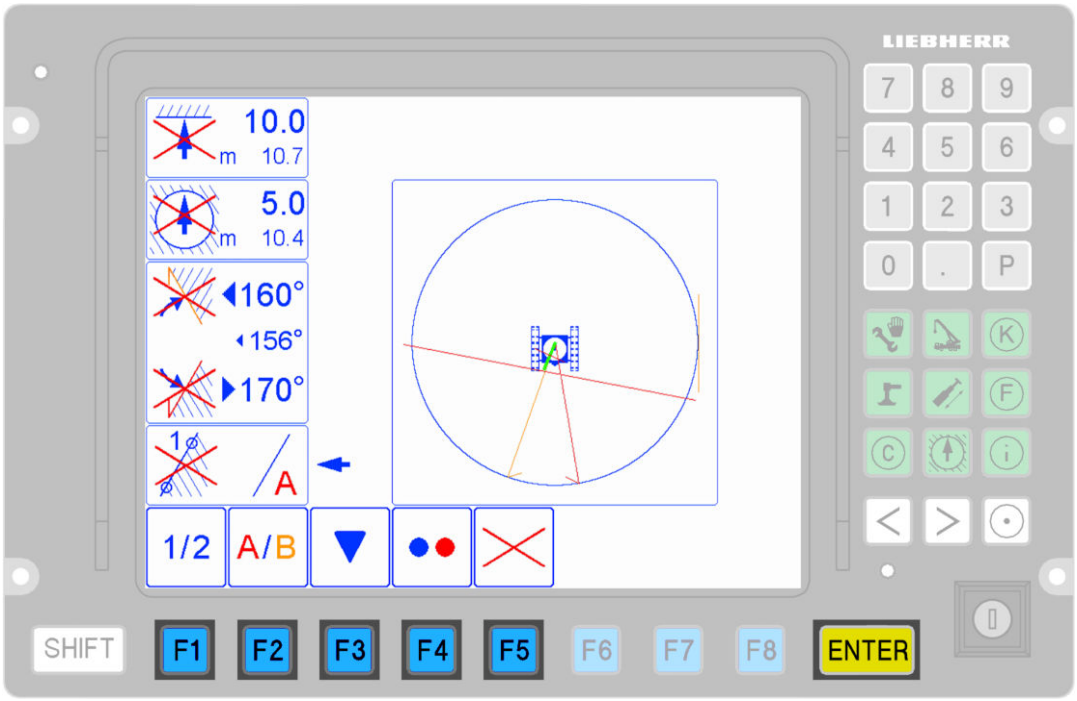


Fig. 1296: Working area limitation menu

Select the limit

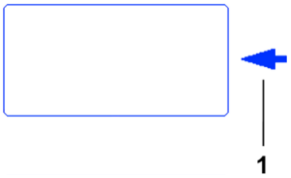


Fig. 1297: Exemplary illustration: Selected limit

1 Selected limit icon

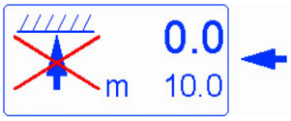
▶ Until the desired limit is selected: Press the *down* F-button repeatedly.

Set the maximum upper pulley block height

Note
The displayed height refers to the height of the upper pulley block above ground.
The actual height of the boom system is higher.

▶ Observe the actual height of the boom system for setting the limit value.

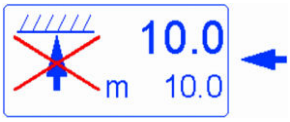
▶ Move the crane to the desired limit value for the upper pulley block height.



▶ Select the upper pulley block height limit.

ENTER

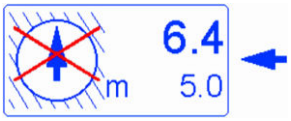
▶ Press the *ENTER* button.



▷ The current upper pulley block height is set as the new limit value.

Set the maximum boom radius

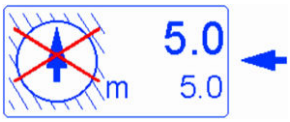
▶ Move the crane to the desired limit value for the maximum boom radius.



▶ Select the maximum boom radius limit.

ENTER

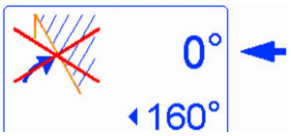
▶ Press the *ENTER* button.



▷ The current boom radius is set as the new limit value.

Set the maximum slewing angle on the right and left

▶ Move the crane to the desired limit value for the right slewing angle.



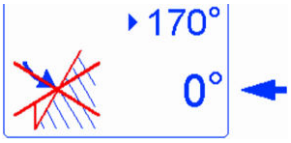
▶ Select the right slewing angle limit.

ENTER

▶ Press the *ENTER* button.

▷ The current slewing angle is set as the new limit value.

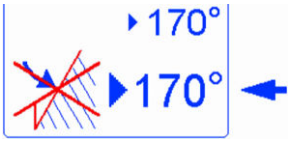
▶ Move the crane to the desired limit value for the left slewing angle.



▶ Select the left slewing angle limit.

ENTER

▶ Press the *ENTER* button.



▷ The current slewing angle is set as the new limit value.

Setting the edges

Two edges (edge A and edge B) can be set independently of each other.

Two points must be set on each edge.

1/2

▶ Until the desired point is selected: Press the *Point 1/2* F-button.

A/B

▶ Until the desired edge is selected: Press the *edge A/B* F-button.

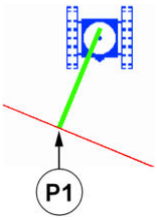
The adjustment of the edges is described based on the example of Edge A.

▶ Move the crane in any point of the desired edge.

▶ Select edge A limit.

ENTER

▶ Press the *ENTER* button.



▷ The current point **P1** is set for the edge.

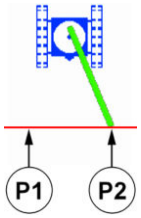
▷ The second point is preselected.

Note

The further the set points are located from each other, the edge is set more precisely.

▶ Move the crane in the second point of the desired edge.

▶ Press the *ENTER* button.



▷ The current point **P2** is set for the edge.
▷ The edge is set along both points.

Turning the limit on and off

▶ Select the desired limit:

Note

The left and right slewing angle limits are always turned on and off together.

▶ Press the *turn limit on / off* F-button.
▷ The selected limit is turned on or off.

Turning off all limits

▶ Press the *turn all limits off* F-button.
▷ The working area is completely released.

8.15.10 Showing and hiding the crane operation auxiliary displays

In the *crane operation* menu, the *crane operation* auxiliary displays can be hidden and shown.

In the case of an error or impermissible condition, the corresponding display is shown automatically.

Make sure that the following prerequisites are met:
❑ The *crane operation* menu is displayed.

(→ Opening menus, p. 439)

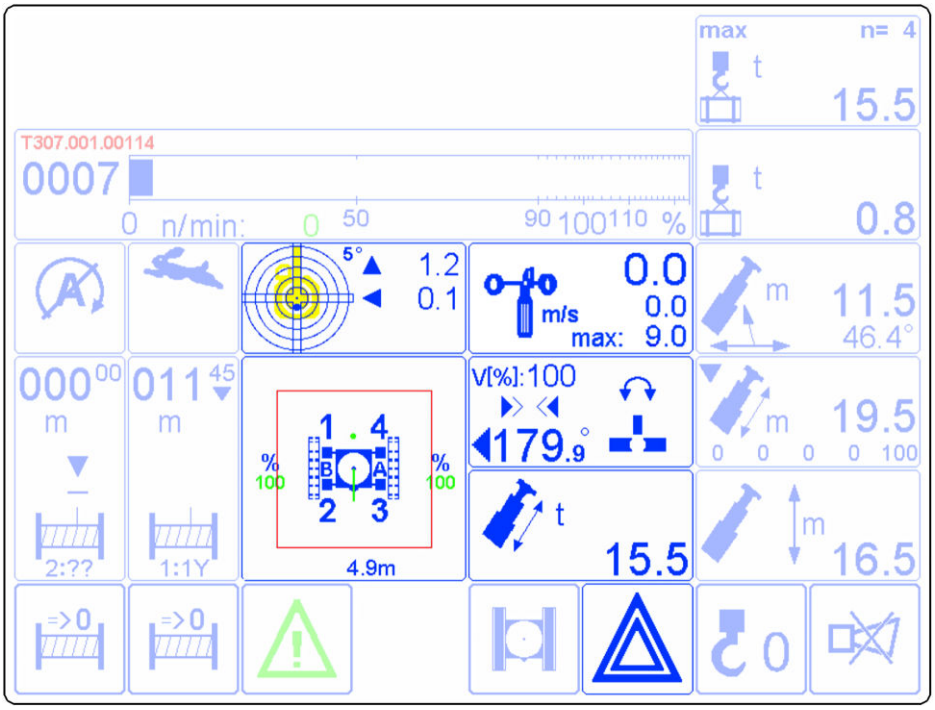


Fig. 1321: Exemplary illustration: Crane operation menu

▶ Press the *crane operation auxiliary displays* F-button.
▷ The *crane operation* auxiliary displays are hidden or shown.

8.15.11 Resetting the rope path

Rope path measurement: Completed vertical path of the hook block / load hook from a selectable zero point. Only winch spooling is taken into consideration.

Note

To ensure that the displayed values can be calculated correctly, the reeving must match the settings in the *set up* menu.

8.15.11.1 Resetting the rope path from the crane cab

Make sure that the following prerequisites are met:
❑ The *crane operation* menu is displayed.

(→ Opening menus, p. 439)

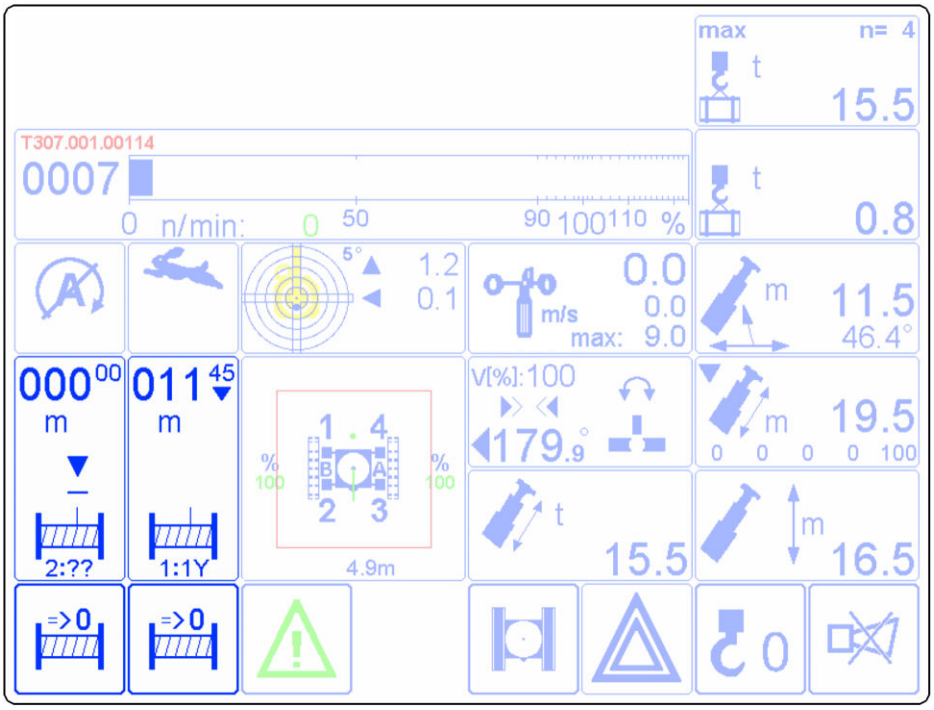
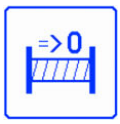


Fig. 1323: Crane operation menu



▶ Press the *reset rope path* F-button.

▷ The rope path is reset.

8.15.11.2 Resetting the rope path with expanded crane remote control*

Make sure that the following prerequisites are met:
❑ The *crane operation* menu is displayed.
(→ Opening the crane operation menu, p. 486)

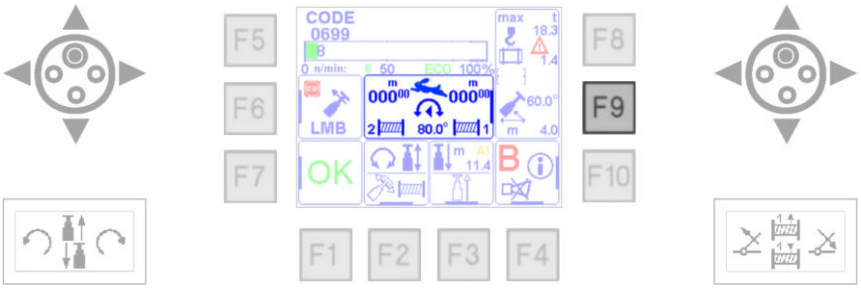


Fig. 1326: Crane operation menu

▶ Press the *F9* button for more than 2 seconds.

▷ The rope path is reset.

8.15.12 Taring the load display (reset)

By taring the actual load, it is possible, for example, to eliminate the load and load handling equipment from the display value. The maximum load is **not** increased or adjusted.

Make sure that the following prerequisites are met:
❑ The *crane operation* menu is displayed.
(→ Opening menus, p. 439)

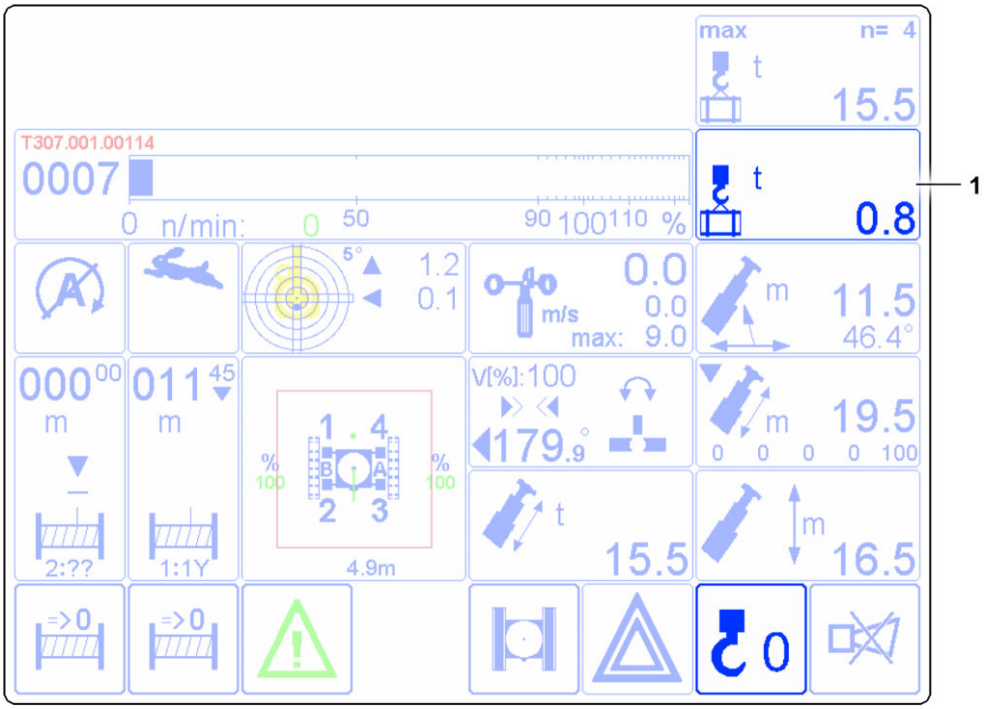


Fig. 1329: Exemplary illustration: Crane operation menu

1 Actual load / net load display

8.15.12.1 Switching to net load

Make sure that the following prerequisites are met:
❑ The *actual load* icon is displayed.

Note
Actual weight of the load can deviate from the displayed value!

▶ Do **not** use the *actual load / net load* display **1** as a calibrated weighing device.

▶ Press the *actual load taring* button.

▷ The *net load* icon is displayed.
▷ The *actual load / net load* display **1** is tared (reset).

▷ The *actual load taring* button is displayed in red.

If the *Actual load / net load* display **1** is calibrated, only winch spooling can be carried out. If other crane movements are performed, actual load is switched to automatically.

8.15.12.2 Switching to actual load

Make sure that the following prerequisites are met:
❑ The *net load* icon is displayed.

▶ Press the *actual load taring* button.

▷ The *actual load* icon is displayed.
▷ The *actual load / net load* display **1** shows the actual load.

▷ The *actual load taring* button is displayed in blue.

8.16 Pinning the superstructure

The superstructure can be pinned at the following angles of rotation:
- 0°
- 174.5° to right
- 180°

Make sure that the following prerequisites are met:
❑ The superstructure is rotated to a pin position.
(→ Turning the superstructure from the crane cab, p. 543)

Fig. 1338: Side window operating unit

The superstructure must be pinned with the chassis in the following situations:
- Picking up and taking down the ballast
- Certain load charts
- Transport

▶ Press and hold the *pin superstructure* button.
▷ If the superstructure is pinned: The indicator light on the *pin superstructure* button lights up and an acoustic signal sounds.

Troubleshooting

Is the superstructure **not** pinned?
Pinning is **not** in the pin position.

▶ Until the superstructure is pinned: Turn the superstructure carefully to the left or right.

8.17 Unpinning the superstructure

Fig. 1340: Side window operating unit

- ▶ Press and hold the unpin superstructure button.
  - ▷ If the superstructure is unpinned: The indicator light on the *unpin superstructure* button lights up and an acoustic signal sounds.

Troubleshooting

Is the superstructure **not** unpinned?
Pinning is stuck.

- ▶ Until the superstructure is unpinned: Turn the superstructure carefully to the left or right.

8.18 Crane movements

8.18.1 Possible crane movements

Various crane movements can be carried out with the crane. Through these crane movements, the load can be taken up, positioned and placed down exactly.

The following crane movements are possible:
- Luff the boom system up and down.
- Spool the winch up and out.
- Turn the superstructure to the left and right.
- Telescope the telescopic boom in and out.

Make sure that the following prerequisites are met:
- The specifications in the load chart are observed.

Observe the following during all crane movements:
- An acoustic warning signal is given before crane movements.
- Always initiate and brake crane movements carefully.
- **No** obstacles in the movement area.

8.18.2 Luffing the boom

8.18.2.1 Speed when luffing

Parameter for the luffing speed:
- Deflection of the control lever
- Engine rpm (Valid only for luffing up)
- Rapid gear turned on or off
- Set speed reduction

8.18.2.2 Safety

This section supplements the “Safety” chapter.

Danger zone

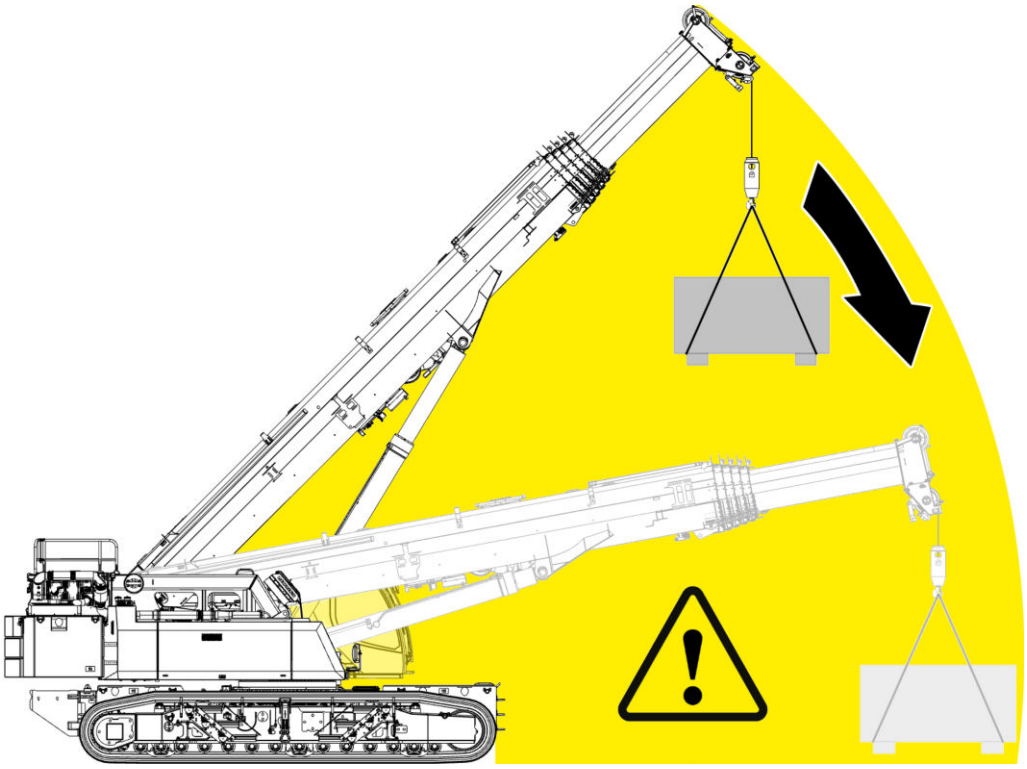


Fig. 1343: Luffing danger zone

8.18.2.3 Luffing the telescopic boom from the crane cab

Make sure that the following prerequisites are met:

- ❑ The *luff the telescopic boom* icons are displayed on armrest operating unit 1.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ Crane operation is released.
  (→ 8.7 Releasing crane operation, p. 419)

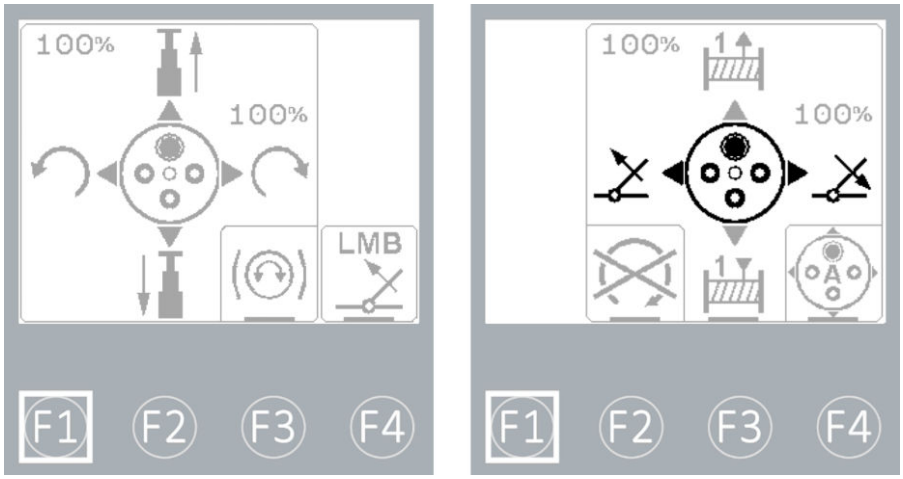
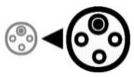


Fig. 1344: Armrest operating units - control lever assignment

Luff the telescopic boom up



▶ Move control lever 1 to the left and hold.

Luff the telescopic boom down

▶ Move control lever 1 to the right and hold.

8.18.2.4 Luffing the telescopic boom with expanded crane remote control*

Make sure that the following prerequisites are met:
- ❑ The *crane operation* menu is displayed.
  (→ Opening the crane operation menu, p. 486)
- ❑ On the *control lever assignment 1* display, the *luff the telescopic boom* icons are displayed.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ Crane operation is released.
  (→ 8.7 Releasing crane operation, p. 419)

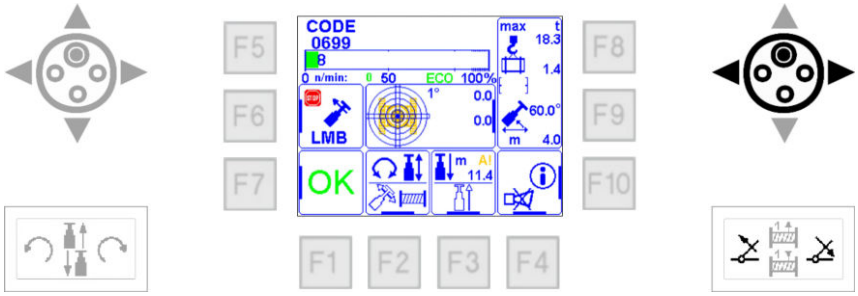
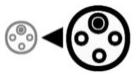


Fig. 1347: Crane operation menu

Luff the telescopic boom up



▶ Move control lever 1 to the left and hold.

Luff the telescopic boom down

▶ Move control lever 1 to the right and hold.

8.18.2.5 Luffing the hydraulic auxiliary boom* from the crane cab

Make sure that the following prerequisites are met:
- ❑ The *luff the auxiliary boom* icons are displayed on armrest operating unit 1.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ Crane operation is released.
  (→ 8.7 Releasing crane operation, p. 419)

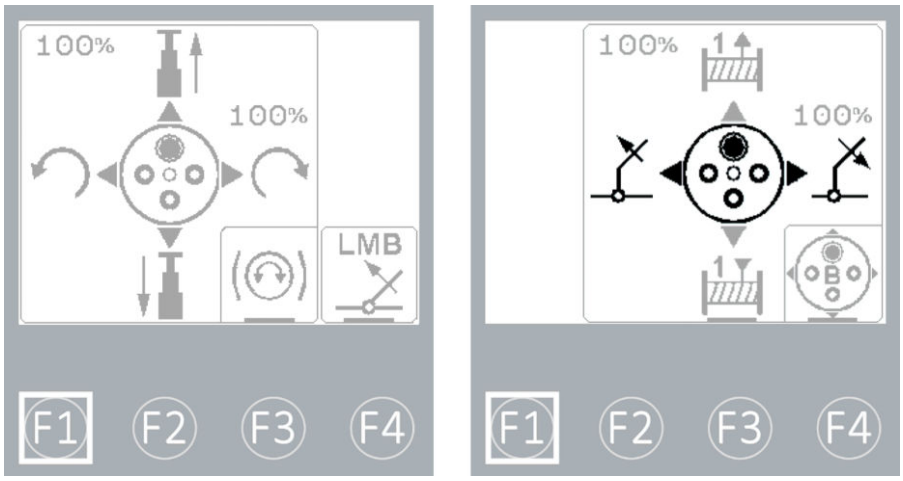
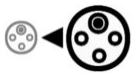


Fig. 1350: Exemplary illustration: Armrest operating unit - control lever assignment

Luff the auxiliary boom up



▶ Move control lever 1 to the left and hold.

Luff the auxiliary boom down

▶ Move control lever 1 to the right and hold.

8.18.2.6 Luffing the hydraulic auxiliary boom with expanded crane remote control*

Make sure that the following prerequisites are met:

❑ The *crane operation* menu is displayed.
(→ Opening the crane operation menu, p. 486)

❑ On the *control lever assignment 1* display, the *luff the auxiliary boom* icons are displayed.
(→ 8.15.5 Adjusting the control lever assignment, p. 515)

❑ Crane operation is released.
(→ 8.7 Releasing crane operation, p. 419)

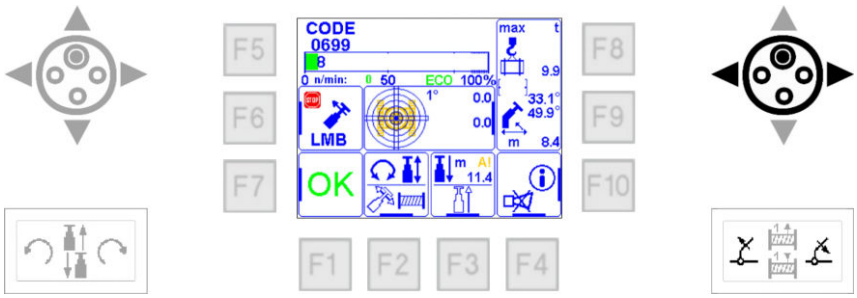
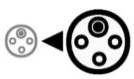


Fig. 1353: Crane operation menu

Luff the auxiliary boom up



▶ Move control lever 1 to the left and hold.

Luff the auxiliary boom down

▶ Move control lever 1 to the right and hold.

8.18.3 Spooling the winch

8.18.3.1 Speed when spooling the winch

Parameter for the spooling speed:
- Deflection of the control lever
- Engine rpm
- Rapid gear turned on or off
- Set speed reduction

8.18.3.2 Locking and unlocking winches

Make sure that the following prerequisites are met:
❑ The *winch 1* or *winch 2* is displayed on the armrest operating unit.
(→ 8.15.5 Adjusting the control lever assignment, p. 515)

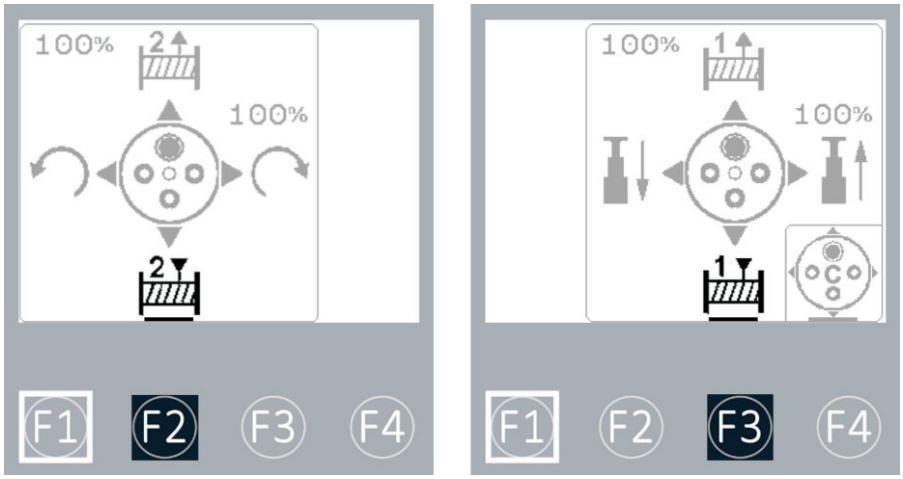


Fig. 1356: Armrest operating units - control lever assignment

Lock and release winch 1

▶ Until the winch is locked / unlocked and an acoustic signal sounds: Press and hold the *lock / unlock winch 1* F-button.

Lock and release winch 2*

▶ Until the winch is locked / unlocked and an acoustic signal sounds: Press and hold the *lock / unlock winch 2* F-button.

8.18.3.3 Spooling winch 1 up and out from the crane cab

Make sure that the following prerequisites are met:
❑ Winch 1 is released.

(→ Locking and unlocking winches, p. 536)
- ❑ The *winch 1* icons are displayed on armrest operating unit 1.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ Crane operation is released.
  (→ 8.7 Releasing crane operation, p. 419)

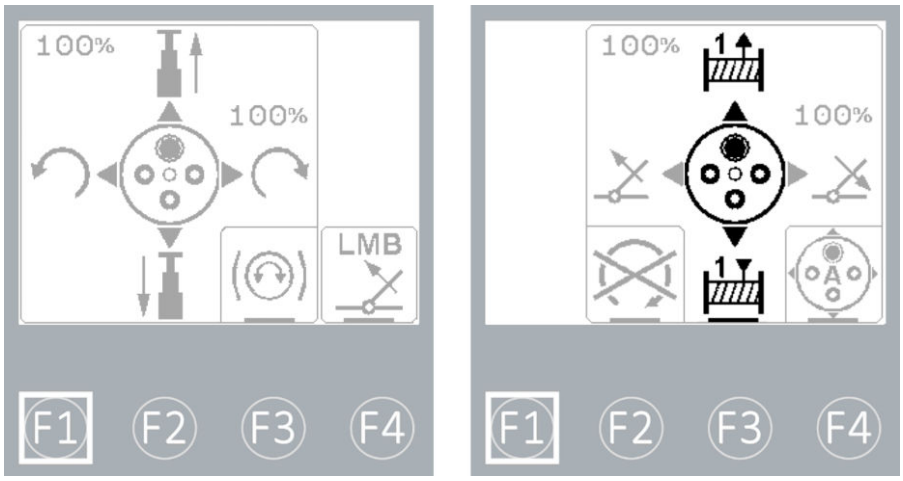


Fig. 1359: Armrest operating unit - control lever assignment

Spool winch 1 up

▶ Move control lever 1 to the rear and hold.

Spool winch 1 out

▶ Move control lever 1 forward and hold.

8.18.3.4 Spooling winch 1 up and out with the expanded crane remote control

Make sure that the following prerequisites are met:
- ❑ The *crane operation* menu is displayed.
  (→ Opening the crane operation menu, p. 486)
- ❑ Winch 1 is released.
  (→ Locking and unlocking winches, p. 536)
- ❑ On the *control lever assignment 1* display, *winch 1* icons are displayed.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ Crane operation is released.
  (→ 8.7 Releasing crane operation, p. 419)

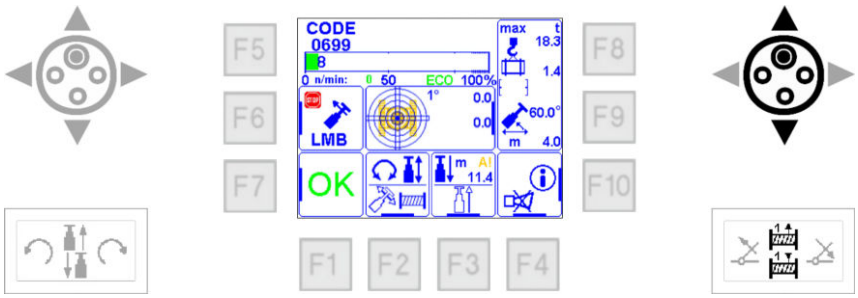


Fig. 1362: Crane operation menu

Spool winch 1 up

▶ Move control lever 1 to the rear and hold.

Spool winch 1 out

▶ Move control lever 1 forward and hold.

8.18.3.5 Spooling winch 2* up and out from the crane cab

Make sure that the following prerequisites are met:
- ❑ Winch 2 is released.
  (→ Locking and unlocking winches, p. 536)
- ❑ The *winch 2* icons are displayed on armrest operating unit 2.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ Crane operation is released.
  (→ 8.7 Releasing crane operation, p. 419)

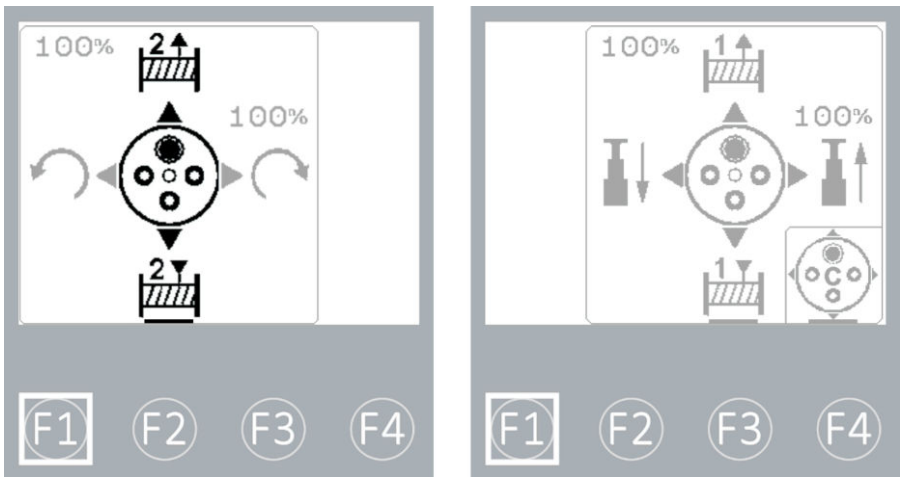


Fig. 1365: Armrest operating unit - control lever assignment

Spool winch 2 up

▶ Move control lever 2 to the rear and hold.

Spool winch 2 out

▶ Move control lever 2 forward and hold.

8.18.3.6 Spooling winch 2* up and out with the expanded crane remote control

Make sure that the following prerequisites are met:
- ❑ The *crane operation* menu is displayed.
  (→ Opening the crane operation menu, p. 486)
- ❑ Winch 2 is released.
  (→ Locking and unlocking winches, p. 536)
- ❑ On the *control lever assignment 2* display, *winch 2* icons are displayed.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ Crane operation is released.
  (→ 8.7 Releasing crane operation, p. 419)

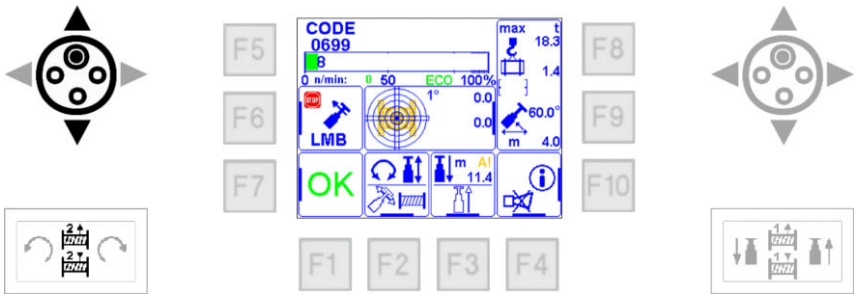


Fig. 1368: Crane operation menu

Spool winch 2 up

▶ Move control lever 2 to the rear and hold.

Spool winch 2 out

▶ Move control lever 2 forward and hold.

8.18.4 Turning the superstructure

8.18.4.1 Safety

This section supplements the “Safety” chapter.

Danger zone when turning

Observe the additional safety instructions (→ 5.7 Danger zone, p. 167).

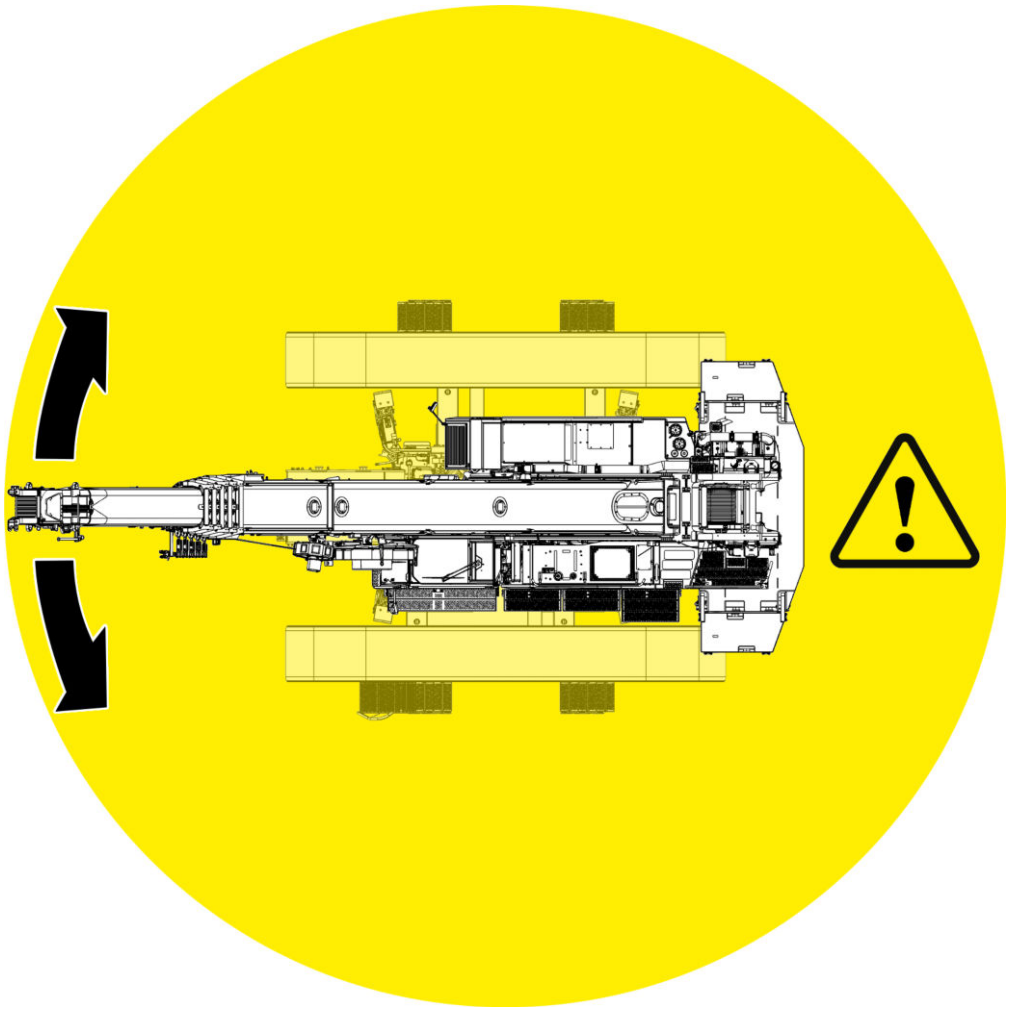


Fig. 1372: Turning danger zone

Speed when turning

Observe the following rules for the speed when turning the superstructure:
- Adjust the slewing speed according to the utilization and length of the boom system.
- Do **not** exceed the maximum permissible slewing speed according to the chart.
  (→ Maximum permissible slewing speeds, p. 540)

Parameters for the slewing speed:
- Deflection of the control lever
- Engine rpm
- Set speed reduction

8.18.4.2 Maximum permissible slewing speeds

Operating mode	Telescopic boom length	Maximum permissible slewing speed	
		Slewing angle	Rpm
T / TK-2.9 m	T-11.4 m to T-19.6 m	446°/min	1.24 rpm
T / TK-2.9 m	T-18.9 m to T-31.4 m	270°/min	0.75 rpm
T / TK-2.9 m	T-33.8 m to T-52.0 m	108°/min	0.3 rpm

Operating mode	Telescopic boom length	Maximum permissible slewing speed	
		Slewing angle	Rpm
TK / TNZK TVK / TVNZK	T-11.4 m to T-52.0 m	108°/min	0.3 rpm

Tab. 94: Maximum permissible slewing speed at nominal load

8.18.4.3 Applying the slewing gear service brake

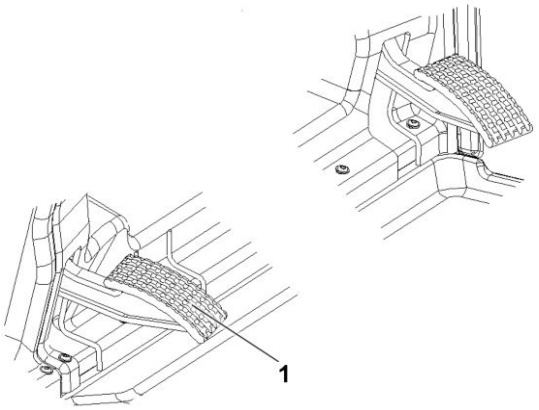


Fig. 1373: Slewing gear brake pedal

1 Brake pedal

The slewing gear can be slowed down with the service brake in addition to the parking brake.

The harder the brake pedal **1** is actuated, the greater the braking force.

NOTICE
Actuate the turning movement and at the same time actuate the slewing gear brake!
Slewing gear brake worn.

▶ When actuating a turning movement: Do **not** press the brake pedal for an extended period of time.

▶ Press the brake pedal **1**.
▷ The turning movement is braked.

8.18.4.4 Releasing and applying the slewing gear parking brake

Make sure that the following prerequisites are met:
❑ The *control lever assignment* menu is displayed on armrest operating unit 2.

(→ Changing the menu, p. 437)

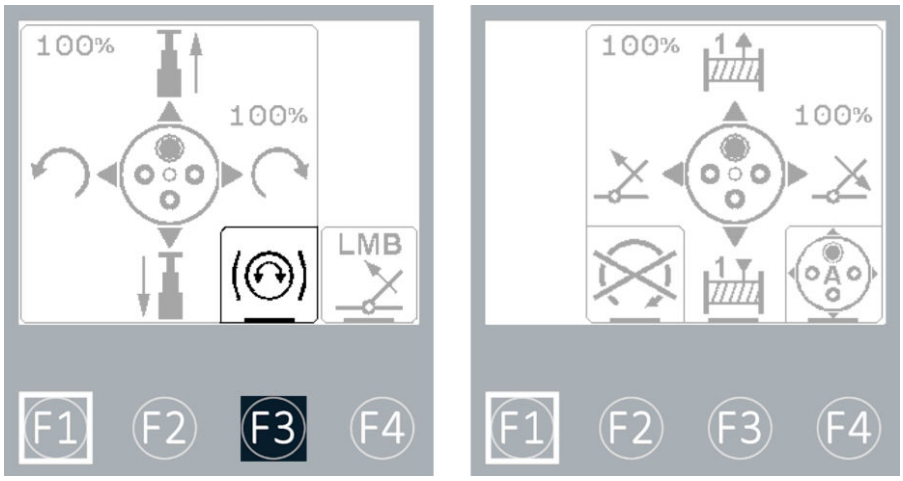


Fig. 1374: Armrest operating units

Note

In the slewing gear fixed operating mode, the parking brake opens automatically as long as a turning movement is actuated.

Releasing the parking brake

WARNING
The superstructure turns without actuated turning movement!
The superstructure and load can catch people or obstacles.

If the superstructure starts to turn due to wind or an incline position:
▶ Apply the slewing gear parking brake.

▶ Press the *slewing gear parking brake* F-button.

▷ The *slewing gear parking brake released* button is displayed.

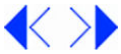
Applying the parking brake

▶ Press the *slewing gear parking brake* F-button.

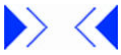
▷ The *slewing gear parking brake applied* button is displayed.

8.18.4.5 Switching over slewing gear operating mode

The slewing gear has the following operating modes
- Freely rotating
- Fixed



Freely rotating: The parking brake must be released and applied manually.



Fixed: The parking brake is released automatically when activating a turn movement and is applied as soon as the slewing gear is at a standstill. If the parking brake is opened manually prior to actuation of a turning movement, it is **not** closed automatically as soon as the slewing gear is at a standstill.

In the following cases, there is forced switching to the **fixed** slewing gear operating mode:
- Approaching the shut-off limit: Set up slewing range “x°”
- Approaching the shut-off limit: Working area limitation
- Approaching the shut-off limit: Limited slewing range set up
- Slewing gear shut-off
- Crane operation with expanded crane remote control*

Make sure that the following prerequisites are met:
❑ The *crane function settings* window is displayed on the superstructure monitor.
(→ Hiding and displaying the crane function settings window, p. 445)

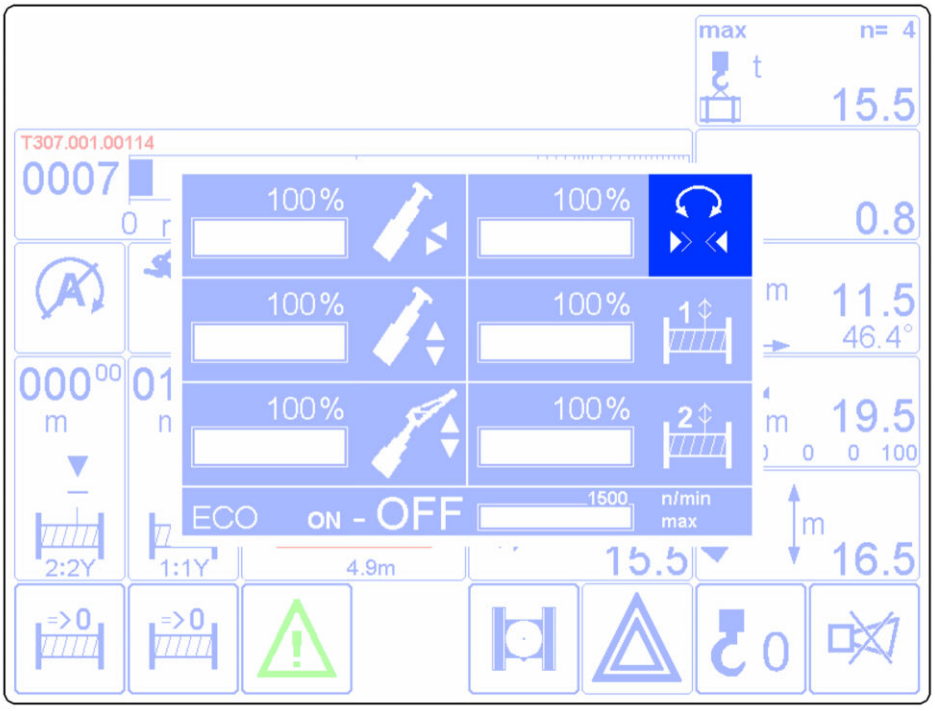


Fig. 1381: Crane function settings window

▶ Press the *rapid gear* button on control lever 1 or control lever 2.
▷ The slewing gear operating mode is switched.

8.18.4.6 Turning the superstructure from the crane cab

Make sure that the following prerequisites are met:
❑ Crane operation is released.

(→ 8.7 Releasing crane operation, p. 419)
- ❑ The *turning* icons are displayed on armrest operating unit 2.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ The superstructure is **not** pinned.
  (→ 8.17 Unpinning the superstructure, p. 531)
- ❑ The maximum permissible rotational speed is set.
  (→ Safety, p. 539)

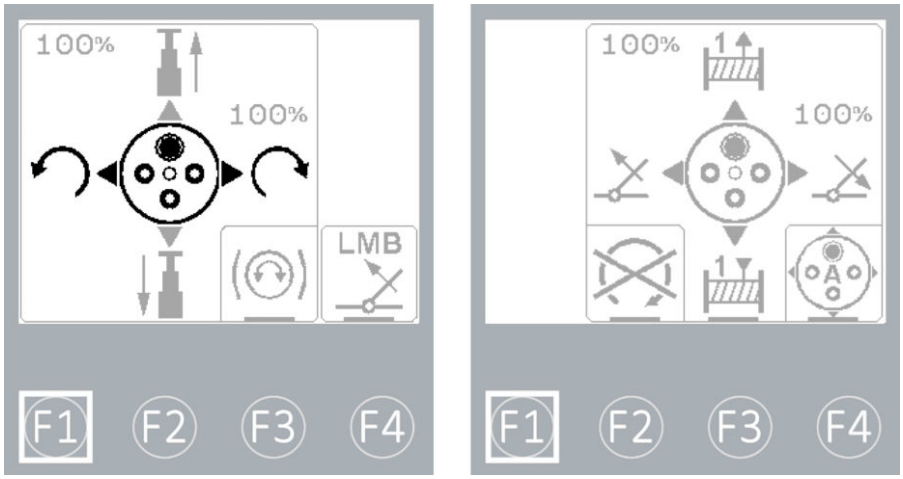
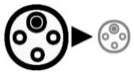


Fig. 1383: Armrest operating units - control lever assignment

Turn the superstructure to the right



▶ Move control lever 2 to the right and hold.

Turn the superstructure to the left

▶ Move control lever 2 to the left and hold.

8.18.4.7 Turning the superstructure with expanded crane remote control*

Make sure that the following prerequisites are met:
- ❑ The *crane operation* menu is displayed.
  (→ Opening the crane operation menu, p. 486)
- ❑ Crane operation is released.
  (→ 8.7.3 Releasing crane operation with expanded crane remote control*, p. 420)
- ❑ On the *control lever assignment 2* display, the *turn* icons are displayed.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ The superstructure is **not** pinned.
  (→ 8.17 Unpinning the superstructure, p. 531)
- ❑ The maximum permissible rotational speed is set.
  (→ Safety, p. 539)

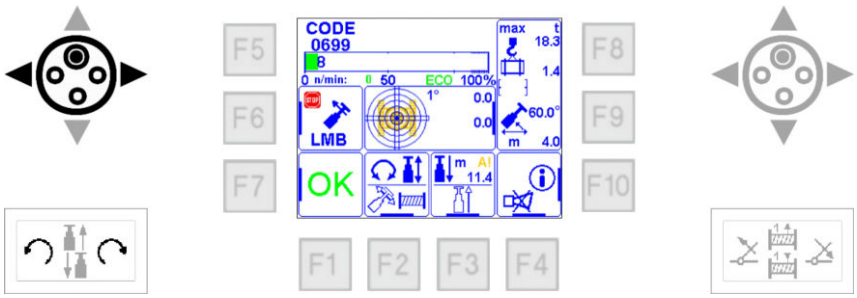
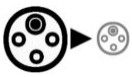


Fig. 1386: Crane operation menu

Note

When operating with the expanded crane remote control*, the system automatically switches to the fixed slewing gear operating mode.

Turn the superstructure to the right



▶ Move control lever 2 to the right and hold.

Turn the superstructure to the left

▶ Move control lever 2 to the left and hold.

8.18.5 Telescoping the telescopic boom

8.18.5.1 Speed when telescoping

Parameter for the telescoping speed:
- Deflection of the control lever
- Engine rpm
- Rapid gear telescoping turned on or turned off (only for telescoping automatic operation)
- Set speed reduction

8.18.5.2 Carrying the hook block / load hook along

Telescoping has a direct effect on the hook block /load hook. Slack rope can form if the hook block / load hook comes into contact with the ground.

Note

▶ During the telescoping procedures: Compensate for movements of the hook block / load hook by spooling the winch up or out.

8.18.5.3 Bore play of the telescopic pinning

When telescoping out, the individual telescopes can be pulled apart due to friction and the bore play of the telescopic pinning. If subsequently telescoping in, if the telescope is tensioned or luffed up, the telescope can retract suddenly.

8.18.5.4 Safety

This section supplements the “Safety” chapter.

Danger zone when telescoping

Observe the additional safety instructions (→ 5.7 Danger zone, p. 167).

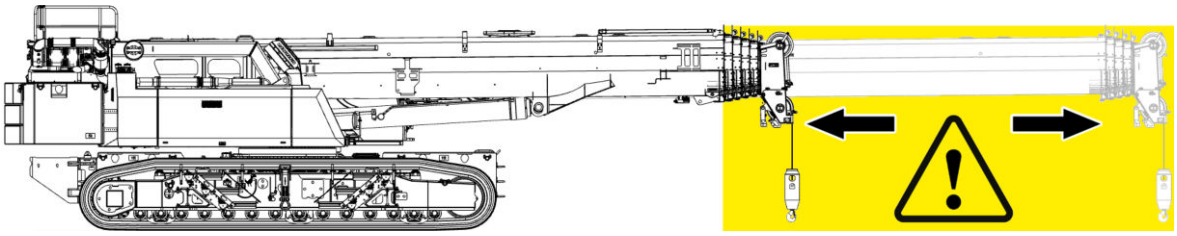


Fig. 1390: Danger zone when telescoping

Swinging up of the telescopic boom

Insufficient lubrication can cause a “stick-slip effect” that leads to the swinging up of the telescopic boom.

Observe the following rules:
- If the telescopic boom swings up: Interrupt the telescoping movement until the telescopic boom stops swinging.
- If the telescopic boom swings up: Lubricate the telescopic boom.

Damage to the telescopic boom

If the maximum telescopable load is exceeded, the telescopic boom can be damaged.

Observe the following rules:
- Do **not** exceed the maximum telescopable load displayed on the superstructure monitor and the expanded crane remote control*.
- If possible: Telescope the telescopic boom without load. Subsequently pick up the load.

Inadvertent telescoping out when setting down the load

If a load is set down, the compromised oil column in the telescoping cylinder is relieved. The oil column expands and can lead to the inadvertent telescoping out of the telescopic boom.

Observe the following rules:
- While the load is set down: Telescope the telescopic boom in briefly or luff up briefly.

Inadvertent telescoping out when picking up the load

If the telescopic boom is telescoped out and a load is lifted after a delay, the oil column that cooled down in the meantime in the telescoping cylinder could cause the telescopic boom to telescope in suddenly.

Observe the following rules:
– Before lifting a load: Telescope the telescopic boom out slightly.

Danger of collision of the telescoping cylinder

With a long telescopic boom and high loads, the telescopic boom can sag considerably. If the considerably sagging telescopic boom is telescoped in or our, the telescoping cylinder will collide with components of the telescopes.

The load bearing capacity of the telescopic boom can be reduced.

Rules for telescoping with a telescopic boom that is sagging considerably:
– Do **not** retract or extend the telescoping cylinder.
– Before the telescoping procedure: Set down the load.

8.18.5.5 Telescoping from the crane cab with control lever 2

Make sure that the following prerequisites are met:
❑ The *telescoping* icons are displayed on armrest operating unit 2.
(→ 8.15.5 Adjusting the control lever assignment, p. 515)
❑ Crane operation is released.
(→ 8.7 Releasing crane operation, p. 419)

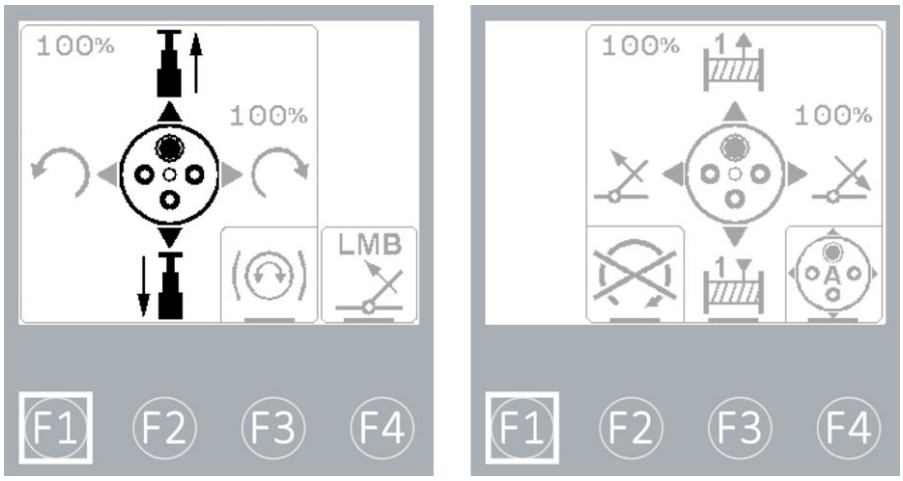


Fig. 1391: Armrest operating units - control lever assignment

Telescoping out

▶ Move control lever 2 forward and hold.

Telescoping in

▶ Move control lever 2 to the rear and hold.

8.18.5.6 Telescoping with expanded crane remote control* and control lever 2

Make sure that the following prerequisites are met:
❑ The *crane operation* menu is displayed.

(→ Opening the crane operation menu, p. 486)
- ❑ On the *control lever assignment 2* display, the *telescoping* icons are displayed.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ *Telescoping automatic operation* is active.
  (→ Switching over the operating mode, p. 550)
- ❑ Crane operation is released.
  (→ 8.7.3 Releasing crane operation with expanded crane remote control*, p. 420)

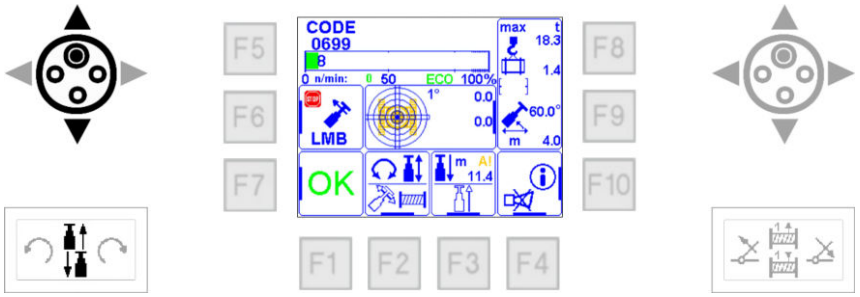


Fig. 1394: Crane operation menu

Telescoping out

▶ Move control lever 2 forward and hold.

Telescoping in

▶ Move control lever 2 to the rear and hold.

8.18.5.7 Telescoping from the crane cab with control lever 1

Make sure that the following prerequisites are met:
- ❑ The *luff the telescopic boom* icons are displayed on armrest operating unit 1.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ Crane operation is released.
  (→ 8.7 Releasing crane operation, p. 419)

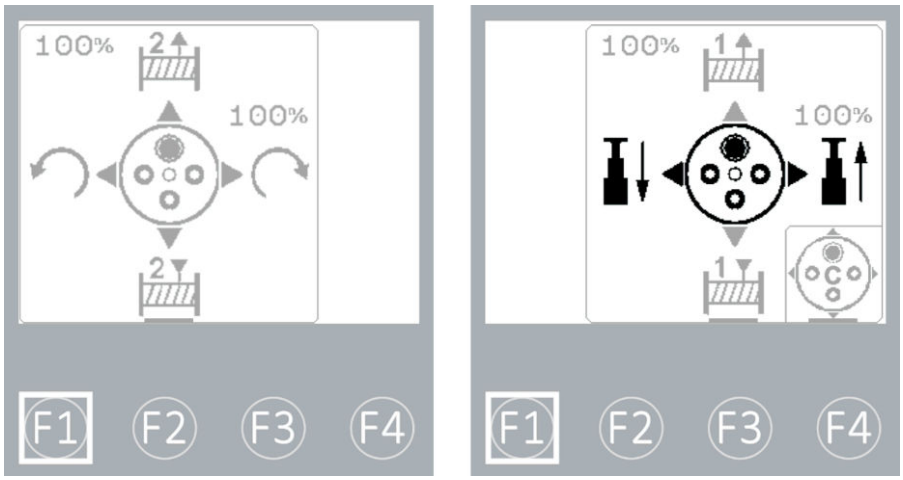
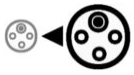


Fig. 1397: Armrest operating units - control lever assignment

Telescoping out

▶ Move control lever 1 to the right and hold.

Telescoping in



▶ Move control lever 1 to the left and hold.

8.18.5.8 Telescoping with expanded crane remote control* and control lever 1

Make sure that the following prerequisites are met:
- ❑ The *crane operation* menu is displayed.
  (→ Opening the crane operation menu, p. 486)
- ❑ On the *control lever assignment 1* display, the *telescoping* icons are displayed.
  (→ 8.15.5 Adjusting the control lever assignment, p. 515)
- ❑ *Telescoping automatic operation* is active.
  (→ Switching over the operating mode, p. 550)
- ❑ Crane operation is released.
  (→ 8.7.3 Releasing crane operation with expanded crane remote control*, p. 420)

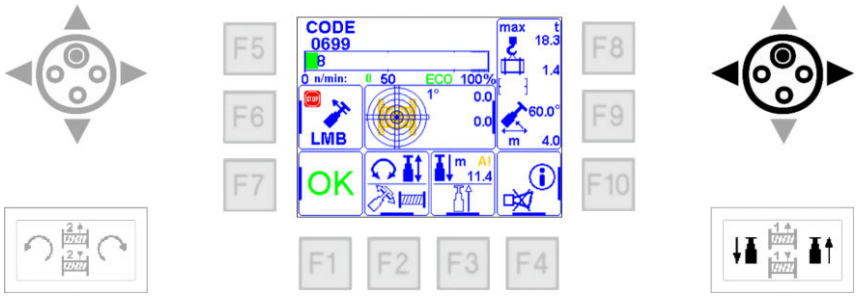
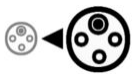


Fig. 1400: Crane operation menu

Telescoping out

▶ Move control lever 1 to the right and hold.

Telescoping in



▶ Move control lever 1 to the left and hold.

8.18.5.9 Telescoping from the crane cab with control pedal*

Make sure that the following prerequisites are met:
- ❑ Travel mode is **not** active.
  (→ 8.19.5 Turning travel mode on and off, p. 568)
- ❑ Crane operation is released.
  (→ 8.7 Releasing crane operation, p. 419)

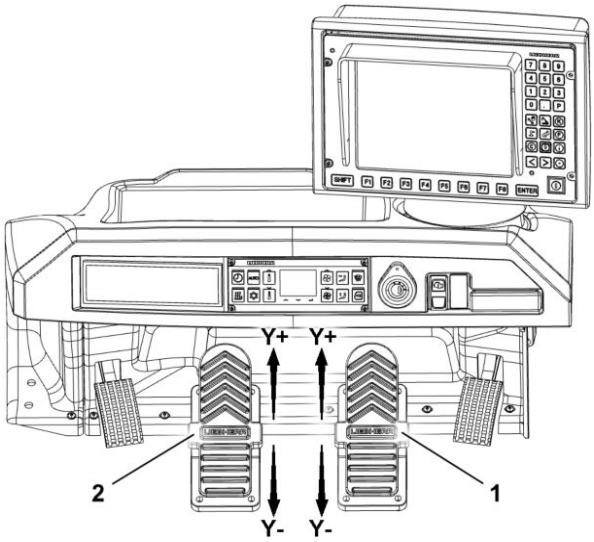


Fig. 1403: Control pedal 1 and control pedal 2

1 Right control pedal 1 **2** Left control pedal 2

Telescoping out

▶ Operate the control pedal **2** in the “Y+” direction and hold.

Telescoping in

▶ Operate the control pedal **2** in the “Y-” direction and hold.

8.18.5.10 Switching over the operating mode

Make sure that the following prerequisites are met:
❑ The *telescoping* menu is displayed.

(→ Opening menus, p. 439)

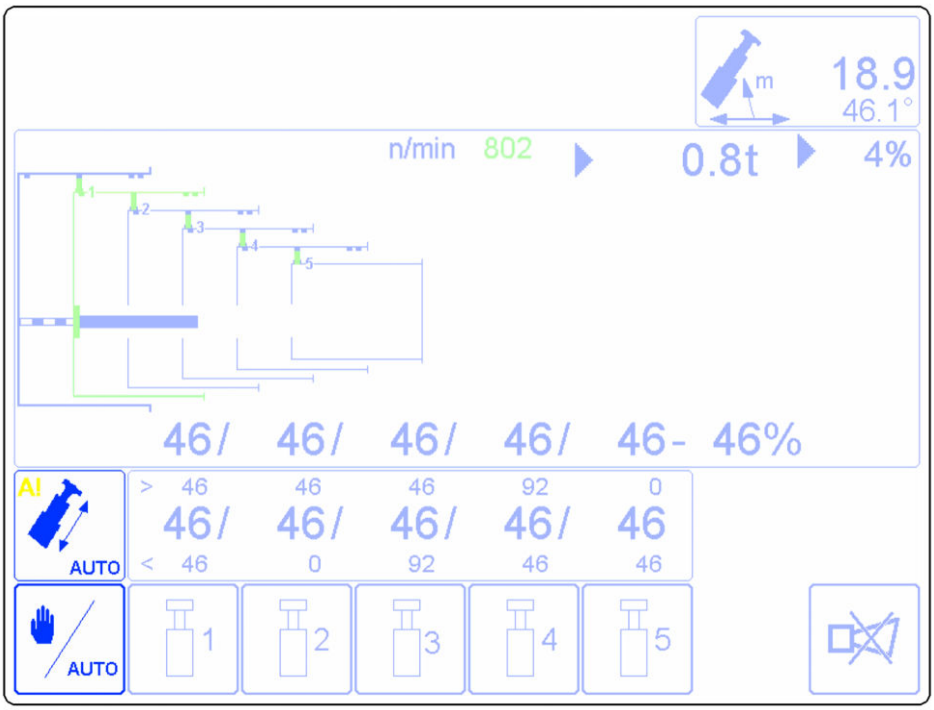


Fig. 1404: Exemplary illustration: Telescoping menu

Note

Switching the telescoping operating mode automatically extends the telescopic pinning and the telescoping cylinder pinning.

▶ Press the *telescoping operating mode* F-button.

8.18.5.11 Automatic telescoping from the crane cab

Setting the telescoping target

Make sure that the following prerequisites are met:
❑ The *telescoping* menu is displayed.
(→ Opening menus, p. 439)
❑ Telescoping automatic operation is active.
(→ Switching over the operating mode, p. 550)

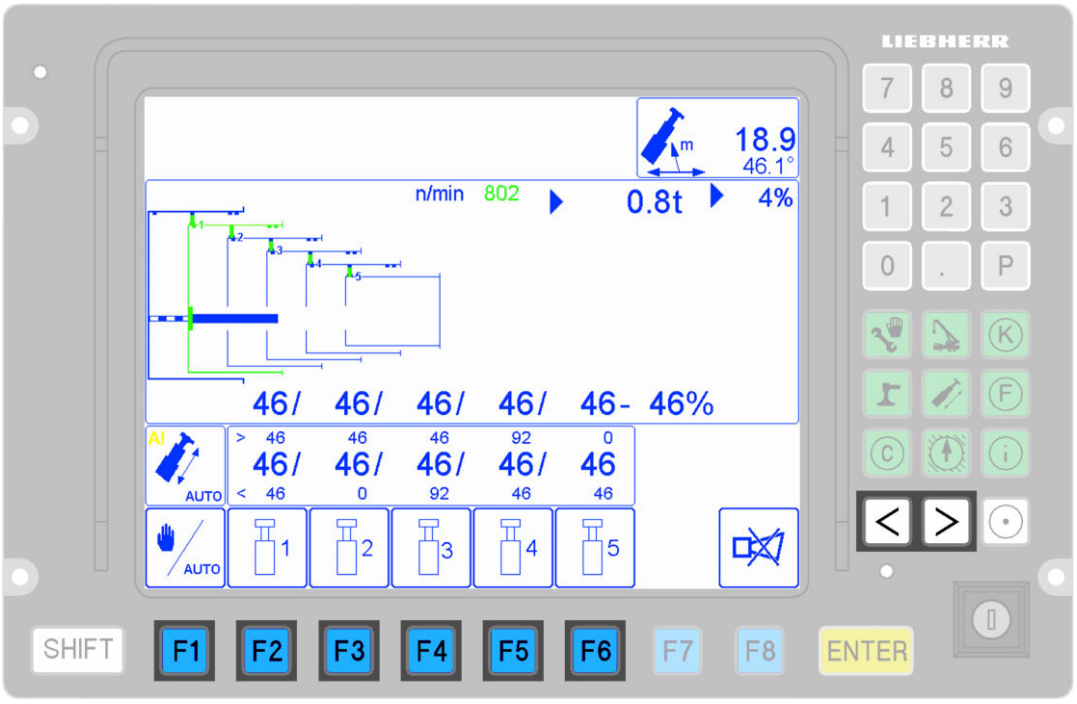


Fig. 1406: Telescoping menu

Select the nominal extension conditions individually

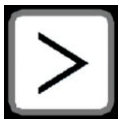
The individual telescopes can be selected independently of each other at an extension length of 0 %, 46 %, 92 % or 100 %.

When telescope 1 is to be extended:

▶ Until the desired target extension condition is displayed: Press the *Set telescope 1 set extension condition* F-button.

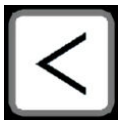
▶ Until the telescoping target is set completely: Repeat the procedure for all telescopes.

Select the next longer telescoping target



▶ Press the *right* button.

Select the next shorter telescoping target



▶ Press the *left* button.

Set the telescoping target in the *set up* menu

▶ Opening the *set up* menu (→ Opening menus, p. 439).

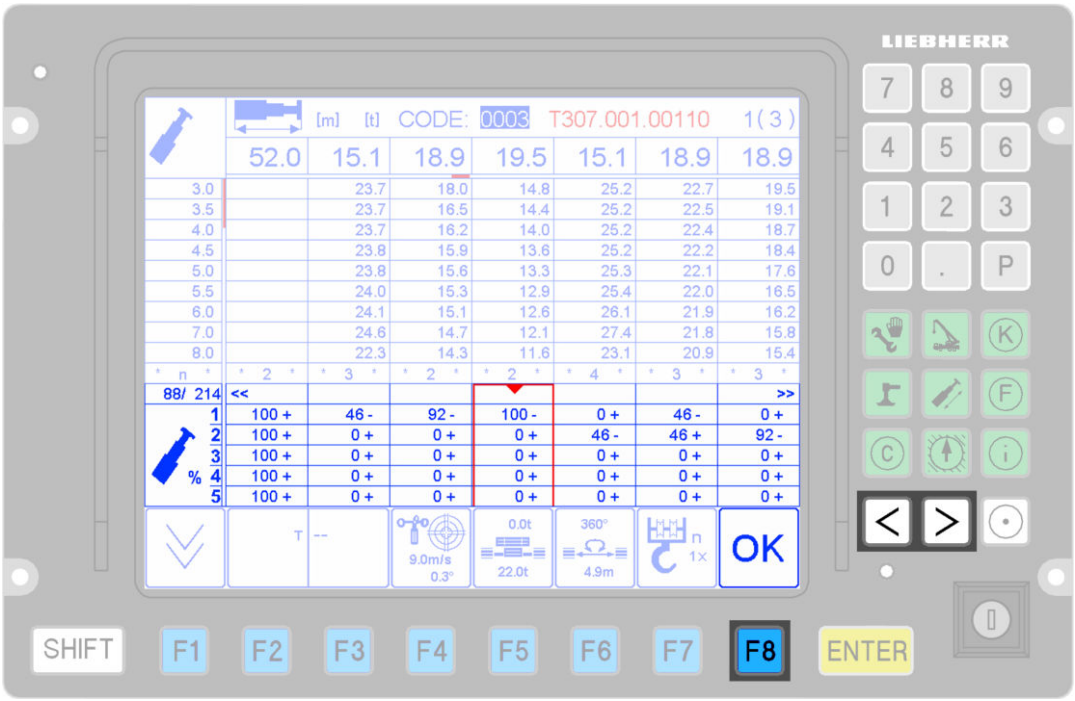
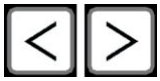


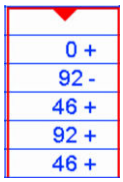
Fig. 1410: Exemplary illustration: Set up menu

Key combination	Effect
SHIFT + <	Jump to the first column.
SHIFT + >	Jump to the last column.
2x <	Jump one page to the left.
2x >	Jump one page to the right.

Tab. 95: Key combinations - page



▶ Select the desired telescoping target with the *left* button and the *right* button.



▷ The new telescoping target is bordered in red.

▶ Check the set up configuration and confirm with the *OK* F-button.
▷ The new telescoping target is set.

Telescoping to the telescoping target

Make sure that the following prerequisites are met:
- ❑ Telescoping automatic operation is active.
  (→ Switching over the operating mode, p. 550)
- ❑ The desired telescoping target is set.
  (→ Setting the telescoping target, p. 551)

In order to reach the telescoping target, the telescoping device must be selected according to the *telescope condition* icon.

Note

In the *crane operation* menu, the *telescope condition* icon is located on the *telescopic boom length* display.

If the *telescoping out request* icon is displayed:
- ▶ Telescope the telescopic boom out.

or

If the *telescoping in request* icon is displayed:
Telescope the telescopic boom in.

▷ When the telescoping procedure is completed: The *telescoping target reached* icon is displayed.

8.18.5.12 Automatic telescoping with the expanded crane remote control*

Telescoping to the telescoping target

Make sure that the following prerequisites are met:
- ❑ Telescoping automatic operation is active.
  (→ Switching over the operating mode, p. 550)
- ❑ The desired telescoping target is set on the superstructure monitor.
  (→ Setting the telescoping target, p. 551)
- ❑ The *crane operation* menu is displayed.
  (→ Opening the crane operation menu, p. 486)

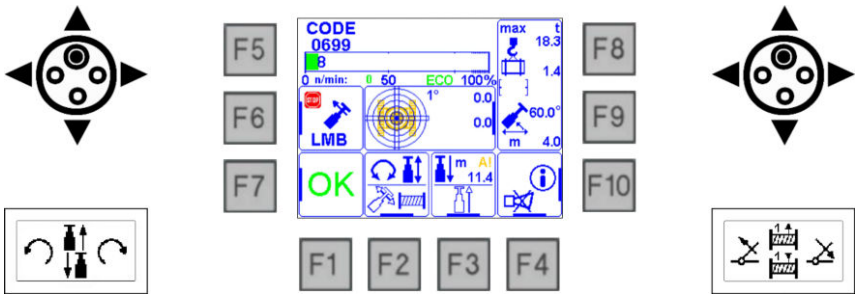
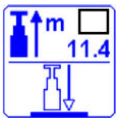


Fig. 1421: Exemplary illustration: Crane operation menu

If the *telescope out* button is **not** displayed:
▶ Press the *telescoping* F-button.



▷ The *telescope out* button is displayed.

In order to reach the nominal extension condition, the telescoping device must be selected according to the *telescope condition* icon on the telescoping button.

If the *telescoping out request* icon is displayed:
▶ Telescope the telescopic boom out.

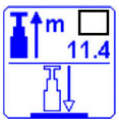
or

If the *telescoping in request* icon is displayed:
Telescope the telescopic boom in.

▷ When the telescoping procedure is completed: The *telescoping target reached* icon is displayed.

Telescoping the telescopic boom in all the way

Make sure that the following prerequisites are met:
❑ Telescoping automatic operation is active.
(→ Switching over the operating mode, p. 550)
❑ The *telescope in* button is displayed.



If the *telescope in* button is **not** displayed:
▶ Press the *telescoping* F-button.

▷ The *telescope in* button is displayed.

In order to retract the telescopic boom completely, the telescoping device must be selected according to the *telescope condition* icon on the telescoping button.

If the *telescoping out request* icon is displayed:
▶ Telescope the telescopic boom out.

or

If the *telescoping in request* icon is displayed:
Telescope the telescopic boom in.

▷ When the telescoping procedure is completed: The *telescoping target reached* icon is displayed.

8.18.5.13 Manual telescoping

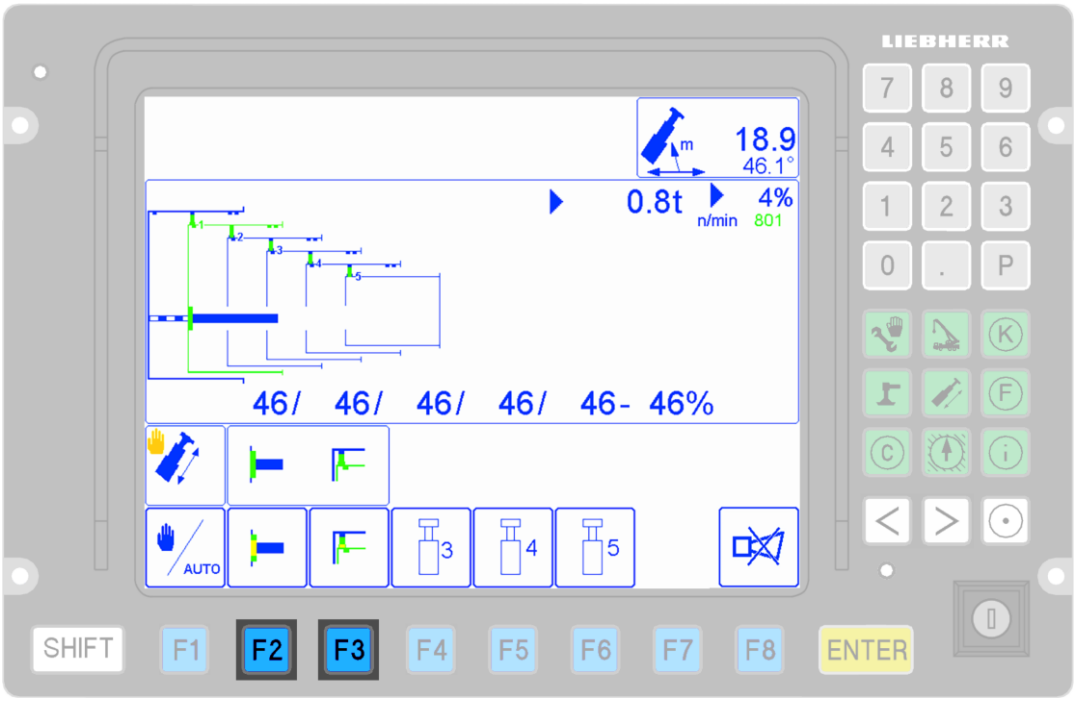


Fig. 1432: Telescoping menu

Manual telescoping is regarded as an exception, as automatic mode makes it possible to reach every extension condition.

All pinning procedures as well as extending and retracting the telescoping cylinder must be performed manually.

All pinning states as well as the position of the telescoping cylinder and the telescopes are displayed in the *telescoping* menu. The telescoping cylinder pinning and telescopic pinning are audibly unpinned and pinned.

The crane operator must be familiar with all functions of the extension system. The crane operator is responsible for damage to the telescoping system or the boom system.

Note

Observe the telescoping order.

Telescope out the telescopes in descending order. (Telescope 5 first)

Telescope in the telescopes in ascending order. (Telescope 1 first)

Unpinning telescoping cylinder

Make sure that the following prerequisites are met:
- ❑ Telescoping manual operation is active.
  (→ Switching over the operating mode, p. 550)
- ❑ All telescopes are pinned.
- ❑ The telescoping cylinder is pinned.
- ❑ The *telescoping* menu is displayed.
  (→ Opening menus, p. 439)

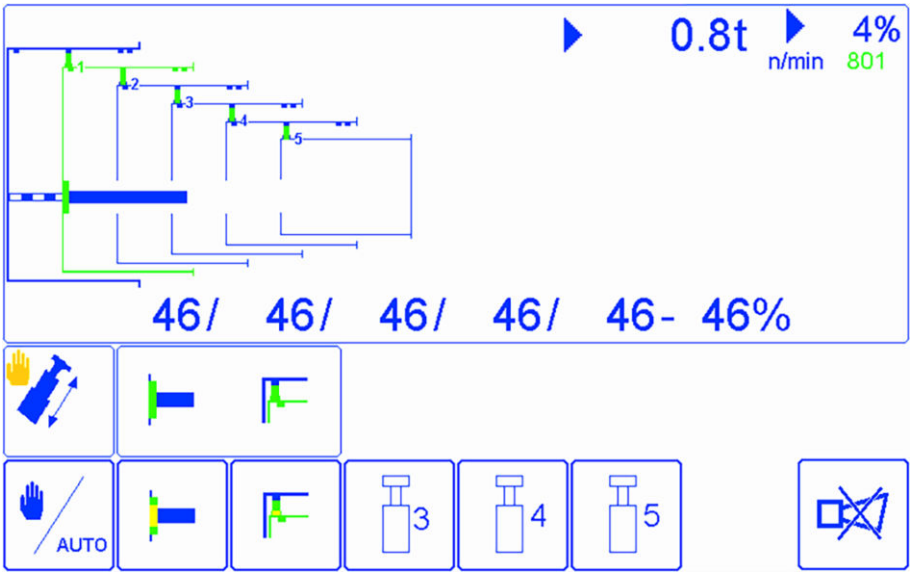
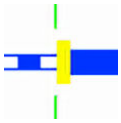


Fig. 1433: Telescoping manual operation, telescopes and telescoping cylinder pinned

▶ Press the *telescoping cylinder pinning* F-button.



▷ The *telescoping cylinder unpinned* icon is displayed.

Troubleshooting

Is the telescoping cylinder **not** being unpinned?
Telescoping cylinder unpinning clamped.

When the *telescoping cylinder pinning in intermediate position* icon is displayed:
▶ Telescope out or in carefully.

Pinning the telescoping cylinder

Make sure that the following prerequisites are met:
❑ Telescoping manual operation is active.
(→ Switching over the operating mode, p. 550)
❑ All telescopes are pinned.
❑ The telescoping cylinder is unpinned.
❑ The *telescoping* menu is displayed.
(→ Opening menus, p. 439)

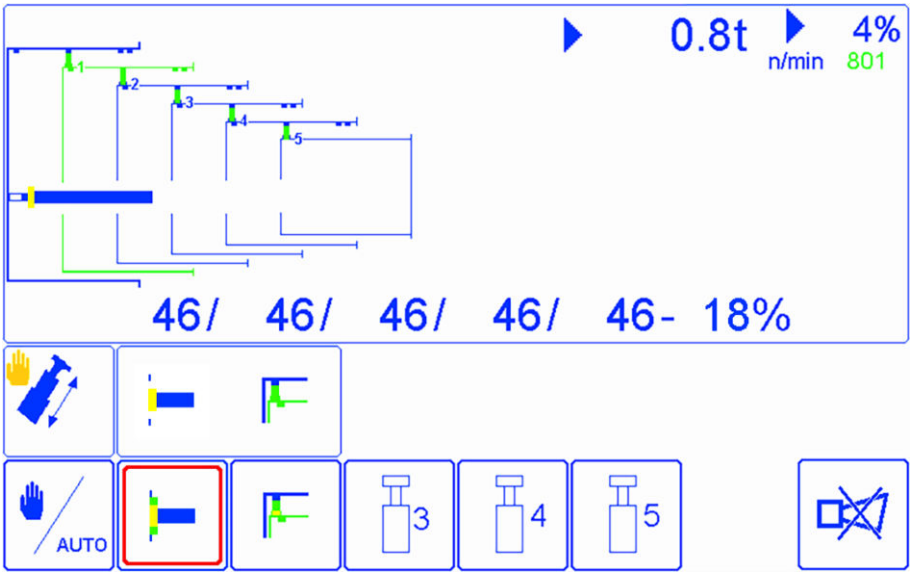
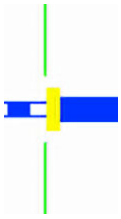


Fig. 1437: Telescoping manual operation, telescoping cylinder unpinned

▶ Telescope the desired telescope to the pin position.



▷ The desired telescope is displayed in green.

▶ Press the *telescoping cylinder pinning* F-button.

▷ The *telescoping cylinder pinned* icon is displayed.

Troubleshooting

Is the telescoping cylinder **not** being pinned?
The telescoping cylinder pinning is **not** in the pin position.

When the *telescoping cylinder pinning in intermediate position* icon is displayed:
▶ Telescope out or in carefully.

Unpinning telescope

Make sure that the following prerequisites are met:
❑ Telescoping manual operation is active.
(→ Switching over the operating mode, p. 550)
❑ All telescopes are pinned.
❑ The telescoping cylinder is pinned with the selected telescope.
❑ The *telescoping* menu is displayed.

(→ Opening menus, p. 439)

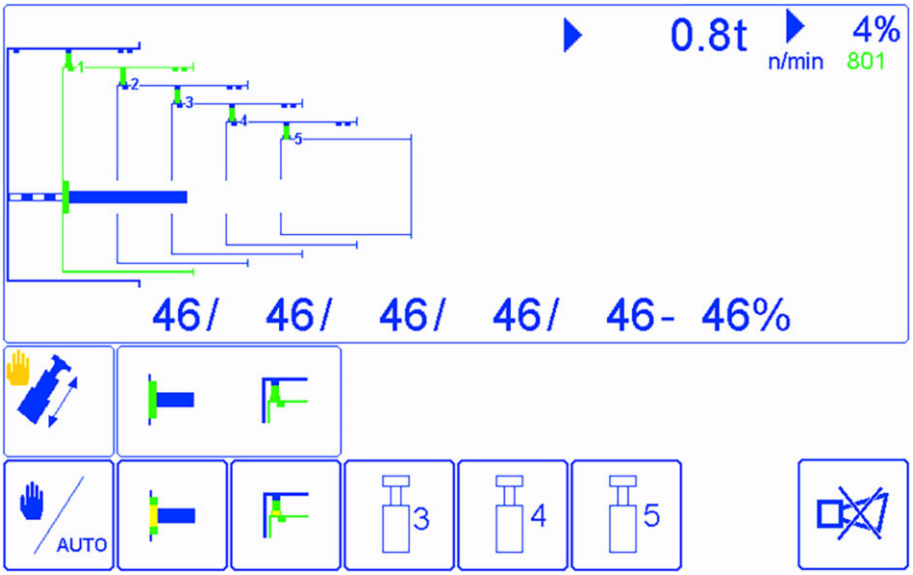
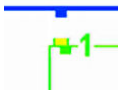


Fig. 1442: Telescoping manual operation, telescopes and telescoping cylinder pinned

▶ Press the *telescope pinning* F-button.

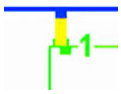


▷ The *telescope unpinned* icon is displayed.

Troubleshooting

Is the telescope **not** unpinned?
Telescopic pinning clamped.

When the *telescopic pinning in intermediate position* icon is displayed:



▶ Telescope out or in carefully.

Pinning the telescope

Make sure that the following prerequisites are met:
❑ Telescoping manual operation is active.
(→ Switching over the operating mode, p. 550)
❑ The telescoping cylinder is pinned with the selected telescope.
❑ The telescope is unpinned.
❑ The *telescoping* menu is displayed.
(→ Opening menus, p. 439)

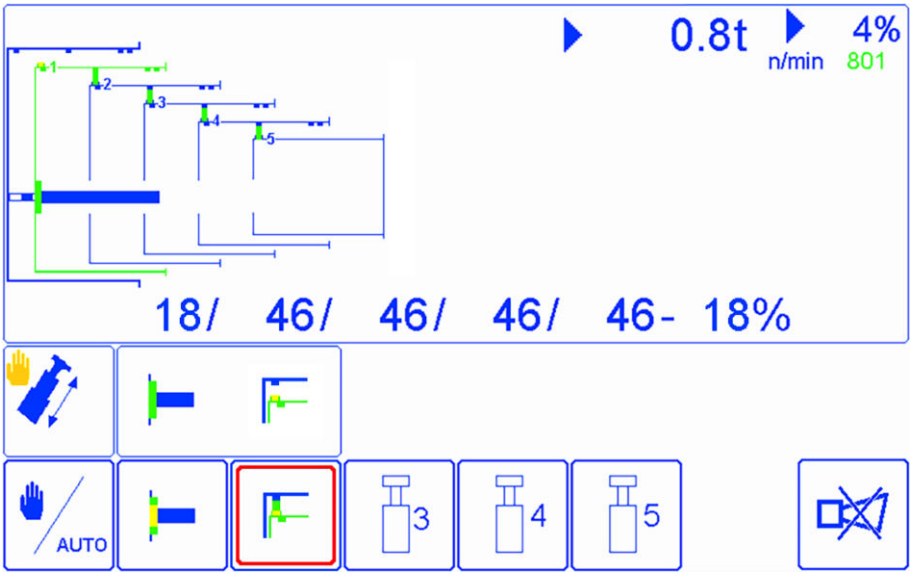


Fig. 1446: Telescoping manual operation, telescope unpinned

Telescopes have pin points at 0 %, 46 %, 92 % and 100 % extension lengths. The determining factor is the extension length of the current telescope, the extension length of the telescoping cylinder is **not** relevant.

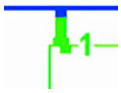
▶ Telescope to the desired pin position.

NOTICE
Improper use of telescopic pinning!
The telescopic boom can be damaged.

▶ Actuate the telescopic pinning maximum 2 % before or after the pin position.

▶ Approach the pin positions slowly and carefully.

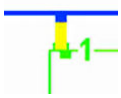
▶ Press the *telescope pinning* F-button.



▷ The *telescope pinned* icon is displayed.

Troubleshooting

Is the telescope **not** pinned?
The telescopic pinning is **not** in the pin position.



When the *telescopic pinning in intermediate position* icon is displayed:

▶ Telescope out or in carefully.

NOTICE
The telescopic boom is **not** tensioned!
The telescopic boom can be damaged.

When the telescope is pinned:
▶ Tension the telescopic boom.

For the tensioning procedure, the control lever must be deflected completely. The extension conditions of the telescoping cylinder and the telescope may **not** change during the tensioning procedure.

▶ Telescope in for 8 seconds.

8.18.5.14 Telescoping under load

Separate load charts for telescoping with a load are available.

Telescoping under load is seen as a special case.

Liebherr-Werk Ehingen GmbH recommends extending the telescopic boom without load to the required extension condition and pinning it before taking on the load.

Make sure that the following prerequisites are met:
❑ The telescopic boom is sufficiently lubricated.
❑ The load charts for telescoping with a load are selected.
❑ The actual load is lower than the telescopable load.

8.19 Driving from the crane cab

8.19.1 Driving checklist

Make sure that the following prerequisites are met:

Job planning
- ❑ Job planning is carried out.
- ❑ The travel route is selected.
- ❑ The optimal positions for the boom system were determined for the travel route to ensure as even a crawler pressure as possible.
- ❑ Job planning was carried out with the actual set up configuration of the crane on the job planner or the Crane Planner.

Travel condition
- ❑ If driving **inside** the load chart: The crane is in the set up configuration according to the selected chart.
- ❑ If driving **outside** the load chart: Observe the additional specifications.
- ❑ Warning and safety equipment is available, functional and correctly set.
- ❑ The crane is free of defects.
- ❑ No loose parts on the crane.
- ❑ Maintenance carried out according to the maintenance and inspection plan.
- ❑ All covers, storage compartments and tool boxes are closed.
- ❑ The hook block is secured to prevent it from swinging back and forth.

Environment
- ❑ The travel route complies with the specifications.
- ❑ A guide for monitoring the crane while driving is present.
- ❑ **No** personnel or objects are in the danger zone.

Equipment and attachment parts
- ❑ The equipment and attachment parts are secured against loosening up by themselves.

Crane cab
- ❑ The crane cab is completely luffed down.
- ❑ The crane cab door is closed.
- ❑ The windows are free. The field of vision is **not** restricted.

Control
- ❑ The crane set up configuration is set in the *set up* menu.
- ❑ The maximum permissible crawler pressure of the travel route is set on the superstructure monitor.
  (→ 8.15.7 Setting crawler pressure monitoring, p. 518)
- ❑ The safety equipment is **not** bypassed.
- ❑ All displays are functional and within a permissible range.

8.19.2 Safety

⚠ **This section supplements the “Safety” chapter.**

8.19.2.1 Danger zone when driving

Observe the additional safety instructions(→ 5.7 Danger zone, p. 167).

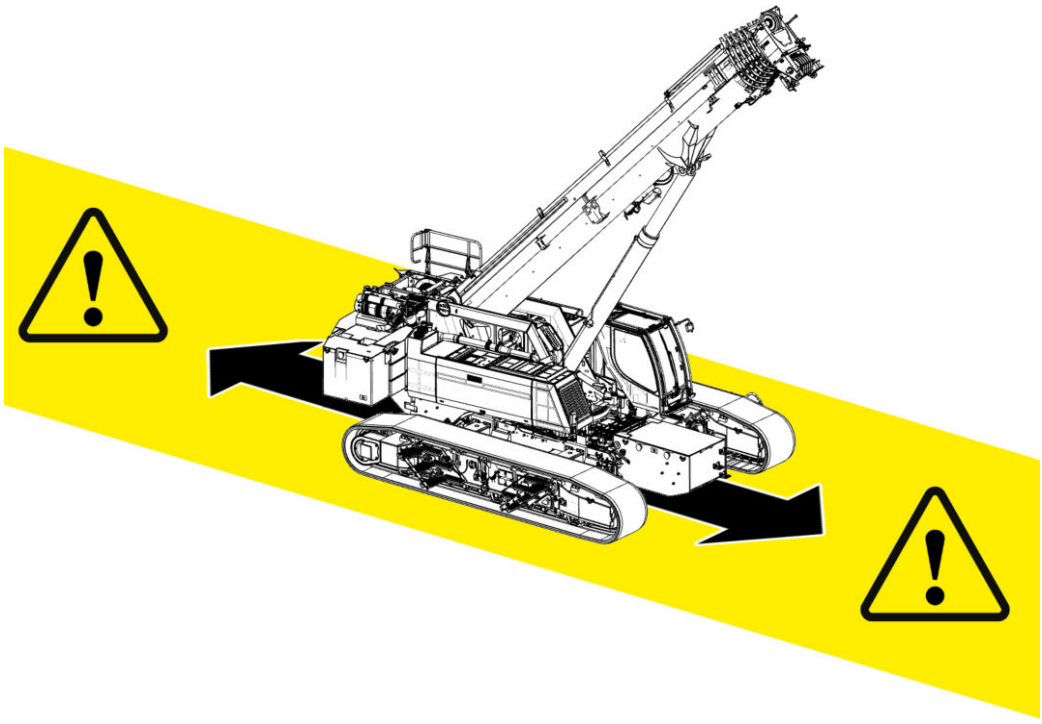


Fig. 1451: Driving in a danger zone

The hazard area includes the crane and the surrounding area as well as the entire travel route.

8.19.2.2 Ground

Travel route

An incorrectly prepared ground can lead to accidents and cause the crane to tip over.

The travel route must fulfil the following prerequisites:
- The maximum incline according to the applicable load chart may **not** be exceeded.
- An incline change must be made continuously. There may not be any edges.
- The ground must be able to safely absorb the occurring crawler pressures.
- The friction coefficient between the crawler travel gear and the ground is high enough to absorb the occurring drive forces and so that the crane **cannot** slip in an incline position.
- Only use the insertion plates if there is still a sufficient friction coefficient.
- Possible environmental influences on the travel route (rain for example) was taken into account in the job planning.
- If possible: The entire travel route can be driven without steering movements.
- When driving with a load: The load can be set down at any moment.
- A sufficient distance from local facilities (power lines, etc.) is ensured.
- The travel route is free of obstacles.

Note

If measures were taken to transfer the forces better to the ground, they must be checked by an expert before starting to drive.

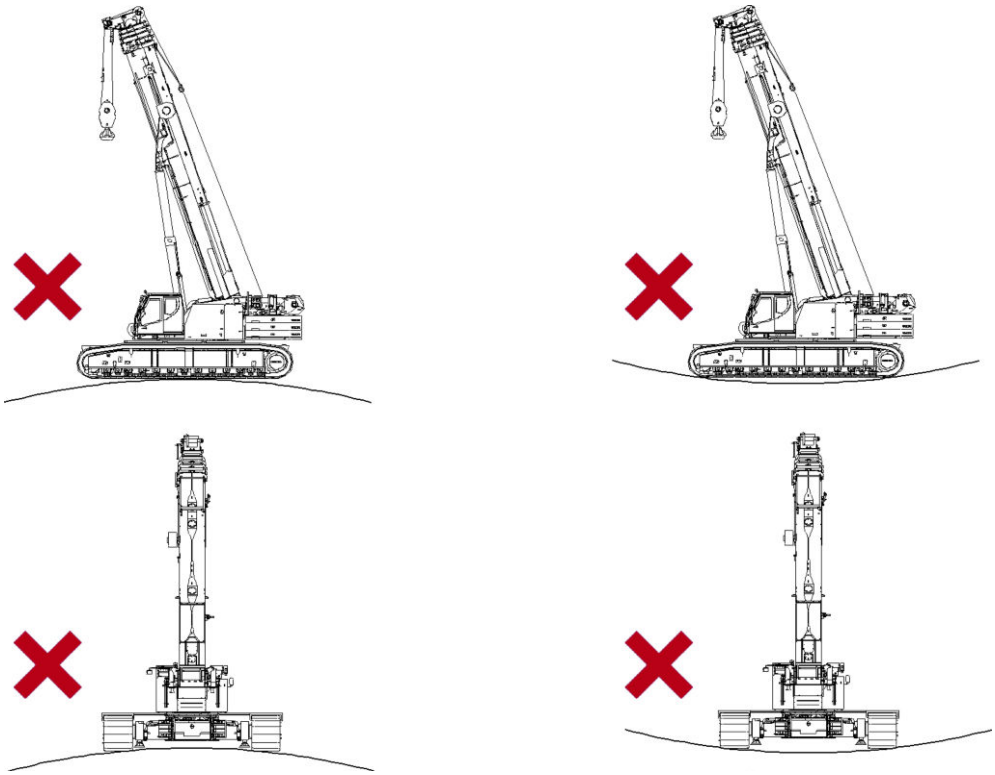


Fig. 1452: Localized pressure on the crawler travel gear

Continuous localized pressure on the crawler travel gear leads to increased wear and damage to the crawler travel gear.

Specifications in order to avoid increased wear and damage to the crawler travel gear:
- Use suitable measures to eliminate deformations in the travel route (such as depressions, crests, track grooves).
- Lay out the travel route in such a way that no steering movements are required, if possible.
- For extended travel operation: Shorten the maintenance intervals.

Uphill and downhill gradients

The crane can slip or fall over when driving incorrectly on uphill and downhill gradients.

Comply with the following specifications when driving on uphill and downhill gradients:
- Observe the required transition lengths on uphill and downhill gradients.
- Do **not** let the crane tip over the edges.
- Drive onto uphill and downhill gradients only at a right angle.
- On uphill and downhill gradients, the “crawler travel gear rapid gear” may **not** be turned on. Reduce the driving speed depending on the conditions of use.
- Adapt the angle of the boom system for uphill and downhill gradients: Keep the center of gravity as centered as possible.
- Do **not** park the crane on uphill or downhill gradients.

Note

When driving with the radio remote control, the center of gravity is **not** displayed. Keep the boom system always at the same angle to the horizontal.

The maximum climbing ability of the crawler crane is limited by the following criteria:
- Unfavorable center of gravity
- Poor friction coefficient between the road and crawler travel gear.
- Insufficient transition length between the horizontal and the uphill incline.

Calculating the required transition length on uphill gradients / downhill gradients

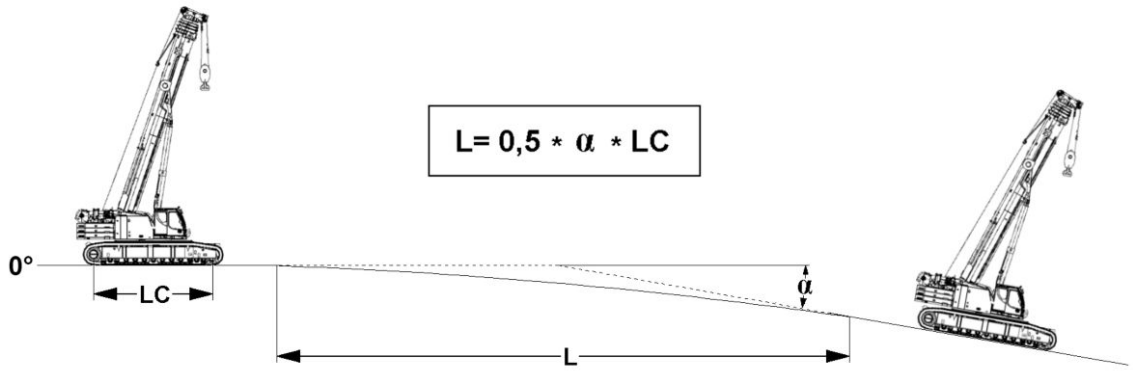


Fig. 1453: Calculating the transition length

L Required transition length
LC Length of crawlers
α Incline angle (degree)

8.19.2.3 Overload of the travel drive

On longer travel routes and / or when driving uphill / downhill, the components of the travel drive could overheat and be damaged.

The components of the travel drive include:
- Travel gear
- Hydraulic motors
- Track rollers

Rules to prevent overloading components:
- Fill up the travel gear to the maximum permissible fill level before starting to drive.
- Check the temperatures of the components while driving with suitable measuring equipment.
- Make sure that the temperature on the components does **not** continuously exceed 90 °C.
- For a short time (up to maximum 10 minutes), the temperature of the components may be between 90 °C and 100 °C.
- If the maximum permissible temperature is reached: Stop travel operation until the temperature of all components has dropped below 90 °C.

8.19.2.4 Center of gravity

If the center of gravity **1** of the crane is outside the core area **2**, then the crane can topple over.

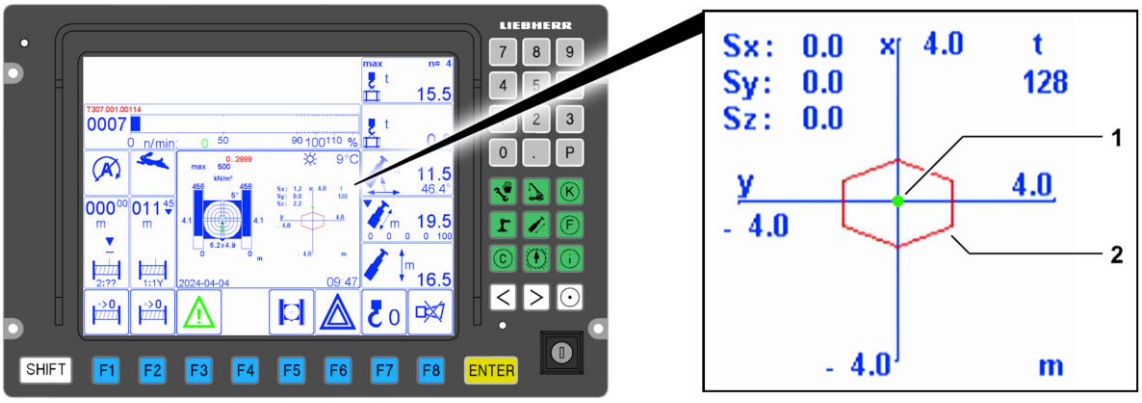


Fig. 1454: Crane operation program - center of gravity display

1 Center of gravity **2** Core area

Make sure that the center of gravity **1** is always within the core area **2**. By adjusting the boom system, the center of gravity **1** can be adjusted to the conditions of the travel route.

Note

The center of gravity is calculated and displayed under ideal conditions.

(→ 5.19.4 Calculating the center of gravity, p. 215)

8.19.2.5 Driving with a load

A collision of the load with the crane or the ground can lead to accidents.

Also observe the following specifications when driving with a load:
- Secure the load to avoid oscillation.
- Observe the maximum driving speed of 0.1 m/s or 0.36 km/h.
- If the 66 % load chart is set up: Observe the maximum driving speed of 0.4 m/s or 1.4 km/h.
- Do **not** turn the crawler travel gear rapid gear on.
  (→ 8.19.6 Turning the crawler travel gear rapid gear on and off, p. 568)
- Do **not** exceed the maximum permissible incline according to the applicable load chart.
- Keep the load as close as possible above the ground.
- The load is freely suspended and cannot collide with anything.
- It must be possible to take down the load onto the ground at any time.
- Keep the boom lengths and boom radius as small as possible.

8.19.2.6 Driving outside of the load chart

The crane can slip or fall over when driving incorrectly on inclines.

Maximum permissible inclines:
- Longitudinal incline smaller than / equal to 25° and lateral incline smaller than / equal to 1°
- Longitudinal incline smaller than / equal to 10° and lateral incline smaller than / equal to 4°

Also observe the following specifications when driving outside of the load chart:
- There is **no** load on the hook.
- Observe the maximum driving speed of 0.1 m/s or 0.36 km/h.
- Do **not** turn the crawler travel gear rapid gear on.
  (→ 8.19.6 Turning the crawler travel gear rapid gear on and off, p. 568)
- Do **not** exceed the maximum permissible incline.
- The engine oil level is at the maximum permissible filling height.
- The superstructure is pinned with the chassis at 0° or 180°.
- The crawler travel gear is set to the wide track width (4.9 m).
- When driving, do **not** perform any other crane movements.

8.19.3 Distribution of the crawler pressure

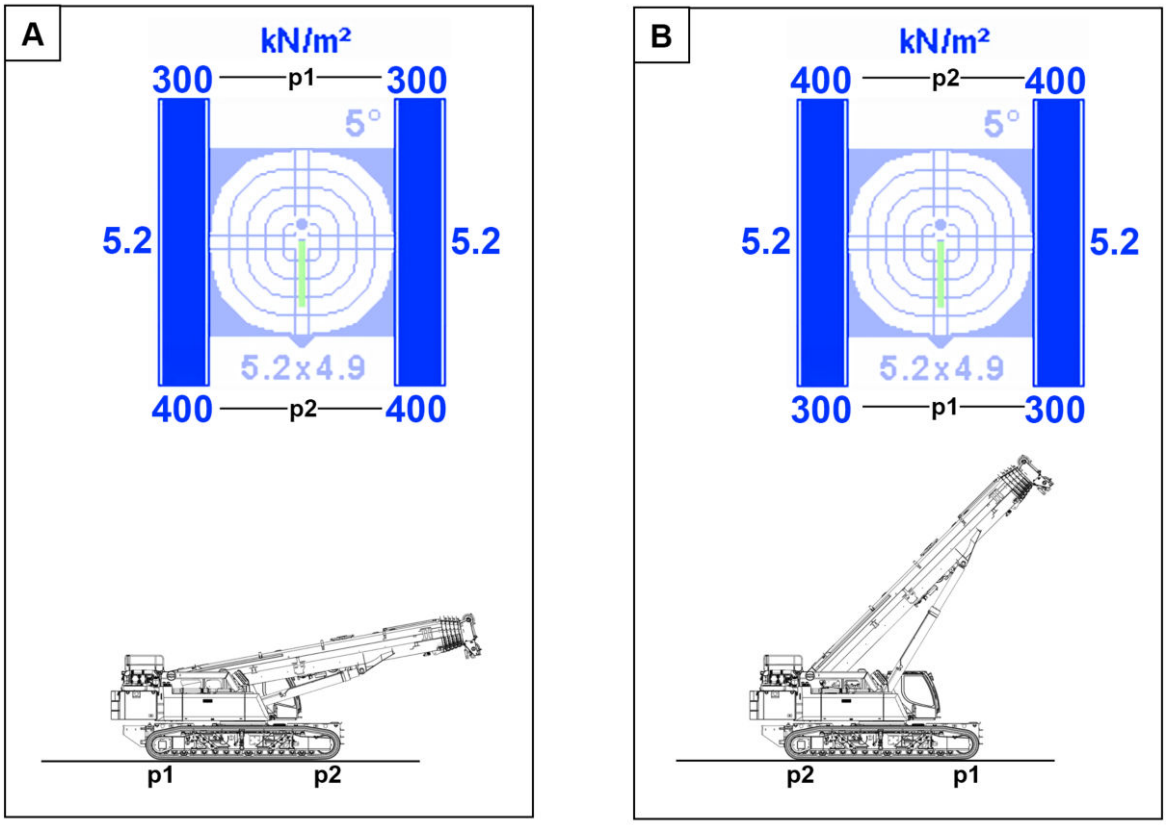


Fig. 1455: Exemplary illustration: Surface pressure distribution

A Crawler travel gear loaded heavier at the front in the travel direction
B Crawler travel gear loaded heavier at the rear in the travel direction
p1 Low crawler pressure
p2 Higher crawler pressure

The radio of the crawler pressure (p1 / p2) should be above 0.3.

Suitable crawler pressure:
- **Turning the superstructure:** Load the crawler travel gear evenly.
- **Driving uphill:** Load the crawler travel gear heavier at the front in the travel direction.
- **Driving downhill:** Load the crawler travel gear heavier at the rear in the travel direction.

8.19.4 Steering ability

Note
Steering movements lead to a higher crawler travel track load.

▶ If possible, do not perform steering movements with a load.

If possible:
▶ Set down the load before steering movements are performed.

The steering ability depends on the following factors:
- Friction ratios between the crawler travel gear and ground.
- Evenness of the ground: In the case of localized pressure on the crawler travel track, steering is **not** possible.
- Load bearing capacity of the ground: Sinking the crawler travel track considerably reduces steering.

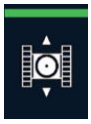
– Center of gravity position: If the center of gravity is in the center of the crane, steering is limited or **not** possible.

Steering ability can be improved with the following measures:
– Placing plates, sand or gravel below the crawler travel gear.
– Watering the ground (**not** permissible when driving on inclines!)
– Shifting the center of gravity.

8.19.5 Turning travel mode on and off

Make sure that the following prerequisites are met:
❑ The crane is at a standstill.
❑ All control systems are in the zero position.

Fig. 1456: Side window operating unit



▶ Press the *travel mode* button.

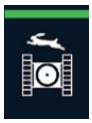
8.19.6 Turning the crawler travel gear rapid gear on and off

Fig. 1458: Side window operating unit

DANGER
Excessive driving speed when driving!
The crane can topple over.

When driving with a load:
▶ Do **not** turn the crawler travel gear rapid gear on.

If driving outside the load chart:
▶ Do **not** turn the crawler travel gear rapid gear on.



▶ Press the *crawler travel gear rapid gear* button.

8.19.7 Turning the crawler travel gear parallel travel on and off

Make sure that the following prerequisites are met:
❑ The crane is at a standstill.

Fig. 1460: Side window operating unit

▶ Press the *crawler travel gear parallel travel* button.

8.19.8 Driving

Always initiate and decelerate crane movements carefully.

Perform a change in travel direction only at a standstill.

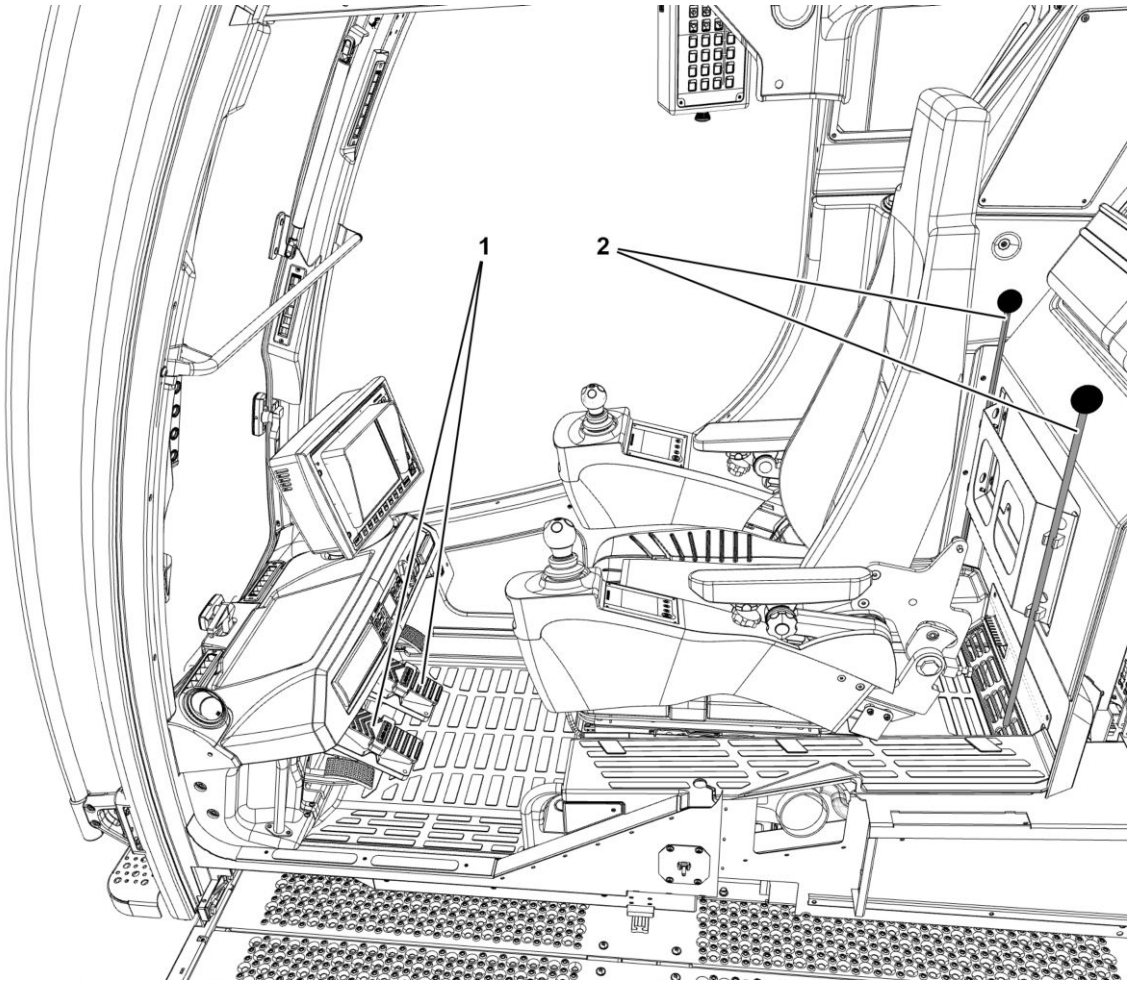


Fig. 1462: Crane cab - Park position lever for control pedals

1 Control pedal **2** Lever

The crawler travel track is operated with the control pedals **1**. The lever **2** in the control pedals **1** can be used for easier operation.

Make sure that the following prerequisites are met:
❑ The checklist is fulfilled.
(→ 8.19.1 Driving checklist, p. 562)(→ 8.20.1 Driving checklist, p. 574)

DANGER
Impermissible crane incline, crawler pressure or center of gravity!
The crane can topple over.
The crane travel gear is **not** shut off.

▶ Only drive the crane on permissible inclines.

▶ Do **not** exceed the maximum permissible crawler pressure of the travel route. If necessary, adjust the boom system to better distribute the surface pressure.

▶ Make sure that the center of gravity is always within the core area.

8.19.8.1 Driving in normal travel

During normal travel, every control pedal is assigned to a crawler carrier. The assignment is always from the point of view of the superstructure.

If the superstructure is turned when driving above the threshold value (slewing angle ±90°), the assignment changes only when both control pedals are in the zero position.

Make sure that the following prerequisites are met:
- ❑ Travel mode is turned on.
  (→ 8.19.5 Turning travel mode on and off, p. 568)
- ❑ Crawler travel gear parallel travel is turned off.
  (→ 8.19.7 Turning the crawler travel gear parallel travel on and off, p. 569)

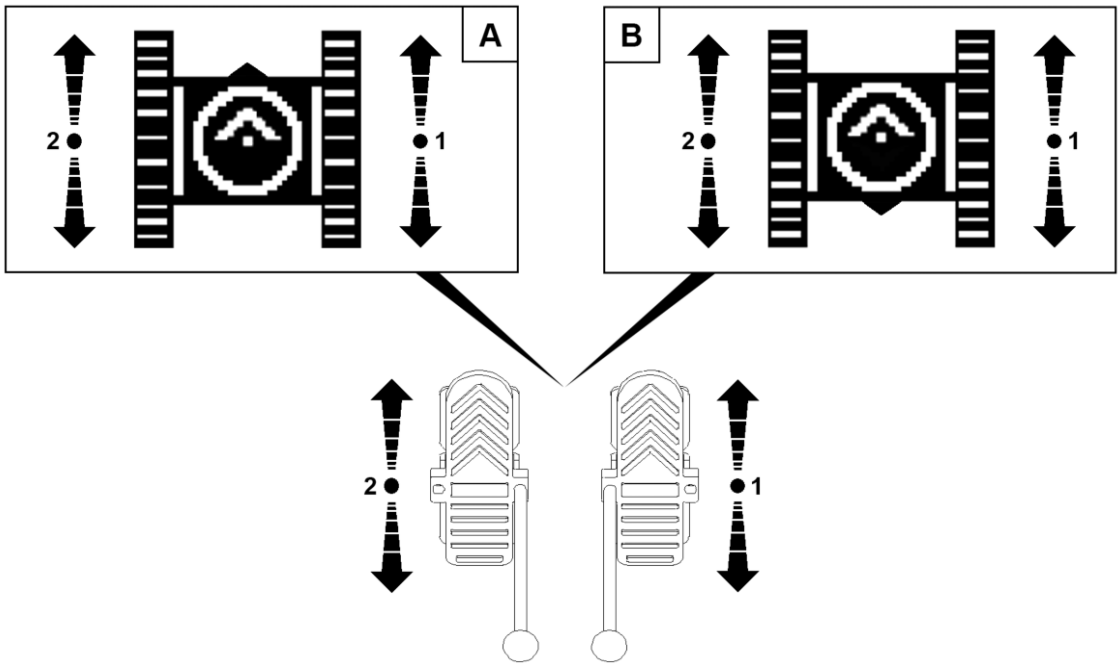


Fig. 1463: Normal travel control pedal assignment

1 Control pedal

2 Control pedal

A Superstructure turned to the front (slewing angle 90° to 180°)

B Superstructure turned to the rear (slewing angle 0° to 90°)

NOTICE
Steering in small radii!
Increased wear on the crawler travel gear

- ▶ If possible, always drive in curves with large radii.
- ▶ Avoid turning over a stationary crawler chain, if possible.
- ▶ Avoid turning on the spot, if possible.

- ▶ Actuate the control pedals according to the desired travel direction.

8.19.8.2 Driving in parallel travel

During parallel travel, both crawler carriers can be operated with control pedal 1. Control pedal 2 is used in addition for driving in curves.

The travel direction is always assigned to the position of the superstructure.

If the superstructure is turned when driving above the threshold value (slewing angle ±90°), the driving direction changes only when both control pedals are in the zero position.

Make sure that the following prerequisites are met:
❑ Travel mode is turned on.
(→ 8.19.5 Turning travel mode on and off, p. 568)
❑ Crawler travel gear parallel travel is turned on.
(→ 8.19.7 Turning the crawler travel gear parallel travel on and off, p. 569)

Drive straight

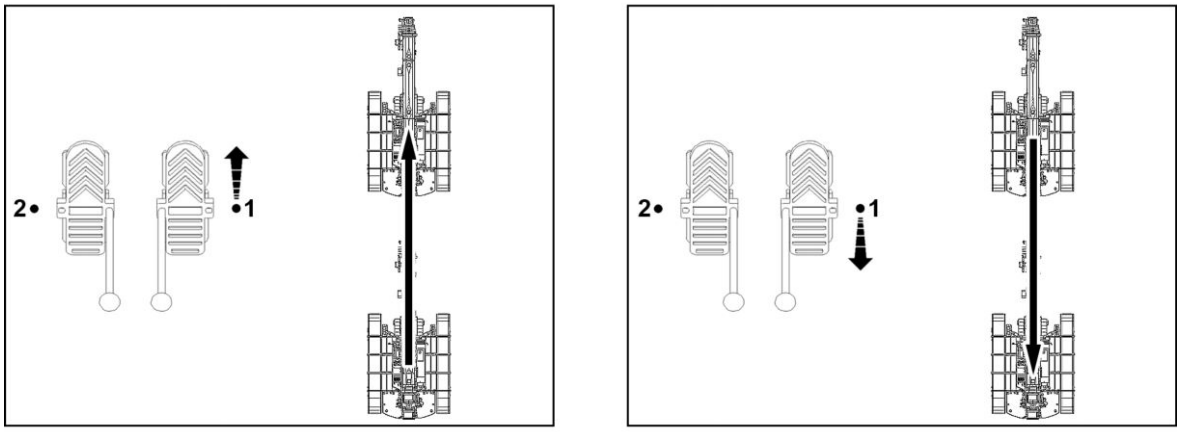


Fig. 1464: Parallel travel - driving straight

1 Control pedal **2** Control pedal

▶ Actuate the control pedal **1** according to the desired travel direction.

Driving in curves

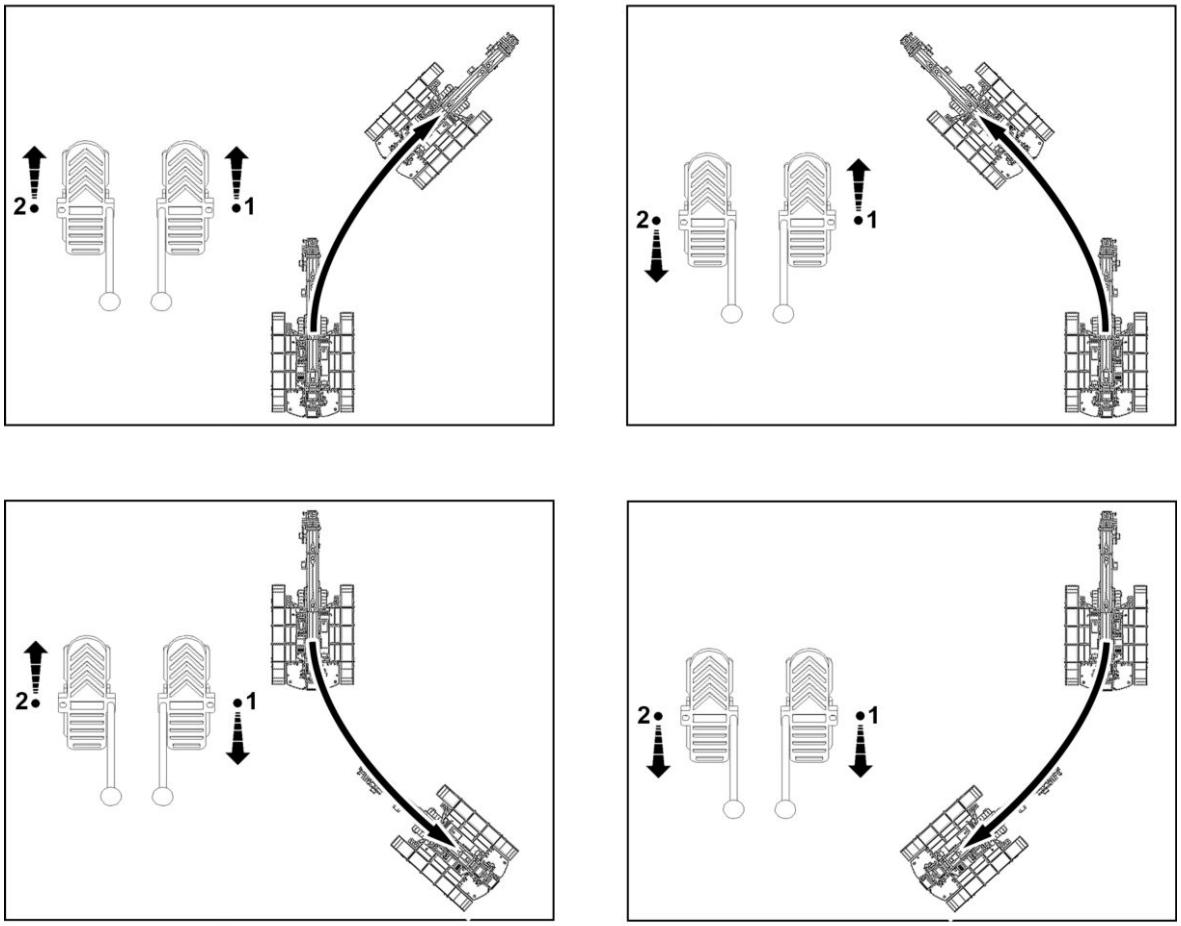


Fig. 1465: Parallel travel - driving in curves

1 Control pedal **2** Control pedal

The stronger the control pedal **2** is pressed, the more narrow the curves are driven.

If the control pedal **2** is actuated completely, the right or left crawler chain is stopped depending on the travel direction.

Turning on the spot is **not** possible in parallel travel.

NOTICE
Steering in small radii!
Increased wear on the crawler travel gear

- ▶ If possible, always drive in curves with large radii.
- ▶ Avoid turning over a stationary crawler chain, if possible.
- ▶ Avoid turning on the spot, if possible.

- ▶ Actuate the control pedals according to the desired travel direction.

8.20 Driving with expanded crane remote control

8.20.1 Driving checklist

Make sure that the following prerequisites are met:

Job planning
- ❑ Job planning is carried out.
- ❑ The travel route is selected.
- ❑ The optimal positions for the boom system were determined for the travel route to ensure as even a crawler pressure as possible.
- ❑ Job planning was carried out with the actual set up configuration of the crane on the job planner or the Crane Planner.

Travel condition
- ❑ If driving **inside** the load chart: The crane is in the set up configuration according to the selected chart.
- ❑ If driving **outside** the load chart: Observe the additional specifications.
- ❑ Warning and safety equipment is available, functional and correctly set.
- ❑ The crane is free of defects.
- ❑ No loose parts on the crane.
- ❑ Maintenance carried out according to the maintenance and inspection plan.
- ❑ All covers, storage compartments and tool boxes are closed.
- ❑ The hook block is secured to prevent it from swinging back and forth.

Environment
- ❑ The travel route complies with the specifications.
- ❑ A guide for monitoring the crane while driving is present.
- ❑ **No** personnel or objects are in the danger zone.

Equipment and attachment parts
- ❑ The equipment and attachment parts are secured against loosening up by themselves.

Crane cab
- ❑ The crane cab is completely luffed down.
- ❑ The crane cab door is closed.
- ❑ The windows are free. The field of vision is **not** restricted.

Control
- ❑ The crane set up configuration is set in the *set up* menu.
- ❑ The maximum permissible crawler pressure of the travel route is set on the superstructure monitor.
  (→ 8.15.7 Setting crawler pressure monitoring, p. 518)
- ❑ The safety equipment is **not** bypassed.
- ❑ All displays are functional and within a permissible range.

8.20.2 Safety

⚠ **This section supplements the “Safety” chapter.**

8.20.2.1 Danger zone when driving

Observe the additional safety instructions(→ 5.7 Danger zone, p. 167).

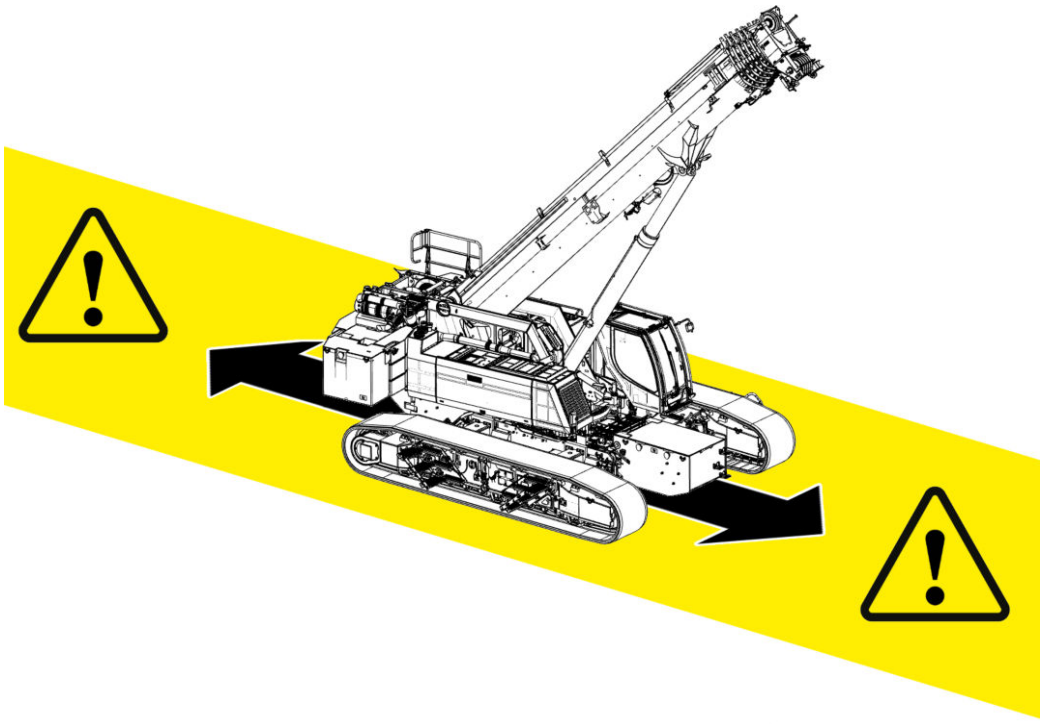


Fig. 1467: Driving in a danger zone

The hazard area includes the crane and the surrounding area as well as the entire travel route.

8.20.2.2 Ground

Travel route

An incorrectly prepared ground can lead to accidents and cause the crane to tip over.

The travel route must fulfil the following prerequisites:
- The maximum incline according to the applicable load chart may **not** be exceeded.
- An incline change must be made continuously. There may not be any edges.
- The ground must be able to safely absorb the occurring crawler pressures.
- The friction coefficient between the crawler travel gear and the ground is high enough to absorb the occurring drive forces and so that the crane **cannot** slip in an incline position.
- Only use the insertion plates if there is still a sufficient friction coefficient.
- Possible environmental influences on the travel route (rain for example) was taken into account in the job planning.
- If possible: The entire travel route can be driven without steering movements.
- When driving with a load: The load can be set down at any moment.
- A sufficient distance from local facilities (power lines, etc.) is ensured.
- The travel route is free of obstacles.

Note

If measures were taken to transfer the forces better to the ground, they must be checked by an expert before starting to drive.

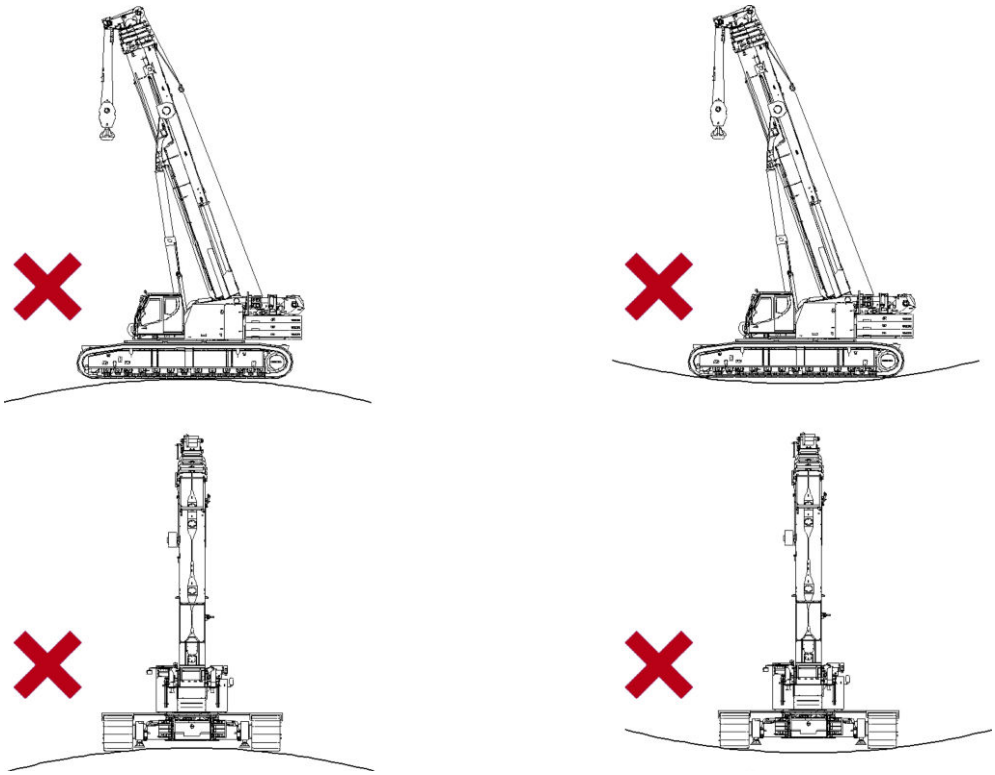


Fig. 1468: Localized pressure on the crawler travel gear

Continuous localized pressure on the crawler travel gear leads to increased wear and damage to the crawler travel gear.

Specifications in order to avoid increased wear and damage to the crawler travel gear:
- Use suitable measures to eliminate deformations in the travel route (such as depressions, crests, track grooves).
- Lay out the travel route in such a way that no steering movements are required, if possible.
- For extended travel operation: Shorten the maintenance intervals.

Uphill and downhill gradients

The crane can slip or fall over when driving incorrectly on uphill and downhill gradients.

Comply with the following specifications when driving on uphill and downhill gradients:
- Observe the required transition lengths on uphill and downhill gradients.
- Do **not** let the crane tip over the edges.
- Drive onto uphill and downhill gradients only at a right angle.
- On uphill and downhill gradients, the “crawler travel gear rapid gear” may **not** be turned on. Reduce the driving speed depending on the conditions of use.
- Adapt the angle of the boom system for uphill and downhill gradients: Keep the center of gravity as centered as possible.
- Do **not** park the crane on uphill or downhill gradients.

Note

When driving with the radio remote control, the center of gravity is **not** displayed. Keep the boom system always at the same angle to the horizontal.

The maximum climbing ability of the crawler crane is limited by the following criteria:
- Unfavorable center of gravity
- Poor friction coefficient between the road and crawler travel gear.
- Insufficient transition length between the horizontal and the uphill incline.

Calculating the required transition length on uphill gradients / downhill gradients

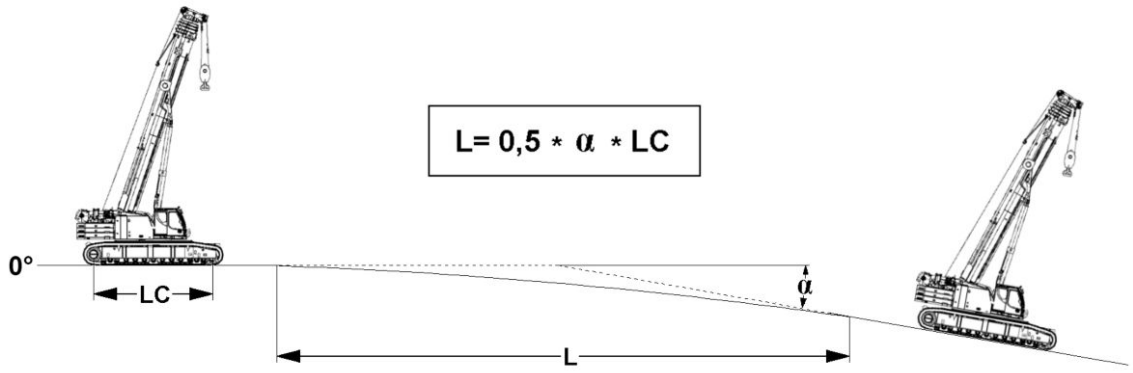


Fig. 1469: Calculating the transition length

L Required transition length
LC Length of crawlers
α Incline angle (degree)

8.20.2.3 Overload of the travel drive

On longer travel routes and / or when driving uphill / downhill, the components of the travel drive could overheat and be damaged.

The components of the travel drive include:
- Travel gear
- Hydraulic motors
- Track rollers

Rules to prevent overloading components:
- Fill up the travel gear to the maximum permissible fill level before starting to drive.
- Check the temperatures of the components while driving with suitable measuring equipment.
- Make sure that the temperature on the components does **not** continuously exceed 90 °C.
- For a short time (up to maximum 10 minutes), the temperature of the components may be between 90 °C and 100 °C.
- If the maximum permissible temperature is reached: Stop travel operation until the temperature of all components has dropped below 90 °C.

8.20.2.4 Center of gravity

If the center of gravity **1** of the crane is outside the core area **2**, then the crane can topple over.

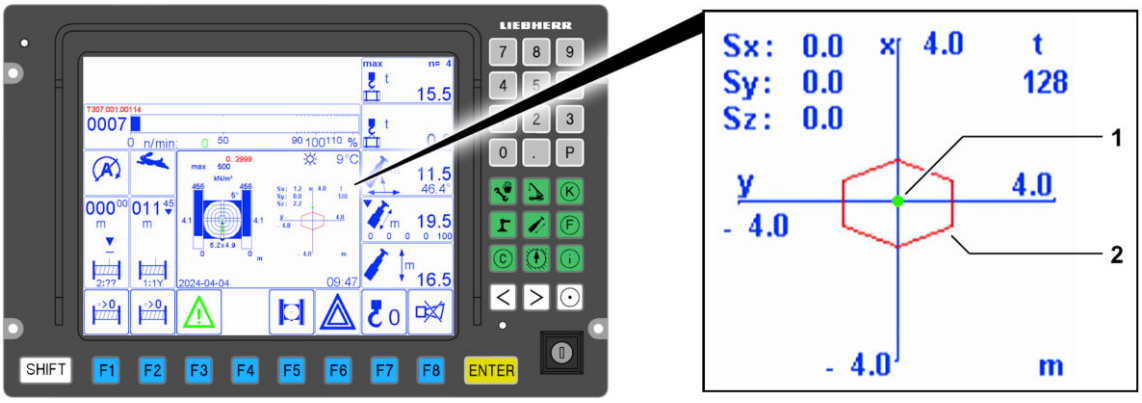


Fig. 1470: Crane operation program - center of gravity display

1 Center of gravity **2** Core area

Make sure that the center of gravity **1** is always within the core area **2**. By adjusting the boom system, the center of gravity **1** can be adjusted to the conditions of the travel route.

Note

The center of gravity is calculated and displayed under ideal conditions.

(→ 5.19.4 Calculating the center of gravity, p. 215)

8.20.2.5 Driving with a load

A collision of the load with the crane or the ground can lead to accidents.

Also observe the following specifications when driving with a load:
- Secure the load to avoid oscillation.
- Observe the maximum driving speed of 0.1 m/s or 0.36 km/h.
- If the 66 % load chart is set up: Observe the maximum driving speed of 0.4 m/s or 1.4 km/h.
- Do **not** turn the crawler travel gear rapid gear on.
  (→ 8.19.6 Turning the crawler travel gear rapid gear on and off, p. 568)
- Do **not** exceed the maximum permissible incline according to the applicable load chart.
- Keep the load as close as possible above the ground.
- The load is freely suspended and cannot collide with anything.
- It must be possible to take down the load onto the ground at any time.
- Keep the boom lengths and boom radius as small as possible.

8.20.2.6 Driving outside of the load chart

The crane can slip or fall over when driving incorrectly on inclines.

Maximum permissible inclines:
- Longitudinal incline smaller than / equal to 25° and lateral incline smaller than / equal to 1°
- Longitudinal incline smaller than / equal to 10° and lateral incline smaller than / equal to 4°

Also observe the following specifications when driving outside of the load chart:
- There is **no** load on the hook.
- Observe the maximum driving speed of 0.1 m/s or 0.36 km/h.
- Do **not** turn the crawler travel gear rapid gear on.
  (→ 8.19.6 Turning the crawler travel gear rapid gear on and off, p. 568)
- Do **not** exceed the maximum permissible incline.
- The engine oil level is at the maximum permissible filling height.
- The superstructure is pinned with the chassis at 0° or 180°.
- The crawler travel gear is set to the wide track width (4.9 m).
- When driving, do **not** perform any other crane movements.

8.20.3 Distribution of the crawler pressure

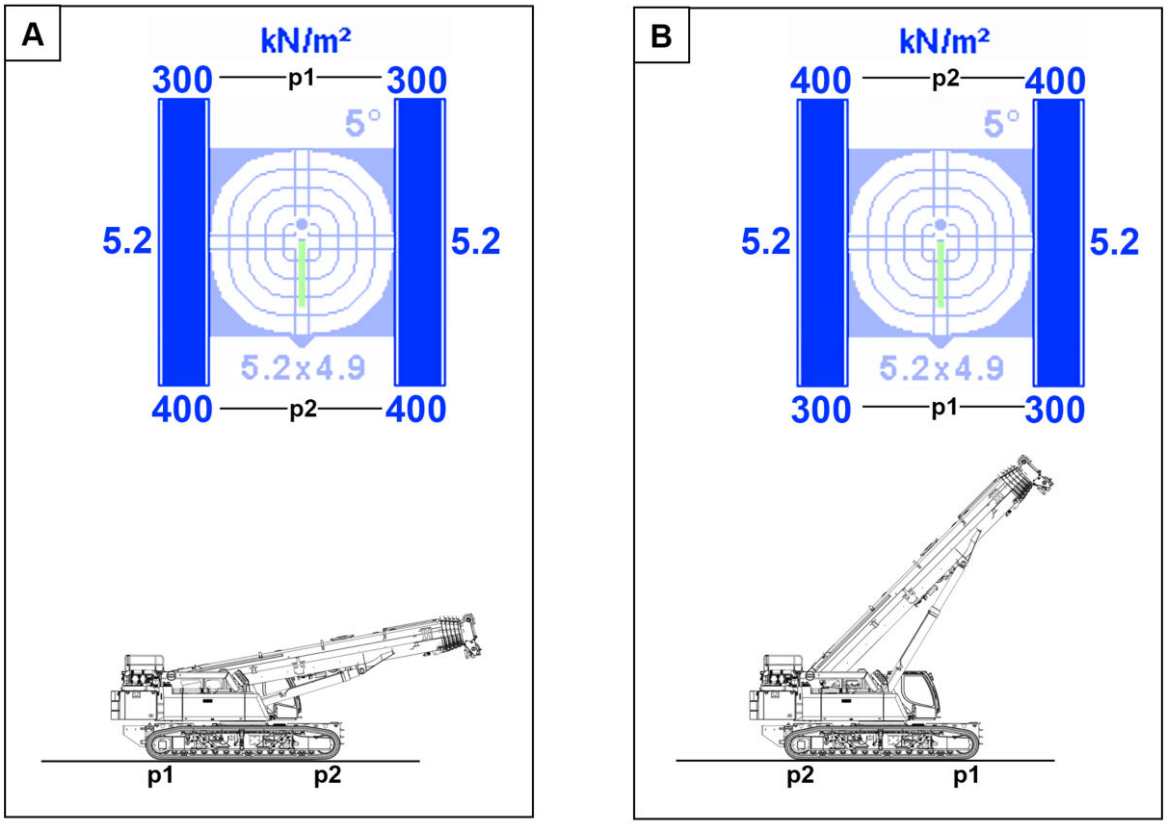


Fig. 1471: Exemplary illustration: Surface pressure distribution

A Crawler travel gear loaded heavier at the front in the travel direction
B Crawler travel gear loaded heavier at the rear in the travel direction
p1 Low crawler pressure
p2 Higher crawler pressure

The radio of the crawler pressure (p1 / p2) should be above 0.3.

Suitable crawler pressure:
- **Turning the superstructure:** Load the crawler travel gear evenly.
- **Driving uphill:** Load the crawler travel gear heavier at the front in the travel direction.
- **Driving downhill:** Load the crawler travel gear heavier at the rear in the travel direction.

8.20.4 Steering ability

Note
Steering movements lead to a higher crawler travel track load.

▶ If possible, do not perform steering movements with a load.

If possible:
▶ Set down the load before steering movements are performed.

The steering ability depends on the following factors:
- Friction ratios between the crawler travel gear and ground.
- Evenness of the ground: In the case of localized pressure on the crawler travel track, steering is **not** possible.
- Load bearing capacity of the ground: Sinking the crawler travel track considerably reduces steering.

– Center of gravity position: If the center of gravity is in the center of the crane, steering is limited or **not** possible.

Steering ability can be improved with the following measures:
– Placing plates, sand or gravel below the crawler travel gear.
– Watering the ground (**not** permissible when driving on inclines!)
– Shifting the center of gravity.

8.20.5 Turning travel mode on and off

Make sure that the following prerequisites are met:
❑ The crane is at a standstill.
❑ All control systems are in the zero position.
❑ The *travel operation* menu is displayed.
(→ Opening the travel operation menu, p. 486)

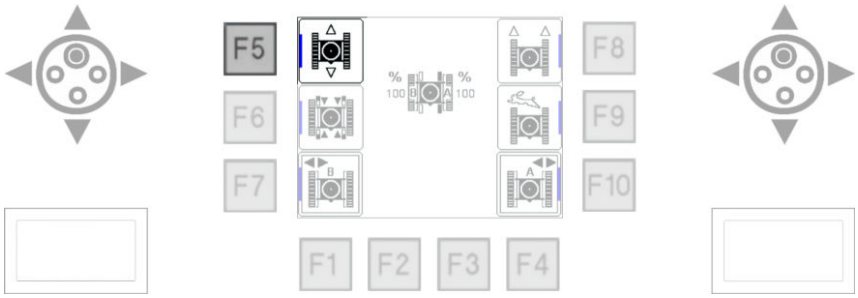


Fig. 1472: Travel operation menu

▶ Press the *travel mode* F-button.

8.20.6 Turning the crawler travel gear rapid gear on and off

Make sure that the following prerequisites are met:
❑ The *travel operation* menu is displayed.
(→ Opening the travel operation menu, p. 486)

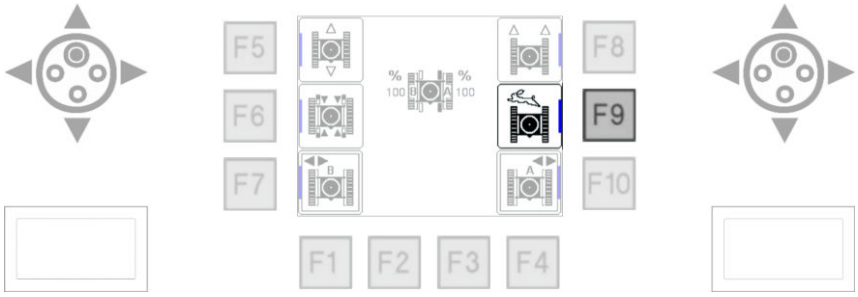


Fig. 1474: Travel operation menu

DANGER
Excessive driving speed when driving!
The crane can topple over.

When driving with a load:
▶ Do **not** turn the crawler travel gear rapid gear on.

If driving outside the load chart:
▶ Do **not** turn the crawler travel gear rapid gear on.

▶ Press the *crawler travel gear rapid gear* F-button.

8.20.7 Turning the crawler travel gear parallel travel on and off

Make sure that the following prerequisites are met:
❑ The crane is at a standstill.
❑ The *travel operation* menu is displayed.
(→ Opening the travel operation menu, p. 486)

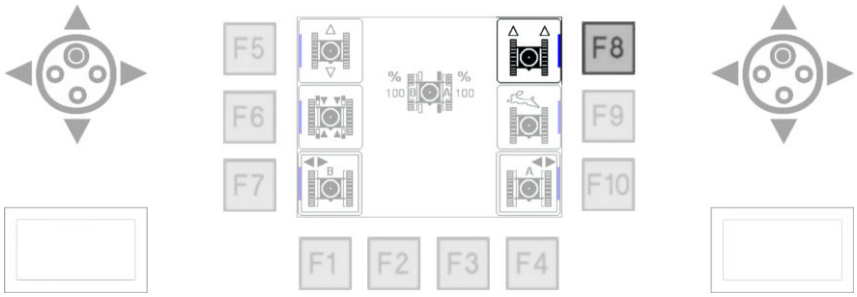


Fig. 1476: Travel operation menu

▶ Press the *crawler travel gear parallel travel* F-button.

8.20.8 Driving

Make sure that the following prerequisites are met:
❑ The checklist is fulfilled.
(→ 8.19.1 Driving checklist, p. 562)(→ 8.20.1 Driving checklist, p. 574)

DANGER
Impermissible crane incline, crawler pressure or center of gravity!
The crane can topple over.
The crane travel gear is **not** shut off.

▶ Only drive the crane on permissible inclines.

▶ Do **not** exceed the maximum permissible crawler pressure of the travel route. If necessary, adjust the boom system to better distribute the surface pressure.

▶ Make sure that the center of gravity is always within the core area.

8.20.8.1 Driving in normal travel

During normal travel, every control lever is assigned to a crawler carrier. The assignment is always from the point of view of the superstructure.

If the superstructure is turned when driving above the threshold value (slewing angle ±90°), the assignment changes only when both control levers are in the zero position.

Make sure that the following prerequisites are met:
- ❑ Travel mode is turned on.
  (→ 8.20.5 Turning travel mode on and off, p. 580)
- ❑ Crawler travel gear parallel travel is turned off.
  (→ 8.20.7 Turning the crawler travel gear parallel travel on and off, p. 581)
- ❑ The *crane operation* menu is displayed.
  (→ Opening the crane operation menu, p. 486)

Fig. 1478: Exemplary illustration: Crane operation menu

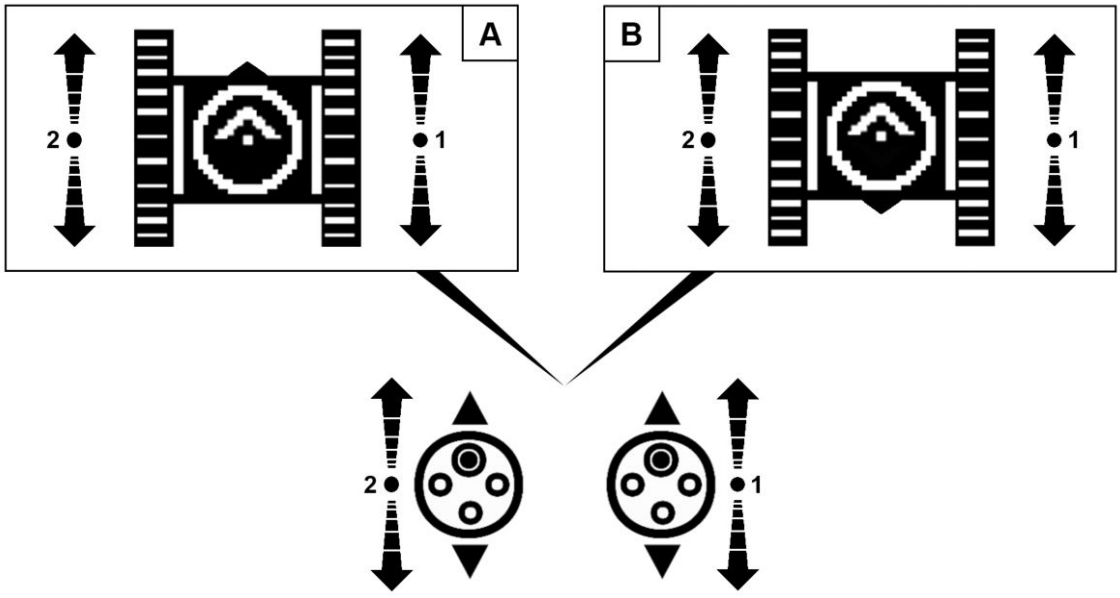


Fig. 1479: Normal travel control lever assignment

1 Control lever

2 Control lever

A Superstructure turned to the front (slewing angle 90° to 180°)

B Superstructure turned to the rear (slewing angle 0° to 90°)

NOTICE
Steering in small radii!
Increased wear on the crawler travel gear

- ▶ If possible, always drive in curves with large radii.
- ▶ Avoid turning over a stationary crawler chain, if possible.
- ▶ Avoid turning on the spot, if possible.

- ▶ Move the control lever in the desired travel direction.

8.20.8.2 Driving in parallel travel

During parallel travel, both crawler carriers can be operated with one control lever. The travel direction is always assigned to the position of the superstructure.

If the superstructure is turned when driving above the threshold value (slewing angle ±90°), the driving direction changes only when both control levers are in the zero position.

Control lever 1 **or** control lever 2 can be used.

Make sure that the following prerequisites are met:
- ❑ Travel mode is turned on.
  (→ 8.20.5 Turning travel mode on and off, p. 580)
- ❑ Crawler travel gear parallel travel is turned on.
  (→ 8.20.7 Turning the crawler travel gear parallel travel on and off, p. 581)
- ❑ The *crane operation* menu is displayed.
  (→ Opening the crane operation menu, p. 486)

Fig. 1480: Exemplary illustration: Crane operation menu

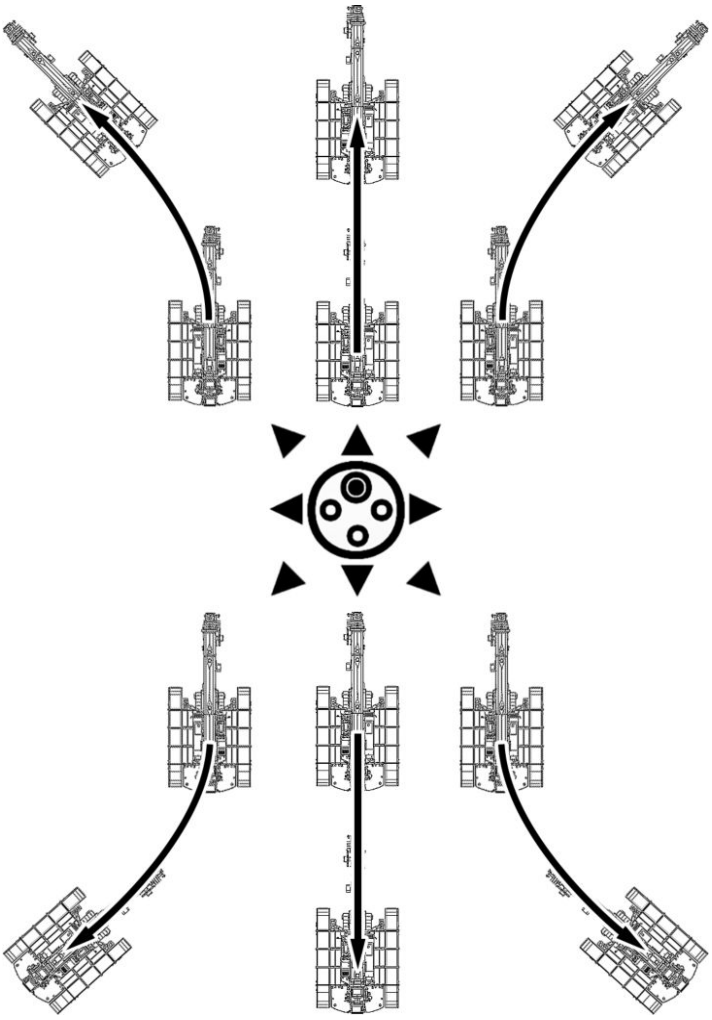


Fig. 1481: Parallel travel control lever assignment

The further the control lever is moved to the left or the right, the more narrow the curves are driven.

If the control lever is moved completely to the left or the right, the right or left crawler chain is stopped depending on the travel direction.

Turning on the spot is **not** possible in parallel travel.

NOTICE
Steering in small radii!
Increased wear on the crawler travel gear

- ▶ If possible, always drive in curves with large radii.
- ▶ Avoid turning over a stationary crawler chain, if possible.
- ▶ Avoid turning on the spot, if possible.

- ▶ Move the control lever in the desired travel direction.

8.21 Two hook operation

Two hook operation that is **not** monitored is permissible for this crane with the following boom systems:
- Telescopic boom with boom nose*
- Telescopic boom with folding jib*
- Telescopic boom with special folding jib*

8.21.1 Safety

This section supplements the “Safety” chapter.

8.21.1.1 Reeving in the hoist rope in two hook operation

If the hoist ropes are reeved in incorrectly during two hook operation, the crane can be overloaded or the hoist ropes can be damaged.

Observe the following rules:
- The reeving on the auxiliary boom must be less than or equal to the reeving on the telescopic boom.
- Reeve in the hoist rope of winch 1 on the telescopic boom.
- Reeve in the hoist rope of winch 2 on the auxiliary boom.

8.21.1.2 Imprecise displays for boom radius and actual load

In **non** monitored two hook operation, the displays for boom radius and actual load can deviate from the actual values.

The crane can topple over.

Observe the following rules:
– Only move the crane within the permissible utilization range.

8.21.2 Two hook operation with boom nose*

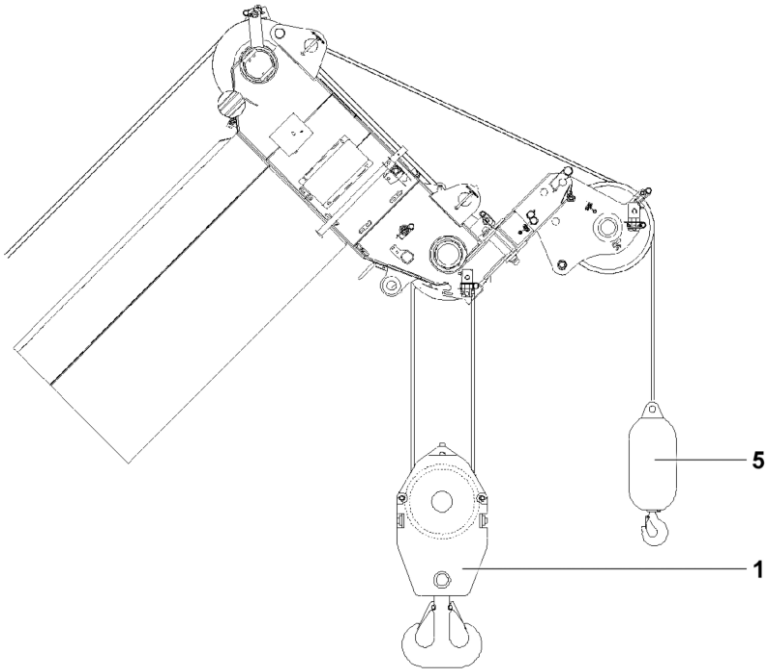


Fig. 1483: Exemplary illustration: Two hook operation with boom nose

1 Load position (telescopic boom) **5** Load position (boom nose)

DANGER
Impermissible operating conditions!
The crane can be overloaded.

▶ Only operate the crane in permissible operating conditions according to the following specifications.

Utilized load position	Illustration	Description	Warning
1		**Single hook operation:** Hook block / load hook reeved in on the telescopic boom. The load is lifted with the telescopic boom.	Actual load display inexact.
5		**Single hook operation:** Hook block / load hook reeved in on the boom nose. The load is lifted with the boom nose.	The boom radius and actual load display is not precise.
1		**Two hook operation:** One hook block and one load hook are reeved in on the telescopic boom and boom nose. The load is lifted with the telescopic boom.	Actual load display inexact.

Utilized load position	Illustration	Description	Warning
5		**Two hook operation:** One hook block and one load hook are reeved in on the telescopic boom and boom nose. The load is lifted with the boom nose.	The boom radius and actual load display is not precise.

Tab. 96: Permissible operating states with installed boom nose

Make sure that the following prerequisites are met:
- ❑ The boom nose is correctly installed and in the operating position.
  (→ 10.11.2 Assembling the boom nose, p. 847)
  (→ 10.11.1 Swinging into the operating position, p. 846)
- ❑ The telescopic boom and boom nose are reeved in according to the reeving plan.
  (→ 10.4.7 Reeving the telescopic boom in, p. 723)
  (→ 10.11.4 Reeving the hoist rope in, p. 849)
- ❑ Telescopic boom operation (operating mode T) is *set in the set up* menu.
  (→ 8.6.2 Entering the set up configuration manually, p. 413)
- ❑ The crane set up configuration and settings in the *set up* main menu match.

Note

Two hook operation **cannot** be set up and is **not** monitored.

The settings in the *set up* menu must be checked before each load hoist and adjusted if necessary.

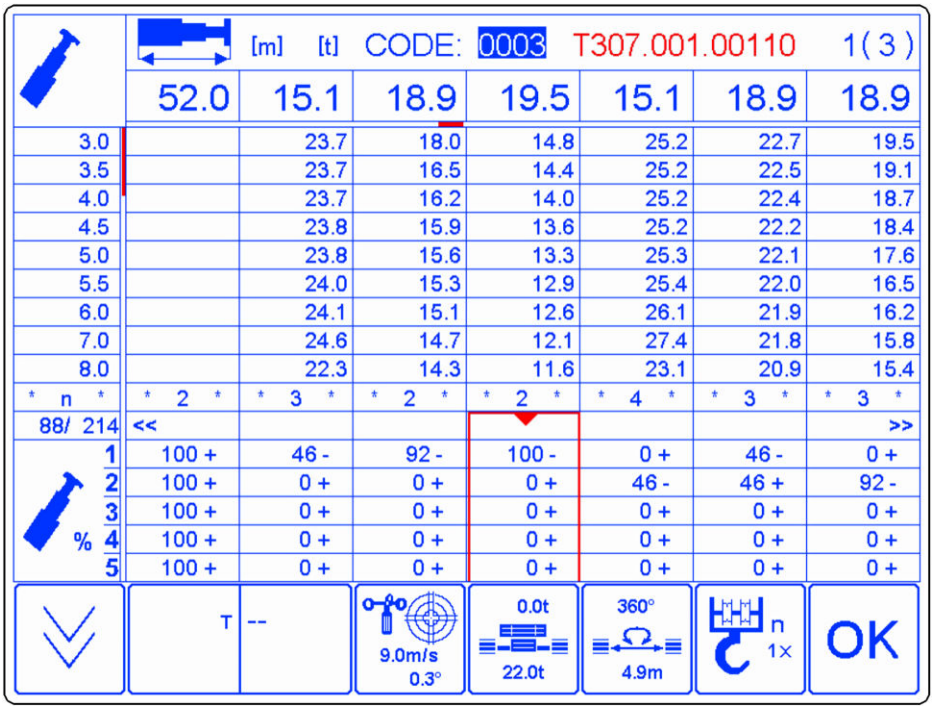


Fig. 1488: Exemplary illustration: Set up menu

Depending on if the telescopic boom or the boom nose is used to lift the load, the reeving must be adjusted.

DANGER
Incorrect reeving selected!
The crane can topple over

▶ The reeving must be set for the utilized load position.

▶ Select the reeving for the utilized load position.

When all settings in the *set up* menu are correct:
▶ Confirm the set up configuration.

▶ Lift the load with the telescopic boom.
or
Lift the load with the boom nose.

8.21.3 Two hook operation with folding jib*

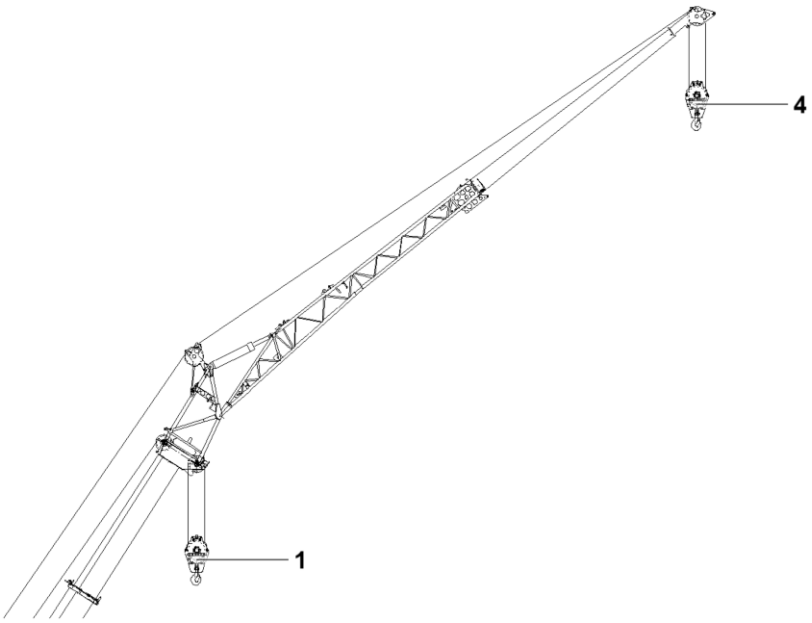


Fig. 1491: Exemplary illustration: Two hook operation with folding jib

1 Load position (telescopic boom) **4** Load position (folding jib)

DANGER
Impermissible operating conditions!
The crane can be overloaded.

▶ Only operate the crane in permissible operating conditions according to the following specifications.

Utilized load position	Illustration	Description	Warning
4		**Single hook operation:** Hook block / load hook reeved in on the folding jib. The load is lifted with the folding jib.	-
1		**Two hook operation:** One hook block and one load hook are reeved in on the telescopic boom and folding jib. The load is lifted with the telescopic boom.	The boom radius and actual load display is not precise.
4		**Two hook operation:** One hook block and one load hook are reeved in on the telescopic boom and folding jib. The load is lifted with the folding jib.	Actual load display inexact.
1 + 4		**Two hook operation:** One hook block and one load hook are reeved in on the telescopic boom and folding jib. The load is lifted together with the telescopic boom and folding jib.	The boom radius and actual load display is not precise.

Tab. 97: Permissible operating states with installed folding jib

Make sure that the following prerequisites are met:
- ❑ The folding jib is correctly installed and in the operating position.
  (→ 10.8.5 Assembling the folding jib , p. 786)
  (→ 10.8.3 Swinging into the operating position, p. 773)
  (→ 10.9.4 Assembling the special folding jib, p. 830)
  (→ 10.9.3 Swinging into the operating position, p. 827)
- ❑ The telescopic boom and folding jib are reeved in according to the reeving plan.
  (→ 10.4.7 Reeving the telescopic boom in, p. 723)
  (→ 10.8.6 Reeving the hoist rope in, p. 787)
  (→ 10.9.6 Reeving in the hoist rope, p. 833)
- ❑ The folding jib is reeved in less than or equal to the telescopic boom.
- ❑ The reeving in the *set up* menu is set on the folding jib.
  (→ 8.6.1 Entering the set up configuration via the short code, p. 412)
  (→ 8.6.2 Entering the set up configuration manually, p. 413)
- ❑ The crane set up configuration and settings in the *set up* menu match.
- ❑ The weight of the load is less than the maximum load of the folding jib.

Note

Two hook operation **cannot** be set up and is **not** monitored.

Only the maximum load according to the set up folding jib may be lifted. This also applies when a higher load could be reached on the telescopic boom.

▶ Lift the load with the telescopic boom.

or

Lift the load with the folding jib.

or

Lift the load together with the telescopic boom and folding jib (→ 8.21.4 Lift the load together with the telescopic boom and auxiliary boom., p. 590).

8.21.4 Lift the load together with the telescopic boom and auxiliary boom.

In **non** monitored two hook operation, only set up the reeving of the auxiliary boom.

Make sure that the following prerequisites are met:

- ❑ The auxiliary boom is correctly installed and in the operating position.
  (→ 10.8.5 Assembling the folding jib , p. 786)
  (→ 10.8.3 Swinging into the operating position, p. 773)
  (→ 10.9.4 Assembling the special folding jib, p. 830)
  (→ 10.9.3 Swinging into the operating position, p. 827)
  (→ 10.11.2 Assembling the boom nose, p. 847)
  (→ 10.11.1 Swinging into the operating position, p. 846)
- ❑ The telescopic boom and auxiliary boom are reeved in according to the reeving plan.
  (→ 10.4.7 Reeving the telescopic boom in, p. 723)
  (→ 10.8.6 Reeving the hoist rope in, p. 787)
  (→ 10.9.6 Reeving in the hoist rope, p. 833)
  (→ 10.11.4 Reeving the hoist rope in, p. 849)
- ❑ The auxiliary boom is reeved in less than or equal to the telescopic boom.
- ❑ The reeving in the *set up* menu is set on the auxiliary boom.
  (→ 8.6.1 Entering the set up configuration via the short code, p. 412)
  (→ 8.6.2 Entering the set up configuration manually, p. 413)
- ❑ The crane set up configuration and settings in the *set up* menu match.
- ❑ The weight of the load is less than the maximum load of the auxiliary boom.
- ❑ The load is fastened according to the horizontal distance of both hook blocks / load hooks.

DANGER
Both hook blocks / load hooks loaded and boom luffed down!
The auxiliary boom can be overloaded.

▶ Do **not** luff the telescopic boom and auxiliary boom down.

8.21.4.1 Lifting the load

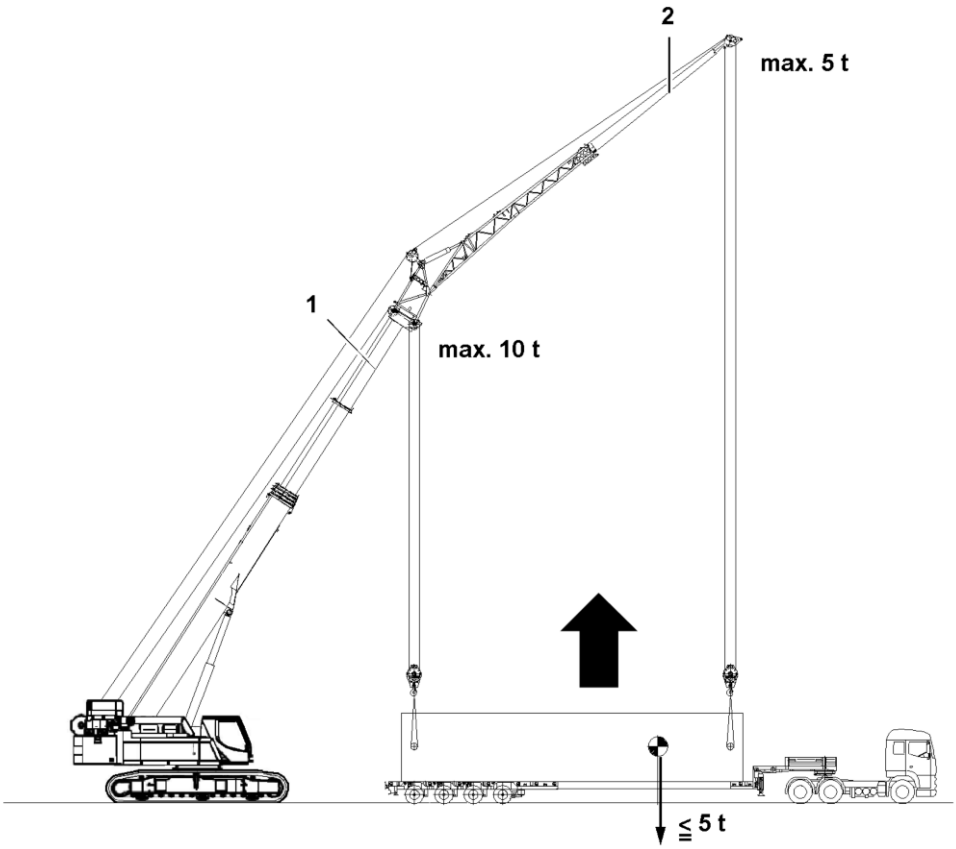


Fig. 1496: Exemplary illustration: Lifting the load evenly together

1 Telescopic boom **2** Auxiliary boom

The telescopic boom **1** and auxiliary boom **2** must lift the load evenly without creating angular pull.

▶ Lift the load vertically with the telescopic boom **1** and auxiliary boom **2**.

8.21.4.2 Turning the load

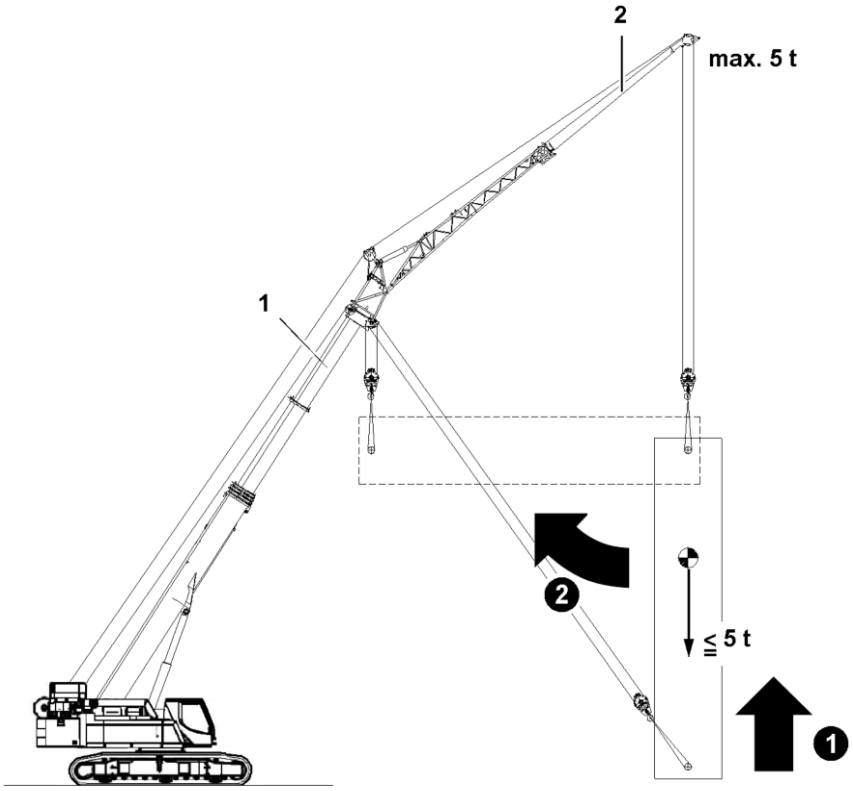


Fig. 1497: Exemplary illustration: Lifting the load with the auxiliary boom

1 Telescopic boom **2** Auxiliary boom

NOTICE
Angular pull!
The hoist rope and telescopic boom can be damaged.

- ▶ Make sure that the hoist rope is does **not** rub against the rope retaining pipes.
- ▶ Perform angular pull only in direction of the boom.

- ▶ Until the load is lifted completely off the ground: Lift a load only with the auxiliary boom **2**.

If the load is lifted completely off the ground and hangs on the auxiliary boom **2**:

- ▶ Until the load is distributed evenly on the telescopic boom **1** and auxiliary boom **2**: Pick the load up with the telescopic boom **1**.

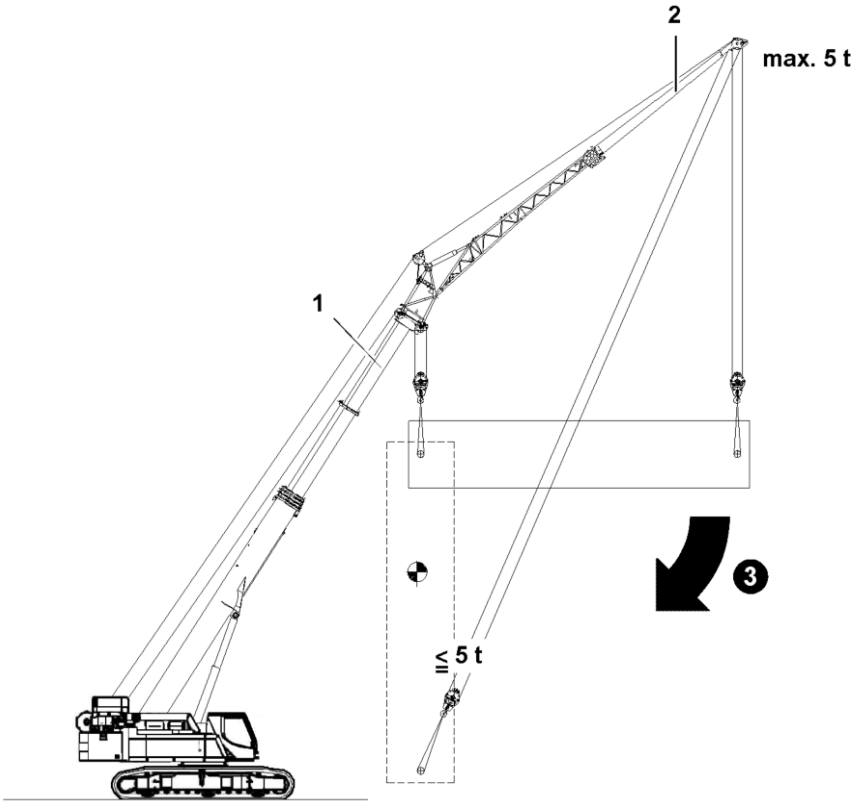


Fig. 1498: Exemplary illustration: Transferring the load to the telescopic boom

1 Telescopic boom **2** Auxiliary boom

▶ Until the load is fully transferred to the telescopic boom **1**: Lower the load on the auxiliary boom **2**.

8.22 Ending crane operation

When crane operation is ended, the following operations must be carried out to leave the crane in a safe condition.

- ▶ Set down and unhook the load.
- ▶ Telescope the telescopic boom in all the way.
- ▶ Luff the telescopic boom down as far as possible.

Note

If it is not possible to luff the telescopic boom down completely: Observe the additional safety instructions (→ 5.19.7 Interrupting crane operation with erected telescopic boom, p. 216).

- ▶ Make sure that hook block or load hook cannot collide with objects or endanger personnel.
- ▶ Turn the engine off.
- ▶ Plug the crane remote control in the charging cradle.
- ▶ Lock the crane and secure against unauthorized access.
- ▶ If necessary: Block off the danger zone.

9 Malfunction and emergency operation

Note

If a problem **cannot** be remedied independently:
▶ Contact Customer Service at Liebherr-Werk Ehingen GmbH.

9.1 Operating the emergency off switch

In emergencies, in the case of all problems in the working area of the mobile crane or in case of technical defects, the mobile crane can be taken out of operation with an emergency off switch.

All movements are brought to a standstill in a controlled manner and the engine is turned off.

The emergency off switches are located in the following positions:
- In the crane cab on the side window operating unit
- On the front of the crane cab

Note

In radio operations, the *stop* switch on the crane remote control fulfils the same function as the emergency off.

The control and engine can be restarted also without releasing the *stop* switch!

(→ 9.2 Operating the stop switch of crane remote control, p. 596)

Trigger an emergency off

Only use the emergency off switch in emergency situations.

▶ Press the emergency off switch.
  ▷ Crane movements are stopped.
  ▷ The engine is turned off.

Reset the emergency off

▶ Release the emergency off switch by turning it to the left.

▶ Turn the ignition off and back on.
  ▷ The control starts up again.
  ▷ The emergency off is reset.

9.2 Operating the stop switch of crane remote control

All movements are brought to a standstill in a controlled manner and the engine is turned off.

Make sure that the following prerequisites are met:
❑ The crane remote control is in radio contact with the crane.
(→ 8.10.6 Connecting the crane remote control with the crane, p. 479)

Fig. 1499: Crane remote control

1 Stop switch

Trigger a stop

Only use the stop switch **1** in emergency situations.

▶ Press the stop switch **1**.
▷ The crane remote control is turned off.
▷ Crane movements are stopped.
▷ The engine is turned off.

Note

If the *stop* switch is pressed during operation with the expanded crane remote control*, the engine is shut off with a time delay.

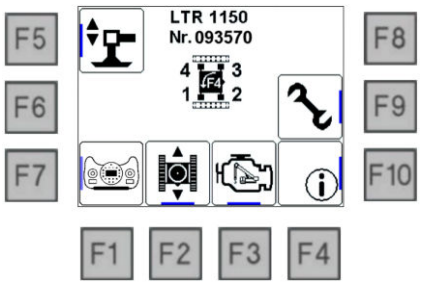
Reset the stop

▶ Release the *stop* switch by turning it to the left.
▷ The crane remote control starts up.

Note
It may be necessary to perform a code calibration.

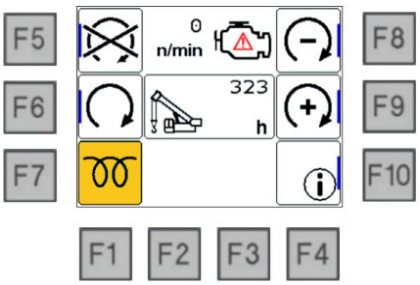
▶ Carry out code calibration (→ 8.10.6 Connecting the crane remote control with the crane, p. 479).

▶ Press the *F1* button



▷ The *start menu* is displayed.

▶ Press the *engine menu* F-button.



▷ The *engine* menu is displayed.
▷ The control starts up again.

Note
The stop can be reset also without releasing the stop switch.
The crane remote control remains turned off.

▶ Turn the ignition off and back on.

9.3 Error messages

LICCON monitors the mobile crane for operating errors and system errors.

Note

"LICCON-Error-Code Manual" contains all error codes (LECs).

(→ Separate document "LICCON error code manual")

While LICCON is running, active and inactive error messages can be viewed.

Error messages are completely deleted every time the LICCON is shut down.

9.3.1 Superstructure monitor error stack

9.3.1.1 Opening the total system error stack

The *total system* error stack is opened in the test system(→ Opening the menus in the test system, p. 442).

9.3.1.2 Opening the module error stack

Make sure that the following prerequisites are met:

- ❑ The *crane operation* menu or the *telescoping* menu is displayed.
  (→ Opening menus, p. 439)
- ❑ An error is displayed on the *Interrupt acoustic warning* button.
- ❑ The superstructure monitor acoustic warning is interrupted.
  (→ Interrupting the superstructure monitor acoustic warning, p. 446)

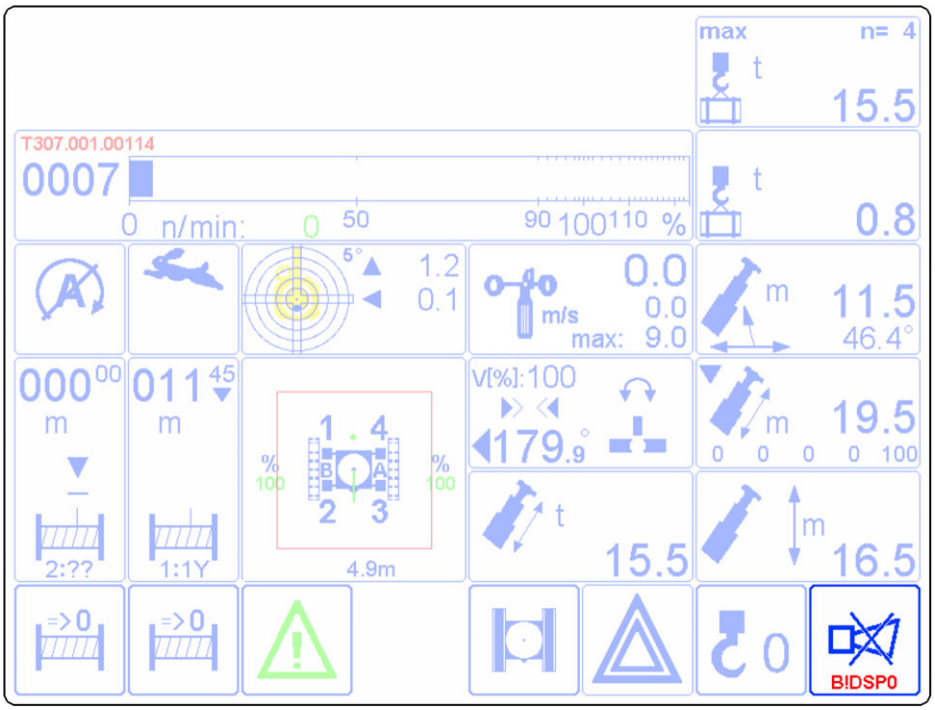


Fig. 1503: Exemplary illustration: Opening the error stack

▶ Press the *interrupt acoustic warning* F-button
▷ The *module* error stack is opened.

9.3.1.3 Operating the error stack

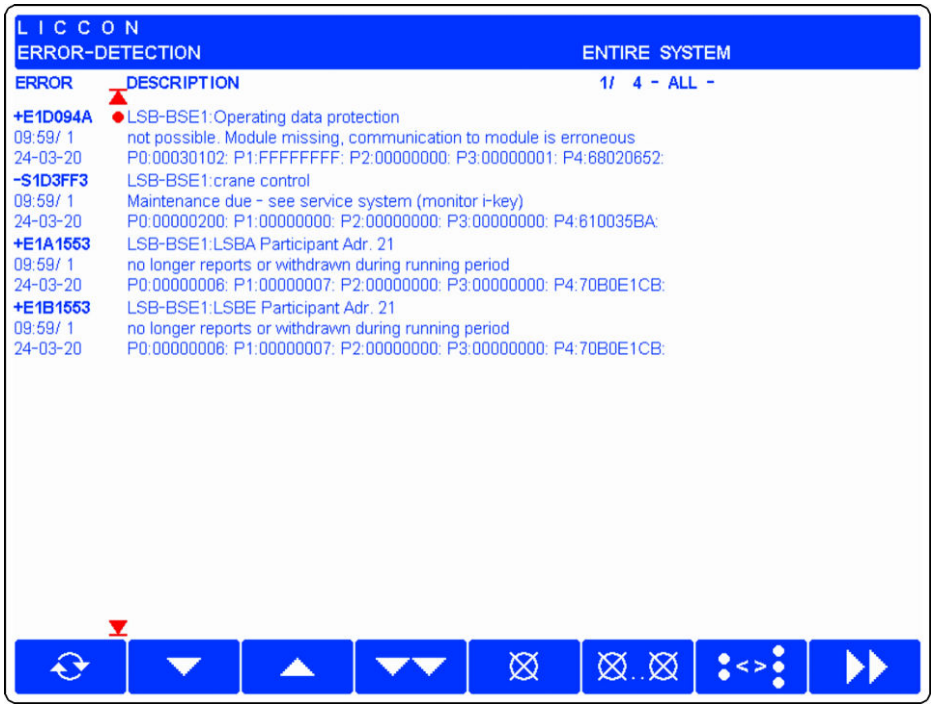


Fig. 1505: Exemplary illustration: Error stack

Changing the module

Make sure that the following prerequisites are met:
❑ The *module* error stack is displayed.

(→ Opening the module error stack, p. 598)

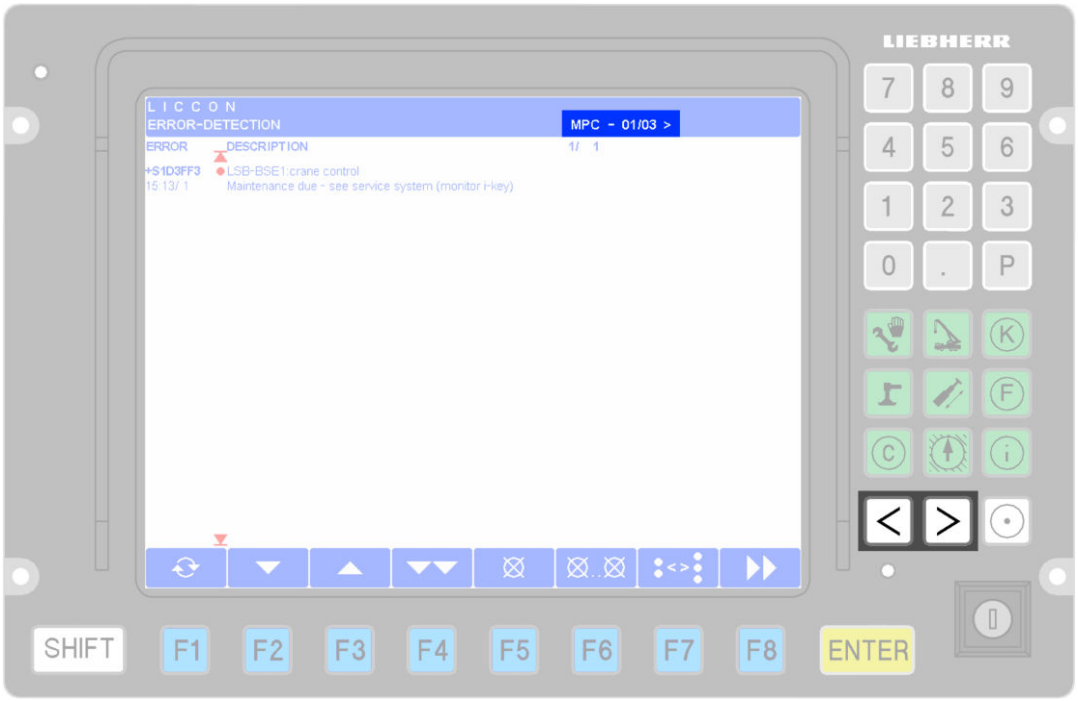
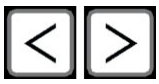


Fig. 1506: Exemplary illustration: Module error stack

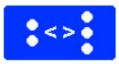


▶ Select the desired module with the *left* button and the *right* button.

Update the error stack

▶ Press the *update* F-button.

Display and hide the additional information



▶ Press the *additional information* F-button.

Deleting error messages

The error messages can be deleted individually or together.

Active errors can **not** be deleted.

Deleting all errors

▶ Press the *delete all errors* F-button.
▷ All inactive errors are deleted.

Deleting individual errors

▶ Select the desired error with the *cursor down*, F-button *cursor up* F-button and *page down* F-button.

▶ Press the *delete selected error* F-button.
▷ The selected error is deleted.

Closing the error stack

▶ Press the *back* F-button.

9.3.2 Crane remote control error stack

9.3.2.1 Opening the error stack

Make sure that the following prerequisites are met:
❑ The *diagnostics system* menu is displayed.
(→ Opening the diagnostics system menu, p. 476)

Note

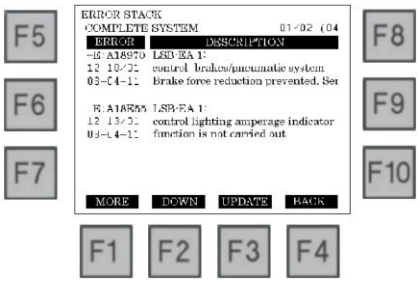
The most current error is already displayed in the diagnostics system.

> ERROR STACK

ENTER ▶ Select *Error Stack* and press the *ENTER* F-button.

> COMPLETE SYSTEM

ENTER ▶ Select *Complete System* and press the *ENTER* F-button.



▷ The *error stack* menu is displayed.

9.3.2.2 Operating the error stack

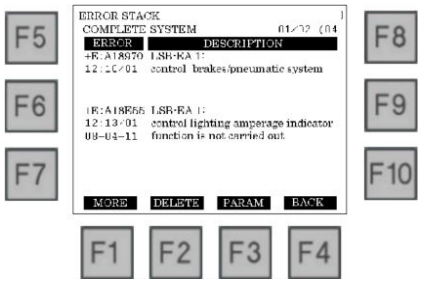


Fig. 1519: Exemplary illustration: Error stack menu

Changing the page

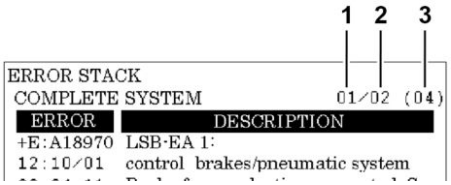


Fig. 1520: Error stack - number of pages

1 Current Page
2 Total number of pages
3 Number of error messages

2 error messages can be displayed per page.

DOWN

▶ Press the *next page* button.
▷ The next page is displayed.

Display other buttons

Not all options can be displayed at the same time.

MORE

▶ Press the *more options* F-button.

Update the error stack

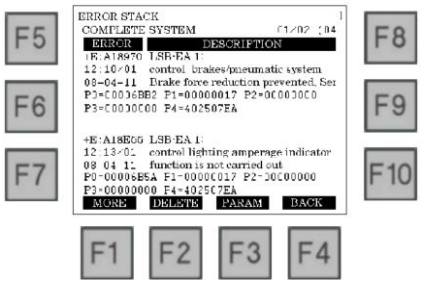
UPDATE

▶ Press the *update* F-button.

Displaying additional information

PARAM

▶ Press the *additional information* F-button.



▷ The additional information is displayed.

Delete error messages

All error messages can only be deleted together.

Active errors **cannot** be deleted.

DELETE

▶ Press the *delete* F-button.

Close the error stack

BACK

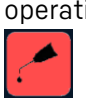
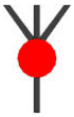
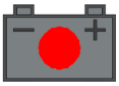
▶ Press the *back* F-button.

9.4 Behavior in case of an error

9.4.1 Fault displays

In the case of all problems, also observe the operating instructions and error messages.

9.4.1.1 General fault displays

Display / icon	Cause and effects	Remedy
	No value available. Sensor defective or not connected. Internal error.	Replace or connect the sensor. Contact Customer Service at Liebherr-Werk Ehingen GmbH.
 The indicator light blinks fast	Error of the displayed function	Observe the error message. Contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Is displayed in red	Leak oil filter maintenance limit reached	Replace the leak oil filter (→ Separate document “Maintenance and inspection log” > “Maintenance personnel maintenance activities”).
 Is displayed in red	Hydraulic oil temperature too high	Operate the engine at idle without load. If the hydraulic oil temperature does **not** go down: Stop crane operation and contact Customer Service at Liebherr-Werk Ehingen GmbH.
On the side window operating unit:  Lights up red	Superstructure central lubrication system error or low fill level of the grease container.	Fill the central lubrication system (→ 11.9.3 Servicing the central lubrication system, p. 918). If the fill level of the grease container is **not** low: Contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Lights up red	No radio signal between the crane remote control and mobile crane.	Change the location or bypass the radio signal with the line (→ 9.4.4 Faulty crane remote control radio connection, p. 608).
 Lights up red	Rechargeable battery for the crane remote control discharged	Charge the rechargeable battery

Tab. 98: General warning lights

9.4.1.2 Engine and exhaust aftertreatment fault displays

Display / icon	Cause and effects	Remedy
 Is displayed in red	Fuel tank level very low!	Refueling
 Is displayed in red	Engine oil pressure too low	Immediately bring the mobile crane to a standstill and turn the engine off. Contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Is displayed in red	Coolant temperature too high **Cause:** Power reduction possible	Bring the mobile crane to a standstill. Operate the engine without load at a medium rpm. If the coolant temperature does **not** go down: Turn off the engine and contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Is displayed in yellow	The level of the urea tank is less than 10 % of the maximum level or error in the exhaust aftertreatment system.	Refill urea or contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Is displayed in yellow  Is displayed in yellow	The level of the urea tank is less than 5 % of the maximum level or error in the exhaust aftertreatment system. **Cause:** Low power reduction	Refill urea or contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Is displayed in yellow  Is displayed in red	The level of the urea tank is less than 2.5 % of the maximum level or error in the exhaust aftertreatment system. **Cause:** High power reduction	Refill urea or contact Customer Service at Liebherr-Werk Ehingen GmbH.

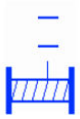
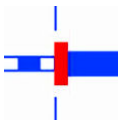
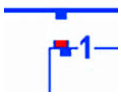
Display / icon	Cause and effects	Remedy
 Is displayed in red  Is displayed in red	The level of the urea tank is less than 0 % of the maximum level or error in the exhaust aftertreatment system. **Cause:** High power reduction	Refill urea or contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Is displayed in yellow	Diesel particle filter load condition increased	Perform regeneration at a standstill in time (within one work day) (→ 8.13.1 Regenerating the diesel particle filter, p. 497).
 Is displayed in red	Diesel particle filter load condition critically increased **Cause:** High power reduction	Turn off the engine and contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Is displayed	Air filter maintenance limit reached	Replace the air filter according to the maintenance schedule (→separate document “Maintenance and inspection log” > “Maintenance personnel maintenance activities”).
 Is displayed in red	Preheating unit error	Contact Customer Service at Liebherr-Werk Ehingen GmbH.
Blinks yellow	Engine warning message	Pay attention to the engine displays! (→ Engine displays, p. 287)
 Blinks red	Critical engine error	Turn off the engine immediately and observe the error message.
 Blinks	Engine error	Observe the error message.
 Is displayed in red	Alternator error. **Cause:** The batteries are **not** being charged.	Contact Customer Service at Liebherr-Werk Ehingen GmbH.

Display / icon	Cause and effects	Remedy
 Is displayed in red	Battery voltage too low	Charge or replace the batteries.
 Is displayed in red	Coolant level too low	Fill up the coolant.
 Is displayed in red	Charge air temperature too high **Cause:** Power reduction possible	Bring the mobile crane to a stand-still. Operate the engine without load at a medium rpm. If the charge air temperature does **not** go down: Turn off the engine and contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Is displayed in red	Automatic engine stop Battery voltage warning	Turn the engine on. Otherwise the starting capability is no longer guaranteed due to the low battery voltage.
 Is displayed in red	Automatic engine stop Error	Contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Lights up red	Alternator error **Cause:** The batteries are **not** being charged.	Contact Customer Service at Liebherr-Werk Ehingen GmbH.
  Blinks fast yellow / red alternatively	Engine preheating error	Contact Customer Service at Liebherr-Werk Ehingen GmbH.

Tab. 99: Engine and exhaust aftertreatment warning lights

9.4.1.3 Crane operation fault displays

Display / icon	Cause and effects	Remedy
 Blinks red	Overload protection shut-off	Reverse the crane movement (→ 9.8 Procedure for shutting-off the crane movement, p. 616).

Display / icon	Cause and effects	Remedy
 Blinks red	Overload protection shut-off	Reverse the crane movement (→ 9.8 Procedure for shutting-off the crane movement, p. 616).
 Blinks Exemplary illustration	Shut-off by displayed hoist limit switch	Reverse the crane movement (→ 9.8 Procedure for shutting-off the crane movement, p. 616).
 Is displayed in red	Calculated crawler pressure greater than the set maximum permissible crawler pressure.	Observe the set maximum crawler pressure. Adapt the crawler pressure accordingly.
	The maximum load is invalid. Exemplary causes: Sensor error, incorrect set up configuration or wind speed too high.	Stop crane operation immediately and observe the error message.
	Winch blocked or error	For crane operation: Release the winch. Contact Customer Service at Liebherr-Werk Ehingen GmbH.
	Winch turned off in emergency. Only three more safety coils on the winch.	Spool the winch up. If there are still more than three coils on the winch: Readjust the winch speed sensor or contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Exemplary illustration	Luffing shut-off error	Contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Is displayed in red	Telescoping cylinder pinning error	Contact Customer Service at Liebherr-Werk Ehingen GmbH.
 Exemplary illustration Is displayed in red	Telescope pinning error	Contact Customer Service at Liebherr-Werk Ehingen GmbH.

Tab. 100: Crane operation warning lights

9.4.2 Engine malfunction

Possible malfunction of the engine.
- Dropping or significantly fluctuating oil pressure
- Reducing power without changing the gas pedal
- Reducing engine rpm without changing the gas pedal
- Significant smoke development
- Increasing coolant temperature
- Abnormal engine noises

In the case of a malfunction:
▶ Turn off the engine immediately and contact customer service at Liebherr-Werk Ehingen GmbH.

9.4.3 High filter loading on the diesel particle filter

If the diesel particle filter reaches load condition 5, regeneration **cannot** be performed any longer.

The engine output and travel speed are limited to a minimum.

▶ Perform regeneration at a standstill **no later than** at load condition 4.

When load condition 5 is reached:
▶ Turn off the engine and contact customer service at Liebherr-Werk Ehingen GmbH.

9.4.4 Faulty crane remote control radio connection

If the radio connection between the crane remote control and the mobile crane is faulty (*radio connection* **5** indicator light turns on red), then it can be bypassed with a bypass line.

The radio connection can be disturbed by the following conditions:
- Interference signals from nearby radio towers.
- The radio module for the crane remote control or mobile crane is defective.
- Unfavorable environmental conditions.

Make sure that the following prerequisites are met:
❑ The crane remote control is out of the charging cradle.
❑ The crane remote control is turned on.
(→ 8.10.5 Turning the crane remote control on and off, p. 478)

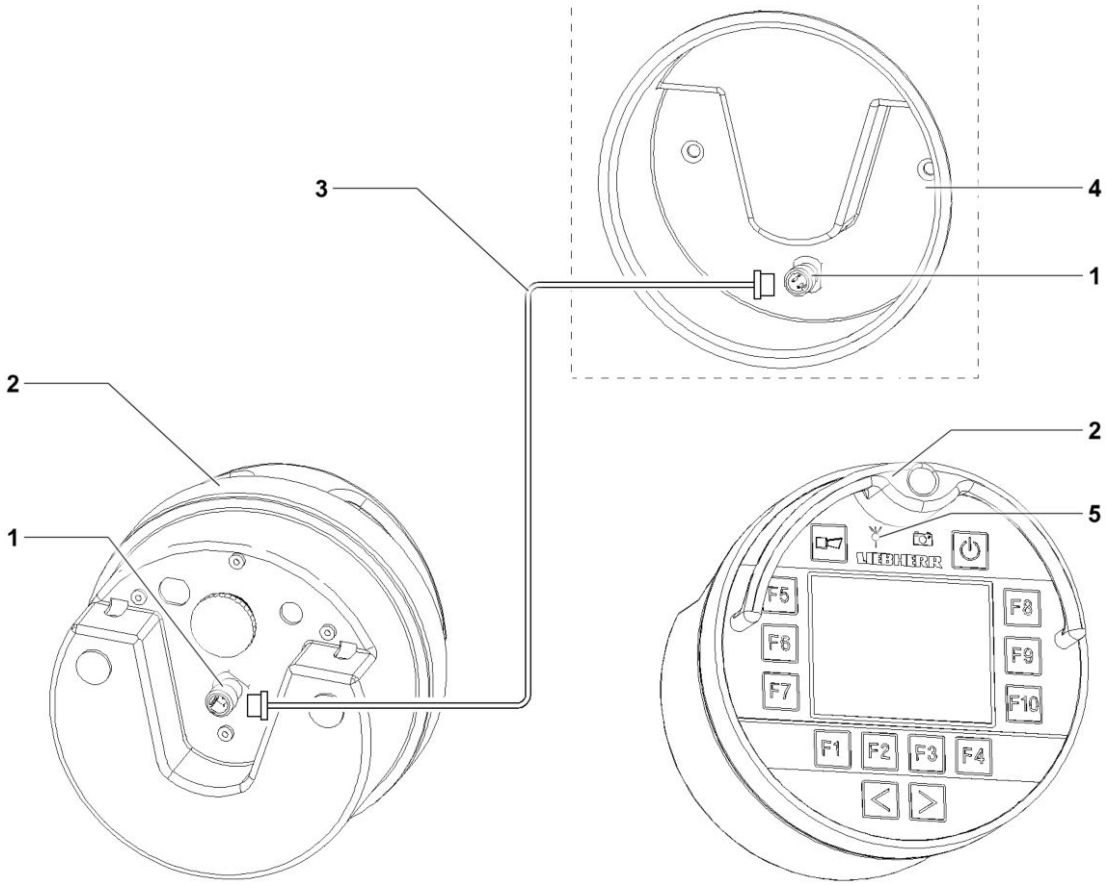


Fig. 1571: Bypassing the radio connection

1 Plug connections
2 Crane remote control
3 Bypass line
4 Charging cradle
5 Radio connection indicator light

The bypass line **3** is located in the crane cab control cabinet.

▶ Remove the protective caps on the bypass line **3** and plug connections **1**.

▶ Connect and tighten the bypass line **3** with plug connections **1**.
▷ The radio communication is bypassed

9.4.5 Failure of the engine, hydraulic system or electrical system

In the case of a serious failure of components, the mobile crane can be brought into a safe condition with the emergency control and the load can be set down (→ 9.11 Emergency control, p. 632).

▶ Bring the mobile crane into a safe condition with the emergency control.

▶ Replace or repair failed components.

Troubleshooting

Is it **not** possible to bring the mobile crane into a safe condition with the emergency control?

▶ Block off a large mobile crane and hazard area and contact Customer Service at Liebherr-Werk Ehingen GmbH.

9.5 Remote diagnostics

With the aid of remote diagnostics, Customer Service at Liebherr-Werk Ehingen GmbH can access the mobile crane diagnostic system to diagnose errors.

Make sure that the following prerequisites are met:
❑ The mobile crane is located within the range of a compatible mobile radio / data network

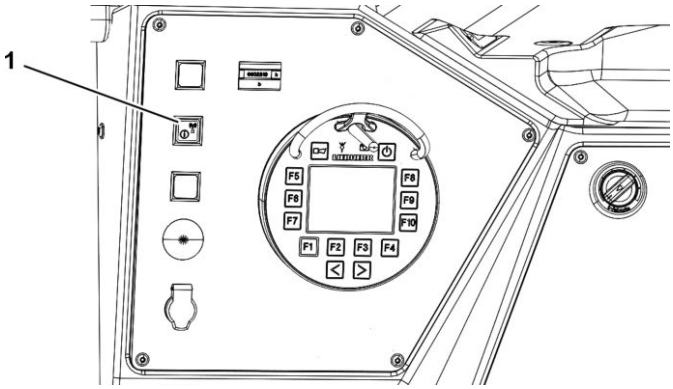


Fig. 1572: Side window instrument panel

1 Remote diagnostics button

Turning remote diagnostics on

▶ Press the *remote diagnostics* button **1** in the crane cab.

Turning remote diagnostics off

▶ Remote diagnostics are automatically turned off after 4 hours.

9.6 Remedying slack rope formation

If the hook block can **no** longer be lowered due to slack rope formation, then the following steps must be carried out.

▶ Spool up loose hoist rope between the boom head and the winch carefully.

Note

A small amount of rope sag must remain between the boom head and the winch.

In order to tension the hoist rope, the telescopic boom is luffed down, which reduces the hoist rope length between the hook block and the boom head.

▶ Until the hoist rope between the boom head and the winch is tensioned. Luff the telescopic boom down carefully.

While the winch is spooled out, make sure that additional slack rope does not form.

▶ Until the hoist rope is guided correctly on the winch: Spool the winch out carefully.

9.7 Jump starting of the mobile crane

If the battery voltage is too low, the engine cannot be started independently and the mobile crane must be started externally.

Make sure that the following prerequisites are met:
- ❑ The ignition and all electrical users are turned off.
  (→ 8.12 Engine, p. 490)
- ❑ An external voltage source with 24 V is available.

For external start operations with external vehicles, make sure that the following prerequisites are met:
- ❑ The parking brake of the external vehicle is applied.
- ❑ The ignition and all electrical users of the external vehicle are turned off.

9.7.1 Jump starting of the mobile crane via the 24 V* external power supply

Make sure that the following prerequisites are met:
- ❑ The supplied jumper cable with plug for the 24 V external power supply is available.

9.7.1.1 External vehicle without 24 V external power supply

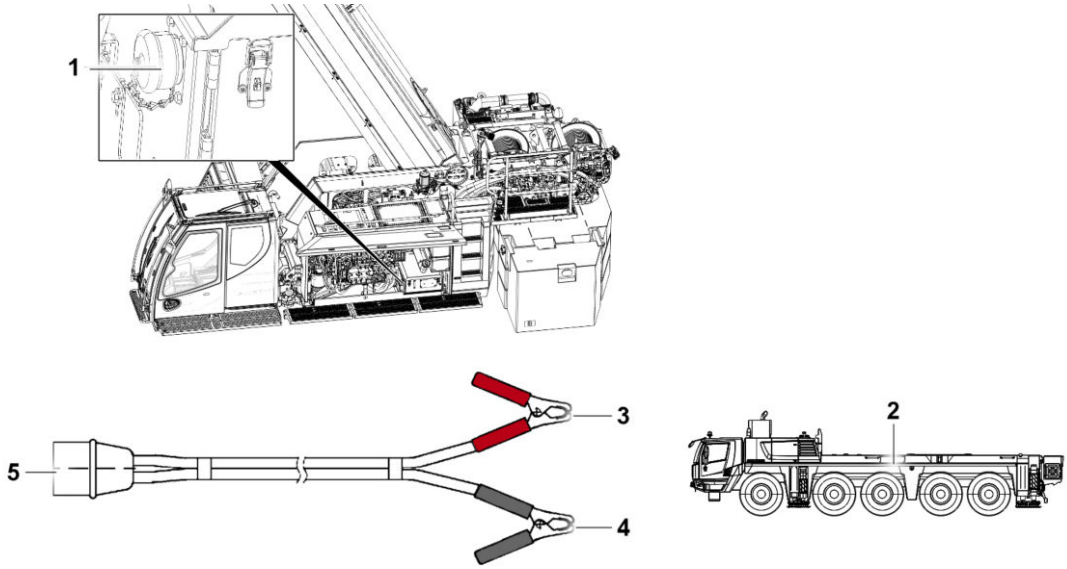


Fig. 1574: Jump starting of the mobile crane via the 24 V external power supply*

1 24 V external power supply
2 External vehicle
3 Red clamp (+)
4 Black clamp (-)
5 Plug

▶ Unlock the left turntable flap.

▶ Open the left turntable flap.

▶ Connect the red clamp **3** of the jumper cable to the positive battery pole of the external vehicle **2**.

▶ Connect the black clamp **4** of the jumper cable to the negative battery pole or specified ground connection of the external vehicle **2**.

▶ Insert the plug **5** of the jumper cable in the 24 V external power supply **1**.

▶ Start the engine of the external vehicle and let it run at idling speed.

A start attempt may take a maximum of three to five seconds.

Carry out a maximum of three start attempts at intervals of one minute.

▶ Start the mobile crane engine.

▶ As soon as the mobile crane engine is running: Let the engine run until the batteries have recovered.
▷ The batteries are charged by the alternator.

▶ Unplug the plug **5** of the jumper cable on the 24 V external power supply **1**.

▶ Disconnect the black clamp **4** of the jumper cable from the negative battery pole or specified ground connection of the external vehicle **2**.

▶ Disconnect the red clamp **3** of the jumper cable from the positive battery pole of the external vehicle **2**.

If necessary:

▶ Charge the battery of the mobile crane with a suitable battery charger.

▶ Close the left turntable flap.

9.7.1.2 External vehicle with 24 V external power supply

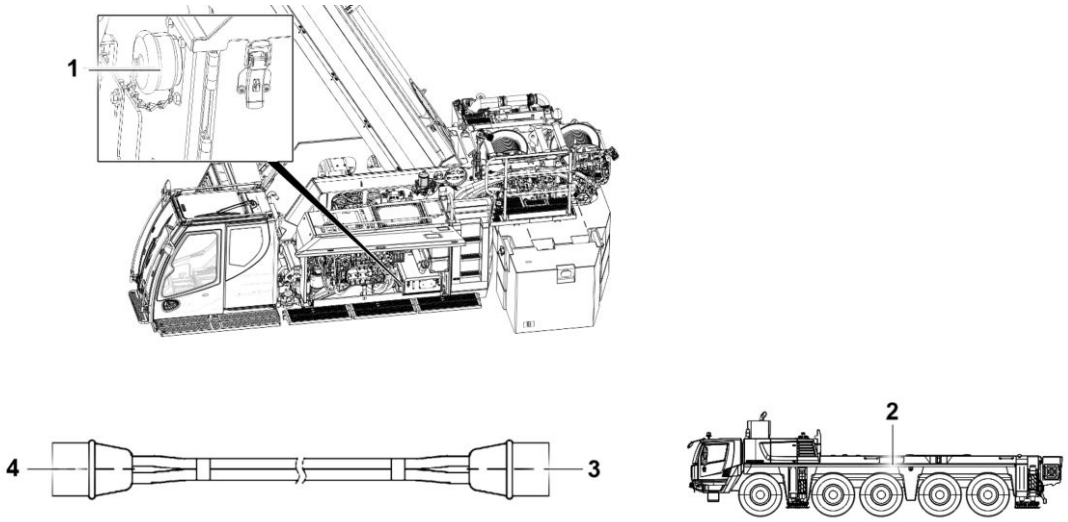


Fig. 1575: Jump starting of the mobile crane via the 24 V external power supply*

1 24 V external power supply
2 External vehicle
3 Plug
4 Plug

▶ Unlock the left turntable flap.

▶ Open the left turntable flap.

▶ Insert the plug **3** of the jumper cable on the external vehicle **2** in the 24 V external power supply.

▶ Insert the plug **4** of the jumper cable on the 24 V external power supply **1**.

▶ Start the engine of the external vehicle and let it run at idling speed.

A start attempt may take a maximum of three to five seconds.

Carry out a maximum of three start attempts at intervals of one minute.

▶ Start the mobile crane engine.

- ▶ As soon as the mobile crane engine is running: Let the engine run until the batteries have recovered.
  ▷ The batteries are charged by the alternator.
- ▶ Unplug the plug **4** of the jumper cable on the 24 V external power supply **1**.
- ▶ Unplug the plug **3** of the jumper cable on the external vehicle **2** on the 24 V external power supply.

If necessary:

- ▶ Charge the battery of the mobile crane with a suitable battery charger.
- ▶ Close the left turntable flap.

9.8 Procedure for shutting-off the crane movement

In general, the cause must be identified in case of a shut-off and if possible the crane movement that caused it must be reversed.

Telescopic boom luff up shut-off

▶ Luff the telescopic boom down.

Telescopic boom luff down shut-off

▶ Luff the telescopic boom up.

Luff up auxiliary boom shut-off

▶ Luff the auxiliary boom down.

Luff down auxiliary boom shut-off

▶ Luff the auxiliary boom up.

Telescopic boom telescope out shut-off

▶ Telescope the telescopic boom in.

Telescopic boom telescope in shut-off

▶ Telescope the telescopic boom out.

Spool winch up shut-off

▶ Spool the winch out.

Spool winch out shut-off

▶ Spool the winch up.

Hoist limit switch shut-off

▶ Spool the winch out.

Danger of tipping to the rear shut-off

▶ Increase the boom radius

▶ Reduce the ballast.

Shut-off due to error message

▶ Determine the existing error based on the error message (→ 9.3 Error messages, p. 598).

▶ Remedy the error.

If the error cannot be remedied:

▶ Contact Customer Service at Liebherr-Werk Ehingen GmbH.

Overload shut-off

Under some circumstances, the following can reduce mobile crane utilization:

▶ Set down the load.

▶ Increase the ballast.

▶ Reduce the boom radius.

Troubleshooting

Is crane operation limited because the maximum load is apparently too low or reached too soon?

▶ Make sure that the load bearing capacity of the mobile crane is suitable for use of the crane.

▶ Make sure that the mobile crane is set up in accordance with the corresponding load chart and the mobile crane set up configuration is set in the *set up* menu.

▶ Make sure that the mobile crane is assembled according to the crane documentation.

▶ Make sure that all attachment parts on the boom system that are **not** needed have been removed (weight).

▶ Make sure that the boom system is free of snow and ice (weight).

▶ Make sure that the environmental influences (for example wind) on the mobile crane are **not** too great.

▶ When the shut-off **cannot** be remedied despite the observance of all points listed here: (→ 9.9 Overload protection special functions, p. 618).

▶ Contact Customer Service at Liebherr-Werk Ehingen GmbH.

9.9 Overload protection special functions

9.9.1 Description of the overload protection special functions

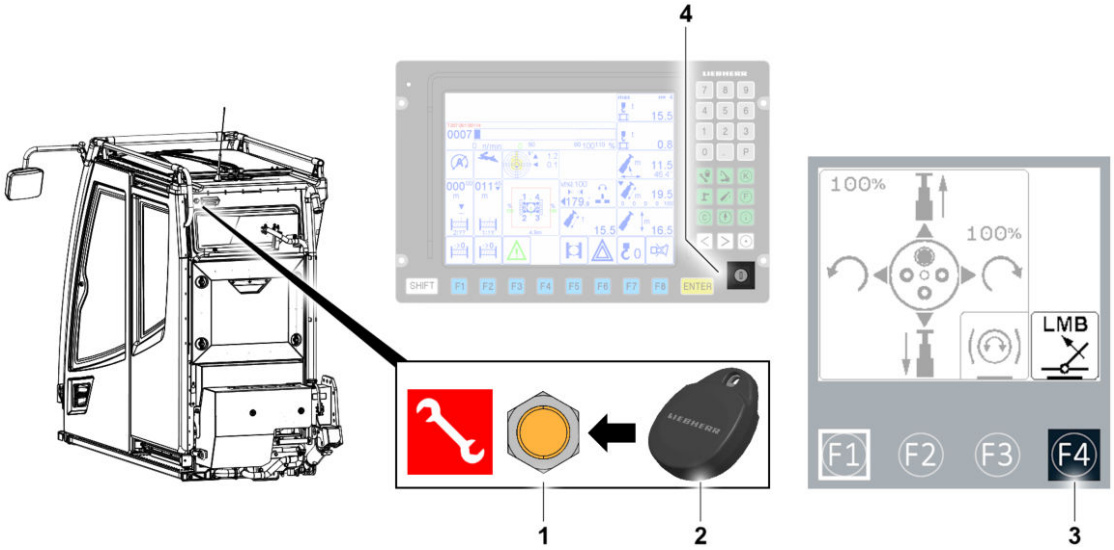


Fig. 1576: Overload protection special functions

1 Sensor
2 Transponder
3 Luffing in with suspended load F-button
4 Bypass key

In case of shut-offs by the overload protection or failure of the overload protection, it may be necessary to activate a special function of the overload protection to bring the mobile crane into a safe condition.

There are the following special functions:
- Luff in with suspended load
- Bypassing the overload protection
- Overload protection emergency operation

Multiple shut-offs can be bypassed at the same time or one after another with the special functions.

The causes for the shut-off must be identified and, if possible, remedied **without** activating a special function. Reverse the crane movement that caused it if possible (→ 9.8 Procedure for shutting-off the crane movement, p. 616).

Depending on the situation, the special function is activated with the *luffing in with handing load* **3** F-button, with the transponder **2** or with the bypass key **4**.

A differentiation is made between “EN 13000 active” and “ASME B30.5 active”.

9.9.2 Safety

⚠ **This section supplements the “Safety” chapter.**

9.9.2.1 Overload of the mobile crane

If the special function is activated, the safety equipment is **no** longer monitored and crane movements are **not** turned off in case of an overload.

Due to erroneous operation or deliberate misuse, the mobile crane can collapse or topple over.

Observe the following rules:
- If crane operation is possible: Do **not** activate the special function.
- The cause of the shut-off must be known.
- Only the crane operator who is aware of the effects of the operation may activate a special function.
- It is only permitted to activate a special function in emergencies and for assembly purposes.
- Crane movements must be carried out with extreme caution and anticipatorily.
- If present: Perform crane movements only in the permissible working area according to the load charts or the erection / take-down charts.
- If required: Determine the permissible working range with the job planner or Crane Planner.
- Make sure that the mobile crane does **not** tip backward. Especially with a reduced support base.
- Special functions of the overload protection may **not** be used to increase the maximum load carrying capacity or expand the specified working area.

9.9.2.2 Expansion of the danger zone

If the special function is activated, the mobile crane danger zone can expand considerably.

Failure to observe the expanded danger zone can lead to accidents resulting in fatal or severe injuries.

Observe the following rules:
- Make sure that there are no persons in the danger zone.

9.9.3 Luffing in with suspended load special function

If the maximum permissible load momentum is exceeded, the overload protection turns all load momentum increasing crane movements off.

The “luffing in with suspended load” special function makes it possible to return to a safe operating condition from certain shut-offs of the overload protection by luffing up the telescopic boom. This is the case, for example, if the boom radius range of the load chart is left.

With the “Luffing in with suspended load” special function, **only** luffing up the telescopic boom or the auxiliary boom* is released. All other shut-off crane movements remain locked.

The “luffing in with suspended load” special function can only be activated from the crane cab and with the expanded crane remote control* activated.

Make sure that the following prerequisites are met:
- ❑ The load, hook and boom system are free and lifted off the ground.
- ❑ Crane movements are turned off due to a too high boom radius.
- ❑ By luffing up the telescopic boom, a safe operating condition can be established.
- ❑ Luffing up the telescopic boom does **not** lower the crane load.

Activate “luff in with suspended load” from the crane cab

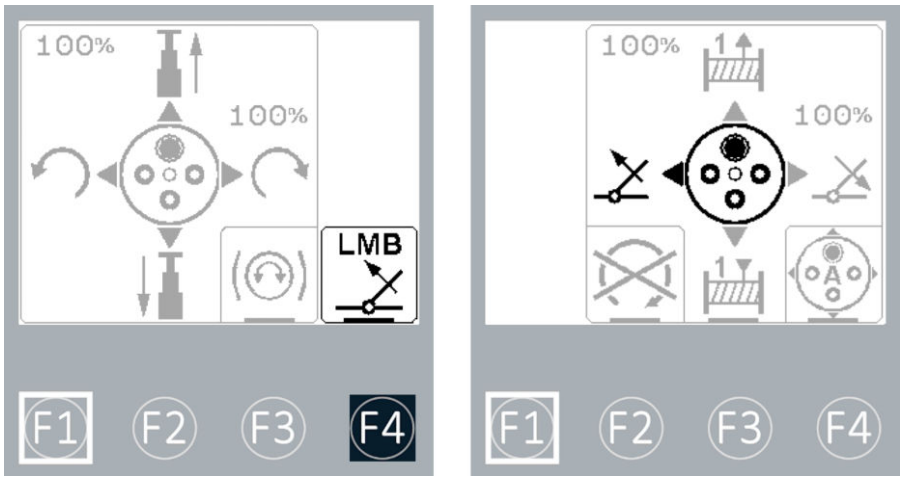


Fig. 1578: Armrest operating units - control lever assignment

▶ Press and hold the *luffing in with suspended load* F-button.
▷ Luffing up the telescopic boom is released.

DANGER
Taking on a load by “luffing in with suspended load”!
The crane can collapse or topple over.

▶ Never pick up a load with the “luffing in with suspended load” special function.

Only when the load and load handling equipment are lifted completely off the ground:
▶ Use the “luffing in with suspended load” special function.

If the “luffing in with suspended load” special function is active, the working speed is **not** reduced by the LICCON for luffing up.

DANGER
Working speed **not** reduced!
The load can start swinging.
The crane can collapse or topple over.

▶ Crane movements must be carried out with extreme caution and anticipatorily.

▶ Until a safe operating condition is reached: Lower the telescopic boom carefully.

When a safe operating status is established again:
▶ Release the *luffing in with suspended load* F-button.
▷ The “luffing in with suspended load” special function is deactivated.
▷ Operation can be continued without the special function.

Troubleshooting

Does the “luffing in with suspended load” special function **not** work?
“Luff in with suspended load” can bypass only certain shut-offs.

▶ Observe the error message.

▶ Carry out further procedures according to the error message.

Activate “luff in with suspended load” with the expanded crane remote control*

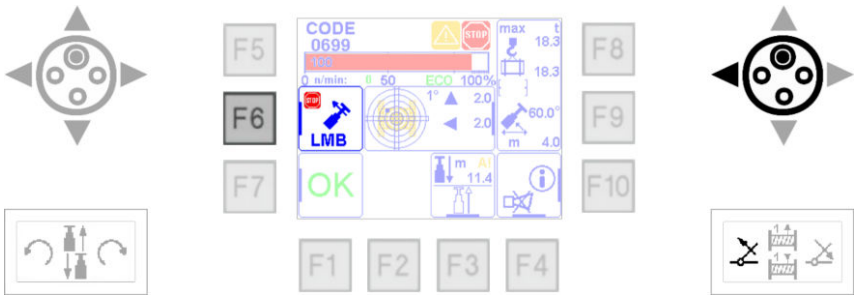


Fig. 1580: Crane operation menu

▶ Press and hold the *luffing in with suspended load* F-button.
▷ Luffing up the telescopic boom is released.

DANGER
Taking on a load by “luffing in with suspended load”!
The crane can collapse or topple over.

▶ Never pick up a load with the “luffing in with suspended load” special function.

Only when the load and load handling equipment are lifted completely off the ground:
▶ Use the “luffing in with suspended load” special function.

If the “luffing in with suspended load” special function is active, the working speed is **not** reduced by the LICCON for luffing up.

DANGER
Working speed **not** reduced!
The load can start swinging.
The crane can collapse or topple over.

▶ Crane movements must be carried out with extreme caution and anticipatorily.

▶ Until a safe operating condition is reached: Lower the telescopic boom carefully.

When a safe operating status is established again:
▶ Release the *luffing in with suspended load* F-button.
▷ The “luffing in with suspended load” special function is deactivated.
▷ Operation can be continued without the special function.

Troubleshooting

Does the “luffing in with suspended load” special function **not** work?
“Luff in with suspended load” can bypass only certain shut-offs.

▶ Observe the error message.

▶ Carry out further procedures according to the error message.

9.9.4 EN 13000 active

With “EN13000 active”, a differentiation is made between the “overload protection bypass” special function and the “overload protection emergency operation” special function.

The “overload protection bypass” special function may be used for:
- Assembly / disassembly procedures
- Special operating conditions (for example: deadlock)

The “overload protection emergency operation” special function may be used for:
- Failure of overload protection components
- Emergency situation (according to EN 13000)

9.9.4.1 Bypassing the overload protection special function

Liebherr-Werk Ehingen GmbH recommends setting the limit value of the shut-off to the factory set limit value (100 %) before activating the “overload protection bypass” special function (→ 8.15.1 Setting the overload protection limit values, p. 511).

With “EN 13000 active”, the limit value of shut-off can be exceeded by 1/10 with the “overload protection bypass” special function.

Example: With a set shut-off limit value of 70 %, with the bypass key it is possible to bypass to maximum 77 % utilization.

With the “overload protection bypass” special function, the working speed is limited to maximum 15 %.

Make sure that the following prerequisites are met:
- ❑ With the “luffing in with suspended load” special function, a safe operating state **cannot** be reached.
  (→ 9.9.3 Luffing in with suspended load special function, p. 619)
- ❑ The seat contact button is actuated.
  (→ 8.7.1 Actuating the seat contact button, p. 419)
- ❑ All control levers are in the zero position.
- ❑ The *crane operation* menu or the *telescoping* menu is displayed.
  (→ Opening menus, p. 439)

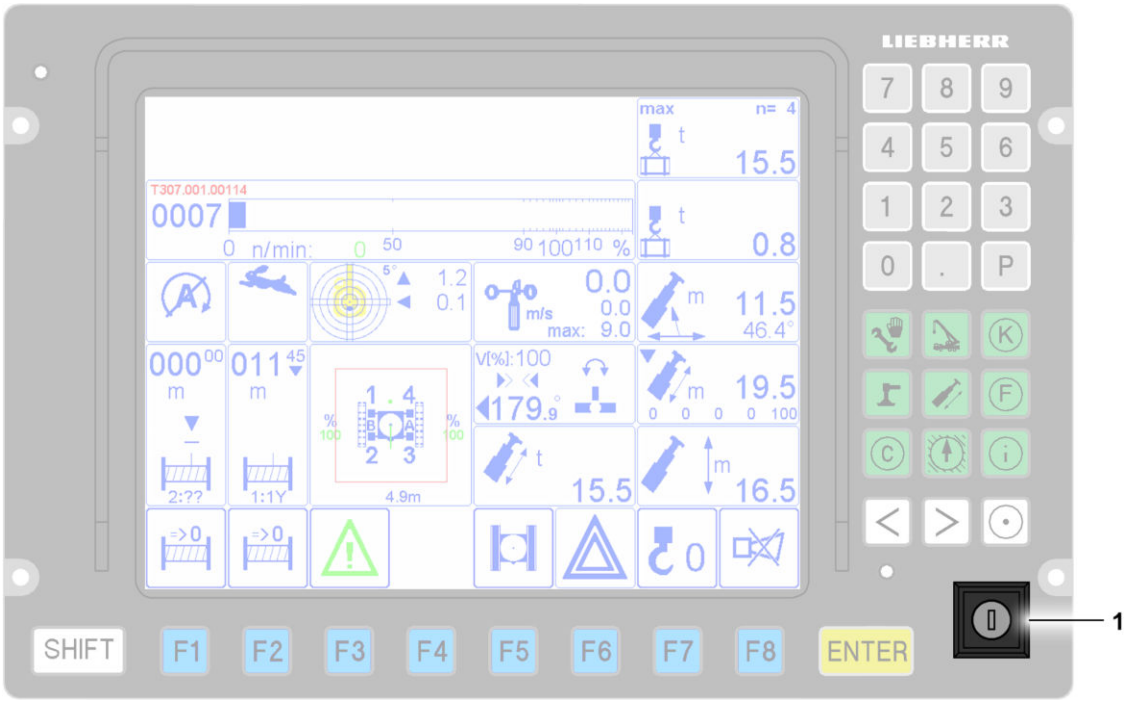


Fig. 1582: Superstructure monitor

1 Bypass key

Activating overload protection bypass (load chart available)

In case of a deadlock, it may be necessary to activate the “overload protection bypass” special function.

Example of a deadlock: A load is lowered from a great height with the maximum permissible load momentum. The increasing hoist rope weight between the boom head and the hook block / load hook increases the load momentum and leads to a shut-off by the overload protection and further on to self-blockage.

DANGER
“Overload protection bypass” special function used improperly!
The crane can collapse or topple over.

If load charts are available:
▶ Use special function only with deadlock.

▶ Turn the bypass key **1** to the right.

▷ The *overload protection bypass* icon blinks on the superstructure monitor.
▷ “Overload protection bypass” is active.

The “overload protection bypass” is deactivated if:
- The bypass key **1** is turned again to the right.
- If a crane movement is not initiated within 10 seconds of activating the special function.
- If no other crane movement is initiated within 10 seconds of ending the crane movement.
- The engine is turned off.

Activating overload protection bypass (no load chart available)

DANGER
"Overload protection bypass" special function used improperly!
The crane can collapse or topple over.

If **no** load chart is available:
▶ Use the special function only for assembly / disassembly procedures.

▶ Use a Job planner or Crane Planner.

▶ Turn the bypass key **1** to the right.

▷ The *overload protection bypass (assembly)* icon blinks on the superstructure monitor.
▷ "Overload protection bypass" is active.

The "overload protection bypass" is deactivated if:
– The bypass key **1** is turned again to the right.
– If a crane movement is not initiated within 10 seconds of activating the special function.
– The engine is turned off.

9.9.4.2 Overload protection emergency operation special function

With the "overload protection emergency operation" special function, the working speed is limited to maximum 15 %.

Make sure that the following prerequisites are met:
❑ With the "overload protection bypass" special function, a safe operating state **cannot** be reached.
(→ Bypassing the overload protection special function, p. 622)
❑ All control levers are in the zero position.
❑ The *crane operation* menu or the *telescoping* menu is displayed.
(→ Opening menus, p. 439)
❑ At least one shut-off is active that can be bypassed with the overload protection emergency operation.

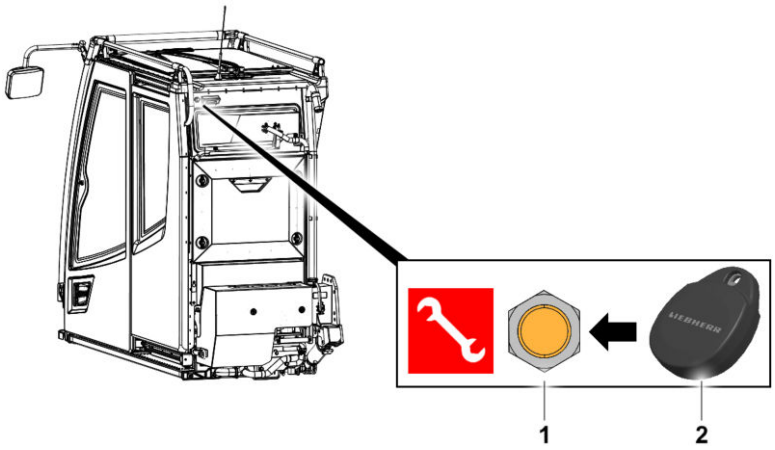


Fig. 1585: Sensor and transponder

1 Sensor **2** Transponder

Activating the overload protection emergency operation

DANGER
"Overload protection emergency operation" special function used improperly!
The crane can collapse or topple over.

▶ Use the special function only in case of a failure of overload protection components.

▶ Hold the transponder **2** on the sensor **1**.

▷ The *overload protection emergency operation* icon blinks on the superstructure monitor.
▷ "Overload protection emergency operation" is active.

"Overload protection emergency operation" is deactivated when:
- The transponder **2** is held again on the sensor **1**.
- 30 minutes have elapsed.
- The engine is turned off.

Activating Telematik emergency operation (load chart available)

During Telematik emergency operation, the unpinning of the telescopic pinning is guaranteed and the following shut-offs are bypassed:
- Telescoping cylinder retracting / extending is possible in the intermediate position of the telescoping cylinder pinning.
- Telescoping cylinder extending is possible when the maximum push out length of the telescoping cylinder is reached.

Make sure that the following prerequisites are met:
❑ Error in the Telematik system.
❑ The *telescoping* menu is displayed.
(→ Opening menus, p. 439)
❑ Telescoping manual operation is selected.

DANGER
"Overload protection emergency operation" special function used improperly!
The crane can collapse or topple over.

▶ Use the special function only in case of a failure of Telematik components.

▶ Hold the transponder **2** on the sensor **1**.

▷ The *overload protection emergency operation* icon blinks on the superstructure monitor.
▷ Telematik Emergency operation is active.

Telematik emergency operation is deactivated when:
- The transponder **2** is held again on the sensor **1**.
- 30 minutes have elapsed.
- The engine is turned off.

Activating Telematik emergency operation (load chart not available)

During Telematik emergency operation, the unpinning of the telescopic pinning is guaranteed and the following shut-offs are bypassed:
- Telescoping cylinder retracting / extending is possible in the intermediate position of the telescoping cylinder pinning.
- Telescoping cylinder extending is possible when the maximum push out length of the telescoping cylinder is reached.

Make sure that the following prerequisites are met:
❑ Error in the Telematik system.
❑ The *telescoping* menu is displayed.
(→ Opening menus, p. 439)
❑ Telescoping manual operation is selected.

DANGER
"Overload protection emergency operation" special function used improperly!
The crane can collapse or topple over.

▶ Use the special function only in case of a failure of Telematik components.

▶ If **no** load chart is available: Use a Job planner or Crane Planner.

▶ Turn the bypass key to the right.

▷ The *overload protection emergency operation* icon blinks on the superstructure monitor.
▷ Telematik emergency operation is active.

Telematik emergency operation is deactivated when:
- The bypass key is turned again to the right.
- If a crane movement is not initiated within 10 seconds of activating the special function.
- The engine is turned off.

9.9.5 ASME B30.5 active

The "overload protection emergency operation" special function may be used for:
- Assembly / disassembly procedures
- Special operating conditions (for example: deadlock)
- Failure of overload protection components
- Emergency situations

9.9.5.1 Overload protection emergency operation special function

Liebherr-Werk Ehingen GmbH recommends setting the limit value of the shut-off to the factory set limit value (100 %) before activating the "overload protection emergency operation" special function.

(→ 8.15.1 Setting the overload protection limit values, p. 511)

Make sure that the following prerequisites are met:
❑ With the "luffing in with suspended load" special function, a safe operating state **cannot** be reached.
(→ 9.9.3 Luffing in with suspended load special function, p. 619)
❑ The seat contact button is actuated.
(→ 8.7.1 Actuating the seat contact button, p. 419)
❑ All control levers are in the zero position.
❑ The *crane operation* menu or the *telescoping* menu is displayed.
(→ Opening menus, p. 439)

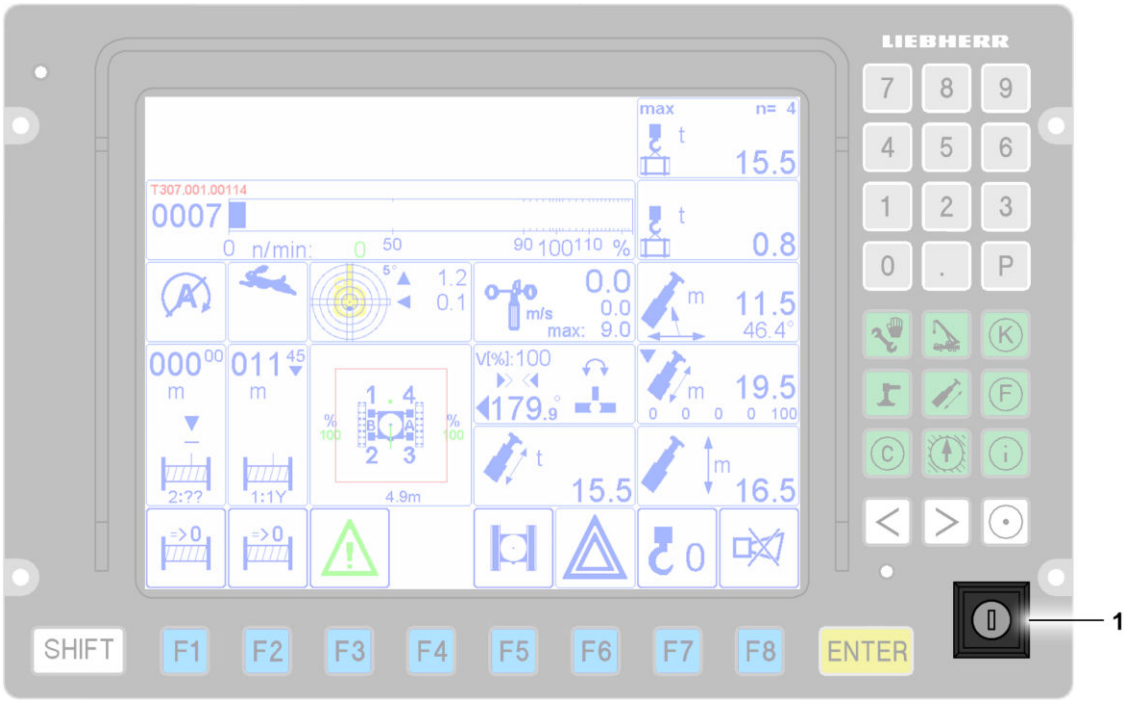


Fig. 1589: Superstructure monitor

1 Bypass key

Activating overload protection emergency operation (load chart available)

In case of a deadlock, it may be necessary to activate the “overload protection emergency operation” special function.

Example of a deadlock: A load is lowered from a great height with the maximum permissible load momentum. The increasing hoist rope weight between the boom head and the hook block / load hook increases the load momentum and leads to a shut-off by the overload protection and further on to self-blockage.

DANGER
“Overload protection emergency operation” special function used improperly!
The crane can collapse or topple over.

If load charts are available:
▶ Use the special function only in case of a deadlock or a failure of overload protection components.

▶ Turn the bypass key **1** to the right.

▷ The *overload protection bypass* icon blinks on the superstructure monitor.
▷ “Overload protection emergency operation” is active.

“Overload protection emergency operation” is deactivated when:
- The bypass key **1** is turned again to the right.
- If a crane movement is not initiated within 10 seconds of activating the special function.
- If no other crane movement is initiated within 10 seconds of ending the crane movement.
- The engine is turned off.

Activating overload protection emergency operation (no load chart available)

DANGER
"Overload protection emergency operation" special function used improperly!
The crane can collapse or topple over.

If **no** load chart is available:
▶ Use the special function only for assembly / disassembly procedures.

▶ Use a Job planner or Crane Planner.

▶ Turn the bypass key **1** to the right.

▷ The *overload protection bypass (assembly)* icon blinks on the superstructure monitor.
▷ "Overload protection emergency operation" is active.

"Overload protection emergency operation" is deactivated when:
- The bypass key **1** is turned again to the right.
- If a crane movement is not initiated within 10 seconds of activating the special function.
- The engine is turned off.

Activating Telematik emergency operation (load chart available)

During Telematik emergency operation, the unpinning of the telescopic pinning is guaranteed and the following shut-offs are bypassed:
- Telescoping cylinder retracting / extending is possible in the intermediate position of the telescoping cylinder pinning.
- Telescoping cylinder extending is possible when the maximum push out length of the telescoping cylinder is reached.

Make sure that the following prerequisites are met:
❑ Error in the Telematik system.
❑ The *telescoping* menu is displayed.
(→ Opening menus, p. 439)
❑ Telescoping manual operation is selected.

DANGER
"Overload protection emergency operation" special function used improperly!
The crane can collapse or topple over.

▶ Use the special function only in case of a failure of Telematik components.

▶ Turn the bypass key **1** to the right.

▷ The *overload protection emergency operation* icon blinks on the superstructure monitor.
▷ Telematik emergency operation is active.

Telematik emergency operation is deactivated when:
- The bypass key **1** is turned again to the right.
- If a crane movement is not initiated within 10 seconds of activating the special function.
- If no other crane movement is initiated within 10 seconds of ending the crane movement.
- The engine is turned off.

Activating Telematik emergency operation (load chart not available)

During Telematik emergency operation, the unpinning of the telescopic pinning is guaranteed and the following shut-offs are bypassed:
- Telescoping cylinder retracting / extending is possible in the intermediate position of the telescoping cylinder pinning.
- Telescoping cylinder extending is possible when the maximum push out length of the telescoping cylinder is reached.

Make sure that the following prerequisites are met:
❑ Error in the Telematik system.
❑ The *telescoping* menu is displayed.
(→ Opening menus, p. 439)
❑ Telescoping manual operation is selected.

DANGER
"Overload protection emergency operation" special function used improperly!
The crane can collapse or topple over.

▶ Use the special function only in case of a failure of Telematik components.

▶ If **no** load chart is available: Use a Job planner or Crane Planner.

▶ Turn the bypass key **1** to the right.

▷ The *overload protection emergency operation* icon blinks on the superstructure monitor.
▷ Telematik emergency operation is active.

Telematik emergency operation is deactivated when:
- The bypass key **1** is turned again to the right.
- If a crane movement is not initiated within 10 seconds of activating the special function.
- The engine is turned off.

9.9.6 Interrupting the acoustic warning horn

Note

The acoustic warning horn can be interrupted at the earliest after five seconds.

In certain situations, the acoustic warning horn can **not** be interrupted.

The horn acoustic warning can only be activated from the crane cab and with the expanded crane remote control* interrupted.

Interrupting the acoustic warning horn from the crane cab

If the acoustic warning horn should be interrupted:
▶ Press the *horn* button on control lever 1 or control lever 2
▷ The acoustic warning horn is interrupted.

Interrupting the acoustic warning horn with expanded crane remote control*

▶ Press the *horn* button on the crane remote control.
▷ The acoustic warning horn is interrupted.

9.10 Bypassing the hoist limit switch

If the hook block / load hook touches the hoist limit switch weight, the hoist limit switch is triggered (→ 4.7.3 Warning and safety equipment, p. 77).

“Hoist limit switch” bypass is permissible **only** in the following situations:
- Hoist limit switch failed
- “Hoist limit switch” bypass required for assembly purposes
- An emergency situation occurred

Make sure that the following prerequisites are met:
❑ A hoist limit switch was triggered or has failed.
❑ “Hoist limit switch” bypass is required for further operation.

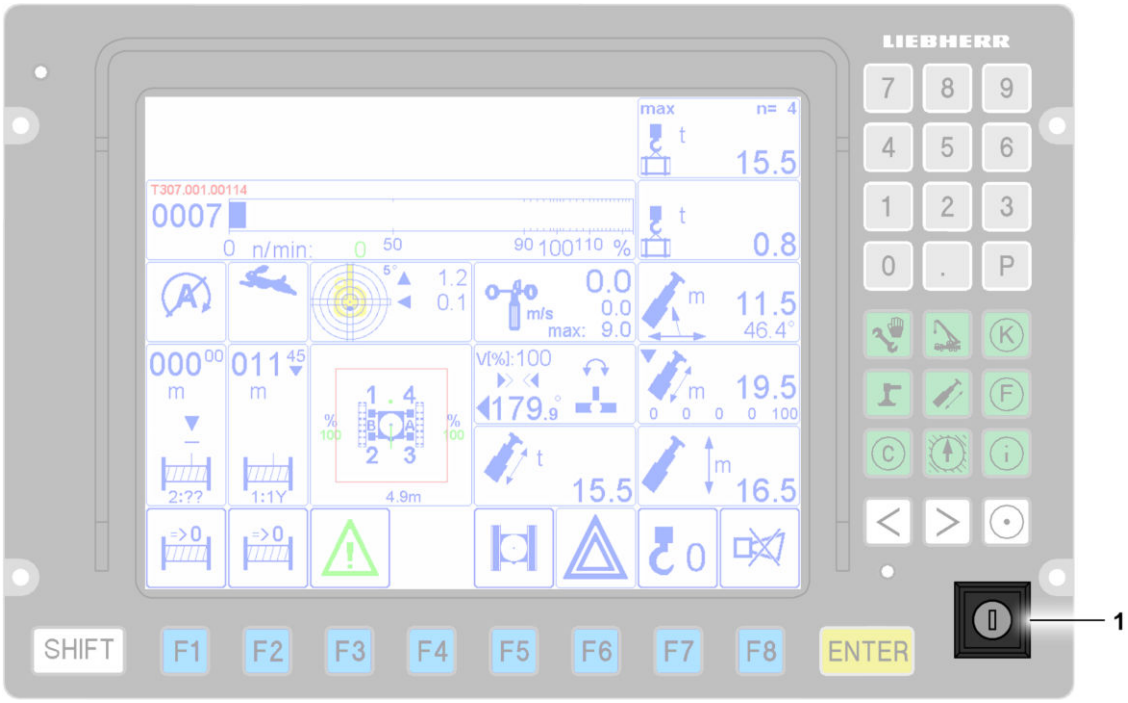


Fig. 1596: Superstructure monitor

1 Bypass key

▶ Turn the bypass key **1** to the right.

▷ The *hoist limit switch bypassed* icon is displayed.
▷ The hoist limit switch is bypassed for 10 seconds.

▷ The *overload protection bypass* icon is displayed.

DANGER
The “hoist limit switch” bypass is used improperly!
The hook block / load hook can collide with the pulley head. The load can fall down.

- ▶ **Never** use to increase the lifting height during crane operation.
- ▶ Make sure that there is sufficient distance between the hook block / load hook and the pulley head.

- ▶ Perform crane movements with foresight and extreme caution.

“Hoist limit switch” bypass is reset when:
- The *bypass* button is pressed again.
- 10 seconds **no** crane movement is carried out.
- The hoist limit switch is **no** longer triggered.
- The control lever is **no** longer deflected after a crane movement.

9.11 Emergency control

9.11.1 Description of the emergency control

With emergency control, the mobile crane can be brought into a safe condition in the case of a serious failure of components and the load can be set down.

Various work is necessary depending on the failed component.

(→ 9.11.3 Reason for failure, p. 632)

If the emergency control is used, all safety equipment is circumvented!

Use of the emergency control is only permissible in emergency situations.

The following movements can be performed using the emergency control:
- Luff the boom system.
- Spool the winch.
- Turn the superstructure.
- Telescoping the telescopic boom (only by authorized service personnel).
- Driving the crawler travel gear.

All movement speeds will be strongly reduced.

9.11.2 Safety

⚠ **This section supplements the “Safety” chapter.**

9.11.2.1 Misuse of the emergency control

All safety equipment is disabled during emergency control. There is an increased danger of accident. The mobile crane can collapse or topple over.

Observe the following rules:
- Only use the emergency control in emergency situations.
- If crane operation is possible: Do **not** use the emergency control.
- Only the crane operator who is aware of the effects of the operation may use the emergency control.
- Plan all necessary crane movements carefully.
- Perform crane movements only in the permissible working area.
- Observe all safety regulations, which apply also during regular crane operation.
- Determine the permissible working range with the load charts, erection / take-down charts, Job Planner or the Crane Planner.
- Crane movements must be carried out with extreme caution and anticipatorily.
- Only when the emergency situation **cannot** be averted by spooling the winch up or out: Use other crane movements.
- If possible: Set down the load first.
- Do **not** carry out crane movements at the same time.
- Telescoping emergency control may only be carried out by authorized service personnel.

9.11.3 Reason for failure

9.11.3.1 Failed electrical supply

The superstructure is **not** supplied with voltage.

The following work must be performed in advance:
- Establishing the external electrical supply.
  (→ 9.11.5 Establishing the external electrical supply, p. 635)
- Prepare the emergency control of the electrical system.
  (→ 9.11.7 Preparing the emergency control of the electrical system, p. 637)

Emergency control can be carried out (→ 9.11.8 Operating crane movements, p. 640).

9.11.3.2 Failed engine or hydraulic system

The following work must be performed in advance:
- Establish the external hydraulic supply.
  (→ 9.11.4 Establishing the external hydraulic supply, p. 633)
- Prepare the emergency control of the hydraulic system.
  (→ 9.11.6 Preparing the emergency control of the hydraulic system, p. 636)
- Prepare the emergency control of the electrical system.
  (→ 9.11.7 Preparing the emergency control of the electrical system, p. 637)

Emergency control can be carried out (→ 9.11.8 Operating crane movements, p. 640).

9.11.3.3 Failed critical operating components

Critical operating components include the control lever or control module, for example.

Note

At least one control lever must be operational for the emergency control.

The following work must be performed in advance:
- Prepare the emergency control of the electrical system.
  (→ 9.11.7 Preparing the emergency control of the electrical system, p. 637)

Emergency control can be carried out (→ 9.11.8 Operating crane movements, p. 640).

9.11.4 Establishing the external hydraulic supply

Note

Only necessary if the engine or hydraulic systems have failed.

If the engine or the hydraulic system fails, the hydraulic supply can be provided by an external hydraulic power unit* or by an external crane with hydraulic supply option.

Make sure that the following prerequisites are met:
- ❑ The ignition is turned off.
- ❑ A hydraulic power unit* or external crane with hydraulic supply option is available.

Connecting the hydraulic power unit*

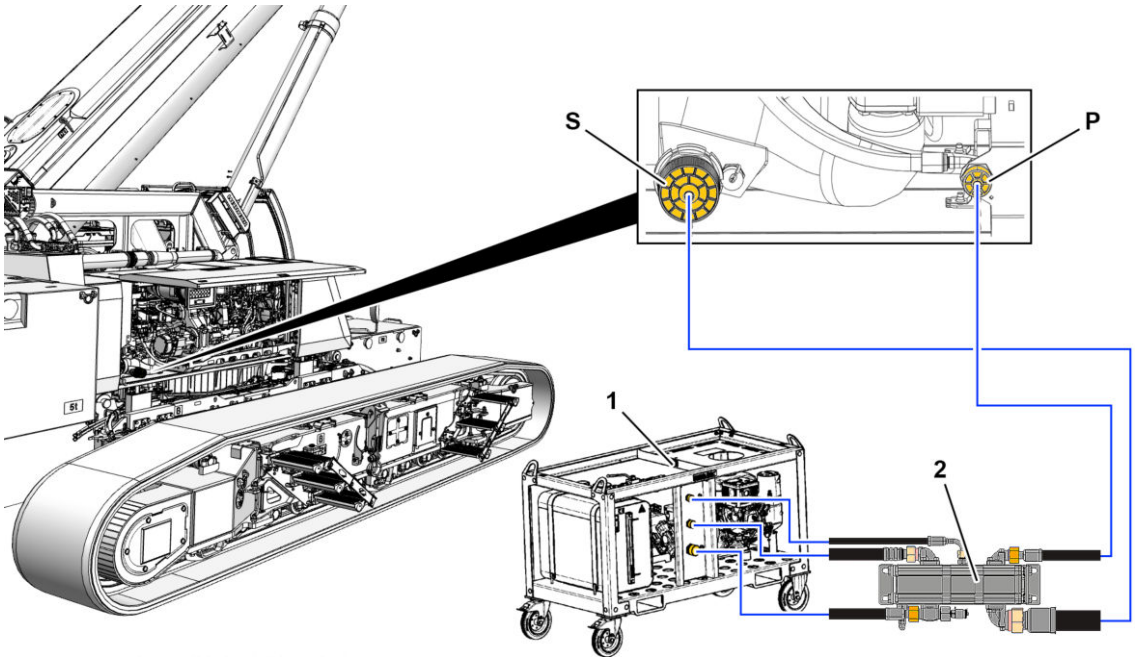


Fig. 1600: Connecting the hydraulic power unit

1 Hydraulic power unit
2 Hydraulic transformer
P Connection (pressure supply)
S Connection (return run)

WARNING
Unsuitable components for emergency control!
Emergency control **cannot** be performed.

▶ Use only components approved by Liebherr-Werk Ehingen GmbH.

▶ Remove the caps from the hydraulic lines and connections.

▶ Connect the hydraulic transformer **2** with the hydraulic power unit **1**.

▶ Connect the hydraulic transformer **2** with connection **S** and connection **P**.
▷ The hydraulic supply for crane movements is established.

Connecting the external crane

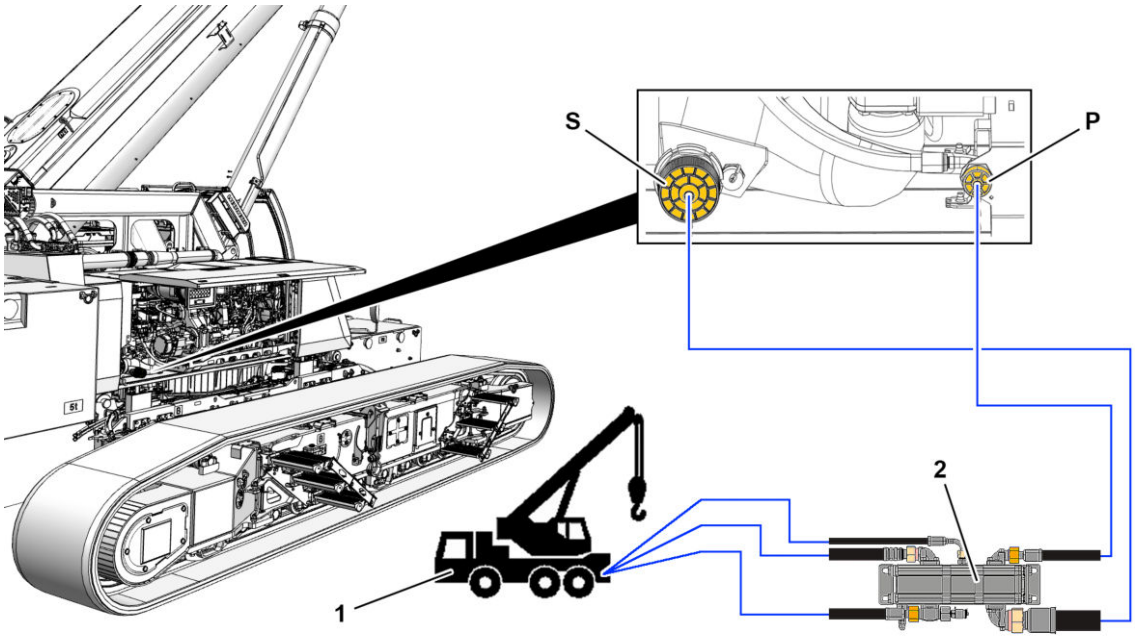


Fig. 1601: Connecting the external crane

1 External crane
2 Hydraulic transformer
P Connection (pressure supply)
S Connection (return run)

▶ Remove the caps from the hydraulic lines and connections.

▶ Connect the hydraulic transformer **2** with connection **S** and connection **P**.

▶ Prepare the hydraulic supply for the external crane **1** (→ Separate documents “Manufacturer's operating instructions”)
▷ The hydraulic supply for crane movements is established.

9.11.5 Establishing the external electrical supply

Note

Only necessary when the internal electrical crane supply has failed.

A permanent electrical supply is required for the emergency control.

Make sure that the following prerequisites are met:
❑ The crane electrical supply has failed.
❑ The ignition is turned off.
(→ 8.12 Engine, p. 490)
❑ An external voltage source **2** (DC 12V-24V) is available.

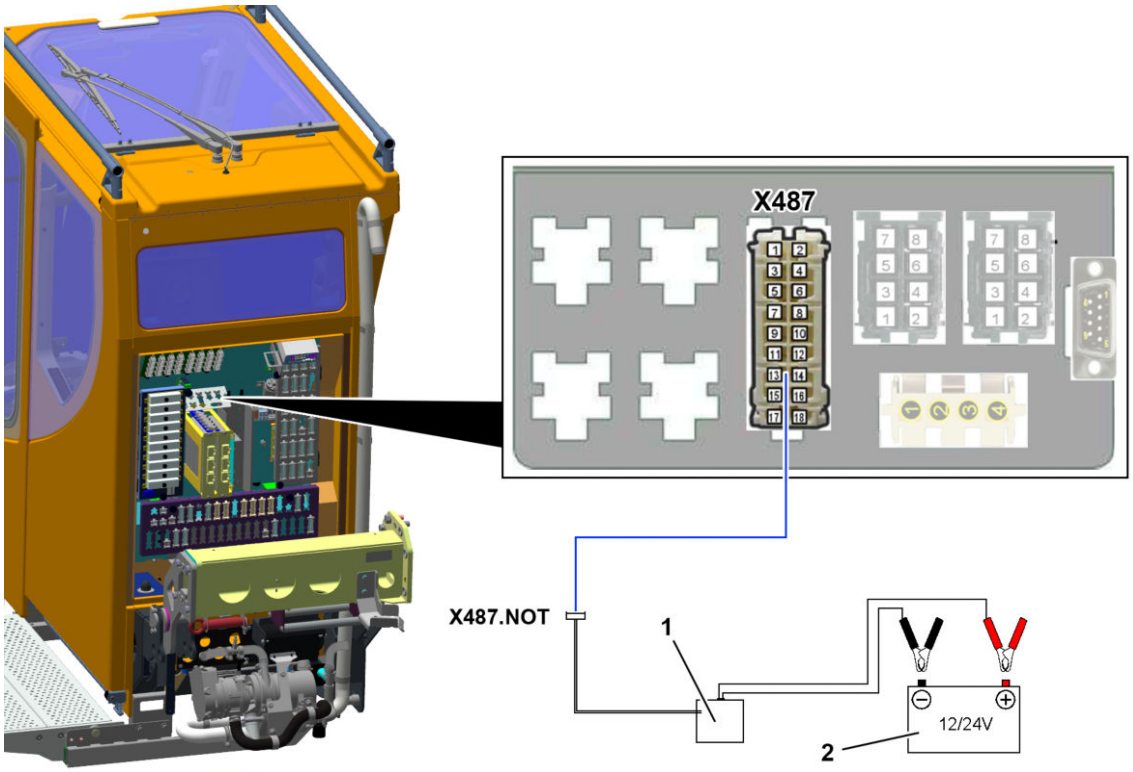


Fig. 1602: Connecting the voltage transformer

1	Voltage transformer*	**X487**	Voltage supply external connection
2	External voltage source (car battery, for example)		

Voltage sources of between 12V and 24V can be connected via the voltage transformer **1**.

- ▶ Unplug plug **-X487.B**.
- ▶ Insert the voltage transformer **1** in plug location **-X487.S**.
- ▶ Connect the voltage transformer **1** with an external voltage source (car battery, for example).

9.11.6 Preparing the emergency control of the hydraulic system

Note

Only necessary if the mobile crane has an external hydraulic supply.

Make sure that the following prerequisites are met:
- ❑ The hydraulic system or engine has failed.
- ❑ The external hydraulic supply is established.
  (→ 9.11.4 Establishing the external hydraulic supply, p. 633)

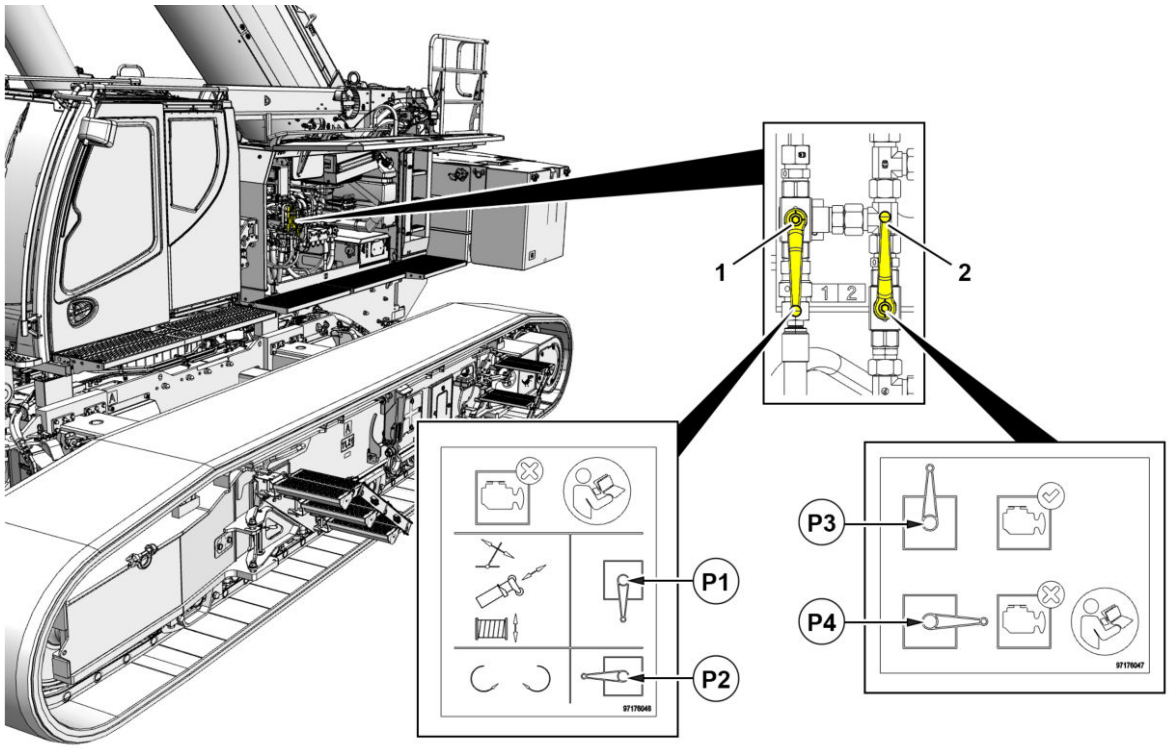
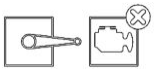


Fig. 1603: Crane movement emergency control ball valve installation location

1 Crane movement switching ball valve
2 Emergency control switching ball valve
P1 Winch spooling, luffing, telescoping and crawler travel gear position
P2 Turning position
P3 Crane operation position
P4 Emergency control position

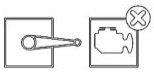
Prepare for winch spooling, luffing, telescoping and crawler travel gear emergency control



▶ Move the ball valve **2** in the emergency control position **P4** to the right.

▶ Move the ball valve **1** down into the position **P1**.

Prepare for turning emergency control



▶ Move the ball valve **2** in the emergency control position **P4** to the right.

▶ Move the ball valve **1** in the position **P2** to the left.

9.11.7 Preparing the emergency control of the electrical system

Make sure that the following prerequisites are met:
❑ The ignition is turned off.

Note

The emergency control for the crawler travel gear and the emergency control for the superstructure **cannot** be active at the same time.

Preparing for superstructure emergency control

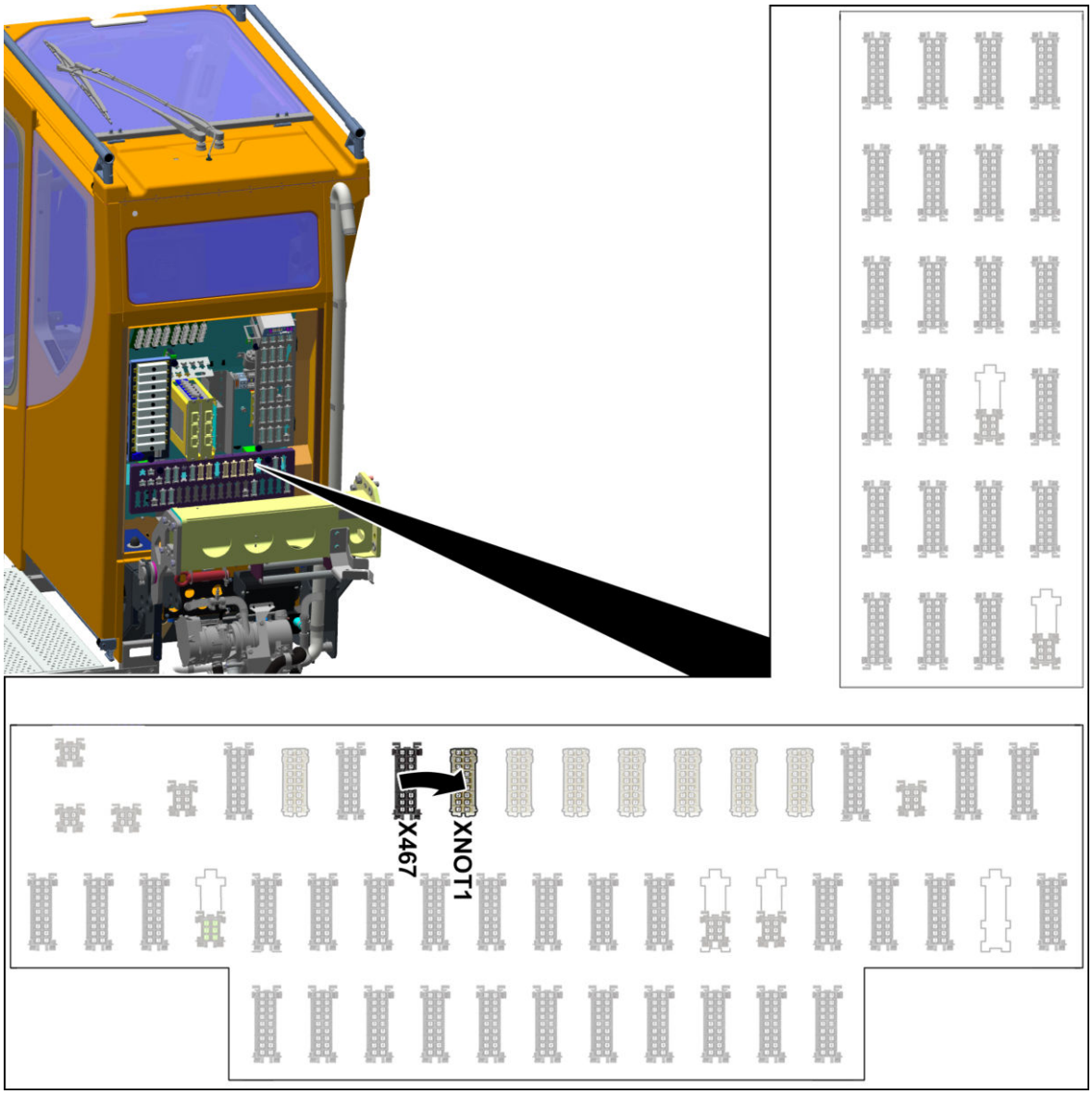


Fig. 1608: Emergency control plug locations

X467 Superstructure crane operation **XNOT1** Emergency control

▶ Unplug plug **-X467.B** and insert in plug location **-XNOT1.S**.
▷ The superstructure emergency control is active

Preparing for crawler travel gear emergency control

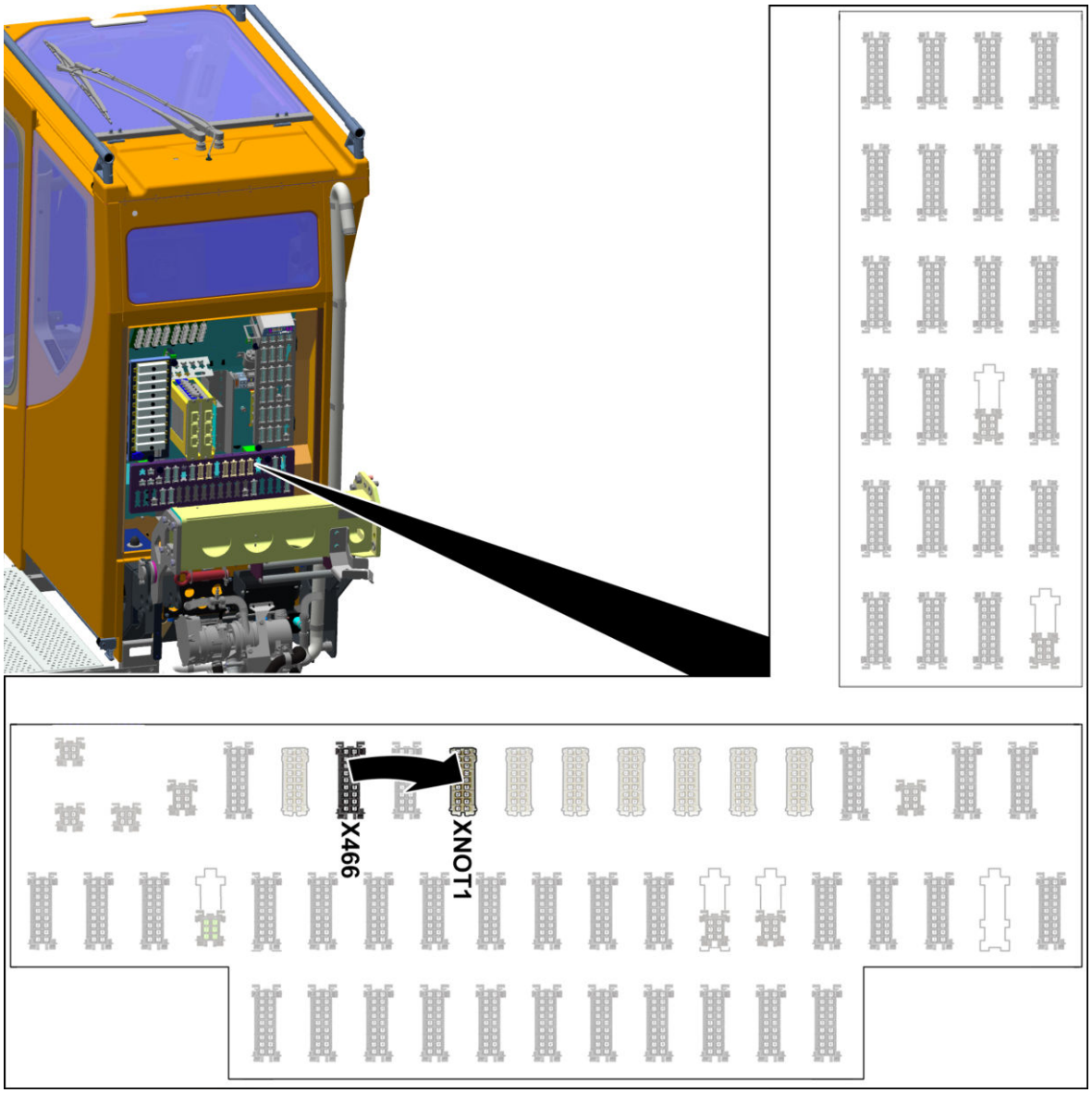


Fig. 1609: Emergency control plug locations

X466 Crawler travel gear crane operation **XNOT1** Emergency control

▶ Unplug plug **-X466.B** and insert in plug location **-XNOT1.S**.

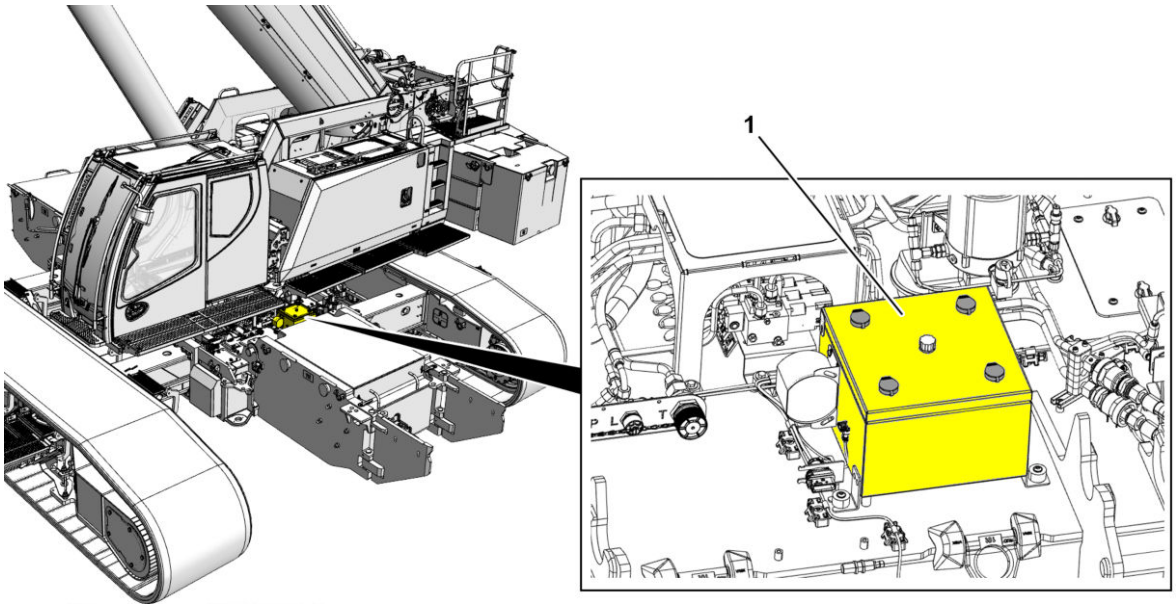


Fig. 1610: Chassis switch box

In the switch box **1**:

▶ Unplug plug **-X192.S**.

▶ Insert plug **-XNOT2FW.NS** in plug connection **-X192.B**.
▷ The crawler travel gear emergency control is active

9.11.8 Operating crane movements

During emergency control, each crane movement can be assigned to any control lever. The assignment takes place by replugging plugs into the crane cab control cabinet.

The crane movement valves are actuated using the selected control lever. Every crane movement has its own cycle signal that is reflected by the assigned vibration sensor of the control lever.

Crane movement	Plug location	Vibration sensor cycles
Crawler travel gear	XNOT0	6x
Turn the superstructure	XNOT2	4x
Spool winch 2*	XNOT3	2x
Spool winch 1	XNOT4	2x
Luff the auxiliary boom*	XNOT5	5x
Luffing the telescopic boom	XNOT6	3x

Tab. 101: Overview of crane movement emergency control

Make sure that the following prerequisites are met:

❑ If required: The external hydraulic supply is established.
(→ 9.11.4 Establishing the external hydraulic supply, p. 633)

❑ If required: The external electrical supply is prepared.
(→ 9.11.5 Establishing the external electrical supply, p. 635)

❑ The electrical system is prepared.
(→ 9.11.7 Preparing the emergency control of the electrical system, p. 637)

❑ If a mobile crane has an external hydraulic supply: The hydraulic system is prepared for the required crane movement.

(→ 9.11.6 Preparing the emergency control of the hydraulic system, p. 636)

- ❑ The ignition is turned off.
- ❑ At least one control lever is functioning.
- ❑ The valves for crane movements are functioning.

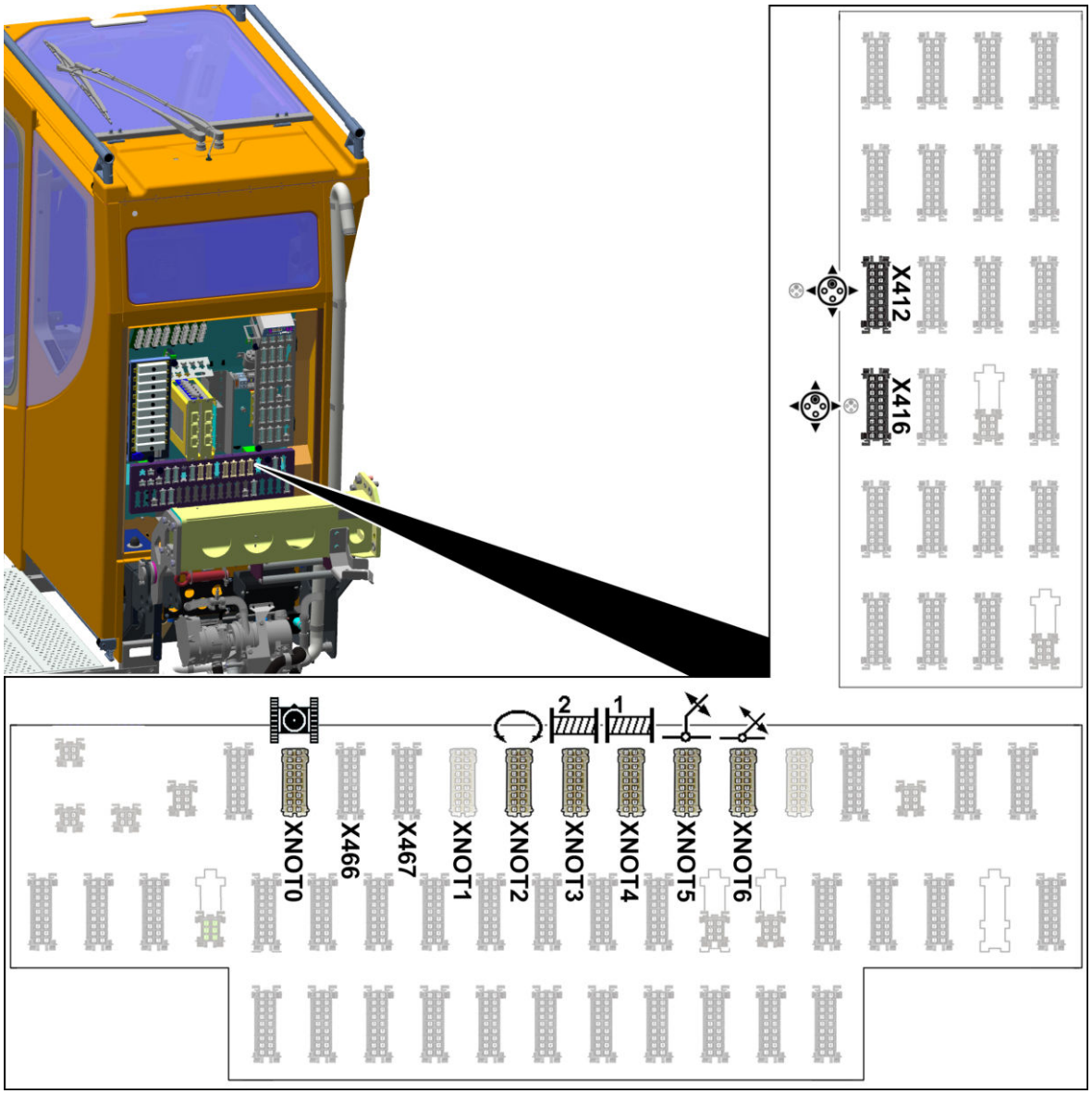


Fig. 1611: Emergency control plug locations

XNOT0 Crawler travel gear
XNOT2 Turn the superstructure
XNOT3 Spool winch 2*
XNOT4 Spool winch 1
XNOT5 Luff the auxiliary boom*
XNOT6 Luffing the telescopic boom
X412 Control lever 1 (right)
X416 Control lever 2 (left)

Spool winch 1 

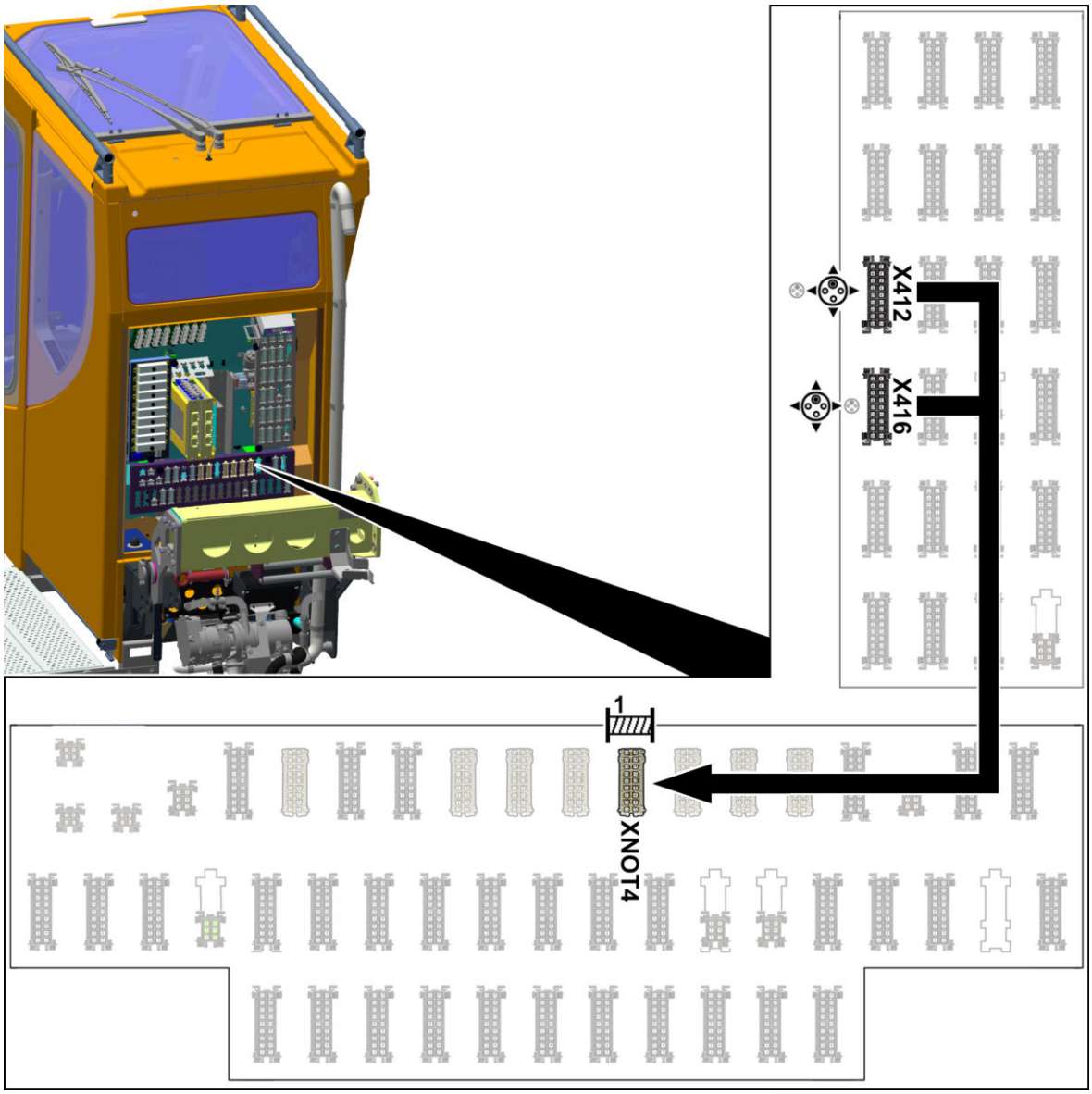


Fig. 1612: Emergency control plug locations

XNOT4 Spool winch 1
X412 Control lever 1 (right)
X416 Control lever 2 (left)

▶ Unplug plug **-XNOT4.B**

If control lever 1 (right) is used:
▶ Insert plug **-X412.B** in plug location **-XNOT4.S**.
or

If control lever 2 (left) is used:
Insert plug **-X416.B** in plug location **-XNOT4.S**.

▶ Turn the ignition on.
▷ The vibration sensor of the selected control lever outputs two cycles.

▶ Start the engine or turn on the external hydraulic supply.

On the selected control lever:

▶ **Press and hold** the button **1** or button **2**.

If winch 1 should be spooled out:

▶ Deflect the selected control lever to the front.

or

If winch 1 should be spooled up:

Deflect the selected control lever to the rear.

▷ Crane movement is carried out.

Turn the superstructure

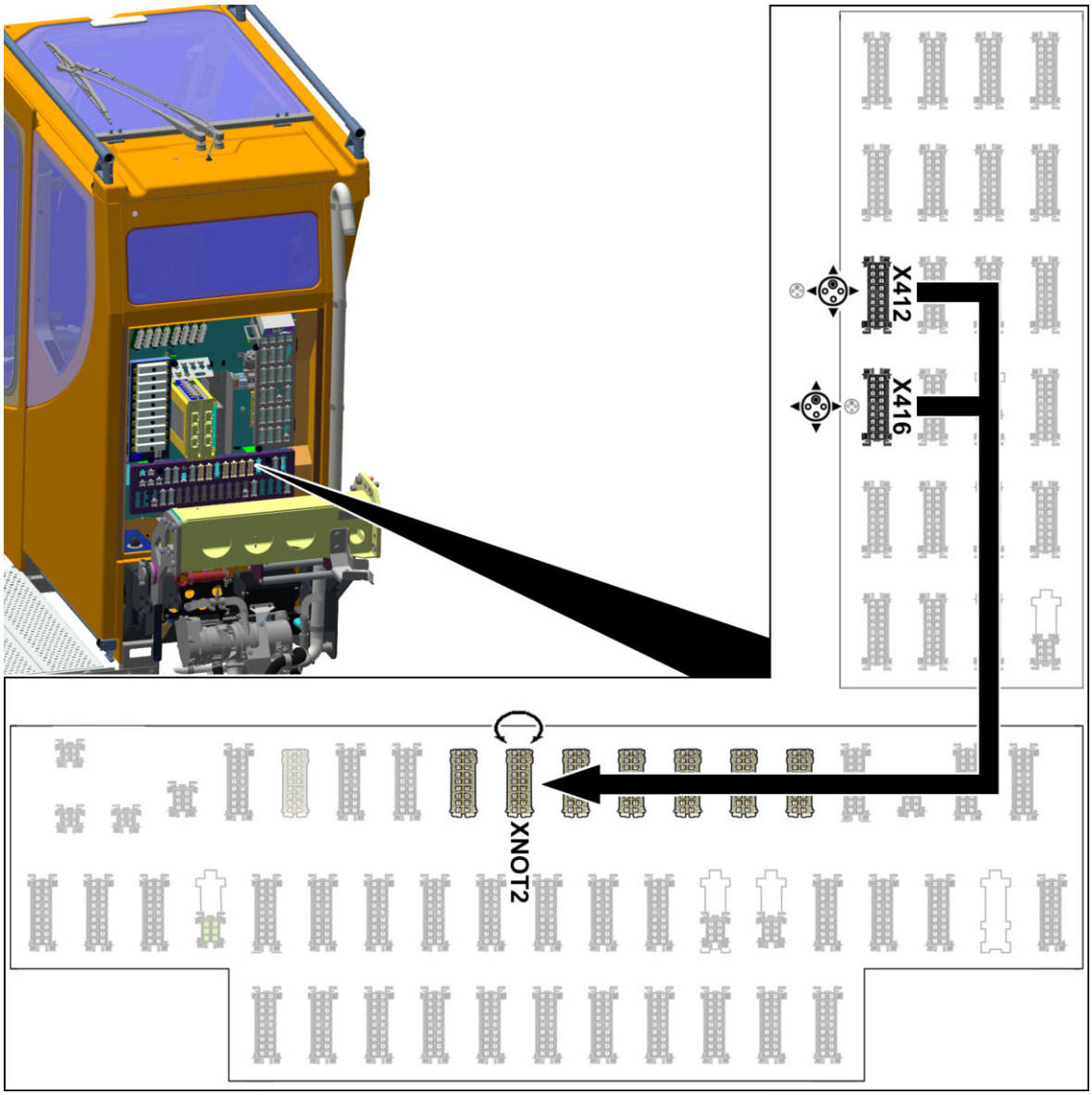


Fig. 1616: Emergency control plug locations

XNOT2 Turn the superstructure
X412 Control lever 1 (right)
X416 Control lever 2 (left)

▶ Unplug plug **-XNOT2.B**

If control lever 1 (right) is used:
▶ Insert plug **-X412.B** in plug location **-XNOT2.S**.
or

If control lever 2 (left) is used:
Insert plug **-X416.B** in plug location **-XNOT2.S**.

▶ Turn the superstructure ignition on.
▷ The vibration sensor of the selected control lever outputs four cycles.

▶ Start the engine or turn on the external hydraulic supply.

On the selected control lever:
▶ **Press and hold** the button **1** or button **2**.

If the superstructure should be turned to the left:
▶ Deflect the selected control lever to the left.

or

If the superstructure should be turned to the right:
Deflect the selected control lever to the right.

▷ The crane movement is carried out.

Luffing the telescopic boom 

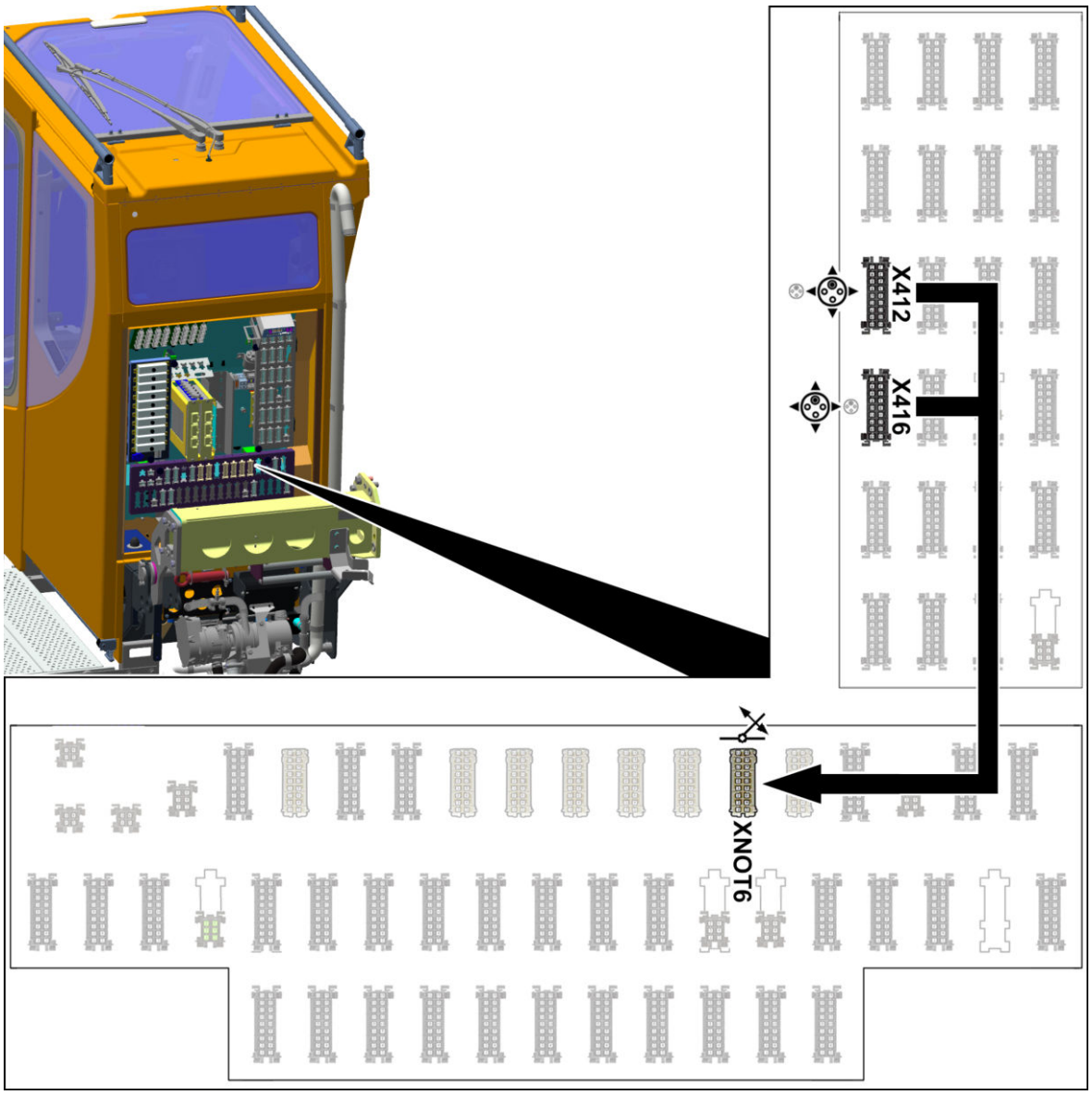


Fig. 1620: Emergency control plug locations

XNOT6 Luffing the telescopic boom
X412 Control lever 1 (right)
X416 Control lever 2 (left)

▶ Unplug plug **-XNOT6.B**

If control lever 1 (right) is used:
▶ Insert plug **-X412.B** in plug location **-XNOT6.S**.
or

If control lever 2 (left) is used:
Insert plug **-X416.B** in plug location **-XNOT6.S**.

▶ Turn the superstructure ignition on.
▷ The vibration sensor of the selected control lever outputs three cycles.

▶ Start the engine or turn on the external hydraulic supply.

On the selected control lever:
▶ **Press and hold** the button **1** or button **2**.

If the telescopic boom is to be luffed up:
▶ Deflect the selected control lever to the left.

or

If the telescopic boom is to be luffed down:
Deflect the selected control lever to the right.

▷ The crane movement is carried out.

Spool winch 2*

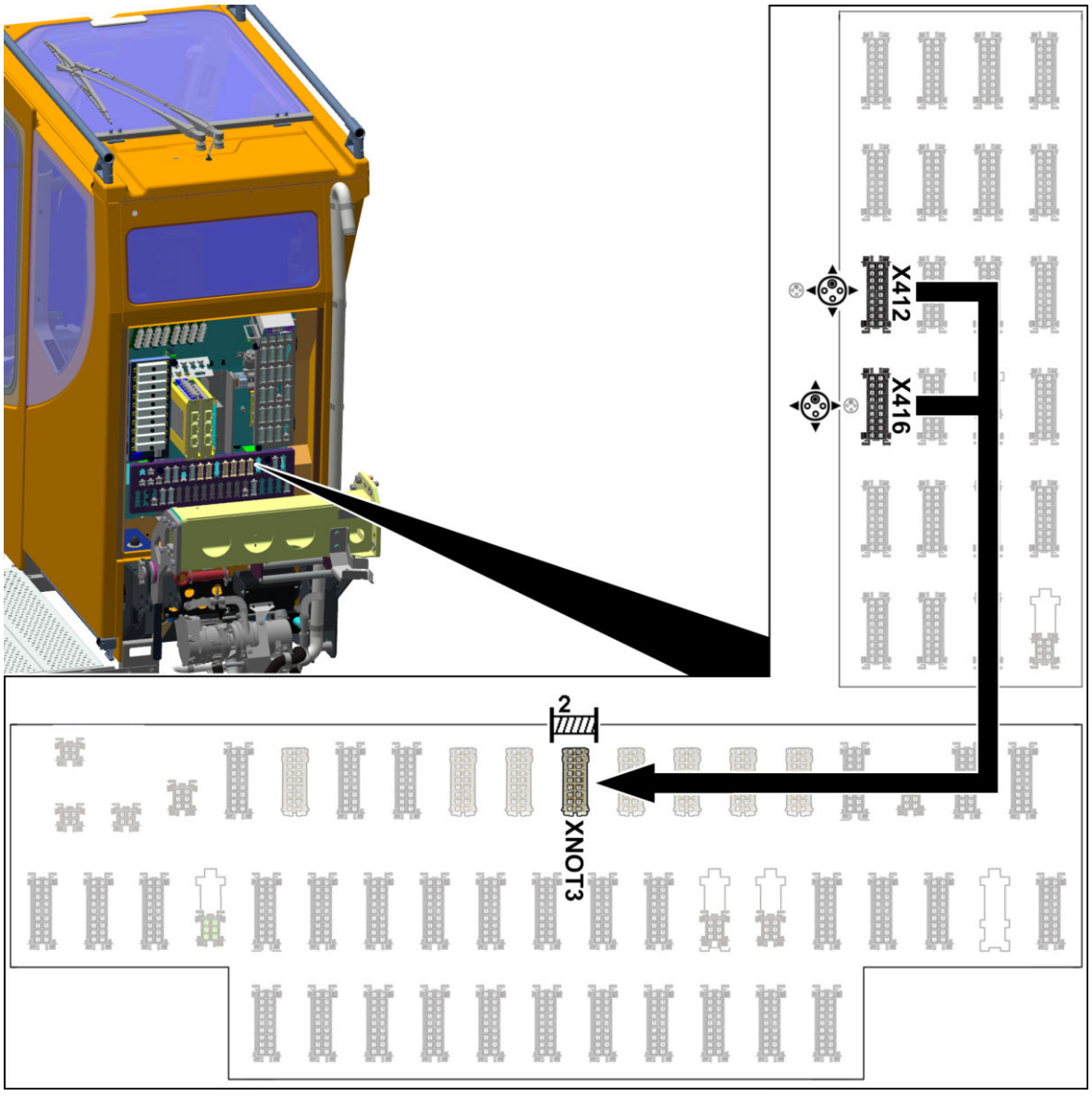


Fig. 1624: Emergency control plug locations

XNOT3 Spool winch 2*
X412 Control lever 1 (right)
X416 Control lever 2 (left)

▶ Unplug plug **-XNOT3.B**

If control lever 1 (right) is used:
▶ Insert plug **-X412.B** in plug location **-XNOT3.S**.
or

If control lever 2 (left) is used:
Insert plug **-X416.B** in plug location **-XNOT3.S**.

▶ Turn the superstructure ignition on.
▷ The vibration sensor of the selected control lever outputs two cycles.

▶ Start the engine or turn on the external hydraulic supply.

On the selected control lever:

▶ **Press and hold** the button **1** or button **2**.

If winch 2 should be spooled out:

▶ Deflect the selected control lever to the front.

or

If winch 2 should be spooled up:

Deflect the selected control lever to the rear.

▷ The crane movement is carried out.

Luff the hydraulic auxiliary boom* 

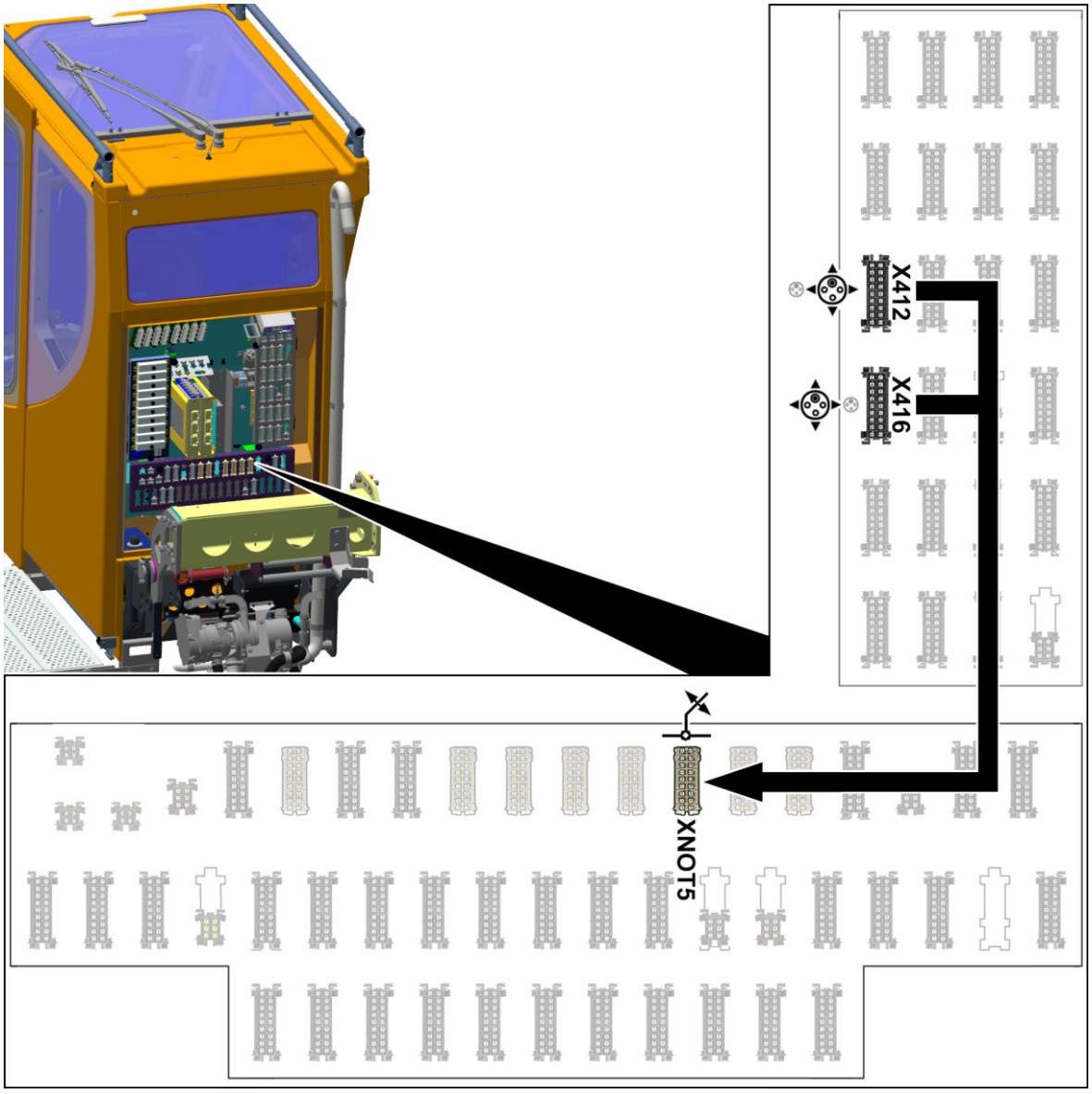


Fig. 1628: Emergency control plug locations

XNOT5 Luff the auxiliary boom*
X412 Control lever 1 (right)
X416 Control lever 2 (left)

▶ Unplug plug **-XNOT5.B**

If control lever 1 (right) is used:
▶ Insert plug **-X412.B** in plug location **-XNOT5.S**.
or

If control lever 2 (left) is used:
Insert plug **-X416.B** in plug location **-XNOT5.S**.

▶ Turn the superstructure ignition on.
▷ The vibration sensor of the selected control lever outputs five cycles.

▶ Start the engine or turn on the external hydraulic supply.

On the selected control lever:
▶ **Press and hold** the button **1** or button **2**.

If the auxiliary boom is to be luffed up:
▶ Deflect the selected control lever to the left.

or

If the auxiliary boom is to be luffed down:
Deflect the selected control lever to the right.

▷ The crane movement is carried out.

Crawler travel gear 

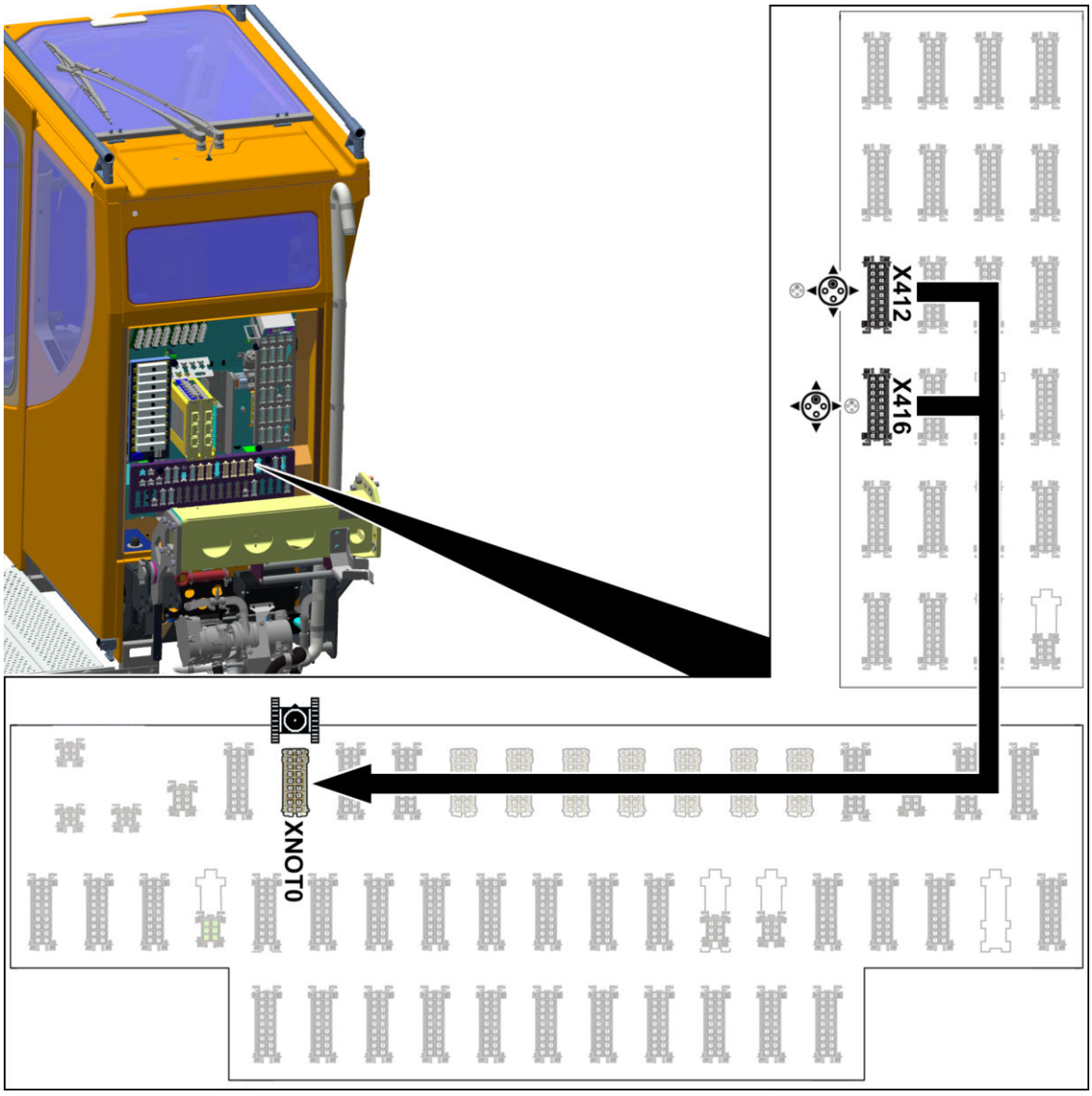


Fig. 1632: Emergency control plug locations

XNOT0 Crawler travel gear
X412 Control lever 1 (right)
X416 Control lever 2 (left)

▶ Unplug plug **-XNOT0.B**

If control lever 1 (right) is used:
▶ Insert plug **-X412.B** in plug location **-XNOT0.S**.
or

If control lever 2 (left) is used:
Insert plug **-X416.B** in plug location **-XNOT0.S**.

▶ Turn the superstructure ignition on.
▷ The vibration sensor of the selected control lever outputs six cycles.

▶ Start the engine or turn on the external hydraulic supply.

On the selected control lever:
▶ **Press and hold** the button **1** or button **2**.

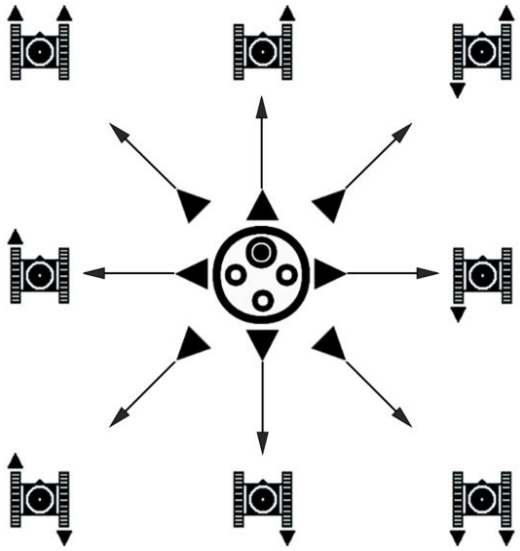


Fig. 1634: Crawler travel gear control lever assignment

▶ Deflect the selected control lever in the desired direction.
▷ The crane movement is carried out.

9.11.9 Ending emergency control

Make sure that the following prerequisites are met:
❑ The engine is turned off.
(→ 8.12 Engine, p. 490)
❑ The ignition is turned off.
❑ The hydraulic power unit* is turned off.
❑ The engine of the external crane is turned off.

Ending the emergency control of the electrical system

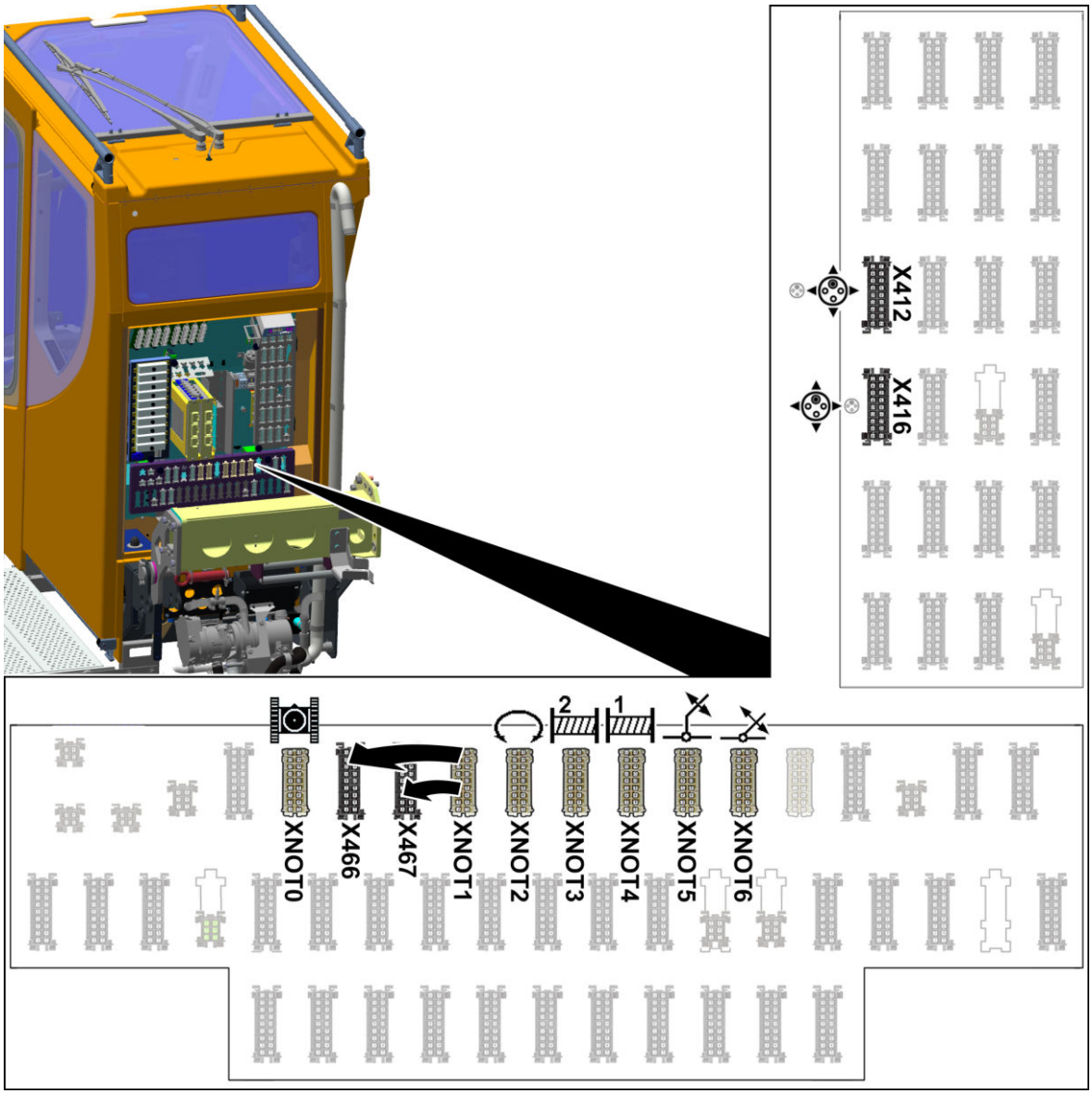


Fig. 1635: Emergency control plug locations

X466 Crawler travel gear crane operation
X467 Superstructure crane operation
XNOT0 Crawler travel gear
XNOT1 Emergency control
XNOT2 Turn the superstructure
XNOT3 Spool winch 2*
XNOT4 Spool winch 1
XNOT5 Luff the auxiliary boom*
XNOT6 Luffing the telescopic boom
X412 Control lever 1 (right)
X416 Control lever 2 (left)

The plugs for crane movements (XNOT0 and XNOT2 to XNOT6) and control lever (X412 und X416) must return to the correct plug location (for example: **-X412.B → -X412.S**).

▶ Insert all plugs into their original plug location.

If the superstructure emergency control is used:
▶ Unplug plug **-X466.B** and insert in plug location **-X466.S**.
or

If the crawler travel gear emergency control is used:
Unplug plug **-X467.B** and insert in plug location **-X467.S**.

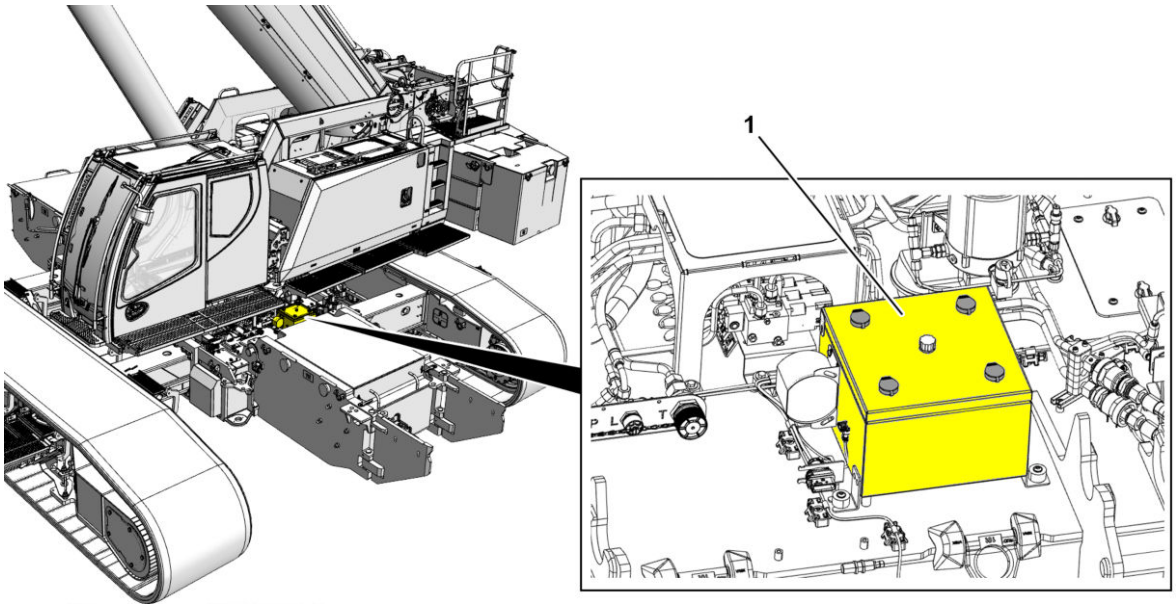


Fig. 1636: Chassis switch box

In the switch box **1**:

▶ Unplug plug **-XNOT2FW.NS**

▶ Insert plug **-X192.S** in plug connection **-X192.B**.
▷ Emergency control is deactivated.

Disconnecting the external electrical supply

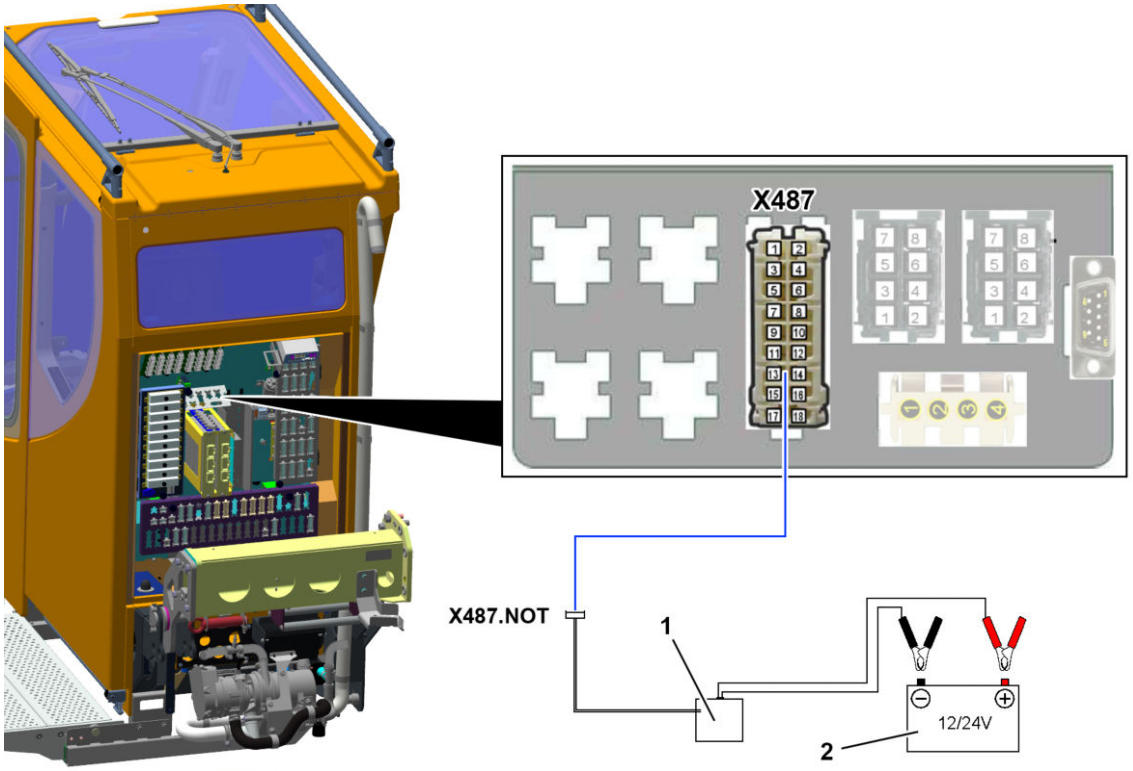


Fig. 1637: Disconnecting the voltage transformer

1 Voltage transformer*

X487 Voltage supply external connection

See next page for continuation of the image legend

2 External voltage source (car battery, for example)

▶ Disconnect the voltage transformer **1** from the external voltage source **2**.

▶ Disconnect the voltage transformer **1**: Unplug plug **-X487.NOT** from plug location **-X487.S**.

▶ Insert plug **-X487.B** in plug location **-X487.S**

Ending the emergency control of the hydraulic system

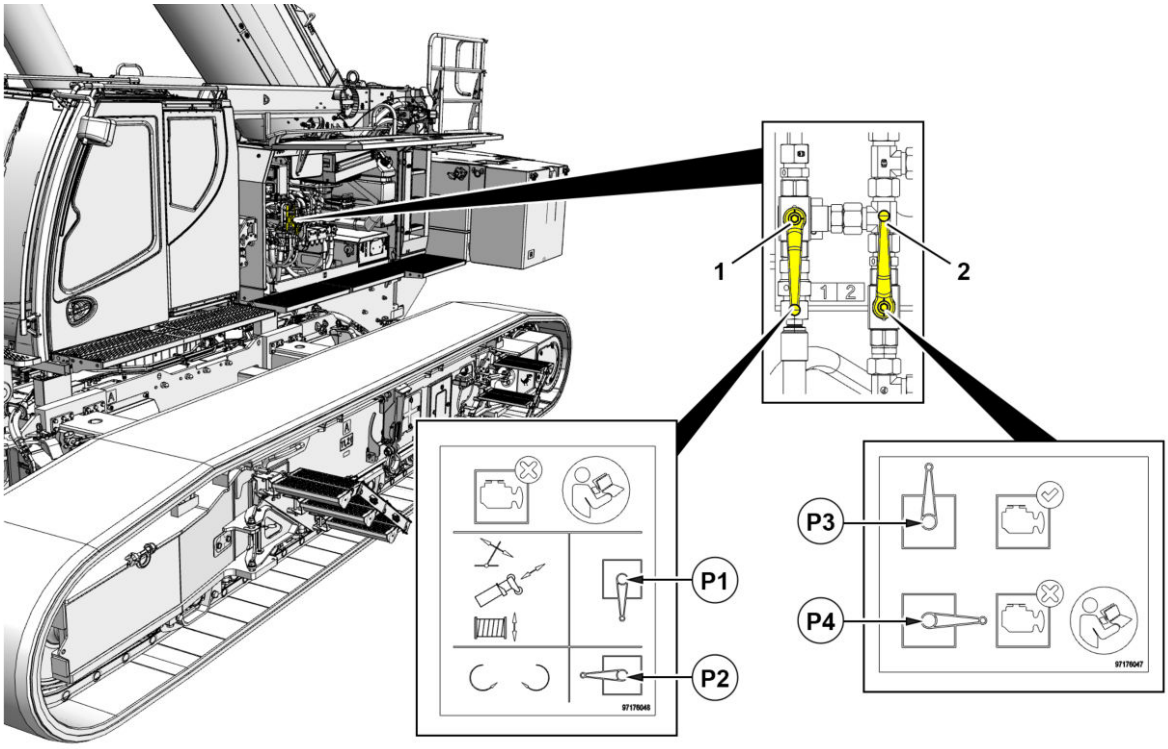
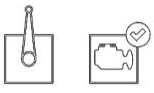


Fig. 1638: Crane movement emergency control ball valve installation location

1 Crane movement switching ball valve
2 Emergency control switching ball valve
P1 Winch spooling, luffing, telescoping and crawler travel gear position
P2 Turning position
P3 Crane operation position
P4 Emergency control position



▶ Move the ball valve **2** up into the position **P3**.

Note

The position of the ball valve **1** is **not** relevant for crane operation.

Disconnecting the hydraulic power unit*

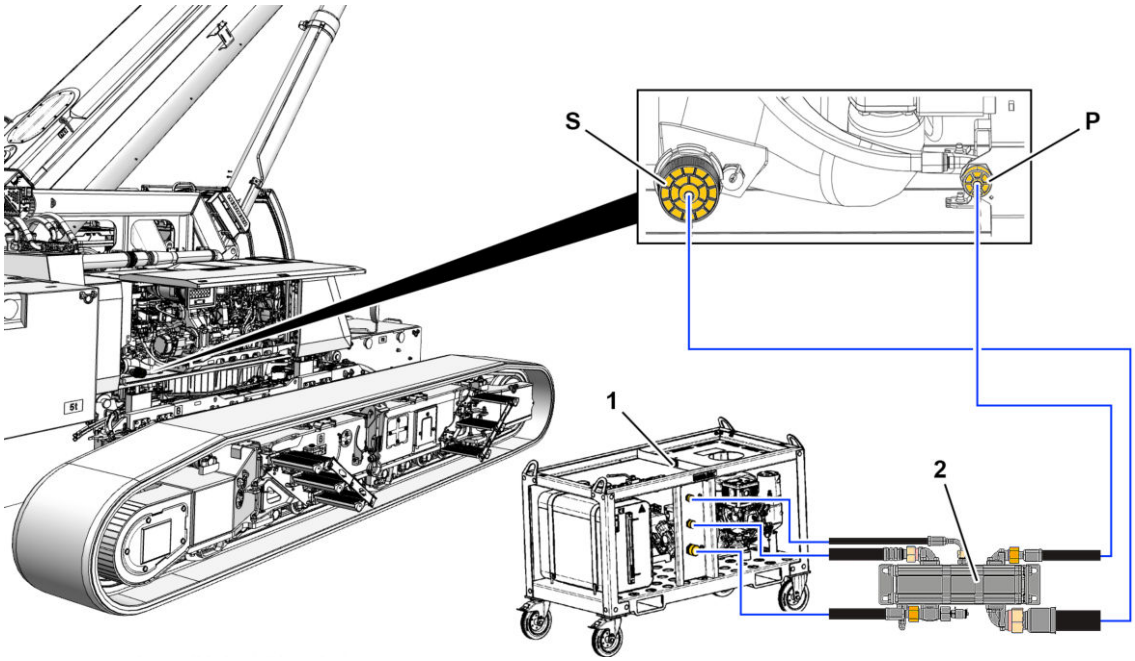


Fig. 1640: Disconnecting the hydraulic power unit

1 Hydraulic power unit
2 Hydraulic transformer
P Connection (pressure supply)
S Connection (return run)

▶ Disconnect the hydraulic transformer **2** from the connection **P** and connection **S**.

▶ Disconnect the hydraulic transformer **2** from the hydraulic power unit **1**.

▶ Attach the caps to the hydraulic lines and connections.

Disconnecting the external crane

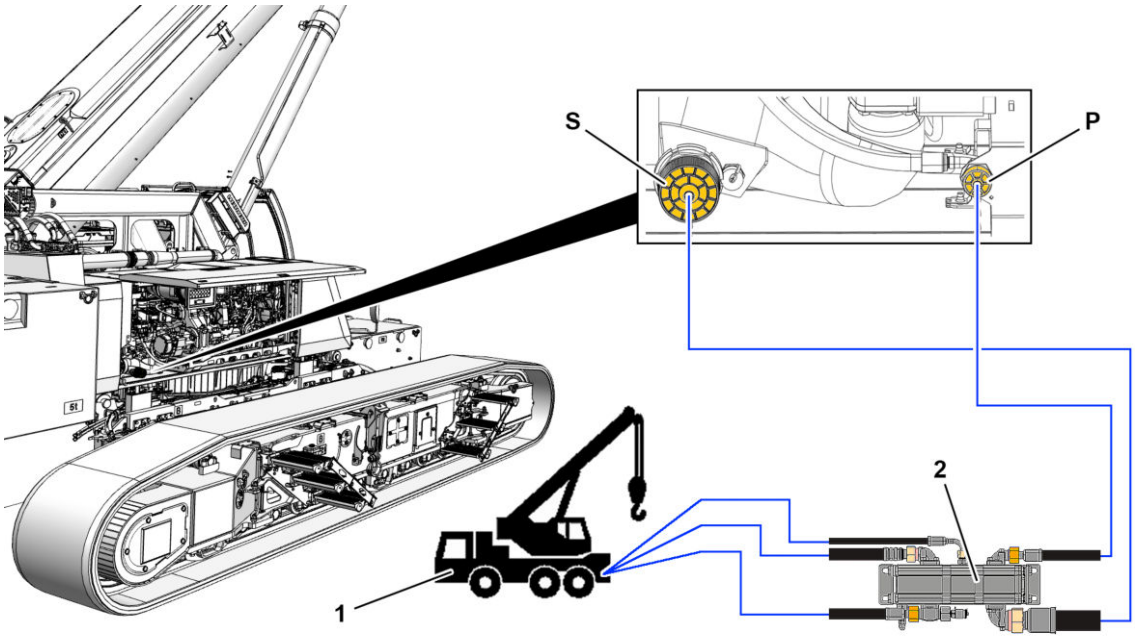


Fig. 1641: Disconnecting the external crane

1	External crane	**P**	Connection (pressure supply)
2	Hydraulic transformer	**S**	Connection (return run)

▶ End the hydraulic supply for the external crane **1** (→ Separate documents “Manufacturer's operating instructions”)

▶ Disconnect the hydraulic transformer **2** from the connection **S** and connection **P**.

▶ Attach the caps to the hydraulic lines and connections.

9.11.10 Supplying the external crane with emergency hydraulic power

Make sure that the following prerequisites are met:
❑ The engine is **not** running.
(→ 8.12 Engine, p. 490)
❑ The engine of the external crane **3** is **not** running.
❑ The external crane **3** is connected with the hydraulic transformer **2**.
(→ separate documents “Manufacturer's operating instructions”)

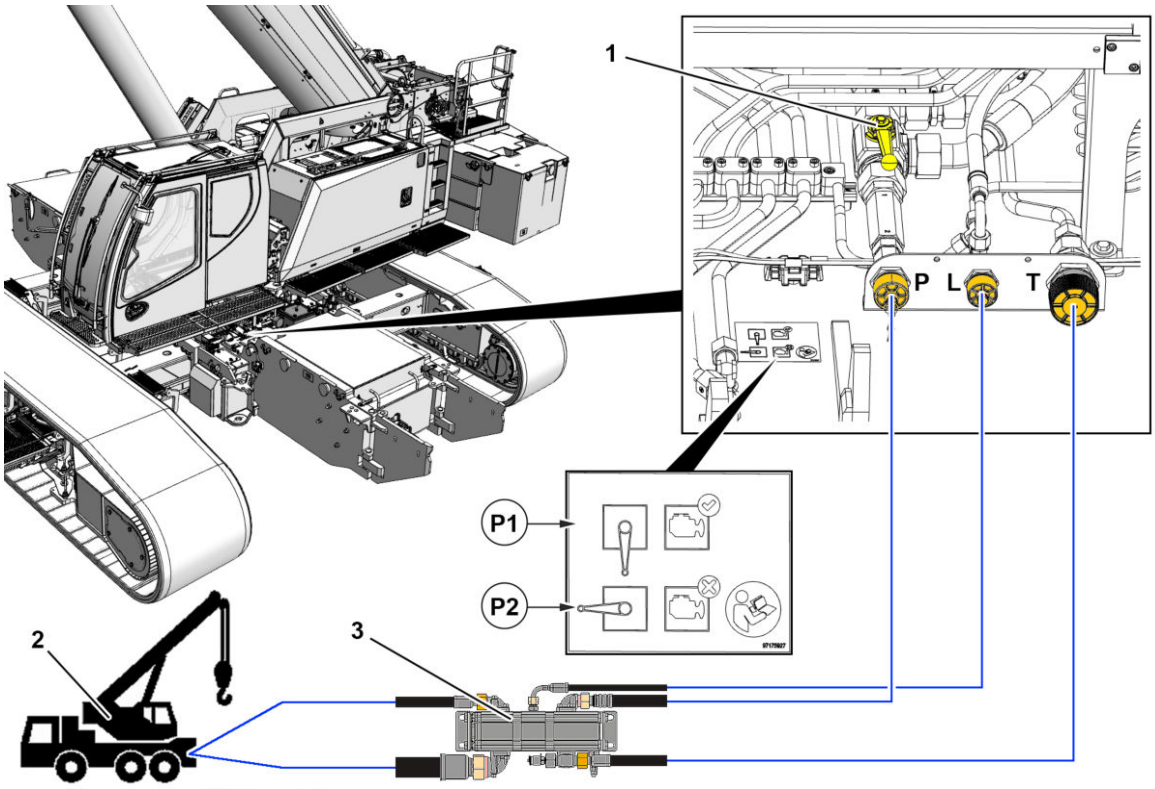


Fig. 1642: Supplying the external crane with emergency hydraulic power

1 Ball valve
2 Hydraulic transformer
3 External crane
P Connection (pressure supply)
L Connection (leak oil)
T Connection (return run)
P1 Normal operation position
P2 Emergency supply position

Preparing the emergency supply

- ▶ Remove the caps from the hydraulic lines and connections
- ▶ Connect the hydraulic transformer **2** with connection **P**, connection **T** and connection **L**.
- ▶ Start the engine
- ▶ Move the ball valve **1** to position **P2**.

  ▷ The hydraulic emergency supply is prepared.

Ending the emergency supply

- ▶ Disconnect the hydraulic transformer **2** from connection **P**, connection **T** and connection **L**.
- ▶ Attach the caps to the hydraulic lines and connections.
- ▶ Move the ball valve **1** to position **P1**.

  ▷ The mobile crane is in normal operation

10 Assembling and disassembling

10.1 Railing and accesses

10.1.1 Safety

This section supplements the “Safety” chapter.

10.1.1.1 Moving parts

If there are moving parts, there is danger of crushing and shearing of fingers and hands.

Moving parts include, for example:
- Hinge
- Ladder retainer on the crane
- Swinging cross beams on the multi-purpose ladders
- Joints on the ladder legs of the multi-purpose ladder
- Swinging railings and fall protection equipment
- Swinging stairs and accesses

Rules for safe use with moving parts:
- Do not insert hands or fingers in the movement area of moving parts.
- Remove the multi-purpose ladder only from the ground or secure in the retainer.
- Swing the railing and stairs carefully.

10.1.2 Assembling the removable stairs on the crawler carrier

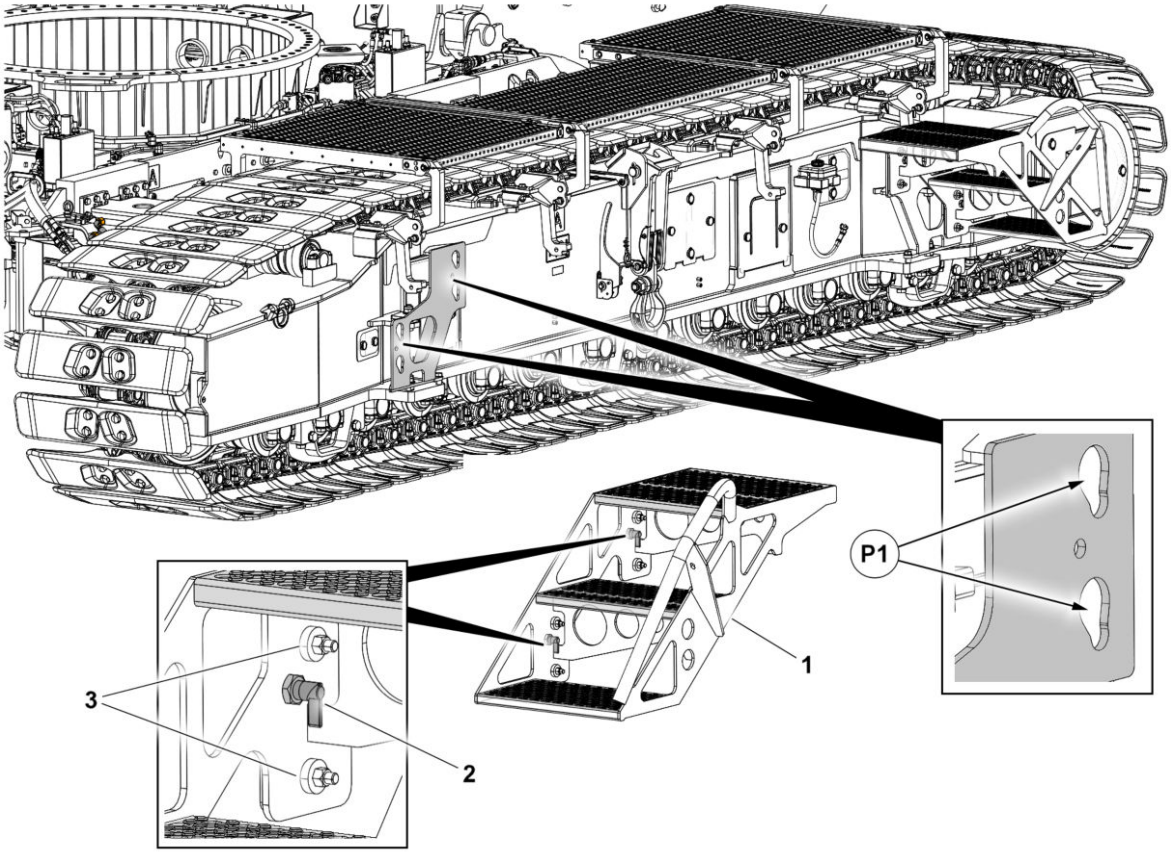


Fig. 1646: Assembling the stairs on the crawler carrier

1 Stairs
2 Retaining element
3 Retainer
P1 Assembly position

The separately transported stairs must be assembled on the crawler carriers before crane operation. Assembly is the same for all stairs.

▶ Connect the stairs **1** with the retainers **3** in the assembly position **P1** on the crawler carrier in the operating position.

When all four retainers **3** are correctly connected:
▶ Lock both retaining elements **2** on the stairs **1**.

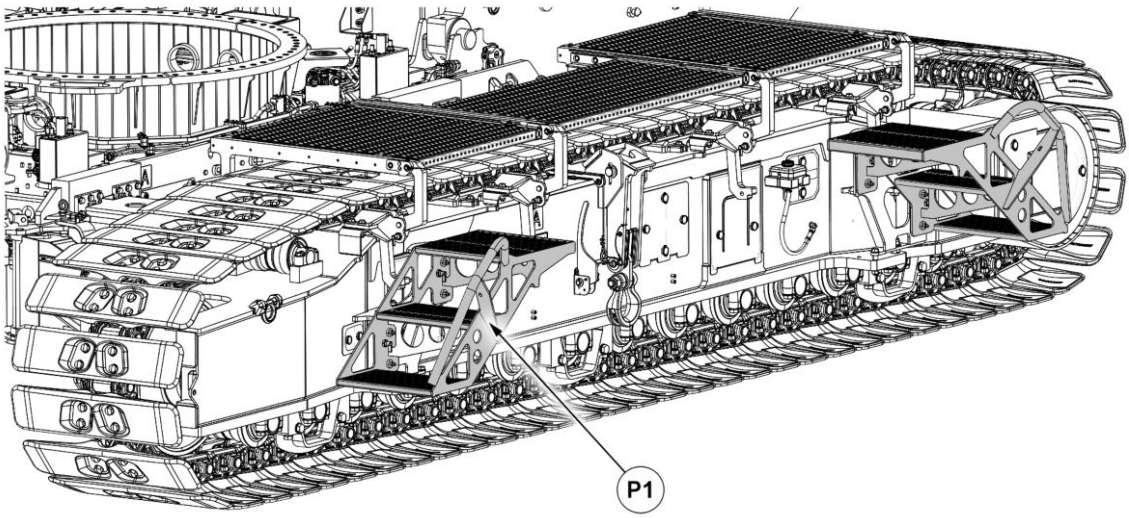


Fig. 1647: Stairs assembled in the operating position

P1 Operating position

▷ The stairs are assembled in the operating position **P1**.

10.1.3 Swinging the swinging steps* on the crawler carrier into the “wide track width” operating position

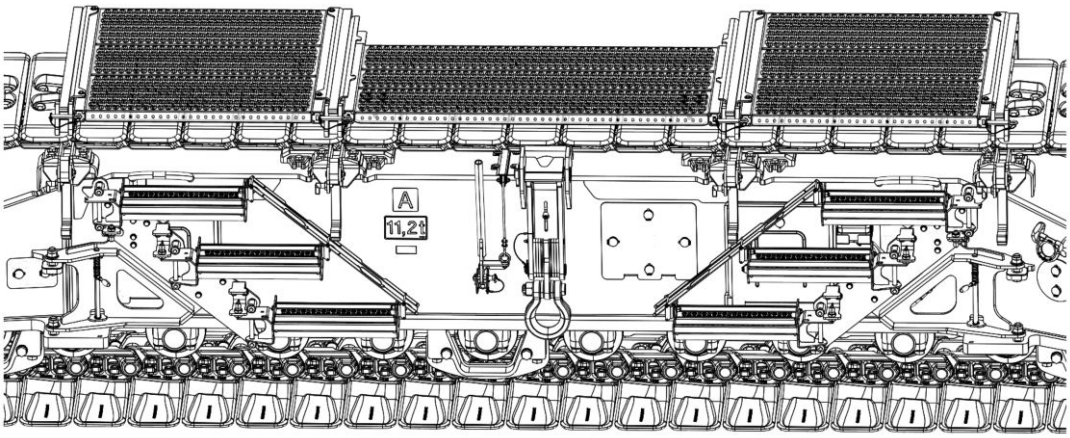


Fig. 1648: Swingable stairs in the transport position

All four swingable steps on the crawler carriers are brought into the operating position in the same manner.

⚠ **Danger of crushing! Moving parts!**

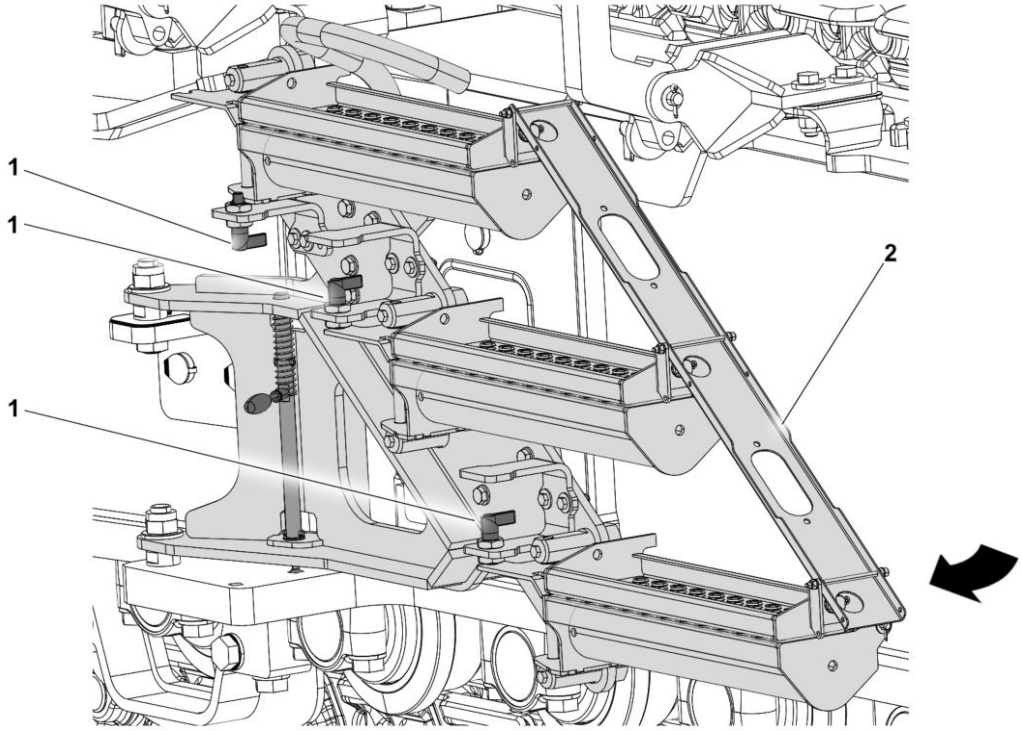


Fig. 1649: Releasing the stairs and swinging into the operating position

1 Retaining element **2** Guide rail

▶ Unlock the retaining elements **1**.

▶ Hold the stairs on the guide rails **2** and swing into the operating position.

▶ Lock the retaining elements **1** again.

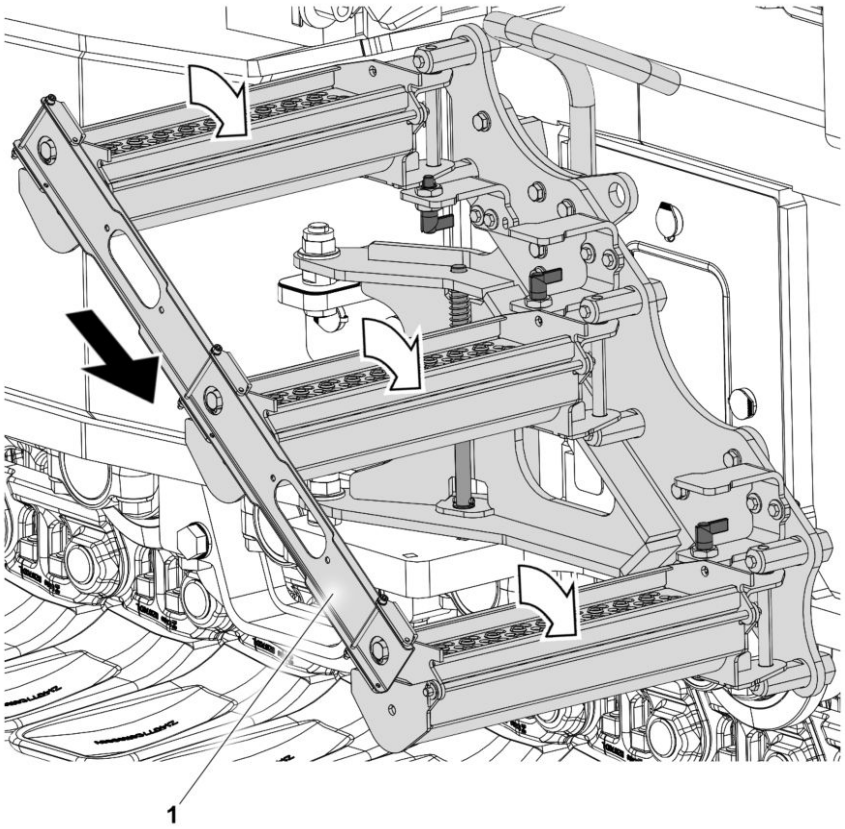


Fig. 1650: Swinging the steps into the operating position

1 Guide rail

Swing all steps into the operating position at the same time:

▶ Hold the guide rail **1** and swing it down.

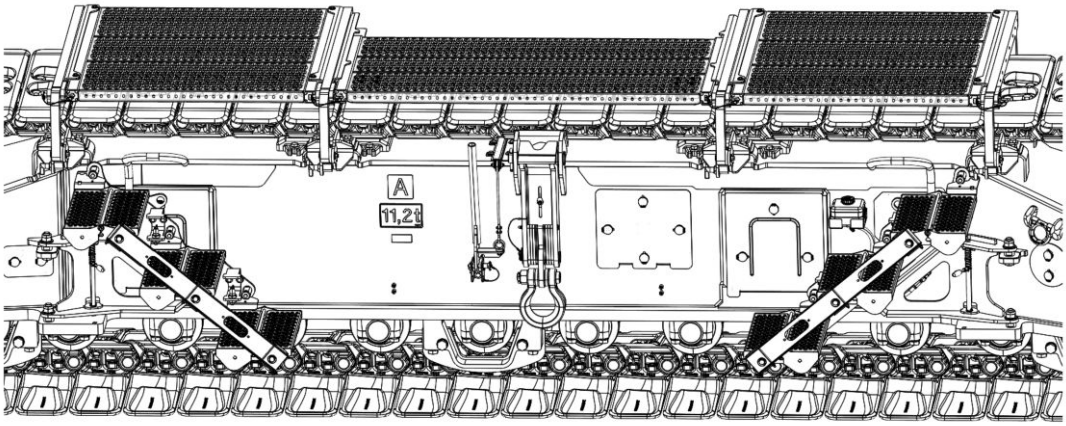


Fig. 1651: Stairs in the “wide track width” operating position

▷ The operating position may only be used for “wide track width” crane operation.

10.1.4 Swinging the swinging steps* on the crawler carrier into the “narrow track width” operating position

The swingable steps must be swung out an additional 30° and locked for “narrow track width” crane operation.

The steps in the “narrow track width” operating position can also be used for “wide track width” crane operation.

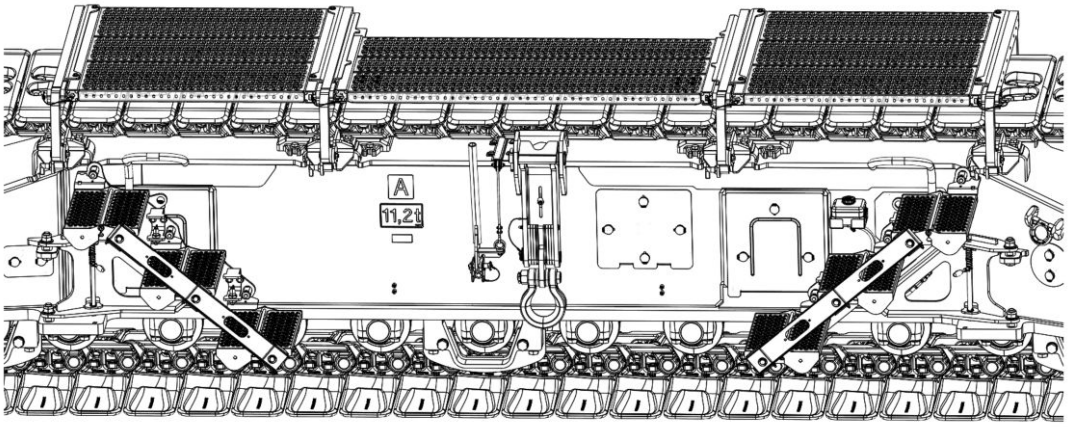


Fig. 1652: Stairs in the “wide track width” operating position

Make sure that the steps are in the “wide track width” operating position (→ 10.1.3 Swinging the swinging steps* on the crawler carrier into the “wide track width” operating position, p. 661).

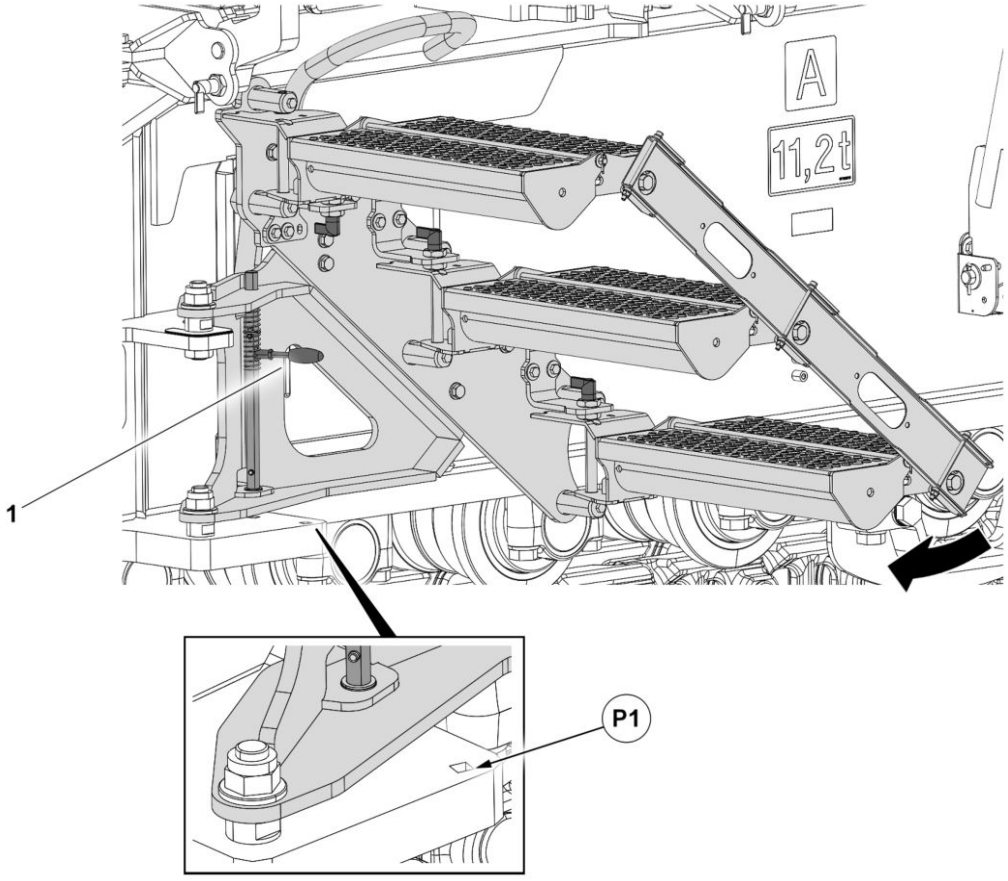


Fig. 1653: Swinging the stairs into the “narrow track width” operating position

1 Lever

P1 Lock position

Unlock the step retainer lock:

▶ Pull the lock lever **1** up.

Until the lock engages again in the lock position **P1**:

▶ Swing the stairs away from the crawler carrier.

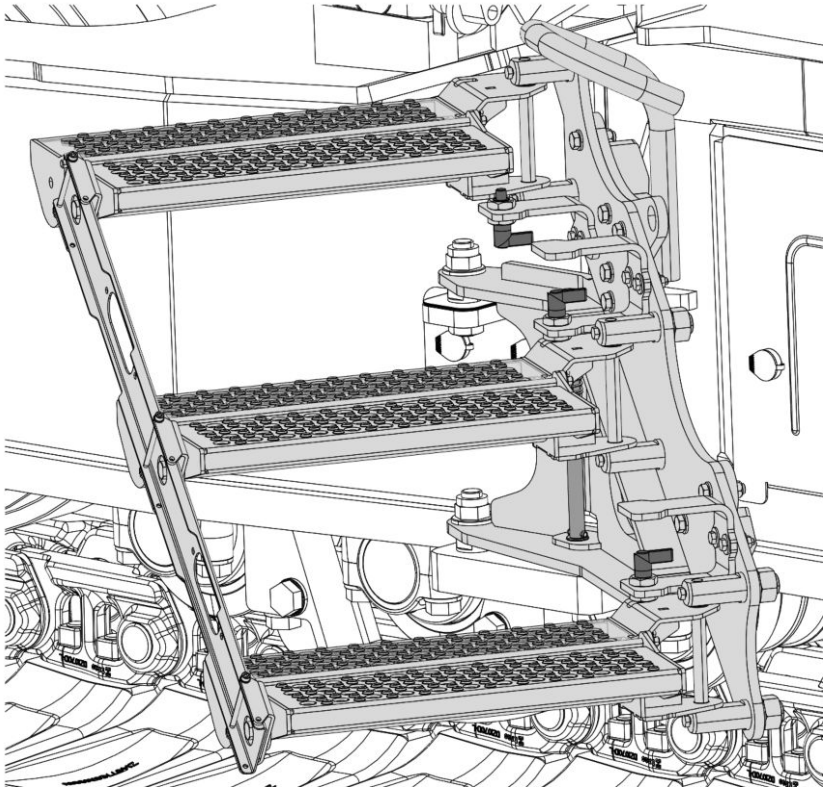


Fig. 1654: Stairs locked in the “narrow track width” operating position

10.1.5 Swinging the swinging steps* on the crawler carrier back into the “wide track width” operating position

If the swinging stars is no longer required in the “narrow track width” operating position, it can be swung back into the “wide track width” operating position.

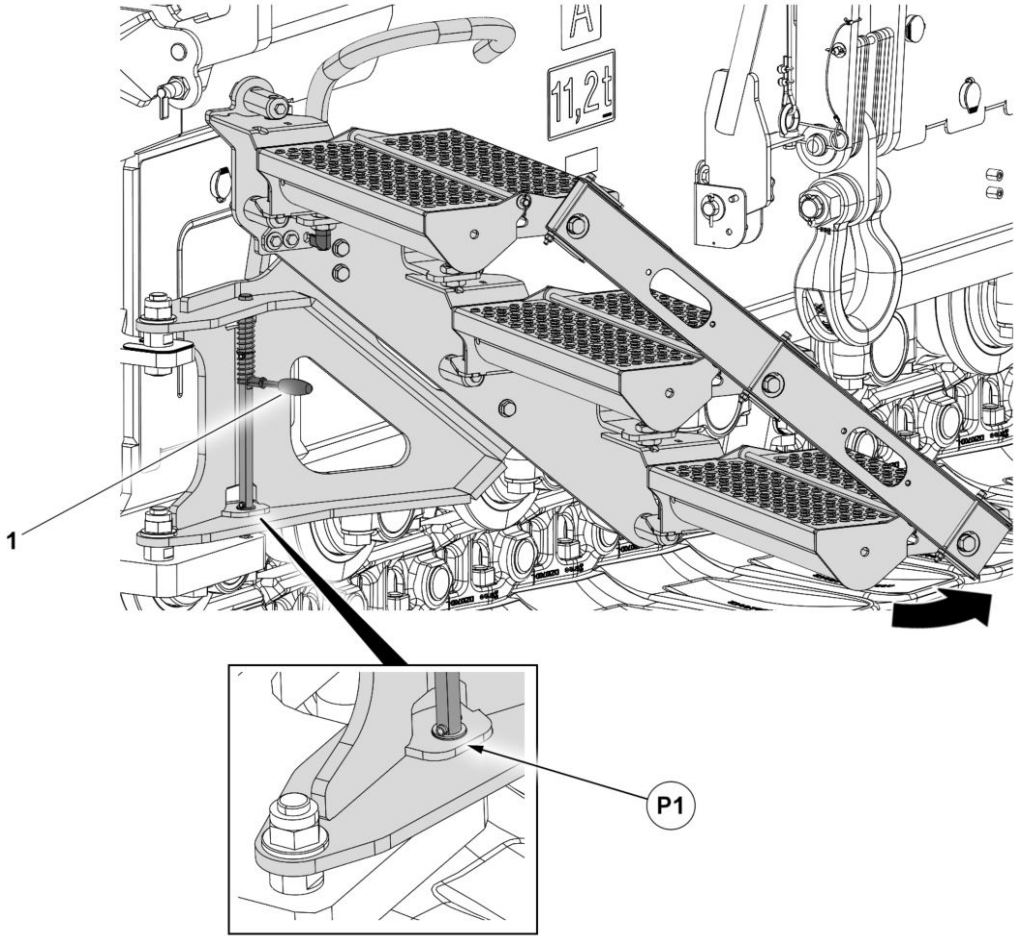


Fig. 1655: Swinging the stairs back into the “wide track width” operating position

1 Lever

P1 Lock position

Unlock the step retainer lock:

▶ Pull the lock lever **1** up.

Until the lock engages again in the lock position **P1**:

▶ Swing the stairs toward the crawler carrier.

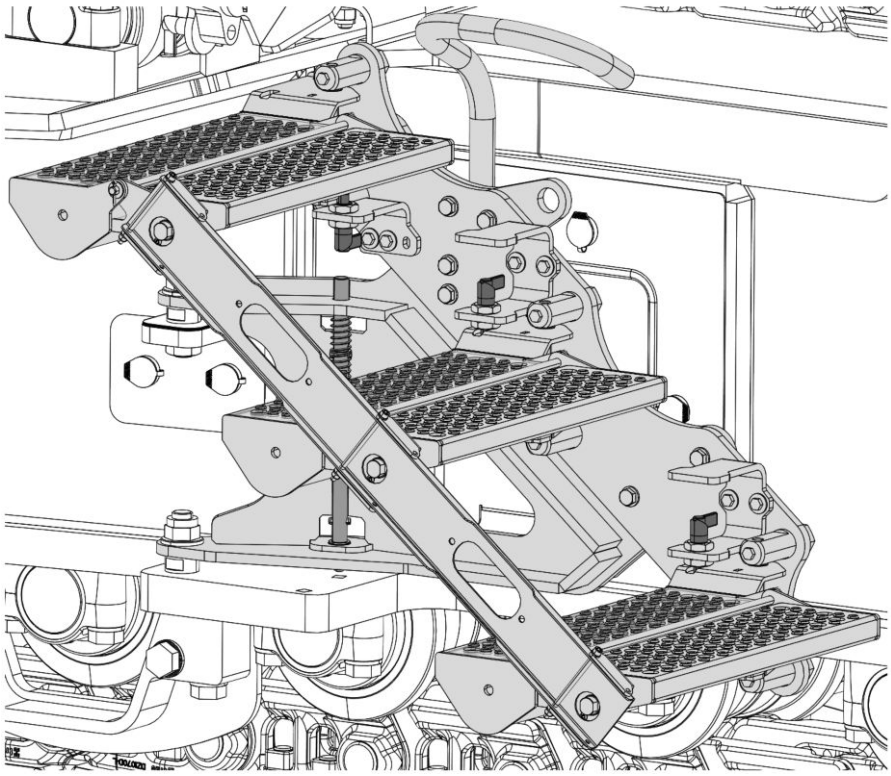


Fig. 1656: Stairs in the “wide track width” operating position

10.1.6 Swinging the steps on the central ballast into the operating position

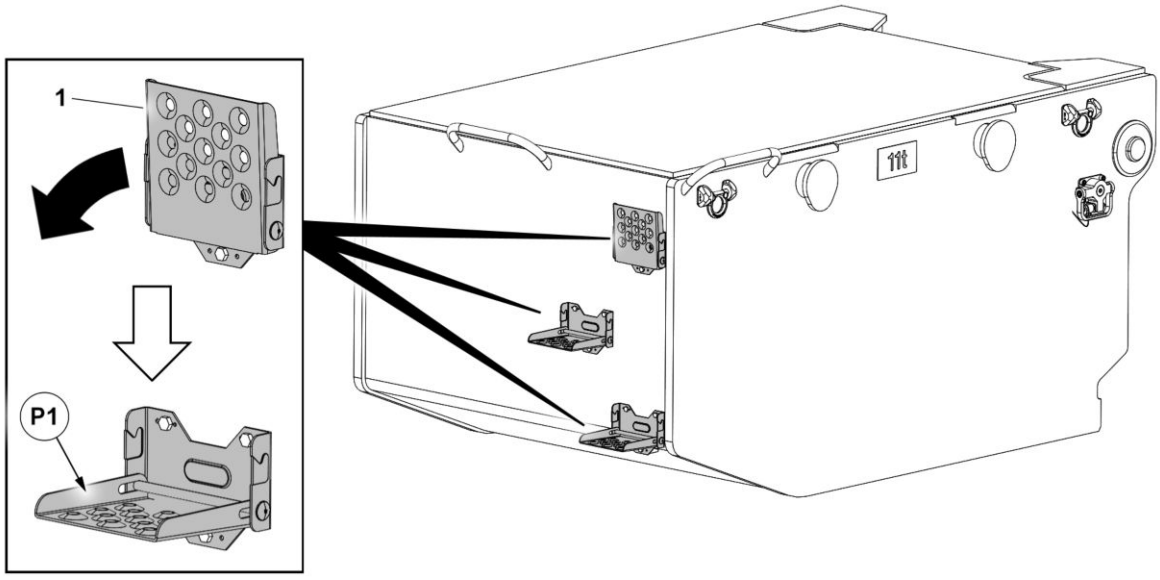


Fig. 1657: Swinging the steps on the central ballast into the operating position

1 Step

P1 Operating position

The procedure is the same for all four stairs.

▶ Pull the step **1** up and swing down into the operating position **P1**.

10.1.7 Swinging the platforms on the turntable into the operating position

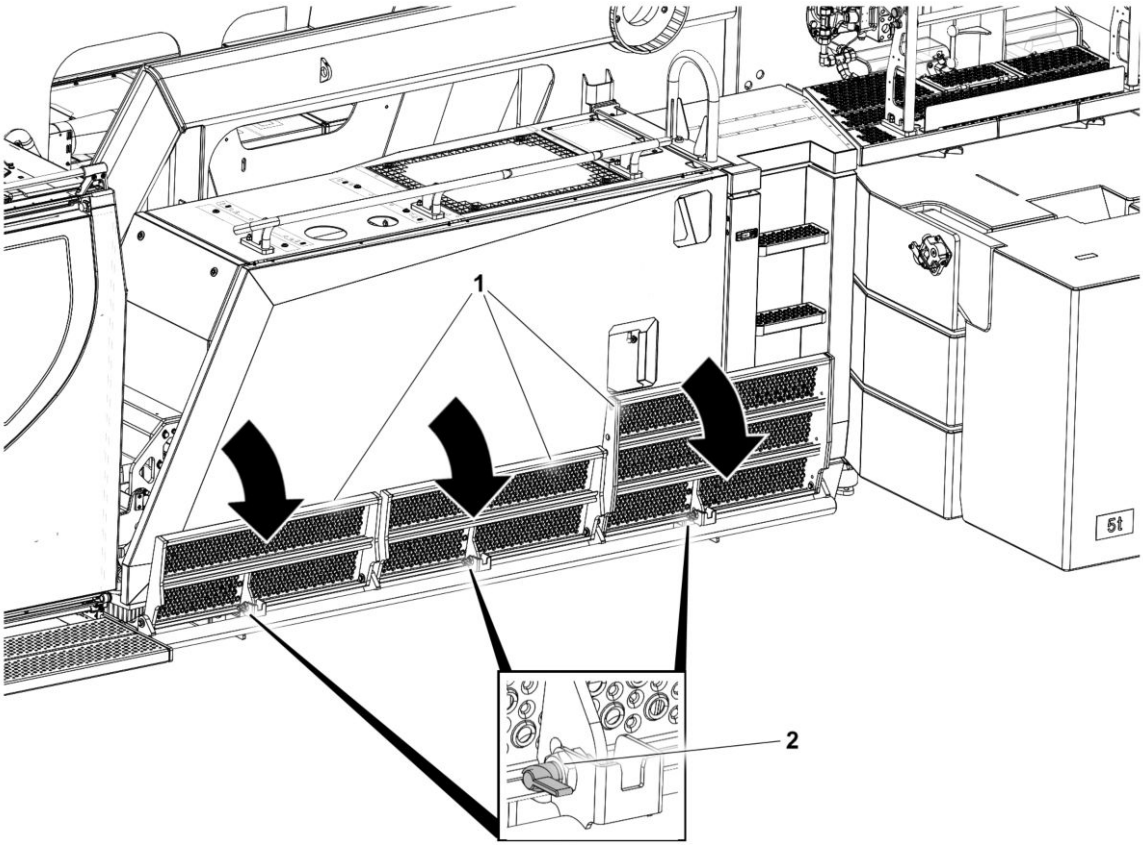


Fig. 1658: Swinging the platforms into the operating position

1 Platform in the transport position **2** Retaining element

Perform the following in succession for each of the three platforms **1**:

⚠ **Danger of crushing! Moving parts!**

▶ Unlock the retaining element **2** under the platform **1**.

▶ Hold the platform **1** and swing it down carefully.

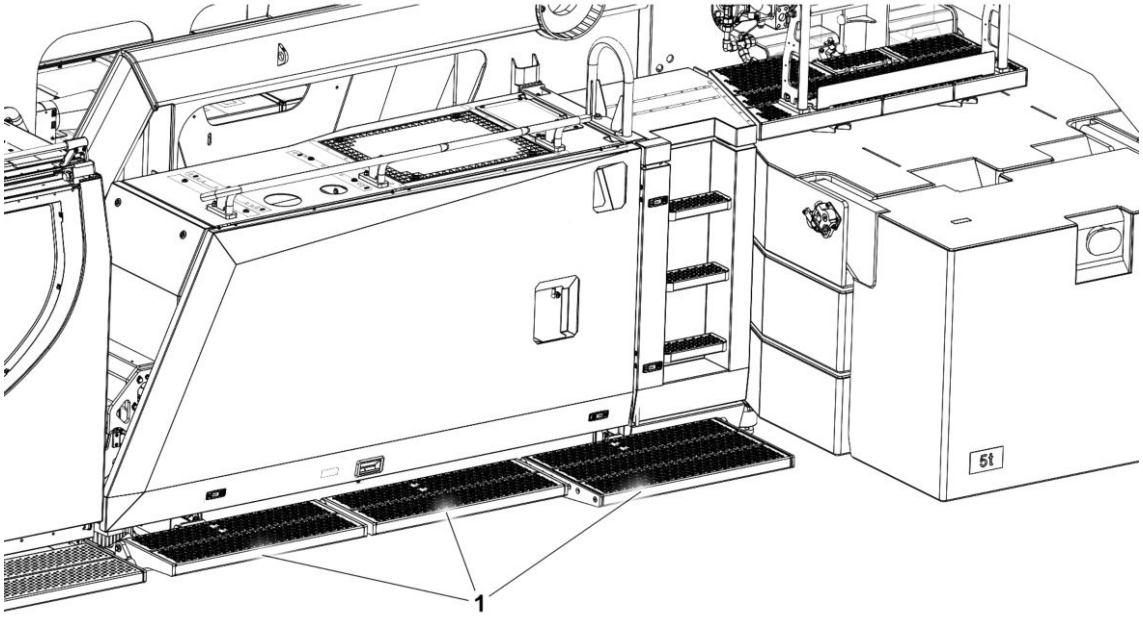


Fig. 1659: Platforms in the operating position

1 Platform

10.1.8 Pushing the platforms into the operating position

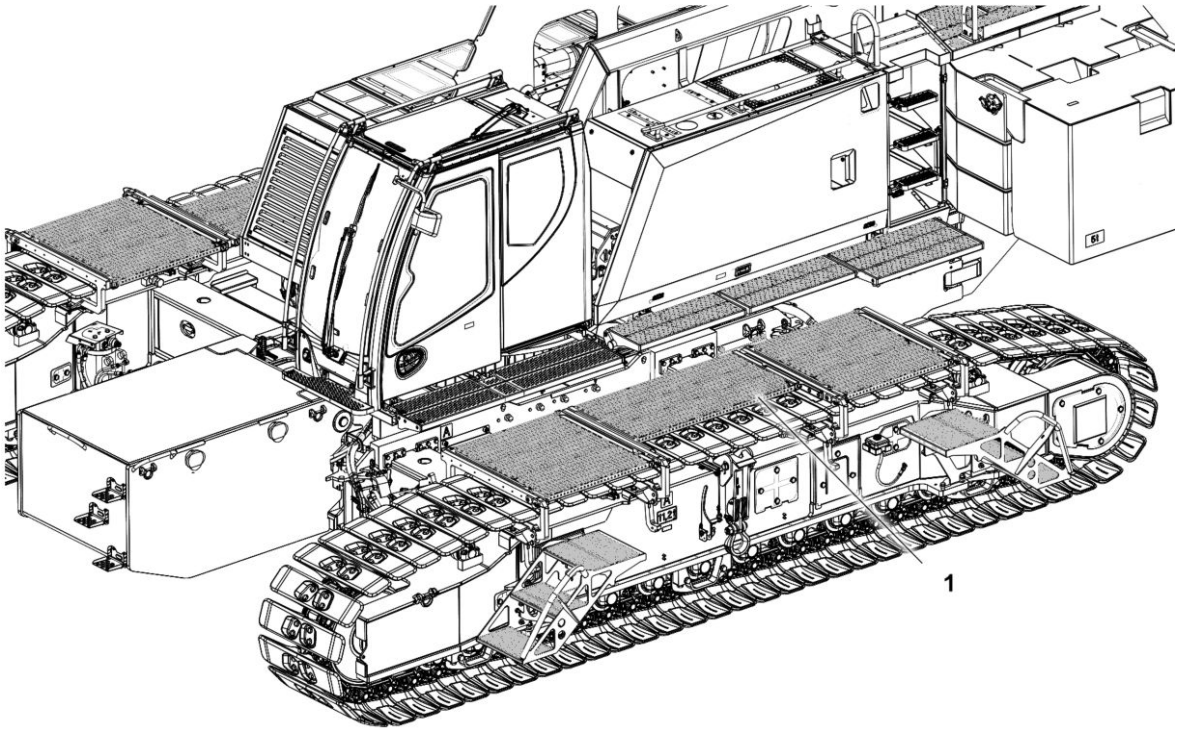


Fig. 1660: Platform in the maintenance position

1 Platform

The platforms **1** are pushed to the outside of the crawler carrier and locked in the operating position. The operating position is also the transport position.

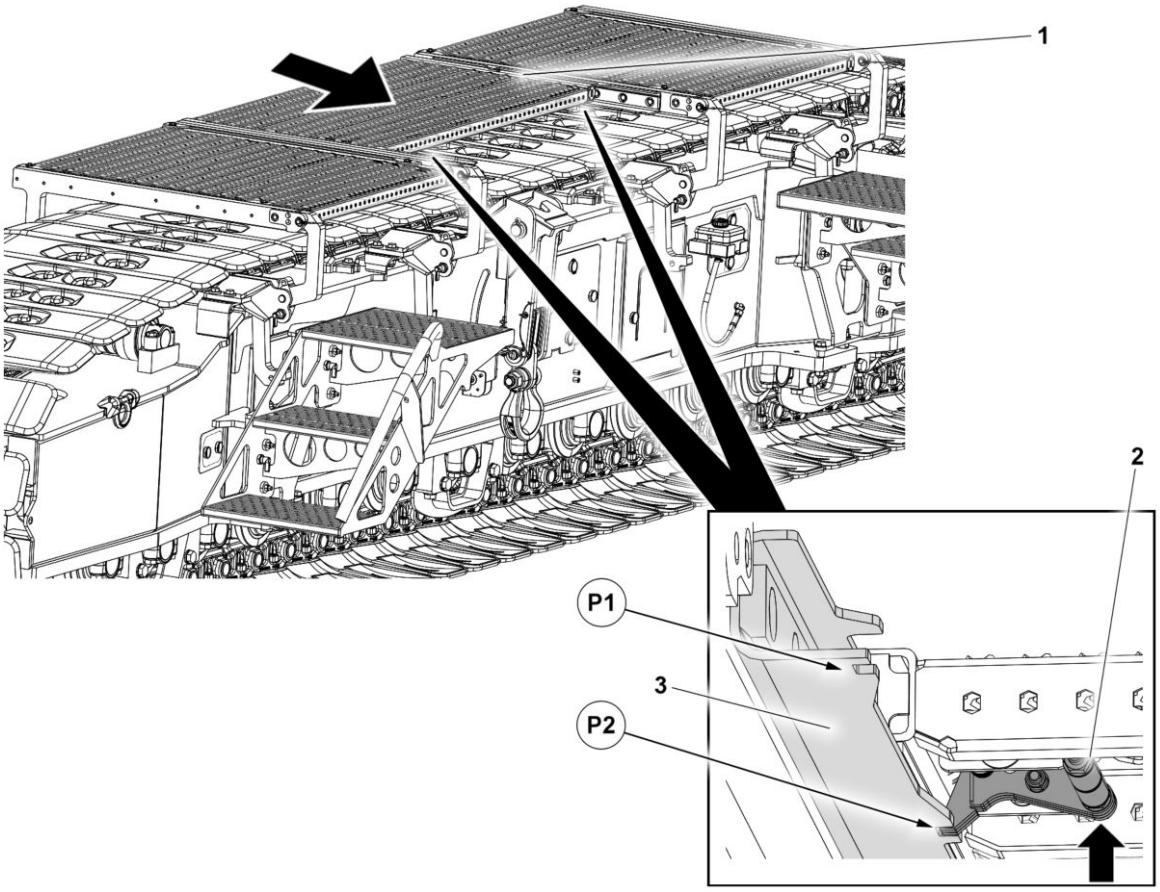


Fig. 1661: Pushing the platform into the operating position

1 Platform
2 Latch
3 Guide rail
P1 Engagement position for maintenance
P2 Engagement position for crane operation and transport

⚠ Danger of crushing! Moving parts!

- ▶ Release the platform **1**: Below the platform **1**, press and hold up the latch **2** on both sides.
- ▶ Until the latch **2** engages on both sides in the engagement position **P1**: Pull the platform **1** along the guide rail **3** to the outside of the crawler carrier.
- ▶ Make sure that latch **2** is engaged on both sides in the engagement position **P1**.

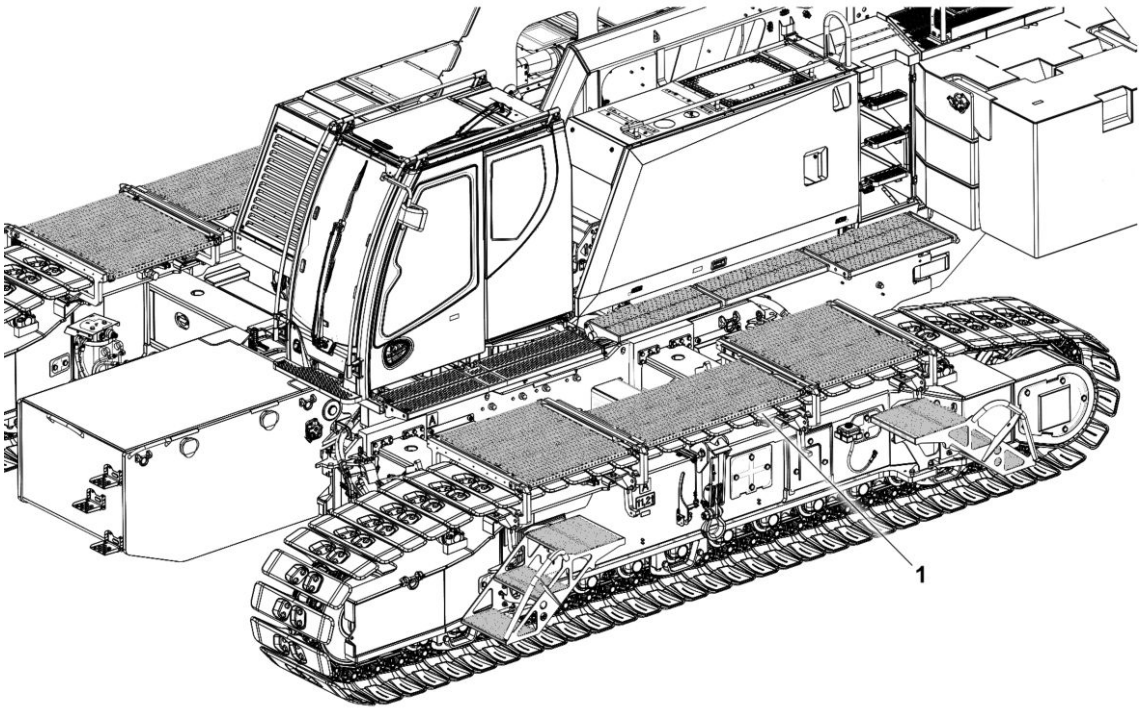


Fig. 1662: Platform in the operating position

1 Platform

The platforms **1** are pushed to the inside of the crawler carrier in direction of the turntable and locked in the maintenance position: (→ 10.1.18 Pushing the platforms into the maintenance position, p. 684).

10.1.9 Swinging the step on the crane cab into the operating position

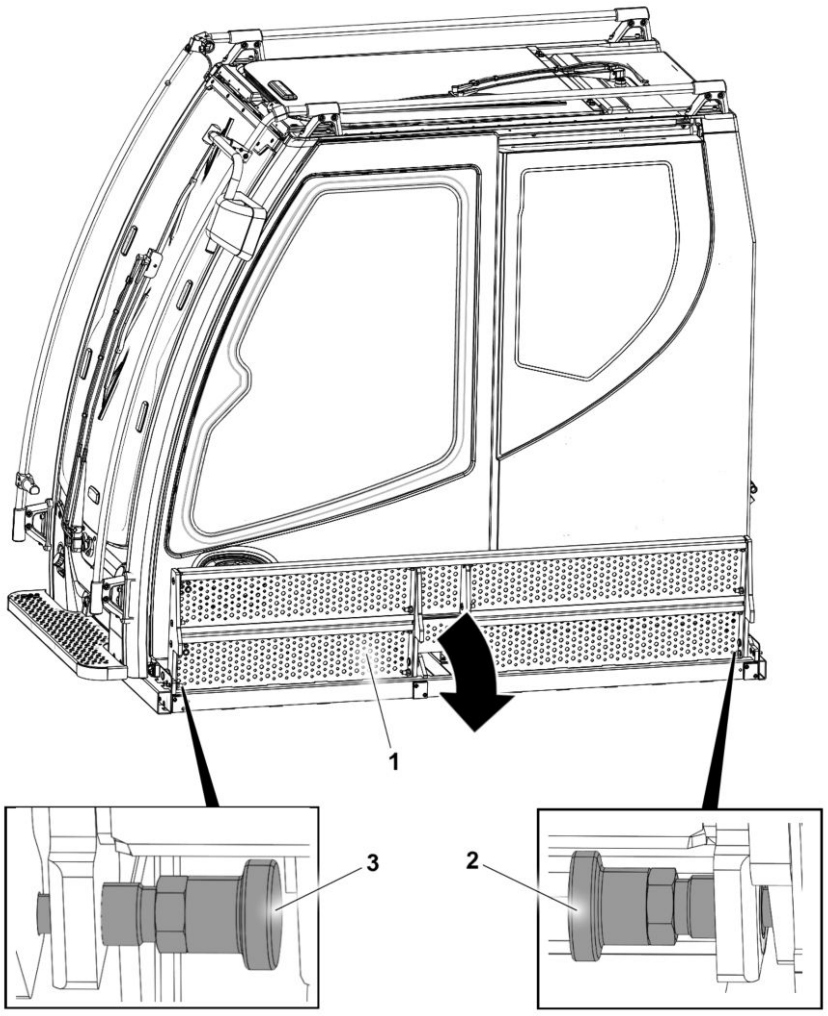


Fig. 1663: Swinging the step into the operating position

1 Step
2 Retaining element
3 Retaining element

Make sure that the following prerequisites are met:
❑ The step **1** is in the transport position.

Depending on the standing position:

▶ Pull the retaining element **2** on the step **1** and turn it 90°.
or

Pull the retaining element **3** on the step **1** and turn it 90°.
▷ The retaining element is locked and cannot engage again.

▶ Unlock the other retaining element.

▶ Hold the step **1** with one hand and swing it down carefully.
▷ The retaining element that is not locked engages.

▶ Unlock the locked retaining element **2** or locked retaining element **3** and let it engage in the new position.
▷ The step **1** is in the operating position.

10.1.10 Swinging the railing into the operating position

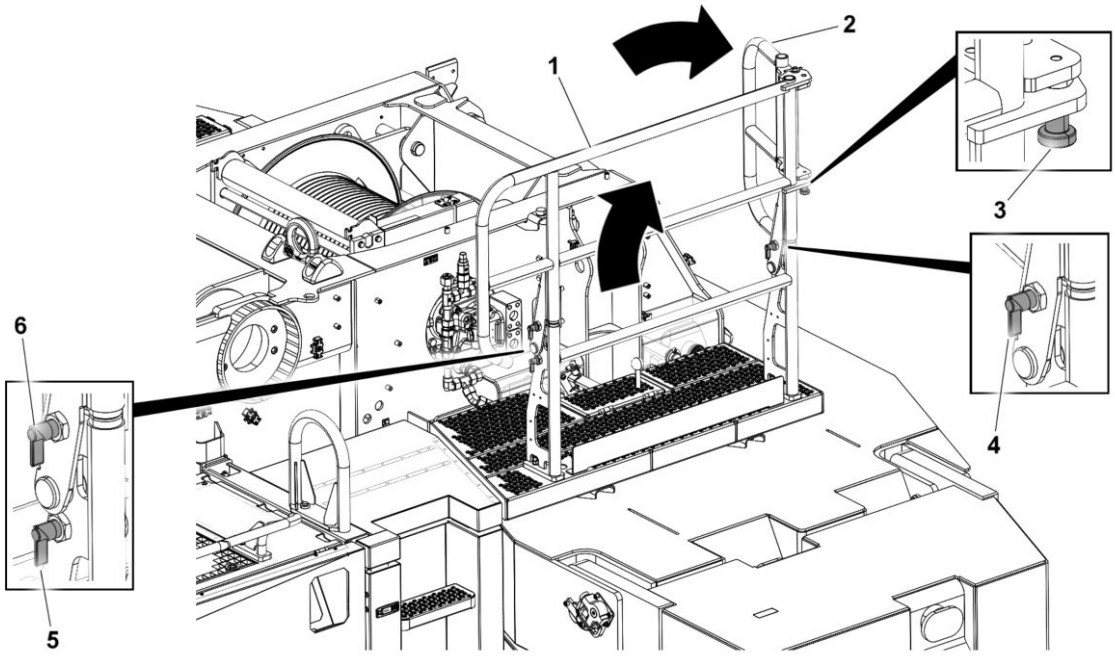


Fig. 1664: Swinging the railing into the operating position

1 Railing
2 Swing bar
3 Retaining element
4 Retaining element
5 Retaining element
6 Retaining element

⚠ **Danger of crushing! Moving parts!**

- ▶ Unlock the retaining element **5**.
- ▶ Swing the railing **1** upward.
- ▶ Lock the retaining element **6**.
- ▶ Lock the retaining element **4**.
- ▶ Unlock the retaining element **3**.
- ▶ Until the retaining element **3** engages: Swing the swing bar **2** toward the outside.
  - ▷ The retaining element **6** and retaining element **4** are locked in the operating position.
  - ▷ The retaining element **5** is not locked in the operating position.

10.1.11 Removing the multi-purpose ladder from the retainer

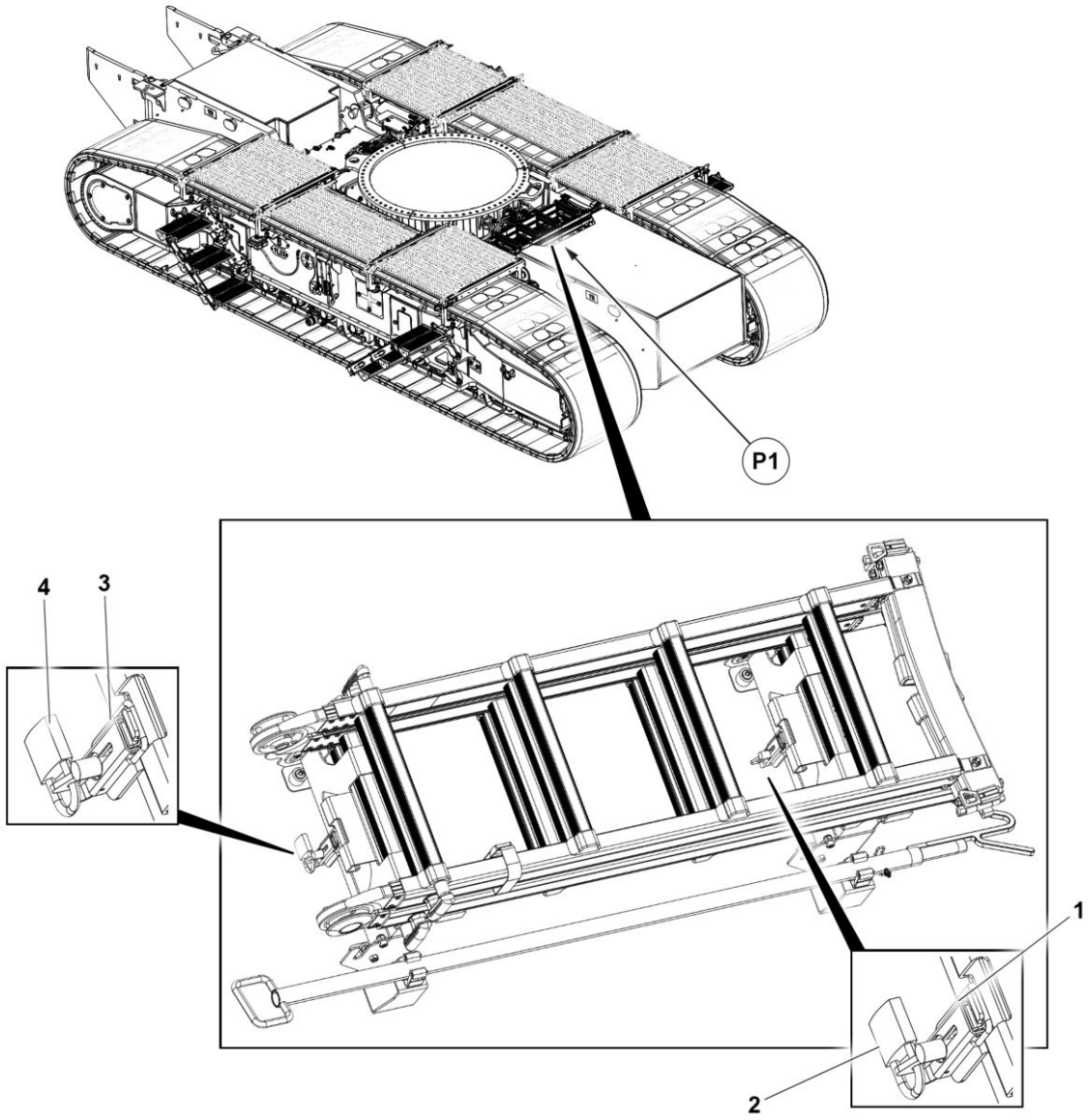


Fig. 1665: Removing the multi-purpose ladder from the retainer

1	Retainer	**3**	Retainer
2	Padlock	**4**	Padlock

Note

Liebherr-Werk Ehingen GmbH recommends using 2 men for the assembly and disassembly of the ladder due to weight reasons.

⚠ Danger of crushing! Moving parts!

- ▶ Remove the padlock **2** from the retainer **1**.
- ▶ Fold the retainer **1** down.
- ▶ Remove the padlock **4** from the retainer **3**.
- ▶ Fold the retainer **3** down.

- ▶ Remove the multi-purpose ladder in position **P1** and place it on the ground.
- ▶ Fold the retainers and use padlocks again.

10.1.12 Assembling and disassembling ladders

10.1.12.1 Swinging the cross beam into the operating position

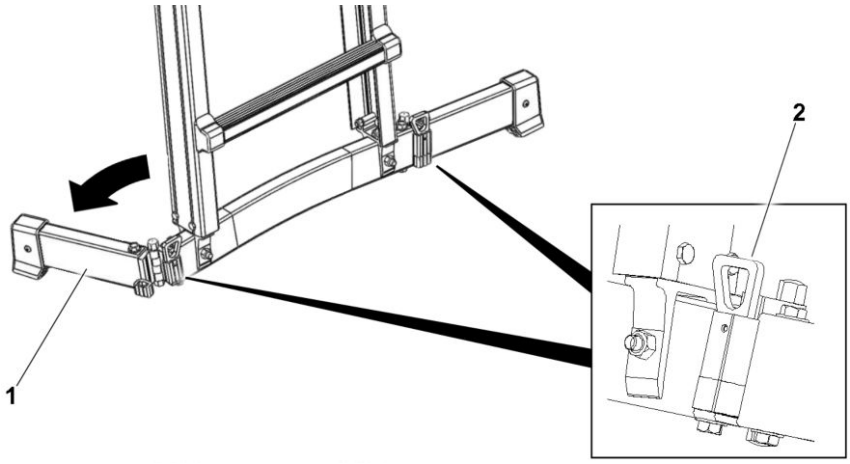


Fig. 1666: Swinging the cross beam into the operating position

1 Cross beam **2** Retaining element

- ▶ Unlock the retaining elements **2**.
- ▶ Until the retaining elements **2** engage: Swing the cross beams **1** on both sides into the operating position.
- ▶ Before using the multi-purpose ladder: Make sure that both cross beams **1** are swung into the operating position and the retaining elements **2** are engaged.

10.1.12.2 Swinging the cross beam into the transport position

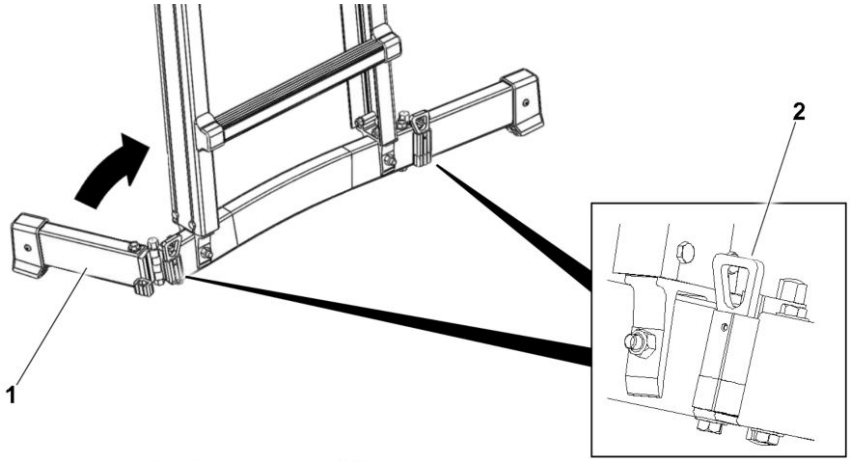


Fig. 1667: Swing the cross beam into the transport position

1 Cross beam **2** Retaining element

- ▶ Unlock the retaining elements **2**.

- ▶ Until the retaining elements **2** engage: Swing the cross beam **1** on both sides into the transport position
- ▶ Before storing the multi-purpose ladder: Make sure that both cross beams **1** are in the transport position and the retaining elements **2** are engaged.

10.1.12.3 Assembling the multi-purpose ladder as a leaning ladder

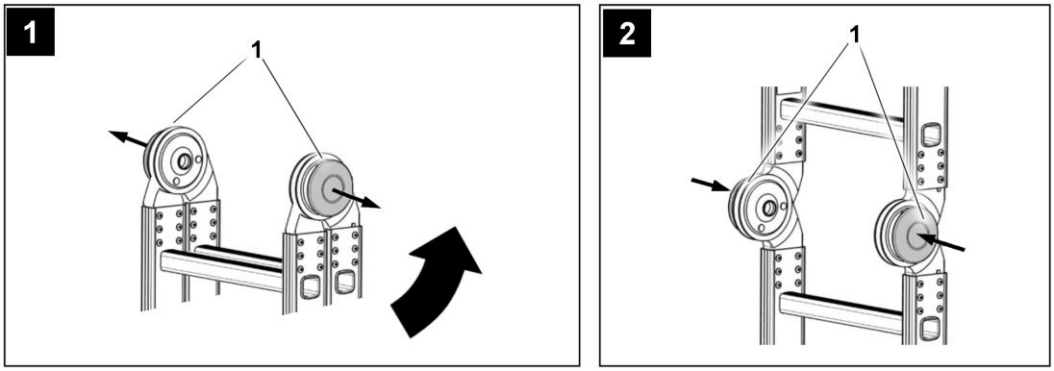


Fig. 1668: Assembling the multi-purpose ladder as a leaning ladder

1 Hinge

To adjust a part of the ladder, both hinges on opposite sides must be actuated.

- ▶ Release the hinge **1** on both sides.
- ▶ Until the hinges **1** engage again: Spread out the ladder legs to the stop.
- ▶ Swing the folding cross beam into the operating position (→ Swinging the cross beam into the operating position, p. 675).
- ▶ Before using the multi-purpose ladder as a leaning ladder: Make sure that the hinges **1** have engaged.

10.1.12.4 Removing the multi-purpose ladder as a leaning ladder

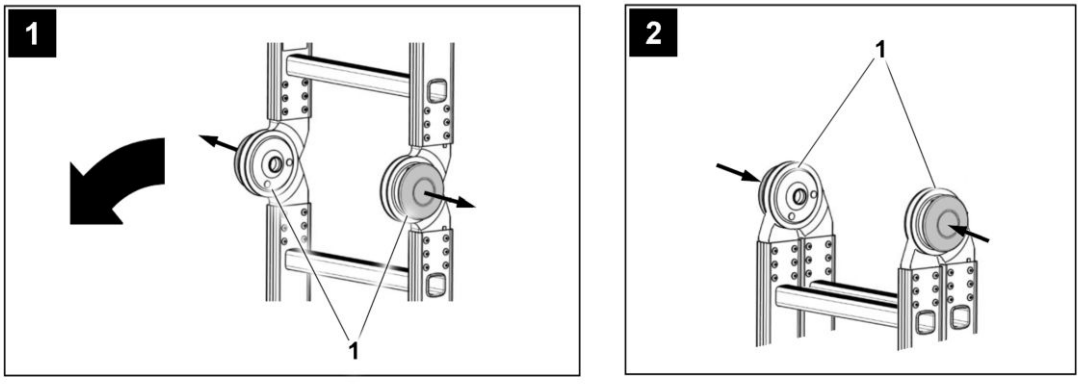


Fig. 1669: Removing the multi-purpose ladder for transport

1 Hinge

To adjust a part of the ladder, both hinges on opposite sides must be actuated.

- ▶ Swinging the folding cross beam into the transport position (→ Swinging the cross beam into the transport position, p. 675).
- ▶ Release the hinge **1** on both sides.

▶ Until the ladder legs lie together and the hinges **1** engage: Swing the ladder legs together in the transport position.
▷ The multi-purpose ladder is removed for transport. The multi-purpose ladder can be stored.

10.1.12.5 Assembling the multi-purpose ladder as a stepladder

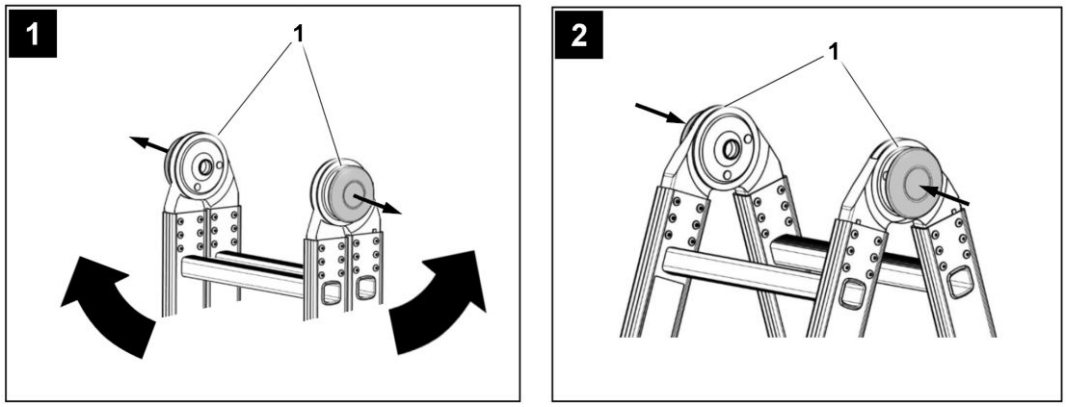


Fig. 1670: Assembling the multi-purpose ladder as a stepladder

1 Hinge

To adjust a part of the ladder, both hinges on opposite sides must be actuated.

▶ Release the hinge **1** on both sides.

▶ Until the hinges **1** engage again: Spread out the ladder legs.

▶ Swing the folding cross beam into the operating position (→ Swinging the cross beam into the operating position, p. 675).

▶ Before using the multi-purpose ladder as a stepladder: Make sure that the hinges **1** have engaged.

10.1.12.6 Removing the multi-purpose ladder as a stepladder

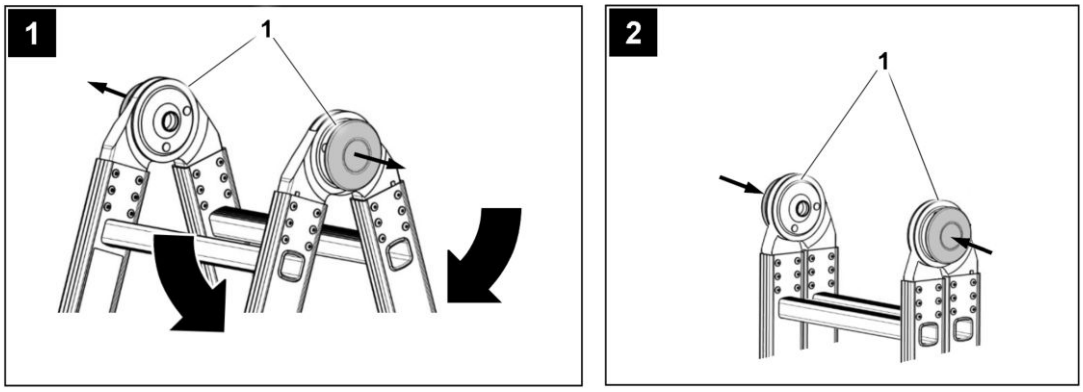


Fig. 1671: Removing the multi-purpose ladder as a stepladder

1 Hinge

To adjust a part of the ladder, both hinges on opposite sides must be actuated.

▶ Swing the folding cross beam into the transport position (→ Swinging the cross beam into the transport position, p. 675).

▶ Release the hinge **1** on both sides.

▶ Until the ladder legs lie together and the hinges **1** engage: Swing the ladder legs together in the transport position.
▷ The multi-purpose ladder is removed for transport. The multi-purpose ladder can be stored.

10.1.12.7 Adjusting the height of the multi-purpose ladder

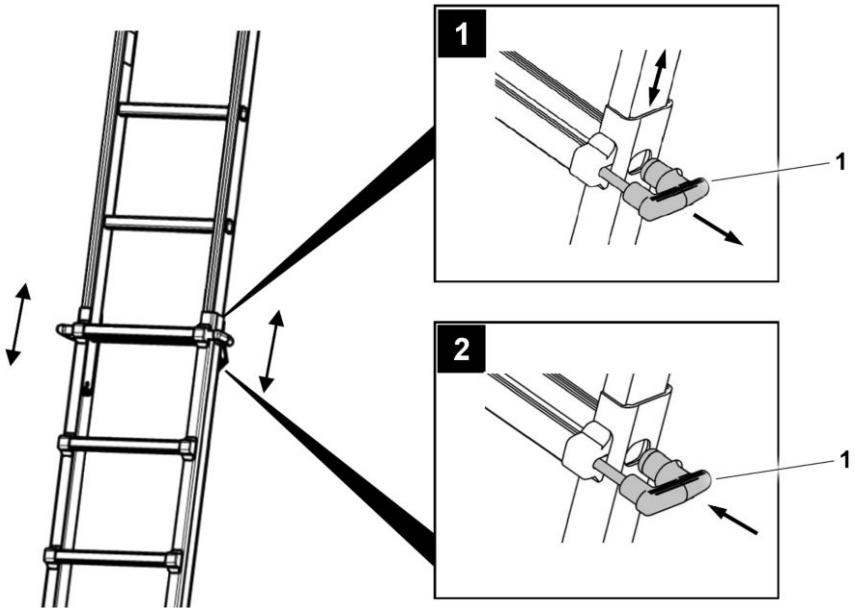


Fig. 1672: Adjusting the height-adjustable multi-purpose ladder

1 Handle

▶ Release the handle **1** on both sides.

▶ Pull out or push in the multi-purpose ladder to the desired length.

▶ Lock the multi-purpose ladder with the handle **1** on both sides.

▶ Before using the multi-purpose ladder: Make sure that both handles **1** have engaged.

10.1.13 Assembling the leaning tube on the telescopic boom in the operating position

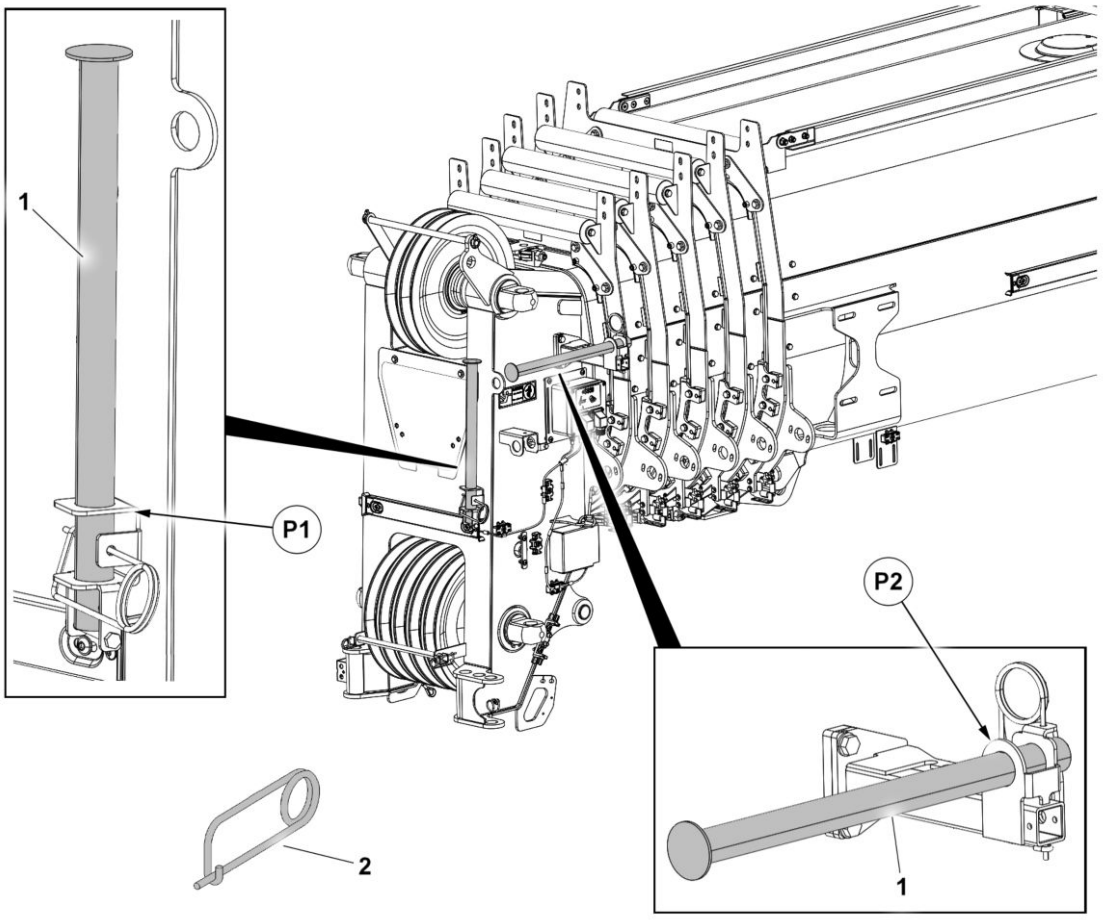


Fig. 1673: Assembling the leaning tube on the telescopic boom in the operating position

1 Leaning tube
2 Retaining element
P1 Transport position
P2 Operating position

- ▶ Remove the retaining element **2** from the transport position **P1**.
- ▶ Disassemble the leaning tube **1** in the transport position **P1**.
- ▶ Assemble the leaning tube **1** in the operating position **P2**.
- ▶ Secure the leaning tube **1** with the retaining element **2** in the operating position **P2**.

10.1.14 Disassembling the leaning tube on the telescopic boom for the transport position

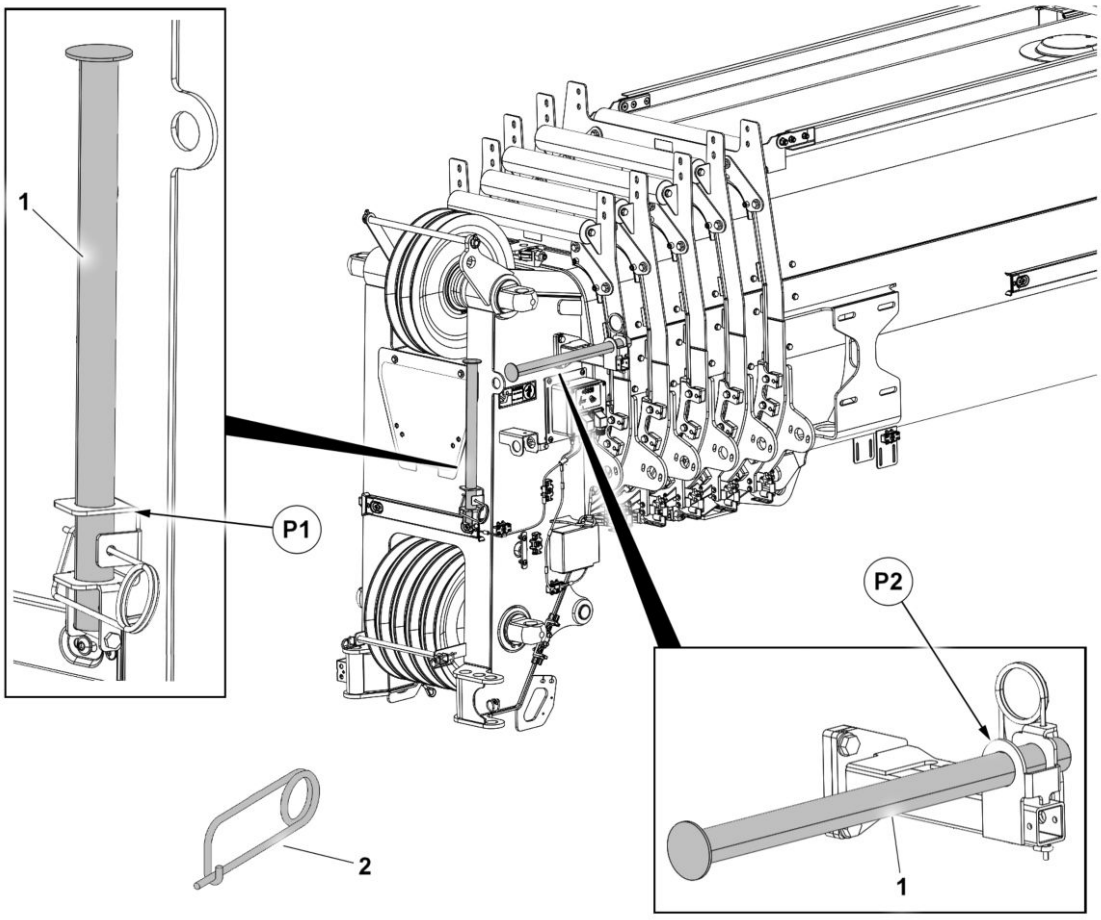


Fig. 1674: Assembling the leaning tube on the telescopic boom in the transport position

1 Leaning tube
2 Retaining element
P1 Transport position
P2 Operating position

▶ Remove the retaining element **2** in the operating position **P2**.

▶ Disassemble the leaning tube **1** in the operating position **P2**.

▶ Assemble the leaning tube **1** in the transport position **P1**.

▶ Secure the leaning tube **1** with the retaining element **2** in the transport position **P1**.

10.1.15 Securing the multi-purpose ladder in the retainer

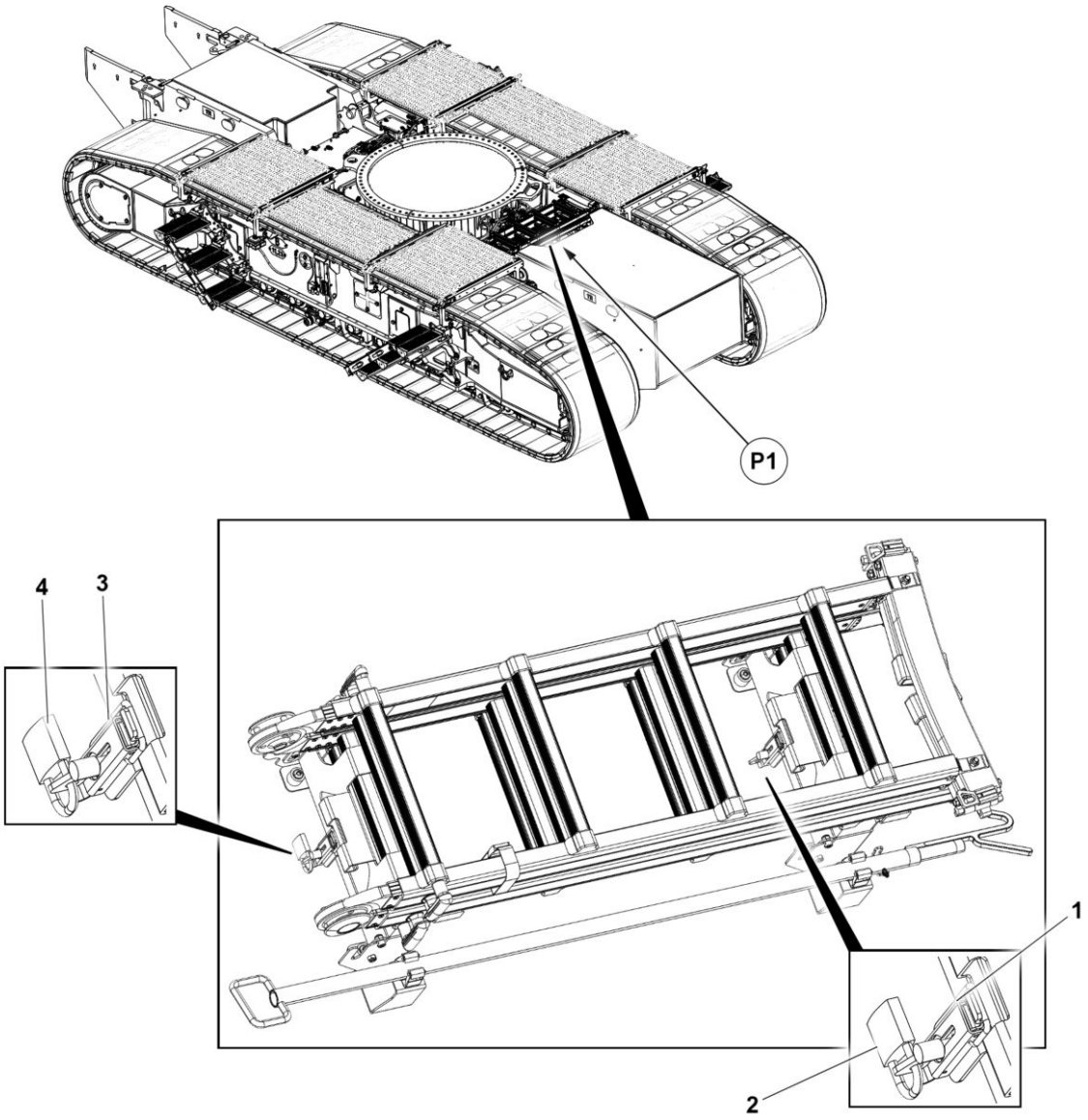


Fig. 1675: Removing the multi-purpose ladder from the retainer

1	Retainer	**3**	Retainer
2	Padlock	**4**	Padlock

Note

Liebherr-Werk Ehingen GmbH recommends using 2 men for the assembly and disassembly of the ladder due to weight reasons.

Make sure that the following prerequisites are met:

❑ The multi-purpose ladder is folded together for transport (→ 10.1.12 Assembling and disassembling ladders, p. 675).

⚠ Danger of crushing! Moving parts!

▶ Remove the padlock **2** from the retainer **1**.

▶ Fold the retainer **1** down.

- ▶ Remove the padlock **4** from the retainer **3**.
- ▶ Fold the retainer **3** down.
- ▶ Take the multi-purpose ladder down in position **P1** in the retainer.
- ▶ Fold the retainer **1** and secure it with a padlock **2**.
- ▶ Fold the retainer **3** and secure it with a padlock **4**.

10.1.16 Swinging the railing into the transport position

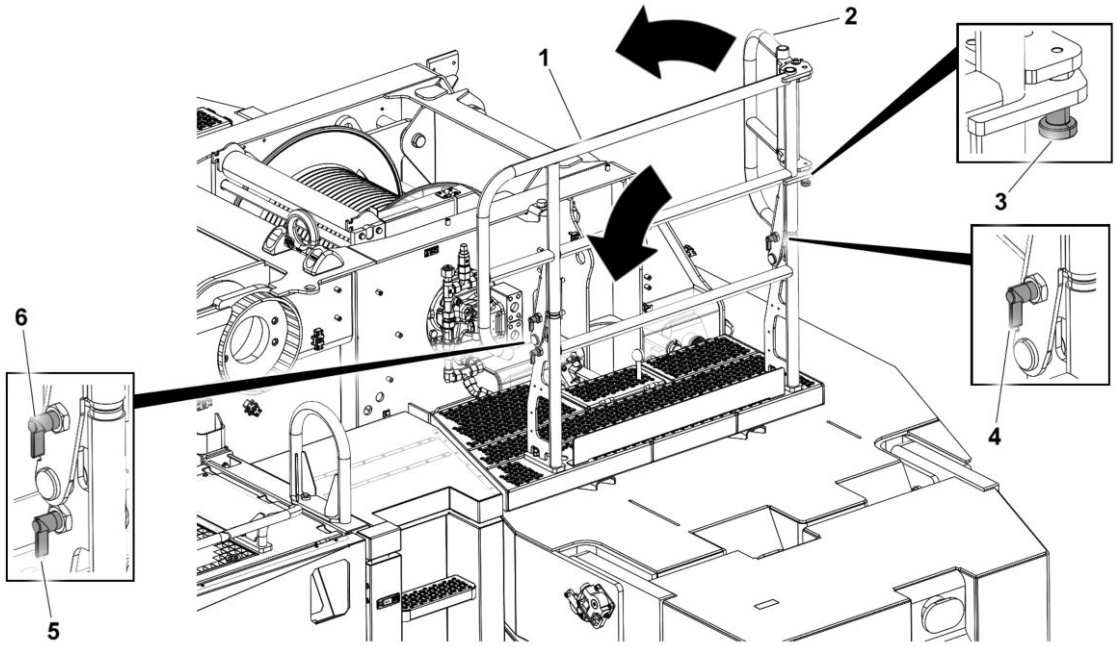


Fig. 1676: Swing the retainer into the transport position

1 Railing
2 Swing bar
3 Retaining element
4 Retaining element
5 Retaining element
6 Retaining element

⚠ **Danger of crushing! Moving parts!**

- ▶ Unlock the retaining element **3**.
- ▶ Until the retaining element **3** engages again: Swing the swing bar **2** toward the inside.
- ▶ Unlock the retaining element **4**.
- ▶ Unlock the retaining element **6**.
- ▶ Swing the railing **1** downward.
- ▶ Lock the retaining element **5**.
  - ▷ The retaining element **5** is unlocked in the transport position.
  - ▷ In the transport position, the retaining element **4** and retaining element **6** are not locked.

10.1.17 Swinging the step on the crane cab into the transport position

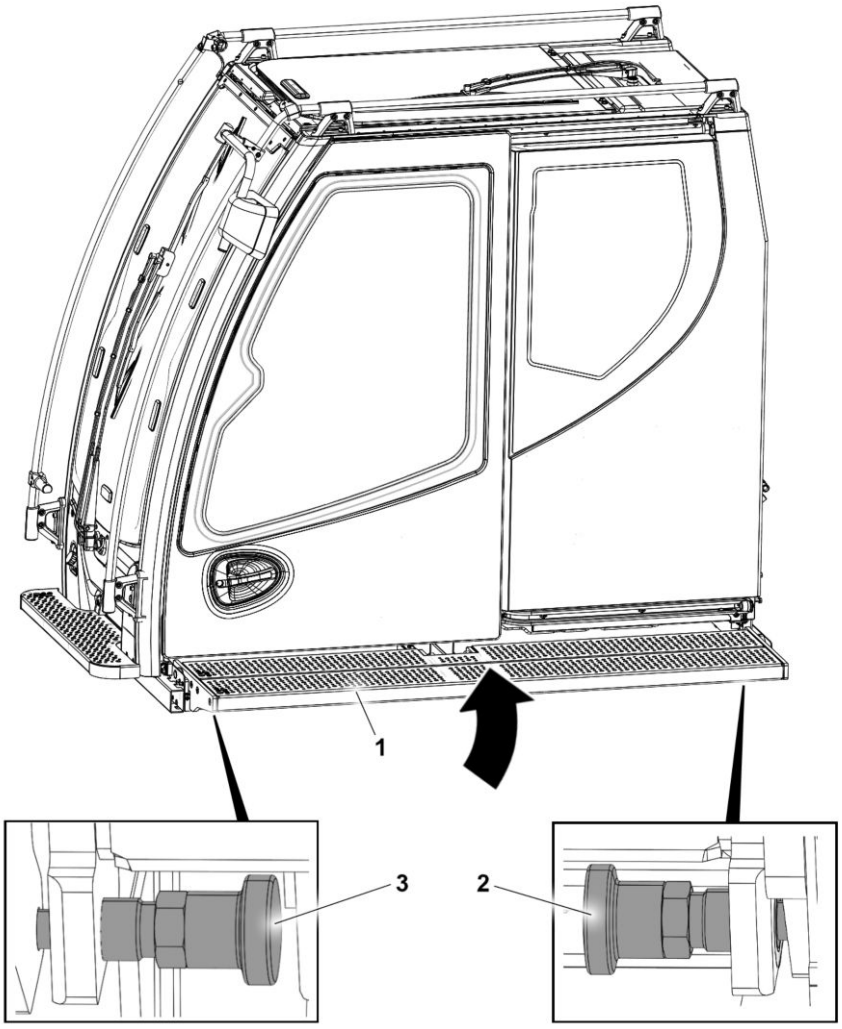


Fig. 1677: Swinging the step into the transport position

1 Step
2 Retaining element
3 Retaining element

Make sure that the following prerequisites are met:
❑ The step **1** is in the operating position.

Depending on the standing position:

▶ Pull the retaining element **3** under the step **1** and turn it 90°.
or

Pull the retaining element **2** under the step **1** and turn it 90°.
▷ The retaining element is locked and cannot engage again.

▶ Unlock the other retaining element.

▶ Hold the step **1** with one hand and swing it up carefully.
▷ The retaining element that is not locked engages.

▶ Unlock the locked retaining element **3** or locked retaining element **2** and let it engage in the new position.
▷ The step **1** is in the transport position.

10.1.18 Pushing the platforms into the maintenance position

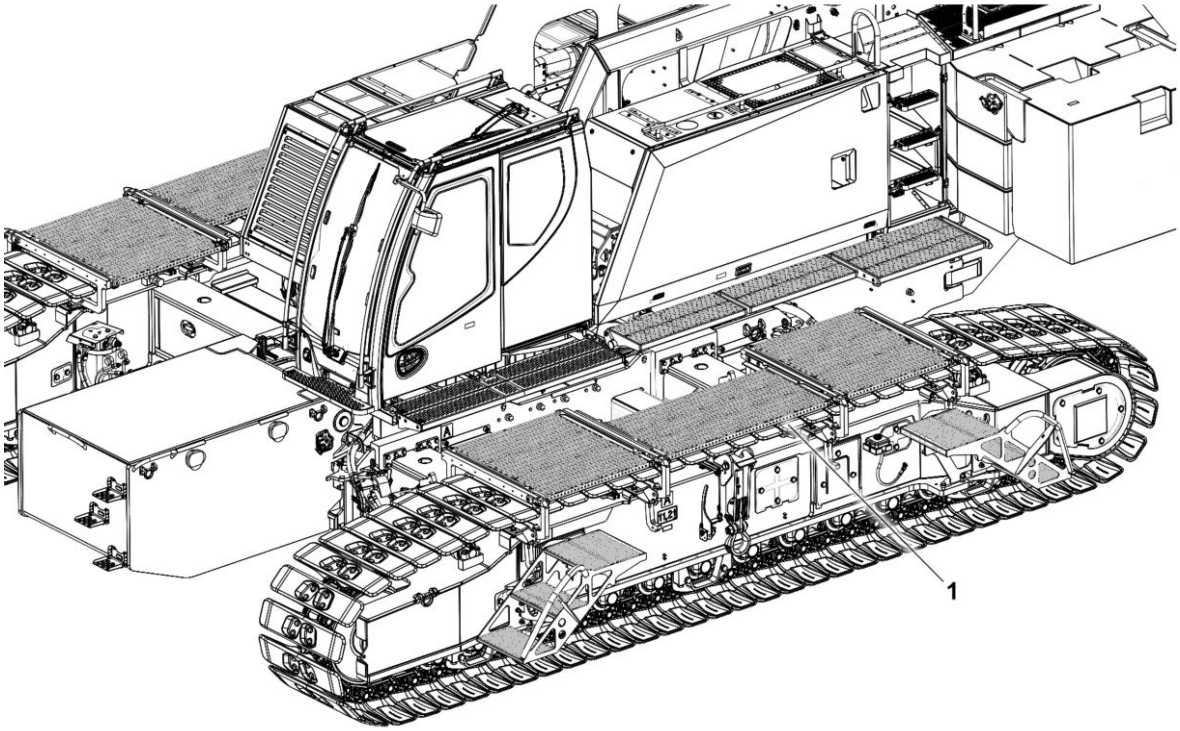


Fig. 1678: Platform in the operating position

1 Platform

The platforms **1** are pushed to the inside of the crawler carrier in direction of the turntable and locked in the maintenance position.

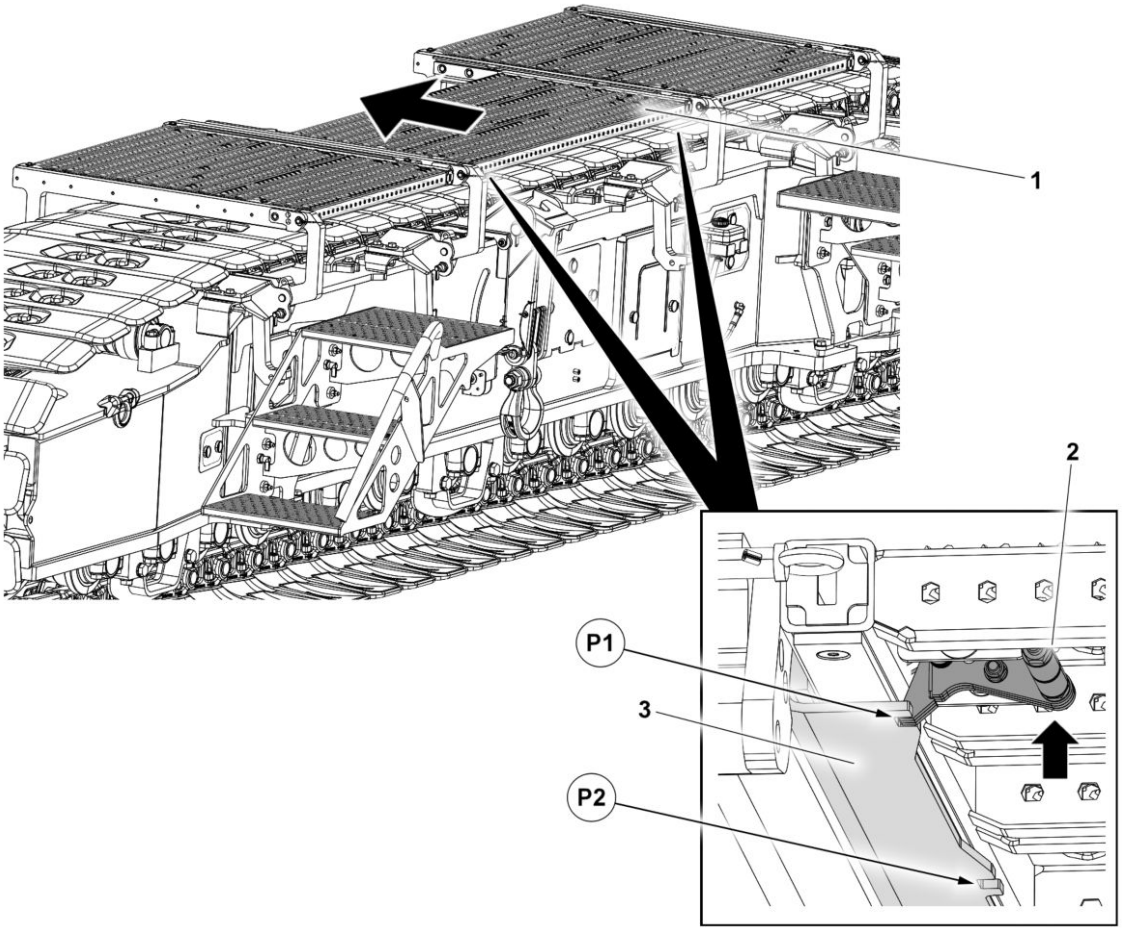


Fig. 1679: Pushing the platform into the maintenance position

1 Platform
2 Latch
3 Guide rail
P1 Engagement position for maintenance
P2 Engagement position for crane operation and transport

⚠ Danger of crushing! Moving parts!

- ▶ Release the platform **1**: Below the platform **1**, press and hold up the latch **2** on both sides.
- ▶ Until the latch **2** engages on both sides in the engagement position **P2**: Push the platform **1** along the guide rail **3** in the direction of the crane cab.
- ▶ Make sure that latch **2** is engaged on both sides in the engagement position **P2**.

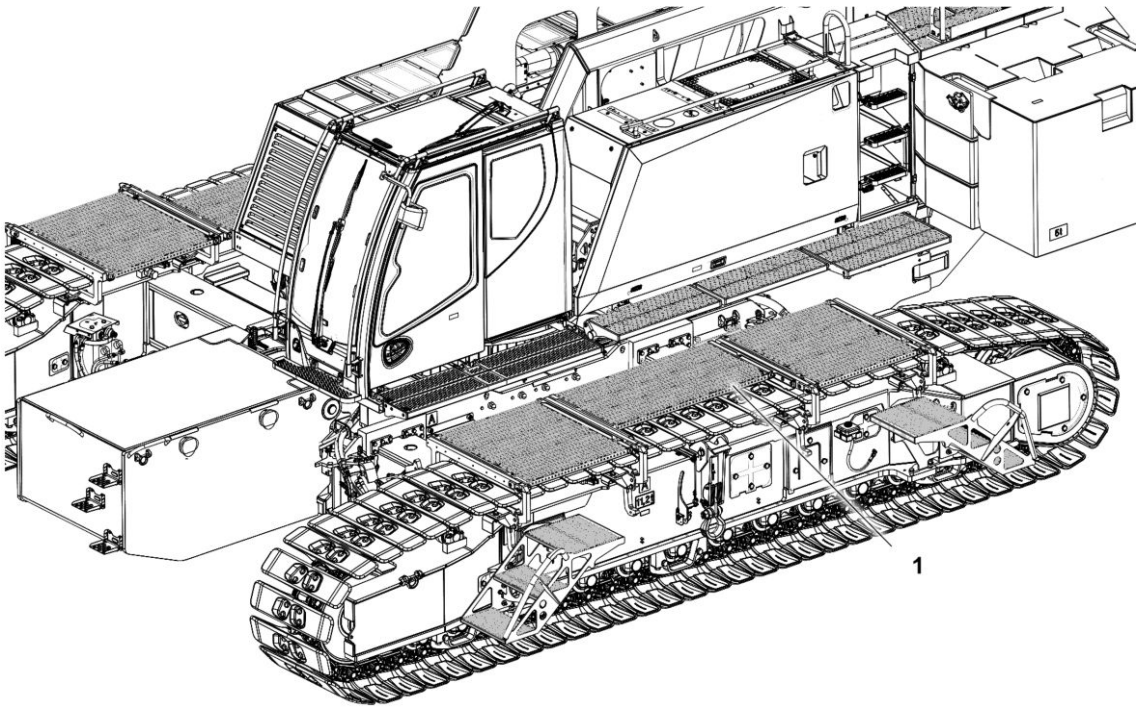


Fig. 1680: Platform in the maintenance position

1 Platform

The platforms **1** are pushed to the outside of the crawler carrier and locked in the operating position: (→ 10.1.8 Pushing the platforms into the operating position , p. 669).

10.1.19 Swinging the platforms on the turntable into the transport position

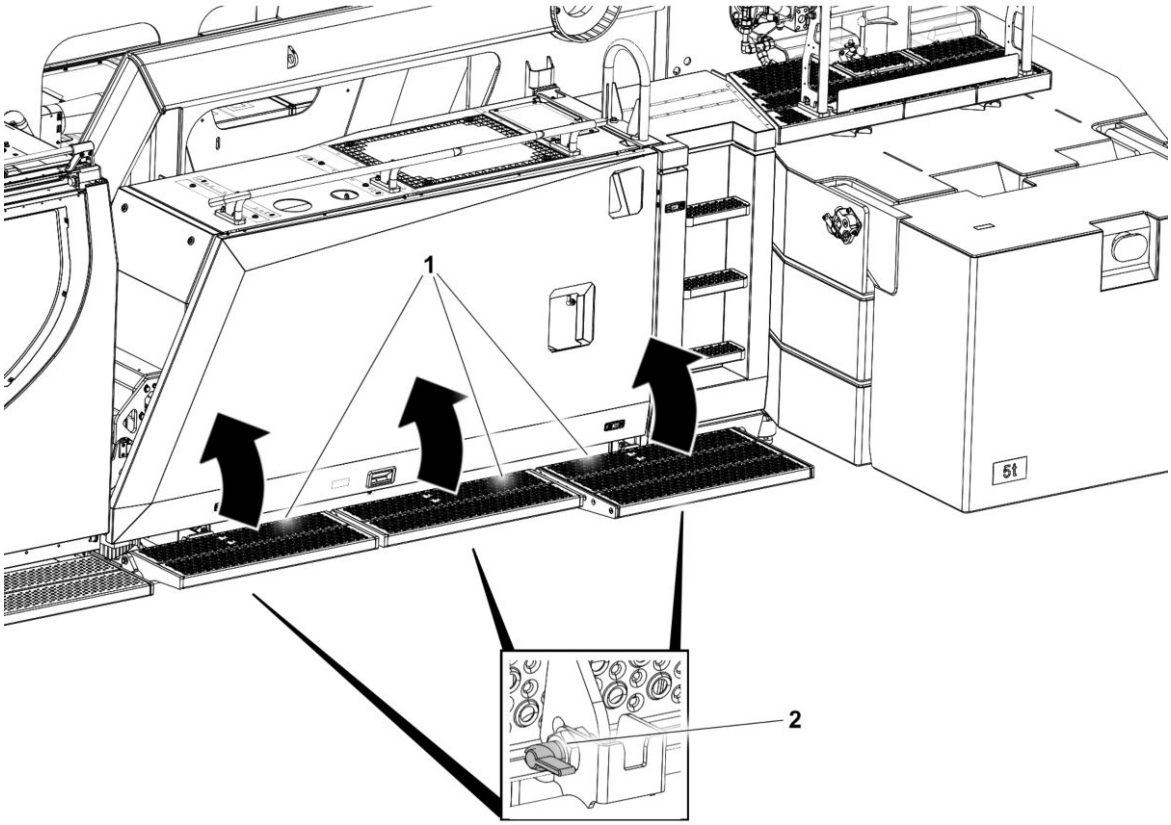


Fig. 1681: Swinging the platforms into the transport position

1 Platform in the operating position **2** Retaining element

Perform the following in succession for each of the three platforms **1**:

⚠ **Danger of crushing! Moving parts!**

▶ Until the retaining element **2** can be locked: Swing the platform **1** up carefully.

When all platforms **1** are swung up into the transport position:
▶ Make sure that all retaining elements **2** are locked.

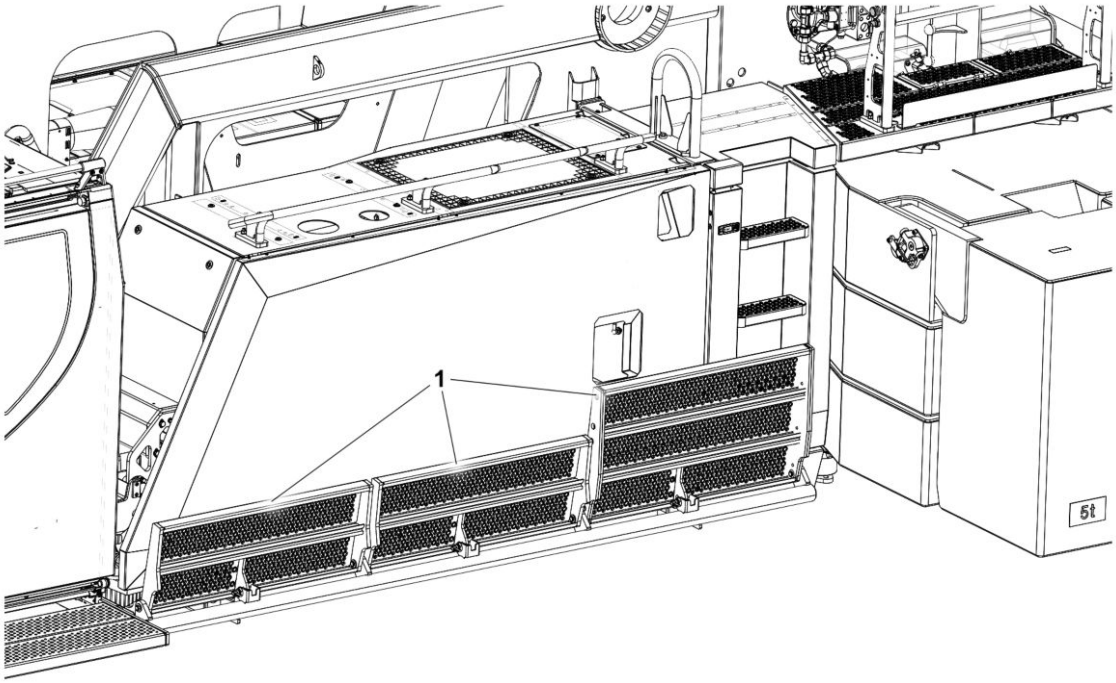


Fig. 1682: Platforms in the transport position

1 Platform

10.1.20 Swinging the steps on the central ballast into the transport position

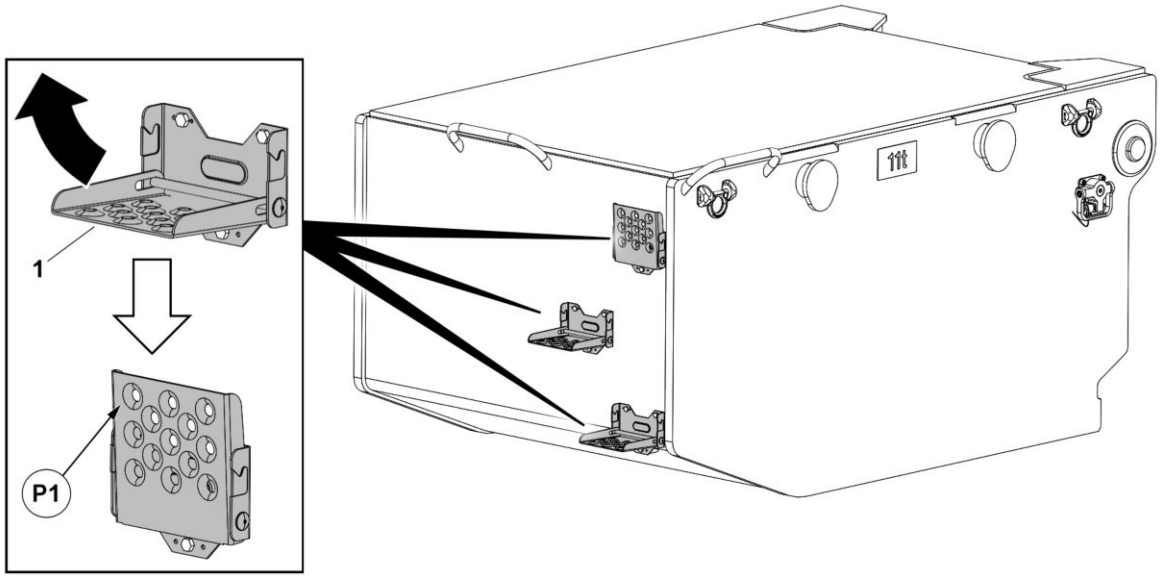


Fig. 1683: Swinging the steps on the central ballast into the transport position

1 Step **P1** Transport position

The procedure is the same for all four stairs.

▶ Swing the step **1** up and lock downward in the transport position **P1**.

10.1.21 Swinging the swinging steps* on the crawler carrier into the transport position

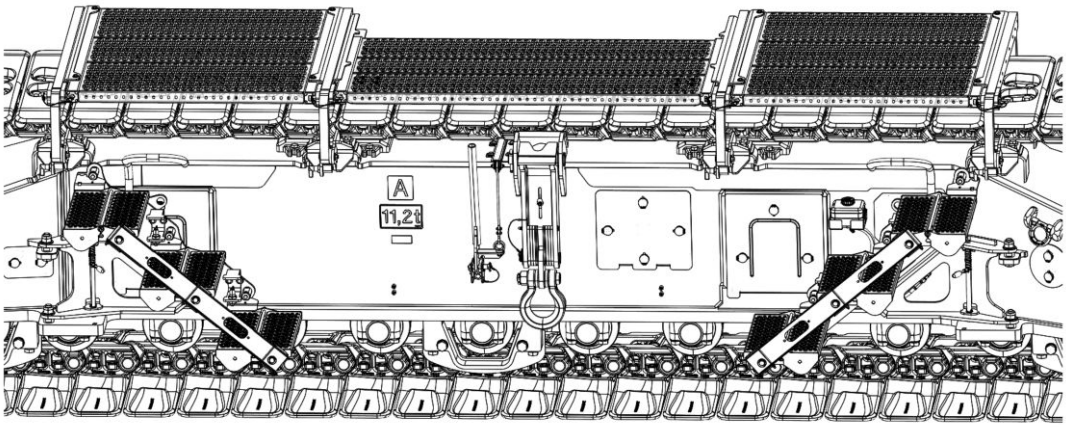


Fig. 1684: Stairs in the operating position

All four swingable steps on the crawler carriers are brought into the transport position in the same manner.

⚠ **Danger of crushing! Moving parts!**

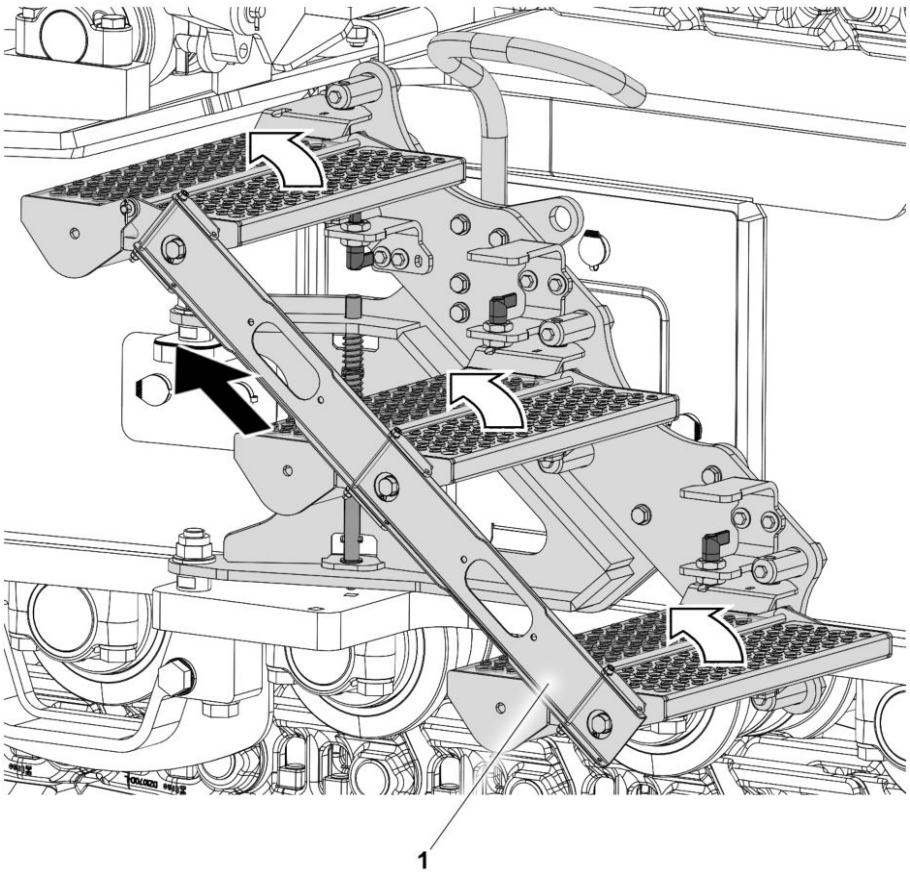


Fig. 1685: Swinging the steps into the transport position

1 Guide rail

Swing all steps into the transport position at the same time:

▶ Hold the guide rail **1** and swing it up.

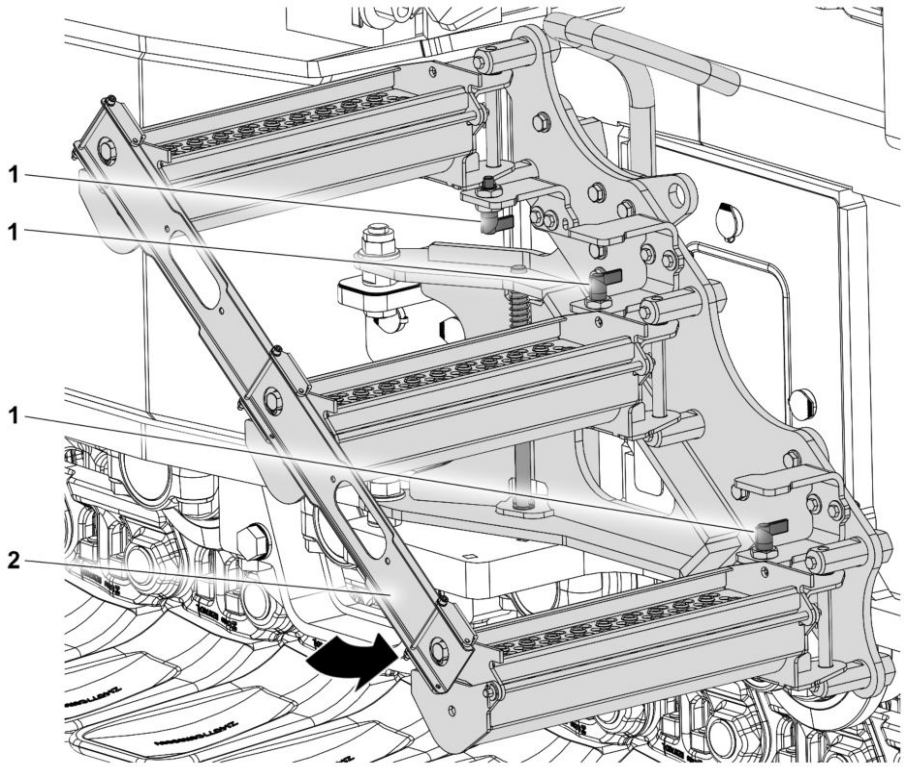


Fig. 1686: Releasing the stairs and swinging into the transport position

1 Retaining element **2** Guide rail

▶ Unlock the retaining elements **1**.

▶ Hold the stairs on the guide rails **2** and swing into the transport position.

▶ Lock the retaining elements **1** again.

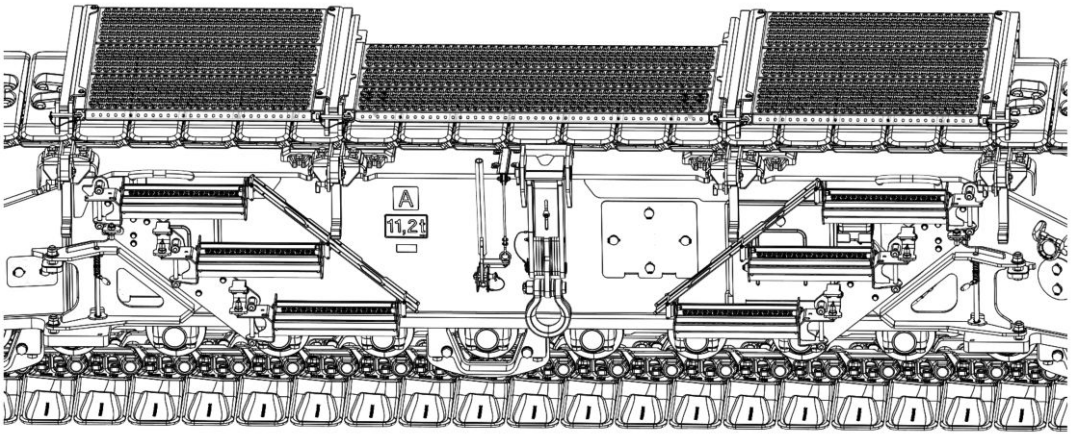


Fig. 1687: Stairs in the transport position

10.1.22 Disassembling the removable stairs on the crawler carrier

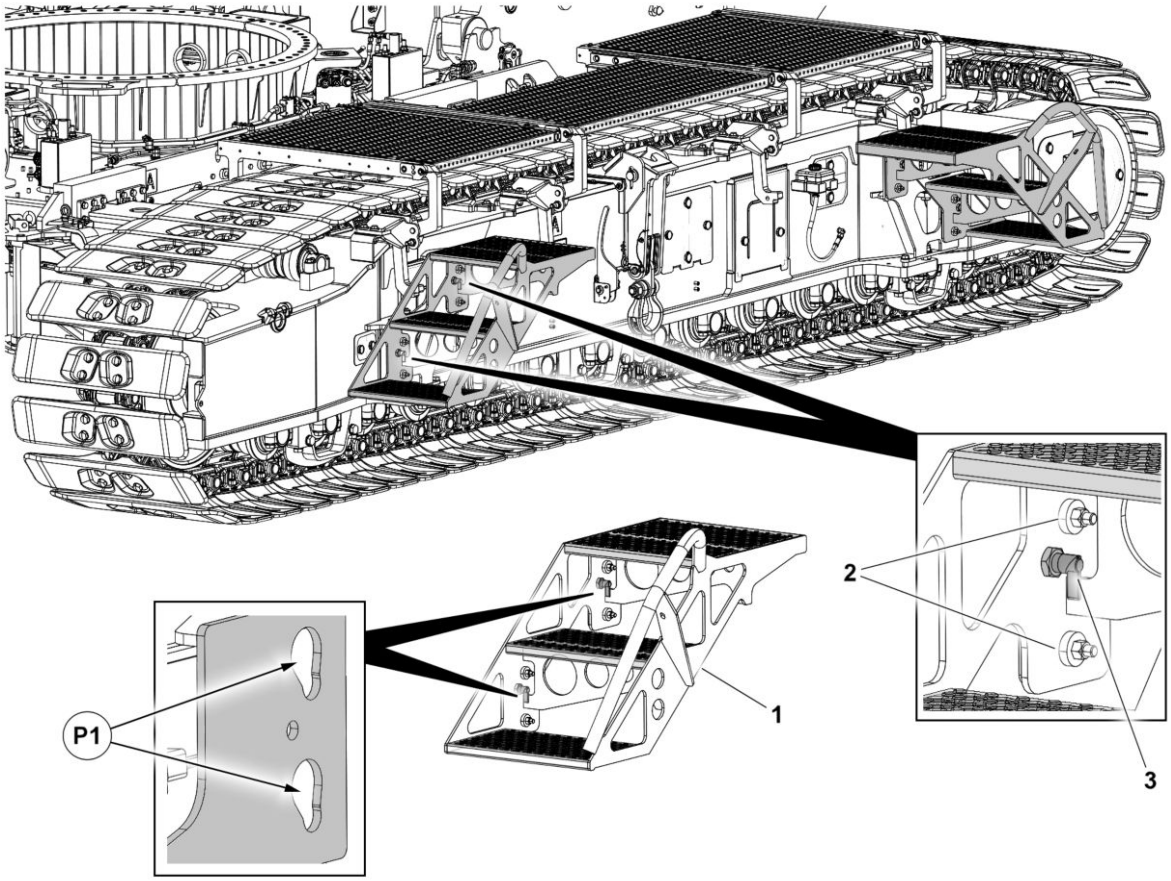


Fig. 1688: Disassembling the stairs on the crawler carrier

1 Stairs
2 Retainer
3 Retaining element
P1 Assembly position

The stairs on the crawler carriers must be disassembled for separate transport. Disassembly is the same for all stairs.

▶ Unlock the retaining elements **3** on the stairs **1**.

▶ Remove the stairs **1** with the retainer **2** in the assembly position **P1** on the crawler carrier.

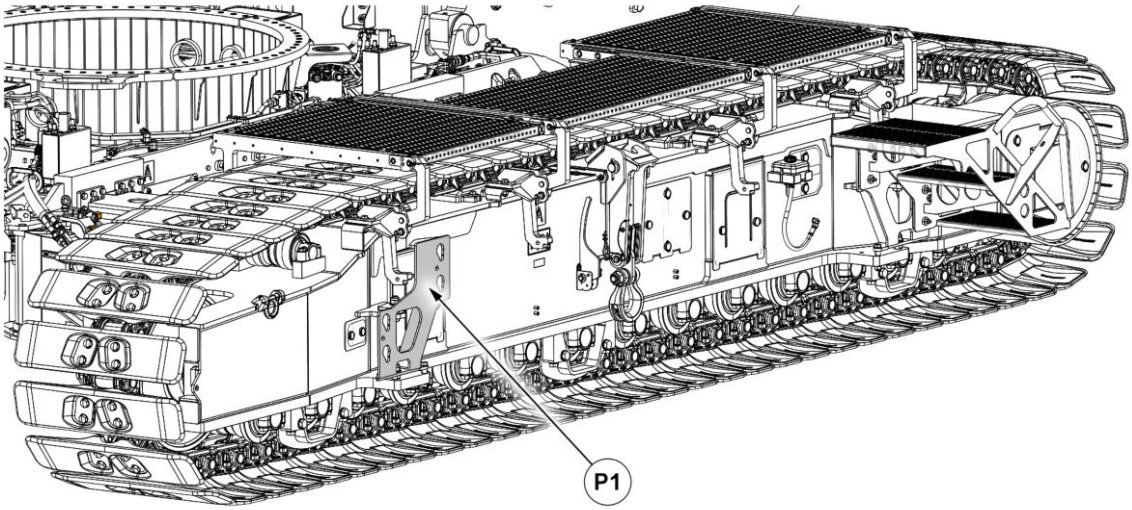


Fig. 1689: The stairs are disassembled

P1 Operating position

▷ The stairs are disassembled in the operating position **P1**.

▶ Set the stairs on the transport vehicle.

10.2 Assembly support*

10.2.1 Safety

⚠ **This section supplements the “Safety” chapter.**

10.2.1.1 Danger zone of the assembly support

Observe the additional safety instructions (→ 5.7 Danger zone, p. 167).

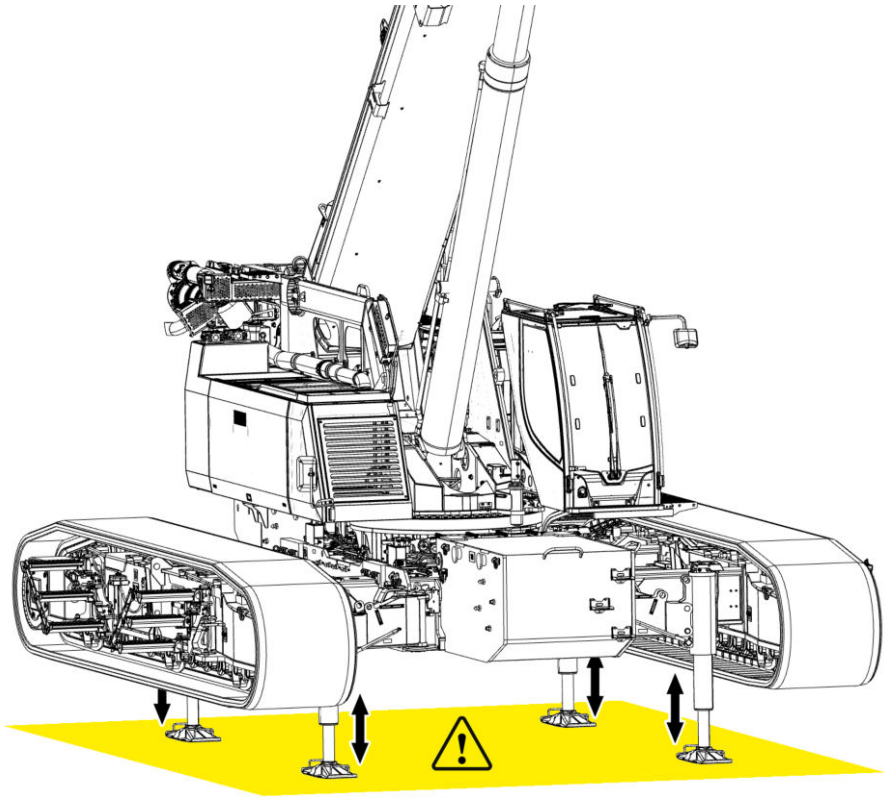


Fig. 1690: Danger zone of the assembly support

10.2.1.2 Use of the assembly support

The crane can topple over if the assembly support is not used properly.

Rules for the use of the assembly support:
- The crane may only be supported for the assembly and disassembly of the central ballast and the crawler carrier.
- The turntable ballast may **not** be assembled and may **not** be taken down on the ballast placement.

10.2.2 Swinging the support cylinder pulley into the operating position

Make sure that the following prerequisites are met:
❑ If the crawler carriers are assembled: The crawler travel gear is set on the wide track width (4.9 m).

(→ 8.14 Crawler travel gear track width adjustment, p. 502)

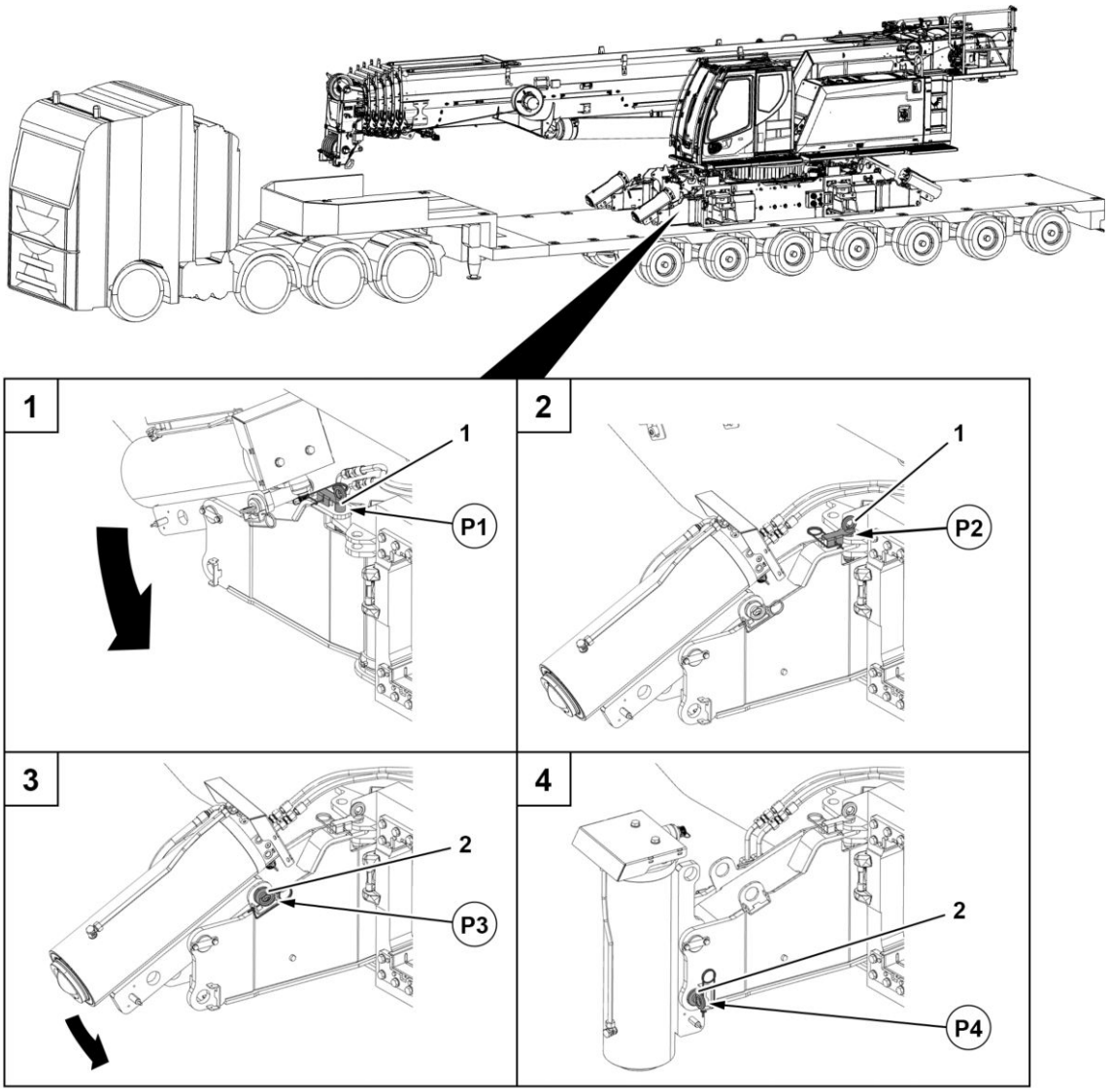


Fig. 1691: Exemplary illustration: Swinging the support cylinder pulley into the operating position

1 Pin
2 Pin
P1 Transport position
P2 Operating position
P3 Transport position
P4 Operating position

▶ Release and unpin the pin **1** in the transport position **P1**.

⚠ **Danger of crushing! Moving parts!**

▶ Swing the support cylinder outward into the operating position.

▶ Insert the pin **1** in the operating position **P2** and secure.

⚠ **Danger of crushing! Moving parts!**

▶ Hold the support cylinder during the entire swinging procedure.

▶ Release and unpin the pin **2** in the transport position **P3**.

▶ Swing the support cylinder down into the operating position.

▶ Insert the pin **2** in the operating position **P4** and secure.

10.2.3 Extending the support cylinders

Make sure that the following prerequisites are met:
- ❑ The support cylinders are swung into the operating position.
  (→ 10.2.2 Swinging the support cylinder pulley into the operating position, p. 693)
- ❑ The ground is of sufficient load bearing capacity. If necessary: Support the assembly support.
- ❑ A permissible support condition is established according to the load chart.
  (→ Separate document “Load chart”)

10.2.3.1 Extending the support cylinder with the crane remote control

Make sure that the following prerequisites are met:
- ❑ The *assembly support* menu is displayed.
  (→ Opening the assembly support menu, p. 473)

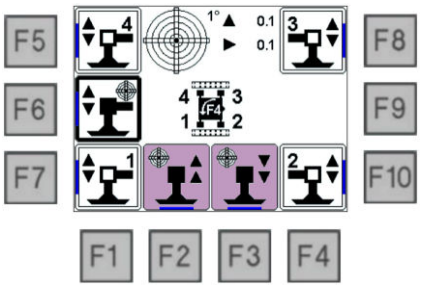


Fig. 1692: Exemplary illustration: Assembly support menu

Positioning the support cylinders

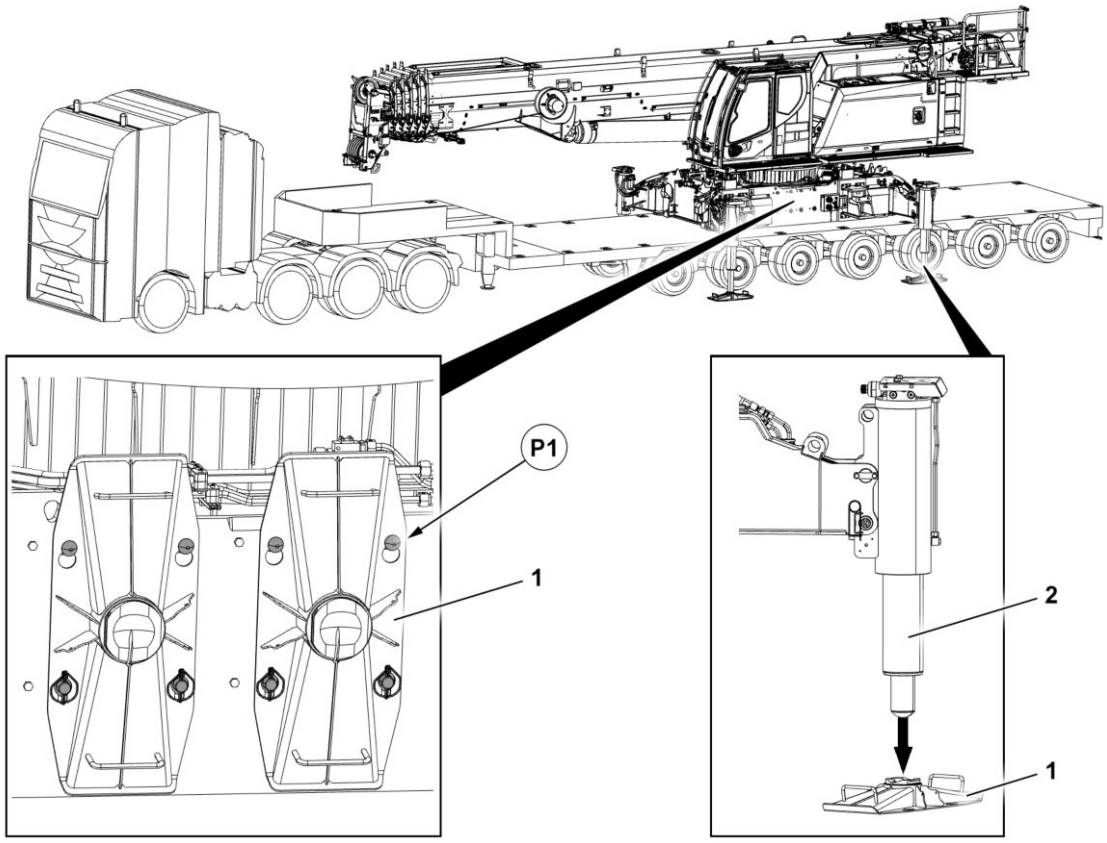


Fig. 1693: Exemplary illustration: Extending the support cylinders

1 Support plate
2 Support cylinder
P1 Transport position

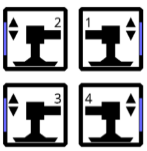
▶ Remove the support plate **1** from the transport position **P1**.

Note

With the crawler carriers assembled, the support plates can be parked on the central ballast.

▶ Position the support plate **1** below the support cylinder.

Only extend the support cylinders **2 individually**.



▶ Press the *support cylinder* F-button.
▷ The required support cylinder **2** is selected.
▷ Additional buttons are displayed.

▶ Until the support cylinder **2** lies on the support plate **1**: Press and hold the *extend support cylinder* F-button.

▶ Repeat the procedure for every support cylinder **2**.

Supporting the crane

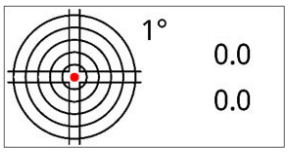


Fig. 1696: Crane incline 0.0°

The crane can be automatically or manually supported.

The crane must be aligned levelled to 0.0°.

Make sure that the following prerequisites are met:
❑ All support cylinders are in contact with the ground.

Supporting the crane automatically

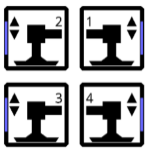
▶ Press the *automatic support* F-button.
▷ Additional buttons are displayed.

▶ Until the crane is lifted off the ground and the crane incline is 0.0°: Press and hold the *extend support cylinder* F-button.

▶ After the support procedure: Make sure that the crane is lifted off the ground.

Supporting the crane manually

Select the support cylinder such that the crane can be aligned leveled and is completely lifted off the ground.



▶ Press the *support cylinder* F-button.
▷ Additional buttons are displayed.
▷ The required support cylinders are selected.

▶ Until the crawler carriers can be assembled or disassembled and the crane incline is 0.0°: Press and hold the *extend support cylinder* F-button.

10.2.3.2 Extending the support cylinders from the crane cab

Make sure that the following prerequisites are met:
❑ The *assembly support* menu is displayed on armrest operating unit 1.

(→ Changing the menu, p. 437)

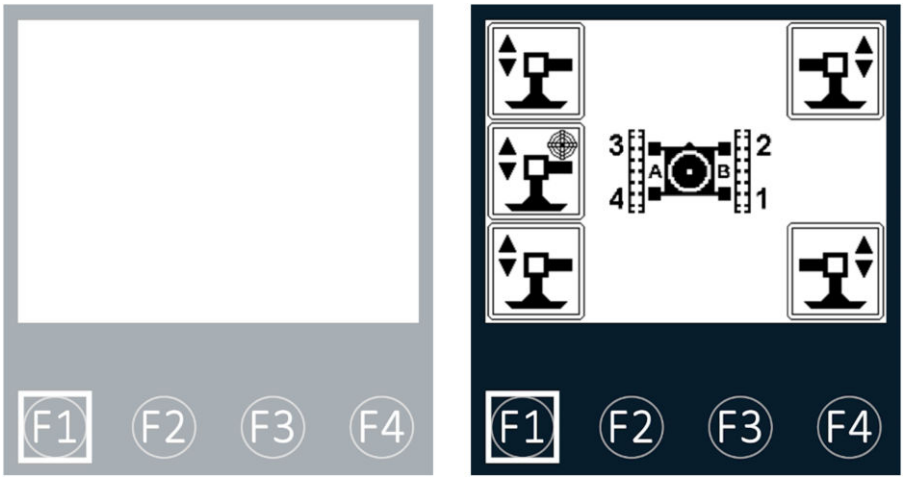


Fig. 1701: Assembly support menu

Positioning the support cylinders

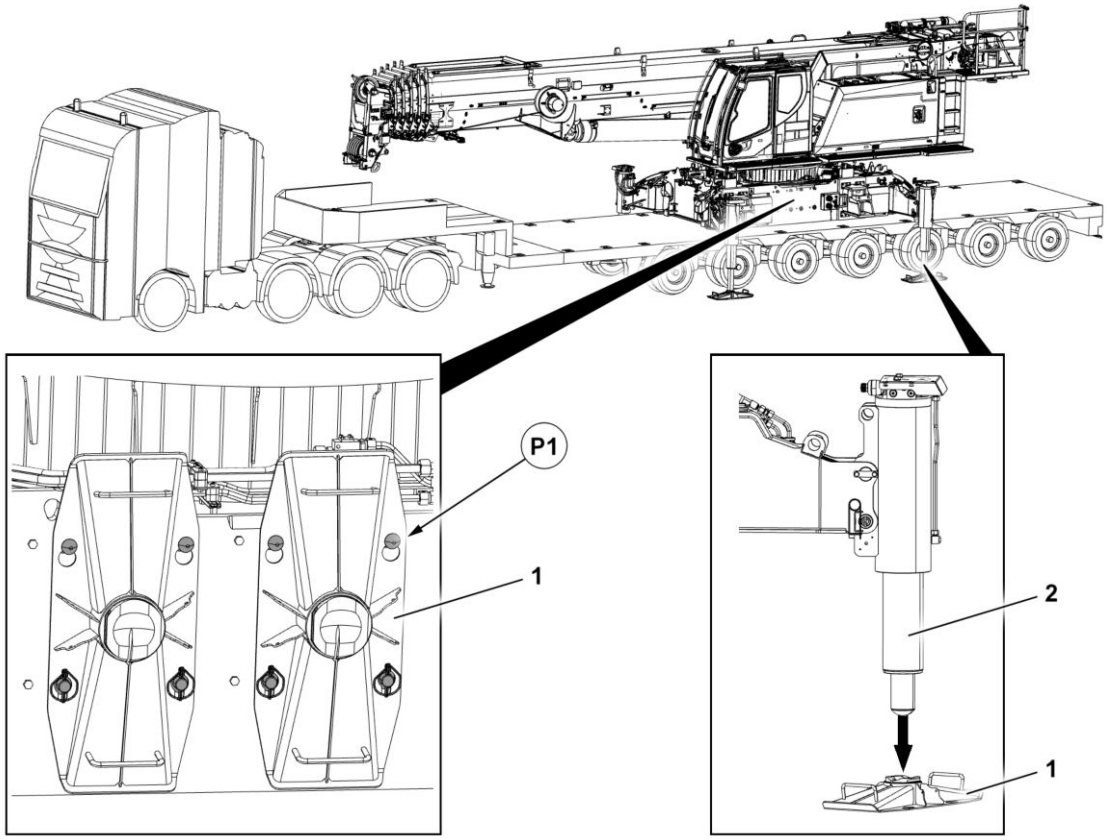


Fig. 1702: Exemplary illustration: Extending the support cylinders

1 Support plate
2 Support cylinder
P1 Transport position

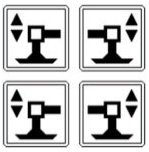
▶ Remove the support plate **1** from the transport position **P1**.

Note

With the crawler carriers assembled, the support plates can be parked on the central ballast.

▶ Position the support plate **1** below the support cylinder **2**.

Only extend the support cylinders **2 individually**.



▶ Press the *support cylinder* button.

▷ The selected support cylinder **2** has a black border.

▶ Press and hold the *special function* button on control lever 1.

▶ Until the support cylinder **2** lies on the support plate **1**: Move control lever 1 to the front and hold.

▶ Repeat the procedure for every support cylinder **2**.

Supporting the crane

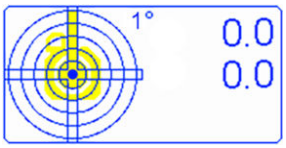


Fig. 1707: Crane incline 0.0°

The crane can be automatically or manually supported.

The crane must be aligned levelled to 0.0°.

Make sure that the following prerequisites are met:
❑ All support cylinders are in contact with the ground.

Supporting the crane automatically

▶ Press the *automatic support* button.

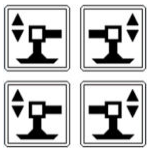
▶ Press and hold the *special function* button on control lever 1.

▶ Until the crane is lifted off the ground and the crane incline is 0.0°: Move control lever 1 to the front and hold.

▶ After the support procedure: Make sure that the crane is lifted off the ground.

Supporting the crane manually

Select the support cylinder such that the crane can be aligned leveled and all wheels are in the air.



▶ Press the *support cylinder* button.
▷ The required support cylinders are selected.

▶ Press and hold the *special function* button on control lever 1.

▶ Until the crawler carriers can be assembled or disassembled and the crane incline is 0.0°: Move control lever 1 to the front and hold.

10.2.3.3 Extending the support cylinder with the expanded crane remote control*

Make sure that the following prerequisites are met:
❑ The *assembly support* menu is displayed.
(→ Opening the assembly support menu, p. 473)

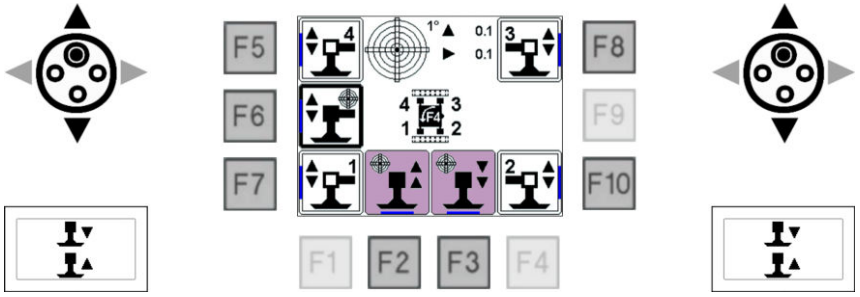


Fig. 1714: Assembly support menu

Positioning the support cylinders

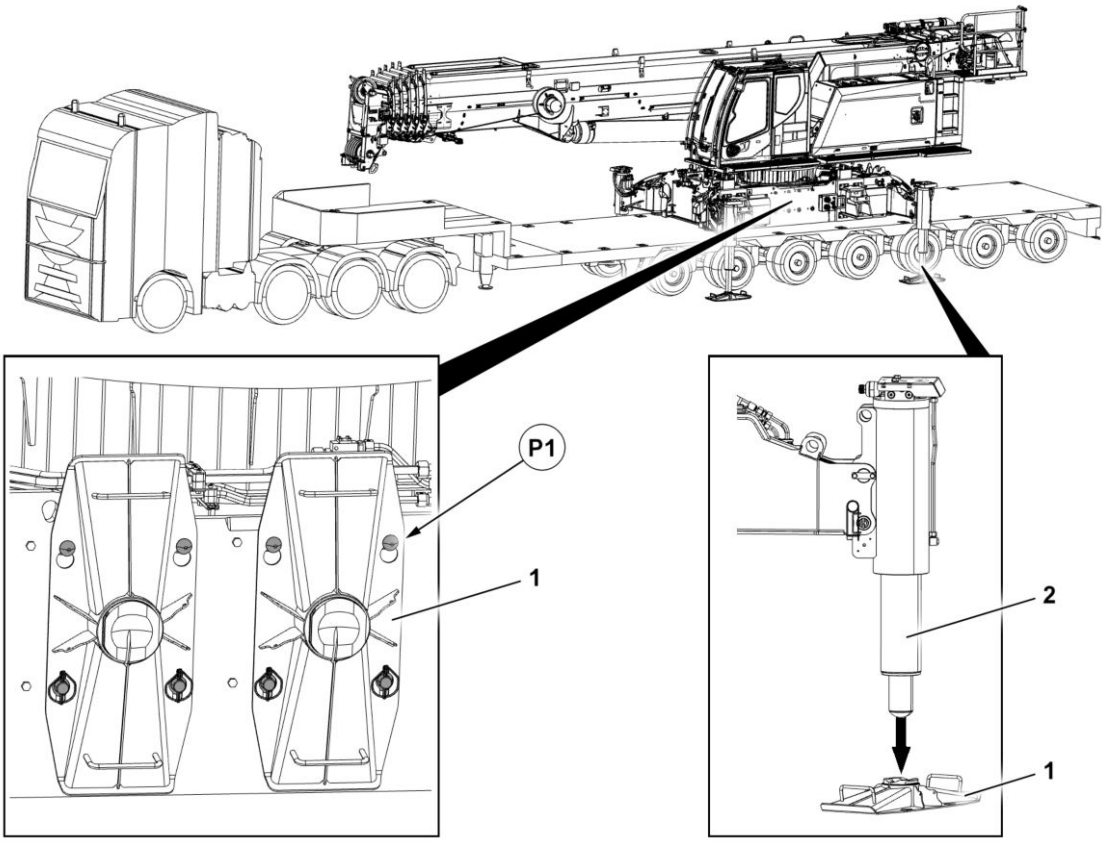


Fig. 1715: Exemplary illustration: Extending the support cylinders

1 Support plate
2 Support cylinder
P1 Transport position

▶ Remove the support plate **1** from the transport position **P1**.

Note

With the crawler carriers assembled, the support plates can be parked on the central ballast.

▶ Position the support plate **1** below the support cylinder.

Only extend the support cylinders **2 individually**.

▶ Press the *support cylinder* F-button.
▷ The required support cylinder **2** is selected.

▶ Until the support cylinder **2** lies on the support plate **1**: Move control lever 1 or control lever 2 to the front and hold.

▶ Repeat the procedure for every support cylinder **2**.

Supporting the crane

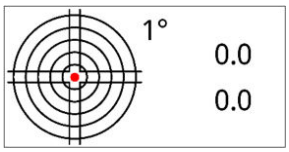


Fig. 1718: Crane incline 0.0°

The crane can be automatically or manually supported.

The crane must be aligned levelled to 0.0°.

Make sure that the following prerequisites are met:
❑ All support cylinders are in contact with the ground.

Supporting the crane automatically

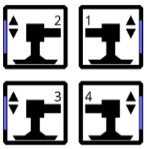
▶ Press the *automatic support* F-button.

▶ Until the crane is lifted off the ground and the crane incline is 0.0°: Move control lever 1 or control lever 2 to the front and hold.

▶ After the support procedure: Make sure that the crane is lifted off the ground.

Supporting the crane manually

Select the support cylinder such that the crane can be aligned leveled and is completely lifted off the ground.



▶ Press the *support cylinder* F-button.
▷ The required support cylinders are selected.

▶ Until the crawler carriers can be assembled or disassembled and the crane incline is 0.0°: Move control lever 1 or control lever 2 to the front and hold.

10.2.4 Retracting the support cylinders

Make sure that the following prerequisites are met:
❑ If the crawler carriers are disassembled: The permissible transport condition is established. (→ 7.2 Mobile crane without crawler carrier, p. 361)
❑ **No** personnel or objects are within the extension range of the support cylinders or below the crane.

10.2.4.1 Retracting the support cylinder with the crane remote control

Make sure that the following prerequisites are met:
❑ The *assembly support* menu is displayed.

(→ Opening the assembly support menu, p. 473)

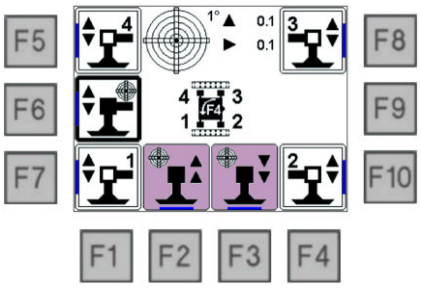


Fig. 1723: Assembly support menu

Retract the support cylinder automatically

▶ Press the *automatic support* F-button.
▷ Additional buttons are displayed.

▶ Until all support cylinders are fully retracted: Press and hold the *retract support cylinder* F-button.

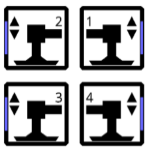
If the crawler carriers are disassembled:
▶ Connect the support plates to the crawler center section in the transport position and secure.

or

If the crawler carriers are assembled:
Connect the support plates to the central ballast in the park position.

Retracting the support cylinders manually

All support cylinders must be retracted evenly until the crane is no longer standing on the support cylinders.



▶ Press the *support cylinder* F-button.
▷ Additional buttons are displayed.
▷ The required support cylinders are selected.

▶ Until all support cylinders are fully retracted: Press and hold the *retract support cylinder* F-button.

If the crawler carriers are disassembled:
▶ Connect the support plates to the crawler center section in the transport position and secure.

or

If the crawler carriers are assembled:
Connect the support plates to the central ballast in the park position.

10.2.4.2 Retracting support cylinders from the crane cab

Make sure that the following prerequisites are met:
❑ The *assembly support* menu is displayed on armrest operating unit 1.

(→ Changing the menu, p. 437)

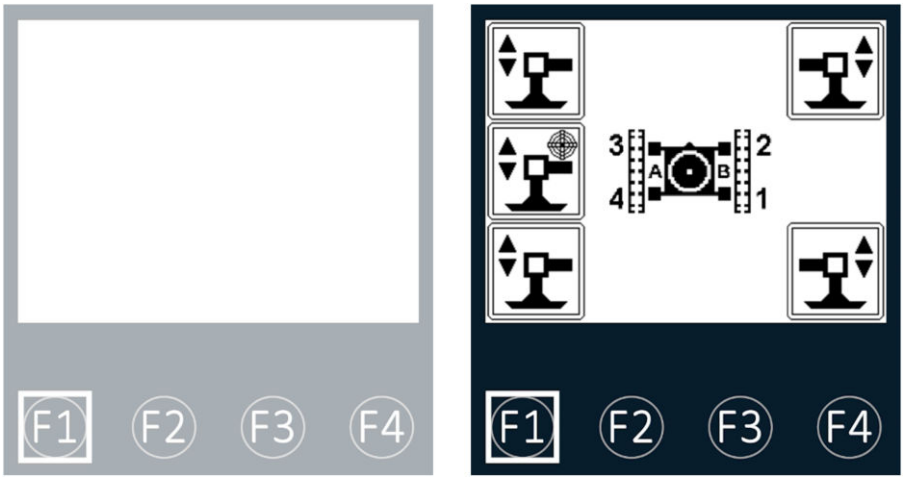


Fig. 1728: Assembly support menu

Retract the support cylinder automatically

▶ Press the *automatic support* button.

▶ Press and hold the *special function* button on control lever 1.

▶ Until all support cylinders are fully retracted: Move control lever 1 to the rear and hold.

If the crawler carriers are disassembled:

▶ Connect the support plates to the crawler center section in the transport position and secure.

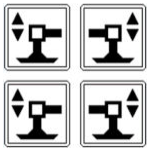
or

If the crawler carriers are assembled:

Connect the support plates to the central ballast in the park position.

Retracting the support cylinders manually

All support cylinders must be retracted evenly until the crane is no longer standing on the support cylinders.



▶ Press the *support cylinder* button.

▷ The required support cylinders are selected.

▶ Press and hold the *special function* button on control lever 1.

▶ Until all support cylinders are fully retracted: Move control lever 1 to the front and hold.

If the crawler carriers are disassembled:
▶ Connect the support plates to the crawler center section in the transport position and secure.
or
If the crawler carriers are assembled:
Connect the support plates to the central ballast in the park position.

10.2.4.3 Retracting the support cylinder with the expanded crane remote control*

Make sure that the following prerequisites are met:
❑ The *assembly support* menu is displayed.
(→ Opening the assembly support menu, p. 473)

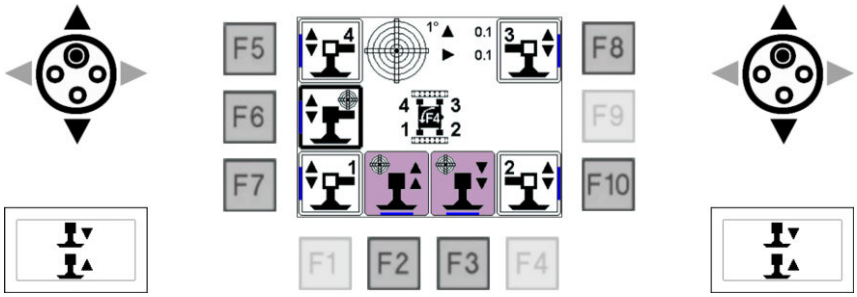


Fig. 1735: Assembly support menu

Retract the support cylinder automatically

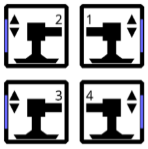
▶ Press the *automatic support* F-button.

▶ Until the support cylinders are fully retracted: Move control lever 1 or control lever 2 to the rear and hold.

If the crawler carriers are disassembled:
▶ Connect the support plates to the crawler center section in the transport position and secure.
or
If the crawler carriers are assembled:
Connect the support plates to the central ballast in the park position.

Retracting the support cylinders manually

All support cylinders must be retracted evenly until the crane is no longer standing on the support cylinders.



▶ Press the *support cylinder* F-button.
▷ The required support cylinders are selected.

▶ Until all support cylinders are fully retracted: Move control lever 1 or control lever 2 to the rear and hold.

If the crawler carriers are disassembled:

▶ Connect the support plates to the crawler center section in the transport position and secure.

or

If the crawler carriers are assembled:

Connect the support plates to the central ballast in the park position.

10.2.5 Swinging the support cylinder into the transport position

Make sure that the following prerequisites are met:

❑ If the crawler carriers are assembled: The crawler travel gear is set on the wide track width (4.9 m).
(→ 8.14 Crawler travel gear track width adjustment, p. 502)

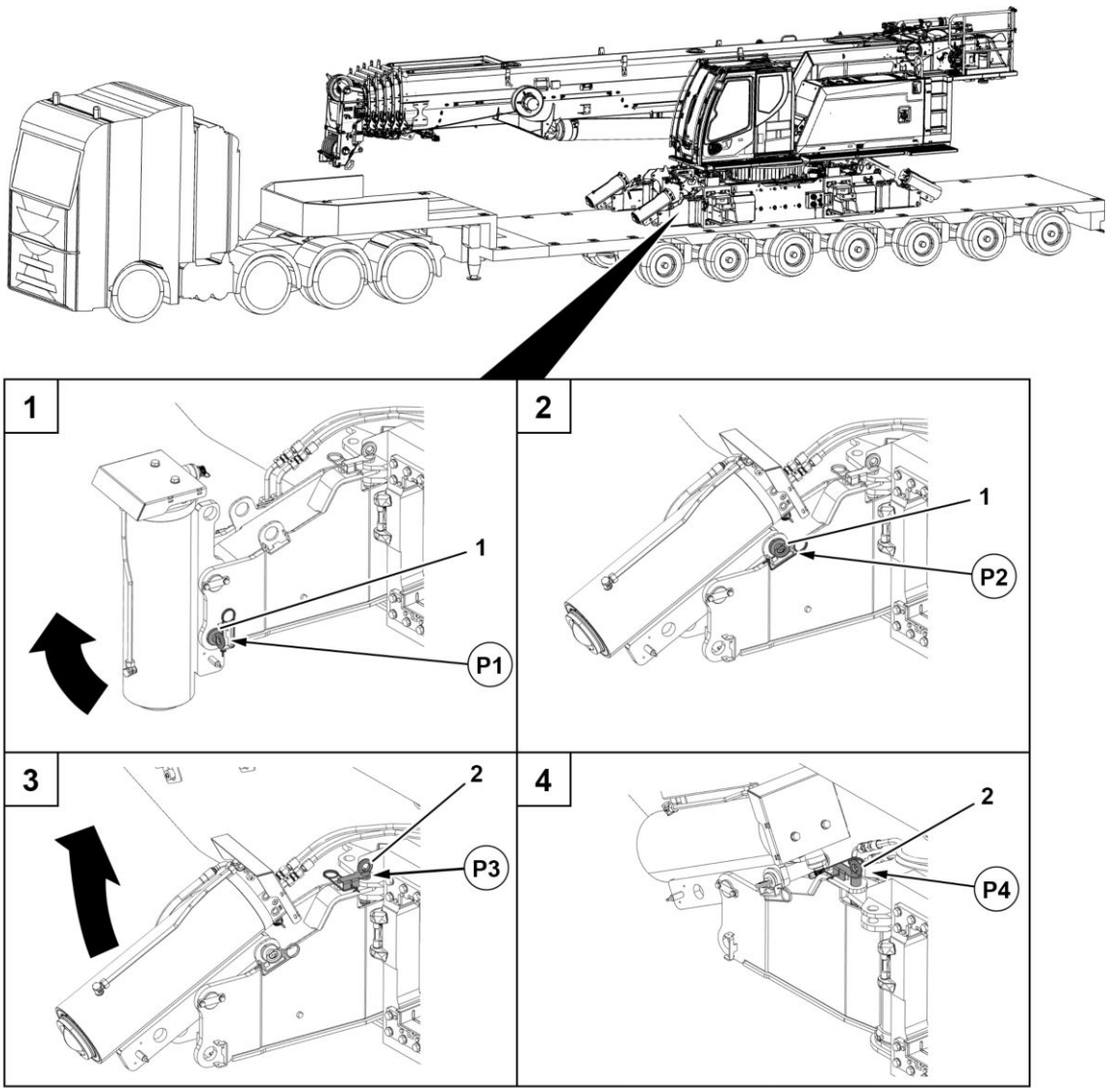


Fig. 1740: Exemplary illustration: Swinging the support cylinder into the transport position

1 Pin

P2 Transport position

See next page for continuation of the image legend

2 Pin
P1 Operating position
P3 Operating position
P4 Transport position

▶ Release and unpin the pin **1** in the operating position **P1**.

⚠ **Danger of crushing! Moving parts!**

▶ Swing the support cylinder up into the transport position and hold.

▶ Insert and secure the pin **1** in the transport position **P2**.

▶ Release and unpin the pin **2** in the operating position **P3**.

⚠ **Danger of crushing! Moving parts!**

▶ Swing the support cylinder inward into the transport position.

▶ Insert and secure the pin **2** in the transport position **P4**.

10.3 Crawler carrier

10.3.1 Assembling the crawler carrier

Make sure that the following prerequisites are met:
- ❑ The crawler center section is supported and leveled.
  (→ 10.2.3 Extending the support cylinders, p. 695)
- ❑ The cross carrier is set on the wide track width (4.9 m).
  (→ 8.14 Crawler travel gear track width adjustment, p. 502)
- ❑ The crane set up configuration is set in the *set up* menu.
  (→ 8.6 Setting up the crane, p. 412)

Note

The crawler carriers can be assembled before or after the central ballast.

Higher boom radii are possible with the central ballast assembled.

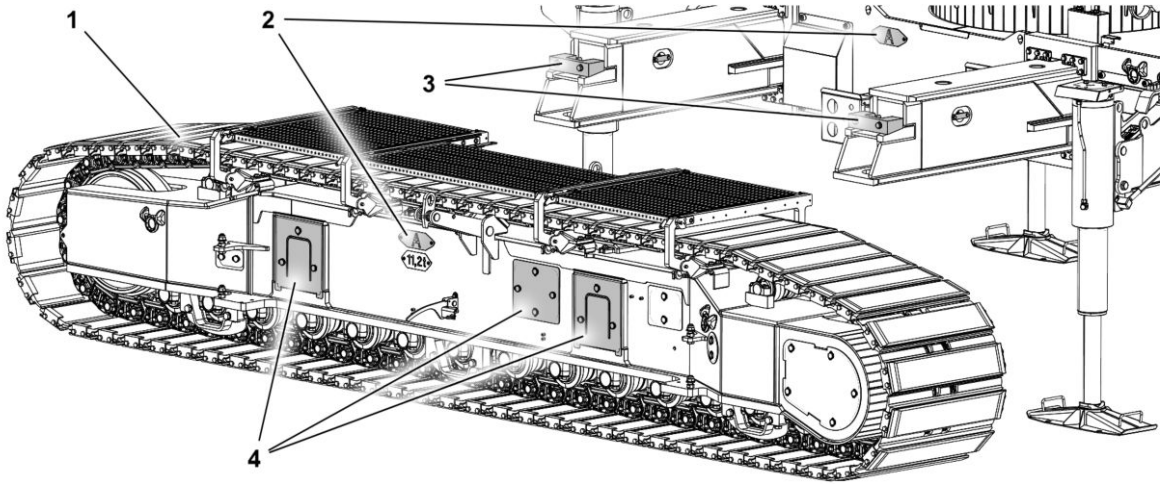


Fig. 1741: Assembling the crawler carrier

1 Crawler carrier 11.2 t
2 Identification
3 Connection wedge
4 Cover

During assembly, the markings **2** on the crawler carrier and crawler center section must match.

▶ Remove the connection wedges **3** from the cross carrier.

▶ Remove the covers **4** on the crawler carrier.

▶ Fasten the crawler carrier **1** (→ 7.2.8 Fastening the crawler carrier, p. 370).

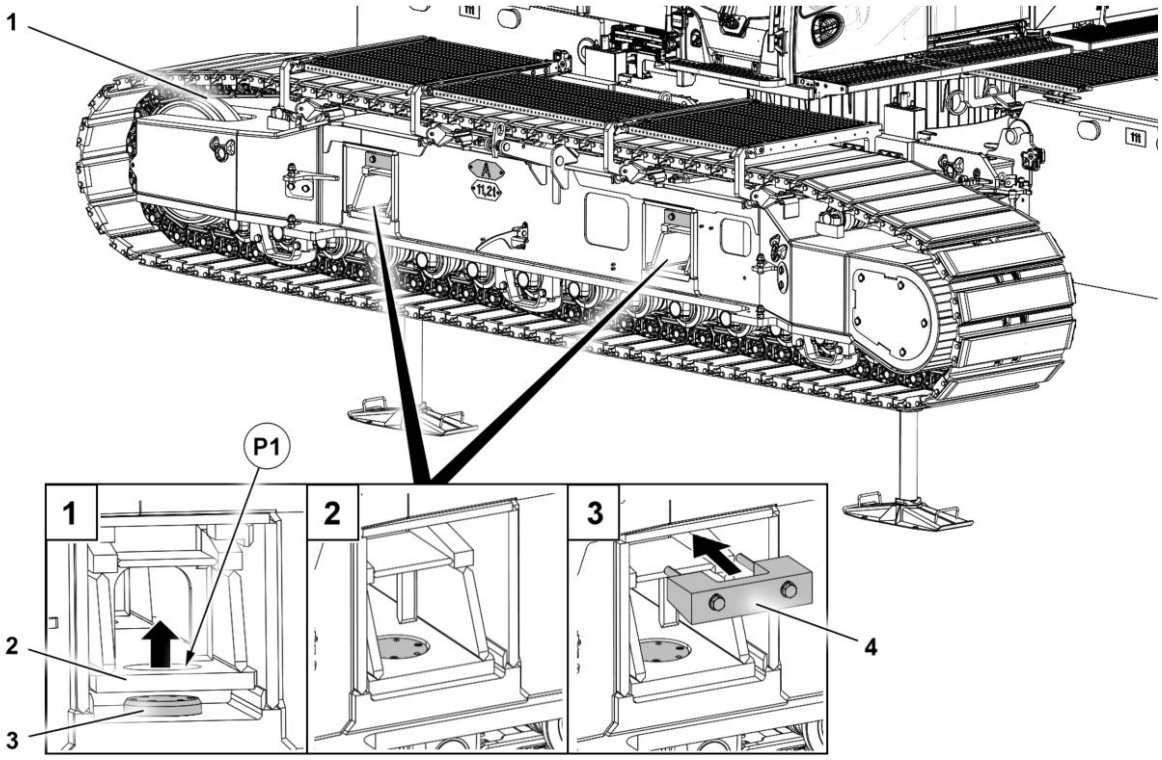


Fig. 1742: Assembling the crawler carrier

1 Crawler carrier 11.2 t
2 Cross carrier
3 Centering cone
4 Connection wedge
P1 Assembly position

▶ Until the centering cone **3** aligns with the assembly positions **P1**: Lift the crawler carrier **1** over the cross carriers **2**.

NOTICE
The hoist rope is tensioned too much!
The tow brackets can be damaged.

▶ The hoist rope pretension may not exceed the net weight of the crawler carrier.

▶ Until the centering cones **3** are lying in the assembly positions **P1**: Lift the crawler carrier **1**.

▶ Tighten the connection wedges **4** alternately with a tightening torque of 300 Nm.

▶ Remove the fastening equipment.

▶ When **both** crawler carriers **1** are wedged and bolted: Retract the assembly support.

When the crane is completely on the crawler travel gear:
▶ Retighten the connection wedges **4** with a tightening torque of 300 Nm.

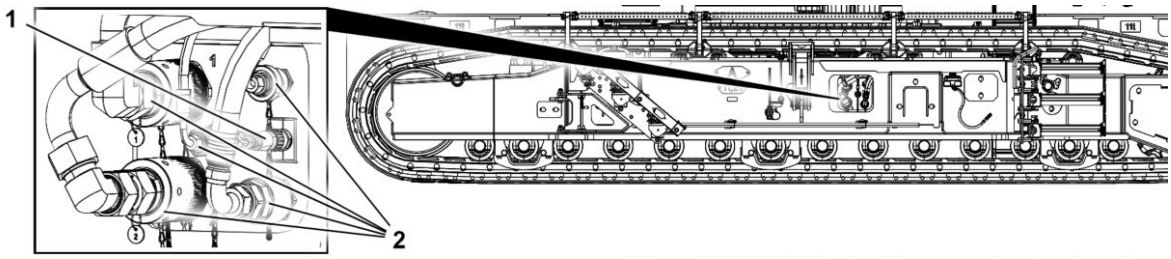


Fig. 1743: Connecting the crawler carrier

1 Electrical line **2** Hydraulic line

▶ Remove the caps from all lines and connections.

▶ Connecting the hydraulic lines **2**.

▶ Connect the electrical line **1**.

▶ Assemble the covers.

10.3.2 Disassembling the crawler carrier

Make sure that the following prerequisites are met:
❑ The crawler center section is supported and leveled.
(→ 10.2.3 Extending the support cylinders, p. 695)
❑ The cross carrier is set on the wide track width (4.9 m).
❑ The crane set up configuration is set in the *set up* menu.
(→ 8.6 Setting up the crane, p. 412)

Note

The crawler carriers can be disassembled before or after the central ballast.

Higher boom radii are possible with the central ballast assembled.

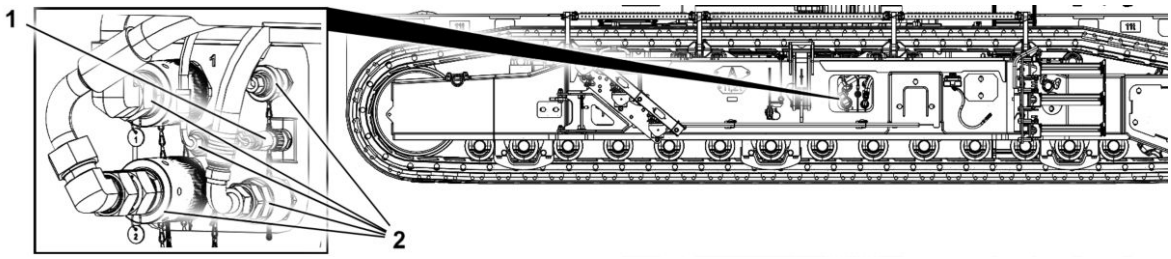


Fig. 1744: Removing the lines

1 Electrical line **2** Hydraulic line

▶ Remove the covers.

▶ Disconnect the hydraulic lines **2**.

▶ Disconnect the electrical line **1**.

▶ Attach the caps to all lines and connections.

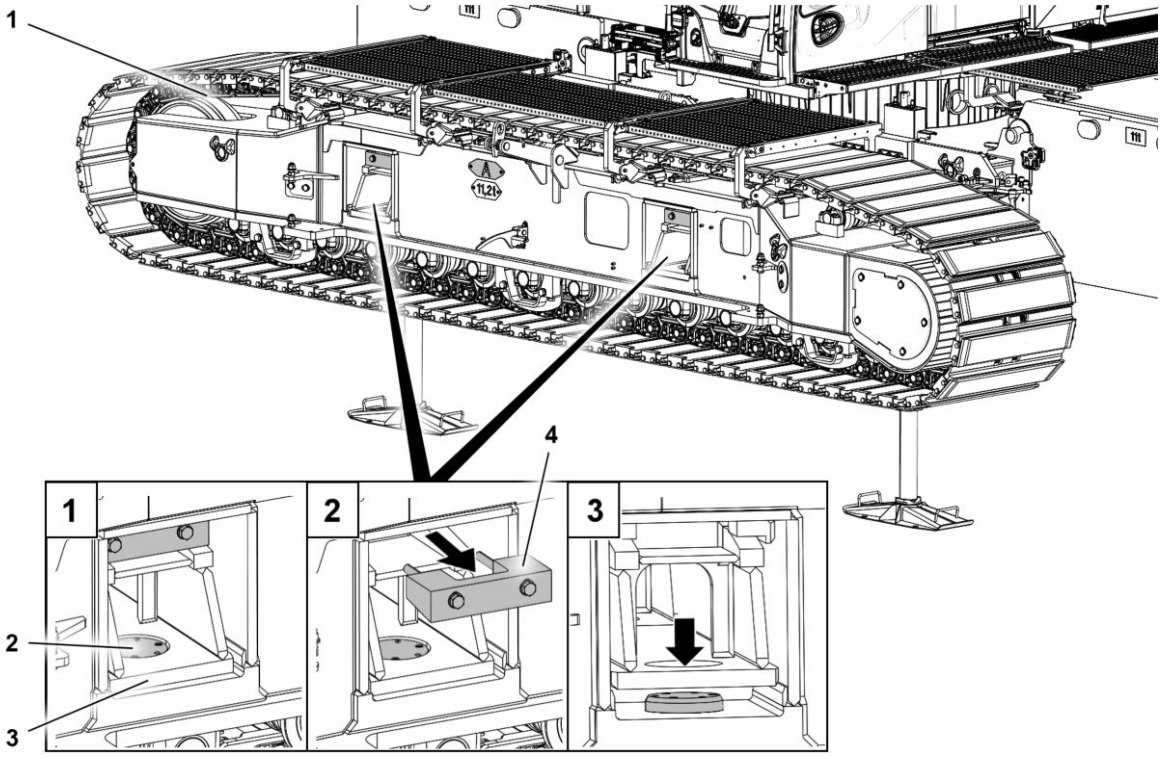


Fig. 1745: Disassembling the crawler carrier

1 Crawler carrier 11.2 t
2 Centering cone
3 Cross carrier
4 Connection wedge

NOTICE
The hoist rope is tensioned too much!
The tow brackets can be damaged.

▶ The hoist rope pretension may not exceed the net weight of the crawler carrier.

▶ Fasten and pretension the crawler carrier **1** (→ 7.2.8 Fastening the crawler carrier, p. 370).

▶ Release the connection wedges **4** and remove from the cross carrier.

▶ Until the centering cones **2** are free: Lower the crawler carrier **1**.

If the crawler carrier **1** is free:
▶ Remove the crawler carrier **1** from the cross carrier **3** and set it down on suitable ground.

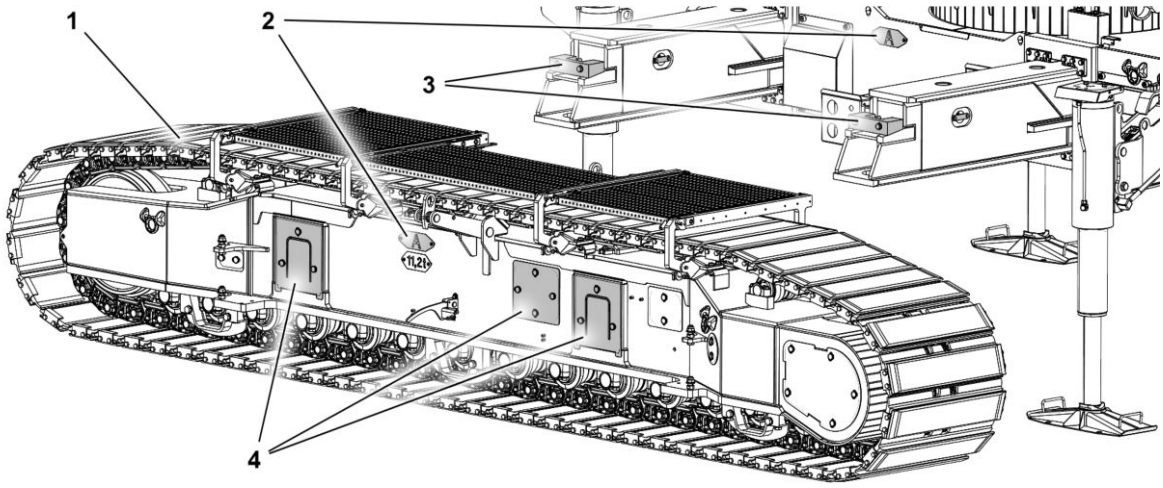


Fig. 1746: Disassembling the crawler carrier

1 Crawler carrier 11.2 t
2 Identification
3 Connection wedge
4 Cover

▶ Assemble the connection wedges **3** on the cross carrier.

▶ Assemble the covers **4**.

10.3.3 Assembling the insertion plates

Make sure that the following prerequisites are met:
❑ The grouser crawler plates are assembled.
❑ The support surfaces are clean.

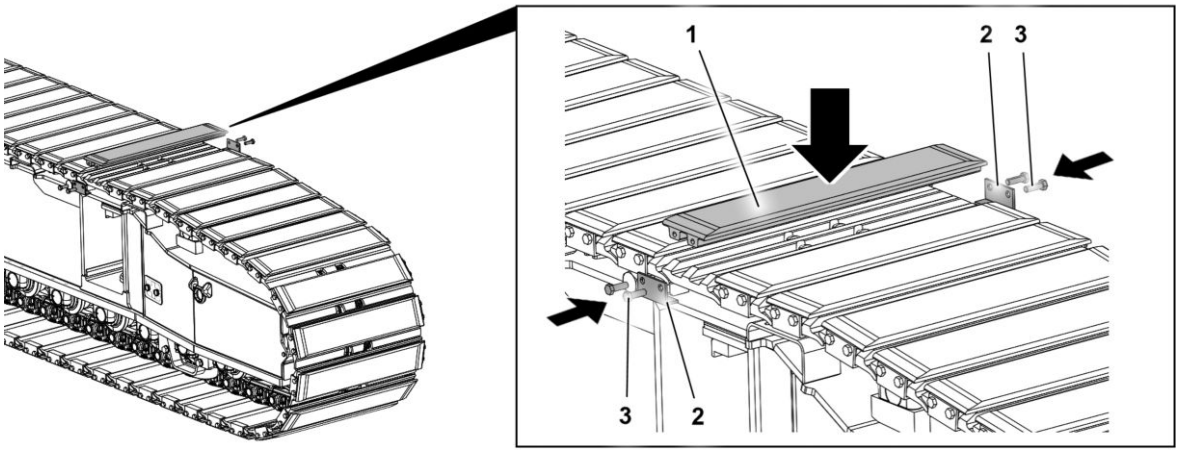


Fig. 1747: Assembling the insertion plates

1 Insertion plate
2 Bracket
3 M16x50 screws

DANGER
Danger of slipping when using insertion plates!
The crane can topple over.

▶ Make sure that there is a sufficient friction coefficient between the insertion plates and the ground.

▶ Place the insertion plate **1** from above on the 3-grouser crawler plate.

- ▶ Secure with the angle bracket **2** and M16x50 **3** screws.
- ▶ Tighten the screws alternately with 80 Nm.
- ▶ Repeat the procedure until all grouser plates are occupied. Retrace the crawler travel gear if necessary.

10.3.4 Assembling the insertion plates

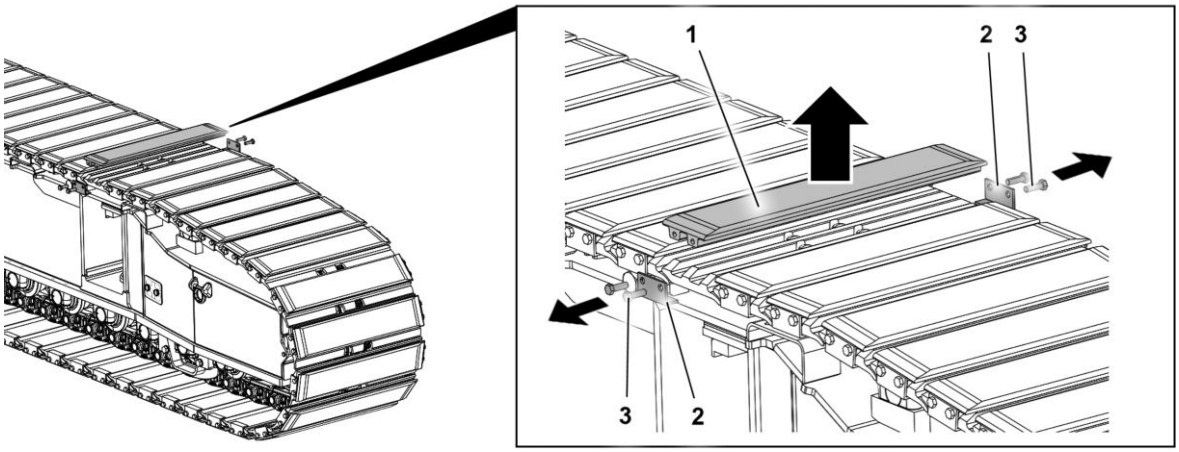


Fig. 1748: Disassembling the insertion plates

1 Insertion plate
2 Bracket
3 M16x50 screws

- ▶ Release the M16x50 screws **3** and remove the bracket **2**.
- ▶ Remove the insertion plate **1**.
- ▶ Repeat the procedure until all insertion plates are removed. Retrace the crawler travel gear if necessary.

10.4 Hook block and load hook

10.4.1 Safety

This section supplements the “Safety” chapter.

10.4.1.1 Assembling and disassembling the hook block and load hook safely

If basic rules are not observed when assembling and disassembling the hook block or the load hook, dangers for personnel or malfunctions on the crane may occur.

Observe the following rules:
- Avoiding slack rope: Do not fall below the minimum required hook block weight (→ separate document “Use of load charts”).
- Do not exceed the maximum required hook block weight (→ separate document “Use of load charts”).
- Secure the hook block to prevent it from tipping over: Park the hook block on level ground with sufficient load bearing capacity and secure it additionally when necessary.
- Secure the load hook to prevent it from rolling off: Take down the load hook on level ground with sufficient load bearing capacity and secure it additionally when necessary.
- Only use load hooks and hook blocks approved for the crane (→ separate document “Use of load charts”).

10.4.2 Disconnecting the hook block or load hook

The crane movements described here can also be carried out using the corresponding control levers in the crane cab and with the expanded crane remote control* (→ 8.18.1 Possible crane movements, p. 532).

Make sure that the following prerequisites are met:
- ❑ The *assembly functions* menu is displayed in the crane remote control.
  (→ Opening the assembly functions menu, p. 474)
- ❑ The crane set up configuration is set in the *set up* menu.
  (→ 8.6 Setting up the crane, p. 412)
- ❑ The superstructure is pinned with the chassis at 0° or 180°.
  (→ 8.16 Pinning the superstructure, p. 530)
- ❑ The telescopic boom is telescoped in all the way and pinned.
  (→ 8.18.5 Telescoping the telescopic boom, p. 545)
- ❑ The location is safe and the danger zones are well visible.
- ❑ The hook block has been reeved in a maximum of four times.
  (→ 10.4.9 Reeving the hook block in, p. 726)
  (→ 10.4.4 Use of reeving plans, p. 718)
- ❑ The utilized winch is released.
  (→ Locking and unlocking winches, p. 536)

10.4.2.1 Disconnecting the hook block or load hook

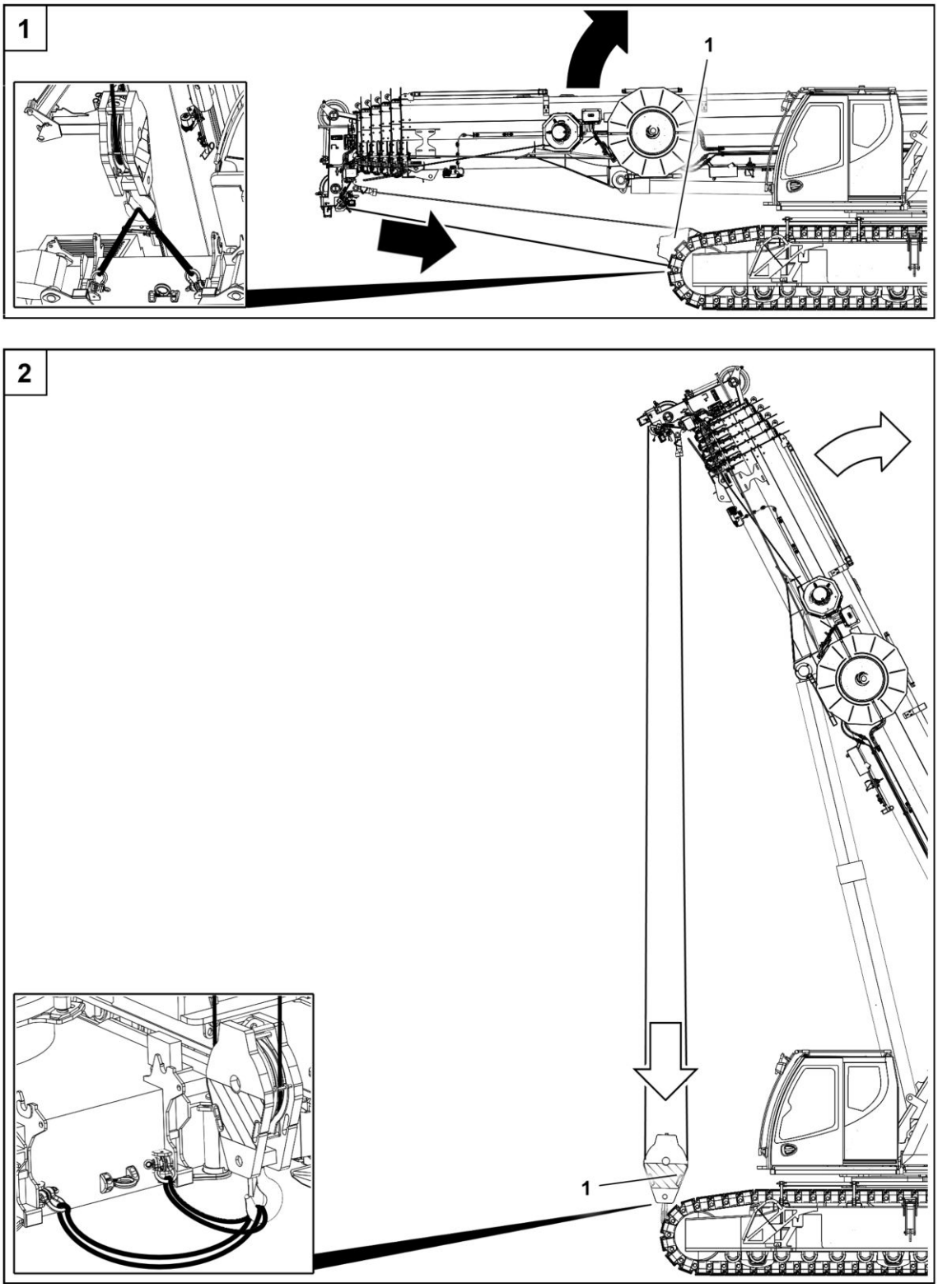


Fig. 1750: Exemplary illustration: Disconnecting the hook block

1 Hook block or load hook

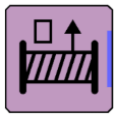
NOTICE
Hoist limit switch bypassed!
The hook block or load hook can collide with the pulley head.

▶ Keep the hook block or load hook away from the pulley head by spooling out the winch.

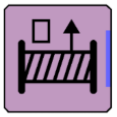
▶ Select winch: Press the *hook block assembly* F-button on the crane remote control.
▷ Additional buttons are displayed.
▷ The hoist limit switch is bypassed up to a telescopic boom angle of 10°.

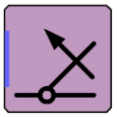
If multiple winches are installed, the *hook block assembly* icon shows the selected winch highlighted filled in.

If the correct winch is **not** selected:
▶ Press the *hook block assembly* F-button again.
▷ The correct winch is highlighted in the *hook block assembly* icon.



▶ Spool out the hoist rope slightly: Press the *spool winch out* F-button.





⚠ **Danger of crushing! The hook block or load hook oscillates!**

▶ Until the hook block or load hook **1** can be disconnected: Use the *spool out winch* F-button to spool out the hoist rope further and at the same time, use the *luff up telescopic boom* F-button to luff up the telescopic boom.

▶ Disconnect the hook block or load hook **1**.

10.4.3 Connecting the hook block or load hook

The crane movements described here can also be carried out using the corresponding control levers in the crane cab and on the expanded crane remote control* (→ 8.18.1 Possible crane movements, p. 532).

Make sure that the following prerequisites are met:
❑ The *assembly functions* menu is displayed in the crane remote control.
(→ Opening the assembly functions menu, p. 474)
❑ The crane set up configuration is set in the *set up* menu.
(→ 8.6 Setting up the crane, p. 412)
❑ The superstructure is pinned with the chassis at 0° or 180°.
(→ 8.16 Pinning the superstructure, p. 530)
❑ The telescopic boom is telescoped in all the way and pinned.
(→ 8.18.5 Telescoping the telescopic boom, p. 545)
❑ The location is safe and the danger zones are well visible.
❑ The hook block has been reeved in a maximum of four times.
(→ 10.4.9 Reeving the hook block in, p. 726)
❑ The utilized winch is released.
(→ Locking and unlocking winches, p. 536)

10.4.3.1 Connecting the hook block or load hook

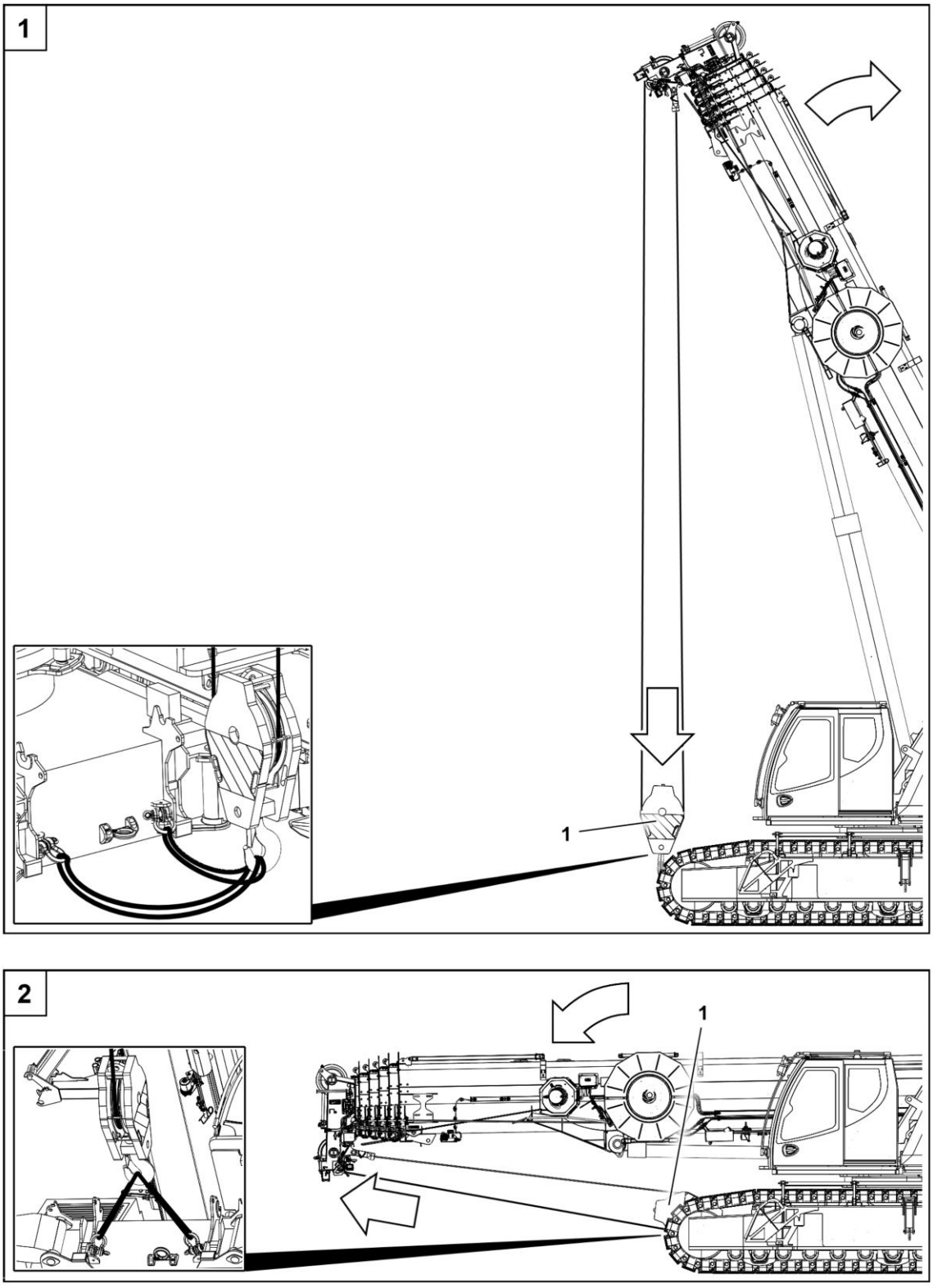


Fig. 1755: Exemplary illustration: Connecting the hook block

1 Hook block or load hook

▶ Select winch: Press the *hook block assembly* F-button on the crane remote control.
▷ Additional buttons are displayed.
▷ The hoist limit switch is bypassed up to a telescopic boom angle of 10°.

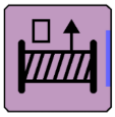
If multiple winches are installed, the *hook block assembly* icon shows the selected winch highlighted filled in.

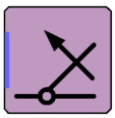
If the correct winch is **not** selected:
▶ Press the *hook block assembly* F-button again.
▷ The correct winch is highlighted in the *hook block assembly* icon.

NOTICE
Hoist limit switch bypassed!
The hook block or load hook can collide with the pulley head.

▶ Keep the hook block or load hook away from the pulley head by spooling out the winch.

⚠ Danger of crushing! The hook block or load hook oscillates!





▶ Until the hook block or load hook **1** can be connected: use the *spool out winch* F-button to spool out the hoist rope and at the same time use the *luff up telescopic boom* F-button to luff up the telescopic boom.

▶ Connect the hook block or load hook **1**.

NOTICE
The hoist rope is improperly tensioned!
If the hoist rope is **not** tensioned or is tensioned too much, the components can be damaged.

▶ Lightly tighten the hoist rope.

▶ Until the telescopic boom head is completely luffed down and the hoist rope is slightly tensioned: Use the *luff down telescopic boom* F-button to luff the telescopic boom down and at the same time use the *spool out winch* F-button to spool the hoist rope up.

10.4.4 Use of reeving plans

Reeving plans are the systematic representation of the hoist rope run across the pulleys available on the telescopic boom and the hook block. The reeving plan is explained below based on a 6x reeving on a boom head and a 3-pulley hook block.

Note

To determine the required hoist rope reeving:

(→ Separate document “Use of load charts”)

All reeving plans:

(→ Separate document “Reeving plan”)

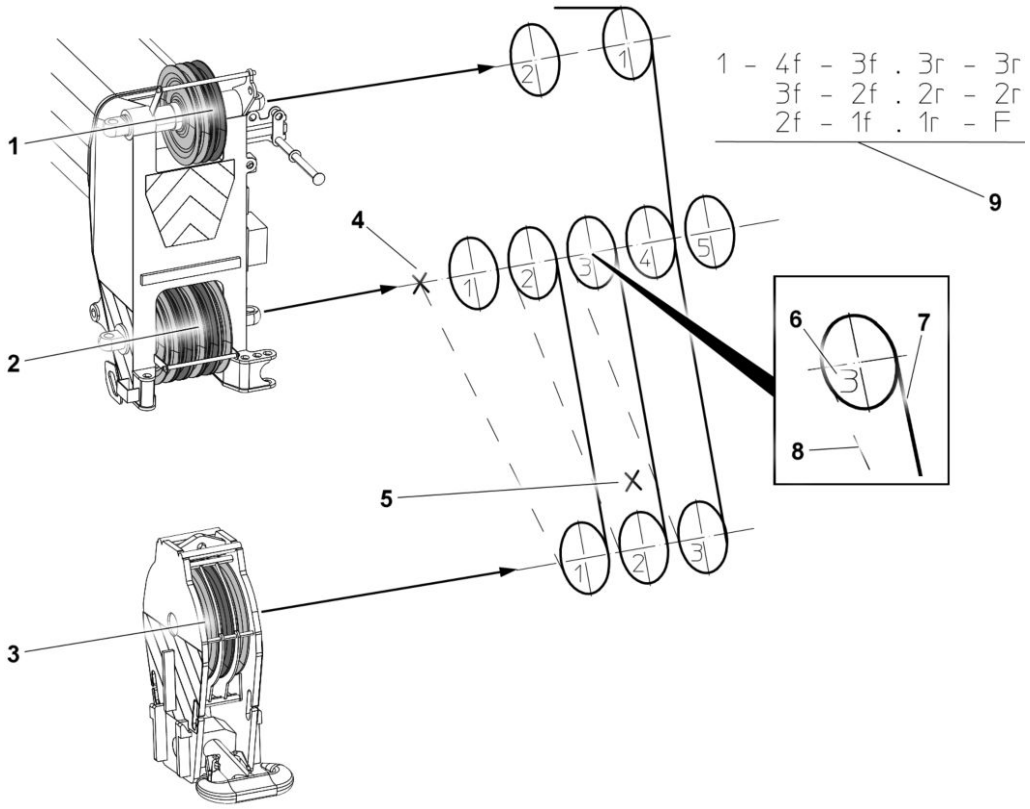


Fig. 1760: Exemplary illustration: Reeving plan

1 End pulley
2 Upper pulley block
3 Lower pulley block
4 Rope fixed point on the pulley head
5 Rope fixed point on the hook block
6 Pulley marking
7 The rope is running over the front side of the pulleys (solid line)
8 The rope is running over the rear side of the pulleys (dashed line)
9 Reeving order

10.4.4.1 Reeving order

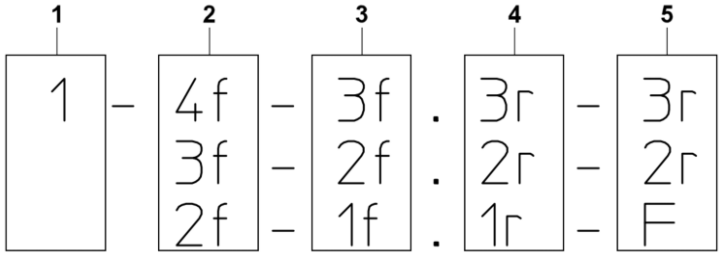


Fig. 1761: Exemplary illustration: Reeving code

1 End pulley column
2 Upper pulley block front side column
3 Lower pulley block front side column
4 Lower pulley block rear side column
5 Upper pulley block rear side column
f Front of the pulley (front)
r Rear of the pulley (rear)
F Rope fixed point (Fixpoint)

10.4.5 Assembling the auxiliary weights

If a larger hook block weight is required, auxiliary weights must be assembled on the hook block (→ Separate document “Use of the load charts” > “hook block weight”).

Note

The own weight is marked on the side on the auxiliary weights.

The maximum permissible own weight (WT max.) is engraved on the hook block.

Make sure that the following prerequisites are met:
- ❑ The ground is of sufficient load bearing capacity.
- ❑ The ground is level and horizontal.
- ❑ The hook block is placed on the ground.

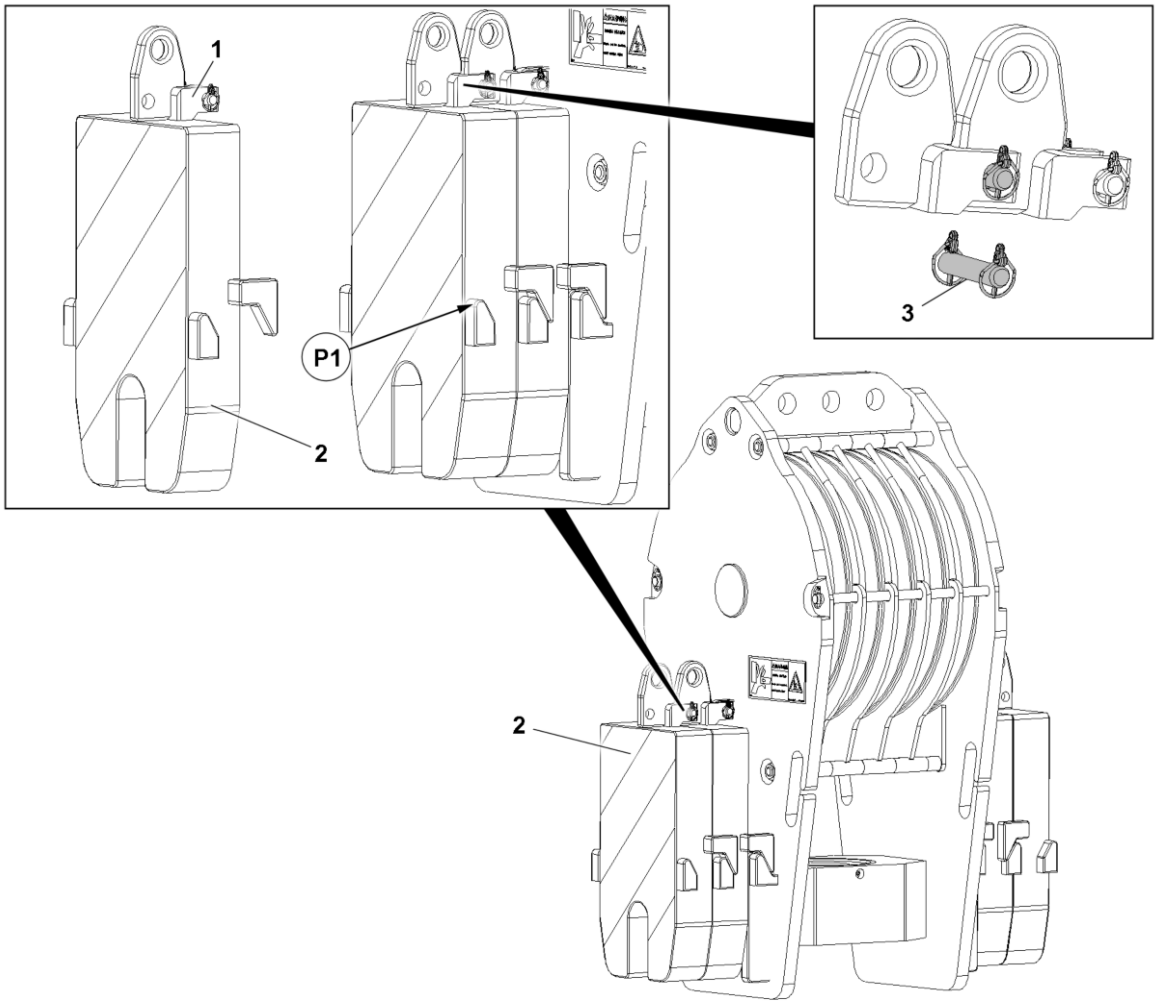


Fig. 1762: Exemplary illustration: Quick-change system auxiliary weights

1	Mounting brackets	**3**	Pin
2	Auxiliary weights	**P1**	Position

WARNING
Maximum permissible net weight of the hook block exceeded!
Failure of the hook block and the auxiliary weight mount.

▶ Do **not** exceed the maximum permissible net weight (WT max.) of the hook block.

▶ Fasten the auxiliary weight **2** individually (→ 7.5.4 Fastening the hook block auxiliary weights, p. 387).

▶ Attach the auxiliary weight **2** to the hook block in position **P1**.

▶ Insert the pin **3** on both sides in the mounting brackets **1** and secure.

When the respective auxiliary weight **2** is properly assembled and secured:
▶ Remove the auxiliary crane.

Asymmetric assembly of the auxiliary weights! The hook block can topple over!

▶ Assemble other auxiliary weights **2** only individually and alternately.

10.4.6 Disassembling the auxiliary weights

Make sure that the following prerequisites are met:
- ❑ The ground is of sufficient load bearing capacity.
- ❑ The ground is level and horizontal.
- ❑ The hook block is placed on the ground.
- ❑ The hoist rope on the hook block is reeved out.
  (→ 10.4.10 Reeving the hook block out, p. 728)

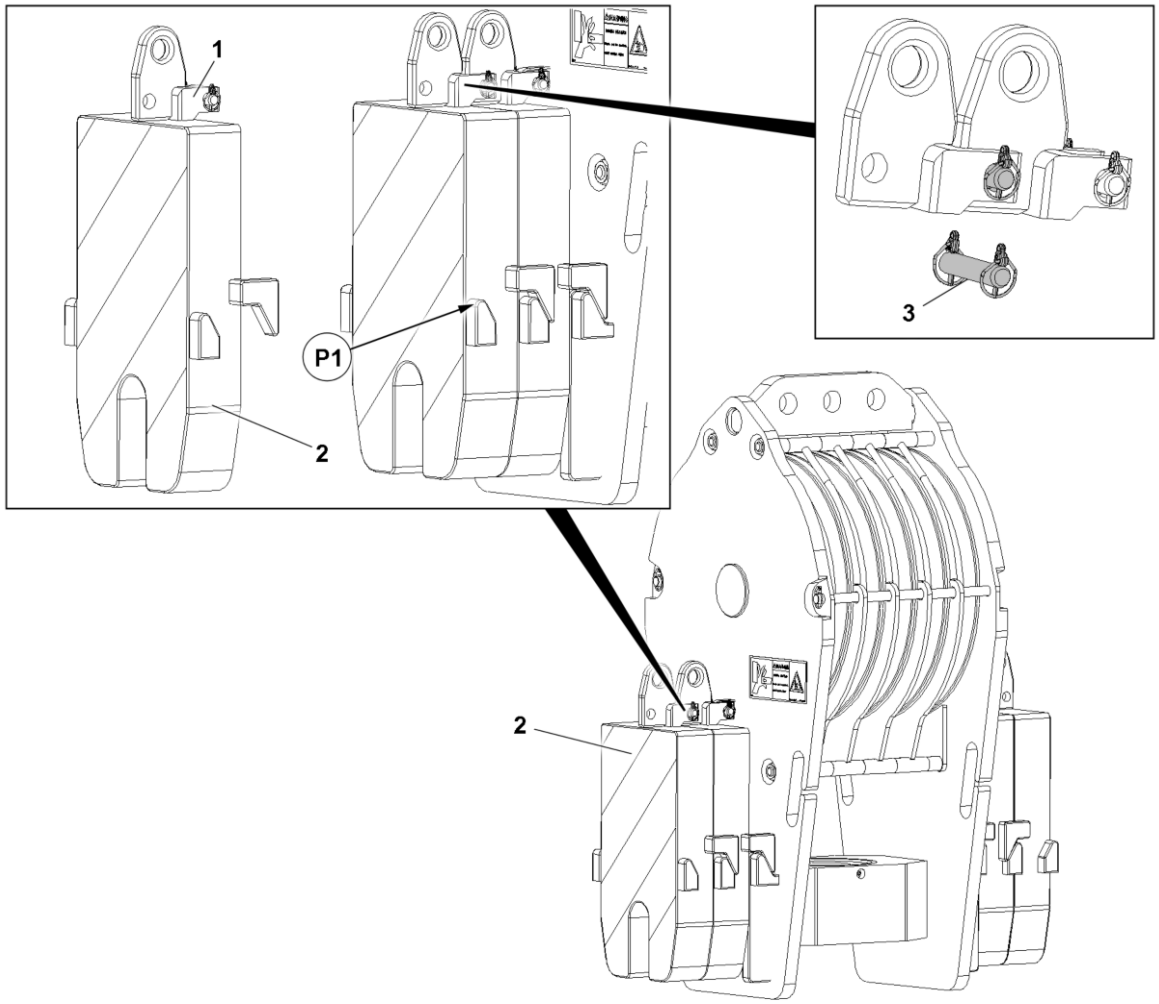


Fig. 1763: Exemplary illustration: Quick-change system auxiliary weights

1	Mounting brackets	**3**	Pin
2	Auxiliary weights	**P1**	Position

⚠ **Asymmetric disassembly of the auxiliary weights! The hook block can topple over!**

▶ Fasten the auxiliary crane to the auxiliary weight **2** (→ 7.5.4 Fastening the hook block auxiliary weights, p. 387).

▶ Tension the fastening equipment carefully.

WARNING
Multiple auxiliary weights released!
Auxiliary weights can fall down.

- ▶ Only release and unpin the outer auxiliary weight.
- ▶ **Never** release and unpin multiple auxiliary weights at the same time.

- ▶ Release the pin connection on the mounting brackets **1** of the outermost auxiliary weight **2** and remove the pin **3**.
- ▶ Lift the auxiliary weight **2** with the auxiliary crane from the hook block.
- ▶ Take the auxiliary weight **2** down.
- ▶ Disassemble the additional auxiliary weights **2** as described above.

10.4.7 Reeving the telescopic boom in

Make sure that the following prerequisites are met:
- ❑ The crane set up configuration is set in the *set up* menu.
  (→ 8.6 Setting up the crane, p. 412)
- ❑ The telescopic boom is telescoped in all the way.
- ❑ The telescopic boom is luffed to 0°.

10.4.7.1 Connecting the auxiliary reeving rope with the hoist rope

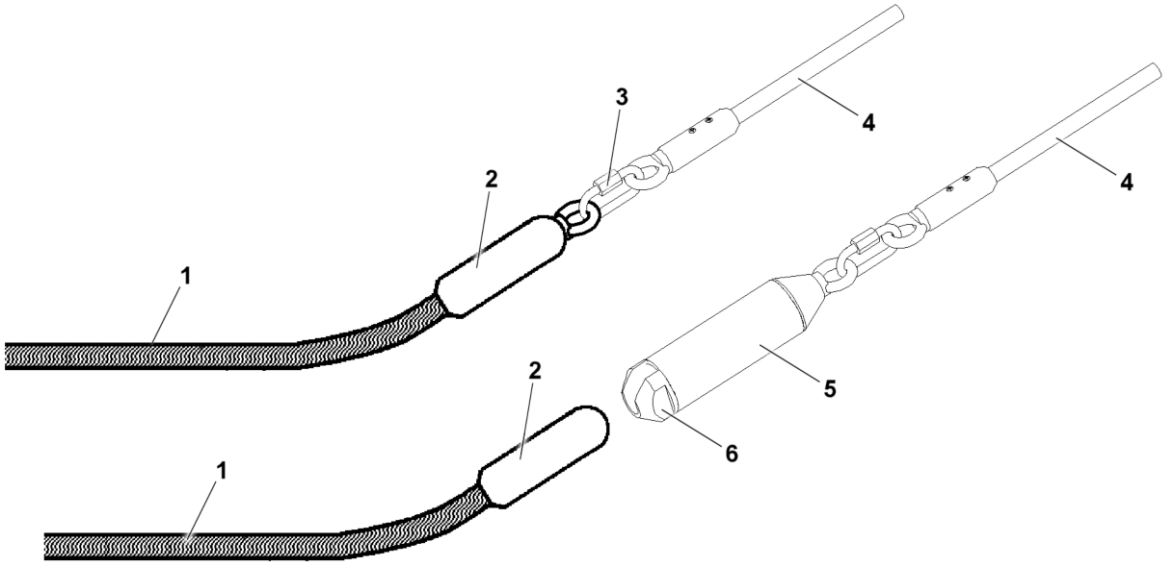


Fig. 1764: Connecting the auxiliary reeving rope with the hoist rope

1	Hoist rope	**4**	Auxiliary reeving rope
2	Rope end connection	**5**	Intake sleeve
3	Chain lock	**6**	Sleeve plug

If there is an eyehook on the rope connection **2**:
- ▶ Connect the auxiliary reeving rope **4** with the hoist rope **1**: Open the chain lock **3**, connect it with the eyehook of the rope end connection **2** and close the chain lock **3**.

or

If there is not an eyehook on the rope connection **2**:
Connect the auxiliary reeving rope **4** with the hoist rope **1**: Slide the intake sleeve **5** onto the rope end connection **2** and close off with the sleeve plug **6**.

10.4.7.2 Reeving the hoist rope in

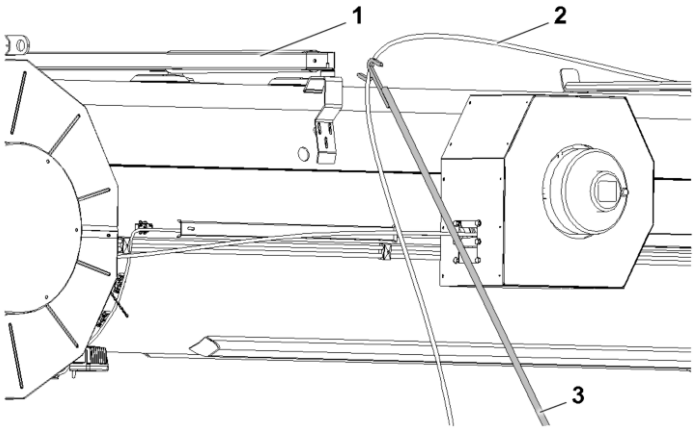


Fig. 1765: Guiding the auxiliary reeving rope with the hook rod

1 Hoist rope lug
2 Auxiliary reeving rope
3 Hook rod

▶ Throw the auxiliary reeving rope **2** to the front.

▶ Route the auxiliary reeving rope **2** with the hook rod **3** to the hoist rope lug **1**.

▶ Guide the auxiliary reeving rope **2** through below the hoist rope lug **1**.

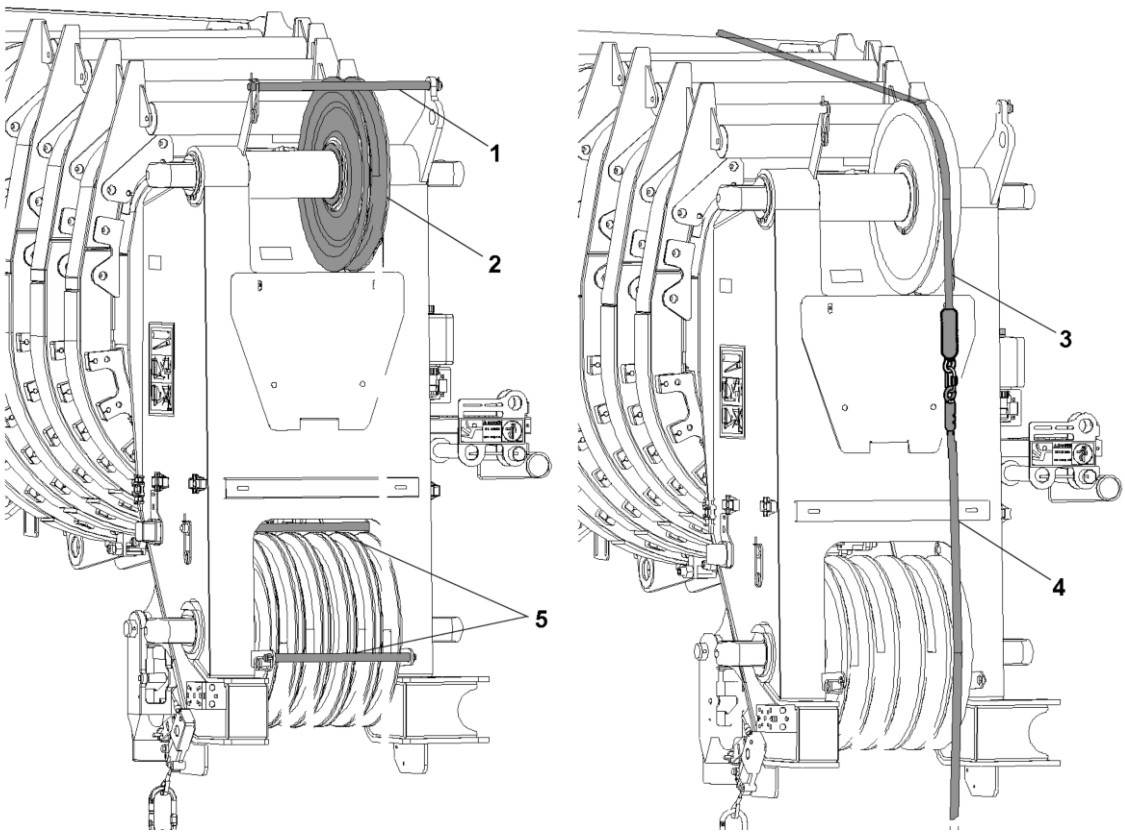


Fig. 1766: Reeving in the hoist rope with the auxiliary reeving rope

1 Rope retaining pipe
2 Rope pulley
3 Hoist rope
4 Auxiliary reeving rope
5 Rope retaining pipe

▶ Remove the rope retaining pipe **1** and rope retaining pipe **5** on the pulley head.

▶ Place the auxiliary reeving rope **4** over the rope pulley **2**.

Hoist rope tension too low! Slack rope formation!

▶ Spool out the winch slowly and pull the hoist rope **3** with the auxiliary reeving rope **4** over the rope pulley **2**.

▶ Remove the auxiliary reeving rope **4** from the hoist rope **3**.

▶ Reeve the hoist rope **3** in to the hook block (→ 10.4.9 Reeving the hook block in, p. 726).

▶ Pin and secure the rope retaining pipe **1** and the rope retaining pipe **5** on the pulley head.

10.4.8 Reeving the telescopic boom out

Make sure that the following prerequisites are met:
❑ The crane set up configuration is set in the *set up* menu.
(→ 8.6 Setting up the crane, p. 412)
❑ The telescopic boom is telescoped in all the way.
❑ The telescopic boom is luffed to 0°.

10.4.8.1 Connecting the auxiliary reeving rope with the hoist rope

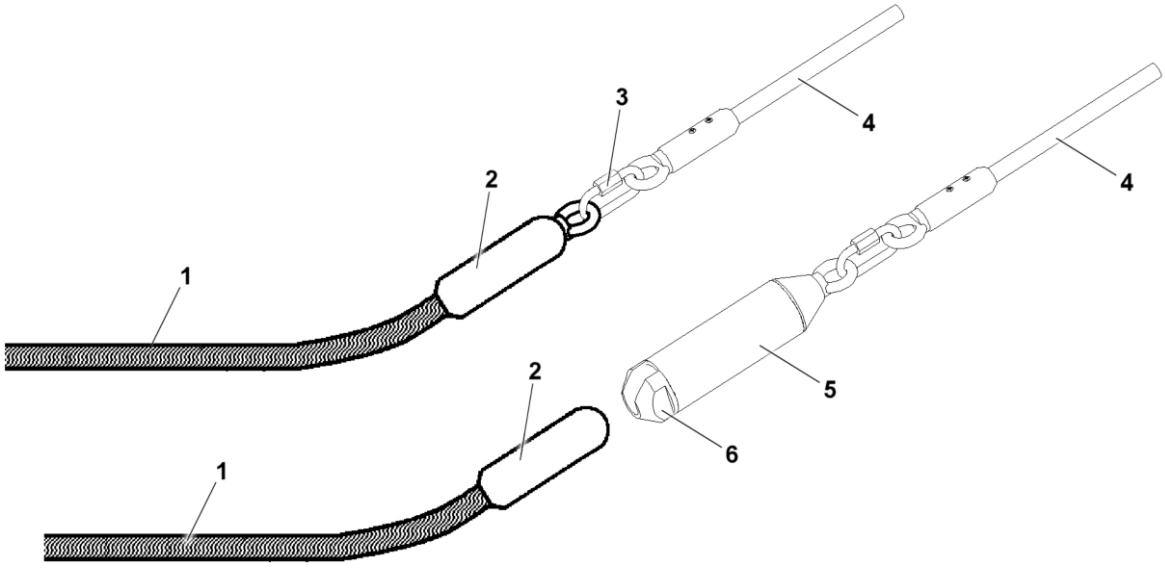


Fig. 1767: Connecting the auxiliary reeving rope with the hoist rope

1 Hoist rope
2 Rope end connection
3 Chain lock
4 Auxiliary reeving rope
5 Intake sleeve
6 Sleeve plug

If there is an eyehook on the rope connection **2**:
▶ Connect the auxiliary reeving rope **4** with the hoist rope **1**: Open the chain lock **3**, connect it with the eyehook of the rope end connection **2** and close the chain lock **3**.

or

If there is not an eyehook on the rope connection **2**:
Connect the auxiliary reeving rope **4** with the hoist rope **1**: Slide the intake sleeve **5** onto the rope end connection **2** and close off with the sleeve plug **6**.

10.4.8.2 Reeving the hoist rope out

Make sure that the following prerequisites are met:
❑ The hoist rope **3** is reeved out of the hook block.

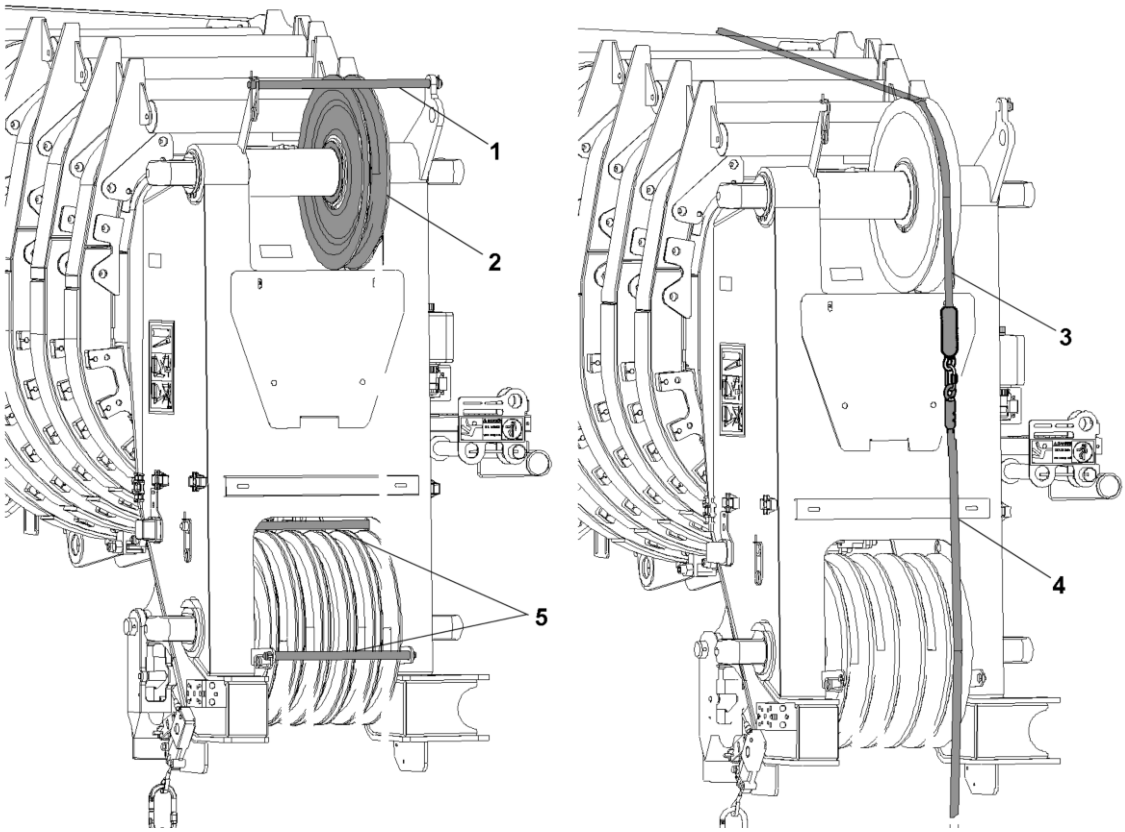


Fig. 1768: Reeving out the hoist rope with the auxiliary reeving rope

1 Rope retaining pipe
2 Rope pulley
3 Hoist rope
4 Auxiliary reeving rope
5 Rope retaining pipe

▶ Remove the rope retaining pipe **1** and rope retaining pipe **5** on the pulley head.

▶ Reeve the hoist rope **3** out on the hook block (→ 10.4.10 Reeving the hook block out, p. 728).

Hoist rope tension too low! Slack rope formation!

▶ Spool up the winch slowly and keep the hoist rope **3** tensioned with the auxiliary reeving rope **4**.

▶ If the hoist rope **3** is spooled up: Stop the winch movement.

▶ Pin and secure the rope retaining pipe **1** and the rope retaining pipe **5** on the pulley head.

▶ Remove the auxiliary reeving rope **4** from the hoist rope **3**.

▶ Fasten the hoist rope **3** to the winch.

10.4.9 Reeving the hook block in

Make sure that the following prerequisites are met:
❑ The hoist rope is reeved in on the telescopic boom.
(→ 10.8.6 Reeving the hoist rope in, p. 787)
❑ The rope lock is assembled.

(→ 10.4.15 Assembling the lock, p. 732)

- ❑ The required hook block is located below the boom head.
- ❑ The hook block is positioned securely on the ground.
- ❑ The telescopic boom is luffed down to 0°.
- ❑ An assistant is present to guide the hoist rope.

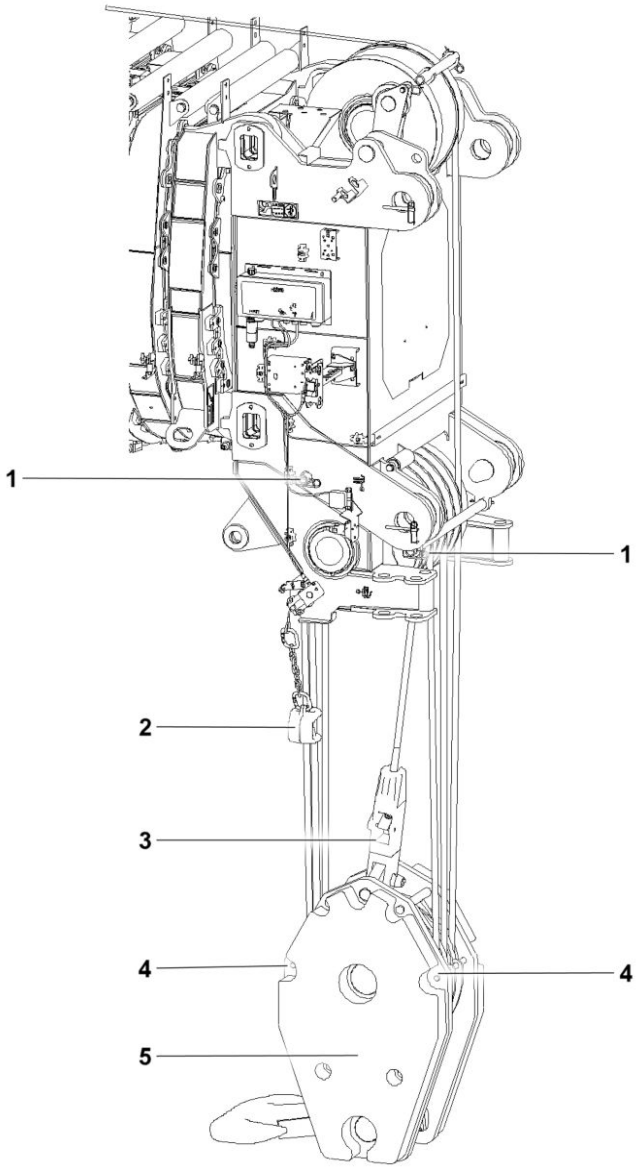


Fig. 1769: Exemplary illustration: Reeving the hook block in

1 Rope retaining pipes
2 Hoist limit switch weight
3 Lock
4 Rope retaining pipes
5 Hook block

▶ Release and unpin both rope retaining pipes **4** on the hook block **5**.

▶ Reeve the hook block **5** in according to the reeving plan (→ Separate document “Reeving plan”).

▶ Pin and secure the rope retaining pipes **4**.

▶ Connect the hoist rope to the lock **3** (→ 10.4.15 Assembling the lock, p. 732).

▶ Assemble the hoist limit switch weight **2** (→ 10.4.13 Assembling the hoist limit switch weight, p. 730).

10.4.10 Reeving the hook block out

Make sure that the following prerequisites are met:
- ❑ The crane set up configuration is set in the *set up* main menu. (→ 8.6 Setting up the crane, p. 412)
- ❑ The telescopic boom is telescoped in all the way.
- ❑ The telescopic boom has been swung to the rear or the side.
- ❑ The telescopic boom is luffed down to 0°.

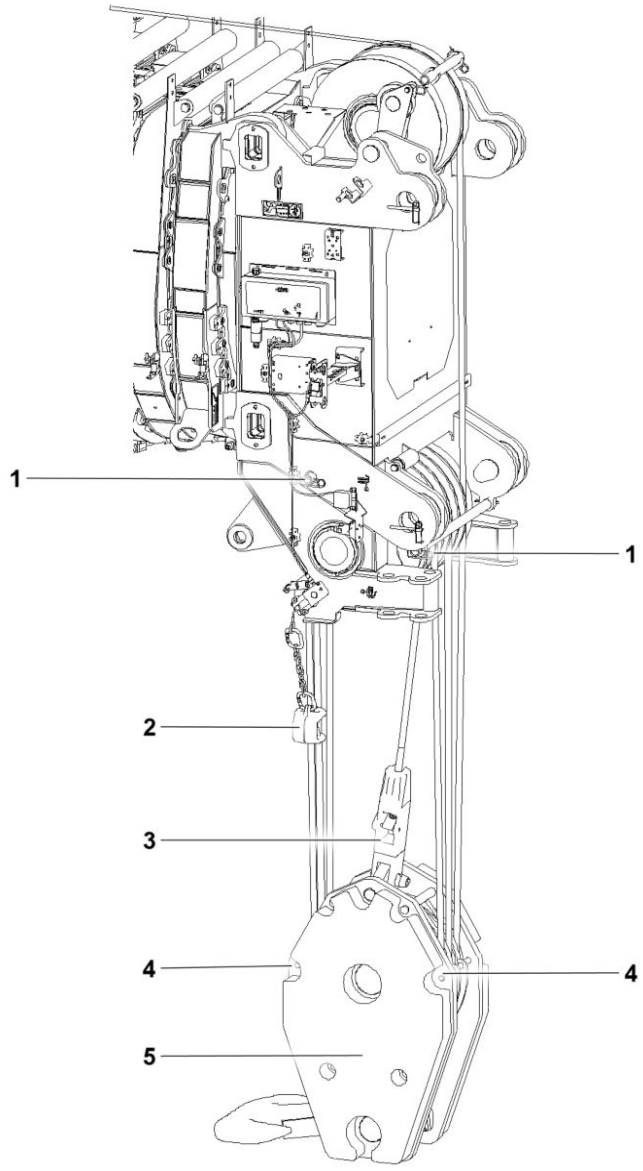


Fig. 1770: Exemplary illustration: Reeving the hook block out

1 Rope retaining pipes
2 Hoist limit switch weight
3 Rope lock
4 Rope retaining pipes
5 Hook block

▶ Lower the hook block **5** and place it on the ground.

▶ Disassemble the hoist limit switch weight **2** (→ 10.4.14 Disassembling the hoist limit switch weight, p. 732).

▶ Release and unpin the rope retaining pipes **1** on the pulley head.

- ▶ Release and unpin the rope retaining pipes **4** on the hook block **5**.
- ▶ Disconnect the hoist rope from the rope lock **3** (→ 10.4.16 Removing the lock, p. 735).
- ▶ Reeve out the hoist rope from the hook block **5**.
- ▶ Pin and secure the rope retaining pipes **1** and rope retaining pipes **4** again.

10.4.11 Assembling the load hook

Make sure that the following prerequisites are met:
- ❑ The hoist rope is reeved in on the boom head.
- ❑ The required load hook lies below the boom head.
- ❑ The telescopic boom is luffed down to 0°.
- ❑ An assistant is present to guide the hoist rope.

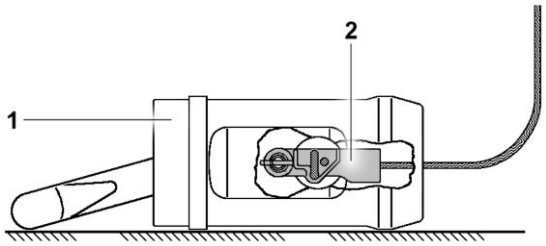


Fig. 1771: Assembling the load hook

1 Load hook **2** Rope lock

- ▶ Connect the hoist rope to the rope lock **2**.
- ▶ Pin and secure the rope lock **2** in the load hook **1**.
- ▶ Assemble the hoist limit switch weight (→ 10.4.13 Assembling the hoist limit switch weight, p. 730).

10.4.12 Disassembling the load hook

Make sure that the following prerequisites are met:
- ❑ The crane set up configuration is set in the *set up* menu. (→ 8.6 Setting up the crane, p. 412)
- ❑ The telescopic boom is telescoped in all the way.
- ❑ The telescopic boom is luffed down to the 0° position.

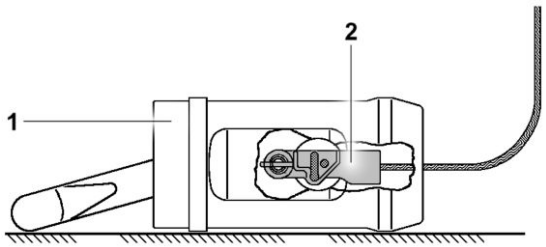


Fig. 1772: Assembling the load hook

1 Load hook **2** Rope lock

- ▶ Take the load hook **1** down on the ground.
- ▶ Disassemble the hoist limit switch weight (→ 10.4.14 Disassembling the hoist limit switch weight, p. 732).

▶ Disconnect the hoist rope from the rope lock **2**.

▶ Unpin and remove the rope lock **2** on the load hook **1**.

10.4.13 Assembling the hoist limit switch weight

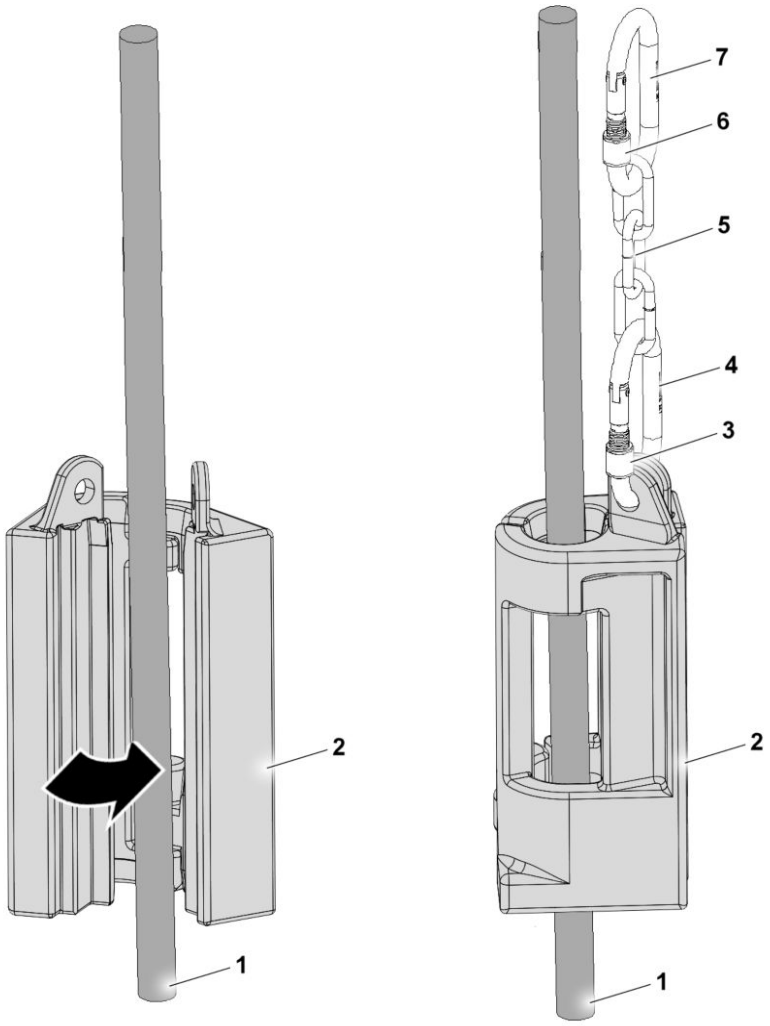


Fig. 1773: Assembling the hoist limit switch weight

1 Hoist rope
2 Hoist limit switch weight
3 Knurled nut
4 Lower carabiner
5 Chain
6 Knurled nut
7 Upper carabiner

WARNING
Impermissible parts installed!
The hook block or load hook can collide with the pulley head.

▶ Only use original parts.

The following parts are required:
- Hoist limit switch weight **2**
- Lower carabiner **4**
- Chain **5**
- Upper carabiner **7**

WARNING
Hoist limit switch chain shortened!
The hook block or load hook can collide with the pulley head.

▶ Do **not** shorten the hoist limit switch chain.

WARNING
The hoist limit switch weight is improperly assembled!
The hoist limit switch weight can fall down.

▶ Makes sure that the hoist limit switch weight, carabiner and chain do **not** scrape against the hoist rope after assembly.

▶ Assemble the knurled nut closing downward.

▶ Connect the chain **5** with the upper carabiner **7** to the hoist limit switch.

▶ Secure the upper carabiner **7** with the knurled nut **6**.

The attachment of the hoist limit switch weight **2** depends on the position of the rope fixed point.

Rope fixed point on the pulley head:
– In the event of multiple hoist rope reeving, the hoist limit switch weight **2** must always be laid around the “stationary rope strand”, in other words around the rope strand that leads directly to the rope lock.

Rope fixed point on the hook block:
– The hoist limit switch weight **2** is laid around the outer strand that has the least angular pull, i.e. the one with the smallest angle between the connected hoist limit switch weight **2** and the hoist rope **1**.

▶ Place the hoist limit switch weight **2** around the hoist rope **1**.

▶ Close the hoist limit switch weight **2**.

▶ Connect the chain **5** to the lower carabiner **4** on the hoist limit switch weight **2**.

▶ Secure the lower carabiner **4** with the knurled nut **3**.
▷ The hoist limit switch weight **2** is assembled and secured.

10.4.14 Disassembling the hoist limit switch weight

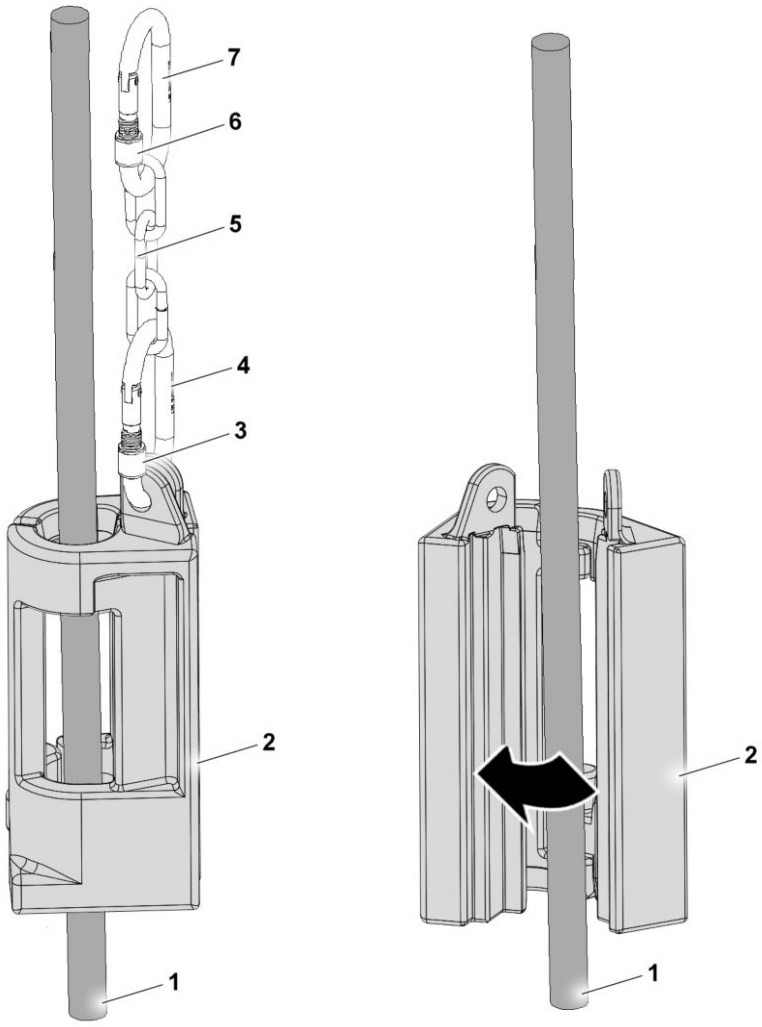


Fig. 1774: Disassembling the hoist limit switch weight

1 Hoist rope
2 Hoist limit switch weight
3 Knurled nut
4 Lower carabiner
5 Chain
6 Knurled nut
7 Upper carabiner

▶ Release and unscrew the knurled nut **3** on the lower carabiner **4**.

▶ Hold the hoist limit switch weight **2** with one hand and with the other hand, disconnect the lower carabiner **4** on the hoist limit switch weight **2**.

▶ Remove the chain **5** with the upper carabiner **7** on the hoist limit switch.

▶ Store the hoist limit switch weight **2**, chain **5** with the upper carabiner **7** and lower carabiner **4** safely.

10.4.15 Assembling the lock

The lock can be fastened to the following components depending on the reeving and utilized equipment:
- Hook block or load hook
- Telescopic boom
- Auxiliary boom*

10.4.15.1 Pinning the lock

Note

This also applies when using a wedge lock.

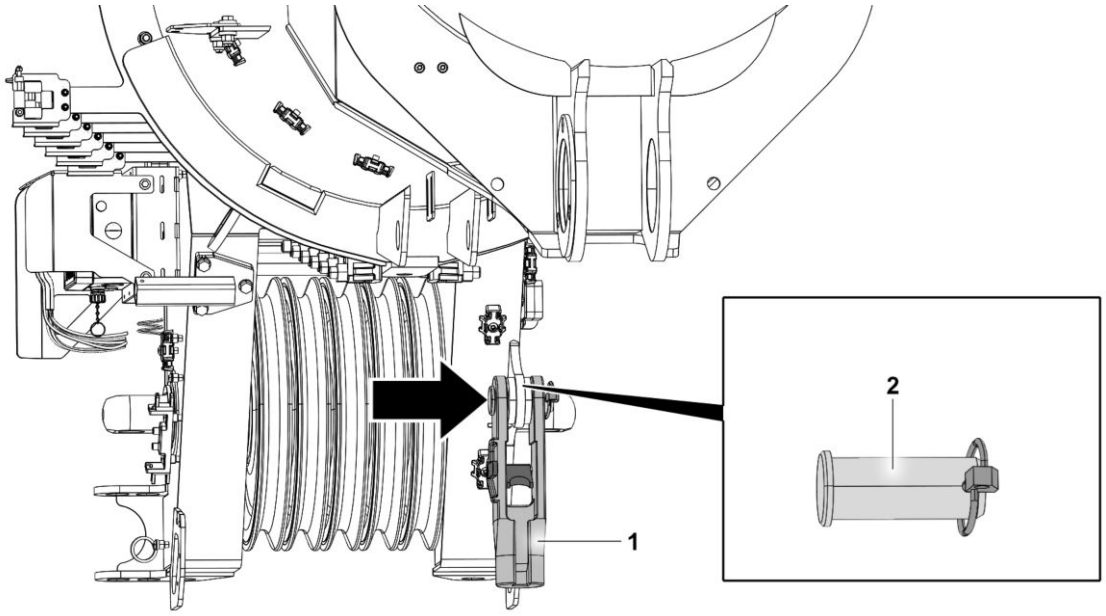


Fig. 1775: Exemplary illustration: Pinning the lock

1 Lock **2** Pin

NOTICE
Lock installed incorrectly!
Damage to the hoist rope.

When the lock is fastened to the pulley head:
▶ Insert the pin from the “inside to the outside” and secure from the outside.

When the lock is fastened to the hook block:
▶ Select the rope fixed point: The last strand runs as parallel as possible to the remaining rope strands.

▶ Attach the lock **1** in the corresponding position.

▶ Insert and secure the pin **2**.

10.4.15.2 Connecting the hoist rope

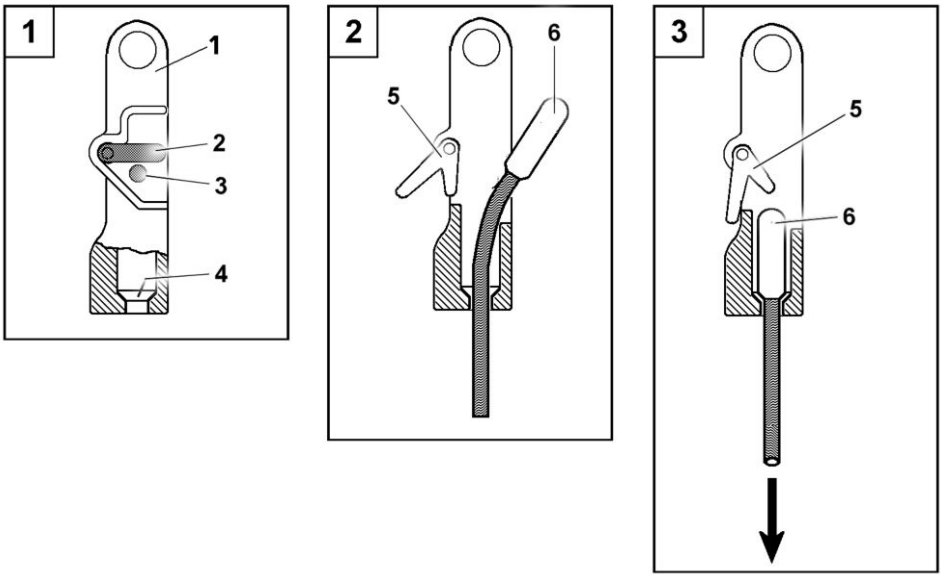


Fig. 1776: Connecting the hoist rope in the lock

1	Lock	**4**	Cone
2	Lever	**5**	Locking pawl
3	Retaining element pin	**6**	Rope end connection

- ▶ Press the retaining element pin **3** in on the lock **1**.
- ▶ Swing the lever **2** down and hold it in this position.
  - ▷ The locking pawl **5** is swung down.
- ▶ Until the rope end connection **6** is lying on the cone **4**: Connect the rope end with the rope end connection **6** in the rope lock **1** and pull down firmly (in direction of the arrow).
- ▶ Release the lever **2**.
  - ▷ The lever **2** returns to the initial position and is locked by the retaining element pin **3**.
- ▶ Check the rope retainer: Perform a visual inspection.
- ▶ Assemble the hoist limit switch weight (→ 10.4.13 Assembling the hoist limit switch weight, p. 730).

10.4.16 Removing the lock

10.4.16.1 Unpinning the lock

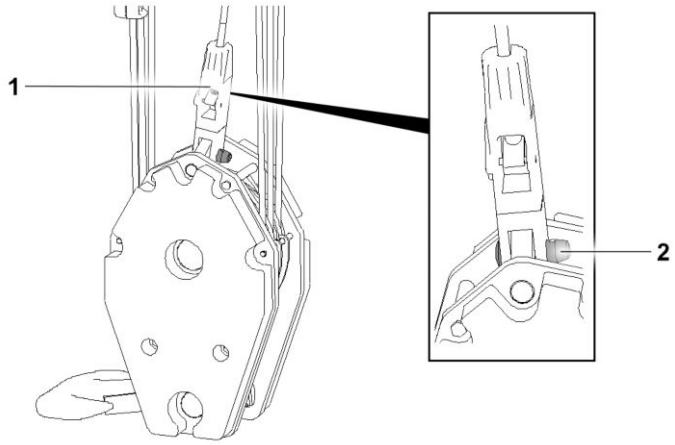


Fig. 1777: Exemplary illustration: Unpinning the lock

1 Lock **2** Pin

▶ Release and unpin the pin **2**.

▶ Remove the lock **1** in the corresponding position.

10.4.16.2 Disconnecting the hoist rope

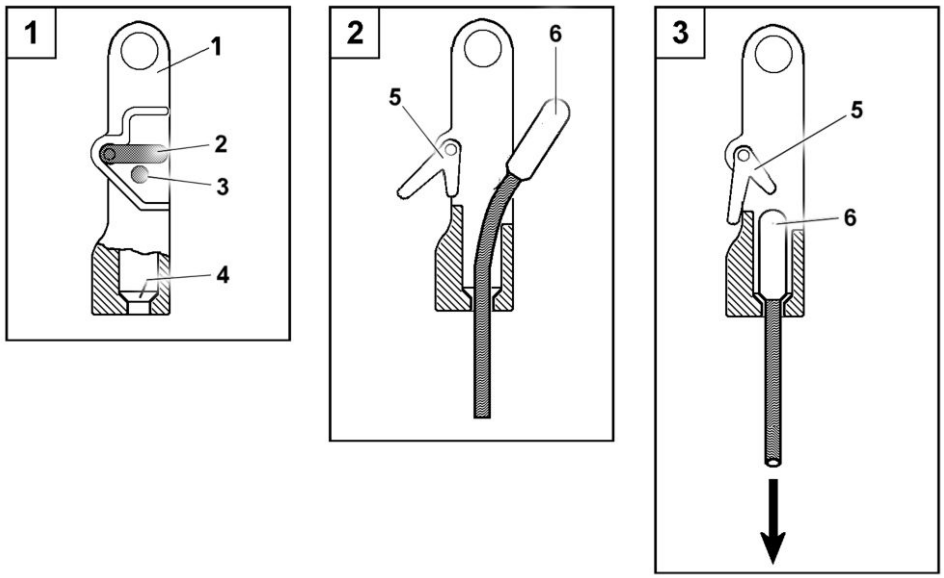


Fig. 1778: Disconnecting the hoist rope in the lock

1 Lock
2 Lever
3 Retaining element pin
4 Cone
5 Locking pawl
6 Rope end connection

▶ Press the retaining element pin **3** in on the lock **1**.

▶ Swing the lever **2** down and hold it in this position.
▷ The locking pawl **4** is swung down.

▶ Push the hoist rope up and detach the rope end connection **6**.

10.4.17 Assembling and disassembling the wedge lock

10.4.17.1 Description of the wedge lock

If the hoist rope end must be shortened due to damage, the supplied wedge lock can be used for further operation.

The wedge lock must be released by Liebherr-Werk Ehingen GmbH for use on the corresponding rope type.

When using a wedge lock in connection with rotation-resistant hoist ropes, there are some positive characteristics of the lock that they do not have, which can lead to a reduced service life of the rope.

10.4.17.2 Safety

⚠ **This section supplements the “Safety” chapter.**

Assembling and disassembling the wedge lock safely

Have the wedge lock assembled and disassembled only by authorized and trained expert personnel.

Wedge lock with a bore for a clamp

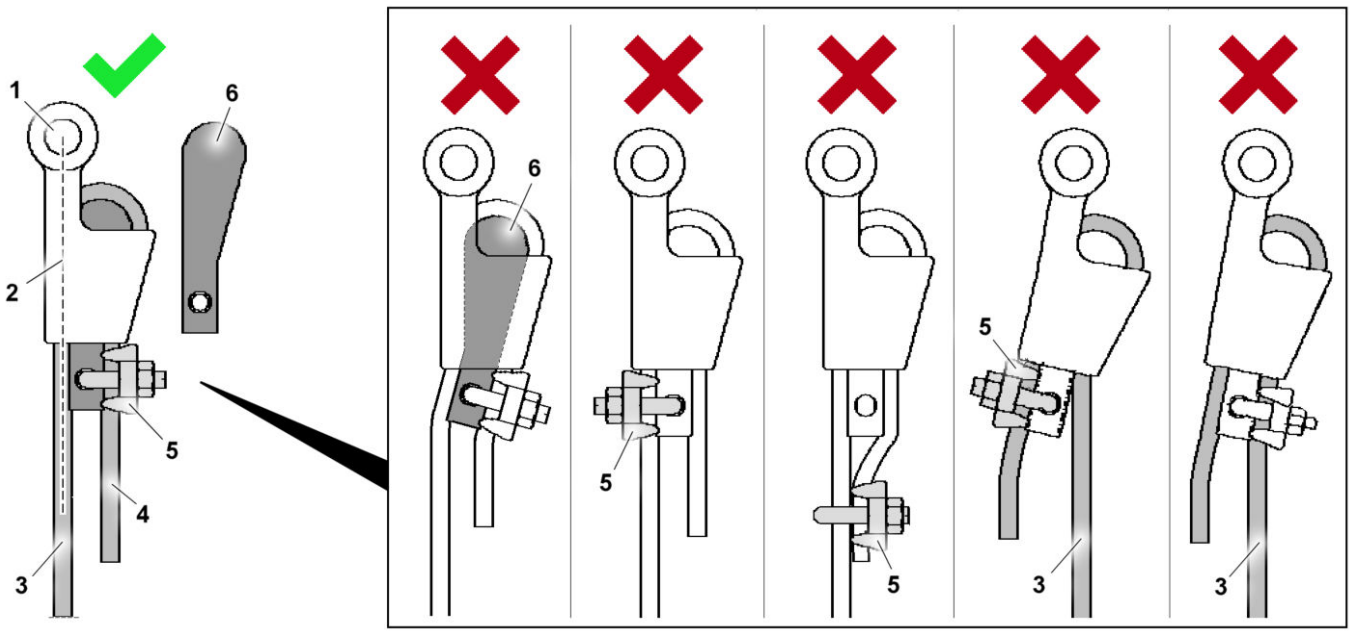


Fig. 1780: Correct assembly: Wedge lock with a bore for a clamp

1 Pin bore
2 Pull axle
3 Rope strand, load bearing
4 Dead rope end
5 Clamp
6 Wedge

Observe the following rules:
- Assemble the wedge **6** and clamp **5** in the correct position (see the illustration).
- Assemble the clamp **5** with the correct tightening torque (→ tab. 102, p. 737).
- Make sure that the load bearing rope strand **3** runs in the pull axle **2** of the wedge lock.
- The threads and support surfaces of the clamp are clean, rust-free, dry and free of lubricants.
- Do **not** clamp the wedge lock to an annealing separated area or a trimming of the hoist rope.
- Observe the nominal dimensions during assembly.

Diameter Hoist rope	Nominal size Clamp	Tightening torque Clamp
9 mm to 10 mm	⅜	61 Nm
11 mm to 13 mm	½	88 Nm
14 mm to 16 mm	⅝	129 Nm
18 mm to 19 mm	¾	176 Nm
20 mm to 22 mm	⅞	305 Nm
24 mm to 26 mm	1	305 Nm
28 mm	1⅛	305 Nm

Tab. 102: Wedge lock with a bore for a clamp

Wedge lock without a bore for a clamp

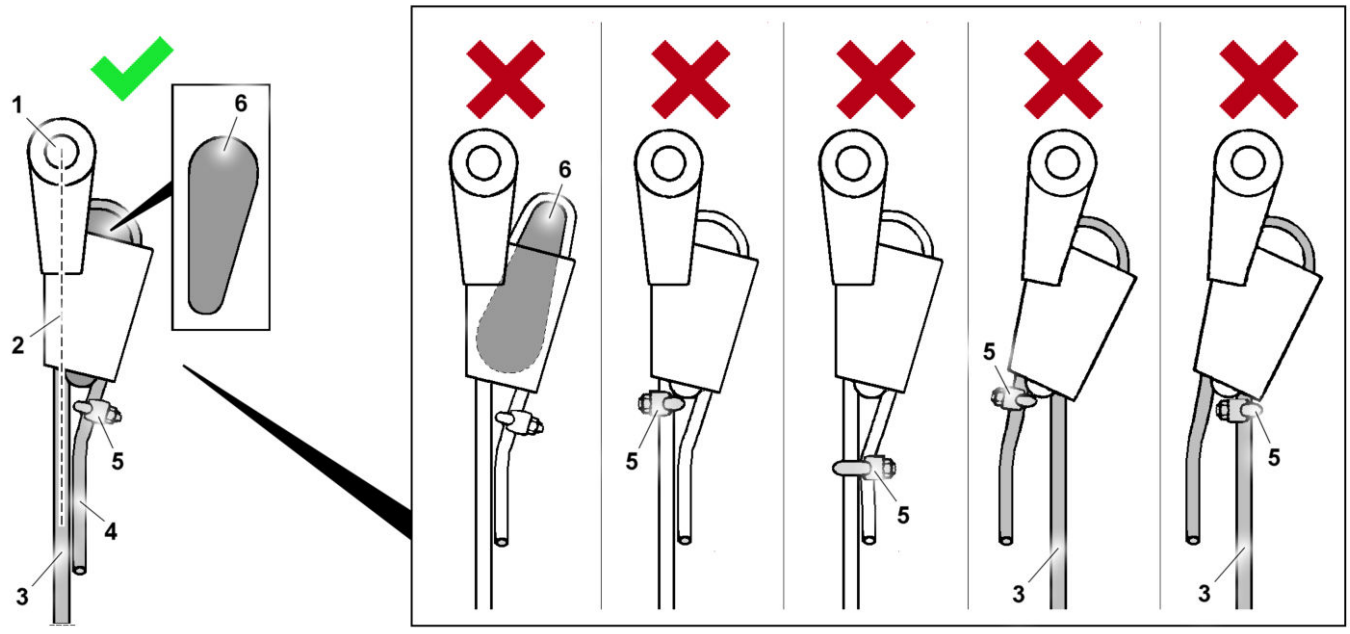


Fig. 1781: Correct assembly: Wedge lock without a bore for a clamp

1 Pin bore
2 Pull axle
3 Rope strand, load bearing
4 Dead rope end
5 Clamp
6 Wedge

Observe the following rules:
- Assemble the wedge **6** and clamp **5** in the correct position (see the illustration).
- Assemble the clamp **5** with the correct tightening torque (→ tab. 103, p. 738).
- Make sure that the load bearing rope strand **3** runs in the pull axle **2** of the wedge lock.

- The threads and support surfaces of the clamp are clean, rust-free, dry and free of lubricants.
- Do **not** clamp the wedge lock to an annealing separated area or a trimming of the hoist rope.
- Observe the nominal dimensions during assembly.

Nominal size Wedge lock / wedge	Nominal size Clamp	Tightening torque Clamp
8/7	8	6 Nm
8/8	8	6 Nm
10/9	10	9 Nm
10/10	10	9 Nm
13/11	12	20 Nm
13/12	12	20 Nm
13/13	14	33 Nm
17/13	14	33 Nm
17/15	16	49 Nm
17/17	16	49 Nm
19/16	16	49 Nm
19/18	19	68 Nm
23/19	19	68 Nm
23/21	22	107 Nm
26/23	26	147 Nm
26/25	26	147 Nm
29/27	30	212 Nm
33/30	30	212 Nm
33/32	34	296 Nm

Tab. 103: Wedge lock without a bore for a clamp

Danger of collision of the rope lock with the hoist limit switch weight

If the hoist limit switch weight is fit on the same rope strand as the rope lock, a collision can occur and the wedge lock can release.

Observe the following rules:
- Make sure that the wedge lock does **not** run on the hoist limit switch weight.
- If possible: Do **not** assemble the hoist limit switch weight on the same rope strand as the wedge lock.

Damage to the hoist rope after using a wedge lock

The area of the hoist rope that is used for assembly of the wedge lock is damaged after disassembly of the wedge lock.

Observe the following rules:
- The hoist rope must be shortened after every disassembly of the wedge lock.
- In the case of fixed hoist rope lengths, pay attention to further usability after shorting.
- The use of the wedge lock is considered a special case and should **not** take place too often.

– For a proper rope repair with a suitable end connection: Contact Customer Service at Liebherr-Werk Ehingen GmbH.

Failure of the rope end connection

If a wedge lock is used instead of an L-shaped lock, the rope end connection can fail. The load can fall down.

Observe the following rules:
– Do **not** use a wedge lock to replace an L-shaped lock.
– Select a reeving that does **not** require the wedge lock to be installed in a fixed point for which an L-shaped lock is required.

Safe operation with the wedge lock

There may be danger when using the wedge lock in the following cases:
– Falling loads, shock loads and exceeding the permissible load.
– Damage to the wedge lock.
– Side load and angular pull.
– The hoist rope, wedge or pinning is **not** positioned correctly.
– The position and tightening torque of the clip are **not** correct.
– Loss of tensile strength.

If the following rules are not observed the end connection can fail.

Observe the following rules:
– Check all wedge lock components at regular intervals for high loads and loss of tensile strength. At least once a month.
– Avoid side load and angular pull.
– Make sure that there are no falling loads or shock loads.
– Do **not** exceed the permissible load.

10.4.17.3 Assembling the wedge lock

Make sure that the following prerequisites are met:
❑ A wedge lock (housing, wedge and clamp) suitable for the hoist rope is available.
❑ The end connection of the hoist rope is cut off properly.
❑ The hoist rope and wedge lock do **not** have any damage or dirt in the clamping area.
❑ The hoist rope is reeved in according to the reeving plan.
(→ 10.4.4 Use of reeving plans, p. 718)

Assemble the hoist rope on the wedge lock

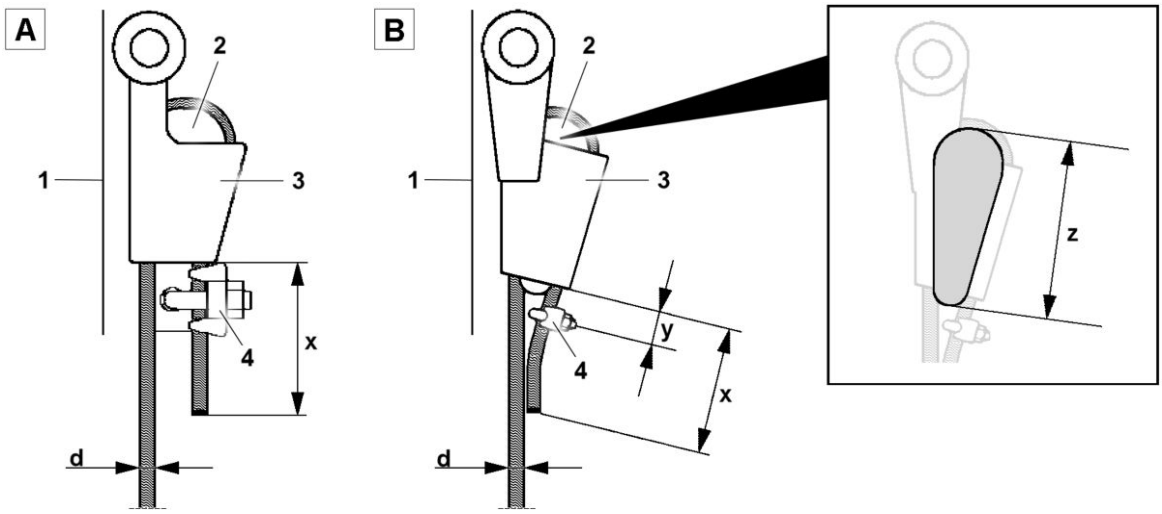


Fig. 1782: Wedge locks

A	Wedge lock with a bore for a clamp	**4**	Clip
B	Wedge lock without a bore for a clamp	**d**	Rope diameter
1	Wedge lock	**x**	Dead rope end length
2	Wedge	**y**	Distance
3	Housing	**z**	Wedge length

After engaging the hoist rope in the wedge lock **1**, the length of the dead rope end **x** must be 20 times the rope diameter **d**. The long dead rope end **x** may however **not** be shorter than 150 mm.

The dead rope end must be secured against lashing out during assembly.

▶ Insert the hoist rope with the wedge **2** in the housing **3**.

Note

If necessary, the hoist rope and wedge can be inserted deeper into the housing by striking them carefully with a rubber hammer.

When using a wedge lock without a bore: The distance **y** must be 2 times the rope diameter **d**. The distance **y** may however **not** exceed 75 of the wedge length **z**.

When a wedge lock with a bore is used:
▶ Assemble the clip **4** through the bore in the wedge **2** on the dead rope end.
or

When a wedge lock without a bore is used:
Assemble the clip **4** at the specified distance **y** on the dead rope end.

Troubleshooting

Is the thread length of the clamp **not** sufficient?

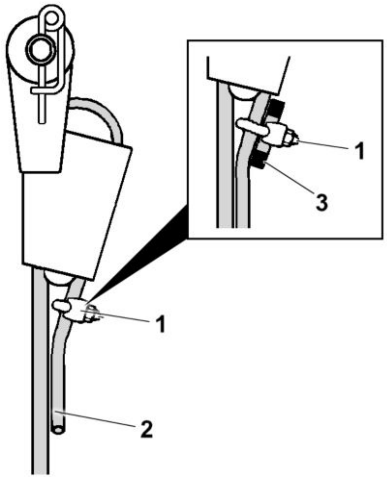


Fig. 1783: Inserting the short rope section

1 Clip
2 Dead rope end
3 Rope section

▶ Place a short, intact rope section **3** with tied ends parallel to the dead rope end **2** and assemble them together with the clamp **1**.

Pinning the wedge lock

The wedge lock can be fastened to the following components depending on the reeving and utilized equipment:
- Hook block or load hook
- Telescopic boom
- Auxiliary boom*

NOTICE
Wedge lock assembled incorrectly!
Damage to the hoist rope.

When the wedge lock is fastened to the pulley head:
▶ Insert the pin from the “inside to the outside” and secure from the outside.

If the wedge lock is fastened to the hook block:
▶ Select the rope fixed point: The last strand runs as parallel as possible to the remaining rope strands.

▶ Pin and secure the wedge lock in the corresponding position.

Troubleshooting

Does the pin point of the wedge lock **not** fit in the fixed point of the crane?

▶ Use the supplied adapter (→ Assembling the adapter on the wedge lock, p. 743).

Fastening the tie and marking

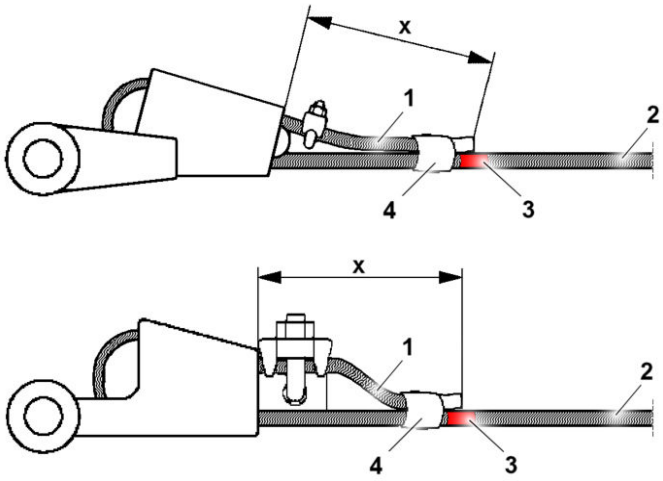


Fig. 1784: Fastening the tie and marking

1 Dead rope end
2 Rope strand, load bearing
3 Color marking
4 Tie
x Dead rope end length

▶ Also secure the dead rope end **1** with a soft tie **4** with tape or a soft binding wire.

▶ Permanently and clearly mark the dead rope end length **x**: Apply the color marking **3** on the load bearing rope strand **2** at the same height.

Note
Use a well-visible signal color for the color marking **3**.

▶ Use the color marking **3** to control the length of the dead rope end **x**.

10.4.17.4 Assembling the adapter on the wedge lock

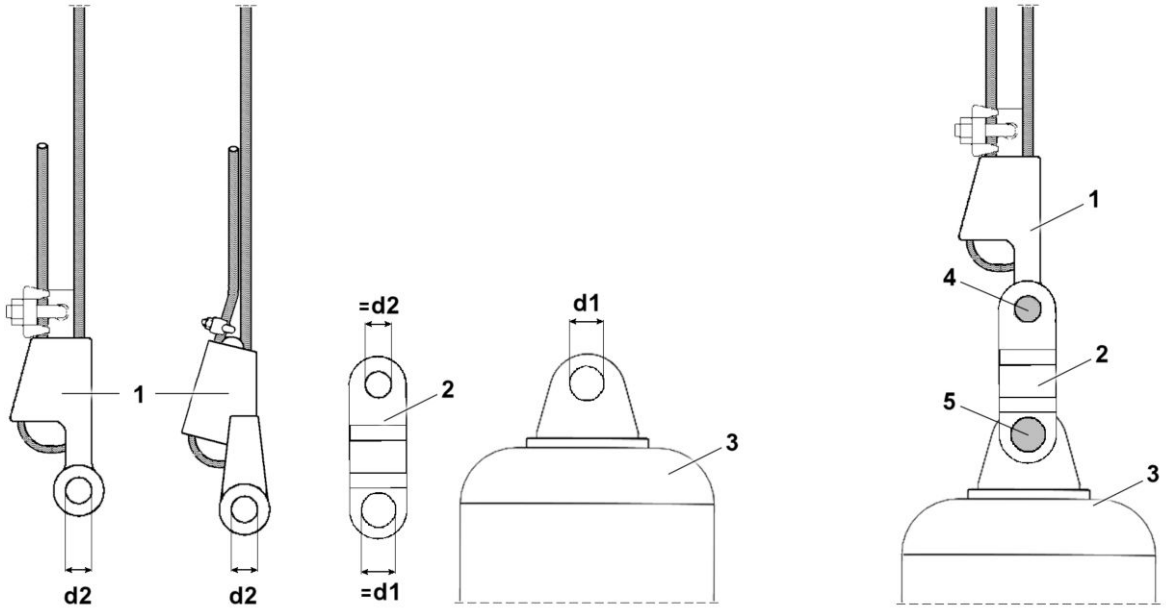


Fig. 1785: Exemplary illustration: Assembling the wedge lock with the adapter to the load hook

1 Wedge lock
2 Adapter
3 Fixed point (on the load hook for example)
4 Pin (wedge lock)
5 Pin (lock)
d1 Fixed point diameter
d2 Wedge lock diameter
=d1 Fixed point side diameter
=d2 Wedge lock side diameter

If the wedge lock diameter **d2** does **not** match the fixed point diameter **d1** on the crane or the hook block / load hook, an adapter **2** must be used.

Note

The fixed point for the wedge lock can be on the pulley head, hook block or load hook.

Make sure that the following prerequisites are met:
- ❑ The hoist rope is assembled properly on the wedge lock **1**.
  (→ Assembling the wedge lock, p. 739)
- ❑ The fixed point diameter **d1** and wedge lock diameter **d2** do **not** match.

For the adapter **2**, the pin **5** and retaining element of the non-used lock are required.

▶ Pin and secure the adapter **2** with the wedge lock **1** and fixed point **3**.

10.4.17.5 Disassembling the adapter on the wedge lock

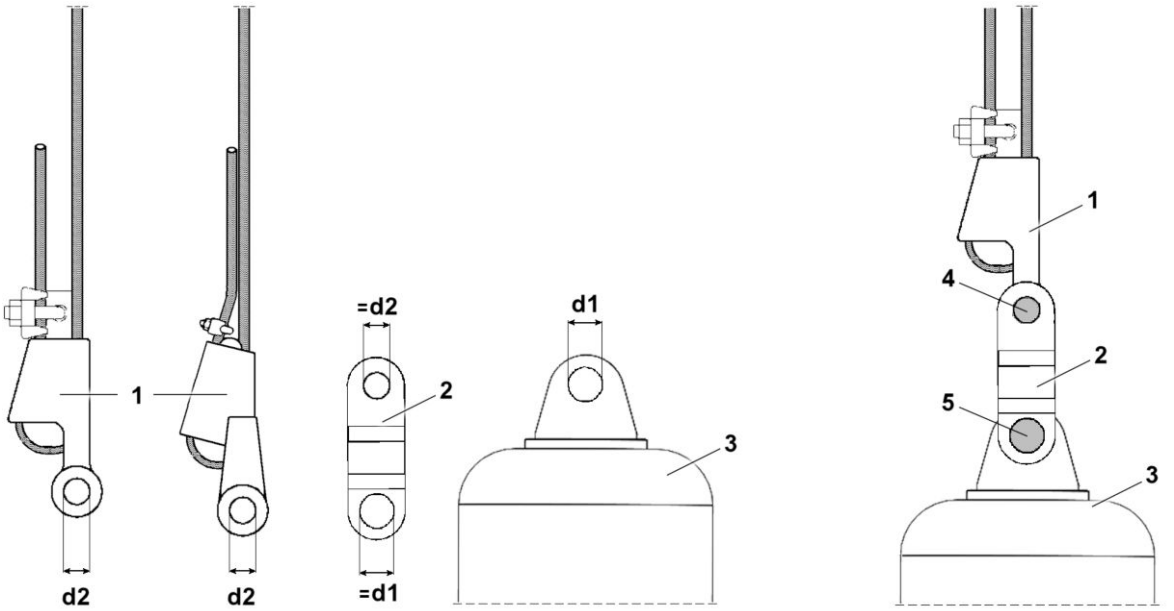


Fig. 1786: Exemplary illustration: Disassembling the wedge lock with the adapter on the load hook

1 Wedge lock
2 Adapter
3 Fixed point (on the load hook as an example)
4 Pin (wedge lock)
5 Pin (lock)

d1 Fixed point diameter
d2 Wedge lock diameter
=d1 Fixed point side diameter
=d2 Wedge lock side diameter

▶ Release and unpin the adapter **2** from the wedge lock **1** and fixed point **3**.

▶ Store the pin **5** and retaining element of the lock together with the lock.

10.4.17.6 Before start up

Make sure that the following prerequisites are met:
❑ The rope is assembled properly to the wedge lock.
(→ Assembling the wedge lock, p. 739)
❑ The wedge lock is pinned in a permissible fixed point.
(→ Assembling the adapter on the wedge lock, p. 743)

WARNING
Wedge lock assembled improperly or incompletely!
The end connection can loosen up.

If the wedge lock is loaded for the first time:
▶ Monitor the load test from a safe position.

▶ Load the wedge lock under supervision with 10 % of the minimum tensile strength of the rope.

▶ Wait a 2 minute setting time.

▶ Make sure after the setting time that there is no relative movement between the wedge and the rope.
▷ Crane operation can be carried out.

10.4.17.7 Disassembling the wedge lock

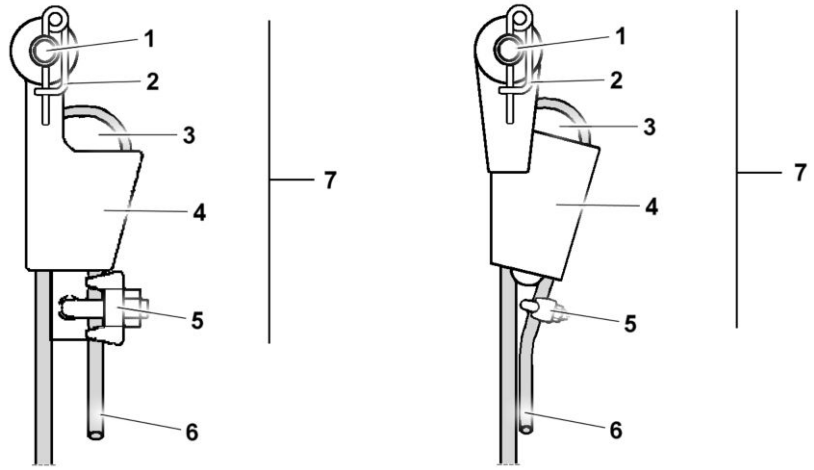


Fig. 1787: Exemplary illustration: Disassembling the wedge lock

1 Pin
2 Retaining element
3 Wedge
4 Housing
5 Clip
6 Dead rope end
7 Wedge lock

▶ Unpin the wedge lock **7** in the fixed point.

The dead rope end **6** must be secured against lashing out during disassembly.

▶ Disassemble the clip **5**. Pull the rope together with the wedge **3** out of the housing **4**.

▶ Check the wedge lock **7** for wear and damage. In the case of damage, do **not** continue use and replace immediately.

WARNING
Clamped hoist rope used again!
The end connection can fail.

When the wedge lock is disassembled:
▶ Completely cut off the clamped area.

▶ Secure the hoist rope to prevent it from falling.

If the hoist rope is secured to prevent it from untwisting:
▶ Completely cut off the clamped area of the hoist rope.

10.5 Auxiliary pulley*

10.5.1 Assembling the auxiliary pulley

Make sure that the following prerequisites are met:
- ❑ The pivot section floodlight* is disassembled.
- ❑ The telescopic boom is telescoped in all the way.
  (→ Automatic telescoping from the crane cab, p. 551)
- ❑ The telescopic boom is luffed down to 0°.
  (→ Luffing the telescopic boom from the crane cab, p. 533)
- ❑ A suitable aid for lifting the auxiliary pulley is available.

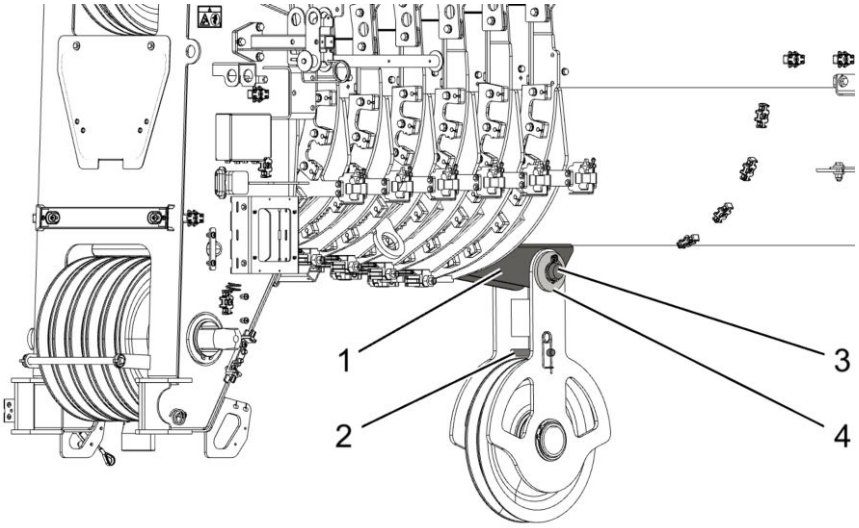


Fig. 1788: Exemplary illustration: Auxiliary pulley on the telescopic boom

1	Receptacle for the auxiliary pulley	**3**	Pin
2	Rope retaining pin	**4**	Washer

The auxiliary pulley is assembled on the telescopic boom with a pin **3** and a washer **4**.

▶ Pin and secure the auxiliary pulley with the support **1**.

▶ Place the hook block on the ground between the auxiliary pulley and the pulley head.

▶ Release and unpin the rope retaining pin **2** on the auxiliary pulley, pulley head and hook block.

NOTICE
Hoist limit switch chain too short!
Components can be damaged.

If crane operation is carried out with the auxiliary pulley:
▶ Use a longer hoist limit switch chain.

▶ Reeve the hook block in (→ 10.4.9 Reeving the hook block in, p. 726).

▶ Insert and secure the rope retaining pin **2** on the auxiliary pulley, pulley head and hook block.

10.5.2 Disassembling the auxiliary pulley

Make sure that the following prerequisites are met:
- ❑ The telescopic boom is telescoped in all the way.

(→ Automatic telescoping from the crane cab, p. 551)

- ❑ The hook block is placed on the ground between the auxiliary pulley and the pulley head.
- ❑ The telescopic boom is luffed down to 0°.
  (→ Luffing the telescopic boom from the crane cab, p. 533)
- ❑ A suitable aid for lifting the auxiliary pulley is available.

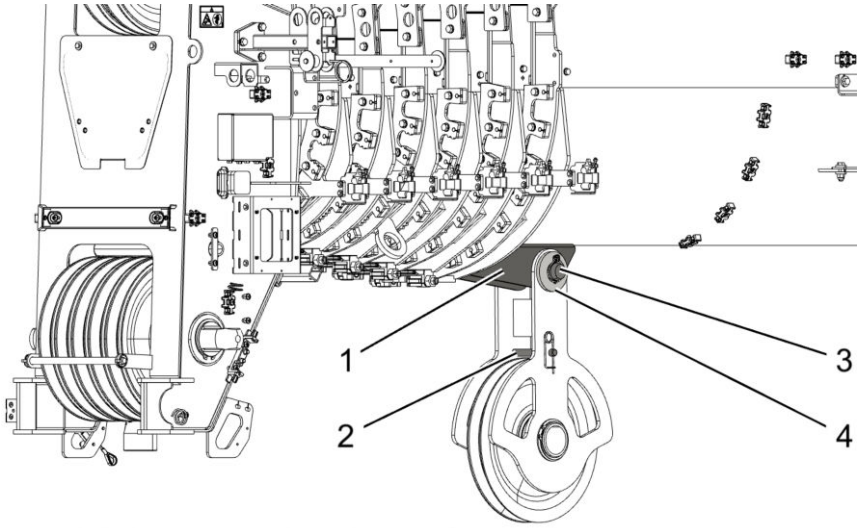


Fig. 1789: Exemplary illustration: Auxiliary pulley on the telescopic boom

1	Receptacle for the auxiliary pulley	**3**	Pin
2	Rope retaining pin	**4**	Washer

- ▶ Release and unpin the rope retaining pin **2** on the auxiliary pulley, pulley head and hook block.
- ▶ Reeve the hook block out (→ 10.4.10 Reeving the hook block out, p. 728).
- ▶ Pin and secure the rope retaining pin **2** on the auxiliary pulley.
- ▶ Unpin the auxiliary pulley: Secure the auxiliary pulley from falling down, release and unpin the pin **3**.

10.6 Central ballast

10.6.1 Assembling the central ballast

Note

The central ballast can be assembled before or after the crawler carriers.

Make sure that the following prerequisites are met:
- ❑ For assembly on crawler carriers: The crawler travel gear is set on the wide track width (4.9 m).
  (→ 8.14 Crawler travel gear track width adjustment, p. 502)
- ❑ For assembly on the assembly support: The crawler center section is leveled.
  (→ 10.2.3 Extending the support cylinders, p. 695)
- ❑ The crane set up configuration and settings in the *set up* menu match.

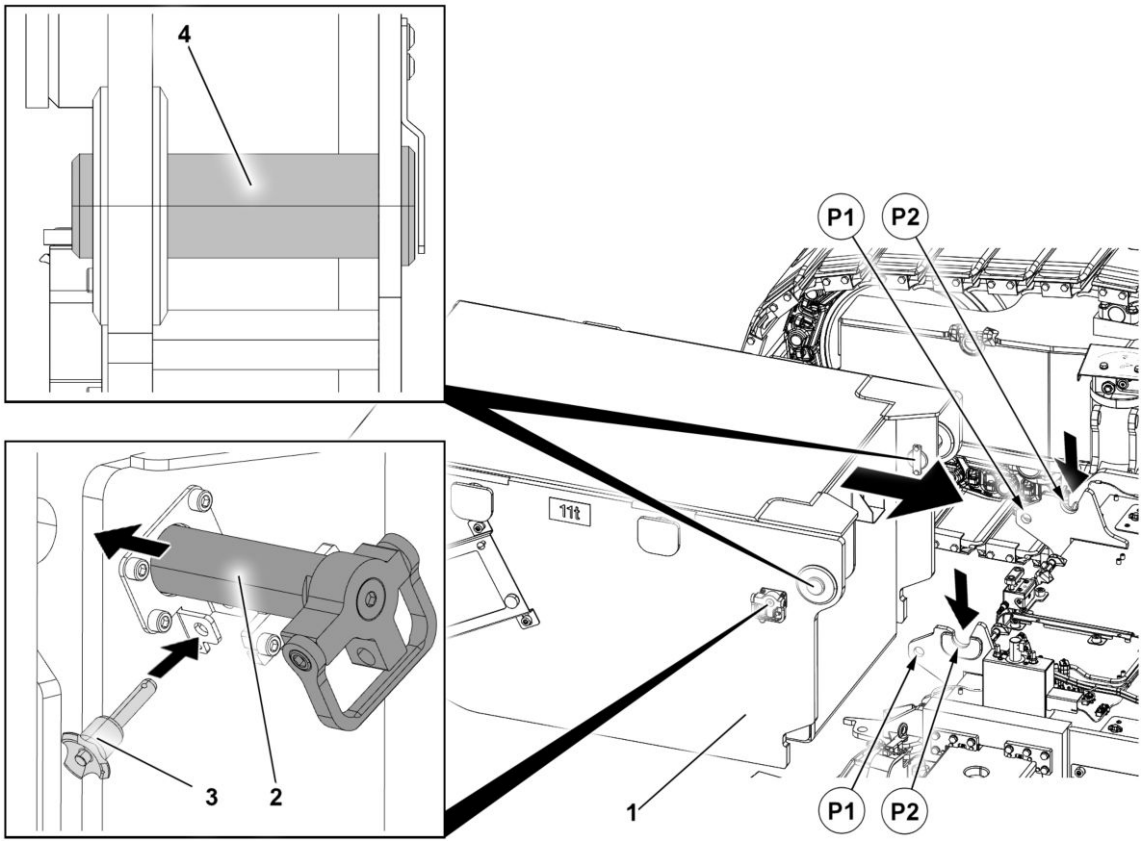


Fig. 1790: Assembling the front central ballast

1 Front central ballast
2 Pin
3 Retaining element
4 Pin
P1 Pin position
P2 Assembly position

▶ Remove the retaining elements **3** and unpin the pin **2** on both sides.

▶ Fasten the front central ballast **1** (→ 7.3 Central ballast, p. 371).

▶ Set the pin **4** with the front central ballast **1** on the assembly position **P2**.

▶ When the front central ballast **1** aligns with the pin position **P1**: Pin and secure the pin **2** on both sides.

▶ Remove the fastening equipment.

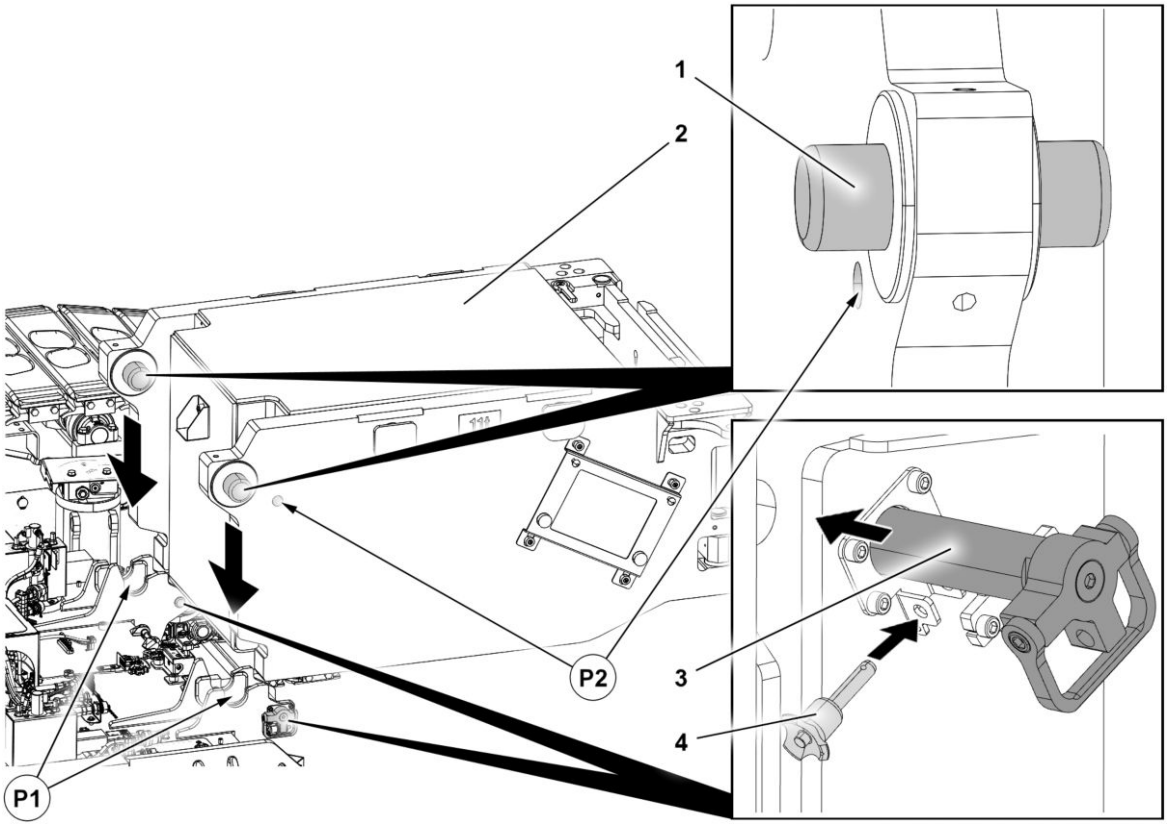


Fig. 1791: Assembling the rear central ballast

1 Pin
2 Rear central ballast
3 Pin
4 Retaining element
P1 Assembly position
P2 Pin position

- ▶ Remove the retaining elements **4** and unpin the pin **3** on both sides.
- ▶ Fasten the rear central ballast **2** (→ 7.3 Central ballast, p. 371).
- ▶ Set the pin **1** with the rear central ballast **2** on the assembly position **P1**.
- ▶ When the rear central ballast **2** aligns with the pin position **P2**: Pin and secure the pin **3** on both sides.
- ▶ Remove the fastening equipment.

10.6.2 Swinging the ballast placement into the operating position

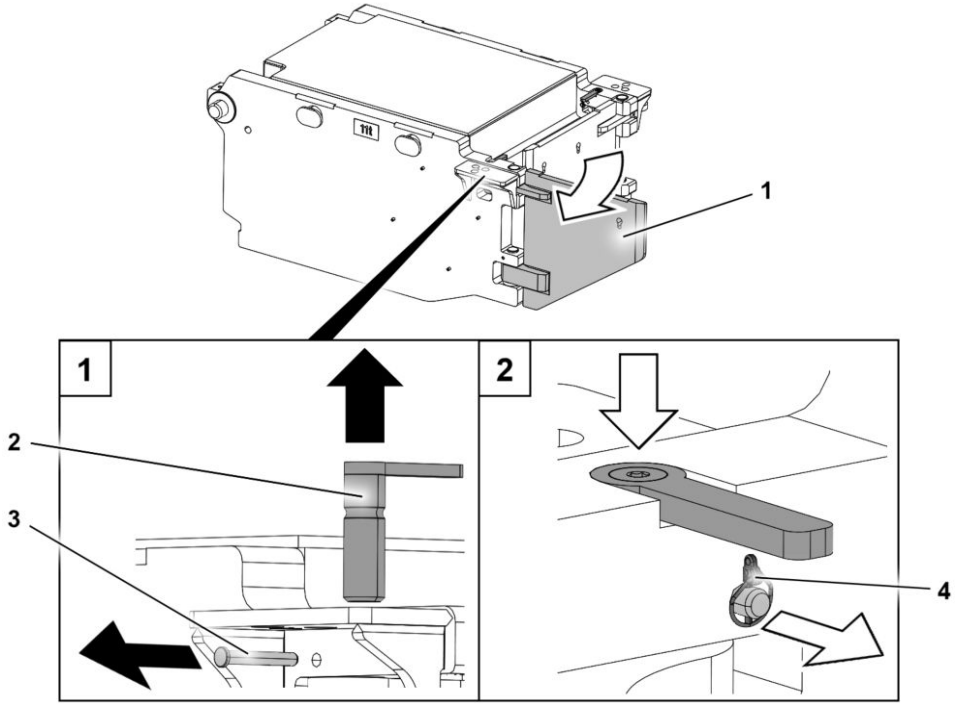


Fig. 1792: Swinging the left ballast placement

1 Left ballast placement
2 Pin
3 Pin
4 Retaining element

▶ Remove the retaining element **4** and unpin the pin **3**.

▶ Unpin the pin **2**.

▶ Until the pin points align: Swing the left ballast placement **1**.

▶ Insert the pin **2**.

▶ Insert the pin **3** and secure it with the retaining element **4**.

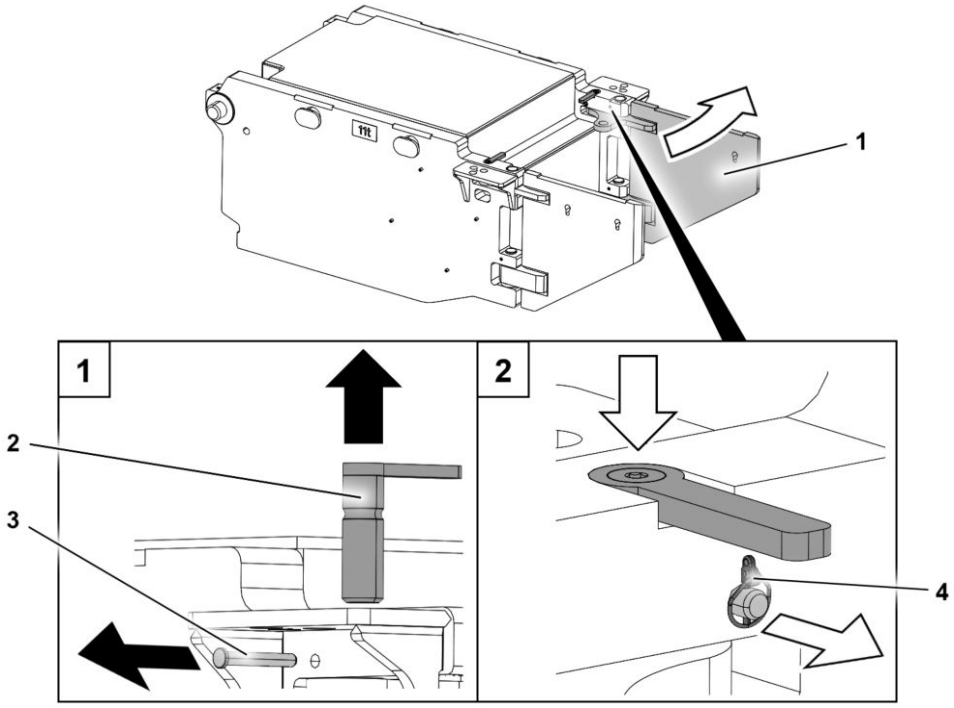


Fig. 1793: Swinging the right ballast placement

1 Right ballast placement
2 Pin
3 Pin
4 Retaining element

▶ Remove the retaining element **4** and unpin the pin **3**.

▶ Unpin the pin **2**.

▶ Until the pin points align: Swing the right ballast placement **1**.

▶ Insert the pin **2**.

▶ Insert the pin **3** and secure it with the retaining element **4**.

▷ The ballast placement is in the operating position.

10.6.3 Swinging the ballast placement into the transport position

Make sure that the following prerequisites are met:
❑ The steps are in the transport position.

(→ 10.1.21 Swinging the swinging steps* on the crawler carrier into the transport position, p. 689)

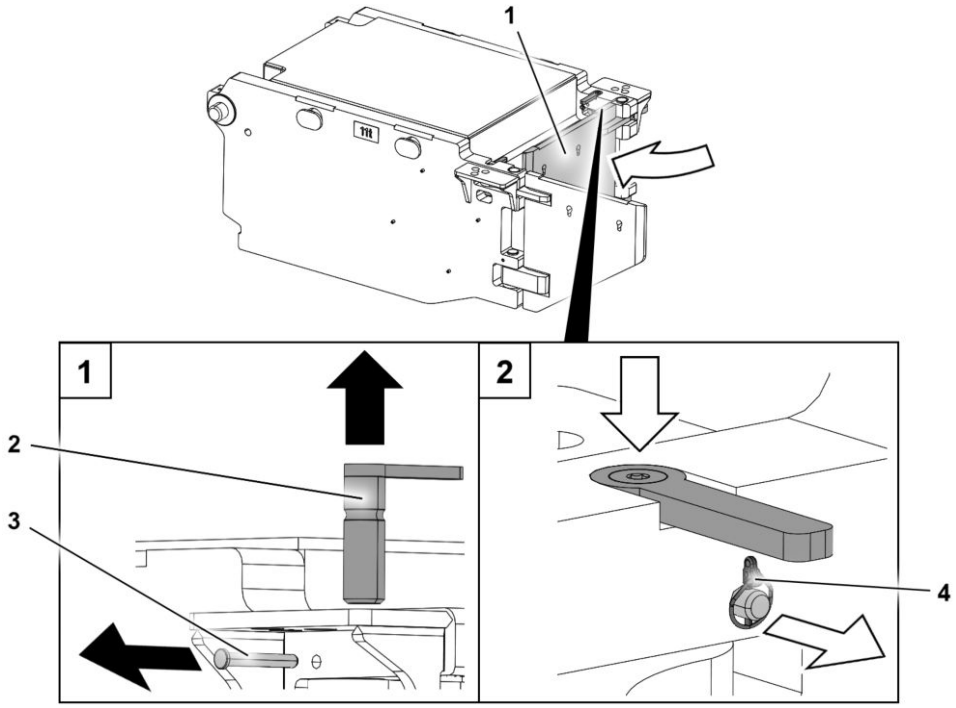


Fig. 1794: Swinging the right ballast placement

1 Right ballast placement
2 Pin
3 Pin
4 Retaining element

- ▶ Remove the retaining element **4** and unpin the pin **3**.
- ▶ Unpin the pin **2**.
- ▶ Until the pin points align: Swing the right ballast placement **1**.
- ▶ Insert the pin **2**.
- ▶ Insert the pin **3** and secure it with the retaining element **4**.

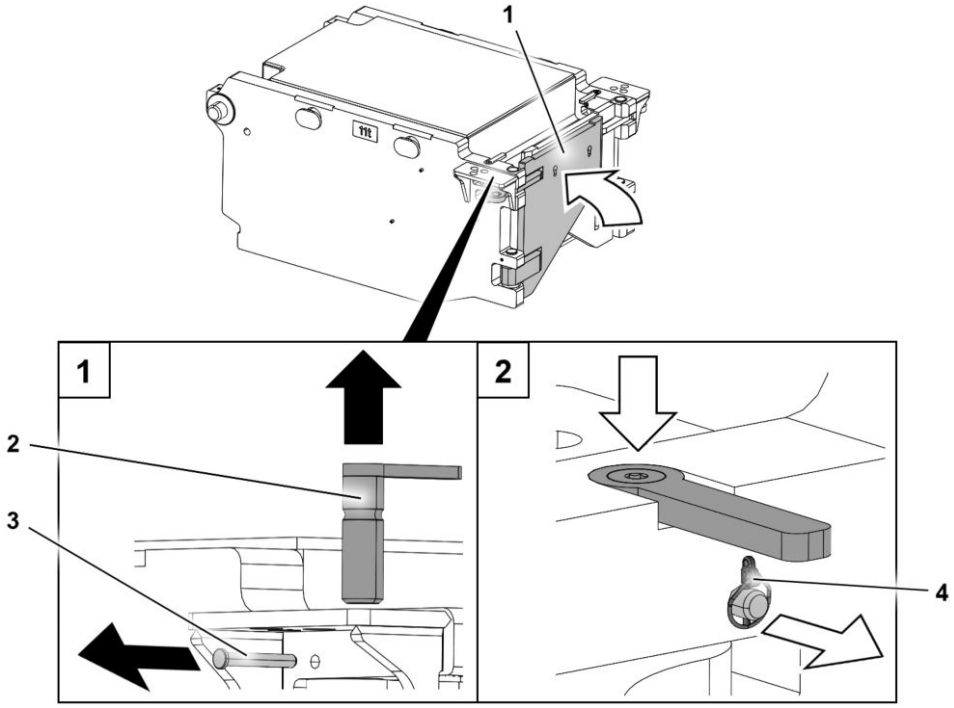


Fig. 1795: Swinging the left ballast placement

1 Left ballast placement
2 Pin
3 Pin
4 Retaining element

▶ Remove the retaining element **4** and unpin the pin **3**.

▶ Unpin the pin **2**.

▶ Until the pin points align: Swing the left ballast placement **1**.

▶ Insert the pin **2**.

▶ Insert the pin **3** and secure it with the retaining element **4**.

▷ The ballast placement is in the transport position.

10.6.4 Disassembling the central ballast

Note

The mobile crane can stand on the crawler carriers **or** be supported when disassembling the central ballast.

Make sure that the following prerequisites are met:
❑ For disassembly on crawler carriers: The crawler travel gear is set on the wide track width (4.9 m).
(→ 8.14 Crawler travel gear track width adjustment, p. 502)
❑ For disassembly on the assembly support: The crawler center section is leveled.
(→ 10.2.3 Extending the support cylinders, p. 695)
❑ The mobile crane set up configuration and settings in the *set up* menu match.

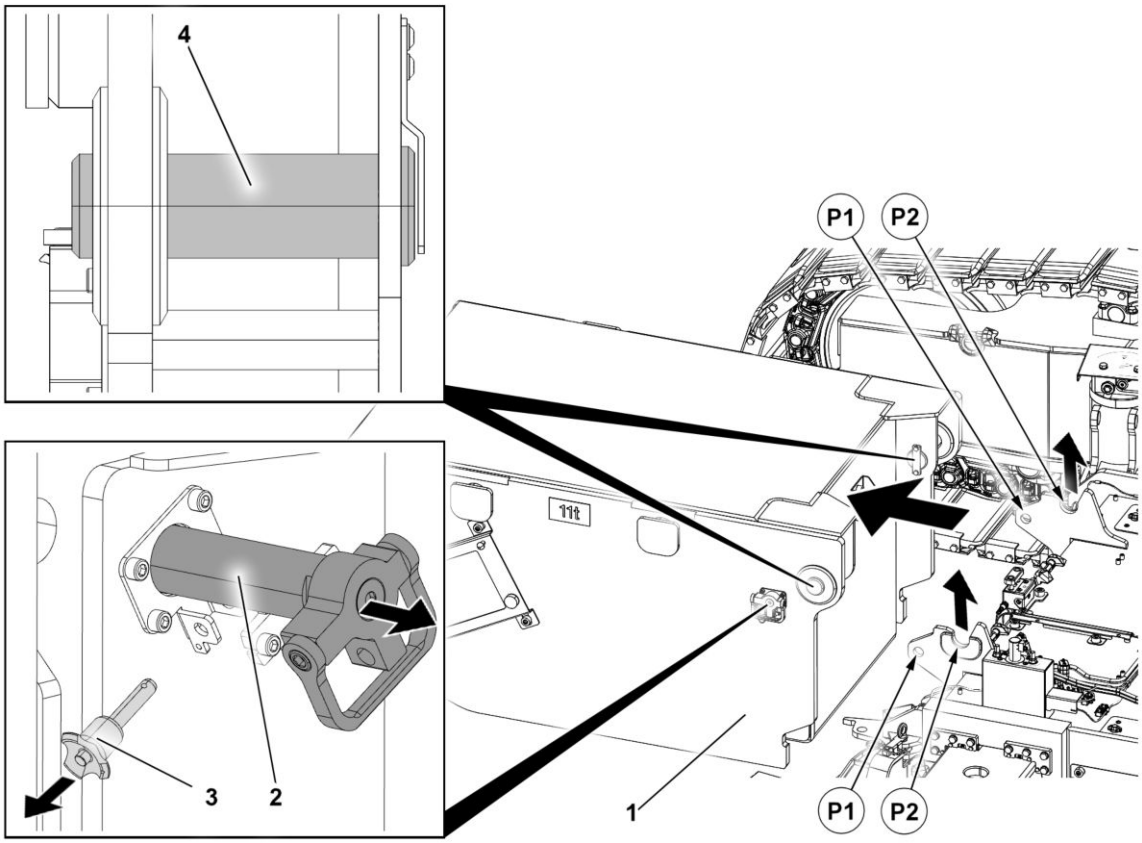


Fig. 1796: Disassembling the front central ballast

1	Front central ballast	**4**	Pin
2	Pin	**P1**	Pin position
3	Retaining element	**P2**	Assembly position

▶ Fasten the front central ballast **1** (→ 7.3 Central ballast, p. 371).

▶ Until the front central ballast **1** can be unpinned: Tension the hoist rope.

▶ Remove the retaining element **3** and unpin the pin **2**.

▶ Take the front central ballast **1** down on the transport vehicle.

▶ Insert and secure the pin **2** again on both sides.

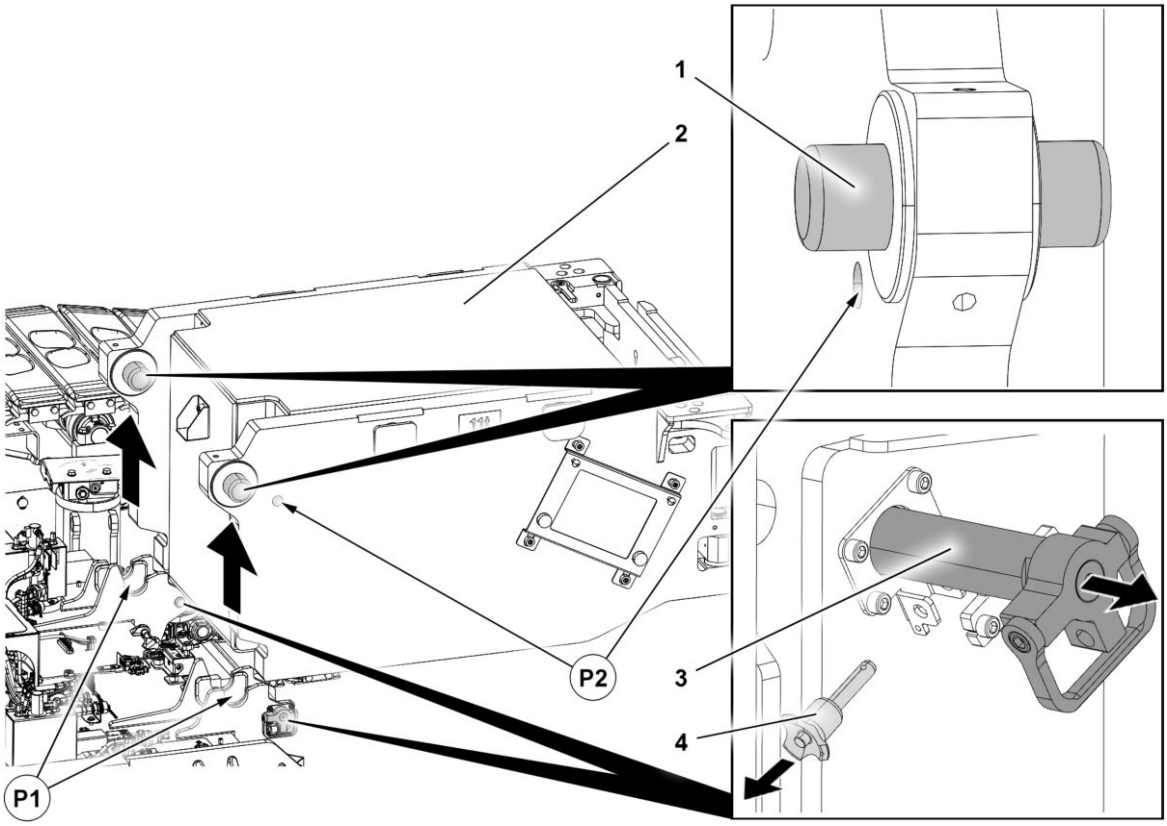


Fig. 1797: Disassembling the rear central ballast

1	Pin	**4**	Retaining element
2	Rear central ballast	**P1**	Assembly position
3	Pin	**P2**	Pin position

- ▶ Fasten the rear central ballast **2** (→ 7.3 Central ballast, p. 371).
- ▶ Until the rear central ballast **2** can be unpinned from the pin position **P2**: Tension the hoist rope.
- ▶ Remove the retaining element **4** and unpin the pin **3**.
- ▶ Take the rear central ballast **2** down on the transport vehicle.
- ▶ Insert and secure the pin **3** in the crawler center section.

10.7 Turntable ballast

10.7.1 Ballast overview

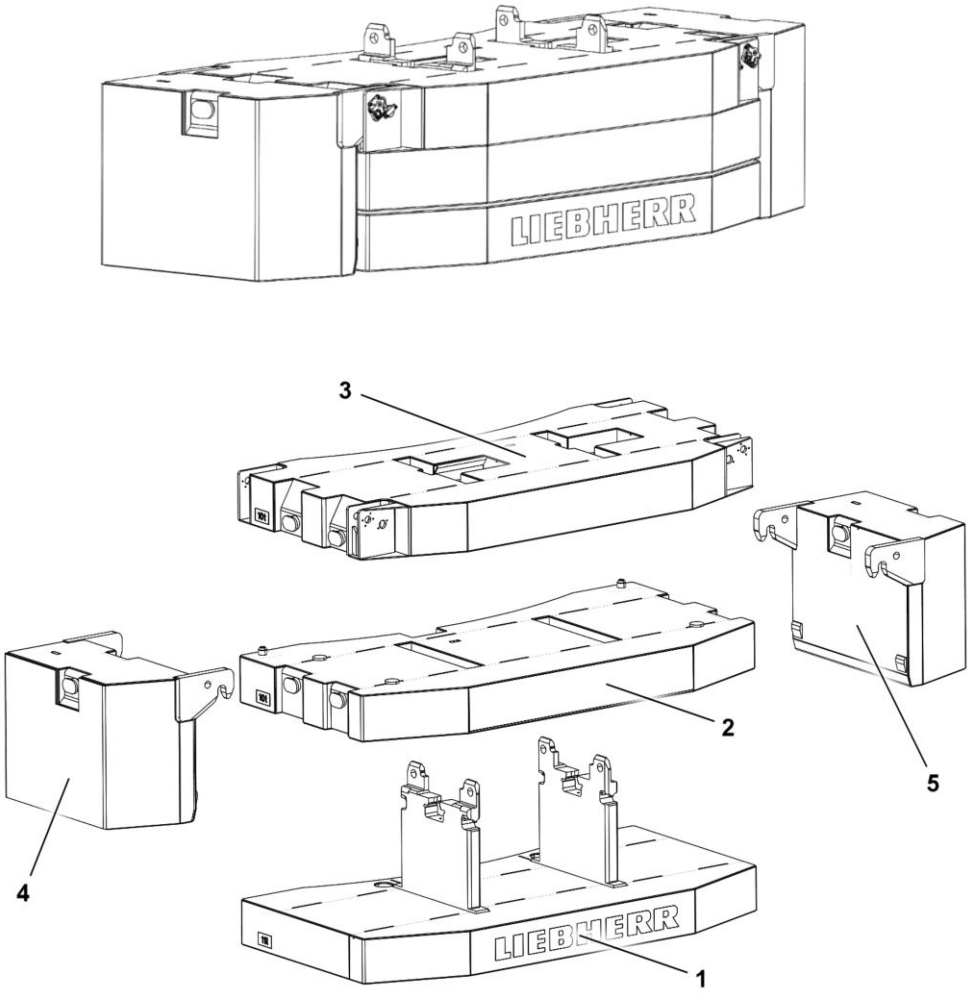


Fig. 1798: Ballast overview

1 Receptacle plate 11 t
2 Ballast plate 10 t
3 Ballast plate 10 t
4 Ballast plate 5 t
5 Ballast plate 5 t

Ballast combinations: (→ 4.23.1 Ballast combinations, p. 144).

10.7.2 Pinning ballast plate 4 and ballast plate 5 with ballast plate 3

Make sure that the following prerequisites are met:
❑ Ballast combination **31 t** is set up.

(→ 4.23.1 Ballast combinations, p. 144)

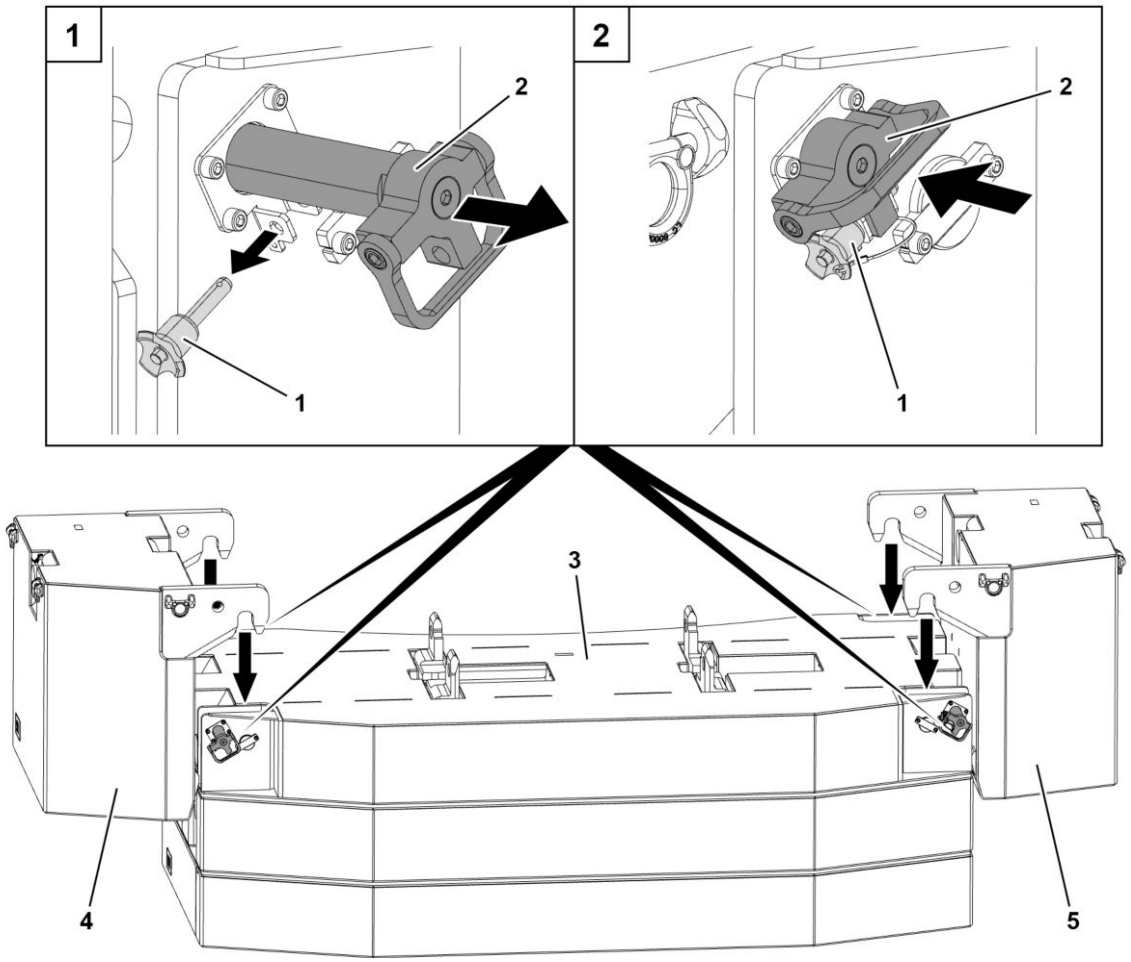


Fig. 1799: Pinning ballast plate 4 and ballast plate 5

1 Retaining element (4x)
2 Pin (4x)
3 Ballast plate 10 t
4 Ballast plate 5 t
5 Ballast plate 5 t

▶ Remove the all retaining elements **1** and pins **2**.

▶ Connect the ballast plate **4** and ballast plate **5** to the side of ballast plate **3**.

▶ Pin the ballast plates together: Insert all pins **2** and secure with the retaining element **1**.

10.7.3 Unpinning ballast plate 4 and ballast plate 5 from ballast plate 3

Make sure that the following prerequisites are met:
❑ Ballast combination **41 t** is set up.

(→ 4.23.1 Ballast combinations, p. 144)

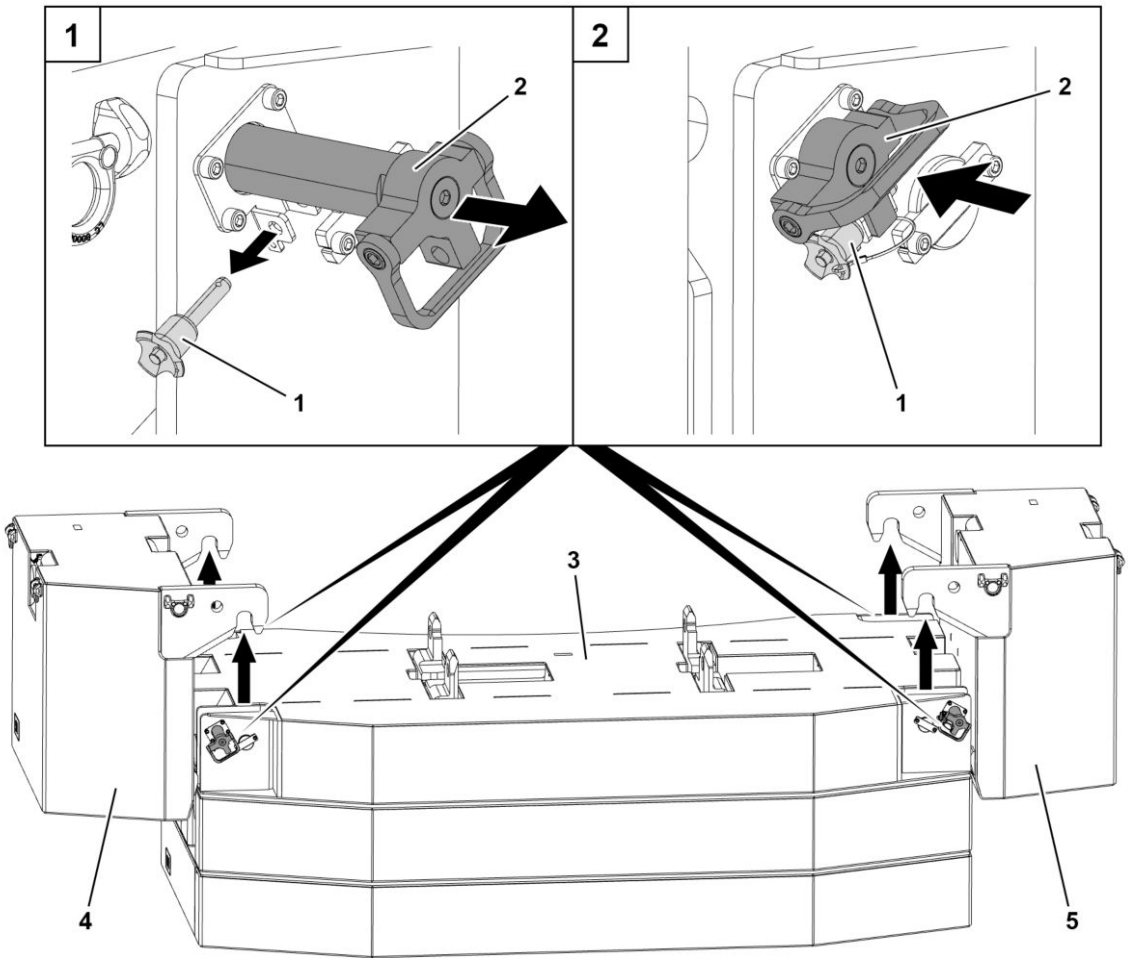


Fig. 1800: Pinning ballast plate 4 and ballast plate 5

1 Retaining element (4x)
2 Pin (4x)
3 Ballast plate 10 t
4 Ballast plate 5 t
5 Ballast plate 5 t

▶ Remove the all retaining elements **1** and pins **2**.

▶ Disconnect the ballast plate **4** and ballast plate **5** to the side of ballast plate **3** and take down.

▶ Insert all pins **2** back in the ballast plate **3** and secure with the retaining element **1**.

10.7.4 Stacking the ballast on the ballast placement

Make sure that the following prerequisites are met:
❑ The crane is standing on the crawler travel gear.
❑ The maximum side incline is 2°.
❑ The central ballast is assembled.
(→ 10.6.1 Assembling the central ballast, p. 748)
❑ The ballast placement **3** is in the operating position.
(→ 10.6.2 Swinging the ballast placement into the operating position, p. 750)
❑ The transport vehicle with ballast plates is in the immediate vicinity of the crane.
❑ The **ballast** is not damaged.
❑ There are **no** foreign objects between the ballast plates.
❑ The ballast cylinders are fully retracted.

❑ The crane set up configuration is set in the *set up* menu.
(→ 8.6 Setting up the crane, p. 412)

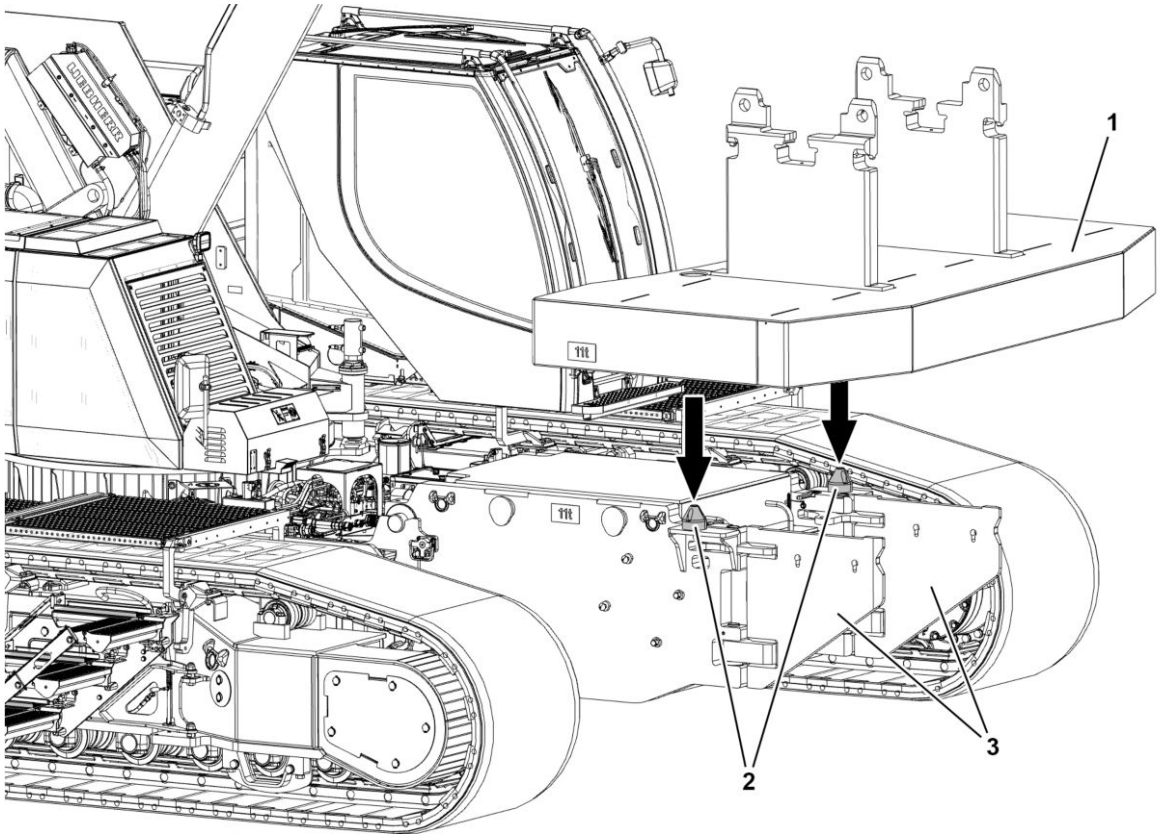


Fig. 1801: Stacking the ballast on the ballast placement

1 Receptacle plate 11 t
2 Centering cone
3 Ballast placement

The receptacle plate **1**, as the carrier plate for the other ballast plates, must always be taken down on the ballast placement **3** first.

▶ Fasten the receptacle plate **1** (→ 7.4.1 Dimensions and weight, p. 374).

▶ Take the receptacle plate **1** down on the centering cone **2** of the ballast placement **3**.

▶ Take the required ballast plates down in the correct order on the receptacle plate **1** (→ 4.23.1 Ballast combinations, p. 144).

If ballast combination **41 t** is installed:
▶ Pin the ballast plates together (→ 10.7.2 Pinning ballast plate 4 and ballast plate 5 with ballast plate 3, p. 756).

10.7.5 Picking up the ballast

Fig. 1802: Side window operating unit

The buttons for picking up the ballast are located on the side window operating unit. The displays are located on the superstructure monitor.

10.7.5.1 Picking up the ballast automatically

The following movements and functions are automatically carried out:
- Turn the superstructure.
- Extend and retract the ballast cylinder.
- Pin and unpin the superstructure with the chassis.

Make sure that the following prerequisites are met:
- ❑ The permissible ballast combination is stacked on the ballast placement. (→ 10.7.4 Stacking the ballast on the ballast placement, p. 758)
- ❑ The ballast pinning on the turntable is completely pulled out and secured. (→ 10.7.7 Unpinning the ballast from the turntable, p. 765)
- ❑ The crane is standing on the crawler travel gear.
- ❑ The maximum side incline is 2°.
- ❑ The superstructure is turned to 180° ±5°.
- ❑ The ballast cylinders are fully retracted.
- ❑ The superstructure is **not** pinned with the chassis.
- ❑ **No** personnel or objects are within the slewing range or ballasting range.
- ❑ The functions on the side window operating unit are released.

▶ Press the *ballast automatic* button.
▷ The indicator light on the *ballast automatic* button lights up.

▶ Press and hold the *retract ballast cylinder* button.
▷ When ballast is picked up completely: The indicator light on the *retract ballast cylinder* button lights up and an acoustic signal sounds.

▶ Adjust the ballast settings to the crane set up configuration in the *set up* menu (→ 8.6 Setting up the crane, p. 412).

▶ Pinning the ballast with the turntable (→ 10.7.6 Pinning the ballast with the turntable, p. 763).

Troubleshooting

Does automatic ballasting not start?
When pressing the *retract ballast cylinder* button, the indicator light blinks on the *retract ballast cylinder* button.
The prerequisites for automatic ballasting are **not** met.

▶ Check and meet all prerequisites.

10.7.5.2 Picking up the ballast manually

Make sure that the following prerequisites are met:
- ❑ The permissible ballast combination is stacked on the ballast placement.
  (→ 10.7.4 Stacking the ballast on the ballast placement, p. 758)
- ❑ The ballast pinning on the turntable is completely pulled out and secured.
  (→ 10.7.7 Unpinning the ballast from the turntable, p. 765)
- ❑ The crane is standing on the crawler travel gear.
- ❑ The maximum side incline is 2°.
- ❑ Ballast automatic is **not** active.
- ❑ The ballast cylinders are fully retracted.
- ❑ The superstructure is **not** pinned with the chassis.
- ❑ **No** personnel or objects are within the slewing range or ballasting range.
- ❑ The functions on the side window operating unit are released.

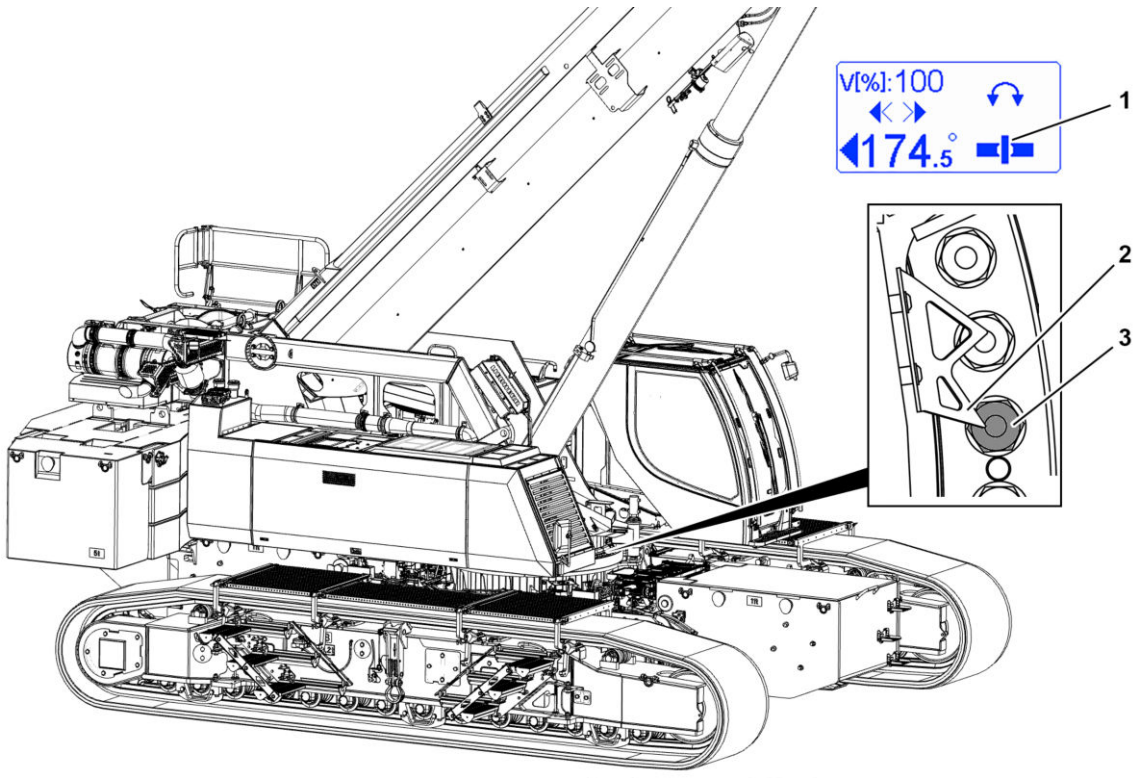


Fig. 1805: Pinning the superstructure at 174.5°

1 Superstructure pinning icon
2 Small pointer
3 Marked screw

The small pointer **2** and marked screw **3** must be aligned (174.5° angle position).

▶ Turn the superstructure to 174.5°.
  ▷ The ballast cylinders are located next to the intake openings of the receptacle plate.

▶ Press and hold the *pin superstructure* button.

▷ If the superstructure is pinned: The indicator light on the *pin superstructure* button lights up and an acoustic signal sounds.
▷ The *superstructure pinned* icon is displayed in the *crane operation* menu.

▶ Press and hold the *extend ballast cylinder* button.
▷ When the ballast cylinders are fully extended: The indicator light on the *extend ballast cylinder* button lights up and an acoustic signal sounds.

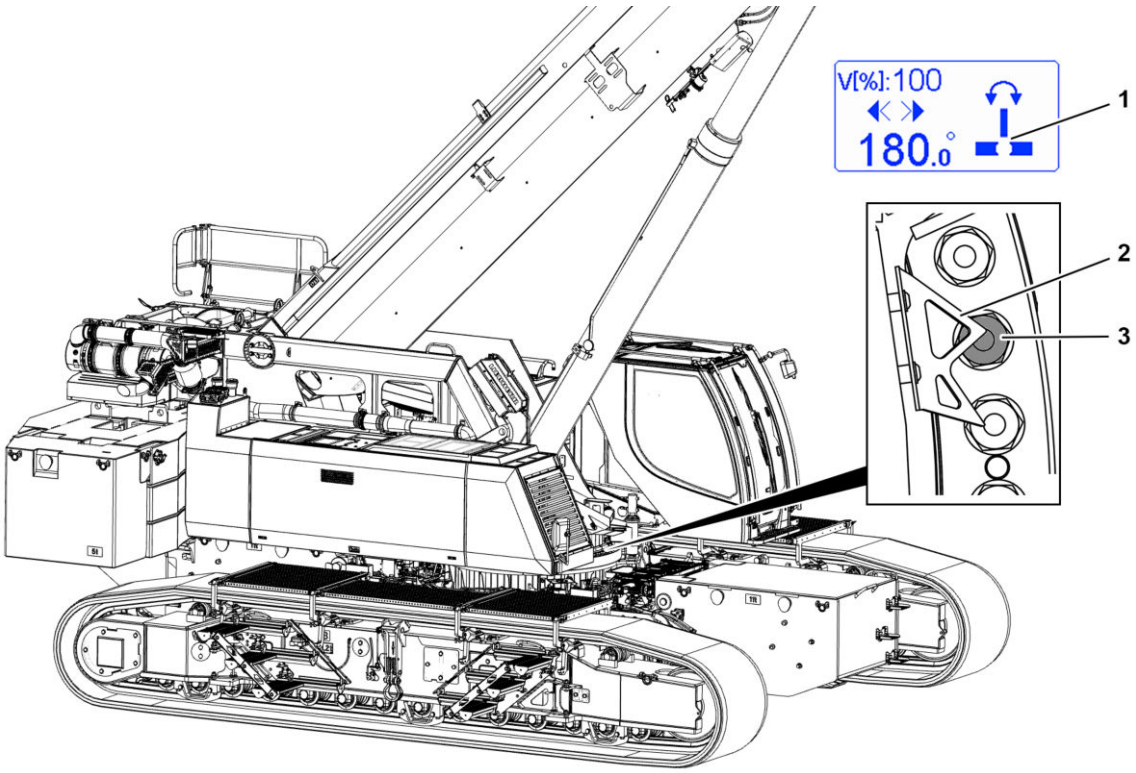


Fig. 1809: Pinning the superstructure at 180°

1 Superstructure pinning icon
2 Large pointer
3 Marked screw

▶ Press and hold the *unpin superstructure* button.

▷ If the superstructure is unpinned: The indicator light on the *unpin superstructure* button lights up and an acoustic signal sounds.
▷ The *superstructure unpinned* icon is displayed in the *crane operation* menu.

The large pointer **2** and marked screw **3** must be aligned (0° angle position).

▶ Turn the superstructure carefully to 180° to the right.
▷ The ballast cylinders are in the receptacles of the receptacle plate.

▶ Press and hold the *pin superstructure* button.

▷ If the superstructure is pinned: The indicator light on the *pin superstructure* button lights up and an acoustic signal sounds.
▷ The *superstructure pinned* icon is displayed in the *crane operation* menu.

Note

Ballast weighing is performed when the ballast is picked up (→ 10.7.8 Performing ballast weighing by taking on the ballast, p. 765).

▶ Press and hold the *retract ballast cylinder* button.
▷ When ballast is picked up: The indicator light on the *retract ballast cylinder* button lights up and an acoustic signal sounds.

▶ Press and hold the *unpin superstructure* button.

▷ If the superstructure is unpinned: The indicator light on the *unpin superstructure* button lights up and an acoustic signal sounds.
▷ The *superstructure unpinned* icon is displayed in the *crane operation* menu.

▶ Adjust the ballast settings to the crane set up configuration in the *set up* menu (→ 8.6 Setting up the crane, p. 412).

▶ Pinning the ballast with the turntable (→ 10.7.6 Pinning the ballast with the turntable, p. 763).

10.7.6 Pinning the ballast with the turntable

Make sure that the following prerequisites are met:
❑ The ballast is picked up completely.

(→ 10.7.5 Picking up the ballast, p. 760)

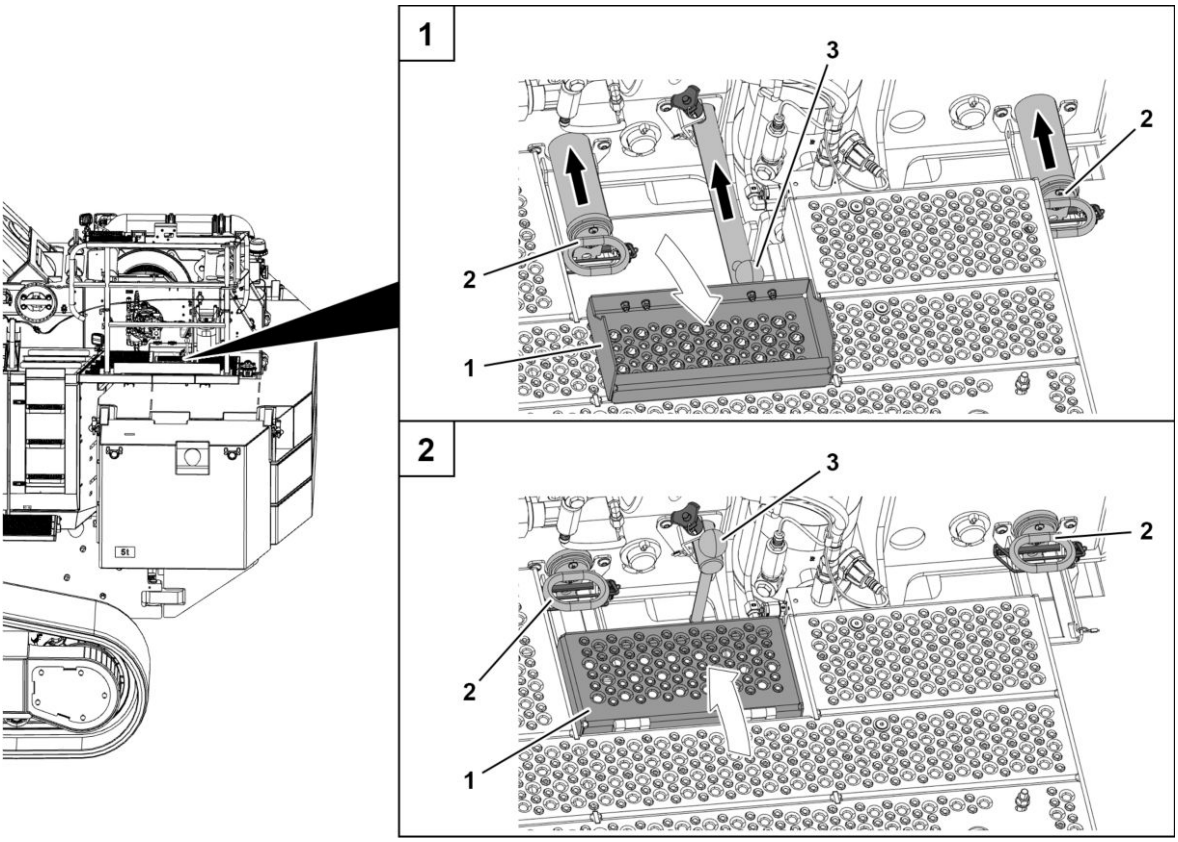


Fig. 1817: Pinning the ballast with the turntable

1 Step
2 Pin (2x)
3 Lock

- ▶ Swing the step **1** up.
- ▶ Release both pins **2**.
- ▶ Insert both pins **2** completely and secure.
- ▶ Release the lock **3**.
- ▶ Pin the ballast on the opposite side: Push the lock **3** in all the way and secure it.
- ▶ Swing the step **1** down.

10.7.7 Unpinning the ballast from the turntable

Make sure that the following prerequisites are met:
❑ The ballast cylinders are fully retracted.

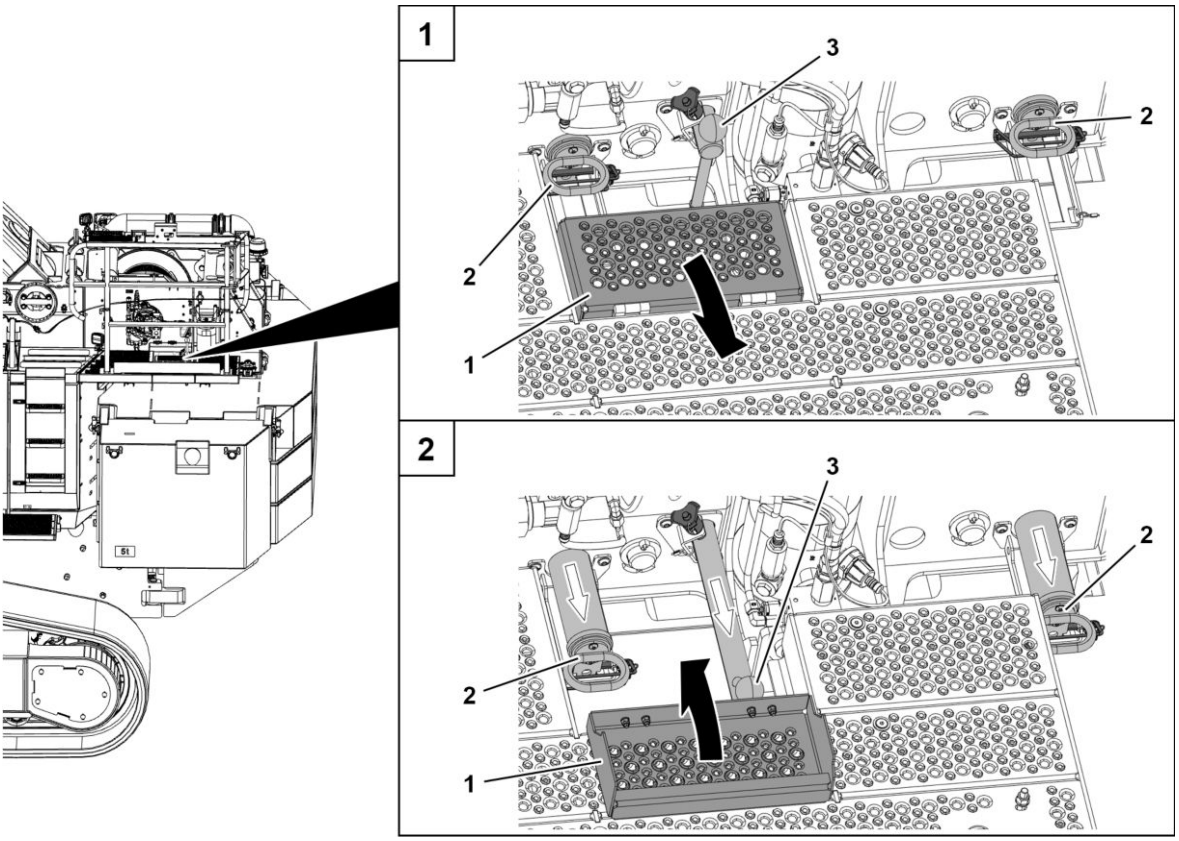


Fig. 1818: Unpinning the ballast from the turntable

1 Step
2 Pin (2x)
3 Lock

▶ Swing the step **1** up.

▶ Release both pins **2**.

▶ Unpin both pins **2** completely and secure.

▶ Release the lock **3**.

▶ Unpin the ballast on the opposite side: Push the lock **3** out all the way and secure it.

▶ Swing the step **1** down.
▷ The ballast can be taken down (→ 10.7.9 Taking the ballast down, p. 766).

10.7.8 Performing ballast weighing by taking on the ballast

Make sure that the following prerequisites are met:
❑ The ballast is taken down on the ballast placement.
(→ 10.7.4 Stacking the ballast on the ballast placement, p. 758)

Note
If taking on the ballast is interrupted, the ballast is not weighed.

▶ Repeat taking on the ballast.

▶ Pick up the ballast automatically or manually (→ 10.7.5 Picking up the ballast, p. 760).
▷ During ballast weighing: The ballast is lifted, partially lowered and then lifted again.
▷ The ballast is detected and compared with the ballast settings in the *set up* menu.

▶ Adjust the ballast settings in the *set up* menu.

Troubleshooting

Does the error message not turn off?
The error message is displayed on the superstructure monitor.

▶ Check if the ballast settings in the *set up* menu coincide with the installed ballast.

▶ Check if all electrical lines for ballast monitoring are connected.

▶ Perform ballast weighing again.

If the error **cannot** be remedied:
▶ Contact Customer Service at Liebherr-Werk Ehingen GmbH.

10.7.9 Taking the ballast down

Fig. 1819: Side window operating unit

The buttons for picking up the ballast are located on the side window operating unit. The displays are located on the superstructure monitor.

10.7.9.1 Taking down the ballast automatically

The following movements and functions are automatically carried out:
- Turn the superstructure.
- Extend and retract the ballast cylinder.
- Pin and unpin the superstructure with the chassis.

Make sure that the following prerequisites are met:
❑ The crane is standing on the crawler travel gear.
❑ The maximum side incline is 2°.
❑ The ballast placement is in the operating position.
(→ 10.6.2 Swinging the ballast placement into the operating position, p. 750)
❑ The ballast is unpinned from the turntable.
(→ 10.7.7 Unpinning the ballast from the turntable, p. 765)
❑ The superstructure is turned to 180° ±5°.
❑ The ballast cylinders are fully retracted.

❑ The superstructure is **not** pinned with the chassis.
❑ **No** personnel or objects are within the slewing range or ballasting range.
❑ The functions on the side window operating unit are released.

▶ Press the *ballast automatic* button.
▷ The indicator light on the *ballast automatic* button lights up.

▶ Press and hold the *extend ballast cylinder* button.
▷ When ballast is fully taken down: The indicator light on the *extend ballast cylinder* button lights up and an acoustic signal sounds.

▶ Make sure that all ballast plates are taken down.

▶ Adjust the ballast settings to the crane set up configuration in the *set up* menu (→ 8.6 Setting up the crane, p. 412).

Troubleshooting

Does automatic ballasting not start?
When pressing the *extend ballast cylinder* button, the indicator light blinks on the *extend ballast cylinder* button.
The prerequisites for automatic ballasting are **not** met.

▶ Check and meet all prerequisites.

10.7.9.2 Taking down the ballast manually

Make sure that the following prerequisites are met:
❑ The crane is standing on the crawler travel gear.
❑ The maximum side incline is 2°.
❑ The ballast placement is in the operating position.
(→ 10.6.2 Swinging the ballast placement into the operating position, p. 750)
❑ The ballast is unpinned from the turntable.
(→ 10.7.7 Unpinning the ballast from the turntable, p. 765)
❑ Ballast automatic is **not** active.
❑ The ballast cylinders are fully retracted.
❑ The superstructure is **not** pinned with the chassis.
❑ **No** personnel or objects are within the slewing range or ballasting range.
❑ The functions on the side window operating unit are released.

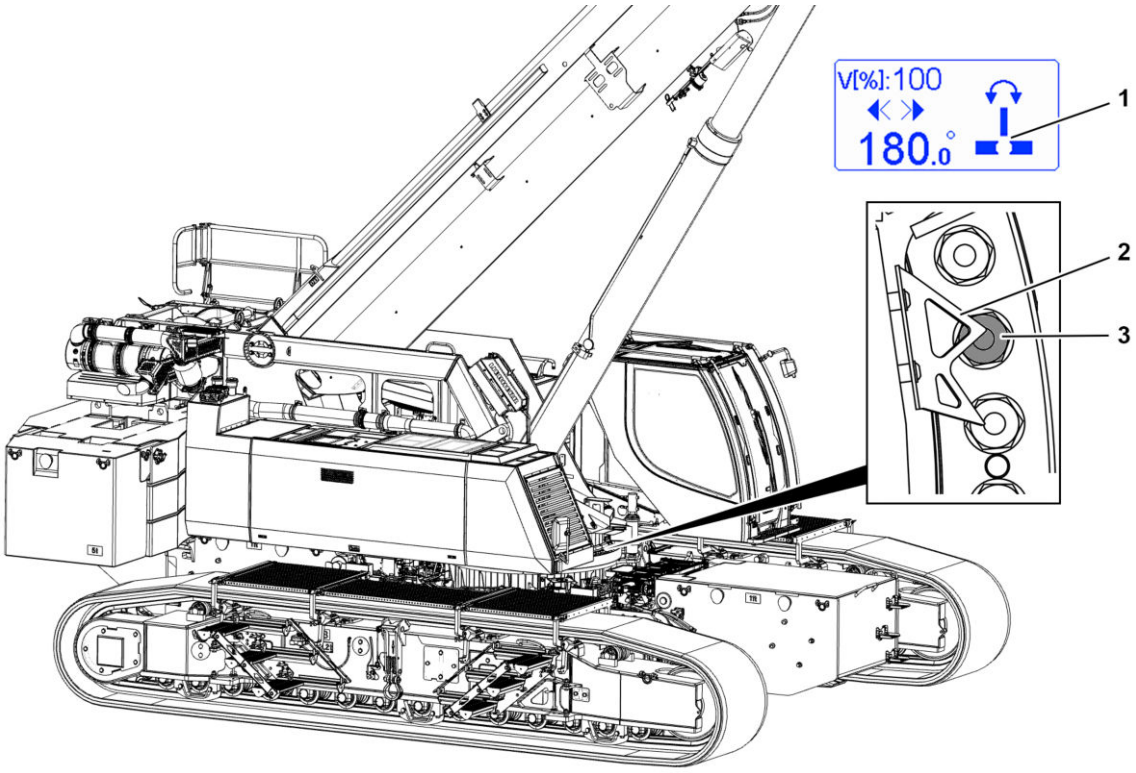


Fig. 1822: Pinning the superstructure at 180°

1 Superstructure pinning icon
2 Large pointer
3 Marked screw

The large pointer **2** and marked screw **3** must be aligned (180° angle position).

▶ Turn the superstructure to 180°.

▶ Press and hold the *pin superstructure* button.

▷ If the superstructure is pinned: The indicator light on the *pin superstructure* button lights up and an acoustic signal sounds.
▷ The *superstructure pinned* icon is displayed in the *crane operation* menu.

▶ Press and hold the *extend ballast cylinder* button.
▷ When ballast is taken down: The indicator light on the *extend ballast cylinder* button lights up and an acoustic signal sounds.

▶ Make sure that all ballast plates are taken down.

▶ Press and hold the *unpin superstructure* button.

▷ If the superstructure is unpinned: The indicator light on the *unpin superstructure* button lights up and an acoustic signal sounds.
▷ The *superstructure unpinned* icon is displayed in the *crane operation* menu.

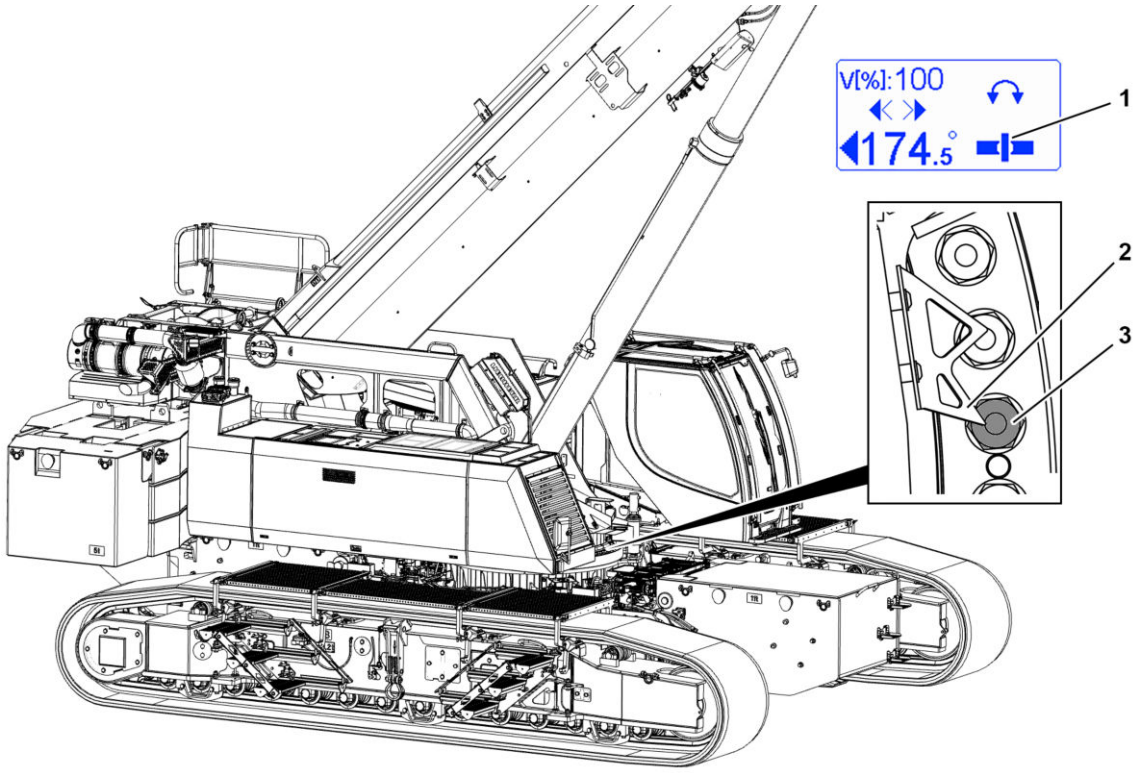


Fig. 1828: Pinning the superstructure at 174.5°

1 Superstructure pinning icon
2 Small pointer
3 Marked screw

The small pointer **2** and marked screw **3** must be aligned (174.5° angle position).

▶ Turn the superstructure carefully to 174.5° to the left.
▷ The ballast cylinders are next to the receptacles of the receptacle plate.

▶ Press and hold the *pin superstructure* button.

▷ If the superstructure is pinned: The indicator light on the *pin superstructure* button lights up and an acoustic signal sounds.
▷ The *superstructure pinned* icon is displayed in the *crane operation* menu.

▶ Press and hold the *retract ballast cylinder* button.
▷ When the ballast cylinders are fully retracted: The indicator light on the *retract ballast cylinder* button lights up and an acoustic signal sounds.

▶ Press and hold the *unpin superstructure* button.

▷ If the superstructure is unpinned: The indicator light on the *unpin superstructure* button lights up and an acoustic signal sounds.
▷ The *superstructure unpinned* icon is displayed in the *crane operation* menu.

▶ Adjust the ballast settings to the crane set up configuration in the *set up* menu (→ 8.6 Setting up the crane, p. 412).

▶ Pinning the ballast with the turntable (→ 10.7.6 Pinning the ballast with the turntable, p. 763).

10.8 Folding jib*

10.8.1 Safety

This section supplements the “Safety” chapter.

10.8.1.1 Danger zone when swinging the folding jib

Observe the additional safety instructions (→ 5.7 Danger zone, p. 167).

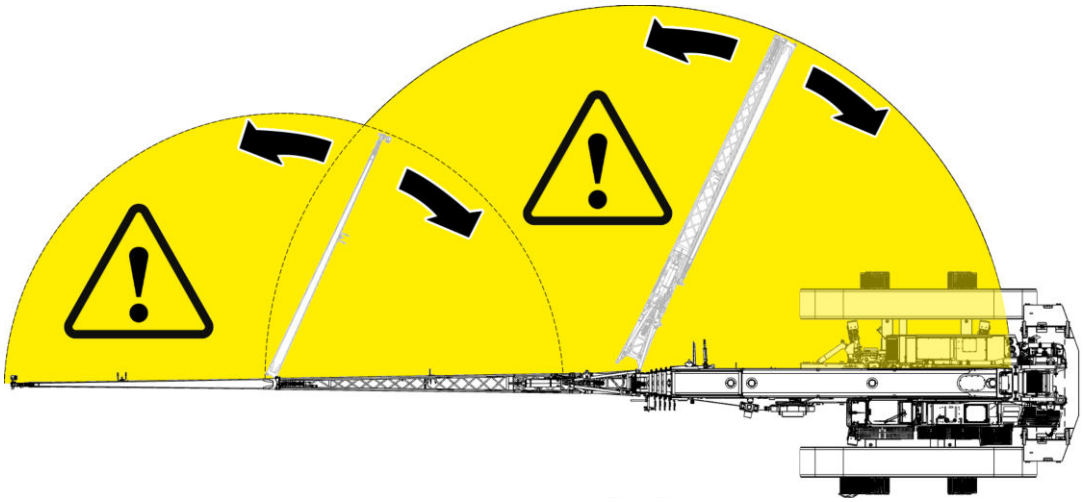


Fig. 1835: Danger zone when swinging the folding jib into the operating position / transport position

10.8.1.2 Danger of falling when stepping on the folding jib

The folding jib is not designed for being stepped on. The folding jib does not have stepping surfaces.

There is a danger of falling.

Observe the following rules:
– **Never** step on the folding jib.

10.8.1.3 Working on ladders on the folding jib

Personnel can fall when working on ladders on the folding jib (→ 5.10 Using the ladders correctly, p. 176).

Also observe the following rules:
- Have the tool for assembly and disassembly handed over by a second person.

10.8.1.4 Catch bar-plus system

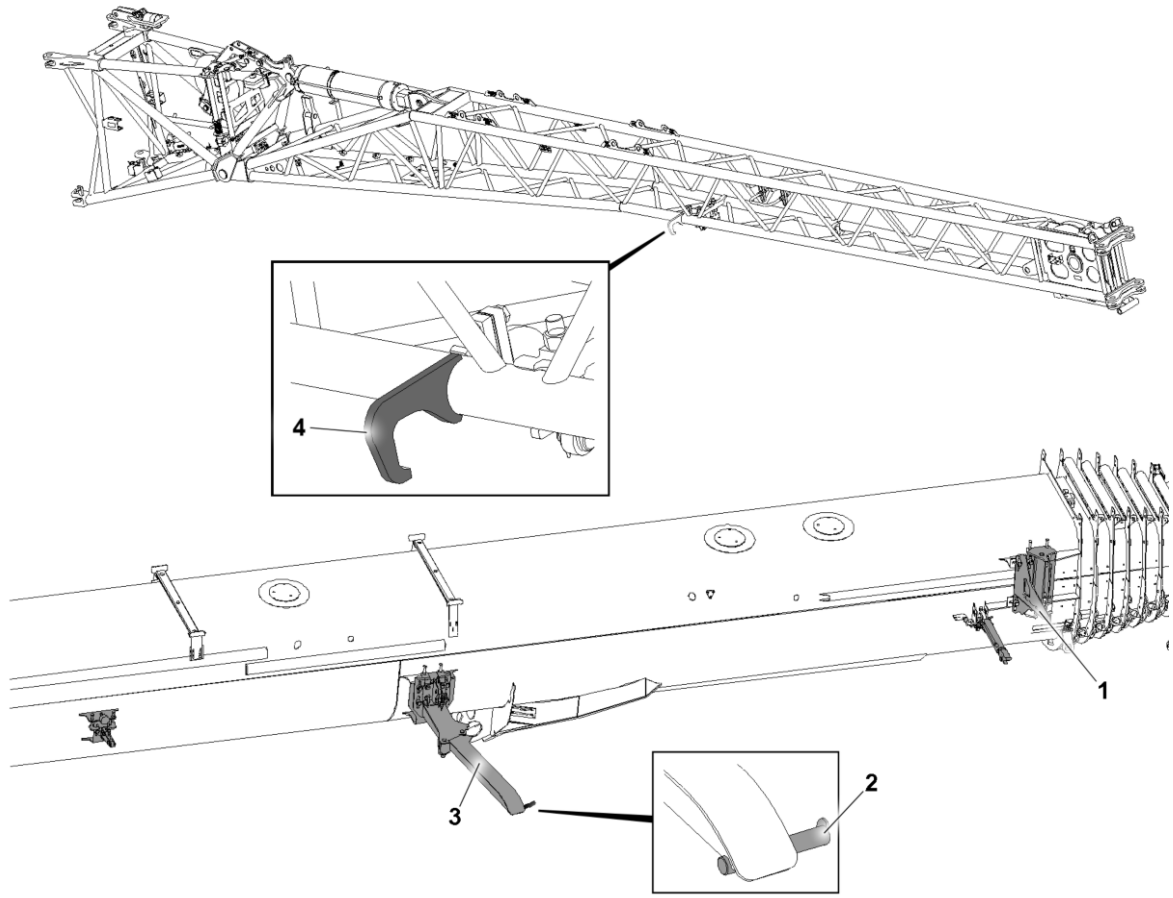


Fig. 1836: Components of the catch bar-plus system

1	Catch bar	**3**	Folding jib support
2	Rod	**4**	Hook

The catch bar plus system prevents the folding jib from falling down when swinging the folding jib out in case of an incorrect assembly sequence.

If the folding jib is transported on the crane without the catch bar-plus system, the folding jib can fall down and strike personnel.

Observe the following rules:
- Only transport the folding jib on the crane with the integrated catch bar plus system.
- Transport folding jibs without the catch bar plus system with a separate transport vehicle.
- Only assemble and disassemble folding jibs without the catch bar plus in flying mode.
  (→ 4.19.1 Folding jib*, p. 133)

10.8.1.5 Reduction of load due to removed end section

If the end section **1** of the double folding jib is installed on the side of the pivot section of the folding jib during operation with the single folding jib, the load is reduced.

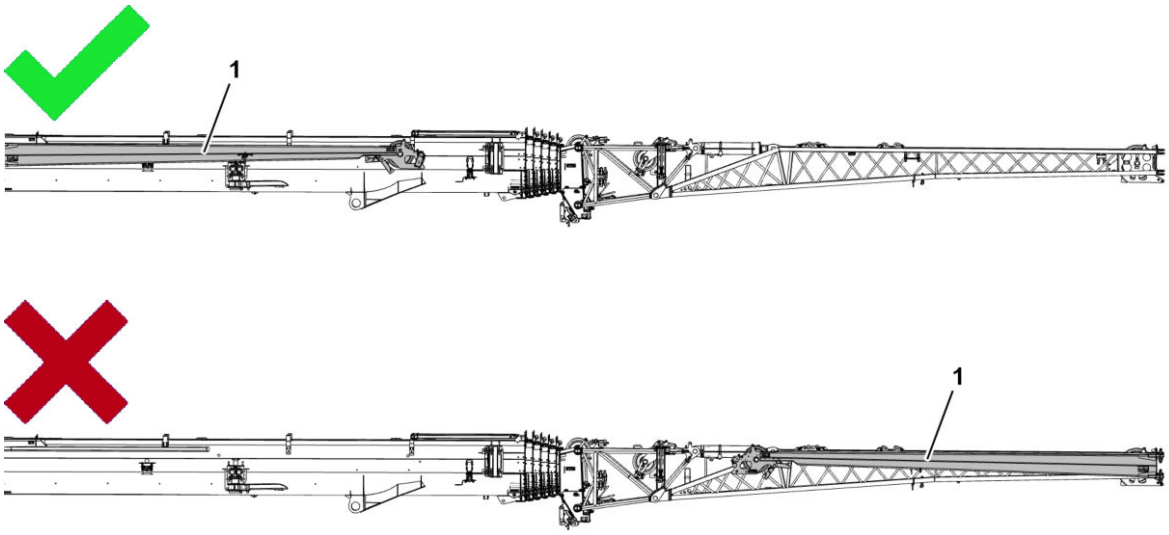


Fig. 1837: Operation with a single folding jib - end section correctly and incorrectly installed

1 End section

Observe the following rules:
- Before operation with a single folding jib: Disassemble the end section **1** or leave it to the side of the telescopic boom.

10.8.2 Reeving the hoist rope out on the boom head

Make sure that the following prerequisites are met:
❑ The folding jib is in the transport position or is disassembled.
(→ 10.8.14 Swinging into the transport position, p. 802)
(→ 10.8.15 Disassembling the folding jib, p. 819)

Note

In two hook operation, the hook block remains reeved on the boom head.

▶ Telescope the telescopic boom out to the length that corresponds to the length of the folding jib to be assembled.
▶ Set the hook block down on the ground.
▶ Disconnect the hoist rope in the rope fixed point and reeve the hook block out.
▶ Disassemble the hoist limit switch weight and chain.
▶ Disassemble the rope lock.
▶ Actuate the hoist limit switch mechanically.
▶ Remove the rope retaining pipes on the pulley head and on the back pulley.
▶ Take the hoist rope down onto the ground with the hook rod.
▶ Pin the rope retaining pipes on the pulley head and on the back pulley.
▶ Telescope the telescopic boom in all the way.
▶ Luff the telescopic boom down to 0°.

10.8.3 Swinging into the operating position

This section describes swinging the folding jib carried along on the crane in the operating position.

Make sure that the following prerequisites are met:
- ❑ The crane is in the set up configuration according to the assembly chart. (→ 10.8.18 Folding jib assembly charts, p. 824)
- ❑ The central ballast is assembled. (→ 10.6.1 Assembling the central ballast, p. 748)
- ❑ The crane inclination is maximum 0.3°.
- ❑ The crane set up configuration is set in the *set up* menu (→ 8.6 Setting up the crane, p. 412).
- ❑ The telescopic boom is telescoped in all the way.
- ❑ The telescoping target is at 0 %, no telescope is selected.
- ❑ The telescopic boom is luffed to 0.3°.
- ❑ The folding jib is pinned in the transport position.
- ❑ For hydraulic folding jibs: The hydraulic line from the folding jib to the telescopic boom is disconnected.

DANGER
The crane is **not** horizontal!
The folding jib can swing uncontrolled.

▶ Make sure that the crane is standing on horizontal ground.

10.8.3.1 Checking the pressure in the control cylinder*

This step must be performed only with a hydraulic folding jib.

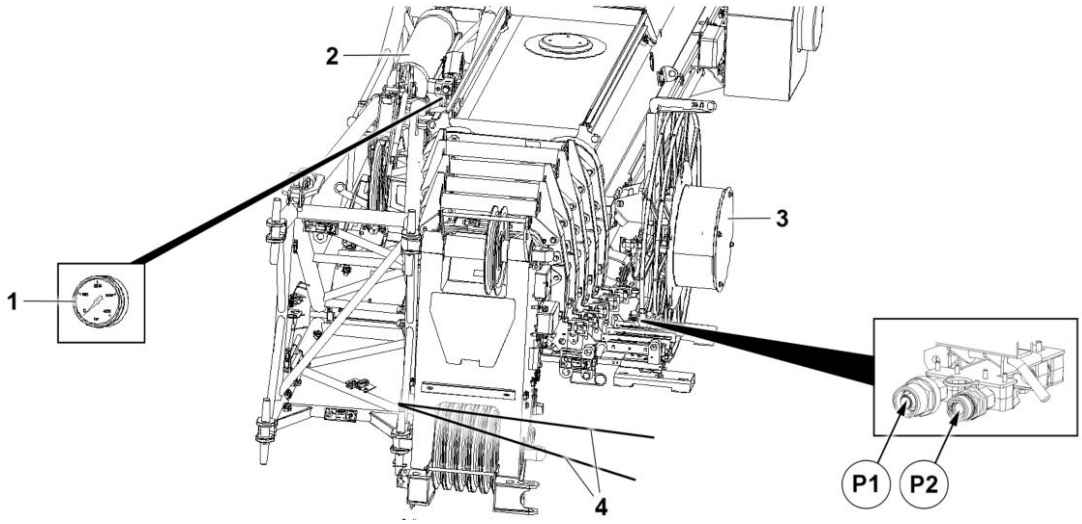


*Fig. 1838: Checking the pressure in the control cylinder**

1 Pressure gauge
2 Control cylinder
3 Hose drum
4 Hydraulic lines
P1 Connection position
P2 Connection position

WARNING
Pressure too low in the control cylinder!
The folding jib can luff down uncontrolled.

▶ Make sure sufficient pressure is available in the control cylinder.

▶ Check the pressure in the control cylinder **2**. The pressure gauge **1** must display at least 60 bar.

Troubleshooting

Is the pressure in the control cylinder too low?

▶ Connect the hydraulic lines **4** from the folding jib to the connection position **P1** and connection position **P2** on the hose drum **3** (→ 10.8.9 Connecting the hydraulic lines, p. 792).

The folding jib is luffed up via the crane remote control in the *assembly functions* menu (→ Opening the assembly functions menu, p. 474).

▶ Press the *hydraulic auxiliary boom luffing* F-button.

▶ Until the pressure gauge **1** displays a pressure of at least 60 bar: Press and hold the *luff up auxiliary boom* F-button.

The folding jibs can be luffed up alternatively also from the crane cab. To do so, a special overload protection special function must be activated (→ 9.9 Overload protection special functions, p. 618).

▶ Disconnect the hydraulic lines **4** and taken them down onto the folding jib.

10.8.3.2 Disconnecting the hydraulic line

This step must be performed only with a hydraulic folding jib.

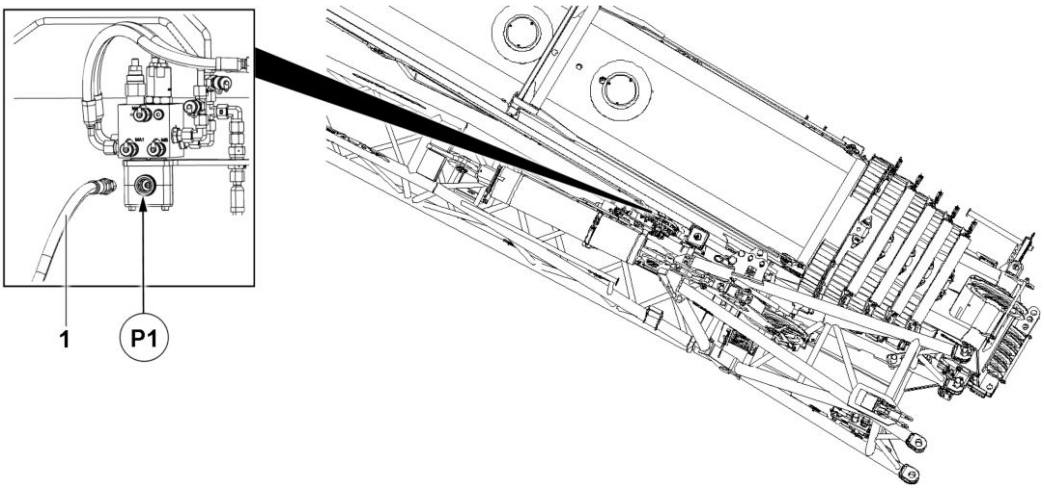


Fig. 1841: Disconnecting the hydraulic line in the transport position

1 Hydraulic line **P1** Connection position

▶ Disconnect the hydraulic line **1** in the connection position **P1**.

10.8.3.3 Preparing for swinging into the operating position

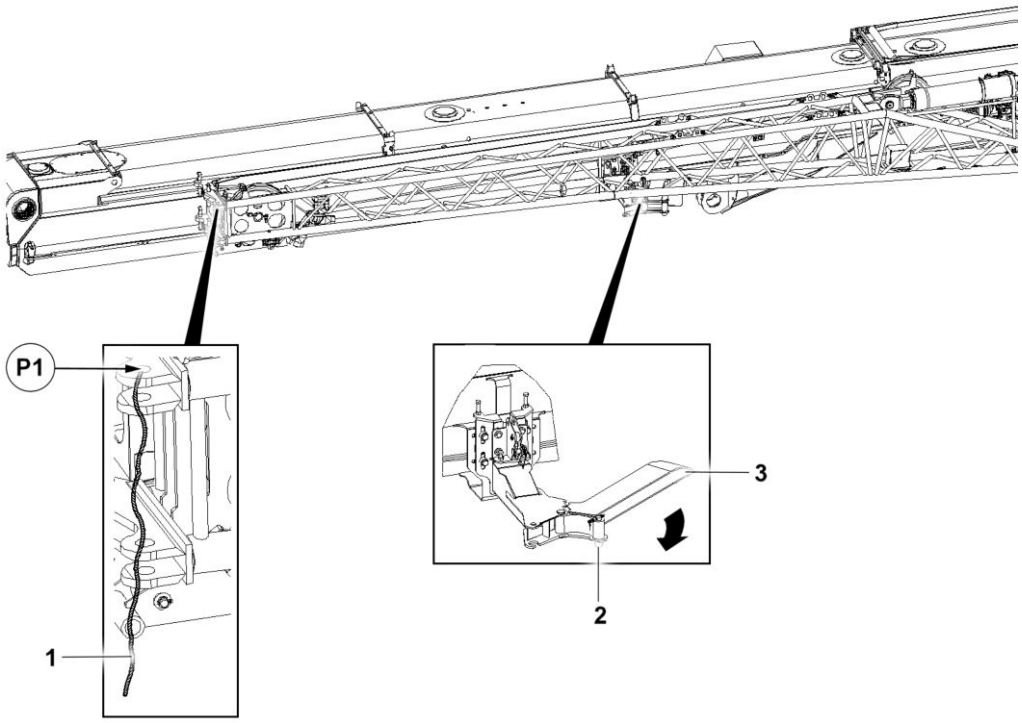


Fig. 1842: Exemplary illustration: Preparing for swinging the folding jib into the operating position

1 Guide rope
2 Spring pin
3 Support
P1 Fastening point

▶ Release the spring pin **2**.

▶ Pull the spring pin **2** down with one hand.

⚠**Danger of crushing! The support swings!**

▶ Until the spring pin **2** engages: Swing the support **3** out with the other hand.

▶ Secure the spring pin **2**.

▶ Fasten the guide rope **1** in the fastening point **P1**.

10.8.3.4 Swinging the single folding jib into the operating position

Releasing the pivot section from the end section

This step must only performed if the double folding jib is used as a single folding jib.

Make sure that the following prerequisites are met:
❑ The end section is pinned with the telescopic boom.

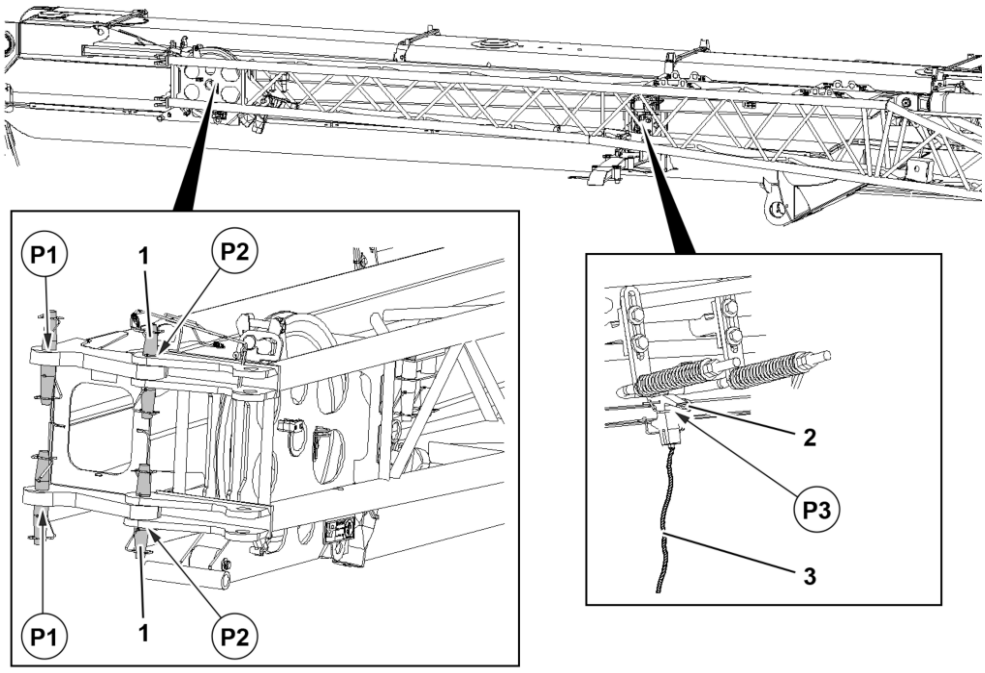


Fig. 1843: Pinning the pivot section with the end section

1 Double cone pin
2 Retaining element
3 Rope
P1 Pin position
P2 Pin position
P3 Locking point

DANGER
End section on the telescopic boom unpinned!
The end section falls down.

▶ Make sure that the end section is pinned to the telescopic boom.

(→ 10.8.14 Swinging into the transport position, p. 802)

▶ Release and unpin the double cone pin **1** at the **top and bottom** in the pin position **P2**.

▶ Insert both double cone pins **1** in the pin position **P1** and secure.

▶ Remove the retaining element **2**.

▶ Pull the rope **3** and secure again with the retaining element **2**.
▷ The pivot section is released from the end section.

Swinging and pinning in the assembly position

Make sure that the following prerequisites are met:
❑ The *assembly functions* menu is displayed in the crane remote control.

(→ Opening the assembly functions menu, p. 474)

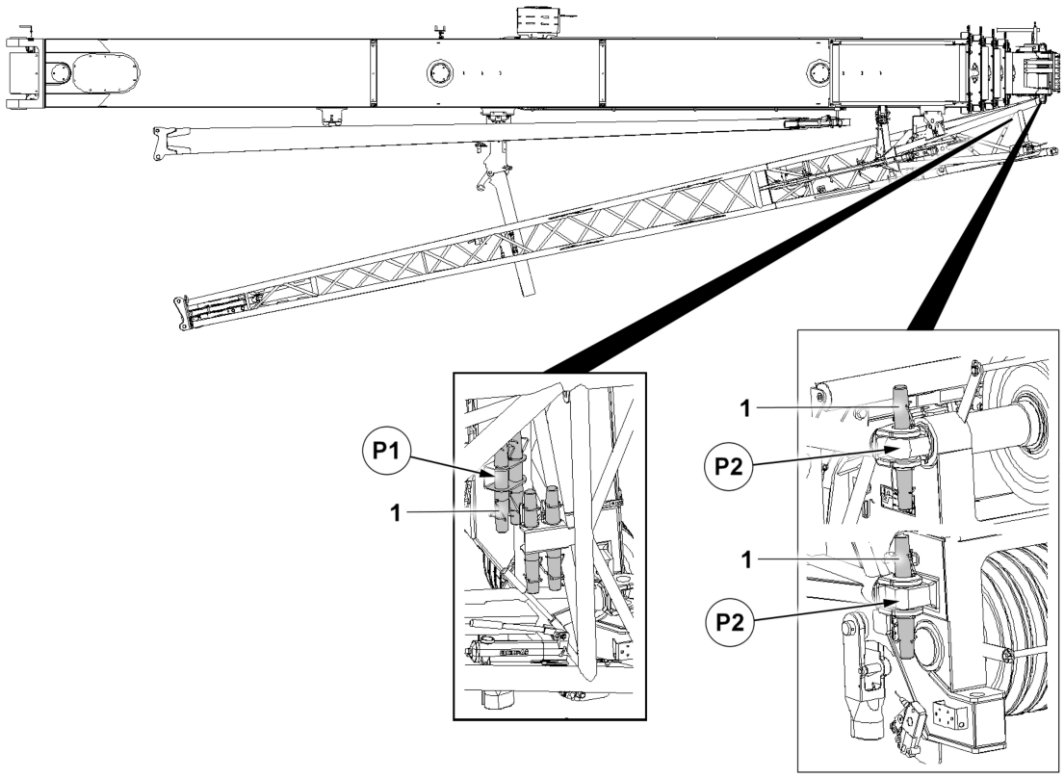


Fig. 1844: Swinging and pinning the single folding jib in the assembly position

1 Double cone pin
P1 Transport position
P2 Pin position

▶ Press the *folding jib assembly* F-button.
▷ Additional buttons are displayed.

▶ Until the telescopic boom can be pinned in the pin position **P2**: Press the *swing folding jib out* F-button.

Troubleshooting

Is swinging the folding jib out blocked?
Swing the folding jib out is **not** permissible if the telescopic boom angle is too small.

▶ Bring the telescopic boom into a slightly luffed up position (0.3°).

▶ Release and unpin both double cone pins **1** in the transport position **P1**.

▶ Insert both double cone pins **1** in the pin position **P2** and secure with retaining clips.

Troubleshooting

Do the pin bores not align in the pin position **P2**?

▶ Tension the telescopic boom (→ 10.8.4 Tensioning the telescopic boom, p. 785).

Swinging and pinning in the operating position

Make sure that the following prerequisites are met:
- ❑ The folding jib is pinned and secured at the **top and bottom** in the assembly position.
- ❑ The *assembly functions* menu is displayed in the crane remote control.
  (→ Opening the assembly functions menu, p. 474)
- ❑ For hydraulic folding jibs: Sufficient pressure is available in the control cylinder.
  (→ Checking the pressure in the control cylinder*, p. 773)

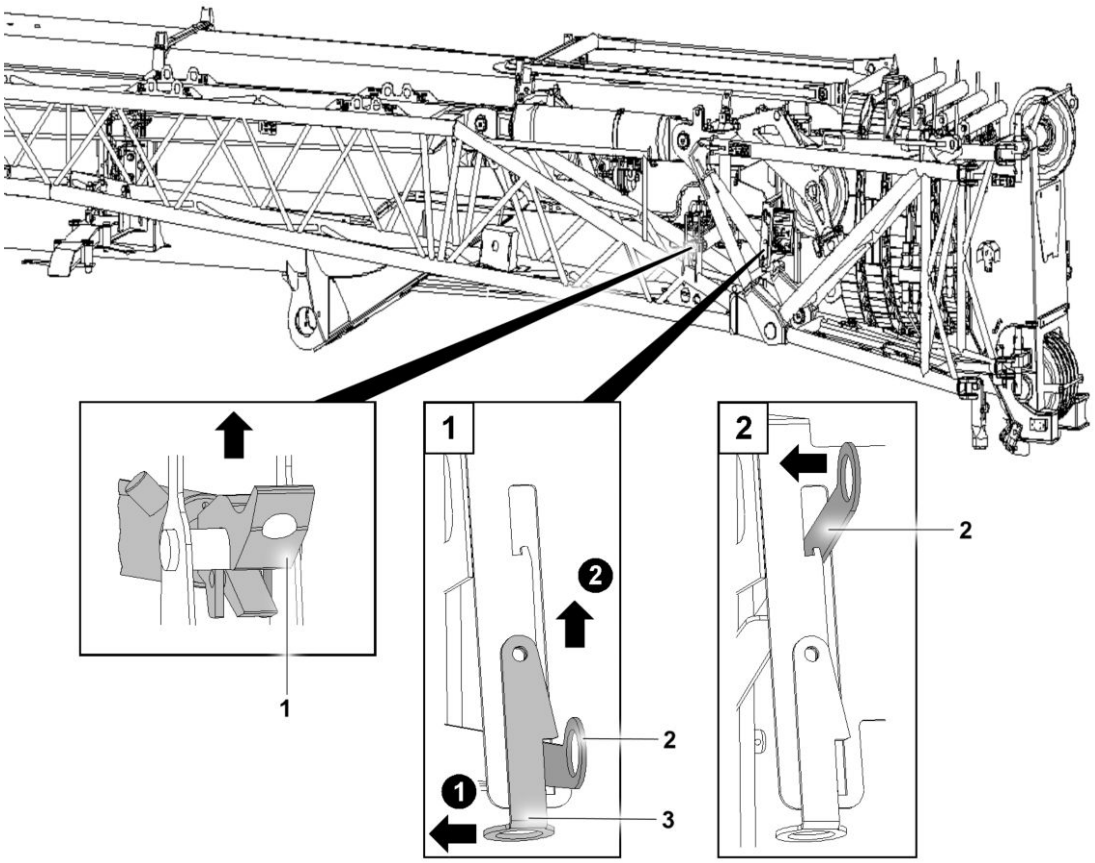


Fig. 1847: Exemplary illustration: Unlocking the swing cylinder and folding jib

1 Swing cylinder
2 Lever
3 Retaining bracket

▶ Swing the retaining bracket **3** to the side with the hook rod.

▶ Press the lever **2** with the hook rod upward and engage it in the link.

▶ Until the swing cylinder **1** is completely extended: Press the *swing folding jib out* F-button.

▶ Push the swing cylinder **1** up with the hook rod and unlock it.

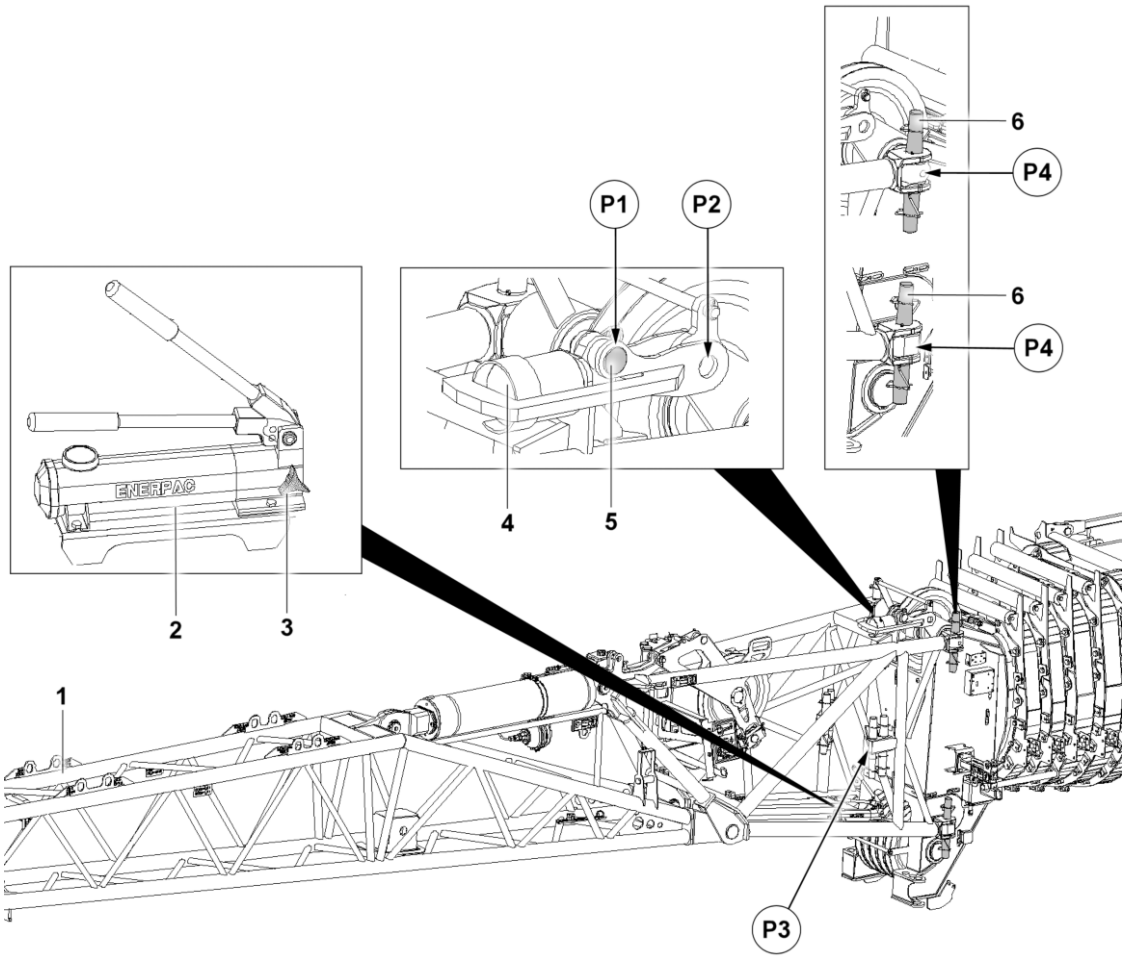


Fig. 1849: Pinning the folding jib in the operating position

1 Pivot section
2 Hand pump
3 Knob
4 Assembly aid
5 Pin
6 Double cone pin
P1 Transport position
P2 Pin position
P3 Transport position
P4 Pin position

- ▶ Until the telescopic boom can be pinned in the pin position **P4** at the **bottom**: Swing the pivot section **1** out with the guide rope.
- ▶ Release and unpin the double cone pin **6** in the transport position **P3**.
- ▶ Insert the double cone pin **6** at the **bottom** in the pin position **P4** and secure with retaining clips.
- ▶ Release and unpin the pin **5** in the transport position **P1**.
- ▶ Pin the assembly aid **4** with the telescopic boom: Insert and secure the pin **5** in the pin position **P2**.
- ▶ Close the knob **3**.
- ▶ Until the pin points align at the **top** in the pin position **P4**: Actuate the hand pump **2**.
- ▶ Release and unpin the double cone pin **6** in the transport position **P3**.
- ▶ Insert the **top** double cone pin **6** in the pin position **P4** and secure with retaining clips.
- ▶ Open the knob **3**.
  ▷ The pin **5** is relieved.
- ▶ Release and unpin the pin **5** in the pin position **P2**.

▶ Insert and secure the pin **5** in the transport position **P1**.

▶ Remove the guide rope on the folding jib.

▶ Connect the electrical line (→ 10.8.7 Connecting the electrical lines, p. 790).

If a hydraulic folding jib is assembled:

▶ Connect the hydraulic line (→ 10.8.9 Connecting the hydraulic lines, p. 792).

▶ Reeve the hoist rope in (→ 10.8.6 Reeving the hoist rope in, p. 787).

10.8.3.5 Swinging the double folding jib into the operating position

Unpinning in the transport position

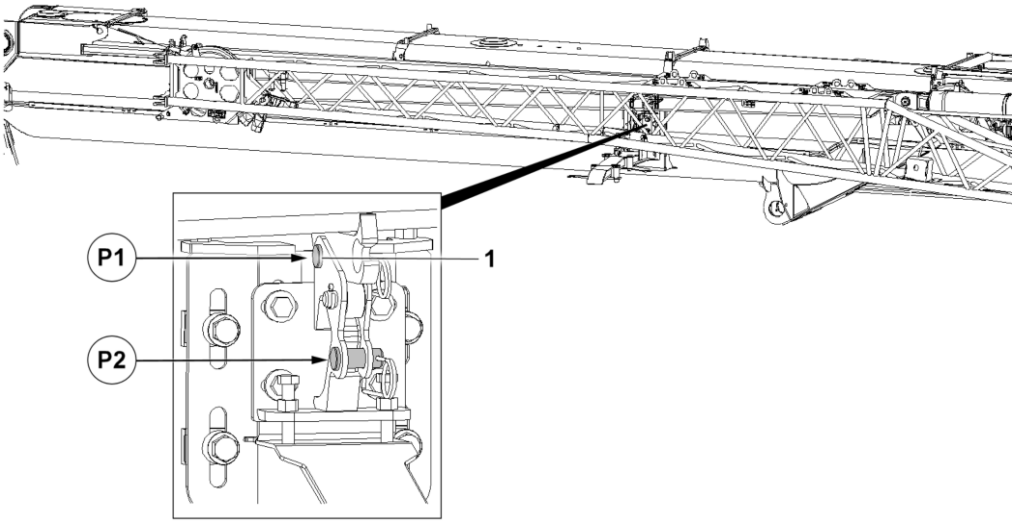


Fig. 1850: Unpinning the double folding jib in the transport position

1 Pin
P1 Pin position
P2 Park position

▶ Release and unpin the pin **1** in the pin position **P1**.

▶ Insert and secure the pin **1** in the park position **P2**.

Swinging and pinning in the assembly position

Make sure that the following prerequisites are met:

❑ The *assembly functions* menu is displayed in the crane remote control.

(→ Opening the assembly functions menu, p. 474)

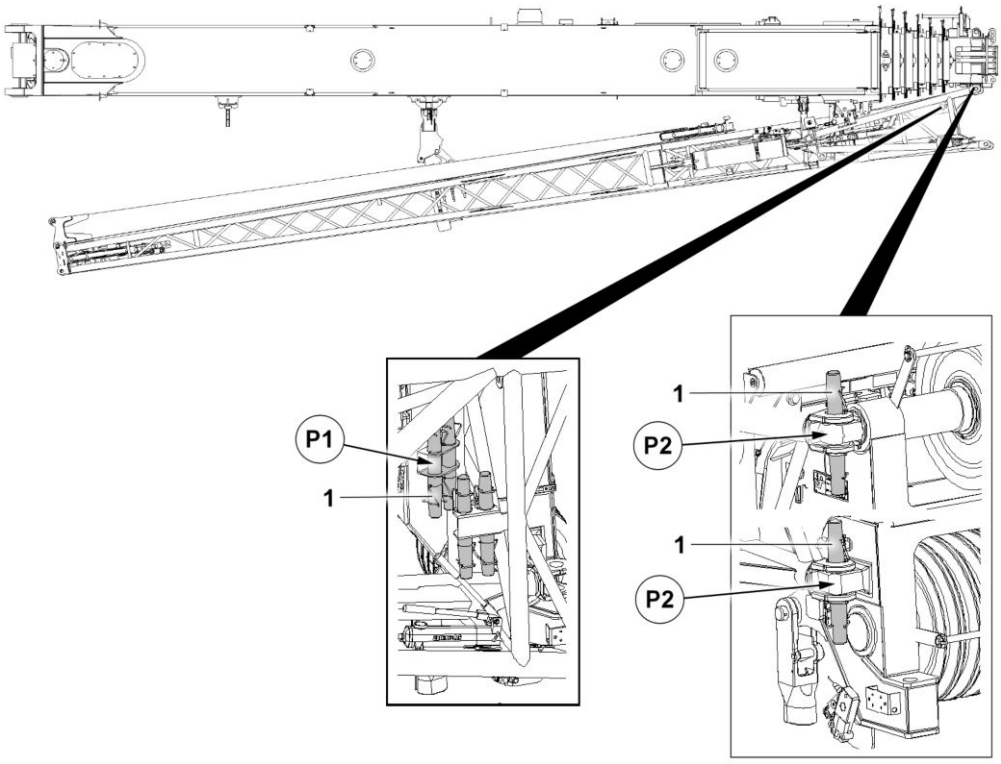


Fig. 1851: Swinging and pinning the double folding jib in the assembly position

1 Double cone pin
P1 Transport position
P2 Pin position

▶ Press the *folding jib assembly* F-button.
▷ Additional buttons are displayed.

▶ Until the telescopic boom can be pinned in the pin position **P2**: Press the *swing folding jib out* F-button.

▶ Release and unpin both double cone pins **1** in the transport position **P1**.

▶ Insert both double cone pins **1** in the pin position **P2** and secure with retaining clips.

Troubleshooting

Do the pin bores not align in the pin position **P2**?

▶ Tension the telescopic boom (→ 10.8.4 Tensioning the telescopic boom, p. 785).

Swinging and pinning the pivot section in the operating position

Make sure that the following prerequisites are met:
❑ The folding jib is pinned and secured at the **top and bottom** in the assembly position.
❑ The *assembly functions* menu is displayed in the crane remote control.
(→ Opening the assembly functions menu, p. 474)

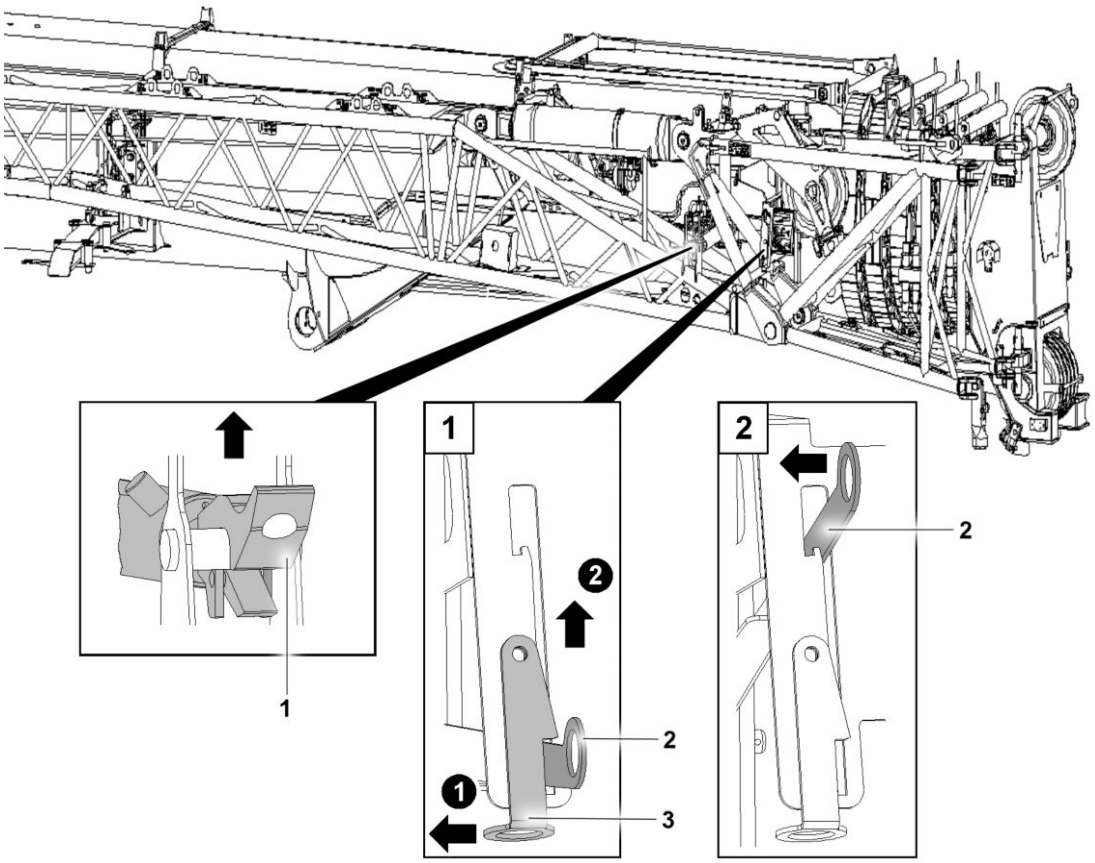


Fig. 1854: Exemplary illustration: Unlocking the swing cylinder and folding jib

1 Swing cylinder
2 Lever
3 Retaining bracket

▶ Swing the retaining bracket **3** to the side with the hook rod.

▶ Press the lever **2** with the hook rod upward and engage it in the link.

▶ Until the swing cylinder **1** is completely extended: Press the *swing folding jib out* F-button.

▶ Push the swing cylinder **1** up with the hook rod and unlock it.

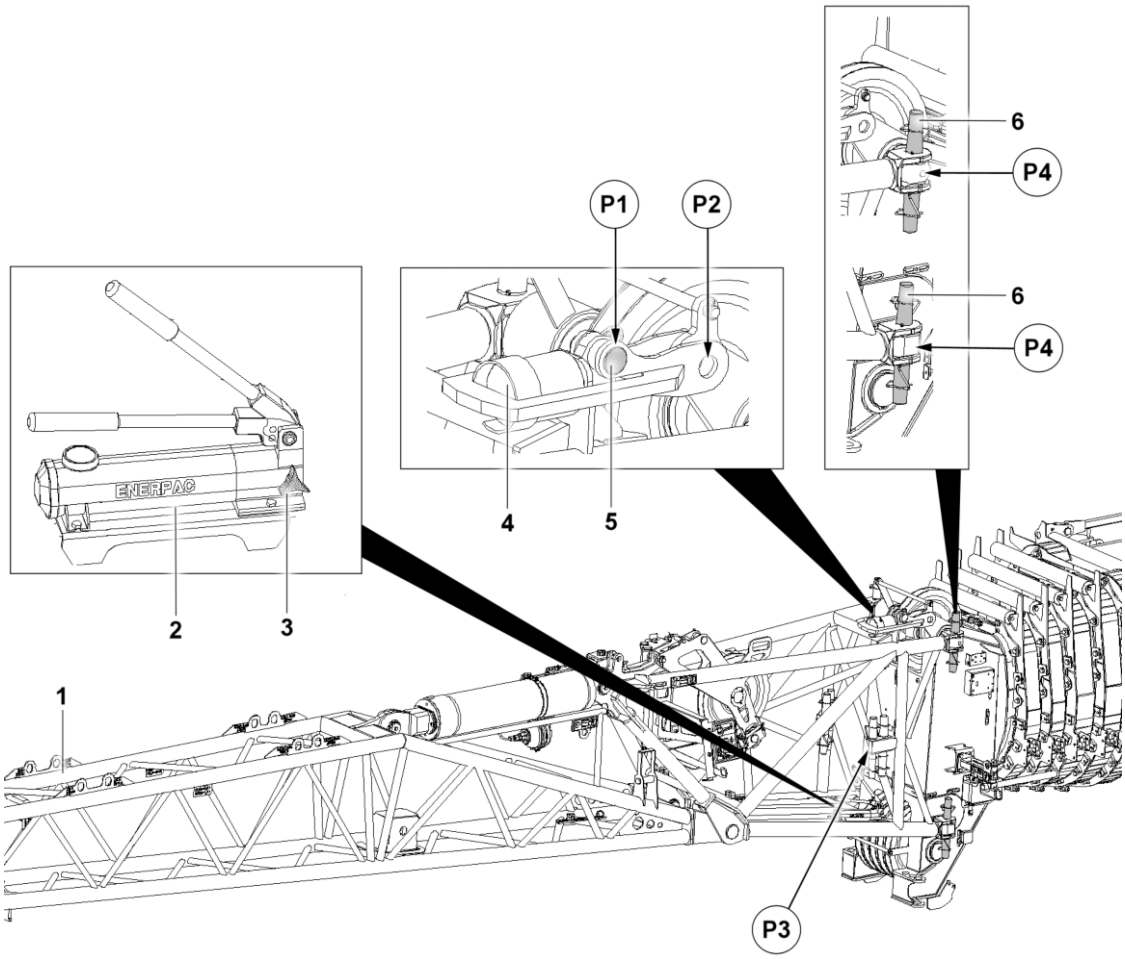


Fig. 1856: Pinning the folding jib in the operating position

1 Pivot section
2 Hand pump
3 Knob
4 Assembly aid
5 Pin
6 Double cone pin
P1 Transport position
P2 Pin position
P3 Transport position
P4 Pin position

- ▶ Until the telescopic boom can be pinned in the pin position **P4** at the **bottom**: Swing the pivot section **1** out with the guide rope.
- ▶ Release and unpin the double cone pin **6** in the transport position **P3**.
- ▶ Insert the double cone pin **6** at the **bottom** in the pin position **P4** and secure with retaining clips.
- ▶ Release and unpin the pin **5** in the transport position **P1**.
- ▶ Pin the assembly aid **4** with the telescopic boom: Insert and secure the pin **5** in the pin position **P2**.
- ▶ Close the knob **3**.
- ▶ Until the pin points align at the **top** in the pin position **P4**: Actuate the hand pump **2**.
- ▶ Release and unpin the double cone pin **6** in the transport position **P3**.
- ▶ Insert the **top** double cone pin **6** in the pin position **P4** and secure with retaining clips.
- ▶ Open the knob **3**.
  ▷ The pin **5** is relieved.
- ▶ Release and unpin the pin **5** in the pin position **P2**.

▶ Insert and secure the pin **5** in the transport position **P1**.

▶ Remove the guide rope on the folding jib.

▶ Connect the electrical line (→ 10.8.7 Connecting the electrical lines, p. 790).

If a hydraulic folding jib is assembled:

▶ Connect the hydraulic line. (→ 10.8.9 Connecting the hydraulic lines, p. 792)

Swinging and pinning the end section in the operating position

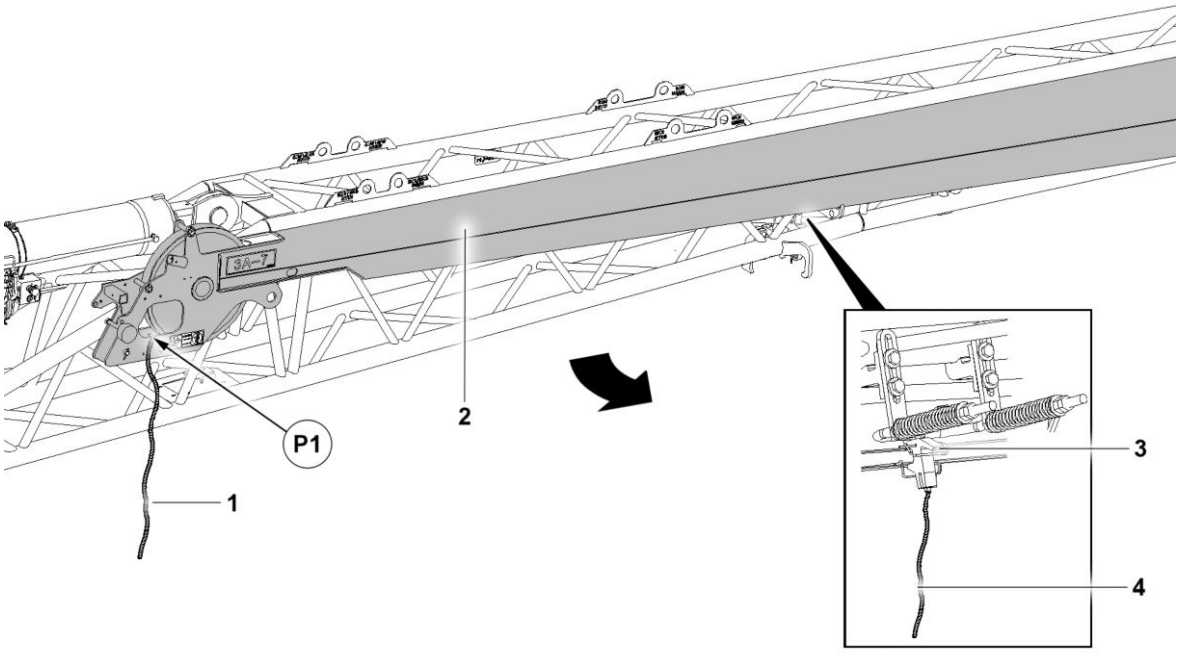


Fig. 1857: Swinging the end section into the operating position

1 Guide rope
2 End section
3 Retaining element
4 Rope
P1 Fastening point

▶ Fasten the guide rope **1** in the fastening point **P1**.

▶ Remove the retaining element **3**.

▶ Unlock the end section **2**: Pull the rope **4**.

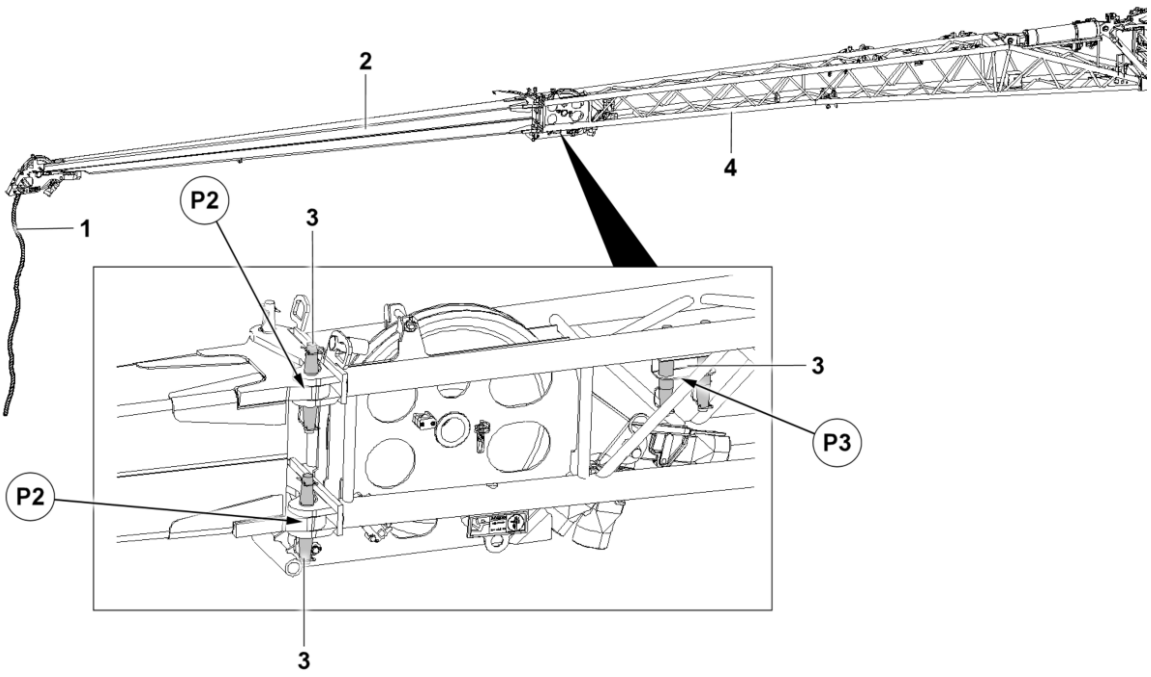


Fig. 1858: Pinning the end section in the operating position

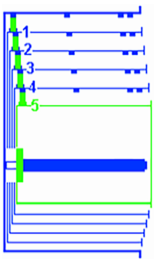
1	Guide rope	**4**	Pivot section
2	End section	**P2**	Pin position
3	Double cone pin	**P3**	Transport position

- ▶ Until the pivot section **4** can be pinned in the pin position **P2**: Swing the end section **2** out with the guide rope **1**.
- ▶ Release and unpin the double cone pin **3** in the transport position **P3**.
- ▶ Insert the double cone pin **3** at the **top and bottom** in pin position **P2** and secure with retaining clips.
- ▶ Remove the guide rope **1**.
- ▶ Connect the electrical line (→ 10.8.7 Connecting the electrical lines, p. 790).
- ▶ Reeve the hoist rope in (→ 10.8.6 Reeving the hoist rope in, p. 787).

10.8.4 Tensioning the telescopic boom

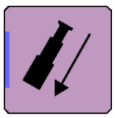
To be able to pin the folding jib in the operating position, the telescopic boom must be telescoped in all the way and tensioned.

Due to the tolerances of the individual telescopic pinnings, it may be necessary to retension the telescopic boom. As a result, all telescopes are retracted into the pinned condition.



Make sure that the following prerequisites are met:
- ❑ The telescopes are fully retracted and pinned.
- ❑ The telescoping cylinder is pinned with telescope 5.
- ❑ The *assembly functions* menu is displayed in the crane remote control. (→ Opening the assembly functions menu, p. 474)

- ▶ Press the *folding jib assembly* F-button.
  - ▷ Additional buttons are displayed.



⚠ Danger of crushing! The telescopes are pulled together!

▶ Until the pin bores of the folding jib and telescopic boom align: Press the *tension the telescopic boom* F-button.

10.8.5 Assembling the folding jib

Make sure that the following prerequisites are met:

- ❑ The crane is in the set up configuration according to the assembly chart. (→ 10.8.18 Folding jib assembly charts, p. 824)
- ❑ The central ballast is assembled. (→ 10.6.1 Assembling the central ballast, p. 748)
- ❑ The crane inclination is maximum 0.3°.
- ❑ The crane set up configuration is set in the *set up* menu. (→ 8.6 Setting up the crane, p. 412)
- ❑ The telescopic boom is telescoped in all the way.
- ❑ The telescopic boom is luffed to 0.3°.
- ❑ With a double folding jib: The end section is folded in, locked and secured.
- ❑ The guide rope for guiding the folding jib is secured.

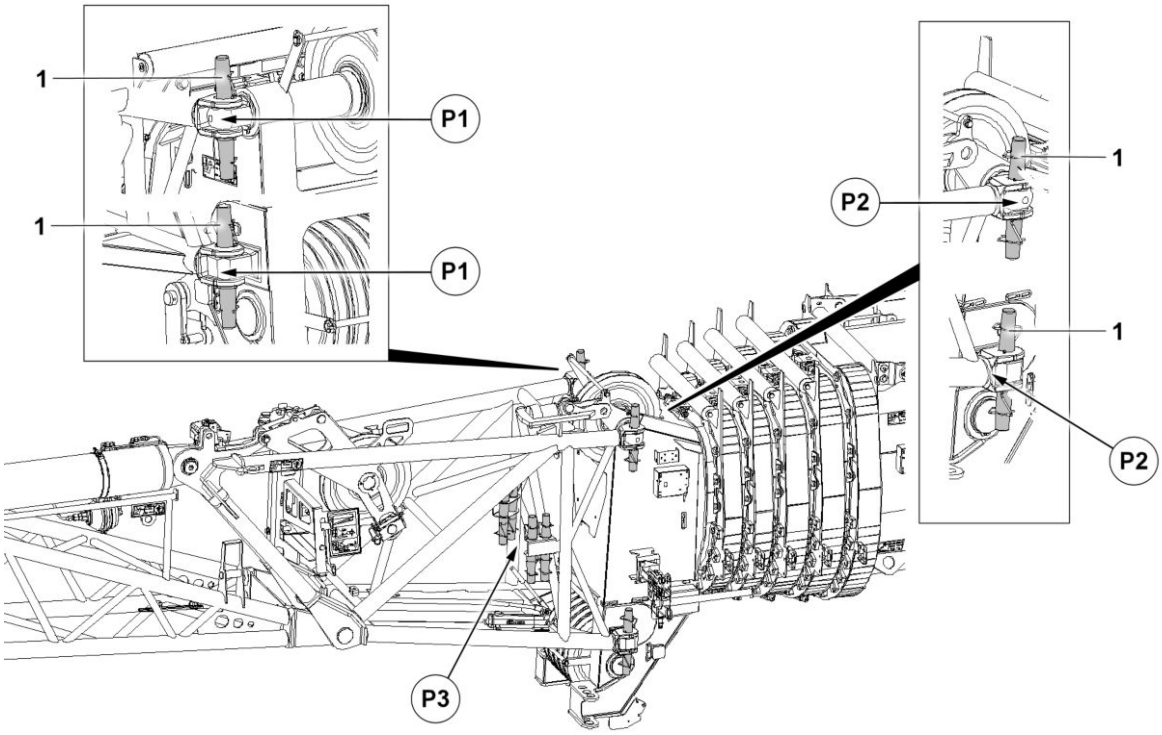


Fig. 1862: Assembling the folding jib with the auxiliary crane

1 Double cone pin
P1 Pin position
P2 Pin position
P3 Transport position

The folding jib remains subsequently in the operating position

▶ Fasten the auxiliary crane to the folding jib (→ 7.7 Folding jib, p. 389).

▶ Lift the folding jib with the auxiliary crane and fix it to the telescopic boom at the **top** in pin position **P1** and pin position **P2**.

▶ Release and unpin the double cone pin **1** in the transport position **P3**.

- ▶ Insert the **top** double cone pin **1** in the pin position **P1** and pin position **P2** and secure with retaining clips.
- ▶ Until pinning is possible at the **bottom** in the pin position **P1** and pin position **P2**: Lower the folding jib.
- ▶ Release and unpin the double cone pin **1** in the transport position **P3**.
- ▶ Insert the double cone pin **1** at the **bottom** pin position **P1** and pin position **P2** and secure with retaining clips.

If the folding jib is pinned to the telescopic boom:
- ▶ Disconnect the folding jib from the auxiliary crane.

If the double folding jib should be used as a single folding jib:
- ▶ Swing the folding jib into the transport position and assemble the end section to the side on the telescopic boom.
- ▶ Connect the electrical line (→ 10.8.7 Connecting the electrical lines, p. 790).

If a hydraulic folding jib is assembled:
- ▶ Connect the hydraulic line (→ 10.8.9 Connecting the hydraulic lines, p. 792).
- ▶ Reeve the hoist rope in (→ 10.8.6 Reeving the hoist rope in, p. 787).

The folding jib is subsequently swung into the transport position

- ▶ Fasten the auxiliary crane to the folding jib (→ 7.7 Folding jib, p. 389).
- ▶ Lift the folding jib with the auxiliary crane and fix it to the telescopic boom at the **top** in pin position **P1** and pin position **P2**.
- ▶ Release and unpin the double cone pin **1** in the transport position **P3**.
- ▶ Insert the **top** double cone pin **1** in the pin position **P1** and secure with retaining clips.
- ▶ Until pinning is possible at the **bottom** in the pin position **P1**: Lower the folding jib.
- ▶ Release and unpin the double cone pin **1** in the transport position **P3**.
- ▶ Insert the double cone pin **1** at the **bottom** in the pin position **P1** and secure with retaining clips.

If the folding jib is pinned to the telescopic boom:
- ▶ Disconnect the folding jib from the auxiliary crane.
- ▶ Swinging the folding jib into the transport position (→ 10.8.14 Swinging into the transport position, p. 802).

10.8.6 Reeving the hoist rope in

CAUTION
Danger of crushing with pulley supports and swinging rope guide pulleys!

- ▶ Do **not** reach into the slewing range.

Make sure that the following prerequisites are met:
- ❑ The telescopic boom is telescoped in all the way.
  (→ 8.18.5 Telescoping the telescopic boom, p. 545)
- ❑ The folding jib is in the operating position.
  (→ 10.8.3 Swinging into the operating position, p. 773)
- ❑ A hook rod is available.
  (→ 4.7.10 Hook rod, p. 85)

10.8.6.1 Swinging and pinning the rope guide pulley in the operating position

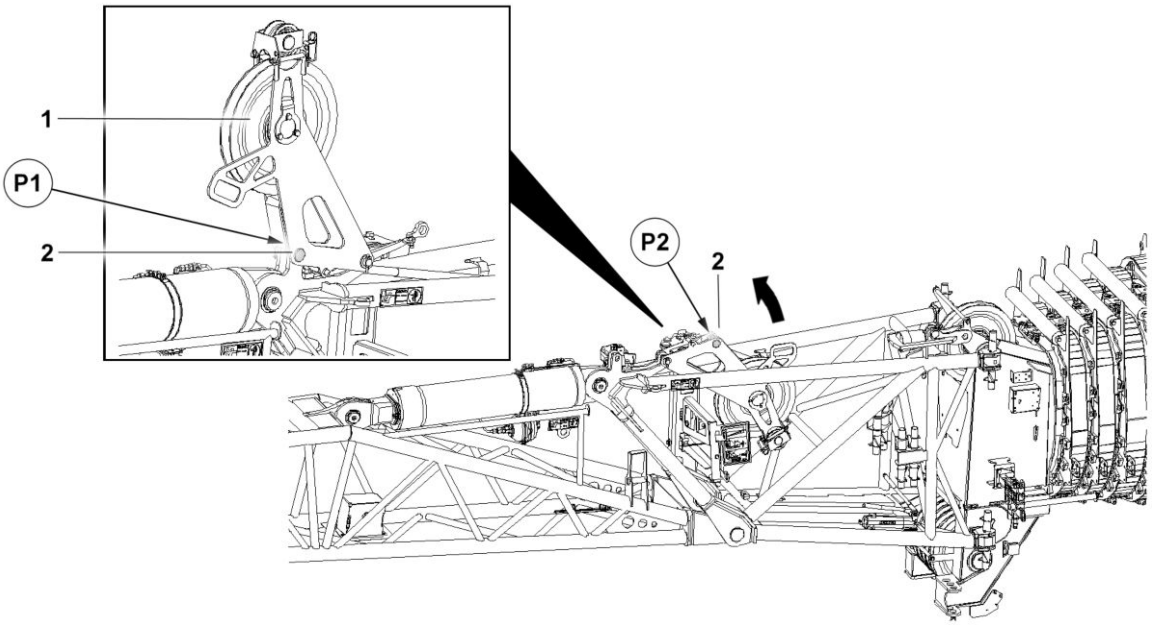


Fig. 1863: Pinning the rope guide pulley in the operating position

1 Rope guide pulley
2 Pin
P1 Pin position
P2 Pin position

▶ Release the pin **2** in the pin position **P2** and unpin.

▶ Swing the rope guide pulley **1** into the operating position.

▶ Insert the pin **2** in the pin position **P1** and secure.

10.8.6.2 Reeving in the hoist rope on the single folding jib

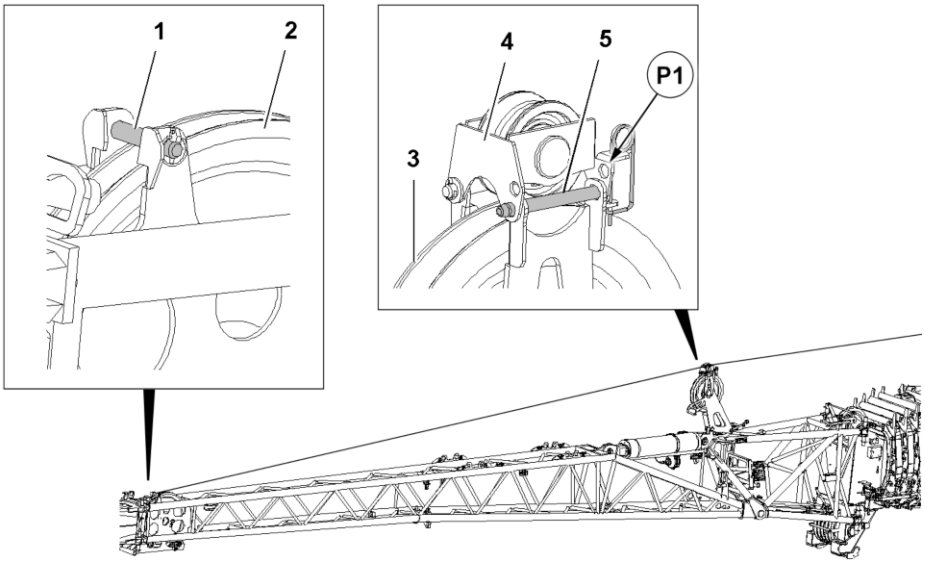


Fig. 1864: Reeving in the hoist rope on the single folding jib

1 Rope retaining pin
2 Rope pulley
3 Rope guide pulley
4 Pulley support
5 Pin
P1 Park position

- ▶ Unpin the pin **5** and insert it in park position **P1**.
- ▶ Swing the pulley support **4** into the assembly position.
- ▶ Release and unpin the rope retaining pin **1**.
- ▶ Place the hoist rope with the hook rod over the rope guide pulley **3**.
- ▶ Place the hoist rope with the hook rod over the rope pulley **2**.
- ▶ Swing the pulley support **4** into the operating position.
- ▶ Insert the pin **5** in the operating position and secure.
- ▶ Insert and secure the rope retaining pin **1**.
- ▶ Assembling the load hook (→ 10.4.11 Assembling the load hook, p. 729).

or

Reeve the hook block in (→ 10.4.9 Reeving the hook block in, p. 726).

- ▶ Assemble the hoist limit switch weight (→ 10.4.13 Assembling the hoist limit switch weight, p. 730).

10.8.6.3 Reeving in the hoist rope on the double folding jib

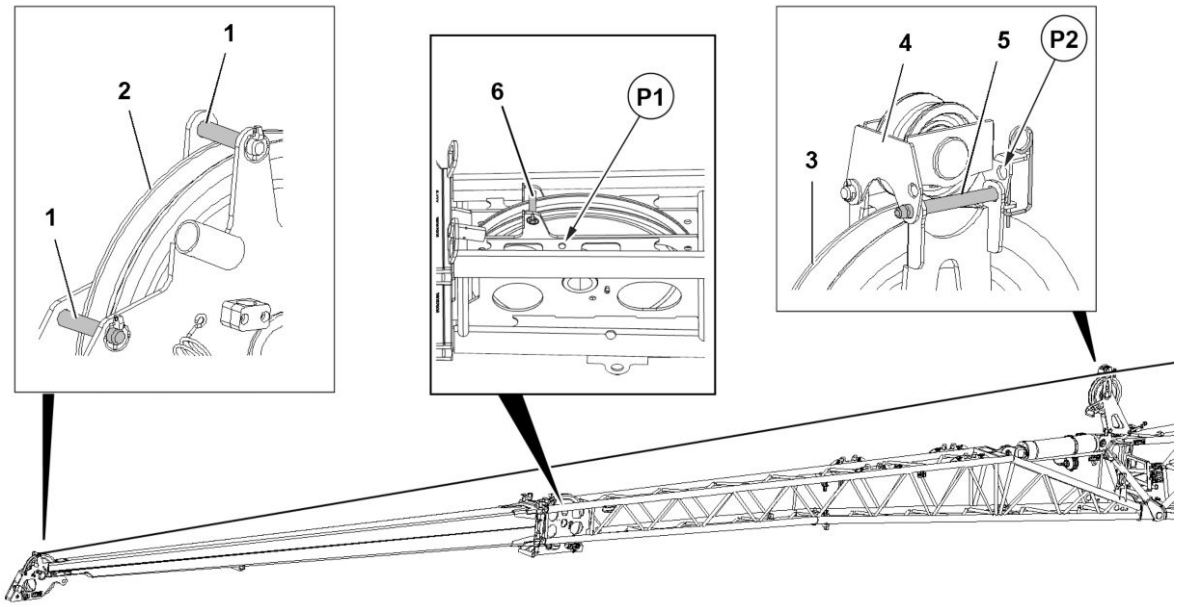


Fig. 1865: Reeving in the hoist rope

1	Rope retaining pin (2x)	**5**	Pin
2	Rope pulley	**6**	Rope retaining pin
3	Rope guide pulley	**P1**	Park position
4	Pulley support	**P2**	Park position

- ▶ Unpin the pin **5** and insert it in park position **P2**.
- ▶ Swing the pulley support **4** into the assembly position.
- ▶ Release and unpin the rope retaining pin **6**.
- ▶ Insert the rope retaining pin **6** in the park position **P1** and secure.
- ▶ Release and unpin both rope retaining pins **1**.
- ▶ Place the hoist rope with the hook rod over the rope guide pulley **3**.
- ▶ Place the hoist rope with the hook rod over the rope pulley **2**.

▶ Swing the pulley support **4** into the operating position.

▶ Insert the pin **5** in the operating position and secure.

▶ Insert and secure both rope retaining pins **1**.

▶ Assembling the load hook (→ 10.4.11 Assembling the load hook, p. 729).

or

Reeve the hook block in (→ 10.4.9 Reeving the hook block in, p. 726).

▶ Assemble the hoist limit switch weight (→ 10.4.13 Assembling the hoist limit switch weight, p. 730).

10.8.7 Connecting the electrical lines

Make sure that the following prerequisites are met:

❑ Wind speed sensor and airplane warning light* are assembled on the folding jib. (→ 10.13.1 Assembling in the operating position, p. 870)

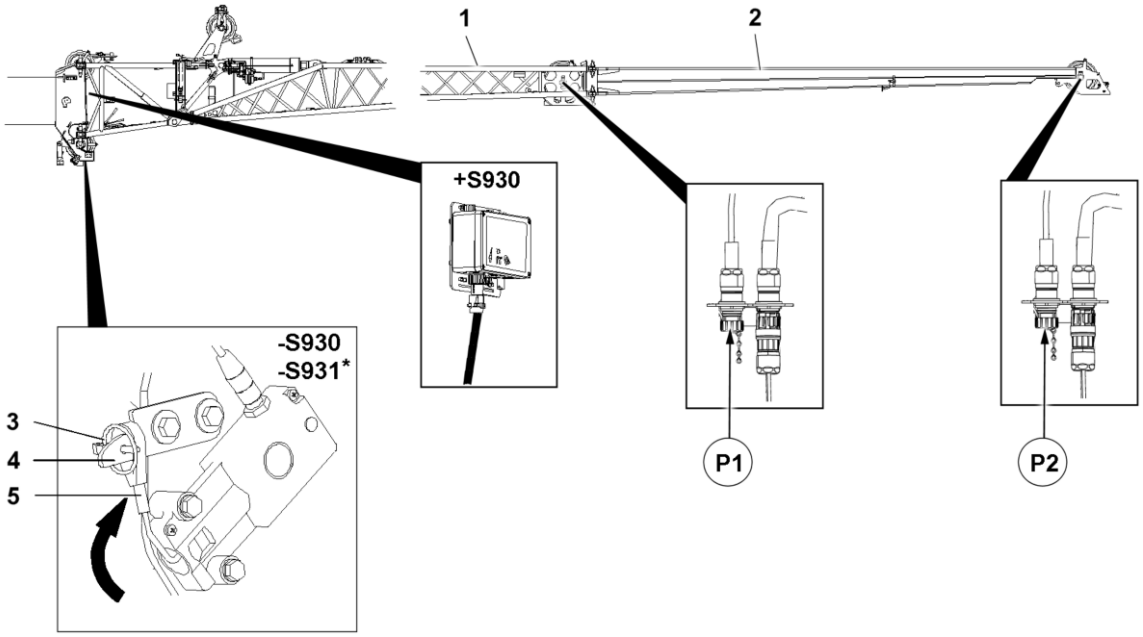


Fig. 1866: Connecting the electrical lines

1	Pivot section	**+S930**	Connector box
2	End section	**-S930**	Hoist limit switch
3	Retaining element	**-S931**	Hoist limit switch*
4	Fixed point	**P1**	Single folding jib connection
5	Hoist limit switch rope	**P2**	Double folding jib connection

Single folding jib

▶ Connect the electrical lines from the pivot section **1** to the connector box **+S930** on the boom head.

▶ Connect the wind speed sensor and airplane warning light* to connection **P1**

▶ Test the warning and safety equipment (→ 8.3 Checking the warning and safety equipment, p. 404).

When the folding jib is used in single hook operation:

▶ Prepare the hoist limit switch for single hook operation

Double folding jib

- ▶ Connect the electrical lines from the pivot section **1** to the connector box **+S930** on the boom head.
- ▶ Connect the electrical lines from the end section **2** to the pivot section **1** at the connection **P1**.
- ▶ Connect the wind speed sensor and airplane warning light* to connection **P2**
- ▶ Test the warning and safety equipment (→ 8.3 Checking the warning and safety equipment, p. 404).

When the folding jib is used in single hook operation:

- ▶ Prepare the hoist limit switch for single hook operation

Single hook operation

The hoist limit switch **-S930** and hoist limit switch* **-S931** must remain electrically connected even when not in use.

- ▶ Disassemble the hoist limit switch weight on the boom head.
- ▶ Pull the hoist limit switch rope **5**, connect it to the fixed point **4** and secure with the retaining element **3**.

10.8.8 Checking the electrical lines

Make sure that the following prerequisites are met:

- ❑ All electrical lines are connected.
- ❑ LICCON is running.
- ❑ The crane set up configuration and settings in the *set up* main menu match.
- ❑ **No** error message on the superstructure monitor.

10.8.8.1 Angle sensor

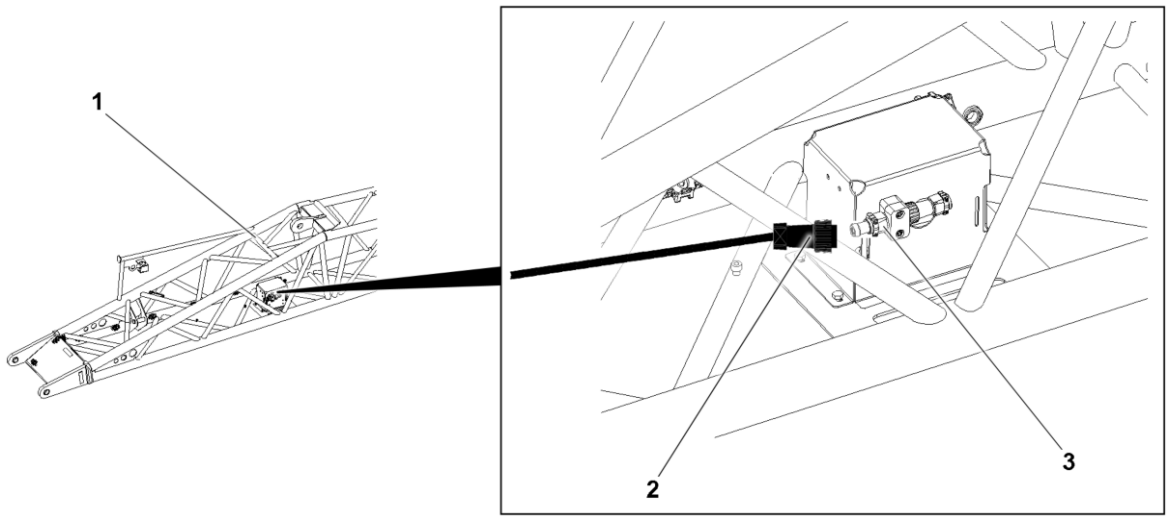


Fig. 1867: Folding jib with angle sensor

1 Folding jib
2 Cable plug
3 Angle sensor

Make sure that the following prerequisites are met:

- ❑ All electrical lines are connected.
- ❑ LICCON is running.
- ❑ The cable plug **2** is inserted in the angle sensor **3**.

Folding jib without an angle sensor

▶ Observe the display on the superstructure monitor.

Troubleshooting

Is the error message displayed on the superstructure monitor?
The angle sensor **3** is required by the crane.

▶ Have the angle sensor **3** installed: Contact Customer Service at Liebherr-Werk Ehingen GmbH.

10.8.9 Connecting the hydraulic lines

For a folding jib with hydraulic angle adjustment* a hydraulic connection must be established from the folding jib to the telescopic boom.

Make sure that the following prerequisites are met:
❑ The hose drum **4** is assembled on the telescopic boom.
(→ 10.15.1 Assembling the hose drum, p. 884)
❑ The hydraulic connections **3** are assembled in the operating position.
(→ 10.15.2 Assembling the hydraulic connections in the operating position, p. 887)
❑ The electrical lines are connected.
(→ 10.8.7 Connecting the electrical lines, p. 790)

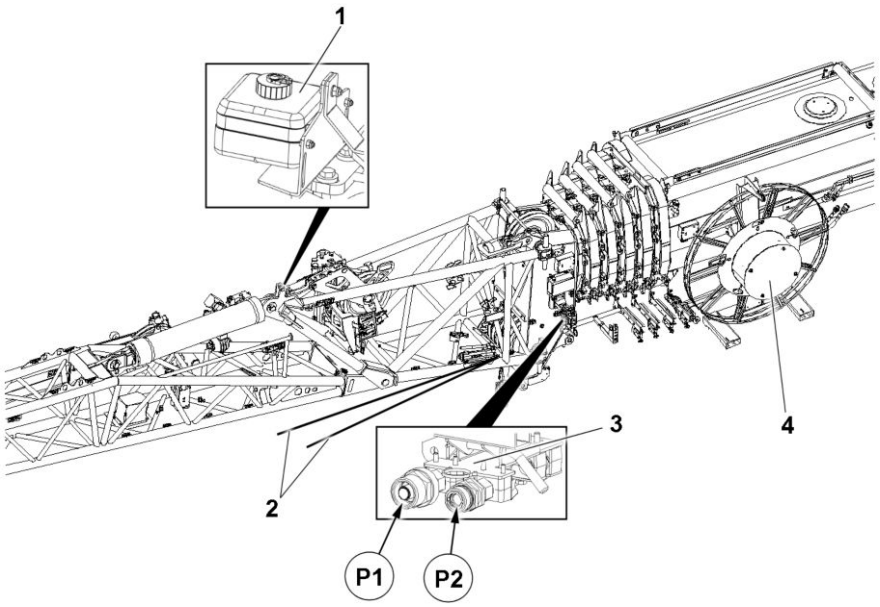


Fig. 1868: Exemplary illustration: Connecting the hydraulic lines

1 Overflow container
2 Hydraulic lines
3 Hydraulic connections
4 Hose drum
P1 Connection position
P2 Connection position

Hydraulic lines cannot be incorrectly coupled due to the different diameters of the hydraulic couplings.

▶ Remove the hydraulic lines **2** from the folding jib and connect in the connection position **P1** and connection position **P2** with the hose drum **4**.

10.8.10 Adjusting the mechanical folding jib angle

The mechanical folding jib angle can be adjusted to 0°, 20° or 40°.

The following options are available for adjusting the mechanical folding jib:
- Single folding jib: With hoist rope or hook block
- Double folding jib: With the hoist rope

Make sure that the following prerequisites are met:
- ❑ The crane is in the set up configuration according to the assembly chart.
  (→ 10.8.18 Folding jib assembly charts, p. 824)
- ❑ The crane set up configuration is set in the *set up* menu.
  (→ 8.6 Setting up the crane, p. 412)
- ❑ The telescopic boom is luffed down and telescoped in all the way.
  (→ 8.18 Crane movements, p. 532)
- ❑ The hoist limit switch weight is disassembled.
  (→ 10.4.14 Disassembling the hoist limit switch weight, p. 732)
- ❑ The folding jib is in the operating position.
  (→ 10.8.3 Swinging into the operating position, p. 773)

NOTICE
Telescoping during the adjustment procedure!
Damage to the folding jib and the hoist rope.

▶ Do **not** telescope the telescopic boom.

Note

The crane movements described here can also be carried out using the corresponding control levers in the crane cab and the expanded crane remote control (→ 8.18 Crane movements, p. 532).

10.8.10.1 Adjusting the angle with the hoist rope

Make sure that the following prerequisites are met:
- ❑ The load hook is disassembled or the hook block is reeved out.
  (→ 10.4.12 Disassembling the load hook, p. 729)
  (→ 10.4.10 Reeving the hook block out, p. 728)
- ❑ The rope lock is disassembled.
  (→ 10.4.16 Removing the lock, p. 735)

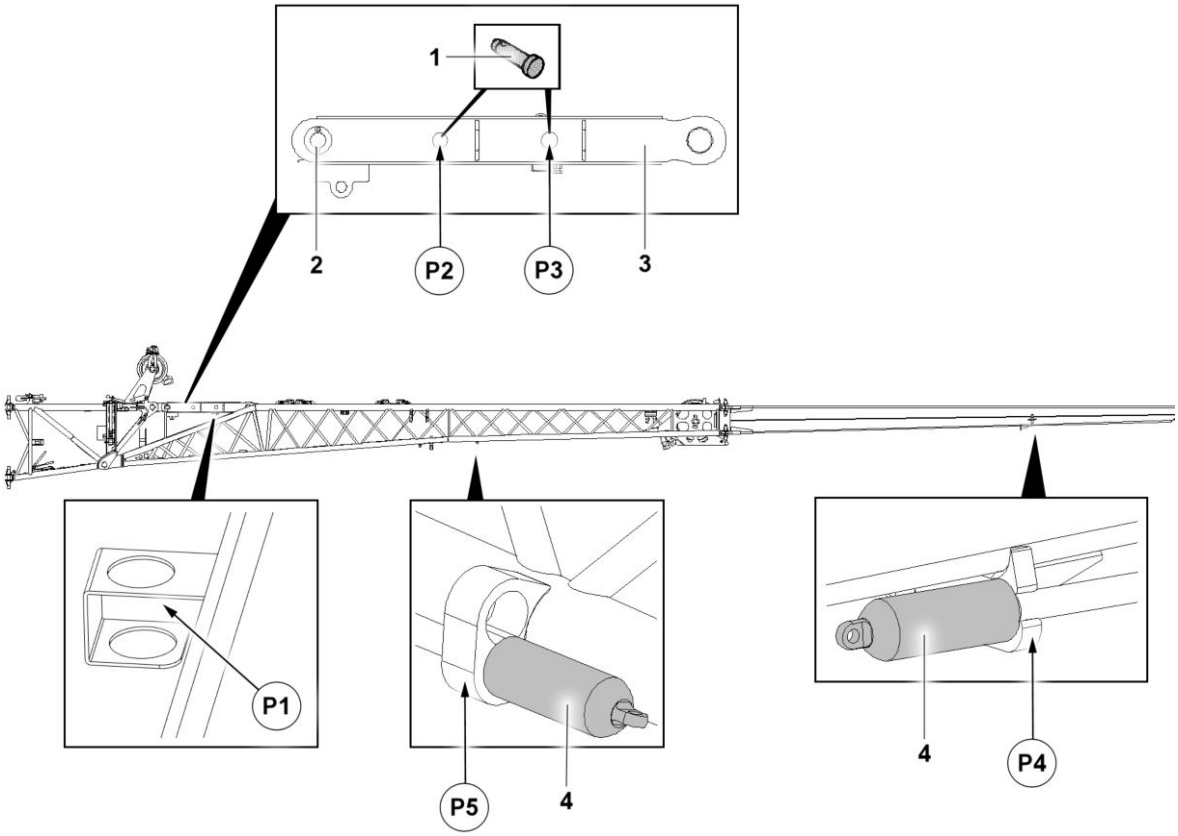


Fig. 1869: Changing the single folding jib and double folding jib with the hoist rope

1 Pin
2 Pin
3 Pull bracket
4 Rope end connection
P1 Park position 40°
P2 Pin position 20°
P3 Pin position 0°
P4 Double folding jib assembly fixed point
P5 Single folding jib assembly fixed point

Fastening the hoist rope

If a single folding jib is assembled:
▶ Fasten the rope end connection **4** in the single folding jib assembly fixed point **P5**.
or

If a double folding jib is assembled:
Fasten the rope end connection **4** in the double folding jib assembly fixed point **P4**.

Tensioning the hoist rope

Make sure that the following prerequisites are met:
❑ The rope end connection is fastened correctly in the assembly fixed point.
❑ The *assembly functions* menu is displayed in the crane remote control.
(→ Opening the assembly functions menu, p. 474)

▶ Select winch: Press the *hook block assembly* F-button in the crane remote control.
▷ Additional buttons are displayed.

▶ Tension the hoist rope **carefully**: Press the *spool up winch* F-button.
▷ The folding jib is held by the hoist rope.

Adjusting the angle to 20° or 40°

Make sure that the following prerequisites are met:
- ❑ The folding jib is in the 0° position.
- ❑ The telescopic boom is luffed to 0°.
- ❑ The folding jib is held by the hoist rope.
- ❑ The *assembly functions* menu is displayed in the crane remote control.
  (→ Opening the assembly functions menu, p. 474)

WARNING
Pin **2** is unpinned!
The folding jib folds down uncontrolled.

▶ **Never** unpin pin **2**.

NOTICE
Luff down during the adjustment procedure!
Damage to the folding jib and the hoist rope.

▶ Do **not** luff the telescopic boom down.

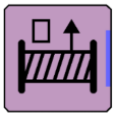
If the folding jib is held by the hoist rope:

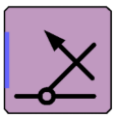
▶ Release and unpin the pin **1** in pin position 0° **P3**.

▶ Adjust to 20°: Insert and secure the pin **1** in the 20° pin position **P2**.

or

Adjust to 40°: Insert and secure the pin **1** in the 40° park position **P1**.





▶ Until the pull bracket **3** is touching the pin **1** or pin **2**: Press and hold the *spool out winch* F-button and *luff telescopic boom up* F-button.
- ▷ The angle on the folding jib is adjusted to 20° or 40°.
- ▷ The hoist rope is relieved.

Adjusting the angle to 0°

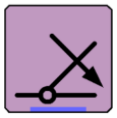
Make sure that the following prerequisites are met:
- ❑ The folding jib is in the 40 ° position or 20 ° position.
- ❑ The folding jib is held by the hoist rope.
- ❑ The *assembly functions* menu is displayed in the crane remote control.
  (→ Opening the assembly functions menu, p. 474)

WARNING
Pin **2** is unpinned!
The folding jib folds down uncontrolled.

▶ **Never** unpin pin **2**.

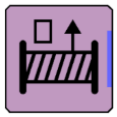
If the folding jib is held by the hoist rope:

▶ Release and unpin the pin **1** in the 20° pin position **P2** or the 40° pin position **P1**.



▶ Until the pin **1** can be inserted in the 0° pin position **P3**: Press and hold the *spool up winch* F-button and *luff telescopic boom down* F-button.

▶ Insert and secure the pin **1** in the 0° pin position **P3**.



▶ Until the pull bracket **3** is touching the pin **1**: Press and hold the *spool winch out* F-button.
▷ The angle on the folding jib is adjusted to 0°.
▷ The hoist rope is relieved.

Completing angle adjustment

Make sure that the following prerequisites are met:
❑ The folding jib is pinned and secured in the required angle.

▶ Release the rope end connection **4** in the assembly fixed point.

▶ Assemble the rope lock.

▶ Assembling the load hook (→ 10.4.11 Assembling the load hook, p. 729).

or

Reeve the hook block in (→ 10.4.9 Reeving the hook block in, p. 726).

▶ Assemble the hoist limit switch weight (→ 10.4.13 Assembling the hoist limit switch weight, p. 730).

10.8.10.2 Adjusting the angle on the single folding jib with hook block

Angle adjustment of the mechanical double folding jib with a hook block is **prohibited**.

Make sure that the following prerequisites are met:
❑ The single folding jib is reeved in with a 1-pulley or 3-pulley hook block.
❑ The hook block has been reeved in 2 times.
❑ The hook block weight is maximum 1.3 t.

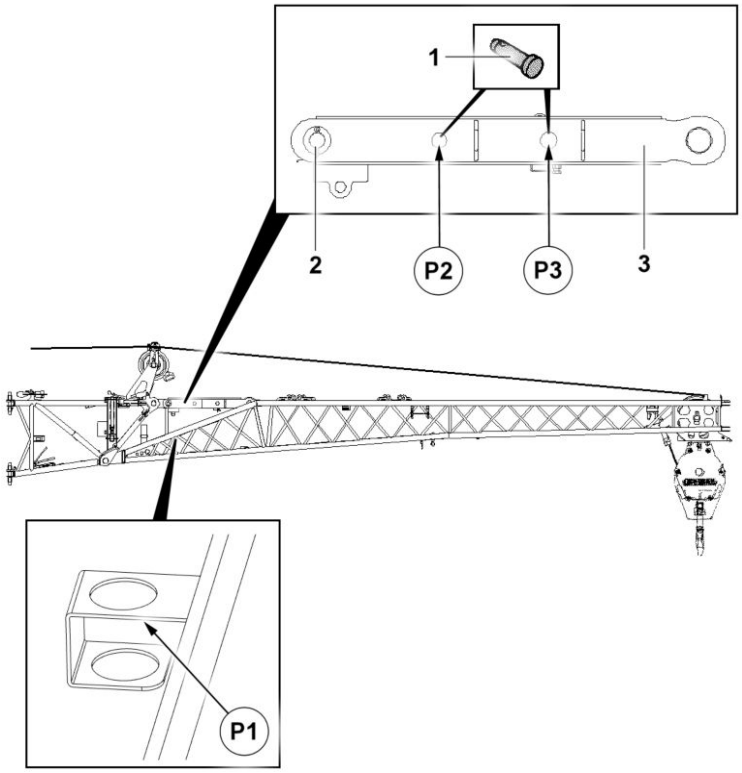


Fig. 1875: Changing the single folding jib with hoist rope and hook block

1 Pin
2 Pin
3 Pull bracket
P1 Park position 40°
P2 Pin position 20°
P3 Pin position 0°

Tensioning the hoist rope

Make sure that the following prerequisites are met:
❑ The *assembly functions* menu is displayed in the crane remote control.
(→ Opening the assembly functions menu, p. 474)

Tensioning the hoist rope with the crane remote control

▶ Select winch: Press the *hook block assembly* F-button in the crane remote control.
▷ Additional buttons are displayed.

▶ Tension the hoist rope **carefully**: Press the *spool up winch* F-button.
▷ The folding jib is held by the hoist rope.

Adjusting the angle to 20° or 40°

Make sure that the following prerequisites are met:
❑ The folding jib is in the 0° position.
❑ The telescopic boom is luffed to 0°.
❑ The folding jib is held by the hoist rope.
❑ The *assembly functions* menu is displayed in the crane remote control.
(→ Opening the assembly functions menu, p. 474)

WARNING
Pin **2** is unpinned!
The folding jib folds down uncontrolled.

▶ **Never** unpin pin **2**.

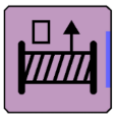
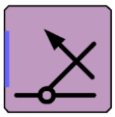
NOTICE
Luff down during the adjustment procedure!
Damage to the folding jib and the hoist rope.

▶ Do **not** luff the telescopic boom down.

If the folding jib is held by the hoist rope:
▶ Release and unpin the pin **1** in pin position 0° **P3**.

▶ Adjust to 20°: Insert and secure the pin **1** in the 20° pin position **P2**.
or

Adjust to 40°: Insert and secure the pin **1** in the 40° park position **P1**.

▶ Until the pull bracket **3** is touching the pin **1** or pin **2**: Press and hold the *spool out winch* F-button and*luff telescopic boom up* F-button.
▷ The angle on the folding jib is adjusted to 20° or 40°.
▷ The hoist rope is relieved.

Adjusting the angle to 0°

Make sure that the following prerequisites are met:
❑ The folding jib is in the 40 ° position or 20 ° position.
❑ The folding jib is held by the hoist rope.
❑ The *assembly functions* menu is displayed in the crane remote control.
(→ Opening the assembly functions menu, p. 474)

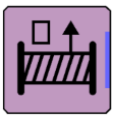
WARNING
The pin **2** is unpinned!
The folding jib folds down uncontrolled.

▶ **Never** unpin the pin **2**.

▶ Release and unpin the pin **1** in the 20° pin position **P2** or the 40° pin position **P1**.


▶ Until the pin **1** can be inserted in the 0° pin position **P3**: Press and hold the *spool up winch* F-button and *luff telescopic boom down* F-button.

▶ Insert and secure the pin **1** in the 0° pin position **P3**.



▶ Until the pull bracket **3** is touching the pin **1**: Press the *spool winch out* F-button.
▷ The angle on the folding jib is adjusted to 0°.
▷ The hoist rope is relieved.

Completing angle adjustment

▶ Assemble the hoist limit switch weight (→ 10.4.13 Assembling the hoist limit switch weight, p. 730).

10.8.11 Reeving the hoist rope out

CAUTION
Danger of crushing with pulley supports and swinging rope guide pulleys!

▶ Do **not** reach into the slewing range.

Make sure that the following prerequisites are met:
- ❑ The telescopic boom is telescoped in all the way.
  (→ 8.18.5 Telescoping the telescopic boom, p. 545)
- ❑ The folding jib is in the operating position.
  (→ 10.8.3 Swinging into the operating position, p. 773)
- ❑ A hook rod is available.
  (→ 4.7.10 Hook rod, p. 85)
- ❑ The load hook is disassembled or the hook block is reeved out.
  (→ 10.4.12 Disassembling the load hook, p. 729)
  (→ 10.4.10 Reeving the hook block out, p. 728)
- ❑ The hoist limit switch weight is disassembled.
  (→ 10.4.14 Disassembling the hoist limit switch weight, p. 732)
- ❑ The rope lock is disassembled.
  (→ 10.4.16 Removing the lock, p. 735)
  (→ Disassembling the wedge lock, p. 745)

10.8.11.1 Reeving the hoist rope out - single folding jib

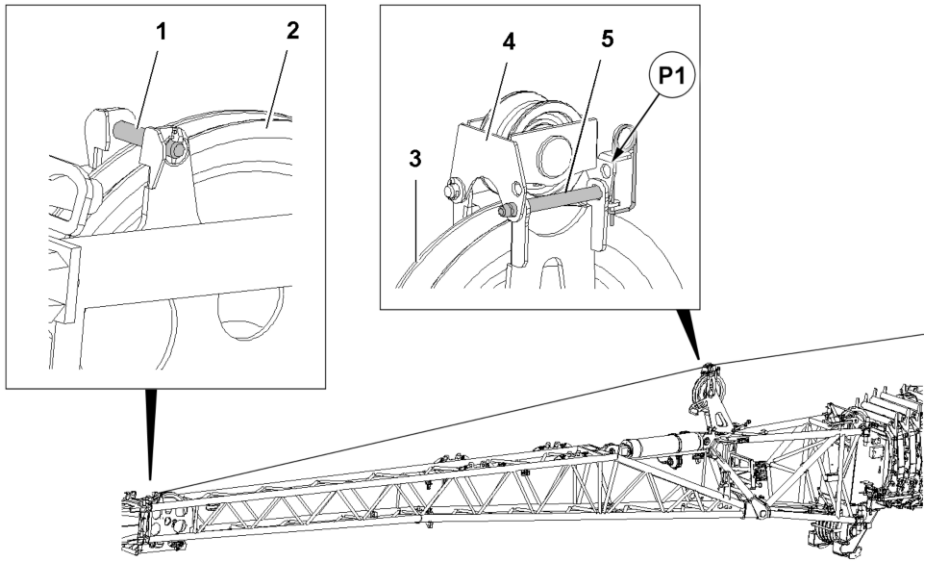


Fig. 1881: Reeving in the hoist rope on the single folding jib

1	Rope retaining pin	**4**	Pulley support
2	Rope pulley	**5**	Pin
3	Rope guide pulley	**P1**	Park position

▶ Unpin the pin **5** and insert it in park position **P1**.

▶ Swing the pulley support **4** into the assembly position.

▶ Release and unpin the rope retaining pin **1**.

- ▶ Take the hoist rope down onto the ground with the hook rod.
- ▶ Swing the pulley support **4** into the operating position.
- ▶ Insert the pin **5** in the operating position and secure.
- ▶ Insert and secure the rope retaining pin **1**.

10.8.11.2 Reeving the hoist rope out - double folding jib

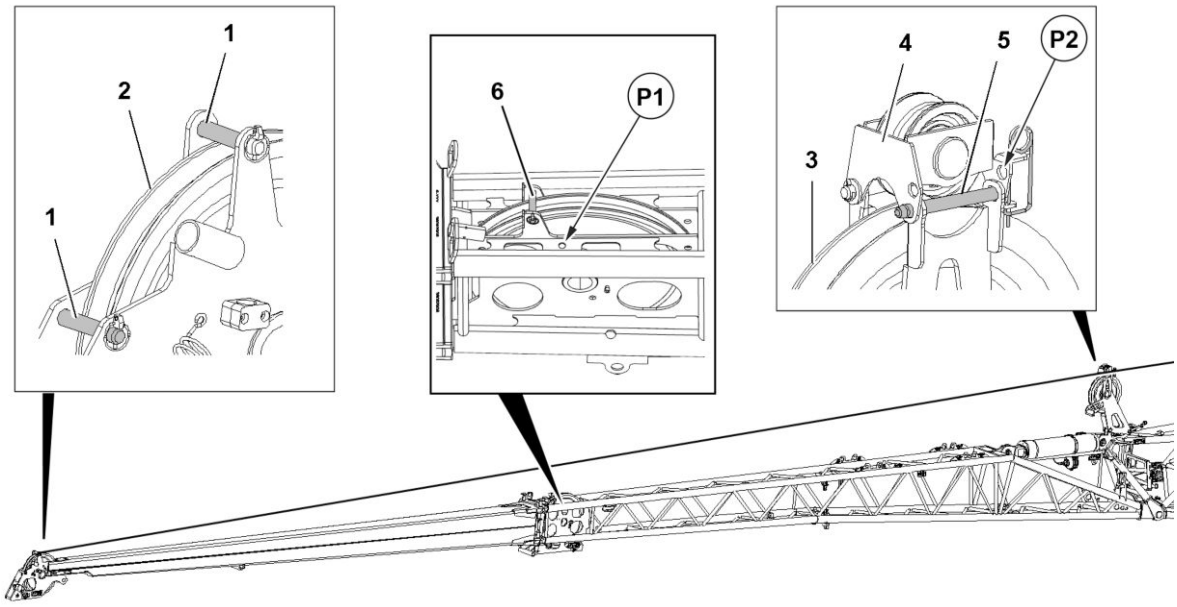


Fig. 1882: Reeving in the hoist rope

1 Rope retaining pin (2x)
2 Rope pulley
3 Rope guide pulley
4 Pulley support
5 Pin
6 Rope retaining pin
P1 Park position
P2 Park position

- ▶ Unpin the pin **5** and insert it in park position **P2**.
- ▶ Swing the pulley support **4** into the assembly position.
- ▶ Release and unpin both rope retaining pins **1**.
- ▶ Take the hoist rope down onto the ground with the hook rod.
- ▶ Swing the pulley support **4** into the operating position.
- ▶ Insert the pin **5** in the operating position and secure.
- ▶ Release the rope retaining pin **6** from the park position **P1** and unpin.
- ▶ Insert the rope retaining pin **6** in the operating position and secure.
- ▶ Insert and secure both rope retaining pins **1**.

10.8.11.3 Swinging and pinning the rope guide pulley in the transport position

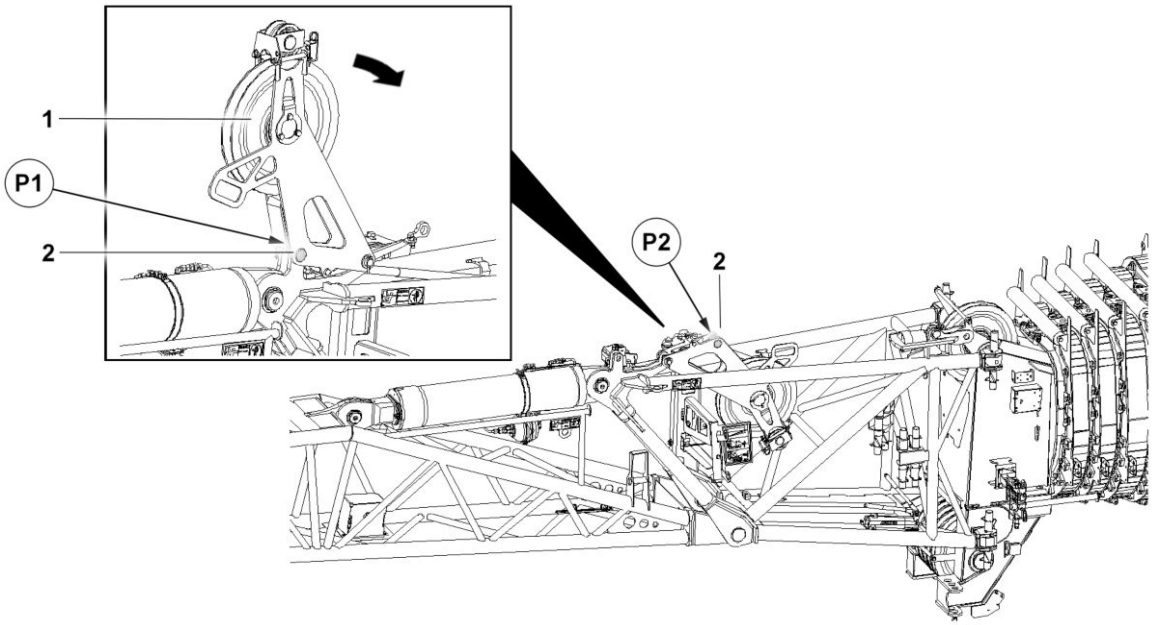


Fig. 1883: Swinging and pinning the rope guide pulley in the transport position

1 Rope guide pulley
2 Pin
P1 Pin position
P2 Pin position

▶ Release the pin **2** in the pin position **P1** and unpin.

▶ Swing the rope guide pulley **1** into the transport position.

▶ Insert the pin **2** in the pin position **P2** and secure.

10.8.12 Disconnecting the electrical lines

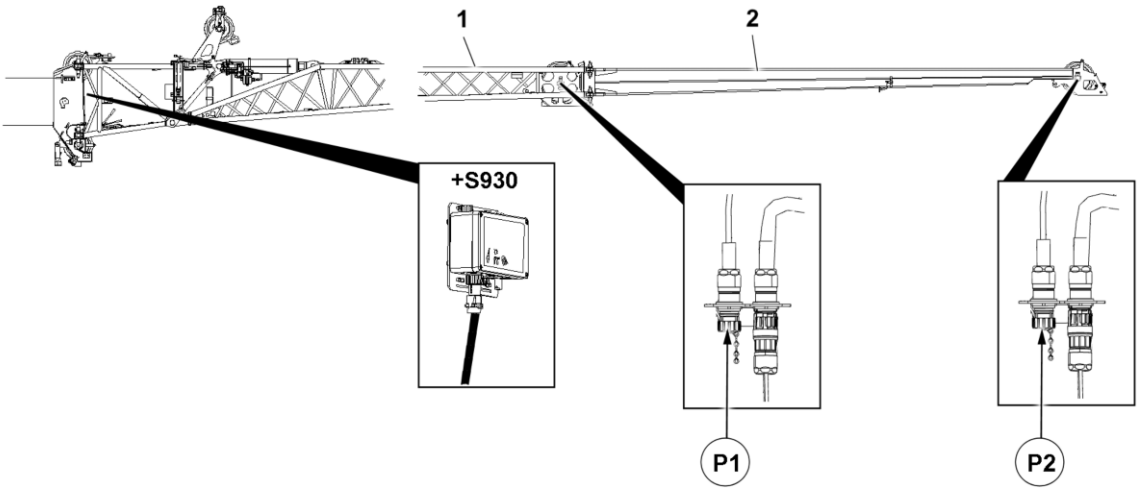


Fig. 1884: Connecting the electrical lines

1 Pivot section
2 End section
+S930 Connector box
P1 Single folding jib connection
P2 Double folding jib connection

Single folding jib

- ▶ Disconnect the electrical lines from the pivot section **1** to the connector box **+S930** on the boom head.
- ▶ Disconnect the wind speed sensor and airplane warning light at the connection **P1**.

Double folding jib

- ▶ Disconnect the electrical lines from the pivot section **1** to the connector box **+S930** on the boom head.
- ▶ Disconnect the electrical lines from the end section **2** to the pivot section **1** at the connection **P1**.
- ▶ Disconnect the wind speed sensor and airplane warning light at the connection **P2**.

10.8.13 Disconnecting the hydraulic lines

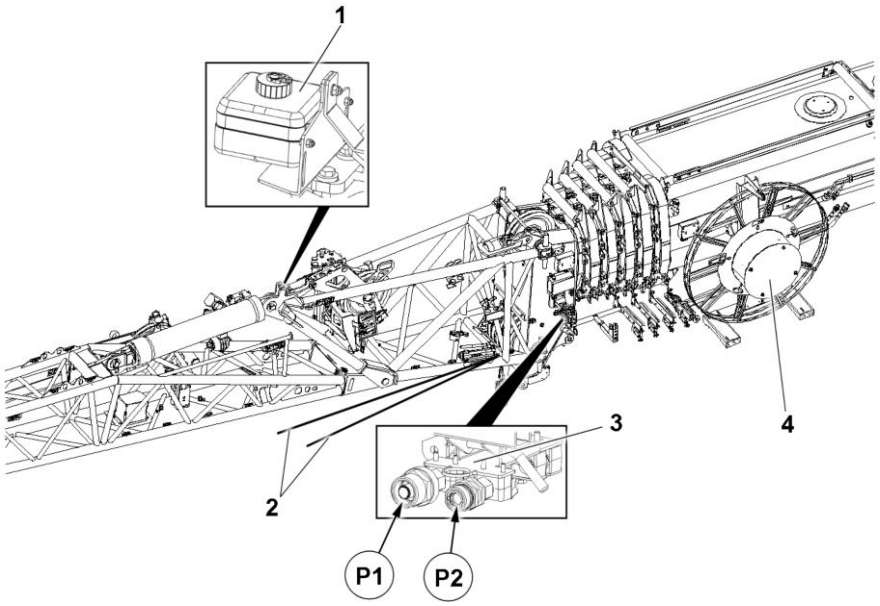


Fig. 1885: Exemplary illustration: Disconnecting the hydraulic lines

1 Overflow container
2 Hydraulic lines
3 Hydraulic connections
4 Hose drum
P1 Connection position
P2 Connection position

- ▶ Disconnect the hydraulic lines **2** in the connection position **P1** and connection position **P2** from the hydraulic connections **3**.
- ▶ Protect the hydraulic lines **2** and hydraulic connections **3** from contamination.
- ▶ Take the hydraulic lines **2** down into the folding jib and secure.

If the overflow container **1** on the control cylinder is full:
- ▶ Empty the overflow container **1**.

10.8.14 Swinging into the transport position

This section describes swinging the folding jib out of the operating position into the transport position.

Make sure that the following prerequisites are met:
- ❑ The crane is in the set up configuration according to the assembly chart.

(→ 10.8.18 Folding jib assembly charts, p. 824)
- ❑ The central ballast is assembled.
  (→ 10.6.1 Assembling the central ballast, p. 748)
- ❑ The crane inclination is maximum 0.3°.
- ❑ The crane set up configuration is set in the *set up* menu.
  (→ 8.6 Setting up the crane, p. 412)
- ❑ The telescopic boom is telescoped in all the way.
- ❑ The telescoping target is at 0 %. No telescope is selected.
- ❑ The telescopic boom is luffed to 0.3°.
- ❑ Hydraulic folding jib: The folding jib is luffed up completely.
  (→ Luffing the hydraulic auxiliary boom* from the crane cab, p. 534)
- ❑ Mechanical folding jib: The folding jib is in the 0° position.
  (→ 10.8.10 Adjusting the mechanical folding jib angle, p. 793)
- ❑ The hoist rope is reeved out. The rope guide pulley is pinned in the transport position.
  (→ 10.8.11 Reeving the hoist rope out, p. 799)

DANGER
The crane is **not** horizontal!
The folding jib can swing uncontrolled.

▶ Make sure that the crane is standing on horizontal ground.

10.8.14.1 Establishing pressure in the control cylinder*

This step must be performed only with a hydraulic folding jib.

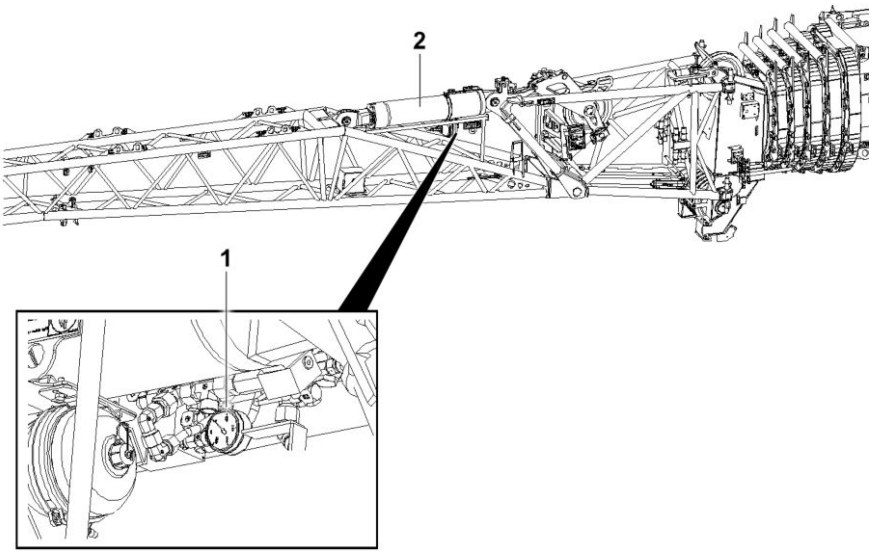


*Fig. 1886: Establishing pressure in the control cylinder**

1 Pressure gauge **2** Control cylinder

The pressure in the control cylinder **2** can be read on the pressure gauge **1**.

▶ Until the pressure gauge **1** displays a pressure of 200 bar to 250 bar: Luff the folding jib up for approx. 15 seconds to the block (→ Luffing the hydraulic auxiliary boom* from the crane cab, p. 534).

▶ Disconnect the hydraulic lines (→ 10.8.13 Disconnecting the hydraulic lines, p. 802).

▶ Disconnect the electrical lines (→ 10.8.12 Disconnecting the electrical lines, p. 801).

10.8.14.2 Preparing swinging into the transport position

Make sure that the following prerequisites are met:
❑ The *assembly functions* menu is displayed in the crane remote control.
(→ Opening the assembly functions menu, p. 474)

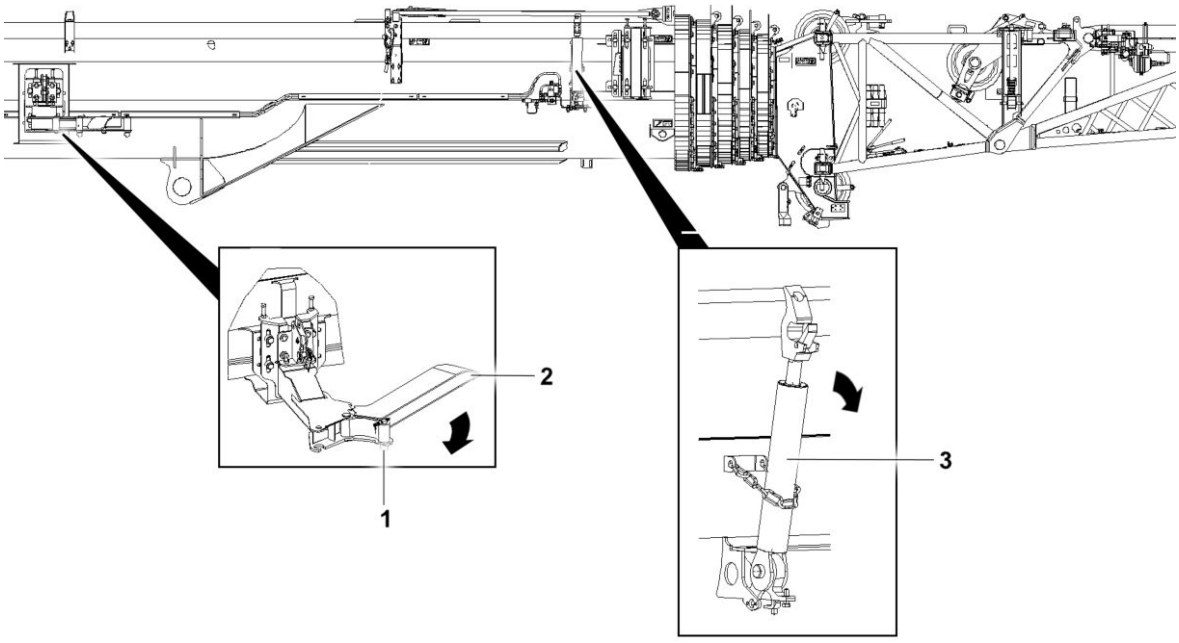


Fig. 1887: Exemplary illustration: Preparing swinging the folding jib into the transport position

1 Spring pin
2 Support
3 Swing cylinder

▶ Release the spring pin **1**.

▶ Pull the spring pin **1** down with one hand.

⚠ **Danger of crushing! The support swings!**

▶ Until the spring pin **1** engages: Swing the support **2** out with the other hand.

▶ Secure the spring pin **1**.

▶ Remove the swing cylinder **3** from the transport retainer and swing it downward.

▶ Press the *folding jib assembly* F-button.
▷ Additional buttons are displayed.

▶ Until the swing cylinder **3** is completely extended: Press and hold the *swing folding jib out* F-button.

10.8.14.3 Swinging the single folding jib into the transport position

Make sure that the following prerequisites are met:
❑ The electrical lines are disconnected.

(→ 10.8.12 Disconnecting the electrical lines, p. 801)

❑ For hydraulic folding jibs: The hydraulic line from the folding jib to the telescopic boom is disconnected.
(→ 10.8.13 Disconnecting the hydraulic lines, p. 802)

❑ For hydraulic folding jibs: There is a pressure of 200 bar to 250 bar in the control cylinder.

Unpinning in the operating position

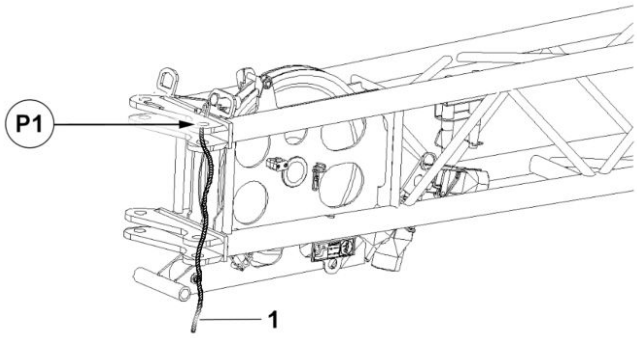


Fig. 1890: Fastening the guide rope to the pivot section

1 Guide rope **P1** Fastening point

▶ Fasten the guide rope **1** in the fastening point **P1**.

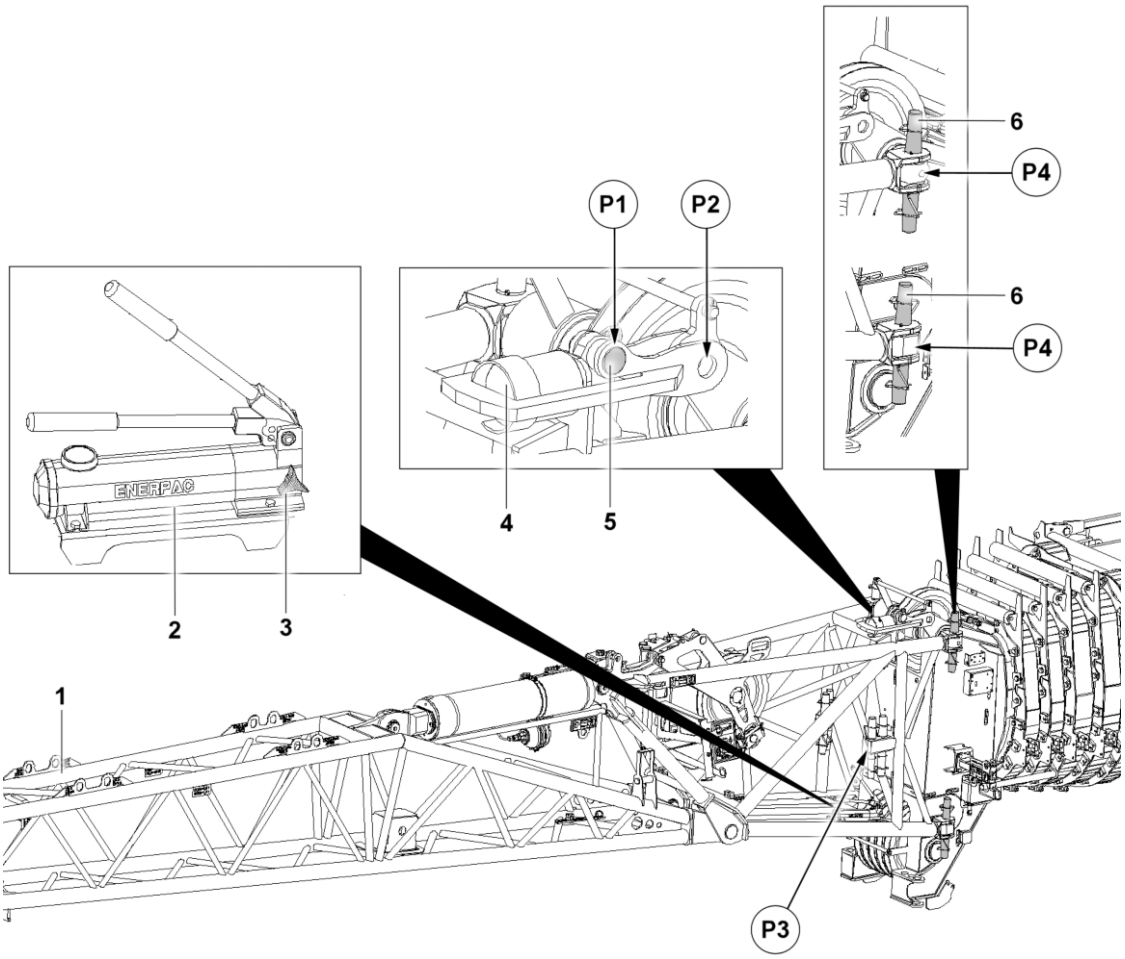


Fig. 1891: Unpinning the folding jib in the operating position

1 Pivot section
2 Hand pump
3 Knob
4 Assembly aid
5 Pin
6 Double cone pin
P1 Transport position
P2 Pin position
P3 Transport position
P4 Pin position

▶ Release and unpin the pin **5** in the transport position **P1**.

▶ Insert and secure the pin **5** in the pin position **P2**.
▷ The assembly aid **4** is pinned with the telescopic boom.

▶ Close the knob **3**.

▶ Until the double cone pin **6** can be unpinned at the **top** in the pin position **P4**: Actuate the hand pump **2**.

▶ Release and unpin the **top** double cone pin **6** in the pin position **P4**.

▶ Insert and secure the double cone pin **6** in the transport position **P3**.

▶ Open the knob **3**.
▷ The pin **5** is relieved.

▶ Release and unpin the pin **5** in the pin position **P2**.

▶ Insert and secure the pin **5** in the transport position **P1**.

⚠ **Danger of crushing! The folding jib swings in uncontrolled!**

▶ Before unpinning: Hold the folding jib with the guide rope.

▶ Release and unpin the double cone pin **6** at the **bottom** in the pin position **P4**.

▶ Insert and secure the double cone pin **6** in the transport position **P3**.

Swinging and securing in the assembly position

Make sure that the following prerequisites are met:
❑ The *assembly functions* menu is displayed in the crane remote control.
(→ Opening the assembly functions menu, p. 474)

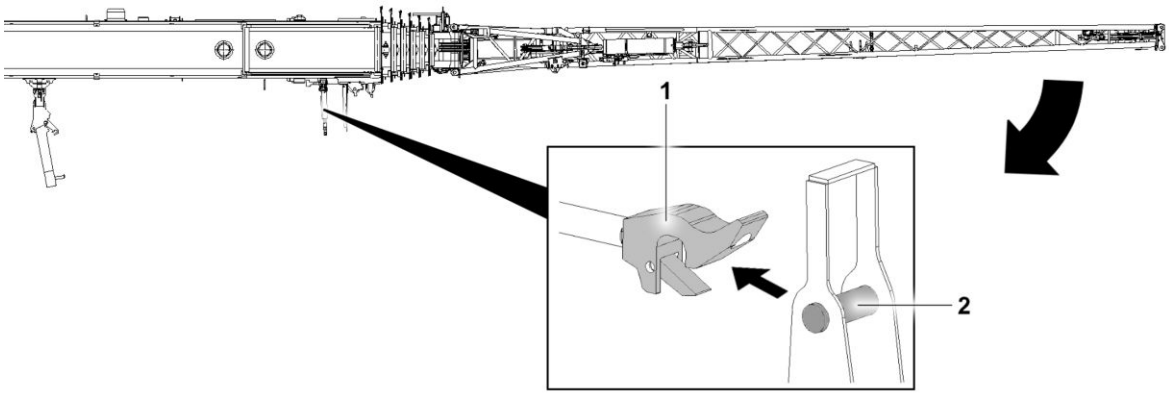


Fig. 1892: Engaging the swing cylinder

1 Swing cylinder **2** Pin

▶ Until the swing cylinder **1** can be engaged with the pin **2**: Swing the folding jib in with the guide rope.

▶ Engage the swing cylinder **1** on the pin **2**.

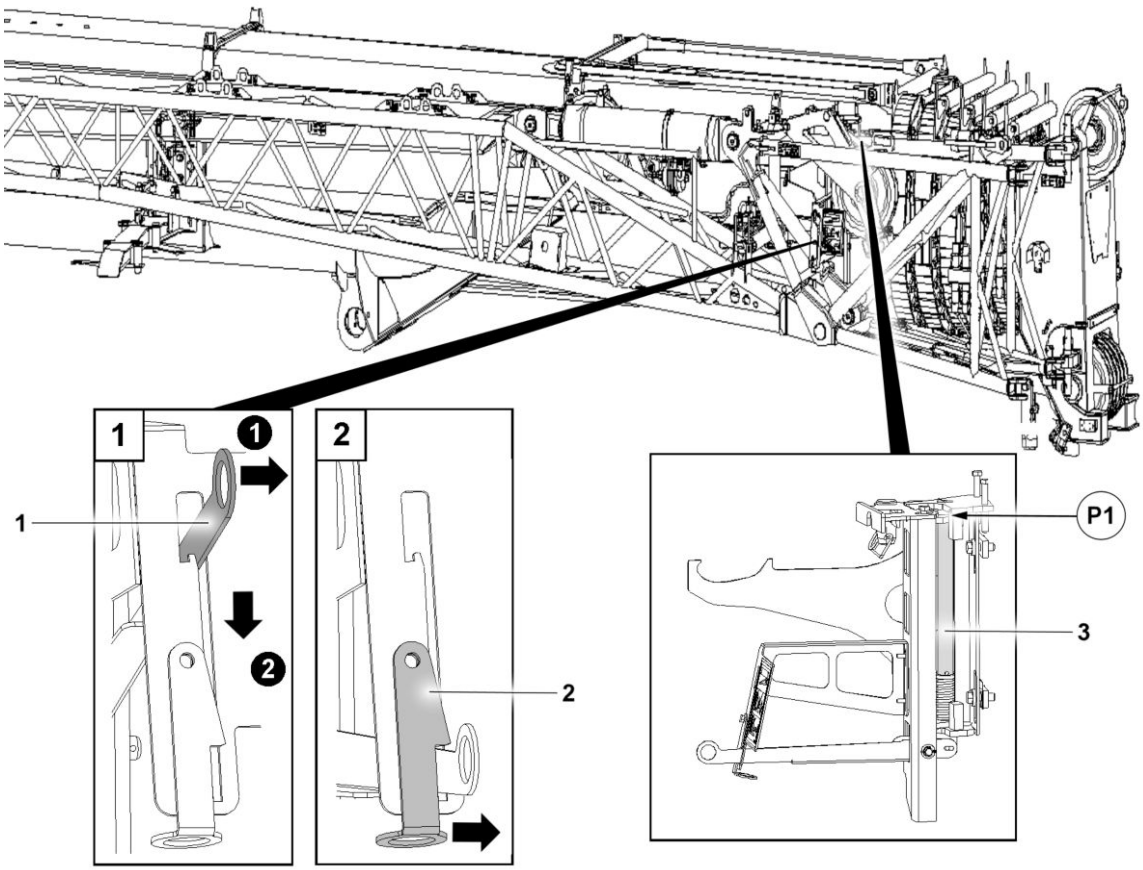


Fig. 1893: Exemplary illustration: Securing in the assembly position

1	Lever	**3**	Bracket
2	Retaining bracket	**P1**	Pivot point

▶ Disengage the lever **1** with the hook rod from the link and pull it down.

▶ Swing the retaining bracket **2** to the side with the hook rod.

▶ Press the *folding jib assembly* F-button.
▷ Additional buttons are displayed.

▶ Until the bracket **3** is engaged in the pivot point **P1**: Press the *swing folding jib in* F-button.

▶ Secure the lever **1** with the retaining bracket **2** in the lower position.

Unpinning in the assembly position

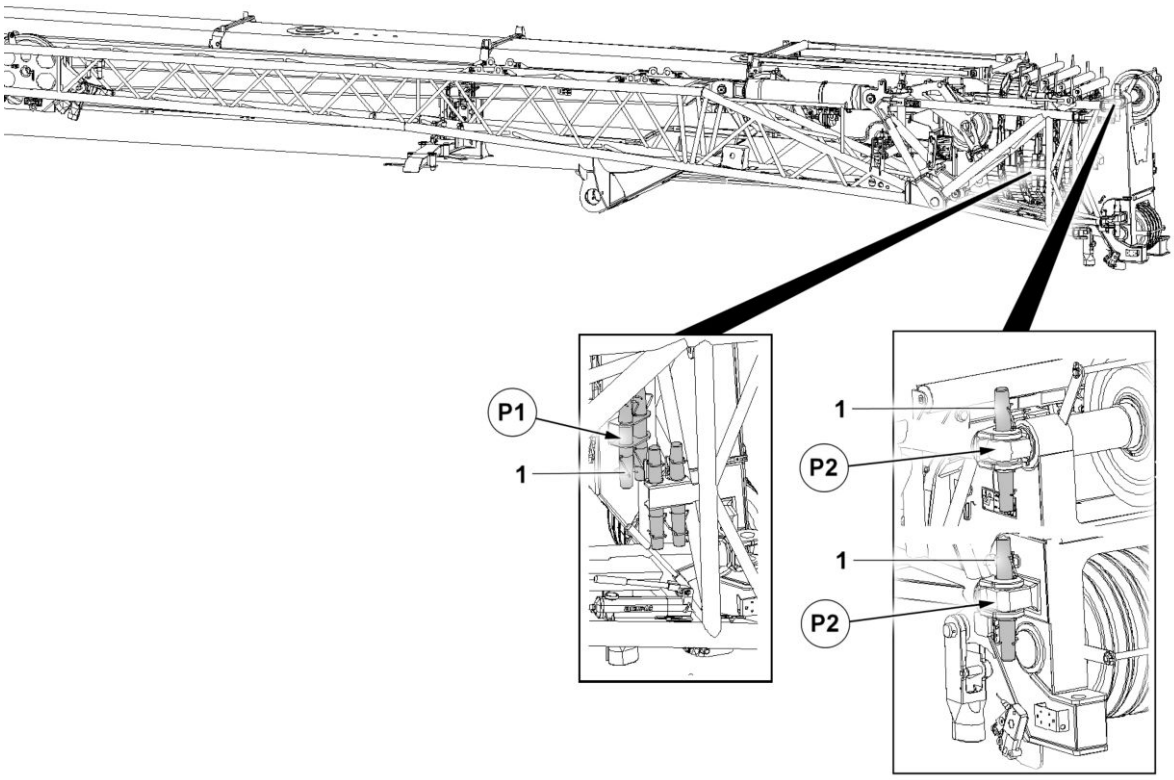


Fig. 1896: Unpinning the folding jib in the assembly position

1 Double cone pin
P1 Transport position
P2 Pin position

▶ Release and unpin the **top** double cone pin **1** in the pin position **P2**.

▶ Insert and secure the double cone pin **1** in the transport position **P1**.

▶ Release and unpin the double cone pin **1** at the **bottom** in the pin position **P2**.

▶ Insert and secure the double cone pin **1** in the transport position **P1**.

Swinging into the transport position and securing

Make sure that the following prerequisites are met:
❑ The *assembly functions* menu is displayed in the crane remote control.

(→ Opening the assembly functions menu, p. 474)

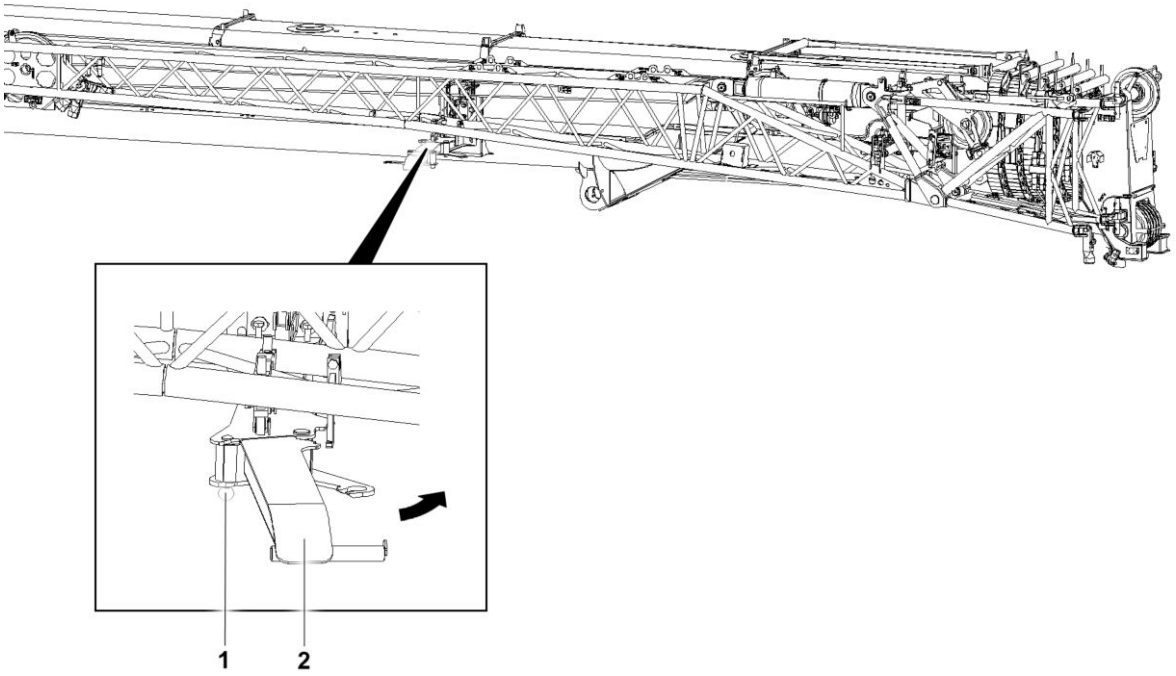


Fig. 1897: Exemplary illustration: Swinging into the transport position and securing

1 Spring pin **2** Support

▶ Until the folding jib is completely swung in all the way: Press the *swing folding jib in* F-button.

▶ Release the spring pin **1**.

▶ Pull the spring pin **1** down with one hand.

⚠ **Danger of crushing! The support swings!**

▶ Until the spring pin **1** engages: Swing the support **2** in with the other hand.

▶ Secure the spring pin **1**.
▷ The folding jib is secured to the telescopic boom.

Connecting the hydraulic line

This step must be performed only with a hydraulic folding jib.

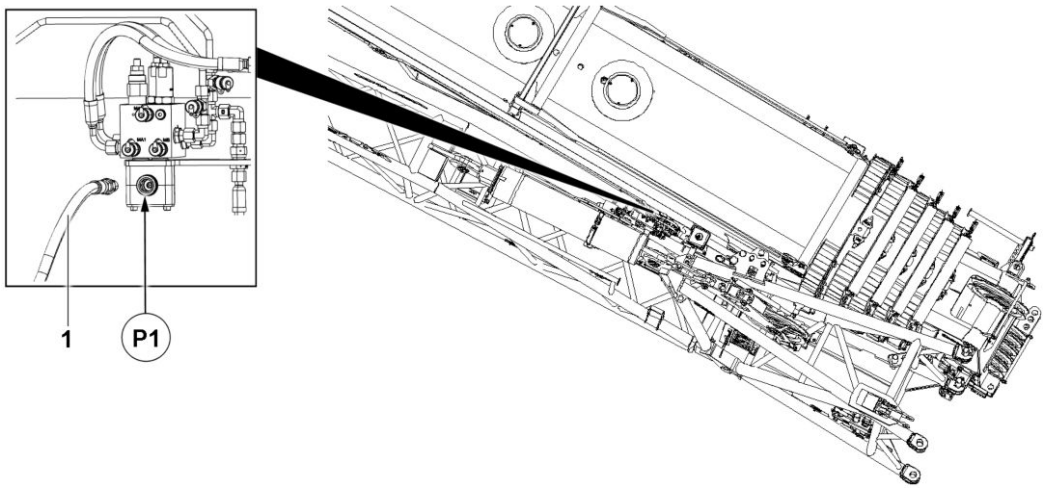


Fig. 1899: Disconnecting the hydraulic line in the transport position

1 Hydraulic line
P1 Connection position

▶ Connect the hydraulic line **1** in the connection position **P1**.

Pinning the pivot section with the end section

This step must only performed if the double folding jib was used as a single folding jib.

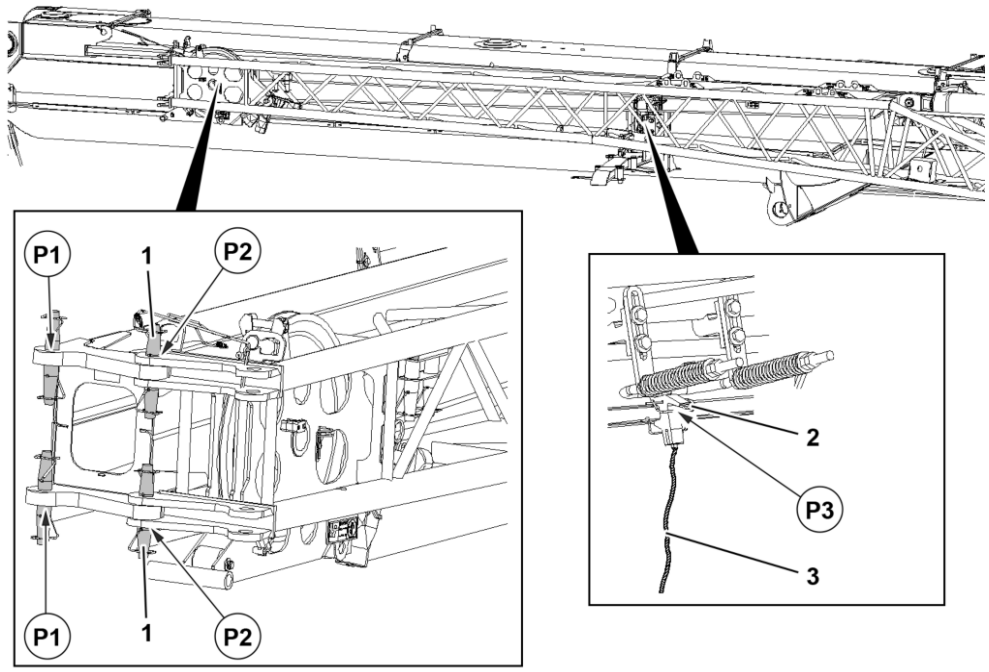


Fig. 1900: Pinning the pivot section with the end section

1 Double cone pin
2 Retaining element
3 Rope
P1 Pin position
P2 Pin position
P3 Locking point

▶ Release and unpin both double cone pins **1** in the pin position **P1**.

▶ Insert and secure the double cone pin **1** at the **top and bottom** in the pin position **P2**.

▶ Make sure that the pivot section is locked with the end section in locking point **P3**.

▶ Secure the lock in the locked position with the retaining element **2**.

10.8.14.4 Swinging the double folding jib into the transport position

Make sure that the following prerequisites are met:
- ❑ The electrical lines are disconnected.
  (→ 10.8.12 Disconnecting the electrical lines, p. 801)
- ❑ For hydraulic folding jibs: The hydraulic line from the folding jib to the telescopic boom is disconnected.
  (→ 10.8.13 Disconnecting the hydraulic lines, p. 802)
- ❑ For hydraulic folding jibs: There is a pressure of 200 bar to 250 bar in the control cylinder.

Unpinning the end section and swinging it into the operating position

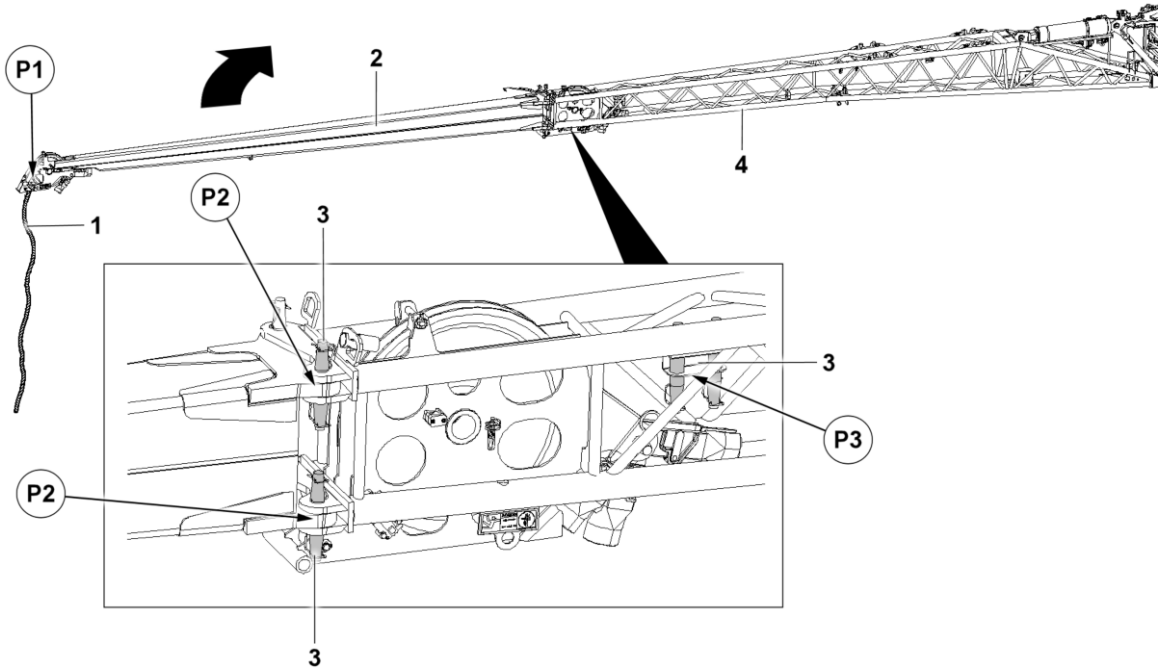


Fig. 1901: Pinning the end section in the operating position

1 Guide rope
2 End section
3 Double cone pin
4 Pivot section

P1 Position
P2 Pin position
P3 Transport position

▶ Fasten the guide rope **1** in position **P1**.

⚠ **Danger of crushing! The folding jib swings in uncontrolled!**

▶ Before unpinning: Hold the folding jib with the guide rope.

▶ Release and unpin both double cone pins **3** in the pin position **P2**.

▶ Insert and secure both double cone pins **3** in the transport position **P3**.

▶ Until the pivot section **4** can be locked: Swing the end section **2** in with the guide rope **1**.

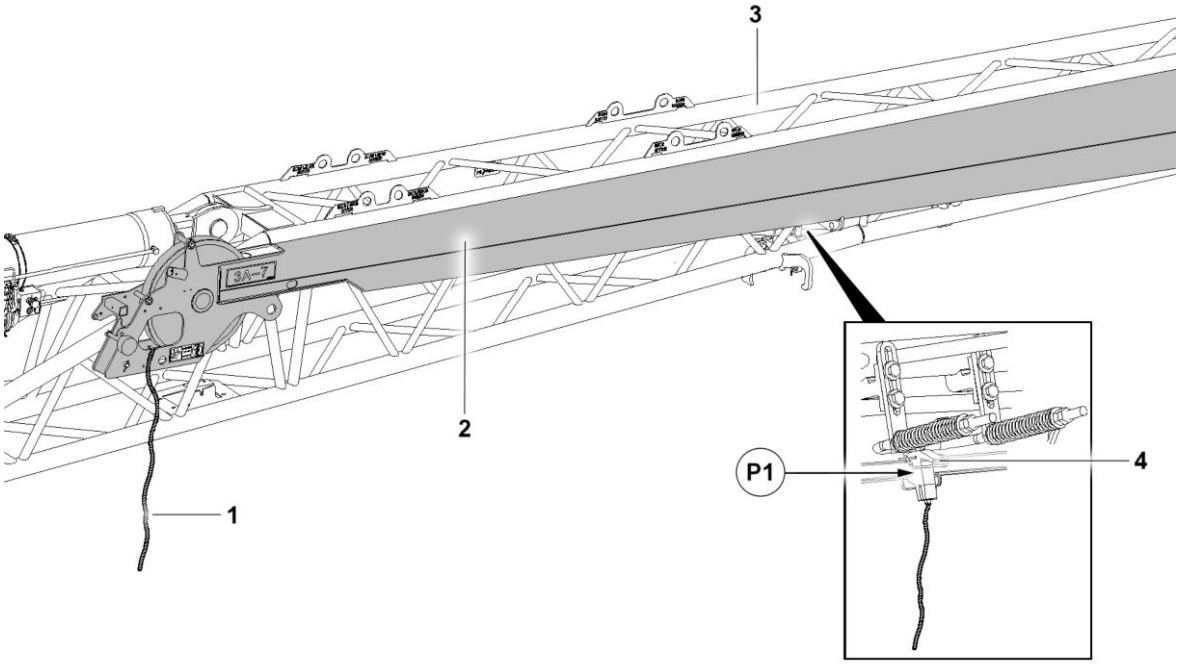


Fig. 1902: Locking the end section with the pivot section

1 Guide rope
2 End section
3 Pivot section
4 Retaining element
P1 Locking point

▶ Lock the end section **2** with the pivot section **3** in the locking point **P1**.

▶ Secure the lock in the locked position with the retaining element **4**.

▶ Remove the guide rope **1**.

Unpinning the pivot section in the operating position

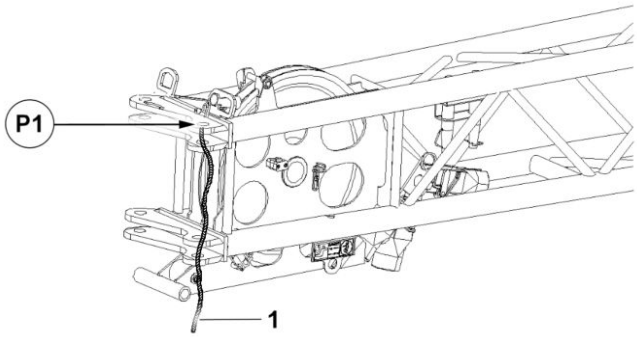


Fig. 1903: Fastening the guide rope to the pivot section

1 Guide rope
P1 Fastening point

▶ Fasten the guide rope **1** in the fastening point **P1**.

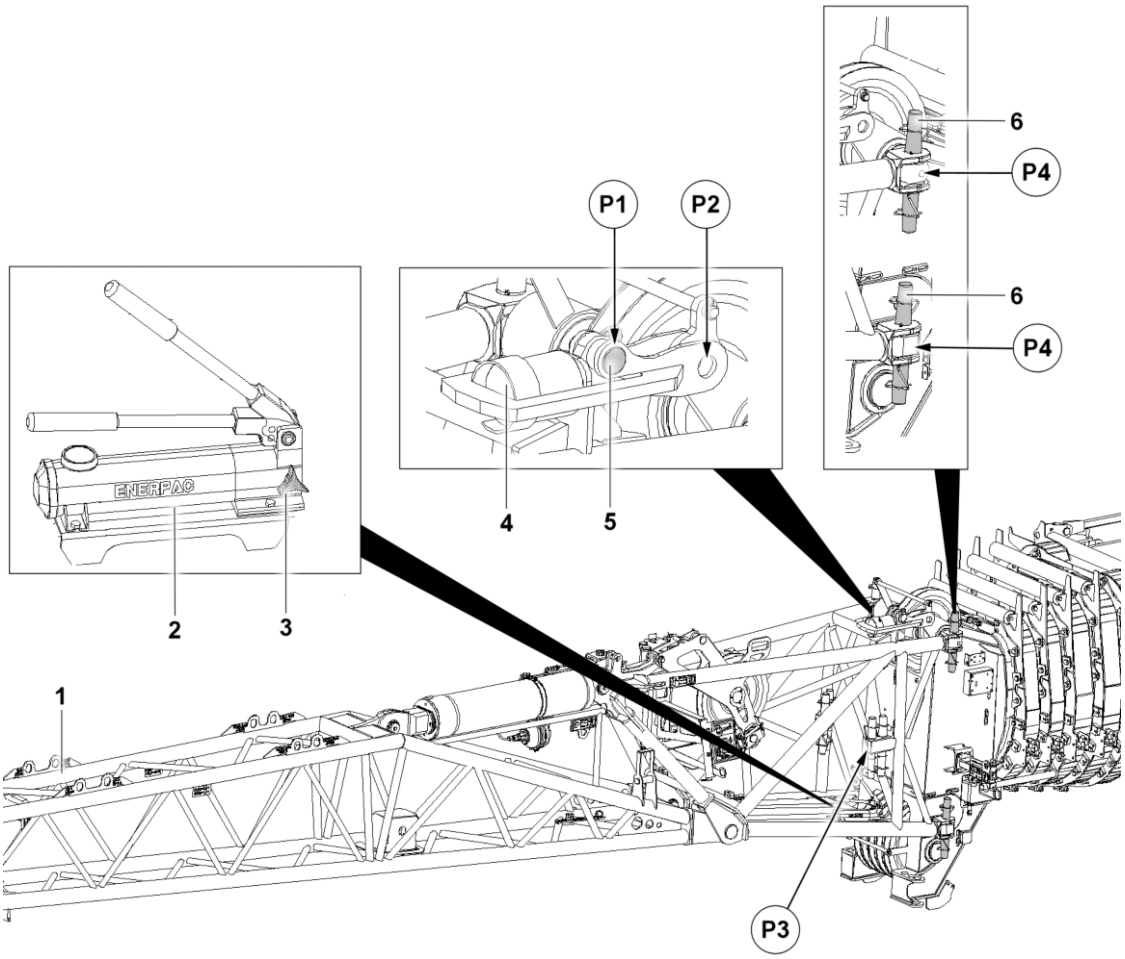


Fig. 1904: Unpinning the folding jib in the operating position

1 Pivot section
2 Hand pump
3 Knob
4 Assembly aid
5 Pin
6 Double cone pin
P1 Transport position
P2 Pin position
P3 Transport position
P4 Pin position

▶ Release and unpin the pin **5** in the transport position **P1**.

▶ Insert and secure the pin **5** in the pin position **P2**.
▷ The assembly aid **4** is pinned with the telescopic boom.

▶ Close the knob **3**.

▶ Until the double cone pin **6** can be unpinned at the **top** in the pin position **P4**: Actuate the hand pump **2**.

▶ Release and unpin the **top** double cone pin **6** in the pin position **P4**.

▶ Insert and secure the double cone pin **6** in the transport position **P3**.

▶ Open the knob **3**.
▷ The pin **5** is relieved.

▶ Release and unpin the pin **5** in the pin position **P2**.

▶ Insert and secure the pin **5** in the transport position **P1**.

⚠ **Danger of crushing! The folding jib swings in uncontrolled!**

▶ Before unpinning: Hold the folding jib with the auxiliary rope.

▶ Release and unpin the double cone pin **6** at the **bottom** in the pin position **P4**.

▶ Insert and secure the double cone pin **6** in the transport position **P3**.

Swinging and securing in the assembly position

Make sure that the following prerequisite is met:
❑ The *assembly functions* menu is displayed in the crane remote control.
(→ Opening the assembly functions menu, p. 474)

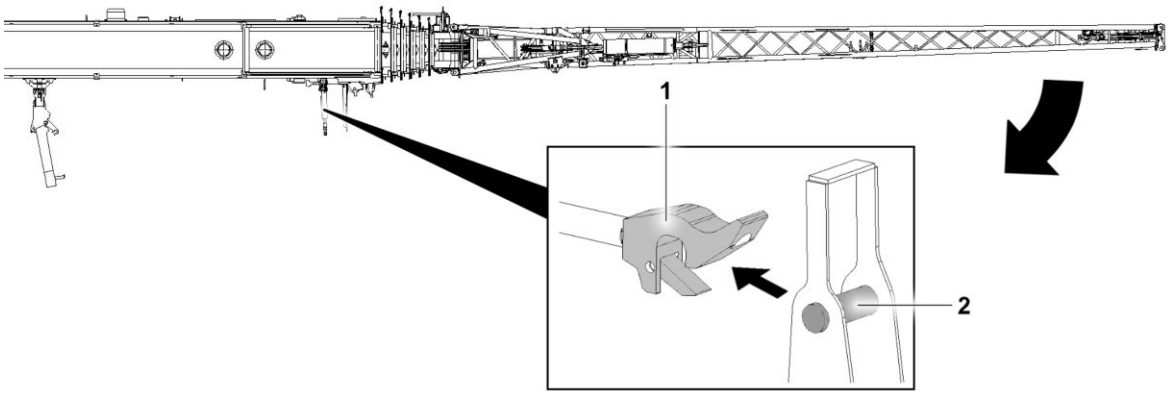


Fig. 1905: Engaging the swing cylinder

1 Swing cylinder **2** Pin

▶ Until the swing cylinder **1** can be engaged with the pin **2**: Swing the folding jib in with the guide rope.

▶ Engage the swing cylinder **1** on the pin **2**.

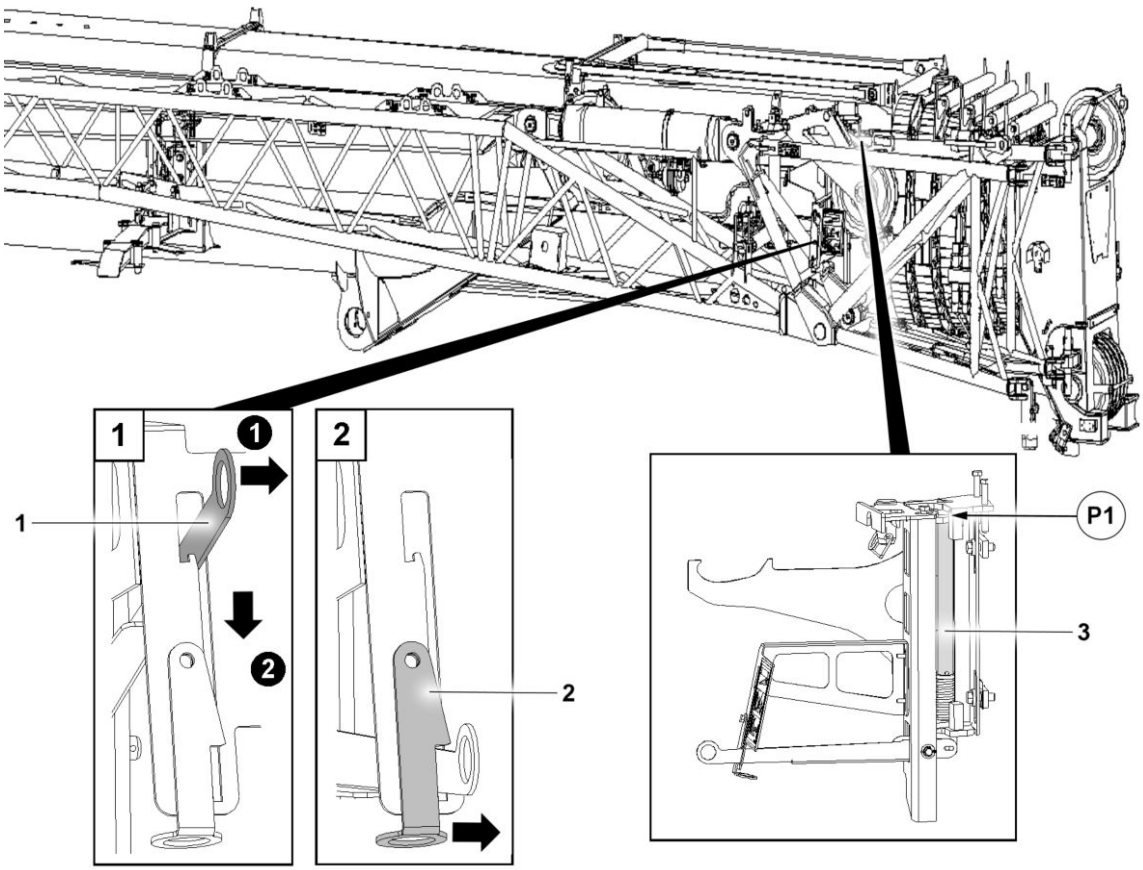


Fig. 1906: Securing in the assembly position

1 Lever
2 Retaining bracket
3 Bracket
P1 Pivot point

▶ Disengage the lever **1** with the hook rod from the link and pull it down.

▶ Swing the retaining bracket **2** to the side with the hook rod.

▶ Press the *folding jib assembly* F-button.
▷ Additional buttons are displayed.

▶ Until the bracket **3** is engaged in the pivot point **P1**: Press the *swing folding jib in* F-button.

▶ Secure the lever **1** with the retaining bracket **2** in the lower position.

Unpinning in the assembly position

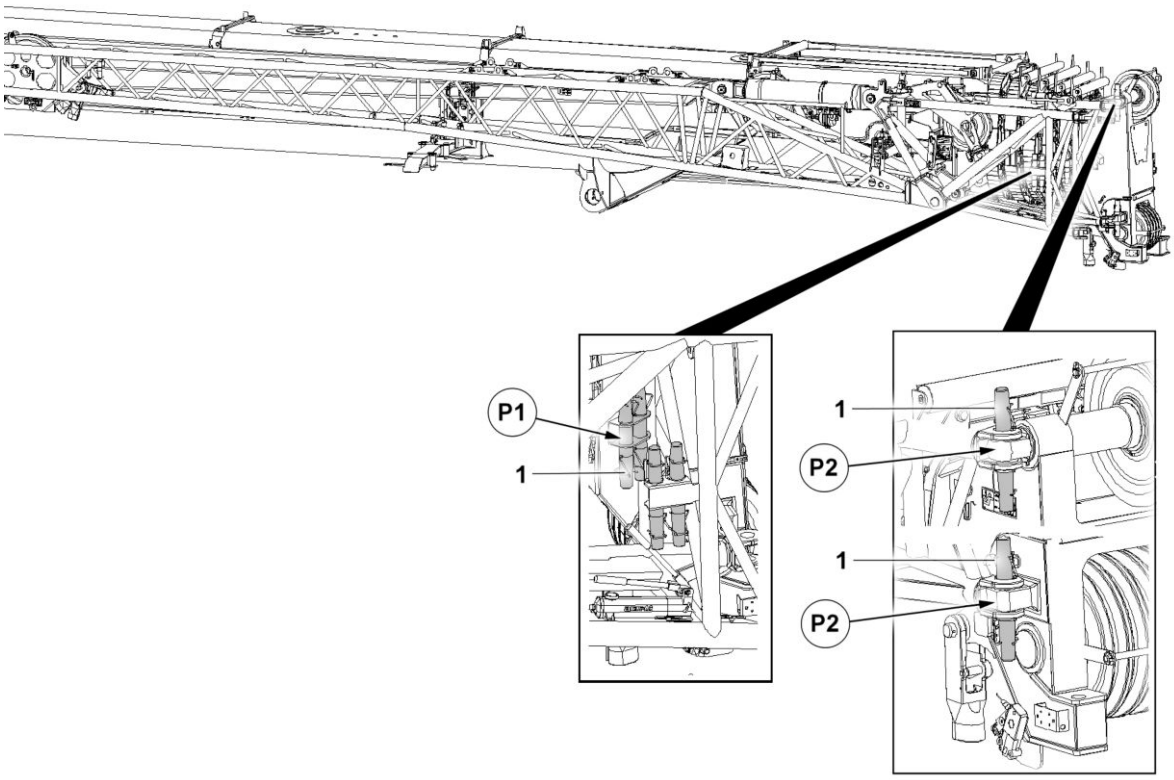


Fig. 1909: Unpinning the folding jib in the assembly position

1 Double cone pin
P1 Transport position
P2 Pin position

▶ Release and unpin the **top** double cone pin **1** in the pin position **P2**.

▶ Insert and secure the double cone pin **1** in the transport position **P1**.

▶ Release and unpin the double cone pin **1** at the **bottom** in the pin position **P2**.

▶ Insert and secure the double cone pin **1** in the transport position **P1**.

Swinging into the transport position and securing

Make sure that the following prerequisites are met:
❑ The *assembly functions* menu is displayed in the crane remote control.

(→ Opening the assembly functions menu, p. 474)

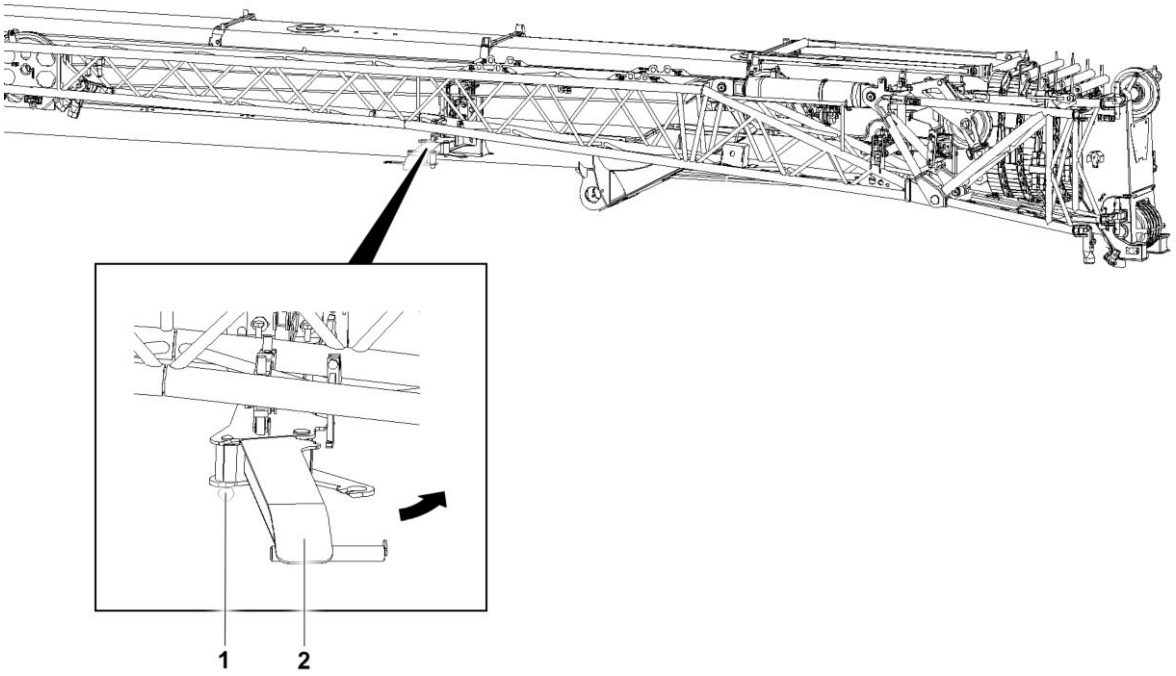


Fig. 1910: Swinging into the transport position and securing

1 Spring pin **2** Support

▶ Until the folding jib is completely swung in all the way: Press the *swing folding jib in* F-button.

⚠ **Danger of crushing! The support swings!**

▶ Release the spring pin **1**.

▶ Pull the spring pin **1** down with one hand.

▶ Until the spring pin **1** engages: Swing the support **2** in with the other hand.

▶ Secure the spring pin **1**.

Pinning the end section

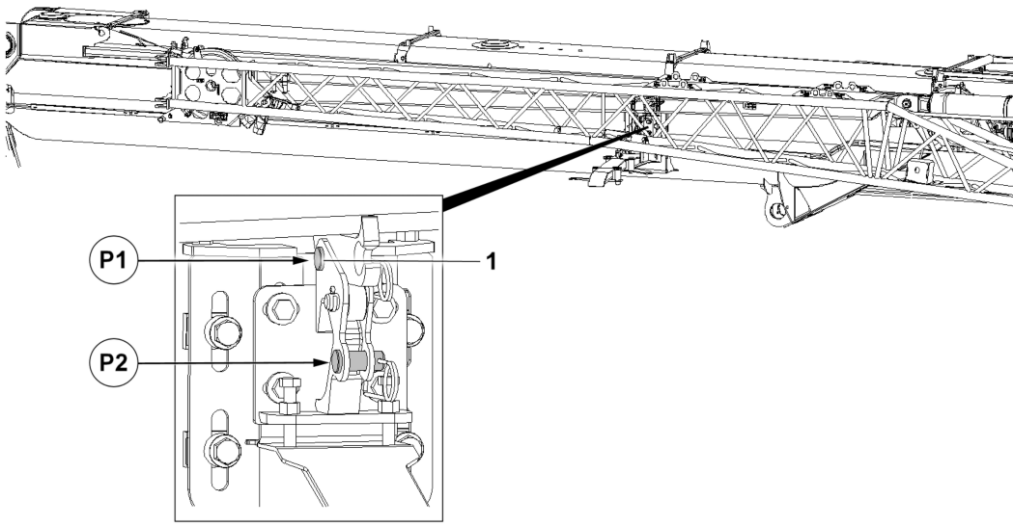


Fig. 1912: Pinning the double folding jib in the transport position

1 Pin
P1 Pin position
P2 Park position

▶ Release and unpin the pin **1** in the park position **P2**.

▶ Insert and secure the pin **1** in the pin position **P1**.

Connecting the hydraulic line

This step must be performed only with a hydraulic folding jib.

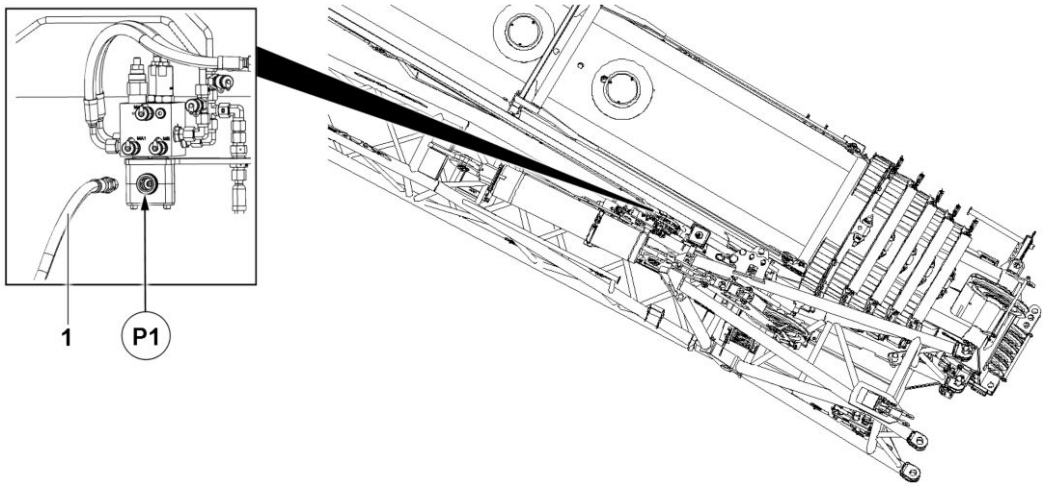


Fig. 1913: Disconnecting the hydraulic line in the transport position

1 Hydraulic line
P1 Connection position

▶ Connect the hydraulic line **1** in the connection position **P1**.

10.8.15 Disassembling the folding jib

Make sure that the following prerequisites are met:
❑ The crane is in the set up configuration according to the assembly chart.

(→ 10.8.18 Folding jib assembly charts, p. 824)
- ❑ The central ballast is assembled.
  (→ 10.6.1 Assembling the central ballast, p. 748)
- ❑ The crane inclination is maximum 0.3°.
- ❑ The crane set up configuration is set in the *set up* menu.
  (→ 8.6 Setting up the crane, p. 412)
- ❑ The telescopic boom is telescoped in all the way.
- ❑ The telescopic boom is luffed to 0.3°.
- ❑ The hoist rope is reeved out.
  (→ 10.8.11 Reeving the hoist rope out, p. 799)
- ❑ With a double folding jib: The end section is folded in, locked and secured.
- ❑ The guide rope for guiding the folding jib is secured.
- ❑ The folding jib is in the operating position.
  (→ 10.8.3 Swinging into the operating position, p. 773)
- ❑ The electrical lines are disconnected.
  (→ 10.8.12 Disconnecting the electrical lines, p. 801)
- ❑ For a hydraulic folding jib: The hydraulic lines are disconnected.
  (→ 10.8.13 Disconnecting the hydraulic lines, p. 802)

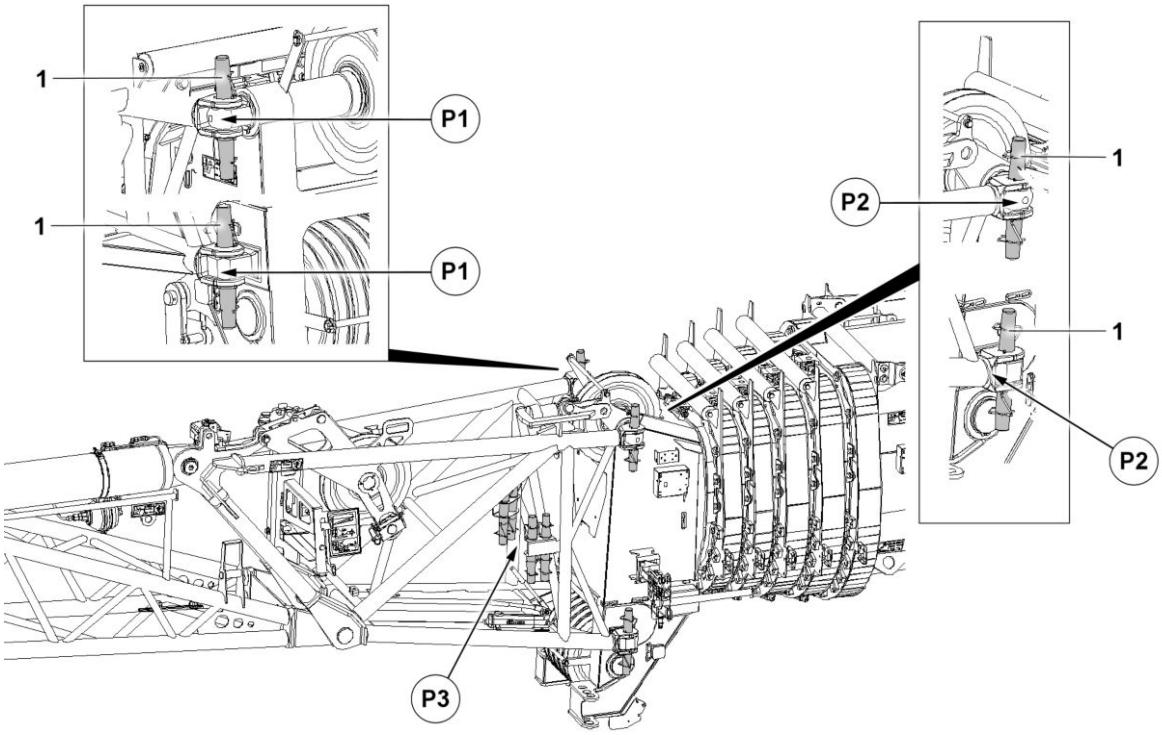


Fig. 1914: Disassembling the folding jib

1 Double cone pin
P1 Pin position
P2 Pin position
P3 Transport position

▶ Fasten the auxiliary crane to the folding jib (→ 7.7 Folding jib, p. 389).

▶ Tension the hoist rope of the auxiliary crane.

▶ Release and unpin the double cone pin **1** at the **bottom** in the pin position **P1** and pin position **P2**.

▶ Release and unpin the **top** double cone pin **1** in the pin position **P1** and pin position **P2**.

▶ Take the folding jib down.

▶ Insert all double cone pins **1** in the transport position **P3** and secure.

▶ Disconnect the folding jib from the auxiliary crane.

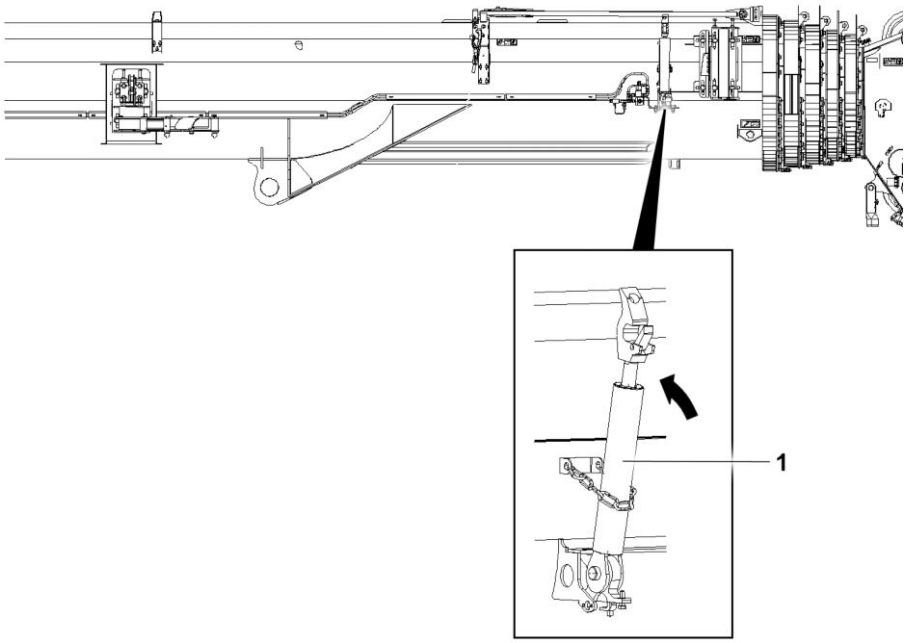


Fig. 1915: Folding up the swing cylinder

▶ Fold the swing cylinder **1** up and secure with a chain.

10.8.16 Disassembling the end section

The end section can be disassembled from the pivot section.

Make sure that the following prerequisites are met:
❑ The folding jib is disassembled from the crane.
(→ 10.8.15 Disassembling the folding jib, p. 819)
❑ The folding jib is lying on the ground and is supported.

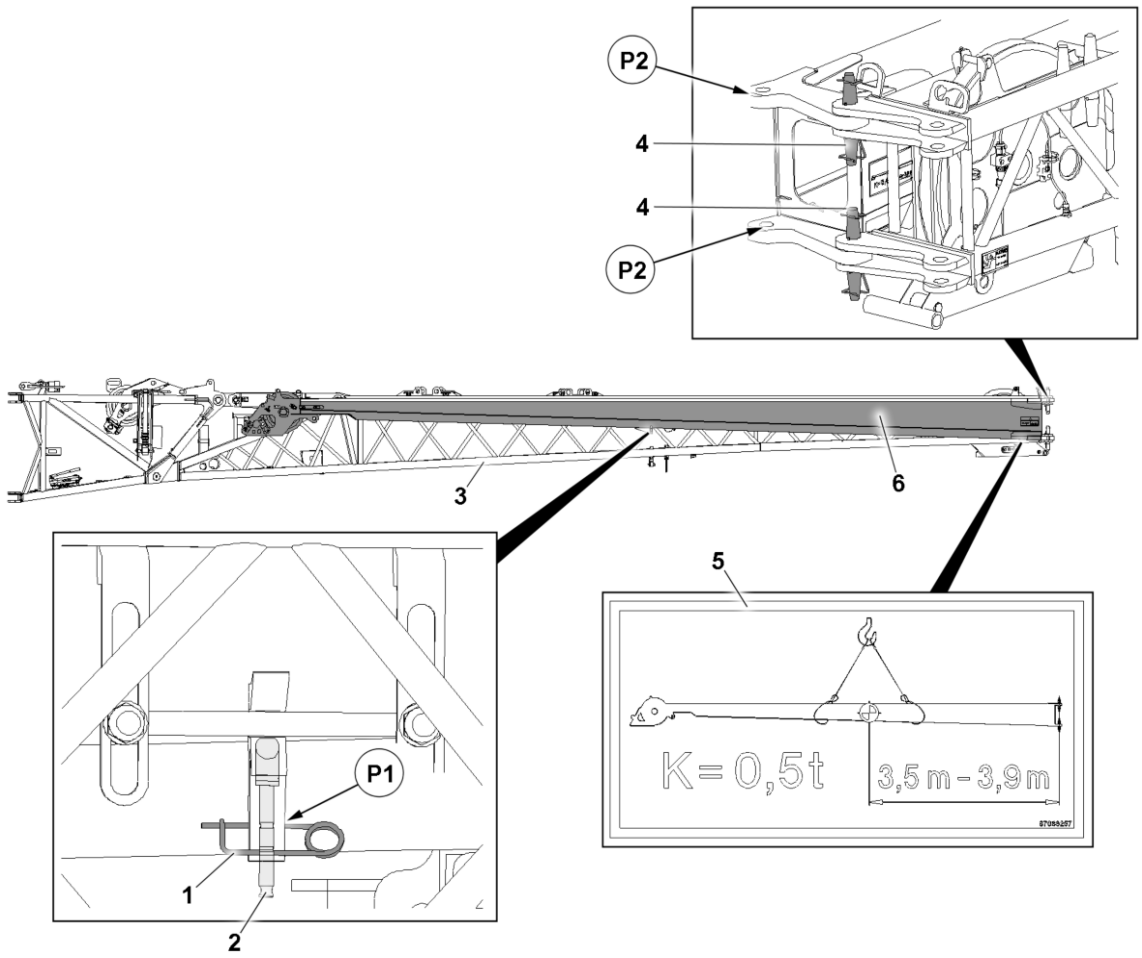


Fig. 1916: Unpinning the end section from the pivot section

1 Retaining element
2 Pin
3 Pivot section
4 Double cone pin (2x)
5 Sign
6 End section
P1 Retaining position
P2 Pin position

- ▶ Fasten the end section **6** (→ 7.7 Folding jib, p. 389).
- ▶ Tension the fastening equipment slightly.
- ▶ Make sure that the end section **6** is secured against swinging out.
- ▶ Disassemble the retaining element **1**.
- ▶ Open the lock: Pull the pin **2** down and secure with the retaining element **1** in the retaining position **P1**.
- ▶ Release and unpin the upper double cone pin **4**.
- ▶ Insert the upper double cone pin **4** in the pin position **P2** and secure with retaining clips.
- ▶ Release and unpin the lower double cone pin **4**.
- ▶ Insert the lower double cone pin **4** in the pin position **P2** and secure with retaining clips.
- ▶ Take the end section **6** down on the ground.
- ▶ Disconnect the end section from the auxiliary crane.

10.8.17 Assembling the end section

Make sure that the following prerequisites are met:
- ❑ The folding jib is disassembled from the crane.
  (→ 10.8.15 Disassembling the folding jib, p. 819)
- ❑ The folding jib is lying on the ground and is supported.

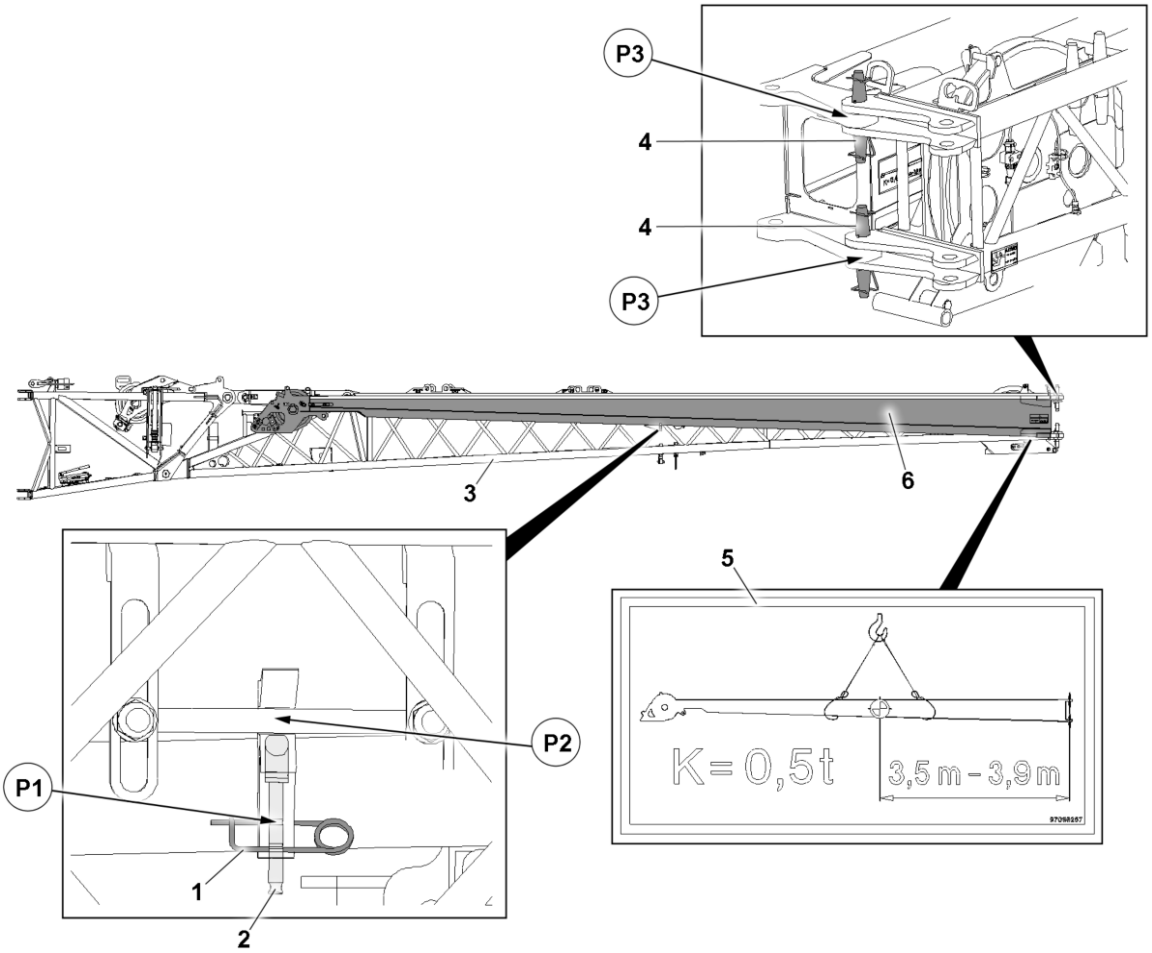


Fig. 1917: Pinning the end section with the pivot section

1 Retaining element
2 Pin
3 Pivot section
4 Double cone pin (2x)
5 Sign
6 End section
P1 Retaining position
P2 Locking point
P3 Pin position

▶ Disassemble the retaining element **1**.

▶ Open the lock: Pull the pin **2** down and secure with the retaining element **1** in the retaining position **P1**.

▶ Fasten the auxiliary crane to the end section **6** (→ 7.7 Folding jib, p. 389).

▶ Tension the fastening equipment slightly.

▶ Until the end section **6** can be pinned with the pivot section **3** in the pin position **P3**: Position the end section **6**.

▶ Insert both double cone pins **4** in the Pin position **P3** and secure with retaining clips.

▶ Lock the end section **6** with the pivot section **3** in the locking point **P2**.

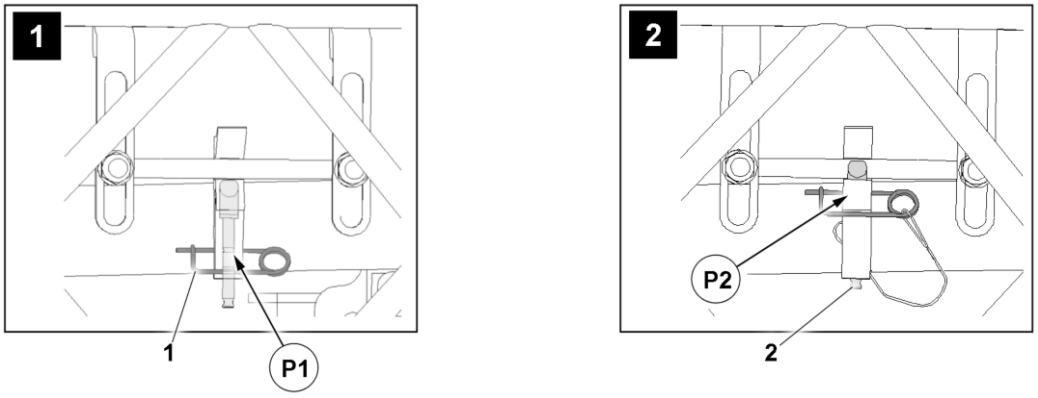


Fig. 1918: Closing the lock

1 Retaining element
2 Pin
P1 Retaining position (unlocked)
P2 Retaining position (locked)

▶ Disassemble the retaining element **1** from the retaining position **P1**.

▶ Secure the pin **2** in the closed position: Assemble the retaining element **1** in the retaining position **P2**.
▷ The end section is locked with the pivot section.

▶ Disconnect the end section from the auxiliary crane.

10.8.18 Folding jib assembly charts

Permissible working position and turntable ballast during assembly / disassembly of the folding jib:

Support base	Boom combination	Work position during assembly or disassembly			
		360°		To the rear or the front (0° or 180°)	
		Minimum turntable ballast	Maximum turntable ballast	Maximum turntable ballast	Maximum turntable ballast
Wide track width (4.9 m)	K-10.8 / NZK-10.8	0 t	41 t	0 t	41 t
	K-19.0 / NZK-19.0	0 t	41 t	0 t	41 t
	V-7.0 + K-10.8 / NZK-10.8	0 t	41 t	0 t	41 t
	V-7.0 + K-19.0 / NZK-19.0	0 t	41 t	0 t	41 t
	V-14.0 + K-10.8 / NZK-10.8	0 t	41 t	0 t	41 t
	V-14.0 + K-19.0 / NZK-19.0	0 t	41 t	0 t	41 t
	V-21.0 + K-10.8 / NZK-10.8	0 t	41 t	0 t	41 t
	V-21.0 + K-19.0 / NZK-19.0	0 t	41 t	0 t	41 t

Support base	Boom combination	Work position during assembly or disassembly			
		360°		To the rear or the front (0° or 180°)	
		Minimum turntable ballast	Maximum turntable ballast	Maximum turntable ballast	Maximum turntable ballast
Reduced track width (4.1 m)	K-10.8 / NZK-10.8	0 t	41 t	0 t	41 t
	K-19.0 / NZK-19.0	0 t	41 t	0 t	41 t
	V-7.0 + K-10.8 / NZK-10.8	0 t	41 t	0 t	41 t
	V-7.0 + K-19.0 / NZK-19.0	0 t	41 t	0 t	41 t
	V-14.0 + K-10.8 / NZK-10.8	0 t	41 t	0 t	41 t
	V-14.0 + K-19.0 / NZK-19.0	0 t	41 t	0 t	41 t
	V-21.0 + K-10.8 / NZK-10.8	11 t	41 t	0 t	41 t
	V-21.0 + K-19.0 / NZK-19.0	11 t	41 t	0 t	41 t
Narrow track width (2.6 m)	K-10.8 / NZK-10.8	0 t	21 t	0 t	41 t
	K-19.0 / NZK-19.0	0 t	21 t	0 t	41 t
	V-7.0 + K-10.8 / NZK-10.8	0 t	21 t	0 t	41 t
	V-7.0 + K-19.0 / NZK-19.0	11 t	21 t	0 t	41 t
	V-14.0 + K-10.8 / NZK-10.8	11 t	21 t	0 t	41 t
	V-14.0 + K-19.0 / NZK-19.0	11 t	21 t	0 t	41 t
	V-21.0 + K-10.8 / NZK-10.8	21 t	21 t	0 t	41 t
	V-21.0 + K-19.0 / NZK-19.0	21 t	21 t	0 t	41 t

Tab. 104: Folding jib - assembly chart

10.9 Special folding jib*

10.9.1 Safety

This section supplements the “Safety” chapter.

10.9.1.1 Danger of falling when stepping on the special folding jib

The special folding jib is not designed for being stepped on. The special folding jib does not have stepping surfaces.

There is a danger of falling.

Observe the following rules:
- **Never** step on the special folding jib.

10.9.1.2 Working on the ladder

Personnel can fall when working on ladders (→ 5.10 Using the ladders correctly, p. 176).

Also observe the following rules:
- Have the tool for assembly and disassembly handed over by a second person.

10.9.1.3 Crane operation

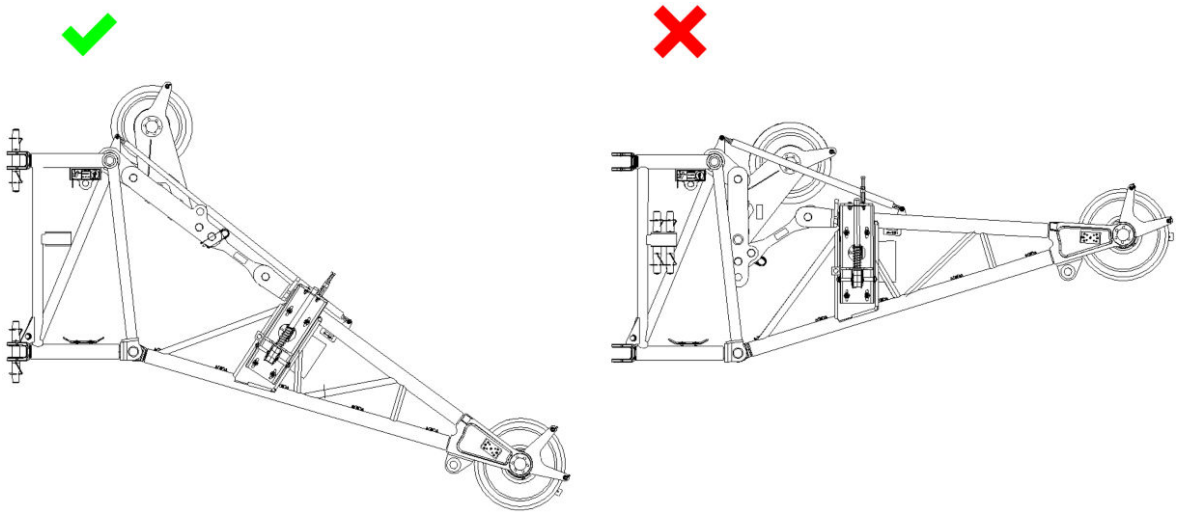


Fig. 1920: Crane operation with the special folding jib

If the end section is in the transport position during crane operation, the special folding jib is overloaded.

Observe the following rules:
- Swing the end section into the operating position prior to crane operation.

10.9.2 Reeving the hoist rope out on the boom head

Make sure that the following prerequisites are met:
❑ The special folding jib is in the transport position or is disassembled.
(→ 10.9.11 Swinging into the transport position, p. 837)

(→ 10.9.12 Disassembling the special folding jib, p. 840)

Note

▶ In two hook operation, the hook block remains reeved on the boom head.

▶ Telescope the telescopic boom out to the length that corresponds to the length of the special folding jib to be assembled.

When the working height must be reduced:

▶ Luff the telescopic boom down.

▶ Set the hook block down on the ground.

▶ Disconnect the hoist rope in the rope fixed point and reeve the hook block out.

▶ Disassemble the hoist limit switch weight and chain.

▶ Disassemble the rope lock.

▶ Actuate the hoist limit switch mechanically.

▶ Remove the rope retaining pipes on the pulley head and on the back pulley.

▶ Take the hoist rope down onto the ground with the hook rod.

▶ Pin the rope retaining pipes on the pulley head and on the back pulley.

▶ Telescope the telescopic boom in all the way again.

▶ Luff the telescopic boom to 0.5°.

10.9.3 Swinging into the operating position

Make sure that the following prerequisites are met:

❑ The crane is in the set up configuration according to the assembly chart.
(→ 10.9.13 Special folding jib assembly charts, p. 841)

❑ The central ballast is assembled.
(→ 10.6.1 Assembling the central ballast, p. 748)

❑ The crane inclination is maximum 0.3°.

❑ The crane set up configuration is set in the *set up* menu.
(→ 8.6 Setting up the crane, p. 412)

❑ The telescopic boom is telescoped in all the way.

❑ The telescopic boom is luffed to 0.5°.

❑ The special folding jib is in the transport position.

❑ An assembly rod is available.
(→ 4.7.11 Assembly rod, p. 86)

DANGER

The crane is **not** horizontal!
The special folding jib can swing uncontrolled.

▶ Make sure that the crane is standing on horizontal ground.

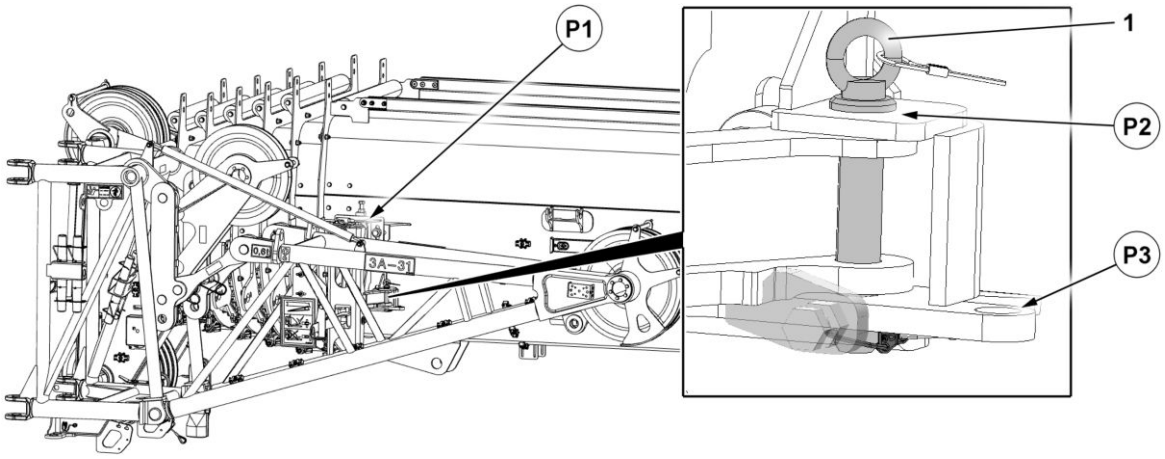


Fig. 1921: Releasing the special folding jib from the retainer

1 Pin
P1 Pivot point
P2 Pin position
P3 Park position

WARNING
Special folding jib not locked in the pivot point!
The special folding jib falls down.

▶ Make sure that the special folding jib is locked in the pivot point.

▶ Release and unpin the pin **1** in the pin position **P2**.

▶ Insert and secure the pin **1** in the park position **P3**.

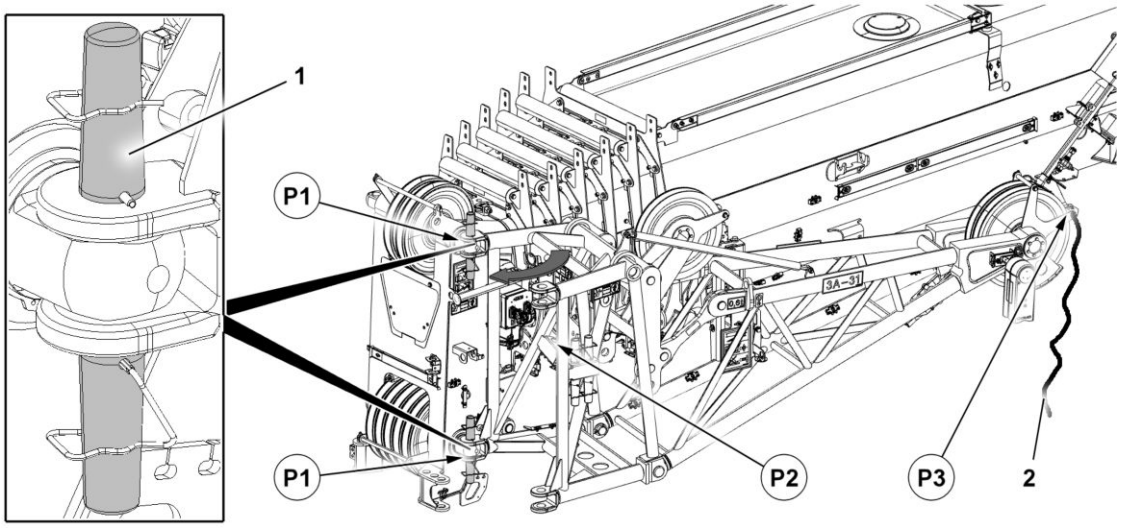


Fig. 1922: Pinning the special folding jib in the assembly position

1 Double cone pin
2 Guide rope
P1 Pin position
P2 Transport position
P3 Fastening point

▶ Fasten the guide rope **2** in the fastening point **P3**.

▶ Until pinning is possible in the pin point **P1**: Swing the special folding jib out with the guide rope **2**.

▶ Release and unpin both double cone pins **1** in the transport position **P2**.

▶ Insert the bottom double cone pin **1** in the pin position **P1** and secure with retaining clips.

▶ Insert the top double cone pin **1** in the pin position **P1** and secure with retaining clips.

Troubleshooting

Do the pin bores not align in the pin position **P1**?

▶ Tension the telescopic boom (→ 10.8.4 Tensioning the telescopic boom, p. 785).

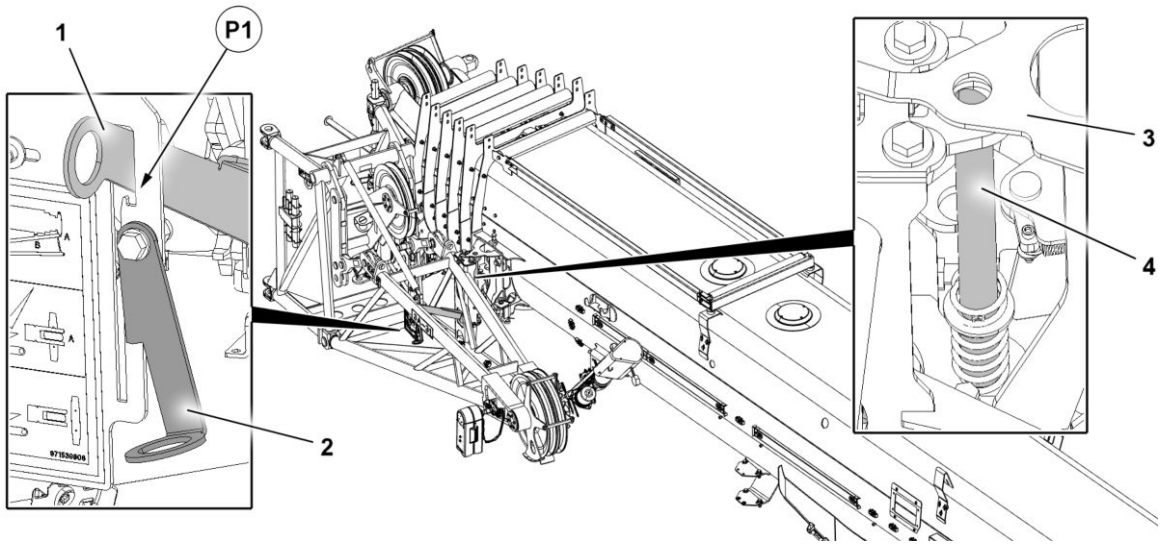


Fig. 1923: Unlocking the special folding jib pivot point

1 Lever
2 Retaining bracket
3 Retainer
4 Lock
P1 Load position

▶ Swing the retaining bracket **2** to the side with the hook rod.

▶ Push the lever **1** up with the hook rod and latch it in the detent position **P1** in the link.
▷ The lock **4** is unpinned from the retainer **3**.

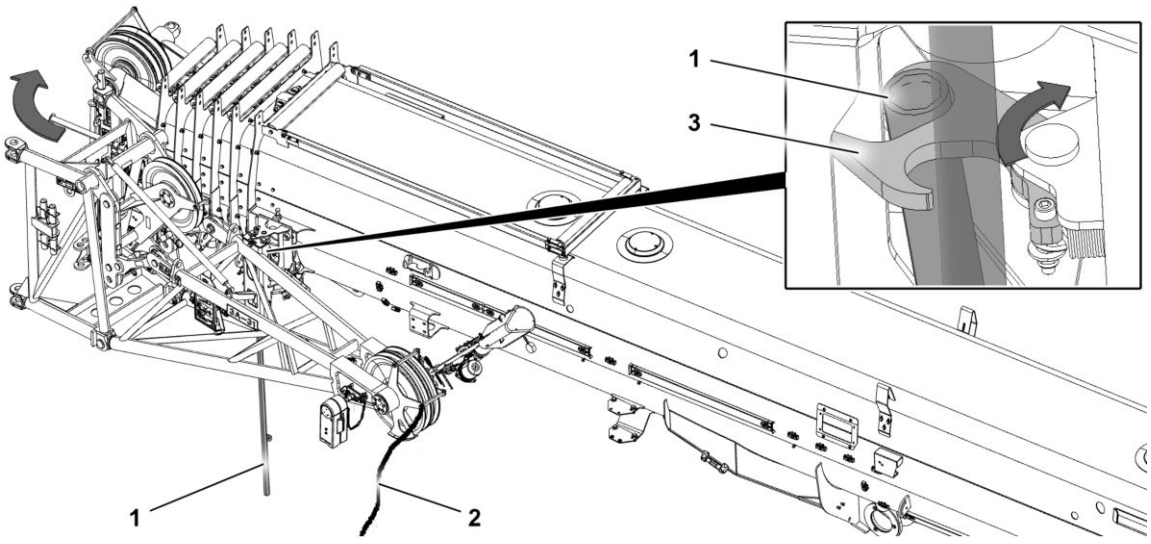


Fig. 1924: Releasing the catch claw, swinging into the operating position

1 Assembly rod
2 Guide rope
3 Catch claw

▶ Guide the assembly rod **1** from below in the catch claw **3** and leverage the catch claw **3** in the direction of the arrow.
▷ The catch claw **3** opens and the special folding jib is leveraged from the transport retainer bracket.

▶ Swing the special folding jib out with the guide rope **2** in the operating position.

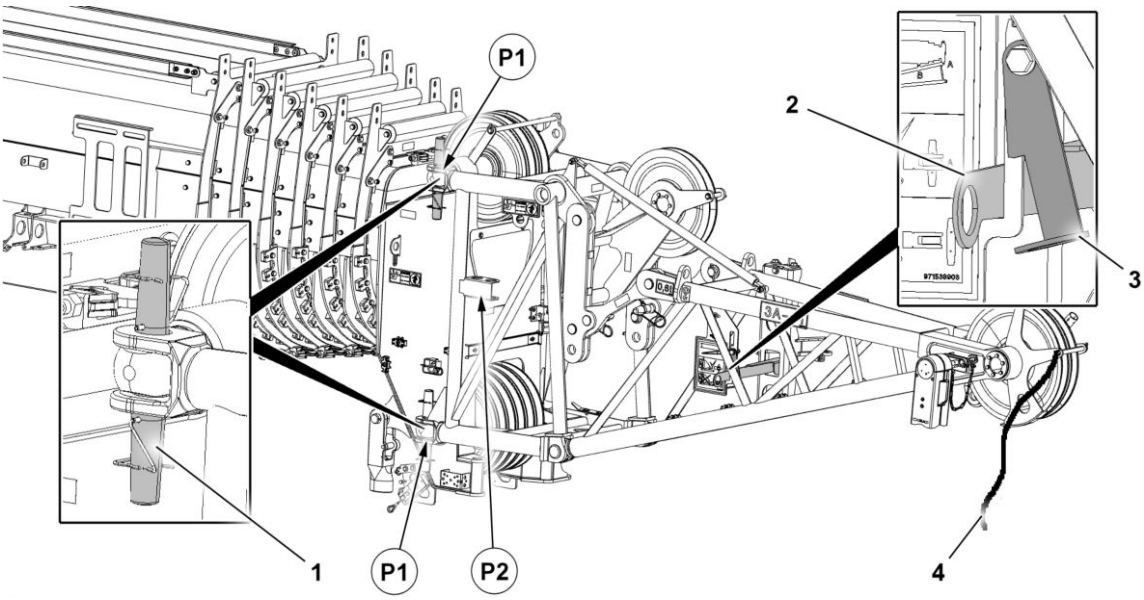


Fig. 1925: Pinning the special folding jib in the operating position

1	Double cone pin	**4**	Guide rope
2	Lever	**P1**	Pin position
3	Retaining bracket	**P2**	Transport position

▶ Release and unpin both double cone pins **1** in the transport position **P2**.

▶ Insert the double cone pin **1** at the top and bottom in the pin position **P1** and secure with retaining clips.

▶ Pull the lever **2** down with the hook rod and secure with the retaining bracket retaining brackets **3**.

▶ Remove the guide rope **4**.

▶ Connect the electrical lines (→ 10.9.7 Connecting the electrical lines, p. 834).

▶ Swing the end section into the operating position (→ 10.9.5 Swinging the end section into the operating position, p. 831).

10.9.4 Assembling the special folding jib

Make sure that the following prerequisites are met:
❑ The crane is in the set up configuration according to the assembly chart.
(→ 10.9.13 Special folding jib assembly charts, p. 841)
❑ The central ballast is assembled.
(→ 10.6.1 Assembling the central ballast, p. 748)
❑ The crane inclination is maximum 0.3°.
❑ The crane set up configuration is set in the *set up* menu.
(→ 8.6 Setting up the crane, p. 412)
❑ The telescopic boom is telescoped in all the way.
❑ The telescopic boom is luffed to 0.5°.
❑ An auxiliary crane is on hand.
❑ The end section is swung into the transport position and pinned.

(→ 10.9.10 Swinging the end section into the transport position, p. 836)

❑ The guide rope for guiding the special folding jib is secured.

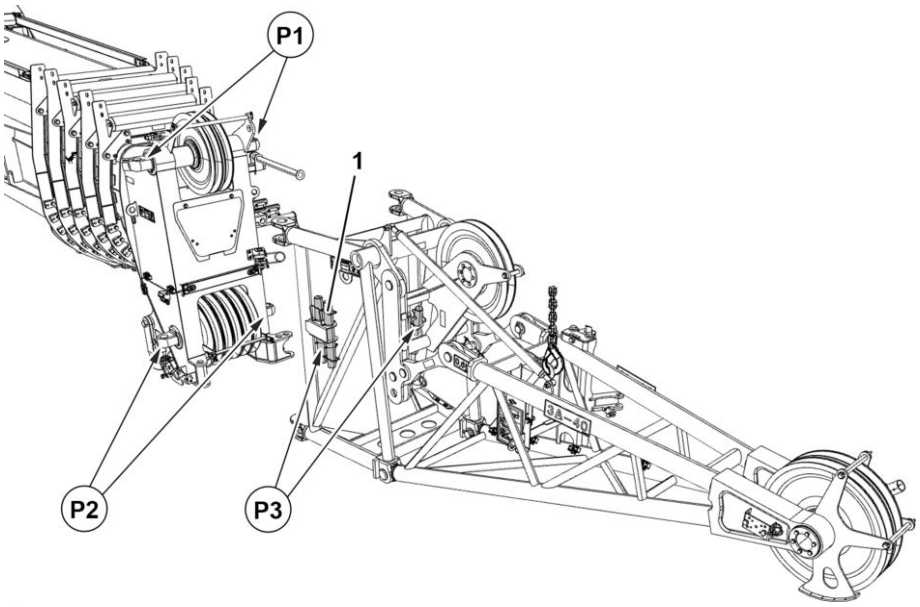


Fig. 1926: Exemplary illustration: Assembling the special folding jib

1 Double cone pin
P1 Pin position
P2 Pin position
P3 Transport position

▶ Fasten the special folding jib to the auxiliary crane (→ 7.8 Special folding jib , p. 393).

▶ Lift the special folding jib with the auxiliary crane and fix in the upper pin points on the telescopic boom.

▶ Release and unpin the double cone pin **1** in the transport position **P3**.

▶ Insert the **top** double cone pin **1** in the pin position **P1** and secure with retaining clips.

▶ Release and unpin the double cone pin **1** in the transport position **P3**.

▶ Insert the **bottom** double cone pin **1** in the pin position **P2** and secure with retaining clips.

▶ Swing the end section into the operating position (→ 10.9.5 Swinging the end section into the operating position, p. 831).

or

Swing the special folding jib into the transport position (→ 10.9.11 Swinging into the transport position, p. 837).

10.9.5 Swinging the end section into the operating position

Make sure that the following prerequisites are met:

❑ The special folding jib is swung and pinned in the operating position.

(→ 10.9.3 Swinging into the operating position, p. 827)

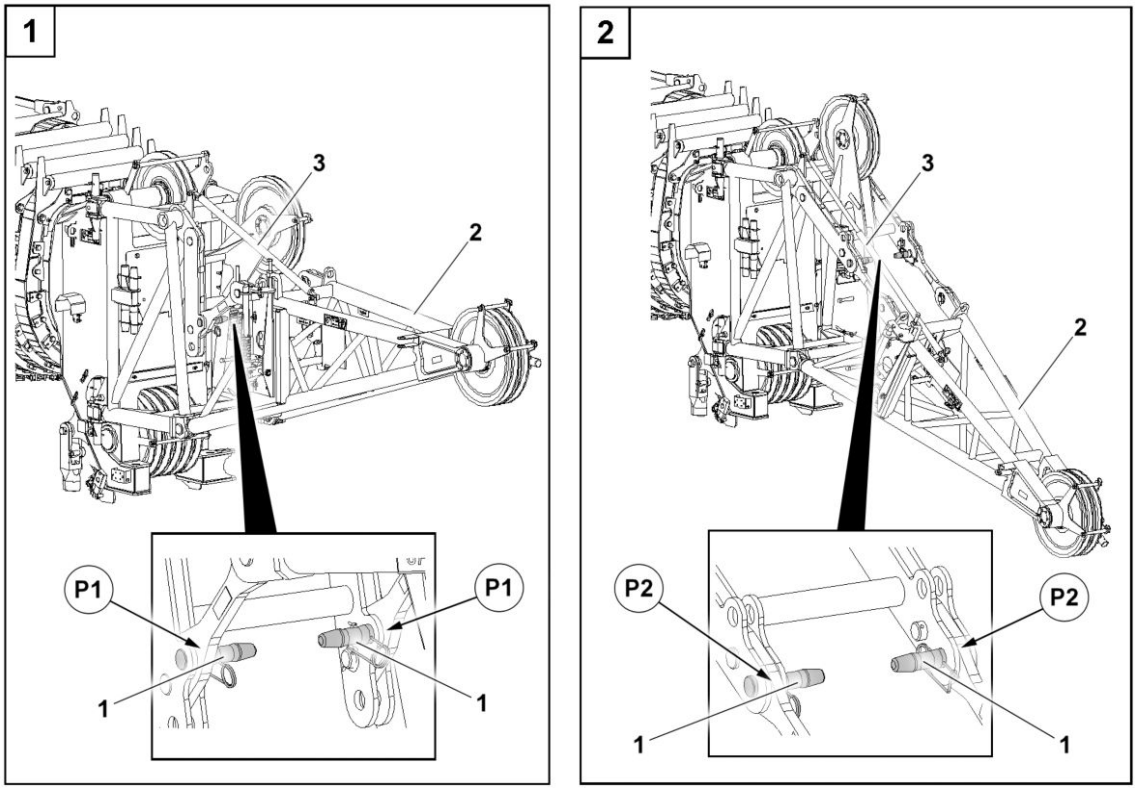


Fig. 1927: Swinging the end section into the operating position

1 Pin (2x)
2 End section
3 Pneumatic spring
P1 Pin position
P2 Pin position

▶ Release both pins **1** in the pin position **P1** and unpin

Note
To facilitate the swinging procedure, a hook block can be reeved in.

▶ Unpin the rope retaining pin.

▶ Reeve the hook block in (→ 10.9.6 Reeving in the hoist rope, p. 833).

▶ The rope retaining pins may be inserted only **after** the swinging procedure.

▶ Until pinning is possible in the pin point **P2**: Lift the hook block carefully.

▶ Until pinning is possible in the pin point **P2**: Swing the end section **2** down.

▶ Insert both pins **1** in the pin position **P2** and secure.

10.9.6 Reeving in the hoist rope

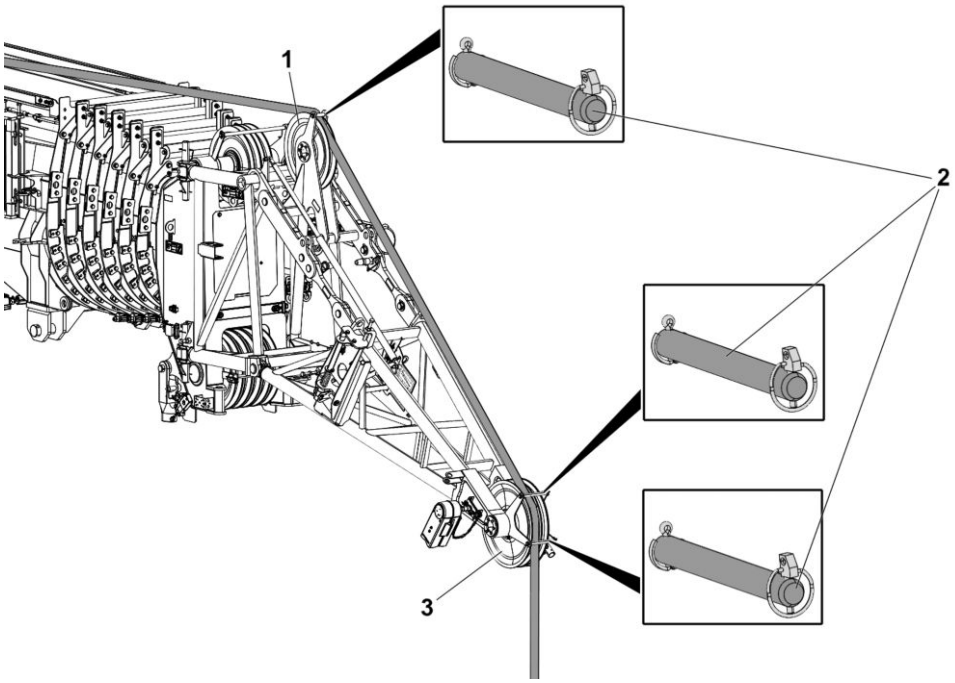


Fig. 1928: Exemplary illustration: Reeving the hoist rope in

1 Rope guide pulley
2 Rope retaining pin (3x)
3 End pulley

The special folding jib must be reeved according to the reeving plan (→ Separate document “Reeving plan”)

- ▶ Release and unpin all rope retaining pins **2**.
- ▶ Place the hoist rope with the hook rod over the rope guide pulley **1** and over the end pulley **3**.
- ▶ Insert and secure all rope retaining pins **2**.
- ▶ Assembling the load hook (→ 10.4.11 Assembling the load hook, p. 729).

or

Reeve the hook block in (→ 10.4.9 Reeving the hook block in, p. 726).

- ▶ Assemble the hoist limit switch weight (→ 10.4.13 Assembling the hoist limit switch weight, p. 730).

10.9.7 Connecting the electrical lines

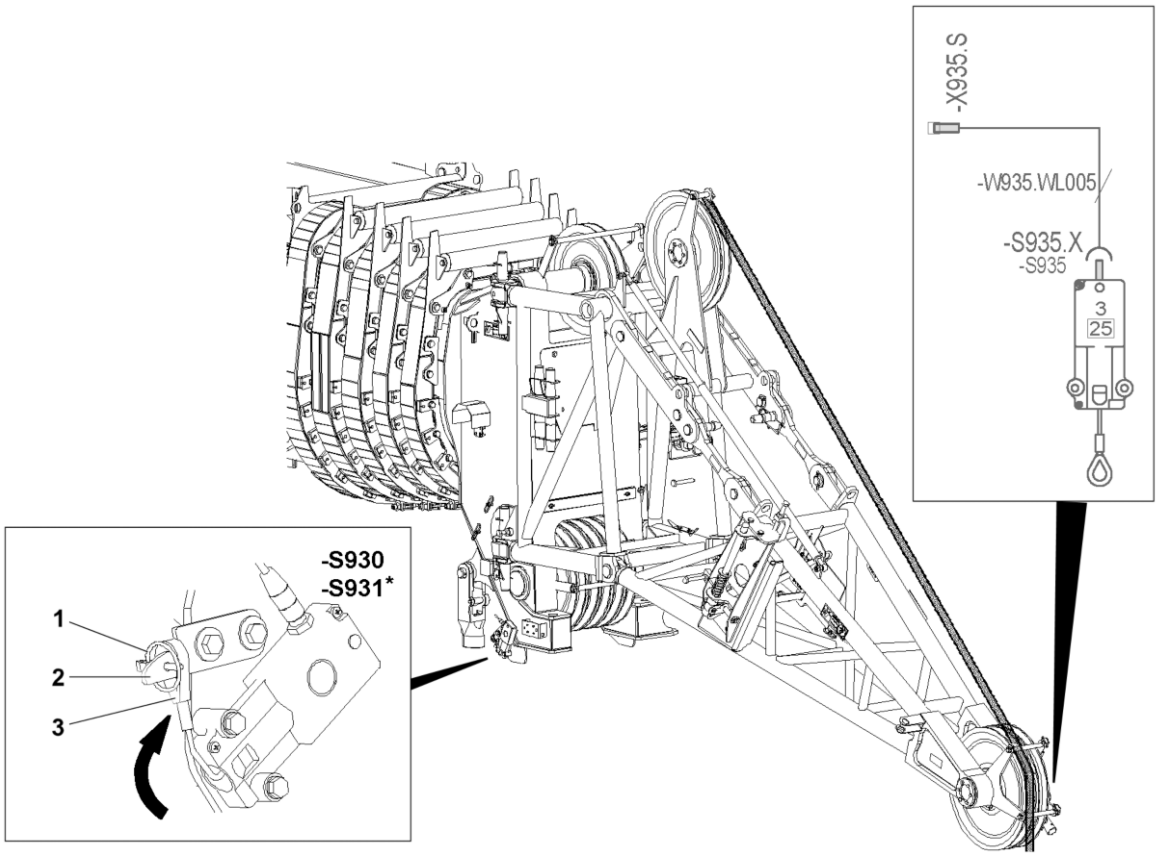


Fig. 1929: Connecting the electrical lines

1	Linch pin
2	Fixed point
3	Hoist limit switch rope
-S935.X	Hoist limit switch
+S930	Connector box
-S930	Hoist limit switch
-S931	Hoist limit switch*

Connecting the electrical lines

- ▶ Connect the electrical lines from the special folding jib to the connector box **+S930** on the boom head.
- ▶ Connect the hoist limit switch **-S935.X**.
- ▶ Assemble and connect the airplane warning light* and the wind speed sensor on the special folding jib.
- ▶ Test the warning and safety equipment (→ 8.3 Checking the warning and safety equipment, p. 404).

Single hook operation

The hoist limit switch **-S930** and hoist limit switch* **-S931** must remain electrically connected even when not in use.

- ▶ Disassemble the hoist limit switch weight on the boom head.
- ▶ Pull the hoist limit switch rope **3**, connect it in the fixed point **2** and secure with the locking pin **1**.

10.9.8 Reeving the hoist rope out

Make sure that the following prerequisites are met:

- ❑ The telescopic boom is telescoped in all the way.
  (→ Automatic telescoping from the crane cab, p. 551)
- ❑ The telescopic boom is luffed down to 0°.
  (→ Luffing the telescopic boom from the crane cab, p. 533)
- ❑ The installation parts on the special folding jib are disassembled.
- ❑ The hook block is reeved out.
  (→ 10.4.10 Reeving the hook block out, p. 728)
- ❑ The hoist limit switch weight is disassembled.
  (→ 10.4.14 Disassembling the hoist limit switch weight, p. 732)
- ❑ The rope lock is disassembled.
  (→ 10.4.16 Removing the lock, p. 735)

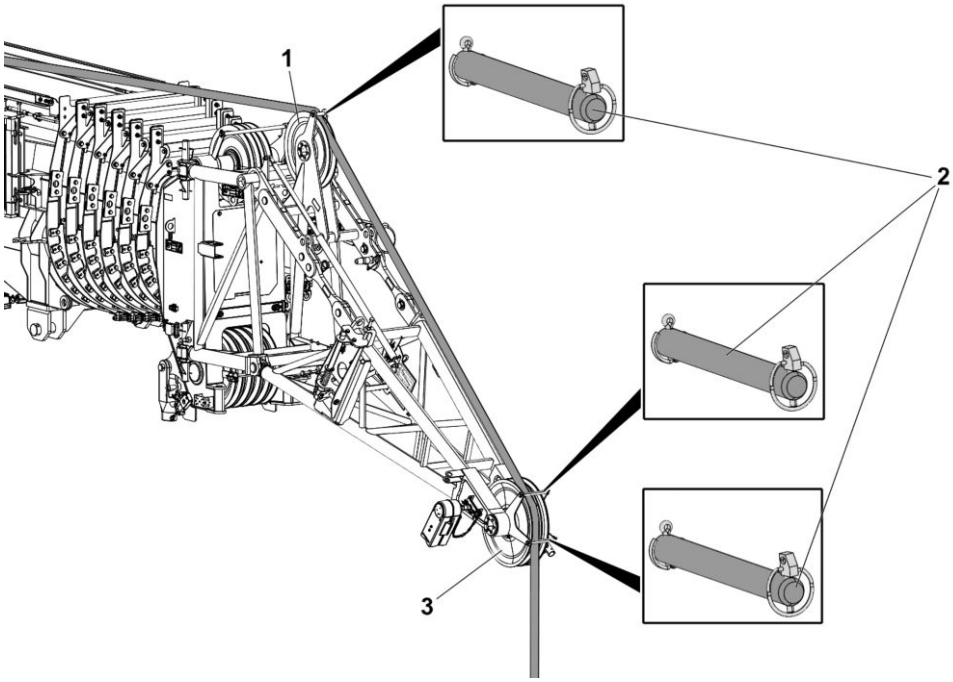


Fig. 1930: Reeving the hoist rope out

1 Rope guide pulley
2 Rope retaining pin (3x)
3 End pulley

▶ Release and unpin all rope retaining pins **2**.

▶ Take the hoist rope down onto the ground with the hook rod.

▶ Spool the hoist rope up.

▶ Insert and secure all rope retaining pins **2**.

10.9.9 Disconnecting the electrical lines

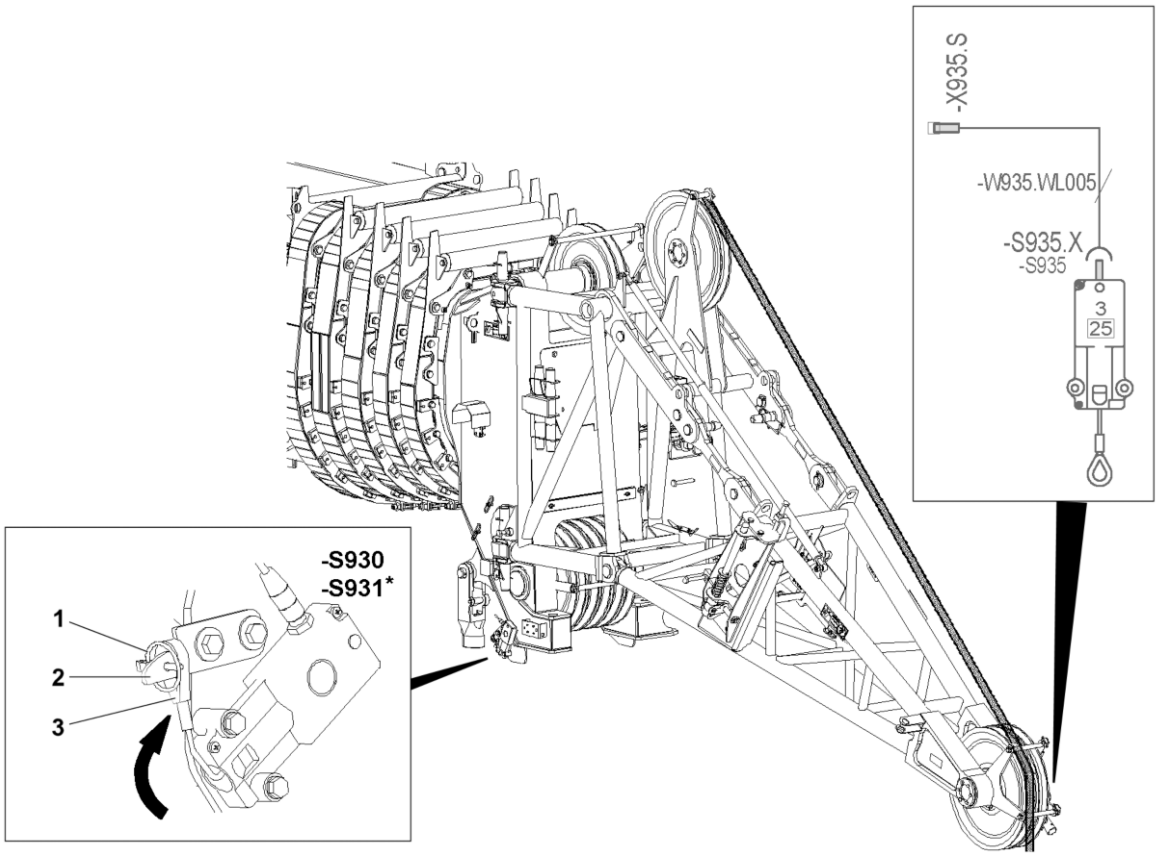


Fig. 1931: Disconnecting the electrical lines

1	Locking pin	**+S930**	Connector box
2	Fixed point	**-S930**	Hoist limit switch
3	Hoist limit switch rope	**-S931**	Hoist limit switch*
-S935.X	Hoist limit switch		

▶ Disconnect the electrical lines from the special folding jib to the connector box **+S930** on the boom head.

▶ Disconnect the hoist limit switch **-S935.X**.

If necessary:

▶ Disconnect and disassemble the airplane warning light* and the wind speed sensor on the special folding jib.

10.9.10 Swinging the end section into the transport position

Make sure that the following prerequisites are met:

❑ The special folding jib is swung and pinned in the operating position.
(→ 10.9.3 Swinging into the operating position, p. 827)

❑ The hoist rope is reeved out.
(→ 10.9.8 Reeving the hoist rope out, p. 835)

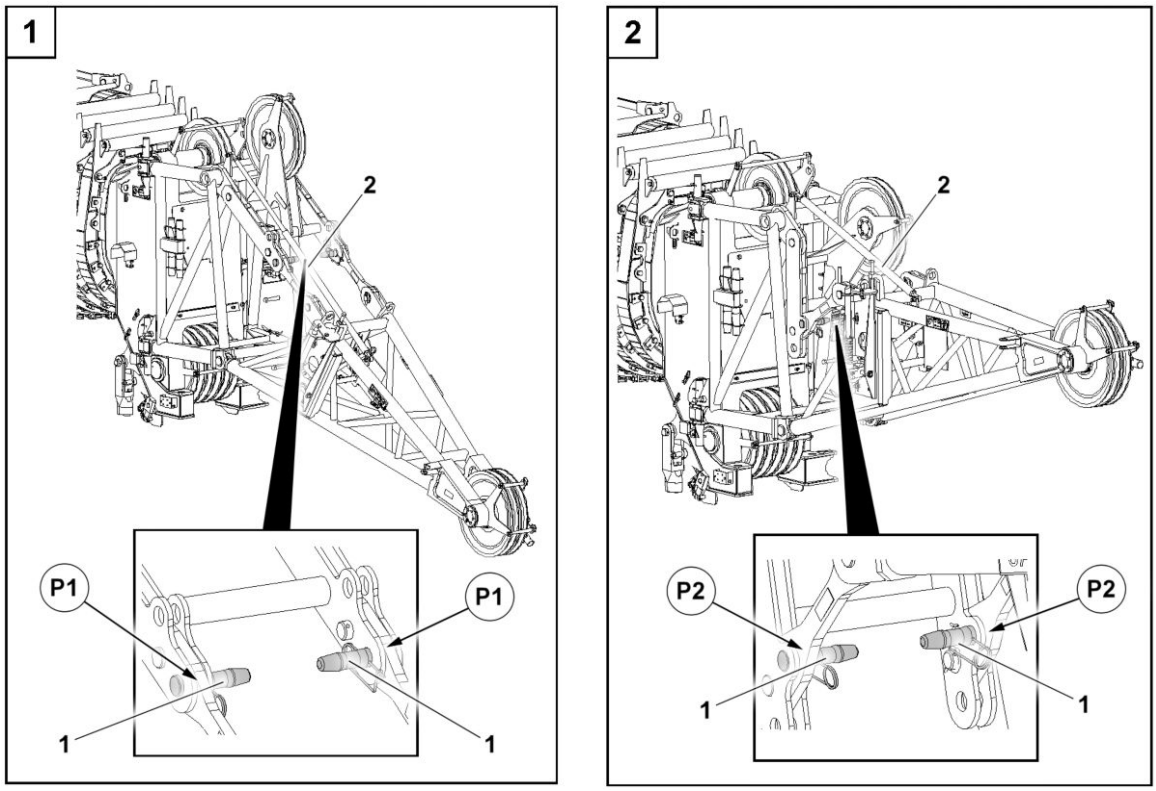


Fig. 1932: Swinging the end section into the transport position

1 Pin (2x)
2 Gas pressure spring
P1 Pin position
P2 Pin position

▶ Release both pins **1** in the pin position **P1** and unpin.

▶ Until pinning is possible in the pin point **P2**: Swing up the special folding jib.

▶ Insert both pins **1** in the pin position **P2** and secure.

10.9.11 Swinging into the transport position

Make sure that the following prerequisites are met:
- ❑ The crane is in the set up configuration according to the assembly chart.
  (→ 10.9.13 Special folding jib assembly charts, p. 841)
- ❑ The central ballast is assembled.
  (→ 10.6.1 Assembling the central ballast, p. 748)
- ❑ The crane inclination is maximum 0.3°.
- ❑ The crane set up configuration is set in the *set up* menu.
  (→ 8.6 Setting up the crane, p. 412)
- ❑ The telescopic boom is telescoped in all the way.
- ❑ The telescopic boom is luffed to 0.5°.
- ❑ The electrical lines are disconnected.
  (→ 10.9.9 Disconnecting the electrical lines, p. 836)
- ❑ The hoist rope is reeved out.
  (→ 10.9.8 Reeving the hoist rope out, p. 835)
- ❑ The end section is swung into the transport position and pinned.
  (→ 10.9.10 Swinging the end section into the transport position, p. 836)

DANGER
The crane is **not** horizontal!
The special folding jib can swing uncontrolled.

▶ Make sure that the crane is standing on horizontal ground.

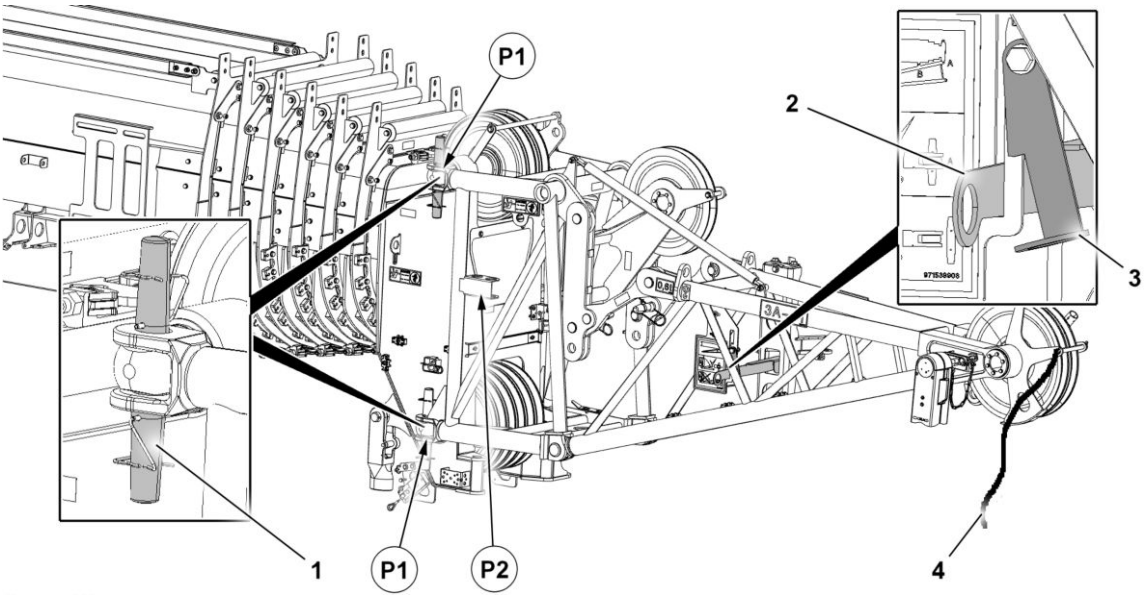


Fig. 1933: Pinning the special folding jib in the operating position

1 Double cone pin
2 Lever
3 Retaining bracket
4 Guide rope
P1 Pin position
P2 Transport position

▶ Fasten the guide rope **4** to the special folding jib.

If necessary:
▶ Disengage the lever **2** with the hook rod from the link and pull downward.

▶ Swing the retaining bracket **3** away from the lever **2** with the hook rod.
▷ The lever **2** can be moved along the longitudinal axis.

⚠ **Danger of crushing! The special folding jib swings in uncontrolled!**

▶ Before unpinning: Hold the special folding jib with the guide rope.

▶ Release and unpin the double cone pin **1** at the top and bottom in the pin position **P1**.

▶ Insert and secure both double cone pins **1** in the transport position **P2**.

▶ Until the lock engages audibly: Swing the special folding jib with the guide rope **4** to the side on the telescopic boom.

▶ Secure the lever **2** with the retaining bracket **3** in the lower position.

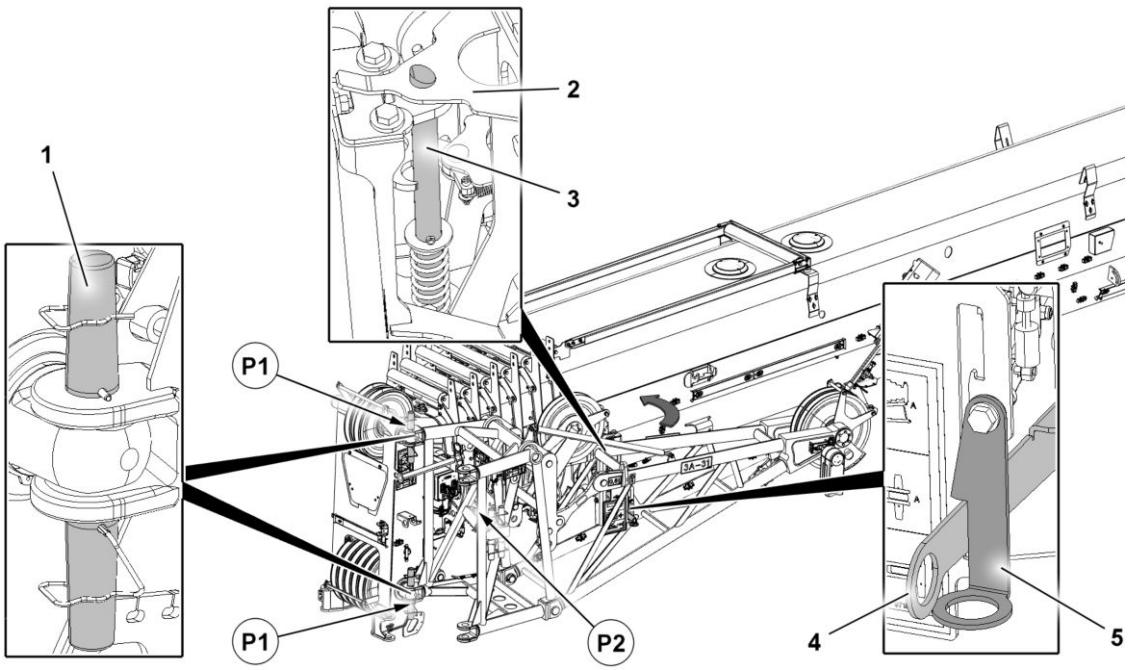


Fig. 1934: Swinging the special folding jib into the transport position

1 Double cone pin
2 Retainer
3 Lock
4 Lever
5 Retaining bracket
P1 Pin position
P2 Transport position

WARNING
Special folding jib **not** locked in the pivot point!
The special folding jib falls down.

- ▶ Make sure that the lock **3** is pinned with the retainer **2**.
- ▶ Make sure that the lever **4** is secured in the lower position with the retaining bracket **5**.

- ▶ Release the top double cone pin **1** in the pin position **P1** and unpin.
- ▶ Release and unpin the double cone pin **1** at the bottom in the pin position **P1**.
- ▶ Insert and secure both double cone pins **1** in the transport position **P2**.

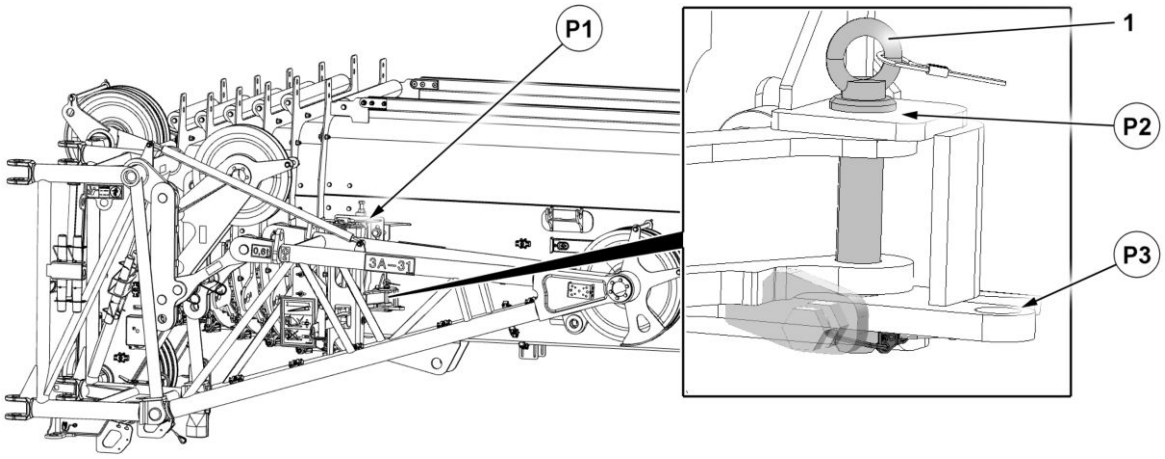


Fig. 1935: Pinning the special folding jib with the retainer

1 Pin
P1 Pivot point
P2 Pin position
P3 Park position

▶ Until the special folding jib can be pinned in the pin position **P2**: Swing the special folding jib in direction of the telescopic boom.

▶ Release and unpin the pin **1** in the park position **P3**.

▶ Insert and secure the pin **1** in the pin position **P2**.

▶ Remove the guide rope.

10.9.12 Disassembling the special folding jib

Make sure that the following prerequisites are met:
❑ The crane is in the set up configuration according to the assembly chart.
(→ 10.9.13 Special folding jib assembly charts, p. 841)
❑ The central ballast is assembled.
(→ 10.6.1 Assembling the central ballast, p. 748)
❑ The crane inclination is maximum 0.3°.
❑ The crane set up configuration is set in the *set up* menu.
(→ 8.6 Setting up the crane, p. 412)
❑ The telescopic boom is telescoped in all the way.
❑ The telescopic boom is luffed to 0.5°.
❑ An auxiliary crane is on hand.
❑ The special folding jib is swung and pinned in the operating position.
(→ 10.9.3 Swinging into the operating position, p. 827)
❑ The end section is swung into the transport position and pinned.
(→ 10.9.11 Swinging into the transport position, p. 837)
❑ The guide rope for guiding the special folding jib is secured.

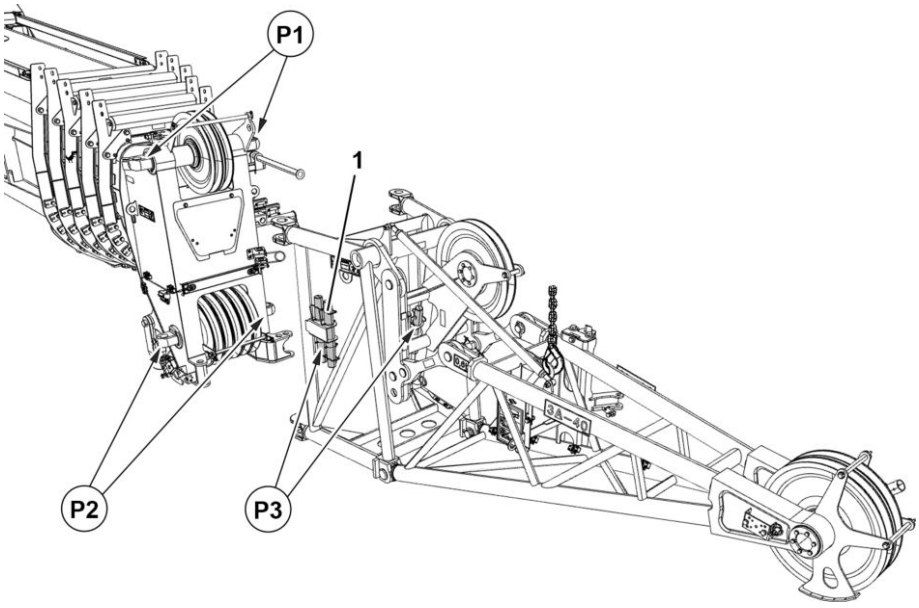


Fig. 1936: Assembling and disassembling the special folding jib

1 Double cone pin
P1 Pin position
P2 Pin position
P3 Transport position

- ▶ Fasten the special folding jib to the auxiliary crane (→ 7.8 Special folding jib , p. 393).
- ▶ Until the special folding jib is secured to prevent it from falling: Tension the fastening equipment.
- ▶ Release and unpin the double cone pin **1** at the **bottom** in the pin position **P2**.
- ▶ Insert and secure the double cone pin **1** in the transport position **P3**.
- ▶ Release the **top** double cone pin **1** in the pin position **P1** and unpin.
- ▶ Insert and secure the double cone pin **1** in the transport position **P3**.
- ▶ Take the special folding jib down.

10.9.13 Special folding jib assembly charts

Permissible working position and turntable ballast during assembly / disassembly of the special folding jib:

Support base	Work position during assembly or disassembly			
	360°		To the rear or the front (0° or 180°)	
	Minimum turntable ballast	Maximum turntable ballast	Maximum turntable ballast	Maximum turntable ballast
Wide track width (4.9 m) **or** Reduced track width (4.1 m)	0 t	41 t	0 t	41 t
Narrow track width (2.6 m)	0 t	21 t	0 t	41 t

Tab. 105: Special folding jib - assembly chart

10.10 Telescopic boom extension*

10.10.1 Safety

This section supplements the “Safety” chapter.

10.10.1.1 Danger of falling when stepping on the telescopic boom extension

The telescopic boom extension is not designed for being stepped on. The telescopic boom extension does not have stepping surfaces.

There is a danger of falling.

Observe the following rules:
- **Never** step on the telescopic boom extension.

10.10.2 Assembling the telescopic boom extension

Make sure that the following prerequisites are met:
- ❑ The crane is in the set up configuration according to the assembly chart.
  (→ 10.8.18 Folding jib assembly charts, p. 824)
- ❑ The crane set up configuration is set in the *set up* menu.
  (→ 8.6 Setting up the crane, p. 412)
- ❑ The telescopic boom is telescoped in all the way.
- ❑ The telescopic boom is luffed down to 0°.
- ❑ An auxiliary crane is available.

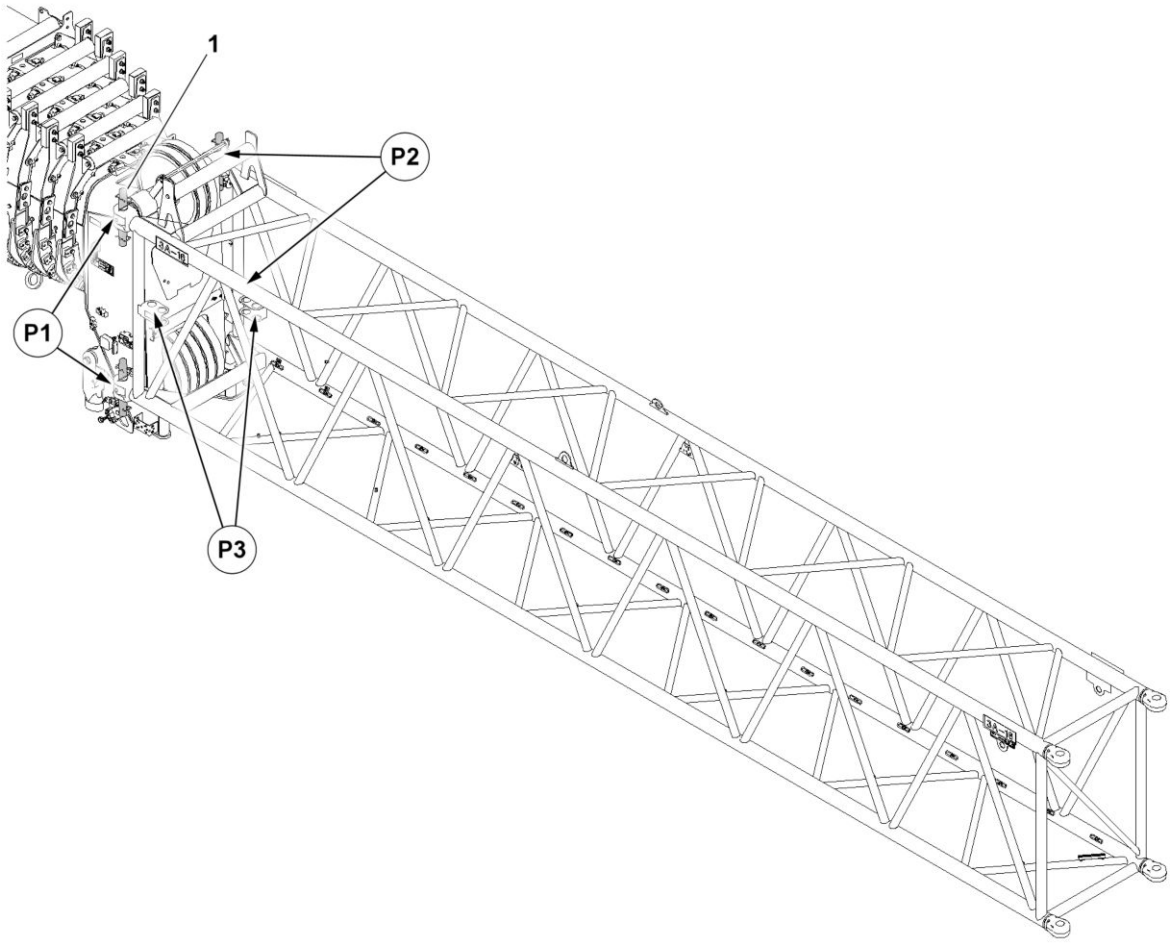


Fig. 1938: Assembling the telescopic boom extension

1 Double cone pin (4x)
P1 Pin position
P2 Pin position
P3 Transport position

- ▶ Fasten the auxiliary crane to the telescopic boom extension(→ 7.9 Telescopic boom extension, p. 395).
- ▶ Until the double cone pin **1** can be inserted at the **top** in the pin position **P1** and pin position **P2**: Fasten the telescopic boom extension on the boom head.
- ▶ Release and unpin the double cone pin **1** in the transport position **P3**.
- ▶ Insert the **top** double cone pin **1** in the pin position **P1** and pin position **P2** and secure with retaining clips.
- ▶ Until the double cone pin **1** can be inserted at the **bottom** in the pin position **P1** and pin position **P2**: Lower the telescopic boom extension.
- ▶ Release and unpin the double cone pin **1** in the transport position **P3**.
- ▶ Insert the double cone pin **1** at the **bottom** pin position **P1** and pin position **P2** and secure with retaining clips.
- ▶ Detach the auxiliary crane.
- ▶ Establish the electrical lines for the telescopic boom extension.

If a hydraulic folding jib is used:

- ▶ Connect the hydraulic lines for the telescopic boom extension.
- ▶ Assemble the folding jib (→ 10.8.5 Assembling the folding jib , p. 786).

10.10.3 Disassembling the telescopic boom extension

Make sure that the following prerequisites are met:
- ❑ The crane is in the set up configuration according to the assembly chart. (→ 10.8.18 Folding jib assembly charts, p. 824)
- ❑ The crane set up configuration is set in the *set up* menu. (→ 8.6 Setting up the crane, p. 412)
- ❑ The telescopic boom is telescoped in all the way.
- ❑ The telescopic boom is luffed down to 0°.
- ❑ An auxiliary crane is available.
- ❑ The folding jib is disassembled.

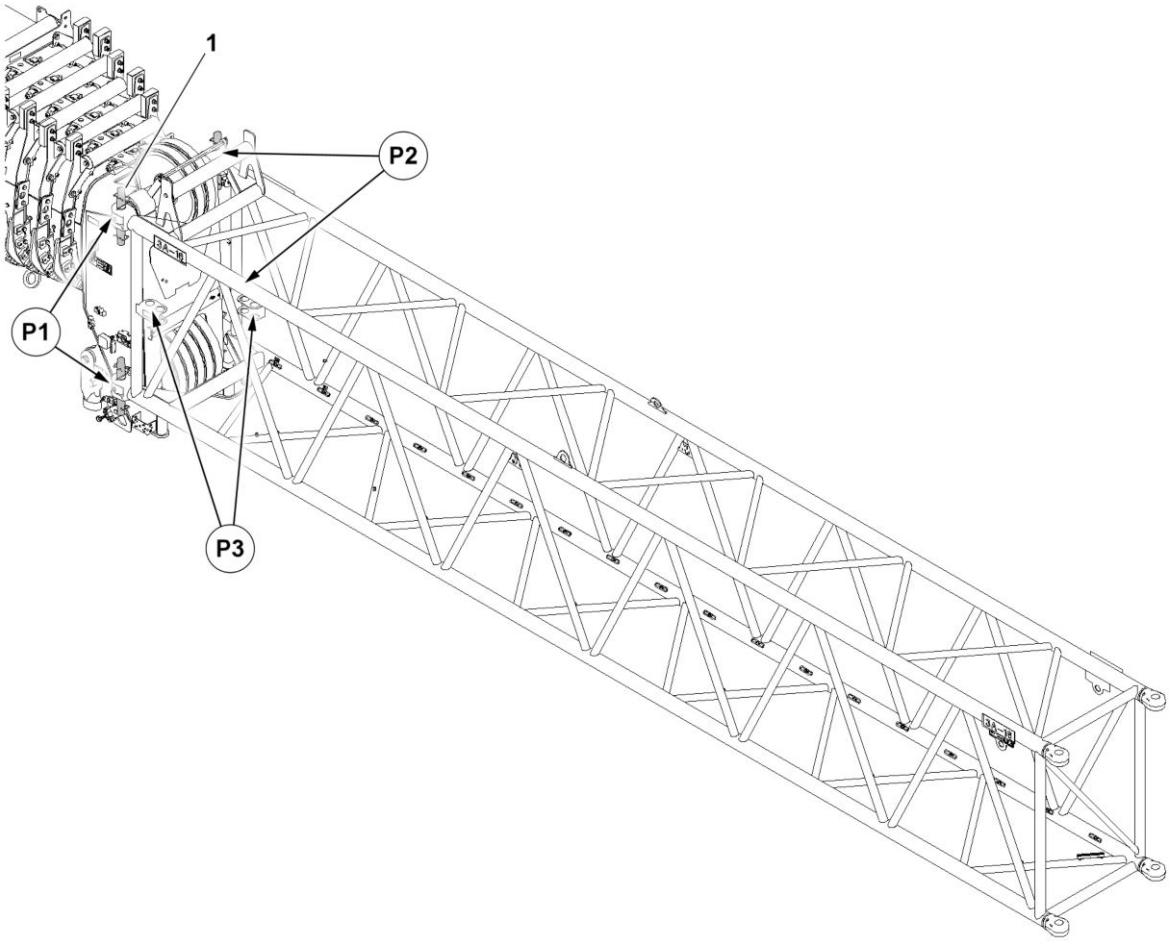


Fig. 1939: Disassembling the telescopic boom extension

1 Double cone pin (4x)
P1 Pin position
P2 Pin position
P3 Transport position

If hydraulic lines are connected:
- ▶ Release the hydraulic lines for the telescopic boom extension.
- ▶ Release the electrical lines for the telescopic boom extension.
- ▶ Fasten the auxiliary crane to the telescopic boom extension and tighten the fastening equipment slightly (→ 7.9 Telescopic boom extension, p. 395).
- ▶ Release and unpin the **bottom** double cone pin **1** in the pin position **P1** and pin position **P2**.
- ▶ Insert the double cone pin **1** in the transport position **P3** and secure with retaining clips.
- ▶ Release and unpin the **top** double cone pin **1** in the pin position **P1** and pin position **P2**.

- ▶ Insert the double cone pin **1** in the transport position **P3** and secure with retaining clips.
- ▶ Take the telescopic boom extension down.

10.11 Boom nose*

10.11.1 Swinging into the operating position

Make sure that the following prerequisites are met:
- ❑ The boom nose is in the transport position.
  (→ 10.11.7 Swinging into the transport position, p. 852)
- ❑ The swing pin **2** is pinned and secured.

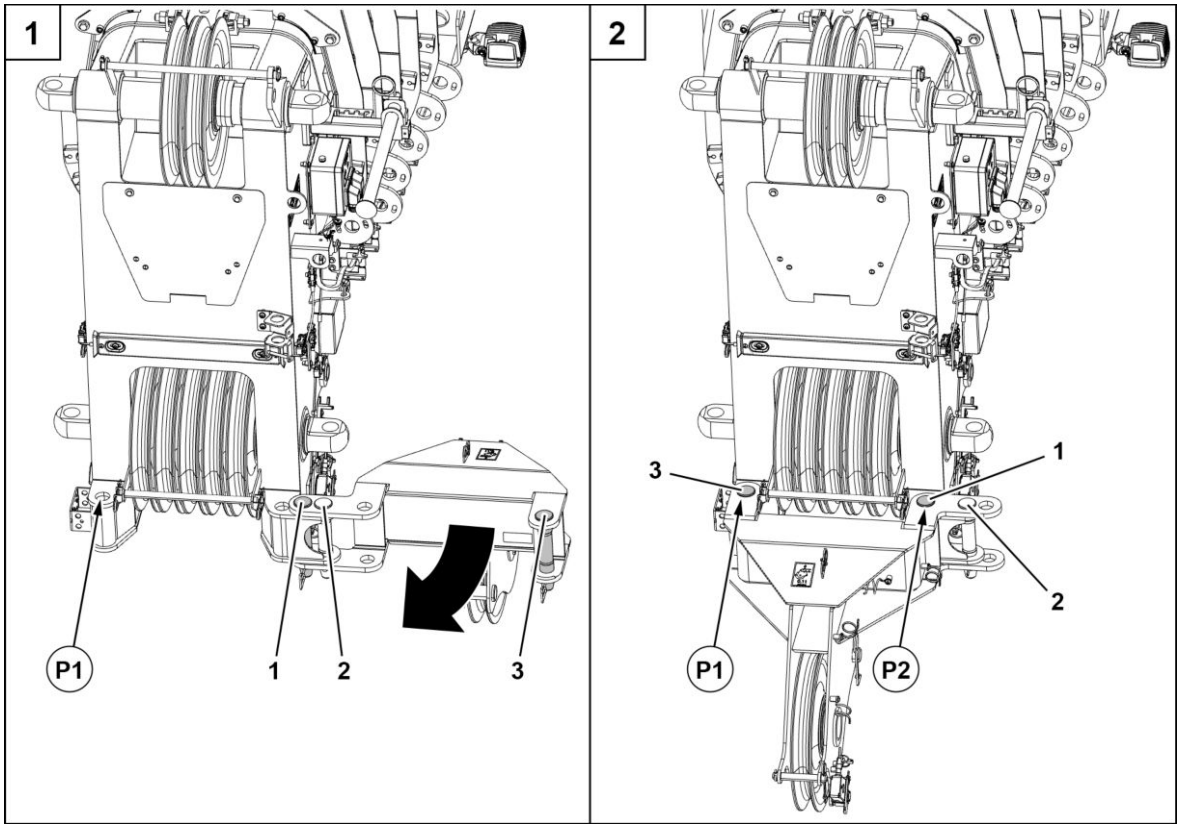


Fig. 1940: Swinging the boom nose into the operating position

1 Pin
2 Swing pin
3 Pin
P1 Pin position
P2 Pin position

▶ Release and unpin the pin **1** and pin **3**.

⚠ **Danger of crushing! Moving parts!**

▶ Until the pin **3** can be inserted in the pin position **P1**: Swing the boom nose to the front.

▶ Insert and secure the pin **3** in the pin position **P1**.

▶ Insert and secure the pin **1** in the pin position **P2**.
▷ The boom nose is in the operating position.

▶ Establish the electrical connection. (→ 10.11.3 Connecting the electrical lines, p. 848)

10.11.2 Assembling the boom nose

Make sure that the following prerequisites are met:
❑ An auxiliary crane is available.

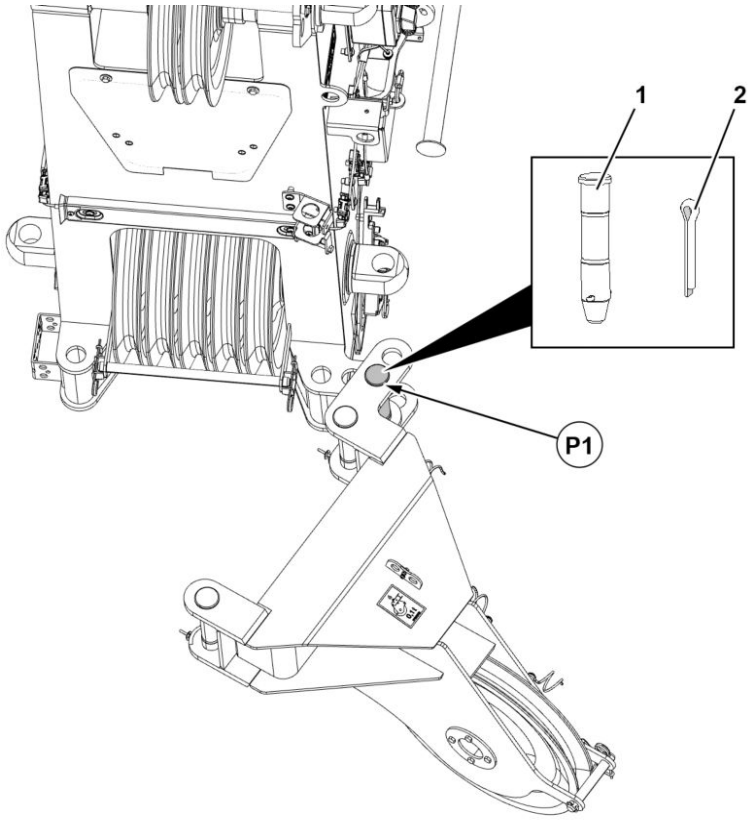


Fig. 1941: Assembling the boom nose

1 Swing pin
2 Split pin
P1 Pin position

▶ Fasten the auxiliary crane to the boom nose (→ 7.10 Boom nose, p. 396).

▶ Until the swing pin **1** can be inserted in the pin position **P1**: Position the boom nose.

▶ Insert the swing pin **1** in the pin position **P1** and secure with the split pin **2**.
▷ The boom nose is assembled on the boom head.

▶ Remove the auxiliary crane.

▶ Swing the boom nose into the operating position (→ 10.11.1 Swinging into the operating position, p. 846).

or

Swing the boom nose into the transport position (→ 10.11.7 Swinging into the transport position, p. 852).

10.11.3 Connecting the electrical lines

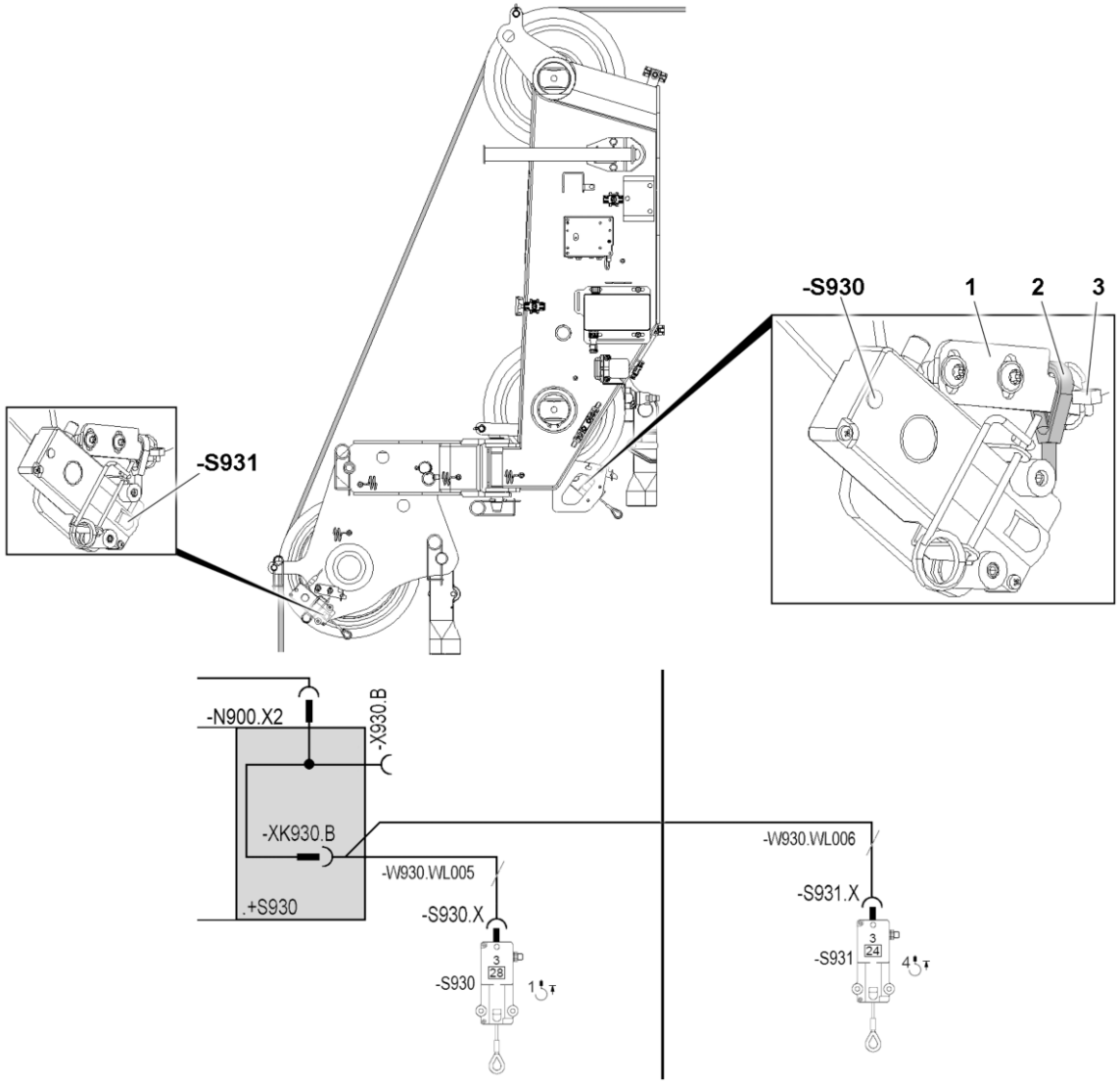


Fig. 1942: Exemplary illustration: Connecting the electrical lines

1	Fixed point	**-S931**	Hoist limit switch
2	Hoist limit switch rope	**-S931.X**	Plug
3	Retaining element	**-XK930.B**	Socket
-S930	Hoist limit switch		

10.11.3.1 Single hook operation

During single hook operation, only the hoist limit switch **-S931** on the boom nose is active.

Actuating the telescopic boom hoist limit switch mechanically

When working in single hook operation, the hoist limit switch **-S930** that is not required must be operated mechanically.

▶ Disassemble the hoist limit switch weight and chain.

Actuate the hoist limit switch **-S930** mechanically:

▶ Connect the hoist limit switch rope **2** in the fixed point **1**.

▶ Secure the hoist limit switch rope **2** with the retaining element **3**.

Boom nose hoist limit switch

If the hoist limit switch **-S931** is assembled on the boom head:

- ▶ Disassemble the hoist limit switch **-S931** on the boom head and assemble on the boom nose.
- ▶ Insert the plug **-S931.X** in the socket **-XK930.B** on the boom head.
- ▶ Test the warning and safety equipment (→ 8.3 Checking the warning and safety equipment, p. 404).

10.11.3.2 Two hook operation

In two hook operation, both hoist limit switches are active, the hoist limit switch **-S930** for the telescopic boom and the hoist limit switch **-S931** for the boom nose are both active.

Boom nose hoist limit switch

If the hoist limit switch **-S931** is assembled on the boom head:

- ▶ Disassemble the hoist limit switch **-S931** on the boom head and assemble on the boom nose.
- ▶ Insert the plug **-S931.X** in the socket **-XK930.B** on the boom head.
- ▶ Test the warning and safety equipment (→ 8.3 Checking the warning and safety equipment, p. 404).

10.11.4 Reeving the hoist rope in

Make sure that the following prerequisites are met:

- ❑ The boom nose is swung into the operating position (→ 10.11.1 Swinging into the operating position, p. 846).

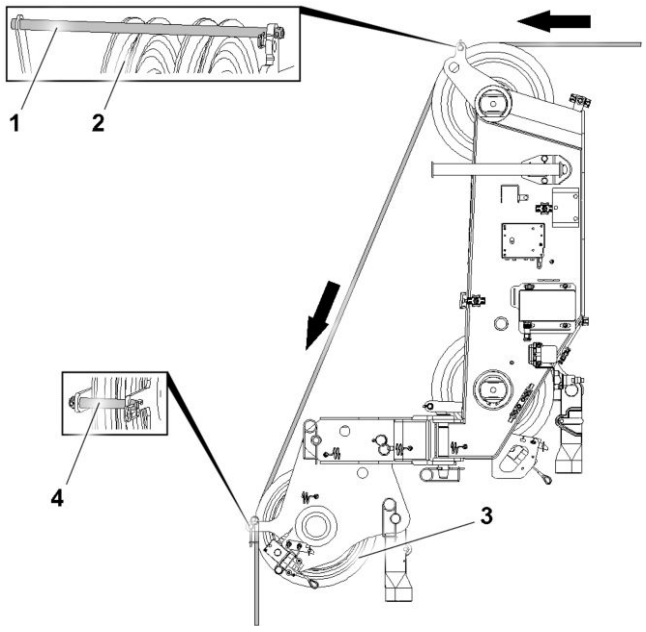


Fig. 1943: Reeving the hoist rope in

1	Rope retaining pipe	**3**	Rope pulley
2	Back pulley	**4**	Rope retaining pipe

Comply with the reeving plan (→ Separate document “Reeving plan”).

- ▶ Release and unpin the rope retaining pipe **1** and the rope retaining pipe **4**.

- ▶ Place the hoist rope in the direction of the arrow over the back pulley **2** on the telescopic boom and over the rope pulley **3** on the boom nose.
- ▶ Pin and secure the rope retaining pipe **1** and the rope retaining pipe **4**.
- ▶ Assembling the load hook (→ 10.4.11 Assembling the load hook, p. 729).

or

Reeve the hook block in (→ 10.4.9 Reeving the hook block in, p. 726).

- ▶ Assemble the hoist limit switch weight (→ 10.4.13 Assembling the hoist limit switch weight, p. 730).

10.11.5 Reeving the hoist rope out

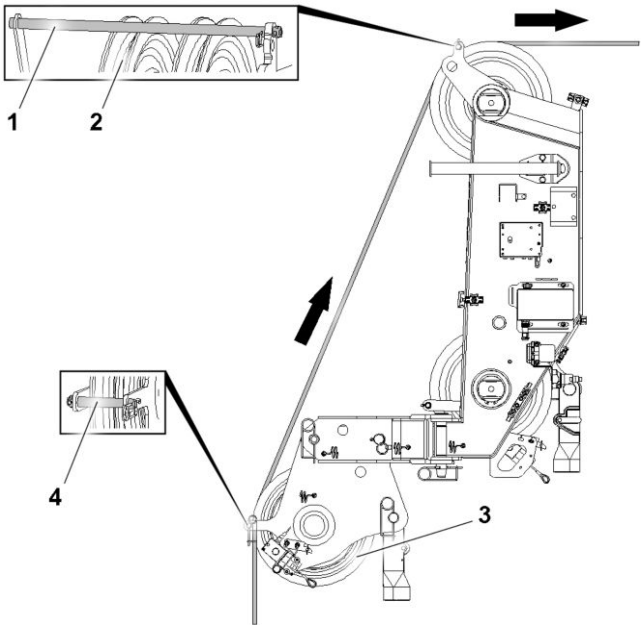


Fig. 1944: Exemplary illustration: Reeving the hoist rope out

1	Rope retaining pipe	**3**	Rope pulley
2	Back pulley	**4**	Rope retaining pipe

- ▶ Disassemble the hoist limit switch weight (→ 10.4.14 Disassembling the hoist limit switch weight, p. 732).
- ▶ Disassemble the load hook (→ 10.4.12 Disassembling the load hook, p. 729).

or

Reeve the hook block out (→ 10.4.10 Reeving the hook block out, p. 728).

- ▶ Release and unpin the rope retaining pipe **1** and the rope retaining pipe **4**.
- ▶ Remove the hoist rope in the direction of the arrow from the boom nose over the rope pulley **3** and from the telescopic boom over the back pulley **2**.
- ▶ Pin and secure the rope retaining pipe **1** and the rope retaining pipe **4**.

10.11.6 Disconnecting the electrical lines

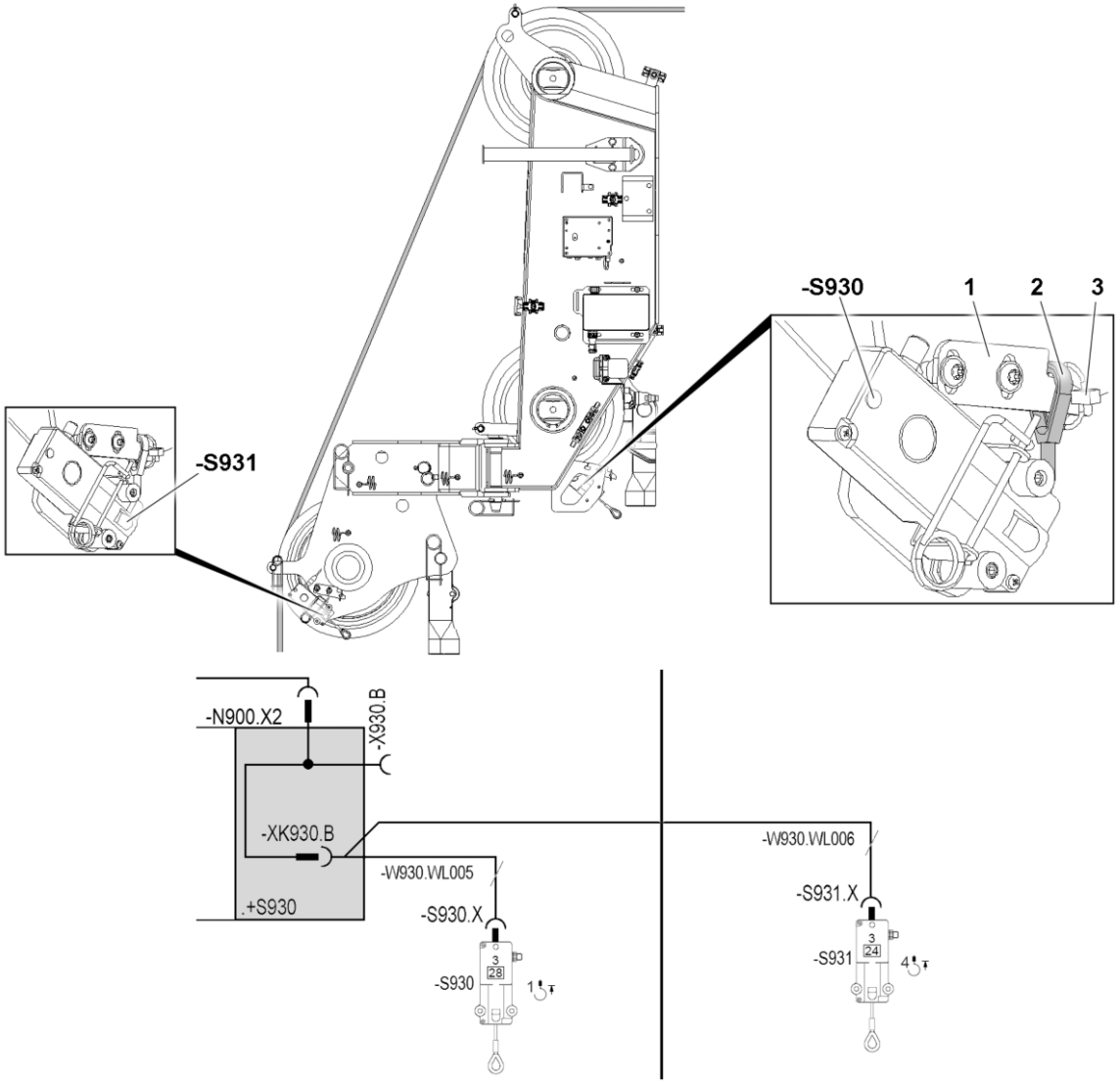


Fig. 1945: Exemplary illustration: Disconnecting the electrical lines

1	Fixed point	**-S931**	Hoist limit switch
2	Hoist limit switch rope	**-S931.X**	Plug
3	Retaining element	**-XK930.B**	Socket
-S930	Hoist limit switch		

10.11.6.1 Disassembling the hoist limit switch on the boom nose

Make sure that the following prerequisites are met:
❑ The hoist limit switch **-S931** is assembled on the boom nose.

▶ Disassemble the hoist limit switch **-S931** on the boom nose and assemble on the boom head.

The hoist limit switch **-S931** remains electrically connected.

Actuate the hoist limit switch **-S931** mechanically:
▶ Connect the hoist limit switch rope **2** in the fixed point **1**.

▶ Secure the hoist limit switch rope **2** with the retaining element **3**.

10.11.7 Swinging into the transport position

Make sure that the following prerequisites are met:
❑ The hoist rope is reeved out.
(→ 10.11.5 Reeving the hoist rope out , p. 850)
❑ The swing pin **3** is pinned and secured.

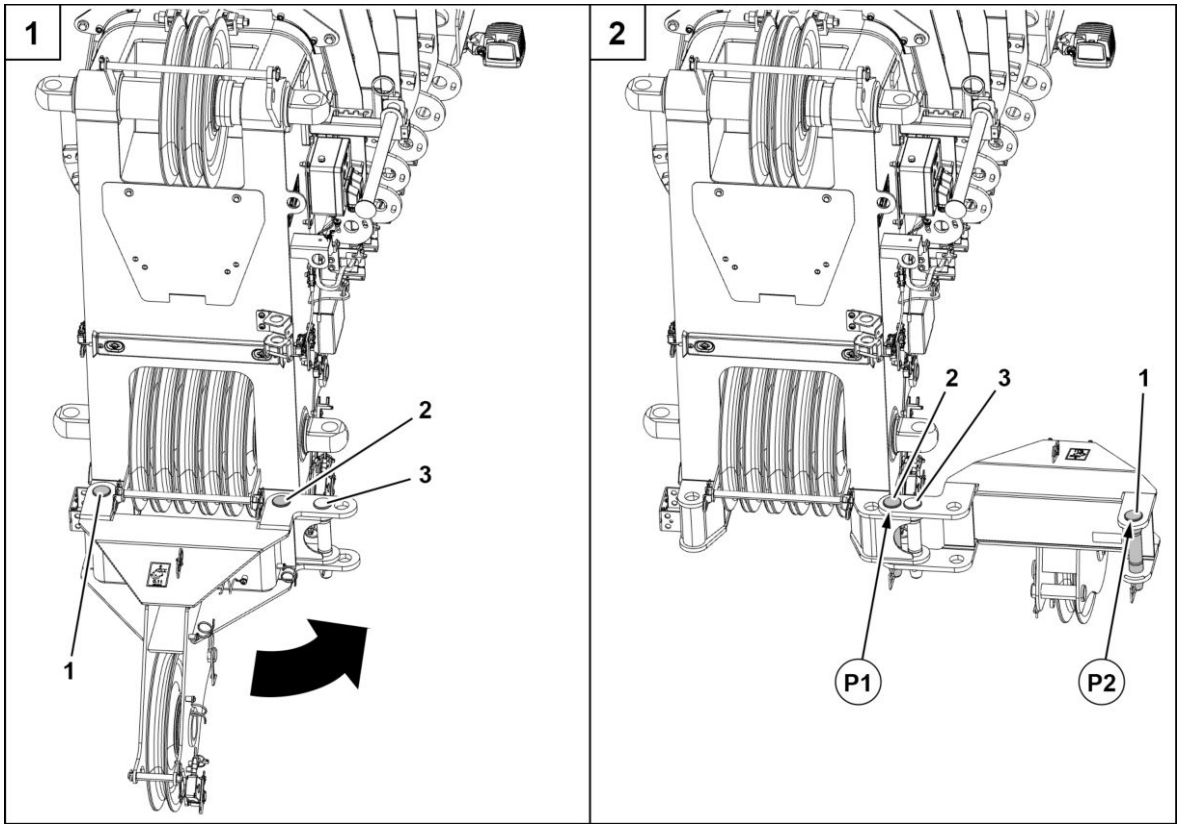


Fig. 1946: Swing the boom nose into the transport position

1 Pin
2 Pin
3 Swing pin
P1 Pin position
P2 Pin position

▶ Release and unpin the pin **1** and pin **2**.

⚠ **Danger of crushing! Moving parts!**

▶ Until the pin **1** can be inserted in the pin position **P2**: Swing the boom nose to the side.

▶ Insert and secure the pin **1** in the pin position **P2**.

▶ Insert and secure the pin **2** in the pin position **P1**.
▷ The boom nose is in the transport position.

10.11.8 Disassembling the boom nose

Make sure that the following prerequisites are met:
❑ The electrical line is disconnected (→ 10.11.6 Disconnecting the electrical lines, p. 851).
❑ An auxiliary crane is available.

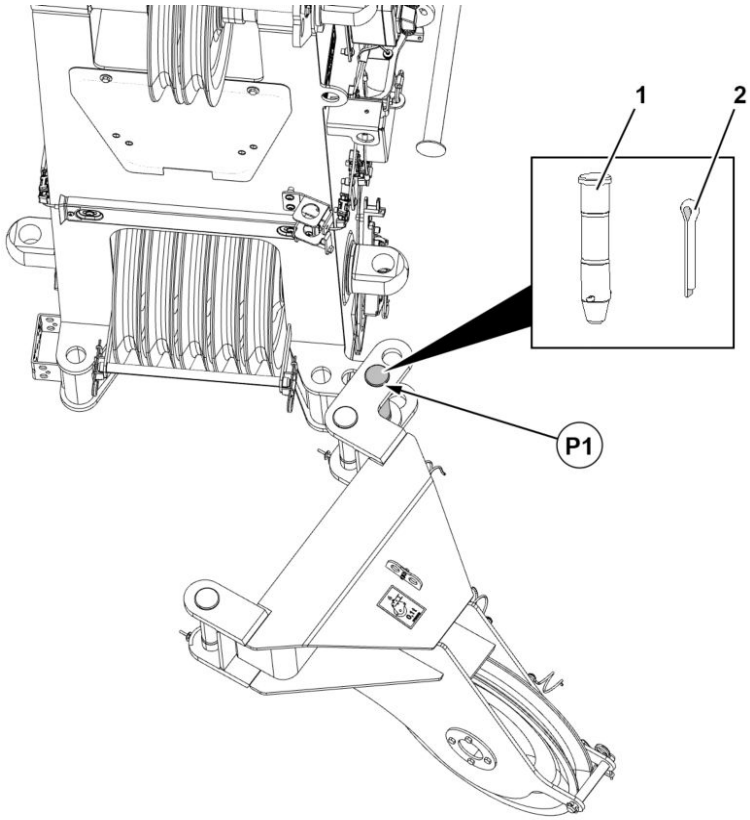


Fig. 1947: Assembling the boom nose

1 Swing pin
2 Split pin
P1 Pin position

▶ Fasten the auxiliary crane to the boom nose (→ 7.10 Boom nose, p. 396).

▶ Release the swing pin **1**: Remove the split pin **2**.

▶ Unpin the swing pin **1** in the pin position **P1**.

▶ Take the boom nose down with the auxiliary crane.

10.12 Cameras

10.12.1 Boom head camera*

10.12.1.1 Bringing the camera and cable drum to the assembly height

Bringing the camera to the assembly height

If a second person is not present during assembly and a ladder is used, the camera must be brought to the assembly height as described:

- ▶ Fasten the auxiliary rope to the camera.
- ▶ Climb onto the ladder and at the same time carry along the auxiliary rope relieved.
- ▶ Until the camera is at the assembly height: Pull the auxiliary rope up.

Bringing the cable drum to the assembly height

If a second person is not present during assembly and a ladder is used, then the cable drum must be brought to the assembly height as described:

- ▶ Fasten the auxiliary rope to the cable drum.
- ▶ Climb onto the ladder and at the same time carry along the auxiliary rope relieved.
- ▶ Until the cable drum is at the assembly height: Pull the auxiliary rope up.

10.12.1.2 Assembling the cable drum

The illustrations in this chapter are an example. The installation of the cable drum is described as an example. The attached retainers are located at times in other positions than as shown.

Carry out the assembly of the cable drum depending on the crane structure.

Assembling the cable drum on the telescopic boom

When the cable drum is assembled on the telescopic boom, the camera must be assembled on the auxiliary boom

Make sure that the following prerequisites are met:
- ❑ The telescopic boom is telescoped in all the way.
- ❑ The telescopic boom is luffed down completely.

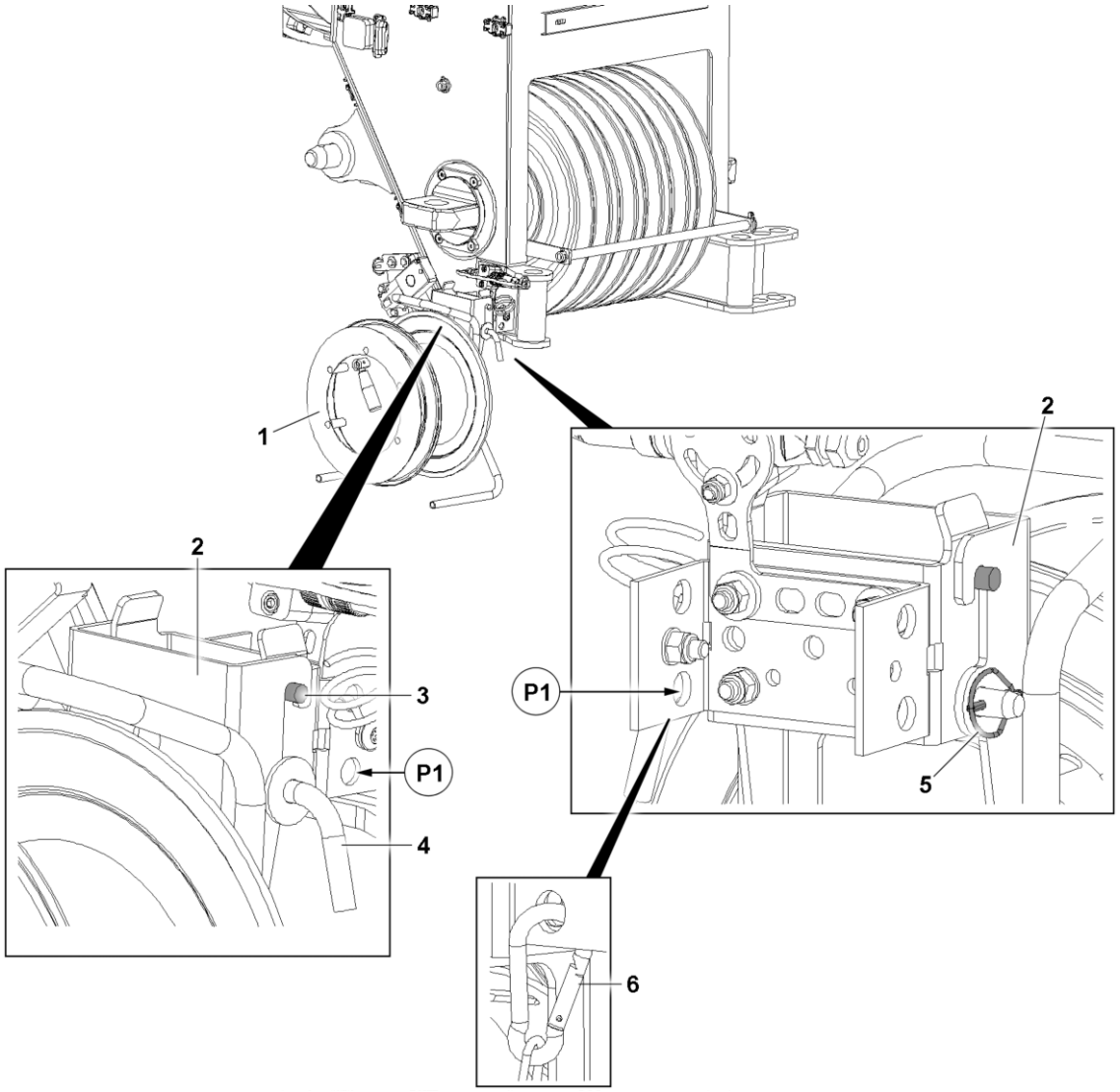


Fig. 1948: Cable drum on the telescopic boom

1 Cable drum
2 Retainer
3 Pin
4 Pin
5 Retaining element
6 Retaining chain
P1 Hook position

▶ Connect the cable drum **1** with the retainer **2** to the pin **3**.

▶ Secure the cable drum **1**: Insert the pin **4**.

▶ Secure the pin **4**: Assemble the retaining element **5**.

▶ Connect the retaining chain **6** of the cable drum **1** in the hook position **P1**.

Assembling the cable drum on the auxiliary boom

Make sure that the following prerequisites are met:
❑ The camera is assembled on the auxiliary boom.
❑ There is a fixed installed line for the camera in the luffing area of the auxiliary boom.
❑ The telescopic boom is telescoped in all the way.

If possible, to reduce the working height:
▶ Luff the auxiliary boom down as far as possible.

The cable drum is installed on the auxiliary boom using the same procedure used to install it on the telescopic boom.

▶ Assemble the cable drum(→ Assembling the cable drum on the telescopic boom, p. 854).

10.12.1.3 Assembling the camera

The installation of the camera is described as an example. The attached retainers are located at times in other positions than as shown.

Carry out the assembly of the camera depending on the crane structure.

Assembling the camera on the telescopic boom

Make sure that the following prerequisites are met:
❑ The telescopic boom is luffed down as far as possible. At least 0°.
(→ Luffing the telescopic boom from the crane cab, p. 533)
❑ The telescopic boom is telescoped in all the way.
(→ Automatic telescoping from the crane cab, p. 551)

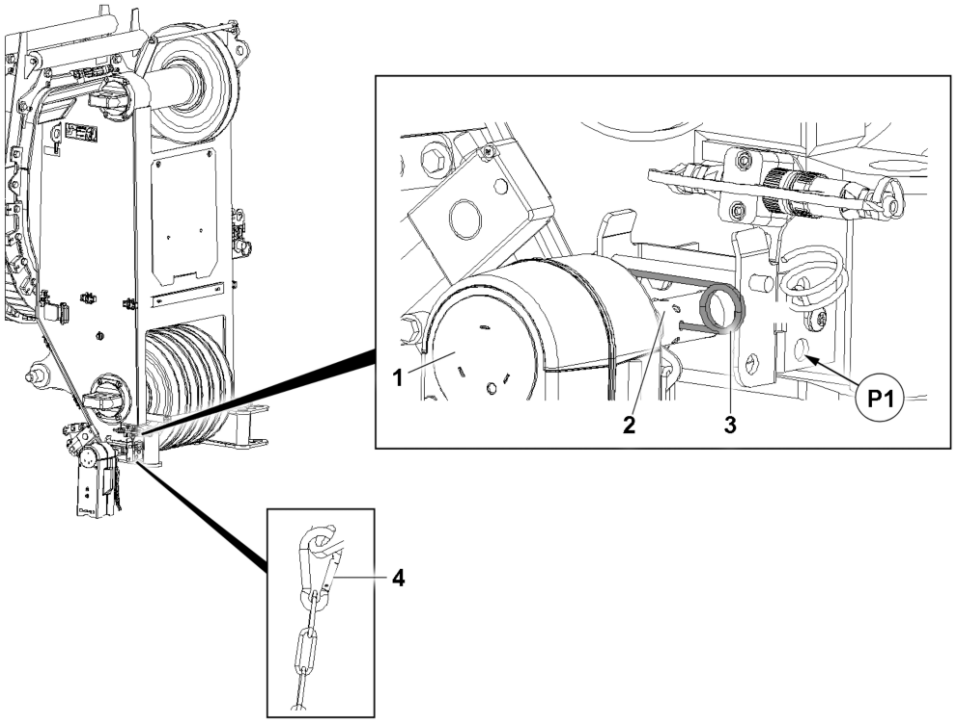


Fig. 1949: Exemplary illustration: Camera assembled on the telescopic boom

1 Camera
2 Retainer
3 Retaining element
4 Retaining chain
P1 Hook position

▶ Insert the camera **1** in the retainer **2**.

▶ Secure the camera **1**: Assemble the retaining element **3**.

▶ Connect the retaining chain **4** of the camera **1** in the hook position **P1**.

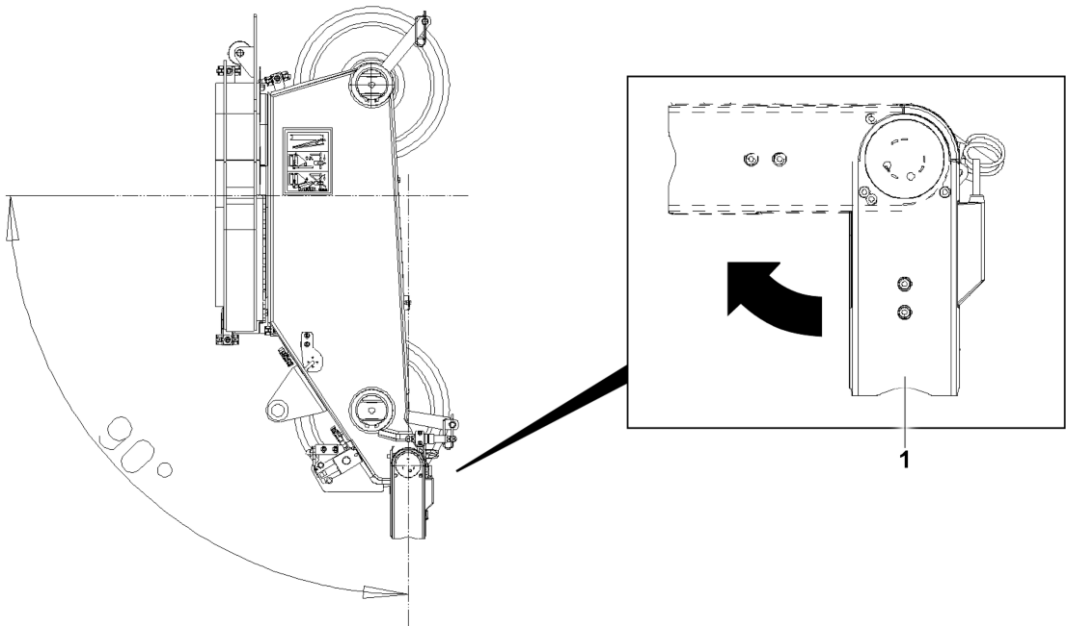


Fig. 1950: Telescopic boom camera slewing range

1 Camera

The camera **1** automatically aligns itself vertically. The swing angle is limited by design.

▶ Make sure that the camera **1** is assembled correctly: a **90°** swing angle with respect to the vertical position to the telescopic boom must be ensured.

Troubleshooting

Is the correct swing angle **not** reached?
The camera is assembled turned.

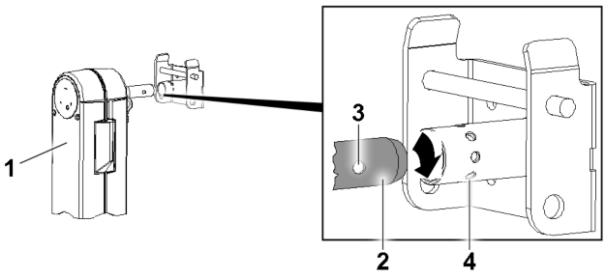


Fig. 1951: Assemble the camera turned.

1 Camera
2 Pin
3 Bore
4 Bore

▶ Disassemble the camera **1**.

▶ Until the bore **3** and bore **4** align: Turn the pin **2** in direction of the arrow.

▶ Pin and secure the camera **1** again (→ Assembling the camera on the telescopic boom, p. 856).

▶ Make sure that correct swing angle is reached (→ fig. 1950, p. 857).

Assembling the camera on the auxiliary boom

Make sure that the following prerequisites are met:
- ❑ The telescopic boom is luffed down as far as possible. At least to 0°.
- ❑ Luff the auxiliary boom down as far as possible.
- ❑ The telescopic boom is telescoped in all the way.

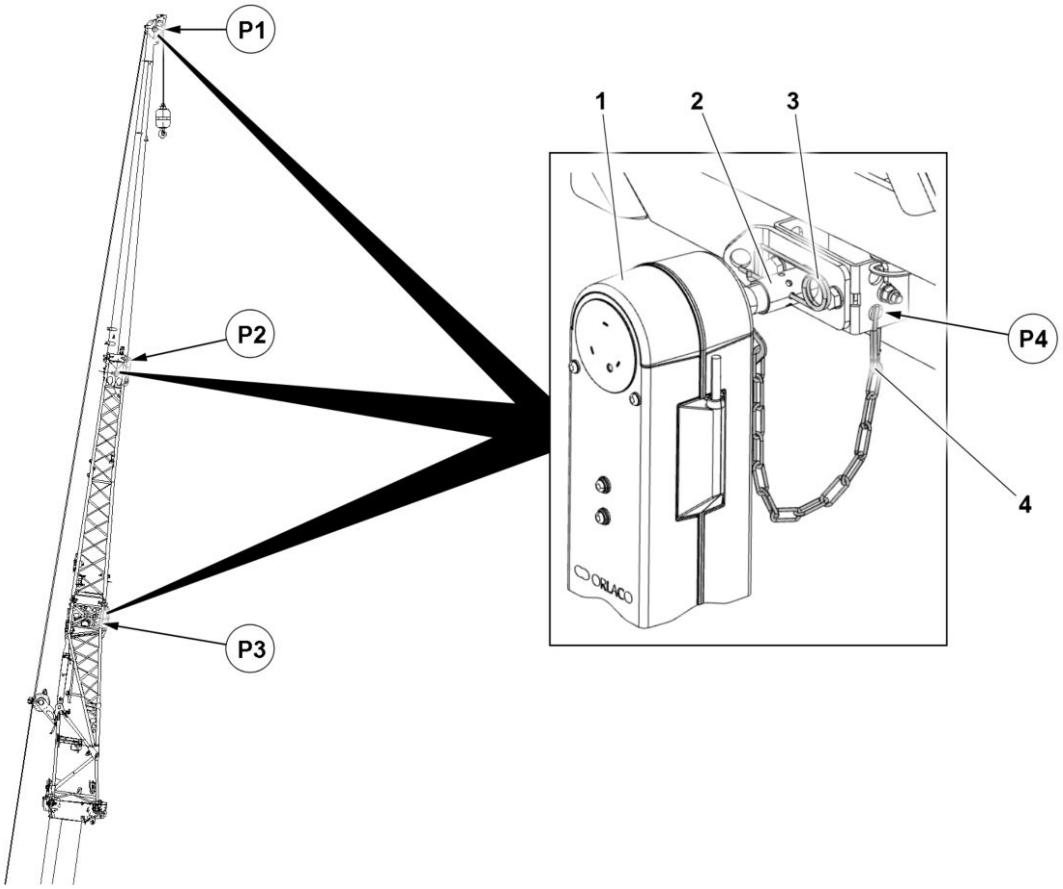


Fig. 1952: Exemplary illustration: Camera auxiliary boom installation options

1 Camera
2 Retainer
3 Retaining element
4 Retaining chain

P1 Double folding jib installation point
P2 Single folding jib installation point
P3 Special folding jib installation point
P4 Hook position

▶ Insert the camera **1** in the retainer **2**.

▶ Secure the camera **1**: Assemble the retaining element **3**.

▶ Connect the retaining chain **4** of the camera **1** in the hook position **P4**.

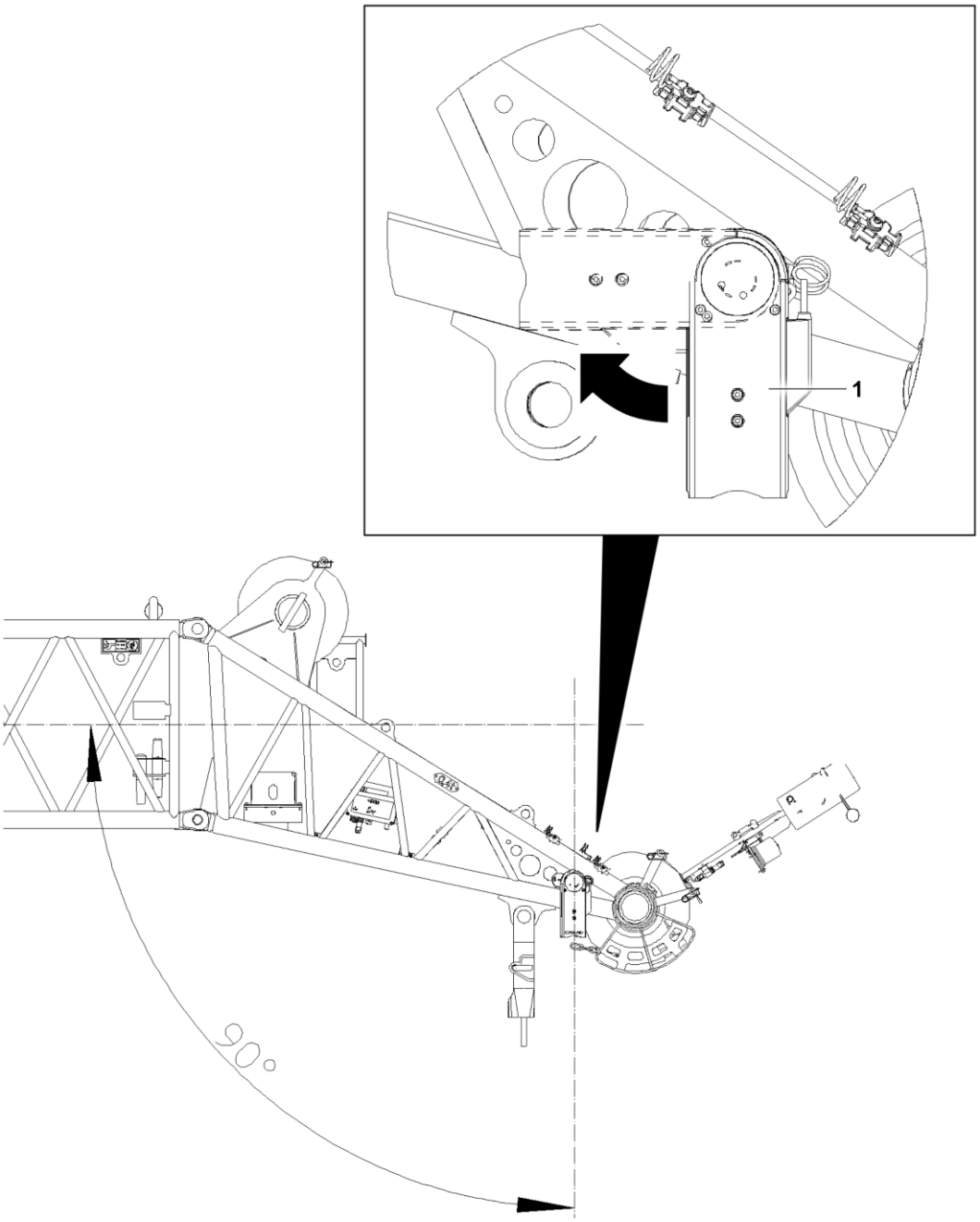


Fig. 1953: Auxiliary boom camera slewing range

1 Camera

The camera **1** automatically aligns itself vertically. The swing angle is limited by design.

▶ Make sure that the camera **1** is assembled correctly: a **90°** swing angle with respect to the vertical position to the telescopic boom must be ensured.

Troubleshooting

Is the correct swing angle **not** reached?
The camera is assembled turned.

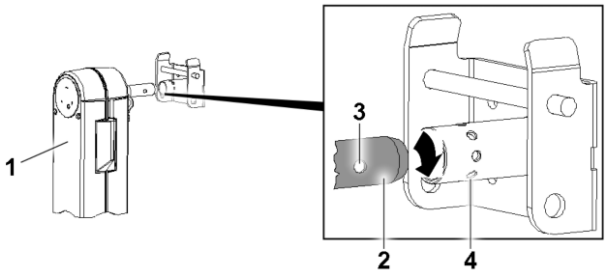


Fig. 1954: Assemble the camera turned.

1	Camera	**3**	Bore
2	Pin	**4**	Bore

▶ Disassemble the camera **1**.

▶ Until the bore **3** and bore **4** align: Turn the pin **2** in direction of the arrow.

▶ Pin and secure the camera **1** again (→ Assembling the camera on the auxiliary boom, p. 858).

▶ Make sure that correct swing angle is reached (→ fig. 1953, p. 859).

10.12.1.4 Connecting the electrical lines

Camera on the telescopic boom

Make sure that the following prerequisites are met:
❑ The camera is assembled on the telescopic boom.

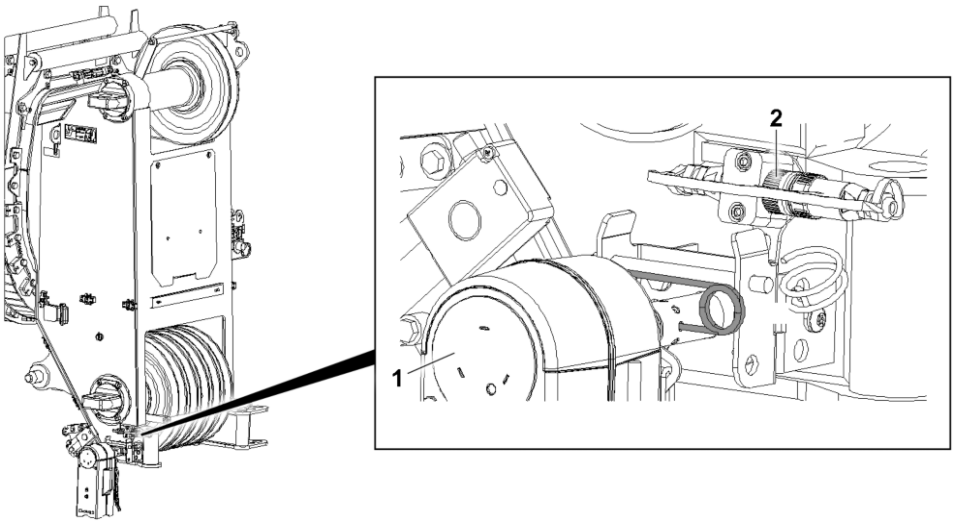
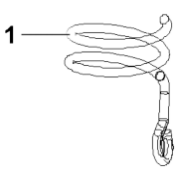


Fig. 1955: Exemplary illustration: Electrical line on the telescopic boom

1	Camera	**2**	Socket

▶ Insert the line from the camera **1** into the socket **2**.



▶ Connect the line to the line holder **1**.

Camera on the auxiliary boom

A cable drum is used for using the camera on the auxiliary boom.

The cable drum is assembled in the installation position of the camera on the auxiliary boom (→ Camera on the telescopic boom, p. 860).

Make sure that the following prerequisites are met:
❑ The camera is installed on the auxiliary boom.
❑ The cable drum is assembled on the auxiliary boom(→ Assembling the cable drum, p. 854).

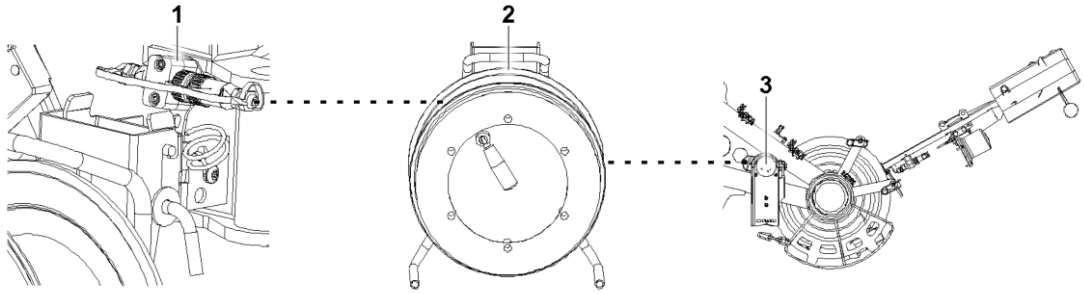


Fig. 1957: Electrical line to the camera on the auxiliary boom

1 Socket
2 Cable drum
3 Camera

NOTICE
Line too short or incorrectly routed!
The line tears or is damaged.

▶ Make sure that enough line length is available for the luffing movement of the auxiliary boom(→ Auxiliary boom luffing range, p. 862).

▶ Make sure that the line for the camera and cable drum is not in the movement range of other components.

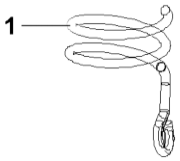
▶ Thread the longer line from the cable drum **2** with struts to the auxiliary boom and connect with the camera **3**.

The longer line of the cable drum **2** must be secured by the pull relief installed on the line.

If the longer line is connected directly with the camera **3**:
▶ Assemble the pull relief on the attached retainer.
or

If the longer line is connected with the fixed line on the auxiliary boom:
Secure the pull relief to the grating.

▶ Insert the shorter line from the cable drum **2** in the socket **1** on the auxiliary boom.



▶ Connect the all lines to the line holder **1**.

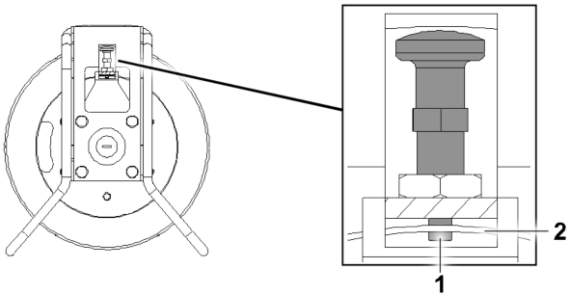


Fig. 1959: Locking the cable drum

1 Pin **2** Cable drum

To ensure that the cable drum **2** does not rotate inadvertently, the cable drum **2** must be locked.

▶ Insert the pin **1**.
▷ The cable drum **2** is secured to prevent turning.

Auxiliary boom luffing range

The boom angle changes depending on crane operation. This therefore changes the required line length.

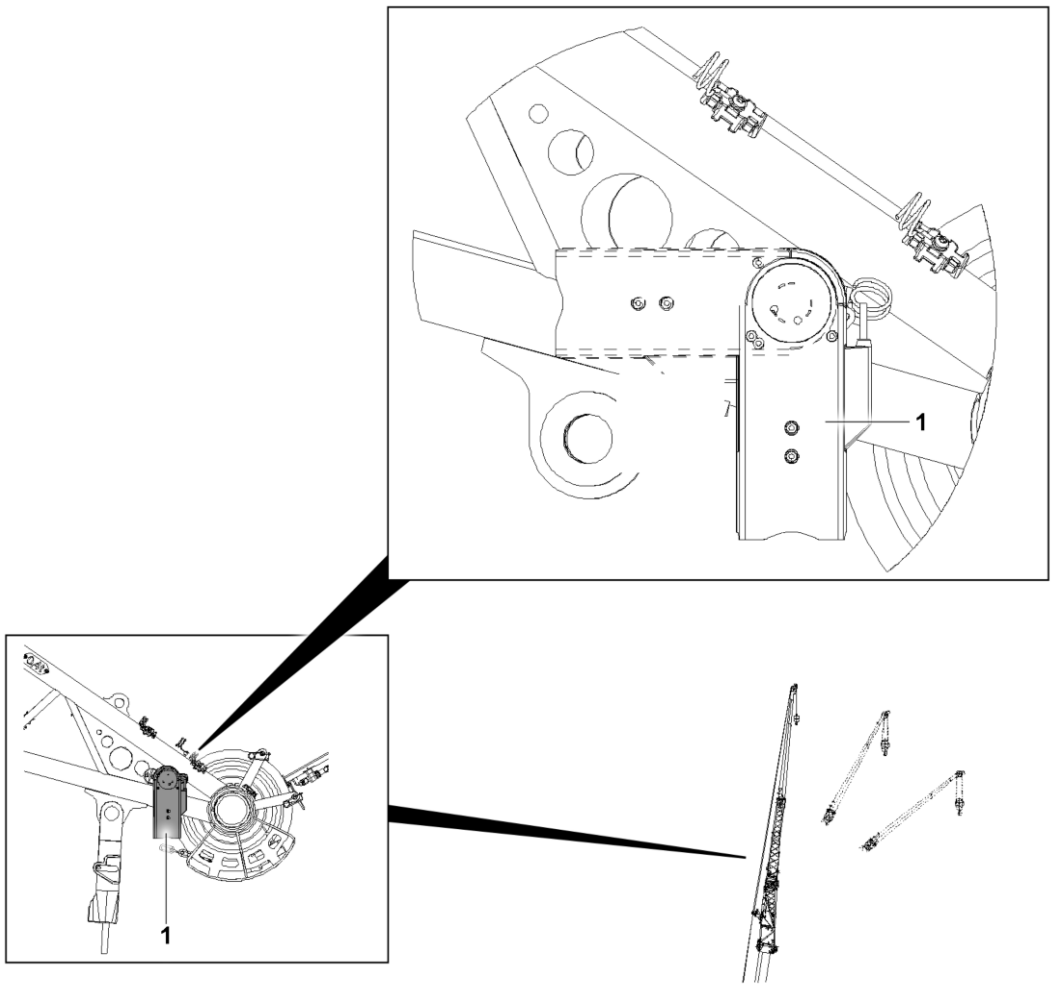


Fig. 1960: Auxiliary boom luffing range and camera slewing range

1 Camera

If the boom angle is changed, also the position of the camera **1** changes.

▶ Make sure that enough line length is available for the swinging movement of the camera **1**.

10.12.1.5 Disconnecting the electrical lines

Camera on the telescopic boom

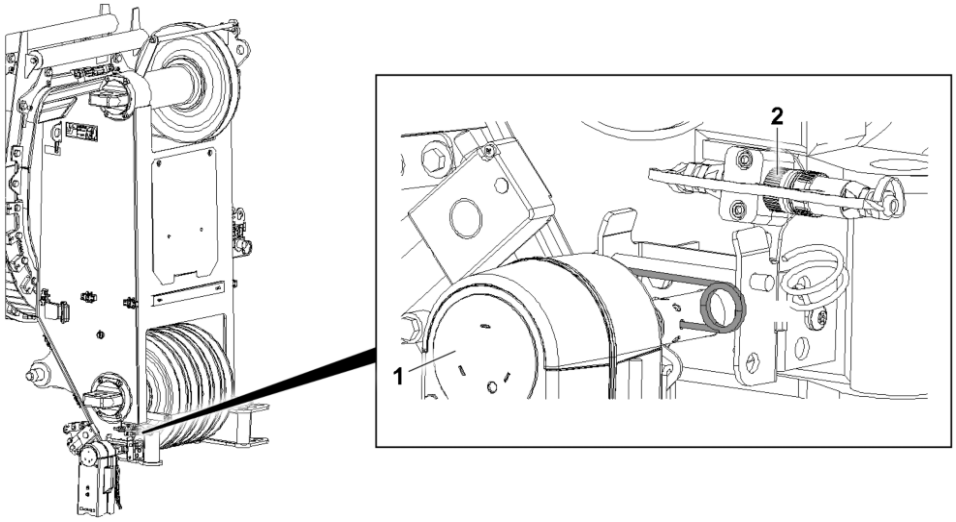


Fig. 1961: Exemplary illustration: Electrical line on the telescopic boom

1 Camera **2** Socket

▶ Unplug the camera **1** line from the socket **2**.

Camera on the auxiliary boom

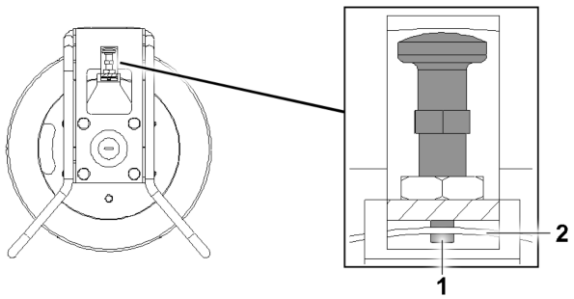


Fig. 1962: Releasing the cable drum lock

1 Pin **2** Cable drum

▶ Unpin the pin **1**.
▷ The cable drum **2** can be turned.

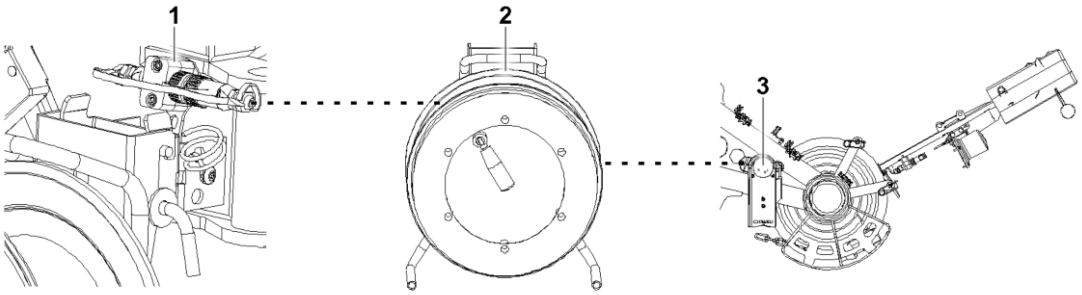


Fig. 1963: Electrical line to the camera on the auxiliary boom

1 Socket
2 Cable drum
3 Camera

▶ Unplug the shorter line of the cable drum **2** from the socket **1**.

▶ Wind up the shorter line on the cable drum **2** and fasten.

▶ Unplug the longer line of the cable drum **2** on the camera **3**.

▶ Disassemble the pull relief.

▶ Wind up the longer line on the cable drum **2** and fasten.

10.12.1.6 Disassembling the cable drum

The illustrations in this chapter are an example. The installation of the cable drum is described as an example. The attached retainers are located at times in other positions than as shown.

Carry out the assembly of the cable drum depending on the crane structure.

Make sure that the following prerequisites are met:
❑ The telescopic boom is luffed down as far as possible. At least to 0°.
❑ If present: The auxiliary boom is luffed down as far as possible. At least to 0°.
❑ The electrical lines are disconnected (→ Disconnecting the electrical lines, p. 863).

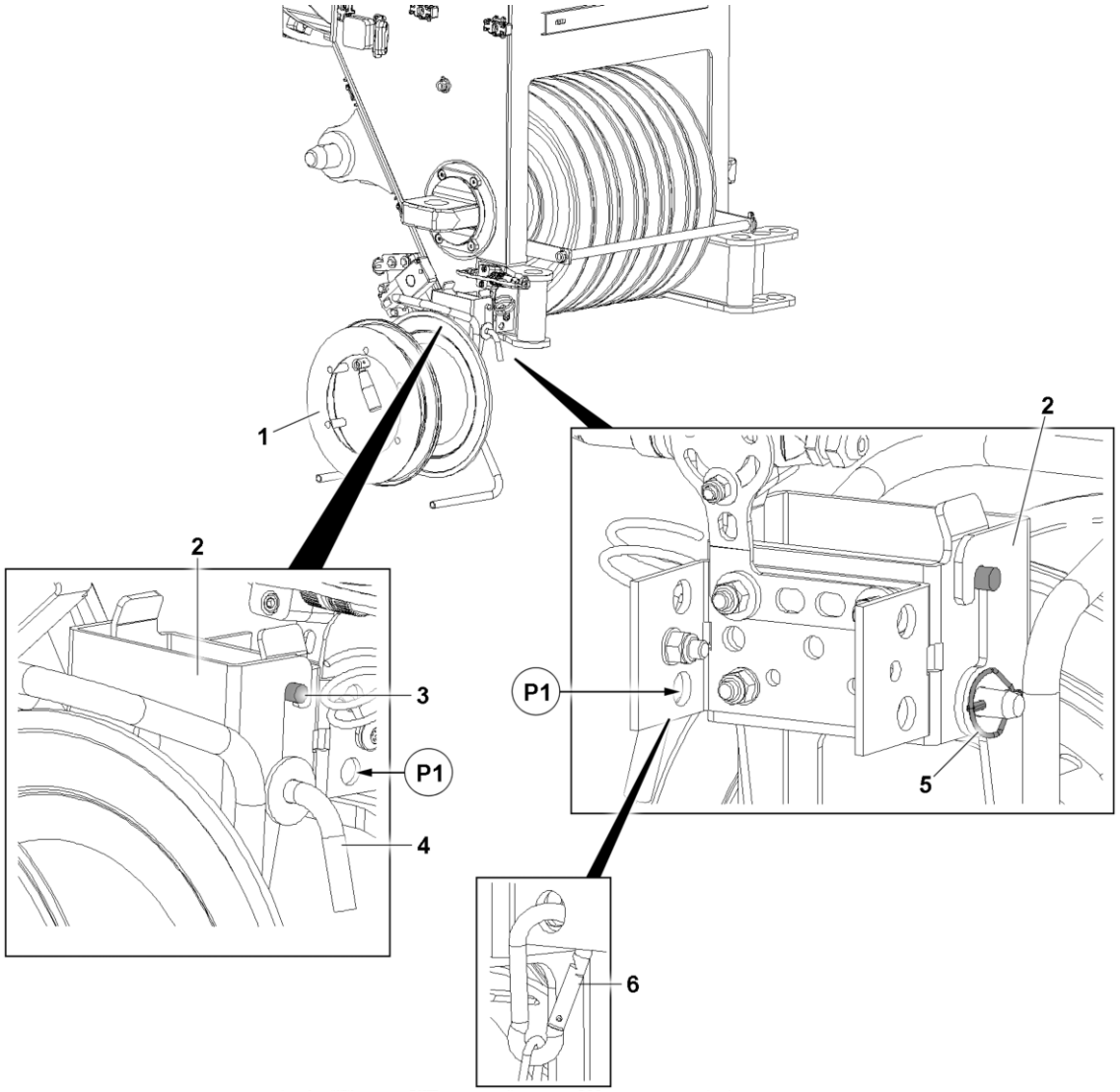


Fig. 1964: Cable drum on the telescopic boom

1 Cable drum
2 Retainer
3 Pin
4 Pin
5 Retaining element
6 Retaining chain
P1 Hook position

When assembly personnel is alone on the ladder:

- ▶ Fasten the auxiliary rope to the cable drum.
- ▶ Disconnect the retaining chain **6** of the cable drum **1** in the hook position **P1**.
- ▶ Release the pin **4**: Disassemble the retaining element **5**.
- ▶ Release the cable drum **1**: Unpin the pin **4**.
- ▶ Detach the cable drum **1** from the pin **3**.
- ▶ Lower the cable drum **1** to the ground using the auxiliary rope.

10.12.1.7 Removing the camera

The installation of the camera is described as an example. The attached retainers are located at times in other positions than as shown.

Carry out the disassembly of the camera depending on the crane structure.

Make sure that the following prerequisites are met:
- ❑ The telescopic boom is luffed down as far as possible. At least to 0°.
  (→ Luffing the telescopic boom from the crane cab, p. 533)
- ❑ If the camera is assembled on the auxiliary boom: The auxiliary boom is luffed down as far as possible. At least to 0°.
  (→ Luffing the hydraulic auxiliary boom* from the crane cab, p. 534)
- ❑ The telescopic boom is telescoped in all the way.
  (→ Automatic telescoping from the crane cab, p. 551)
- ❑ The electrical lines are disconnected.
  (→ Disconnecting the electrical lines, p. 863)

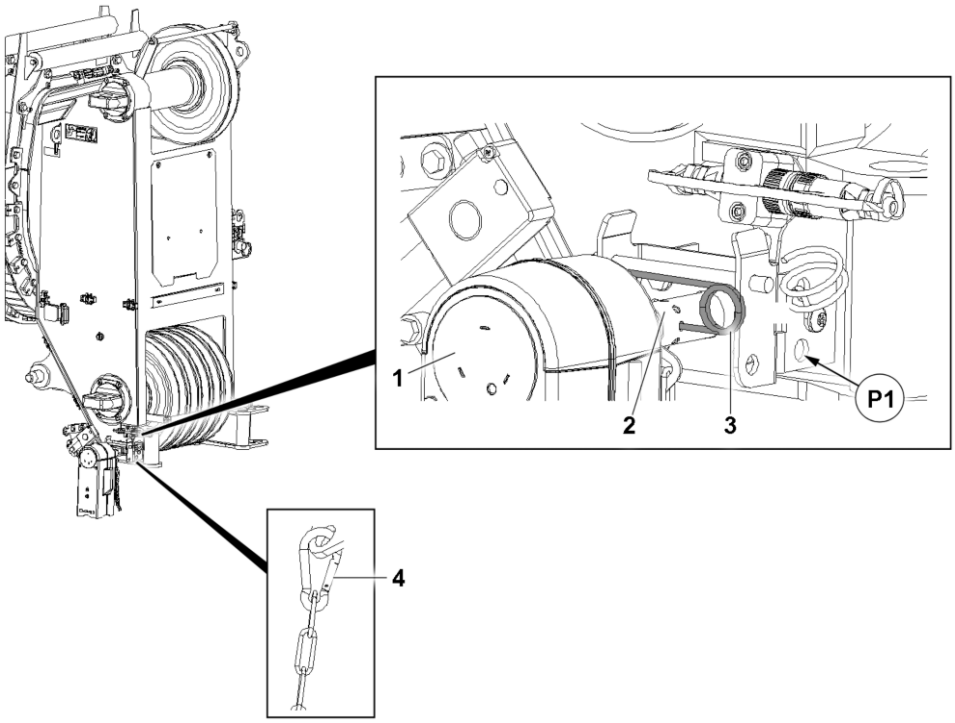


Fig. 1965: Exemplary illustration: Camera assembled on the telescopic boom

1 Camera
2 Retainer
3 Retaining element
4 Retaining chain
P1 Hook position

When assembly personnel is alone on the ladder:
- ▶ Fasten the guide rope to the camera **1**.
- ▶ Detach the retaining chain **4** for the camera **1** in the hook position **P1**.
- ▶ Release the camera **1**: Disassemble the retaining element **3**.
- ▶ Pull the camera **1** out from the retainer **2**.
- ▶ Lower the camera **1** to the ground using the guide rope.
- ▶ Store and transport the camera **1** in the supplied case.

10.12.2 Winch camera*

10.12.2.1 Positioning the winch camera in the operating position

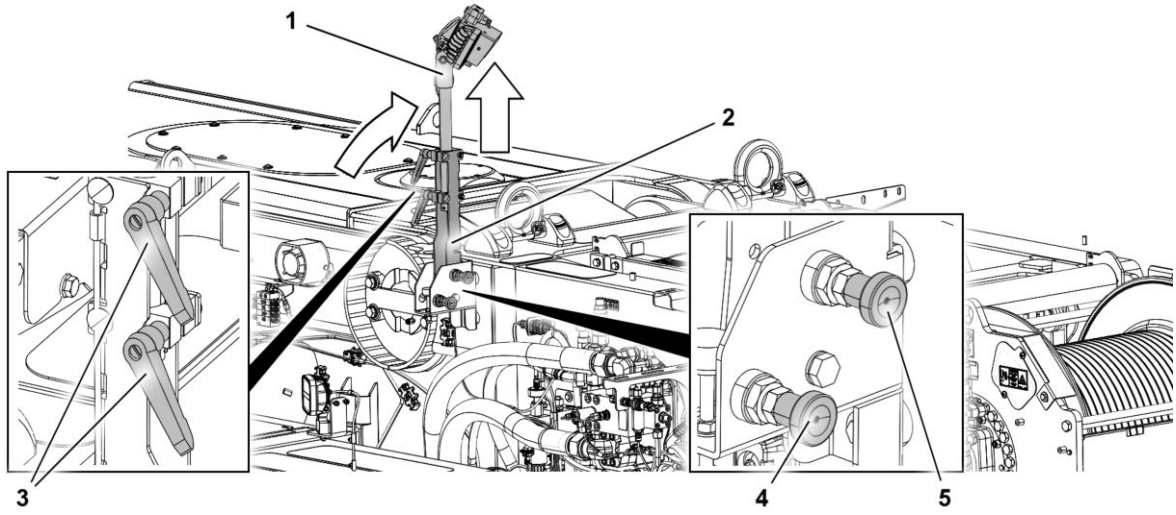


Fig. 1966: Swinging and pulling out the winch camera

1 Camera tripod upper section
2 Camera tripod lower section
3 Clamping lever
4 Retaining element
5 Retaining element

When the winch camera is in the transport position:

- ▶ Pull the retaining element **4** and swing the camera tripod lower section **2**.
- ▶ Position the camera tripod lower section **2** with the retaining element **5**.
- ▶ Unlock the clamping lever **3** and pull up the camera tripod upper section **1**.
- ▶ Lock the camera tripod upper section **1** with the clamping lever **3**.

10.12.2.2 Positioning the winch camera in the transport position

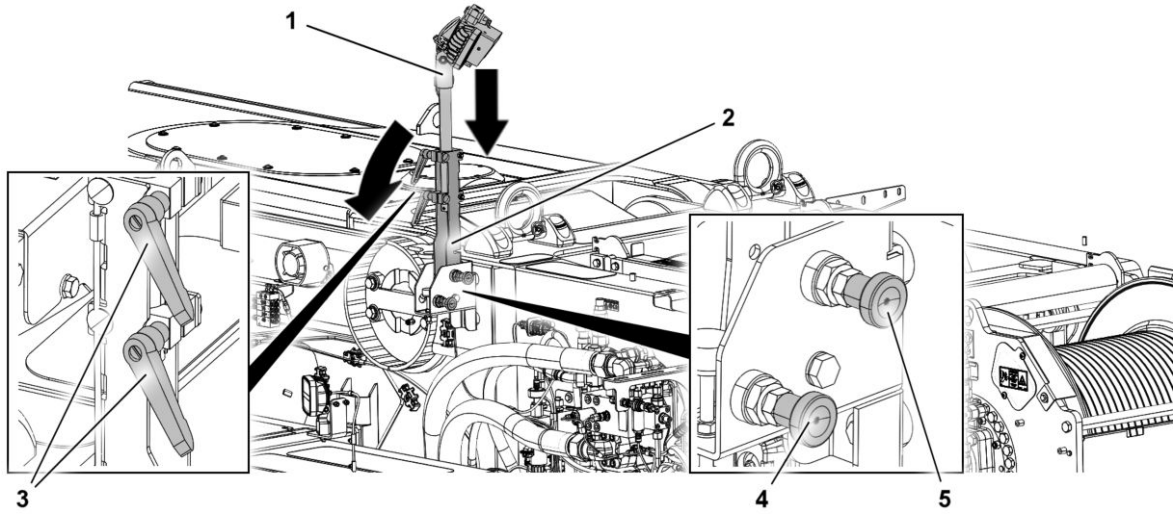


Fig. 1967: Pushing in and swinging the winch camera

1 Camera tripod upper section
2 Camera tripod lower section
3 Clamping lever
4 Retaining element
5 Retaining element

When the winch camera is in the operating position:

▶ Unlock the clamping lever **3** and push in the camera tripod upper section **1**.

▶ Lock the camera tripod upper section **1** with the clamping lever **3**.

▶ Pull the retaining element **5** and swing in the camera tripod lower section **2**.

▶ Position the camera tripod lower section **2** with the retaining element **4** in the transport position.

10.12.3 Rear camera

10.12.3.1 Positioning the rear camera in the operating position

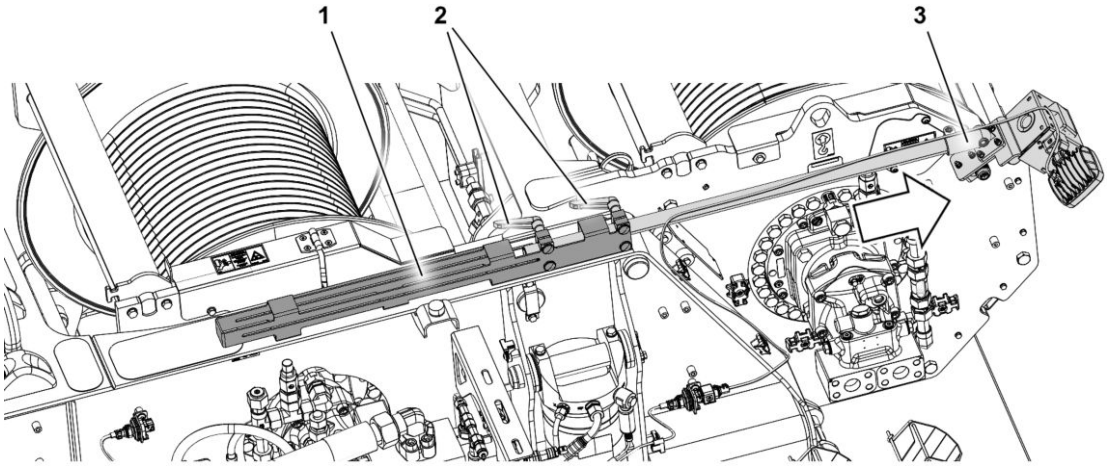


Fig. 1968: Pushing the rear camera out

1 Camera tripod lower section
2 Clamping lever
3 Camera tripod upper section

The camera tripod upper section **3** can be locked and unlocked with the clamping levers **2**.

If the rear camera is pushed in all the way:

▶ Unlock the clamping lever **2** and position the camera tripod upper section **3** in the operating position.

▶ Lock the clamping lever **2**.

10.12.3.2 Positioning the rear camera in the transport position

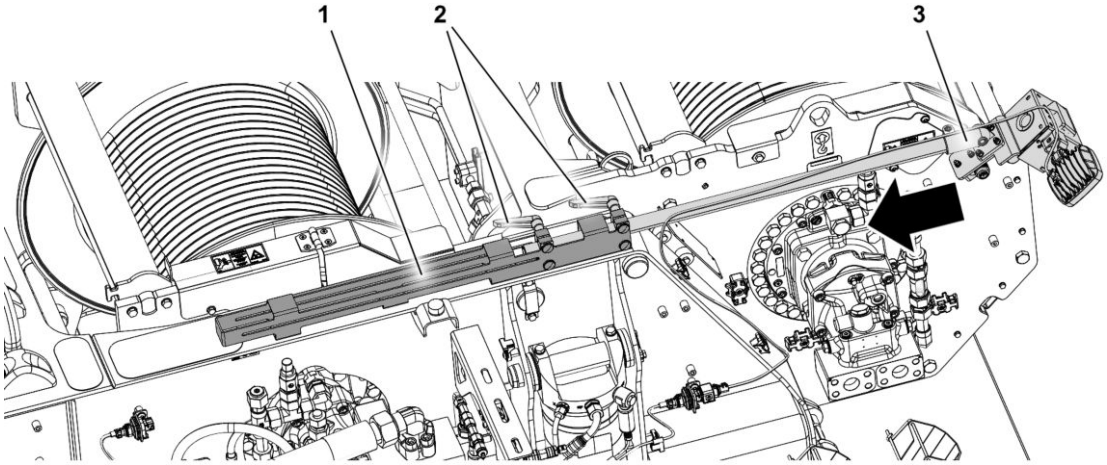


Fig. 1969: Pushing the rear camera in

1 Camera tripod lower section
2 Clamping lever
3 Camera tripod upper section

The camera tripod upper section **3** can be locked and unlocked with the clamping levers **2**.

If the rear camera is pushed out all the way:

▶ Unlock the clamping lever **2** and position the camera tripod upper section **3** in the transport position.

▶ Lock the clamping lever **2**.

10.13 Wind speed sensor and airplane warning light*

10.13.1 Assembling in the operating position

The assembly of the wind speed sensor and the airplane warning light are identical in the operating position. Assembly is explained based on the wind speed sensor.

During crane operation, the wind speed sensor is assembled in the highest point of the boom.

The wind speed sensor installed on the boom measures the wind speed at the boom jib and shows the current wind speed on the superstructure monitor.

10.13.1.1 Assembling the wind speed sensor

Depending on the available equipment, the wind speed sensor can be assembled in different positions.

Possible positions on the telescopic boom and the auxiliary boom are shown below as an example.

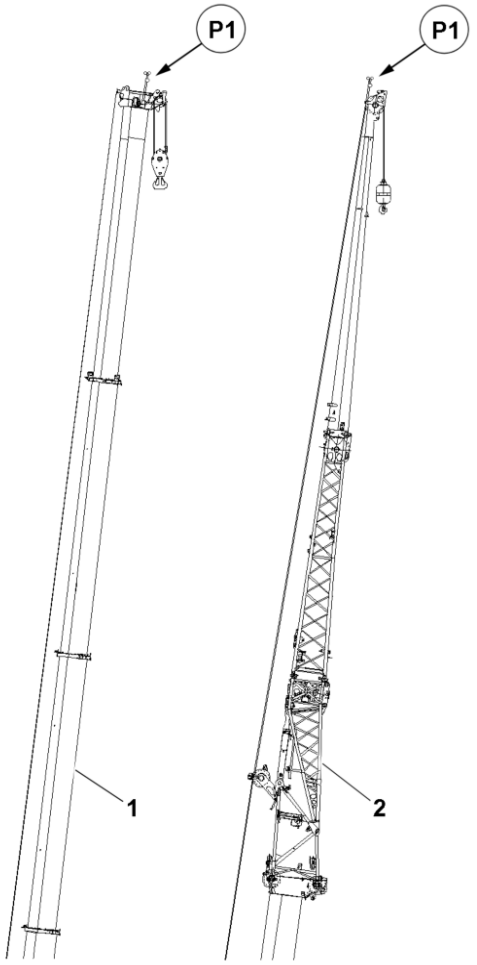


Fig. 1970: Exemplary illustration: Possible assembly positions

1 Telescopic boom
2 Folding jib
P1 Wind speed sensor position

Wind speed sensor alignment

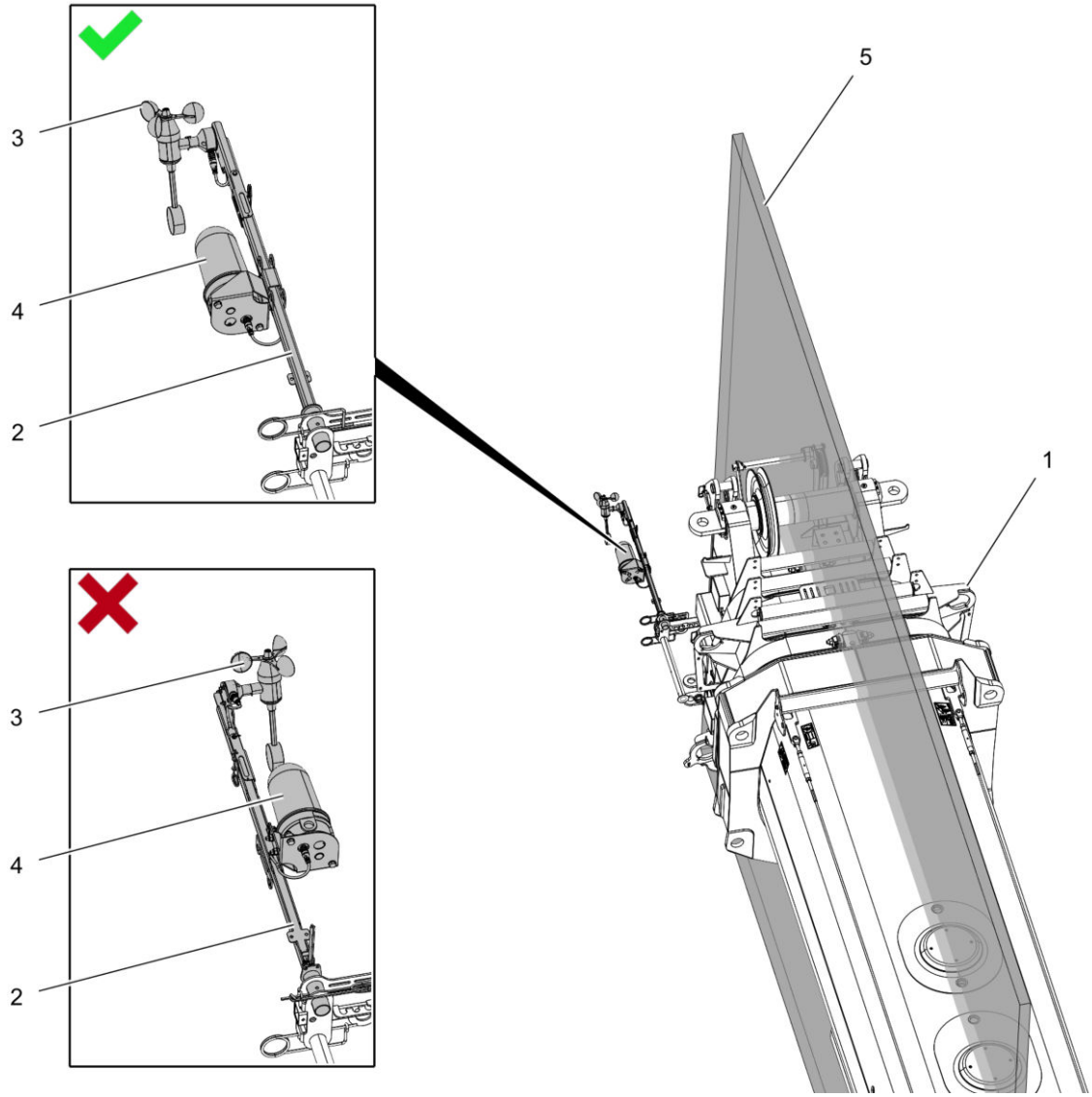


Fig. 1971: Wind speed sensor alignment, example, left installation side

1 Telescopic boom
2 Retainer
3 Wind speed sensor
4 Airplane warning light
5 Center

WARNING
Wind speed sensor incorrectly aligned!
An incorrect wind speed is shown.

▶ Align the wind speed sensor correctly.

▶ Align the wind speed sensor **3** outward in reference to the center **5** of the telescopic boom **1**.

Assembling on the telescopic boom

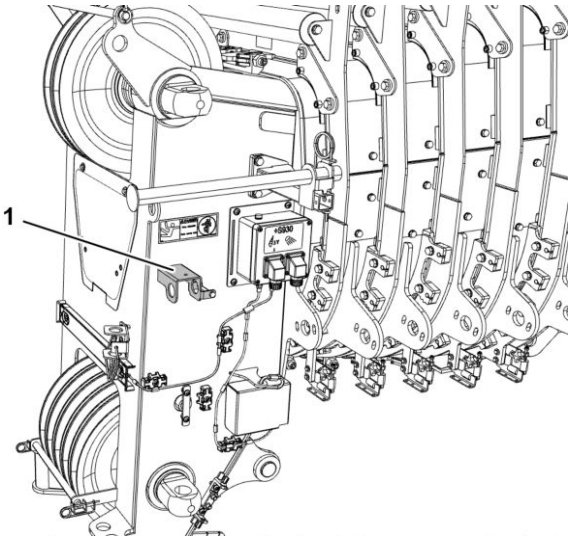


Fig. 1972: Assembling the wind speed sensor on the telescopic boom

1 Retainer

The wind speed sensor is assembled on the retainer **1**

Make sure that the following prerequisites are met:
❑ The telescopic boom is luffed down to 0°.

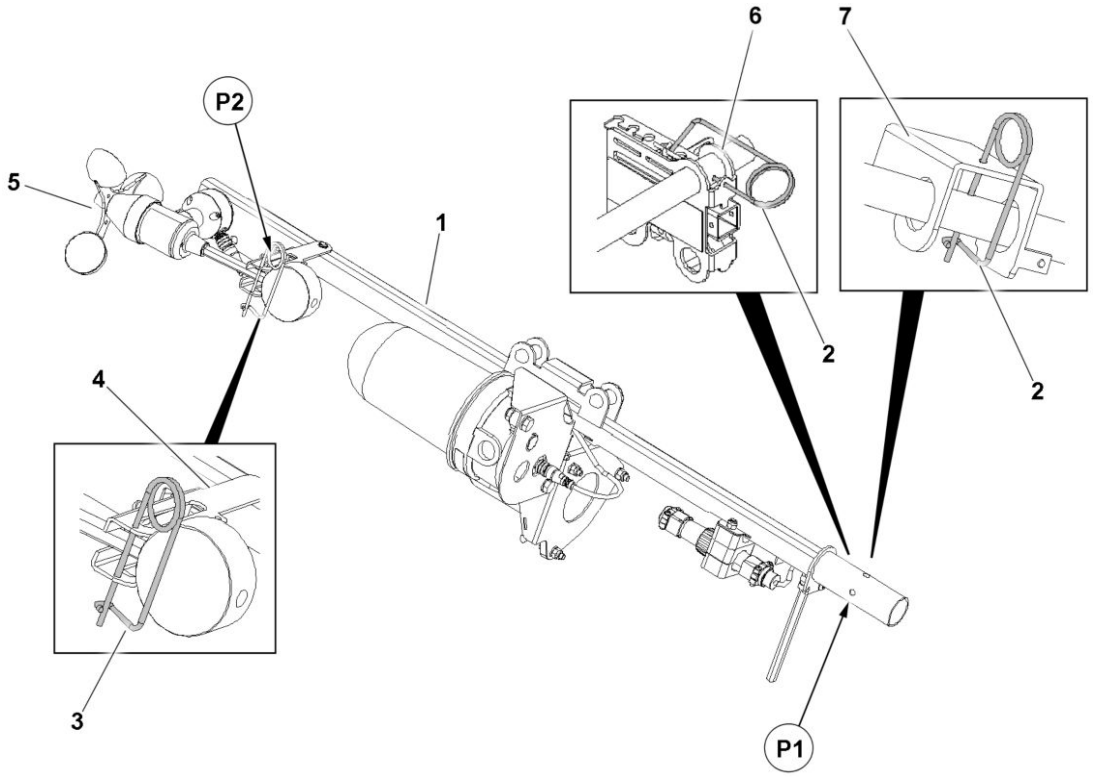


Fig. 1973: Assembling the wind speed sensor on the telescopic boom

1 Retainer
2 Retaining element
3 Retaining element
6 Retainer
7 Retainer
P1 Assembly position

See next page for continuation of the image legend

4 Transport retainer
5 Wind speed sensor
P2 Transport position

▶ Insert the retainer **1** of the wind speed sensor in the retainer **6** or retainer **7** on the telescopic boom.

▶ Secure the retainer **1** with the retaining element **2** in the assembly position **P1**. Pay attention to the correct alignment: (→ Wind speed sensor alignment, p. 871).

▶ Remove the retaining element **3** from the transport position **P2**.
▷ The wind speed sensor **5** oscillates and aligns itself vertically.

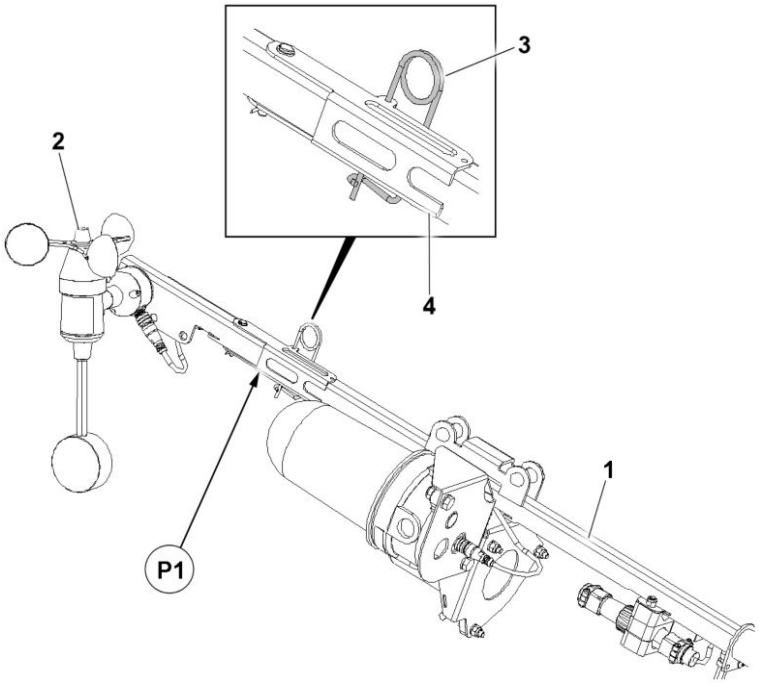


Fig. 1974: Locking the transport retainer

1 Retainer
2 Wind speed sensor
3 Retaining element
4 Transport retainer
P1 Operating position

▶ Fold the transport retainer **4** back to the retainer **1**.

▶ Secure the transport retainer **4** with the retaining element **3** in the operating position **P1**.

▶ Establish the electrical connections (→ 10.13.5 Connecting the electrical lines, p. 879).

Assembly on the auxiliary boom

Always assemble the wind speed sensor in the highest point of the auxiliary boom.

Make sure that the following prerequisites are met:
❑ The telescopic boom is luffed down to 0°.
❑ The auxiliary boom is luffed to 0°.

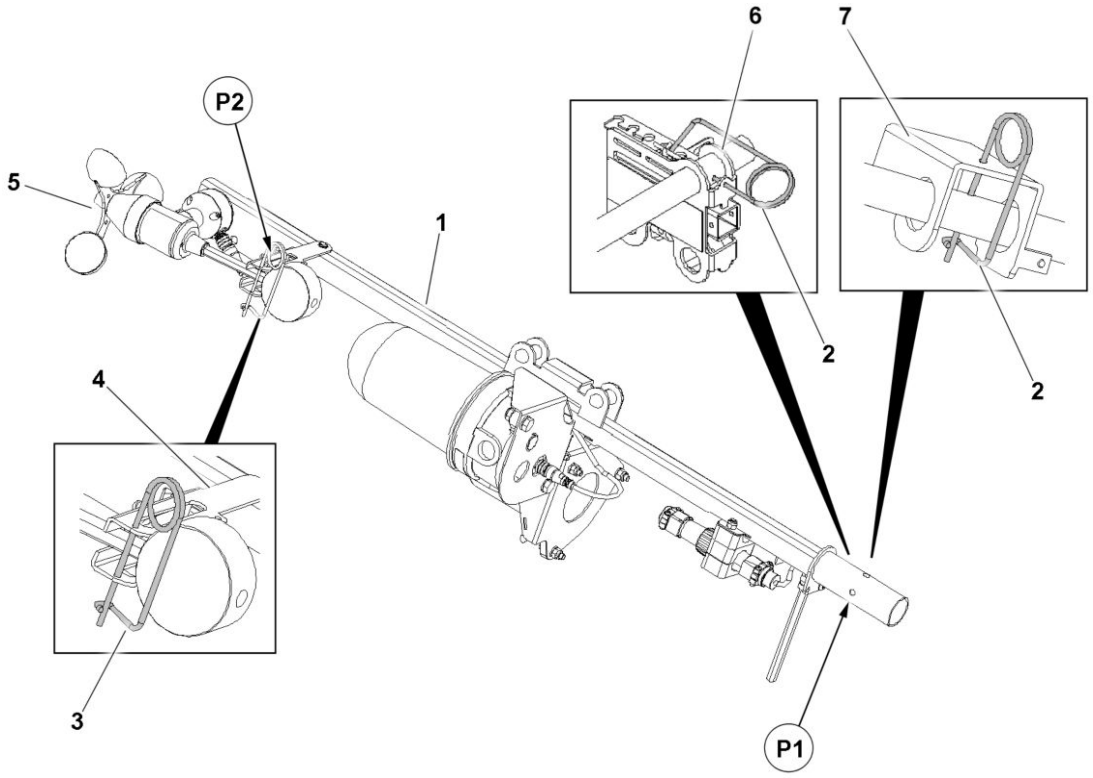


Fig. 1975: Assembling the wind speed sensor on the auxiliary boom

1 Retainer
2 Retaining element
3 Retaining element
4 Transport retainer
5 Wind speed sensor
6 Retainer
7 Retainer
P1 Assembly position
P2 Transport position

▶ Insert the retainer **1** of the wind speed sensor in the retainer **6** or retainer **7** on the auxiliary boom.

▶ Secure the retainer **1** with the retaining element **2** in the assembly position **P1**. Pay attention to the correct alignment: (→ Wind speed sensor alignment, p. 871).

▶ Remove the retaining element **3** from the transport position **P2**.
▷ The wind speed sensor **5** oscillates and aligns itself vertically.

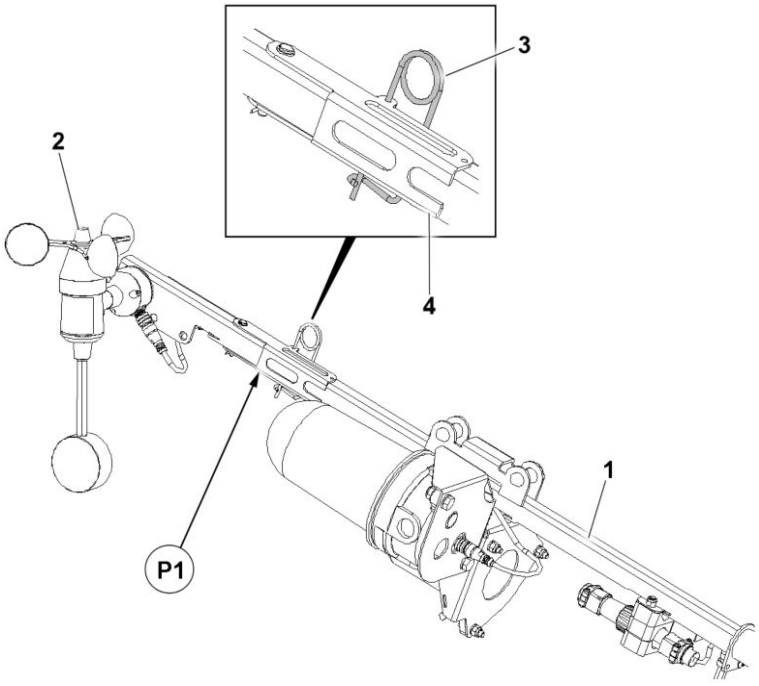


Fig. 1976: Locking the transport retainer

1 Retainer
2 Wind speed sensor
3 Retaining element
4 Transport retainer
P1 Operating position

▶ Fold the transport retainer **4** back to the retainer **1**.

▶ Secure the transport retainer **4** with the retaining element **3** in the operating position **P1**.

▶ Establish the electrical connections (→ 10.13.5 Connecting the electrical lines, p. 879).

Checking the function of the wind speed sensor

The function of the wind speed sensor must be checked each time before erecting the boom.

Check the wind speed sensor for easy movement and proper function:

▶ Manually operate the cup anemometer of the wind speed sensor.

▶ Replace a defective wind speed sensor immediately.

10.13.2 Disassembling in the operating position

The disassembly of the wind speed sensor and the airplane warning light are identical in the operating position. Disassembly is explained based on the wind speed sensor.

During crane operation, the wind speed sensor is assembled in the highest point of the telescopic boom.

The wind speed sensor installed on the telescopic boom measures the wind speed at the boom jib and shows the current wind speed on the superstructure monitor.

10.13.2.1 Disassembling the wind speed sensor

Make sure that the following prerequisites are met:
❑ The telescopic boom is luffed down to 0°.

(→ Luffing the telescopic boom from the crane cab, p. 533)

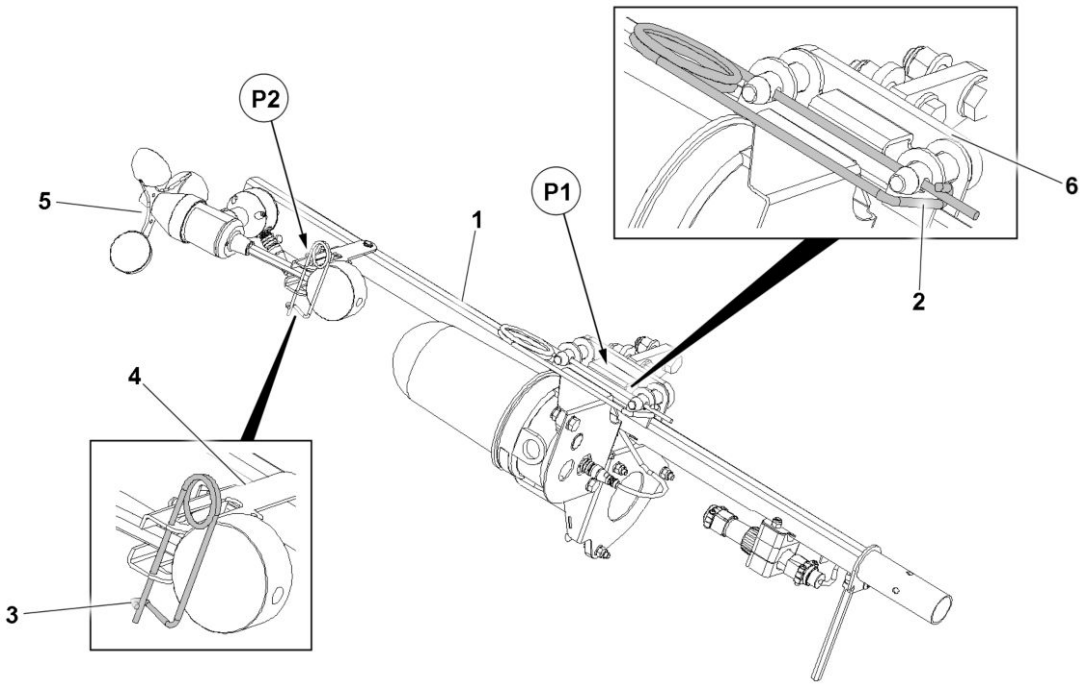


Fig. 1977: Wind speed sensor in the transport position

1	Retainer	**4**	Transport retainer
2	Retaining element	**5**	Wind speed sensor
3	Retaining element	**6**	Retainer

- ▶ Remove the protective cover and store it for later use.
- ▶ Remove the retaining element **2** in position **P1** from the retainer **6** on the telescopic boom.
- ▶ Carefully remove the retainer **1** with attachment parts.
- ▶ Store the retaining element **2** safely for assembly on the boom head or auxiliary boom.

10.13.3 Assembling in the transport position

The assembly of the wind speed sensor and the airplane warning light are identical in the transport position. Assembly is explained based on the wind speed sensor.

10.13.3.1 Assembling the wind speed sensor

Before the crane is transported on public roads, the wind speed sensor and the retainer must be assembled in the transport position.

Securing the wind speed sensor

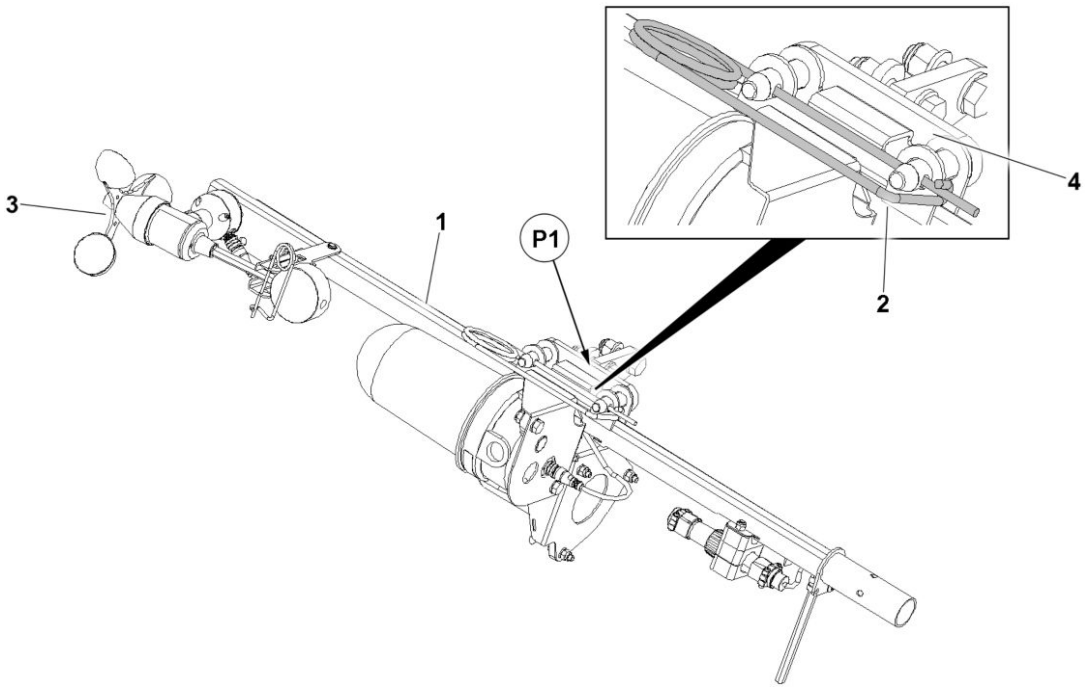


Fig. 1978: Securing the wind speed sensor in the transport position

1 Retainer
2 Retaining element
3 Wind speed sensor
4 Retainer

▶ Assemble the retainer **1** with the wind speed sensor **3** in position **P1**.

▶ Secure the retainer **1** with the retaining element **2** to the retainer **4**.

10.13.3.2 Protecting the wind speed sensor

To prevent the wind speed sensor from being damaged, the wind speed sensor must be protected during transport.

▶ Fasten the supplied protective cover on the wind speed sensor.

10.13.4 Disassembling in the transport position

The disassembly of the wind speed sensor and the airplane warning light are identical in the transport position. Disassembly is explained based on the wind speed sensor.

During transport, the wind speed sensor is assembled on a retainer in the transport position.

10.13.4.1 Disassembling the wind speed sensor

Make sure that the following prerequisites are met:
❑ The telescopic boom is luffed down to 0°.
❑ The auxiliary boom is luffed up to 0°.

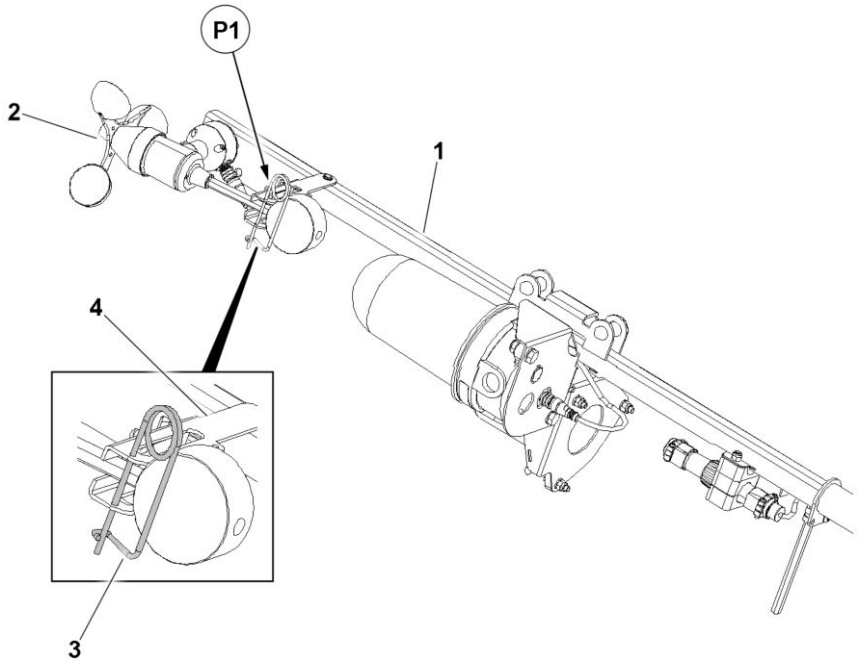


Fig. 1979: Securing the wind speed sensor in the transport position

1 Retainer
2 Wind speed sensor
3 Retaining element
4 Transport retainer

▶ Disconnect the electrical connection.

▶ Release the transport retainer **4** and fold it out.

▶ Swing the wind speed sensor **2** upward and lock the weight in position **P1** in the transport retainer **4**.

▶ Secure the wind speed sensor **2** with the retaining element **3**.

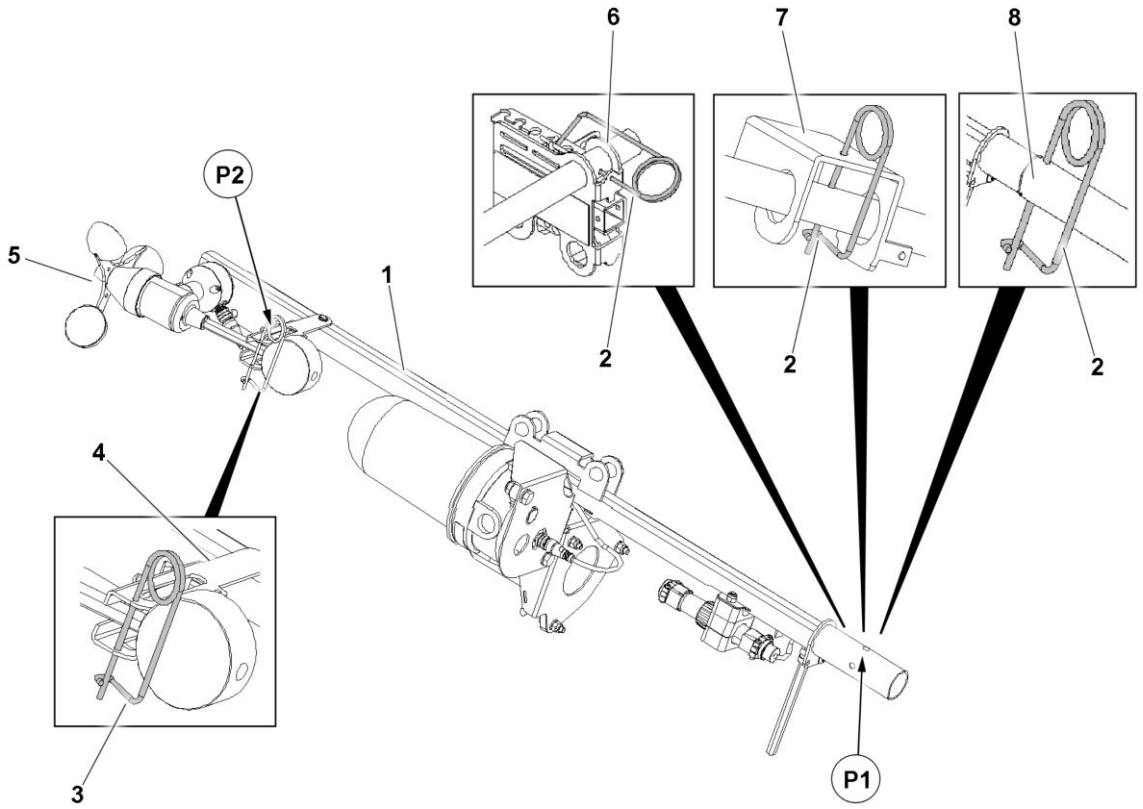


Fig. 1980: Disassembling the retainer

1 Retainer
2 Retaining element
3 Retaining element
4 Transport retainer
5 Wind speed sensor
6 Retainer
7 Retainer
8 Retainer

▶ Remove the retaining element **2** from the retainer **6**, retainer **7** or retainer **8** and store it.

▶ Carefully remove the retainer **1** with attachment parts.

10.13.5 Connecting the electrical lines

The connection of the electrical lines is described based on an example.

The specifications in the supplied electric wiring diagram are applicable for the connection.

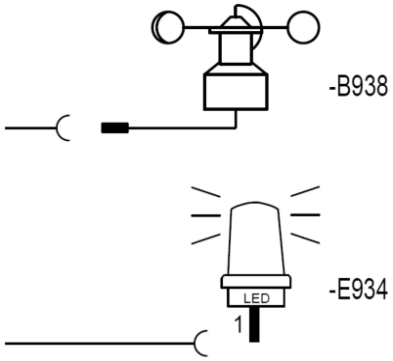


Fig. 1981: Connecting the electrical lines

-B934 Airplane warning light*
-B938 Wind speed sensor

▶ Plug the Wind speed sensor **-B938** into the socket.

▶ Plug the Airplane warning light* **-B934** into the socket.

▶ Test the warning and safety equipment (→ 8.3 Checking the warning and safety equipment, p. 404).

10.13.6 Disconnecting the electrical lines

The disconnection of the electrical lines is described based on an example.

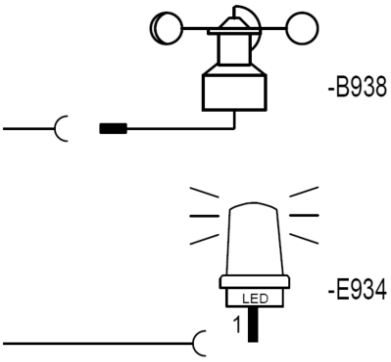


Fig. 1982: Disconnecting the electrical lines

-B934 Airplane warning light* **-B938** Wind speed sensor

▶ Release the wind speed sensor **-B938** from the socket.

▶ Release the airplane warning light* **-B934** from the socket.

The plugs can be protected against contamination and damage.

When protective caps are available:
▶ Fit the protective caps.

10.14 Boom head* floodlight

10.14.1 Assembling the “boom head floodlight”

Depending on the available equipment, the floodlight can be assembled directly on the boom head or the pull relief for the hose drum.

The illustrations are exemplary. The installation of the floodlight is described based on the example of a telescopic boom. The attached retainers are located at times in other positions than as shown.

The assembly of the floodlight is carried out depending on the crane structure.

Make sure that the following prerequisites are met:
❑ The telescopic boom is luffed down to 0°.
(→ Luffing the telescopic boom from the crane cab, p. 533)

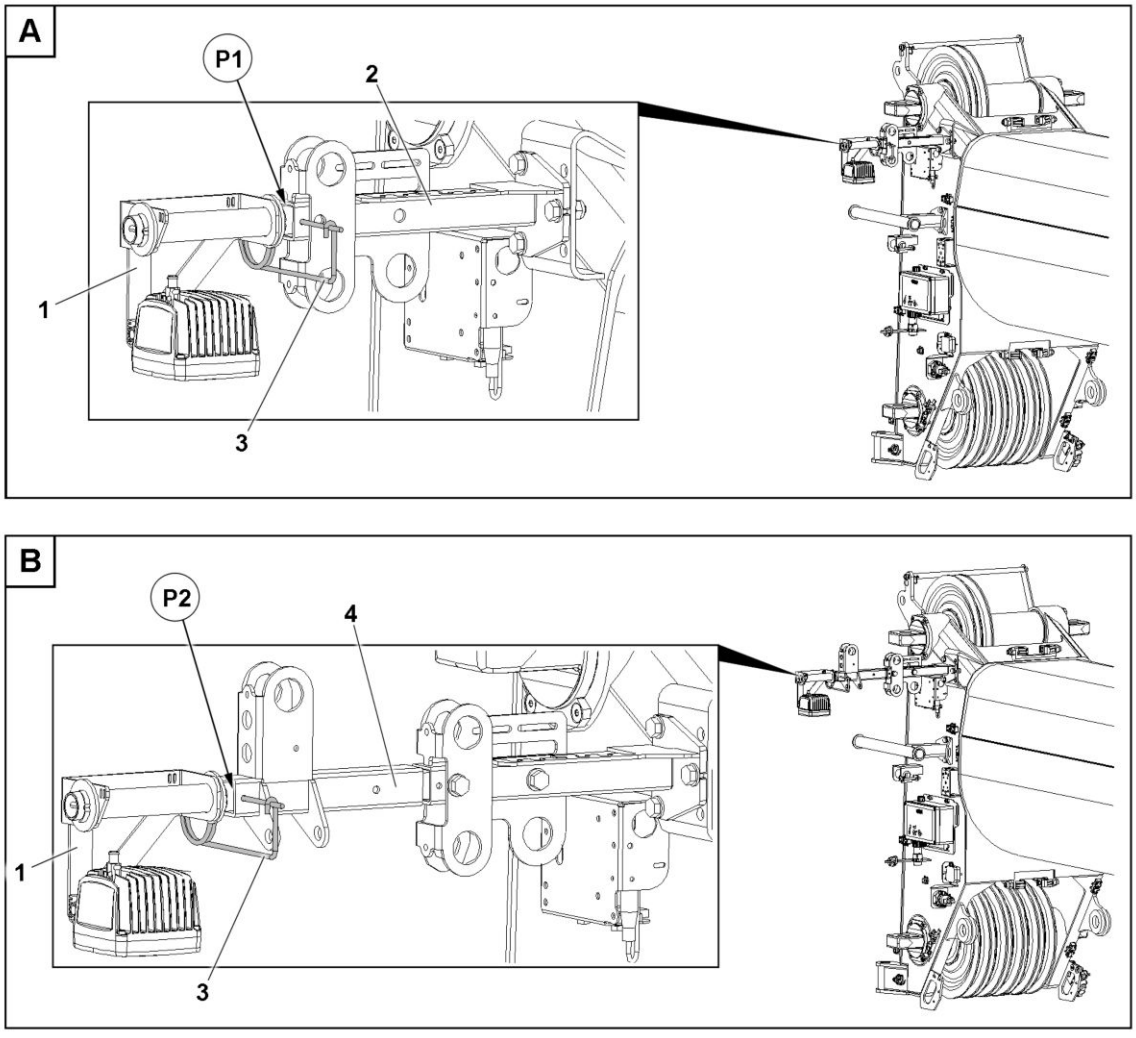


Fig. 1983: “Boom head floodlight” assembly

1 Floodlights
2 Retainer
3 Retaining element
4 Pull relief
P1 Assembly position
P2 Assembly position

▶ Insert the floodlight **1** in assembly position **P1** in the retainer **2** on the telescopic boom.
or

Insert the floodlight **1** in assembly position **P2** in the pull relief **4** for the hose drum.

▶ Secure the floodlight **1** with the retaining element **3**.
▷ The floodlight **1** is assembled.

10.14.2 Connecting the electrical line

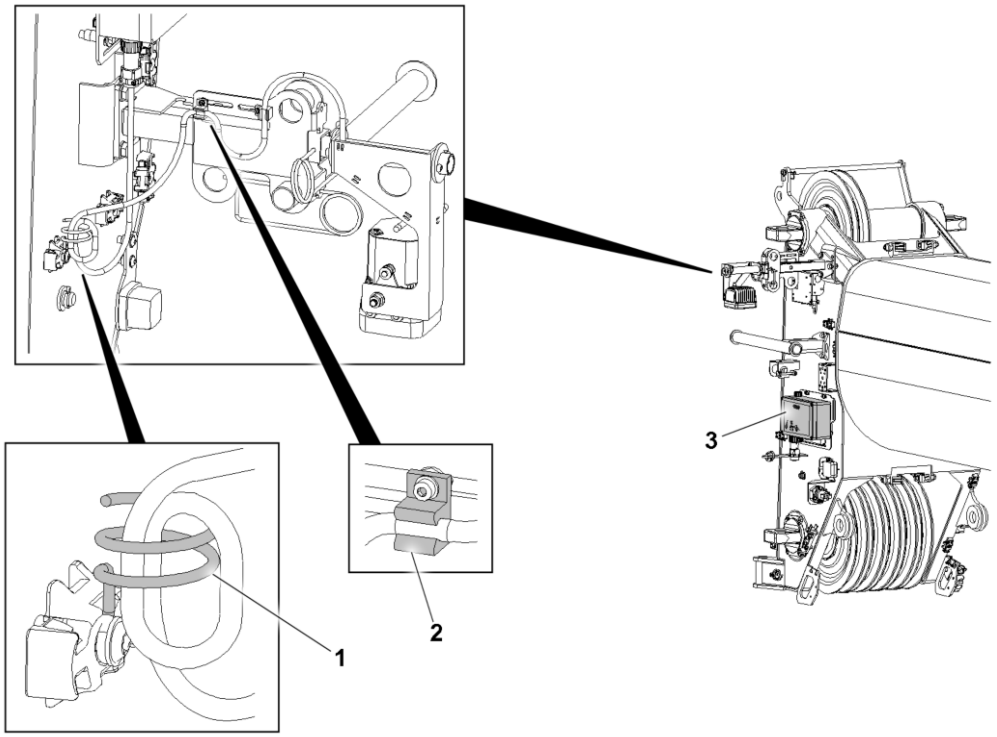


Fig. 1984: Establishing the electrical connection

1 Line holder
2 Clips
3 Terminal box

The establishment of the electrical connection is described based on an example.

The specifications in the supplied electric wiring diagram are applicable for the connection.

▶ Establish the electrical connection from the floodlight to the terminal box **3**.

▶ Secure the electrical connection with clips **2** and, if necessary, using a line holder **1**.

▶ Check the function of the floodlight (→ 8.8.15 Turning the exterior lighting for crane operation on and off, p. 457).

10.14.3 Disassembling the “boom head floodlight”

Depending on the available equipment, the floodlight can be assembled directly on the boom head or the pull relief for the hose drum.

The illustrations are exemplary. The installation of the floodlight is described based on the example of a telescopic boom. The attached retainers are located at times in other positions than as shown.

The assembly of the floodlight is carried out depending on the crane structure.

Make sure that the following prerequisites are met:
- ❑ The telescopic boom is luffed down to 0°.
  (→ Luffing the telescopic boom from the crane cab, p. 533)
- ❑ The boom head floodlight is assembled.
  (→ 10.14.1 Assembling the “boom head floodlight”, p. 881)

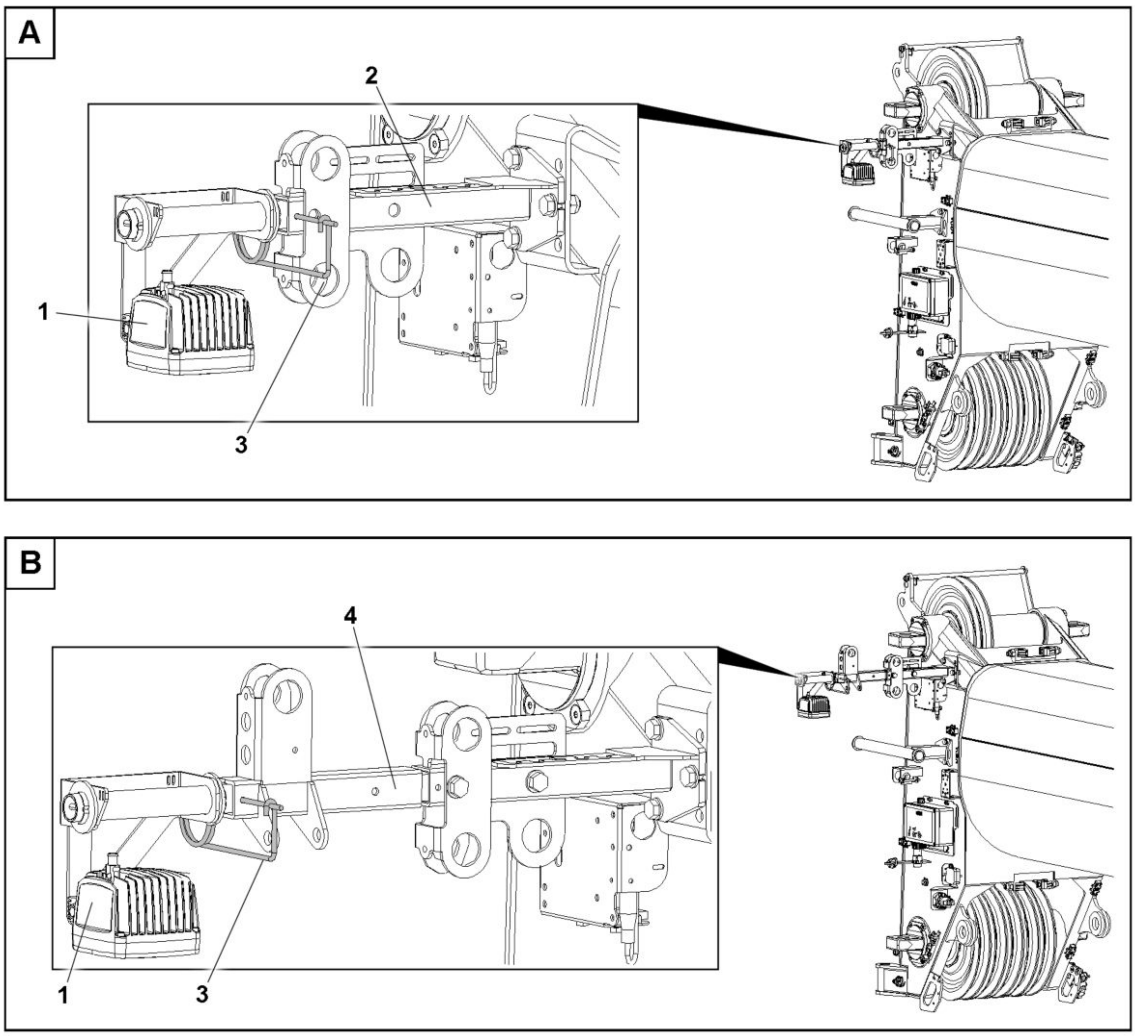


Fig. 1985: Disassembling the boom head floodlight

1 Floodlights
2 Retainer
3 Retaining element
4 Pull relief

▶ Disconnect the electrical line.

▶ Release the floodlight **1**: Remove the retaining element **3**.

▶ Pull the floodlight **1** out of the retainer **2**.

or

Pull the floodlight **1** out of the pull relief **4**.

10.15 Hose drum*

10.15.1 Assembling the hose drum

Make sure that the following prerequisites are met:
- ❑ The ground is level and of sufficient load carrying capacity.
- ❑ The telescopic boom is luffed down to 0°.
  (→ Luffing the telescopic boom from the crane cab, p. 533)
- ❑ The telescopic boom is telescoped in all the way.
  (→ 8.18.5 Telescoping the telescopic boom, p. 545)
- ❑ An auxiliary crane is available.

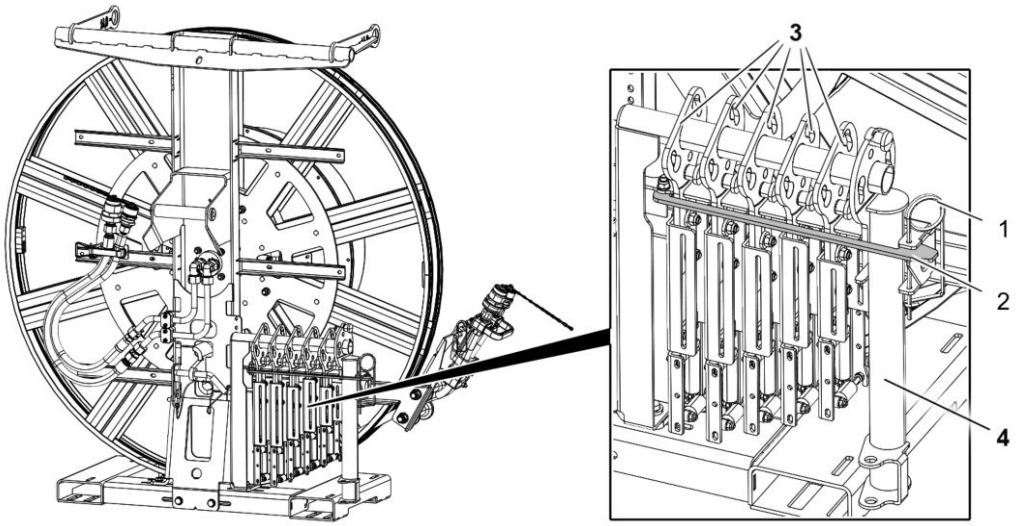


Fig. 1986: Removing the hose routings from the park position

1 Retaining element
2 Retainer
3 Hose routing
4 Pull relief

Before the hose drum can be assembled on the telescopic boom, the hose routings and the pull reliefs must be removed from the park position and assembled.

▶ Release the hose routings **3** and pull relief **4**: Remove the retaining element **1**.

▶ Open the retainer **2**.

▶ Remove the hose routings **3** and pull relief **4** from the park position.

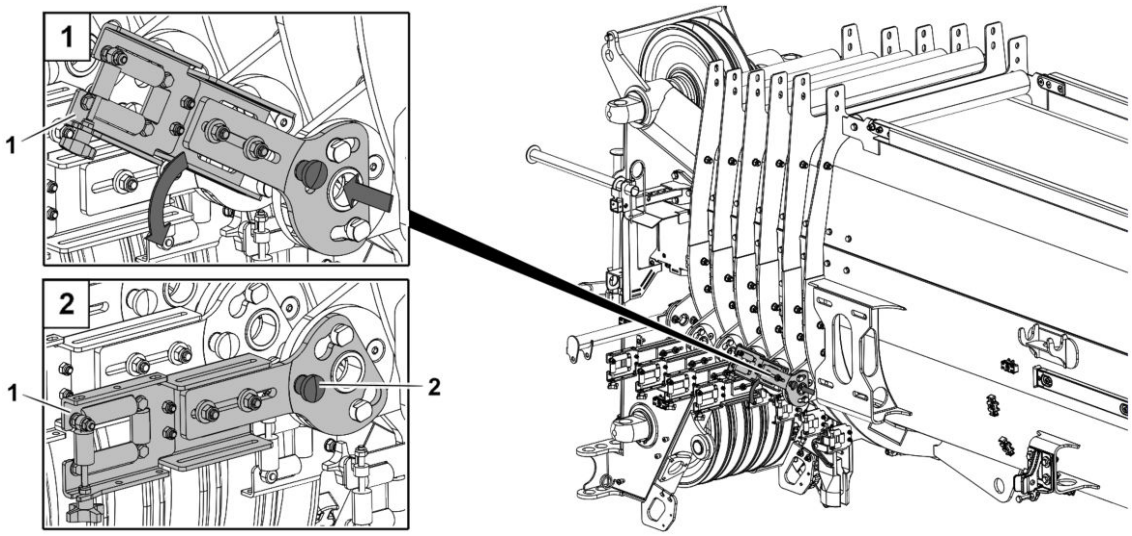


Fig. 1987: Assembling the hose routings

1 Hose routing **2** Lock

To prevent incorrect assembly of the hose routings, they are marked with numbers. The numbering starts on the pivot section with number 1.

▶ Assemble the hose routings **1** and pull relief on the corresponding telescope.

▶ Until the lock **3** engages: Turn the hose routing **1** in direction of the arrow.

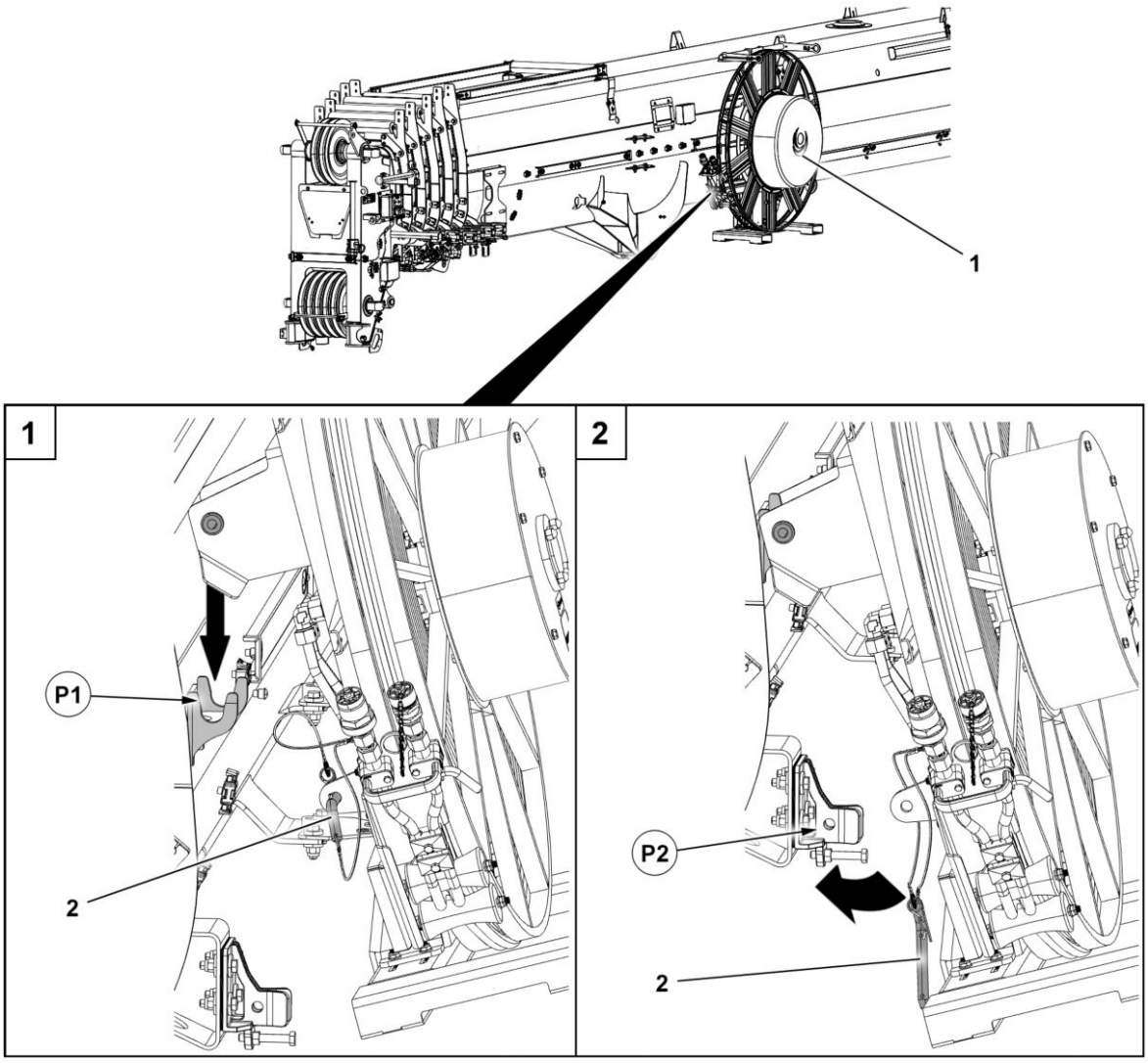


Fig. 1988: Assembling the hose drum

1 Hose drum
2 Pin
P1 Attachment position
P2 Pin position

▶ Fasten the auxiliary crane to the hose drum **1** (→ 7.11 Hose drum , p. 397).

▶ Release and unpin the pin **2**.

▶ Connect the hose drum **1** in the attachment position **P1**.

⚠ **Danger of crushing! The hose drum swings in the direction of the crane!**

▶ Until the hose drum **1** can be pinned in the pin position **P2**: Lower the hose drum **1**.

▶ Insert and secure the pin **2** in the pin position **P2**.

▶ Remove the auxiliary crane.

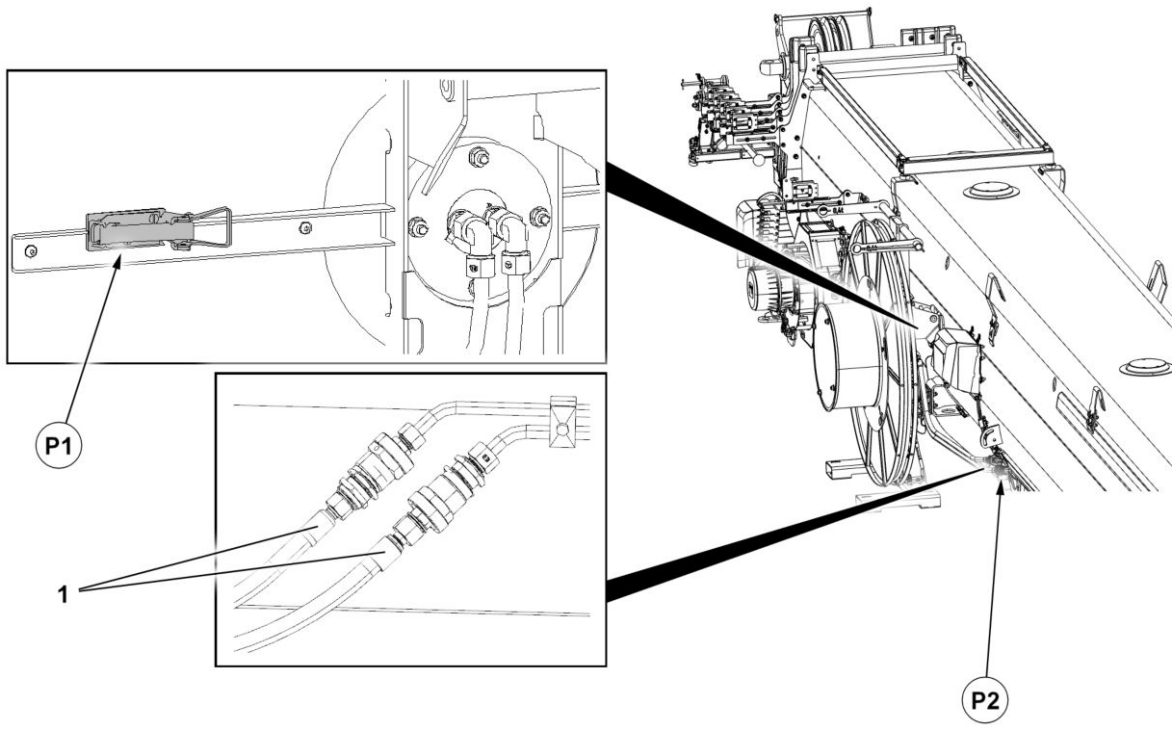


Fig. 1989: Connecting the hydraulic lines

1 Hydraulic lines
P1 Park position
P2 Connection position

▶ Disassemble the hydraulic lines **1** from the park position **P1**.

▶ Connect the hydraulic lines **1** in the connection position **P2** with the hydraulic lines on the telescopic boom.

If a folding jib is used:

▶ Assemble the hydraulic connections in the operating position (→ 10.15.2 Assembling the hydraulic connections in the operating position, p. 887).

10.15.2 Assembling the hydraulic connections in the operating position

The hydraulic connections must be assembled in the operating position to use the hydraulic folding jib.

Make sure that the following prerequisites are met:

❑ The telescopic boom is luffed down to 0°.
(→ Luffing the telescopic boom from the crane cab, p. 533)

❑ The telescopic boom is telescoped in all the way.
(→ 8.18.5 Telescoping the telescopic boom, p. 545)

❑ The guides and pull relief are assembled.
(→ 10.15.1 Assembling the hose drum, p. 884)

❑ A guide with the guide rope is present.

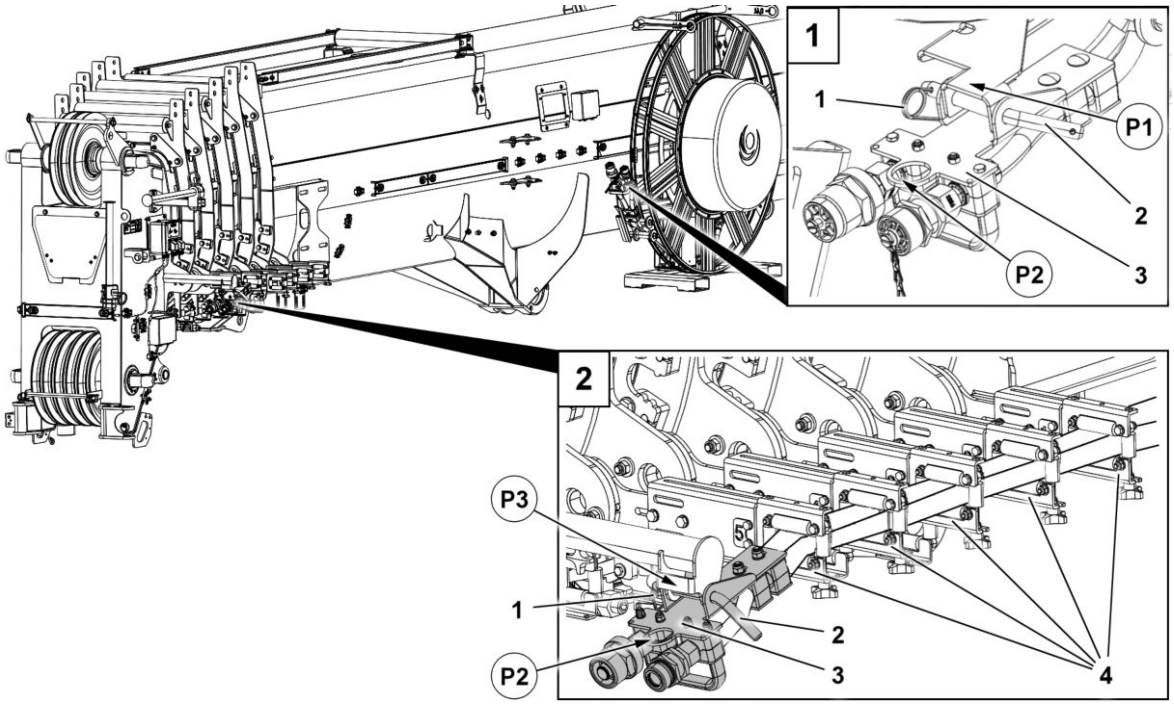


Fig. 1990: Assembling the hydraulic connections in the operating position

1 Retaining element
2 Pin
3 Bracket
4 Guide

P1 Transport position
P2 Attachment position
P3 Operating position

- ▶ Fastening the guide rope in the attachment position **P2**.
- ▶ Remove the retaining element **1** and unpin the pin **2**.
- ▶ Secure the hose drum with a guide to prevent it from spooling up by itself.
- ▶ Open the guides **4**.
- ▶ Place the hydraulic lines in the guides **4**.
- ▶ Pin the bracket **3** in the operating position **P3** and assemble with the retaining element **1**.
- ▶ Remove the guide rope from the attachment position **P2**.
- ▶ Close the guides **4**.

10.15.3 Assembling the hydraulic connections in the transport position

Note

Liebherr-Werk Ehingen GmbH recommends assembling the hydraulic connections for crane operation **without** the folding jib in the transport position.

This avoids having to spool the hose drum up and out unnecessarily.

Make sure that the following prerequisites are met:
- ❑ The telescopic boom is luffed down to 0°.
  (→ Luffing the telescopic boom from the crane cab, p. 533)
- ❑ The telescopic boom is telescoped in all the way.
  (→ 8.18.5 Telescoping the telescopic boom, p. 545)
- ❑ A guide with the guide rope is present.

❑ The hydraulic connections are disconnected from the folding jib.
(→ 10.8.13 Disconnecting the hydraulic lines, p. 802)

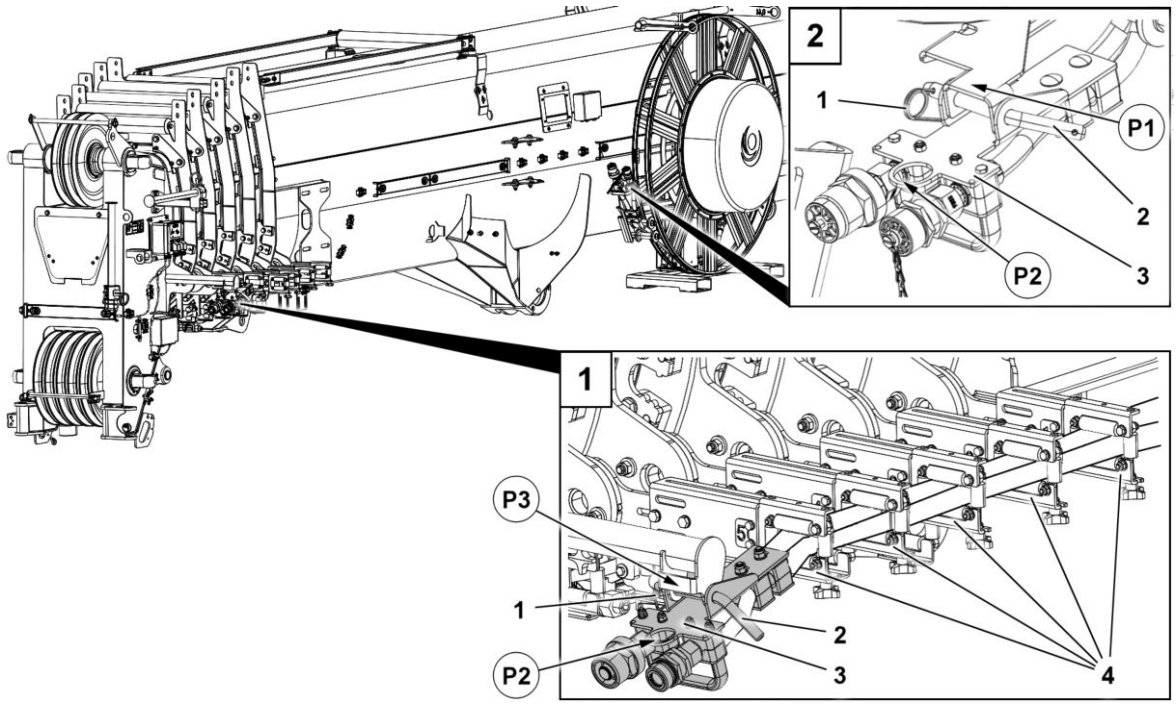


Fig. 1991: Assembling the hydraulic connections in the transport position

1 Retaining element
2 Pin
3 Bracket
4 Guide

P1 Transport position
P2 Attachment position
P3 Operating position

▶ Fastening the guide rope in the attachment position **P2**.

▶ Open the guides **4**.

▶ Remove the retaining element **1** and unpin the pin **2**.

▶ Secure the hose drum with a guide to prevent it from spooling up by itself.

▶ Remove the bracket **3** from the operating position **P3** and remove the guides **4**.

▶ Close the guides **4**.

▶ Until the bracket **3** can be pinned in the transport position **P1**: Spool the hose up with the guide rope on the drum.

▶ Pin and secure the bracket **3** in the transport position **P1**.

▶ Remove the guide rope from the attachment position **P2**.

10.15.4 Disassembling the hose drum

Make sure that the following prerequisites are met:
❑ The crane is leveled. If necessary, level with the assembly support.
❑ The telescopic boom is luffed down to 0°.
(→ Luffing the telescopic boom from the crane cab, p. 533)
❑ The telescopic boom is telescoped in all the way.
(→ 8.18.5 Telescoping the telescopic boom, p. 545)
❑ The hydraulic connections are installed in the transport position.
(→ 10.15.3 Assembling the hydraulic connections in the transport position, p. 888).
❑ An auxiliary crane is available.

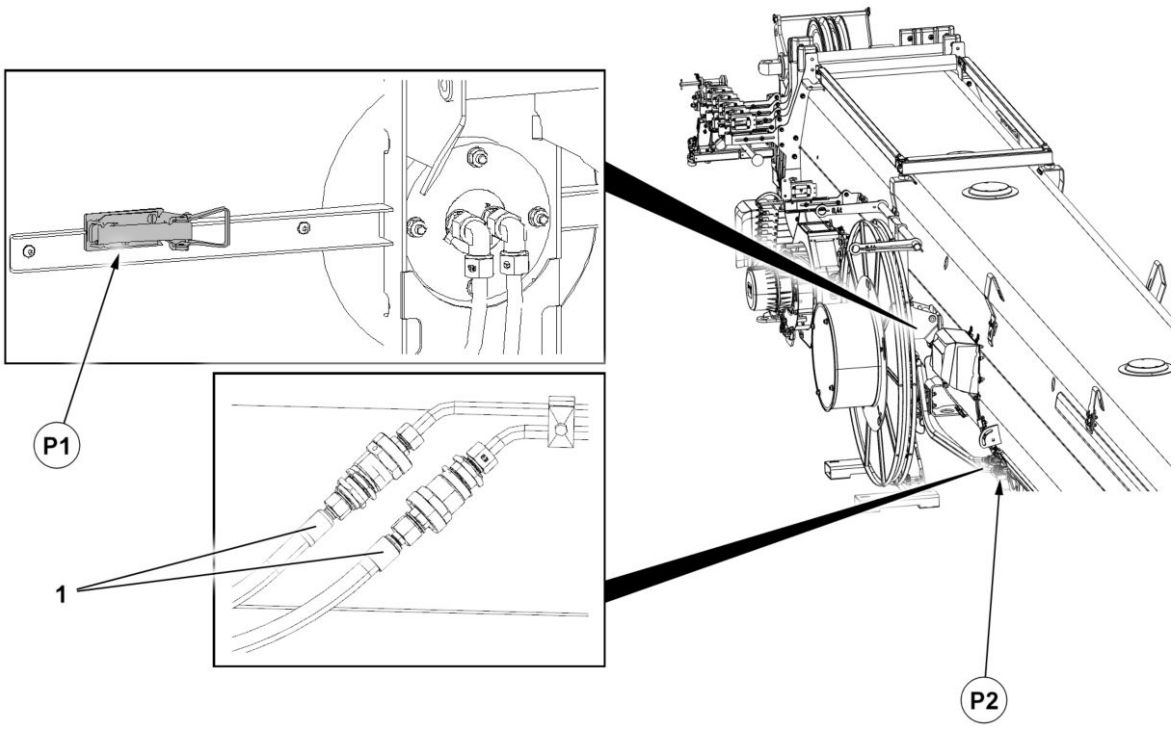


Fig. 1992: Disconnecting the hydraulic lines

1 Hydraulic lines
P1 Park position
P2 Connection position

▶ Disconnect the hydraulic lines **1** in the connection position **P2**.

▶ Assemble the hydraulic lines **1** in the park position **P1**.

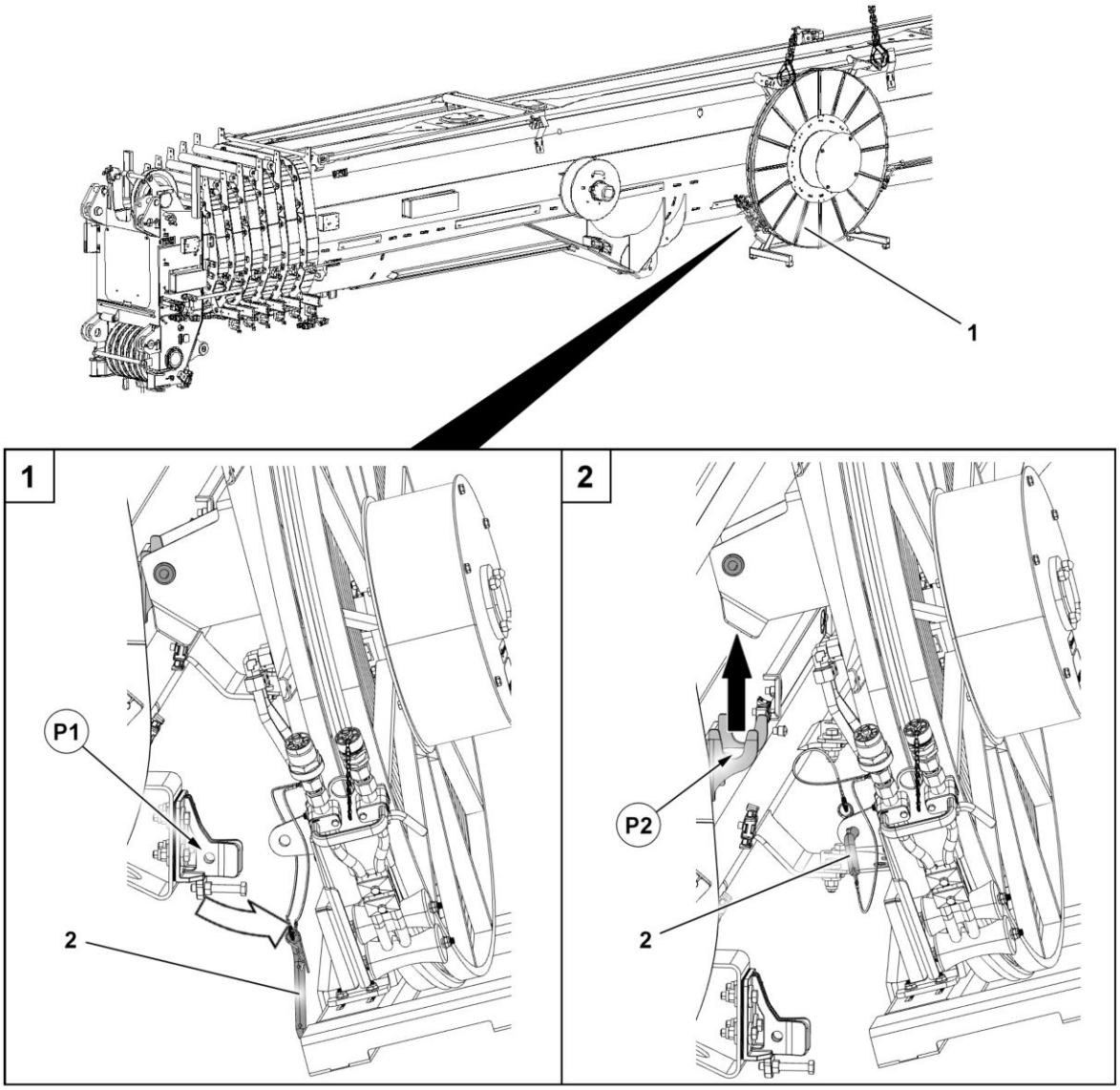


Fig. 1993: Disassembling the hose drum

1 Hose drum
2 Pin
P1 Pin position
P2 Attachment position

▶ Fasten the auxiliary crane to the hose drum **1** (→ 7.11 Hose drum , p. 397).

▶ Release and unpin the pin **2** in the pin position **P1**.

⚠ **Danger of falling! The hose drum swings away from the crane!**

▶ Lift the hose drum **1** carefully.
▷ The hose drum **1** swings away from the crane.

▶ Insert and secure the pin **2** in the hose drum **1**.

▶ Lift the hose drum **1** out of the attachment position **P2**.

▶ Place the hose drum **1** on level ground.

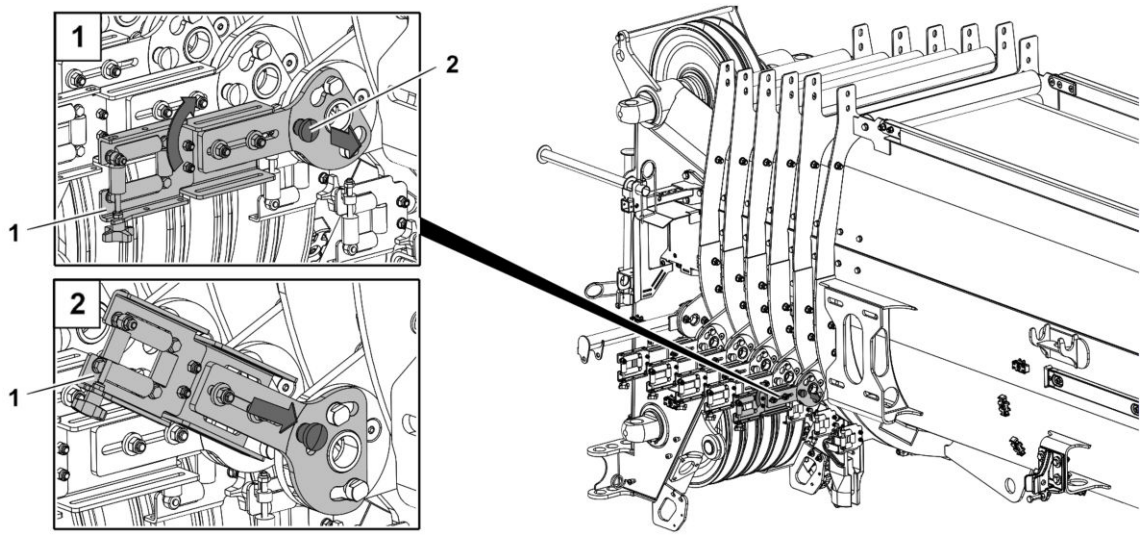


Fig. 1994: Disassembling the hose routings

1 Hose routing
2 Lock

▶ Unlock the lock **2** and turn the hose routings **1** and pull relief in direction of the arrow.

▶ Remove the hose routings **1** and pull relief from the telescopes.

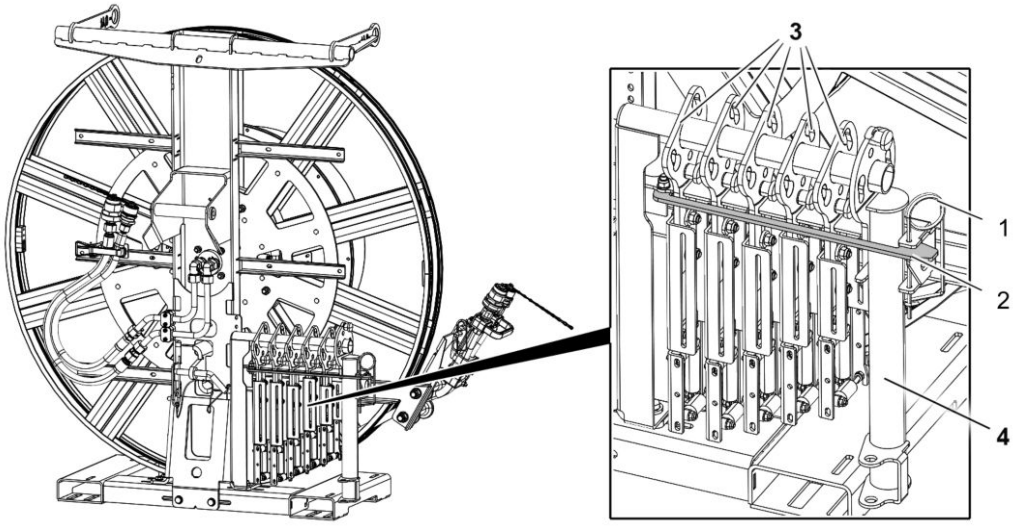


Fig. 1995: Assembling the hose routing in the park position

1 Retaining element
2 Retainer
3 Hose routing
4 Pull relief

▶ Remove the retaining element **1** and open the retainer **2**.

▶ Assemble the hose routings **3** and pull relief **4** in the park position.

▶ Secure the hose routings **3** and pull relief **4**: Close the retainer **2** and secure with the retaining element **1**.

10.16 Winch 2*

10.16.1 Assembling winch 2 with the auxiliary crane

Make sure that the following prerequisites are met:
- ❑ An auxiliary crane is on hand.
- ❑ The ground is level and of sufficient load carrying capacity.

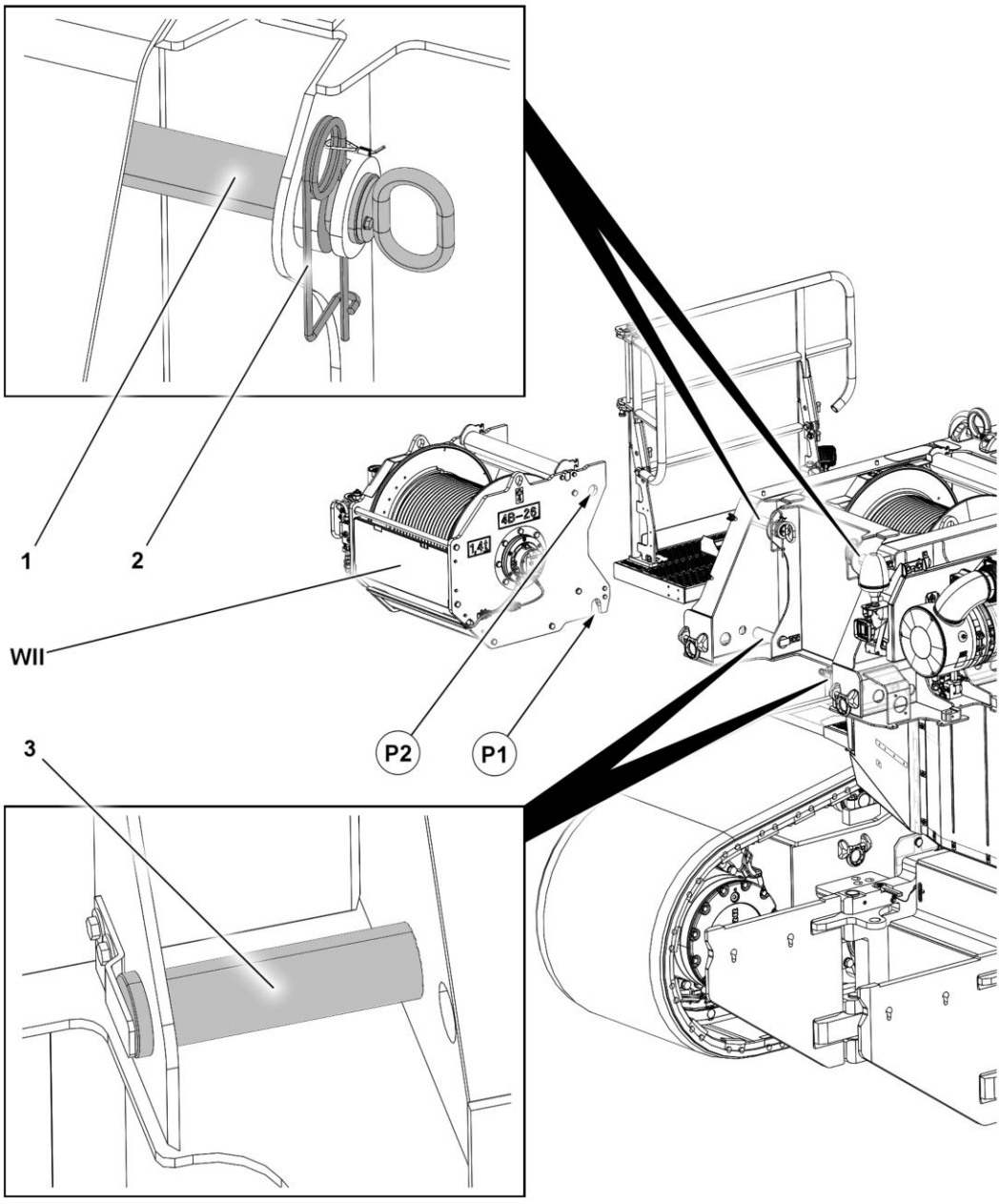


Fig. 1996: Assembling winch 2 with the auxiliary crane

1	Pin	**WII**	Winch 2
2	Retaining element	**P1**	Assembly position
3	Pin	**P2**	Pin position

▶ Fasten winch 2 to the auxiliary crane (→ 7.12 Winch 2, p. 398).

▶ Release and unpin the pins **1** on both sides.

▶ Set winch 2 on pin **3** with assembly positions **P1** on the turntable.

If the pin positions **P2** align with the turntable:
▶ Pin winch 2 with pins **1** on both sides and secure.

When winch 2 is pinned:
▶ Secure the pin **1** with the retaining elements **2**.

▶ Detach the auxiliary crane.

▶ Connect the electrical and hydraulic lines (→ 10.16.2 Connecting the electrical and hydraulic lines, p. 894).

When winch 2 is used:
▶ Adjust the control lever assignment (→ 8.15.5 Adjusting the control lever assignment, p. 515).

10.16.2 Connecting the electrical and hydraulic lines

Make sure that the following prerequisites are met:
❑ The engine is turned off.
(→ 8.12 Engine, p. 490)

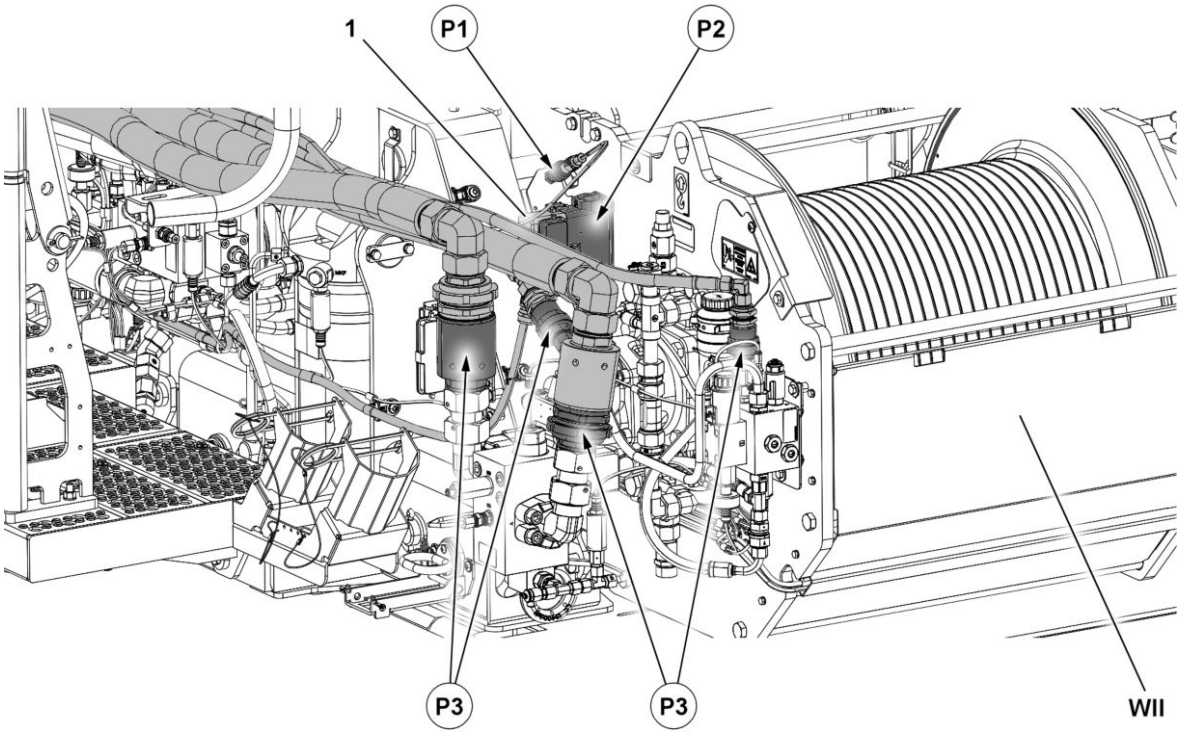


Fig. 1997: Connecting the supply lines

1 Electrical line
P1 Connection position (central lubrication)
P2 Connection position (electrical line)
P3 Connection position (hydraulic lines)
WII Winch 2

▶ Insert the electrical line **1** in the connection position **P2**.

▶ Connect the line of the central lubrication in **P1**.

The different diameters of the hydraulic lines prevent incorrect coupling.

▶ Connect the hydraulic lines in the connection positions **P3**.

▶ Attach the protective caps to the lines and connections.
▷ Ballast weighing is reset.

▶ Perform ballast weighing again (→ 10.7.8 Performing ballast weighing by taking on the ballast, p. 765).

10.16.3 Disconnecting the electrical and hydraulic lines

Make sure that the following prerequisites are met:
❑ The engine is turned off.
(→ 8.12 Engine, p. 490)

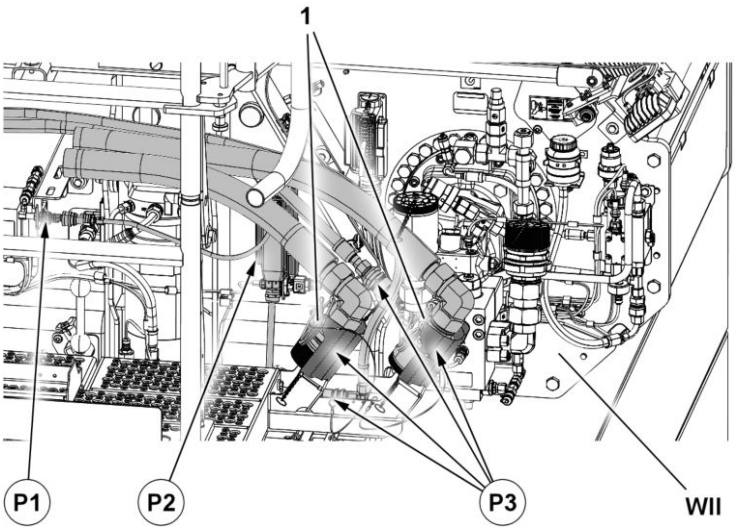


Fig. 1998: Disconnecting the supply lines

1 Retaining element
P1 Connection position (central lubrication)
P2 Connection position (electrical line)
P3 Park position (hydraulic lines)
WII Winch 2

▶ Disconnect the electrical plug from winch 2 **WII** and plug into the connection position **P2**.

After disconnecting the electrical connector for winch 2, ballast weighing is reset.

▶ Perform ballast weighing again (→ 10.7.8 Performing ballast weighing by taking on the ballast, p. 765).

▶ Disconnect the hydraulic lines from winch 2 **WII** and secure in the park positions **P3** with retaining elements **1**.

▶ Disconnect the line of the central lubrication from winch 2 **WII** and plug into the connection position **P1**.

10.16.4 Disassembling winch 2 with the auxiliary crane

Make sure that the following prerequisites are met:
❑ The ground is level and of sufficient load carrying capacity.
❑ An auxiliary crane is on hand.
❑ The hoist rope of winch 2 is spooled up and secured.
❑ Winch 2 is locked.
(→ Locking and unlocking winches, p. 536)
❑ The electrical and hydraulic lines are disconnected.
(→ 10.16.3 Disconnecting the electrical and hydraulic lines, p. 895)
❑ The rear camera is in the transport position.
(→ Positioning the rear camera in the transport position, p. 869)

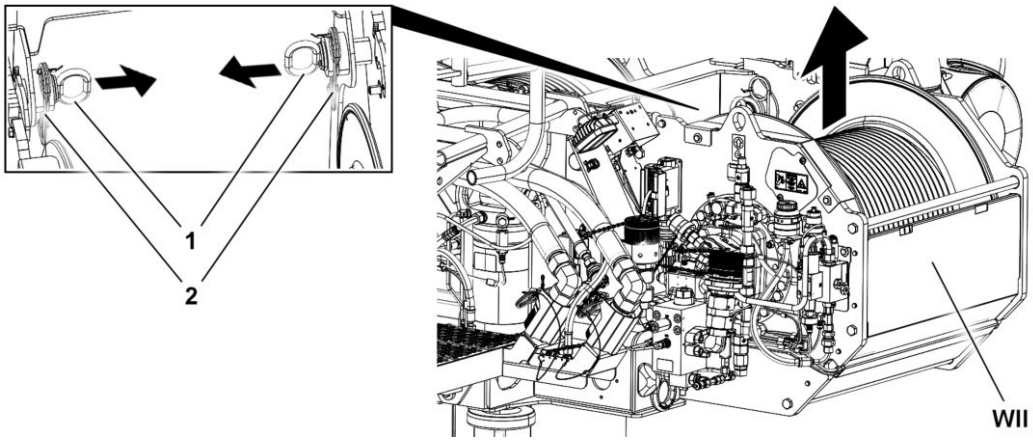


Fig. 1999: Disassembling winch 2

1 Pin
2 Retaining element
WII Winch 2

▶ Fasten winch 2 **WII** to the auxiliary crane (→ 7.12 Winch 2, p. 398).

▶ Until the pin **1** can be unpinned: Tension the hoist rope of the auxiliary crane.

▶ Release the pin **1**: Remove the retaining element **2**.

▶ Unpin winch 2 **WII** with pin **1**.

When winch 2 is unpinned:

▶ Until winch 2 **WII** hangs freely on the auxiliary crane: Pull winch 2 **WII** up vertically.

▶ Take winch 2 down on suitable ground.

▶ Insert the pin **1** again and secure with the retaining element **2**.

When winch 2 is disassembled:

▶ Adjust the control lever assignment (→ 8.15.5 Adjusting the control lever assignment, p. 515).

11 Crane operator and assembly personnel maintenance

11.1 Maintenance and inspection schedule

Daily	Before start up and before assembly	Weekly	4 weeks	8 weeks	3 Months	Special intervals	Crane operator and assembly personnel Activity to be performed ● Repeat interval ▸ Special interval ◆ During the heating period ◇ Outside of the heating period	Confirm activity
							Engine	
●							Check the oil level in the crane cab (→ Engine displays, p. 287)	
							Cooling system	
●							Check the coolant level (→ Engine displays, p. 287)	
							SCR exhaust system*	
●							Check the mounting, electric lines and electronic plug for damage and tight seating (→separate document “Engine manufacturer operating instructions”)	
							Crawler chain	
●							Visual inspection: Checking the chain tension (→ 11.11.1 Checking the chain tension, p. 922)	
							Crawler carrier	
●							Check the travel drive for leaks	
●							Check the carrier rollers, track rollers and idlers for leaks	
							Distributor gear	
●							Check for leaks	
							Hydraulic hose lines	
●							Check for leaks and damage (→ 11.8 Hydraulic hose lines, p. 915)	
							Slewing gears	
●							Slewing gear: Check for leaks	
●							Slewing gear brake: Check for leaks	
							Winches	
●							Winch gear: Check for leaks	

Daily	Before start up and before assembly	Weekly	4 weeks	8 weeks	3 Months	Special intervals	Crane operator and assembly personnel Activity to be performed ● Repeat interval ▸ Special interval ◆ During the heating period ◇ Outside of the heating period	Confirm activity
Rope pulleys								
●							Remove snow and ice	
Overload protection								
●							Check the function Perform a overload protection quick test	
Superstructure parking heater*								
●							Check the fill level in the fuel tank (→ 11.17.1 Checking the fuel tank fill level, p. 932)	
●							Check the fill level in the expansion tank	
Crane cab: Control and operating elements								
●							Check the instrument panels	
							Check the indicator lights	
Ropes								
●							Visual inspection: Check the ropes for damage and distortion.	
Personal protective equipment								
	●						Check the personal protective equipment (→ separate document “Manufacturer documentation”)	
Fall protection equipment								
	●						Check the ladders and ladder positioning points for damage and safe function	
Track width adjustment								
	●						Clean and grease visible gliding surfaces	
							Check the hydraulic cylinder for tightness and tight seating	
Assembly support								
	●						Check the hydraulic cylinder for tightness and tight seating	
Load handling and assembly aids								
	●						Visual inspection: Check for cracks, damage, wear and distortion.	
Fastening equipment and load retainers								
	●						Visual inspection (→ separate document “Manufacturer documentation”)	

Daily	Before start up and before assembly	Weekly	4 weeks	8 weeks	3 Months	Special intervals	**Crane operator and assembly personnel Activity to be performed** ● **Repeat interval** ▸ **Special interval** ◆ **During the heating period** ◇ **Outside of the heating period**	Confirm activity
Rigging points and fastening positions								
	●						Visual inspection: Check the condition and mountings.	
Hydraulic cylinder (telescopic boom)								
	●						Check for leaks	
	●						Lubricate the bearings (→ separate document “Service fill”)	
Pneumatic springs								
	●						Checking for damage and function	
Carrier rollers								
	●						Perform a visual inspection	
	●						Check the depth of the lead-in track (→ separate document “Maintenance and inspection log” › “Maintenance”)	
	●						Check the bearing for easy movement	
Pin connection (telescopic boom)								
	●						Check the retainer of the pin connection	
	●						Visual inspection: Check the pins and connector elements for damage	
	●						Lubricate the pin connection	
Hydraulic folding jib*								
	●						Oil collection container	
	●						Check the hydro reservoir pretension pressure	
Folding jib*								
	●						Check the swing cylinder on the telescopic boom pivot section	
	●						Check the function of the hydraulic assembly aids	
Lattice sections								
	●	●					Lubricate the grease fitting of the lattice sections	
Rope pulleys								
	●	●					Check the groove base for cleanliness	
Hook block								
	●	●					Lubricate pressure bearings	

Daily	Before start up and before assembly	Weekly	4 weeks	8 weeks	3 Months	Special intervals	Crane operator and assembly personnel Activity to be performed ● Repeat interval ▸ Special interval ◆ During the heating period ◇ Outside of the heating period	Confirm activity
	●	●					Lubricate the hinge joint connection of the hook suspension If grease fittings are available: (→separate document “Service fill”) If grease fittings are not available: Use multi-functional spray.	
	●	●					Check if the anti-rotation device of the hook block is tightened	
	●	●					Check the retaining elements: Anti-rotation device of the hook nut, hook guard	
Accessible surfaces (chassis, superstructure)								
		●					Check for cleanliness	
Central lubrication system								
		●					Check the fill level in the grease container (→ 11.9.3 Servicing the central lubrication system, p. 918)	
						▸	Activate the central lubrication system ▸ Every 6 months (→ 11.9.1 Checking the function, p. 916)	
Engine								
		●					Check for leaks, damage and impurities	
Cooling system								
		●					Check for leaks	
Fuel system								
		●					Check for leaks	
		●					Check and drain the fuel preliminary filter (→ 11.3.2 Checking the fuel preliminary filter, p. 906) (→ 11.3.3 Draining the fuel preliminary filter, p. 907)	
Distributor gear								
		●					Check the oil level (→ 11.13 Checking the pump distributor gear oil level, p. 928)	
Compressed air system								
		●					Check for leaks (listen)	
		●					Drain the compressed air tank (→ 11.6 Draining the compressed air system, p. 911)	

Daily	Before start up and before assembly	Weekly	4 weeks	8 weeks	3 Months	Special intervals	Crane operator and assembly personnel Activity to be performed ● Repeat interval ▸ Special interval ◆ During the heating period ◇ Outside of the heating period	Confirm activity
Air filter system								
		●					Clean the dust discharge valve (→ 11.2 Clean the dust discharge valve of the air filter, p. 905)	
Superstructure hydraulic system								
		●					Check for leaks	
		●					Check the fouling indicator on the pressure filter (→ 11.7.3 Checking the pressure filter, p. 913)	
Slewing gears								
		●					Slewing gear: Check the oil level (→ 11.14 Checking the slewing gear oil level, p. 929)	
		●					Check the overflow container Dispose of the gear oil	
Winches								
		●					Winch gear: Check the oil level (→ 11.15 Checking the winch 1 oil level, p. 930) (→ 11.16 Checking the winch 2* oil level, p. 931)	
Crane cab window washing system								
		●					Check the fill level of the cleaning fluid (→ 11.18.1 Checking the fill level of the window washing fluid, p. 935)	
Camera cleaning system								
		●					Check the fill level of the cleaning fluid	
Telematik telescopic boom system								
		●					Check the lubrication condition of the outer and inner gliding surfaces of the telescopic boom bearing Lubricate if necessary (→separate document “Maintenance and inspection log” > “Maintenance”)	
Mobile crane								
		●				▸	Wash the mobile crane ▸ Wash the mobile crane after each use if possible (→ 11.21 Cleaning the crane, p. 939)	
Superstructure auxiliary heater*								

Daily	Before start up and before assembly	Weekly	4 weeks	8 weeks	3 Months	Special intervals	**Crane operator and assembly personnel Activity to be performed** ● **Repeat interval** ▸ **Special interval** ◆ **During the heating period** ◇ **Outside of the heating period**	Confirm activity
		◆				◇	Operate for 15 minutes with the engine cold and the heater at the highest temperature level. Check the function ◇ Every 4 weeks (→ Operating the superstructure* auxiliary heater, p. 469)	
Superstructure parking heater								
		◇					Operate for 15 minutes with the engine cold and the heater at the highest temperature level. Check the function (→ Operating the superstructure* parking heater, p. 467)	
Travel gear								
			●				Check the gear and hydraulic connections for leaks	
			●				Check the oil level (→ 11.10 Checking the gear oil level of the travel gear, p. 920)	
Crawler carrier								
			●				Check the sprocket, idler and idler guides for wear	
			●				Check the roll-off surfaces of the track rollers, carrier rollers, slide plates and guide blocks for wear Replace the components if necessary (→ 11.11.2 Checking for crawler chain wear, p. 923)	
			●				Checking the tightness of the mounting screws	
Crawler chain								
			●				Check the crawler chain for damage	
			●				Check the contact surfaces, gliding surfaces of the chain links, chain pitch, chain bushing and outrigger pads for wear. (→ 11.11.2 Checking for crawler chain wear, p. 923)	
			●				Check that the screws in the outrigger pads are firmly tightened	
Assembly support								

Daily	Before start up and before assembly	Weekly	4 weeks	8 weeks	3 Months	Special intervals	**Crane operator and assembly personnel Activity to be performed** ● **Repeat interval** ▸ **Special interval** ◆ **During the heating period** ◇ **Outside of the heating period**	Confirm activity
			●				Grease the bearing points of the support beams	
Crane cab climate control								
						▸	Operate the climate control system for 15 minutes Check the function ▸ Every 6 weeks (→ 6.3.7 Climate control operating unit, p. 264)	
Slewing ring connection								
				●			Lubricate the gear ring and the slewing gear pinion (→ 11.12 Lubricating the gear ring and the slewing gear pinion, p. 927) (→ separate document “Service fill”)	
Pin connection (superstructure)								
				●			Check the retainer of the pin connection	
				●			Check the pins and connector elements for damage	
				●			Check the retaining elements for damage	
Pin connection (ballast)								
				●			Lubricate the pin connection	
				●			Check the connecting elements for damage	
Crane cab								
				●			Check the function of the swiveling step on the crane cab (→ 5.9.2 Safety equipment for avoiding falls, p. 169)	
				●			Check the function of the inclination sensor Incline the crane cab fully to the rear and to the front (→ 8.8.13 Adjust the crane cab incline, p. 455)	
Central lubrication								
					●		Activate central lubrication If the mobile crane is not moved (→ 11.9.1 Checking the function, p. 916)	
Mobile crane								

Daily	Before start up and before assembly	Weekly	4 weeks	8 weeks	3 Months	Special intervals	**Crane operator and assembly personnel** **Activity to be performed** ● **Repeat interval** ▸ **Special interval** ◆ **During the heating period** ◇ **Outside of the heating period**	Confirm activity
						▸	Check the mobile crane for corrosion and paint damage Each time after the crane is used if possible ▸ Every 6 months	

Tab. 106: Crane operator and assembly personnel maintenance intervals

11.2 Clean the dust discharge valve of the air filter

Make sure that the following prerequisites are met:
- ❑ The ignition is off.
- ❑ The right turntable casing flap is open.

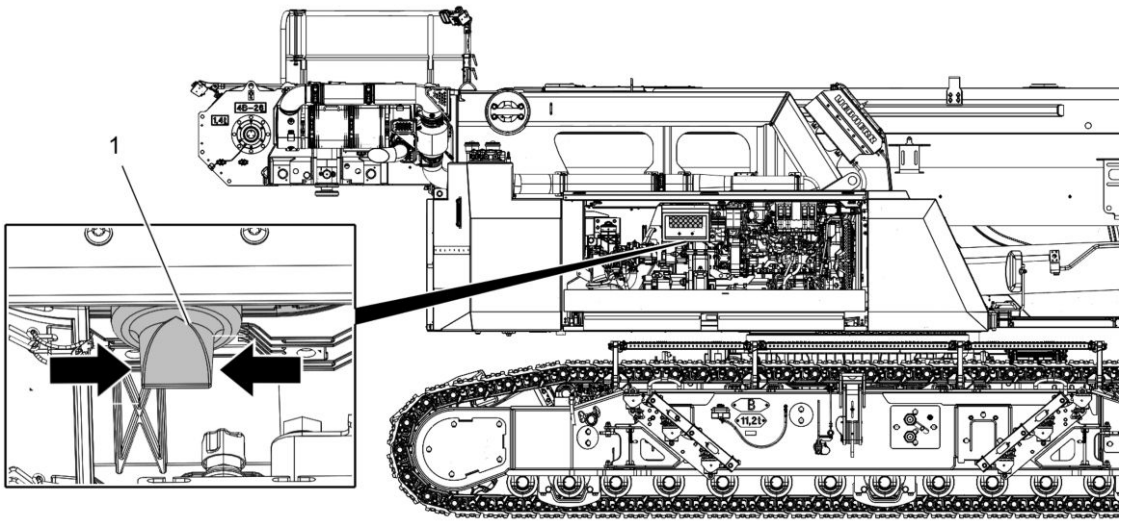


Fig. 2093: Air filter system

1 Dust discharge valve

▶ Continue to compress the dust discharge valve **1** until the dust discharge valve **1** opens.
▷ Dust and deposits release from the dust discharge valve **1**.

Troubleshooting

Do dust and deposits **not** release from the dust discharge valve **1**?

▶ Disassemble the dust discharge valve **1**: Release the hose clamps and pull the dust discharge valve **1** down.

▶ Clean the dust discharge valve **1** manually.

▶ Assemble the dust discharge valve **1**: Push the dust discharge valve **1** over the drain hose and attach the host clamp.

11.3 Fuel system

11.3.1 Refueling

Make sure that the following prerequisites are met:
❑ The ignition is off.
❑ The heating systems are turned off, the parking heater, for example.

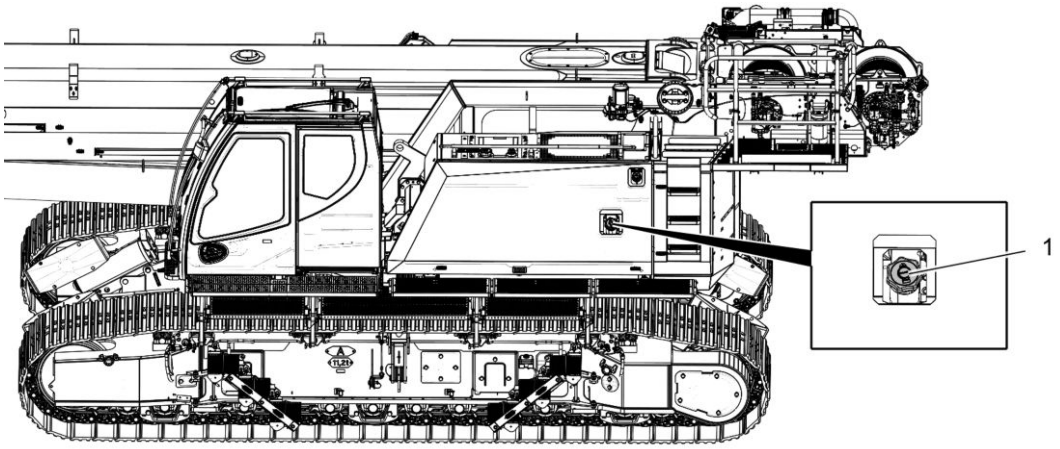


Fig. 2094: Fuel tank

1 Cover

▶ Open the cover **1**.

⚠ **The fuel nozzle can fall down! Fuel escapes!**

▶ Insert the fuel nozzle as deep as possible into the filler neck and secure it prevent it from falling down.

▶ Start refueling.

When refueling is complete:
▶ Take the fuel nozzle out of the filler neck.

▶ Close the cover **1**.

Troubleshooting

Was **impermissible** fuel added?

▶ Do **not** turn the ignition on.

▶ Have the fuel tank and fuel lines completely drained by authorized and trained service personnel.

11.3.2 Checking the fuel preliminary filter

The fuel preliminary filter must be drained in the following situations:
– An error message is displayed.
– The diesel-water mixture is visible in the water manifold.

When the prerequisites for draining the fuel preliminary filter are met:
▶ Follow the instructions (→ 11.3.3 Draining the fuel preliminary filter, p. 907).

11.3.3 Draining the fuel preliminary filter

Make sure that the following prerequisites are met:
❑ The *water in fuel* icon is displayed in red.
❑ The telescopic boom is luffed up.
❑ The engine has been turned off for at least 20 minutes.
❑ A container with sufficient capacity is on hand.

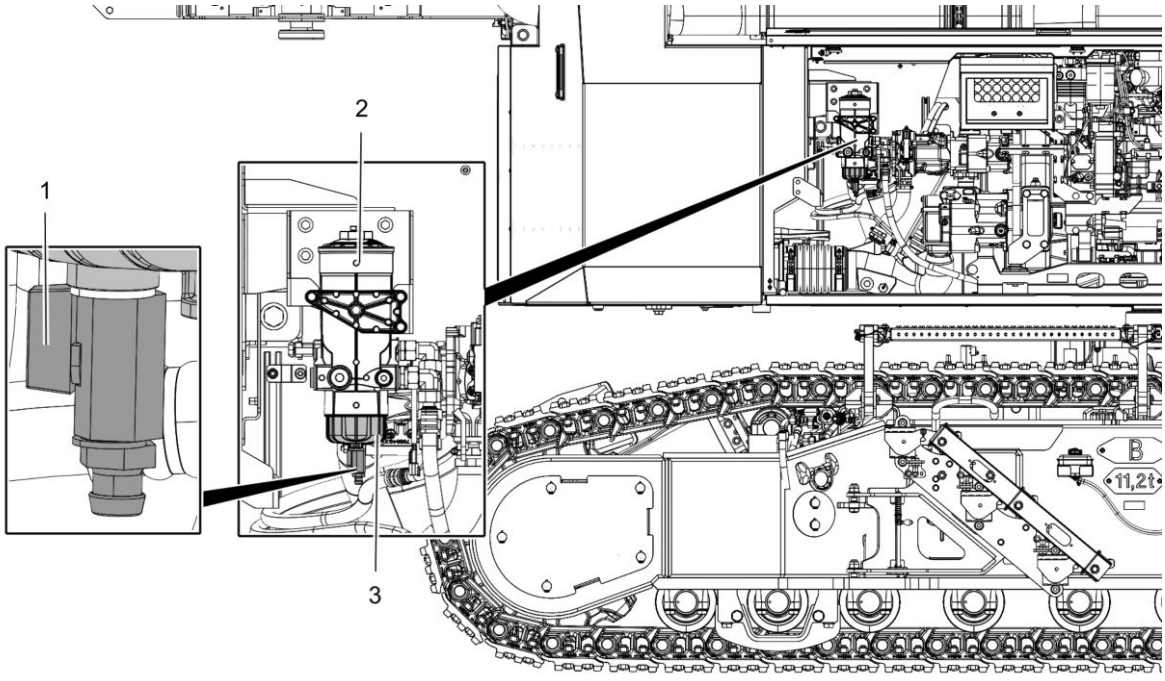


Fig. 2095: Fuel preliminary filter

1 Drain valve
2 Fuel preliminary filter
3 Water collecting tank

▶ Collect the diesel-water mixture: Position a container under the drain valve **1**.
▶ Fully drain the diesel-water mixture: Open the drain valve **1**.
▶ Close the drain valve **1**.
▶ Remove the container and dispose of the fluid.
▶ Turn the ignition on and wait 1 minute.
▶ Start the engine.

Troubleshooting

Is the starting supply still unsuccessful after 20 seconds?

▶ Turn the ignition off.
▶ Wait 1 minute.
▶ Turn the ignition on and wait 1 minute.
▶ Start the engine.

11.4 Adding urea solution*

Make sure that the following prerequisites are met:
- ❑ The heating systems are turned off, the parking heater, for example.
- ❑ The ignition is off.

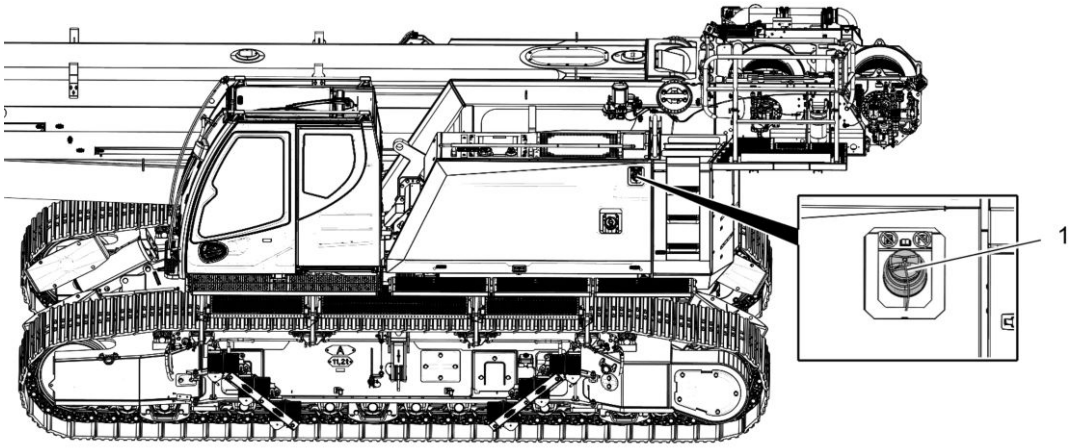


Fig. 2096: Urea tank

1 Cover

▶ Open the cover **1**.

▶ Insert the fuel nozzle as deep as possible into the filler neck.

▶ Start refueling.

When refueling is complete:

▶ Take the fuel nozzle out of the filler neck.

▶ Close the cover **1**.

11.5 Checking the exhaust system for leaks and damage

▶ Check the exhaust gas aftertreatment component group for tightness and damage (→Separate document “engine manufacturer's operating instructions”).

11.6 Draining the compressed air system

Make sure that the following prerequisites are met:
- ❑ 90° superstructure slewing angle
- ❑ The rear of the cover plate is disassembled.
- ❑ A ladder is available.

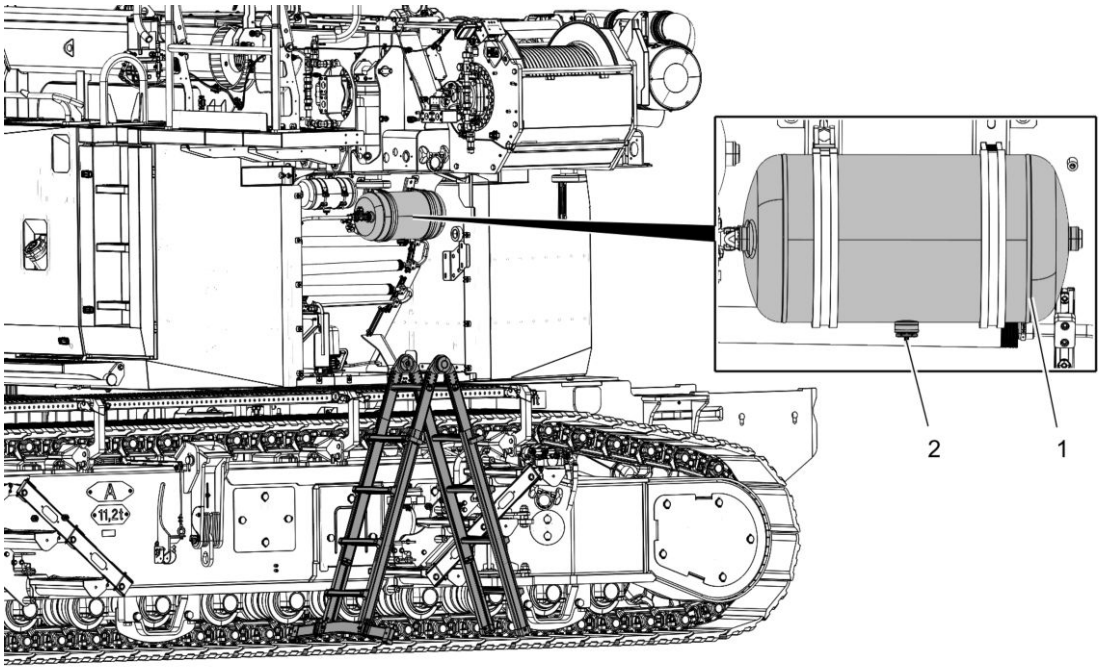


Fig. 2097: Compressed air tank

1 Compressed air tank **2** Valve

▶ Climb onto the ladder.

▶ On every compressed air tank **1**: Press the valve **2** and drain the water.

11.7 Superstructure hydraulic system

11.7.1 Check the oil level

Make sure that the following prerequisites are met:
- ❑ The incline of the base of the crawler travel gear is 0° ±0.3°.
- ❑ All hydraulic cylinders are retracted.

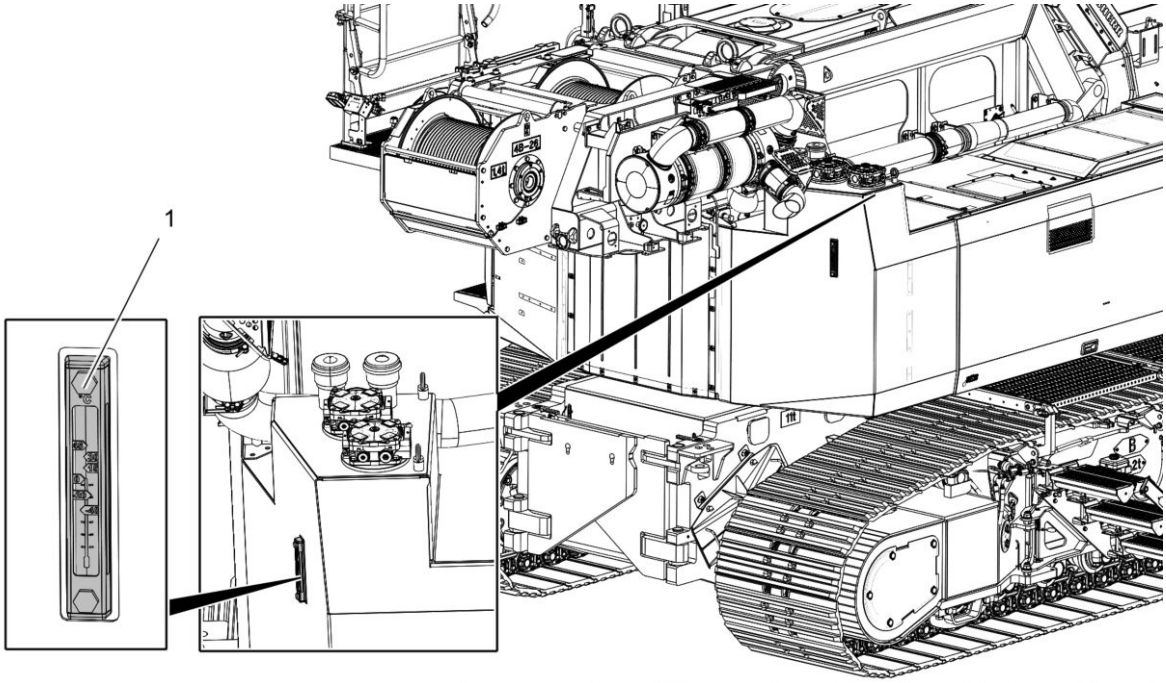


Fig. 2098: Hydraulic system - oil level display

1 Oil level display

The oil level must be visible on the sight gauge.

▶ Check the oil level.

11.7.2 Checking the return filter

The filter elements must be replaced in the following situations:
- The maintenance interval is due.
- The red bar display of the fouling indicator is visible when the hydraulic oil is at operating temperature.

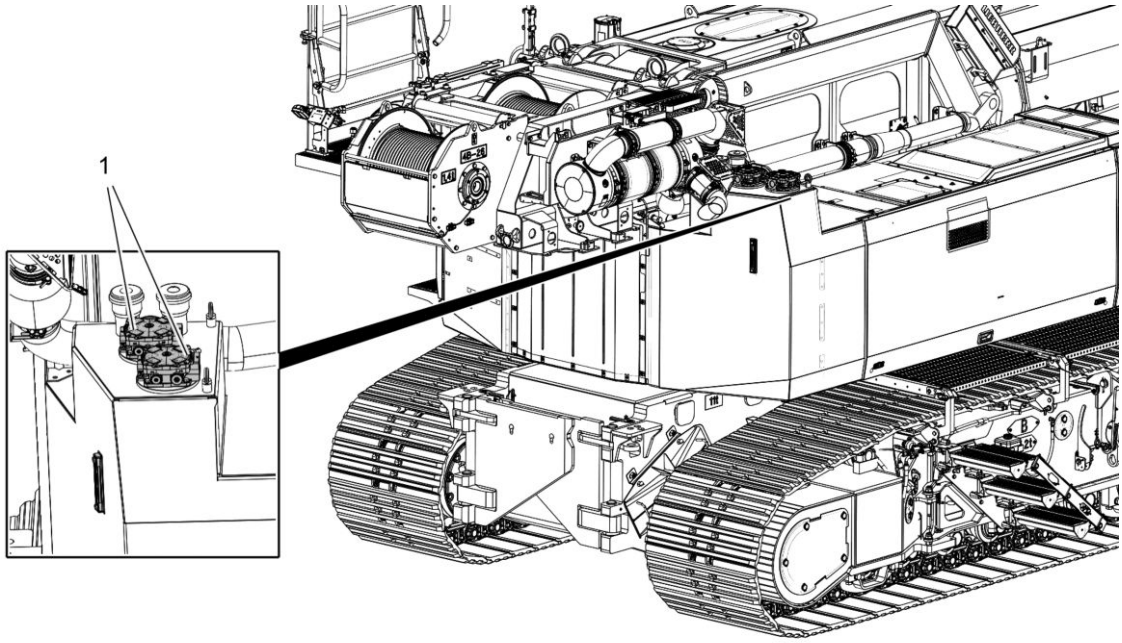


Fig. 2099: Hydraulic system - return filter

1 Return filter

▶ Check the fouling indicator on the return filter **1**.

11.7.3 Checking the pressure filter

The filter elements must be replaced in the following situations:
- The maintenance interval is due.
- The red bar display of the fouling indicator is visible when the hydraulic oil is at operating temperature.

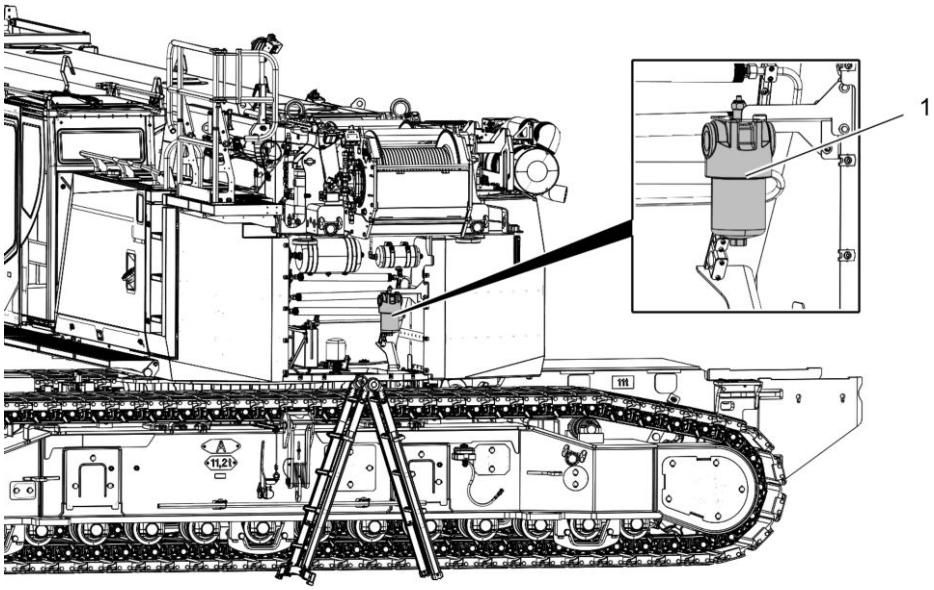


Fig. 2100: Hydraulic system, pressure filter

1 Pressure filter

▶ Check the fouling indicator on the pressure filter **1**.

11.8 Hydraulic hose lines

11.8.1 Checking the hydraulic hose lines for damage

Inspection criteria:
- Damage on the outer surface, such as chafe marks, cuts and cracks.
- Brittleness due to aging of outer layer (cracks).
- Distortion, such as splitting of hose layers, bubbles, crushed areas, kinks, twists.
- Damage or distortion of hose fixtures or the hose fitting (the seal is endangered).

▶ Check the hydraulic hose lines for damage.

If one of the listed defects is found:
▶ Have the hydraulic hose lines inspected by an authorized inspector for hydraulic lines.

11.8.2 Checking the hydraulic hose lines for leaks

Inspection criteria:
- Check the crane for leaked hydraulic oil.
- Check the ground under the crane for leaks.

▶ Check the hydraulic hose lines for leaks.

When the hydraulic system leaks:
▶ Have the hydraulic hose lines inspected by an authorized inspector for hydraulic lines.
or

Contact Customer Service at Liebherr-Werk Ehingen GmbH.

11.9 Central lubrication system

11.9.1 Checking the function

Note

Problems with the central lubrication system in the superstructure are displayed on the side window control and operating unit (→ 6.3.6 Side window operating unit, p. 260).

Note

The lubrication times and cycle times are set in the factory!
▶ Do **not** change the lubrication times and cycle times.

Make sure that the following prerequisites are met:
❑ The ignition is turned on.
(→ 8.12.2 Turning the engine on and off from the crane cab, p. 490)

▶ Check the function: Trigger several lube pulses.
▷ Until lubrication exits all lube points.

11.9.2 Triggering intermediate lubrication

Manual intermediate lubrication is carried out, for example:
- If the mobile crane has not been moved for more than three months.
- After washing the crane.

Note

▶ When a lube pulse is triggered, the pump starts the lubrication cycle from the beginning. The lubrication cycle is reset.

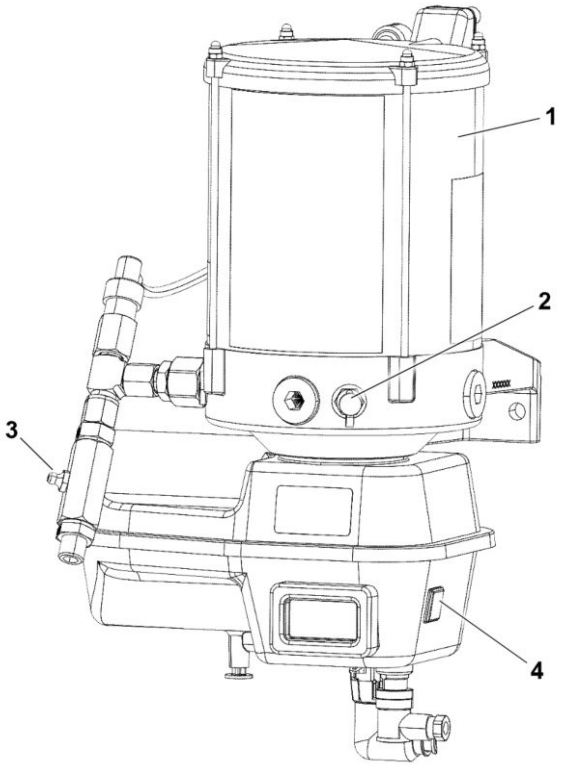


Fig. 2101: Grease pump

1 Grease container
2 Grease fitting
3 Grease fitting
4 Intermediate lubrication button

▶ On the central lubrication system: Press the intermediate lubrication button **4**.
▷ Until lubrication exits all lube points.

11.9.3 Servicing the central lubrication system

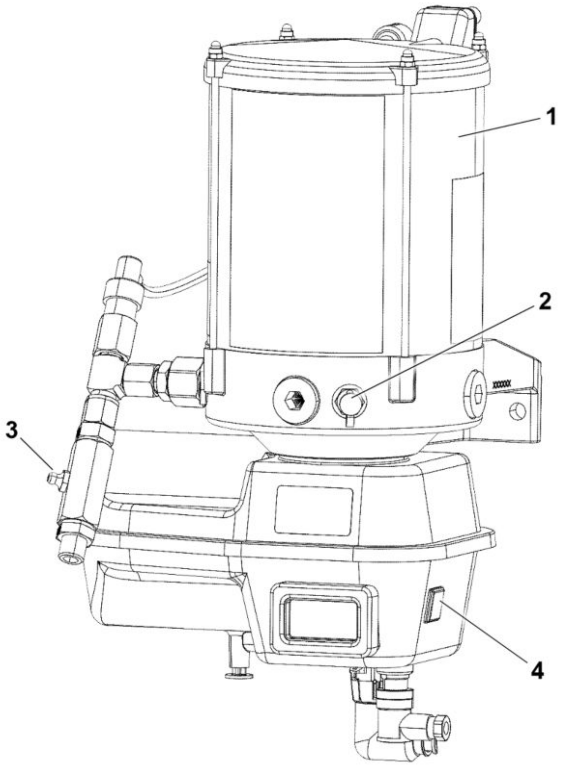


Fig. 2102: Grease container

1 Grease container
2 Grease fitting
3 Grease fitting
4 Button

11.9.3.1 Checking the fill level in the grease container

The grease container **1** must be filled when the lubricant level has dropped below 1/4 of the container content.

Check the lubricant level:

▶ If necessary fill the lubricant container on the grease fitting **2** with the external lubrication pump.

11.9.3.2 Adding lubricant

When the grease container **1** is completely empty:

▶ Bleed the central lubrication system (→ Bleeding the central lubrication system, p. 918).

▶ Fill the grease container **1** with a lubricant pump on the grease fitting **2**.

11.9.3.3 Bleeding the central lubrication system

When the grease container **1** is completely empty, the central lubrication system must be bled.

▶ Fill the main line with an external lubrication pump via the grease fittings **3** until lubricant free of air bubbles emerges in all lube points.

▶ Trigger intermediate lubrication until there are no more air bubbles in the emerging lubricant at the pump outlet.

11.9.3.4 Filling repaired lubrication lines

- ▶ Prior to installation, fill the lubrication lines completely with a lubrication pump on the grease fitting **3**.
- ▶ Activate intermediate lubrication.
  ▷ Until lubrication exits all lube points.
- ▶ Check repaired lubrication lines for function and leaks.

11.10 Checking the gear oil level of the travel gear

Make sure that the following prerequisites are met:
- ❑ The incline of the base of the crawler travel gear is 0° ±0.3°.
- ❑ The Liebherr lettering is horizontal.
- ❑ The assembly support* is swung into the operating position.
  (→ 10.2.2 Swinging the support cylinder pulley into the operating position, p. 693)
- ❑ The engine is turned off.
- ❑ The travel gear has been stationary for at least 2 minutes.

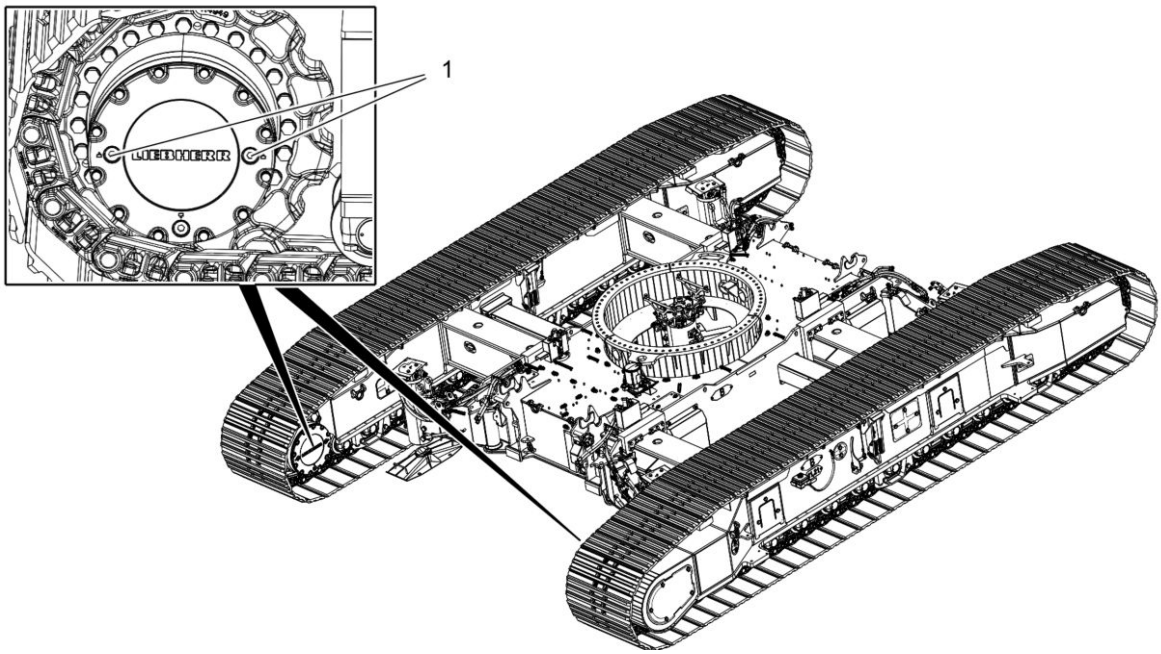


Fig. 2103: Travel gear

1 Filler plug and control plug

▶ Unscrew a filler plug and control plug **1**.

The gear oil level must be at the lower edge of the filler plug and control plug **1**:
▶ Perform a visual inspection.

Troubleshooting

Does gear oil escape when opening the filler plug and control plug **1**?

▶ Depending on the position of the gears in the travel gear, the gear oil level can be higher than the filler plug and control plug **1**.

▶ Add the same amount of gear oil that emerged.

Troubleshooting

Is the gear oil level **not** at the bottom edge of the filler plug and control plug **1**?

▶ Unscrew the second filler plug and control plug **1**.

- ▶ Fill gear oil in one filler plug and control plug **1** until gear oil starts to overflow in the second filler plug and control plug **1**.
- ▶ Screw in the first filler plug and control plug **1** and the second filler plug and control plug **1** in with a new seal.

11.11 Crawler chain

11.11.1 Checking the chain tension

Make sure that the following prerequisites are met:
- ❑ The incline of the base of the crawler travel gear is 0° ±0.3°.
- ❑ The engine is turned off.
- ❑ A level rod is available.

If the crawler chain is too loosely tightened, it can slip out of the guides from the pulleys, drive wheel and idler.

A too tightly tensioned crawler chain increases fuel consumption.

The chain tension is checked by measuring the sag between the level rod and the crawler chain.

With a length of 1 m to 1.5 m, there must be a sag of 2 cm to 2.5 cm.

When the free length is shorter or longer: Linearly reduce the distance. Or increase.

The level rod must be placed on at least 4 crawler plates.

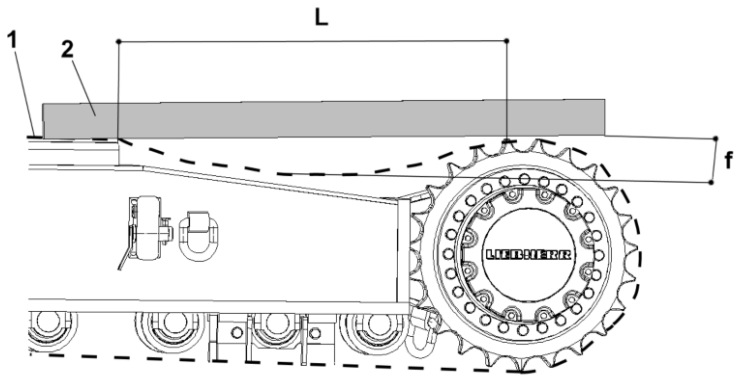


Fig. 2104: Checking the chain tension

1 Crawler chain
2 Level rod
f Sag
L Measuring length

▶ Place the level rod **2** on the crawler chain **1**.

▶ Measure the maximum sag **f** between the level rod **2** and the crawler chain **1**.

Troubleshooting

Is the sag **f** too large?

▶ Have the crawler chain **1** tightened by maintenance personnel.

Troubleshooting

Is the sag **f** too small?

▶ Have the crawler chain **1** relieved by maintenance personnel.

11.11.2 Checking for crawler chain wear

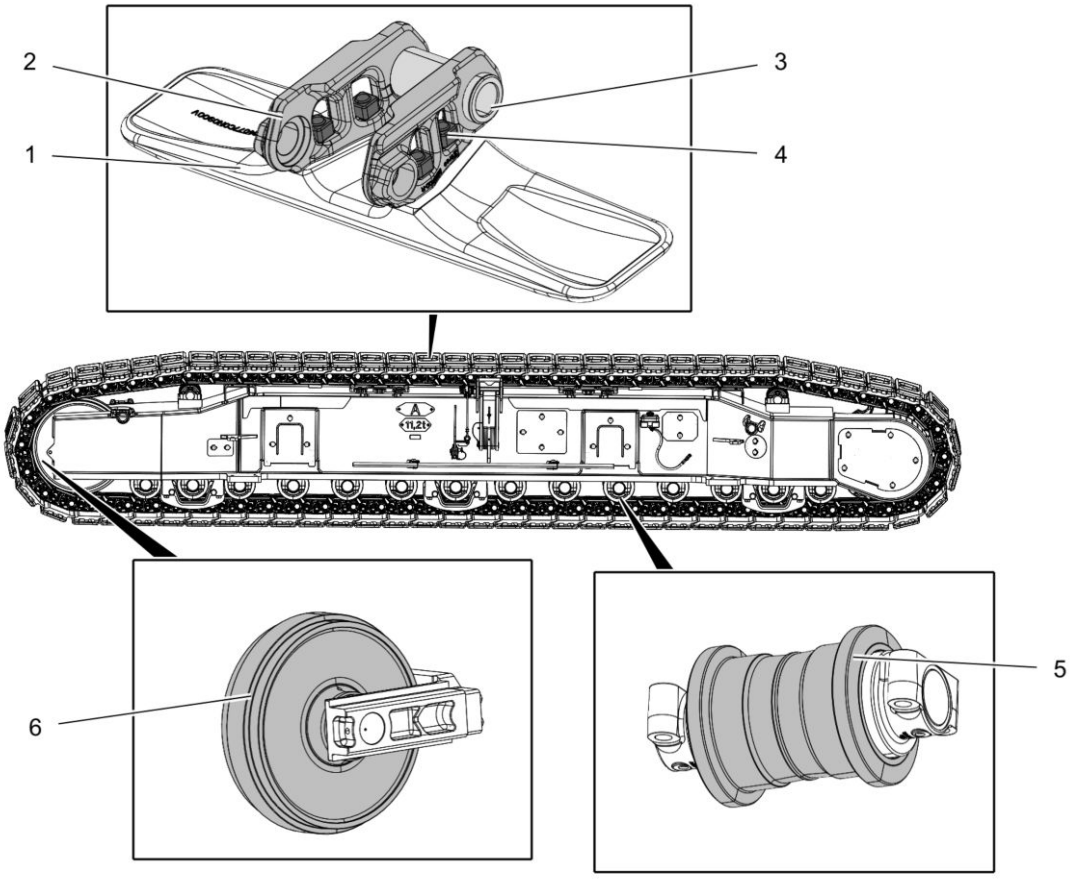


Fig. 2105: Crawler carrier, wear parts

1 Crawler plate
2 Chain link
3 Socket
4 4x screw
5 Track roller
6 Idler

If the wear limit for the chain link, socket, crawler plates, screws, idler or track roller is exceeded, this can cause the crawler chain to rip off.

NOTICE
Significant height differences between the individual components!
Increased wear on the crawler plates and track rollers.

▶ Replace a defective crawler plate with a crawler plate that shows a similar degree of wear.

11.11.2.1 Chain link

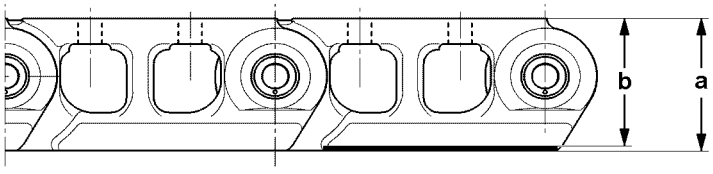


Fig. 2106: Chain link, wear

Component	Dimensions	
	New	Wear limit
	a	b
Chain link	117.5 mm	108.5 mm

Tab. 107: Wear limit

▶ Check for wear.

11.11.2.2 Chain length (four links), chain pitch

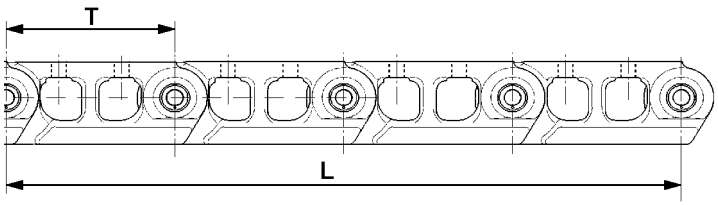


Fig. 2107: Chain length, wear

L Chain length **T** Chain pitch

Component	Dimensions	
	New	Wear limit
Chain length **L**	811.2 mm	832.0 mm
Chain pitch **T**	202.8 mm	

Tab. 108: Wear limit

▶ Check for wear.

11.11.2.3 Socket

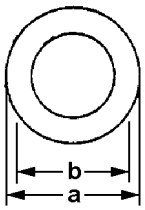


Fig. 2108: Socket, wear

Component	Dimensions	
	New	Wear limit
	a	b
Socket	Diameter: 66.5 mm	Diameter: 61.7 mm

Tab. 109: Wear limit

▶ Check for wear.

11.11.2.4 Crawler plate

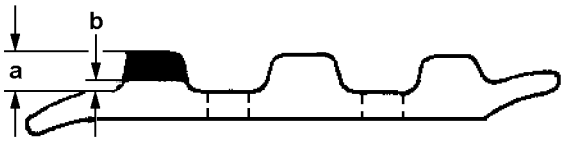


Fig. 2109: Crawler plate, wear

Component	Dimensions	
	New	Wear limit
	a	b
Crawler plate	26.5 mm	10 mm

Tab. 110: Wear limit

▶ Check for wear.

11.11.2.5 Idler

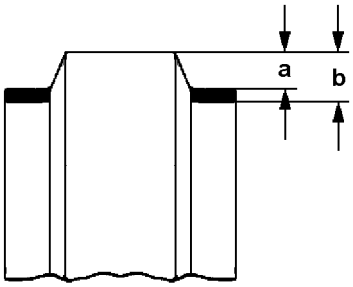


Fig. 2110: Idler, wear

Component	Dimensions	
	New	Wear limit
	a	b
Idler	26 mm	37 mm

Tab. 111: Wear limit

▶ Check for wear.

11.11.2.6 Track roller

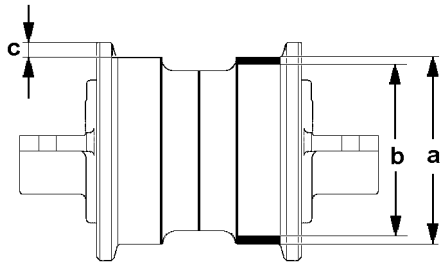


Fig. 2111: Track roller, wear

c Distance
b Diameter
a Diameter

Component	Dimensions	
	New	Wear limit
Track roller	Diameter **a** 172 mm	Diameter **b** 157 mm
Distance **c**“Collar - running surface”	Distance **c** 18.5 mm	Diameter **b** 26 mm

Tab. 112: Wear limit

▶ Check for wear.

11.12 Lubricating the gear ring and the slewing gear pinion

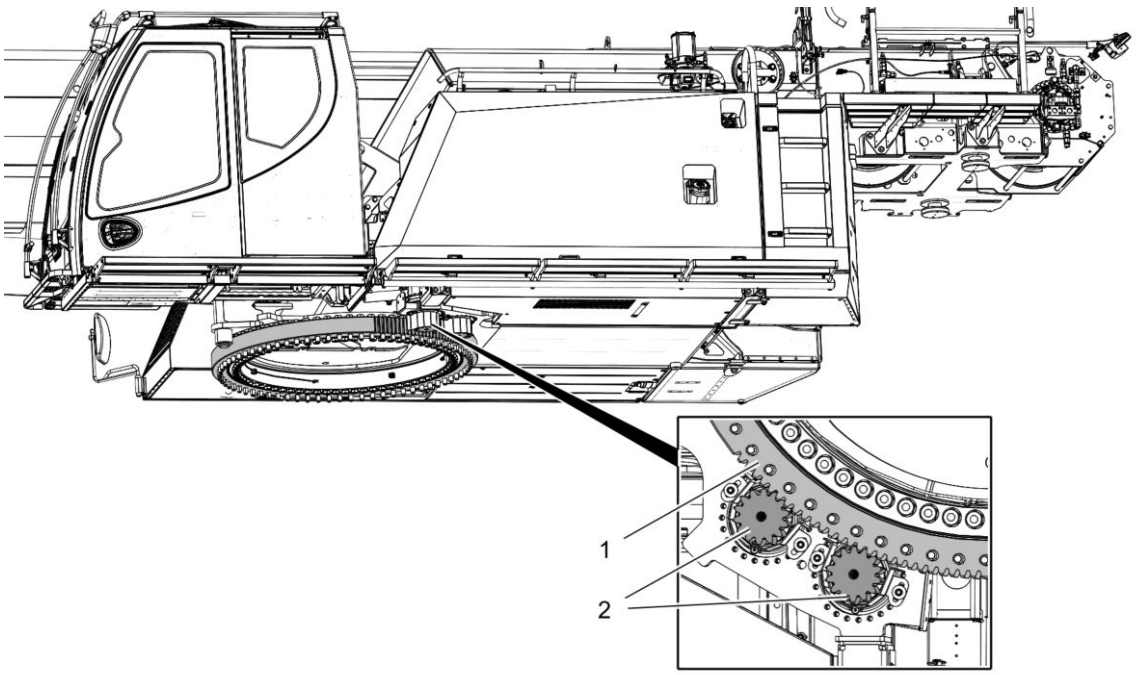


Fig. 2112: Gear ring and slewing gear pinion

1 Gear ring **2** Slewing gear pinion

▶ Grease the gear ring **1** and slewing gear pinion **2**.

11.13 Checking the pump distributor gear oil level

Make sure that the following prerequisites are met:
❑ The incline of the base of the crawler travel gear is 0° ±0.3°.

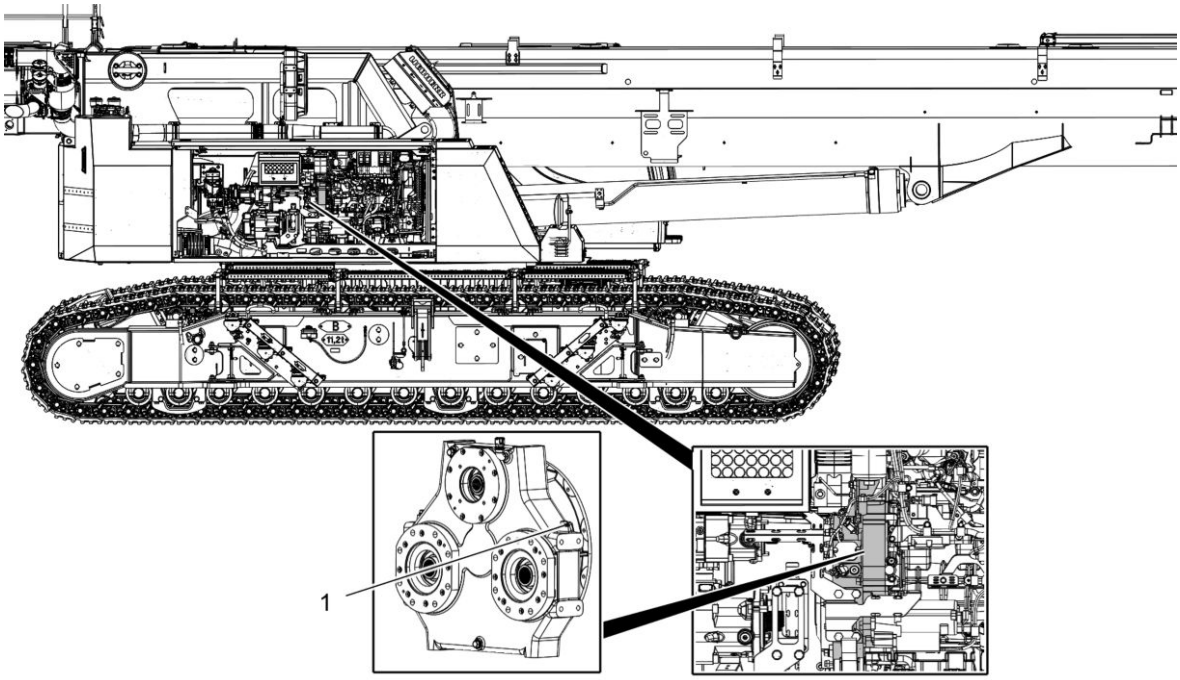


Fig. 2113: Pump distributor gear

1 Dipstick

▶ Unscrew the dipstick **1** and wipe it off.

▶ Insert and pull out the dipstick **1**.

The oil level must be visible between the minimum and maximum mark on the dipstick **1**.

▶ Check the oil level.

If the oil level has dropped below the minimum mark:

▶ Add gear oil in the dipstick port until the oil level is visible between the minimum and maximum marks on the dipstick **1**.

▶ Screw in the dipstick **1**.

11.14 Checking the slewing gear oil level

Make sure that the following prerequisites are met:
- The incline of the base of the crawler travel gear is 0° ±0.3°.
- The gear oil is at operating temperature.

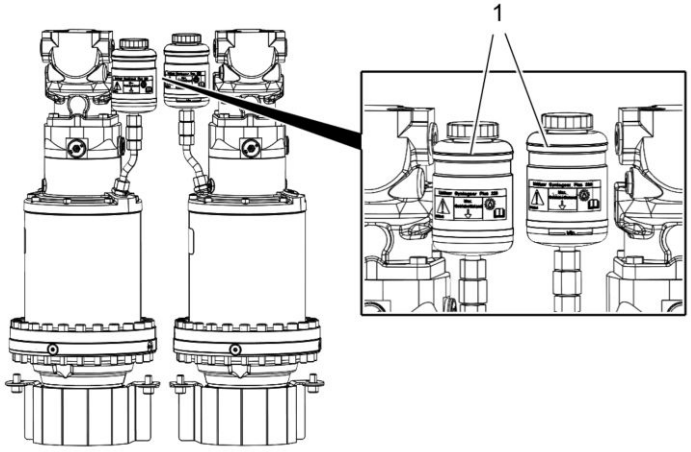


Fig. 2114: Slewing gear

1 Oil container

The oil level must be visible between the minimum and maximum mark on the oil tank **1**.

▶ Check the oil level.

Troubleshooting

Has the oil level has dropped below the minimum mark?

▶ Until the oil level is visible between the two marks on the oil tank **1**: Add gear oil to the oil tank **1**.

11.15 Checking the winch 1 oil level

Make sure that the following prerequisites are met:
- The incline of the base of the crawler travel gear is 0° ±0.3°.
- Winch 1 is at a standstill.

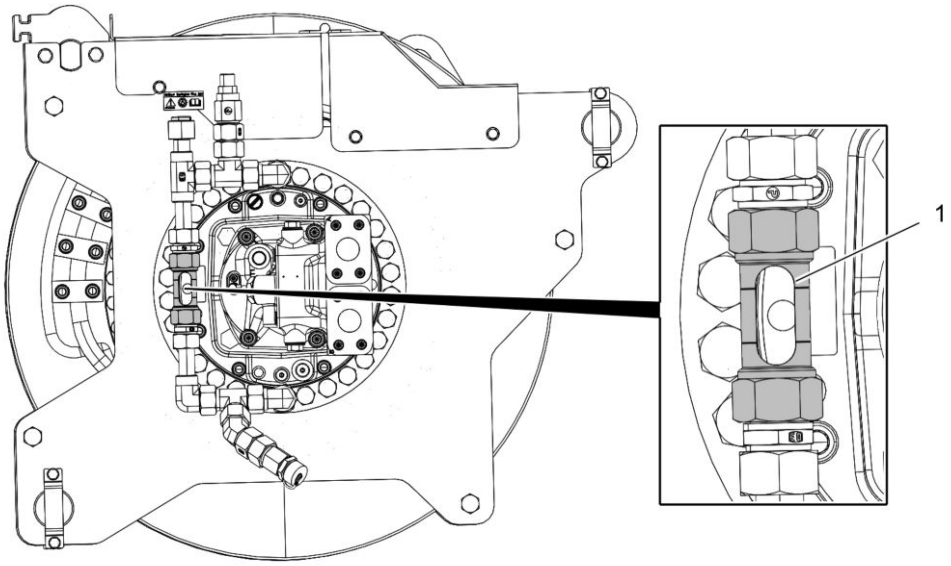


Fig. 2115: Winch 1

1 Sight gauge

The oil level must be visible between the minimum and maximum mark on the sight gauge **1**.

▶ Check the oil level.

The oil level has dropped below the minimum mark:

▶ Until the oil level is visible between the two marks: Add gear oil in the filler port.

11.16 Checking the winch 2* oil level

Make sure that the following prerequisites are met:
- The incline of the base of the crawler travel gear is 0° ±0.3°.
- Winch 2 is at a standstill.
- Or winch 2 is disassembled and in a horizontal position.

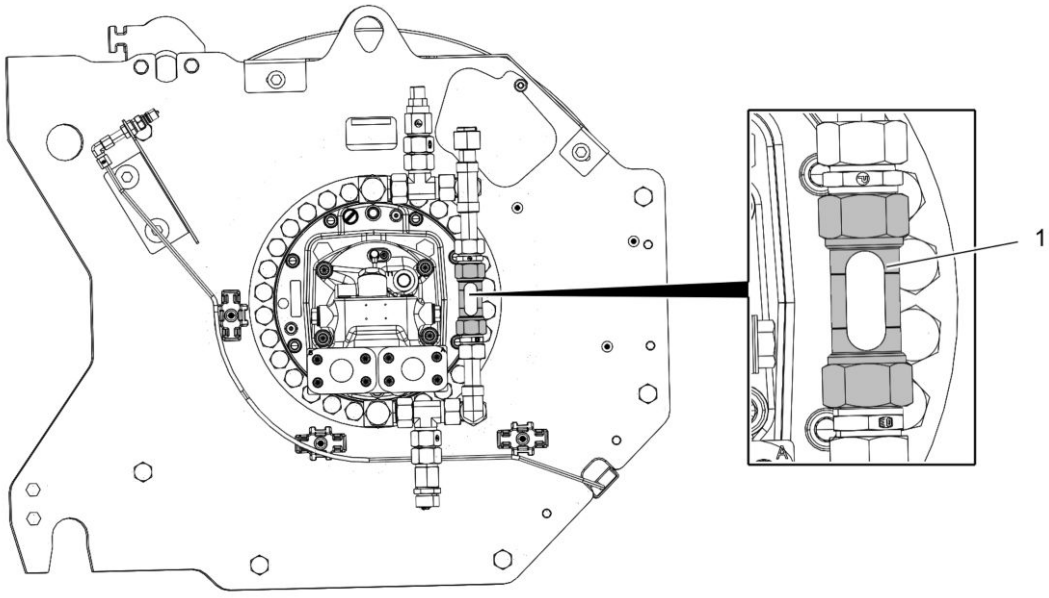


Fig. 2116: Winch 2

1 Sight gauge

The oil level must be visible between the minimum and maximum mark on the sight gauge **1**.

▶ Check the oil level.

The oil level has dropped below the minimum mark:

▶ Until the oil level is visible between the two marks: Add gear oil in the filler port.

11.17 Superstructure parking heater

11.17.1 Checking the fuel tank fill level

Make sure that the following prerequisites are met:
- The incline of the base of the crawler travel gear is 0° ±0.3°.

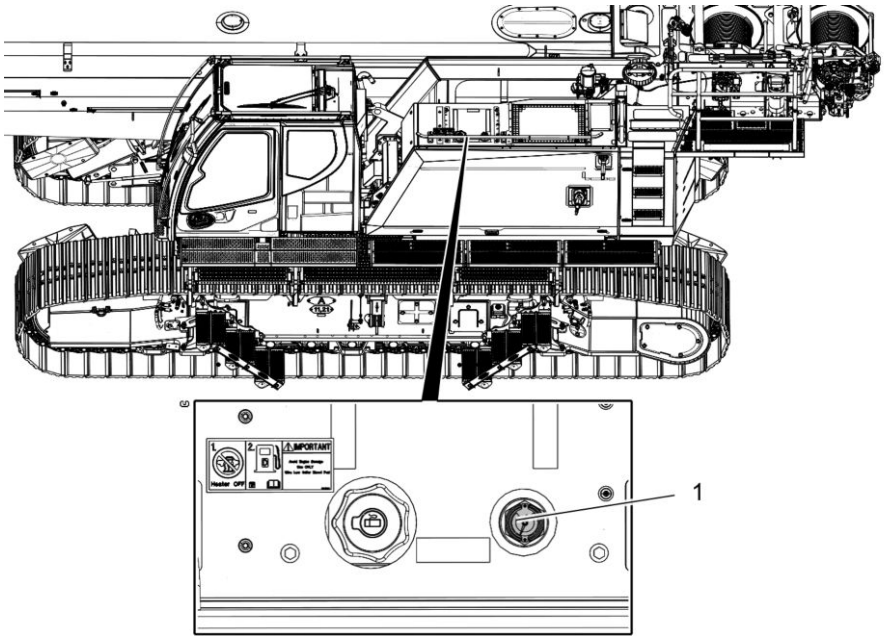


Fig. 2117: Fill level display of the fuel container

1 Fuel level display

The fill level of the fuel tank is displayed by a level indicator **1**:
- Green mark F: The fuel tank is full.
- Red mark E: The fuel tank is empty.

▶ Check the fill level on the level indicator **1**.

Troubleshooting

The fill level display **1** shows the red mark E?

▶ Add fuel (→ 11.17.2 Adding fuel, p. 932).

11.17.2 Adding fuel

Make sure that the following prerequisites are met:
- The incline of the base of the crawler travel gear is 0° ±0.3°.
- The engine is turned off.

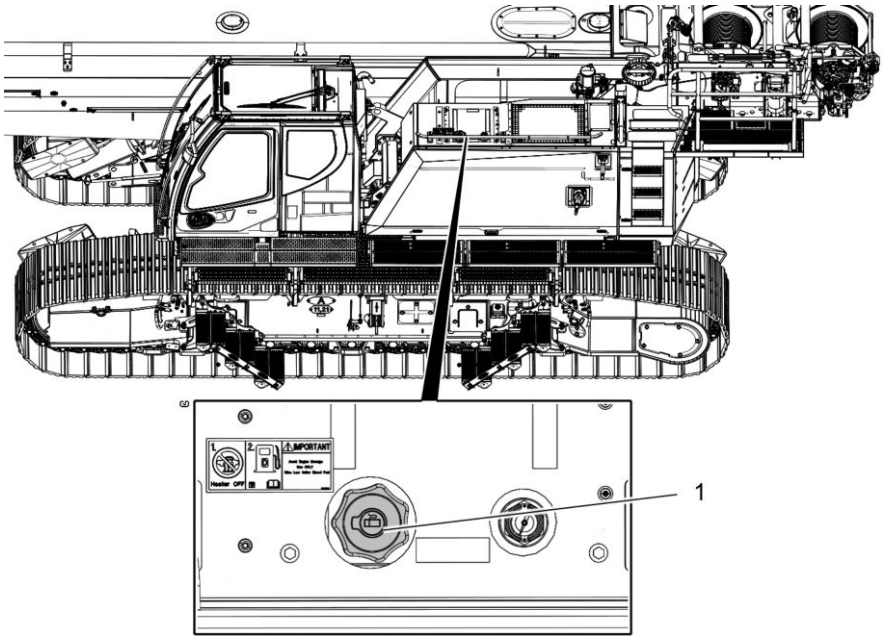


Fig. 2118: Fuel tank

1 Cover of the filler neck

▶ Climb onto the mobile crane.

▶ Open the cover of the filler neck **1**.

⚠ **The fuel nozzle can fall down! Fuel escapes!**

▶ Insert the fuel nozzle as deep as possible into the filler neck and secure it prevent it from falling down.

▶ Until the fuel nozzle turns off: Add fuel.

When refueling is complete:

▶ Remove the fuel nozzle from the filler neck.

▶ Firmly close the cover of the filler neck **1**.

▶ Climb off the mobile crane.

Troubleshooting

Was **impermissible** fuel added?

▶ Do **not** turn the ignition on.

▶ Have the fuel tank and fuel lines completely drained by authorized and trained expert personnel.

11.17.3 Bleeding the fuel line

If the fuel ran out, then the fuel line may have to be bled.

Contact Customer Service at Liebherr-Werk Ehingen GmbH.

11.17.4 Burning-off the burner

To prevent soot deposits in the burner of the parking heater, free-burn the burner according to the maintenance interval. Burning off is used for the self-cleaning of the auxiliary heater burner.

Make sure that the following prerequisites are met:
- ❑ All outlet nozzles in the crane cab are open.
  (→ Adjusting the air vents, p. 471)
- ❑ The crane cab door is open.
- ❑ The interior temperature is set to the highest level.
  (→ Adjusting the temperature, p. 465)
- ❑ The fan stage is set to the highest level.
  (→ Setting the blower stage, p. 466)
- ❑ The air supply is set to fresh air.
  (→ Turning recirculated air on and off, p. 466)
- ❑ The heater is in manual operation.
  (→ Turning automatic operation on and off, p. 468)

▶ Turn on the auxiliary heater to the highest fan stage and run it for at least 15 min.

11.18 Crane cab window washing system

11.18.1 Checking the fill level of the window washing fluid

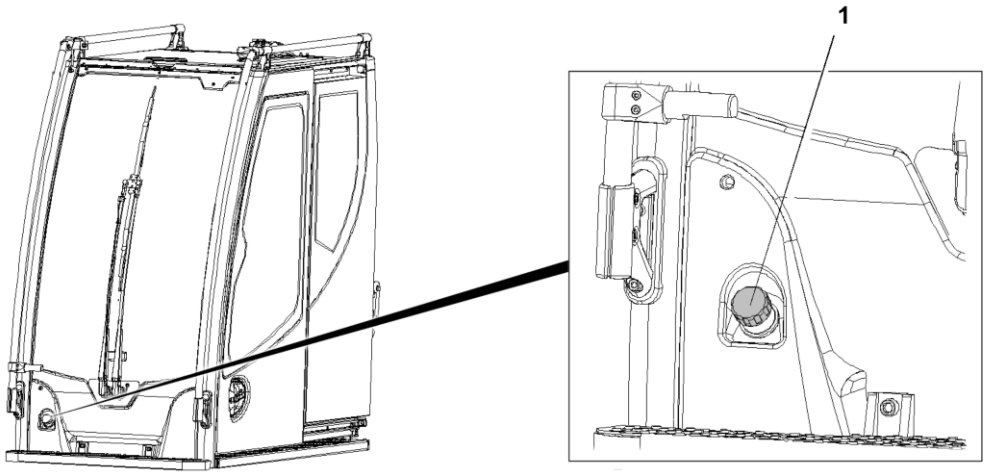


Fig. 2119: Cleaning fluid container

1 Container

▶ Open the container **1**.

▶ Check the window cleaning fluid.

If the window cleaning fluid level is low:

▶ Refill the window cleaning fluid.

▶ Close the container **1**.

11.18.2 Replacing the window washer fluid

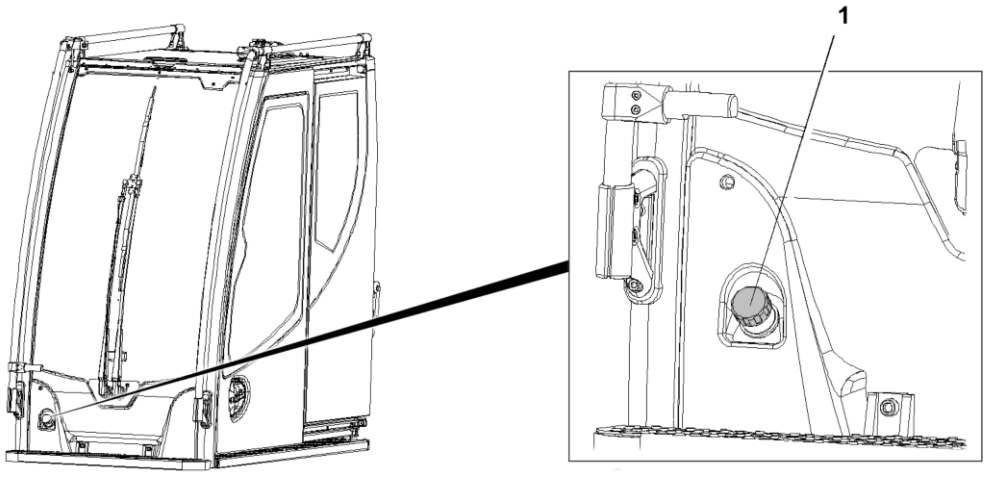


Fig. 2120: Cleaning fluid container

1 Container

▶ Open the container **1**.

▶ Empty the container **1**.

- ▶ Fill the container **1** with a commercially available, frost resistant window cleaning fluid.
- ▶ Close the container **1**.

11.19 Checking the rigging points and fastening positions

Inspection criteria:
- Completeness of the rigging point.
- Distortion of carrying parts.
- Mechanical damage such as severe notches.
- Significant corrosion (pitting).
- Cracks on carrying parts.
- Cracks or other damage on the welding seam.

▶ Check the rigging points and fastening positions (→ 7 Transport and storage, p. 353).

11.20 Servicing the ladder

11.20.1 Lubricating the ladder

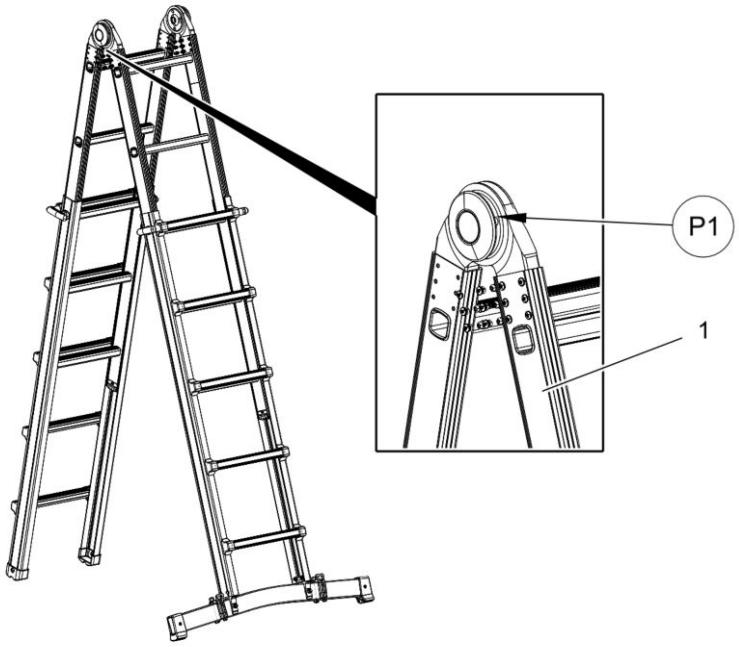


Fig. 2121: Exemplary illustration of the multi-purpose ladder

P1 Lube point

1 Multi-purpose ladder

▶ Grease joints and pivot points on the ladders according to maintenance interval and check them for easy movement.

11.20.2 Cleaning the ladder

Rules for cleaning ladders:
- Only use commercially available, water soluble cleaning agents.
- Do **not** use aggressive or scouring agents.

In the case of visible soiling, immediately after use:

▶ Clean the ladder, especially all moving parts.

▶ Make sure that the grooves on the rungs are free of dirt.

11.21 Cleaning the crane

11.21.1 Safety

This section supplements the “Safety” chapter.

11.21.1.1 Ensuring a surface quality

In order to ensure a consistent surface quality, the crane must be washed. Clean the crane in particular after contact with highly corrosive materials or highly adherent contaminants.

Highly adherent contaminants are, for example:
- Residual road salt
- Oils, grease and fuel
- Rust film
- Tar splashes, concrete splatter

11.21.1.2 Correct use of cleaning agents

If the cleaning agents are not used correctly, the crane surface can be damaged. Damage to surfaces can lead to malfunctions and corrosion.

Observe the following rules:
- Do **not** use aggressive cleaning agents.
- Do **not** use scouring cleaning agents.
- Do **not** use a phosphate based cleaner.
- Do **not** use solvents or cleaning agents that contain solvents.
- Do **not** use tools with sharp edges.
- Make sure that the cleaning agent and water ratio of 3 % is not exceeded.
- Rinse with clear water (not salt water).

11.21.1.3 Avoiding damage due to a high pressure cleaner

If the crane is cleaned with a high pressure cleaner, crane components can be damaged.

Observe the following rules, to prevent damage due to the high pressure cleaner:
- **Only** use a flat spray nozzle to clean the crane.
- Observe the values regarding the water pressure, minimum distance and water temperature (→ tab. 113, p. 940).
- Make sure that **no** fluids and **no** dirt gets into the tailpipe opening of the exhaust system.
- Clean the electrical systems, cables, cable sets and sound insulation with low pressure.

Do **not** expose the following components to a water jet:
- Crane cab interior
- Electric motor
- Electrical plug connections, line drums and power distributor
- Control units
- Transmitter
- Relay circuit boards and fuse circuit boards
- Hydraulic block
- Intake manifolds for combustion air
- Seals
- Bellows
- Sealing lips on the slewing ring connection
- Radial shaft seal rings on winches
- Slewing gears
- Hoist ropes, adjusting motor and assembly rope

- Piston rods
- Slip-resistant mats
- Signs
- Overflow container on the equipment
- Generator
- Lighting
- Wind speed sensor and airplane warning light
- Bearing on the rope pulleys
- Carrier rollers
- Swivel joints
- Pin points
- Boom head camera inclusive of the transmitter and receiver unit
- Hand pump on the folding jib

Surface	Maximum water pressure	Minimum distance	Maximum water temperature
Painted surfaces	150 bar	30 to 40 cm	60 °C
Surfaces covered with film	150 bar	80 cm	60 °C
Surfaces treated with Carlofon 81	30 bar	30 to 40 cm	40 °C

Tab. 113: Adjusting the high pressure cleaner

11.21.2 Washing the crane with a high pressure cleaner

Make sure that the following prerequisites are met:
❑ The engine is turned off.
❑ All crane components have cooled down (surface temperature maximum 50 °C).

▶ Before cleaning, cover all openings.

▶ Wash the crane and equipment with a high pressure cleaner.

▶ Lubricate the crane and equipment (→ 11.9.1 Checking the function, p. 916).

11.21.3 Cleaning the sound insulation mats

▶ Remove severe contamination with suitable tools, for example with soft plastic scrapers.

11.21.4 Cleaning the slip-resistant mats

▶ Clean the slip-resistant mats with a brush with hard plastic bristles.

▶ Flush with water.

11.21.5 Cleaning the crane cab

▶ Clean the instrument panel cover, floor covering, monitors and dirty upholstery with a moist cloth.

▶ Keep the crane cab free of trash.

11.22 Air flap test program

If the air flap is closed with the engine running, the unburnt fuel can reach the exhaust system. When the engine starts again with a hot exhaust gas system, the unburnt fuel can be burned. As a result, there can be increased exhaust gas temperatures and heavy smoke formation.

Note

Performing the air flap test program requires service level 1.

NOTICE
Improper operation of the air flap test program!
Engine damage.

Only if required by the person responsible on site:
▶ Perform the ventilation flap test program.

▶ Contact Customer Service at Liebherr-Werk Ehingen GmbH and request the air flap test program procedure.

11.23 Specified service fluids and lubricants for Liebherr cranes

Information about the service fluids and lubricants that are approved for a mobile crane from Liebherr-Werk Ehingen GmbH are listed online at https://lubricants.liebherr.com.

Note

Observe and adhere to the specifications and notes in the safety data sheets.

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to 50 °C	-40 °C to 30 °C
1.1	Engine **with** Exhaust aftertreatment	**LWE Id. No.: 11100934** **Liebherr engine oil 5W-30 low ash** **or:** **LWE Id. No.: 10663796** **Liebherr engine oil 10W-40 low ash** **LH-00-ENG$_{LA}$** Follow the instructions of the manufacturer	**LWE Id. No.: 11100934** **Liebherr engine oil 5W-30 low ash** **or:** **LWE Id. No.: 10663796** **Liebherr engine oil 10W-40 low ash** **LH-00-ENG$_{LA}$** Follow the instructions of the manufacturer **below -20 °C** with pre-heating
	Note: To improve the cold start ability of the engine at an ambient temperature below -10 °C we recommend the use of Liebherr engine oil 5W-30 low ash, **LWE Id. no.: 11100934**		
	Cummins B 6.7 **with** Exhaust aftertreatment	**LWE Id. No.: 10663796** **Liebherr engine oil 10W-40 low ash** CES 20081 **and** 5W-40 CES 20081 **and** 10W-40	CES 20081 **and** 0W-40
	Note: To improve the cold start ability of the engine at an ambient temperature below -10 °C we recommend the use of Liebherr-Motoroil 5W-30 low ash, **LWE Id. no.: 11100934**		
Note: Alternative oil specifications, (→Separate document “Engine manufacturer operating instructions”).			
1.2	Engine **without** Exhaust aftertreatment	**LWE Id. No.: 10871536** **Liebherr engine oil 5W-30** **or:** **LWE Id. No.: 10663796** **Liebherr engine oil 10W-40** LH-00–ENG	**LWE Id. No.: 10871536** **Liebherr engine oil 5W-30** **or:** **LWE Id. No.: 861005308** **Liebherr engine oil 10W-40** Follow the instructions of the engine manufacturer

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to 50 °C	**-40 °C to 30 °C**
		Follow the instructions of the engine manufacturer	**below -20 °C** with pre-heating
	Note: To improve the cold start ability of the engine at an ambient temperature below -10 °C, we recommend the use of Liebherr engine oil 5W-30, **LWE-Id no.: 10871536**		
	Cummins B 6.7 **without** exhaust aftertreatment	**LWE Id. No.: 10663796** **Liebherr engine oil 10W-40 low** CES 20078 **and** 5W-40 **or:** CES 20078 **and** 10W-40	CES 20078 **and** 0W-40
Note: Alternative oil specifications, (→Separate document “Engine manufacturer operating instructions”).			
2	Drive axle with differentials Planetary gear and installed distributor gear	**LWE Id. No.: 861901008** **Liebherr Gear Hypoid 90 EP** SAE 90 and API GL 5	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5
3.1	Vehicle distributor gear KESSLER VG 2700, VG 3751 W 2700, W 3751	**LWE Id. No.: 861901008** **Liebherr Gear Hypoid 90 EP** SAE 90 and API GL 5	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5
3.2	Vehicle distributor gear with PTO for crane operation KESSLER VG 2600 with PTO VG 2700 with PTO W 2700 with PTO W 3751 with PTO	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5
3.3	Distributor gear for electro-hydraulic crane operation	**LWE Id. No.: 861900608** **Liebherr Hydraulic Gear ATF** or **SAE 75W-90 and API GL 5**	
3.4	Vehicle distributor gear with E-PTO KESSLER	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90**	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90**

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to 50 °C	-40 °C to 30 °C
	VG 2700 with E-PTO	SAE 75W-90 and API GL 5	SAE 75W-90 and API GL 5
4	Miter gear for crane operation	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5
5	Pump distributor gear	**LWE Id. No.: 10190390** **Liebherr Syntogear Plus 220** CLP HC, DIN 51 502 CLP (HC) 220, DIN 51517-3 **NOTICE: Do not mix with other oils!**	**LWE Id. No.: 10190390** **Liebherr Syntogear Plus 220** CLP HC, DIN 51 502 CLP (HC) 220, DIN 51517-3 **NOTICE: Do not mix with other oils!**
6	Powershift transmission ZF ERGOPOWER WG	**LWE Id. No.: 861900608** **Liebherr Hydraulic Gear ATF** ZF TE-ML 03	**LWE Id. No.: 10190390** **Liebherr Hydraulic Gear ATF** ZF TE-ML 03 **below -20 °C** run until warm according to the operating instructions
7	Automatic transmission ZF TraXon ZF TraXon Torque (basic gear)	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02 **below -20 °C** preheat the gear according to the operating instructions
8.1	Torque converter coupling ZF TC HD	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02 **below -20 °C** preheat the gear according to the operating instructions
8.2	Wet starting clutch ZF Dynamic Perform	**LWE Id. No.: 12101837** **ZF-Ecofluid Life Plus** ZF TE-ML 25	**LWE Id. No.: 12101837** **ZF-Ecofluid Life Plus** ZF TE-ML 25
9	Slewing gear	**LWE Id. No.: 10190390** **Liebherr Syntogear Plus 220** CLP HC, DIN 51 502 CLP (HC) 220, DIN 51517-3	**LWE Id. No.: 10190390** **Liebherr Syntogear Plus 220** CLP HC, DIN 51 502 CLP (HC) 220, DIN 51517-3

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to 50 °C	-40 °C to 30 °C
		NOTICE: Do not mix with other oils!	**NOTICE: Do not mix with other oils!**
10.1	Rope winch	**LWE Id. No.: 10190390** CLP HC, DIN 51 502 CLP (HC) 220, DIN 51517-3 **NOTICE: Do not mix with other oils!**	**LWE Id. No.: 10190390** CLP HC, DIN 51 502 CLP (HC) 220, DIN 51517-3 **NOTICE: Do not mix with other oils!**
10.2	Rope winch (tooth flanks) LR 12500-1.0 LR 13000	**LWE Id. No.: 11000948** **Liebherr Universal grease 9900** KPF2N-25, DIN 51502	**LWE Id. No.: 12105012** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
11	Telescopic boom guying winch	**LWE Id. No.: 10190390** **Liebherr Syntogear Plus 220** CLP HC, DIN 51 502 CLP (HC) 220, DIN 51517-3 **NOTICE: Do not mix with other oils!**	**LWE Id. No.: 10190390** **Liebherr Syntogear Plus 220** CLP HC, DIN 51 502 CLP (HC) 220, DIN 51517-3 **NOTICE: Do not mix with other oils!**
12.1	Crane hydraulics, chassis and superstructure Observe exceptions, see 12.2 and 12.3	**LWE Id. No.: 861903508** **Liebherr Hydraulic 37**	**LWE Id. No.: 10293807** **Liebherr Hydraulic Plus Arctic**
12.2	Crane hydraulics, chassis and superstructure LR-cranes and LG-cranes	**LWE Id. No.: 10293807** **Liebherr Hydraulic Plus Arctic**	**LWE Id. No.: 10293807** **Liebherr Hydraulic Plus Arctic**
12.3	Crane hydraulics, chassis and superstructure For crane use in environmentally sensitive areas	**LWE Id. No 121 01 279** **Liebherr Hydraulic Plus 37**	
13	King pin bearing	**LWE Id. No.: 861301308** **Liebherr Special grease 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
14	Glide and roller bearing roller-bearing joint	**LWE Id. No.: 861301308** **Liebherr Special grease 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
15	Rope pulley bearing	**LWE Id. No.: 10296825**	**LWE Id. No.: 10296825**

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to 50 °C	-40 °C to 30 °C
		Liebherr Universal grease Arctic KPFHC1N-60, DIN 51502	**Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
16	Central lubrication system	**LWE Id. No.: 861301308** **Liebherr Special grease 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
17.1	Slewing ring connection Roller bearing	**LWE Id. No.: 861301308** **Liebherr Special grease 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
17.2	Slewing ring connection LR 1250-1.0 LR 13000	**LWE Id. No.: 11000948** **Liebherr Universal grease 9900** KPF2N-25, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
18	Support plate with equalization	**LWE Id. No.: 10877698** **Loctite LB 8104** Silicone oil base **NOTICE: Do not use oils with another base!**	**LWE Id. No.: 10877698** **Loctite LB 8104** Silicone oil base **NOTICE: Do not use oils with another base!**
19	Sliding shoes for cab guidance on the chassis LTC 1045-3.1 LTC 1050-3.1	**LWE Id. No.: 861303608** **Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502	**LWE Id. No.: 861303608** **Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502
20	Cross carrier for track width adjustment Plastic glide bearing	**LWE Id. No.: 861303608** **Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502	**LWE Id. No.: 861303608** **Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502
21.1	Telescopic boom Lower shell outer slide bearing	**LWE Id. No.: 861303608**	**LWE Id. No.: 861303608**

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to 50 °C	-40 °C to 30 °C
	Plastic glide bearing or corner guide top Cylinder guide in the telescope end section Lock pocket in telescope end section (only for Telematik	**Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502	**Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502
21.2	Telescopic boom LTC 1045-3.1 LTC 1050-3.1 Lower shell outer slide bearing Plastic glide bearing or corner guide top Cylinder guide in telescope end section Lock pocket in telescope end section (only for Telematik)	**LWE Id. No.: 11651459** **Bechem Berulub TCG 1 V**	**LWE Id. No.: 11651459** **Bechem Berulub TCG 1 V**
21.3	Telescopic boom LTM 1050-3.1 Lower shell outer slide bearing Plastic glide bearing or corner guide top Cylinder guide in telescope end section Lock pocket in telescope end section (only for Telematik)	**LWE Id. No.: 10878154** **Liebherr Sliding Paste TB 1**	**LWE Id. No.: 10878154** **Liebherr Sliding Paste TB 1**
22	Telescopic boom lock	**LWE Id. No.: 861301308** **Liebherr Special grease 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
23	Gear ring rotary connection Slewing gear drive pinion	**LWE Id. No.: 861007708** **Liebherr RHS Fluid** OGPF 0 S-20, DIN 51502	**LWE Id. No.: 861007708** **Liebherr RHS Fluid** KPFHC1N-60, DIN 51502
24	Running rope	**LWE Id. No.: 10173371** **Liebherr WR-Lube SC** Adhesive grease	**LWE Id. No.: 10173371** **Liebherr WR-Lube SC** Adhesive grease
		or **LWE Id. No.: 10174262** **Liebherr WR-Lube SC** Adhesive grease	**or** **LWE Id. No.: 10174262** **Liebherr WR-Lube SC** Adhesive grease

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to 50 °C	-40 °C to 30 °C
25	Radiator fluid Engine and heating system	**LWE Id. No.: 10871121** **Liebherr Antifreeze OS Mix** Pre-mixed corrosion inhibitor / antifreeze **NOTICE: May not be diluted and / or mixed with other corrosion inhibitors / antifreeze!**	**LWE Id. No.: 10871121** **Liebherr Antifreeze OS Mix** Pre-mixed corrosion inhibitor / antifreeze **NOTICE: May not be diluted and / or mixed with other corrosion inhibitors / antifreeze!**
26.1	Crawler crane travel gear	See the data tag	See the data tag
26.2	Crawler crane with telescopic boom travel gear	See the data tag	See the data tag
27	Recovery winch	See the data tag and manufacturer's specifications	See the data tag and manufacturer's specifications
28	Recovery winch rope	See the manufacturer's specifications	See the manufacturer's specifications
29	Steering uncoupling LTC 1045-3.1 LTC 1050-3.1	**LWE Id. No.: 10800345** **Teflon spray**	**LWE Id. No.: 10800345** **Teflon spray**
30	Pin connections	**LWE Id. No.: 11000948** **Liebherr Universal grease 9900** KPF2N-25, DIN 51502	**LWE Id. No.: 11000948** **Liebherr Universal grease 9900** KPF2N-25, DIN 51502

Tab. 114: Service fluids and lubricants for Liebherr cranes

12 Disposal

12.1 Mobile crane

If the mobile crane is not disposed of properly, this causes a hazard for the environment.

Observe the following rules when disposing of the mobile crane:
- Make the mobile crane unusable by making cuts in the load-bearing steel structure.
- Separate reusable materials and send them for environmentally safe disposal.
- Hire an approved and certified disposal company to dispose of the mobile crane.

Note

In the case of questions about disposal of the mobile crane: Contact Customer Service at Liebherr-Werk Ehingen GmbH.

12.1.1 Operating fluids and lubricants

If operating fluids and lubricants are not disposed of properly, this causes a danger for the environment.

Observe the following rules when disposing of operating fluids and lubricants:
- Collect and dispose of service fluids and lubricants separately.
- Dispose of operating fluids and lubricants according to national and international regulations.
- Observe the notes on disposal located on the safety data sheets of the operating fluids and lubrication.

12.1.2 Batteries

If the batteries are not disposed of properly, this causes a danger for the environment.

Observe the following rules when disposing of batteries:
- Leave batteries at a qualified workshop or at a licensed collection points for used batteries.
- Collect batteries separately and send them for environmentally safe disposal.

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