

LIEBHERR

Crawler crane with lattice mast

LR 1750

LR 1750-000

Operating instructions

BAL No.: 12812-15-02

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ORIGINAL OPERATING MANUAL

The operating manual is part of the crane!

It must always be available within reach!

The regulations for crane operation must be observed!

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Preface

General

This crane was built according to the state of technology and recognized safety technical regulations. Despite that, dangers to body and life for the user and / or third persons or damage to the crane and / or other material assets can occur.

This crane may only be used:

- in impeccable technical condition.
- for destined use.
- by trained personnel, which acts in a safety and danger conscious way.
- when no safety relevant problems are present.
- when no modifications were made on the crane.




Any problems, which could affect safety must be fixed immediately.

Modifications on the crane may only be made with written approval by Liebherr-Werk Ehingen GmbH.

Safety and warning notes

Safety and warning notes are directed to all persons who work with the crane.


The terms **DANGER**, **WARNING**, **CAUTION** and **NOTICE** used in the crane documentation are intended to point out certain rules of conduct to all persons working with the crane.

Warn- ing signs	Signal word	Explanation
	DANGER	Designates a dangerous situation which will lead to death or serious injury if it is not prevented. ¹⁾
	WARNING	Designates a dangerous situation, which can lead to death or serious injury if it is not prevented. ¹⁾
	CAUTION	Designates a dangerous situation, which can lead to slight or medium-grade injuries if it is not prevented. ¹⁾
	NOTICE	Designates a dangerous situation, which can lead to property damage if it is not prevented.

¹⁾ This could also result in property damage.

Additional notes

The term **Note** is used in the crane documentation to make all persons working with the crane aware of useful information and tips.

Sign	Signal word	Explanation
	Note	Designates useful information and tips.

Crane documentation

The crane documentation is comprised of:

- all supplied documents on paper and in digital form.
- all supplied programs and applications.
- all subsequently supplied information, updates and addenda for the crane documentation.

The crane documentation:

- makes it possible for you to operate the crane safely.
- supports you to utilize the permissible application possibilities of the crane.
- provides you with information about the functionality of important components and systems.



Note

Terminology in the crane documentation.

Certain expressions are used in the crane documentation.

- ▶ In order to avoid misunderstandings, the same expressions should always be used.

Translations from the German version of the crane documentation: The crane documentation has been translated to be best of one's knowledge. Liebherr-Werk Ehingen GmbH assumes no liability for translation errors. The German version of the crane documentation is solely applicable for factual accuracy. If you find any errors or if any misunderstandings arise when reading the crane documentation, please contact Liebherr-Werk Ehingen GmbH immediately.



WARNING

Danger of accident due to incorrect operation of the crane!

Incorrect operation of the crane can lead to accidents!

Personnel can be killed or seriously injured!

This could result in property damage!

- ▶ Only authorized and trained expert personnel are permitted to work on the crane.
- ▶ The crane documentation is part of the crane and must be accessible on the crane.
- ▶ The crane documentation and on-site regulations and specifications (such as accident prevention regulations) must be observed.

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 in use.
- **extends** the service life of the crane.
- **minimizes** repair costs and downtime.

Place the crane documentation accessible in the driver's cab or in the crane cab.



WARNING

Outdated version of crane documentation!

If subsequently supplied information, updates and addenda to the crane documentation are not observed and added, there is a danger of accidents!

Personnel can be killed or seriously injured!

This could result in property damage!

- ▶ Observe and add all subsequently supplied information, updates and addenda for the crane documentation.
- ▶ Make sure that all affected persons always know and understand the latest version of the crane documentation.

**WARNING**

Crane documentation is not understood!

If parts of the crane documentation are not understood and the tasks are carried out on or with the crane, then there is a danger of accidents!

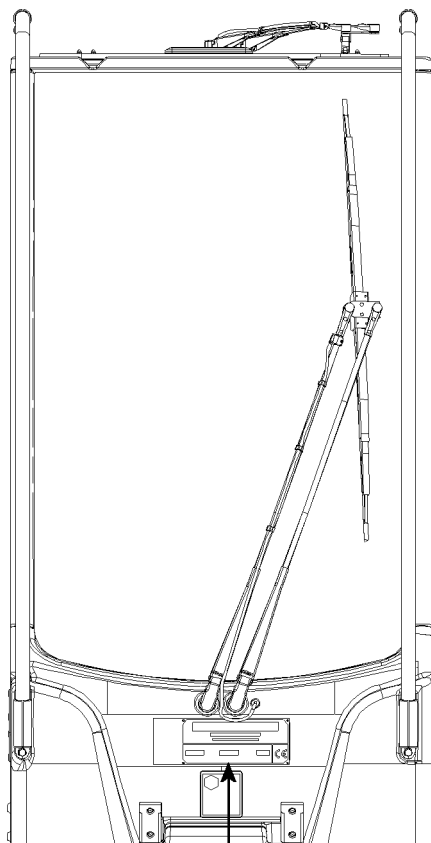
Personnel can be killed or seriously injured!

This could result in property damage!

- ▶ Clear up open questions regarding the crane documentation with Liebherr Service before carrying out the respective task.

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All accident prevention guidelines, operating instructions, load charts etc. are based on destined use of the crane.



1

LIEBHERR		
WERK EHINGEN GMBH		
D-89582 EHINGEN/DONAU		
Type	n°d'usine	année de construction
	Werk-Nr.	Baujahr
Type	Works No.	Year of manufacture
Manufactured in Germany		
		CE



2

LIEBHERR		
WERK EHINGEN GMBH		
D-89582 EHINGEN/DONAU		
Type	n°d'usine	année de construction
	Werk-Nr.	Baujahr
Type	Works No.	Year of manufacture
Manufactured in Germany		

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Fig.110001

CE marking

The CE marking is a mark according to EU laws:

- Cranes with CE-marking according to the European machinery directive 2006/42/EC and the EN 13000! Data tag Crane with CE-marking, see illustration 1.
- Cranes that are operated outside the respective area of application of the European machinery directive do not require a CE marking. Data tag Crane without CE marking, see illustration 2.
- It is prohibited to market and operate cranes without CE marking, which do not meet the product-specific regulations valid in Europe, when a CE marking is specified for the country.
- It is prohibited to operate cranes with a tipping load utilization of 85 % within the European Union or in countries that only permit a lower tipping load utilization! The national regulations apply. These cranes may not have a CE marking!

Destined use

The destined use of the crane consists solely in vertical lifting and lowering of free and non-adhered loads, whose weight and center of gravity are known.

To do so, a hook or hook block approved by Liebherr must be reeved on the hoist rope and it may only be operated within the permissible crane configurations.

Driving with the crane, with or without an attached load is only permissible if a corresponding driving or load chart is available. The set up configurations intended for it and the safety conditions must be observed according to the corresponding crane documentation.

Any other use or any other exceeding utilization is **not** destined use.

Destined use also includes the adherence of the required safety guidelines, conditions, prerequisites, set up conditions and working steps in the crane documentation (for example: Operating instructions, load charts, erection and take down charts, job planner).

The manufacturer is **not** liable for damages, which are caused by non-destined use or improper use of the crane. Any associated risk it is carried solely by the owner, the operator and the user of the crane.

Non-destined use

Non-destined use is:

- Working outside the permissible set up configurations according to the load chart.
- Working outside the permissible boom radii and slewing ranges according to the load chart.
- Selecting load charts, which do not correspond to the actual set up configuration.
- Selection of a set up configuration via code or via manual entry, which does not correspond to the actual set up configuration.
- Working with bypassed / deactivated safety equipment, for example bypassed load torque limiter or with bypassed hoist limit switch.
- Increasing the boom radius of the lifted load after a LMB shut off, for example by diagonally pulling the load.
- Using the support pressure display as information in order to utilize the crane up to the tipping limit!
- Use of equipment parts which are not approved for the crane.
- Operation of the crane in an area exposed to explosion hazards.
- Using the crane at sports and recreational events, especially for "Bungee" jumps and / or "Dinner in the sky".
- On-road driving in non-permissible travel condition (axle load, dimension).
- Driving with the equipment in place in a non-permissible travel condition.
- Pushing, pulling or lifting loads with the level control, the sliding beams or the support cylinders.
- Pushing, pulling or lifting loads by actuating the slewing gear, the luffing gear or the telescoping gear.
- Ripping stuck objects loose with the crane.
- Utilizing the crane for a longer period of time for material handling tasks.
- Releasing the crane suddenly (grapple or dumping operation).
- Utilizing the crane when the weight of the load, which is suspended on the crane is changed, for example by filling a container suspended on the load hook, except:

- The load torque limiter was checked before for function with a known load.
- The crane cab is occupied.
- The crane is operational.
- The container size is selected in such a way that an overload of the crane with full load is eliminated within the valid used load chart.

The crane may **not** be used for:

- Attaching a stuck load for which the weight and center of gravity are not known and which is released only by flame cutting, for example.
- Letting persons drive along outside the driver's cab.
- Transporting personnel in the crane cab while driving.
- Transporting personnel with the load handling equipment and on the load.
- Transporting of persons with work baskets (cherry pickers), if the national regulations of the responsible work safety organization are not observed.
- Transporting loads and objects on the crane chassis.
- Transporting loads and objects on the crane superstructure.
- Transporting loads and objects on the boom lattice sections and / or the crane boom.
- Two hook operation without auxiliary equipment.
- Extended material handling operation.
- Crane operation on a barge if the conditions are not determined and the written release by **Liebherr Werk Ehingen GmbH** is not present.

The crane documentation must be read and used by all persons who are involved in use, operation, assembly and maintenance of the crane.

Ambient temperature

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

If the ambient temperature is lower than -20 °C the crane must be modified with „auxiliary equipment for working at low temperatures“.



WARNING

Working at low temperatures without the corresponding auxiliary equipment!
The crane components can be damaged and fail. The load can rip off.
Death or severe bodily injuries.

If the crane is operated at an ambient temperature lower than -20 °C:

- ▶ Make sure that the crane is equipped with the corresponding „auxiliary equipment for working at low temperatures“. Observe and adhere to the Crane operating instructions, chapter 2.08.
- ▶ Use the operating fluids for the corresponding ambient temperature in time. Observe and adhere to the Crane operating instructions, chapter 7.07.

Safety equipment

Special attention must be paid to the safety equipment built into the crane. The safety equipment must constantly be checked for functionality. The crane may not be operated if the safety equipment are not working or not working correctly.



Note

Your motto must always be:

- ▶ **Safety first!**

The crane has been built in accordance with the applicable crane operation and driving regulations and has been approved by the relevant authorities.

Equipment and spare parts



WARNING

Danger to life if original equipment parts are **not** used!

If the crane is operated with equipment parts, which are **not** original, then the crane can fail and cause fatal accidents!

Crane components can be damaged!

- ▶ Operate the crane only with original equipment parts!
- ▶ Crane operation with equipment parts, which do **not** belong to the crane is prohibited!
- ▶ If there is any doubt about the origin of equipment parts, contact Liebherr Service!



WARNING

The crane permit and the manufacturer's warranty will become void!

If any original installed parts are modified, manipulated or replaced (e.g. removal of parts, installation of non-original Liebherr parts), both the crane permit and the manufacturer's warranty will become void.

- ▶ Leave installed original parts unchanged!
- ▶ Do not remove installed original parts!
- ▶ Use only Original Liebherr spare parts!
- ▶ If there is any doubt about the origin of spare parts, contact Liebherr Service!

For ordering equipment and spare parts, always keep the crane number handy and provide it.

Definition of directional data for mobile cranes

Driving forwards: Driving with the driver's cab on the front.

Driving in reverse: Driving with the taillights of the crane chassis on the front.

Front, rear, right, left in the **driver's cab** refer to the crane chassis. The driver's cab is always in the front.

Front, rear, right, left in the **crane cab** refer to the crane superstructure. Front is always in direction of the placed down boom.

Definition of directional data for crawler cranes

Driving forward driving forward from the view of the crane operator seated in the crane cab. Turntable in 0° or 180° position.

Driving reverse driving backward from the view of the crane operator seated in the crane cab. Turntable in 0° or 180° position.

Front, rear, right, left always orient themselves on the **crawler track** from the position of the chain tension devices. The chain tension devices on the crawler track are always on the front.

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

Optional equipment and functions

The equipment marked with * and the functions are optionally available and are **not** part of the standard crane (optional equipment).

Conversion chart



Note

- ▶ If the crane is used in countries where US-units are customary, you can use the conversion factors in this chart for conversion of metric measuring units into US-units!

	Unit of Measure	Multiply by	To obtain
Length	millimeter (mm)	0.03937	inch (in)
	millimeter (mm)	0.00328084	foot (ft)
	meter (m)	39.37	inch (in)
	meter (m)	3.28084	foot (ft)
	meter (m)	1.09361	yard (yd)
	kilometer (km)	0.62137	mile (mi)
Area	square centimeter (cm ²)	0.155	square inch (in ²)
	square meter (m ²)	10.7639	square foot (ft ²)
	square meter (m ²)	1.196	square yard (yd ²)
	square kilometer (km ²)	0.3861	square mile (mi ²)
Volume	cubic centimeter (cm ³)	0.06102	cubic inch (in ³)
	cubic meter (m ³)	35.3147	cubic foot (ft ³)
	cubic meter (m ³)	1.308	cubic yard (yd ³)
	liter (L)	61.024	cubic inch (in ³)
	liter (L)	0.035	cubic foot (ft ³)
	liter (L)	0.264	gallon (U.S.) (gal)
Weight	gram (g)	0.03527	ounce (oz)
	kilogram (kg)	2.20462	pound (lb)
	metric ton (t)	2204.62262	pound (lb)
	metric ton (t)	1.102	short tons (U.S.)
Mass divided by length	kilogram per meter (kg/m)	0.055998	pound per inch (lb/in)
	kilogram per meter (kg/m)	0.67197	pound per foot (lb/ft)
Force	newton (N)	0.2248	pound-force (lbf)
	kilonewton (kN)	224.809	pound-force (lbf)
	kilonewton (kN)	0.2248	kip (1 kip = 1000 lbf)
Torque	newton meter (N·m)	8.85075	pound-force inch (lbf·in)
	newton meter (N·m)	0.73756	pound-force foot (lbf·ft)
Power	horsepower (metric)	0.73549	kilowatt (kW)
	horsepower (metric)	0.98632	horsepower (U.K.)
	kilowatt (kW)	1.34102	horsepower (U.K.)
Pressure	kilopascal (kPa)	0.01	bar (bar)
	kilopascal (kPa)	0.1450377	pound-force per square inch (psi)
	bar (bar)	14.50377	pound-force per square inch (psi)
	newton per square centimeter (N/cm ²)	1.450377	pound-force per square inch (psi)
	newton per square meter (N/m ²)	0.0001450377	pound-force per square inch (psi)
Speed	meter per second (m/s)	39.37	inch per second (in/s)
	meter per second (m/s)	3.28084	foot per second (ft/s)
	kilometer per hour (km/h)	0.62137	mile per hour (mi/h)

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	Unit of Measure	Multiply by	To obtain
	liter per minute (l/min)	0.26417	gallon per minute (gal/min)
Temperature	degree Celsius (°C)	$([^{\circ}\text{C}] \cdot 1.8) + 32$	degree Fahrenheit (°F)
	kelvin (K)	$([\text{K}] \cdot 1.8) - 459.67$	degree Fahrenheit (°F)

Conversion chart version 1

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1 Description of crane

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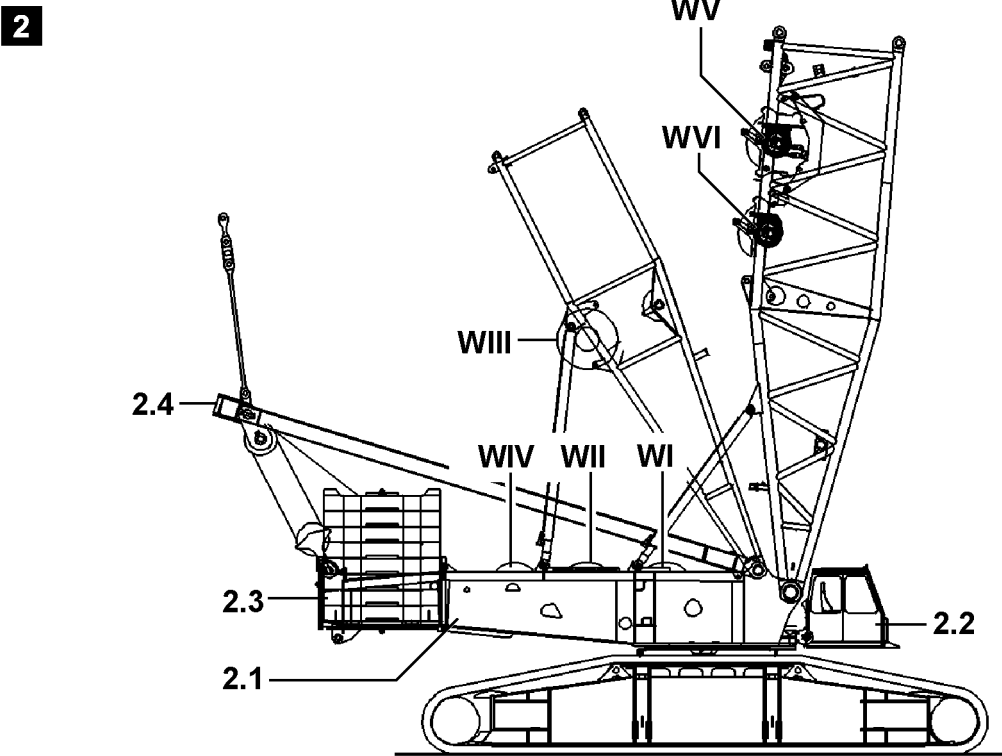
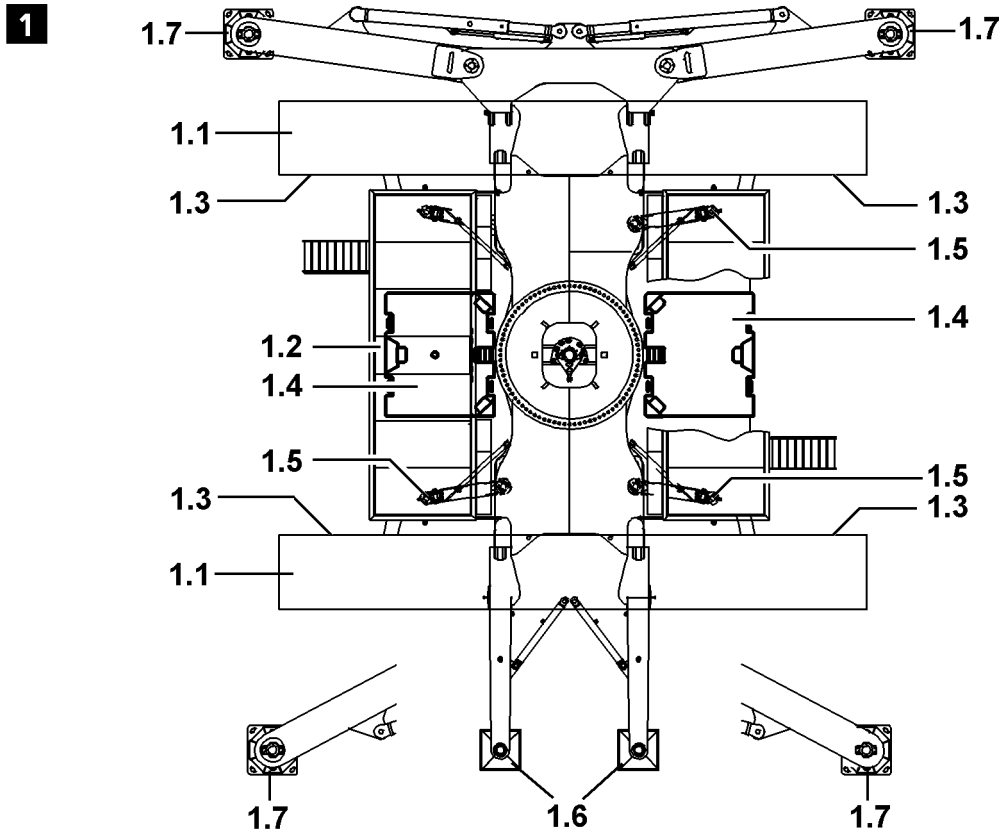


Fig.108669

LWE/LR 1750-000/12812-15-02/en

1 Component overview

1.1 Crawler travel gear, fig. 1

- 1.1 Crawler carrier
- 1.2 Crawler center section
- 1.3 Travel gear
- 1.4 Central ballast
- 1.5 Hydraulic assembly support
- 1.6 Mechanical auxiliary support
- 1.7 Crane support*

1.2 Turntable, fig. 2

- 2.1 Crane engine
- 2.2 Crane operator's cab
- 2.3 Counterweight
- 2.4 SA-frame

- WI** Winch 1
- WII** Winch 2
- WIII** Winch 3
- WIV** Winch 4
- WV** Winch 5
- WVI** Winch 6

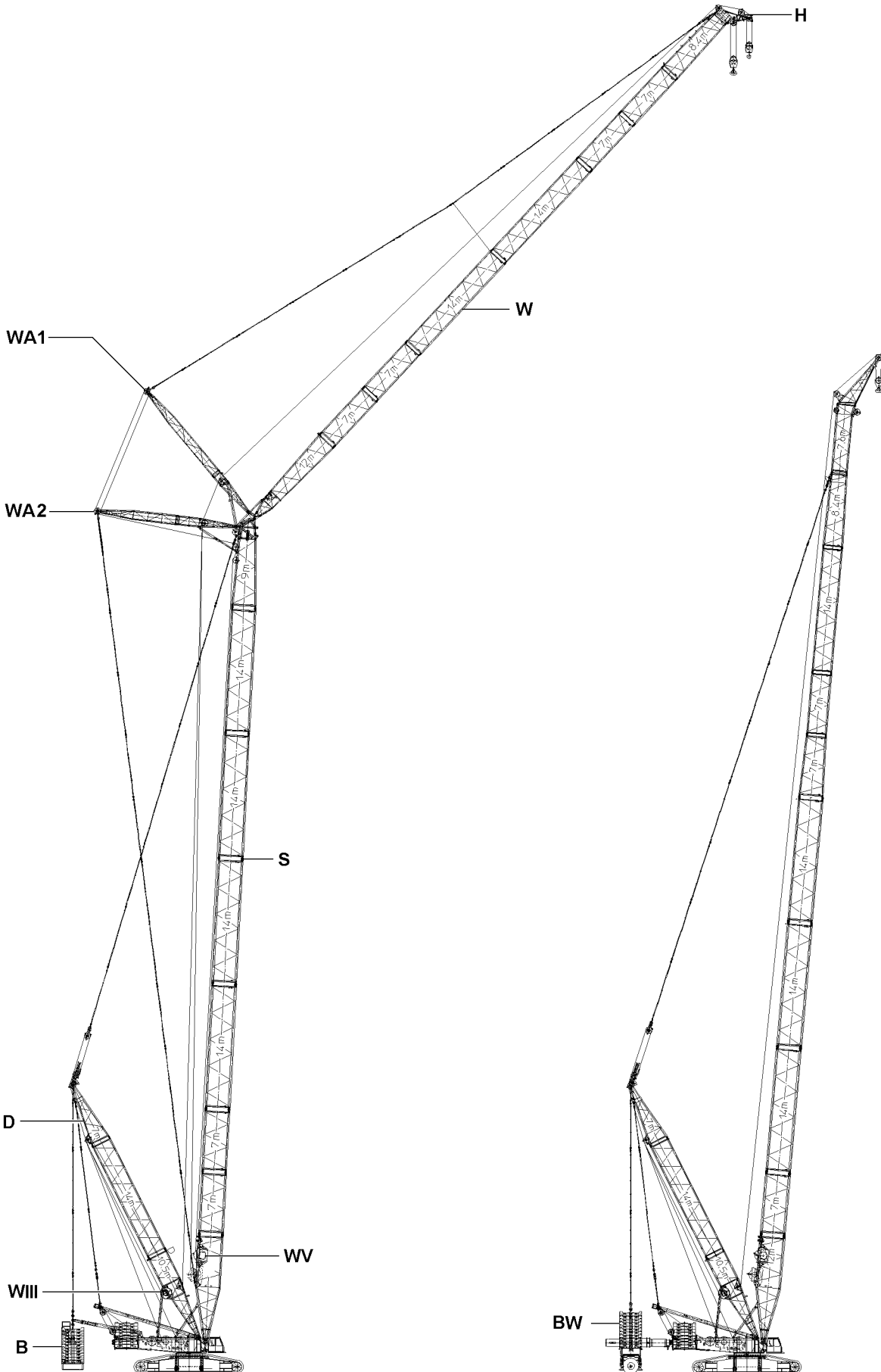


Fig.108668

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1.3 Boom

**Note**

► For equipment for boom systems, see chapter 5.03 in the crane operating instructions!

WA1 WA-frame 1

WA2 WA-frame 2

WIII Winch 3

WV Winch 5

H Boom nose

W Luffing lattice jib

S Main boom

D Derrick

1.4 Derrick ballast

**Note**

► The suspended ballast and ballast trailer are generally referred to as **derrick ballast!**

B Suspended ballast

BW Ballast trailer

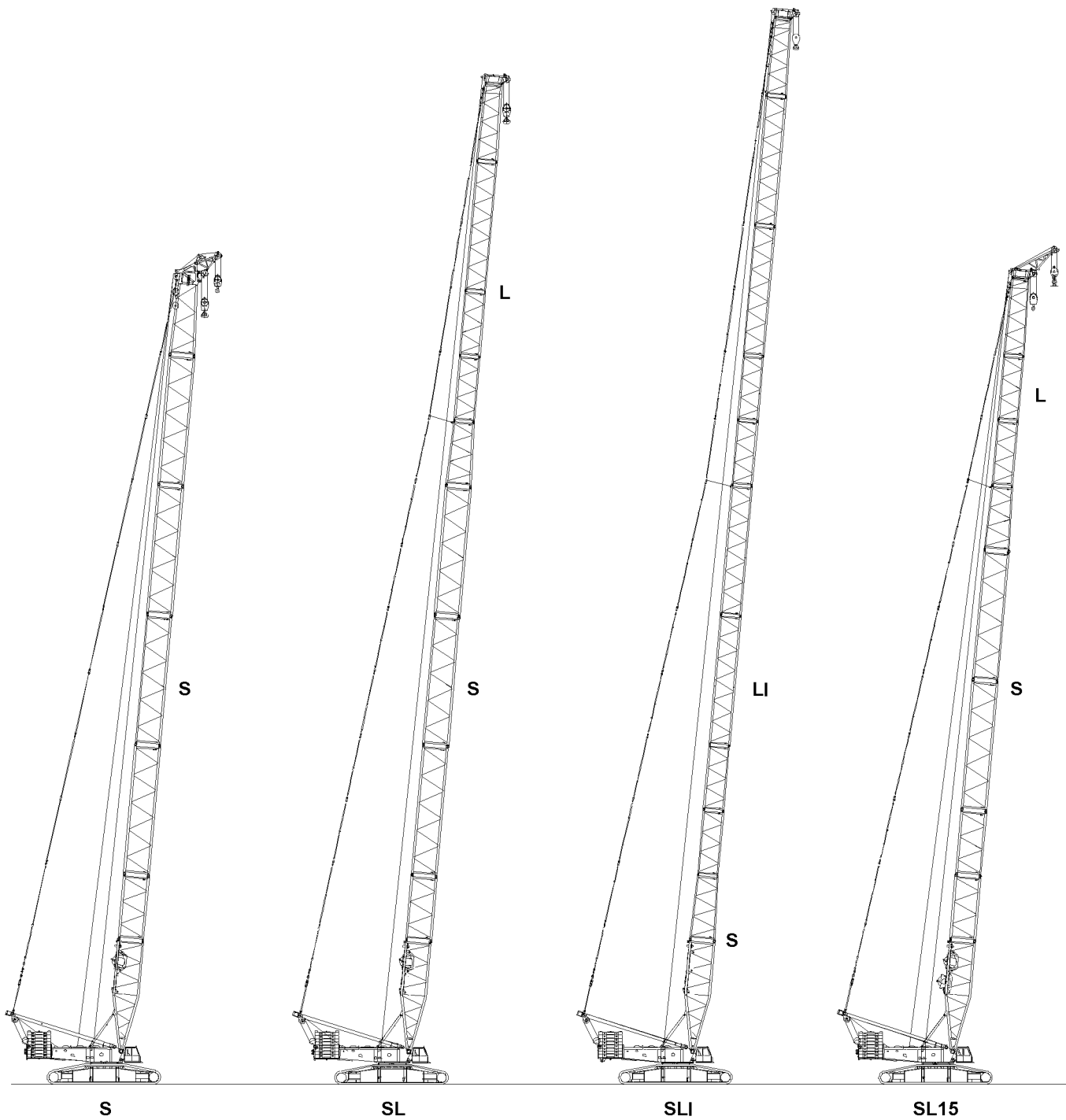


Fig.122712: S // SL // SLI // SL15

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2 Boom systems



WARNING

The crane can topple over!

- ▶ Make sure that all boom systems are installed only according to the respective assembly chapter and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ Do not use the following boom illustrations for assembly purposes.

2.1 Boom combinations

2.1.1 S - boom combination

- S** Main boom
 - Heavy version

2.1.2 SL - boom combination

- SL** Main boom
 - Heavy version, supplemented on top with light lattice sections **L**

2.1.3 SLF - boom combination

- SLI** Main boom
 - S-pivot section
 - Light version, supplemented from the LS reducer with light lattice sections **LI**

2.1.4 SL15 - boom combination

- SL** Main boom
 - Heavy version, supplemented on top with light lattice sections **L**
 - Auxiliary jib 124 t

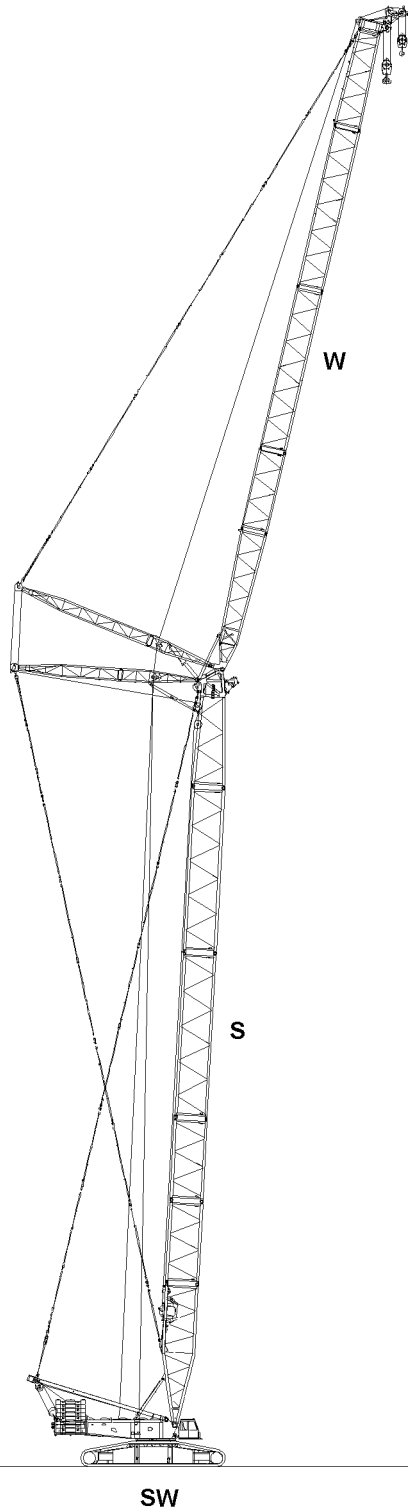


Fig.122713: SW

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2.1.5 SW - boom combination

- S** Main boom
 - Heavy version
- W** Luffing lattice jib
 - W-pivot section on the bottom, supplemented on top with light lattice sections **L**
 - WA-frames

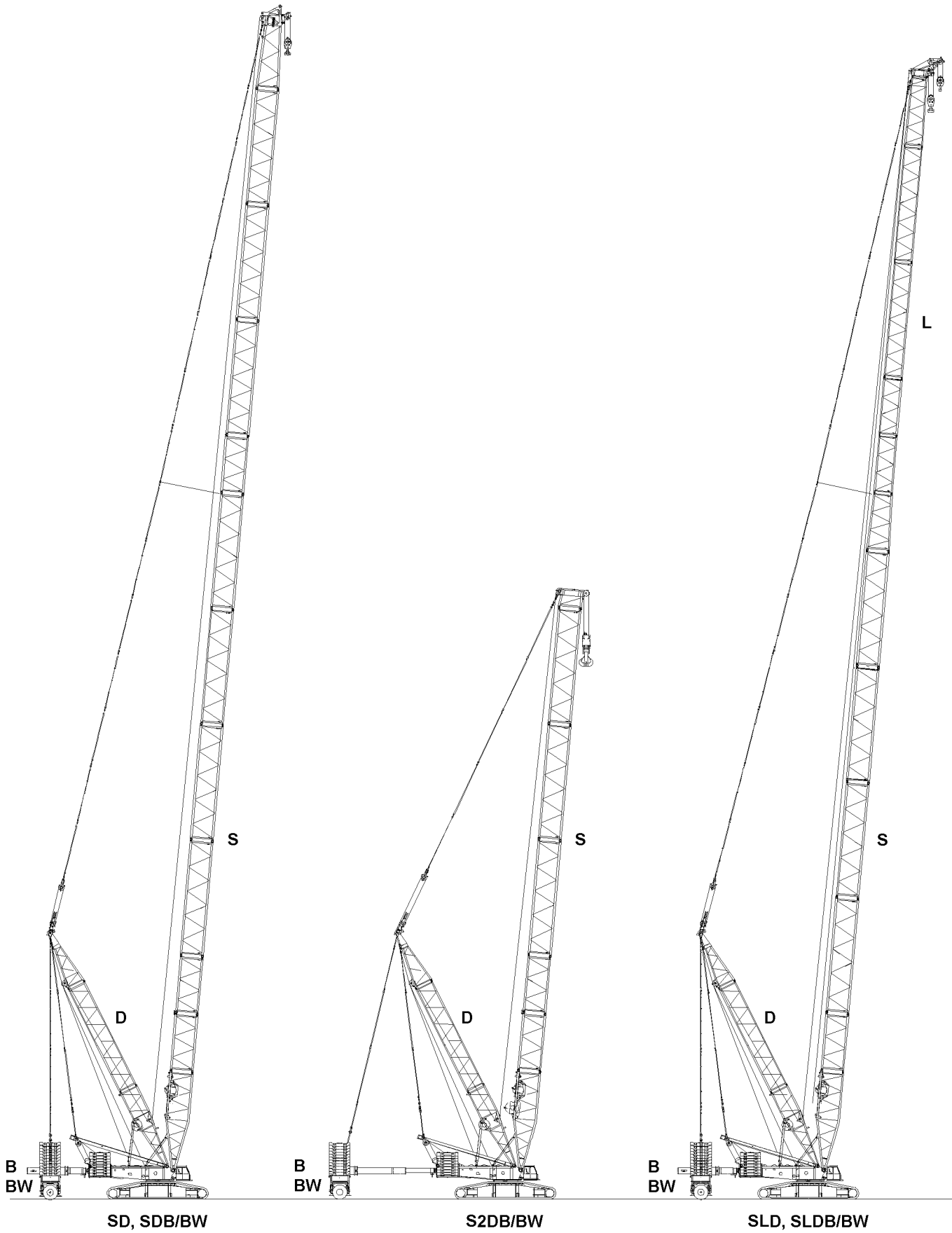


Fig.122714: SD, SDB/BW // S2DB/BW // SLD, SLDB/BW

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2.1.6 D, SDB/BW - boom combination

- S** Main boom
 - Heavy version
- D** Derrick boom
 - Alone as assembly device or in connection with SD
- B** Derrick ballast
 - Suspended ballast
- BW** Derrick ballast
 - Ballast trailer

2.1.7 S2DB/BW - boom combination

- S2** Main boom
 - Heavy version with 750 t head
- D** Derrick boom
 - Alone as assembly device or in connection with S2D
- B** Derrick ballast
 - Suspended ballast
- BW** Derrick ballast
 - Ballast trailer

2.1.8 SLD, SLDB/BW - boom combination

- SL** Main boom
 - Heavy version, supplemented on top with light lattice sections **L**
- D** Derrick boom
 - Alone as assembly device or in connection with SLD
- B** Derrick ballast
 - Suspended ballast
- BW** Derrick ballast
 - Ballast trailer

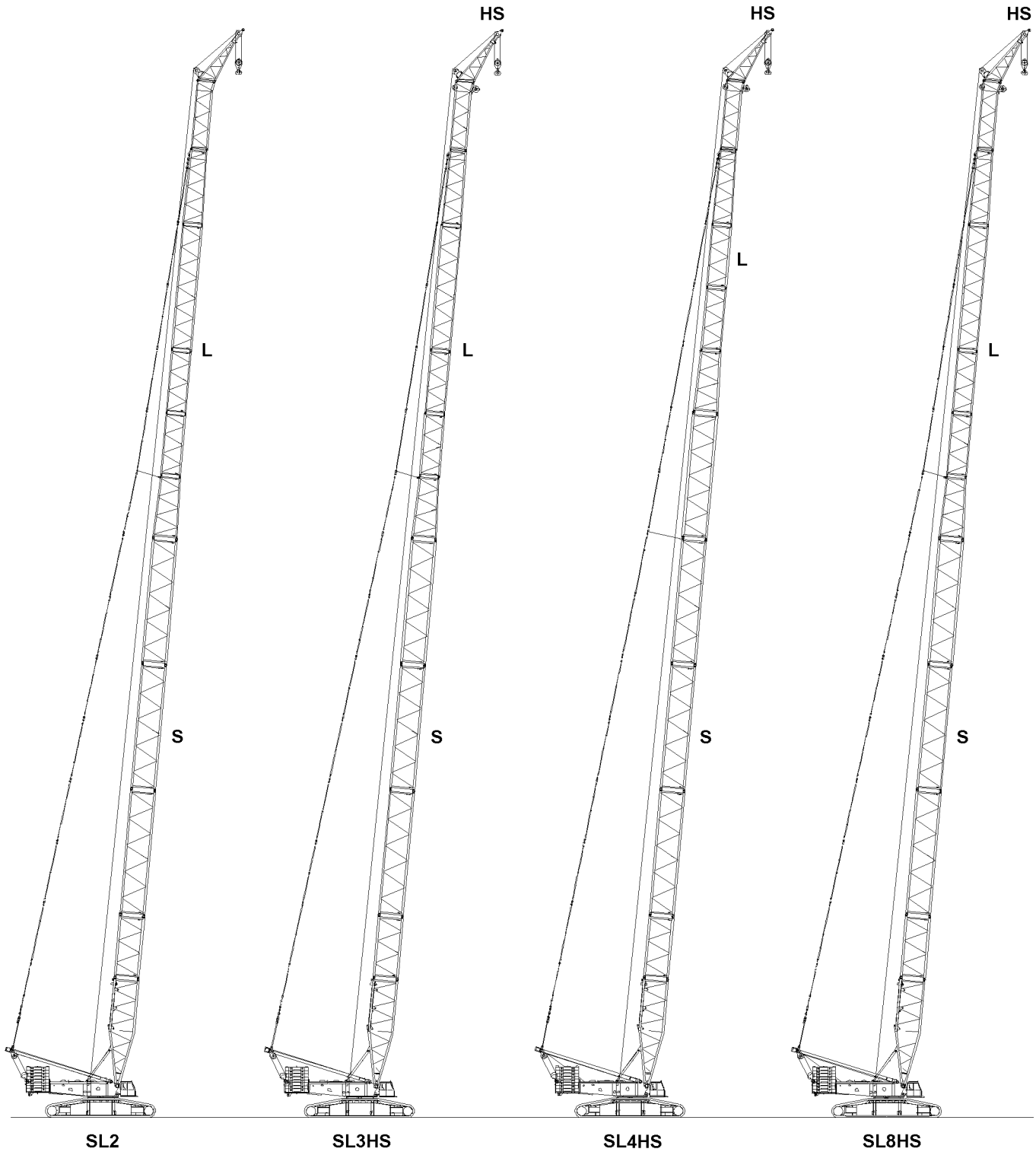


Fig.122715: SL2 // SL3HS // SL4HS // SL8HS

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2.1.9 SL2 - boom combination

SL2 Main boom

- Heavy version, supplemented on top with light lattice sections **L**
- Boom nose 100 t

2.1.10 SL3HS - boom combination

SL3 Main boom

- Heavy version, supplemented on top with light lattice sections **L**
- Pulley set on adapter for boom nose

HS Boom nose 100 t

2.1.11 SL4HS - boom combination

SL4 Main boom

- Heavy version, supplemented on top with light lattice sections **L**
- Pulley set on adapter for boom nose

HS Boom nose 120 t

2.1.12 SL8HS - boom combination

SL8 Main boom

- Heavy version, supplemented on top with light lattice sections **L**
- Pulley set on adapter for boom nose

HS Boom nose 120 t

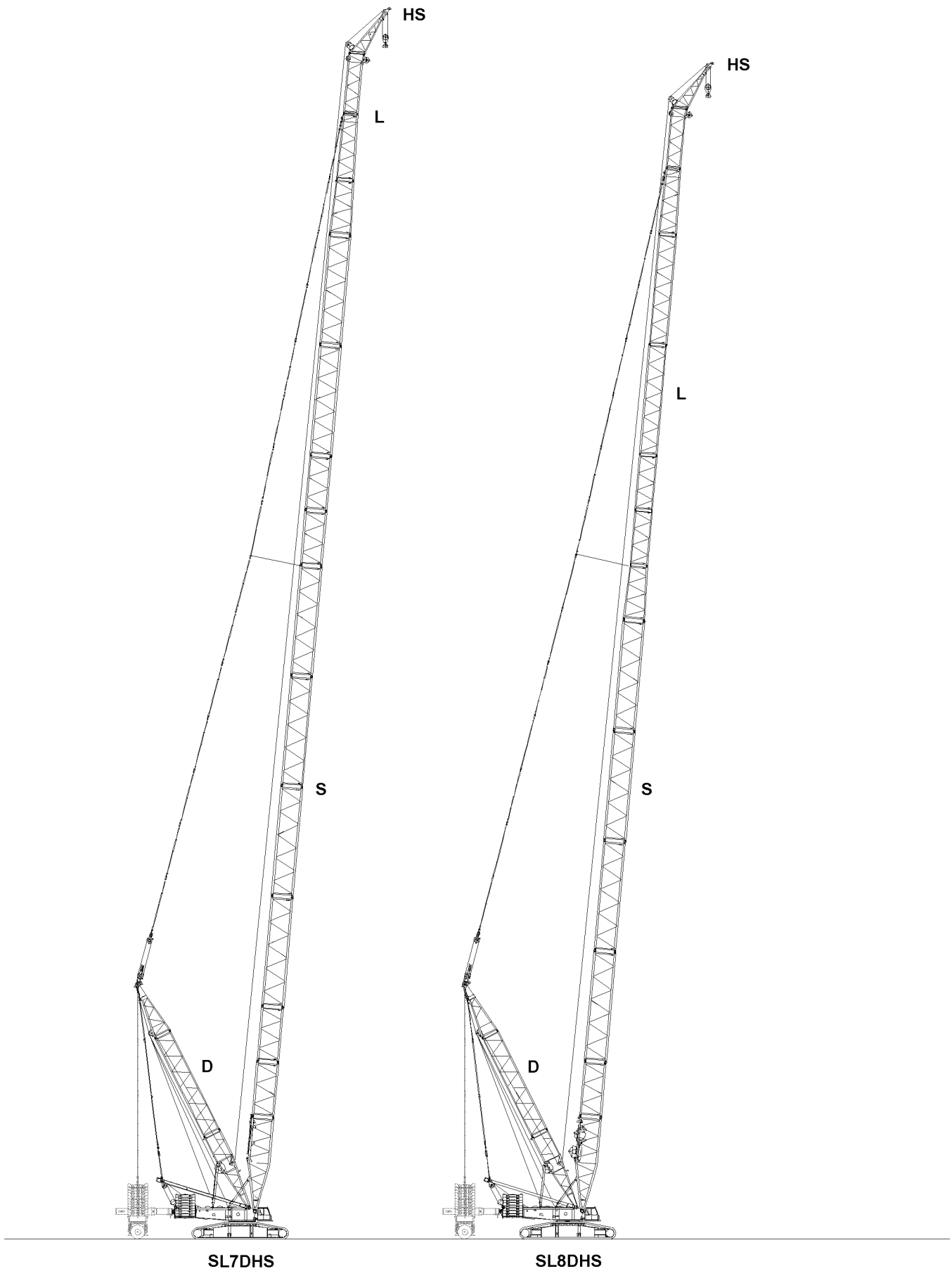


Fig.122716: SL7DHS // SL8DHS

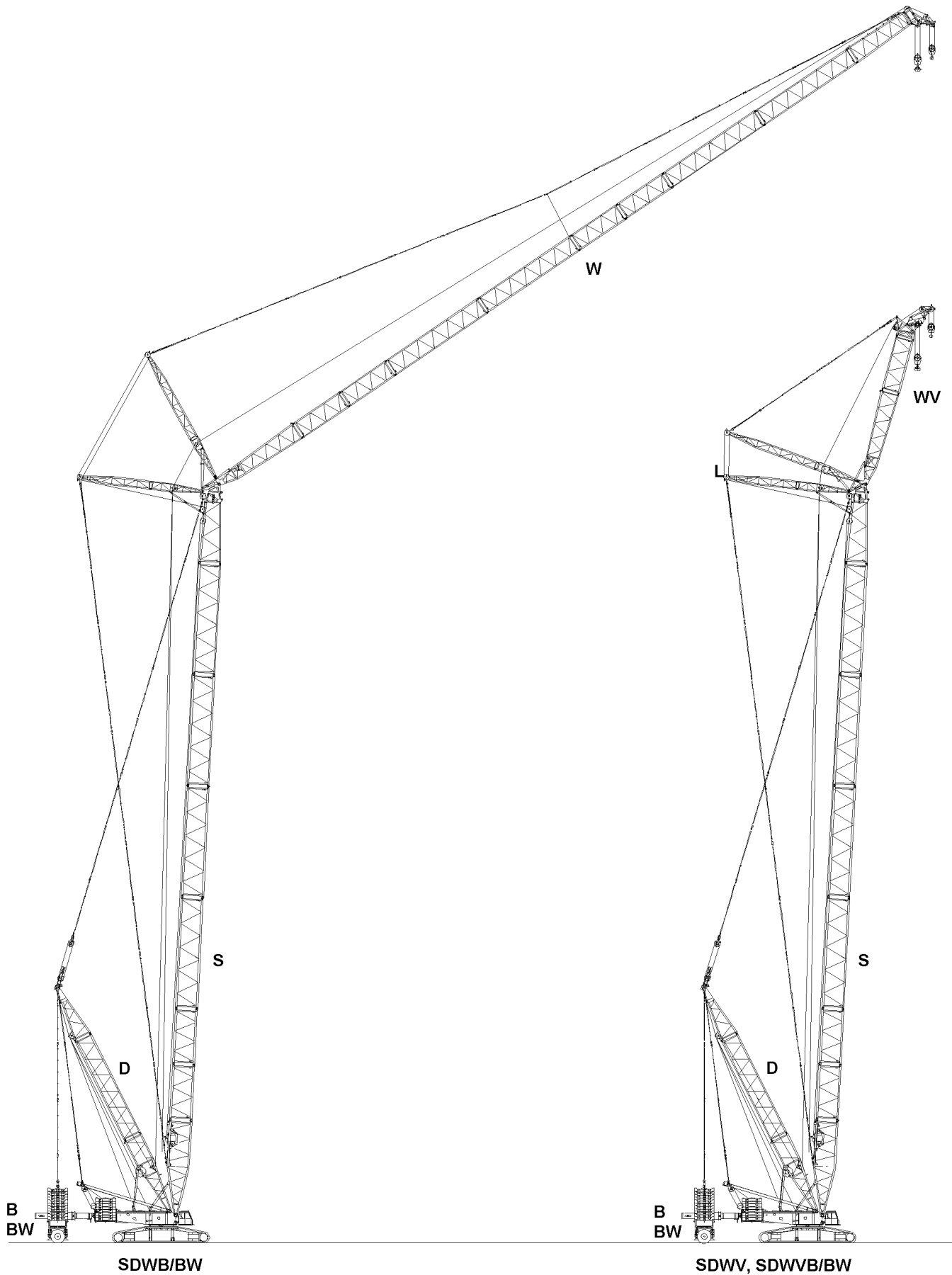
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2.1.13 SL7DHS - boom combination

- SL** Main boom
 - Heavy version, supplemented on top with light lattice sections **LA**
- D** Derrick boom
 - Alone as assembly device or in connection with SL7D
- HS** Boom nose 120 t
- B** Derrick ballast
 - Suspended ballast only for erection and take down of the boom system
- BW** Derrick ballast
 - Ballast trailer only for erection and take down of the boom system

2.1.14 SL8DHS - boom combination

- SL** Main boom
 - Heavy version, supplemented on top with light lattice sections **LI**
- D** Derrick boom
 - Alone as assembly device or in connection with SL8D
- HS** Boom nose 120 t
- B** Derrick ballast
 - Suspended ballast only for erection and take down of the boom system
- BW** Derrick ballast
 - Ballast trailer only for erection and take down of the boom system



SDWB/BW

SDWV, SDWVB/BW

Fig.122717

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2.1.15 SDWB/BW - boom combination

- S** Main boom
 - Heavy version
- D** Derrick boom
 - Alone as assembly device or in connection with SD or SLD
- W** Luffing lattice jib
 - With light lattice sections **L**
- B** Derrick ballast
 - Suspended ballast
- BW** Derrick ballast
 - Ballast trailer

2.1.16 SDWV, SDWVB/BW - boom combination

- S** Main boom
 - Heavy version
- D** Derrick boom
 - Alone as assembly device or in connection with SD or SLD
- WV** Fixed lattice jib
 - With light lattice sections **L**
- B** Derrick ballast
 - Suspended ballast
- BW** Derrick ballast
 - Ballast trailer

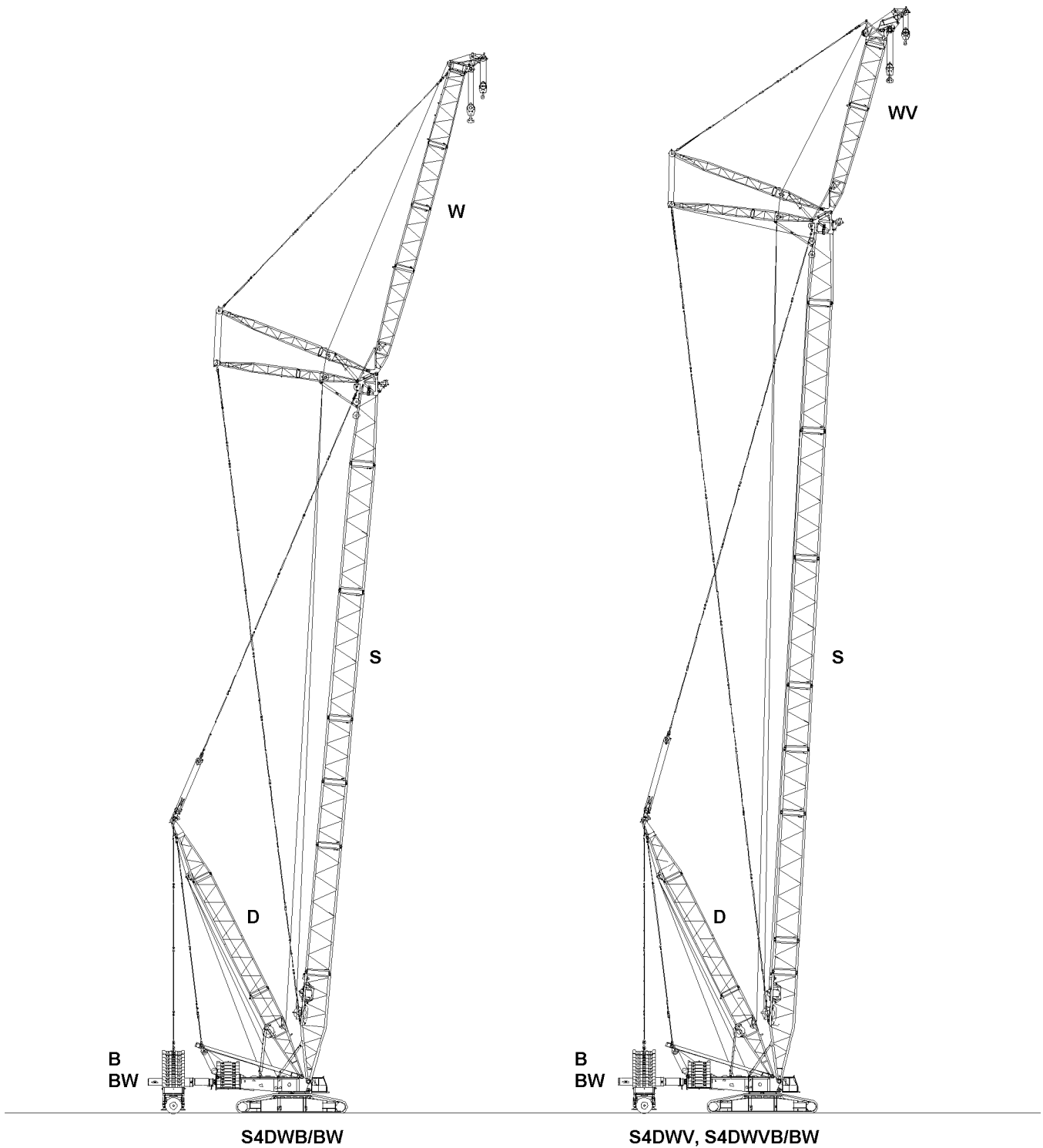


Fig.122719: S4DWB/BW // S4DWV, S4DWVB/BW

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2.1.17 S4DWB/BW - boom combination

- S** Main boom
 - Heavy version, with reinforced S-intermediate sections
- D** Derrick boom
 - Alone as assembly device or in connection with SD or SLD
- W** Luffing lattice jib
 - With light lattice sections **L**
- B** Derrick ballast
 - Suspended ballast
- BW** Derrick ballast
 - Ballast trailer

2.1.18 S4DWV, S4DWVB/BW - boom combination

- S** Main boom
 - Heavy version, with reinforced S-intermediate sections
- D** Derrick boom
 - Alone as assembly device or in connection with SD or SLD
- WV** Fixed lattice jib
 - With light lattice sections **L**
- B** Derrick ballast
 - Suspended ballast
- BW** Derrick ballast
 - Ballast trailer

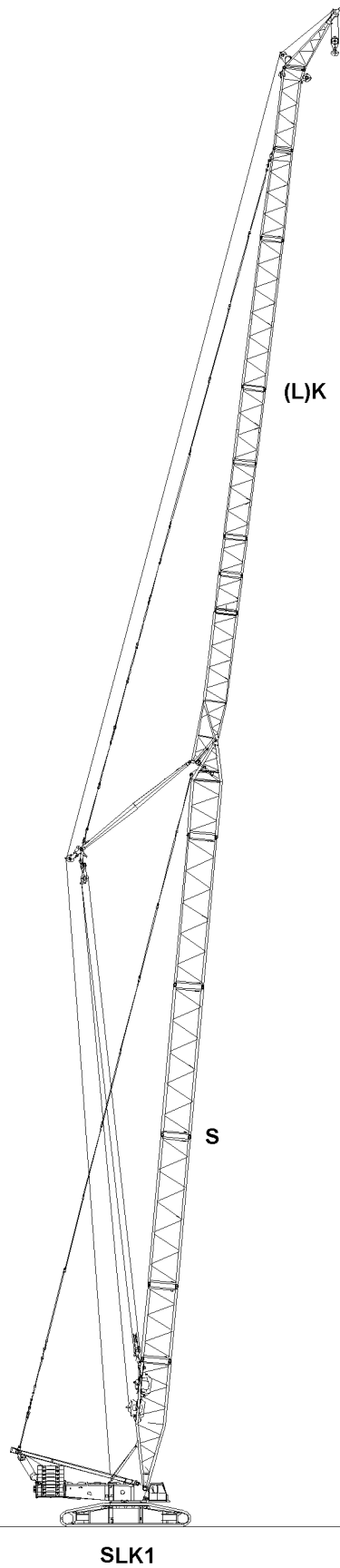


Fig.122718: SLK1

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2.1.19 SLK1 - boom combination

- S** Main boom
 - Heavy version, with S-intermediate sections
- K** K-boom
 - With light lattice sections **L**
 - Boom nose

Fig.195219

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1 Crawler travel gear

1.1 Frame

In-house manufactured, distortion-resistant welded structure made from high-strength, close-grained structural steel.

The crawler carriers can be removed and can be installed / removed with the crane.

1.2 Tracks

Maintenance free, dirt protected crawler track with flat track pads.

Pad width: 1.5 m

Pad width: 2 m *

Track width: 8.8 m

1.3 Central ballast

45 t , consisting of two ballast plates each with 10.0 t and two ballast plates with each 12.5 t.

1.4 Drive

Hydraulic travel drives with planetary gears.

The crawler chains can be controlled independently and in the opposite direction.

There is no preferred travel direction.

1.5 Travel power

Stepless speed from 0 km/h to 1.75 km/h.

2 Crane superstructure

2.1 Frame

In-house manufactured, distortion-resistant welded structure made from high-strength, close-grained structural steel.

Connection to crawler travel gear via 3-row roller rotary connection, slewable by 360°.

2.2 Crane engine

8-cylinder Diesel, Type D9408 TI-E A4, water cooled

Performance: 400 KW at 2100 rpm

Maximum torque: 2470 Nm at 1500 rpm

Exhaust emissions according to guidelines per 97/68/EG Stage 2 and EPA / CARB Tier 2, 2001/27/EC

Fuel tank: 820 l

2.3 Crane drive

Hydraulic via pump distributor gear with six axial piston pumps with power regulation, closed oil circuits.

2.4 Crane control

Servo control with electronic synchronous run device, energy recycling when lowering the load. All movements are carried out independently of each other via joysticks.

2.5 Winch 1

Winch 1 as hoist gear, hydraulically driven via axial piston pump and planetary gear. Disk brakes spring loaded and hydraulically vented.

2.6 Winch 2

Winch 2 as hoist gear, hydraulically driven via axial piston pump, Liebherr rope winch with integrated planetary gear and spring loaded retaining brake.

2.7 Winch 4

Winch 4 as intake gear, hydraulically driven via axial piston pump and planetary gear. Disk brakes spring loaded and hydraulically vented.

2.8 Slewing gear

Hydraulically driven via axial piston fixed displacement motor and planetary gears. Disk brake spring loaded and hydraulically vented. Slewing speed steplessly regulated from 0 rpm to 1.5 rpm.

2.9 Crane operator's cab

Steel plate design with safety glass, can be swung out to the side and inclined to the rear with operating and control instruments, warm water heater.

2.10 Counterweight

170.0 t, consists of: Two base plates each 10.0 t and counterweight plates with a total of 150 t.

2.11 Safety equipment

LICCON overload system, hoist limitation, electronic incline display, safety valves against pipe and hose bursts.

2.12 Electrical system

24 Volt direct current, two batteries with 170 Ah each.

3 Auxiliary equipment

3.1 Winch 3

Winch 3 as control winch, hydraulically driven via axial piston pump, Liebherr rope winch with integrated planetary gear and spring loaded retaining brake.

3.2 Winch 5

Winch 5 to control the luffing lattice jib, hydraulically driven via axial piston pump, Liebherr rope winch with integrated planetary gear and spring loaded retaining brake.

3.3 Winch 6

Winch 6 as winch for boom nose.

3.4 Mechanical auxiliary support

To erect long boom combinations without derrick ballast.

3.5 Counterweight

245.0 t , consists of: Two base plates each 10.0 t and counterweight plates with a total of 225.0 t.

3.6 Hydraulic assembly support

Four hydraulic support cylinders on crawler center section for crane self installation.

3.7 Assembly cylinder

For assembly of the crawler carriers.

3.8 Quick Connection

Quick Connection for easy separation from crane superstructure and crawler travel gear.

3.9 Boom noses

Boom nose 60 t , for installing on SL-, W-head. Boom nose 60 t , for installing on S-head.

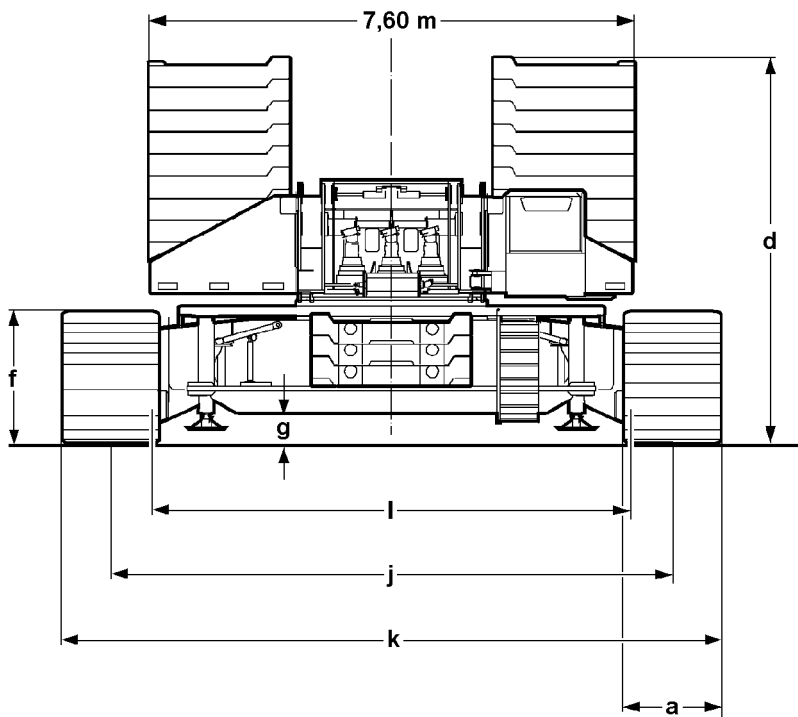
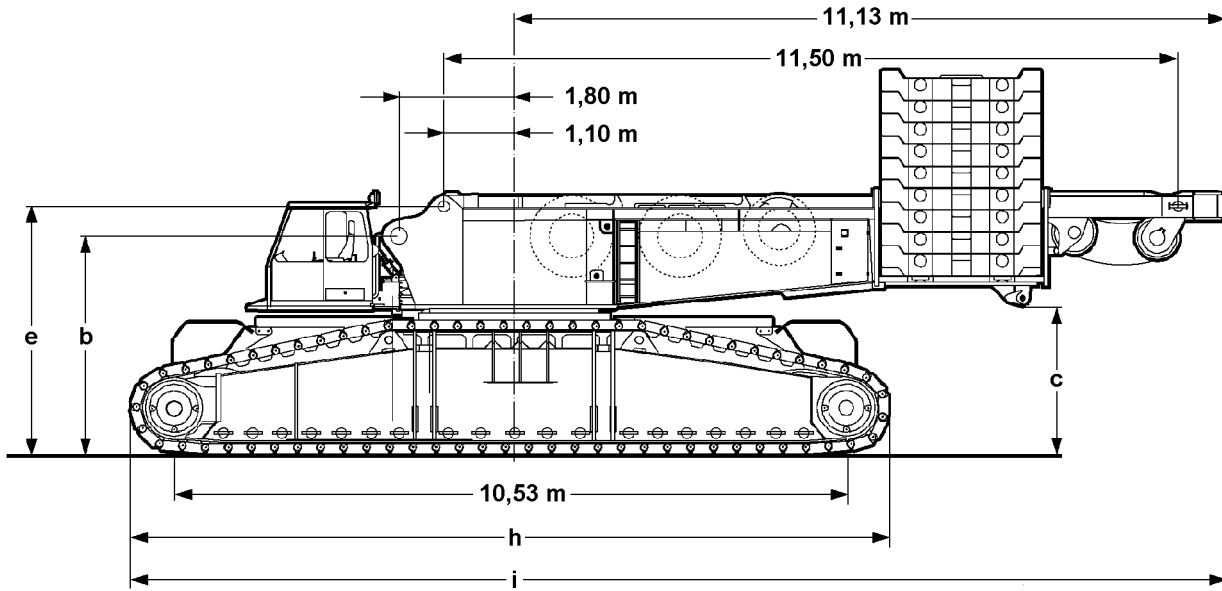


Fig.113363

LWE/LR 1750-000/12812-15-02/en

1 Dimensions and weights

1.1 Dimensions of crawler travel gear with crane superstructure



Note

- ▶ Quick Connection*: Quick connection for easy separation from crane superstructure and crawler travel gear.
- ▶ Overall height **d** given for 245 t counterweight.

Dimension	Track pad width	
	1.50 m	2.00 m *
a	1.50 m	2.00 m *

Dimension	Without Quick connection		With Quick connection	
	Base plate 1.50 m	Base plate 2.00 m *	Base plate 1.50 m	Base plate 2.00 m *
b	3.48 m	3.53 m	3.75 m	3.80 m
c	2.38 m	2.43 m	2.65 m	2.70 m
d	5.76 m	5.81 m	6.03 m	6.08 m
e	3.95 m	4.00 m	4.22 m	4.27 m

Dimension	Track pad width	
	1.50 m	2.00 m
f	2.10 m	2.20 m
g	0.46 m	0.51 m
h	11.90 m	12.00 m
i	17.08 m	17.13 m

Dimension	Center section light		Center section for crane support*	
	Base plate 1.50 m	Base plate 2.00 m *	Base plate 1.50 m	Base plate 2.00 m *
j	8.80 m		8.88 m	
k	10.30 m	10.80 m	10.38 m	10.88 m
l	7.70 m		7.78 m	

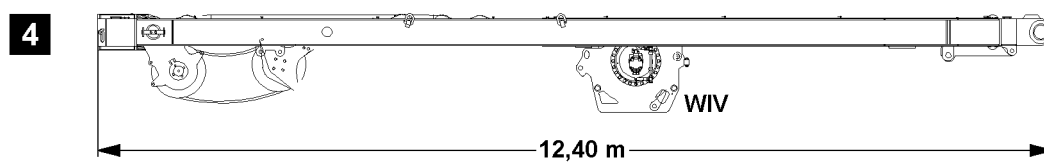
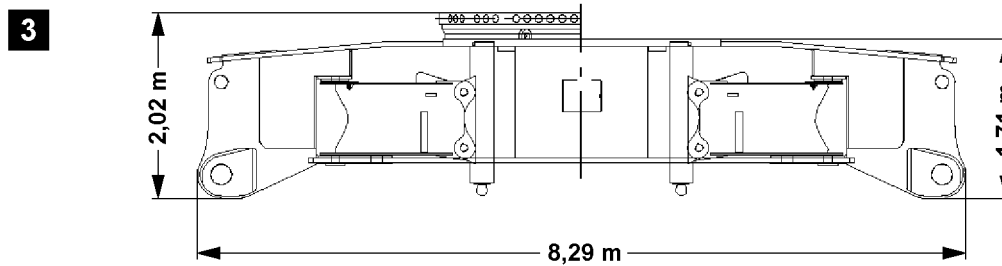
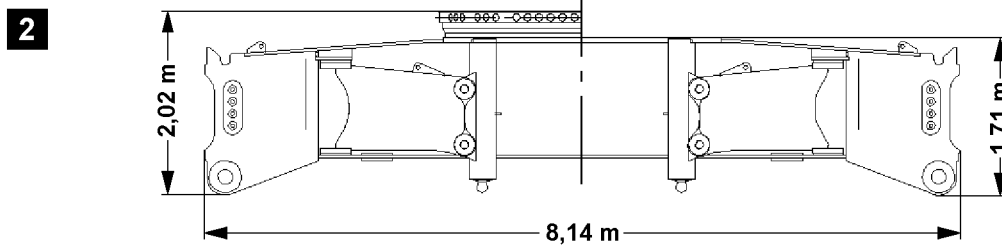
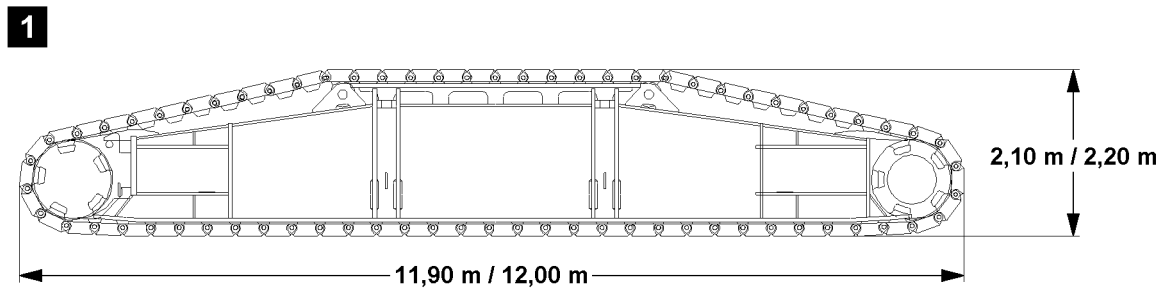


Fig.108652

1.2 Crawler carrier

See illustration 1.



Note

- ▶ Crawler carrier, light: No installation of hydraulic crane support* possible on crawler carrier!
- ▶ Crawler carrier, heavy*: Version for installation of hydraulic crane support* on crawler carrier!
- ▶ Hydraulic crane support*: Fro load capacity increase, reduction of ground pressures and leveling of crane!

Component	Track pad width	Weight	Width
Crawler carrier, light with one travel drive	1.50 m	41.6 t	1.55 m
Crawler carrier, light with two travel drives	1.50 m	44.0 t	1.55 m
Crawler carrier, light with one travel drive	2.00 m	52.8 t	2.00 m
Crawler carrier, light with two travel drives	2.00 m	55.0 t	2.00 m
Crawler carrier, heavy with one travel drive	1.50 m	43.6 t	1.55 m
Crawler carrier, heavy with two travel drives	1.50 m	45.8 t	1.55 m
Crawler carrier, heavy with one travel drive	2.00 m	54.8 t	2.00 m
Crawler carrier, heavy with two travel drives	2.00 m	57.0 t	2.00 m

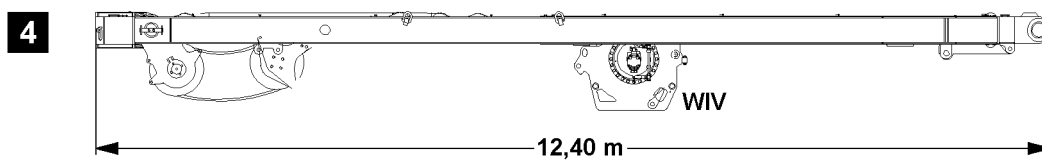
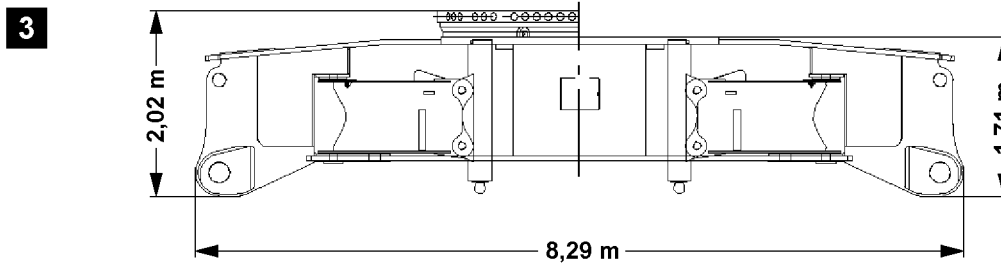
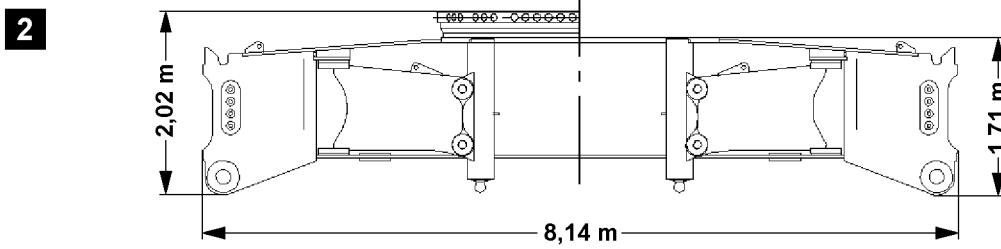
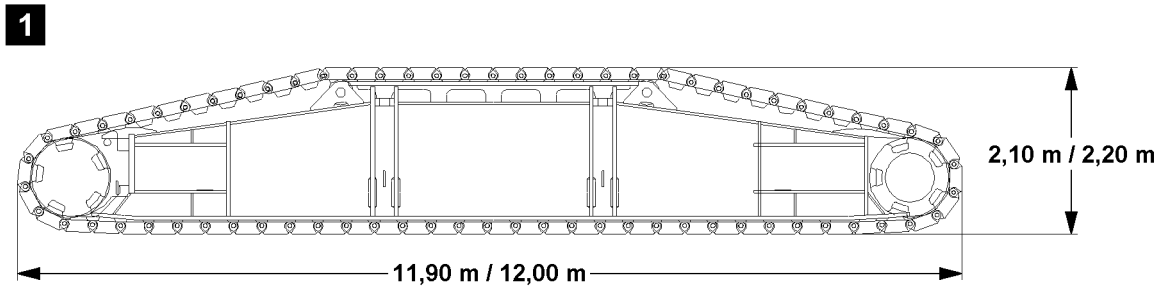


Fig.108652

LWE/LR 1750-000/12812-15-02/en

1.3 Center section, light

See illustration 2.

Version	Weight	Width
Without Quick connection	30.8 t	3.00 m
With Quick connection	33.8 t	3.00 m

1.4 Center section, for crane support*

See illustration 3.



Note

- ▶ Center section for crane support*: Reinforced center section for installation of hydraulic crane support*!

Version	Weight	Width
Without Quick connection	42.5 t	3.00 m
With Quick connection	45.5 t	3.00 m

1.5 SA-frame

See illustration 4.

Component	Weight	Width
SA-frame with winch 4 WIV including rope and pulley set	17.8 t	2.30 m

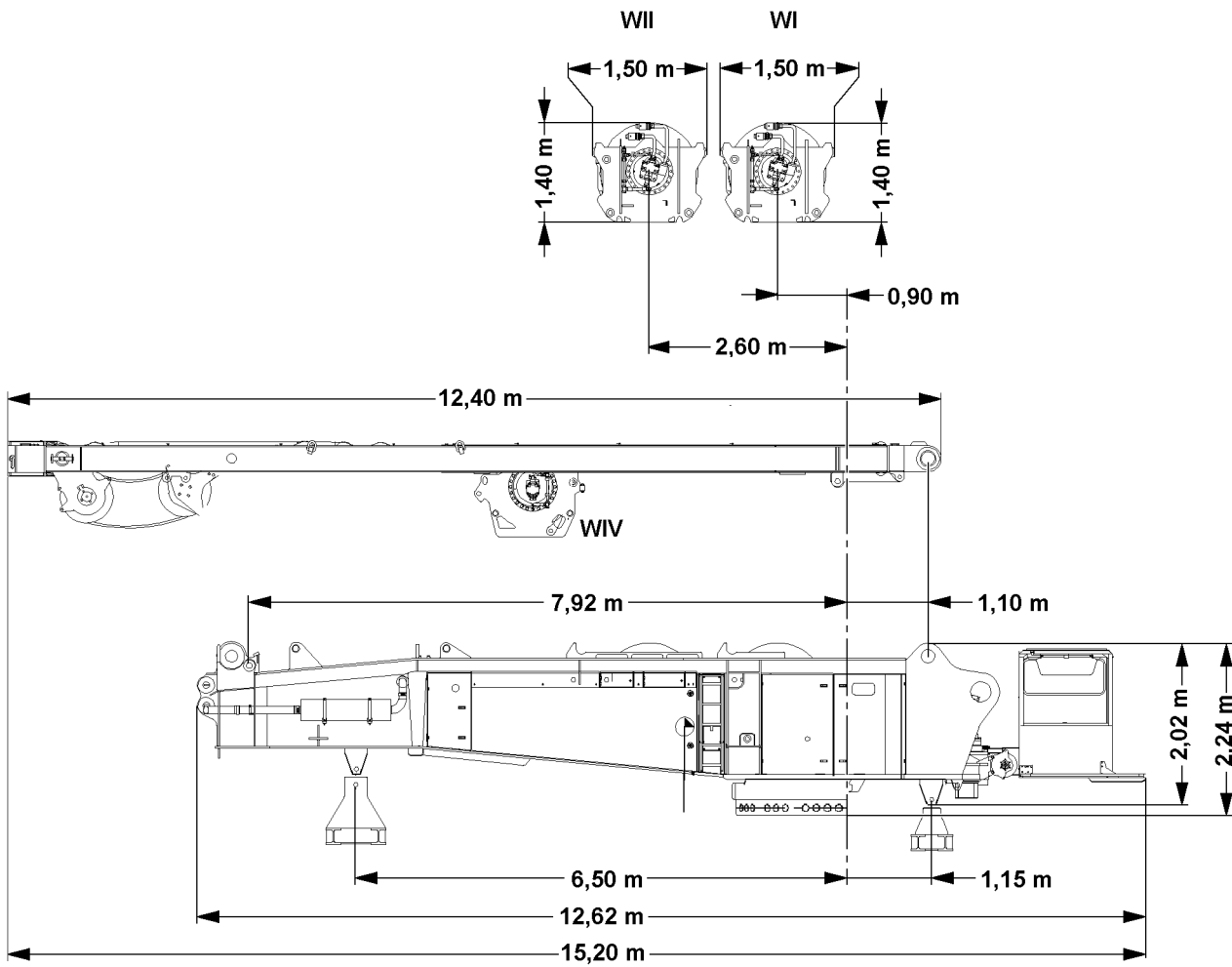


Fig.108789

LWE/LR 1750-000/12812-15-02/en

1.6 Crane superstructure

For the weight data of assembly connections the following is valid:

- Including two slewing gears.
- Without winch 1 **WI** and winch 2 **WII**.
- SA-frame with winch 4 **WIV** including rope and pulley set.

Version	Weight		Width
	Without SA-frame	With SA-frame	
Without Quick connection	36.0 t	54.0 t	3.00 m
With Quick connection	37.0 t	55.0 t	3.00 m

1.7 Winch 1

Component	Weight	Width
Winch 1 WI including rope	8.8 t	1.80 m

1.8 Winch 2

Component	Weight	Width
Winch 2 WII including rope	8.8 t	1.80 m

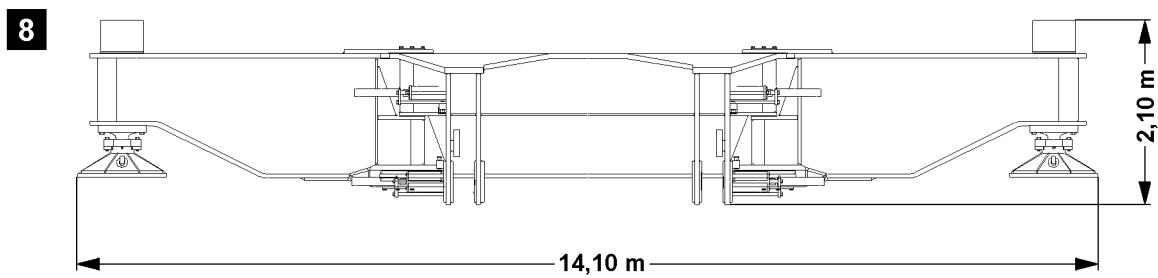
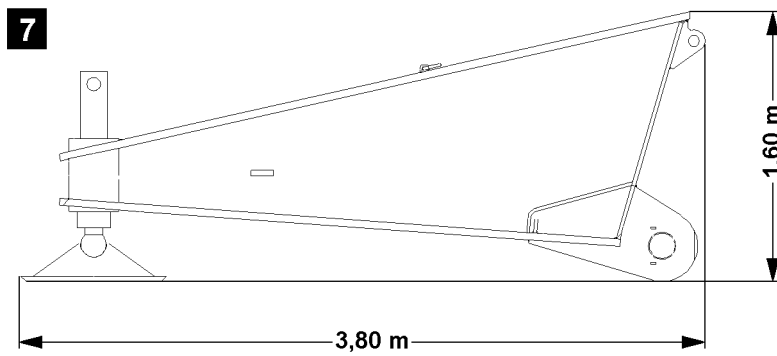
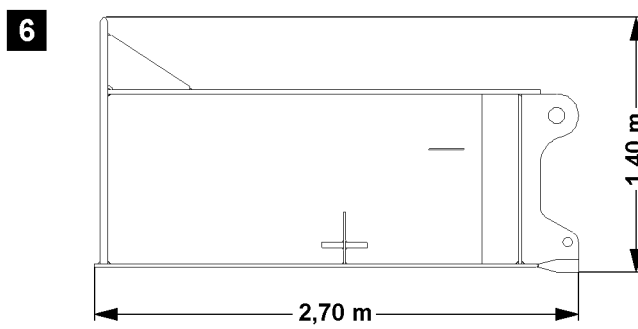
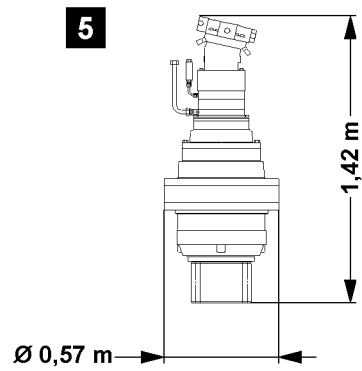


Fig.108723

1.9 Slewing gear

See illustration 5.

Component	Weight	Diameter
Slewing gear	0.9 t	0.57 m

1.10 Turntable extension*

See illustration 6.

Component	Weight	Width
Turntable extension	5.0 t	3.00 m

1.11 Mechanical auxiliary support*

See illustration 7.

Component	Weight	Width
Mechanical auxiliary support with support plate, version for light crawler carrier	2.5 t	0.80 m
Mechanical auxiliary support with support plate, version for heavy crawler carrier	2.8 t	0.80 m

1.12 Hydraulic crane support*

See illustration 8.

Component	Weight	Width
Hydraulic crane support with support pads	29.3 t	2.20 m

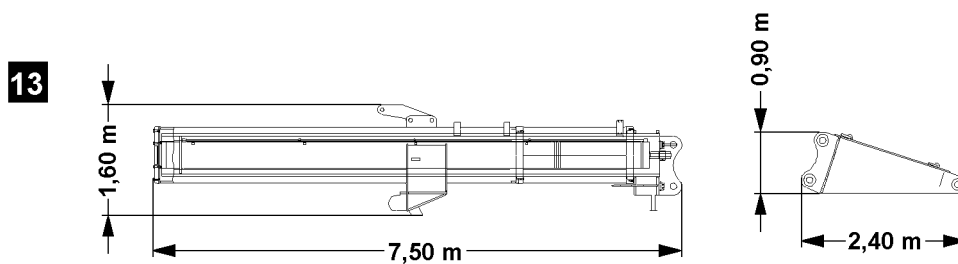
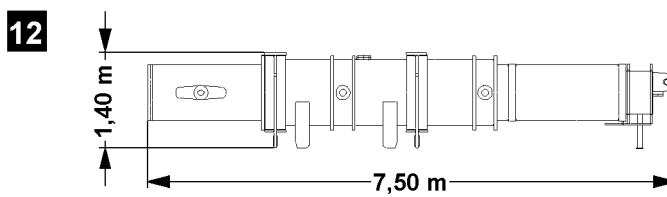
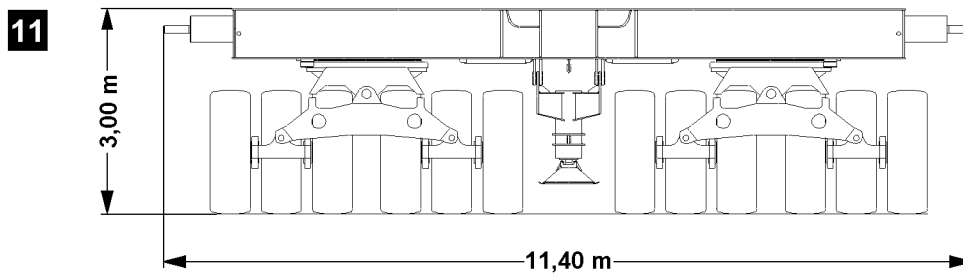
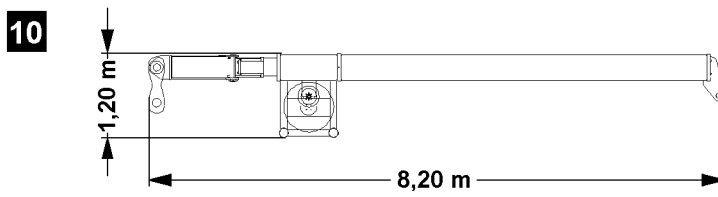
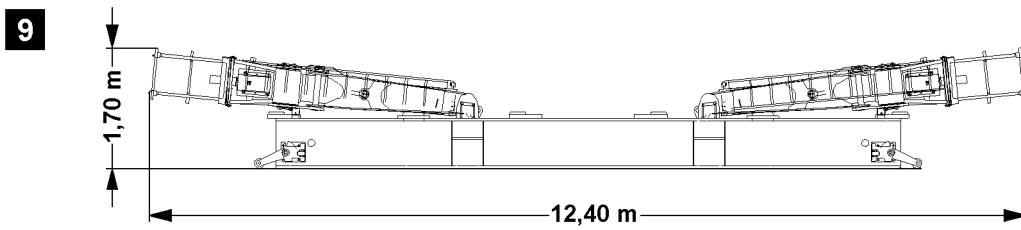


Fig.108724

1.13 Ballast pallet suspended ballast*

See illustration 9.

Component	Weight	Width
Ballast pallet suspended ballast	14.0 t	2.50 m

1.14 Guide frame ballast pallet*

See illustration 10.

Component	Weight	Width
Guide frame ballast pallet	8.6 t	3.00 m

1.15 Ballast trailer*

See illustration 11.

Component	Weight	Width
Ballast trailer	50.0 t	2.50 m

1.16 Ballast trailer guide*

1.16.1 Variation 1

See illustration 12.

Component	Weight	Width
Ballast trailer guide	22.0 t	2.60 m

1.16.2 Variation 2

See illustration 13, two part version

Component	Weight	Width
Ballast trailer guide	13.2 t	2.70 m
Intermediate section 2.00 m for ballast trailer	2.3 t	2.50 m

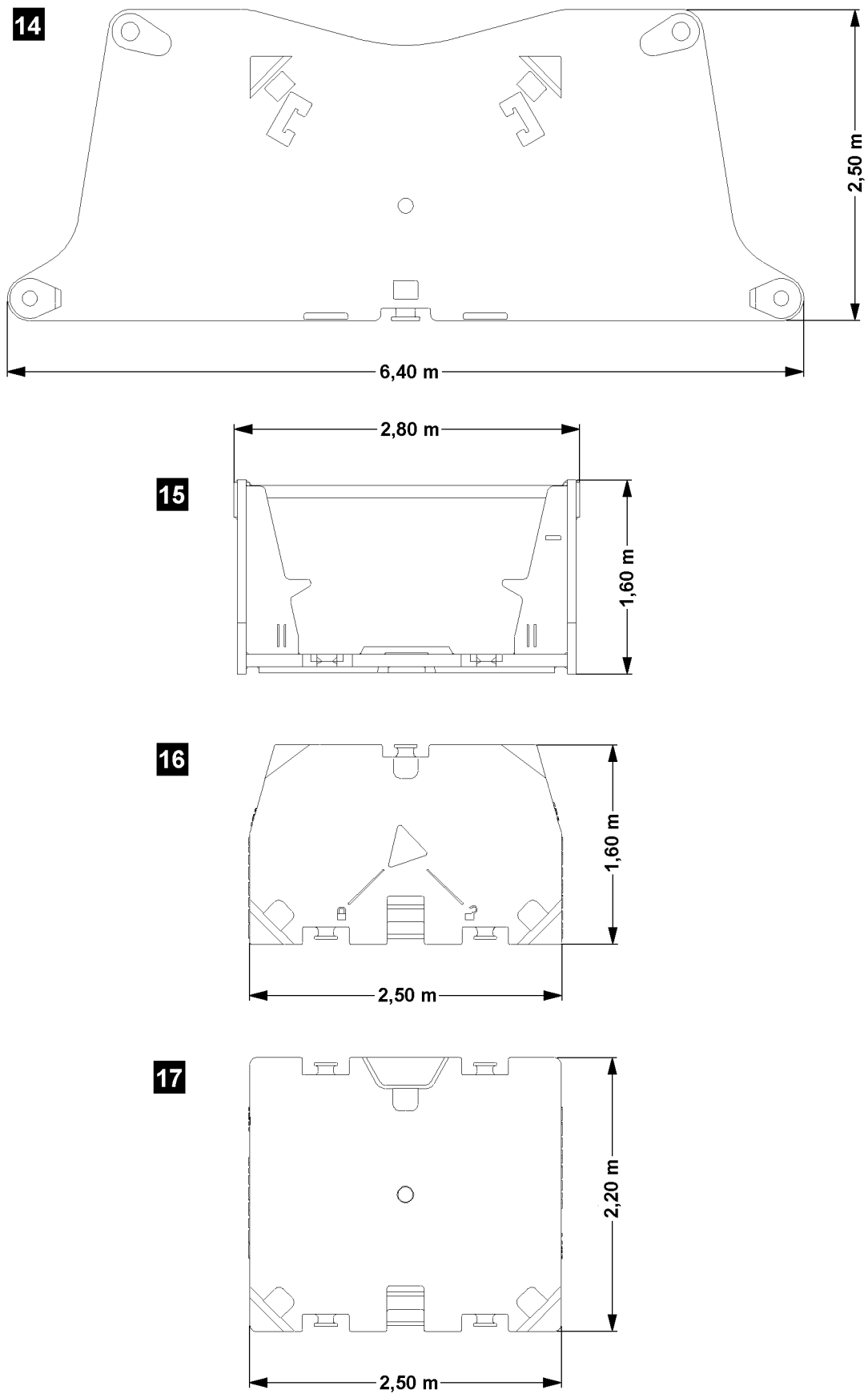


Fig.108725

1.17 Central ballast base plate

See illustration 14.

Component	Weight	Width
Central ballast base plate	14.0 t	2.50 m

1.18 Bracket counterweight

See illustration 15.

Component	Weight	Width
Console counterweight for turntable ballast	8.6 t	3.00 m

1.19 Ballast / counterweight

Variation 1 and variation 2 can be used as:

- Central ballast
- Counterweight turntable
- Derrick ballast



Note

► Twist lock*: For comfortable installation of ballast / counterweight!

1.19.1 Variation 1

See illustration 16, shown with Twist lock.

Component	Weight	Height	
		without Twist lock	with Twist lock
Counterweight 7.5 t	7.5 t	0.35 m	0.37 m
Counterweight 10.0 t	10.0 t	0.45 m	0.47 m

1.19.2 Variation 2

See illustration 17, shown without Twist lock.

Component	Weight	Height	
		without Twist lock	with Twist lock
Counterweight 6.25 t	6.3 t	0.30 m	-
Counterweight 12.5 t	12.5 t	0.45 m	0.47 m
Counterweight 25.0 t	25.0 t	0.74 m	-

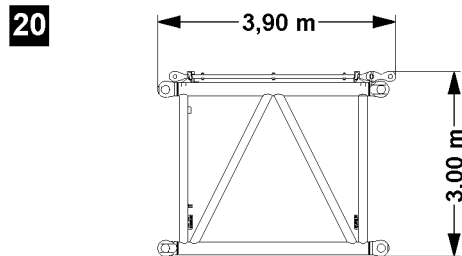
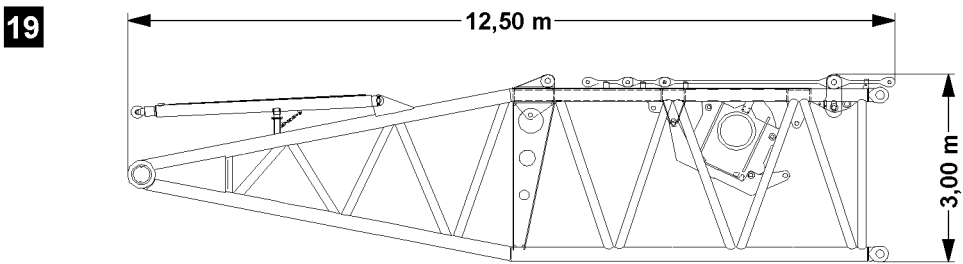
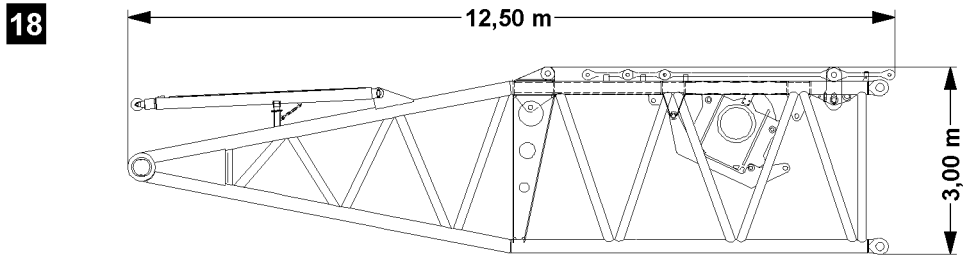


Fig.108771

LWE/LR 1750-000/12812-15-02/en

1.20 S-pivot section 12 m , 2826.20

See illustration 18.

Component	Weight	Width
S-pivot section complete	32.9 t	3.00 m
S-pivot section	14.4 t	
S-relapse cylinder	1.3 t	
Winch 5 with rope	9.5 t	
Winch 6 with rope	6.4 t	
S- and W- guy rods	1.3 t	

1.21 S-pivot section 12 m , 2826.30

See illustration 19.

Component	Weight	Width
S-pivot section complete	33.7 t	3.00 m
S-pivot section	15.2 t	
S-relapse cylinder	1.3 t	
Winch 5 with rope	9.5 t	
Winch 6 with rope	6.4 t	
S- and W- guy rods	1.3 t	

1.22 S-intermediate section 3.5 m , 2826.30

See illustration 20.

Component	Weight	Width
S-intermediate section complete	4.2 t	3.00 m
S-intermediate section	3.5 t	
S- and WA-frame 2 guy rods	0.7 t	

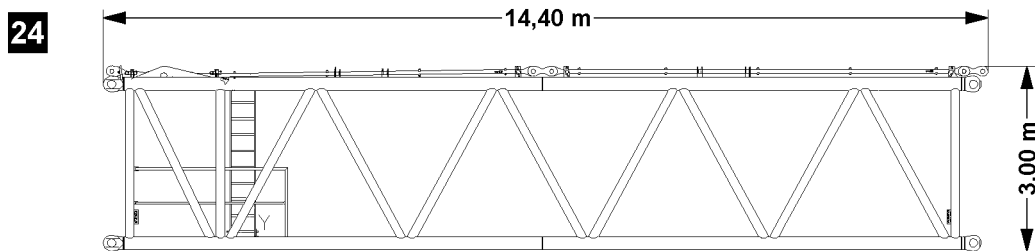
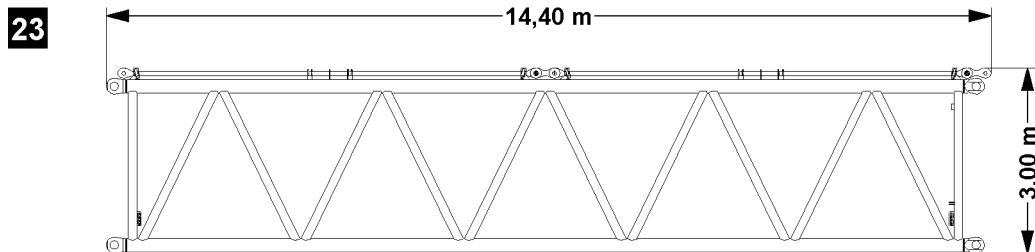
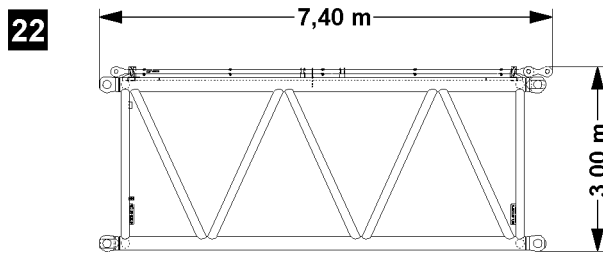
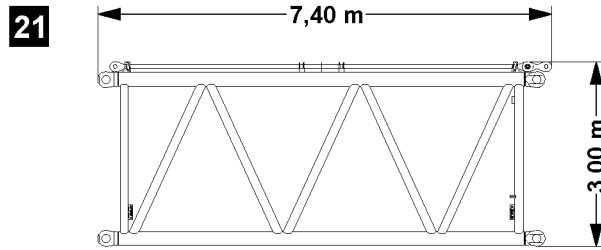


Fig.108772

LWE/LR 1750-000/12812-15-02/en

1.23 S-intermediate section 7.0 m , 2826.20

See illustration 21.

Component	Weight	Width
S-intermediate section complete	6.9 t	3.00 m
S-intermediate section	5.6 t	
S- and WA-frame 2 guy rods	1.3 t	

1.24 S-intermediate section 7.0 m , 2826.30

See illustration 22.

Component	Weight	Width
S-intermediate section complete	7.5 t	3.00 m
S-intermediate section	6.2 t	
S- and WA-frame 2 guy rods	1.3 t	

1.25 S-intermediate section 14.0 m , 2826.20

See illustration 23.

Component	Weight	Width
S-intermediate section complete	12.5 t	3.00 m
S-intermediate section	10.0 t	
S- and WA-frame 2 guy rods	2.5 t	

1.26 S-intermediate section 14.0 m , 2826.20 reinforced

See illustration 24.



Note

► Reinforced version for flying assembly!

Component	Weight	Width
S-intermediate section complete	12.8 t	3.00 m
S-intermediate section	10.3 t	
S- and WA-frame 2 guy rods	2.5 t	

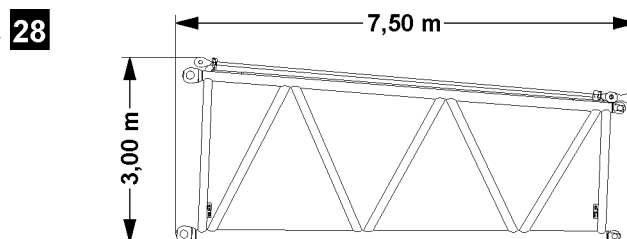
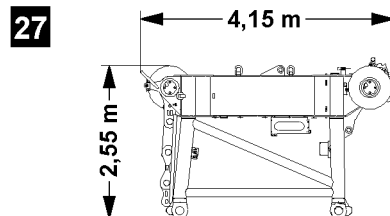
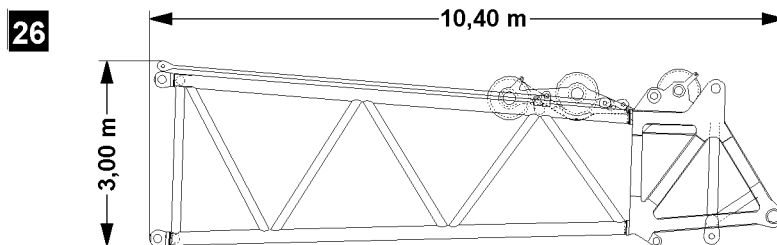
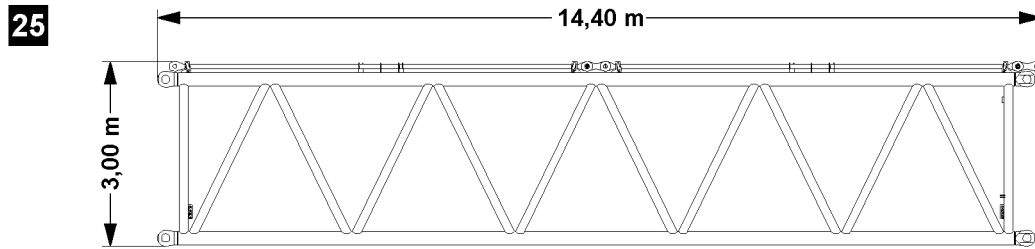


Fig.108773

1.27 S-intermediate section 14.0 m , 2826.30

See illustration 25.

Component	Weight	Width
S-intermediate section complete	13.8 t	3.00 m
S-intermediate section	11.3 t	
S- and WA-frame 2 guy rods	2.5 t	

1.28 S-end section

See illustration 26.

Component	Weight	Width
S-end section	11.5 t	3.00 m

1.29 S-end section 750 t

See illustration 27.

Component	Weight	Width
S-end section	8.5 t	3.00 m

1.30 SL-reducer section 7.0 m

See illustration 28.

Component	Weight	Width
SL-reducer section complete	4.5 t	3.00 m
SL-reducer section	3.8 t	
Guy rods	0.7 t	

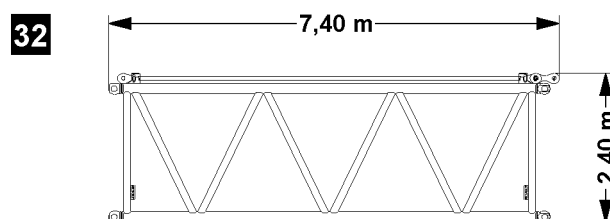
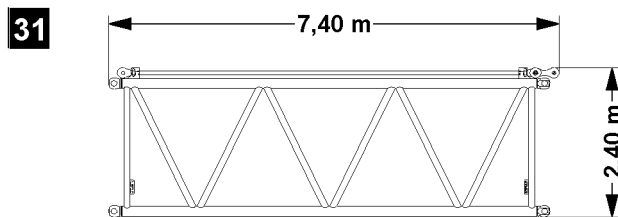
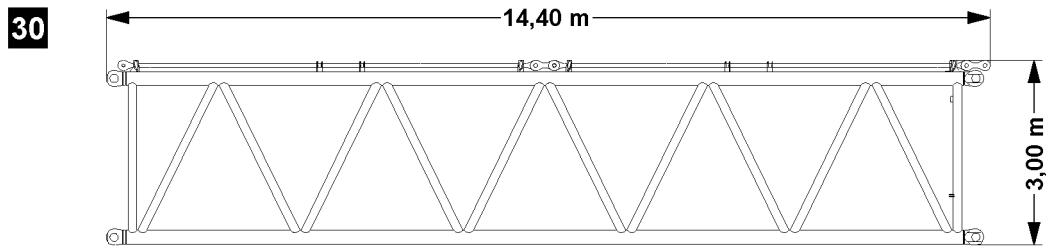
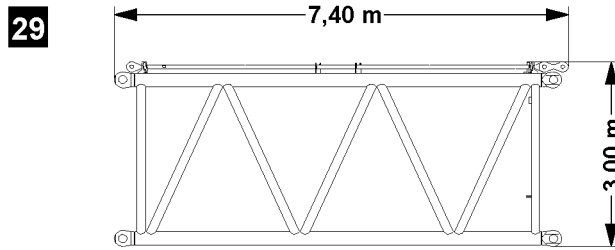


Fig.108774

1.31 LA-intermediate section 7.0 m , 2826.10

See illustration 29.

Component	Weight	Width
LA-intermediate section complete	4.6 t	3.00 m
LA-intermediate section	3.9 t	
Guy rods	0.7 t	

1.32 LA-intermediate section 14.0 m , 2826.10

See illustration 30.

Component	Weight	Width
LA-intermediate section complete	8.1 t	3.00 m
LA-intermediate section	6.8 t	
Guy rods	1.3 t	

1.33 LI-intermediate section 7.0 m , 2421.8

See illustration 31.

Component	Weight	Width
LI-intermediate section complete	3.2 t	2.60 m
LI-intermediate section	2.5 t	
Guy rods	0.7 t	

1.34 LI-intermediate section 7.0 m , 2421.10

See illustration 32.

Component	Weight	Width
LI-intermediate section complete	3.9 t	2.60 m
LI-intermediate section	3.2 t	
Guy rods	0.7 t	

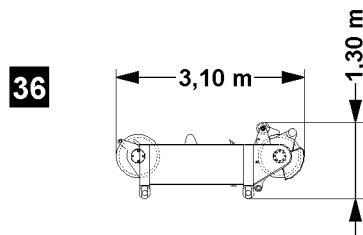
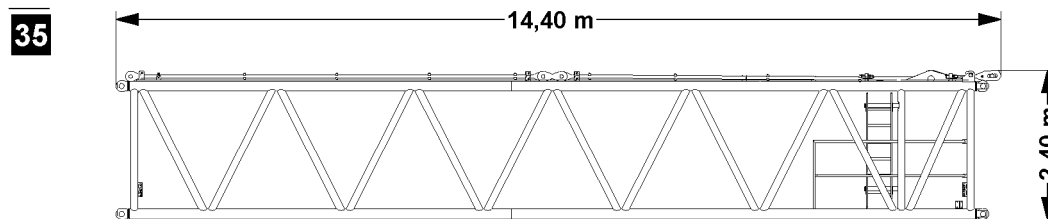
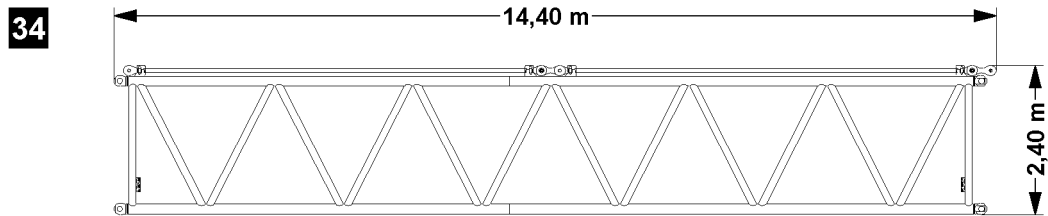
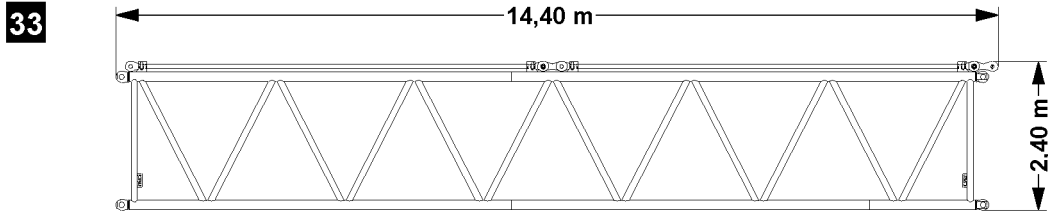


Fig.108775

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1.35 LI-intermediate section 14.0 m , 2421.8

See illustration 33.

Component	Weight	Width
LI-intermediate section complete	5.7 t	2.60 m
LI-intermediate section	4.4 t	
Guy rods	1.3 t	

1.36 LI-intermediate section 14.0 m , 2421.10

See illustration 34.

Component	Weight	Width
LI-intermediate section complete	7.0 t	2.60 m
LI-intermediate section	5.7 t	
Guy rods	1.3 t	

1.37 LI-intermediate section 14.0 m , 2421.10 reinforced

See illustration 35.



Note

► Reinforced version for flying assembly!

Component	Weight	Width
LI-intermediate section complete	7.7 t	2.60 m
LI-intermediate section	6.3 t	
Guy rods	1.4 t	

1.38 L-end section 400 t

See illustration 36.

Component	Weight	Width
L-end section	3.5 t	2.30 m
L-end section for boom nose 120 t	3.6 t	2.30 m

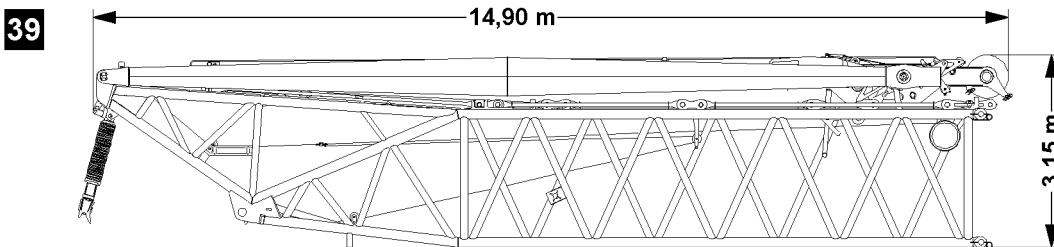
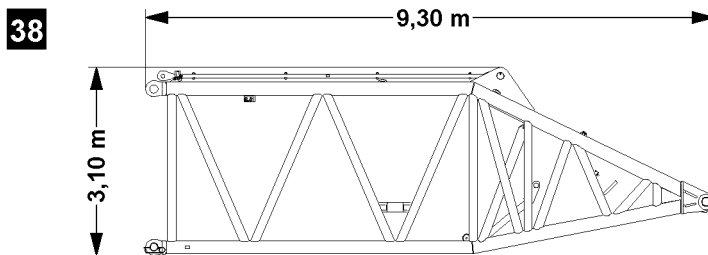
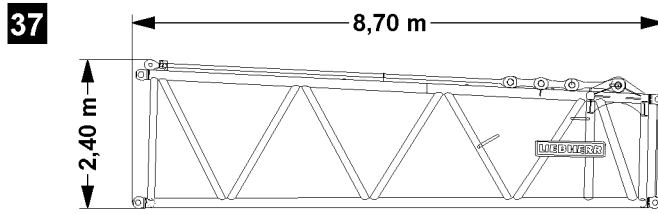


Fig.108785

LWE/LR 1750-000/12812-15-02/en

1.39 L-adapter 8.4 m

See illustration 37.

Component	Weight	Width
L-adapter complete	5.4 t	2.60 m
L-adapter	4.7 t	
Guy rods	0.7 t	

1.40 K-adapter 9.0 m

See illustration 38.

Component	Weight	Width
K-adapter complete	8.8 t	3.00 m
K-adapter	8.3 t	
Guy rods	0.5 t	

1.41 K-assembly unit

See illustration 39.

Component	Weight	Width
K-assembly unit complete	15.7 t	3.00 m
K-pivot section	9.0 t	
KA-frame	5.3 t	
Guy rods with cross beam	1.4 t	

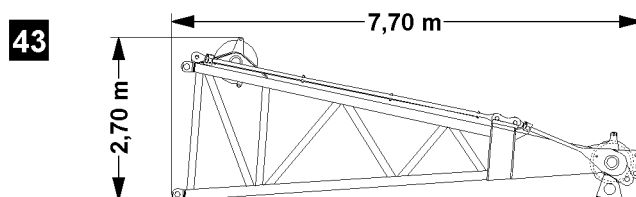
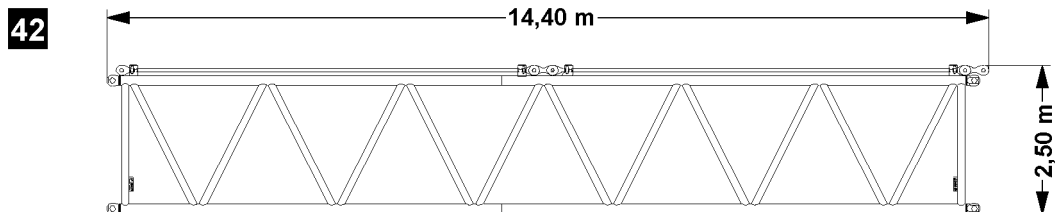
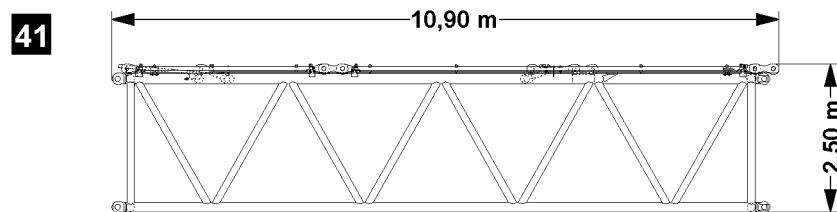
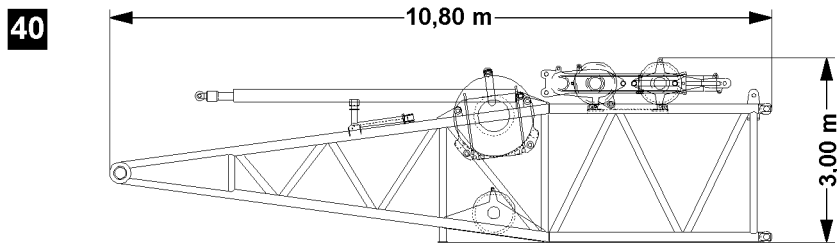


Fig.108786

1.42 D-pivot section 10.5 m

See illustration 40.

Component	Weight	Width
D-pivot section, complete	21.2 t	2.80 m
D-pivot section	5.7 t	
D-relapse retainer	1.5 t	
Winch III with rope	8.8 t	
Pulley blocks	4.5 t	
Guy rods	0.7 t	

1.43 D-intermediate section 10.5 m

See illustration 41.

Component	Weight	Width
D-intermediate section complete	7.0 t	2.60 m
D-intermediate section	5.7 t	
Guy rods	1.3 t	

1.44 D-intermediate section 14.0 m

See illustration 42.

Component	Weight	Width
D-intermediate section complete	8.7 t	2.60 m
D-intermediate section	6.9 t	
Guy rods	1.8 t	

1.45 D-end section 7.0 m

See illustration 43.

Component	Weight	Width
D-end section complete	8.7 t	2.60 m
D-end section	6.9 t	
B- and SA- guy rods	1.8 t	

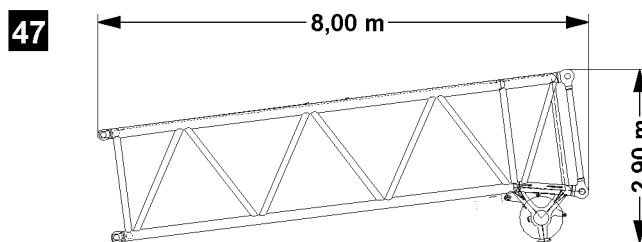
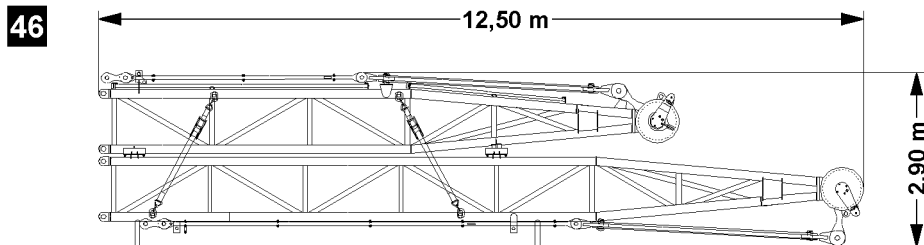
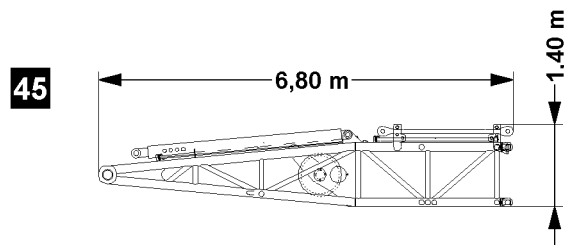
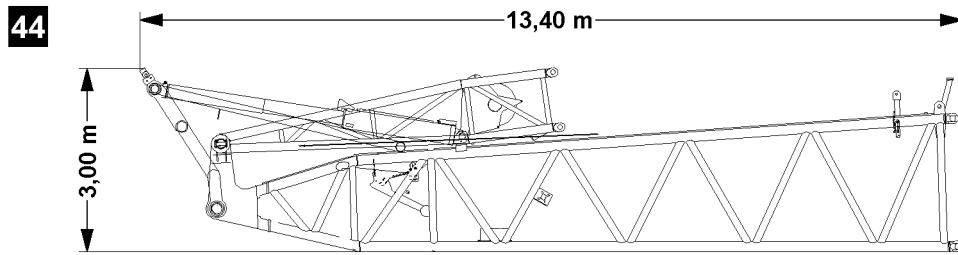


Fig.108787

1.46 W-pivot section 12 m with WA-frame 1 pivot section

See illustration 44 - Transport unit.

Component	Weight	Width
W-pivot section 12 m , with WA-frame 1 pivot section complete	10.6 t	2.80 m

1.47 WA-frame 2, pivot section

See illustration 45.

Component	Weight	Width
WA-frame 2, pivot section	3.5 t	2.80 m

1.48 WA-frame 1 and WA-frame 2 end sections

See illustration 46 - Transport unit.

Component	Weight	Width
WA-frame 1 and WA-frame 2 end sections	9.6 t	2.70 m

1.49 Adapter for boom nose 100 t

See illustration 47.

Component	Weight	Width
Adapter for boom nose 100 t	3.5 t	2.40 m

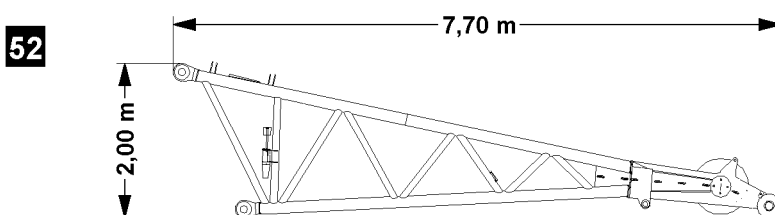
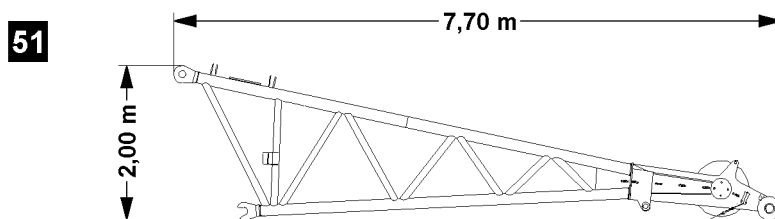
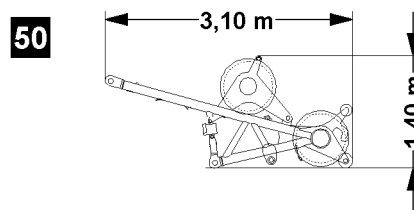
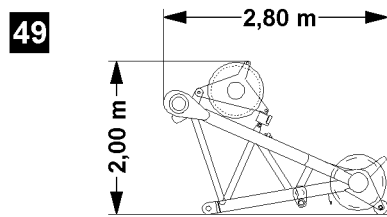
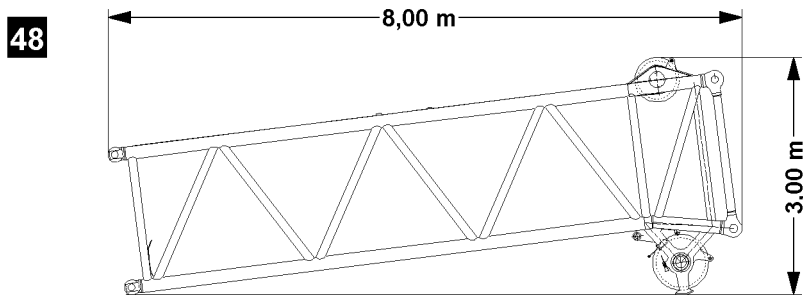


Fig.108788

1.50 Adapter for boom nose 120 t

See illustration 48.

Component	Weight	Width
Adapter for boom nose 120 t	3.7 t	2.40 m

1.51 Boom nose 60 t for S-end section

See illustration 49.

Component	Weight	Width
Boom nose 60 t for S-end section	1.1 t	2.20 m

1.52 Boom nose 60 t for L-end section / L-adapter

See illustration 50.

Component	Weight	Width
Boom nose 60 t for L-end section / L-adapter	0.8 t	0.80 m

1.53 Boom nose 100 t for L-end section / L-adapter

See illustration 51.

Component	Weight	Width
Boom nose 100 t for L-end section / L-adapter	2.4 t	2.30 m

1.54 Boom nose 120 t for L-end section / L-adapter

See illustration 52.

Component	Weight	Width
Boom nose 120 t for L-end section / L-adapter	2.4 t	2.30 m

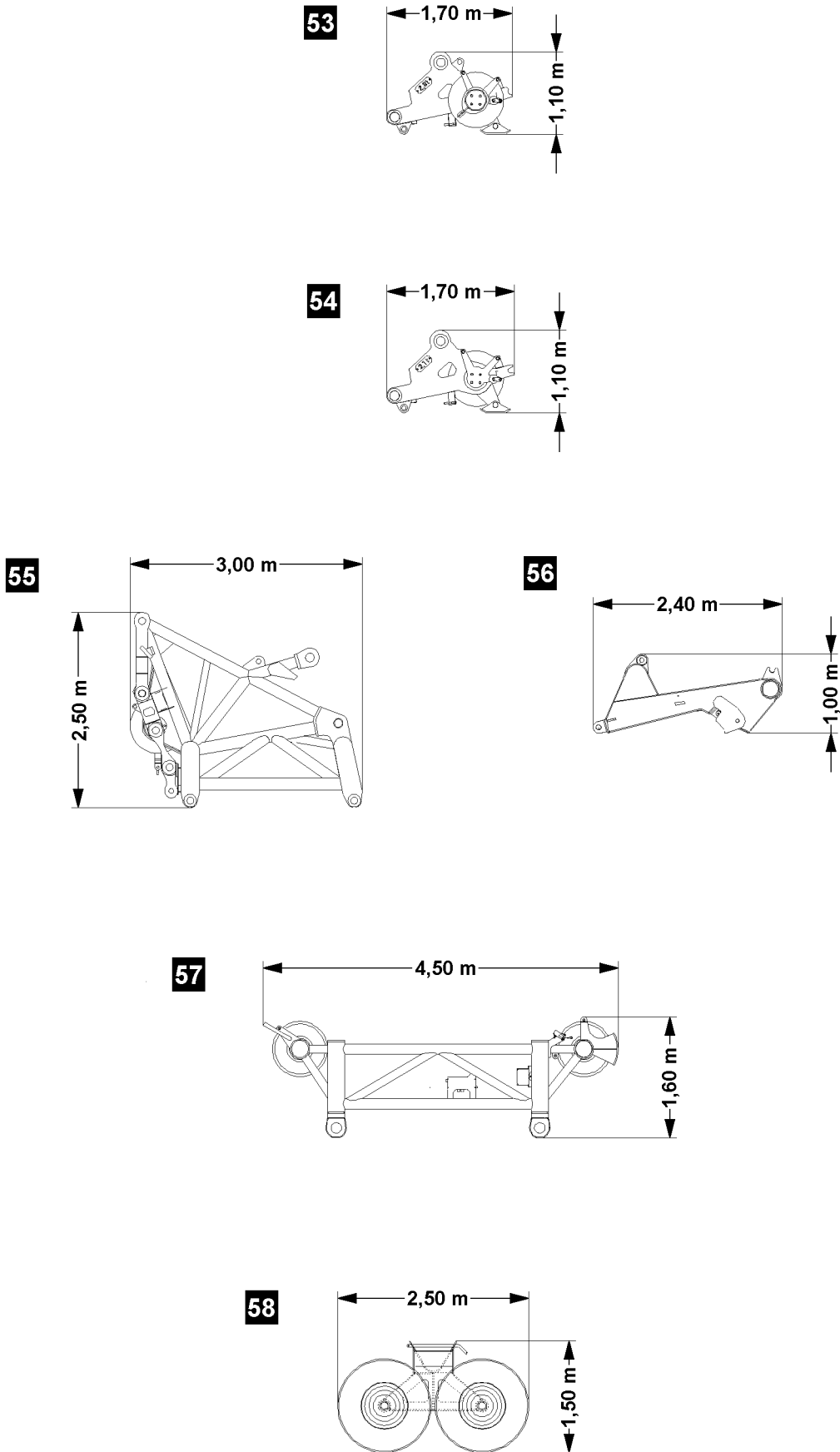


Fig.108790

LWE/LR 1750-000/12812-15-02/en

1.55 Pulley set 400 t

See illustration 53.

Component	Weight	Width
Pulley set 400 t S-end section	2.1 t	1.70 m

1.56 Pulley set 600 t

See illustration 54.

Component	Weight	Width
Pulley set 600 t S-end section	2.8 t	2.60 m

1.57 W-adapter for pulley sets 400 t and 600 t

See illustration 55 and illustration 56

Component	Weight	Width
W-adapter complete	5.9 t	2.50 m
W-adapter part 1 illustration 55	4.6 t	2.50 m
W-adapter part 2 illustration 56	1.3 t	2.20 m

1.58 Assembly head 47 t

See illustration 57.

Component	Weight	Width
Assembly head 47 t	2.3 t	3.00 m

1.59 Pulley cart

See illustration 58.

Component	Weight	Width
Pulley cart	1.9 t	3.40 m

2 Load handling equipment



Note

► For load handling equipment, see load chart manual!

3 Ground pressure

3.1 Ground pressure crawler travel gear

Maximum ground pressure Crawler travel gear	Track pad width	
	1.50 m	2.00 m
At nominal load	2400 kN/m ²	1750 kN/m ²

3.2 Ground pressure hydraulic crane support

Maximum support pressure	Per support
At nominal load	4750 kN

4 Workplace-related emission value

Sound pressure level at nominal engine rpm	Stationary noise L_{pAeq}	
	Left ear	Right ear
Crane operator's cab	72 db(A)	

5 Vibrations

Vibrations transferred to the operator	Value
Total vibration value to which the upper body limbs are exposed	not more than 2.5 m/s ²
Effective value of weighted acceleration to which the entire body is exposed	not more than 0.5 m/s ²

6 Crane speeds



Note

► The crane speeds refer to an engine speed of 1900 rpm.

6.1 Crane speeds Winches

Drive	Speed
Winch 1	0 m/min to 130 m/min for single strand
Winch 2	0 m/min to 130 m/min for single strand
Winch 3	0 m/min to 130 m/min for single strand

Drive	Speed
Winch 4	2 x 0 m/min to 70 m/min for single strand
Winch 5	0 m/min to 130 m/min for single strand
Winch 6	0 m/min to 130 m/min for single strand

6.2 Crane speed slewing gear

Drive	RPM
Slewing gear	0 rpm to 1.5 rpm

7 Ropes

7.1 Hoist ropes

Component	Rope diameter	Rope category number RCN
Winch 1	28 mm	See Rope certificate
Winch 2	28 mm	See Rope certificate
Winch 6	28 mm	See Rope certificate

7.2 Control ropes

Component	Rope diameter	Rope category number RCN
Winch 3	28 mm	See Rope certificate
Winch 4	28 mm	See Rope certificate
Winch 5	28 mm	See Rope certificate

7.3 Guy ropes

Component	Rope diameter	Rope category number RCN
Auxiliary guying	32 mm	See Rope certificate

7.4 Assembly rope

Component	Rope diameter	Rope category number RCN
Assembly winch	8 mm	See Rope certificate

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2 Safety

Fig.195219

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1 Planning Crane operation

In addition to a perfectly working crane and a well-trained crew, the **planning for crane operation** is an important principle for safe crane operation.



WARNING

Missing information!

Death, severe bodily injuries, property damage.

► Obtain the required information and adhere to it.

Obtain the following information before crane operation and adhere to it:

- Type of crane operation
- National laws and regulations
- Height and width clearance measurements
- When mobile crane: Job site, distance and travel route
- Space prerequisites at the job site
- Electrical transmission lines with voltage data
- Movement restrictions caused by buildings
- Weight and dimensions of the load(s) to be lifted
- Geometric form and air resistance coefficient of the load(s) to be lifted
- Required lifting height and boom projection
- Ground bearing capacity at the job site
- Required space for the assembly and disassembly of the crane
- Weather data and weather forecasts

Assemble the equipment for crane operation:

- Hook block / load hook
- Auxiliary boom
- Fastening equipment
- Counterweight
- Base materials for support plates

Fig.195219

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**Note**

- ▶ The illustrations in this chapter are only examples. The illustrations may differ depending on the crane model.

1 Danger zone of crane

1.1 Crane in operation

The danger zone of the crane is made up of the areas which are accessed during crane operation by the load or by movements of the crane or the crane components.

**WARNING**

Do not stay in danger zone!

Personnel within the danger zone can be hit by falling loads or components.

Personnel in the danger zone can be caught by moving crane components or loads.

Fatal or severe injuries can be the result.

- ▶ Warn any personnel within the danger zone with the warning device of the crane.
- ▶ After the warning is issued, wait and ensure that no personnel remains within the danger zone.
- ▶ If required, block off the danger zone with a safety distance.

1.2 Crane out of service

Place the crane out of service, failure to comply with the regulations represents considerable danger for the entire area around the crane.

**WARNING**

Actual wind speed higher than the wind speed permitted for the crane set up configuration!

Personnel within the danger zone can be hit by a toppling crane or crane components.

- ▶ Make sure that the condition of the crane complies with the regulations and the wind speed charts.
- ▶ If required, block off the danger zone with a safety distance.

**WARNING**

Icing on the boom!

Personnel within the danger zone can be hit by a falling ice.

- ▶ Make sure that there are no persons within the danger zone.
- ▶ If required, block off the danger zone with a safety distance.

2 Traffic endangerment and environmental damage

**WARNING**

Danger of slipping and skidding!

If the road becomes contaminated due to technical defects, open tank covers or leaking hydraulic oil, then this would pose a severe traffic endangerment.

Fatal accidents can result.

- ▶ Remove oil immediately and thoroughly.

3 Endangering air traffic

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

**WARNING**

Endangering air traffic!

If no protective measures are taken, this can result in endangerment to air traffic.

- ▶ Get the approval from agency responsible for air traffic.
- ▶ Install the airplane warning light on the boom head and turn it on.
- ▶ If the airplane warning lights is operated for a longer period of time, with the engine turned off, then the battery can be discharged and as the result the airplane warning light turns off. To prevent the battery from discharging, an external electrical power supply must be established.

4 Movement on the crane

**WARNING**

Danger of slipping and falling!

The traction of steps, walkways and hand rails changes due to effects of the weather, such as wetness, ice, snow, frost and dirt.

Personnel can be severely injured or killed.

The crane can be damaged.

- ▶ Step on the walkways and steps only by taking the present conditions into account, such as icing in winter or dirt.
- ▶ Step or place a load only on the approved walkways and steps.
- ▶ Observe the signage.
- ▶ Replace damaged safety signs (warning signs) immediately.

5 Emergency exit

5.1 Emergency exit - driver's cab

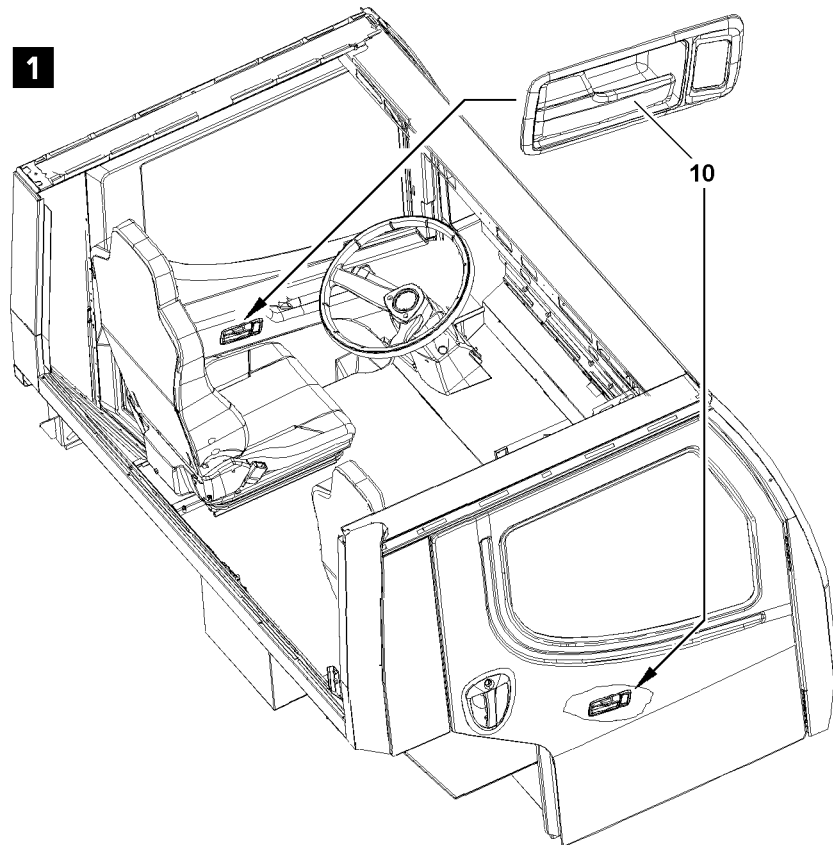


Fig.120932: Example for emergency exit - driver's cab

The driver's cab can be exited through the „left driver's door“ or the „right passenger door“, see illustration 1.



Note

- ▶ Exit the driver's cab through the „left driver's door“ or the „right passenger door“, see illustration 1: Pull and open the door handle 10 on the „left driver's door“ or the „right passenger door“.

5.2 Emergency exist crane cab



WARNING

Danger of falling!

If the crane driver cannot leave the crane cab through the door or if the crane cab is tilted, then there is a danger of falling during the emergency exit.

Death or severe injuries.

- ▶ Exit carefully in an emergency.

During the emergency exit there is an increase danger of accidents:

- ▶ Accept third-party assistance.

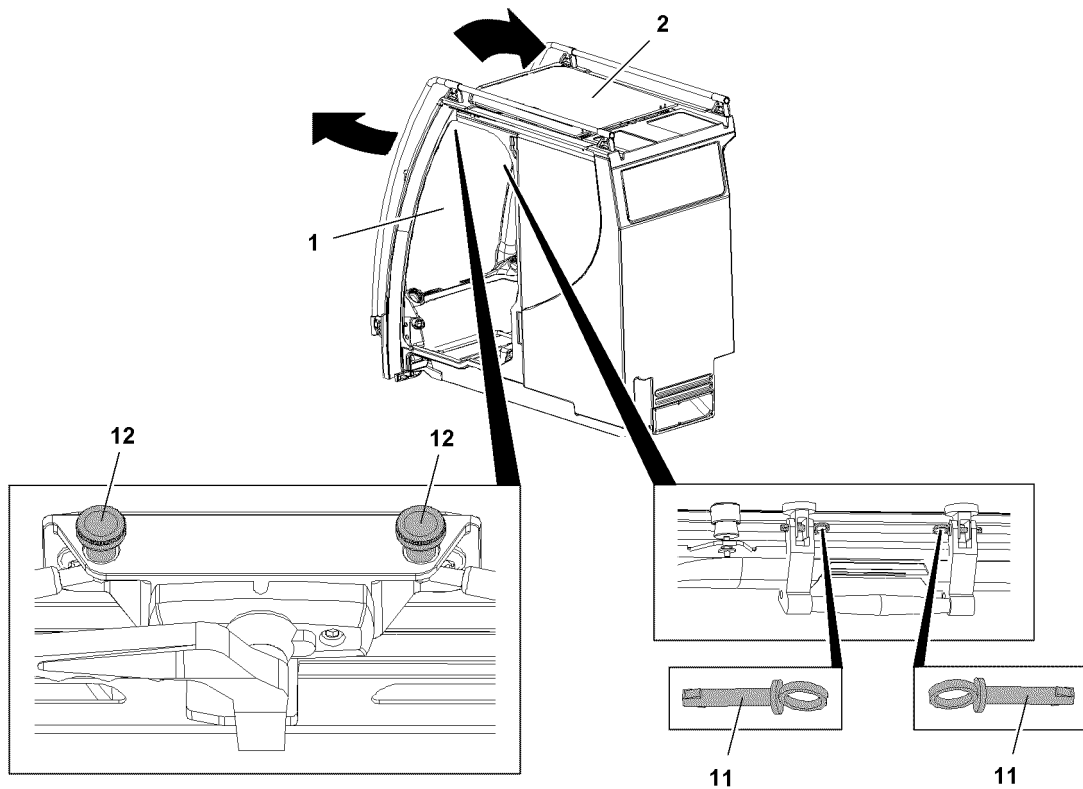


Fig.121111: Examples for emergency exit from the crane cab

If the emergency exit through the door is not possible, then the crane cab can be exited through additional openings.

The following openings are possible:

- 1 Front window
- 2 Roof window

5.2.1 Emergency exit through front window

- Unlock all turn handles.
- Open the front window 1.
- Leave the crane cab through the front window 1.

5.2.2 Emergency exit through the roof window

There are two ways to unlock the roof window 2 for the emergency exit:

- Unpin both pins 11.
- Release both thumbscrews 12.
- Unlock all turn handles.
- Unlock the roof window 2 for the emergency exit.
- Open the roof window 2.
- Leave the crane cab through the roof window 2.

5.2.3 Emergency exit with EMERGENCY hammer*

Certain crane types carry an EMERGENCY hammer* in the crane cab.

- Knock the window out with the EMERGENCY hammer* or a suitable object.
- Leave the crane cab.

6 Personal protective equipment

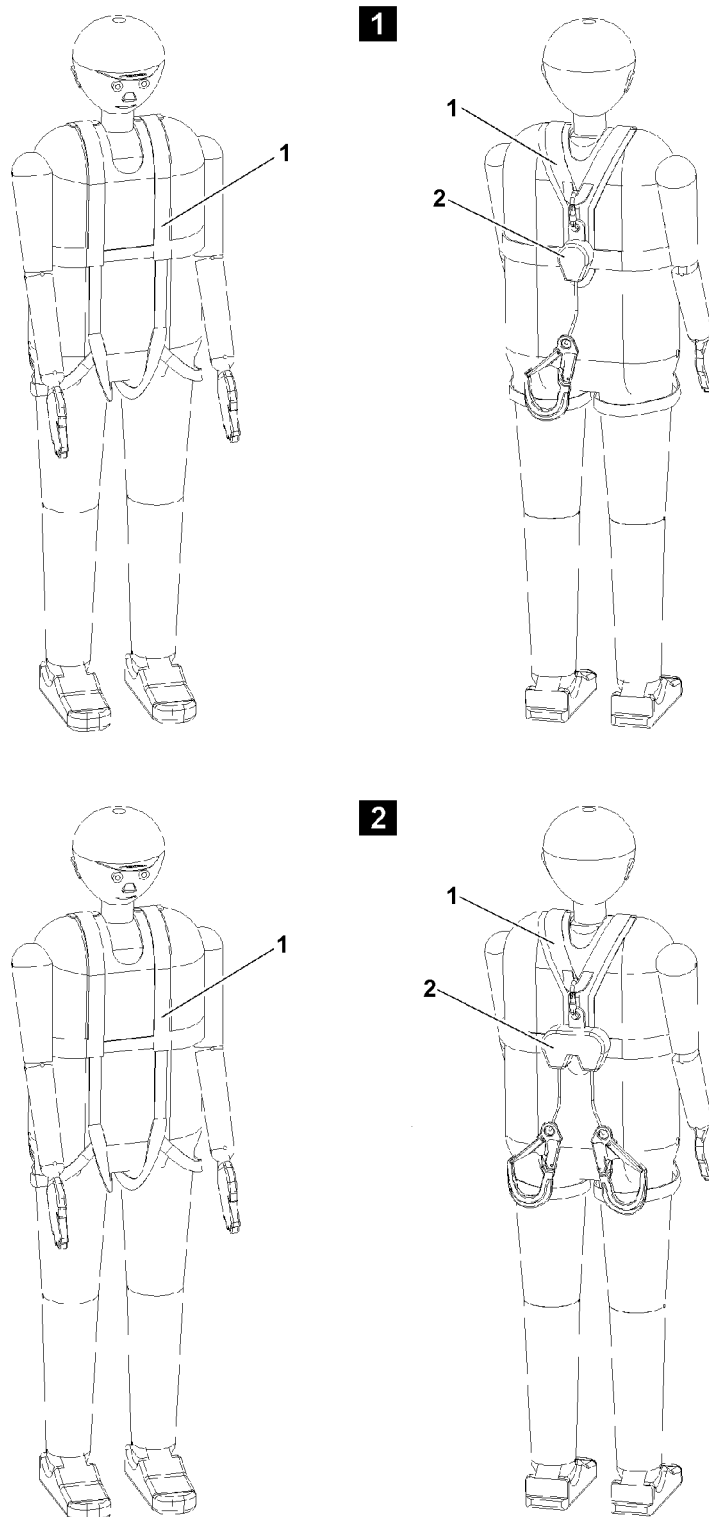


Fig.121161: Examples for safety harness and height safety equipment

**WARNING**

Danger of falling!

If personal protective equipment is not worn during assembly or maintenance work, then the assembly personnel can be killed or severely injured.

- ▶ Observe and adhere the operating instructions and maintenance instructions of the manufacturer for the personal protective equipment.
- ▶ Ensure through regular inspections that the product identification is not damaged.
- ▶ The crane operator must make personal protective equipment available for the assembly personnel.
- ▶ The crane operator must ensure that the personal protective equipment is worn by the assembly personnel.
- ▶ The assembly personnel is obligated to carry the personal protective equipment and to wear it.
- ▶ Check personal protective equipment before use for damage and completeness.
- ▶ Replace defective or damaged personal protective equipment with functioning protective equipment.

**WARNING**

Impermissible fall arrest system!

If a fall arrest system is used, which was not obtained via Liebherr-Werk Ehingen GmbH, there is a danger of falling. Another fall arrest system is **NOT** designed for the crane structure.

Personnel can be severely injured or killed.

- ▶ Utilize exclusively fall arrest systems from Liebherr-Werk Ehingen GmbH.

The personal protective equipment includes the following equipment:

- Supplied fall arrest systems (safety harness **1** and height rescue equipment **2**).
- Head protection with chin strap: Protection from falling parts at assembly and disassembly. Hitting the head during assembly and disassembly work
- Non-skid and slip resistance safety gloves
As a rule, when working with ropes, penetration safe safety gloves must be used.
- Safety shoes: Protection from falling parts at assembly and disassembly.
- Warning apparel

**WARNING**

Danger of fatal injury!

Even personal protective equipment does not provide 100 % protection.

A helmet can protect against small falling objects, but not against falling loads.

Personnel can be killed or seriously injured.

- ▶ Always remain alert.
- ▶ Always be safety conscious.
- ▶ Standing under suspended loads is prohibited.

**WARNING**

Danger of accident!

If the following measures are not carried out, personnel can be killed or severely injured.

- ▶ A plan for rescue actions, taking all possible emergencies into account, must be on hand.
- ▶ The following points can endanger the safe function of the personal protective equipment: for example extreme temperatures, routing of connecting devices, routing over or around sharp edges, chemical influences, electrical effects, cuts, abrasion, climatic influences or swing movements during falls.
- ▶ For that reason, safety preparations must be made.

**WARNING**

Important for the safety of the user!

- ▶ If the personal protective equipment is sold to another country, then the purchaser must make the manufacturer's operating instructions as well as the inspection and maintenance documents available in the language of the user country.

6.1 Identification of protective equipment

Every personal protective equipment or other equipment must be marked clearly and permanently in the language of the user country.

If the identification is no longer legible, then the personal protective equipment must be handed to an expert for inspection.

6.2 Supplied fall arrest system (safety harness and height safety equipment)

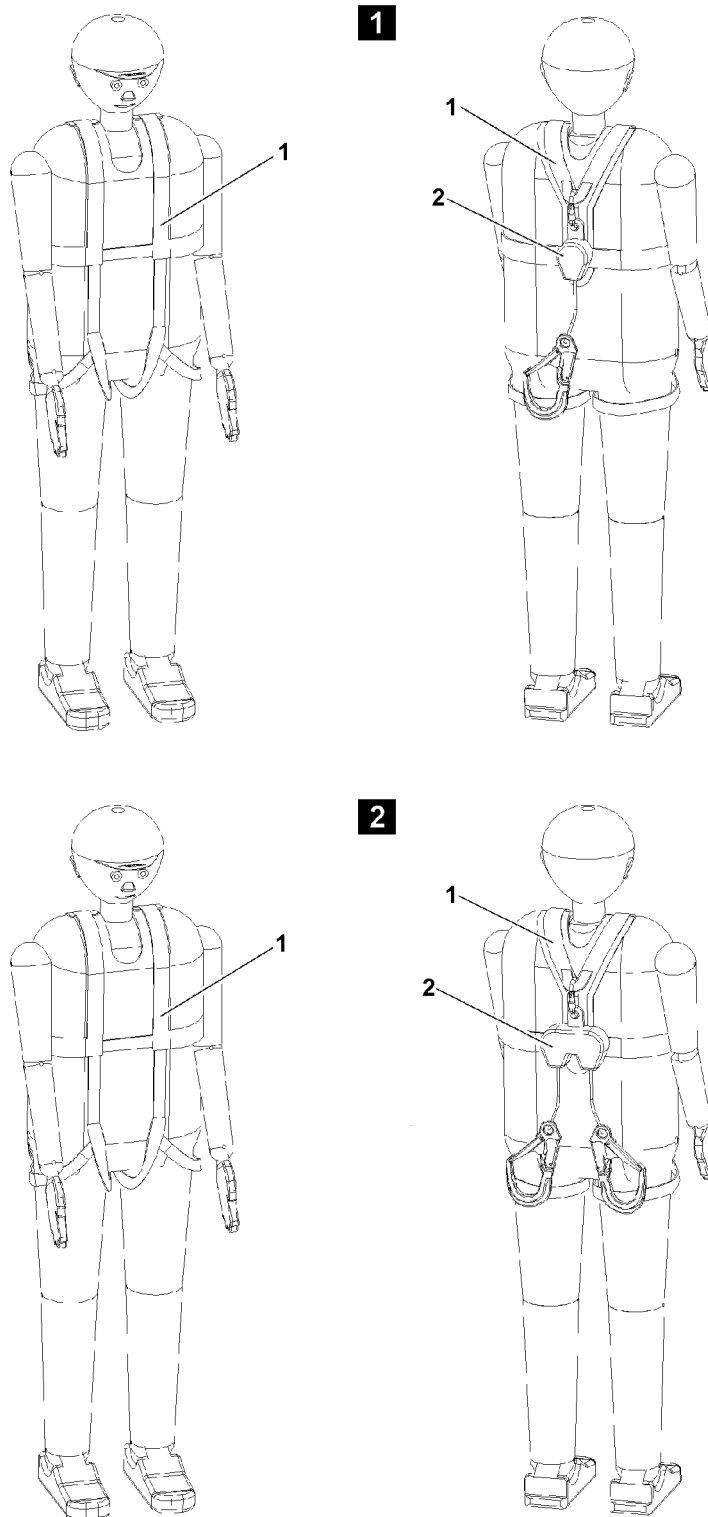


Fig.121161: Examples for safety harness and height safety equipment

The supplied fall arrest system, consisting of safety harness **1** and height safety device **2** must be worn where no other fall protection equipment, such as railings, can be installed for technical reasons.

In these cases, marked fastening and hook points for the fall arrest systems are provided on the components.

Height rescue system, see section "Saving the assembly personnel".



Note

- ▶ For cranes, which do not include the fall arrest system and the height rescue system as part of the scope of delivery can purchase the fall arrest system, consisting of safety harness **1** and height rescue equipment **2** as well as the height rescue system at the Liebherr-Werk Ehingen GmbH.

Part of the category „Aids for working aloft“ are, for example:

- Lifting platforms
- Scaffolding
- Auxiliary cranes
- Ladders



WARNING

Danger of falling!

If the fall arrest system is not worn during assembly or maintenance work, then the assembly personnel can fall down and be killed or severely injured.

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids.
- ▶ If fall protection equipment is available, then the fall protection equipment must be used, see Crane operating instructions, chapter 2.06.
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the supplied fall arrest system to prevent falling.
- ▶ The supplied fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06.
- ▶ The assembly personnel must be instructed in practice on how to wear the supplied fall arrest system (safety harness **1** and height safety equipment **2**). Annual practice instructions and drills must be carried out.
- ▶ The supplied fall arrest system must be used.
- ▶ The fall arrest system consists of a safety harness **1**, approved according to **EN 361** and a height safety equipment **2**, approved according to **EN 360** (for horizontal application and sharp edges).
- ▶ The supplied fall arrest system may not be changed in its configuration. Extending or shortening the fall arrest rope is prohibited.
- ▶ The fall absorber is integrated in the height safety device **2**. The utilization of an additional fall absorber is prohibited.
- ▶ The supplied fall arrest system is effective from a height of 2.5 m.
- ▶ The fall space must be free of obstacles.
- ▶ Solely the intended safety points designed for this purpose on the crane may be used.
- ▶ The operating instructions of the manufacturer for the supplied fall arrest systems (safety harnesses **1** and height safety equipment **2**) must be observed and adhered to.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt.
- ▶ Keep aids, ladders and catwalks free of snow and ice.
- ▶ The safety harness **1** and the height safety equipment **2** must be inspected annually by authorized and trained expert personnel and the results must be documented in the inspection log book.
- ▶ After every fall, the safety harness **1** and the height safety equipment **2** must be removed and inspected by an authorized and trained expert and the results must be documented in the inspection log book.
- ▶ The results must be documented in the inspection log book.
- ▶ Only after written release by expert personnel may the fall arrest system be reused.

6.3 Use of single strand height safety equipment

Height safety equipment with a belt strap, see illustration **1**, is intended for all cranes which have no catwalks with safety ropes. Use the supplied height safety equipment with extendable belt strap and snap hook (**EN 362 Class A**) with swivel.

6.4 Use of double strand height safety equipment

Height safety equipment with two belt straps, see illustration 2, is intended for cranes with catwalks, which are equipped with two ropes as fastening device on the left and right hand side of the catwalk. For example lattice sections, lattice booms, possibly telescopic booms or assembly units. Use the supplied height safety equipment with two extendable belt straps and snap hooks (**EN 362 Class A**) with swivels.



WARNING

Danger of falling!

- ▶ If two safety ropes are installed on the booms, lattice sections and other components, then the height safety equipment with two belt straps must always be used and one belt strap per safety rope must be hooked.

6.5 Documentation Fall arrest systems and Height rescue system



Note

- ▶ The documentation of the fall arrest systems (safety harnesses and height safety equipment) and the height rescue system must be carried out according to the operating instructions of the respective manufacturer.
- ▶ The crane operator, who employs the user, is responsible for the creation of documentation and entry of the required data.

7 Securing persons to prevent them from falling



WARNING

Danger of falling!

- ▶ Wear the supplied fall arrest systems (safety harnesses and height safety equipment) correctly.
- ▶ When accessing a ladder, do not hold any objects in your hands.
- ▶ When accessing a ladder, adhere to the 3-point support. See Crane operating instructions, chapter 2.04.10.

7.1 Working on the telescopic boom head and / or auxiliary boom

Reeve the hoist rope in or out on the pulley head:

- For ladder work, use the supplied ladder. For fastening and hook points, see Crane operating instructions, chapter 2.06.
- For cranes, which carry a ladder along **with** hook device:
Use the hook device to secure the ladder.
- For cranes, which carry a ladder along **without** hook device:
Use the rigging belt to secure the ladder.
- When ascending, the assembly personnel must ensure a 3-point support.
- If there is a danger of falling, the assembly personnel must hook themselves with the snap hooks of the fall arrest system on the fastening points and secure themselves against falling.

7.2 Walking on the telescopic boom



WARNING

Danger of falling!

The assembly personnel can fall down by slipping on the telescopic boom and be killed or severely injured!

- ▶ The telescopic boom may only be accessed if the assembly personnel is protected with suitable safety measures to prevent them from falling.
- ▶ If safety ropes are present on the telescopic boom, then the assembly personnel must hook themselves with the supplied fall arrest system on the safety ropes of the telescopic boom on the left and right with both snap hooks and secure themselves against falling.
- ▶ Without safety measures, it is **strictly** prohibited to step on the telescopic boom.

Assembly of the hoist rope or the TY-guying:

- During assembly, the assembly personnel must hook themselves on the fastening devices on the left and right with both snap hooks of the fall arrest system and secure themselves against falling.

7.3 Access to lattice sections or booms

Climbing the ladder:

- When ascending, the assembly personnel must ensure a 3-point support.

Changing from ladder to catwalk **without** transition aid:

- From a transition height above 1.8 m: **Before** transitioning, the assembly personnel must hook at least one snap hook of the fall arrest system on a safety rope and secure themselves against falling.

Changing from ladder to catwalk **with** transition aid:

- **After** transitioning, the assembly personnel must hook at least one snap hook of the fall arrest system on a safety rope and secure themselves against falling.

7.4 Walking on lattice sections or booms

Walking on catwalks:

- When walking on catwalks, the assembly personnel must hook themselves on the safety ropes on the left and right with both snap hooks of the fall arrest system and secure themselves against falling.
- When changing the fall arrest system over to a new lattice section, the assembly personnel must be hooked with at least one snap hook of the fall arrest system one safety device.

7.5 Working on lattice sections or booms

Pinning, unpinning the lattice sections of pull rods:

- During pinning, unpinning of lattice sections or pull rods, the assembly personnel must hook themselves on the safety ropes on the left and right with both snap hooks of the fall arrest system and secure themselves against falling.

Attaching the lattice sections:

- When attaching the lattice sections, the assembly personnel must hook themselves on the safety ropes on the left and right with both snap hooks of the fall arrest system and secure themselves against falling.

7.6 Descending from lattice sections or booms

Accessing the ladder **without** transition aid:

- From a transition height above 1.8 m: **Before** stepping on the ladder, the assembly personnel must hook at least one snap hook of the fall arrest system on a safety rope and secure themselves against falling.
- When stepping on the ladder, the assembly personnel must ensure a 3-point support.

- The snap hook of the fall arrest system may only be unhooked after standing safely on the ladder (3-point support).

Accessing the ladder **with** transition aid:

- When stepping on the ladder, the assembly personnel must ensure a 3-point support.

Climbing down the ladder:

- When descending, the assembly personnel must ensure a 3-point support.

8 Rescuing the assembly personnel

The height rescue system, consisting of the rappelling rescue device, is an evacuation and rescue device. It is used to lift the fallen person to be able to unhook him from the height safety equipment and to lower him by rope.



WARNING

Danger of falling!

- ▶ The assembly personnel must be instructed and trained properly in the correct handling of the height rescue system. Annual practice instructions and drills must be carried out.
- ▶ The supplied height rescue system must be kept available.
- ▶ The operating instructions of the manufacturer for the height rescue system must be observed and adhered to.
- ▶ The height rescue system must be inspected annually by authorized and trained expert personnel and documented in the inspection log book.

8.1 First aid measures after rescue

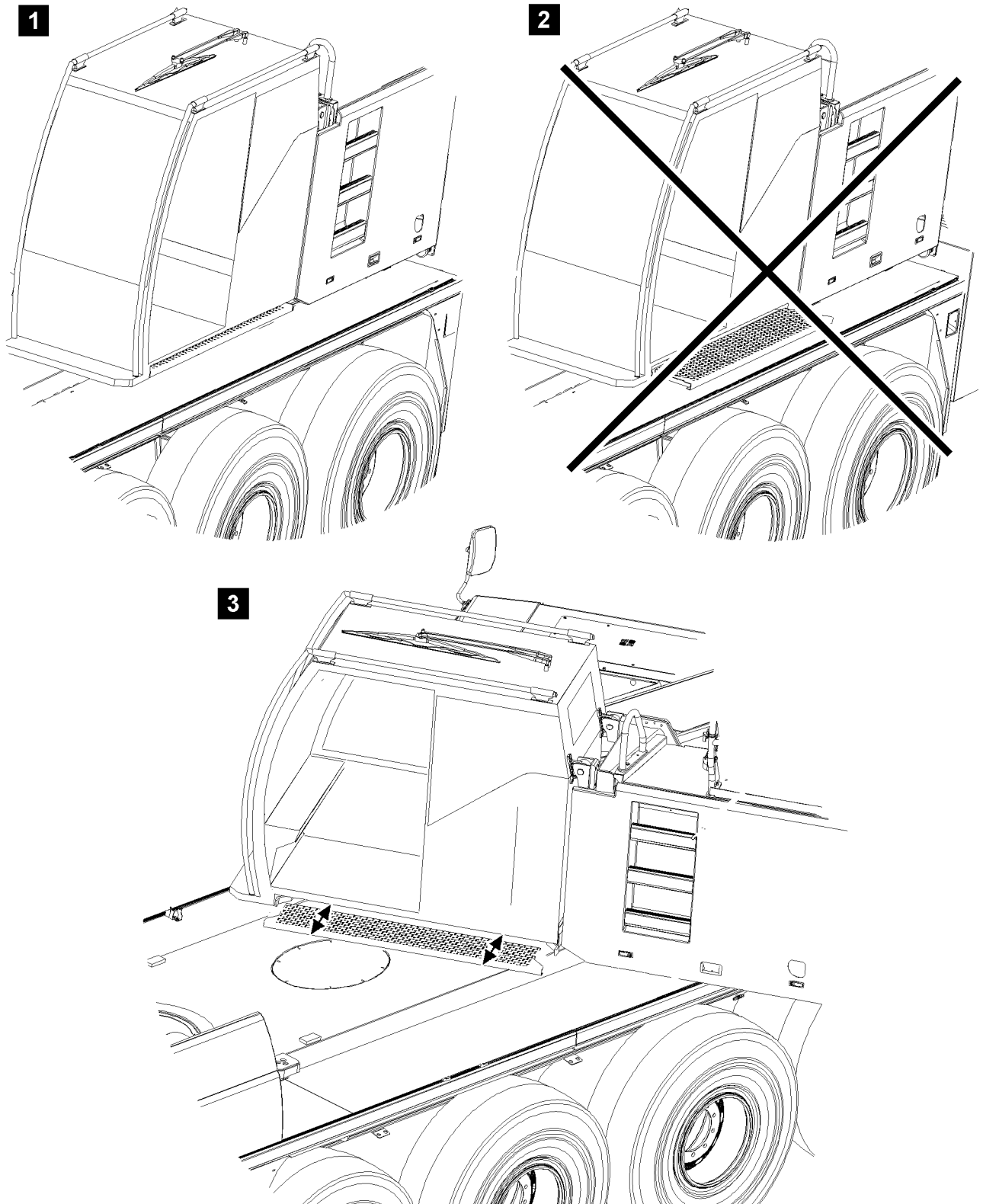


WARNING

Danger of fatal injury!

- ▶ After the rescue, the patient must be positioned with the upper body raised (in seated or squatting position).
- ▶ Immediate flat position or even shock position can be fatal.

9 Crane operator's cab with retractable / extendable step



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Fig.121159: Example for crane operator's cab with retractable / extendable step

9.1 Entering / exiting of crane superstructure alignment length axis crane chassis

See illustration 1.

Before entering the crane cab or existing from the crane cab, the following prerequisites must be met:

- The crane superstructure is aligned in length axis of the crane chassis.
- The step under the crane cab is retracted.
- The crane cab with incline adjustment is in 0° position.
- Folding ladders are folded into the ascent and descent position.



Note

- ▶ When all folding ladders are folded into the ascent and descent position, then a safe descent is possible from every position. See Crane operating instructions, chapter 2.07.



WARNING

Danger of falling!

If the crane superstructure is aligned in length axis of the crane chassis and the step can **not** be moved in, then there is a danger of falling when entering / exiting. See illustration 2.

Personnel can be severely injured or killed.

- ▶ Set up a suitable access, such as a ladder or platform, to ensure safe entry into the crane cab.
- ▶ When exiting the crane cab in position crane superstructure in length axis crane chassis, always move the step in completely.

9.2 Entering / exiting a swung crane superstructure

See illustration 3.

Before entering the crane cab or existing from the crane cab, the following prerequisites must be met:

- The crane superstructure is swung to the point where a safe access to walkable surfaces of the crane chassis is ensured.
- For the crane cab with incline adjustment, the crane cab is in 0° position.
- All folding ladders are folded into the ascent and descent position.



Note

- ▶ Use extendable step!
- ▶ The extended step allows comfortable entry into the crane cab as well as safe exit from the crane to the crane chassis.
- ▶ When all folding ladders are folded into the ascent and descent position, then a safe descent is possible from every position. See Crane operating instructions, chapter 2.07.

10 Crane cab with incline adjustment



WARNING

Danger of falling!

If the crane cab cannot be swung from an inclined position (for example 20° position) to the 0° position, for example due to a problem, then utmost caution must be used when entering / exiting the crane cab.

There is a danger of falling. Personnel can be severely injured or killed.

- ▶ For safety reasons, we recommend to take advantage of outside help.
- ▶ If necessary, have platforms or other suitable entry aids set up to ensure safe exit from the crane cab.

**WARNING**

Danger of accident!

If the door of the crane cab is opened in inclined position, then the door can move back suddenly. Hands can be crushed or injured.

- ▶ When the crane cab is in inclined position, open the door carefully.

11 Safety bar

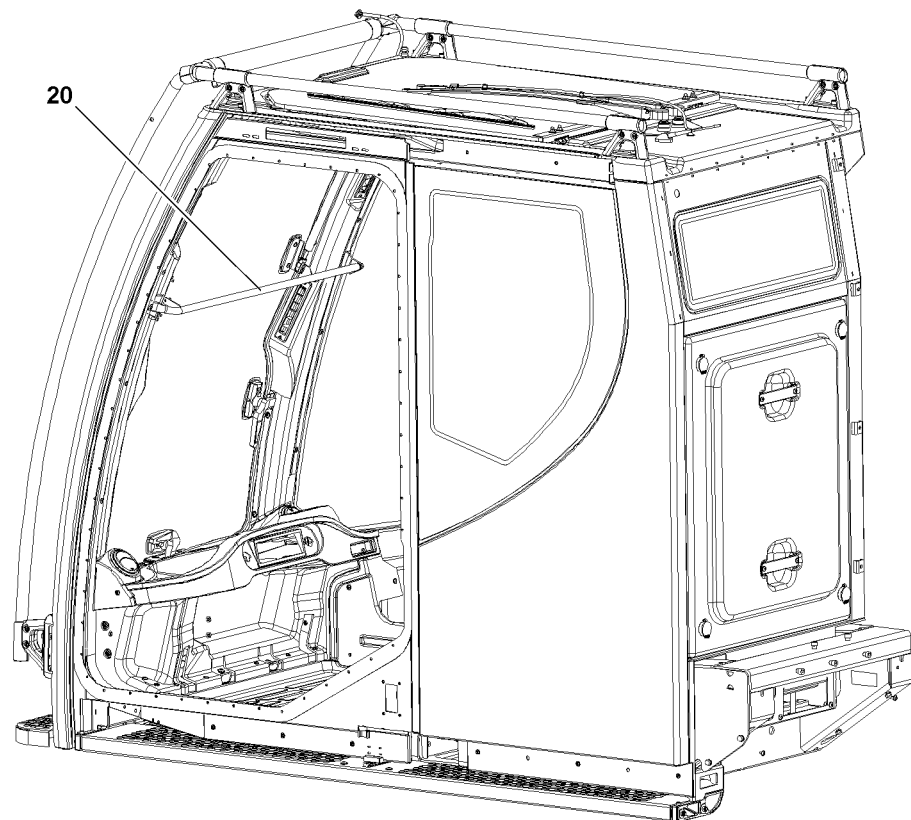


Fig.121158: Example for crane cab with safety bar

**Note**

- ▶ The safety bar **20** is installed to protect the crane operator from a danger of falling when the front window is open.
- ▶ Do not use the safety bar **20** as a handle.

12 Closing the windows



WARNING

Danger of crushing!

Never close the windows carelessly or uncontrolled. Significant crushing injuries can occur.

- ▶ During closing, watch the windows as it moves up.
- ▶ Make sure that no personnel or objects are wedged in.

13 Transport



WARNING

Error during transport!

Death, severe bodily injuries, property damage.

- ▶ To avoid accidents, observe and follow the notes provided in the following sections.

13.1 Crane and crane components

Follow the notes provided below to safely transport the crane and crane components:

- Close the crane operator's cab and all cover doors.
- Use suitable transport vehicles.
- Use rigging devices with sufficient load capacity.
- Regularly inspect the rigging and fastening points. See Crane operating instructions, chapter 8.01.
- Properly support and secure the components on the transport vehicle.
- Use special transport devices. See Crane operating instructions, chapter 3.80.

13.2 Lattice sections

Follow the notes provided below to safely transport the telescoped lattice sections:

- Securely rig the lattice sections on the transport vehicle and secure them together in at least two independent points.

13.3 Mobile cranes

Follow the notes provided below for the safe transport of mobile cranes.

- To ensure the largest possible frictional coefficient to the transport surface, clean the wheels before transport.
- When driving on the transport vehicle, check the easy movement of the vehicle with the aid of a guide to avoid hitting too hard.
- Apply the parking brake. See Crane operating instructions, chapter 3.04.
- Lower the crane with the level control to obtain a center of gravity as low as possible. Level control, see Crane operating instructions, chapter 3.03
- Stopping the mobile crane Place wedges under the wheels. See Crane operating instructions, chapter 2.04.
- Close the driver's cab.

13.4 Accelerating, changing the load

NOTICE

Permissible acceleration exceeded!
Damage to crane.

- ▶ Observe the maximum permissible longitudinal acceleration of 1.0 g.
- ▶ Observe the maximum permissible lateral acceleration of 0.8 g.
- ▶ Offloading and running is prohibited during rail transport.

If higher accelerations are expected (rail transport, maneuvering operation):

- ▶ Carry out the special measures to secure the crane and crane components:

NOTICE

Frequent dynamic load change!
Premature fatigue of load bearing crane components.

- ▶ Demount and properly secure components with large masses.

Components with large masses are, for example:

- Folding jibs
- Counterweights

14 Stops



WARNING

Defective fastening equipment or fastening points!
The load can fall down.

- ▶ Make sure that the fastening points and fastening equipment are in a perfect condition.
- ▶ Regularly inspect the rigging and fastening points. See Crane operating instructions, chapter 8.01.
- ▶ Check the fastening equipment regularly. See Crane operating instructions, chapter 8.01.



WARNING

Load bearing capacity of the fastening equipment is **not** sufficient!
The load can fall down.

- ▶ Determine the weight of the crane component to be fastened.
- ▶ Fasten the components solely with approved and sufficiently load bearing fastening equipment.



WARNING

Component incorrectly fastened!
The load can fall down.

- ▶ Attach the components only on the intended fastening points.

15 Heated crane components



WARNING

Danger of burns!

You can get severely burnt on the surfaces of hot components.

This applies especially to exhaust systems, the engines and the respective gears in the crane chassis and in the crane superstructure.

- ▶ Let the components cool off before touching them.
- ▶ Proceed with special caution near heated crane components.

16 Crane operator responsibilities

16.1 General

The crane operator's primary responsibility is to use and operate the crane in a manner that is safe for both himself and others.

The following important safety guidelines will help you achieve this.

Many crane accidents are caused by incorrect crane control.



WARNING

Danger due to operating error!

- ▶ In your interest and in the interest of others, make sure that you know your crane. Also learn to recognize all dangers connected with the work to be carried out.

Operating errors, which are made again and again while operating or driving a crane are especially careless while working, in particular:

- Slewing too quickly
- Stopping the load too quickly
- Pulling the load at an angle
- Allowing slack rope formation
- Overloading the crane
- Driving too fast with a load and / or equipment on an uneven roadway
- Attaching the load incorrectly
- Unsuitable operation; especially angular pulling, breaking away stuck loads
- Wind action on suspended loads
- Mistakes when driving on a road, for example:
 - Overspeeding the engine when driving downhill
 - Driving with turned on differential lock
- Crashing into bridges, roofs or high voltage wires due to insufficient headroom
- Inadequate support; supporting base, substructure under the support plates
- Mistakes during assembly or disassembly of booms
- Incorrect positioning of the crane when it is taken out of service
- Exceeding the permissible wind speeds in operation and when out of service

In many cases, crane damage is caused by improper maintenance:

- Insufficient oil, grease or antifreeze
- Contamination
- Broken cable wires, defective tires, worn parts
- Emergency limit switch or load torque limiter (LMB) not operating properly
- Brake and clutch failure
- Hydraulic defects; for example cracked hoses
- Loose bolts

16.2 Working on the crane superstructure or boom



WARNING

Danger of falling!

When working on the crane superstructure or boom, personnel must be secured with appropriate safety measures to prevent them from falling. If this is not observed, working personnel can fall and be killed or severely injured.

- ▶ For all work on the crane where there is a danger of falling, suitable safety measures must be taken.
- ▶ The crane superstructure or the boom may not be accessed without suitable aids.
- ▶ Suitable aids are, for example: Lifting platforms, scaffoldings, ladders, assembly platforms, auxiliary crane.
- ▶ If railing are present on the crane superstructure, then they must be swung into operating position and secured for all work, see Crane operating instructions, chapter 2.06.
- ▶ Step on aids and stepping surfaces on the crane only with clean shoes.
- ▶ Keep aids and stepping surfaces clean and free from snow and ice.
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with supplied fall arrest systems to avoid falling, see section „Personal protective equipment“.
- ▶ It is prohibited to step on the driver's cab or crane cab roof and specially marked surfaces, see Crane operating instructions, chapter 2.05.

16.3 Obligations of the crane operator

1. Before starting to work, the crane operator must check the brake function and the emergency shut off devices. He must monitor the condition of the crane for obvious defects. On wireless controlled cranes, he must check the assignment of control unit and crane.
2. The crane operator must cease crane operation in case of problems endangering the safety.
3. The crane operator must report all defects on the crane to the appropriate supervisor, also to his replacement in case of crane change.
4. The crane operator must make sure that:
 - All control systems are set to neutral or idle position before release of the energy supply to the drive components.
 - The control systems are set to neutral or idle position and the energy supply is shut off before leaving the control platform.
 - When taking down the control unit for wireless control, the control unit is secured to prevent unauthorized operation.
5. The crane operator must ensure that cranes subjected to wind are not operated past the limits which were set by the crane manufacturer, and that the boom is taken down at least when the critical wind speeds for the crane are reached and at the end of the work.
6. The crane operator must monitor the load during all crane movements or the load handling equipment when moving the crane without a load, if they could cause a dangerous situation. If observation is not possible, then the crane operator may move the crane only with the aid of a guide.
7. The crane operator must give warning signs when necessary.
8. The crane operator may not move loads over personnel.
9. Any loads attached by hand may only be moved by the crane operator after he received a clear sign from the person who attached the load, the guide or any other responsible party which was assigned to that task by the contractor. If signals must be used to communicate with the crane operator, then these signals must be agreed upon before use between the responsible party and the crane operator. If the crane operator determines that the loads are not properly attached, then he may not move these loads.
10. As long as a load is suspended on the crane, the crane operator must keep the control systems within reach. This does not apply for towing of vehicles with towing cranes.
11. The crane operator may not run up to end positions operationally, if they are limited by the emergency limit switches.
12. After a load torque limiter was triggered, the crane operator may not take on an overload by pulling in / raising the boom.

13. The crane operator may **not** bypass the overload protection to increase the hoisting power of the crane.

17 Selecting the crane operating location

In the following illustrations 1 to 3 the possible situations are shown as an example.

It is very important to choose an appropriate placement location in order to minimize safety risks.

It must always be possible to take down the crane in order to take down the crane in a timely manner in the case of unexpected weather conditions.

It must always be possible to position the crane in a safe out of service position.

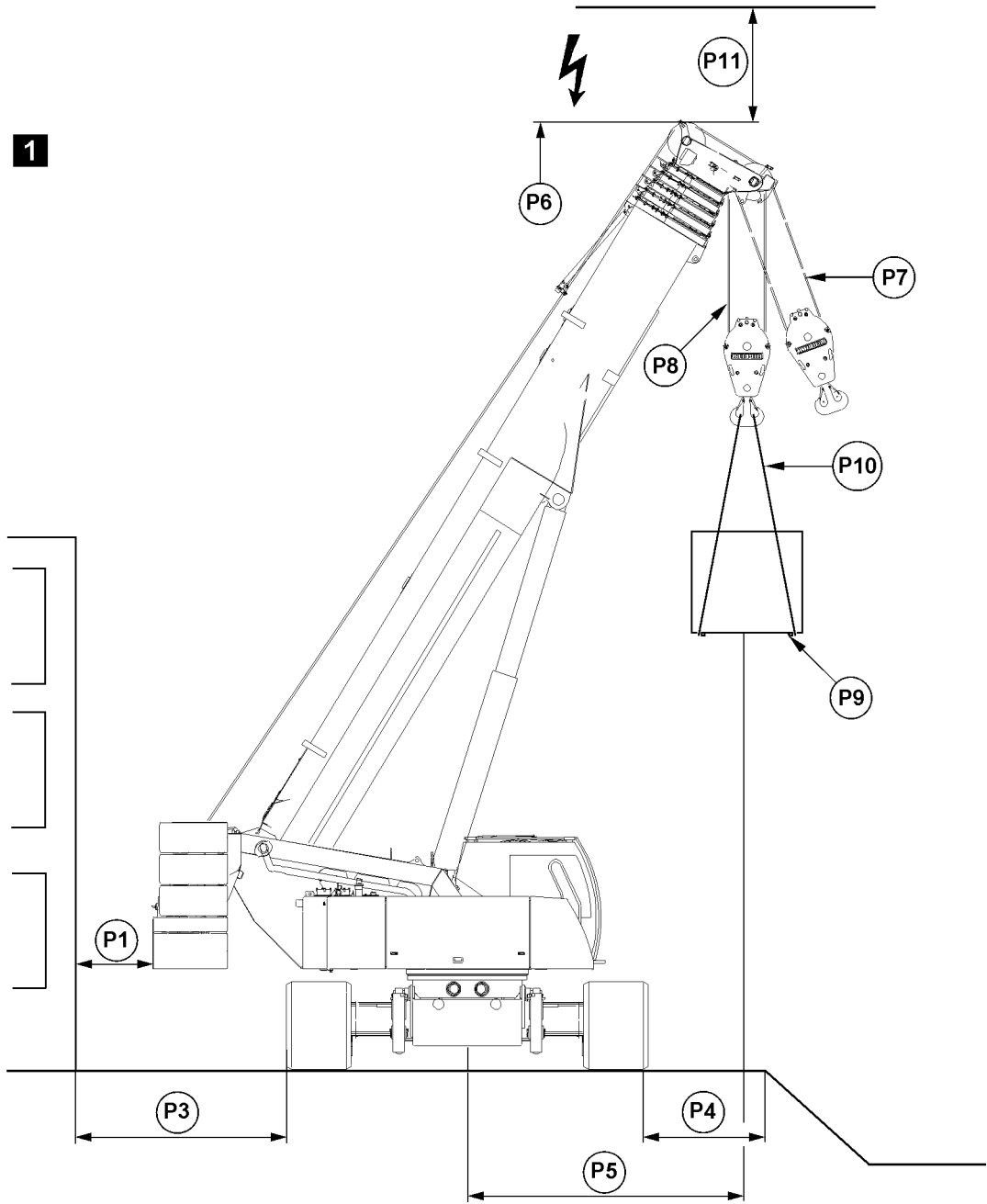


Fig.121166: Example for crawler crane with telescopic boom

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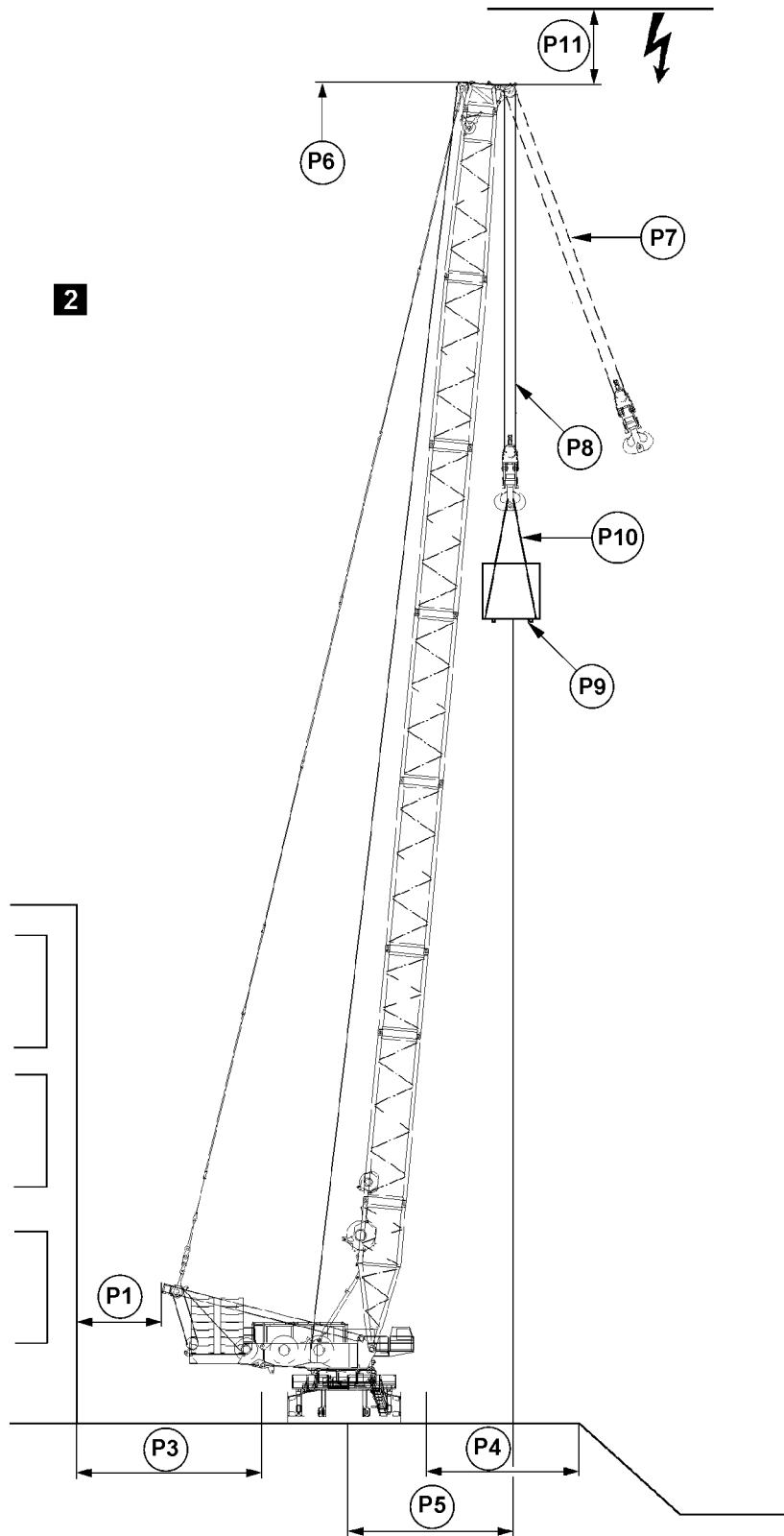


Fig.121167: Example for crawler crane with lattice mast boom

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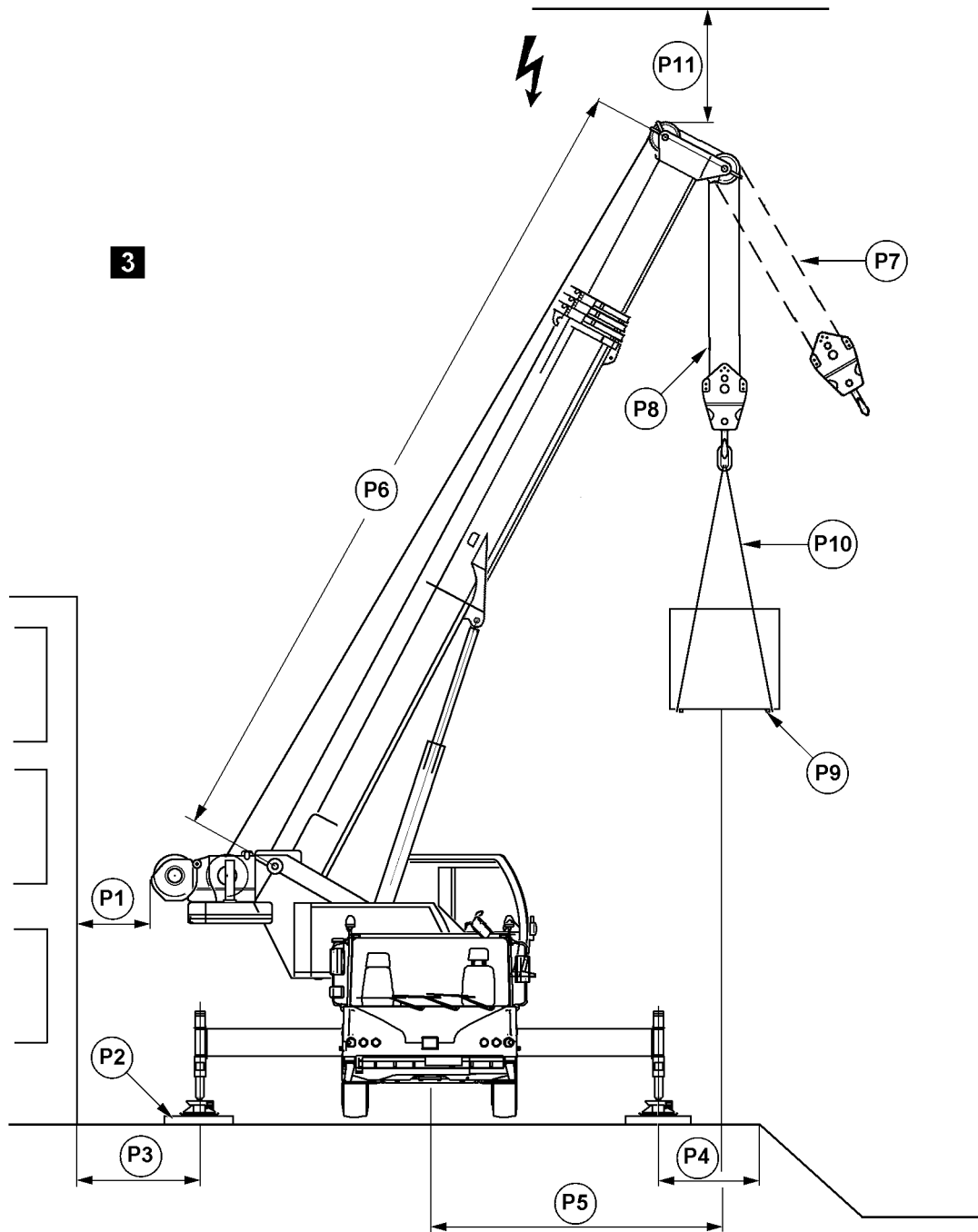


Fig.121168: Example for mobile cranes



DANGER

Danger of accidents due to ground with **insufficient** load bearing capacity!

If the crane is supported or driven on ground with **insufficient** load bearing capacity, then the crane can topple over and kill personnel.

- ▶ Only support or drive the crane on ground with sufficient load bearing capacity.
- ▶ Act responsibly when planning and selecting the crane location and route.
- ▶ Observe the following points.

Sign	When selecting the placement location for the crane, observe and adhere to the following:
P1	Select the placement location in such a way that crane movements can be carried out without collision and that the supports can be extended to the supporting base specified in the load charts. Make sure that no personnel is injured or killed. Always keep a safety distance of 0.5 m. If this is not possible, block the danger zone off.
P2	When crane support is required: Support the crane correctly and support the support plates large enough according to the load bearing capacity of the ground and the placement location.
P3	Keep a safety distance to basements or similar.
P4	Keep a safety distance to slopes or similar.
P5	Keep the radius to as low as possible.
P6	Select the correct boom length to the load case.
P7	Angular pull is prohibited.
P8	Select the correct reeving of the hoist rope to the load case.
P9	Bear in mind the weight and the wind exposure surface of the load.
P10	Select fastening equipment according to the weight of the load, the type of attachment and the incline angle.
P11	Keep sufficient distance to electrical overhead wiring.

18 Slopes and excavations

In the following illustrations 4 and 5 the possible situations are shown as an example.

The crane may not be set up too close to slopes or excavations. Maintain adequate safety distance **A** and safety distance **B** in accordance with the type of soil.

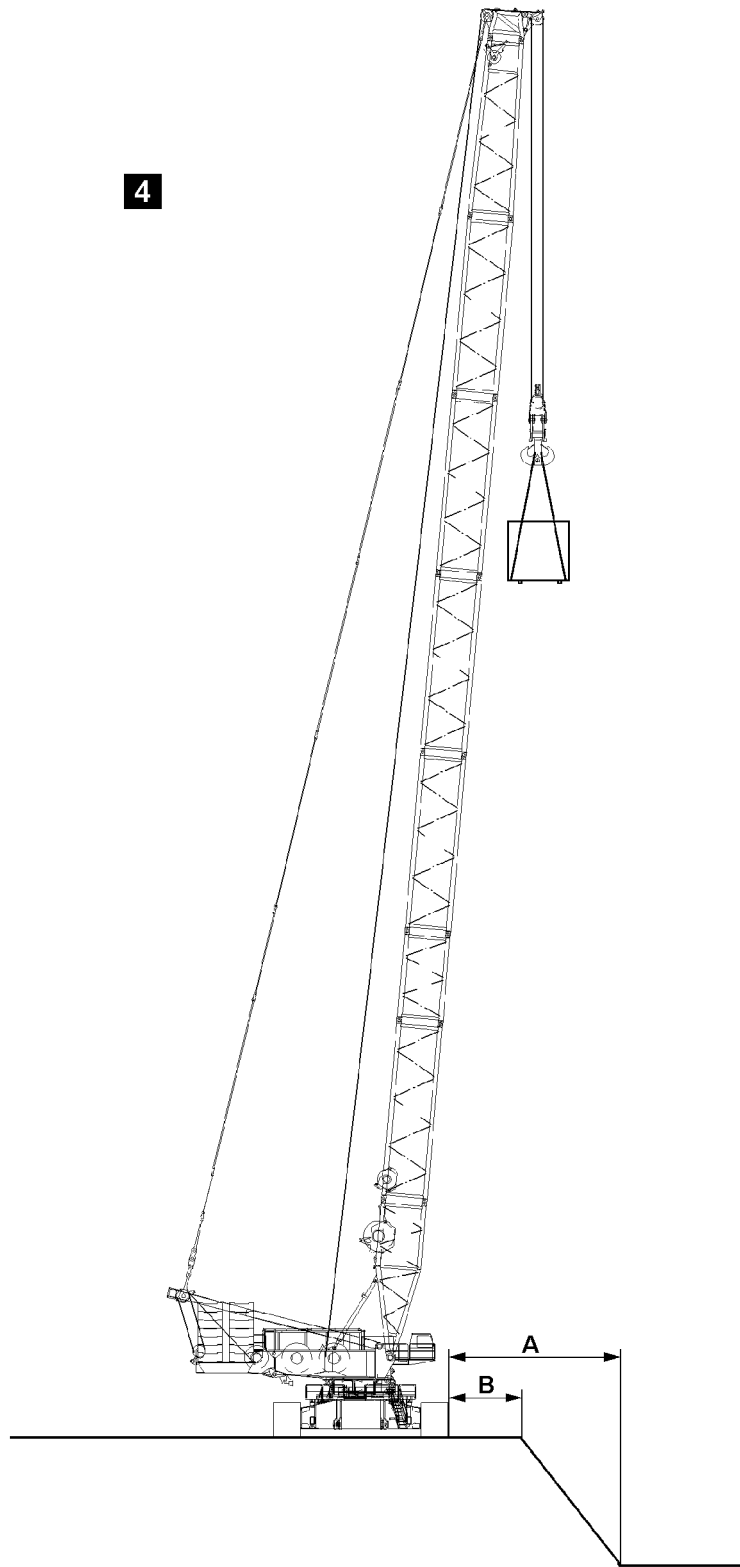


Fig.121162: Example for crawler cranes

- A** Distance to bottom of excavation
- B** Distance to excavation

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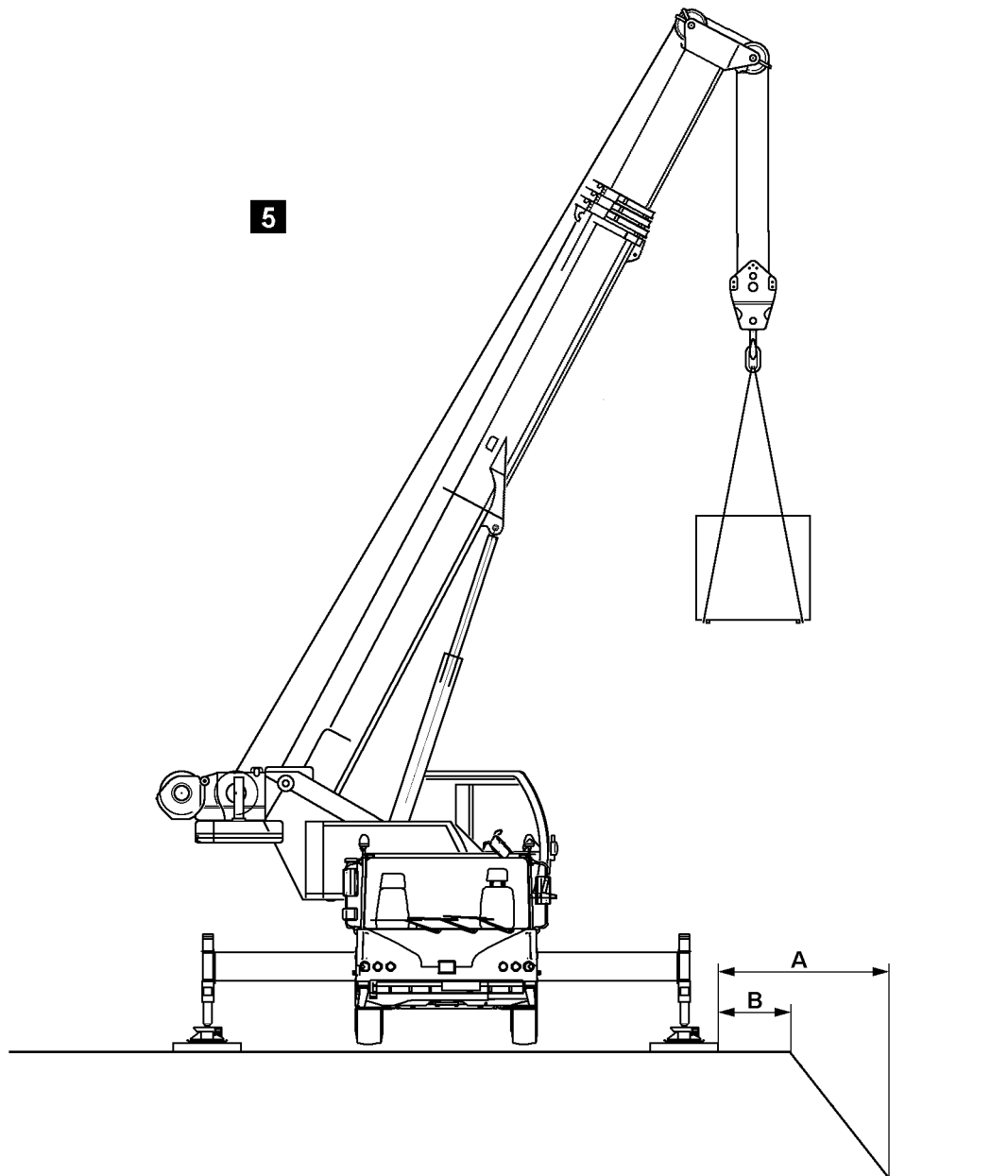


Fig.121163: Example for mobile cranes

- A** Distance to bottom of excavation **B** Distance to excavation



WARNING

The crane can topple over!

The edge of the slope or excavation can break in if safety distance **A** or safety distance **B** is too small. If the edge of the slope or excavation break in, the crane can topple over and kill personnel.

► Always maintain the required safety distance **A** and safety distance **B**.

19 Load burdens on the ground due to crane operation



Note

- ▶ Take into account that on a crane with high counterweight the crawler pressures or support forces at low load can be higher than at high load.

19.1 Load burdens on the ground on cranes on crawlers

For cranes on crawlers significant forces are transferred via the track pads of the crawlers into the ground (crawler pressures).

- The ground must be able to safely withstand the resulting pressure.
- If the area of the track pads is inadequate, then the crawlers must be supported from below according to the load bearing capacity of the ground.
- The required substructure can be calculated from the load bearing capacity of the ground and the crawler pressures of the crane.



WARNING

Load bearing capacity of the ground insufficient!
The ground can give, the crane can topple over.
Death or severe bodily injuries.

- ▶ Support large enough, according to the load bearing capacity of the ground with suitable materials, such as wooden beams or steel plates.

To obtain an even pressure distribution over the substructure surface:

- ▶ Set the crawlers centered on the substructure.



Note

- ▶ The respective ideal crawler pressure can be determined with the job planner program.

19.2 Load burdens on the ground on cranes on supports

When the crane is supported, significant forces (support forces) are transferred by the support cylinders via the support plates into the ground.

The ground must be able to safely withstand the resulting pressure.

If the support plate surface area is inadequate, then the support plates must be supported from below according to the load bearing capacity of the ground.

The required support surface areas can be calculated from the load bearing capacity of the ground and the support forces of the crane.



WARNING

Load bearing capacity of the ground insufficient!
The ground can give, the crane can topple over.
Death or severe bodily injuries.

- ▶ Support large enough, according to the load bearing capacity of the ground with suitable materials, such as wooden beams or steel plates.

To obtain an even pressure distribution over the substructure surface:

- ▶ Set the support plates centered on the substructure.

19.3 Examples for the load bearing capacity of the ground

Soil type		Permissible ground pressure [kN/m ²]
1.	Organic ground: Peat, sludge, muck	0
2.	Uncompacted fill: Construction debris	0 to 100
3.	Non-cohesive ground: Sand, gravel, rocks and mix	200
4.	Cohesive soil:	
	a) Clayed silt, mixed with topsoil	120
	b) Silt, consisting of poor clay and coarse clay	130
	c) Plastic clay, consisting of potter's clay and fill	
	Stiff	90
	Semi-solid	140
	Solid	200
	d) Mixed granular ground, clay to sand, gravel and rocky areas	
	Stiff	150
	Semi-solid	220
	Solid	330
5.	Rock in evenly solid condition:	
	a) Brittle, with traces of decomposition	1500
	b) Not brittle	4000

Examples: Permissible ground pressure of the ground

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.

19.4 Calculation examples

The following are general calculation examples. The values are used only to explain the calculation steps. The crane specific values are in chapter 1.03 of the crane operating instructions.

Example: Calculation of ground pressure of support plates for cranes on supports		□
Support force according to Crane operating instructions, chapter 1.03 for example: 720 kN	720 kN	
Surface of square support plate with 550 mm side length according to chapter 1.03, for example: 0.55 m x 0.55 m = 0.3 m ²	0.3 m ²	
80 % as carrying surface of support plate: 0.3 m ² x 0.8 = 0.24 m ²	0.24 m ²	
Ground pressure = Support force / load bearing surface support plate	720 kN / 0.24 m ² = 3000 kN/m ²	
Ground pressure per support:	3000 kN/m²	

Example: Calculation of ground pressure

- The value of the ground pressure is far higher than the permissible ground pressure for all types of granular soil.
- If this crane is utilized on bedrock, gravel type of ground, permissible ground pressure 200 kN/cm², then the support surface must be increased.

Example: Calculation of required support surface for cranes on supports		□
Support force according to Crane operating instructions, chapter 1.03 for example: 720 kN	720 kN	
Ground pressure from chart <i>Permissible ground pressures</i> for example: 200 kN/m ²	200 kN/m ²	
Required support surface = Support force / permissible ground pressure	720 kN / 200 kN/m ² = 3.6 m ²	
Required support surface per support:	3.6 m²	

Example: Calculation of support surface

- The surface of the substructure for each support plate must be at least **3.6 m²**.
- The height of the substructure must be selected depending on the load distribution angle.



Note

- ▶ The corresponding ideal support forces can be determined with the Job planner.

19.5 LICCON job planner

The calculation of support forces and crawler pressures with the LICCON job planner are based on idealized assumptions: level and homogenous ground, rigid crane structure, no consideration in regard to wind.

Side deformations of the boom system due to wind, incline position and elastic compliance of the steel structure can lead to increase of support forces or to increase of crawler pressures.

The determination of the values, taking wind load on the crane and the load into account, as well as the elastic deformation of the crane can only be carried out by the crane manufacturer or a qualified authorized inspector.

19.5.1 Example for crane on crawler with derrick boom, suspended ballast and short (main) boom system

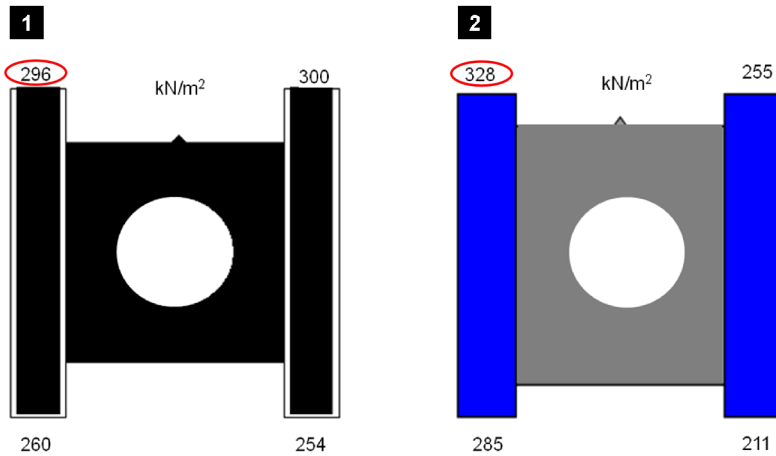


Fig.125052: Example for crane on crawler with derrick boom, suspended ballast and short (main) boom system

Illustration 1: Idealized crawler pressures from Job planner calculated with the aid of a rigid body system and no consideration regarding wind

Illustration 2: Idealized crawler pressures with consideration of elastic deformation and wind on crane and load

19.5.2 Example for crane on crawler with derrick boom, suspended ballast and long (main) boom system

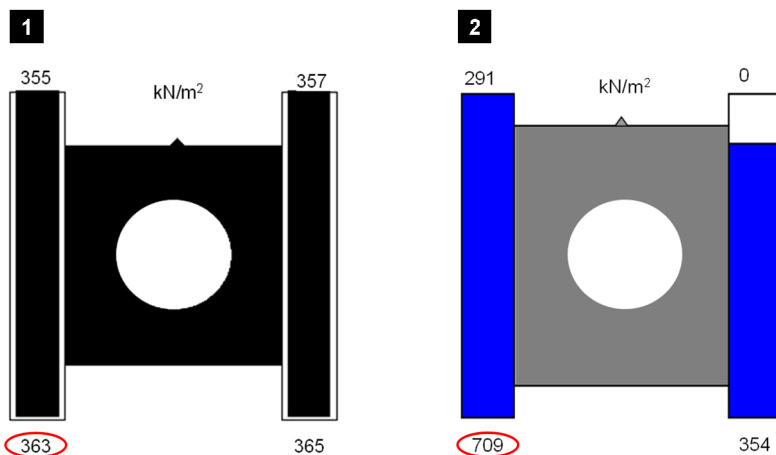


Fig.125053: Example for crane on crawler with derrick boom, suspended ballast and long (main) boom system

Illustration 1: Idealized crawler pressures from Job planner calculated with the aid of a rigid body system and no consideration regarding wind

Illustration 2: Idealized crawler pressures with consideration of elastic deformation and wind on crane and load

19.5.3 Example for crane on supports

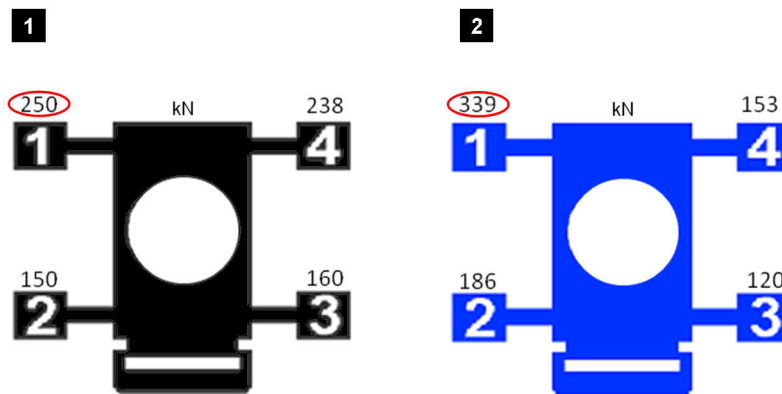


Fig.125054: Example for crane on supports

Illustration 1: Support forces from Job planner calculated with the aid of a rigid body system and no consideration regarding wind

Illustration 2: Support forces with consideration of elastic deformation and wind on crane and load

20 Support

20.1 Supporting the crane

The maximum permitted deviation from the horizontal position is $\pm 0.5\%$ ($\pm 0.3^\circ$)



WARNING

The crane is **not** horizontally aligned.
The crane can topple over, death, property damage.
▶ Align crane horizontally.



DANGER

The crane can topple over!
When actuating the supports with attached load and / or at loaded derrick ballast guying, the incline and the force conditions of the entire boom system change.
There is **no** shut off by the LICCON overload protection.
The crane can topple over.
Personnel can be severely injured or killed.
▶ When a load is suspended it is prohibited to actuate the support.
▶ When the derrick ballast guying is loaded it is prohibited to actuate the support.

It is absolutely essential that the crane be supported with the supporting base exactly in accordance with the load charts to ensure safe crane operation.

The match of the sliding beams placement surfaces must be observed to ensure proper force transfer between the sliding beams.

The crane may only be supported in these extension conditions.

**WARNING**

The crane can topple over!

If only the sliding beams on the load side are extended, then the crane can topple over and kill personnel.

- ▶ Move all 4 sliding beams and support cylinders out according to the data in the load chart and pin.
- ▶ In intermediate positions between the support bases, do **not** support.
- ▶ Pin the sliding beams to supporting base according to the load chart.
- ▶ Fully insert and secure the pins.

**WARNING**

Risk of toppling the crane due to incorrect extension of the sliding beams!

The load suspended on the hook causes tension and deformation of the hoist rope and telescopic boom. The same applies for operation with lattice jib and guy ropes. If the load is dropped from the fastening ropes or if the fastening or hoist rope breaks in this situation, a sudden relief occurs. The boom snaps back quickly. This can cause the crane to topple over.

Despite previous assumption, it might become necessary to swing the load to the opposite side. This can cause the crane to topple over.

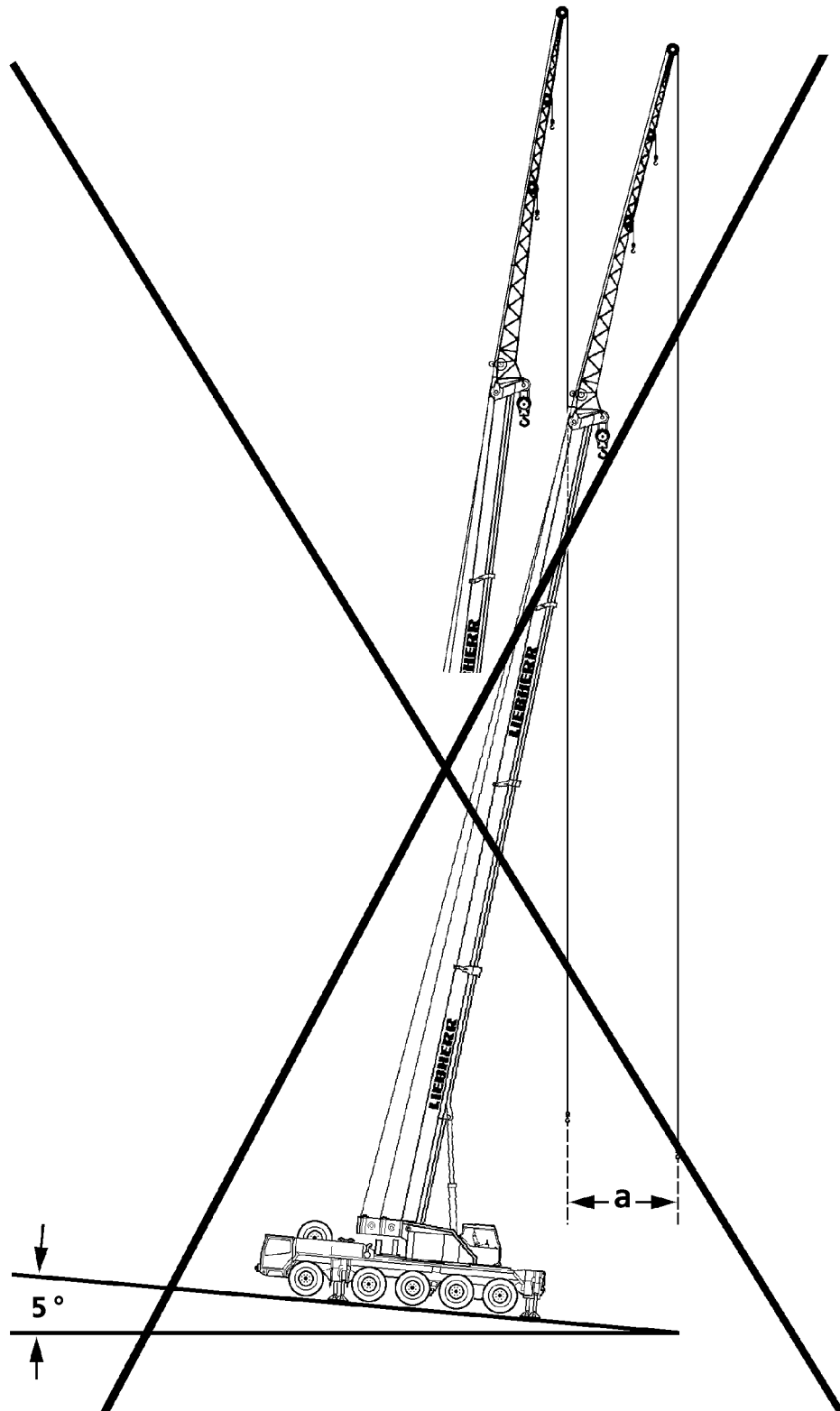
The boom and / or counterweight momentum may cause the crane to topple when slewing from the longitudinal vehicle direction.

- ▶ Move all 4 sliding beams and support cylinders out according to the data in the load chart.

20.2 Supporting the crane with *variable support*

When supporting the crane with *variable support* special measures are required. These measures are described in detail in the Crane operating instructions, chapter 6.26.

21 Aligning the crane



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Fig. 121164: Example for **non-permissible** incline position

In addition to the proper foundation for the supports, the horizontal alignment of the crane is of utmost importance for safe crane operation.

**DANGER**

The crane can topple over due to the incline position!

If the crane is positioned at an incline, and if the boom is turned towards the slope, then the radius is increased as a result.

It is possible that the slewing gear can no longer hold the crane superstructure and, in extreme cases, the crane can topple over.

Personnel can be severely injured or killed.

▶ Align the crane horizontally before starting crane operation.

If the horizontal alignment of the crane has to be readjusted:

▶ Set the load down on the ground before readjusting the crane.

For cranes on crawlers, readjustment is **not** possible:

▶ If possible, use load charts for limited terrain incline.

Example: At a boom length of 50 m, an incline position of the crane by only 5° at a radius of 10 m causes an increase of the radius of $a = 4$ m.

22 Checking the safety measures

- The placement location has been selected so that all planned lifts included in the load chart for the erected set up configuration can be lifted.
- The load bearing capacity of the ground is adequate.
- There is safe clearance to excavations and slopes.
- There are no live transmission wires within the working range of the crane.
- There are no obstacles that will hinder required crane movements.
- The crane is horizontally aligned.
- When crane support is required:
 - All four sliding beams and support cylinders have been extended according to the supporting base given in the load chart.
 - The sliding beams have been secured with pins to prevent them from moving.
 - The support plates are pinned and secured in operating position.
- On mobile cranes:
 - The axle suspension is blocked.
 - The axles are relieved, which means the tires do not touch the ground.

23 Safety guidelines in case of external power supply



Fig.197720

A potential hazard exists when supplying a crane with an external power supply from a low voltage distribution system (100 V AC to 400 V AC).

A special electrical hazard is present when a protective conductor is interrupted (caused by the mechanical stress on flexible supply lines or the service connection), loose terminal connections, high wire or contact resistance, mixed up conductors, defective or missing protective equipment (FI / fault interrupters) in combination with a body contact on the crane.



WARNING

Danger of fatal injury if the body conducts current!

Water and / or defective devices can cause hazardous stray voltages when touched. The person touching the crane is subject to lethal currents.

- ▶ The external supply cable must be in good working order.

Make sure that the external flexible supply cable is in good working order.

Where applicable, we recommend the use of a power isolating transformer.

24 Grounding

24.1 Grounding the crane



WARNING

Danger of fatal injury due to electric shock!

There is a danger of electrical shock, if the crane is not properly grounded.

- ▶ Properly ground the crane.
- ▶ Make sure that there is a potential equalization between the crane and the ground.

The crane must be grounded before operation:

- Near transmitters (radio and TV transmitters, radio stations, etc.)

- Near high frequency switching stations
- In case of severe possibility of thunderstorms or potential thunderstorms

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 wooden planks).

24.2 Grounding the load



WARNING

Danger of fatal injury due to electric shock!

There is a risk of electrical shock, if the load is not properly grounded.

- ▶ Properly ground the load.
 - ▶ Make sure that there is a potential equalization between the load and the ground.
-

The load must be grounded before operation:

- Near transmitters (radio and TV transmitters, radio stations, etc.)
- Near high frequency switching stations
- In case of severe possibility of thunderstorms or potential thunderstorms

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.

25 Working in the vicinity of transmitters

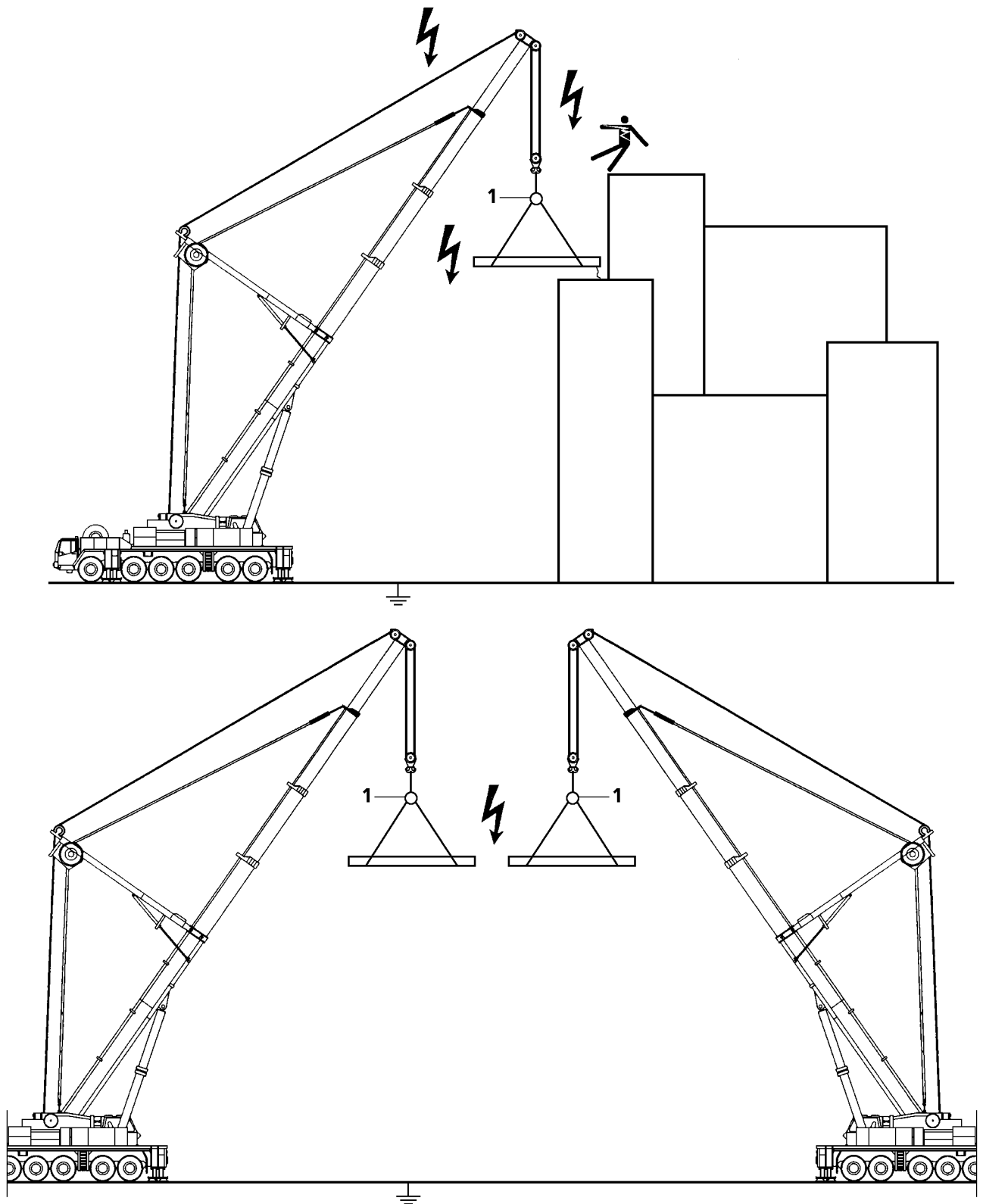


Fig.121165: Example for electrostatic charge

Strong electromagnetic fields are likely to be present if the construction site is close to a transmitter.

These electromagnetic fields can pose direct or indirect danger to persons or objects, for example:

- Effect on human organs due to temperature increase.

- Danger of burns or inflammation due to temperature increase
- Spark or electric arc formation



DANGER

Danger due to electromagnetic fields!

- ▶ Before operating a crane in the vicinity of transmitters, be sure to consult with Liebherr-Werk Ehingen GmbH.
- ▶ Also consult a high frequency specialist.

High frequency (HF) radiation from a transmitter requires supplementary work safety protection and special environmental specifications for crane operators and personnel:

1. Each crane must be „fully“ grounded. Check visually or with a simple continuity tester to ensure that ladder, crane cab and rope pulleys are grounded.
2. All personnel working on the crane or with large metal objects must protect themselves from burns by wearing non-conductive synthetic gloves and suitable clothing while working.
3. There is no need to panic if you feel your hand warm up. Always work under the assumption that the respective workpiece, structural steel member or support is „hot“.
4. The temperature of objects affected by high frequency radiation depends on their „size“. Cranes, carriers and coverings, for example, are „hotter“.
5. Contact with other crane loads is not permitted when operating the crane (arcing). Since defects caused by burns considerably reduce rope's load bearing capacity, any such occurrences must be reported immediately to the foreman so that the ropes can be inspected.
6. An insulator **1** is required at all times between the crane load hook and fastening equipment. It is strictly prohibited to remove this insulator **1**.
7. Do not touch the ropes above the insulator **1**.
8. Loads that are attached to the crane may not be touched by any unprotected parts of the body after the load has been lifted or set down.
9. Do not work with a bare upper torso or in short pants, this is prohibited.
10. To minimize absorption of high-frequency radiation, larger loads should be transported horizontally if possible.
11. Loads must be grounded, or additional insulation used (rubber material between the object and gloves) when manual work is required.
12. Use a suitable measuring instrument to check the „temperature“ of the workpiece.
For example, if 500 V can be measured on a workpiece at a distance of 1 cm to 2 cm, then the workpiece may not be touched with bare hands.
The greater the distance, the higher is the voltage on the object:
At 10 cm distance, approx. 600 V are present, at 30 cm distance approx. 2000 V are present.
13. When refueling the crane, it must be ensured that no sparks are created within a radius of 6 m, neither by handling larger metallic parts nor by other work.
14. To avoid secondary accidents, use personal protective equipment when working on components that are high off the ground.
15. Any accidents and unexpected events must immediately be reported to the local construction supervisor and the safety engineer.

26 Crane operation in case of thunderstorms

In weather conditions, which can include lightning:

- Stop work on the crane.
- If possible, place the load down.
- If possible, telescope the boom in and / or put it down in the boom receptacle and bring it into a safe condition.

If this is not possible, the crane cab must remain occupied by the crane operator to keep the crane and the load always under control.

**WARNING**

Danger of accidents due to lightning strikes!

- ▶ Make sure that there are no persons near the immediate area of the crane.

27 Wind influences

**Note**

- ▶ The wind speeds are valid for a 360° wind direction for a 3-second wind gust at the highest point of the crane.

**WARNING**

Disregard of permissible wind speeds!

If the permissible wind speeds are disregarded, the crane can topple over. Personnel can be severely injured or killed.

- ▶ It is prohibited to erect the crane to measure the wind speed.
- ▶ Observe the permissible wind speeds depending on the assembly / crane conditions and act accordingly, see following chart.

Assembly / crane conditions	Reference for permissible wind speed
Erection and take down of various boom configurations	Wind speed charts and / or erection and take-down charts.
Crane operation	Load chart manual
When the permissible wind speed according to the load charts is exceeded in crane operation, then crane operation is prohibited .	Wind speed charts
Interruption of crane operation when crane remains equipped	Wind speed charts
Crane out of operation, when crane remains equipped	Wind speed charts

**Note**

No wind speed charts available!

For a set up configuration for which no wind speed charts are available:

- ▶ Observe and adhere the maximum wind speeds of the load charts.

The wind load on the crane boom has **not** been taken into account for the planning of crane operation with the LICCON job planner.

- As a result, the actual values of the support force and / or the crawler pressure can be significantly higher than the values determined with the LICCON Job planner.
- The wind affecting the crane and the load, the elastic distortion of the crane structure, incline position as well as wind exposure surface (A_w) per ton of hoist load larger than 1.2 m²/t can significantly increase the support force and / or the crawler pressure.

**WARNING**

Increase of support force and / or the crawler pressure!

The resulting pressure on the ground becomes larger.

The permissible ground pressure can be exceeded.

- ▶ Do not exceed the permissible ground pressure.

**Note**

- ▶ The determining factor for all crane work in the actual wind speed at the job site of the crane.
- ▶ The current wind speed can be checked at the nearest weather bureau.
- ▶ Be aware that the wind speed on the boom jib is higher than near the ground.
- ▶ Always observe the national valid regulations.

27.1 Wind speed charts for *variable support*

For *variable support*: Observe and adhere to the wind speed charts according to the supporting base for the smallest extension length of the sliding beams.

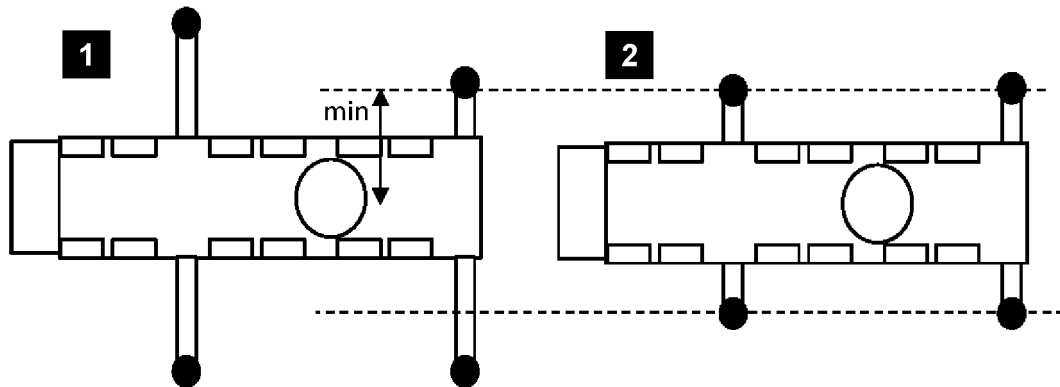


Fig.121577: Example for the selection of wind speed charts for *variable support*

Example for the selection of wind speed charts for *variable support*:

- The crane is supported with *variable support* according to illustration 1.
- Select wind speed charts according to the supporting base in illustration 2.

**Note**

No wind speed charts available!

If the smallest extension length of a sliding beam is less than those of the wind speed charts on hand:

- ▶ Observe and adhere the maximum wind speeds of the load charts.

27.2 Wind speed, wind gust speed and wind direction

The depiction of the wind is made by statement of wind speed (wind force), wind gust speed and wind direction.

High above the ground, the wind is less influenced by the surface condition of the ground. In the lower layers of the atmosphere, the wind speed is reduced by the ground friction. One differentiates between roughness of terrain, influence of obstacles and influence of terrain contours. Vegetation, buildings etc have great influence on the wind speed, wind gust speed and wind direction.

The site selection is thus especially important for wind measurement.

The wind speed, wind gust speed and wind direction are subject to significant time and local fluctuations. For that reason it is important to have reliable information regarding the expected wind speed, wind gust speed and wind direction during a load lift and to carry out exact wind measurements.

For mobile cranes, always assume a wind load of 360°. The determining factor is the „3 second gust speed“ on the highest point of the boom.

27.3 Measurement of wind speed

The anemometer installed on the crane boom measures the wind speed on the tip of the boom and shows the current wind speed in the crane cab.

The function of the anemometer must be checked every time before erection of the boom by manually actuating the shell start for easy movement and proper function.

Before lifting a load, especially with large wind exposure surface, the wind speed and the wind direction expected during the lift must be known. Information can be obtained for example at the local weather bureau. The determining factor is the „3 second gust speed“ on the highest point of the boom.



WARNING

Overload of crane!

The acoustic wind warning is only issued if the standard wind exposure surface in the load chart is exceeded (wind surface per ton load: 1 m², drag: 1.2) given wind speed.

If the permissible wind speed must be reduced for loads due to large wind exposure surfaces, no acoustic wind warning is issued.

There is no shut off of crane movement.

- ▶ The wind exposure surface and the wind resistance coefficient for the load to be lifted must be known.
- ▶ The maximum permissible wind speed specified in the load chart must be reduced for large wind exposure surfaces as described in the load chart manual chapter "Wind influences during crane operation".

For safe determination of wind speed, the crane must be turned before application by 360°. The highest measured value while doing so must be compared with the „maximum permissible wind speed“ for the load according to the load chart. Thus the possibility that the result of the measurement is distorted due to nearby buildings, cranes or components is eliminated.

In gusty wind conditions, the probability of sudden high wind speed increases. In gusty wind conditions no large surface loads may be lifted.



Note

- ▶ If in doubt and in case of questions for further information and / or training in the area of „Wind influences in crane operation“ contact the Customer Service at Liebherr-Werk Ebingen GmbH.

27.4 Conversion chart for wind force



Note

- ▶ The influence of the wind on the surrounding is described clearly in the Beaufort scale to provide an orientation for the crane driver.
- ▶ The wind force of the Beaufort scale refers to the wind speed determined over 10 minutes at a height of 10 m.

Wind force		Wind speed		Effect of the wind Inland
Beaufort number	Description	[m/s]	[km/h]	
0	Calm	0 to 0.2	1	Calm, smoke rises vertically
1	Slight air movement (draft)	0.3 to 1.5	1 to 5	Wind direction is shown only by observing the trail of smoke, not by the wind sock
2	Light breeze	1.6 to 3.3	6 to 11	Wind can be felt on the face, the leaves rustle, wind sock moves slightly
3	Gentle breeze	3.4 to 5.4	12 to 19	Leaves and small twigs in constant motion Wind extends a flag
4	Moderate breeze	5.5 to 7.9	20 to 28	Swirls up dust and loose paper, moves twigs and thin branches

Wind force		Wind speed		Effect of the wind Inland
Beaufort number	Description	[m/s]	[km/h]	
5	Fresh breeze	8.0 to 10.7	29 to 38	Small deciduous trees begin to sway, whitecaps form at sea
6	Strong breeze	10.8 to 13.8	39 to 49	Thicker branches move; telephone lines begin to whistle, umbrellas are difficult to use
7	Near gale	13.9 to 17.1	50 to 61	Entire trees swaying; difficult to walk into wind
8	Gale force wind	17.2 to 20.7	62 to 74	Breaks branches off trees, impedes walking in open areas considerably
9	Gale	20.8 to 24.4	75 to 88	Minor damage to property (chimney caps and roofing tile are blown off)
10	Severe storm	24.5 to 28.4	89 to 102	Trees are uprooted, significant damage to property
11	Violent storm	28.5 to 32.6	103 to 117	Extensive, widespread storm damage
12	Hurricane	32.7 and more	118 and more	Major destruction

Beaufort scale

27.5 Height dependent wind speeds according to EN 13000:2010



Note

- ▶ The maximum permissible wind speed (v_{max}) and the maximum permissible wind speed according to the load chart (v_{max_TAB}) always refers to the 3 second wind gust speed, which is present in the maximum height of the crane.
- ▶ Instead of the 3 second wind gust speed, weather information services often report a wind speed (v_m), which is averaged within a time period of 10 minutes (so-called 10 minute average). It refers to the wind force on the Beaufort scale, normally to the medium value of the wind speed, which is determined within a time from of 10 minutes at a height of 10 m above ground or above sea level.
- ▶ The determining factor for the calculation of the 3 second wind gust speed in maximum height of the crane is significantly higher than the medium value of the wind speed, which is determined over a time of 10 minutes at a height of 10 m above ground.



Note

- ▶ The following chart shows the 3-second wind gust speed depending on the height and the Beaufort number and / or the wind speed determined over a time of 10 minutes at a height of 10 m.
- ▶ With the aid of this chart the 3-second wind gust speed for a certain height can be determined.

Beaufort number	3	4	5 ^a	5	6	7 ^a	7	8	9	10
v_m [m/s ^b]	5.4	7.9	10.1	10.7	13.8	14.3	17.1	20.7	24.4	28.4
z [m]	$v(z)$ [m/s]									
10	7.6	11.1	14.1	15.0	19.3	20.0	23.9	29.0	34.2	39.8
20	8.1	11.9	15.2	16.1	20.7	21.5	25.7	31.1	36.6	42.7
30	8.5	12.4	15.8	16.8	21.6	22.4	26.8	32.4	38.2	44.5
40	8.7	12.8	16.3	17.3	22.3	23.1	27.6	33.4	39.4	45.8
50	8.9	13.1	16.7	17.7	22.8	23.6	28.3	34.2	40.3	46.9

Beaufort number	3	4	5 ^a	5	6	7 ^a	7	8	9	10
60	9.1	13.3	17.0	18.0	23.3	24.1	28.8	34.9	41.1	47.9
70	9.3	13.5	17.3	18.3	23.6	24.5	29.3	35.5	41.8	48.7
80	9.4	13.7	17.6	18.6	24.0	24.8	29.7	36.0	42.4	49.4
90	9.5	13.9	17.8	18.8	24.3	25.1	30.1	36.4	42.9	50.0
100	9.6	14.1	18.0	19.1	24.6	25.4	30.4	36.9	43.4	50.6
110	9.7	14.2	18.2	19.2	24.8	25.7	30.8	37.2	43.9	51.1
120	9.8	14.3	18.3	19.4	25.1	25.9	31.1	37.6	44.3	51.6
130	9.9	14.5	18.5	19.6	25.3	26.2	31.3	37.9	44.7	52.0
140	10.0	14.6	18.7	19.8	25.5	26.4	31.6	38.2	45.1	52.5
150	10.0	14.7	18.8	19.9	25.7	26.6	31.8	38.5	45.4	52.9
160	10.1	14.8	18.9	20.1	25.9	26.8	32.1	38.8	45.7	53.2
170	10.2	14.9	19.1	20.2	26.0	27.0	32.3	39.1	46.0	53.6
180	10.3	15.0	19.2	20.3	26.2	27.1	32.5	39.3	46.3	53.9
190	10.3	15.1	19.3	20.4	26.4	27.3	32.7	39.5	46.6	54.2
200	10.4	15.2	19.4	20.6	26.5	27.4	32.8	39.8	46.9	54.6
^a Wind stages for the crane in operation: 1 light $v_m = 10.1$ m/s at $z = 10$ m $v(z) = 14.1$ m/s $q(z) = 125$ N/m ² 2 normal $v_m = 14.3$ m/s at $z = 10$ m $v(z) = 20.0$ m/s $q(z) = 250$ N/m ²										
^b Upper limit of Beaufort scale										

3-second wind gust speed depending on the height and the Beaufort number and / or the wind speed determined over a time of 10 minutes at a height of 10 m

Sign	Unit	Definition
v_m	[m/s]	Wind speed determined over a time of 10 minutes at a height of 10 m
z	[m]	Height above level ground
$v(z)$	[m/s]	Speed effective at height z , decisive for the calculation of a 3 second gust
$q(z)$	[N/m ²]	At a height z effective quasi-static back pressure, determined from $v(z)$

Symbol

27.6 Wind influences during erection and take down



WARNING

The crane can topple over!

If a boom or a boom system is erected or taken down and the expected wind speeds are larger than the maximum permissible wind speeds according to the wind speed chart, then the crane can topple over and fatally injure personnel.

- ▶ If wind speeds are expected which are larger than the maximum permissible wind speeds for erection, then erection of the boom or erection of the boom system is prohibited.
- ▶ If wind speeds are expected, which are larger than the maximum permissible wind speeds for take down, then the boom or the boom system must be taken down immediately.

**WARNING**

Wind speed higher than permissible!

When the permissible wind speed for „Crane out of operation“ is higher than the permissible wind speed for take down: Take down of the boom is not permissible in case of unexpected increase of wind speed.

Toppling crane. Death, severe injury, property damage.

- ▶ If wind speeds are expected which are higher than the maximum permissible wind speeds for "Crane out of operation", then take the equipment and the boom down.
- ▶ Always take the boom down for safety reasons if weather conditions are unclear, see Erection and take down charts.
- ▶ Observe the permissible wind speeds for take down.

27.7 Wind influences in crane operation

**WARNING**

The crane can topple over!

Unforeseeable factors, such as sudden wind gusts on the crane and the load cannot be exactly predicted in advance.

- ▶ The size and shape of the load has a significant influence on the permissible wind speed during crane operation.
- ▶ Carry out a professional job planning with authorized and trained expert personnel. All environmental conditions, such as weather forecast and wind speeds must be taken into account.
- ▶ The authorized and trained expert personnel must have sufficient knowledge in the area of „Wind influences in crane operation“.

**Note**

- ▶ Calculation examples are included in the load charts. If you need further information, contact Liebherr-Werk Ehingen GmbH.

Depending on crane application, for example:

1. Lifting of large surfaced loads.
2. Working with long boom combinations.
3. Erection and take down of boom combinations.

The crane operator must check with appropriate information sources about the expected wind speeds, at:

1. The start of crane operation.
2. Interruption of crane operation.
3. Resumption of crane operation

**WARNING**

The crane can topple over!

If the crane is operated at wind speeds which are larger than the maximum permissible wind speeds according to the load chart, then the crane can topple over and kill personnel.

- ▶ If wind speeds are expected which are larger than the maximum permissible wind speeds for the equipped crane, then the equipment and the boom must be taken down.
- ▶ If wind speeds are expected which are larger than the maximum permissible winds speeds for crane operation, then it is prohibited to lift a load.

27.8 Wind influences for „Crane out of operation“



WARNING

Toppling crane. Death, severe injury, property damage!

If the crane is taken out of operation in set up condition and the expected wind speeds are higher than the maximum permissible wind speeds according to the wind chart, then the crane can topple over and fatally injure personnel.

- ▶ If wind speeds are expected which are higher than the maximum permissible wind speeds for „Crane out of operation“, then take the equipment and the boom down.
- ▶ Always take the boom down for safety reasons if weather conditions are unclear, see Erection and take down charts.
- ▶ Observe the permissible wind speeds for take down.

28 Lifting a load with two cranes

Before lifting a load with two cranes, the crane operator or a representative of the operator must determine the work sequence and assign a responsible supervisory person for the operation. The responsible supervisory person must monitor the operation and remain in constant contact with the crane operator.



WARNING

Overload and toppling the cranes!

If the load is not lifted or lowered exactly evenly by both cranes, then the center of gravity changes. The cranes can be overloaded and topple over.

Personnel can be killed or seriously injured.

- ▶ Make sure that the cranes are horizontally aligned.
- ▶ Observe the national valid standards, regulations and accident prevention guidelines.
- ▶ Determine the utilization degree of the cranes in operation, depending on the complexity of the load lift.
- ▶ Plan for sufficient safety reserves.
- ▶ Avoid side load on the boom.
- ▶ Carry out crane movements synchronously and slowly.



Note

- ▶ The total weight and the center of gravity of the load must be known exactly.
- ▶ Carry out the job planning in detail and with care.
- ▶ Avoid fastening points below the center of gravity of the load.

When the operational conditions or the work to be carried out require:

- ▶ Set up an assembly plan and operating instructions for the operation.

In the drawing is shown how the center of gravity for the load changes if the load is lifted or lowered unevenly. Already 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.

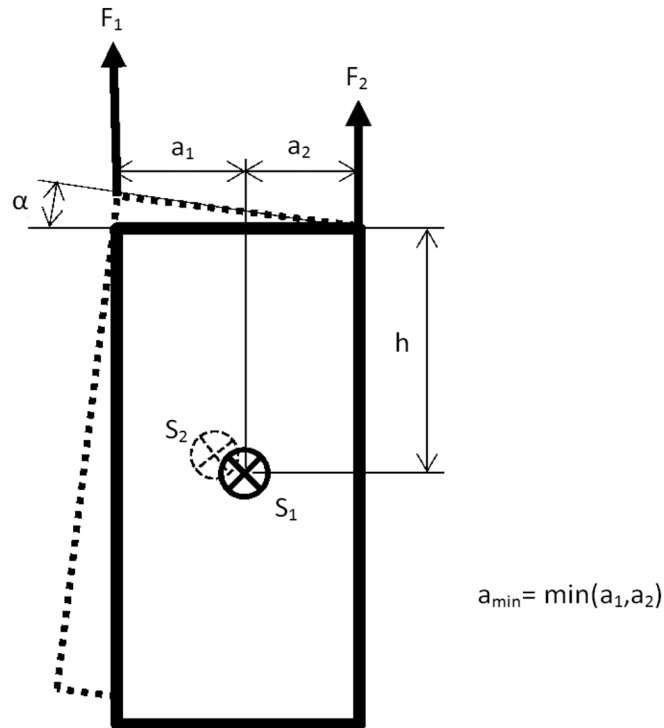


Fig. 124126: Geometric conditions

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

The following chart 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 in percentages.

**WARNING**

Danger of accident if standing under suspended loads!

- ▶ Always keep loads in sight.
- ▶ Standing under suspended loads is prohibited.

If this is not possible, the crane operator may only operate the crane if he is signed by an assigned guide.

The operator may be guided by hand signals or a two-way radio. It must be ensured that there are no misunderstandings.

**WARNING**

Danger of accident caused by misunderstood hand signals!

- ▶ Hand signals must be mutually agreed upon and clearly executed.
- ▶ In any case, **national regulations** must be observed.

30.1 Hand signals

30.1.1 Start operation, follow my instructions

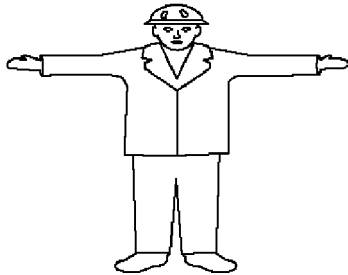


Fig.111700: Start operation, follow my instructions

Both arms stretched out horizontally with hands open and palms directed to the front.

30.1.2 Stop (normal stop)



Fig.111701: Stop (normal stop)

Lift one arm overhead with open hand and palm directed to the front.

30.1.3 Emergency stop (quick stop)

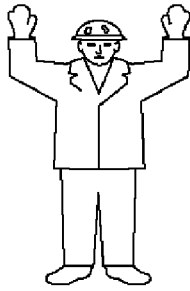


Fig.111702: Emergency stop (quick stop)

Lift both arms overhead with open hands and palms directed to the front.

30.1.4 End operation, no longer follow my instructions

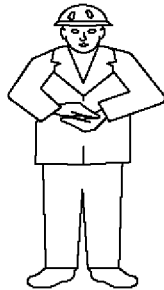


Fig.111703: End operation, no longer follow my instructions

Fold hands together at chest height in front of body.

30.1.5 Inching gear or very slow movement

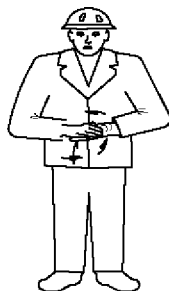


Fig.111704: Inching gear or very slow movement

Rub palms together in circular motion. After this sign, all other applicable hand signals apply.

30.2 Vertical movements

30.2.1 Showing the vertical distance

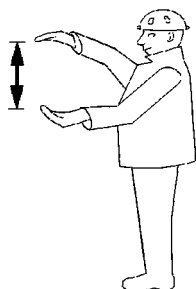


Fig.121364: Showing the vertical distance

Both arms stretched out in front of the body one on top of the other, with opposing palms.

30.2.2 Lifting / lowering a load with even speed



Fig.111706: Lifting / lowering a load with even speed

Lift one arm overhead with closed hand and index finger pointing upward, with small horizontal circular movements with forearm.

30.2.3 Lifting slowly



Fig.121365: Lifting slowly

Give lift signal with one hand, the other palm is not moving and positioned over the hand, which gives the signal.

30.2.4 Lowering the load while stationary

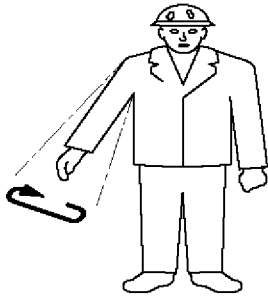


Fig.111708: Lowering the load while stationary

Point one arm away from the body, downward, with hand closed and index finger pointing down. Make small circular movements with forearm.

30.2.5 Lowering slowly



Fig.121366: Lowering slowly

Give lowering signal with one hand, do not move the other palm and hold it under the hand, pointing to the hand which gives the signal.

30.3 Horizontal movements

30.3.1 Moving / swinging in specified direction

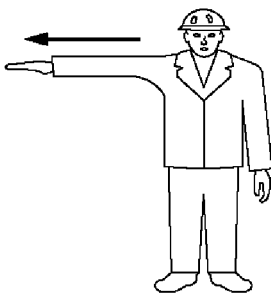


Fig.111710: Moving / swinging in specified direction

Hold stretched out arm horizontally into the desired direction, with the hand open and the palm pointing down.

30.3.2 Moving away from me



Fig.111711: Moving away 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.

30.3.3 Moving toward me

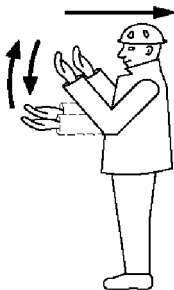


Fig.111712: Moving toward me

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.

30.3.4 Moving both track chains

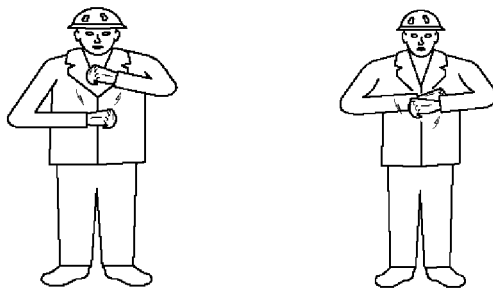


Fig.121367: Moving both track chains

Turn both fists around each other in front of the body in direction of the movement (forward or reverse).

30.3.5 Moving one track chain

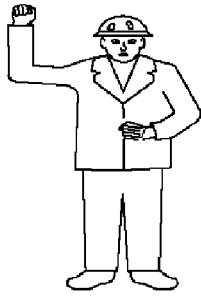


Fig.111714: Moving one track chain

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.

30.3.6 Showing the horizontal distance

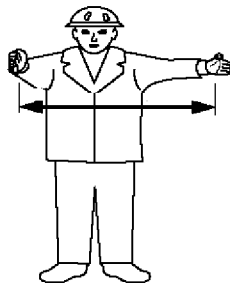


Fig.121380: Showing the horizontal distance

Keep both arms stretched out horizontally in front of the body with the palms opposite each other.

30.3.7 Transfer (between two cranes or two hooks)

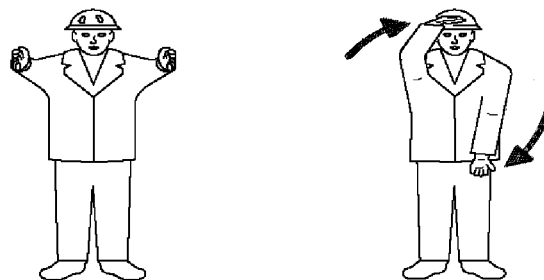


Fig.121368: Transfer (between two cranes or two hooks)

Hold both arms stretched out to the front, parallel and horizontally and turn by 90° in direction of the transfer.



WARNING

Danger of toppling the crane!

- ▶ Make sure that the load carrying capacity of the individual crane and hook is sufficient even if the transfer of the load is suddenly asymmetric.

30.4 Machine related movements

30.4.1 Lifting with main winch

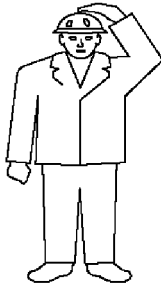


Fig.111719: Lifting with main winch

Place one hand on your head and hold the other arm on the side of the body.

After this signal all other hand signals apply only for the main winch.



Note

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

30.4.2 Lifting with auxiliary winch

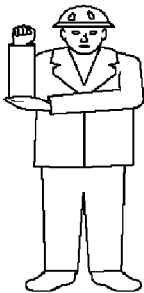


Fig.111720: Lifting with auxiliary winch

Hold one forearm vertically with closed hand and touch the elbow of this arm with the other hand.

After this signal all other hand signals apply only for the auxiliary winch.

30.4.3 Lifting the boom

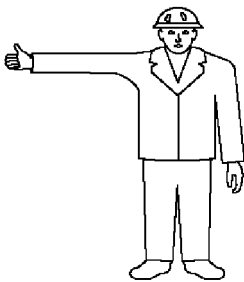


Fig.111721: Lifting the boom

Hold one arm horizontally with thumb directed upward.

30.4.4 Lowering the boom

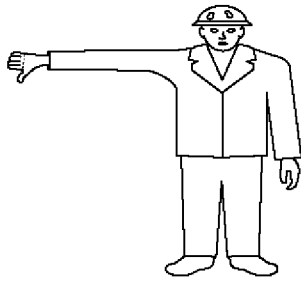


Fig.111722: Lowering the boom

Hold one arm horizontally with thumb directed downward.

30.4.5 Extending the boom

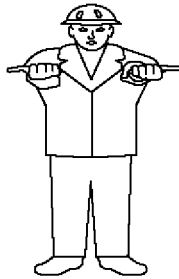


Fig.111723: Extending the boom

Hold both hands (with closed fists) stretched out to the front, with both thumbs directed away from each other.

30.4.6 Retracting the boom

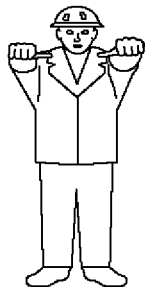


Fig.111724: Retracting the boom

Hold both hands (with closed fists) stretched out to the front, with both thumbs directed toward each other.

30.4.7 Lifting the boom and lower the load at the same time

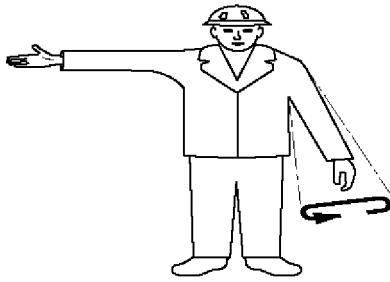


Fig.111725: Lifting the boom and lower the load at the same time

Hold one arm stretched out horizontally with thumb directed upward and stretch the other arm downward and away from the body, make small flat circles with the forearm.

30.4.8 Lowering the boom and lift the load at the same time

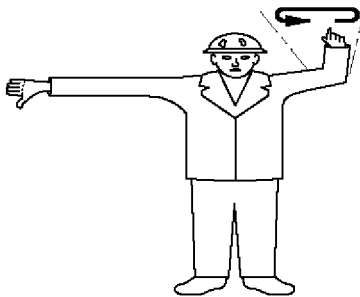


Fig.111726: Lowering the boom and lift the load at the same time

Hold one arm stretched out with thumb pointing down, stretch the other forearm upward and make small flat circles.

31 Travel operation

31.1 Starting to drive

Before starting to drive the crane

- Close all doors.
- Keep the doors closed during the travel operation.

31.2 Turning / driving in reverse



WARNING

Danger of accidents when turning or driving in reverse!

When turning or driving in reverse, personnel can be overlooked and killed.

Objects can be severely damaged.

- ▶ When turning or driving in reverse, the driver must act in such a way that he does not endanger other traffic participants.
- ▶ The driver may only drive in reverse or reset when persons or devices are **not** endangered. If this can **not** be ensured, then he must use a guide.
- ▶ An acoustical back up warning device will never replace the guide.
- ▶ Make sure that there are no persons or objects behind the vehicle when driving in reverse.
- ▶ Make sure that no personnel is injured or killed.
- ▶ Make sure that no objects are damaged.
- ▶ Driving in reverse is only permissible at slow driving speed (maneuvering speed).
- ▶ Adhere to the national regulations.

31.3 Stopping the mobile crane

Make sure that the following prerequisites are met:

- The mobile crane is standing on load bearing, level and tractive ground.
- The parking brake is applied.



WARNING

Parking brake is **not** applied!

The mobile crane can roll off, death, property damage.

- ▶ Park the mobile crane exclusively with applied parking brake.

- Turn off the ignition and pull out the ignition key.

When a battery master switch is present:

- Turn off the battery master switch and remove the switch cams.



WARNING

Downhill or uphill slope is too large!

The mobile crane can roll off, death, property damage.

- ▶ Park the mobile crane at an downhill or uphill slope of no more than maximum 18 %.

Under the following conditions the mobile crane must be additionally secured with wheel chocks to prevent it from rolling off:

- The mobile crane is parked on a slope or an incline.
- The mobile crane is defective, particularly when the brake system is defective.



WARNING

Wheel chocks incorrectly placed!

The mobile crane can roll off, death, property damage.

- ▶ So that the wheel chocks have an immediate braking action and hold the mobile crane in park position: Place all wheel chocks tightly directly under the wheel.
- ▶ Place all specified wheel chocks.
- ▶ All wheel chocks must counteract the downhill slope force.

If necessary:

- Place wheel chocks.

32 Crane operation

32.1 Before starting to work

Before starting to work with the crane:

- Close all doors.
- Keep the doors closed during crane operation.

32.2 While working with the crane



WARNING

Defective crane!

Death, severe bodily injuries, property damage.

If an erroneous function of a crane movement is recognized during crane operation:

- ▶ Telescope the boom in completely and place it down, find the source of the problem and remedy it.

32.3 Crane operation with a load



WARNING

The crane can topple over!

If the crane is in condition which is **not** operationally safe, the crane can topple over or crane components can fall down.

Personnel can be severely injured or killed.

- ▶ Before starting to work, the crane operator must ensure that the crane is in operationally safe condition.
- ▶ If safe crane operation cannot be ensured by the crane operator, then crane operation is prohibited until an operationally safe condition for the crane is established.
- ▶ Safety equipment, for example: Load torque limiter, hoist limit switch, brakes must be fully functioning, otherwise crane operation is prohibited.

Make sure that the following prerequisites are met:

- The load torque limiter must be adjusted according to the current set up configuration of the crane.
- The loads given in the load chart may not be exceeded.
- The crane may never be subjected with a load which exceeds those specified in the load charts.
- The weight, center of gravity and dimensions of the load to be lifted must be known.
- Load carriers, load handling and fastening equipment must be in accordance with specified requirements.



Note

- ▶ Make sure that the weight of the hook block and the weight of the fastening equipment is subtracted from the load given in the load chart, see the following chart.

Example:		
Maximum permissible load according to chart		30.000 t
Weight of the hook block	350 kg	- 0.350 t
Weight of the fastening rope	50 kg	- 0.050 t
Actual load capacity of the crane		= 29.600 t

The weight of the load to be lifted, in this example, may not exceed **29.6 t**.

**DANGER**

There is a high risk of accidents should the following points not be observed!

- ▶ Observe the following points.

Great danger of accidents exists if:

- The load torque limiter is not set in accordance with the current crane set up configuration and is therefore not able to provide proper protection.
- The load torque limiter is defective or taken out of operation.
- The hoist limit switches are defective or not functioning.
- For crawler cranes and mobile cranes with luffing lattice jib:
The angle sensor and the force test brackets are not functioning.
- For mobile cranes and crawler cranes with support:
The sliding beams of the hydraulic supports are not extended to the dimensions specified in the load chart.
- On crawler cranes:
The crawlers are not supported with stable base material sufficiently large for the ground conditions.
- For mobile cranes and crawler cranes with support:
The support plates are not supported with stable materials large enough for the ground conditions.
- Angular pulling is performed.
Angular pulling to the side is particularly dangerous, because the boom has only minimal lateral resistance momentum.

Angular pull is prohibited.

- Load attached during disassembly is too heavy and is freely suspended on the crane after release.
- The load hook is used to break away stuck loads.
Even if the weight of a stuck load does not exceed the permissible load capacity, the crane can topple over backwards if the load is suddenly released due to the tension of the boom, which can cause it to tip backwards.
- Working when the wind is excessively strong.
Comply with the load chart specifications.
- The crane is not levelled and the load is slewed in the direction of the slope.
- If improper crane movements cause the suspended load to swing like a pendulum.
- The loads and boom radii specified in the load charts are exceeded.
- When working in the vicinity of electricity transmission lines:
 - The electricity transmission lines were not turned off by expert electricians.
 - The danger zone was not covered or blocked off.

**WARNING**

Danger of current transfer!

If electricity transmission lines are not shut off nor covered nor blocked off, then there is an increased danger due to current transfer.

- ▶ Adhere to the safety distance according to the following chart.

If the crane becomes electrified despite having taken all necessary precautions, proceed as follows:

- ▶ Remain calm!
- ▶ Do not leave the crane cab.
- ▶ Warn people outside: Stay in place and do not touch the crane.
- ▶ Move the crane away from the danger zone.

Nominal voltage	Safety clearance	
Up to 50 kV	4 m	10 ft
More than 50 kV to 200 kV	5 m	15 ft
More than 200 kV to 350 kV	7 m	20 ft
More than 350 kV to 500 kV	8 m	25 ft

Nominal voltage	Safety clearance	
More than 500 kV to 750 kV	11 m	35 ft
More than 750 kV to 1000 kV	14 m	45 ft
More than 1000 kV	Determination by power supplier or authorized electrician	Determination by power supplier or authorized electrician

Safety distance to electrical power lines depending on the nominal voltage

32.3.1 Counterweight and / or ballast

The type of counterweight and / or ballast required depends on the weight of the load to be lifted and the radius required for crane operation. The deciding factor for the selection of the counterweight and / or ballast is the data in the corresponding load chart.



WARNING

The crane can topple over!

If the counterweight and / or ballast is not installed according to the load chart, then the crane can topple over and fatally injure personnel.

- ▶ Install the counterweight and / or ballast according to the load chart.

32.3.2 Hoist gear, hoist rope

The lifting capability of the crane depends on the pull force of the hoist gear and the number of possible hoist rope reevings. When using a single strand, the crane can only lift a load that is pulled by the hoist gear.

If the load to be lifted is heavier than the pull force of the hoist gear, then the hoist rope must be reeved as needed according to the principle of a pulley between the pulley head on the boom and the hook block.

When reeving, carefully observe the load chart specifications and the operating instructions.



WARNING

Hoist rope failure!

If the maximum pull force of the hoist gear is exceeded, the hoist rope can break or the hoist gear can be damaged.

The load can fall and kill personnel.

- ▶ Observe the maximum tensile force of the hoist gear.

32.4 Interrupting crane operation



WARNING

Impermissible weather conditions!

If the crane is exposed to impermissible weather conditions during interruption of crane operation, situations can occur which could bring the crane into an unsafe condition.

Toppling crane, death, severe bodily injuries, property damage.

- ▶ Get the weather forecast for the entire period during which the crane is set up.

If the predicted wind speeds are above the permissible values according to the load chart and / or the wind speed chart:

- ▶ Place the boom and equipment down in time before impermissible wind speeds occur. See Crane operating instructions, wind speed charts and Erection and take down charts.

When wind conditions are present, which are above the permissible values of the wind speed chart and the boom can no longer be taken down:

- ▶ Make sure that there is no danger for persons, crane and surrounding area. Secure the crane and surrounding area of the crane far enough against access. Warn persons in the surrounding area and bring them in safety.

A weather forecast includes information about:

- Changing weather conditions
- Wind
- Ice
- Precipitation
- Flooding
- Lightning



WARNING

Defective crane!

Death, severe bodily injuries, property damage.

If a crane movement occurs during the interruption of crane operation:

- ▶ Make sure, when an unintentional crane movement occurs, for example as a result of leak, no danger for persons, crane and surrounding is created.

Leaks can occur all on pressurized hydraulic cylinders, for example on the following cylinders:

- Support cylinder
- Luffing cylinder
- Telescoping cylinder
- Control cylinder



Note

- ▶ Movements can occur on hydraulic cylinders also as a result of changing oil temperature.

**WARNING**

Set up crane is not supervised!

Situations during interruption of crane operation may occur which could cause the crane to become unsafe if left unsupervised.

Toppling crane, death, severe bodily injuries, property damage.

- ▶ Always watch the crane and keep it under control.

If the crane is in set up condition:

- ▶ Do **not** leave the crane.

If the crane can **not** be constantly kept under control:

- ▶ Place the equipment down and telescope the boom in and place it down.
- ▶ The boom on the crane may only be placed down if the predicted wind speeds according to the wind speed charts are less than the maximum permissible wind speeds during assembly and disassembly.
- ▶ Before the crane is unsupervised: Establish an emergency plan.
- ▶ Carry out the measures listed below.

**Note**

- ▶ An emergency plan includes information how the crane is brought into a safe condition if an unforeseen event occurs.

If possible:

- Take down and secure the equipment, see the erection and take-down charts.
- Telescope the boom in and secure it. The crane boom may only be telescoped when the prevalent wind speed is lower than the wind speed indicated in the load chart for the boom.
- Place the boom down and secure it. The crane boom may only be placed down if the wind speeds are lower than the maximum permitted wind speeds according to the wind speed charts or does not exceed them according to the assembly / disassembly instructions.

On mobile cranes:

- Lift the axles to the maximum position and block the hydraulic suspension.

On lattice mast cranes:

- Set the Derrick ballast, if present, down on the ground.
- Place the load completely on the ground and unhook from the crane hook.
- Remove the fastening ropes from the hook.
- Place the load completely on the ground and unhook from the crane hook.
- Remove the fastening ropes from the hook.

When the hook block remains installed:

- Lift the hook block into the highest position.
- Make sure that the hook block does not touch other crane parts or obstacles.
- Make sure that all measures were taken to keep the crane in a safe condition if something happens.
- If possible, turn the engines off.
- Set all control levers into neutral position or into a locked position.
- Turn all secondary systems off, except systems, which are required for restart.
- Establish the energy supply and functionality of safety equipment.
- Close off all control devices, which are not in use.
- Disconnect all control devices, which are connected with cables, if possible, and secure them to prevent unauthorized use.
- Secure control devices without cables to prevent unauthorized use.
- Make sure that the batteries in control devices without cables are charged.
- Make sure that access to the crane and operation for unauthorized personnel is excluded: Lock the driver's cab and the crane operator's cab.
- Secure all keys to prevent unauthorized access.

If the construction site has limited space:

- The decision not to take the boom down while the crane is unsupervised can only be made by an authorized and qualified crane operator, who is familiar with the construction site.

- Make sure that no danger can occur for persons, crane and its surroundings should something unforeseen happen.
- Make sure for the duration of the interruption of crane operation, that the predicted wind speeds do not exceed the permissible values for the respective set up configuration, see wind speed chart.
- If the wind speed charts do not provide values for the set up condition, the permissible wind speed in the load chart shall be observed.

If crane operation with a set up crane is interrupted:

- Make sure measures are initiated in time by trained, qualified personnel to bring the crane into a safe condition if anything happens.
- Make sure that no danger can occur for persons, crane and its surroundings should something unforeseen happen.

If the predicted wind speeds are above the permissible values:

- Bring the boom and equipment in time into a permissible condition before impermissible wind speeds occur, depending on the predicted wind speed, or place it completely on the ground. See Crane operating instructions, wind speed charts and Erection and take down charts.
- Telescope the telescopic boom in and luff down to 0°. Position the boom and auxiliary boom, see Crane operating instructions, wind speed charts and Erection and take-down charts.

Incidents are for example:

- Vandalism
- The ground giving way due to severe rain
- Melting ice under the supports
- Storm and thunderstorm
- Storm and wind
- Lightning
- Flooding
- Landslides
- Washouts
- For mobile cranes and crawler cranes with support:
Slippage of support cylinders (leak, temperature changes)
- For cranes with telescopic booms:
Slippage of luffing cylinders (leak, temperature changes)

32.5 Resuming crane operation

Before resuming crane operation, the crane operator is obligated, among others, but not exclusively, to inspect the crane condition, the safety equipment, as well as the environmental conditions.



WARNING

Danger of accident!

When the crane operator leaves the crane cab:

- ▶ Before resuming work, check the operating mode setting and reset, if necessary.

32.6 Ending crane operation

Before the crane operator may leave the crane, the following prerequisites must be met:

- Place the load fully on the ground and unhook from the crane hook.
- On crane with telescopic boom: Telescope the telescopic boom all the way in and take down the boom in the boom receptacle.
- On crane with lattice mast boom: Set down the lattice mast boom and disassemble if necessary.
- Bring the control lever (master switch) to 0-position.
- Apply the parking brake on the crane chassis.
- Turn the engine off and pull out the ignition key.
- When a battery master switch is present: Turn off the battery master switch and remove the switch cams.
- Lock the crane cab.
- Secure the crane to prevent unauthorized use.

- For mobile crane: Make sure that the driver's cab is **not** occupied. Lock the driver's cab. Secure the crane to prevent it from rolling off unintentionally, see section „Parking the vehicle“.
- Make sure that no danger can occur for persons, crane and its surroundings should something unforeseen happen.

33 Lifting of personnel

33.1 Destined use

- The destined use of the crane is **lifting of loads**.
- **Lifting of personnel** is **not** considered to be destined use of the crane.



Note

- ▶ These instructions do **not** apply for work platforms, which are attached on the crane boom and are used to lift personnel. This subject is governed by international standards for mobile aerial work platforms.



WARNING

Non-designated use of the crane!

Personnel can be severely injured or killed.

- ▶ The crane is **not** intended to lift personnel.
- ▶ The crane may **not** be used for recreational purposes and exhibitions, such as lifting personnel for shows, bungee jumping or Dinner in the sky.
- ▶ The crane may **not** be used for lifting of devices with personnel on them or under the device, such as lifting of tents.
- ▶ Exception: If lifting of personnel for special work situations is the least dangerous possibility to carry out the work, then personnel may be lifted or brought into a suspended position when using lifting cages (cherry pickers).

33.2 Prerequisites for lifting of personnel

Make sure that the following prerequisites are met:

- Lifting personnel with cranes is permissible by national and local laws in the country where this crane application is carried out.



DANGER

Lifting of personnel!

Accidents which occur when lifting personnel often result in severe injuries or even death.

- ▶ This exceptional application is within the scope of responsibility of the user and is only permitted if the requirements and instructions in the next sections are observed and adhered to.
- ▶ The company, the supervisor, the crane operator and auxiliary personnel must proceed especially carefully and safety conscious.
- ▶ Before the lifting procedure, a meeting must be held with all associated personnel.
- ▶ The following warning notes and safety regulations must be strictly observed.

33.2.1 Legal prerequisites

Make sure that the following prerequisites are met:

- Special arrangements were made for the use of the lifting cage (cherry picker) according to the requirements of national laws.
- If required by national laws: The use of the crane to lift personnel was 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 with the aid of a work-specific risk analysis for the possibility of rescuing personnel in emergencies was defined.

- To rescue personnel in emergencies, precautionary measures must be present on the crane, if they are required by national laws.
- The measures for safe operation near power lines, depending on the conditions on the job site and the national laws / national regulations were observed and adhered to.

33.2.2 Prerequisites for crane equipment and accessories

Make sure that the following prerequisites are met:

- The hoist gear to lift personnel must also be able to be moved in emergency operation.
- Before lifting personnel, the crane was inspected. No damage was found.
- The lifting cage (cherry picker) is utilized according to national laws and / or standards and according to intended purpose.
- Before lifting personnel, the lifting cage (cherry picker) was carefully inspected. No damage was found.
- Every emergency rescue device was inspected and its operational readiness was determined, if required by national laws.
- Any hooks in use must be equipped with a latch, which prevents the hook mouth to open. According to national laws, the latch must be manually closable or lockable or must automatically close via a spring.

33.2.3 Inspection before operation

Make sure that the following inspections are made before use of the lifting cage (cherry picker):

- On every new construction site and after every modification or repair: To ensure the operating safety of the lifting cage (cherry picker) and the lifting equipment, a test with 125 % of the nominal load carrying capacity of the lifting cage (cherry picker) without personnel must be carried out. During the test, the lifting cage (cherry picker) may only be lifted just above the ground.
- A test lift with loaded lifting cage (cherry picker) without personnel must be carried out. The weight in the lifting cage (cherry picker) for the test lift must be at least as large as the weight of the personnel and the weight with the work equipment carried along. For this test lift, the course of all planned movements of the lifting procedure must be simulated.
- This test lift must be carried out for every location on a construction site, where personnel must be carried.

33.2.4 Prerequisites for operation with lifting cage (cherry picker)

Make sure that the following prerequisites are met for operation with lifting cage (cherry picker):

- The personnel and technical prerequisites for safe use and operation of the emergency control of the crane are present.
- The emergency control for emergency rescue of the person in the lifting cage is functioning.
- 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.

34 Securing personnel on shut off crane

34.1 Terms and abbreviations

- PSAgA: Personal protective equipment to prevent falling
- HSG: Height safety device

34.2 Destined use

Cranes are **not** designed to protect personnel against falling.

When the following prerequisites are met, the personnel protection may be permissible:

- A justified individual care is present.
- A project-specific written risk assessment and work procedure for the precise case by the employer is on hand.

- Specific safety measures are strictly adhered to.
- The crane is intended by the manufacturer for personnel protection.

Limitations for movement and operation:

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

34.3 Prerequisites



WARNING

Prerequisites for personnel protection are **not** met!

Danger of accident. Death, severe bodily injuries.

- ▶ Carry out the personnel protection on the shut off crane only when **all** prerequisites in this section have been met.

Make sure that the following prerequisites are met:

- The country-specific, legal regulations are being observed.
- 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.
 - Personnel protection on the shut off crane is the safest and most useful method to carry out this work.
- Last transport and personnel protection occur independent of each other:
 - Do **not** carry out personnel protection at the same time as load transport. Simultaneous personnel movement is impermissible.
 - Riding along on the load is impermissible.
- Determination of fastening points and rescue plan for the precise case is on hand from the employer.

34.3.1 Personnel and qualification

Make sure that the following prerequisites for personnel and qualification are met:

- The crane operator is suited and competent to operate the crane.
- Person, which is secured, must be trained in handling the PSAG.
- The following persons are present on the job site and separately instructed:
 - a supervisor
 - the crane operator
 - required number of rescue staff according to the rescue plan
- Access protection, fall protection on the shut off crane is made in accordance with the project-specific risk assessment on hand and the measures to be taken.
- The supervisor monitors the safe execution of work. He may **not** take part in the work.
- An effective communication must be ensured between crane operator and the secured person.

34.3.2 PSAG, rescue equipment and tools

Make sure that the following prerequisites and measures are met:

- Use only HSG (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 identification.
- Recurring inspections have been made. There are **no** visible defects present.
- At least 1 m connecting device of the maximum possible extension length of the HSG (height safety device) must remain in the housing.
- Fasten the HSG (height safety device) with two separate connecting devices (for example Securing on crane hook and on crane pulley block).

- Position the crane in such a way that the HSG (height safety device) is at least 5 m and plumb **over** the person, which is being secured.
- Do **not** exceed the maximum permissible deflection of the HSG (height safety device)
- Keep the required space **underneath** the person, which is being secured.
- All required objects (tools, building material) for the work are secured to prevent them from falling.

34.3.3 Crane

Make sure that the following prerequisites are met:

- The maintenance intervals and periodic crane inspections have been adhered to. There are **no** visible defects present.
- The load on the crane hook in any possible position is at least 600 kg , see Load chart (take the crane pulley block into account).
- Ensure sufficient load bearing capacity: For the load cases catching, pendular fall and possible angular pull adhere to the manufacturer's instructions.
- The crane is secured against movements and inadvertent movement (remote control is deactivated, crane control is activated).
- Only for aligning loads in the end position: Carry out a minimum of crane movements with the least possible speed.
- The overload protection is active.
- Auxiliary booms are **not** used.

34.4 Fastening device

Make sure that the following prerequisites are met:

- The crane hook is equipped with the hook safety.
- On the carrying device two connecting devices separated from each other can be fastened.
- HSG (height safety device) is redundantly fastened.
- Suitable fastening devices according to EN 795 Type B are on hand:
 - Round sling or fastening rope with steel core
 - Belt loop
- Textile components must be protected against greases, oils and other aggressive substances.
- Use only steel carabiners according to EN 362 with Tri-Lock function.

34.5 Rescue

A person in an accident must be lifted or lowered with the aid of the crane.

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, which is rescued.

34.6 Additional risks

Make sure that the following risks are taken into account:

- Wind effect and environmental influences
- Crushing and shearing points
- Endangerment by additional cranes, for example material transport

35 Welding work on the load



Note

- ▶ The load must also be grounded.

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, crane superstructure or crane chassis.

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LWE/LR 1750-000/12812-15-02/en

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Safety guidelines

The ladders have been built according to the present level of technology and recognized safety technical regulations. Despite that, during their use dangers to life and physical condition of the user and / or third parties can occur.

The 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.

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

The ladders are exclusively designated for the ascent and descent of personnel.

Any other use is not as intended and therefore prohibited.

The manufacturer is **not** liable for damages, which are caused by unintended use or improper usage.



WARNING

Danger of falling!

If the following safety guidelines are not observed, personnel can fall down and be killed or severely injured.

- ▶ Observe and adhere to the assembly and safety guidelines for ladders.
- ▶ Observe and adhere to the safety signs on the ladders.
- ▶ Install and secure the ladders properly.
- ▶ Use ladders exclusively if you are healthy enough to do this.
- ▶ Climb up / down the ladder with the 3-point support.
- ▶ Use the rungs as handles.
- ▶ Step into the rungs deep enough.
- ▶ Do not use damaged ladders and replace them immediately.
- ▶ Repair the ladder exclusively through authorized service facilities.

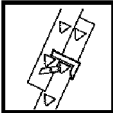
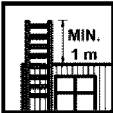


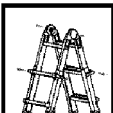
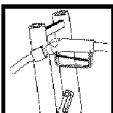
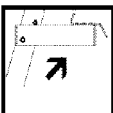
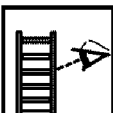


2 Safety signs





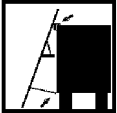

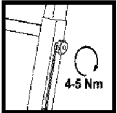









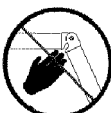


Note







- ▶ All safety signs on the ladders must be complete and always legible.
- ▶ Observe and adhere to the manufacturer's operating instructions.

Sign	Explanation
	Read the operating instructions.
	Maximum number of users on one ladder.
	Correct set up angle 65° to 75°.

Sign	Explanation
	Before use: Engage the lift out safety.
	Ladder overhang above the exit level.
	Secure the upper / lower end of the ladder.
	Before use: Tension the safety struts on stepladders.
	Before use: Engage the locking pin joints and pull pin locks.
	To open / close the tank cover and to ascent / descent: Insert the fuel nozzle into the retainer.
	Fold the platform out before setting up the ladder.
	Before use: Check the ladder for damage.
	Check the legs of the ladder.
	Maximum load.

Sign	Explanation
	Do not use the three uppermost rungs of an extension ladders as rungs to stand on.
	Do not use the four uppermost rungs / steps of a stepladder without a platform to stand on.
	Do not use the two uppermost rungs of a stepladder with integrated extension ladder as rungs to stand on.
	If hinged ladders are used as stepladders: Spread the ladder legs to the stop.
	Place the upper placement angle flat. Hold the belt on tension.
	Hook the hook on the platform of the refueling ladder on the vehicle.
	Tighten the star knob on the beam extension tightly.
	Do not use a damaged ladder.
	Preclude any contaminants on the ground.
	Make sure the upper end of the ladder is placed correctly. Place the ladder only on safe surfaces.

Sign	Explanation
	Only one person may climb up / down on any accessible leg of the ladder.
	Avoid leaning out to the side. The body's center of gravity should be between the ladder beams.
	Face the ladder when climbing up / down the ladder.
	Use the ladder only with suitable shoes.
	Do not use a stepladder as a leaning (extension) ladder.
	Do not use the inner section of multi-part hinged ladders without outer sections as a stepladder.
	Crushing danger.
	Set the ladder up on horizontal and solid ground.
	Set the ladder up on solid ground.
	Use the ladder in the correct set up direction.

Sign	Explanation
	Do not carry along bulky objects or objects over 10 kg on the ladder.
	It is not permitted to step off the ladder to the side.
	During transport, pay attention to danger due to power lines.
	Do not use the ladder as a walkway.
	Do not transport snow and ice shovels over the ladder. Use hooks!
	Danger due to shearing point.

3 Ladder inspection

Make sure that the following conditions are met:

- All ladders are inspected at least every 12 months. See chapter 8.17.
- The inspection may be made exclusively by authorized and trained expert personnel.

4 User guidelines

Make sure that the following prerequisites are met before using the ladder:

- A risk evaluation had been made.
The national legal regulations have been taken into account.
- Use are able to use a ladder as far as your health is concerned.
- The ladder is suited for the respective application.
- The ladder is complete and not damaged (visual inspection).
- The ladder is free of contaminants, such as:
 - Ice
 - Snow

- Frost
- Wet paint
- Lubricants
- The legs of the ladders are not worn.
- Screws and connections have been checked for tight seating.
- The base is:
 - Level
 - Horizontal
 - Slip-resistant
 - Unmoveable

Before setting the ladder up:

- Secure the locking devices of the ladder.
- Tension the spreaders of the stepladder.
- Do **not** set up the ladder from above.
- Do **not** set the ladder on braces or steps.

When using the ladder:

- Make sure that no children are playing on the ladders.
- Set the ladder up in the correct set up angle.
- Subject the ladder with no more than maximum 150 kg.
- Use the ladder exclusively as described in section „Ladder access“.
- Do **not** use the ladder outside in strong wind.
- Do **not** subject the ladder excessively to loads in side assembly work.
- Face the ladder when climbing up or down the ladder.
- Step on the ladder with suitable shoes.
- Do not use the ladder as a walkway.
- Secure the ladder to prevent it from being knocked over inadvertently.
- For leaning ladders, do not step on the uppermost three steps / rungs, in reference to the ladder placement point.
- For stepladders, do not step on the uppermost two steps / rungs.
- When working on a ladder, hold on tightly with one hand.
If this is not possible: Take additional safety measures, such as: Use the WORK POSITIONING SYSTEM (WPS).

For repair, maintenance and storage of a ladder:

- Have repairs and maintenance made by expert personnel according to the manufacturer's instructions.
- Store the ladders according to the manufacturer's instructions.

Before transporting the ladders:

- Lock and secure the ladders in their provided transport retainers.

5 Ladder access

Wearing the personal protection equipment to prevent falling and the ladder safeguard depend on the type of work, among others.

5.1 Ladder safeguards

The ladder can be secured to prevent it from sliding away to the side by:

- Restraint device, for example: Tether or side stops on component
- Friction lock, for example: Rubber caps or plastic caps on the end of the ladder beam at direct placement on a surface

The ladder can be secured to prevent it from tipping to the rear by:

- the correct placement angle

5.2 3-point support

A 3-point support is ensured when:

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

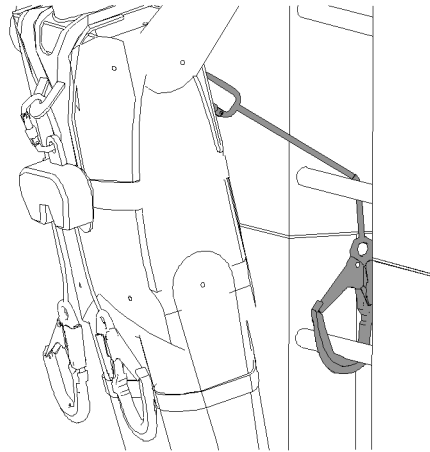


Fig.126746: Example of how to use the WPS

5.3 Light and / or heavy work

The following lists various light and heavy work

Examples for light work:

- Installing / removing retaining pins or spring retainers
- Fastening components, disengaging fastening equipment
- Pushing the transition aid out / in
- Establishing / disconnecting electrical or hydraulic connection between components
- Actuating the hand pump for the folding jib
- Reeving the auxiliary winch in / out
- Setting up / taking down foldable railings
- Carrying out maintenance and inspection work
- Refueling the crane chassis and / or crane superstructure

Examples for heavy work:

- Knocking the connector pins in / out
- Installing / removing the wind warning
- Reeving the hoist rope in / out
- Installing / removing the connector pin with assembly aid (hydraulic cylinder or mechanical assembly tool)
- Installing / removing the rope lock

5.4 Remove the end section on the leaning ladder

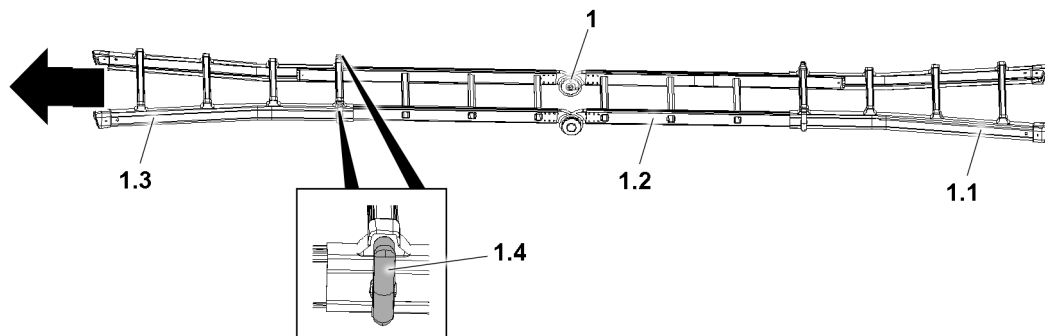


Fig.126873: Leaning (extension) ladder 1

The leaning ladder 1 consists of the following components:

- 1.1 Base
- 1.2 Center section
- 1.3 End section
- 1.4 Locks

When the end section 1.3 is wider than the leaning tube 2 or the intended placement surface, the leaning ladder 1 cannot be placed fully expanded. In order to position the leaning ladder 1 fully expanded, the end section 1.3 must be disassembled and removed.



CAUTION

Fingers in the spring range of the lock 1.4!

Finger crushing when locking and unlocking.

- ▶ Grip the lock 1.4 outside of the spring range.
- ▶ Release the locks 1.4 on the left and right.
- ▶ Slide the end section 1.3 out of the center section 1.2 and remove it.

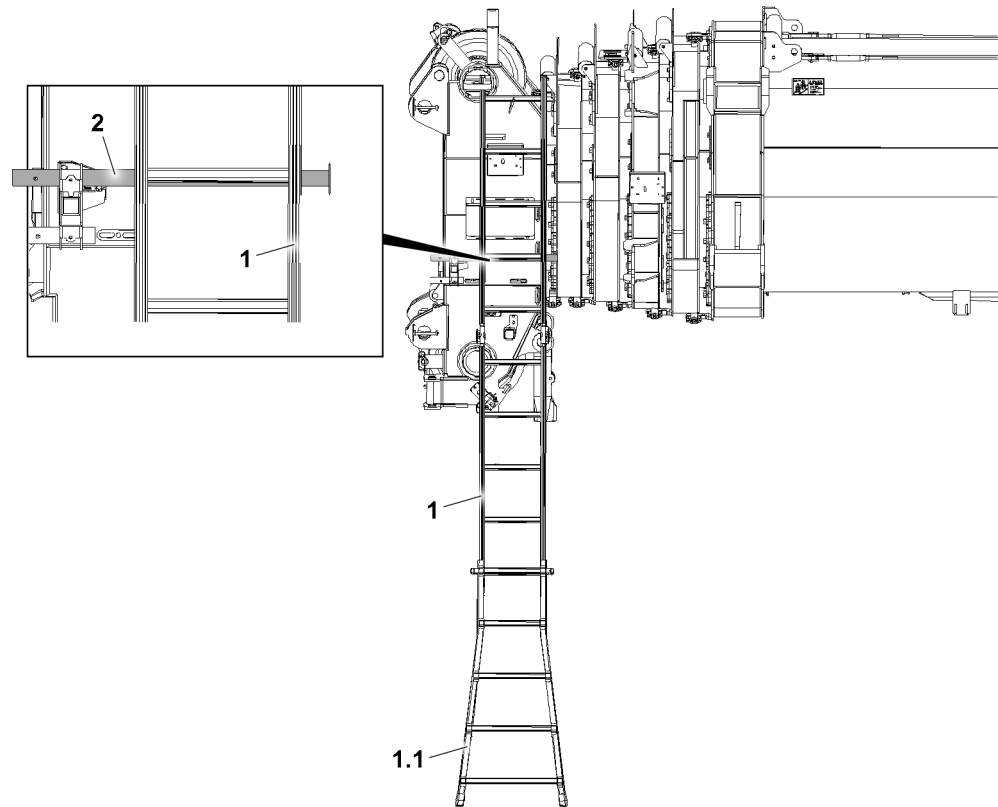


Fig.126874: Leaning ladder 1 placed on the leaning tube 2

When placing the leaning ladder 1, the base 1.1 must be placed on the ground.

- ▶ Place the leaning ladder 1 on the leaning tube 2 or the intended placement surface.



WARNING

The leaning ladder 1 is wider than the leaning tube 2 or the intended placement surface! Assembly personnel can fall when stepping on the leaning ladder 1 and be severely injured.

- ▶ When stepping on the leaning ladder 1 make sure that the leaning ladder 1 **is not** wider than the leaning tube 2 or the intended placement surface.
 - ▶ Climb on the leaning ladder 1. Carry out the assembly work.
- Before leaving the jobsite, the end section 1.3 must be reinstalled.
- ▶ Before leaving the jobsite: Install the end section 1.3.
 - ▶ Secure the leaning ladder 1 in transport position.

5.5 Types of ladders

5.5.1 Stepladder

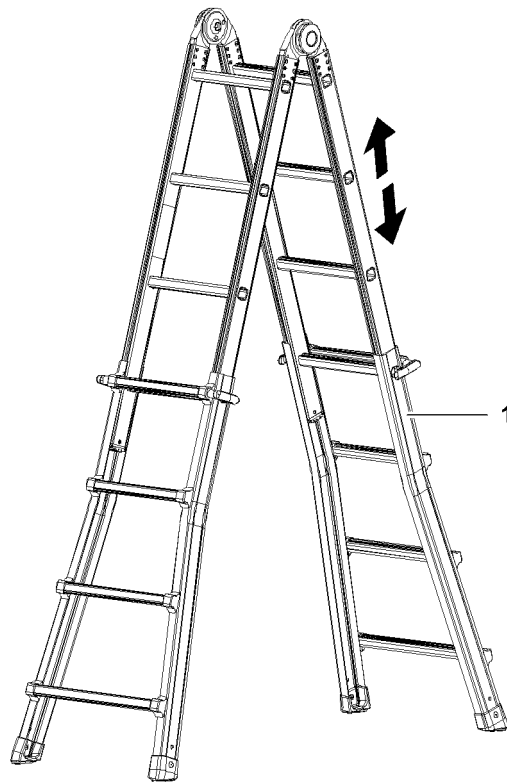


Fig.121175: Examples for stepladders



WARNING

Danger of falling when transitioning from a stepladder 1 to other components!
Personnel can fall down and be killed or severely injured.

- ▶ Do **not** transition from a stepladder 1 to other components.



WARNING

Danger of falling!
Personnel can fall down and be killed or severely injured.

- ▶ When using stepladders 1, adhere to the 3-point support.
- ▶ Adhere to the prerequisites and conditions for the use of stepladders 1.

Prerequisites for the use of stepladders 1:

- Make sure that the weight of the tool carried along is not more than 10 kg.

Access	Work
Maximum rise to the third rung / step from the top	Maximum rise to the third rung / step from the top
3-point support required	3-point support required
	Rise to 1 m: Personal protective equipment to prevent falling not required

Access	Work
	Rise above 1 m to 7 m Light work: Personal protective equipment to prevent falling not required
	Rise above 1 m to 7 m Heavy work: Personal protective equipment to prevent falling required

Conditions for access and work on stepladders 1

5.5.2 Leaning (extension) ladder

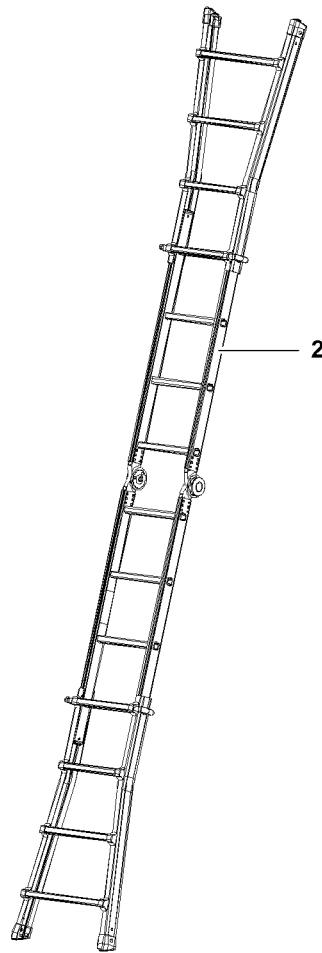


Fig.121176: Example for leaning (extension) ladders



WARNING

Danger of falling!

Personnel can fall down and be killed or severely injured.

- ▶ When using leaning (extension) ladders **2**, adhere to the 3-point support.
- ▶ Adhere to the prerequisites and conditions for the use of leaning (extension) ladders **2**.

Prerequisites for the use of leaning (extension) ladders **2**:

- Make sure that the leaning (extension) ladder **2** is positioned onto a level placement surface.

- Make sure that the leaning ladder **2** is placed in an incline angle of 65° to 75° (approx. 1:4) to the horizontal.
- Make sure that the ladder overhang when leaning it on components is selected in such a way that the leaning (extension) ladder **2** is safely placed when subjected to a load / flex due to ascending persons.
- Make sure that the weight of the tool carried along is not more than 10 kg.

Access	Work
Maximum rise to the fourth rung / step from the top, in reference to the placement point	Maximum rise to the fourth rung / step from the top, in reference to the placement point
3-point support required	3-point support required
	Rise to 1 m: Ladder safeguard not required Personal protective equipment to prevent falling not required
	Rise above 1 m to 7 m Light work: Ladder safeguard required Personal protective equipment to prevent falling not required
	Rise above 1 m to 7 m Heavy work: Ladder safeguard and protection to prevent it from tipping to the rear required Personal protective equipment to prevent falling required

Conditions for access and work on leaning (extension) ladders 2

5.5.3 Leaning (extension) ladder with transition

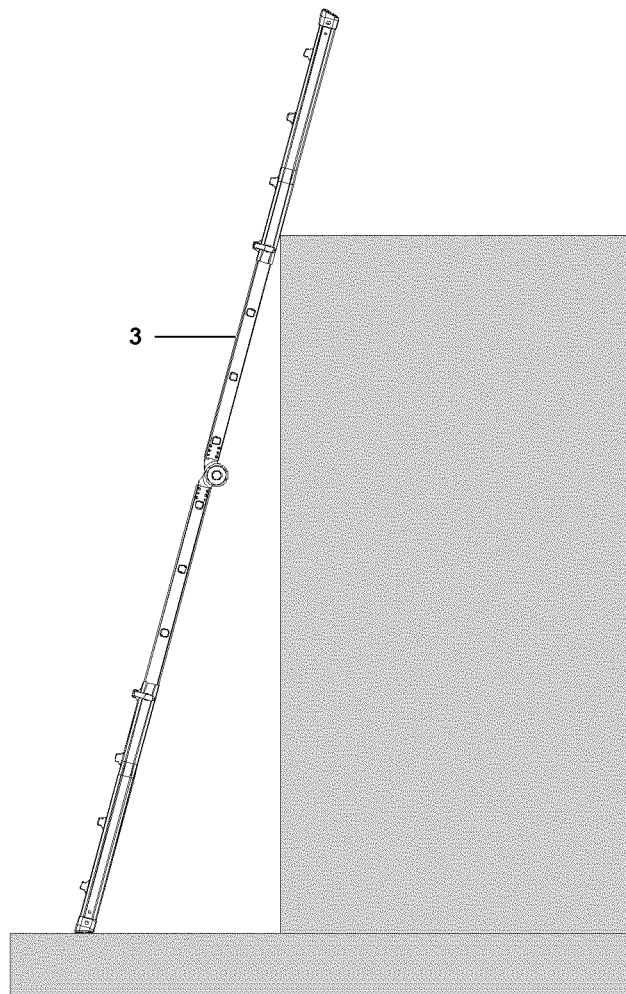


Fig.121177: Examples for leaning (extension) ladders with transition



WARNING

Danger of falling!

Personnel can fall down and be killed or severely injured.

- ▶ When transitioning, adhere to the 3-point support.
- ▶ Adhere to the prerequisites and conditions for the use of leaning (extension) ladders with transition **3**.

Prerequisites for the use of leaning (extension) ladders with transition **3**:

- Make sure that the leaning (extension) ladder with transition **3** is positioned onto a level placement surface.
- Make sure that the leaning ladder with transition **3** is placed in an incline angle of 65° to 75° (approx. 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 (extension) 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 ladder overhang when leaning it on components is selected in such a way that the leaning (extension) ladder is safely placed when subjected to a load / flex due to ascending persons.
- Make sure that the weight of the tool carried along is not more than 10 kg.

Access	Transition
Maximum rise to a rung / step below the placement edge	Maximum rise to a rung / step below the placement edge
3-point support required	3-point support required
Personal protective equipment to prevent falling not required	Personal protective equipment to prevent falling not required
	Rise to 1 m: Ladder safeguard not required
	Rise above 1 m to 7 m Ladder safeguard required

Conditions for access and transition to leaning (extension) ladders with transition 3

5.5.4 Vertical ladder with transition aid

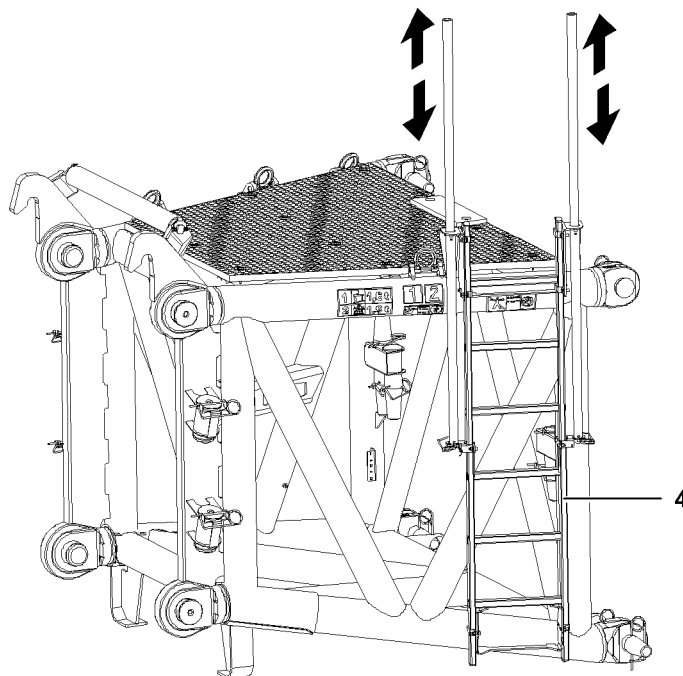


Fig.121178: Example for vertical ladder with transition aid



WARNING

Danger of falling!
Personnel can fall down and be killed or severely injured.

When using vertical ladders with transition aid 4:

- ▶ Adhere to the 3-point support.

Before transitioning:

- ▶ Hook the personal protective equipment to prevent falling on a suitable location (for example: uppermost rung, safety rope or separate hook point).
- ▶ Adhere to the prerequisites and conditions for the use of vertical ladders with transition aid 4.

Prerequisites for the use of vertical ladders with transition aid 4:

- Make sure, a centered grip reachable from the transition edge and a possibility to support oneself with the second hand is present for transitioning.
- Make sure that the transition area is slip-resistant.
- Make sure that the ladder position can be recognized from above.
- Make sure that the weight of the tool carried along is not more than 10 kg.

Access	Work
3-point support required	3-point support required
If necessary: use a WORK POSITIONING SYSTEM (WPS) at a suitable hook point.	If necessary: use a WORK POSITIONING SYSTEM (WPS) at a suitable hook point.

Conditions for access and work on vertical ladders with transition aid 4

Ascent	Transition
3-point support required	3-point support required
Rise to 5 m: Personal protective equipment to prevent falling not required	Rise to 1.8 m: Without transition aid: Personal protective equipment to prevent falling not required
Rise above 5 m: Fall arrest system with moving along fall arrest device or back protection required	Rise above 1.8 m: Without transition aid: Personal protective equipment to prevent falling required

Conditions for ascent and transition to vertical ladders with / without transition aid 4

5.5.5 Platform ladder

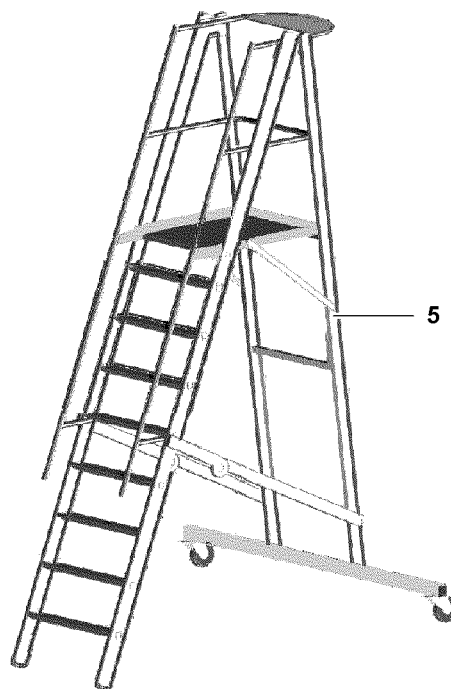


Fig.121179: Example for platform ladder

**WARNING**

Danger of falling when transitioning from a platform ladder **5** to other components!

Personnel can fall down and be killed or severely injured.

- ▶ Do **not** transition from a platform ladder **5** to other components.

**WARNING**

Danger of falling!

Personnel can fall down and be killed or severely injured.

For use of platform ladders **5**:

- ▶ Adhere to the 3-point support.
- ▶ Adhere to the prerequisite and conditions for the use of platform ladders **5**.

Prerequisite for the use of platform ladders **5**:

- Make sure that the weight of the tool carried along is not more than 10 kg.

Access	Working on the ladder	Working on the platform
Maximum rise to platform height	Maximum rise to platform height	Maximum height: Platform height
3-point support required	3-point support required	3-point support required
	Rise to 1 m: Personal protective equipment to prevent falling not required	
	Rise above 1 m to 7 m Light work: Personal protective equipment to prevent falling not required	Platform height Light work: Personal protective equipment to prevent falling not required
	Rise above 1 m to 7 m Heavy work: Personal protective equipment to prevent falling required	Platform height Heavy work: Personal protective equipment to prevent falling required

Conditions for access and work on platform ladders 5

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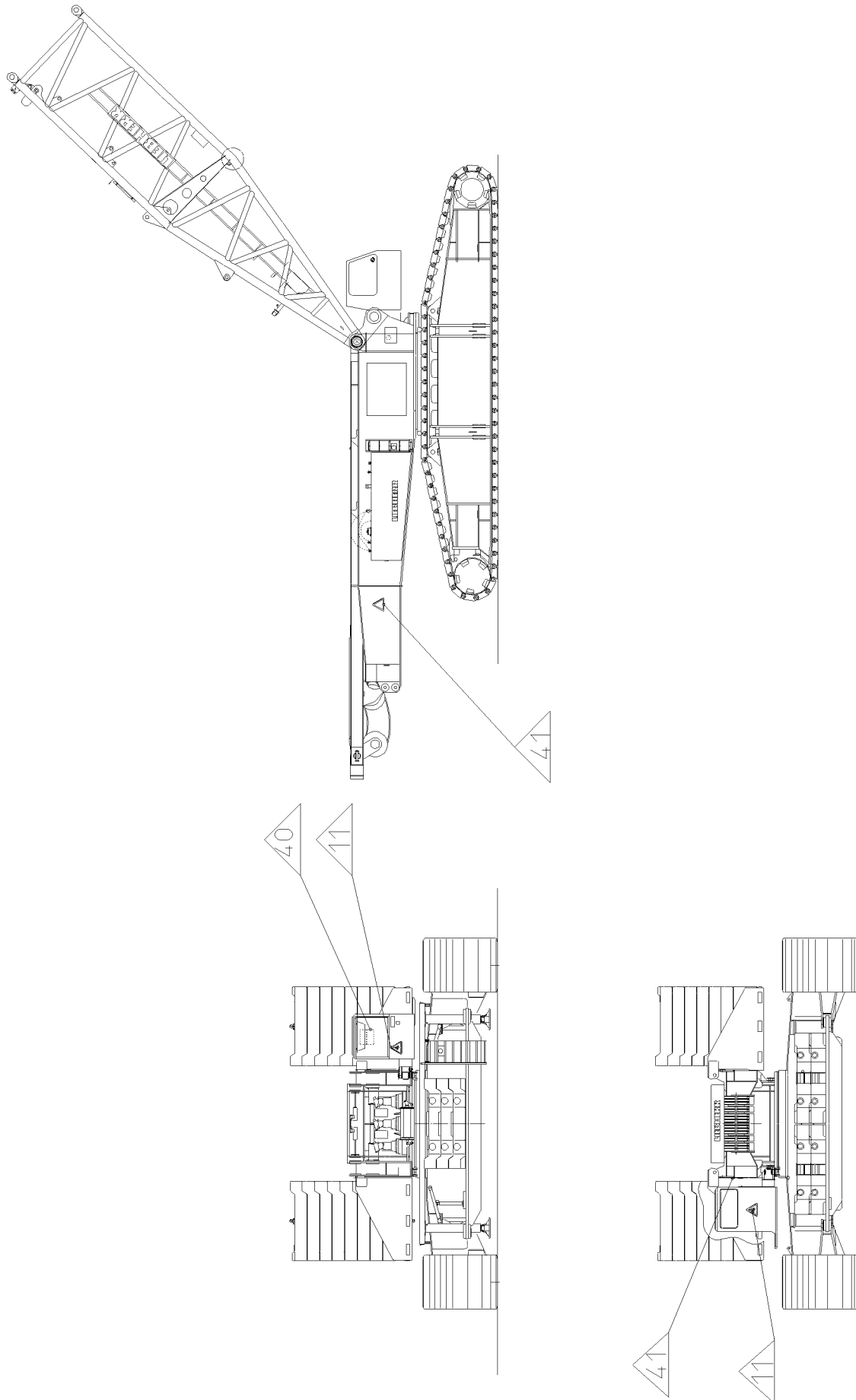


Fig.108090

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1 Warning signs



Note

- ▶ Warning signs are safety signs, which warn of a risk or danger!
- ▶ For that reason, all warning signs on the crane must always be complete and legible!
- ▶ Replace damaged warning signs immediately!

1.1 Warning of suspended load (position 11)



Fig.108093



DANGER

Risk of fatal injury under suspended load!

- ▶ Standing under suspended loads is prohibited!
- ▶ Keep away from the working range of the machine!

1.2 Warning of high voltage (position 40)

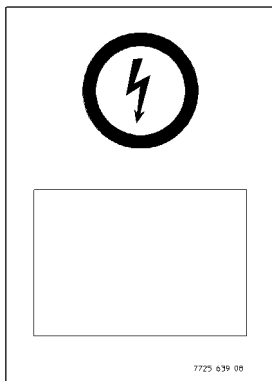


Fig.106031



Note

- ▶ Only for certain countries!

1.3 Slewing range (position 41)

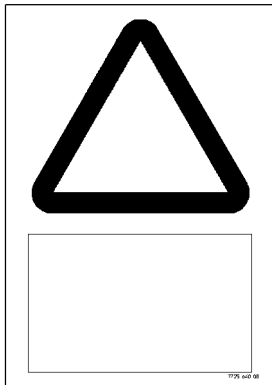


Fig.106032



Note

► Only for certain countries!

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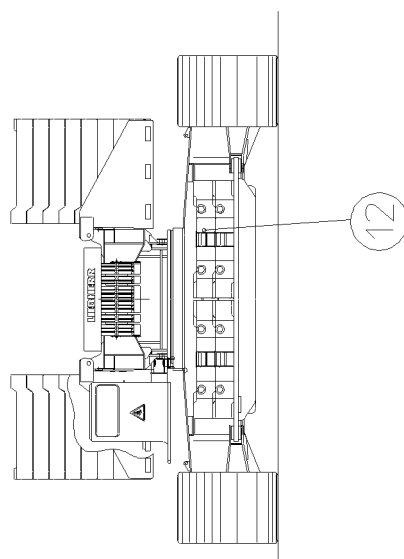
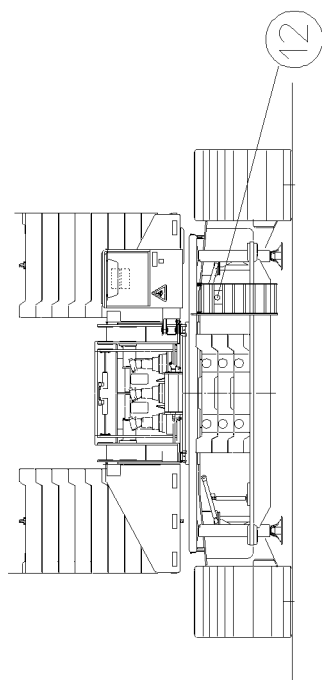
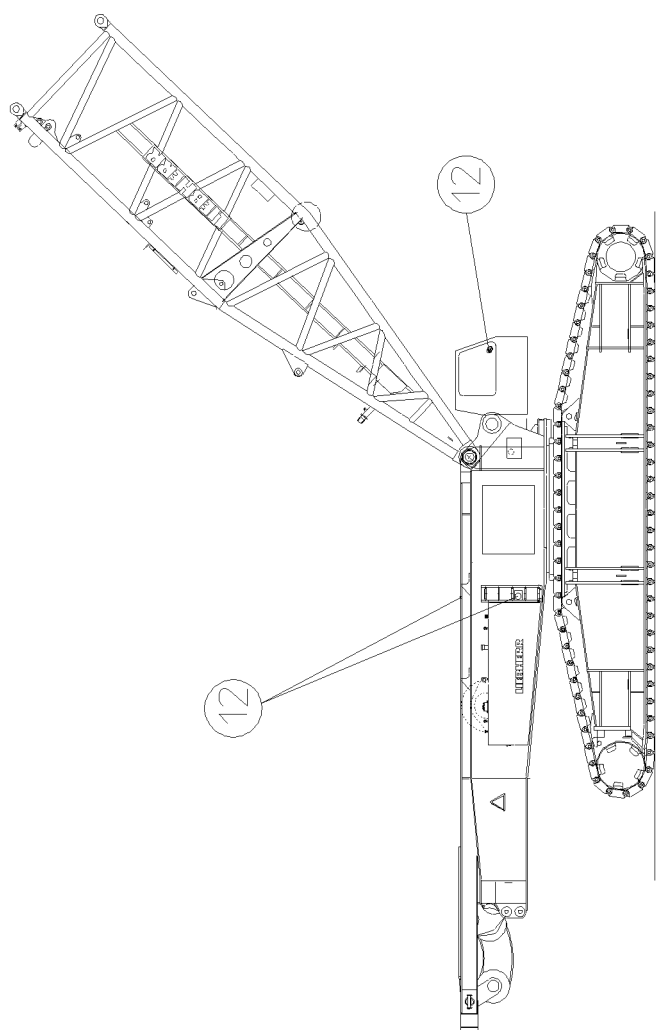


Fig.108091

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2 Command and prohibition signs

2.1 Prohibition sign

**Note**

- ▶ Prohibition signs are safety signs, which prohibit a behaviour, which could result in danger!
- ▶ For that reason, all prohibition signs on the crane must always be complete and legible!
- ▶ Replace damaged prohibition signs immediately!

2.1.1 Access for unauthorized personnel prohibited (position 12)



Fig.108098

**DANGER**

Risk of fatal injury!

If the crane is accessed by unauthorized personnel, life threatening injuries can occur!

- ▶ Access is strictly prohibited during crane operation!

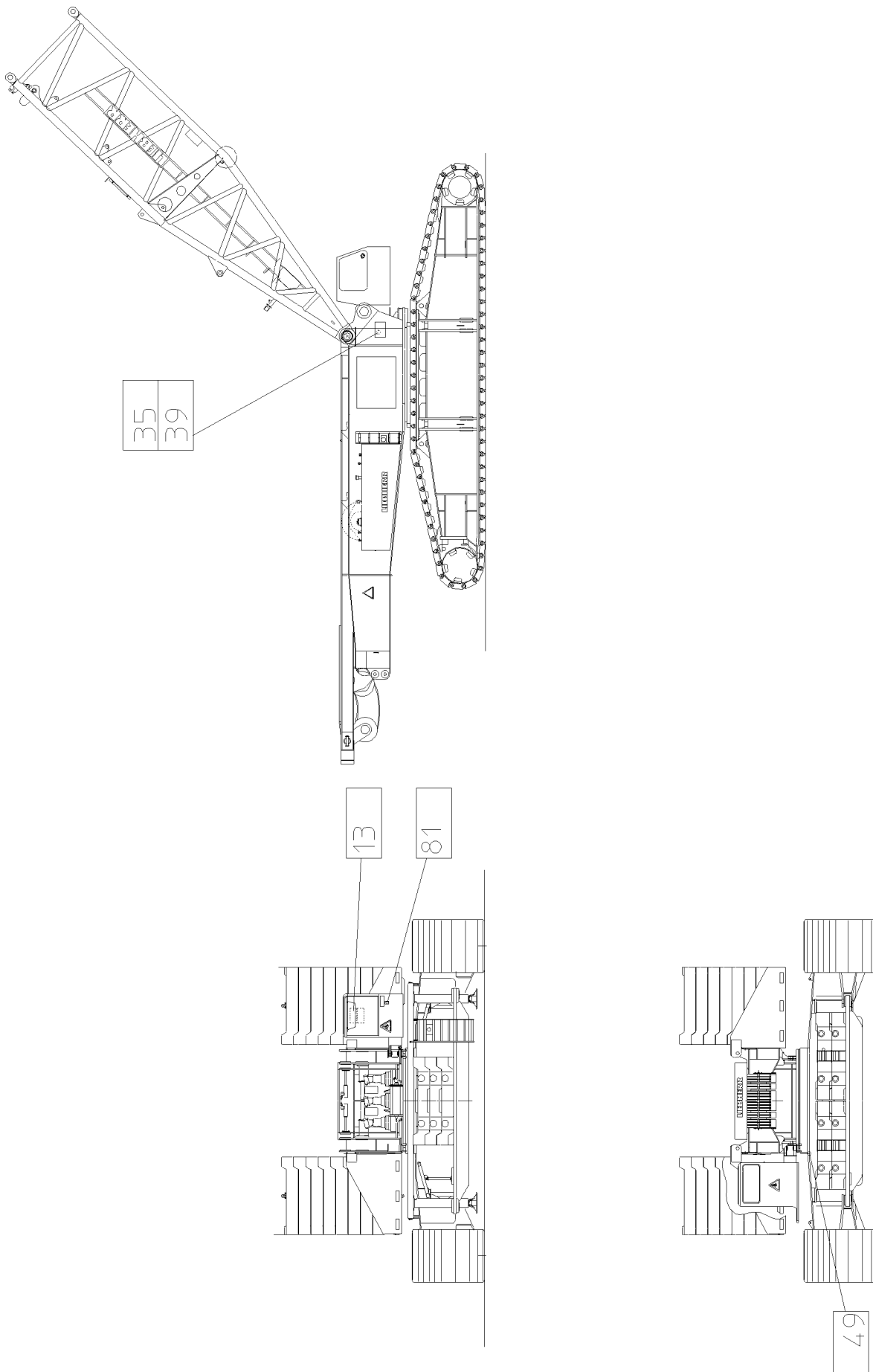


Fig.108092

LWE/LR 1750-000/12812-15-02/en

3 Notice signs



Note

- ▶ Notice signs are signs, which provide additional notes in text form and a pictogram!
- ▶ For that reason, all notice signs on the crane must always be complete and legible!
- ▶ Replace damaged notice signs immediately!

3.1 Operating instructions for cranes (position 13)



Note

- ▶ Only for certain countries!
- ▶ Read and observe the operating instructions before operating the crane!

3.2 Transport weight of components (position 35)

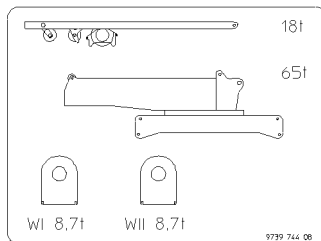


Fig.108094

3.3 Transport weight of components (position 39)

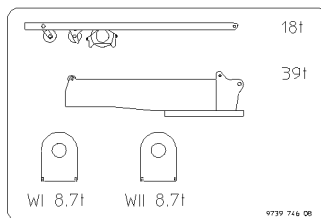


Fig.108095

3.4 Notice sign for refuelling (position 49)

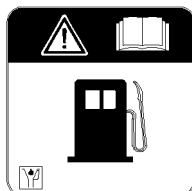


Fig.108096

**CAUTION**

Property damage to the engine!

If the crane is refuelled with fuel not specified in the operating instructions, then engine damage can occur!

► Observe the operating instructions!

3.5 Warranted maximum sound output level (position 81)

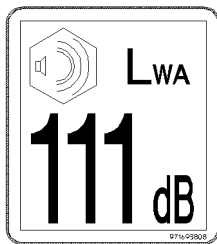


Fig.108097

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Fig.195219

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1 Identifications on the hook block or load hooks

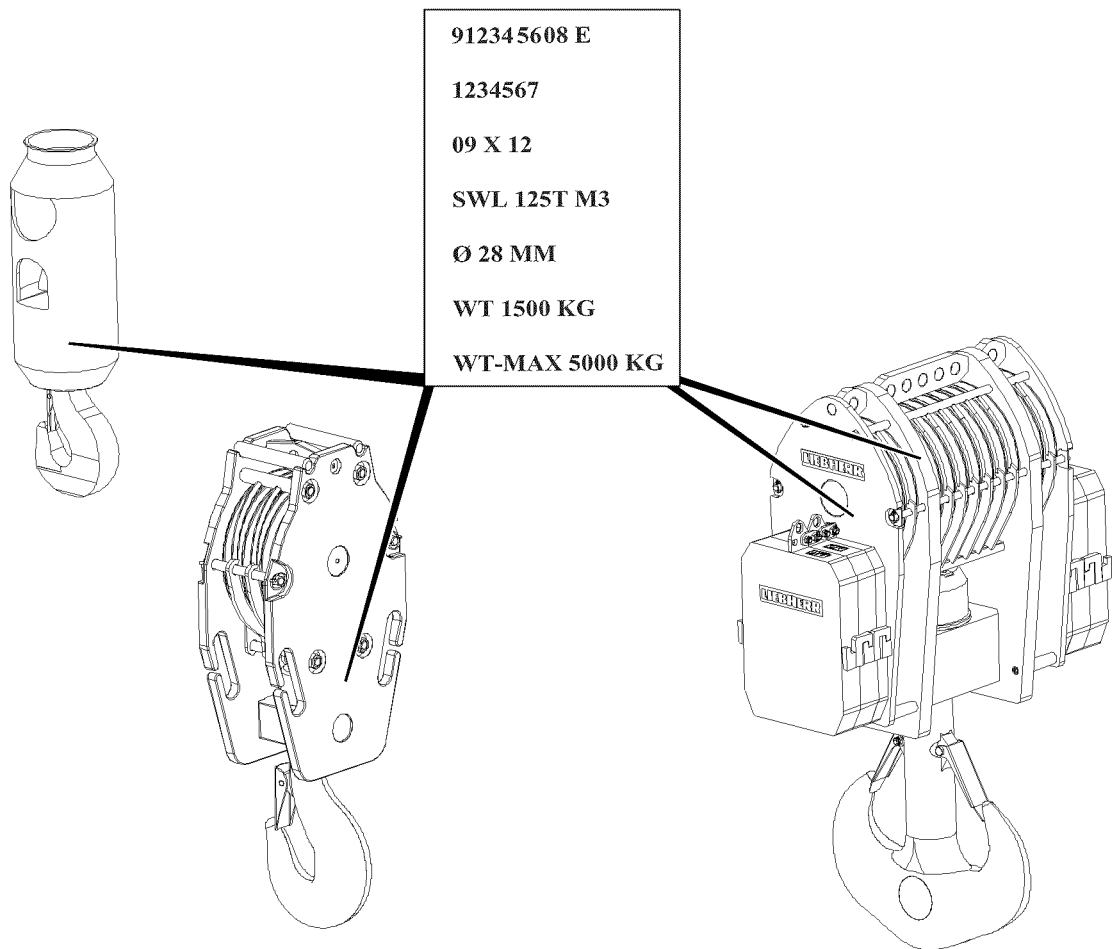


Fig.118509



Note

- ▶ For the load hooks and hook blocks approved for this crane type refer to the load chart.
- ▶ The hook blocks shown are examples only and can deviate from the existing hook block.

Punch mark area	Explanation
912345608 E	Liebherr Id. No. „E = entschärft (deburred)“
123456	Series or factory test number
09 X 12	Month of construction / supplier marks / year of construction
SWL 125T M3	SWL (Safe Working Load) = Load carrying capacity for power train group M3
Ø 28 mm	Hoist rope diameter
WT 1500 Kg	WT (Weight Tara) = Own weight (without auxiliary weights)

Punch mark area	Explanation
WT-MAX 5000 Kg	WT-Max = Maximum permissible own weight of lower pulley block and total number of progressively installed auxiliary weights
	Limits the number of installed auxiliary weights
	Determination via addition of assembled own weights (number of auxiliary weights + hook block)

Identifications on the hook block or load hooks

2 Identifications on single hook or double hook

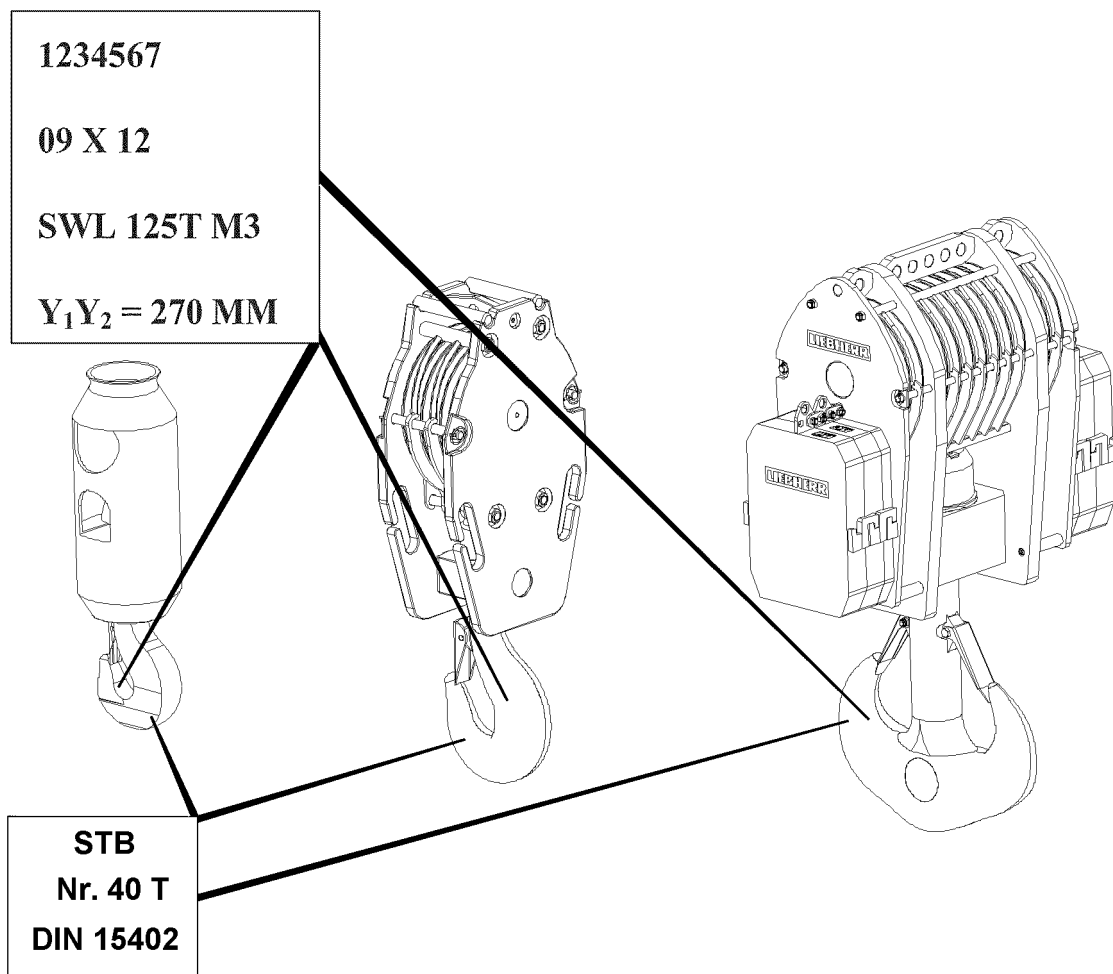


Fig.118510

Punch mark area	Explanation
STB	Hook manufacturer
40-T	Hook number + strength class according to DIN 15 400
DIN	Hook shape according to DIN 15 401 /DIN 15 402
123456	Series or factory test number
09 X 12	Month of construction / supplier marks / year of construction

Punch mark area	Explanation
SWL 125T M3	SWL (Safe Working Load) = Load carrying capacity for power train group M3
Y1Y2 = 270 mm	Dimension Y or dimension Y1 and dimension Y2 according to DIN (= Test dimensions for recurrent tests)

Identifications on single hook or double hook

3 Identifications on auxiliary weights

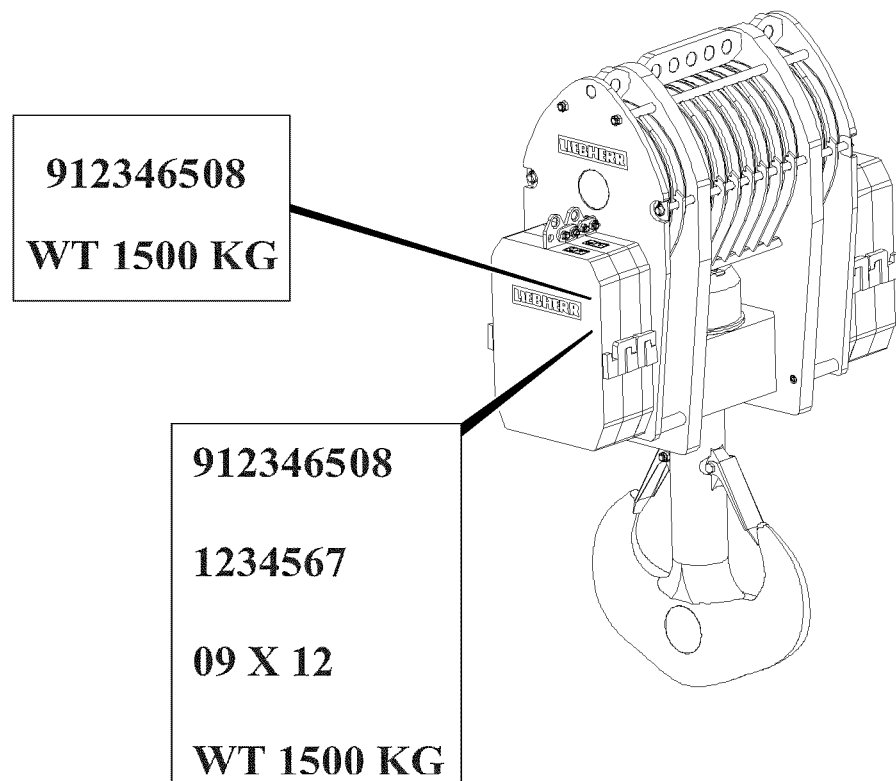


Fig.118511



Note

- The own weight of the individual auxiliary weight is noted on the side on the respective auxiliary weight.

3.1 Identifications on auxiliary weights at delivery

Punch mark area	Explanation
912346508	Liebherr Id. No.
WT 1500 Kg	WT (Weight Tara) = Own weight of individual auxiliary weight

Identifications of auxiliary weights at delivery

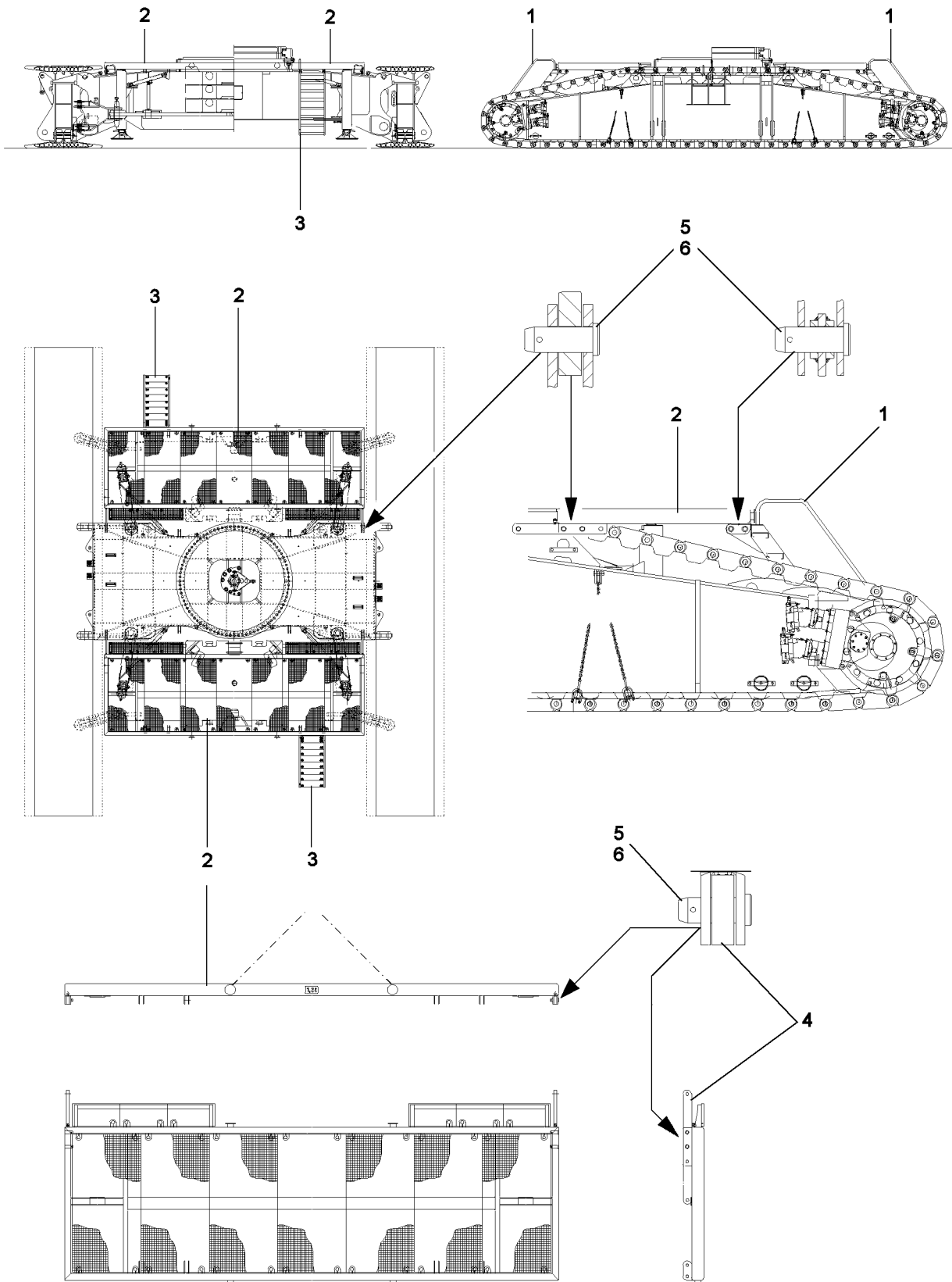
3.2 Identifications on auxiliary weights for reorder

Punch mark area	Explanation
912346508	Liebherr Id. No.
123456	Series or factory test number
09 X 12	Month of construction / supplier marks / year of construction
WT 1500 Kg	WT (Weight Tara) = Own weight of individual auxiliary weight

Identifications of auxiliary weights at reorder

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Fig.107960

1 Antifall guards on the crane



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate antifall guards to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work can neither be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved catch systems to avoid falling, see crane operating instructions chapter 2.04!
- ▶ Fasten personal protective equipment and permissible catch systems before all assembly / disassembly work, maintenance and testing work!
- ▶ Only step on such aids with clean shoes!
- ▶ Keep aids clean and free of snow and ice!
- ▶ During all assembly / disassembly work, maintenance work and inspections, travel or crane operation is prohibited!

2 Fall guards on the crawler track



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ For assembly / disassembly work, maintenance work and inspections, assemble all railings, ladders and platforms properly, swing in position and secure!
- ▶ Only step on the ladder and platform with „clean shoes“!
- ▶ Keep ladders and platform clean and free of snow and ice!
- ▶ Replace damaged ladders and platforms immediately!
- ▶ Assemble all ladders and platforms to be stable and safely accessible!

2.1 Assembling pedestals and ladders

Make sure that the following prerequisites are met:

- the hydraulic assembly cylinders are swung out and pinned,
- the brackets **4** are in pinning position.



WARNING

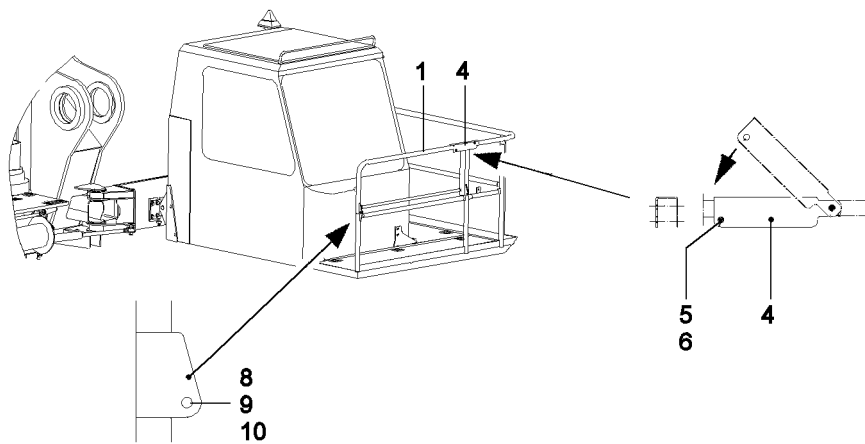
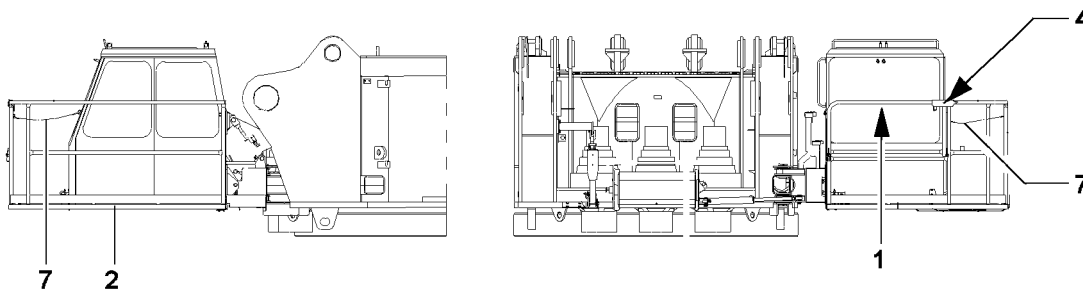
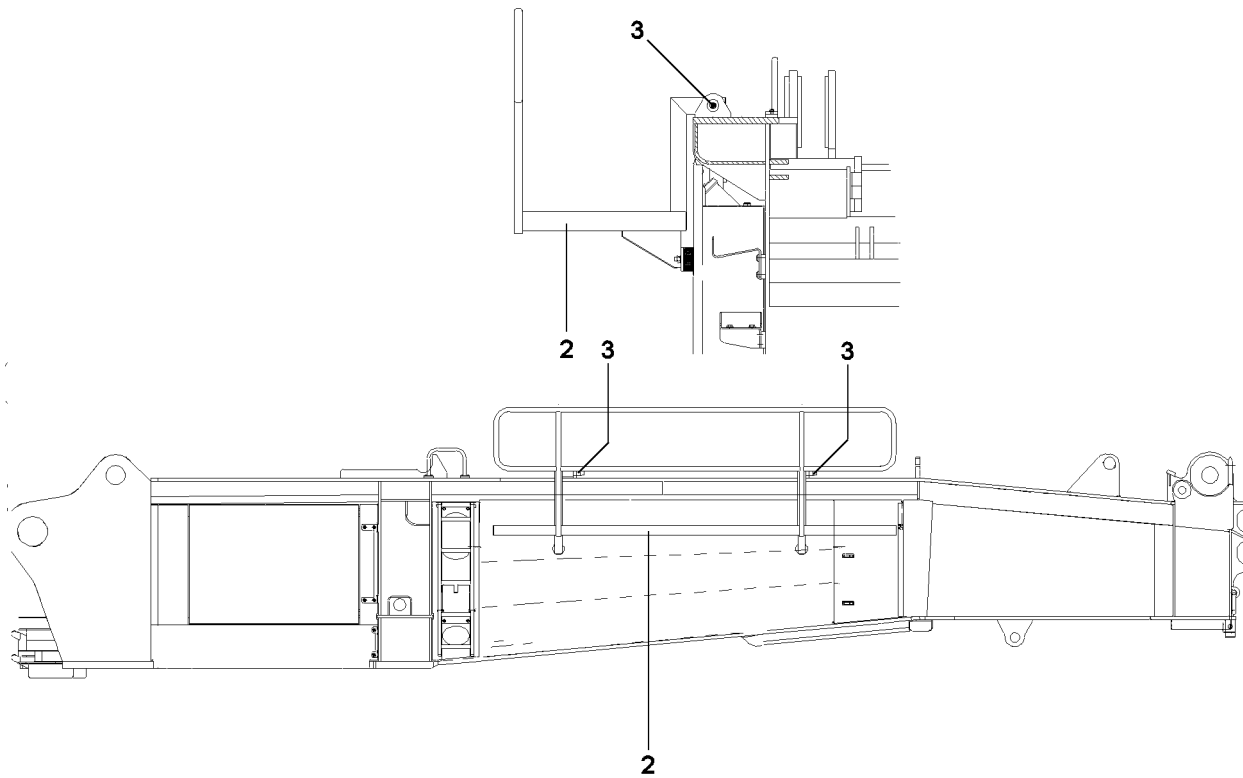
When working aloft, there is a danger of falling!

- ▶ Assemble and secure all anti-fall guards, for example, platforms, ladders and railings properly!



Note

- ▶ The swung out hydraulic assembly cylinders serve as support for the pedestals **2**!
- ▶ Swing pedestals **2** on both sides with auxiliary crane to central section, pin and secure.
- ▶ Pin in the pin **5** and secure with spring retainer **6**.



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Fig.108303

3 Anti-fall guards on the turntable



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ For assembly / disassembly work, maintenance work and inspections, assemble all railings, ladders and platforms properly, swing in position and secure!
- ▶ Only step on the ladder and platform with „clean shoes“!
- ▶ Keep ladders and platform clean and free of snow and ice!
- ▶ Replace damaged ladders and platforms immediately!
- ▶ Assemble all ladders and platforms to be stable and safely accessible!

3.1 Assembling the catwalks

- ▶ Swing catwalks **2** on both sides with auxiliary crane to the bolting brackets on the turntable, pin and secure with lynch pins **3**.
- ▶ Lower catwalks **2** with auxiliary crane until the rubber buffer touches on the turntable frame.

3.2 Assembling the railings

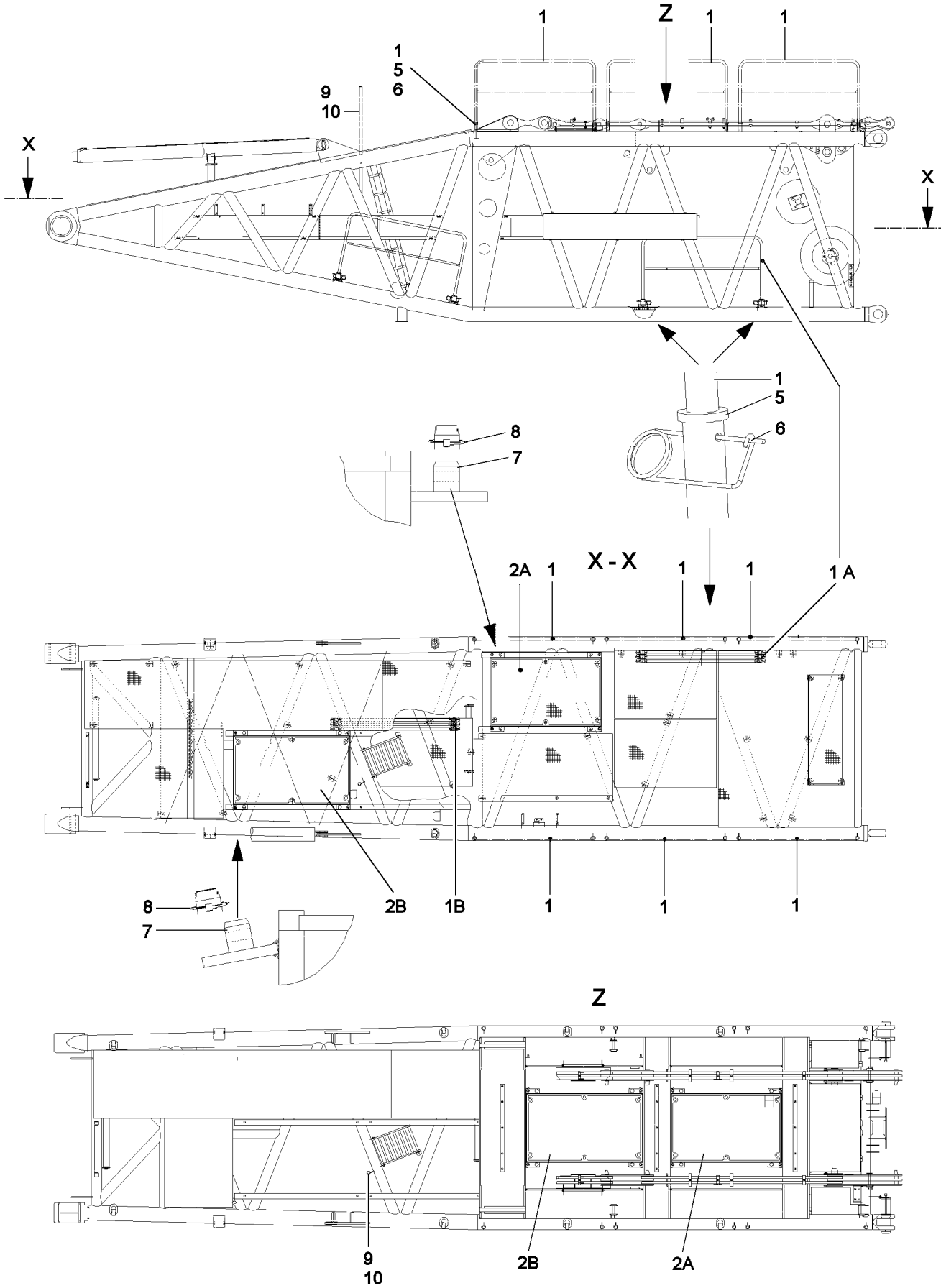
- ▶ Swing railings **1** upward.



Note

▶ The railing **1** is threaded with bolt **8**, washer **9** and lock nuts **10** on the brackets!

- ▶ Swing and pin safety flap **4** downward.
- ▶ Pin in the retaining pin **5** and secure with spring retainer **6**.
- ▶ Close safety chains **7**.



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Fig.108139

4 Antifall guards on S-pivot section and D-pivot section

4.1 Assembling rails on the S-pivot section



WARNING

Risk of falling!

Before any assembly / disassembly work, maintenance and testing work, the assembly personnel must apply permissible catch systems!

During assembly and disassembly, personnel must be secured with appropriate antifall guards to prevent them from falling!

If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ For assembly / disassembly work, maintenance work and inspections on the S-pivot section, assemble all railings **1** and secure!
 - ▶ Only step on S-pivot section with „clean shoes“!
-
- ▶ Push railings **1** into the holders **5** on the S-pivot section and secure with spring retainers **6**.
 - ▶ Pull grip handle **9** upward and secure with spring retainer **10**.



Note

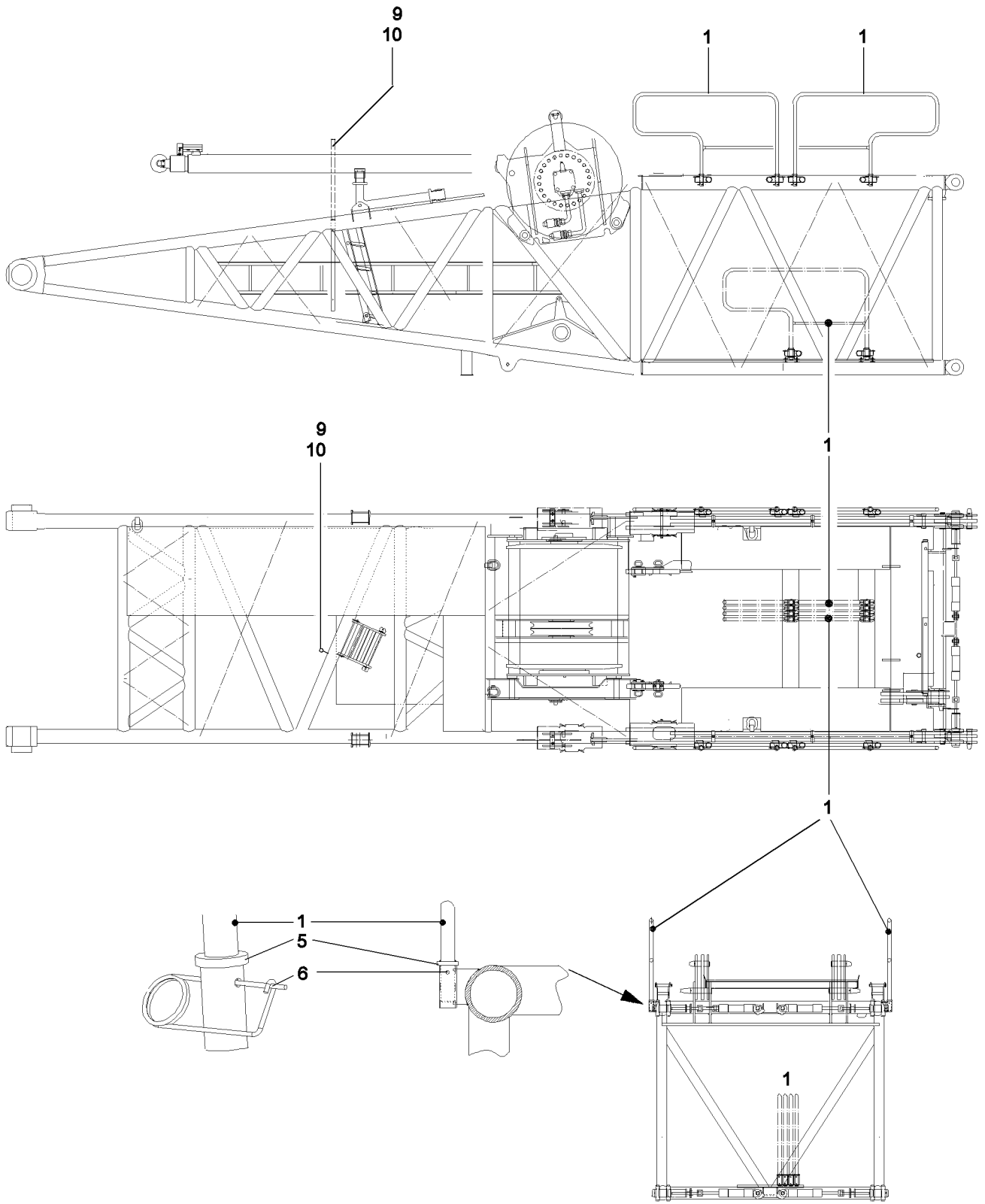
- ▶ After assembly / disassembly work and for transport, the railings must be assembled and secured in transport position!
- ▶ Push all railings **1** into the holders **5** on the S-pivot section and secure with spring retainers **6**.
- ▶ Slide in grip handle **9** and secure with spring retainer **10**!

4.2 Assembling gratings



Note

- ▶ If both winches, winch **5** and winch **6**, or only one winch is **not** installed in the S-pivot section or in transport position, the openings with gratings **2A** and gratings **2B** are closed!
 - ▶ If one or both winches are installed, the above disassembled grates in the receptacle **2A** and receptacle **2B** must be assigned and secured!
-
- ▶ Place the gratings into the centring pins **7** and secure with safety lynch pins **8**.



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Fig.108273

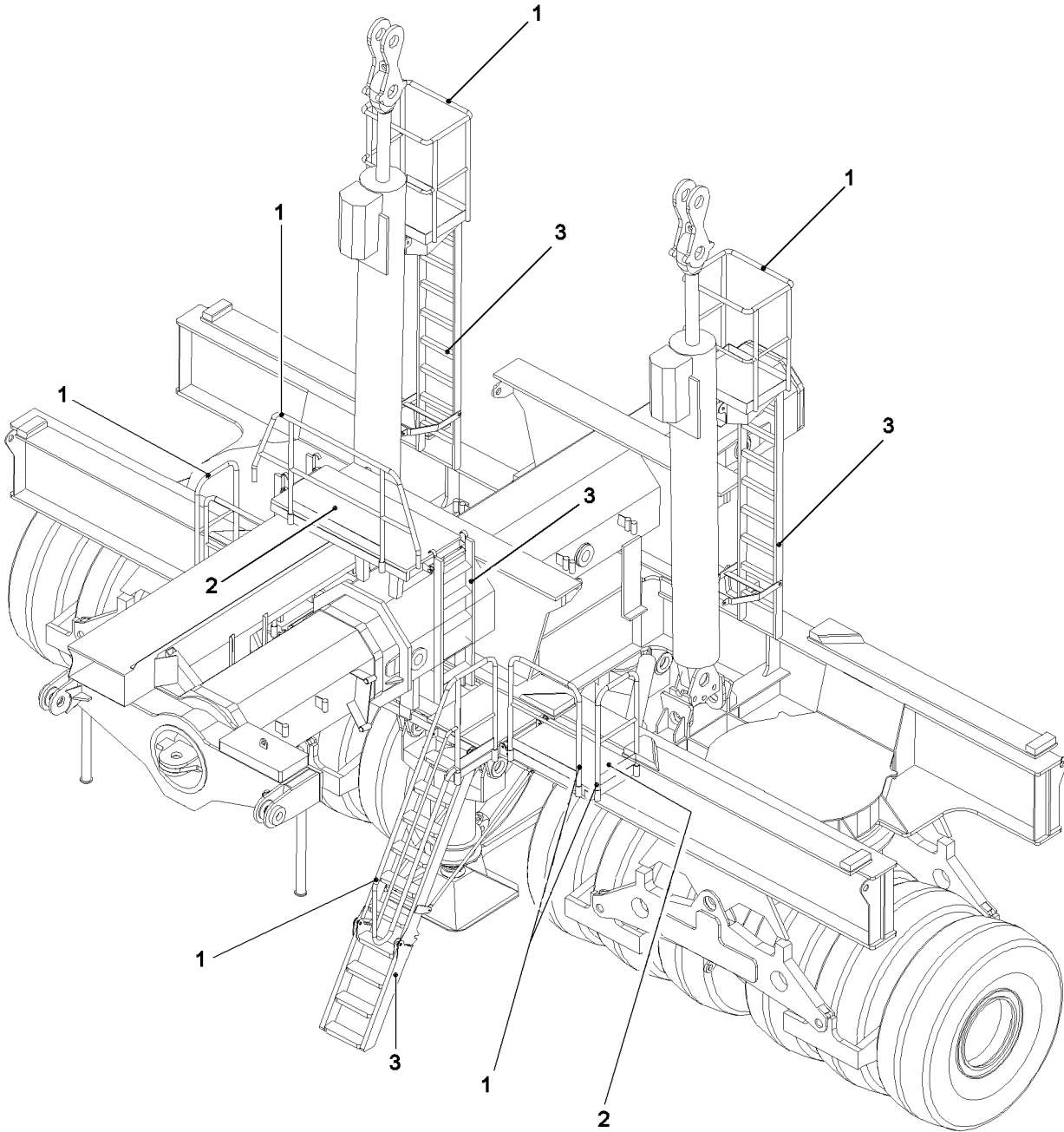
4.3 Assembling guard rails on the D-pivot section

- ▶ Push railings **1** into the holders **5** on the D-pivot section and secure with spring retainers **6**.
- ▶ Pull grip handle **9** upward and secure with spring retainer **10**.



Note

- ▶ After assembly / disassembly work and for transport, the railings must be assembled and secured in transport position!
 - ▶ Push all railings **1** into the holders **5** on the D-pivot section and secure with spring retainers **6**.
 - ▶ Slide in grip handle **9** and secure with spring retainer **10**!
-



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Fig.107963

5 Fall guards on the ballast trailer



WARNING

Risk of falling!

Before any assembly / disassembly work, maintenance and testing work, the assembly personnel must apply permissible catch systems!

During assembly and disassembly, personnel must be secured with appropriate antifall guards to prevent them from falling!

If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ For assembly / disassembly work, maintenance work and inspections, assemble all railings **1**, ladders **3** and pedestals **2** properly, swing in position and secure!
 - ▶ Only step on ladders **4** and catwalks **2** with „clean shoes“!
 - ▶ Keep ladders **4** and catwalks **2** clean and free of snow and ice!
 - ▶ Replace damaged ladders immediately!
 - ▶ Set up all ladders **3** stable and safe to access!
-

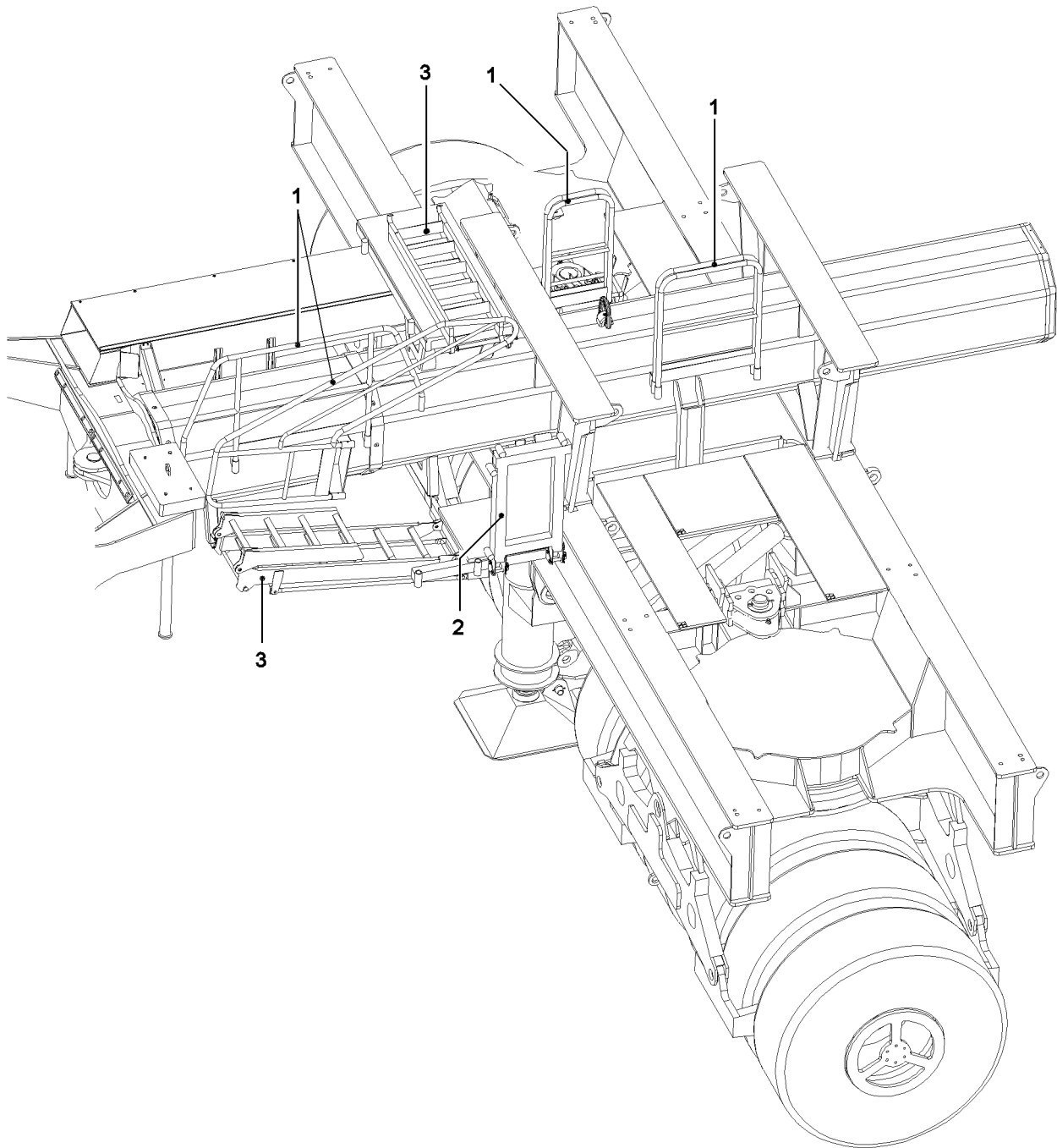


Fig.108138

6 Fall guards on the ballast trailer in transport position



WARNING

Risk of falling!

Before any assembly / disassembly work, maintenance and testing work, the assembly personnel must apply permissible catch systems!

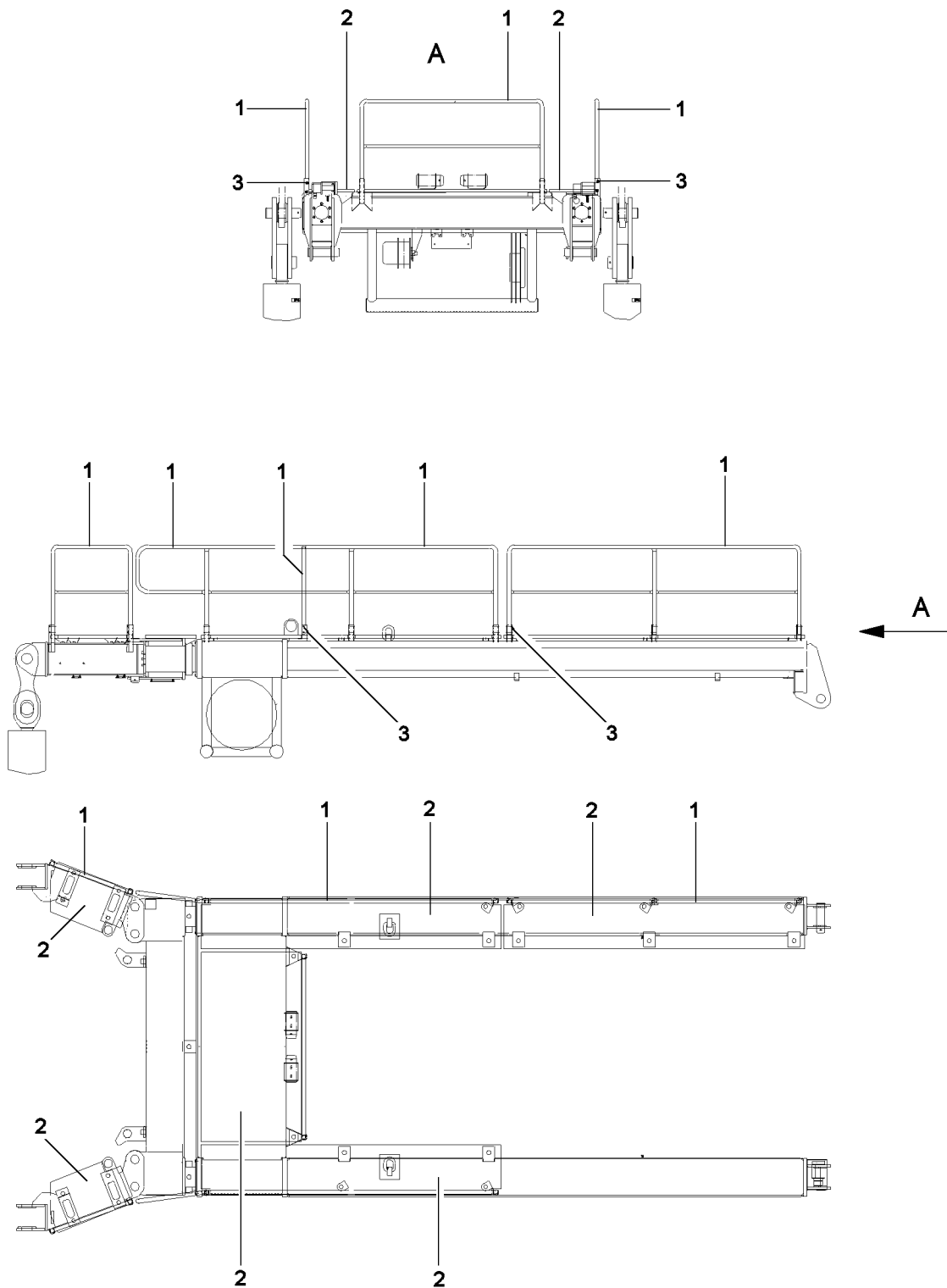
During assembly and disassembly, personnel must be secured with appropriate antifall guards to prevent them from falling!

If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

▶ Wear personal protective equipment and approved catch systems!

6.1 Disassembling railings, ladders and pedestals

▶ Swing all railings **1**, ladders **3** and catwalks **2** in transport position and secure.



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Fig.108274

7 Antifall guards on suspended ballast-guide frames



WARNING

Risk of falling!

Before any assembly / disassembly work, maintenance and testing work, the assembly personnel must apply permissible catch systems!

During assembly and disassembly, personnel must be secured with appropriate antifall guards to prevent them from falling!

If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ Before assembly / disassembly work, maintenance and inspection work, properly assemble and secure all railings **1** and catwalks **2** properly!
- ▶ Step on catwalks **2** only with „clean shoes“!
- ▶ Keep catwalks **2** clean and free of snow and ice!
- ▶ Replace damaged catwalks and railings immediately!



Note

- ▶ Before assembly of the guide frame to the turntable, position and secure railings **1** into operational position!

NOTICE

Damage to the railings **1**!

If the railings **1** are not brought and secured into operating position before assembly of the guide frame to the turntable, they can be severely damaged!

- ▶ Bring and secure railings **1** into operating position before assembly of the guide frame to the turntable!
- ▶ Remove spring retainer **3** on the railings **1**!
- ▶ Swing railings **1** upward into operational position and secure with spring retainers **3**!

Fig.195219

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1 Auxiliary equipment

Without „auxiliary equipment for working at low temperatures“, the crane can be operated and stored at ambient temperatures between -20 °C and +50 °C.

At ambient temperatures below -20 °C , the crane must be modified with „auxiliary equipment for working at low temperatures“.



WARNING

Working at low temperatures without the corresponding auxiliary equipment!
The crane components can be damaged and fail. The load can rip off.
Death or severe bodily injuries.

If the crane is operated at an ambient temperature lower than -20 °C:

- ▶ Make sure that the crane is equipped with the corresponding „auxiliary equipment for working at low temperatures“.
- ▶ Match the operating fluids in time to the ambient temperature.

2 Ambient temperatures below -20 °C

2.1 Snow and ice

Low temperatures, such as snow, frost and ice can impair crane operation and cause problems on the crane.



WARNING

Snow and ice on the crane components!
The crane components can be damaged and fail.
Personnel can fall from the accesses!

- ▶ Remove the snow and ice from all accesses, steps and catwalks.
- ▶ Remove the snow and ice from all rope pulleys and winches.
- ▶ Remove the snow and ice from the hose drum and limit switch.
- ▶ Remove the snow and ice from the crane.



WARNING

Snow and ice below the support plates or the crawler carriers!
The crane can slip and fatally injure personnel.

- ▶ Remove the snow and ice on top and below the support plates.
- ▶ Remove the snow and ice on top and below the crawler carrier.
- ▶ Remove the snow and ice from the travel gear.

Prerequisites for start up with the ambient temperature below -20 °C

- The hose drum and cable are easily movable.
- All rope pulleys are easily movable.
- The view from the crane cab is free. The mirrors are free of snow and ice.
- Fastening equipment is approved for the ambient temperatures present.
- The load fastening points are approved for the ambient temperatures present.

2.2 Preheating time

Crane components	Preheating time
Engine preheating up to start at -40 °C ambient temperature	45 minutes
Preheat the hydraulic system in the crane superstructure and the crane chassis	30 minutes
Preheat the crane cab / driver's cab for start up at the same time up to 5 °C	10 minutes
Total preheating time	75 minutes

2.3 Engine preheating

If the ambient temperature is lower than -20 °C the chassis engine and / or superstructure engine must be preheated before starting.

The preheating of the chassis engine is described in the Crane operating instructions, chapter 6.01.

The preheating of the superstructure engine is described in the Crane operating instructions, chapter 6.02.

- ▶ Preheat the chassis engine and / or the superstructure engine.
- ▶ Start the chassis engine and / or the superstructure engine.

When the chassis engine and / or the superstructure engine has reached its operating temperature:

- ▶ Turn off engine preheating.

2.4 Preheating the hydraulic oil

If the ambient temperature is lower than -20 °C the hydraulic oil must be preheated prior to crane operation.

NOTICE

Hydraulic oil **not** preheated!

The hydraulic system can be damaged during crane operation.

- ▶ Preheat the hydraulic oil to at least 20 °C before crane operation.
- ▶ Retract and extend all the hydraulic cylinders in an unloaded state over the entire stroke multiple times.



WARNING

Persons in the area of the hoist movement!

Personnel can be injured.

- ▶ Observe the area of the hoist movement.
- ▶ Make sure that there are **no** persons in the area of the hoist movement.

2.4.1 Turning the hydraulic oil preheating on

Make sure that the following prerequisites are met:

- The engine is running.
- Hydraulic oil preheating is available.

The hydraulic oil preheating is described in the Crane operating instructions, chapter 4.03.

- ▶ Turn on the hydraulic oil preheating.

When the hydraulic oil is preheated:

- ▶ Turn the hydraulic oil preheating off.

2.4.2 Supporting the crane

The supporting of the mobile crane is described in the Crane operating instructions, chapter 3.05.

All support plates must be supported with suitable and stable materials.

If moveable support plates are not available, the support plates must be supported **on one side of the crane** with greased polyamide plates.



WARNING

No movable support plates or crane **not** supported with greased polyamide plates! The sliding beams can bend. The support plates can suddenly move to the side. The load can swing and fatally injure personnel.

- ▶ Use moveable support plates.

If there are no movable support plates available:

- ▶ Support the support plates **on one side of the crane** with greased polyamide plates.

When supporting the crane, extend the support cylinder a maximum of 50 %.

The wheels must not come in to contact with the ground after the crane is supported.

- ▶ Support the support plates when necessary.
- ▶ Support the crane.

2.4.3 Cranes with lattice mast boom

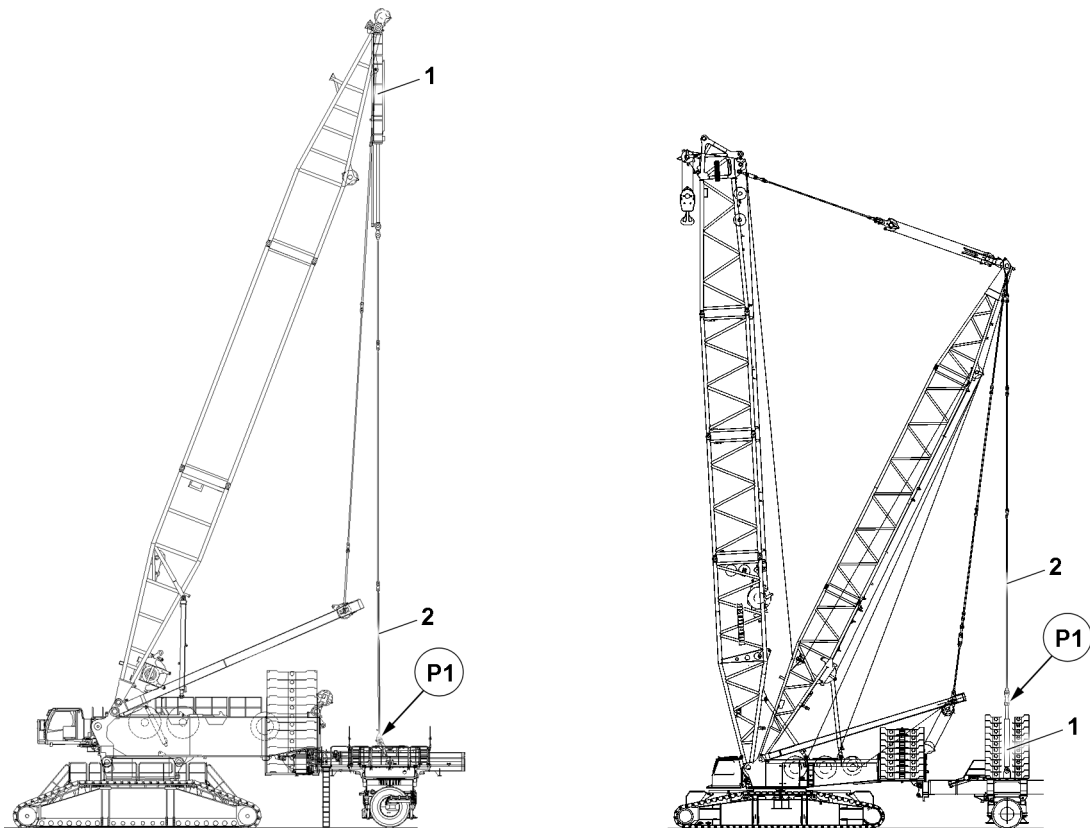


Fig.126875: Removing the guy rods on the derrick ballast

At ambient temperatures of less than $-20\text{ }^{\circ}\text{C}$, the pull cylinders must be preheated by means of retraction and extension. Before the pull cylinders can be preheated, the guy rods **2** must be removed at position **P1** on the derrick ballast.

Disassembly and assembly of the guy rods **2** on the derrick ballast is described in the Crane operating instructions, chapter 5.35 and chapter 5.36.

- ▶ Remove the guy rods **2** at position **P1** on the derrick ballast.
- ▶ Retract and extend the pull cylinders **1** in an unloaded state over the entire stroke multiple times.

When additional hydraulic cylinders are installed on the crane with lattice mast:

- ▶ Retract and extend the hydraulic cylinders in an unloaded state over the entire stroke multiple times.

2.4.4 Cranes with telescopic boom

Make sure that the following prerequisites are met:

- The crane is supported and horizontally aligned.
- No load is hanging on the hook
- ▶ Retract and extend the luffing cylinder in an unloaded state over the entire stroke multiple times.
- ▶ Retract and extend the telescoping cylinder in an unloaded state over the entire stroke multiple times.

2.5 Assembling / disassembling the crane component

Below an ambient temperature of -20 °C the danger of damage is greater if the crane component is struck during assembly or disassembly. Especially the counterweight is subject to greater danger of damage if struck.

NOTICE

Striking of the crane component during assembly or disassembly!
Crane components can be damaged.

- ▶ Do **not** strike the crane component during assembly and disassembly
- ▶ Carry out all work slowly and with utmost caution.

2.6 Reduce rope pull

When working at an ambient temperature below -20 °C Liebherr-Werk Ehingen recommends reducing the rope pull.

The rope pull on the hoist rope can be reduced by increasing the rope reeving.



Note

Increase of rope reeving!

Due to the increased rope reeving, the hoist rope length may not be sufficient for lowering the hook block to the ground.

- ▶ Pay attention to rope length.

NOTICE

Rope reeving higher than specified in the load chart!

Danger of slack rope formation due to a too low hook block weight. Damage of hoist rope.

- ▶ Increase the hook block weight accordingly.
- ▶ Increase the rope reeving specified in the load chart.

2.7 Increase the hook block weight

The calculation of the minimum required hook block weight is described in the load chart.

Ambient temperature	Increase the hook block weight
-21 °C to -30 °C	Increase the minimum required hook block weight by 10 %.
-31 °C to -40 °C	Increase the minimum required hook block weight by 15 %.

- ▶ Increase the minimum required hook block weight depending on the ambient temperature. Observe and adhere to the „hook block weight“ charts.

**Note**

- ▶ Observe and comply with the permissible hook block weights for erection and take down of the boom systems in the erection and take down charts.

2.8 Crane operation

In case of an ambient temperature below -20 °C , crane operation requires an anticipatory working procedure adapted to the weather conditions.

**WARNING**

Sudden acceleration and deceleration of crane movements!

Crane components can break.

Death or severe bodily injuries.

- ▶ Accelerate and decelerate crane movements sensitively and with utmost caution.

2.8.1 Decrease crane utilization

Cranes with lattice mast boom

In the case of cranes with pull cylinders in the derrick ballast guying, if the ambient temperature is between -30 °C and -40 °C the maximum derrick ballast must be reduced. The maximum load is also reduced due to the reduction of the maximum derrick ballast.

**Note**

- ▶ Take load reduction into account during job planning.

- ▶ Reduce the maximum derrick ballast between an ambient temperature of -30 °C and -40 °C by 15 %.

Cranes with telescopic boom

In the case of cranes with a telescopic boom, if the ambient temperature is between -30 °C and -40 °C crane utilization must be reduced.

- ▶ Reduce the crane utilization at an ambient temperature between -30 °C and -40 °C by 15 %.

3 Maintenance

3.1 Load bearing crane structures

Checking the load bearing crane structure is described in the Crane operating instructions, chapter 8.01.

- ▶ The load bearing crane structure must be subjected more frequently to a visual inspection.

3.2 Rope pulleys and hydraulic cylinders

Checking the rope pulleys and the hydraulic cylinders is described in the Crane operating instructions, chapter 8.01.

- ▶ The rope pulleys and hydraulic cylinders must be subjected more frequently to a visual inspection.

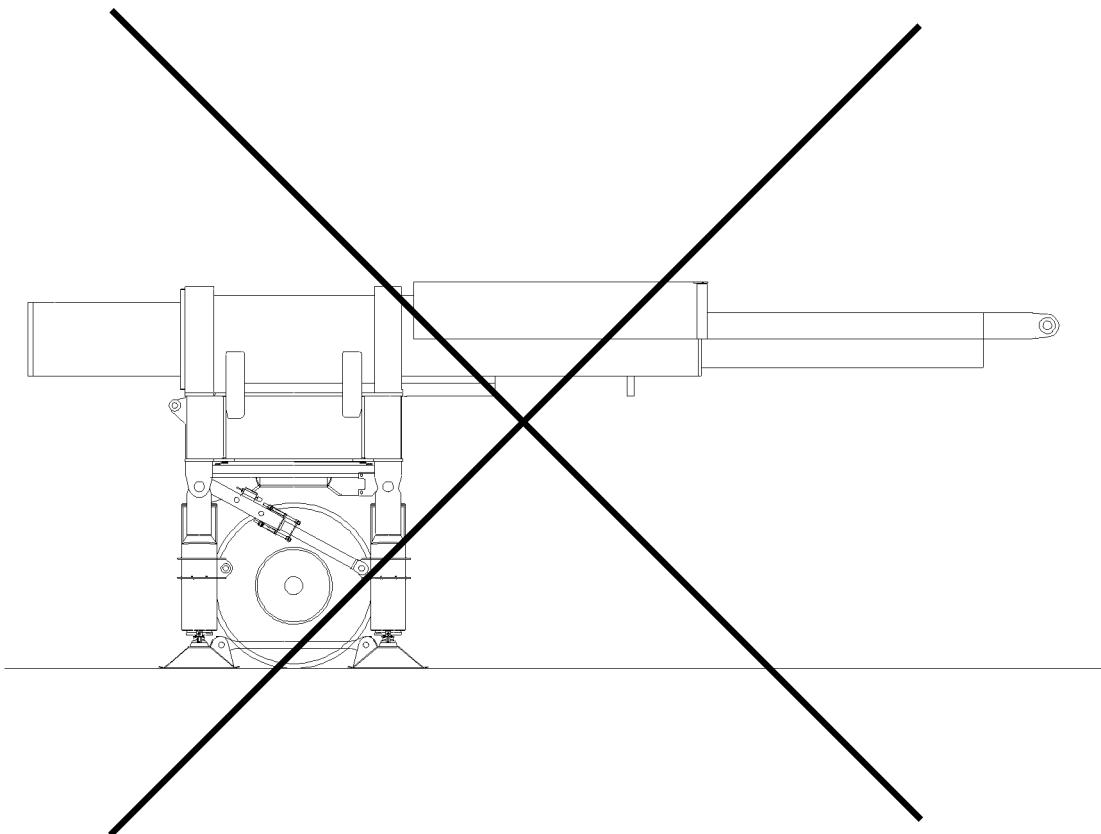
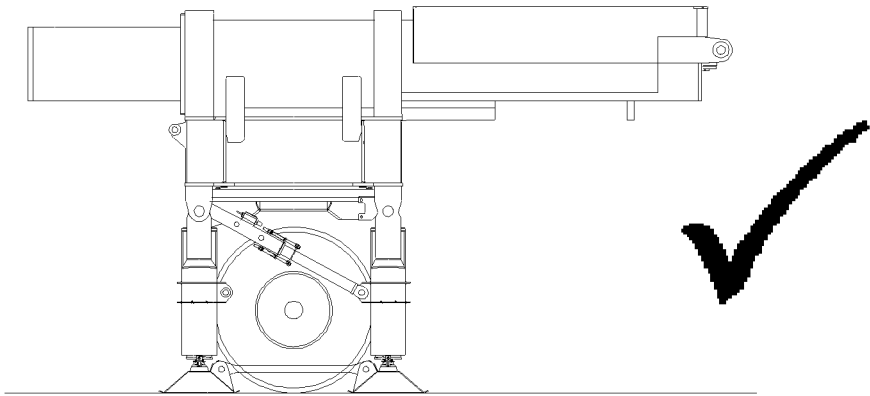


Fig.107353

LWE/LR 1750-000/12812-15-02/en

1 Safety guidelines



WARNING

Risk of falling!

- ▶ During assembly or disassembly work on the ballast trailer, assembly personnel must be secured with appropriate aids! If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!



WARNING

Danger of tipping the ballast trailer!

If the following notes are not observed, the freestanding ballast trailer or the ballast trailer which needs to be disassembled can tip over!

Personnel can be severely injured or killed!

- ▶ The ballast trailer may only be parked on level ground of sufficient load bearing capacity!
- ▶ The ballast trailer may only be unpinned from the crane and parked if the ballast trailer guide is fully retracted!
- ▶ The ballast trailer may only be unpinned from the crane and parked if the support cylinders are extended and the tires are relieved!
- ▶ The ballast trailer may only be unpinned from the crane and parked if the strut on the support cylinders is pinned and secured!



WARNING

Mortal danger if the permissible travel speed is exceeded!

If the permissible travel speed is exceeded, the tires can be damaged!

Personnel can be severely injured or killed!

As a result, significant property damage can occur on the crane and on the ballast trailer!

- ▶ The travel speed of the ballast trailer when turning or driving with maximum ballast on the tires may be not more than maximum 1 km/h (0.28 m/s)!



WARNING

The crane can topple over if the level of the travel path differs!

Due to impermissible level differences between the ballast trailer route and the crane placement level, the entire crane system can be pulled back suddenly!

The relapse cylinders can run to block position. The relapse cylinders and the boom system can be damaged!

Personnel can be severely injured or killed!

- ▶ Do not exceed or fall below the permissible level difference between the ballast trailer travel path and the crane placement level!
- ▶ The travel path of the crane or the circular path of the ballast trailer must be level and of sufficient load bearing capacity!
- ▶ The permissible level difference of the ballast trailer travel path and crane travel path for „towing“ and „parallel driving“ may be no more than maximum 250 mm !
- ▶ The permissible level difference of the ballast trailer path and the crane travel path in relation to the crane travel path for circular driving may be no more than maximum 250 mm - based on a constant uphill incline or constant downhill incline on a 90° turning range!



WARNING

The crane can topple over!

If the following notes are not observed, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ When lifting or lowering the ballast trailer, pay attention to the horizontal alignment of the ballast trailer!
- ▶ The assembly or disassembly work must be carried out according to the Crane operating instructions, chapter 5.35 or chapter 5.11!

NOTICE

Danger of damage to the crane and the ballast trailer!

Due to steering movements on the crawler tracks while driving parallel, the crane and the ballast trailer can be significantly damaged!

- ▶ When driving parallel, steering the crawler tracks is prohibited!
- ▶ For parallel driving, the side tire distortion on the wheel sets must be observed by an instructed person over the entire travel route of the crane. If the tires distort by more than 100 mm, then the position of the wheel sets must be corrected!

**Note**

General safety technical guidelines!

- ▶ The ballast trailer guy rods must be assembled and secured according to the Rod plan. The numbering on the rod plan must be identical to the numbering on the guy rods!

2 Inspection of tires and disk wheels

**Note**

- ▶ See Crane operating instructions, chapter 8.01!

**WARNING**

Mortal danger when using non-approved tires!

Due to the use of tires, which are not explicitly approved by **LIEBHERR-Werk Ehingen GmbH**, uncontrollable operation conditions on the ballast trailer can occur due to the heavy load!

The tires can be destroyed and the ballast trailer as well as the crane can be significantly damaged! Personnel can be severely injured or killed!

- ▶ Use only spare tires which have been approved in writing by **LIEBHERR-Werk Ehingen GmbH**!
- ▶ Using spare tires which have been not explicitly approved in writing by **LIEBHERR-Werk Ehingen GmbH** is prohibited!

NOTICE

Damage to tires!

Due to external environmental influences (for example: rain, wind, snow, frost, sun exposure) and the great weight load on the tires by the ballast trailer, the tires can become porous and the body can lose its original strength!

- ▶ The tires must be replaced according to the data of the tire manufacturer at least after 5 years, or if an expert representative of the tire manufacturer states in writing, after extensive inspection of the tires, that the tires can be utilized for an additional operation period stated by the expert representative!

**Note**

Tightening torque of ballast trailer tires!

- ▶ The tightening torque for the wheel lugs is 600 Nm !
- ▶ Check the wheel lugs according to the specified maintenance intervals for tight seating, see Crane operating instructions, chapter 7.02!

2.1 Tires with air inflation

It is imperative to comply with the following instructions:

- After extended downtime, the inflation pressure must be checked before using the ballast trailer.
- The tires must be protected against UV rays during extended downtimes with tarps or wooden boards.

**Note**

Inflation pressure of ballast trailer tires!

- ▶ The inflation pressure in all tires, which were approved in writing by **LIEBHERR-Werk Echingen GmbH** is **10 bar** !
- ▶ Check the inflation pressure according to the specified maintenance intervals for tight seating, see Crane operating instructions, chapter 7.02!

**WARNING**

Risk of accident due to damaged ballast trailer tires!

Due to extended downtime of the crane, when the ballast trailer tires are not relieved with supports, the tires can get out of round!

As a result, the tires can be destroyed and the ballast trailer as well as the crane can be significantly damaged!

Personnel can be severely injured or killed!

- ▶ During extended downtimes, the ballast trailer tires must always be relieved by the outrigger supports!

**WARNING**

Risk of accident due to damaged ballast trailer tires!

When driving the crane on insufficiently prepared ground, the tires can become damaged or punctured by large rocks or other foreign matter!

As a result, the ballast trailer as well as the crane can be significantly damaged!

Personnel can be severely injured or killed!

- ▶ The travel route of the crane or the ballast trailer must be level, of sufficient load bearing capacity and free of rocks or other foreign matter!
- ▶ The travel route of the crane must be walked off personally in advance by the crane operator!
- ▶ Rocks and other foreign matter on the travel route must be removed before starting to travel!
- ▶ If the crane operator cannot ensure that the ballast trailer tires may not be damaged when moving the crane, then the ballast trailer tires must be foamed with a special foam approved by **LIEBHERR-Werk Echingen GmbH**. Contact **LIEBHERR-Werk Echingen GmbH** in this regard!
- ▶ If you decide to foam the ballast trailer tires, then ballast trailer operation is only permissible if all tires of the ballast trailer have been foamed according to the specifications of **LIEBHERR-Werk Echingen GmbH**!

2.2 Tires foamed with special foam

The tires of the ballast trailer are foamed with a special, high quality foam.

Due to extended downtime of the crane, when the ballast trailer tires are not relieved with supports, the tires can get out of round.

It is imperative to comply with the following instructions:

- Relieve the tires on the ballast trailer if it is at a standstill for more than 2 h via the support cylinders.
- The tires must be protected against UV rays during extended downtimes with tarps or wooden boards.

**WARNING**

Mortal danger when using non-approved tire foams!

Due to the use of tire foams, which are not explicitly approved by **LIEBHERR-Werk Echingen GmbH**, uncontrollable operation conditions on the ballast trailer can occur due to the heavy load!

The tires can be destroyed and the ballast trailer as well as the crane can be significantly damaged!

Personnel can be severely injured or killed!

- ▶ Use of spare tires filled with water, air or special foam of lower quality is prohibited!
- ▶ Using spare tires which have been not explicitly approved in writing by **LIEBHERR-Werk Echingen GmbH** is prohibited!

**WARNING**

Danger of accidents due to retreaded tires!

If tires foamed with the special foam are retreaded, the usage properties can be significantly changed negatively!

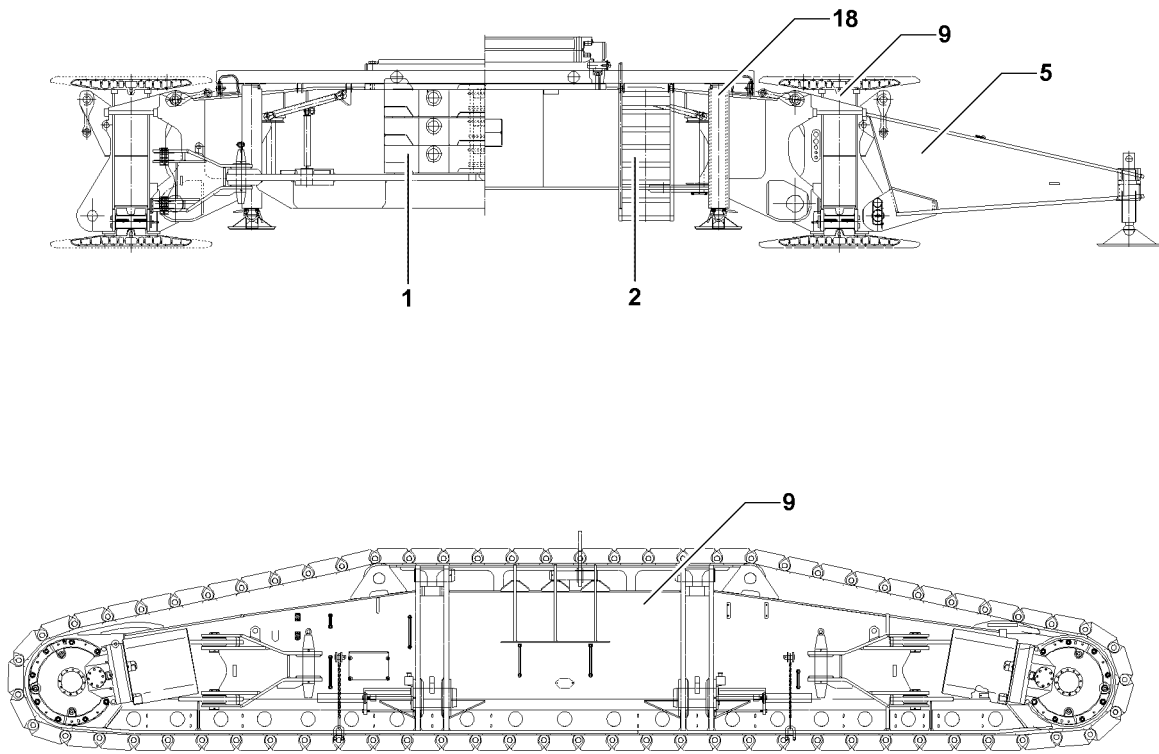
The tires can be destroyed and the ballast trailer as well as the crane can be significantly damaged!

Personnel can be severely injured or killed!

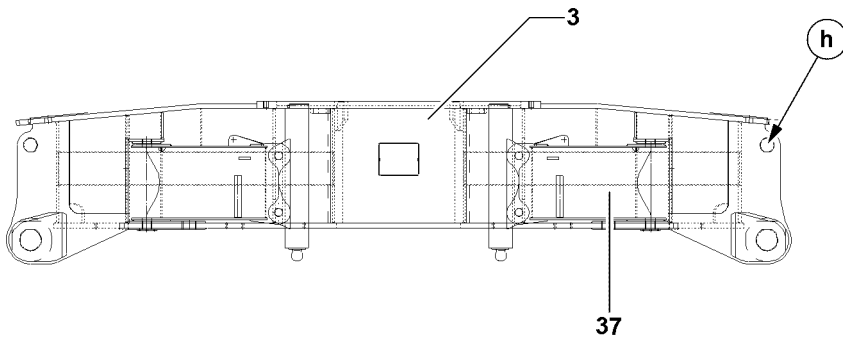
- ▶ Tires which are filled with special foam may not be retreaded, except if a written approval has been issued by the tire manufacturer!
-

3 Crane assembly

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51



52

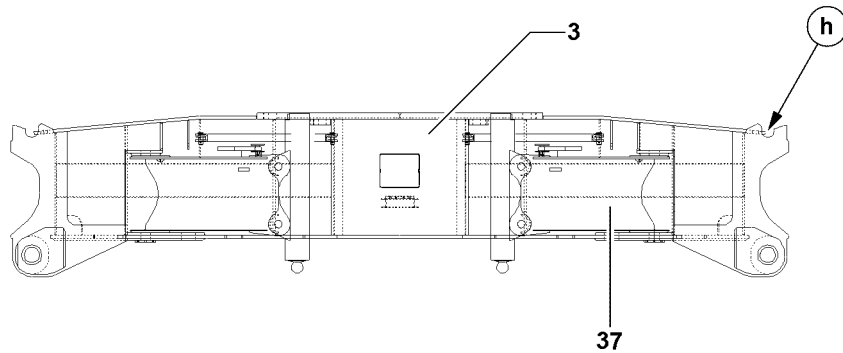


Fig.107998

LWE/LR 1750-000/12812-15-02/en

1 Component overview crawler travel gear

- 1 Central ballast
- 2 Catwalks
- 3 Crawler center section with rotary connection
- 5 Mechanical auxiliary support
- 9 Crawler carrier with track pads
- 18 Support cylinder
- 37 Support beam of hydraulic assembly supports

**Note**

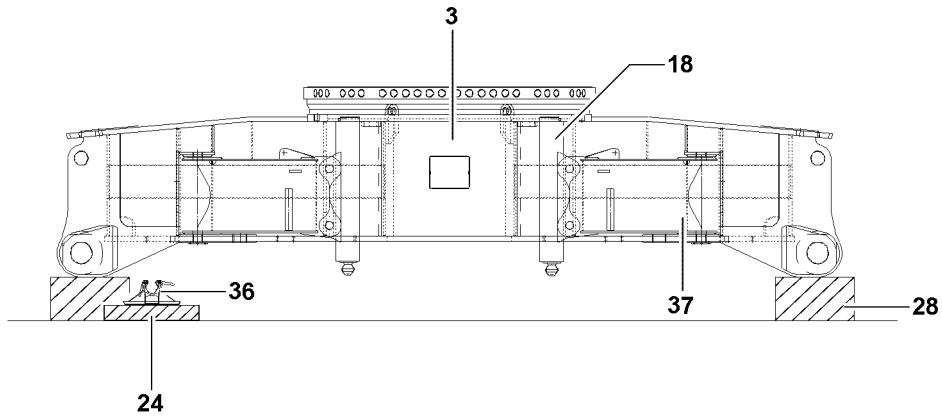
- ▶ The versions of the crawler center section differ on point **h**:
 - ▶ Reinforced crawler center section for installation of crane support, see illustration **51**.
 - ▶ Crawler center section without installation of crane support, see illustration **52**.
-

2 Dimensions and weights

**Note**

- ▶ See Crane operating instructions, chapter 1.03!
-

1



2

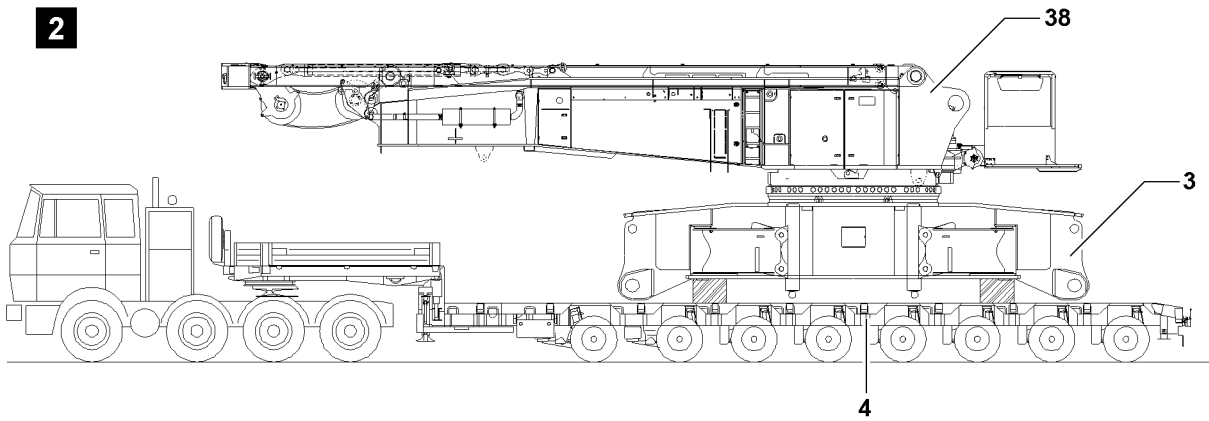


Fig.108004

LWE/LR 1750-000/12812-15-02/en

3 Assembling the crawler center section

The following initial situations are distinguished:

- The center section is set down on the ground for assembly, illustration 1.
- The center section is on a semi-trailer, illustration 2.

3.1 Assembling the crawler center section on the ground

3.1.1 Supporting the crawler center section



WARNING

Risk of accidents due to improper support!

If the crawler center section is not properly supported from below, it can sink into the ground and severely injure personnel!

- ▶ The supporting base must be able to safely take on the weight of the crawler center section, the turntable and the crawler carrier!
- ▶ The supporting base must be made large enough for the ground conditions, with solid materials, such as wood, steel or concrete slabs, see Crane operating instructions, chapter 2.04!

Make sure that the following prerequisite is met:

- Suitable material must be available for the supporting base of the crawler center section.



Note

- ▶ The supporting base **28** must be high enough so that the support plates **36** with supporting base **24** fit under the vertically positioned support cylinders **18**!
- ▶ Support the crawler center section **3** with hardwood timbers (or other suitable materials) from below!

3.2 Assembling the crawler center section on the transport vehicle



WARNING

Unreleased transport retainers!

If the assembly cylinders are extended while the transport retainers are still attached, the assembly cylinders will be overloaded!

The crane and the transport vehicle can be severely damaged!

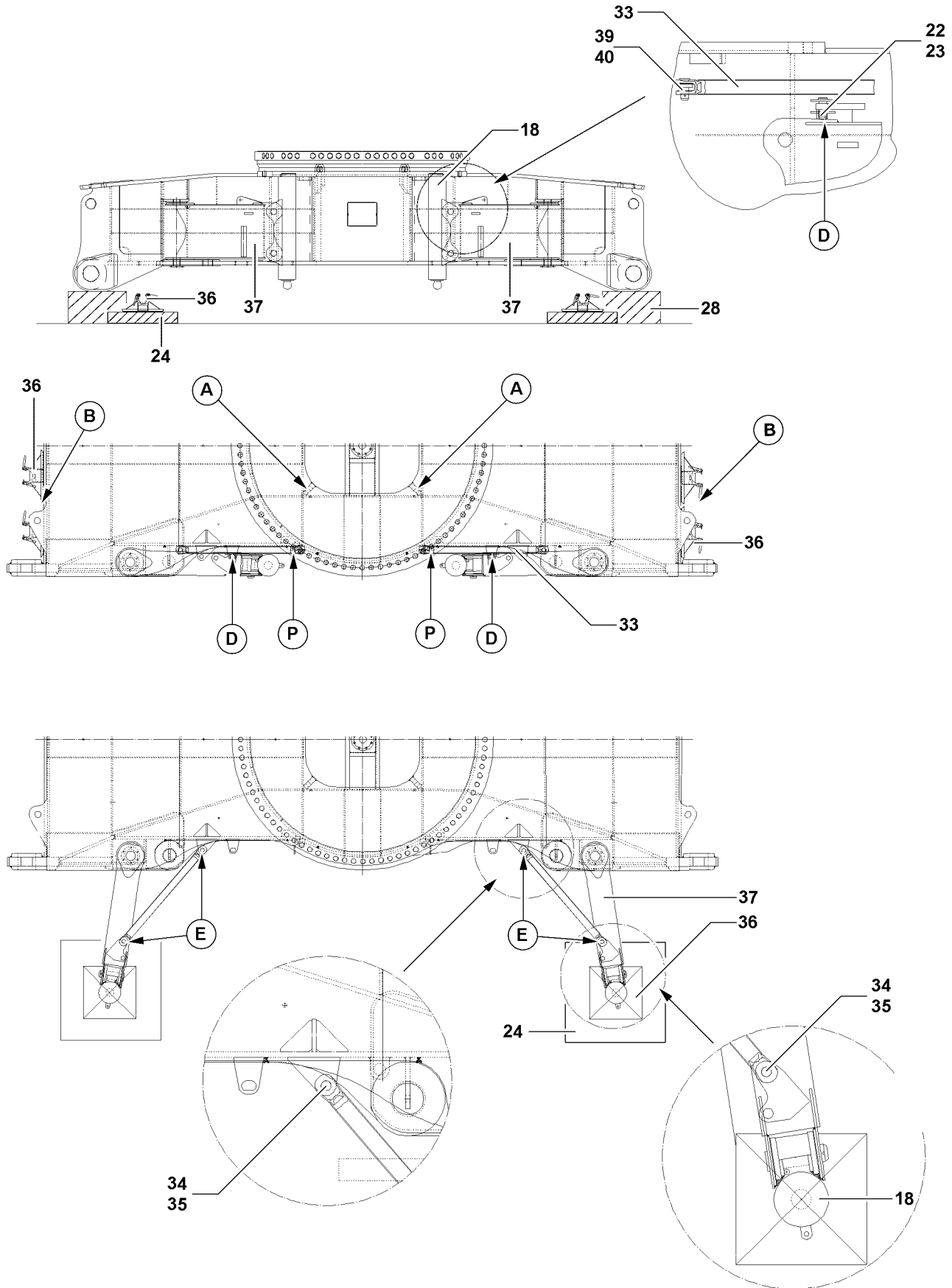
Personnel can be severely injured or killed!

- ▶ Remove the transport retainers between the transport vehicle and the crane components!



Note

- ▶ The placement location of the crawler center section must allow for the transport vehicle to be removed after lifting the crawler center section!



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Fig.107999

3.3 Assembling the assembly supports

- ▶ Attach the fastening equipment on the four fastening brackets **A**.
- ▶ Lift the crawler center section **3** with the auxiliary crane and set it onto the support **28**.

The swinging out and locking procedure of the assembly support is the same for all four assembly supports and is therefore described only once.

- ▶ Release the transport retainer support beam: Remove the spring retainer **22** and unpin the pin **23**, point **D**.



WARNING

Swinging out assembly support!

If any personnel is within the swing range of the assembly support, they can be severely injured or killed!

- ▶ Make sure that no persons are within the swing range of the assembly support!

- ▶ Swing the support beam **3** out.
- ▶ Remove the brace **33** from the transport position **P**: Remove the spring retainer **39** on both sides and unpin the pins **40**.
- ▶ Pin the brace **33** on the crawler center section **3** and on the support beam **37**: Insert pins **34** on points **E** and secure with spring retainers **35**.



WARNING

Risk of accidents due to improper support!

If the support plates are not properly supported from below, they can sink into the ground and severely injure personnel!

- ▶ The supporting base must be able to safely take on the weight of the crawler center section, the turntable and the crawler carrier!
- ▶ The supporting base must be made large enough for the ground conditions, with solid materials, such as wood, steel or concrete slabs, see Crane operating instructions, chapter 2.04!
- ▶ Take the support plates **36** from the transport retainer **B** and place them on the supporting bases **24**.
- ▶ Align the support plates **36** to the hydraulic cylinders **18**.

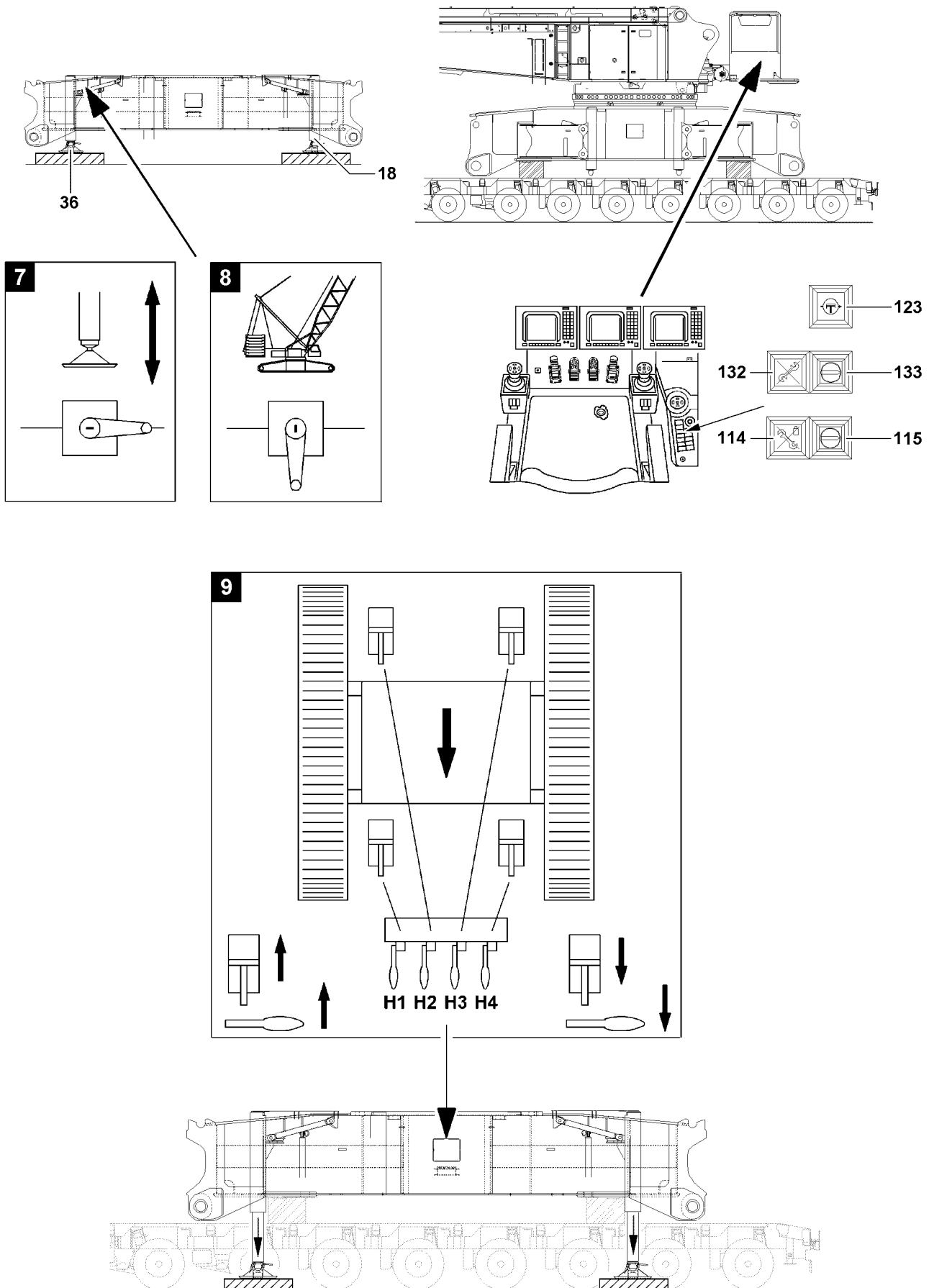


Fig.108000

LWE/LR 1750-000/12812-15-02/en

3.4 Preparing for operation assembly supports

3.4.1 Operation assembly supports from crane cab

- ▶ Start the crane engine, see Crane operating instructions, chapter 4.03.
- ▶ The assembly key button **133** and key button „Crawler assembly“ **115** are actuated.

Result:

- The indicator light „Assembly“ **132** lights up.
- The indicator light „Crawler assembly“ **114** lights up.
- ▶ Set the operating mode on the LICCON computer system, which is to be set up.
- ▶ Turn the switch **123** on to change the pressure supply to the auxiliary users.

3.4.2 Operation assembly supports with pin pulling device

- ▶ Establish the hydraulic connections from the hydraulic aggregate of the pin pulling device to the crawler center section **3**, see Crane operating instructions, chapter 5.30.

3.5 Lifting the crawler center section

The crawler center section is lifted for the following reasons:

- To lift the crawler center section off from the transport vehicle.
- For assembly of the crawler carriers.

Make sure that the following prerequisites are met:

- The turntable is installed: The crane engine is running.
- The turntable is not installed: The pin pulling device is connected and turned on.
- The assembly supports are locked with braces.
- The support plates are properly supported.
- The ball valve is set to „Assembly support“, see illustration 7.

Ball valve positions	
Illustration 7	Assembly support
Illustration 8	Crane operation / crawler carrier installation with SA-bracket

Function assignment of manual levers for the support cylinders	
H1	Manual lever for support cylinder, right front
H2	Manual lever for support cylinder, right rear
H3	Manual lever for support cylinder, left rear
H4	Manual lever for support cylinder, left front

- ▶ Actuate the manual lever and move the support cylinder **18** into the receptacle of the support plates **36**.
- ▶ Close the receptacle.

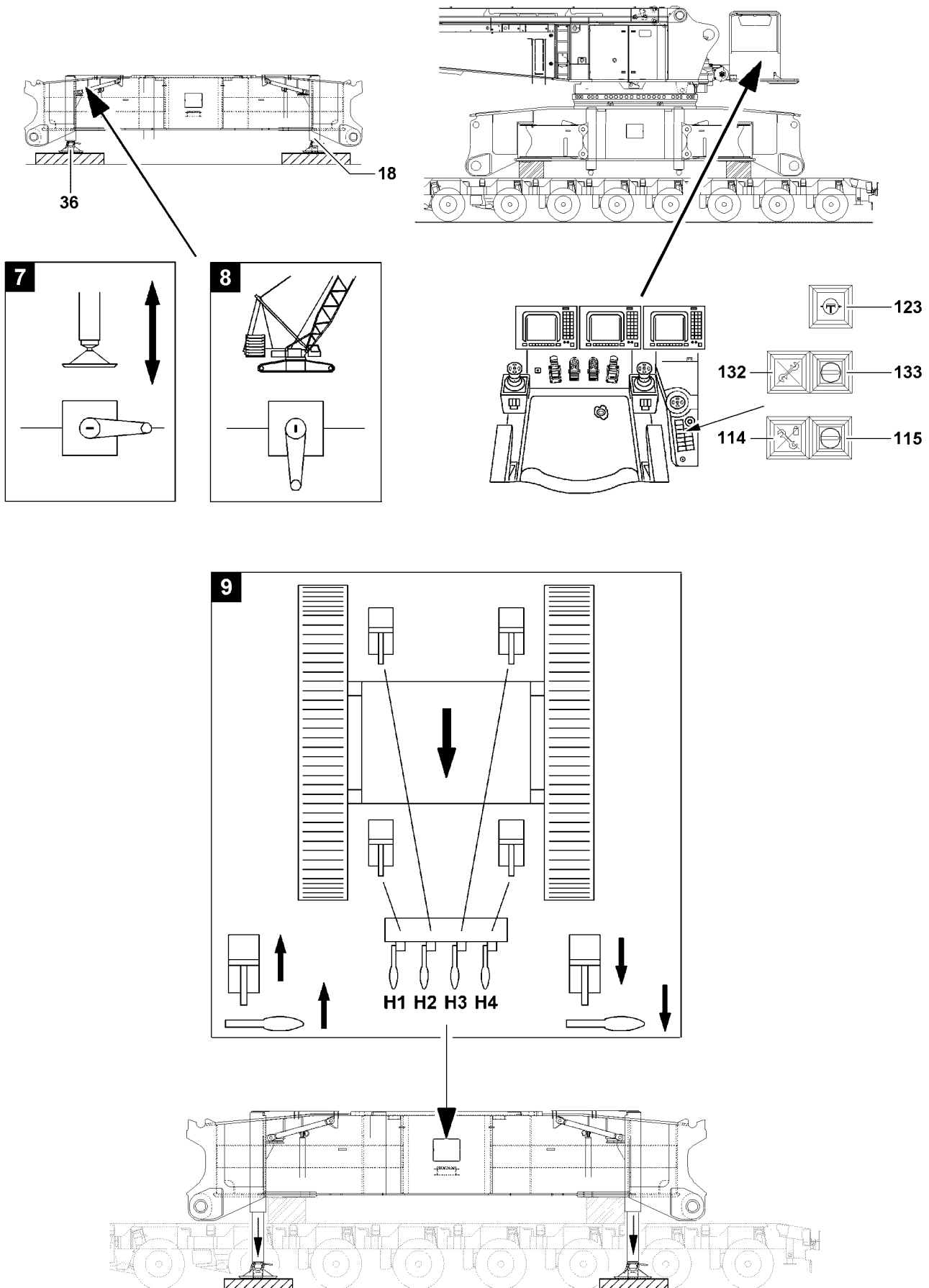


Fig.108000

LWE/LR 1750-000/12812-15-02/en

**Note**

- ▶ Lift the crawler center section so that the crawler carriers can be installed without restriction!
- ▶ Move the support cylinders out evenly!

**WARNING**

Risk of tipping the crawler center section!

If the support cylinder are moved out unevenly, the crawler center section can tip over!

Personnel can be severely injured!

- ▶ When lifting the crawler center section, pay attention to the horizontal alignment, check visually!

- ▶ Actuate the hand lever **H1**, hand lever **H2**, hand lever **H3** and hand lever **H4**.

Result:

- The four support cylinders **18** extend.

- ▶ After supporting and aligning the crawler center section, set the ball valve to „Crane operation / crawler carrier installation“, see illustration **8**.

When the transport vehicle is positioned under the crawler center section:

- ▶ Remove the transport vehicle.

3.6 Assembling the turntable

When the support cylinders are extended and the crawler center section is horizontally aligned, then the turntable can be installed.

**Note**

- ▶ For assembly / disassembly of the turntable, see Crane operating instructions, chapter 3.02!

Fig.195219

LWE/LR 1750-000/12812-15-02/en

4 Assembling / removing the crawler carrier with auxiliary crane

Make sure that the following prerequisites are met:

- An auxiliary crane with sufficient load carrying capacity is available.
- The assembly supports are installed.

4.1 Assembling the crawler carrier with the turntable installed



DANGER

The crane can topple over!

If the crane is installed on the assembly support and a central ballast or turntable ballast is installed, the crane can topple over! Personnel can be severely injured or killed!

- ▶ No central ballast or turntable ballast may be installed!



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling! If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited!



WARNING

Danger of crushing!

While assembling / disassembling crane components, body limbs can be crushed or severed by the swing movement of components!

- ▶ Make sure that the components do not swing back and forth during assembly / disassembly!



Note

- ▶ The weight of the crawler carrier, depending on the equipment configuration, is a maximum of 57 t, see Crane operating instructions, chapter 1.03!
- ▶ The assembly support on the crawler center section is connected to the hydraulic of the turntable!



Note

- ▶ Function assignment for the manual lever for retracting / extending the support cylinder, see section „Lifting the crawler center section“.

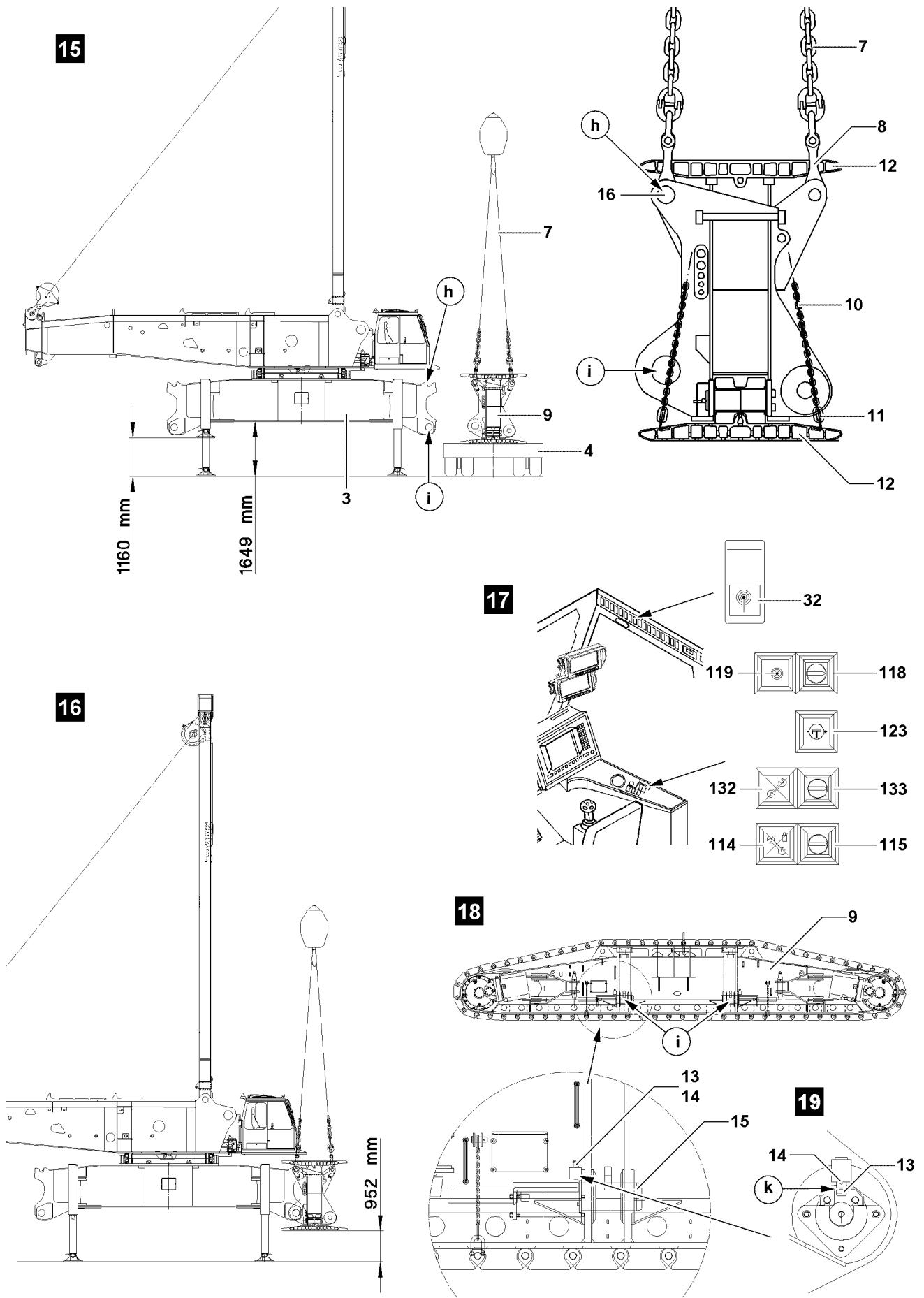


Fig.112279

LWE/LR 1750-000/12812-15-02/en

**Note**

► For assembly on supports, the SA-bracket must be positioned vertically!

Make sure that the following prerequisites are met:

- The crane is aligned in horizontal direction.
- The set up location is level and has sufficient load bearing capacity.
- The hydraulic support cylinders are moved out to 1160 mm , see illustration **15**.

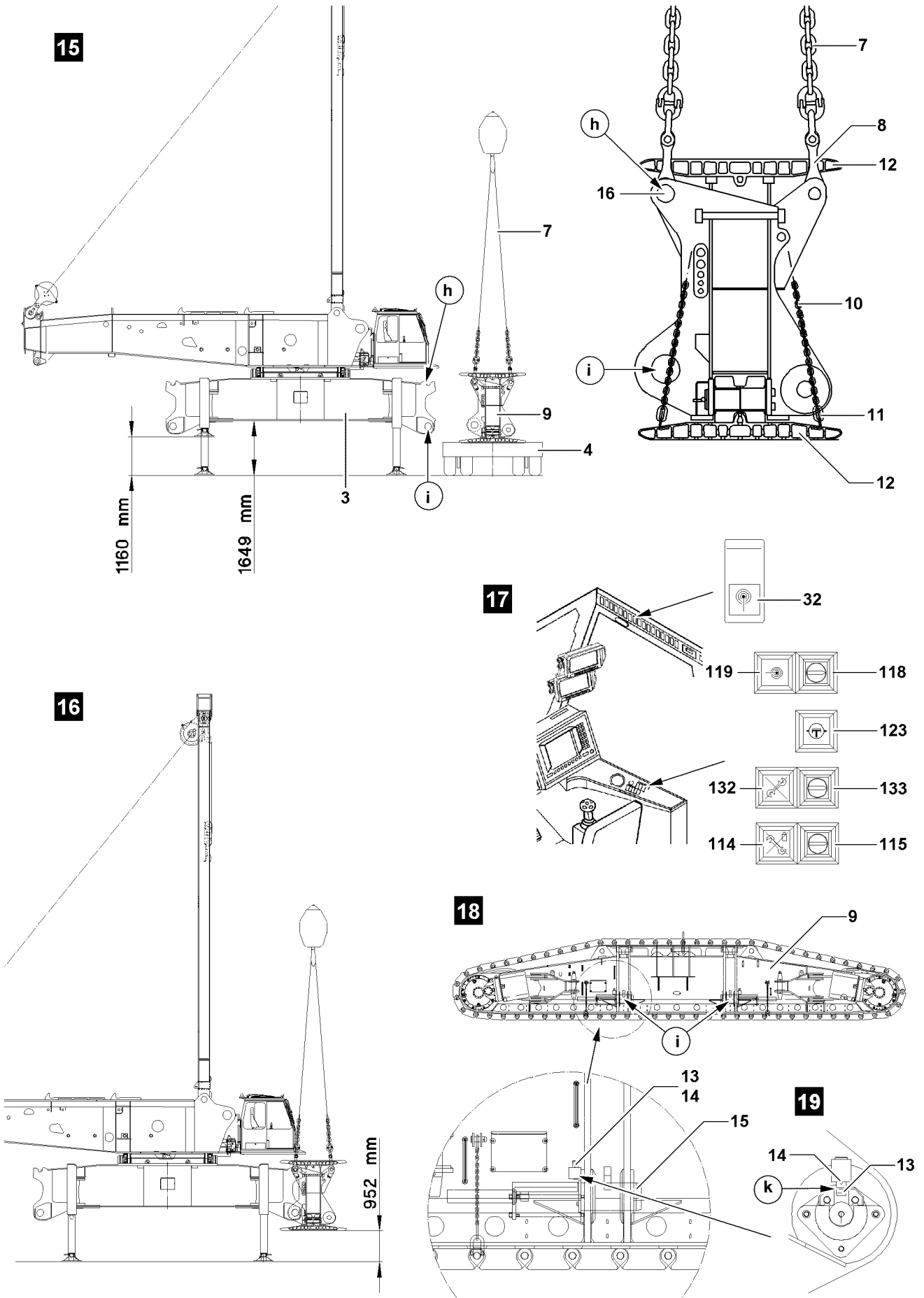


Fig.112279

LWE/LR 1750-000/12812-15-02/en

4.1.1 Assembling the first crawler carrier

Preparing the crawler carrier for assembly

NOTICE

Damage to the crawler carrier!

If the track pads are not secured with the transport retainers to prevent them from sagging, the crawler carrier can be severely damaged!

- ▶ Secure the track pads **12** before assembly of the crawler carrier **9** with the chains **10** to prevent them from sagging!

- ▶ Hang the chains **10** with the bars **11** on the track pads **12**, see illustration **15**.



Note

- ▶ The lugs **8** must be swung between the track pads **12**, „upward“!

- ▶ Swing the lugs **8** „up“.

Positioning the crawler carrier on the crawler center section



Note

- ▶ Note the marking on the crawler carrier and the crawler center section!
- ▶ The crawler carrier and the crawler center section are marked with numbers!

- ▶ Make sure that the pins **15** are completely unpinned on both sides on the crawler carrier.
- ▶ Hook the fastening ropes **7** onto the auxiliary crane.
- ▶ Hook the fastening ropes **7** on the lug **8** and secure.



Note

When the reinforced crawler center section for the crane support is used:

- ▶ Make sure that the pins **16** are unpinned before installation!
- ▶ Lift the crawler carrier **9** with the auxiliary crane to the crawler center section **3** so that points **h** and points **i** align!
- ▶ Insert and secure the pins **16** in points **h**!
- ▶ Lift the crawler carrier **9** with the auxiliary crane from the transport vehicle **4**.
- ▶ Bring the crawler carrier **9** carefully into the crawler center section **3**.
- ▶ Lower the crawler carrier **9** onto the crawler center section **3**: Hang the pins **16** on points **h**.

Pinning the crawler carrier

When connecting hydraulic lines with quick-release couplings, make sure that the coupling procedure is carried out correctly.



DANGER

Loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
- ▶ Release the pressure in the hydraulic system before connecting. Turn the engine off and wait for short time.
- ▶ Connect the coupling components (sleeve and connector) and screw together with the hand-tightened nut.

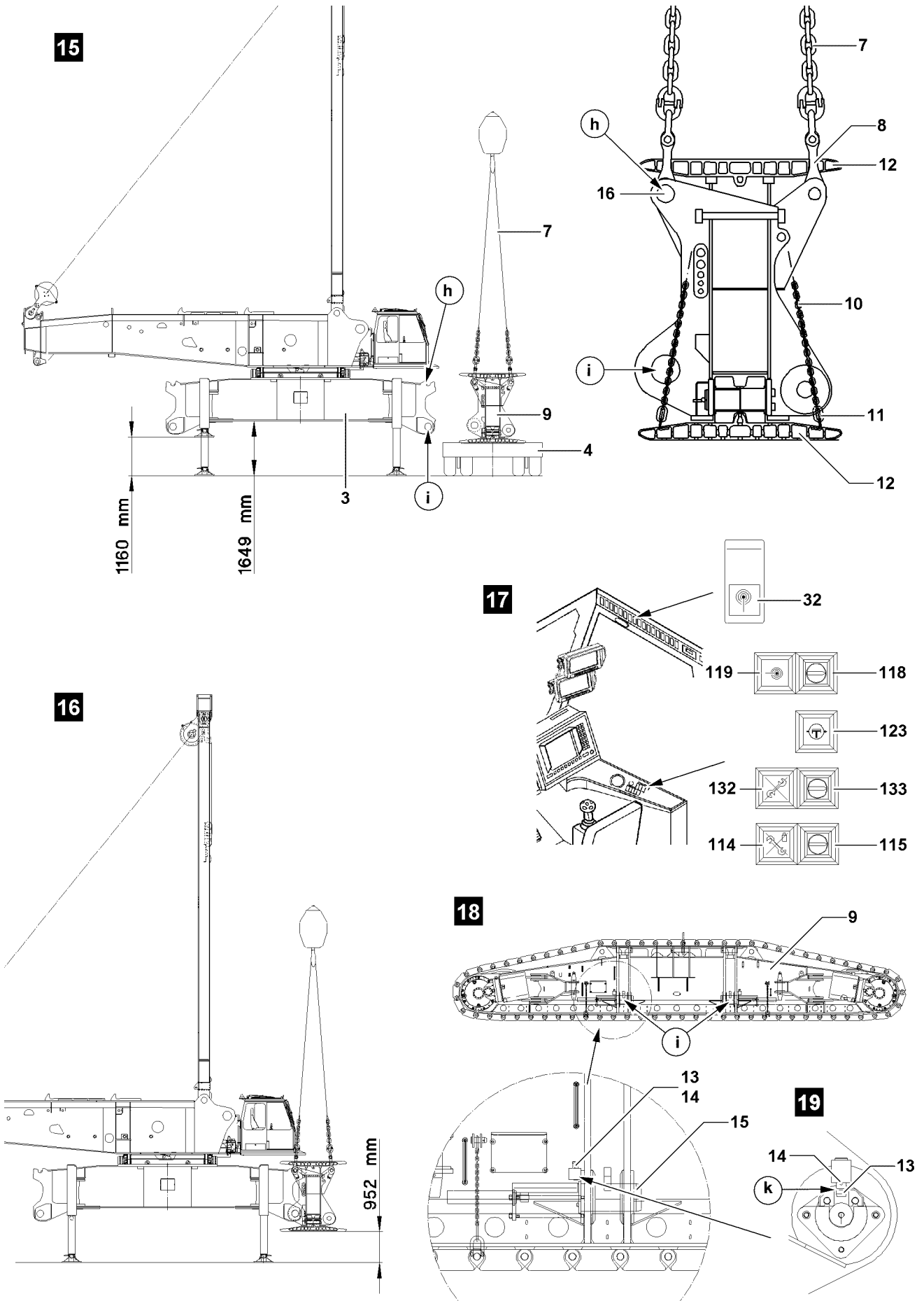


Fig.112279

LWE/LR 1750-000/12812-15-02/en

- ▶ Tighten the hydraulic coupling by hand. Rotate the hand-tightened nut until it reaches a tangible, fixed stop position.
- ▶ Establish the hydraulic connections to the crawler carriers.
- ▶ Establish the electrical connections to the crawler carriers, see separate electrical wiring diagram.

To pin the crawler carriers, the LICCON computer system must be turned on.

The pin pulling cylinders are actuated with the radio remote control.



Note

- ▶ For operation of the radio remote control, see Crane operating instructions, chapter 6.08!
-

- ▶ Start the crane engine, see Crane operating instructions, chapter 4.03.
- ▶ The assembly key button **133** and key button „Crawler assembly“ **115** are actuated.

Result:

- The indicator light „Assembly“ **132** lights up.
- The indicator light „Crawler assembly“ **114** lights up.
- ▶ Set the operating mode on the LICCON computer system, which is to be set up.
- ▶ Change the pressure supply to the auxiliary users: Actuate the switch **123**.

The radio remote control is activated either on the roof console or on the instrument panel, depending on the configuration of the crane.

- ▶ Activate the radio remote control: Actuate the key button **118** or the switch **32**.
- ▶ Make sure that both retaining pins **13** on the crawler carrier are secured in position „top“ with spring retainer **14**.
- ▶ Insert the pins **15** on the pin points **i**: Actuate the remote control.

19 Illustration

When the pins **15** are completely pinned:

- ▶ Secure the pins **15**: Unpin the retaining pin **13** and pin on position **k**.
- ▶ Secure the retaining pins **13** with spring retainers **14**.
- ▶ Release the fastening ropes **7** from the lugs **8** on the crawler carrier **9**.

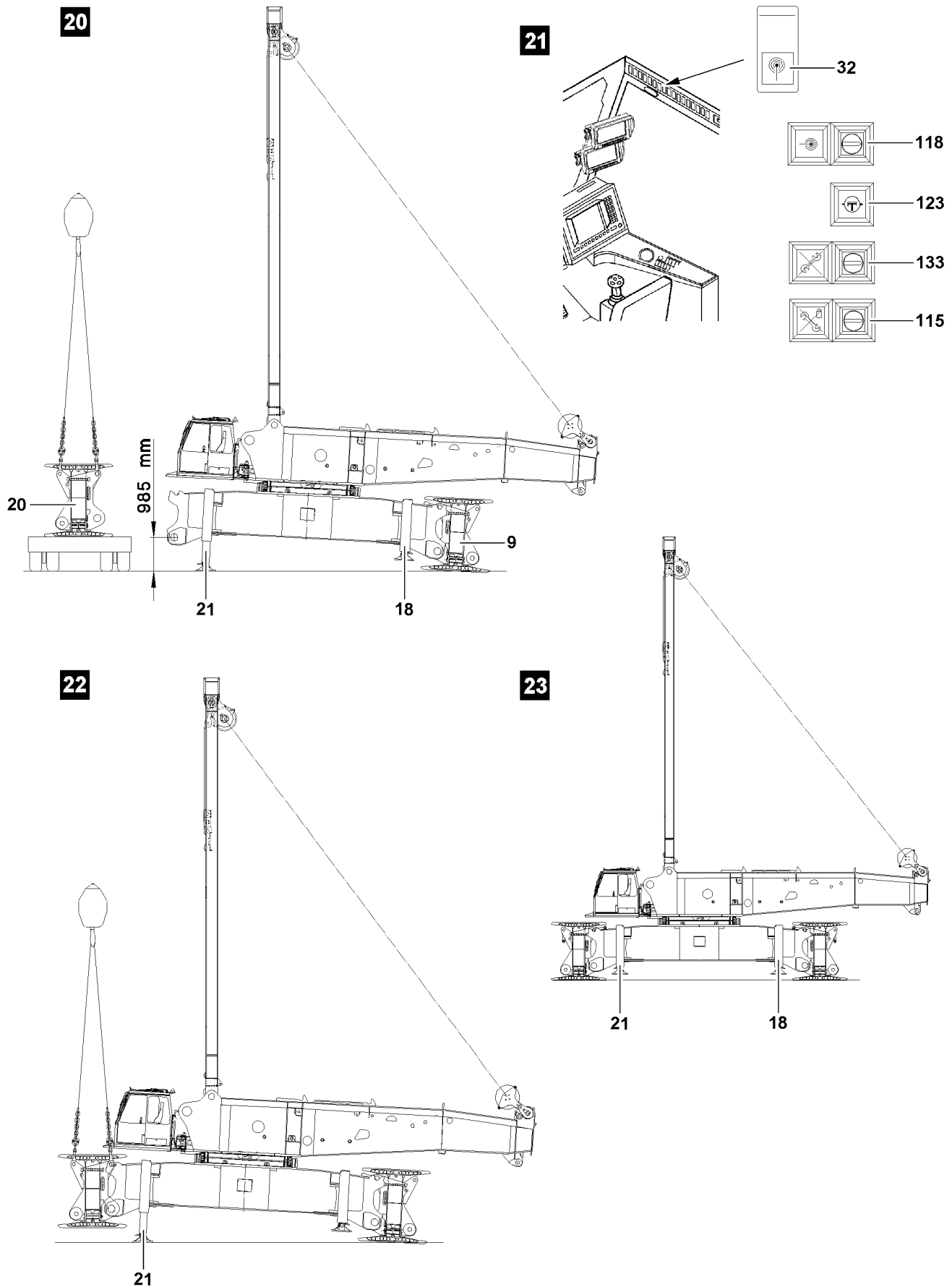


Fig.112280

LWE/LR 1750-000/12812-15-02/en

4.1.2 Setting the first crawler carrier on the ground



WARNING

The crane can tip over!

If the support cylinders are moved out / in unevenly, the crane can tip over. Personnel can be severely injured or killed!

▶ When moving the support cylinders in / out, pay attention to the horizontal alignment, check visually!

▶ Retract the support cylinder evenly until the distance between the ground and the crawler center section is 985 mm.

▶ Set the first crawler carrier **9** on the ground: Move the support cylinders **18** in all the way.



WARNING

Danger of tipping over!

Before turning the turntable, if the first assembled crawler carrier is not positioned on the ground, there is a danger of tipping over!

Personnel can be severely injured or killed!

▶ Before turning the turntable: Set the first assembled crawler carrier on the ground!

▶ The hydraulic support cylinder **18** on the crawler side must be moved in all the way!

▶ Turn the turntable by 180°.

4.1.3 Assembling the second crawler carrier

Make sure that the following prerequisites are met:

- The first installed crawler carrier **9** is standing on the ground.
- The hydraulic support cylinders **18** on the crawler side are fully moved in.
- The distance between the ground and the crawler center section is 985 mm, see illustration **20**.
- The turntable is turned by 180°.



Note

▶ Procedure for assembly of the second crawler carrier **20**, see section „Assembling the first crawler carrier“!

When the second crawler carrier **20** is installed:

- ▶ Set the second crawler carrier on the ground: Move the support cylinder **21** in evenly.
- ▶ Remove chains **10** on the track pads **12** and hang and secure on the crawler carriers.
- ▶ Move the support cylinders **21** in all the way.



Note

▶ The assembly support must remain swung out!

▶ Remove the fastening ropes **7** on the lugs **8** and on the auxiliary crane.

NOTICE

Damage to the lugs **8**!

▶ After removing the fastening equipment, the lugs **8** must be swung down!

▶ Swing the lugs **8** down.

▶ Turn the pressure change over for the auxiliary users off: Actuate the switch **123**.

▶ Deactivate the radio remote control: Actuate the key button **118** or the switch **32**.

Result:

- The crawler carriers are assembled.

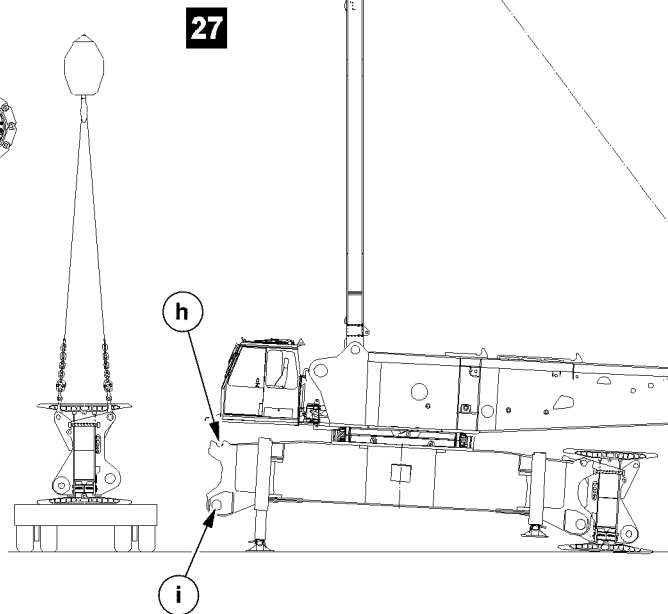
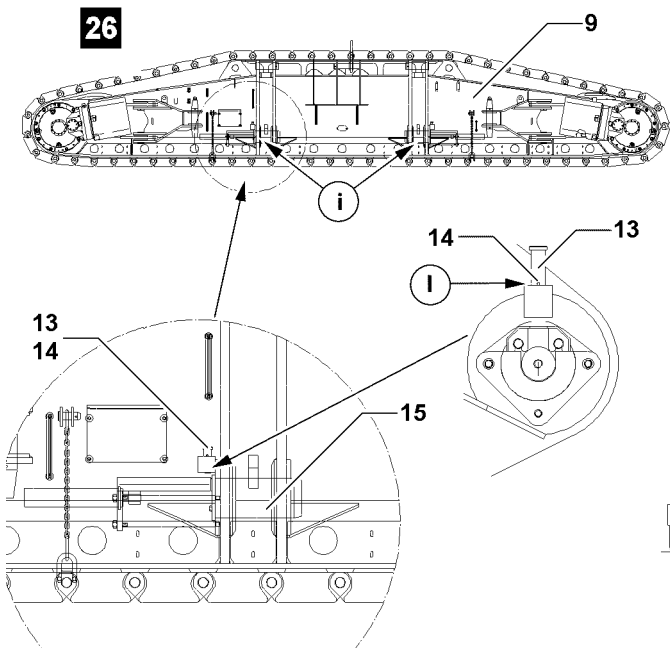
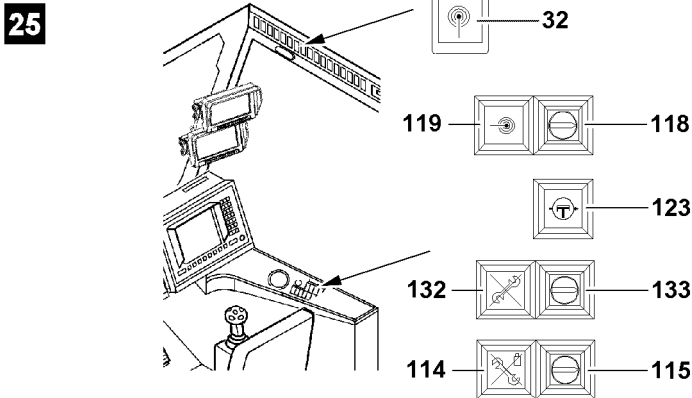
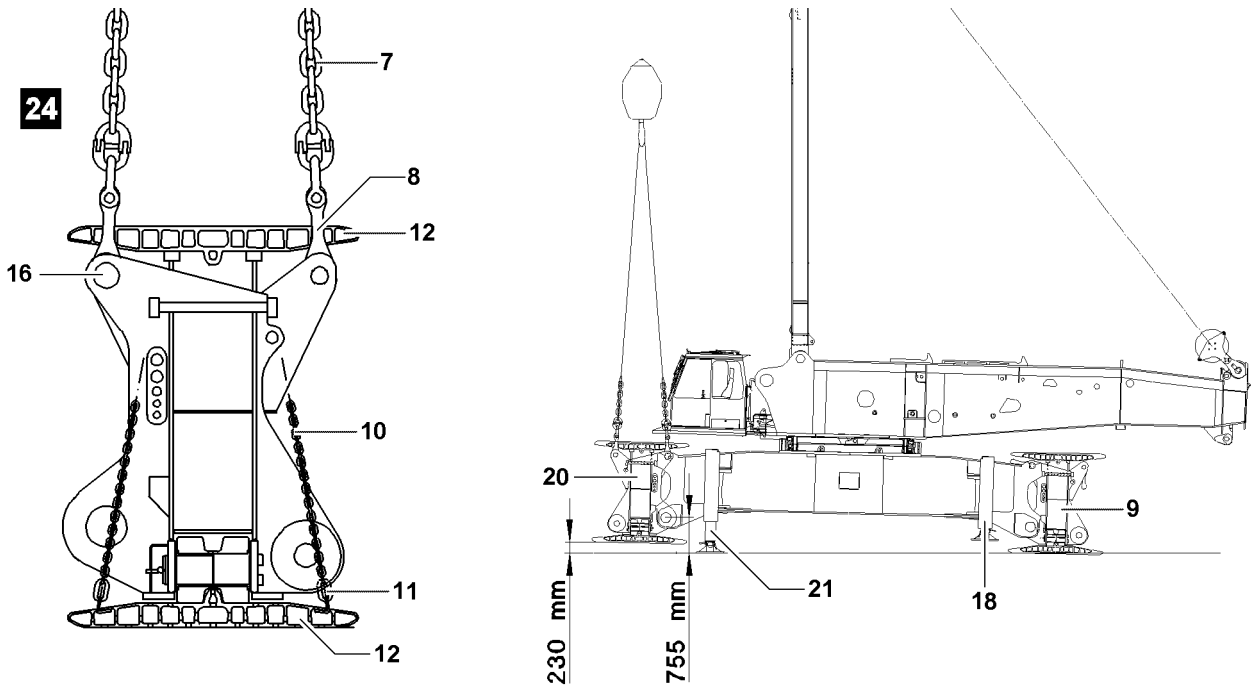


Fig.112281

LWE/LR 1750-000/12812-15-02/en

4.2 Disassembling the crawler carrier with the turntable installed



DANGER

The crane can topple over!

If the central ballast or the turntable ballast is installed, the crane can topple over when removing the crawler carrier!

Personnel can be severely injured or killed!

- ▶ For removal, no central ballast or turntable ballast may be installed!



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited!



WARNING

Danger of crushing!

While assembling / disassembling crane components, body limbs can be crushed or severed by the swing movement of components!

- ▶ Make sure that the components do not swing back and forth during assembly / disassembly!



Note

- ▶ The weight of the crawler carrier, depending on the equipment configuration, is a maximum of 57 t, see Crane operating instructions, chapter 1.03!
- ▶ The assembly support on the crawler center section is connected to the hydraulic of the turntable!



Note

- ▶ For function assignment of hand levers to move the support cylinders in / out, see section „Lifting the crawler center section“!



Note

- ▶ For disassembly on supports, the SA-bracket must be positioned vertically!

Make sure that the following prerequisites are met:

- The crane must be aligned horizontally.
- The placement location must be level and have adequate load-bearing capacity.
- Suitable material must be available for the supporting base of the assembly supports.
- The support plates are installed.
- The crane engine is running.
- The assembly key button **133** is actuated: The indicator light „Assembly“ **132** lights up.
- The key button „Crawler assembly“ **115** is actuated: The indicator light „Crawler assembly“ **114** lights up.

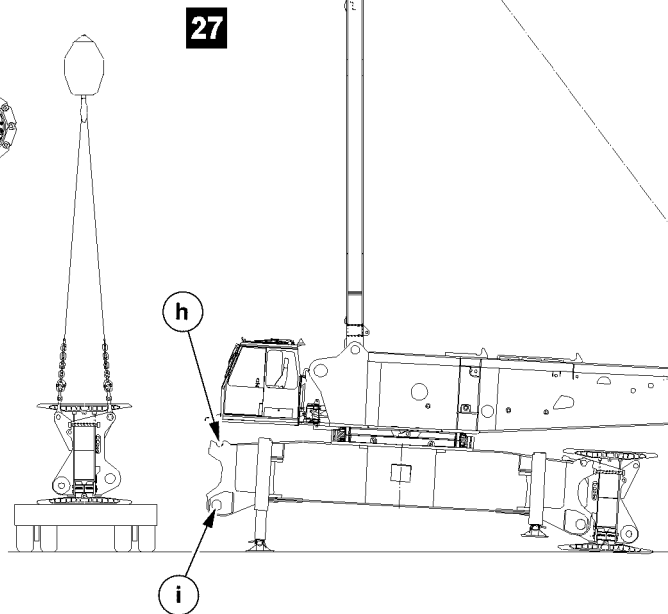
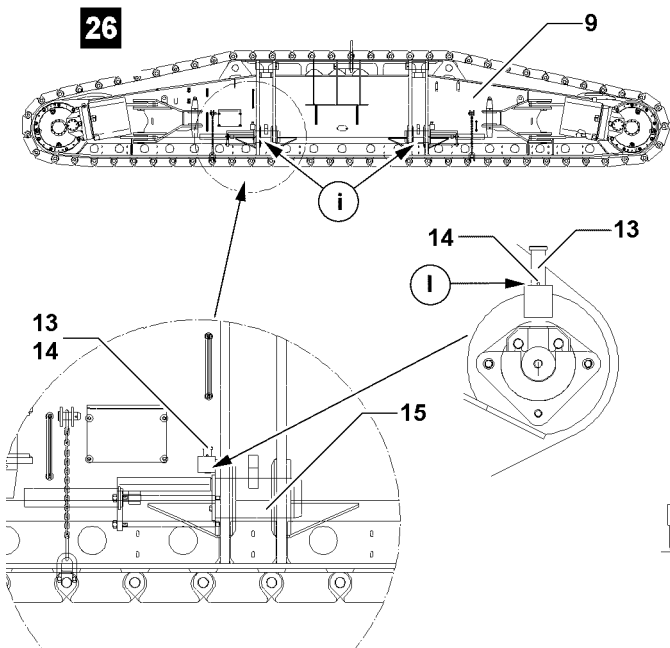
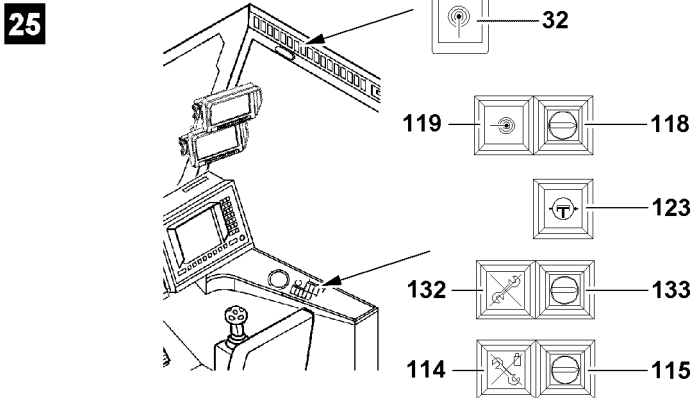
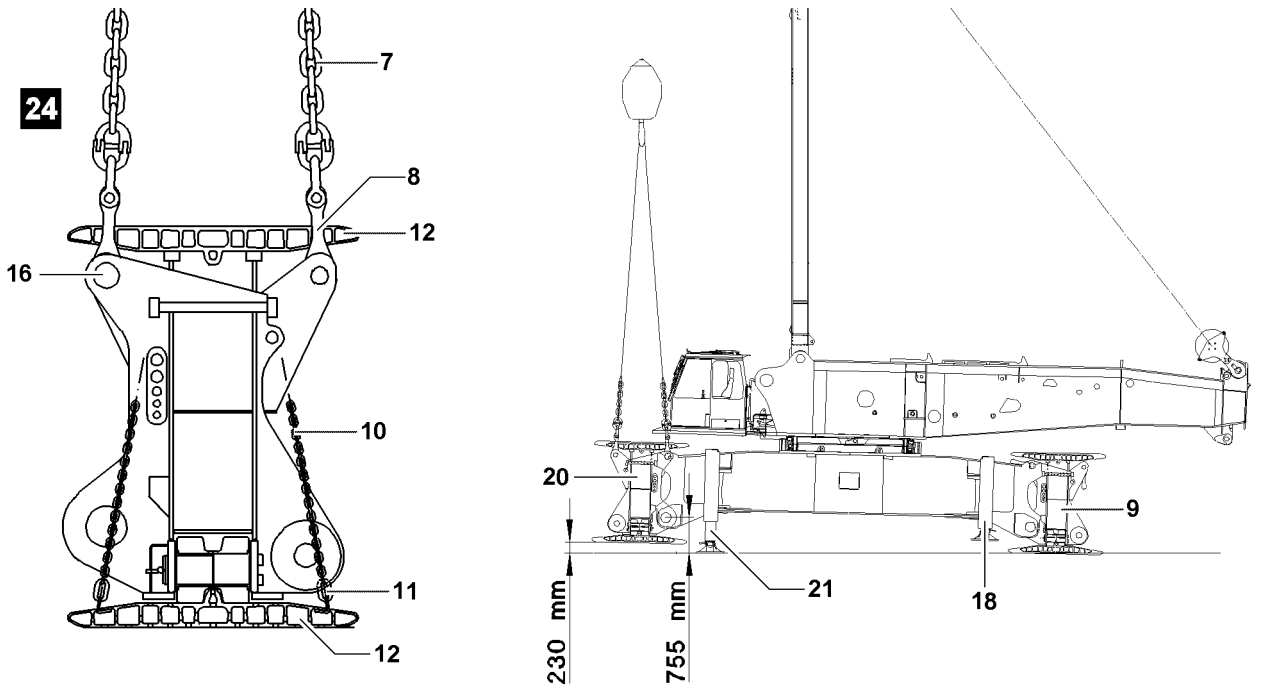


Fig.112281

LWE/LR 1750-000/12812-15-02/en

4.2.1 Disassembling the first crawler carrier

Preparing the crawler carrier for disassembly

NOTICE

Damage to the crawler carrier!

If the track pads are not secured with the transport retainers to prevent them from sagging, the crawler carrier can be severely damaged!

- ▶ Secure the track pads **12** before disassembly of the crawler carrier **9** with the chains **10** to prevent them from sagging!

- ▶ Hang the chains **10** with the bars **11** on the track pads **12**, see illustration **24**.



Note

- ▶ The lugs **8** must be swung between the track pads **12**, „upward“!

- ▶ Swing the lugs **8** „up“.

Unpinning the crawler carrier



WARNING

Risk of accidents due to improper support!

If the assembly support is not properly supported from below, it can sink into the ground and severely injure personnel!

- ▶ The supporting base must take on the weight of the crawler center section safely!
- ▶ The supporting base must be made large enough for the ground conditions, with solid materials, such as wood, steel or concrete slabs, see Crane operating instructions, chapter 2.04!

- ▶ Lift the first crawler carrier off the ground: Move the support cylinder **21** out until the distance between the ground and the underside of the crawler carrier is 230 mm, see illustration **24**.

To unpin the crawler carriers, the LICCON computer system must be turned on.

The pin pulling cylinders are actuated with the radio remote control.



Note

- ▶ For operation of the radio remote control, see Crane operating instructions, chapter 6.08!

- ▶ Change the pressure supply to the auxiliary users: Actuate the switch **123**.

The radio remote control is activated either on the roof console or on the instrument panel, depending on the configuration of the crane.

- ▶ Activate the radio remote control: Actuate the key button **118** or the switch **32**.

NOTICE

Pin is not released!

If the pin **15** is secured with the retaining pin when unpinning it, the pin pulling device can be damaged!

- ▶ Secure the retaining pin **13** before unpinning in „up“ position with spring retainer **14** on point **I**, see illustration **26**!

- ▶ Release the pin **15**: Unpin the retaining pin **13** on the crawler carrier and secure in „up“ position with spring retainer **14** on point **I**.
- ▶ Unpin the pins **15** on the pin points **i**: Actuate the remote control.
- ▶ Hang the fastening ropes **7** on the auxiliary crane and secure on the lugs **8** on the crawler carrier **9**.

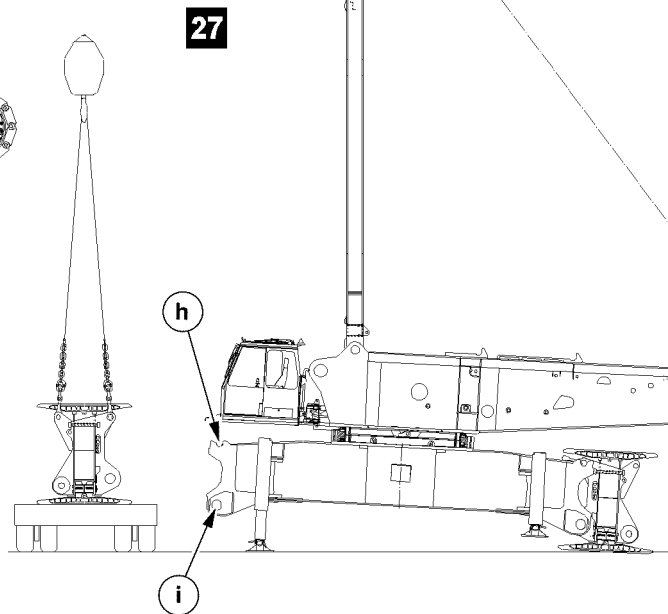
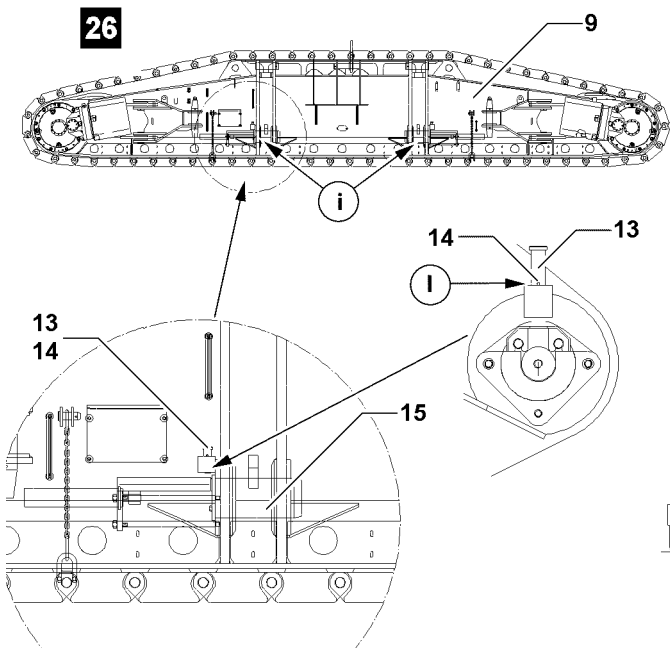
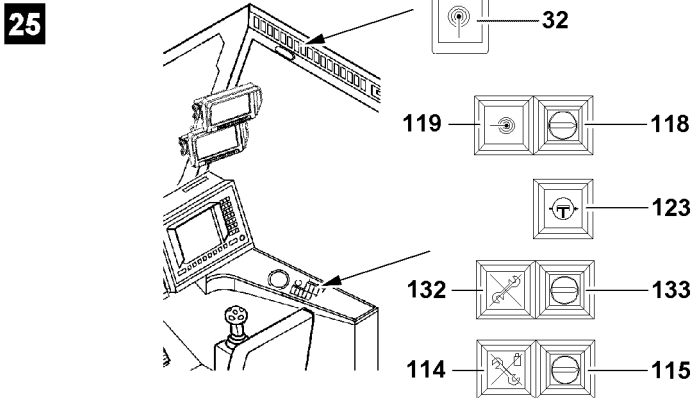
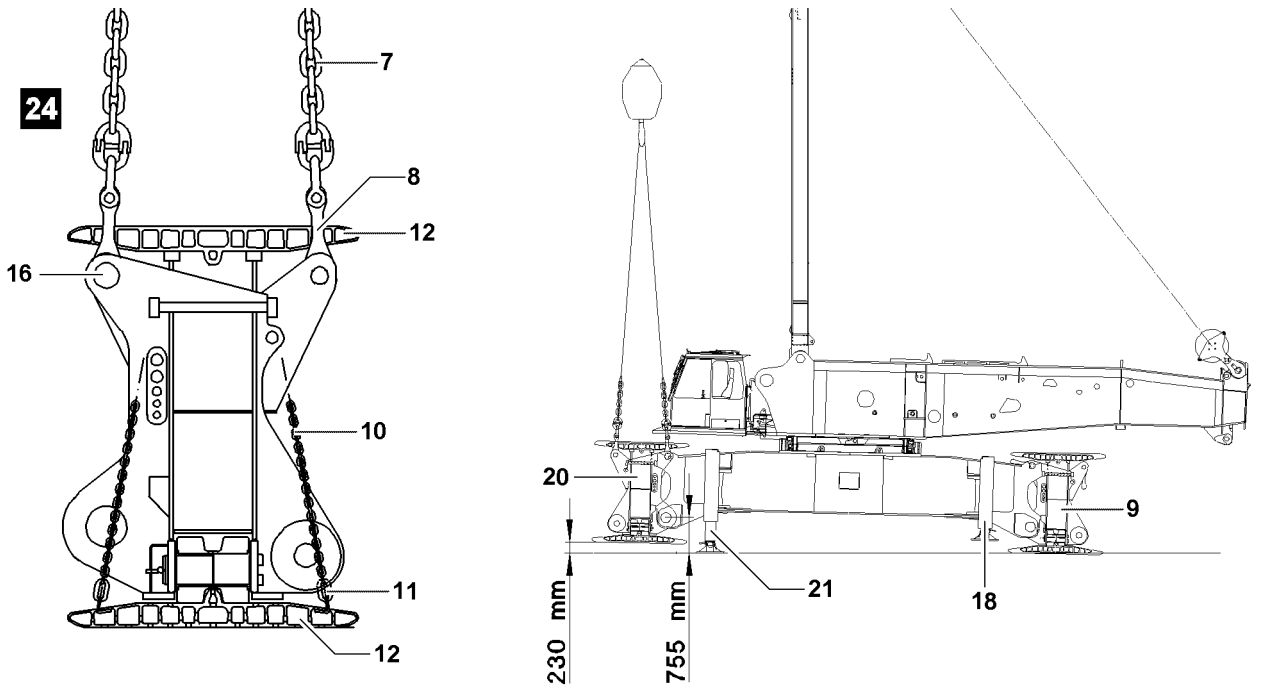


Fig.112281

LWE/LR 1750-000/12812-15-02/en

When releasing hydraulic lines with quick-release couplings, make sure that the uncoupling procedure is carried out correctly.



DANGER

Loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
- ▶ Release the pressure in the hydraulic system before releasing. Turn the engine off and wait for short time.
- ▶ Install the coupling components (sleeve and connector) with the hand-tightened nut.
- ▶ Disconnect the hydraulic connections to the crawler carriers.
- ▶ Properly store the hydraulic hoses on the crawler carrier.
- ▶ Disconnect the electrical connections to the crawler carriers, see separate electrical wiring diagram.

Disassembling the crawler carrier from the crawler center section

- ▶ Make sure that the pins **15** are completely unpinning on both sides on the crawler carrier, see illustration **26**.
- ▶ Raise the auxiliary crane until the fastening ropes **7** are tensioned.



Note

When the reinforced crawler center section for the crane support is used:

- ▶ Release pins **16** in points **h** and unpin!
- ▶ Lift the crawler carrier **9** with the auxiliary crane from the crawler center section **3**!
- ▶ Insert and secure the pins **16** in points **h**!
- ▶ Lift the crawler carrier **9** with the auxiliary crane from the crawler carrier **9** and unhook it on point **h**.
- ▶ Place the crawler carrier **9** on the transport vehicle.
- ▶ Remove the fastening ropes **7** from the lugs **8** on the crawler carrier.

NOTICE

Damage to the lugs **8**!

- ▶ After removing the fastening equipment, the lugs **8** must be swung down!
- ▶ Swing the lugs **8** down.

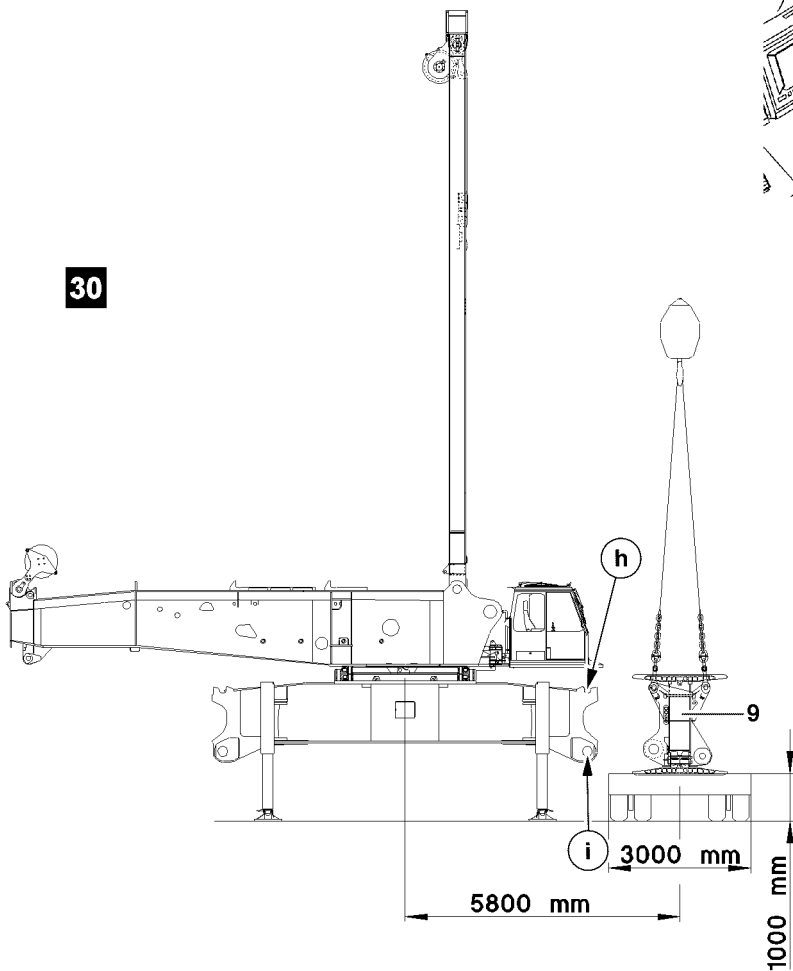
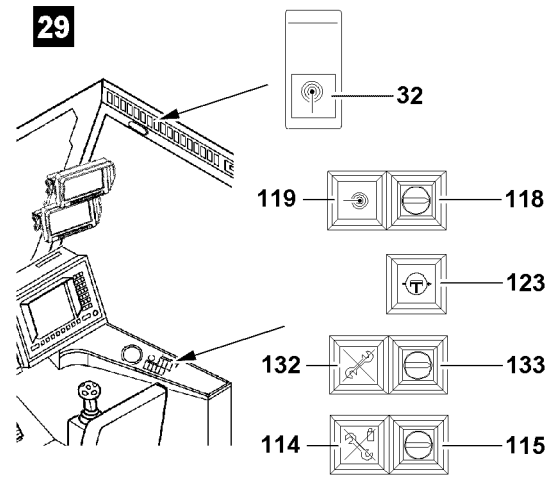
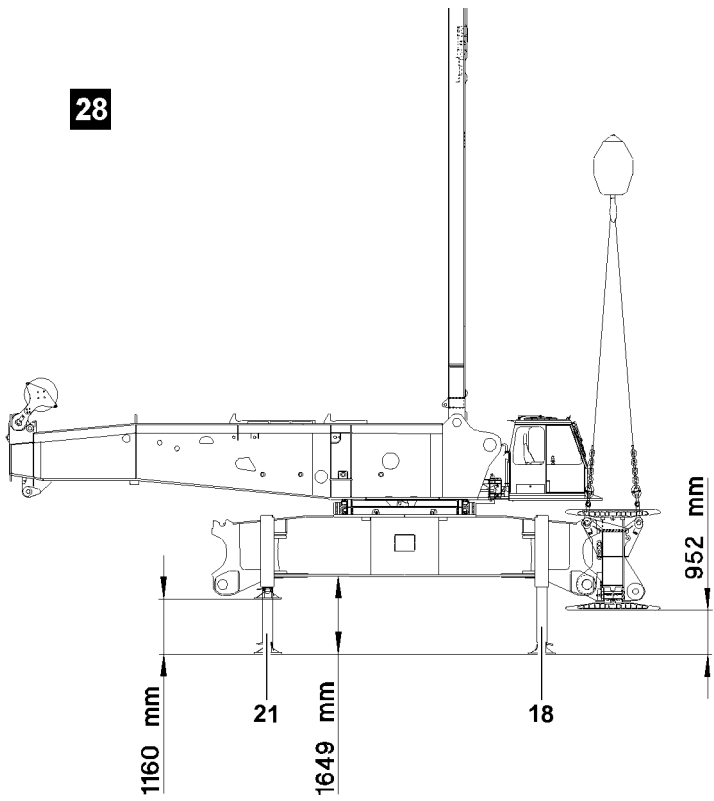


Fig.112282

LWE/LR 1750-000/12812-15-02/en

4.2.2 Extending the assembly supports

Make sure that the following prerequisites are met:

- The crane engine is running.
 - The assembly key button **133** is actuated: The indicator light „Assembly“ **132** lights up.
 - The key button „Crawler assembly“ **115** is actuated: The indicator light „Crawler assembly“ **114** lights up.
 - The pressure supply is changed to the auxiliary users: The switch **123** is actuated.
- ▶ Move the support cylinder **18** out evenly until the crane is in horizontal position.



WARNING

The crane can tip over!

If the support cylinders are moved out / in unevenly, the crane can tip over. Personnel can be severely injured or killed!

- ▶ When moving the support cylinders in / out, pay attention to the horizontal alignment, check visually!
-
- ▶ Move all support cylinders out evenly to at least 1160 mm , see illustration **28**.
 - ▶ Turn the turntable by 180°.

4.2.3 Disassembling the second crawler carrier

Make sure that the following prerequisites are met:

- The first crawler carrier has been removed.
- The hydraulic support cylinders are moved out to at least 1160 mm.
- The turntable is turned by 180°.



Note

- ▶ For procedure for disassembly of the second crawler carrier **20**, see section „Disassemble the first crawler carrier“!

When the second crawler carrier is disassembled:

- ▶ Remove the turntable, see section „Disassembling the turntable“.

4.3 Disassembling the turntable

When the assembly supports are extended and the crawler center section is horizontally aligned, then the turntable can be removed.



Note

- ▶ For assembly / disassembly of the turntable, see Crane operating instructions, chapter 3.02!

When the turntable is removed:

- ▶ Disassemble assembly supports, see section „Disassembling the assembly supports“.

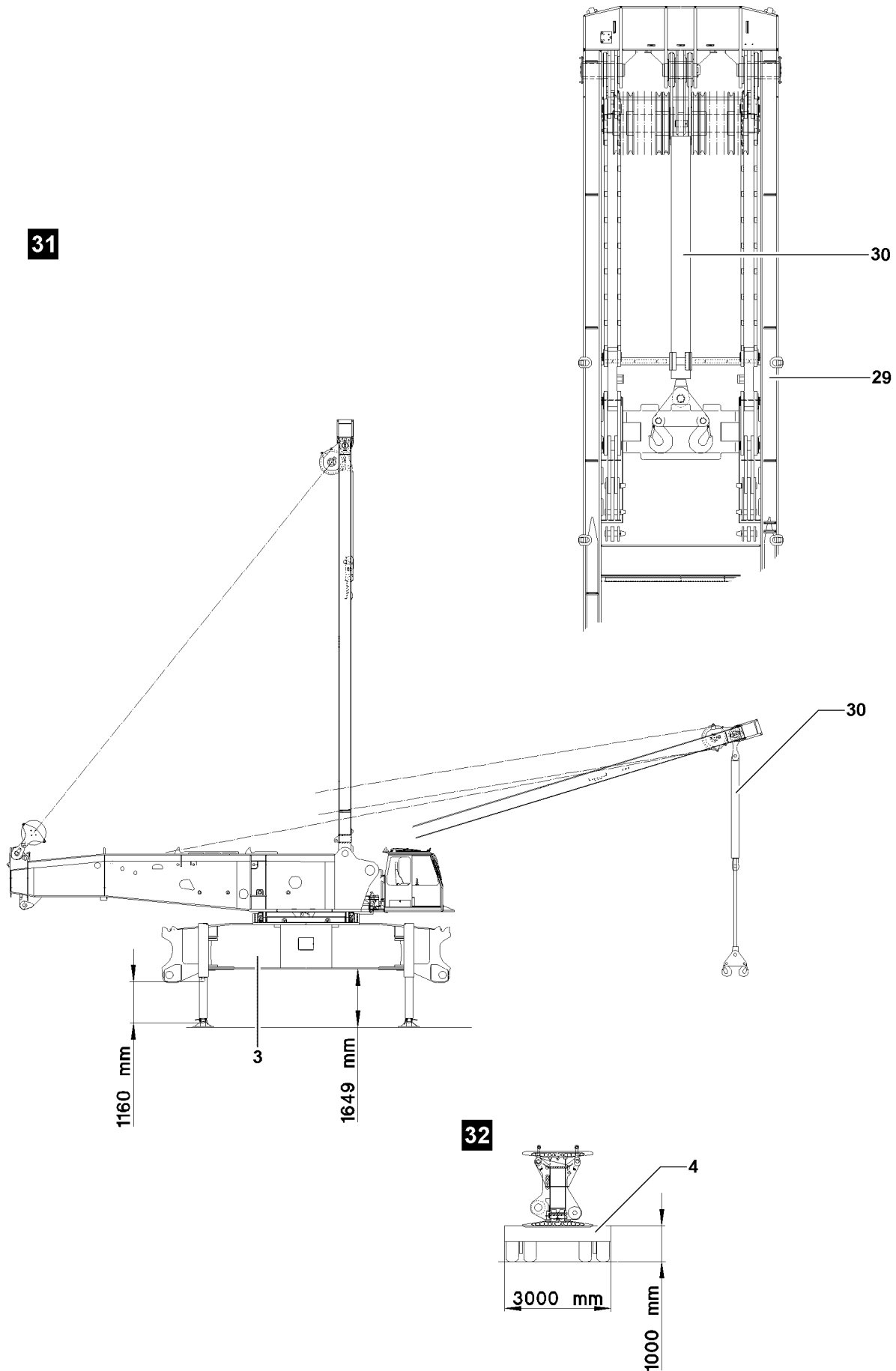


Fig.108009

LWE/LR 1750-000/12812-15-02/en

5 Assembling / disassembling the crawler carrier with SA-bracket

5.1 Assembling the crawler carrier with SA-bracket



DANGER

The crane can topple over!

If the crane is installed on the assembly support and a central ballast or turntable ballast is installed, the crane can topple over! Personnel can be severely injured or killed!

- ▶ No central ballast or turntable ballast may be installed!



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited!



WARNING

Danger of crushing!

While assembling / disassembling crane components, body limbs can be crushed or severed by the swing movement of components!

- ▶ Make sure that the components do not swing back and forth during assembly / disassembly!



Note

- ▶ The weight of the crawler carrier, depending on the equipment configuration, is a maximum of 57 t, see Crane operating instructions, chapter 1.03!
- ▶ The assembly support on the crawler center section is connected to the hydraulic of the turntable!



Note

- ▶ The assembly cylinder **30** is laying unsecured on the SA-bracket **29**!
- ▶ The assembly cylinder **30** has a hoist of 2500 mm !



Note

- ▶ For function assignment of hand levers to move the support cylinders in / out, see section „Lifting the crawler center section“!

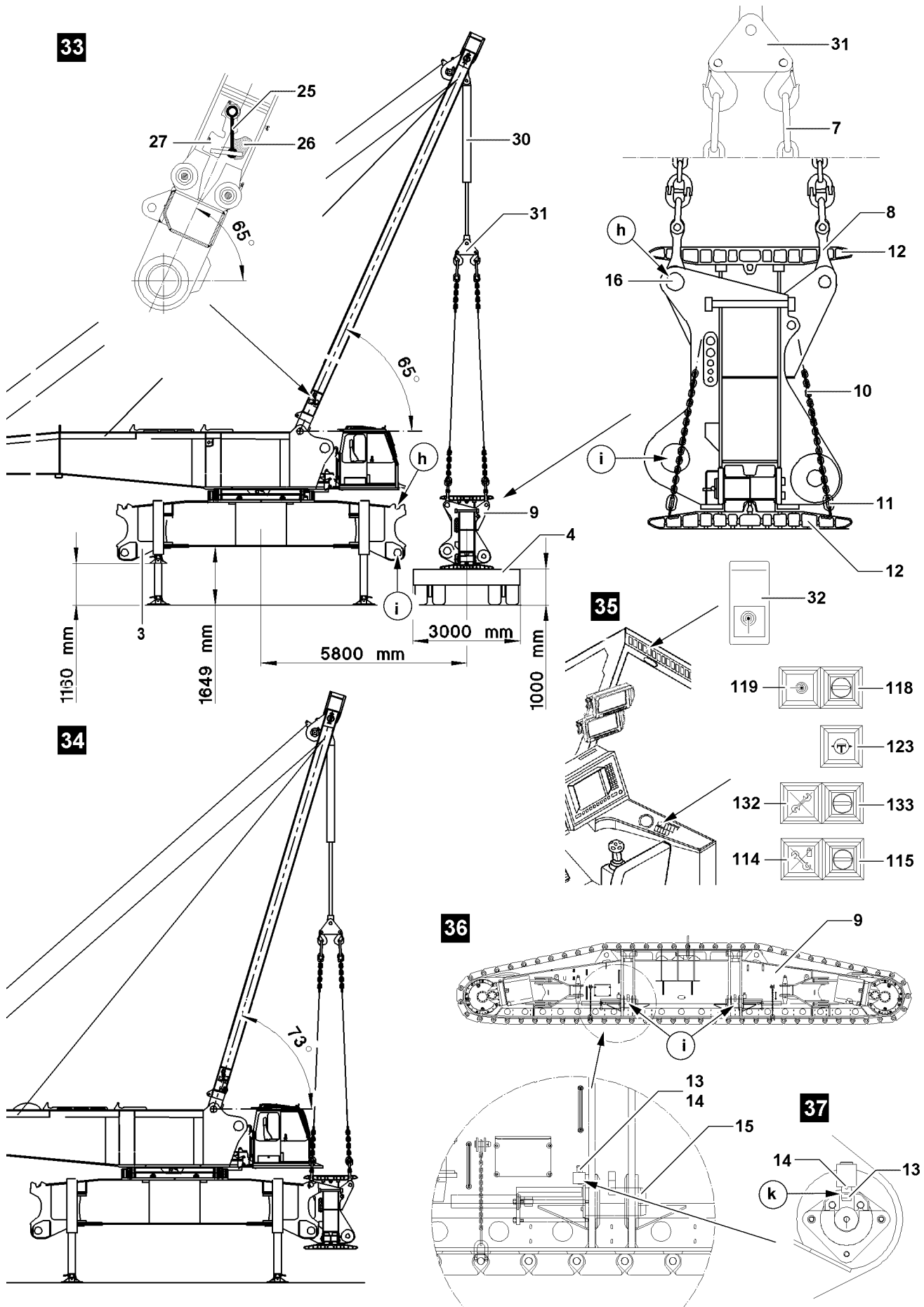


Fig.112283

LWE/LR 1750-000/12812-15-02/en

Make sure that the following prerequisites are met:

- The crane must be aligned horizontally.
- The placement location must be level and have adequate load-bearing capacity.
- The maximum height of the transport vehicle **4** may not exceed 1000 mm and a width of 3000 mm , see illustration **33**.
- The hydraulic support cylinders are moved out to 1160 mm , see illustration **33**.

5.1.1 Assembling the first crawler carrier



DANGER

The crane can topple over!

In operating mode crawler assembly, there is no overload shut off on the SA-bracket! If the distance between the crawler carrier and the center of the turntable exceeds 5800 mm , then the crane can topple over! Personnel can be severely injured or killed!

- ▶ Make sure that the crane is horizontally aligned!
- ▶ The maximum permissible distance of 5800 mm between the crawler carrier and the center of the turntable may not be exceeded, see illustration **33**!

See illustration **35**

Make sure that the following prerequisites are met:

- The crane engine is running.
- The assembly key button **133** is actuated: The indicator light „Assembly“ **132** lights up.
- The key button „Crawler assembly“ **115** is actuated: The indicator light „Crawler assembly“ **114** lights up.

Preparing the crawler carrier for assembly

NOTICE

Damage to the crawler carrier!

If the track pads are not secured with the transport retainers to prevent them from sagging, the crawler carrier can be severely damaged!

- ▶ Secure the track pads **12** before assembly of the crawler carrier **9** with the chains **10** to prevent them from sagging!
- ▶ Hang the chains **10** with the bars **11** on the track pads **12**, see illustration **33**.



Note

- ▶ The lugs **8** must be swung between the track pads **12**, „upward“!
- ▶ Swing the lugs **8** „up“.
- ▶ Make sure that the pins **15** are completely unpinned on both sides on the crawler carrier.

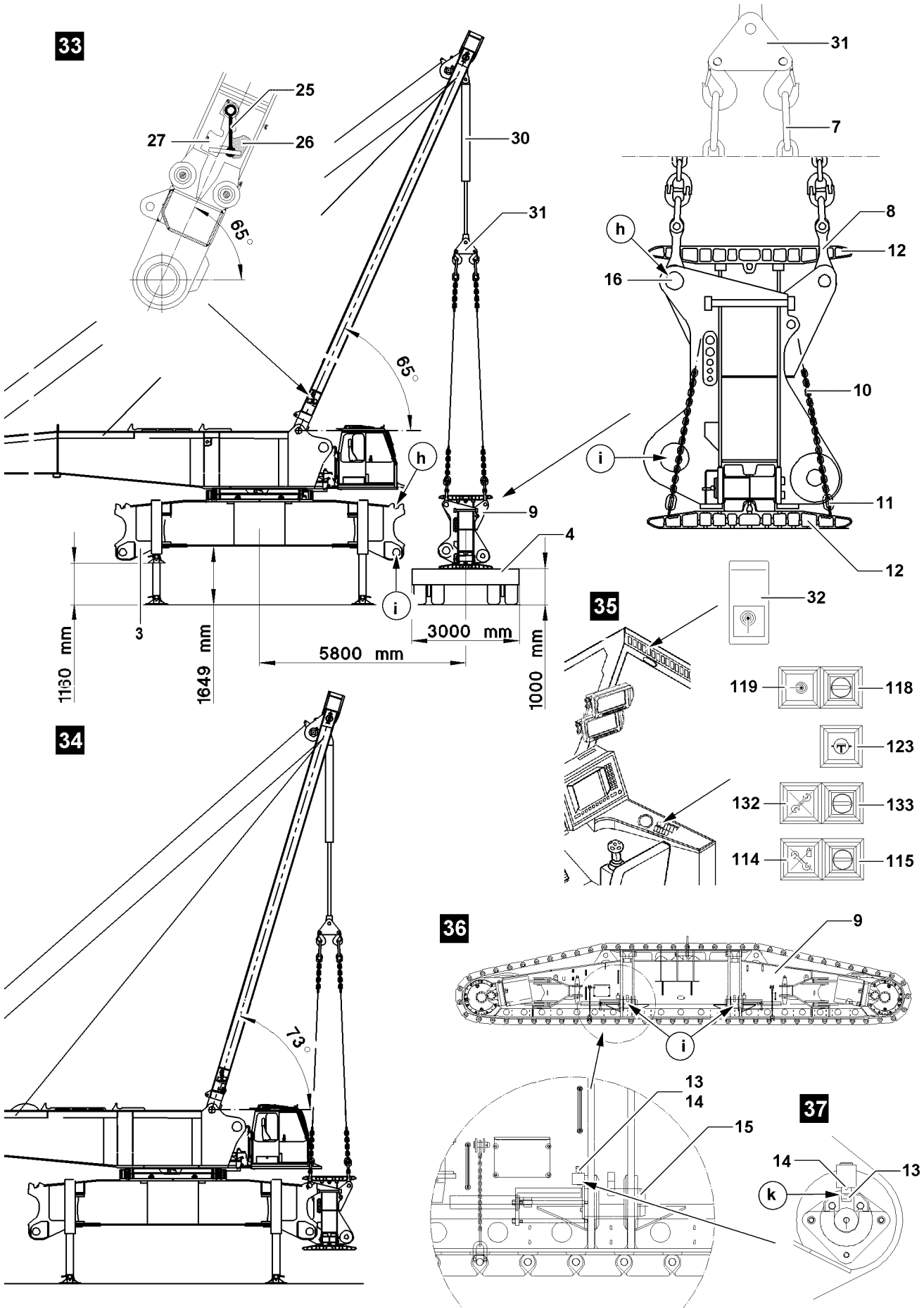


Fig.112283

LWE/LR 1750-000/12812-15-02/en

Positioning the crawler carrier on the crawler center section



Note

- ▶ Note the marking on the crawler carrier and the crawler center section!
 - ▶ The crawler carrier and the crawler center section are marked with numbers!
-
- ▶ Pin the fastening ropes **7** on the assembly device **31** and secure.
 - ▶ Luff the SA-bracket **29** up until the assembly cylinder **30** is centered above the crawler carrier **9**.



Note

- ▶ The assembly cylinder **30** may not be moved out all the way!
-
- ▶ Move the assembly cylinder **30** out: Actuate master switch 2.
 - ▶ Pin the fastening ropes **7** on the lugs **8** and secure.
 - ▶ Move the assembly cylinder **30** in until the fastening ropes **7** are tensioned: Actuate master switch 2.



Note

- ▶ The permissible angle on the SA-bracket **29** is shown by the pendulum **25**!



DANGER

The crane can topple over!

If the angle on the SA-bracket **29** is less than 65° (pendulum **25** in red area) when lifting the crawler carrier **9**, then the crane can topple over!

Personnel can be severely injured or killed!

- ▶ The angle on the SA-bracket **29** must be at least 65°, see illustration **33**!
- ▶ Luff the SA-bracket **29** under load only in the permissible angle range: The pendulum must move in the green area **27**!
- ▶ SA-bracket **29** under load: The pendulum may not move into the red area **26**!



Note

When the reinforced crawler center section for the crane support is used:

- ▶ Make sure that the pins **16** are unpinned before installation!
 - ▶ Lift the crawler carrier **9** with the auxiliary crane to the crawler center section **3** so that points **h** and points **i** align!
 - ▶ Insert and secure the pins **16** in points **h**!
-
- ▶ Lift the crawler carrier **9** with the assembly cylinder **30** from the transport vehicle **4**: Slowly move the assembly cylinder **30** in with master switch 2.



Note

- ▶ To hook the crawler carrier on the crawler center section, the SA-bracket is approximately on 73°, see illustration **34**!
-
- ▶ Carefully luff the SA-bracket **29** up.
 - ▶ Swing the crawler carrier **9** with the SA-bracket **29** to the receptacle on the crawler center section **3**.
 - ▶ Bring the crawler carrier **9** carefully into the crawler center section **3**.
 - ▶ Lower the crawler carrier **9** onto the crawler center section **3**: Move the assembly cylinder **30** out and hang the pins **16** in on points **h**.

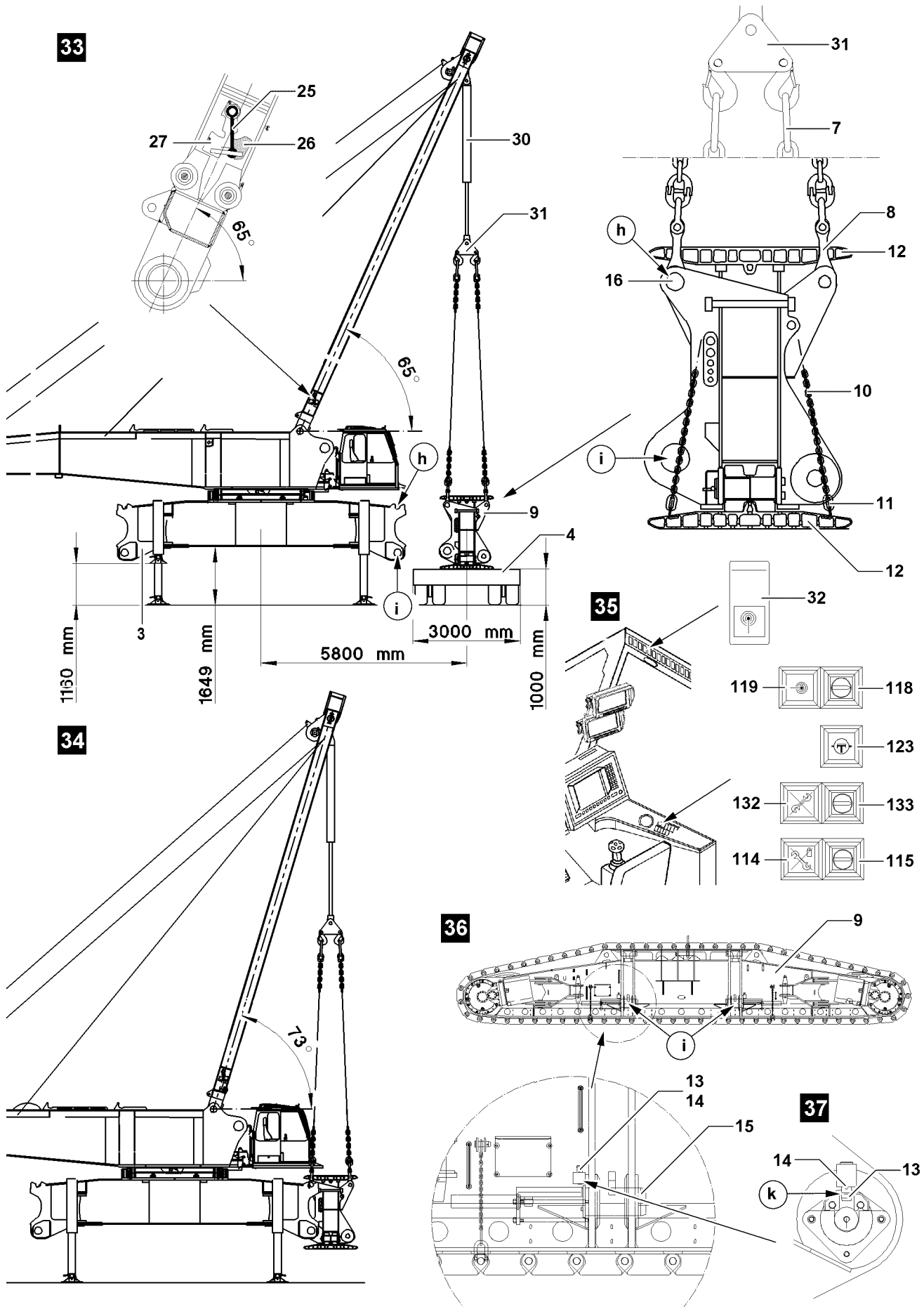


Fig.112283

LWE/LR 1750-000/12812-15-02/en

Pinning the crawler carrier

When connecting hydraulic lines with quick-release couplings, make sure that the coupling procedure is carried out correctly.



DANGER

Loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
-
- ▶ Release the pressure in the hydraulic system before connecting. Turn the engine off and wait for short time.
 - ▶ Connect the coupling components (sleeve and connector) and screw together with the hand-tightened nut.
 - ▶ Tighten the hydraulic coupling by hand. Rotate the hand-tightened nut until it reaches a tangible, fixed stop position.
 - ▶ Establish the hydraulic connections to the crawler carriers.
 - ▶ Establish the electrical connections to the crawler carriers, see separate electrical wiring diagram.

To pin the crawler carriers, the LICCON computer system must be turned on.

The pin pulling cylinders are actuated with the radio remote control.



Note

- ▶ For operation of the radio remote control, see Crane operating instructions, chapter 6.08!

- ▶ Start the crane engine, see Crane operating instructions, chapter 4.03.
- ▶ The assembly key button **133** and key button „Crawler assembly“ **115** are actuated.

Result:

- The indicator light „Assembly“ **132** lights up.
- The indicator light „Crawler assembly“ **114** lights up.
- ▶ Set the operating mode on the LICCON computer system, which is to be set up.
- ▶ Change the pressure supply to the auxiliary users: Actuate the switch **123**.

The radio remote control is activated either on the roof console or on the instrument panel, depending on the configuration of the crane.

- ▶ Activate the radio remote control: Actuate the key button **118** or the switch **32**.

See illustration **36**

- ▶ Make sure that both pins **13** on the crawler carrier are secured in position „top“ with spring retainer **14**.
- ▶ Insert the pins **15** on the pin points **i**: Actuate the remote control.

37 Illustration

When the pins **15** are completely pinned:

- ▶ Secure the pins **15**: Unpin the retaining pin **13** and pin on position **k**.
- ▶ Secure the retaining pins **13** with spring retainers **14**.
- ▶ Release the fastening ropes **7** from the lugs **8** on the crawler carrier **9**.

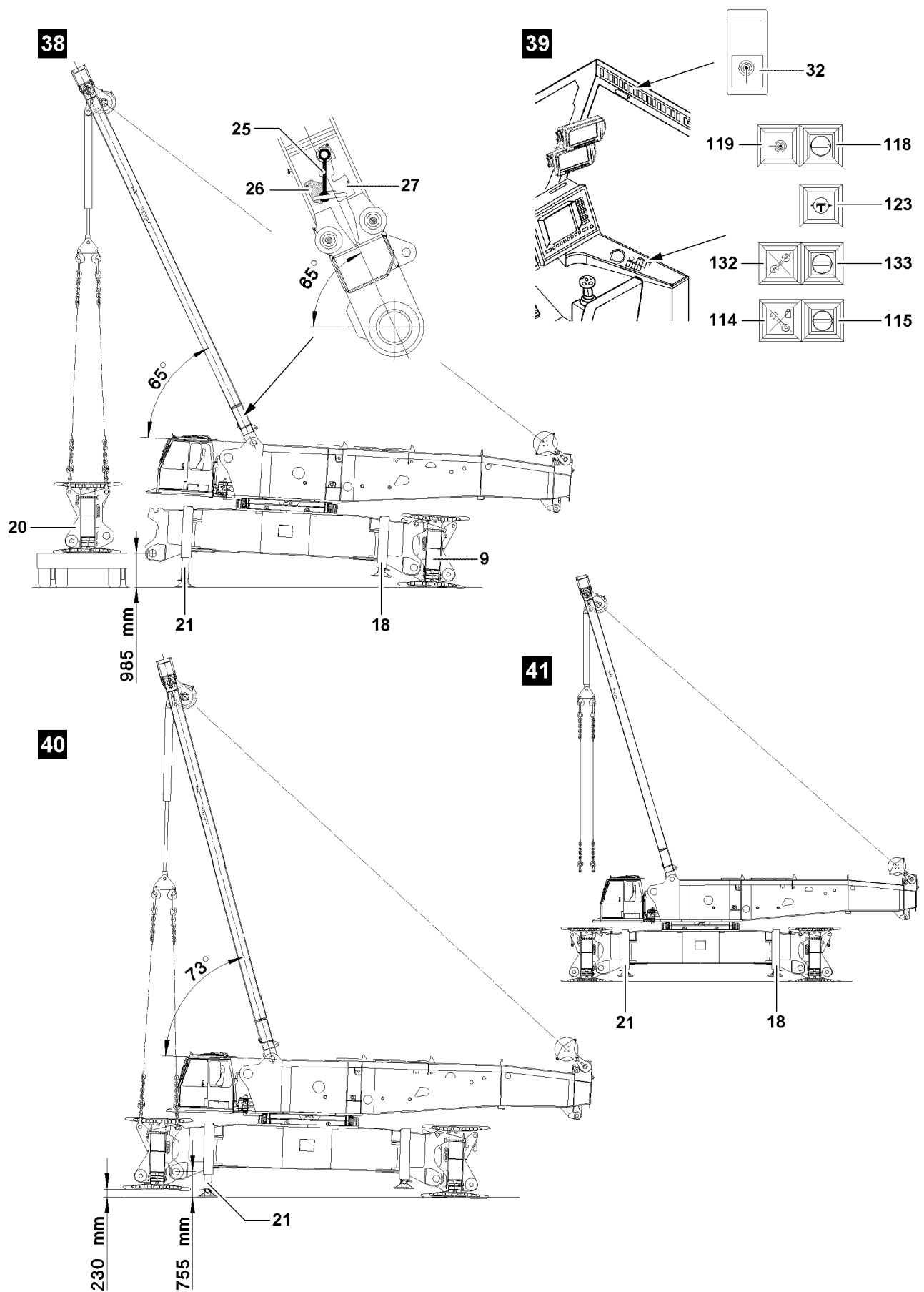


Fig.112284

LWE/LR 1750-000/12812-15-02/en

5.1.2 Setting the first crawler carrier on the ground



WARNING

The crane can tip over!

If the support cylinders are moved out / in unevenly, the crane can tip over. Personnel can be severely injured or killed!

- ▶ When moving the support cylinders in / out, pay attention to the horizontal alignment, check visually!
- ▶ Retract the support cylinder evenly until the distance between the ground and the crawler center section is 985 mm.
- ▶ Set the first crawler carrier **9** on the ground: Move the support cylinders **18** in all the way.



WARNING

Danger of tipping over!

Before turning the turntable, if the first assembled crawler carrier is not positioned on the ground, there is a danger of tipping over!

Personnel can be severely injured or killed!

- ▶ Before turning the turntable: Set the first assembled crawler carrier on the ground!
- ▶ The hydraulic support cylinder **18** on the crawler side must be moved in all the way!
- ▶ Turn the turntable by 180°.

5.1.3 Assembling the second crawler carrier

Make sure that the following prerequisites are met, see illustration **38**:

- The first installed crawler carrier **9** is standing on the ground.
- The hydraulic support cylinders **18** on the crawler side are fully moved in.
- The distance between the ground and the crawler center section is 985 mm, see illustration **8**.
- The turntable is turned by 180°.



Note

- ▶ Procedure for assembly of the second crawler carrier **20**, see section „Assembling the first crawler carrier“!

When the second crawler carrier **20** is installed:

- ▶ Set the second crawler carrier on the ground: Move the support cylinder **21** in evenly.
- ▶ Remove the chains **10** on the track pads **12** and secure on the crawler carriers, see illustration **10**.
- ▶ Move the support cylinders **21** in all the way.



Note

- ▶ The assembly support must remain swung out!
- ▶ Unpin the attachment ropes **7** on the lugs **8** and on the assembly device **6**.

NOTICE

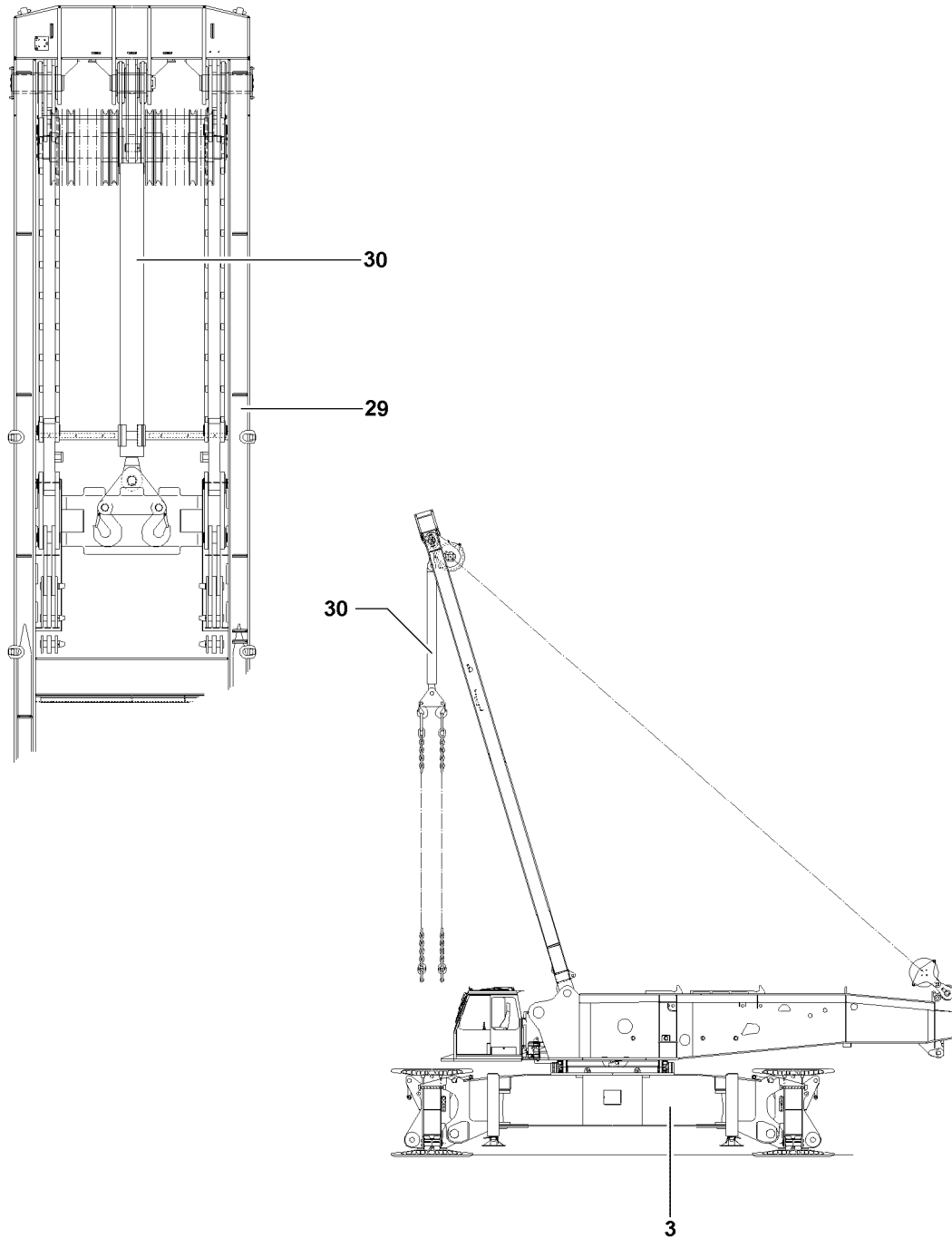
Damage to the lugs **8**!

- ▶ After removing the fastening equipment, the lugs **8** must be swung down!
- ▶ Swing the lugs **8** down.
- ▶ Move the assembly cylinder **30** in completely.
- ▶ Turn the pressure change over for the auxiliary users off: Actuate the switch **123**.
- ▶ Deactivate the radio remote control: Actuate the key button **118** or the switch **32**.

Result:

- The crawler carriers are assembled.

42



43

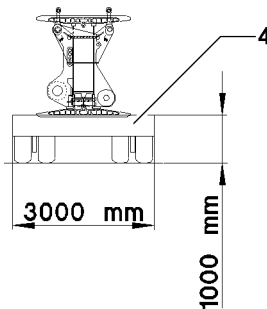


Fig.108011

LWE/LR 1750-000/12812-15-02/en

5.2 Disassembling the crawler carrier with SA-bracket



DANGER

The crane can topple over!

If the central ballast or the turntable ballast is installed, the crane can topple over when removing the crawler carrier!

Personnel can be severely injured or killed!

- ▶ For removal, no central ballast or turntable ballast may be installed!



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited!



WARNING

Danger of crushing!

While assembling / disassembling crane components, body limbs can be crushed or severed by the swing movement of components!

- ▶ Make sure that the components do not swing back and forth during assembly / disassembly!



Note

- ▶ The weight of the crawler carrier, depending on the equipment configuration, is a maximum of 55 t, see Crane operating instructions, chapter 1.03!
- ▶ The assembly support on the crawler center section is connected to the hydraulic of the turntable!



Note

- ▶ The assembly cylinder **30** is laying unsecured on the SA-bracket **29**!
- ▶ The assembly cylinder **30** has a hoist of 2500 mm !



Note

- ▶ For function assignment of hand levers to move the support cylinders in / out, see section „Lifting the crawler center section“!

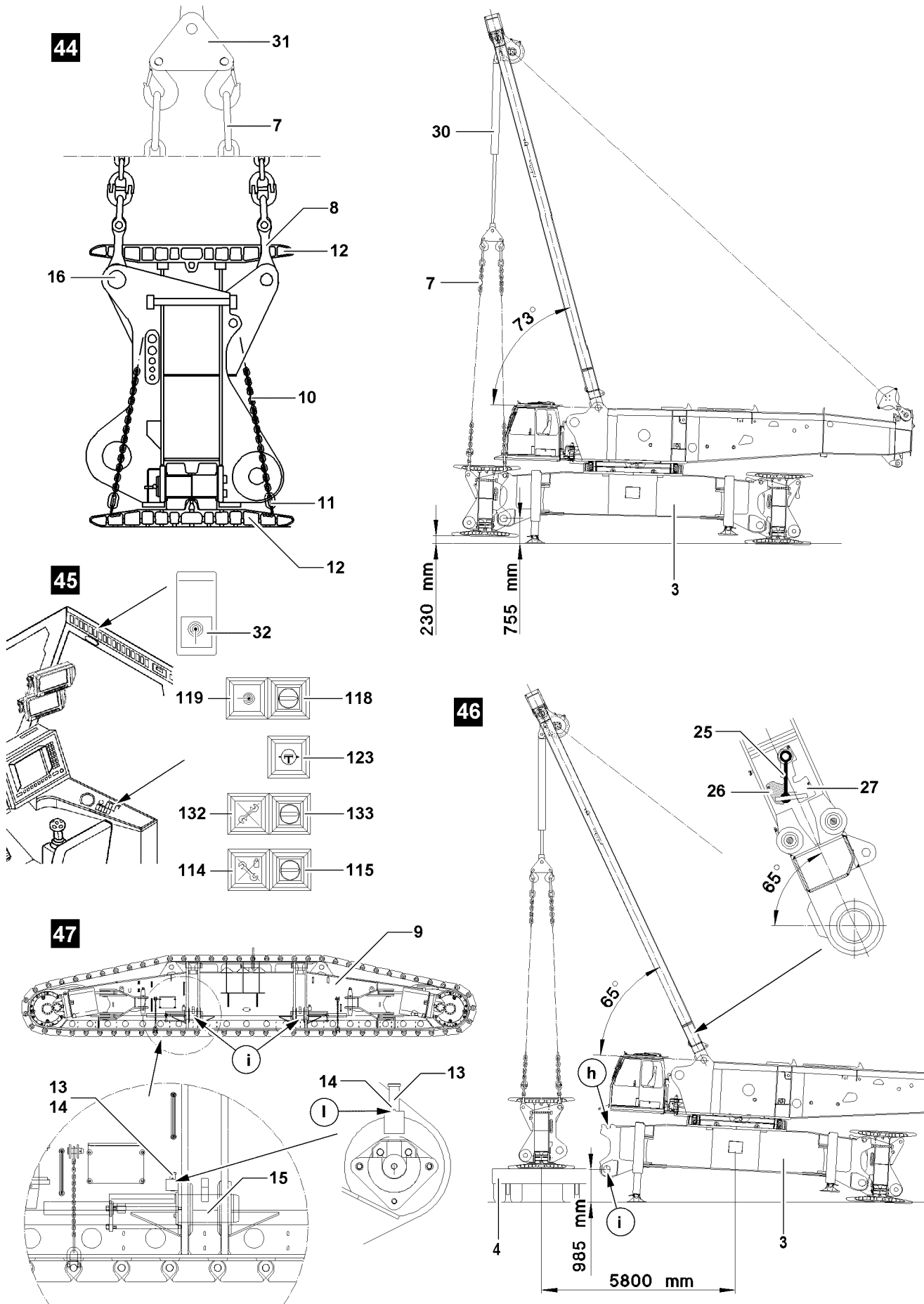


Fig.112285

LWE/LR 1750-000/12812-15-02/en

Make sure that the following prerequisites are met:

- The crane must be aligned horizontally.
- The placement location must be level and have adequate load-bearing capacity.
- The maximum height of the transport vehicle **4** may not exceed 1000 mm and a maximum width of 3000 mm, see illustration **44**.
- Suitable material must be available for the supporting base of the assembly supports.
- The support plates are installed.

5.2.1 Disassembling the first crawler carrier

See illustration **45**

Make sure that the following prerequisites are met:

- The crane engine is running.
- The assembly key button **133** is actuated: The indicator light „Assembly“ **132** lights up.
- The key button „Crawler assembly“ **115** is actuated: The indicator light „Crawler assembly“ **114** lights up.

Preparing the crawler carrier for disassembly

NOTICE

Damage to the crawler carrier!

If the track pads are not secured with the transport retainers to prevent them from sagging, the crawler carrier can be severely damaged!

- ▶ Secure the track pads **12** before assembly of the crawler carrier **9** with the chains **10** to prevent them from sagging!
- ▶ Hang the chains **10** with the bars **11** on the track pads **12**, see illustration **44**.



Note

- ▶ The lugs **8** must be swung between the track pads **12**, „upward“!
- ▶ Swing the lugs **8** „up“.
- ▶ Pin the fastening ropes **7** on the assembly device **31** and secure.
- ▶ Luff the SA-bracket **29** up until the assembly cylinder **30** is centered above the crawler carrier **9**.
- ▶ Move the assembly cylinder **30** out: Actuate master switch 2.
- ▶ Pin the fastening ropes **7** on the lugs **8** and secure.
- ▶ Make sure that the pins **15** are completely unpinned on both sides on the crawler carrier.

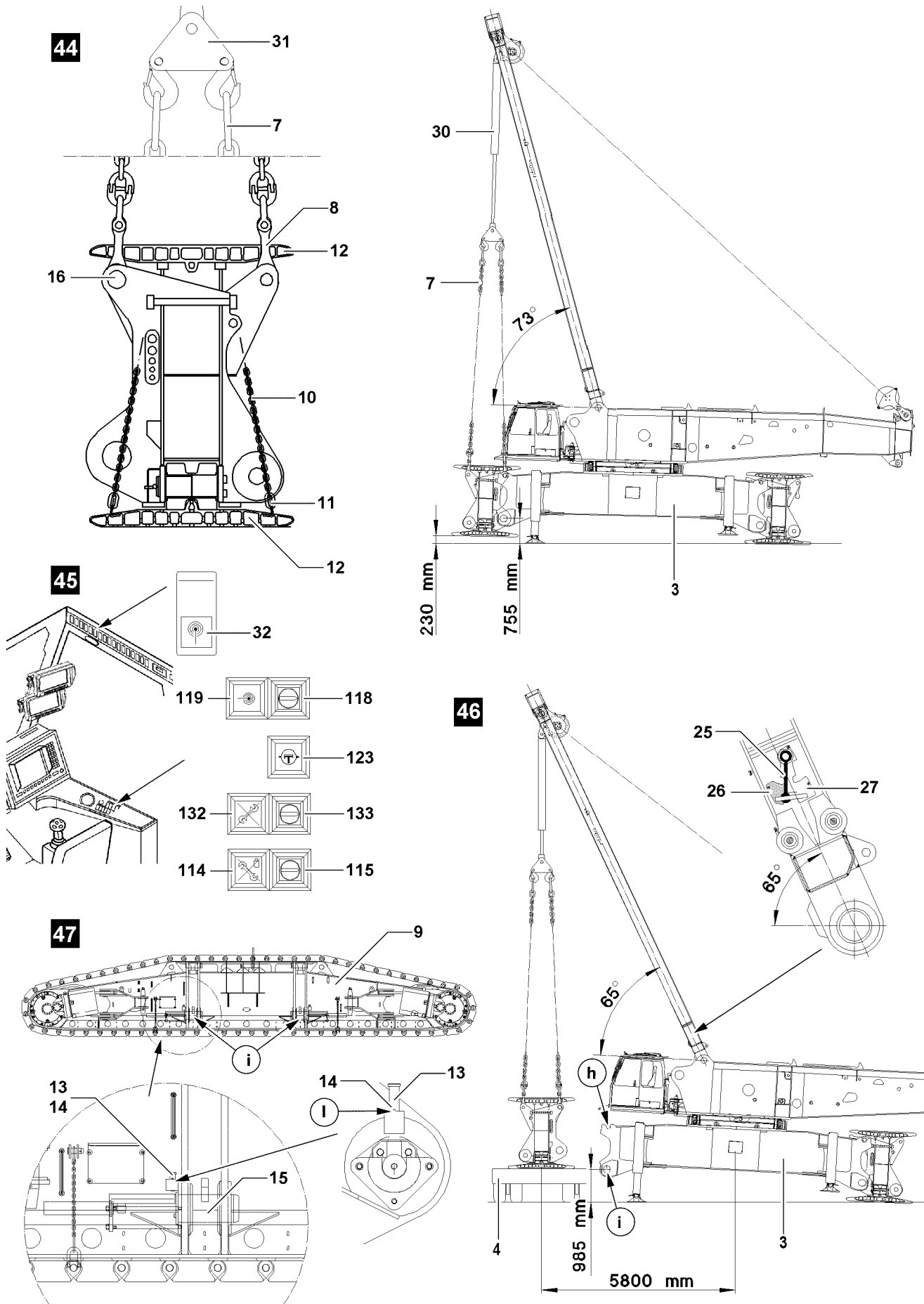


Fig.112285

LWE/LR 1750-000/12812-15-02/en

Unpinning the crawler carrier



WARNING

Risk of accidents due to improper support!

If the assembly support is not properly supported from below, it can sink into the ground and severely injure personnel!

- ▶ The supporting base must take on the weight of the crawler center section safely!
- ▶ The supporting base must be made large enough for the ground conditions, with solid materials, such as wood, steel or concrete slabs, see Crane operating instructions, chapter 2.04!

- ▶ Lift the first crawler carrier off the ground: Move the support cylinder **21** out until the distance between the ground and the underside of the crawler carrier is 230 mm, see illustration **44**.

To unpin the crawler carriers, the LICCON computer system must be turned on.

The pin pulling cylinders are actuated with the radio remote control.



Note

- ▶ For operation of the radio remote control, see Crane operating instructions, chapter 6.08!

- ▶ Change the pressure supply to the auxiliary users: Actuate the switch **123**.

The radio remote control is activated either on the roof console or on the instrument panel, depending on the configuration of the crane.

- ▶ Activate the radio remote control: Actuate the key button **118** or the switch **32**.

NOTICE

Pin is not released!

If the pin **15** is secured with the retaining pin **13**, when unpinning, the pin pulling device can be damaged!

- ▶ Secure the retaining pin **13** before unpinning in „up“ position with spring retainer **14** on point **I**, see illustration **47**!

- ▶ Release the pin **15**: Unpin the retaining pin **13** on the crawler carrier and secure in „up“ position with spring retainer **14** on point **I**.

- ▶ Unpin the pins **15** on the pin points **i**: Actuate the remote control.

When releasing hydraulic lines with quick-release couplings, make sure that the uncoupling procedure is carried out correctly.



DANGER

Loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!

- ▶ Release the pressure in the hydraulic system before releasing. Turn the engine off and wait for short time.

- ▶ Install the coupling components (sleeve and connector) with the hand-tightened nut.

- ▶ Disconnect the hydraulic connections to the crawler carriers.

- ▶ Properly store the hydraulic hoses on the crawler carrier.

- ▶ Disconnect the electrical connections to the crawler carriers, see separate electrical wiring diagram.

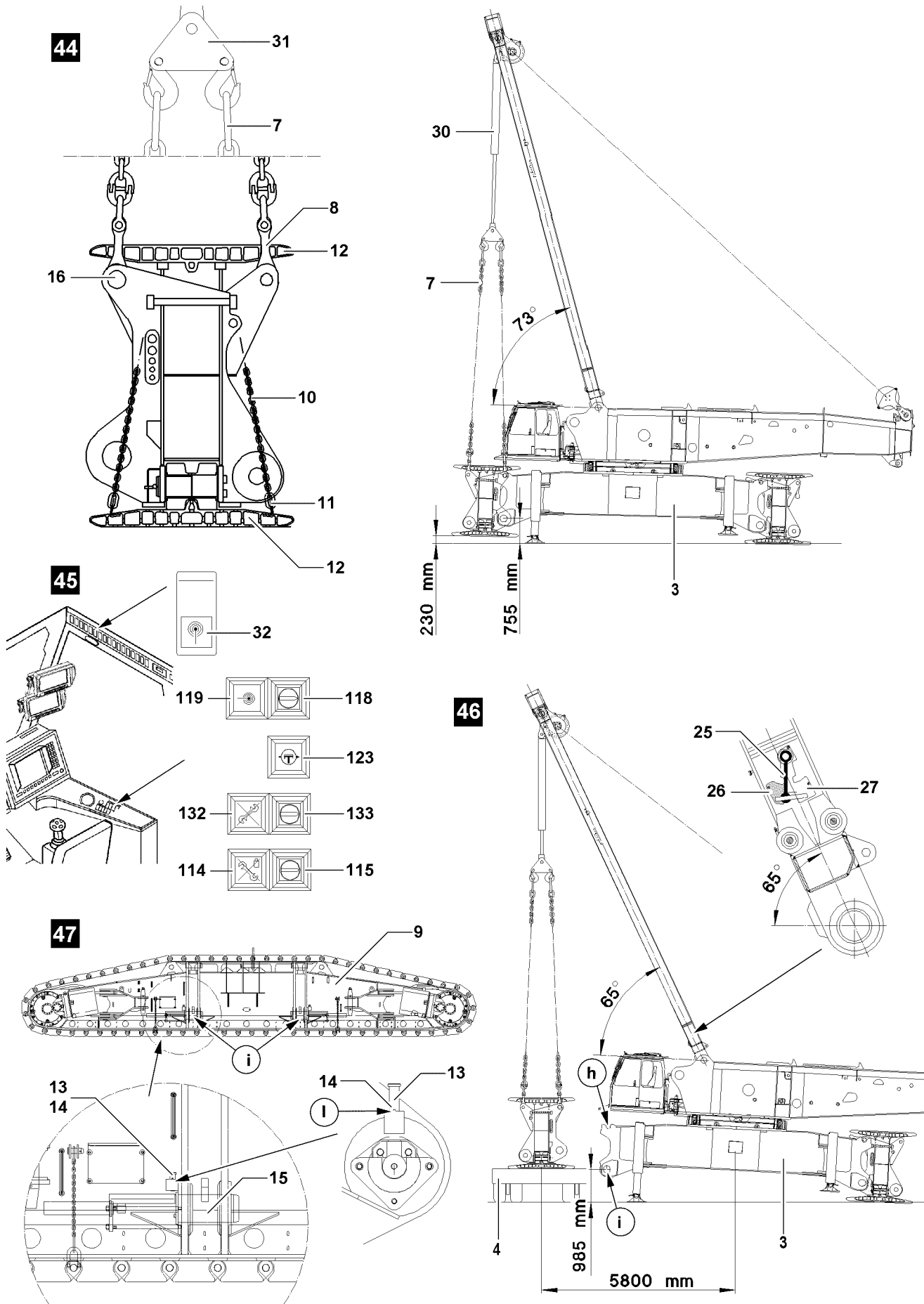


Fig.112285

LWE/LR 1750-000/12812-15-02/en

Disassembling the crawler carrier from the crawler center section

Make sure that the following prerequisites are met:

- The crane engine is running.
- The assembly key button **133** is actuated: The indicator light „Assembly“ **132** lights up.
- The key button „Crawler assembly“ **115** is actuated: The indicator light „Crawler assembly“ **114** lights up.
- The pressure supply is changed to the auxiliary users: The switch **123** is actuated.
- ▶ Make sure that the pins **15** are completely uninned on both sides on the crawler carrier, see illustration **47**.
- ▶ Move the assembly cylinder **30** in until the fastening ropes **7** are tensioned: Actuate master switch **2**.



Note

- ▶ The permissible angle on the SA-bracket **29** is shown by the pendulum **25**!
- ▶ To remove the crawler carrier from the crawler center section, the SA-bracket is approximately on 73°, see illustration **44**!



Note

When the reinforced crawler center section for the crane support is used:

- ▶ Release pins **16** in points **h** and unpin!
- ▶ Lift the crawler carrier **9** with the auxiliary crane from the crawler center section **3**: Slowly move the assembly cylinder **30** in with master switch **2**!
- ▶ Insert and secure the pins **16** in points **h**!
- ▶ Lift the crawler carrier **9** on points **h** with the assembly cylinder **30** from the crawler center section **4**: Slowly move the assembly cylinder **30** in with master switch **2**.



DANGER

The crane can topple over!

If the angle on the SA-bracket **29** is less than 65° (pendulum **25** in red area) when lifting the crawler carrier **9**, then the crane can topple over! Personnel can be severely injured or killed!

- ▶ The maximum permissible distance of 5800 mm between the crawler carrier and the center of the turntable may not be exceeded, see illustration **46**!
- ▶ The angle on the SA-bracket **29** must be at least 65°, see illustration **46**!
- ▶ Luff the SA-bracket **29** under load only in the permissible angle range: The pendulum must move in the green area **27**!
- ▶ SA-bracket **29** under load: The pendulum may not move into the red area **26**!
- ▶ Carefully luff the SA-bracket **29** down.
- ▶ Set the crawler carrier **9** on the transport vehicle **4**.
- ▶ Remove the fastening ropes **7** from the lugs **8** on the crawler carrier.

NOTICE

Damage to the lugs **8**!

- ▶ After removing the fastening equipment, the lugs **8** must be swung down!
- ▶ Swing the lugs **8** down.

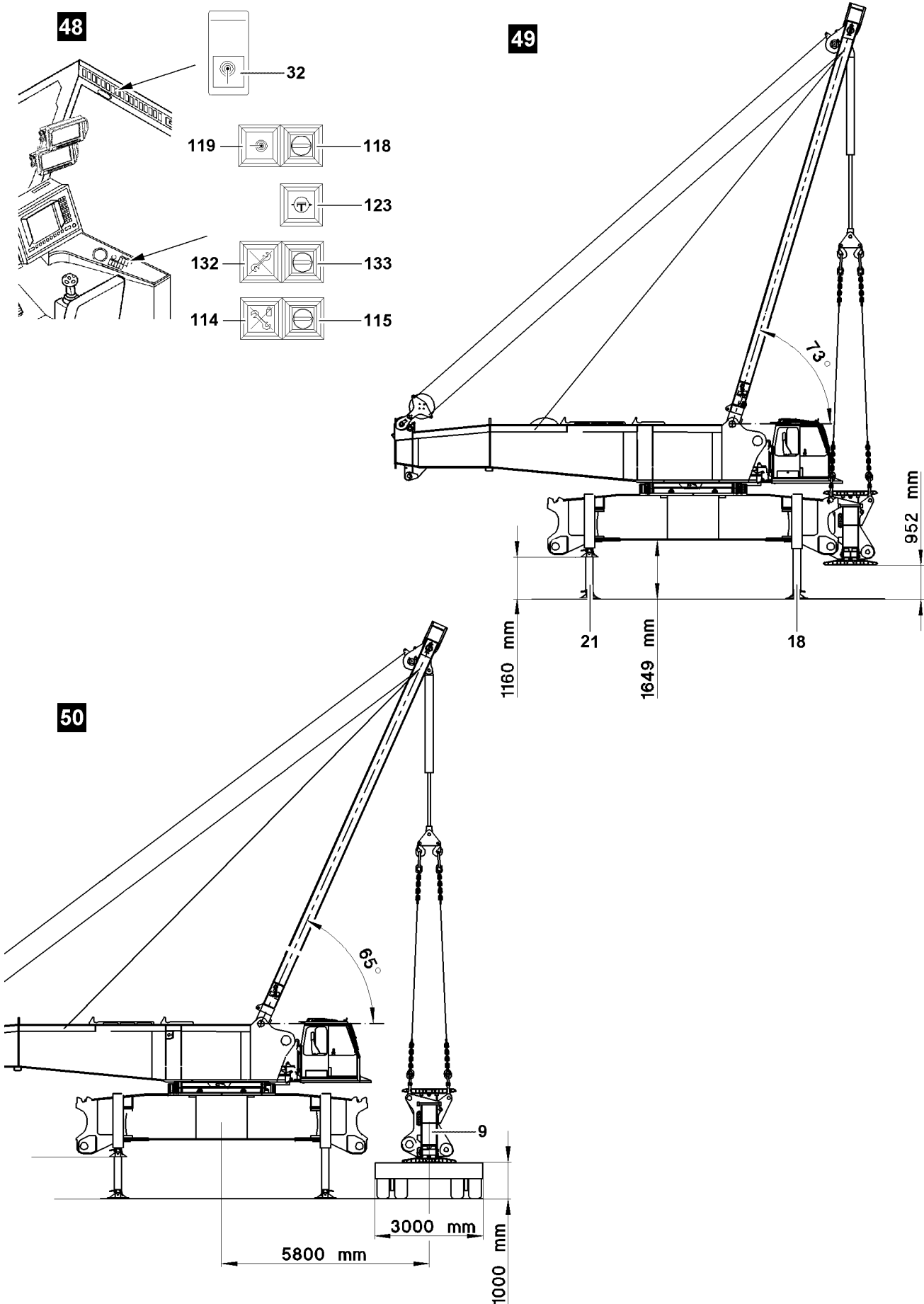


Fig.112286

LWE/LR 1750-000/12812-15-02/en

5.3 Extending the assembly supports

- ▶ Move the support cylinder **18** out evenly until the crane is in horizontal position.



WARNING

The crane can tip over!

If the support cylinders are moved out / in unevenly, the crane can tip over!

Personnel can be severely injured or killed!

- ▶ When moving the support cylinders in / out, pay attention to the horizontal alignment, check visually!

- ▶ Move all support cylinders out evenly to at least 1160 mm , see illustration **49**.
- ▶ Turn the turntable by 180°.

5.4 Disassembling the second crawler carrier

Make sure that the following prerequisites are met:

- The first crawler carrier has been removed.
- The hydraulic support cylinders are moved out to at least 1160 mm.
- The turntable is turned by 180°.



Note

- ▶ For procedure for disassembly of the second crawler carrier **9**, see section „Disassemble the first crawler carrier“!

When the second crawler carrier is disassembled:

- ▶ Remove the turntable, see section „Disassembling the turntable“.

5.5 Disassembling the turntable

When the assembly supports are extended and the crawler center section is horizontally aligned, then the turntable can be removed.



Note

- ▶ For assembly / disassembly of the turntable, see Crane operating instructions, chapter 3.02!

When the turntable is removed:

- ▶ Disassemble assembly supports, see section „Disassembling the assembly supports“.

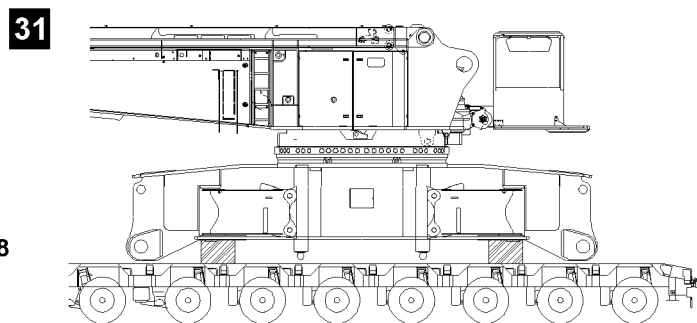
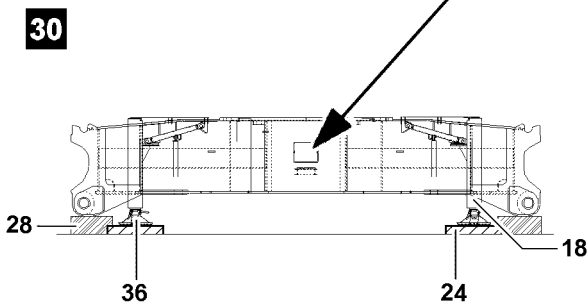
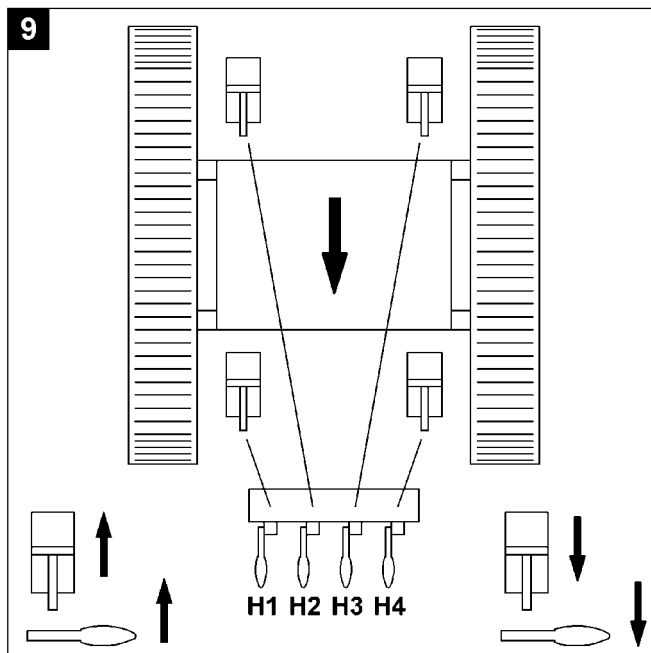
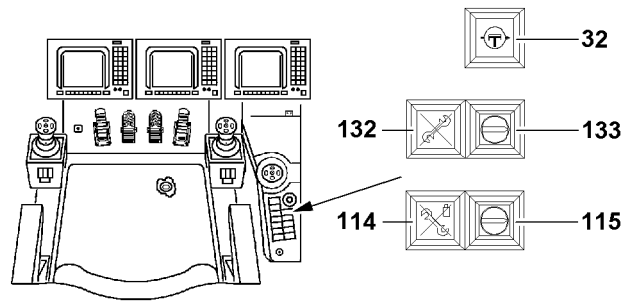
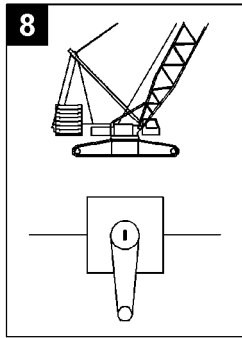
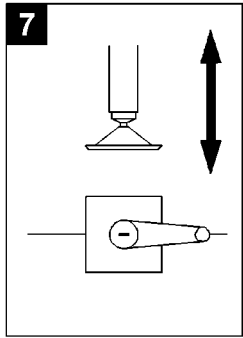
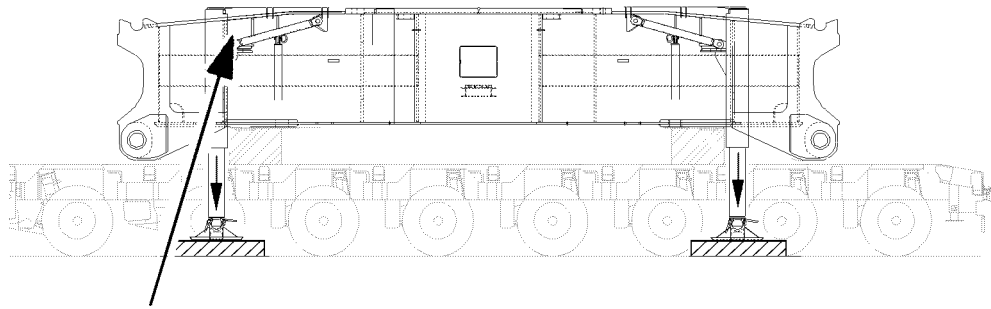


Fig.112287

6 Disassembling the crawler center section

The following initial situations are distinguished:

- The center section is set down on the ground for disassembly, illustration 30.
- The center section is set on a semi-trailer, illustration 31.

6.1 Preparing for operation assembly supports

6.1.1 Operation assembly supports from crane cab

- ▶ Start the crane engine, see Crane operating instructions, chapter 4.03.
- ▶ The assembly key button **133** and key button „Crawler assembly“ **115** are actuated.

Result:

- The indicator light „Assembly“ **132** lights up.
- The indicator light „Crawler assembly“ **114** lights up.
- ▶ Set the operating mode on the LICCON computer system, which is to be set up.
- ▶ Turn the switch **123** on to change the pressure supply to the auxiliary users.

6.1.2 Operation assembly supports with pin pulling device

- ▶ Establish the hydraulic connections from the hydraulic aggregate of the pin pulling device to the crawler center section **3**, see Crane operating instructions, chapter 5.30.

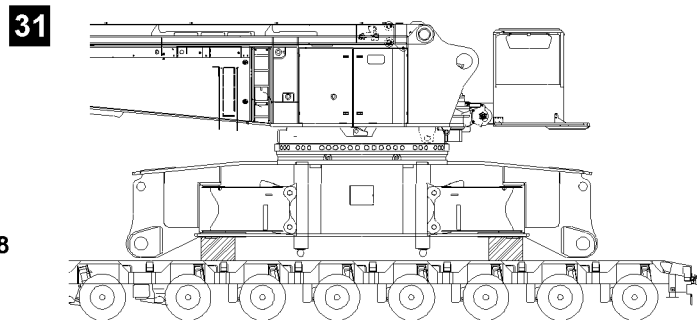
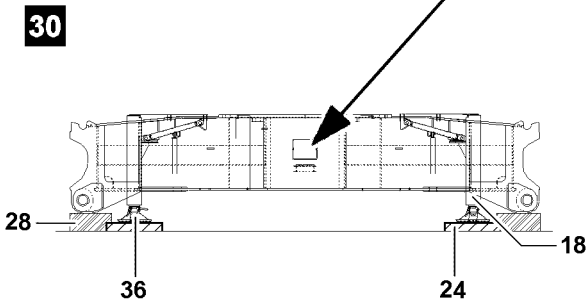
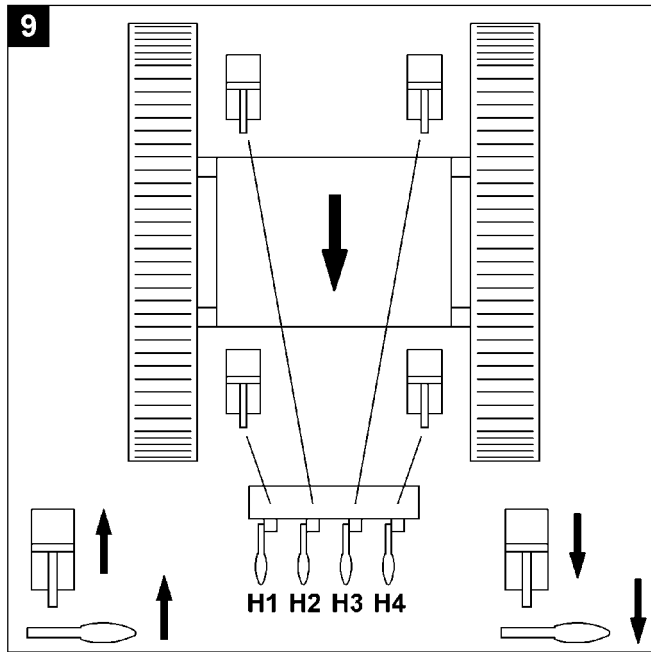
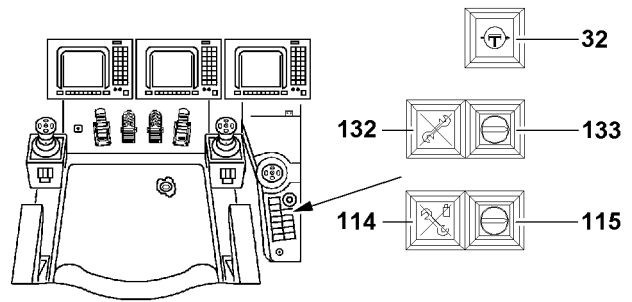
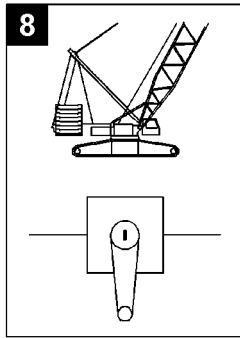
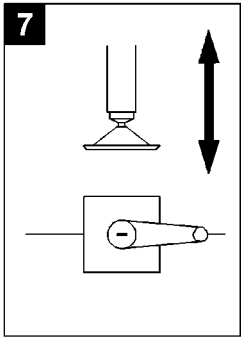
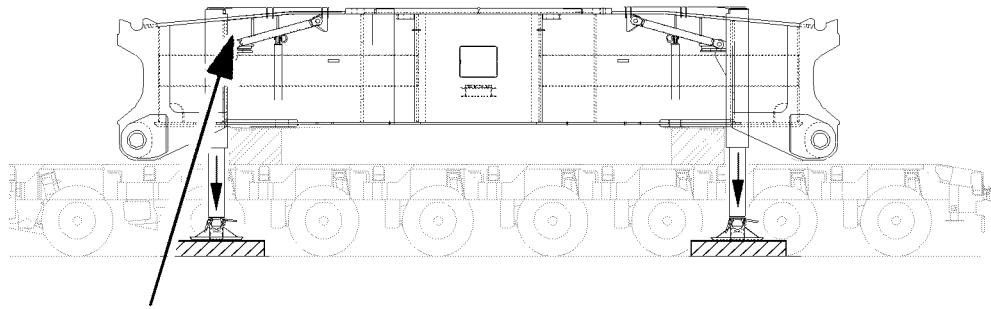


Fig.112287

6.2 Preparing disassembly of the crawler center section on the ground

6.2.1 Supporting the crawler center section



WARNING

Risk of accidents due to improper support!

If the crawler center section is not properly supported from below, it can sink into the ground and severely injure personnel!

- ▶ The supporting base must be able to safely take on the weight of the crawler center section, the turntable and the crawler carrier!
- ▶ The supporting base must be made large enough for the ground conditions, with solid materials, such as wood, steel or concrete slabs, see Crane operating instructions, chapter 2.04!

Make sure that the following prerequisite is met:

- Suitable material must be available for the supporting base of the crawler center section.



Note

- ▶ The supporting base **28** must be higher than that the support plates **14** with supporting base **17** for the vertically positioned hydraulic cylinders **18**!
- ▶ Support the crawler center section **3** with hardwood timbers (or other suitable materials) from below!

6.3 Preparing disassembly of the crawler center section on the transport vehicle



Note

- ▶ The placement location of the crawler center section must allow for the transport vehicle to be removed after lifting the crawler center section!

Make sure that the following prerequisites are met:

- The support cylinders are extended to the point where the transport vehicle can be driven under the crawler center section.

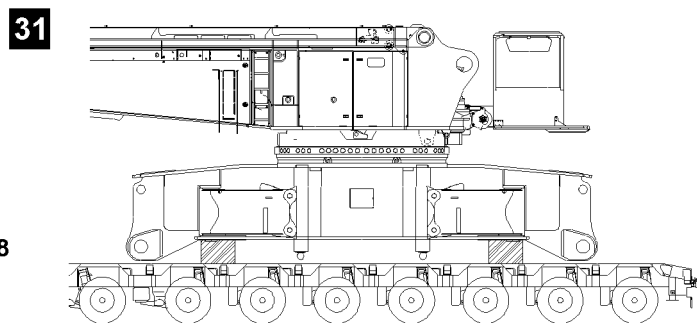
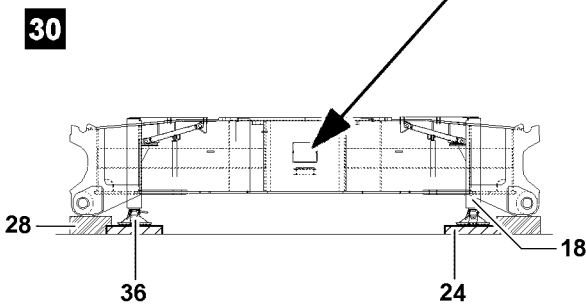
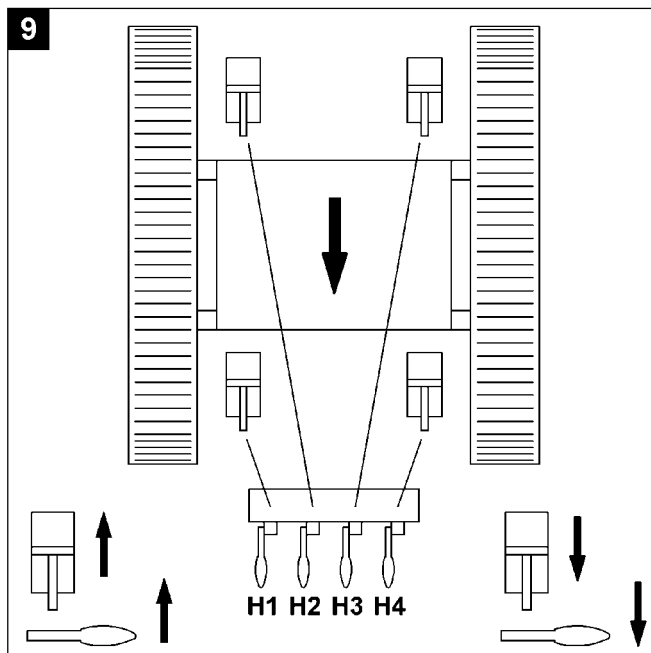
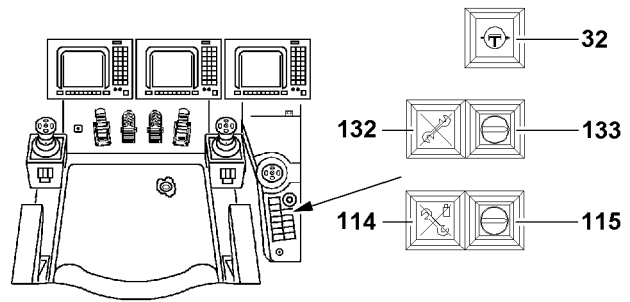
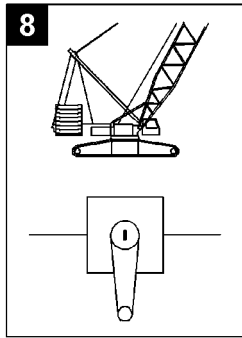
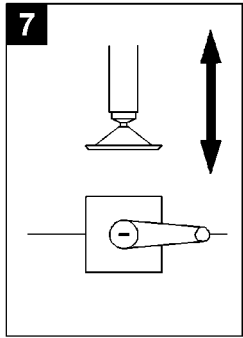
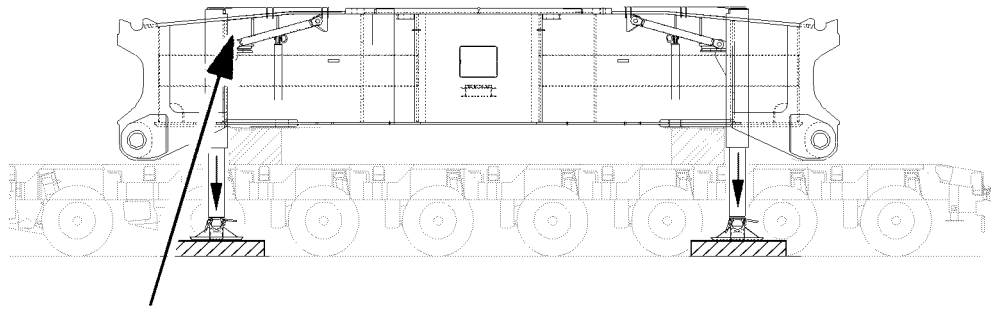


Fig.112287

LWE/LR 1750-000/12812-15-02/en

6.4 Lowering the crawler center section

The crawler center section is lowered for the following reasons:

- To set the crawler center section on a transport vehicle.
- To set the crawler center section on the ground.
- For disassembly of the assembly supports.
- For disassembly of the crawler carriers without turntable.

Make sure that the following prerequisites are met:

- The turntable is installed: The crane engine is running.
- The turntable is not installed: The pin pulling device is connected and turned on.
- The crawler carriers are removed.
- The ball valve is set to „Assembly support“, see illustration 7.



WARNING

Risk of accidents due to improper support!

If the support plates are not properly supported from below, they can sink into the ground and severely injure personnel!

- ▶ The supporting base must be able to safely take on the weight of the crawler center section **3**, the turntable and the crawler carrier!
- ▶ The supporting base must be made large enough for the ground conditions, with solid materials, such as wood, steel or concrete slabs, see Crane operating instructions, chapter 2.04!

Ball valve positions	
Illustration 7	Assembly support
Illustration 8	Crane operation / crawler carrier installation with SA-bracket

Function assignment of manual levers for the support cylinders	
H1	Manual lever for support cylinder, right front
H2	Manual lever for support cylinder, right rear
H3	Manual lever for support cylinder, left rear
H4	Manual lever for support cylinder, left front



WARNING

Risk of tipping the crawler center section!

If the hydraulic cylinders **18** are moved in unevenly, the crawler center section can tip over!

Personnel can be severely injured!

- ▶ When lowering the crawler center section, pay attention to the horizontal alignment, check visually!

- ▶ Actuate the hand lever **H1**, hand lever **H2**, hand lever **H3** and hand lever **H4**.

Result:

- The four support cylinders **18** move in.
- ▶ Move the support cylinders **18** in with the support plates **36** until the crawler center section is laying on the ground or on the transport vehicle.
- ▶ Move the support cylinders **18** in all the way.
- ▶ Actuate the ball valve in position „Crane operation / crawler carrier installation“, see illustration **8**.

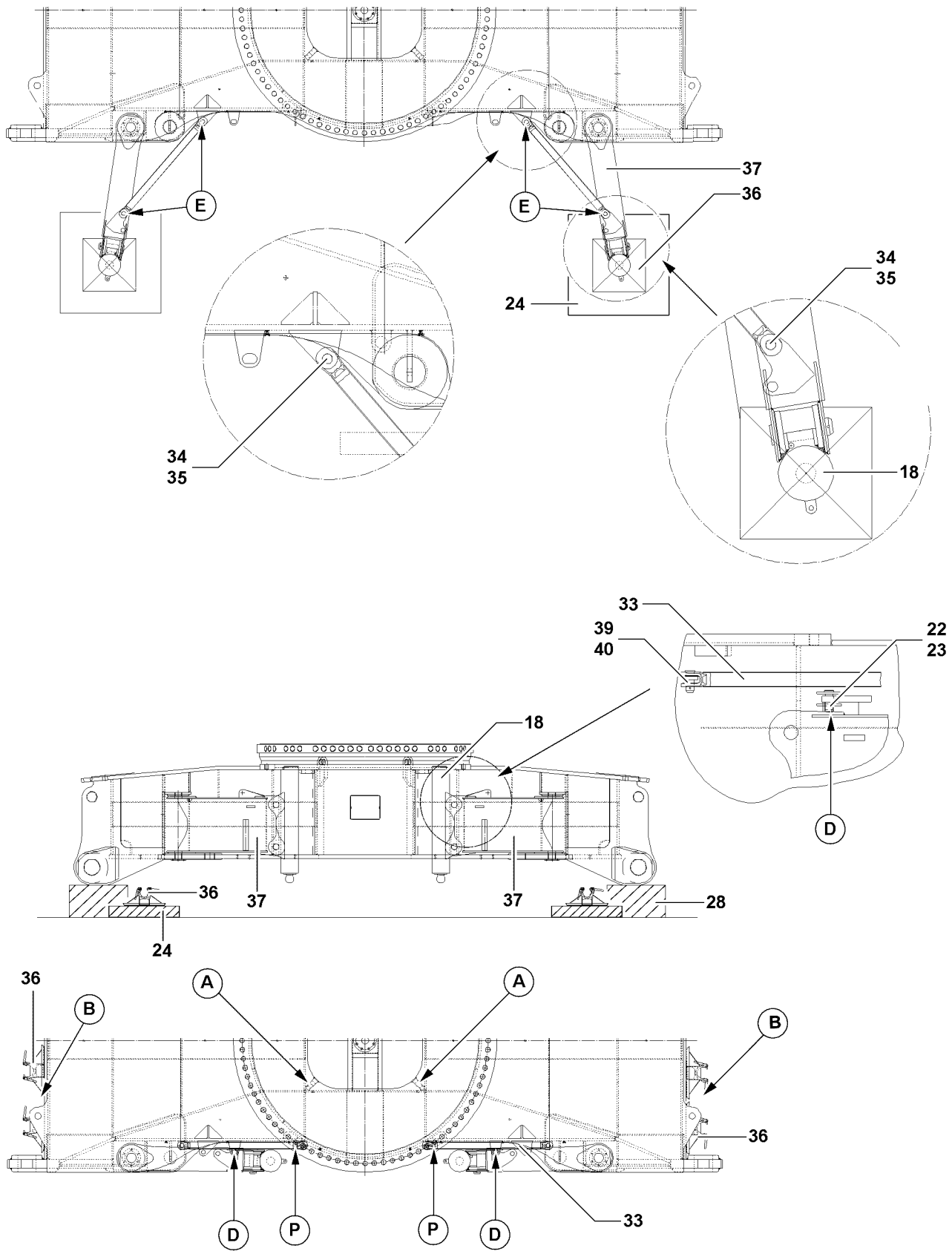


Fig.108007

LWE/LR 1750-000/12812-15-02/en

6.5 Disassembling the assembly supports

The unlocking and swinging in procedure of the assembly support is the same for all four assembly supports and is therefore described only once.

- ▶ Attach the support plates **36** in the transport retainers **B**.
- ▶ Unpin the brace **33** on the crawler center section **3** and on the support beam **37**: On points **E** remove the spring retainers **35** and unpin the pins **34**.
- ▶ Attach the brace **33** in the transport position **P**: Insert the pins **40** on both sides and secure with spring retainers **39**.
- ▶ Swing the support beam **37** in.
- ▶ Pin the transport retainer support beam: Insert the pin **23** and secure with spring retainer **22**, point **D**.

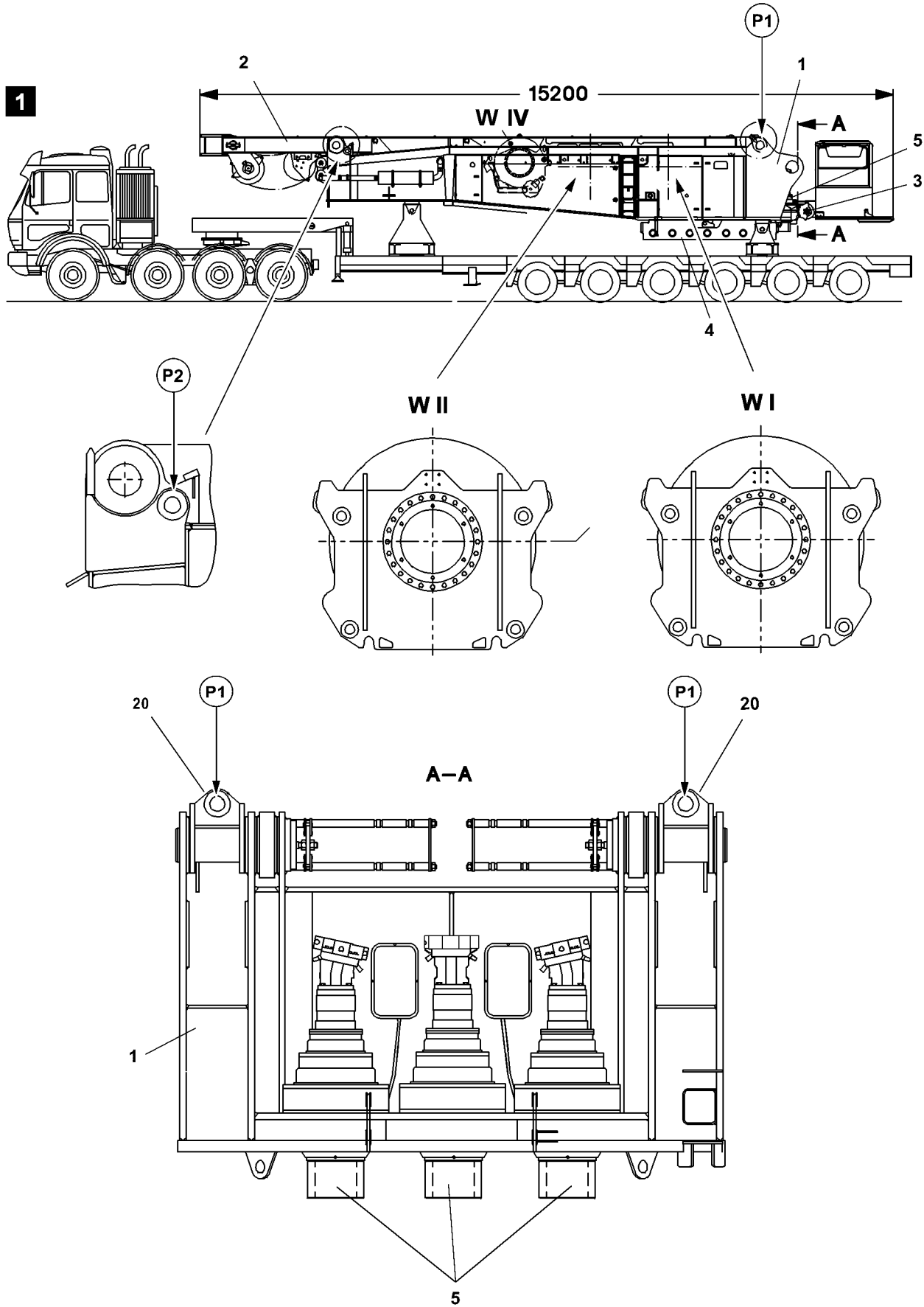


Fig.110383

LWE/LR 1750-000/12812-15-02/en

1 Transport weights and fastening points on the turntable

1.1 Transport weights turntable

Installed are:

- Winch 4 **W IV** including rope
- SA-frame including pulley set **2**
- Assembly winch **3** including rope
- Upper section of the roller ring connection with Quick Connection **4**
- 1 to 3 slewing gears **5** depending on the equipment (slewing gear 2 or slewing gear 2 as option)

Turntable	Winch 1 including rope 8.7 t	Winch 2 including rope 8.7 t
Weight: 56.2 t	—	—
Weight: 64.9 t	—	X
Weight: 73.6 t	X	X

1.2 Fastening points on the turntable



Note

► For fastening points, see opposite illustration, points **P1** and points **P2!**

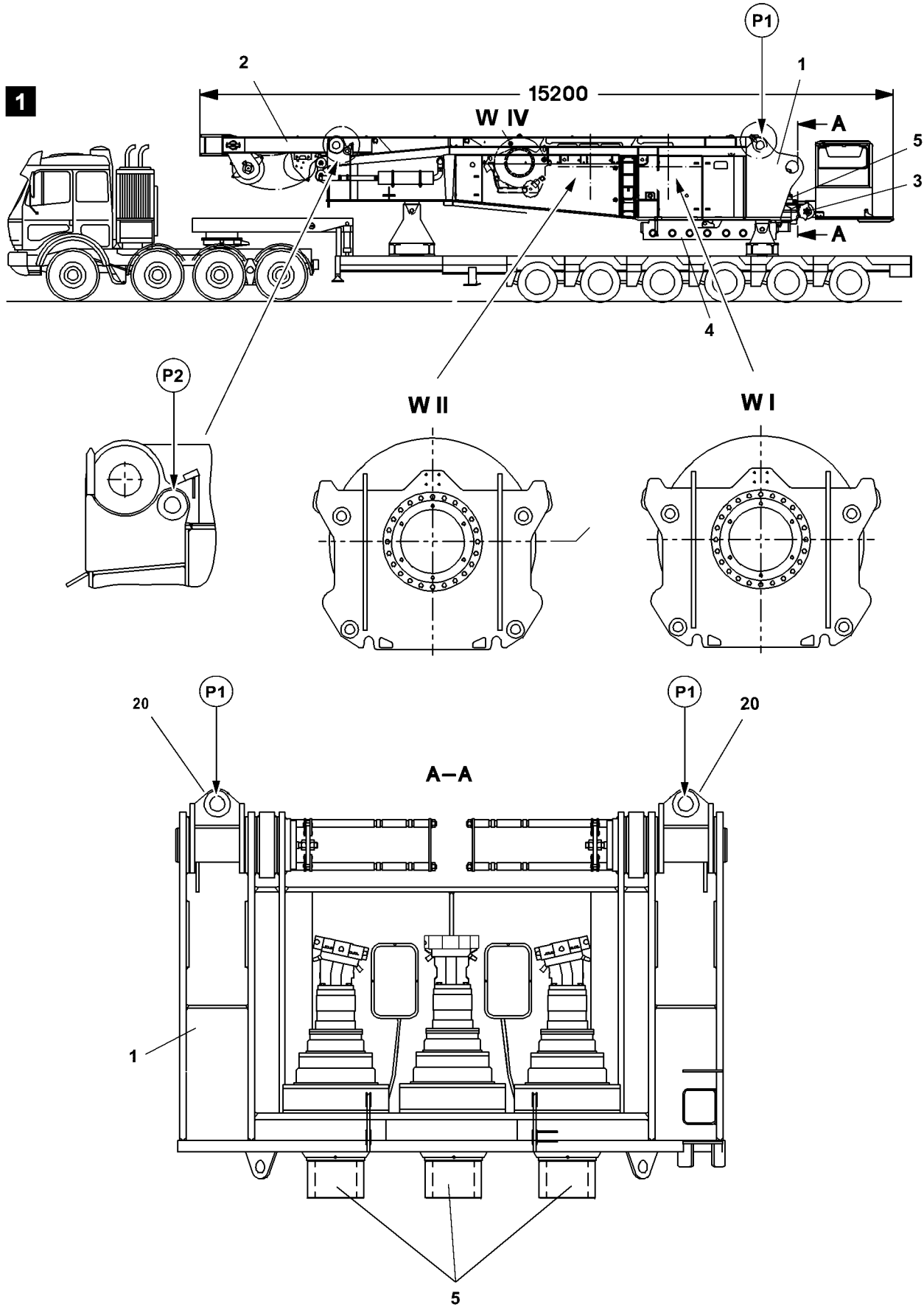


Fig.110383

LWE/LR 1750-000/12812-15-02/en

2 Installing the turntable



WARNING

Risk of falling!

During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any assembly work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see crane operating instructions, Chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!



WARNING

Components not pinned and secured!

If a component is released from the auxiliary crane before having been pinned and secured, the component will fall down! Personnel can be severely injured or killed!

- ▶ Do not disengage the auxiliary crane until the corresponding component is pinned and secured!



WARNING

Danger of impact / crushing!

When installing / removing counterweight components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be caught and severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

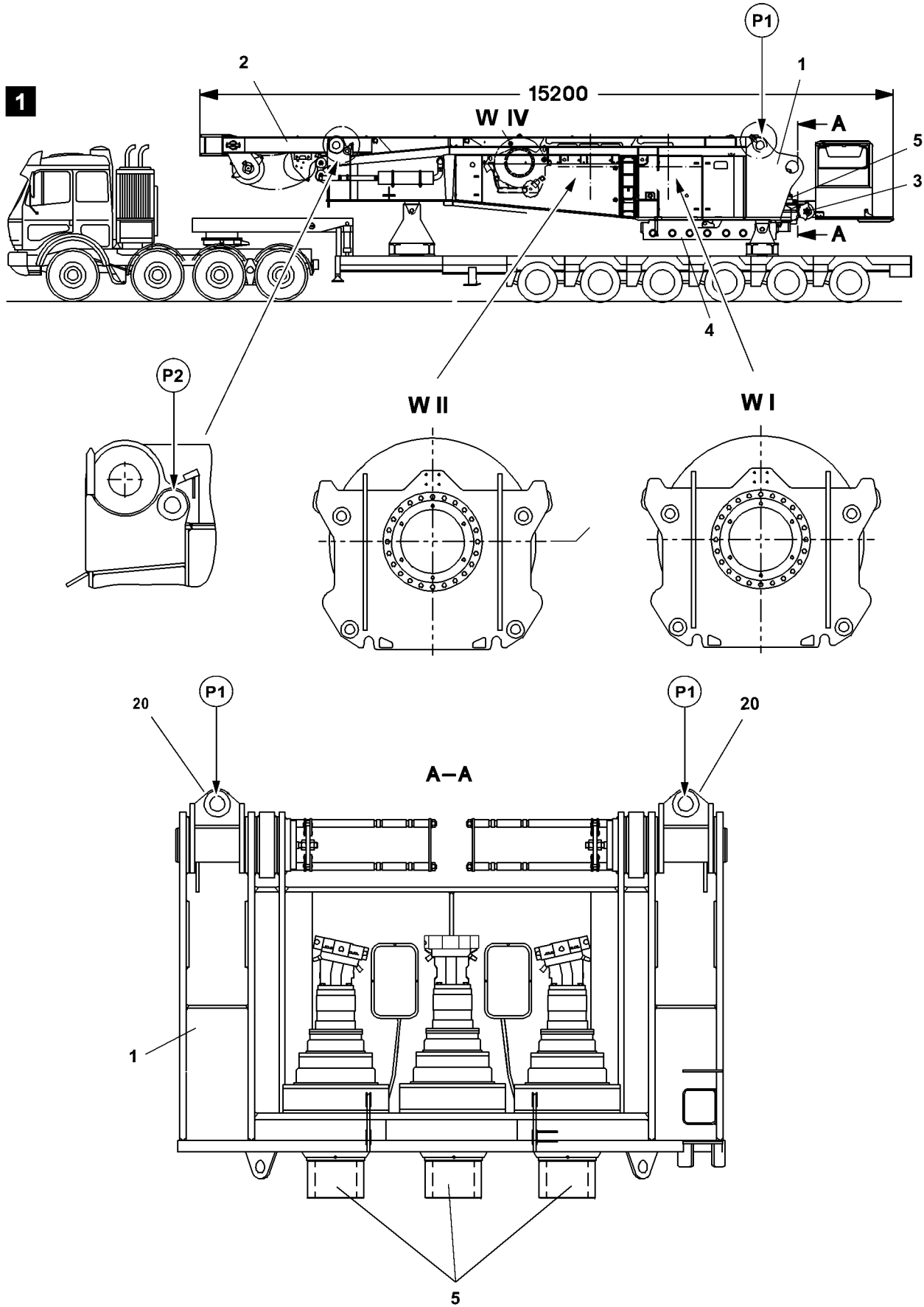


Fig.110383

LWE/LR 1750-000/12812-15-02/en

2.1 Lifting the turntable from the flatbed trailer

Make sure that the following prerequisite is met:

- The brackets **20** are pinned on the receptacle points for the pivot section, points **P1**.
- ▶ Attach the tackle on the receptacle points, points **P1** and points **P2**.
- ▶ Bring the tackle to „tension“.
- ▶ Release and remove the transport retainers on the turntable.



WARNING

Falling components!

When lifting the turntable from the flatbed trailer, components or the turntable can fall down!
Personnel can be severely injured or killed!

- ▶ Make sure that there are no persons within the danger zone!
-
- ▶ Lift the turntable with the auxiliary crane from the flatbed trailer.

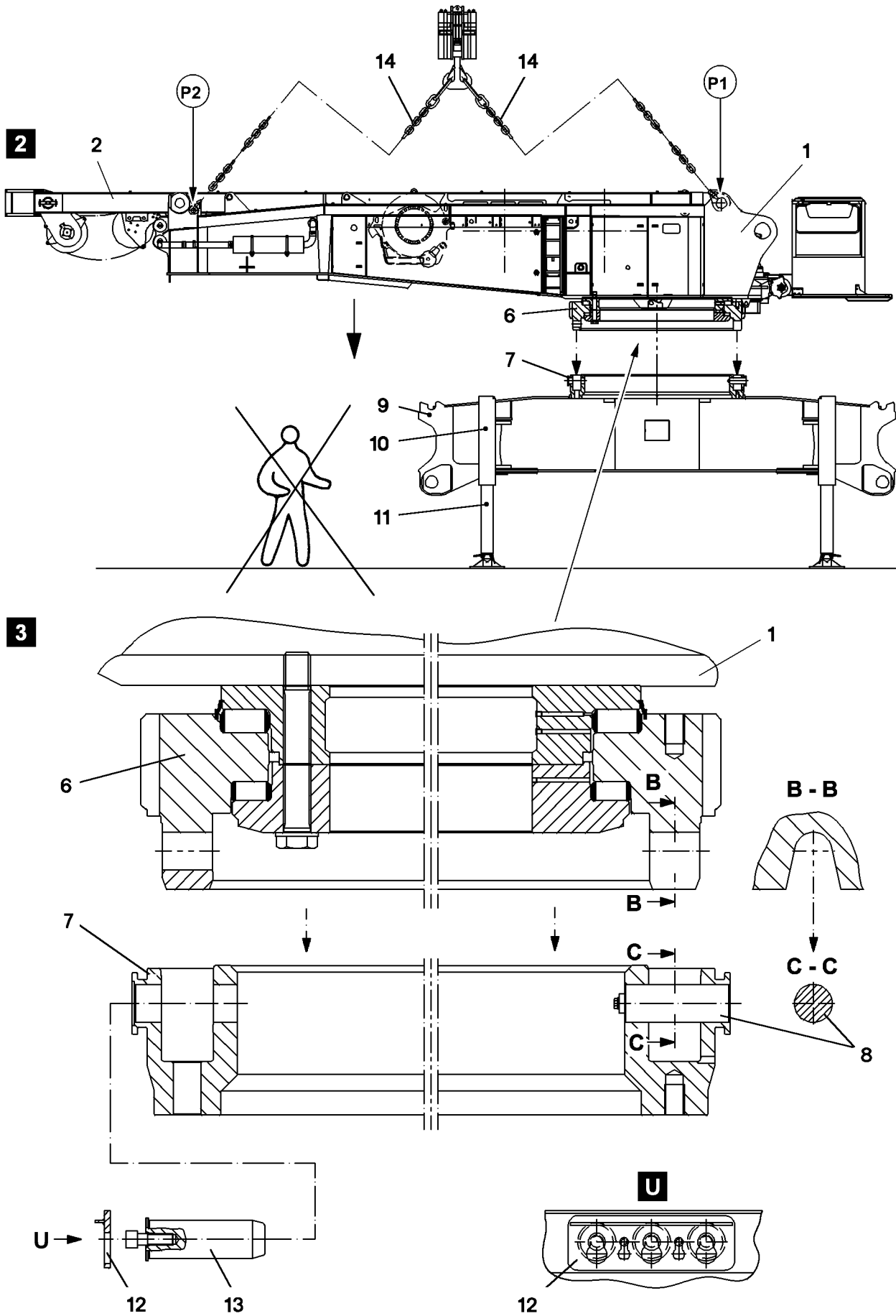


Fig.110384

LWE/LR 1750-000/12812-15-02/en

2.2 Cleaning the roller ring connection

NOTICE

Damage to the roller ring connection!

If the roller ring connection is dirty, then it can be damaged!

▶ Clean the components thoroughly before installation!

- ▶ Clean the placement and contact surfaces on the upper **6** and lower section **7** of the roller ring connection before installation.
- ▶ Clean the pin bores on the upper and lower section of the roller ring connection before installation.

2.3 Placing the turntable on the crawler center section



WARNING

The crane can topple over!

When setting the turntable on the crawler center section, the assembly cylinder can sink into the ground due to the increased weight, this can cause the crane to topple over!

Personnel can be severely injured or killed!

- ▶ Make sure that the ground is level and of sufficient load bearing capacity!
- ▶ If necessary, support the support plates with suitable materials!

Make sure that the following prerequisites are met:

- The assembly supports **10** are swung out, pinned and secured on the crawler center section **9**.
- The support cylinders **11** are extended.
- The crawler center section **9** is horizontally aligned.
- The upper **6** and lower section **7** of the roller ring connection have been cleaned.
- The two centering pins **8** are installed and secured on the lower section **7** of the roller ring connection.
- The centering pins **8** are greased with water repellent grease.



WARNING

Danger of accident due to incorrect attachment!

Life-threatening situations can arise if the turntable is incorrectly or improperly attached!

Personnel can be severely injured or killed!

- ▶ The turntable must be attached on the intended points **P1** and the points **P2**!
- ▶ Make sure that the tackle is correctly attached on the turntable and that it is secured sufficiently to prevent it from loosening up!

- ▶ Attach the tackle on the receptacle points on the turntable - points **P1** and points **P2**, illustration **2**.



WARNING

Danger of accident when swinging in and lowering the turntable!

When swinging in and lowering the turntable on the crawler center section, limbs can be crushed or even severed!

Personnel can be severely injured or killed!

- ▶ Make sure that there are no persons within the danger zone!
- ▶ Do not reach with your hands into the danger zone!

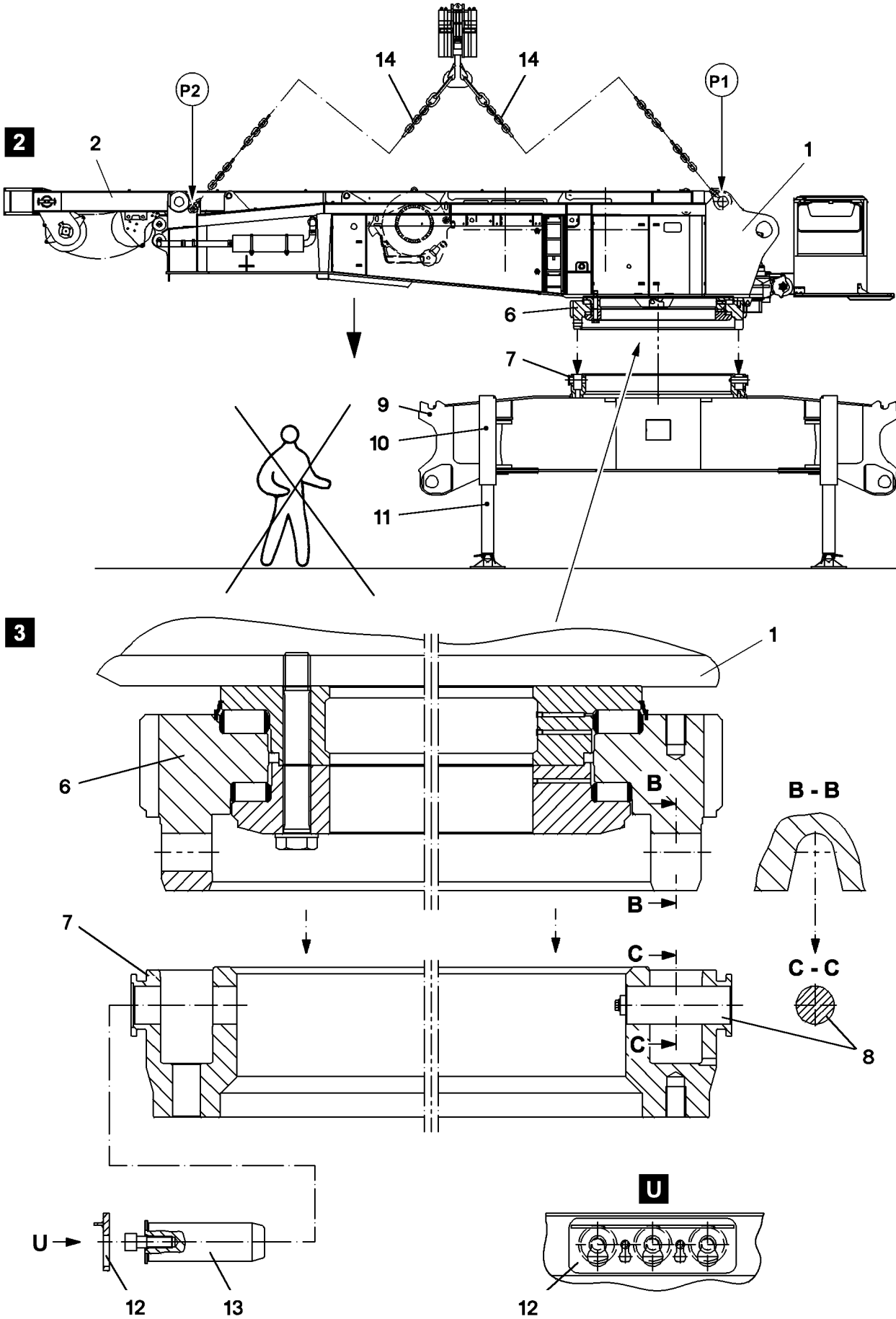


Fig.110384

LWE/LR 1750-000/12812-15-02/en

**Note**

- ▶ Pay attention to the alignment of the turntable or the receptacles **B-B** to the centering pins **8**!
- ▶ Before lowering the turntable, bring it into position in such a way that the receptacles **B-B** are positioned over the centering pins **8** on the lower section **7**!

- ▶ Swing the turntable with the auxiliary crane in over the crawler center section.
- ▶ Slowly lower the turntable.

When the turntable is aligned:

- ▶ Carefully place the turntable on the crawler center section.
- ▶ Lower the turntable completely to the stop on the lower section **7**.

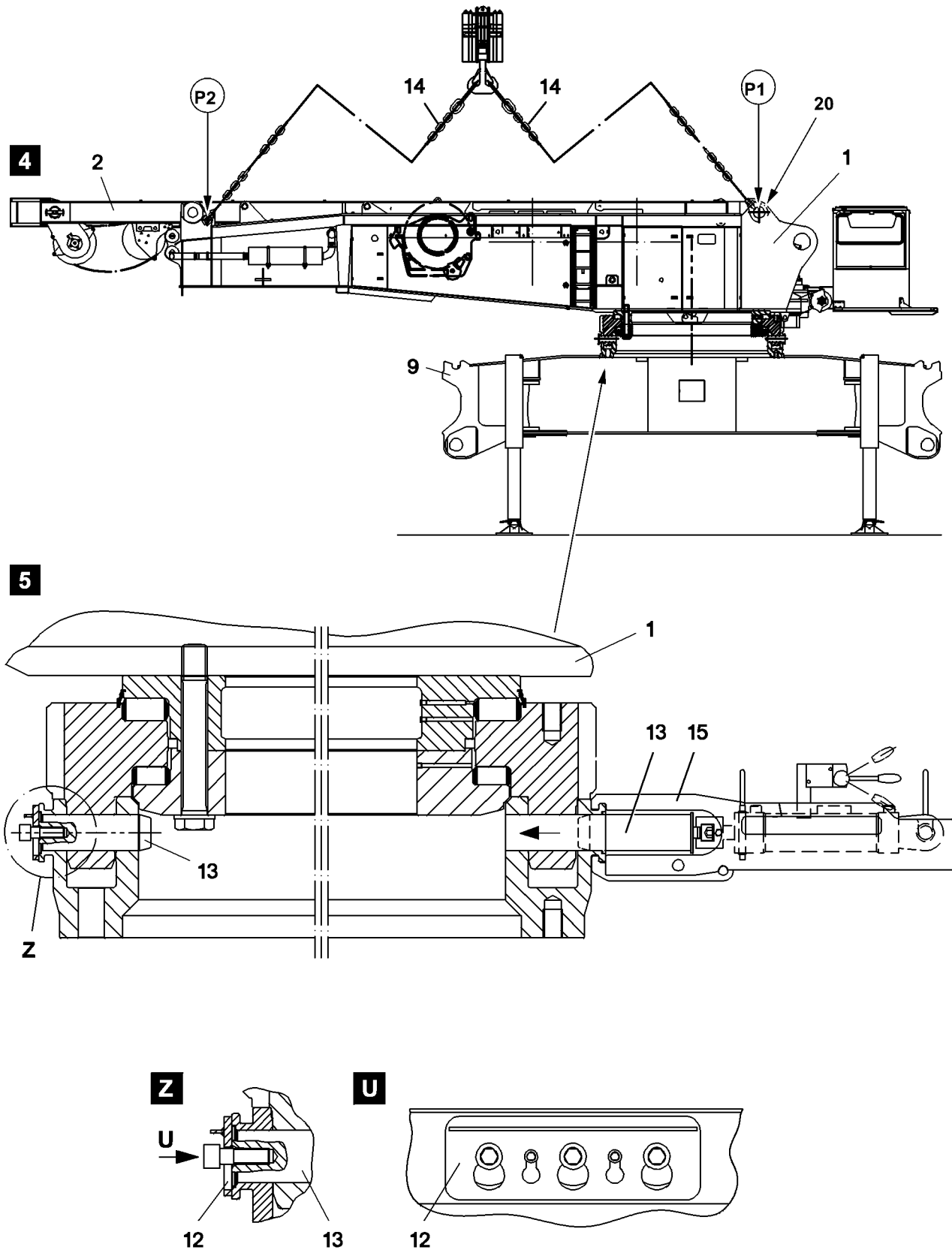


Fig.110385

LWE/LR 1750-000/12812-15-02/en

2.4 Pinning the turntable with the quick connection

Make sure that the following prerequisites are met:

- The turntable **1** is seated on the crawler center section **9**.
 - The tackle **14** between the turntable and the auxiliary crane is „tensioned“.
 - The pin bores are clear on the circumference of the roller ring connection.
- ▶ Grease the connector pins **13** with water repellent grease.
 - ▶ Insert the connector pins by hand completely.



Note

- ▶ If the connector pins **15** are hard to move, use a pin pulling device!
-



WARNING

The connector pins can loosen up by themselves!

- ▶ Secure connector pins **13** immediately after pinning with circlips **12**!
-

When all connector pins are completely pinned:

- ▶ Attach the retaining bars **12** and secure the connector pins **13**, illustration **U**.
- ▶ Remove the tackle on the turntable.

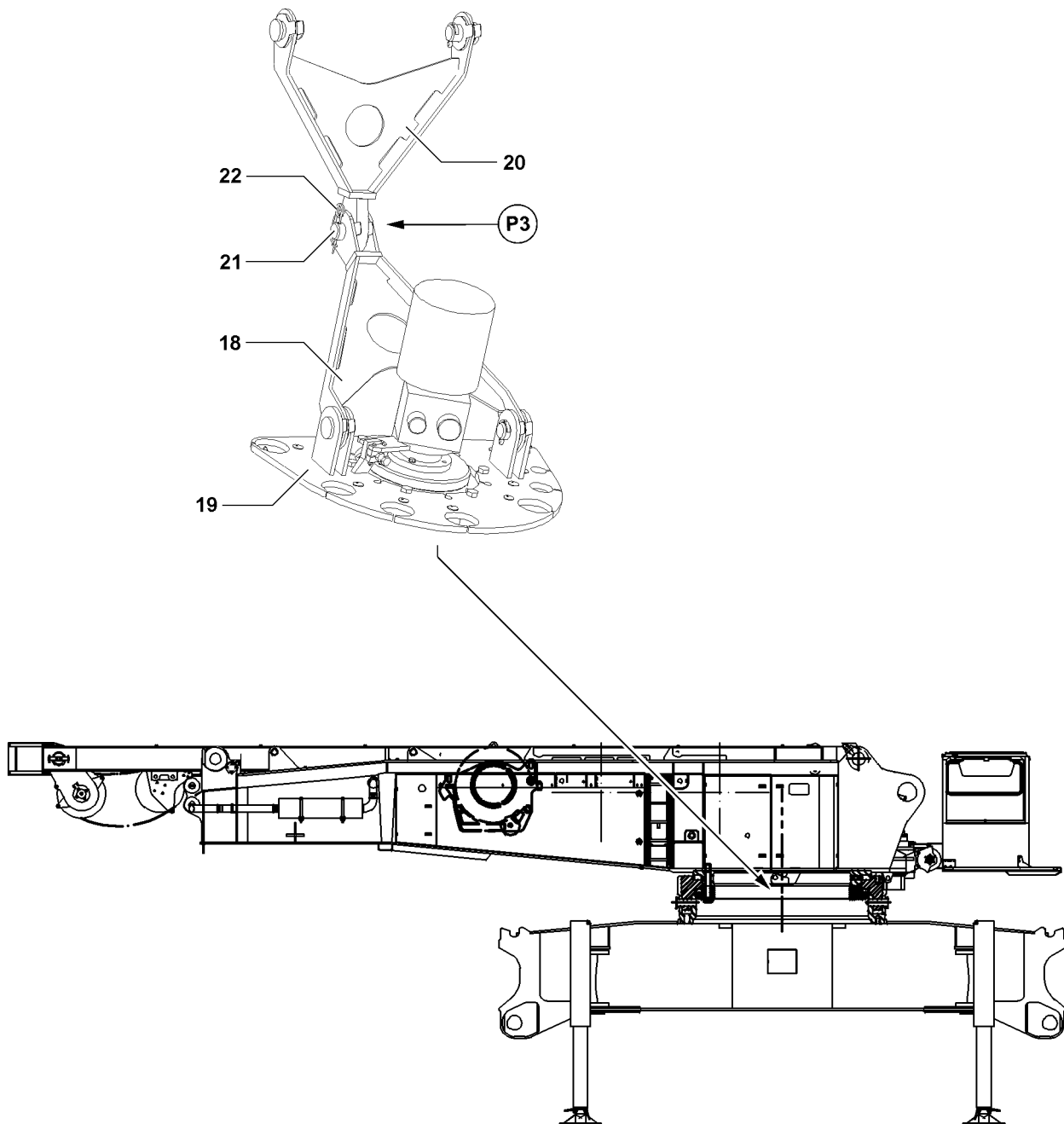


Fig.110439

2.5 Establishing the connection to the turntable

Make sure that the following prerequisites are met:

- The upper and lower section of the quick connection are pinned and secured.
- The bar **18** is pinned with the actuator **19**.
- The bar **20** is pinned with the turntable.

2.5.1 Pinning the bar on the rotary connection

- ▶ Pin the bar **18** on the bar **20**.
- ▶ Insert the pin **21** on point **P3** and secure with spring retainer **22**.

2.5.2 Establishing the hydraulic connections to the turntable

The hydraulic connections on the turntable are established on the rotary connection.

When connecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.



WARNING

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!

Personnel can be severely injured or killed!

- ▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!



WARNING

Loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
- ▶ Assemble coupling components (sleeve and connector) and screw together using hand-tightened nut.
- ▶ Tighten hydraulic coupling by hand. Rotate hand-tightened nut until it reaches a tangible, fixed stop position.
- ▶ Create the hydraulic connection with the turntable.

2.5.3 Establishing the electrical connections to the turntable

- ▶ Establish the electrical connections to the turntable on the rotary connections, see separate electric wiring diagram.

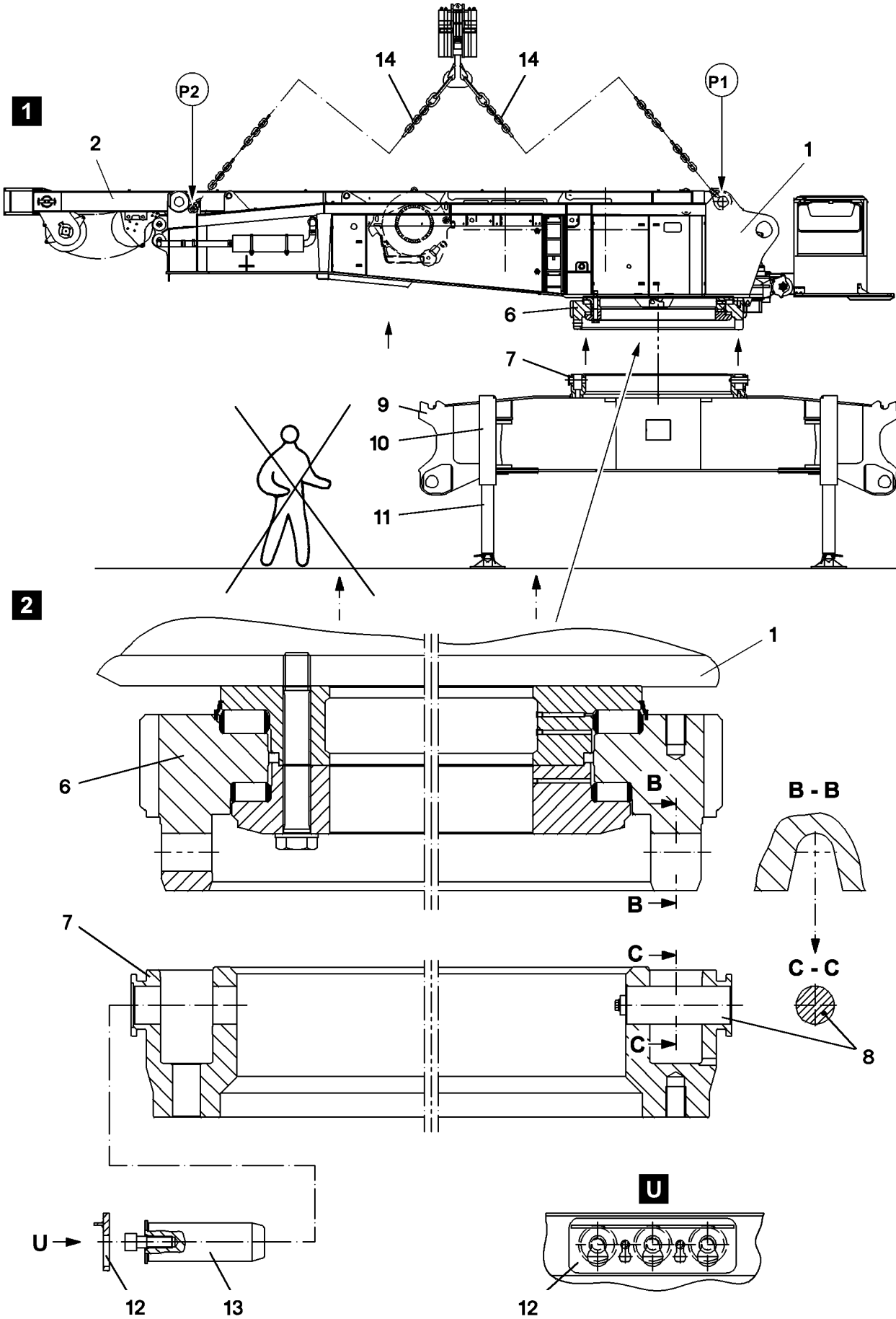


Fig.110386

LWE/LR 1750-000/12812-15-02/en

3 Removing the turntable



WARNING

Risk of falling!

During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any assembly work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see crane operating instructions, Chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!



WARNING

Components not pinned and secured!

If a component is released from the auxiliary crane before having been pinned and secured, the component will fall down! Personnel can be severely injured or killed!

- ▶ Do not disengage the auxiliary crane until the corresponding component is pinned and secured!



WARNING

Danger of impact / crushing!

When installing / removing counterweight components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be caught and severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

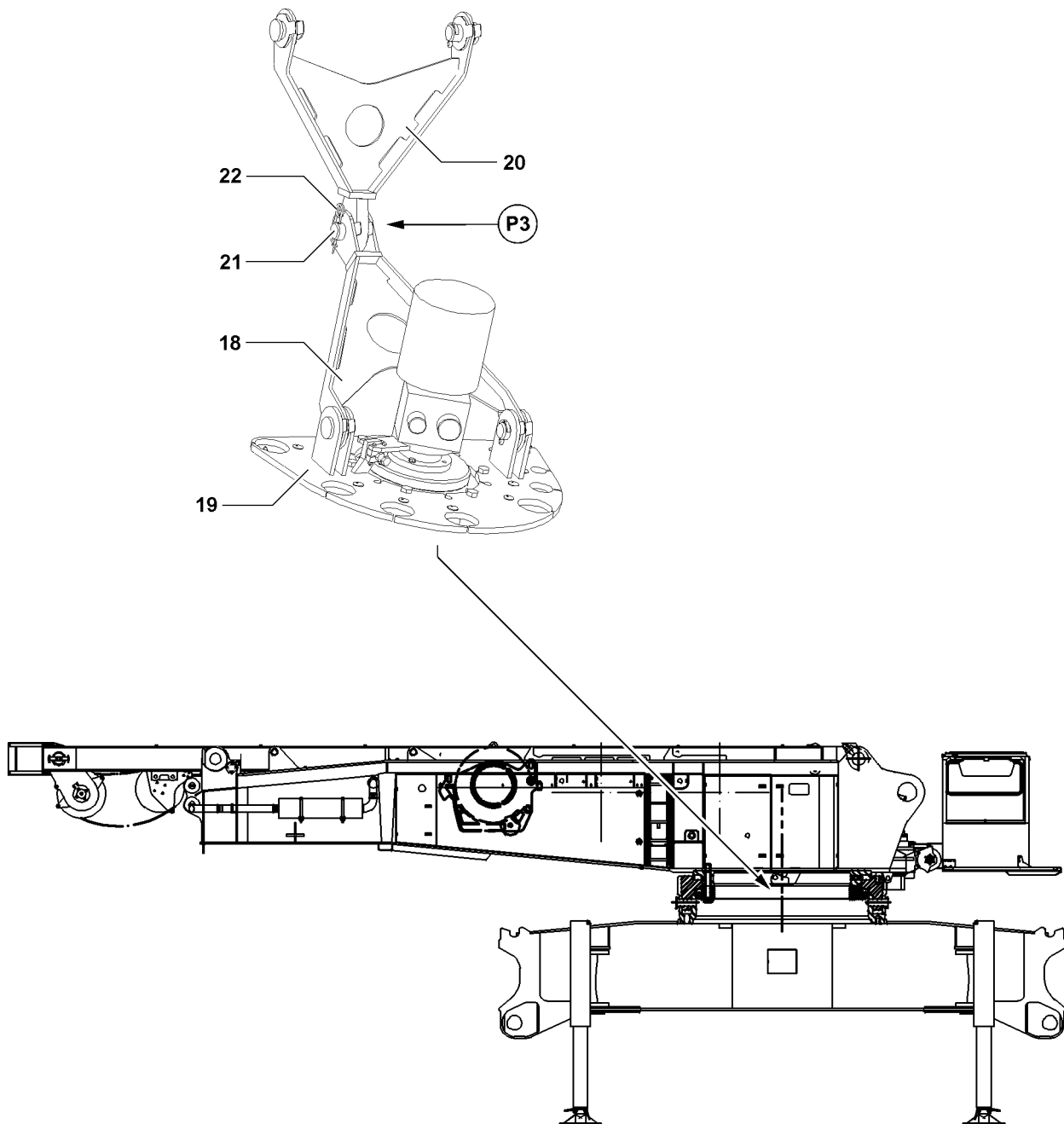


Fig.110439

3.1 Disconnecting the connections to the turntable

Make sure that the following prerequisites are met:

- The counterweight and boom systems are disassembled.
- The central ballast has been removed.
- The crawler carriers are removed.
- The assembly supports **10** are swung out, pinned and secured on the crawler center section **9**.
- The support cylinders **11** are extended.
- The crawler center section **9** is horizontally aligned.
- The SA-frame **2** is placed on the turntable **1**.

3.1.1 Disconnecting the hydraulic connections to the turntable

When releasing hydraulic lines with quick-release couplings, make sure that the uncoupling procedure is carried out correctly.



WARNING

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!

Personnel can be severely injured or killed!

▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!

-
- ▶ Release the hydraulic coupling by hand.
 - ▶ Disconnect the hydraulic connection to the turntable on the rotary connection.

3.1.2 Disconnecting the electrical connections to the turntable

- ▶ Disconnect the electrical connection to the turntable on the rotary connection.

3.1.3 Unpinning the bar on the rotary connection

- ▶ Remove spring retainer **22** on point **P3**.
- ▶ Unpin the pin **21** on point **P3**.
- ▶ Disconnect the bar **18** on the bar **20**.

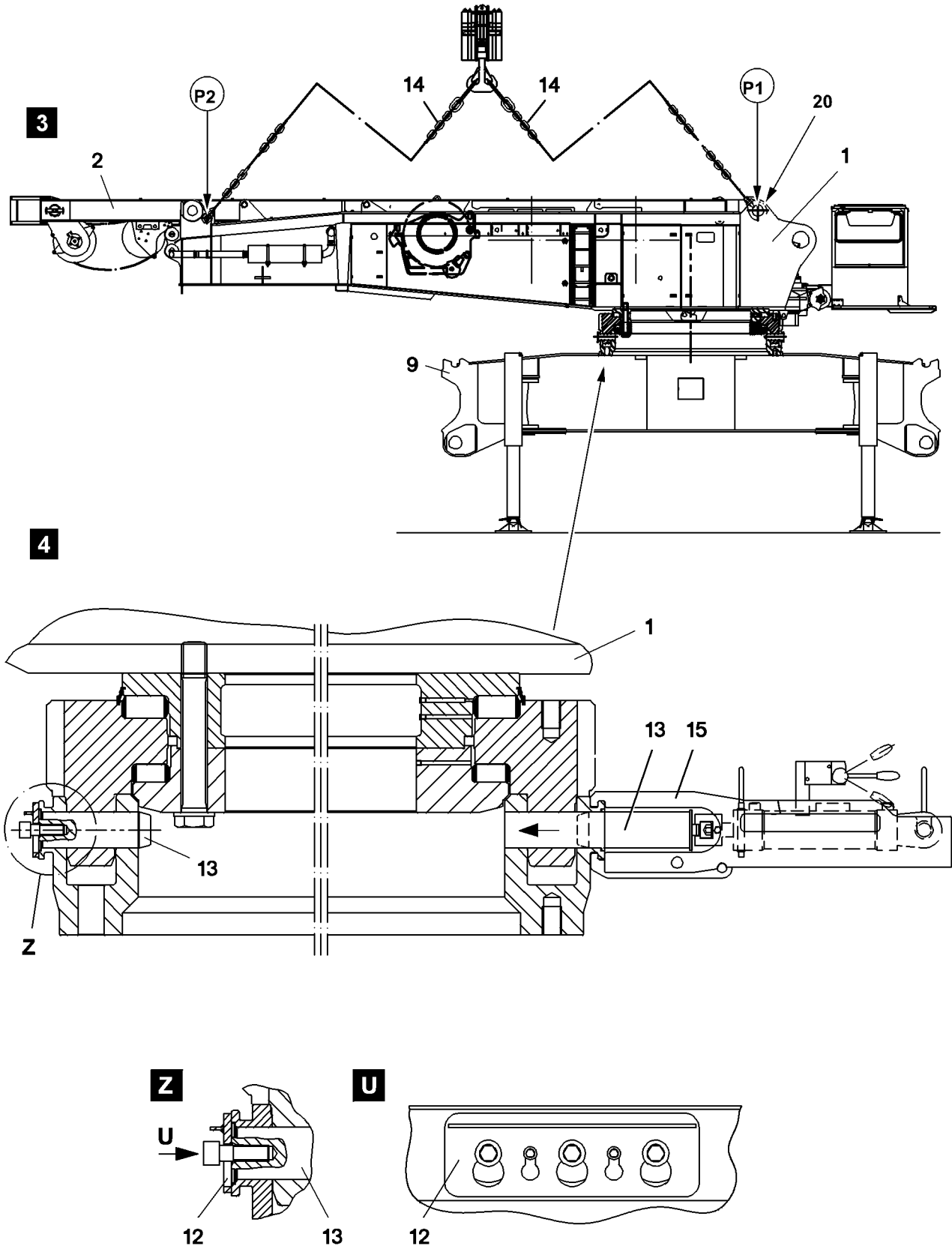


Fig.110440

LWE/LR 1750-000/12812-15-02/en

3.2 Disconnecting the turntable with the quick connection

Make sure that the following prerequisites are met:

- The hydraulic connections on the rotary connection are disconnected.
 - The brackets **20** are installed and pinned.
 - The tackle is attached on the receptacle points point **P1** and point **P2** on the turntable, illustration **3**.
- ▶ Bring the tackle to „tension“.
 - ▶ Release and remove the retaining bars **12**, illustration **U**.
 - ▶ Unpin the connector pins **13** all the way by hand.



Note

- ▶ If the connector pins **13** are hard to move, use a pin pulling device **15**!

NOTICE

Damage to the connector parts!

By lifting the turntable, the connection lines and the quick connection can be damaged!

- ▶ Make sure that all hydraulic and electrical connections are disconnected!
- ▶ Make sure that all connector pins of the quick connection have been removed!

When all connector pins are removed:

- ▶ Carefully lift the turntable with the auxiliary crane.



WARNING

Falling components!

When lifting the turntable from the crawler center section, components or the turntable can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that there are no persons within the danger zone!

When the turntable is lifted completely off the crawler center section:

- ▶ Set the turntable on the flatbed trailer.
- ▶ Remove the auxiliary crane.

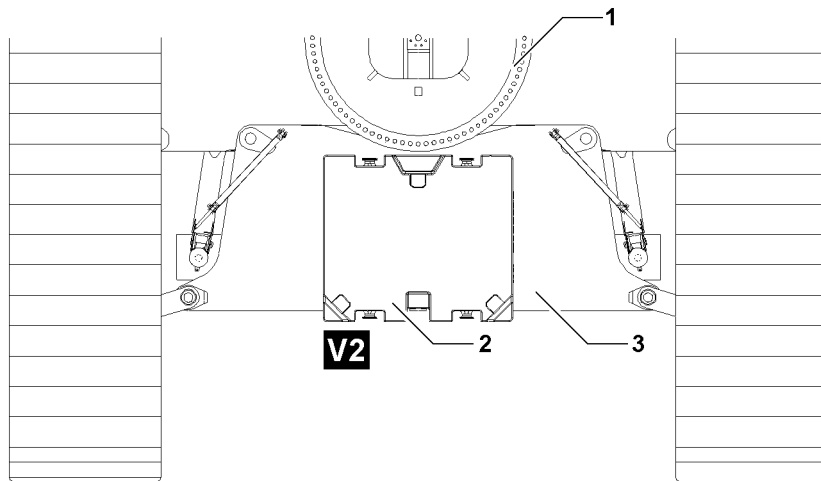
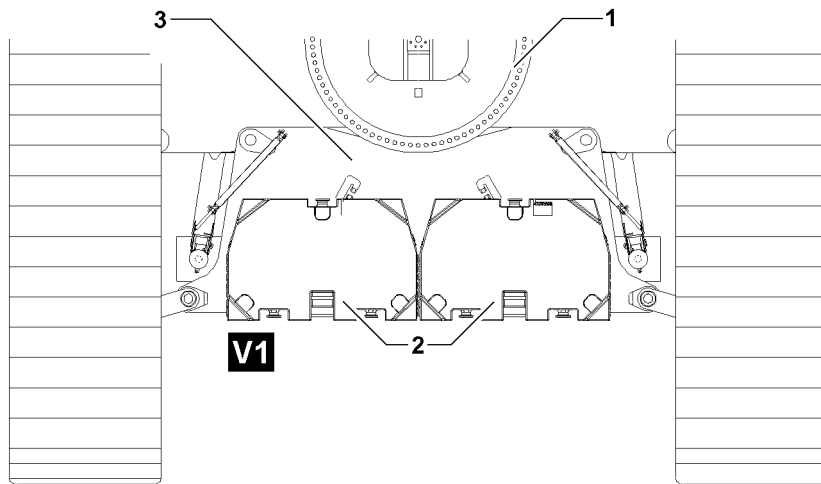
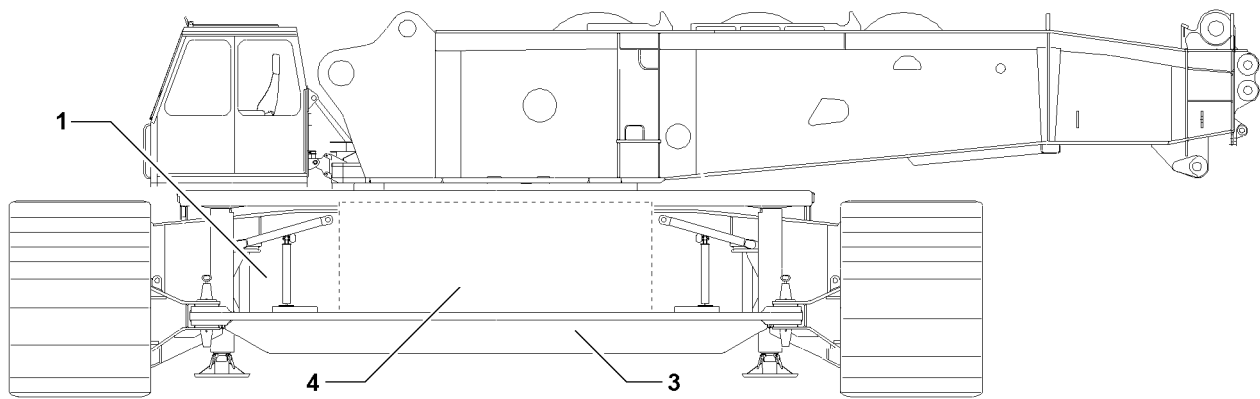


Fig.109674

LWE/LR 1750-000/12812-15-02/en

1 Components

NOTICE

Damage to crane!

When driving the crane, the base plates **3** must be installed!

If the crane is driven without installed base plates **3**, the resulting steering forces cannot be absorbed!

The crane will be severely damaged!

► Drive the crane only with installed base plates **3**!

For the central ballast on the crawler center section **1**, the following components are required:

2 Central ballast plates

3 Base plates

1.1 Central ballast plates



Note

► The central ballast plates **2** are marked with their own weights!

The central ballast plates **2** are placed down as the central ballast stack **4**.

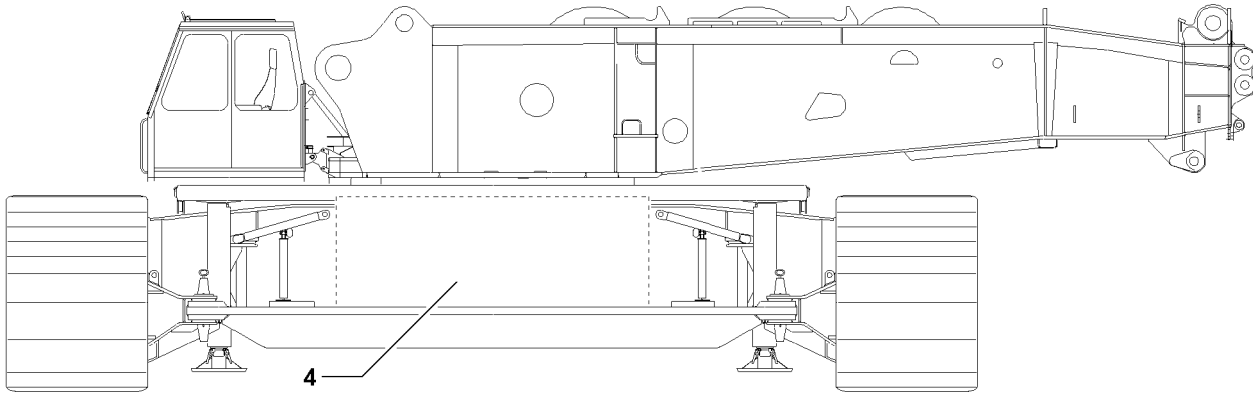
Central ballast plates **2** are available in variation **V1** and variation **V2**:

Component	Weight
Variation V1	10 t
Variation V2	12.5 t

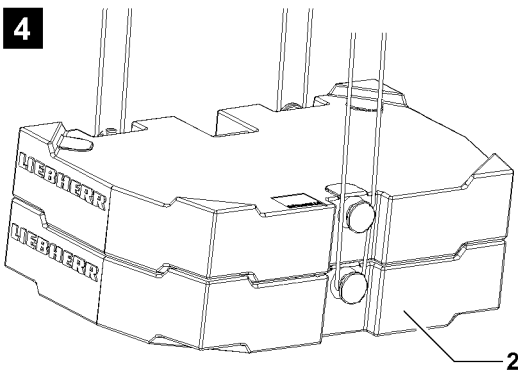
1.2 Base plates central ballast

Component	Weight
Base plate central ballast	10 t

1



4



5

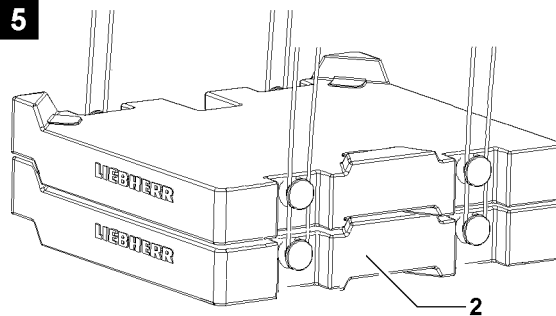


Fig.109675

2 Central ballast combinations

Various central ballast combinations can be placed in the central ballast stack 4:

Central ballast	Combination	Individual weight
20 t	2 x base plate	10 t

Central ballast	Combination	Individual weight
45 t	2 x base plate	10 t
	2 x central ballast plate	12.5 t

Central ballast	Combination	Individual weight
95 t	2 x base plate	10 t
	6 x central ballast plate	12.5 t

Central ballast	Combination	Individual weight
100 t	2 x base plate	10 t
	8 x central ballast plate	10 t

3 Permissible central ballast assemblies



WARNING

Overload attachment points central ballast plates!

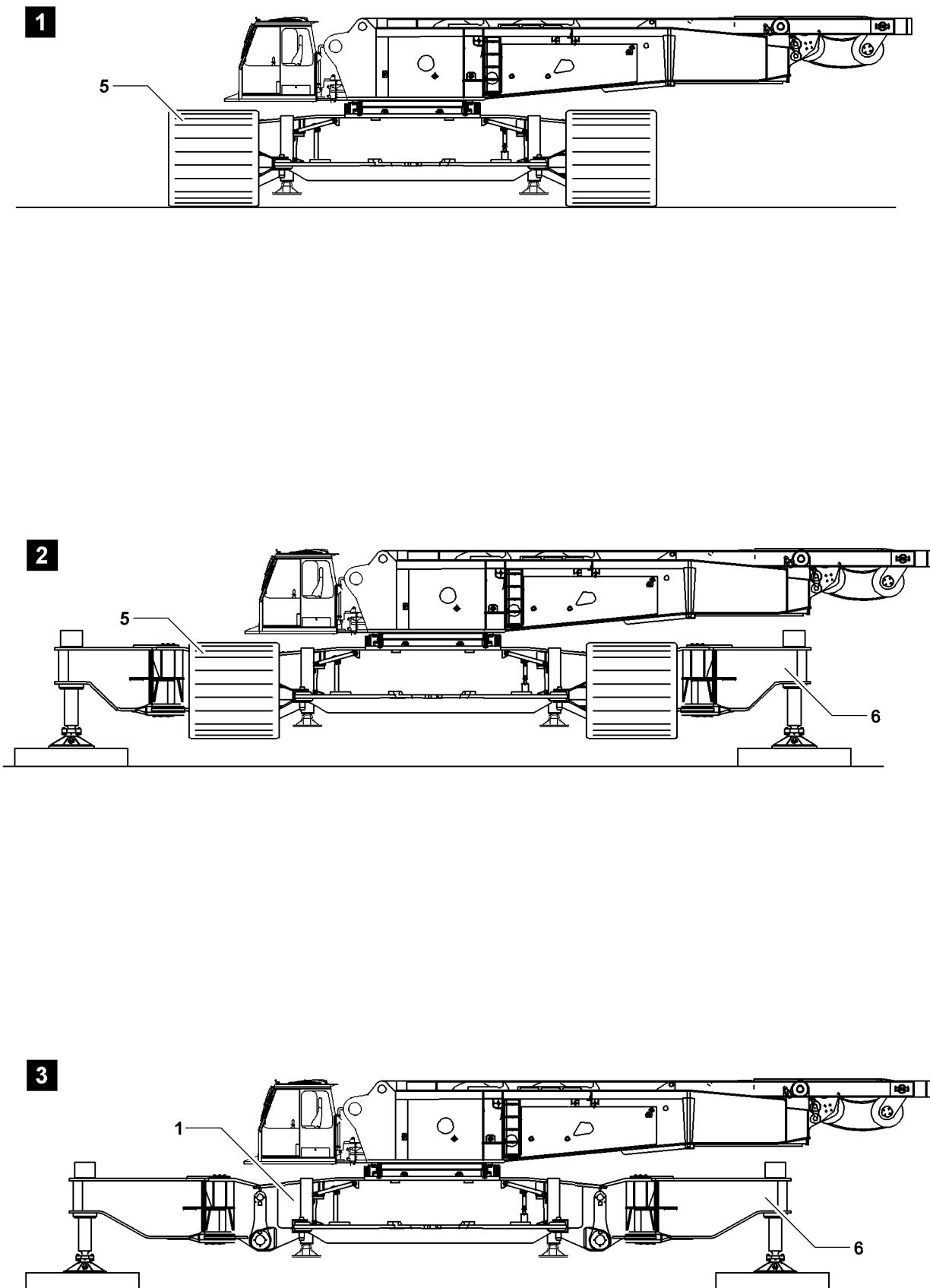
If more than the permissible number of central ballast plates **2** are lifted together, then the attachment points can be overloaded!

The central ballast plates **2** and components can fall down!

Personnel can be severely injured or killed!

► Attach only the maximum permissible number of central ballast plates **2** per lift!

Individual weight Central ballast plate	Maximum number of same central ballast plates per lift
10.0 t	2
12.5 t	2



LWE/LR 1750-000/12812-15-02/en

Fig.109291

4 Installing the central ballast



WARNING

Danger of slipping / falling during assembly / disassembly work!

During assembly and disassembly work, personnel must be secured with appropriate antifall guards to prevent them from falling!

Weather influences, such as wetness, wind, snow, frost increase the slipping / falling danger!

Personnel can be severely injured or killed!

- ▶ All assembly / disassembly work must be carried out using suitable aids (lifting platforms, scaffolding, ladders, auxiliary crane, etc.)!
- ▶ If work cannot be carried out on the ground or using such aids, then assembly personnel must be secured with the personal fall arrest system (see Crane operating instructions, chapter 2.04) to protect against falling!
- ▶ Hang in the personal antifall system in the corresponding attachment points on the crane (see Crane operating instructions, chapter 2.06)!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall arresters only with clean shoes!
- ▶ Keep aids and fall arresters clean and free from snow and ice!



WARNING

Falling components and central ballast plates!

At assembly / disassembly, the components and central ballast plates can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that no persons or objects are within the danger zone!



WARNING

Incorrect handling of the attachment equipment!

If attachment equipment cannot be attached correctly and if it is not secured sufficiently to prevent it from loosening up, loads can fall down! Personnel can be severely injured or killed!

- ▶ Make sure that the attachment equipment is correctly attached on the attachment points and that it is secured sufficiently to prevent it from loosening up!



WARNING

Danger of impact / crushing!

If anyone remains within the assembly / disassembly area of the ballast, they would be exposed to a danger of impact / crushing!

Personnel can be severely injured or killed!

- ▶ Make sure that there are no persons between the components which are to be assembled / disassembled on the components and the crawler travel gear!



Note

- ▶ The assembly procedure varies, depending in the equipment configuration!

The following three equipment configurations are possible and they differ in assembly steps:

- Crane operation on crawler carriers **5**, see illustration **1**
- Crane operation on crane support **6** installed on crawler carriers **5**, see illustration **2**
- Crane operation on crane support **6** installed on crawler center section **1**, see illustration **3**

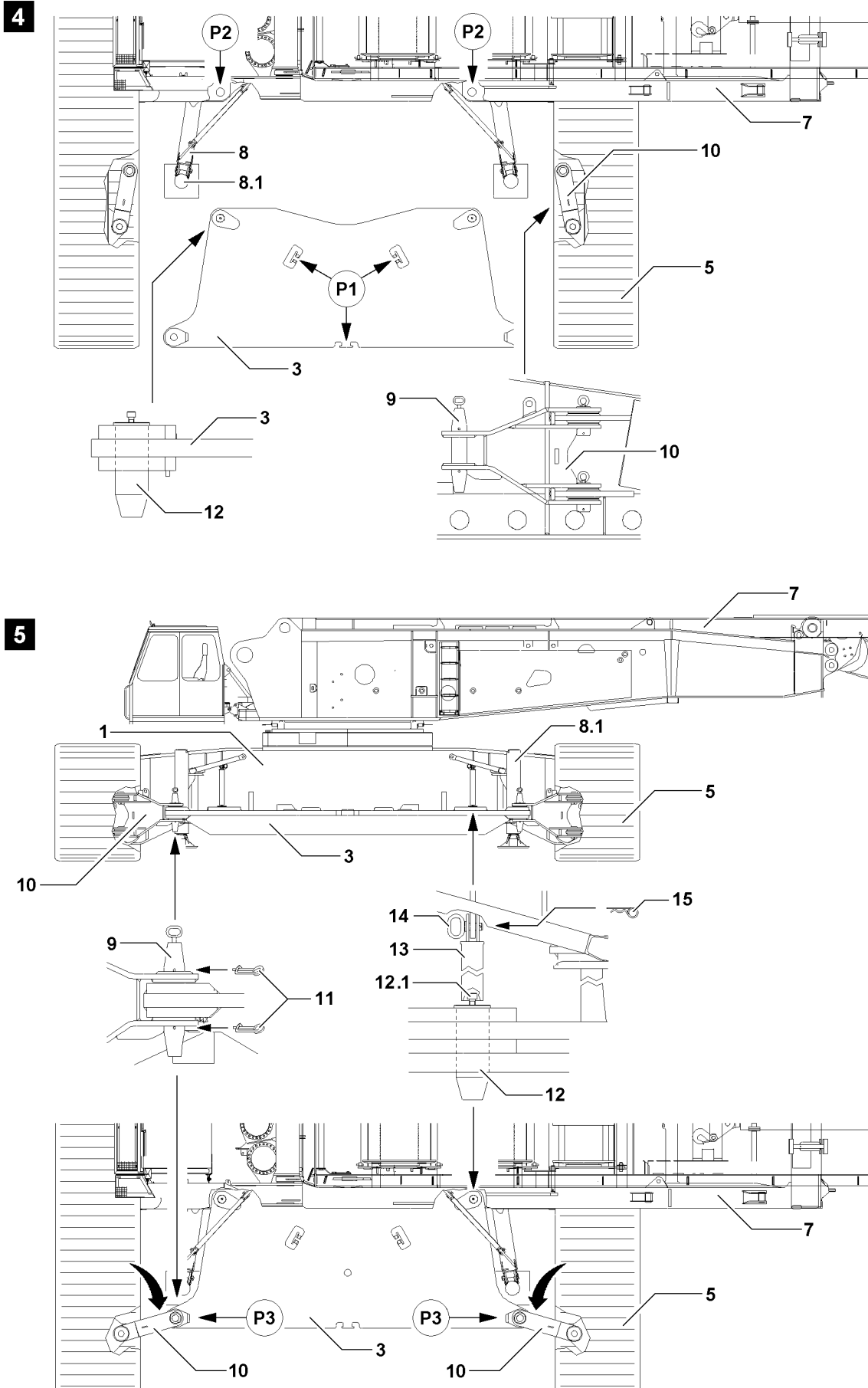


Fig.109292

LWE/LR 1750-000/12812-15-02/en

4.1 Installing the base plates

Make sure that the following prerequisites are met:

- the crane is aligned in horizontal direction
- the turntable **7** is turned by 90° to the crawler carriers **5**, see illustration
- the hydraulic assembly support **8** is swung out, locked and pinned
- the hydraulic support cylinders **8.1** are completely retracted
- the pins **12** are pinned in the base plates **3**

4.1.1 Installing the base plates, crane operation on crawler

Make sure that the following prerequisites are met:

- the installation of the crawler carriers **5** is completed, see chapter 3.01 of the Crane operating instructions
- both crawler carriers **5** are standing on the ground
- the double cone pins **9** in the consoles **10** are unpinned
- ▶ Attach the base plate **3** on the points **P1** to the auxiliary crane.
- ▶ Guide the base plate **3** with the auxiliary crane to the brackets on point **P2** and position the pin **12** directly over the bores on point **P2**.
- ▶ Lower the base plate **3** evenly until the pins **12** are inserted fully into the bores on point **P2**.

Secure the pin **12** with retaining tube **13**, see illustration **5**:

- ▶ Push the retaining tube **13** over the screw head **12.1** of the pin **12**. Pin the retaining tube **13** on the crawler center section **1** with grip bolt **14** and secure with spring retainer **15**.
- ▶ Swing the consoles **10** out until the bores of consoles **10** and base plate **3** align on point **P3**.

NOTICE

Damage to crane!

If the base plate **3** is set down from the auxiliary crane and both consoles **10** are not swung over the base plate **3** on points **P3**, then the crane will be damaged!

- ▶ Make sure, before setting down the base plate **3** from the auxiliary crane, that the consoles **10** are swung over the base plate **3**, see illustration **5**!
 - ▶ Set the base plate **3** down and release it from the auxiliary crane.
 - ▶ Position the double cone pins **9** with the auxiliary crane on point **P3**, insert and secure with spring retainers **11**.
 - ▶ Remove the tackle.
-

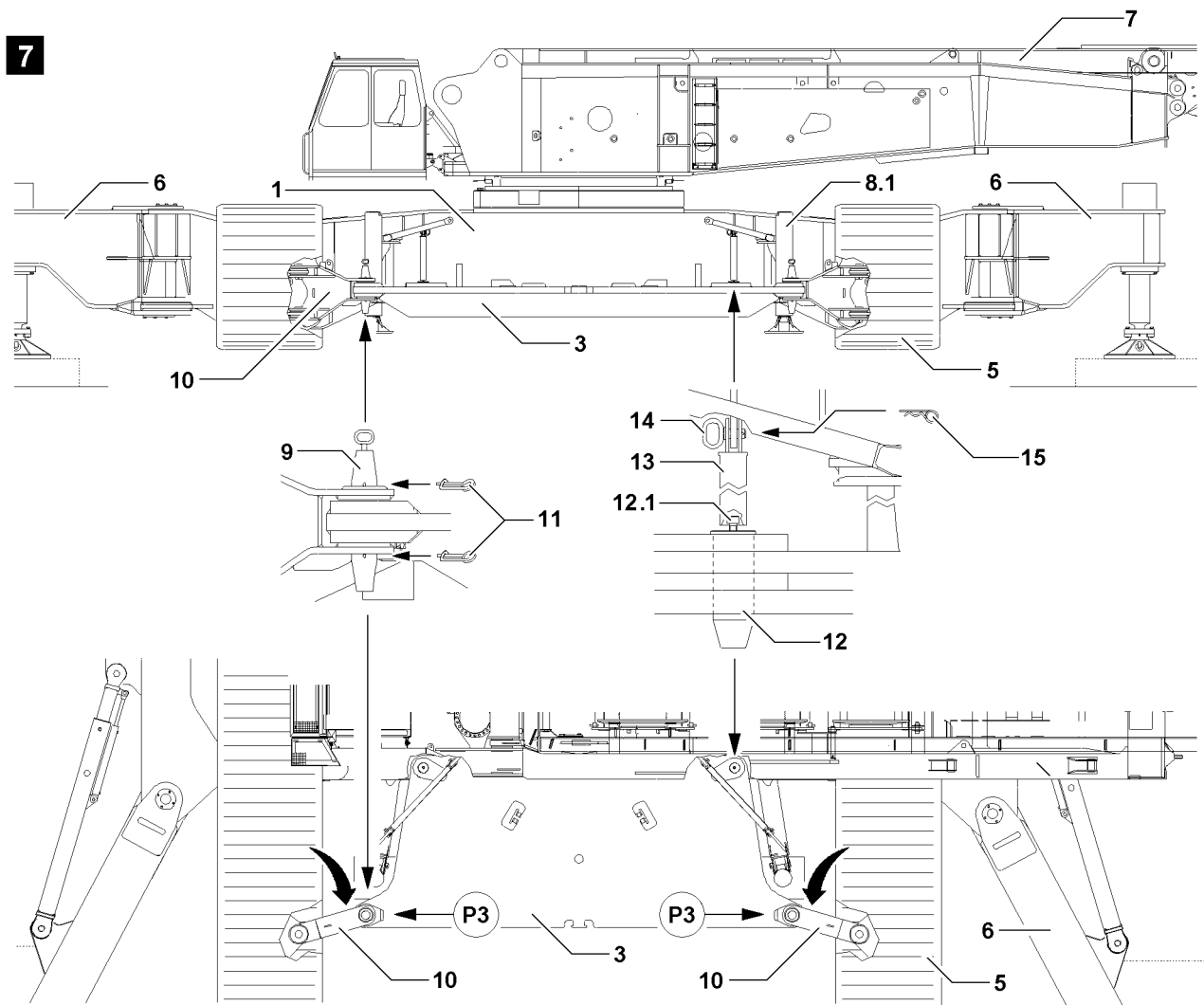
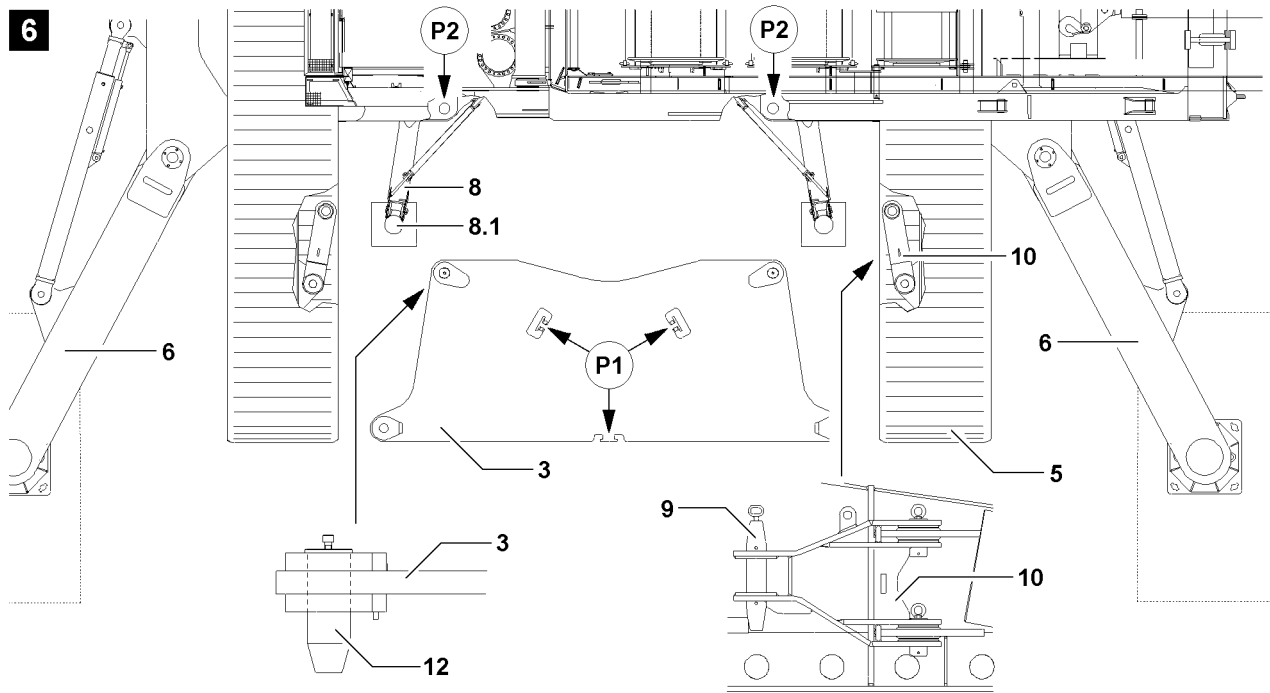


Fig.109293

LWE/LR 1750-000/12812-15-02/en

4.1.2 Installing the base plates, crane operation on crane support on crawler carriers

Make sure that the following prerequisites are met:

- the installation of the crawler carriers **5** and the crane support **6** is completed, see chapter 3.01 and 3.05 of the Crane operating instructions
- the crane is supported via the crane support **6**, see chapter 3.05 of the Crane operation instructions
- the double cone pins **9** in the consoles **10** are unpinned

- ▶ Attach the base plate **3** on the points **P1** to the auxiliary crane.
- ▶ Guide the base plate **3** with the auxiliary crane to the brackets on point **P2** and position the pin **12** directly over the bores on point **P2**.
- ▶ Lower the base plate **3** evenly until the pins **12** are inserted fully into the bores on point **P2**.

Secure the pin **12** with retaining tube **13**, see illustration 7:

- ▶ Push the retaining tube **13** over the screw head **12.1** of the pin **12**. Pin the retaining tube **13** on the crawler center section **1** with grip bolt **14** and secure with spring retainer **15**.
- ▶ Swing the consoles **10** out until the bores of consoles **10** and base plate **3** align on point **P3**.

NOTICE

Damage to crane!

If the base plate **3** is set down from the auxiliary crane and both consoles **10** are not swung over the base plate **3** on point **P3**, then the crane will be damaged!

- ▶ Make sure, before setting down the base plate **3** from the auxiliary crane, that the consoles **10** are swung over the base plate **3**, see illustration 7!
-
- ▶ Set the base plate **3** down and release it from the auxiliary crane.
 - ▶ Position the double cone pins **9** with the auxiliary crane on point **P3**, insert and secure with spring retainers **11**.
 - ▶ Remove the tackle.

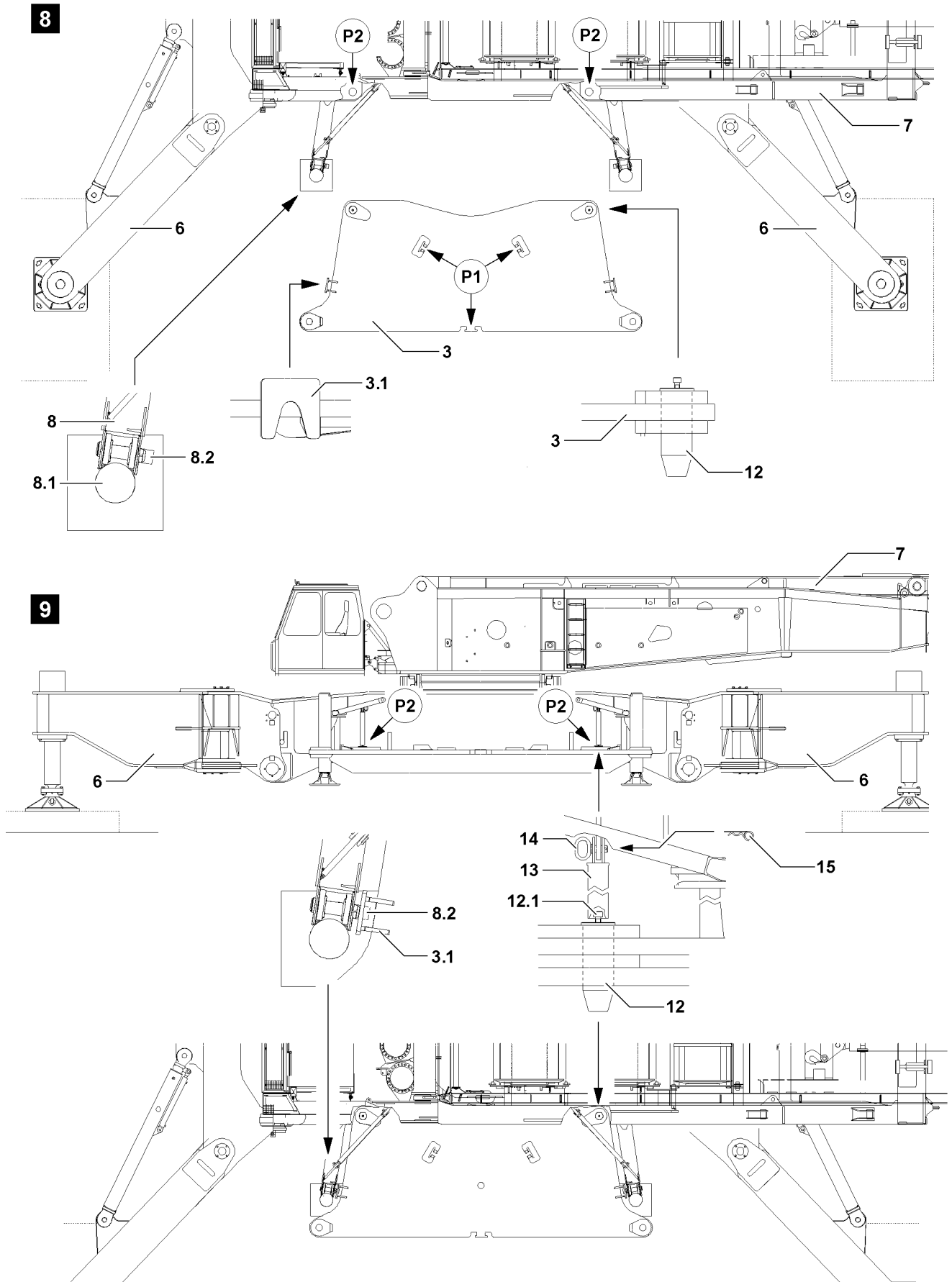


Fig.109294

LWE/LR 1750-000/12812-15-02/en

4.1.3 Installing the base plates, crane operation on crane support on crawler center section

Make sure that the following prerequisites are met:

- the installation of the crawler support **6** on the crawler center section **1** is completed, see chapter 3.05 of the Crane operating instructions
- the crane is supported via the crane support **6**, see chapter 3.05 of the Crane operation instructions
- ▶ Attach the base plate **3** on the points **P1** to the auxiliary crane.
- ▶ Guide the base plate **3** with the auxiliary crane to the brackets on point **P2** and position the pin **12** directly over the bores on point **P2**.
- ▶ Lower the base plate **3** evenly until the pins **12** are inserted completely in the bores on point **P2** and the receptacles **3.1** of the base plate **3** are placed on the extended pin **8.2** of the hydraulic assembly support **8**.

Secure the pin **12** with retaining tube **13**, see illustration **9**:

- ▶ Push the retaining tube **13** over the screw head **12.1** of the pin **12**, insert the grip bolt **14** and secure with spring retainer **15**.

NOTICE

Damage to crane!

If the base plate **3** is set down from the auxiliary crane and both receptacles **3.1** of the base plate **3** are not placed on the extended pin **8.2** of the hydraulic assembly support **8**, the crane will be damaged!

- ▶ Make sure, before placing the base plate **3** from the auxiliary crane, that both receptacles **3.1** of the base plate **3** are placed on the extended pin **8.2** of the hydraulic assembly support **8**, see illustration **9**!
-
- ▶ Set the base plate **3** down and release it from the auxiliary crane.
 - ▶ Remove the tackle.

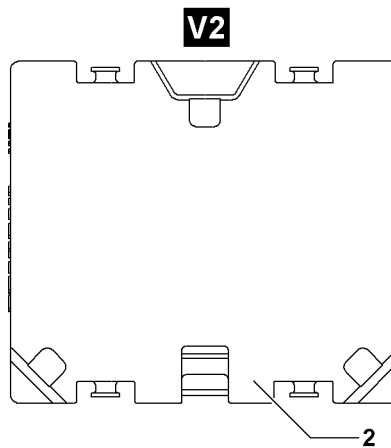
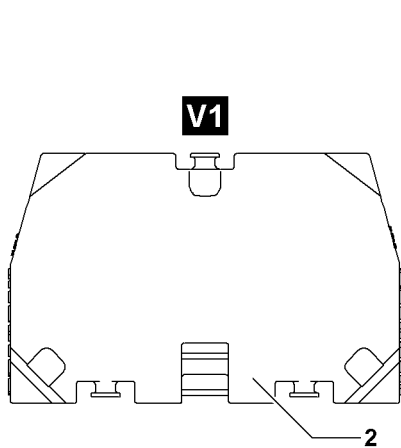
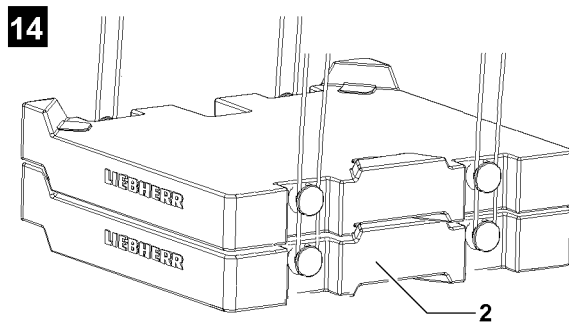
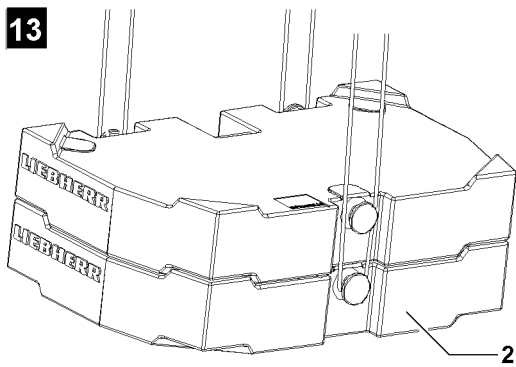
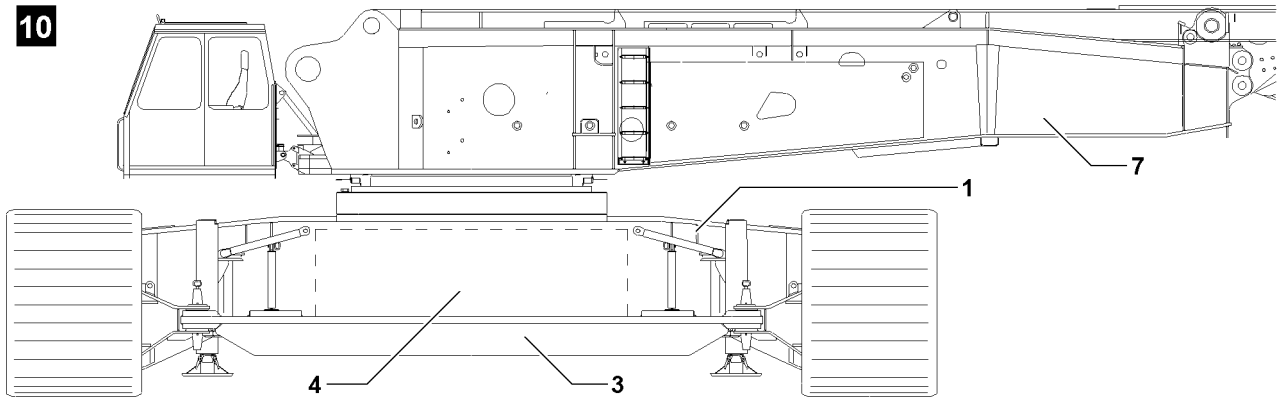


Fig.109676

LWE/LR 1750-000/12812-15-02/en

4.2 Placing the central ballast plates



WARNING

Damaged central ballast plates!

Damage on the central ballast plates **2** can cause the tackle to release!

The central ballast plates **2** and components can fall down!

Personnel can be severely injured or killed!

► Do not use damaged central ballast plates **2** and replace them immediately!



WARNING

Central ballast too low / too high!

If the placed central ballast deviates from the specified data in the load charts or the assembly conditions, then the crane can be damaged or topple over!

Personnel can be severely injured or killed!

► Make sure that the central ballast is placed according to the load chart!



WARNING

Asymmetric central ballast distribution!

If the central ballast is not distributed evenly on both base plates **3**, then this can lead to overload!

The crane can be damaged and components can fall down!

Personnel can be severely injured or killed!

► Make sure that the central ballast is distributed evenly on the base plates **3**!



WARNING

Toppling central ballast stack!

Lopsided stacked central ballast plates **2** create instability in the central ballast stack **4**!

The central ballast plates **2** can tip from the base plates **3** and cause the crane to topple over!

Personnel can be severely injured or killed!

► Make sure that the central ballast plates **2** are placed correctly in the centerings!



WARNING

Impermissible combination of central ballast plates!

Combining central ballast plates **2** of variation **V1** and variation **V2** creates instability in the central ballast stack **4**!

The central ballast plates **2** can tip from the base plates **3** and cause the crane to topple over!

Personnel can be severely injured or killed!

► Only central ballast plates **2** of the same variation may be stacked on each other!

Make sure that the following prerequisites are met:

- the crane is aligned in horizontal direction
- the turntable **7** is turned by 90°, see illustration
- the base plates **3** are pinned and secured

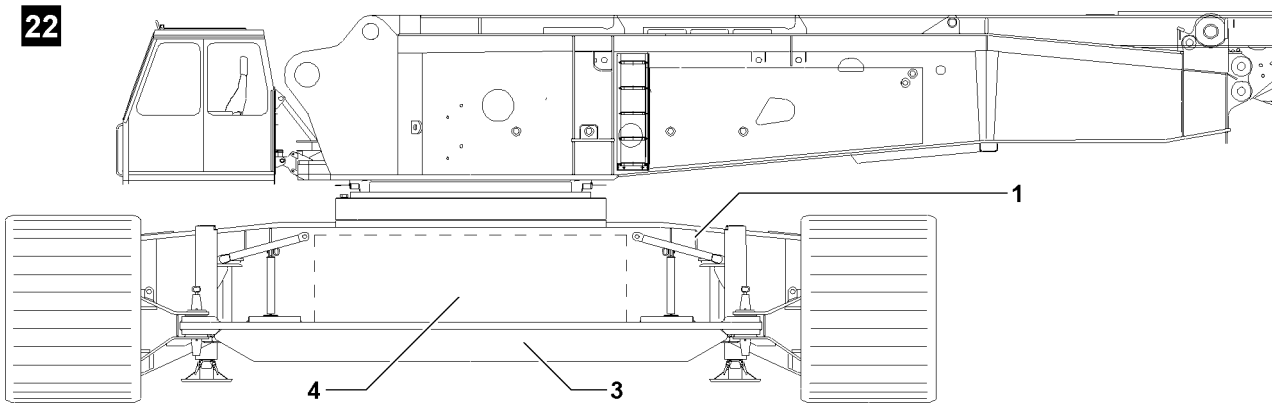
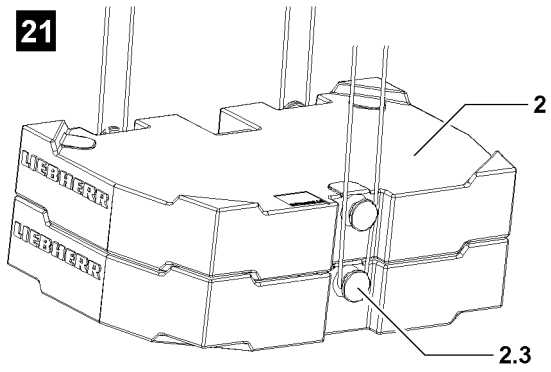
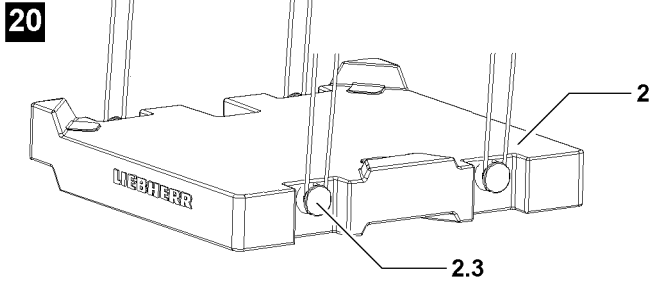


Fig.109678

LWE/LR 1750-000/12812-15-02/en

4.2.1 Placing the central ballast plates

**WARNING**

Overloaded central ballast plates!

If more than the permissible loads are lifted, the bits **2.3** are overloaded!

The central ballast plates **2** can be damaged and fall down!

Personnel can be severely injured or killed!

► Observe the chart „Permissible central ballast assemblies“ in this chapter!

**WARNING**

Incorrect handling of the attachment equipment!

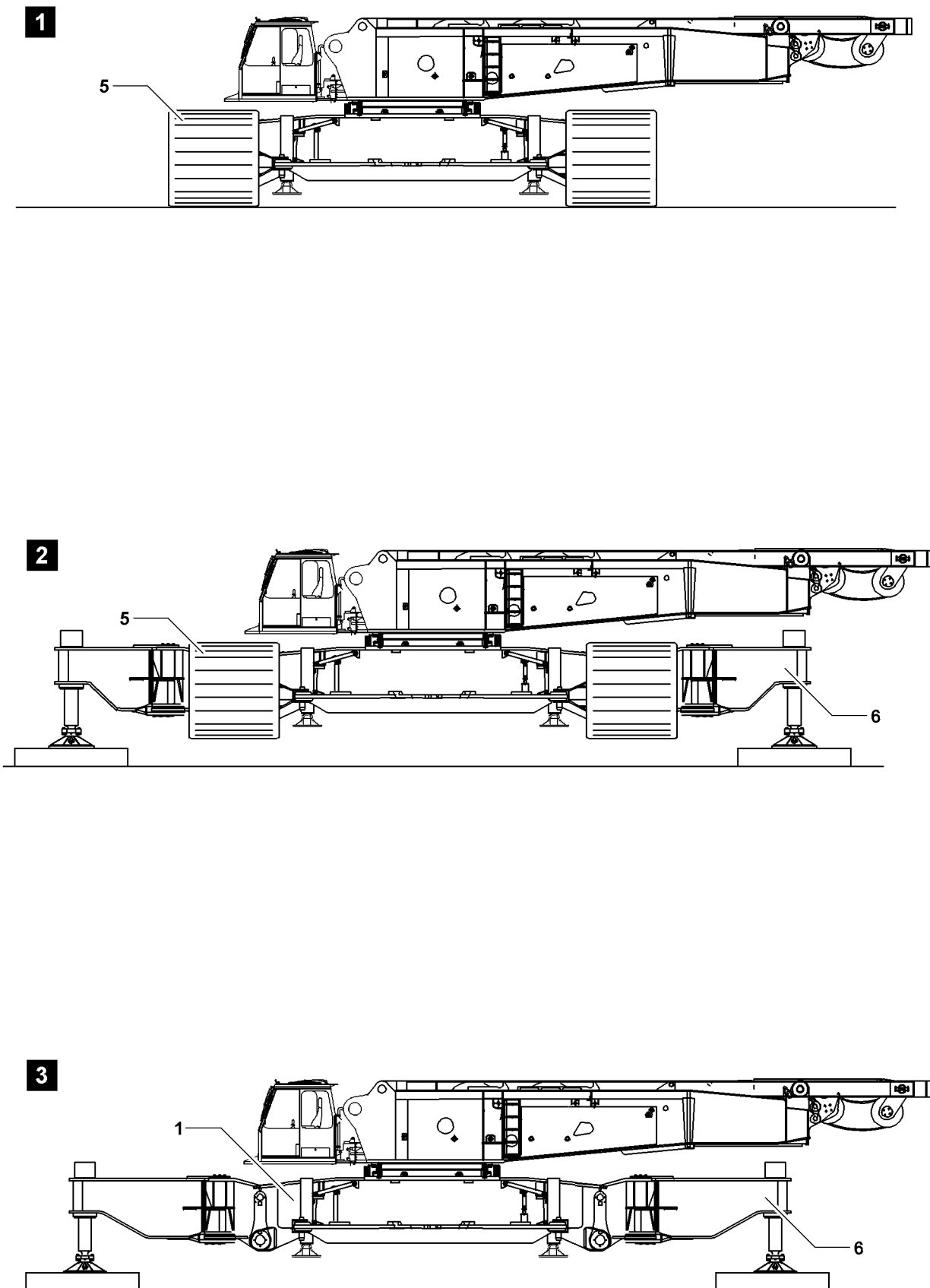
If tackle cannot be attached correctly and if it is not secured sufficiently to prevent it from loosening up, the central ballast plates **2** can fall down!

Personnel can be severely injured or killed!

► Make sure that the attachment equipment is correctly attached on the bits **2.3** and that it is secured sufficiently to prevent it from loosening up!

► Attach the central ballast plates **2** or the central ballast assembly, see illustration **20** and illustration **21** on the auxiliary crane.

► Lift the central ballast plates **2** or the central ballast assembly and place it carefully on the centerings on the base plate **3** or on another central ballast plate **2** in the central ballast stack **4**, see illustration **22**.



LWE/LR 1750-000/12812-15-02/en

Fig.109291

5 Removing the central ballast



WARNING

Danger of slipping / falling during assembly / disassembly work!

During assembly and disassembly work, personnel must be secured with appropriate antifall guards to prevent them from falling!

Weather influences, such as wetness, wind, snow, frost increase the slipping / falling danger!

Personnel can be severely injured or killed!

- ▶ All assembly / disassembly work must be carried out using suitable aids (lifting platforms, scaffolding, ladders, auxiliary crane, etc.)!
- ▶ If work cannot be carried out on the ground or using such aids, then assembly personnel must be secured with the personal fall arrest system (see Crane operating instructions, chapter 2.04) to protect against falling!
- ▶ Hang in the personal antifall system in the corresponding attachment points on the crane (see Crane operating instructions, chapter 2.06)!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall arresters only with clean shoes!
- ▶ Keep aids and fall arresters clean and free from snow and ice!



WARNING

Falling components and central ballast plates!

At assembly / disassembly, the components and central ballast plates can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that no persons or objects are within the danger zone!



WARNING

Incorrect handling of the attachment equipment!

If attachment equipment cannot be attached correctly and if it is not secured sufficiently to prevent it from loosening up, loads can fall down. Personnel can be severely injured or killed!

- ▶ Make sure that the attachment equipment is correctly attached on the attachment points and that it is secured sufficiently to prevent it from loosening up!



WARNING

Danger of impact / crushing!

If anyone remains within the assembly / disassembly area of the ballast, they would be exposed to a danger of impact / crushing!

Personnel can be severely injured or killed!

- ▶ Make sure that there are no persons between the components which are to be assembled / disassembled on the components and the crawler travel gear!

Make sure that the following prerequisites are met for operation on crawler carriers **5**:

- both crawler carriers **5** are standing on the ground
- the crane is aligned in horizontal direction
- the turntable **7** is turned by 90°, see illustration

Make sure that the following prerequisites are met for operation on crane support **6**:

- the crane support **6** is folded out
- the crane is supported and horizontally aligned via the crane support **6**
- the turntable **7** is turned by 90°, see illustration

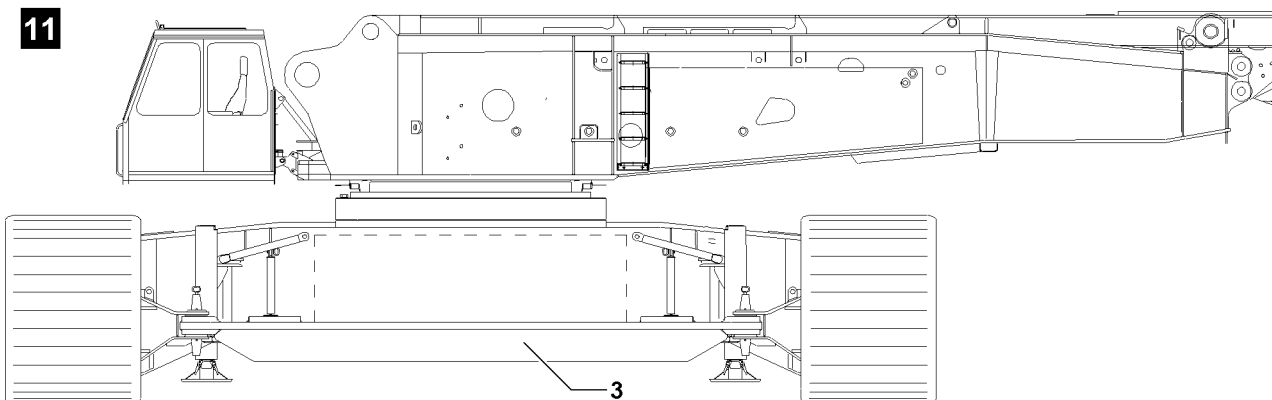
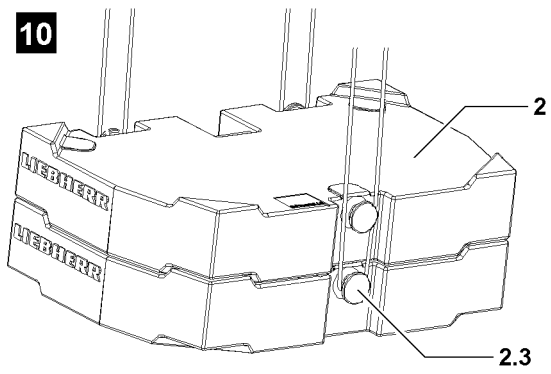
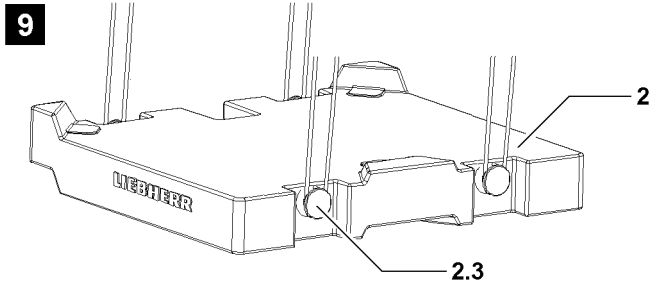


Fig.109677

LWE/LR 1750-000/12812-15-02/en

5.1 Removing the central ballast plates



WARNING

Overloaded central ballast plates!

If more than the permissible loads are lifted, the bits **2.3** are overloaded!

The central ballast plates **2** can be damaged and fall down!

Personnel can be severely injured or killed!

- ▶ Observe the chart „Permissible central ballast assemblies“ in this chapter!



WARNING

Incorrect handling of the attachment equipment!

If tackle cannot be attached correctly and if it is not secured sufficiently to prevent it from loosening up, the central ballast plates **2** can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that the attachment equipment is correctly attached on the bits **2.3** and that it is secured sufficiently to prevent it from loosening up!

- ▶ Attach the central ballast plates **2** or the central ballast assembly, see illustration **9** and illustration **10** on the auxiliary crane.

- ▶ Remove the central ballast plates **2** or the central ballast assembly from the base plate **3** and place it on a suitable storage location.

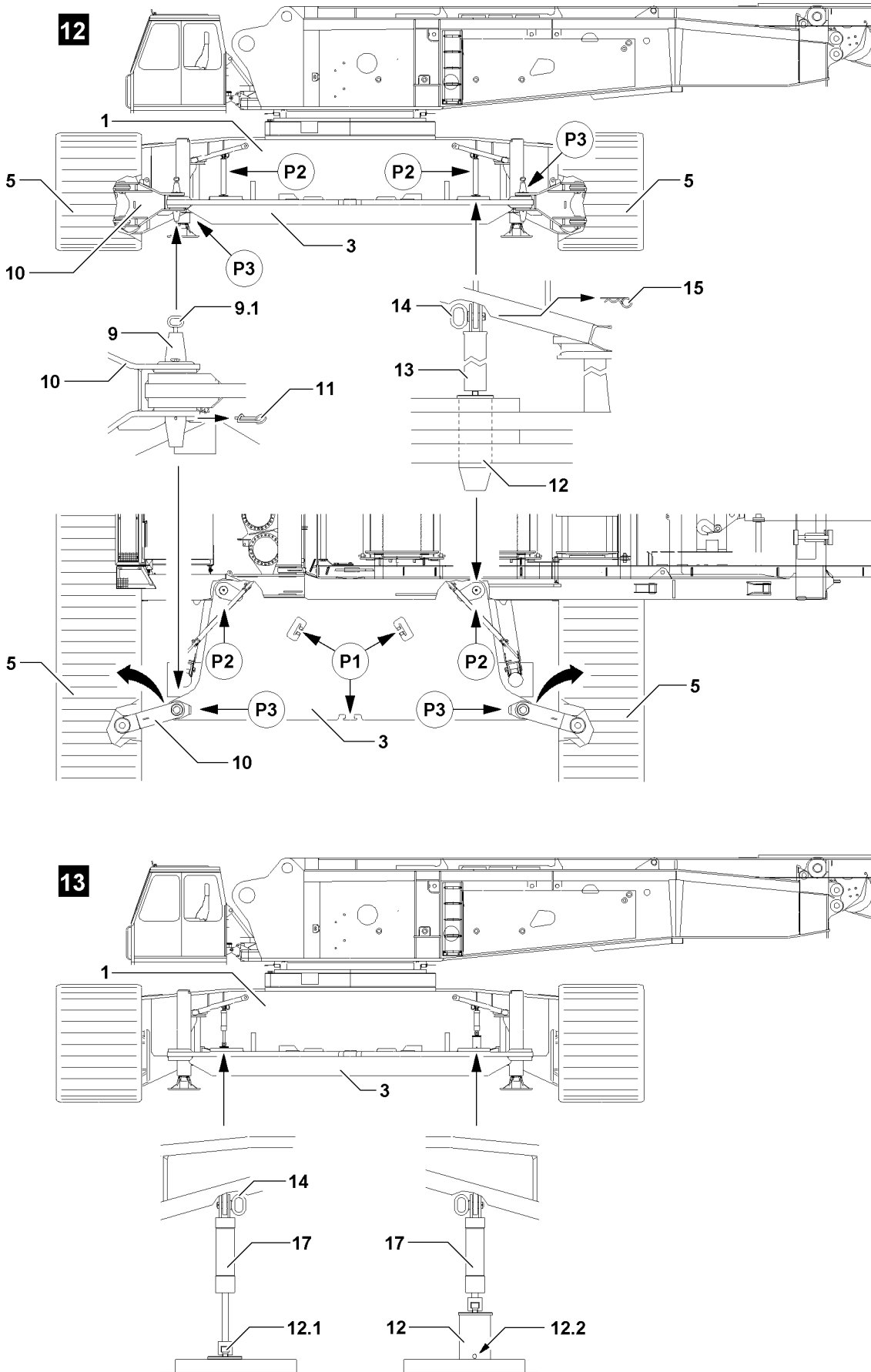


Fig.109300

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5.2 Removing the base plates



Note

- ▶ The disassembly procedure varies, depending in the equipment configuration!

The following three equipment configurations are possible and they differ in disassembly steps:

- Crane operation on crawler
- Crane operation on crane support on crawler carriers
- Crane operation on crane support on crawler center section

5.2.1 Removing the base plates, crane operation on crawler

- ▶ On point **P3**, remove the lower spring retainers **11** from the double cone pins **9**.
- ▶ Attach an auxiliary crane on the ring screw **9.1** and carefully pull the double cone pin **9** out in upward direction.
- ▶ Position the tackle with the auxiliary crane in the center above points **P1**.
- ▶ Attach the base plate **3** on the points **P1** to the auxiliary crane.
- ▶ Tension the tackle with the auxiliary crane until the consoles **10** are freely moveable on point **P3**.
- ▶ Swing in the consoles **10** in the crawler carrier **5** and secure.

Release the pin **12** on point **P2**:

- ▶ Unpin the grip bolt **14** and remove the retaining tube **13**.
- ▶ Push the pin pulling device **17** with the fork head over the screw head **12.1** and pin with the grip bolt **14** on the crawler center section **1**, see illustration **13**.
- ▶ Pull the pin **12** out with the pin pulling device **17** until the bore **12.2** is clear.
- ▶ Unplug the bore **12.2** and relieve the pin pulling device **17**.
- ▶ Remove the pin pulling device **17**.
- ▶ Lift the base plate **3** slightly with auxiliary crane and remove.

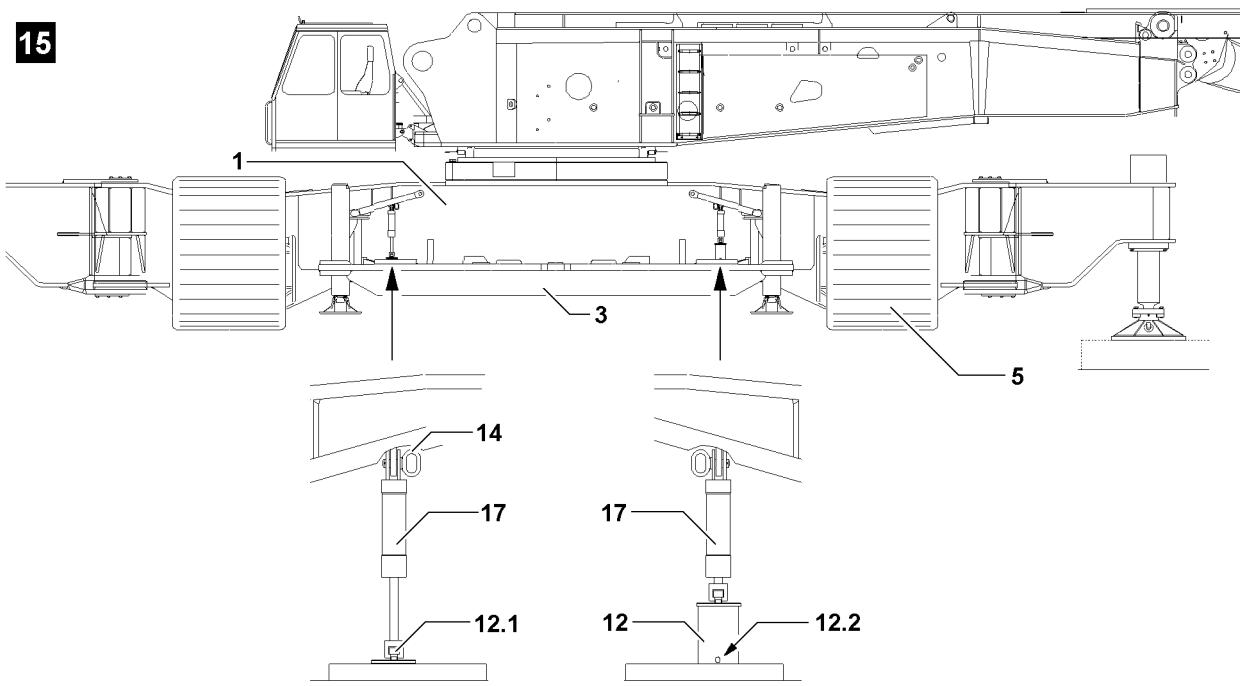
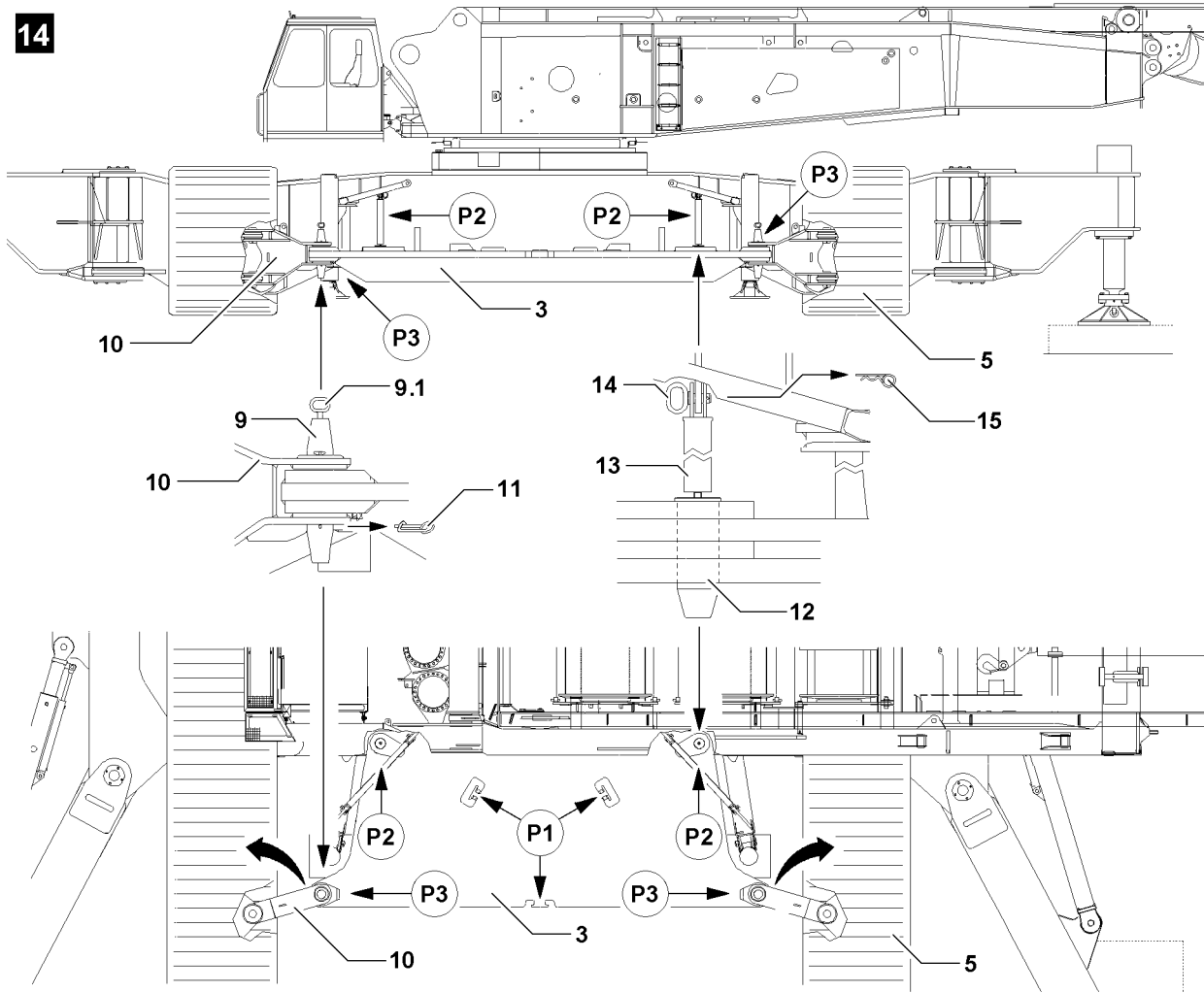


Fig.109391

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5.2.2 Removing the base plates, crane operation on crane support on crawler carriers

- ▶ On point **P3**, remove the lower spring retainers **11** from the double cone pins **9**.
- ▶ Attach an auxiliary crane on the ring screw **9.1** and carefully pull the double cone pin **9** out in upward direction.
- ▶ Position the tackle with the auxiliary crane in the center above points **P1**.
- ▶ Attach the base plate **3** on the points **P1** to the auxiliary crane.
- ▶ Tension the tackle with the auxiliary crane until the consoles **10** are freely moveable on point **P3**.
- ▶ Swing in the consoles **10** in the crawler carrier **5** and secure.

Release the pin **12** on point **P2**:

- ▶ Unpin the grip bolt **14** and remove the retaining tube **13**.
- ▶ Push the pin pulling device **17** with the fork head over the screw head **12.1** and pin with the grip bolt **14** on the crawler center section **1**, see illustration **15**.
- ▶ Pull the pin **12** out with the pin pulling device **17** until the bore **12.2** is clear.
- ▶ Unplug the bore **12.2** and relieve the pin pulling device **17**.
- ▶ Remove the pin pulling device **17**.
- ▶ Lift the base plate **3** slightly with auxiliary crane and remove.

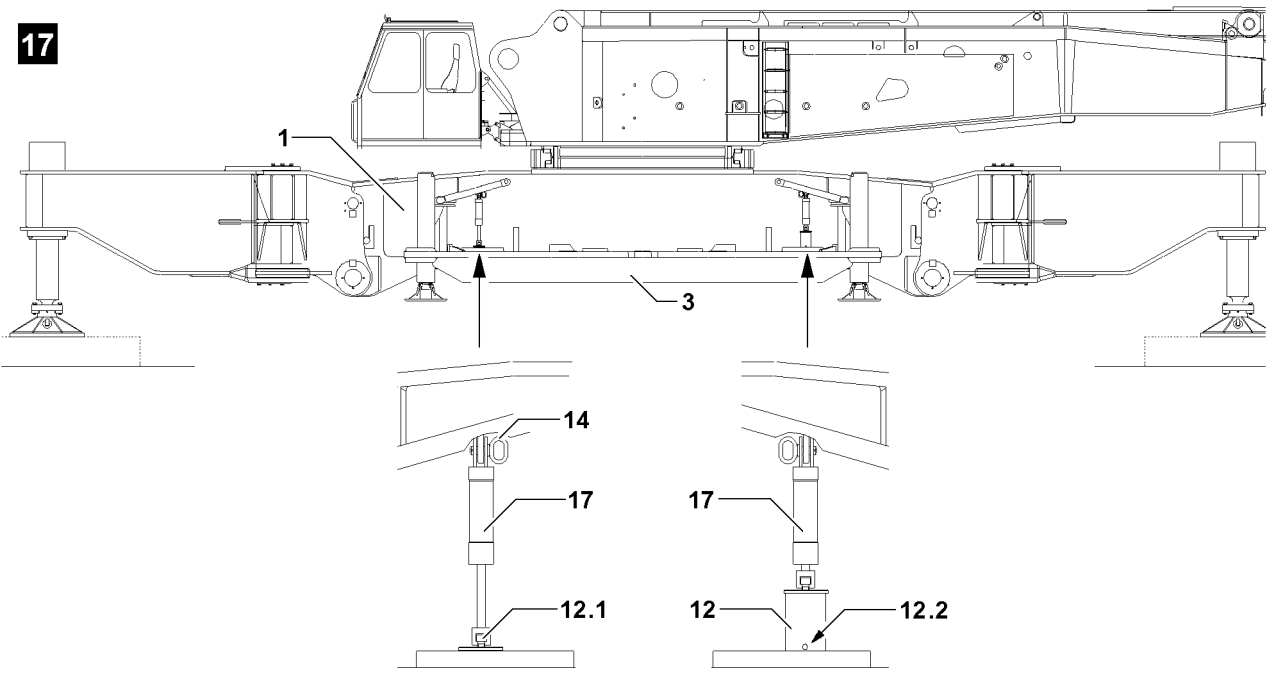
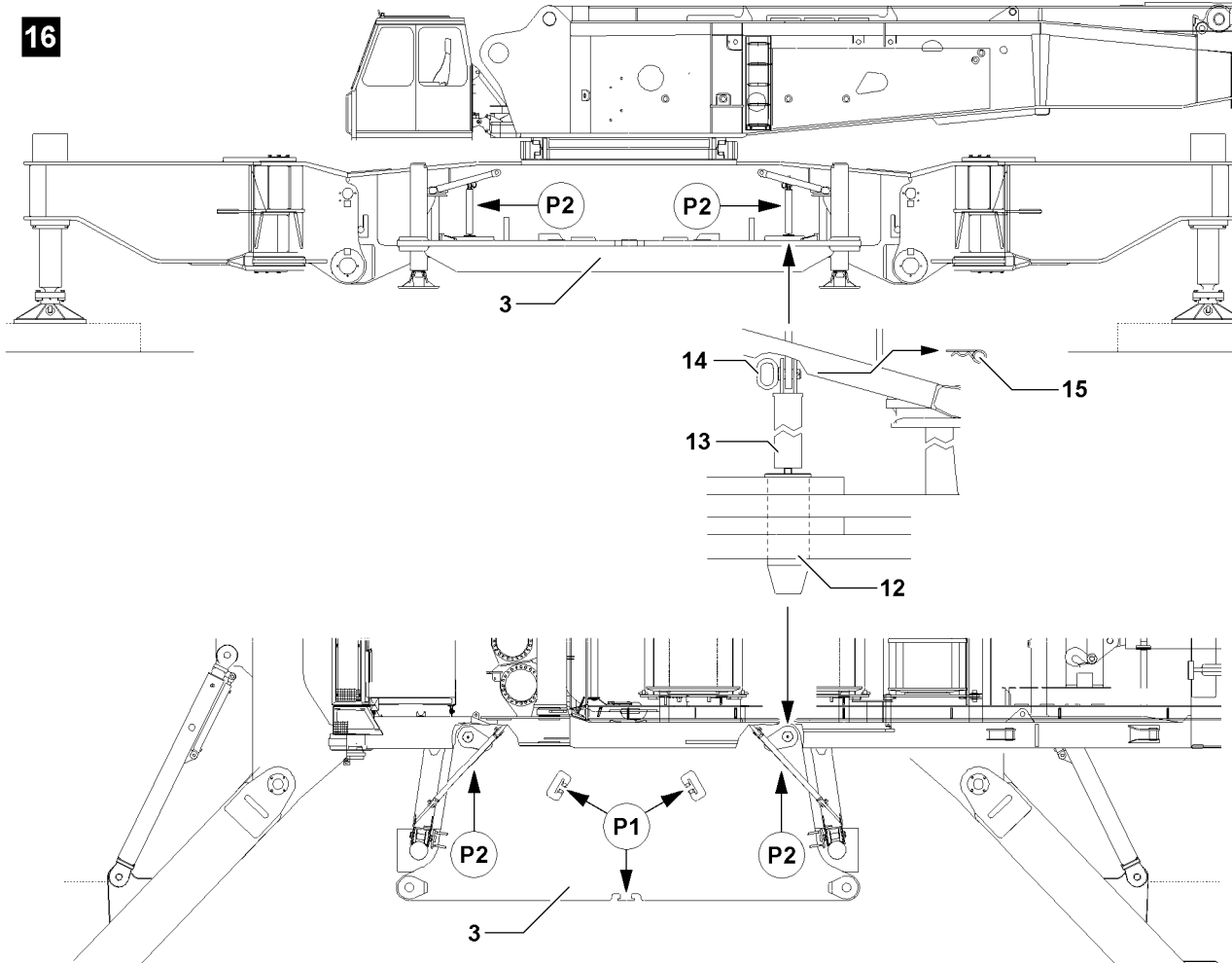


Fig.109392

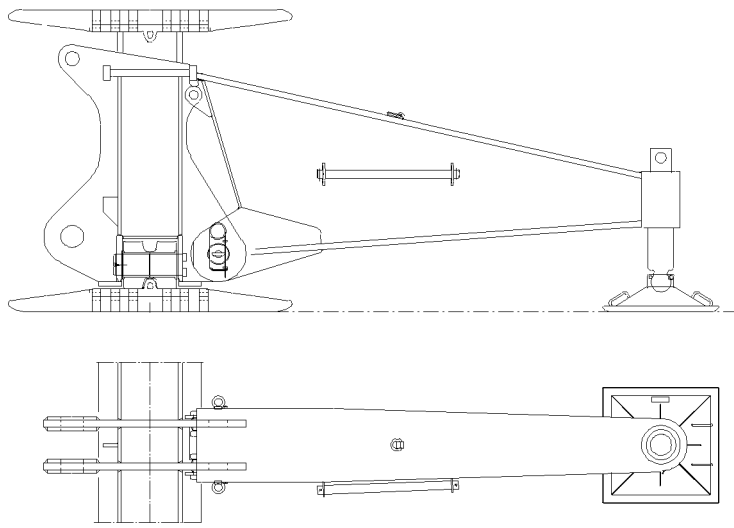
LWE/LR 1750-000/12812-15-02/en

5.2.3 Removing the base plates, crane operation on crane support on crawler center section

Release the pin **12** on point **P2**:

- ▶ Unpin the grip bolt **14** and remove the retaining tube **13**.
- ▶ Push the pin pulling device **17** with the fork head over the screw head **12.1** and pin with the grip bolt **14** on the crawler center section **1**, see illustration **17**.
- ▶ Pull the pin **12** out with the pin pulling device **17** until the bore **12.2** is clear.
- ▶ Unplug the bore **12.2** and relieve the pin pulling device **17**.
- ▶ Remove the pin pulling device **17**.
- ▶ Position the tackle with the auxiliary crane in the center above points **P1**.
- ▶ Attach the base plate **3** on the points **P1** to the auxiliary crane.
- ▶ Lift the base plate **3** carefully with auxiliary crane and remove.

1



2

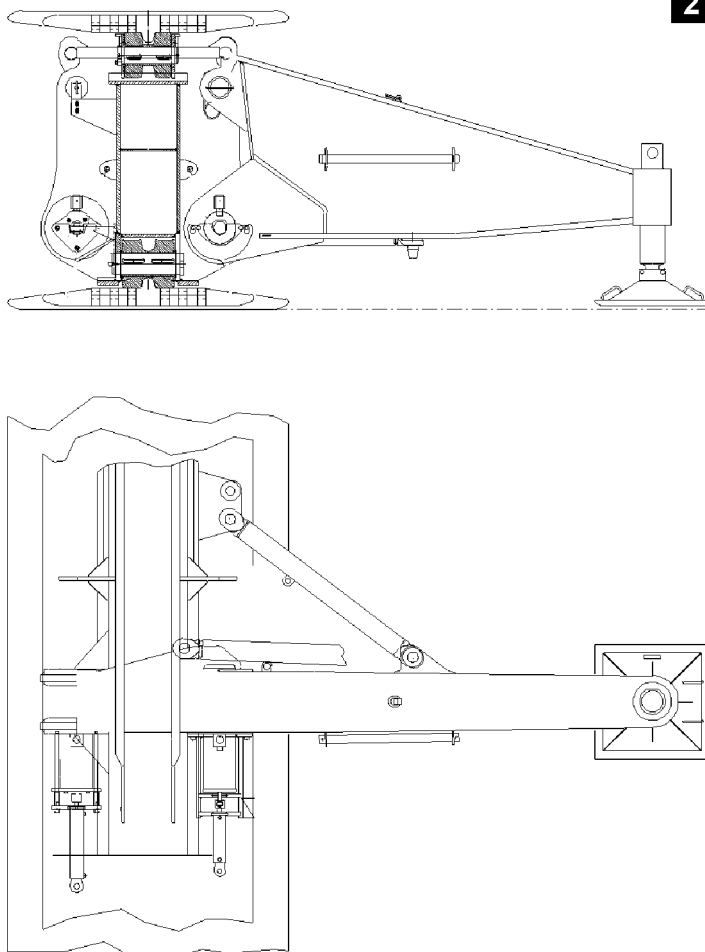


Fig.107770

1 General notes

**Note**

- ▶ The mechanical auxiliary support is required to erect or take down long boom combinations and can be assembled on the left or right crawler carrier!

**WARNING**

The crane can topple over!

If long boom combinations are erected or taken down without mechanical auxiliary support, then the crane can topple over. Personnel can be severely injured or killed!

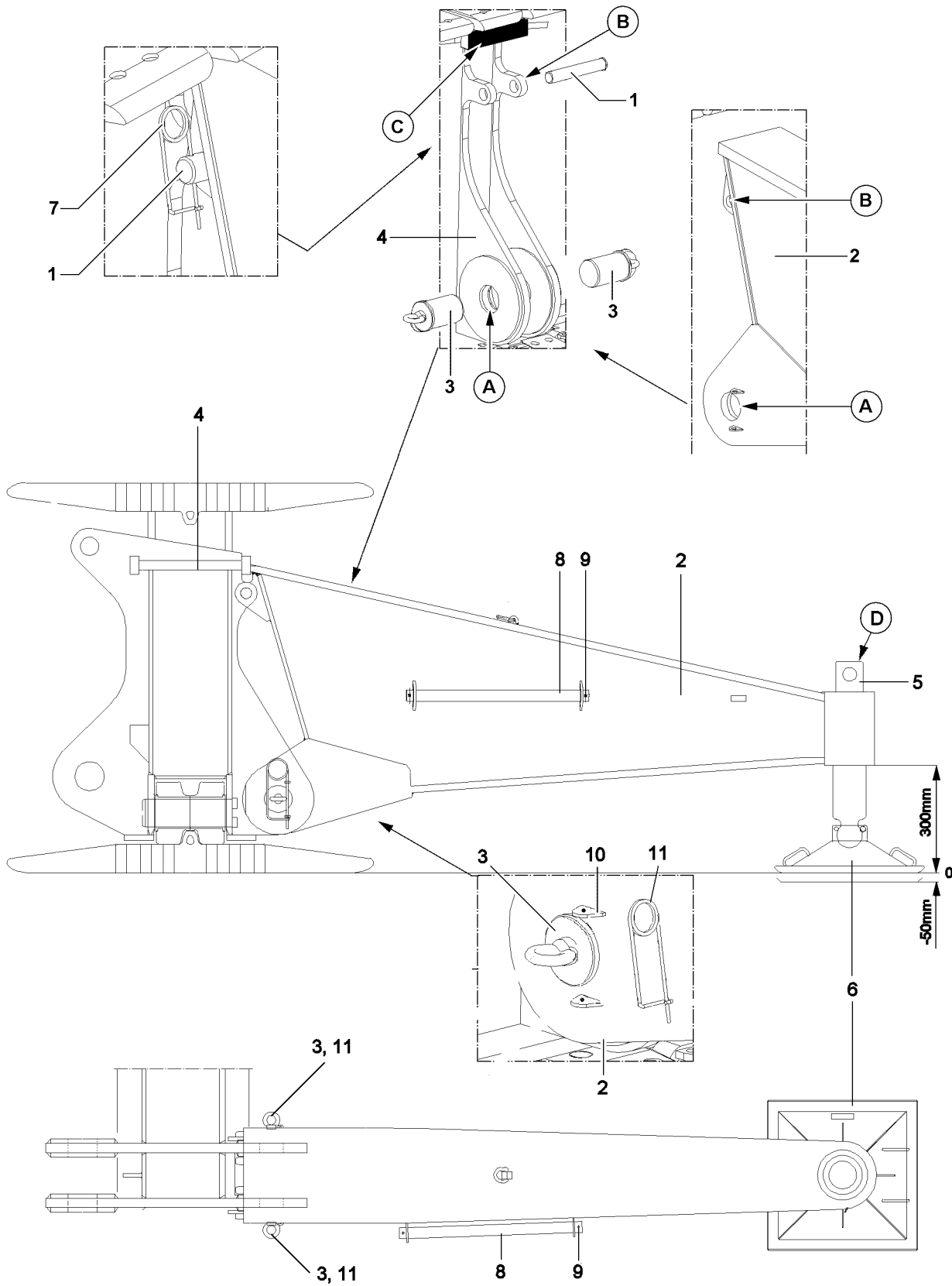
- ▶ Observe and adhere to the data in the erection and take down charts!
- ▶ Pin the mechanical auxiliary support on the crawler carrier and turn the spindle to lay the support pads on the ground.

**Note**

- ▶ There are two different kinds of mechanical auxiliary supports!

Variation 1: Auxiliary support assembled on a crawler carrier **without** brackets for crane support, **illustration 1!**

Variation 2: Auxiliary support assembled on a crawler carrier **with** brackets for crane support, **illustration 2!**



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Fig.107764

2 Mechanical auxiliary support variant 1

Make sure that the following prerequisites are met:

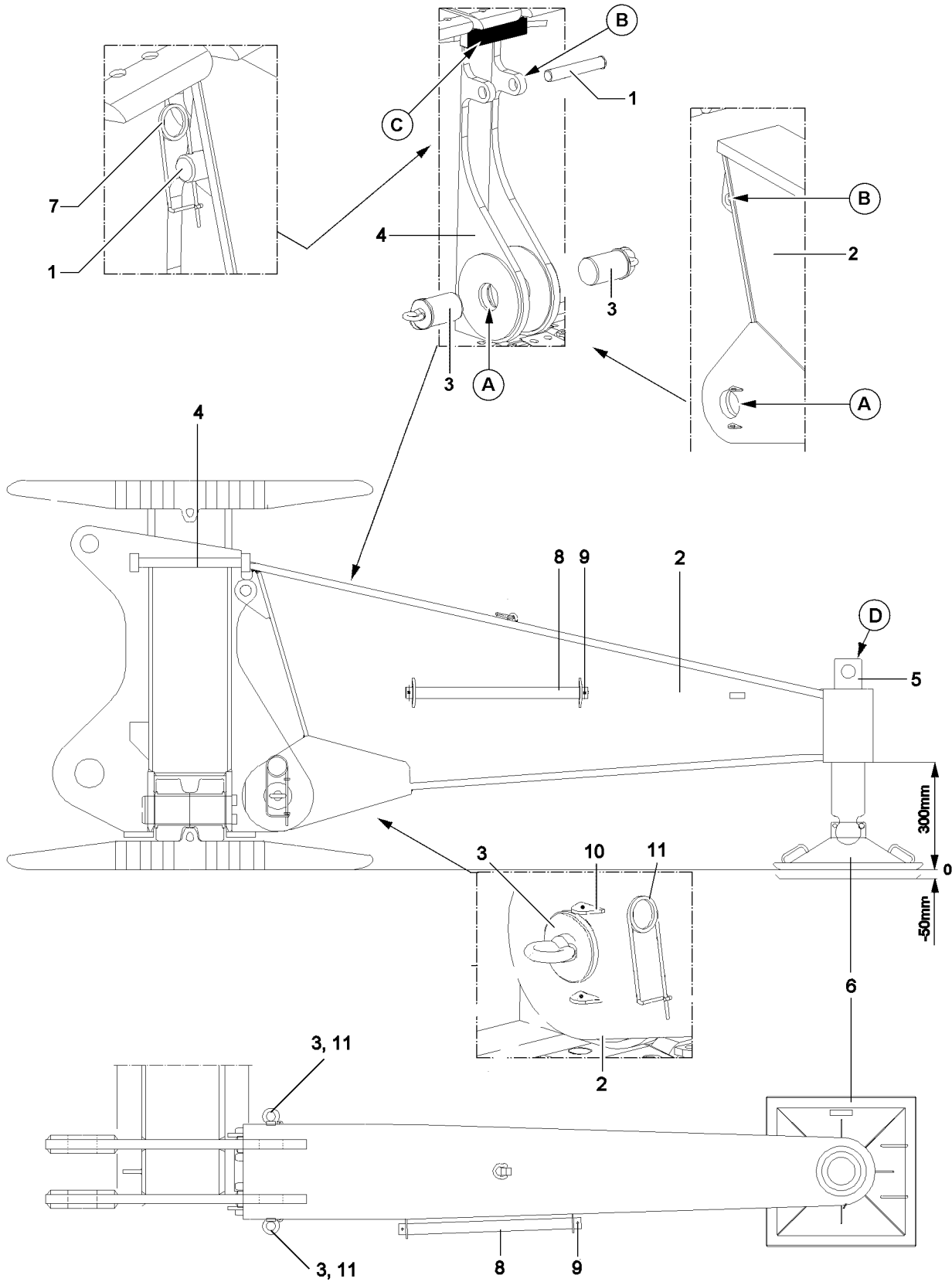
- the crawler carriers are assembled,
- the crane is aligned in horizontal direction,
- the subsoil has sufficient load bearing capacity in the area of the support pads,
- an auxiliary crane is available.

2.1 Components

Position	
1	Pin 60 mm
2	Mechanical auxiliary support
3	Pin 130 mm
4	Crawler carrier
5	Spindle
6	Support pad
7	Spring retainer 5 mm
8	Pipe
9	Spring retainer 6 mm
10	Retaining brackets
11	Spring retainer 8 mm

2.2 Assembling the mechanical auxiliary support

- ▶ Hang the mechanical auxiliary support **2** on the auxiliary crane and swing into pin position.
- ▶ Align the mechanical auxiliary support **2**: Make sure that the pin bores of the auxiliary support and the crawler carrier align in points **A** and in points **B**.
- ▶ Pin in the pins **3** each from the left and right on point **A**.
- ▶ Secure pins **3** from left and right: insert spring retainers **11** in the brackets **10**.
- ▶ Pin in the pin **1** on point **B** and secure with spring retainer **7**.
- ▶ Remove the mechanical auxiliary support from the auxiliary crane.



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Fig.107764

2.3 Adjusting the mechanical auxiliary support



Note

- ▶ The mechanical auxiliary support is only an erection and take down aid device!
- ▶ Due to the mechanical auxiliary support, the stability momentum of the crane increases toward the side, on which the auxiliary support is installed!



DANGER

The crane can topple over!

If the load moments are increased due to the use of the mechanical auxiliary support, the crane can topple over and severely or fatally injure personnel!

- ▶ The support pads must be made large enough for the ground conditions, use solid materials, such as wood, steel or concrete slabs, see chapter 2.04!



WARNING

Jerky movements of the boom system!

If the mechanical auxiliary support **2** is not placed on the crawler carrier **4** at point **C**, then the boom system can move jerkily during erection and take down!

Personnel can be severely injured or killed! The crane can be damaged!

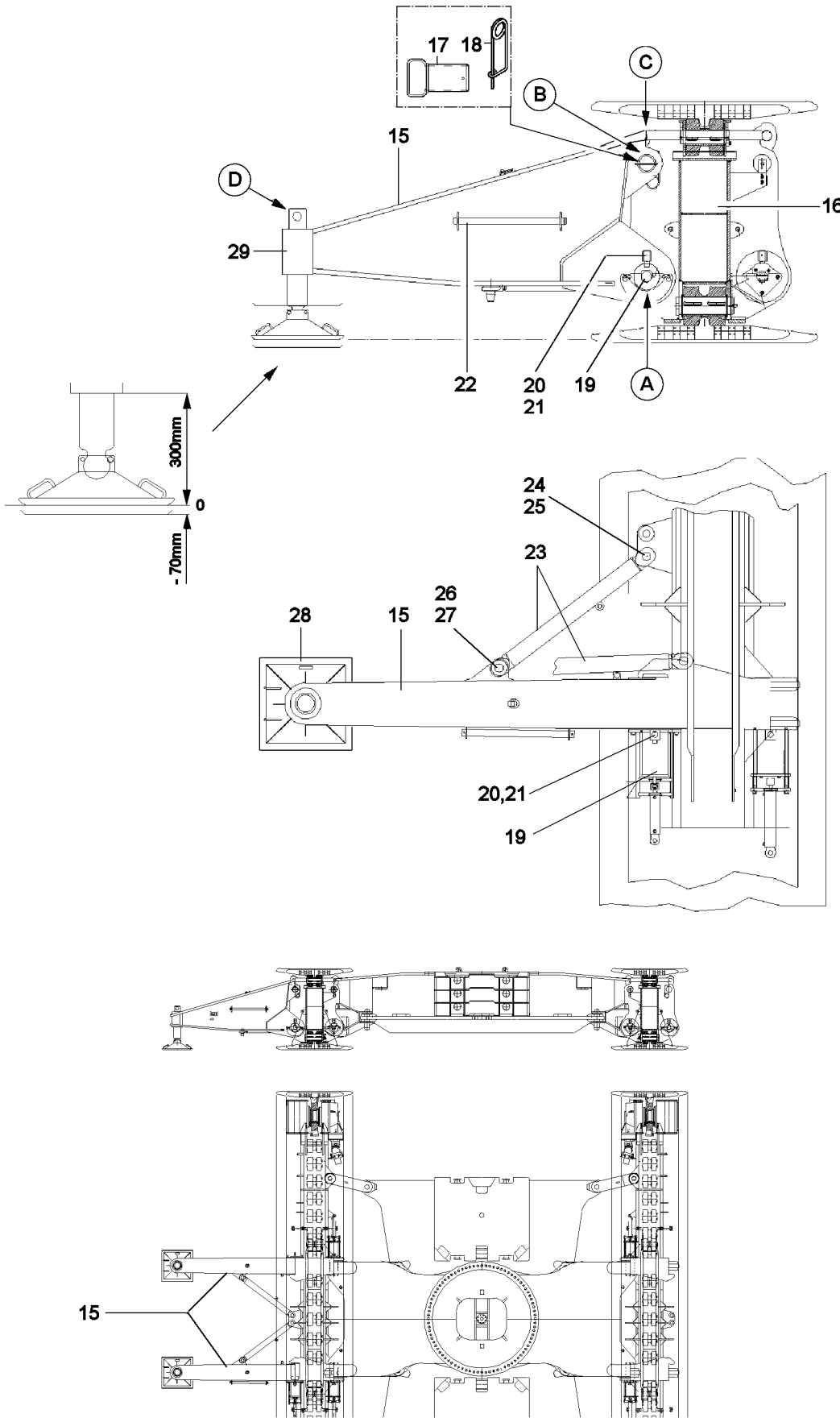
- ▶ Turn the support pad **6** with the spindle **5** until the mechanical auxiliary support **2** touches at point **C**!



Note

- ▶ Adjustment range of support pad: - 50 mm to + 300 mm!

- ▶ Remove the pipe **12** from the transport retainer on the mechanical auxiliary support.
- ▶ Insert the pipe **12** at point **D** into the bore on the spindle **5**.
- ▶ Extend the support pad **6** by turning the spindle **5** with the pipe **12** downward until it is „tensioned“ and placed horizontally on the base support and has contact to the placement surface **C** on the crawler carrier.



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Fig.107769

3 Mechanical auxiliary support variant 2

Make sure that the following prerequisites are met:

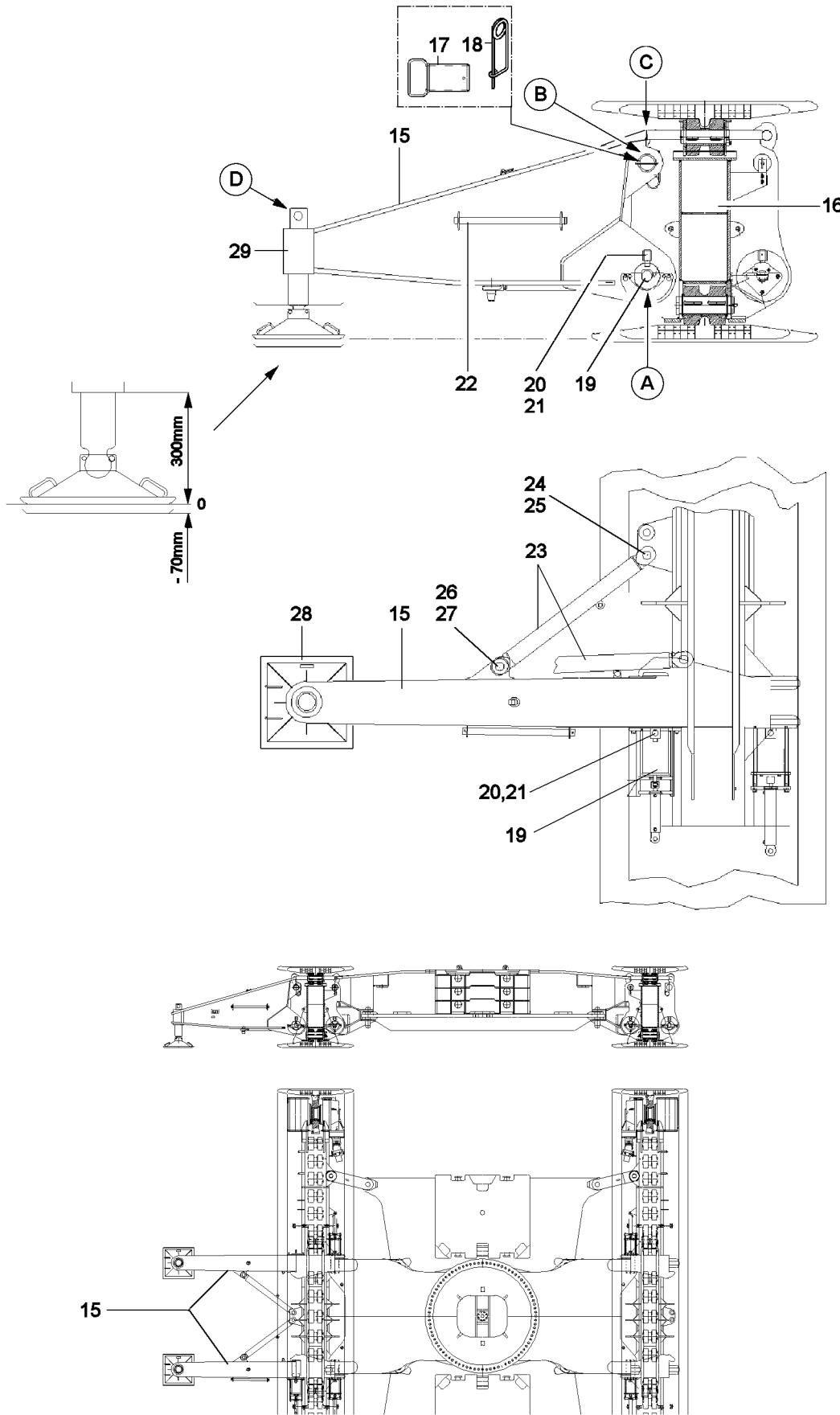
- the crawler carriers are assembled,
- the crane is aligned in horizontal direction,
- the subsoil has sufficient load bearing capacity in the area of the support pads,
- an auxiliary crane is available.

3.1 Components

Position	
15	Mechanical auxiliary support
16	Crawler carrier
17	Pin 148 mm
18	Spring retainer 8 mm
19	Pin 230 mm
20	Retaining pins 40 mm
21	Spring retainer 4 mm
22	Pipe
23	Support
24	Pin 75 mm
25	Spring retainer 8 mm
26	Pin 75 mm
27	Cotter pin 13 mm
28	Support pad
29	Spindle

3.2 Assembling the mechanical auxiliary support

- ▶ Hang the mechanical auxiliary support **15** on the auxiliary crane and swing into pin position.
- ▶ Align the mechanical auxiliary support **15**: Make sure that the pin bores of the auxiliary support and the crawler carrier align in points **A** and in points **B**.
- ▶ Pin in and secure the pin **19** on the point **A**.
- ▶ Pin in the retaining pin **20** and secure with spring retainer **21**.
- ▶ Pin in the pin **17** on point **B** and secure with spring retainer **18**.
- ▶ Remove the mechanical auxiliary support from the auxiliary crane.



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Fig.107769

3.3 Adjusting the mechanical auxiliary support



Note

- ▶ The mechanical auxiliary support is only an erection and take down aid device!
- ▶ Due to the mechanical auxiliary support, the stability momentum of the crane increases toward the side, on which the auxiliary support is installed!



DANGER

The crane can topple over!

If the load moments are increased due to the use of the mechanical auxiliary support, the crane can topple over and severely or fatally injure personnel!

- ▶ The support pads must be made large enough for the ground conditions, use solid materials, such as wood, steel or concrete slabs, see chapter 2.04!



WARNING

Jerky movements of the boom system!

If the mechanical auxiliary support **15** is not placed on the crawler carrier **16** at point **C**, then the boom system can move jerkily during erection and take down!

Personnel can be severely injured or killed! The crane can be damaged!

- ▶ Turn the support pad **28** with the spindle **29** until the mechanical auxiliary support **15** touches at point **C**!



Note

- ▶ Adjustment range of support pad: - 70 mm to + 300 mm!

- ▶ Remove the pipe **22** from the transport retainer on the mechanical auxiliary support.
- ▶ Insert the pipe **22** at point **D** into the bore on the spindle **29**.
- ▶ Extend the support pad **28** by turning the spindle **29** with the pipe **22** downward until it is „tensioned“ and placed horizontally on the base support and has contact to the placement surface **C** on the crawler carrier.

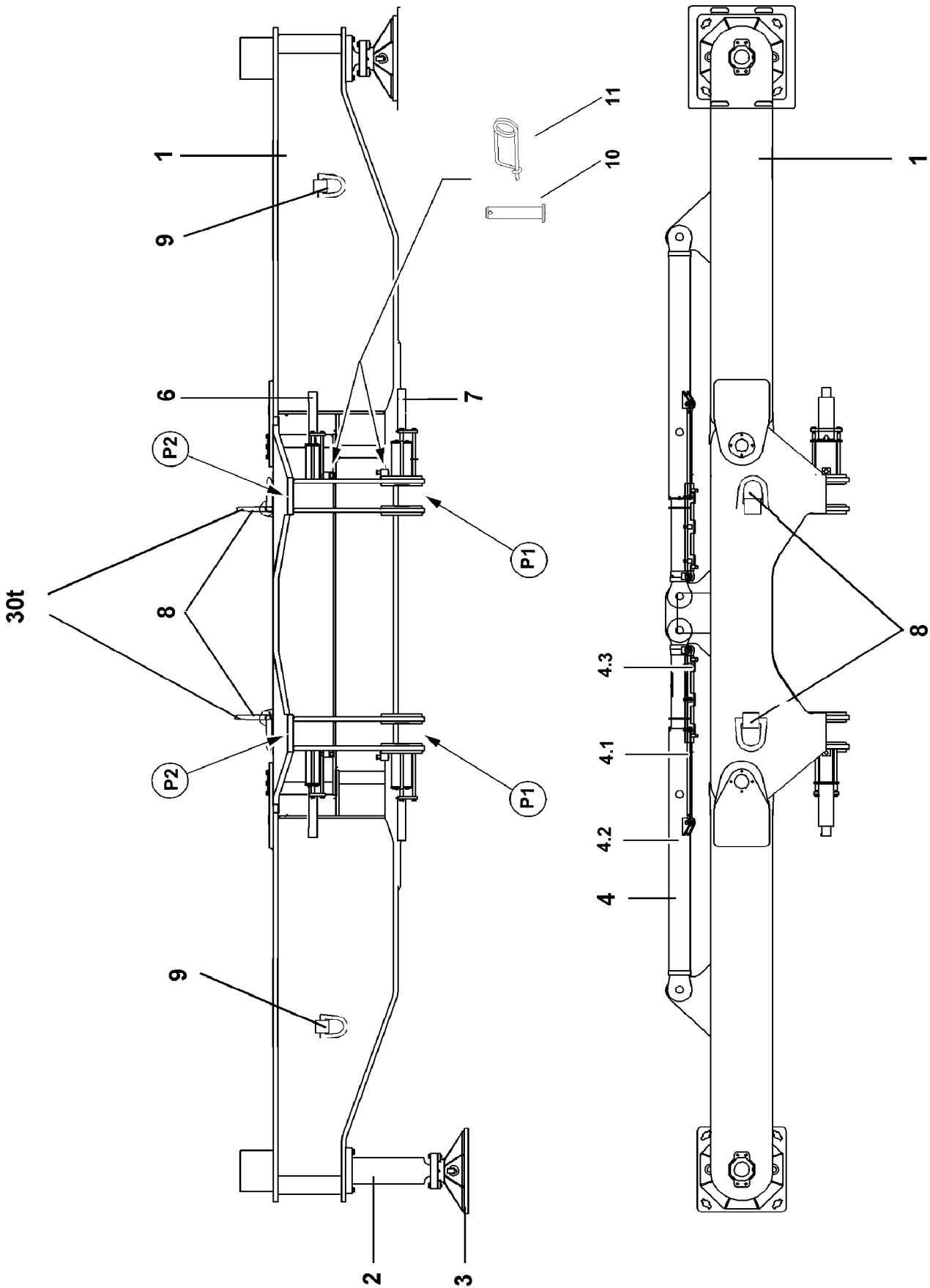


Fig.110534

LWE/LR 1750-000/12812-15-02/en

1 Component overview Crane support

- 1 Support beams
- 2 Support cylinder
- 3 Support plates
- 4 Swing unit
- 4.1 Swing cylinder
- 4.2 Guide tube
- 4.3 Scale for support base
- 6 Pinning top
- 7 Pinning bottom
- 8 Eyehooks
- 9 Rigging eyehooks for transport
- 10 Retaining pin
- 11 Spring retainer

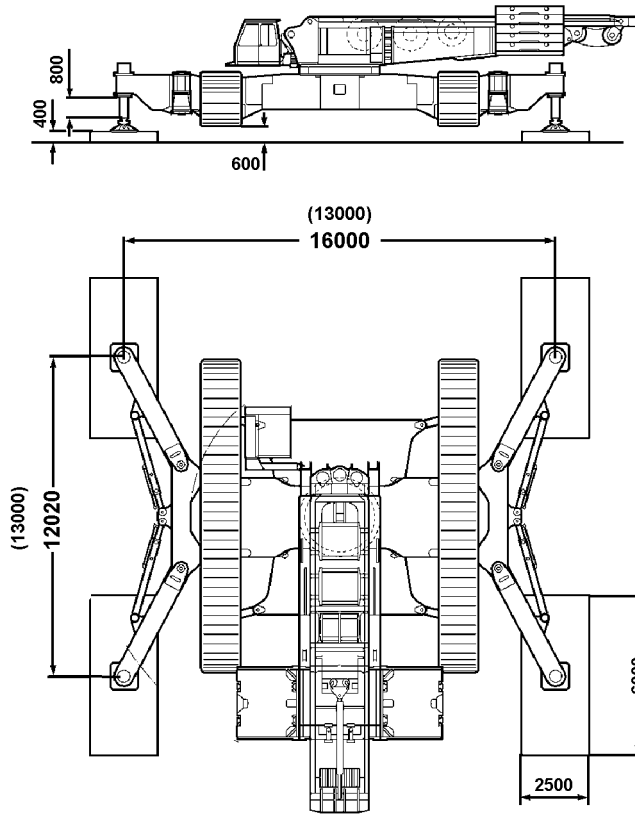
1.1 Dimensions and weights



Note

▶ See Crane operating instructions, chapter 1.03!

1



2

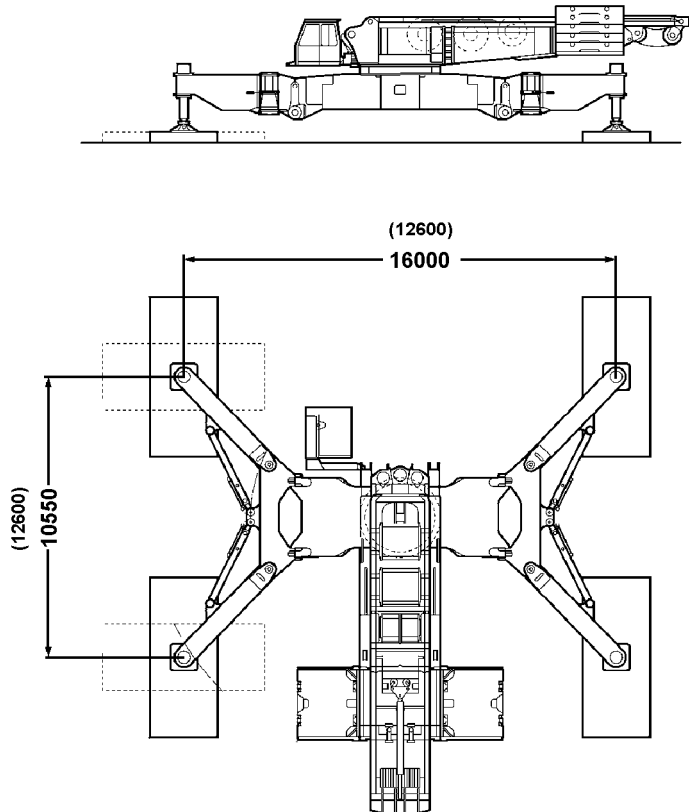


Fig.192175

LWE/LR 1750-000/12812-15-02/en

1.2 Hydraulic crane support

The hydraulic crane support consists of:

- Center section with support control unit and pinning device
- Four fold out support beams with hydraulic cylinders

1.2.1 Support bases for installation on crawler carrier (illustration 1)

- Square 13.0 m x 13.0 m
- Rectangle 16.0 m x 12.0 m

1.2.2 Support bases for installation on crawler center section (illustration 2)

- Square 12.6 m x 12.6 m
- Rectangle 16.0 m x 10.55 m

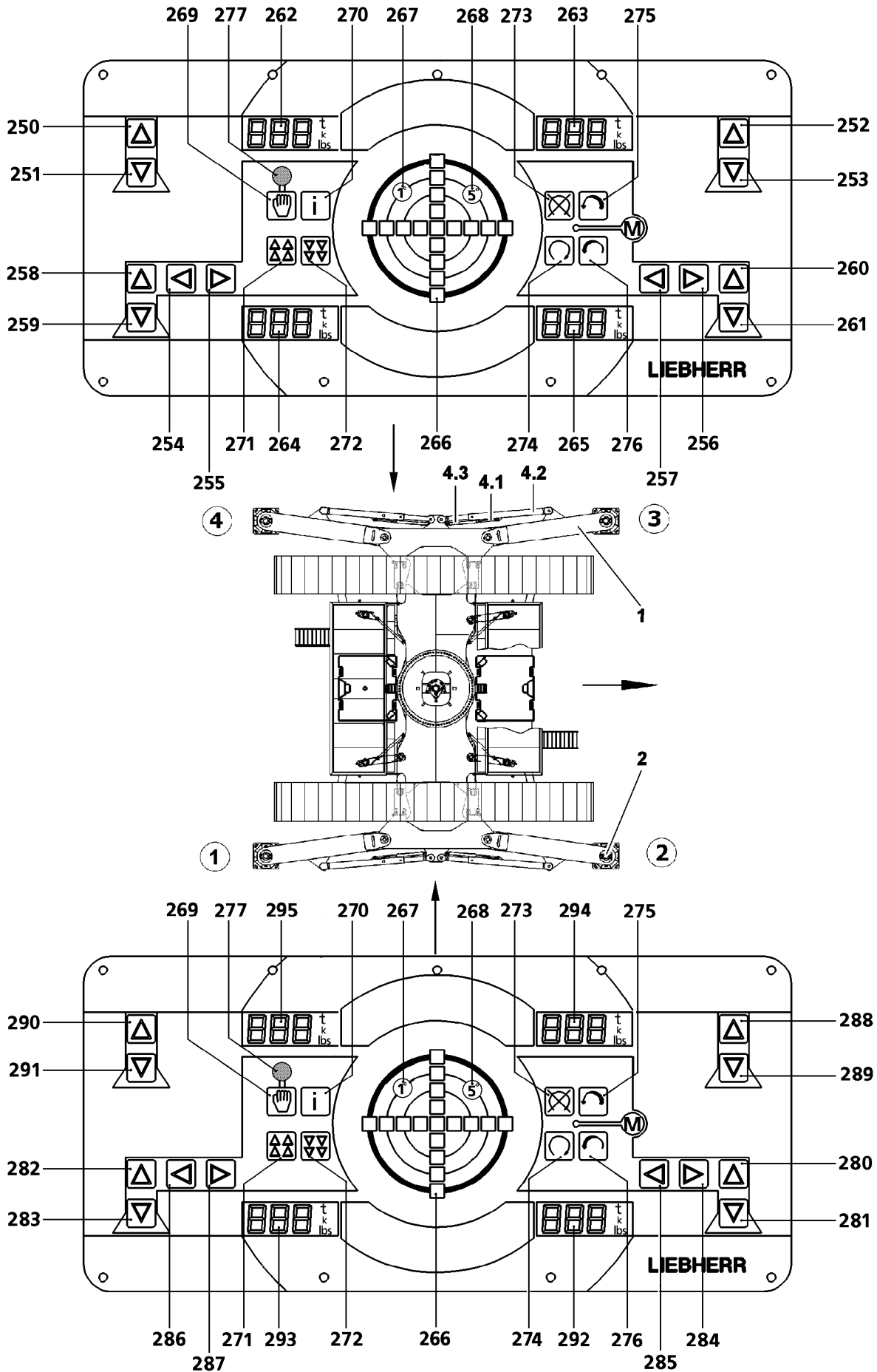


Fig.110546

LWE/LR 1750-000/12812-15-02/en

2 Operating elements support control unit

2.1 Operating elements support control unit left

Position	Element	Function
250	Button	Retract right front support cylinder
251	Button	Extend right front support cylinder
252	Button	Retract right rear support cylinder
253	Button	Extend right rear support cylinder
254	Button	Extend left front support beam
255	Button	Retract left front support beam
256	Button	Extend left rear support beam
257	Button	Retract left rear support beam
258	Button	Retract left front support cylinder
259	Button	Extend left front support cylinder
260	Button	Retract left rear support cylinder
261	Button	Extend left rear support cylinder
262	Display	Right front support force display
263	Display	Right rear support force display
264	Display	Left front support force display
265	Display	Left rear support force display
266	Display	Incline indicator
267	LED 1°	
268	LED 5°	
269	Button	Support control unit release
271	Button	Retract all support cylinders and align horizontally
272	Button	Extend all support cylinders and align horizontally
273	Button	Engine off
274	Button	Engine on
275	Button	Reduce engine rpm
276	Button	Increase engine rpm
277	LED	Lights up when support control unit is released



Note

Button **269** Release support control unit!

- ▶ Before the support cylinders or the sliding beams can be moved, the support control unit release **269** must be actuated first!

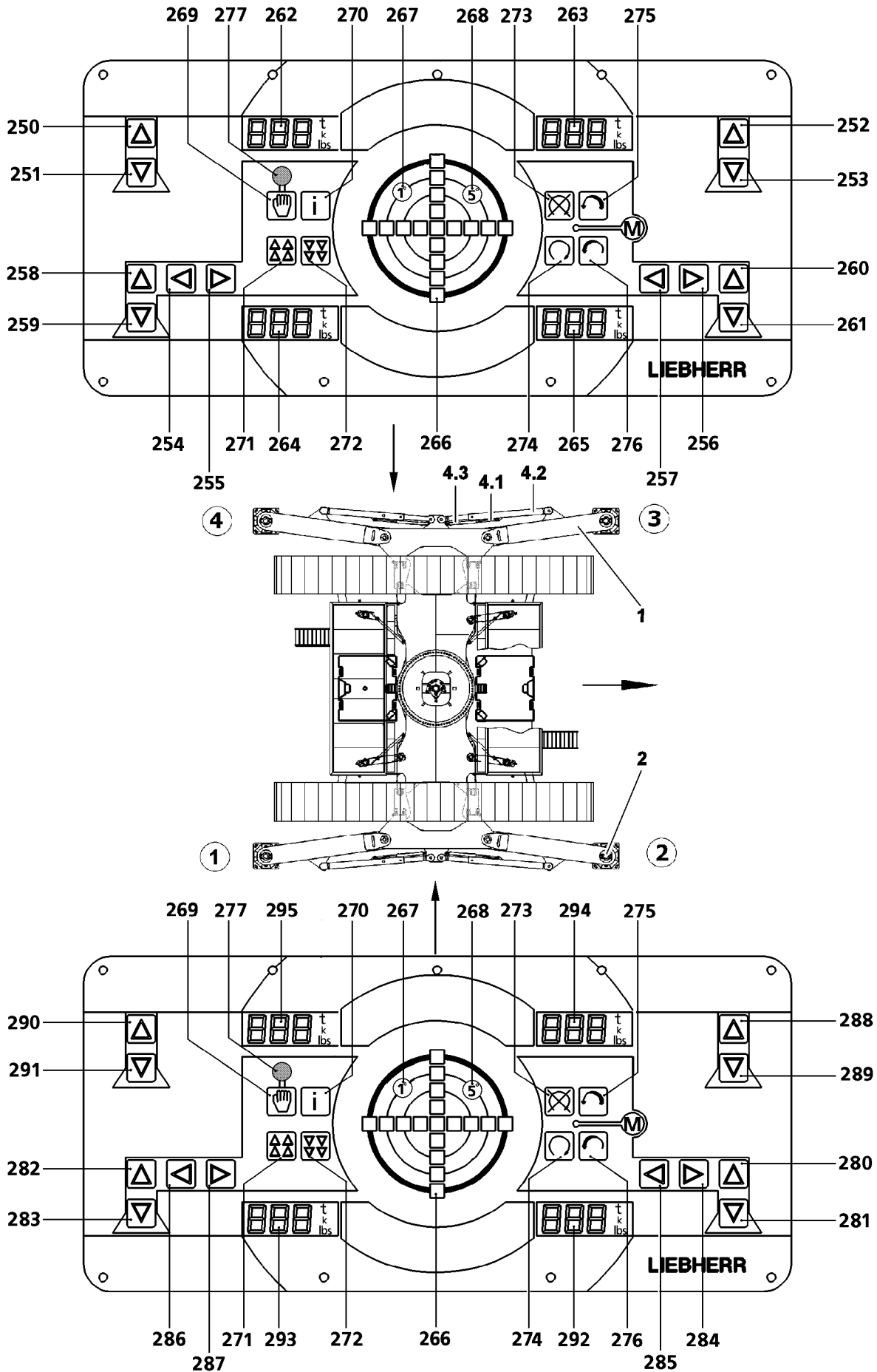


Fig.110546

LWE/LR 1750-000/12812-15-02/en

2.2 Operating elements support control unit right

Position	Element	Function
266	Display	Incline indicator
267	LED 1°	
268	LED 5°	
269	Button	Support control unit release
271	Button	Retract all support cylinders and align horizontally
272	Button	Extend all support cylinders and align horizontally
273	Button	Engine off
274	Button	Engine on
275	Button	Reduce engine rpm
276	Button	Increase engine rpm
277	LED	Lights up when support control unit is released
280	Button	Retract right front support cylinder
281	Button	Extend right front support cylinder
282	Button	Retract right rear support cylinder
283	Button	Extend right rear support cylinder
284	Button	Extend right front support beam
285	Button	Retract right front support beam
286	Button	Extend right rear support beam
287	Button	Retract right rear support beam
288	Button	Retract left front support cylinder
289	Button	Extend left front support cylinder
290	Button	Retract left rear support cylinder
291	Button	Extend left rear support cylinder
292	Button	Right front support force display
293	Display	Right rear support force display
294	Display	Left front support force display
295	Display	Left rear support force display



Note

Button **269** Release support control unit!

- ▶ Before the support cylinders or the sliding beams can be moved, the support control unit release **269** must be actuated first!

3 Installing the crane support



WARNING

Risk of falling!

During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any assembly work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see crane operating instructions, Chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!



WARNING

Components not pinned and secured!

If a component is released from the auxiliary crane before having been pinned and secured, the component will fall down! Personnel can be severely injured or killed!

- ▶ Do not disengage the auxiliary crane until the corresponding component is pinned and secured!



WARNING

Danger of impact / crushing!

When installing / removing counterweight components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be caught and severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

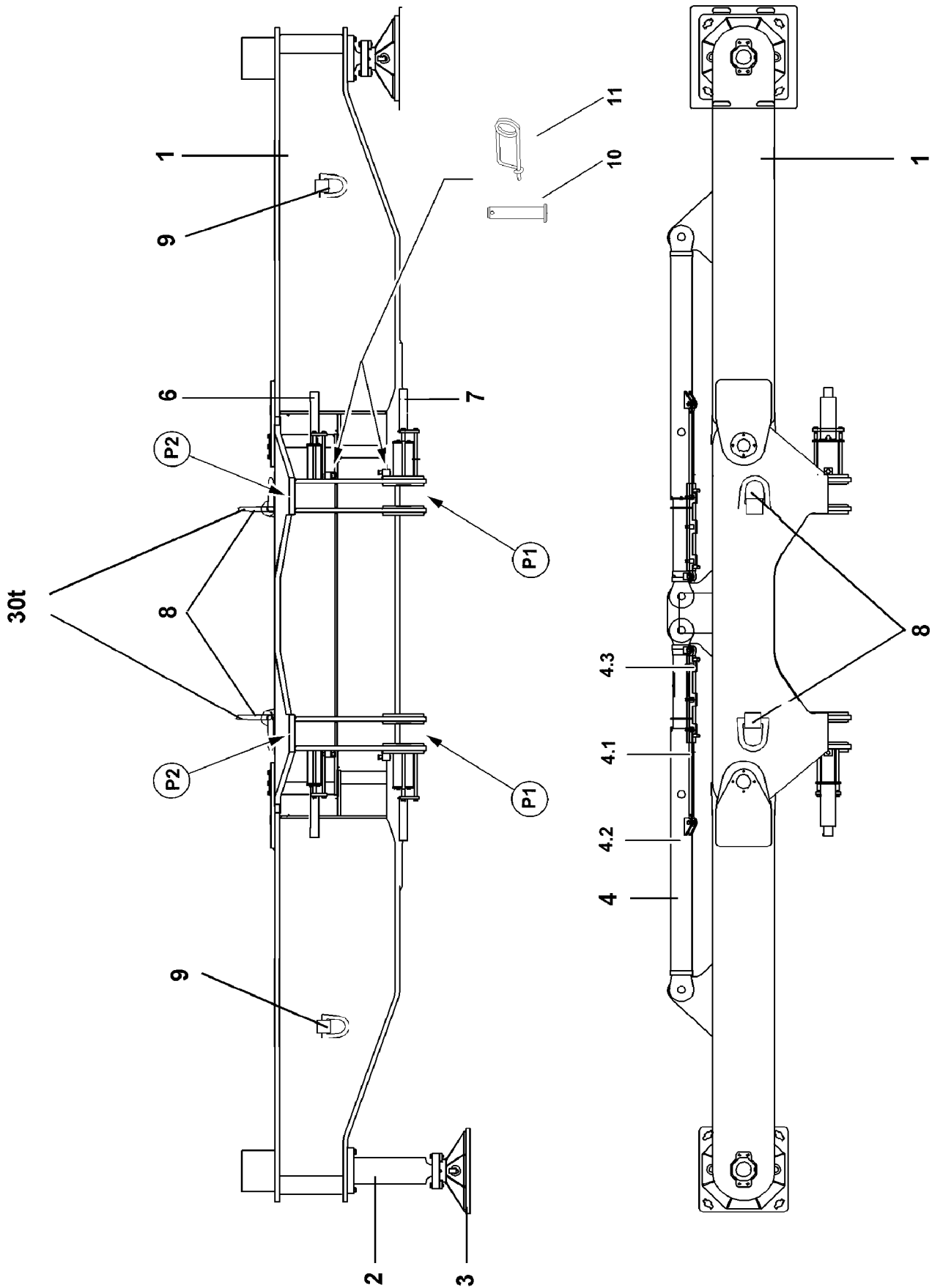


Fig.110534

LWE/LR 1750-000/12812-15-02/en

3.1 Positioning the crane support on the crawler center section or on the crawler carrier

Make sure that the following prerequisites are met:

- An auxiliary crane with sufficient load carrying capacity is available.
- The placement location must be level and have adequate load-bearing capacity.
- The crane is aligned in horizontal direction.

For installation of the crane support, use the eyehooks **8**.

- ▶ Attach the crane support on the eyehooks **8**.
- ▶ Swing the crane support in to the pin points point **P1** and point **P2** on the crawler carrier.
or
Swing the crane support in to the pin points on the crawler center section.

3.2 Establishing the hydraulic and electrical connections

To be able to install the crane support on the crawler center section or the crawler carriers, the hydraulic and electrical connections to the crane supports must be established.

3.2.1 Establishing the hydraulic connections

When connecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.



WARNING

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!

Personnel can be severely injured or killed!

- ▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!



WARNING

Loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
- ▶ Assemble coupling components (sleeve and connector) and screw together using hand-tightened nut.
- ▶ Tighten hydraulic coupling by hand. Rotate hand-tightened nut until it reaches a tangible, fixed stop position.
- ▶ Establish the hydraulic connections to the crane supports.

3.2.2 Establishing the electrical connections

- ▶ Establish the electrical connections to the crane supports, see separate electrical wiring diagram.

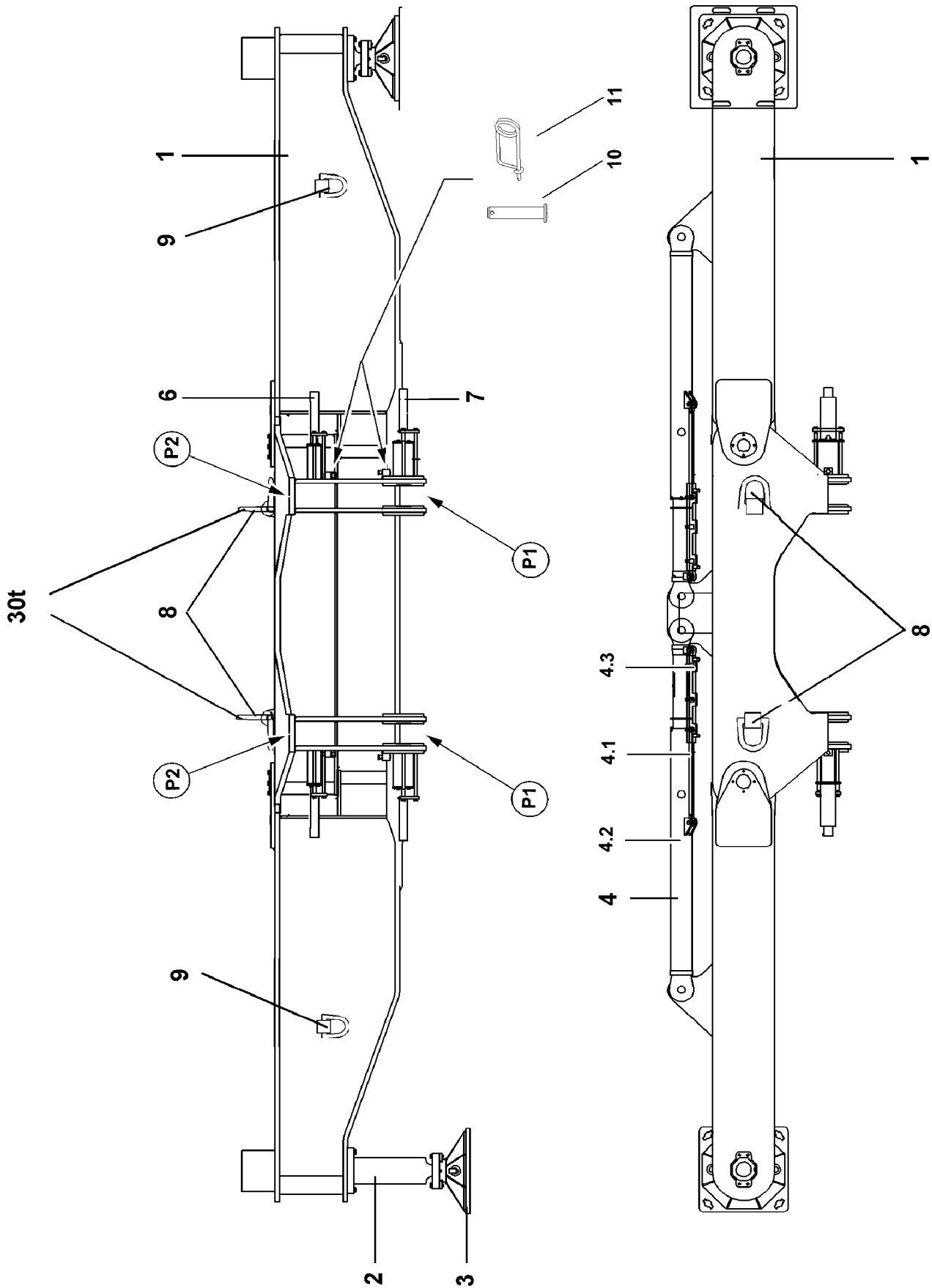


Fig.110534

LWE/LR 1750-000/12812-15-02/en

3.3 Pinning the crane support on the crawler center section or on the crawler carrier

The pinning of the crane supports on the crawler center section or the crawler carriers is made via radio remote control.



Note

- ▶ For operation of the radio remote control, see Crane operating instructions, chapter 5.08!
-

Make sure that the following prerequisites are met:

- All hydraulic connections have been made.
 - All electrical connections have been made.
 - The engine is running.
-

NOTICE

Pin is not released!

If the pin „on top“ **6** and pin „on the bottom“ **7** is secured by the retaining pin **10**, then the pinning device can be damaged during pinning!

- ▶ Make sure that the retaining pins **10** are unpinned!
-
- ▶ Swing the crane support in with the auxiliary crane until the pin bores point **P1** and point **P2** on the crawler center section or the crawler carriers align.
 - ▶ Pin the pin „on top“ **6** and pin „on the bottom“ **7** via the radio remote control on the crawler center section or the crawler carriers and secure with retaining pins **10**.
 - ▶ Secure the retaining pins **10** with spring retainers **11**.
-

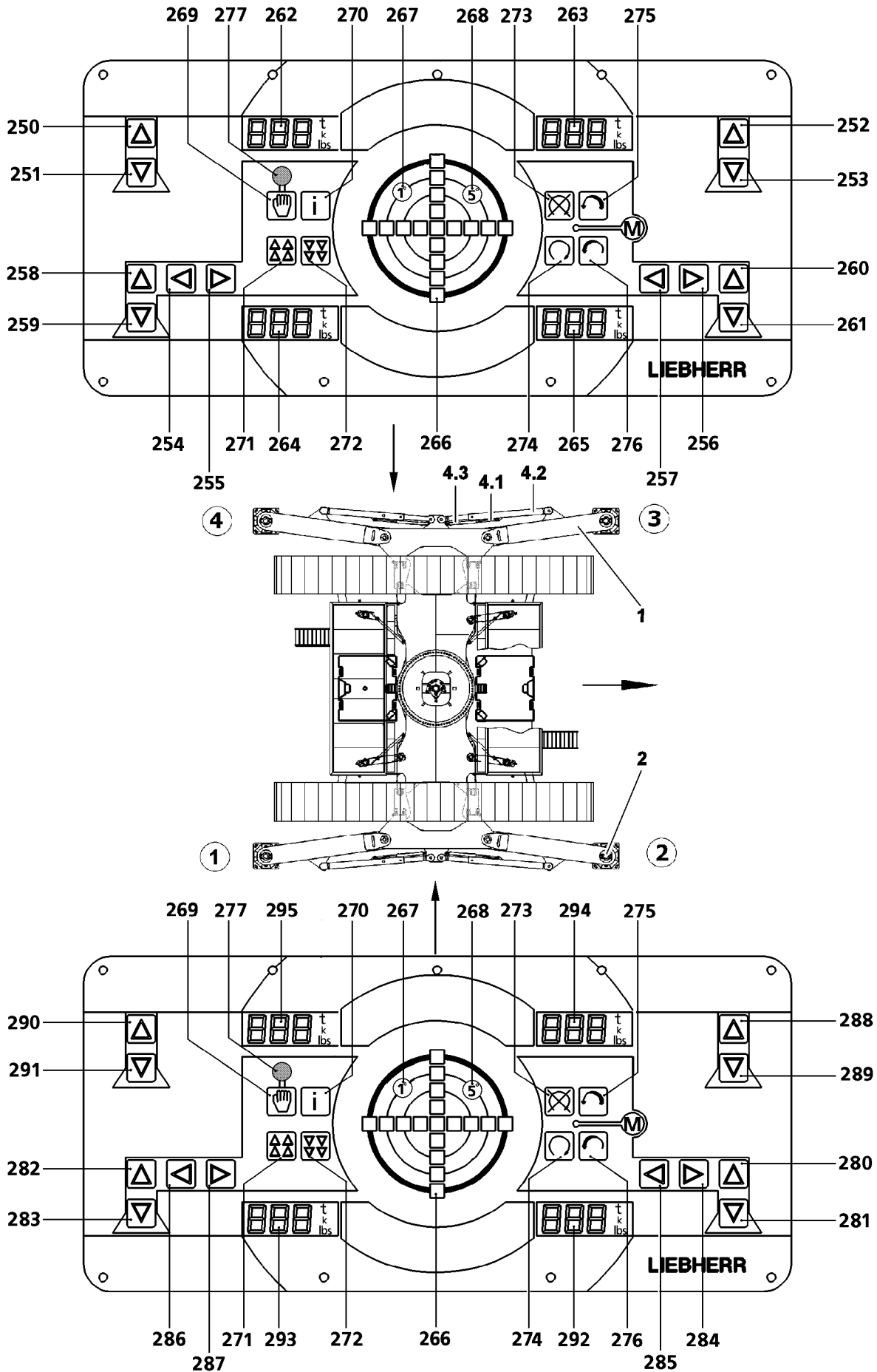


Fig.110546

LWE/LR 1750-000/12812-15-02/en

4 Supporting the crane via the support control unit

The crane can be supported via the support control unit on the support as well as from the crane operator's cab.

A support control unit is installed on both sides to operate the support.

Make sure that the following prerequisites are met:

- All hydraulic connections have been made.
- All electrical connections have been made.
- The placement location must be level and have adequate load-bearing capacity.



Note

Button **269** Release support control unit!

- ▶ Before the support cylinders or the sliding beams can be moved, the support control unit release **269** must be actuated first!
- ▶ The activation of the support control unit is shown by the illumination of the button and the green LED **277** „Release of support control unit“!
- ▶ The release turn off if no other button is pressed for 120 seconds or if the button **269** is pressed again!
- ▶ The deactivation of the support control unit is shown by the blinking button and when the green LED **277** turns off.



Note

- ▶ Starting the engine: Press the button **274**!
- ▶ Turn the engine off: Press the button **275**!
- ▶ The engine speed can be varied during the supporting procedure using button **275** and button **276**.



WARNING

The crane can topple over

If the data in the load chart in the LICCON overload protection regarding the respective support width are not observed, then the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Set the respective support width in the assigned load chart in the LICCON overload protection!

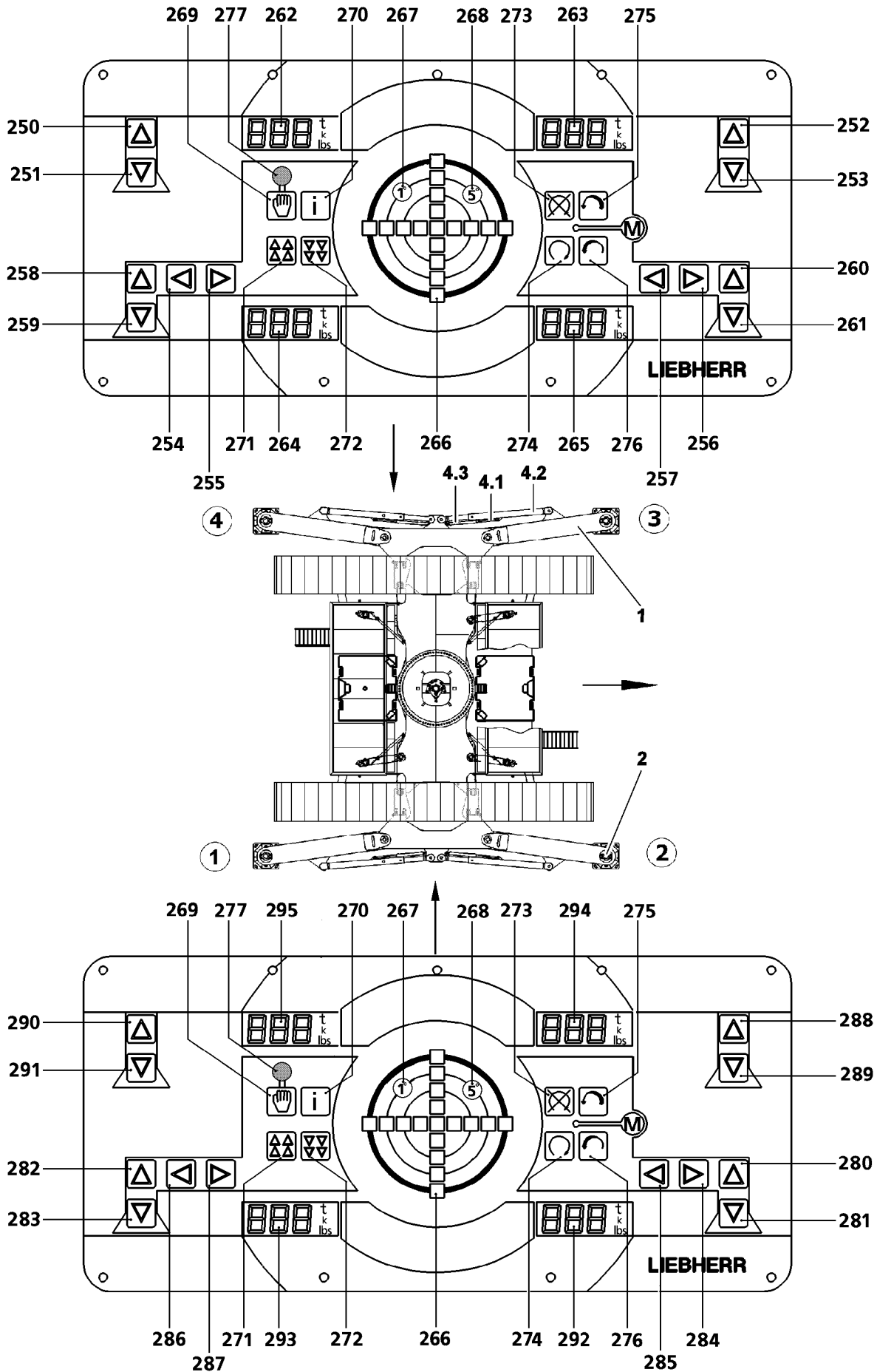


Fig.110546

LWE/LR 1750-000/12812-15-02/en

4.1 Swinging the support beams out with the support control unit

Make sure that the following prerequisites are met:

- The support control unit is released by the button **269**.
- The engine has been started.



Note

- ▶ The support beams on the left side of the crawler can only be operated using the support control unit attached at this side!
- ▶ The support beams on the right side of the crawler can only be operated using the support control unit attached at this side!

NOTICE

Damage to the swing units!

If the retaining pins are not unpinned on the swing units **4**, the swing units can be damaged!

- ▶ Make sure that the retaining pins are unpinned on the four guide tubes **4.2**!

- ▶ Unpin the retaining pins on the four guide tubes **4.2**.
- ▶ Open the switch box for the left or right support control unit.



WARNING

Danger of accidents when swinging the support beams!

When swinging the support beams, personnel can be severely injured or objects can be damaged!

- ▶ Ensure that no persons or objects are within the danger zone when swinging the support beams!

Swing the support beams out to the support base specified in the load chart.

- ▶ Left support control unit: Press button **254** and button **256**.

Result:

- Swing the support beam on the „left front“ and the support beam on the „left rear“ out.

- ▶ Right support control unit: Press button **284** and button **286**.

Result:

- Swing the support beam on the „right front“ and the support beam on the „right rear“ out.



WARNING

Components not pinned and secured!

If all four guide tubes **4.2** are not pinned and secured, then the support beams can move by themselves during crane operation!

This changes the required support base!

This can cause the crane to topple over!

Personnel can be severely injured or killed!

- ▶ Make sure that all retaining pins are pinned and secured!
- ▶ In intermediate positions, supporting is prohibited!

- ▶ Pin and secure all four guide tubes **4.2**.

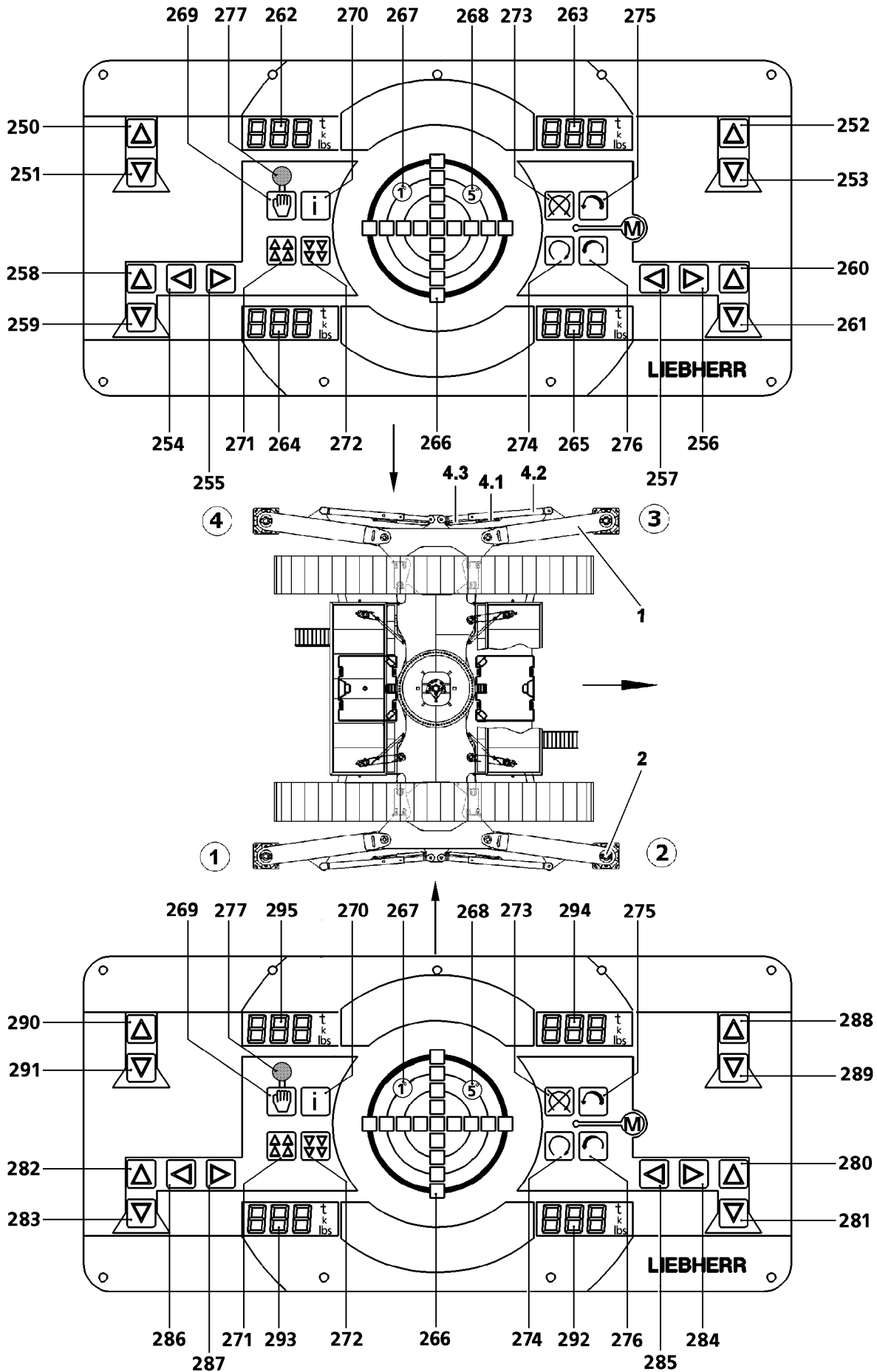


Fig.110546

LWE/LR 1750-000/12812-15-02/en

4.2 Extending the support cylinders with support control unit

Make sure that the following prerequisites are met:

- The support beams are extended to the support base specified in the load chart.
- All four guide tubes **4.2** are pinned and secured.



Note

- ▶ All support cylinders **2** can be actuated from both support control units on the crawler sides!



WARNING

Danger of tipping over due to reduced stability!

If the crane is not sufficiently raised at crane support with installed crawler carriers and the tracks are still in contact with the ground, then the stability is reduced!

The crane can topple over due to reduced stability!

Personnel can be severely injured or killed!

- ▶ Make sure that the crane is raised to the point where the crawlers are no longer in contact with the ground!



WARNING

The crane can topple over

When the crane is supported, the support cylinders **2** can sink into the ground, which can cause the crane to topple over!

Personnel can be severely injured or killed!

- ▶ Make sure that the ground is level and of sufficient load bearing capacity!
- ▶ Support the support cylinders with suitable materials!
- ▶ Retract the support cylinders, which were extended to stop by at least 10 mm !



WARNING

Danger of crushing!

When moving the support cylinders **2** in and out, make sure that there are no persons or objects within the danger zone!

Personnel can be crushed and severely injured or killed as a result!

- ▶ Make sure that personnel cannot be caught by components!

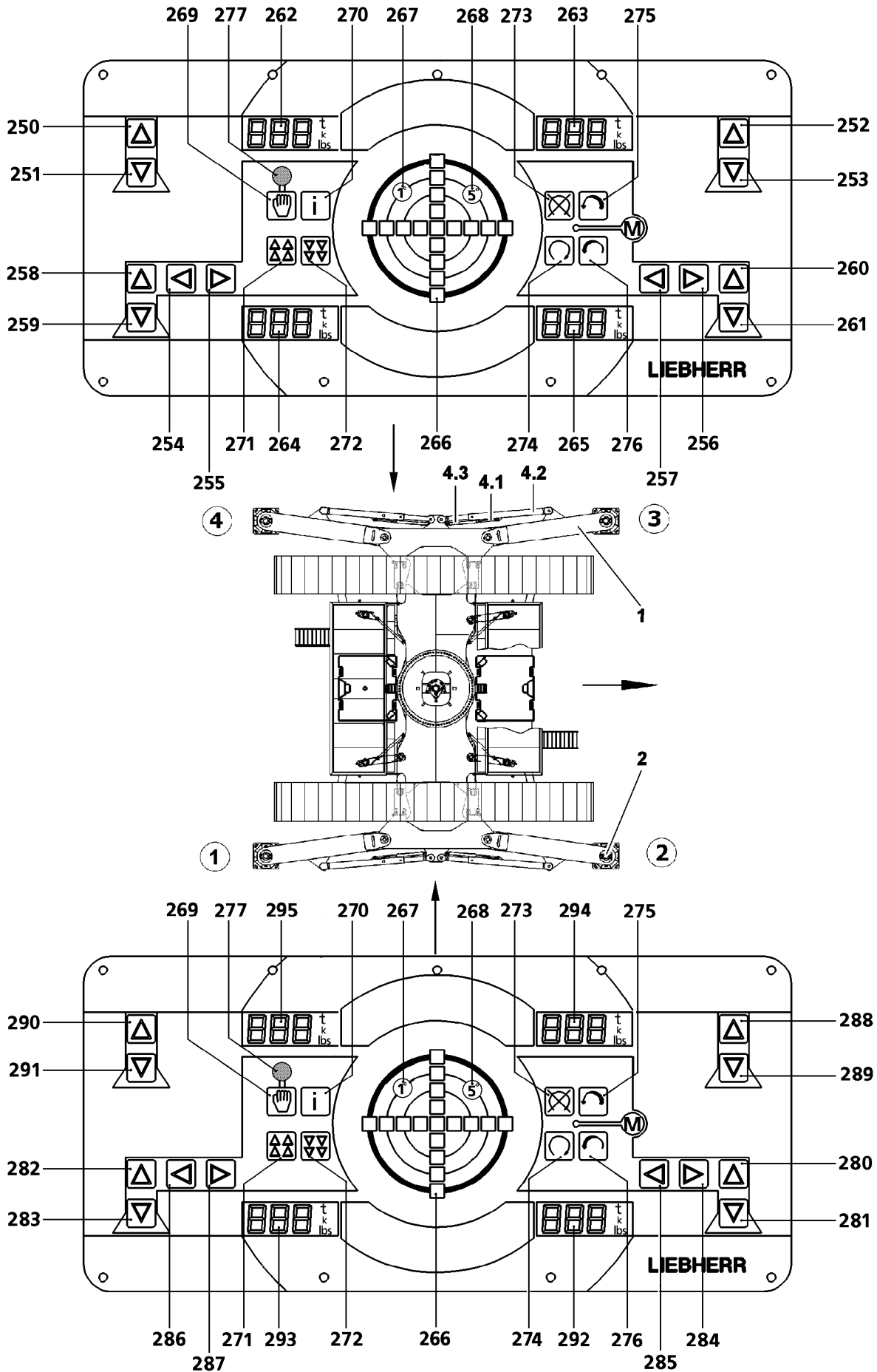


Fig.110546

LWE/LR 1750-000/12812-15-02/en

4.2.1 Supporting and aligning the crane manually in horizontal direction

Extend the support cylinders individually by pressing the respective buttons and support the crane.

- ▶ Left support control unit: Press button **251**, button **253**, button **259**, button **261**.
- or
- ▶ Right support control unit: Press button **281**, button **283**, button **289**, button **291**.

Result:

- The support cylinders extend.



Note

- ▶ The maximum permissible deviation from the horizontal position of the crane is $\pm 0.5\%$ ($\pm 0.3^\circ$)!



WARNING

The crane can tip over!

If the crane is not aligned horizontally, it can tip over!

Personnel can be severely injured or killed!

- ▶ Make sure that the crane is horizontally aligned!
- ▶ Align the crane in horizontal direction by retracting and extending the individual support cylinders **2** until the innermost LED on the incline indicator lights up.

4.2.2 Supporting and aligning the crane automatically in horizontal direction

Extend all four support cylinders **2** automatically.

- ▶ Left support control unit: Press the button **272**.
- or
- ▶ Right support control unit: Press the button **272**.

Result:

- The support cylinders extend.
- The crane is automatically aligned in horizontal direction.



Note

- ▶ The maximum permissible deviation from the horizontal position of the crane is $\pm 0.5\%$ ($\pm 0.3^\circ$)!



WARNING

The crane can tip over!

If the crane is not aligned horizontally, it can tip over!

Personnel can be severely injured or killed!

- ▶ Make sure that the crane is horizontally aligned!
- ▶ Check the horizontal position of the crane.

When the innermost LED on the incline indicator lights up:

- ▶ End the support procedure.

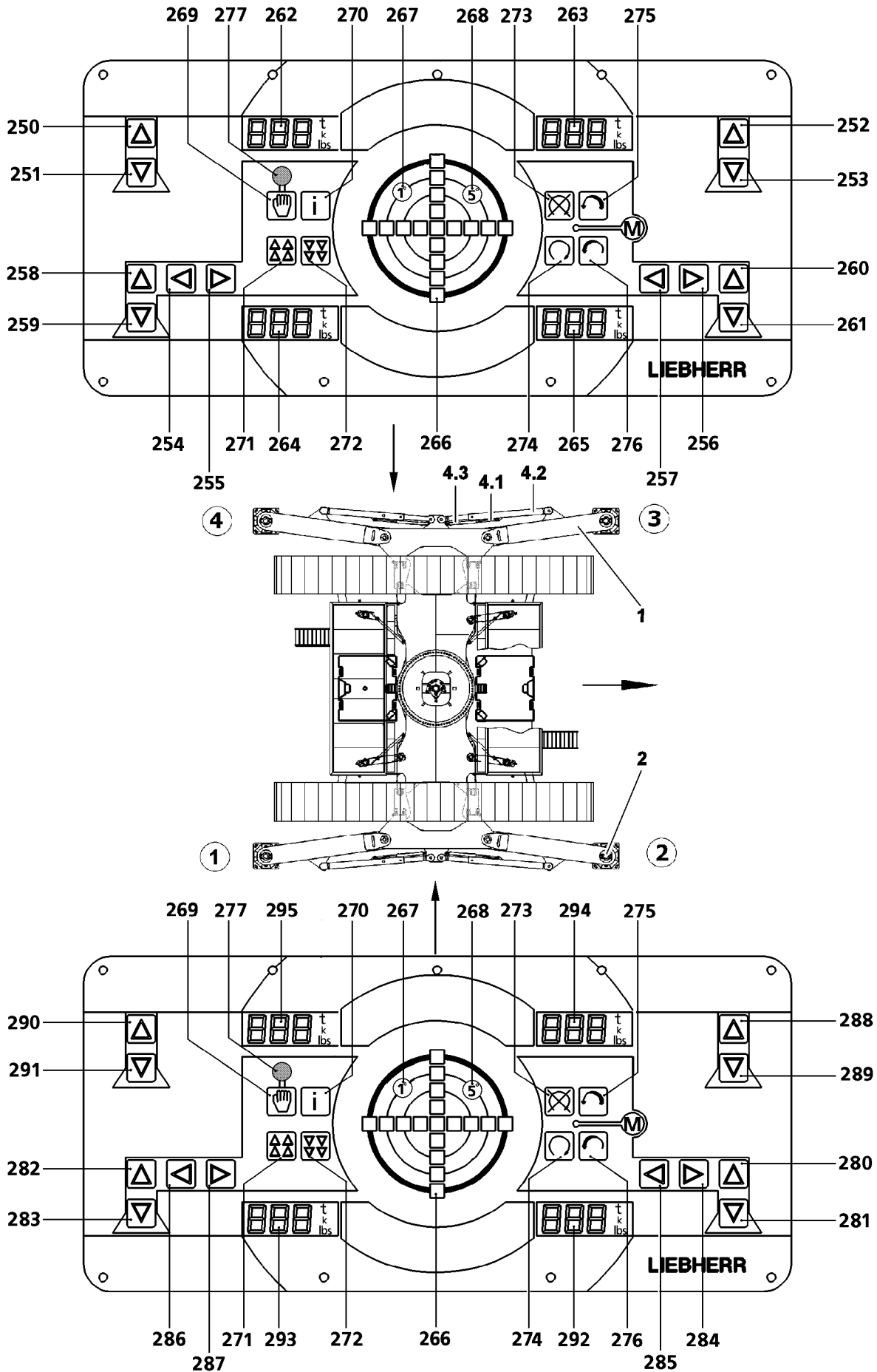


Fig.110546

LWE/LR 1750-000/12812-15-02/en

4.2.3 Checking the supports

In order to minimize the accident risk, the extension conditions and the following safety regulations must be adhered to.



WARNING

The crane can topple over!

Due to the load suspended on the hook, the hoist rope, the boom, guyings or guy rods are tensioned and distorted. If the load drops from the tackle ropes in this situation, or if the tackle or hoist rope breaks, a sudden relief occurs. The boom snaps back quickly. If only the support beams on the load side are moved out, the crane could topple over.

Despite previous assumption, it might become necessary to swing the load to the opposite side. If only the support beams on the load side are moved out, the crane could topple over.

When rotating out of the longitudinal vehicle direction, the boom or counterweight momentum could tip over the crane unless all four support beams are moved out.

- ▶ Always swing out and move out all four support beams, which means also those on the side opposite the load.
-
- ▶ Check the extension conditions.
 - ▶ Make sure that all four support beams of the supports are fully swung out, moved out and pinned according to the load chart.

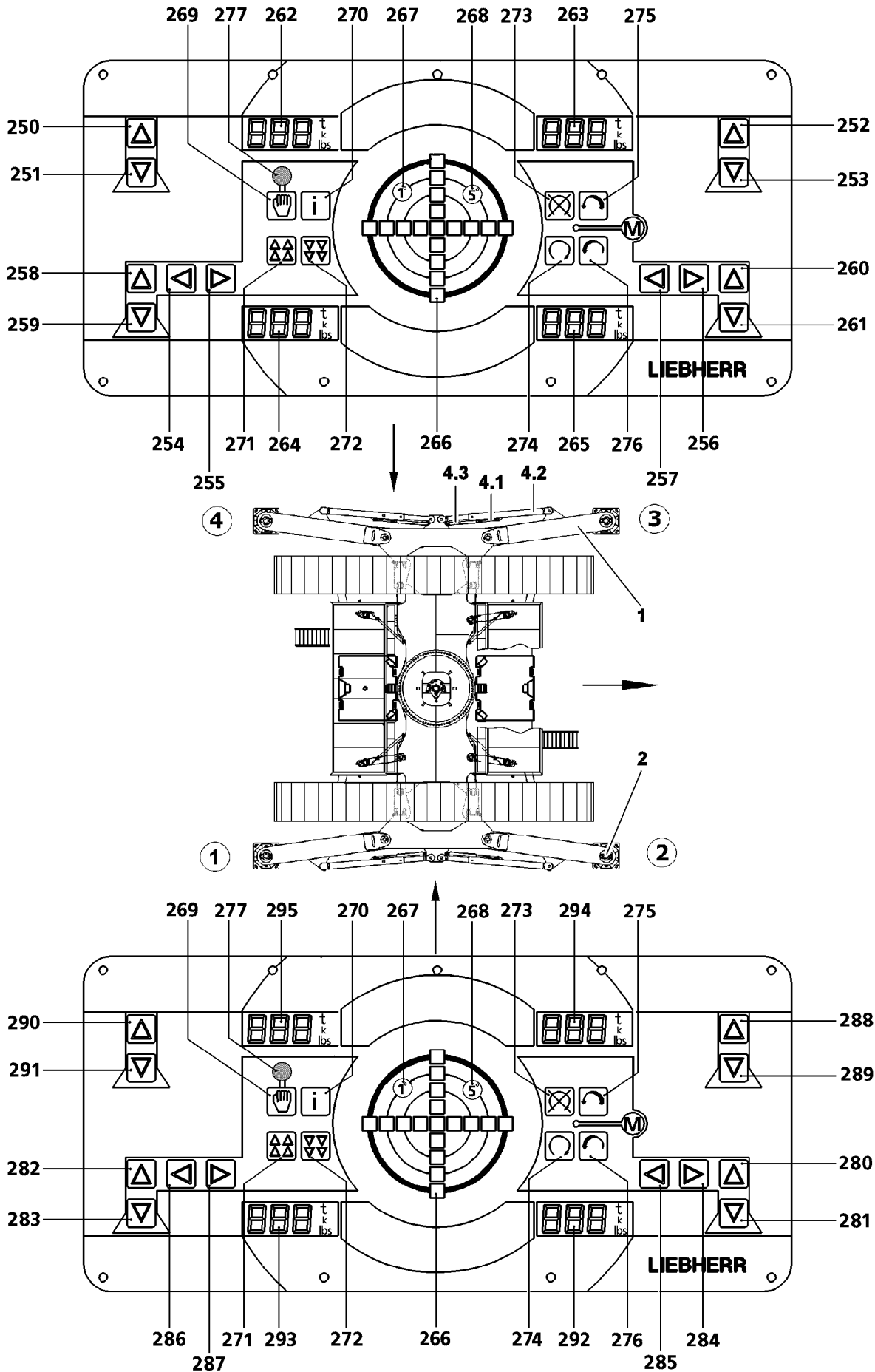


Fig.110546

LWE/LR 1750-000/12812-15-02/en

4.3 Retracting the support cylinders with the support control unit

Make sure that the following prerequisites are met:

- The support control unit is released by the button **269**.
- The engine is running.



Note

- ▶ All support cylinders **2** can be actuated from both support control units on the crawler sides!



WARNING

Danger of crushing!

When moving the support cylinders **2** in and out, make sure that there are no persons or objects within the danger zone!

Personnel can be crushed and severely injured or killed as a result!

- ▶ Make sure that personnel cannot be caught by components!

4.3.1 Retracting the support cylinders with the support control unit manually

- ▶ Open the switch box for the left or right support control unit.

Evenly retract the support cylinders **2** by pressing the corresponding buttons until the tracks are touching the ground.

- ▶ Left support control unit: Press button **250**, button **252**, button **258**, button **260**.
or
- ▶ Right support control unit: Press button **280**, button **282**, button **288**, button **290**.

Result:

- The support cylinders retract.
- ▶ Move the support cylinders in completely.

4.3.2 Retracting the support cylinders with the support control unit automatically

- ▶ Open the switch box for the left or right support control unit.

All support cylinders are retracted automatically until the crawler track is in contact with the ground.

- ▶ Left support control unit: Press the button **271**.
or
- ▶ Right support control unit: Press the button **271**.

Result:

- The support cylinders retract simultaneously.
- ▶ Move the support cylinders in completely.

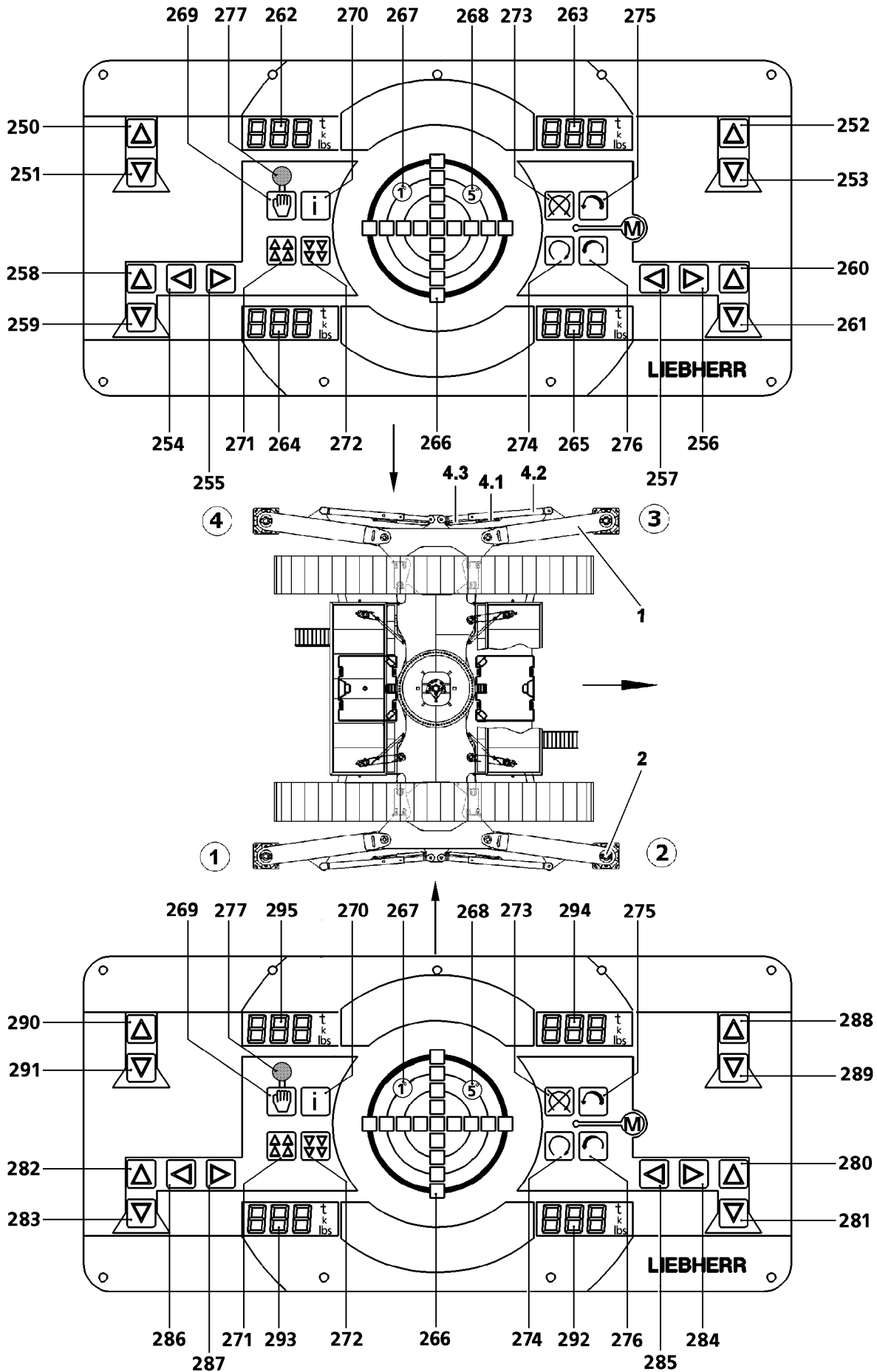


Fig.110546

LWE/LR 1750-000/12812-15-02/en

4.4 Swinging the support beams in with the support control unit

Make sure that the following prerequisites are met:

- The support control unit is released by the buttons **269**.
- The engine is running.



Note

- ▶ The support beams on the left side of the crawler can only be operated using the support control unit attached at this side!
- ▶ The support beams on the right side of the crawler can only be operated using the support control unit attached at this side!

NOTICE

Damage to the swing units!

If the retaining pins are not unpinned on the swing units **4**, the swing units can be damaged!

- ▶ Make sure that the retaining pins are unpinned on the four guide tubes **4.2**!

- ▶ Unpin the retaining pins on the four guide tubes **4.2**.
- ▶ Open the switch box for the left or right support control unit.



WARNING

Danger of accidents when swinging the support beams!

When swinging the support beams, personnel can be severely injured or objects can be damaged!

- ▶ Ensure that no persons or objects are within the danger zone when swinging the support beams!

Swing the support beams in individually by pressing the respective button.

- ▶ Left support control unit: Press button **255** and button **257**.

Result:

- Swing the support beam on the „left front“ and the support beam on the „left rear“ in.

- ▶ Right support control unit: Press button **285** and button **287**.

Result:

- Swing the support beam on the „right front“ and the support beam on the „right rear“ in.

NOTICE

Damage to the swing units!

If the retaining pins on the swing units **4** are not pinned and secured, then the swing units can be damaged during transport!

- ▶ Make sure, with the swing units fully swung in, that the retaining pins are pinned and secured on the four guide tubes **4.2**!

- ▶ Pin and secure all four guide tubes **4.2** in transport position.
- ▶ Regulate the throttle back to low idle.
- ▶ Turn the engine off.

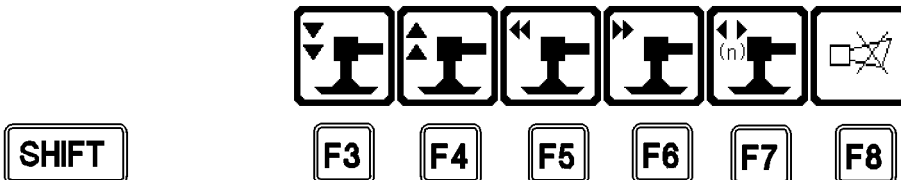
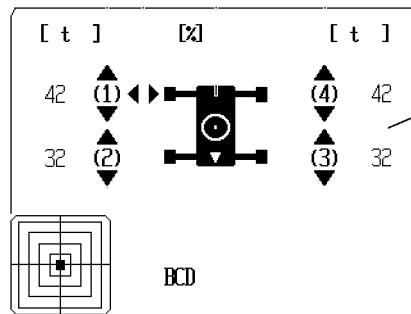
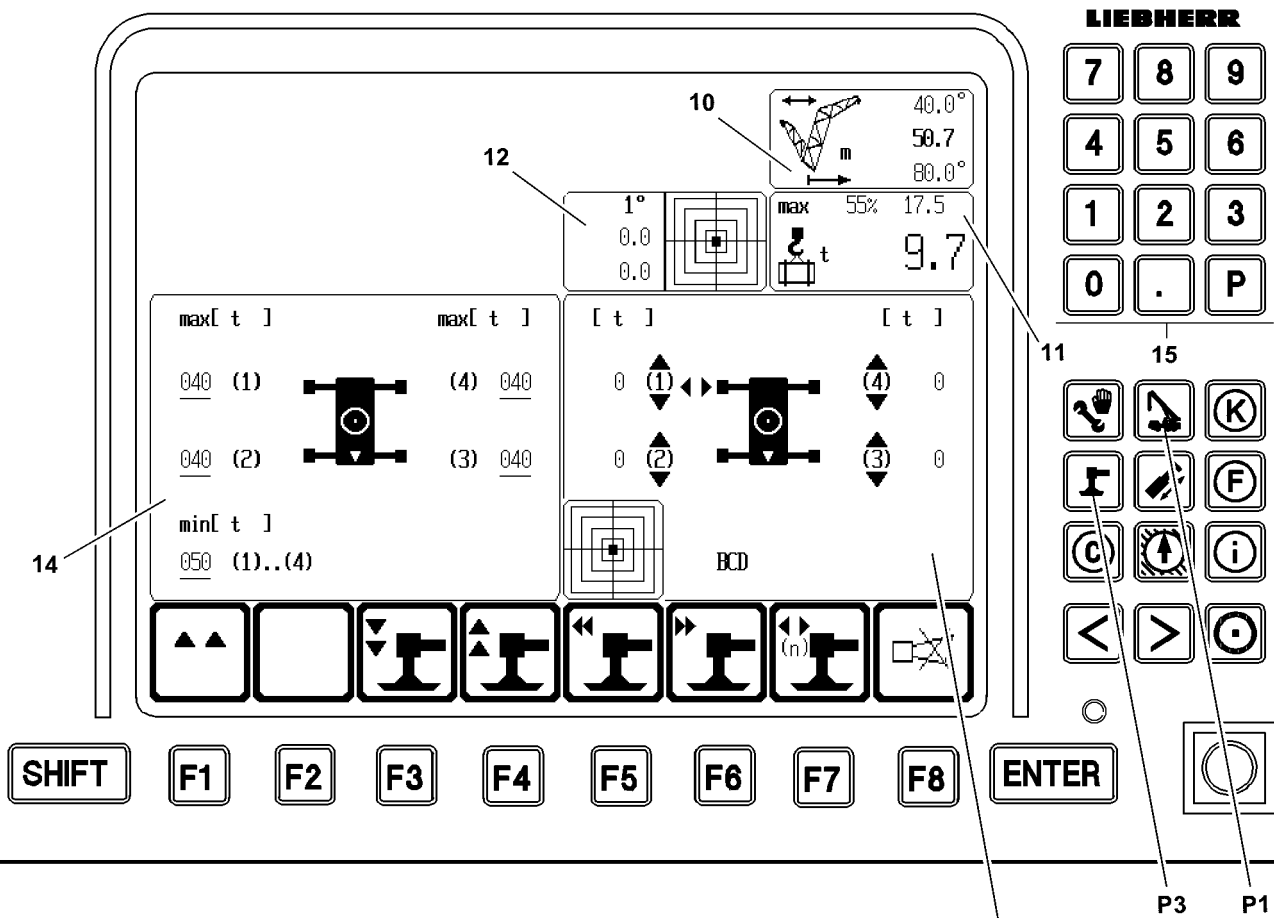


Fig.110535

5 Supporting the crane from the crane operator's cab

The crane can be supported via the support control unit on the support as well as from the crane operator's cab.

Make sure that the following prerequisites are met:

- All hydraulic connections have been made.
- All electrical connections have been made.
- The placement location must be level and have adequate load-bearing capacity.

The supports are operated from the crane operators cab via a process visualization on the LICCON monitor.



WARNING

The crane can topple over

If the data in the load chart in the LICCON overload protection regarding the respective support width are not observed, then the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Set the respective support width in the assigned load chart in the LICCON overload protection!
-



WARNING

Monitoring of crane support!

When extending / retracting the support without visual contact with the respective support beam or the support cylinder, there is a danger of accident!

Personnel can be severely injured or killed!

- ▶ When extending / retracting the support from the crane operator's cab - without visual contact with the respective support beam or support cylinder - the movements must be monitored by a guide!
-

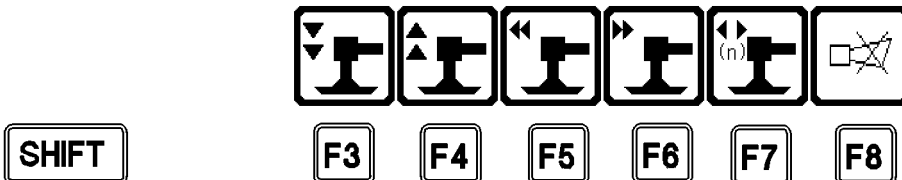
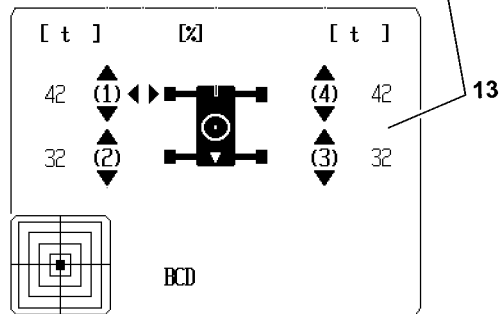
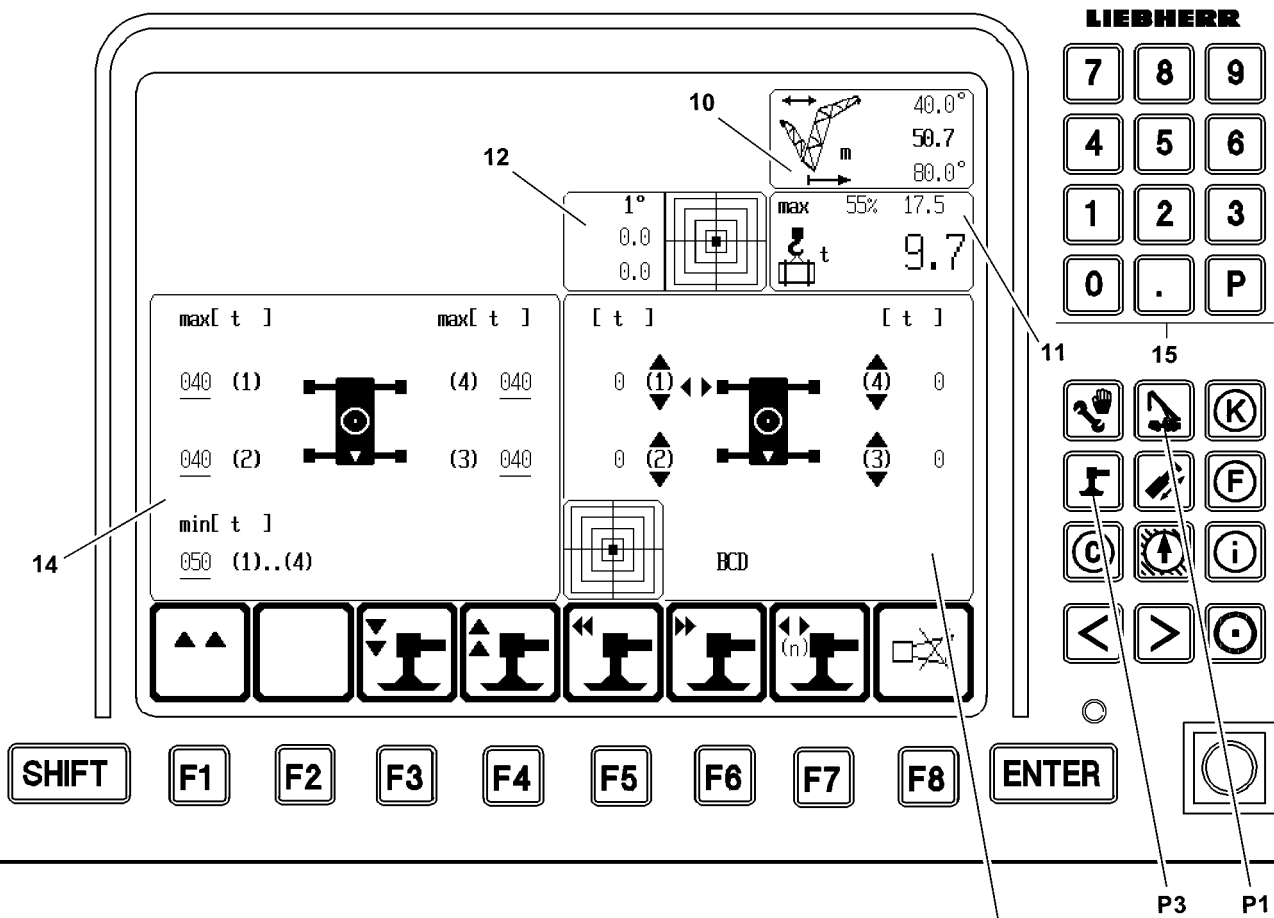


Fig.110535

LWE/LR 1750-000/12812-15-02/en

5.1 Operating elements for supporting from the crane operator's cab

The supports are operated from the crane operators cab via a process visualization on the LICCON monitor.



Note

► See Crane operating instructions, chapter 4.02!

Position	Function
P3	Starting the „support“ program
P1	Ending the „Support“ program and switching back to the crane operating screen
10	Icon element „Radius and main boom angle“
11	Icon element „Load“: Shows „current load“, „maximum load“ and „dynamic utilization in percentages“
12	Icon element „Crane incline“: Shows the incline of the crane. The display is graphic as well as numeric.
13	Monitoring and control operating field
14	Adjustment field for support force limits
15	Numeric keypad



Note

► The crane can also be operated in the „Support“ program! Support procedures, which must be repeated at short intervals do not require switching back to the „Crane operation“ program.

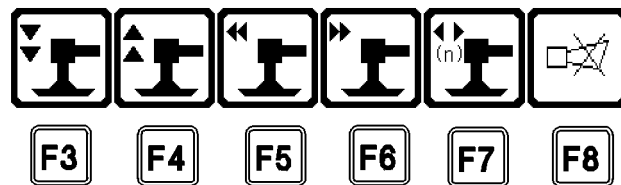
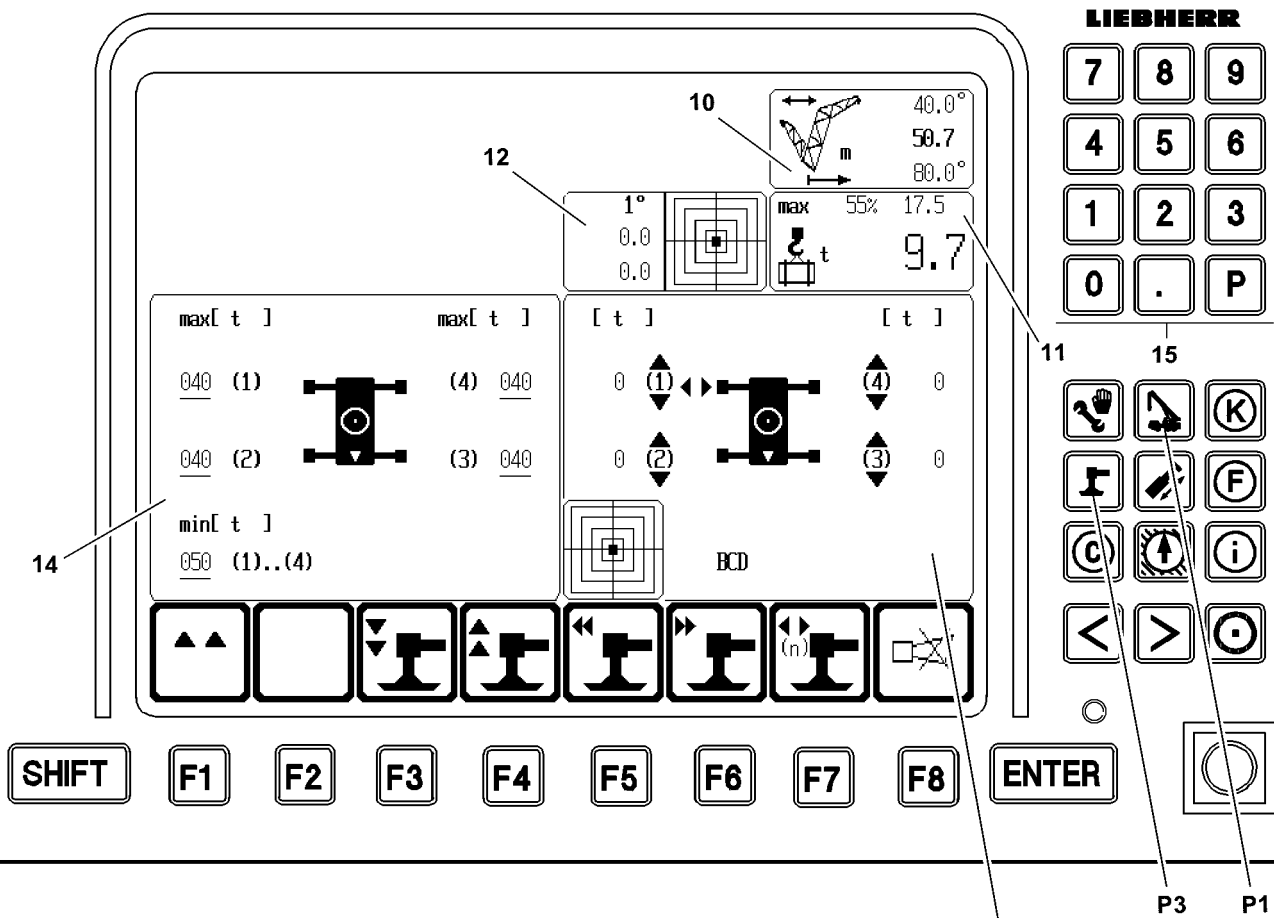


Fig.110535

5.2 Swinging the support beams out from the crane operator's cab

Make sure that the following prerequisite is met:

- The engine has been started.



Note

- ▶ Only one individual support beam can be swung out at a time!

NOTICE

Damage to the swing units!

If the retaining pins are not unpinned on the swing units **4**, the swing units can be damaged!

- ▶ Make sure that the retaining pins are unpinned on the four guide tubes **4.2**!

- ▶ Unpin the retaining pins on the four guide tubes **4.2**.



WARNING

Danger of accidents when swinging the support beams!

When swinging the support beams, personnel can be severely injured or objects can be damaged!

- ▶ Ensure that no persons or objects are within the danger zone when swinging the support beams!

Select the desired support beam.

- ▶ Press function key „F7“.

Result:

- A double arrow appears on the selected support beam.

Swing the preselected support beam out to the support base specified in the load chart.

- ▶ Press function key „F5“.

Result:

- Support beam swings out.
- ▶ Swing out all four support beams



WARNING

Components not pinned and secured!

If all four guide tubes **4.2** are not pinned and secured, then the support beams can move by themselves during crane operation!

This changes the required support base!

This can cause the crane to topple over!

Personnel can be severely injured or killed!

- ▶ Make sure that all retaining pins are pinned and secured!
- ▶ In intermediate positions, supporting is prohibited!

- ▶ Pin and secure all four guide tubes **4.2**.

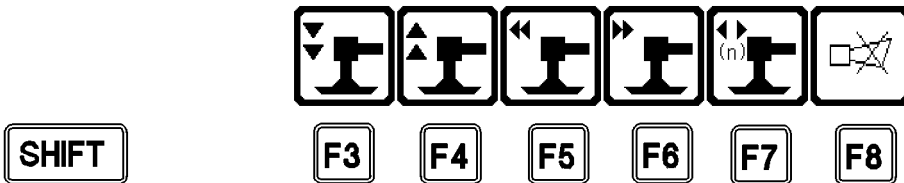
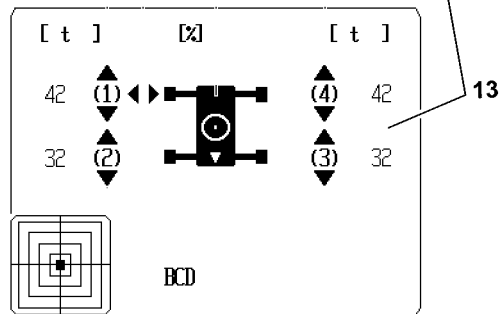
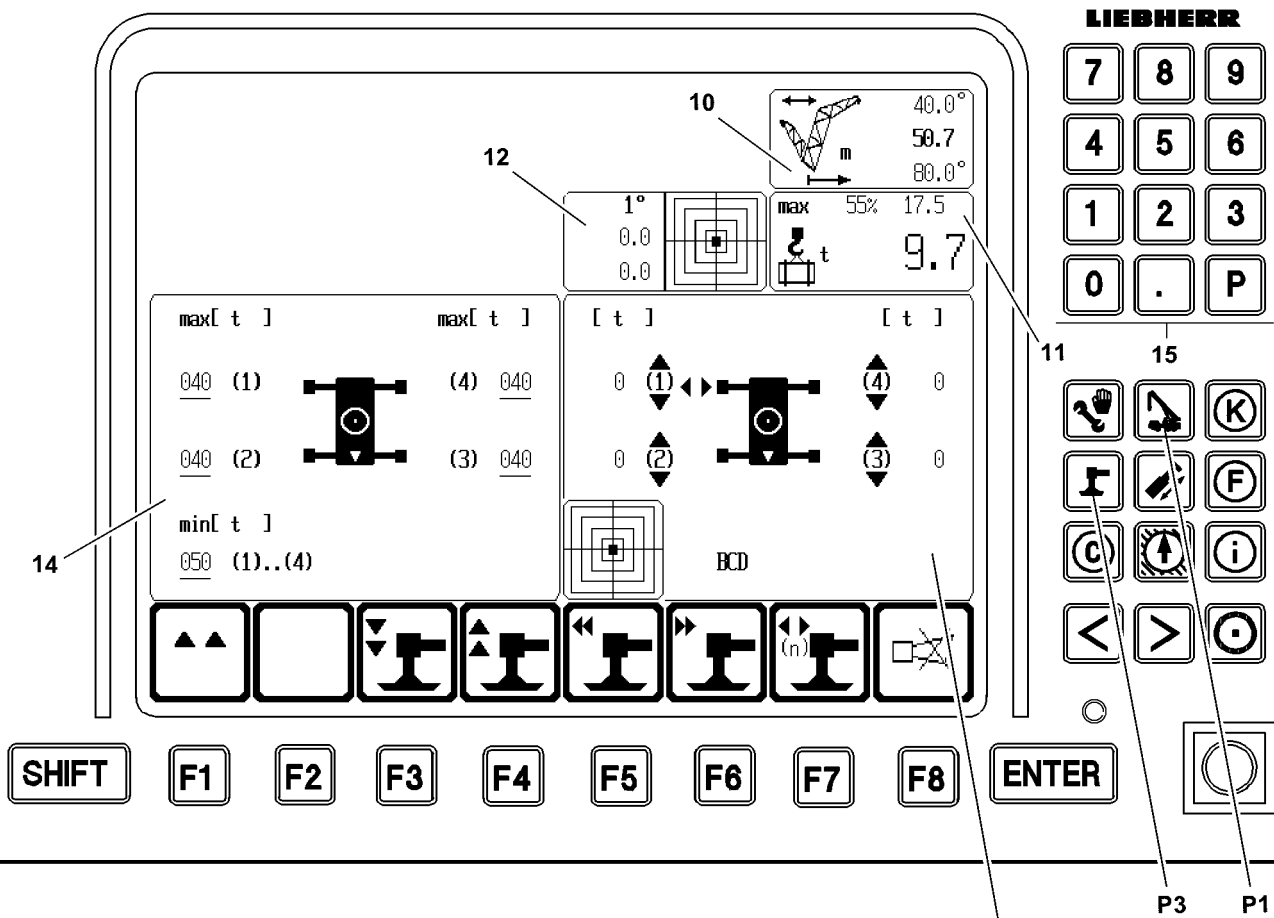


Fig.110535

LWE/LR 1750-000/12812-15-02/en

5.3 Extending the support cylinders from the crane operator's cab

Make sure that the following prerequisites are met:

- The support beams are extended to the support base specified in the load chart.
- All four guide tubes **4.2** are pinned and secured.



Note

- ▶ Any desired support cylinder can be extended simultaneously!



WARNING

Danger of tipping over due to reduced stability!

If the crane is not sufficiently raised at crane support with installed crawler carriers and the tracks are still in contact with the ground, then the stability is reduced!

The crane can topple over due to reduced stability!

Personnel can be severely injured or killed!

- ▶ Make sure that the crane is raised to the point where the crawlers are no longer in contact with the ground!



WARNING

The crane can topple over

When the crane is supported, the support cylinders **2** can sink into the ground, which can cause the crane to topple over!

Personnel can be severely injured or killed!

- ▶ Make sure that the ground is level and of sufficient load bearing capacity!
- ▶ Support the support cylinders with suitable materials!
- ▶ Retract the support cylinders, which were extended to stop by at least 10 mm !



WARNING

Danger of crushing!

When moving the support cylinders **2** in and out, make sure that there are no persons or objects within the danger zone!

Personnel can be crushed and severely injured or killed as a result!

- ▶ Make sure that personnel cannot be caught by components!

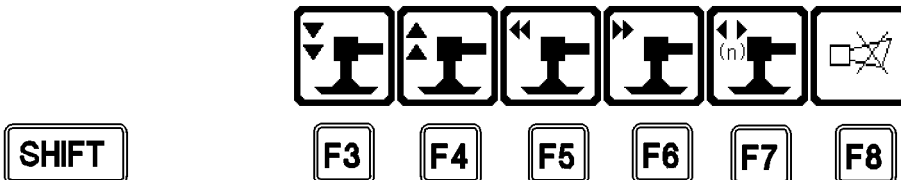
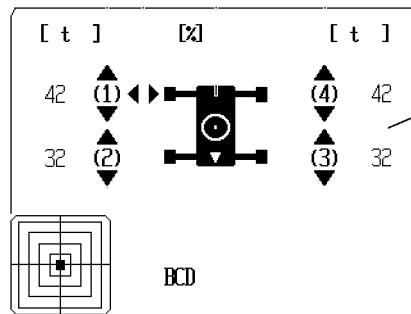
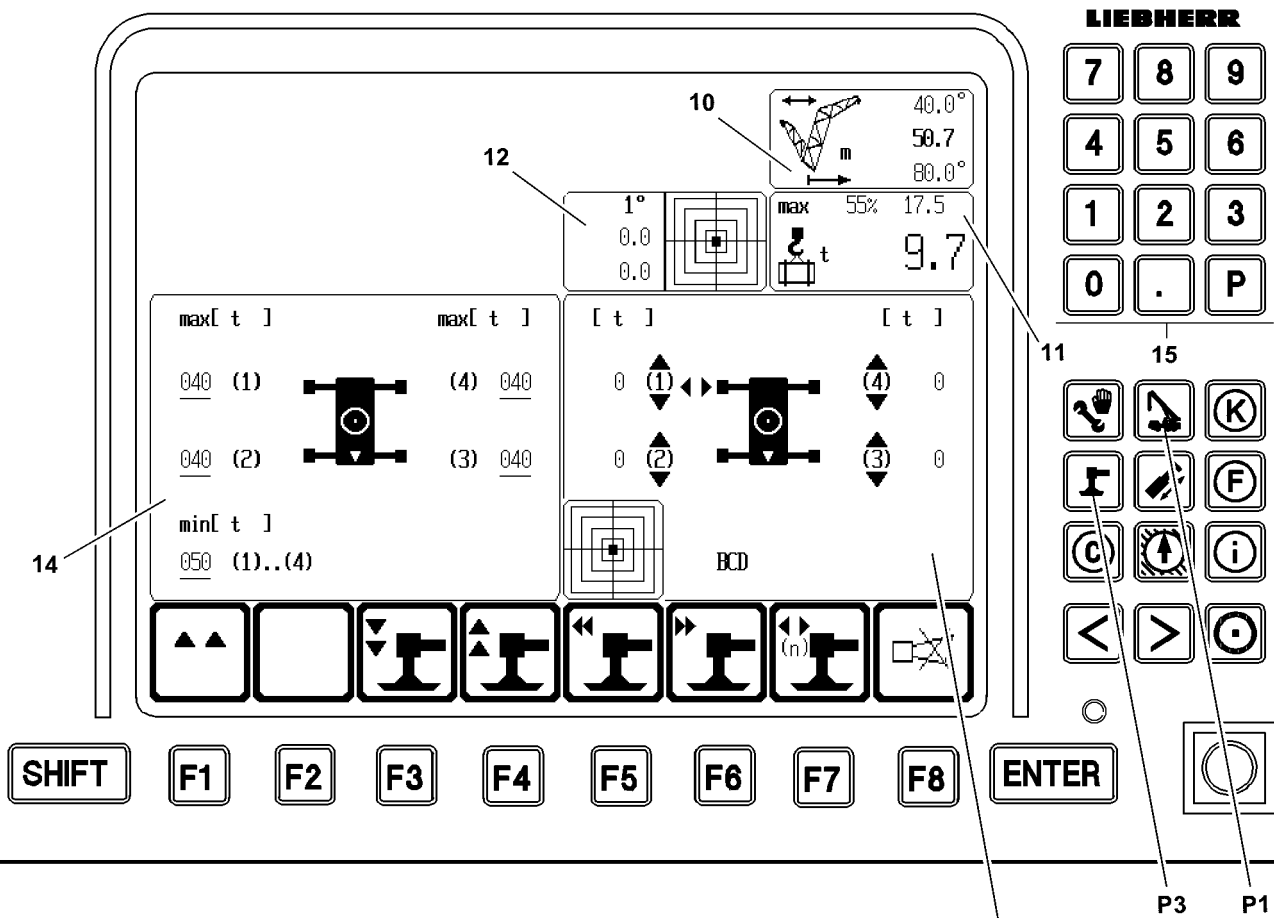


Fig.110535

5.3.1 Supporting and aligning the crane manually in horizontal direction

In the numeric keypad, the respective support cylinder or the respective support cylinder combination can be selected or deselected with buttons 1 to 4.

- ▶ Select the desired support cylinder.

Result:

- A double arrow appears on the selected support.

Extend the preselected support cylinder or support cylinder combination.

- ▶ Press function key „F3“.

Result:

- The support cylinders extend.



Note

- ▶ The maximum permissible deviation from the horizontal position of the crane is $\pm 0.5\%$ ($\pm 0.3^\circ$)!



WARNING

The crane can tip over!

If the crane is not aligned horizontally, it can tip over!

Personnel can be severely injured or killed!

- ▶ Make sure that the crane is horizontally aligned!

- ▶ Align the crane in horizontal direction by retracting and extending the individual support cylinders until the dot „small square“ is in the center of the graphic sight gauge.

5.3.2 Supporting and aligning the crane automatically in horizontal direction

Extend all four support cylinders simultaneously.

- ▶ Press the key combination „SHIFT“ + „F3“.

Result:

- The support cylinders extend simultaneously.
- The crane is automatically aligned in horizontal direction.



Note

- ▶ The maximum permissible deviation from the horizontal position of the crane is $\pm 0.5\%$ ($\pm 0.3^\circ$)!



WARNING

The crane can tip over!

If the crane is not aligned horizontally, it can tip over!

Personnel can be severely injured or killed!

- ▶ Make sure that the crane is horizontally aligned!

- ▶ Check the horizontal position of the crane.

When the dot „small square“ is in the center of the graphic sight gauge:

- ▶ End the support procedure.

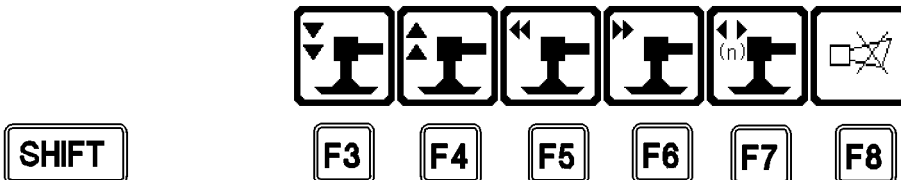
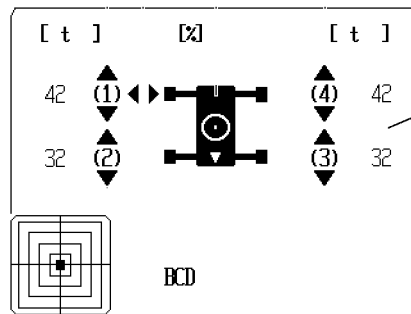
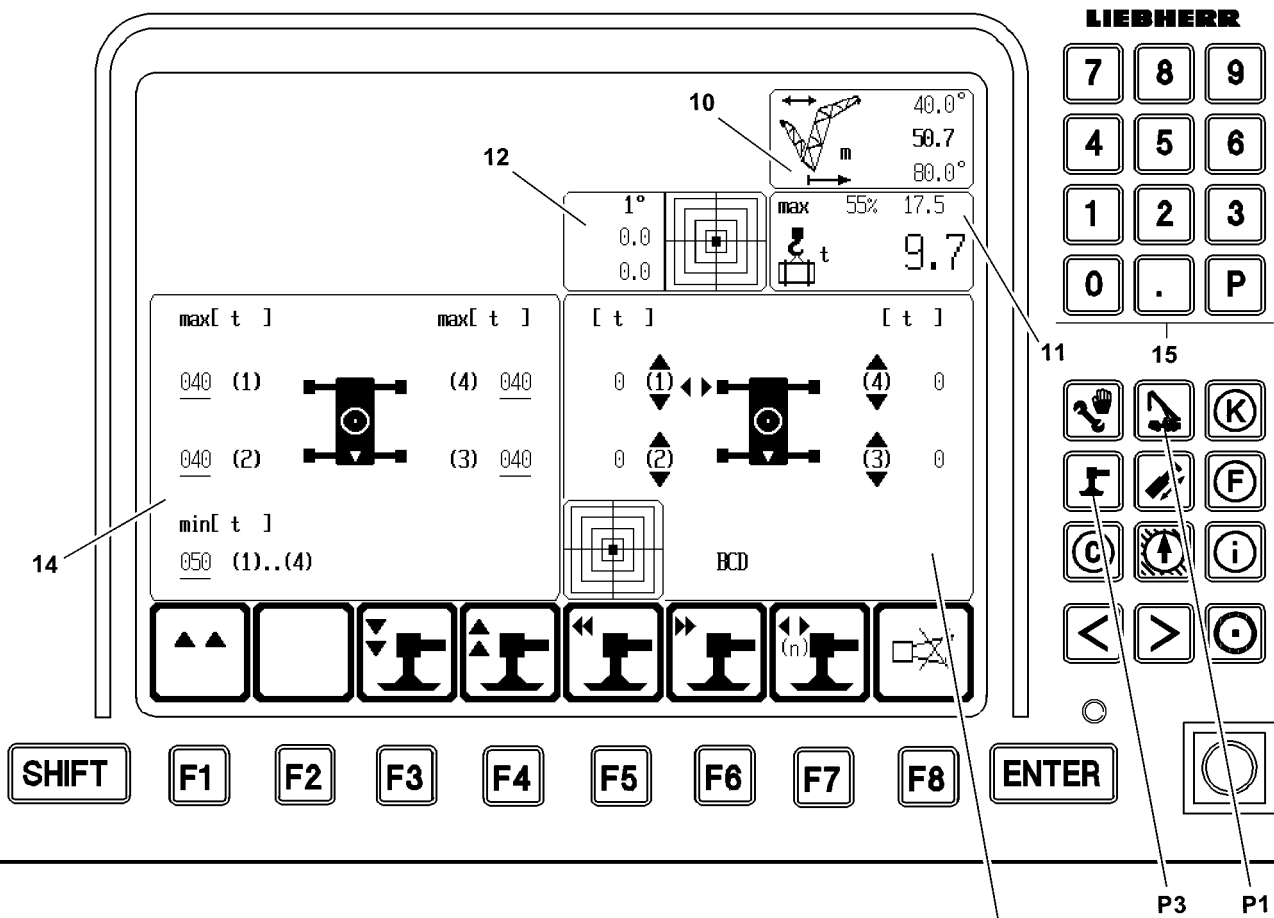


Fig.110535

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5.3.3 Checking the supports

In order to minimize the accident risk, the extension conditions and the following safety regulations must be adhered to.



WARNING

The crane can topple over!

Due to the load suspended on the hook, the hoist rope, the boom, guyings or guy rods are tensioned and distorted. If the load drops from the tackle ropes in this situation, or if the tackle or hoist rope breaks, a sudden relief occurs. The boom snaps back quickly. If only the support beams on the load side are moved out, the crane could topple over.

Despite previous assumption, it might become necessary to swing the load to the opposite side. If only the support beams on the load side are moved out, the crane could topple over.

When rotating out of the longitudinal vehicle direction, the boom or counterweight momentum could tip over the crane unless all four support beams are moved out.

- ▶ Always swing out and move out all four support beams, which means also those on the side opposite the load.
-
- ▶ Check the extension conditions.
 - ▶ Make sure that all four support beams of the supports are fully swung out, moved out and pinned according to the load chart.

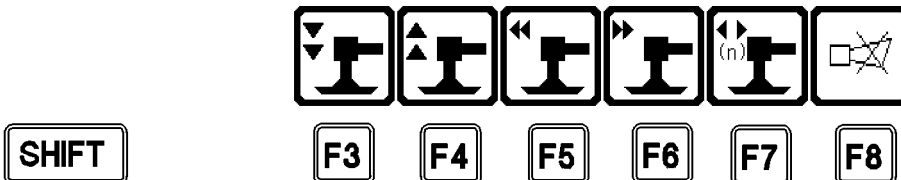
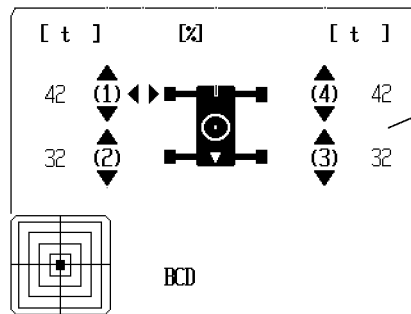
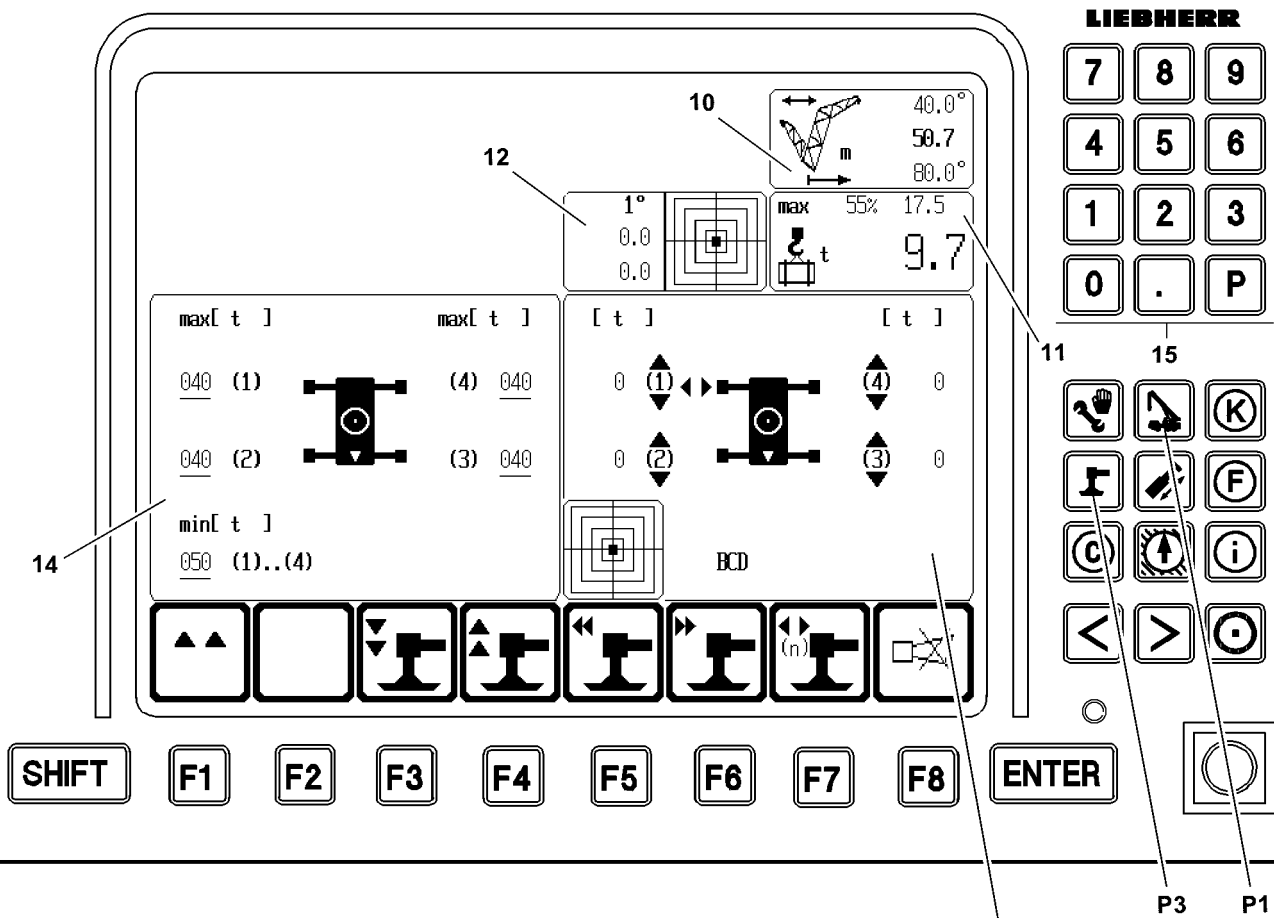


Fig.110535

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5.4 Retracting support cylinders from crane operator's cab

Make sure that the following prerequisite is met:

- The engine is running.



Note

- ▶ Any desired support cylinder can be retracted simultaneously!



WARNING

Danger of crushing!

When moving the support cylinders **2** in and out, make sure that there are no persons or objects within the danger zone!

Personnel can be crushed and severely injured or killed as a result!

- ▶ Make sure that personnel cannot be caught by components!

5.4.1 Retracting support cylinders manually from crane operator's cab

In the numeric keypad, the respective support cylinder or the respective support cylinder combination can be selected or deselected with buttons 1 to 4.

- ▶ Select the desired support cylinder.

Result:

- A double arrow appears on the selected support.

Retract the preselected support cylinder or support cylinder combination.

- ▶ Press function key „F4“.

Result:

- The support cylinders retract.
- ▶ Move the support cylinders in completely.

5.4.2 Retracting support cylinders automatically from crane operator's cab

Retract all four support cylinders automatically.

- ▶ Press the key combination „SHIFT“ + „F4“.

Result:

- The support cylinders retract simultaneously.
- ▶ Move the support cylinders in completely.

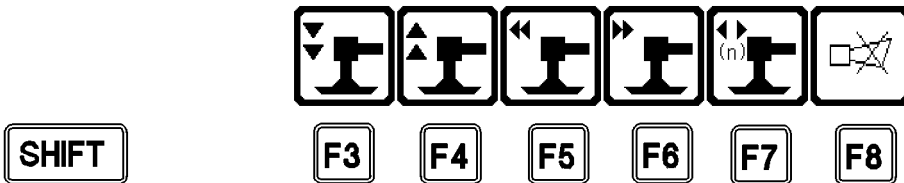
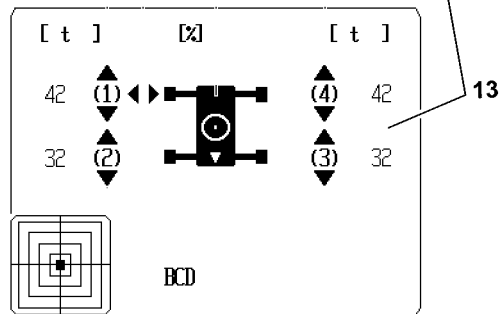
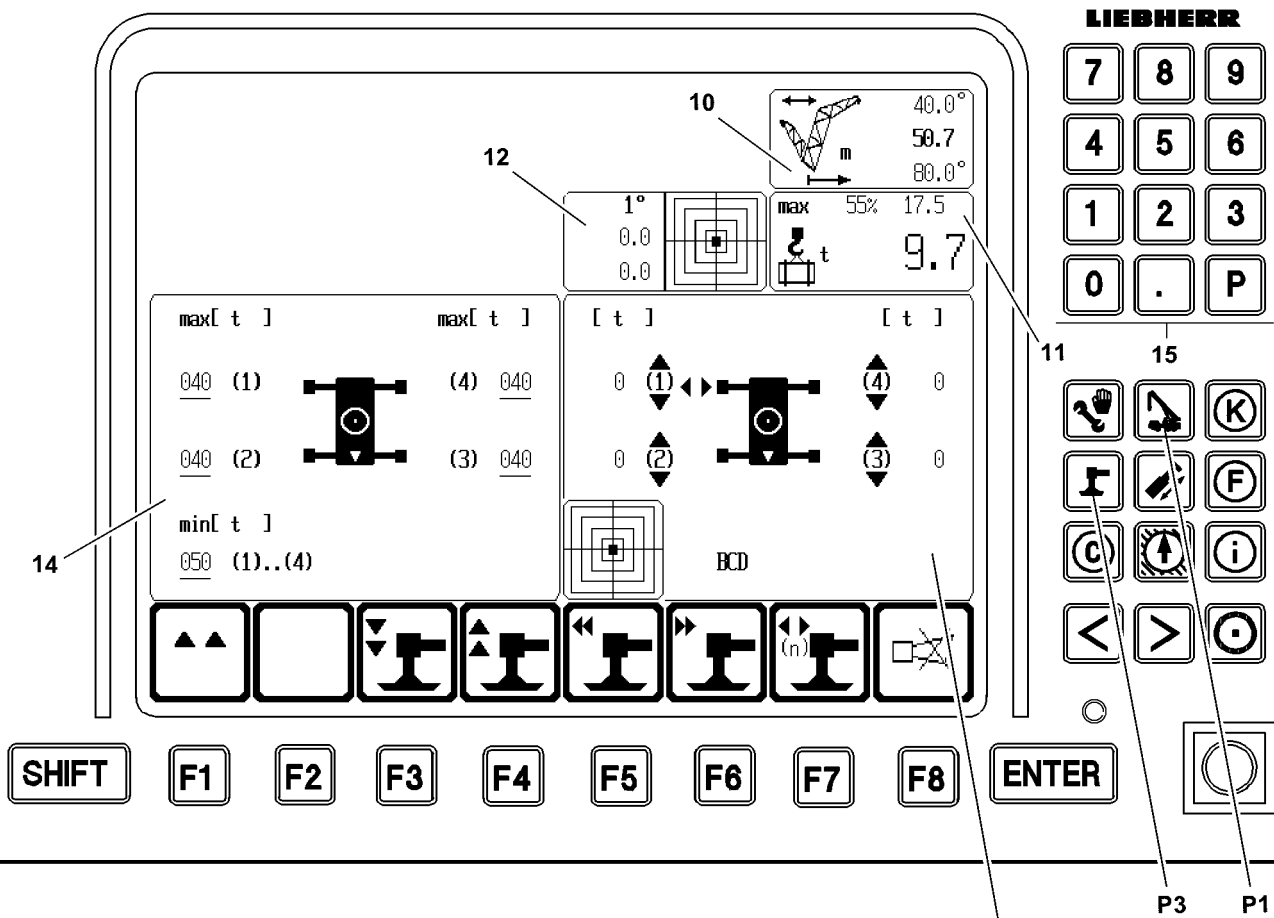


Fig.110535

LWE/LR 1750-000/12812-15-02/en

5.5 Swinging the support beams in from the crane operator's cab

Make sure that the following prerequisite is met:

- The engine is running.



Note

- ▶ Only one individual support beam can be swung in at a time!

NOTICE

Damage to the swing units!

If the retaining pins are not unpinned on the swing units **4**, the swing units can be damaged!

- ▶ Make sure that the retaining pins are unpinned on the four guide tubes **4.2**!

- ▶ Unpin the retaining pins on the four guide tubes **4.2**.



WARNING

Danger of accidents when swinging the support beams!

When swinging the support beams, personnel can be severely injured or objects can be damaged!

- ▶ Ensure that no persons or objects are within the danger zone when swinging the support beams!

Select the desired support beam.

- ▶ Press function key „F7“.

Result:

- A double arrow appears on the selected support.

Swing the preselected support beam in.

- ▶ Press function key „F6“.

Result:

- Support beam swings in.
- ▶ Swing in all four support beams.

NOTICE

Damage to the swing unit!

If the retaining pins on the swing units **4** are not pinned and secured, then the swing units can be damaged during transport!

- ▶ Make sure, with the swing units fully swung in, that the retaining pins are pinned and secured on the four guide tubes **4.2**!

- ▶ Pin and secure all four guide tubes **4.2** in transport position.
- ▶ Regulate the throttle back to low idle.
- ▶ Turn the engine off.

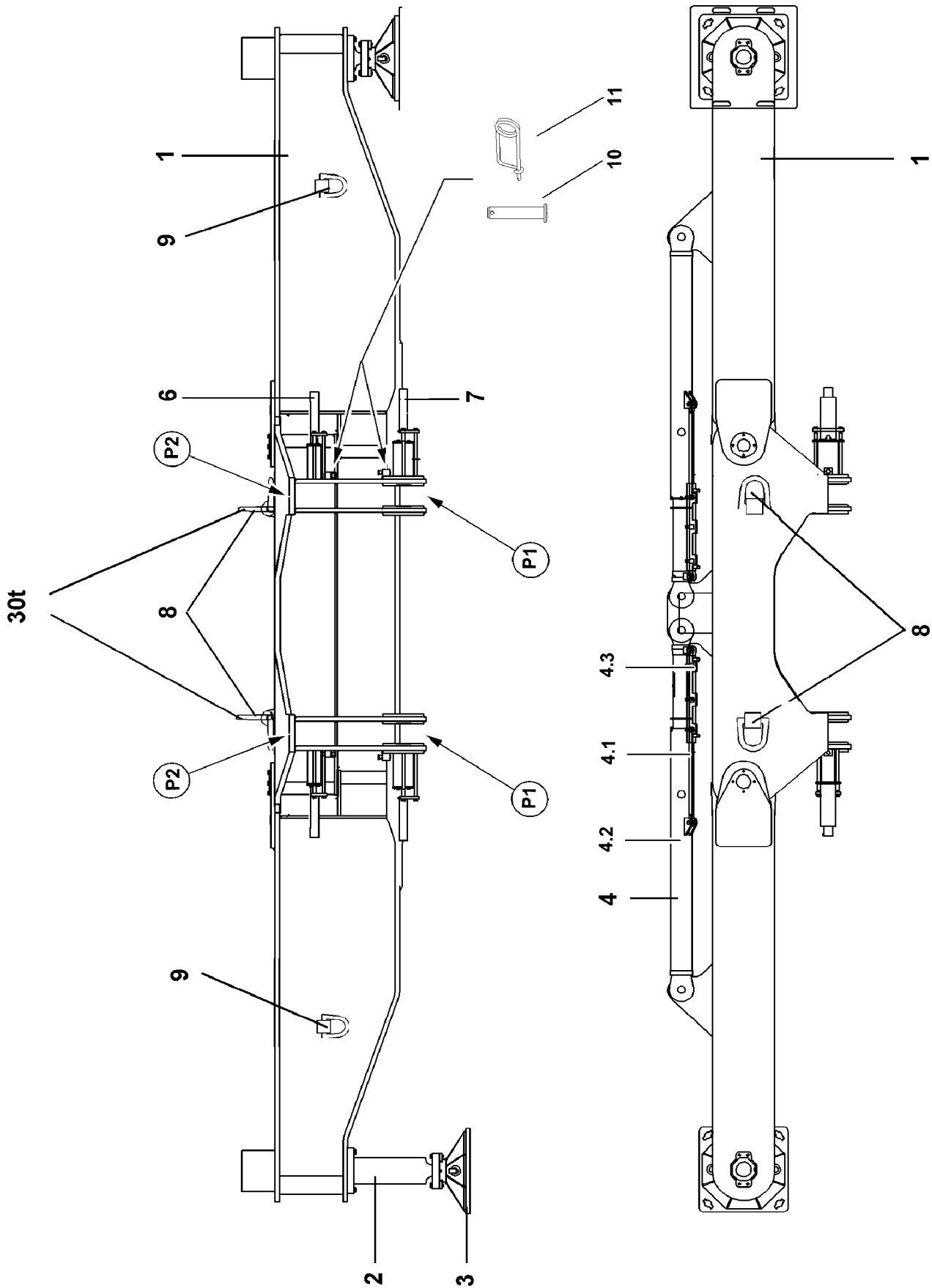


Fig.110534

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6 Removing the crane support



WARNING

Risk of falling!

During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any assembly work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see crane operating instructions, Chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!



WARNING

Components not pinned and secured!

If a component is released from the auxiliary crane before having been pinned and secured, the component will fall down! Personnel can be severely injured or killed!

- ▶ Do not disengage the auxiliary crane until the corresponding component is pinned and secured!



WARNING

Danger of impact / crushing!

When lifting / lowering and extending / retracting crane components, there is an increased danger of impacts / crushing!

Personnel can be caught and severely injured or killed as a result!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!

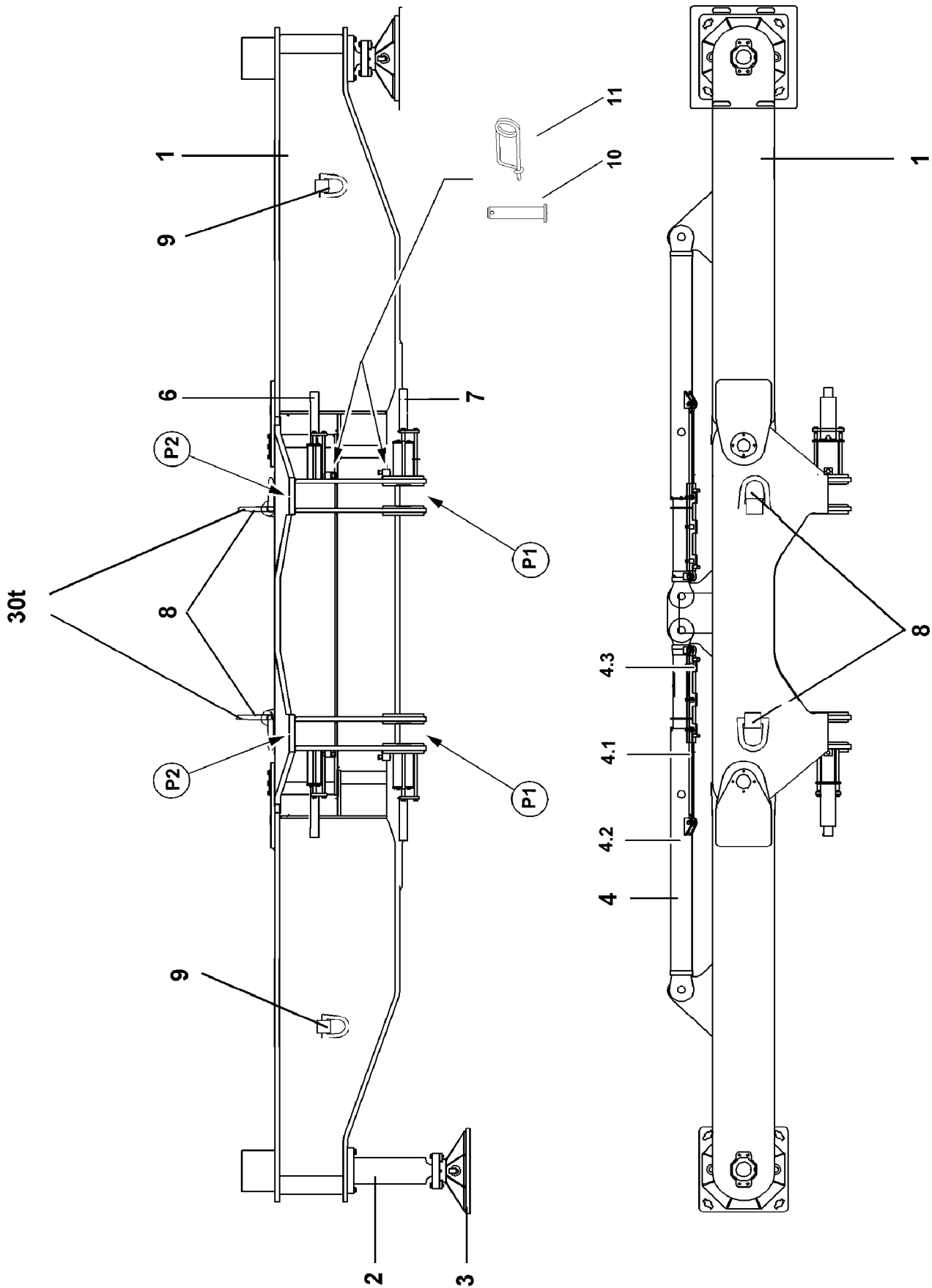


Fig.110534

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6.1 Unpinning the crane support

The unpinning of the crane supports on the crawler center section or the crawler carriers is made via radio remote control.



Note

- ▶ For operation of the radio remote control, see Crane operating instructions, chapter 5.08!

Make sure that the following prerequisites are met:

- The counterweight and boom systems are disassembled.
- An auxiliary crane with sufficient load carrying capacity is available.
- The placement location must be level and have adequate load-bearing capacity.
- The crane is aligned in horizontal direction.

For removal of the crane support, use the eyehooks **8**.

- ▶ Attach the crane support on the eyehooks **8**.
- ▶ Bring the tackle to „tension“.

NOTICE

Pin is not released!

If the pin „on top“ **6** and pin „on the bottom“ **7** is secured by the retaining pin **10**, then the pinning device can be damaged during unpinning!

- ▶ Make sure that the retaining pins **10** are unpinned!

- ▶ Release and unpin the retaining pin **10**.
- ▶ Unpin the pin „on top“ **6** and pin „on the bottom“ **7** via the radio remote control on the crawler center section or the crawler carriers.

NOTICE

Damage to hydraulic and electrical connections!

If the hydraulic and electrical connections are not separated before lifting the crane support, then the connections can be damaged!

- ▶ Make sure that the hydraulic and electrical connections to the crane supports are separated before lifting!
- ▶ Disconnect the connections.

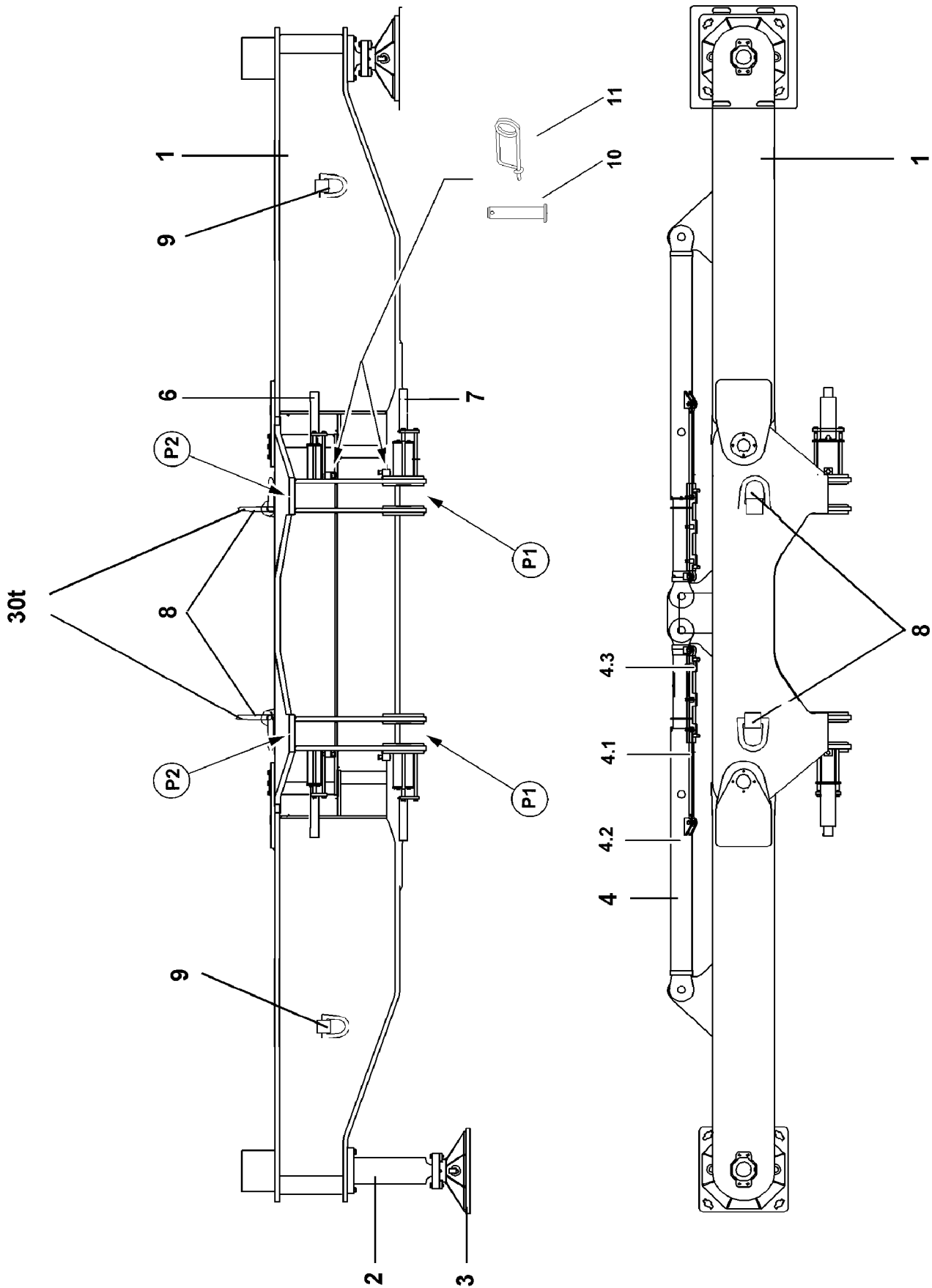


Fig.110534

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6.2 Disconnecting the hydraulic and electrical connections

To be able to remove the crane support on the crawler center section or the crawler carriers, the hydraulic and electrical connections to the crane supports must be disconnected.

6.2.1 Disconnecting the hydraulic connections

When releasing hydraulic lines with quick-release couplings, make sure that the uncoupling procedure is carried out correctly.



WARNING

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!

Personnel can be severely injured or killed!

▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!

▶ Separate the coupling components (sleeve and connector) with the hand-tightened nut.

▶ Release the hydraulic coupling by hand.

▶ Disconnect the hydraulic connections to the crane supports.

6.2.2 Disconnecting the electrical connections

▶ Disconnect the electrical connections to the crane supports, see separate electrical wiring diagram.

6.3 Disconnecting the crane support from the crawler center section or the crawler carriers

Make sure that the following prerequisites are met:

- The pin „on top“ **6** and the pin „on the bottom“ **7** are unpinned.
- The hydraulic connections are disconnected.
- The electrical connections are disconnected.



WARNING

Falling components!

When lifting the crane support from the crawler center section or the crawler carriers, components can fall down!

Personnel can be severely injured or killed!

▶ Make sure that there are no persons within the danger zone!

▶ Lift the crane support with the auxiliary crane and set it on the flatbed trailer.

▶ Remove the auxiliary crane.

Fig.195219

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1 Assembly conditions for crane operation

2 Definition of assembly conditions

Assembly conditions	
1	= With placed down SA-frame (with and without a rope on winch 4)
2	= With 90° SA-frame (with and without a rope on winch 4)
3	= With placed down SA-frame, winch 1 and winch 4 with a rope
4	= With 90° SA-frame, winch 1 and winch 4 with a rope
5	= 90° SA-frame, winch 1 and winch 4 with a rope, S-pivot section installed

3 Crane operation on crawler (chart 1)

Maximum permissible counterweight for the following assembly conditions for crane operation on crawler:

Assembly condition	A				B
	360° on crawler 9.1 m x 8.8 m Central ballast				360° on crawler 9.1 m x 8.8 m Supports installed Central ballast
	95 t	45 t	20 t	190 t	20 t
1	170 t	120 t	70 t	245 t	170 t
2	220 t	170 t	70 t	245 t	220 t
3 1)	170 t	120 t	70 t	245 t	170 t
4	220 t	170 t	70 t	245 t	220 t
5	245 t	170 t	70 t	245 t	245 t
1	—	—	—	175 t	—
2	—	—	—	175 t	—
3 2)	—	—	—	175 t	—
4	—	—	—	175 t	—
5	—	—	—	175 t	—

1) Maximum permissible counterweight

2) Maximum permissible counterweight on the turntable extension

4 Crane operation on supports (chart 2)

Maximum permissible counterweight for the following assembly conditions for crane operation on supports:

Assembly condition	C	D ^{S)}	E	F
	360° on supports 12.6 m x 12.6 m	360° on supports 12.6 m x 12.6 m Central ballast 110 t	To the side on supports 16.0 m x 10.5 m	360° on supports 16.0 m x 10.5 m
1	245 t	245 t	245 t	170 t
2	245 t	245 t	245 t	170 t
3 1)	245 t	245 t	245 t	170 t
4	245 t	245 t	245 t	195 t
5	245 t	245 t	245 t	195 t
1	125 t	250 t	225 t	75 t
2	125 t	250 t	250 t	75 t
3 2)	125 t	250 t	250 t	75 t
4	150 t	250 t	250 t	100 t
5	150 t	250 t	250 t	100 t

1) Maximum permissible counterweight

2) Maximum permissible counterweight on the turntable extension

S) Special central ballast

5 Crane operation on supports with installed crawler (chart 3)

Maximum permissible counterweight for the following assembly conditions for crane operation on supports with installed crawler:

Assembly condition	D	G	H
	360° on supports 13.0 m x 13.0 m Crawler installed Central ballast 20 t	To the side on supports 16.0 m x 12.0 m Crawler installed Central ballast 20 t	360° on supports 16.0 m x 12.0 m Crawler installed Central ballast 20 t
1	245 t	245 t	245 t
2	245 t	245 t	245 t
3 1)	245 t	245 t	245 t
4	245 t	245 t	245 t
5	245 t	245 t	245 t
1	250 t	250 t	200 t
2	250 t	250 t	200 t

Assembly condition	D	G	H
3 2)	250 t	250 t	200 t
4	250 t	250 t	225 t
5	250 t	250 t	225 t

1) Maximum permissible counterweight

2) Maximum permissible counterweight on the turntable extension

6 Erection / take down of boom systems



WARNING

Incorrect erection / take down of the boom system!

Toppling crane, failure of crane structures.

Death or severe injuries, high property damage.

► Observe and adhere to the respective Erection and take down charts.

► Observe chart 1 to chart 3 in section „Assembly conditions for crane operation“.

6.1 Erection of boom systems

6.1.1 Required counterweight smaller or equal to maximum permissible counterweight

Erection
Required counterweight according to erection chart is smaller or equal to the maximum permissible counterweight according to chart 1 to chart 3 in section „Assembly conditions for crane operation“:
- Erection according to the Erection and take down charts.

6.1.2 Required counterweight larger than maximum permissible counterweight

Erection
Required counterweight according to erection chart is larger than maximum permissible counterweight according to chart 1 to chart 3 in section „Assembly conditions for crane operation“:
1. Before installation of the boom system, only the maximum permissible counterweight according to chart 1 to chart 3 may be placed.
2. Before tightening the boom guying, the maximum permissible counterweight according to chart 1 to chart 3 must be placed.
3. The boom guying must be tensioned. When erecting on supports: The relieved supports may not lift off.
4. The required counterweight according to the erection chart must be placed.
5. The boom system can be pulled up.

6.2 Taking down boom systems

6.2.1 Required counterweight smaller or equal to maximum permissible counterweight

Take down
Required counterweight according to erection chart is smaller or equal to the maximum permissible counterweight according to chart 1 to chart 3 in section „Assembly conditions for crane operation“:
- Take down according to the Erection and take down charts.

6.2.2 Required counterweight larger than maximum permissible counterweight

Take down
Required counterweight according to erection chart is larger than maximum permissible counterweight according to chart 1 to chart 3 in section „Assembly conditions for crane operation“:
1. Take down the boom; the boom guying must remain tensioned.
2. Remove the counterweight until no more than the maximum permissible counterweight is placed according to chart 1 to chart 3.
3. The boom guying can be relieved.
4. The boom system can be disassembled.

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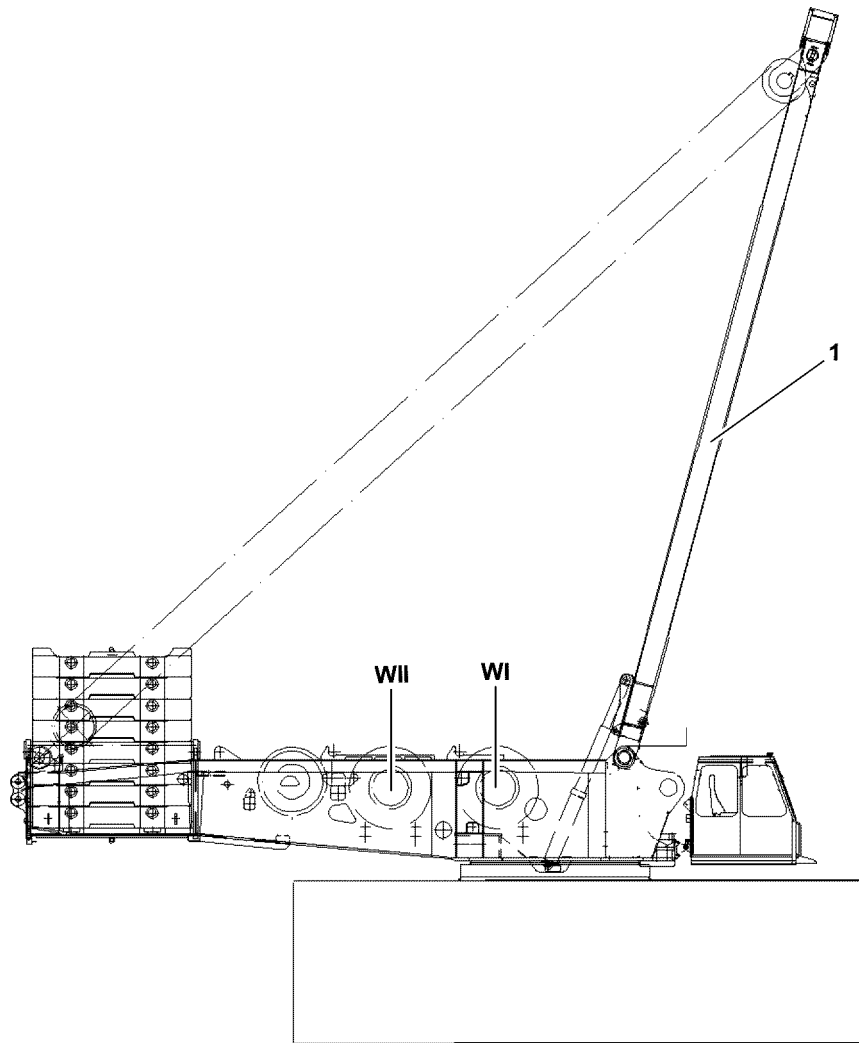


Fig.110974

LWE/LR 1750-000/12812-15-02/en

1 Component overview

- 1 SA-frame
- WI** Winch 1
- WII** Winch 2

2 Dimensions and weights



Note

▶ See Crane operating instructions, chapter 1.03!

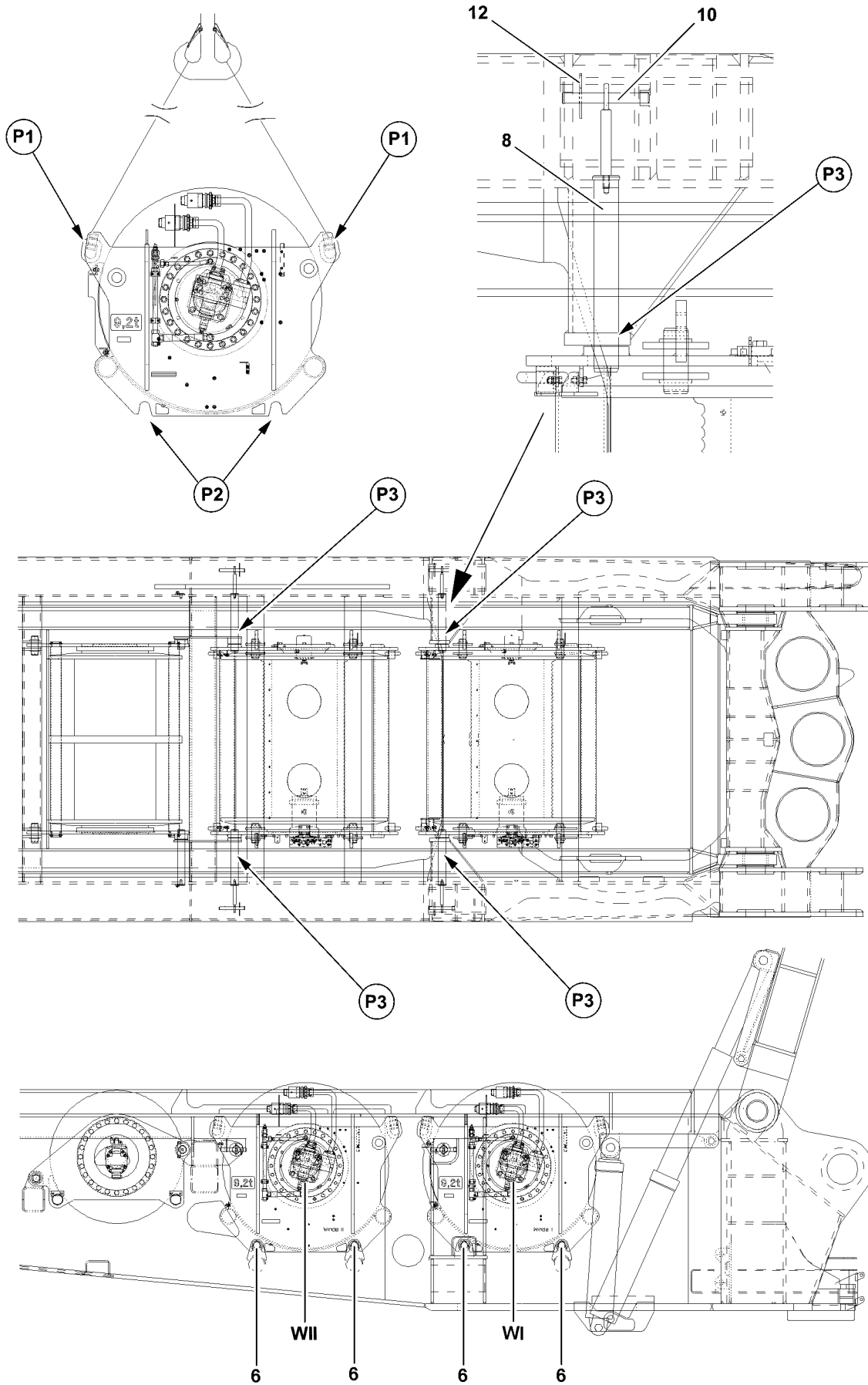


Fig.110973

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3 Assembling winch 1



WARNING

Risk of falling!

During assembly / disassembly work, personnel must be secured with appropriate fall arresters to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any assembly work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, Chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall arresters only with clean shoes!
- ▶ Keep aids and fall arresters clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!



WARNING

Components not pinned and secured!

If a component is released from the auxiliary crane before having been pinned and secured, the component will fall down! Personnel can be severely injured or killed!

- ▶ Do not disengage the auxiliary crane until the corresponding component is pinned and secured!



WARNING

Danger of impact / crushing!

When installing / removing counterweight components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be caught and severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

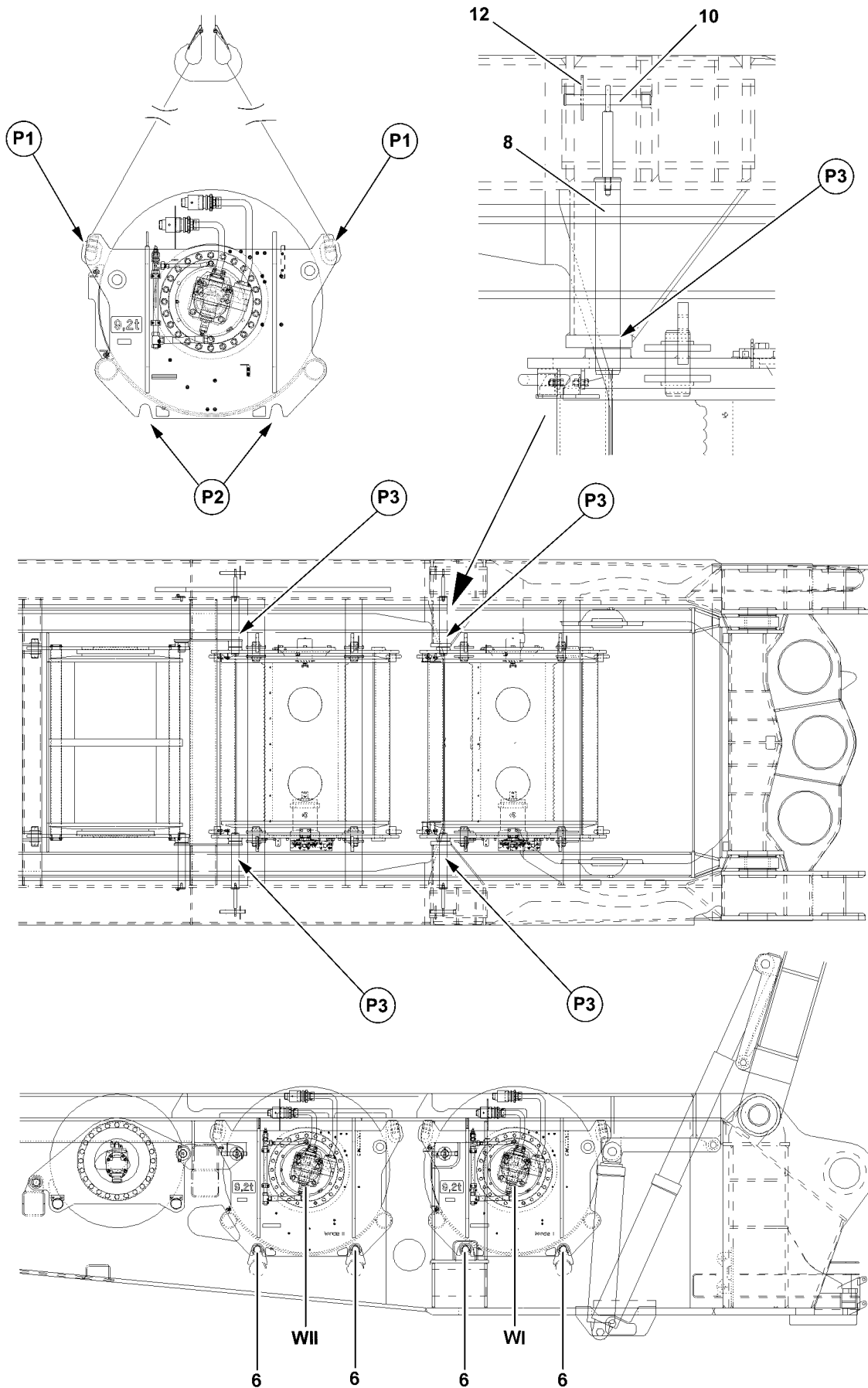


Fig.110973

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3.1 Lifting winch 1 from the flatbed trailer

Make sure that the following prerequisites are met:

- The installation of the turntable is completed.
- The crane is aligned in horizontal direction.
- An auxiliary crane with sufficient load carrying capacity is available.



WARNING

Danger of accident due to incorrect attachment!

Life-threatening situations can arise if the winch 1 is incorrectly or improperly attached!

Personnel can be severely injured or killed!

- ▶ Winch 1 must be attached on the intended receptacle point, point **P1**!
- ▶ Make sure that the tackle is correctly attached on winch 1 and that it is secured sufficiently to prevent it from loosening up!

-
- ▶ Attach the tackle on the receptacle points, point **P1**.
 - ▶ Bring the tackle to „tension“.
 - ▶ Release and remove the transport retainers on the flatbed trailer.



WARNING

Falling components!

When lifting winch 1 from the flatbed trailer, components or winch 1 can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that there are no persons within the danger zone!
-
- ▶ Lift winch 1 with the auxiliary crane from the flatbed trailer.

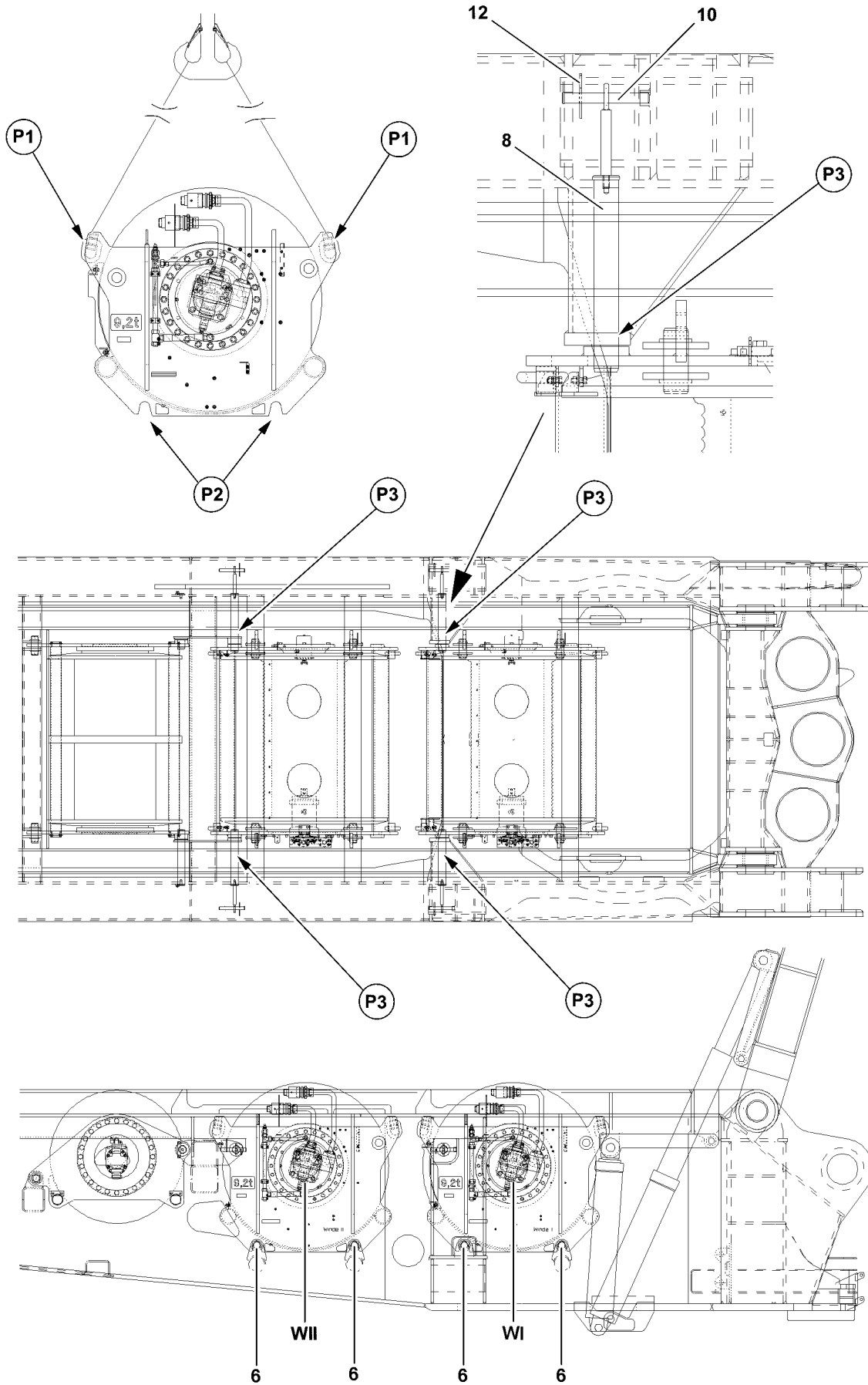


Fig.110973

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3.2 Setting winch 1 into the turntable

Make sure that the following prerequisites are met:

- The SA-frame is aligned / placed down to the point where the assembly area of winch 1 is easily accessible.
- The pin bores are clear.



WARNING

Danger of accident when swinging in and lowering winch 1!

When swinging in and lowering winch 1 on the turntable, limbs can be crushed or even severed!

Personnel can be severely injured or killed!

- ▶ Make sure that there are no persons within the danger zone!
- ▶ Do not reach with your hands into the danger zone!

NOTICE

Property damage!

If the following note is not observed, damage can result to the crane or winch 1!

- ▶ When moving winch 1 in with the SA-frame, it must be ensured that winch 1 does not hit against the SA-frame!



Note

- ▶ Check to ensure that the alignment of winch 1 or the receptacles, point **P2** to the pins **6** on the turntable is exact!
- ▶ Before lowering, bring winch 1 into position that the receptacles, point **P2** are above the pins **6** on the turntable!

- ▶ Move winch 1 in with the auxiliary crane between the SA-frame.
- ▶ Lower winch 1 slowly.

When winch 1 is aligned:

- ▶ Set winch 1 carefully on the pins **6** on the turntable.

3.3 Pinning winch 1 with the turntable

Make sure that the following prerequisites are met:

- Winch 1 is seated on the pins **6**.
- The tackle between winch 1 and the auxiliary crane is „tensioned“.
- ▶ Insert the pins **8**, point **P3**.



WARNING

The pins can loosen up by themselves!

- ▶ Secure the pins **8** immediately after pinning with pins **10** and cotter pins **12**!

When all pins **8** are completely pinned:

- ▶ Insert pin **8** with pin **10** and secure with cotter pin **12**.
- ▶ Remove the tackle on winch 1.

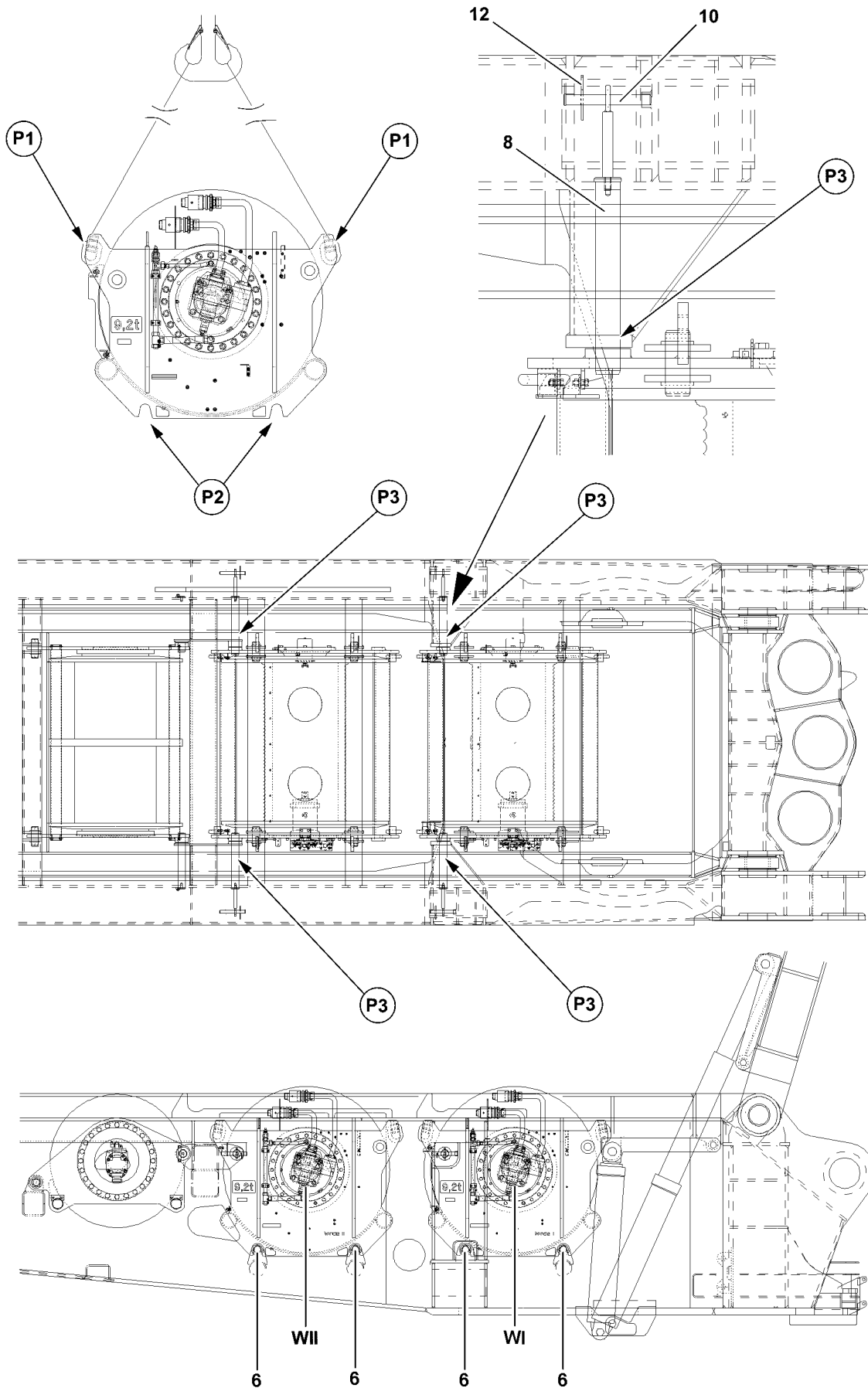


Fig.110973

LWE/LR 1750-000/12812-15-02/en

3.4 Establishing the connection to the turntable

Make sure that the following prerequisite is met:

- The winch is properly installed, pinned and secured.

3.4.1 Establishing the hydraulic connections to winch 1

The hydraulic connections of winch 1 are made with quick couplings.

When connecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.



WARNING

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!

Personnel can be severely injured or killed!

- ▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!



WARNING

Loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
- ▶ Assemble coupling components (sleeve and connector) and screw together using hand-tightened nut.
- ▶ Tighten hydraulic coupling by hand. Rotate hand-tightened nut until it reaches a tangible, fixed stop position.
- ▶ Establish the hydraulic connection to winch 1.

3.4.2 Establishing the electrical connections to winch 1

- ▶ Establish the electrical connections to winch 1, see electric wiring diagram.

3.4.3 Establishing the connections of the central lubrication system to winch 1

- ▶ Establish the connections of the central lubrication system to winch 1.

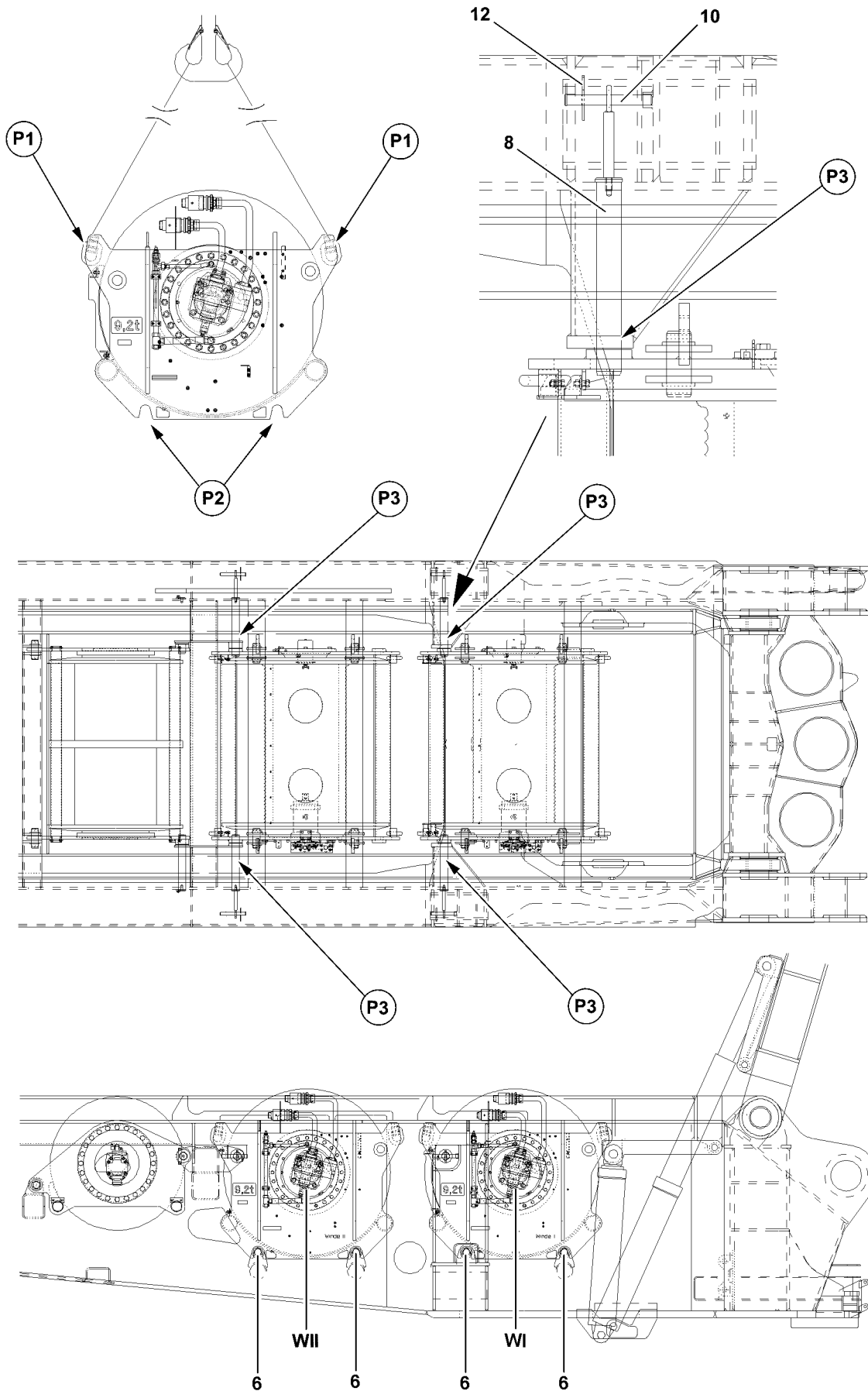


Fig.110973

LWE/LR 1750-000/12812-15-02/en

4 Removing winch 1



WARNING

Risk of falling!

During assembly / disassembly work, personnel must be secured with appropriate fall arresters to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any assembly work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, Chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall arresters only with clean shoes!
- ▶ Keep aids and fall arresters clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!



WARNING

Components not pinned and secured!

If a component is released from the auxiliary crane before having been pinned and secured, the component will fall down! Personnel can be severely injured or killed!

- ▶ Do not disengage the auxiliary crane until the corresponding component is pinned and secured!



WARNING

Danger of impact / crushing!

When installing / removing counterweight components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be caught and severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

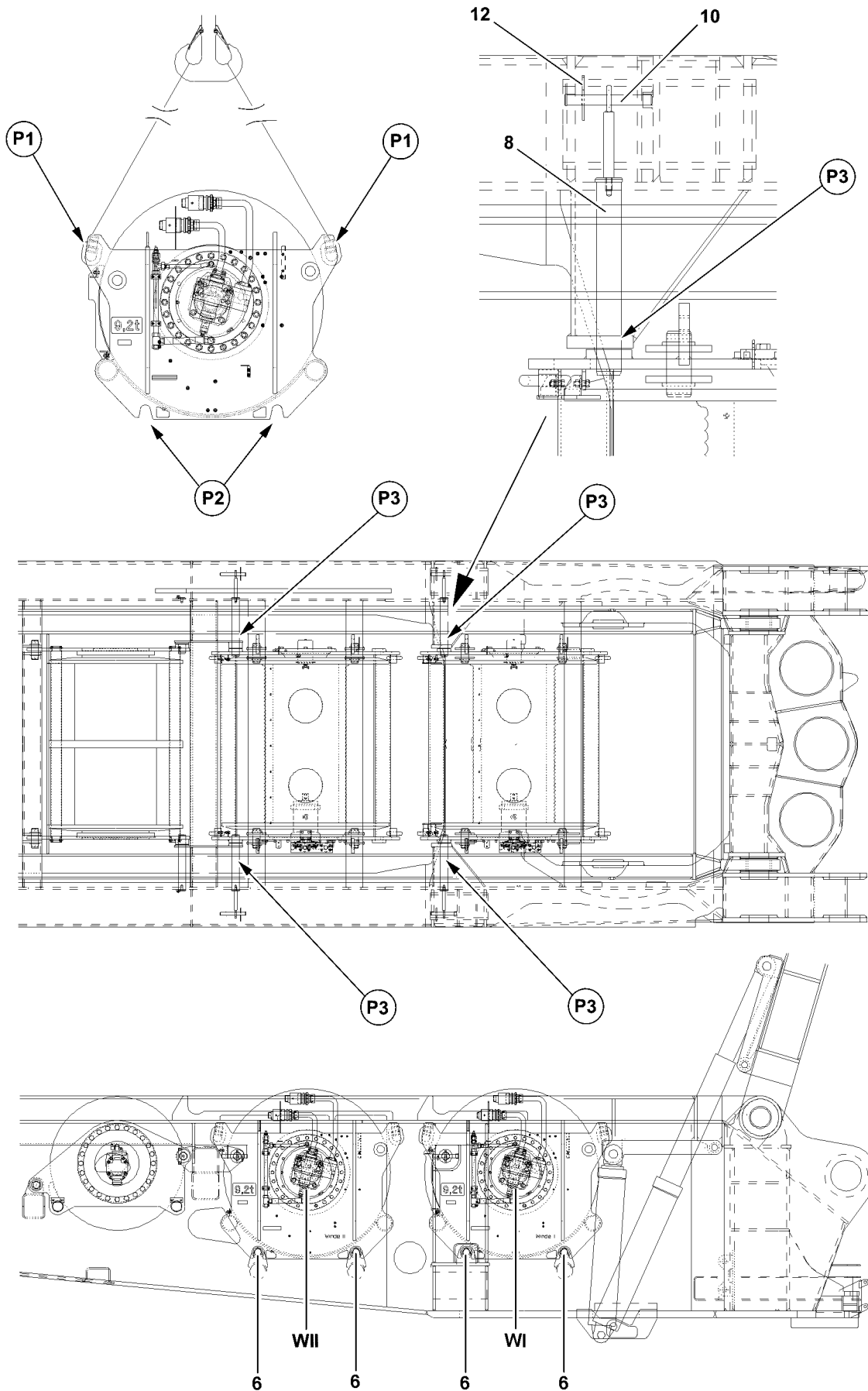


Fig.110973

LWE/LR 1750-000/12812-15-02/en

4.1 Disconnecting the connections to winch 1

Make sure that the following prerequisite is met:

- The hoist rope is completely spooled up.

4.1.1 Disconnecting the hydraulic connections to winch 1

When releasing hydraulic lines with quick-release couplings, make sure that the uncoupling procedure is carried out correctly.



WARNING

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!

Personnel can be severely injured or killed!

- ▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!

-
- ▶ Release the hydraulic coupling by hand.
 - ▶ Disconnect the hydraulic connection to winch 1.

4.1.2 Disconnecting the electrical connections to winch 1

- ▶ Disconnect the electrical connections to winch 1.

4.1.3 Disconnecting the connections of the central lubrication system to winch 1

- ▶ Disconnect the connections to winch 1.

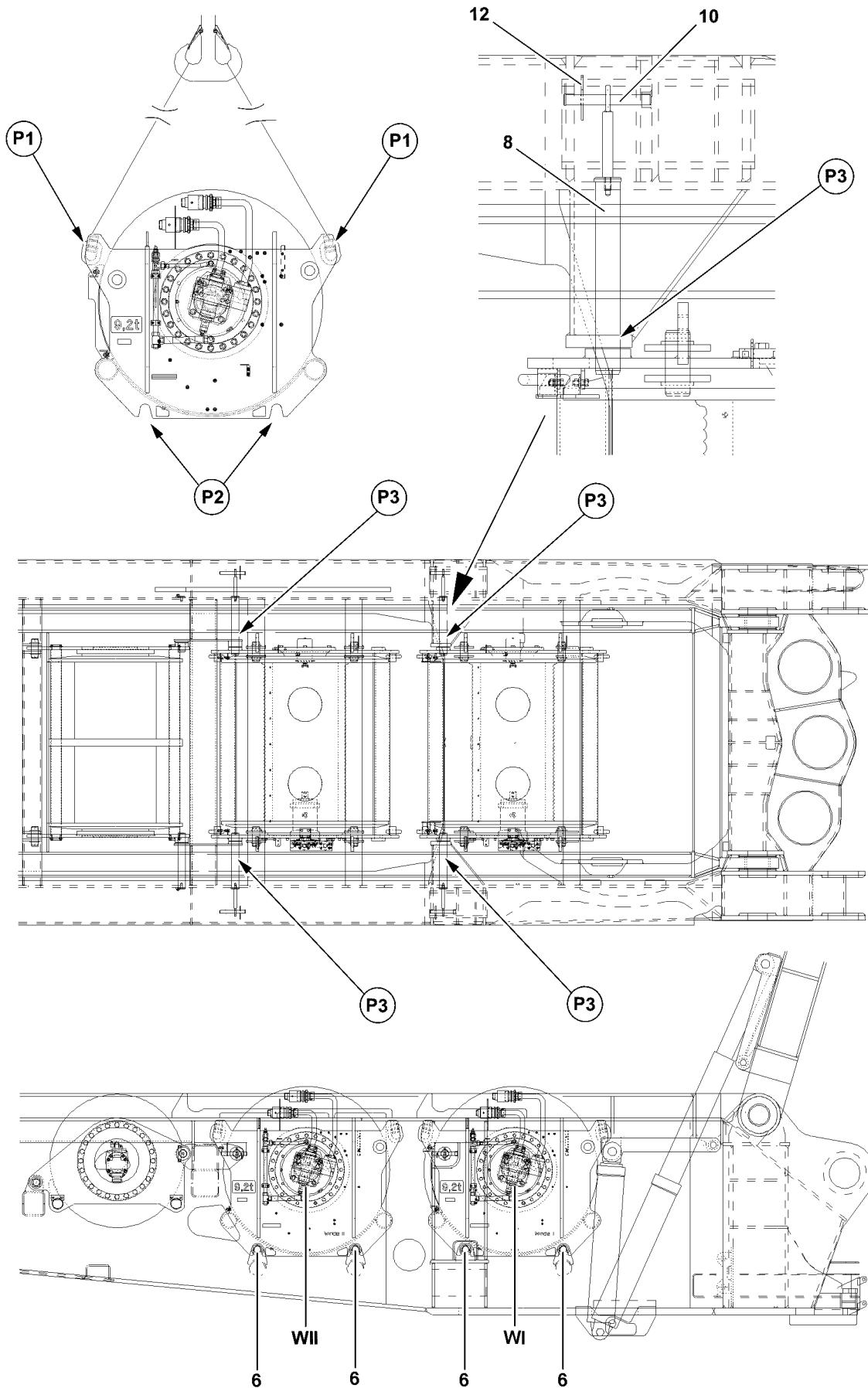


Fig.110973

LWE/LR 1750-000/12812-15-02/en

4.2 Unpinning winch 1 on the turntable

Make sure that the following prerequisites are met:

- The hydraulic connections are disconnected.
 - The electrical connections are disconnected.
 - The connections of the central lubrication system are disconnected.
 - The SA-frame is aligned / placed down to the point where the assembly area of winch 1 is easily accessible.
 - An auxiliary crane with sufficient load carrying capacity is available.
 - The tackle is attached on the receptacle points, point **P1** of winch 1.
- ▶ Bring the tackle to „tension“.
 - ▶ Release the pin **10**:
 - ▶ Release the pin **8**.
 - ▶ Unpin the pin **8**.

NOTICE

Damage to the connector parts!

By lifting winch 1, the connector lines can be damaged!

- ▶ Make sure that all hydraulic and electrical connections are disconnected!
 - ▶ Make sure that the connections to the central lubrication system are disconnected!
 - ▶ Make sure that all pins are removed!
-

NOTICE

Property damage!

If the following note is not observed, damage can result to the crane or winch 1!

- ▶ When moving winch 1 out with the SA-frame, it must be ensured that winch 1 does not hit against the SA-frame!
-

When the pins **8** are unpinned:

- ▶ Lift winch 1 carefully with the auxiliary crane.
-



WARNING

Falling components!

When lifting winch 1 from the turntable, components or winch 1 can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that there are no persons within the danger zone!
-

- ▶ Move winch 1 out

When winch 1 is moved out:

- ▶ Set winch 1 on the flatbed trailer.
- ▶ Remove the auxiliary crane.

5 Assembly and disassembly of winch 1

The assembly or disassembly of winch 1 is to be carried out according to the assembly or disassembly of winch 1.

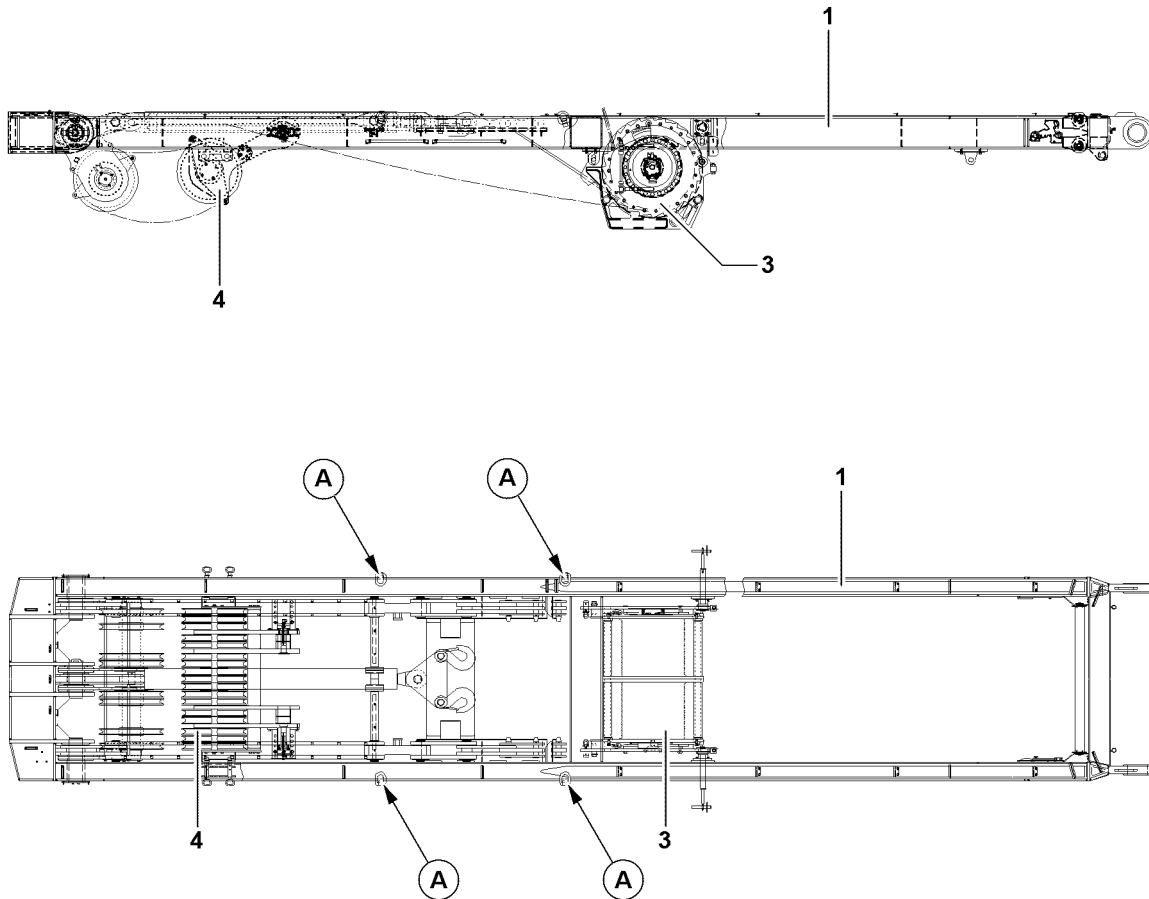


Fig.107469

1 Component overview SA-frame

Position	Component	Weight
1	SA-frame	
3	Intake gear winch 4	
4	Roller bearings	
	SA-frame complete	17.8 t

2 Attachment points SA-frame



WARNING

Danger of accident due to incorrect attachment!

Life-threatening situations can arise due to improper or incorrect attachment of the corresponding components!

► The corresponding components must be attached on the intended points **A!**

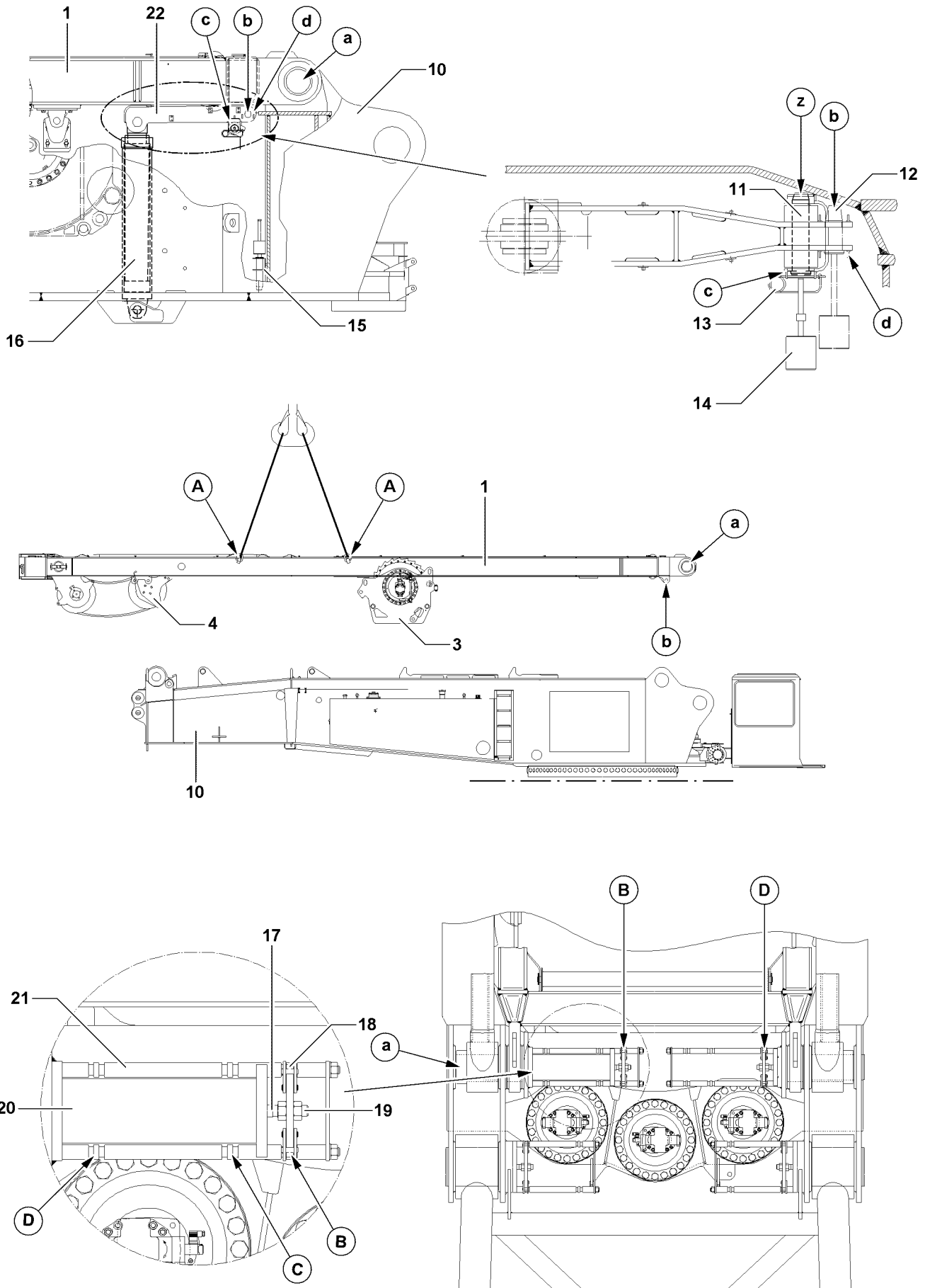


Fig.108271

LWE/LR 1750-000/12812-15-02/en

3 Assembling SA-frame



Note

- ▶ Guarantee equally long attachment equipment such that the SA-frame can be horizontally positioned over the turntable!



Note

- ▶ Control of radio remote control, see chapter 5.08 of the crane operating instructions!

3.1 Pinning the SA-frame on the turntable

NOTICE

Collision of components!

If the SA-frame is positioned with the auxiliary crane on the turntable, roller bearings and hoist gear can collide with the turntable. Components can be damaged!

- ▶ Make sure that the roller bearing **4** does not collide with the turntable **10**!
- ▶ Make sure that the intake gear winch **4 3** does not collide with the turntable **10**!

Make sure that the following prerequisites are met:

- pins **20** are unpinned on both sides at position **a**,
 - pins **12** are unpinned on both sides at position **b**,
 - securing hooks **18** are hung on both sides on the guide at the point **B**.
- ▶ Attach SA-frame **1** with auxiliary crane on the attachment points **A**.
 - ▶ Position SA-frame **1** with auxiliary auxiliary crane on the turntable **10** so that pinning points **a** and pinning points **b** align.
 - ▶ Pin in the pins **20**: Activate radio remote control.
 - ▶ Fold up securing hooks **18** at the point **B**.



Note

- ▶ Likewise, if the derrick boom is assembled, the pins **20** must be secured at the points **C** with the securing hooks **18**!
 - ▶ For derrick boom assembly, see chapter 5.05 of the crane operating instructions!
- ▶ Retract cylinder: Activate remote control operation, until securing hooks **18** can be hung on point **D**.

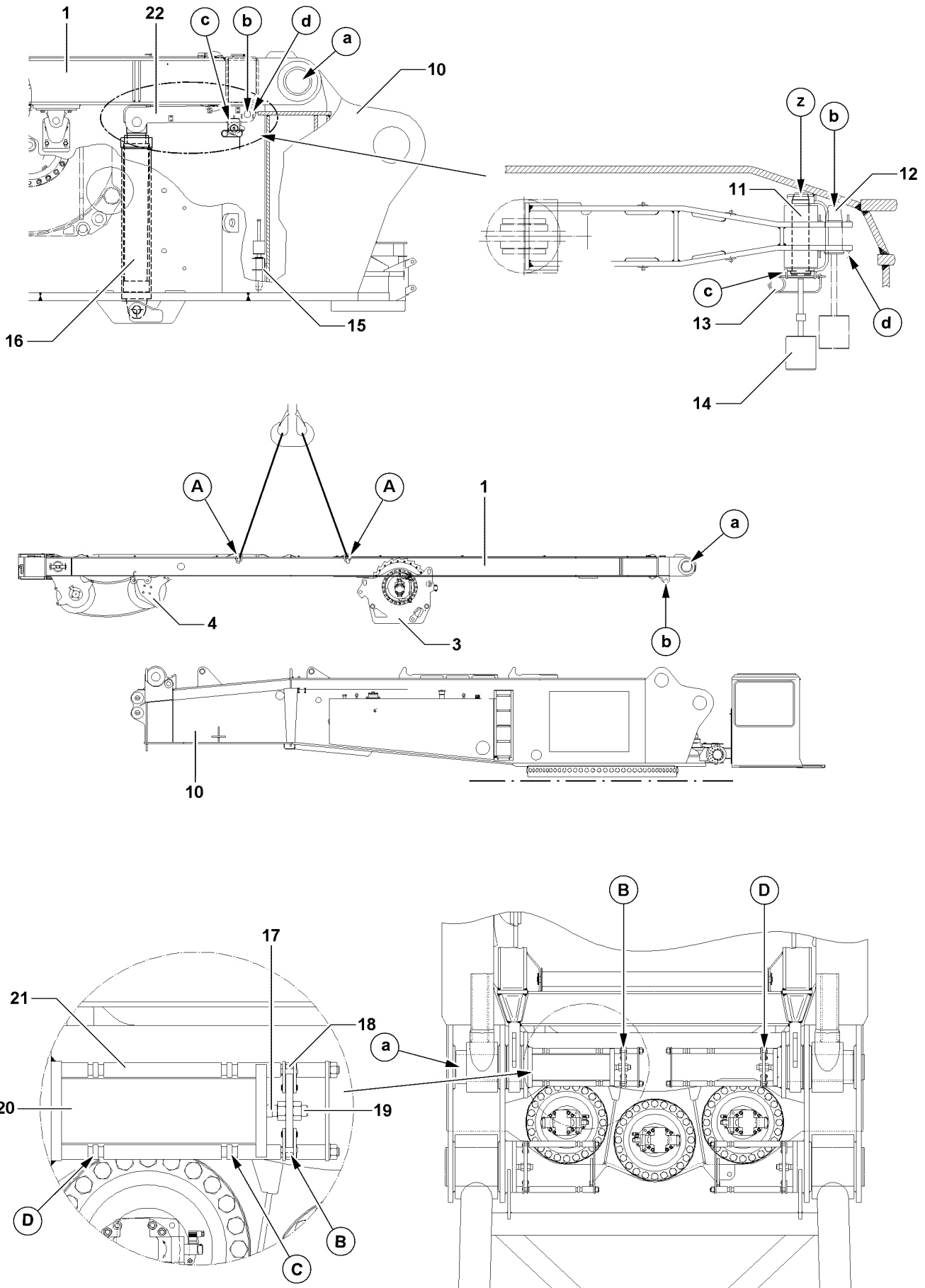


Fig.108271

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Unsecured pin!

If the pins **20** are not secured, the pins can loosen. Personnel can be severely injured or killed!

▶ Secure pin **20** with securing hooks **18**!

▶ Hang securing hooks **18** on the point **D**.

Result:

– The pin **20** is secured.

- ▶ Pin in and secure pins **20** on both sides.
- ▶ Pin in the pins **12** on both sides with pin device **14** at position **b**.
- ▶ Remove spring retainer **13** on point **c**.
- ▶ Secure pins **12** on both sides with spring retainer **13** in position **d**.
- ▶ Unpin pins **11** with pin device **14**.
- ▶ Insert pins **11** with pin device **14** in receptacle **15**.
- ▶ Lay down SA-frame **1** completely with auxiliary crane.
- ▶ Separate and remove SA-frame **1** from tackle and auxiliary crane.

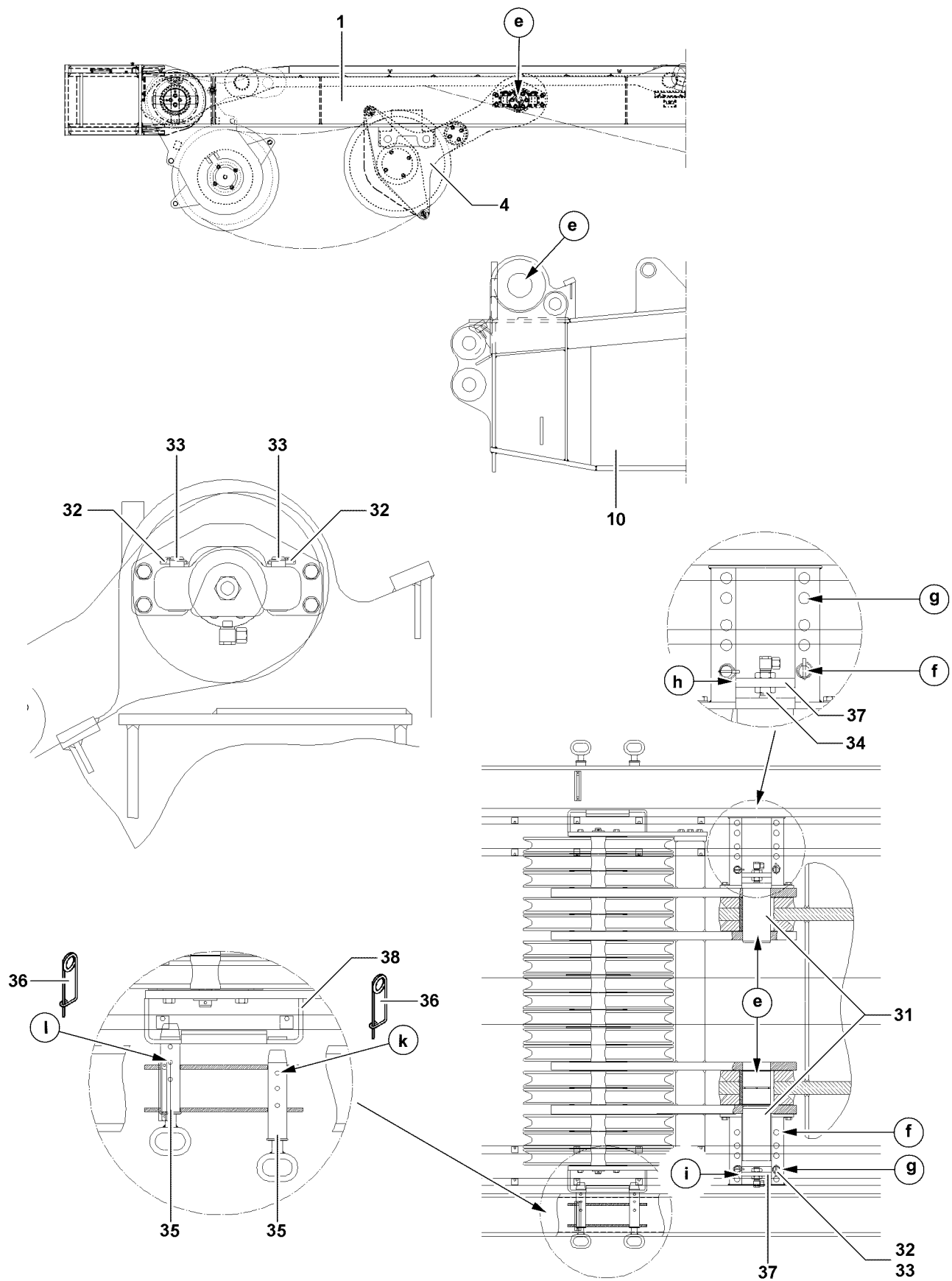


Fig.107471

LWE/LR 1750-000/12812-15-02/en

3.2 Pin roller bearings.

Ensure that the following prerequisites are met:

- align pinning points **e**,
 - pins **31** are unpinned on both sides,
 - retaining pins **33** are pinned on both sides on the point **g** and secured with linch pins **32**.
- ▶ Pin in the pins **31**: Activate radio remote control.
 - ▶ Unpin the linch pin **32** on both sides and unpin the pins **33**.
 - ▶ Retract cylinder **34**: Activate radio remote control until metal **37** stands at position **h** and retaining pins **33** can be pinned at point **f**.
 - ▶ Pin in the pins **33** on both sides and secure with spring retainers **32**.
 - ▶ Secure the pin **31**: Pin in the retaining pins **33** on both sides at the point **f** and secure with linch-pins **32**.
 - ▶ Hang roller bearing **4** on the auxiliary crane and and lightly lift until the socket pins **35** may be unpinned.
 - ▶ Remove spring retainer **36** on point **l**.
 - ▶ Unpin socket pins **35** on metal **38**, so that roller bearing **4** is separated from SA-frame **1**.
 - ▶ Secure socket pins **35** on the point **k** with spring retainer **36**.
 - ▶ Lower pulley set **4** with auxiliary crane, until pulley set **4** hangs completely in the rope reeving.
 - ▶ Remove the auxiliary crane.

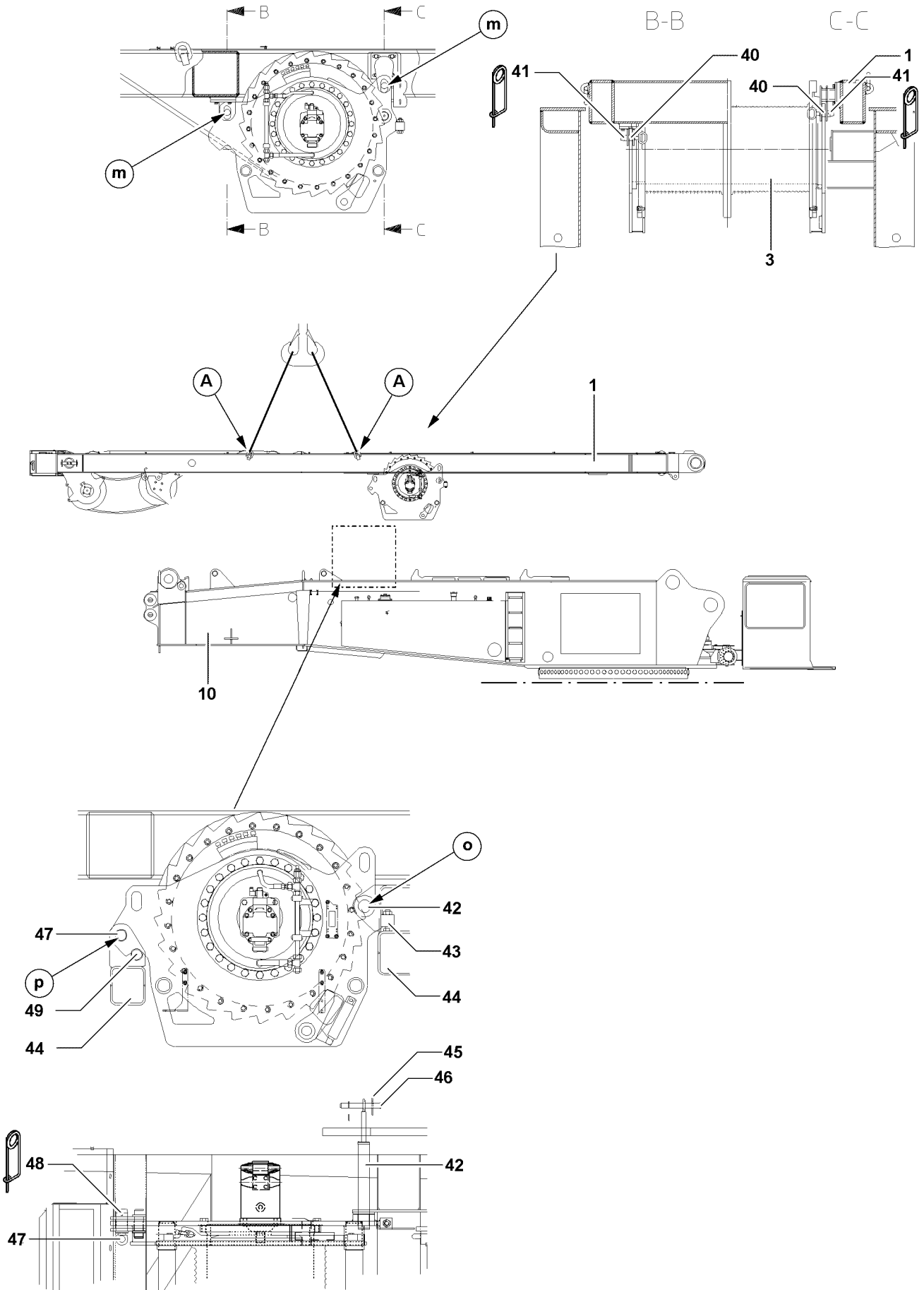


Fig.108272

LWE/LR 1750-000/12812-15-02/en

3.3 Pin intake gear winch 4 on turntable

Make sure that the following prerequisites are met:

- align pin points **o** between intake gear winch 4 **3** and turntable **10**,
 - align pin points **p** between intake gear winch 4 **3** and turntable **10**,
 - intake gear winch 4 **3** lies with pins **49** and stop **43** on turntable frame **44** up.
- ▶ Pin in the socket pins **42** at the pin points **o** and secure with retaining pins **46**.
 - ▶ Secure the retaining pins **46** on both sides with cotter pins **45**.
 - ▶ Secure socket pins **47** at the pin points **p** and pin with retaining pins **48**.
 - ▶ Separate intake gear winch 4 **3** from SA-frame 1: Remove pin points **m** on both sides spring retainer **41** and unpin stick pins **40**.

3.4 Establishing the electrical connections



Note

- ▶ For production of the electrical connections on the SA-frame, the separate electrical diagram is to be employed!
-
- ▶ Establish electric connections between turntable and SA-frame.
 - ▶ Establish electrical connections between turntable and intake gear winch 4.

3.5 Establish the hydraulic connections

When hydraulic lines are connected and disconnected with quick-release couplings, make sure that the coupling procedure is carried out correctly.



DANGER

Risk of accident due to loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) as well as self-loosening of quick-release couplings can result in serious injury due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!



Note

- ▶ To connect or loosen the hydraulic lines with quick couplers, see chapter 5.01 of the crane operating instructions!
-
- ▶ Release the pressure in the hydraulic system before connecting and disconnecting. Turn the engine off and wait for short time.
 - ▶ Assembling coupling components (sleeve and connector) by using hand-tightened nut.
 - ▶ Combine coupling components.

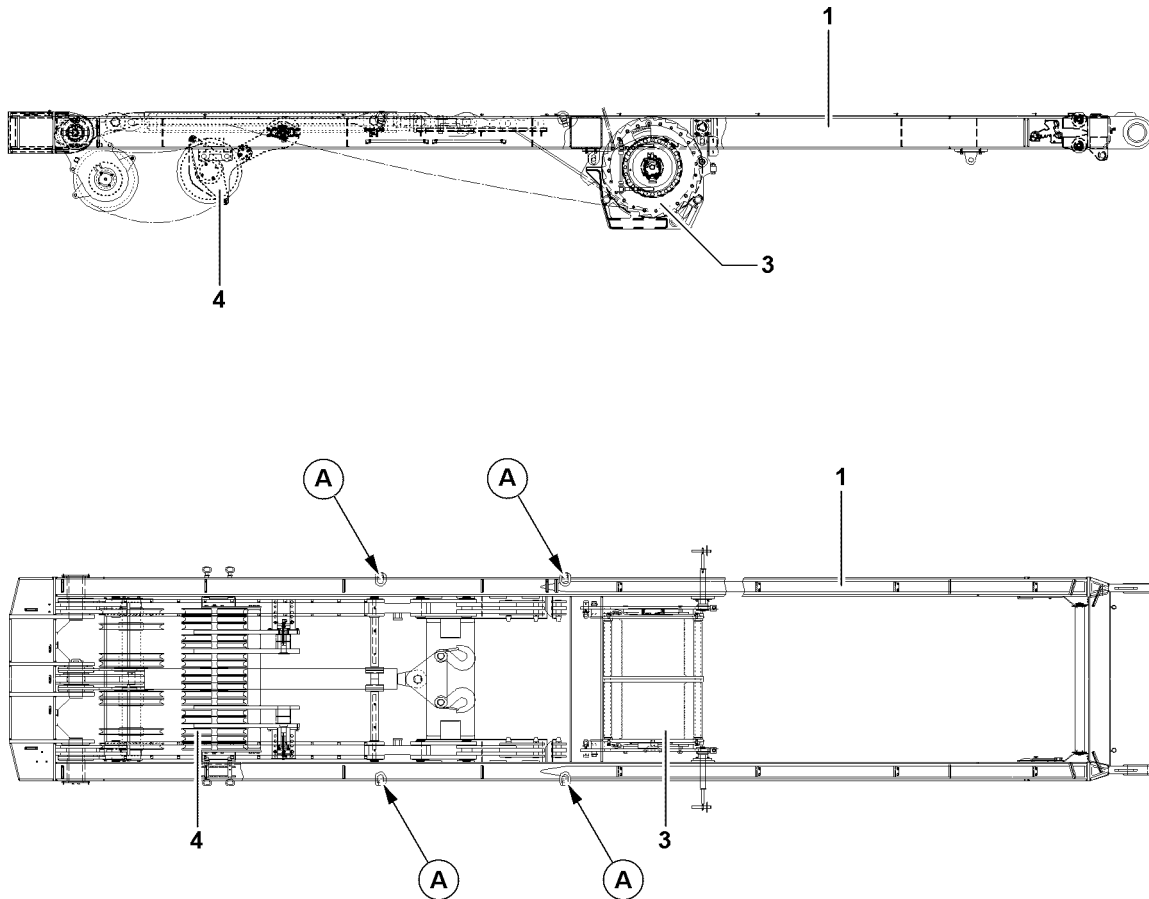


Fig.107469

4 Disassembling SA-frame

**Note**

- ▶ Guarantee equally long tackle such that the SA-frame can be horizontally lifted from the turntable!

**Note**

- ▶ Control of radio remote control, see chapter 5.08 of the crane operating instructions!

Ensure that the following prerequisite is met:

- roller bearings are found in transport position: SA-frame is found in the 0° position.

4.1 Disconnect the electrical connections

- ▶ Separate and properly store electrical connections between turntable and SA-frame.
- ▶ Separate and properly store electrical connections between turntable and winch 4.

4.2 Disconnect the hydraulic connections

When hydraulic lines are connected and disconnected with quick-release couplings, make sure that the coupling procedure is carried out correctly.

**Note**

- ▶ To connect or loosen the hydraulic lines with quick couplers, see chapter 5.01 of the crane operating instructions!
- ▶ Release the pressure in the hydraulic system before connecting and disconnecting. Turn the engine off and wait for short time.
- ▶ Loosen coupling components (sleeve and connector) by using hand-tightened nut.
- ▶ Separate coupling components.
- ▶ Properly store hydraulic hoses on the the SA-frame on the turntable.
- ▶ Fitting the coupling components with protective caps against contamination and damage.

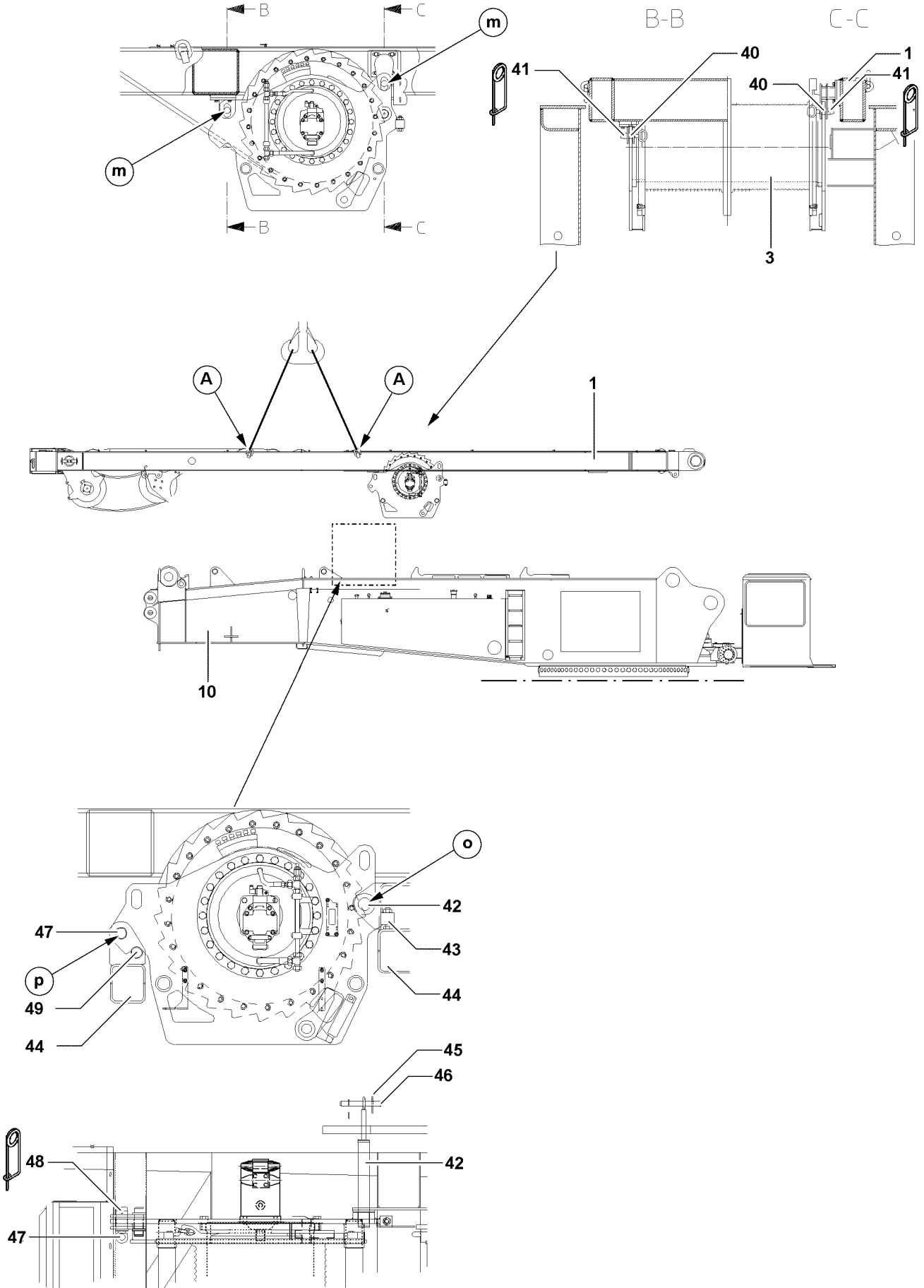


Fig.108272

LWE/LR 1750-000/12812-15-02/en

4.3 Prepare intake gear winch 4 for transport

Ensure that the following prerequisite is met:

- align pin points **m** between intake gear winch 4 **3** and SA-frame **1**.
- ▶ Secure socket pins **40** at the pin points **m** and pin with retaining pins **41**.
- ▶ Separate intake gear winch 4 **3** from turntable **10**:
- ▶ Remove cotter pins **45** on both sides at the pin points **o** and unpin retaining pins **46**.
- ▶ Unpin the pins **42** on both sides.
- ▶ Remove spring retainers **48** on both sides on the pin points **p** and unpin socket pins **47**.

Result:

- Intake gear winch 4 **3** is separated from SA-frame **1**.

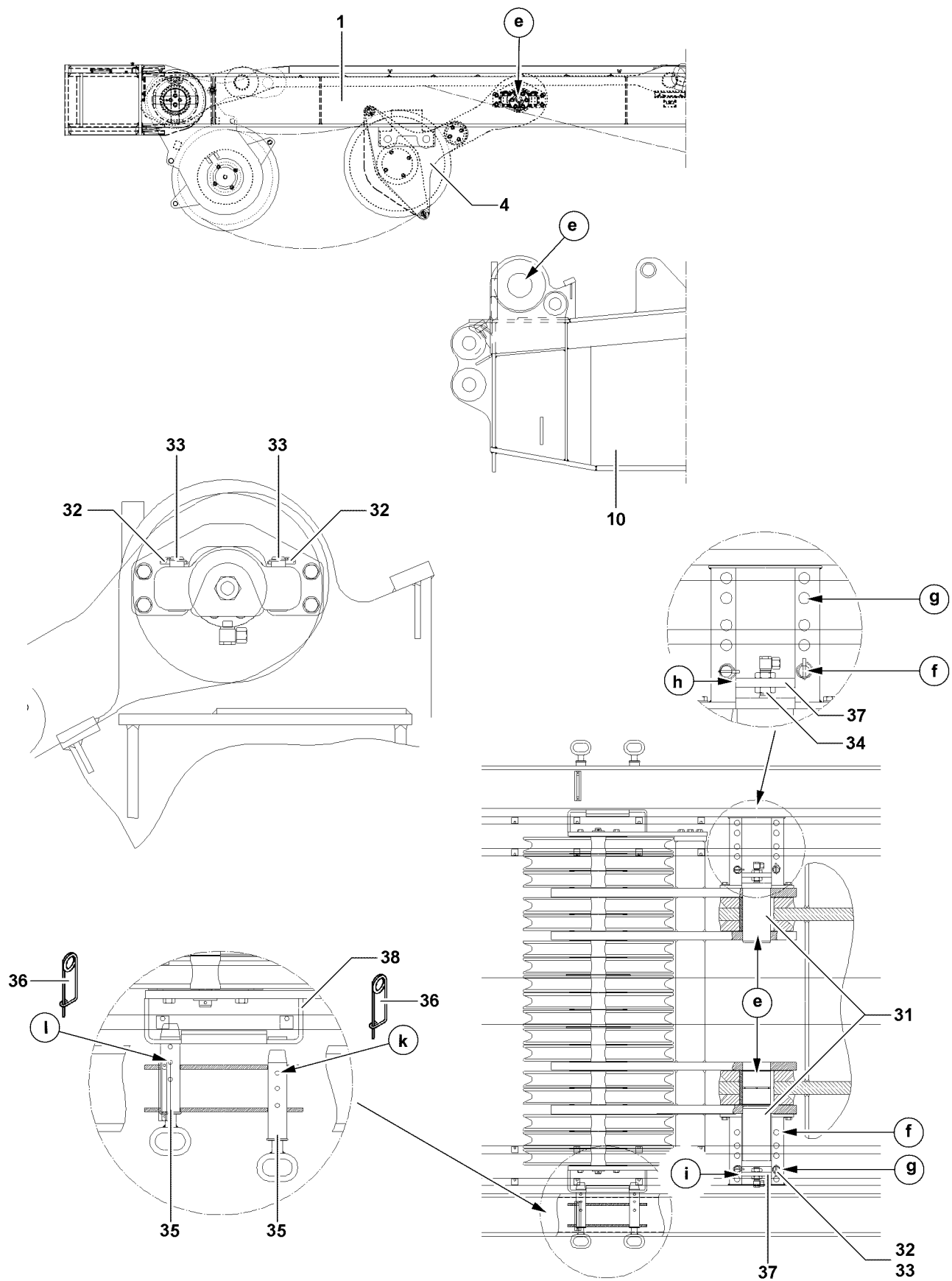


Fig.107471

LWE/LR 1750-000/12812-15-02/en

4.4 Preparing the roller bearings for transport

Ensure that the following prerequisites are met:

- align pinning points **k**,
 - pins **35** are unpinned on both sides,
 - retaining pins **33** are pinned on both sides on the point **f** and secured with lynch pins **32**.
- ▶ Hang roller bearing **4** on the auxiliary crane and and lightly lift until the socket pins **35** may be unpinned.
 - ▶ Remove spring retainer **36** on point **k**.
 - ▶ Unpin socket pins **35** on metal **38**, so that roller bearing **4** is connected with SA-frame **1**.
 - ▶ Unpin the lynch pin **32** on both sides and unpin the pins **33**.
 - ▶ Extend cylinder **34**: Activate radio remote control until metal **37** stands at position **i** and retaining pins **33** can be pinned at point **g**.
 - ▶ Pin in the pins **33** on both sides and secure with spring retainers **32**.
 - ▶ Unpin the pins **31**: Activate radio remote control.
 - ▶ Remove auxiliary crane and tackle.

Result:

- The roller bearing **4** is connected with the SA-frame **1**.

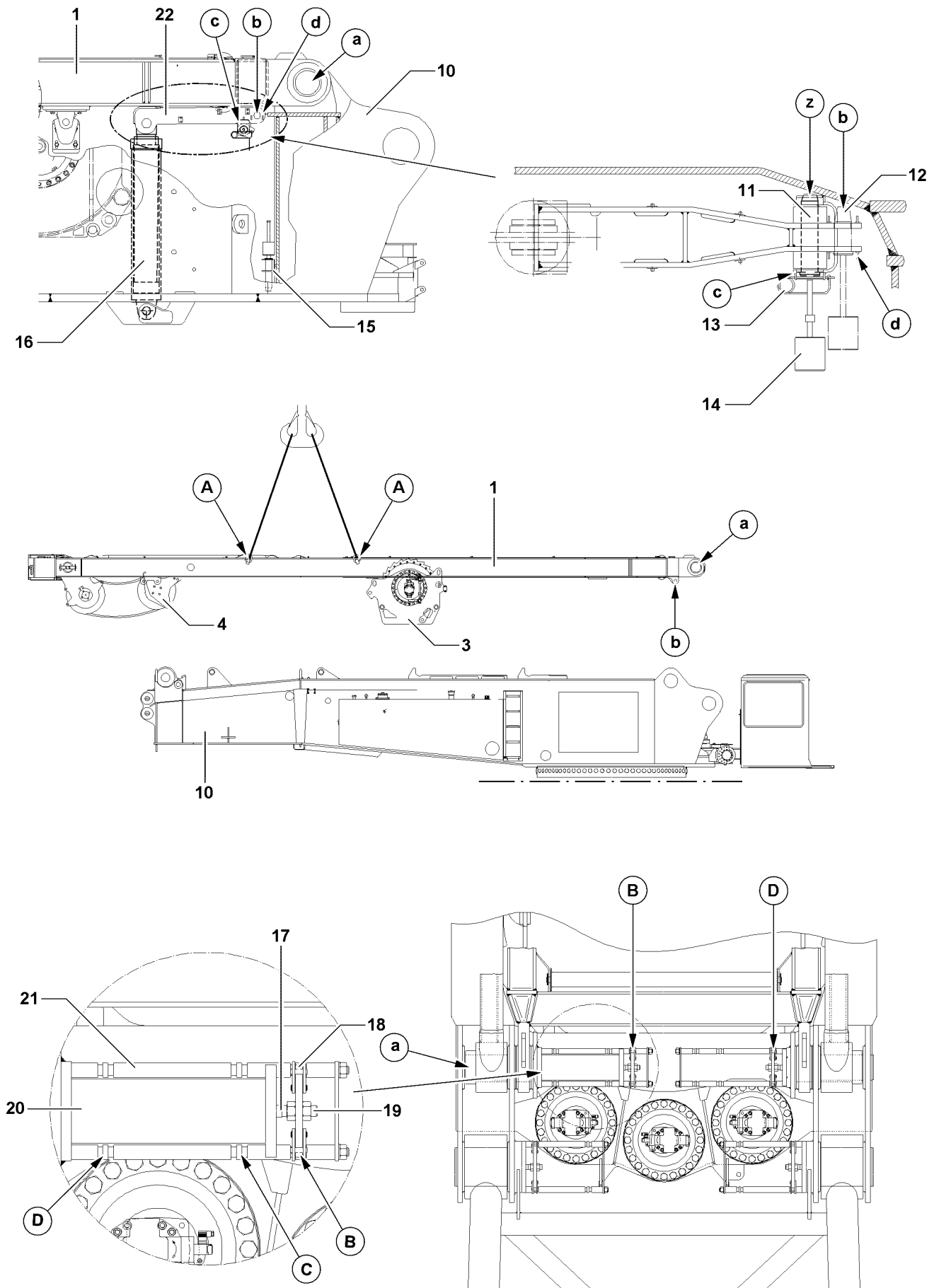


Fig.108271

LWE/LR 1750-000/12812-15-02/en

4.5 Unpin the SA-frame on the turntable

NOTICE

Collision of components!

If the SA-frame is lifted with the auxiliary crane on the turntable, roller bearings and hoist gear can collide with the turntable. Components can be damaged!

- ▶ Make sure that the roller bearing **4** does not collide with the turntable **10**!
- ▶ Make sure that the intake gear winch **4 3** does not collide with the turntable **10**!

Ensure that the following prerequisite is met:

- securing hooks **18** are hung on both sides on the guide at the point **D**,
- ▶ attach and secure SA-frame **1** with auxiliary crane on the attachment points **A**.
- ▶ Pin in the pins **11** with pin device **14** in position **z**.
- ▶ Remove spring retainer **13** in position **c**.
- ▶ Pin in the pins **11** and secure spring retainer **13** in position **c**.
- ▶ Unpin pins **12** on both sides with pin device **14** in position **b** and insert in receptacle **15**.

Result:

- Erection cylinder **16** is separated from SA-frame **1** and secured on flap **22**.



DANGER

Unpinned derrick boom!

If the SA-frame is unpinned, as long as the derrick boom is still assembled, the derrick boom topples! Personnel can be severely injured or killed!

- ▶ Disassemble derrick boom before disassembly of the SA-frame!



Note

- ▶ For derrick boom assembly, see chapter 5.05 of the crane operating instructions!

- ▶ Fold up securing hooks **18** at the point **D**.
- ▶ Extend cylinder: Activate remote control operation, until securing hooks **18** can be hung on point **B**.
- ▶ Unpin the pins **20**: Actuate radio remote control.
- ▶ Hang in the securing hooks **18** on both sides on the point **B**.

Result:

- The pin **20** is secured.

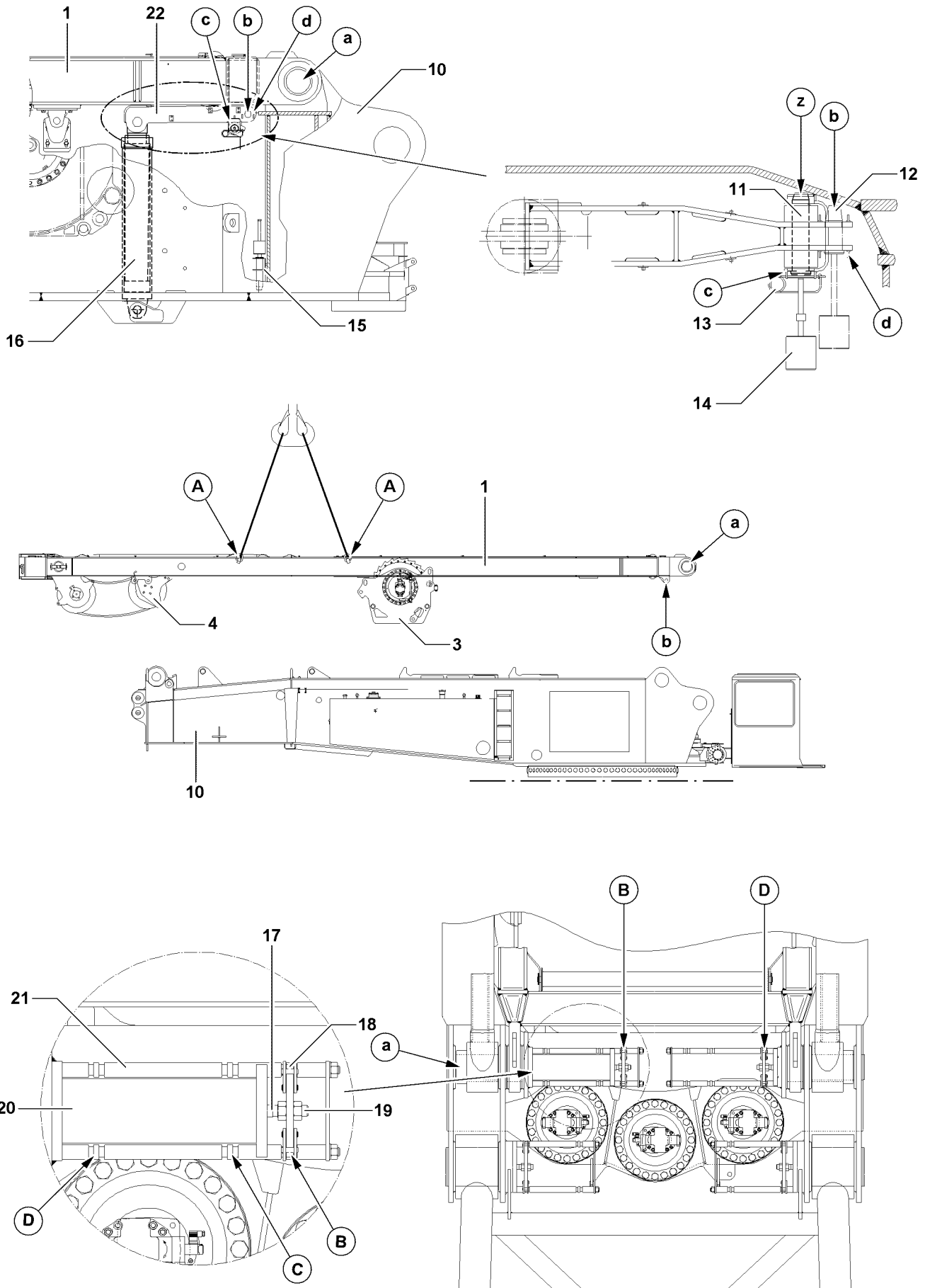


Fig.108271

LWE/LR 1750-000/12812-15-02/en

4.6 Remove the SA-frame from the turntable

**Note**

- ▶ Guarantee equally long tackle such that the SA-frame can be horizontally lifted from the turntable!

NOTICE

Collision of components!

If the SA-frame is lifted with the auxiliary crane on the turntable, roller bearings and hoist gear can collide with the turntable. Components can be damaged!

- ▶ Make sure that the roller bearing **4** does not collide with the turntable **10**!
- ▶ Make sure that the intake gear winch **4 3** does not collide with the turntable **10**!
- ▶ Attach SA-frame **1** with auxiliary crane on the attachment points.
- ▶ Carefully lift and remove SA-frame **1**.

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4 Operation of crane superstructure

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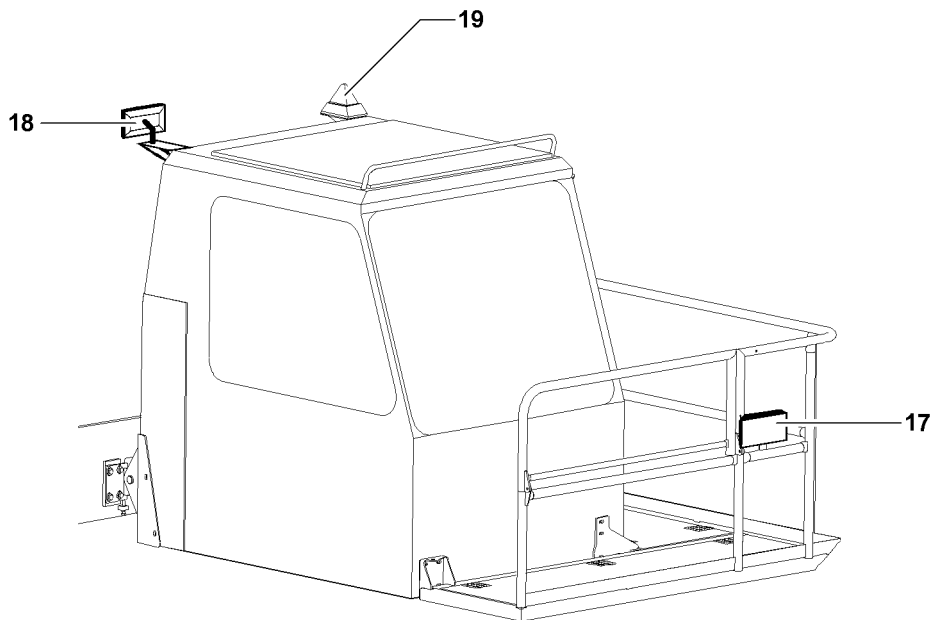
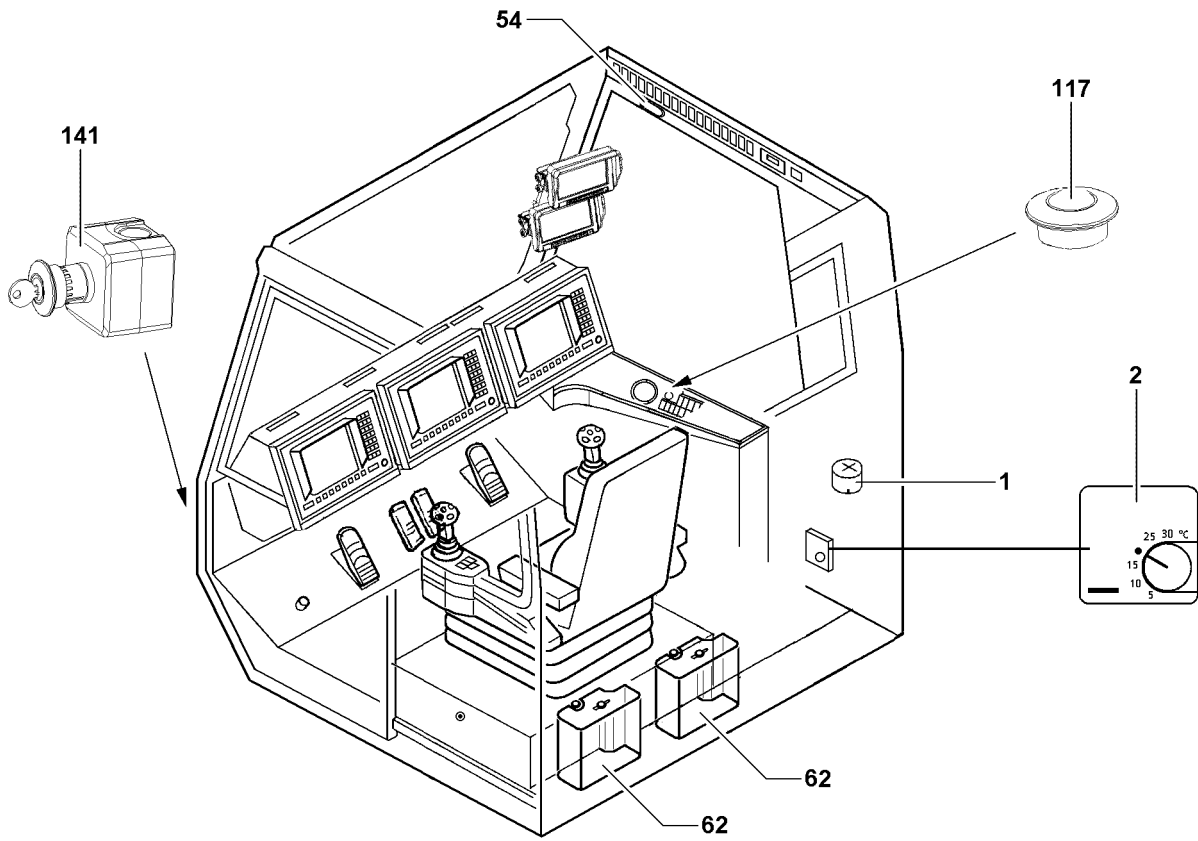


Fig.108901

LWE/LR 1750-000/12812-15-02/en

1 Operating and monitoring instruments

This chapter describes the elements in the cab and is divided into:

- General equipment in the cab
- Operating units in the cab

2 Equipment in the cab

2.1 Installations in the cab

- 17 Working floodlight, front
- 18 Working floodlight, rear
- 19 Flashing beacon
- 62 Reservoir for window cleaning fluid

2.2 Emergency equipment

- 117 Palm button
 - EMERGENCY OFF
- 141 Palm button
 - EMERGENCY OFF

2.3 Interior equipment

- 1 Pressure gauge
 - Erection cylinder with A-frame
- 2 Thermostat
 - Auxiliary heater
- 54 Cab lighting

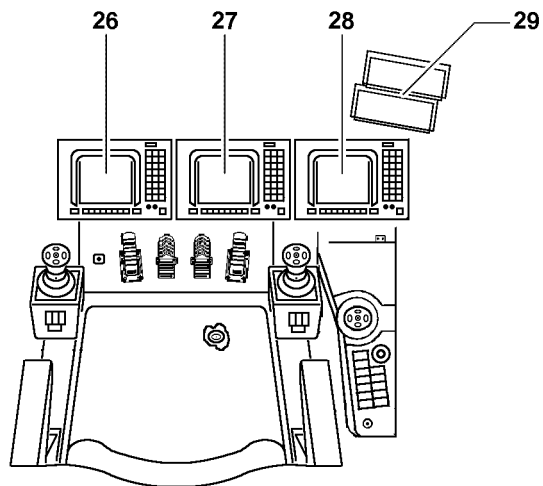
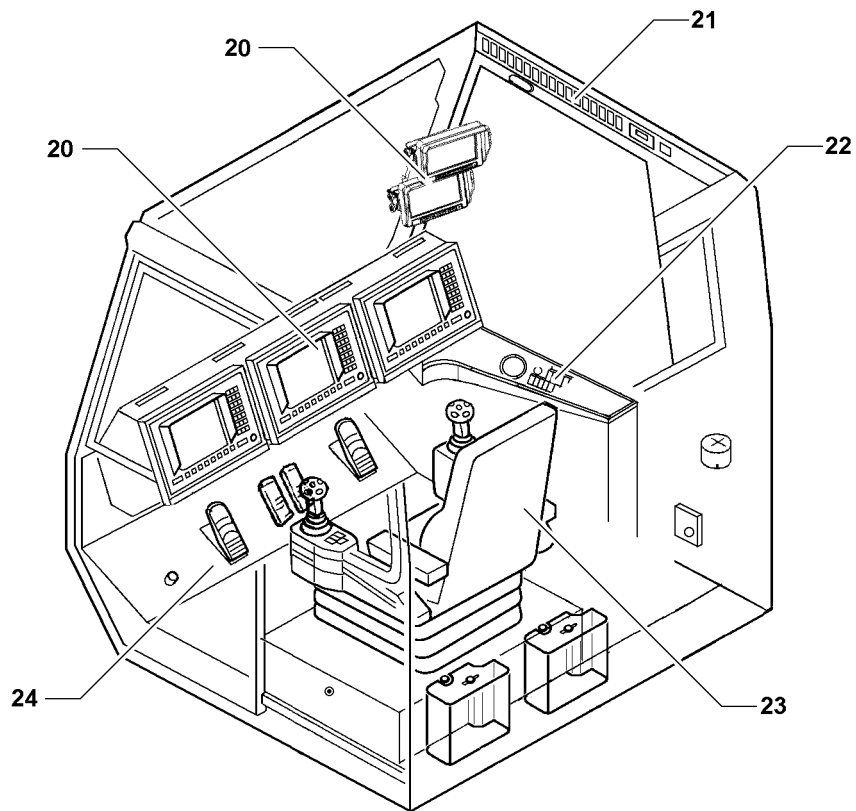


Fig.107975

LWE/LR 1750-000/12812-15-02/en

3 Operating units in the cab

The following operating units are in the cab:

- 20 Monitors and displays
- 21 Roof console
- 22 Instrument panel
- 23 Control platform
- 24 Pedal carrier

3.1 Monitors and displays

3.1.1 LICCON computer system

- 26 LICCON monitor 1
 - User interface for operation with „derrick“ boom
- 27 LICCON monitor 0
 - User interface for entry of equipment configurations and for crane operation
- 28 LICCON monitor 2*
 - User interface for „LICCON job planner“

3.1.2 Camera monitoring

- 29 Monitors camera monitor

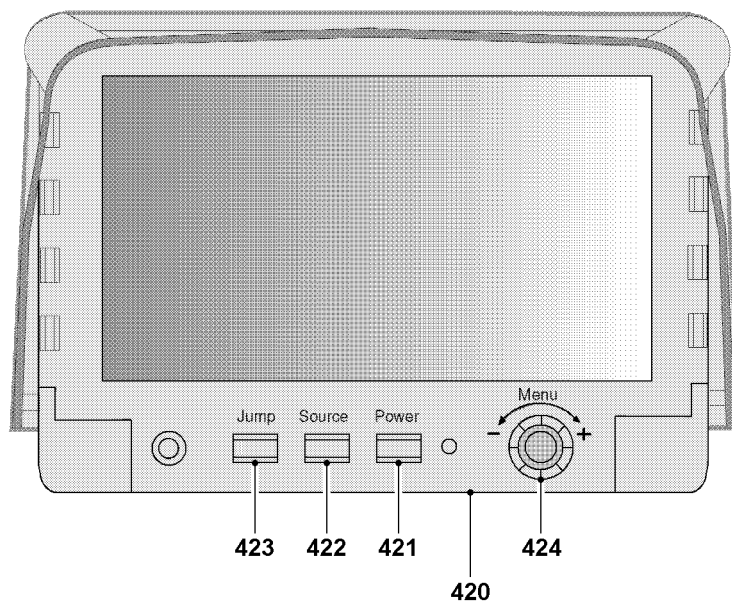


Fig.107376

Monitor with rotary selection switch

420 TFT monitor

421 „Power“ key

- Monitor on / off

422 „Source“ key

- By pressing the „Source“ key in turned on condition, the view on the monitor is changed

423 „Jump“ key

- By pressing the „Jump“ key, the preset camera inputs can be selected

424 Selection knob / pressure switch

- The selection menu on the monitor is activated by pressing the selection knob / pressure switch

Note:

If no adjustments are made after activation of selection on the monitor, then the selection turns off by itself after several seconds.

- When the selection menu is activated, a menu point can be selected by turning the selection knob / pressure switch. The selected menu point is highlighted in „yellow“. Press the selection knob / pressure switch to change the color from „yellow“ to „red“. This selects the desired function.

Selection menu

- **Screen adjustments**

Note:

The following adjustments can be made in the menu „Screen adjustments“.

- Brightness
- Contrast
- Color
- Hue
- Automatic brightness control
- Direction display
- Back

- **OSD settings**

Note:

The following adjustments can be made in the menu „OSD adjustments“.

- Display
- Distance display
- Back

- **Camera adjustments**

Note:

The following adjustments can be made in the menu „Camera adjustments“.

- Reflection
- Changeover
- Video outlet
- Back

- **Reset**

- The display is reset to default settings

- **Output**

- OSD selection is ended

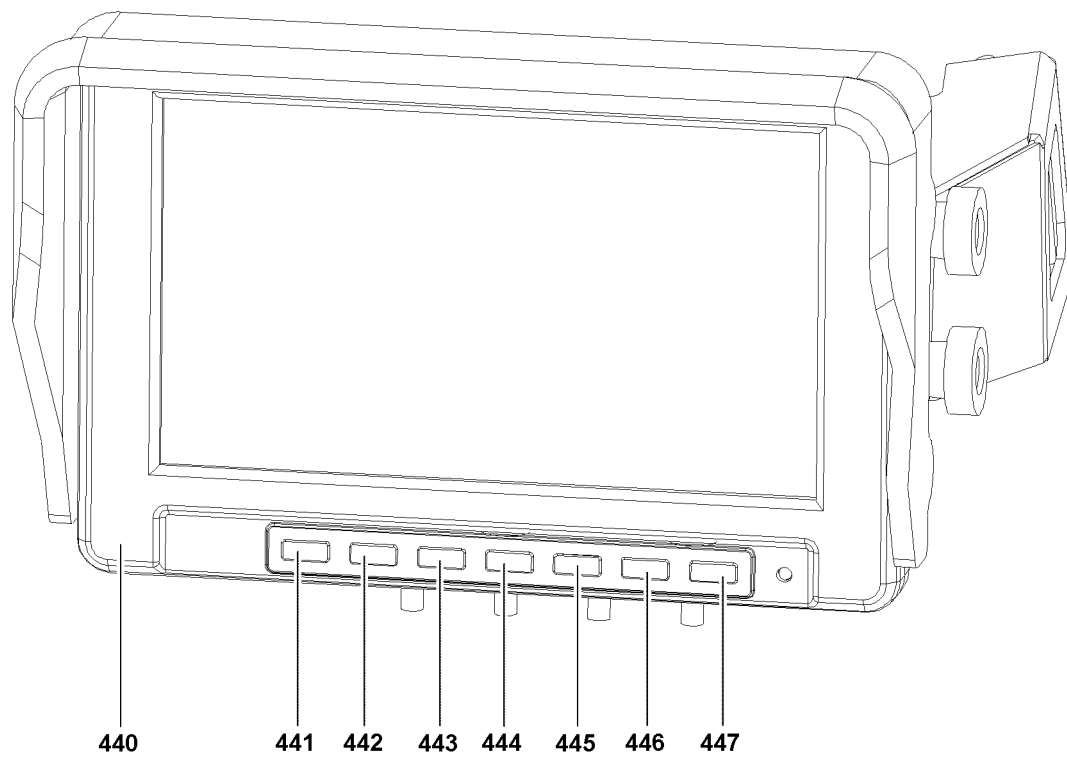


Fig.107366

Monitor with keypad

440 TFT monitor

441 Button „MODE“

- By pressing the button „MODE“ the system changes between the individual display modes:
 - Single display mode
 - Split display mode
 - Tripled or quadrupled display mode

442 „Camera selection“ key

- By pressing the button „Camera selection“ the system changes between the cameras:
 - Single display mode: Change between camera 1 and camera 2
 - Split display mode: Change between cameras 1/2, 2/3, 3/4 and camera 4/1
 - Tripled or quadrupled display mode: This button has no function.

443 Menu button

- By pressing the „Menu“ button, menus for various adjustments are called up and changed over, in the following order:
 - Color: Adjustment of color saturation
 - Brightness: Brightness adjustment
 - Contrast: Contrast adjustment
 - Standard: Reset to default settings
 - Volume: Volume adjustment
 - Language: Language adjustment (English, French, German, Spanish, Italian, Portuguese, Polish)
 - Reflection: Reflection of camera view Return to the main menu with „Enter“. End menu with „End“.

444 „Minus“ key

- By pressing the „Minus“ key, the value of a setting is reduced.

445 „Plus“ key

- By pressing the „Plus“ key, the value of a setting is increased.

446 „Change between day / night“ key

- Press the „Change between day / night“ button to match the brightness of the display to the time of day.

447 Key

- Monitor on / off

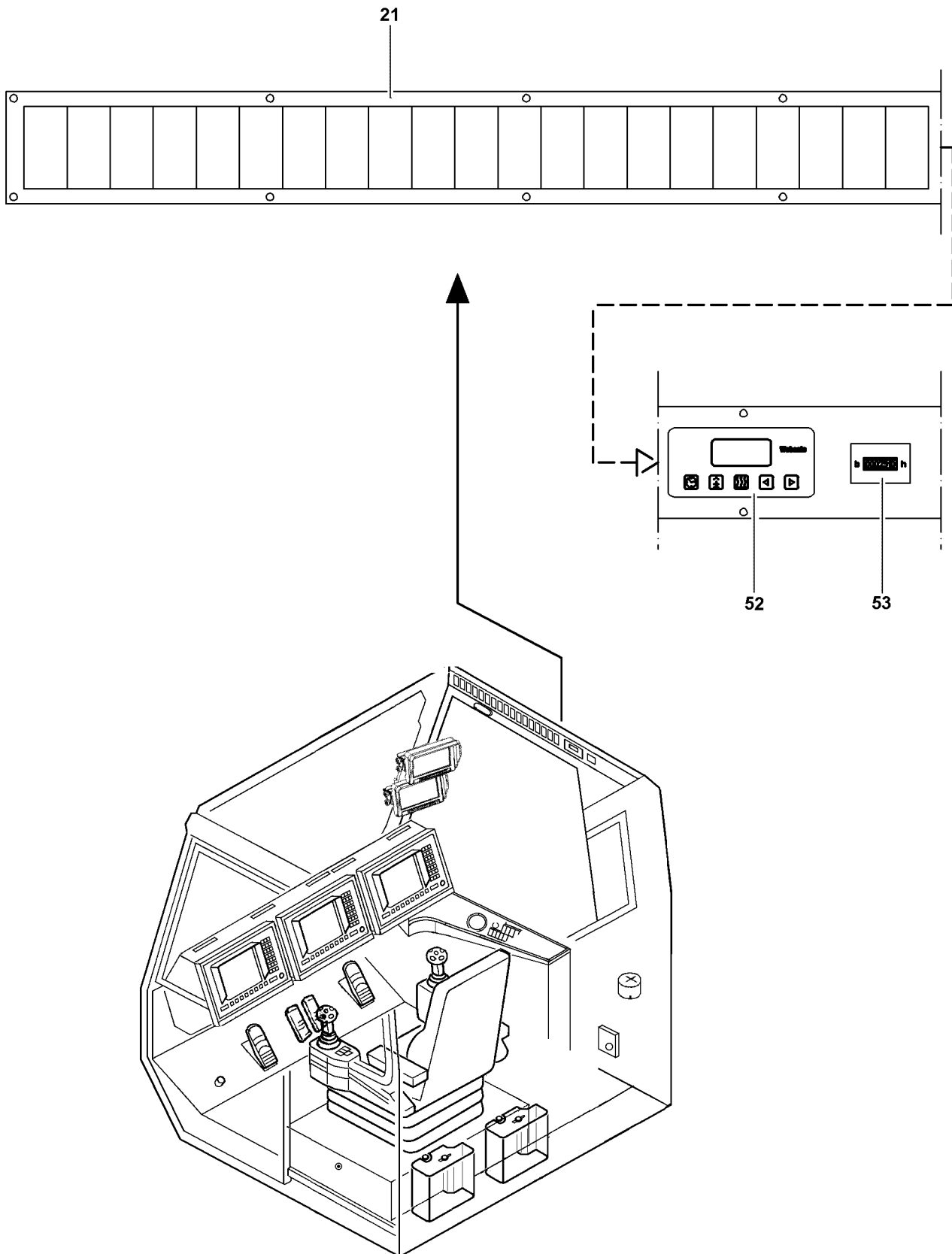


Fig.107599

LWE/LR 1750-000/12812-15-02/en

3.2 Roof console



Note

- ▶ The indicator lights as well as the operating buttons of the roof console are described in detail in the following sections.
- ▶ The number of operating buttons in the roof console depends on the respective crane equipment and can differ from crane to crane!

21 Roof console

- Housing with indicator lights and operating buttons


52 Operating section auxiliary heater

- Shown are:
 - Time and day of the week
 - Fault in auxiliary heater
 - Air temperature
 - Preselection of heating operation of auxiliary heater with three preselection times (every preselection time can be programmed in advance of up to seven days)

53 Operating hour meter

3.2.1 Indicator lights on the roof console

Position	Button	LED condition	Description
33		Red: blinks once after engine start	Control of function, operational readiness
		Green: blinks once after engine start	
		Red: off	Pump on, lubrication active
		Green: lights up during the lubrication time	
		Red: blinks	Error monitoring time, lubrication time
		Green: blinks	
Central lubrication system		Red: blinks quickly	Error CPU / memory
		Green: off	
49	 Auxiliary heater	Lights up	Auxiliary heater in operation
51		Lights up	Air conditioning system is in operation



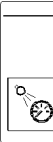


Position	Button	LED condition	Description
	Air conditioning system		
55*	 Hydraulic oil preheating	Lights up	Hydraulic oil preheating is in operation

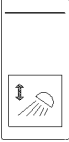
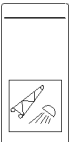


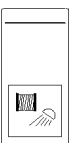
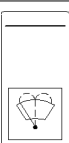
3.2.2 Operating buttons on the roof console


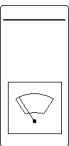
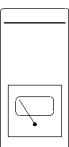
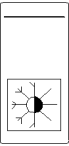



Note

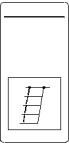
- With the LEDs in the operating buttons, the operating conditions and problems can be recognized quickly and reliably by the crane operator.

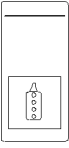
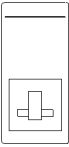
Position	Button	Function	LED	Description
30	 Shut off LMB bell	Off		By pressing the button
		On		By pressing the button
32	 Radio remote control LR-operation	Off		By actuating the switch
		On		By actuating the switch
34	 Instrument panel illumination, reading light	Note: The reading lights can be turned on and off with a separate switch on the reading light.		
		On		By actuating the switch
		Off		By actuating the switch
35	 Airplane warning	Off		By actuating the switch
		On		By actuating the switch
37	 Camera illumination			There are two different illumination areas: 0: Camera illumination „Off“ 1: Winch lighting „On“ 2: Winch lighting remains active and the illumination to the rear is „On“

Position	Button	Function	LED	Description
				Every time the switch is actuated, the illumination stage changes. „Lighting to the rear“ can only be turned on in connection with „winch lighting“.
39	 <p>Swing the floodlight pivot section</p>			<p>There are two swing directions:</p> <p>0: Swing the floodlight „Out“</p> <p>1: Swing the floodlight „Down“</p> <p>2: Swing the floodlight „Up“</p> <p>As long as the button is pressed, the floodlight swings.</p>
40	 <p>Floodlight pivot section</p>	Off		By actuating the switch
		On		By actuating the switch
41	 <p>Working floodlight platform cab</p>	Off		By actuating the switch
		On		By actuating the switch
42	 <p>Rear cab roof floodlight</p>	Off		By actuating the switch
		On		By actuating the switch
43	 <p>Mirror heater Floodlight turntable</p>	Off		By actuating the switch
		On		By actuating the switch
46	 <p>Window washer system „front“</p>	On		Clean the window: By pressing and holding the button „Front“ or „Roof“. The window wipers are activated at the same time.
				Note: After releasing the switch „Front“ or „Roof“, three additional wipe movements are carried out before the wiper blades return to their original position.

Position	Button	Function	LED	Description
44	 Window washer system „Roof“	Off		By releasing the button „Front“ or „Roof“
47	 Window wiper „Front“			<p>There are two different wipe stages:</p> <p>0: Wiper „Off“ 1: Wiper „On“: Intermittent operation 2: Continuous operation</p> <p>Every time the switch „Front“ or „Roof“ is actuated, the wipe stages change incrementally.</p>
45	 Window wiper „Roof“			
		Off		By actuating the switch „Front“ or „Roof“
48	 Air conditioning system	Off		By actuating the switch
		On		By actuating the switch
56*	 Hydraulic oil preheating	Off		By actuating the switch
		On		By actuating the switch

3.2.3 Alternative operating buttons in LG-operation

Position	Button	Function	LED	Description
31	 Ladder		Note:	The movement of the ladder when moving in and out stops by itself when the ladder is moved in or out completely.
		Up / down		By pressing the button
		Stop		By pressing the button

Position	Button	Function	LED	Description
32	 Radio remote control	Off		By actuating the switch
		On		By actuating the switch
38	 Turntable lock			Note: As long as the button is pressed, the locking pin moves out / in until the end position is reached.
				There are two locking positions: 1: Insert the locking pin on the chassis 2: Remove the locking pin on the chassis

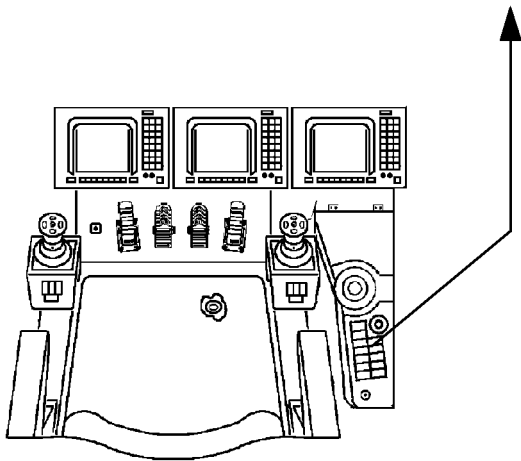
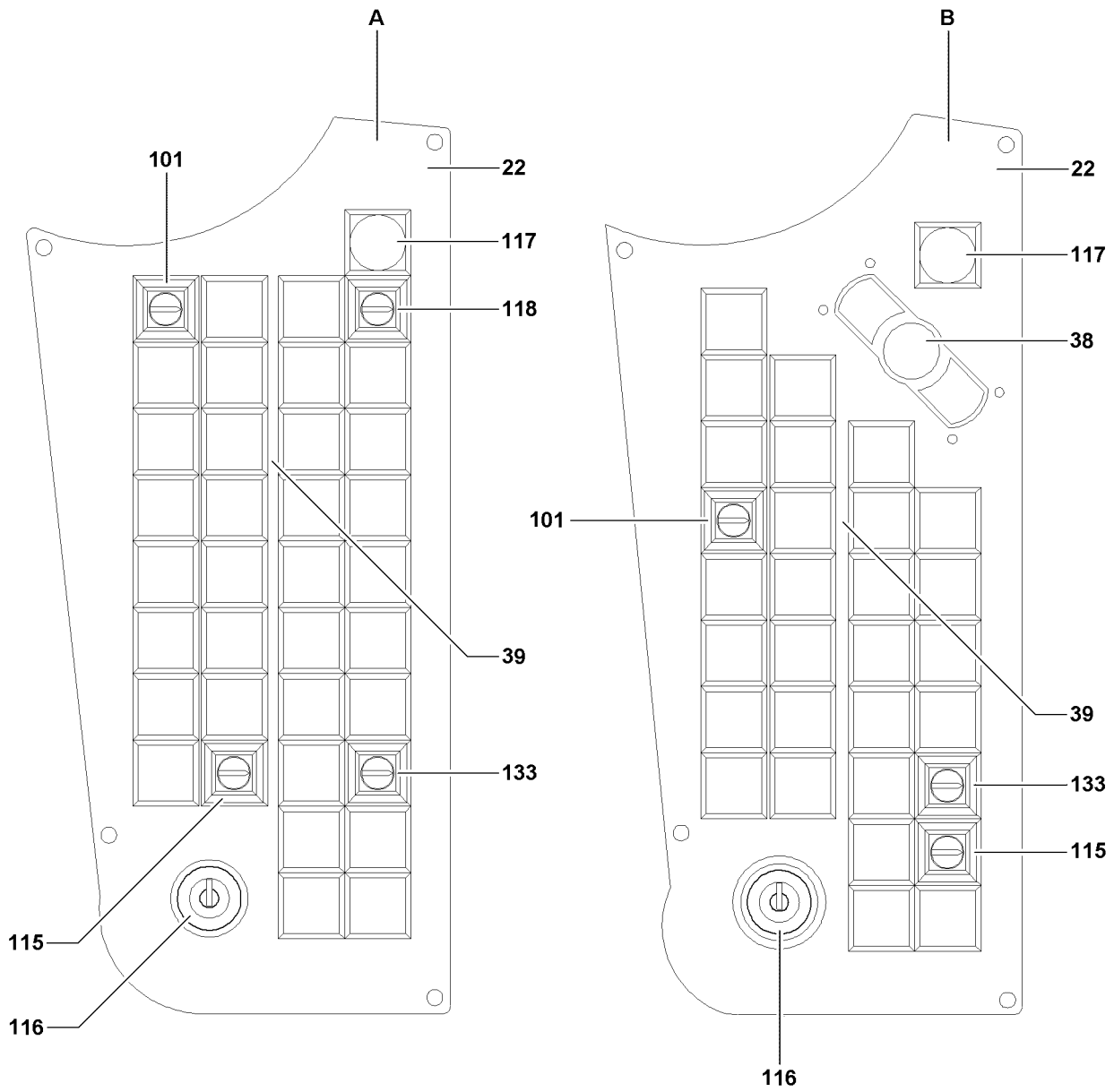


Fig.107789

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3.3 Instrument panel



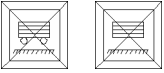


Note

- ▶ The instrument panel **22** is available in two versions.
- ▶ Version **A** and version **B** differ in the arrangement of the operating buttons and additional operating elements.
- ▶ The number of operating buttons on the instrument panel **22** depends on the respective crane equipment and can differ from crane to crane!











The instrument panel **22** consists of the following elements:










- 38** Micro module (Mouse)
 - Operation LICCON job planner
- 39** Keypad
 - Indicator lights and operating buttons
- 116** Ignition key switch
- 117** EMERGENCY OFF button










3.3.1 Indicator lights and operating buttons



Position	Button	Function	LED	Description
100	 (BT) or (B) Button with warning light „Derrick ballast lifted off“		Note:	Derrick ballast: Ballast on ballast trailer (BT) or suspended ballast (B)!
			Blinks	Briefly pressing the key button 101 activates the operating mode „Derrick ballast lifted off“ (self retention). The derrick ballast icon on LICCON monitor 1 is represented suspended.
		Off	Off	Pressing the button momentarily deactivates the operating mode „Derrick ballast lifted off.“ Ballast trailer symbol is shown on LICCON monitor 1 on the ground.
101	 Key button „Derrick ballast lifted off“	DANGER! The crane can topple over! If the derrick ballast lifts off the ground during towing, the turntable can turn to the side. Personnel can be severely injured or killed! Activate „Derrick ballast lifted off“ after lift off of the ballast trailer! Carry out constant visual inspection! See chapter 5.11 or 5.35 in the Crane operating instructions!		
102	 Button BT Manual steering correction to the left		Lights up	Operating mode Manual steering correction: When pressing and holding the button, the ballast trailer wheels turn to the left to drive on tight construction sites.

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


Position	Button	Function	LED	Description
103	 Button BT Manual steering correction to the right		Lights up	Operating mode Manual steering correction: When pressing and holding the button, the ballast trailer wheels turn to the right to drive on tight construction sites.
104	 Button BT towing		Blinks	Pressing and holding the button sets the ballast trailer wheels in travel position
			Lights up	Ballast trailer wheels in travel position
106	 Button BT turning position		Blinks	Press and hold the button to turn the ballast trailer wheels in turning position
			Lights up	Ballast trailer wheels in turning position
107	 Button BT Parallel position		Blinks	Turn ballast trailer wheels into parallel position (crab steering)
			Lights up	Ballast trailer wheels in parallel position
108	 Button Block ballast cylinder A	On		Pressing and holding the button blocks cylinder A on the derrick ballast
		Off		Releasing the button releases cylinder A on the derrick ballast
109	 Button Block ballast cylinder B	On		Pressing and holding the button blocks cylinder B on the derrick ballast
		Off		Releasing the button releases cylinder B on the derrick ballast
110	 Button derrick ballast down	On		Pressing and holding the button lowers the derrick ballast
		Off		Releasing the button interrupts the movement
111	 Button derrick ballast up	On		Pressing and holding the button lifts the derrick ballast
		Off		Releasing the button interrupts the movement
112	 Button Telescope derrick ballast in	On		Pressing and holding the button telescopes the derrick ballast out
		Off		Releasing the button interrupts the movement
113	 Button Telescope derrick ballast out	On		Pressing and holding the button telescopes the derrick ballast in
		Off		Releasing the button interrupts the movement
114	 Button	Off		Pressing the button deactivates the self-retention of operating mode crawler assembly, key button 115

Position	Button	Function	LED	Description
115	Button Crawler assembly off 			
	Key button crawler assembly	DANGER! In operating mode crawler assembly there is no overload shut off for the assembly cylinder as well as for the crane. Personnel can be severely injured or killed!		
		On	Button 114 lights up	Prerequisite: Operating mode assembly is turned on: The indicator light in the button 132 lights up
119	Indicator light radio remote control 	On	Lights up	Radio remote control „On“
		Off	Off	Radio remote control „Off“
118	Key button radio remote control pinning 	Off		Position 0 (horizontal): Radio remote control pinning „Off“.
		On		Position 1 (vertical): Radio remote control pinning „On“.
120	Button Spool the assembly winch up 	On		Pressing and holding the button spools the assembly winch up
		Off		Releasing the button interrupts the movement
121	Button Spool assembly winch out 	On		Pressing and holding the button spools the assembly winch out
		Off		Releasing the button interrupts the movement
123	Switch Pressure supply auxiliary user 	Note: For all functions, which are actuated with the hydraulic manual control levers, the pressure supply must be changed over.		
		On		Pressing the button establishes the pressure supply to the auxiliary users: Erection cylinder SA-frame, support cylinder assembly
		Off		Pressing the button interrupts the pressure supply to the auxiliary users
124	Button BT support front down 	On		By pressing and holding the button the support cylinder ballast trailer front moves out
		Off		Releasing the button interrupts the movement
125	Button BT support front up 	On		By pressing and holding the button the support cylinder ballast trailer front moves in
		Off		Releasing the button interrupts the movement
126	Button BT support rear out 	On		By pressing and holding the button the support cylinder ballast trailer rear moves out

Position	Button	Function	LED	Description
	Button BT support rear down	Off		Releasing the button interrupts the movement
127	 Button BT support rear up			By pressing and holding the button the support cylinder ballast trailer rear moves in
128	 Warning light support moved in		Lights up	Shows when the support ballast trailer is moved in
129	 Warning light suspended ballast on the ground		Lights up	Shows when the suspended ballast is on the ground
130	 Switch Test system BT	Note: Can only be turned on with „Engine off“.		
		On	Lights up	Actuating the switch switches from LICCON monitor 1 to Test system control ballast trailer
131	 Warning light		Lights up	Control ballast trailer does not run or One of the pressure sensors or length sensor for the ballast trailer is defective or missing, see chapter 5.11 Ballast trailer.
132	 Button Assembly off	Off		Pressing the button deactivates the self retention of operating mode „Assembly“, key button 133
133	 Key button Assembly	DANGER! The LICCON overload protection is no longer effective! Observe the Technical safety instructions, see chapter 5.01		
		Note: Operating mode „Assembly“ turned on is shown by: Indicator light in the button, icon on the monitor and red flashing beacon on the cab.		
		On		Briefly pressing the key button activates the operating mode „Assembly“
134	 Indicator light engine preheating		Lights up	Shows that the engine is preheated
135	 Switch Fuel preheating	On	Lights up	Actuating the switch activates fuel preheating
		Off	Off	Actuating the switch deactivates fuel preheating

Position	Button	Function	LED	Description
135	 Button Starting aid engine			Starting aid for engine: Additional pressurized air support when starting in high altitudes
136	 Charge indicator light		Lights up	When the engine is running: Erroneous function charge regulator Before / at engine start: Shows that the battery is not being charged.

3.3.2 Alternative operating buttons in LG-operation

Position	Button	Function	LED	Description
31	 Ladder		Note:	The movement of the ladder when moving in and out stops by itself when the ladder is moved in or out completely.
		Up / down		By pressing the button
		Stop		By pressing the button
119	 Indicator light radio remote control		Lights up	Shows that the radio remote control is activated
		Off	Shows that the radio remote control is deactivated	
118	 Key button radio remote control pinning	Off		Pressing the key button deactivates the radio remote control for pinning: Position 0 (horizontal)
		On		Pressing the key button activates the radio remote control for pinning: Position 1 (vertical)

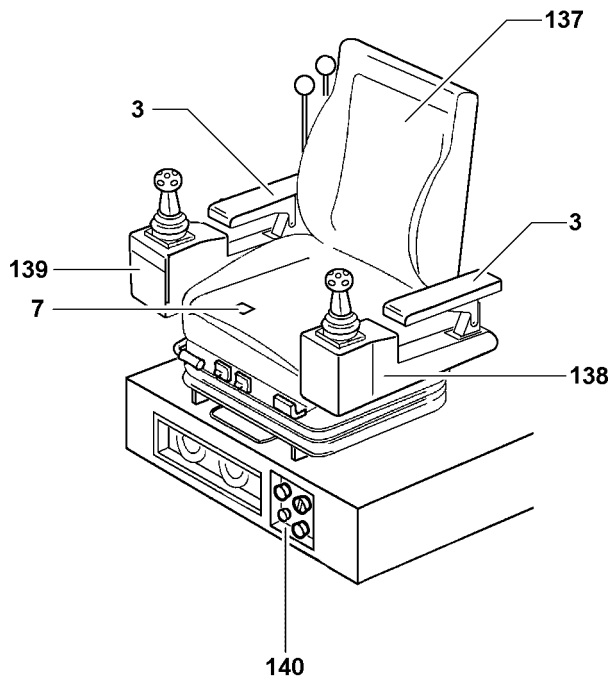


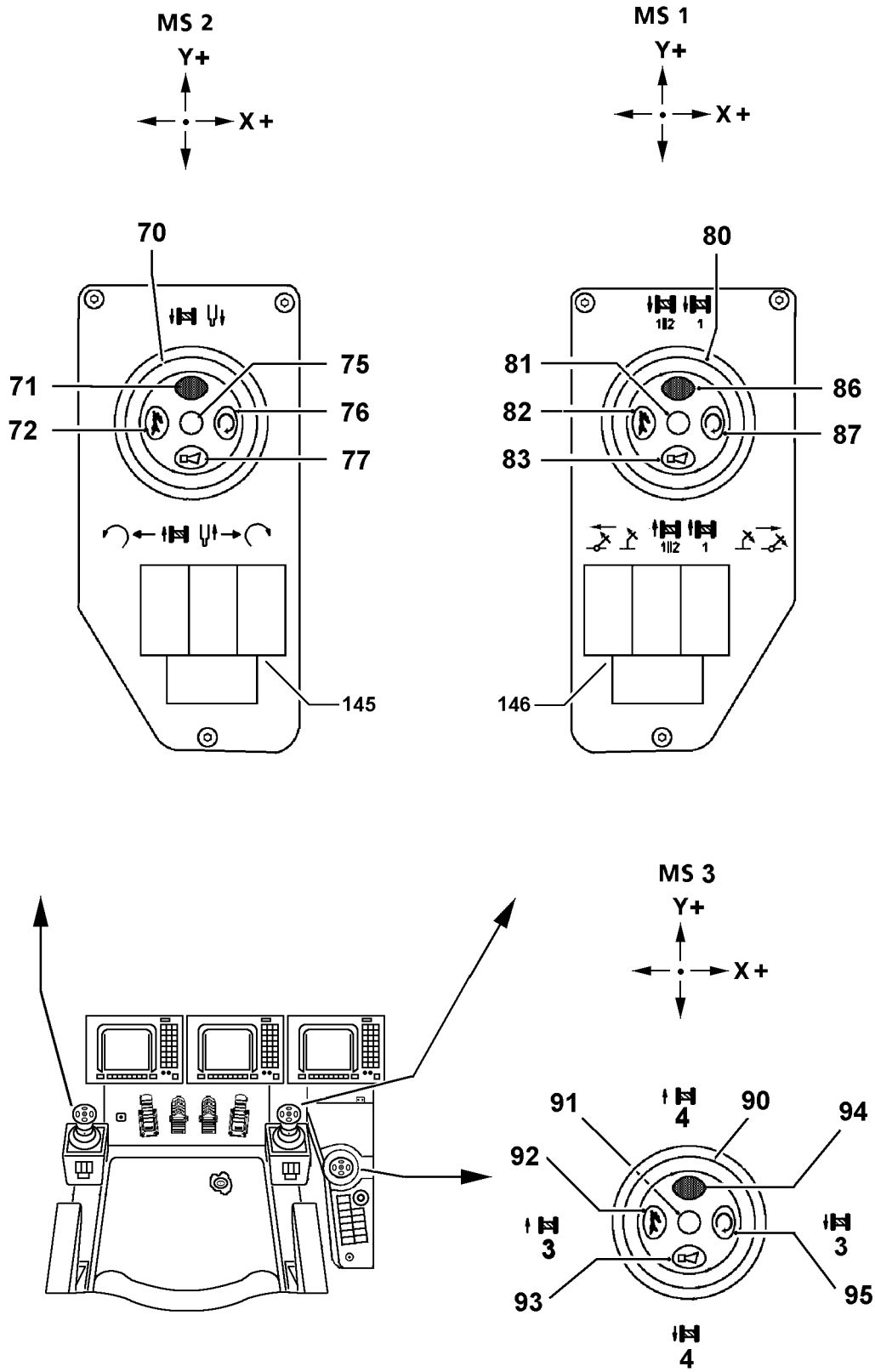
Fig.107827

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3.4 Operating elements on control platform

The control platform consists of the following elements:

- 3** Armrests
- 7** Seat contact switch
- 137** Crane operator's seat
- 138** Control panel, left
- 139** Control panel, right
- 140** Climate control system / cab heater



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Fig.107829

3.4.1 Operating elements on the control panels

Control panel, left

Master switch assignment MS 2:

70 Master switch - left (MS 2)

- **Note:**

For assignment of master switch to operating modes, see chart, chapter 4.05.

71 Button

- Bypass of the seat contact switch **or** if the seat contact switch is actuated: Addition of the vibration sensor **75**.

72 Button

- Power Plus addition, crane operation

75 Vibration sensor

- Turn sensor: Slewing gear and winch 2, winch 5, winch 6.

76 Button

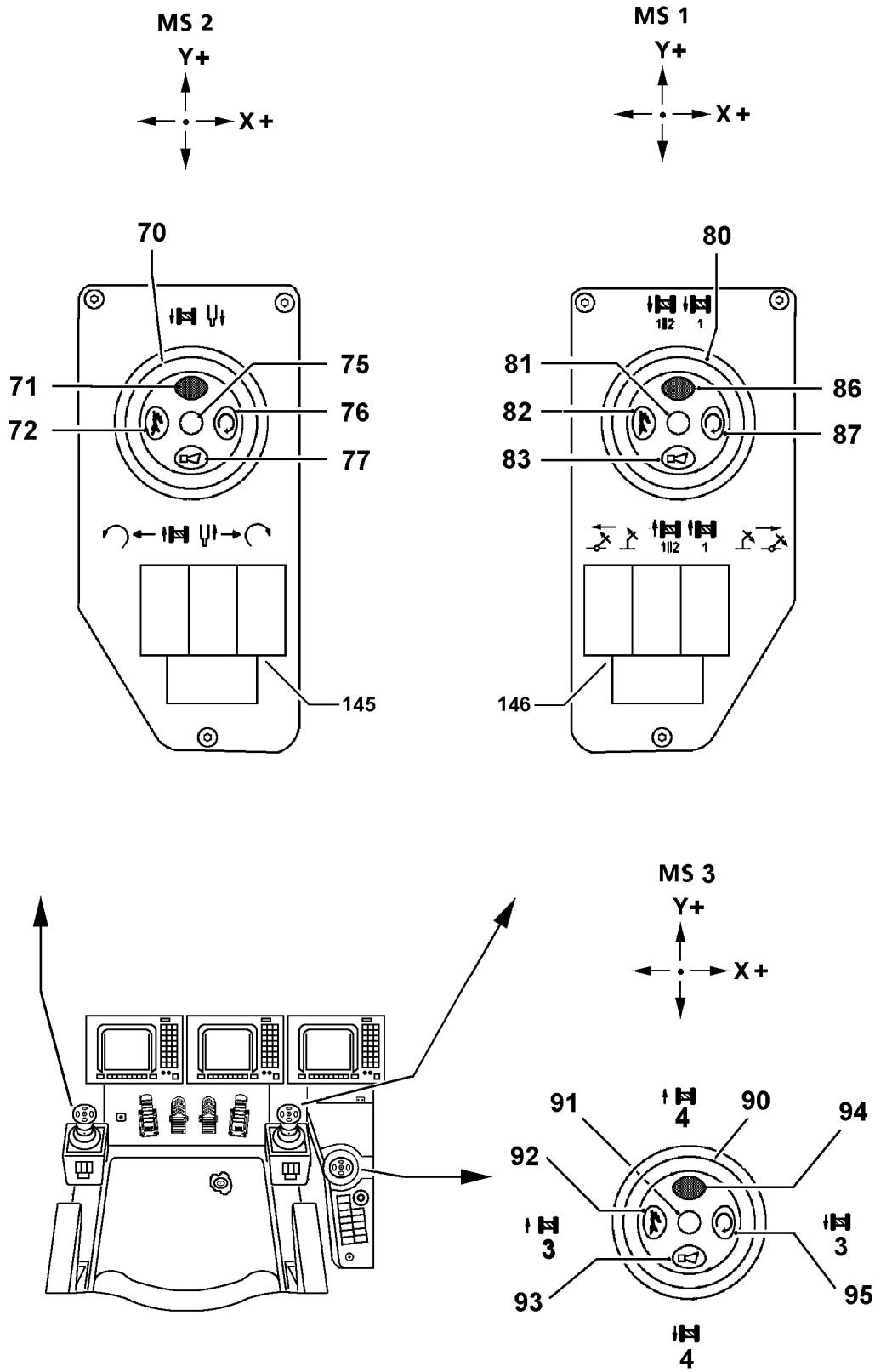
- Engine rpm lock

- **Note:**

By pressing the button **76** the engine rpm is locked in the current state.

77 Button

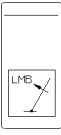
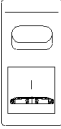
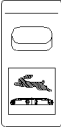
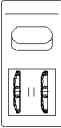
- Horn



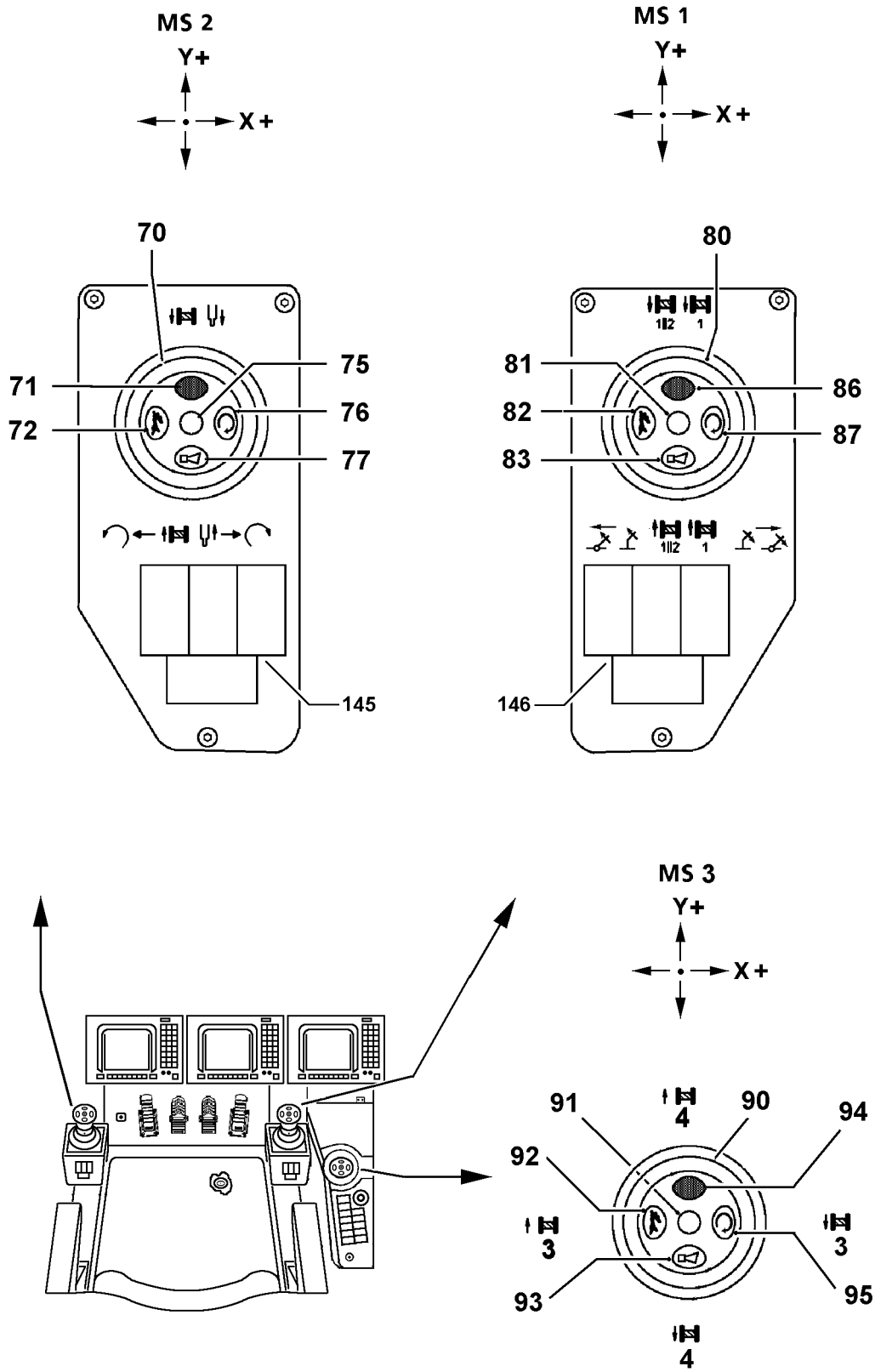
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Fig.107829

Instruments **145** control panel:

Position	Button	Function	LED	Description
73	 Overload protection by-pass button		DANGER!	The bypass may only be done if the overload was caused by luffing down at freely suspended load and the crane operator is absolutely certain that luffing up the load will take it out of the overload range!
		On		Pressing the button releases luffing up at overload
74	 Switch Crawler operation		Note:	After crawler operation, you must switch back to crane operation.
			DANGER!	Damage of crane support! If the crawler travel gear is turned on when using the crane support, the support will be severely damaged when actuating the pedals for the crawler travel gears! The crane can topple over! Personnel can be severely injured or killed! When working with crane support: Turn crawler operation off!
		On		Releasing and actuating the switch activates the operating mode „Crawler operation“.
		Off		By actuating the switch: Position 0
78	 Switch Crawler rapid gear	On		Actuating the switch activates the operating mode „Rapid gear“
		Off		By actuating the switch: Position 0
79	 Switch Crawler parallel travel	On		Actuating the switch activates the operating mode „Parallel driving“: The left and right tracks move at the same speed.
		Off		By actuating the switch: Position 0

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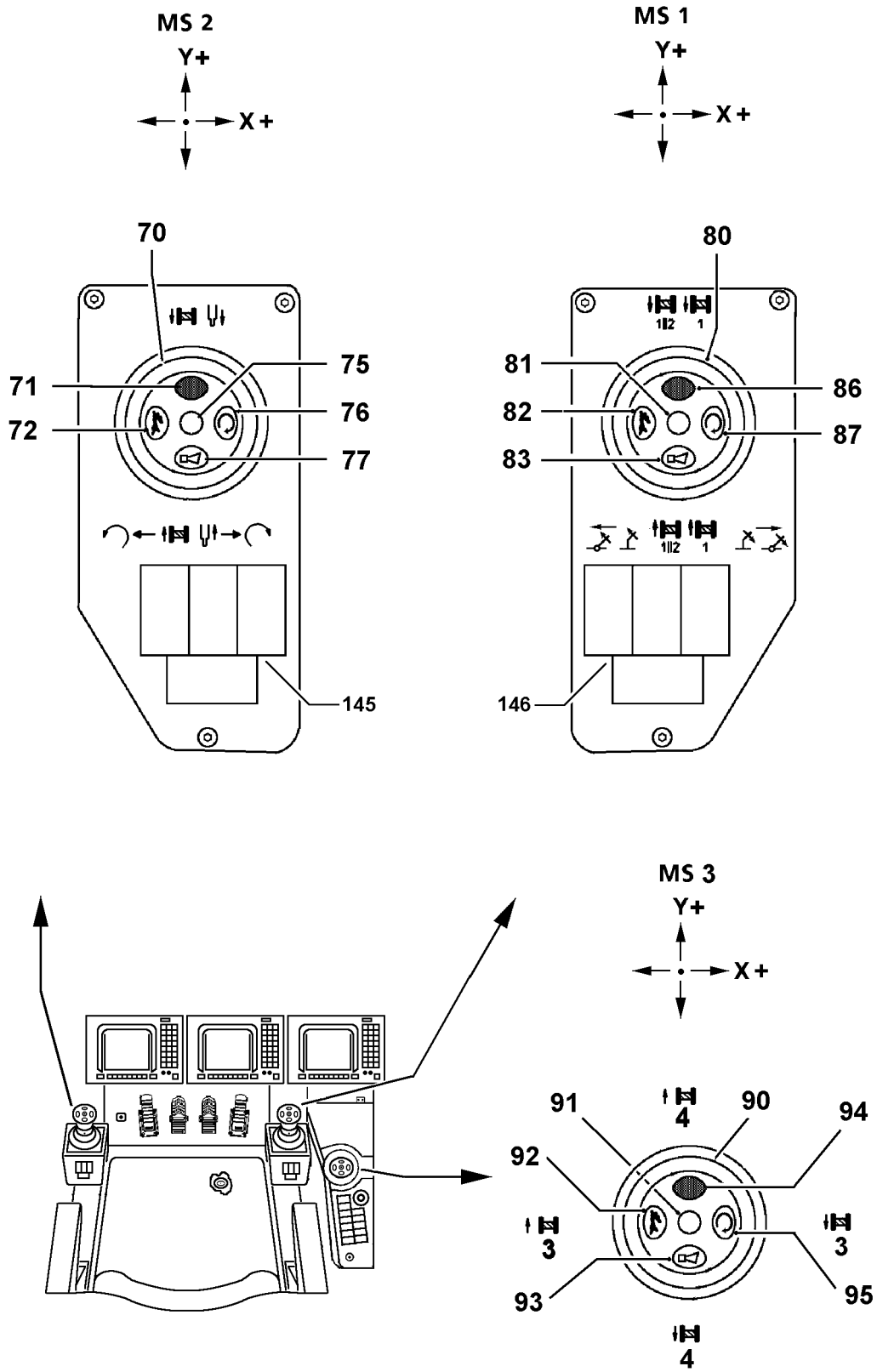
LWE/LR 1750-000/12812-15-02/en

Fig.107829

Control panel, right

Master switch assignment MS 1:

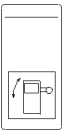
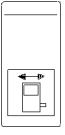
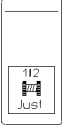
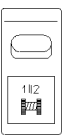
- 80** Master switch - right (MS 1)
 - **Note:**
For assignment of master switch to operating modes, see chart, chapter 4.05.
- 81** Vibration sensor
 - Turn sensor: Slewing gear and winch 3, winch 4, winch 5.
- 82** Button
 - Power Plus addition, crane operation
- 83** Button
 - Horn
- 86** Button
 - Bypass of the seat contact switch **or** if the seat contact switch is actuated: Addition of the vibration sensor **81**.
- 87** Button
 - Engine rpm lock
 - **Note:**
By pressing the button **87** the engine rpm is locked in the current state.

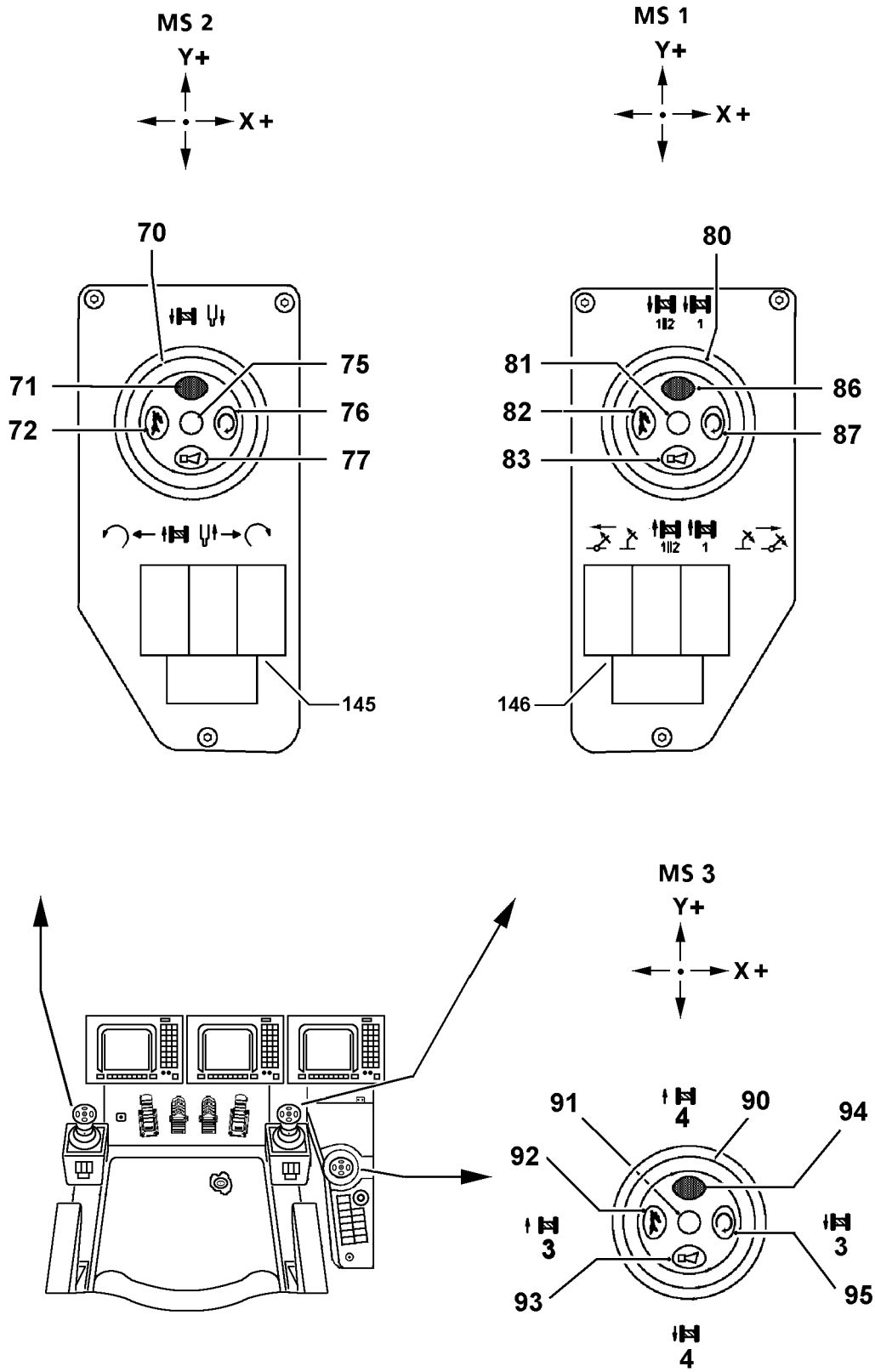


LWE/LR 1750-000/12812-15-02/en

Fig.107829

Instruments **146** control panel:

Position	Button	Function	LED	Description
84	 Button Tilt cab	Off		By releasing the button: Position 0 (center)
		Up		By pressing the button the cab tilts up: Position 2 (front)
		Down		By pressing the button the cab tilts up: Position 1 (rear)
85	 Button Swing the cab	Off		By releasing the button: Position 0 (center)
		Transport		Pressing the button swings the cab into transport position: Position 2 (front)
		Work		Pressing the button swings the cab into working position: Position 1 (rear)
88	 Button Adjusting the parallel control		Note:	Adjust only with parallel hook blocks, parallel control Winch 1 II 2.
		On		Pressing the button activates the „Adjustment of the parallel control“ of winch 1 and winch 2
		Off		By releasing the button
89	 Switch Parallel operation	On		Actuating the switch activates the „Parallel operation“ of winch 1 and winch 2
		Off		By actuating the switch



LWE/LR 1750-000/12812-15-02/en

Fig.107829

3.4.2 Operating elements Master switch (MS) 3

90 Master switch (MS 3)

- **Note:**

For assignment of master switch to operating modes, see chart, chapter 4.05.

91 Vibration sensor

- Turn sensor and winches

92 Button

- Power Plus addition, crane operation

93 Button

- Horn

94 Button

- Bypass of the seat contact switch **or** if the seat contact switch is actuated: Addition of the vibration sensor **91**.

95 Button

- Engine rpm lock

- **Note:**

By pressing the button **95** the engine rpm is locked in the current state.

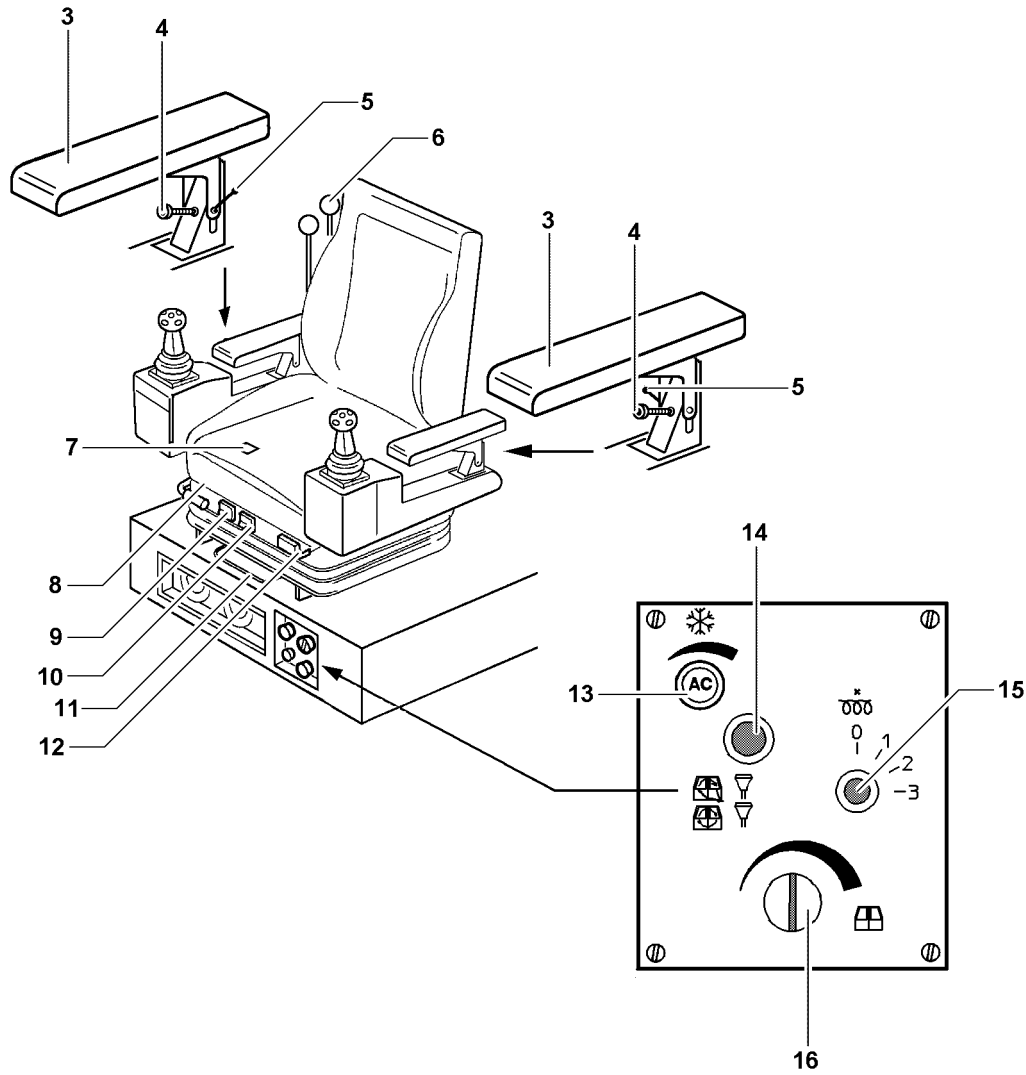


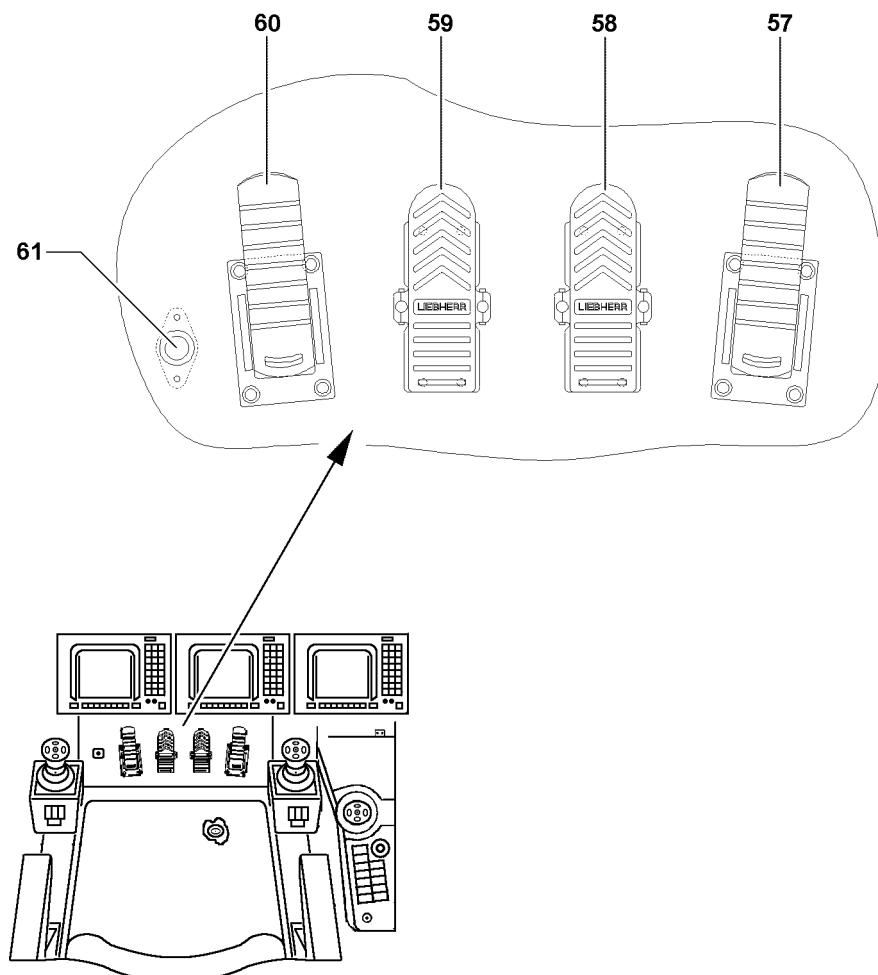
Fig.107828

LWE/LR 1750-000/12812-15-02/en

3.4.3 Operating elements crane operator's seat

- 3 Armrest
- 4 Set screw
 - Adjustment of armrest incline
- 5 Locking lever
 - Armrest height adjustment
- 6 Manual control lever
 - Control Crawler travel gears left and right

Note:
The crawler travel gears can also be controlled via the manual control levers. To do so, they must be inserted into the foot rocker **58** or foot rocker **59**.
- 7 Seat contact switch
- 8 Hand lever
 - Adjustment of seat cushion incline
- 9 Button
 - Lumbar support in lower part of backrest
- 10 Button
 - Lumbar support in upper part of backrest
- 11 Hand lever
 - Lock for horizontal seat adjustment
- 12 Hand lever
 - Lock for backrest incline
- 13 Regulator knob
 - Air conditioning system
- 14 Switch
 - Switching between fresh air / recirculated air, air quantity
- 15 Rotary switch
 - Blower 3-stage
- 16 Regulator knob
 - Temperature Cab heater



LWE/LR 1750-000/12812-15-02/en

Fig.107830

3.5 Pedal carrier

- 57 Pedal
 - Engine regulation
- 58 Master switch foot rocker (MS 5)
 - Move the crawler forward or backward on the right hand side
 - Note:**
Only for LR-operation.
- 59 Master switch foot rocker (MS 4)
 - Move the crawler forward or backward on the left hand side
 - Note:**
Only for LR-operation.
- 60 Pedal
 - Slewing gear brake
- 61 Foot button
 - Freewheeling slewing gear

Fig. 199898

1 General



Note

- ▶ The monitor illustrations in this chapter are only examples!
 - ▶ The numerical values in the individual icons and charts do not have to necessarily match the crane exactly!
 - ▶ Numbers and letters can be replaced by place holders!
 - ▶ In addition, many of the illustrations show the maximum configuration of the LICCON monitor with icons!
 - ▶ In normal crane operation, an identical display will **not** appear on the LICCON monitor!
-

The LICCON computer system is a computer system for controlling and monitoring mobile and crawler cranes. In addition to the overload protection (Load moment limitation = **LMB**) there are a number of application programs that can be used for controlling and monitoring the crane movements.

Currently the LICCON computer system includes the following application programs:

- Set up program
- Crane operation program
- Support* program
- Working range limitation* program
- Control parameter program
- Engine monitoring program

The electrical and electronic components are linked via data bus transmission technology (Liebherr System Bus = LSB).

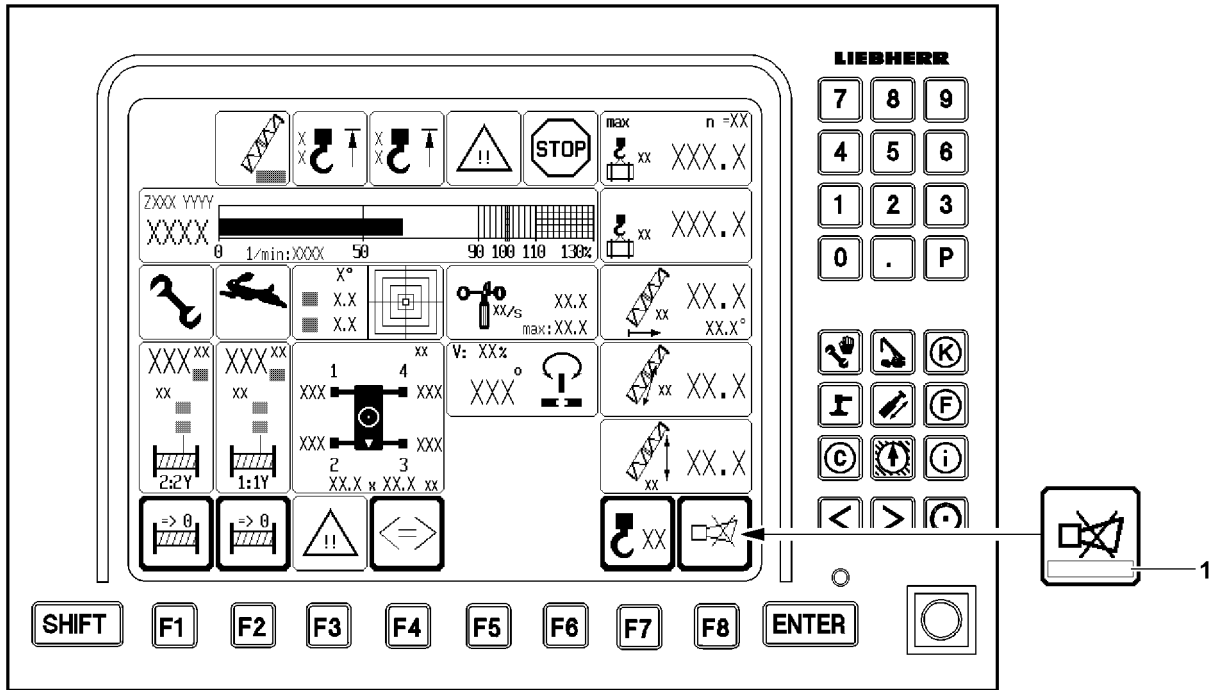


Fig.111937

1.1 Overload protection (LMB)

The overload protection is implemented in microprocessor CPU 0 of base assembly 0. The LICCON computer system works on the principle of comparing the current / actual load with the maximum permissible load according to the load chart and reeving.

1.1.1 Actual load

The current load is determined by recording variable values.

The **load on the crane** results from the load momentum and the boom momentum together. It exerts a force in the boom guying, which is measured by force test sensors.

The **boom momentum** is calculated from angle sensor information (boom angle) and the crane data (boom weights) for the set operating mode.

The **radius** is calculated with data from the angle sensors (boom angle) and the geometric data for the set operating mode. This also takes into account the boom flexation due to its own weight and the weight of the load.

The actual load is calculated from the total load, the boom momentum and the boom projection.

1.1.2 Maximum load according to load chart and reeving

Crane data such as load charts, boom weights and geometry data are stored in the central data memory of the LICCON computer system.

The „Maximum load according to the load chart and reeving“ is constantly determined for the set crane configuration, for the set reeving and for the calculated radius, based on the load charts.

1.1.3 Comparison

The actual load and the „Maximum load according to the loading chart and reeving“ are compared. When they approach the specified limit, an advance warning is issued. If this limit is exceeded, the overload „STOP“ is triggered and any crane movements which increase the load moment are turned off.

1.2 Error messages

The LICCON computer system monitors the crane permanently for operating / system errors.

If errors occur, error messages **1** are issued. Error messages appear in the horn icon of LICCON monitor 0.



Note

- ▶ Always pay attention to error messages **1**!
- ▶ For procedure in case of error messages, see Diagnostics manual and the respective chapter in the Crane operating instructions!

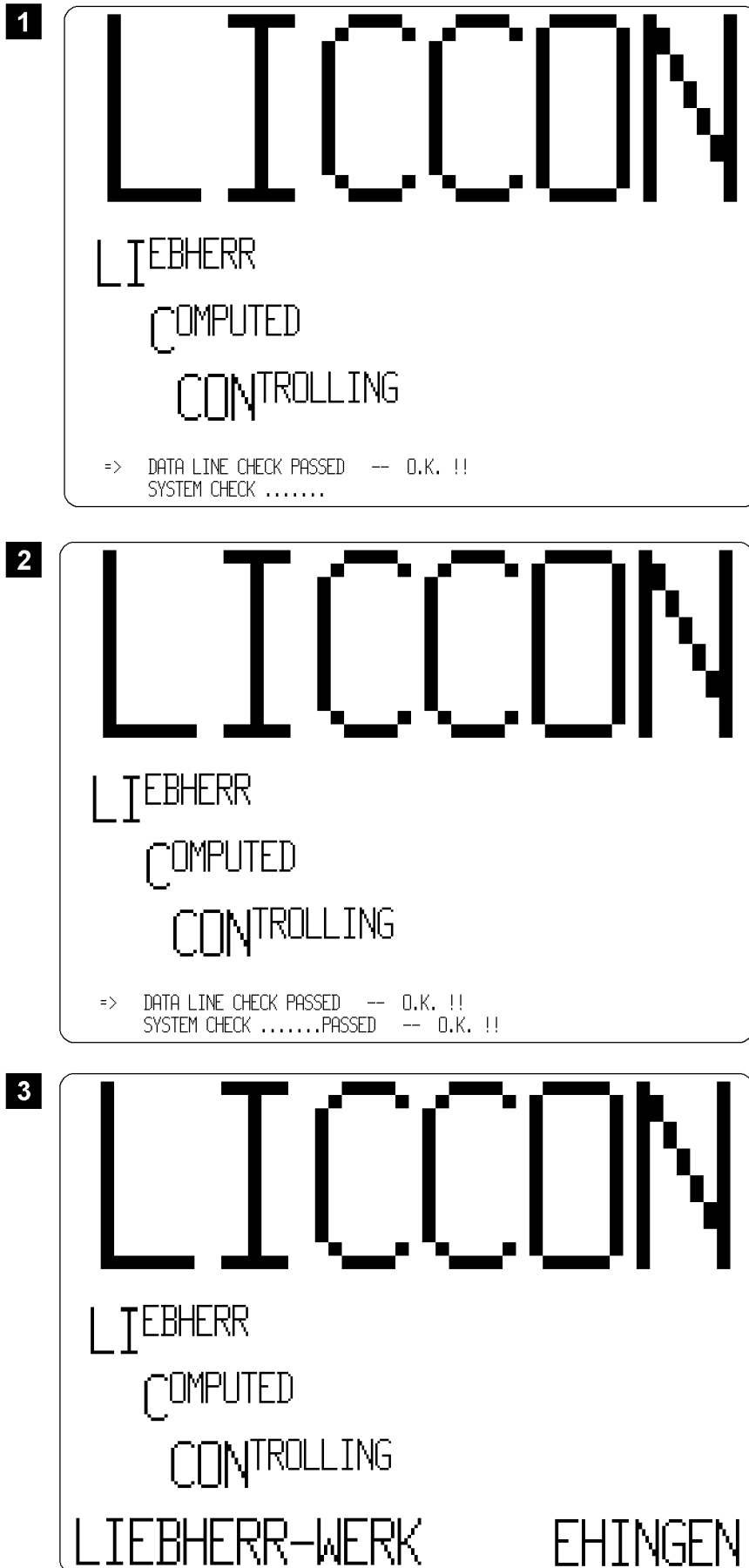


Fig.199899

2 LICCON computer system boot up

After it is turned on, the LICCON computer system performs a self test.

First the connections from the microprocessor CPU (ZE 0) to the monitor are checked. If no error is found during the test, the monitor shows this image:

```
=> DATA LINE CHECK PASSED -- O.K. !!
    SYSTEM CHECK .....
```

Fig.199926

If the test finds no connection problems, there is a system test of all the microprocessor CPUs (ZE). The stepwise running of the self test can be watched on the 7 segment displays of the CPUs. If no errors are found during the system test, the monitor shows this image:

```
=> DATA LINE CHECK PASSED -- O.K. !!
    SYSTEM CHECK .....PASSED -- O.K. !!
```

Fig.199927

Shortly after that, this general initialisation screen appears on the monitor:

```
LIEBHERR-WERK      EHINGEN
```

Fig.199928



Note

Errors during LICCON computer system start-up.

If an advance warning, warning or STOP event occurs in the engine monitoring while the LICCON computer system boots up, it switches automatically to the engine monitoring program!

► Refer to section „Engine monitoring program“ for additional information!

3 Operating mode preselection on the LICCON computer system



WARNING

Danger of accident due to deviating equipment set up configuration!

If the equipment set up configuration and the operating mode of the crane set on the LICCON computer system **does not** match, then the crane can be overloaded unnoticed and topple over!

Personnel can be severely injured or killed!

► In the operating mode preselection, only the operating mode may be selected which actually corresponds to the equipment set up configuration of the crane!

When the starting procedure is completed successfully after a successful self test of the LICCON computer system, the following appears on:

- **LICCON monitor 0** for approx. 3 seconds the operating mode preselection screen.
- **LICCON monitor 1** the title screen with the words: „LIEBHERR-WERK EHINGEN“

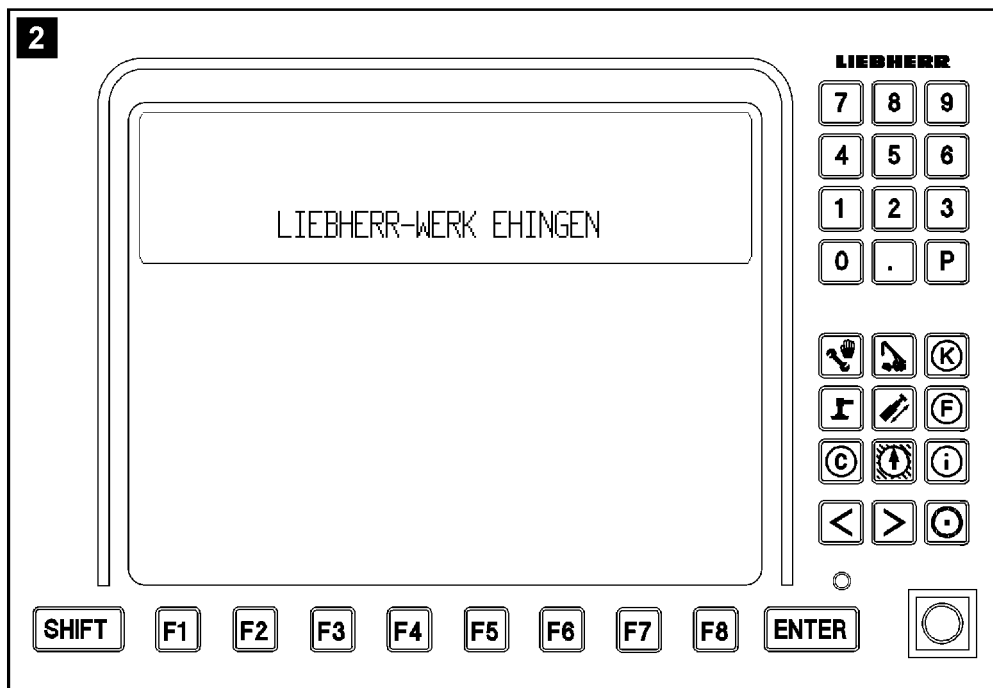
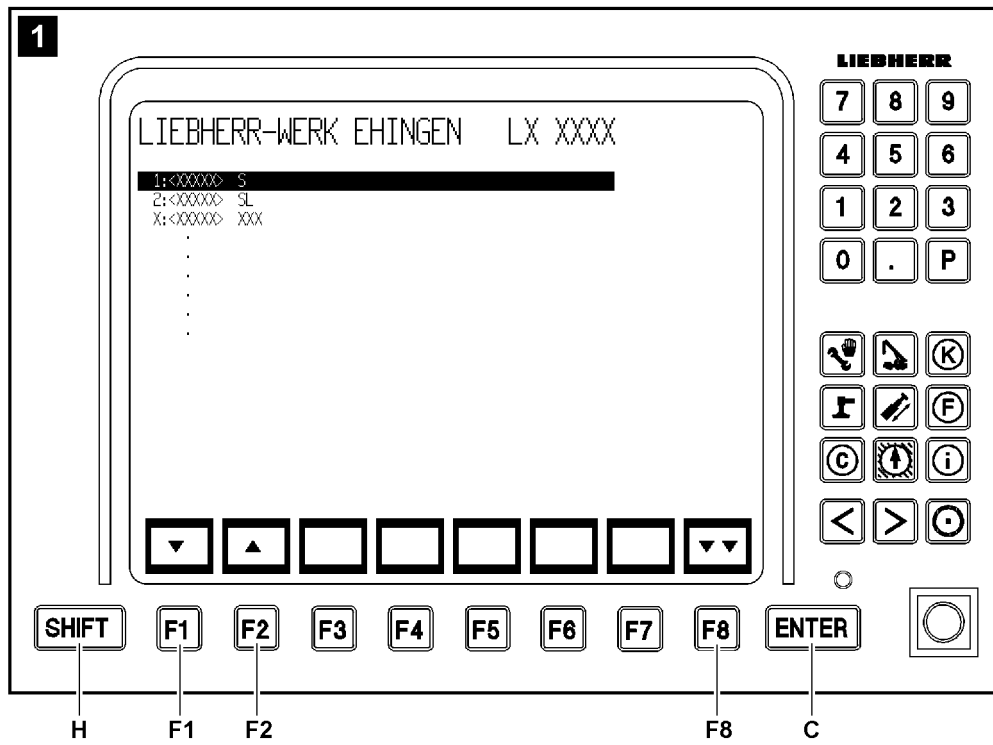


Fig.111918

LWE/LR 1750-000/12812-15-02/en

3.1 LICCON monitor 0

After successful starting procedure, the operating mode preselection screen appears on the **LICCON monitor 0** for approximately three seconds, see illustration 1.



Note

- ▶ The operating mode preselection screen is skipped if the crane only has one level! For example: The crane has only one S-boom (only S-operation possible)! In this case, the system changes directly into the set up screen for the only possible level!
- ▶ If the memory loses its data (for example as a result of a cold start) the previous operating mode is „rejected“ and the first operating mode in the operating mode selection menu is activated! In this case, the corresponding set up screen appears!

The function key **F1** or the function key **F2** is pressed within three seconds when the operating mode preselection screen appears.

Result:

- The operating mode preselection screen is retained until the settings are confirmed by pressing the function key **F8** or the ENTER key **C**.



Note

- ▶ If neither the function key **F1** nor the function key **F2** are pressed within three seconds, then the last active operating mode remains set. The corresponding set up screen appears automatically!

To select the required operating mode group for crane operation, press the function key **F1** (cursor down) or function key **F2** (cursor up).



Note

- ▶ The selected operating mode group is highlighted in black in the operating mode preselection screen on the monitor!

Press the function key **F8** or the ENTER key **C**.

Result:

- The set operating mode group is taken over into the LICCON computer system and the set up program appears with the corresponding set up screen.

3.2 LICCON monitor 1

After successful starting procedure, the title screen with the words appears on the **LICCON monitor 1**: „**LIEBHERR-WERK EHINGEN**“, see illustration 2.



Note

- ▶ Depending on the set up configuration of the crane, it is possible that a note for an operating mode appears!

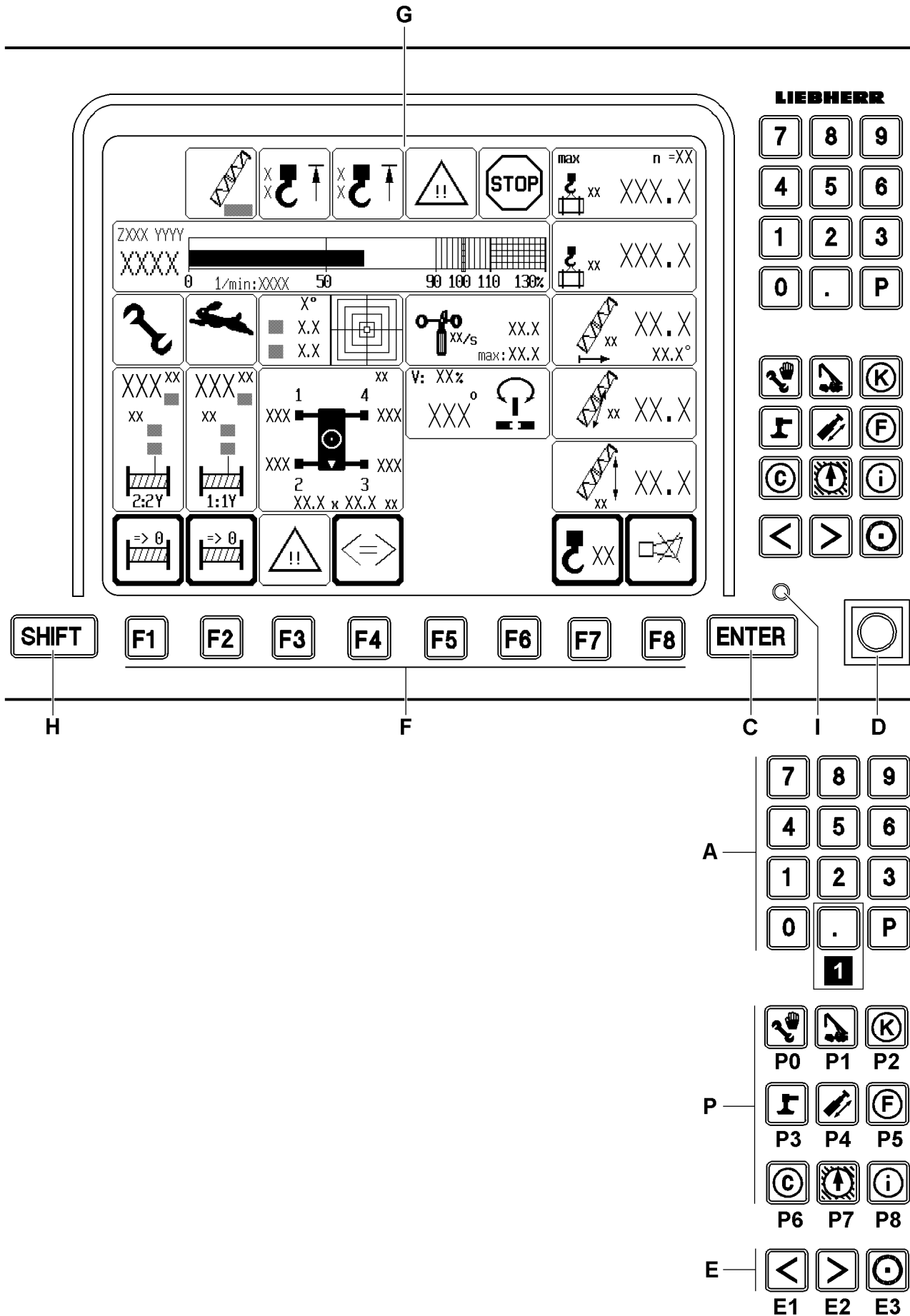


Fig.111900

4 Operating elements of the LICCON computer system on monitor 0

The functions of the individual monitor operating elements are program-dependent and can differ, depending on the LICCON program which is currently running. Therefore the description of the individual LICCON programs will be described in more detail.

- A** Keypad
- P** Program keys
 - Selection of the individual LICCON programs
- P0** Configuration
 - **SHIFT** and **P0**: Engine monitoring
- P1** Crane operation
- P2** Crane acceptance
 - Correction coefficients (program blocked - for LIEBHERR service personnel only)
- P3** Crane support
- P4** —
 - Program key not assigned!
- P5** Input window hook block weight
- P6** Control parameter
- P7** Working range limitation
- P8** Test system
 - **Note:**
Description test system, see Diagnostics manual!
- C** Input key ENTER
 - Confirmation of changes
- D** Bypass key button
 - Position to right (touching)
= the hoist limit switch and load moment limiter shut off are bypassed
 - Operating position (self-retaining)
= normal operation
- E** Special function keys
 - Monitor brightness adjustment
 - Key combination **E3** and **E1**: Turn background illumination on / off
 - Key combination **E3** and **E2**: Brightness adjustment in three stages
 - **Note:**
Additional functions of the special function keys are program-dependent and are further explained in the descriptions of the individual LICCON programs!
- F** Function keys
 - The function keys should always be viewed in conjunction with the function key icon line displayed on the monitor.
- G** Display
 - Display of the individual programs (example: Crane operation program).
- H** SHIFT key
 - Second-level key assignments, for example „Supervisory function“.
- I** LED display
 - Monitor supply voltage present

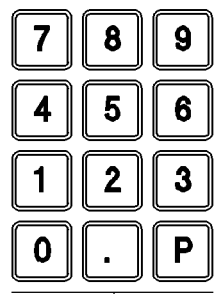
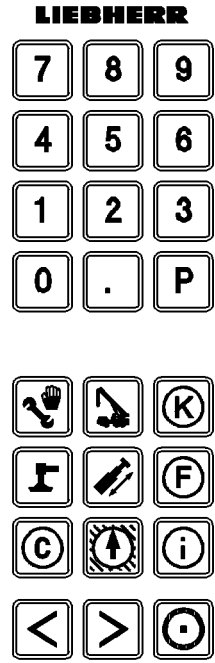
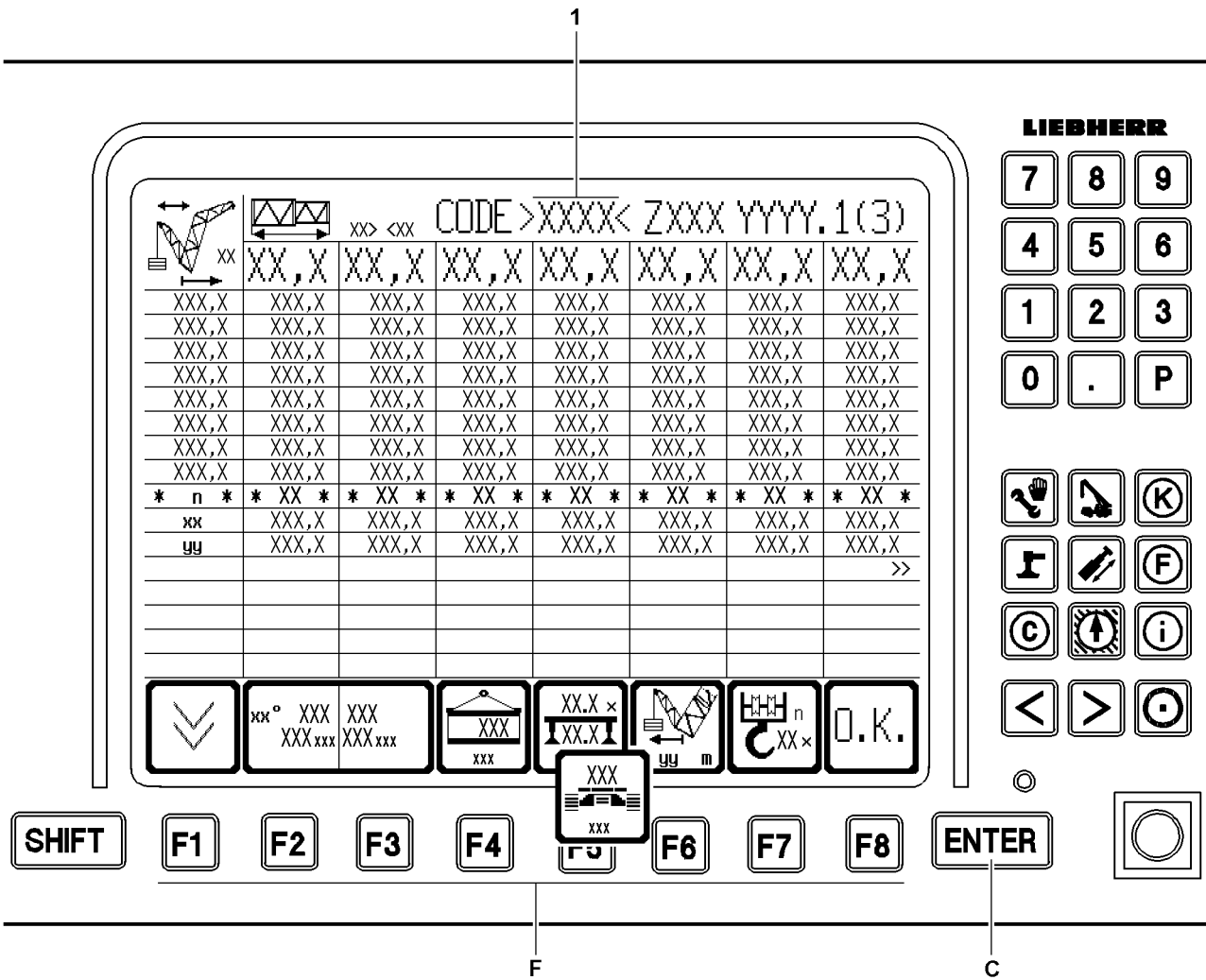


Fig.111919

5 The set up program

After the LICCON computer system boots up correctly, it changes automatically into the set up program.



Note

- ▶ All entries and settings, which are to be made by the crane operator in the set up program can only be carried out on **LICCON monitor 0!**



Note

Adjustment and display of set up configuration and reeving!

- ▶ Normally, the most recently run set up configuration and the reeving used at that time will be automatically set and displayed!
- ▶ If the computer system is started for the first time after set up of the crane, then the first valid set up configuration appears in the set up screen (first valid operating mode and reeving number „0“)!
- ▶ After a new start of the computer system, due to a „Cold start“ (for example: battery or CPU change), the first valid configuration appears in the set up screen (first valid operating mode and reeving number „0“)!

Using the set up program, the crane operator can set to the current operating mode, the current configuration status of the crane and the reeving number of the hoist rope.

In addition, in the set up program he can also see all the load charts programmed into the LICCON.

5.1 Setting the operating mode and set up configuration

The crane operator can select the operating mode and the set up configuration with the function keys **F** or by entering a 4-digit short code **1**.

5.1.1 Setting the operating mode and set up configuration via the function keys

The function keys **F** are explained in the section „Function key line“ in this chapter.

- ▶ Select the respective function keys **F**.
- ▶ Press the ENTER key **C** to confirm and accept the settings.

Result:

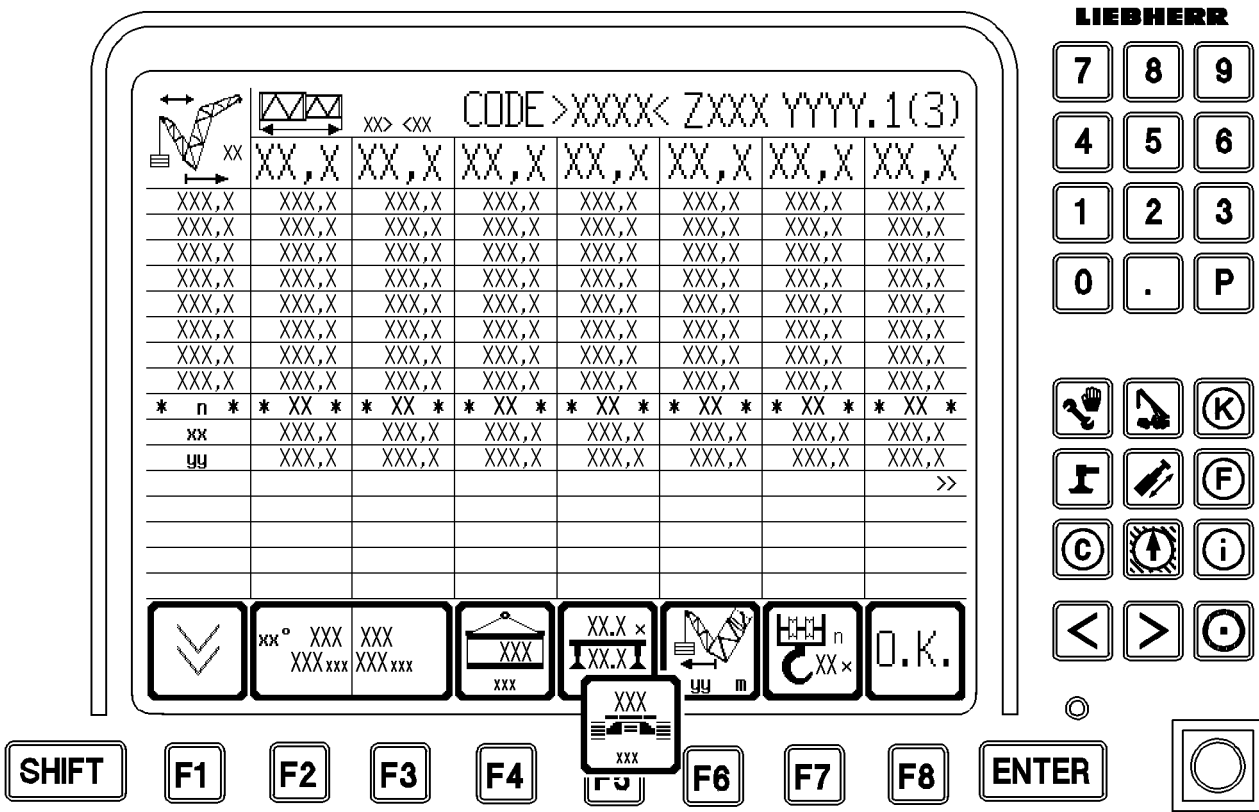
- The data from the selected load chart can be viewed.

5.1.2 Setting the operating mode and set up configuration via the 4-digit short code

- ▶ Enter a 4-digit short code **1** with the keypad **A** on the **LICCON monitor 0**.
- ▶ Press the ENTER key **C** to confirm and accept the settings.

Result:

- The data from the selected load chart can be viewed.



CODE >XXXX< ZXXX YYYYY.1(3) — 1

This section shows a detailed view of the display screen grid. It includes the crane icon with 'XX', the header 'CODE >XXXX< ZXXX YYYYY.1(3)', and the data grid with eight columns of 'XX,X' and 'XXX,X' values. Below the grid are rows with asterisks and 'n', 'XX', 'YY', and '>>'. A line labeled '2' points to the right side of the grid.

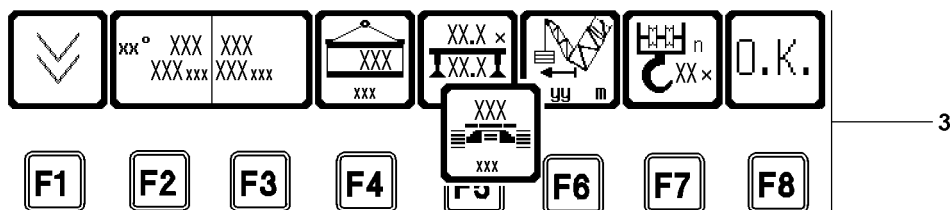


Fig.111296

LWE/LR 1750-000/12812-15-02/en

5.2 Set up program areas



Note

- ▶ The monitor illustrations in this chapter are only examples!
- ▶ The numerical values in the individual icons and charts do not have to necessarily match the crane exactly!
- ▶ Numbers and letters can be replaced by place holders!
- ▶ The programmed load charts for the crane are binding!

The monitor is divided into three areas in the set up program:

- 1 General information line
- 2 Display area of load chart values
- 3 Function key line with assigned icons

5.2.1 General information line

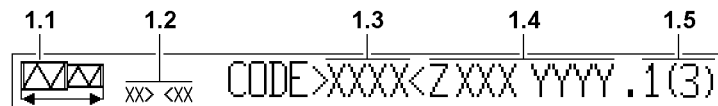
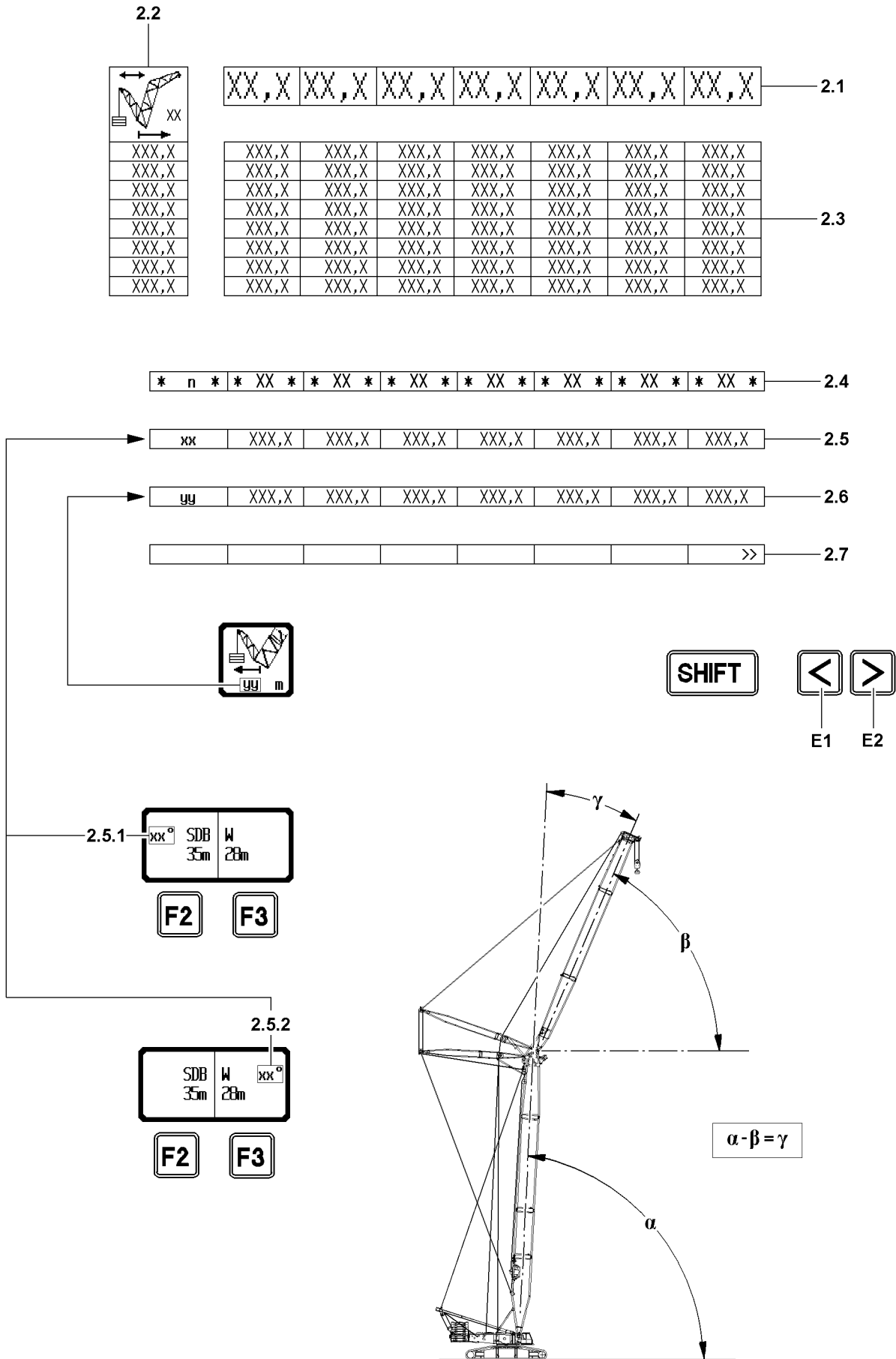


Fig.111920

- 1.1 Main boom length icon
 - The icon is identical for all operating modes
- 1.2 Abbreviations
 - For the programmed length units (LE) and weight units (GE)
 - Possible length units are [m] and [ft]
 - Possible weight units are [t] and [lbs]
- 1.3 4-digit short code
 - It is located next to the text „CODE“ inside angled brackets
 - Each short code uniquely identifies a crane configuration. The valid set up configuration and their associated short code numbers for the crane can be found in the load chart manual of the crane.
- 1.4 Organization number
 - For internal Liebherr load chart administration
- 1.5 Page number
 - Relates to the currently displayed part of the load chart
 - Separated from the organization number with „.“
 - The total number of pages in this load chart is in parentheses



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Fig.111297

5.2.2 Display area of load chart values

2.1 Main boom lengths

- In [m] or [ft]
- Maximum of 7 columns per display page



Note

Illustration „Boom radius“ icon 2.2!

- ▶ Depending on the operating mode of the crane, the view changes from the „Boom radius“ icon 2.2!
- ▶ In the illustration, the „Boom radius“ icon 2.2 shows an operating mode with luffing auxiliary boom / accessories, derrick boom and derrick ballast!

2.2 „Boom radius“ icon

- In [m] or [ft]
- Maximum 10 lines of radius values
- Vertical axis of load value field

2.3 Load value field

- Columns under the main boom lengths and in the lines to the right of radius values
- Load values depending on boom length and radius

2.4 Reeving number of hoist rope

- * n *

n = reeving number of the hoist rope between the boom head and hook block, in order to be able to lift the maximum load in the corresponding load chart column in single winch operation

- Enter and confirm the reeving on the LICCON monitor 0, according to the reeving on the boom head.

NOTICE

Special equipment necessary!

- ▶ If a load value in the column exceeds that of a load that can be lifted with the maximum possible reeving, then there is an exclamation mark beside the reeving number („!“). This exclamation mark indicates that special equipment is needed to lift this load!



Note

Parallel operation of hoist winches!

- ▶ For parallel operation of hoist winches (1||2), when reeving in the hoist rope, enter the total reeving of winch 1 and winch 2 on the LICCON computer system!
- ▶ **Example:** Winch 1 and winch 2 are each reeved 7ways, the total reeving is therefore $n = 14$!
- ▶ The total reeving **must** always show an even number value in parallel operation!

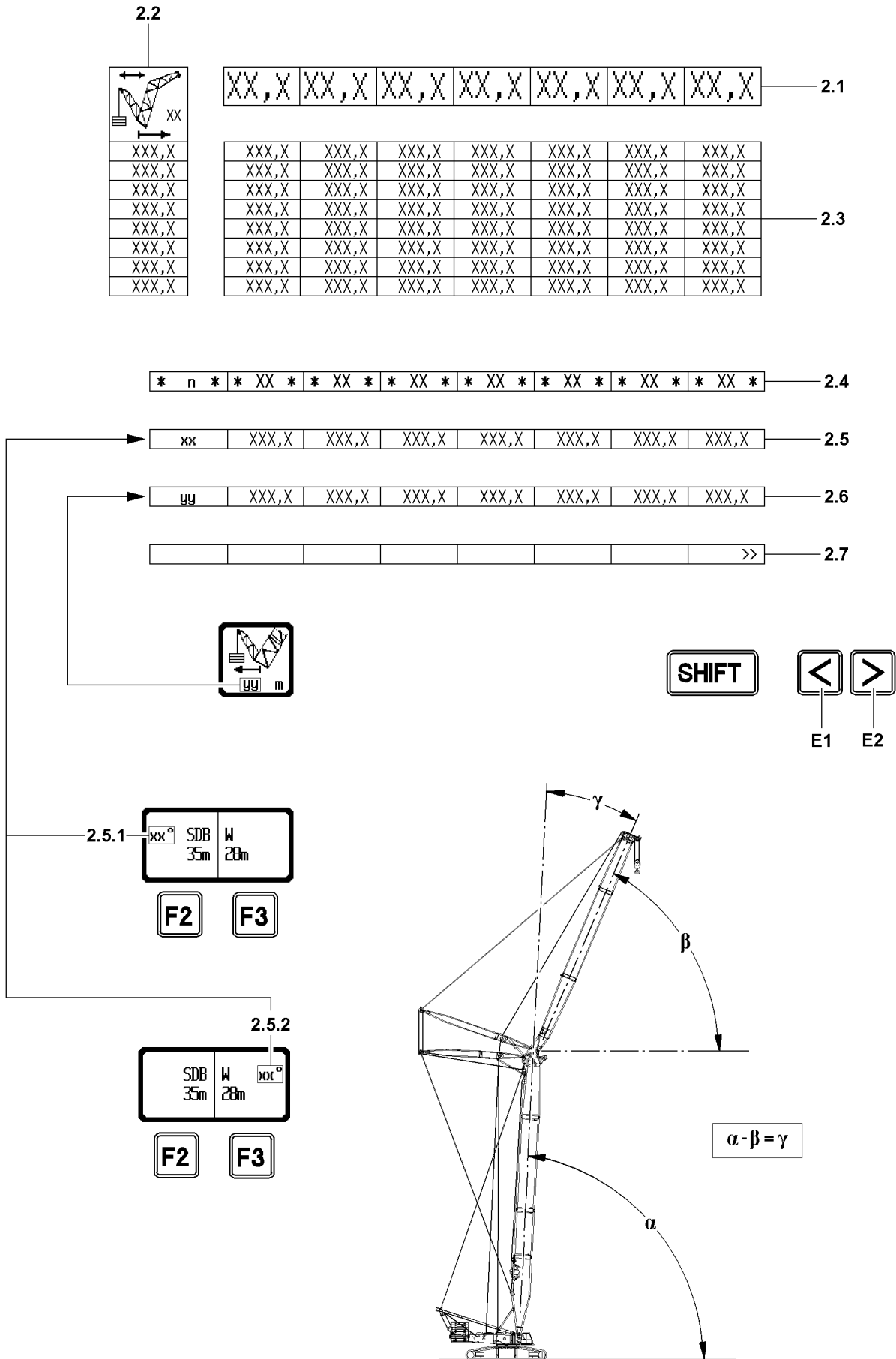


Fig.111297

LWE/LR 1750-000/12812-15-02/en

2.5 Boom angle

- Line **xx**
- In [°]
- **Note:**
Appears **only** in operating modes with luffing auxiliary boom / accessory!

2.5.1 Main geometry

- Appears „**xx**^o“ in main geometry status icon (for example: „**xx**^o SDB“) means „**xx**^o“ = main boom angle α in [°].
- In the line **xx** the main boom angles are listed, which must be set in order to be able to lift the load values in the corresponding load chart column.

2.5.2 Auxiliary geometry

- Appears „**xx**^o“ in auxiliary geometry icon (for example: „**W**“ „**xx**^o“) then means „**xx**^o“ = relative angle auxiliary boom / accessory γ in [°].
- In the load chart columns, the relative angles auxiliary boom / accessory, which must be set to be able to lift the load values in the corresponding load chart column are listed next to each other.

**Note**

- ▶ Main boom angle α : The angle of the main boom to the placement surface of the crane!
- ▶ Angle auxiliary boom / accessory β : The angle of the auxiliary boom / accessory to the placement surface of the crane!
- ▶ Relative angle auxiliary boom / accessory γ : The angle of the auxiliary boom / accessory is determined relative to the main boom!

2.6 Derrick ballast radius

- Line **yy**
- In [m] or [ft]
- **Note:**
Appears **only** in operating modes with derrick ballast!
- In the line **yy** the derrick ballast radii are listed, which must be set in order to be able to lift the load values in the corresponding load chart column.

2.7 Line for special displays

- If a load chart consists of more than seven columns, it cannot be fully displayed because of the size of the monitor. In that case, marking arrows in the first or the seventh field in this line indicate that there are additional chart columns to the left or right of the displayed chart. They can be shown by pressing the key **E1** or the key **E2**.
- **Note:**
Using the key combination **SHIFT** and **E1** or **SHIFT** and **E2**, you can, where possible, scroll left or right by 7 load chart columns (corresponds to 1 page)!

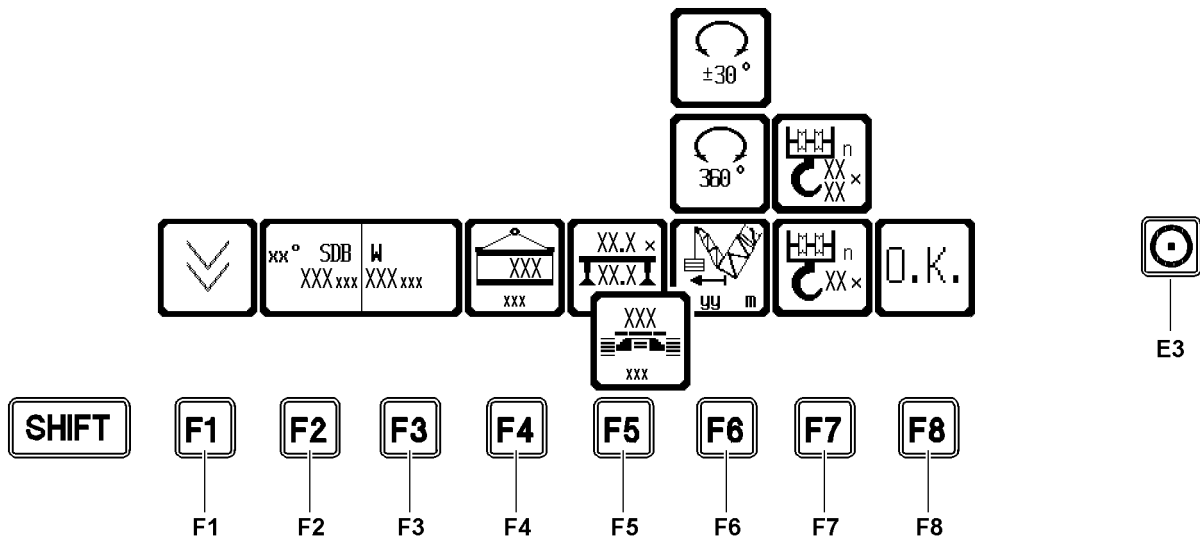


Fig.111298

5.2.3 Function key line in the set up program

The function key line consists of function keys **F1** to **F8** and the function key icon bar above it. The function keys correspond to the various function key icons above them.

Various functions are indicated by the function key icons, or they may refer to changes of:

- Operating mode and
- set up configuration.

Not all function keys have to be assigned icons on the LICCON monitor. This depends on the program selection.

Pressing a function key changes the appearance of the icon above, its meaning, or its textual content.

F1 Vertical paging

- Depending on the size of the monitor, up to 10 load chart lines can be displayed at once. If a chart consists of more than 10 lines, then the display is spread over several pages. When pressing a key, the next page of the load chart will be displayed, and the number of the current page in the „General information line“ will be counted up by 1. When the last page is reached, page 1 will appear again after pressing the function key **F1**.

F2 Main boom geometry

- Adjustment possibility of different main boom operating modes and main boom lengths of the crane (if available). The types are described by abbreviations (for example: **SDB** = heavy main boom, derrick boom and suspended ballast) and length data in the icon.

SHIFT and **F2**

- Previous main boom geometry (if available)

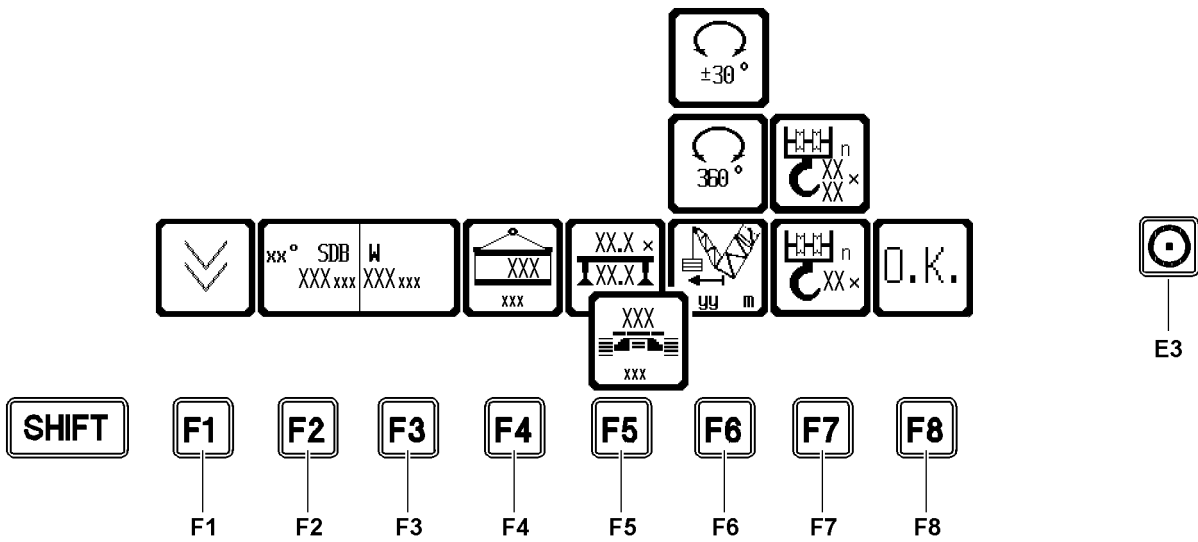


Fig.111298

F3 Boom geometry auxiliary boom / accessory

- Adjustment possibility of different auxiliary boom operating modes and auxiliary boom lengths of the crane (if available). The types are described by abbreviations (for example: **W** = luffing lattice jib) and length data in the icon. Possibly additional angle data is noted in the icon.

- **Note:**

Pressing the function key **F2** and / or the function key **F3** removes all data (operating mode, set up configuration) from the monitor and sets the short code in the general information line to „CODE >????<“!

- **Operating mode data:**

- Boom length icon in the general information line
- Length units and weight units
- Load chart organization number
- Boom radius icon
- Boom length data

- **Set up dependent data:**

- Numbering of current page number and total number of pages in load chart
- Radius values in length units
- Load values in weight units

SHIFT and **F3**

- Previous auxiliary boom geometry (if available)

F4 Counterweight

- Adjustment possibility for current counterweight, which must be on the turntable in order to obtain the values in the current chart. When pressing a key, the following icon appears with additional text in the counterweight icon.
- Example:
„ 110 t “ = total counterweight of 110 t

F5 Crane chassis

- Adjustment possibility „Set up configuration crane chassis“ (for example: crawler, support, central ballast).
- In operating modes, where there are various crane chassis versions (for example: Ballast on crawler travel gear), this can be set with the function key **F5**.

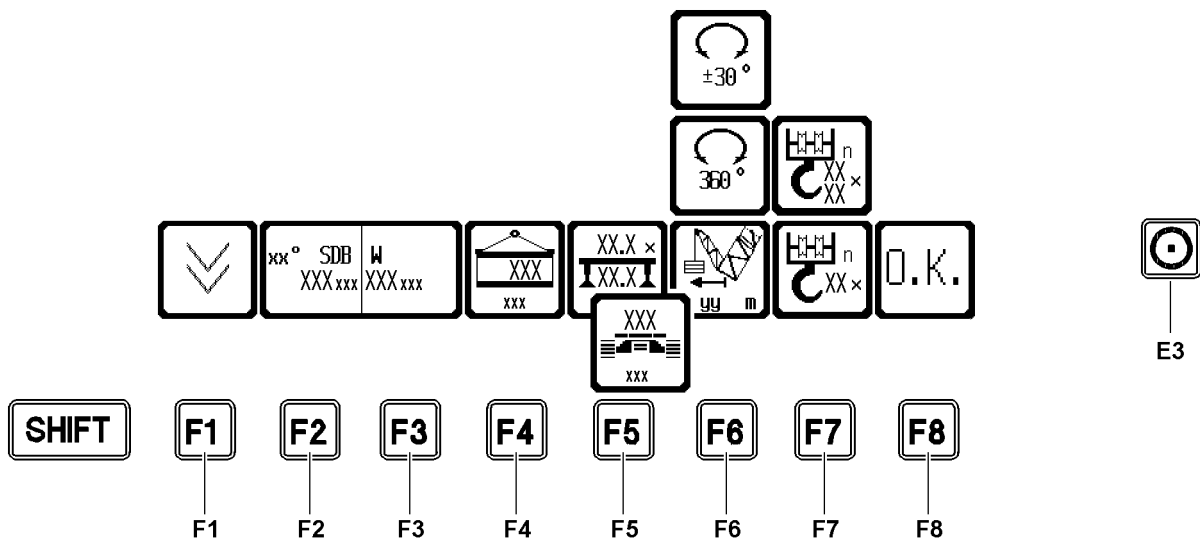


Fig.111298

**Note**

- ▶ For crane operating modes without derrick ballast, the slewing range icon crane superstructure appears at **F6!**
- ▶ For crane operating modes with derrick ballast, the derrick ballast radius icon appears at **F6!**

F6 Slewing range crane superstructure

- „Slewing range icon 360°“

or

- „Slewing range icon to the side ($\pm 30^\circ$)“

- **Note:**

For the limited slewing range to the side ($\pm 30^\circ$) there is a separate load chart with higher load capacities! When turning away from this angle range, the load moment limiter (LMB) switches automatically to the load chart for slewing range 360°!

**Note**

- ▶ If the current load can only be lifted with a limited slewing range to the side ($\pm 30^\circ$), then the slewing speed is reduced toward the limit of the slewing range up to „zero“. An overload of the crane is thereby avoided by turning the crane superstructure, see section „Automatic slewing range change“!

or

F6 Derrick ballast radius

- Set the set up configuration derrick ballast radius **yy** in [m] or [ft]

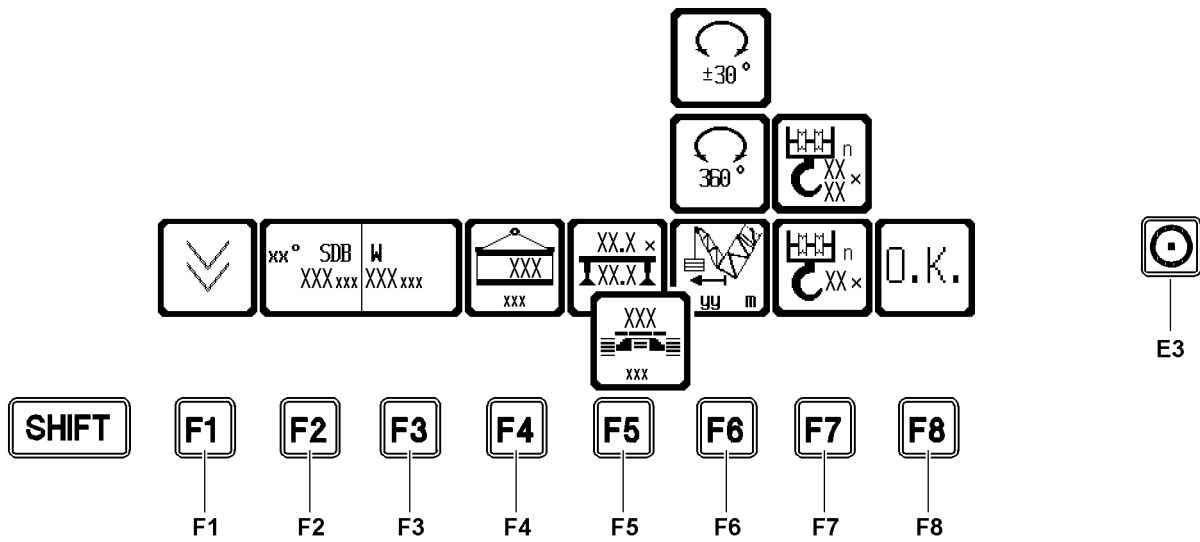


Fig.111298

F7 Hoist rope reeving

- Adjustment possibility for the **number of hoist rope strands on the boom** to obtain a certain load carrying capacity.
- Press the key: Reeving number on boom is increased by 1.

SHIFT and **F7**

- Press the key: Reeving number on boom is reduced by 1.

**Note**

- ▶ The displayed number of hoist rope strands (reeving) in the icon will be increased with every keystroke by one counter, up to a fixed maximum value (depending on operating mode)! If the maximum value is exceeded, the counter starts again at the minimum value!
- ▶ If the set value is still within the minimum and maximum values when switching to another operating mode, it remains valid! Otherwise it will be set to the minimum value for the new operating mode!
- ▶ After a „Cold start“ (for example loss of data in the memory), the display of the hoist rope reeving is at „0“!

**Note**

Parallel operation of hoist winches!

- ▶ For parallel operation of hoist winches (1||2), when reeving in the hoist rope, enter the total reeving of winch 1 and winch 2 on the LICCON computer system!
- ▶ **Example:** Winch 1 and winch 2 are each reeved 7ways, the total reeving is therefore $n = 14$!
- ▶ The total reeving **must** always show an even number value in parallel operation!

E3 and **F7**

- Adjustment possibility for the **number of hoist rope strands on the boom nose** to obtain a certain load carrying capacity.
- Press the key: Reeving number on boom nose* (upper number in „Hoist rope reeving“ icon) is increased by 1.

SHIFT and **E3** and **F7**

- Press the key: Reeving number on boom nose* (upper number in „Reeving“ icon) is reduced by 1.

**Note**

Display reeving boom nose!

- ▶ The reeving for the boom nose is only shown if the boom nose is assembled!
- ▶ If the boom nose is installed during operation, then the reeving of the boom nose must be correctly entered in the set up program!

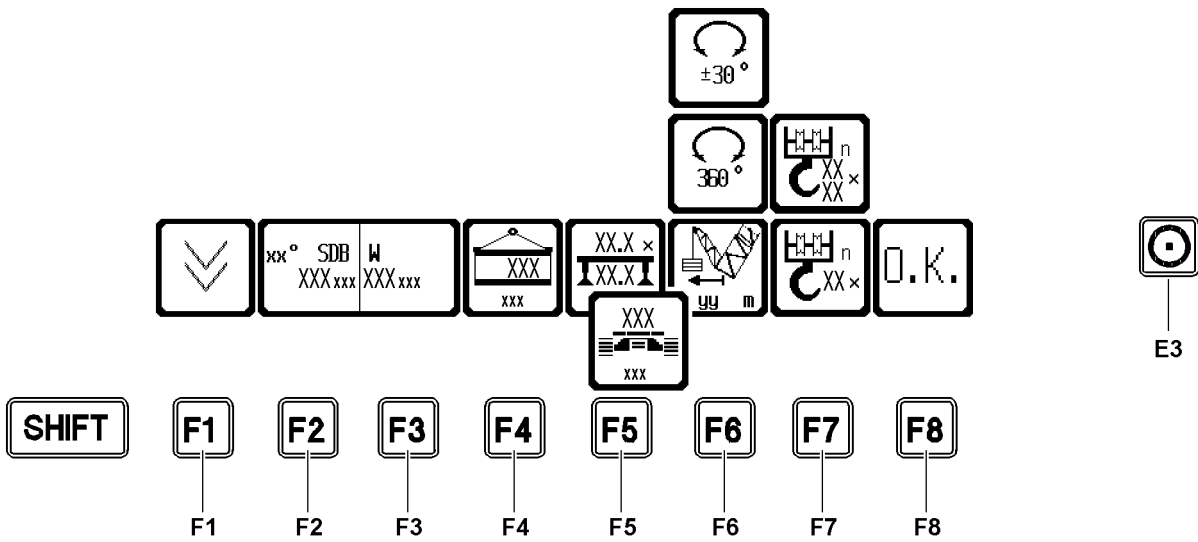


Fig.111298

F8 Confirmation key

- For confirmation of selected set up configuration
- **Prerequisites:**
 - The entry of the set up configuration must be completed all the way. A valid short code is shown and in the chart field are load values.
 - The external conditions for this set up configuration, if stipulated, must be met.
 - The crane may not be utilized by more than 20 % in the previous set up configuration or the load suspended on the hook may not be heavier than 0.5 t. Switching to the crane operation program can otherwise only be done with the program key **P1**. In that case, the newly entered set up configuration is not accepted.

**Note**

- ▶ Make sure that the selected set up configuration (short code) and the hoist rope reevings are taken over after switching into the operating screen!
-

**Note**

Display of operating errors from the set up program!

- ▶ Operating errors created in the set up program are displayed in the icon above the function key **F8** and are saved in the error stack for about 5 seconds!
 - ▶ If the function key **F8** is pressed within 5 seconds, the program will switch automatically to the error determination screen in the test system and the error will be displayed documentarily!
 - ▶ The operating error will not be saved!
 - ▶ Operating errors are always placed on top in the error stack, see Diagnostics manual!
-

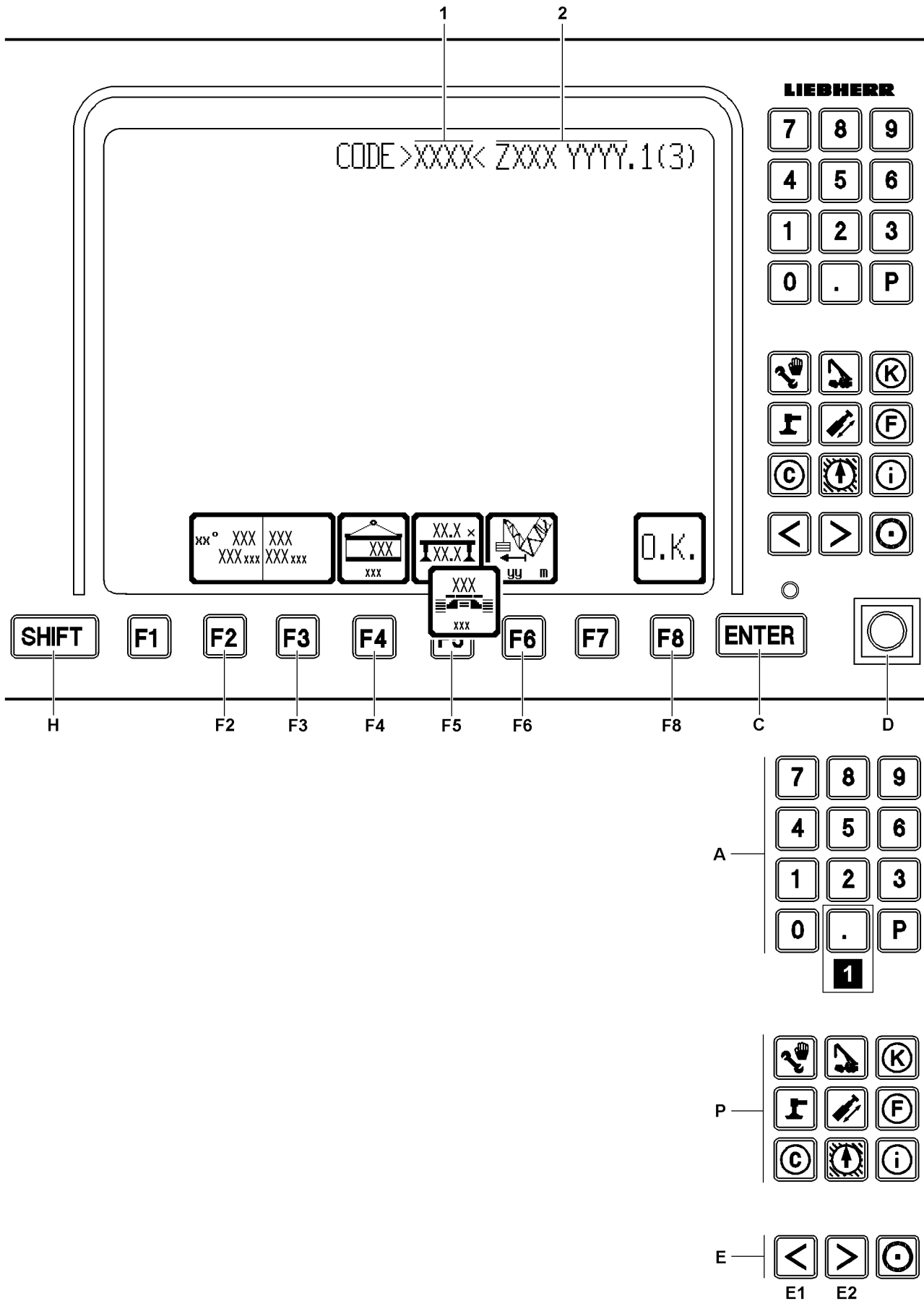


Fig.111922

LWE/LR 1750-000/12812-15-02/en

5.2.4 Operating errors in the set up program

A Keypad

- Pressing the keypad deletes all operating mode and set up dependent data from the monitor.
- The keys **0** to **9** on the keypad can be used to enter the short code directly into the LICCON monitor.
- The key **P** and the key „**„**“ (illustration 1) have no function in the set up program.

P Program keys

- Selection of individual programs. The settings in the set up program are discarded and the set up configuration and reeving, which were last confirmed with the function key **F8** (OK) are continued to be used.
A program currently running **cannot** be called again using its program key.

C Input key ENTER

- Confirmation of input both for short codes **1** as well as for any change in the set up configuration via the function keys.
- **ENTER** after entering the short code, the short code **1** is searched for in all stored load charts. If the matching load chart has been programmed, it will be displayed in full. Otherwise there is an error message in the form of „????“ in the second part of the organization number **2** and the acoustic signal „Horn“ sounds.
- **ENTER** after a changing the operating mode using the function key **F2** and the function key **F3** searches for this operating mode. If successful, sets its first set up configuration and displays the load chart and its short code **1**. In the event of an error, the short code **1** remains on „CODE ?????“, the organization number **2** is displayed as „ZXXX????“ and the acoustic signal „Horn“ sounds.
- **ENTER** after a change in the set up configuration with the function keys **F4** and **F5** as well as the function key **F6** this load chart (if the chart exists) displays with short code **1** on the monitor. In the event of error, the short code **1** remains on „CODE ?????“ and the acoustic signal „Horn“ sounds.

D Bypass key button

- Has no function in the set up program

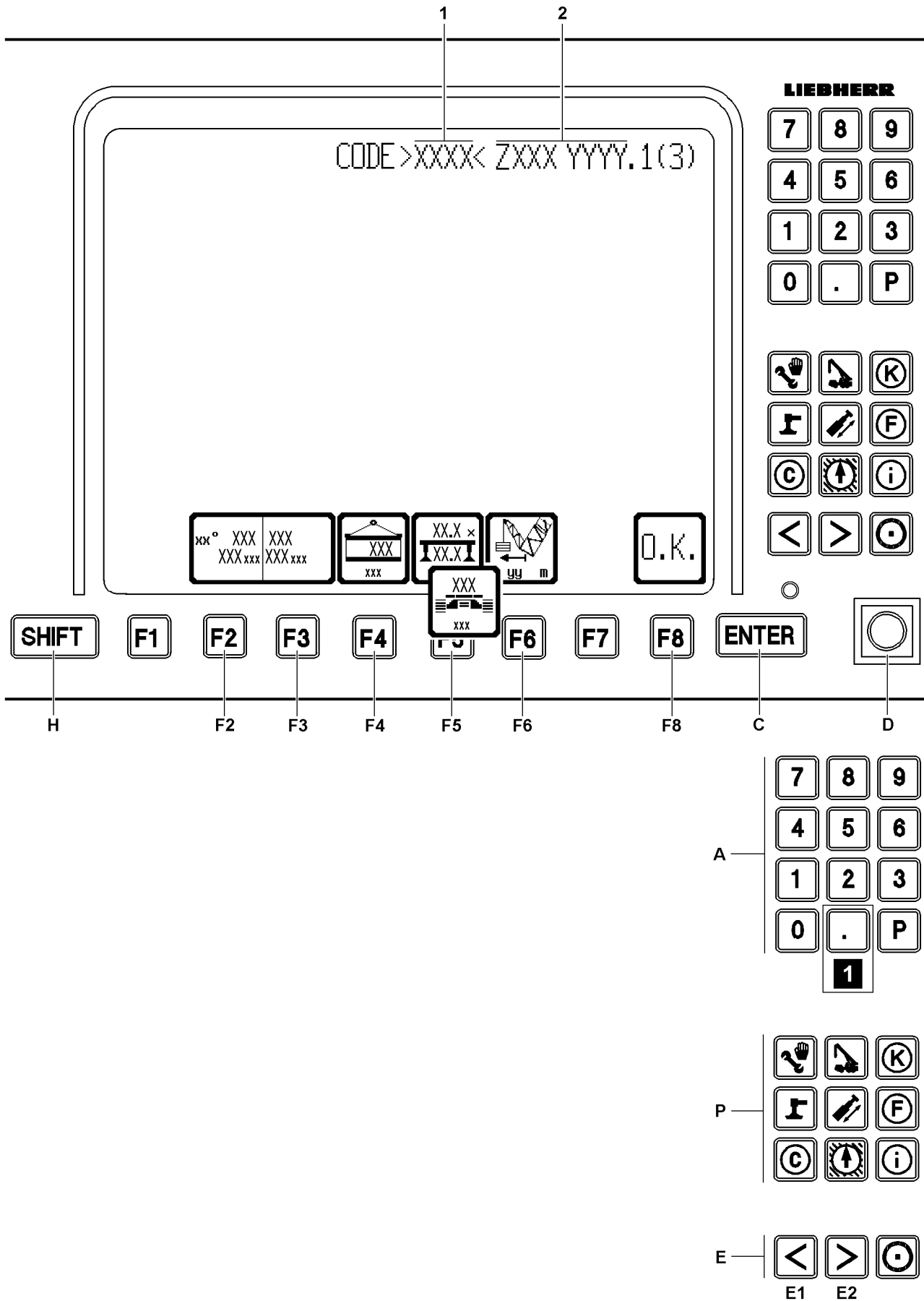


Fig.111922

LWE/LR 1750-000/12812-15-02/en

E Horizontal paging• **Note:**

The key **E1** and key **E2** only have a function if this is indicated in the „Line for special displays“!

- If a load chart consists of more than 7 columns, the first display of the set up configuration only shows columns 1 to 7.
- Pay attention to the double arrow on the right (>>) and / or on the left (<<) edge of the line of the load chart! It points to additional columns in the respective direction!
- Press the key **E1** to display the next left chart column.
- Press the key **E2** to display the next right chart column.

• **Note:**

Using the key combination **SHIFT** and **E1** or **SHIFT** and **E2**, you can, where possible, scroll left or right by 7 load chart columns (corresponds to 1 page)!

H SHIFT key

- For example supervisory function
- By pressing and holding down the **SHIFT** key and then pressing one of the function keys, which must correspond to the corresponding function, the previous main boom geometry, the auxiliary boom geometry and the previous reeving are reset.
- **Note:**
See section „The function key line“ in the set up program!

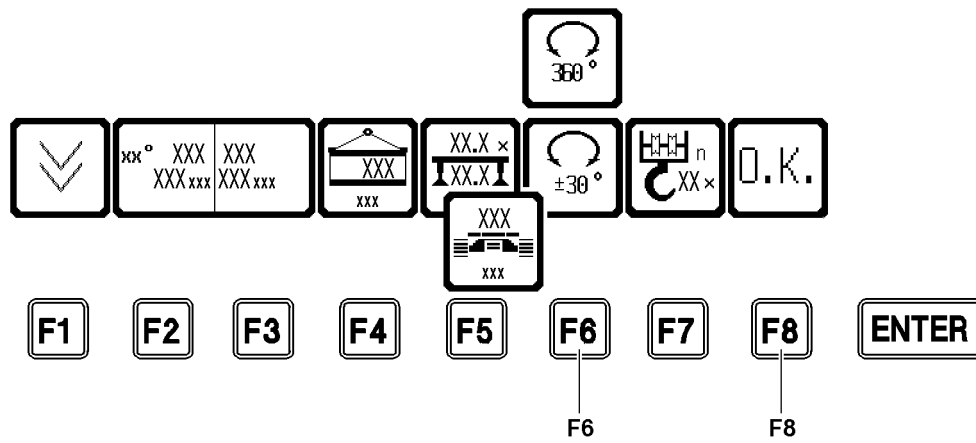


Fig.111299

6 Automatic slewing range change



Note

- ▶ Applies only for cranes with the respective load charts!

There are set up configurations, which have different load charts for different slewing ranges of the crane superstructure. For example: Crane with crane support, support base 16 m x 12 m , **SL8HS**. On this support base there are load charts to the side ($\pm 30^\circ$), which permit higher loads.

When turning away from this angle range, the load moment limiter (LMB) switches automatically to the load chart for slewing range 360° .

6.1 Activation of slewing range change



Note

- ▶ The activation of the slewing range change is only possible in load charts to the side ($\pm 30^\circ$)!
- ▶ If the 360° load chart is selected, there is no slewing range change! Within the entire 360° slewing range, only the load for the 360° load chart can be lifted!

NOTICE

Shut off of slewing movement!

If the current load can only be lifted with a limited slewing range to the side ($\pm 30^\circ$), then the slewing speed is reduced toward the limit of the slewing range up to „zero“ and shut off!

- ▶ Turning the crane superstructure outside the slewing range to the side ($\pm 30^\circ$) is not possible under these circumstances with the current load!

- ▶ Select load charts to the side ($\pm 30^\circ$) and actuate with the function key **F8**.

Result:

- The slewing range change is active.
If there is a load chart for the slewing range 360° for the current load, then the load moment limiter (LMB) switches automatically to the load chart for the slewing range 360° when turning out of the angle range to the side ($\pm 30^\circ$).



Note

Coasting slewing gear!

- ▶ When the slewing range change is set and the foot button „Coasting slewing gear“ is actuated, then the load from the load chart for the slewing range 360° is valid!

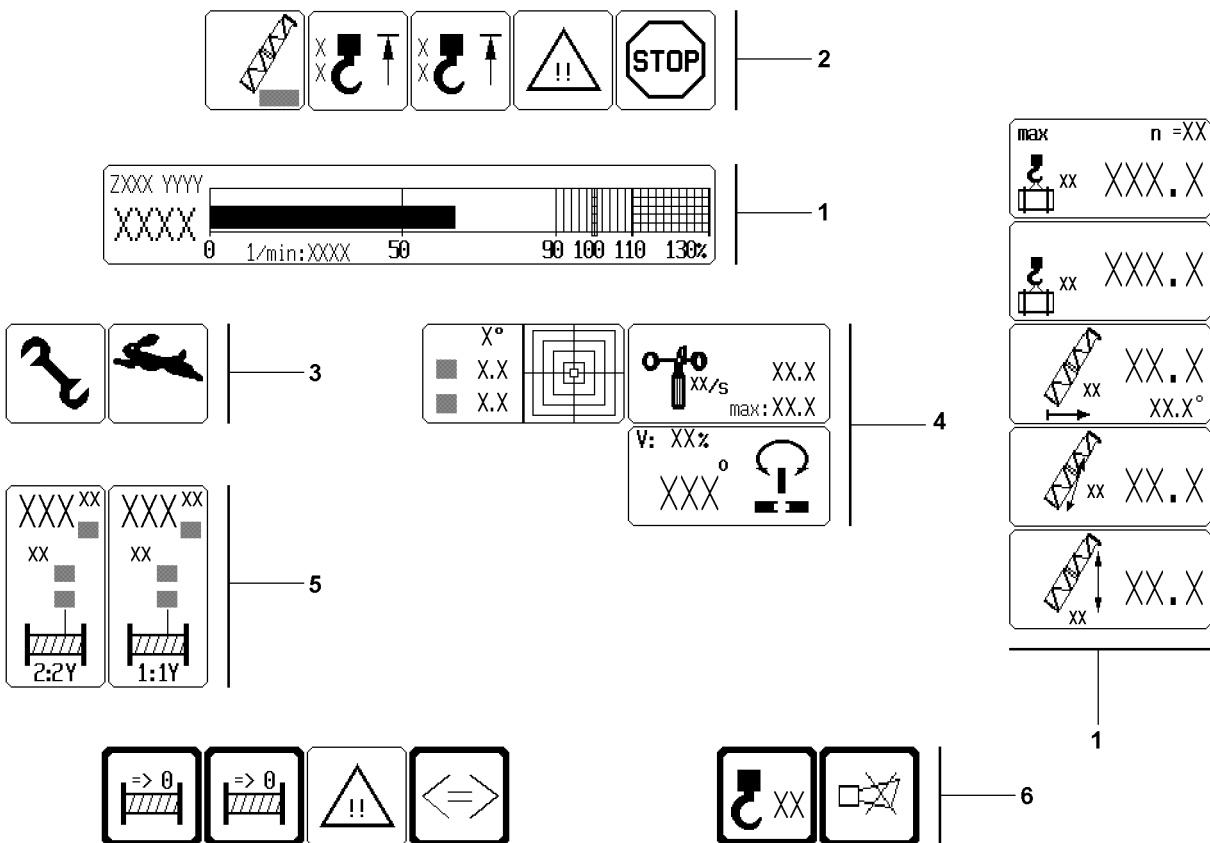
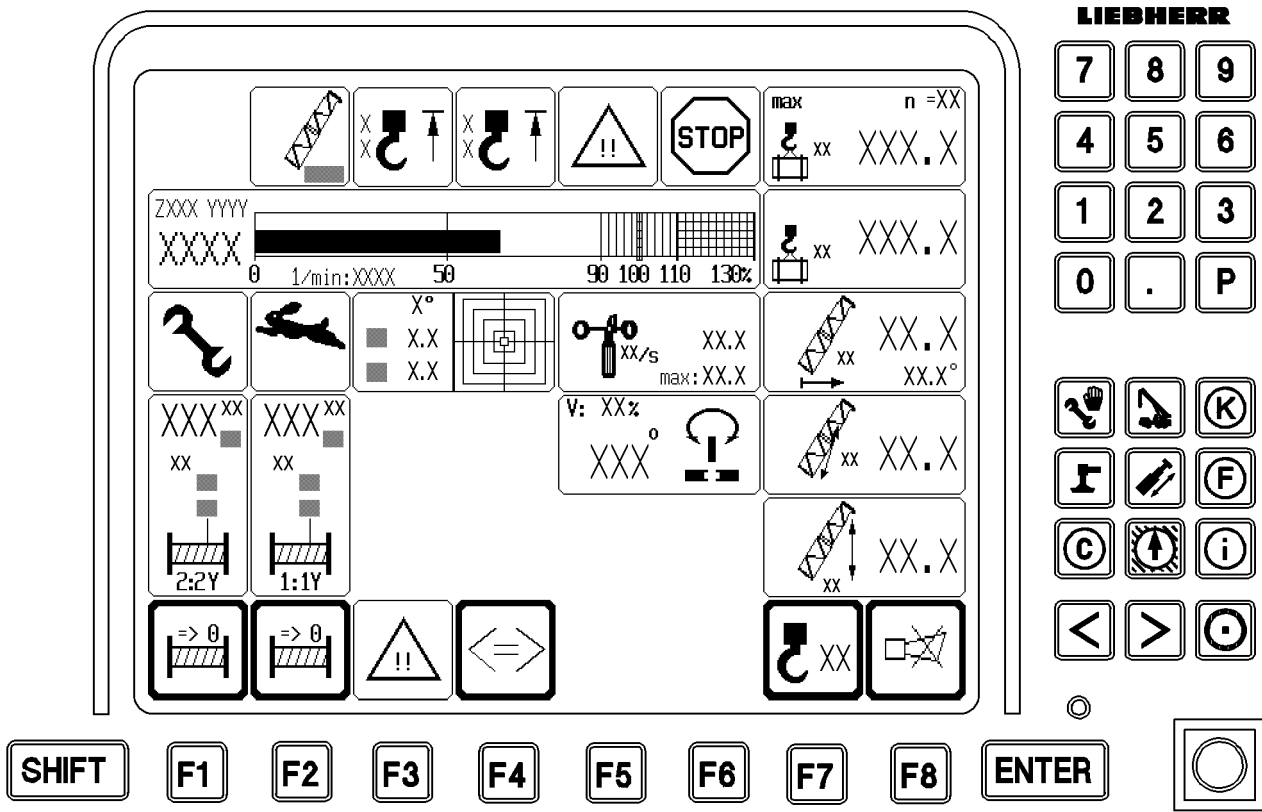


Fig.111892

LWE/LR 1750-000/12812-15-02/en

7 The crane operation program on monitor 0

The LICCON program Crane operation assists the crane operator by displaying the data needed for operating the crane clearly on **monitor 0**. An acoustic signal accompanies all critical displays. Depending on the equipment, a range of other icons may also be turned on as additional displays, either as required by the crane operator, or automatically in the event of a problem.

It also alerts the crane operator to imminent overload conditions. In the event of overload and many error conditions, which could be hazardous during crane operation, the system shuts off.

The LICCON monitor is divided into six areas in the crane operation program:

- 1 Crane geometry and load information
- 2 Alarm functions
- 3 Special functions
- 4 Monitored auxiliary functions
- 5 Winch display
 - Winch 1 and winch 2
- 6 Function key line



Note

- ▶ The monitor illustrations in this chapter are only examples!
 - ▶ The numerical values in the individual icons and charts do not have to necessarily match the crane exactly!
 - ▶ The configuration of the LICCON monitor with icons is only descriptive!
 - ▶ An identical icon display will **not** appear during crane operation!
-

7.1 Crane geometry and load information



Note

- ▶ The crane illustrations in this section are only examples and are generalized!
 - ▶ They may differ from the crane type and equipment!
-

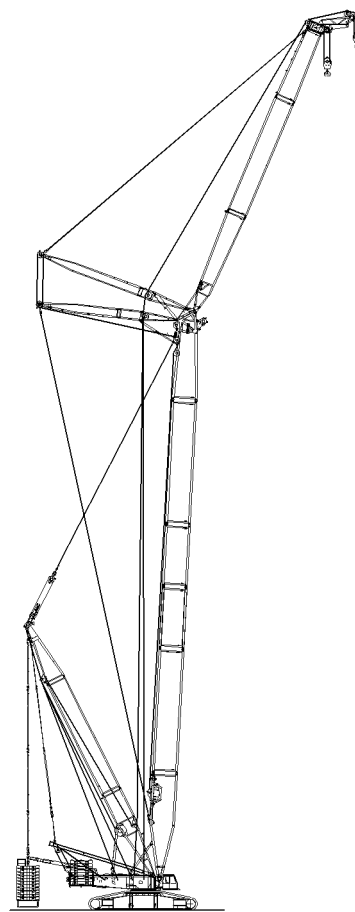
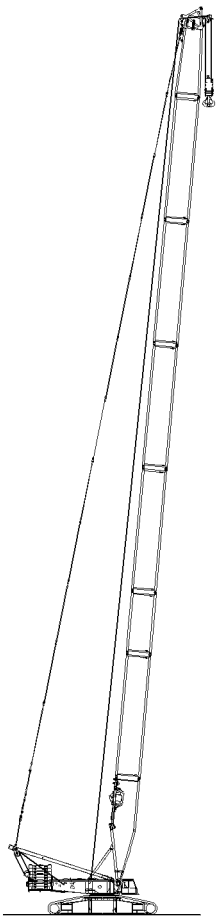
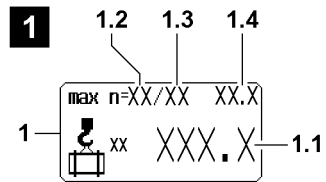
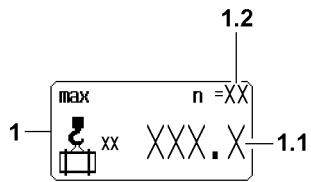


Fig.111931

LWE/LR 1750-000/12812-15-02/en

7.1.1 Maximum load

According to the set up configuration, the following changes:

- The illustration of the icon.
- The position of values in the icon, see sample illustration 1!

1 „Maximum load“ icon

- In [t] or [lbs]

1.1 Maximum load on the boom

- In [t] or [lbs]
- The load capacity depends on:
 - The selected operating mode
 - The selected set up configuration (load chart)
 - The boom radius
 - The various boom angles
 - The derrick ballast radius*
 - The currently pulled derrick ballast*
 - The reeving of the hoist rope on the boom

• Note:

The maximum load on the boom (also: Maximum load according to the load chart and the reeving on the boom) is the load, which the crane can lift in its current operating condition with the maximum utilized ballast / counterweight!

• Note:

„? ? ? . ?“ is shown when no load chart value can be accessed!

An error message is issued, see Diagnostics manual!

- Example:

The crane is not in the range of the load chart!

or

The value cannot be calculated / determined!

1.2 Reeving number hoist rope on boom

- n = reeving number of hoist rope on the pulley head selected via the load chart. The reeving number has been set first in the set up program.

1.3 Reeving number of hoist rope on the boom nose*

- n = reeving number of hoist rope on the installed boom nose*. The reeving number has been set first in the set up program.

1.4 Maximum load carrying capacity of the installed boom nose*

- In [t] or [lbs]

• Note:

The „Maximum load carrying capacity“ of the boom nose* depends on the set reeving of the boom nose*!

• Note:

The maximum load carrying capacities on the boom (1.1) and on the boom nose* (1.4) are monitored simultaneously!

If the load on one position is exceeded, then an LMB stop is issued!

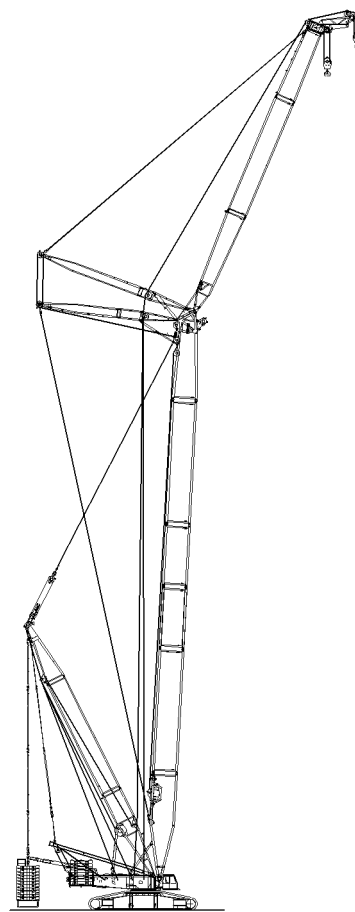
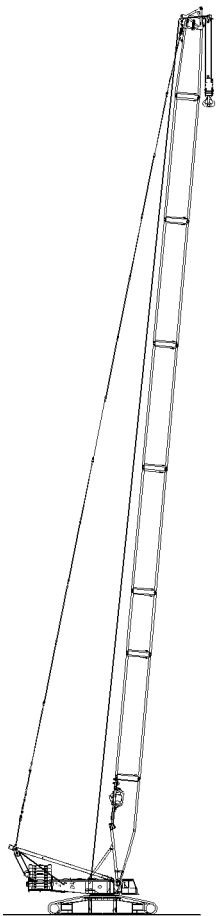
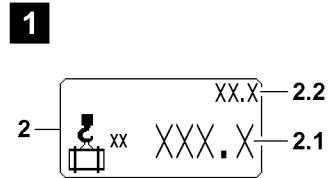
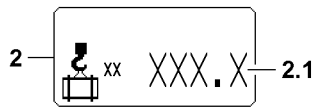


Fig.111932

LWE/LR 1750-000/12812-15-02/en

7.1.2 Current load

According to the set up configuration, the following changes:

- The illustration of the icon.
- The position of values in the icon, see sample illustration 1!

2 „Current load“ icon

- In [t] or [lbs]

2.1 Current load on the boom

- Actual load display = current load in [t] or [lbs] on the selected boom.
- Display of the calculated total load including the weights of the carrying equipment, the lifting equipment (hook block) and / or the fastening equipment, but **without** the nominal weight of the hoist rope.

- **Note:**

„? ? ? . ?“ is shown if the value cannot be calculated / determined!

An error message is issued, see Diagnostics manual!

2.2 Current load on the boom nose*

- Actual load display = current load in [t] or [lbs] on the boom nose*.
- Display of the calculated total load on the boom nose*, including the weights of the carrying equipment, the lifting equipment (hook block) and / or the fastening equipment, **including** the hoist rope.

- **Note:**

„? ? ? . ?“ is shown if the value cannot be calculated / determined!

An error message is issued, see Diagnostics manual!



Note

Net load display in the „Current load“ icon 2!

- ▶ By using the function „Tare“ (see description of function key **F7** in section „Function key icon line“) the display can be changed over to display the net load! In the icon appears additionally the word „Net“!

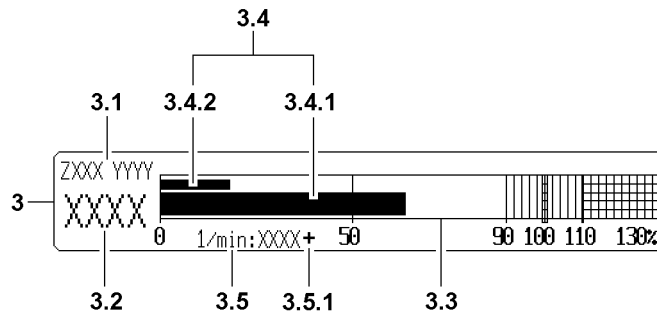


Fig.111933

7.1.3 Dynamic utilization bar

- 3 „Dynamic utilization bar“ icon
 - In percent [%]
- 3.1 Organization number
 - For internal Liebherr load chart administration
- 3.2 Short code
 - Identifies the selected set up configuration
- 3.3 Utilization scale
 - Marking from a utilization of 90 %: **Advance warning**
 - Marking at a utilization of 100 %: **STOP shut off**
- 3.4 Utilization bar
 - 3.4.1 Utilization bar of crane
 - According to load chart and reeving
 - **Note:**
The utilization bar is the measurement for the current utilization of the crane!

Utilization of crane according to load chart and reeving	=	$\frac{\text{Current load on the boom head}}{\text{Maximum load according to load chart and reeving}}$
--	---	--

- 3.4.2 Utilization bar boom nose*
 - **Note:**
Maximum load carrying capacity of the boom nose*: Load which can be lifted by the boom nose* alone!
Requirement: Sufficiently high load capacity on the boom head!

Utilization of the boom nose*	=	$\frac{\text{Current load carrying capacity of the boom nose*}}{\text{Maximum load carrying capacity of the boom nose*}}$
-------------------------------	---	---

- 3.5 Engine rpm
 - In [rpm] or [n/min]
 - **Note:**
„????“ is displayed in case of an error in rpm value for approximately 5 seconds!
Then the nominal rpm for the diesel engine is set for the output regulation of the drives!
The set nominal rpm is shown blinking!
An error message is issued!
 - 3.5.1 Engine rpm lock
 - The engine rpm can be locked on the master switch. If the engine rpm has been locked, the icon „+“ appears behind the rpm display.

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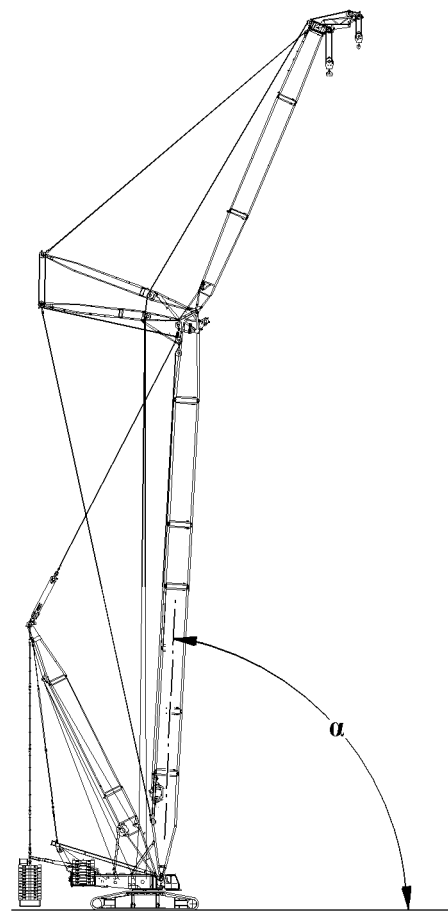
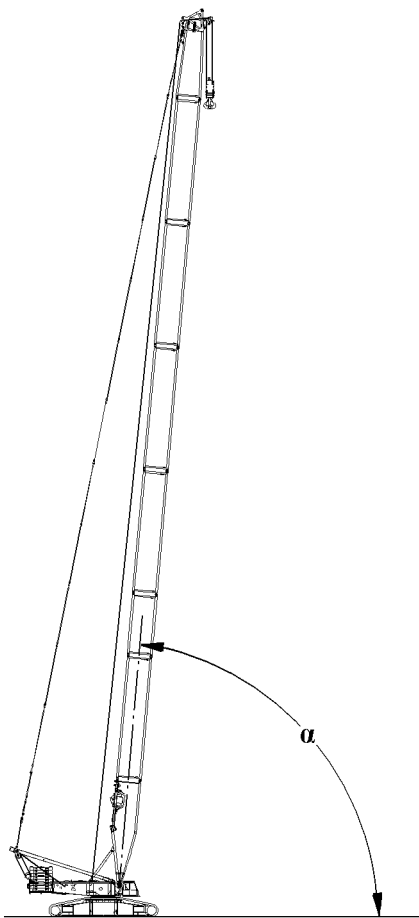
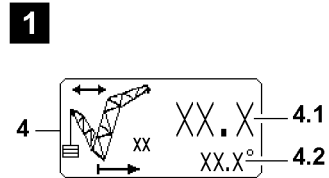
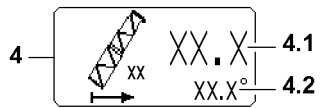


Fig.111934

LWE/LR 1750-000/12812-15-02/en

7.1.4 Radius

According to the set up configuration, the following changes:

- The illustration of the icon.
- The position of values in the icon, see sample illustration 1!

4 „Boom radius“ icon

4.1 Radius

- In [m] or [ft]

Identifies the horizontal center of gravity distance of the load (on the load hook selected by the operating mode) from the center of rotation of the crane superstructure, measured on the ground! This also takes into account the boom flexation due to its own weight and the suspended weight of the load!

- **Note:**

„? ? ? . ?“ is shown if the value cannot be calculated / determined!

An error message is issued, see Diagnostics manual!

4.2 Main boom angle

- In [°]

Displayed is the medium value of the angle sensor in the main boom pivot section and the angle sensor in the main boom pulley head.

- **Note:**

„? ? ? . ?“ is shown if the value cannot be calculated / determined!

An error message is issued, see Diagnostics manual!



Note

- ▶ Main boom angle α : The angle of the main boom to the placement surface of the crane!

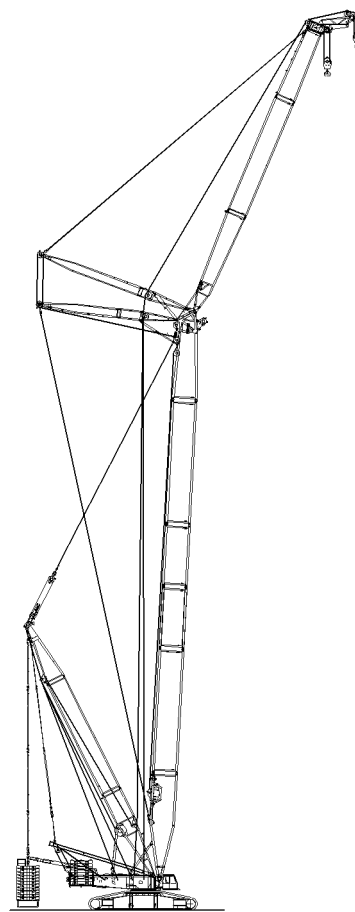
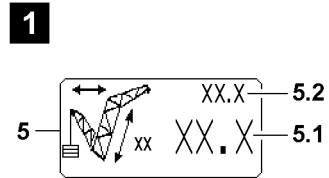
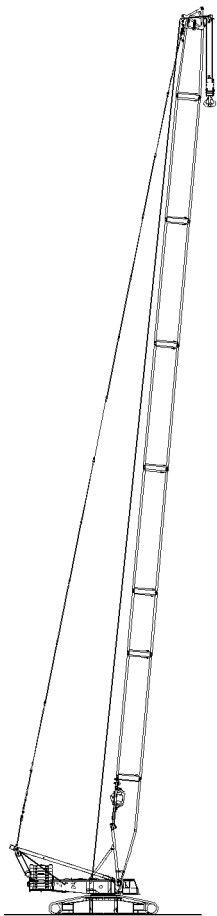
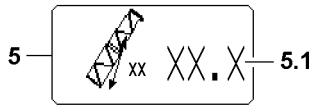


Fig.111935

LWE/LR 1750-000/12812-15-02/en

7.1.5 Boom length

According to the set up configuration, the following changes:

- The illustration of the icon.
- The position of values in the icon, see sample illustration 1!

5 „Boom length“ icon

5.1 Length of main boom

- In [m] or [ft]

5.2 Length of auxiliary boom / accessory

- In [m] or [ft]

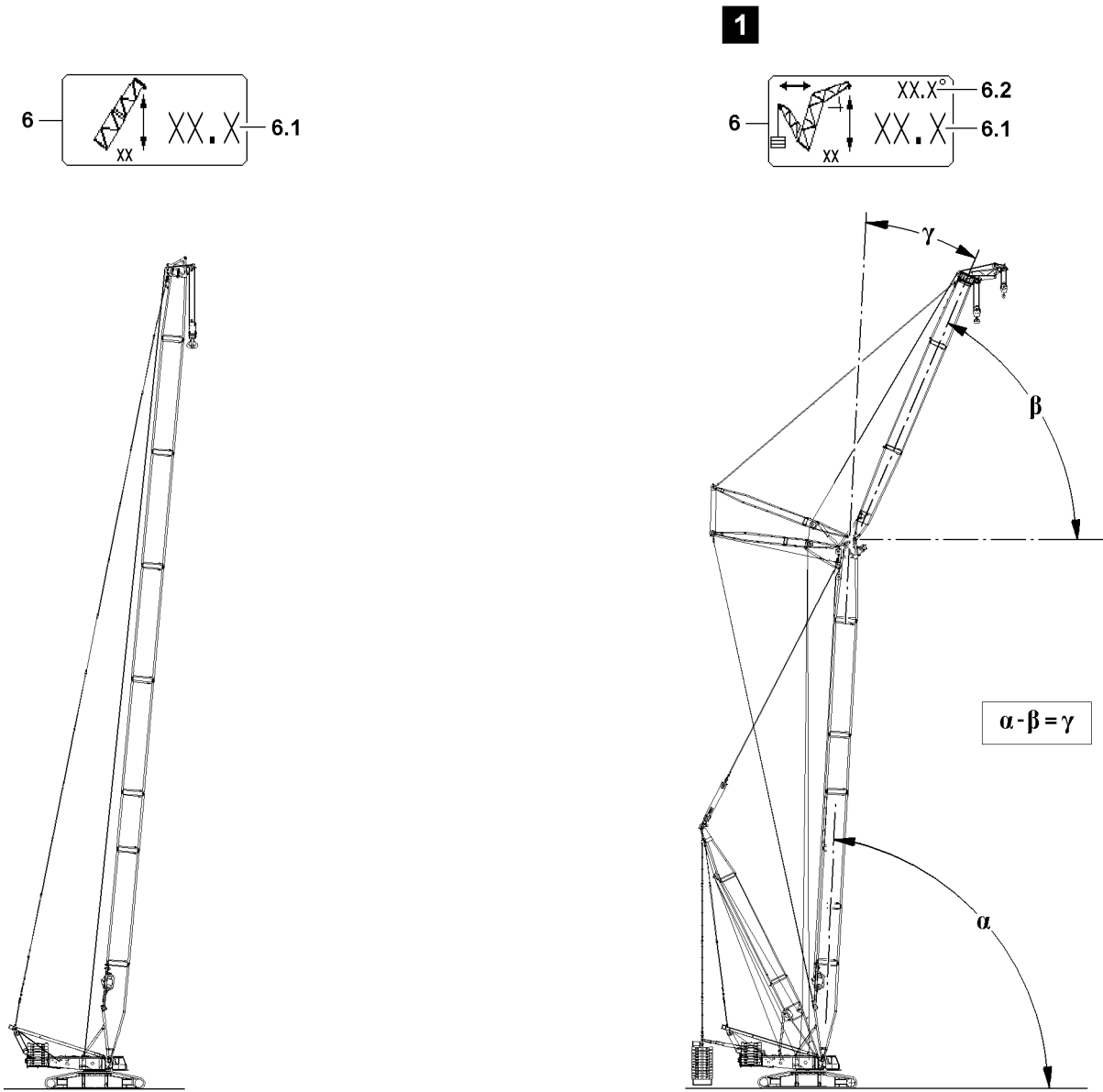


Fig.111936

LWE/LR 1750-000/12812-15-02/en

7.1.6 Pulley head height



Note

- ▶ Main boom angle α : The angle of the main boom to the placement surface of the crane!
- ▶ Angle auxiliary boom / accessory β : The angle of the auxiliary boom / accessory to the placement surface of the crane!
- ▶ Relative angle auxiliary boom / accessory γ : The angle of the auxiliary boom / accessory is determined relative to the main boom!

According to the set up configuration, the following changes:

- The illustration of the icon.
- The position of values in the icon, see sample illustration 1!

6 „Pulley head height“ icon

6.1 Pulley head height

- In [m] or [ft]
- Identifies the distance from the horizontal (crane base) to the selected pulley head axle, for which the displayed maximum load applies.
- **Note:**
„? ? ? . ?“ is shown if the value cannot be calculated / determined!
An error message is issued, see Diagnostics manual!

6.2 Angle auxiliary boom / accessory

- In [°]
- **Note:**
„? ? ? . ?“ is shown if the value cannot be calculated / determined!
An error message is issued, see Diagnostics manual!



Note

- ▶ Depending on the set up configuration and the load chart, a differentiation is made between an absolute angle display or a relative angle display!

β Absolute angle auxiliary boom / accessory

- The angle of the auxiliary boom / accessory to the horizontal (placement surface of the crane) in [°]
- Display absolute angle: For operating modes with load chart for a fixed defined main boom angle!

or

γ Relative angle auxiliary boom / accessory

- Angle between the main boom and the auxiliary boom / accessory in [°]
- Display relative angle: For operating modes with load chart for a fixed defined angle auxiliary boom / accessory!

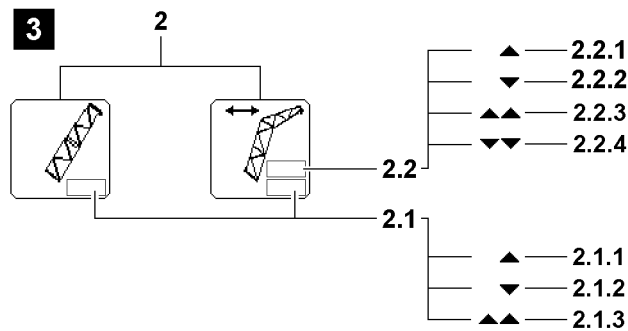
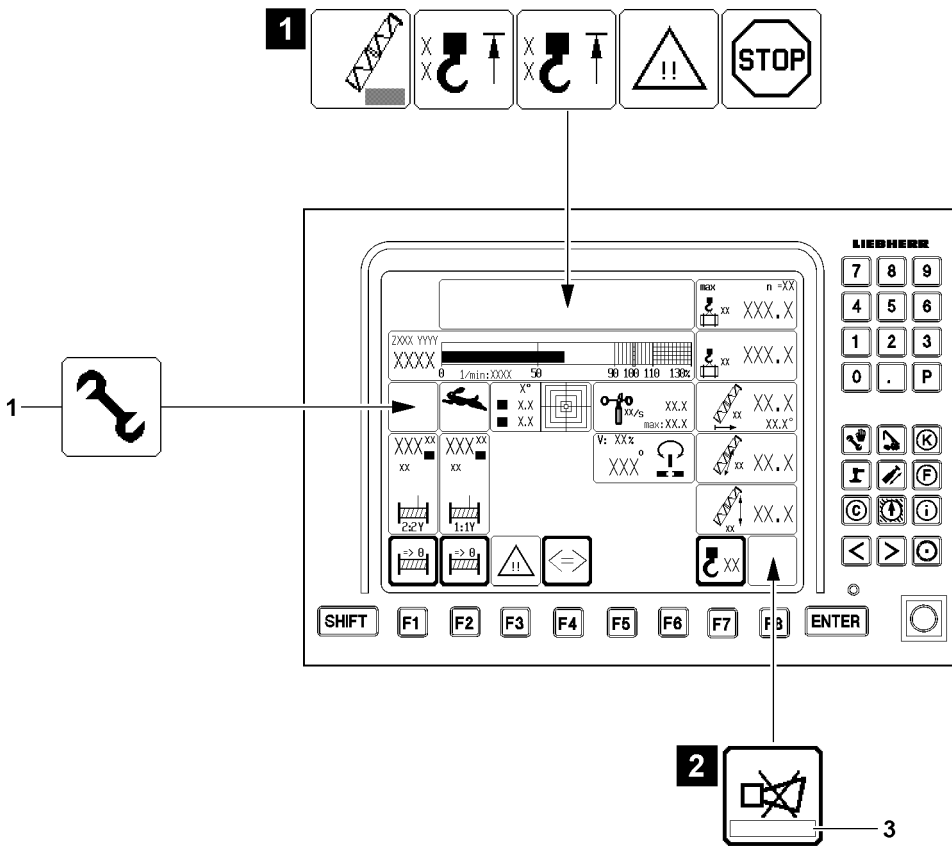


Fig.111924

7.2 Alarm functions

The limit ranges of the crane movements are monitored. When the limit ranges are reached, the crane operator is warned by the alarm functions.

The alarm functions are shown by the LICCON monitor:

- Optically with icons, see illustration 1.
- Acoustically by a warning sound „Horn“, see illustration 2.

In case of a failure of the relevant sensors / limit switches, special error messages are added.



WARNING

Activated assembly operation!

When the assembly operation is activated, various alarm functions and shut offs of crane movements are deactivated!

With activated assembly operation, the assembly icon 1 appears in the LICCON monitor!

- ▶ Crane operation with activated assembly operation is prohibited!
- ▶ With activated assembly operation, all crane movements must be carried out with foresight and extreme caution!

7.2.1 Boom limitation

See illustration 3

Limit signs main boom



Note

- ▶ The icon „Boom limitation“ 2 can change in different operating modes, but it is shown always at the same position in the LICCON monitor!
- ▶ The field 2.1 „on the bottom“ refers to the main boom!
- ▶ The field 2.2 „on the top“ refers to the equipment!

2.1 „Boom limitation Main boom“ icon

- The luffing range of the boom is limited both upwards and downwards.
- This icon appears if an end position determined by the load chart is reached when luffing the boom or when luffing the boom is disabled by a proximity switch.
- Exclamation marks show when an associated sensor is defective.


Position	Icon	Description
2.1.1	▲	The shut off „Luffing up the main boom“ is made by running against the upper load chart limit or Utilization larger than 95 % and falling load carrying capacity when luffing up the main boom. Note: Luffing down the main boom is still possible!
2.1.2	▼	The shut off „Luffing down the main boom“ is made by running against the lower load chart limit. Note: Luffing up the main boom is still possible!



WARNING

Alarm function deactivated!

- ▶ With activated assembly operation, there is no shut off of crane movement via position 2.1.1 and position 2.1.2!

Position	Icon	Description
2.1.3		The shut off „Luffing up the main boom“ is triggered by running against the block limit switch of the main boom relapse cylinders (RFP) on the left / right (boom steep) or due to an error in one block limit switch of the main boom relapse cylinders. Note: Luffing down the main boom is still possible!

**Note**



- ▶ At shut off of crane movement via position **2.1.3**, the „Luffing up main boom“ is shut off **unbypassably!**

Limit sign equipment**Note**

- ▶ The icon „Boom limitation“ **2** can change in different operating modes, but it is shown always at the same position in the LICCON monitor!
- ▶ The field **2.1** „on the bottom“ refers to the main boom!
- ▶ The field **2.2** „on the top“ refers to the equipment!

2.2 „Boom limitation equipment“ icon


- The luffing range of the equipment is limited both upwards and downwards.
- This icon appears if an end position determined by the load chart is reached when luffing the equipment or when luffing the equipment is disabled by a proximity switch.
- Exclamation marks show when an associated sensor is defective.


Position	Icon	Description
2.2.1		The shut off „Luffing up the equipment“ is triggered by running against the upper load chart limit. Note: Luffing down the equipment is still possible!
2.2.2		The shut off „Luffing down the equipment“ is made by running against the lower load chart limit. Note: Luffing up the equipment is still possible!

**WARNING**

Alarm function deactivated!

- ▶ With activated assembly operation, there is no shut off of crane movement via position **2.2.1** and position **2.2.2!**

Position	Icon	Description
2.2.3		The shut off „Luffing up the equipment“ is triggered by running against a block limit switch of the luffing jibs relapse cylinder (RFP) or the retaining flap or an error on one of these limit switches occurs. Note: Luffing down the equipment is still possible!

Position	Icon	Description
2.2.4		The shut off „Luffing down the equipment“ is triggered by running against a block limit switch („Equipment lower left / right“) or an error on one of these limit switches occurs. Note: Luffing up the equipment is still possible!

**Note**

- ▶ At shut off of crane movement via position **2.2.3**, the „Luffing up equipment“ is shut off **unbypassably!**
- ▶ At shut off of crane movement via position **2.2.4**, the „Luffing down equipment“ is shut off **unbypassably!**

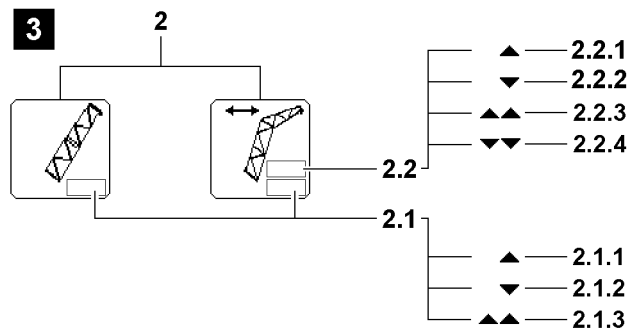
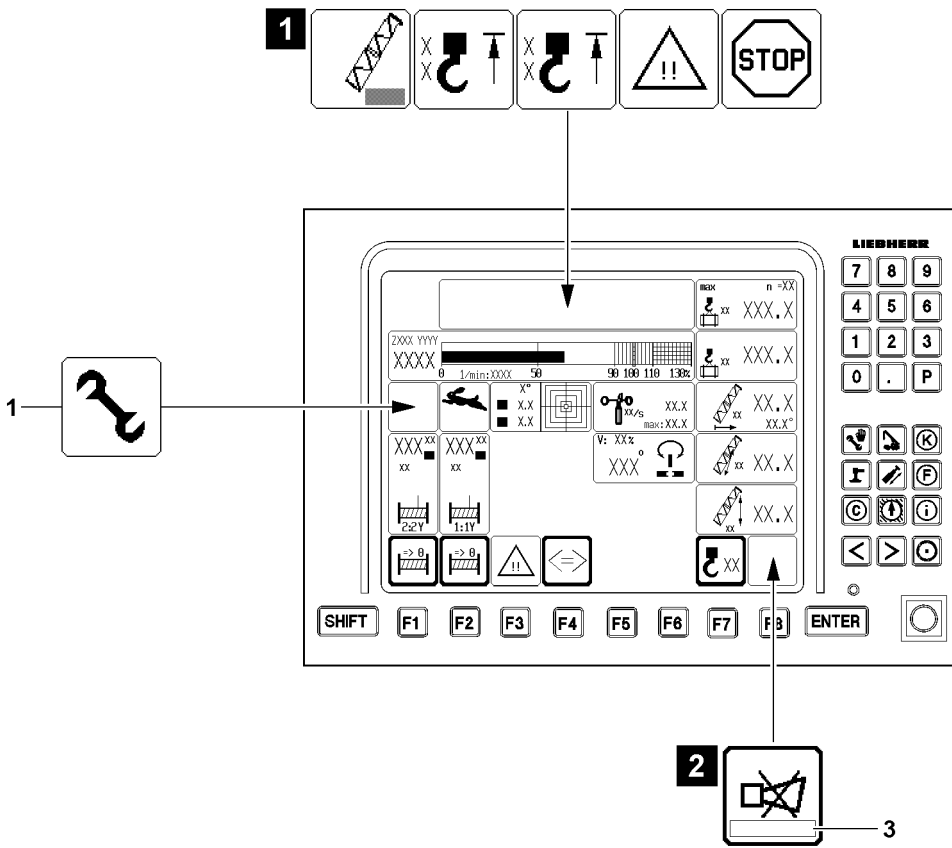


Fig.111924

7.2.2 Failure of sensor / limit switch

NOTICE

Failure of sensor / limit switch!

Depending on the classification of the sensor / limit switch, the crane can continue to be operated with limitation or is shut off by the control!

If an error message is issued in the horn icon 3, see illustration 2!

The error message shows defective sensors / limit switches, see Diagnostics manual!

Various shut offs of the control due to failure of sensor / limit switch can be bypassed in an emergency with the bypass key button or the assembly key switch!

- ▶ The error must be remedied immediately!
- ▶ Crane movements after a failure of a sensor / limit switch must be carried out anticipatorily and with extreme caution!

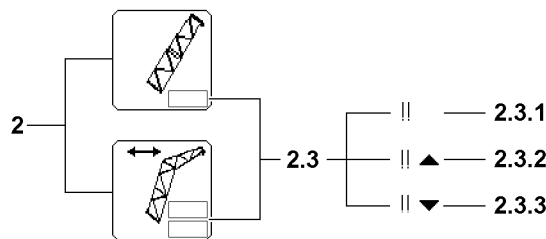


Fig.111928

Position	Icon	Description
2.3.1	!!	On the auxiliary boom / accessory, at least one associated sensor / limit switch is defective / missing. If an alarm function occurs at the same time, then the icon can be shown differently, see position 2.3.1, position 2.3.2 or position 2.3.3.
2.3.2	!!▲	
2.3.3	!!▼	Note: Not every failure of a sensor / limit switch on the boom is shown in the „Boom limitation“ icon 2.



Note

- ▶ Depending on the classification of the sensor / limit switch, the respective crane movement is shut off in case of a failure **unbypassable!**
- ▶ When deflecting the master switch, an operating error message is issued in the horn icon 3! The operating error message shows defective sensors / limit switches!
- ▶ If the error cannot be remedied by yourself, contact Liebherr service!

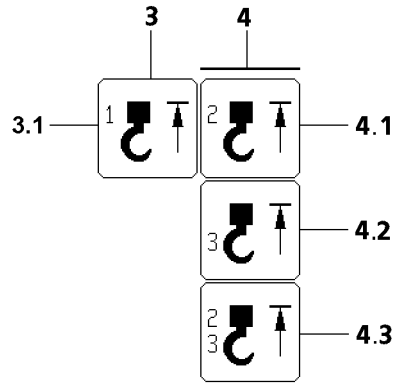


Fig.111925

LWE/LR 1750-000/12812-15-02/en

7.2.3 Hoist top limit switch HES1

3 „Hoist top on HES1“ icon

- In order to prevent the crane from being operated without hoist limit switches (HES), the minimum hoist limit switch configuration is continuously monitored. If a hoist limit switch required for a particular operating mode is not plugged in, therefore not active on the LSB bus system, an LMB STOP is triggered and an operating error report is also issued.

- **Note:**

HES1 must be present for all operating modes with main boom!

HES1A + HES1B turn the same functions off as the remaining hoist limit switches!

3.1 HES1(1A/1B)

- Location HES1A: Main boom head left
Bus address: 27
- Location HES1B: Main boom head right
Bus address: 28
- The „**HES1**“ icon appears if:
 - The hook block moves against the HES1A on the left hand side of the main boom head.
 - HES1A is not active, although it must be present on the bus.
 - HES1A has an internal error.
 - The hook block moves against the HES1B on the right hand side of the main boom head.
 - HES1B is not active, although it must be present on the bus.
 - HES1B has an internal error.
- **Note:**
The crane movements spool the hoist winches up, luff the boom down as well as luff the derrick boom down are turned off!

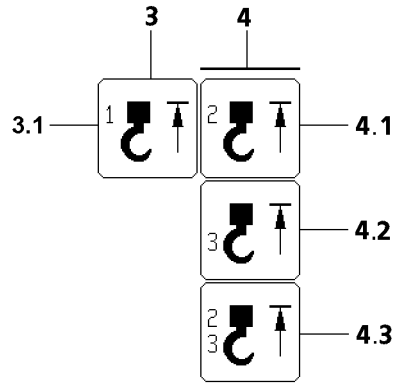


Fig.111925

7.2.4 Hoist top limit switch HES2 and HES3

4 „Hoist top on HES2/HES3“ icon

- In order to prevent the crane from being operated without hoist limit switches (HES), the minimum hoist limit switch configuration is continuously monitored. If a hoist limit switch required for a particular operating mode is not plugged in, therefore not active on the LSB bus system, an LMB STOP is triggered and an operating error report is also issued.

4.1 „Hoist top on HES2 (2A/2B)“* icon

- Installation location HES2A: Auxiliary boom / accessory, left*
Bus address: 27
- Installation location HES2B: Auxiliary boom / accessory, right*
Bus address: 28
- The „**HES2**“ icon appears if:
 - The hook block moves against the HES2A on the auxiliary boom / accessory.
 - HES2A is not active, although it must be present on the bus.
 - HES2A has an internal error.
 - The hook block moves against the HES2B on the auxiliary boom / accessory.
 - HES2B is not active, although it must be present on the bus.
 - HES2B has an internal error.
- **Note:**
The crane movements spool the hoist winches up, luff the boom down as well as luff the derrick boom down are turned off!



Note

- ▶ HES2 must be present for all operating modes with auxiliary boom / accessory!
- ▶ If HES2 is missing despite having to be present, an „LMB STOP“ is triggered! In addition, an error message is issued!

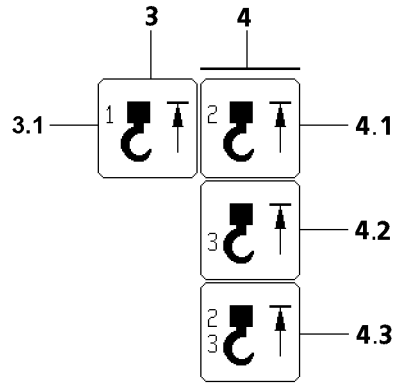


Fig.111925

4.2 „Hoist top on HES3“ icon

Installation location(s):

- Main boom boom nose 1, bus address: 24*
- Main boom boom nose 2, bus address: 25*
- Auxiliary boom / accessory boom nose 1, bus address: 24*
- Auxiliary boom / accessory boom nose 2, bus address: 25*
- The „**HES3**“ icon appears if:
 - The hook block runs against the HES3 at the boom nose.
 - HES3 is not active, although it must be present on the bus.
 - HES3 has an internal error.

• **Note:**

The crane movements spool the hoist winches up, luff the boom down as well as luff the derrick boom down are turned off!

• **Note:**

HES3 must be present for all operating modes with „Boom nose“!

If this is not the case, an „LMB STOP“ is triggered and an error message is also issued!

4.3 HES2 and HES3

- The icon appears when icon HES2 and HES3 appear simultaneously.

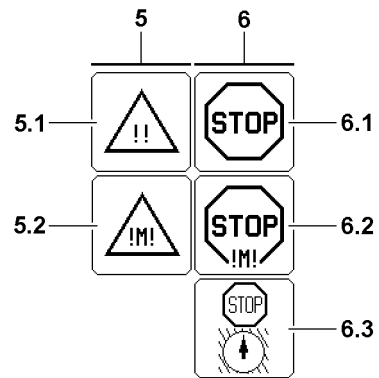


Fig.111901

7.2.5 Advance warning load / motor

5 „Advance warning“ icon

5.1 Load charts advance warning

- The current load chart utilization is calculated from the „Current load“ and the „Maximum load according to the load chart and the reeving“.
- The „Advance warning“ icon appears if:
 - The current load chart utilization of the crane, according to the „Load chart and reeving“ exceeds the programmed limit (**90 percent**) for the advance warning.
 - or**
 - The current utilization of the boom nose* exceeds the programmed limit (**90 %**) for the advance warning.

5.2 Engine monitoring

- If a warning event occurs in the engine monitoring system, the „Engine monitoring advance warning“ icon is displayed on the LICCON monitor.

7.2.6 STOP load / engine / working range limitation

6 „STOP“ icon

6.1 Load carrying capacity exceeded

- The „STOP“ icon appears when the load chart utilization exceeds the **100 % mark** (LMB STOP).
- **Note:**
All crane movements are shut off!

or

6.1 Sensor error

- The „STOP“ icon appears when a sensor which is required to monitor the load chart has an error (LMB STOP).
- **Note:**
All crane movements are shut off!

or

6.1 No load chart

- The „STOP“ icon appears if no load chart is available (LMB STOP).
- **Note:**
All crane movements are shut off!

6.2 Engine monitoring

- If a STOP event occurs in the engine monitoring system, the system automatically switches over (from the crane operation program) to the engine monitoring program.

6.3 Working range limitation*

- If a programmed working range limit* is reached, then this condition is indicated by the STOP icon working range limitation* **6.3** instead of the standard „STOP“ icon **6**.



Note

- ▶ If an LMB STOP occurs simultaneously, the STOP working range limitation* **6.3** icon continues to be displayed!
- ▶ The LMB STOP is identifiable if the utilization bar exceeds 100 % or if a maximum load carrying capacity of 0 t is permitted!

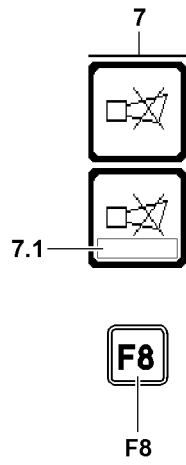


Fig.111270

7.2.7 Acoustic warning on monitor 0

Acoustic warnings on monitor 0 are indicated by the warning sound „Horn“.

The warning sound „Horn“ is divided into two categories:

- „Horn“ is a beeping sound of a duration of approximately 0.5 seconds, which is repeated in a second cycle.
- „Short horn“ is a beeping sound of a duration of approximately 0.1 seconds, which is repeated in a second cycle.

7 Horn icon

- When the horn icon is shown in the LICCON monitor, any acoustic signals which will occur can be shut off by the LICCON monitor **0** by pressing the function key **F8**.
- If an error message is shown in the horn icon **7** in field **7.1**, then the present error can be determined through it in the diagnostics manual. Pressing the function key **F8** twice, automatically changes to the error determination screen of the test system. The error is displayed there in documentary form.

Acoustic signal „Horn“

1. Sounds in addition to the optical display of an error message in field **7.1** in case of operational errors are found, which lead to a shut off of a crane movement.

Operational errors are:

- Overload
- Boom outside the angle range of the load chart
- Boom outside radius range of the load chart

2. In case of application errors with error number (LICCON Error Code LEC). For example sensor errors, which occur due to insufficient sensor signals or a defective sensor.

The following sensors are monitored:

- Hoist limit switch
- Length sensors
- Angle sensor
- Pressure sensors
- Pull test brackets (force test boxes)
- Wind sensor
- Battery voltage
- Inductive sensor

Acoustic signal „Short horn“

Sounds in addition to the visual display of error messages without an error number and which do not lead directly to crane movement shut off by the LICCON overload protection.

Monitored error messages are:

- Maximum permissible wind speed exceeded (only for activated wind sensor*)
- Maximum or minimum support force exceeded (only with active support force monitoring*)
- Crane utilization value for „Advance warning“ (90 %) reached

Priority acoustic signal

- The „Horn“ alarm has higher priority than the „Short horn“ alarm, i.e. „Horn“ takes preference over „Short horn“.
- The „Horn“, as well as the „Short horn“ immediately become active again if an error recurs!

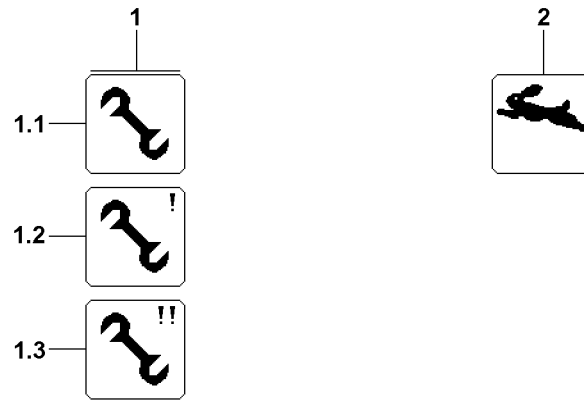


Fig.111926

LWE/LR 1750-000/12812-15-02/en

7.3 Special functions

7.3.1 Exceeding the shut off limits of the LICCON overload protection



Note

- ▶ The various assembly icons 1 are shown on the same position in the LICCON monitor, depending on the operating mode.

1.1 „Assembly“ icon

- The icon blinks if, the crane control has been switched to the „Assembly“ position with the assembly key switch.
- **Note:**
The crane operation program is locked, meaning, no other program can be turned on via the program keys.

1.2 Emergency operation without assembly

- The icon blinks in emergency operation if the crane control has **not** been switched simultaneously to the „Assembly“ position with the assembly key switch.
- **Note:**
The crane operation program is not locked.

1.3 Emergency operation with assembly

- The icon blinks in emergency operation if the crane control has been switched simultaneously to the „Assembly“ position with the assembly key switch.

3 „Rapid gear“ 3 icon

- The icon appears if the rapid gear is enabled during a crane movement.
- This is possible for the following crane movements:
 - Lift / lower hoist gear 1
 - Lift / lower hoist gear 2
 - Lift / lower hoist gear 3
 - Luff the boom up
 - Telescope the boom



Note

- ▶ If the rapid gear is added, the respective speed reductions are ineffective!
- ▶ If a crane movement has reached its maximum speed due to the current utilization, then no speed increase is possible by adding the rapid gear!
- ▶ If the total power requirement of all actuated crane movements is larger than the available power, then those crane movements are reduced which require the most power!

NOTICE

Interference of crane movement by the rapid gear!

If another crane movement is added or taken back to one or more actuated crane movements then this has an influence on the speed of all crane movements!

This applies especially for added rapid gear!

- ▶ In situations in which an interference of the individual crane movements is troublesome, do not add the rapid gear or turn the rapid gear off!

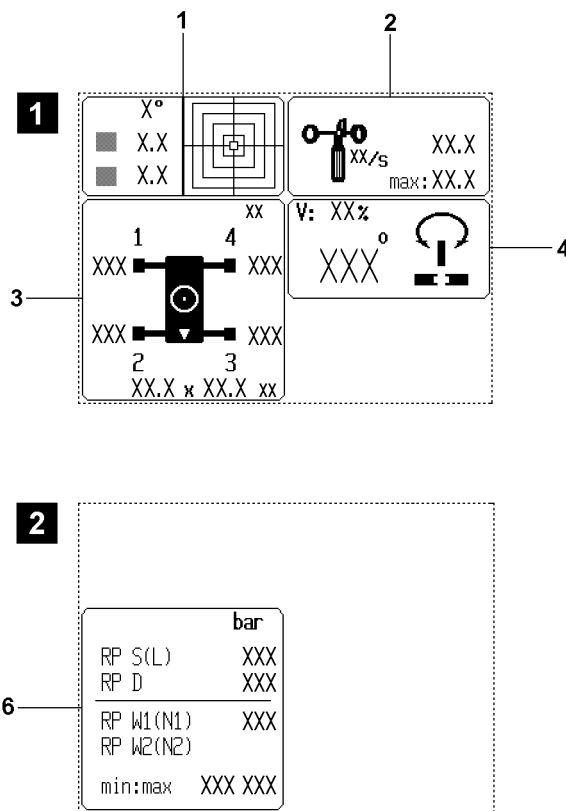
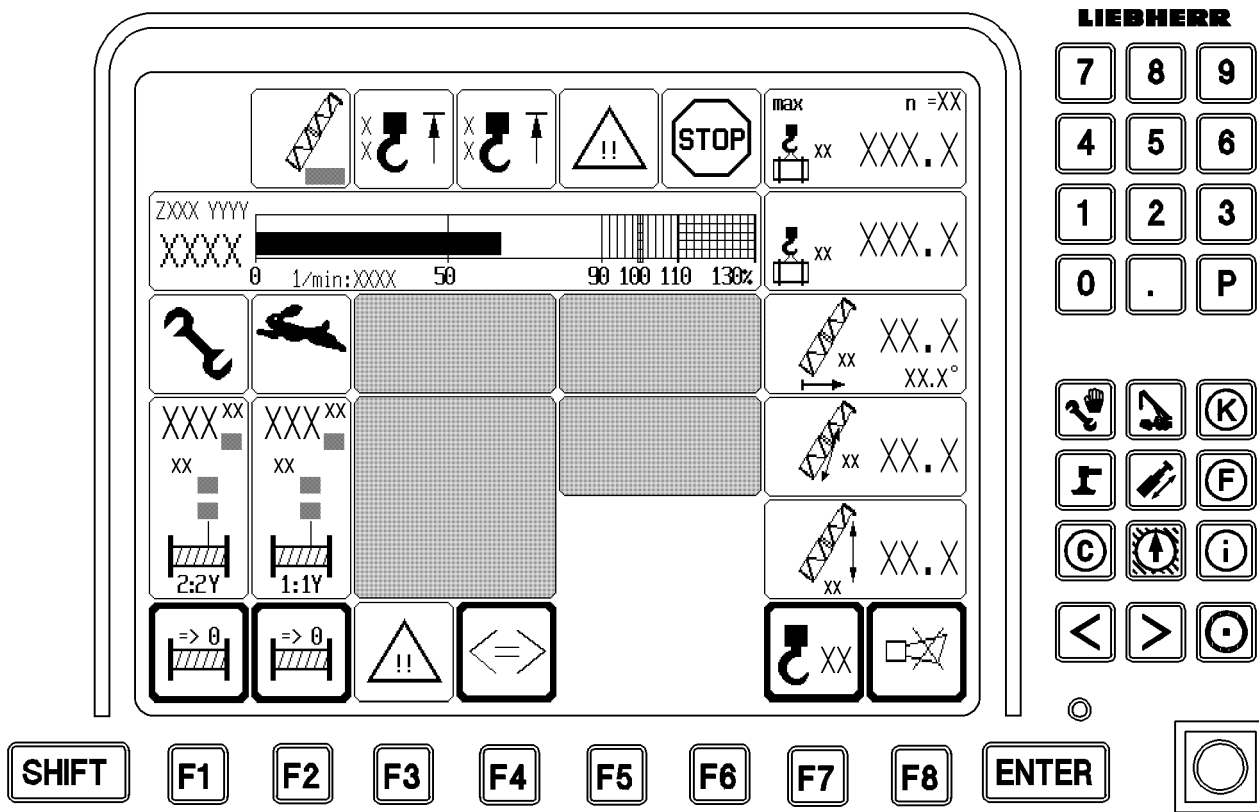


Fig.111895

LWE/LR 1750-000/12812-15-02/en

7.4 Monitored auxiliary functions for crane operation

There are several monitored auxiliary functions, which can be displayed when needed or automatically.

The monitoring of all auxiliary functions is always active, only the icons may be hidden. The icons of the monitored auxiliary functions have their fixed place on the LICCON monitor.



Note

- ▶ Using the function key **F3**, you can show the icons for the monitored auxiliary functions. Since not all icons of the auxiliary functions fit on one page (at maximum assignment), they are split over two pages. The icons on page 2 (if available) can be shown with the function key **F4**!

Page 1 (illustration 1):

- 1 Crane incline
- 2 Wind speed
- 4 Slewing range

Page 2 (illustration 2):

- 6 Relapse cylinder monitoring



Note

- ▶ Depending if the monitored auxiliary functions are turned off or on, the illustration of the monitored auxiliary functions differs!

Monitored auxiliary functions turned off:

- No error:
Icons are not shown.
- Only error in one function on page 1:
Icon is displayed on page 1.
- Only error in one function on page 2:
Icon is displayed on page 2.
- Error in one function on page 1 and 2:
Icon is displayed on page 1 and icon over **F4** blinks (= indicates an error in a function on page 2).

Monitored auxiliary functions turned on:

- No error:
Optional icons (customer request) are displayed.
If there are also optional icons on page 2, the icon „Change page“ of the **F4** key is activated (= indication for switching option).
- Error in one function on page 2:
Icon „Change page“ blinks (= indication regarding an error of a function on the other page).
- Error in one function on page 1 and 2:
Icon is displayed on page 1.
Icon „Change page“ blinks (= indication regarding an error of a function on the other page).

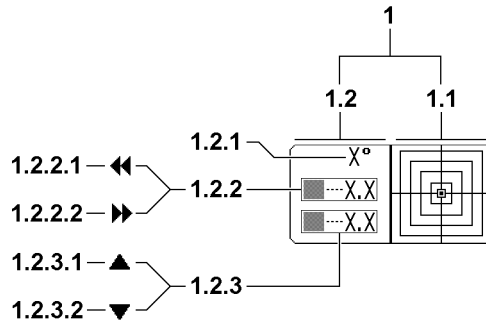


Fig.111929

LWE/LR 1750-000/12812-15-02/en

7.4.1 General



Note

„?“ instead of display value!

- ▶ The value cannot be determined due to an error!
- ▶ If an error occurs and an error message is issued, see Diagnostics manual!
- ▶ Always pay attention to error messages!
- ▶ Remedy the error always as quick as possible!

7.4.2 Crane incline

1 „Incline“ icon

- Display of the incline of the crane to the horizontal in longitudinal and lateral direction. The display is graphic as well as numeric.
- The direction data refers to the driving direction of the crane chassis.

1.1 Graphic part

- The graphic display is in the form of a spirit level, with a moving dot (small square) representing the air bubble. The center of the dot shows the precise incline value.

1.2 Numeric part

1.2.1 Incline range

- Value either 1° or 5°

This value describes the resolution of the graphic illustration and can only assume the two values „1“ or „5“. If the incline is less than 1° in lateral direction **and** in longitudinal direction, the level moves within the 1° range. If at least one value exceeds the 1° limit, it switches to the 5° range.

The range change is automatic.

1.2.2 Crane incline

- In [°] in lateral direction
- **1.2.2.1** Double arrow left
 - The crane is inclined to the left
- **1.2.2.2** Double arrow right
 - The crane is inclined to the right

1.2.3 Crane incline

- In [°] in longitudinal direction
- **1.2.3.1** Arrow pointing up
 - The crane is inclined to the rear
- **1.2.3.2** Arrow pointing down
 - The crane is inclined to the front

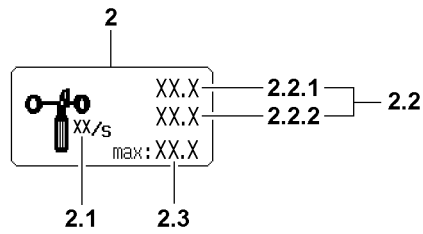


Fig.111265

7.4.3 Wind speed

- 2 „Wind speed“ icon
 - The wind speeds are displayed in [m/sec.] or [ft/sec.] depending on the units of measurement shown in the load chart.
- 2.1 „Wind speed“ unit
 - [m/s] or [ft/s]
- 2.2 Current wind speed



Note

- ▶ Depending on the set up configuration of the crane, a certain number of wind sensors must be present on the LSB bus!
- ▶ If a wind sensor does not have to be present, then no display value appears in the „Wind speed“ icon 2!
- ▶ If no value can be determined for a wind sensor which must be present, then current wind speed 2.2 „???“ appears in the display!

2.2.1 Current wind speed

- Wind sensor 2
- Wind sensor 3
- **Note:**

The priority of wind sensor 2 is larger than that of wind sensor 3, this means: If both wind sensors are present, then the value of wind sensor 2 is shown!

2.2.2 Current wind speed

- Wind sensor 1
- **Note:**

If several wind sensors are attached on the LSB bus, then the location of the wind sensor determines the corresponding display in the „Wind speed“ icon! The priority depends on the installation location of the wind sensor, from „outside“ (for example luffing jib) to „inside“ (for example boom head). The wind speed of the „Exterior“ wind sensor is displayed in 2.2.1 and the wind speed of the „Interior“ wind sensor is displayed in 2.2.2.



WARNING

Crane operation without display value of wind speed!

If the current wind speed 2.2 „???“ appears in the display, then a wind sensor which must be present is missing or there is an error in the wind sensor!

- ▶ Pay attention to the error message and remedy the error immediately!

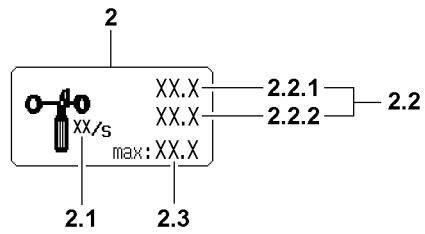


Fig.111265

2.3 Maximum permissible wind speed

- With icon text „Max:“
- The value depends on the operating mode and the set up configuration
- **Note:**
If access to a load chart is not possible, then the maximum value starts to blink and the acoustic alarm „Short horn“ sounds!
If the current wind speed value exceeds the displayed maximum value, the maximum value starts to blink and the acoustic alarm „Short horn“ sounds!



WARNING

Wind speed too high!

If the maximum permissible wind speed is exceeded with erected boom system, there is a danger of accidents!

Dangerous situations can arise, such as oscillating load or shaking crane!

The crane can topple over, personnel can be severely injured or killed!

▶ **The crane movements will not be shut off!**

▶ The danger notes, see Crane operating instructions, chapter 2.04 must be strictly observed and adhered to!

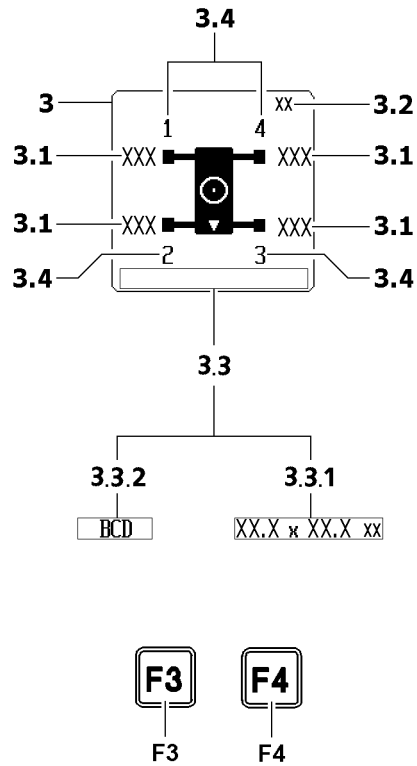


Fig.111896

7.4.4 Support force display



DANGER

The crane can topple over!

When reaching the programmed minimum / maximum supporting forces, no automatic shut off of the crane movements occurs!

The displayed support force values depend on the fluctuating influences of operator and environment!

The resulting expanded tolerance field of the determined values may not be utilized by the support force display to determine the tipping limit of the crane!

- ▶ The displayed support force values of the support force display may not be used to utilize the crane up to the tipping limit!
- ▶ Make sure that all support force values are within the minimum / maximum support forces!



Note

- ▶ The support force display icon **3** appears only when the crane is supported. For crane operation on crawler, the support force display icon **3** does not appear.

3 Support force display icon*

- The LICCON support force monitoring system continuously records the current hydraulic pressure present in all 4 support cylinders during crane operation using a pressure sensor, and converts this into a support force [t] value for each support.
- If needed, the support force display icon* **3** can be shown in the crane operation program with the function key **F3** or function key **F4**.
- If a critical support force value occurs, then the support force display icon* **3** appears automatically with the alarm signal „Short horn“.
- The respective critical support force value is shown blinking when:
 - A support has reached or exceeds the maximum force
 - A support has reached or exceeds the minimum force
 - The sum of the two lowest support force values is less than 15 % of the total support forces

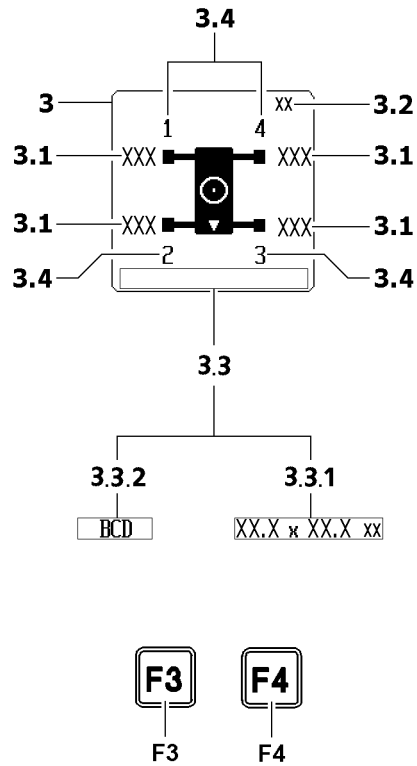


Fig.111896

3.1 Display of current support force

- Display of support force for each support



Note

- ▶ The same maximum support force and a common minimum support force is programmed for each support at the factory!
- ▶ In the support program, these 5 values can be changed depending on the situation, see section „The support program“!



WARNING

Tolerances and erroneous operation of the support force monitoring!

Due to the friction forces in different directions and non-measurable lateral forces in the support cylinders, a test falsification up to $\pm 2\%$ in relation to the maximum load capacity of the crane is possible! If the support cylinders are moved on „block bottom“ or „block top“, then the display of the support forces is erroneous!

- ▶ Make sure that there is no block position on the support cylinders!
- ▶ Take the tolerances in the display value into account!

3.2 Weight unit of support force

- In [t] or [lbs]

3.3 Display of support base

3.3.1 Support base LG

- Only LG 1750
- Support bases are shown in their dimensions, for example 12.0 m x 12.0 m

3.3.2 Support base LR

- Only LR 1750
- The various support bases are shown by letters or letter combinations, for example: B, C, D.
- **Note:**
The respective letters and letter combinations arise from the assembly conditions!

3.4 Numbering support cylinder

- Support cylinder 1 to 4

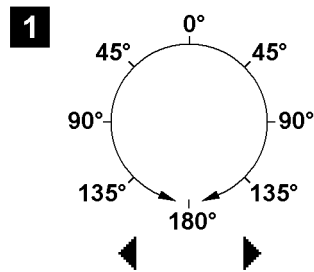
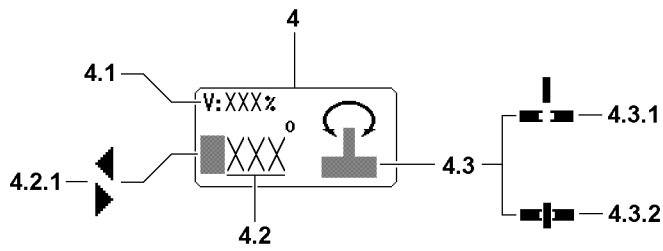


Fig.111266

7.4.5 Slewing range



DANGER

Danger of accidents in case of excessive slewing speed!

► Make the selection of the slewing speed according to the specifications in the load chart manual!

4 „Slewing range“ icon

4.1 Maximum slewing speed

- V: [%]
- Identifies the current (selected) „Maximum slewing speed“ of the slewing gear with a fully deflected master switch, relating to the maximum attainable slewing speed of the slewing gear.
This value may be preselected in fixed percentage stages in the LICCON program control parameter.

4.2 Current position of the crane superstructure*

- In relation to the main working direction (0 [°])
Increasing to the maximum value of 180°, see illustration 1

4.2.1 Direction of deviation

- The arrow in front of the value indicates the direction of the deviation.
 - Arrow to the right: Turn to the right
 - Arrow to the left: Turn to the left

4.3 Crane superstructure lock

- Status of lock between crane superstructure and crane chassis
- **Note:**
Only crane type **LG 1750!**

4.3.1 Locking pin on top

- Crane superstructure unpinned

4.3.2 Locking pin on the bottom

- Crane superstructure pinned

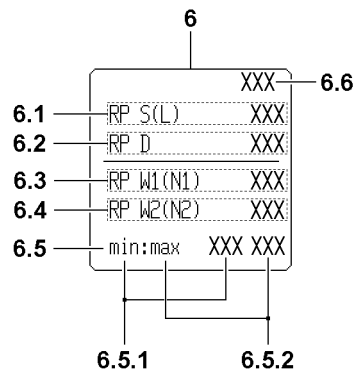


Fig.111897

7.4.6 Relapse cylinder monitoring

- 6** „Relapse cylinder monitor“ icon
- 6.1** Pressure display S(L)
 - In the S- or L-boom relapse cylinders
- 6.2** Pressure display D
 - In the derrick boom relapse cylinders
- 6.3** Pressure display W1(N1)
 - Pressure in the W1-relapse cylinder (= RPW1) at W-operation
 - or**
 - Pressure in the N1-relapse cylinder (= RPN1) at N-operation
- 6.4** Pressure display W2(N2)
 - Pressure in the W2-relapse cylinder (= RPW2), if available
 - or**
 - Pressure in the N2-relapse cylinder (= RPN2), if available
- 6.5** Pressure limits
 - Monitored relapse cylinders (RP) - pressure limits in the relapse cylinders (W/N)
Minimum / maximum pressure for RPW1 (RPN1) and RPW2 (RPN2)
- 6.5.1** Pressure display - minimum pressure for RP (W/N)
 - This monitored minimum pressure is calculated from the angle of the main boom and the auxiliary boom / assessor. If one of the angles is invalid and is shown in the display with „??“, then no monitoring of the minimum pressure can occur.
- 6.5.2** Pressure display - maximum pressure for RP (W/N)
 - If a pressure limit value is being exceeded, then this is shown by a blinking pressure actual value and an additional error message.
- 6.6** Measuring unit „Relapse cylinder monitor“

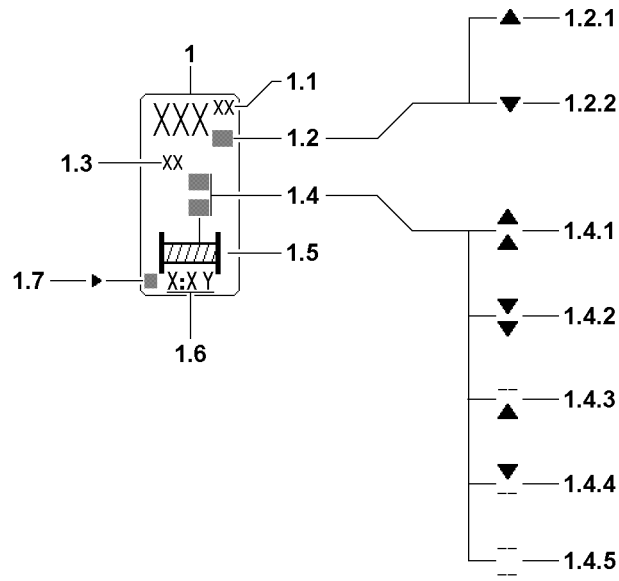


Fig.111898

LWE/LR 1750-000/12812-15-02/en

7.5 „Winch display“ icon

- 1 Winch icon
 - The winch 1 and winch 2 icons have the same meaning and are explained on one icon.
- 1.1 Travelled distance
 - In [m] or [ft]
From a zero point which must be determined
 - For single operation with the reeving setting made in the set up program: Completed hook path
 - For parallel operation with the set total reeving made in the set up program: Distance completed by hook block
 - The positions before the decimal point are displayed with a maximum of three large digits. The digits after the decimal point are displayed with small digits. Setting to zero point, see section „The function key line“.
 - A prerequisite for a correct display is that the reeving value entered equals the actual number of rope strands between the boom head and the hook block.



Note

Display area winch displays!

- ▶ The „Completed path“ display **1.1** has only three positions before the comma, any positions before that are cut off! The crane operator must evaluate for himself if, for example 200 m rope are spooled up on a winch or 1200 m. **The display in both cases with 200 m is identical!**
- ▶ The hook path calculation only works accurately if the load is suspended freely and is not luffed during the lifting procedure. Not taken into account are flexation and rope expansion.
- ▶ The length display (hook travel display) is only accurate and the layer sheer is only taken into account correctly if the winch has been calibrated and no interruptions of the CPU power supply have occurred (cold start). The hook travel display is calibrated by spooling the rope up or out until the calibration switch reacts.

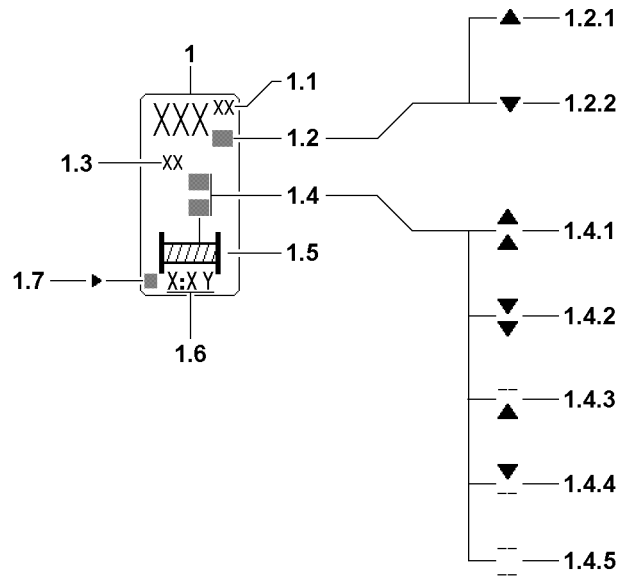


Fig.111898

LWE/LR 1750-000/12812-15-02/en

1.2 Direction of hook movement

The arrows on the length value show the direction of the hook movement in relation to the zero point:

- Arrow up **1.2.1**: Hook moves upward from the zero point
- Arrow down **1.2.2**: Hook moves downward from the zero point

1.3 Measuring unit hook path display

1.4 Winch status display

- There are five winch status icons (all blinking):

1.4.1 Spool out

1.4.2 Spool up

1.4.3 Spooled out

- Spooling out is blocked

1.4.4 Spooled up

- Spooling up is blocked

1.4.5 Winch is deactivated or unplugged

- Spooling up and spooling out are blocked (via Control parameter program)

- **Note:**

If no winch status icon appears, the activated winch is inactive and is neither spooled up nor out!

1.5 Winch icon

- (with rope end for winch status icon)

1.6 Winch number with master switch number and master switch operating direction

- Example: 1 : 1 Y
First digit: Winch number
Second digit: Master switch number
Letter: Master switch operating direction

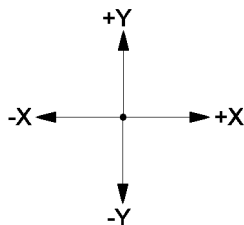


Fig.195422

1.7 Vibration sensor

- If the vibration sensor for a winch is added on the master switch, then an arrow appears in this winch icon for the added vibration sensor.

- **Note:**

The vibration sensor is added for the first actuated crane function!

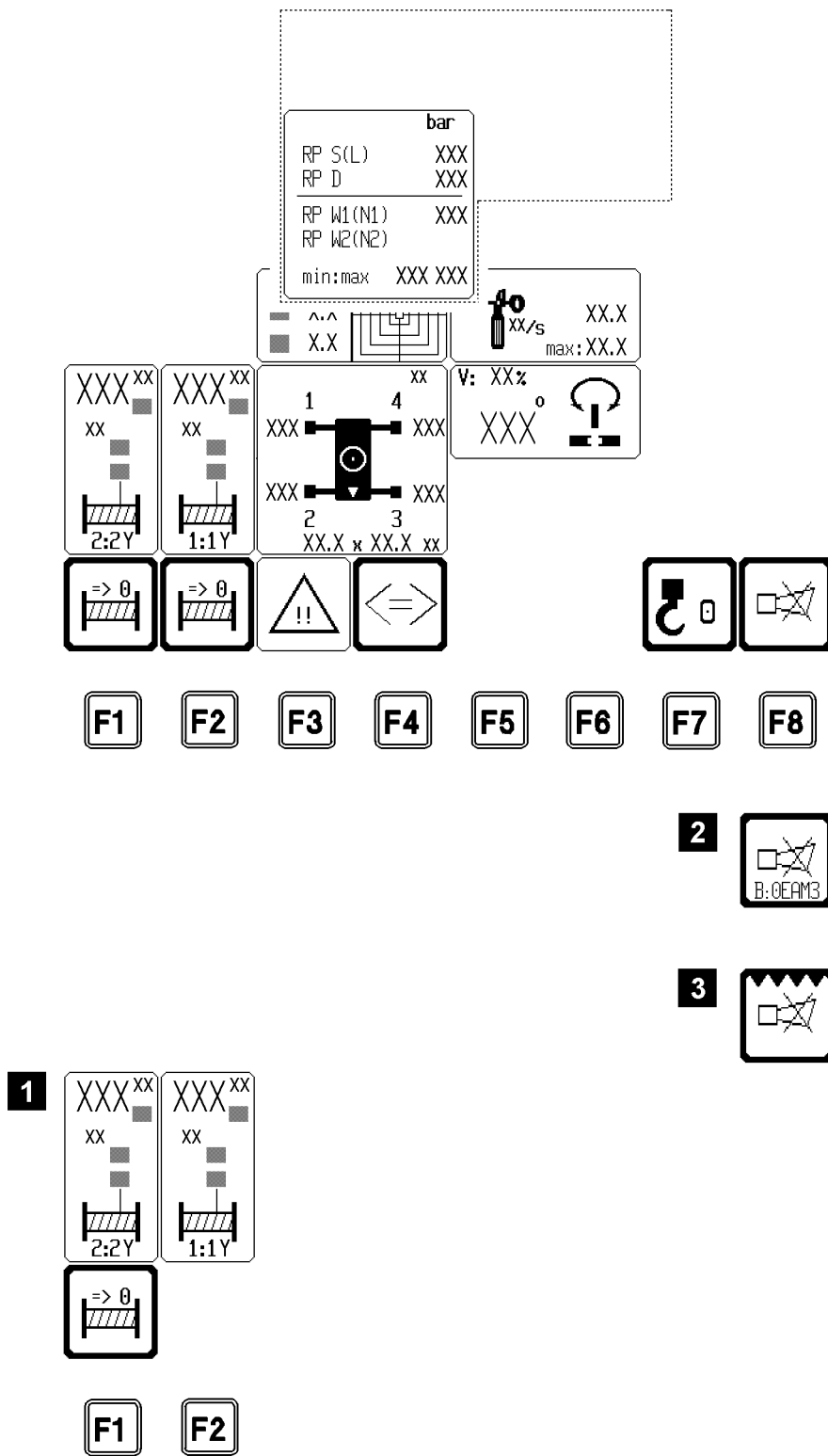


Fig.111899

7.6 The function key line in the crane operation program

The function key line consists of function keys **F1** to **F8** and the function key icon bar above it. The function keys correspond to the various function key icons above them.

The function key icons may trigger a function or they change their appearance upon the push of a key (function keys) and thereby their definition.

Not all function keys must have assigned icons. This depends on the „active“ program selection.

Pressing a function key changes the appearance of the icon above, its meaning, or its textual content.

F1 Function key

- Zero point for hook travel display, winch 2
- Pressing the function key **F1** causes the „Set winch display to zero“ icon to appear, i.e. the winch 2 hook travel display in the winch icon above is set to „000.00“ when the key is pressed. The path measurement begins here.

F2 Function key

- Zero point for hook travel display, winch 1
- Pressing the function key **F2** causes the „Set winch display to zero“ icon to appear, i.e. the winch 1 hook travel display in the winch icon above is set to „000.00“ when the key is pressed. The path measurement begins here.
- **Note:**
When winch 1 and winch 2 work in parallel operation, then the lengths displays of winch 1 and winch 2 can only be set together with the function key **F1** to „000.00“! Then the function key **F2** has no function, see illustration 1!

F3 Function key

- Turn monitoring icons on or off
- The function key **F3** can be used to turn all the monitored auxiliary functions in the crane on or off.
- The appearance of the icon changes according to the condition:
„Thick border“ = auxiliary function icons turned off
„Thin border“ = auxiliary function icons turned on
- **Note:**
The monitoring of all auxiliary functions is always active, even if the monitoring icons are hidden!
When a monitored limit is exceeded, then an acoustic warning (horn) sounds and the respective icon is shown!

F4 Function key

- Change monitoring page (if present)
See also section „Monitored auxiliary functions“

F5 Function key

- Not assigned

F6 Function key

- Not assigned

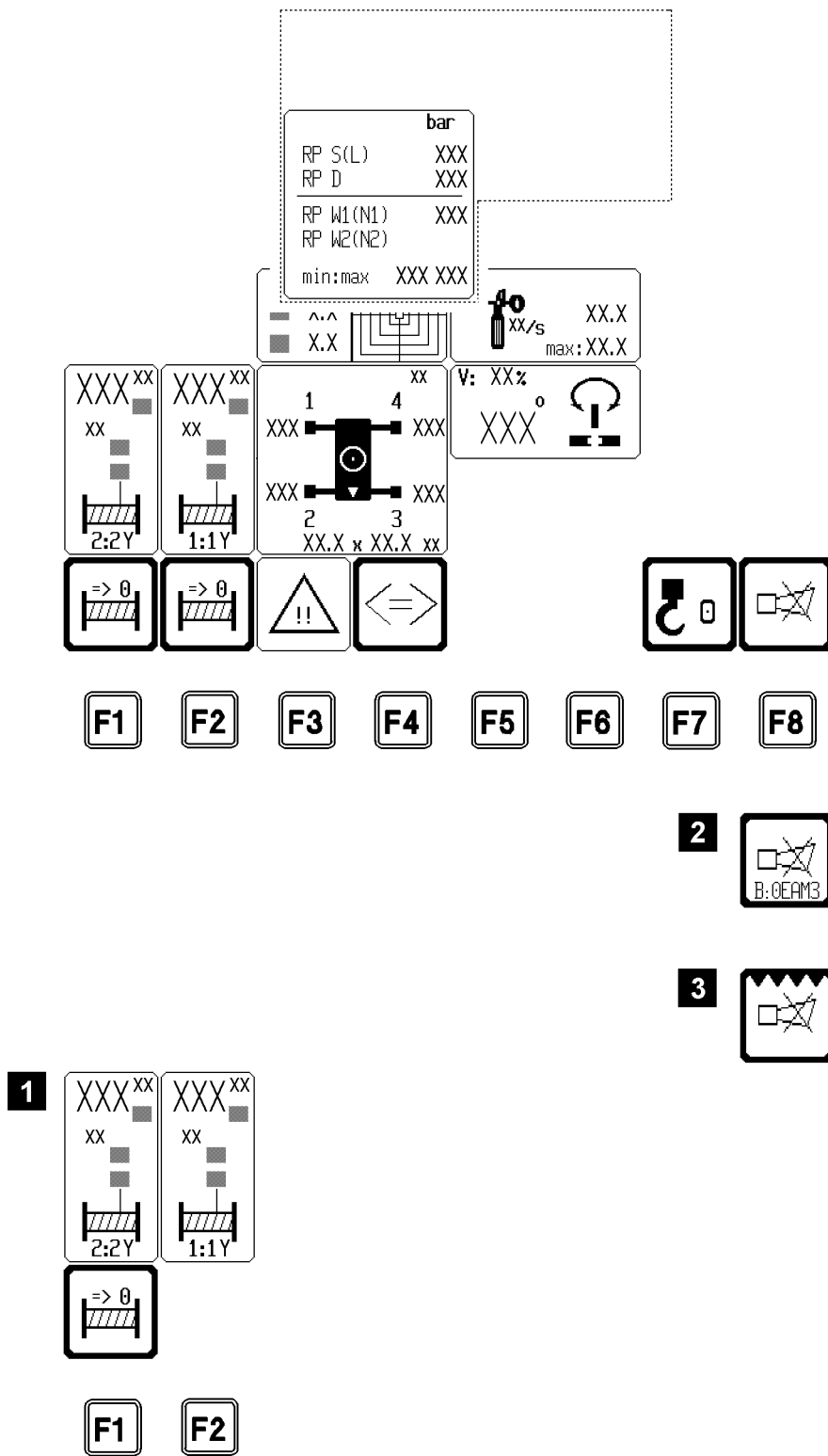


Fig.111899

F7 Function key

- Taring
- When the function key **F7** is pressed, the actual load display is set to „zero“. The word „Net“ appears in the icon of the actual load display at the same time. This function, for example, makes it possible to eliminate the weights of the hoist rope, load carriers, lifting and fastening equipment and only display the weight of the load that must be lifted (net load).
If the taring is cancelled, the word „Net“ disappears from the icon „Actual load display“ and the gross load value is displayed.
- Tare is cancelled by one of the following two actions:
 1. Pressing the function key **F7** again
 2. Luffing by more than $\pm 4^\circ$
- **Note:**
The function key **F7** acts the same way to the actual load display of the boom nose, if the boom nose is installed!

F8 Function key

- Turn the horn off / error diagnostics
- Turn off the acoustic warning
The „Horn“ and „Short horn“ acoustic warnings can be turned off by pressing the function key **F8**.
- **Note:**
A new error turns the acoustic warning on again!
- Error message in „Horn“ icon
If a system, application or operating error occurs, an error message appears in the „Horn“ icon, see illustration 2.
- By pressing the function key **F8** twice, the acoustic warning is turned off and the Test system program switches to the error determination screen where the error is documented. (see Diagnostics manual)

**WARNING**

Malfunctions in the crane control!

A special program is available for LIEBHERR crane acceptance in the LICCON computer system!

This program is blocked after conclusion of the crane acceptance!

If an additional marking is displayed in the „Horn“ icon (talons along the upper margin, see illustration 3), then the special program is activated!

- ▶ Contact LIEBHERR service immediately!
- ▶ In order to prevent error functions, access to the special program is only permitted for trained LIEBHERR personnel!

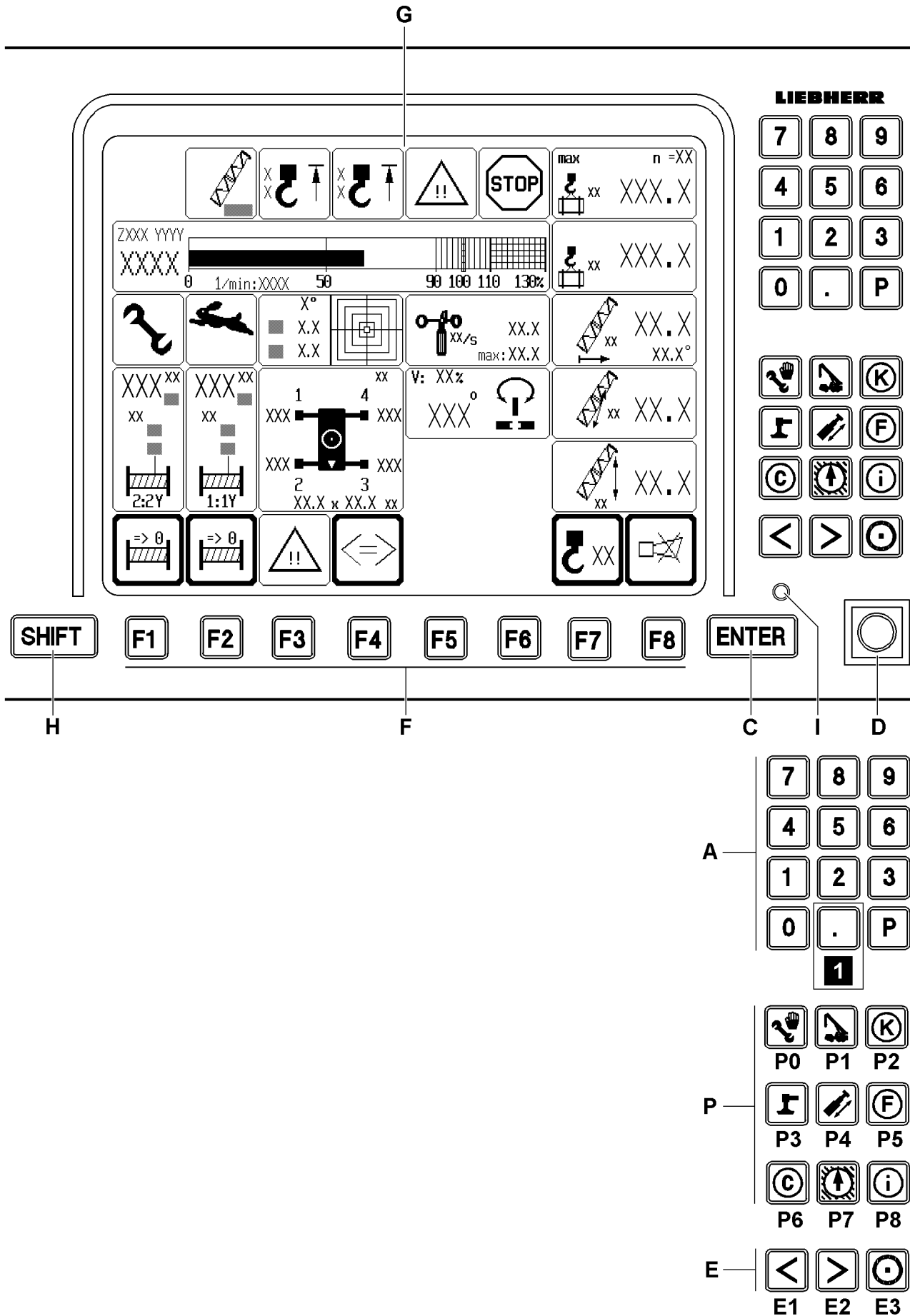


Fig.111900

LWE/LR 1750-000/12812-15-02/en

7.7 Other operating elements

The following functions are assigned to the other operating elements of the display and operating unit of the LICCON computer system in the crane operation program.

A Keypad

- Keys „0“ to „9“ and „P“ have no function in the crane operation program.

- Key „.“, illustration 1

With the key „.“ the so-called test screen function is turned on and off. All existing icons appear with a test value on the LICCON monitor.

- **Note:**

The monitored auxiliary functions must be opened in the desired page to appear in the test screen!

The test screen display can be held by pressing the SHIFT key **H** and the key „.“!

By pressing the key „.“ again, the normal crane operating screen appears again!

If the test screen is not held, then the normal crane operating screen appears after 10 seconds!

P Program keys

- The program keys are used to select individual programs. However, the appropriate program-specific features (for example, switching from set up to crane operation once with „O.K.“) must be noted.

- **Note:**

A program currently running **cannot** be called again using its program key!

If the assembly key switch is switched to position „Assembly“, the programs can **not** be called up with their program key!

C Input key ENTER

- No function in crane operation program

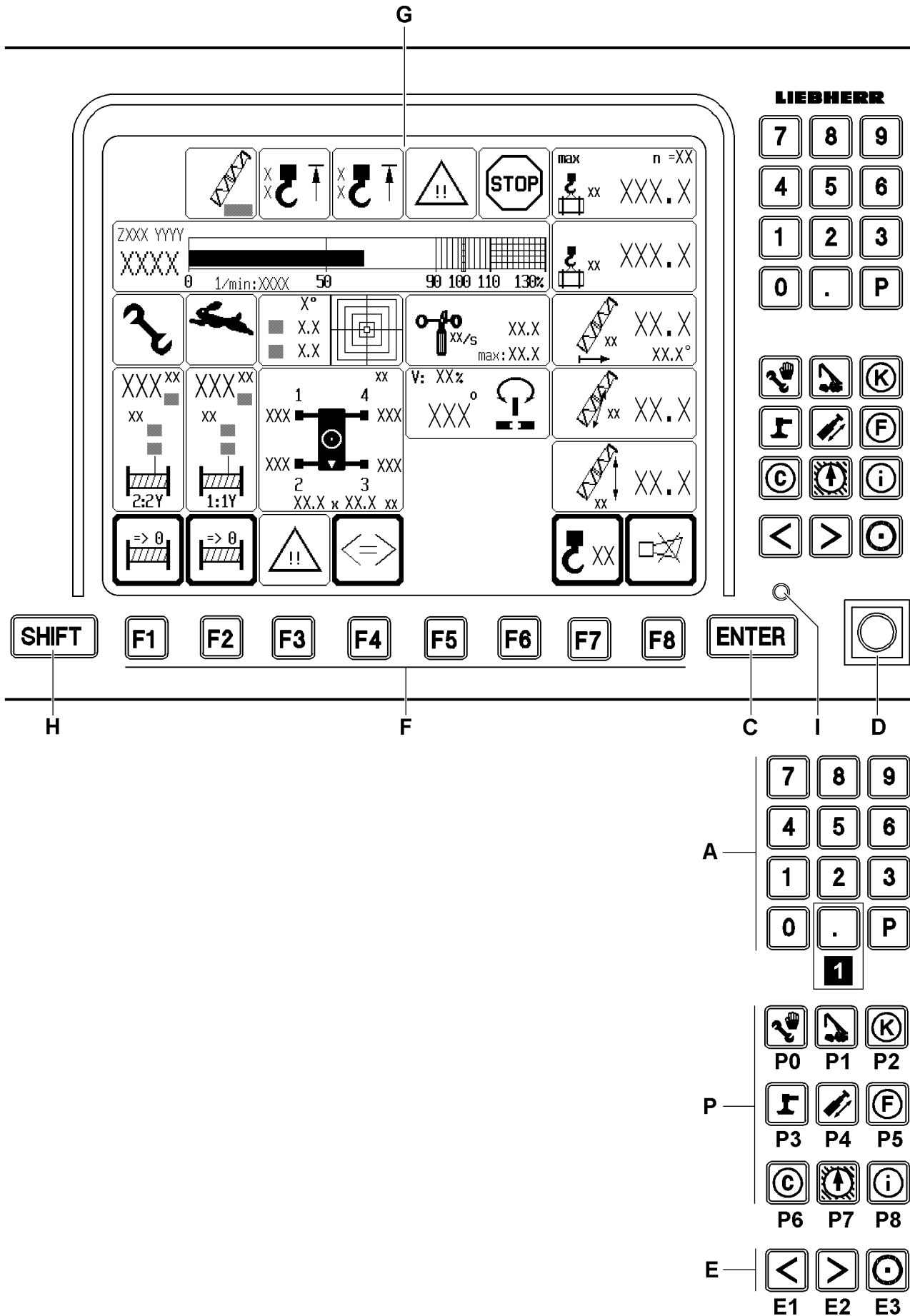


Fig.111900

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Risk of accident when bypassing the LICCON overload protection!

If the shut off limits of the LICCON overload protection are exceeded, there is **no** additional protection against crane overload!

In the event of improper operation or deliberate misuse, the crane can be severely overloaded and / or topple over!

Personnel can be severely injured or killed!

This could result in high property damage!

- ▶ The bypass key button **D** may only be used when it is ensured that no normal operating condition (utilization below 100 % and no active shut off) can be reached without exceeding the shut off limits of the LICCON overload protection!
- ▶ It is only permitted to exceed the shut off limits of the LICCON overload protection in emergencies!
- ▶ The bypass key button **D** may only be actuated by persons who are aware of the effects of their acts regarding the exceeding of the shut off limits of the LICCON overload protection!
- ▶ Exceeding the shut off limits of the LICCON overload protection requires the presence of an authorized person and must be performed with utmost caution!
- ▶ Crane operation with exceeded shut off limits of the LICCON overload protection is prohibited!
- ▶ When bypassing the LICCON overload protection, the hoist top shut off is automatically bypassed!

**WARNING**

Property damage and falling load!

When the hoist top shut off is bypassed there is the danger that the hook block or the load hook is pulled against the pulley head!

This danger exists especially when the hoist winch is continued to be spooled up and for crane movements which have an influence on the hoist rope, for example luffing the main boom, the auxiliary boom / accessory or the derrick boom!

Property damage and falling load can result!

Personnel can be severely injured or killed!

- ▶ The bypass of the hoist top shut off may only be carried out by an authorized person, along with a guide. The guide must be in direct contact with the crane operator and must continually monitor the distance between the hook block / load hook and the boom head!
- ▶ Carry out all crane movements with utmost caution!

D Bypass key button

- Operating position (self-retaining):
Normal operation
- Position to right (touching):
The hoist limit switch and load moment limiter shut-off are bypassed

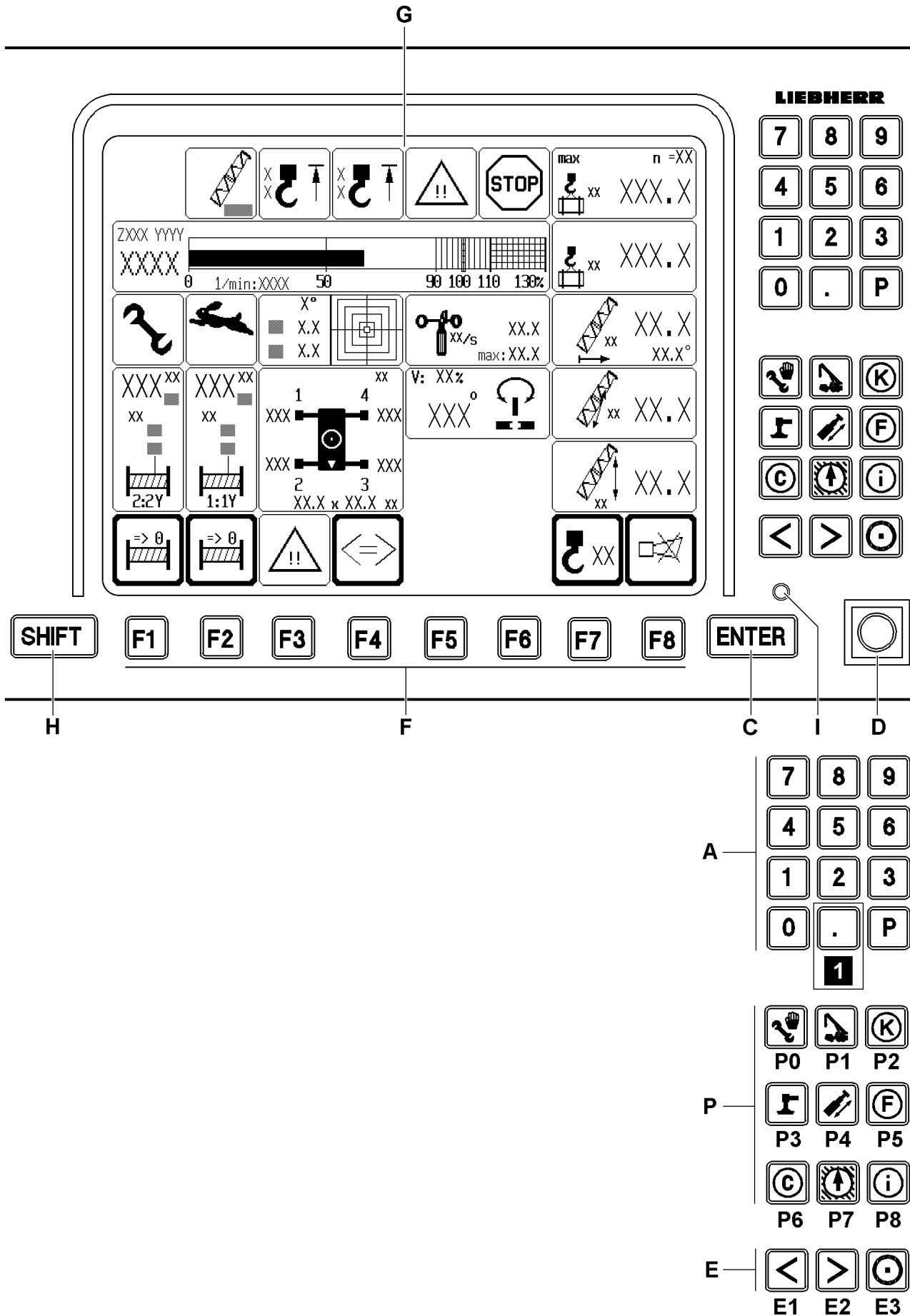


Fig.111900

- **Exceeding the shut off limits of the LICCON overload protection**

If the maximum permissible load momentum is exceeded or if a hoist limit switch is actuated, the LICCON overload protection turns the crane movements off. These shut offs can be exceeded by the bypass key button **D** in the „right touching“ position.

- **Bypass of the hoist top shut off**

If the hook block touches the hoist limit switch weight during the upward movement, the hoist limit switch reacts. The crane movement „Spool up winches“ is turned off. This turn off can be bypassed by the Bypass key button **D** in the „right touching“ position.

E Special function keys

- Monitor brightness adjustment
- Key combination **E3** and **E1**: Turn background illumination on / off
- Key combination **E3** and **E2**: Brightness adjustment in three stages



Note

- ▶ Additional functions of the special function keys **E** are program-dependent and are further explained in the description of the individual LICCON programs!
-

H SHIFT key

- Second level key assignments

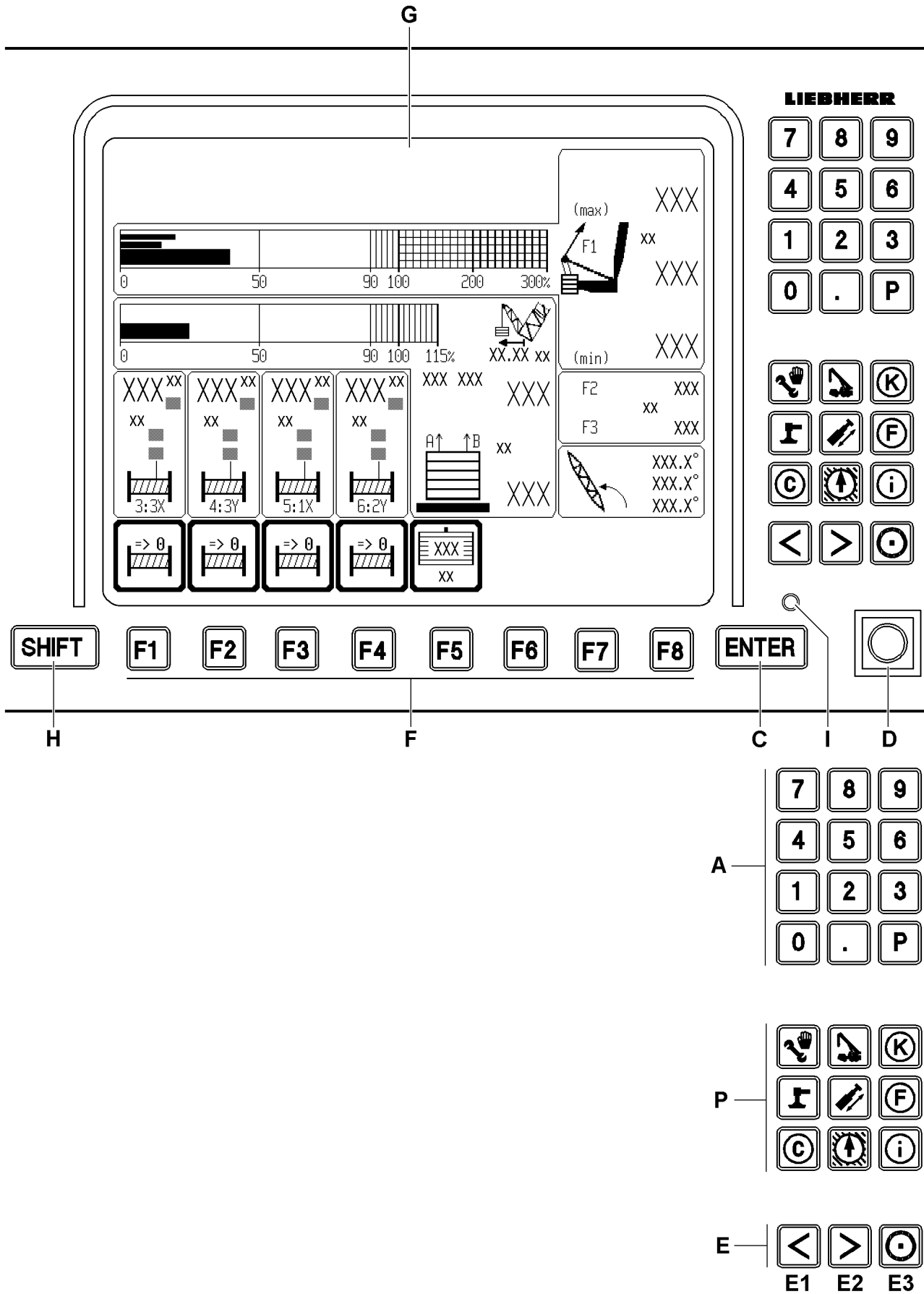


Fig.111902

LWE/LR 1750-000/12812-15-02/en

8 Operating elements of the LICCON computer system on monitor 1

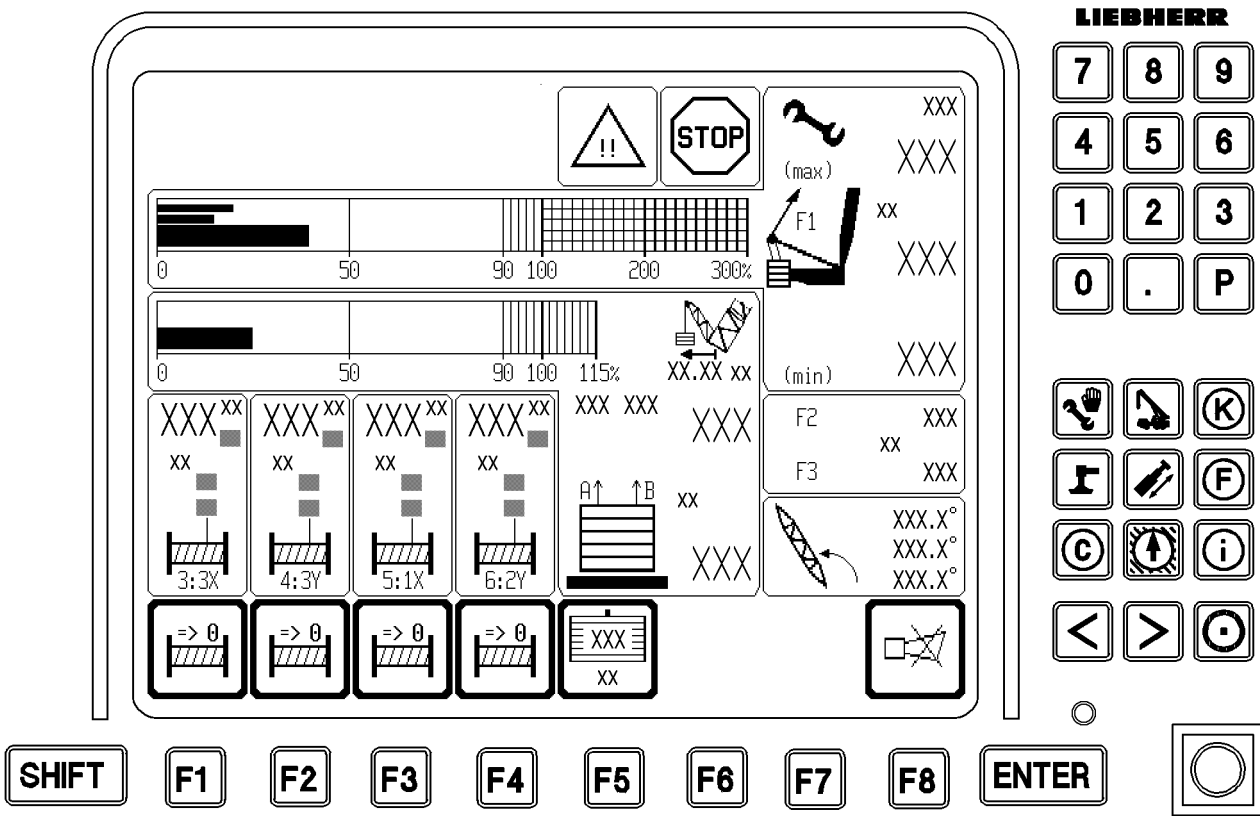
- A** Keypad
 - To edit the derrick ballast input values
- P** Program keys
 - No function
- C** Input key ENTER
 - Confirmation of changes
- D** Key button
 - Depending on the crane version:
No function
 - or:**
Acoustical signals which can be shut off of bell / horn turntable can be shut off
- E** Special function keys
 - Monitor brightness adjustment
 - Key combination **E3** and **E1**: Turn background illumination on / off
 - Key combination **E3** and **E2**: Brightness adjustment in three stages



Note

- ▶ Additional functions of the special function keys **E** are program-dependent and are further explained in the description of the individual LICCON programs!

- F** Function keys
 - The function keys should always be viewed in conjunction with the function key icon line displayed on the monitor.
- G** Display
 - In the display appears „normally“ the crane operating screen of monitor 1.
 - Note:**
For diagnostics purposes, the monitor of the ballast trailer control* can be assigned (only optional for LR1750)!
- H** SHIFT key
 - No function
- I** LED display
 - Monitor supply voltage present



LIEBHERR

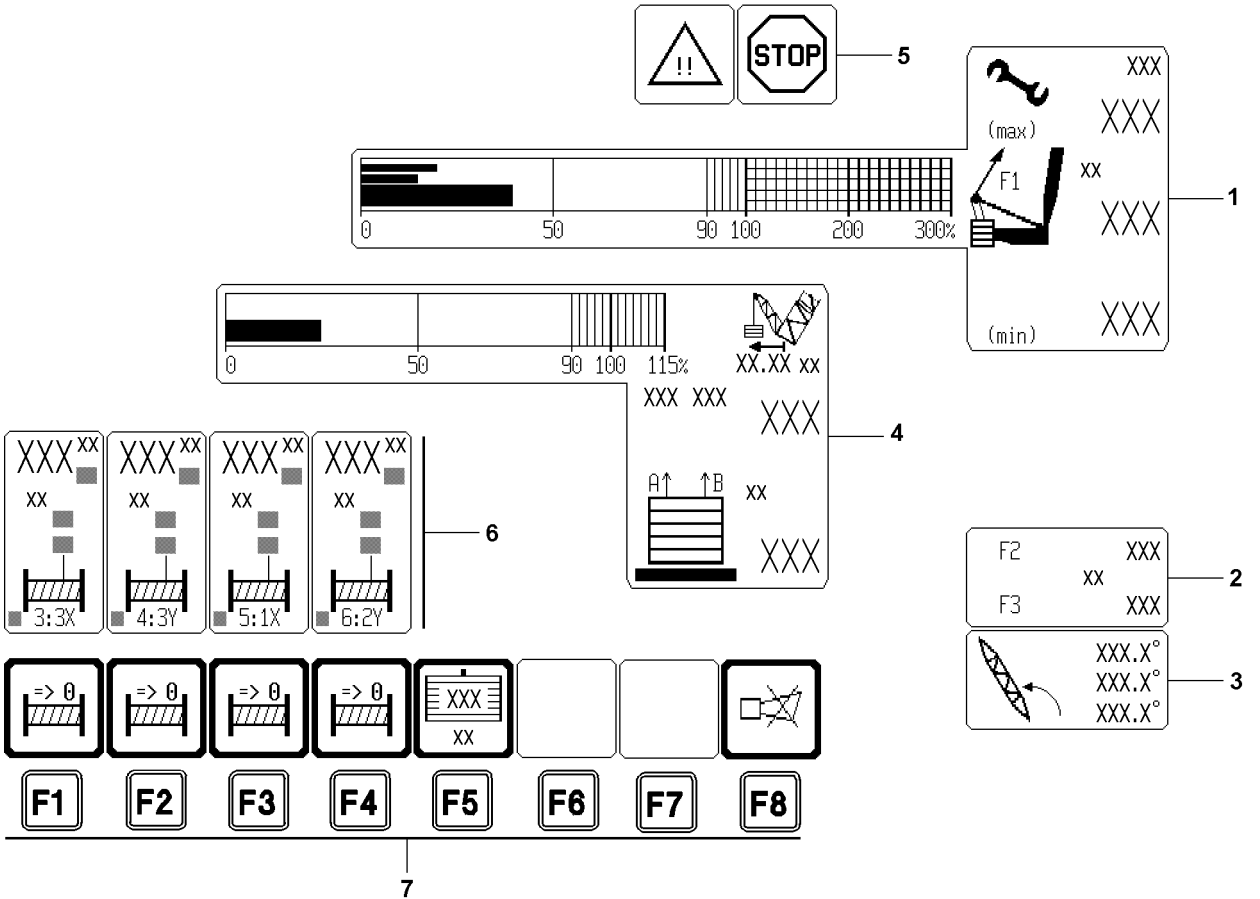
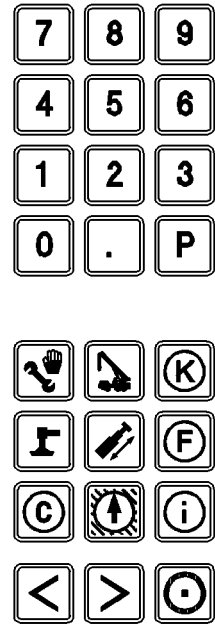


Fig.111911

LWE/LR 1750-000/12812-15-02/en

9 The crane operation program on monitor 1

The maximum or minimum load required to balance the crane can be increased or decreased on cranes with a derrick ballast* operating under load, by increasing or reducing the derrick ballast.



Note

- ▶ The suspended ballast and the ballast trailer* (only optional for LR1750) are generally described as **derrick ballast!**
- ▶ The fixed compensation weight which is assembled on the turntable is generally described as the **counterweight!**

In the crane operation program on monitor 1, the monitor is divided into eight areas:

- 1 Test point 1 = F1
 - Pull test brackets on test points 1A and 1B in the SA bracket guying
- 2 Test points 2/3 = F2/F3
 - Pull test brackets on test points 2A and 2B in the N/W guying
 - Pull test brackets on test points 3A and 3B in the S-guying in derrick operation
- 3 Derrick boom angle
- 4 Derrick ballast, weight and utilization
 - Derrick ballast, placed and pulled
 - Derrick ballast radius
 - Derrick ballast utilization
 - Forces in derrick ballast guyings A and B
- 5 Alarm functions
 - „Advance warning“ and „**STOP**“ icons
- 6 Winch displays
 - Winch 3*
 - Winch 4
 - Winch 5*
 - Winch 6*
- 7 Function key line
 - Function keys always refer to the icon shown directly above
 - **Note:**
If no icon is shown in the line directly above the function key, then no function is assigned in the program to the function key!
See for example function key F6 and function key F7!

9.1 Test point 1 = F1



DANGER

Danger of fatal injury in assembly operation!

If the crane is utilized in assembly operation past the assembly limit, then crane components can be overloaded!

The crane can topple over and personnel can be severely injured or killed!

- ▶ In assembly operation, the crane operator must make sure that the crane is not subjected to loads to the assembly limit!
- ▶ The crane may always only be erected / taken down **without load**, according to the data in the operating instructions and the erection and take down charts!

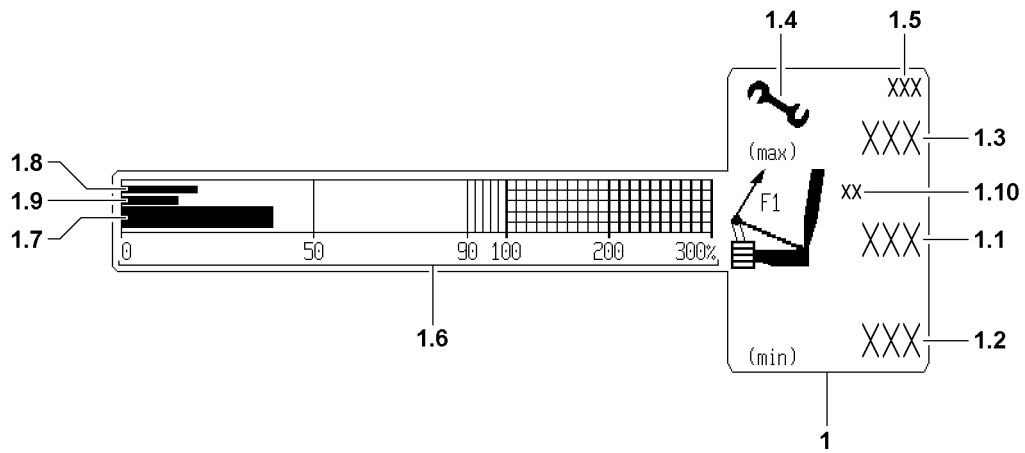


Fig.111912

9.1.1 F1-assembly maximum force

The F1-assembly-maximum force is abbreviated in the chapter as $F1_{\text{max-assembly}}$.



Note

- ▶ A load chart is available in the operating range of the crane! Outside of the operating range, no load chart is available, the specifications for assembly operation apply!
- ▶ $F1_{\text{max-assembly}}$ can be larger within the operating range for static reasons than $F1_{\text{max-assembly}}$ outside the operating range!
- ▶ When luffing out of the operating range with load chart, the value $F1_{\text{max-assembly}}$ can therefore be significantly reduced!



DANGER

Failure of angle sensor!

If angle sensor on the boom for the LMB are defective, then the LMB uses the higher $F1_{\text{max-assembly}}$ as the non-bypassable maximum value!

This ensures that the boom can always be taken down, even with a defective angle sensor!

If the crane is not taken down after a failure of the angle sensors exactly according to the data in the operating instructions and the erection / take down charts, then it can be overloaded!

The crane can topple over and personnel can be severely injured or killed!

- ▶ Take the crane down if needed exactly according to the data in the operating instructions and the erection / take down charts!

Operating modes without derrick boom

For operating modes without derrick boom, there is a unbyassable F1-limit value:

- $F1_{\text{max-assembly}}$
For erection / take down of the boom
and
as upper limit for crane operation with load chart

Operating modes with derrick boom

For operating modes with derrick boom there are two F1-limit values

- $F1_{\text{max-assembly}}$ outside the operating range
For erection and assembly of the crane (unbypassable)
- $F1_{\text{max-operation}}$
As upper limit for crane operation with load chart (and a few angle degrees next to it)

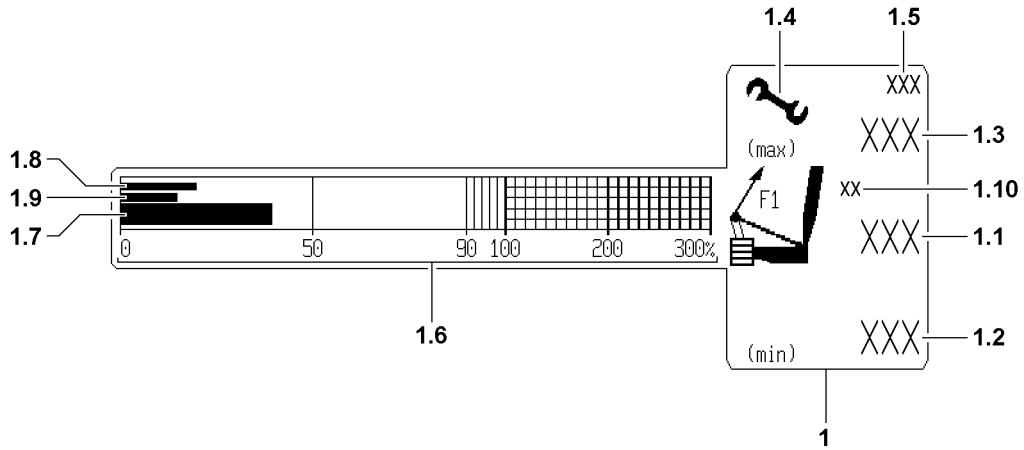


Fig.111912

LWE/LR 1750-000/12812-15-02/en

9.1.2 Test point 1 = F1 / icon description

Pull test brackets Test point 1A and 1B are in the SA-bracket guying

Position	Icons / display values	Type of display	Is shown
1	Icon „Test point 1“	Static	Always
1.1	F1-actual force = $F1_{\text{actual}}$ $F1_{\text{actual}} = F1A_{\text{actual}} + F1B_{\text{actual}}$ $F1A_{\text{actual}} = F1$ -actual force test point 1A (SA-bracket left) $F1B_{\text{actual}} = F1$ -actual force test point 1B (SA-bracket right)	Static „???“ blinking	For valid value For invalid value
1.2	F1-minimum force = $F1_{\text{min}}$	Static	Always when $F1_{\text{min}}$ is larger than 0 Note: A shut off occurs when falling below $F1_{\text{min}}$ If no value is shown $F1_{\text{min}} = 0!$
1.3	F1-operational maximum force = $F1_{\text{max-operation}}$	Static	Only in operating modes with derrick ballast (DB/DBW) Note: $F1_{\text{max-operation}}$ is the maximum value which may be reached in crane operation! In crane operation, the shut off occurs at $F1_{\text{actual}}$ larger than $F1_{\text{max-operation}} + F1_{\text{addition for shut off}}!$ For cranes with maximum load less than 1000 t applies: $F1_{\text{addition for shut off}} = 20 \text{ t}!$

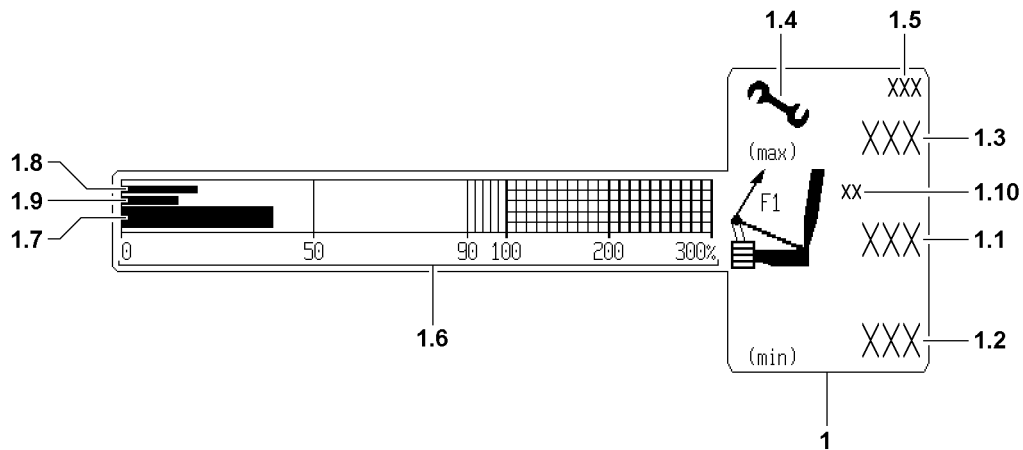


Fig.111912

LWE/LR 1750-000/12812-15-02/en

Position	Icons / display values	Type of display	Is shown
1.4	Assembly icon	Static / blinking	In „Assembly operation: Boom not in operating range“ and / or Advance warning / shut off: Observe F1 limit values!
1.5	F1-assembly maximum force = F1 _{max-assembly}	Static / blinking	In „Assembly operation: Boom not in operating range“ and / or Advance warning / shut off: Observe F1 limit values!
1.6	F1-utilization scale in percent [%]	Static	Always
1.7	F1-utilization bar = Relationship F1 _{min} to F1 _{max-operation} No display (0 percent) at: F1 _{max-operation} = 0 or No value or F1 _{min} = invalid	Dynamic	In operating modes with derrick ballast (DB/DBW)

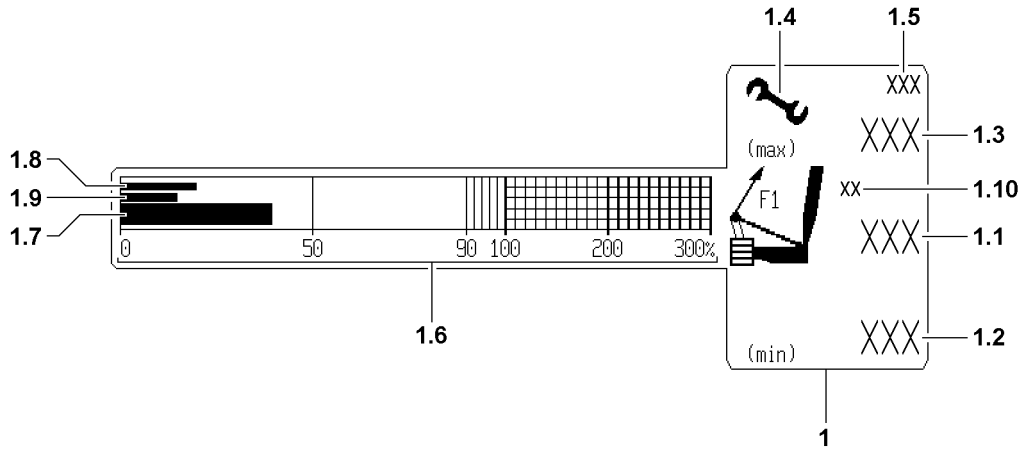


Fig.111912

Position	Icons / display values	Type of display	Is shown
1.8	<p>F1-min-warning bar =</p> <p>Relationship $F1_{\text{min-warning value}}$ to $F1_{\text{max-operation}}$</p> <p>($F1_{\text{min-warning value}} = F1_{\text{min}} + \Delta_{F1}$)</p> <p>No display (0 percent) at:</p> <p>$F1_{\text{max-operation}} = 0$</p> <p>or</p> <p>No value</p> <p>or</p> <p>$F1_{\text{max-operation}} = \text{invalid}$</p>	Dynamic	<p>In operating modes with derrick ballast (DB/DBW)</p> <p>$\Delta_{F1} =$</p> <p>15 t for cranes with max-load smaller than 1000 t</p>
1.9	<p>F1-min-stop bar =</p> <p>Relationship $F1_{\text{min}}$ to $F1_{\text{max-operation}}$</p> <p>0 percent [%] for:</p> <p>$F1_{\text{max-operation}} = 0$</p> <p>or</p> <p>No value</p> <p>or</p> <p>$F1_{\text{max-operation}} = \text{invalid}$</p>	Dynamic	In operating modes with derrick ballast (DB/DBW)
1.10	Measuring unit icon	Static	Always

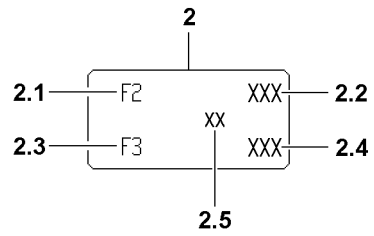


Fig.111913

LWE/LR 1750-000/12812-15-02/en

9.2 Test point 2 = F2 and test point 3 = F3

Pull test brackets test point 2A and 2B are in the guying auxiliary boom / accessory on the NA-bracket I (WA-bracket I).

Pull test brackets test point 3A and 3B are in the guying derrick boom / main boom on the main boom head.

Position	Icons / display values	Type of display	Is shown
2	Icon for N/W-guy force and main boom guy force in derrick operation	Static	In operating modes with auxiliary boom / accessory and / or derrick boom
2.1	Icon F2 for N/W-guy force test point 2	Static	In operating modes with auxiliary boom / accessory
2.2	$F2_{\text{actual}} = F2_{\text{actual}}$	Static	In operating modes with auxiliary boom / accessory and valid F2-value
	$F2_{\text{actual}} = F2A_{\text{actual}} + F2B_{\text{actual}}$ Test point 2A = left Test point 2B = right	„???“ blinking	In operating modes with auxiliary boom / accessory and invalid F2-value
2.3	Icon F3 for main boom guy force test point 3	Static	In operating modes with derrick boom
2.4	$F3_{\text{actual}} = F3_{\text{actual}}$	Static	In operating modes with derrick boom and valid F3-value
	$F3_{\text{actual}} = F3A_{\text{actual}} + F3B_{\text{actual}}$ Test point 3A = left Test point 3B = right	„???“ blinking	In operating modes with derrick boom and invalid F3-value
2.5	Measuring unit icon	Static	Always

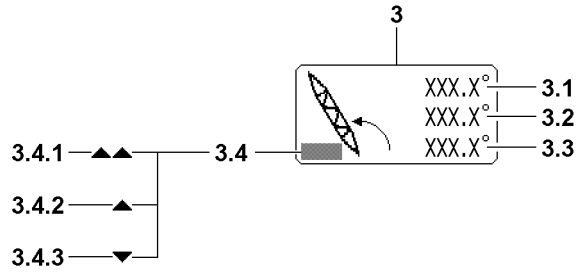


Fig.111914

LWE/LR 1750-000/12812-15-02/en

9.3 Derrick boom angle

Position	Icons / display values	Type of display	Is shown
3	Derrick boom angle icon	Static	In operating modes with derrick boom
3.1	Maximum derrick boom angle in crane operation = angle-D _{max} in [°]	Static	In operating modes with derrick boom and angle-D _{current} smaller or same as angle-D _{max}
		Blinking	In operating modes with derrick boom and angle-D _{current} larger than angle-D _{max}
3.2	Current derrick boom angle = angle-D _{current} in [°]	Static	In operating modes with derrick boom and valid value
		„???“ blinking	In operating modes with derrick boom and invalid value
3.3	Minimum derrick boom angle during crane operation = angle-D _{min} in [°]	Static	In operating modes with derrick boom and angle-D _{current} larger or same as angle-D _{min}
		Blinking	In operating modes with derrick boom and angle-D _{current} smaller than angle-D _{min}
3.4	Alarm functions derrick boom		Limitation / monitoring of relapse cylinders Note: As an icon appears, an error message is issued!
3.4.1	Two arrows pointing up	Static	Relapse cylinder on block (limit switch actuated) or sensor / limit switch defective
3.4.2	Arrow pointing up	Static	At angle-D _{current} larger than angle-D _{max}
3.4.3	Arrow pointing down	Static	At angle-D _{current} smaller than angle-D _{min}

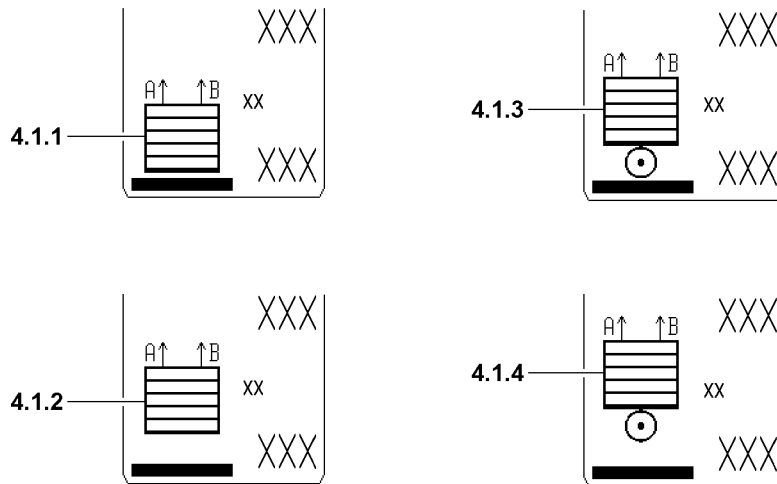
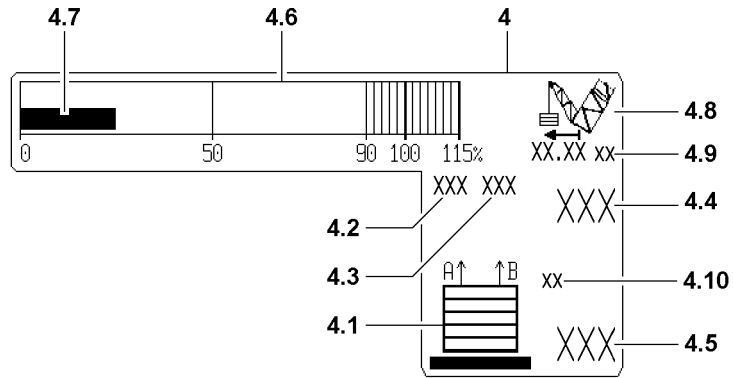


Fig.111915

9.4 Derrick ballast, weight and utilization



Note

- ▶ Ballast trailer*: Only optional for LR1750!
- ▶ In crane operation with ballast trailer* observe the respective chapters!

Test points derrick ballast guying A are:

- Test point 4A = pressure sensor ring surface left F4A
- Test point 5A = pressure sensor piston surface left F5A

Test points derrick ballast guying B are:

- Test point 4B = pressure sensor ring surface right F4B
- Test point 5B = pressure sensor piston surface right F5B

Position	Icons / display values	Type of display	Is shown
4	„Derrick ballast, weight and utilization“ icon	Static	In operating modes with derrick ballast
4.1	„Derrick ballast“ icon	Static	In operating modes with derrick ballast, depending on the type and the condition of the derrick ballast (see 4.1.1 - 4.1.4)
4.1.1	„Suspended ballast on the ground“ icon	Static	Ground contact sensor reports „Suspended ballast not suspended “
4.1.2	„Suspended ballast suspended“ icon	Static	Ground contact sensor reports „Suspended ballast suspended “
4.1.3	„Ballast trailer on the ground“ icon	Static	Key button ballast trailer in position „Ballast trailer not suspended “
4.1.4	„Ballast trailer suspended“ icon	Static	Key button ballast trailer in position „Ballast trailer suspended “

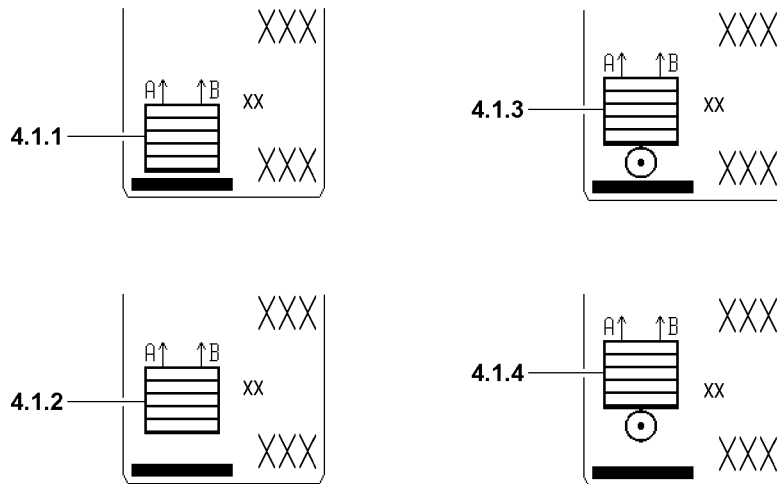
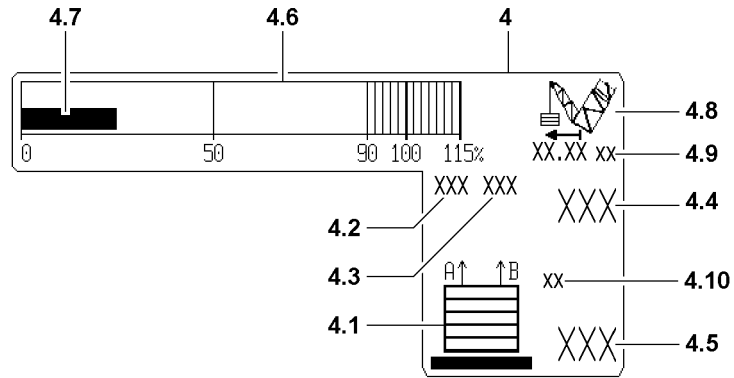


Fig.111915

Position	Icons / display values	Type of display	Is shown
4.2	Force in derrick ballast guying A (left) Test point 4A Test point 5A	Static	In operating modes with derrick ballast and „Values test points“ valid
		Blinking	In operating modes with derrick ballast and „Values test points“ valid and Difference between guy force A and B is larger than permissible
		„???“ Blinking	In operating modes with derrick ballast and At least one „Value test point“ invalid
4.3	Force in derrick ballast guying B (right) Test point 5A Test point 5B	Static	Valid in operating modes with derrick ballast and F4B and „Values test points“ valid
		Blinking	In operating modes with derrick ballast and „Values test points“ valid and Difference between guy force A and B is larger than permissible
		„???“ Blinking	In operating modes with derrick ballast and At least one „Value test point“ invalid

**Note**

Failure of pressure sensor!

- ▶ If only one pressure sensor fails, for example F5A (test point 5A) invalid, then the LICCON takes $F5A = F5B$ in the interim!
- ▶ An error message is issued!
- ▶ The error must be remedied immediately!

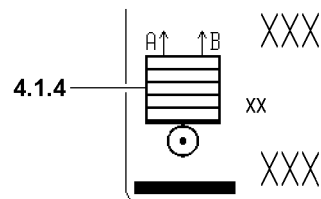
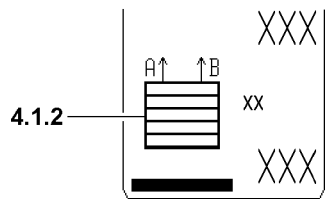
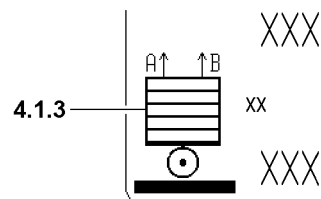
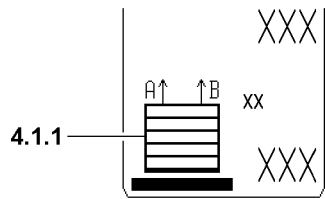
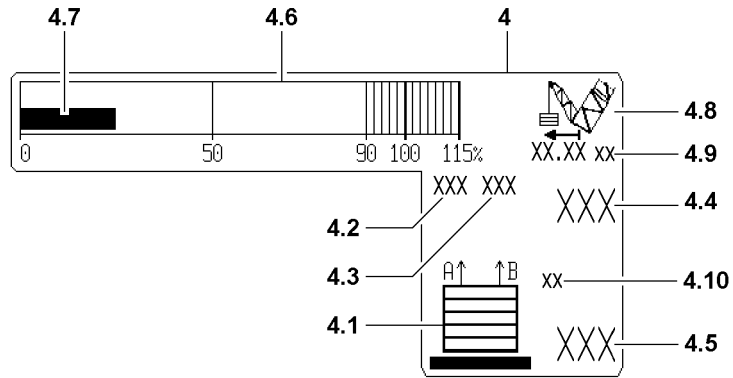


Fig.111915

Position	Icons / display values	Type of display	Is shown
4.4	Pulled derrick ballast $= BA_{\text{pulled}}$ = vertical force components in derrick ballast guying, calculated from test points 4A, 4B, 5A and 5B Note: The sum of forces in the derrick ballast guying A and B is larger or the same as the pulled derrick ballast (BA_{pulled})!	Static	In operating modes with derrick ballast, if value valid
		„???“ blinking	In operating modes with derrick ballast, if value invalid or Operating mode with BW and derrick ballast radius invalid
4.5	Placed derrick ballast $= BA_{\text{placed}}$ Note: This value has been entered by hand and confirmed with the ENTER key! The value is saved when turning off and is valid again after turning on until it is changed with the function key „F5“!	Static	In operating modes with derrick ballast, if value BA_{placed} is permissible
		Blinking	In operating modes with derrick ballast, if value BA_{placed} is questionable
		„???“ blinking	In operating modes with derrick ballast, if value invalid

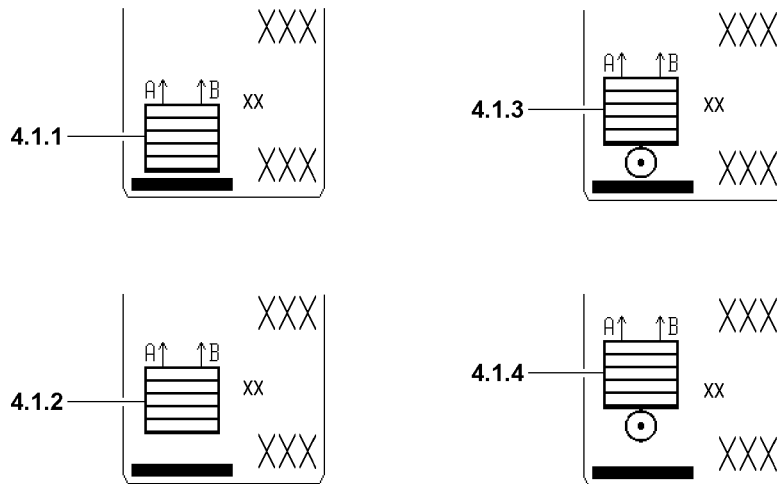
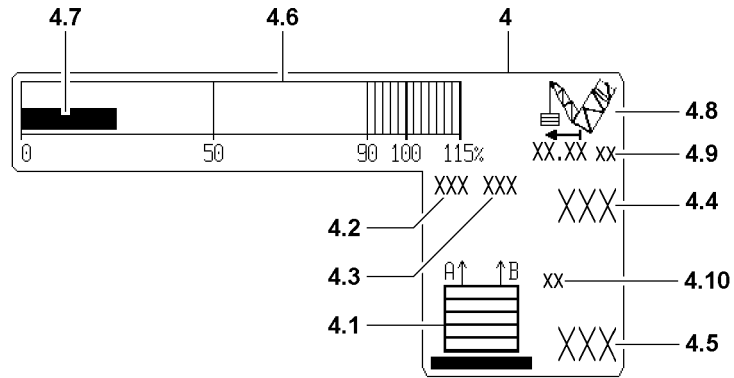


Fig.111915

Position	Icons / display values	Type of display	Is shown
4.6	Ballast utilization scale	Static	Always
4.7	<p>Derrick ballast utilization bar $= BA_{pulled} / BA_{placed}$ in percentages [%]</p> <p>Derrick ballast utilization bar is 0 at: BA_{placed} smaller than BA_{placed_min}</p> <p>or $BA_{pulled} = \text{invalid}$</p>	Dynamic	<p>In operating modes with derrick ballast</p> <p>Note: The utilization bar can show max. 115 %!</p> <p>Note: BA_{placed_min} 5 t for cranes with max- load smaller than 1000 t !</p> <p>BA_{placed_min} 10 t for cranes with max. load larger or same as 1000 t !</p>
4.8	„Derrick ballast radius“ icon	Static	In operating modes with derrick ballast
4.9	Measuring unit Derrick ballast radius	Static	Valid in operating modes with derrick ballast and derrick ballast radius value
		Blinking	Invalid in operating modes with derrick ballast and derrick ballast radius value
4.10	Measuring unit Derrick ballast weight	Static	Always

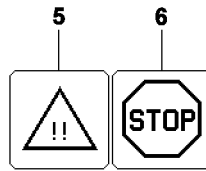


Fig.199940

9.5 Alarm functions

Position	Icons / display values	Type of display	Is shown
5	„Advance warning“ icon	Blinking	At $F1_{\text{min-advance warning}}$ ($F1_{\text{is}}$ smaller than $F1_{\text{min-warning value}}$)
6	„STOP“ icon	Blinking	At $F1_{\text{min-stop}}$ ($F1_{\text{is}}$ smaller than $F1_{\text{min}}$) with after run 3 s or At $F1_{\text{max-operation stop}}$ ($F1$ larger or same as $F1_{\text{max-operation shut off value}}$) with after run three seconds or $F1_{\text{max-assembly-stop}}$ ($F1_{\text{is}}$ larger or same as $F1_{\text{max-assembly}}$) with after run three seconds Note: $F1_{\text{max-operation shut off value}} = F1_{\text{max-operation}} + F1_{\text{addition for shut off}}$ For cranes with maximum load less than 1000 t applies: $F1_{\text{addition for shut off}} = 20 \text{ t}$

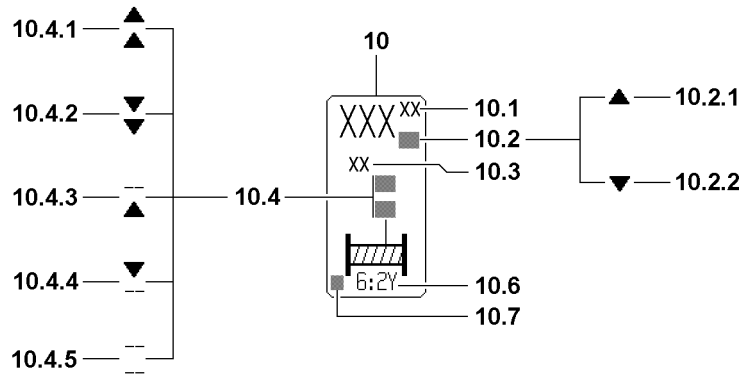
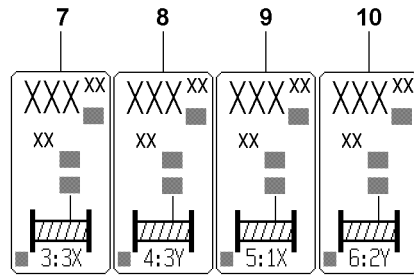


Fig.111916

9.6 Winch displays

9.6.1 Winches 3 to 6

The icons for winch 3*, winch 4, winch 5* and winch 6* are only shown on monitor 1, if the crane is equipped with these winches.

The display of winches is the same as the display of winch 1 and 2 on LICCON monitor 0.

Position	Icons / display values	Type of display	Is shown
7	Winch display winch 3*	Static	With installed and plugged in winch 3 and winch turn sensor active* or If emergency operation is turned on
8	Winch display winch 4	Static	With installed and plugged in winch 4 and winch turn sensor active or If emergency operation is turned on
9	Winch display winch 5*	Static	With installed and plugged in winch 5 and winch turn sensor active* or If emergency operation is turned on
10	Winch display winch 6*	Static	With installed and plugged in winch 6 and winch turn sensor active* or If emergency operation is turned on



Note

Assignment control winch / hoist winch

- ▶ „Winch 3*“ and „Winch 4“ are always calculated as control winches!
- ▶ „Winch 5*“ is calculated as control winch in crane operation with auxiliary boom / accessory!
- ▶ „Winch 5*“ is calculated as hoist winch in crane operation without auxiliary boom / accessory!
- ▶ „Winch 6*“ is always calculated as hoist winch!



Note

When „Winch 5*“ or „Winch 6*“ is calculated as hoist winch and:

- ▶ No boom nose is installed, then the hook path calculation is made with the reeving of the boom!
- ▶ The boom nose is installed, then the hook path calculation is made with the reeving of the boom nose!

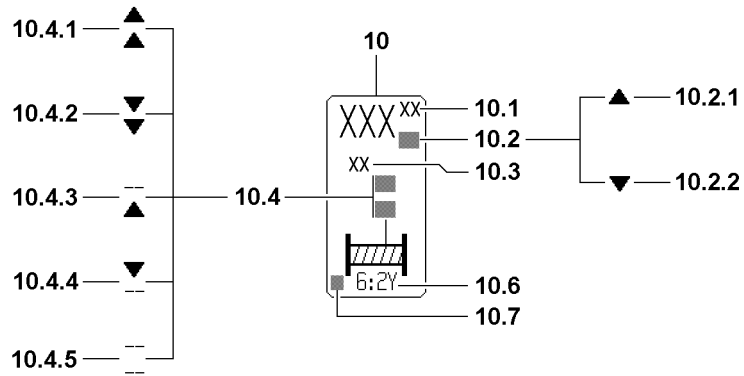
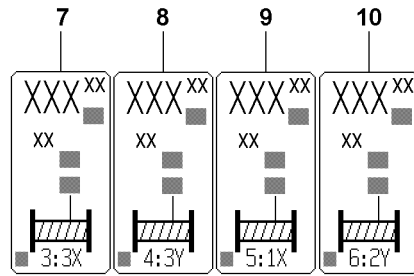


Fig.111916

LWE/LR 1750-000/12812-15-02/en

9.6.2 Winch display icon

The winch 3 and winch 6 icons have the same meaning, which are explained for the „Winch 6“ **10** icon.



Note

Display area winch displays!

- ▶ The display values **10.1** have only three positions before the comma, any positions before that are cut off! The crane operator must evaluate for himself if, for example 200 m rope is on a winch or 1200 m. **The display in both cases is identical with 200 m !**
- ▶ The hook path calculation only works accurately if the load is suspended freely and is not luffed during the lifting procedure. Not taken into account are flexation and rope expansion.
- ▶ The length display (hook travel display) is only accurate and the layer sheer is only taken into account correctly if the winch has been calibrated and no interruptions of the CPU power supply have occurred (cold start). The hook travel display is calibrated by spooling the rope up or out until the calibration switch reacts.



Note

- ▶ If one of the winches is used as hoist winch according to the set operating mode, then the **completed hook path** is shown in the winch icon. The value, which was tared by the corresponding function key is still shown unchanged, even after turning off and on or after an operating mode change!
- ▶ If one of the winches is used as a control winch, then the current **rope length on the winch drum** is shown, not the hook path. Then taring is possible, but after turning on and off again or after an operating mode change, the original value „Rope length on the rope drum“ is shown again!

10 „Winch 6“ icon

10.1 Completed hook path

- In [m] or [ft]
From a zero point which must be determined
- **Note:**
Is statically shown when the winch is calculated as **hoist winch** and a manually entered reeving must be assigned to this winch!
- **Note:**
Is statically shown when the winch is calculated as **hoist winch** and a manually entered reeving must be assigned to this winch!

or

10.1 Rope length of the winch drum

- In [m] or [ft]
- **Note:**
Is statically shown when the winch is calculated as **control winch!**
- **Note:**
For the intake gear, the rope length is valid equally for the left and the right half of the rope drum!



Note

Error in winch path measurement!

- ▶ In case of an error in the winch path measurement, blinking „???“ appear as display value **10.1!**
- ▶ If an error occurs and an error message is issued, see Diagnostics manual!

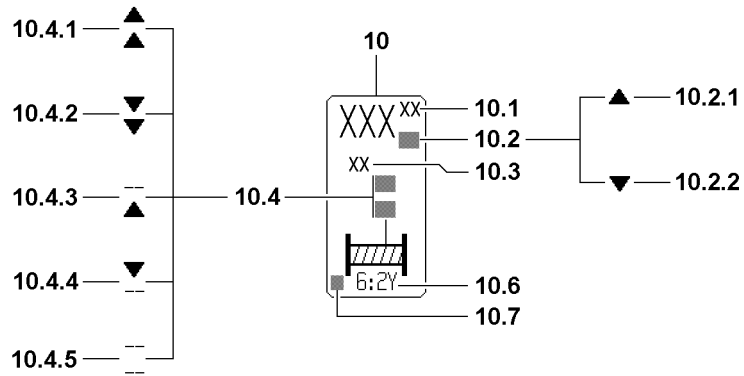
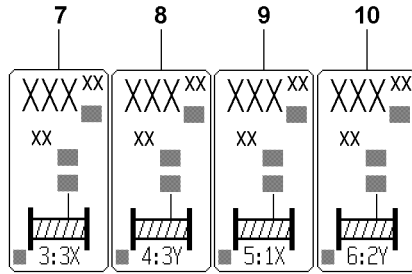


Fig.111916

10.2 Direction of hook movement

The arrows on the length value show the direction of the hook movement in relation to the zero point:

- Arrow up **10.2.1**: Hook has moved upward from the zero point.
- Arrow up **10.2.2**: Hook has moved down from the zero point.

10.3 Length unit for hook path display

- In [m] or [ft]

10.4 Winch status display

- There are five winch status icons (all blinking):

10.4.1 Spool out**10.4.2** Spool up**10.4.3** Spooled out

- Spooling out is blocked

10.4.4 Spooled up

- Spooling up is blocked

10.4.5 Winch is deactivated

- Spooling up and spooling out are blocked (via Control parameter program)

• **Note:**

If no winch status icon appears, the activated winch is inactive and is neither spooled up nor out!

10.5 Winch icon

- (with rope end for winch status icon)

10.6 Winch number with master switch number and master switch operating direction

- Example: 6:2Y
First digit: Winch number
Second digit: Master switch number
Letter: Master switch operating direction

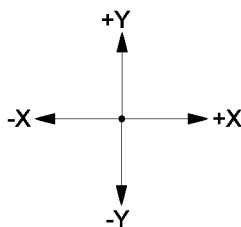


Fig.199930

10.7 Vibration sensor

- If the vibration sensor for a winch is added on the master switch, then the arrow **10.7** appears in this winch icon for the added vibration sensor.

• **Note:**

The vibration sensor is added for the first actuated crane function!

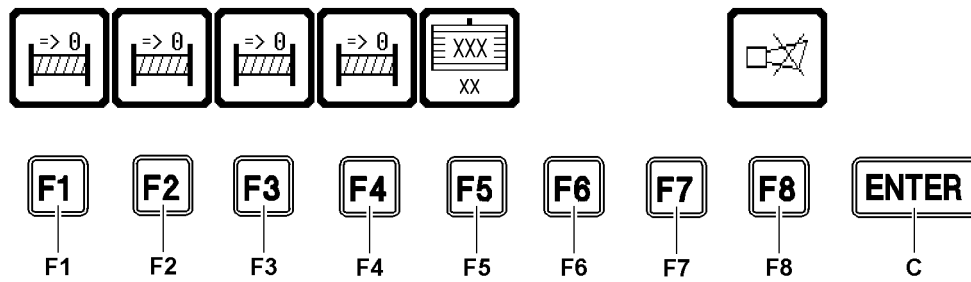


Fig.111917

9.7 Function key line

Position	Function / function key line	Type of display	Is shown
F1	Tare length display of winch 3* Note: Tare = length display is set to 0!	Static	If winch display for winch 3* is shown
F2	Tare the length display of winch 4 Note: Tare = length display is set to 0!	Static	If winch display for winch 4 is shown
F3	Tare length display of winch 5* Note: Tare = length display is set to 0!	Static	If winch display for winch 5* is shown
F4	Tare the length display of winch 6 Note: Tare = length display is set to 0!	Static	If winch display for winch 6* is shown

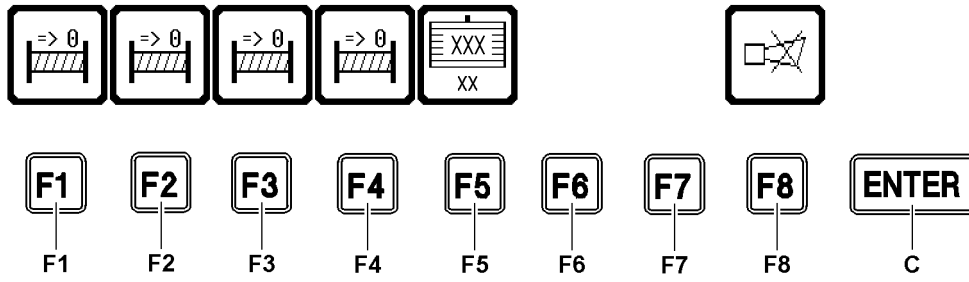


Fig.111917

Position	Function / function key line	Type of display	Is shown
F5	<p>Ballast editing key*</p> <p>When pressing function key F5, the thick icon frame changes to a thin icon frame. A blinking cursor appears in the ballast editing field. The value for the placed ballast can only be entered in the displayed weight unit [t] or [kips] via the key field on monitor 1.</p> <p>The ballast editing can be ended with:</p> <p>- Press the ENTER key C</p> <p>= take over value The entered value appears now as value for the placed ballast (BA_{placed}) in the ballast icon</p> <p>or</p> <p>- Pressing „F5“ key</p> <p>= end editing. The change is discarded The old value of BA_{placed} remains in the ballast icon.</p>	Static	In operating modes with derrick ballast



Note

- When editing the ballast, make sure to observe the respective section regarding the derrick ballast in the Crane operating instructions, chapter 4.03!
-

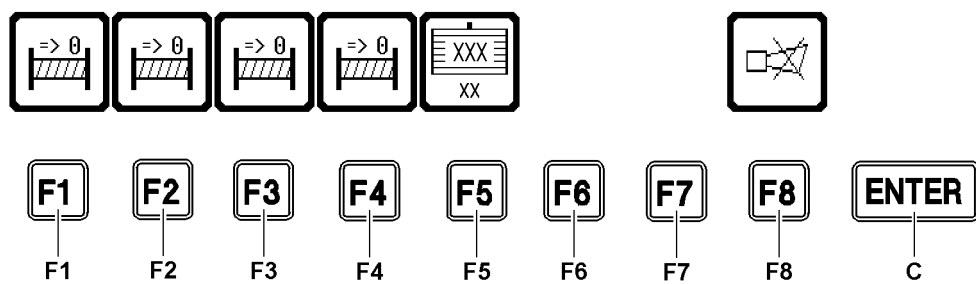


Fig.111917

Position	Function / function key line	Type of display	Is shown
F5*	Ballast input value (BA _{edit})*	Static	For valid ballast input value
	= edited ballast value in function key icon of „F5“	„???“ blinking	For invalid ballast input value
F6	Not assigned		
F7	Not assigned		
F8	„Horn“ icon - Turn off the acoustic signal „Horn“ on monitor 1 by pressing the „F8“ key	Blinking	If the acoustical signal „Horn“ sounds on monitor 1. See section „Acoustic warning on monitor 1“

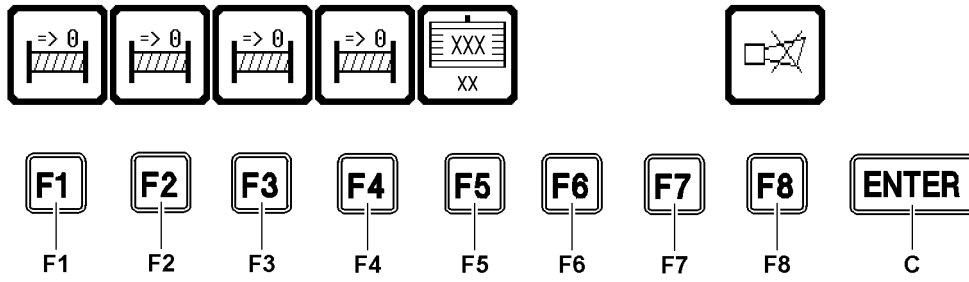


Fig.111917

9.8 Acoustic warning on monitor 1

Acoustic warnings on monitor 1 are indicated by the warning sound „Horn“.

Error messages are shown in the horn icon of LICCON monitor 0.

The warning sound „Horn“ is divided into two categories:

- „Horn“ is a beeping sound of a duration of approximately 0.5 seconds, which is repeated in a second cycle.
- „Short horn“ is a beeping sound of a duration of approximately 0.1 seconds, which is repeated in a second cycle.

F8 „Horn“ icon

- When the horn icon is shown in the LICCON monitor, any acoustic signals which will occur can be shut off by the LICCON monitor 1 by pressing the function key F8.

9.8.1 Acoustic signal „Horn“

For some operational errors found on the CPU 1, which can lead to a shut off of a movement, it is important to check the operating screen on monitor 1. These errors are also reported by the acoustic signal „Horn“, in addition to the optical display.

Operational errors are:

- Exceeding of test point 1 - assembly maximum threshold
- Exceeding of test point 1 - operation-max-shut off threshold
- Exceeding of test point 1 - minimum threshold
- Exceeding of maximum derrick angle
- Falling below minimum derrick angle

Operational errors with error messages (LICCON-Error-Code LEC) are:

- Derrick ballast input error
- Derrick ballast guy force: Difference between right (A) and left (B) too large



Note

- ▶ The sensor monitored by CPU1 (pull test brackets, pressure sensors, angle sensors) are shown in case of an error by an error message on LICCON monitor 0!
- ▶ There is **no** acoustic signal „Horn“ on monitor 1!

9.9 Acoustic signal „Short horn“

Sounds in addition to the visual display of error messages without an error number and which do not lead directly to crane movement shut off by the LICCON overload protection.

Monitored error messages are:

- Advance warning threshold of test point 1 - minimum force has been reached.

9.10 Priority acoustic signal

- The „Horn“ alarm has higher priority than the „Short horn“ alarm, i.e. „Horn“ takes preference over „Short horn“.
- The „Horn“, as well as the „Short horn“ immediately become active again if an error recurs!

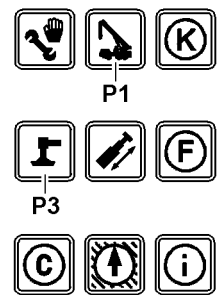
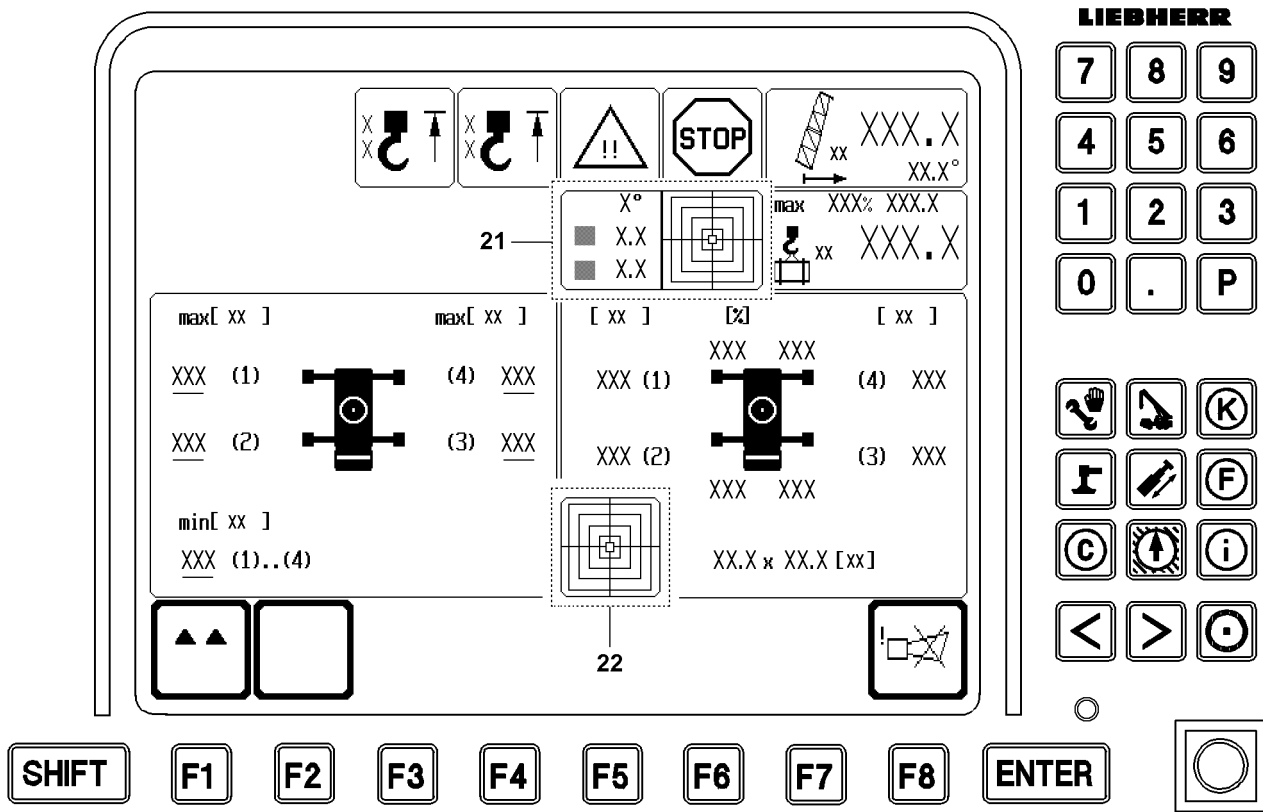


Fig.111906

10 The support program

The support program can contain up to two separate and independent parts (customer request).

The monitor screen shows the complete configuration of the support program. Depending on the customer request, the individual parts of the program are inactive and therefore not visible on the LICCON monitor. The numerical values in the icons are only examples and may differ from the crane.



Note

In the support program, the incline of the crane is shown in two different icons:

- ▶ Incline of the crane in relation to the alignment of the crane superstructure: „Incline crane superstructure“ icon **21**!
- ▶ Incline of the crane in relation to the alignment of the crane chassis: „Incline crane chassis“ icon **22**!
- ▶ Example: If the crane superstructure is turned by 90°, then the „Incline crane superstructure“ icon **21** adjusts to the changed position of the crane superstructure, the display in the „Incline crane chassis“ icon **22** keeps its direction!

10.1 Starting / stopping the program

10.1.1 Starting the program



Note

- ▶ Support the crane manually / automatically, see Crane operating instructions, chapter 3.05!

- ▶ Press program key **P3**.

Result:

- The support program is started.

10.1.2 Stopping the program

- ▶ Press program key **P1**.

Result:

- The support program is terminated.
- System switches back to the crane operation program.

10.1.3 Program configuration

- **Support force monitoring***
Display and monitoring of support force of all four support cylinders during crane operation.
- **Sliding beam monitoring***
Only optional for LG 1750.
Display and monitoring of extension conditions of all four sliding beams during crane operation.

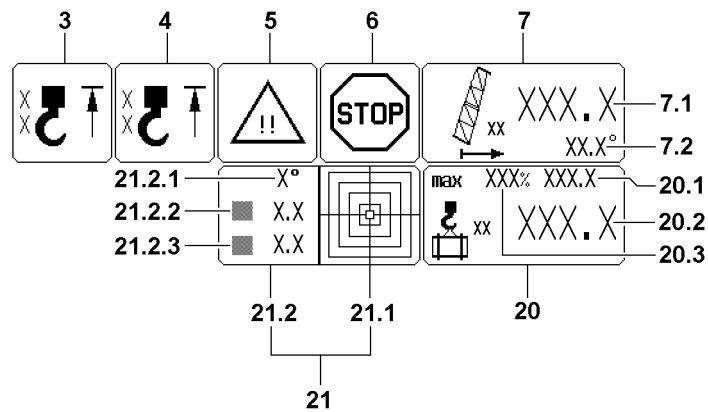
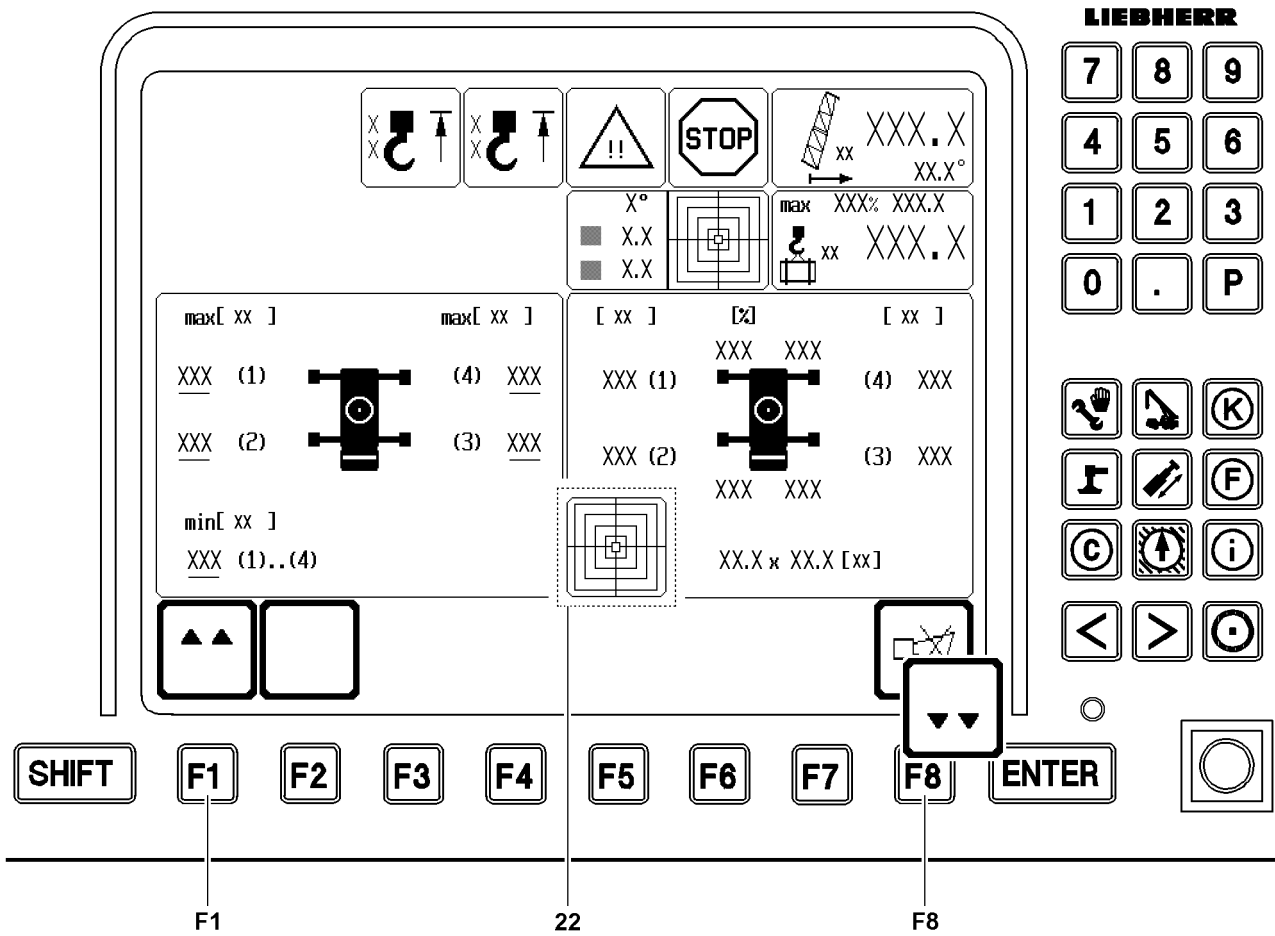


Fig.111904

10.2 Crane operation in support program



Note

- ▶ This function is only enabled for the „Support force monitoring“* option.
- ▶ For more detailed description of icons 3 to 6, see section „Alarm functions“ in the crane operation program.



WARNING

Missing display values for wind speed!

No wind speed is shown in the support program during crane operation!

- ▶ If wind conditions are unclear, crane operation in the support program is not permissible!



WARNING

Missing display values for crane operation with boom nose!

The utilization of the boom nose during crane operation in the support program is not shown!

- ▶ Crane operation with boom nose is not permissible in the support program!

3 „Hoist top“ icon

- On HES1

4 „Hoist top“ icon

- On HES2 and / or HES3

5 „Advance warning“ icon

6 „STOP“ icon

7 „Boom radius and main boom angle“ icon

- See section „Crane geometry and load information“

7.1 Radius

7.2 Boom angle

20 „Maximum load“ icon

20.1 Maximum load on the boom

- In [t] or [lbs]

20.2 Current load on the boom

- In [t] or [lbs]

20.3 Utilization of main boom

- In percent [%]

21 „Incline crane superstructure“ .icon

21.1 Graphic part

21.2 Numeric part

21.2.1 Incline range

- 1° or 5°

21.2.2 Incline

- Of crane in lateral direction

21.2.3 Incline

- Of crane in longitudinal direction

22 „Incline crane chassis“ icon

F1 Function key

- Switching over into the adjustment field for support limit forces (refer to section „Support force monitoring“)

- **Note:**

At actuation, an LMB STOP is triggered! All hoisting and luffing moments will be stopped and the icons for crane operation disappear!

F8 Function key

- Turn off acoustical signal / error determination screen

or

- End adjustment mode

Empty page!

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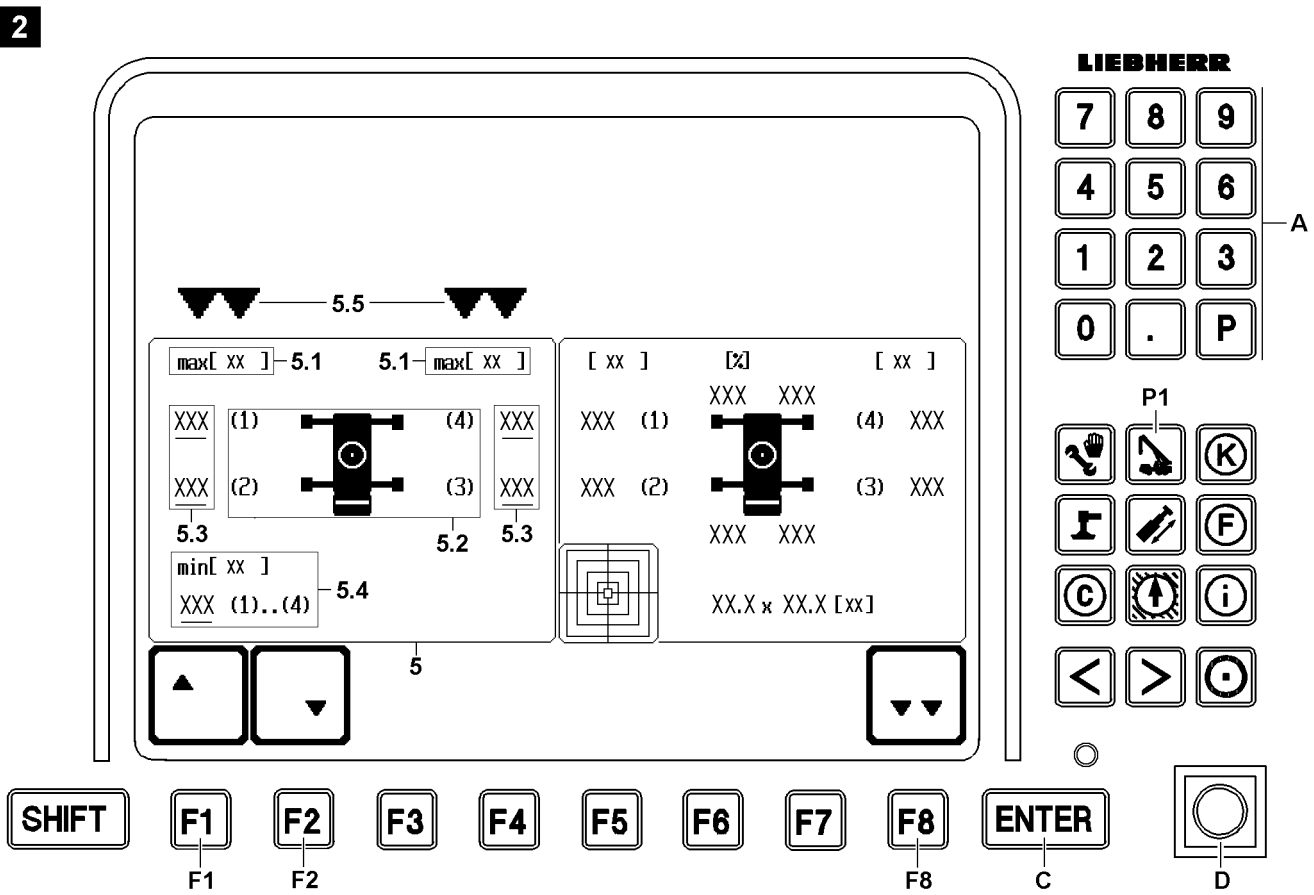
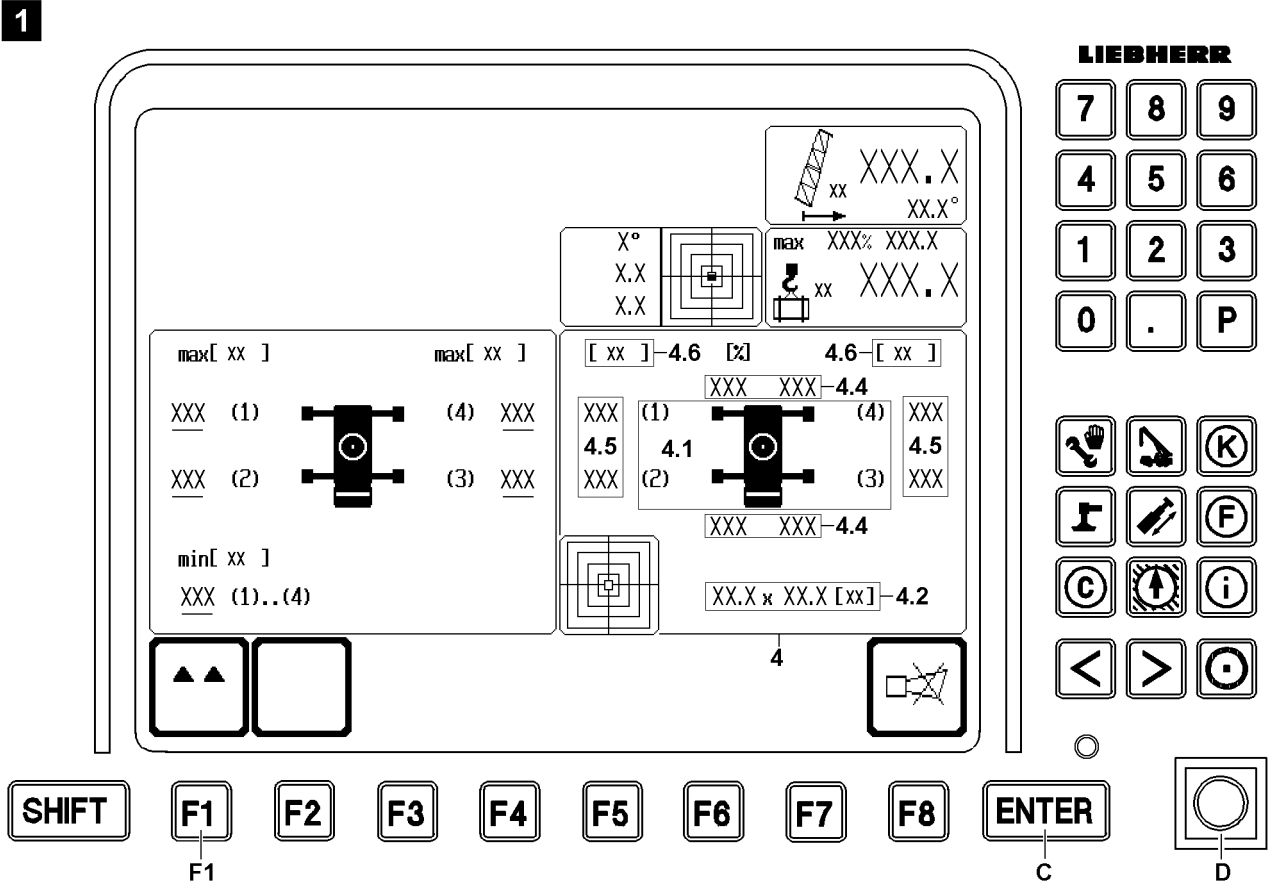


Fig.111905

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10.3 Support force monitoring*



DANGER

Risk of accident!

- ▶ The LICCON support force monitoring is only an aid. It does **not** prevent a possible crane overload!
- ▶ Never use the support force monitoring to utilize the crane up to its tipping limit!

The support force monitoring constantly determines the current pressure on all 4 support cylinders during operation. The support force for each support is determined from that.

Due to the possibility to specify limit values, the support force monitoring can be utilized for individual advance warning.

Example: For application under certain placement conditions, the:

- Maximum permissible total force is 100 t.
- Desired advance warning 10 % before
which results in: Maximum support limit force value to be programmed is 90 t.

10.3.1 Monitoring mode / control mode

See illustration 1

- 4 Monitoring and control field
 - 4.1 Crane icon with support numbers
 - **Note:**
The icon can vary depending on crane type (LG or LR)!
 - 4.2 Support base
 - **Note:**
Depending on crane type (LG or LR), as letter code or as number value!
 - 4.4 Extension length sliding beam
 - **Note:**
Only optional for LG 1750!
 - 4.5 Support force values
 - In [t] or [kibs]
 - 4.6 Unit of displayed support forces
 - In [t] or [kibs]
 - F1 Function key
 - Switch to the setting field for support limit forces
 - F8 Function key
 - Press once:
Turn the acoustic signal off
 - Press twice:
In the „Horn“ icon, fields are automatically displayed on the error determination screen (see Diagnostics manual)

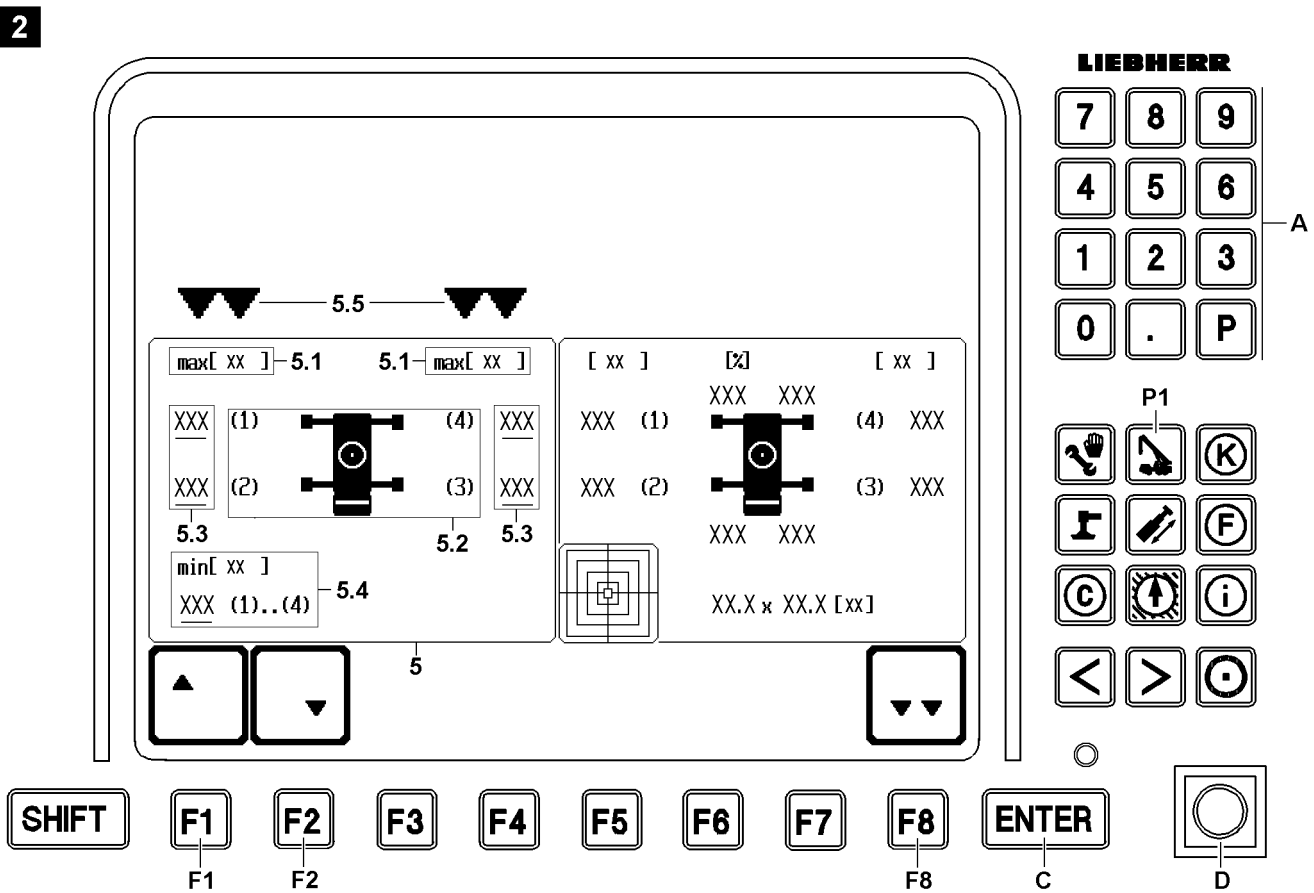
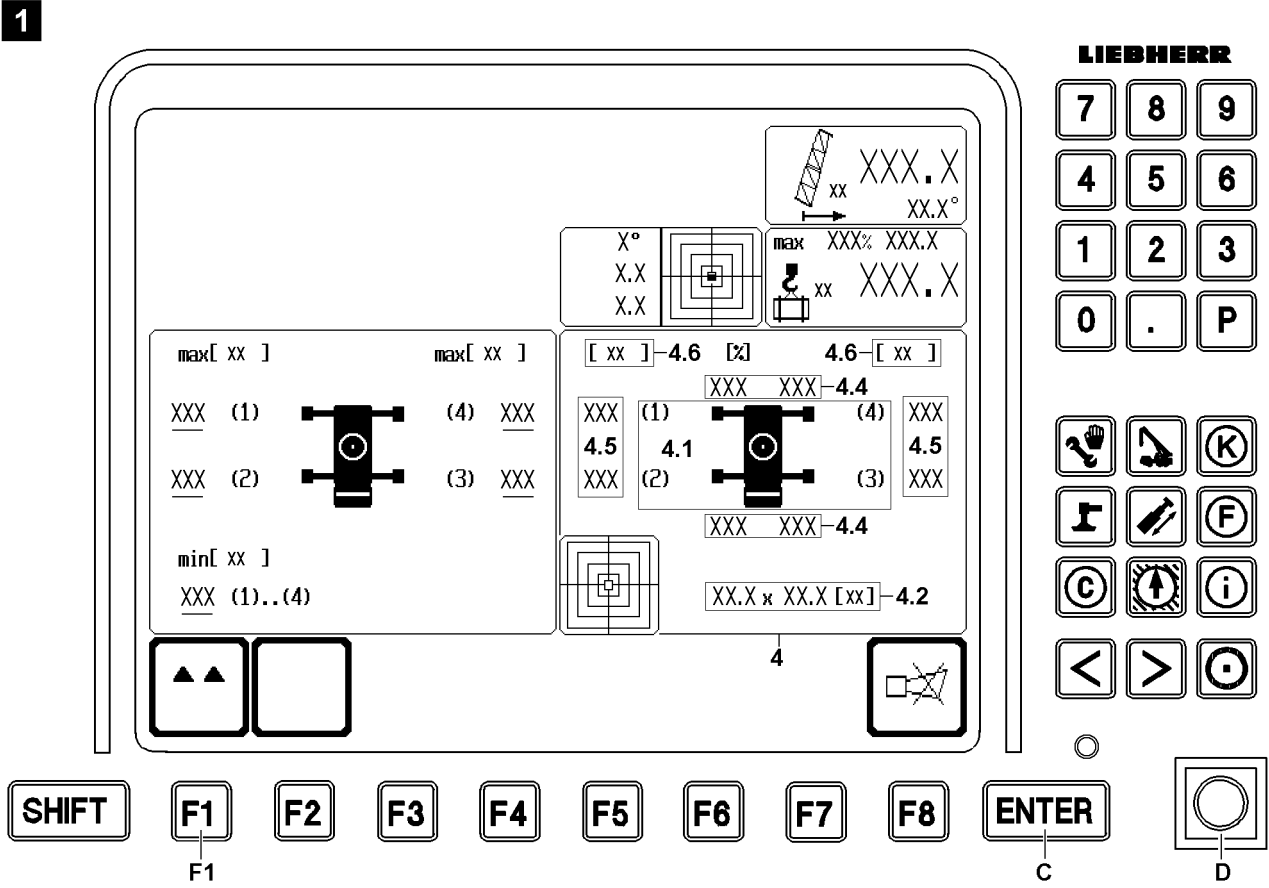


Fig.111905

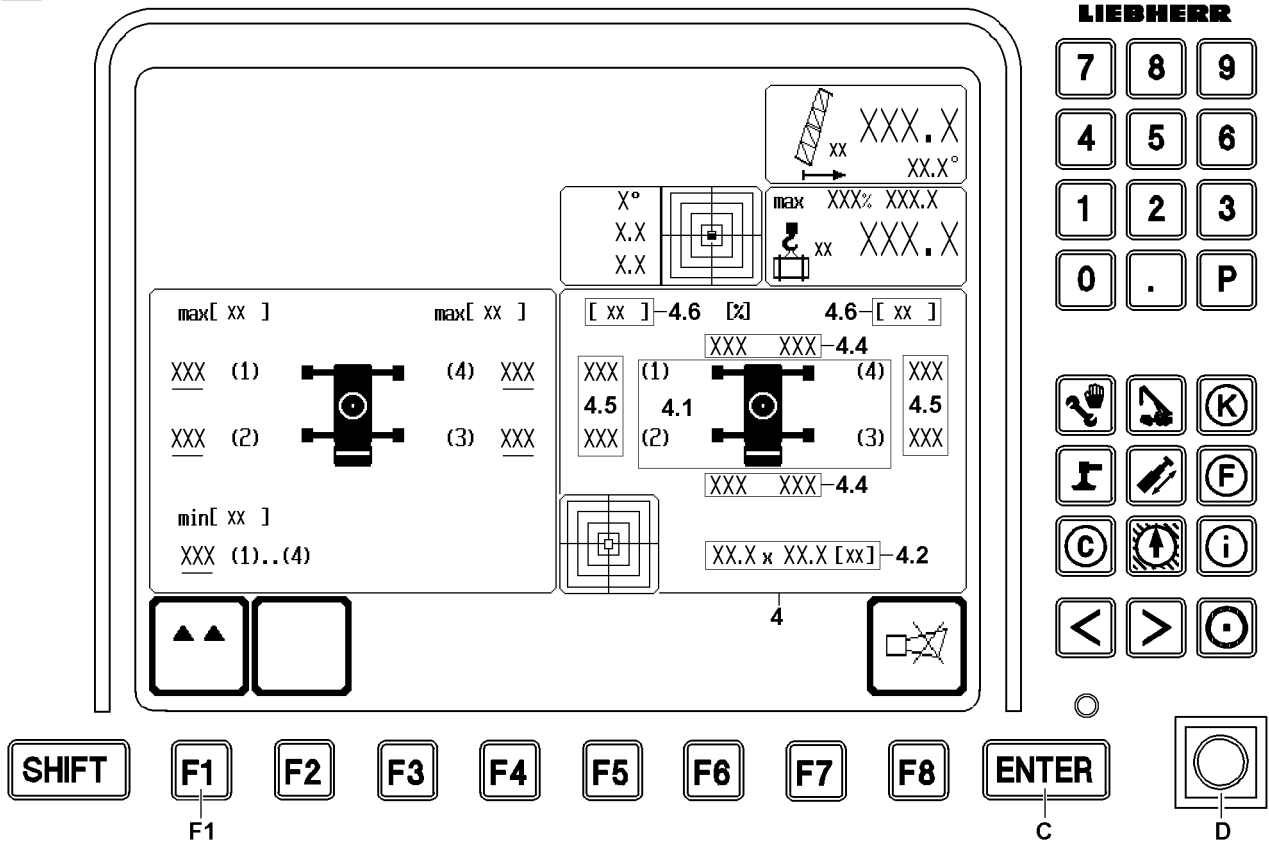
LWE/LR 1750-000/12812-15-02/en

10.3.2 Setting mode

See illustration 2

- 5** Setting field for support force limits
 - 5.1** Unit of maximum support force limit values
 - In [t] or [kibs]
 - 5.2** Crane icon with support numbers
 - 5.3** Maximum support force limit values
 - Maximum value in [t] or [kibs]
 - 5.4** Minimum support force limit value
 - Minimum value in [t] or [kibs]
 - Valid for all four supports
 - 5.5** Selector arrows
 - Point to the active setting field
- F1** Function key
 - Move cursor (input pointer) to next support force limit value
- F2** Function key
 - Move cursor (input pointer) to previous support force limit value
- F8** Function key
 - Switch back to the Monitoring and control operating field **4**.

1



2

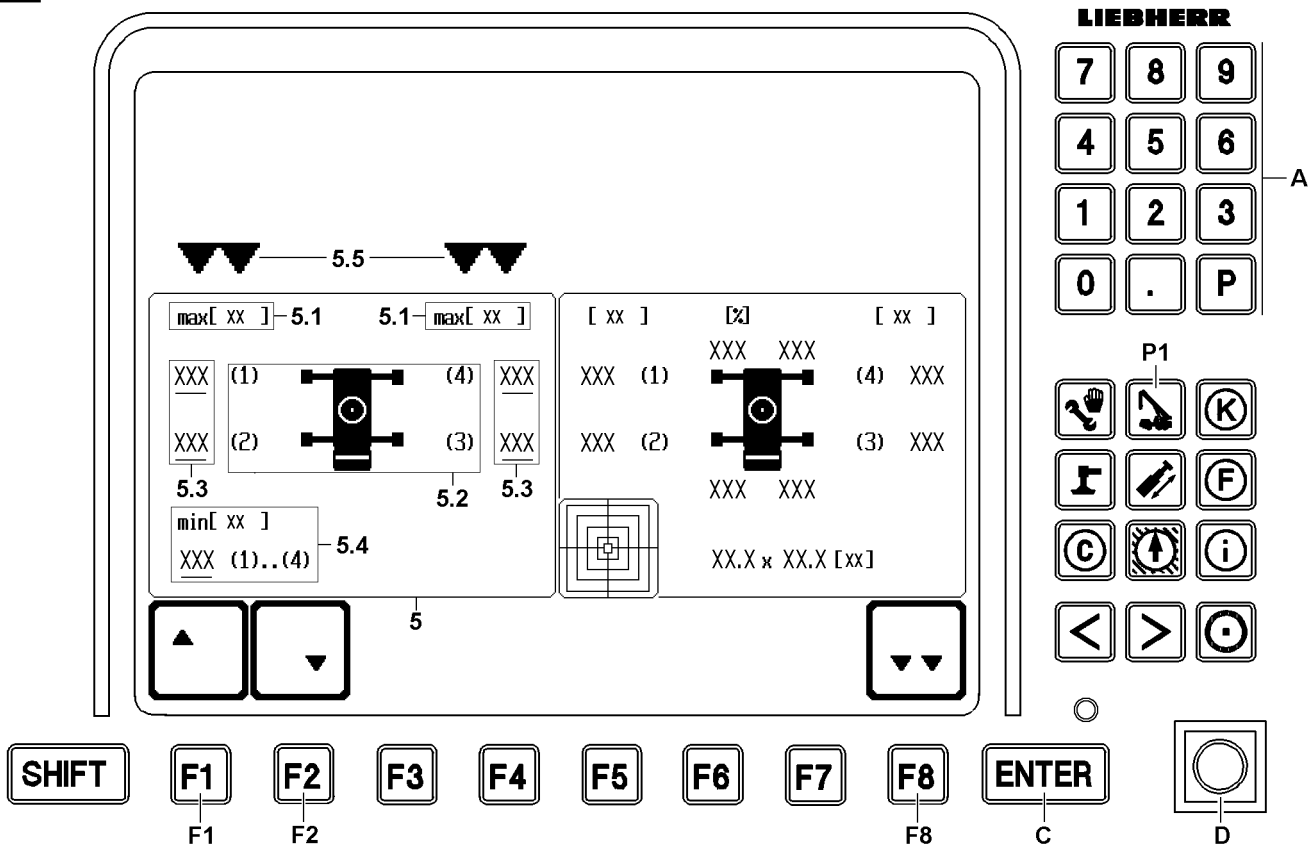


Fig.111905

10.3.3 Display current support forces



Note

- ▶ Display current support forces in crane operating screen, see „Monitored auxiliary functions for crane operation“!

The current support force values **4.5** are shown in the monitoring and control field **4**.

10.3.4 Remarks

Because of the option to determine limit values yourself, the LICCON support force monitoring can also be used as an advance warning device:

- Any trends in changes of the support forces during crane operation can be quickly recognized.
- Advance warning limits for the support forces can be individually programmed.



WARNING

Tolerances and erroneous operation of the support force monitoring

For technical reasons, a test deviation of up to $\pm 2\%$ in relation to the maximum load capacity of the crane is possible!

If the support cylinders are moved on „block bottom“ or „block top“, then the display of the support forces is erroneous!

- ▶ Make sure that there is no block position on the support cylinders!
- ▶ Take the tolerances in the display value into account!
- ▶ Take additional influences onto the tolerance field into account!

The tolerance field expands:

- In case of large support forces.
- In case of far extended support cylinders.
- When extending the support cylinders and up to 15 minutes afterwards.

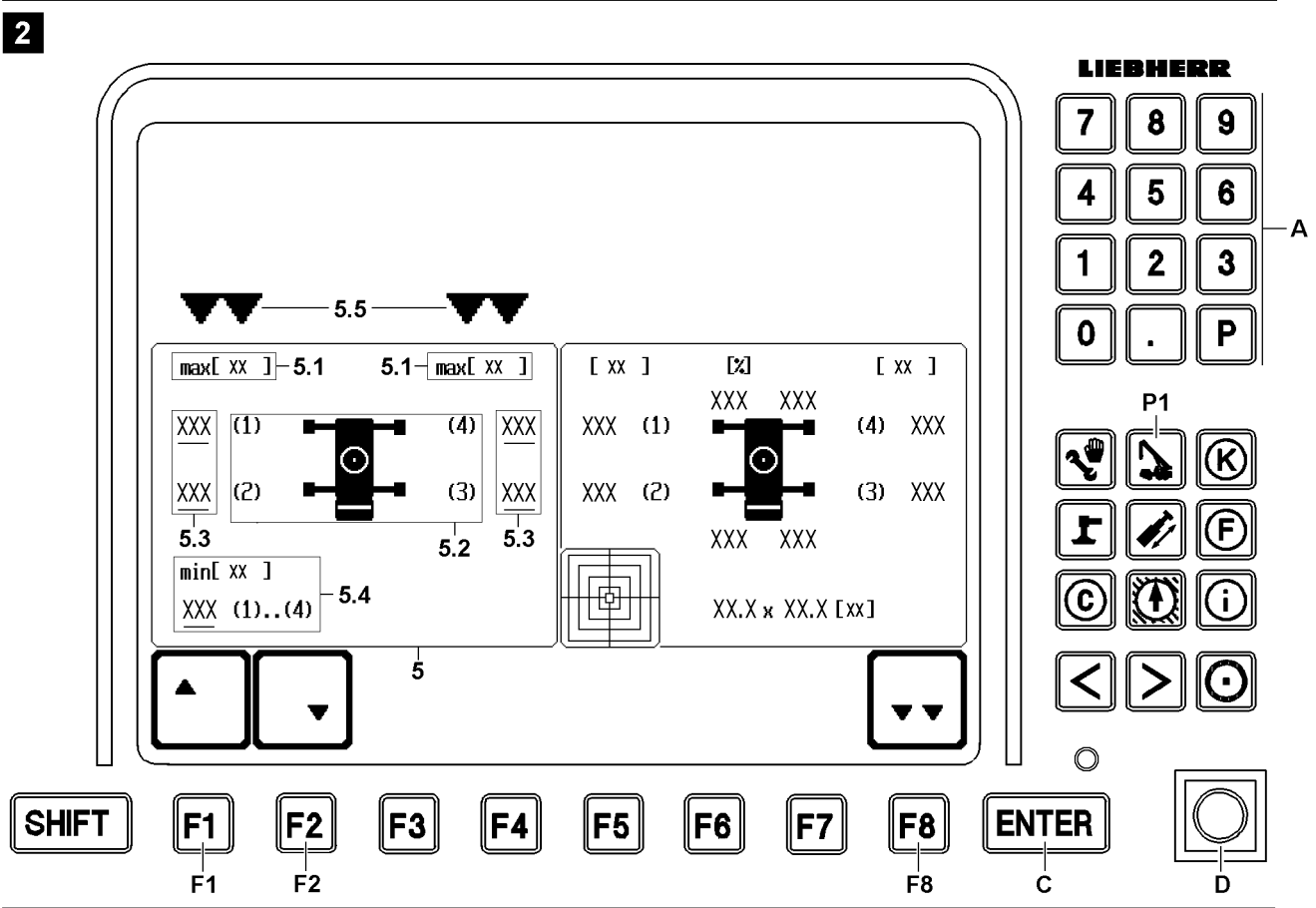
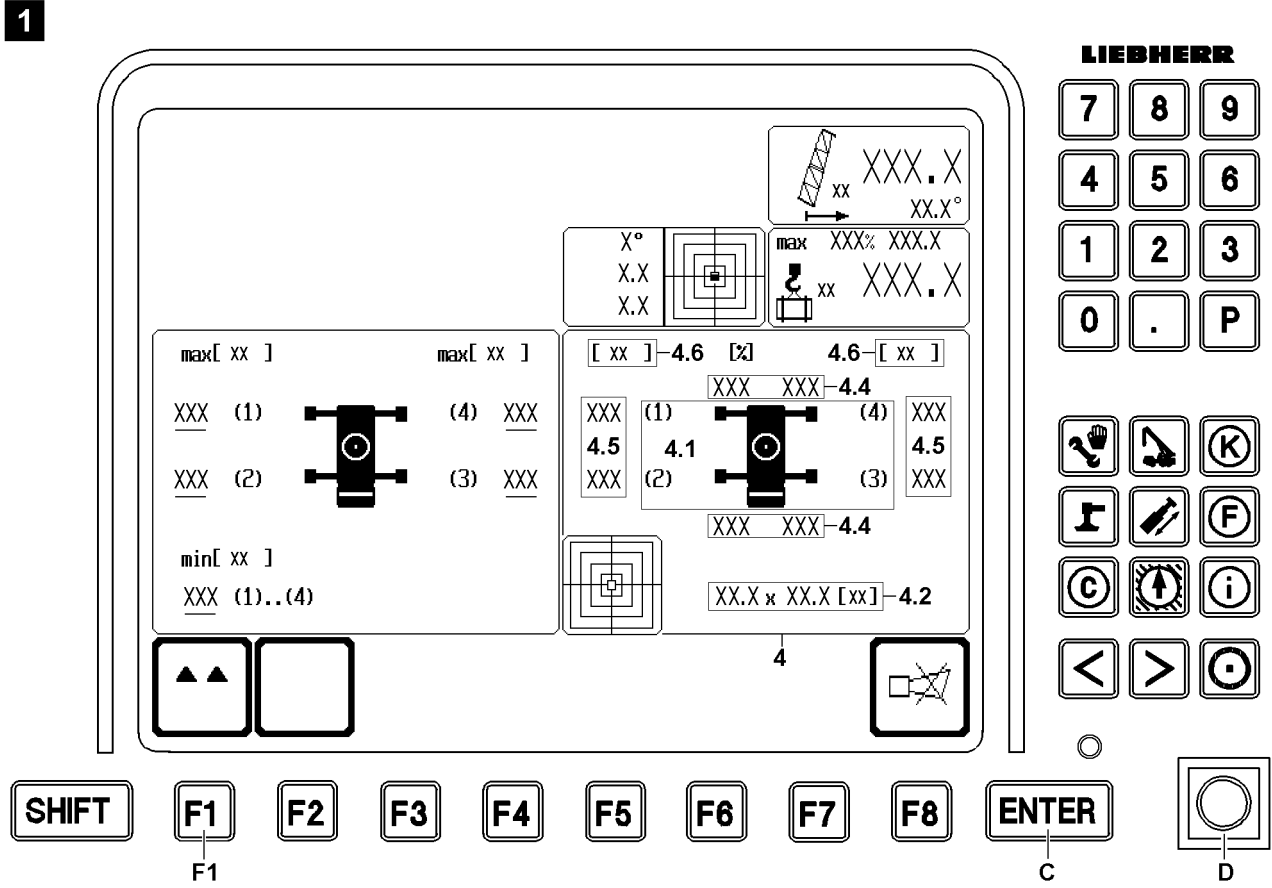


Fig.111905

LWE/LR 1750-000/12812-15-02/en

10.3.5 Modifying minimum and maximum support force limits

As an additional safety precaution, this program monitors the bypass key button **D** and the assembly key switch. If one of the key buttons is actuated, the system switches back to the crane operation program.

In the Monitoring and control field **4** the current support force values are displayed.

If one or more of the values are below or above the programmed maximum values for the support force limits, then they are displayed blinking.

The programmed maximum / minimum values for the support force limits are displayed in the adjustment field **5**.

Make sure that the following prerequisites are met:

- The crane is supported and horizontally aligned.
- The bypass key button **D** has not been pressed.
- The assembly key button is not in position „Assembly“.

The program initially runs in monitoring mode. All icons relevant to crane operation are displayed.



Note

Switching to the adjustment field for support limit forces.

- ▶ By pressing the function key **F1**, an LMB STOP / operational error is triggered immediately. All hoist and luffing moments are stopped and the icons for crane operation disappear.

When pressing the function key **F1**, the two double arrows **5.5** point to the settings field **5** for support limit forces. The cursor appears on the maximum value of the support limit force on support 1.

By pressing the function key **F1** or function key **F2** you switch the cursor to the next or previous maximum value for the support limit force or the minimum value for the support limit force (valid for all four support cylinders).



Note

Testing the validity range for the support limit force values.

Every newly entered support limit force value will be tested for its validity range.

- ▶ If valid, the value entered will be accepted.
- ▶ If invalid, the value will be rejected as too small or too big with an „ERROR“ message.

With the keypad **A** you can change the support limit force values and then close the input function using the ENTER key **C**.

Use the function key **F8** to switch back to the monitoring and control field **4**.

Use the program key **P1** to switch back to the crane operation program.

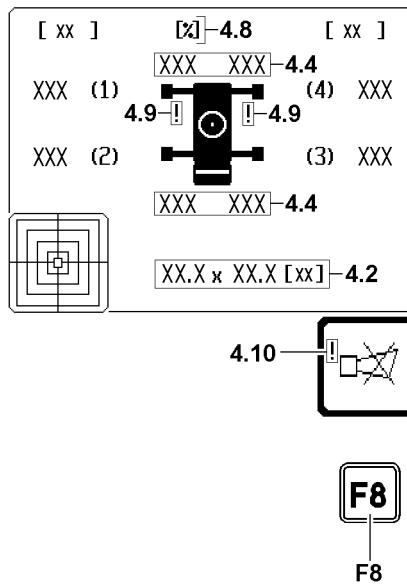
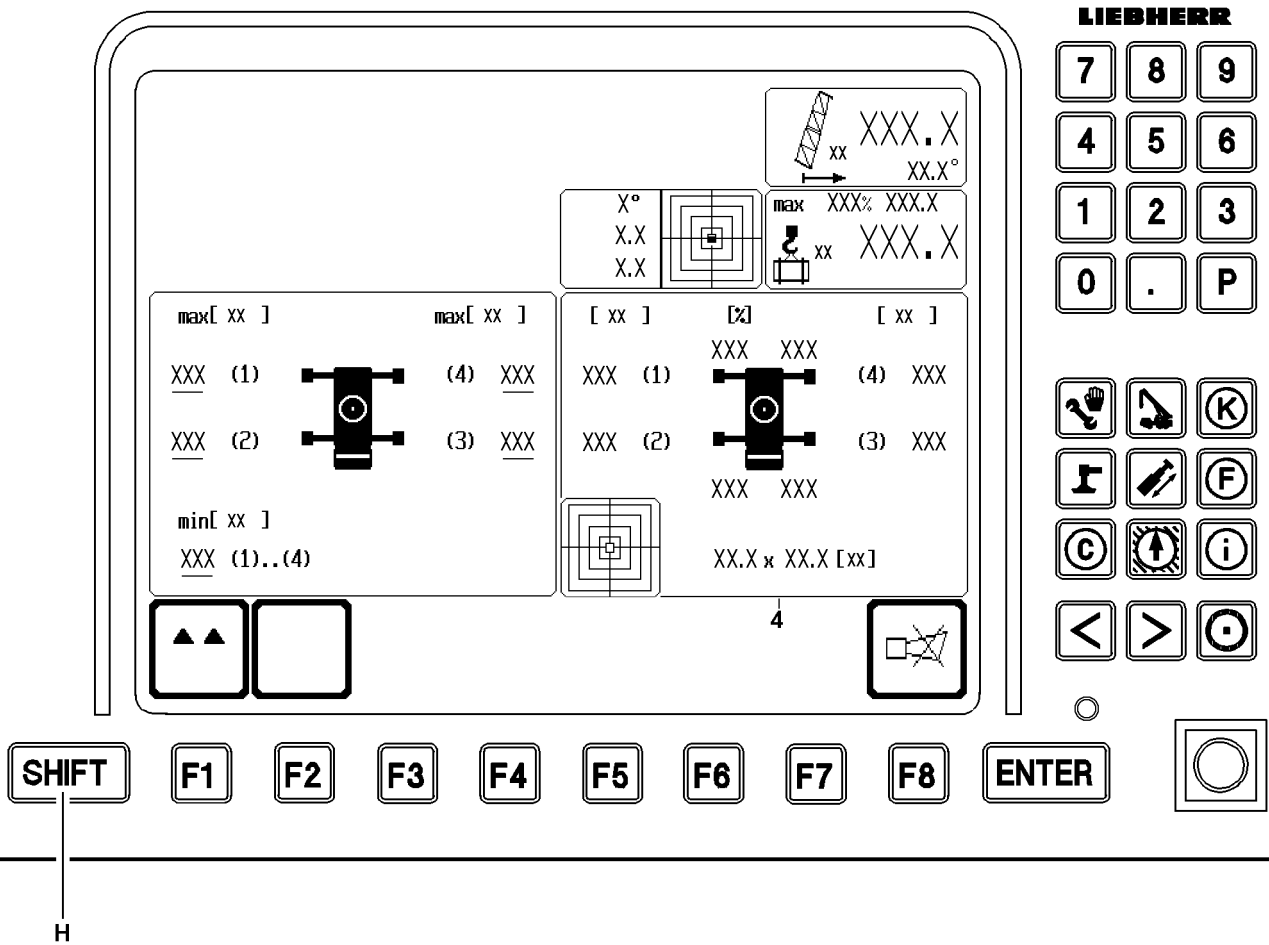


Fig.111907

10.4 Sliding beam monitoring*



Note

- ▶ Only optional for LG 1750!

- 4 Monitoring and control field
- 4.2 Support base
 - In [m] or [ft]
- 4.4 Sliding beam length values
 - In percent of the maximum extension length
 - The sliding beam length values blink in the ranges that are unsuitable for supporting.
 - 0 – Sliding beam retracted
 - 100 – Sliding beam widely extended
- 4.8 Percentage sign
 - Unit for sliding beam length display
- 4.9 Exclamation mark „!“
 - Sliding beam length monitoring is now bypassed

Note:
An exclamation mark „!“ **4.09** will appear on the support screen **and** crane operating screen when the sliding beam length monitoring is bypassed!
- 4.10 Exclamation mark „!“
 - Sliding beam length monitoring can be bypassed

Note:
An exclamation mark „!“ **4.10** will only appear in the horn icon when it is possible to bypass the sliding beam length monitoring!
- F8 Function key
 - Press once:
 - Turn the acoustic signal off
 - Press twice:
 - Fields that are displayed visually in the „Horn“ icon are automatically displayed in the error determination display.

SHIFT and F8

 - Sliding beam length monitoring is bypassed
 - Note:
 - By pressing the key combination SHIFT H and function key F8 again, the sliding beam length monitoring is activated again!



WARNING

Increased accident risk when bypassing sliding beam length monitoring!

The sliding beam position is no longer monitored when the sliding beam length monitoring is bypassed. An inadequate support base may cause the crane to topple and cause fatal injury.

- ▶ The sliding beam length monitoring should only be bypassed by personnel who are aware of the consequences!
- ▶ The crane operator must ensure that the sliding beam position corresponds to the data given in the load chart and LICCON!
- ▶ The crane operator must ensure that the crane is supported using the support base specified in the load chart!

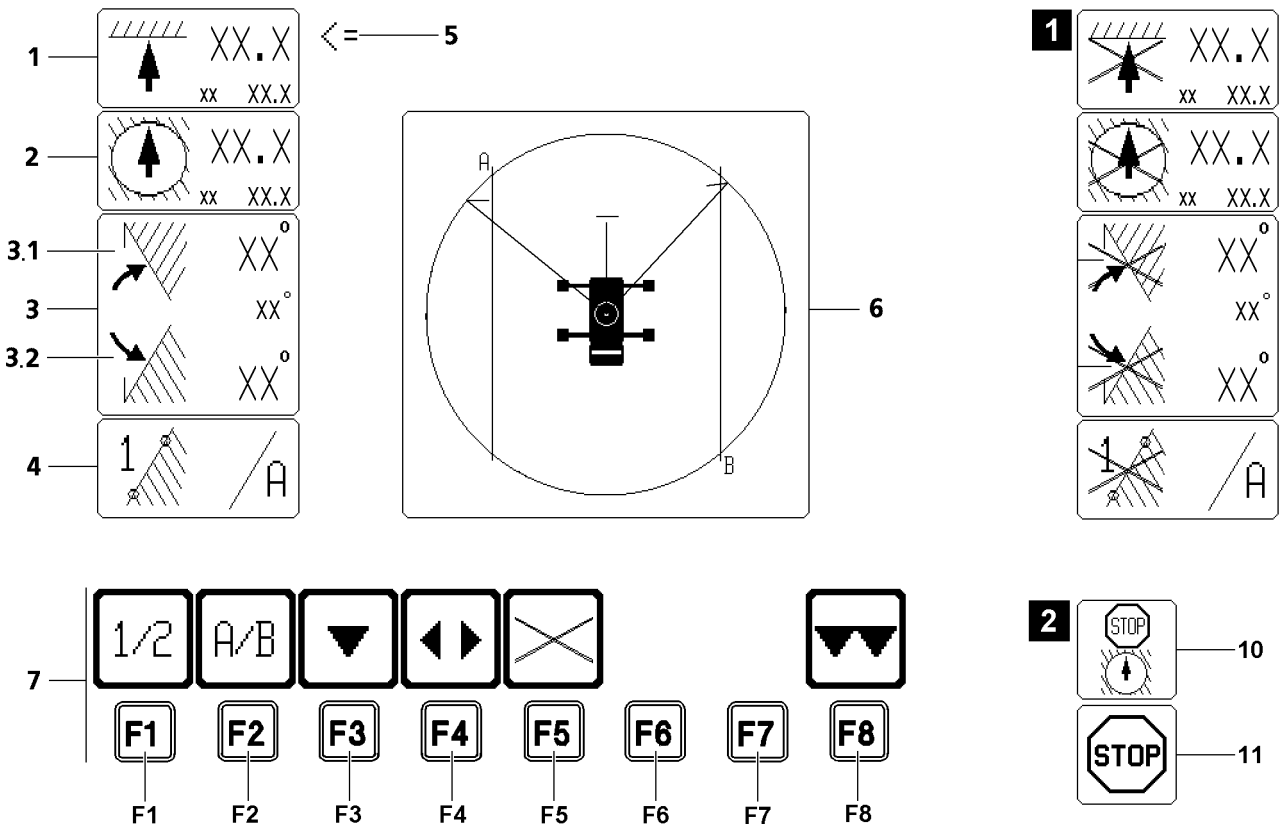
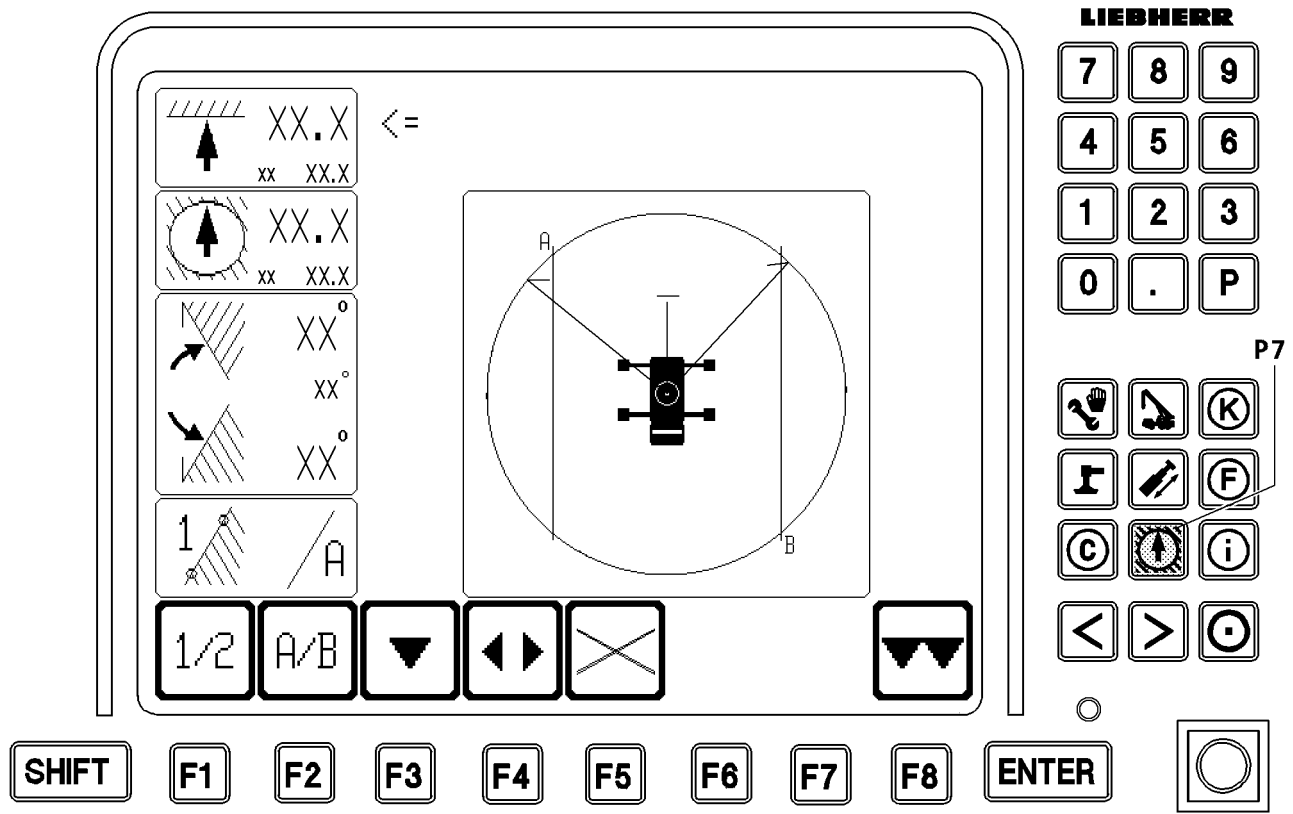


Fig.111257

LWE/LR 1750-000/12812-15-02/en

11 The working range limitation program*

**Note**

► For detailed description of the working range limitation, see the „Working range limitation“ manual.

11.1 Starting the program

► Press program key **P7**.

11.2 User interface

- 1 „Pulley head height limitation“ icon
- 2 „Radius limitation“ icon
- 3 „Slewing limit stop“ icon
- 3.1 Right slewing limit stop
- 3.2 Left slewing limit stop
- 4 „Edge limit with edge and point selection“ icon
- 5 Function selector
 - For selecting limiting functions
- 6 „Graphic display of programmed limits“ icon
 - **Note:**
Depending on crane type, either the crane icon crane chassis or crawler travel gear are shown!

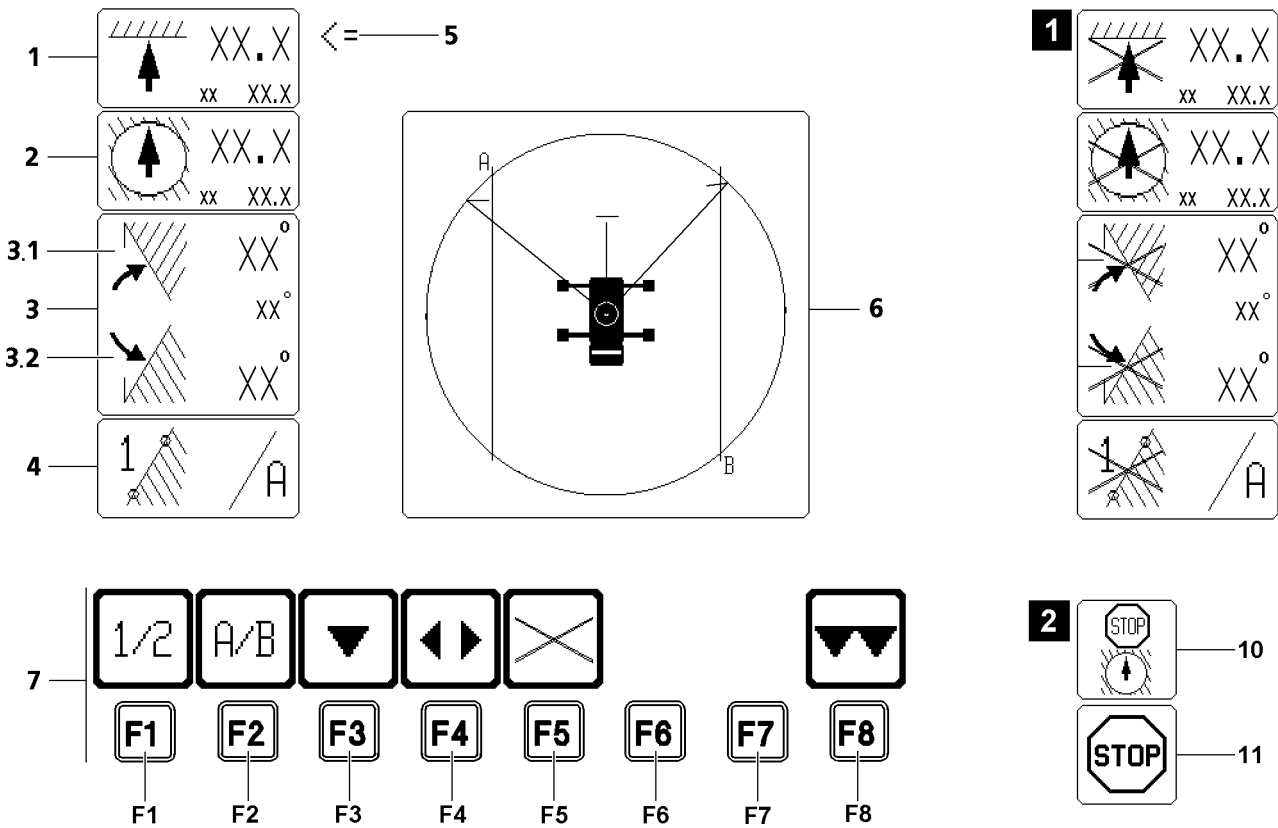
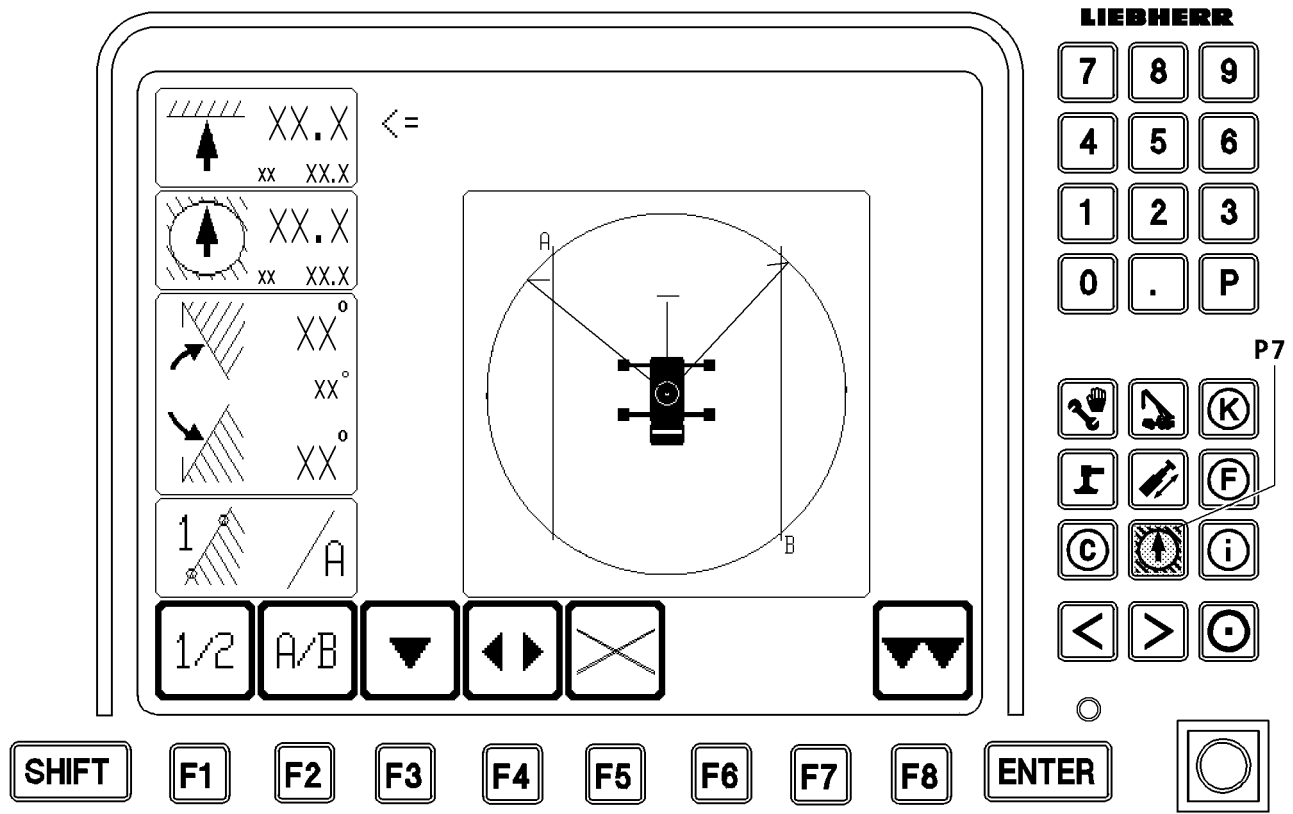


Fig.111257

LWE/LR 1750-000/12812-15-02/en

11.2.1 Function key line

The function key line **7** is operated via the function key located below.

- F1** Function key
 - Selection of point 1 or 2 of selected edge A or B
- F2** Function key
 - Selection of edge A or B that is being programmed
- F3** Function key
 - The function selector is moved down by one limit function
- F4** Function key
 - The limit function selected with the function selector changes its status. If previously active, it will now be inactive when the function key **F4** is pressed, and vice versa. An inactive limit function is identified by a crossed out symbol. If the function selector shows a slewing limit to the left or the right, then both limits will always be switched.
 - **Note:**
For the edge limit, only the preselected edge will be switched! The edge that is not displayed can be active or inactive at the same time!
- F5** Function key
 - All limit functions become inactive, icons crossed out - see illustration **1**
- F6** Function key
 - Not assigned in the working range limitation program
- F7** Function key
 - Not assigned in the working range limitation program
- F8** Function key
 - Exit the program and return to the crane operation program

11.3 Displays in the crane operation program

If a programmed working range limitation is activated, then this status is indicated in the „Crane operation“ program by an alternative STOP icon **10** on the position of the normal LMB STOP icon **11**, see illustration **2**.

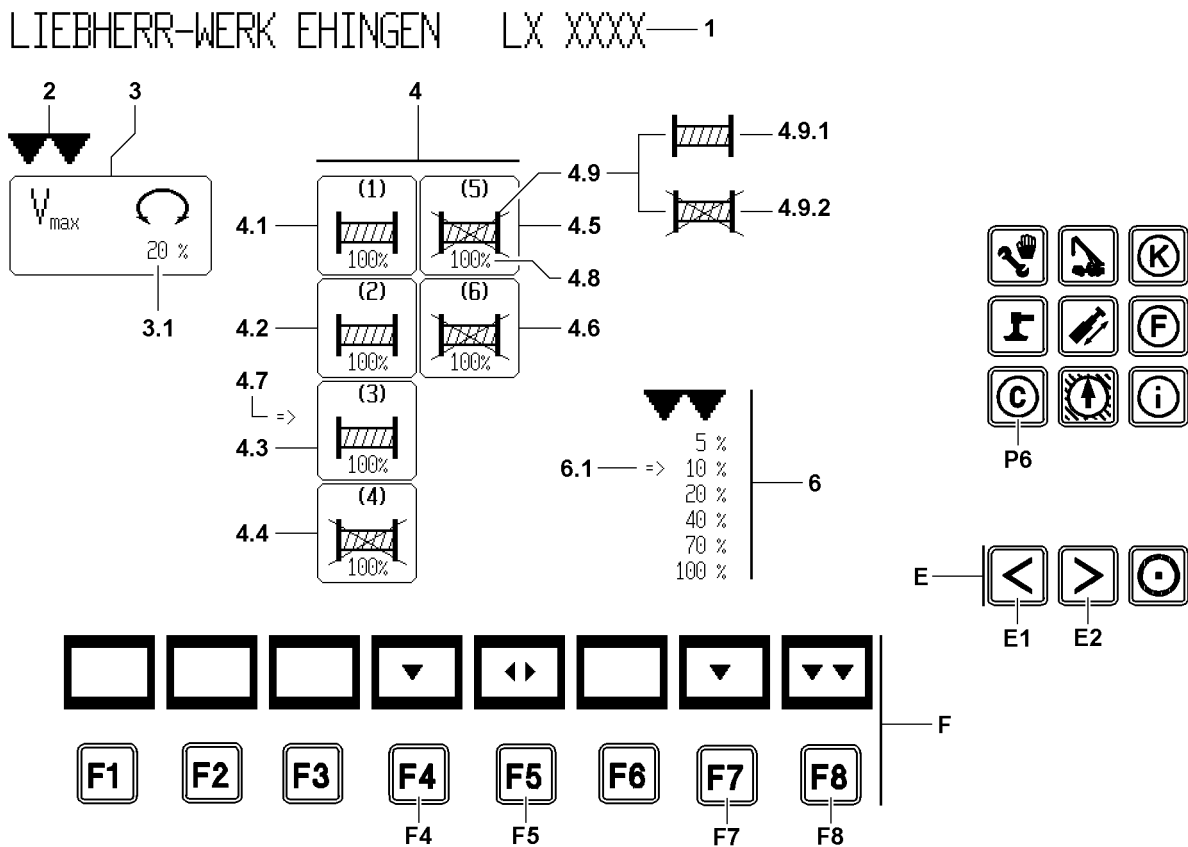
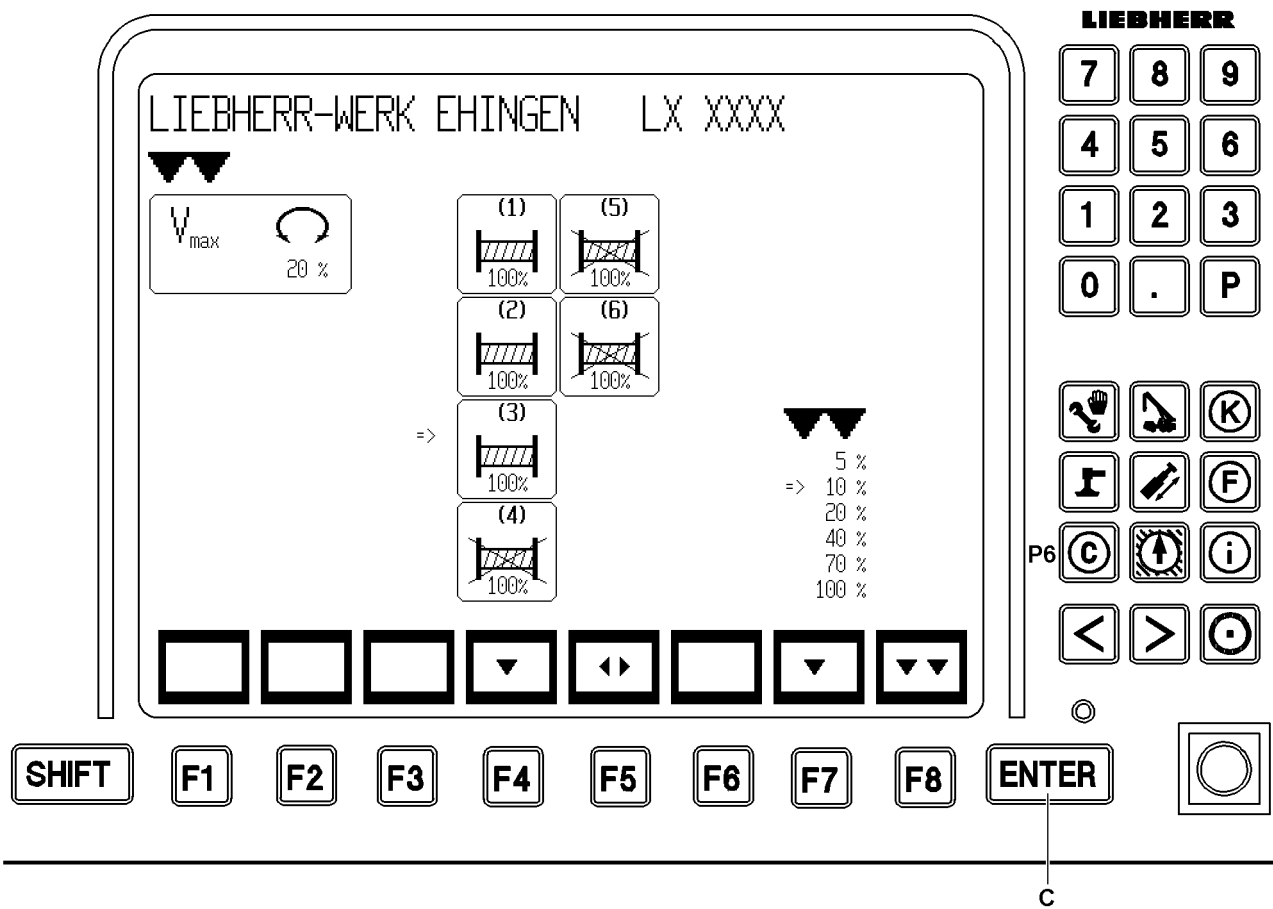


Fig.111903

LWE/LR 1750-000/12812-15-02/en

12 The control parameter program

The control parameter program offers the following possibilities:

- Preselection of maximum slewing speed of the slewing gear.
- Preselection of maximum slewing speed of individual winches.
- Activation / deactivation of individual winches.

The bypass switches are monitored during the control parameter program. If one of these switches is activated during the program, the system immediately switches back to the crane operation program.



DANGER

Risk of accident!

- ▶ **Never** change the speeds or the activation / deactivation of the winches while actuating a crane movement!
-

12.1 Starting the program

- ▶ Press the program key **P6**.

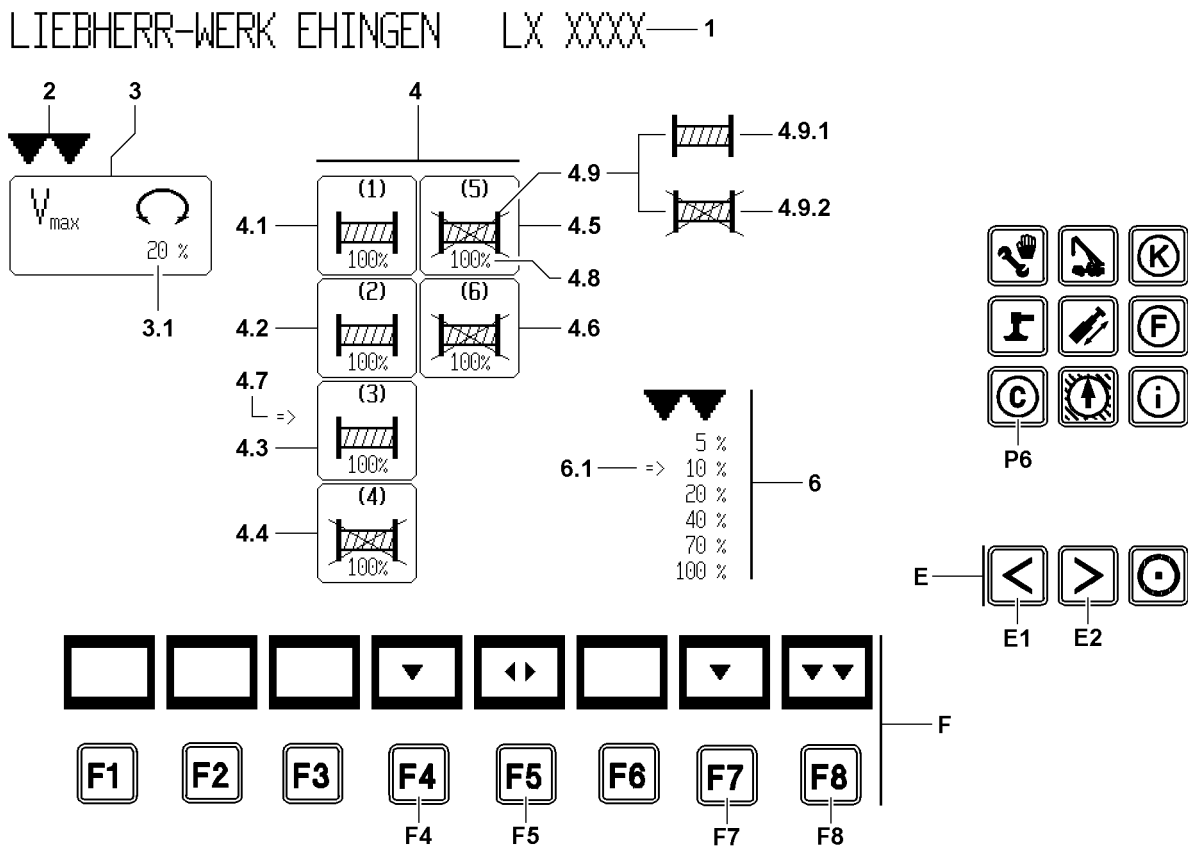
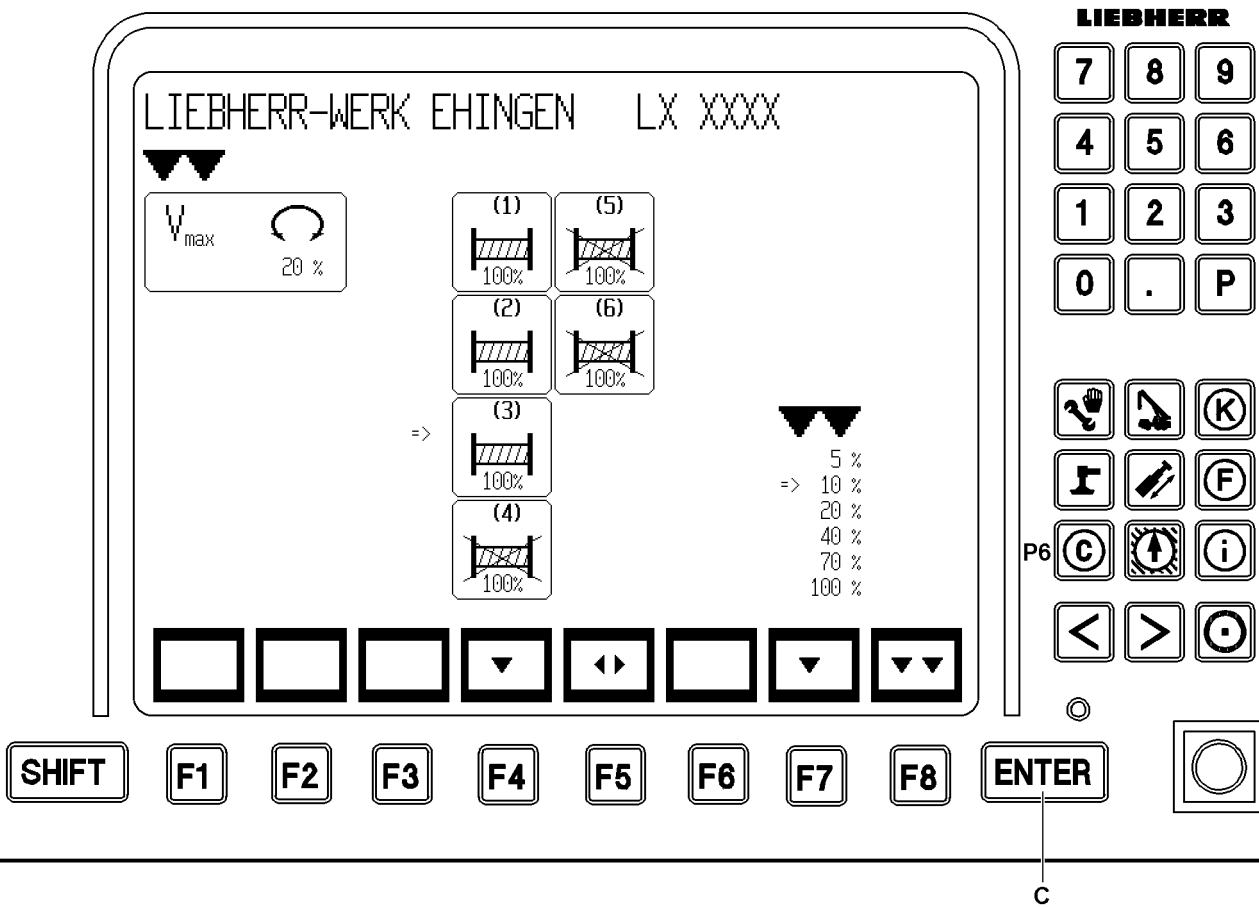


Fig.111903

LWE/LR 1750-000/12812-15-02/en

12.2 User interface

- 1 Crane type
- 2 Selector „Icon selection“
 - Double arrow pointing down
 - Select icon
- 3 „Slewing gear“ icon
- 3.1 „Maximum slewing speed“
 - V_{max} in percent [%]
- 4 „Winches“ icon group
 - 4.1 Winch 1
 - 4.2 Winch 2
 - 4.3 Winch 3*
 - 4.4 Winch 4
 - 4.5 Winch 5*
 - 4.6 Winch 6*
 - 4.7 Winch selector
 - Arrow to the right
 - Select the winch, which „Properties“ are to be changed
 - 4.8 Speed
 - In percent [%]
 - See value field with selector
 - 4.9 Winch icon
 - 4.9.1 Winch activated
 - 4.9.2 Winch deactivated
 - 6 Value field with selector
 - The percentage values relate to the speed with maximum deflection of the manual control lever, always in relation to the maximum achievable speed of the drive, with 100 % preselected speed. Six stages may be preselected.
 - 6.1 Speed selector
 - Arrow to the right
 - Select percentage value(s) for speed stages
- F Function key line
 - F4 Function key
 - Select winch
 - F5 Function key
 - Activate / deactivate selected winch(es)
 - F7 Function key
 - Select percentage value of corresponding speed in value field
 - F8 Function key
 - Return to the crane operation program and take over parameter
- C Input key ENTER
 - Take over the selected speed setting for the preset functions
- E Special function keys
 - E1 Special function key
 - Move the selector 2 for selecting icons to the left
 - E2 Special function key
 - Move the selector 2 for selecting icons to the right

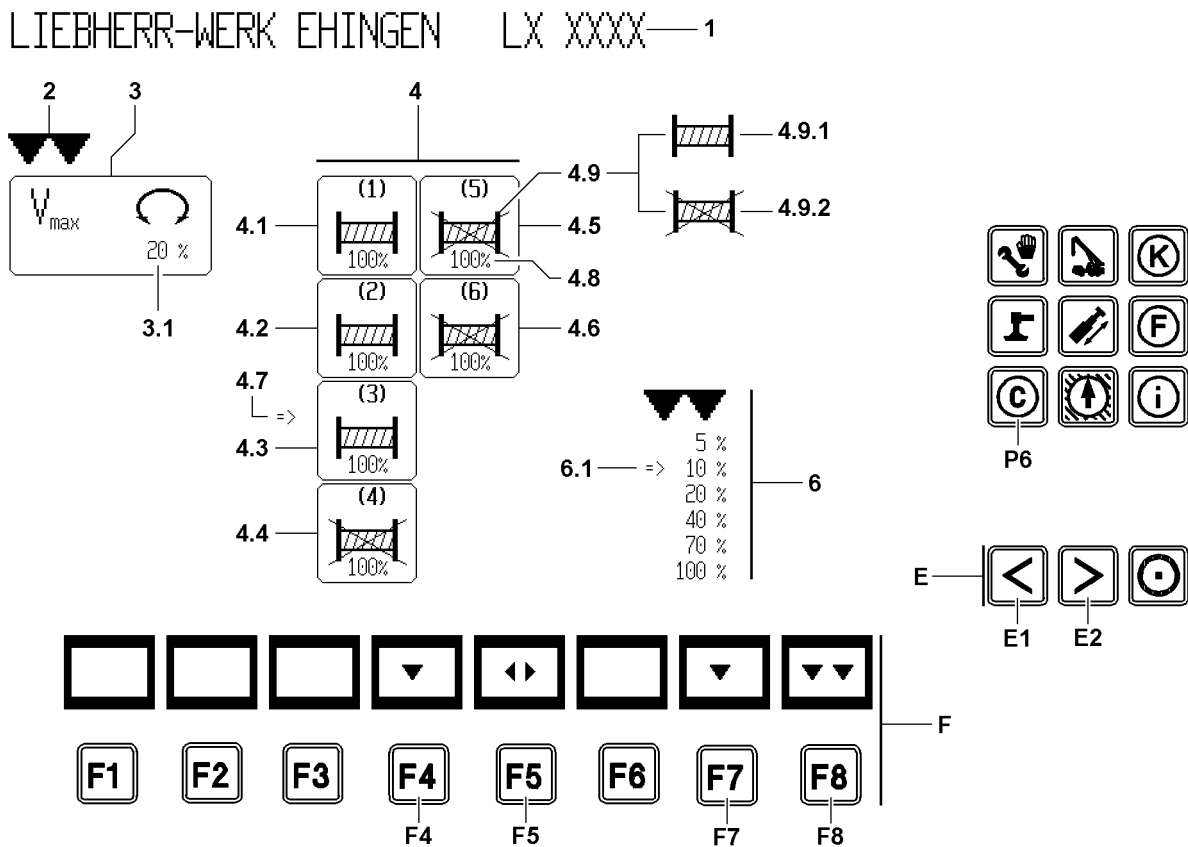
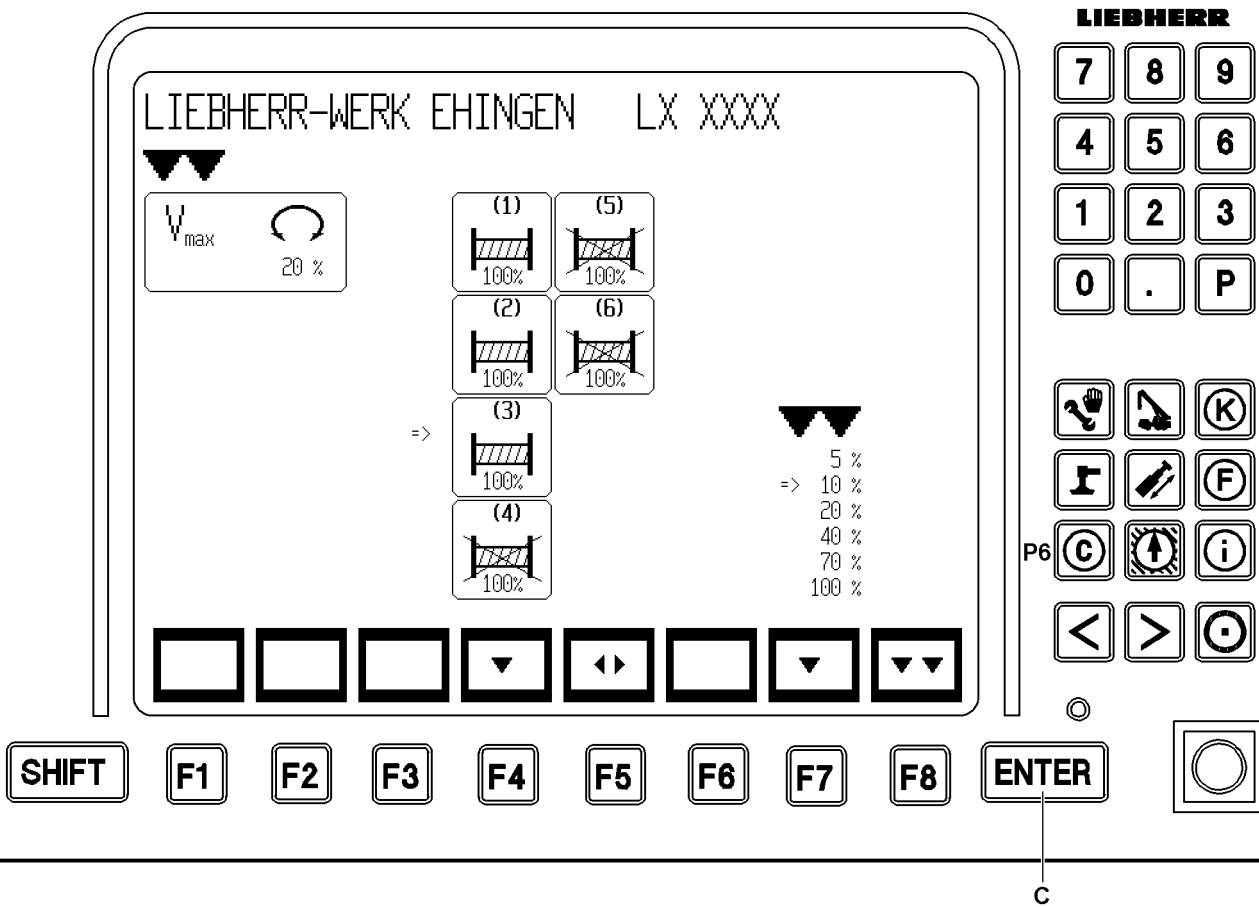


Fig.111903

LWE/LR 1750-000/12812-15-02/en

12.3 Changing the maximum slewing speed of the slewing gear



DANGER

Risk of accident!

- ▶ Always adhere to the maximum speeds relative to the boom length and the operating modes during crane operations with loads (according to load charts)!
- ▶ The longer and heavier the boom is and the greater the load, the smaller the set „Maximum slewing speed“ must be!
- ▶ **Never** deflect the master switch for the slewing gear to the stop at maximum load!

- ▶ Use the special function key **E1** or special function key **E2** to select the „Slewing gear“ icon **3**.

Result:

- Selector (double arrow down) **2** appears above the „Slewing gear“ icon **3**.

- ▶ Select the maximum slewing speed in percent [%] with function key **F7**.

Result:

- Selector (arrow to right) **6.1** shows the selected percentage value.

- ▶ Use the ENTER key **C** to confirm the selected „Maximum slewing speed“.

Result:

- The value of the „Maximum slewing speed“ is shown in the icon and taken over into the control.

12.4 Winches

12.4.1 Changing maximum winch speed

- ▶ Using the special function key **E1** or special function key **E2**, select the icon group „Winches“ **4**.

Result:

- Selector (double arrow down) **2** appears above the icon group „Winches“.

- ▶ With the function key **F4**, select the icon for „Winch 1“, **or** „Winch 2“, **or** „Winch 3“*, **or** „Winch 4“, **or** „Winch 5“, * **or** „Winch 6“*.

Result:

- Selector (arrow to right) **4.7** shows the selected winch.

- ▶ Select the „Maximum winch speed“ in percent [%] with function key **F7**.

Result:

- Selector (arrow to right) **6.1** shows the selected percentage value.

- ▶ Use the ENTER key **C** to confirm the selected „Maximum winch speed“.

Result:

- The value of the „Maximum winch speed“ is shown in the selected winch icon and taken over into the control.

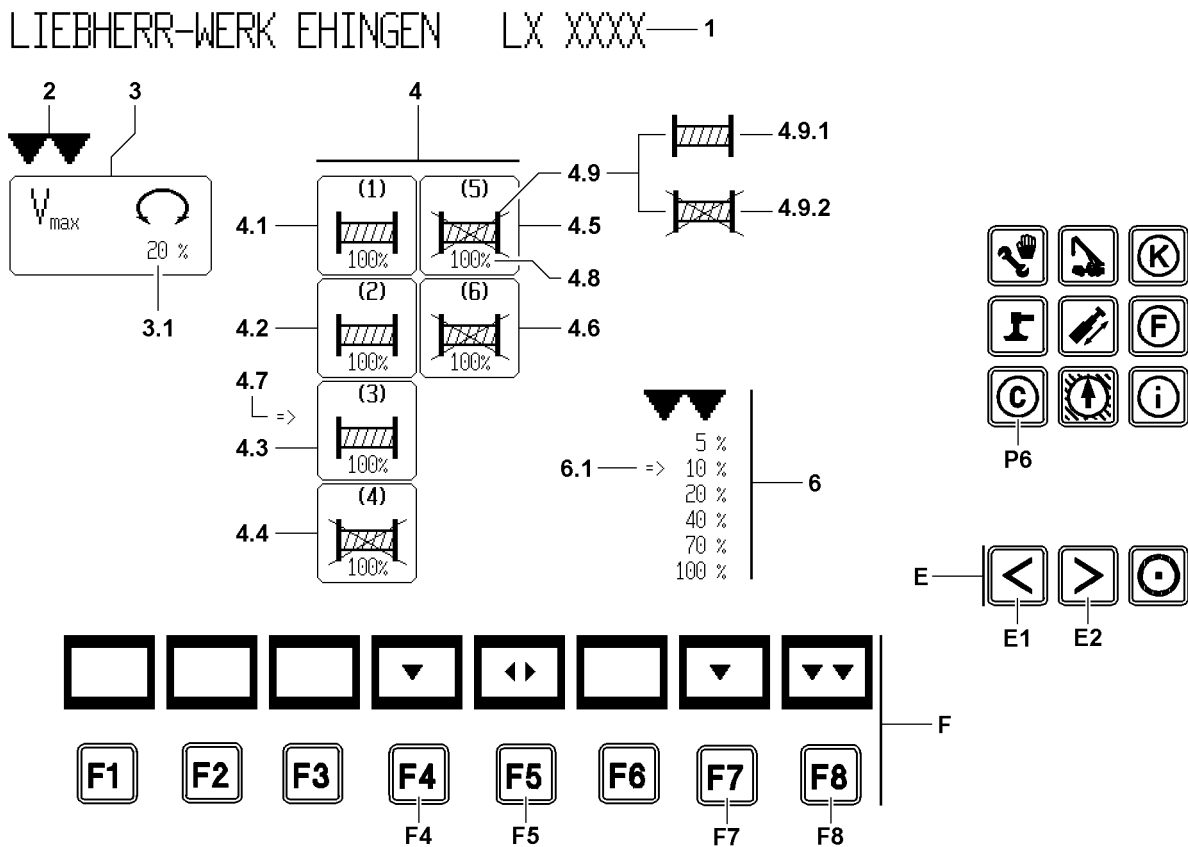
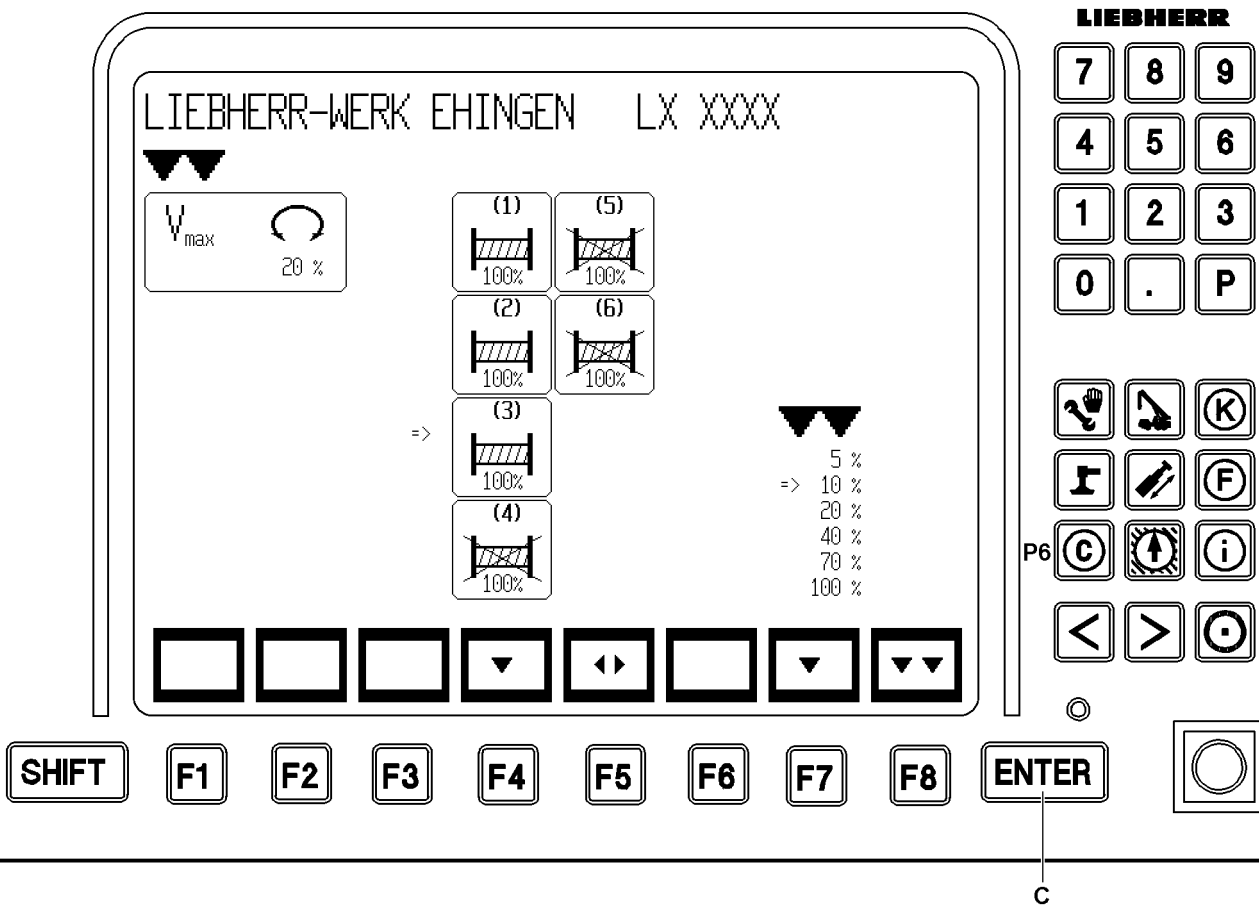


Fig.111903

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12.4.2 Activating / deactivating individual winches

In order to prevent unintentional activation of a winch that is currently not required, deactivate individual winches.

- ▶ Using the special function key **E1** or special function key **E2**, select the icon group „Winches“ **4**.

Result:

- Selector (double arrow down) **2** appears above the icon group „Winches“ **4**.

- ▶ With the function key **F4**, select the icon for „Winch 1“, **or** „Winch 2“, **or** „Winch 3“, **or** „Winch 4“, **or** „Winch 5“, * **or** „Winch 6“*.

Result:

- Selector (arrow to right) **4.7** shows the selected winch.

- ▶ Using the function key **F5**, activate or deactivate the selected winch.

Result:

- The winch icon in the icon changes the appearance.

Winch icon not crossed out = winch activated **4.9.1**

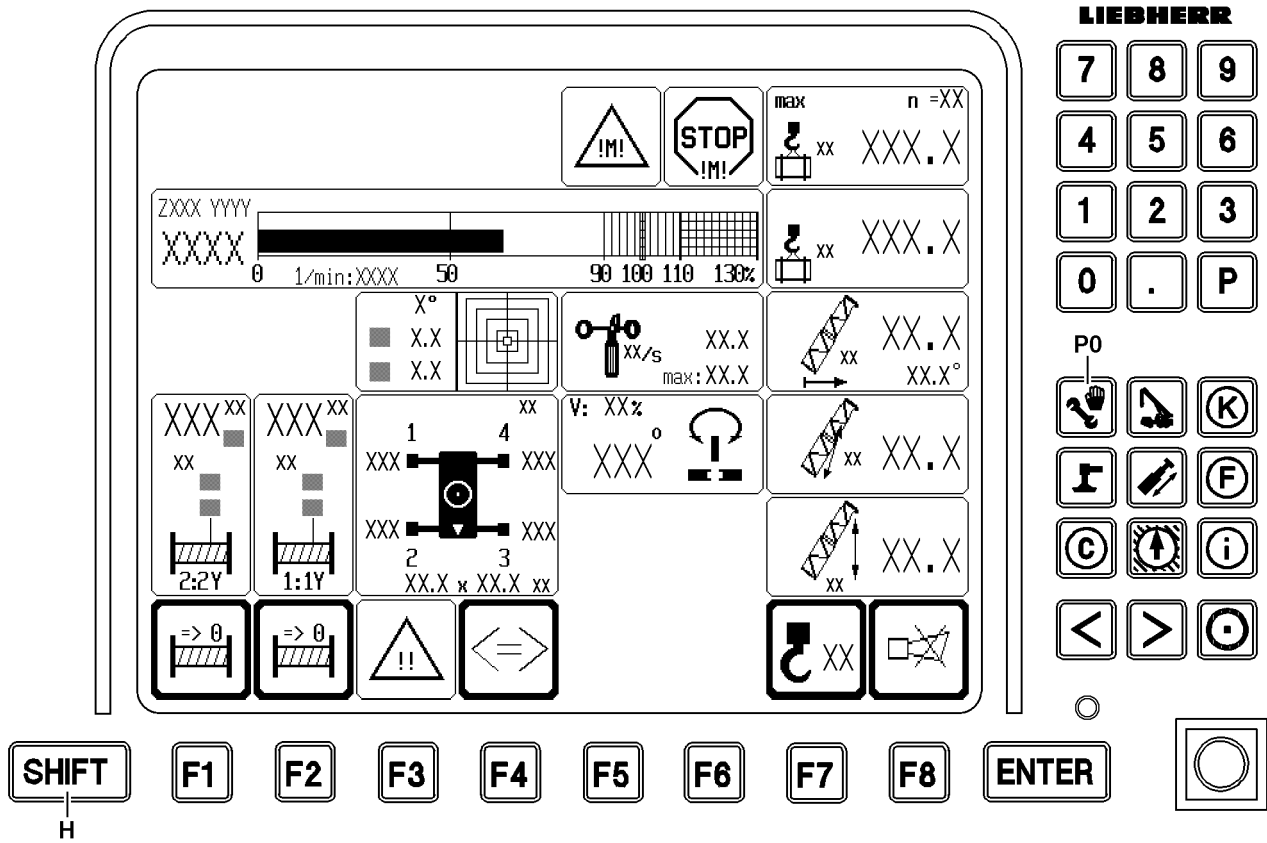
Winch icon crossed out = winch deactivated **4.9.2**

12.5 Switching back to the crane operation program

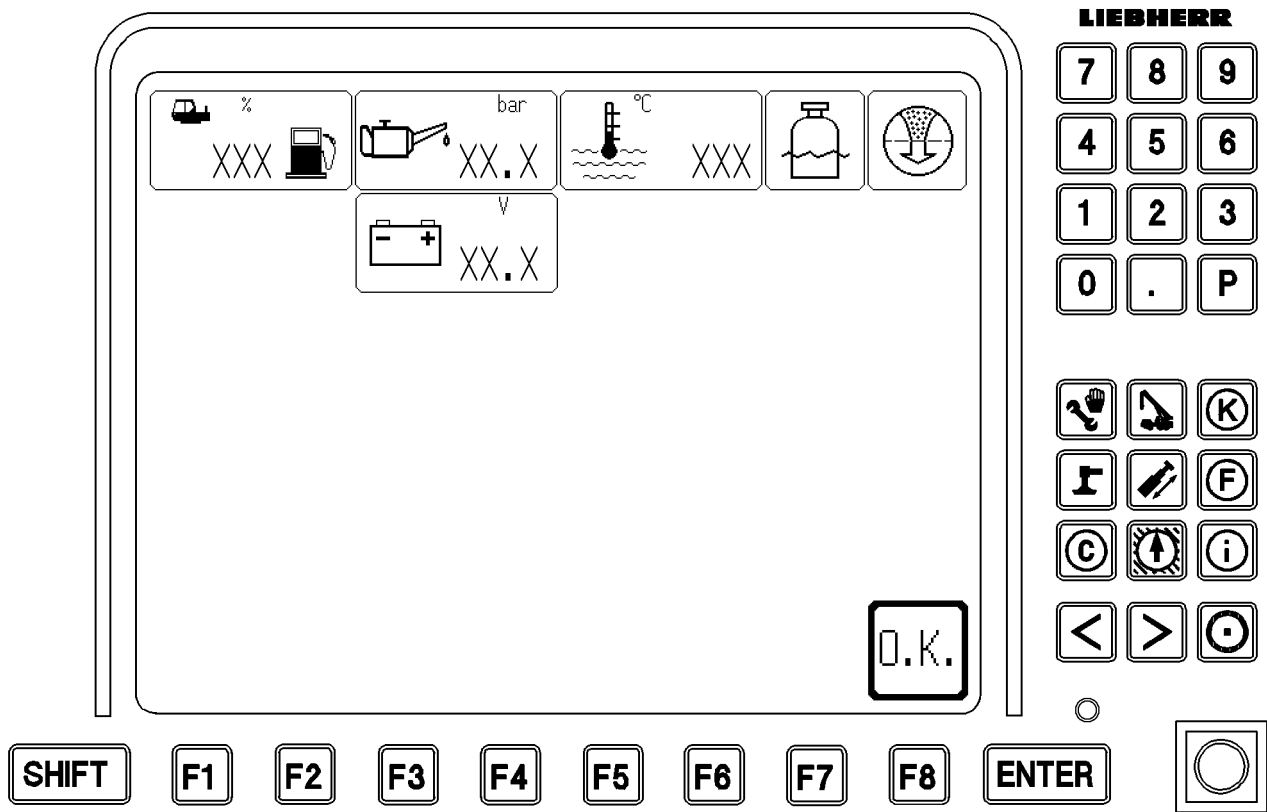
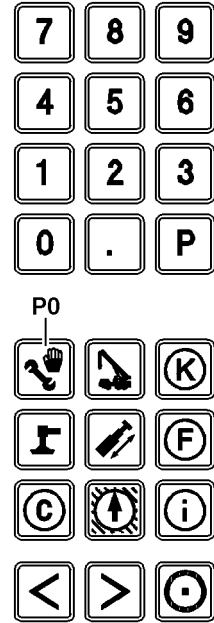
- ▶ Press the function key **F8**.

Result:

- The parameters previously confirmed with the ENTER key **C** will be taken over into the control.



LIEBHERR



LIEBHERR

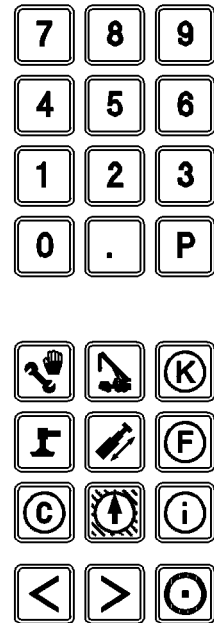


Fig.111908

13 The engine monitoring program

All engine-related data is displayed by the engine monitoring program, such as the engine oil pressure, coolant temperature etc. The change from the crane operation into the engine monitoring program is made automatically in case of a problem.

13.1 Starting the program

The program starts automatically:

- ▶ Once if a STOP event of the engine monitoring takes place during **crane operation** or in the support program (at least one master switch is deflected or activated). The engine monitoring screen is displayed for approx. 5 seconds and then automatically reverts to the crane operating screen.
- ▶ Once if a STOP event of the engine monitoring occurs while the support program is active.
or
At an advance warning, warning or STOP event of the engine monitoring during the boot up of the LICCON computer system.

This is how you start the program on request:

- ▶ Press the key combination SHIFT **H** + program key **P0**.

Result:

- The engine monitoring screen is shown.
- All **load moment increasing** crane movements are blocked or turned off.

NOTICE

Danger of severe engine damage!

If the engine monitoring program reports a problem and / or warning occurrence, then you must react immediately and remedy the problem!

- ▶ React to problems and / or warning occurrences immediately and remedy the problem!
 - ▶ If necessary, stop crane operation and turn the engine off!
-

NOTICE

Disregard of occurred STOP events!

If other programs are used for extended periods of time, for example the set up program, it is essential to switch occasionally to the engine monitoring screen in order to ensure that no engine monitoring events have occurred, which could lead to damage or destruction of the engine!

- ▶ Switch over occasionally to the engine monitoring screen!
-
- ▶ If you don't work in the crane operation or the support* programs, switch over occasionally to the engine monitoring screen.

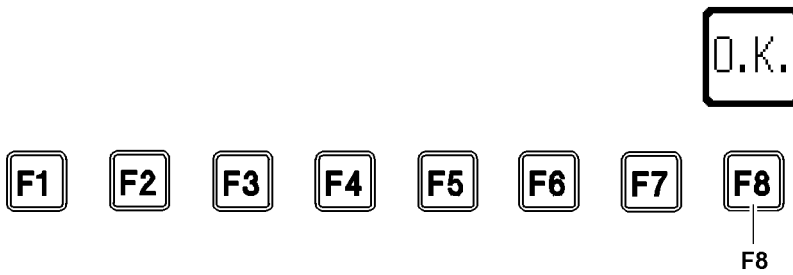
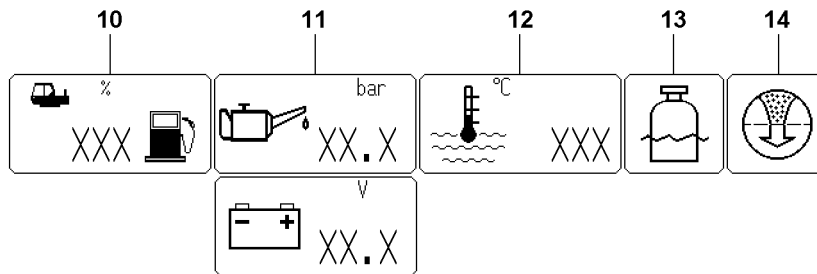


Fig.111910

13.2 Engine monitoring icons

13.2.1 Crane engine

- 10 Tank contents
 - In percent [%]
Icon blinks if the fuel reserve is less than 10 %
- 11 Oil pressure
 - In [bar]
Numeric display in icon blinks if the engine oil pressure is too low
- 12 Coolant / charge air temperature
 - In [°C]
- 12.1 Coolant temperature
 - Numeric display blinks if the coolant temperature is too high
- 12.2 Charge air temperature
 - Numeric display blinks if the charge air temperature is too high
- 13 Coolant level too low
 - Icon appears if the coolant level is too low
- 14 Air filter is dirty
 - Icon appears if air filter is dirty
- 18 Auxiliary function - Battery voltage
 - In [V]
Numeric display in icon blinks if the operating voltage is less than 16 V or above 36 V

13.3 Function key line

- F8 Function key
 - Switching back to the crane operation program



Note

- ▶ The function keys „F1“ to „F7“ are **not** used!
-

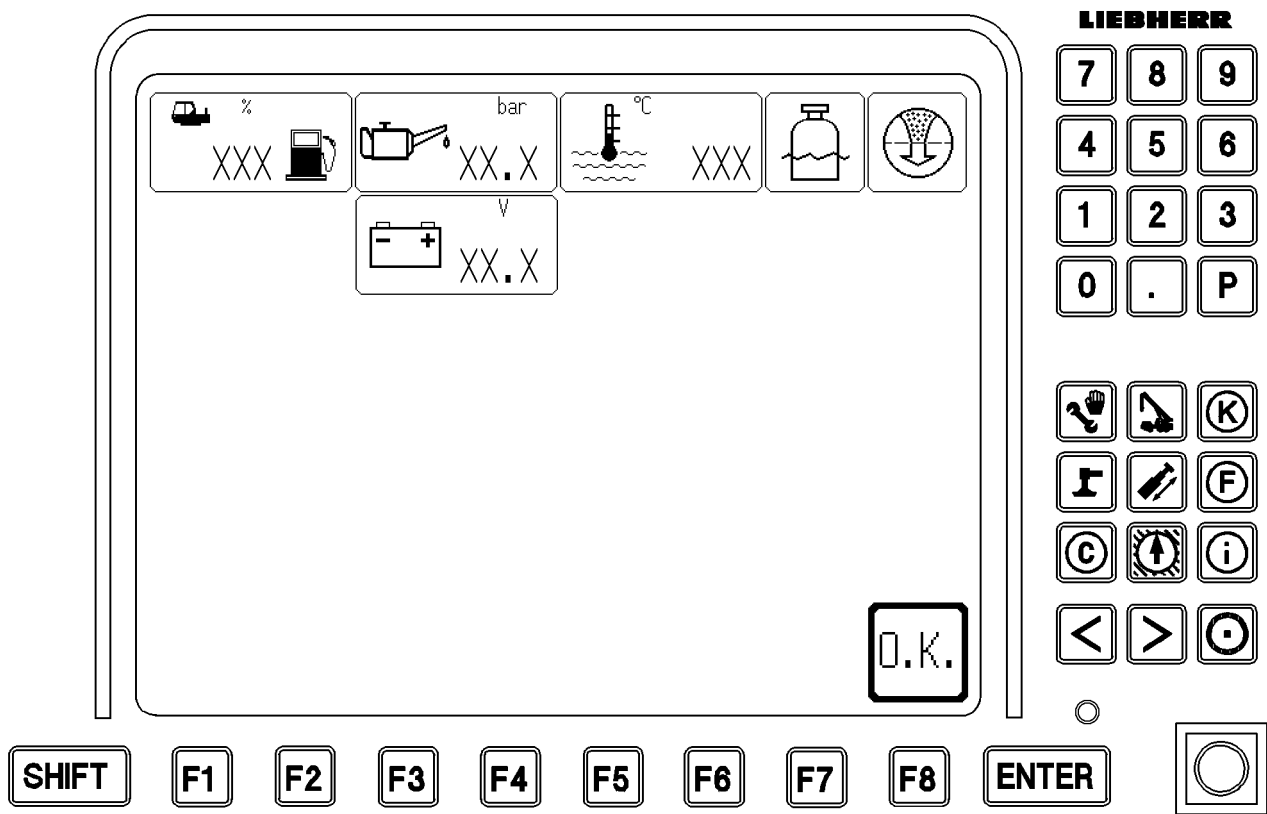
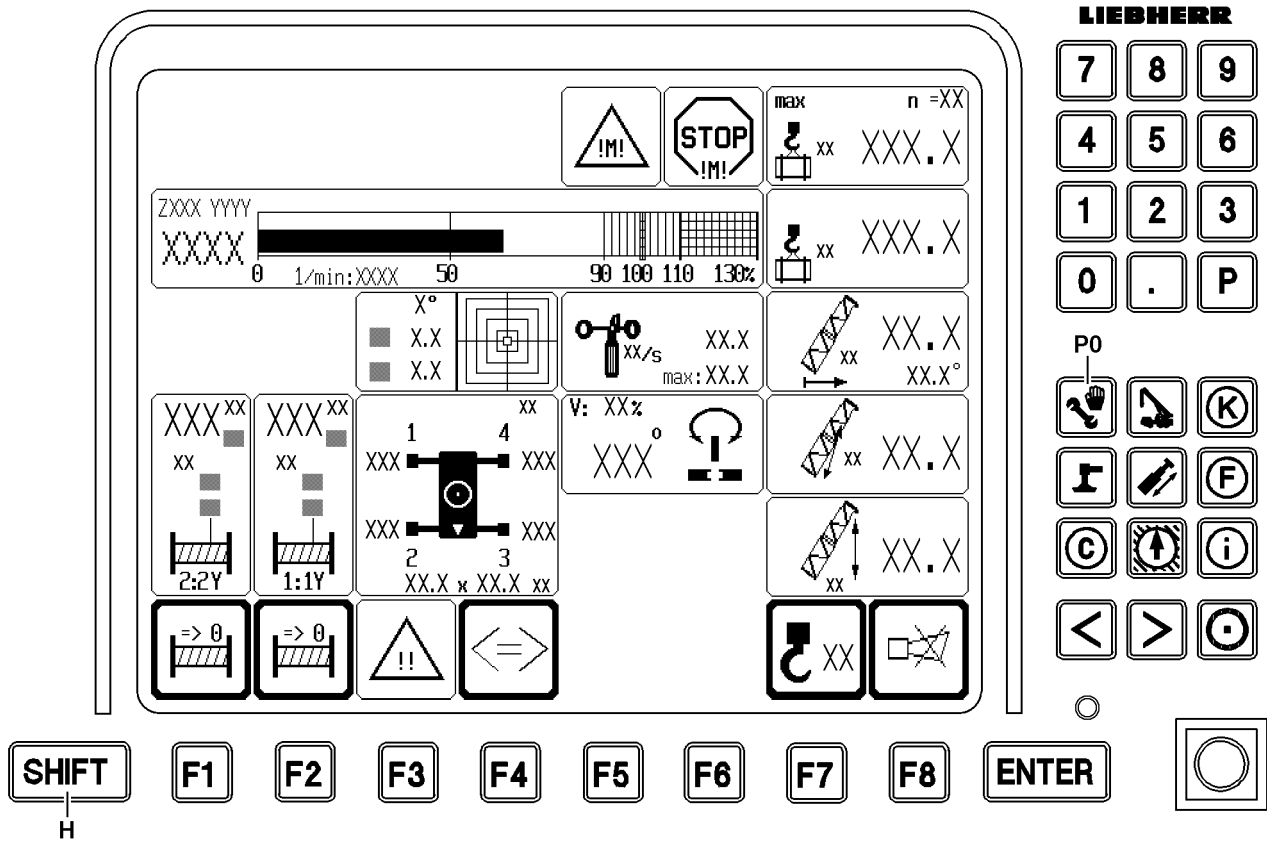


Fig.111908

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14 Possible engine monitoring advance warning, warning and STOP events

Events	Advance warning	Warning 5.2	STOP 6.2
Engine oil pressure (display value) missing		x	
Erroneous engine oil pressure (display value)		x	
Engine oil pressure warning active			x
Coolant / charge air temperature (display value) missing		x	
Erroneous coolant / charge air temperature (display value)		x	
Coolant / charge air temperature warning active			x
Coolant level warning active			x
Hydraulic oil temperature (display value) missing	x		
Erroneous hydraulic oil temperature (display value)	x		
Hydraulic oil temperature (display value) too high		x	
Air filter monitoring		x	
Battery voltage (display value) missing	x		
Erroneous battery voltage (display value)	x		
Battery voltage not between 16 V and 36 V	x		
Fuel reserve (display value) missing	x		
Erroneous fuel reserve (display value)	x		
Fuel reserve (display value) 10 % or less	x		
Fuel reserve (display value) 6 % or less		x	
Fuel reserve (display value) 1 % or less			x

If the system automatically switches to the engine monitoring program when an engine STOP event occurs, there is an option for retaining the engine monitoring screen within 5 seconds (retaining the engine monitoring screen is achieved by pressing the function key **F1**). Switch back to the operating screen using the function key **F8** (OK) or the program key **P1** (crane operation). If the engine monitoring screen is **not** retained, then after 5 seconds the system switches back automatically to the crane operation program.

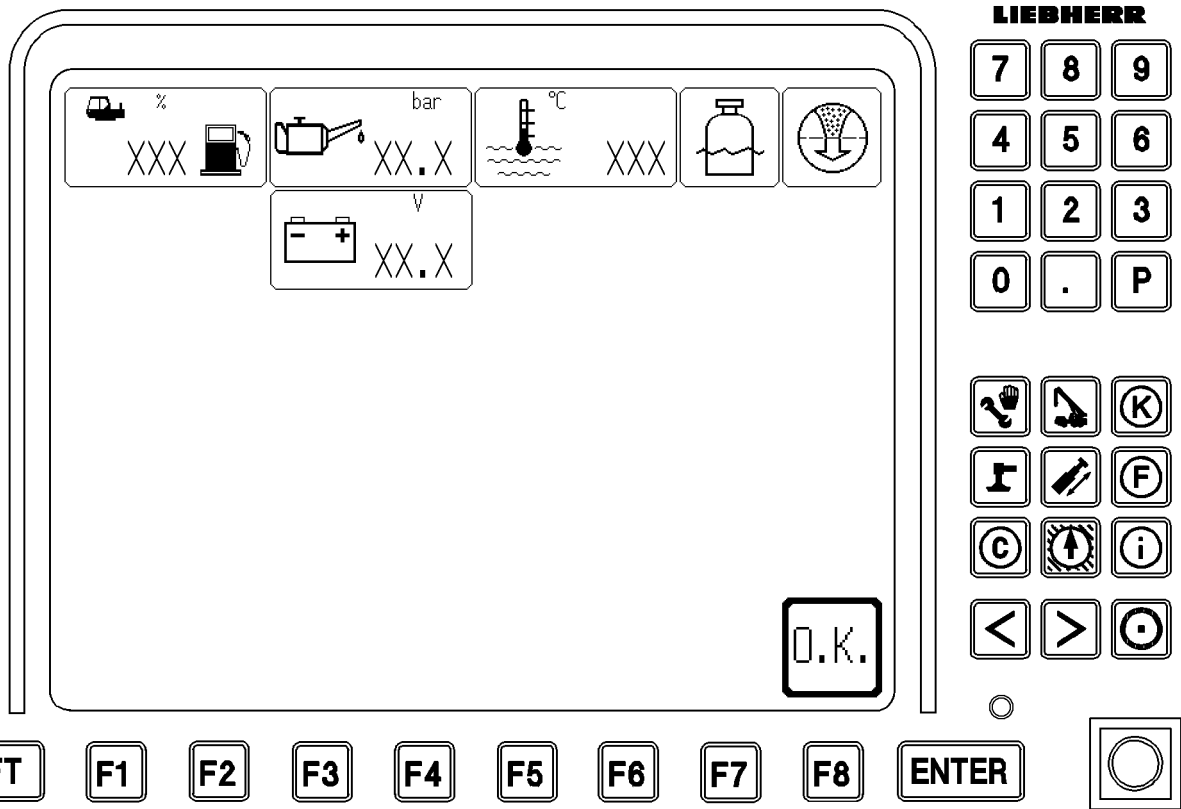
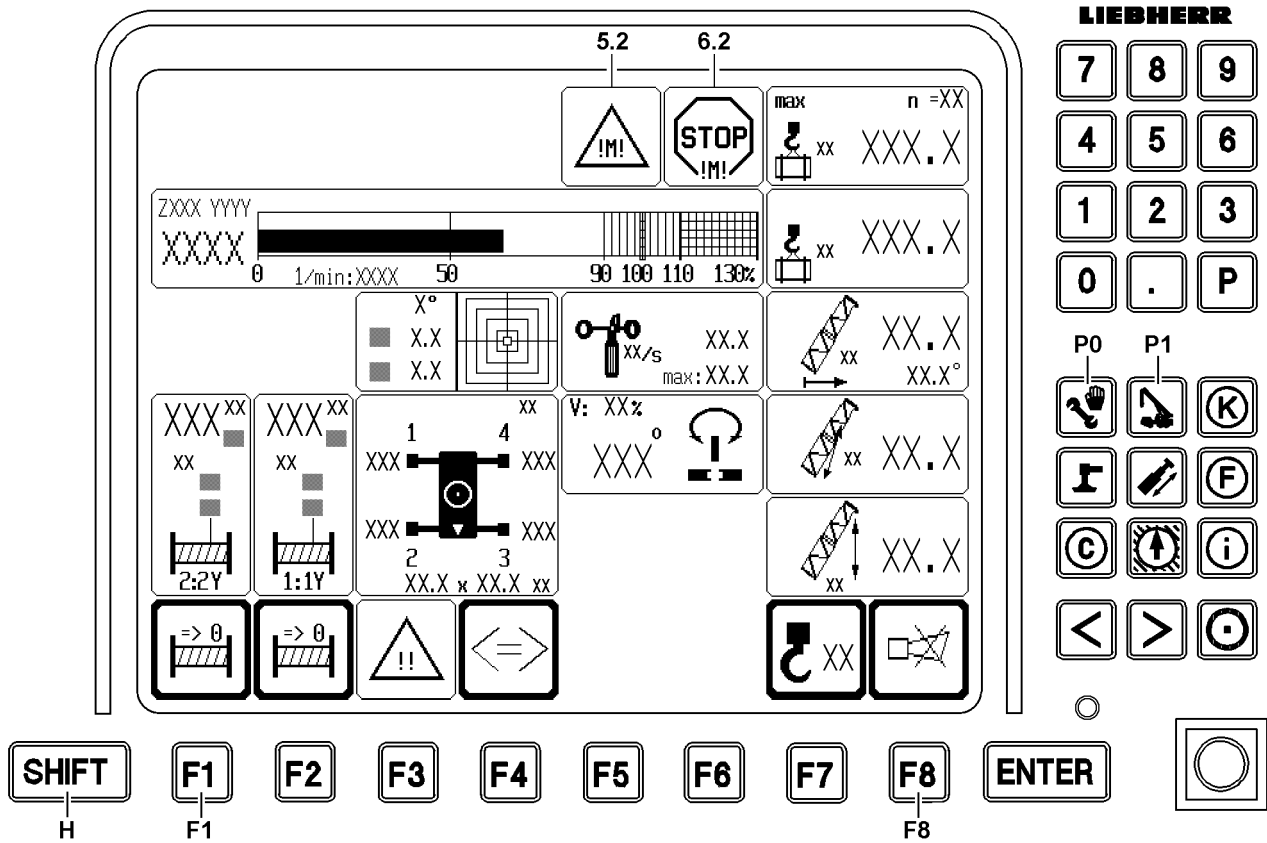


Fig.111909

15 Retaining the engine monitoring screen

The automatic change over into the engine monitoring screen is only made from the crane operation program.

If you confirm a monitoring event in the engine monitoring screen with the function key **F8**, then there will be **no** automatic change over to the engine monitoring screen for the same event.

When switching back to the crane operation program, the STOP icon **6.2** or the warning icon **5.2** appears. Advance warnings are **not** pointed out in the crane operation program.

NOTICE

Danger of severe engine damage due to disregard of STOP occurrences!

If other programs are used for extended periods of time, for example the set up program, it is essential to switch occasionally to the engine monitoring screen in order to ensure that no engine monitoring events have occurred, which could lead to damage or destruction of the engine!

- ▶ Switch over occasionally to the engine monitoring screen!
- ▶ In case of an active engine STOP event, turn the engine off immediately!

-
- ▶ Press the function key **F1**.

Result:

- Icon frames are displayed with a thin border.
- All load moment increasing crane movements will be turned off or blocked.

- ▶ Press the function key **F8**.

Result:

- System switches back to the crane operation program.
- The block of the load moment increasing crane movements will be lifted.
- The warning or STOP icon is still shown in the crane operation program.

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Checks before start up

Various checks must be performed before operating the crane.

Make sure that the following prerequisites are met:

- Engine off
- LICCON computer system in stand-by mode



Note

- ▶ LICCON computer system in stand-by mode, see Crane operating instructions, chapter 4.02!
-

1.1 Checking the general condition of the crane

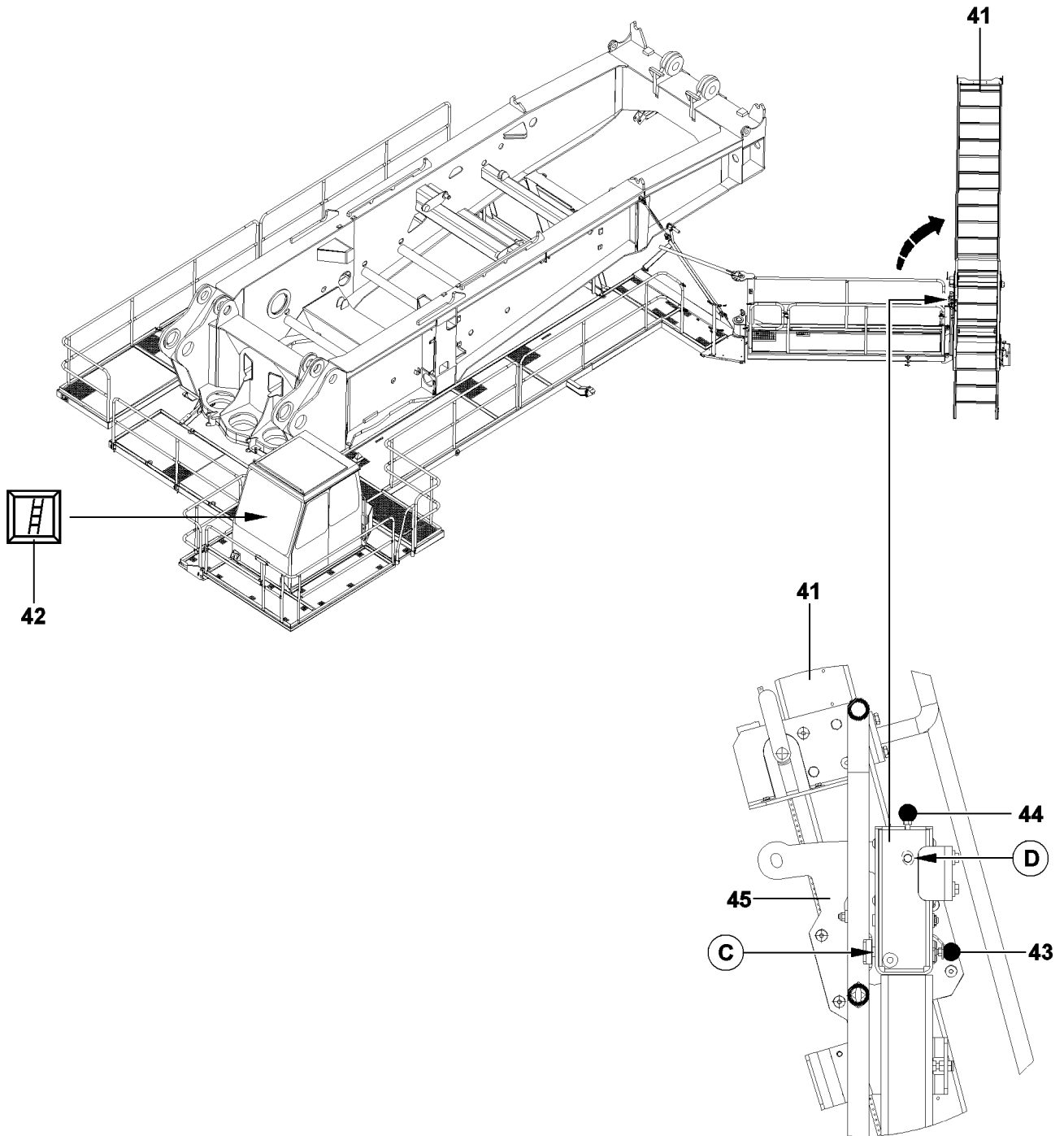


WARNING

Danger of fatal injuries due to falling parts!

If parts fall from the main boom during erection, personnel can be severely injured or killed!

- ▶ Before erecting the boom: Make sure that there are no loose parts on the boom system, such as pins, spring retainers or ice!
 - ▶ Make sure that the cable / rope drum and the limit switches are free of snow and ice!
-
- ▶ Make sure that the crane is horizontally aligned.
 - ▶ Make sure that the gear ring of the rotary connection is clean and greased.
 - ▶ Make sure that the air supply to the oil and water cooler is clear.
 - ▶ Make sure that side covers are closed and locked.
 - ▶ Make sure that no persons or objects are within the danger zone of the crane.



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Fig.198729

1.2 Electric access ladder, only for LG-operation

Make sure that the following prerequisite is met:

- The power supply in the driver's cab is turned on, see Crane operating instructions, chapter 3.01.



Note

- ▶ The access ladder **41** can be moved up / down from the driver's cab, see Crane operating instructions, chapter 3.01, or from the crane operator's cab with the button **42**!



WARNING

Danger of crushing!

When moving the access ladder **41** in / out, make sure that there are no persons or objects within the danger zone!

Personnel can be caught by the access ladder **41** and severely injured or killed as a result!

- ▶ Make sure that personnel cannot be caught by the access ladder **41**!
- ▶ When moving the access ladder **41** in / out without visual contact, the movements must be monitored by a guide!

NOTICE

Damage to the access ladder!

If the access ladder **41** is not moved in upward completely before crane operation, then the access ladder can be damaged during crane operation!

- ▶ Before crane operation, move the access ladder **41** in completely upward!

Swing the access ladder **41** into operating position:

- ▶ Set the access ladder **41** up vertically from the placement position until the spring pin **43** automatically engages in the bore **C**.
- ▶ Pull the spring pin **44** and swing the access ladder **41** approx. 15 ° to the rear until the spring pin **44** engages in the bore **D** of the retainer **45**.
- ▶ Establish the electrical connections for the access ladder **41**.
- ▶ Press the button and set up the access ladder **41** until stable by moving it out downward completely to the ground.

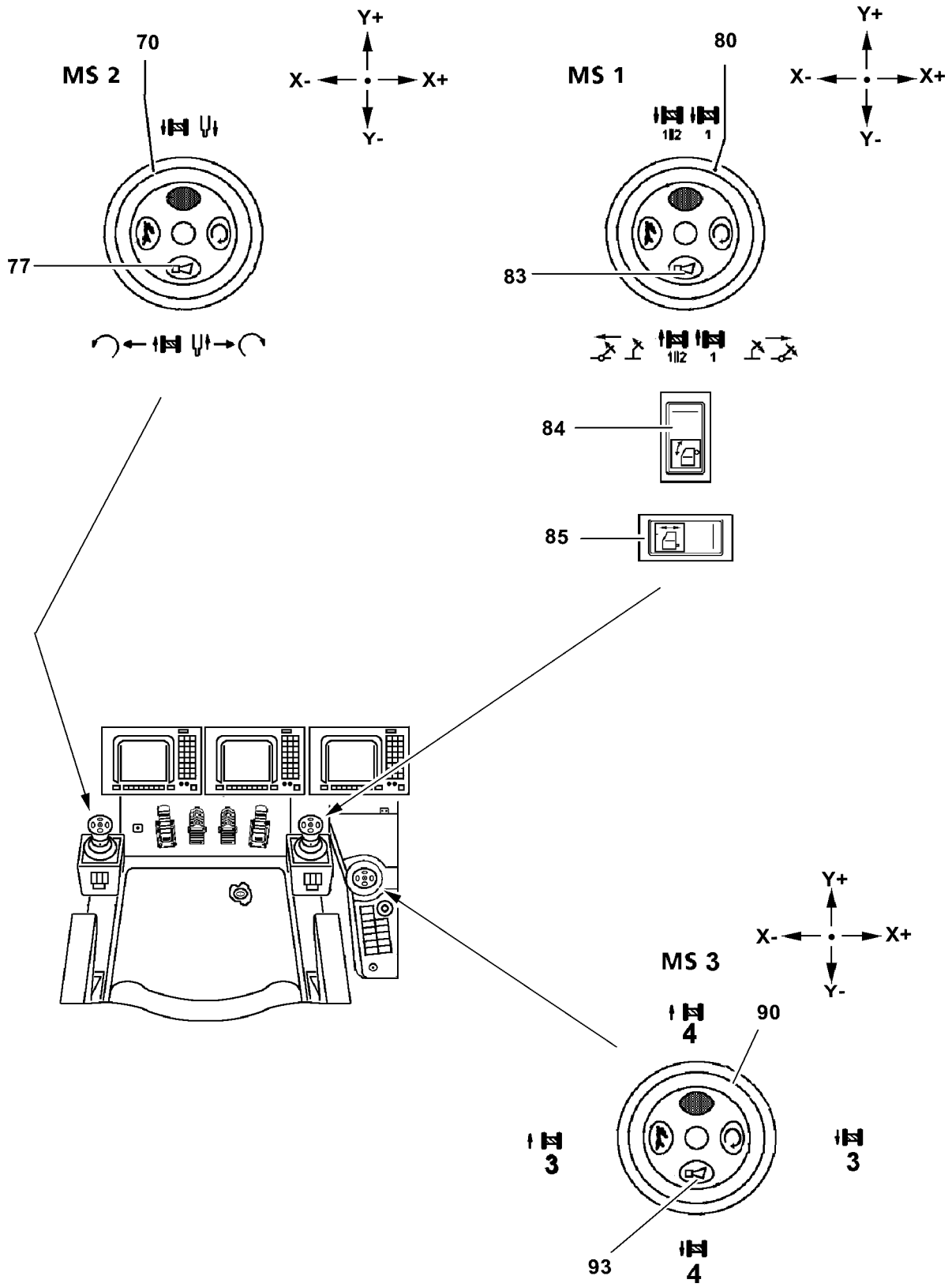


Fig.110613

LWE/LR 1750-000/12812-15-02/en

1.3 Moving the crane operator's cab



WARNING

Danger of crushing!

When swinging the crane operator's cab in and out, make sure that there are no persons or objects within the danger zone!

Personnel can be crushed and severely injured or killed as a result!

▶ Make sure that personnel cannot be caught by the crane operator's cab!

1.3.1 Swinging into operating position

The crane operator's cab is swung during transport in front of the turntable.

▶ Swinging the crane operator's cab out into operating position: Press the button **85**.

Result:

– The crane operator's cab swings out.

1.3.2 Swinging into transport position

Swing the crane operator's cab in from the operating position into the transport position.

▶ Swing the crane operator's cab all the way in: Press the button **85**.

Result:

– The crane operator's cab swings in.

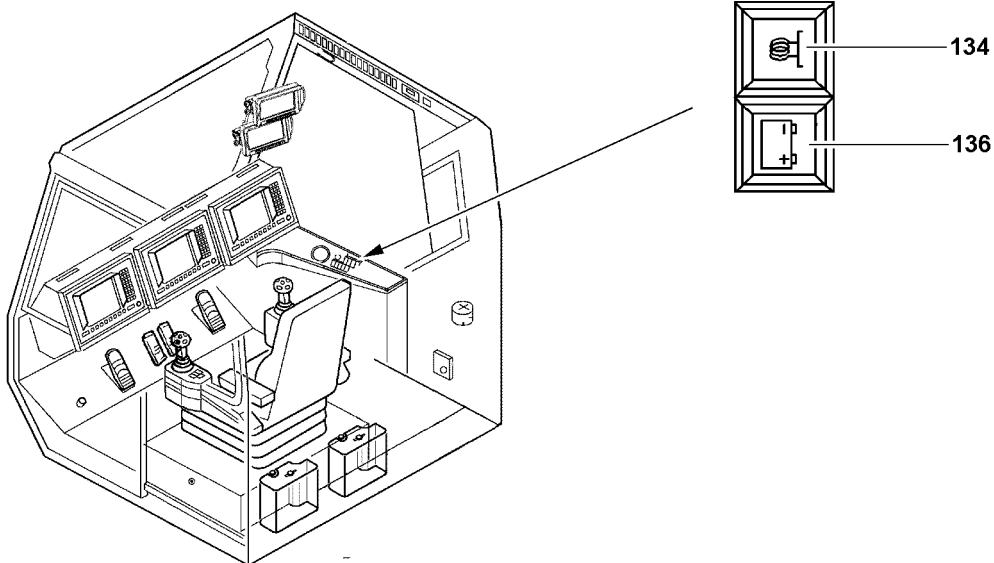
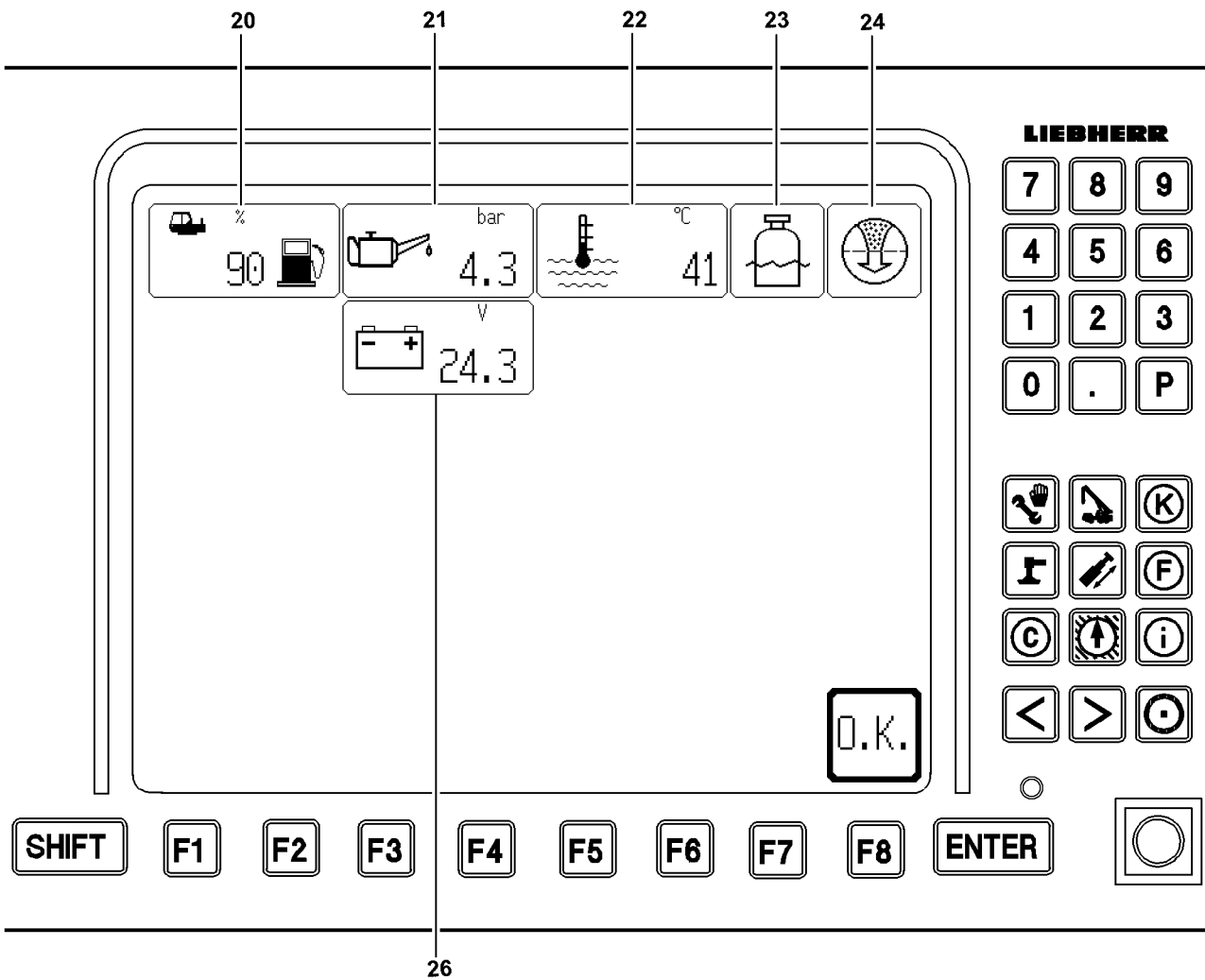


Fig.110609

LWE/LR 1750-000/12812-15-02/en

1.4 Checking the oil level and filters

- ▶ Check oil level on the crane engine.
- ▶ Check the oil level in the hydraulic tank.
- ▶ Check the filter on the hydraulic tank.

1.5 Checking the fuel level



Note

Fuel tank empty!

If the fuel tank has been run dry, then the fuel system must be bled!

- ▶ Refuel in time!

On the LICCON monitor, the amount of fuel left in the tank is shown in the form of a numerical display in percentages [%], see icon **20**.

- ▶ Check the tank contents on LICCON monitor.

1.6 Checking the coolant level

For detailed description of lubricants and fill quantities, see Crane operating instructions, chapter 7.06 and chapter 7.07.



WARNING

Danger of burns due to hot coolant!

Coolant at operating temperature is under pressure. If the cooling system is opened, there is the danger of scalding!

- ▶ Check the coolant level only when the engine is cold!

NOTICE

Property damage due to insufficient cooling!

- ▶ Check the coolant level!

If the coolant level of the coolant expansion tank falls below the overflow on the filler neck:

- ▶ Add coolant!

1.7 Checking the battery voltage



Note

The battery voltage must be checked in regular intervals, especially if the crane has been „out of service“ for a longer period of time and users, such as the airplane warning lights - are checked and the battery must be recharged if necessary!

- ▶ Recharge the battery, see Crane operating instructions, chapter 7.05!



Note

Reduced battery performance requires greater power requirements!

- ▶ Ensure that batteries are well charged, particularly during the colder months!

- ▶ Check the battery voltage, see icon **26**.

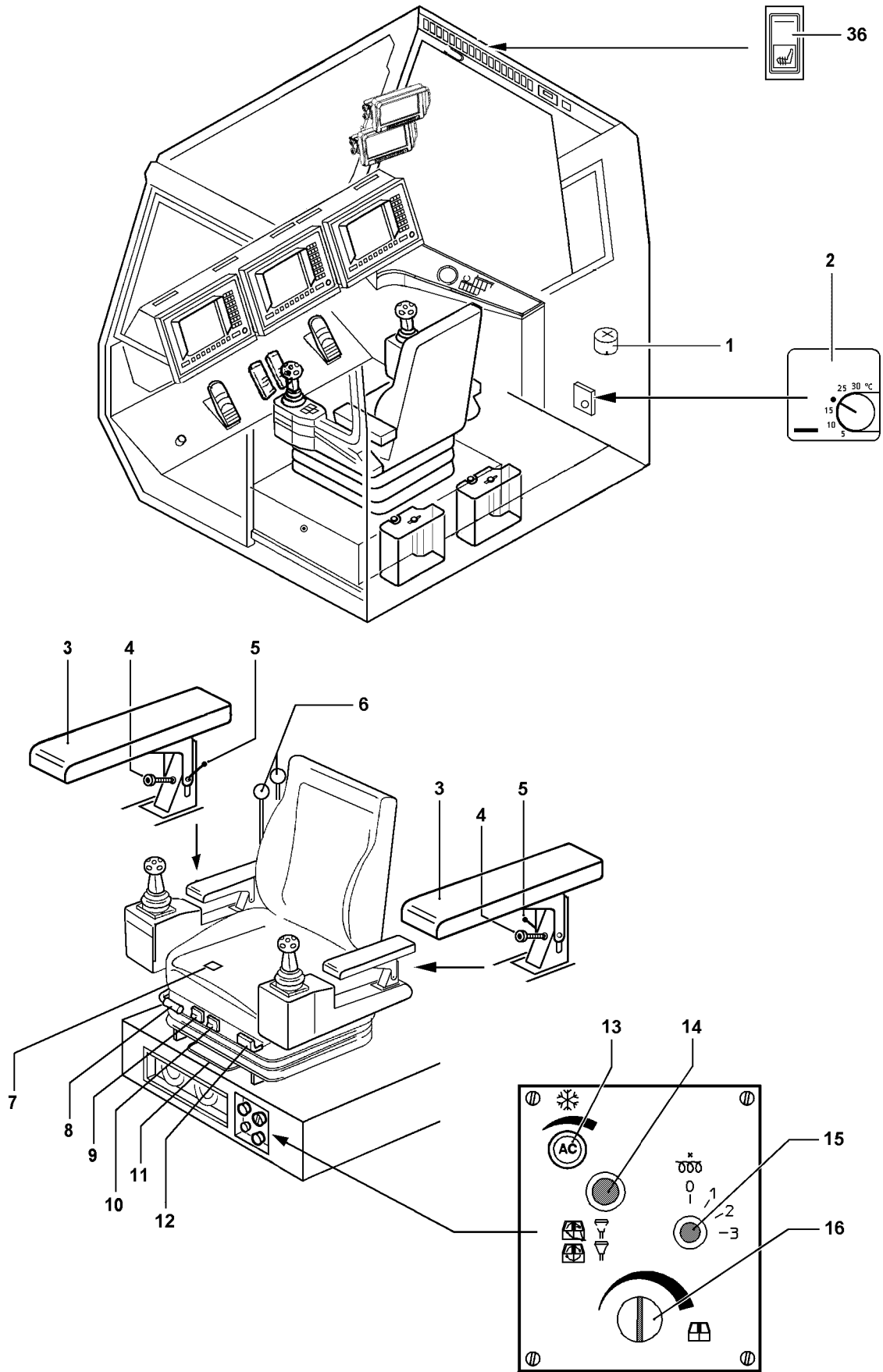


Fig.110610

LWE/LR 1750-000/12812-15-02/en

1.8 Checking the central lubrication system

For detailed description of lubricants and fill quantities, see Crane operating instructions, chapter 7.06 and chapter 7.07.

NOTICE

Property damage due to insufficient lubrication!

- ▶ Check the fill quantity of the grease containers!

If the fill quantity falls below the marked minimum amount:

- ▶ Fill the grease container with grease!
-

2 Work station - Crane operator's cab

2.1 Adjusting the crane operator's seat

The crane operator's seat can be adjusted to suit different body sizes.

2.1.1 Adjusting the seat position

- ▶ Adjust the armrest incline with the locking lever **5**.
- ▶ Adjust the seat surface incline with the manual lever **8**.
- ▶ With the button **9** adjust the lumbar area support „on the bottom“.
- ▶ With the button **10** adjust the lumbar area support „on top“.
- ▶ Unlock the horizontal seat adjustment with the bar **11**.
- ▶ Adjust the backrest incline with the manual lever **12**.



Note

- ▶ To ensure fatigue free and concentrated work with the crane, the armrests should be adjusted in such a way that you can comfortably reach and operate the master switches!
-

2.1.2 Seat heater*

The crane operator's seat can be heated with the seat heater.

- ▶ Turn the seat heater on or off with the switch **36**.

2.2 Turning the heater and ventilation on

The crane operator's cab can be heated or ventilated depending on the desired temperature.



Note

- ▶ For a detailed description, see Crane operating instructions, chapter 6.01!
-

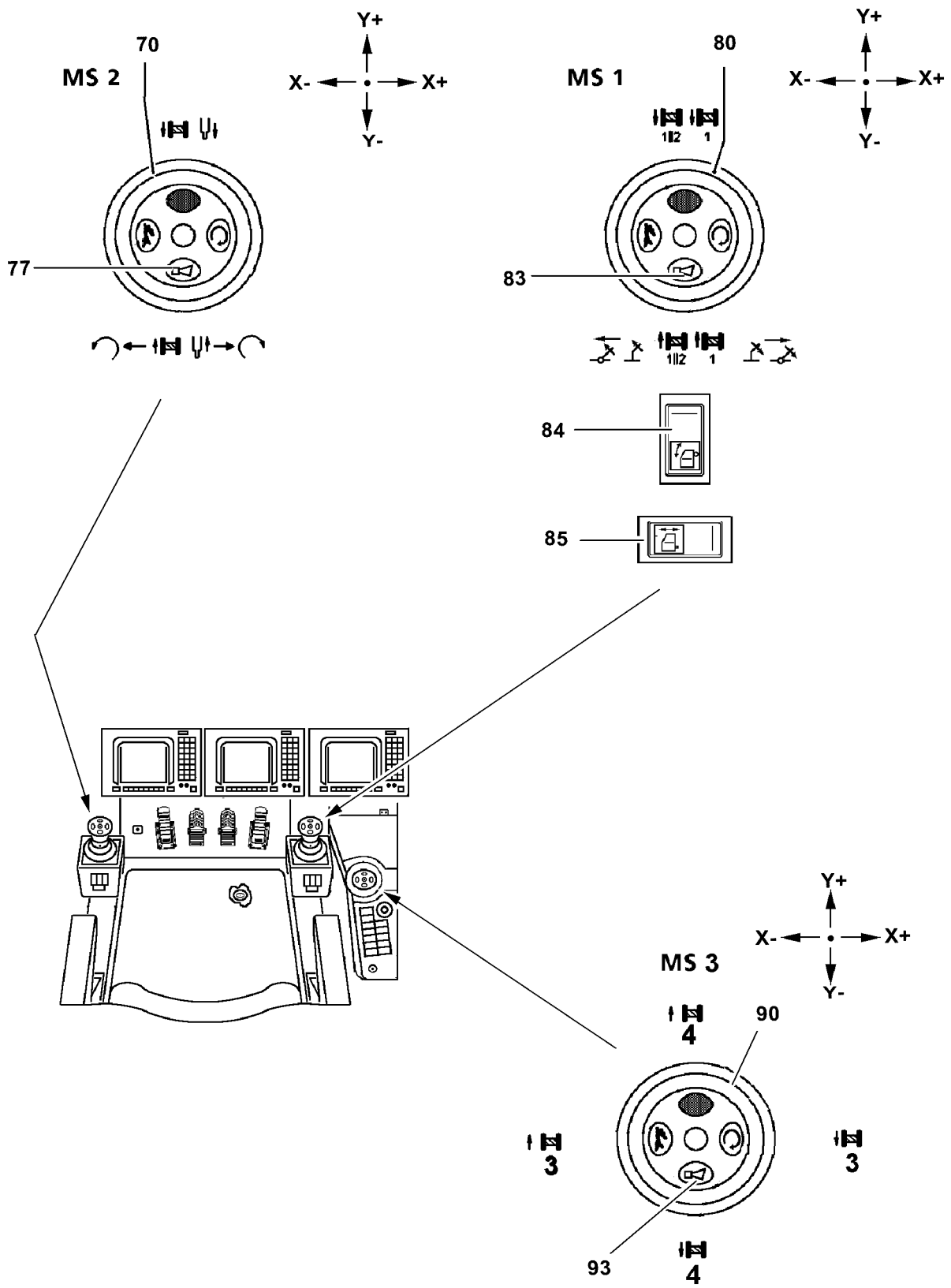


Fig.110613

LWE/LR 1750-000/12812-15-02/en

2.3 Tilting the crane operator's cab

To give the crane operator a better field of view, the crane operator's cab can be tilted upward.



WARNING

Danger of crushing!

When the crane operator's cab is tilted, the cab doors will open more quickly and hit the backstop!

Personnel can be crushed and severely injured or killed as a result!

The crane operator's cab can be damaged!

- ▶ Hold the crane operator's cab only on the handle provided for this purpose!
- ▶ To open, hold the cab door by the handle and open it slowly!

2.3.1 Tilting the crane operator's cab up

- ▶ Push the button **84** „upward“.

Result:

- The crane operator's cab swings upward.

2.3.2 Setting the crane operator's cab into horizontal position

- ▶ Press the button **84** „downward“.

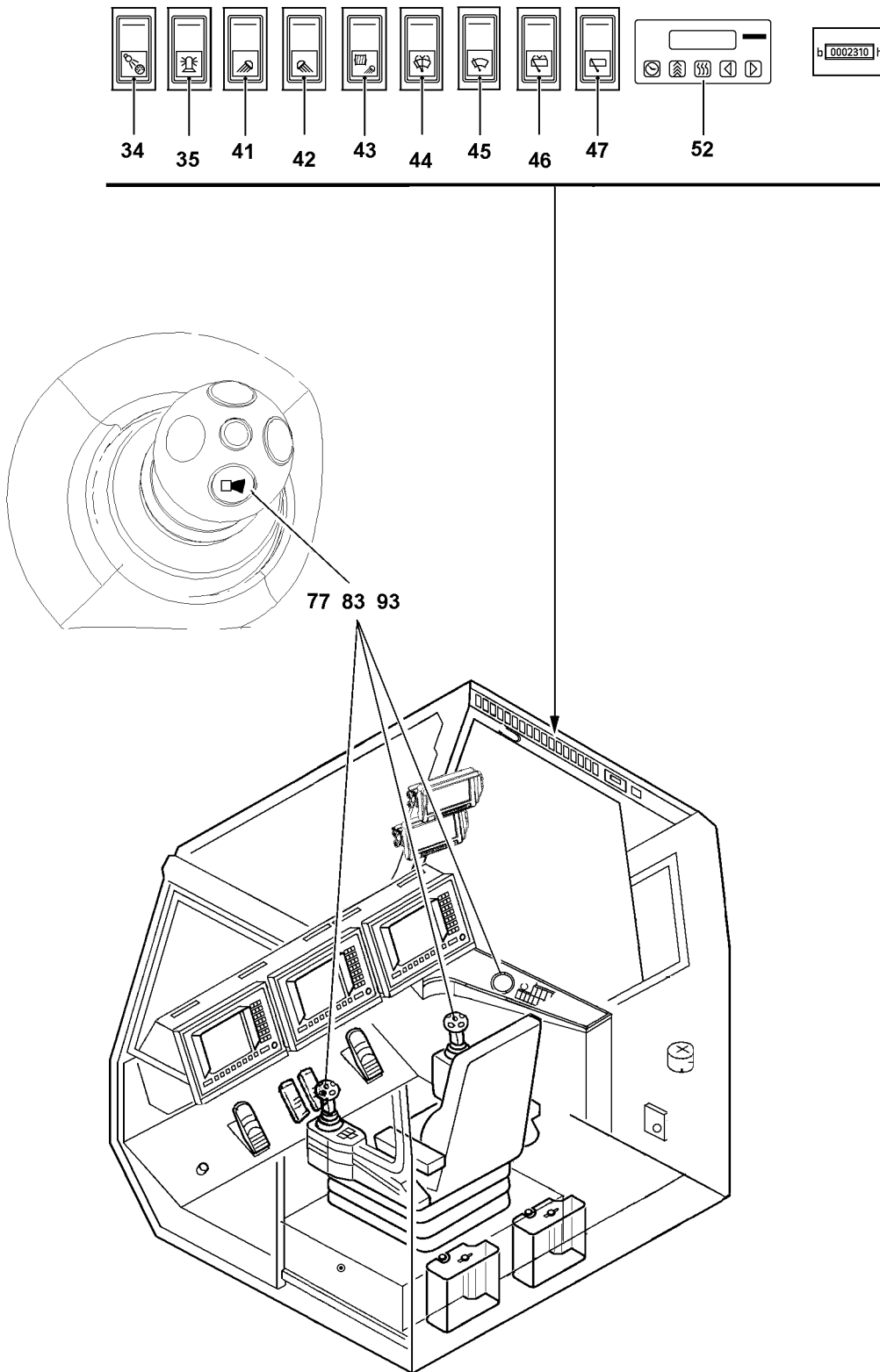
Result:

- The crane operator's cab swings downward.



Note

- ▶ After ending crane operation: Set the crane operator's cab into horizontal position!



LWE/LR 1750-000/12812-15-02/en

Fig.110611

2.4 Operating the windshield wiper / windshield washer system

2.4.1 Operating the windshield wiper

The windshield wipers on the front and roof window can be actuated with the two-stage switch:

- Switch position I: Intermittent
- Switch position II: Wipe

- ▶ Turn the windshield wiper on the front window on: Actuate the switch **45**.
- ▶ Turn the windshield wiper on the roof window on: Actuate the switch **47**.

2.4.2 Operating the windshield washer system

The windshield wipers on the front and roof windows can be assisted by a windshield washer system.



Note

- ▶ Before the start of the cold season, fill the container for the window washer fluid with standard anti-freeze mix!

-
- ▶ Turn the windshield washer system for the front window on: Press the button **44**.
 - ▶ Turn the windshield washer system for the roof window on: Press the button **46**.

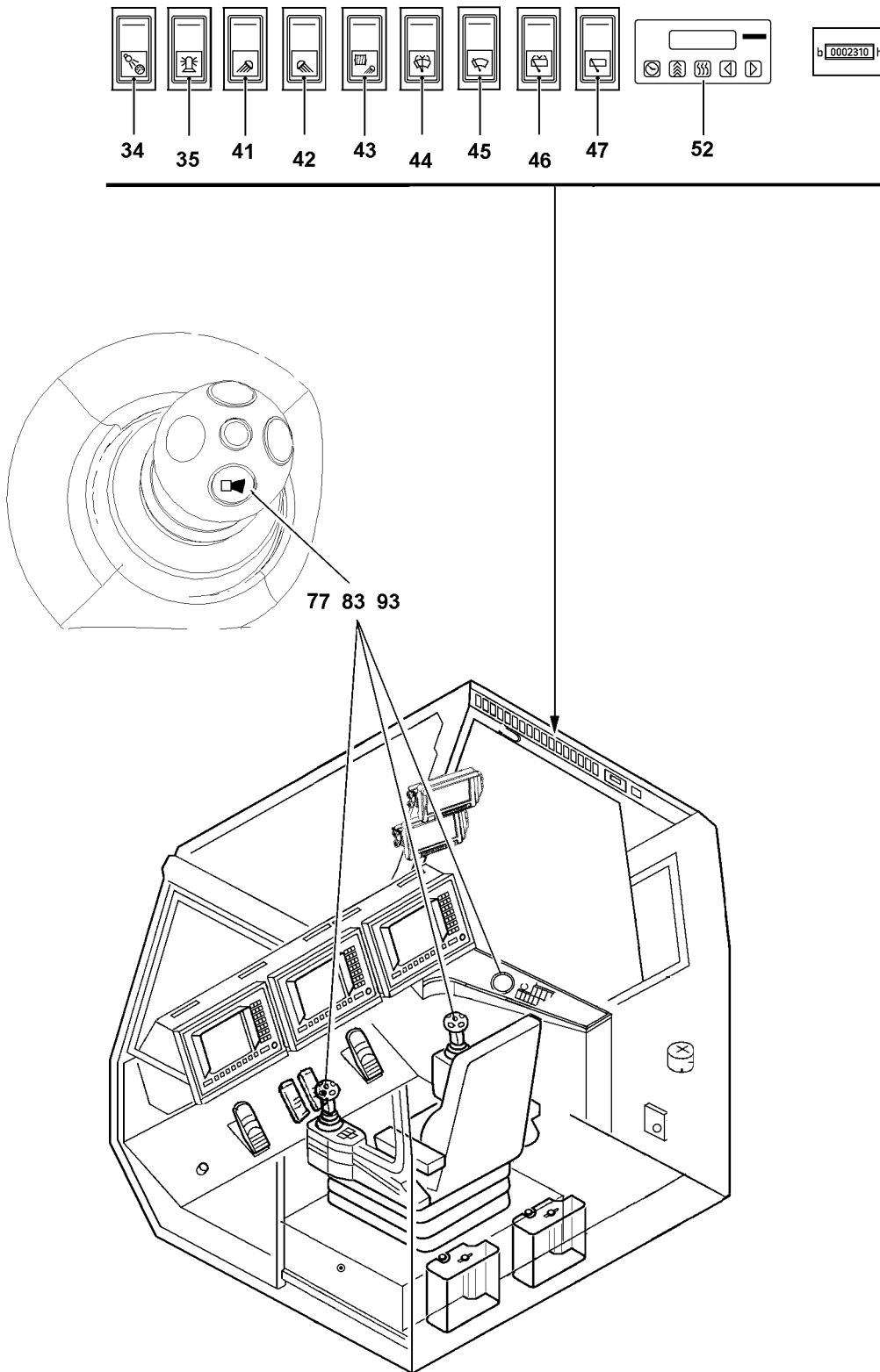


Fig.110611

LWE/LR 1750-000/12812-15-02/en

2.5 Opening the front window



WARNING

Danger of hand injury from trapping!

- ▶ Be careful with your hands when closing the front window!

A pair of nitrogen gas cylinders provide help to lift the front window.

- ▶ To open from inside, just press on the front window.
or

If you only want to partly open the window:

Adjust the window in the desired position with the provided perforated belt.

2.6 Checking the horn



Note

Use of the horn!

- ▶ Only use the horn only in dangerous situations to maintain its warning effect!

Before starting to work, check that the horn is functioning:

- ▶ Press the button **77**.
or
Press the button **83**.
or
Press the button **93**.

2.7 Turning the lights on / off

- ▶ With the switch **34** turn the instrument panel lighting on / off.
- ▶ With the switch **35** turn the airplane warning light on / off.
- ▶ With the switch **41** turn the working floodlight on the crane operator's cab pedestal on / off.
- ▶ With the switch **42** turn the working floodlight on the crane operator's cab roof on the front and rear on / off.
- ▶ With the switch **43** turn the working floodlight on the hoist winch and the mirror heater on / off.

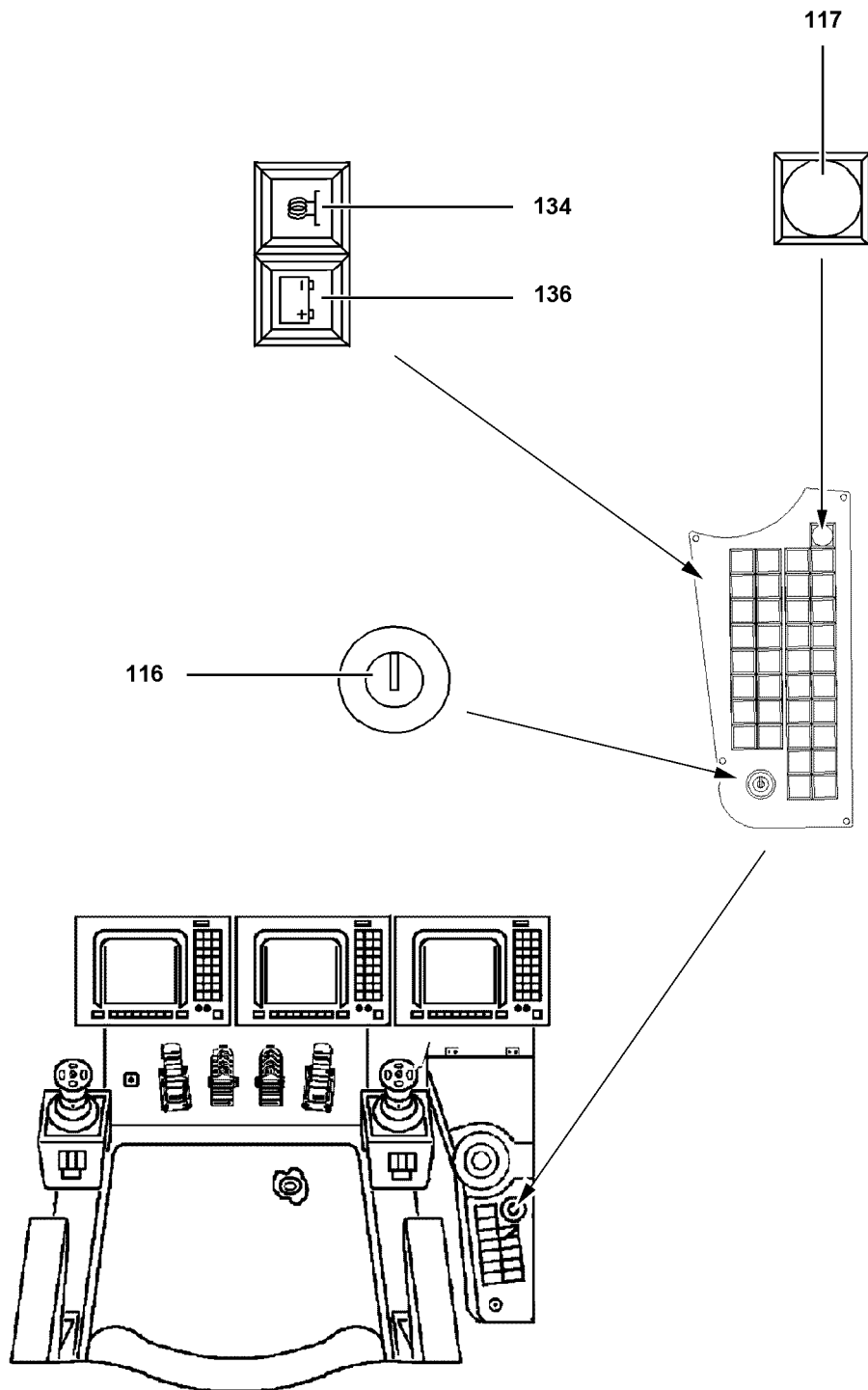


Fig.110612

LWE/LR 1750-000/12812-15-02/en

3 Starting and stopping the engine



Note

- ▶ The engine must be operated according to the separately supplied Engine Operating instructions!

3.1 Starting the engine

- ▶ Turn the ignition switch **116** to position „I“.

Result:

- The indicator light **134** blinks.
- The engine is ready to start.

NOTICE

Property damage!

- ▶ Start the engine only when the warning light **136** lights up and the indicator light **134** blinks!

- ▶ Turn the ignition starter switch **116** to position „II“.
- ▶ Start the engine.

Problem remedy

The engine does not start after a maximum of 10 seconds.

- ▶ Wait for 1 minute. The starter can be operated three times for 10 seconds per attempt with a pause in between of one minute each time.

Problem remedy

The engine stops again after running for 4 seconds.

- ▶ Turn the ignition starter switch **116** to position „0“.
- ▶ Preheat the engine for approx. 10 seconds, then restart.
- ▶ The engine control now runs with default values. Make sure to observe any error message and contact Liebherr Service, if necessary.

- ▶ Check the instruments after starting the engine.

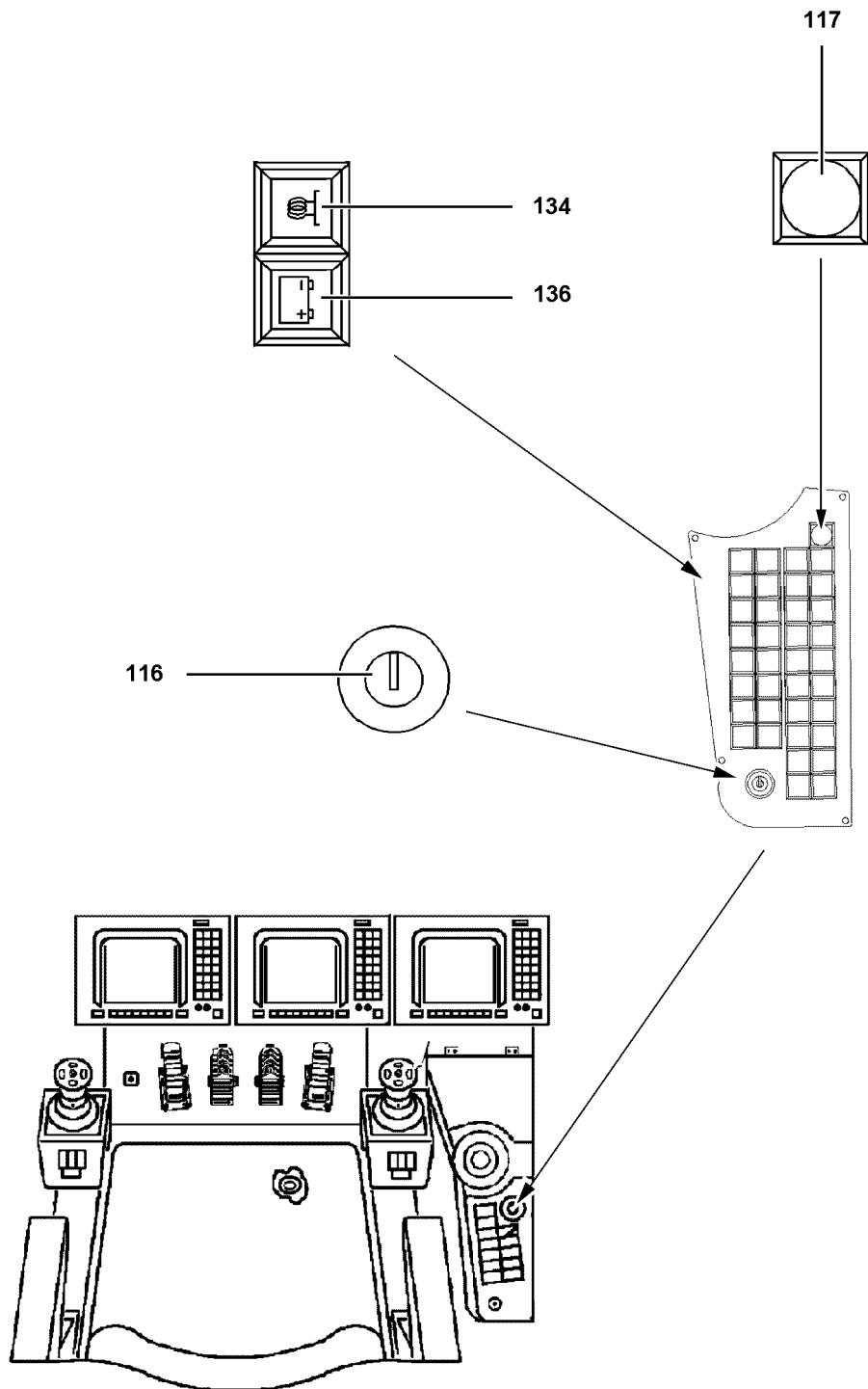


Fig.110612

LWE/LR 1750-000/12812-15-02/en

3.2 Starting the engine with the flame start system

To improve the cold start procedure, the engine is equipped with a flame start system. The flame start control turns on automatically at a coolant temperature below 15 °C and remains in operation until a coolant temperature of 25 °C has been reached.

At a coolant temperature above 15 °C , the flame start system does not turn on.

The flame start system turns off automatically if:

- The crane engine is not started when it is ready.
- The crane engine is started while the indicator light **134** lights up.
- The coolant temperature reaches 25 °C while the engine is running.



Note

Functionality of the battery in the cold season!

The starting capacity of the battery is considerably reduced in cold temperatures: For example, at a temperature of - 10 °C , the battery is at only 66% of its normal capacity!

- ▶ Once the engine has been turned off, store batteries in a heated room, if possible!

3.2.1 Starting the engine

- ▶ Turn the ignition switch **116** to position „I“.

Result:

- The indicator light **134** lights up first and then starts to blink after a short time.
- The engine is ready to start.
- ▶ Turn the ignition starter switch **116** to position „II“.
- ▶ Start the engine.

3.2.2 Error on the flame start system



Note

- ▶ If the indicator light **134** blinks too fast, then the control unit has recognized an error on the flame start control.

As errors are recognized:

- Interruption of the flame glow plug heating coil
- Missing supply voltage on terminal 30
- Defective fuse of flame start control unit
- ▶ Remedy the error or contact Liebherr Service.

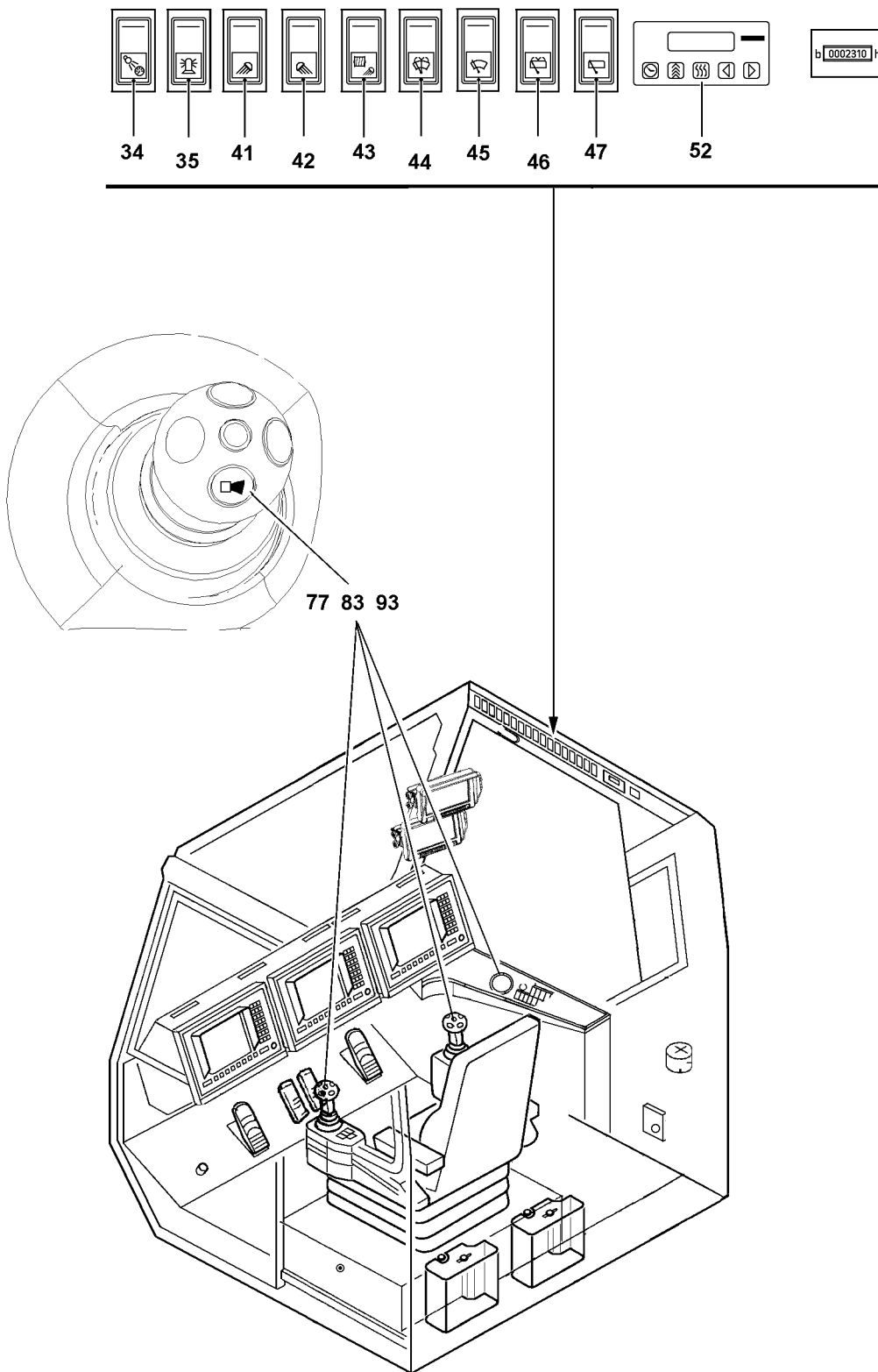


Fig.110611

LWE/LR 1750-000/12812-15-02/en

3.3 Crane engine preheating with timer

**Note**

▶ Refer to the separate WEBASTO operating instructions!

▶ Up to approx. 75 minutes before engine start, depending on the ambient temperature, turn the auxiliary heater on: Turn the auxiliary heater on on the timer **52**.

Result:

– The auxiliary heater starts approx. 10 seconds after turn on.

▶ Turn the auxiliary heater off after completion of the preheat time: Turn the auxiliary heater off on the timer **52**.

Result:

– An afterrun of the auxiliary heater will run up to 150 seconds.

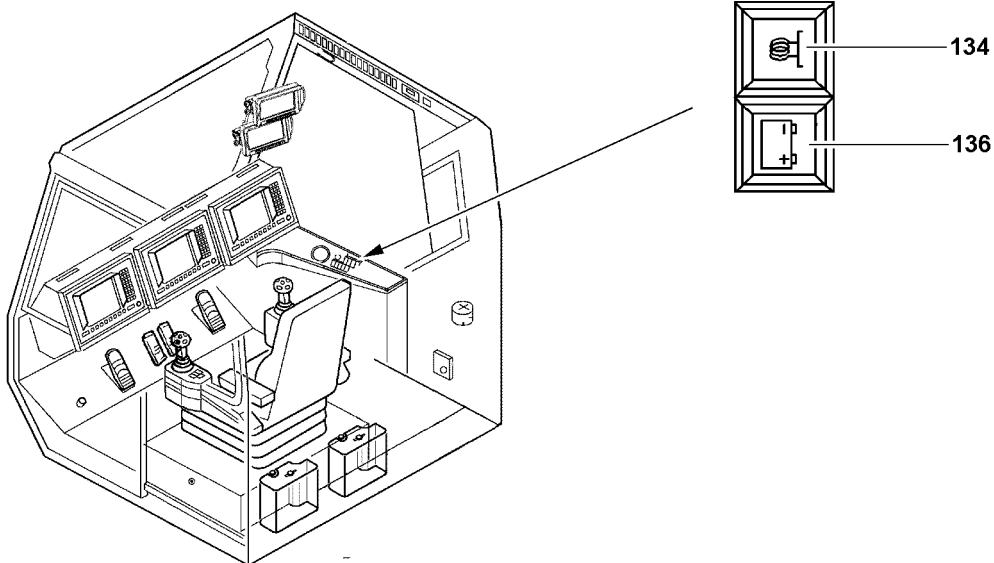
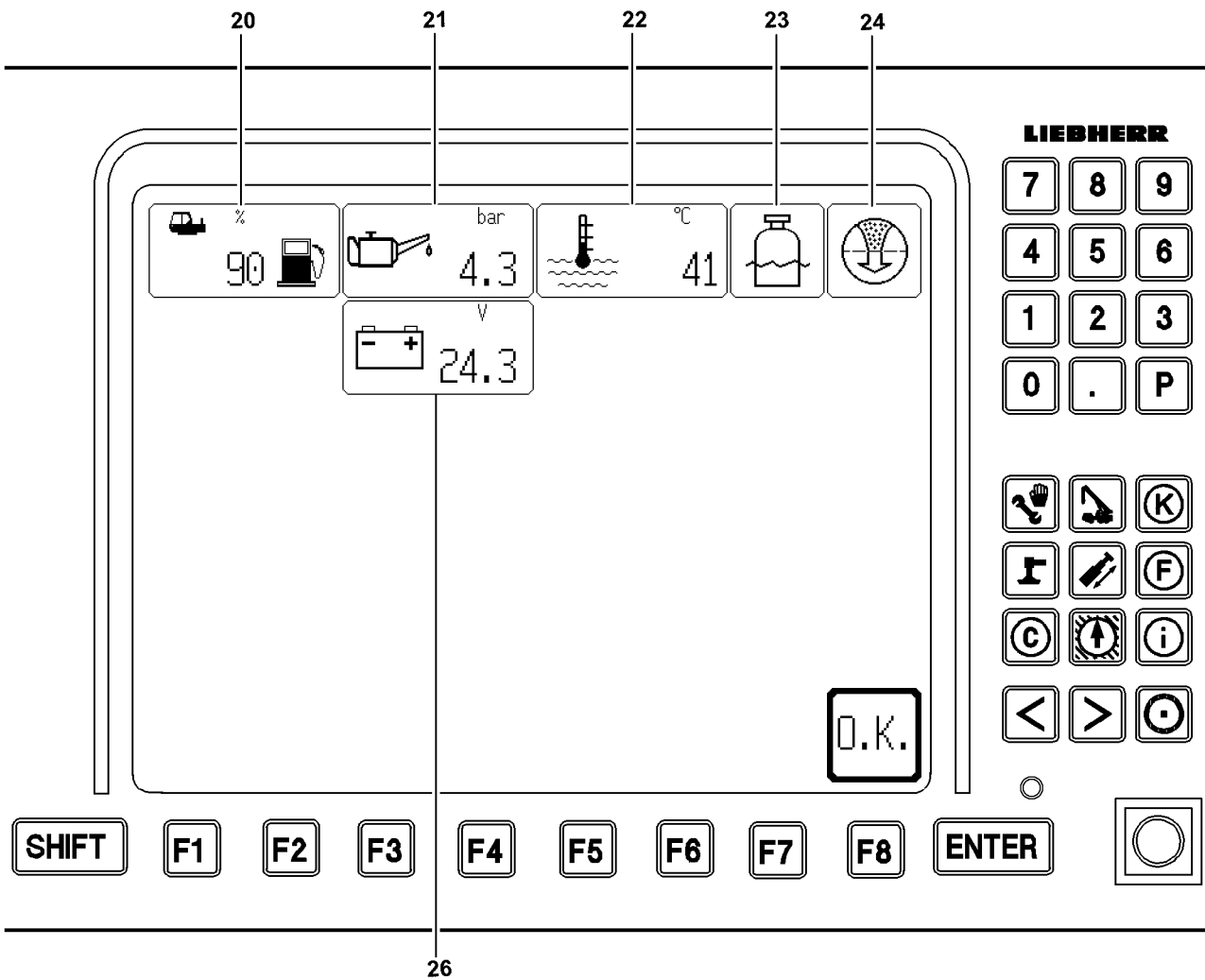


Fig.110609

LWE/LR 1750-000/12812-15-02/en

3.4 After engine start: Checking the instruments on LICCON monitor

As soon as a stable voltage is present with the engine running, the electric crane control and the LICCON computer system are turned on automatically. A self-test of the microprocessor system follows, and after a few seconds the configuration screen appears on the monitor.



Note

- ▶ Do not put a full load on the engine until it is at operating temperature!
-

The following icons must turn off when the engine is running:

- ▶ Warning light **134** „Preheat the crane engine“.
- ▶ Warning light **136** „Charge indicator“

Check the following icons when the engine is running:

- ▶ Check the icon **21** „engine oil pressure“ on the LICCON monitor.
-

Problem remedy

The numerical display for the engine oil pressure in the icon **21** blinks after approximately 10 seconds or starts to blink during crane operation.

The engine oil pressure is too low. The engine can be damaged as a result of insufficient oil pressure.

- ▶ Turn the engine off immediately and determine the cause.
-

- ▶ Check the icon **22** for „coolant temperature“.
-

Problem remedy

The numerical display for the „coolant temperature“ in the icon **22** blinks during operation.

The coolant temperature is too high. Excessive coolant temperatures can lead to engine damage.

- ▶ Turn the engine off immediately.
-

- ▶ Check the icon **20** for „fuel content“.
- ▶ Check the icon **23** for „coolant level“.
- ▶ Check the icon **24** for „air filter“.
- ▶ Check the icon **26** for „battery voltage“.
- ▶ Check the icon **27** for „hydraulic oil temperature“.

3.5 Engine monitoring

For a detailed description of engine monitoring, see Crane operating instructions, chapter 4.02.

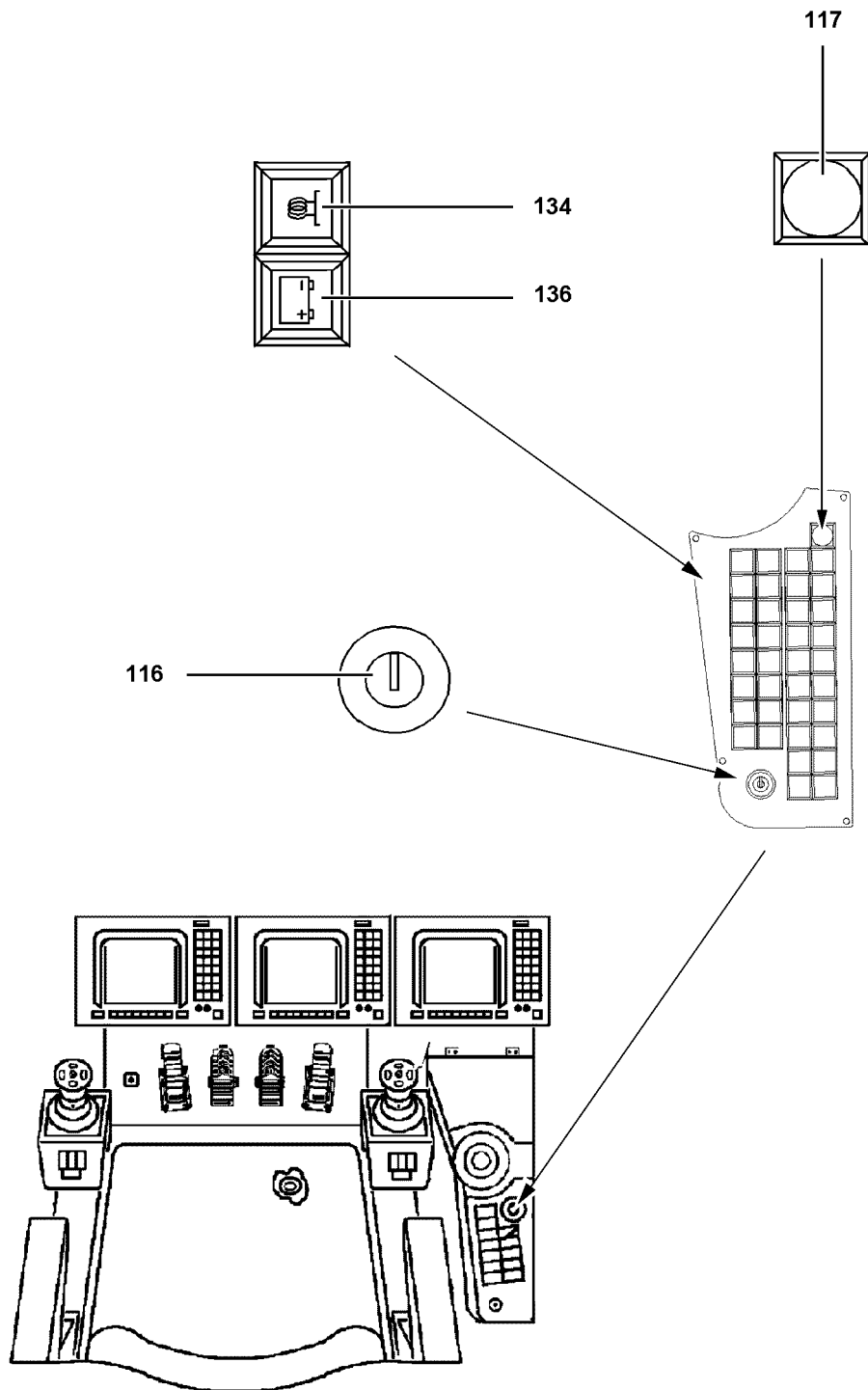


Fig.110612

LWE/LR 1750-000/12812-15-02/en

3.6 Turning the engine off

3.6.1 Turning the engine off in the event of danger



WARNING

Danger of accident due to falling loads!

If crane movements are stopped via EMERGENCY OFF, loads can start to swing and fall down. Personnel can be severely injured or killed!

- ▶ Operational use of the EMERGENCY OFF button **117** is prohibited!
 - ▶ Only use the EMERGENCY OFF button **117** in clear emergency situations!
-

- ▶ Press the EMERGENCY OFF button **117**.

Result:

- The engine will be turned off immediately.

3.6.2 Turning the engine off with the ignition key



Note

- ▶ If the crane has been operated at full engine output or at very high coolant temperatures (above 95 °C), let the engine run without a load for 1 to 2 minutes at low idle speed!
-

- ▶ Turn the ignition starter switch **116** back to the stop in position „0“.

Result:

- The engine is turned off.
- ▶ Pull the ignition key and store it in a safe place.

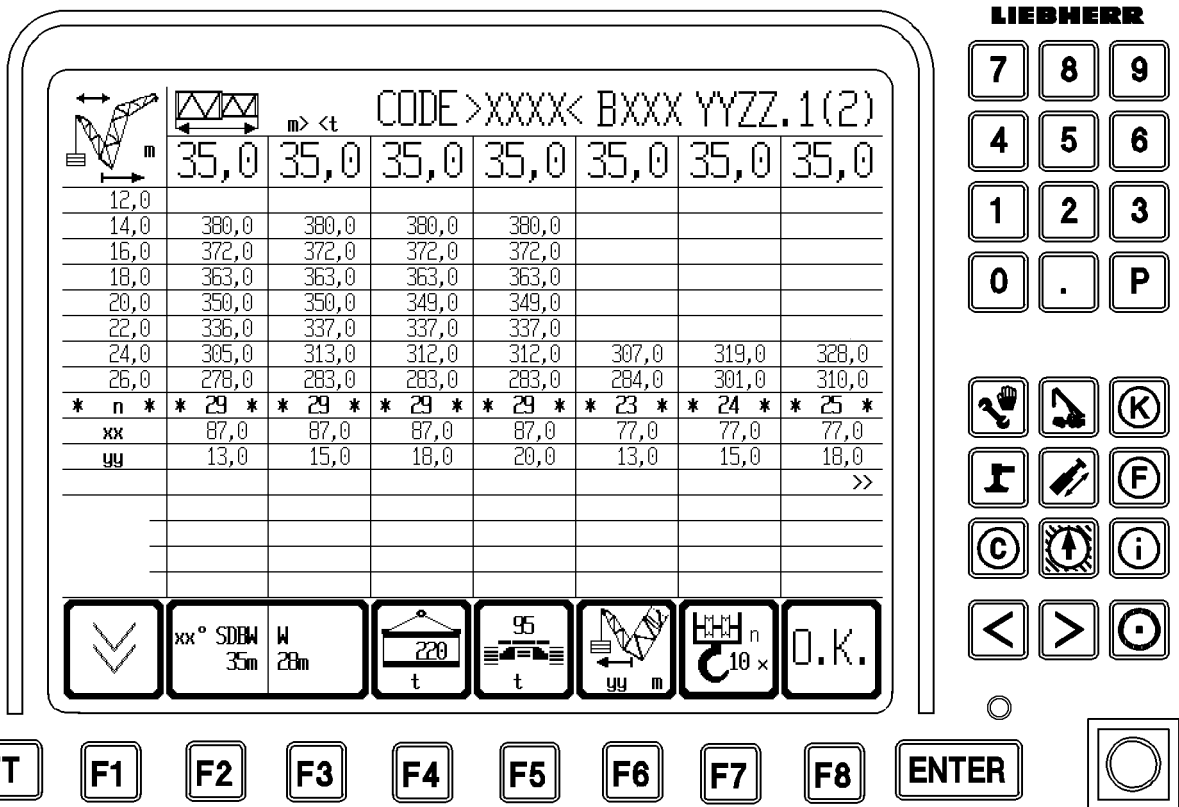
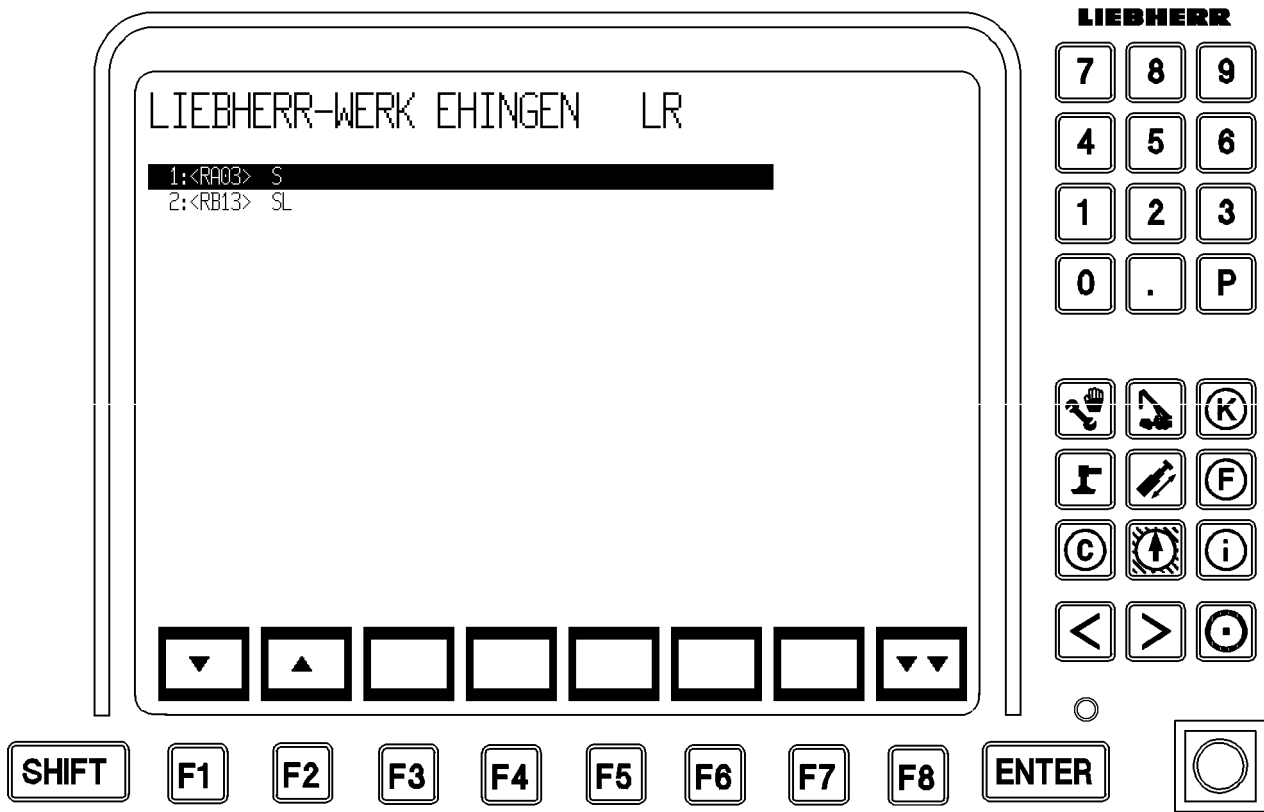


Fig.110695

LWE/LR 1750-000/12812-15-02/en

4 LICCON computer system after engine start

4.1 Waiting for the boot up phase



Note

- ▶ After being turned on, the LICCON computer system boots up and carries out a self-test, see Crane operating instructions, chapter 4.02!

- ▶ Wait for the boot up phase.

Result:

- The operating mode preselection appears.
- After approx. 3 seconds: The configuration screen appears on the LICCON monitor.
- Normally, the most recently set configuration state and reeving number will be displayed.

If a master switch is moved away from the zero position during the boot up phase, the function circuit of the electrical safety chain is interrupted.

In this case:

- ▶ Turn the engine and ignition off and then restart, so that the crane control can carry out a valid test of the electrical safety chain.

Problem remedy

An error message appears on the LICCON monitor.

- ▶ Turn the engine and the ignition off and restart.
- ▶ The LICCON computer system automatically displays the troubleshooting display.

Problem remedy

The LICCON monitor does **not** show the most recently set configuration state and the most recently set reeving number.

If there has been a data loss in the memory (cold start), then the first valid configuration appears in the configuration screen. The reeving number is set to „0“.

- ▶ Set the configuration state and reeving number again.

4.2 Taking over the previously selected configuration and hoist rope reeving

Check in the configuration screen if the correct short code and the correct reeving number have been set, see Crane operating instructions, chapter 4.02.

If the settings on the configuration screen are correct:

- ▶ Press the function key **F8**.

Result:

- The „Configuration“ program is terminated and the adjusted parameters are accepted for the newly started „Operation“ program.

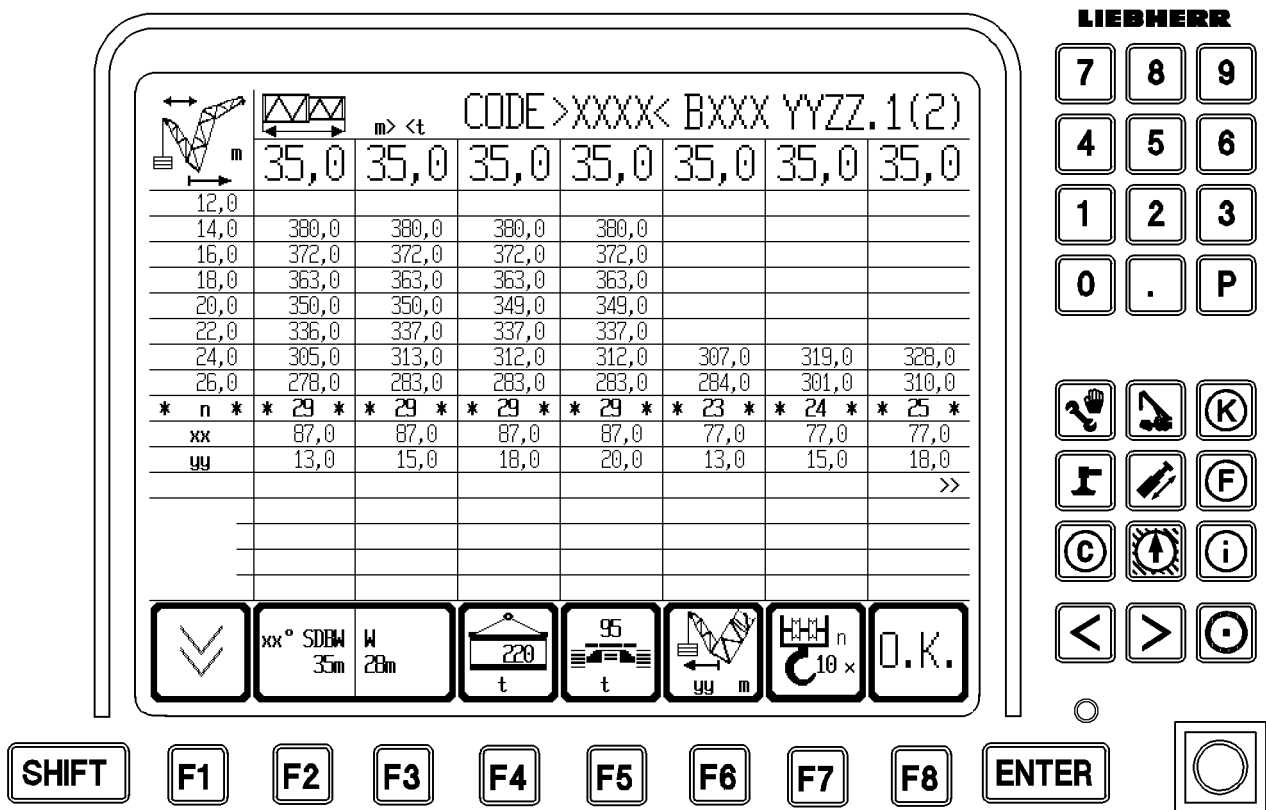
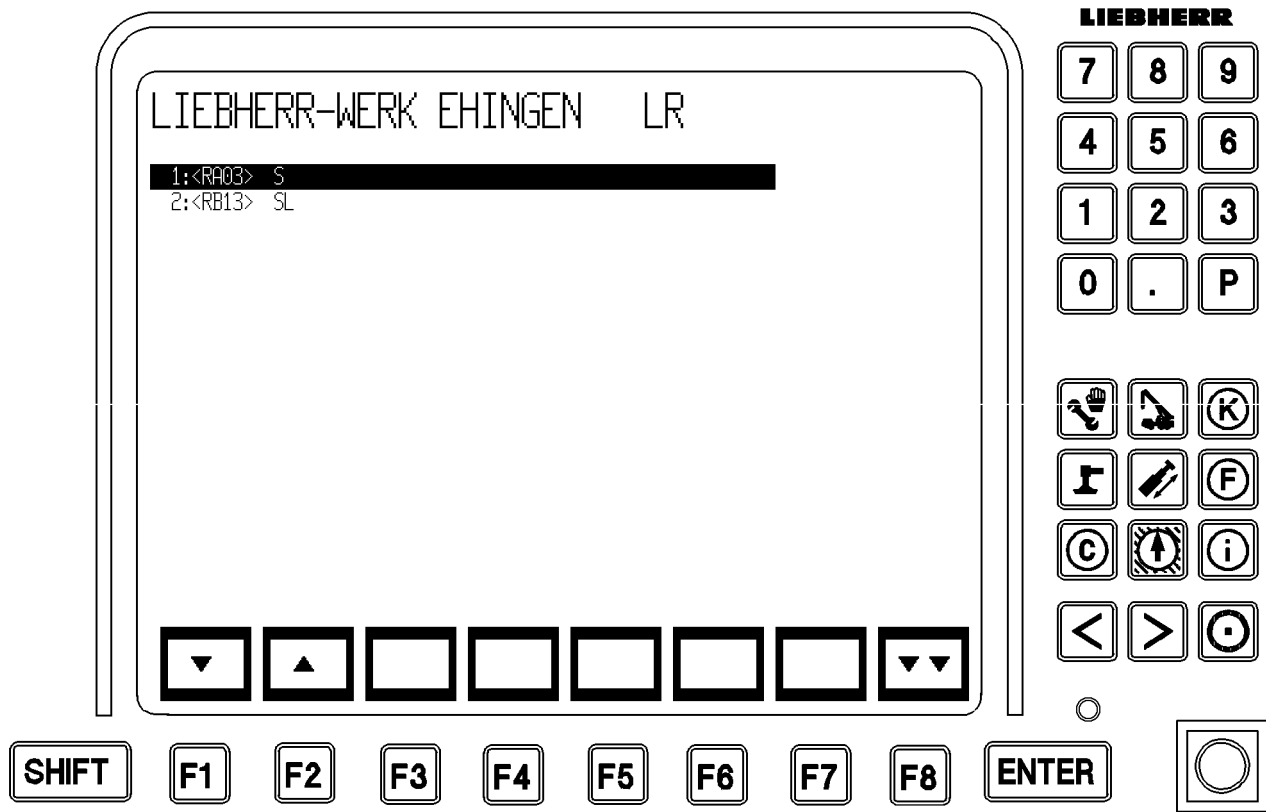


Fig.110695

LWE/LR 1750-000/12812-15-02/en

4.3 Changing the set up configuration and hoist rope reeving

The selected and displayed configuration can be changed with the function keys or by entering the short code.

4.3.1 Setting the set up configuration with the function keys

- ▶ Press the function key **F2** until the desired main geometry status is selected.
- ▶ Press the function key **F3** until the desired accessory status is selected.
- ▶ Press the function key **F4** until the desired counterweight is selected.
- ▶ Press the function key **F5** until the desired central ballast is selected.
- ▶ For crane operation **without** derrick ballast: Press the function key **F6** until the desired turning range is selected.
- ▶ For crane operation **with** derrick ballast: Press the function key **F6** until the desired derrick ballast radius or the derrick ballast weight is selected.
- ▶ Press the **ENTER** key.
- ▶ Check the set load chart.

4.3.2 Selecting the set up configuration with short code

The short code is taken from the load chart manual or from the job planner.

- ▶ Entering the 4-digit short code with keypad.
- ▶ Confirm with the **ENTER** key.

Result:

- The data from the selected load chart can be viewed.

For a more detailed description of the „Configuration“ program, see Crane operating instructions, chapter 4.02.

- ▶ Check the set load chart.

4.3.3 Setting the hoist rope reeving

- ▶ Press the function key **F7** until the desired reeving number is selected.
or
Press the function key **SHIFT** and the function key **F7** until the desired reeving numbers are selected.

4.3.4 Checking and accepting the changed set up configuration and hoist rope reeving

If the settings on the configuration screen are correct:

- ▶ Press the function key **F8**.

Result:

- The „Configuration“ program is terminated and the adjusted parameters are accepted for the newly started „Operation“ program.
- ▶ Check in the operating screen if the correct short code and the correct reeving number have been set, see Crane operating instructions, chapter 4.02.

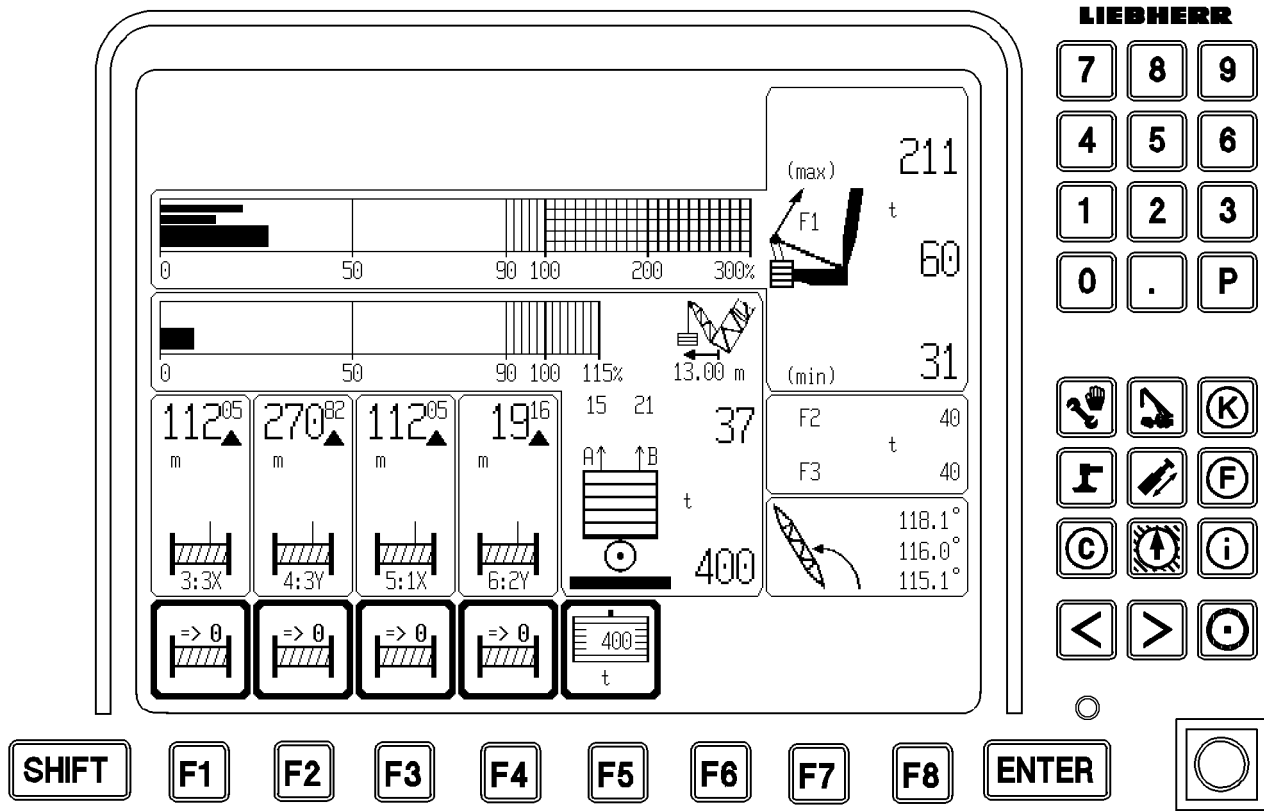


Fig.110970

4.4 Adjusting the control parameters



Note

- ▶ For detailed description to adjust the control parameters, see Crane operating instructions, chapter 4.02!

4.5 Adjusting the derrick ballast

For detailed description to adjust the derrick ballast, see Crane operating instructions, chapter 4.02.

The weight of the derrick ballast consists of:

- The weight of the empty ballast pallet or the empty ballast trailer
- The weight of the placed derrick ballast plates



WARNING

Risk of accident due to toppling crane!

If an incorrect derrick ballast value is entered, the safety shut offs from test point 1 (F1_{min}) become ineffective. The crane can topple over and personnel can be severely injured or killed!

- ▶ If a derrick ballast value is set, which is too low, then the displayed derrick ballast utilization is too large!
- ▶ If a derrick ballast value is set, which is too large, then the displayed derrick ballast utilization is too small!
- ▶ Make sure that the set derrick ballast value matches the actually installed derrick ballast weight!



Note

While the derrick ballast is adjusted, the remaining monitor displays cannot be updated!

The crane operating screen on the monitor is frozen and can even show incorrect values!

- ▶ Quickly complete the derrick ballast adjustment!

If a master switch is actuated during the adjustment of the derrick ballast, the adjustment procedure is automatically aborted. The old value of the placed ballast (BA_{placed}) remains in the ballast icon.

- ▶ LICCON Monitor 1: Enter the derrick ballast with key **F5**.

5 Adjusting the winches

All rope winches are equipped with an incremental counter for relative path measurement. So that the LICCON computer system is able to calculate the absolute path between the rope length in lengths units, the rope length in a certain winch position (adjusting position) must be known to the LICCON system.

The rope length and the current angle radius for this winch position are saved with the remaining geometric data on the program memory card on the CPU 0 and CPU1.

When the winch is in this winch position (adjustment position) is recognized by winch 1 to winch 6 via an adjustment switch (cam limit switch).



Note

- ▶ Winch 4 has no adjustment switch (cam limit switch)!

The cam limit switches of the winches are set in such a way that they switch from „0“ to „1“ exactly in this winch position (adjustment position) when the rope is spooled out.

**DANGER**

When the rope is changed make sure to avoid the following cases otherwise the adjustment switch (cam limit switch) must be readjusted again!

- ▶ Pull the rope from the stationary winch!
- ▶ Turn the winch without a rope!

**Note**

- ▶ If the adjustment switch (cam limit switch) must be readjusted, consult with Liebherr Service!

5.1 Adjusting the winches

Winches must always be readjusted when the absolute path information of the incremental sensor in the memory was lost.

Adjust all winches:

- When the LICCON computer system is separated from the power supply
- When the power supply is pulled out at basic component group „0“

Adjust winch 1 and winch 2:

- When the CPU „1“ is pulled out
- When there is a calculation error or an incremental sensor error

Adjust winch 3 and winch 4:

- When the CPU „3“ is pulled out
- When there is a calculation error or an incremental sensor error

Adjust winch 5 and winch 6:

- When the CPU „4“ is pulled out
- When there is a calculation error or an incremental sensor error

**Note**

- ▶ Description of error remedy, see Diagnostics manual!

**Note**

Erroneous winch moment!

If the winch is adjusted, then the LICCON computer control calculates the current winch coil radius and therefore the correct winch turning moment!

If the winch is adjusted incorrectly or not at all, then the LICCON computer control works with an erroneous winch moment! This causes the brakes of the winches to open a little too early or too late when starting out which can cause a slight jerk!

- ▶ Adjust the winches!

5.2 Adjust the winches, not winch 4

**Note**

- ▶ A rope layer is considered to be full when the rope „jumps“ for the first time from the previous row into a new layer when spooling the rope up!

- ▶ Spool the winch up or out until the adjustment position (see chart).
- ▶ Check the distance „d“.
- ▶ Spool the winch up and run past the adjustment point by a few turns.
- ▶ Then spool the winch out and run again past the adjustment point by a few turns.
- ▶ Check the winch display.

5.3 Adjusting winch 4

- ▶ Spool the winch up or out until the adjustment position (see chart).
- ▶ Check the distance „d“.

- ▶ Actuate the adjustment button in the switch cabinet by hand.
- ▶ Check the winch display.

5.4 Adjustment positions

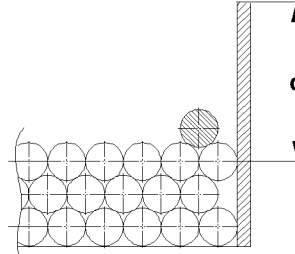


Fig.110696

Winch	Adjustment position at	Distance d ¹⁾	Rise
Winch 1,2,3	Layer 8 full (approx. 960 m)	116 mm	Right hand rise
Winch 4	Layer 5 full (approx. 560 m)	80 mm	Left hand rise ²⁾
Winch 5	Layer 9 full (approx. 1112 m)	91 mm	Left hand rise
Winch 6	Layer 3 full (approx. 306 m)	244 mm	Left hand rise

1) d: Distance between center of rope of full layer to the edge of the flanged wheel

2) The left drum half is valid

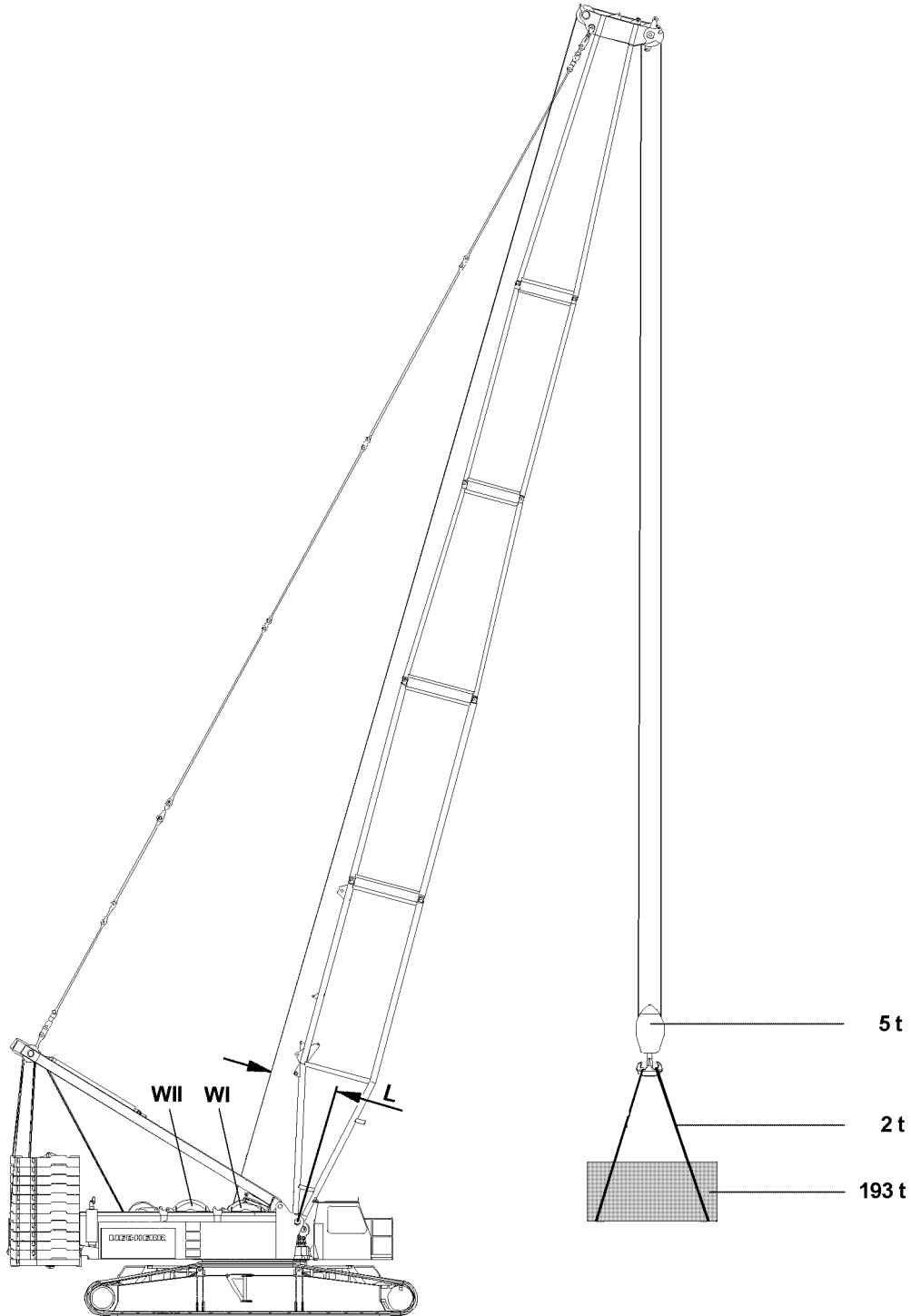


Fig.103667

LWE/LR 1750-000/12812-15-02/en

6 Load weighing and load display

Included in the load capacities given in the load charts are the weights of the load carrier, load take up equipment and tackle.



Note

- ▶ The weight of the hook block and the weight of the tackle must be subtracted from the load given in the load chart!

Example:		
Maximum permissible load according to chart		200 t
Weight of the hook block	5t	- 5 t
Weight of the tackle rope	2 t	- 2 t
Actual load capacity of the crane		= 193 t

In this case, the load to be lifted may not exceed **193 t**.



Note

- ▶ In the LMB calculation, the lever arm to the winch winch 2 **WII** is not used, always use the lever arm **L** to winch 1 **WI**.
- ▶ For that reason, to ensure an exact load weighing to lift the load on the main boom and on the fixed accessories (for example the fixed jib), winch 1 **WI** must be used!



DANGER

Danger of accidents due to overload!

In case of inaccurate load weighing or load display, a danger exists due to unrecognized overload of the crane!

- ▶ The crane operator must know the weight, the center of gravity and the dimensions of the load to be lifted before operating the crane!
- ▶ The crane operator must check, before lifting the load, if he may even lift the load according to the data in the load chart!



DANGER

Danger of accident due to incorrect reeving!

If winch 1 **WI** is used for lifting the load on the fixed accessory because the ropes of winch 1 **WI** and winch 2 **WII** would cross otherwise, then you can assume that the load display is too small, especially for small reevings!

- ▶ For the small radii, select a large reeving for winch 2 **WII**!
- ▶ Select the reeving which is required for the maximum load in this radius range!

Fig.195219

LWE/LR 1750-000/12812-15-02/en

6.1 Load weighing

Make sure that the following prerequisites are met:

- The angle sensors are functioning.
- The incline sensors are functioning.
- The turn sensor in the turntable is functioning.
- The pressure sensors are functioning.
- The pull test brackets are functioning.

The boom position where the relapse cylinders are actuated must be recognized by the LICCON exactly via the sensors, because otherwise the relapse cylinders have a strong affect on the load - weighing error.



Note

- ▶ If only one of these sensors is not functioning, a LEC error display is issued, then the load display and the load weighing are not exact!
- ▶ The calculation is made anyway, but the result is not exact!

6.1.1 Possible weighing errors

For an exact load weighing, exact signals of the pull test bracket, angle sensor, incline sensors and pressure sensors are required.

Since all sensor values are always within a certain tolerance, a weighing error can occur.

The weighing error is increasingly larger if:

- The hoist winch sits in the turntable instead of in the main boom.
- The reeving is small.
- The hoist winch sits far to the rear in the turntable.
- Several hoist winches are used (parallel operation).
- The boom, on which the load is suspended, is short.
- The boom, on which the load is suspended, is standing steeply.



DANGER

Danger of accidents due to overload!

Overload due to weighing error!

- ▶ When the prerequisites for small weighing errors not not given, special caution must be exercised!

6.1.2 Adjustment of reeving

The number of reevings must be correctly set on the LICCON. The reeving should not be higher than the nominal reeving, otherwise the hoist ropes reeved above the nominal reeving count as part of the load.



Note

- ▶ The nominal reeving determines for which maximum reeving the load chart values of a load chart are valid!
- ▶ If the crane is in a position outside of the load chart, the hoist rope is added to the load, because no nominal reeving is recognized outside the load chart!

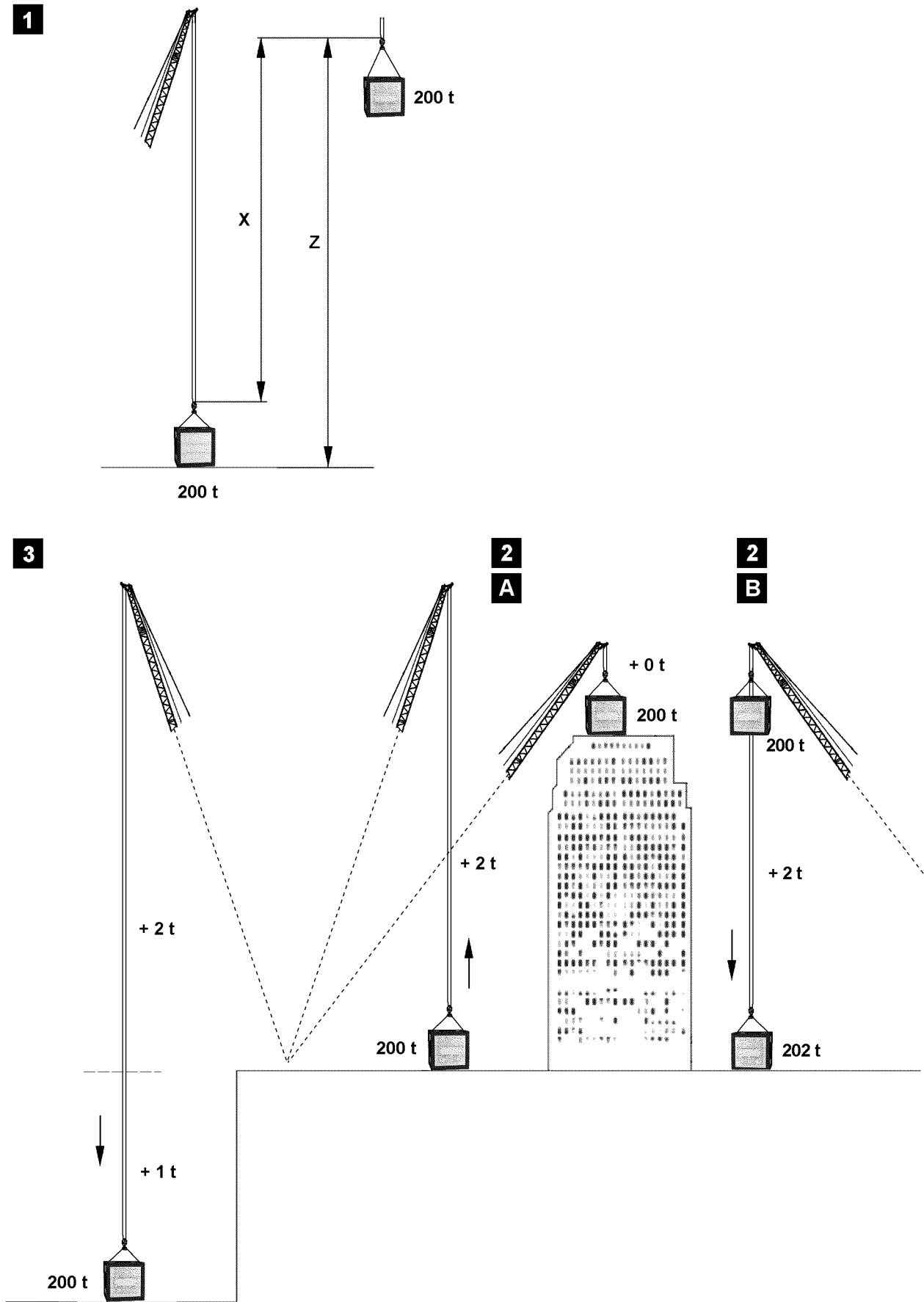


Fig.103643

LWE/LR 1750-000/12812-15-02/en

6.2 Load display

6.2.1 Lifting, illustration 1

For the calculation of the displayed actual load, the weight of the hoist rope to the ground is deducted from the total load **Z**, which hangs on the pulley head **X**, see fig. 1.

In that case, the number of the reevings set on the LICCON is taken into account, but the nominal reeving at nominal reeving.



Note

- ▶ If the load is raised far above the ground, see illustration 1, then the load display is too small by the weight of the hoist rope from the load to the ground!

6.2.2 Lifting over-ground, illustration 2A

When the load is raised above the crane level (high rise), then the hoist rope to the ground is deducted anyway for the display, therefore the load seems increasing lighter when lifting than it did on the ground.

Therefore a somewhat larger load can be lifted in large heights than on the ground, without triggering the LMB overload shut off at 100 %.

This poses no danger because the load stress for the crane is the same if, for example 200 t of load hangs on the bottom and 2 t rope or 202 t load on top and 0 t rope on the pulley head.

6.2.3 Load take up on high rise, illustration 2B

When a load is taken up on the high rise on top (=100 %), for example 200 t, and then lowered to the ground, then weight of the hoist rope below the high rise level is calculated as load and displayed.

6.2.4 Lifting below ground, illustration 3

When a load is lowered below the crane level (excavation), then the hoist rope below the crane level is calculated as load and displayed.



DANGER

Danger of accidents due to overload!

It must be noted that the load display in illustration 2B and illustration 3 is correct, the overload of the crane is also shown in the utilization bar, but no shut off of the lowering movement occurs!

- ▶ At LMB overload, all crane movements are shut off, which would increase the danger of overload, however, lowering the load at 100 % -LMB shut off remains clear because one normally assumes that the overload was caused by lifting the load!
- ▶ However, the crane can also be overloaded by lowering the load, especially in case of high reevings with high hoist rope weight on the pulley head! The crane operator must know this, so that he can relieve the crane by careful lifting again in this special case, even though the lifting and not the lowering of the load is automatically shut off!

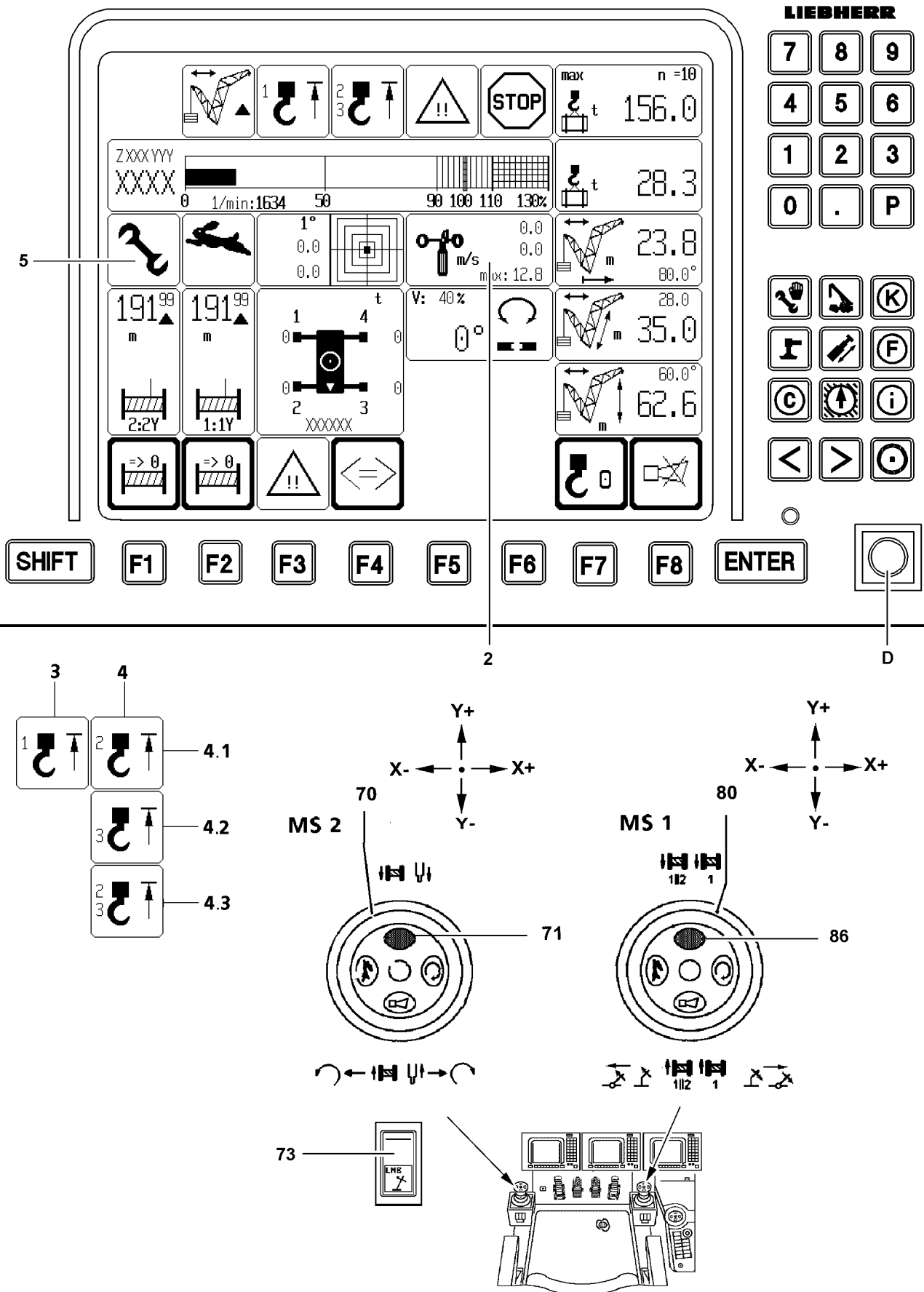


Fig.110804

LWE/LR 1750-000/12812-15-02/en

1 Prerequisites for crane operation

1.1 Checking the safety devices

The crane operator is obligated before every crane operation to ensure that the safety devices are functioning.



WARNING

Danger of accident from defective warning and safety systems!

Operating the crane with defective warning and safety systems can lead to life-threatening accidents!

- ▶ Make sure that all warning and safety systems are functioning!
- ▶ Make sure that the overload protection is functioning!



Note

- ▶ The crane operator must know and observe the shut off diagrams, see electric wiring diagram!

1.2 Aligning the crane

To ensure the working safety of the crane, the crane must be aligned horizontally on level ground with sufficient load bearing capacity.



WARNING

Risk of accident due to toppling crane!

If the crane is not aligned horizontally, it can tip over!

Personnel can be severely injured or killed!

- ▶ Align the crane horizontally!
- ▶ Pay attention to the maximum permissible deviation from the horizontal position of the crane, see load charts!

The horizontal alignment of the crane is displayed in the LICCON crane operating screen both graphically as well as numerically.

2 Overload protection of LICCON computer system

The LICCON computer system is a system for control and monitoring of cranes. In addition to the overload protection (Load moment limiter **LMB**) there are a number of application programs that can be used for controlling and monitoring the crane movements, see Crane operating instructions, chapter 4.02.

The relevant sensors for the overload protection are:

- Pull test brackets
- Angle sensor
- Pressure sensors
- Length sensors

The electronic overload protection **turns all load moment increasing** crane movements **off** if the permissible load moment is being exceeded. Only load moment decreasing movements can then be carried out.



WARNING

Risk of accident!

The presence of the overload protection does not relieve the crane operator of his obligation for care and attention!

- ▶ Before lifting a load, determine its weight and radius and decide with the help of the load chart if the crane is able to carry out this task!

The overload protection cannot cover all possible operational conditions.



WARNING

Danger of accident due to incorrect operation of the crane!

Due to incorrect operation of the crane, the overload protection does not become effective or the shut off does not occur quickly enough. In these cases, accidents are possible despite an installed overload protection!

- ▶ Be especially alert!

The overload protection registers, but:

- Does not turn off, for example the wind speed
- Does not monitor, for example the crane incline
- Does not monitor, for example the turn angle of the turntable

The overload protection does **not** register:

- The hooking of the load or the load suspension equipment
- Excessive delay forces
- Loads falling onto the rope
- Angular pulling
- Driving the crane on ground with large slope
- Collapsing ground



DANGER

Risk of accident due to crane toppling over or destruction of the crane!

- ▶ The overload protection is a device according to EN 13000. It may not be used as an operational shut off device for crane movements of any kind!
- ▶ The overload protection must be adjusted to the current equipment configuration of the crane before crane operation to match the load chart. Only that way can it fulfill its protective task!
- ▶ After every equipment configuration change and / or boom configuration, the overload protection device must be reset to the corresponding equipment configuration and / or boom configuration!
- ▶ The crane operator must meet his duty of caution and attention, despite the overload protection!

2.1 Failure of the overload protection

It is technically possible to operate the crane without the LICCON.



DANGER

Danger of accident due to crane operation without the LICCON computer system!

- ▶ If the LICCON system is no longer functioning properly because of a error in the LICCON monitor, the CPU or the power supply, then the crane can be operated in emergency mode with utmost caution, if absolutely necessary!
- ▶ In this case, the crane driver bears full responsibility!
- ▶ The crane driver may **not** use emergency mode if he is **not** fully aware of the extent of the monitoring tasks and dangers associated with that mode!

2.2 Procedure to follow in case of a problem

Basically, all conditions in the load charts must be strictly adhered to, even those not monitored by the LMB:

- The exact weight of the load, including load suspension equipment, must be known.
- The current crane geometry, such as main boom angle, derrick angle, luffing jib angle as well as the derrick ballast radius and the pulled derrick ballast weight must be known and match the given values in the corresponding load chart.
- Radius, boom angle and derrick ballast radius must be measured manually.

In the event of a LICCON monitor failure:

Replace LICCON monitor with a functioning substitute monitor.

In the event of a CPU failure:

Replace CPU with a functioning substitute CPU.

In the event of power supply failure:

Replace the power supply unit with a functioning substitute power supply unit.

If one or more sensors fail, it is possible to continue work manually, if the „Missing values“ are monitored manually and agree with the values in the load chart that is used.

2.3 Ending a load lift



WARNING

Risk of accident due to overloading the crane!

► Determine the weight of the load with hook and fastening equipment!

If the problem cannot be remedied using these measures, we recommend:

- Before continuing the load lift, contact the nearest Liebherr Service center or the Liebherr-Werk in Ehingen.

If this is not possible, then the load lift can be completed with utmost caution, as follows:

- All values, which are needed for determining the current set up condition and the associated load chart must be measured and / or manually determined.

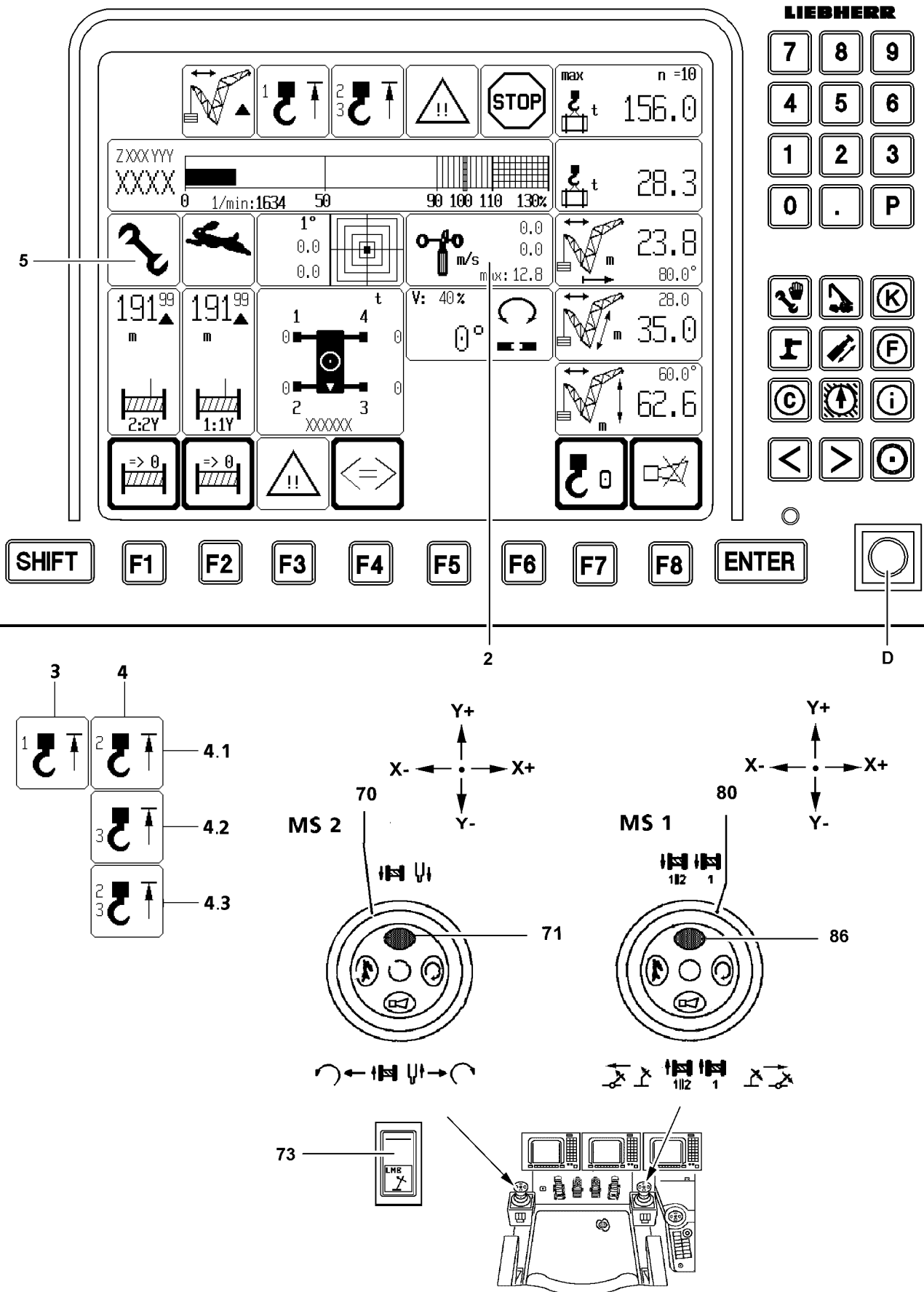


Fig.110804

LWE/LR 1750-000/12812-15-02/en

3 Wind warning device

The wind warning appears in the crane operating screen of the LICCON computer system.

If the current wind speed exceeds the displayed maximum value, the „Wind warning“ icon **2** starts to blink and the acoustic alarm „Short horn“ sounds. But there is **no shut off** of crane movements.



WARNING

Danger of accidents if the permissible wind speed is exceeded!

There is **no** automatic shut off of crane movements!

- ▶ Stop crane operation and place down the boom!

4 Hoist limit switch „Hoist top“

The hoist limit switch is intended to prevent the hook block from colliding with the boom head.

Before every crane application, the function of the hoist limit switch must be checked by running against the switch weight with the hook block.

When the hoist limit switch is actuated, the icon **3** appears in the crane operating screen. The crane movements „Lift and luff down the boom“ are turned off.



WARNING

Risk of accident due to crane toppling over or destruction of the crane!

If the hoist limit switch „Hoist top“ is bypassed, the crane can topple over or be destroyed. Personnel can be severely injured or killed!

- ▶ Bypass the hoist limit switch during crane operation only with the bypass key button if a guide is present to monitor exactly the distance between the hook block and the boom head. The guide must be in direct contact with the crane operator!
- ▶ Carry out hoist movement with maximum caution and minimum speed!
- ▶ In emergency situations, only an authorized person may bypass the hoist limit switch!
- ▶ Do **not** use the hoist limit switch as an operational shut off function!

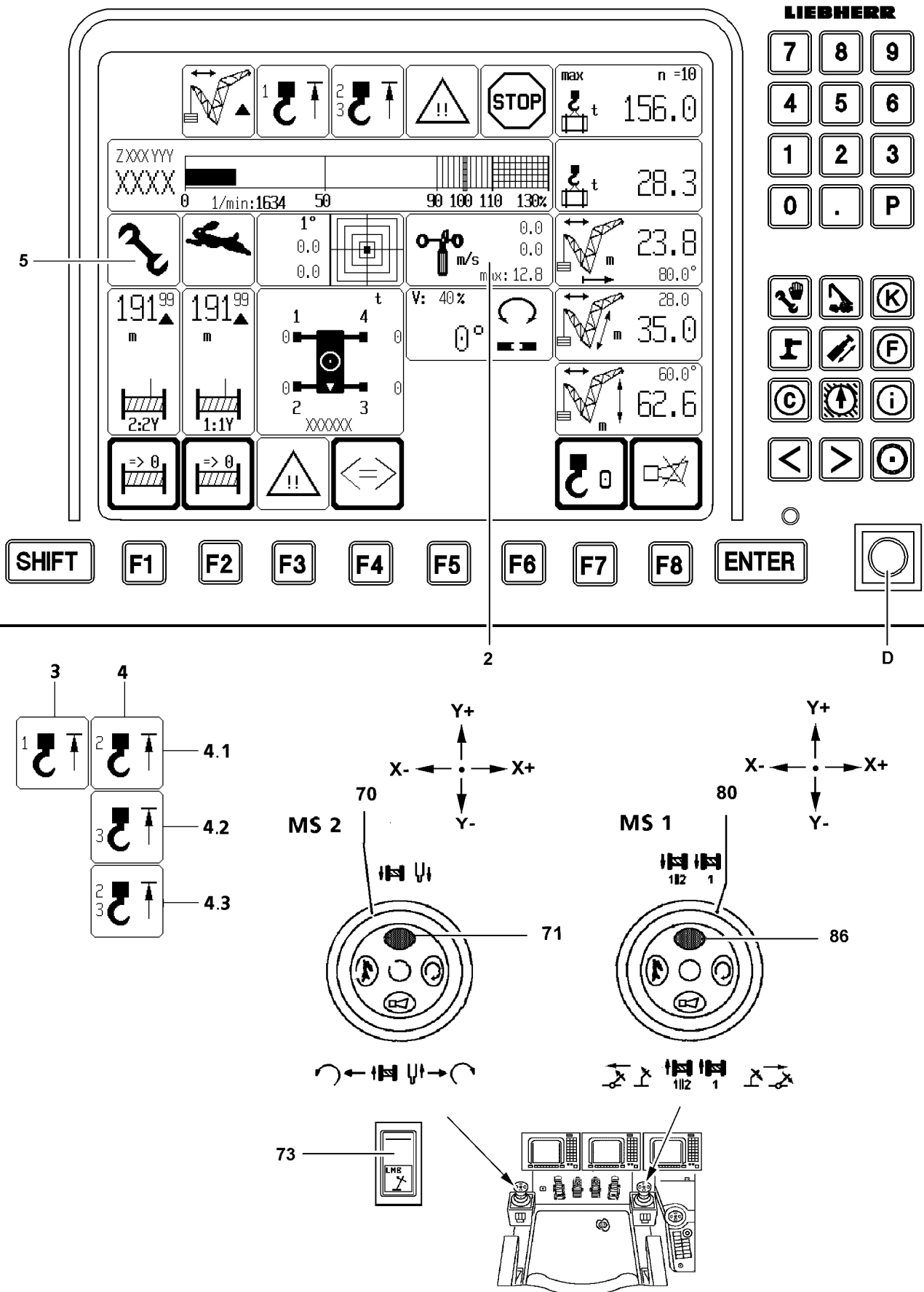


Fig.110804

LWE/LR 1750-000/12812-15-02/en

5 Limit switch winch spooled out

The cam limit switches in winches 1, 2, 3, 5, and 6 have been adjusted at the factory. If used properly, the cam limit switches will not need readjustment.



DANGER

Risk of accident due to falling load!

Due to a defective cam limit switch, the rope attachment can be ripped out, causing the load to drop!

- ▶ The cam limit switch must turn off the spool out movement of the winch as soon as the last 3 rope coils are reached!



DANGER

Risk of accident due to falling load!

If the following conditions are not observed, the cam limit switch does not turn off when the last 3 minimum rope coils are reached and the load can fall down!

Personnel can be killed or severely injured!

The cam limit switch must be readjusted!

- ▶ Do **not** pull the end of rope underneath the winch by spooling up the rope winch!
- ▶ Do **not** pull the rope from the „stationary“ winch!
- ▶ The cam limit switch must be readjusted, if it is determined during operation or when changing the rope that the „spool out“ winch movement is not deactivated when the minimum rope coils are reached!



WARNING

Risk of accident due to falling load!

If the wind speed sensor does not turn off on the minimum rope coil, then the rope mount can be ripped out and the load can fall down!

Personnel can be severely injured or killed!

- ▶ Crane operation with an incorrectly or non-adjusted winch is strictly prohibited!
- ▶ Check the shut off without a load on the hook!

If it is found during operation or when changing a rope that there is no shut off at the minimum rope coil:

- ▶ Have the winch turn sensor readjusted by **Liebherr Service!**

5.1 Checking the shut off of minimum rope coils

Spool the winch out and check the shut off point by triggering it carefully.

Slowly spool out winch 1, winch 2, winch 3, winch 5 and winch 6 until the shut off at 3 minimum rope coils.

Check the shut off.



Note

- ▶ If the spool out crane movement does **not** turn off when the minimum rope coils are reached, have the cam limit switch readjusted by **Liebherr Service!**

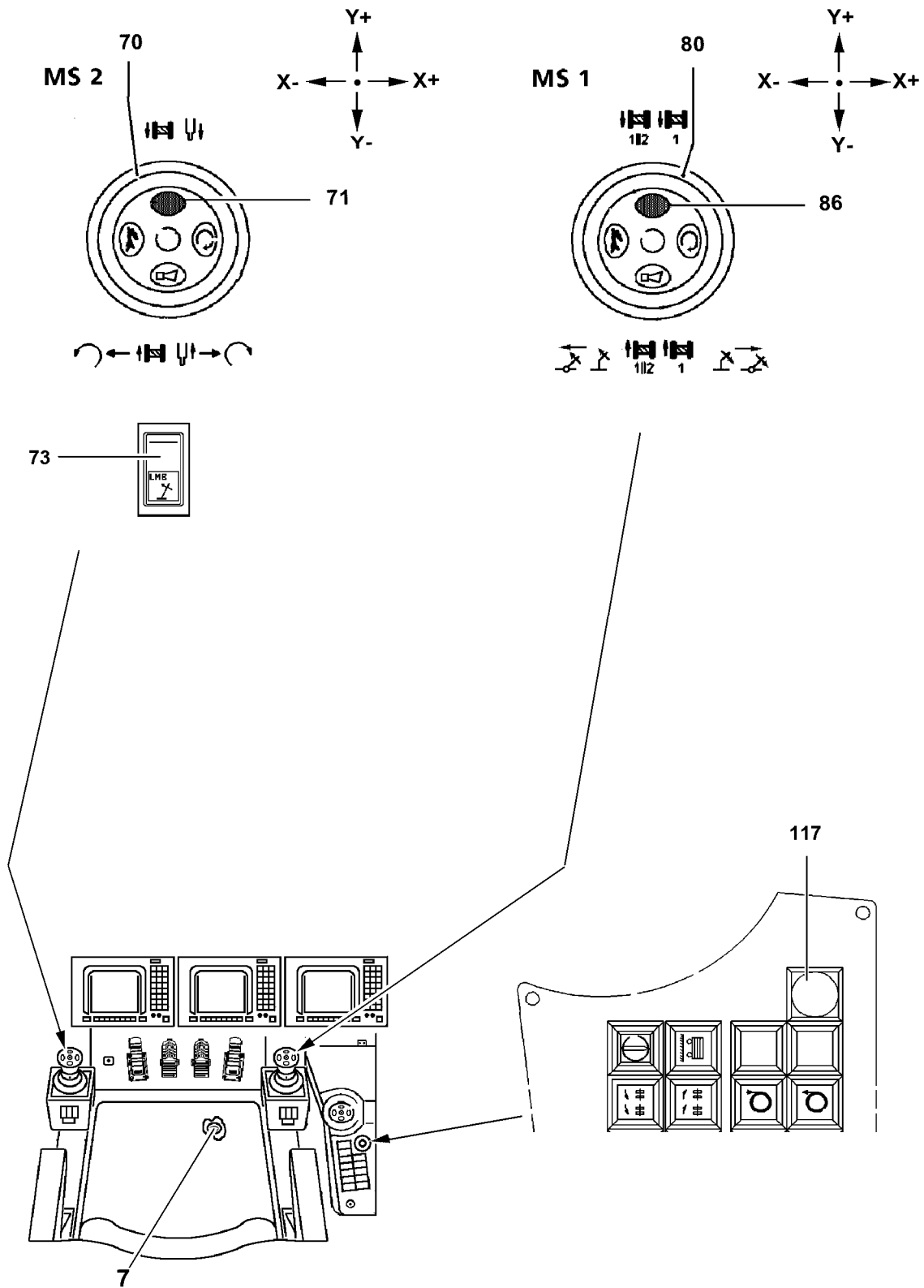


Fig.110803

LWE/LR 1750-000/12812-15-02/en

6 EMERGENCY OFF button

When pressing the EMERGENCY OFF button **117**, the engine and the electric crane control are turned off. Every carried out movement can be stopped immediately.

After pressing the EMERGENCY OFF button **117**, the release can only be made by an authorized person.



WARNING

Risk of accident due to falling load!

If crane movements are stopped by pressing the EMERGENCY OFF button, loads can start to swing and fall down!

Personnel can be severely injured or killed!

- ▶ Operational use of the EMERGENCY OFF button **117** is prohibited!
- ▶ Do not press the EMERGENCY OFF button **117** at maximum speed of a crane movement.
- ▶ Only use the EMERGENCY OFF button **117** in clear emergency situations!

7 Control release

The seat contact button **7** shuts down the crane control as soon as the crane operator gets up from the seat.

This prevents unintended crane movements by accidentally touching the master switch when getting in or out of the cab.

The button **71** and button **86** bypass the seat contact button **7** if it becomes necessary for the operator to work standing up.

8 Hydraulic safety valves

A distinction is made between two types:

- Pressure limitation valves against pipe and hose breaks
- Shut off valves in the hydraulic cylinders

8.1 Pressure monitoring in the relapse cylinders

Pressure sensors are installed in the hydraulic cylinders. The pressure measured with the pressure sensor is shown on the LICCON monitor, see Crane operating instructions, chapter 4.02.



WARNING

Risk of accident due to crane toppling over or destruction of the crane!

If the pressure drops, the relapse cylinder can no longer stabilize the boom. The crane can topple over or be destroyed!

Personnel can be severely injured or killed!

- ▶ During crane operation: Constantly monitor the pressure in the relapse cylinders!

8.2 Servo oil pressure monitoring in the winches

If no servo oil pressure is present when the master switch is actuated, a corresponding error message appears.

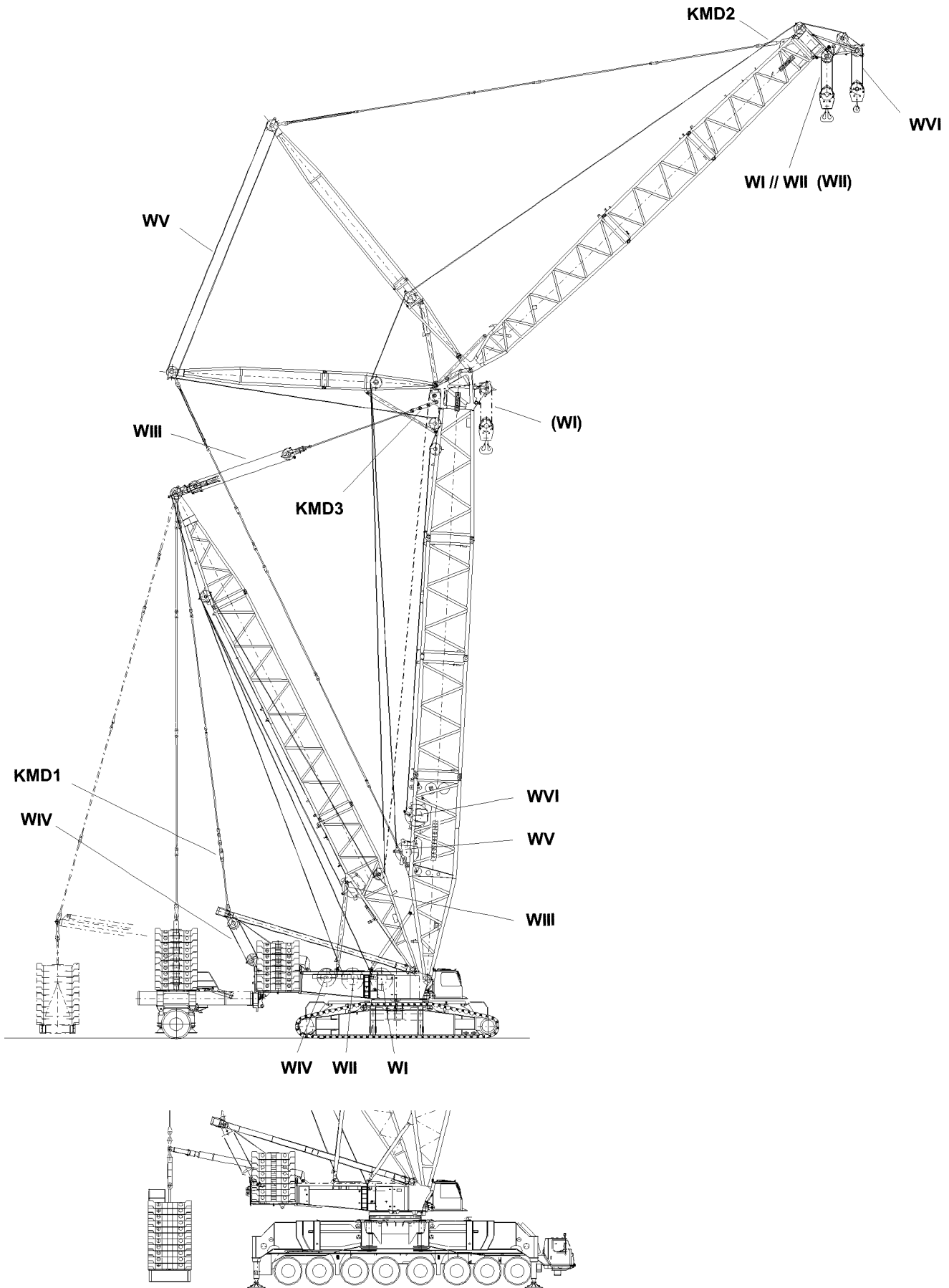


Fig.110805

LWE/LR 1750-000/12812-15-02/en

9 Limit switch



WARNING

Risk of accident due to crane toppling over or destruction of the crane!

If the crane movement is stopped by the limit switch, then the load forces cannot be received through the control. The boom system can become unstable and the crane can topple over or be destroyed!

Personnel can be severely injured or killed!

- ▶ Do **not** use the hoist limit switch and limit switch for steepest boom position and luffing jib position as an operational shut off function!

Limit switch	Position
Hoist „top“	On main boom, lattice jib and on boom nose
Boom „top“, steepest position	On boom relapse cylinder
Lattice jib „top“, steepest position	On lattice jib relapse cylinder
Lattice jib „top“, steepest mechanical position	Mechanical flap in lattice jib pivot section
Lattice jib „bottom“, lowest position	On boom head section
Derrick	On derrick relapse cylinder
SA-bracket 25 ° to the front	On SA-bracket

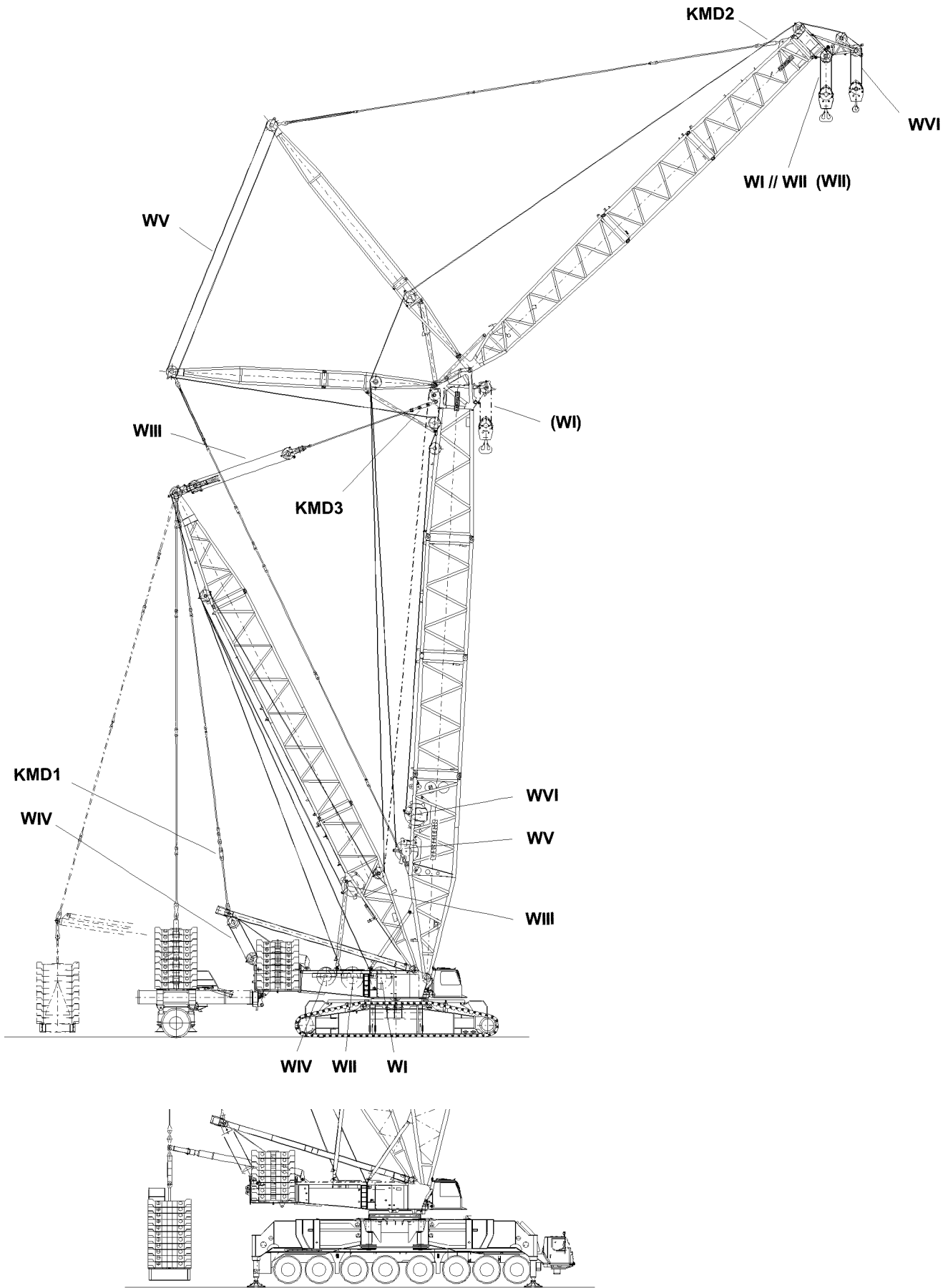


Fig.110805

LWE/LR 1750-000/12812-15-02/en

10 Angle sensor

Component	Angle sensor (WG) Position
Main boom	Pivot section
Main boom	End section
Lattice jib	Pivot section
Lattice jib	End section
Derrick	Two (WG) on pivot section



Note

► Refer to the electrical schematic!

11 Test brackets (KMD = force test box)

The test brackets measure the force in the guying, which results from the load and the boom momentum.

The test brackets are located:

- **KMD 1**, in the boom guying, SA-bracket to boom for all operating modes **without** derrick
- **KMD 1**, in the derrick guying, SA-bracket to derrick for all operating modes **with** derrick
- **KMD 2**, in the lattice jib guying, WA-bracket 1 to lattice jib head piece
- **KMD 3**, in the boom guying, derrick to boom for all operating modes **with** derrick



Note

► Refer to the electrical schematic!

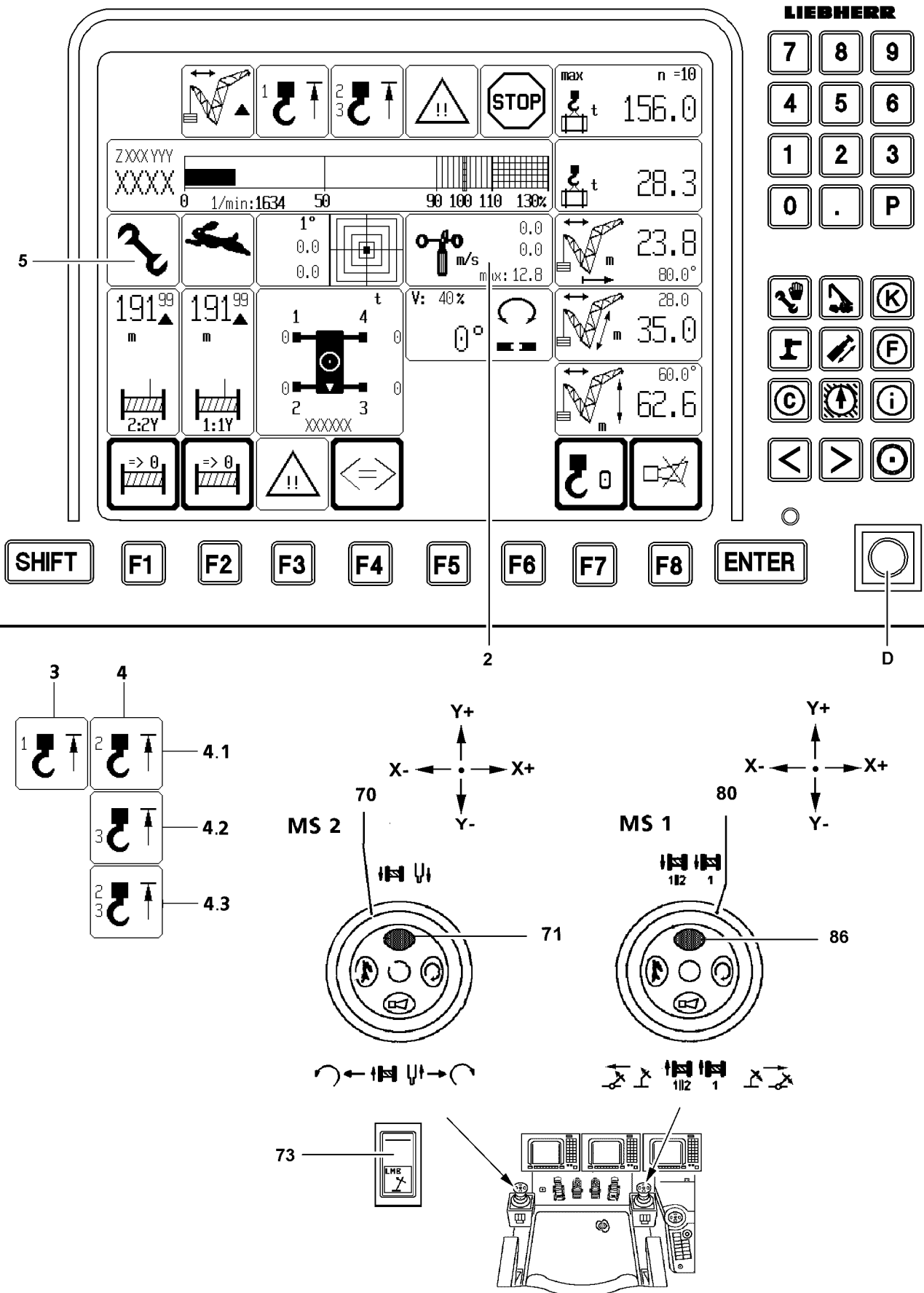


Fig.110804

LWE/LR 1750-000/12812-15-02/en

12 Bypassing the safety devices

The safety devices are bypassed with the following control elements:

- Control console: Button **73**, luffing up at overload.
- LICCON monitor 0: Bypass key button **D**

The bypass key button **D** on the LICCON monitor has two positions:

- Position center - Operating position (self-retaining): Crane is in normal operation.
- Position to right (touching): The hoist limit switch and the LMB shut off are bypassed.



Note

- ▶ Bypassable shut offs with bypass key button **D**, see Electrical wiring diagram!

12.1 Bypassing the overload protection

If the maximum permissible load capacity is exceeded, the LICCON overload protection turns off all crane movements that increase the load torque.



DANGER

Danger of accidents when bypassing the overload protection!

If the overload protection is bypassed, there is no additional protection against crane overload!

All LICCON overload protection displays remain functional!

- ▶ The bypass of the overload protection is only permitted in emergency cases!
- ▶ The bypass key button **D** may only be actuated by persons who are aware of the effects of their acts regarding the bypass of the overload protection!
- ▶ Bypassing the overload protection requires the presence of the crane supervisor and must be performed with utmost caution!
- ▶ **Crane operation** with bypassed overload protection is prohibited!

12.2 Bypassing the „Hoist top“ shut off

If the hook block contacts the hoist limit switch weight during its upward movement, the hoist limit switch is „triggered“. The crane movements „Spool up winches“ and „Luff boom down“ are turned off. The shut off can be bypassed by the bypass key button **D** in the „right touching“ position.



DANGER

Danger of accidents due to bypass of **Hoist top** shut off!

When bypassing the „Hoist top“ shut off, there is a risk that the hook block may be pulled against the pulley head when continuing to lift or luffing down the boom. This may damage the pulleys and cause the loads to fall!

- ▶ The „Hoist top“ shut off may only be bypassed if the crane supervisor is present, and with the help of a „Guide“. The guide must be in direct contact with the crane operator and must continually monitor the distance between the hook block and the boom head!
- ▶ Carry out all crane movements with maximum care and minimum speed!

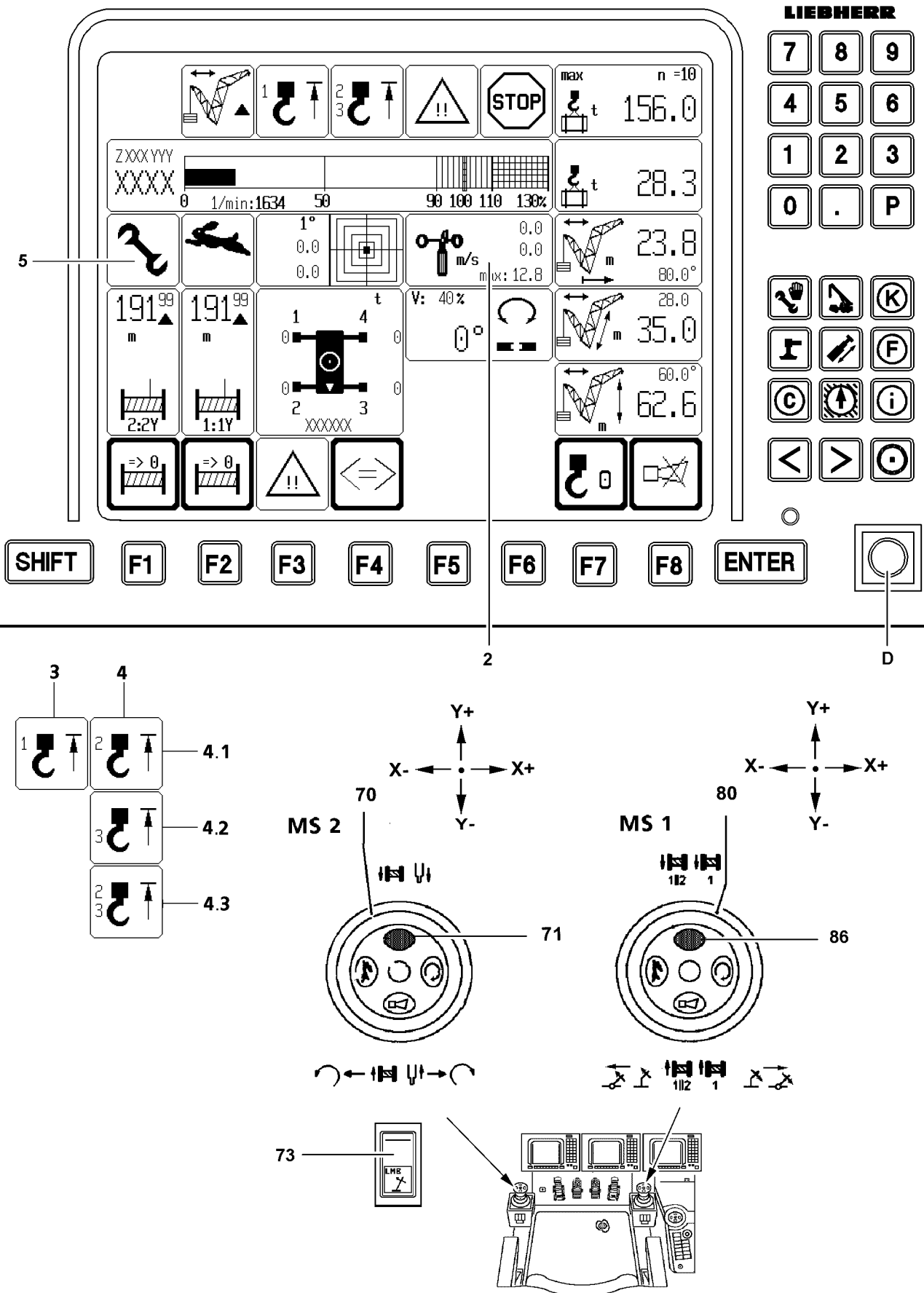


Fig.110804

LWE/LR 1750-000/12812-15-02/en

- ▶ Turn the bypass key button **D** to the right and hold.

Result:

- The LICCON overload protection is inactive.
- The assembly icon **5** in the LICCON monitor 0 blinks.
- An acoustic signal sounds.
- The red flashing beacon on the crane cab blinks.

- ▶ Do no longer press the bypass key button **D**.

Result:

- The LICCON overload protection is active.
- The assembly icon **5** on the LICCON monitor 0 turns off.
- The acoustical signal turns off.
- The red flashing beacon on the crane cab extinguishes.

12.3 Bypassing „Luffing up at overload“

The „Luff up“ crane movement:

- Depicts a load torque decreasing crane movement.
- At freely suspended load, it almost always leads to an increase of maximum load capacity.

**Note**

- ▶ At overload, the „Luff up“ crane movement is turned off!
- ▶ With the button **73**, „Luff up with boom or luffing jib“, the load moment limiter can be bypassed!

**DANGER**

Risk of accident due to toppling crane!

If the load moment limiter is bypassed, the crane can be overloaded and topple over! Personnel can be severely injured or killed!

It is not permissible to lift the load by luffing up the boom.

- ▶ If the hoist gear has been turned off by the load moment limiter when lifting a load!

Bypassing the load moment limiter with the button **73** is only permitted if:

- ▶ The load is freely suspended and the crane operator is sure at the same time that the load capacity will be increased when luffing up (utilization decreases)!
- ▶ The overload occurred before by luffing the boom or the luffing jib down! The crane operator must clearly prove according to the load chart, that the luffing up movement will lead to an increase of the maximum load capacity and the overload will be thereby removed!

In order to still perform the luffing up movement:

- ▶ Press the button **73**, „Bypass of overload“ and deflect the „Master switch 1 **80**“ in direction X-.

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 LICCON computer system

**WARNING**

Danger of accidents due to overload!

- ▶ Constantly monitor the displays on the LICCON monitor.
- ▶ Observe changing utilization conditions and forces.

**WARNING**

Danger of accident!

- ▶ The crane operator must evaluate constantly if the data shown in the crane operating screen can even be correct. He may not rely blindly on the LICCON system but must think for himself and must recognize a possible error or overload conditions.

**Note**

- ▶ For a detailed description of the LICCON computer system, see Crane operating instructions, chapter 4.02.

2 Winch and master switch assignment to operating modes

The assignment of the master switches to the winches is different, according to the operating modes. The assignments are shown in the winch icons on the LICCON monitor.

**Note**

- ▶ The crane operator must know and observe the assignments, see Electric wiring diagram.

3 Function check and control measures

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- The counterweight is installed and secured according to the data in the load chart.
- The ground is able to carry the weight of the crane, the load and the load handling equipment.
- The hook block is correctly reeved as shown in reeving plan.
- The crawler operation is turned off: Switch **74** in 0-position
(only for LR-cranes)
- No bypass of the LICCON computer system or exceedance of overload protection is active
- The LICCON computer system is in the normal operation.
- The engine is running.
- All safety equipment has been adjusted according to the data in the load chart.
- There are no persons or objects in the danger zone.



WARNING

Danger of accident!

Death, severe bodily injuries, property damage.

- ▶ In order to protect the crane and reduce the danger of accidents, always operate the master switch slowly and sensitively.
- ▶ Ensure that there are no obstacles in the working range of the crane and that there are no persons within the danger zone.
- ▶ Give a warning signal before initiating a crane movement.
- ▶ Observe the danger notes for crane operation, see Crane operating instructions, chapter 5.01.

3.1 Checking the function of the safety equipment before crane operation

The following checks must be made before crane operation:

- ▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
- ▶ Check the function of the hoist limit switch „on top“ by running against the hoist limit switch weight.
- ▶ Check the function of the limit switch „Boom steep“ on running on the relapse cylinder.
- ▶ Check the function of the limit switch „Derrick“ on running on the relapse cylinder.
- ▶ Check the function of the limit switch „Lattice jib steep“ on running on the relapse cylinder.



WARNING

Tipping of W-lattice jib!

If the relapse retainer is not moving easily, then the mechanical relapse support cannot engage correctly in steep lattice jib position.

The lattice jib can tip backward uncontrolled and cause the crane to topple over.

Death, severe bodily injuries, property damage.

- ▶ Make sure that the pedal can be easily moved before erecting the W-boom system.

Carry out the following checks additionally before crane operation with the W-lattice jib:

- ▶ Check the function of the limit switch on the flap (pendulum).
- ▶ Check that the mechanical relapse support moves into the flap.

3.2 Control measures before crane operation



WARNING

The crane can topple over!

If the control measures are not carried out before crane operation, then the crane can topple over or be damaged.

Death, severe bodily injuries, property damage.

- ▶ Crane operation with safety devices which are **not** functioning correctly is strictly prohibited.
- ▶ Start crane operation only after all safety devices have been checked and are functioning correctly.
- ▶ Start crane operation only if the overload protection has been set according to the data in the load chart.
- ▶ Start crane operation only if the crane is properly supported and horizontally aligned.



Note

- ▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation.

3.2.1 Guy rods of lattice sections in crane operation



Note

- ▶ Guy rods on lattice sections in crane operation, see Crane operating instructions, chapter 5.01.

3.2.2 Dangerous conditions without shut off

Block position of relapse cylinders when setting down the load.

NOTICE

Damage to boom or relapse cylinder!

If the block position of the relapse cylinders is triggered by the boom or the derrick with attached, freely suspended load, then there is a danger of damaging the boom or the relapse cylinders when setting the load on the ground. By setting down the load, the crane is relieved, which causes the boom system to move to the rear.

There is no shut off of the spooling out function of the winch.

- ▶ Operational running on the block position is prohibited.

If the crane should be in block position once:

- ▶ Actuate the opposite direction of movement which caused the block position and eliminate the block position.

4 Releasing the crane control

The crane control is stopped by a seat contact button **7** as soon as the crane operator gets up from his seat so that no inadvertent crane movements are carried out when entering or exiting the cab due to inadvertent movement of the master switch.



Note

- ▶ If the crane operator must work while standing up, then the seat contact button **7** can be bypassed by button **71**, button **86** and button **94** on the respective master switch.

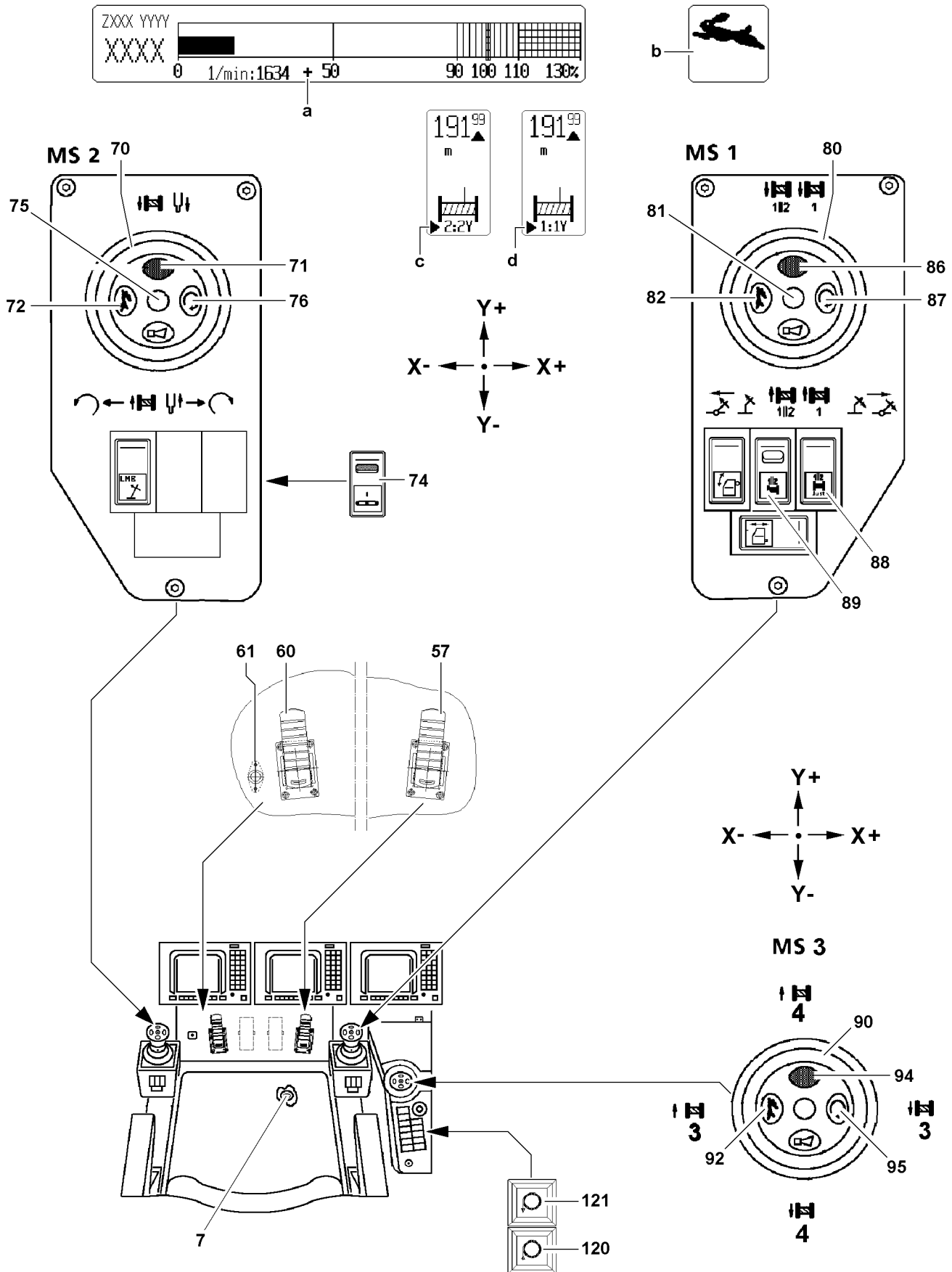


Fig.110601

LWE/LR 1750-000/12812-15-02/en

5 Regulating the engine rpm

5.1 Locking the engine rpm

Locking the engine rpm relieves the crane operator if he needs to work for an extended period with constant rpm. The engine rpm can be locked in any position.

- ▶ Press the pedal **57** down for the engine regulation until the desired rpm is reached.
- ▶ Press the button **76**.
or
Press the button **87**.
or
Press the button **95**.

Result:

- The pedal **57** is locked and the engine rpm is saved.
- The icon **a** appears on the monitor.

5.2 Increasing the engine rpm via the pedal

Make sure that the following prerequisite is met:

- The maximum rpm has not yet been reached.

When the engine rpm is locked, the engine rpm can be increased with the pedal.

When the pedal is no longer actuated, the engine rpm drops to the saved value.

- ▶ Press the pedal **57** and increase the engine rpm.

When this engine rpm is to be saved:

- ▶ Press the button **76**.
or
Press the button **87**.
or
Press the button **95**.

5.3 Releasing the engine rpm lock

If the engine rpm is locked:

- ▶ Do no longer press down the pedal for the engine regulation **57**.
- ▶ Press the button **76**.
or
Press the button **87**.
or
Press the button **95**.

Result:

- The lock is released.
- The icon **a** turns off on the monitor.
- The rpm reduces to low idle rpm.

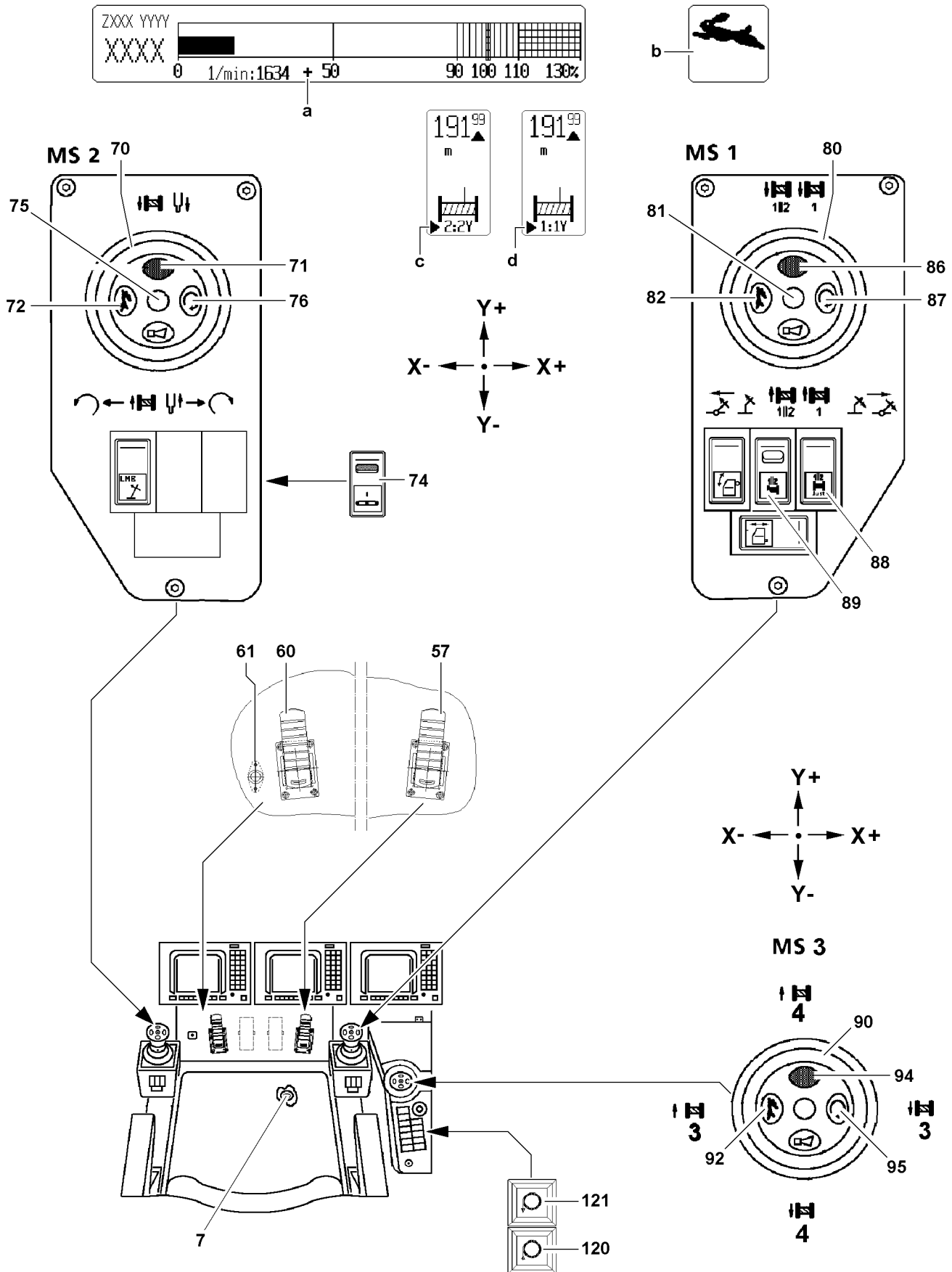


Fig.110601

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5.4 „Power Plus“



Note

When „Power Plus“ is turned on, observe the following:

- ▶ If a crane movement has reached its maximum speed due to the current utilization, then no speed increase is possible by adding the „Power Plus“.
- ▶ If the total power requirement of all actuated crane movements is larger than the available power, then those crane movements are reduced which require the most power.
- ▶ If another crane movement is added or taken back to one or more actuated crane movements then this has an influence on the other movements. For that reason we recommend in situations in which an interference of the individual crane movements is troublesome, not to turn the „Power Plus“ on to turn the „Power Plus“ off.

5.4.1 Adding „Power Plus“

The speed of the „lift / lower“ crane movement is increased with the button **72**, button **82** or button **92**.



WARNING

Danger of accidents in case of single to triple sheave reeving!

- ▶ Do **not** add „Power Plus“ if the crane is utilized by more than 50 % of its maximum permissible load carrying capacity for the corresponding radius.
-
- ▶ Press the button **72**.
or
Press the button **82**.
or
Press the button **92**.

Result:

- „Power Plus“ is added.
- The icon **b** appears on the LICCON monitor.

5.4.2 Turning the „Power Plus“ off

If the „Power Plus“ is added:

- ▶ Press the button **72** again.
or
Press the button **82** again.
or
Press the button **92** again.

Result:

- „Power Plus“ is turned off.
- The icon **b** turns off on the LICCON monitor.

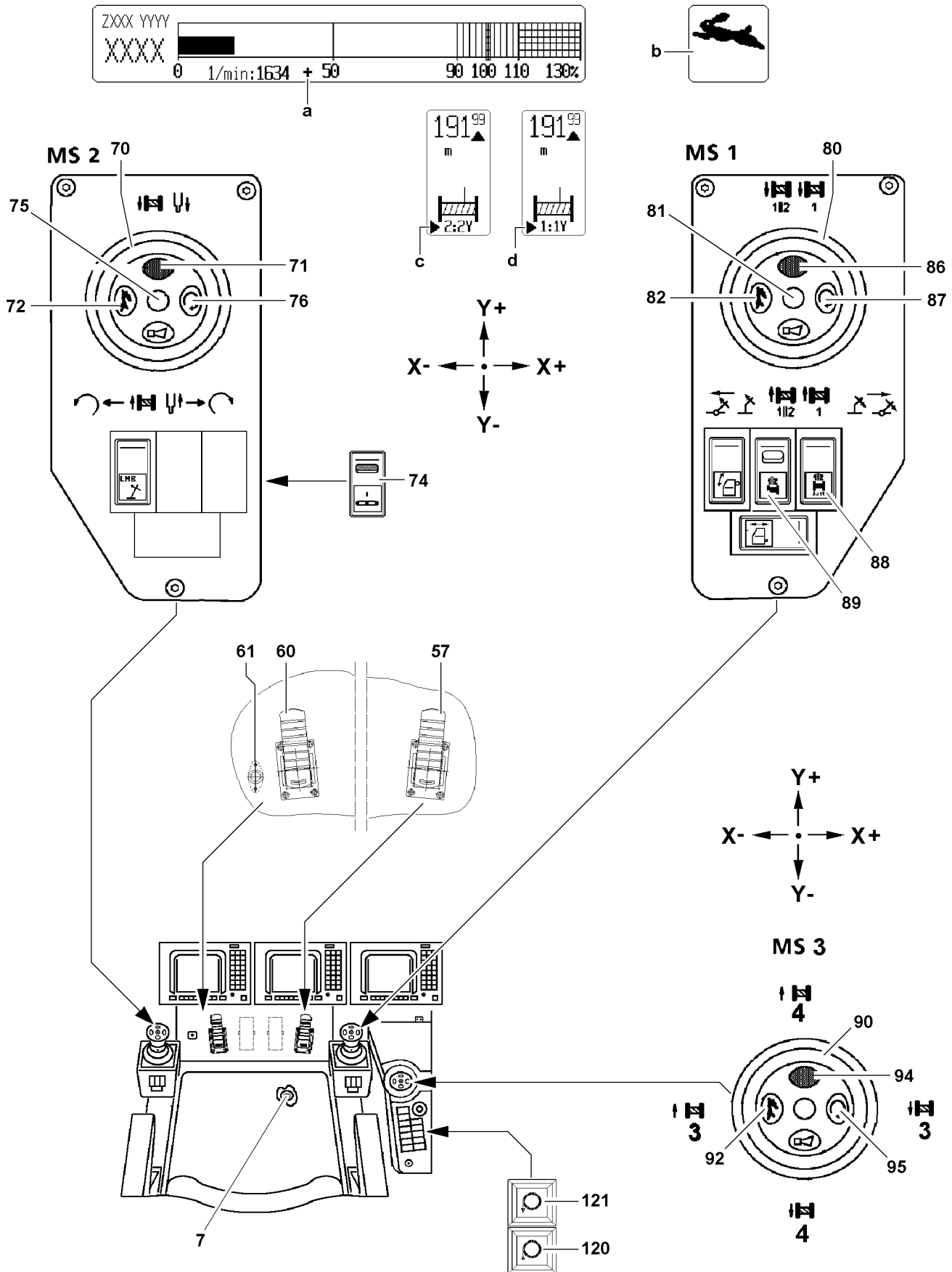


Fig.110601

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6 Vibration sensor*

By adding the vibration sensor, a crane movements can be detected by vibration of the master switch.

Make sure that the following prerequisite is met:

- The seat contact button **7** is actuated.

6.1 Vibration sensor winch 1

Adding the vibration sensor

- ▶ Press the button **86**.

Result:

- The vibration sensor **81** is turned on.
- The icon **d** appears on the LICCON monitor.

Turning the vibration sensor off

When the vibration sensor **81** is turned on:

- ▶ Press the button **86** again.

Result:

- The vibration sensor **81** is turned off.
- The icon **d** turns off on the LICCON monitor.

6.2 Vibration sensor winch 2 or slewing gear

If winch 2 and the slewing gear are operated, then the vibration sensor **75** will react to the first deflected movement.

Adding the vibration sensor

- ▶ Press the button **71**.

Result:

- The vibration sensor **75** is turned on.
- The icon **c** appears on the LICCON monitor.

Turning the vibration sensor off

When the vibration sensor **75** is turned on:

- ▶ Press the button **71** again.

Result:

- The vibration sensor **75** is turned off.
- The icon **c** turns off on the LICCON monitor.

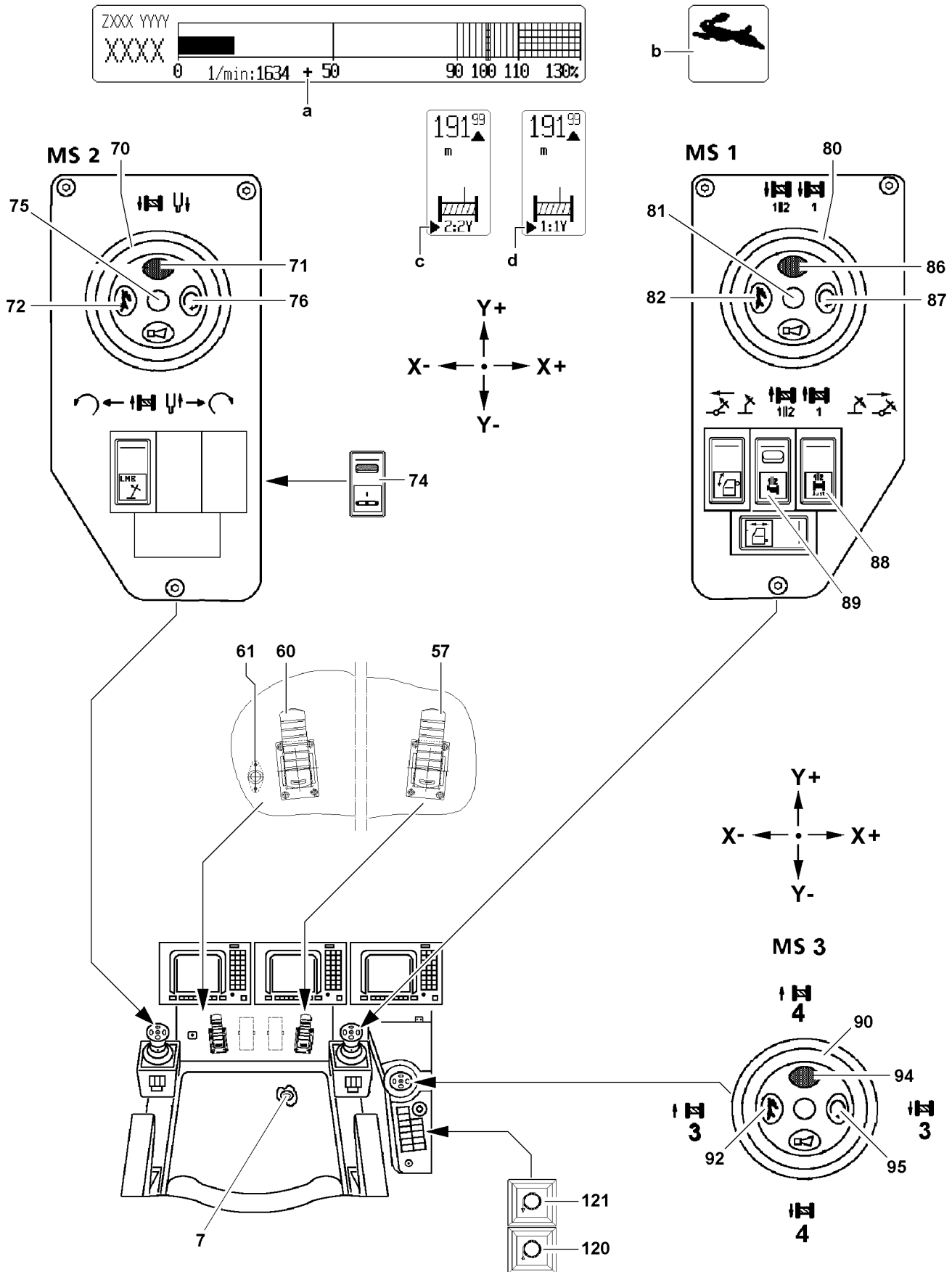


Fig.110601

LWE/LR 1750-000/12812-15-02/en

7 Lifting / lowering a load

NOTICE

Rope damage due to slack rope!

- ▶ When spooling the winches up or out, make sure that no slack rope forms.

The speed of crane movement „lifting and lowering“ is controlled via the deflection of the corresponding master switch and via the pedal **57** of the engine regulation.

In the „Control Parameter“ program, it is possible to preselect the maximum winch speed. It is also possible to deactivate or activate the individual winches.

See Crane operating instructions, chapter 4.02.

Make sure that the following prerequisite is met:

- The winches are correctly assigned to the respective pulley heads, see Crane operating instructions, chapter 4.02.

7.1 Operating winch 1 - hoist winch

In the winch icon is shown with the arrow icons that the winch is turning, even if no hook movement is visible due to multiple reeving and low speed.

- ▶ Deflect master switch 1 **80** in direction Y+.

Result:

- Winch 1 spools out and the load is lowered.

- ▶ Deflect master switch 1 **80** in direction Y-.

Result:

- Winch 1 spools up and the load is lifted.

7.2 Operating winch 2 - hoist winch

In the winch icon is shown that the winch is turning, even if no hook movement is visible due to multiple reeving and low speed.

- ▶ Deflect master switch 2 **70** in direction Y+.

Result:

- Winch 2 spools out and the load is lowered.

- ▶ Deflect master switch 2 **70** in direction Y-.

Result:

- Winch 2 spools up and the load is lifted.

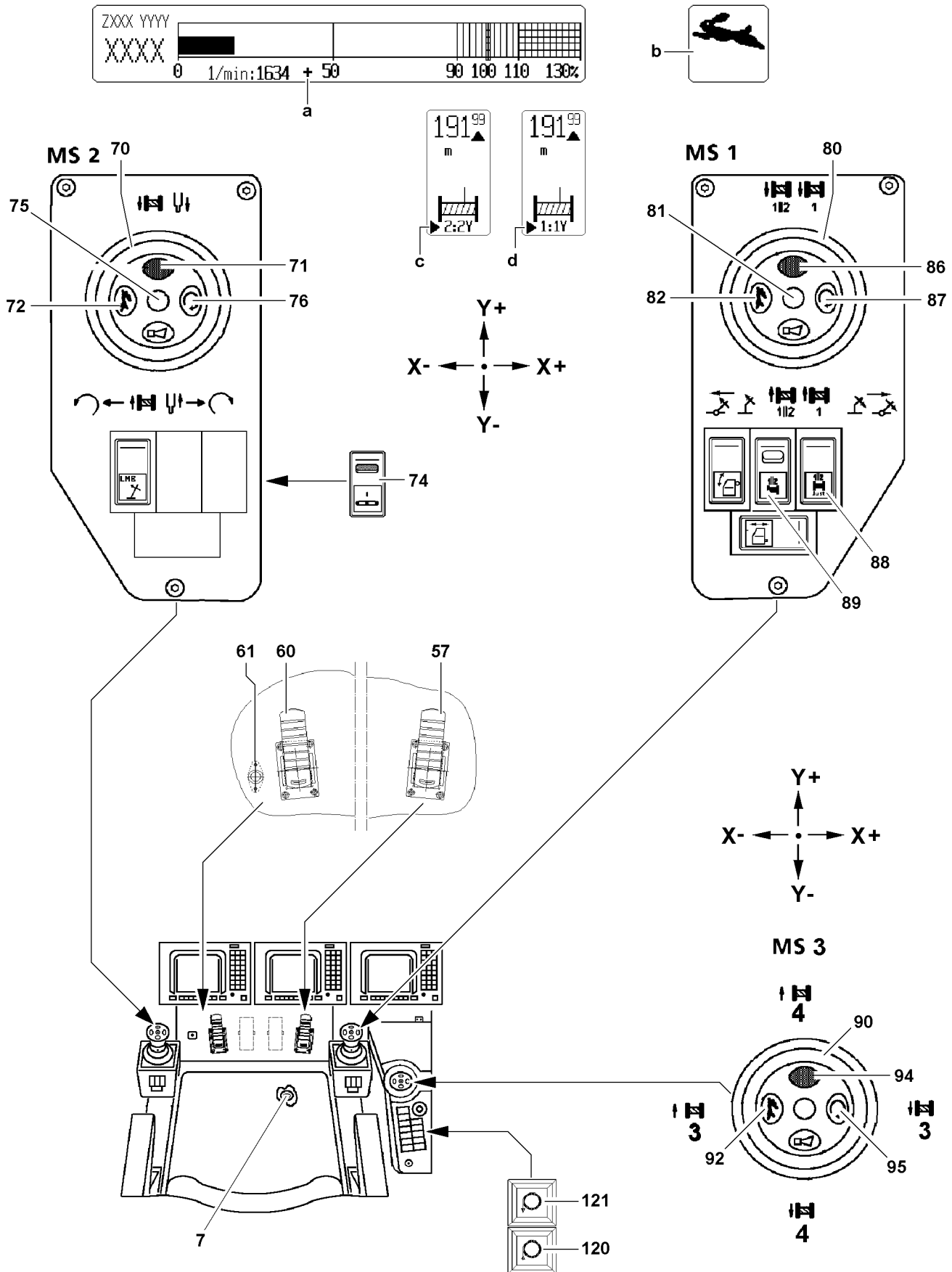


Fig.110601

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7.3 Winch 1II2 - Parallel operation

7.3.1 Setting up parallel operation

For parallel operation, winch 1 and winch 2 are used.

In parallel operation, actuation of winch 1 and winch 2 is made only together with master switch 1 **80**.

Make sure that the following prerequisites are met:

- The double hook blocks are installed together, see Crane operating instructions, chapter 4.06.
- The double hook blocks are reeved according to the load charts.
- The double hook blocks are properly reeved according to the reeving plan, see separate reeving plan.
- The total reeving has been entered on the LICCON monitor.
- The reeving number on both winches 1 and 2 must be the same and even.



WARNING

Danger of accident!

Death, severe bodily injuries, property damage.

- ▶ The total reeving number on both winches 1 and winch 2 must be the same and even in parallel operation. If the minimum value of the reeving is uneven, then - in parallel operation - the next higher, even reeving must be selected.
- ▶ Remove the transporting pin on the hook blocks prior to the horizontal alignment and prior to the crane operation.
- ▶ Make sure that there are no persons within the danger zone.

Aligning the hook blocks horizontally

Make sure that the following prerequisites are met:

- Individual operation for winch 1 and winch 2 is set.
- The parallel operation switch **89** is turned off.
- There is no load on the hook.

Align the hook blocks visually in horizontal direction. To do so, spool the winches manually up or out.

- ▶ Deflect master switch 1 **80** or master switch 2 **70** in direction Y.

Result:

- Winch 1 or winch 2 spools out or up until the hook blocks are horizontally aligned.

Adjusting the parallel control of winch 1 and winch 2

Make sure that the following prerequisites are met:

- The double hook blocks are horizontally aligned, check visually.
- There is no load on the hook.

- ▶ Turn on the switch **89** for the parallel operation.
- ▶ Press the button **88**.

Result:

- The parallel control of winch 1 and winch 2 is adjusted.

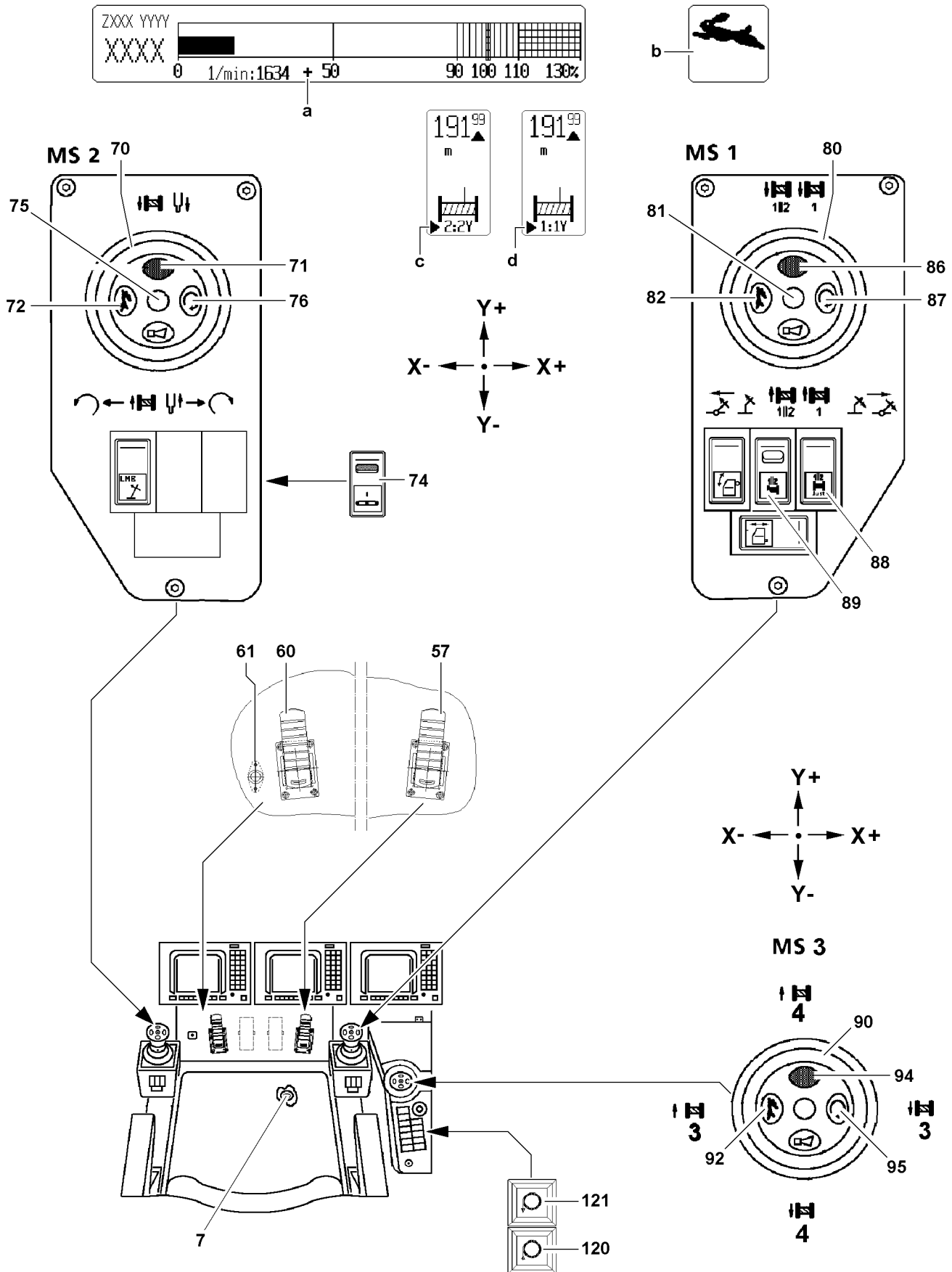


Fig.110601

LWE/LR 1750-000/12812-15-02/en

7.3.2 Parallel operation: Lifting / lowering a load



WARNING

Danger of accidents due to overload!

If the compensation cross bar is inclined, then significant load increases will occur on the individual hook blocks.

If this is not observed, then the hook block, boom or rope can be overloaded, resulting in property damage and personal injury.

Death, severe bodily injuries, property damage.

- ▶ Make sure that the compensation cross bar is always aligned horizontally on the double hook blocks.



WARNING

Danger of accidents due to different level of hook blocks!

The electronic parallel control only monitors the same rotational speed of the two winches, however, it does **not** consider the following errors:

- Uneven rope length
- Different rope diameters
- Different winding behavior
- Uneven reeving

- ▶ The crane operator must verify and is responsible despite electronic monitoring that the hook blocks are always at the same level.



Note

- ▶ The winch movement is shut off if the difference range of the parallel control is being exceeded. In that case, the winches must be again parallel adjusted.

Make sure that the following prerequisites are met:

- The double hook blocks are horizontally aligned, check visually.
- There is no load on the hook.
- Parallel control of winches is adjusted.
- The button **89** for parallel operation is turned on.

- ▶ Deflect master switch 1 **80** in direction Y+.

Result:

- Winch 1 and winch 2 spool out together: The load is lowered.

- ▶ Deflect master switch 1 **80** in direction Y-.

Result:

- Winch 1 and winch 2 spool up together: The load is lifted.

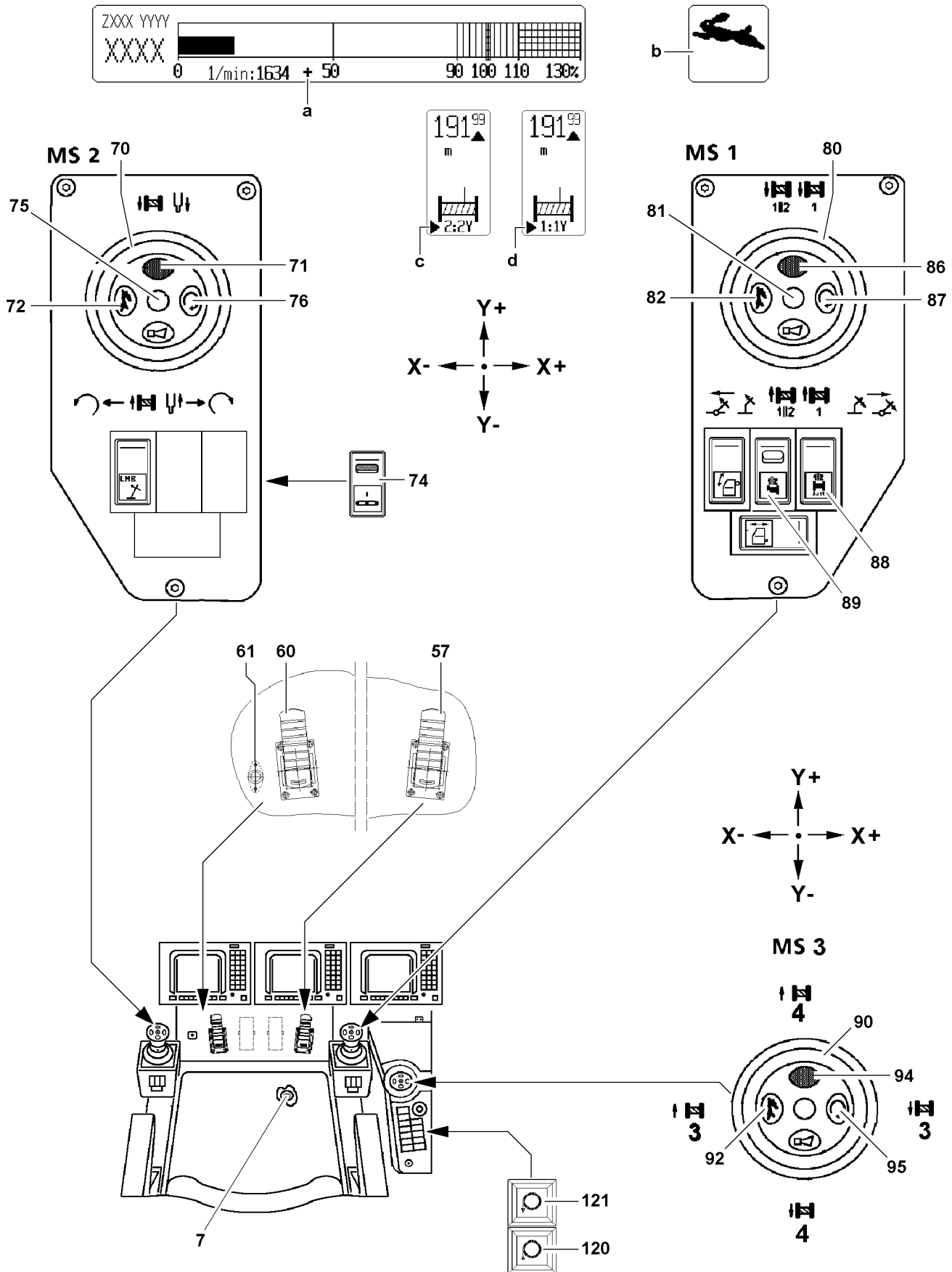


Fig.110601

LWE/LR 1750-000/12812-15-02/en

7.4 Operating winch 6 - hoist winch

In the winch icon is shown that the winch is turning, even if no hook movement is visible due to multiple reeving and low speed.



Note

- ▶ In individual operation of winch 1 and winch 2, no master switch is assigned to winch 6.
 - ▶ In parallel operation, winch 1 and winch 2 are actuated with the master switch 1 **80**.
 - ▶ When the switch **89** is turned on, then the master switch 2 **70** is assigned to winch 6.
-

7.4.1 Operating winch 6 in parallel operation of winch 1 and winch 2

Make sure that the following prerequisite is met:

- Switch **89** is turned on.

- ▶ Deflect master switch 2 **70** in direction Y+.

Result:

- Winch 6 spools out and the load is lowered.

- ▶ Deflect master switch 2 **70** in direction Y-.

Result:

- Winch 6 spools up and the load is lifted.

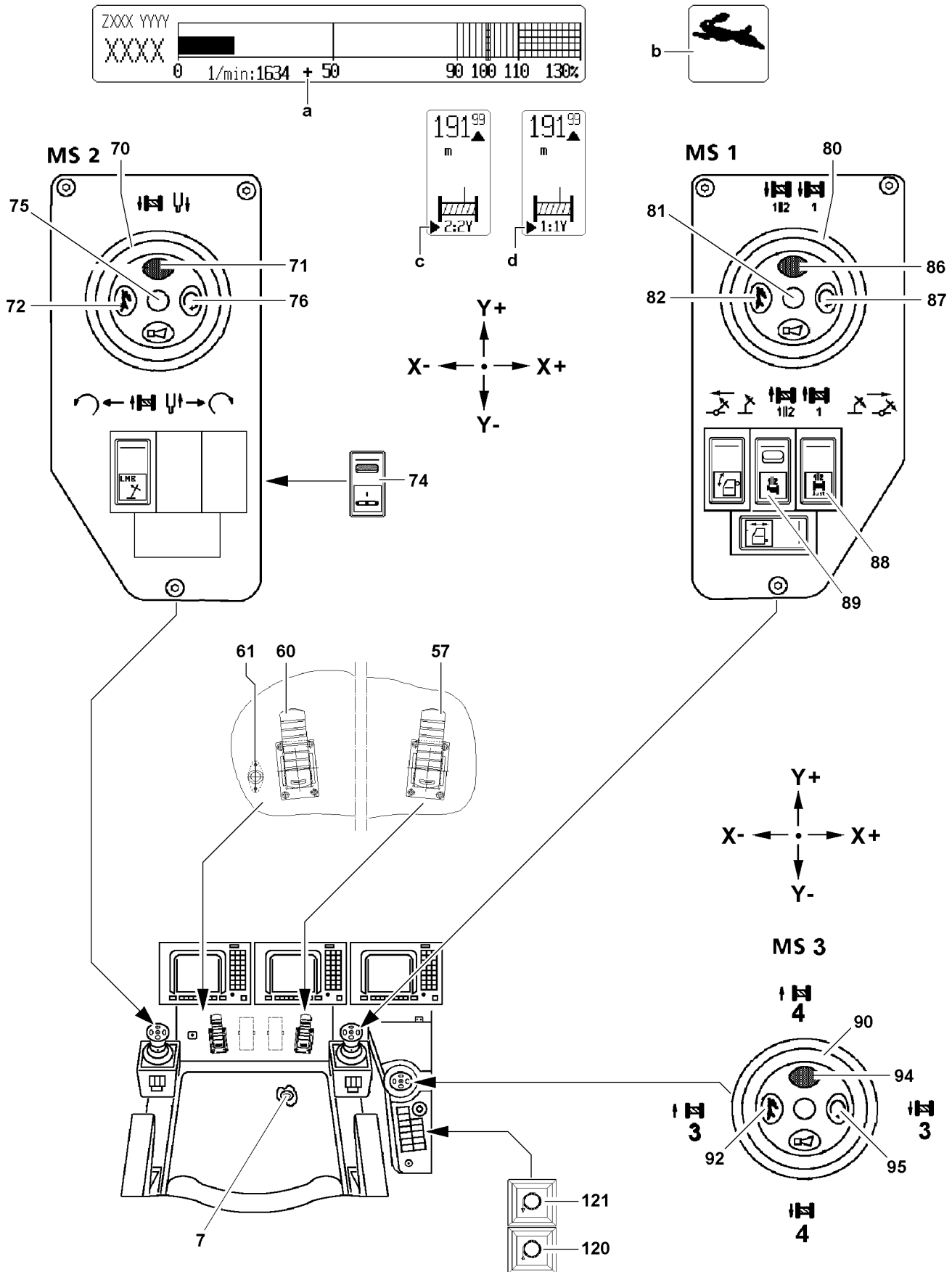


Fig.110601

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7.5 Operating winch 6 as winch 5

7.5.1 Crane operation with winch 6

In operating modes, except SDW-operation, winch 6 must be connected on the hydraulic and electrical system of winch 5, because winch 6 and winch 4 are supplied by the same pump.



Note

- ▶ Winch 6 and winch 4 cannot be moved simultaneously if they are connected to the same pump.

If winch 6 is connected to the pump 5 of winch 5, then winch 6 and winch 4 can be moved separately.



Note

- ▶ If winch 6 is moved as hoist winch with the hydraulic and electrical connections of winch 5, then winch 6 is operated as winch 5.
- ▶ In the LICCON crane operating screen, winch 6 is then shown as winch 5.
- ▶ The hook path display is then not correct for winch 6.



WARNING

Danger of accident due to falling load!

If the wind speed sensor does not turn off on the minimum rope coil, then the rope mount can be ripped out and the load can fall down.

Death, severe bodily injuries, property damage.

- ▶ Crane operation with an incorrectly or non-adjusted winch is strictly prohibited.
- ▶ Make sure that the winches are correctly adjusted: Check the shut off without a load on the hook.

If it is found during operation or when changing a rope that there is no shut off at the minimum rope coil:

- ▶ Have the winch speed sensor readjusted by **Liebherr Service**.

If winch 5 is operated again on pump 5, then the hook path display is incorrect until winch 5 is readjusted.

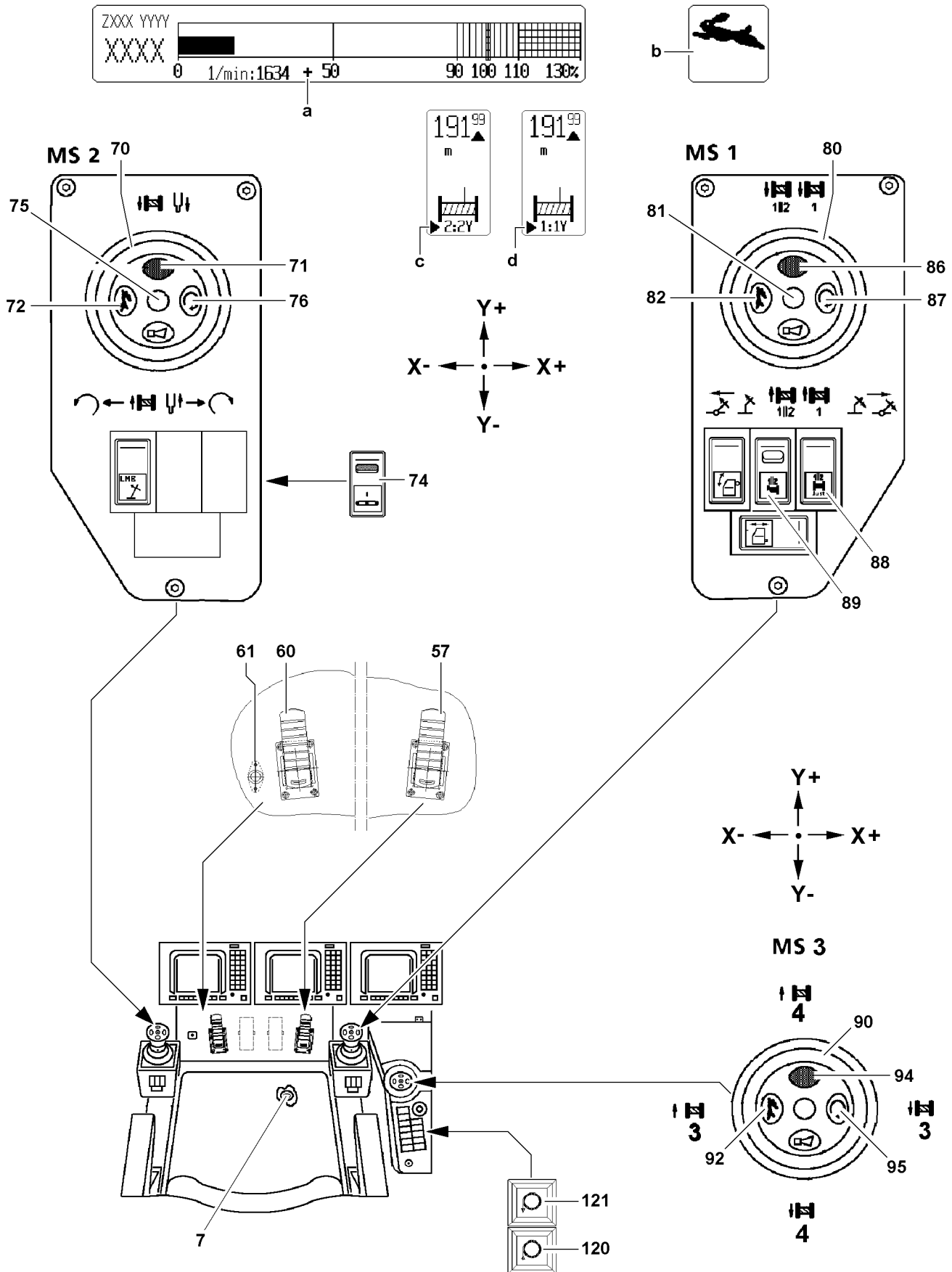


Fig.110601

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7.5.2 Crane operation without winch 6

If winch 6 is not installed, then the hoist rope is placed normally on the W-control winch (winch 5)* which allows constant operation for control operation only for maximum 2 months.

NOTICE

Damage to the hoist rope!

If a hoist rope is placed on winch 5 and it is used for W-control, then significant wear and a shorter service life for the rope is the result.

The hoist rope can fail in crane operation and rip off.

- ▶ Make sure that someone checks before every crane operation which type of rope is placed on winch 5.
 - ▶ Observe the Crane operating instructions, chapter 8.04.
-



WARNING

Falling W-lattice jib!

If a hoist rope is used as a control rope on the W-control winch (winch 5) in long-term applications of more / equal to two months, then the rope can fail in crane operation and rip off.

The W-lattice jib can fold down uncontrolled.

Death, severe bodily injuries, property damage.

- ▶ Carry out regular visual inspections.
 - ▶ Check the rope regularly and unreeve no later than after two month in operation and reeve in again.
 - ▶ Replace a damaged rope.
-



Note

- ▶ Important inspection and maintenance notes for ropes, see Crane operating instructions, chapter 7.05.50 and chapter 8.04.
-

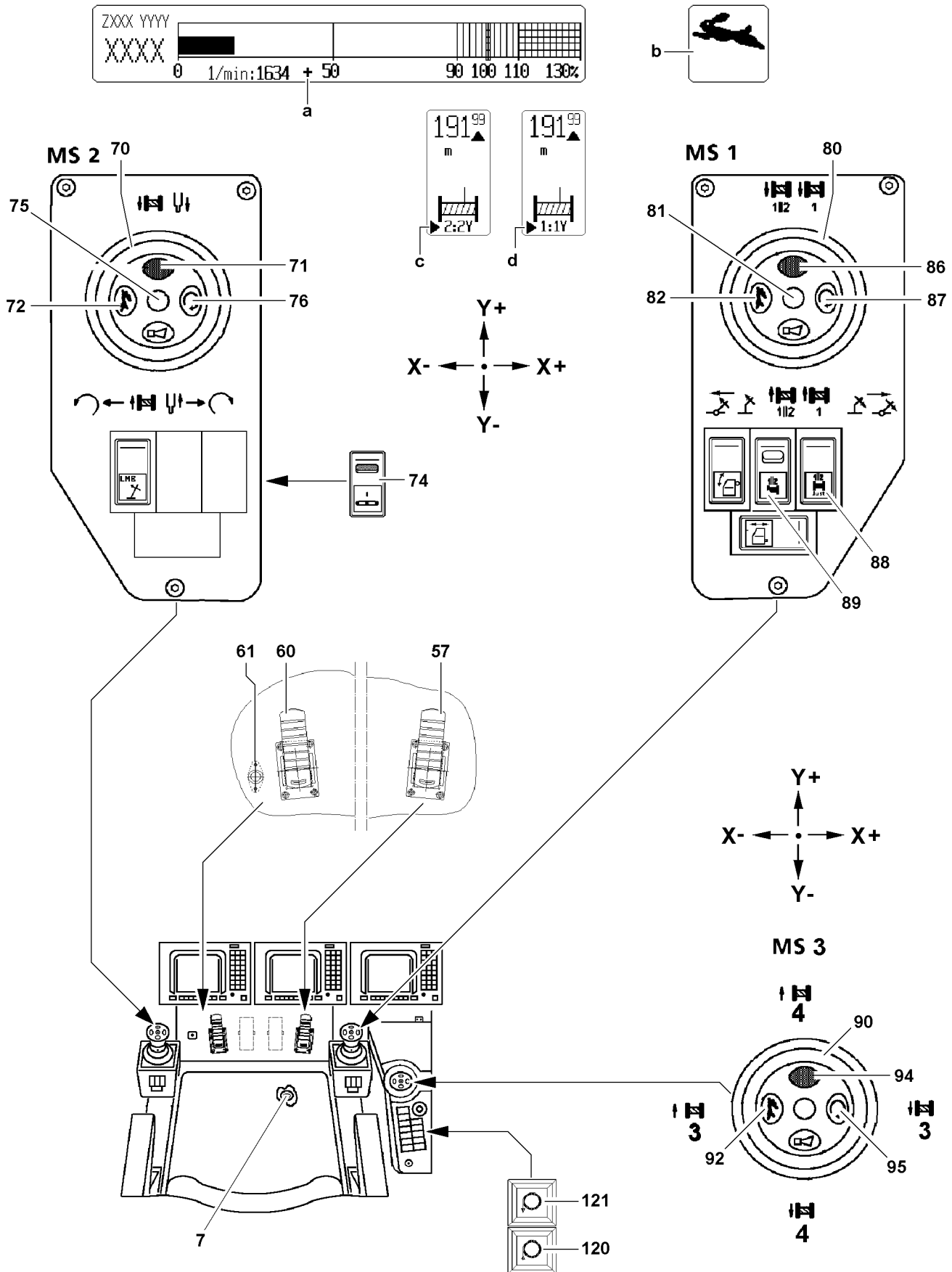


Fig.110601

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7.6 Operating the assembly winch

Spool assembly winch out:

- ▶ Press the button **121** and hold.

Result:

- The assembly winch spools out.

Stop the assembly winch:

- ▶ Stop pressing the button **121**.

Result:

- The assembly winch is stopped.

Spool the assembly winch up:

- ▶ Press the button **120** and hold.

Result:

- The assembly winch spools up.

Stop the assembly winch:

- ▶ Stop pressing the button **120**.

Result:

- The assembly winch is stopped.

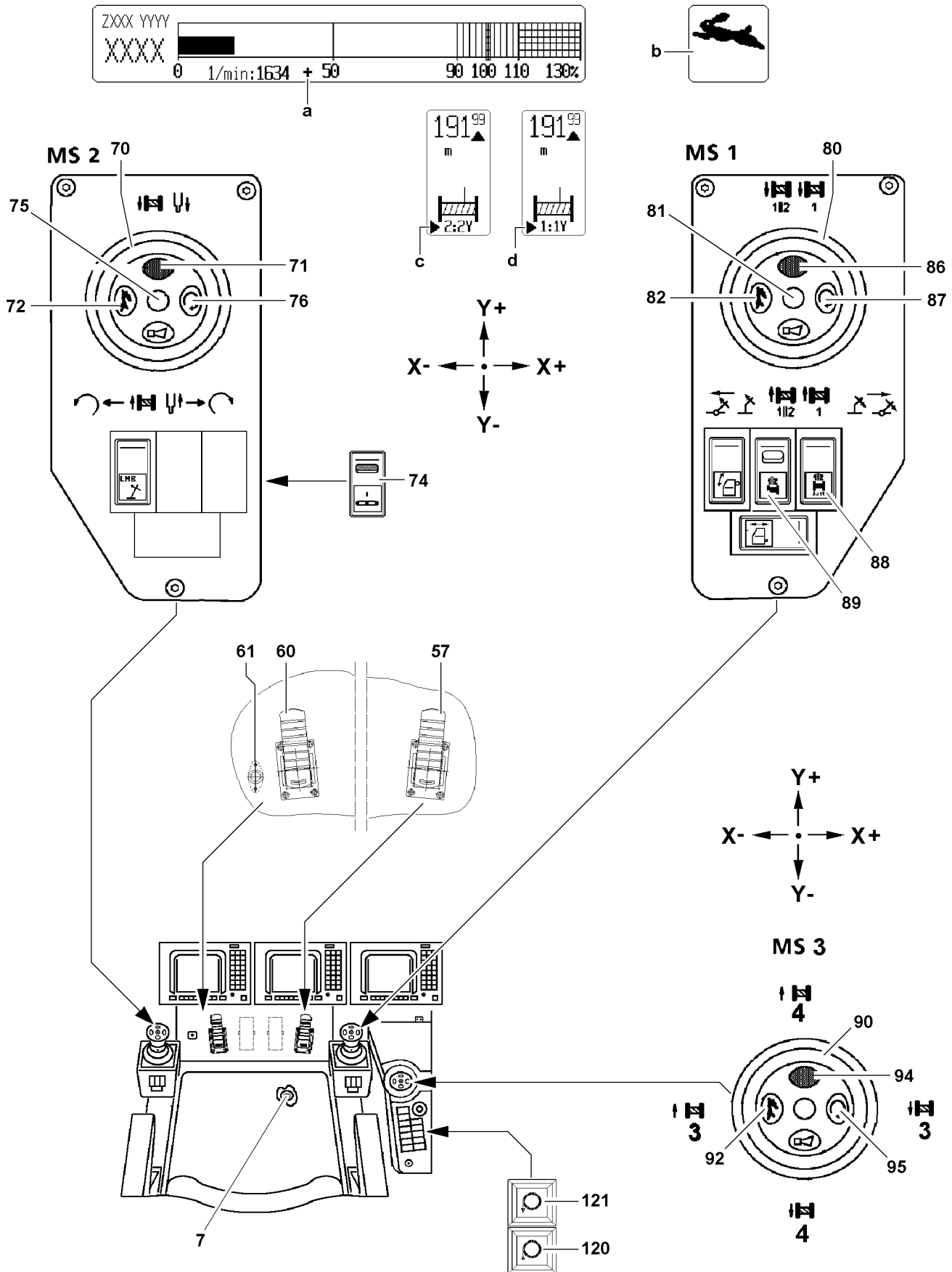


Fig.110601

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8 Luffing the boom



DANGER

Danger of accident due to toppling crane!

If the LICCON overload protection turns off while trying to lift the load with the winch, then a subsequent luffing movement can cause the crane to topple over or damage it.

Death, severe bodily injuries, property damage.

▶ Do not lift the load by luffing up the boom, see Crane operating instructions, chapter 4.04.

The speed of crane movement „Luffing“ is controlled by the deflection of the corresponding master switch and the pedal **57**.



Note

▶ The operating modes are explained in the load chart manual.



Note

▶ Observe the pump - master switch assignment in the electric wiring diagram.

8.1 Luffing the main boom in operating mode S/SL

▶ Deflect the master switch 1 **80** in direction X-.

Result:

– The boom is luffed up.

▶ Deflect the master switch 1 **80** in direction X+.

Result:

– The boom is luffed down.

8.2 Luffing the main boom in operating mode SW

▶ Deflect master switch 3 **90** in direction Y-.

Result:

– The boom is luffed up.

▶ Deflect master switch 3 **90** in direction Y+.

Result:

– The boom is luffed down.

8.3 Luffing the main boom in operating mode SDW

▶ Deflect the master switch 3 **90** in direction X-.

Result:

– The boom is luffed up.

▶ Deflect the master switch 3 **90** in direction X+.

Result:

– The boom is luffed down.

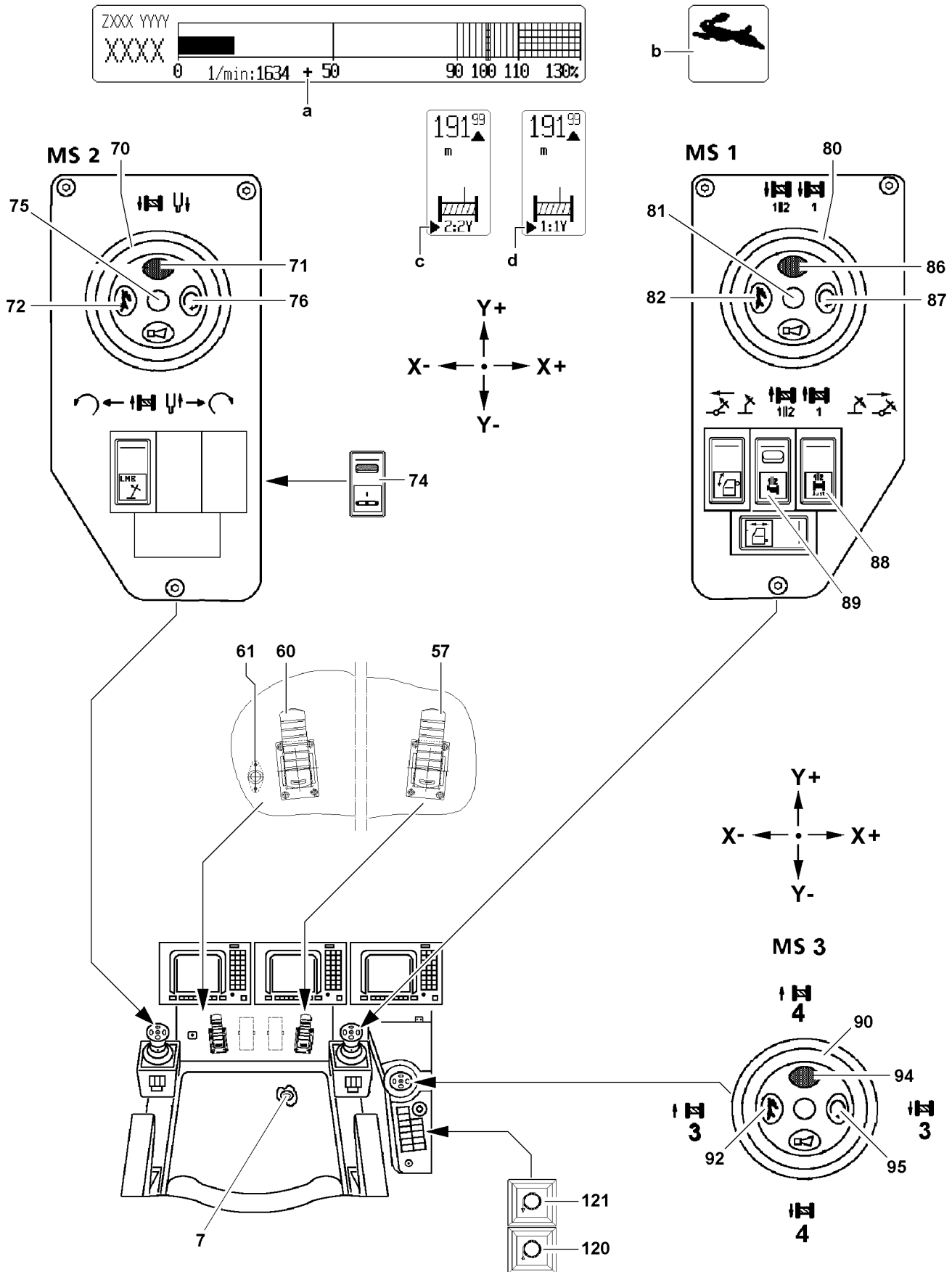


Fig.110601

LWE/LR 1750-000/12812-15-02/en

8.4 Luffing the lattice jib in operating mode SW/SDW

- ▶ Deflect the master switch 1 **80** in direction X-.

Result:

- The lattice jib is luffed up.

- ▶ Deflect the master switch 1 **80** in direction X+.

Result:

- The lattice jib is luffed down.

8.5 Luffing the lattice jib in operating mode SDWV/SLK

- ▶ Deflect the master switch 3 **90** in direction X-.

Result:

- The lattice jib is luffed up.

- ▶ Deflect the master switch 3 **90** in direction X+.

Result:

- The lattice jib is luffed down.

8.6 Luffing the derrick, for all D-operating modes

- ▶ Deflect master switch 3 **90** in direction Y-.

Result:

- The derrick is luffed up.

- ▶ Deflect master switch 3 **90** in direction Y+.

Result:

- The derrick is luffed down.

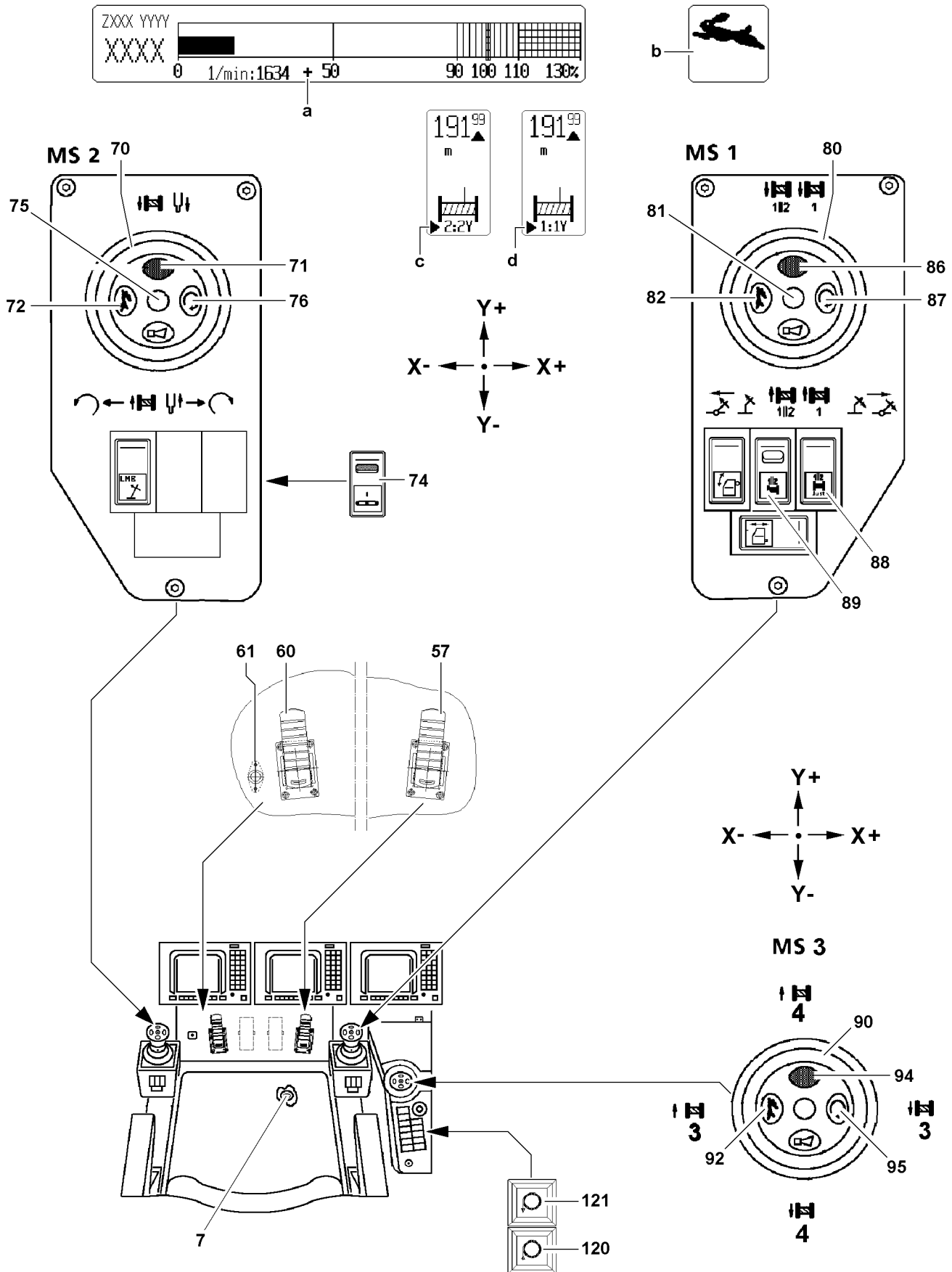


Fig.110601

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9 Running / slowing down the slewing movement with the pedal

NOTICE

Danger of property damage on the slewing ring connection!

When actuating the slewing gear brake with the pedal **60**, only part of the braking momentum of the slewing gear brake can be created.

- ▶ Use the pedal **60** to actuate the slewing gear brake only at minimum slewing speeds, which means the master switch **2 70** is almost in zero position.
- ▶ Do not brake the turning movement of the crane by moving the master switch **2 70** back to the neutral position and / or by abruptly applying the slewing brake with the pedal **60**.

Use the pedal **60** to actuate the slewing gear brake only in the following cases:

- Starting the slewing movement in strong side wind
- Stopping the slewing movement in strong side wind

9.1 Starting the slewing movement in strong side wind

When turning against the wind in strong side wind and with a long boom systems, then the superstructure, due to leakage in the hydraulic motor, will turn into the opposite direction, in relation to the deflection of the master switch.

This can be avoided as follows:

- ▶ Actuate the pedal **60** and deflect the master switch **2 70** into the desired turning direction.
- ▶ Slowly release the pedal **60** until the superstructure turns in the desired turning direction.

9.2 Stopping the slewing movement in strong side wind

- ▶ Slow down the crane with master switch **2 70** to minimum slewing speed.
- ▶ Apply the pedal **60** carefully, until the crane has come to a standstill at the desired position.



Note

- ▶ Preselection of slewing speed, see Crane operating instructions, chapter 4.02!

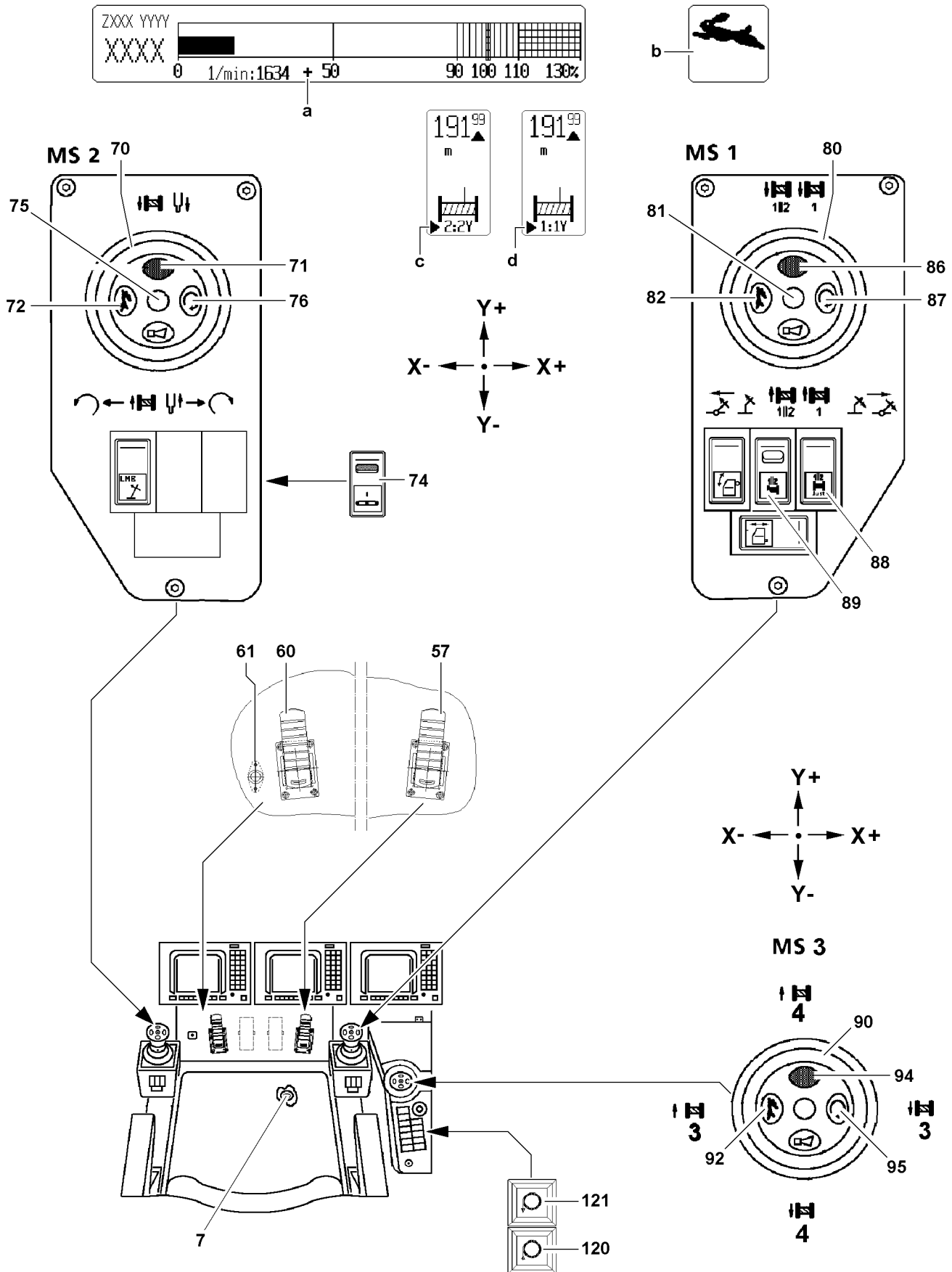


Fig.110601

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10 Switching the slewing gear to freewheeling / coasting

In order to position the boom over the load more easily, the slewing gear can be switched to freewheeling.

The master switch 2 **70** may not be deflected while doing so.

The slewing gear **cannot** be switched to coasting in these situations:

- Slewing gear shut off by the LICCON overload protection.
- Activated working range limitation.

▶ Press the foot button **61**.

Result:

- The slewing gear is switched to freewheeling / coasting.

Problem remedy

With the slewing gear released, the superstructure turns unintentionally (for example due to wind).

- ▶ Continue to hold the foot button **61**.
 - ▶ Deflect the master switch 2 **70** in slewing direction and then no longer press the foot button **61**.
 - ▶ Slow down the slewing movement by slowly resetting the master switch 2 **70**.
-

11 Turning the crane superstructure



WARNING

Danger of accident!

Death, severe bodily injuries, property damage.

- ▶ Ensure that there are no obstacles in the turning range for the crane and that there are no persons within the danger zone.
 - ▶ Give a short warning signal (horn) before starting a crane movement.
-



WARNING

Danger of accident due to toppling crane!

If the slewing speed is exceeded, there is the danger that the loads start to swing.

The crane can be damaged or topple over.

Death, severe bodily injuries, property damage.

- ▶ Turning with a load: Initiate and slow down a turning movement extremely sensitively.
 - ▶ Longer boom and larger load: Operate the crane with lower slewing speed.
 - ▶ Observe and adhere to the values in the load chart manual.
-

The speed of the „turning“ crane movement is controlled via the deflection of master switch 2 **70** and via the pedal **57** of the engine regulation.

In the „Control Parameter“ program, it is possible to preselect the maximum rotational speed.

See Crane operating instructions, chapter 4.02.

- ▶ Deflect the master switch 2 **70** in direction X+.

Result:

- The crane superstructure turns to the right.

- ▶ Deflect the master switch 2 **70** in direction X-.

Result:

- The crane superstructure turns to the left.

**Note**

▶ Preselection of slewing speed, see Crane operating instructions, chapter 4.02!

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LWE/LR 1750-000/12812-15-02/en

Fig.195219

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1 Wire ropes and rope end connections

1.1 Wire ropes

Check if a **rotating resistant** or a **non-rotating** rope is required for the application. The selected type of rope then requires the corresponding rope end connections, see Crane operating instructions, chapter 8.04.



Note

- ▶ Correct choice and use of the wire rope and the rope end connections are a decisive precondition for proper and accident-free crane operation.



DANGER

Incorrect rope type!

Danger of severe injuries to personnel and property damage.

- ▶ **Never** use rotation-resistant ropes with a rotating rope end connection.
- ▶ **Never** install a twist compensator / swivel.

1.2 Rope end connections

Rope end connections are grouped into:

- Rope end connections with locking clamp or locking cast sleeve
- The L-shaped rope end connection with locking clamp or locking cast sleeve (LR 11000 only)
- Rope end connection **without** locking clamp or locking cast sleeve



Note

- ▶ The locking clamp **8** is pressed on the rope.
- ▶ The locking cast sleeve **8** is cast with the rope.

1.2.1 Rope end connections with locking clamp or locking cast sleeve

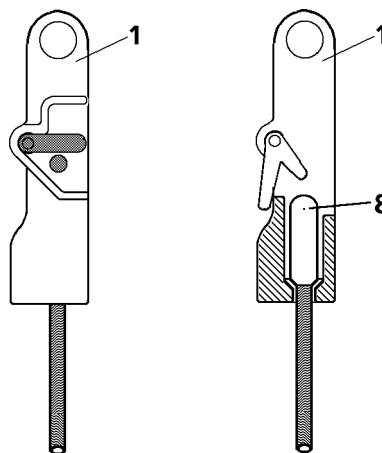


Fig.144019: Rope end connections with locking clamp **8** or locking cast sleeve **8**

- Rope end connections **with** locking clamp **8** or locking cast sleeve **8**.
A rope end connection **1** or an L-shaped rope end connection **24** should be used for this.

1.2.2 The L-shaped rope end connection with locking clamp or locking cast sleeve (LR 11000 only)



WARNING

Load can be ripped off!

Death, severe bodily injuries, property damage.

- ▶ The L-shaped rope end connection **24** is only permitted for use on LR 11000.
- ▶ It is prohibited to use the L-shaped rope end connection **24** on other crane types.
- ▶ Make sure that the L-shaped rope end connection is only used for **reeving with a even number of strands**.

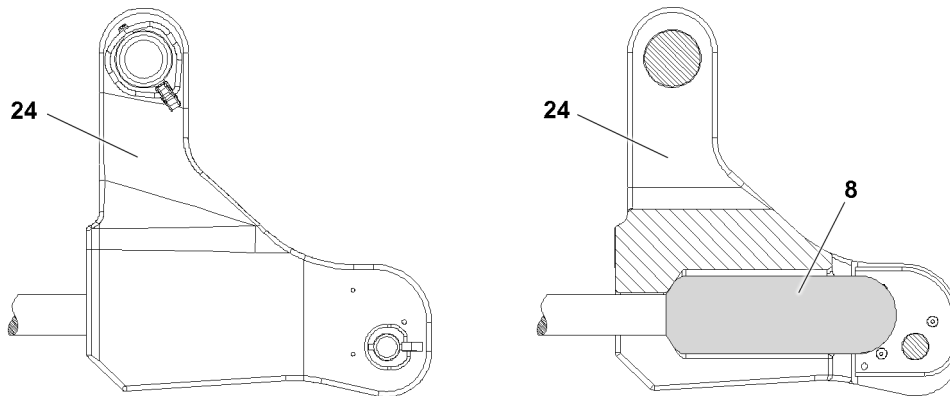


Fig.144020: L-shaped rope end connection **24** with locking clamp **8** or locking cast sleeve **8**

- Rope end connections **with** locking clamp **8** or locking cast sleeve **8**.
An L-shaped rope end connection **24** or a rope end connection **1** should be used for this.

1.2.3 Rope end connection without locking clamp or locking cast sleeve

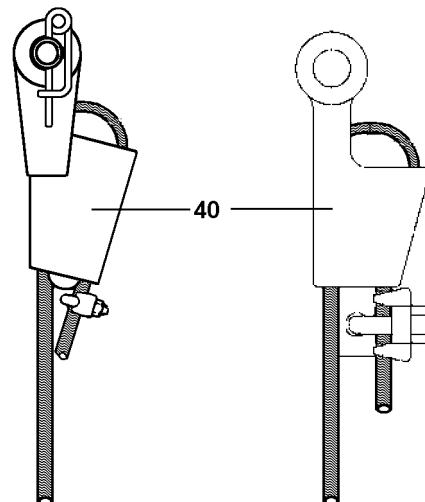


Fig.144021: Rope end connection without locking clamp or locking cast sleeve

- Rope end connections **without** locking clamp **8** or locking cast sleeve **8**.
For that, use a wedge lock **40**.

2 Reeving in the hoist rope



WARNING

Slipping at assembly work!

Danger of falling.

Death, severe injury, property damage.

- ▶ The boom system may only be accessed if the assembly personnel is protected with suitable safety measures to prevent them from falling.
- ▶ If retaining ropes are present on the boom system, then the assembly personnel must hang an approved fall arrest system to the retaining ropes of the boom system on the left and right with both snap hooks and secure themselves to prevent them from falling.
- ▶ Without appropriate safety measures it is **strictly** prohibited to step on the boom system.
- ▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly.
- ▶ Carry out all assembly work from a safe location.
- ▶ Observe the assembly guidelines in the Crane operating instructions, chapter 5.01.

Make sure that the following prerequisites are met:

- The ground is level and of sufficient load carrying capacity.
- **Only for cranes with crane support:** The crane is properly supported.
- The crane is horizontally aligned.
- The crane is ballasted according to the load chart.
- The LICCON overload protection has been set according to the load chart.
- The slewing gear brake is applied.
- The boom end section is just above the ground.

2.1 Reeving in the hoist rope with the assembly winch

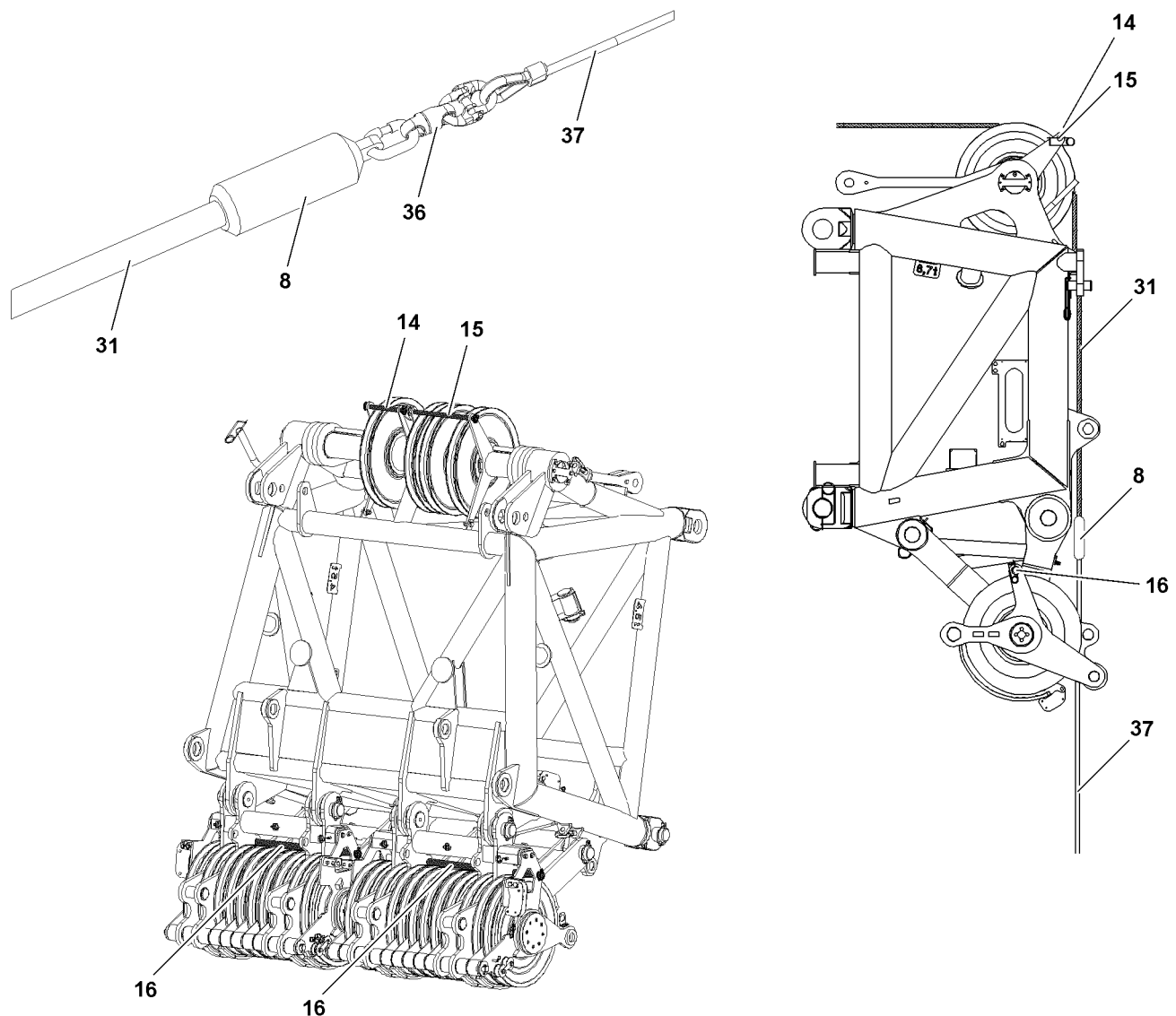


Fig.121853: Reeving in with assembly winch

- ▶ Wear approved fall arrest system and protective equipment, see Crane operating instructions, chapter 2.04.
- ▶ Bring the fall protection equipment on the crane superstructure and on the lattice boom in operating position and secure, see Crane operating instructions, chapter 2.06.
- ▶ Properly hang the fall arrest system on the intended safety ropes and / or fastening points.
- ▶ Switch the assembly winch to freewheeling.
- ▶ Remove the rope retaining pin **14**, rope retaining pin **15** and rope retaining pin **16**.
- ▶ Connect the auxiliary rope **37** with the auxiliary reeving rope (hemp rope).
- ▶ Reeve in the auxiliary rope **37** in the reverse direction between the hook block and the pulley head.
- ▶ Bring the auxiliary rope **37** with the auxiliary reeving rope (hemp rope) upward over the back pulley, which is to be reeved according to the reeving plan.
- ▶ Pull the auxiliary rope **37** to the rear to the hoist winch.
- ▶ Release the auxiliary reeving rope (hemp rope) from the auxiliary rope **37**.

When the auxiliary rope is on the hoist winch:

- ▶ Connect the auxiliary rope **37** with the hoist rope **31**: Open the connecting link **36**, connect it with the eyehook of the lock clamp **8** and close the connecting link **36**.
- ▶ Turn the freewheeling off on the assembly winch.

NOTICE

Hoist rope tension too low!

Slack rope formation.

- ▶ Permit no slack rope on the hoist winch and the assembly winch.

-
- ▶ Reeve in the hoist rope **31**: Spool the hoist rope **31** from the hoist winch and simultaneously spool up the auxiliary rope **37** on the assembly winch.

When the hoist rope **31** is reeved:

- ▶ Release the auxiliary rope **37** from the hoist rope **31**.
- ▶ Spool the auxiliary rope on the assembly winch.
- ▶ Pin and secure the rope retaining pin **14**, rope retaining pin **15** and rope retaining pin **16**.
- ▶ Hang the hoist rope properly in on the rope lock, see section „Hanging the hoist rope in on the rope lock“.

When the hoist rope is properly hung in on the rope lock:

- ▶ Attach the hoist limit switch weight, see section „Attaching the hoist limit switch weight“.

**Note**

Parallel operation of winch 1 and winch 2!

- ▶ Repeat the above described reeving procedure with the second hoist rope.
 - ▶ Observe the reeving plan.
-

3 Reeving the hook block in and out

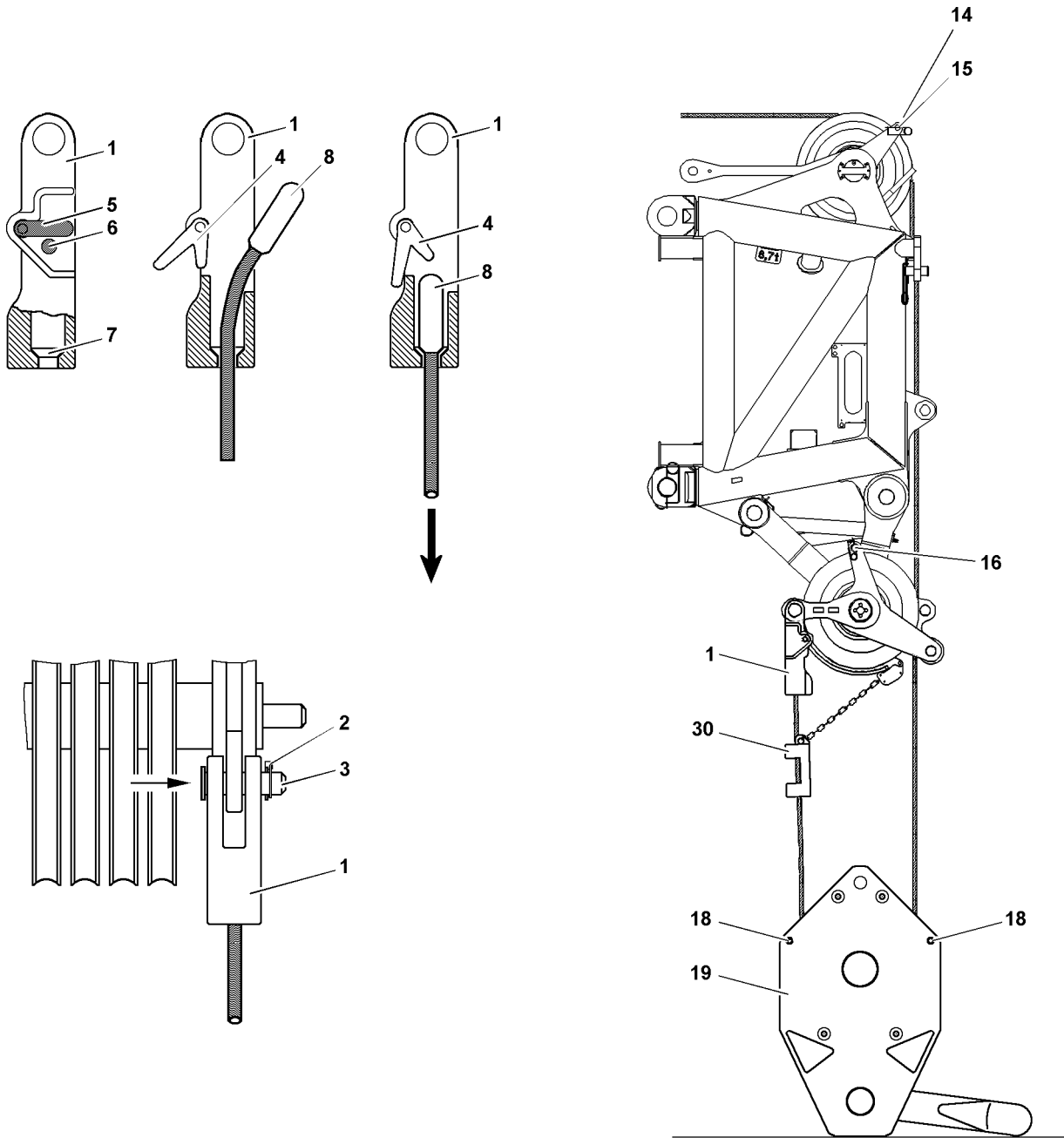


Fig.144024: Details Reeving Hook block

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3.1 Reeving in the hook block



WARNING

Toppling of hook block!

If the retaining pins are **not** pinned in the roller block / the pulley blocks of the hook block before placing the hook block down, then the pulley blocks / the hook block can topple over when unreeving the hoist rope.

Death, severe injury, property damage.

- ▶ Pin the retaining pins, see Crane operating instructions, chapter 5.19 or separate operating instructions.

3.1.1 Preparing the hook block

Make sure that the following prerequisites are met:

- The crane is horizontally aligned.
- The slewing gear brake is applied.
- The hook block is set down on the ground properly.
- The boom is luffed down to the point where the pulley head is above the hook block.
- An assistant is present to guide the hoist rope.



WARNING

Danger of accident due to side wind!

If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.

Death, severe injury, property damage.

The crane can collide with close-by structures or objects.

- ▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

NOTICE

Hook block incorrectly reeved!

Damage to the hoist rope.

- ▶ Carry out the reeving of the hoist rope according to the reeving plan.
- ▶ Select the rope fixed point on the hook block is in such a way that the last strand runs parallel to the remaining rope strands, as much as possible.
- ▶ Set the required hook block under the boom head.
- ▶ At the hook block **19**, remove the spring retainers **18** for both rope retaining pins and pull them both out.



WARNING

Slipping at assembly work!

Danger of falling.

Death, severe injury, property damage.

- ▶ The boom system may only be accessed if the assembly personnel is protected with suitable safety measures to prevent them from falling.
- ▶ If retaining ropes are present on the boom system, then the assembly personnel must hang an approved fall arrest system to the retaining ropes of the boom system on the left and right with both snap hooks and secure themselves to prevent them from falling.
- ▶ Without appropriate safety measures it is **strictly** prohibited to step on the boom system.
- ▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly.
- ▶ Carry out all assembly work from a safe location.
- ▶ Observe the assembly guidelines in the Crane operating instructions, chapter 5.01.

- ▶ Reeve the hook block.
- ▶ Insert the rope retaining pins again and secure with spring retainers.

3.1.2 Hooking the hoist rope on the rope lock

NOTICE

Hoist rope is incorrectly installed!
Damage to the hoist rope.

- ▶ Always insert the pins **3** from „inside to outside“ and secure from the outside.
- ▶ The rope lock **1** must be pinned in either at the pulley head or on the hook block and secured with locking pins **2**, depending on reeving.
- ▶ On the rope lock **1**, push the safety pin **6** in.
- ▶ Swing the lever **5** „down“ and hold it in this position.

Result:

- The latch **4** is swung „downward“.
- ▶ Attach the rope end with the locking clamp **8** in the rope lock **1** and pull „down“ firmly (in direction of arrow), until the locking clamp **8** is touching in the cone **7**.



WARNING

Locking clamp is incorrectly installed!
Danger of accident.
Death, severe injuries, property damage.

- ▶ The locking clamp **8** must touch on the cone **7** after hanging it into the rope lock **1** and must be secured by the latch **4**.

- ▶ Release the lever **5**.

Result:

- The lever **5** returns to the initial position and is locked by the safety pin **6**.
- ▶ Check the rope retainer. Visual check.

3.2 Unreeving the hook block



WARNING

Toppling of hook block!
If the retaining pins are **not** pinned in the roller block / the pulley blocks of the hook block before placing the hook block down, then the pulley blocks / the hook block can topple over when unreeving the hoist rope.

Death, severe injury, property damage.

- ▶ Pin the retaining pins, see Crane operating instructions, chapter 5.19 or separate operating instructions.

Make sure that the following prerequisites are met:

- The ground is level and of sufficient load carrying capacity.
- **Only for cranes with crane support:** The crane is properly supported.
- The crane is horizontally aligned.
- The crane is ballasted according to the load chart.
- The LICCON overload protection has been set according to the load chart.
- The slewing gear brake is applied.
- The boom end section is just above the ground.



WARNING

Danger of accident due to side wind!

If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.

Personnel can be severely injured or killed.

The crane can collide with close-by structures or objects.

- ▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

3.2.1 Lowering the hook block



WARNING

Crushing of hands!

When unreeving the hook block, it can topple over.

Death, severe injury, property damage.

- ▶ Use the handles in the safe area of the hook block.
- ▶ Make sure the hook block is safely positioned.

- ▶ Lower the hook block and set it on the ground.
- ▶ Remove the hoist limit switch weight.

3.2.2 Detaching the hoist rope

- ▶ On the rope lock **1**, push the safety pin **6** in.
- ▶ Swing the lever **5** „down“ and hold it in this position.

Result:

- The latch **4** is swung downward.
- The locking clamp **8** is released.
- ▶ Push the hoist rope up and detach the locking clamp **8**.
- ▶ Release and unpin the rope retaining pin on the hook block.
- ▶ Unreeve the hoist rope from the hook block and the pulley head.
- ▶ Insert the rope retaining pins again and secure with spring retainers.

4 Reeving in / reeving out the hook block, L-shaped rope end connection (LR 11000 only)



WARNING

Load can be ripped off!

Death, severe bodily injuries, property damage.

- ▶ The L-shaped rope end connection **24** is only permitted for use on LR 11000.
- ▶ It is prohibited to use the L-shaped rope end connection **24** on other crane types.
- ▶ Make sure that the L-shaped rope end connection is only used for **reeving with a even number of strands**.

Depending on the number of rope strands, with the even reeving of the hook block, the L-shaped rope end connection must be installed on one of the pin points (pin point **P1** to pin point **P4**) on the roller set / roller sets.

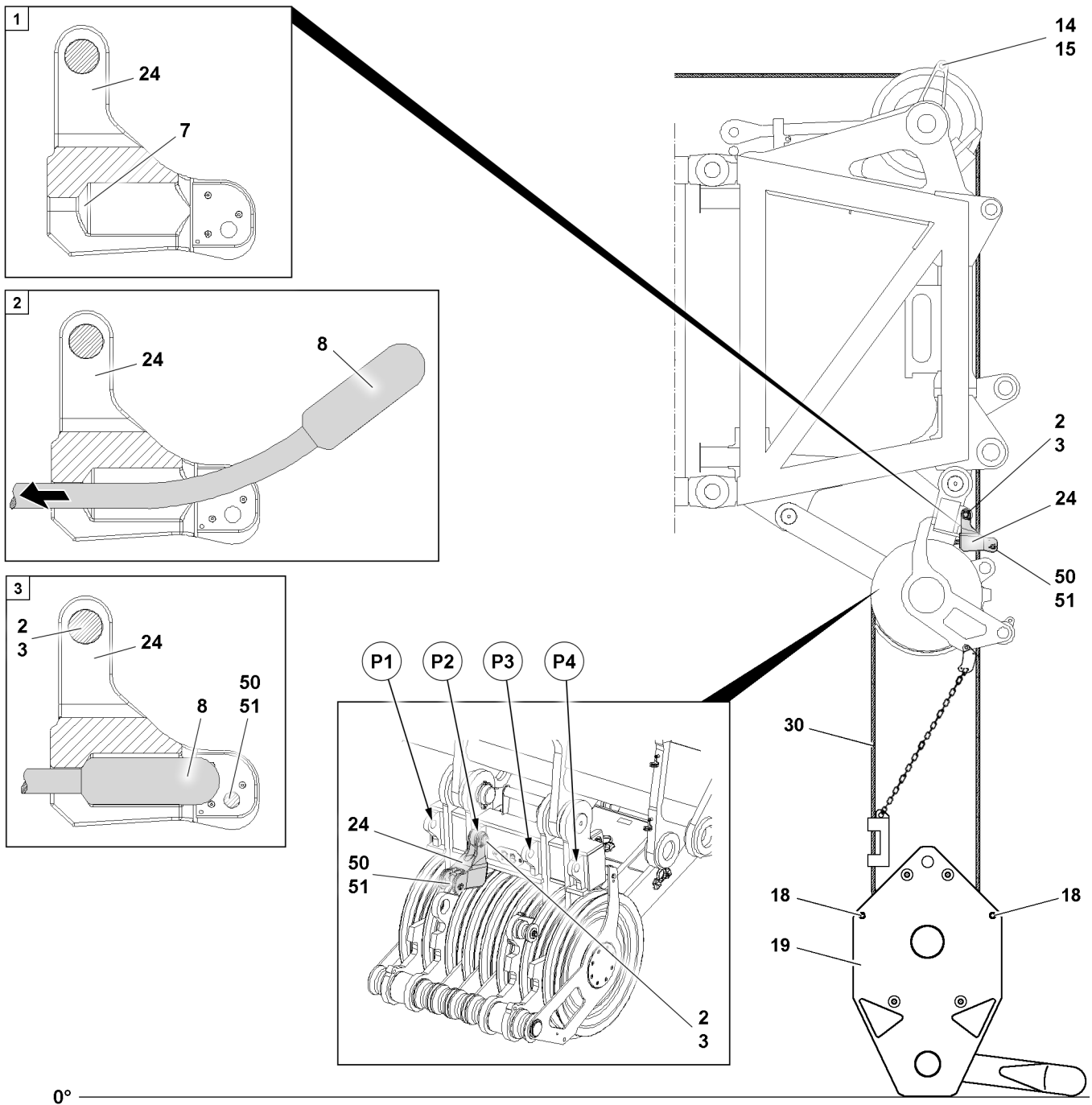


Fig.144022: Details reeving hook block, L-shaped rope end connection 24

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4.1 Reeving in the hook block



WARNING

Toppling of hook block!

If the retaining pins are **not** pinned in the roller block / the pulley blocks of the hook block before placing the hook block down, then the pulley blocks / the hook block can topple over when unreeving the hoist rope.

Death, severe injury, property damage.

- ▶ Pin the retaining pins, see Crane operating instructions, chapter 5.19 or separate operating instructions.

4.1.1 Preparing the hook block

Make sure that the following prerequisites are met:

- The crane is horizontally aligned.
- The slewing gear brake is applied.
- The hook block is set down on the ground properly.
- The boom is luffed down to the point where the pulley head is above the hook block.
- An assistant is present to guide the hoist rope.



WARNING

Danger of accident due to side wind!

If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.

Death, severe injury, property damage.

The crane can collide with close-by structures or objects.

- ▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

NOTICE

Hook block incorrectly reeved!

Damage to the hoist rope.

- ▶ Carry out the reeving of the hoist rope according to the reeving plan.
- ▶ Select the rope fixed point on the hook block in such a way that the last strand runs parallel to the remaining rope strands, as much as possible.
- ▶ Set the required hook block under the boom head.
- ▶ At the hook block **19**, remove the spring retainers **18** for both rope retaining pins and pull them both out.



WARNING

Slipping at assembly work!

Danger of falling.

Death, severe injury, property damage.

- ▶ The boom system may only be accessed if the assembly personnel is protected with suitable safety measures to prevent them from falling.
- ▶ If retaining ropes are present on the boom system, then the assembly personnel must hang an approved fall arrest system to the retaining ropes of the boom system on the left and right with both snap hooks and secure themselves to prevent them from falling.
- ▶ Without appropriate safety measures it is **strictly** prohibited to step on the boom system.
- ▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly.
- ▶ Carry out all assembly work from a safe location.
- ▶ Observe the assembly guidelines in the Crane operating instructions, chapter 5.01.

- ▶ Reeve the hook block.
- ▶ Insert the rope retaining pins again and secure with spring retainers.

4.1.2 Fitting the hoist rope on the rope lock, L-shaped rope end connection

NOTICE

Hoist rope is incorrectly installed!
Damage to the hoist rope.

- ▶ Always insert the pins **50** from „inside to outside“ and secure from the outside.
- ▶ Only pin the rope lock **24** on the roller set / roller sets and secure with a locking pin **2**.
- ▶ On the rope lock **24**, release and unpin the retaining pin **50**.
- ▶ Fit the rope end with the locking clamp **8** in the rope lock **24** and pull the rope firmly in the direction of the arrow, until the locking clamp **8** contacts the cone **7**.



WARNING

Locking clamp is incorrectly installed!
Danger of accident.
Death, severe injuries, property damage.

- ▶ The locking clamp **8** must touch on the cone **7** after fitting it into the rope lock **24** and must be secured by the retaining pin **50**.
- ▶ Insert the retaining pin **50** and secure properly with the retaining element **51**.
- ▶ Check the rope retainer. Visual check.

4.2 Unreeving the hook block



WARNING

Toppling of hook block!

If the retaining pins are **not** pinned in the roller block / the pulley blocks of the hook block before placing the hook block down, then the pulley blocks / the hook block can topple over when unreeving the hoist rope.

Death, severe injury, property damage.

- ▶ Pin the retaining pins, see Crane operating instructions, chapter 5.19 or separate operating instructions.

Make sure that the following prerequisites are met:

- The ground is level and of sufficient load bearing capacity.
- **Only for cranes with crane support:** The crane is properly supported.
- The crane is horizontally aligned.
- The crane is ballasted according to the load chart.
- The LICCON overload protection has been set according to the load chart.
- The slewing gear brake is applied.
- The boom end section is just above the ground.



WARNING

Danger of accident due to side wind!

If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.

Personnel can be severely injured or killed.

The crane can collide with close-by structures or objects.

- ▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

4.2.1 Lowering the hook block

**WARNING**

Crushing of hands!

When unreeving the hook block, it can topple over.

Death, severe injury, property damage.

- ▶ Use the handles in the safe area of the hook block.
- ▶ Make sure the hook block is safely positioned.

- ▶ Lower the hook block and set it on the ground.
- ▶ Remove the hoist limit switch weight.

4.2.2 Detaching the hoist rope

- ▶ On the rope lock **24**, release and unpin the retaining pin **50**.

Result:

- The locking clamp **8** is released.
- ▶ Push the hoist rope forward and detach the locking clamp **8**.
- ▶ Release and unpin the rope retaining pin on the hook block.
- ▶ Unreeve the hoist rope from the hook block and the pulley head.
- ▶ Insert the rope retaining pins again and secure with spring retainers.

5 Attaching and removing the load hook*

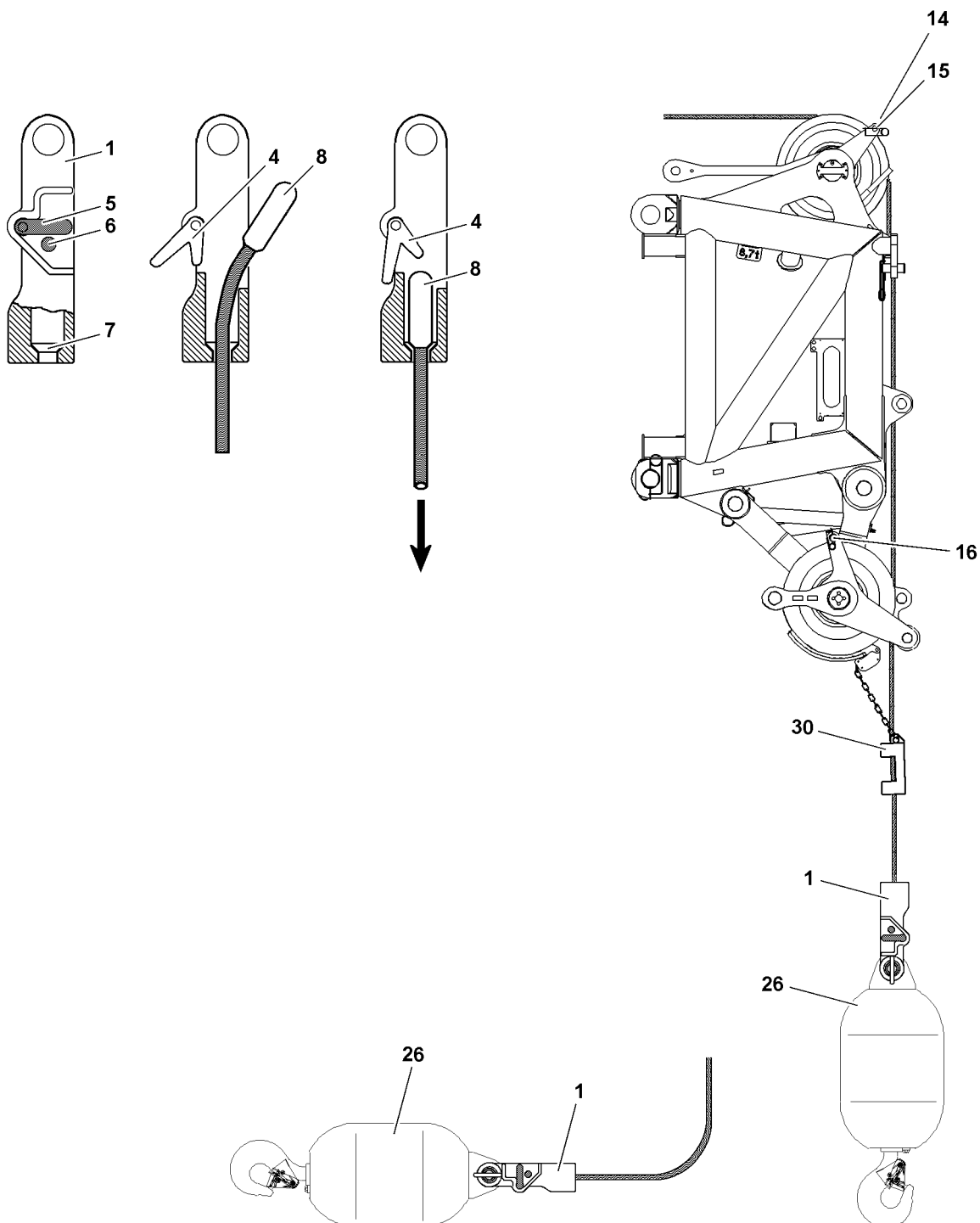


Fig.121854: Fastening load hook

5.1 Fastening the load hook*

5.1.1 Assembling the load hook*

- ▶ Place the load hook under the pulley head of the boom.
- ▶ Release and unpin the rope retaining pins on the back pulley and on the pulley head.

**WARNING**

Slipping at assembly work!

Danger of falling.

Death, severe injury, property damage.

- ▶ The boom system may only be accessed if the assembly personnel is protected with suitable safety measures to prevent them from falling.
- ▶ If retaining ropes are present on the boom system, then the assembly personnel must hang an approved fall arrest system to the retaining ropes of the boom system on the left and right with both snap hooks and secure themselves to prevent them from falling.
- ▶ Without appropriate safety measures it is **strictly** prohibited to step on the boom system.
- ▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly.
- ▶ Carry out all assembly work from a safe location.
- ▶ Observe the assembly guidelines in the Crane operating instructions, chapter 5.01.

- ▶ Place the hoist rope over the back pulley on the boom head.
- ▶ Insert the rope retaining pins again and secure with spring retainers.
- ▶ Pin the rope lock **1** in the load hook **26** and secure with spring retainers.

5.1.2 Fastening the hoist rope

Make sure that the following prerequisites are met:

- The crane is horizontally aligned.
- The slewing gear brake is applied.
- The hook block is set down on the ground properly.
- The boom is luffed down to the point where the pulley head is above the hook block.
- An assistant is present to guide the hoist rope.

**WARNING**

Danger of accident due to side wind!

If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.

Personnel can be severely injured or killed.

The crane can collide with close-by structures or objects.

- ▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.
- ▶ On the rope lock **1**, push the safety pin **6** in.
- ▶ Swing the lever **5** „down“ and hold it in this position.

Result:

- The latch **4** is swung „downward“.
- ▶ Attach the rope end with the locking clamp **8** in the rope lock and pull „down“ firmly (in direction of arrow), until the locking clamp **8** is touching in the cone **7**.

**WARNING**

Locking clamp is incorrectly fastened!

Damage to locking clamp.

Death, severe injuries, property damage

- ▶ The locking clamp **8** must touch on the cone **7** after hanging it into the rope lock **1** and must be secured by the latch **4**.
- ▶ Release the lever **5**.

Result:

- The lever **5** returns to the initial position and is locked by the safety pin **6**.

5.2 Removing the load hook*

Make sure that the following prerequisites are met:

- The ground is level and of sufficient load carrying capacity.
- **Only for cranes with crane support:** The crane is properly supported.
- The crane is horizontally aligned.
- The slewing gear brake is applied.
- The load hook is prepared for assembly.
- An assistant is present to guide the hoist rope.

5.2.1 Lowering the load hook



WARNING

Crushing of hands!

When unreeving the hook block, it can topple over.
Death, severe injury, property damage.

- ▶ Use the handles in the safe area of the hook block.
- ▶ Make sure the hook block is safely positioned.

- ▶ Place the load hook **26** on the ground.
- ▶ Remove the hoist limit switch weight.

5.2.2 Detaching the hoist rope



WARNING

Danger of accident due to side wind!

If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.

Death, severe injury, property damage.

The crane can collide with close-by structures or objects.

- ▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

- ▶ On the rope lock **1**, push the safety pin **6** in.
- ▶ Swing the lever **5** „down“ and hold it in this position.

Result:

- The latch **4** is swung „downward“.
- The locking clamp **8** is released.
- ▶ Push the hoist rope in the direction of the load hook and detach the locking clamp **8**.
- ▶ Remove the rope retaining pins on the pulley head and on the back pulley.
- ▶ Lift the hoist rope from the rope pulleys.
- ▶ Insert the rope retaining pins again and secure with spring retainers.

6 Attaching / removing the hoist limit switch weight

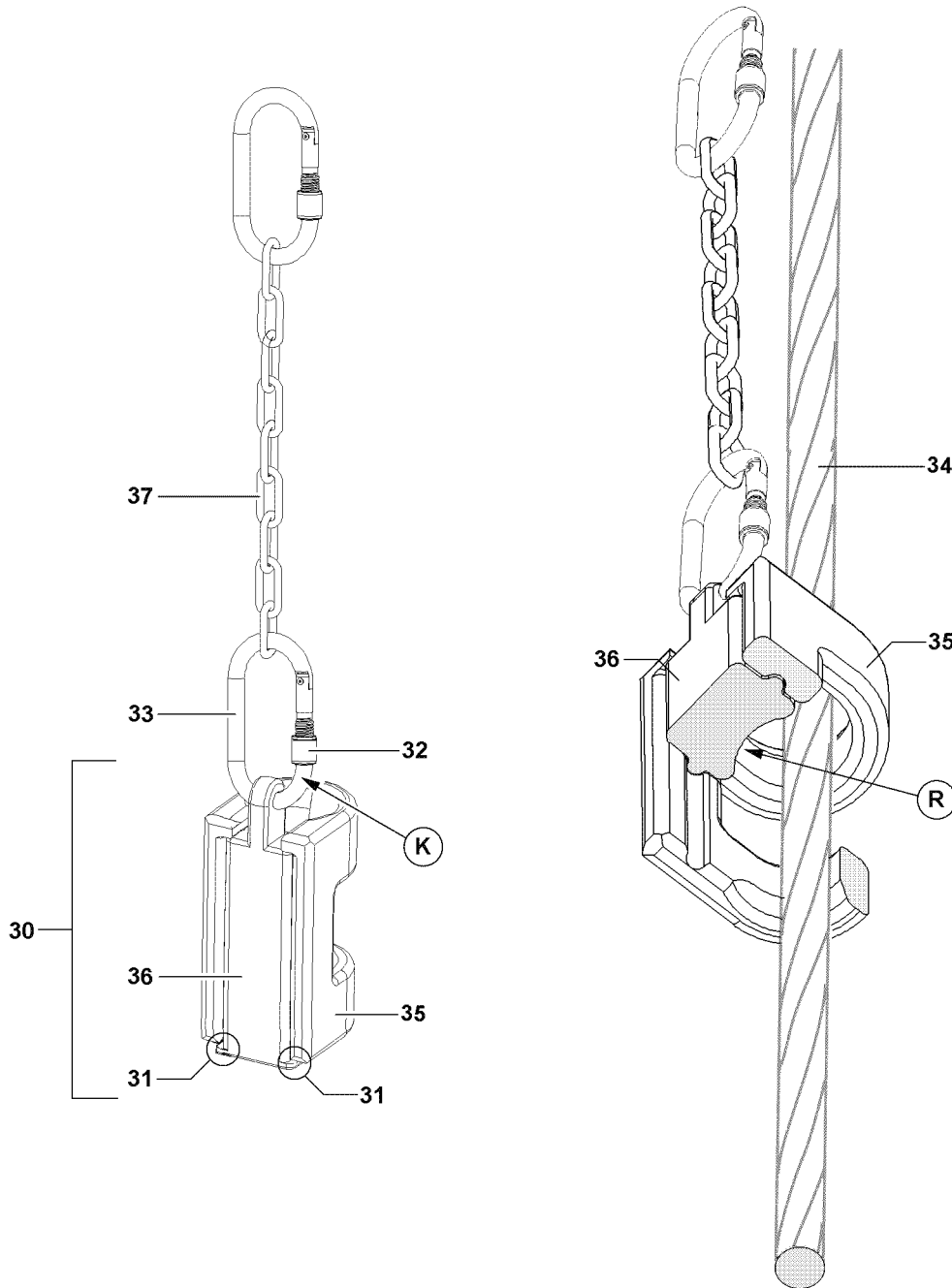


Fig.122728: Details Hoist limit switch weight

6.1 Attaching the hoist limit switch weight

The hoist limit switch weight **30** consists of two parts, which are pushed into each other:

- The weight **35**
- The carrier section **36**

► Loosen and open the screw retainer **32**.

**WARNING**

Hoist limit switch weight is incorrectly installed!

Hoist limit switch weight can fall down. Death, severe injuries.

- ▶ Do not replace the snap hook **33** with other parts, such as a shackle or similar.
- ▶ When detaching or attaching the hoist limit switch weight **30** make sure that the weight **35** and the carrier section **36** do not fall down.
- ▶ Make sure that the curvature **R** of the carrier section **36** points to the hoist rope **34**.
- ▶ Make sure that the noses **31** of the carrier section **36** is placed on the weight **35**.
- ▶ Make sure that the screw retainer **32** can be turned to be closed from top to bottom, point **K**.

The attachment of the hoist limit switch weight **30** 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 **30** must always be laid around the „stationary rope strand“, in other words around the rope strand that leads directly to the cable lock.

Rope fixed point on hook block:

- The hoist limit switch weight **30** is laid around the outer strand which shows the least angular pull, i.e. the one with the smallest angle between the hanging hoist limit switch weight and the hoist rope.

**Note**

- ▶ The chain **37** must be attached in full length during crane operation and may not be shortened.
- ▶ Push the weight **35** with one hand on the hoist rope **34** and hold.
- ▶ With the other hand, guide the carrier section **36** behind the hoist rope **34** and under the weight **35**. The curvature **R** of the carrier section **36** must point to the hoist rope **34**.
- ▶ Push the weight **35** on the carrier section **36**.
- ▶ Hang in the hoist limit switch weight **30** with the carrier section **36** in the snap hook **33**.

The snap hook **33** must be secured with the screw retainer **32**.

- ▶ Screw the screw retainer **32** closed on the snap hook **33**.

6.2 Removing the hoist limit switch weight

**WARNING**

Hoist limit switch weight is incorrectly installed!

Hoist limit switch weight can fall down. Death, severe injuries.

- ▶ When detaching or attaching the hoist limit switch weight **30** make sure that the weight **35** and the carrier section **36** do not fall down.
- ▶ It is prohibited to remain within the danger zone.
- ▶ Release and open the screw retainer **32** on the snap hook **33**.
- ▶ Detach the hoist limit switch weight **30** from the snap hook **33**.
- ▶ Hold the weight **35** with one hand and with the other hand, push the carrier section **36** from the weight **35**.
- ▶ Store the weight **35** and carrier section **36** safely.

7 Assembling / disassembling the wedge lock

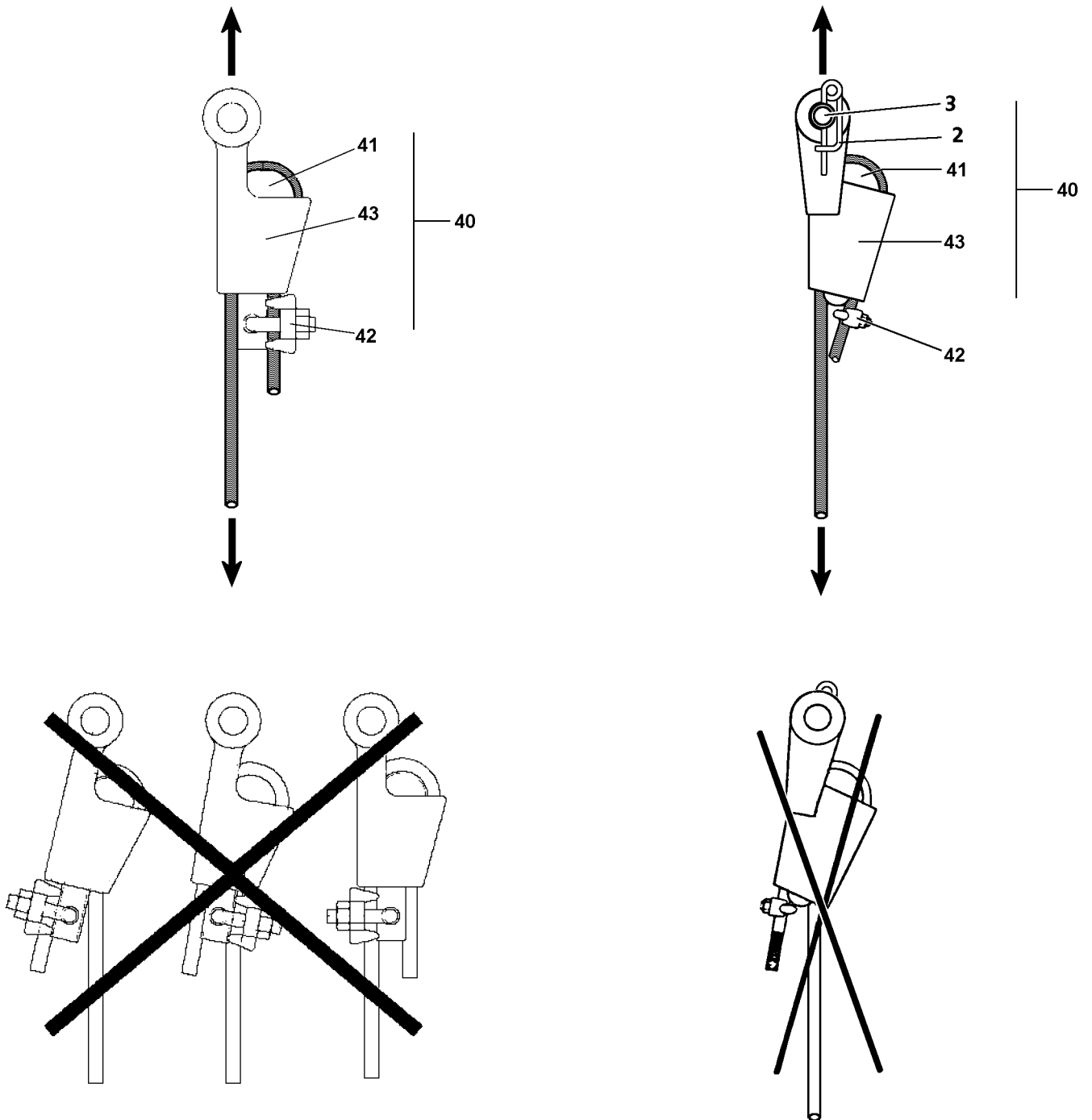


Fig.122729: Wedge lock

Make sure that the following prerequisites are met:

- The rope clamp is cut off on the hoist rope.
- The hook block or the load hook is ready for assembly.

7.1 Installing the wedge lock



WARNING

Wedge lock is incorrectly installed!

Hook block or load can fall down. Death, severe injuries, property damage.

- ▶ Use only a wedge lock **40** approved by Liebherr-Werk Ehingen.
- ▶ Install the wedge lock **40** correctly.
- ▶ Place the hoist rope with the wedge **41** into the housing **43** in such a way that the rope strand runs in the pull axle of the wedge lock **40**.
- ▶ The dead end of the rope must be secured by the clamp **42** to prevent it from being pulled through.
- ▶ It is prohibited for personnel to remain in the danger zone.

- ▶ Take a matching wedge lock **40** from the tool box.
- ▶ Place the hoist rope with the wedge **41** into the housing **43**.
- ▶ If possible, assemble the clamp **42** through the wedge **41** on the dead end of the rope.

NOTICE

Damage to the hoist rope!

If the pin **3** has been assembled incorrectly, the hoist rope may rub against the pin **3** or on the lynch pin **2**.

- ▶ Always insert the pins **3** from „inside to outside“ and secure from the outside.
- ▶ Pin and secure the wedge lock **40** on the fixed point of the pulley head or on the fixed point of the hook block or on the load hook, depending on the reeving plan.

7.2 Removing the wedge lock

- ▶ Unpin the wedge lock **40** on the fixed point.
- ▶ Remove the clamp **42** and pull the hoist rope with the wedge from the housing.
- ▶ Store the wedge lock **40**.

8 Rope reeving



Note

- ▶ See separate reeving plans.

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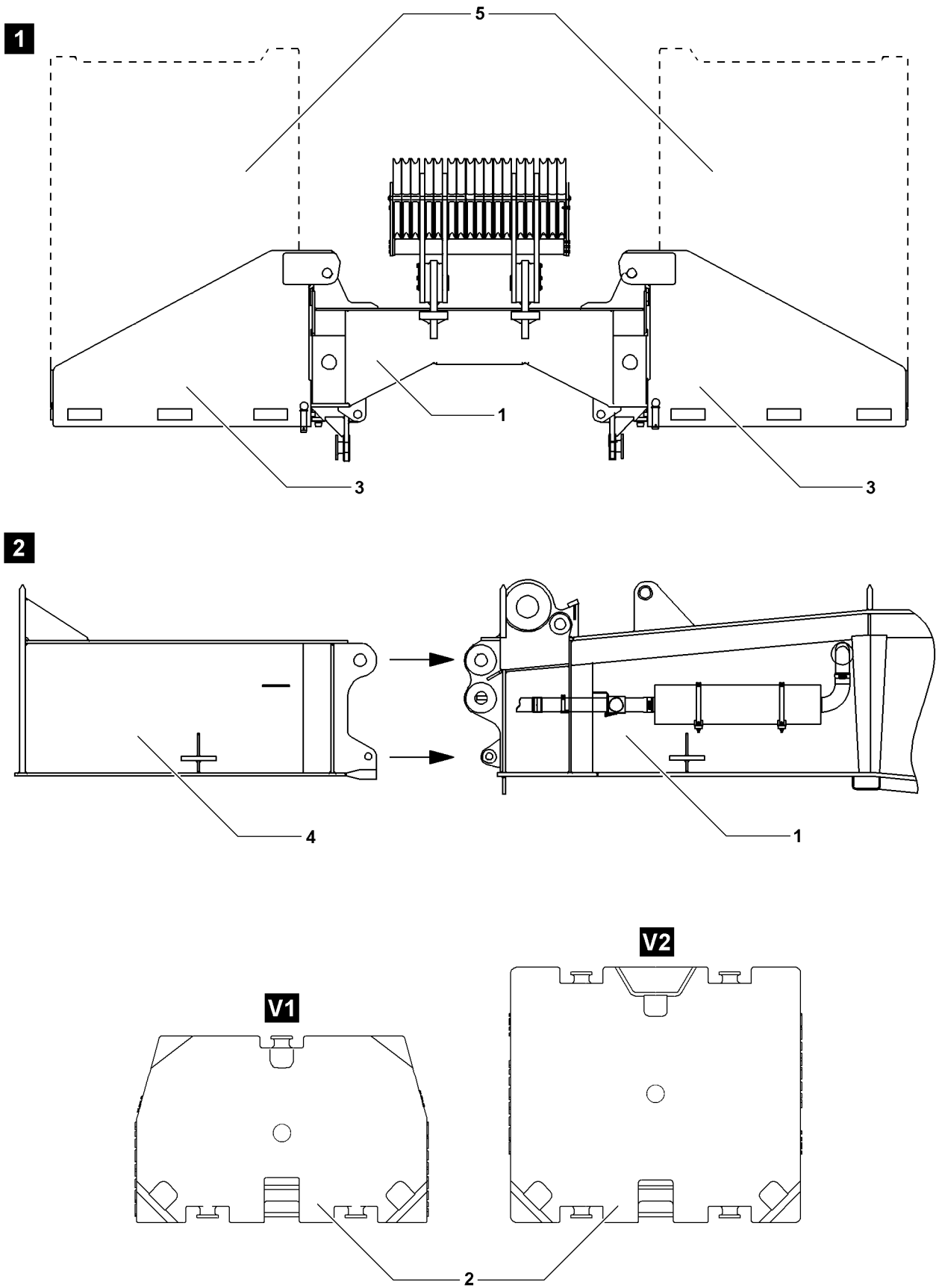


Fig.112542

1 Components

The following components are required for the counterweight on the turntable **1**:

- 2** Counterweight plates
- 3** Console counterweight
- 4** Turntable extension*

1.1 Counterweight plates

The counterweight plates **2** are placed down as the counterweight stack **5**.

Counterweight plates **2** are available in variation **V1** and variation **V2**:

Component	Weight
Variation V1	5.0 t
	7.5 t
	10.0 t
Variation V2	12.5 t

1.2 Console counterweight

Component	Weight
Console counterweight	10.0 t

1.3 Turntable extension*

By installing the turntable extension **4** on the turntable **1**, it can be extended by approx. 2.5 m. This means the counterweight is set back by approx. 2.5 m .

When using the turntable extension **4** higher load capacities, for example during operation without derrick ballast, can be obtained.

Use of the turntable extension **4** is only permissible in connection with the crane support*.

Component	Weight
Turntable extension	5.0 t

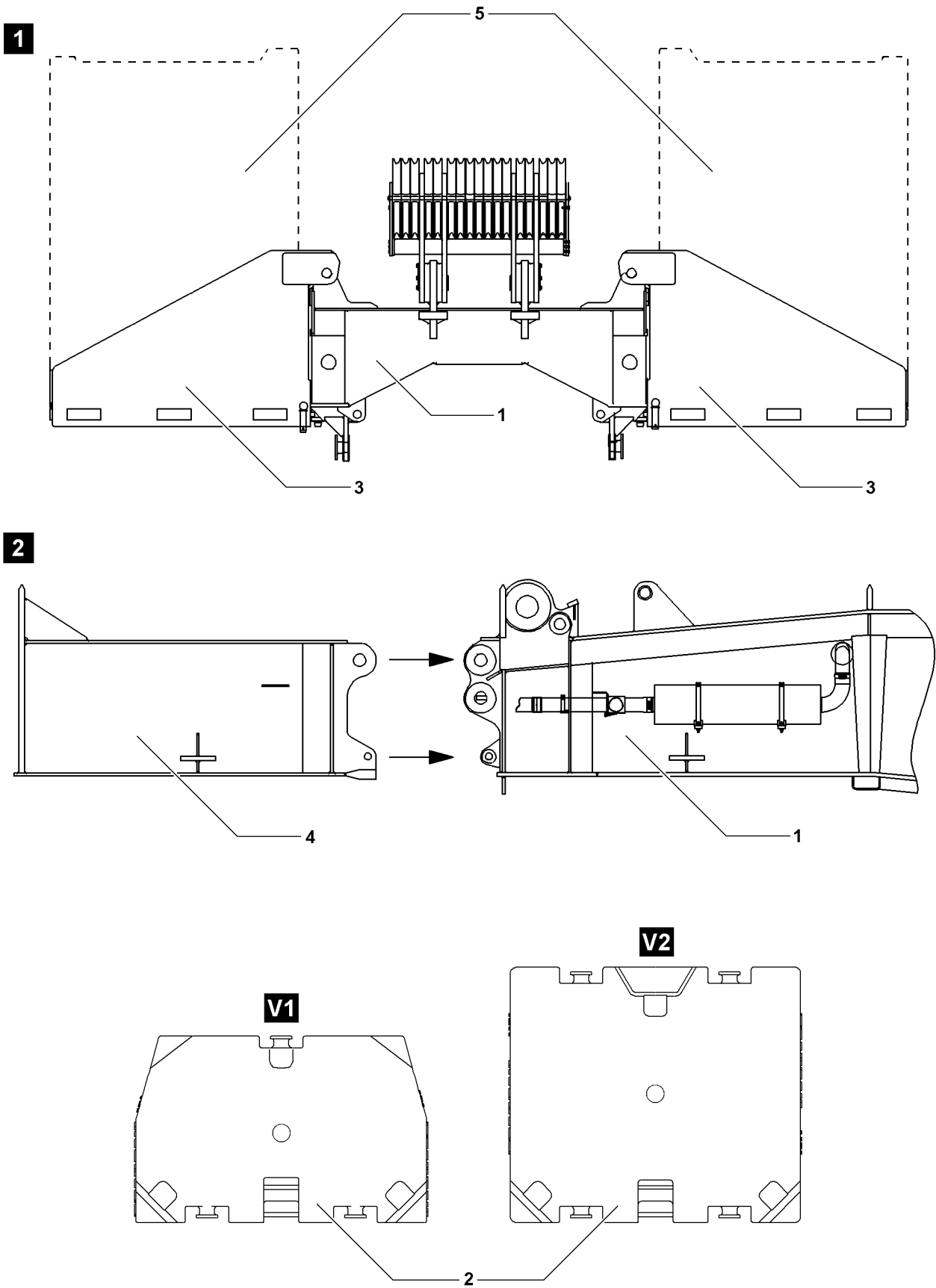


Fig.112542

2 Counterweight combinations



WARNING

Incorrectly calculated counterweight!

The nominal dimension of the counterweight from the load charts includes also the own weight of the consoles **3** and possibly the turntable extension* **4**!

If the weight of the consoles **3** and possibly the turntable extension **4** is not taken into account, too much counterweight has been placed!

The crane can be severely damaged or topple over!

Personnel can be severely injured or killed!

- ▶ Make sure that for the combination of the counterweight the weight of the brackets **3** has been taken into account!
- ▶ Make sure that for the combination of the counterweight the weight of the turntable extension **4** has been taken into account!
- ▶ Observe the chart „Calculation example counterweight combination“ in this chapter!

2.1 Counterweight combinations Counterweight plates variation V1

Variation V1		
Maximum counterweight	Combination	Individual weight
250.0 t	The counterweight can be assembled from the following counterweight plates:	5.0 t
		7.5 t
		10.0 t
	Console	10.0 t
	Turntable extension*	5.0 t

2.2 Counterweight combinations Counterweight plates variation V2

Variation V2		
Maximum counterweight	Combination	Individual weight
250.0 t	The counterweight can be assembled from the following counterweight plates:	12.5 t
		10.0 t
	Turntable extension*	5.0 t

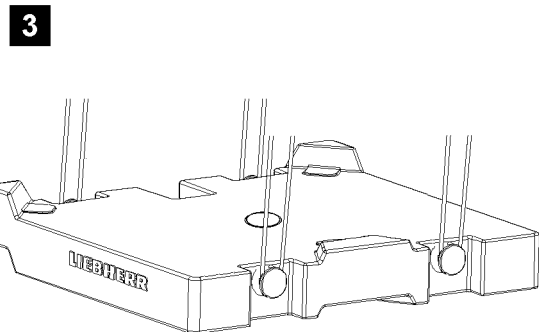
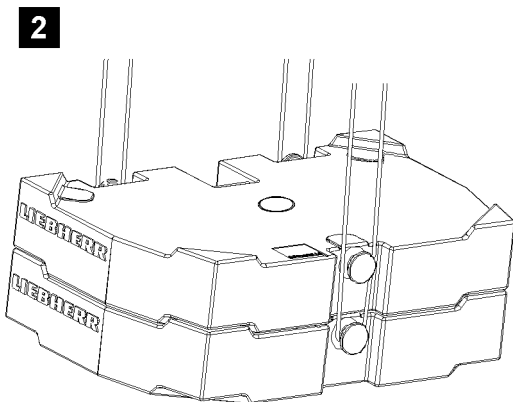
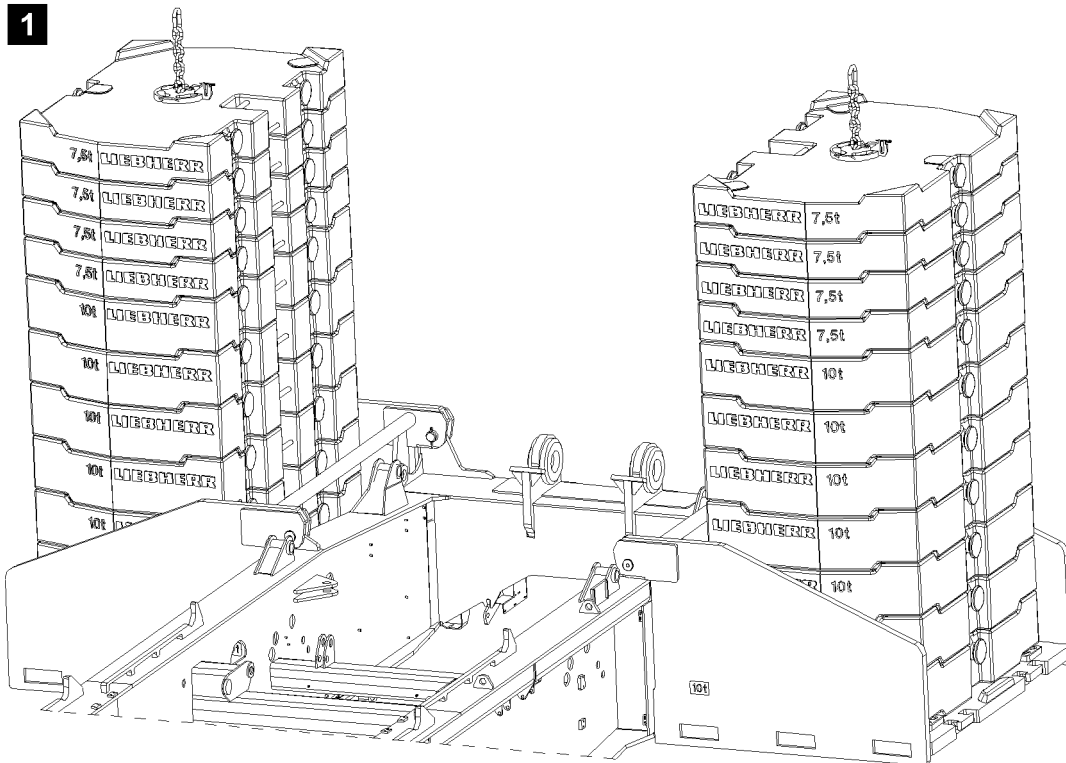


Fig.112543

2.3 Calculation example counterweight combination

See illustration 1

Counterweight from load chart 220.0 t		
8 x	Counterweight plate 7.5 t =	60.0 t
14 x	Counterweight plate 10.0 t =	140.0 t
2 x	Console 10.0 t =	20.0 t
Counterweight:		220.0 t

3 Permissible counterweight assemblies



WARNING

Overload fastening points counterweight plates!

If more than the permissible number of counterweight plates are lifted together, then the attachment points can be overloaded!

The counterweight plates and components can fall down!

Personnel can be severely injured or killed!

► Attach only the maximum permissible number of counterweight plates per lift!



WARNING

Incorrect set up of counterweight assemblies!

When lifting mixed weight counterweight assemblies, and the heavier counterweight plates are placed on top, the fastening points can be overloaded!

The counterweight plates and components can fall down!

Personnel can be severely injured or killed!

► Always stack the heavier counterweight plate on the bottom in the counterweight assembly!

Individual weight Counterweight plate	Maximum number of same counterweight plates per hoist via bitt
5.0 t	1
7.5 t	2
10.0 t	2
12.5 t	2

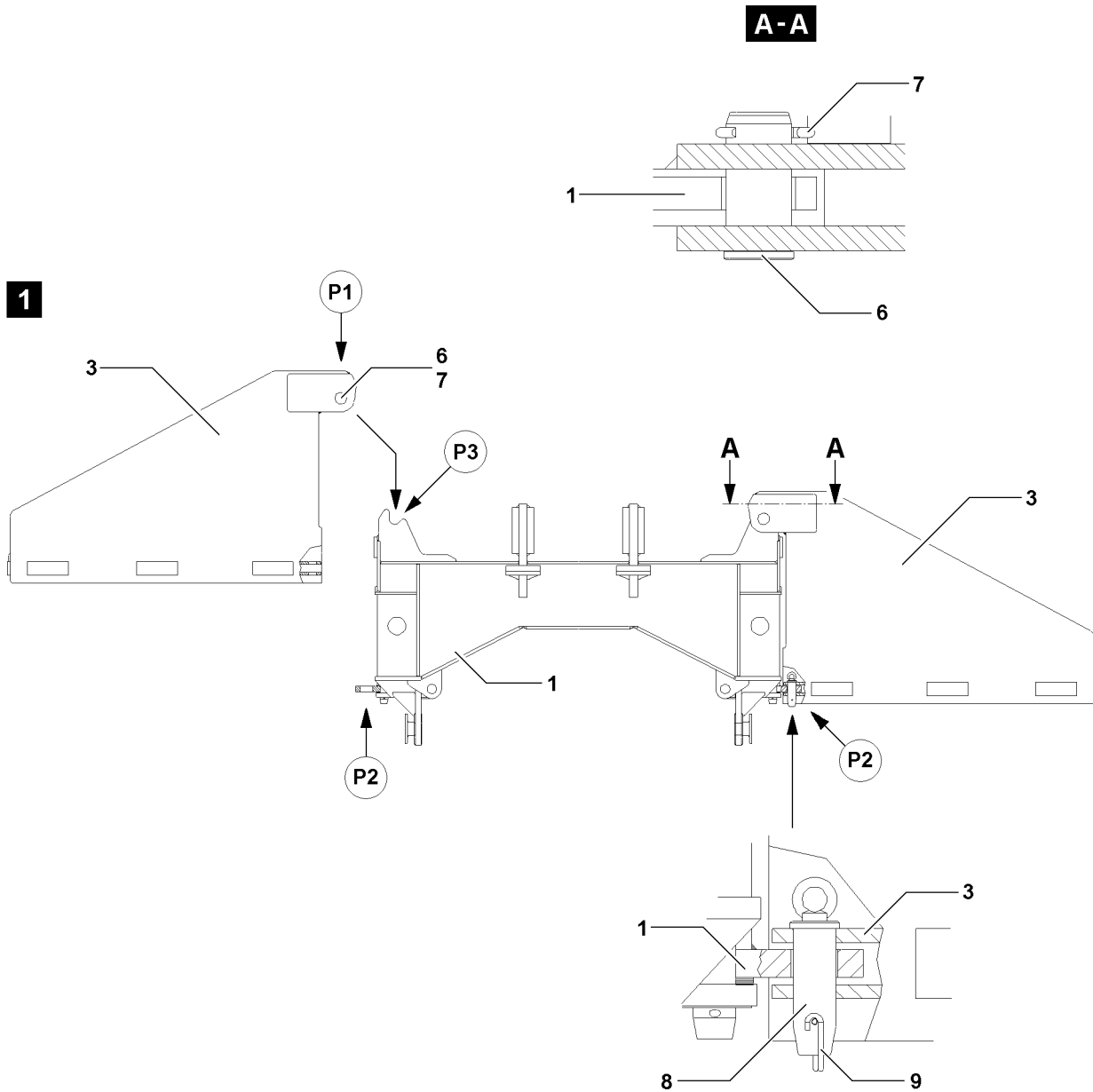


Fig.109129

LWE/LR 1750-000/12812-15-02/en

4 Installing the counterweight



WARNING

Falling components and counterweight plates!
At assembly, the components and counterweight plates can fall down!
Personnel can be severely injured or killed!

- ▶ Make sure that no persons or objects are within the danger zone!



WARNING

Danger of impact / crushing when working with the auxiliary crane!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth!
Personnel can be caught and severely injured or killed!

- ▶ Make sure that no persons can be caught when installing the components!
- ▶ If necessary, guide the components with suitable aids!



WARNING

Risk of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling! If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids!
- ▶ If fall protection equipment is available, then it must be used, see Crane operating instructions, chapter 2.06!
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the permissible fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04!
- ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06!
- ▶ Only step on the aids, ladders and catwalks with clean shoes!
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice!
- ▶ It is prohibited to walk on the telescopic or an auxiliary boom without suitable protective devices!

4.1 Installing the console

Make sure that the following prerequisites are met:

- The crane is aligned in horizontal direction.
- The SA-bracket is erected, see chapter 5.02 of the Crane operating instructions.
- The boom is not installed.
- The pin **6** on point **P1** is inserted and secured with cotter pin **7**.
- The pin **8** is unpinned on point **P2**.
- ▶ Attach the console **3** onto the auxiliary crane.
- ▶ Hang in the console **3** with the auxiliary crane on point **P3** on the side of the turntable **1**.
- ▶ Pin the console **3** on the turntable **1**: Insert the pin **8** on point **P2** and secure with spring retainer **9**.
- ▶ Release and remove the fastening equipment.

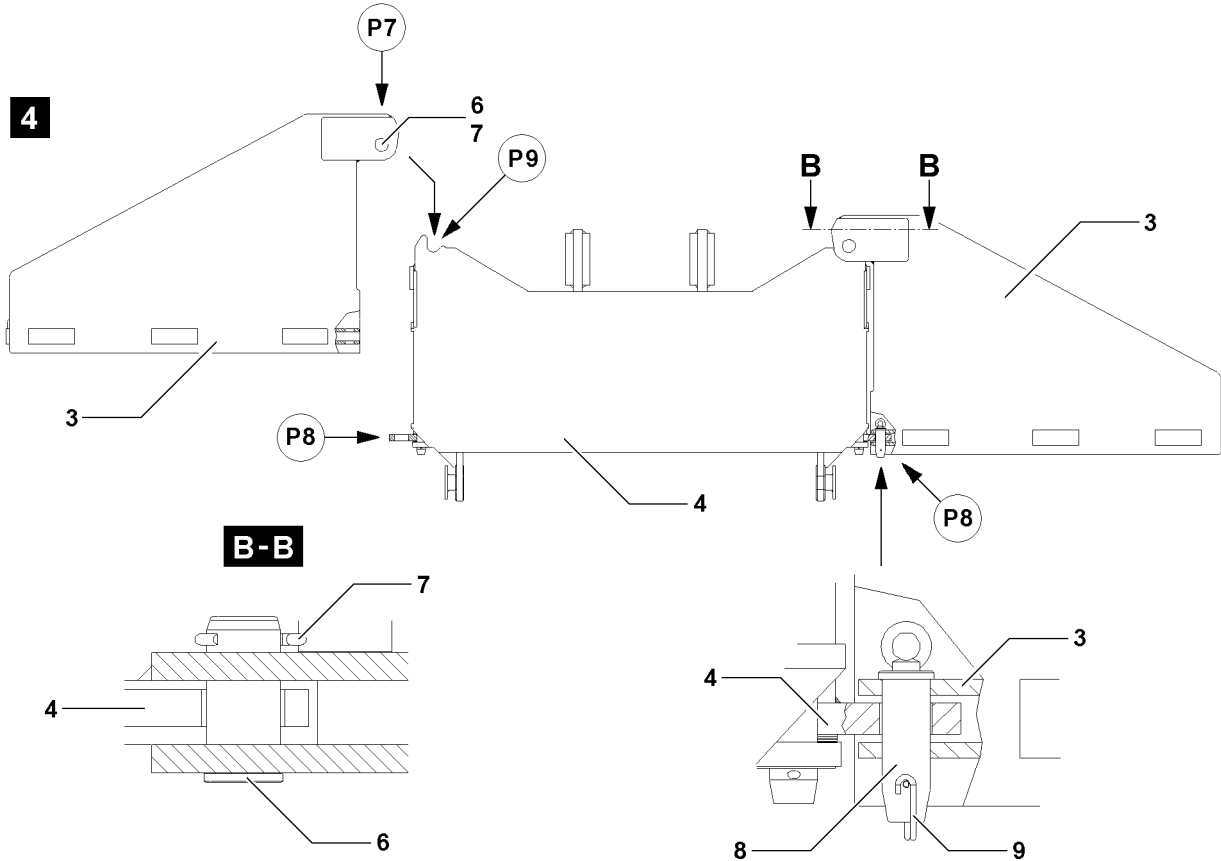
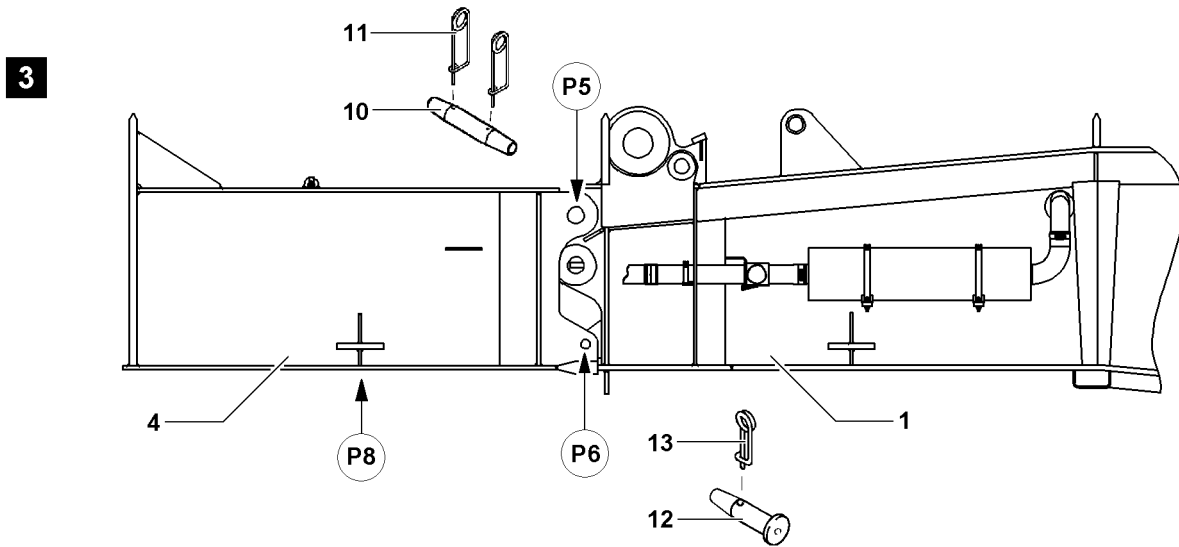
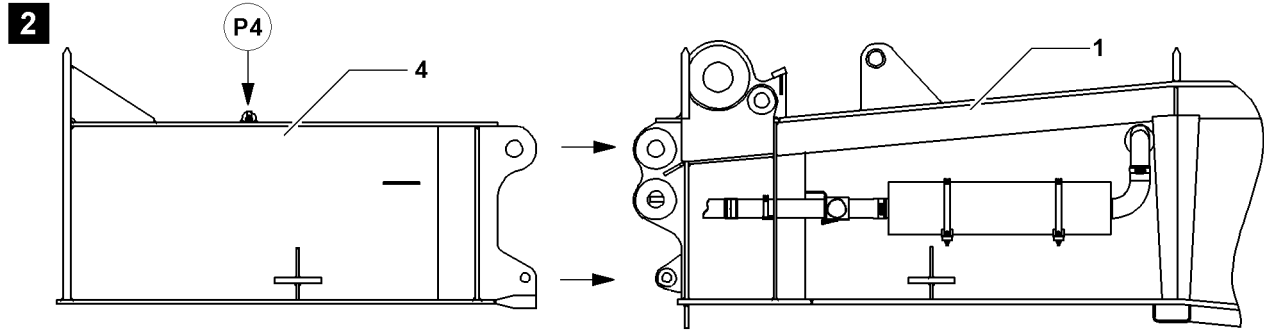


Fig.109171

LWE/LR 1750-000/12812-15-02/en

4.2 Installing the consoles with turntable extension*



WARNING

The crane can topple over if the center of gravity shifts!

When installing the counterweight in connection with the turntable extension **4**, the center of gravity of the crane is shifted!

A non-supported crane can topple over under these circumstances!

Personnel can be severely injured or killed!

▶ The crane must be supported with the crane support* and levelled in horizontal direction!

Make sure that the following prerequisites are met:

- The crane support is installed on the crawler center section or on the crawler carriers, see chapter 3.05 in the Crane operating instructions.
 - The crane support is swung out, pinned and secured.
 - The crane is supported and horizontally aligned.
 - The SA-bracket is erected, see chapter 5.02 of the Crane operating instructions.
 - The boom is not installed.
 - The pin **6** on point **P7** is inserted and secured with cotter pin **7**, see illustration 4.
 - The pin **8** is unpinned on point **P8**.
- ▶ Attach the turntable extension **4** on the auxiliary crane on point **P4**, see illustration 2.
 - ▶ Retract the turntable extension **4** with the auxiliary crane to the stop on the rear of the turntable.
 - ▶ Pin the turntable extension **4** on the turntable **1**, see illustration 3: Insert the pins **10** on point **P5** and secure with spring retainers **11**. Insert the pin **12** on point **P6** and secure with spring retainer **13**.
 - ▶ Release and remove the fastening equipment.
 - ▶ Attach the console **3** onto the auxiliary crane.
 - ▶ Hang the console **3** with the auxiliary crane on point **P9** on the side on the turntable extension **4** and the turntable **1**, see illustration 4.
 - ▶ Pin the console **3** on the turntable extension **4**: Insert the pin **8** on point **P8** and secure with spring retainer **9**.
 - ▶ Release and remove the fastening equipment.

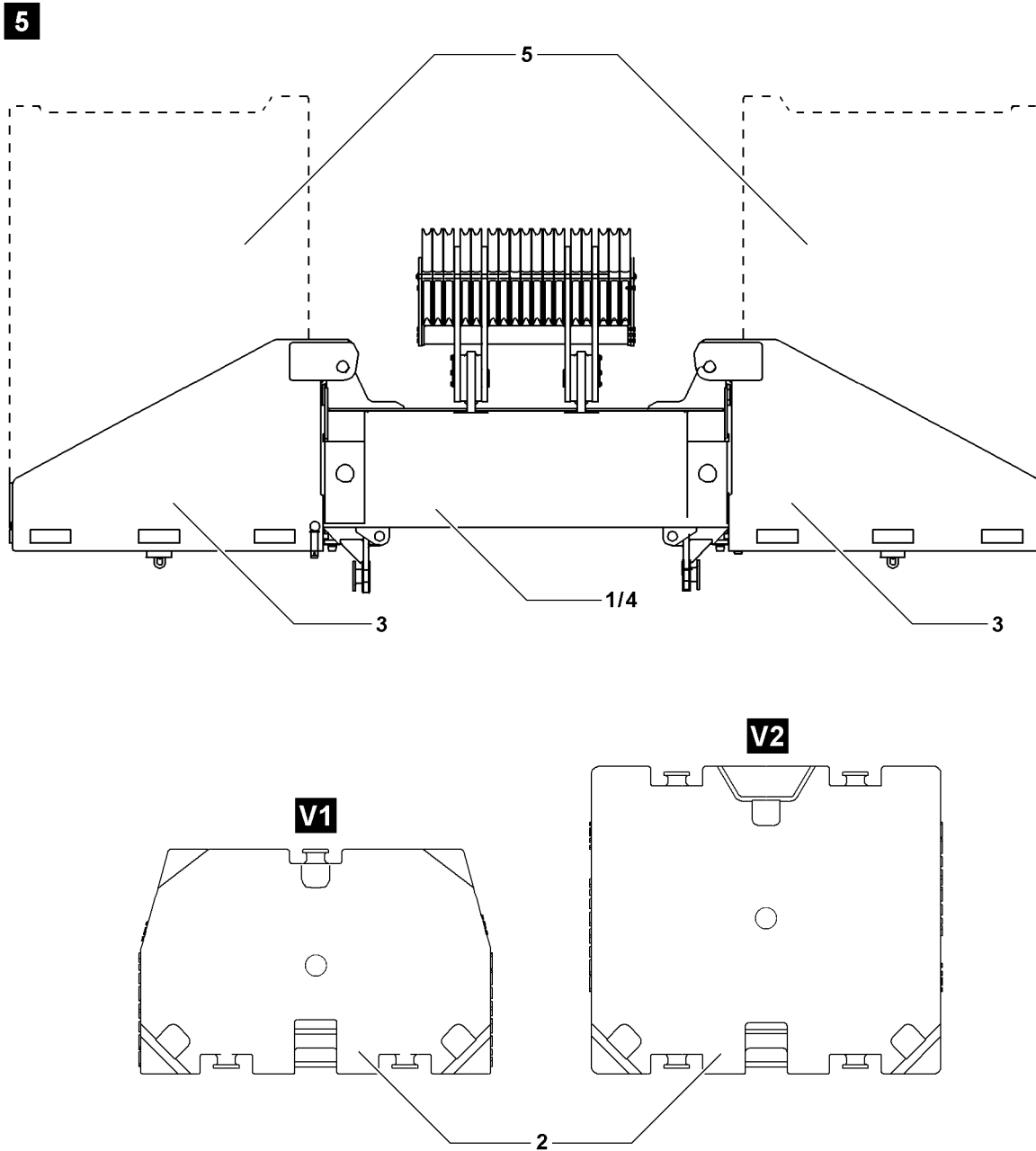


Fig.112544

4.3 Placing the counterweight plates



WARNING

Damaged counterweight plates!
 Damage on the counterweight plates **2** can cause the fastening equipment to release!
 The counterweight plates **2** and components can fall down!
 Personnel can be severely injured or killed!
 ► Do not use damaged counterweight plates **2** and replace them immediately!



WARNING

Impermissible combination of counterweight plates!
 Combining counterweight plates **2** of variation **V1** and variation **V2** creates instability in the counterweight stack **5**!
 The counterweight plates **2** can tip from the brackets **3** and cause the crane to topple over!
 Personnel can be severely injured or killed!
 ► Only counterweight plates **2** of the same variation may be stacked on each other!



WARNING

Counterweight too low / too high!
 If the placed counterweight deviates from the specified data in the load charts or the assembly conditions, then the crane can be damaged or topple over!
 Personnel can be severely injured or killed!
 ► Place the counterweight according to the data in the load chart!
 ► Before placing the counterweight plates **2** check the maximum permissible counterweight depending on the assembly conditions, see chapter 3.06 in the Crane operating instructions!



WARNING

Asymmetrical counterweight distribution!
 If more than 25 t are asymmetrically placed / removed on the counterweight stacks **5**, the crane can topple over!
 Personnel can be severely injured or killed!
 ► A weight difference between the right and left counterweight stack **5** of more than 25 t * is prohibited!
 ► Place / remove the counterweight assemblies alternately symmetrically on the left and right on the counterweight stack **5**!



WARNING

Toppling counterweight stack!
 Lopsided stacked counterweight plates **2** create instability in the counterweight stack **5**!
 The counterweight plates **2** can tip from the brackets **3** and cause the crane to topple over!
 Personnel can be severely injured or killed!
 ► Make sure that the counterweight plates **2** are placed correctly in the centerings!

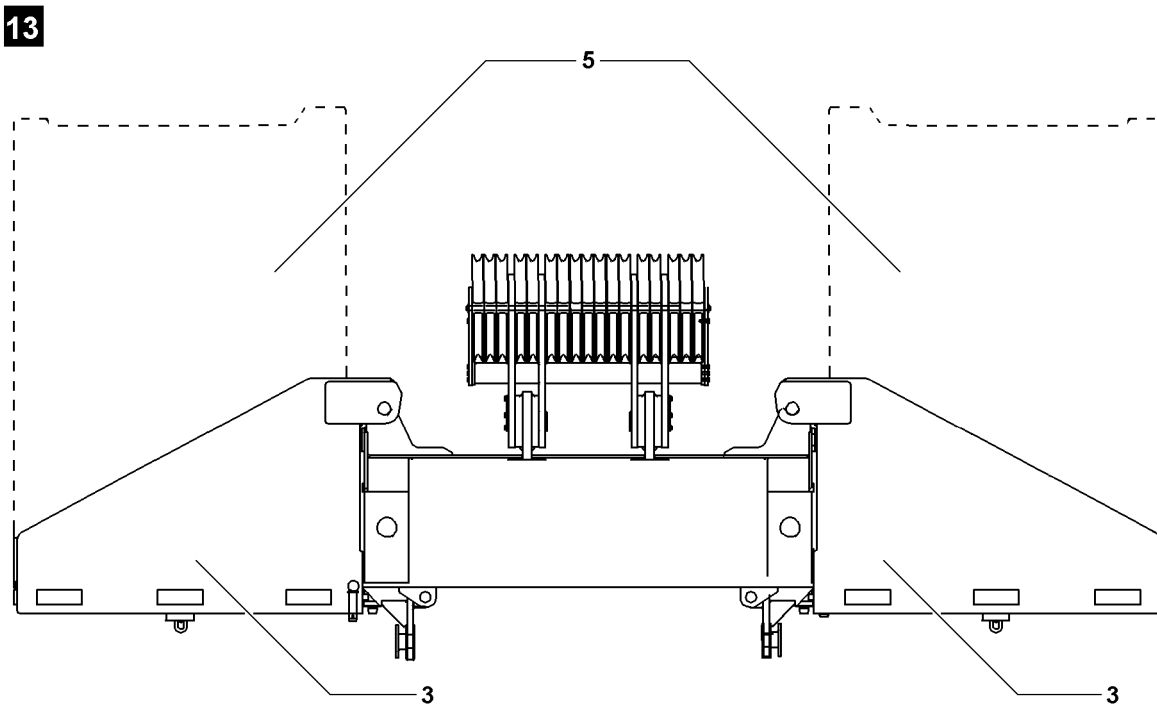
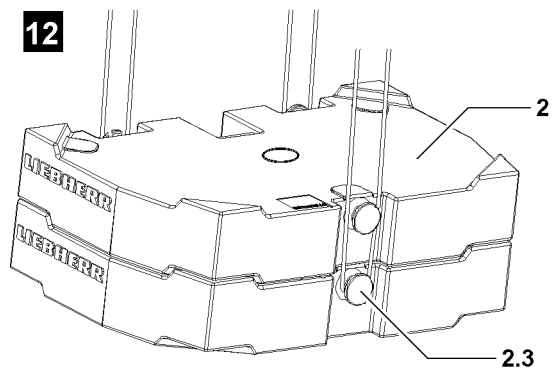
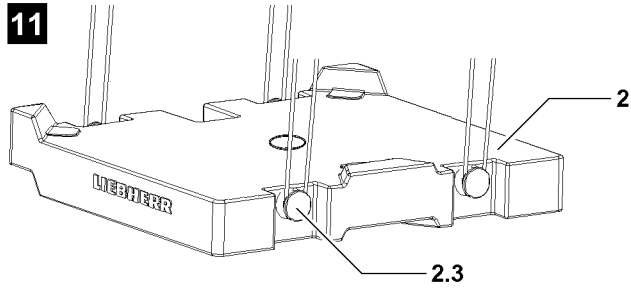


Fig.112545

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Overloaded counterweight plates!

If more than the permissible loads are lifted, the bits **2.3** are overloaded!

The counterweight plates **2** can be damaged and fall down!

Personnel can be severely injured or killed!

- ▶ Observe the chart „Permissible counterweight assemblies“ in this chapter!

**WARNING**

Incorrect handling of the fastening equipment!

If fastening equipment cannot be attached correctly and / or if it is not secured sufficiently to prevent it from loosening up, the counterweight plates **2** can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that the fastening equipment is correctly attached on the bits **2.3** and that it is secured sufficiently to prevent it from loosening up!
- ▶ Attach counterweight plate **2** or the counterweight assembly, see illustration **11** and illustration **12** on the auxiliary crane.
- ▶ Place the counterweight plate **2** or the counterweight assembly on the centerings on the console **3** or on another counterweight plate **2** in the counterweight stack **5**.

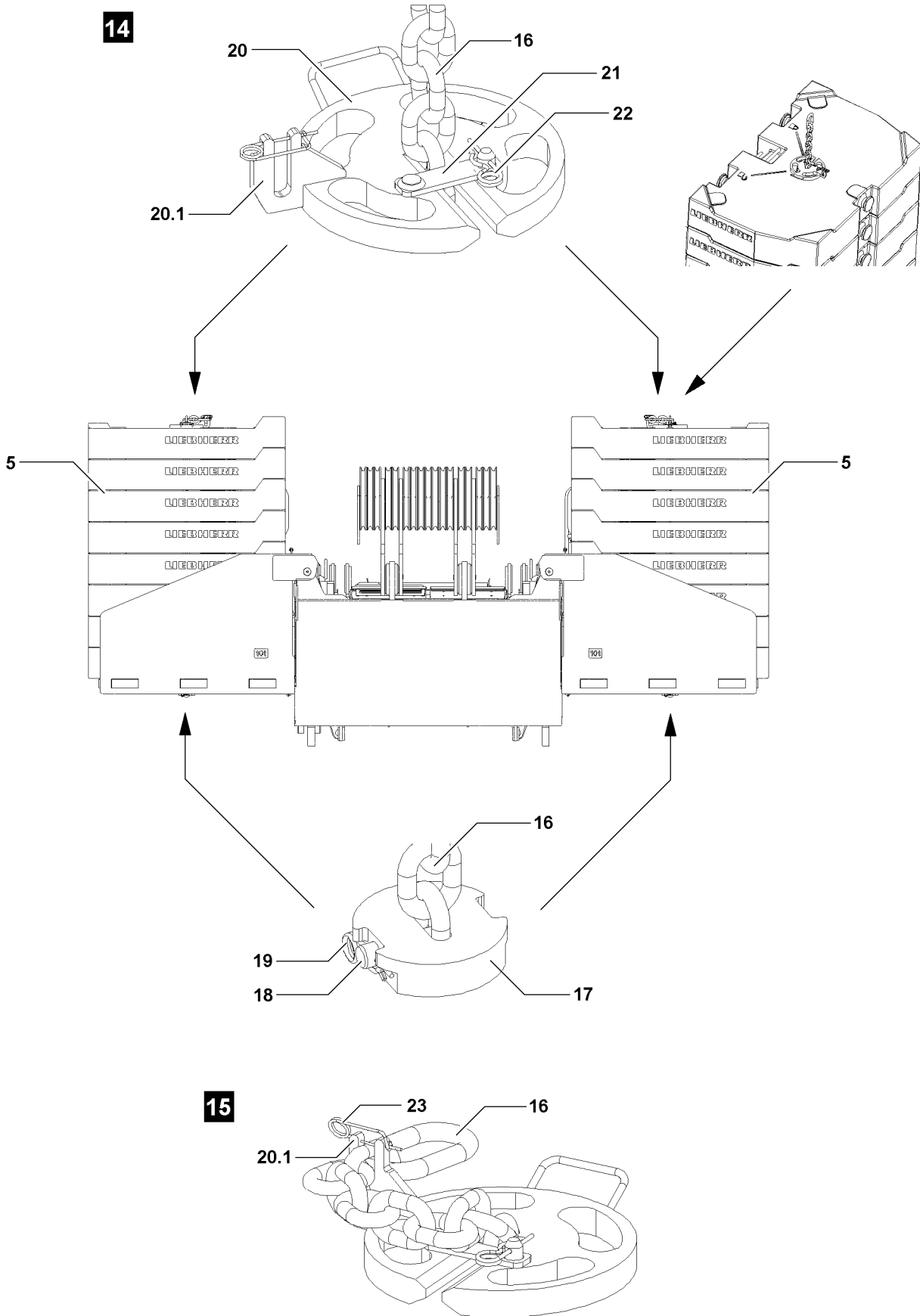


Fig.109230

LWE/LR 1750-000/12812-15-02/en

4.4 Securing the counterweight



WARNING

Unsecured counterweight plates!

If the counterweight is not or not correctly secured, then it can fall down!

Personnel can be severely injured or killed!

- ▶ Before starting crane operation, the complete counterweight must be secured!

Make sure that the following prerequisite is met:

- The counterweight has been stacked according to the load chart and the operating instructions.
- ▶ Guide the retaining chain **16** on the auxiliary crane from top through the counterweight stack **5**.
- ▶ Pin the retaining chain **16** on the bottom with the retaining plate **17**: Insert the pin **18** in the lowest chain link and secure with spring retainer **19**.
- ▶ Carefully tighten the retaining chain **16** with the auxiliary crane vertically.



Note

- ▶ To optimally secure the counterweight stack **5**, keep the retaining chain **16** between the retaining plate **17** and the retaining plate **20** as short as possible!

- ▶ Push the retaining plate **20** on top on the side over the retaining chain **16**.
- ▶ Insert the retaining plate **21** in the retaining plate **20**.
- ▶ Secure the retaining plate **21** with spring retainer **22**.



WARNING

Danger of accidents due to chain overhang!

If the stack height of the counterweight plates is not high enough, the chain overhang of the retaining chain **16** on the side on the counterweight stack **5** can fall down!

Personnel can be severely injured or killed!

- ▶ Secure the chain overhang from falling down!

- ▶ Hang the chain overhang of the retaining chain **16** into the fork **20.1** and secure with spring retainer **23** to prevent it from falling down, see illustration **15**.

Fig.195219

LWE/LR 1750-000/12812-15-02/en

5 Removing the counterweight



WARNING

Falling components and counterweight plates!

At disassembly, the components and counterweight plates can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that no persons or objects are within the danger zone!



WARNING

Risk of falling!

During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling! If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids!
- ▶ If fall protection equipment is available, then it must be used, see Crane operating instructions, chapter 2.06!
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the permissible fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04!
- ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06!
- ▶ Only step on the aids, ladders and catwalks with clean shoes!
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice!
- ▶ It is prohibited to walk on the telescopic or an auxiliary boom without suitable protective devices!



WARNING

Danger of impact / crushing when working with the auxiliary crane!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth!

Personnel can be caught and severely injured or killed!

- ▶ Make sure that no persons can be caught when installing the components!
- ▶ If necessary, guide the components with suitable aids!

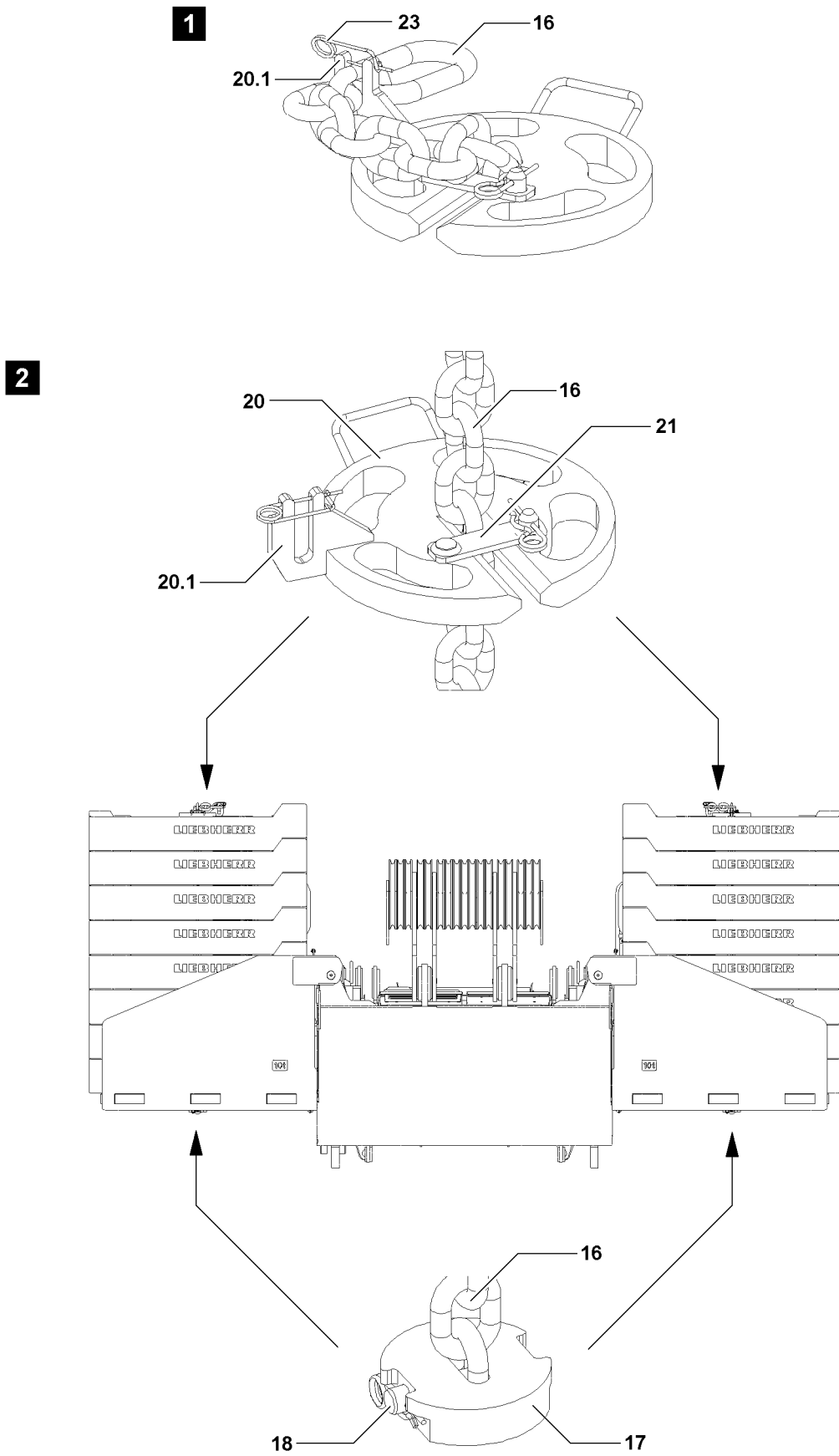


Fig.109231

LWE/LR 1750-000/12812-15-02/en

5.1 Releasing the counterweight

Make sure that the following prerequisites are met:

- The crane is aligned in horizontal direction.
- The SA-bracket is erected, see chapter 5.02 of the Crane operating instructions.
- The boom is not installed.

In case of previous operation with crane support* and turntable extension*:

- The crane support is swung out, pinned and secured.
- The crane is supported and horizontally aligned.

For secured chain overhang, see illustration 1:

- ▶ Remove the spring retainer **23**, unhook the retaining chain **16** from the fork **20.1**.

Chain overhang loose, see illustration 2:

- ▶ Attach the retaining chain **16** on the auxiliary crane and tension it slightly.
- ▶ Remove the retaining plate **20**: Release and remove retaining plate **21**, remove the retaining plate **20** on the side.
- ▶ Lower the retaining chain **16** until the lower retaining plate **17** is freely accessible.
- ▶ Unpin the pin **18** and remove the retaining plate **17**.
- ▶ Pull the retaining chain **16** through upward and remove it.

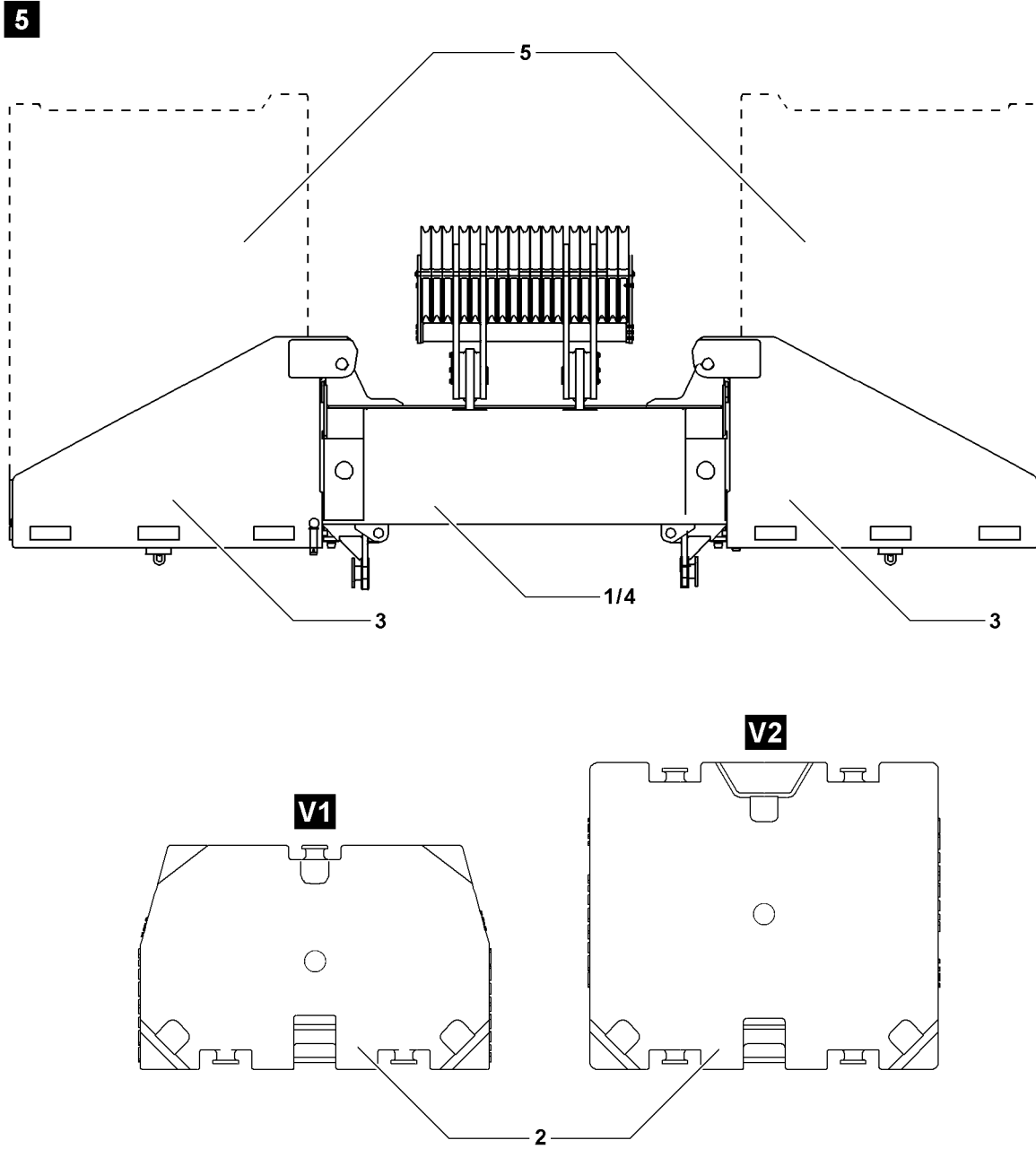


Fig.112544

LWE/LR 1750-000/12812-15-02/en

5.2 Removing the counterweight plates



WARNING

Damaged counterweight plates!

Damage on the counterweight plates **2** can cause the fastening equipment to release!

The counterweight plates **2** and components can fall down!

Personnel can be severely injured or killed!

- ▶ Do not use damaged counterweight plates **2** and replace them immediately!



WARNING

Asymmetrical counterweight distribution!

If more than 25 t are asymmetrically placed / removed on the counterweight stacks **5**, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ A weight difference between the right and left counterweight stack **5** of more than 25 t * is prohibited!
- ▶ Place / remove the counterweight assemblies alternately symmetrically on the left and right on the counterweight stack **5**!



Note

- ▶ The counterweight plates are marked with their own weights!

Make sure that the following prerequisite is met:

- The retaining chains are removed.

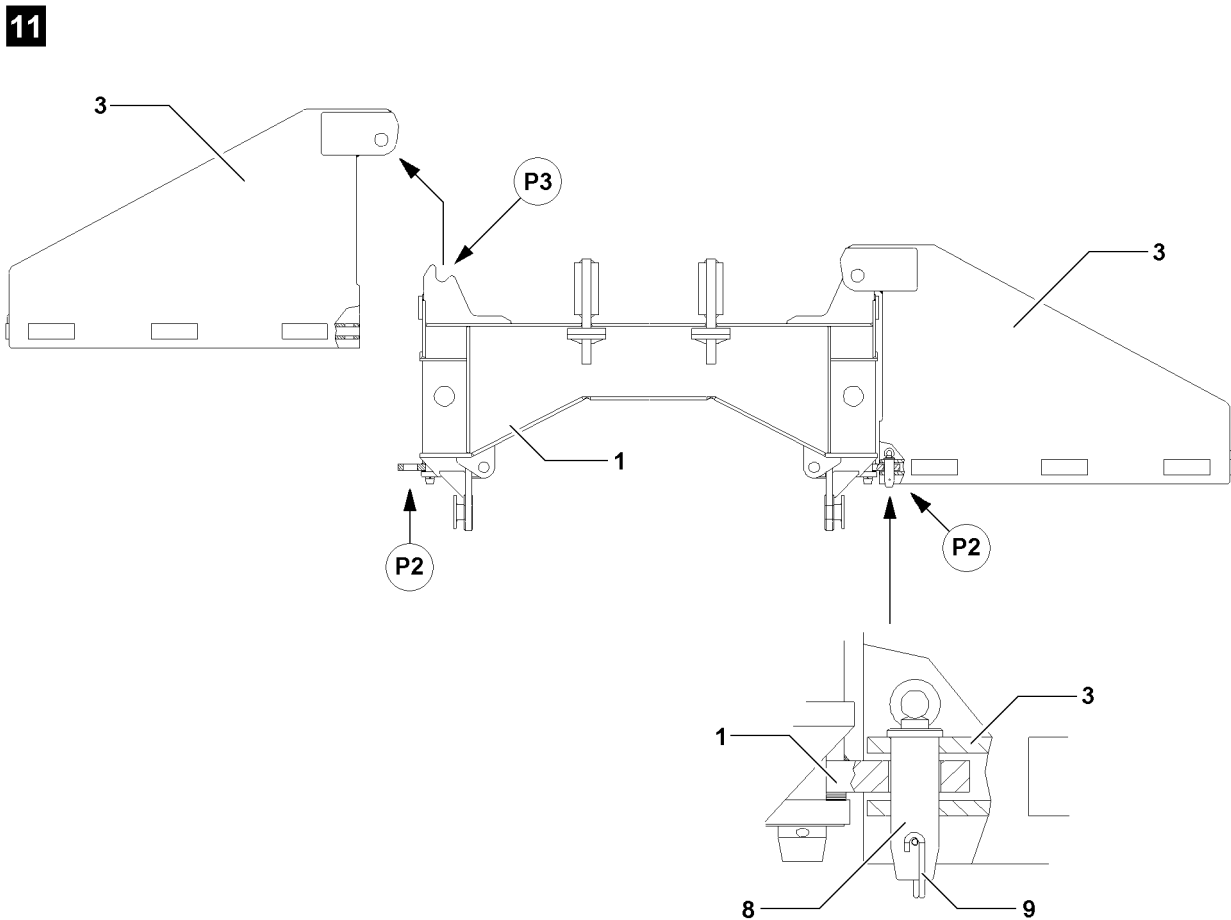
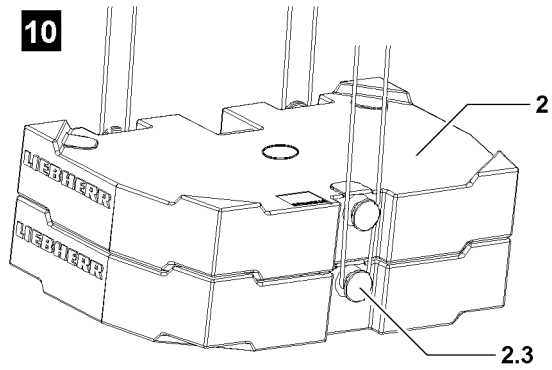
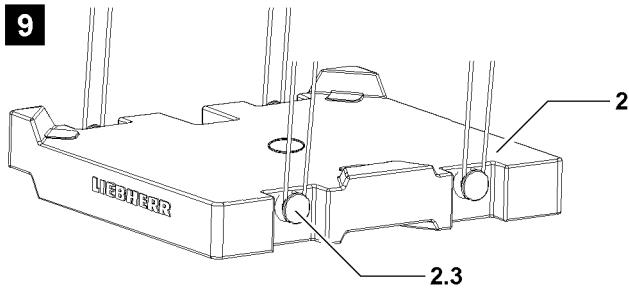


Fig.112546

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Overloaded counterweight plates!

If more than the permissible loads are lifted, the bits **2.3** are overloaded!

The counterweight plates **2** can be damaged and fall down!

Personnel can be severely injured or killed!

- ▶ Observe the chart „Permissible counterweight assemblies“ in this chapter!

**WARNING**

Incorrect handling of the fastening equipment!

If fastening equipment cannot be attached correctly and if it is not secured sufficiently to prevent it from loosening up, the counterweight plates **2** can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that the fastening equipment is correctly attached on the bits **2.3** and that it is secured sufficiently to prevent it from loosening up!
- ▶ Attach counterweight plate **2** or the counterweight assembly, see illustration **9** and illustration **10** on the auxiliary crane and place it on a suitable storage location.

5.3 Removing the bracket

See illustration **11**

Make sure that the following prerequisite is met:

- In the console **3** are no counterweight plates **2**.
- ▶ Attach the console **3** onto the auxiliary crane.
- ▶ Unpin the console **3** on the turntable **1**: Unpin the pin **8** on point **P2**.
- ▶ Remove the console **3** with the auxiliary crane on point **P3** on the side of the turntable **1**.
- ▶ Place the console **3** on a suitable storage location.

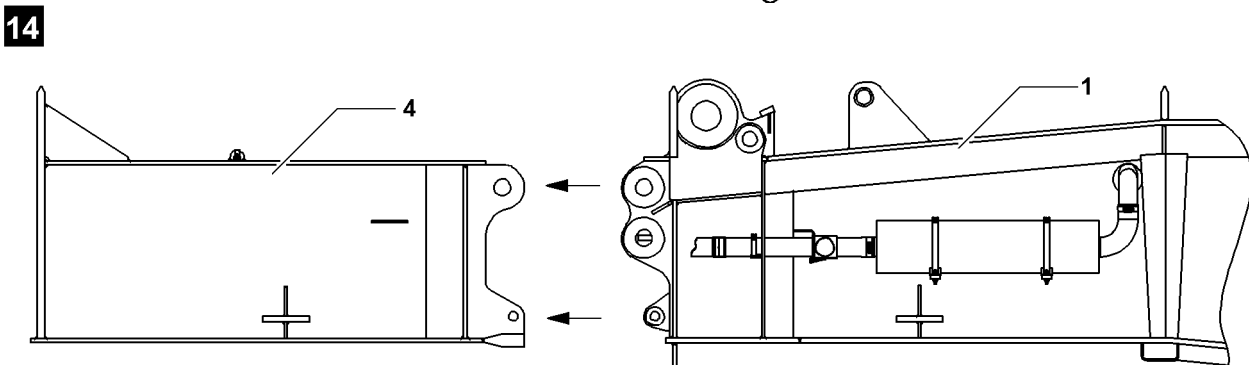
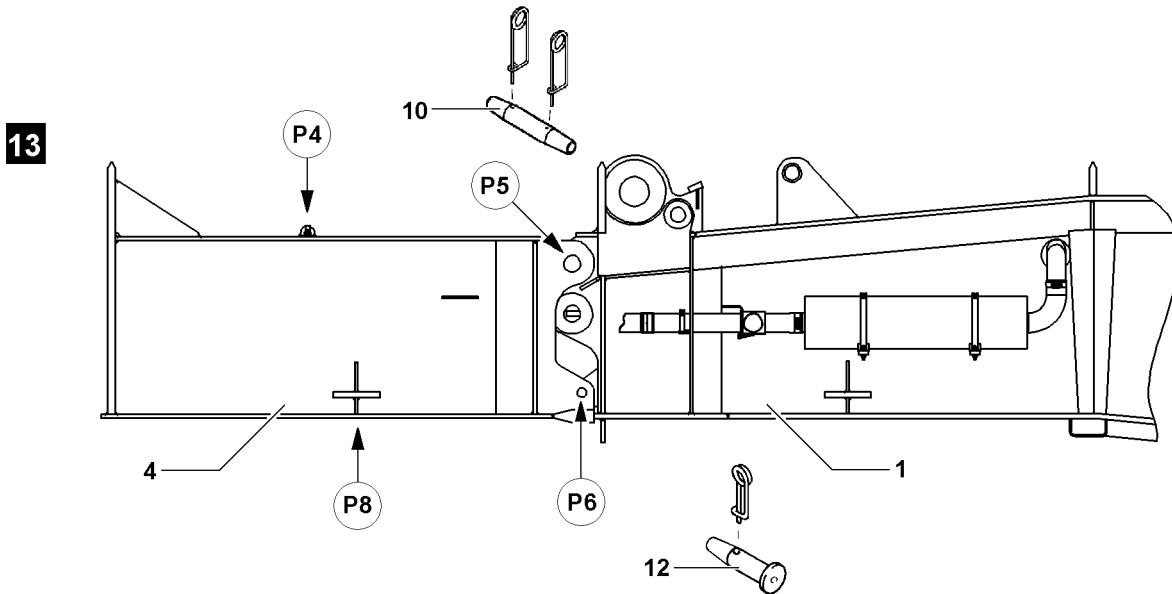
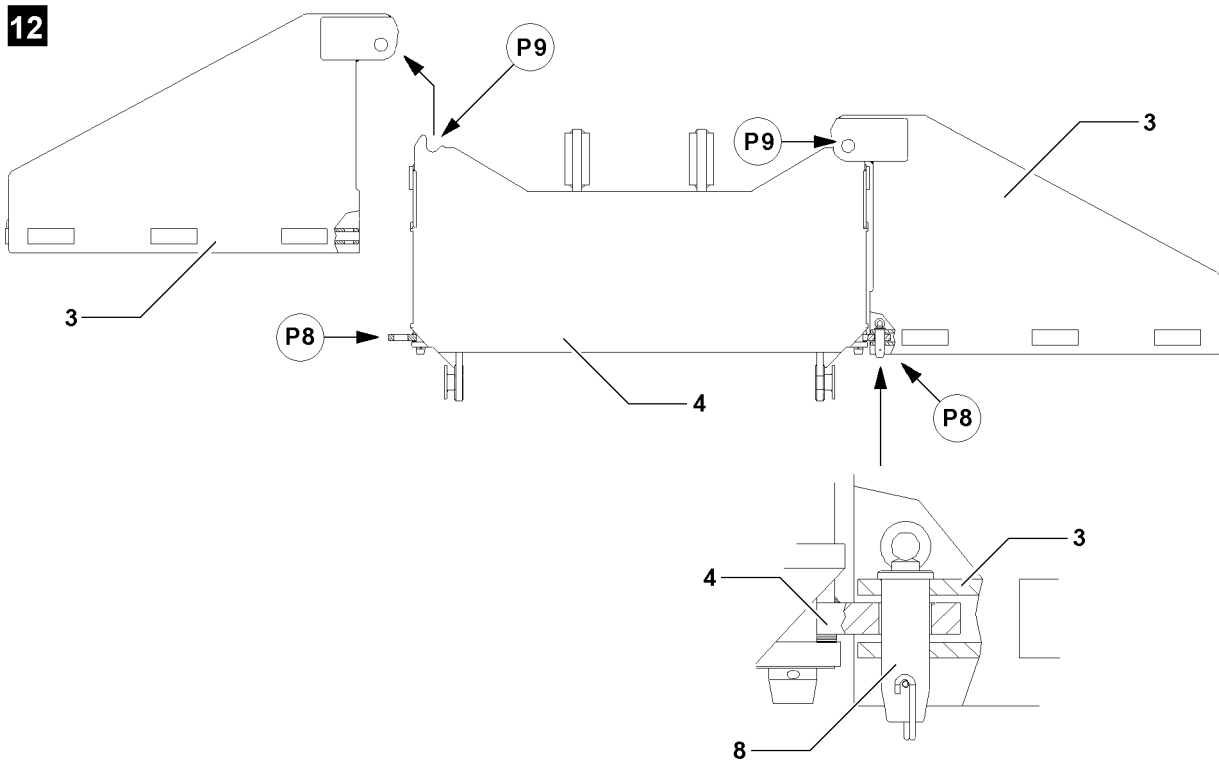


Fig.109236

LWE/LR 1750-000/12812-15-02/en

5.4 Removing the consoles with turntable extension

Make sure that the following prerequisite is met:

- In the console **3** are no counterweight plates.
- ▶ Attach the console **3** onto the auxiliary crane.
- ▶ Unpin the console **3** on the turntable extension **4**: Unpin the pin **8** on point **P8**.
- ▶ Unhook in the console **3** with the auxiliary crane on point **P9** on the side of the turntable extension **4**.
- ▶ Place the console **3** on a suitable storage location.

5.5 Removing the turntable extension on the turntable

- ▶ Attach the turntable extension **4** on the auxiliary crane on point **P4**, see illustration **13**.
- ▶ Unpin the turntable extension **4** on the turntable **1**: Unpin the pin **10** on point **P5** and unpin the pin **12** on point **P6**.
- ▶ Remove the turntable extension **4** with the auxiliary crane from the rear of the turntable.
- ▶ Place the turntable extension **4** on a suitable storage location.

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Technical safety instructions for working with a load



Note

► In addition to this chapter, observe Chapter 2.04 in the Crane operating instructions.



WARNING

The crane can topple over!

For steep boom positions, for which no loads are specified in the load charts there is a risk of the crane superstructure toppling when turning „backward“, i.e. towards the counterweight side.

There is a particular danger if the support basis has been reduced and supported with the sliding beams retracted.

Personnel can be severely injured or killed.

► The radii specified in the load chart must be observed.



WARNING

Danger of accident due to faulty operation!

If the reeving number on the pulley head is less than the reeving number set on the LICCON computer system and if the load is lifted with the luffing gear, it can result in an overload of the hoist rope, as a result, the hoist rope can rip, causing the load to drop.

Personnel can be severely injured or killed.

► Always comply with the reeving numbers specified in the load chart for maximum loads.

► The reeving on the pulley head and the reeving set on the LICCON computer system must match, otherwise crane operation is prohibited.



DANGER

Danger of fatal injury due falling load!

If the number of three coils is fallen below (for example due to a technical defect), the hoist rope is ripped from the winch drum and the load falls down.

Personnel can be severely injured or killed.

► The crane operator must ensure that there are always at least three rope coils on the winch drum.

Always comply with the maximum loads specified in the load chart.

The weight of the hook block according the load chart must be taken into account.

For the lift, use the hook block which is suited best for the existing set up configuration in connection with the load chart.

Initiate all crane movements carefully. Also slow down the crane movements carefully. That way you can avoid a swinging or pendulum motion in the suspended load.

2 Checks before starting to work with the crane

Before starting work with the crane, the crane operator must carry out a further inspection to satisfy himself about the crane's operational safety:

- Check that the crane is properly supported and level.
- Check that all values in the load chart that apply to the current equipment configuration have been entered and met.
- Ensure that there are no people or objects in the crane danger zone.

**WARNING**

Danger of accidents when turning the crane superstructure!

By turning the crane superstructure in restricted space conditions on the job site, especially in the rear boom radius of the counterweight and towards the chassis, personnel can be crushed and severely injured or killed.

- ▶ Give a short warning signal (horn) before starting a crane movement.
- ▶ Ensure before starting any slewing movement that there are no people or objects in the danger zone.

2.1 Visual check for damage

**WARNING**

Danger of accident!

If the crane is operated despite existing defects, personnel can be severely injured or killed.

- ▶ In the event of deficiencies which threaten operational safety, stop crane operation immediately.

The following deficiencies threaten the crane's operational safety:

- Damage to load-bearing parts of the crane design, such as booms, supports etc.
- Failure of the hoist gear brake and consequent slipping of the load
- Functional failures in the crane control system
- Functional defects in the indicator and warning lights
- Damage to the hoist ropes
- Safety defects in the safety equipment
- Leaks on safety relevant components of the crane hydraulic

Inform the appropriate supervisor about the deficiencies on the crane and also inform your relief when crane operators are changed.

2.2 Telescopic boom distortion because of sunshine on one side

A temperature difference occurs between the side facing the sun and the side facing away from the sun for cranes with telescopic booms. This causes telescopic boom side distortion, which can reduce the load bearing capacity of the telescopic boom.

For example, a temperature difference between the two boom sides of 30 °C and a boom length of 60 m results in a length difference caused by the temperature difference between the two sides of the telescopic boom of approximately 22 mm. With narrow boom parts, this causes the profiles to bend sideways.

If the maximum load is being utilized when a telescopic boom extension such as a fixed lattice jib, luffing lattice jib or folding jib is being used, then it must be ensured through a visual inspection before picking up the load that the boom is not showing signs of side deformation due to one-sided sun exposure.

**WARNING**

Danger of accident due to component overload!

If the telescopic boom has become distorted because of one-sided sunlight, this can cause component overload and therefore accidents.

- ▶ Turn the crane so that both sides of the boom are heated up equally, eliminating side deformation due to temperature difference.

3 Crane movement - Telescoping

If the telescopic boom is telescoped with the auxiliary boom or telescopic boom extension, before the telescoping procedure, ensure that:

- The crane is properly supported and horizontally aligned.
- The telescopic boom is evenly warmed up by solar radiation.

- There is no strong side wind.



WARNING

Damage of the telescopic boom or the hoist rope!

If these 3 factors are not adhered to, damage of the telescopic boom or the hoist rope can occur and lead to accidents.

- ▶ Support the crane properly and align it horizontally.
 - ▶ Keep both sides of the boom at about the same temperature.
 - ▶ Telescope only to the permissible wind speed according to the load chart.
 - ▶ If the actual wind speed is higher than the permissible wind speed noted on the load chart, telescoping is prohibited.
-

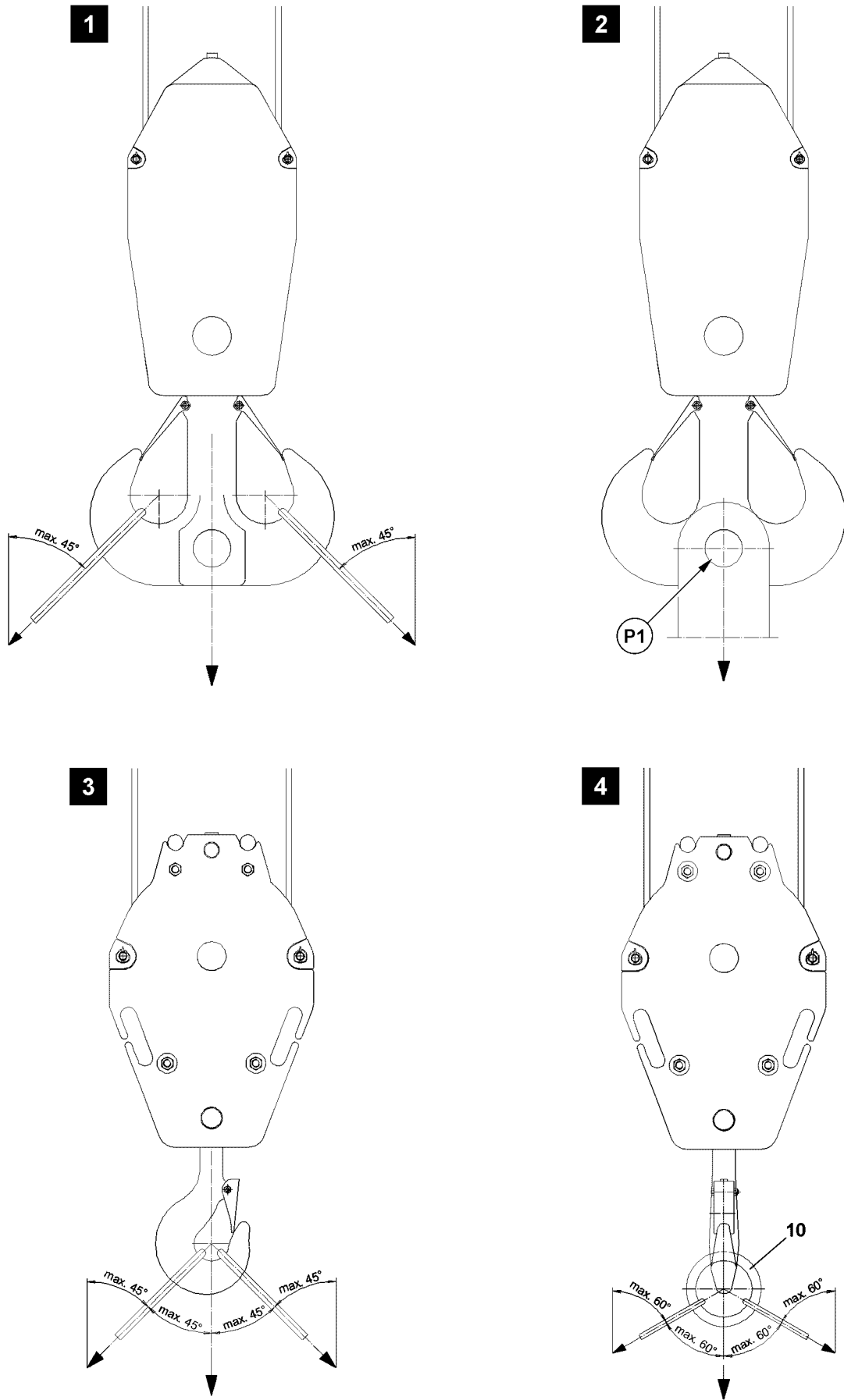


Fig.121650

LWE/LR 1750-000/12812-15-02/en

4 Taking on a load

The crane must always be operated in such a way that its load-bearing parts are not destroyed or damaged and its stability is ensured.

Make sure that the following prerequisites are met:

- The crane is supported and horizontally aligned.
- The LICCON overload protection has been set according to the load chart.
- The LICCON overload protection is active.
- The central ballast has been attached according to the load chart.
- The counterweight is installed according to the load chart.
- The derrick ballast has been installed according to the load chart.
- The hook block or the load hook is correctly reeved.

4.1 Fastening the load



WARNING

Load can be ripped off!

If impermissible fastening and / or load handling equipment is used when taking on a load on the centric bore on the double hook at point **P1** (illustration 2), then the double hook as well as the hook block can be damaged.

The load can rip off and fall down.

Personnel can be severely injured or killed.

- ▶ Lift the load via the centric bore on the double hook (point **P1**): For the technical requirements and the technical design of the fastening and / or load handling equipment contact the hook block manufacturer.



WARNING

The crane can topple over!

If the following conditions are not met, the crane can topple over.

Personnel can be severely injured or killed.

This could result in high property damage.

- ▶ Pay attention to the own weight of the load handling equipment.
- ▶ Pay attention to the load bearing capacity of the load handling equipment!
- ▶ The maximum permissible incline of the strands fastened on the single or double hook in the hook jaws is 45°. See illustration 1 and illustration 3.

If necessary for the single hook:

- ▶ Use fastening equipment with a suspension link **10**. The maximum permissible incline in this case is 60°. See illustration 4.
- ▶ Load a single and double hook symmetrically. A maximum deviation of $\pm 3^\circ$ from the direction of the center of gravity is permissible.

If necessary:

- ▶ Use cross beam or two cranes for taking on the load.

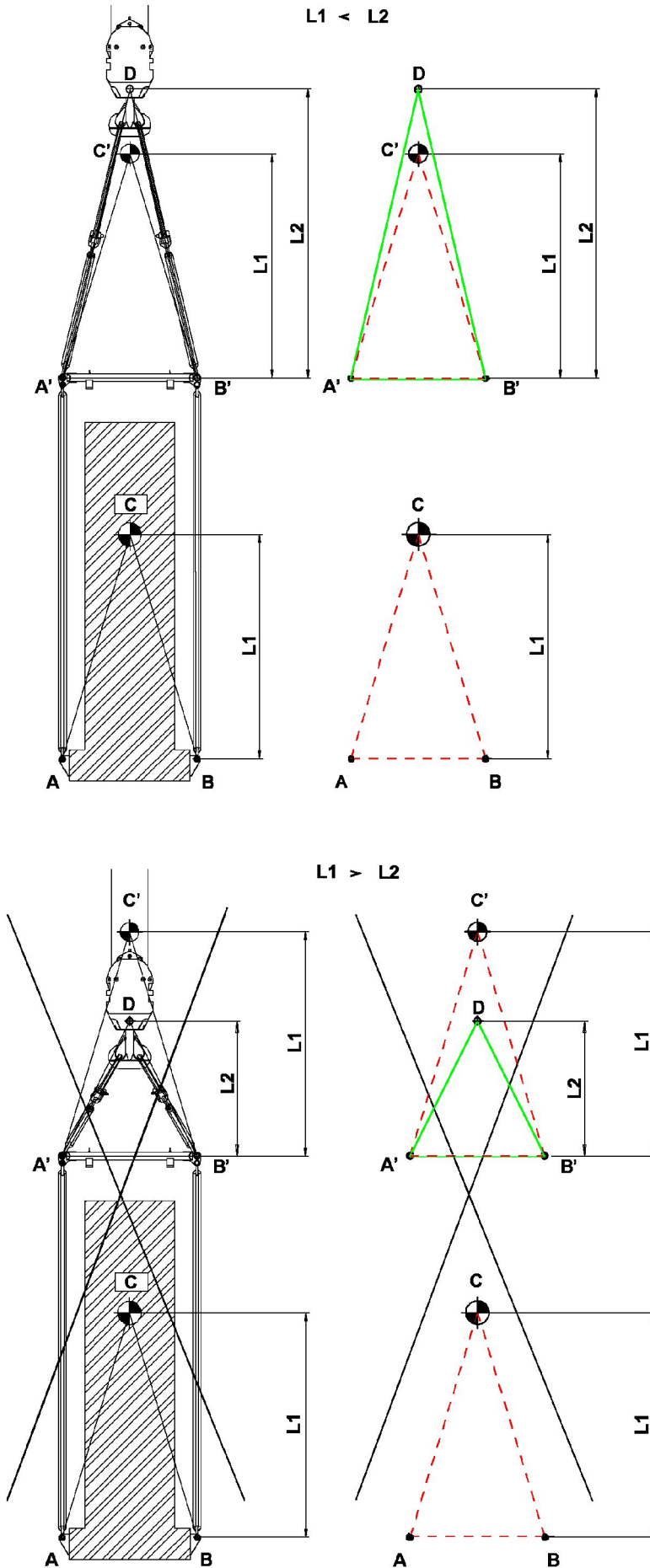


Fig.116274

LWE/LR 1750-000/12812-15-02/en

4.2 Taking on a load with cross beam

Cross beam are load handling equipment between crane hook and load.

The distance of the center of gravity **L1** is the vertical dimension from the fastening point of the load to the center of gravity of the load.

The cross beam height **L2** is the vertical dimension from the point of rotation of the crane hook to the next lower linkage point of the cross bar.



WARNING

Tipping of load to the side!

If fastening ropes are used which are too short, so that the load center of gravity is above the fastening point, then there is a danger of the load tipping to the side.

Personnel can be severely injured or killed.

- ▶ The load center of gravity must be below the crane hook.
- ▶ The distance of the center of gravity **L1** must be smaller than the cross beam height **L2** ($L1 < L2$).
- ▶ The triangle **A'B'C'** must be within the triangle **A'B'D**.

4.3 Transporting the hook block

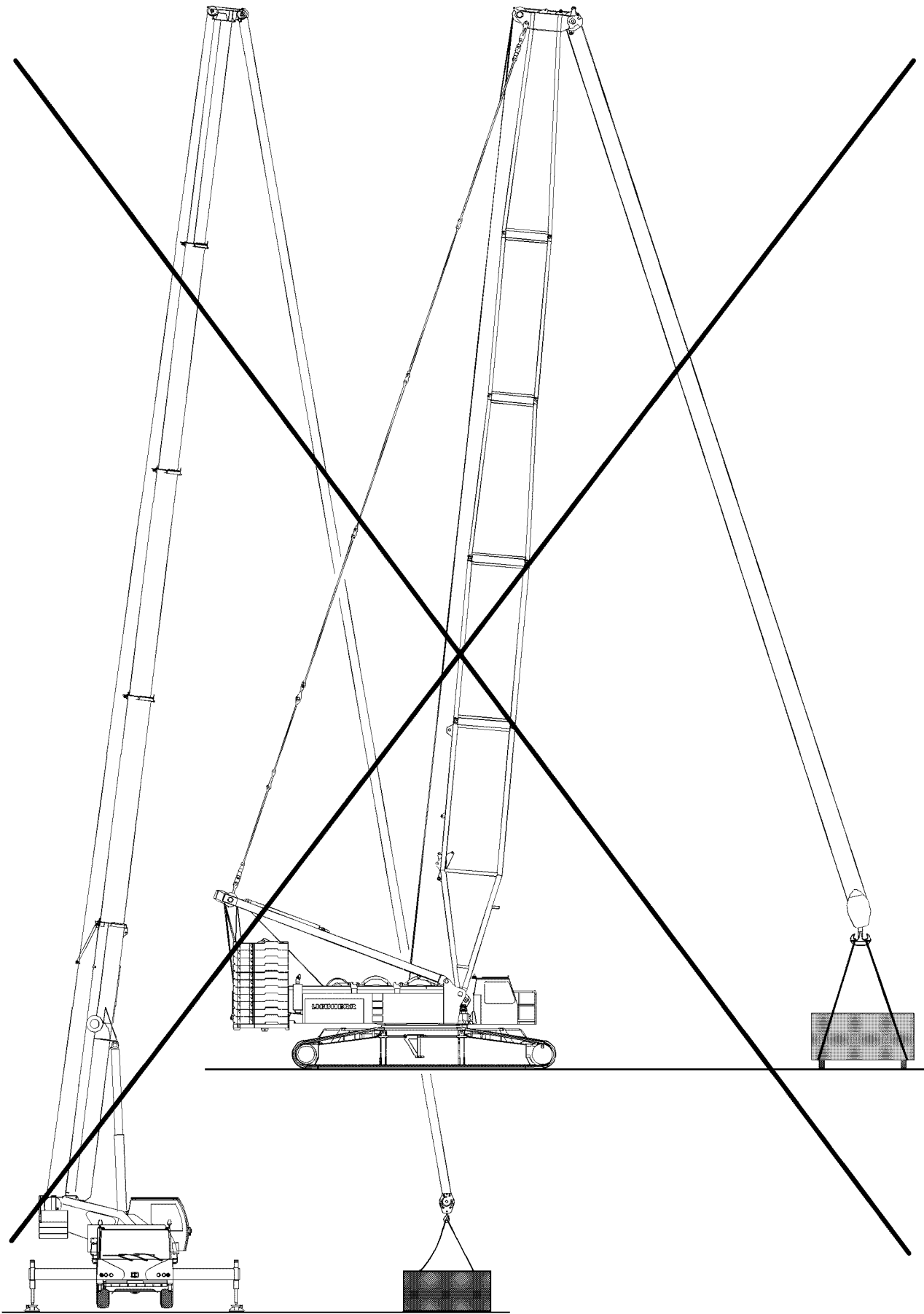


WARNING

Danger of accident!

If a hook block is fastened incorrectly for transport, personnel can be injured.

- ▶ Fasten the hook block for transport on the fixed point in the center.
- ▶ Fastening the complete hook block on the auxiliary weights is prohibited.



LWE/LR 1750-000/12812-15-02/en

Fig.102716

4.4 Lifting the load



WARNING

Danger of crushing for people in the load zone!

If personnel is located between the load to be lifted and a possible interfering edge (such as a wall of a building or similar) when the load is lifted, personnel can be severely injured or killed.

- ▶ Before lifting the load it must be ensured that there are no persons within the danger zone.
- ▶ It is prohibited to remain within the danger zone.
- ▶ It is prohibited for anyone to be under the load. Keep a safety distance.
- ▶ Swinging the load is prohibited.
- ▶ Exercise extreme caution when lifting a load.



WARNING

The crane can topple over!

If an attempt to lift a load over the hoist gear causes the LICCON overload protection to turn off, then the load may not be lifted by luffing up the boom. This causes overload or toppling the crane. Personnel can be severely injured or killed.

- ▶ Do not lift the load by luffing up the boom off the ground.



Note

When using the assembly winch* observe the following:

- ▶ Use the assembly winch* only for assembly and not for lifting loads.
- ▶ Lifting of loads with the auxiliary winch is prohibited.

If the fastening rope is manually attached by an assistant to the load to be lifted:

- Make sure that the assistant's hands are not crushed by the tightened ropes between the load and the fastening rope.
- Make sure that the assistant's body parts (hands, legs etc.) are not crushed by a swaying movement of the load during lifting.

4.5 Angular pulling



WARNING

The crane can topple over!

Angular pulling can destroy the crane or cause it to topple over.

Personnel can be severely injured or killed.

- ▶ Fasten (hang) the hook block always vertically over the center of gravity of the load to be lifted.
- ▶ Do not use the slewing gear to pull and set up loads.
- ▶ Angular pull is prohibited.

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

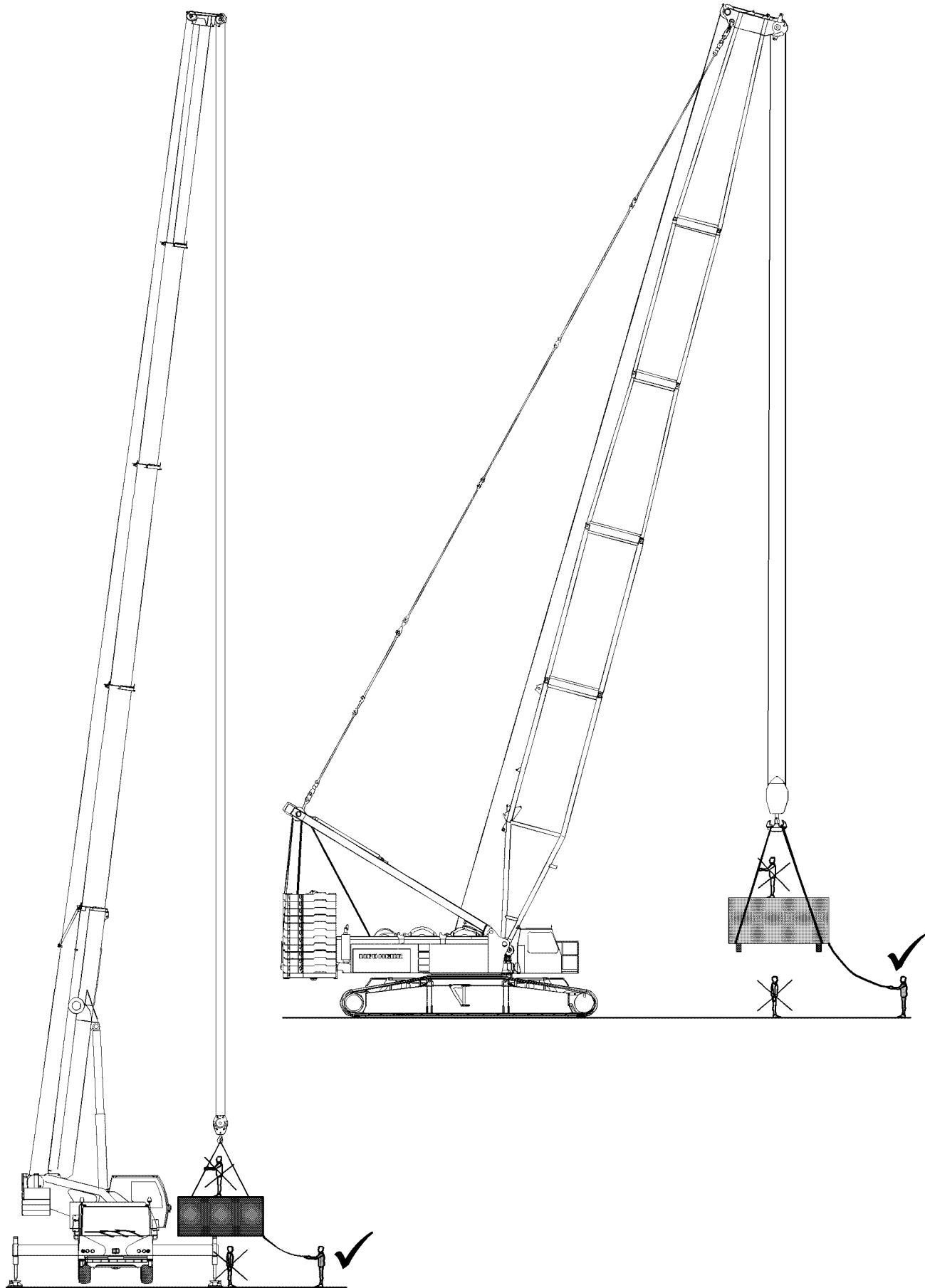


Fig.102717

LWE/LR 1750-000/12812-15-02/en

4.6 Breaking away fixed loads



WARNING

The crane can topple over!
Ripping stuck loads free can destroy the crane or cause it to topple over.
Personnel can be severely injured or killed.
▶ Ripping stuck loads free is prohibited.

5 Crane operation

The maximum load capacity of the crane is not just limited by the stability, but in many cases a load-bearing component breaks when the crane is overloaded **before** the crane topples over. Components that are susceptible to buckling such as the telescopic boom may fail suddenly **without showing signs of distortion beforehand** if the crane is overloaded.



WARNING

Danger of accidents for cranes with luffing cylinders!
When the luffing cylinder is on block position, the overload protection is not functioning.
▶ Crane operation at block position of luffing cylinders is prohibited.

5.1 General

A suspended load must always be kept under control. A fundamental requirement for this is the safe and delicate control of the crane's functions.



WARNING

Risk of accident due to swaying loads!
A swaying load can damage the crane and cause it to topple.
▶ All crane movements must be executed slowly and delicately.
▶ Initiate all crane movements slowly.
▶ Apply the brakes slowly in all crane movements.
▶ Crane operation with swaying load is prohibited.

NOTICE

Damage of rope pulleys!
▶ Place down hook blocks, booms, folding jibs, auxiliary booms and boom noses in such a way that the rope pulleys do not lie on the ground and are damaged.

5.2 Guiding the load

The use of guide ropes is recommended to help the crane operator manage the load more precisely and to prevent the load from swaying. This will prevent undesirable movements of the load and consequent damage.

5.3 Danger of crushing



WARNING

Danger of fatal injury!
Extreme care is needed when lowering a load. Danger of fatal injury exists for personnel in the immediate area of the load being lowered.
Personnel can be severely injured or killed.
▶ Standing under a suspended loads is strictly prohibited.

5.4 Danger of falling!



WARNING

Danger of fatal injury!

If persons are on the suspended load, then they can fall down and be severely injured or killed.

- ▶ Remaining on a suspended load is strictly prohibited.
- ▶ Remaining on or within crane components (for example: At assembly of boom sections, lattice sections) which are moved during lifting, lowering, turning or closing procedures is strictly prohibited.

5.5 Working in the vicinity of electricity transmission lines

If there are electricity transmission lines in the immediate vicinity of the building site, then the electrical transmission lines must be turned off by qualified electricians. If this is not possible, the danger area must be covered over or cordoned off.



WARNING

Danger of current transfer!

If electricity transmission lines are not shut off nor covered nor blocked off, then there is an increased danger due to current transfer.

- ▶ For rated voltages to 500 kV AC: Adhere to a safety distance of 8 m.

If the crane becomes electrified despite having taken all necessary precautions, proceed as follows:

- ▶ Remain calm!
- ▶ Do not leave the crane cab.
- ▶ Warn people outside: Stay in place and do not touch the crane.
- ▶ Move the crane away from the danger zone.

5.6 Ram work or pulling sheet piles

Vibration can be transmitted to the supporting steel structure of the crane during ram work or when pulling sheet piles with the crane. This vibration can cause premature fatigue of the material and therefore cracks in the supporting steel structure.



DANGER

Important instructions for „ram work“ or „pulling sheet piles“.

If the crane is used for ram work or pulling sheet piles, then the following instructions must be followed. Failure to follow the instructions can result in damage to the crane.

- ▶ The ramming equipment may not pass on vibrations into the boom.
- ▶ When pulling sheet piles, the maximum pull force of the crane is limited according to the load chart. Restricting the maximum pull force via the crane overload protection **only** is prohibited. The pull force must be additionally checked by measuring.

6 Crane rope pretension

Damage that can occur with multi layer spooling:

- Friction
- Broken wires and loop formation
- Flattenings, deformations

NOTICE

Crane rope pretension too low!

Loosely coiled rope layers.

Rope damage. Reduced service life of the crane rope.

Cutting of the crane rope into the lower rope layers. The load can not be lowered any further.

- ▶ To maximize the service life of the crane rope, carry out the measures in the following sections.

**Note**

- ▶ Liebherr recommends to shorten crane ropes with damage in the cross over area of the coils, in order to lengthen the service life. Shortening the crane rope, see Crane operating instructions, chapter 7.05.50.

6.1 Working with a high rope pull

If multiple lifts are performed with a high rope pull, loosen the lower rope layers that are rarely or never spooled out.

NOTICE

Loosely spooled out rope layers!

Rope damage.

Upper rope layers with a high rope pull deform the lower rope layers in the cross over area of the crane rope.

Spooling deformed rope sections over rope pulleys reduces the service life of the crane rope.

- ▶ Place a shorter crane rope.

When the lower rope layers are **not** used during repeat work:

- ▶ Increase the pretension of the lower rope layers: Spool out the entire rope length and then spool back up with the highest rope pull possible. See section „Increasing the hoist rope pretension“.

6.1.1 Placing a shorter crane rope

**Note**

- ▶ Liebherr recommends using the entire rope length.

Unused rope sections cause the loosening of the lower rope layers.

When only a part of the crane rope length is used for a longer period of time:

- ▶ Place a shorter crane rope.

6.1.2 Reducing rope unwinding

Telescopic boom

When telescoping out less, then the smallest amount of fixed coiled up crane rope is spooled out.

- ▶ Telescope out as little as possible.

Picking up the fastening equipment

If the fastening equipment with a flat boom system must be picked up, then the smallest possible amount of crane rope is spooled up loose.

- ▶ Establish a flat boom system: Telescope out or luff up the boom.
- ▶ Pick up the fastening equipment.

6.1.3 Restoring hoist rope pretension

Brief description

If a multi-pulley hook block is reeved, then the entire hoist rope length can be spooled out from the rope drum.

- ▶ Spool the hoist rope out until three safety coils.
- ▶ Create 10 % maximum strand pull: Attach the load.

While the hoist rope is spooled up:

- Hold the load just off the ground.

- In the permissible range of the load chart of the relevant set up configuration: Increase the load radius by luffing down.
- ▶ Spool the hoist rope up.

Description using the example LR 1600-2, SL3F

This section explains the procedure with the help of the set up configuration for LR 1600-2 with boom system SL3F.

The crane-specific parameters ensure that rope is spooled out until four rope coils and as many rope coils with pretension as possible can be spooled up.

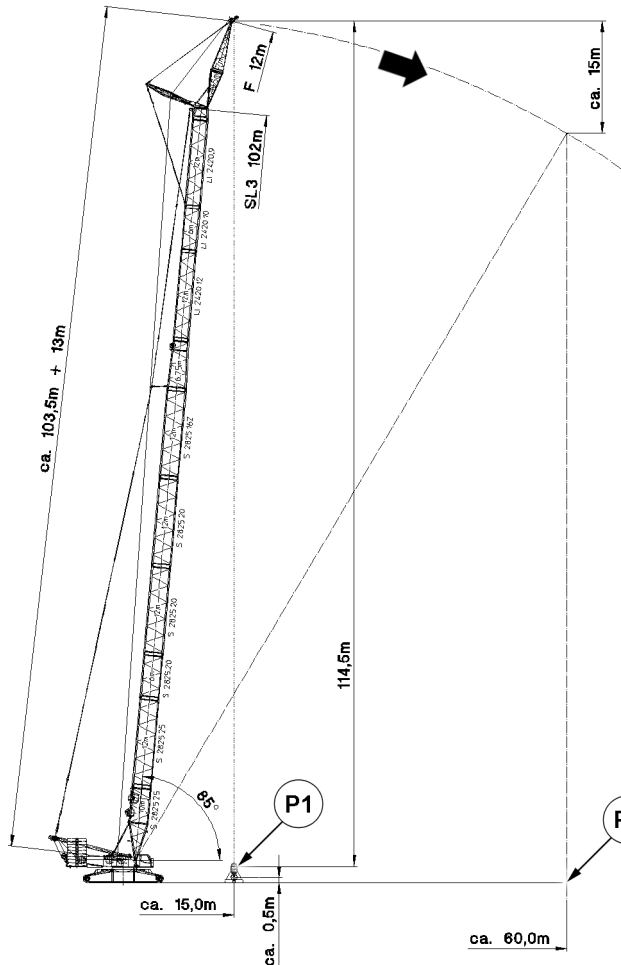


Fig.127131: LR 1600-2, SL3F: Spooling up hoist rope with pretension

Boom radius	Load	10 % of maximum strand pull
60 m	14.4 t	1.8 t

Load example: LR 1600-2, SL3 102, F12, according to the load charts

Hoist rope for this example:

- Hoist rope with a length of 1050 m

Hook block for this example:

- Hook block 200 DM, 5-pulley, reeved 8 times
- The weight of the hook block with ten auxiliary weights is 7.0 t

To reach sufficient rope pull, another load must be hung in addition to the hook block.

Make sure that the following prerequisites are met when hanging the load:

- Load is hung as short as possible.
- For a boom radius of 15.0 m, the hoist rope can be spooled out on the winch until four coils.
- The load is suspended over the ground.
- ▶ Pick up the load with 7.4 t.
- ▶ Set the boom system to boom radius 15.0 m.
- ▶ Spool the hoist rope out.

Result:

- In position **P1** there are 9 m of hoist rope (four coils) on the hoist winch:

Spoiled out rope section	Length
8-way reeving, distance of ground to the F-jib with boom radius 15 m	8 x 114,5 m = 916,0 m
Winch to FA-frame	103.5 m
F-head	13.0 m
Rope pulleys	7.5 m
Total of spoiled out hoist rope	1040.0 m

Rope lengths in position P1

While the hoist rope is spooled up:

- Hold the load just off the ground.
- In the permissible range of the load chart of the relevant set up configuration: Increase the load radius by luffing down.
- ▶ Spool up the hoist rope and luff down the boom at the same time until boom radius 60.0 m is reached.
- ▶ Set down the load.

Result:

- The pretension of the first and second position of the rope coils is restored.
- In position **P2** there are 130 m of hoist rope (23 coils) on the hoist winch:

Spoiled up rope section	Length
Four coils initial situation	9 m
8-way reeving, F-jib height difference with boom radius 60 m	8 x 15 m = 120 m
Total of spoiled up hoist rope	130 m

Rope lengths in position P2

- ▶ Make sure that the hoist rope on the winch remains pretensioned: Reeve out the hook block and reeve in with slower reeving. See Reeving plan.

6.2 Picking up and lowering overhead loads

The load is picked up overhead in the following applications:

- Repowering wind power plants
- Disassembly of slewing tower cranes

NOTICE

Load picked up overhead with loosely coiled rope layers!

The rope pull increases when the load is picked up. The rope coils in the lower rope layers move laterally and are compressed. The hoist rope can cut into the lower rope layers.

- ▶ Spool up the hoist rope without a load only with rope pretension.

NOTICE

Load lowered with cut in rope layers!

The hoist rope is pulled jerkily from the lower rope layers. Vibrations are introduced into the crane system.

Cut in hoist rope clamped between the lower rope layers. The load can **not** be lowered any further.

- ▶ To prevent the cutting in of the hoist rope, carry out the measures in the following sections.

6.2.1 Increasing the reeving number

NOTICE

Higher reeving number than indicated on the load chart!

Slack rope formation.

The crane load drops due to additional weight from the rope strands and hook block.

If a higher reeving number is not considered in the set up configuration, the load display on the LIC-CON monitor no longer corresponds.

- ▶ Increase the hook block weight in direct proportion to the reeving.
- ▶ Check if the crane load is sufficient for higher reeving.

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.

- ▶ Select the highest reeving number possible for the hoist rope.

6.2.2 Increase the hook block weight

NOTICE

Lift the hook block without a load!

The hoist rope is spooled up with a low rope pull. The rope layers are spooled up loose on the rope pulley.

- ▶ Increase the rope pull: Increase the hook block weight.

A higher hook block weight increases the rope pull.

- ▶ Increase the hook block weight.

If the crane load is sufficient:

- ▶ Attach an auxiliary weight between the load and hook block.

6.2.3 Pretensioning the hoist rope with pretensioning ballast with two hook operation

The pretensioning ballast is **not** included in the Liebherr scope of delivery.

NOTICE

Lift the hook block without a load!

The hoist rope is spooled up with a low rope pull. The rope layers are spooled up loose on the rope drum.

- ▶ Pretension the hoist rope with pretensioning ballast with two hook operation.

Make sure that the following prerequisites are met:

- The crane is equipped for two hook operation.
- The pretensioning ballast is present.

Properties of the pretensioning ballast:

- Developed by Liebherr.
- The weight is 4 t.
- Special tow coupling

- ▶ Fasten the pretensioning ballast on the main hook and on the auxiliary hook.

The pretensioning ballast is lifted with the main hook, the auxiliary hook is carried along without a load.

- ▶ Lift the pretensioning ballast.

When the main hook has reached the required height:

- ▶ Stop the main hook.

After the load is completely transferred to the auxiliary hook, the main hook fastening ropes release automatically.

- ▶ Lift the auxiliary hook until the pretensioning ballast hangs completely on the auxiliary hook.

When the main hook fastening ropes have released:

- ▶ Lower the pretensioning ballast with the auxiliary hook and place it on the ground.

Result:

- The full load is present on the main hook.

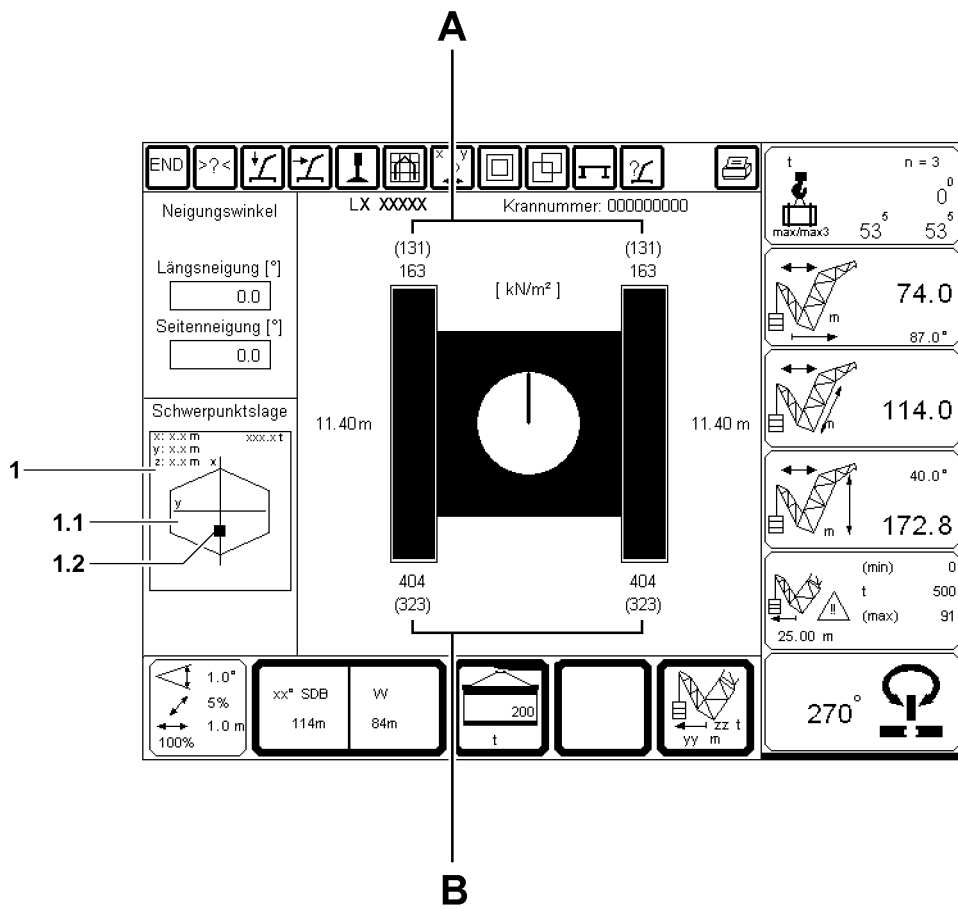


Fig.109839

1 Prerequisites for driving / moving crawler cranes (crawler operation)



WARNING

The crane can topple over!

If the following instructions are not observed, the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Before moving the crane with the attachment, the optimum boom position must be determined with the aid of the job planner, to obtain as even a surface pressure on the crawler track as possible.
- ▶ The maximum permissible wind speed from the load chart is not exceeded.



WARNING

Crane with narrow crawler track!

- ▶ When moving cranes with narrow crawler track (example: LR1600/2-W) and respective equipment, in addition to the „prerequisites for driving the crane“, the special travel charts and danger notes must be observed and adhered to, see „Moving the crane with equipment in place“.



WARNING

The crane can topple over!

If the turntable is not parallel to the crawler track when driving the crane, the crawler crane can topple over.

- ▶ For downhill gradients of more than 0.3° , make sure that the turntable is aligned parallel to the crawler track in 0° or 180° position before moving the crawler crane!



WARNING

The crane can topple over!

If the following specifications, instructions and prerequisites are not observed, then the crane can topple over or be overloaded.

Personnel can be severely injured or killed.

- ▶ The crane operator is responsible for adhering to all specifications, instructions and prerequisites in the crane documentation.
- ▶ The crane operator may not drive the crane if not all specifications, instructions and prerequisites in the crane documentation can be adhered to.
- ▶ The crane operator is responsible for the correct and complete data entry into the LICCON computer system and into the LICCON job planner, if applicable.
- ▶ All acceleration and delay maneuvers must be initiated with extreme caution and at the least possible speed.
- ▶ Depending on the situation, additional observers, who are acoustically or visually connected with the crane operator (for example by radio or sight), may have to support the crane operator with shared responsibility.



WARNING

Combined crane movements at crawler operation!

- ▶ In crawler operation, do not carry out any additional crane movements.
- ▶ Carry out additional crane movements while the crane is at a standstill, if possible.

Make sure that the following prerequisites are met:

- No personnel or objects are within the danger zone.
- The crane is in operational condition.
- The crane is in a set up configuration permitted for travel operation.
- Installed ballast (central ballast, counterweight and derrick ballast) is locked and secured.
- There are no loose objects on the crane.

1.1 Travel route



WARNING

The crane can topple over!

If the following specifications, instructions and prerequisites are not observed, then the crane can topple over or be overloaded.

Personnel can be severely injured or killed.

- ▶ The transfer from the horizontal into an uphill slope and from the uphill slope into the horizontal must be made evenly, i.e.: There may be no edges which can cause the crane to topple over. Any incline changes must be made continuously.
- ▶ If the travel route cannot safely take on the surface pressure, then measures must be taken to be able to safely induce the forces into the ground.
- ▶ If measures were taken to induce the forces into the ground, then they must be checked by an expert before starting to drive for proper execution and sufficient supportability.
- ▶ An insufficient ground condition can cause accidents, for example the crane can slide away to the side and as a result get into an impermissible incline position.

Make sure that the following prerequisites are met:

- Before starting to drive, the travel route was determined.
- Before starting to drive, the condition of the ground has been checked.
- The entire travel route can safely absorb the surface pressure.
- All inclines occurring on the travel route can be driven safely by the crane.
- The entire travel route is free of obstacles.
- The friction coefficient between crawler track and ground is sufficiently large to absorb the occurring drive forces or to eliminate the crane from slipping away in an incline position.
- Possible environmental influences while driving the crane (among others precipitation and wind) were taken into account for the travel route.
- The travel route was selected and prepared in such a way that the boom system can be taken down at any time.
- Select the travel route in such a way that no steering movements are required, if possible.
- With load on the hook: Setting down the load is possible at any time.
- The entire travel route is secured as a danger zone.
- The travel route has been selected in such a way that a sufficient distance to local facilities (among others power lines) can be retained.

For falling terrain gradients outside the range of a valid load chart, the following applies additionally:

- Before starting to drive, the travel route was checked in connection with the actual set up configuration of the crane on the LICCON job planner.
- Before starting to drive, the optimum positions for the boom system were determined to obtain as even a surface pressure as possible - the LICCON job planner can be used for this purpose.



Note

- ▶ For a detailed description of the LICCON job planner on the crane, see the operating instructions LICCON job planner.
- ▶ For a detailed description of the computer program LICCON job planner, see separate description.

1.1.1 Optimizing measures for travel route

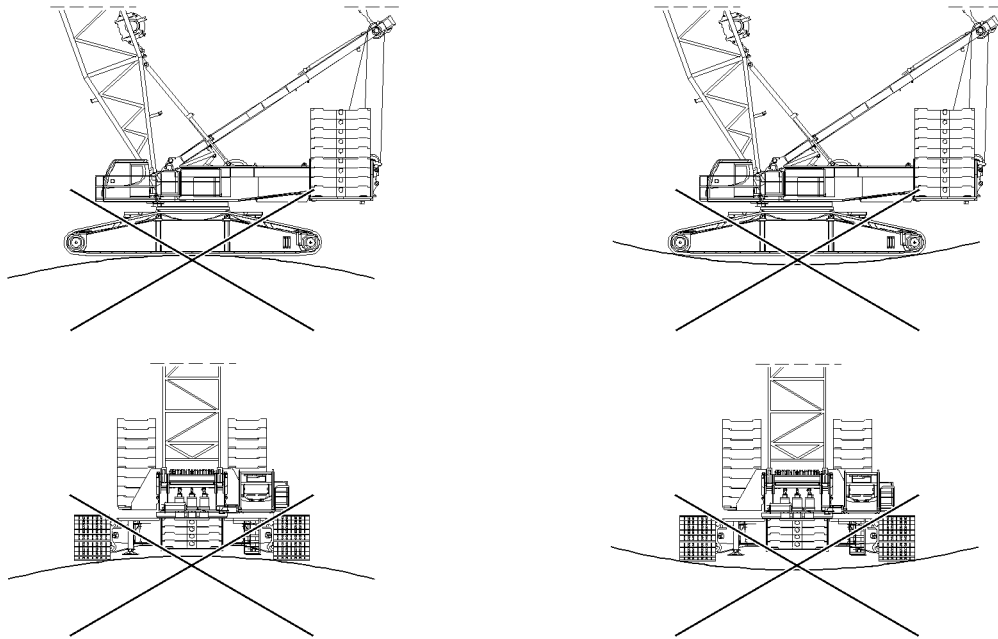


Fig.119598: Depressions, crests, track grooves and other uneven areas of the travel route cause punctiform strain to the track.

NOTICE

Damage to the track!

Continuous punctiform strain to the track causes increased wear.

Continuous increased wear can cause damage to the track.

- ▶ Set up the travel routes in such a way that the track is not subjected to continuous punctiform strain.
- ▶ For extended travel operation shorten the maintenance intervals.

Through the following configuration features of the travel route, wear on the track can be minimized:

- Shapings of the travel route (such as depressions, crests, track grooves) have been eliminated via suitable measures.
- Lay out the travel route in such a way that no steering movements are required, if possible.

1.2 Travel gears / hydraulic motors / track rollers

NOTICE

Damage to the travel gear, hydraulic motors and track rollers!

On longer travel routes and / or when driving uphill / downhill, the travel gears, hydraulic motors and / or track rollers can be overheated and damaged.

- ▶ Make sure that the travel gears - before driving the crane - are on maximum fill level.
- ▶ With suitable measuring devices make sure that the maximum permissible temperature of the travel gears, hydraulic motors and / or track rollers in travel operation over longer distances is below 90 °C. For a short time (**maximum** 10 minutes), the temperature may increase to a value between 90 °C and 100 °C.
- ▶ As soon as the maximum permissible temperature on one position is exceeded, take a break for cooling off.
- ▶ The crane operator is responsible for any damage on travel gears, hydraulic motors and / or track rollers.

When the maximum permissible temperature range on a travel gear and / or hydraulic motor is reached:

- ▶ Take a break until the temperature on travel gear(s), hydraulic motor(s) and / or track rollers had dropped considerably.

Maximum permissible temperature range on travel gear(s) / hydraulic motor(s)		
	To 90 °C	between 90 °C and 100 °C
Duration of exposure	continuous	not longer than 10 minutes

When the temperature has dropped on all travel gears / hydraulic motors under 90 °C:

- ▶ Travel operation is permissible again.

1.3 Center of gravity display



WARNING

Shifting of center of gravity!

The calculation of the values for the display of the center of gravity in the job planner are based on ideal assumptions.

- ▶ Side deformations of the boom system due to wind, inclined position and elastic resilience of the steel structure are not taken into account but they can lead to a shifting of the center of gravity.

Position	Description
1	Center of gravity display
1.1	Core surface
1.2	Center of gravity



WARNING

Center of gravity of the crane is outside the core area!

If the center of gravity **1.2** of the crane is outside the core area **1.1**, then the crane can topple over. Personnel can be severely injured or killed.

- ▶ To drive the crane, the center of gravity **1.2** must always be within the core area **1.1**.
- ▶ If the center of gravity is outside of the core area, then it is prohibited to drive the crane.



Note

- ▶ If the center of gravity **1.2** of the crane is within the core area **1.1**, then the center of gravity **1.2** is shown in green.
- ▶ If the center of gravity **1.2** of the crane is outside the core area **1.1**, then the center of gravity **1.2** is shown in red.

The following specifications and instructions must be observed:

- By luffing the boom system up and down, the position of the center of gravity **1.2** must be corrected in such a way that the overall center of gravity remains within the core area **1.1**.

1.4 Distribution of surface pressure



WARNING

Increased surface pressure!

The calculation of the values for the display of the surface pressure in the job planner are based on ideal assumptions.

- ▶ Side deformations of the boom system due to wind, inclined position and elastic resilience of the steel structure are not taken into account but they can lead to an increase of the surface pressure.

**Note**

- ▶ The boom must be luffed down before driving until the load is even distributed on the tracks.
- ▶ If the counterweight on the turntable is large, then it is required to position the boom in such a way that a suitable distribution of surface pressure for driving is obtained.

1.5 Suitable distribution of surface pressure

If the distribution of the surface pressure is even (surface pressure front and surface pressure rear approx. the same value), then steering is difficult or not possible at all.

For the suitable distribution of surface pressure, the following applies:

- A = Surface pressure on the side of the two tracks which has the lower load
- B = Surface pressure on the side of the two tracks which has the higher load
- The center of gravity must however always be within the core area **1.1**.

Distribution of surface pressure A to B			
A	/	B	=
			Should be greater than 0.3

In case of unfavorable distribution of surface pressure it is required to position the boom system in such a way that a suitable distribution of the surface pressure is reached for driving.

- ▶ The turntable should be turned while at a standstill: The boom system should be luffed in such a way that the crawlers are subjected to a load as evenly as possible.
- ▶ Driving uphill: The boom system should be luffed in such a way that the side of the crawler track which has less of a load is on the rear.
- ▶ Driving downhill: The boom system should be luffed in such a way that the side of the crawler track which has less of a load is on the front.

1.6 Steering ability

**Note**

High load on the crane!

When driving the crane, steering movements cause a high load on the crane travel gear.

- ▶ If possible, forego steering movements with load on the hook and / or derrick ballast.
- ▶ Select the travel route in such a way that no steering movements are required, if possible.
- ▶ If not otherwise possible, before initiating a steering movement, set down the load and / or derrick ballast.

The steering ability of the crane depends on the following factors:

- Friction conditions under the chains
- Evenness of the ground:
 - Steering is not possible if the crawler travel gear is only making contact with the ground at the front and rear.
- Load bearing capacity of the ground:
 - If the crawler travel gear sinks into the ground, then the steering ability is significantly restricted.
- Position of the overall center of gravity:
 - If the overall center of gravity - under consideration of the suspended load - is at the center of the crane, then steering is hard or not possible at all.

The steering ability can be improved by:

- Placing metal sheeting, sand, gravel, water underneath
- By taking the load bearing capacity of the ground and the position of the center of gravity into account: Changing the center of gravity.

2 Driving with a load and / or Derrick ballast



WARNING

The crane can topple over!

If the following prerequisites are not observed for crawler operation, the crane can topple over. Personnel can be severely injured or killed.

- ▶ Make sure that the prerequisites for crawler operation are read and have been understood - before „driving with a load and / or Derrick ballast“.

2.1 Prerequisites for driving with a load and / or derrick ballast



WARNING

The crane can topple over!

If load charts with lateral inclines of more than 0.3° are available, then the crane may be driven with a load within these load charts.

If the following points are not observed, the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The following prerequisites for driving with a load must be adhered to.
- ▶ Driving the crane with lateral and longitudinal inclines of more than $\pm 0.3^\circ$ - with installed derrick ballast - is prohibited.



Note

- ▶ The permissible inclines from the load charts apply for driving with a load.
- ▶ Take the maximum permissible wind speed from the load charts.

Permissible inclines for driving with a load	
Overall incline	$\pm 0.3^\circ$

**WARNING**

The crane can topple over!

If the following conditions are not observed, the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The ground must be level ($\pm 0.3^\circ$) and have adequate load bearing capacity.
- ▶ The ground must be able to safely take on the maximum occurring surface pressures.

**WARNING**

The crane can topple over!

If the crane is driven in lateral and longitudinal inclines of more than $\pm 0.3^\circ$ with a load or derrick ballast, then crane structures can fail and the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Driving uphill / downhill with a load and / or derrick ballast is prohibited.

**WARNING**

The crane can topple over!

The crane can be driven with the given loads from the load charts, if the following prerequisites are met.

If the following prerequisites are not observed, the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The maximum permissible travel speed of the crawler with load and / or derrick ballast may **not** exceed 0.05 m/s **or** 3 m/min **or** 0.18 km/h.
- ▶ Steering the crawler with suspended load and / or installed derrick ballast is difficult and often not possible at all. Make sure that the slewing gear free wheeling is actuated for steering.
- ▶ Avoid jerky driving movements.
- ▶ Secure the suspended load to avoid oscillation.
- ▶ Lift the suspended ballast no more than maximum 250 mm off the ground.
- ▶ Luff the main boom up or down until a medium utilization is obtained on test point 1 **MS1**.

3 Driving without a load and without derrick ballast

**WARNING**

The crane can topple over!

If the following prerequisites are not observed for crawler operation, the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Make sure that the prerequisites for crawler operation are read and have been understood - before „driving without a load and without Derrick ballast“.

3.1 Prerequisites for driving without a load and without derrick ballast

Make sure that the following prerequisites are met:

- The maximum permissible oil fill quantity in the diesel motor is present.
- The oil level in the hydraulic oil tank must be lowered by extending the cylinders so that an overflow is not possible.
- The contents of the fuel tank must be reduced so that an overflow is not possible.
- The maximum permissible wind speed of 9 m/s is not being exceeded.
- the travel speed may not exceed 0.4 m/s or 24 m/min or 1.44 km/h
- The turntable is aligned parallel to the crawler track, 0° or 180° position.



WARNING

The crane can topple over!

When driving in lateral inclines, the crane can slip off or topple over.

Personnel can be severely injured or killed.

- ▶ Make sure that the overall center of gravity of the crane is in the center of rotation when driving in lateral inclines.
- ▶ The overall center of gravity for driving without a load must be constantly checked with the LICCON job planner.
- ▶ Make sure that the permissible lateral and longitudinal inclines are not exceeded.



Note

- ▶ By luffing the boom up and down, the position of the center of gravity **1.2** must be corrected in such a way that the overall center of gravity remains within the core area **1.1**.
- ▶ When driving the crane in terrain with a longitudinal and lateral incline, then the required boom position must be determined with the aid of the LICCON job planner via the position of the overall center of gravity, see section „Display of center of gravity“.



WARNING

The crane can topple over!

When driving in lateral inclines with boom lengths of more than 150 m the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Driving in lateral inclines with boom lengths of more than 150 m is **exclusively** permitted after a written release is obtained from **Liebherr-Werk Ehingen GmbH**.



WARNING

Crane with narrow crawler track!

- ▶ When driving cranes with narrow tracks and corresponding equipment, the special travel charts and danger notes must be observed and adhered to.

Permissible lateral inclines for driving without a load / derrick ballast	
Overall length of boom	Maximum permissible lateral incline
Shorter / equal to 96 m	± 3°
97 m to 150 m	± 2°

Permissible longitudinal inclines for driving without a load / derrick ballast	
Overall length of boom	Maximum permissible longitudinal incline
To 150 m	± 10°

**WARNING**

The crane can topple over!

If the following conditions are not met when driving the crawler crane uphill / downhill, then the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The ground must be able to take on the occurring surface pressures.
- ▶ The friction coefficient between the roadway and the ground must be large enough to take on the occurring drive forces.
- ▶ Slippery ground, especially ice, frost and snow can cause the crane to slide off sideways in longitudinal and lateral inclines and therefore cause the crane to topple over.
- ▶ The turntable must be parallel to the crawler carriers and secured to prevent it from turning.
- ▶ All acceleration and delay maneuvers must be initiated with extreme caution and at the least possible speed.
- ▶ The transfer from the horizontal into an uphill / downhill slope and from the uphill / downhill slope into the horizontal must be made evenly.
- ▶ Edges, over which the crane tilts are impermissible.
- ▶ Any incline changes must be made continuously.
- ▶ The surface pressures which will occur should be determined with the job planner before travel.
- ▶ The ground must be sufficiently load bearing and have sufficient traction to prevent the crane from slipping.
- ▶ The counterweight on the turntable must be secured with a chain, see chapter 4.07 of the Crane operating instructions.
- ▶ The center of gravity of the crane must lie within the core area **1.1** of the crane.
- ▶ The appropriate and permissible boom position for the respective equipment configuration must be determined with the job planner.

4 Driving uphill / downhill

The maximum climbing ability of the crawler crane is limited by the following criteria:

- The location of the center of gravity for the complete crawler crane
- The friction coefficient between roadway and track pads
- The transit between the horizontal and the uphill / downhill slope
- The maximum permissible longitudinal incline of $\pm 10^\circ$ up to a boom length of 150 m
- The oil level in the diesel engine
- The oil level in the travel gears

4.1 Calculation of required length of transfers in uphill / downhill slopes

The required length **L** for transfers results from the existing uphill angle α and the length of the tracks **LC**.

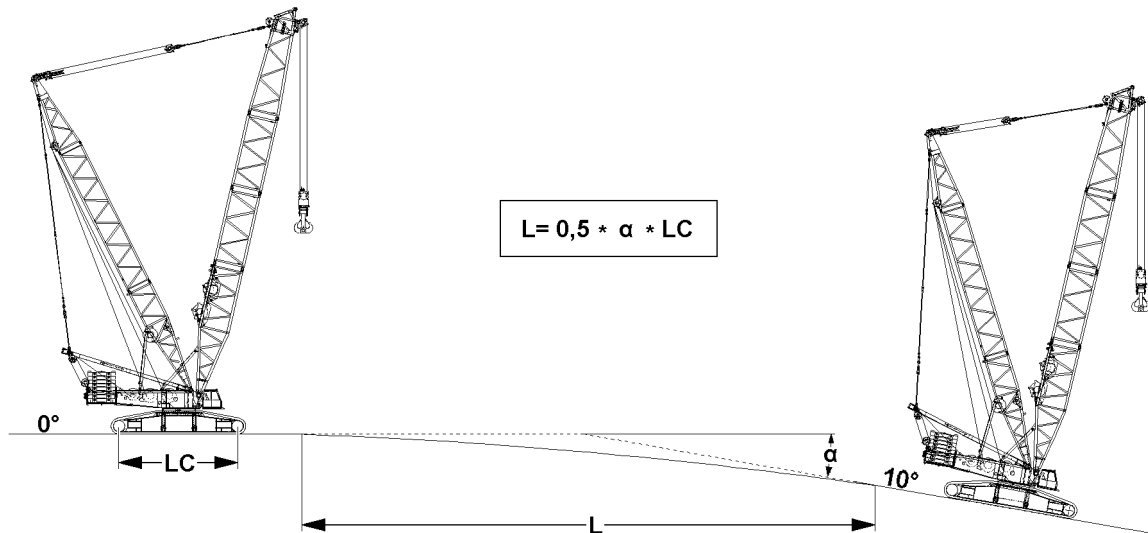


Fig.119612

Abbreviation	Description
L	Required length of transfers
α	Angle Rising / falling inclines in degrees
LC	Length of crawlers between drive wheels / steering wheels

4.1.1 Calculation example

Given:

$\alpha = 10^\circ$

LC = 17.3 m (use only the actual value of the crane!)

Wanted:

L = ?

Calculation formula						
L	=	0,5	*	α	*	LC
L	=	0,5	*	10	*	17.3 m
L	=	86.5				

4.2 Prerequisites for driving under observation of the boom position



Note

- ▶ The illustrations in this section are only examples and may not match to your crane.
- ▶ The determining factor for driving uphill / downhill is the exact knowledge of the existing operational conditions on the jobsite and the surface pressures, permissible boom angles and inclines as well as the overall center of gravity which were determined from them with the job planner.



WARNING

The crane can topple over!

If the following note is not observed, the crane can topple over.
Personnel can be severely injured or killed.

- ▶ Driving uphill / downhill must always be anticipatory, with utmost caution and at the slowest speed.

- There are two different possibilities to drive crawler cranes uphill / downhill:
- with boom angle adjustment
 - without boom angle adjustment

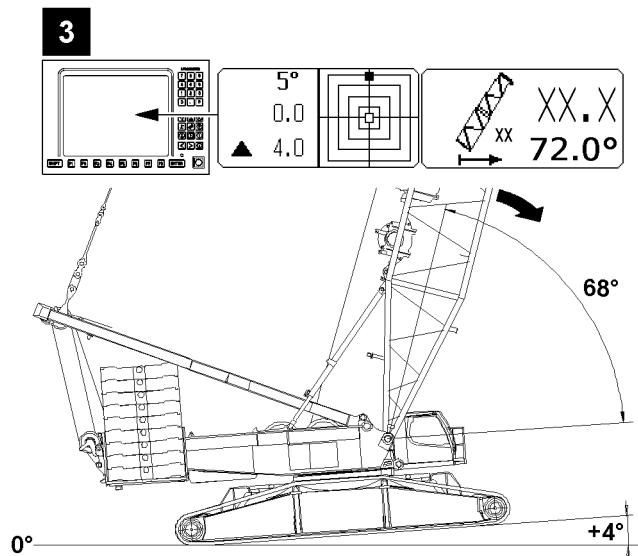
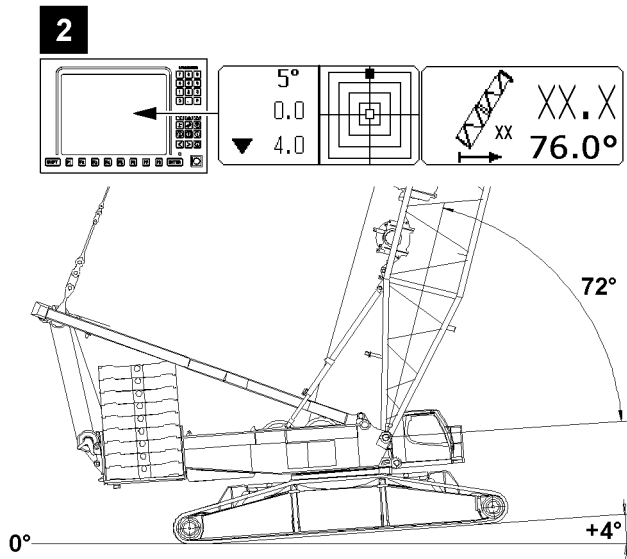
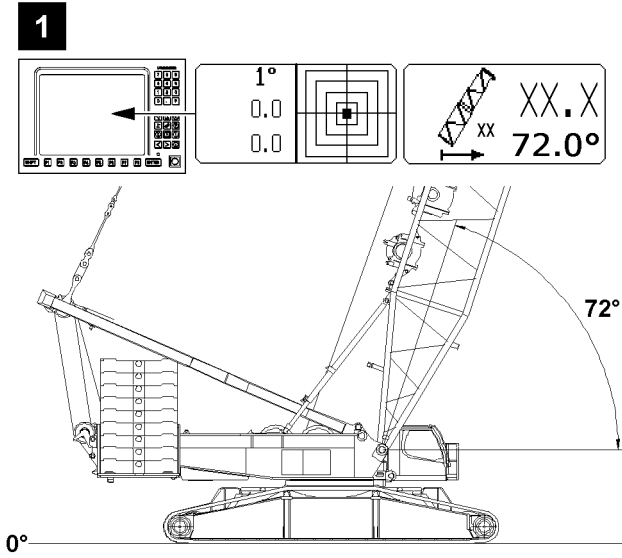


Fig.117601

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4.2.1 Prerequisites for driving on uphill / downhill slopes with boom angle adjustment



Note

- ▶ When driving into an uphill / downhill slope, during the transition between the horizontal into the uphill / downhill incline, the original boom angle must be changed continuously in such a way that the original boom angle always remains between the boom and the horizontal. This angle must be retained in the uphill / downhill incline.
- ▶ When driving out of an uphill / downhill slope, during the transition between the uphill / downhill incline into the horizontal, the original boom angle must be changed continuously in such a way that the original boom angle always remains between the boom and the horizontal.
- ▶ In addition, the overall center of gravity of the crane must be observed.



WARNING

The crane can topple over!

When driving in uphill / downhill inclines with a load or derrick ballast, structural parts can break, the carrying crane structures can be damaged or the crane can topple over.

If the boom angle is not matched to the uphill / downhill incline when driving the crane in uphill / downhill slopes, then the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Driving uphill / downhill with a load and / or derrick ballast is prohibited.
- ▶ Match the boom angle to the uphill / downhill incline.

Positive longitudinal incline (illustration 1 to 3)



Note

- ▶ When driving in positive longitudinal inclines (uphill slopes), the boom / the luffing jib must be luffed down continuously - maximum by the **uphill incline angle α** .
- ▶ The uphill incline angle α is 4° in the displayed example, see opposite graphic.
- ▶ View of incline and boom angle (as seen from the crane operator's cab in the direction of travel).

– Illustration 1:

- Crane is horizontally aligned

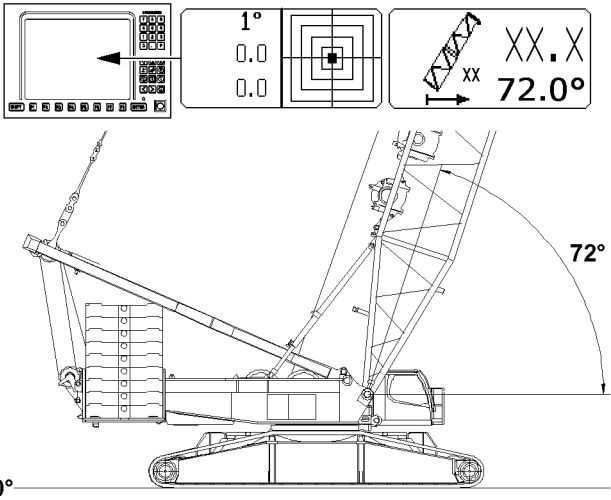
– Illustration 2:

- Crane at 4° uphill incline (positive longitudinal incline), no lateral incline
- **Note:**
The boom angle is always shown to the horizontal.
Example Display boom angle = 76° ($72^\circ + 4^\circ$)
Correct the boom angle.

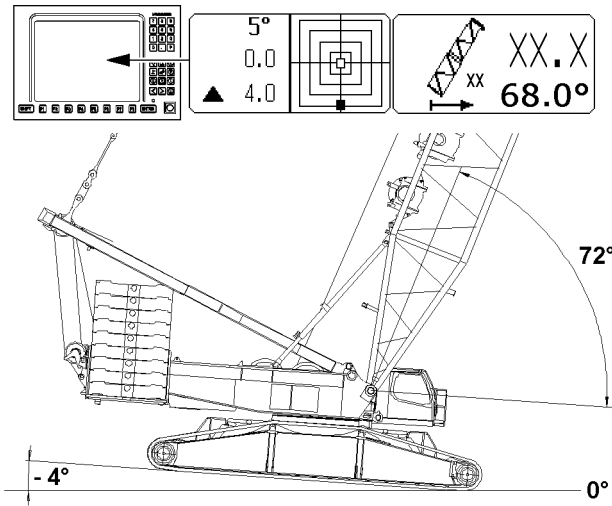
– Illustration 3:

- Crane at 4° uphill incline (positive longitudinal incline), no lateral incline
- **Note:**
The boom angle is always shown to the horizontal.
Luff the boom down by the uphill angle (4°) so that the display boom angle = 72° (68° plus 4°)

4



5



6

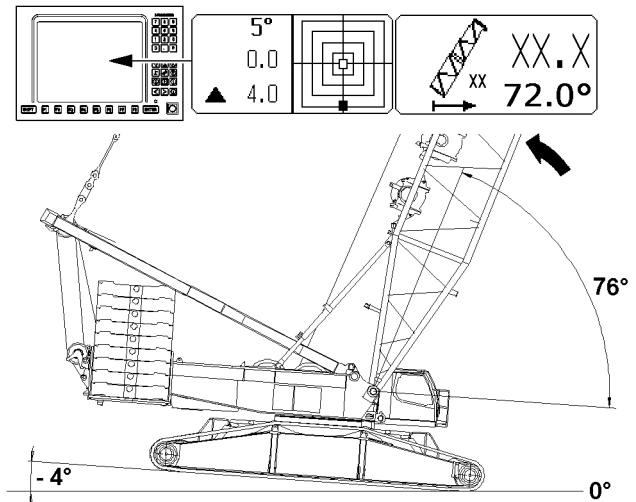


Fig.117607

LWE/LR 1750-000/12812-15-02/en

Negative longitudinal incline (illustration 4 to 6)



Note

- ▶ When driving in negative longitudinal inclines (downhill slopes), the boom / the luffing jib must be luffed up continuously - maximum by the **uphill incline angle α** .
- ▶ The uphill incline angle α is 4° in the displayed example, see opposite graphic.
- ▶ View of incline and boom angle (as seen from the crane operator's cab in the direction of travel).

– Illustration 1:

- Crane is horizontally aligned

– Illustration 2:

- Crane at 4° downhill slope (negative longitudinal incline), no lateral incline

- **Note:**

The boom angle is always shown to the horizontal.

Example Display boom angle = 68° (72° minus 4°)

Correct the boom angle.

– Illustration 3:

- Crane at 4° downhill slope (positive longitudinal incline), no lateral incline

- **Note:**

The boom angle is always shown to the horizontal.

Luff the boom up by the uphill angle (4°) so that the display boom angle = 72° (76° minus 4°)

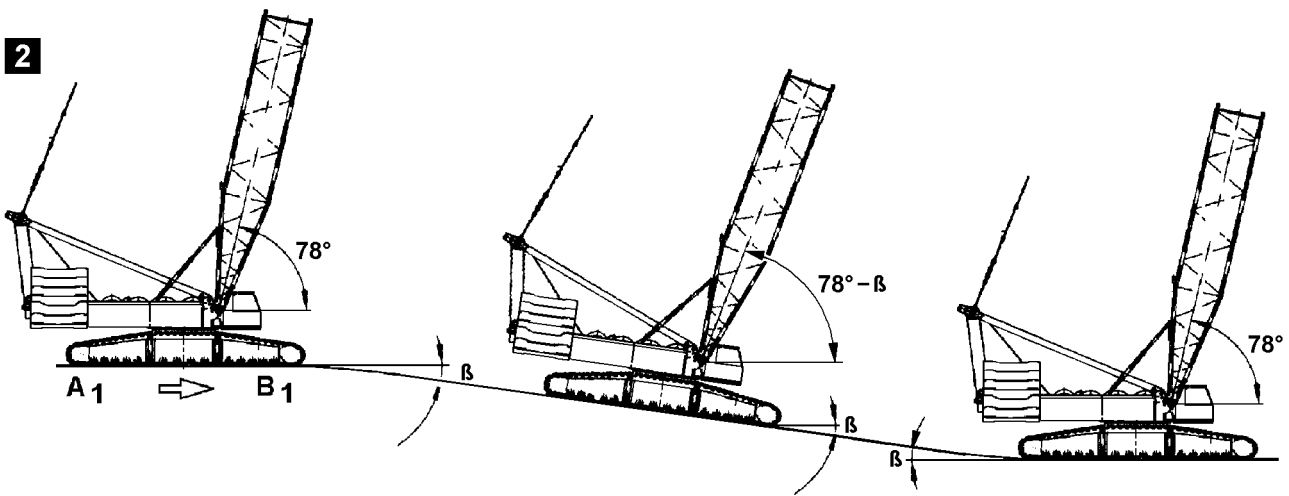
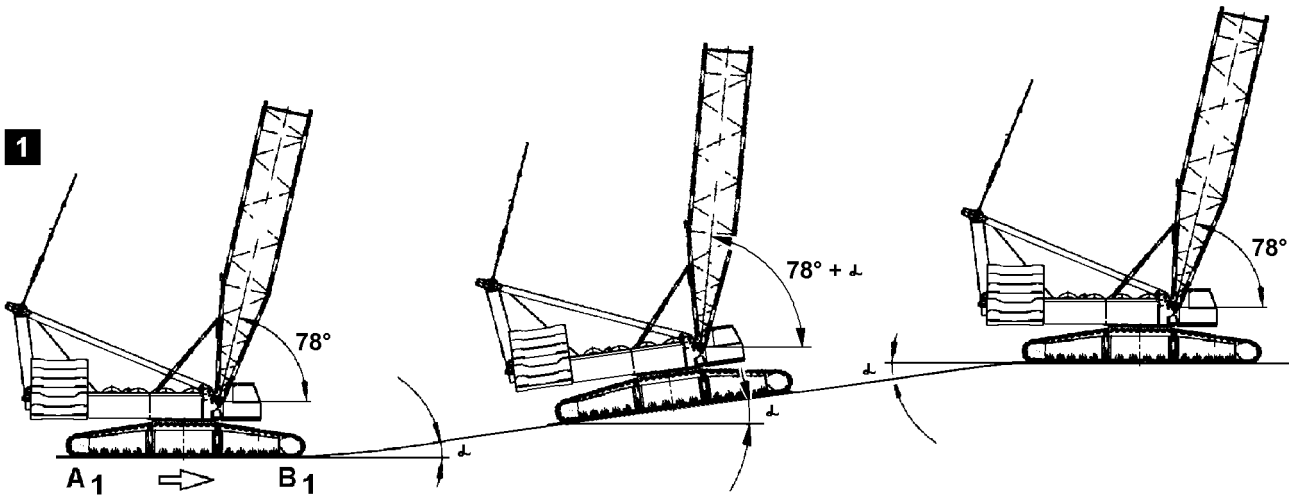


Fig.109866

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4.2.2 Prerequisites for driving on uphill / downhill slopes without boom angle adjustment



WARNING

The crane can topple over!

If the overall center of gravity of the crane is outside the core area when driving on uphill / downhill inclines without boom angle adjustment, then the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Before driving into uphill / downhill slopes, check the change of the center of gravity with the job planner.
- ▶ To be able to approximately determine the changes of the center of gravity in uphill / downhill slopes with the job planner, the boom angle must be increased by the incline angle α when driving in uphill / downhill inclines, illustration 1.
- ▶ To be able to approximately determine the changes of the center of gravity in downhill slopes with the job planner, the boom angle must be decreased by the incline angle β when driving in downhill slopes, illustration 2.
- ▶ Before driving the crane, determine exactly with the job planner if the crane may drive on the intended route without changing the boom angle.
- ▶ If the intended uphill / downhill incline cannot be driven without changing the boom angle according to the job planner, then the boom angle must be changed to be able to drive on the uphill / downhill incline.

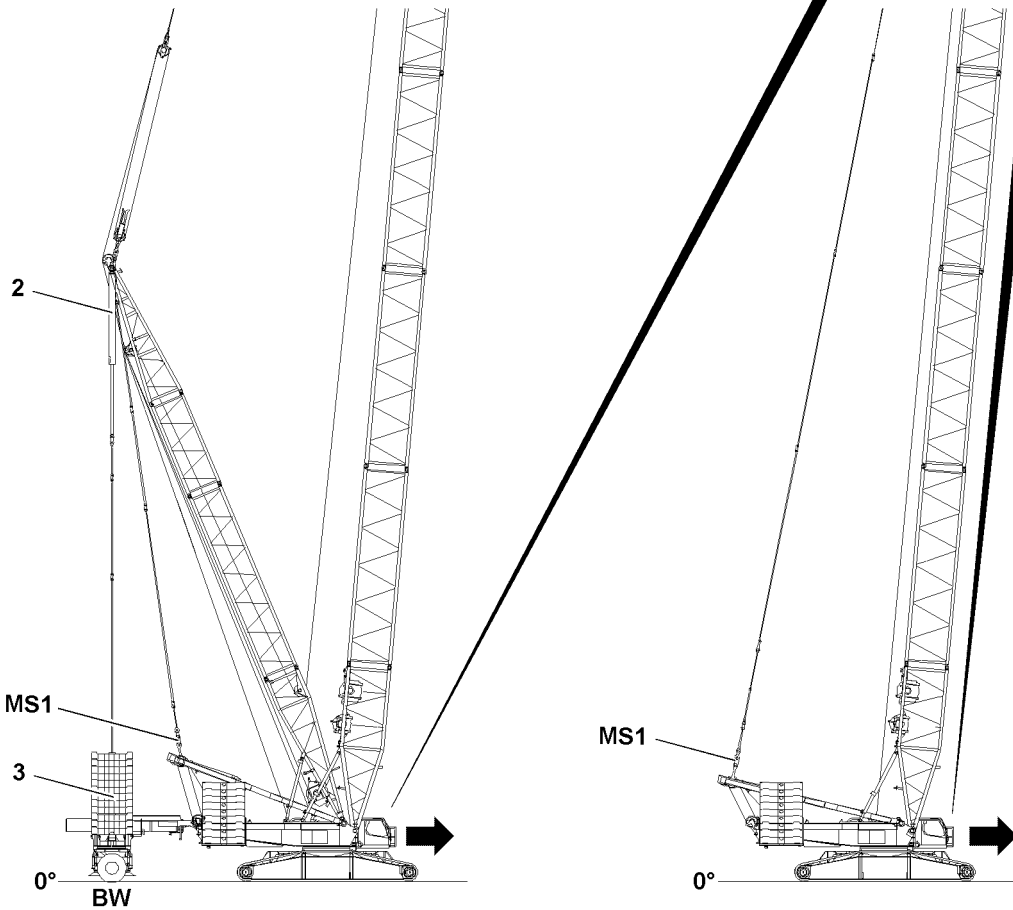
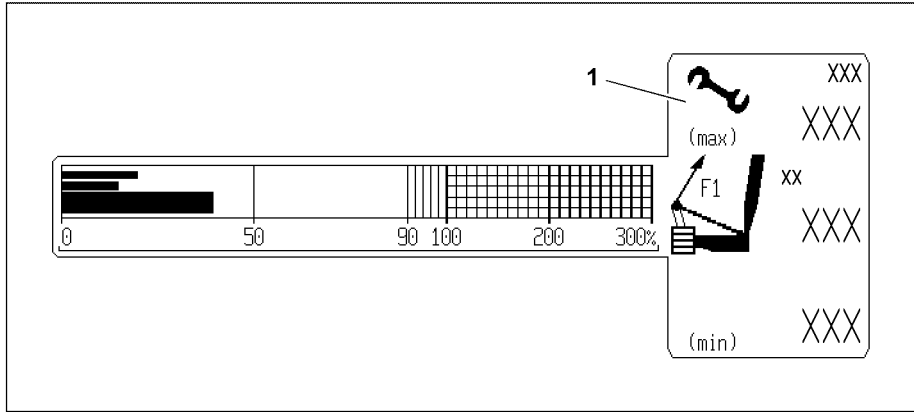


Fig.117598

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5 Driving the crawler crane



Note

- ▶ Test point 1 **MS1** = F1 in icon 1.
- ▶ For description of test point 1, see Crane operating instructions, chapter 4.02.



WARNING

The crane can topple over!

When driving the crane - this also applies for „circular travel“ - the ballast trailer **3** is raised due to ground unevenness, the force on test point 1 **MS1** increases very quickly and the crane will be overloaded.

If the ballast trailer **3** sinks while driving due ground unevenness, the force on test point 1 **MS1** drops and the ballast trailer **3** lifts off the ground, or the entire boom system is pulled backward.

There is no LMB shut off.

The crane can topple over and personnel can be severely injured or killed.

- ▶ The crane operator must constantly observe the displays on the LICCON monitor while driving the crawler crane.
- ▶ The crane operator must correct the force changes on test point 1 **MS1** to a permissible operating range already when an advance warning occurrence on the LICCON monitor is issued, by actuating the pull cylinder in the derrick ballast guying.



WARNING

The crane can topple over!

If the following instructions are not observed, the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Before driving the crane with the attachment, the optimum boom position must be determined with the aid of the job planner, to obtain as even a surface pressure as possible.
- ▶ When driving crawler cranes, it must be ensured that the ground can take on the surface pressures safely, which have been calculated with the job planner, over the entire intended travel route. If this is not the case, appropriate measures must be taken to be able to discharge the forces into the ground.
- ▶ An additional monitor, who is connected by radio contact with the crane operator must ensure that there are no persons or obstacles within the danger zone of the crane.

Make sure that the following prerequisite is met:

- The crane engine is running.

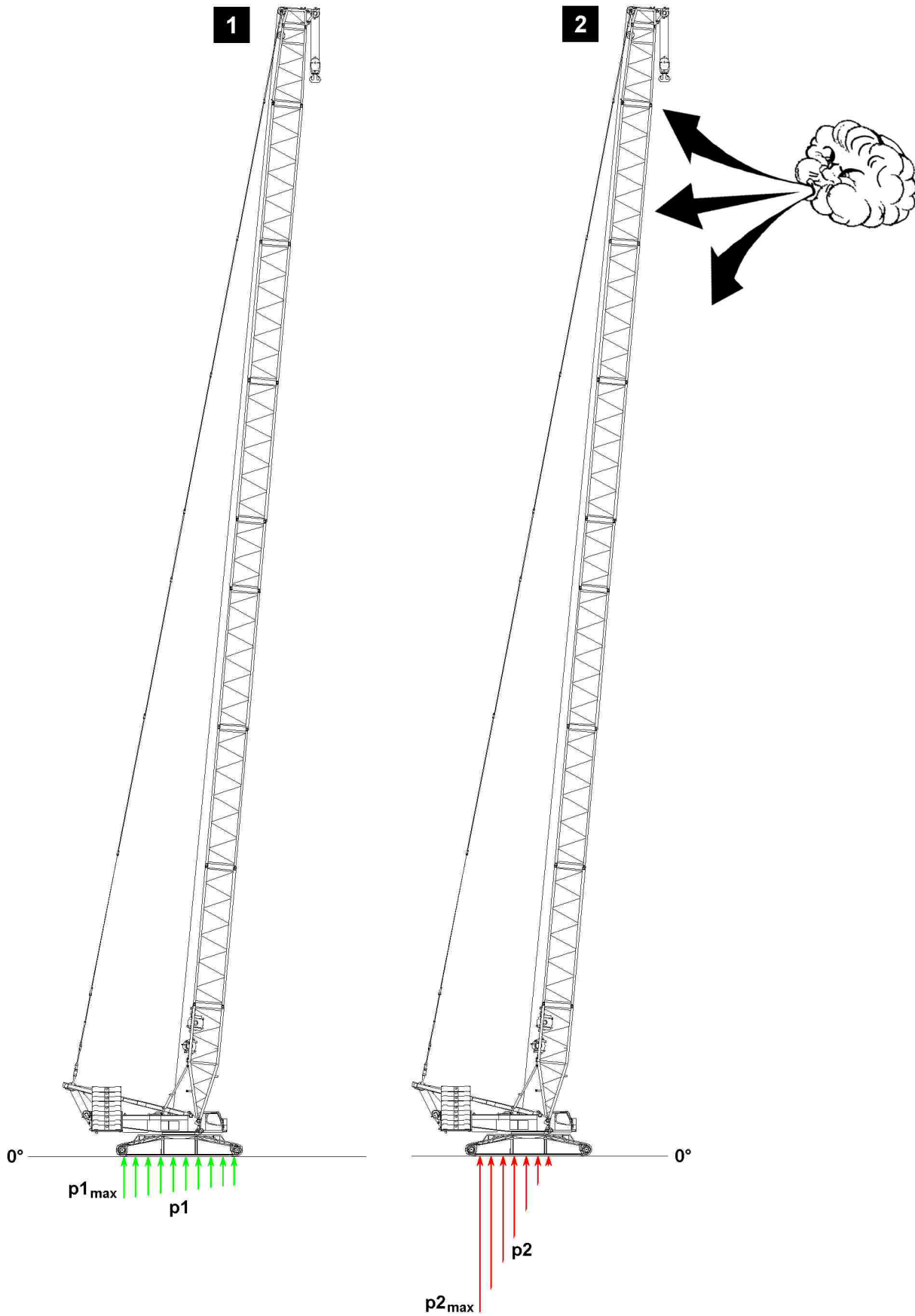


Fig.117599: $p2_{max}$ larger than $p1_{max}$

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5.1 Surface pressures and force distribution when driving the crane



WARNING

The crane can topple over!

When driving crawler cranes, surface pressures can significantly increase or change due to different factors.

This can cause the crane to topple over.

Personnel can be severely injured or killed.

- ▶ Make sure that the ground has sufficient load bearing capacity in the entire working range and / or over the entire travel route, to be able to safely take on even increased surfaces pressures of the crane.
- ▶ Make sure that the center of gravity is always within the core surface, see section „Prerequisites for crawler operation“ and LICCON job planner.

5.1.1 Surface pressures in case of wind load on boom



WARNING

The crane can topple over!

When driving the crane with long boom lengths and / or when driving with large sized loads and / or at high wind speeds, the surface pressures can increase significantly.

This can cause the crane to topple over.

Personnel can be severely injured or killed.

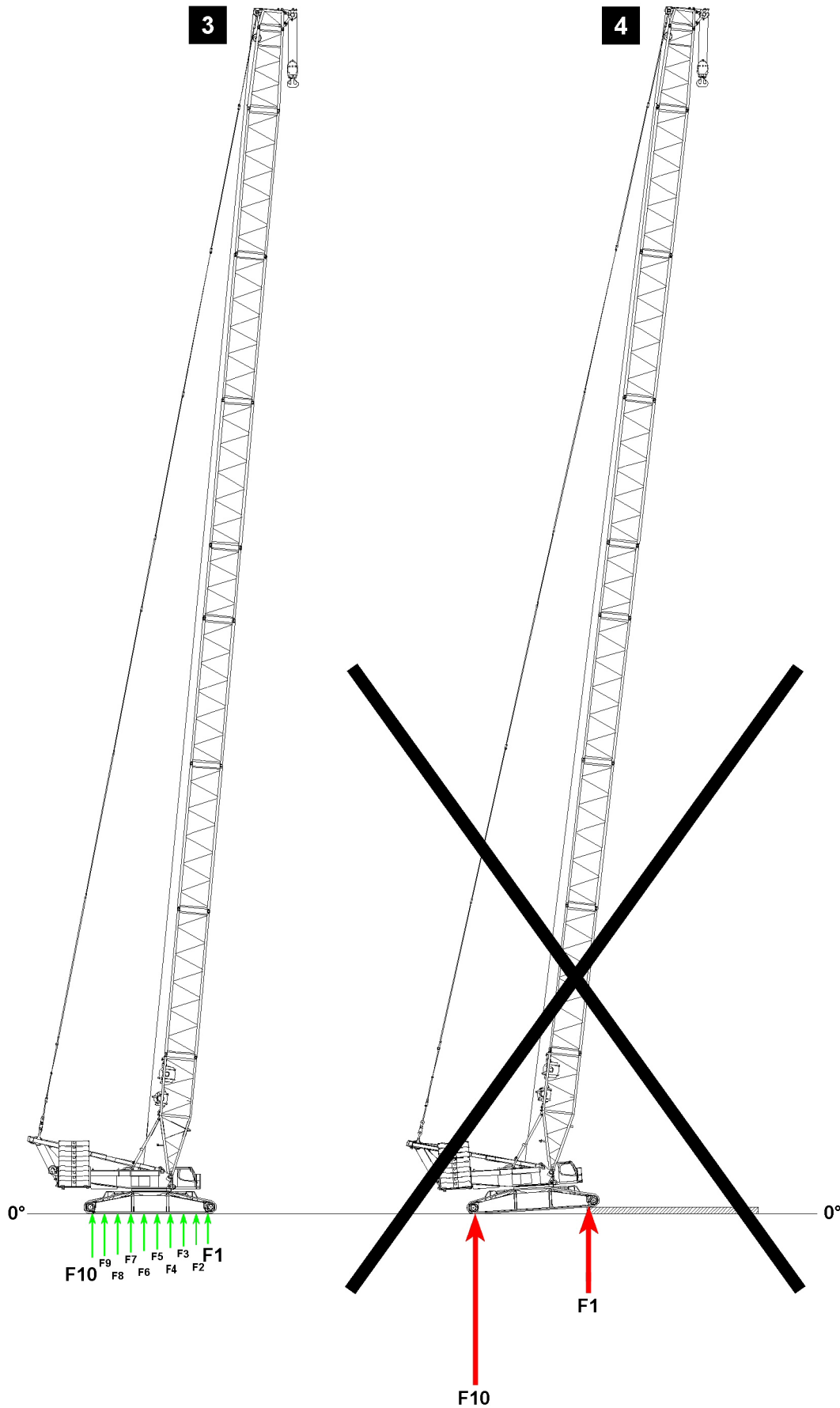
- ▶ Make sure that the entire travel route of the crane is sufficiently load bearing to be able to take on even increase surface pressures - for example if „wind is coming front the front on the boom“.
- ▶ Change of surface pressures on crawler track under wind load, see opposite graphic.

Illustration 1:

- Surface pressures **p1** on crawler track without wind load

Illustration 2:

- Surface pressures **p2** on crawler track in case of wind load from the front



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Fig.117600: Force distribution in normal operation // driving on pressure distributor plates

5.1.2 Force distribution when driving on pressure distributor plates



WARNING

The crane can topple over!

When driving the crane on pressure distributor plates, a movement of forces occurs due to the reduction of the ground contact surfaces on the crawler track. The forces concentrate at force **F1** and force **F10**, see illustration 4.

This can cause the crane to topple over.

Personnel can be severely injured or killed.

- ▶ Make sure, before driving the crane on pressure distributor plates, that a load bearing transfer (height equalization) was established, see section „Calculation of required length of transfers“.
- ▶ Driving the crane on pressure distributor plates without transfer (height equalization) is prohibited.

Illustration 3:

- Force distribution on crawler track of crane (normal operation)
 - Without wind influence

Illustration 4:

- Not permissible

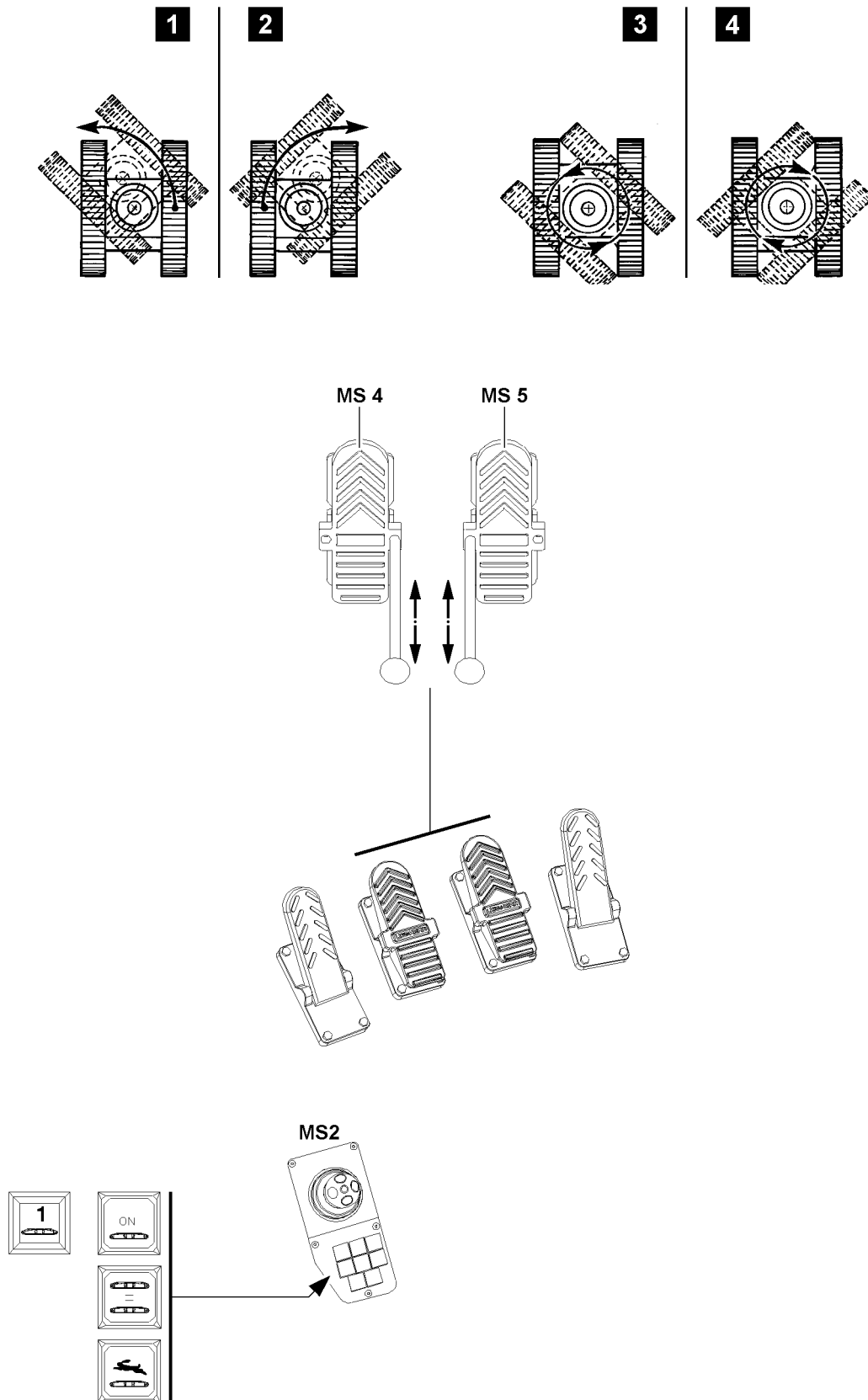






Fig.107964





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5.2 Operating elements for the crawler operation

5.2.1 Pedal carrier

Pedal carrier (Pedal assignment, see opposite illustration)				
				
	<i>Pedal</i>	<i>Foot rocker MS4</i>	<i>Foot rocker MS5</i>	<i>Pedal</i>
Function:	Slewing gear brake	Crawler travel „left“	Crawler travel „right“	Engine regulation:
Note: See also Crane operating instructions, chapter 4.01 and chapter 4.05				

5.2.2 Switch for crawler operation

Control panel MS2			
			
	Switch „Crawler operation“	Switch „Crawler parallel travel“	Switch „Rapid gear“
	or:		
			
	Switch „Crawler operation“		
Function:	On / Off	On / Off	On / Off
Note: See Crane operating instructions, chapter 4.01.			

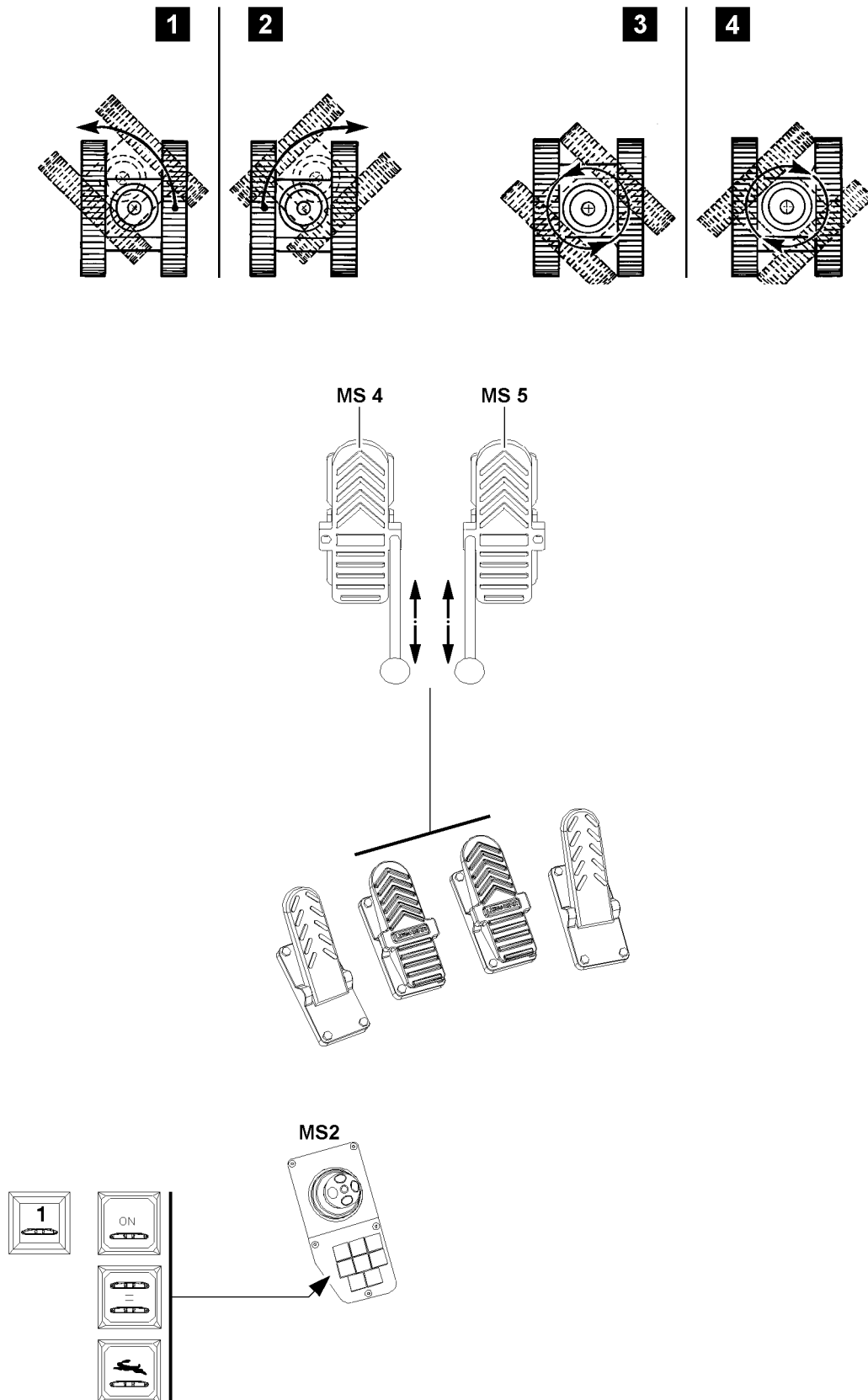


Fig.107964

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5.3 Activating crawler operation



Note

- ▶ The engine rpm is increased or decreased via the pedal „engine regulation“.
- ▶ The switch „crawler operation“ can differ somewhat, depending on the crane type.

- ▶ Actuate the switch „Crawler operation“.

Result:

- Crawler operation is activated.
- The indicator light in the switch „crawler operation“ lights up.

To deactivate crawler operation:

- ▶ Actuate the switch „Crawler operation“.

Result:

- Crawler operation is deactivated.
- The indicator light in the switch „crawler operation“ turns off.

5.4 Selecting the travel speed

This crawler crane has 2 possible speeds:

1. Speed stage 1:
Creeper gear
2. Speed stage 2:
Fast mode (Rapid gear)

5.4.1 Activating the creeper gear

Make sure that the following prerequisites are met:

- The switch „Rapid gear“ is not actuated.
- The indicator light in the switch „Rapid gear“ is off.

- ▶ Actuate the switch „Crawler operation“.

Result:

- The creeper gear is active.

5.4.2 Turning the rapid gear on



WARNING

The crane can topple over!

If the crane is driven in rapid gear with a load or derrick ballast, then the crane can topple over. Personnel can be severely injured or killed.

- ▶ Driving with a load or derrick ballast in rapid gear is prohibited.

Make sure that the following prerequisites are met:

- The switch „Parallel travel crawler“ is not actuated.
- The indicator light in switch „Parallel travel crawler“ is off.
- Inching gear is active

To select speed stage 2:

- ▶ Actuate the switch „Rapid gear“.

Result:

- The rapid gear is activated.
- The indicator light in the switch „Rapid gear“ lights up.

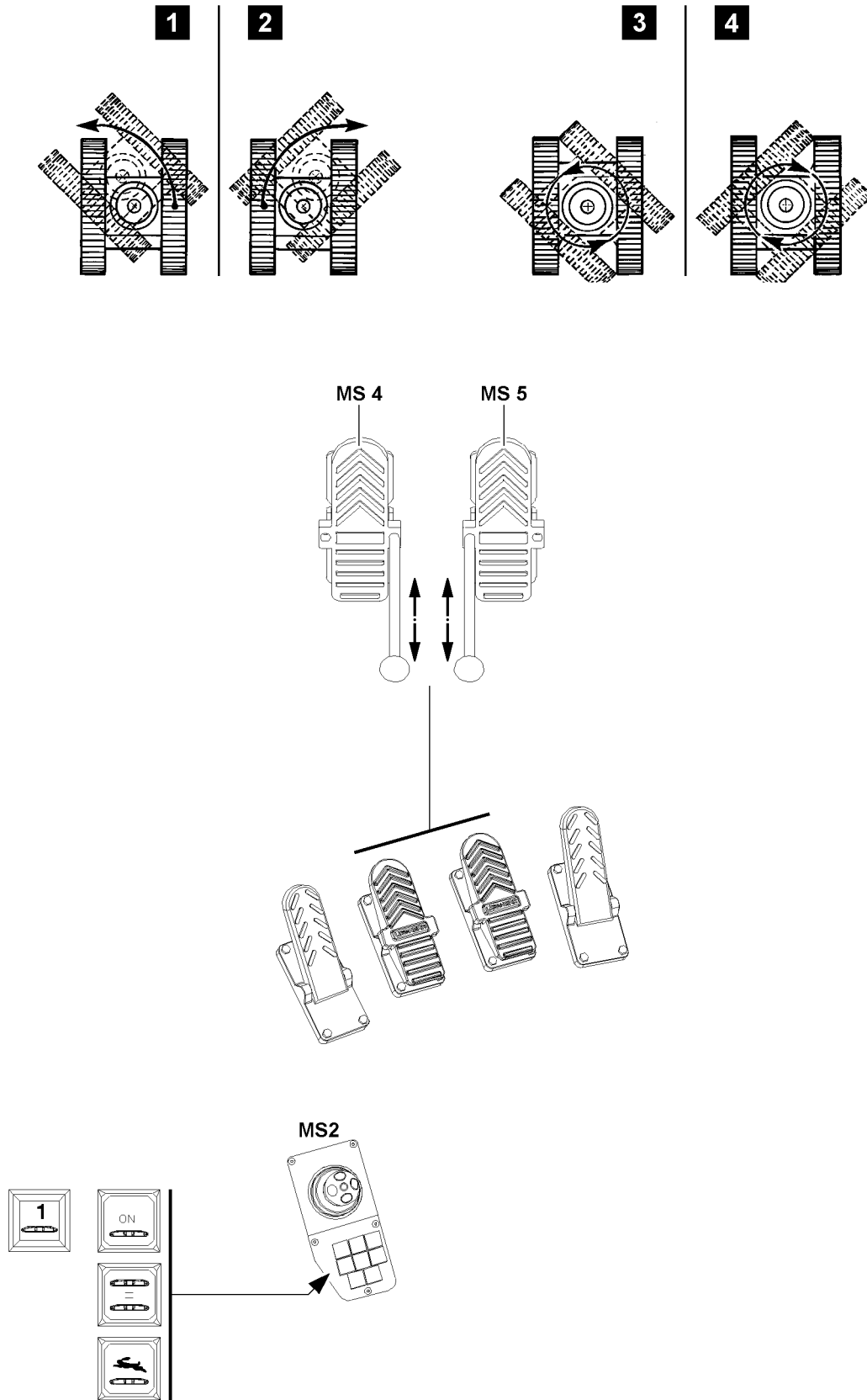


Fig.107964

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5.5 Driving the crawler



WARNING

The crane can topple over!

If a crane is driven with a load and / or derrick ballast in rapid gear, then the load and / or the boom can start to swing, structural components can be damaged and the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Driving with a load and / or derrick ballast in rapid gear is prohibited.
- ▶ The maximum permissible travel speed of the crawler with load and / or derrick ballast may not exceed 0.05 m/s or 3 m/min or 0.18 km/h.
- ▶ Steering the crawler with suspended load and / or installed derrick ballast is prohibited.



WARNING

Personnel present in danger zone.

Personnel within the danger zone of the crane can be severely injured or killed.

- ▶ An additional monitor, who is connected by radio contact with the crane operator must ensure that there are no persons or obstacles within the danger zone of the crane.
- ▶ The observer may not remain in the danger zone of the crane.



Note

- ▶ Take the hand level from the transport retainer in the crane operator's cab.
- ▶ The technical design of the hand levers is completely identical. The differentiation of the two hand levers is only in their assignment to the corresponding foot rockers in assembled (pushed on) condition.

Make sure that the following prerequisite is met:

- The switch „crawler operation“ is actuated.

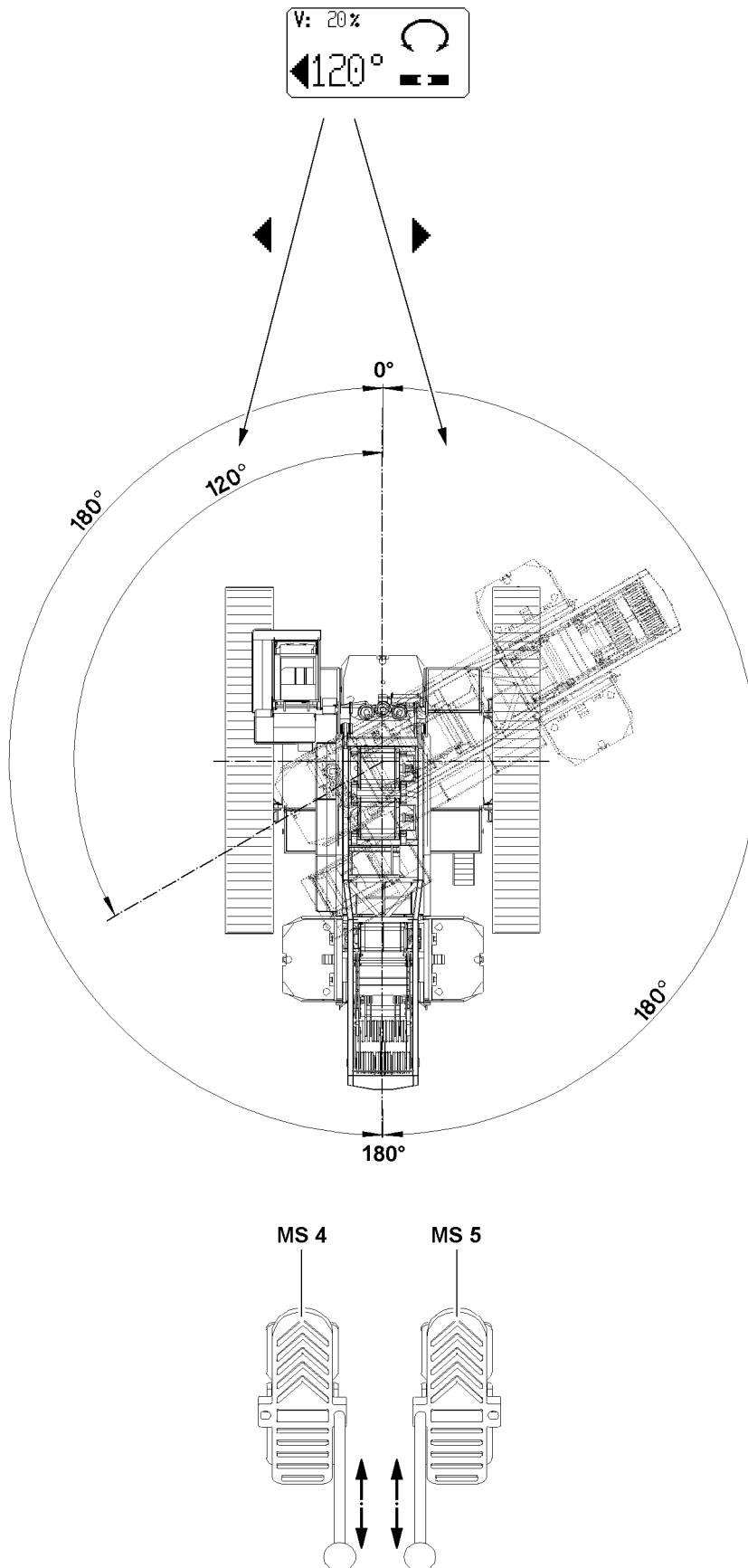


Fig.107974

LWE/LR 1750-000/12812-15-02/en

5.5.1 Changing the travel direction



Note

- ▶ At 0°, the crane superstructure is exactly in position „to the front“.
 - ▶ At 180°, the crane superstructure is exactly in position „to the rear“.
-

The travel direction relates to the position of the crane superstructure:

- If the crane superstructure is turned past 90°, then the „forward / reverse“ travel direction changes.
- If the crane superstructure with actuated foot rocker **MS 4** or foot rocker **MS 5** is turned past 90°, then the travel direction remains until the corresponding foot rocker / manual control lever is „returned“ to neutral position.

This means the new travel direction becomes active only if the corresponding foot rocker / manual control lever is no longer actuated.

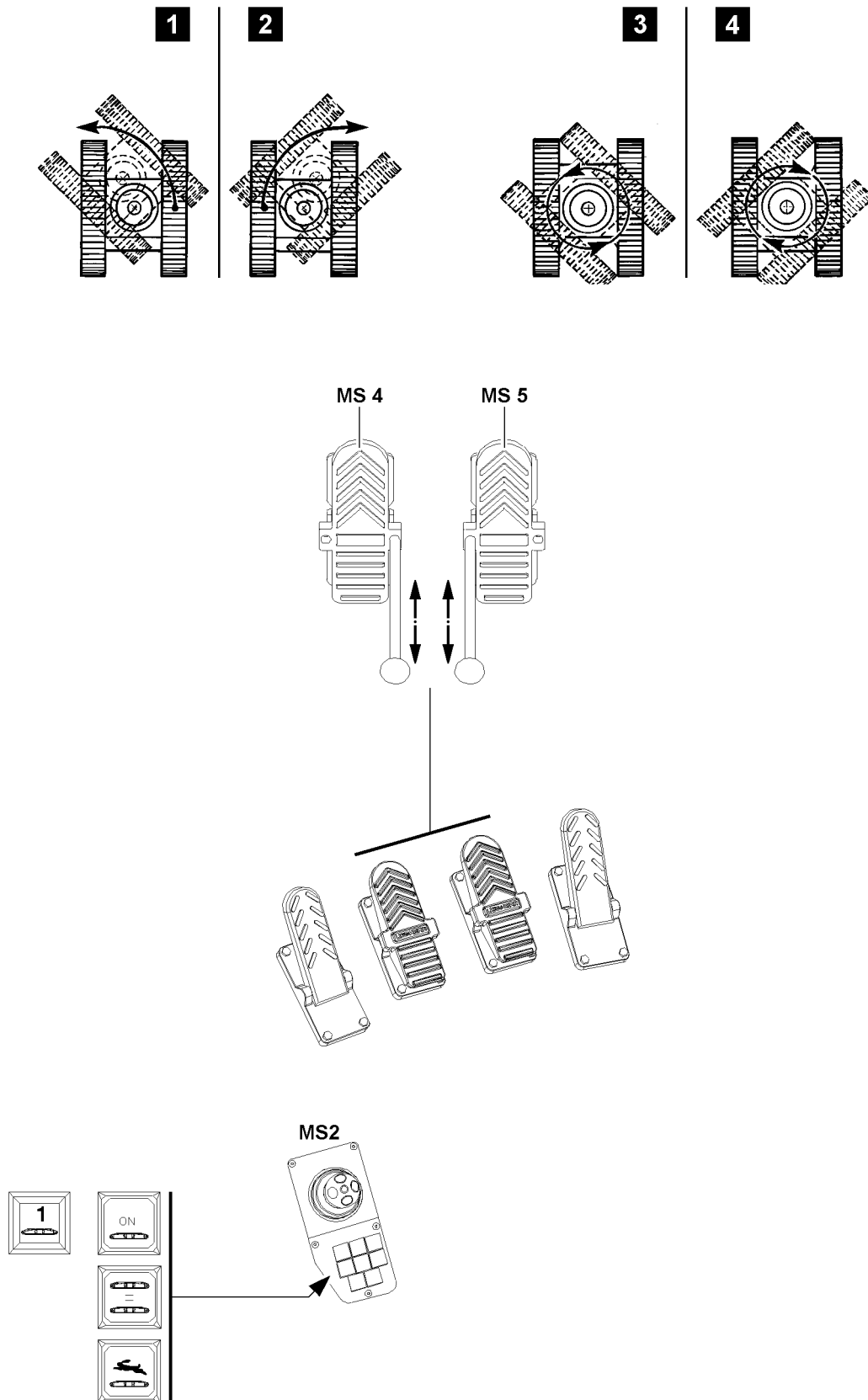


Fig.107964

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5.5.2 Driving the crawler forward and backward

The tracks can be operated with the foot rockers:

- Crawler track left: Foot rocker **MS4**
- Crawler track right: Foot rocker **MS5**

Alternatively, a manual lever can be installed (inserted) on the foot rocker **MS4** and the foot rocker **MS5** in order to control the travel movements of the crawler precisely.

Driving the crawler forward

- ▶ Push the right foot rocker **MS5** forward.
or
Move the manual lever on the foot rocker **MS5** forward.

Result:

- The right track moves forward.

- ▶ Push the left foot rocker **MS4** forward.
or
Move the manual lever on the foot rocker **MS4** forward.

Result:

- The left track moves forward.

Move the crawler backward.

- ▶ Push the right foot rocker **MS5** back.
or
Move the manual lever on the foot rocker **MS5** backward.

Result:

- The right track moves backward.

- ▶ Push the left foot rocker **MS4** back.
or
Move the manual lever on the foot rocker **MS4** backward.

Result:

- The left track moves backward.

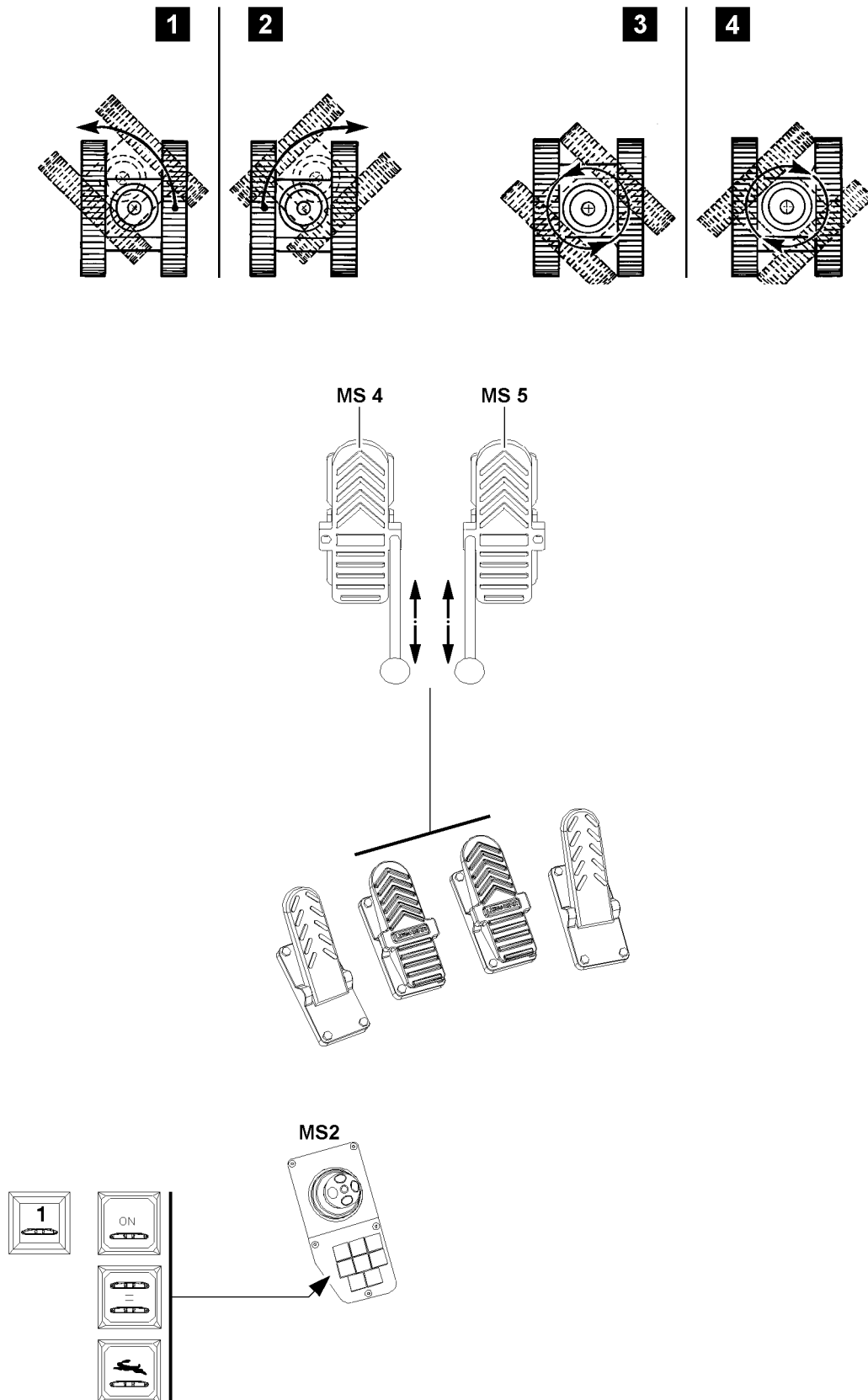


Fig.107964

LWE/LR 1750-000/12812-15-02/en

5.5.3 Activating „parallel travel“

If „parallel travel crawler“ is added, both tracks are simultaneously controlled by pressing down on foot rocker **MS4** or foot rocker **MS5**. The foot rocker, which is actuated first serves as the control for both crawler tracks. This makes it possible to drive the tracks exactly straight forward on suitable ground.



Note

- ▶ If, with the „rapid gear“ turned on, the function „parallel travel crawler“ is added, then the function „rapid gear“ is deactivated: The indicator light in the switch „rapid gear“ turns off. However, the switch remains actuated.
 - ▶ If the function „parallel travel crawler“ is turned off again, the rapid gear activates automatically: The indicator light in the switch „Rapid gear“ lights up.
-

Make sure that the following prerequisite is met:

- Rapid gear is deactivated: The indicator lights in switch „rapid gear“ is off.
- ▶ Actuate the switch „parallel travel crawler“.

Result:

- „Parallel travel crawler“ is activated.
- The indicator light in the switch „parallel travel crawler“ lights up.

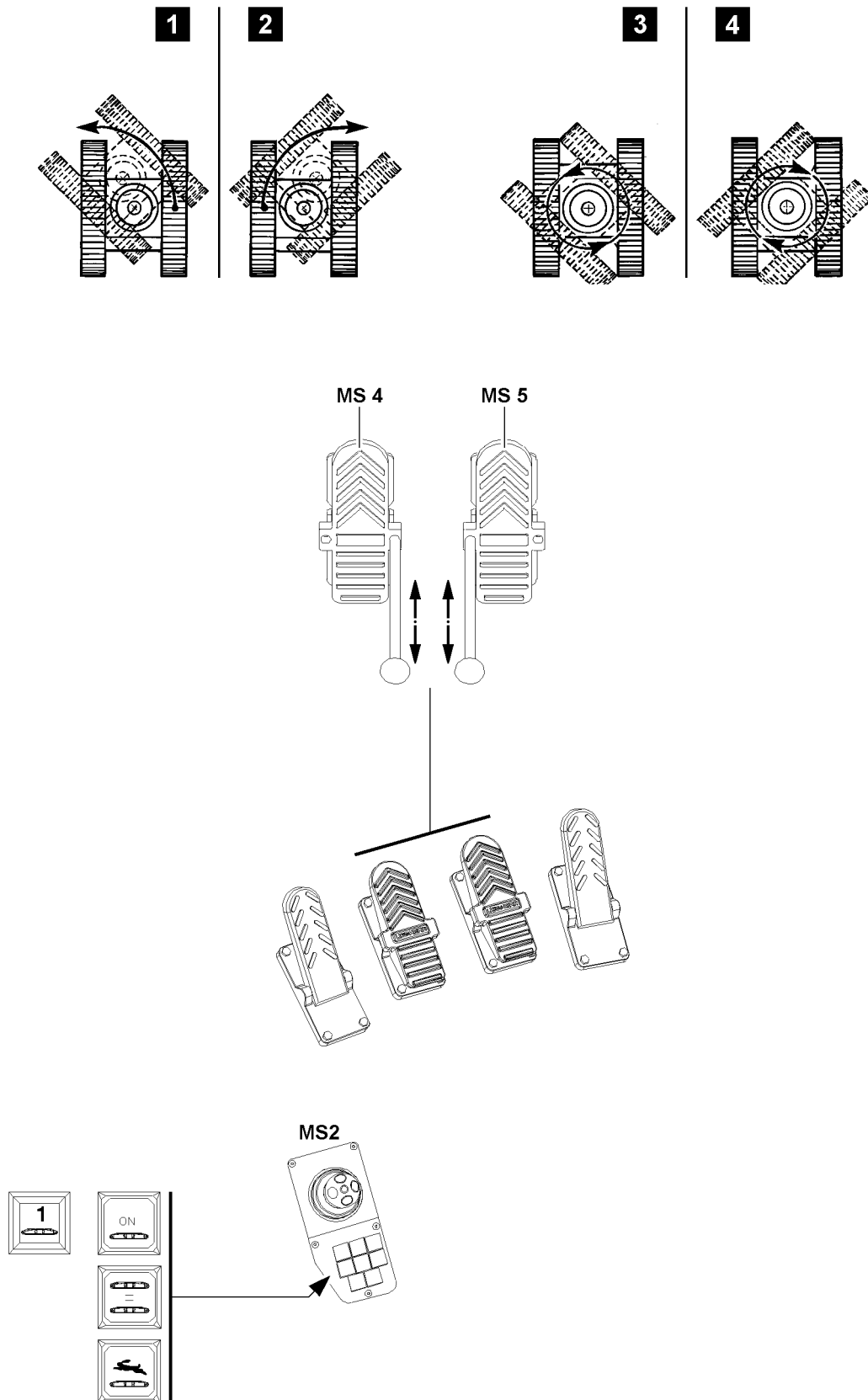


Fig.107964

LWE/LR 1750-000/12812-15-02/en

5.5.4 Steering the crane



WARNING

The crane can topple over!

If the crane is steered with applied slewing gear brake, then the boom system can be damaged due to high side acceleration.

Personnel can be severely injured or killed.

- ▶ When steering the crawler, always activate the slewing gear freewheeling.



WARNING

The crane can topple over!

If the crawler is steered with a sagging chain, then the centering cams of the track pads can no longer be centered and guided in the drive wheels and the track rollers.

The centering cams are damaged and / or the chain can jump from the drive wheels and damage them.

Personnel can be severely injured or killed.

- ▶ Stop steering movements immediately.
- ▶ Drive straight forward until all centering cams are centered again in the track rollers.
- ▶ If possible, retension the track chain, see Crane operating instructions, chapter 7.04.



WARNING

The crane can topple over!

When steering in small radii or when steering in counterrotation, the crawler tracks can „dig“ into the ground and cause the crane to topple over.

Personnel can be severely injured or killed.

- ▶ Steer the tracks in as large a radius as possible.
- ▶ Avoid counterrotation.

Steering the tracks to the left

See illustration 1.

- ▶ Push the right foot rocker **MS5** forward.
- or
- ▶ Move the manual lever on the foot rocker **MS5** forward.

Steering the tracks to the right

See illustration 2.

- ▶ Push the left foot rocker **MS4** forward.
- or
- ▶ Move the manual lever on the foot rocker **MS4** forward.

Counter-rotating the tracks to the left

See illustration 3.

- ▶ Push the right foot rocker **MS5** forward and the left foot rocker **MS4** backward.
- or
- ▶ Move the manual lever on the foot rocker **MS5** forward and move the foot rocker **MS4** backward.

Counter-rotating the tracks to the right

See illustration 4.

- ▶ Push the left foot rocker **MS4** forward and the right foot rocker **MS5** backward.
- or
- ▶ Move the manual lever on the foot rocker **MS4** forward and move the foot rocker **MS5** backward.

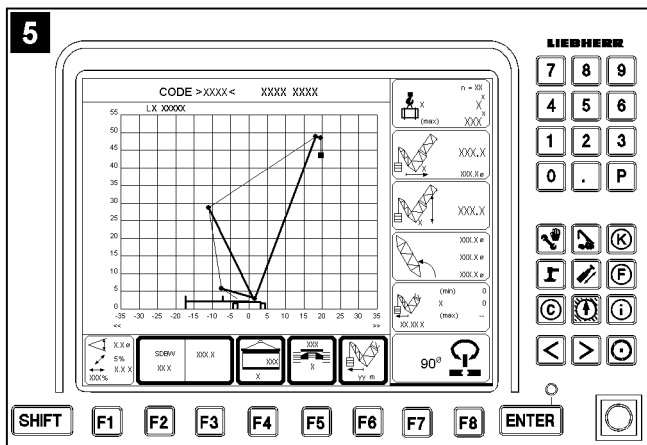
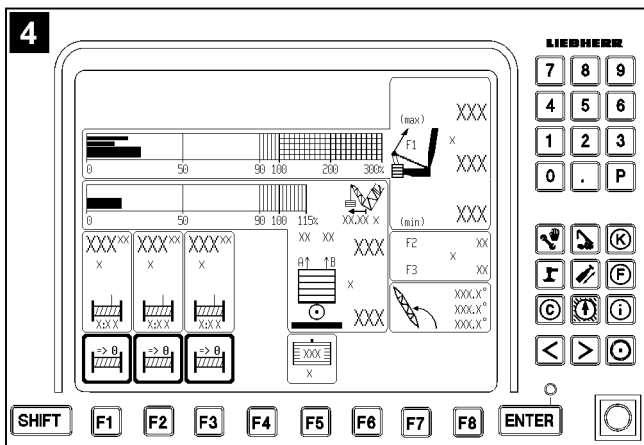
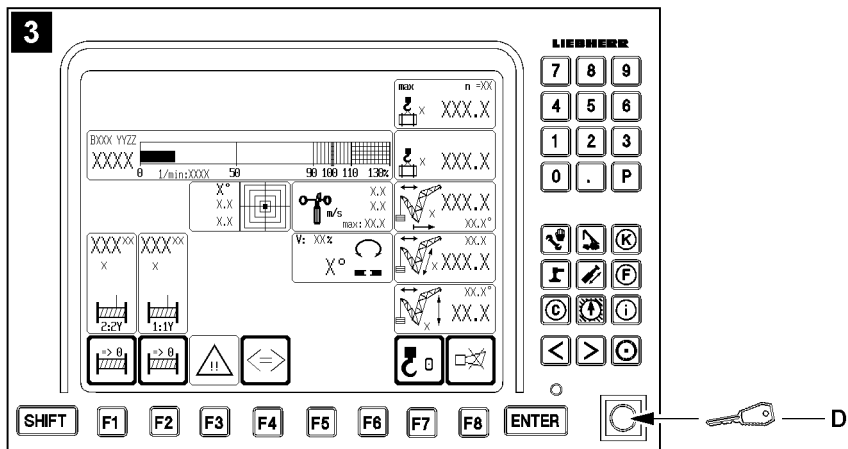
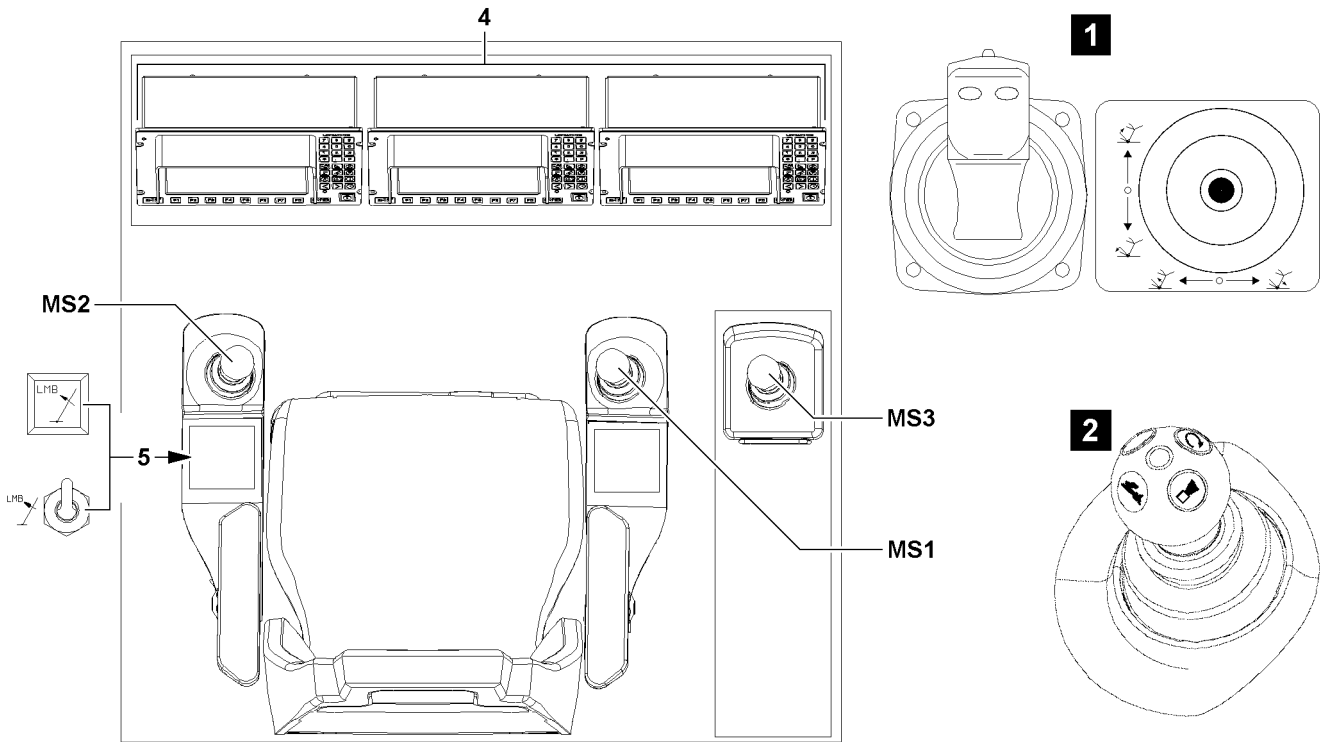


Fig.112332

1 General

To operate the crane, three manually actuated master switches (MS1, MS2, MS3) are available.

- **MS1** Master switch
 - Right control console
- **MS2** Master switch
 - Left control console
- **MS3** Master switch
 - Right instrument panel

To monitor the crane, depending on the crane type, two or three LICCON monitors **4** are in the instrument panel.

- LICCON monitor, illustration **3**
 - User interface for entry of equipment configurations and for crane operation (crane operating screen), also described as LICCON monitor 0
- LICCON monitor, illustration **4**
 - User interface for operation with „Derrick“ boom, also described as LICCON monitor 1
- LICCON monitor, illustration **5**
 - User interface for „LICCON job planner“ (only for crane types with three monitors), also described as LICCON monitor 2

Equipment in the crane cab		
Crane type	Manually actuated master switches	LICCON monitors
LR 1350/1	Three (version illustration 2)	Two (three*)
LR 1400/2	Three (versions illustration 1)	Two
LR 1600/2	Three (version illustration 2)	Three
LR 1600/2–W	Three (version illustration 2)	Three
LR 1750	Three (version illustration 2)	Three
LR 1750/2	Three (version illustration 2)	Three
LG 1750	Three (version illustration 2)	Three
LR 11350	Three (version illustration 2)	Three

In the crane operator's cab, two buttons are installed to make it possible to bring the crane from an emergency situation after a shut off of the LICCON overload protection.

- Set up key **D** (Function „Exceeding the shut off limits for the LICCON overload protection“) on the LICCON monitor with crane operating screen, illustration **3**
- Button **5** „Luffing in with suspended load“ in the left control console

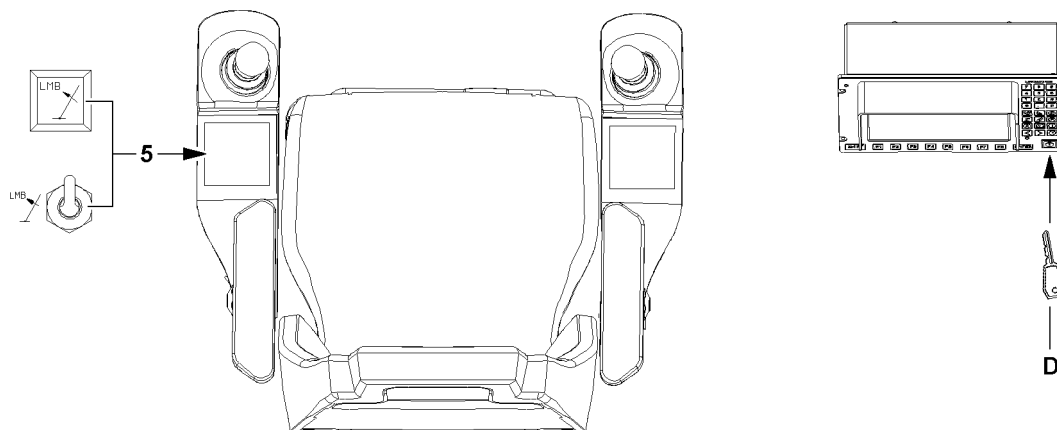


Fig. 112333

The function „Exceedance of shut off limits of the LICCON overload protection“, which is activated with the set up key **D** includes the following:

- Exceedance of the maximum permissible load moment
- Bypass of the hoist top shut off
- Exceedance of limit values from load charts
- Exceedance of maximum value test point 1 (force F1)
- Allowance of individual, limited crane movements after LMB STOP (error message)
- Completion of crane movements outside of load charts (erection / take down procedures)

NOTICE

Multi action function „Exceedance of shut off limits of the LICCON overload protection“!

If the set up key **D** is actuated, then it is possible to exceed several shut off limits of the LICCON overload protection simultaneously.

The LICCON overload protection as a whole is deactivated or limited.

There is no additional protection against crane overload.

- ▶ When the set up key **D** is actuated, it must be taken into account that the LICCON overload protection as a whole is deactivated or limited.



Note

The set up key **D** has two functions, independent of each other:

- ▶ If no crane movement can be carried out due to the shut off of crane operation by the LICCON overload protection, then by pressing the set up key **D**, a 100 % utilization can be exceeded and / or an active shut off can be bypassed. The crane can thereby be controlled again in normal operating status (utilization below 100 % and no active shut off).
- ▶ When the set up key **D** is actuated, all erection / take down procedures can be carried out within the erection / take down charts (assembly operation).

**WARNING**

Danger of accident due to function „Exceedance of shut off limits of the LICCON overload protection“! If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.

Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The button **5** „Luffing in with suspended load“ and the set up key **D** may only be actuated when it is ensured that no normal operating condition (utilization below 100 % and no active shut off) can be reached without the function „Exceedance of shut off limits of the LICCON overload protection“!
- ▶ Actuate the set up key **D** only when no normal operating condition (utilization below 100 % and no active shut off) can be reached with the button **5** „Luffing in with suspended load“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The set up key **D** may only be actuated by persons who are aware of the effects of their acts regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

**WARNING**

Expanded working / danger zone of the crane!

Due to the function „Exceedance of shut off limits of the LICCON overload protection“ it is possible that the working / danger zone of the crane is significantly expanded.

If these circumstances are not observed, collisions and accidents can occur.

Personnel can be severely injured or killed.

- ▶ With activated function „Exceedance of shut off limits of the LICCON overload protection“ take an expanded working / danger zone of the crane into account and monitor it.

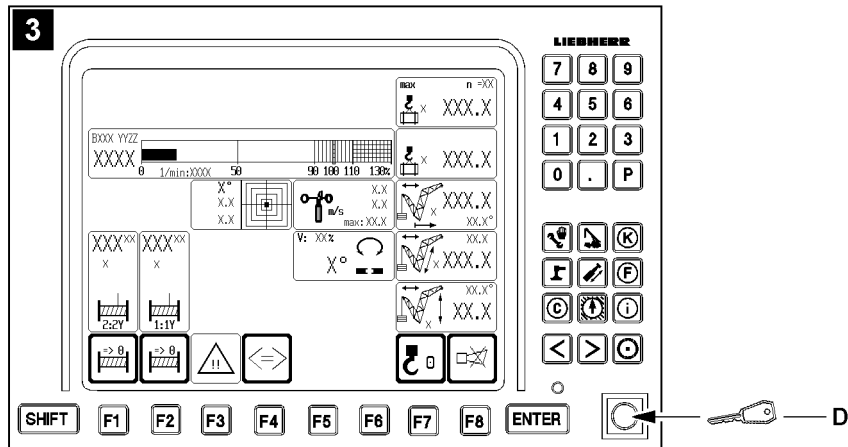
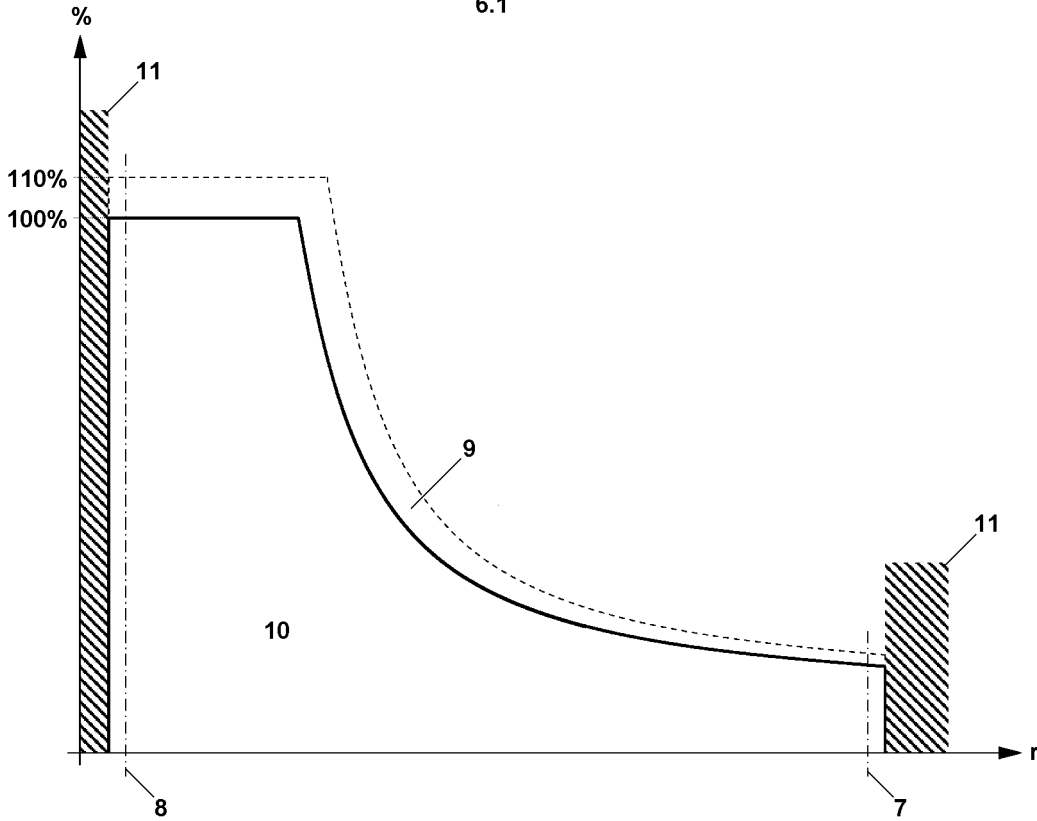
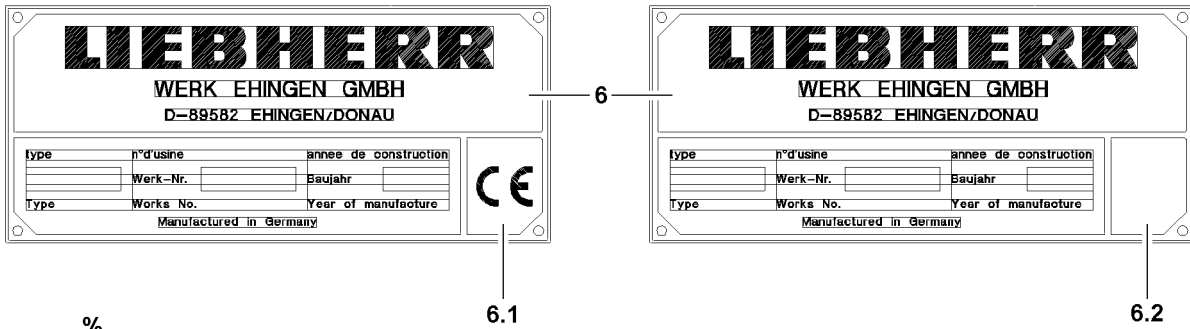


Fig.111211

LWE/LR 1750-000/12812-15-02/en

2 Instructions for resuming crane movements for cranes with CE mark



WARNING

Danger of accident!

If the following points are not observed, personnel can be severely injured or killed.

- ▶ The crane operator bears the sole and full responsibility for the adherence to measures to be taken in case of shut off of crane movement.
- ▶ The crane operator must make sure, before crane operation, that he is using the correct description for the current programming.



Note

- ▶ Check the data tag **6** to determine if your crane has a CE mark.
- ▶ The following section applies to a crane with CE mark, see data tag **6.1**.
- ▶ If your crane does not have a CE mark, see data tag **6.2**, then you must observe the description in section „Instructions for resuming a crane movement for cranes without CE mark“.

2.1 Overview load chart for cranes with CE mark

Axle	Description
r	Radius boom (working radius)
%	Utilization of the crane in percentages

Position	Description
7	Lower limit angle load chart
8	Upper limit angle load chart
9	Utilization up to 110 % with reduced working speed
10	Range „Load chart available“
11	Range „No load chart available“



Note

- ▶ If the set up key **D** (LICCON monitor with crane operating screen, illustration **3**) is actuated in the area „load chart available“, then the working speed is reduced and all displays of the LICCON overload protection remain functional.
- ▶ If the set up key **D** is actuated in the area „no load chart available“, then the working speed is not reduced.

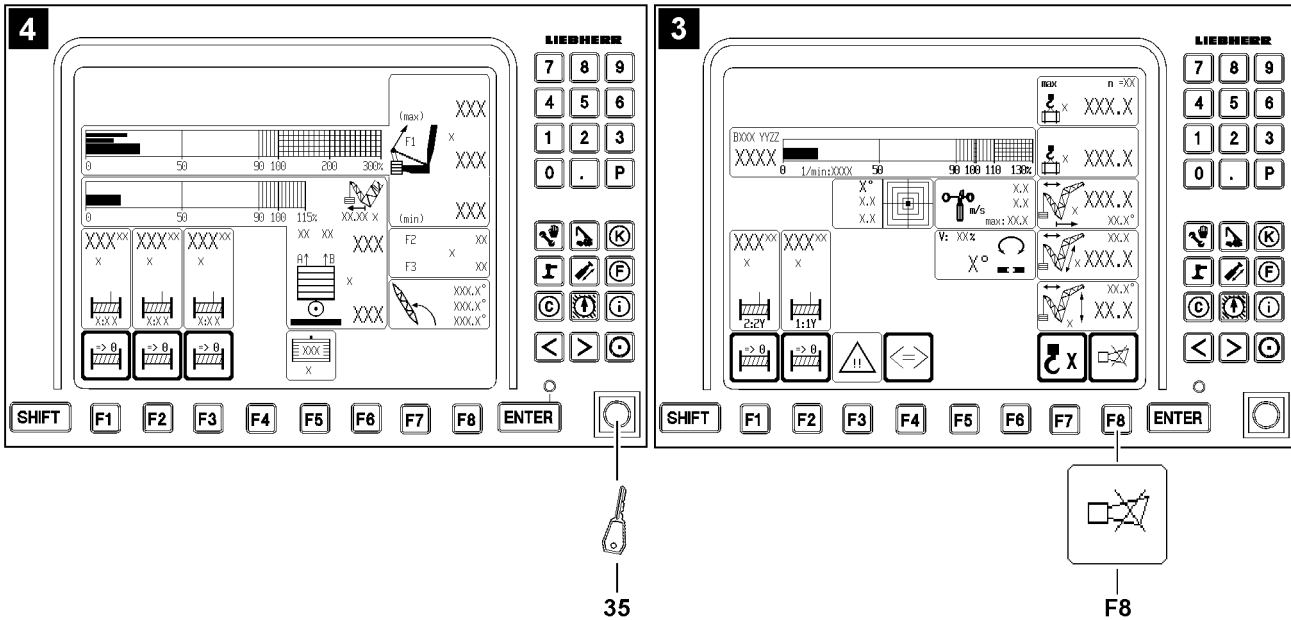
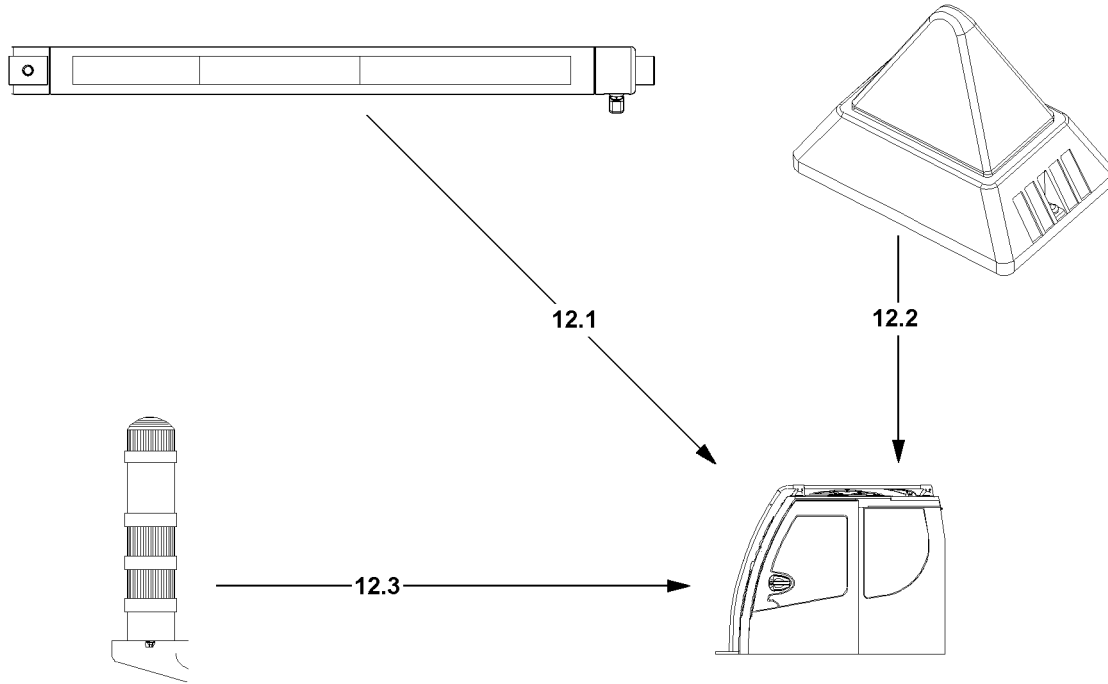


Fig.111212

LWE/LR 1750-000/12812-15-02/en

2.2 Overview of acoustic / visual warnings for cranes with CE mark

- Depending on the crane type, either a warning light **12.1** or a flashing beacon **12.2** or a combination of flashing beacon **12.2** and warning light* **12.3** are installed.
- The acoustic warnings within the crane operator's cab are turned off by pressing the button **F8** on the LICCON monitor with crane operating screen (illustration **3**).
- The acoustic warnings outside the crane operator's cab are turned off by actuating the key button **35** on the LICCON monitor with derrick operating screen (illustration **4**).

2.2.1 Description of acoustic / visual warnings

The case numbers from the chart „Overview of case numbers“ are valid for the following charts in this chapter:

- „Acoustic / visual warnings on the LICCON monitor“
- „Warning light 12.1“
- „Flashing beacon 12.2“
- „Warning light 12.3“

Overview of case numbers	
Case number	Description Case
Case 001	Utilization of crane from 0 % to 89 %
Case 002	Utilization of crane from 90 % to 100 %
Case 003	Utilization of crane over 100 %
Case 004	Shut off of crane movements - LMB STOP
Case 005	Luffing in with suspended load
Case 006	Participating sensor (LMB) defective
Case 010	Exceeding the shut off limits of the LICCON overload protection
Case 011	Bypass of shut off hoist top
Case 016	Bypass of shut off luffing down the boom / auxiliary boom / accessories, „Load chart available“
Case 018	Bypass of shut off luffing down the boom / auxiliary boom / accessories, „No load chart available“
Case 020	Exceeding the shut off limits of the LICCON overload protection during erection / take down procedures, „No load chart available“

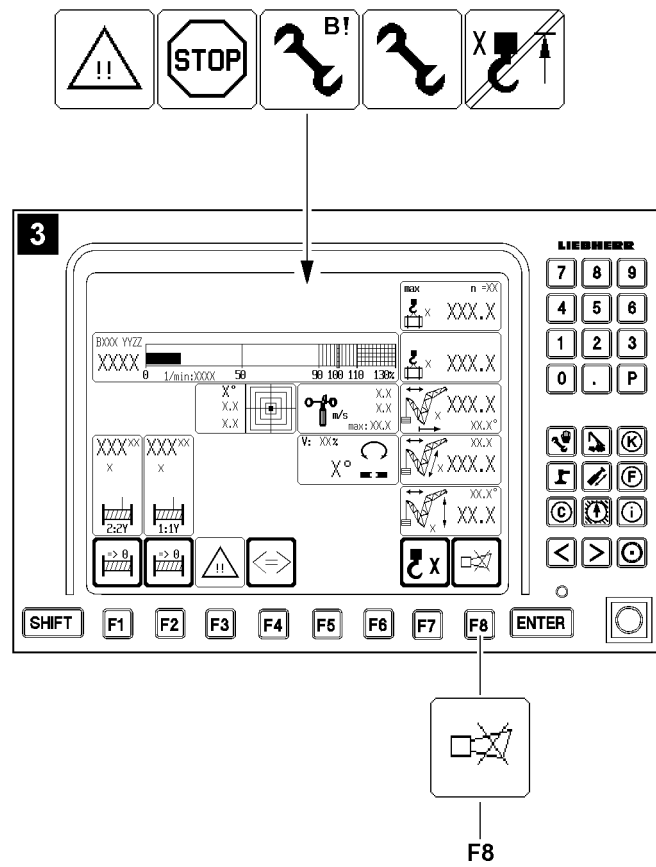


Fig.111209

2.2.2 Acoustic / visual warnings within the crane operator's cab



Note

► Description of individual case numbers, see chart „Overview of case numbers“.

Acoustic / visual warnings on the LICCON monitor									
Case number	Acoustic warning LICCON monitor at utilization of crane			Visual warning LICCON monitor					
	Short sound	Long sound	Long sound	Utilization of crane		Occurrence			
	From 90 %	Above 100 %	Always	From 90 %	Above 100 %	LMB STOP	Appears if the set up key D is actuated		
Case 001							—	—	—
Case 002	X ²			○			—	—	—
Case 003		X ²		○	○		—	—	—
Case 004			X ²		○		—	—	—
Case 005	X ²	X ²		○	○		—	—	—
Case 006			X ²			○	Cannot be bypassed ⁵		
Case 010	X ²	X ²		○	○		○		
Case 011			X ²	○	○	○	○		○
Case 016	X ²	X ²		○	○		○		
Case 018			X ²			○		○	
Case 020			X ²			○		○	

○ = cannot be turned off

X² = can be turned off immediately on the LICCON monitor key **F8**

Cannot be bypassed⁵ = contact Liebherr Service

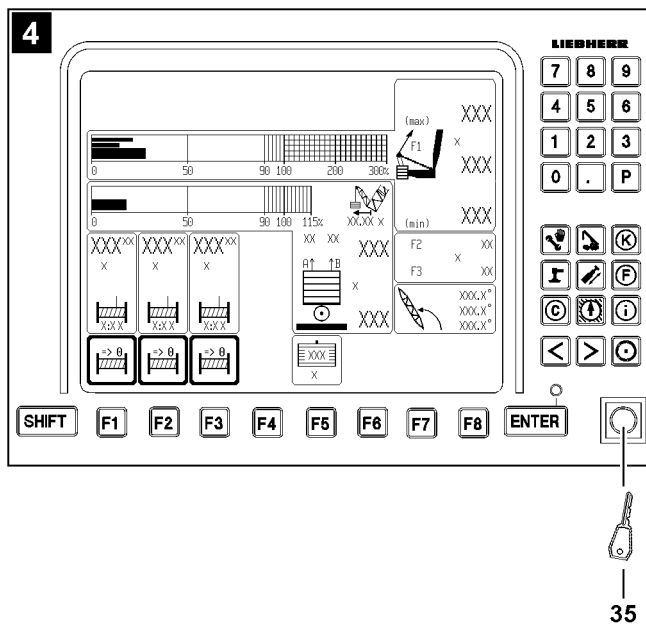
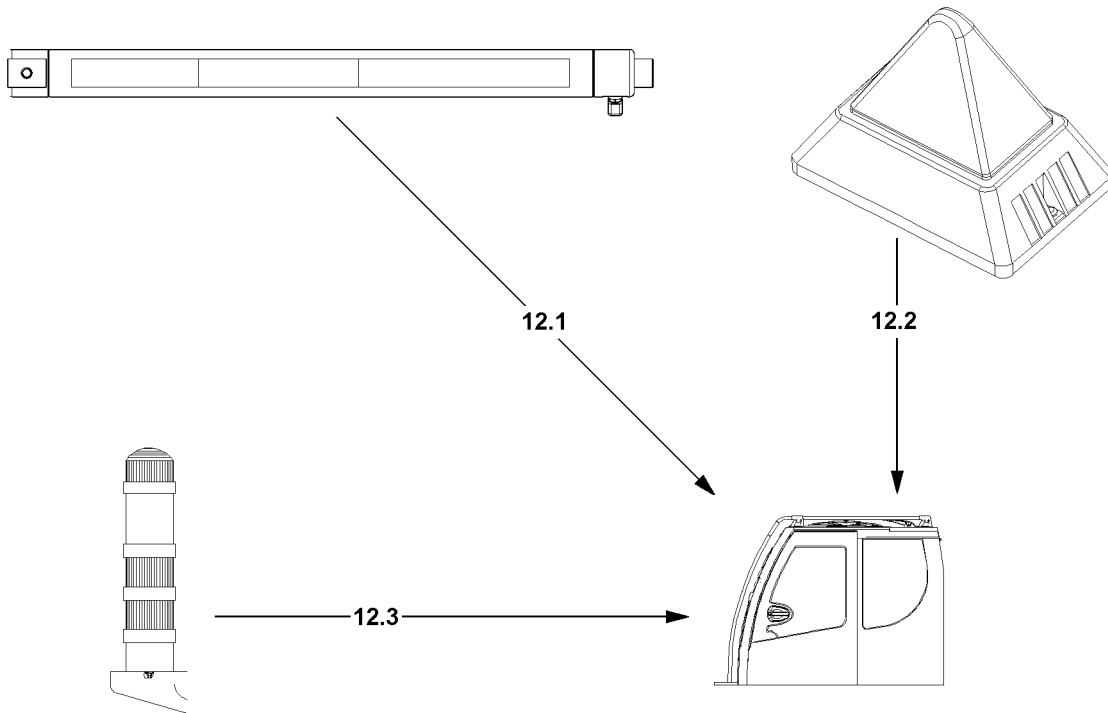


Fig.111206

LWE/LR 1750-000/12812-15-02/en

2.2.3 Acoustic / visual warnings outside the crane operator's cab



Note

► Description of individual case numbers, see chart „Overview of case numbers“.

Warning light 12.1					
Case number	At utilization of crane	Acoustic warning	Visual warning		
		Signal turntable	Green	Yellow	Red
Case 001	From 0 % to 89 %		O ¹		
Case 002	From 90 % to 100 %			O ¹	
Case 003	Above 100 %	X ¹			O ¹
Case 004	-				O ¹
Case 005	From 0 % to 89 %		O ¹		
Case 005	From 90 % to 100 %			O ¹	
Case 005	Above 100 %	X ¹			O ²
Case 006	-				O ¹
Case 010	From 0 % to 89 %		O ¹		
Case 010	From 90 % to 100 %			O ¹	
Case 010	Above 100 % to 110 %			O ²	
Case 010	Above 110 %	X ¹			O ¹
Case 011	Up to 110 %			O ²	
Case 011	Above 110 %	O			O ²
Case 016	From 0 % to 89 %		O ¹		
Case 016	From 90 % to 100 %			O ¹	
Case 016	Above 100 % to 110 %			O ²	
Case 016	Above 110 %	X ¹			O ¹
Case 018	No value available			O ²	
Case 020	No value available			O ²	

O = cannot be turned off

O¹ = warning light **12.1** lights up

O² = warning light **12.1** blinks

X¹ = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

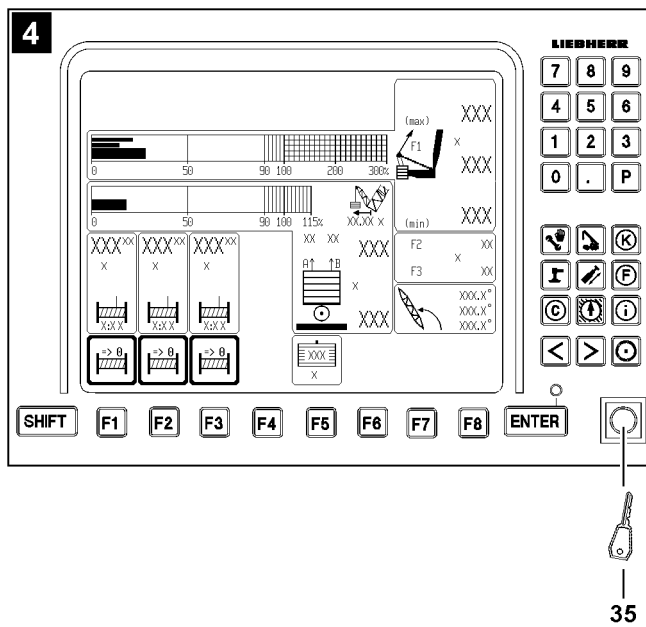
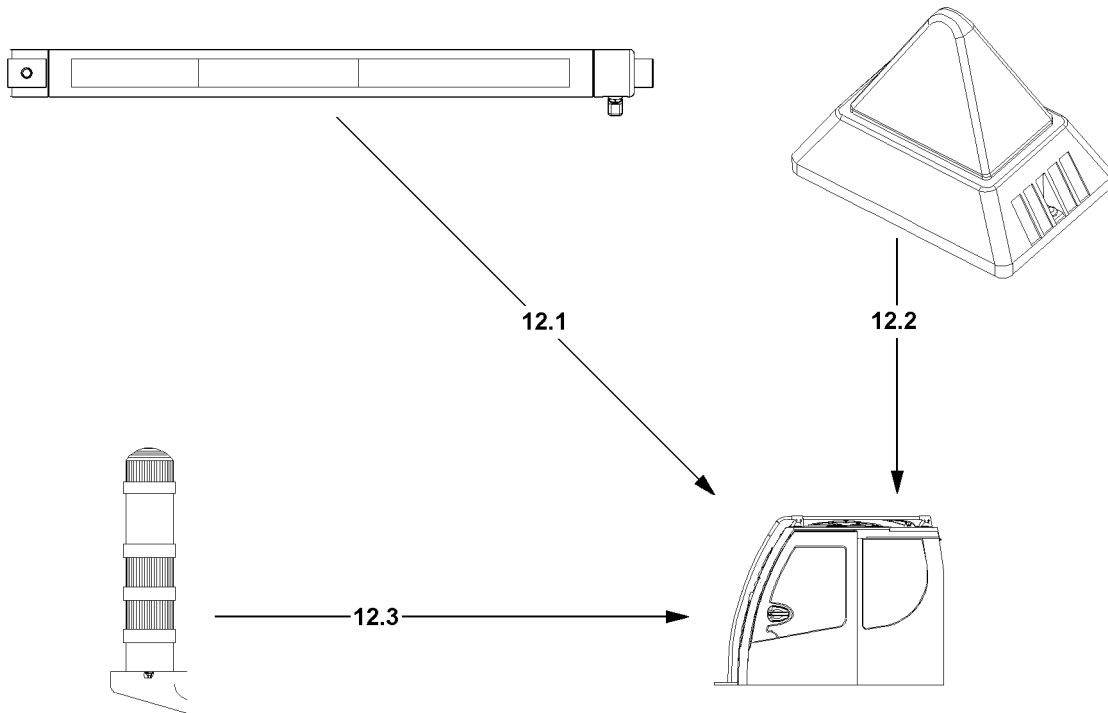


Fig.111206

**Note**

► Description of individual case numbers, see chart „Overview of case numbers“.

Flashing beacon 12.2			
Case number	At utilization of crane	Acoustic warning	Visual warning
		Signal turntable	Red
Case 001	0 % to 89 %	-	-
Case 002	90 % to 100 %	-	-
Case 003	Above 100 %	X ¹	O ²
Case 004	-		O ²
Case 005	Above 100 %	X ¹	O ²
Case 006	-		O ²
Case 010	Above 110 %	X ¹	O ²
Case 011	Above 110 %	X ¹	O ²
Case 016	Above 110 %	X ¹	O ²
Case 018	No value available		O ²
Case 020	No value available		O ²

O = cannot be turned off

O² = flashing beacon **12.2** blinks

X¹ = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

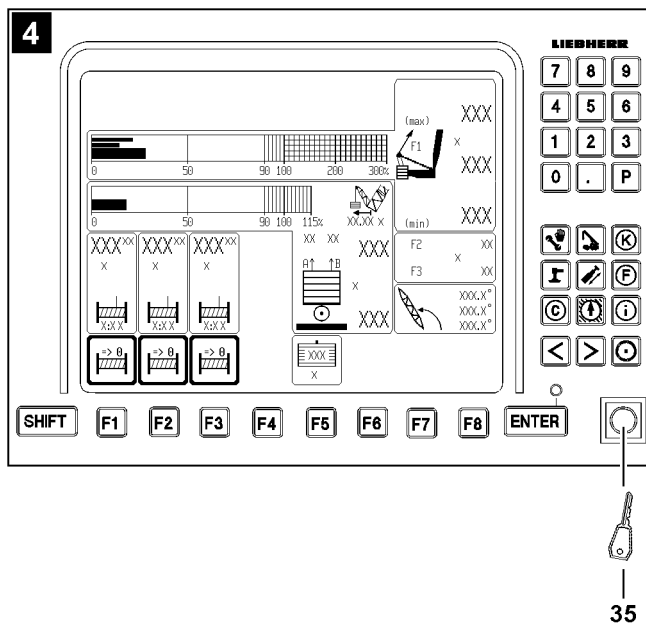
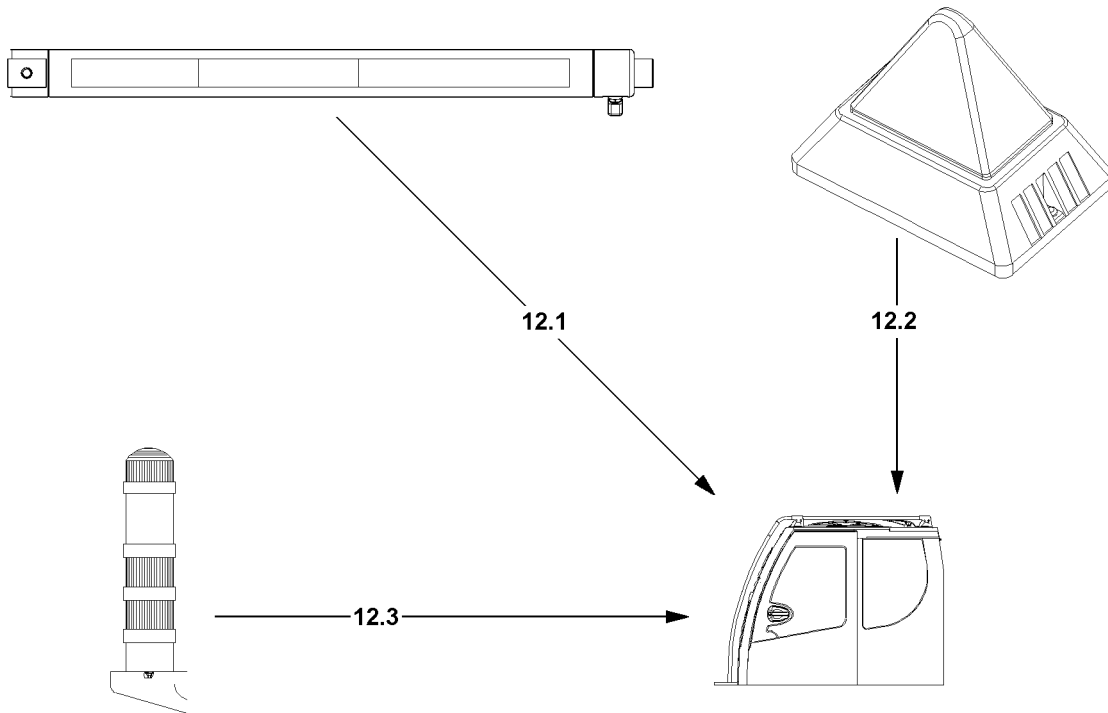


Fig.111206

**Note**

► Description of individual case numbers, see chart „Overview of case numbers“.

Warning light 12.3					
Case number	At utilization of crane	Acoustic warning	Visual warning		
		Signal turntable	Green	Yellow	Red
Case 001	From 0 % to 89 %		O ¹		
Case 002	From 90 % to 100 %			O ¹	
Case 003	Above 100 %	X ¹			O ²
Case 004	-				O ²
Case 005	From 0 % to 89 %		O ¹		
Case 005	From 90 % to 100 %			O ¹	
Case 005	Above 100 %	X ¹			O ²
Case 006	-				O ²
Case 010	From 0 % to 89 %		O ¹		
Case 010	From 90 % to 110 %			O ¹	
Case 010	Above 110 %	X ¹			O ²
Case 011	Up to 110 %			O ¹	
Case 011	Above 110 %	X ¹			O ²
Case 016	From 0 % to 89 %		O ¹		
Case 016	From 90 % to 110 %			O ¹	
Case 016	Above 110 %	X ¹			O ²
Case 018	No value available				O ²
Case 020	No value available				O ²

O = cannot be turned off

O¹ = warning light **12.3** lights up

O² = warning light **12.3** blinks

X¹ = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

2.3 Monitoring of crane movement

**Note**

- If the LICCON overload protection turns the crane movement off, then the exact cause for the shut off must be determined first.
- As a first step, try to rescind the crane movement which has caused a shut off.
- If it is not possible to rescind the affected crane movement, then the additional steps are described in the following sections of the chapter.

**Note**

- For detailed description of the individually listed symbols, see Crane operating instructions, chapter 4.02.

The LICCON overload protection carries out the following shut offs if a limit value is exceeded in crane operation:

- Shut off luffing the main boom up / down
- Shut off Upper limit shut off angle (OGAW)
- Shut off Luffing the auxiliary boom / accessory up / down
- Shut off maximum / minimum value test point 1 (force F1)
- Shut off spooling the winch up / out
- Shut off Hoist top
- Shut off due to error message

The LICCON overload protection warns if the limit values are exceeded, but does not turn off:

- Minimum / maximum support forces

2.3.1 Shut off luffing the main boom up / down

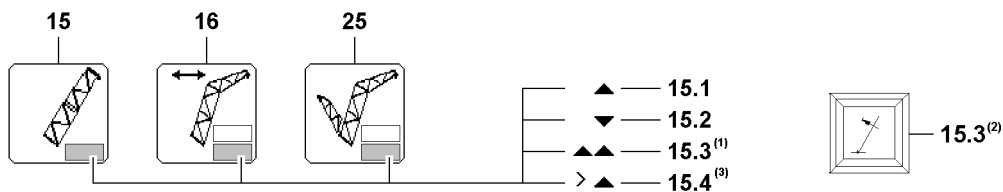


Fig.124701

⁽¹⁾not LR 1400/2

⁽²⁾only LR 1400/2

⁽³⁾Only for certain crane types

In symbol **15**, or symbol **16**, or symbol **25** appears in the lower field symbol **15.1**, or symbol **15.2** or symbol **15.4** and the LICCON overload protection has shut the crane movement off.

„Luffing the main boom up“ (symbol **15.1**) or „Luffing the main boom down“ (symbol **15.2**) or „upper limit shut off angle“ reached (symbol **15.4**), was shut off because the upper / lower limit angle of the selected load chart was exceeded / fallen below.

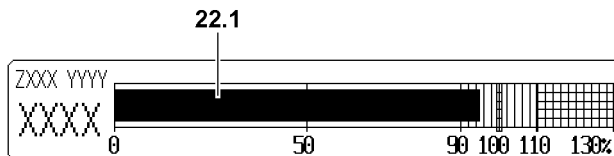


Fig.112340



Note

- ▶ If the utilization of the crane is more than 95 % (utilization bar **22.1** exceeds 95 %) and the maximum load according to the load chart (falling load capacity) drops by continuing to luff up the boom, then the symbol **15.1** also appears and the crane movement „Luffing the main boom up“ is turned off.

If the symbol / warning light **15.3** appears, then:

- **either** it was luffed up to a limit switch or the limit switch has turned off the crane movement „Luffing the main boom up“
- **or** there is an error on one of the limit switches „Main boom top“

The symbol **15.1** appears and the crane movement „Luffing the main boom up“ was turned off:

- ▶ Luff the main boom down.

Result:

- Crane operation is possible again.

The symbol **15.2** appears and the crane movement „Luffing the main boom down“ was turned off:

- ▶ Luff the main boom up.

Result:

- Crane operation is possible again.

The symbol / warning light **15.3** appears and the crane movement „Luffing the main boom up“ was turned off:

- ▶ Luff the main boom down.

Result:

- Crane operation is possible again.

Problem remedy

The symbol / warning light **15.3** appears continuously?

If a symbol / warning light **15.3** appears without having luffed the main boom up to a limit switch, then there may be an error in the limit switches „Main boom top“.

- ▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
- ▶ If yes: Remedy the error immediately.

The symbol **15.4** appears and the crane movement „Luffing the main boom up“ (upper limit shut off angle) was turned off:

- ▶ Luff the main boom down.

Result:

- Crane operation is possible again.



WARNING

Limited warning functions!

If one of the double version limit switches is not ok and the crane is continued to be operated, then the warning functions of the LICCON overload protection are limited.

- ▶ The crane can only be operated in an emergency after failure of a double version limit switch.
- ▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

2.3.2 Shut off Luffing the auxiliary boom / accessory up / down

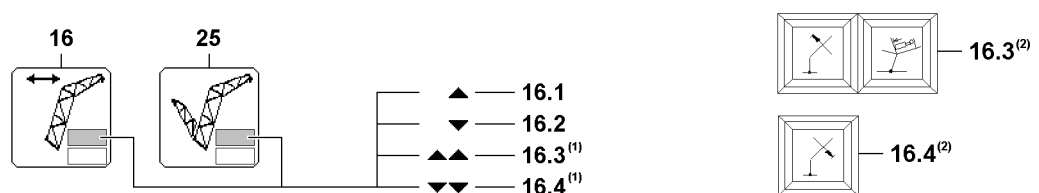


Fig.124702

⁽¹⁾not LR 1400/2

⁽²⁾only LR 1400/2

In symbol **16** or symbol **25** appear in the upper field symbol **16.1** or symbol **16.2** and the LICCON overload protection has shut off the crane movement.

„Luffing the auxiliary boom / accessory up“ (symbol **16.1**) or „Luffing the auxiliary boom / accessory down“ (symbol **16.2**) was shut off because the upper / lower limit angle of the selected load chart was exceeded / fallen below.

If the symbol / warning light **16.3** appears, then:

- **either** it was luffed up to a limit switch or the limit switch has turned off the crane movement „Luffing the auxiliary boom / accessory up“

- **or** the mechanical relapse support has turned off the crane movement „Luffing the auxiliary boom / accessory up“
- **or** there is an error on one of the limit switches „Auxiliary boom / accessory top“.

If the symbol / warning light **16.4** appears, then:

- **either** it was luffed down to a limit switch „Auxiliary boom / accessory bottom“ and the limit switch has turned off the crane movement „Luffing the auxiliary boom / accessory up“
- **or** there is an error on one of the limit switches „Auxiliary boom / accessory bottom“

The symbol **16.1** appears and the crane movement „Luffing the auxiliary boom / accessory up“ was turned off:

- ▶ Luff the auxiliary boom / accessory down.

Result:

- Crane operation is possible again.

The symbol **16.2** appears and the crane movement „Luffing the auxiliary boom / accessory down“ was turned off:

- ▶ Luff the auxiliary boom / accessory up.

Result:

- Crane operation is possible again.

The symbol / warning light **16.3** appears and the crane movement „Luffing the auxiliary boom / accessory up“ was turned off:

- ▶ Luff the auxiliary boom / accessory down.

Result:

- Crane operation is possible again.

Problem remedy

The symbol / warning light **16.3** appears continuously?

If a symbol / warning light **16.3** appears without having luffed up to a limit switch, then there may be an error in the limit switches „Auxiliary boom / accessory top“.

- ▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
- ▶ If yes: Remedy the error immediately.

The symbol / warning light **16.4** appears and the crane movement „Luffing the auxiliary boom / accessory down“ was turned off:

- ▶ Luff the auxiliary boom / accessory up.

Result:

- Crane operation is possible again.

Problem remedy

The symbol / warning light **16.4** appears continuously?

If a symbol / warning light **16.4** appears without having luffed down to a limit switch, then there may be an error in the limit switches „Auxiliary boom / accessory bottom“.

- ▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
- ▶ If yes: Remedy the error immediately.



WARNING

Limited warning functions!

If one of the double version limit switches is not ok and the crane is continued to be operated, then the warning functions of the LICCON overload protection are limited.

- ▶ The crane can only be operated in an emergency after failure of a double version limit switch.

- ▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

2.3.3 Shut off maximum / minimum value test point 1 (force F1)



Note

- ▶ The force determined on test point 1 is generally described as $F1_{\text{actual}}$ (actual value F1).
- ▶ In the icon 17 (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).
- ▶ The value $F1_{\text{max-operation}}$ 17.3 corresponds to 100 % in the F1-bar display.
- ▶ The F1-utilization bar 17.1 shows the relationship $F1_{\text{actual}}$ 17.2 to $F1_{\text{max-operation}}$ 17.3.
- ▶ In crane operation without derrick ballast, fewer values may be shown in the icon 17 (F1-load display).

Shut off maximum value F1 in crane operation

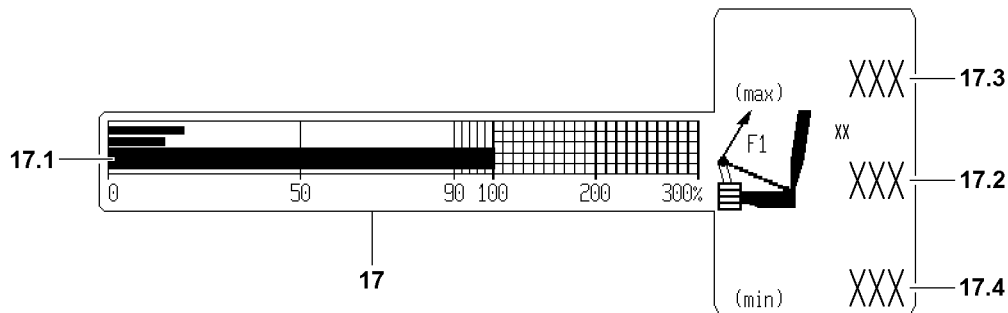


Fig.110991

In the icon 17(F1-load display) the F1-utilization bar 17.1 exceeds the 100 % mark and the LICCON overload protection has shut off the crane movement. The value $F1_{\text{actual}}$ 17.2 has exceeded the value $F1_{\text{max-operation}}$ 17.3.

All further movements, which lead to an increase of the force F1(value $F1_{\text{actual}}$) are shut off.

- ▶ Reverse any crane movement which has caused the shut off.
or
Initiate an alternative crane movement, which lowers the force F1 (value $F1_{\text{actual}}$).

Result:

- Crane operation is possible again.

Problem remedy

The crane operation is limited because the value $F1_{\text{max-operation}}$ apparently is being reached too early?

- ▶ Make sure that a valid set up status has been entered on the LICCON computer system.
- ▶ Make sure that the crane is assembled according to the assembly drawings.
- ▶ Make sure that the actual set up status and the entered set up status of the crane match.
- ▶ Make sure that all attachment parts and guy rods on the boom system, which are not needed, have been removed (weight).
- ▶ Make sure that the boom system is free of snow and ice (weight).
- ▶ Make sure that the wind influence onto the boom is not too great.

If no irregularities can be found:

- ▶ Contact Liebherr Service.

Shut off minimum value F1 in crane operation



Note

- ▶ A shut off minimum value F1 ($F1_{\text{min}}$) only occurs in operating modes with derrick ballast. The status $F1_{\text{actual}} = F1_{\text{min}}$ cannot be reached in all other operating modes.

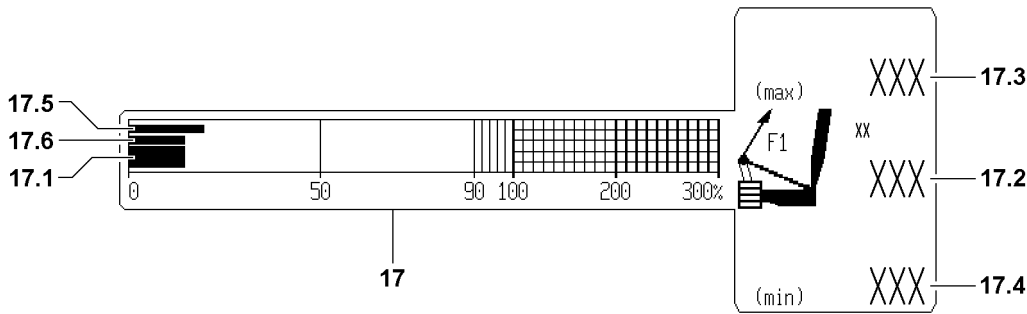


Fig.110992

In the icon **17** (F1-load display), when falling below the $F1_{\min}$ advance warning bar **17.5**, a warning of the upcoming shut off is issued by the F1-utilization bar **17.1**.

If the F1-utilization bar **17.1** falls below the $F1_{\min}$ -STOP bar **17.6**, then the LICCON overload protection shuts off the crane movement. The value $F1_{\text{actual}}$ **17.2** has fallen below the value $F1_{\min}$ **17.4**.

**Note**

Shut off $F1_{\min}$

- ▶ If the utilization of the derrick ballast is below 50 %, then there is no immediate shut off when falling below value $F1_{\min}$.

All further movements, which lead to an decrease of the force $F1$ (value $F1_{\text{actual}}$) are shut off.

- ▶ Reverse any crane movement which has caused the shut off.
or
Initiate an alternative crane movement, which increases the force $F1$ (value $F1_{\text{actual}}$).

Result:

- Crane operation is possible again.

Problem remedy

The crane operation is limited because the value $F1_{\min}$ apparently is being reached too early?

- ▶ Make sure that a valid set up status has been entered on the LICCON computer system.
- ▶ Make sure that the crane is assembled according to the assembly drawings.
- ▶ Make sure that the actual set up status and the entered set up status of the crane match.
- ▶ Make sure that all attachment parts and guy rods on the boom system, which are not needed, have been removed (weight).
- ▶ Make sure that the boom system is free of snow and ice (weight).
- ▶ Make sure that the wind influence onto the boom is not too great.

If no irregularities can be found:

- ▶ Contact Liebherr Service.

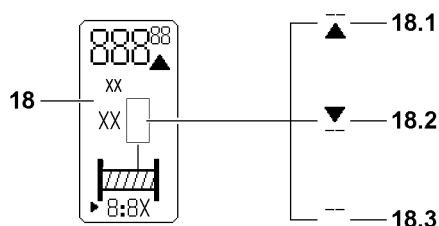
2.3.4 Shut off spooling the winch up / out

Fig.110878

In symbol **18** appears symbol **18.1**, symbol **18.2** or symbol **18.3** and the LICCON overload protection has shut off the crane movement.

„Spooling the winch out“ (symbol **18.1**) or „spooling the winch up“ (symbol **18.2**) was shut off because the upper / lower limit value of the rope for the selected winch was exceeded or fallen below.

If symbol **18.3** appears blinking in the symbol **18**, then the affected winch is deactivated.

The symbol **18.1** appears and the crane movement „Spooling the winch out“ was turned off:

▶ Spool the winch up.

Result:

– Crane operation is possible again.

The symbol **18.2** appears and the crane movement „Spooling the winch up“ was turned off:

▶ Spool the winch out.

Result:

– Crane operation is possible again.

The line / line **18.3** appear and the winch is deactivated:

▶ Activate the winch, see Crane operating instructions, chapter 4.02.

Result:

– Crane operation is possible again.

2.3.5 Shut off hoist top

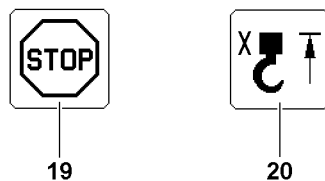


Fig.110875

The symbol **19** and hoist top icon **20** appear in the LICCON monitor and the LICCON overload protection has turned the crane movement off.

Spooling the hoist winch up was turned off because the hook block or the load hook has run against a hoist limit weight during the upward movement and the affected hoist limit switch was triggered.



WARNING

Property damage / falling load!

▶ After shut off spool hoist winch up (hoist top), for every further crane movement, the distance between the hook block / load hook and the boom head must be checked.



Note

▶ After a hoist top shut off occurred, further crane movements, which affect the length of the hoist rope are also shut off.

▶ Spool the hoist winch out.

Result:

– Crane operation is possible again.

2.3.6 Shut off due to error message

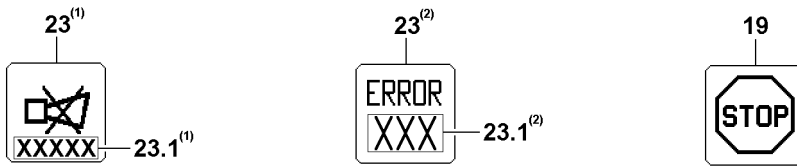


Fig.112331

⁽¹⁾not LR 1400/2

⁽²⁾only LR 1400/2

In the icon **23** appears an error message, the icon **19** appears in the LICCON monitor and the LICCON overload protection has turned off crane movement.

- ▶ Determine the existing error with the help of the error message from the error field **23.1** in icon **23**, see Diagnostics manual.
- ▶ Remedy the error.

If the error cannot be remedied:

- ▶ Contact Liebherr Service.

Problem remedy

The erection of the crane, for example after assembly on a new job site or with another equipment configuration, is not possible due to an error message?

- ▶ Evaluate the error message.
- ▶ Make sure that all electrical connections are established correctly.
- ▶ Check if all sensors or dummy plugs with integrated electric have been connected properly.



Note

- ▶ If there is a defect on a participating sensor (LMB), then the crane can no longer be operated in normal operating condition. Contact Liebherr Service and fix / replace the sensors.

2.3.7 Minimum / maximum support forces



Note

- ▶ Applies only for cranes with support force monitoring*.
- ▶ Description of support force monitoring, see Crane operating instructions, chapter 4.02.

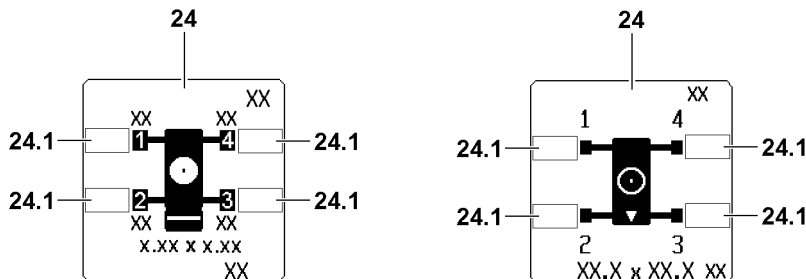


Fig.110881

**WARNING**

The crane can topple over!

When reaching the programmed minimum / maximum support forces there is no automatic shut off of crane movements.

The displayed support force values are subjected to fluctuating influences, for example crane operation, surrounding and environmental influences.

The resulting tolerance field of the determined values may not be utilized by the support force display to determine the tipping limit of the crane.

If this is disregarded, then the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The displayed support force values of the support force display may not be used to utilize the crane up to the tipping limit.
- ▶ Make sure that all support force values are within the minimum / maximum support forces.

The icon **24** (depending on the crane, similar to the left or right illustration) is shown in the LICCON monitor with blinking value in one or several fields **24.1**. Blinking values in the fields **24.1** signal exceedance of the minimum / maximum support forces.

- ▶ Reverse the crane movements, which caused the support forces to be outside the minimum / maximum values.

Result:

- All values in the fields **24.1** are within the minimum / maximum support forces.
- ▶ Carry out crane movements in such a way that the support forces always remain within the minimum / maximum values.

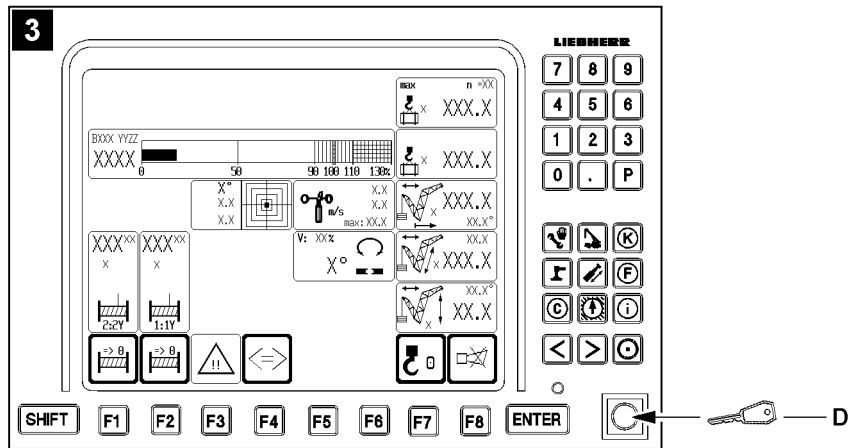
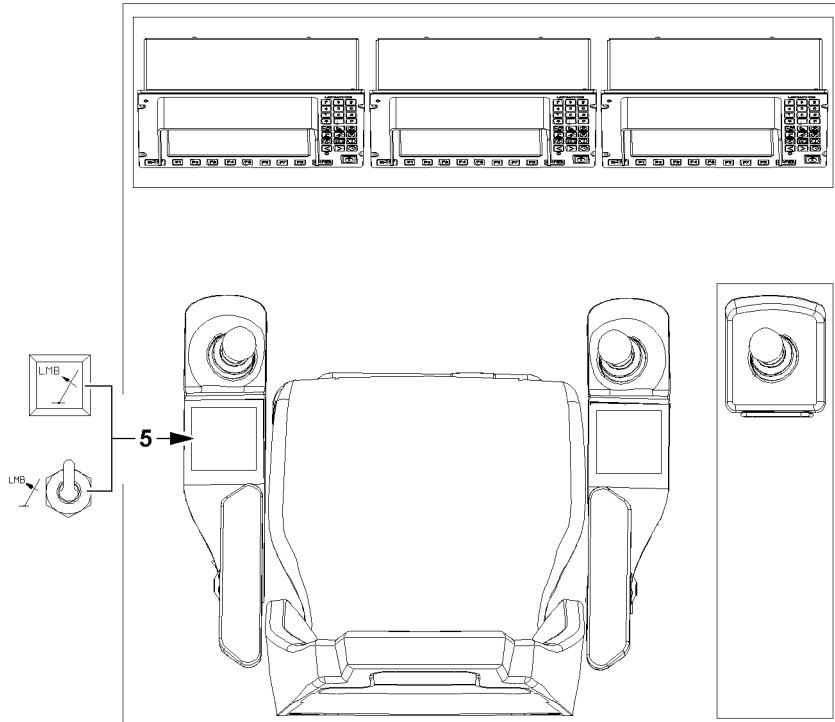


Fig.112334

LWE/LR 1750-000/12812-15-02/en

2.4 Shut off of crane movement: LMB STOP by LICCON overload protection



WARNING

Risk of overload and toppling the crane!

If the shut off limits of the LICCON overload protection are exceeded without knowing the exact cause for the shut off by the LICCON overload protection, then the crane can be overloaded and topple over. Personnel can be severely injured or killed.

- ▶ Before activating the function „Exceedance of shut off limits of the LICCON overload protection“ determine the exact cause for the shut off.



WARNING

Danger of accident due to function „Exceedance of shut off limits of the LICCON overload protection“! If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.

Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The button **5** „Luffing in with suspended load“ and the set up key **D** may only be actuated when it is ensured that no normal operating condition (utilization below 100 % and no active shut off) can be reached without the function „Exceedance of shut off limits of the LICCON overload protection“!
- ▶ Actuate the set up key **D** only when no normal operating condition (utilization below 100 % and no active shut off) can be reached with the button **5** „Luffing in with suspended load“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The set up key **D** may only be actuated by persons who are aware of the effects of their acts regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.



WARNING

Expanded working / danger zone of the crane!

Due to the function „Exceedance of shut off limits of the LICCON overload protection“ it is possible that the working / danger zone of the crane is significantly expanded.

If these circumstances are not observed, collisions and accidents can occur.

Personnel can be severely injured or killed.

- ▶ With activated function „Exceedance of shut off limits of the LICCON overload protection“ take an expanded working / danger zone of the crane into account and monitor it.

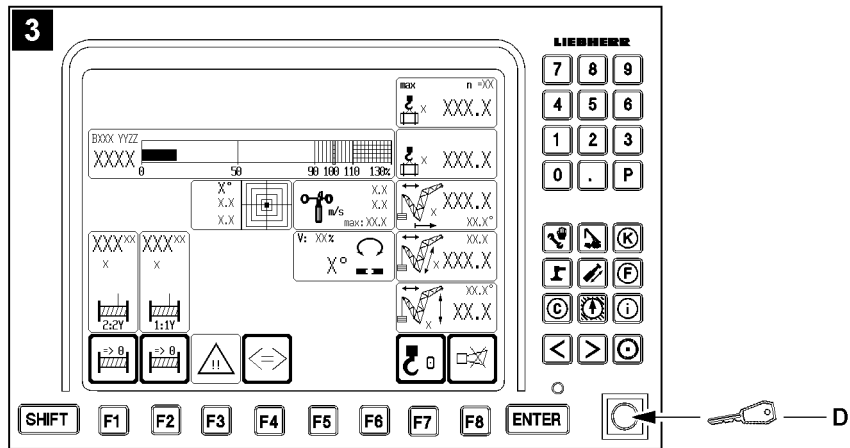
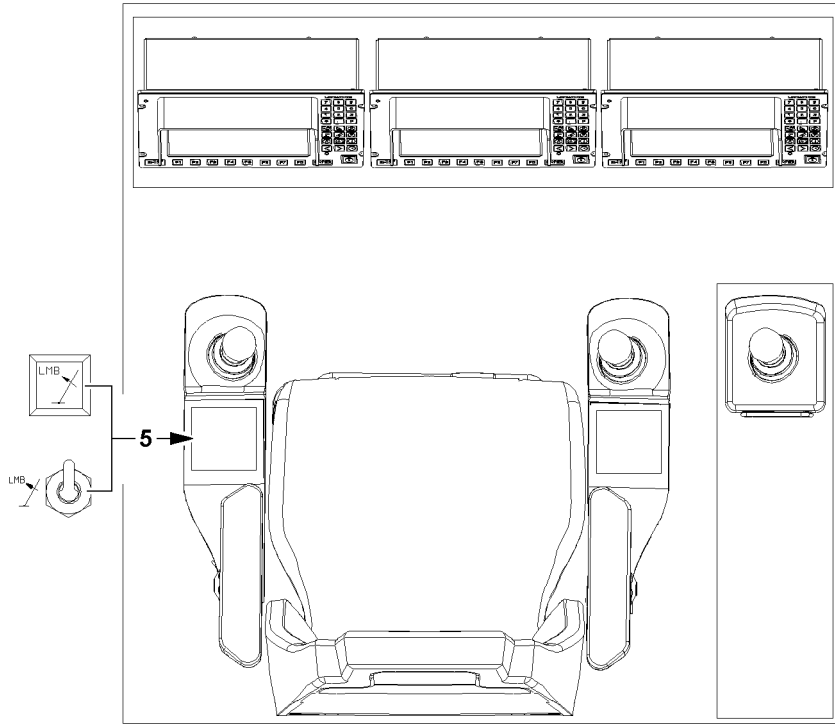


Fig.112334

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Overload of crane!

When taking on a load by luffing the boom up, the crane can be overloaded.

This could result in serious accidents.

- ▶ Taking on load by luffing up the boom is prohibited.
- ▶ Take on a load only with the hoist gear.

**Note**

- ▶ If the set up key **D** is actuated in the area „load chart available“, then the working speed is reduced.
- ▶ If the set up key **D** is actuated in the area „no load chart available“, then the working speed is not reduced.

There are two possibilities to exceed the shut off limits of the LICCON overload protection after LMB STOP:

- With button **5** „Luffing in with suspended load“ in the left control console
- With the set up key **D** on the LICCON monitor with crane operating screen, see illustration **3**

NOTICE

Danger of mix up!

The function „Exceedance of shut off limits of LICCON overload protection“ can only be activated with the set up key **D** on the LICCON monitor with crane operating screen, see illustration **3**.

The key buttons on the other monitors are not assigned with this function.

- ▶ Do not mix up the set up key **D** with the other key buttons.
- ▶ In case of mix up: Deactivate the activated function.

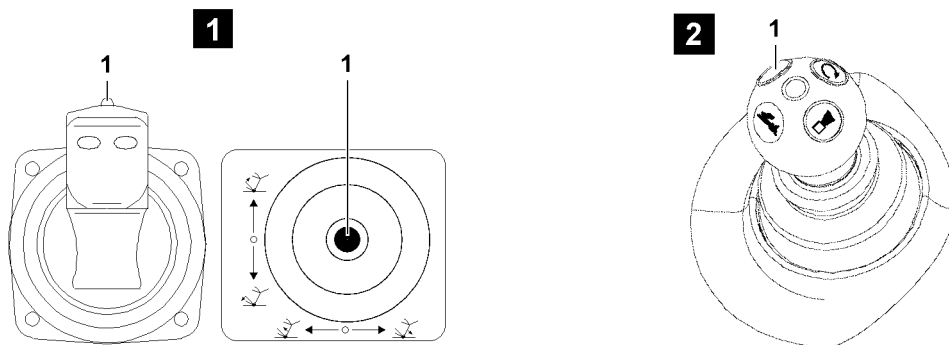
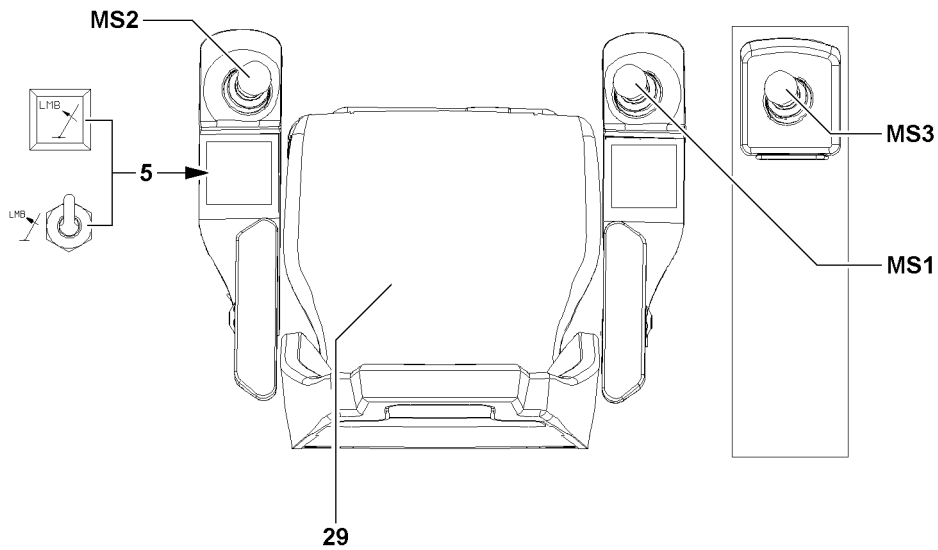
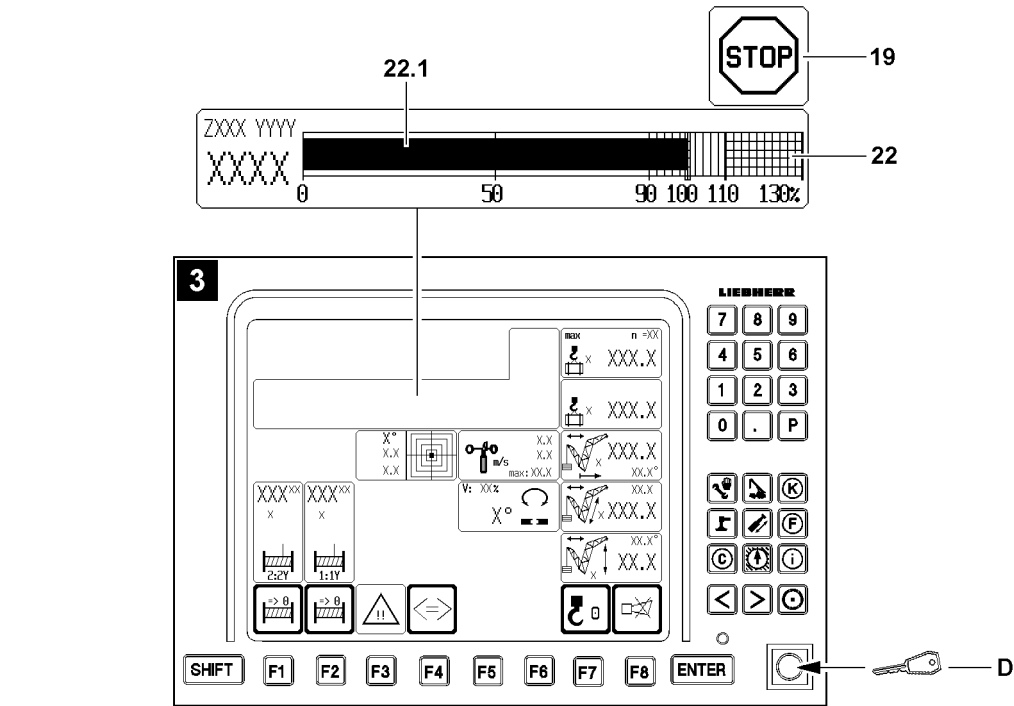


Fig.112335

LWE/LR 1750-000/12812-15-02/en

2.4.1 Luffing in with suspended load

If the maximum permissible load torque is exceeded, the LICCON overload protection turns off all crane movements that increase load torque.

In the icon **22** (load moment display) the utilization bar **22.1** has exceeded the 100 % mark and in the LICCON monitor appears the icon **19**.

This shut off limit can be exceeded by actuating the button **5** „Luffing in with suspended load“.

Make sure that the following prerequisite is met:

- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.



Note

- ▶ If the load is reduced by luffing up, then the button **5** „Luffing in with suspended load“ is possibly not functioning.
- ▶ For the procedure when the button **5** „Luffing in with suspended load“ is not functioning, see section „Exceedance of maximum permissible load moment“.

- ▶ Press the function key **5** „Luffing in with suspended load“ and hold it.

Result:

- The LICCON overload protection is inactive.

- ▶ Luff the load in.

Result:

- If the crane reaches a normal operation status (utilization below 100 % and no active shut off) then the icon **19** turns off, normal crane operation is possible again.

The function „Luffing in with suspended load“ is deactivated:

- When the function key **5** „Luffing in with suspended load“ is not longer actuated.
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- In case of defect of an associated sensor (LMB).
- At engine stop.

The function „Luffing in with suspended load“ is deactivated:

- The LICCON overload protection is active.
- ▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

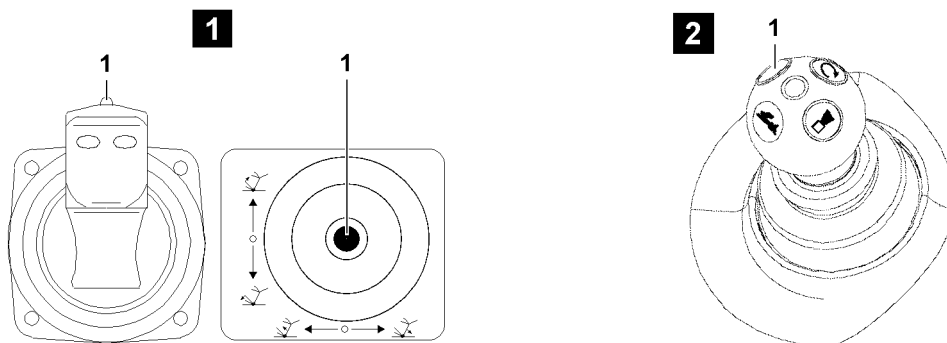
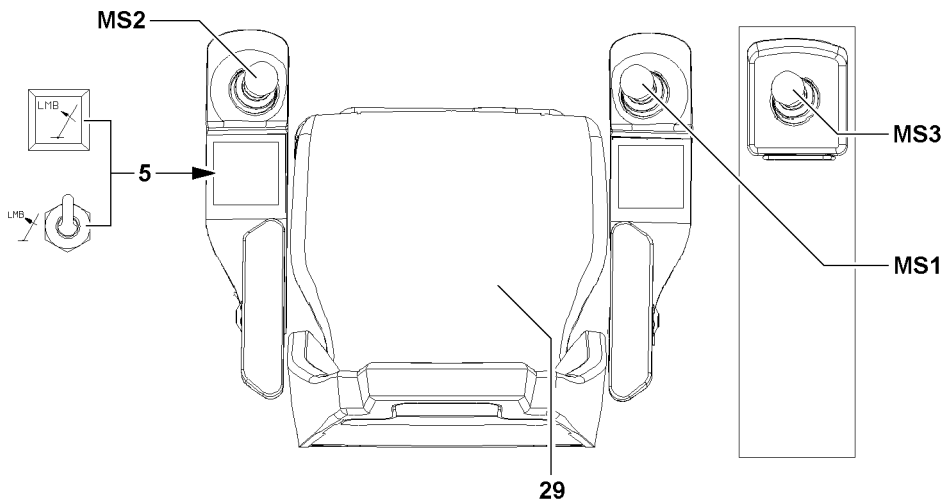
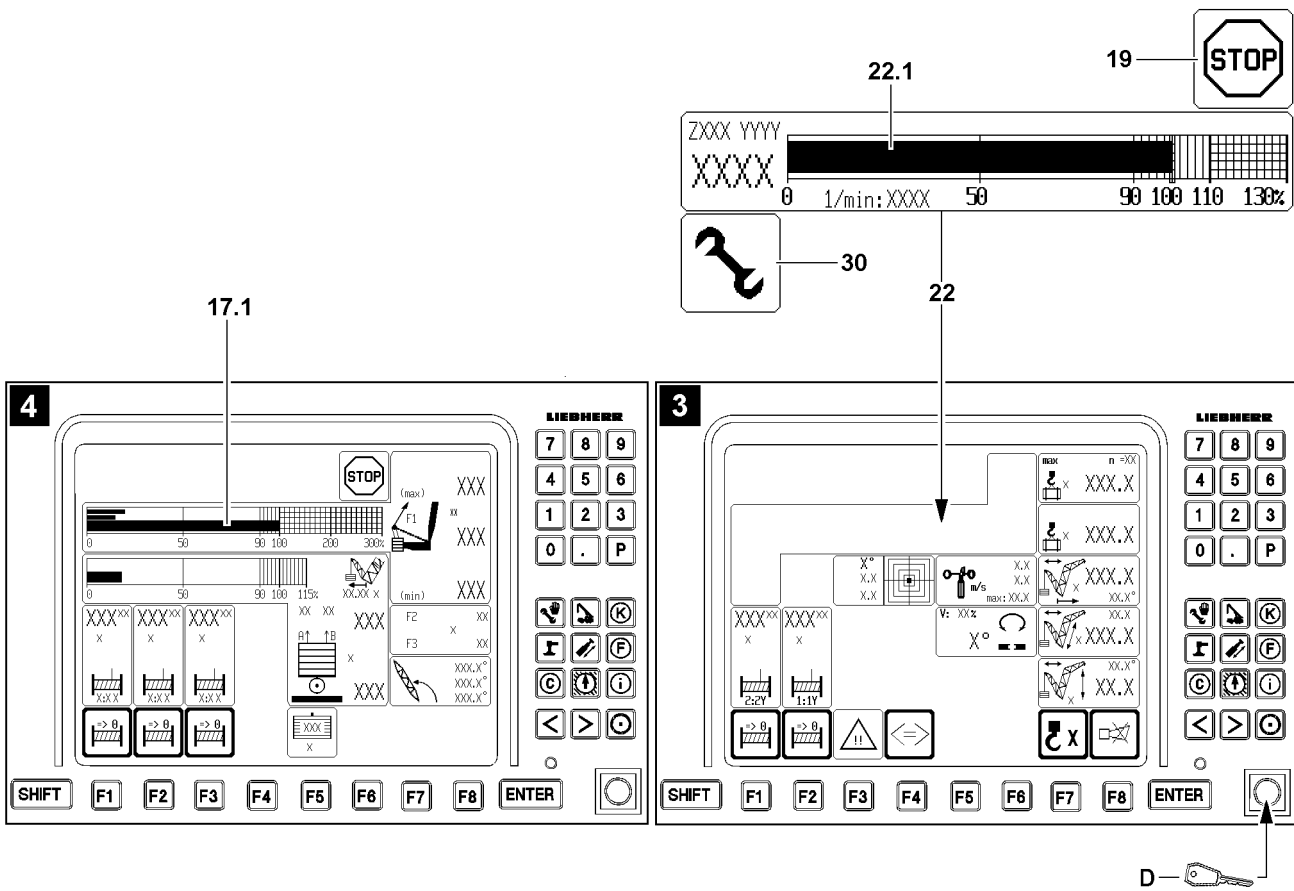


Fig.112336

LWE/LR 1750-000/12812-15-02/en

2.4.2 Exceedance of the maximum permissible load moment

If the maximum permissible load torque is exceeded, the LICCON overload protection turns off all crane movements that increase load torque.

In the icon **22** (load moment display) the utilization bar **22.1** has exceeded the 100 % mark and in the LICCON monitor appears the icon **19**.

This shut off can be exceeded by the set up key **D** in the „right touching“ position.



WARNING

Shut off safety device!

If the function „Exceedance of shut off limits of LICCON overload protection“ is activated by actuating the set up key **D** then it is possible to exceed the maximum permissible load moment. The function „Exceedance of maximum value test point 1“ is automatically activated too. Thus there is no shut off when exceeding the maximum value test point 1.

- ▶ All notes regarding the function „Exceedance of shut off limits of LICCON overload protection“ must be observed.
- ▶ The utilization bar $F1_{\text{actual}}$ **17.1** of the F1 load display must be observed.



Note

- ▶ In emergency situations, the function „Exceedance of shut off limits of the LICCON overload protection“ can be activated with the set up key **D** and the maximum permissible load moment can be exceeded by 10 % to maximum 110 %.

The set up key **D** on the LICCON monitor has two positions:

- Operating position (not actuated): Crane is in normal operation
- Position to right (touching): The function „Exceedance of shut off limits of the LICCON overload protection“ is activated, the assembly icon **30** appears in the LICCON monitor.

Make sure that the following prerequisites are met:

- With the button **5** „Luffing in with suspended load“ no normal operating status (utilization below 100 % and no active shut off) can be reached.
- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- Radio operation* is not active.
- The load moment display 110 % has not been reached and a load chart is available.
- ▶ Turn the set up key **D** to the right (touching).

Result:

- The LICCON overload protection is inactive.
- The assembly icon **30** appears in the LICCON monitor.
- The working speed in the area „Load chart available“ is reduced for all functions.

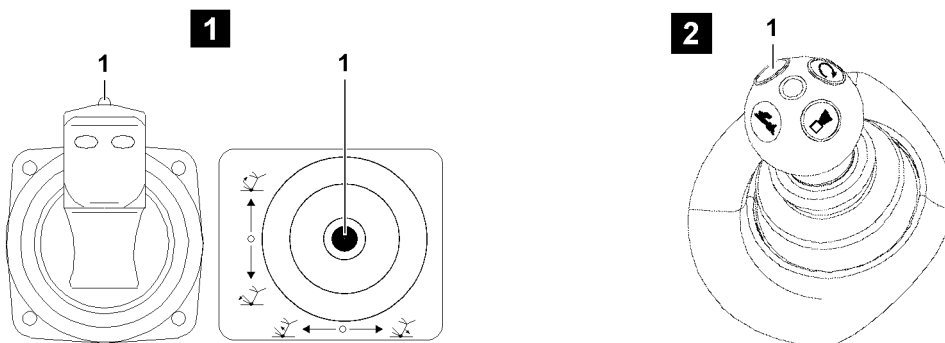
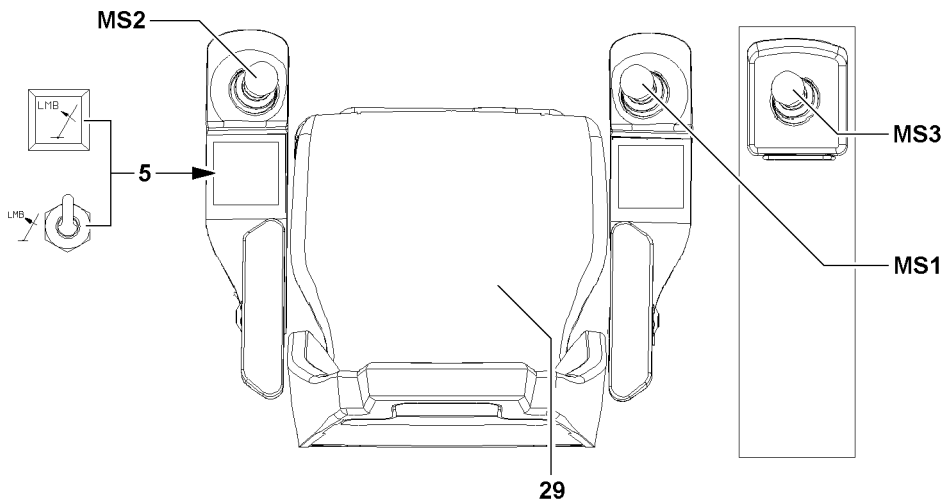
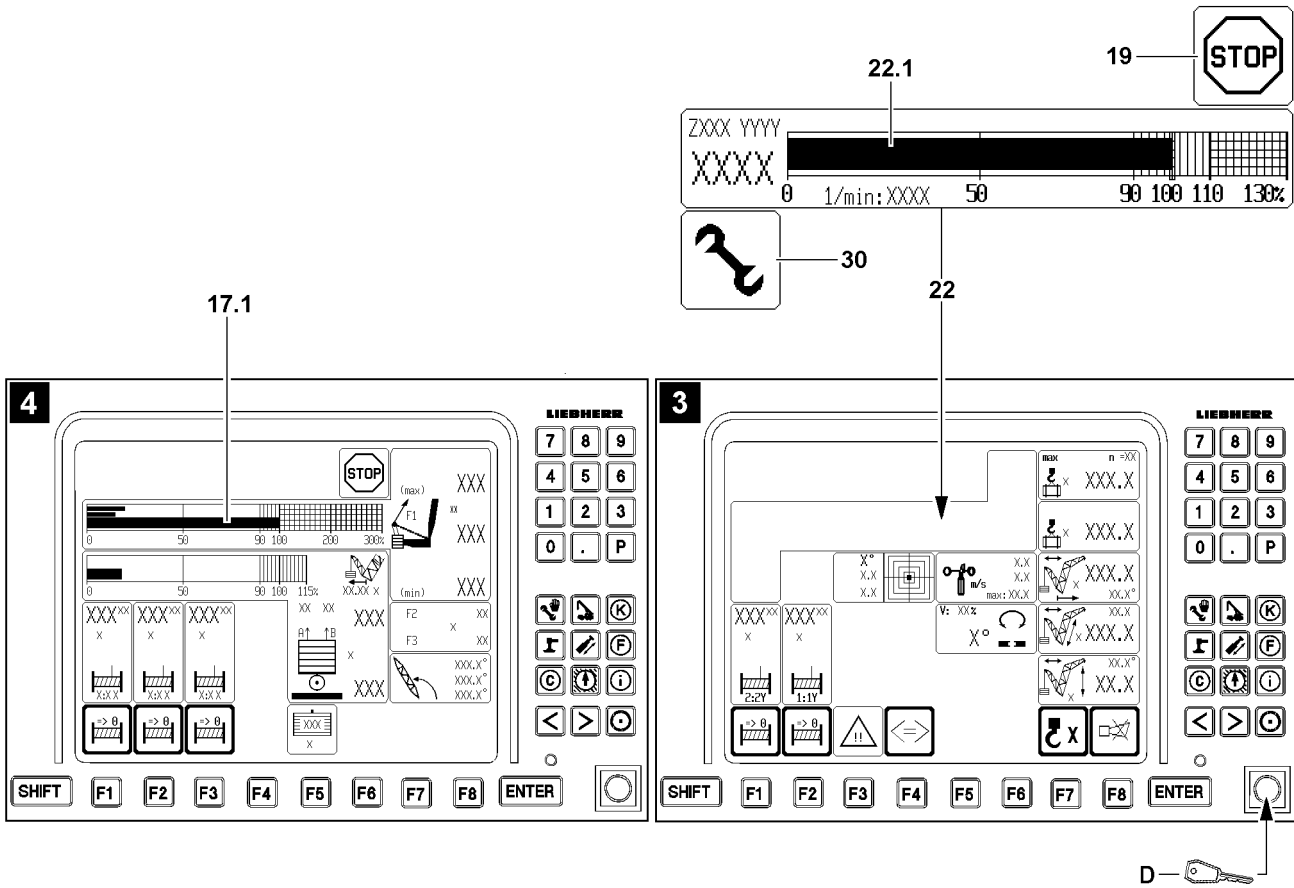


Fig.112336

- ▶ Initiate crane movements which directly lead to a normal operating status (utilization below 100 % and no active shut off).

Result:

- If a crane reaches a normal operation status (utilization below 100 % and no active shut off), then the function „Exceedance of shut off limits of the LICCON overload protection“ shuts off, the assembly icon **30** and icon **19** in the LICCON monitor turn off.

In addition, the function „Exceedance of shut off limits of LICCON overload protection“ turns off immediately:

- If the set up key **D** is actuated again.
- If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with load chart available).
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- If radio operation* is activated.
- At engine stop.
- At hoist top shut off.
- When leaving the angle range of the load chart.
- When the utilization bar **22.1** (load moment display) exceeds a utilization of 110 %.



Note

- ▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only turned off when the assembly icon **30** in the LICCON monitor turns off.
- ▶ If the function „Exceedance of shut off limits of the LICCON overload protection“ does not turn off after pressing the set up key **D** once, then press the set up key **D** again until the assembly icon **30** in the LICCON monitor turns off.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:

- The assembly icon **30** in the LICCON monitor turns off.
- The working speed is reduced until all master switches (MS1, MS2, MS3) are in zero position at the same time.
- ▶ Make sure that the assembly icon **30** does no longer appear in the LICCON monitor.
- ▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

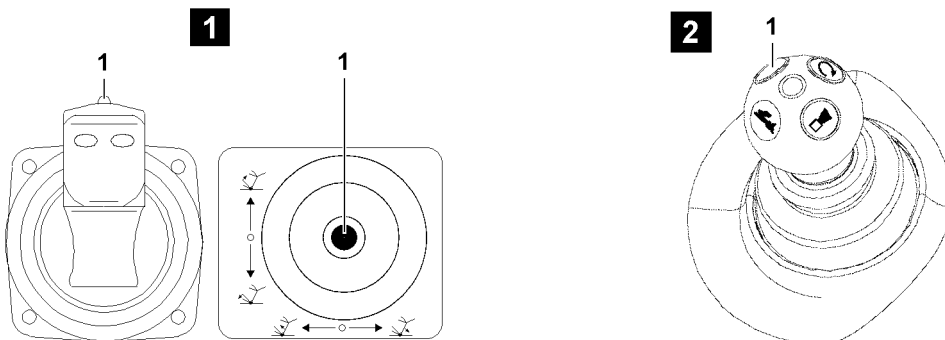
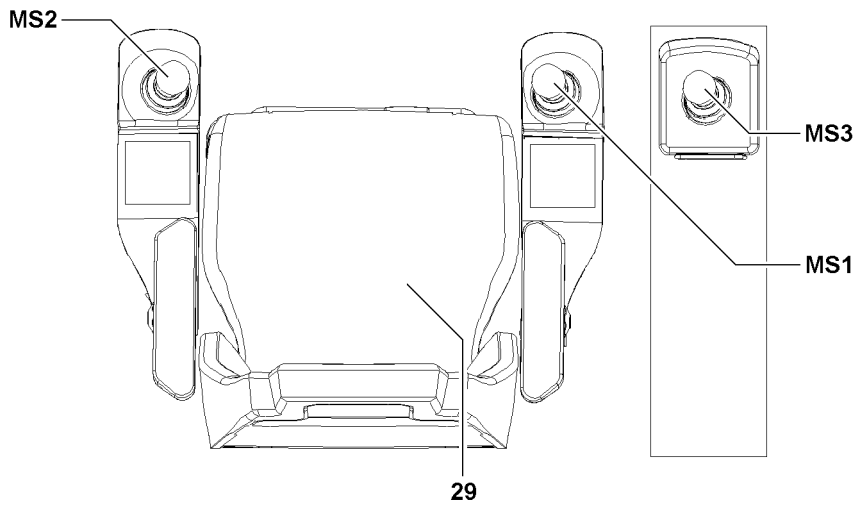
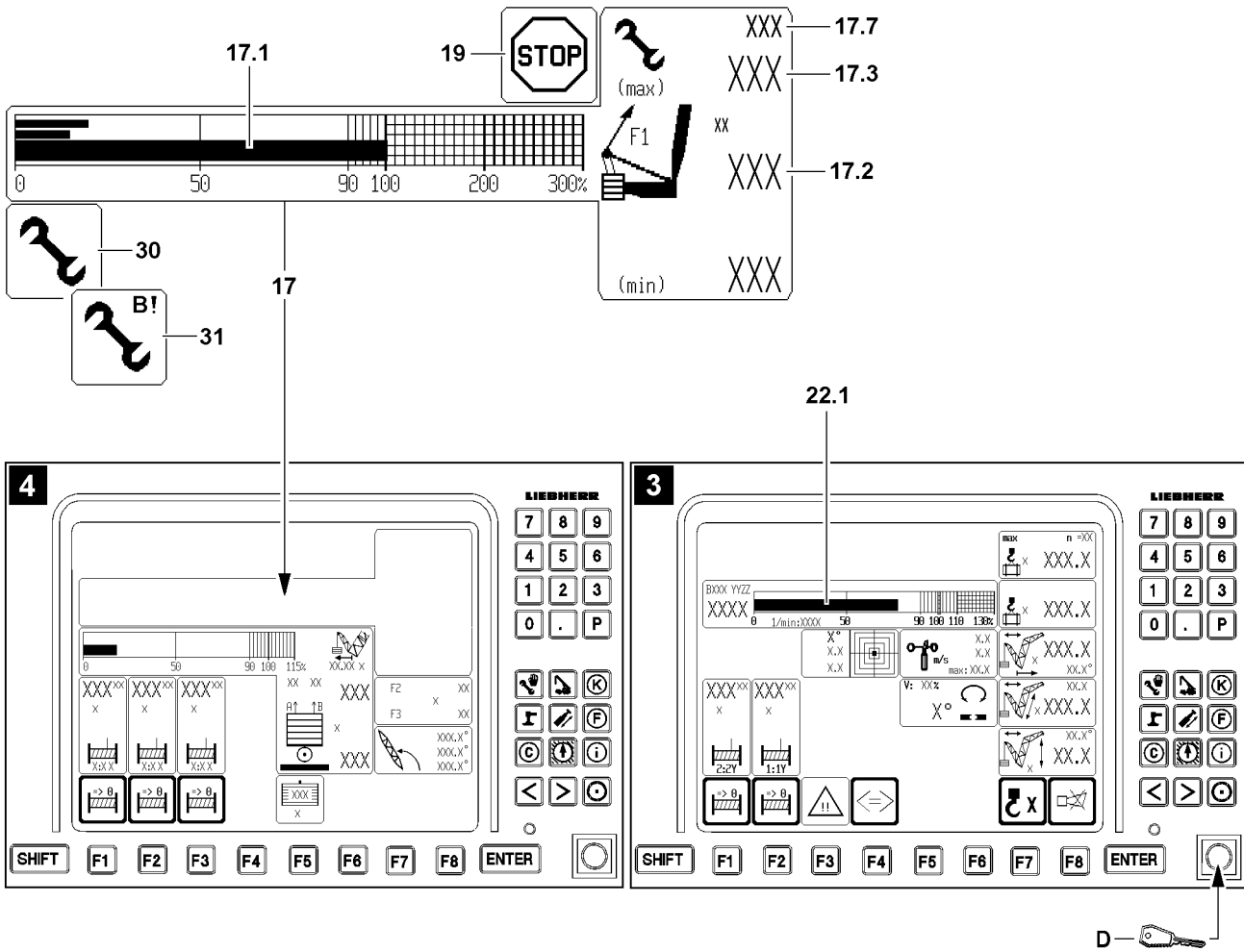


Fig.112337

LWE/LR 1750-000/12812-15-02/en

2.4.3 Exceedance of maximum value test point 1 (force F1) in crane operation



WARNING

Leaving the load chart with load on hook!

If, by actuating the set up key **D**, the shut off is bypassed by value $F1_{\text{max-operation}}$ **17.3** and exceeded by more than 110 %, then the crane is in assembly operation, the assembly icon **31** appears in the LICCON monitor.

There is no load chart available any longer and various display values may not be shown any longer in the crane operating screen.

The load on the hook is no longer monitored by the load chart.

Severe accidents due to crane overload can result.

Personnel can be severely injured or killed.

▶ In assembly operation, the data in the erection / take down charts is binding.



WARNING

Shut off safety device!

If, by actuating the set up key **D**, the function „Exceedance of maximum value test point 1“ is activated, then the function „Exceedance of shut off limits of LICCON overload protection“ is also activated automatically. Thus there is no shut off if the maximum permissible load moment is exceeded.

▶ All notes regarding the function „Exceedance of shut off limits of LICCON overload protection“ must be observed.

▶ The utilization bar **22.1** of the load moment display must be observed.



Note

▶ The force determined on test point 1 is generally described as $F1_{\text{actual}}$ (actual value F1).

▶ In the icon **17** (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).

▶ The value $F1_{\text{max-operation}}$ **17.3** corresponds to 100 % in the F1-bar display.

▶ The F1-utilization bar **17.1** shows the relationship $F1_{\text{actual}}$ **17.2** to $F1_{\text{max-operation}}$ **17.3**.

▶ In crane operation without derrick ballast, fewer values may be shown in the icon **17** (F1-load display).

▶ If the actual load is **larger** than the permissible hook block weight according to the erection / take down charts, then it can be exceeded up to maximum 110 % of $F1_{\text{max-operation}}$ **17.3**.

▶ If the actual load is **smaller** than the permissible hook block weight according to the erection / take down charts, then the assembly operation becomes active above 110 % of $F1_{\text{max-operation}}$ **17.3**. In assembly operation, there is no load chart available.

▶ The value $F1_{\text{max-assembly}}$ **17.7** appears in crane operation when 90 % of its nominal value is exceeded.

In the icon **17** (F1 load display) the utilization bar $F1_{\text{actual}}$ **17.1** exceeds the 100 % mark and the LICCON overload protection has shut off the crane movement. The value $F1_{\text{actual}}$ **17.2** has exceeded the value $F1_{\text{max-operation}}$ **17.3**.

All further movements, which lead to an increase of the force (value $F1_{\text{actual}}$) are shut off.

In the LICCON monitor with the derrick operating screen (illustration **4**) appears the icon **19**.

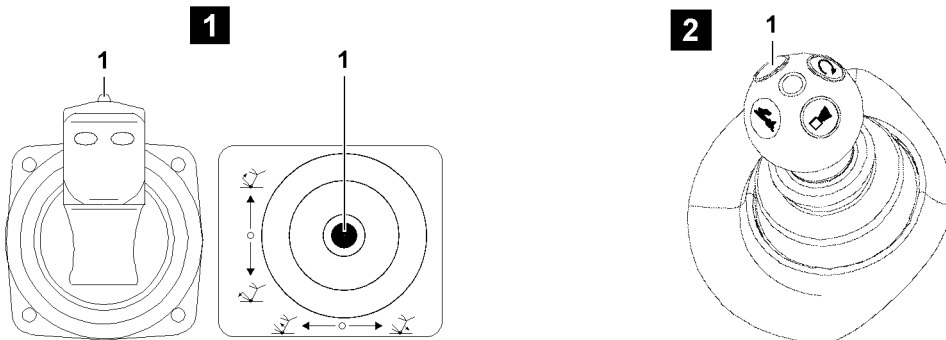
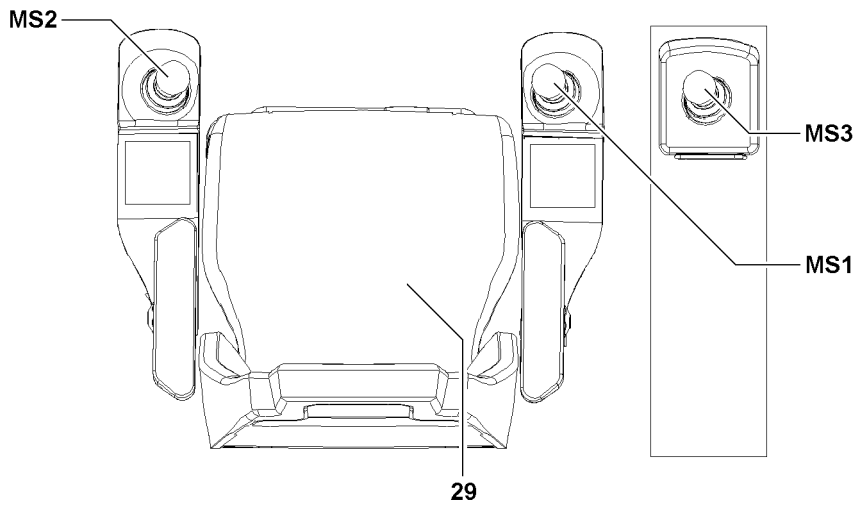
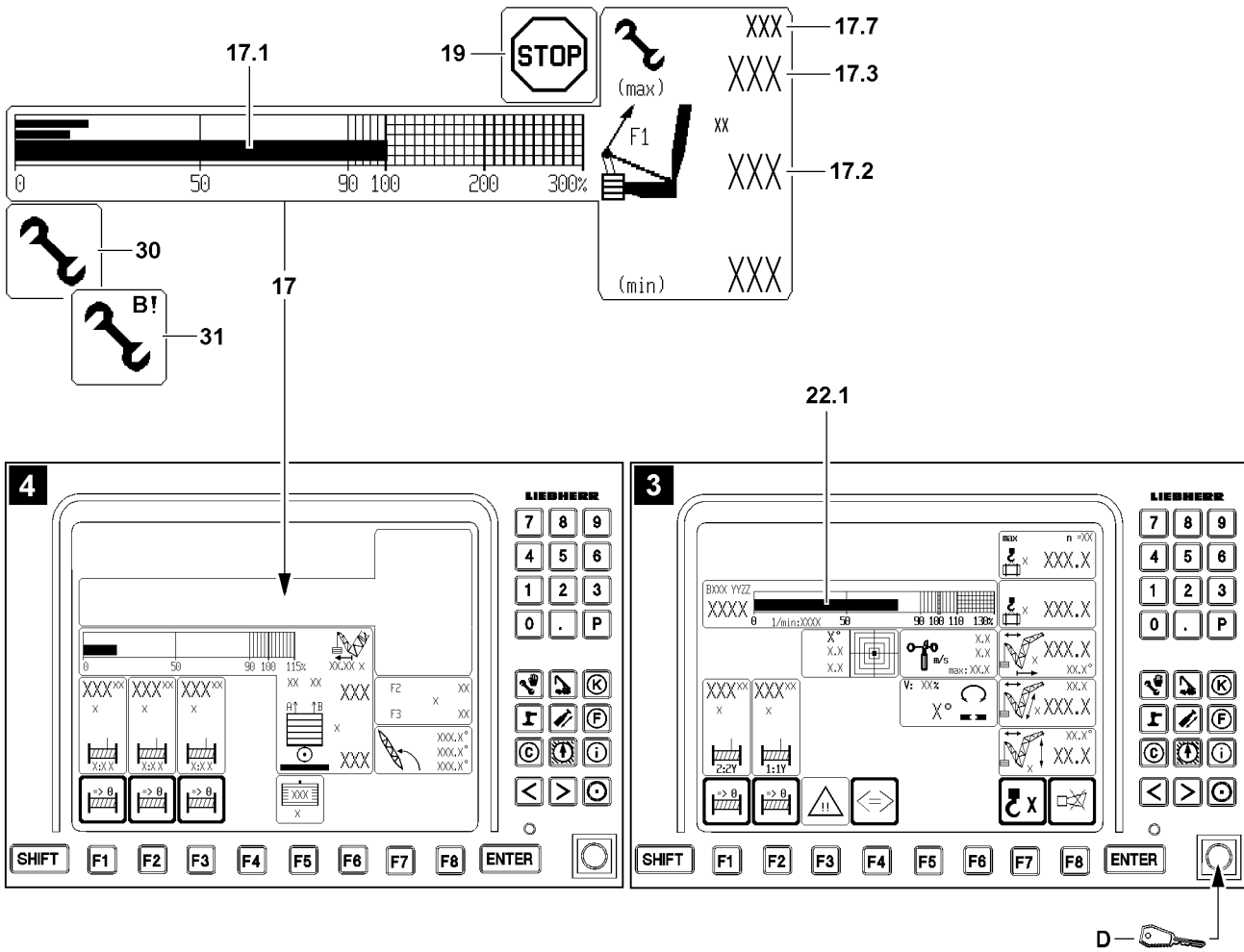


Fig.112337

LWE/LR 1750-000/12812-15-02/en

Make sure that the following prerequisites are met:

- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
 - Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
 - Radio operation* is not active.
 - The F1 load display 110 % has not been reached and a load chart is available.
- ▶ Turn the set up key **D** to the right (touching).

Result:

- The function „Exceedance of maximum value test point 1“ is activated in connection with the function „Exceedance of the shut off limits of the LICCON overload protection“.
- $F1_{\text{max-operation}}$ **17.3** can be exceeded.

The function „Exceedance of shut off limits of the LICCON overload protection“ in connection with the function „Exceedance of the maximum value test point 1“ also shuts off immediately:

- If the set up key **D** is actuated again.
- If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with load chart available).
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- If radio operation* is activated.
- At engine stop.
- At hoist top shut off.



Note

- ▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only turned off when the assembly icon **30** in the LICCON monitor turns off.
- ▶ If the function „Exceedance of shut off limits of the LICCON overload protection“ does not turn off after pressing the set up key **D** once, then press the set up key **D** again until the assembly icon **30** in the LICCON monitor turns off.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:

- The assembly icon **30** in the LICCON monitor turns off.
 - The working speed is reduced until all master switches (MS1, MS2, MS3) are in zero position at the same time.
- ▶ Make sure that the assembly icon **30** does no longer appear in the LICCON monitor.
- ▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

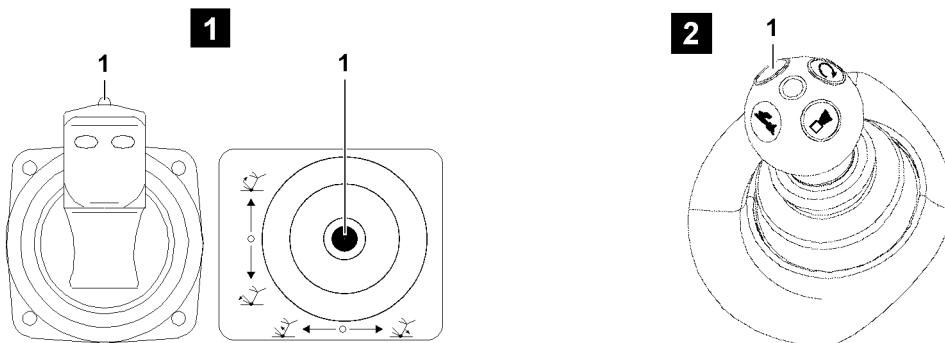
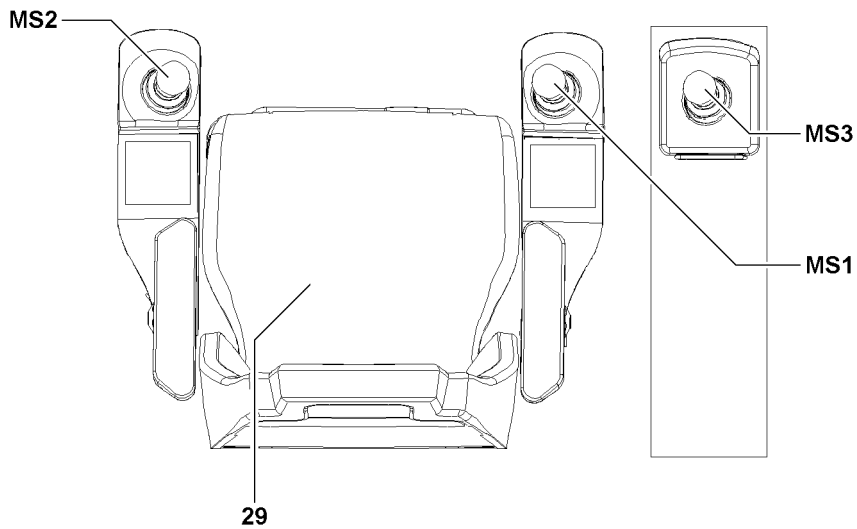
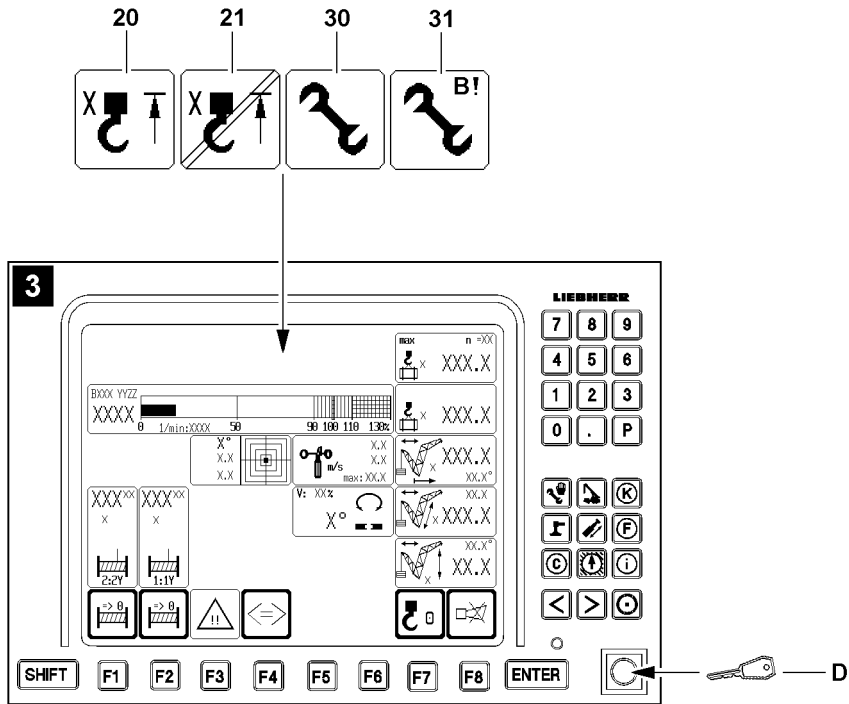


Fig.111230

LWE/LR 1750-000/12812-15-02/en

2.5 Bypass of the hoist top shut off



WARNING

Improper use of the function „Bypass of hoist top shut off“!

- ▶ The function „Bypass of hoist top shut off“ may never be used to increase the lifting height during crane operation.



WARNING

Property damage and falling load!

If the function „Bypass of hoist top shut off“ is activated, there is the danger that the hook block or the load hook is pulled against the pulley head.

This danger exists especially when the hoist winch is continued to be spooled up and for crane movements which have an influence on the hoist rope, for example luffing the boom, the auxiliary boom / accessory or the derrick boom.

Property damage and falling load can result.

Personnel can be severely injured or killed.

- ▶ The function „Bypass of hoist top shut off“ may only be carried out by an authorized person, along with a guide. The guide must be in direct contact with the crane operator and must continually monitor the distance between the hook block / load hook and the boom head.
- ▶ Carry out all crane movements with utmost caution.



Note

- ▶ The activation of the function „Bypass of hoist top shut off“ is only possible if the hoist limit switch was touched and the hoist top shut off has occurred.
- ▶ If the hoist limit switch is triggered when the set up key **D** is actuated (function „Exceedance of shut off limits of the LICCON overload protection“ is active, the assembly icon **30** or the assembly icon **31** appear), then a hoist top shut off occurs and the function „Exceedance of shut off limits of the LICCON overload protection“ is deactivated.
- ▶ For assembly purposes or in emergency cases, if the activation of the function „Bypass of hoist top shut off“ **and** activation of the function „Exceedance of shut off limits of the LICCON overload protection“ is necessary, then the set up key **D** must be actuated until the icon **21** and assembly icon **30** or assembly icon **31** (assembly operation) appear.

Make sure that the following prerequisites are met:

- A hoist top shut off has occurred, the hoist top icon **20** appears in the LICCON monitor.
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- The radio operation* is not active.

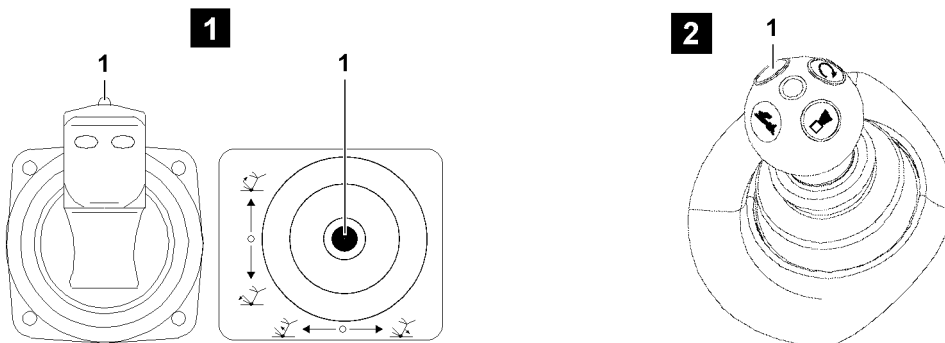
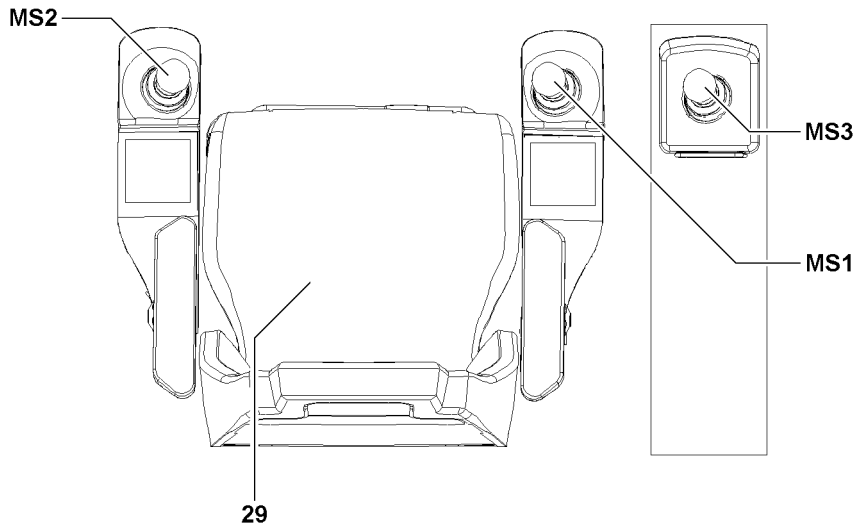
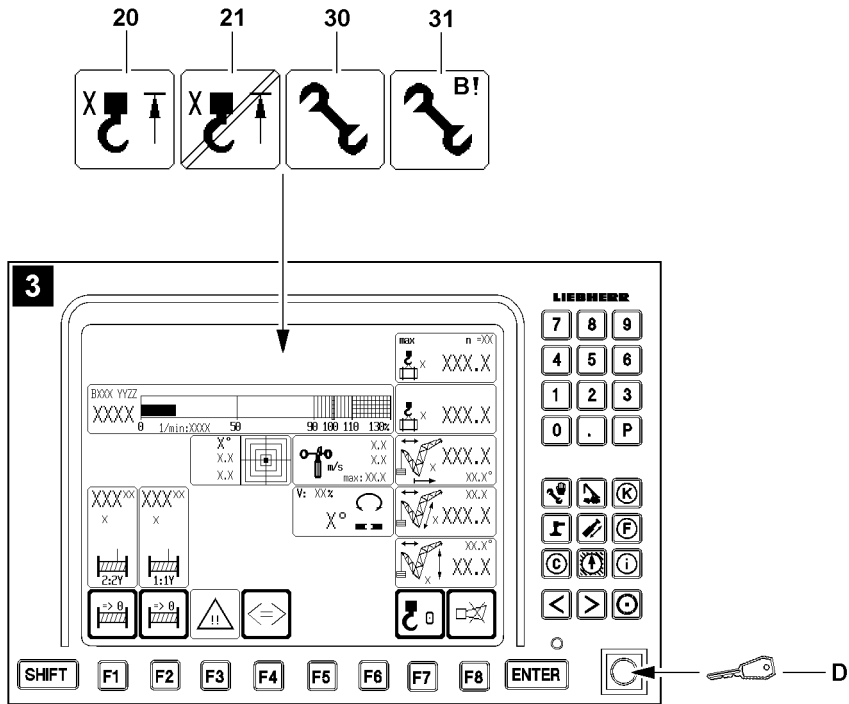


Fig.111230

LWE/LR 1750-000/12812-15-02/en

- ▶ Turn the set up key **D** to the right (touching).

Result:

- The assembly icon **30** or the assembly icon **31** (assembly operation) appear in the LICCON monitor.
 - The hoist top icon **20** in the LICCON monitor changes to the icon **21**.
 - The working speed is reduced for all functions (if load chart is available).
 - All hoist limit switches are bypassed.
- ▶ Carry out a crane movement with bypassed hoist limit switches with utmost caution and by taking the safety guidelines into account.

The function „Bypass of the hoist top shut off“ turns off:

- If the set up key **D** is actuated again.
- When no master switch (MS1, MS2, MS3) was deflected for 10 seconds.
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- If there is no longer a shut off of a hoist limit switch.
- If the radio operation* is active.
- At engine stop.

The function „Bypass of the hoist top shut off“ has / was turned off:

- The assembly icon **30** or the assembly icon **31** (assembly operation) in the LICCON monitor turn off.
 - The icon **21** on the LICCON monitor turns off.
 - The working speed is reduced until all master switches (MS1, MS2, MS3) are in zero position at the same time.
- ▶ Make sure that the assembly icon **30** or the assembly icon **31** (assembly operation) as well as the icon **21** no longer appear in the LICCON monitor.
 - ▶ Carry out the crane movements in such a way that no repeated hoist top shut off occurs.

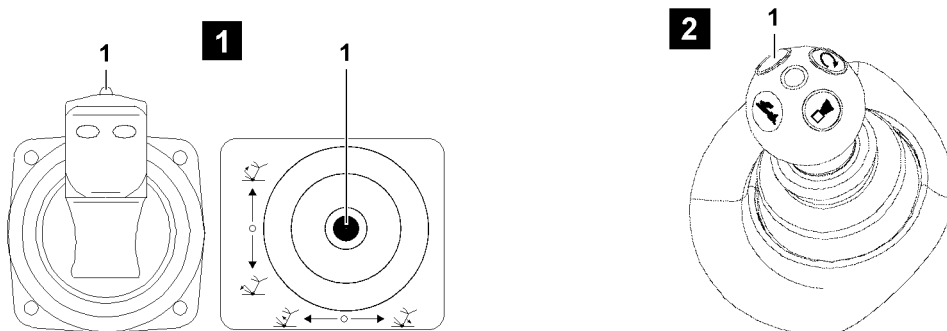
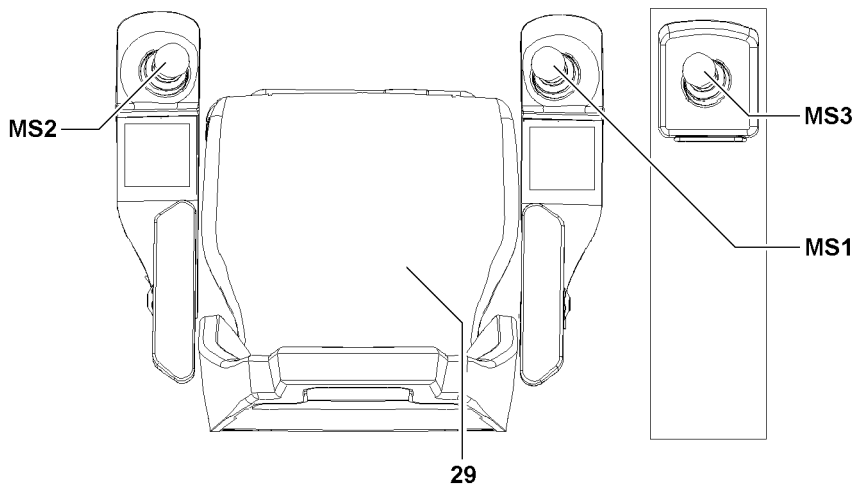
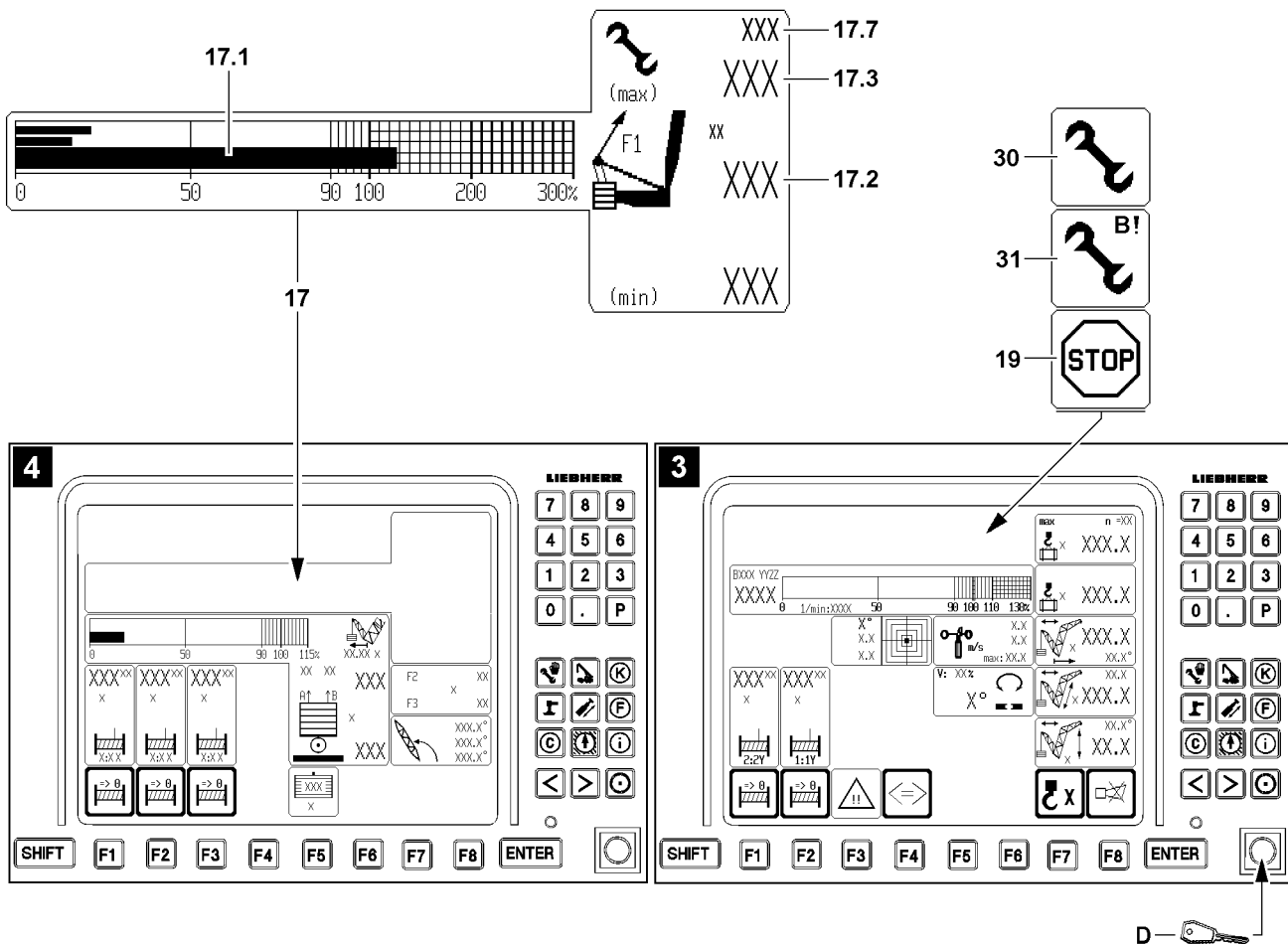


Fig.112343

LWE/LR 1750-000/12812-15-02/en

2.6 Exceeding the shut off limits of the LICCON overload protection during erection / take down procedures (assembly operation)



Note

- ▶ If the crane is in the range „No load chart available“ then there is a shut off of the crane control by the LICCON overload protection. The icon **19** appears in the LICCON monitor.
- ▶ By an actuated set up key **D**, the function „Exceedance of shut off limits of the LICCON overload protection“ can be activated, all erection / take down procedures can be carried out within the erection / take down charts, for which no load charts are available.



WARNING

Danger of accident during erection / take down procedures!

If the erection / take down charts are not observed, the crane could collapse, the boom can break off or the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The erection / take down charts must be observed.
- ▶ Press the set up key **D** only when the configuration status has been entered correctly in the LICCON computer system and matches the actual situation.



Note

- ▶ The force determined on test point 1 is generally described as $F1_{\text{actual}}$ (actual value F1).
- ▶ In the icon **17** (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).
- ▶ The value $F1_{\text{max-operation}}$ **17.3** corresponds to 100 % in the F1-bar display.
- ▶ The F1-utilization bar **17.1** shows the relationship $F1_{\text{actual}}$ **17.2** to $F1_{\text{max-operation}}$ **17.3**.
- ▶ In crane operation without derrick ballast, fewer values may be shown in the icon **17** (F1-load display).
- ▶ If a load chart is available, then the value $F1_{\text{max-operation}}$ **17.3** is valid as the limit value for a shut off of crane operation.
- ▶ When leaving the area „Load chart available“, the assembly icon **30** turns off and the assembly icon **31** appears.
- ▶ When leaving the area „Load chart available“ then $F1_{\text{max-assembly}}$ **17.7** is valid as the upper limit value.
- ▶ $F1_{\text{max-assembly}}$ **17.7** might only appear when 90 % of its nominal value is exceeded.

2.6.1 Carrying out erection procedures (assembly operation)

Make sure that the following prerequisites are met:

- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- Radio operation* is not active.
- The set up configuration corresponds to the erection / take down charts.
- The set up status has been entered correctly into the LICCON computer system.

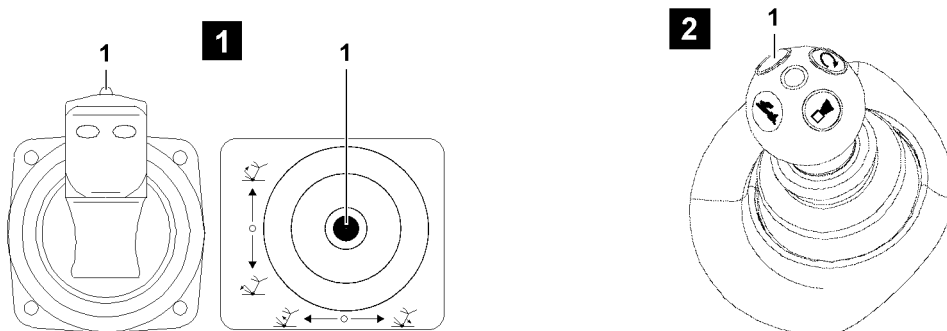
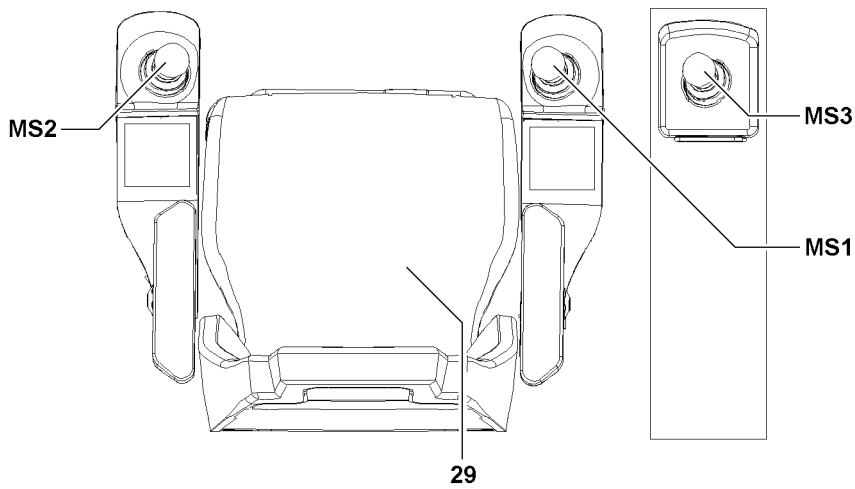
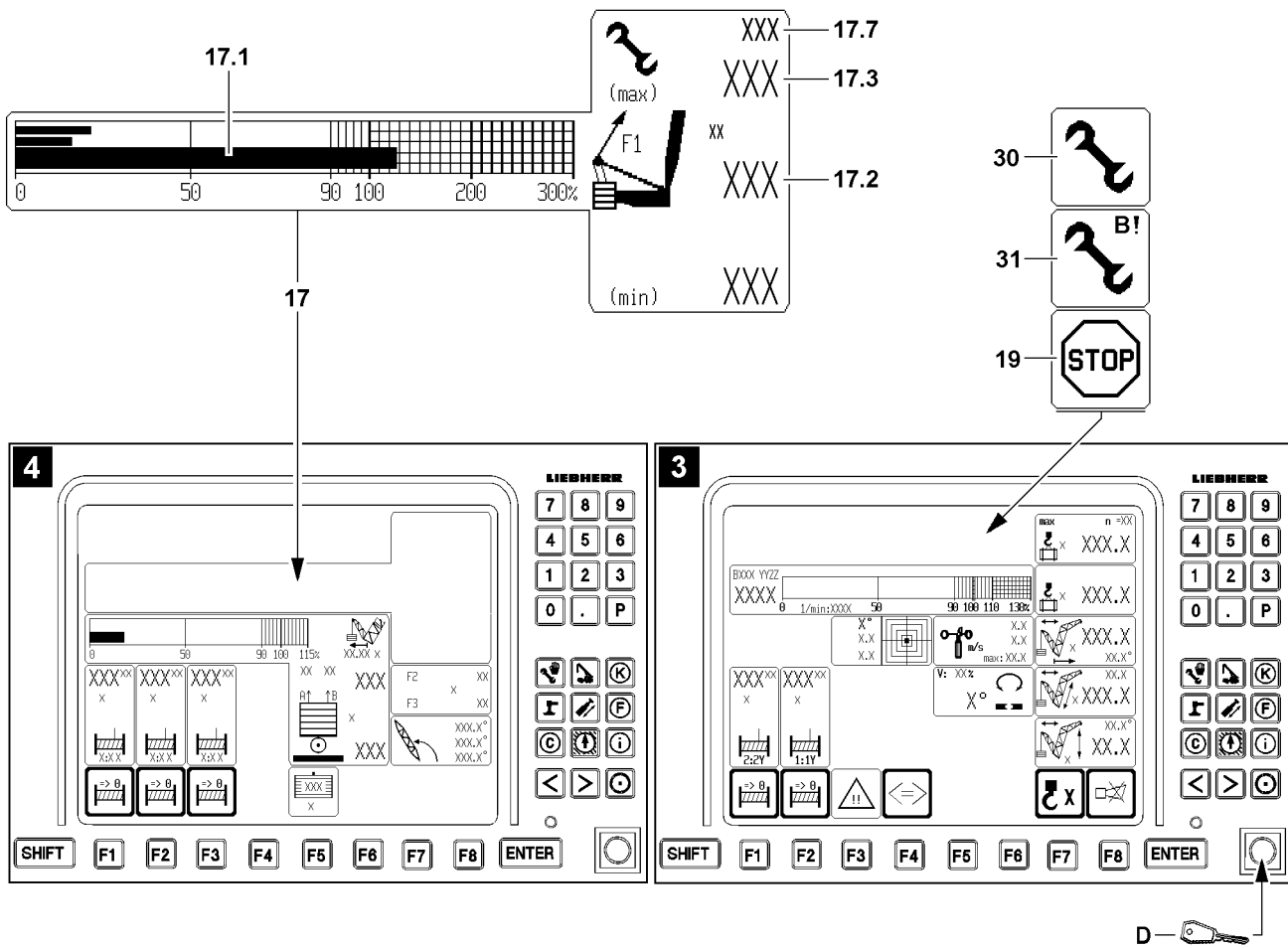


Fig.112343

LWE/LR 1750-000/12812-15-02/en

- ▶ Turn the set up key **D** to the right (touching).

Result:

- The assembly icon **31** appears in the area „No load chart available“.
- The erection / take down procedures can be carried out.
- ▶ Watch the icon **17** (F1-load display), the value $F1_{\text{actual}}$ **17.2** may not exceed the value $F1_{\text{max-assembly}}$ **17.7**.

Problem remedy

The erection / take down procedure cannot be carried out due to shut off „ $F1_{\text{max-assembly}}$ **17.7** exceeded“?

- ▶ See section „Danger of exceeding $F1_{\text{max-assembly}}$ “.
-

Problem remedy

The function „Exceedance of shut off limits of the LICCON overload protection“ can not be activated during erection / take down procedures?

- ▶ Check the error messages.
 - ▶ Check the electrical connections.
 - ▶ Check if all sensors or dummy plugs with integrated electric have been connected properly.
-

The function „Exceedance of shut off limits of the LICCON overload protection“ turns off:

- If the set up key **D** is actuated again.
- When an range with existing load chart is reached (erection procedure).
- If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with „Load chart available“).
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- At engine stop.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:

- The assembly icon **30** or the assembly icon **31** in the LICCON monitor turns off.
- ▶ After completion of the erection / take down procedures, make sure that the assembly icon **30** or the assembly icon **31** no longer appear in the LICCON monitor.

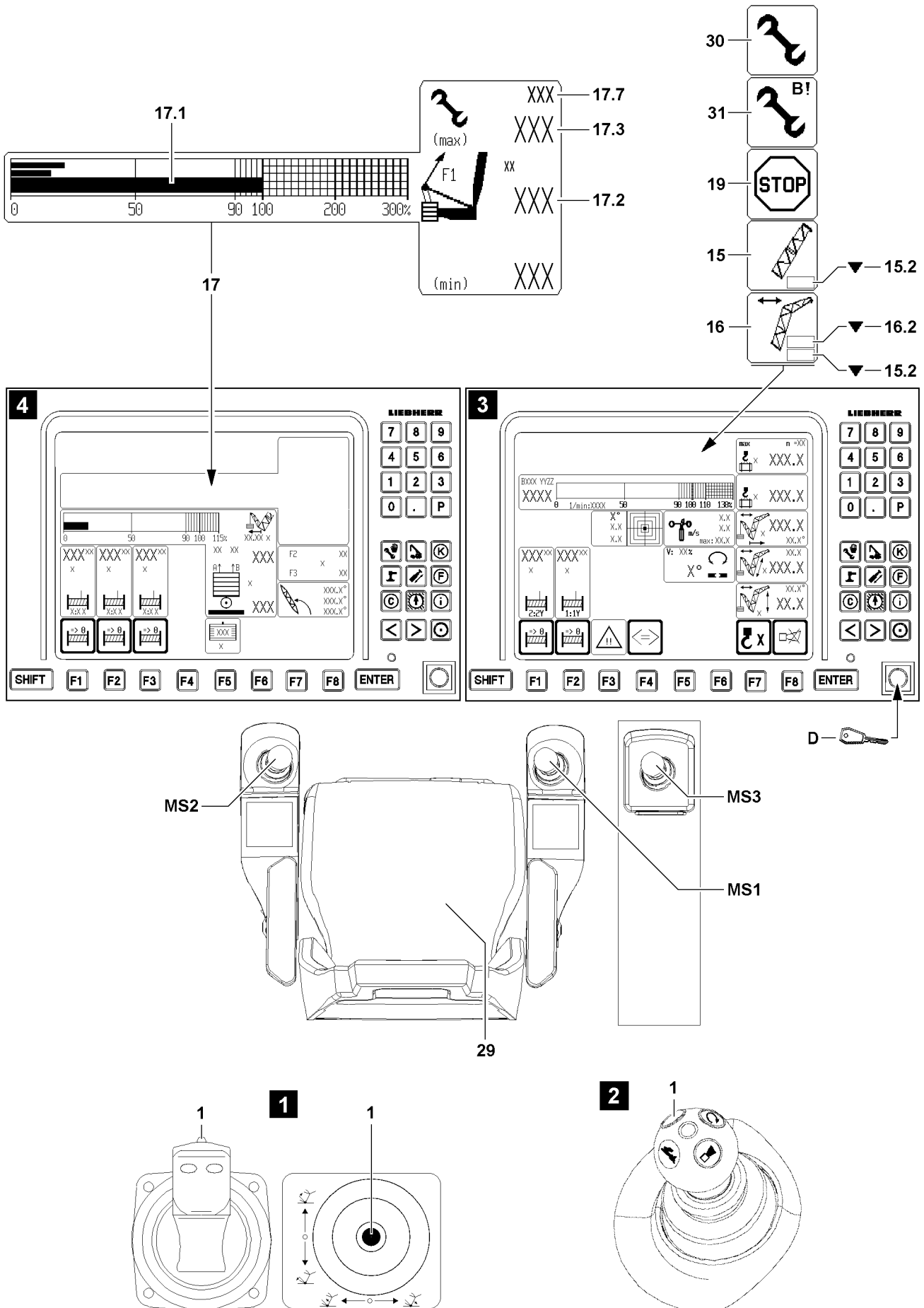


Fig.112341

2.6.2 Carrying out take down procedures (assembly operation)



WARNING

Increased danger of accidents due to bypass of shut off of luffing the main boom / auxiliary boom / accessory down!

When the shut off luffing the main boom / auxiliary boom / accessory down is bypassed, then the LICCON overload protection as a whole is deactivated or limited.

When the shut off luffing the main boom / auxiliary boom / accessory down is bypassed and the main boom and / or the auxiliary boom / accessory is further luffed down, then there is no load chart available any longer.

Crane operation with bypassed shut off luffing the main boom / auxiliary boom / accessory down is prohibited, since severe accidents can result.

Personnel can be severely injured or killed.

- ▶ Activate the bypass of the shut off luffing the main boom / auxiliary boom / accessory down only in emergency cases or for erection / take down procedures with erection / take down charts.
- ▶ Carry out all crane movements with utmost caution.

Make sure that the following prerequisites are met:

- In symbol **15** or symbol **16** appear symbol **15.2** or symbol **16.2** and the LICCON overload protection has shut off the crane movement.
 - Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
 - All master switches (MS1, MS2, MS3) are in zero position (not deflected).
 - The radio operation* is not active.
- ▶ Turn the set up key **D** to the right (touching).

Result:

- The assembly icon **30** appears in the LICCON monitor.
- The function „Exceedance of shut off limits of the LICCON overload protection“ is activated and has bypassed the shut off luffing the main boom / auxiliary boom / accessory down.



Note

- ▶ If a load chart is available, then the value $F1_{\text{max operation}}$ **17.3** is valid as the limit value for a shut off of crane operation.
- ▶ When leaving the area „Load chart available“, the assembly icon **30** turns off and the assembly icon **31** appears.
- ▶ When leaving the area „Load chart available“ then $F1_{\text{max assembly}}$ **17.7** is valid as the upper limit value.
- ▶ If no derrick boom is installed, then the icon **17** only shows $F1_{\text{actual}}$ **17.1** and $F1_{\text{max-assembly}}$ **17.7**.
- ▶ $F1_{\text{max-assembly}}$ **17.7** might only appear when 90 % of its nominal value is exceeded.

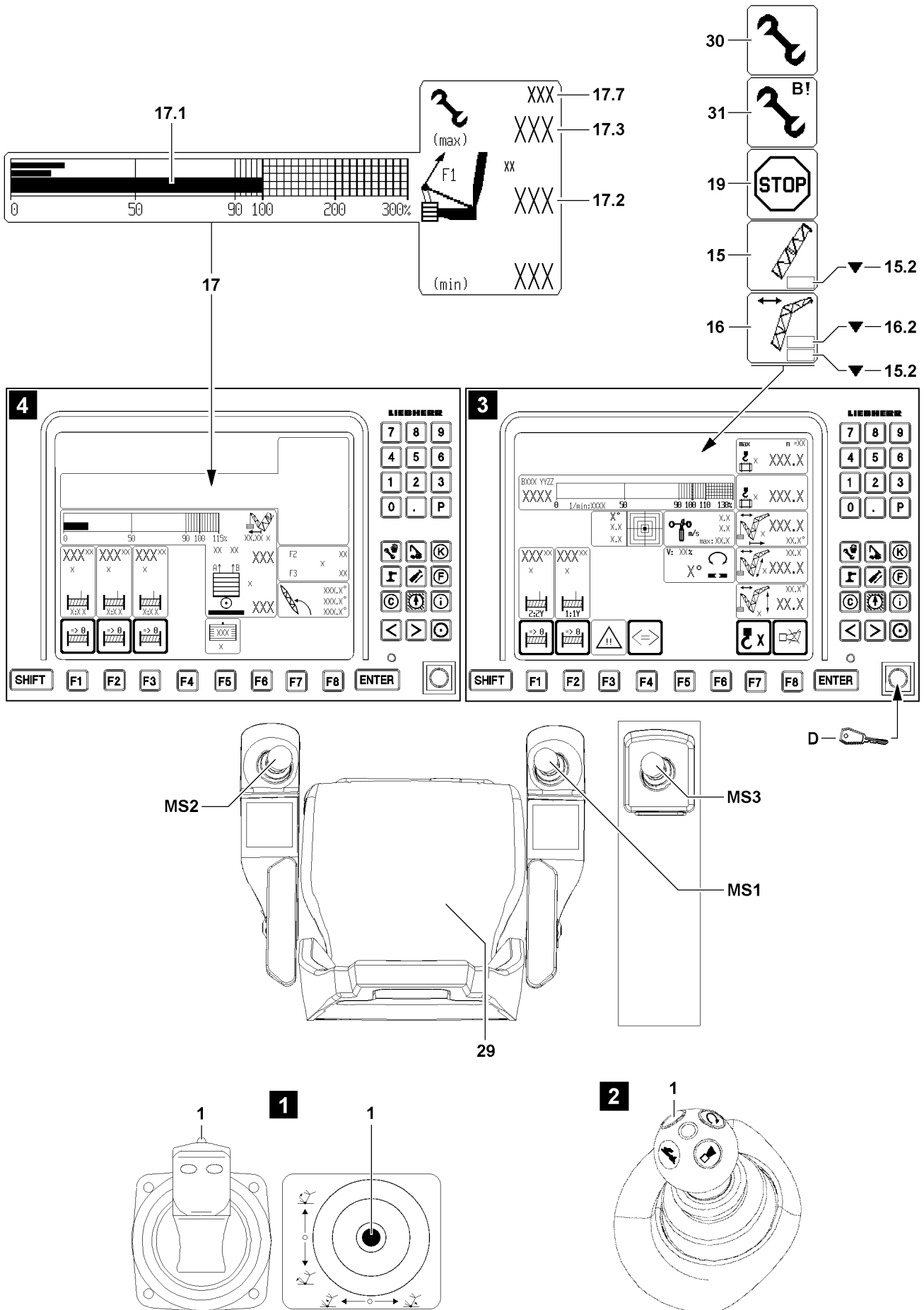


Fig.112341

**DANGER**

The crane can topple over!

There is **no** shut off of the luff down movement after reaching the limit value $F1_{\text{max assembly}}$ **17.7**.

If the warnings by the LICCON overload protection are ignored, then the crane will be overloaded or topples over.

Personnel can be severely injured or killed.

- ▶ The symbol **17** (F1-load display) must be watched permanently. It must be ensured that the value $F1_{\text{actual}}$ **17.2** is smaller than the value $F1_{\text{max assembly}}$ **17.7**.
- ▶ The luff down movement must be stopped before the value $F1_{\text{actual}}$ **17.2** exceeds the limit value $F1_{\text{max assembly}}$ **17.7**.

- ▶ During the take down procedure watch the icon **17** (F1-load display).

Problem remedy

The take down procedure cannot be carried out due to danger of exceeding the $F1_{\text{max assembly}}$ **17.7**?

- ▶ See section „Danger of exceeding $F1_{\text{max assembly}}$ “.

The bypass of the shut off luffing the main boom / auxiliary boom / accessory down turns off:

- If the set up key **D** is actuated again.
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- When an area with existing load chart is reached.
- If the radio operation* is active.
- At engine stop.

The bypass of the shut off luffing the main boom / auxiliary boom / accessory down has / was turned off:

- The assembly icon **31** or the assembly icon **30** in the LICCON monitor turns off.
- ▶ Make sure that the assembly icon **30** or the assembly icon **31** no longer appear in the LICCON monitor.

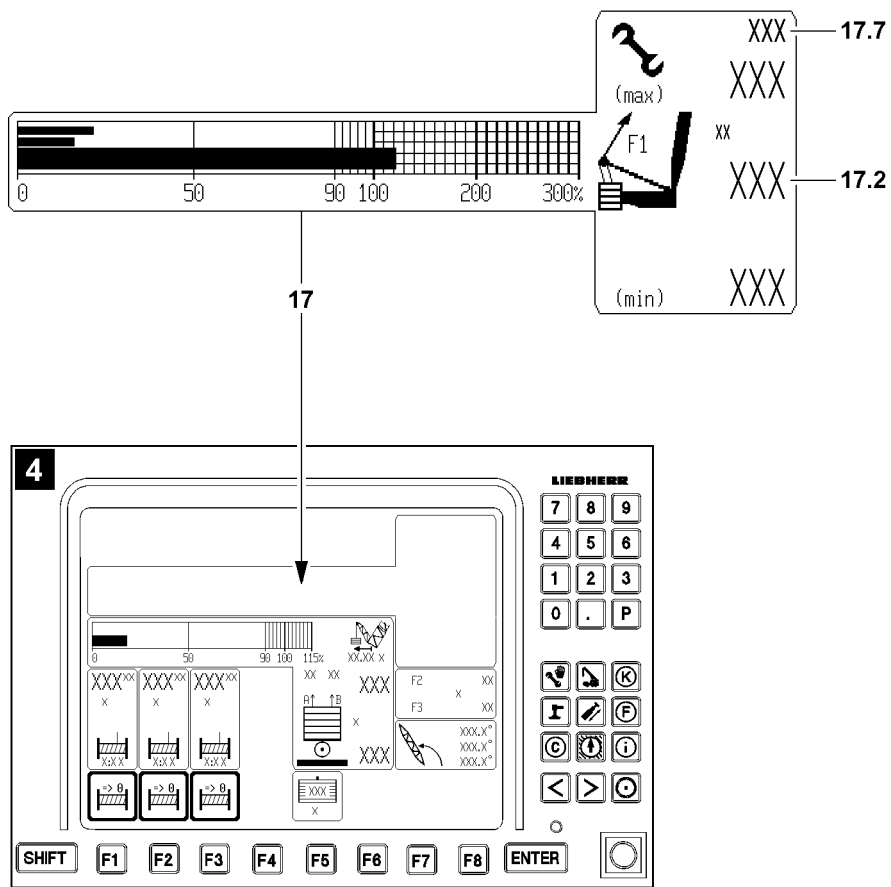


Fig.112344

2.6.3 Danger of exceeding $F1_{\text{max assembly}}$



Note

- ▶ $F1_{\text{max-assembly}}$ 17.7 might only appear when 90 % of its nominal value is exceeded.



DANGER

The crane can topple over!

There is **no** shut off of the luff down movement after reaching the limit value $F1_{\text{max assembly}}$ 17.7.

If the warnings by the LICCON overload protection are ignored, then the crane will be overloaded or topples over.

Personnel can be severely injured or killed.

- ▶ The luff down movement must be stopped before the value $F1_{\text{actual}}$ 17.2 exceeds the limit value $F1_{\text{max assembly}}$ 17.7.

In the icon 17 (F1-load display), the value $F1_{\text{actual}}$ 17.2 has reached the upper limit value $F1_{\text{max-assembly}}$ 17.7.

- ▶ Check if a crane movement, which can lower the force $F1$ (value $F1_{\text{actual}}$ 17.2) can be initiated, for example setting down the hook block / load hook.
- ▶ Check if the correct set up configuration has been entered on the LICCON computer system.
- ▶ Check if the actual set up configuration matches the entered set up configuration.
- ▶ Check if the correct hook block weight has been entered.
- ▶ Check if the respective hook block / load hook is installed.
- ▶ Check if all attachment parts and guy rods on the boom system, which are not needed, have been removed.
- ▶ Check if environmental influences (wind, snow or ice) on the crane are not too great.



Note

- ▶ Hook block weight entry and correction of weighing errors, see Crane operating instructions, chapter 4.02.

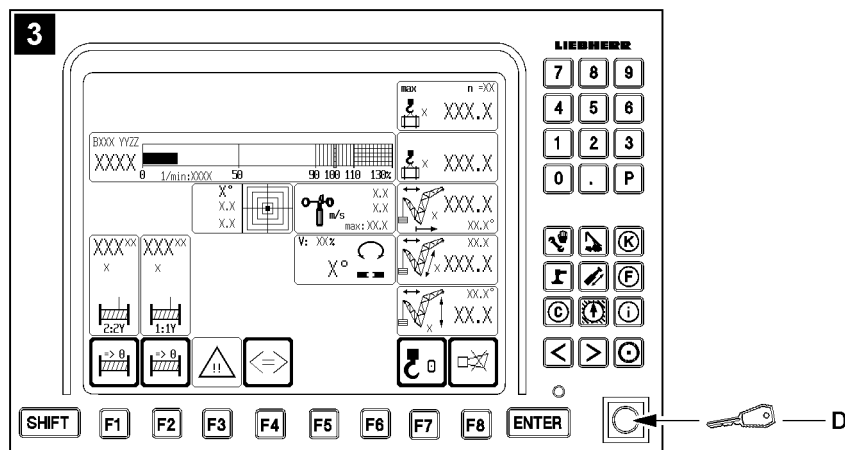
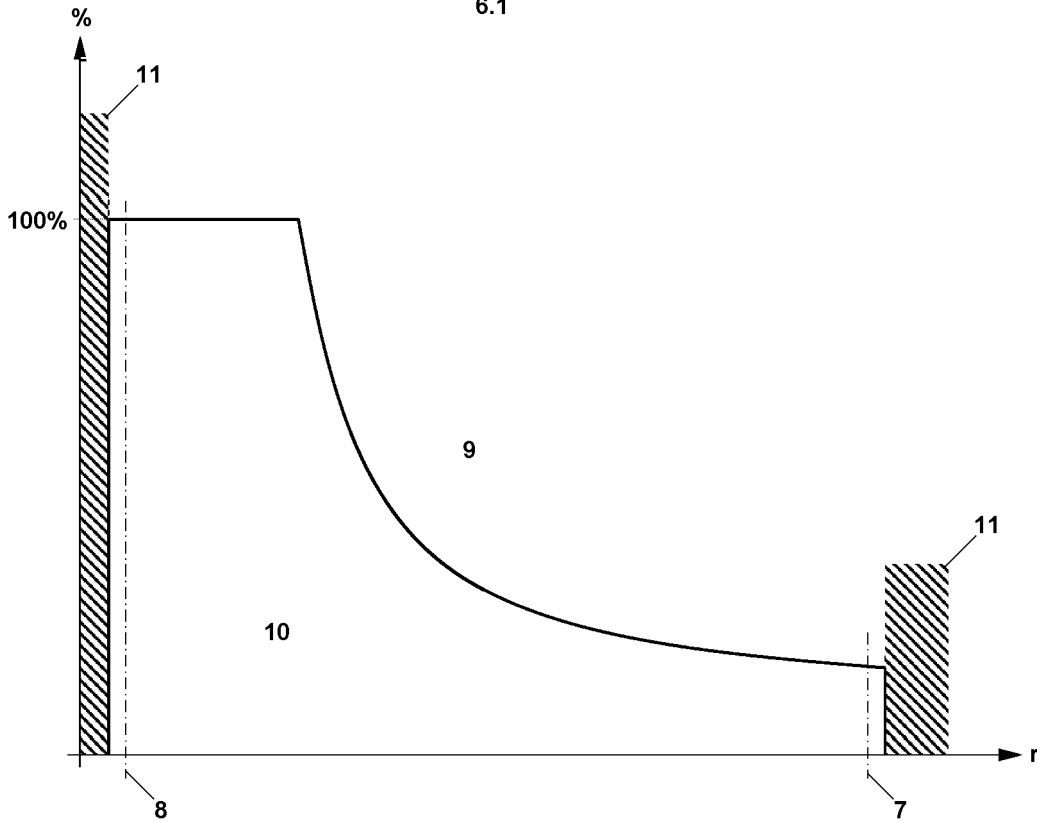
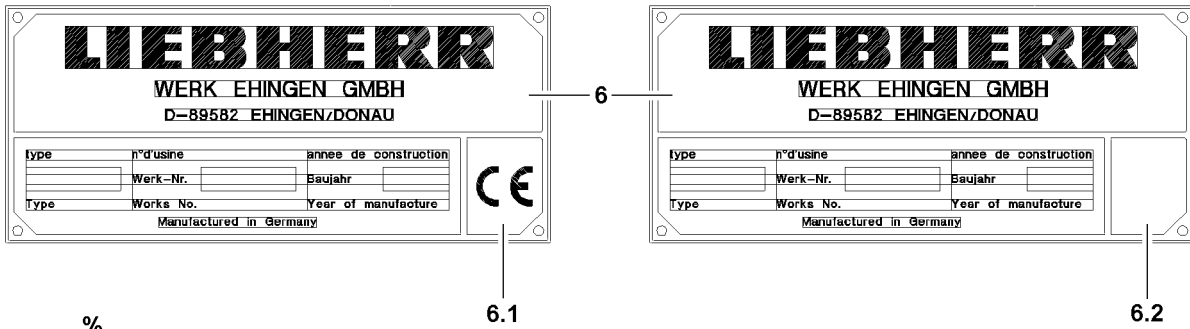


Fig.111208

LWE/LR 1750-000/12812-15-02/en

3 Instructions for resuming crane movements for cranes without CE mark



WARNING

Danger of accident!

If the following points are not observed, personnel can be severely injured or killed.

- ▶ The crane operator bears the sole and full responsibility for the adherence to measures to be taken in case of shut off of crane movement.
- ▶ The crane operator must make sure, before crane operation, that he is using the correct description for the current programming.



Note

- ▶ Check the data tag **6** to determine if your crane has a CE mark.
- ▶ The following section applies to a crane without CE mark, see data tag **6.2**.
- ▶ If your crane does have a CE mark, see data tag **6.1**, then you must observe the description in section „Instructions for resuming a crane movement for cranes with CE mark“.

3.1 Overview load chart for cranes without CE mark

Axle	Description
r	Radius boom (working radius)
%	Utilization of the crane in percentages

Position	Description
7	Lower limit angle load chart
8	Upper limit angle load chart
9	Area „Exceeding the overload protection“
10	Range „Load chart available“
11	Range „No load chart available“



Note

- ▶ If the set up key **D** (LICCON monitor with crane operating screen, illustration **3**) is actuated, the working speed is not reduced.

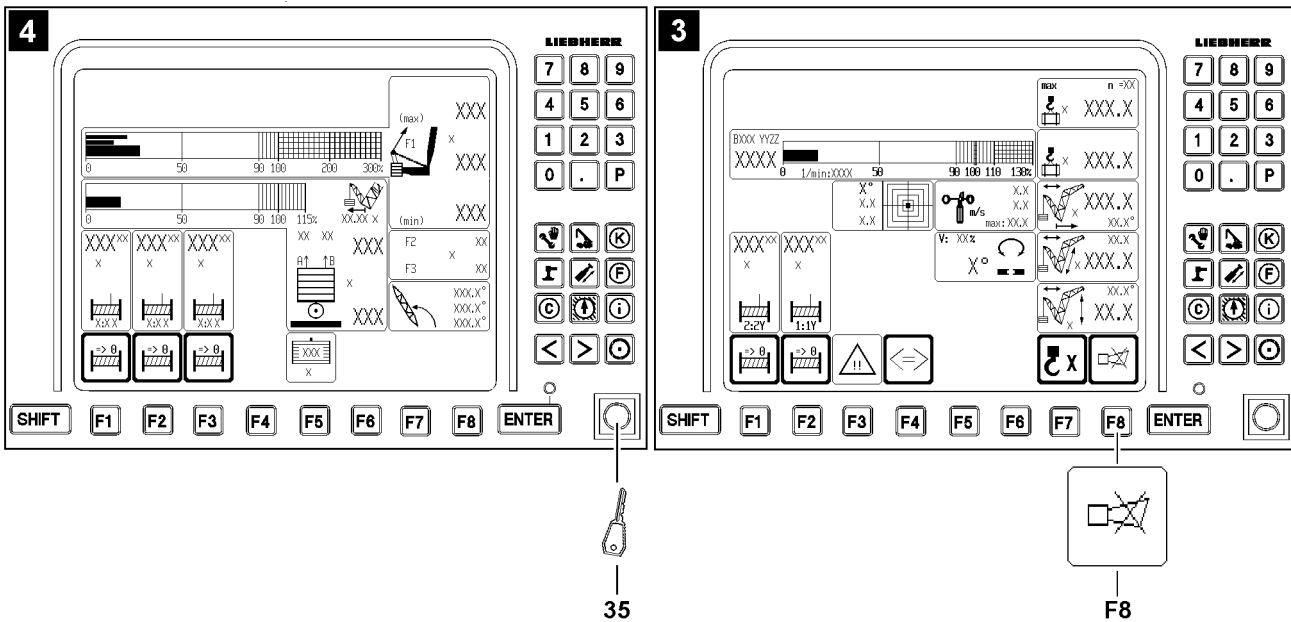
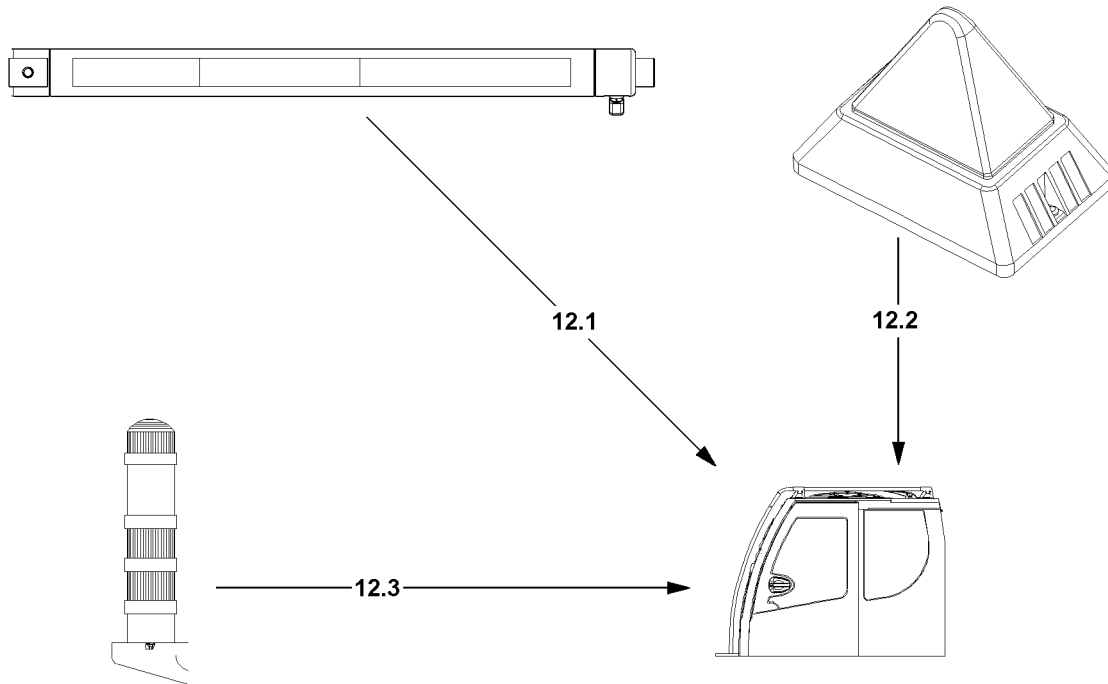


Fig.111212

LWE/LR 1750-000/12812-15-02/en

3.2 Overview of acoustic / visual warnings for cranes without CE mark

- Depending on the crane type, either a warning light **12.1** or a flashing beacon **12.2** or a combination of flashing beacon **12.2** and warning light* **12.3** are installed.
- The acoustic warnings within the crane operator's cab are turned off by pressing the button **F8** on the LICCON monitor with crane operating screen (illustration **3**).
- The acoustic warnings outside the crane operator's cab are turned off by actuating the key button **35** on the LICCON monitor with derrick operating screen (illustration **4**).

3.2.1 Description of acoustic / visual warnings

The case numbers from the chart „Overview of case numbers“ are valid for the following charts in this chapter:

- „Acoustic / visual warnings on the LICCON monitor“
- „Warning light 12.1“
- „Flashing beacon 12.2“
- „Warning light 12.3“

Overview of case numbers	
Case number	Description Case
Case 001	Utilization of crane from 0 % to 89 %
Case 002	Utilization of crane from 90 % to 100 %
Case 003	Utilization of crane over 100 %
Case 004	Shut off of crane movements - LMB STOP
Case 005	Luffing in with suspended load
Case 006	Participating sensor (LMB) defective
Case 010	Exceeding the shut off limits of the LICCON overload protection
Case 011	Bypass of shut off hoist top
Case 016	Bypass of shut off luffing down the boom / auxiliary boom / accessories, „Load chart available“
Case 018	Bypass of shut off luffing down the boom / auxiliary boom / accessories, „No load chart available“
Case 020	Exceeding the shut off limits of the LICCON overload protection during erection / take down procedures, „No load chart available“

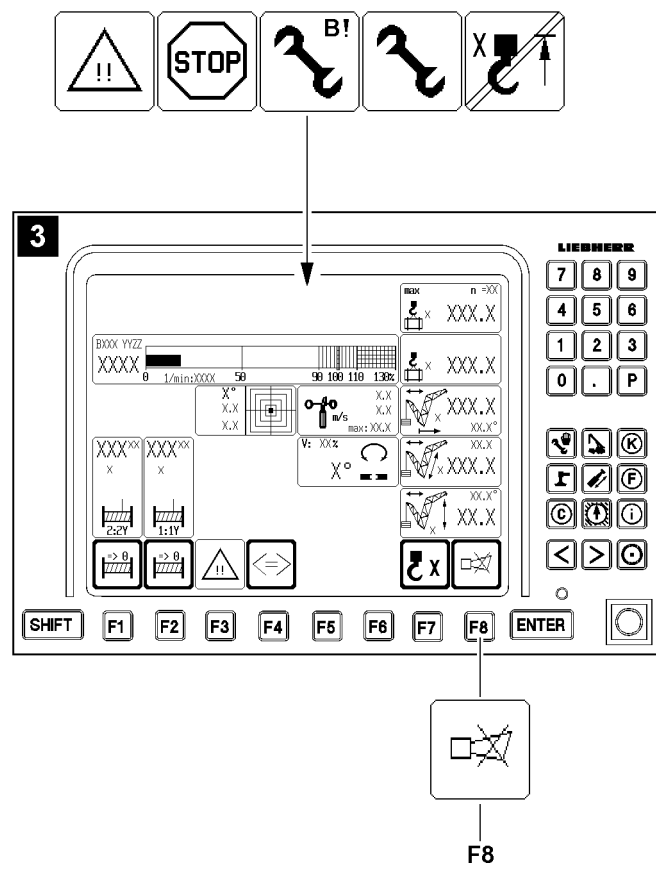


Fig.111209

LWE/LR 1750-000/12812-15-02/en

3.2.2 Acoustic / visual warnings within the crane operator's cab



Note

► Description of individual case numbers, see chart „Overview of case numbers“.

Acoustic / visual warnings on the LICCON monitor									
Case number	Acoustic warning LICCON monitor at utilization of crane			Visual warning LICCON monitor					
	Short sound	Long sound	Long sound	Utilization of crane		Occurrence			
	From 90 %	Above 100 %	Always	From 90 %	Above 100 %	LMB STOP	Appears if the set up key D is actuated		
Case 001							—	—	—
Case 002	X ²			○			—	—	—
Case 003		X ²		○	○		—	—	—
Case 004			X ²		○		—	—	—
Case 005	X ²	X ²		○	○		—	—	—
Case 006			X ²			○		○	
Case 010	X ²	X ²		○	○		○		
Case 011			X ²	○	○	○	○		○
Case 016	X ²	X ²		○	○		○		
Case 018			X ²			○		○	
Case 020			X ²			○		○	

○ = cannot be turned off

X² = can be turned off immediately on the LICCON monitor key **F8**

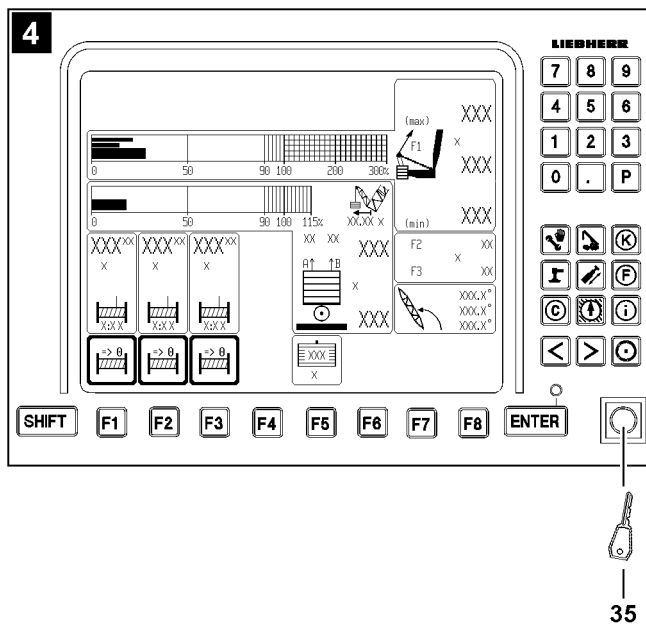
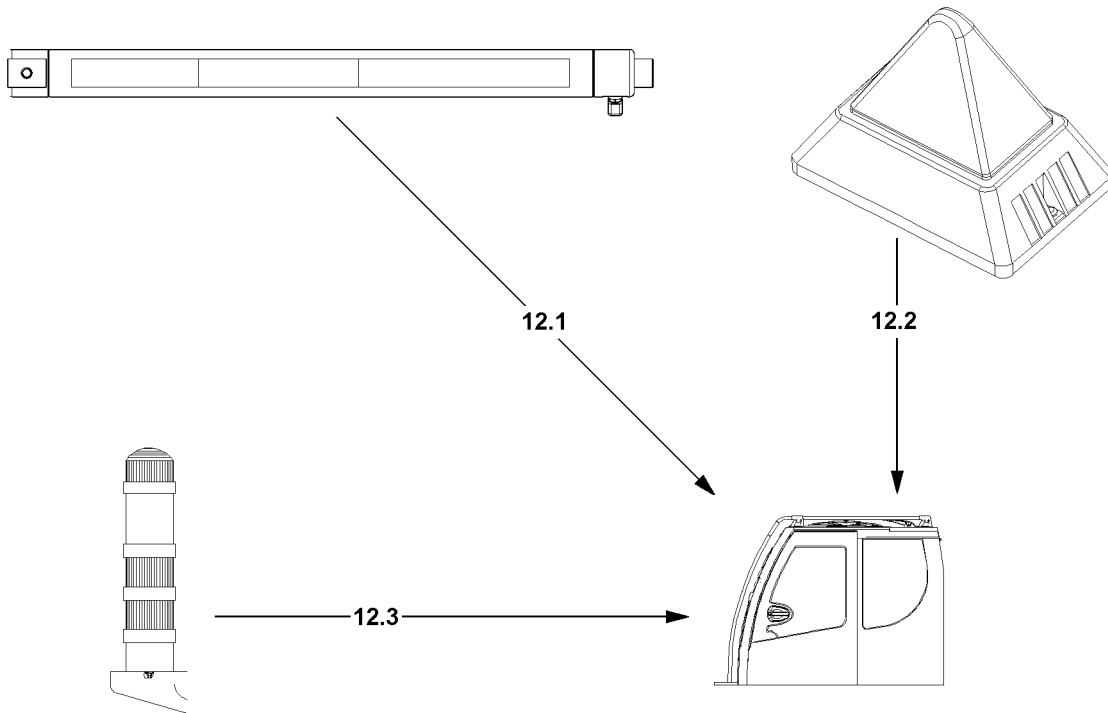


Fig.111206

3.2.3 Acoustic / visual warnings outside the crane operator's cab



Note

► Description of individual case numbers, see chart „Overview of case numbers“.

Warning light 12.1					
Case number	At utilization of crane	Acoustic warning	Visual warning		
		Signal turntable	Green	Yellow	Red
Case 001	From 0 % to 89 %		O ¹		
Case 002	From 90 % to 100 %			O ¹	
Case 003	Above 100 %	X ¹			O ¹
Case 004	-				O ¹
Case 005	From 0 % to 89 %		O ¹		
Case 005	From 90 % to 100 %			O ¹	
Case 005	Above 100 %	X ¹			O ²
Case 006	-			O ²	
Case 010	From 0 % to 89 %		O ¹		
Case 010	From 90 % to 100 %			O ¹	
Case 010	Above 100 %	O			O ²
Case 011	From 0 % to 100 %			O ²	
Case 011	Above 100 %	O			O ²
Case 016	Up to 90 %		O ¹		
Case 016	Above 90 % to 100 %			O ¹	
Case 016	Above 100 %	O			O ²
Case 018	No value available			O ²	
Case 020	No value available			O ²	

O = cannot be turned off

O¹ = warning light **12.1** lights up

O² = warning light **12.1** blinks

X¹ = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

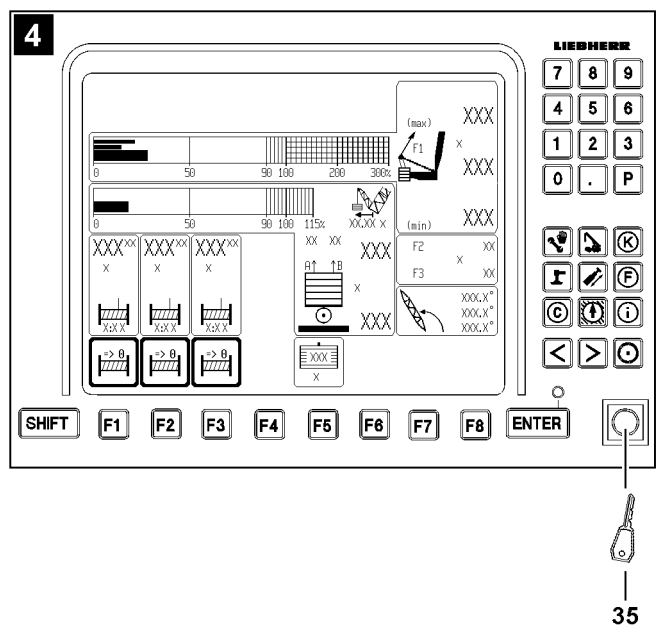
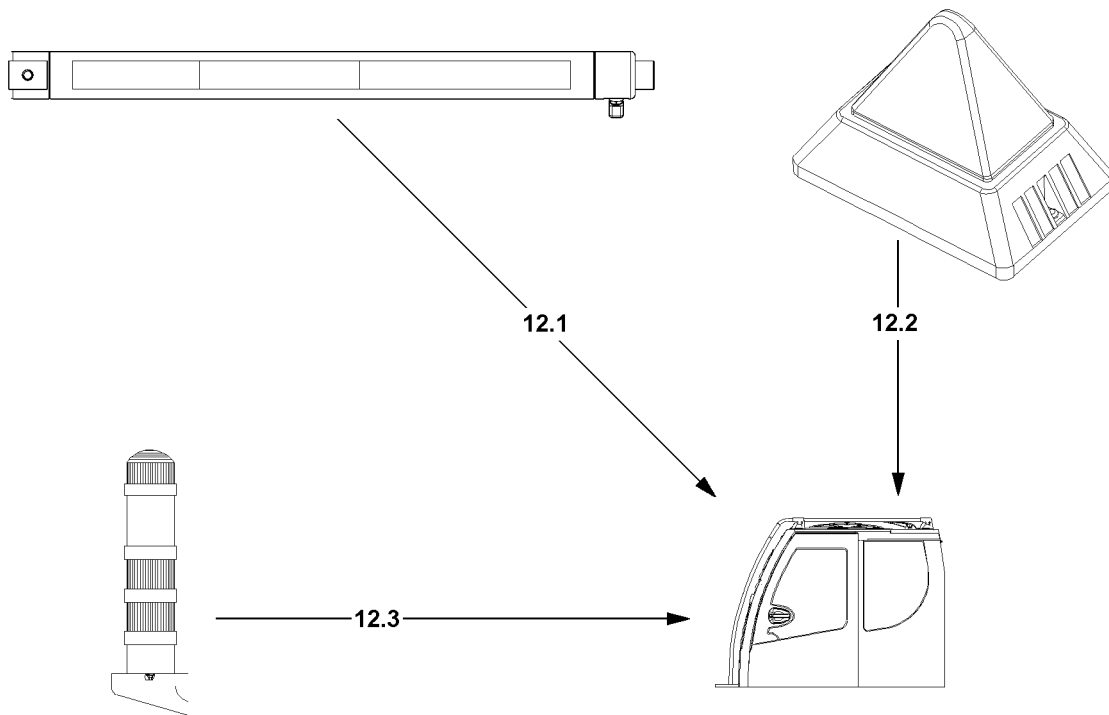


Fig.111206

LWE/LR 1750-000/12812-15-02/en

**Note**

► Description of individual case numbers, see chart „Overview of case numbers“.

Flashing beacon 12.2			
Case number	At utilization of crane	Acoustic warning	Visual warning
		Signal turntable	Red
Case 001	0 % to 89 %	-	-
Case 002	90 % to 100 %	-	-
Case 003	Above 100 %	X ¹	O ²
Case 004	-		O ²
Case 005	Above 100 %	X ¹	O ²
Case 006	-		O ²
Case 010	Above 100 %	O	O ²
Case 011	Above 100 %	O	O ²
Case 016	Above 100 %	O	O ²
Case 018	No value available		O ²
Case 020	No value available		O ²

O = cannot be turned off

O² = flashing beacon **12.2** blinks

X¹ = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

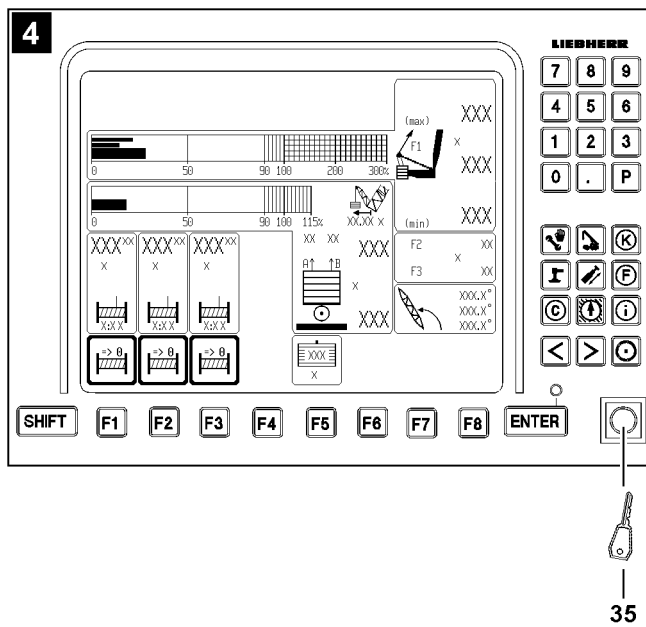
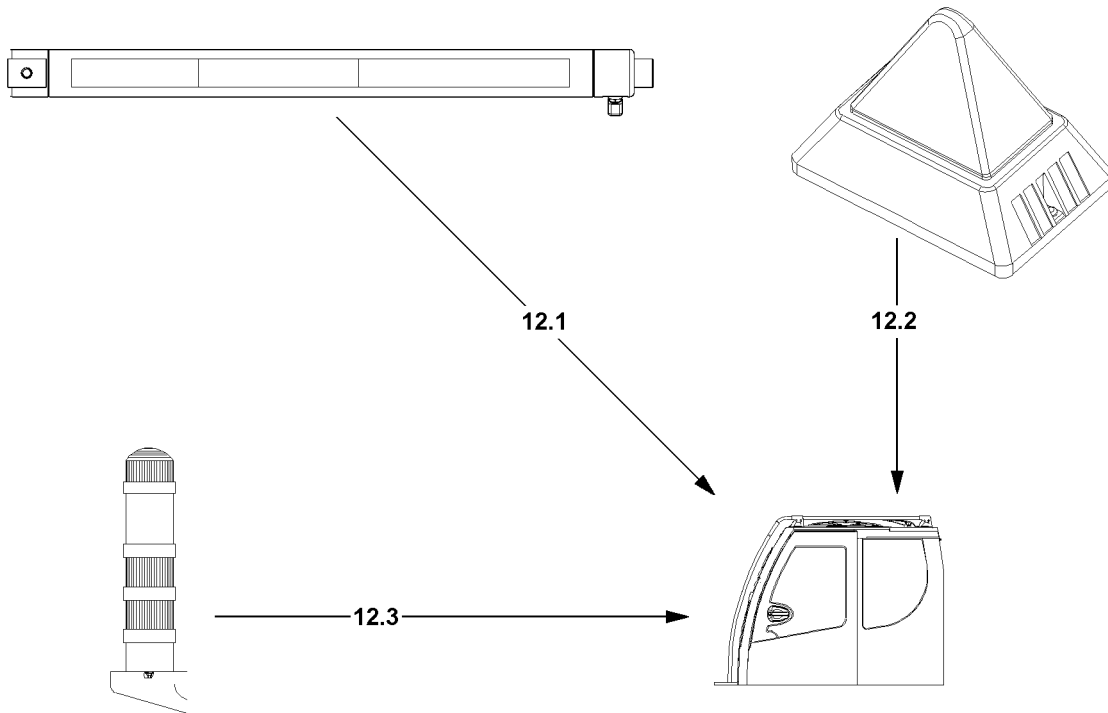


Fig.111206

**Note**

► Description of individual case numbers, see chart „Overview of case numbers“.

Warning light 12.3					
Case number	At utilization of crane	Acoustic warning	Visual warning		
		Signal turntable	Green	Yellow	Red
Case 001	From 0 % to 89 %		O ¹		
Case 002	From 90 % to 100 %			O ¹	
Case 003	Above 100 %	X ¹			O ²
Case 004	-				O ²
Case 005	From 0 % to 89 %		O ¹		
Case 005	From 90 % to 100 %			O ¹	
Case 005	Above 100 %	X ¹			O ²
Case 006	-				O ²
Case 010	From 0 % to 89 %		O ¹		
Case 010	From 90 % to 100 %			O ¹	
Case 010	Above 100 %	O			O ²
Case 011	From 0 % to 100 %			O ¹	
Case 011	Above 100 %	O			O ²
Case 016	From 0 % to 89 %		O ¹		
Case 016	From 90 % to 100 %			O ¹	
Case 016	Above 100 %	O			O ²
Case 018	No value available				O ²
Case 020	No value available				O ²

O = cannot be turned off

O¹ = warning light **12.3** lights up

O² = warning light **12.3** blinks

X¹ = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

3.3 Monitoring of crane movement

**Note**

- If the LICCON overload protection turns the crane movement off, then the exact cause for the shut off must be determined first.
- As a first step, try to rescind the crane movement which has caused a shut off.
- If it is not possible to rescind the affected crane movement, then the additional steps are described in the following sections of the chapter.

**Note**

- For detailed description of the individually listed symbols, see Crane operating instructions, chapter 4.02.

The LICCON overload protection carries out the following shut offs if a limit value is exceeded in crane operation:

- Shut off luffing the main boom up / down
- Shut off Upper limit shut off angle (OGAW)
- Shut off Luffing the auxiliary boom / accessory up / down
- Shut off maximum / minimum value test point 1 (force F1)
- Shut off spooling the winch up / out
- Shut off Hoist top
- Shut off due to error message

The LICCON overload protection warns if the limit values are exceeded, but does not turn off:

- Minimum / maximum support forces

3.3.1 Shut off luffing the main boom up / down

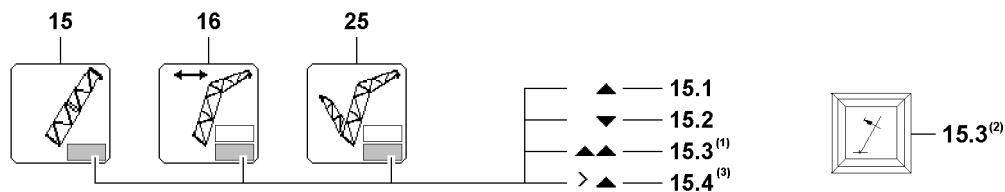


Fig.124701

⁽¹⁾not LR 1400/2

⁽²⁾only LR 1400/2

⁽³⁾Only for certain crane types

In symbol **15**, or symbol **16**, or symbol **25** appears in the lower field symbol **15.1**, or symbol **15.2** or symbol **15.4** and the LICCON overload protection has shut the crane movement off.

„Luffing the main boom up“ (symbol **15.1**), „Luffing the main boom down“ (symbol **15.2**) or „upper limit shut off angle“ reached (symbol **15.4**), was shut off because the upper / lower limit angle of the selected load chart was exceeded / fallen below.

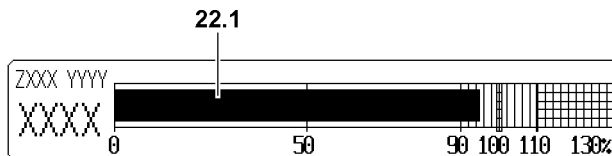


Fig.112340



Note

- ▶ If the utilization of the crane is more than 95 % (utilization bar **22.1** exceeds 95 %) and the maximum load according to the load chart (falling load capacity) drops by continuing to luff up the boom, then the symbol **15.1** also appears and the crane movement „Luffing the main boom up“ is turned off.

If the symbol / warning light **15.3** appears, then:

- **either** it was luffed up to a limit switch or the limit switch has turned off the crane movement „Luffing the main boom up“
- **or** there is an error on one of the limit switches „Main boom top“

The symbol **15.1** appears and the crane movement „Luffing the main boom up“ was turned off:

- ▶ Luff the main boom down.

Result:

- Crane operation is possible again.

The symbol **15.2** appears and the crane movement „Luffing the main boom down“ was turned off:

- ▶ Luff the main boom up.

Result:

- Crane operation is possible again.

The symbol / warning light **15.3** appears and the crane movement „Luffing the main boom up“ was turned off:

- ▶ Luff the main boom down.

Result:

- Crane operation is possible again.

Problem remedy

The symbol / warning light **15.3** appears continuously?

If a symbol / warning light **15.3** appears without having luffed the main boom up to a limit switch, then there may be an error in the limit switches „Main boom top“.

- ▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
- ▶ If yes: Remedy the error immediately.

The symbol **15.4** appears and the crane movement „Luffing the main boom up“ (upper limit shut off angle) was turned off:

- ▶ Luff the main boom down.

Result:

- Crane operation is possible again.



WARNING

Limited warning functions!

If one of the double version limit switches is not ok and the crane is continued to be operated, then the warning functions of the LICCON overload protection are limited.

- ▶ The crane can only be operated in an emergency after failure of a double version limit switch.
- ▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

3.3.2 Shut off Luffing the auxiliary boom / accessory up / down

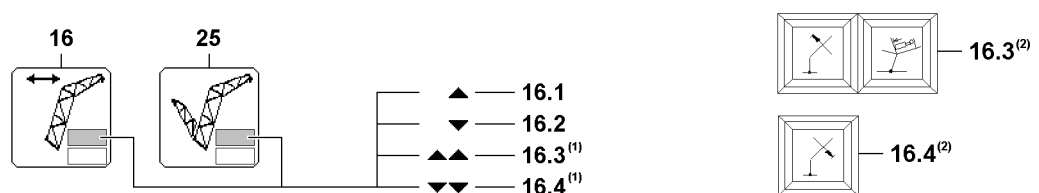


Fig.124702

⁽¹⁾not LR 1400/2

⁽²⁾only LR 1400/2

In symbol **16** or symbol **25** appear in the upper field symbol **16.1** or symbol **16.2** and the LICCON overload protection has shut off the crane movement.

„Luffing the auxiliary boom / accessory up“ (symbol **16.1**) or „Luffing the auxiliary boom / accessory down“ (symbol **16.2**) was shut off because the upper / lower limit angle of the selected load chart was exceeded / fallen below.

If the symbol / warning light **16.3** appears, then:

- **either** it was luffed up to a limit switch or the limit switch has turned off the crane movement „Luffing the auxiliary boom / accessory up“

- **or** the mechanical relapse support has turned off the crane movement „Luffing the auxiliary boom / accessory up“
- **or** there is an error on one of the limit switches „Auxiliary boom / accessory top“.

If the symbol / warning light **16.4** appears, then:

- **either** it was luffed down to a limit switch „Auxiliary boom / accessory bottom“ and the limit switch has turned off the crane movement „Luffing the auxiliary boom / accessory up“
- **or** there is an error on one of the limit switches „Auxiliary boom / accessory bottom“

The symbol **16.1** appears and the crane movement „Luffing the auxiliary boom / accessory up“ was turned off:

- ▶ Luff the auxiliary boom / accessory down.

Result:

- Crane operation is possible again.

The symbol **16.2** appears and the crane movement „Luffing the auxiliary boom / accessory down“ was turned off:

- ▶ Luff the auxiliary boom / accessory up.

Result:

- Crane operation is possible again.

The symbol / warning light **16.3** appears and the crane movement „Luffing the auxiliary boom / accessory up“ was turned off:

- ▶ Luff the auxiliary boom / accessory down.

Result:

- Crane operation is possible again.

Problem remedy

The symbol / warning light **16.3** appears continuously?

If a symbol / warning light **16.3** appears without having luffed up to a limit switch, then there may be an error in the limit switches „Auxiliary boom / accessory top“.

- ▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
- ▶ If yes: Remedy the error immediately.

The symbol / warning light **16.4** appears and the crane movement „Luffing the auxiliary boom / accessory down“ was turned off:

- ▶ Luff the auxiliary boom / accessory up.

Result:

- Crane operation is possible again.

Problem remedy

The symbol / warning light **16.4** appears continuously?

If a symbol / warning light **16.4** appears without having luffed down to a limit switch, then there may be an error in the limit switches „Auxiliary boom / accessory bottom“.

- ▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
- ▶ If yes: Remedy the error immediately.



WARNING

Limited warning functions!

If one of the double version limit switches is not ok and the crane is continued to be operated, then the warning functions of the LICCON overload protection are limited.

- ▶ The crane can only be operated in an emergency after failure of a double version limit switch.

- ▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

3.3.3 Shut off maximum / minimum value test point 1 (force F1)



Note

- ▶ The force determined on test point 1 is generally described as $F1_{\text{actual}}$ (actual value F1).
- ▶ In the icon 17 (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).
- ▶ The value $F1_{\text{max-operation}}$ 17.3 corresponds to 100 % in the F1-bar display.
- ▶ The F1-utilization bar 17.1 shows the relationship $F1_{\text{actual}}$ 17.2 to $F1_{\text{max-operation}}$ 17.3.
- ▶ In crane operation without derrick ballast, fewer values may be shown in the icon 17 (F1-load display).

Shut off maximum value F1 in crane operation

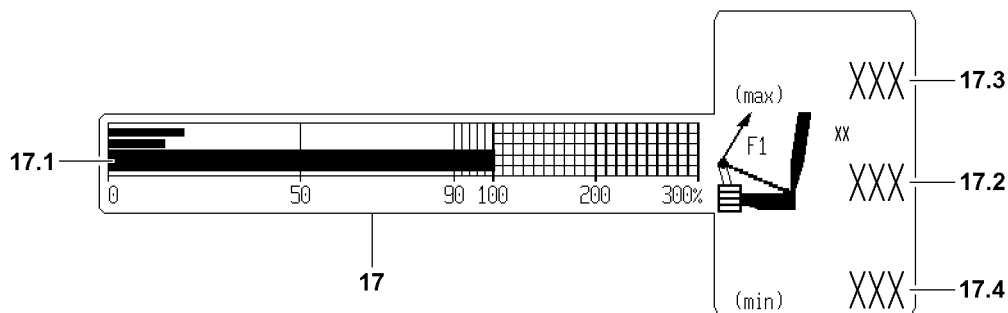


Fig. 110991

In the icon 17 (F1-load display) the F1-utilization bar 17.1 exceeds the 100 % mark and the LICCON overload protection has shut off the crane movement. The value $F1_{\text{actual}}$ 17.2 has exceeded the value $F1_{\text{max-operation}}$ 17.3.

All further movements, which lead to an increase of the force F1 (value $F1_{\text{actual}}$) are shut off.

- ▶ Reverse any crane movement which has caused the shut off.
- or
- Initiate an alternative crane movement, which lowers the force F1 (value $F1_{\text{actual}}$).

Result:

- Crane operation is possible again.

Problem remedy

The crane operation is limited because the value $F1_{\text{max-operation}}$ apparently is being reached too early?

- ▶ Make sure that a valid set up status has been entered on the LICCON computer system.
- ▶ Make sure that the crane is assembled according to the assembly drawings.
- ▶ Make sure that the actual set up status and the entered set up status of the crane match.
- ▶ Make sure that all attachment parts and guy rods on the boom system, which are not needed, have been removed (weight).
- ▶ Make sure that the boom system is free of snow and ice (weight).
- ▶ Make sure that the wind influence onto the boom is not too great.

If no irregularities can be found:

- ▶ Contact Liebherr Service.

Shut off minimum value F1 in crane operation



Note

- ▶ A shut off minimum value F1 ($F1_{\text{min}}$) only occurs in operating modes with derrick ballast. The status $F1_{\text{actual}} = F1_{\text{min}}$ cannot be reached in all other operating modes.

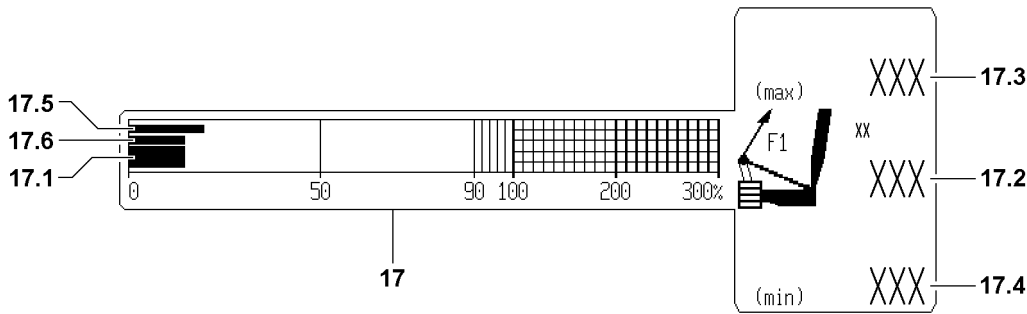


Fig.110992

In the icon **17** (F1-load display), when falling below the $F1_{\min}$ advance warning bar **17.5**, a warning of the upcoming shut off is issued by the F1-utilization bar **17.1**.

If the F1-utilization bar **17.1** falls below the $F1_{\min}$ -STOP bar **17.6**, then the LICCON overload protection shuts off the crane movement. The value $F1_{\text{actual}}$ **17.2** has fallen below the value $F1_{\min}$ **17.4**.

**Note**

Shut off $F1_{\min}$!

- ▶ If the utilization of the derrick ballast is below 50 %, then there is no immediate shut off when falling below value $F1_{\min}$ **17.4**.

All further movements, which lead to an decrease of the force $F1$ (value $F1_{\text{actual}}$) are shut off.

- ▶ Reverse any crane movement which has caused the shut off.
or
Initiate an alternative crane movement, which increases the force $F1$ (value $F1_{\text{actual}}$).

Result:

- Crane operation is possible again.

Problem remedy

The crane operation is limited because the value $F1_{\min}$ apparently is being reached too early?

- ▶ Make sure that a valid set up status has been entered on the LICCON computer system.
- ▶ Make sure that the crane is assembled according to the assembly drawings.
- ▶ Make sure that the actual set up status and the entered set up status of the crane match.
- ▶ Make sure that all attachment parts and guy rods on the boom system, which are not needed, have been removed (weight).
- ▶ Make sure that the boom system is free of snow and ice (weight).
- ▶ Make sure that the wind influence onto the boom is not too great.

If no irregularities can be found:

- ▶ Contact Liebherr Service.

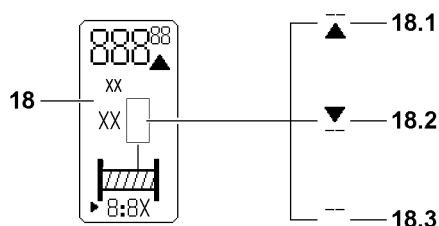
3.3.4 Shut off spooling the winch up / out

Fig.110878

In symbol **18** appears symbol **18.1**, symbol **18.2** or symbol **18.3** and the LICCON overload protection has shut off the crane movement.

„Spooling the winch out“ (symbol **18.1**) or „spooling the winch up“ (symbol **18.2**) was shut off because the upper / lower limit value of the rope for the selected winch was exceeded or fallen below.

If symbol **18.3** appears blinking in the symbol **18**, then the affected winch is deactivated.

The symbol **18.1** appears and the crane movement „Spooling the winch out“ was turned off:

- ▶ Spool the winch up.

Result:

- Crane operation is possible again.

The symbol **18.2** appears and the crane movement „Spooling the winch up“ was turned off:

- ▶ Spool the winch out.

Result:

- Crane operation is possible again.

The symbol **18.3** appears and the winch is deactivated:

- ▶ Activate the winch, see Crane operating instructions, chapter 4.02.

Result:

- Crane operation is possible again.

3.3.5 Shut off hoist top

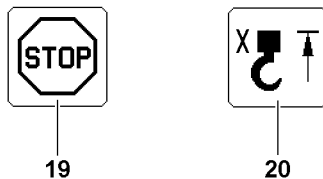


Fig.110875

The symbol **19** and hoist top icon **20** appear in the LICCON monitor and the LICCON overload protection has turned the crane movement off.

Spooling the hoist winch up was turned off because the hook block or the load hook has run against a hoist limit weight during the upward movement and the affected hoist limit switch was triggered.



WARNING

Property damage / falling load!

- ▶ After shut off spool hoist winch up (hoist top), for every further crane movement, the distance between the hook block / load hook and the boom head must be checked.



Note

- ▶ After a hoist top shut off occurred, further crane movements, which affect the length of the hoist rope are also shut off.

- ▶ Spool the hoist winch out.

Result:

- Crane operation is possible again.

3.3.6 Shut off due to error message

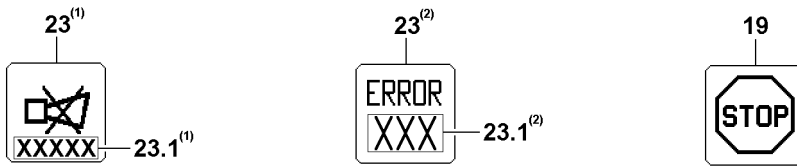


Fig.112331

⁽¹⁾not LR 1400/2

⁽²⁾only LR 1400/2

In the icon **23** appears an error message, the icon **19** appears in the LICCON monitor and the LICCON overload protection has turned off crane movement.



WARNING

Limited warning functions!

If there is a defect on a participating sensor (LML) and the crane is continued to be operated by bypassing the sensor other otherwise, then the warning functions and the shut offs of the LICCON overload protection are deactivated.

- ▶ If there is a defect on a participating sensor (LMB), then the crane may be operated further only in emergency cases.
- ▶ Fix / replace the sensor before starting crane operation again.

- ▶ Determine the existing error with the help of the error message from the error field **23.1** in icon **23**, see Diagnostics manual.
- ▶ Remedy the error.

Problem remedy

The erection of the crane, for example after assembly on a new job site or with another equipment configuration, is not possible due to an error message?

- ▶ Evaluate the error message.
- ▶ Make sure that all electrical connections are established correctly.
- ▶ Check if all sensors or dummy plugs with integrated electric have been connected properly.

If the error cannot be remedied:

- ▶ Contact Liebherr Service.

3.3.7 Minimum / maximum support forces



Note

- ▶ Applies only for cranes with support force monitoring*.
- ▶ Description of support force monitoring, see Crane operating instructions, chapter 4.02.

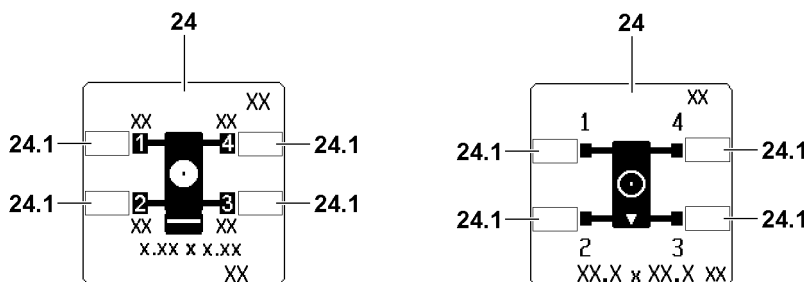


Fig.110881

LWE/LR 1750-000/12812-15-02/en

**WARNING**

The crane can topple over!

When reaching the programmed minimum / maximum support forces there is no automatic shut off of crane movements.

The displayed support force values are subjected to fluctuating influences, for example crane operation, surrounding and environmental influences.

The resulting tolerance field of the determined values may not be utilized by the support force display to determine the tipping limit of the crane.

If this is disregarded, then the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The displayed support force values of the support force display may not be used to utilize the crane up to the tipping limit.
- ▶ Make sure that all support force values are within the minimum / maximum support forces.

The icon **24** (depending on the crane, similar to the left or right illustration) is shown in the LICCON monitor with blinking value in one or several fields **24.1**. Blinking values in the fields **24.1** signal exceedance of the minimum / maximum support forces.

- ▶ Reverse the crane movements, which caused the support forces to be outside the minimum / maximum values.

Result:

- All values in the fields **24.1** are within the minimum / maximum support forces.
- ▶ Carry out crane movements in such a way that the support forces always remain within the minimum / maximum values.

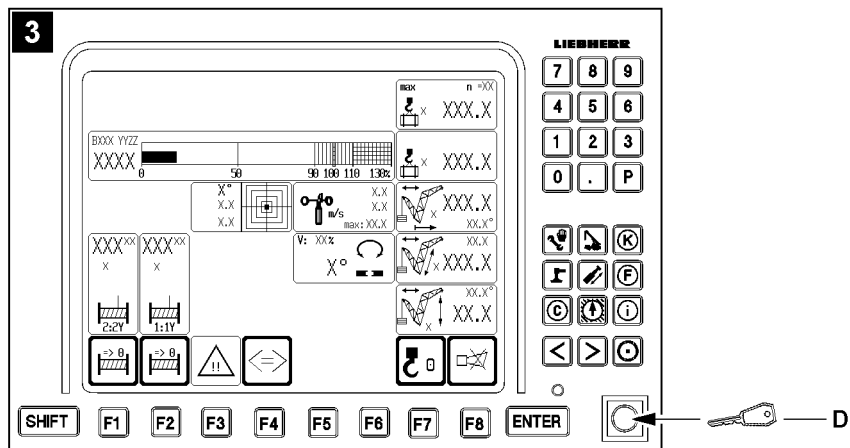
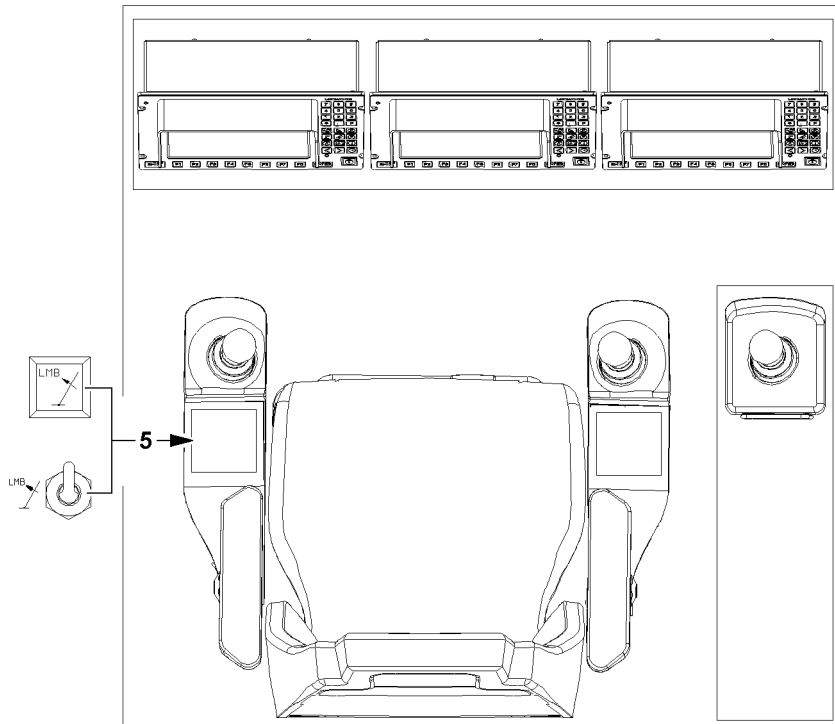


Fig.112334

LWE/LR 1750-000/12812-15-02/en

3.4 Shut off of crane movement: LMB STOP by LICCON overload protection



WARNING

Risk of overloading and toppling of the crane!

If the shut off limits of the LICCON overload protection are exceeded without knowing the exact cause for the shut off by the LICCON overload protection, then the crane can be overloaded and topple over. Personnel can be severely injured or killed.

- ▶ Before activating the function „Exceedance of shut off limits of the LICCON overload protection“ determine the exact cause for the shut off.



WARNING

Danger of accident due to function „Exceedance of shut off limits of the LICCON overload protection“! If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.

Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The button **5** „Luffing in with suspended load“ and the set up key **D** may only be actuated when it is ensured that no normal operating condition (utilization below 100 % and no active shut off) can be reached without the function „Exceedance of shut off limits of the LICCON overload protection“!
- ▶ Actuate the set up key **D** only when no normal operating condition (utilization below 100 % and no active shut off) can be reached with the button **5** „Luffing in with suspended load“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The set up key **D** may only be actuated by persons who are aware of the effects of their acts regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.



WARNING

Expanded working / danger zone of the crane!

Due to the function „Exceedance of shut off limits of the LICCON overload protection“ it is possible that the working / danger zone of the crane is significantly expanded.

If these circumstances are not observed, collisions and accidents can occur.

Personnel can be severely injured or killed.

- ▶ With activated function „Exceedance of shut off limits of the LICCON overload protection“ take an expanded working / danger zone of the crane into account and monitor it.

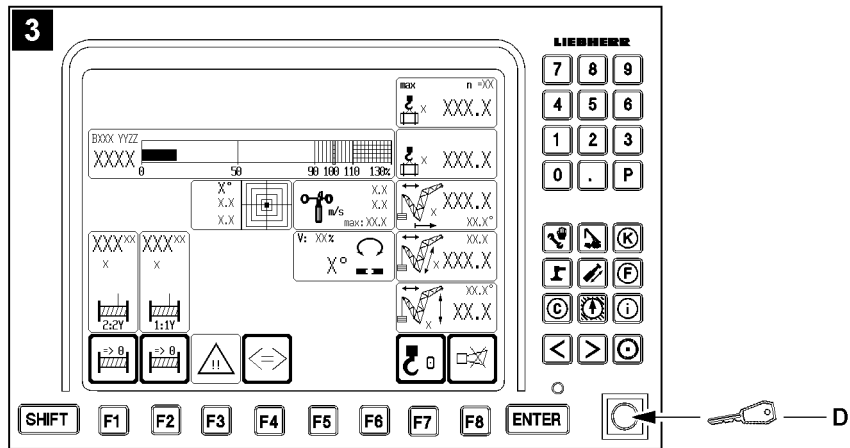
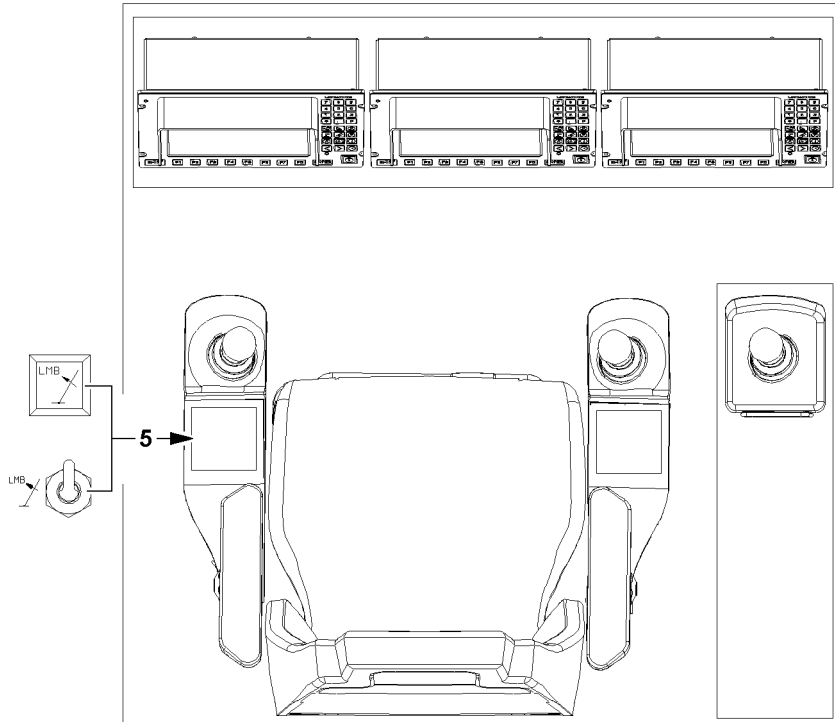


Fig.112334

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Overload of crane!

When taking on a load by luffing the boom up, the crane can be overloaded.

This could result in serious accidents.

- ▶ Taking on load by luffing up the boom is prohibited.
- ▶ Take on a load only with the hoist gear.

There are two possibilities to exceed the shut off limits of the LICCON overload protection after LMB STOP:

- With button **5** „Luffing in with suspended load“ in the left control console
- With the set up key **D** on the LICCON monitor with crane operating screen, see illustration **3**

NOTICE

Danger of mix up!

The function „Exceedance of shut off limits of LICCON overload protection“ can only be activated with the set up key **D** on the LICCON monitor with crane operating screen, see illustration **3**.

The key buttons on the other monitors are not assigned with this function.

- ▶ Do not mix up the set up key **D** with the other key buttons.
- ▶ In case of mix up: Deactivate the activated function.

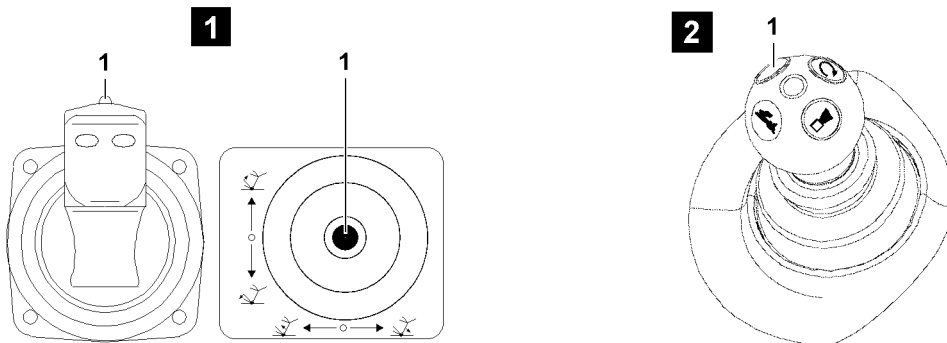
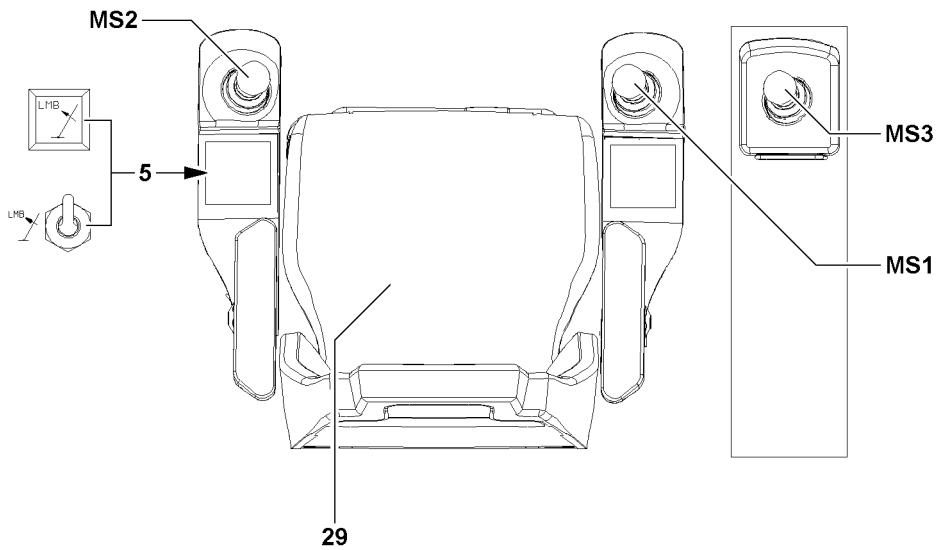
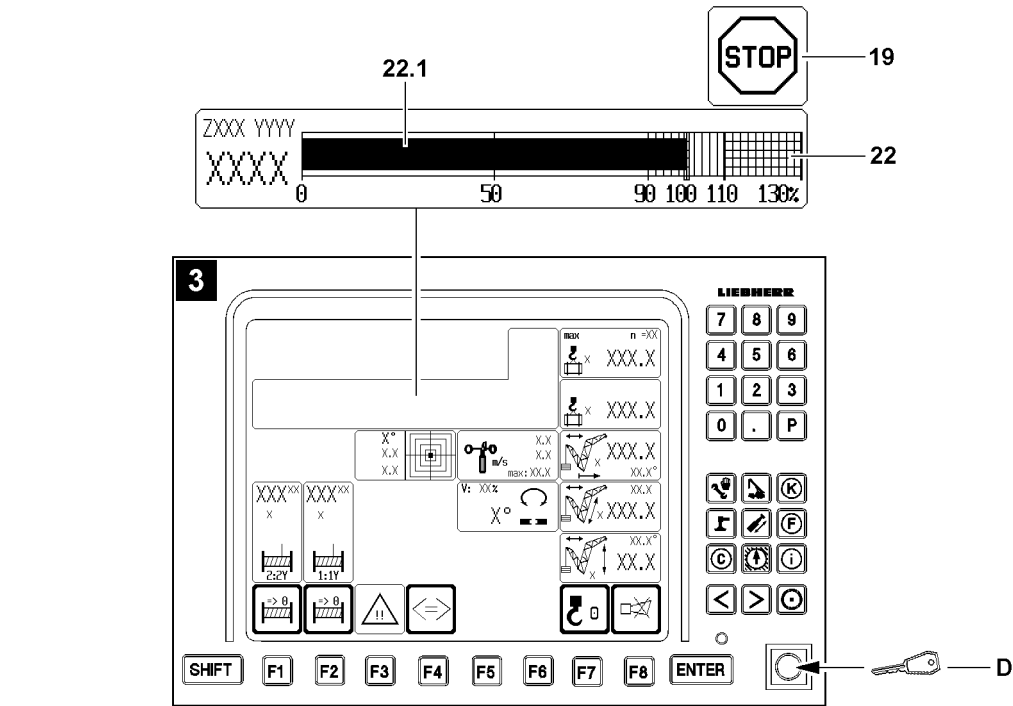


Fig.112335

LWE/LR 1750-000/12812-15-02/en

3.4.1 Luffing in with suspended load

If the maximum permissible load torque is exceeded, the LICCON overload protection turns off all crane movements that increase load torque.

In the icon **22** (load moment display) the utilization bar **22.1** has exceeded the 100 % mark and in the LICCON monitor appears the icon **19**.

This shut off limit can be exceeded by actuating the button **5** „Luffing in with suspended load“.

Make sure that the following prerequisite is met:

- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.



Note

- ▶ If the load is reduced by luffing up, then the button **5** „Luffing in with suspended load“ is possibly not functioning.
- ▶ For the procedure when the button **5** „Luffing in with suspended load“ is not functioning, see section „Exceedance of maximum permissible load moment“.

-
- ▶ Press the function key **5** „Luffing in with suspended load“ and hold it.

Result:

- The LICCON overload protection is inactive.

- ▶ Luff the load in.

Result:

- If the crane reaches a normal operation status (utilization below 100 % and no active shut off) then the icon **19** turns off, normal crane operation is possible again.

The function „Luffing in with suspended load“ is deactivated:

- When the function key **5** „Luffing in with suspended load“ is not longer actuated.
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- At engine stop.

The function „Luffing in with suspended load“ is deactivated:

- The LICCON overload protection is active.
- ▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

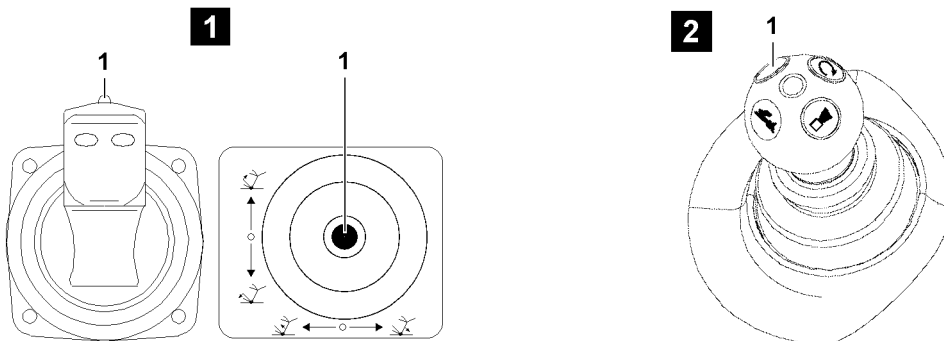
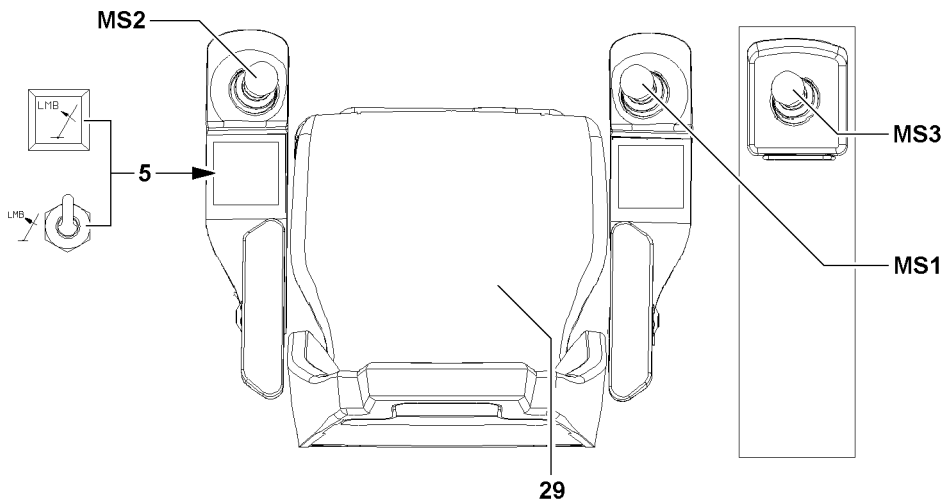
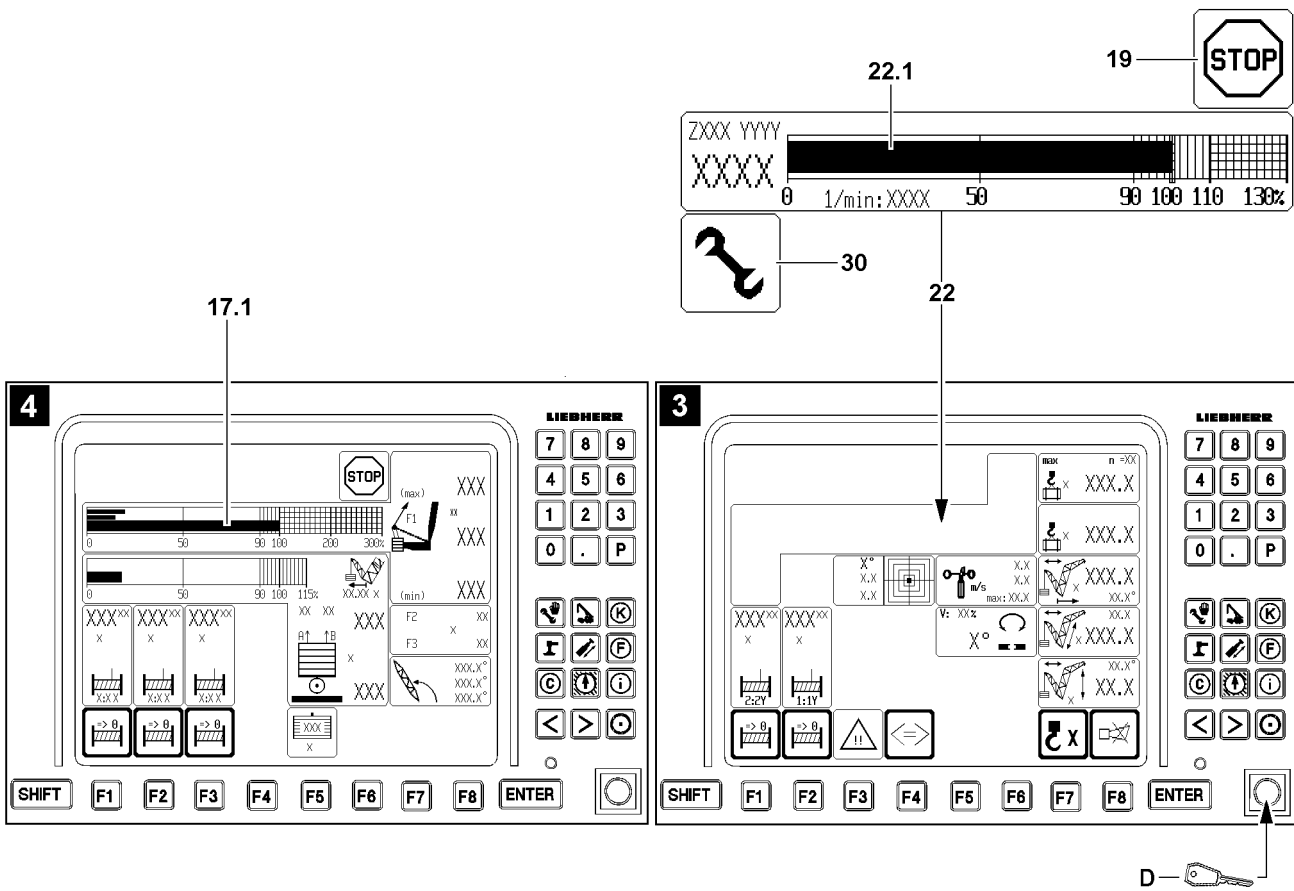


Fig.112336

LWE/LR 1750-000/12812-15-02/en

3.4.2 Exceedance of the maximum permissible load moment

If the maximum permissible load torque is exceeded, the LICCON overload protection turns off all crane movements that increase load torque.

In the icon **22** (load moment display) the utilization bar **22.1** has exceeded the 100 % mark and in the LICCON monitor appears the icon **19**.

This shut off can be exceeded by the set up key **D** in the „right touching“ position.



WARNING

Shut off safety device!

If the function „Exceedance of shut off limits of LICCON overload protection“ is activated by actuating the set up key **D** then it is possible to exceed the maximum permissible load moment. The function „Exceedance of maximum value test point 1“ is automatically activated too. Thus there is no shut off when exceeding the maximum value test point 1.

- ▶ All notes regarding the function „Exceedance of shut off limits of LICCON overload protection“ must be observed.
- ▶ The utilization bar $F1_{\text{actual}}$ **17.1** of the F1 load display must be observed.



Note

- ▶ In emergency situations, the function „Exceedance of shut off limits of the LICCON overload protection“ can be activated with the set up key **D** and the maximum permissible load moment of 100 % can be exceeded.

The set up key **D** on the LICCON monitor has two positions:

- Operating position (not actuated): Crane is in normal operation
- Position to right (touching): The function „Exceedance of shut off limits of the LICCON overload protection“ is activated, the assembly icon **30** appears in the LICCON monitor.

Make sure that the following prerequisites are met:

- With the button **5** „Luffing in with suspended load“ no normal operating status (utilization below 100 % and no active shut off) can be reached.
 - All master switches (MS1, MS2, MS3) are in zero position (not deflected).
 - Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
 - Radio operation* is not active.
- ▶ Turn the set up key **D** to the right (touching).

Result:

- The LICCON overload protection is inactive.
- The assembly icon **30** appears in the LICCON monitor.

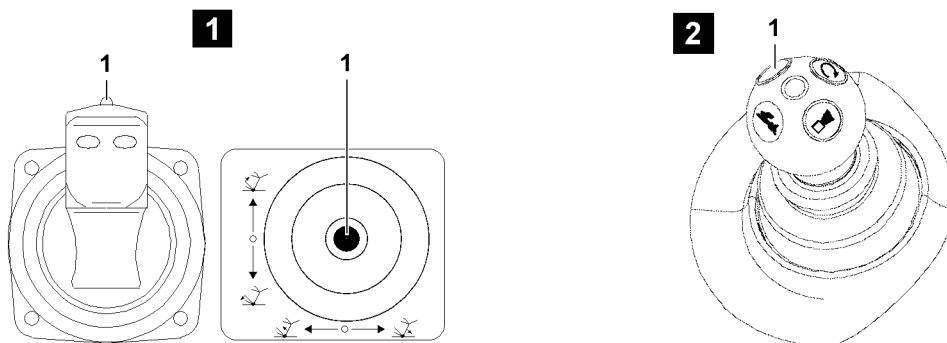
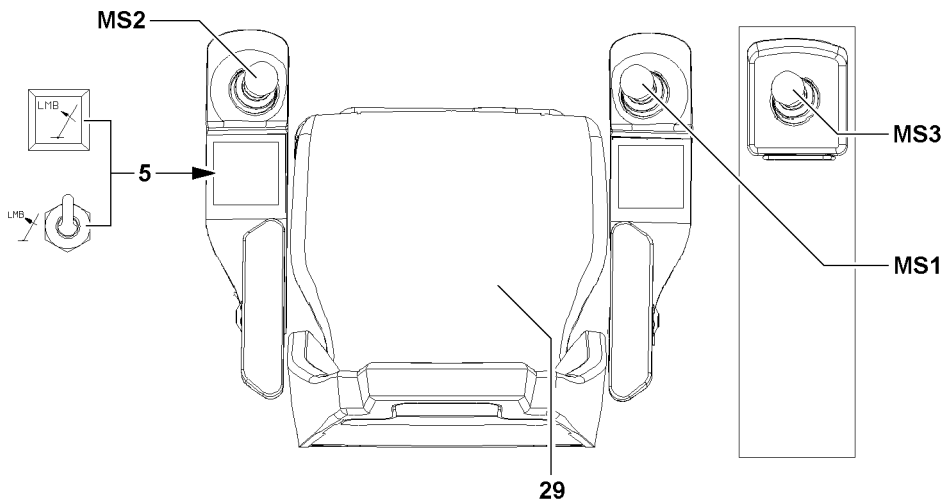
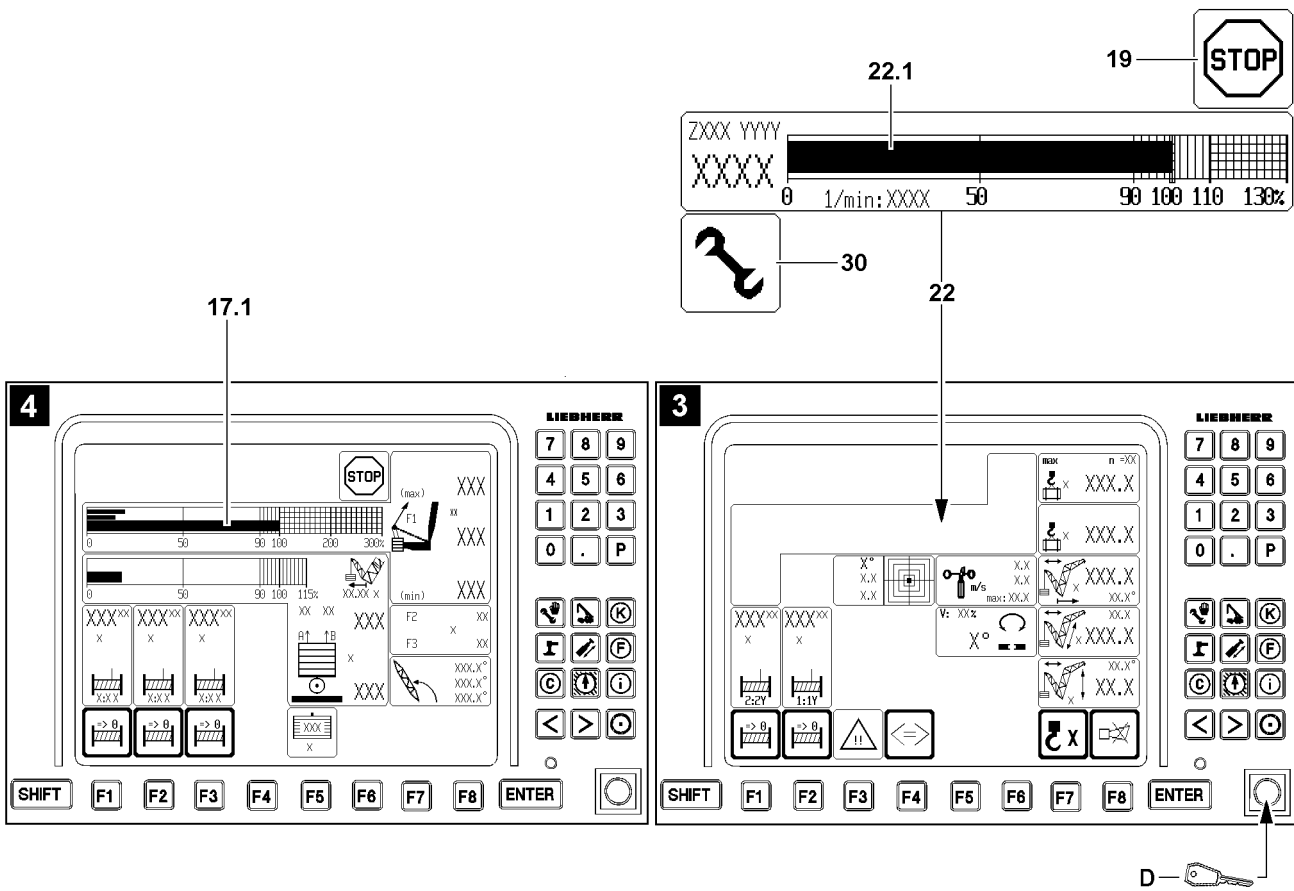


Fig.112336

- ▶ Initiate crane movements which directly lead to a normal operating status (utilization below 100 % and no active shut off).

Result:

- If a crane reaches a normal operation status (utilization below 100 % and no active shut off), then the function „Exceedance of shut off limits of the LICCON overload protection“ shuts off, the assembly icon **30** and icon **19** in the LICCON monitor turn off.

In addition, the function „Exceedance of shut off limits of LICCON overload protection“ turns off immediately:

- If the set up key **D** is actuated again.
- If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with load chart available).
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- If radio operation* is activated.
- At engine stop.
- At hoist top shut off.
- When leaving the angle range of the load chart.



Note

- ▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only turned off when the assembly icon **30** in the LICCON monitor turns off.
- ▶ If the function „Exceedance of shut off limits of the LICCON overload protection“ does not turn off after pressing the set up key **D** once, then press the set up key **D** again until the assembly icon **30** in the LICCON monitor turns off.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:

- The assembly icon **30** in the LICCON monitor turns off.
- ▶ Make sure that the assembly icon **30** does no longer appear in the LICCON monitor.
- ▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

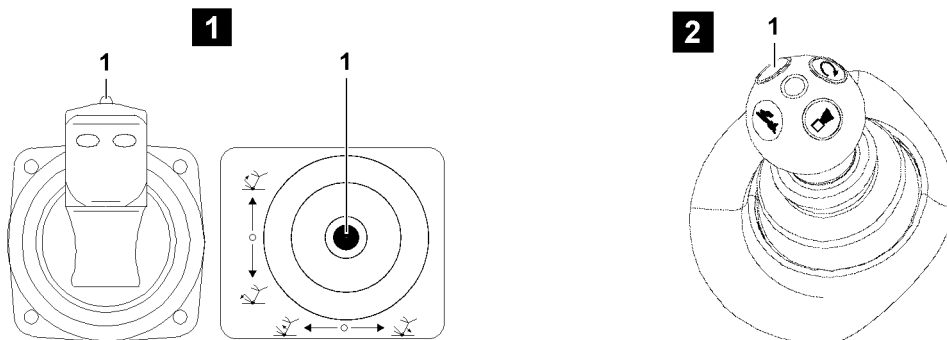
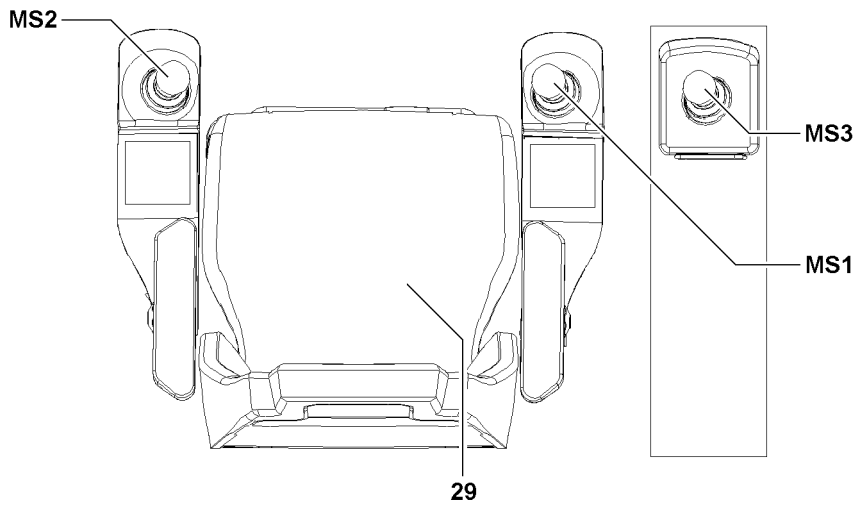
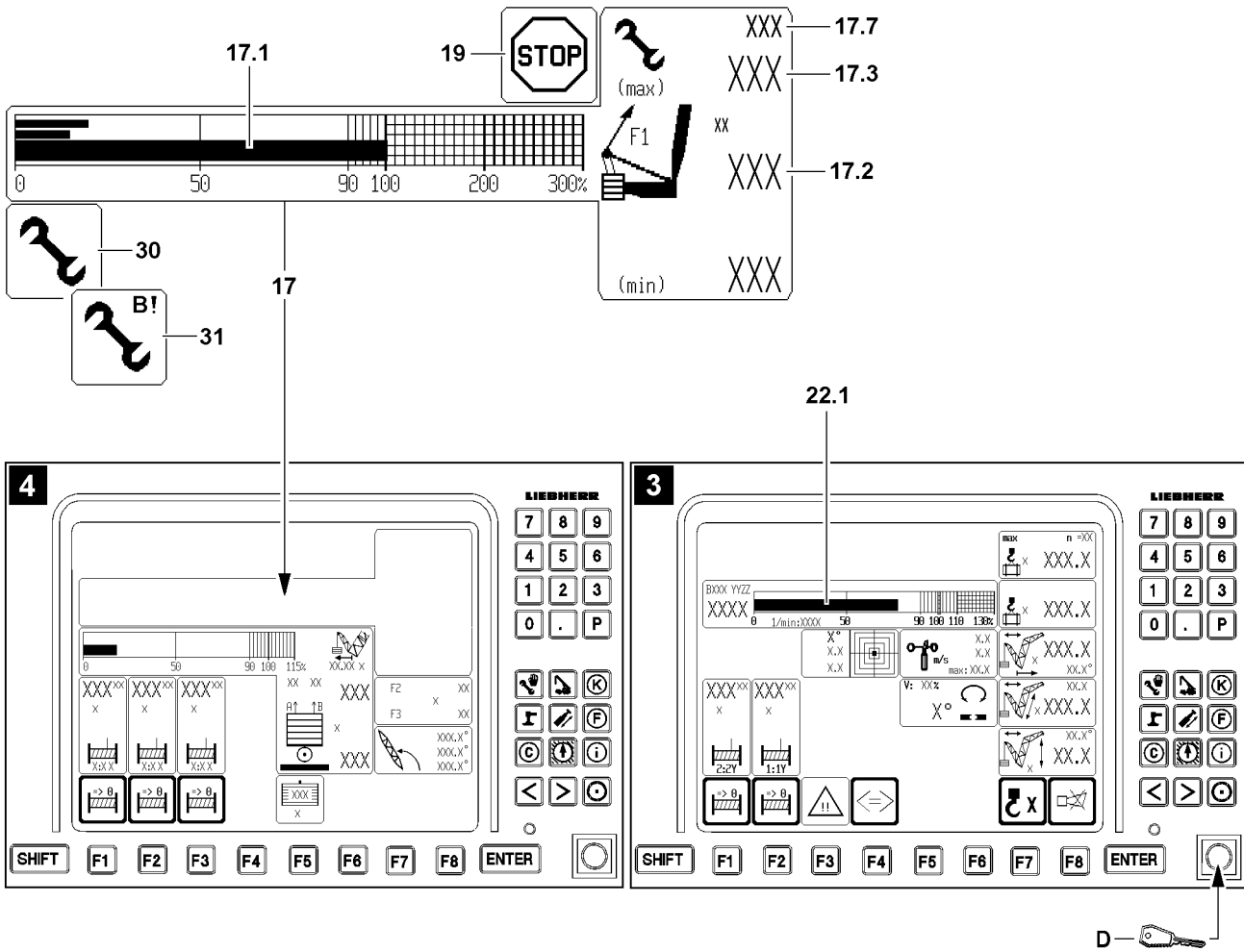


Fig.112337

LWE/LR 1750-000/12812-15-02/en

3.4.3 Exceedance of maximum value test point 1 (force F1) in crane operation



WARNING

Leaving the load chart with load on hook!

If, by actuating the set up key **D**, the shut off is bypassed by value $F1_{\text{max-operation}}$ **17.3** and exceeded by more than 110 %, then the crane is in assembly operation, the assembly icon **31** appears in the LICCON monitor.

There is no load chart available any longer and various display values may not be shown any longer in the crane operating screen.

The load on the hook is no longer monitored by the load chart.

Severe accidents due to crane overload can result.

Personnel can be severely injured or killed.

▶ In assembly operation, the data in the erection / take down charts is binding.



WARNING

Shut off safety device!

If, by actuating the set up key **D**, the function „Exceedance of maximum value test point 1“ is activated, then the function „Exceedance of shut off limits of LICCON overload protection“ is also activated automatically. Thus there is no shut off if the maximum permissible load moment is exceeded.

▶ All notes regarding the function „Exceedance of shut off limits of LICCON overload protection“ must be observed.

▶ The utilization bar **22.1** of the load moment display must be observed.



Note

▶ The force determined on test point 1 is generally described as $F1_{\text{actual}}$ (actual value F1).

▶ In the icon **17** (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).

▶ The value $F1_{\text{max-operation}}$ **17.3** corresponds to 100 % in the F1-bar display.

▶ The F1-utilization bar **17.1** shows the relationship $F1_{\text{actual}}$ **17.2** to $F1_{\text{max-operation}}$ **17.3**.

▶ In crane operation without derrick ballast, fewer values may be shown in the icon **17** (F1-load display).

▶ If the actual load is **larger** than the permissible hook block weight according to the erection / take down charts, then it can be exceeded up to maximum 110 % of $F1_{\text{max-operation}}$ **17.3**.

▶ If the actual load is **smaller** than the permissible hook block weight according to the erection / take down charts, then the assembly operation becomes active above 110 % of $F1_{\text{max-operation}}$ **17.3**. In assembly operation, there is no load chart available.

▶ The value $F1_{\text{max-assembly}}$ **17.7** appears in crane operation when 90 % of its nominal value is exceeded.

In the icon **17**(F1 load display) the utilization bar $F1_{\text{actual}}$ **17.1** exceeds the 100 % mark and the LICCON overload protection has shut off the crane movement. The value $F1_{\text{actual}}$ **17.2** has exceeded the value $F1_{\text{max-operation}}$ **17.3**.

All further movements, which lead to an increase of the force (value $F1_{\text{actual}}$) are shut off.

In the LICCON monitor with the derrick operating screen (illustration **4**) appears the icon **19**.

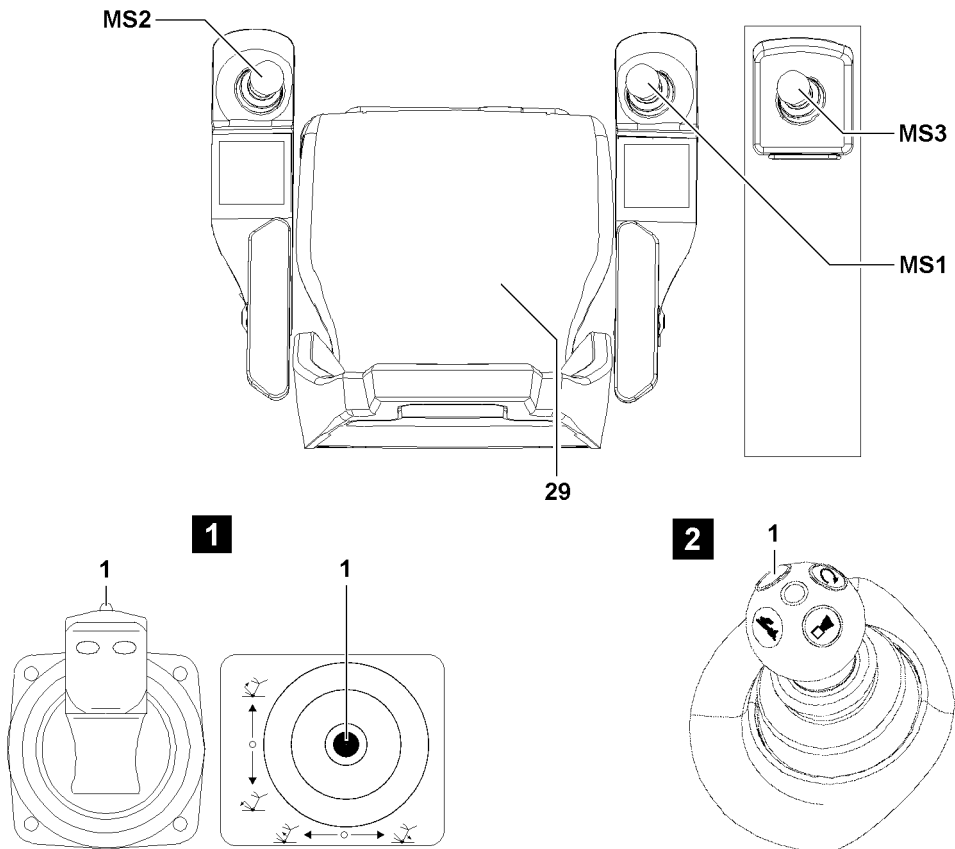
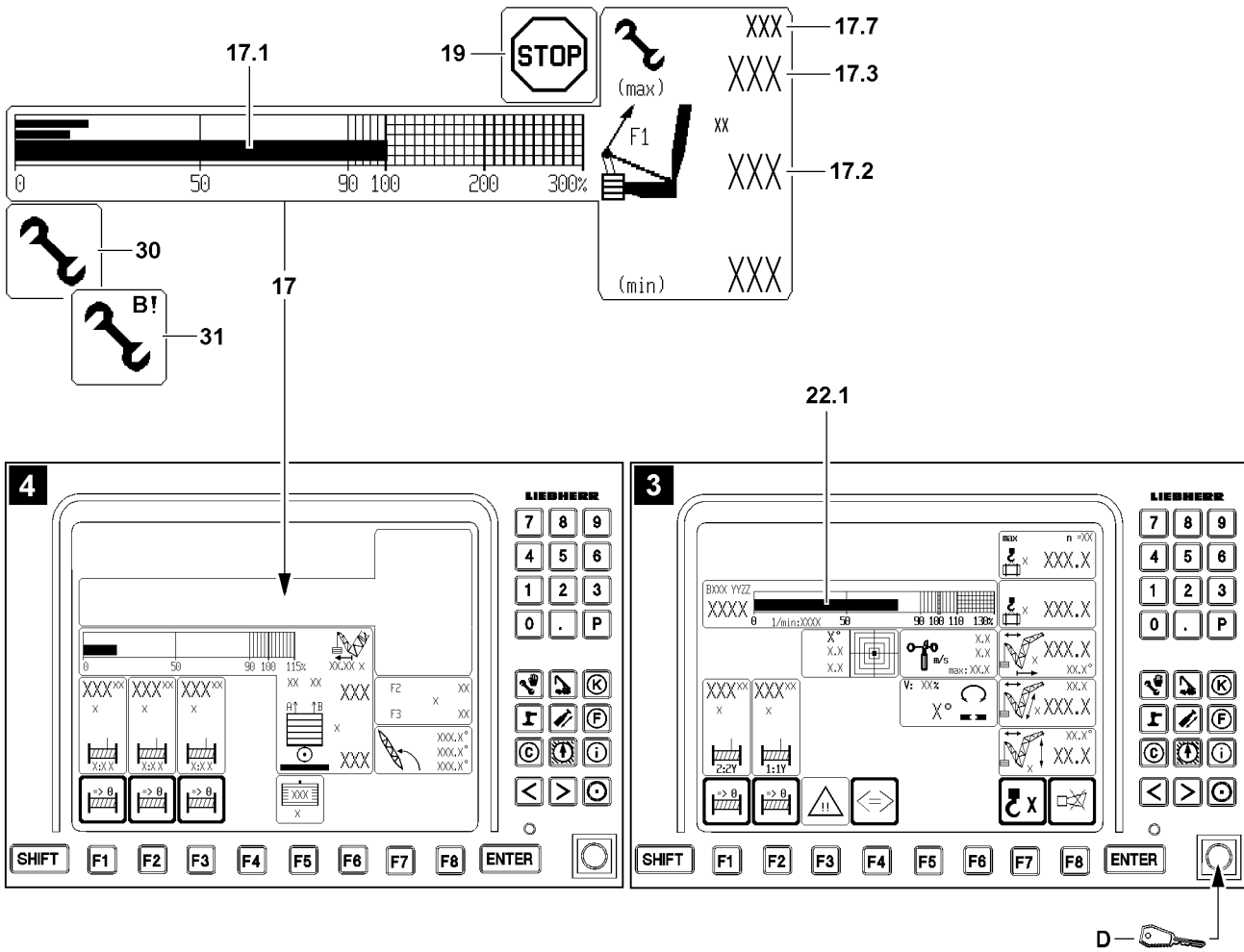


Fig.112337

LWE/LR 1750-000/12812-15-02/en

Make sure that the following prerequisites are met:

- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
 - Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
 - Radio operation* is not active.
 - The F1 load display 110 % has not been reached and a load chart is available.
- ▶ Turn the set up key **D** to the right (touching).

Result:

- The function „Exceedance of maximum value test point 1“ is activated in connection with the function „Exceedance of the shut off limits of the LICCON overload protection“.
- $F1_{\text{max-operation}}$ **17.3** can be exceeded.

The function „Exceedance of shut off limits of the LICCON overload protection“ in connection with the function „Exceedance of the maximum value test point 1“ also shuts off immediately:

- If the set up key **D** is actuated again.
- If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with load chart available).
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- If radio operation* is activated.
- At engine stop.
- At hoist top shut off.



Note

- ▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only turned off when the assembly icon **30** in the LICCON monitor turns off.
- ▶ If the function „Exceedance of shut off limits of the LICCON overload protection“ does not turn off after pressing the set up key **D** once, then press the set up key **D** again until the assembly icon **30** in the LICCON monitor turns off.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:

- The assembly icon **30** in the LICCON monitor turns off.
 - The working speed is reduced until all master switches (MS1, MS2, MS3) are in zero position at the same time.
- ▶ Make sure that the assembly icon **30** does no longer appear in the LICCON monitor.
- ▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

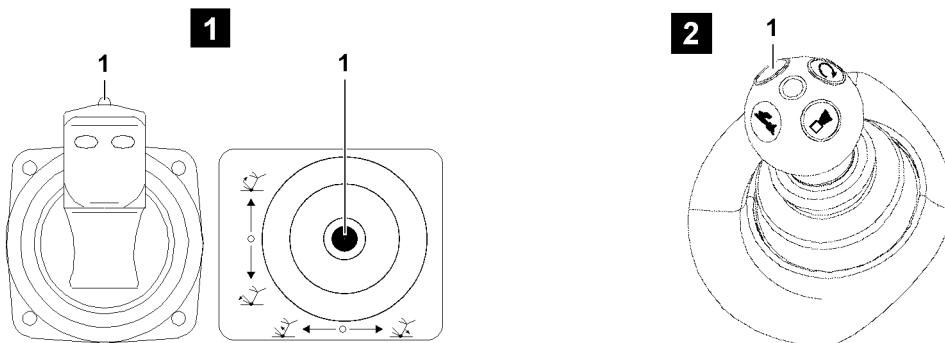
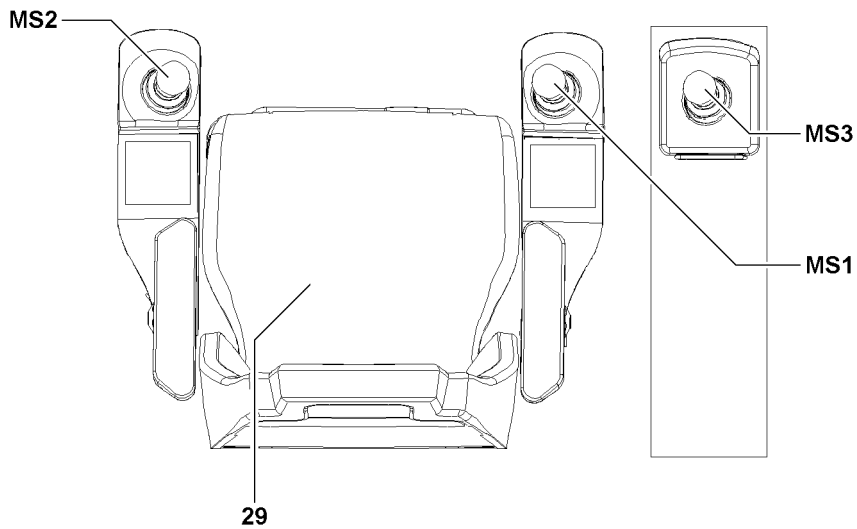
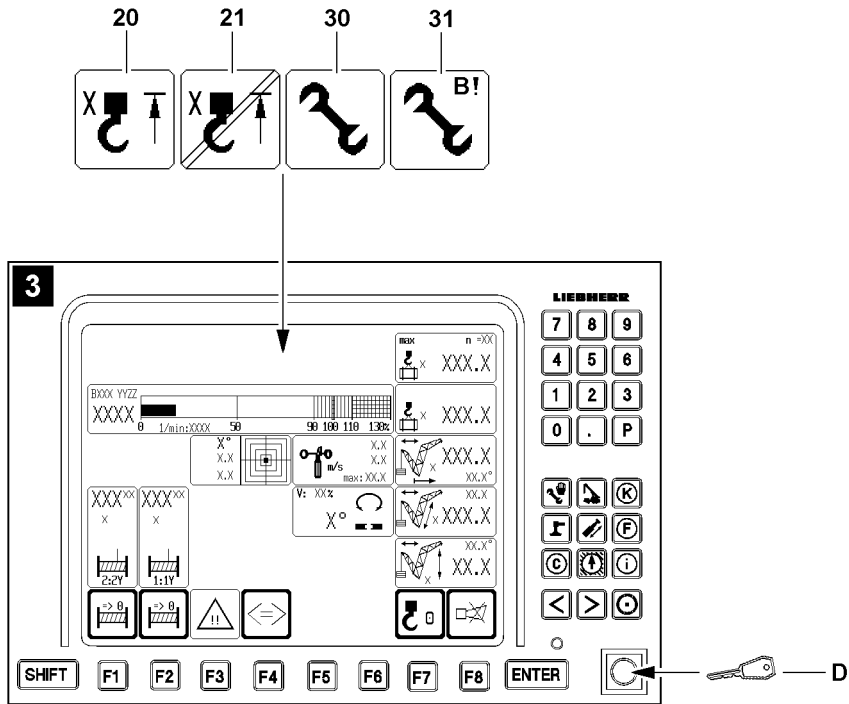


Fig.111230

3.5 Bypass of the hoist top shut off



WARNING

Improper use of the function „Bypass of hoist top shut off“!

- ▶ The function „Bypass of hoist top shut off“ may never be used to increase the lifting height during crane operation.



WARNING

Property damage and falling load!

If the function „Bypass of hoist top shut off“ is activated, there is the danger that the hook block or the load hook is pulled against the pulley head.

This danger exists especially when the hoist winch is continued to be spooled up and for crane movements which have an influence on the hoist rope, for example luffing the boom, the auxiliary boom / accessory or the derrick boom.

Property damage and falling load can result.

Personnel can be severely injured or killed.

- ▶ The function „Bypass of hoist top shut off“ may only be carried out by an authorized person, along with a guide. The guide must be in direct contact with the crane operator and must continually monitor the distance between the hook block / load hook and the boom head.
- ▶ Carry out all crane movements with utmost caution.



Note

- ▶ The activation of the function „Bypass of hoist top shut off“ is only possible if the hoist limit switch was touched and the hoist top shut off has occurred.
- ▶ If the hoist limit switch is triggered when the set up key **D** is actuated (function „Exceedance of shut off limits of the LICCON overload protection“ is active, the assembly icon **30** or the assembly icon **31** appear), then a hoist top shut off occurs and the function „Exceedance of shut off limits of the LICCON overload protection“ is deactivated.
- ▶ For assembly purposes or in emergency cases, if the activation of the function „Bypass of hoist top shut off“ **and** activation of the function „Exceedance of shut off limits of the LICCON overload protection“ is necessary, then the set up key **D** must be actuated until the icon **21** and assembly icon **30** or assembly icon **31** (assembly operation) appear.

Make sure that the following prerequisites are met:

- A hoist top shut off has occurred, the hoist top icon **20** appears in the LICCON monitor.
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- The radio operation* is not active.

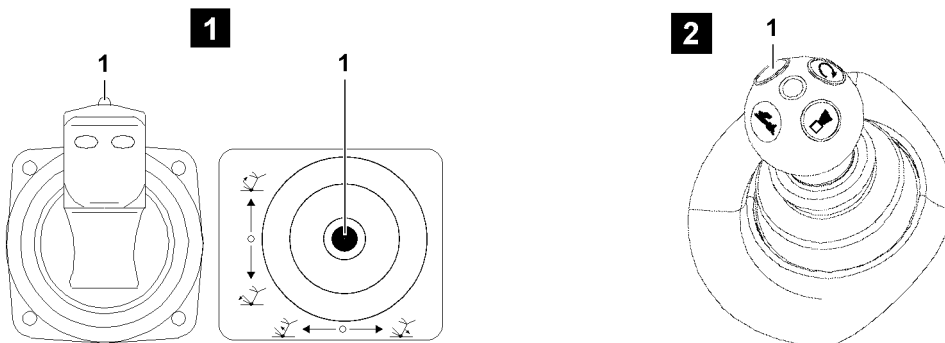
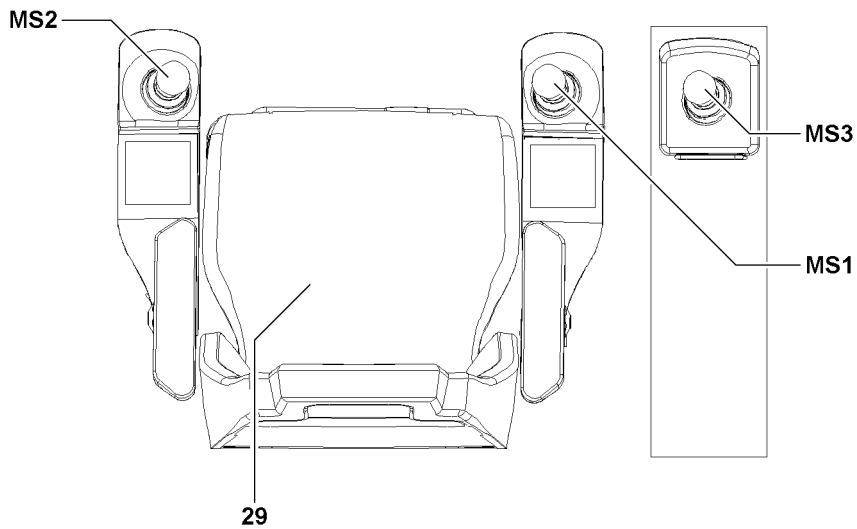
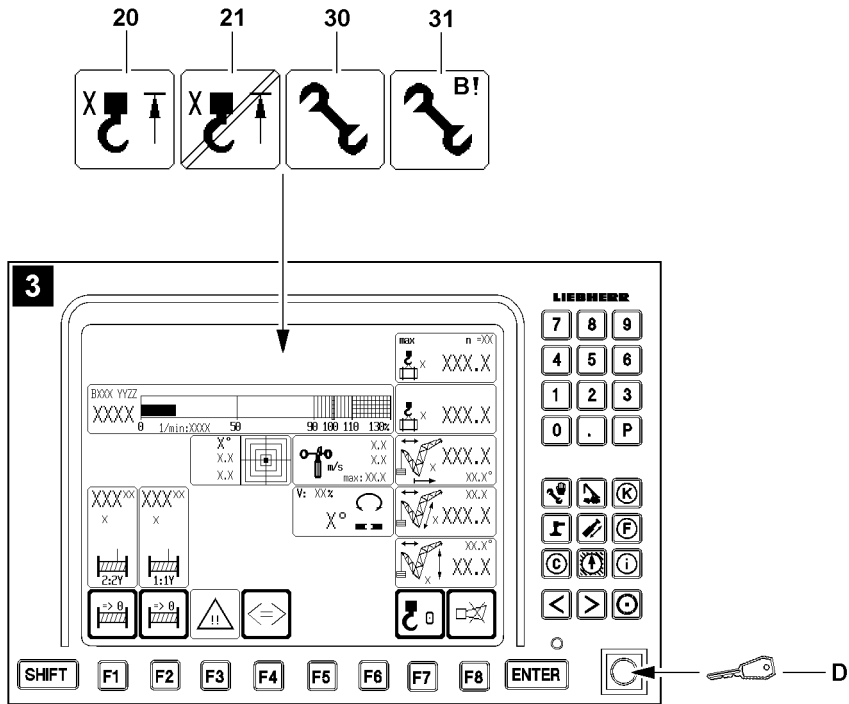


Fig.111230

LWE/LR 1750-000/12812-15-02/en

- ▶ Turn the set up key **D** to the right (touching).

Result:

- The assembly icon **30** or the assembly icon **31** (assembly operation) appear in the LICCON monitor.
- The hoist top icon **20** in the LICCON monitor changes to the icon **21**.
- All hoist limit switches are bypassed.
- ▶ Carry out a crane movement with bypassed hoist limit switches with utmost caution and by taking the safety guidelines into account.

The function „Bypass of the hoist top shut off“ turns off:

- If the set up key **D** is actuated again.
- When no master switch (MS1, MS2, MS3) was deflected for 10 seconds.
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- If there is no longer a shut off of a hoist limit switch.
- If the radio operation* is active.
- At engine stop.

The function „Bypass of the hoist top shut off“ has / was turned off:

- The assembly icon **30** or the assembly icon **31** (assembly operation) in the LICCON monitor turn off.
- The icon **21** on the LICCON monitor turns off.
- ▶ Make sure that the assembly icon **30** or the assembly icon **31** (assembly operation) as well as the icon **21** no longer appear in the LICCON monitor.
- ▶ Carry out the crane movements in such a way that no repeated hoist top shut off occurs.

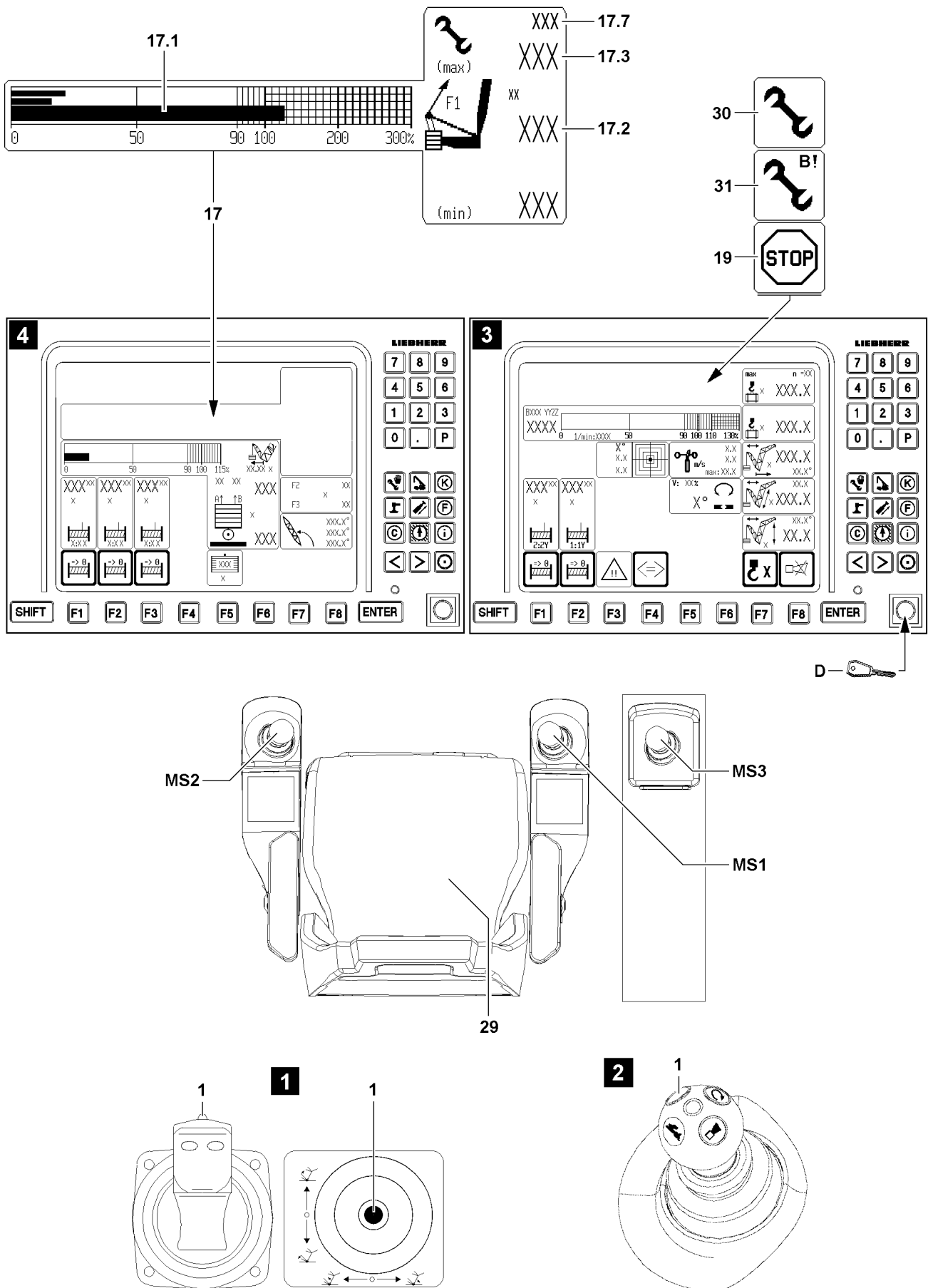


Fig.112343

LWE/LR 1750-000/12812-15-02/en

3.6 Exceeding the shut off limits of the LICCON overload protection during erection / take down procedures (assembly operation)



Note

- ▶ If the crane is in the range „No load chart available“ then there is a shut off of the crane control by the LICCON overload protection. The icon **19** appears in the LICCON monitor.
- ▶ By an actuated set up key **D**, the function „Exceedance of shut off limits of the LICCON overload protection“ can be activated, all erection / take down procedures can be carried out within the erection / take down charts, for which no load charts are available.



WARNING

Danger of accident during erection / take down procedures!

If the erection / take down charts are not observed, the crane could collapse, the boom can break off or the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The erection / take down charts must be observed.
- ▶ Press the set up key **D** only when the configuration status has been entered correctly in the LICCON computer system and matches the actual situation.



Note

- ▶ The force determined on test point 1 is generally described as $F1_{\text{actual}}$ (actual value F1).
- ▶ In the icon **17** (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).
- ▶ The value $F1_{\text{max-operation}}$ **17.3** corresponds to 100 % in the F1-bar display.
- ▶ The F1-utilization bar **17.1** shows the relationship $F1_{\text{actual}}$ **17.2** to $F1_{\text{max-operation}}$ **17.3**.
- ▶ In crane operation without derrick ballast, fewer values may be shown in the icon **17** (F1-load display).
- ▶ If a load chart is available, then the value $F1_{\text{max operation}}$ **17.3** is valid as the limit value for a shut off of crane operation.
- ▶ When leaving the area „load chart available“, the assembly icon **30** turns off and the assembly icon **31** appears.
- ▶ When leaving the area „Load chart available“ then $F1_{\text{max assembly}}$ **17.7** is valid as the upper limit value.
- ▶ $F1_{\text{max-assembly}}$ **17.7** might only appear when 90 % of its nominal value is exceeded.

3.6.1 Carrying out erection procedures (assembly operation)

Make sure that the following prerequisites are met:

- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- Radio operation* is not active.
- The set up configuration corresponds to the erection / take down charts.
- The set up status has been entered correctly into the LICCON computer system.

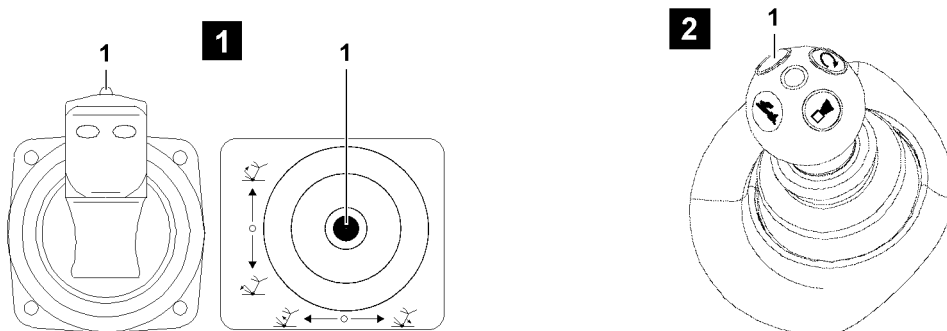
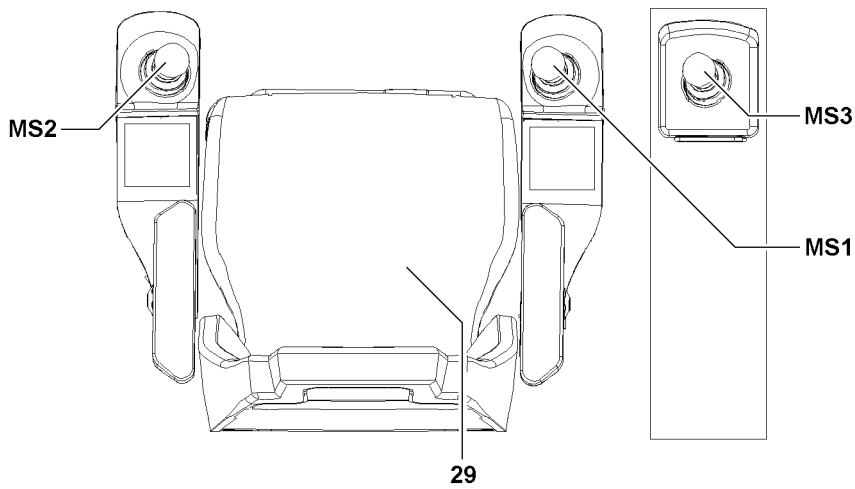
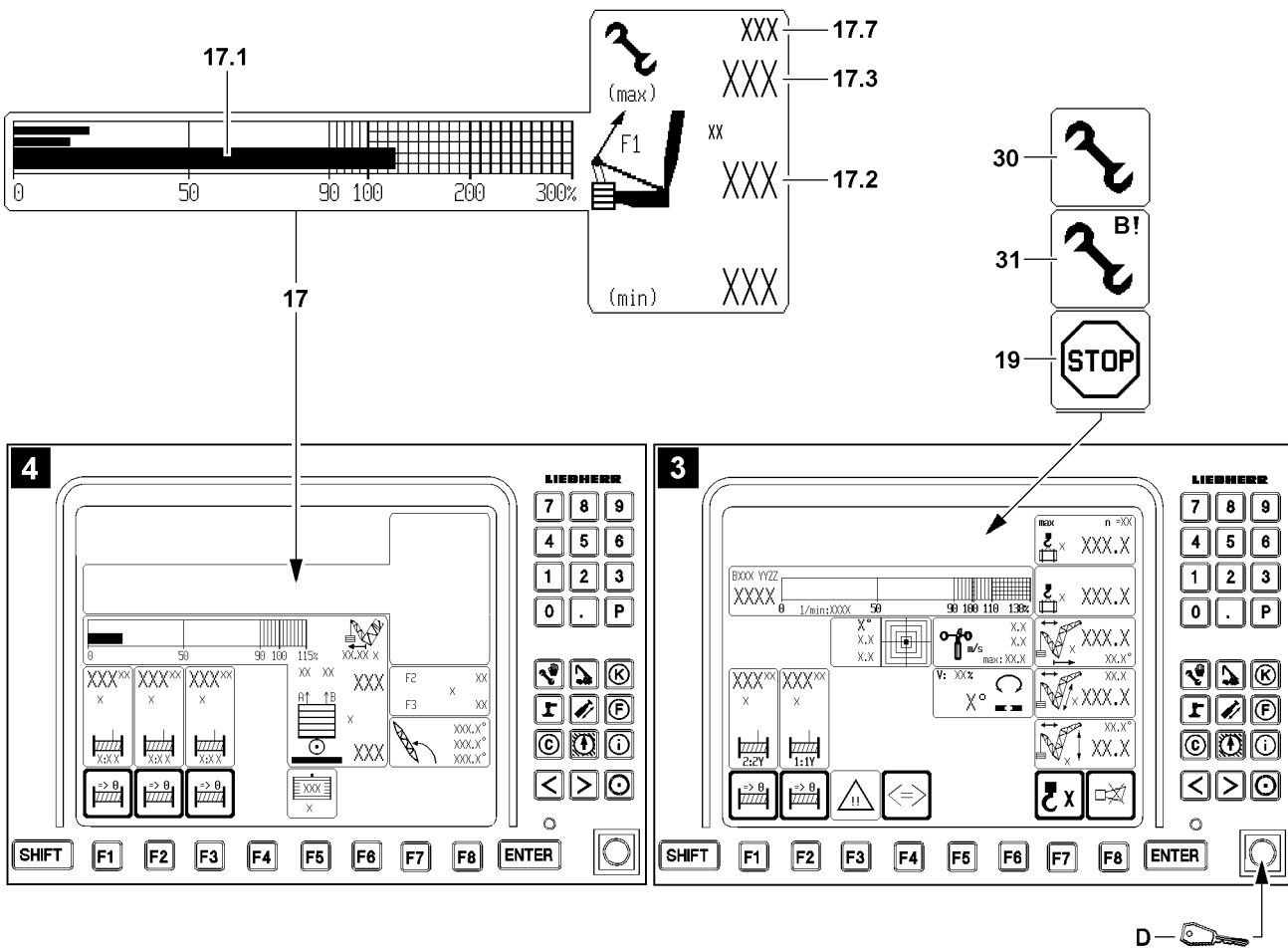


Fig.112343

- ▶ Turn the set up key **D** to the right (touching).

Result:

- The assembly icon **31** appears in the area „No load chart available“.
- The erection / take down procedures can be carried out.
- ▶ Watch the icon **17** (F1-load display), the value $F1_{\text{actual}}$ **17.2** may not exceed the value $F1_{\text{max-assembly}}$ **17.7**.

Problem remedy

The erection / take down procedure cannot be carried out due to shut off „ $F1_{\text{max-assembly}}$ **17.7** exceeded“?

- ▶ See section „Danger of exceeding $F1_{\text{max-assembly}}$ “.
-

Problem remedy

The function „Exceedance of shut off limits of the LICCON overload protection“ can not be activated during erection / take down procedures?

- ▶ Check the error messages.
 - ▶ Check the electrical connections.
 - ▶ Check if all sensors or dummy plugs with integrated electric have been connected properly.
-

The function „Exceedance of shut off limits of the LICCON overload protection“ turns off:

- If the set up key **D** is actuated again.
- When an range with existing load chart is reached (erection procedure).
- If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with „Load chart available“).
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- At engine stop.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:

- The assembly icon **30** or the assembly icon **31** in the LICCON monitor turns off.
- ▶ After completion of the erection / take down procedures, make sure that the assembly icon **30** or the assembly icon **31** no longer appear in the LICCON monitor.

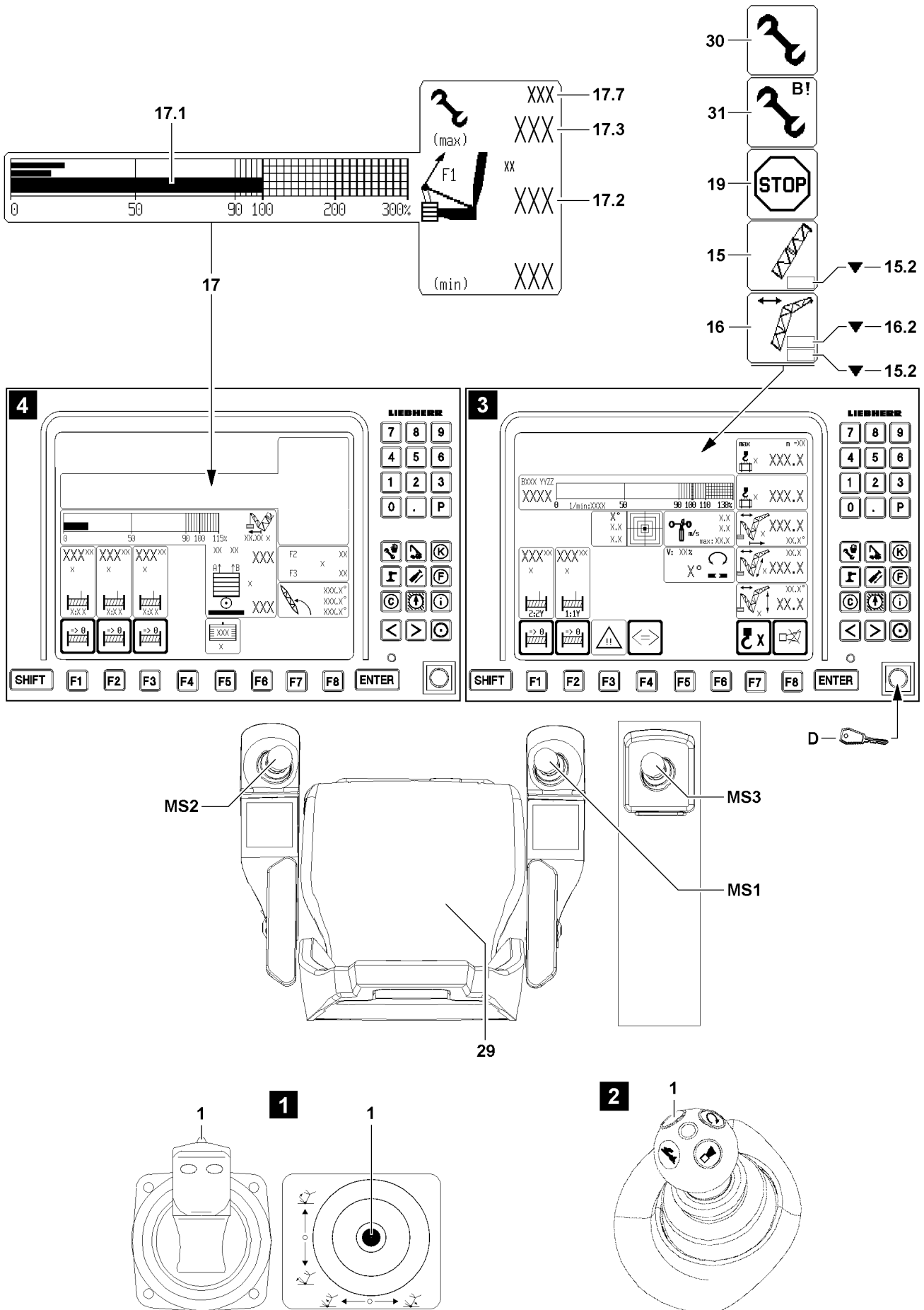


Fig.112341

3.6.2 Carrying out take down procedures (assembly operation)



WARNING

Increased danger of accidents due to bypass of shut off of luffing the main boom / auxiliary boom / accessory down!

When the shut off luffing the main boom / auxiliary boom / accessory down is bypassed, then the LICCON overload protection as a whole is deactivated or limited.

When the shut off luffing the main boom / auxiliary boom / accessory down is bypassed and the main boom and / or the auxiliary boom / accessory is further luffed down, then there is no load chart available any longer.

Crane operation with bypassed shut off luffing the main boom / auxiliary boom / accessory down is prohibited, since severe accidents can result.

Personnel can be severely injured or killed.

- ▶ Activate the bypass of the shut off luffing the main boom / auxiliary boom / accessory down only in emergency cases or for erection / take down procedures with erection / take down charts.
- ▶ Carry out all crane movements with utmost caution.

Make sure that the following prerequisites are met:

- In symbol **15** or symbol **16** appear symbol **15.2** or symbol **16.2** and the LICCON overload protection has shut off the crane movement.
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- The radio operation* is not active.

- ▶ Turn the set up key **D** to the right (touching).

Result:

- The assembly icon **30** appears in the LICCON monitor.
- The function „Exceedance of shut off limits of the LICCON overload protection“ is activated and has bypassed the shut off luffing the main boom / auxiliary boom / accessory down.



Note

- ▶ If a load chart is available, then the value $F1_{\text{max operation}}$ **17.3** is valid as the limit value for a shut off of crane operation.
- ▶ When leaving the area „load chart available“, the assembly icon **30** turns off and the assembly icon **31** appears.
- ▶ When leaving the area „Load chart available“ then $F1_{\text{max assembly}}$ **17.7** is valid as the upper limit value.
- ▶ If no derrick boom is installed, then the icon **17** only shows $F1_{\text{actual}}$ **17.1** and $F1_{\text{max-assembly}}$ **17.7**. $F1_{\text{max-assembly}}$ **17.7** might only appear when 90 % of its nominal value is exceeded.

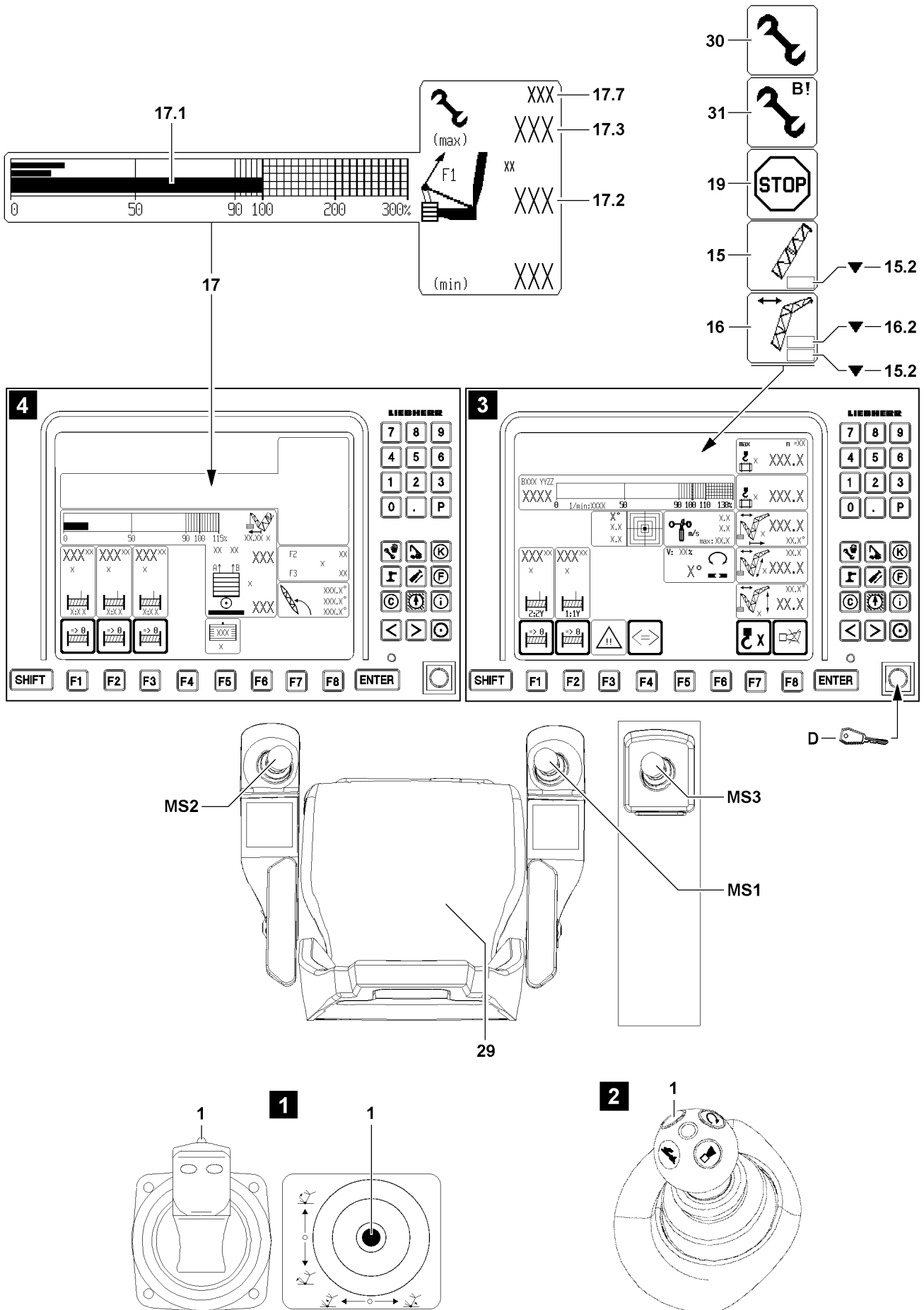


Fig.112341

LWE/LR 1750-000/12812-15-02/en

**DANGER**

The crane can topple over!

There is **no** shut off of the luff down movement after reaching the limit value $F1_{\text{max assembly}}$ **17.7**.

If the warnings by the LICCON overload protection are ignored, then the crane will be overloaded or topples over.

Personnel can be severely injured or killed.

- ▶ The symbol **17** (F1-load display) must be watched permanently. It must be ensured that the value $F1_{\text{actual}}$ **17.2** is smaller than the value $F1_{\text{max assembly}}$ **17.7**.
- ▶ The luff down movement must be stopped before the value $F1_{\text{actual}}$ **17.2** exceeds the limit value $F1_{\text{max assembly}}$ **17.7**.

- ▶ During the take down procedure watch the icon **17** (F1-load display).

Problem remedy

The take down procedure cannot be carried out due to danger of exceeding the $F1_{\text{max assembly}}$ **17.7**?

- ▶ See section „Danger of exceeding $F1_{\text{max assembly}}$ “.

The bypass of the shut off luffing the main boom / auxiliary boom / accessory down turns off:

- If the set up key **D** is actuated again.
- When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- When an area with existing load chart is reached.
- If the radio operation* is active.
- At engine stop.

The bypass of the shut off luffing the main boom / auxiliary boom / accessory down has / was turned off:

- The assembly icon **31** or the assembly icon **30** in the LICCON monitor turns off.
- ▶ Make sure that the assembly icon **30** or the assembly icon **31** no longer appear in the LICCON monitor.

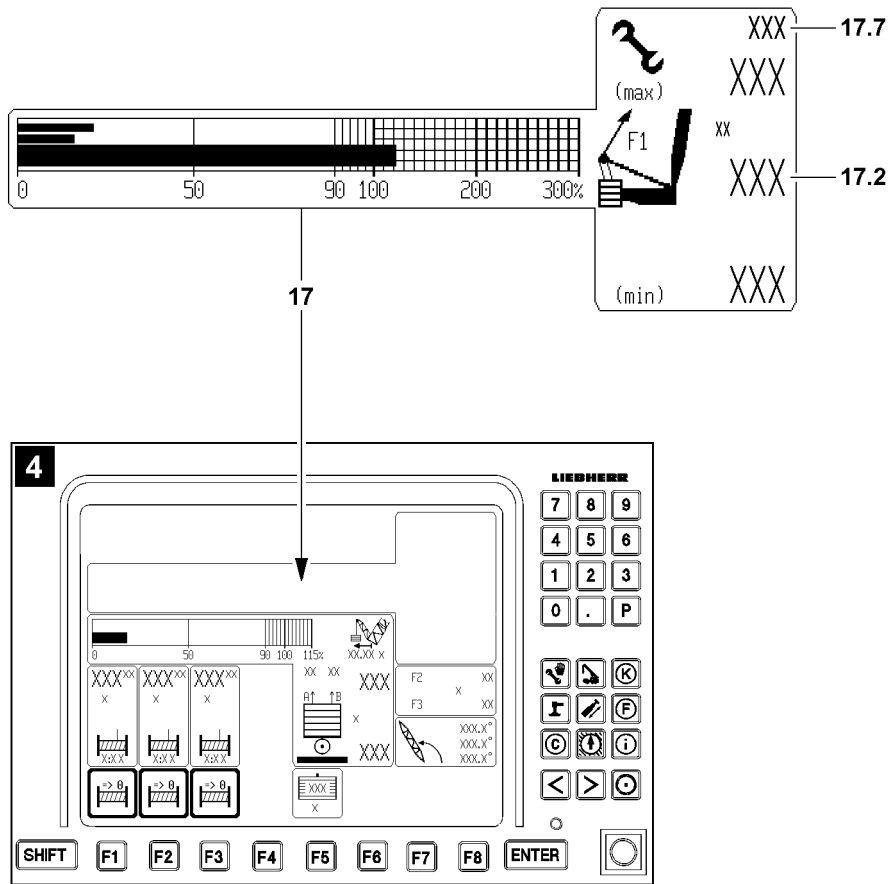


Fig.112344

3.6.3 Danger of exceeding $F1_{\text{max assembly}}$



Note

- ▶ $F1_{\text{max-assembly}}$ 17.7 might only appear when 90 % of its nominal value is exceeded.



DANGER

The crane can topple over!

There is **no** shut off of the luff down movement after reaching the limit value $F1_{\text{max assembly}}$ 17.7.

If the warnings by the LICCON overload protection are ignored, then the crane will be overloaded or topples over.

Personnel can be severely injured or killed.

- ▶ The luff down movement must be stopped before the value $F1_{\text{actual}}$ 17.2 exceeds the limit value $F1_{\text{max assembly}}$ 17.7.

In the icon 17 (F1-load display), the value $F1_{\text{actual}}$ 17.2 has reached the upper limit value $F1_{\text{max-assembly}}$ 17.7.

- ▶ Check if a crane movement, which can lower the force $F1$ (value $F1_{\text{actual}}$ 17.2) can be initiated, for example setting down the hook block / load hook.
- ▶ Check if the correct set up configuration has been entered on the LICCON computer system.
- ▶ Check if the actual set up configuration matches the entered set up configuration.
- ▶ Check if the correct hook block weight has been entered.
- ▶ Check if the respective hook block / load hook is installed.
- ▶ Check if all attachment parts and guy rods on the boom system, which are not needed, have been removed.
- ▶ Check if environmental influences (wind, snow or ice) on the crane are not too great.



Note

- ▶ Hook block weight entry and correction of weighing errors, see Crane operating instructions, chapter 4.02.

Empty page!

LWE/LR 1750-000/12812-15-02/en

5 Equipment

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Checking the retaining elements

Retaining elements are used to secure the pins. Due to mechanical damage / distortion, the function of the retaining elements can be compromised. In addition, the spring force of the retaining elements can be reduced significantly. Do not re-use retaining elements if there is insufficient spring force. The pin retainer must be secured with a correctly **functioning** retaining element.



WARNING

Failure of retaining element!

If the spring force of the retaining element is not sufficient or in case of mechanical damage / distortion, the retaining element can fail.

If the correct retention of the pin is no longer ensured, then the pin can unpin by itself.

Accidents with bodily injuries / property damage can result.

- ▶ Use exclusively **functioning** retaining elements in proper condition.

2 Rope pulleys



WARNING

Danger of crushing due to rotating rope pulleys!

Arms and legs can be caught and crushed or severed between the rope pulley and the rope due to rotating rope pulleys.

- ▶ It is prohibited to touch the ropes or rope pulleys during operation.
- ▶ Adhere to the safety distance to ropes and rotating rope pulleys.

3 Checking the ropes



WARNING

Danger of accident!

- ▶ The ropes must be checked by an expert before assembly and checks must be performed at regular intervals in order to detect possible damage or wear and tear at an early stage. See Crane operating instructions, chapter 8.04.

The ropes must be removed immediately if any of the following damage is detected:

- Breakage of a strand
- Wire breaks
- Broken wire nests
- Reduction in the rope diameter by 10 % or more of the nominal size
- Rope deformations

3.1 Placing the hoist / control ropes

In order to guarantee safety and operating characteristics, only original Liebherr replacement parts or parts approved by Liebherr may be used.

NOTICE

Damage of hoist / control rope!

If a hoist / control rope is placed with worn rope pulleys, damage can occur.

- ▶ Before placing a rope, check the rope pulleys. See Crane operating instructions, chapter 8.01.
- ▶ Replace worn or damaged rope pulleys.

NOTICE

If the following notes are not observed, the cam limit switch / winch speed sensor must be readjusted!

- ▶ When the hoist rope is spooled up, the end of the hoist rope must remain in front of the winch and may not be pulled over the winch.
- ▶ Pull the hoist rope end never under the winch by spooling the winch up.
- ▶ Pull the hoist rope never off from the „stationary“ winch.
- ▶ The winch speed sensor must also be readjusted, if it is determined during operation or when changing the hoist rope that the winch does not turn off when the minimum rope coils are reached.

3.1.1 Cranes with cam limit switch

The cam limit switch is adjusted at the factory that it turns off before the minimum rope coils are reached (three hoist rope coils on the winch).

**WARNING**

Danger of accident due to falling load!

If the following instructions are not observed, the hoist rope end attachment may be torn out, causing the load to topple.

- ▶ If a new hoist rope is used, the cam limit switch must be reset.
- ▶ The cam limit switch must be adjusted so that it turns off when only 3 hoist rope coils remain on the winch.

3.1.2 Cranes with winch speed sensor

The winch speed sensor is adjusted at the factory that it turns off before the minimum rope coils are reached (four hoist rope coils on the winch). If used properly, the winch turn sensor will not need readjustment.

**WARNING**

Danger of accident due to falling load!

If the following instructions are not observed, the hoist rope end attachment may be torn out, causing the load to topple.

- ▶ If a new hoist rope is placed, the winch speed sensor must be checked.
- ▶ The winch speed sensor must be set to turn off when only 4 hoist rope coils remain on the winch.

4 Control measures**WARNING**

The crane can topple over!

If the control measures are not carried out before crane operation, then accidents can occur. The crane can topple over, be overloaded or damaged.

Personnel can be killed or injured.

- ▶ Crane operation with safety equipment which are **not** functioning correctly is strictly prohibited.
- ▶ Start crane operation only after all safety equipment have been checked and are functioning correctly.
- ▶ Start crane operation only if the overload protection has been set according to the data in the load chart.
- ▶ Start crane operation only if the crane is properly supported and horizontally aligned.

**WARNING**

Interruption of crane operation!

If the following specifications for interruption of crane operation are not observed, accidents can occur.

- ▶ If the crane operator leaves the crane cab even if for just a short time, the crane must be secured to prevent unauthorized access.
- ▶ Before starting to work again with the crane, the crane operator is obligated to check the operating mode settings and to reset them, if necessary.



Fig.113437: Control displays

Make sure that the following prerequisites are met:

- The overload protection is not bypassed.
- No assembly operation is activated.
- Crane operation can be carried out with minimum boom radius.

4.1 General control measures before crane operation

- Make sure that no visible damage is present on the crane.
- Make sure that there are no loose parts on the boom, crane chassis and crane superstructure.
- Make sure that exposed rope pulleys are free of snow, frost and ice.
- Make sure that the cable / rope drums as well as the limit switches are free of snow and ice.
- Make sure that the gear ring of the slewing ring connection is clean and greased.
- Make sure that the air supply to the oil and water cooler is clear.
- Make sure that steps, ladders and platforms are in the correct position for crane operation.
- Make sure that all tool boxes, compartments, coverings, covers and cabinet doors are closed.
- Make sure that no persons or objects are within the danger zone of the crane.
- Make sure that the crane is standing on level, load bearing ground.
- Make sure that the crane is sufficiently supported depending on the load case and the ground conditions.
- Make sure that there is sufficient distance to excavations and slopes.
- Make sure that no obstacles are within the working range of the crane, which obstruct the required crane movements.
- Make sure that the crane has sufficient distance to live power lines.
- Make sure that the LICCON overload protection is set according to the data in the load chart.
- Make sure that the overload protection is set according to the actual set up configuration of the crane.
- Make sure that the electrical connections, the connector plug, the pull release, the cables and the protective insulation function. Replace missing or defective parts.
- Make sure that the cable routings on the electrical connections are seated tightly. If necessary, tighten loose screw connections.
- Make sure that the existing safety equipment is functioning.
- Make sure that the overload protection is functioning.
- Make sure that the hoist limit switches are functioning.
- Make sure that the limit switch boom „steepest position“ is functioning.
- Make sure that the wind speed sensor easily moves and is functioning.

4.2 Additional controls for cranes with crane support

- Make sure that the folding / sliding beams are secured with pins to prevent them from sliding.
- Make sure that the support plates are secured in the operating position.
- Make sure that the crane is properly supported.
- Make sure that the crane is horizontally aligned.
- Make sure that the axle suspension is blocked (mobile crane).
- Make sure that the tires have no contact to the ground (mobile crane).

- Make sure that the track chains are secured to prevent them from sagging (crawler crane).

4.3 Additional controls for cranes on tires on the front and supported on the rear

- Make sure that the rear folding / sliding beams are secured with pins to prevent them from sliding.
- Make sure that the rear support plates are secured in the operating position.
- Make sure that the crane is properly supported on the rear.
- Make sure that the axle pressure compensation is correctly switched.
- Make sure that the axle suspension is blocked.
- Make sure that the tires of the rear axle group have no contact with the ground.
- Make sure that a sufficient tire pressure is present in the tires.
- Make sure that the ground for the front axle group is sufficiently level.

4.4 Additional controls for cranes supported on the front and on tires on the rear

- Make sure that the front folding / sliding beams are secured with pins to prevent them from sliding.
- Make sure that the front support plates are secured in the operating position.
- Make sure that the crane is properly supported on the front.
- Make sure that the axle pressure compensation is correctly switched.
- Make sure that the axle suspension is blocked.
- Make sure that the tires of the front axle group have no contact with the ground.
- Make sure that a sufficient tire pressure is present in the tires.
- Make sure that the ground for the rear axle group is sufficiently level.

4.5 Additional controls for freestanding crane operation (on tires)

- Make sure that all prerequisites for freestanding crane operation are met.
- Make sure that sufficient tire pressure is in all tires for crane operation on tires.
- Make sure that the ground is sufficiently level for crane operation on tires.

4.6 Additional controls for cranes with derrick boom

- Make sure that the shut off via the limit switch - derrick is functioning.
- Make sure that the entire slewing range of the suspended ballast / ballast trailer is free of personnel and obstacles.

4.7 Additional controls for cranes with luffing auxiliary boom / accessories

- Make sure that the shut off via the limit switch luffing auxiliary boom / accessories „steepest position“ is functioning.
- Make sure that the shut off via the limit switch luffing auxiliary boom / accessories „lowest position“ is functioning.
- Make sure that the shut off via the limit switch flap in „steepest position“ position is functioning.
- Make sure that the pendulum of the mechanical relapse retainer moves easily over the entire slewing range and is functioning.

4.8 Additional controls for certain crawler cranes

For existing crawler assembly key button:

- Make sure that the crawler assembly key button is turned off.

5 Dangerous conditions without shut off

5.1 Block position of relapse cylinders when setting down the load

NOTICE

Damage to boom or relapse cylinder!

If the block position of the relapse cylinders is triggered by the boom or the derrick with attached, freely suspended load, then there is a danger of damaging the boom or the relapse cylinders when setting the load on the ground. By setting down the load, the crane is relieved, which causes the boom system to move to the rear.

There is no shut-off of the hoist gear down function.

- ▶ Actuate the opposite direction of movement which caused the block position and eliminate the block position.
-

6 Pneumatic springs for assembly support of components

Pneumatic springs are installed on various crane components to simplify the installation of these components.



WARNING

Danger of crushing!

Defective pneumatic springs no longer provide the supporting properties on the movable components. Due to falling components, personnel can be killed or severely injured.

High risk of accident.

- ▶ Always check pneumatic springs for damage before actuating the corresponding components.
 - ▶ Do not use components with defective pneumatic springs. Replace defective pneumatic springs immediately.
 - ▶ Make sure that no persons or objects are in the movement range of the moving components which is supported by the pneumatic spring.
 - ▶ It is strictly prohibited to remain or place any objects in the movement or other danger zone of the moving crane components which are supported by the pneumatic spring.
-

7 Manual rope winches for assembly support of components

Manual rope winches are installed on various components to simplify the installation or removal of these components.

**WARNING**

Danger of crushing!

Defective manual rope winches no longer provide the supporting action on the movable components. Due to falling components, personnel can be killed or severely injured.

High risk of accident.

- ▶ Always check manual rope winches for external and functional damage before actuating the respective components.
- ▶ Check the rope of the manual rope winch for damage.
- ▶ At least two rope coils must always remain on the rope drum.
- ▶ Do not use components with defective manual rope winches. Replace defective manual rope winches.
- ▶ It is strictly prohibited for personnel or objects to remain within the movement range of the components, which are supported by the manual rope winch.
- ▶ It is prohibited for personnel or objects to remain within the danger zone of the moveable components.

8 Weights

**Note**

- ▶ The weight of each component is specified in the chapter 1.03 or the respective chapter in the Crane operating instructions or is stated on the tag attached to the corresponding component.
- ▶ If components are pushed into one another (for example intermediate pieces) or folded together (for example the folding jib), then the total weight is given by the sum of the individual components.

NOTICE

False estimation of weights

- ▶ Contact the Service department at **Liebherr-Werk Ehingen GmbH** if the weight of the respective component is not stated on the tag or in the Crane operating instructions.
- ▶ Use an auxiliary crane with sufficient load carrying capacity including judicious reserve.

9 Guy rods

**WARNING**

Boom can break off!

The arrangement of the guy rods for the boom or boom systems is stipulated in the rod plan. If the arrangement of the guy rods according to the rod plan is not observed, the crane can collapse, the boom can break off or the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Always carry out the arrangement of the guy rods according to the rod plan.
- ▶ If an auxiliary guying is required for a certain boom length, then it must always be installed according to the rod plan on the position defined in the rod plan.

**WARNING**

Unutilized guy rods on boom!

If guy rods are on the lattice sections which are not used for operation, then there is a danger of accidents.

Unused guy rods can loosen up and fall down.

Personnel can be severely injured or killed.

The load chart is invalid.

The load display of the LICCON computer system shows an incorrect value.

The weight of the boom is too large for erection.

- ▶ Disassemble and remove the guy rods which are not needed on the transport retainers before erecting the boom.

**Note**

- ▶ Inspection and maintenance of guy rods, see Crane operating instructions, chapter 8.15.
- ▶ In reference to the guy rods, observe section „Erection / take down“.

10 Auxiliary guying

The auxiliary guying is of significant importance for safe crane operation.

The auxiliary guying is a deciding factor in relieving the boom, or the boom system during erection and take down as well as during crane operation.

**WARNING**

The crane can topple over!

If the auxiliary guying is not installed or not installed on the position specified in the rod plan, then the crane can collapse, the boom can break off or the crane can topple over.

- ▶ If an auxiliary guying is specified in the rod plan for the required boom length, then it must be installed on the respective position.
- ▶ Make sure that the auxiliary guying is always completely installed and that all pins are properly pinned and secured.

11 Bypassing the overload protection



Fig.113438: Bypassing the overload protection

- Illustration 1: LICCON monitor (only certain crane types).
- Illustration 2: Indicator light „Assembly“ in instrument panel crane cab (only certain crane types).

The overload protection is considered bypassed for:

- all types of assembly operations.
- all types of exceeded shut off limits of the overload protection.
- all types of emergency operation.
- all types of crane operation with deactivated or defective sensors and limit switches.
- all types of deviation from specified set up configuration of the crane.

**DANGER**

Increased danger of accident due to bypass of the overload protection!

Proper and destined use of the crane is ensured due to the construction of the overload protection system and observance of the information in the Crane operating instructions. All **sensibly foreseeable erroneous operations** of the crane have been taken into consideration.

Impermissible crane operation with bypassed overload protection – with the aim of increasing the maximum load bearing capacity of the crane above the rated value in the load chart or to extend the designated working range of the crane – does not constitute a **sensibly foreseeable erroneous operation**, rather a **deliberate improper use with high risk of accident**.

The possible risks and consequences of such deliberate improper use are detailed in the Crane operating instructions.

Such deliberate improper use can neither be prevented by means of the structural design nor by means of information in the Crane operating instructions

- ▶ Bypass the overload protection only according to the Crane operating instructions.
- ▶ Exceed the shut off limits of the overload protection only according to the Crane operating instructions.
- ▶ Any other use of the crane with bypassed overload protection than that described in the Crane operating instructions is prohibited.

If the maximum permissible load moment is exceeded, the overload protection turns all load moment increasing crane movements off.

This shut off can be bypassed or exceeded various ways, for example:

- exceeding the shut off limits (utilization more than 100 % or leaving the load chart).
- activating an assembly operation.
- activating an emergency operation.

The displays of the LICCON overload protection remain functioning when all associated sensors and limit switches are active and a load chart is available.

**WARNING**

Increased danger of accident due to bypass of the overload protection!

If overload protection is bypassed, there is no further protection against overloading the crane.

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over.

Personnel can be killed.

This could result in high property damage.

- ▶ It is only permitted to bypass the overload protection for assembly or in emergencies.
- ▶ The bypass of the overload protection may only be carried out by persons who are aware of the effects of their acts.
- ▶ Bypassing the overload protection requires the presence of a person authorized by the crane operator and must be performed with utmost caution.
- ▶ It is strictly prohibited to operate the crane when the overload protection is bypassed.

11.1 Bypassing the LICCON overload protection

**Note**

- ▶ Applies only for cranes with LICCON overload protection.

Depending on the crane version, one or more operating elements are available to bypass the overload protection:

- Button in the control panel.
- Key button on the LICCON monitor.
- Key button in the instrument panel.
- Key button in the control cabinet.
- Sensor for transponder on the crane cab.
- ▶ Actuate the respective operating element.

Result:

- The LICCON overload protection is bypassed / inactive.
- The „Assembly“ icon appears on the LICCON monitor.
- Depending on the circumstances, acoustic and / or optical warning signals (blinkers, flashing lights, bells and horns) sound.

If the LICCON overload protection is to be reactivated:

- ▶ No longer actuate the respective operating element or reset.

Result:

- The LICCON overload protection is active.
- The „Assembly“ icon no longer appears on the LICCON monitor.
- The acoustic and / or optical warning signals which were triggered by the bypass are turned off again.

11.2 Bypassing the PAT overload protection

**Note**

- ▶ Applies only for cranes with PAT overload protection.

- ▶ Actuate the bypass key button and turn the PAT overload protection off.

Result:

- The PAT overload protection is bypassed / inactive.

- ▶ Actuate the bypass key button and turn the PAT overload protection on.

Result:

- The PAT overload protection is active.

12 Bypassing the hoist top shut off

**Note**

- ▶ Applies only for cranes with hoist limit switch.

If the hook block touches the hoist limit switch weight during the upward movement, the hoist limit switch reacts. The crane movements „Spool up winches“, „Luff boom down“ and „Telescope telescopic boom out“ are turned off. The shut off can be bypassed.

**WARNING**

Danger of accidents due to bypass of Hoist top shut off!

When bypassing the hoist top shut off, there is a risk that the hook block may be pulled against the pulley head when continuing to lift or luffing down the boom. This may damage the pulleys and cause the loads to fall.

- ▶ The bypass of the hoist top shut off in crane operation with a load may only be carried out by a person authorized by the crane operator with the aid of a „Guide“. The guide must be in direct contact with the crane operator and must continually monitor the distance between the hook block and the boom head.
- ▶ Carry out all crane movements with maximum care and minimum speed.

13 Pin connections



WARNING

Danger due to pin connections!

If pins / pin connections are not properly greased or lubricated before installation, then they can corrode.

The pins can be stuck in the pin bores and / or be damaged.

During the unpinning procedure, the pins can suddenly release.

Death, severe bodily injuries, property damage.

- ▶ Make sure that all pins, which are not supplied with grease via the central lubrication system are sufficiently greased before assembly.
- ▶ Make sure that all lube points, which are equipped with a grease fitting, are properly greased at assembly and according to the respective interval specification.
- ▶ Make sure that all pins are secured with the intended retaining elements to prevent them from loosening up by themselves.
- ▶ Never pin or unpin pins by force.



WARNING

Danger of accident due to distorted pins!

Angular pulling or excessive / low hoisting force of the auxiliary crane may result in distortion of the pins.

Distorted parts can suddenly fly off when the pins are unpinned.

Death, severe bodily injuries, property damage.

- ▶ When the pins are unpinned, the „lifting force“ of the crane must be adapted to the „weight“ of the parts being lifted.
- ▶ Do **not** remove difficult to remove pins by force.
- ▶ Remedy the cause of the distortion.

13.1 Pinning the collar pin

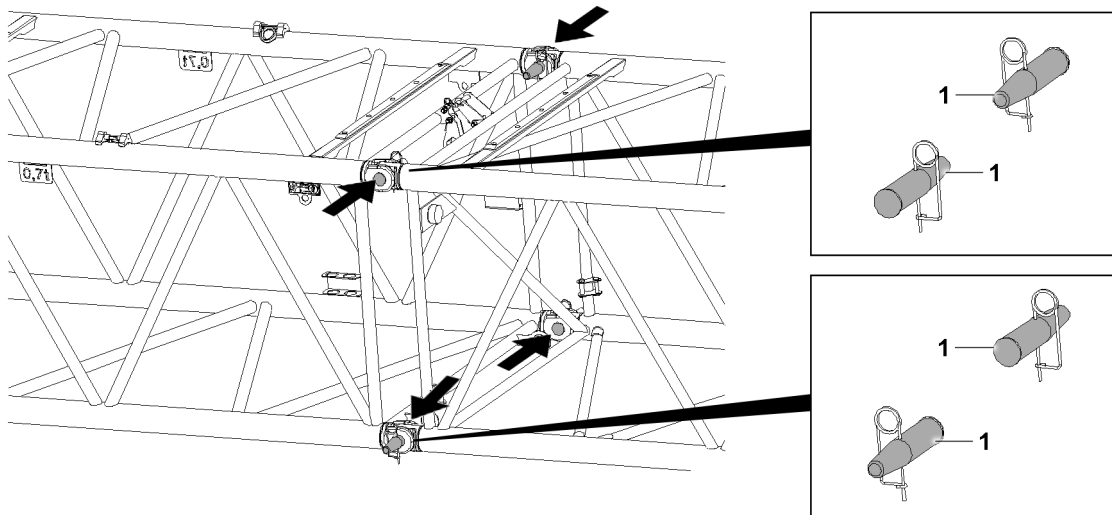


Fig.143114: Pinning the collar pin



WARNING

The collar pin is incorrectly pinned!

Death, severe bodily injuries, property damage.

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Pin the upper collar pin **1** from the **outside to the inside** and unpin from the **inside to the outside**.
- ▶ Pin the lower collar pin **1** from the **inside to the outside** and unpin from the **outside to inside**.

13.2 Assembling the double cone pins horizontally

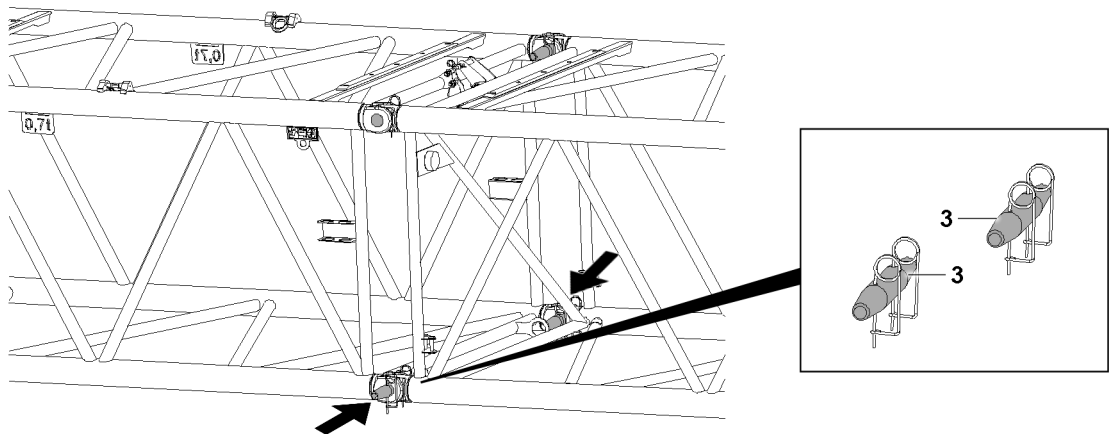


Fig.143115: Pinning the double cone pins horizontally



WARNING

Double cone pins incorrectly pinned!

Death, severe bodily injuries, property damage.

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Pin and unpin horizontally installable double cone pins **3** from the **outside to the inside**.

13.3 Assembling the double cone pins vertically

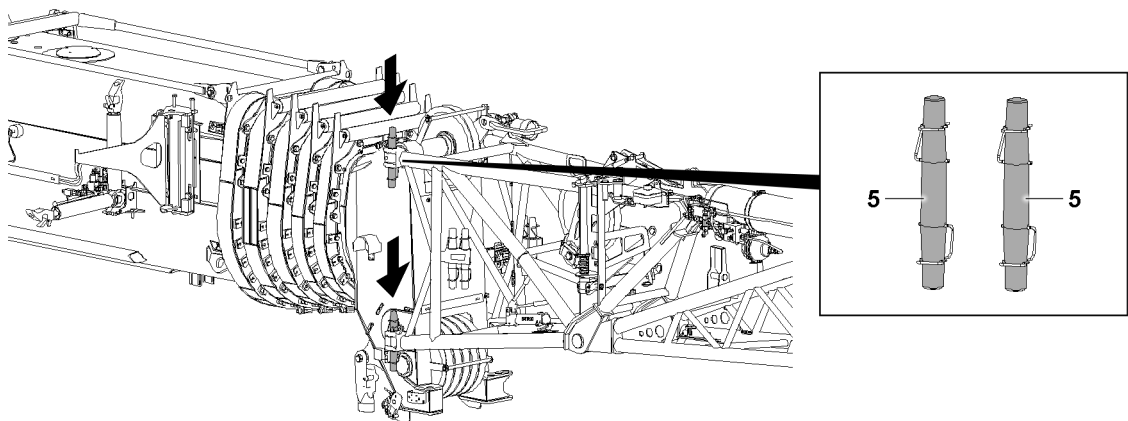


Fig.143116: Assembling the double cone pins vertically



WARNING

Double cone pins incorrectly pinned!

Death, severe bodily injuries, property damage.

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Pin and unpin vertically installable double cone pins **5** from the **top to the bottom**.

14 Retaining elements

14.1 Checking the retaining elements

Retaining elements are used to secure the pins. Due to mechanical damage / distortion, the function of the retaining elements can be compromised. In addition, the spring force of the retaining elements can be reduced significantly. Do **not** re-use retaining elements if there is insufficient spring force. The pin retainer must be secured with a correctly **functioning** retaining element.



WARNING

Mechanical damage or deformation of the retaining element!

The retaining elements can fail.

The pin can unpin by itself.

Death, severe bodily injury, property damage.

► Use exclusively functioning retaining elements in a proper condition.

► Replace defective retaining elements.

14.2 Overview of the retaining elements

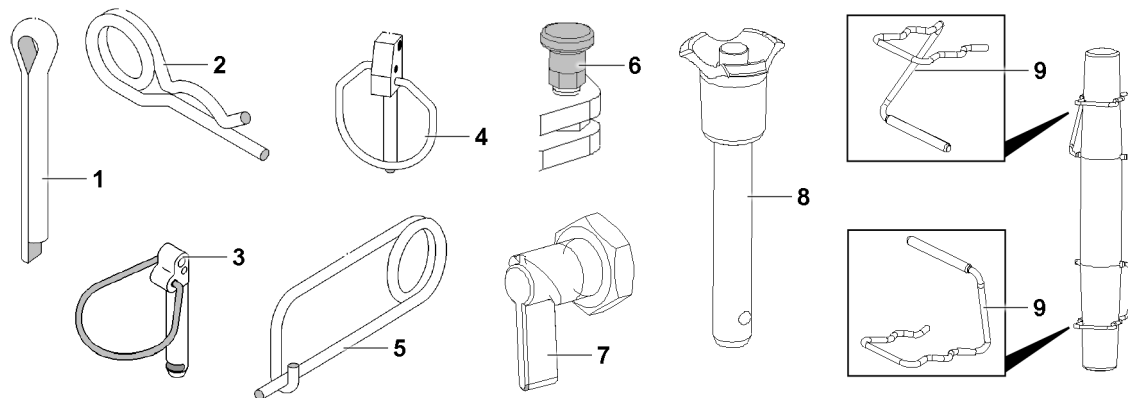


Fig.143102: Retaining elements

- | | | | |
|---|--------------------|---|------------------|
| 1 | Split pin | 6 | Detent pin |
| 2 | Cotter pin | 7 | Latch |
| 3 | Safety locking pin | 8 | Ball locking pin |
| 4 | Linch pin | 9 | Retaining clip |
| 5 | Spring retainer | | |

14.3 Split pin

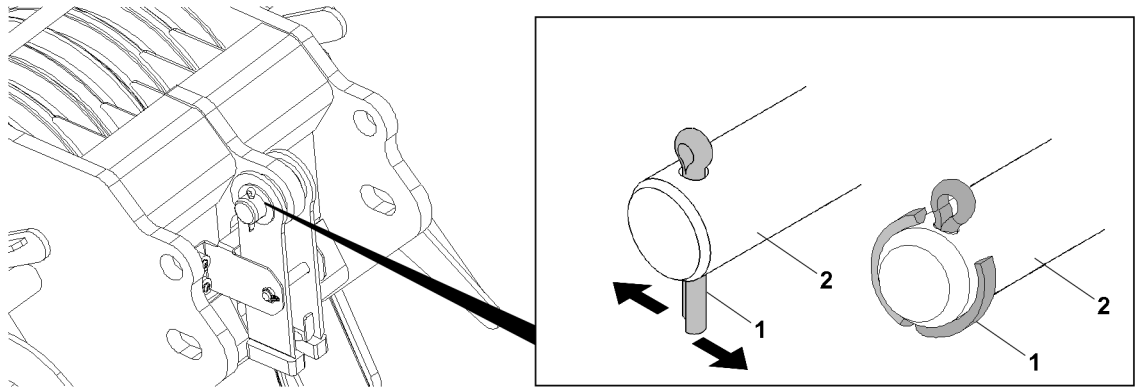


Fig.143105: Split pin

1 Split pin

2 Pin



WARNING

Multiple use of a split pin 1!
The split pin 1 can break.

- ▶ Assemble the split pin 1 only once.
- ▶ Use a correctly sized split pin 1.

- ▶ Secure the pin 2: Insert the split pin 1.
- ▶ Bend the end of the split pin 1 toward the outside.

Problem remedy

Split pin 1 defective!

- ▶ Replace the split pin 1.

14.4 Cotter pin

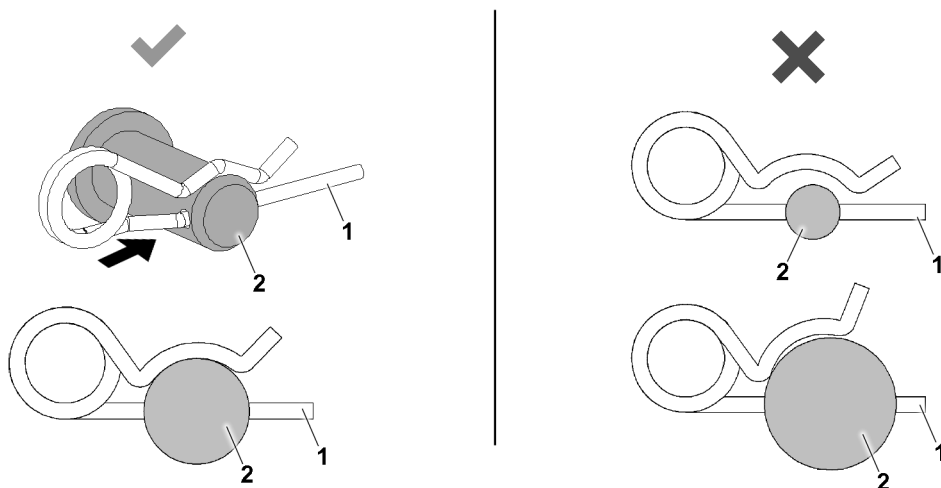


Fig.143106: Cotter pin, correct and incorrect dimensions

1 Cotter pin

2 Pin

**WARNING**

Improper dimensions of the cotter pin 1!

The cotter pin 1 can loosen up by itself.

- ▶ Use a correctly sized cotter pin 1.
-
- ▶ Secure the pin 2: 1 Insert the cotter pin 1.

Problem remedy

Spring tension is too low?

The cotter pin 1 is defective.

- ▶ Replace the cotter pin 1.

14.5 Safety locking pin

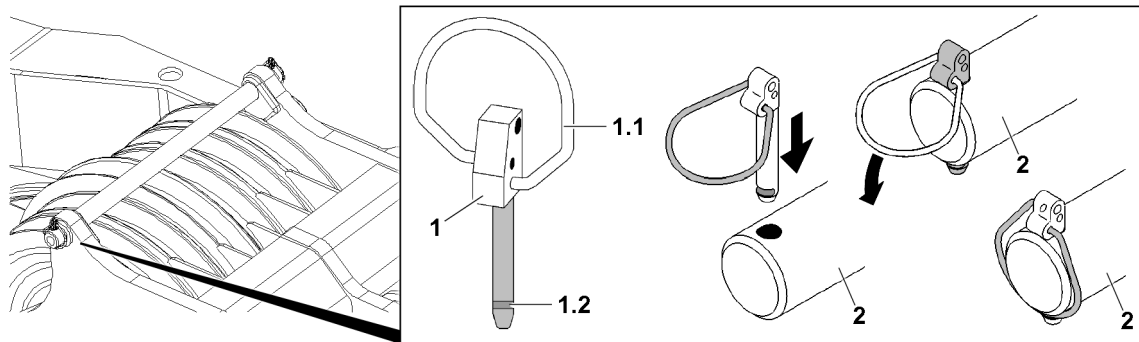


Fig.143103: Safety locking pin

1 Safety locking pin

1.2 Groove

1.1 Spring clip

2 Pin

Increased effort is necessary for opening the safety locking pin 1.

**WARNING**

Spring clip 1.1 **not** engaged!

The safety locking pin 1 can loosen up by itself.

- ▶ Engage the spring clip 1.1 completely in the groove 1.2.
-
- ▶ Secure the pin 2: Insert the safety locking pin 1.
 - ▶ Close the spring clip 1.1 and engage it completely in the groove 1.2.

Problem remedy

The spring clip 1.1 does **not** engage completely?

Tension of the spring clip 1.1 is too low.

- ▶ Replace the safety locking pin 1.

14.6 Linch pin

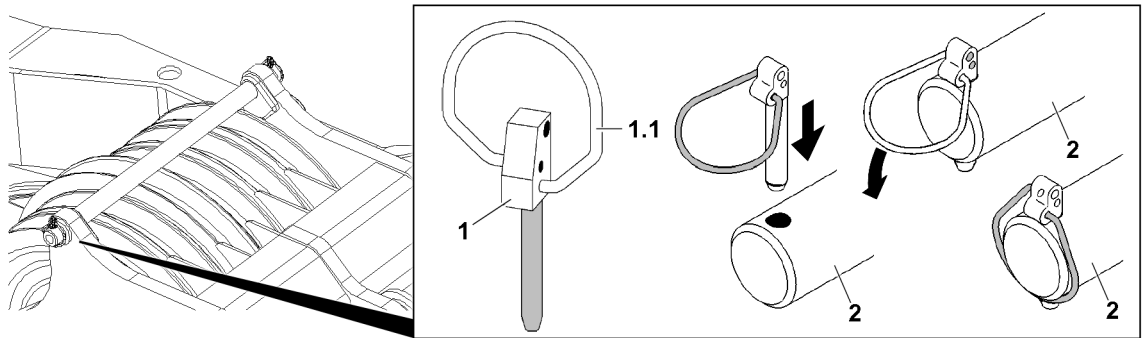


Fig.143104: Linch pin

1 Safety locking pin
1.1 Spring clip

2 Pin



WARNING

The locking pin 1 is **not** completely closed!

The locking pin 1 can loosen up by itself.

▶ Close the spring clip 1.1 completely.

▶ Secure the pin 2: Insert the locking pin 1.

▶ Close the spring clip 1.1 completely.

Problem remedy

The spring clip 1.1 does not close completely?

Tension of the spring clip 1.1 is too low.

▶ Replace the locking pin 1.

14.7 Spring retainer

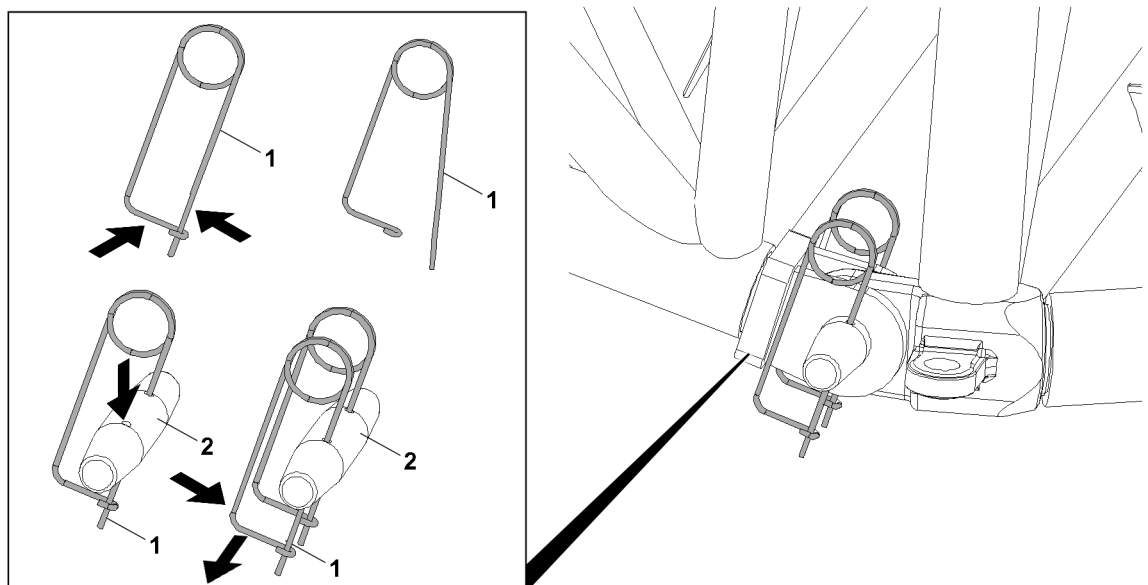


Fig.143108: Spring retainer

1 Spring retainer

**WARNING**

The spring retainer **1** is **not** closed!
 The spring retainer **1** can loosen up by itself.
 ► Close the spring retainer **1**.

- Secure the pin **2**: Insert the spring retainer **1**.
- Close the spring retainer **1**.

Problem remedy

Spring tension is too low?
 The spring retainer **1** is defective.
 ► Replace the spring retainer **1**.

14.8 Detent pin

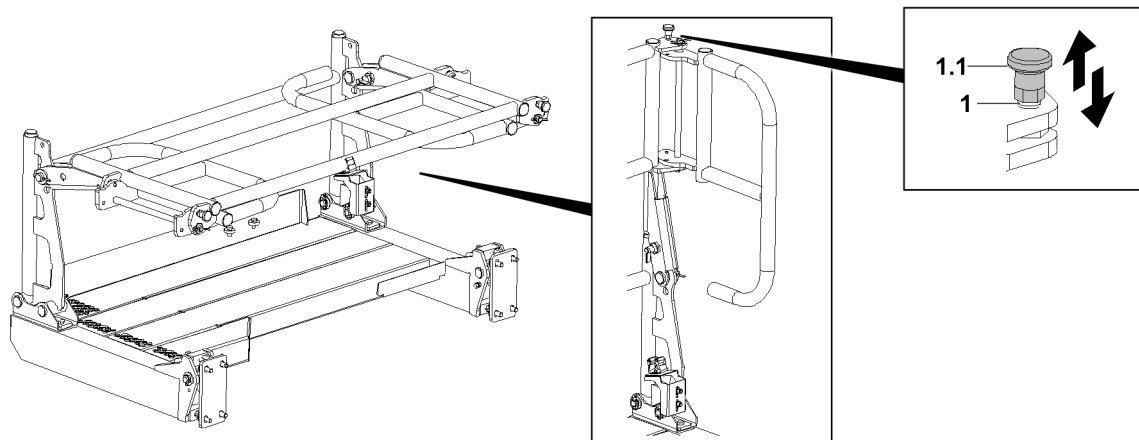


Fig.143110: Detent pin

1 Detent pin

1.1 Handle

**WARNING**

The handle **1.1** is **not** locked!
 The detent pin **1** can loosen up by itself.
 ► Lock the detent pin **1**.

- Pull the handle **1.1**.

Result:

– The detent pin **1** is unlocked.

- Insert the detent pin **1**: Release the handle **1.1**.

Result:

– The detent pin **1** is pinned.

Problem remedy

The handle **1.1** cannot be pulled.
 The detent pin **1** is defective.
 ► Replace the detent pin **1**.

14.9 Latch

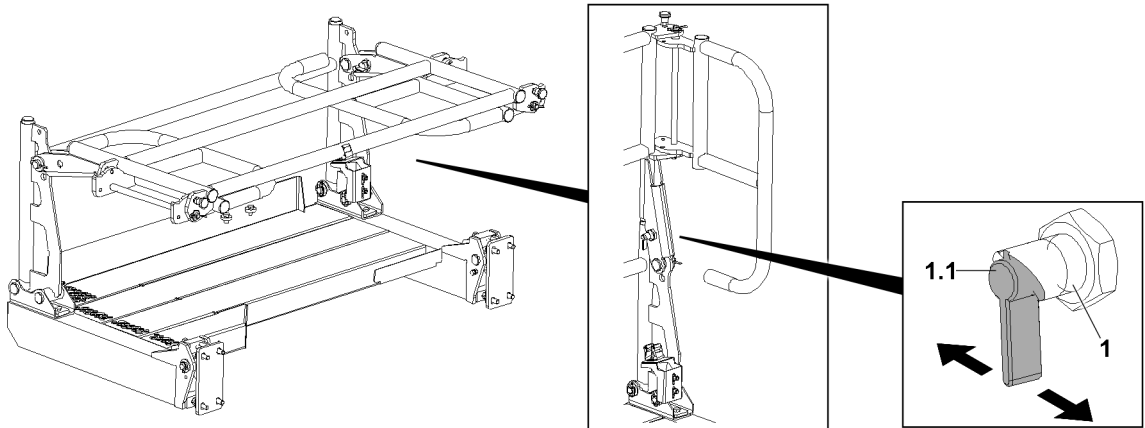


Fig.143111: Latch

1 Latch

1.1 Lever



WARNING

The latch **1** is **not** locked!
The latch **1** can loosen up by itself.
▶ Lock the latch **1**.

▶ Operate the lever **1.1**.

Result:

– The latch **1** is unlocked.

▶ Insert the latch **1**: Release the lever **1.1** and swing the railing until the latch is pinned.

Problem remedy

The lever **1.1** cannot be actuated?
The latch **1** is defective.

▶ Replace the latch **1**.

14.10 Ball locking pin

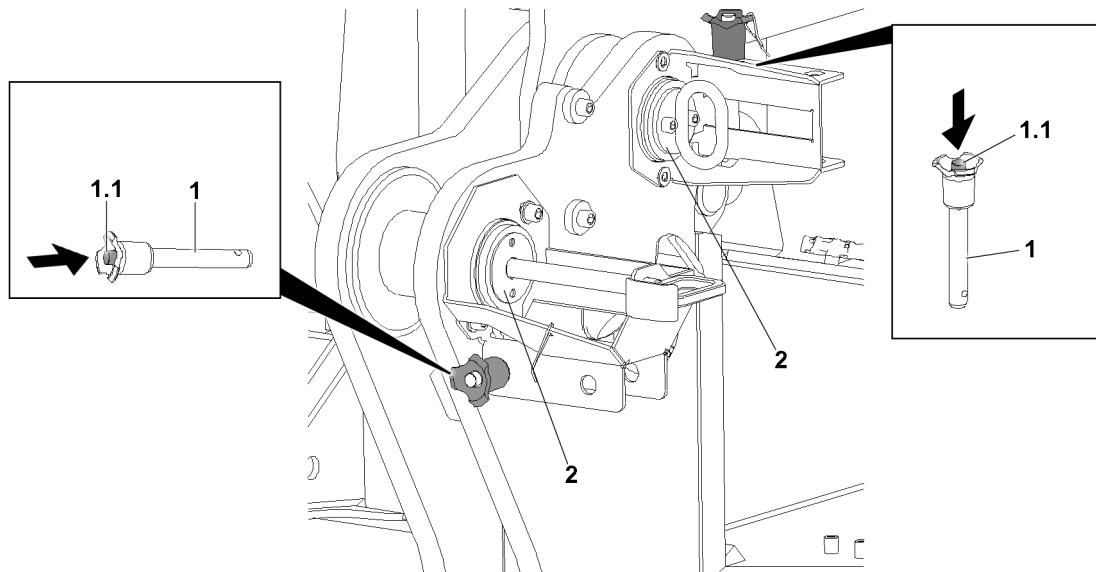


Fig.143109: Ball locking pin

- 1 Ball locking pin
1.1 Press button
2 Pin



WARNING

The ball locking pin **1** is **not** locked!
The ball locking pin **1** can loosen up by itself.

- ▶ Lock the ball locking pin **1**.
- ▶ Secure the pin **2**: Actuate the press button **1.1**.

Result:

- The ball locking pin **1** is unlocked.
- ▶ Pin the ball locking pin **1** and release the press button **1.1**.

Result:

- The ball locking pin **1** is pinned and secured.

Problem remedy

The press button **1.1** cannot be actuated?

The ball locking pin **1** is defective.

- ▶ Replace the ball locking pin **1**.

14.11 Retaining clip

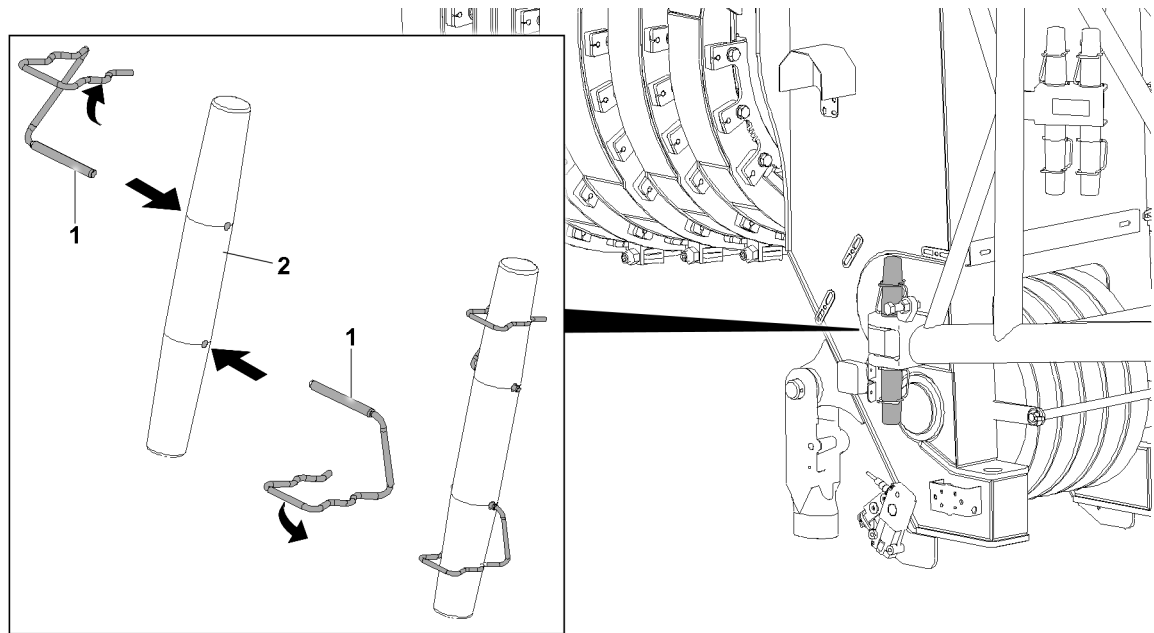


Fig.143107: Retaining clip 1

1 Retaining clip

2 Pin



WARNING

Incorrect retaining element!
Shearing off of the retaining element.

- ▶ To secure the folding jib pinning: Use retaining clips 1.
- ▶ The use of other retaining elements is **prohibited**.



WARNING

Retaining clip **not** engaged!
The retaining clip 1 can loosen up by itself.

- ▶ Engage the retaining clip 1.
- ▶ Secure the pin 2: Insert the retaining clip 1.
- ▶ Engage the retaining clip 1.

Problem remedy

Retaining clip 1 defective?
The spring force of the retaining clip 1 is too low.

- ▶ Replace the retaining clip 1.

15 Assembly / disassembly



WARNING

Danger of fatal injury due to incorrect assembly or disassembly!

The assembly / disassembly of lattice sections and / or components may never be performed by untrained personnel.

An erroneous assembly / disassembly of lattice sections and / or components can cause damage on load carrying crane structures.

Crane components can fail due to improper assembly / disassembly.

Death, severe bodily injuries, property damage.

- ▶ Make sure that the assembly / disassembly of lattice sections and / or components is carried out only by authorized and trained expert personnel.
- ▶ Make sure that the fastening equipment on lattice sections and / or components is always fastened properly.
- ▶ Make sure that lattice sections and / or components are always properly pinned and secured at assembly.
- ▶ For assembly / disassembly of individual components, also observe the chapters relating to those components.
- ▶ The boom combinations must be assembled according to the separately supplied rod plans.
- ▶ The winch use is regulated in the master switch assignment in the Electric wiring diagram. The winches may only be operated according to this master switch assignment specified in the Electric wiring diagram.
- ▶ All components which must be transported separately must be transported with suitable auxiliary cranes and fastening equipment near ground level.



WARNING

Failure of auxiliary winch!

- ▶ Only use the auxiliary winch (assembly or reeving winch) for assembly and not to lift loads.
- ▶ Lifting of loads with the auxiliary winch is prohibited.

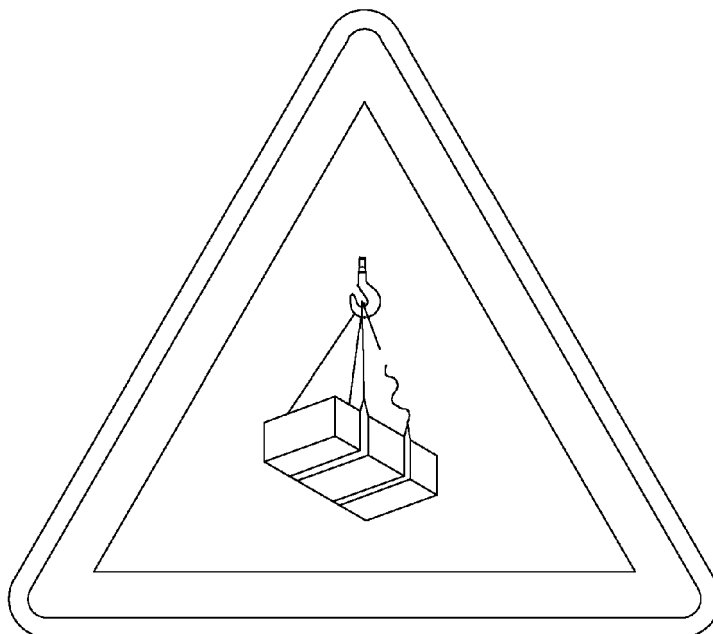


Fig.121169

**WARNING**

Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.

Death, severe bodily injuries, property damage.

- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is horizontally aligned.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.
- ▶ During assembly / disassembly no one may be in the dangerous area around or underneath the suspended load before the load has been secured.

Part of the category „Aids for working aloft“ are, for example:

- Lifting platforms
- Scaffolding
- Auxiliary cranes
- Ladders

**WARNING**

Danger of falling!

During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.

Death, severe bodily injuries, property damage.

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see Crane operating instructions, chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ When closing or opening boom systems during boom assembly or boom disassembly, no persons may remain on the boom system or in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow, frost and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping and walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane driver of the main crane must be in voice contact with the crane driver / crane drivers of the auxiliary crane / auxiliary cranes.
- ▶ For assembly tasks, the crane driver may only initiate crane movements when the responsible guide has explicitly released the movement.

**DANGER**

The components can fall down!

If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.

Death, severe bodily injuries, property damage.

- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

**WARNING**

The components can fall down!

If the corresponding component is unpinned without being secured by an auxiliary crane, the corresponding component can fall down.

Death, severe bodily injuries, property damage.

- ▶ Do not unpin the components until they are secured by an auxiliary crane.

**WARNING**

Falling components and tools!

Whenever working aloft, for example on the crane or on an aerial platform, components or tools can fall down.

Death, severe bodily injuries, property damage.

- ▶ Make sure that the danger zone under the work area is blocked off and marked.

15.1 Assembly drawings

**WARNING**

Use of assembly drawings!

Due to sole use of assembly drawings, dangerous situations can arise up to toppling of the crane.

Death, severe bodily injuries, property damage.

- ▶ Assembly drawings should only be considered to be **additional** and **supplementary** information.
- ▶ The respective chapters in the crane operating instructions are decisive for the assembly and disassembly of crane structures, lattice sections or crane components.
- ▶ The detailed information and danger notes in the respective chapters must be observed.

15.2 Guiding crane structures, lattice sections or crane components

**WARNING**

Danger due to oscillating load!

During the assembly of crane structures, lattice sections or crane components with the auxiliary crane, they can start to swing back and forth.

Death, severe bodily injuries, property damage.

- ▶ To guide and position crane structures, lattice sections or crane components always use a guide rope.
- ▶ Make sure that there are no persons or obstacles within the danger zone.
- ▶ Make sure that the guide rope is long enough.

15.3 Assembly / disassembly of electrical lines

**WARNING**

The crane can topple over!

If mechanical crane components, which have electrical connections are not immediately electrically connected after installation, then the limit switches and / or electrical sensors are not functioning.

Safety relevant shut offs are not recognized by the LICCON computer system.

Any errors or safety relevant messages which might occur are not shown on the LICCON computer system.

Death, severe bodily injuries, property damage.

- ▶ Make sure that the electrical connections are made immediately after installation of the respective crane components on the crane.
- ▶ Make sure that the procedure to make the electrical connections to the boom end sections in the respective assembly and set up chapters are observed.

NOTICE

Danger of damage of electrical connections!

If the following measures are not adhered to, the electrical connections can be damaged.

- ▶ Do not plug in the plug connection or unplug them under tension.
- ▶ Do not pinch or crush electrical connections.

When pulling the cable out:

- ▶ Hold the plug and not the cable. Do not pull on the cable to release the plug connection.
- ▶ Relieve the electrical connections in operating condition.
- ▶ In case of defective or faulty electrical lines, contact Service at Liebherr-Werk Ehingen.

**WARNING**

Malfunction if dummy plugs are not installed!

If the dummy plugs on the non-required electrical connections are not installed, then malfunctions or functional limitations can occur on the crane.

- ▶ Make sure that all non-required electrical connections, which have a dummy plug, are closed off with dummy plugs.
- ▶ Pay attention to the Electrical wiring diagram.

NOTICE

Property damage due to dirt and / or corrosion!

The plug connections are only protected when plugged in. If the plug connections are not plugged in, then the contact surfaces can corrode.

This could result in malfunctions.

- ▶ Always plug or screw the plug connections together properly.
 - ▶ Keep plug connections clean and dry. Clean contact surfaces provide the best signal transfer.
 - ▶ Close off the plug connections with dust caps.
-
- ▶ Establish the electrical connections to the installed crane components properly.
 - ▶ As a rule, close off on-required electrical connections (for example for accessories which are not installed) with the respective dummy plugs.
 - ▶ Properly close off electrical connections, which have no dummy plugs, with the corresponding protective dust or cover caps.

If a pull release for the cable drum is present:

- ▶ Hang the pull release in on the fixed point and relieve the plug connections from the pull strain.

After installing the plug connections:

- ▶ Check all plug connections for proper connection.

If a plug connection is not properly connected:

- ▶ Plug or screw the plug connection together properly.

After removing the plug connections:

- ▶ Protect the electrical connections with protective dust or cover caps or place them in intended storage retainers.
- ▶ After unplugging the electrical plug connections, install the dummy plugs, see Electrical wiring diagram.

If locking brackets are present:

- ▶ Close the locking bracket.

15.4 Assembling / disassembling of hydraulic lines

When connecting and releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

**WARNING**

Danger of accident due to loss of pressure or leakage!

Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.

Death, severe bodily injuries, property damage.

- ▶ Check the quick couplings after assembly for correct connection.
- ▶ Make sure that the sleeve and plug after fastened after assembly with the knurled nut.

**WARNING**

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before releasing the hydraulic lines, the hydraulic oil can escape with high pressure.

Death, severe bodily injuries, property damage.

- ▶ Release the pressure in the hydraulic system before releasing. Interrupt the pressure supply and wait for a short time.
- ▶ Release the pressure in the hydraulic system before connecting or disconnecting: Turn the engine off and wait for short time.
- ▶ Connect the coupling components (sleeve and connector) and screw together with the knurled nut.
- ▶ Tighten the hydraulic coupling by hand. Rotate the knurled nut until it reaches a tangible, fixed stop position.

15.5 Bypass at assembly / disassembly Crawler

**Note**

- ▶ Applies only for cranes with crawler assembly key button.

**WARNING**

High danger of accident in case of actuated crawler assembly key button!

If the crawler assembly key button is actuated, the overload protection is bypassed. No shut off at overload will occur in assembly operation nor in crane operation.

In the event of deliberate misuse, the crane can topple over.

Death, severe bodily injuries, property damage.

- ▶ The crawler assembly key button may only be actuated for assembly tasks.
- ▶ All other usage of the crawler assembly key button other than as described in the operating instructions is prohibited.
- ▶ Operating the crane with the crawler assembly key button enabled is strictly prohibited.

15.5.1 Activating the bypass at crawler assembly and crawler disassembly

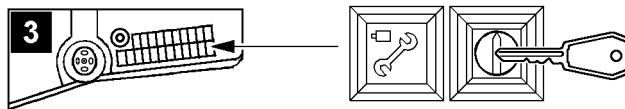


Fig.113441: Activating the bypass

- Illustration 3: Crawler assembly key button and indicator light *Crawler assembly* with touch function *Crawler assembly off*

- ▶ Actuate the crawler assembly key button.

Result:

- The LICCON overload protection is inactive.
- The indicator light *Crawler assembly* lights up.

15.5.2 Deactivating the bypass at crawler assembly and crawler disassembly

Make sure that the following prerequisites are met:

- The LICCON overload protection is bypassed / inactive and the „Bypass at assembly and disassembly“ is activated.
- The indicator light *Crawler assembly* lights up.

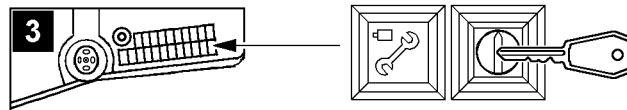


Fig.113441: Deactivating the bypass

If the bypass at crawler assembly is to be turned off:

- ▶ Turn the crawler assembly off by pressing the off button *Crawler assembly off*.

Result:

- The indicator light in the button *Crawler assembly* turns off.

15.6 Bypass at assembly / disassembly

Depending on the crane version, the „Bypass at assembly and disassembly“ is activated by:

- The set up button (key button) on the LICCON monitor.
- The assembly key button in the instrument panel.



Note

- ▶ Applies only for cranes with LICCON overload protection.
- ▶ Indicator light *Assembly* is only present in the instrument panel for certain crane types.



WARNING

High danger of accident at crane operation with activated „Bypass at assembly and disassembly“! At activated „Bypass at assembly and disassembly“ the overload protection and possibly bypassed hoist limit switches.

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over.

Personnel can be killed.

This could result in high property damage.

- ▶ The activation of the „Bypass at assembly and disassembly“ is only permissible for assembly and disassembly purposes.
- ▶ All other usage of the „Bypass at assembly and disassembly“ other than as described in the operating instructions is prohibited.
- ▶ The „Bypass at assembly and disassembly“ may only be activated by persons who are aware of the consequences of a bypass.
- ▶ Crane operation with activated „Bypass at assembly and disassembly“ is strictly prohibited.
- ▶ The „Bypass at assembly and disassembly“ must be deactivated immediately after assembly and disassembly work.
- ▶ The crane operator or a person authorized by him must make sure that no misuse of the bypass device is possible (remove the key and store it safely, if necessary).

15.6.1 Activating the bypass at assembly and disassembly



Fig.113438: Activating the bypass at assembly and disassembly

- Illustration 1: LICCON monitor (only certain crane types).
 - Illustration 2: Indicator light „Assembly“ in instrument panel crane cab (only certain crane types).
- ▶ Actuate the respective operating element.

Result:

- The LICCON overload protection is bypassed / inactive and the „Bypass at assembly and disassembly“ is activated.
- The „Assembly“ icon appears in the LICCON monitor and / or the indicator light „Assembly“ in the instrument panel lights up.
- Depending on the circumstances, acoustic and / or optical warning signals (blinkers, flashing lights, bells and horns) sound.

15.6.2 Bypass at assembly and disassembly

Fig.113437: Bypass at assembly and disassembly

- ▶ No longer actuate the respective operating element or reset.

Result:

- The LICCON overload protection is active and the „Bypass at assembly and disassembly“ is deactivated.
- The „Assembly“ icon turns off in the LICCON monitor and / or the indicator light „Assembly“ in the instrument panel no longer lights up.
- The acoustic and / or optical warning signals which were triggered by the bypass are turned off again.

15.7 Actuation of winch and / or crane movements during assembly / disassembly**Note**

- ▶ The winches and / or crane movements can be controlled from the crane operator's cab or, depending on the crane set up configuration, with the Bluetooth™ Terminal (BTT) or the radio remote control*.
- ▶ Observe the Crane operating instructions, chapter 4.05, chapter 5.31 and chapter 6.08.

**WARNING**

Uncoordinated procedure for assembly tasks!

Death, severe bodily injuries, property damage.

- ▶ Before starting the assembly tasks, define the course of action and agree on all steps with all involved personnel.
- ▶ Monitor all steps and continuously check the course of action.
- ▶ In the case of unforeseen events, stop the course of action and agree on the new situation with all involved personnel.
- ▶ Make sure that winches and / or crane movements are only controlled by people who are aware of the effects on the crane and / or boom system as well as the connected dangers.
- ▶ Make sure that no persons, objects or obstacles are within the danger zone of the crane.
- ▶ Prewarn persons within the surrounding area of the crane, for example via a horn signal.
- ▶ Perform all winch and / or crane movements anticipatorily and at a low speed.

15.8 Assembly / disassembly of booms



WARNING

The crane can topple over!

Angular pull can overload the crane.

Overload can cause destruction of the crane or cause it to topple over.

Death, severe bodily injuries, property damage.

- ▶ The hook block must always be attached (hooked) vertically over the center of gravity of the load to be lifted.
- ▶ Angular pull is prohibited.

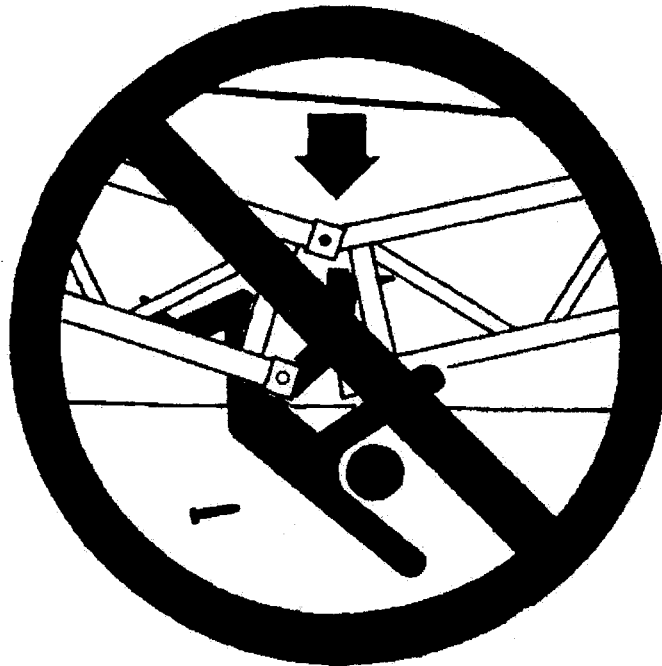


Fig.113444: Danger of accident during assembly / disassembly



WARNING

Danger of accident at assembly / disassembly of booms!

When you disassemble unsecured or unsupported booms, they can fall down.

Death, severe bodily injuries, property damage.

- ▶ Never unpin the pins under unsecured or unsupported booms.
- ▶ Never unpin the connecting pins on unsecured or unsupported booms.
- ▶ Do not stand under the booms or within the complete danger zone during the pinning and unpinning procedure of the booms.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ The railing at assembly and disassembly of booms must be horizontal.
- ▶ Do not lean the ladder against the component being disassembled.

Make sure that the following prerequisites are met:

- If parts of the equipment (for example lattice sections) are not in contact with the ground during assembly / disassembly, then they must be supported with suitable, stable materials.
- Select the height of the substructure so that the parts of the equipment are not in contact with the ground.
- Place the parts of the equipment with rope pulleys down in such a way that the rope pulleys are not damaged.
- During disassembly make sure that the auxiliary crane can lift the load vertically.
- Have an auxiliary crane with sufficient load carrying capacity available to be able to hold the load at a respective radius.

15.9 Fastening positions for assembly / disassembly of the lattice jib



WARNING

Danger of fatal accidents due falling components!

The maximum permissible tensile load on the fastening eye is engraved on the fastening eye.

The maximum permissible fastening load of the respective components can differ to the maximum permissible tensile load of the fastening eye.

Components can be damaged at overload and fall down during lifting.

- ▶ Observe the maximum permissible fastening load according to the operating instructions and the tags on the components.
- ▶ Fasten the lattice jib only according to the following descriptions.
- ▶ Do not overload the components.

15.9.1 Closing the end section

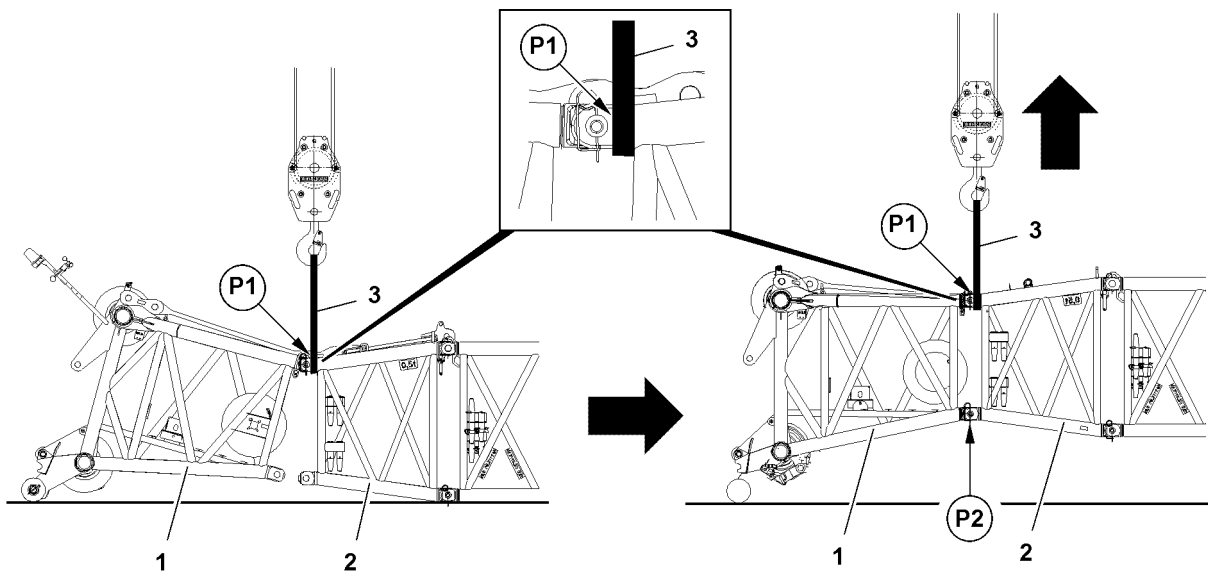


Fig.117840: Closing the end section

For closing the end section, observe the following:

- Use textile type fastening equipment **3**
- Loop the textile type fastening equipment **3** on the left and right around on the pin points

Before fastening:

- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the textile type fastening equipment **3** on the upper pin points **P1** between the end section **1** and the pinned components **2**.
- ▶ Lift the lattice jib until the lower pin points **P2** align between the end section **1** and components **2**.
- ▶ Pin the end section **1** and components **2** on the lower pin points **P2** on the left and right.

After pinning:

- ▶ Remove the textile type fastening equipment **3**.

15.9.2 Placing the lattice jib into the roller cart



Note

- ▶ The following illustrations are examples and may not match your crane exactly.

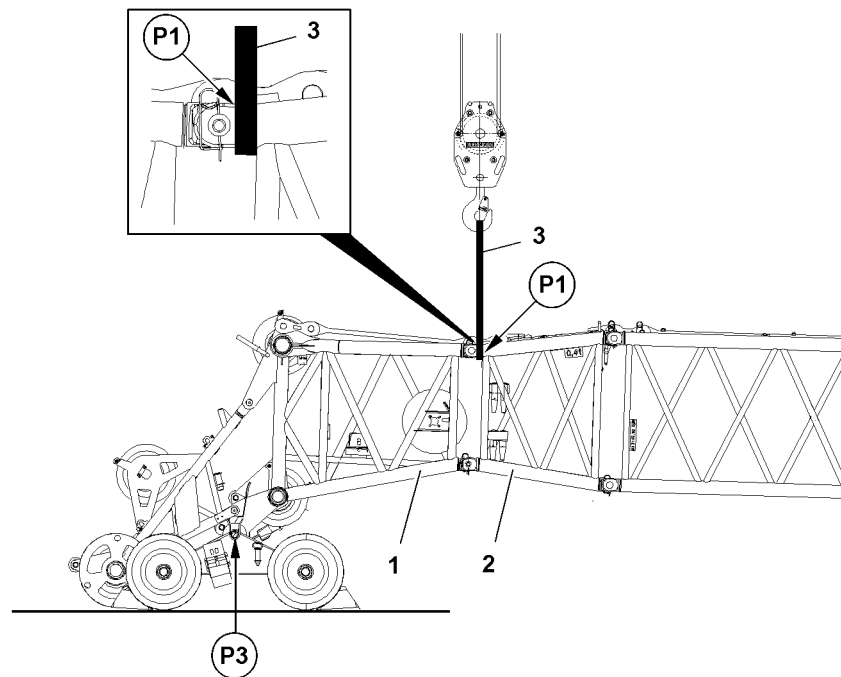


Fig.117842: Placing the lattice jib into the roller cart (telescopic crane with lattice jib)

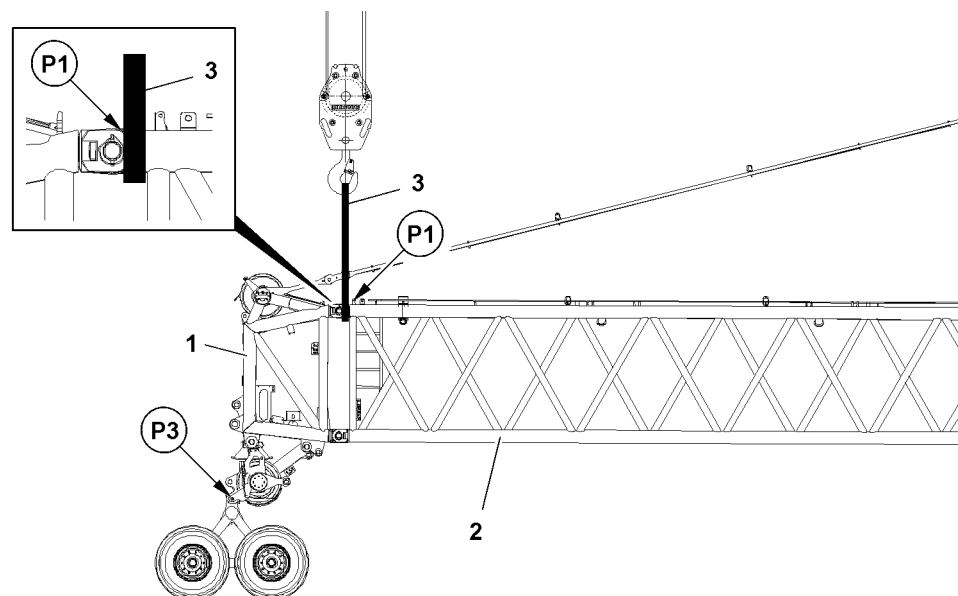


Fig.121550: Placing the lattice jib into the roller cart (crane with lattice mast)

When placing it into the roller cart, observe the following:

- The end section 1 is completely installed.
- Use textile type fastening equipment 3
- Loop the textile type fastening equipment 3 on the left and right around on the pin points

Before fastening:

- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the textile type fastening equipment 3 on the upper pin points P1 between the end section 1 and the pinned components 2.
- ▶ Lift the lattice jib and place it in the roller cart 4.
- ▶ Pin the end section 1 with the roller cart 4 on the pin points P3 on the left and right.
- ▶ Remove the textile type fastening equipment 3.

**Note**

- ▶ The disassembly and removal of the pulley cart 4 is handled accordingly.

15.9.3 Opening the end section

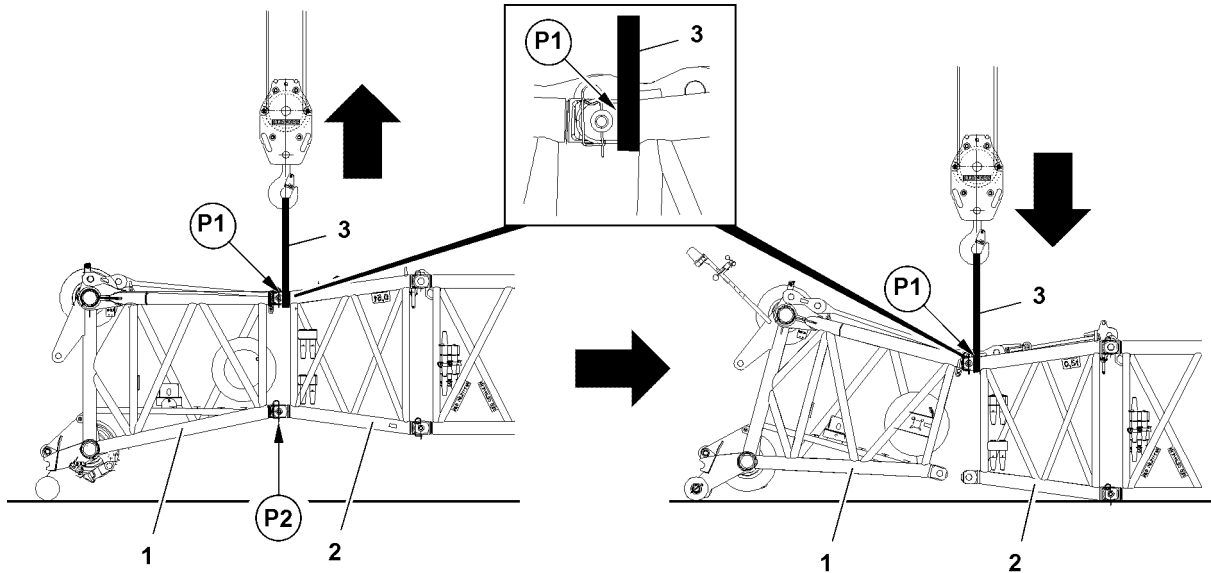


Fig.117841: Opening the end section

For opening the end section, observe the following:

- The roller cart is disassembled and removed.
- Use textile type fastening equipment 3
- Loop the textile type fastening equipment 3 on the left and right around on the pin points

Before fastening:

- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the textile type fastening equipment 3 on the upper pin points P1 between the end section 1 and the pinned components 2.
- ▶ Lift the lattice jib and relieve the pins on the lower pin points P2.
- ▶ Unpin the end section 1 and components 2 on the lower pin points P2 on the left and right.
- ▶ Place the lattice jib on the ground.
- ▶ Remove the textile type fastening equipment 3.

15.9.4 Holding the luffing lattice jib

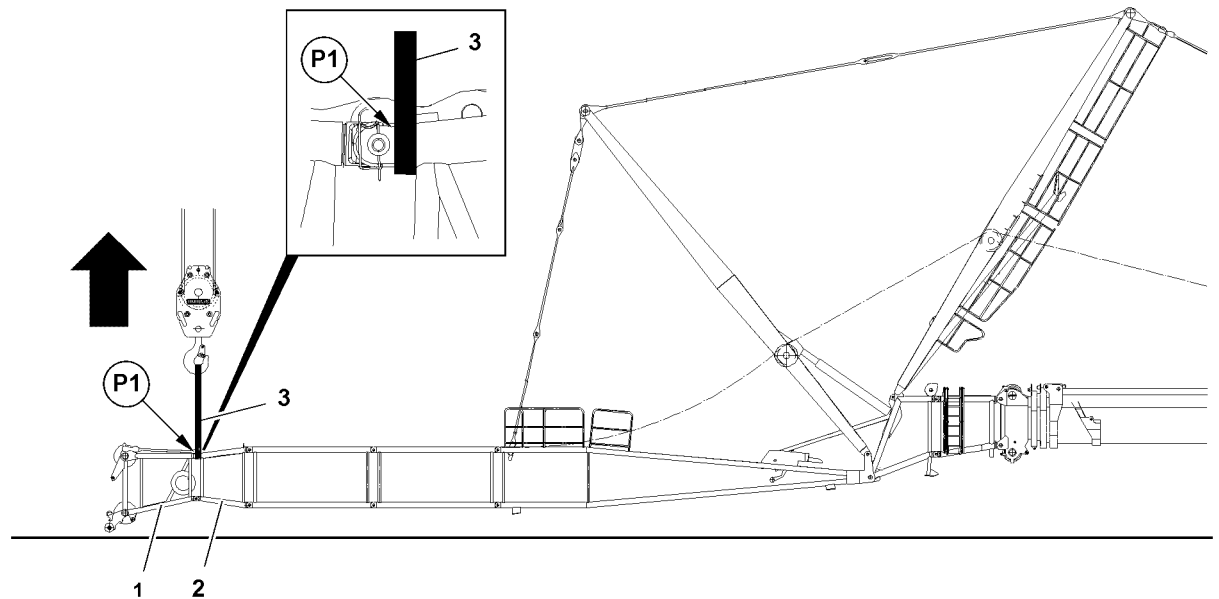


Fig.117843: Holding the luffing lattice jib

To be able to install or remove the guy rods and "flying assembly", the luffing lattice jib must be held on the upper pin points **P1**.

When holding the luffing lattice jib, observe the following:

- The lattice jib has been completely assembled
- Use textile type fastening equipment **3**
- Loop the textile type fastening equipment **3** on the left and right around on the pin points

Before fastening:

- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the textile type fastening equipment **3** on the upper pin points **P1** between the end section **1** and the pinned components **2**.
- ▶ Lift the lattice jib and install the guy rods.

When the guy rods are installed:

- ▶ Remove the textile type fastening equipment **3**.



Note

- ▶ The removal of the guy rods is handled accordingly.

15.9.5 Assembling the fixed lattice jib on the TF-adapter



WARNING

Mortal danger if the lattice jib tilts over!

Due to unfavorable center of gravity, only certain lattice jib lengths can be installed / removed as an assembled lattice jib.

If a lattice jib length cannot be installed / removed as an assembled lattice jib, then they must be installed / removed individually in flying mode.

- ▶ Check if the respective lattice jib length can be installed / removed as an assembled lattice jib. See charts in the Crane operating instructions, chapter 5.01.10.

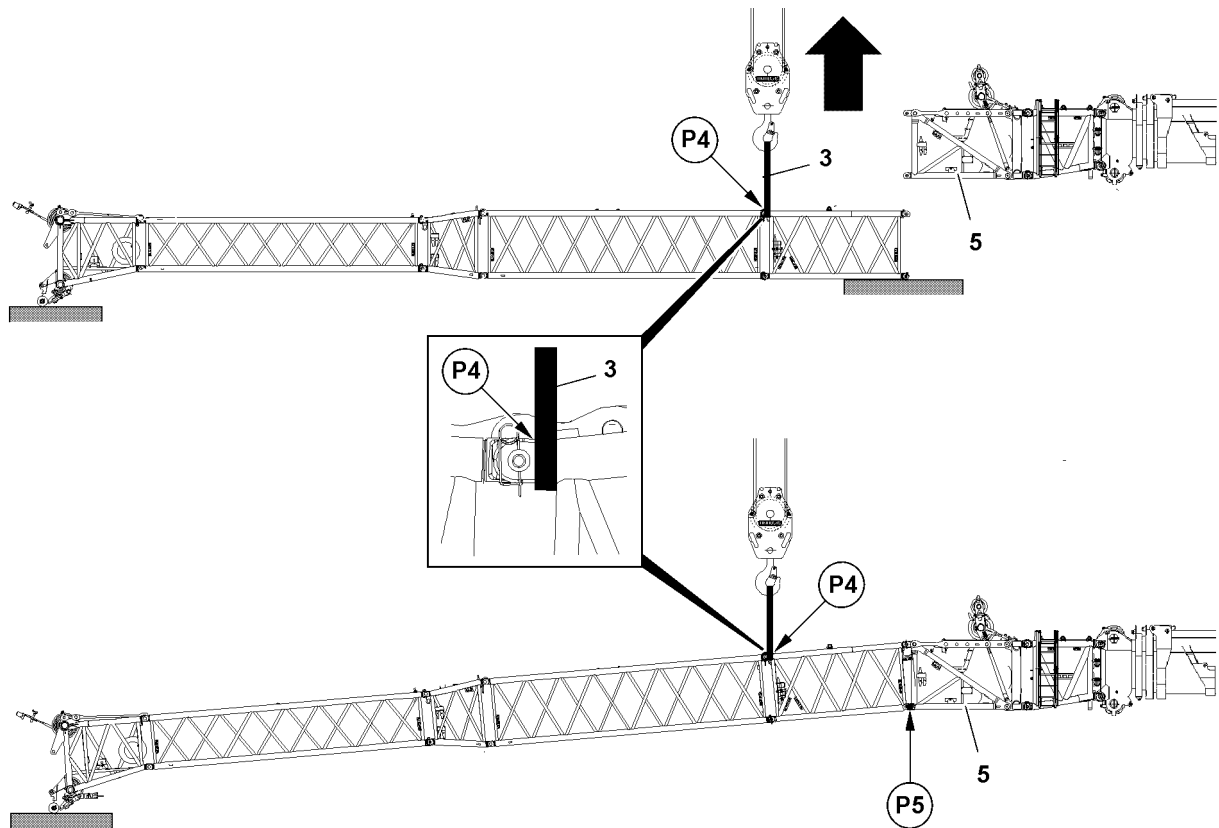


Fig.117844: Assembling the lattice jib on the TF-adapter

For installation on the TF-adapter, observe the following:

- The lattice jib has been assembled.
- The TF-adapter **5** is installed.
- Use textile type fastening equipment **3**
- Loop the textile type fastening equipment **3** on the left and right around on the pin points

Before fastening:

- ▶ Check the position of the spring retainers and correct, if necessary.

Fasten between the lattice sections, which are installed directly on the TF-adapter.

- ▶ Fasten the textile type fastening equipment **3** on the upper pin points **P4**.
- ▶ Lift the lattice jib and affix on the lower pin point **P5** on the TF-adapter **5**.
- ▶ Pin the lattice jib on the lower pin point **P5** with the TF-adapter **5**.

After pinning:

- ▶ Remove the textile type fastening equipment **3**.



WARNING

Mortal danger if the lattice jib tilts over!

- ▶ Make sure to always observe the permissible lattice jib length at disassembly.
- ▶ Disassemble accordingly.

15.9.6 Closing the fixed lattice jib

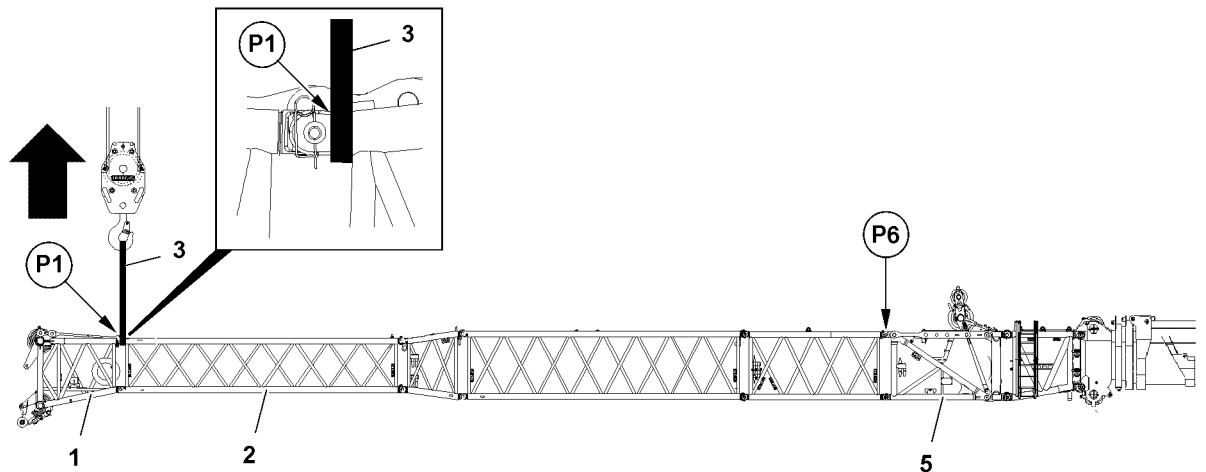


Fig.117850: Closing the lattice jib

For installation on the TF-adapter, observe the following:

- The lattice jib is pinned on the lower pin points of the TF-adapter **5**.
- Use textile type fastening equipment **3**
- Loop the textile type fastening equipment **3** on the left and right around on the pin points

Before fastening:

- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the textile type fastening equipment **3** on the upper pin points **P1** between the end section **1** and the pinned components **2**.
- ▶ Lift the lattice jib and affix on the upper pin point **P6** on the TF-adapter **5**.
- ▶ Pin the lattice jib on the upper pin point **P6** with the TF-adapter **5**.

After pinning:

- ▶ Remove the textile type fastening equipment **3**.



Note

- ▶ Disassemble accordingly.

15.9.7 Angle adjustment on the fixed lattice jib

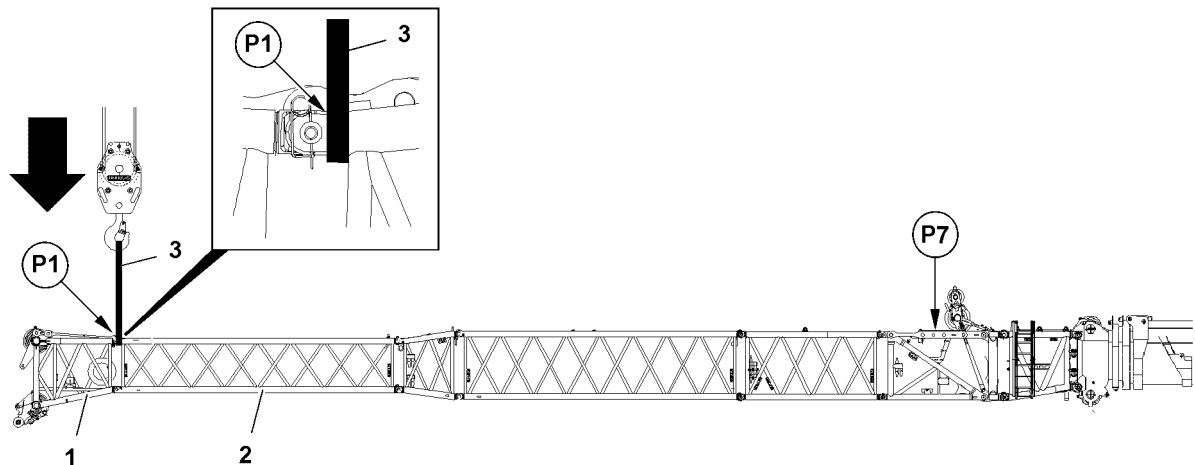


Fig.117851: Angle adjustment on the fixed lattice jib

For the angle adjustment on the fixed lattice jib, observe the following:

- The lattice jib has been completely assembled.
- Use textile type fastening equipment 3
- Loop the textile type fastening equipment 3 on the left and right around on the pin points

Before fastening:

- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the textile type fastening equipment 3 on the upper pin points P1 between the end section 1 and the pinned components 2.
- ▶ Lift the lattice jib and relieve the pins on the angle adjustment P7.
- ▶ Unpin the angle adjustment P7, see Crane operating instructions, chapter 5.03.
- ▶ Set and pin a New angle on the angle adjustment P7, see Crane operating instructions, chapter 5.03.
- ▶ Lower the lattice jib.

After lowering:

- ▶ Remove the textile type fastening equipment 3.

15.9.8 Loading the preassembled lattice jib

For loading the lattice jib, observe the following:

- The lattice jib has been preassembled.
- Use textile type fastening equipment.
- Loop the textile type fastening equipment on the left and right around on the pin points.

Before fastening:

- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the preassembled lattice jib according to the fastening points in the Crane operating instructions, chapter 5.03.

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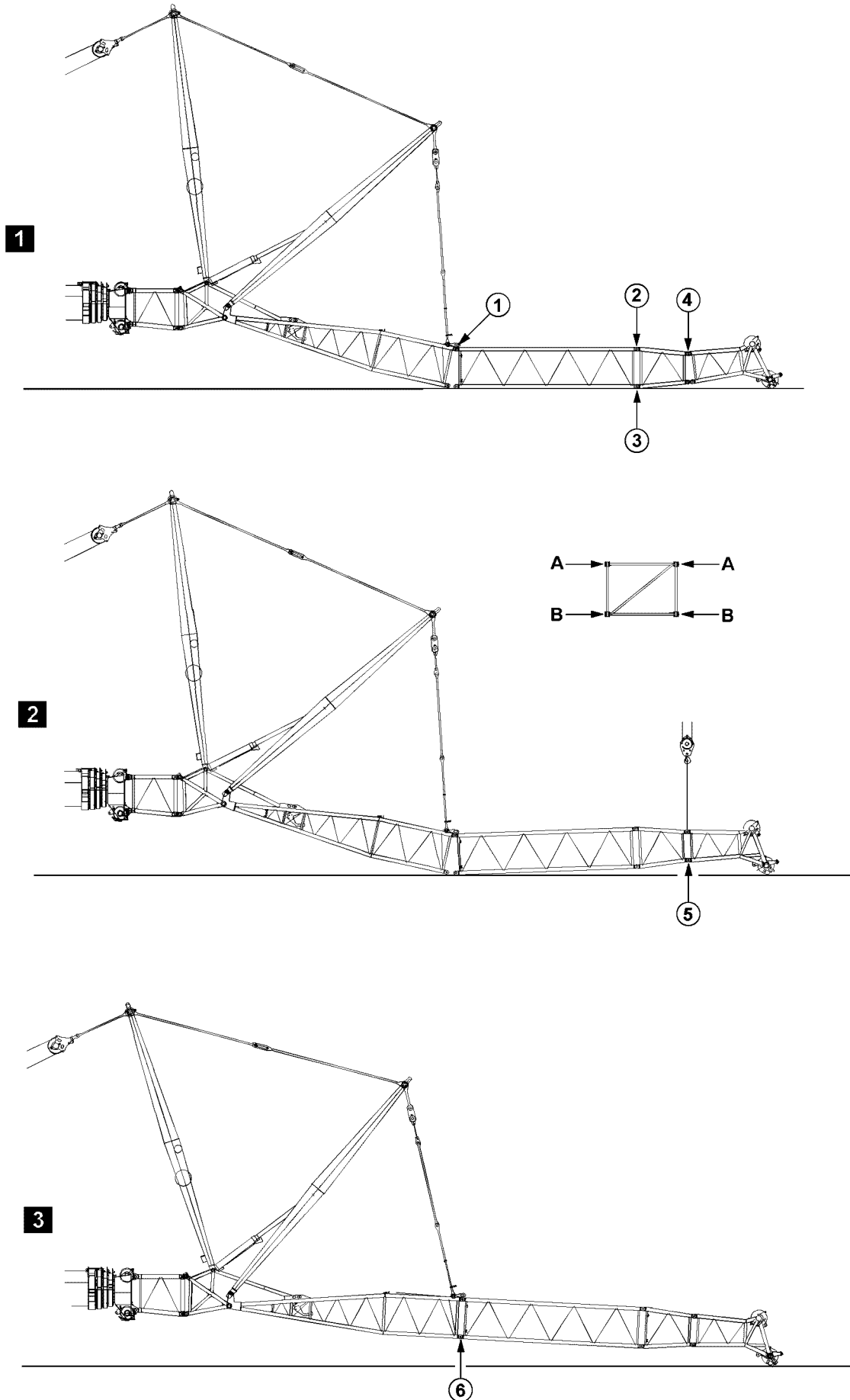


Fig.197718: Example for cranes with telescopic boom

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15.10 Assembly / disassembly of lattice sections on telescopic cranes with guyed auxiliary boom with an auxiliary crane

15.10.1 Assembly of lattice sections for guyed auxiliary boom with an auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.



WARNING

Danger of fatal injury when assembling auxiliary booms!

If the pins are not pinned in the given sequence, then lattice sections may suddenly fold down or fall down.

Death, severe bodily injuries, property damage.

▶ Pins must be pinned in the order specified.

- ▶ Pin and secure pins at both sides (level **A**) at point **1**, illustration 1.
- ▶ Pin and secure pins at both sides (level **A**) at point **2**, illustration 1.
- ▶ Pin and secure pins at both sides (level **B**) at point **3**, illustration 1.
- ▶ Pin and secure pins at both sides (level **A**) at point **4**, illustration 1.
- ▶ Close the end section with the auxiliary crane, illustration 2.
- ▶ Pin and secure pins at both sides (level **B**) at point **5**, illustration 2.
- ▶ Lift the lattice sections, illustration 3.
- ▶ Pin and secure pins at both sides (level **B**) at point **6**, illustration 3.

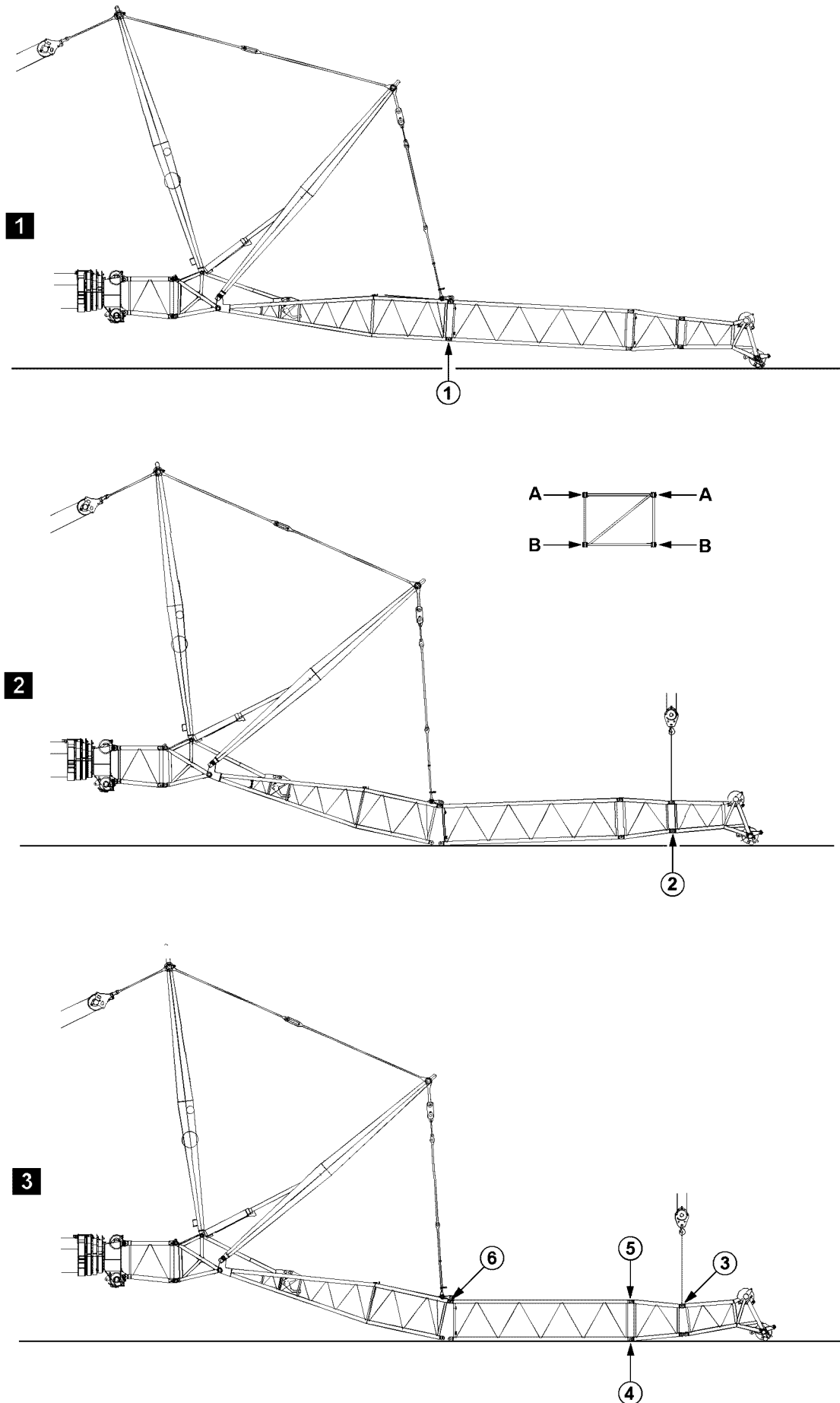


Fig.197719: Example for cranes with telescopic boom

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15.10.2 Disassembly of lattice sections for guyed auxiliary boom with an auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.



WARNING

Danger of fatal injury when disassembling auxiliary booms!

If the pins are not unpinned in the given sequence, then lattice sections may suddenly fold down or fall down.

Death, severe bodily injuries, property damage.

▶ Pins must be unpinned in the order specified.

- ▶ Luff the auxiliary boom down until the end section touches the ground slightly, illustration 1.
- ▶ Release and unpin the pins at both sides (level **B**) at point 1, illustration 1.
- ▶ Completely remove the lattice sections, illustration 2.
- ▶ Lift the end section with the auxiliary crane, illustration 2.
- ▶ Release and unpin the pins at both sides (level **B**) at point 2, illustration 2.
- ▶ Release and unpin the pins at both sides (level **A**) at point 3, illustration 3.
- ▶ Release and unpin the pins at both sides (level **B**) at point 4, illustration 3.
- ▶ Release and unpin the pins at both sides (level **A**) at point 5, illustration 3.
- ▶ Release and unpin the pins at both sides (level **A**) at point 6, illustration 3.

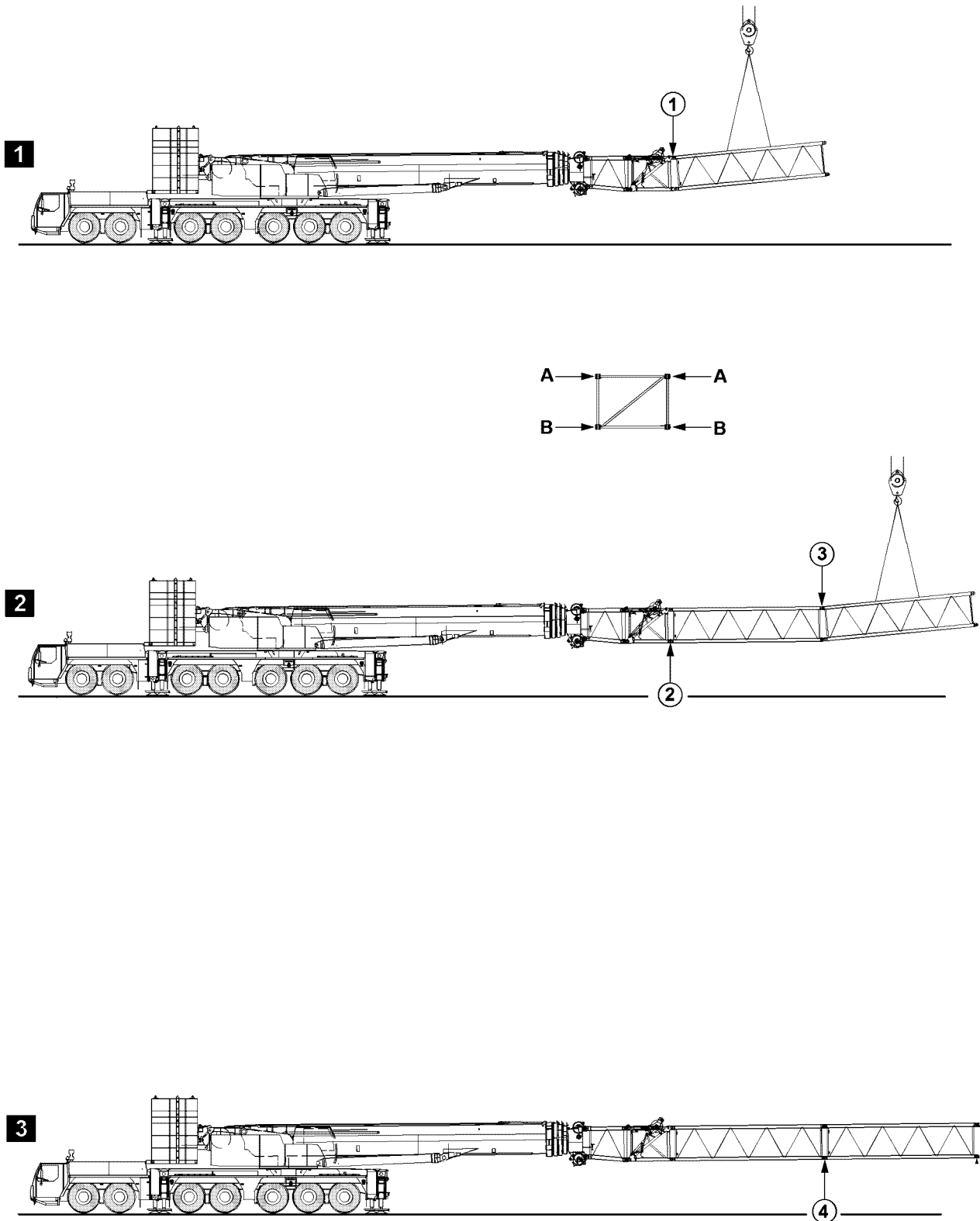


Fig.197705: Example for cranes with telescopic boom

15.11 Assembly / disassembly of lattice sections on telescopic cranes with self-supporting auxiliary boom with an auxiliary crane

15.11.1 Assembly of lattice sections on self-supporting auxiliary boom with an auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.



WARNING

Danger of fatal injury when assembling auxiliary booms!

If the pins are not pinned in the given sequence, then lattice sections may suddenly fold down or fall down.

Death, severe bodily injuries, property damage.

▶ Pins must be pinned in the order specified.

- ▶ Pin and secure pins at both sides (level **A**) at point **1**, illustration **1**.
- ▶ Pin and secure pins at both sides (level **B**) at point **2**, illustration **2**.
- ▶ Pin and secure pins at both sides (level **A**) at point **3**, illustration **2**.
- ▶ Pin and secure pins at both sides (level **B**) at point **4**, illustration **3**.

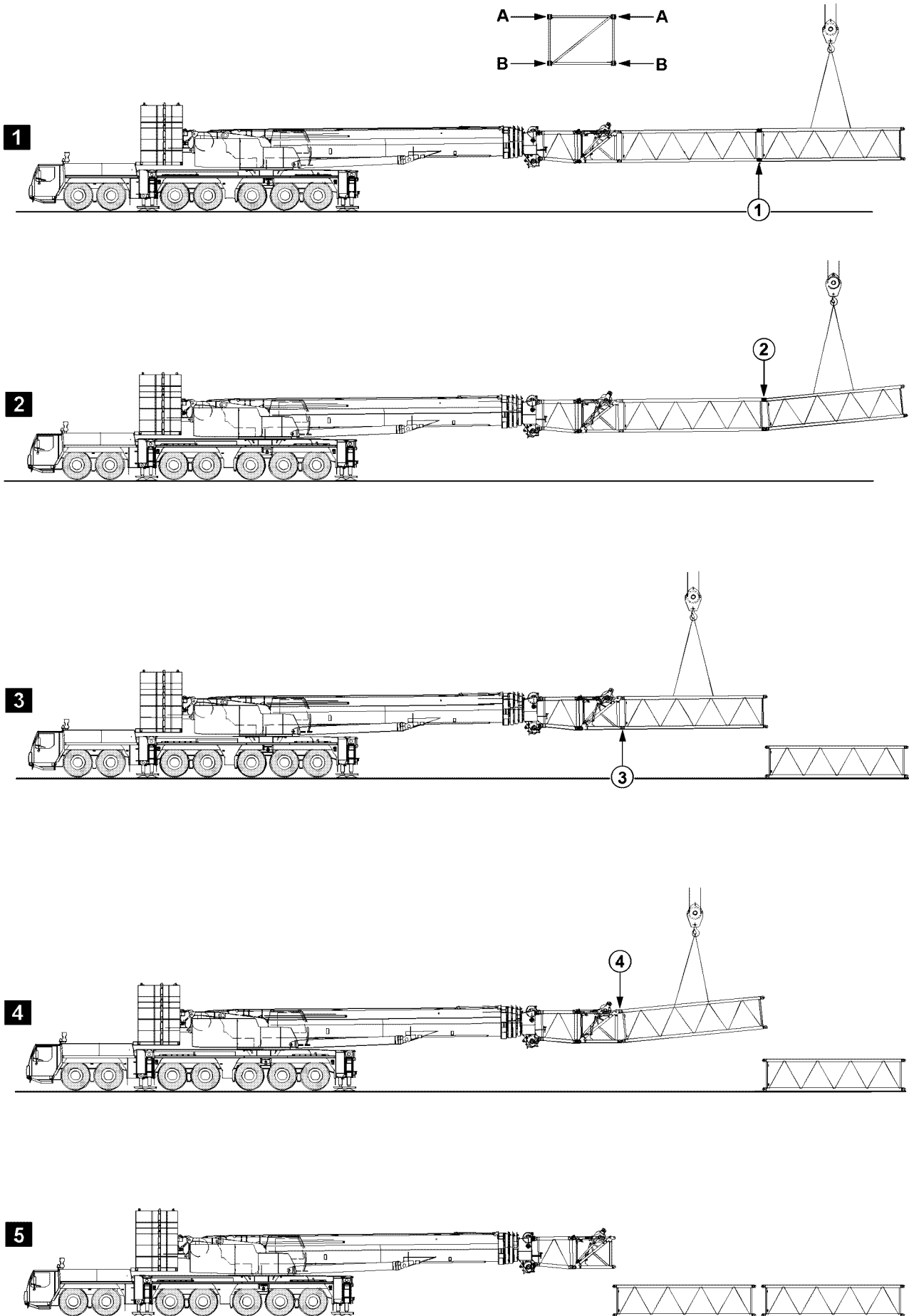


Fig.105510: Example for cranes with telescopic boom

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15.11.2 Disassembly of lattice sections on self-supporting auxiliary boom with an auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.



WARNING

Danger of fatal injury when disassembling auxiliary booms!

If the pins are not unpinned in the given sequence, then lattice sections may suddenly fold down or fall down.

Death, severe bodily injuries, property damage.

▶ Pins must be unpinned in the order specified.

- ▶ Release and unpin the pins at both sides (level **B**) at point **1**, illustration **1**.
- ▶ Release and unpin the pins at both sides (level **A**) at point **2**, illustration **2**.
- ▶ Release and unpin the pins at both sides (level **B**) at point **3**, illustration **3**.
- ▶ Release and unpin the pins at both sides (level **A**) at point **4**, illustration **4**.

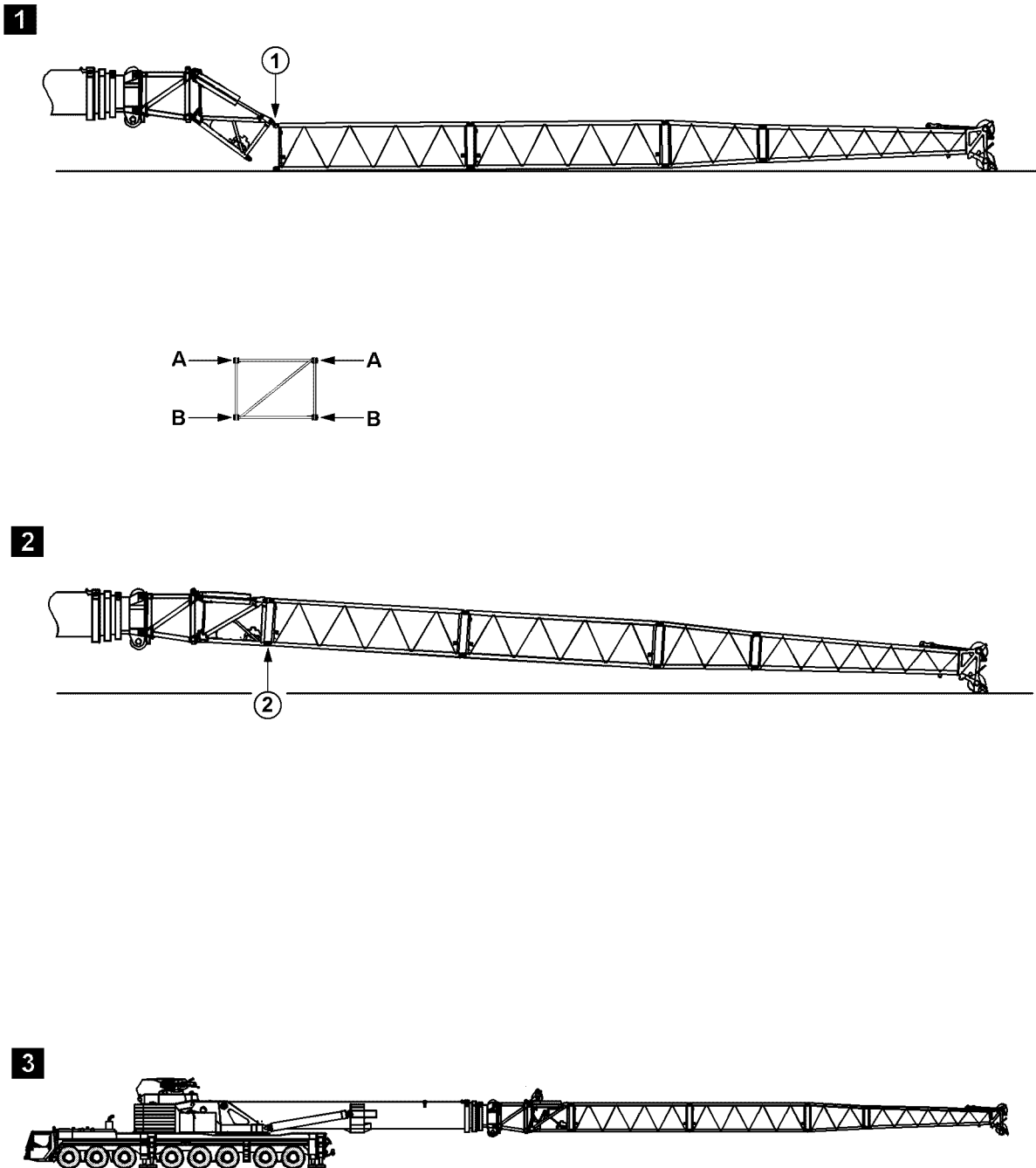


Fig.197712: Example for cranes with telescopic boom

15.12 Assembly / disassembly of lattice sections on telescopic cranes with self-supporting auxiliary boom, without an auxiliary crane

15.12.1 Assembly of lattice sections on self-supporting auxiliary booms, without auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.



WARNING

Danger of fatal injury when assembling auxiliary booms!

If the pins are not pinned in the given sequence, then lattice sections may suddenly fold down or fall down.

Death, severe bodily injuries, property damage.

- ▶ Pins must be pinned in the order specified.
-

For cranes with hydraulic angle adjustment and self-supporting auxiliary boom, the assembly / disassembly of additional lattice sections may be performed using the crane itself.

In order to do so, proceed as follows.

- ▶ Assemble the lattice sections to the required length.
- ▶ Pin and secure pins at both sides (level **A**) at point **1**, illustration **1**.
- ▶ Close the auxiliary boom until the pins can be pinned at point **2**, illustration **2**.
- ▶ Pin and secure pins at both sides (level **B**) at point **2**, illustration **2**.

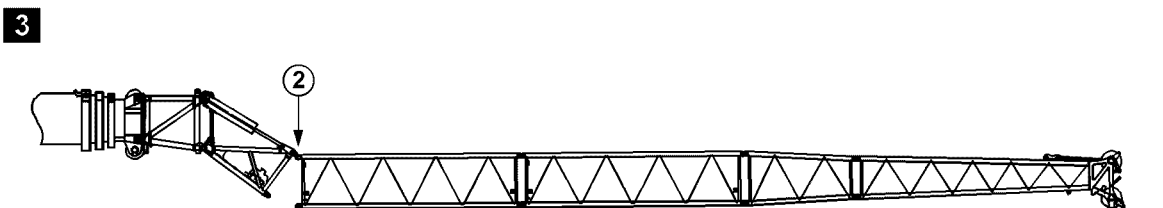
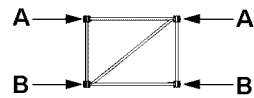
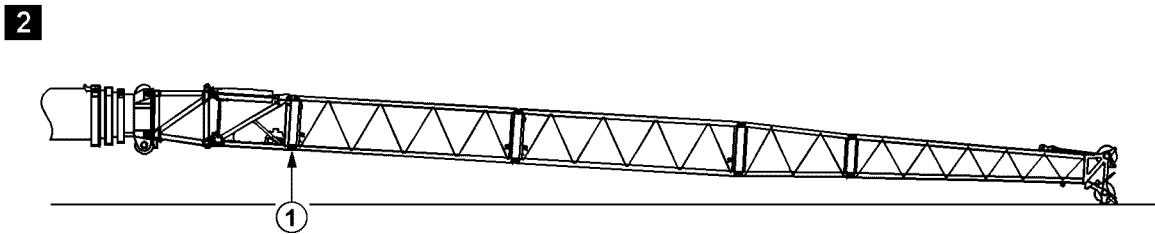
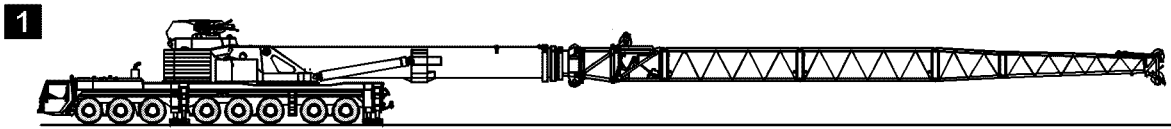


Fig.197713: Example for cranes with telescopic boom

15.12.2 Disassembly of lattice sections on self-supporting auxiliary booms, without auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.



WARNING

Danger of fatal injury when disassembling auxiliary booms!

If the pins are not unpinned in the given sequence, then lattice sections may suddenly fold down or fall down.

Death, severe bodily injuries, property damage.

- ▶ Pins must be unpinned in the order specified.

For cranes with hydraulic angle adjustment and self-supporting auxiliary boom, the assembly / disassembly of additional lattice sections may be performed using the crane itself.

In order to do so, proceed as follows.

NOTICE

Damage of hydraulic cylinders on the TF-adapter!

- ▶ As soon as the lattice jib is placed, stop the luff down movement.
- ▶ It is prohibited to set down the fixed lattice jib „hard“.

- ▶ Luff the main boom down until the end section touches the ground slightly, illustration 2.

If it is not possible to luff down that far:

- ▶ Adjust the TF-adapter until the end section touches the ground slightly, illustration 2.
- ▶ Release and unpin the pins at both sides (level **B**) at point 1, illustration 2.

NOTICE

Damage of hydraulic cylinders on the TF-adapter.

- ▶ As soon as the lattice jib is placed, stop the opening movement.

- ▶ Open the auxiliary boom until the lattice sections to be removed are laying completely on the ground, illustration 3.
- ▶ Release and unpin the pins at both sides (level **A**) at point 2, illustration 3.
- ▶ Completely remove the auxiliary boom.

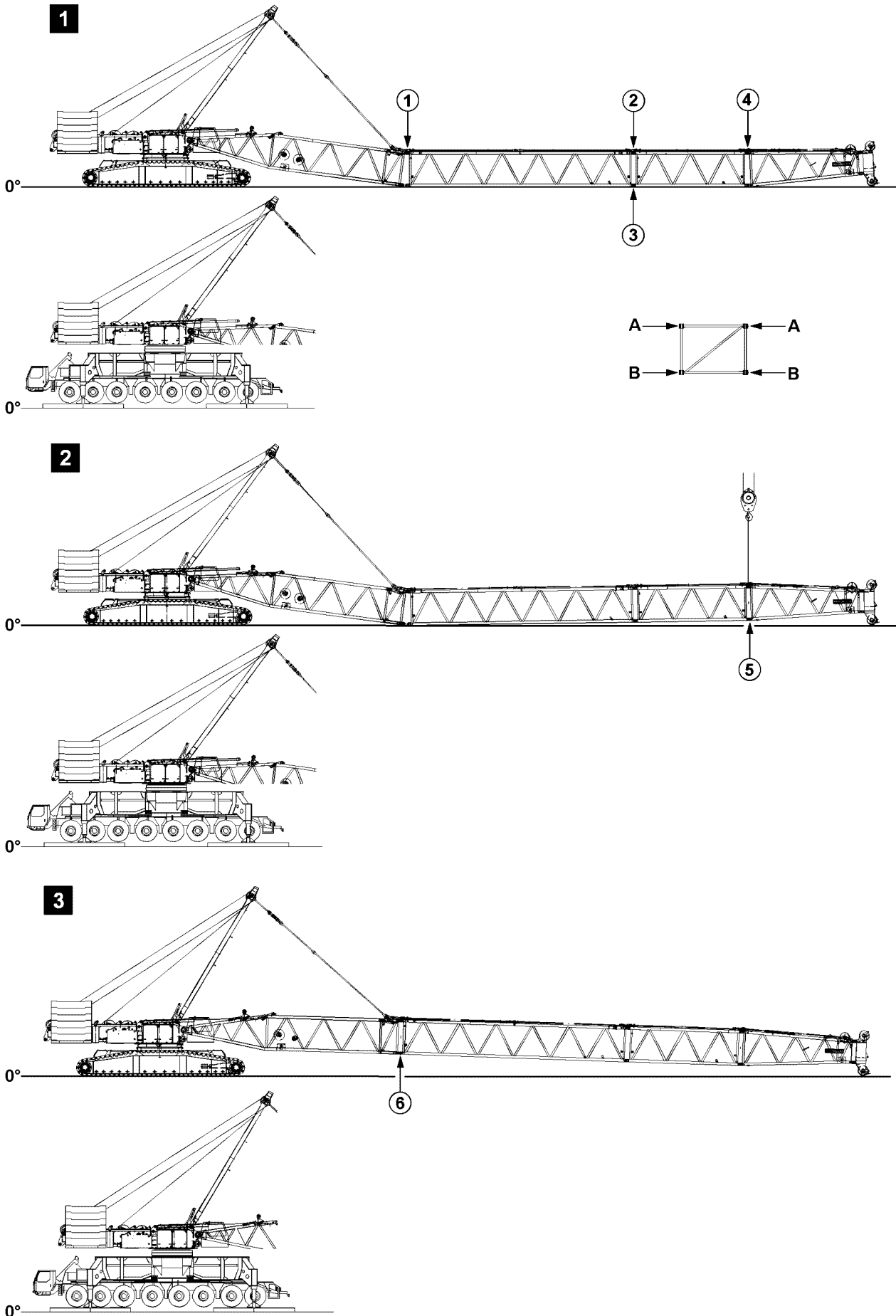


Fig.121633: Example for cranes with lattice mast booms

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15.13 Assembly / disassembly of lattice sections for lattice mast cranes

15.13.1 Assembly of lattice sections

The illustrations serve as examples. The illustrations may differ depending on the crane.



WARNING

Danger of fatal injury when assembling booms!

If the pins are not pinned in the given sequence, then lattice sections may suddenly fold down or fall down.

Personnel can be killed or seriously injured.

▶ Pins must be pinned in the order specified.

- ▶ Pin and secure pins at both sides (level **A**) at point **1**, illustration **1**.
- ▶ Pin and secure pins at both sides (level **A**) at point **2**, illustration **1**.
- ▶ Pin and secure pins at both sides (level **B**) at point **3**, illustration **1**.
- ▶ Pin and secure pins at both sides (level **A**) at point **4**, illustration **1**.
- ▶ Lift the end section with the auxiliary crane, illustration **2**.
- ▶ Pin and secure pins at both sides (level **B**) at point **5**, illustration **2**.
- ▶ Close the boom system with the SA-frame, illustration **3**.
- ▶ Pin and secure pins at both sides (level **B**) at point **6**, illustration **3**.

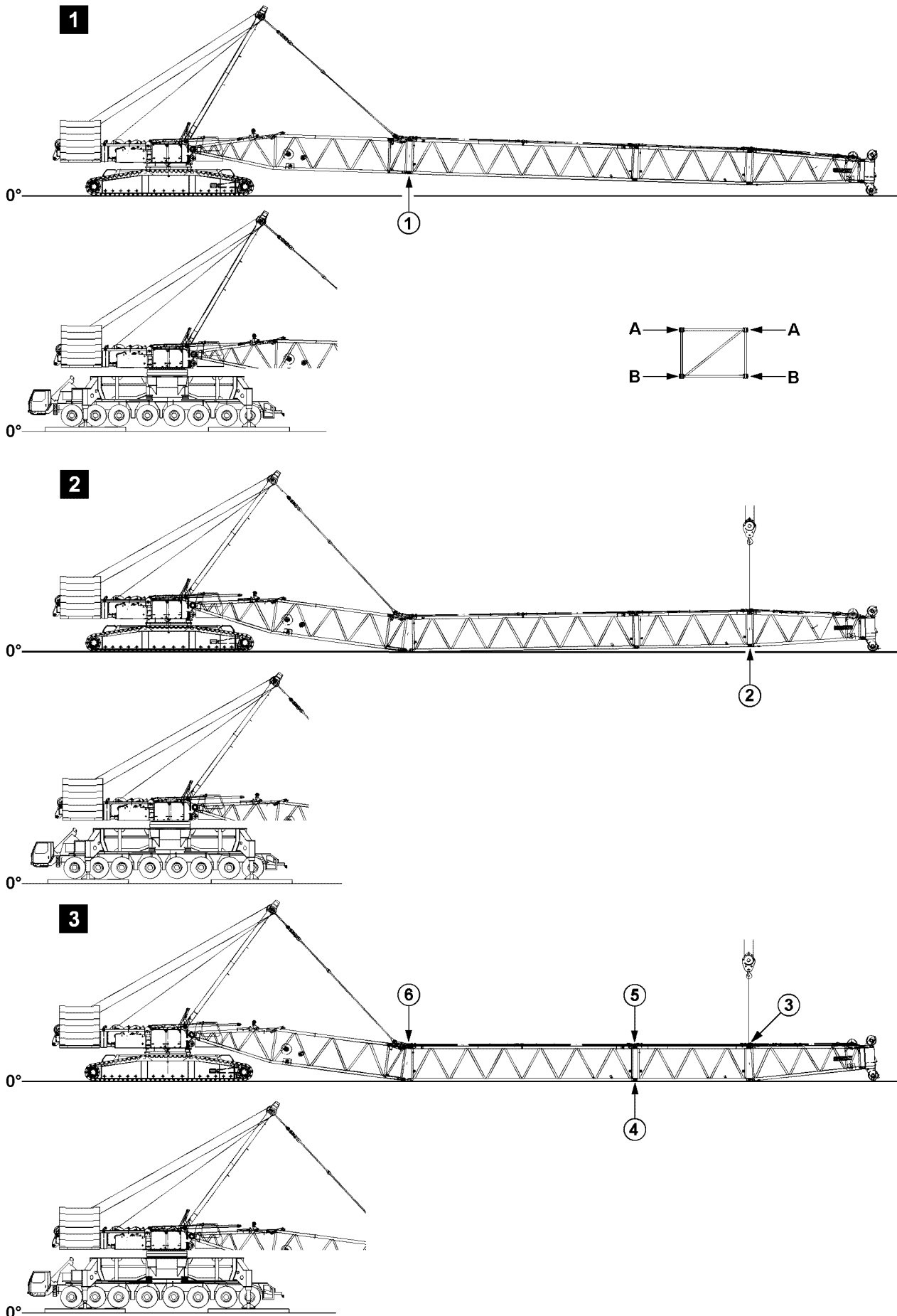


Fig.121634: Example for cranes with lattice mast booms

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15.13.2 Disassembly of lattice sections

The illustrations serve as examples. The illustrations may differ depending on the crane.



WARNING

Danger of fatal injury when disassembling booms!

If the pins are not unpinned in the given sequence, then lattice sections may suddenly fold down or fall down.

Personnel can be killed or seriously injured.

- ▶ Make sure that the SA-frame guying is tensioned before the pins are unpinned at point **1**, see illustration **1**.
 - ▶ Pins must be unpinned in the order specified.
-
- ▶ Luff the boom down until the end section touches the ground slightly, illustration **1**.
 - ▶ Guy the boom with SA-frame, illustration **1**.
 - ▶ Release and unpin the pins at both sides (level **B**) at point **1**, illustration **1**.
 - ▶ Open the boom system with the SA-frame, illustration **2**.
 - ▶ Completely remove the lattice sections, illustration **2**.
 - ▶ Lift the end section with the auxiliary crane, illustration **2**.
 - ▶ Release and unpin the pins at both sides (level **B**) at point **2**, illustration **2**.
 - ▶ Release and unpin the pins at both sides (level **A**) at point **3**, illustration **3**.
 - ▶ Release and unpin the pins at both sides (level **B**) at point **4**, illustration **3**.
 - ▶ Release and unpin the pins at both sides (level **A**) at point **5**, illustration **3**.
 - ▶ Release and unpin the pins at both sides (level **A**) at point **6**, illustration **3**.

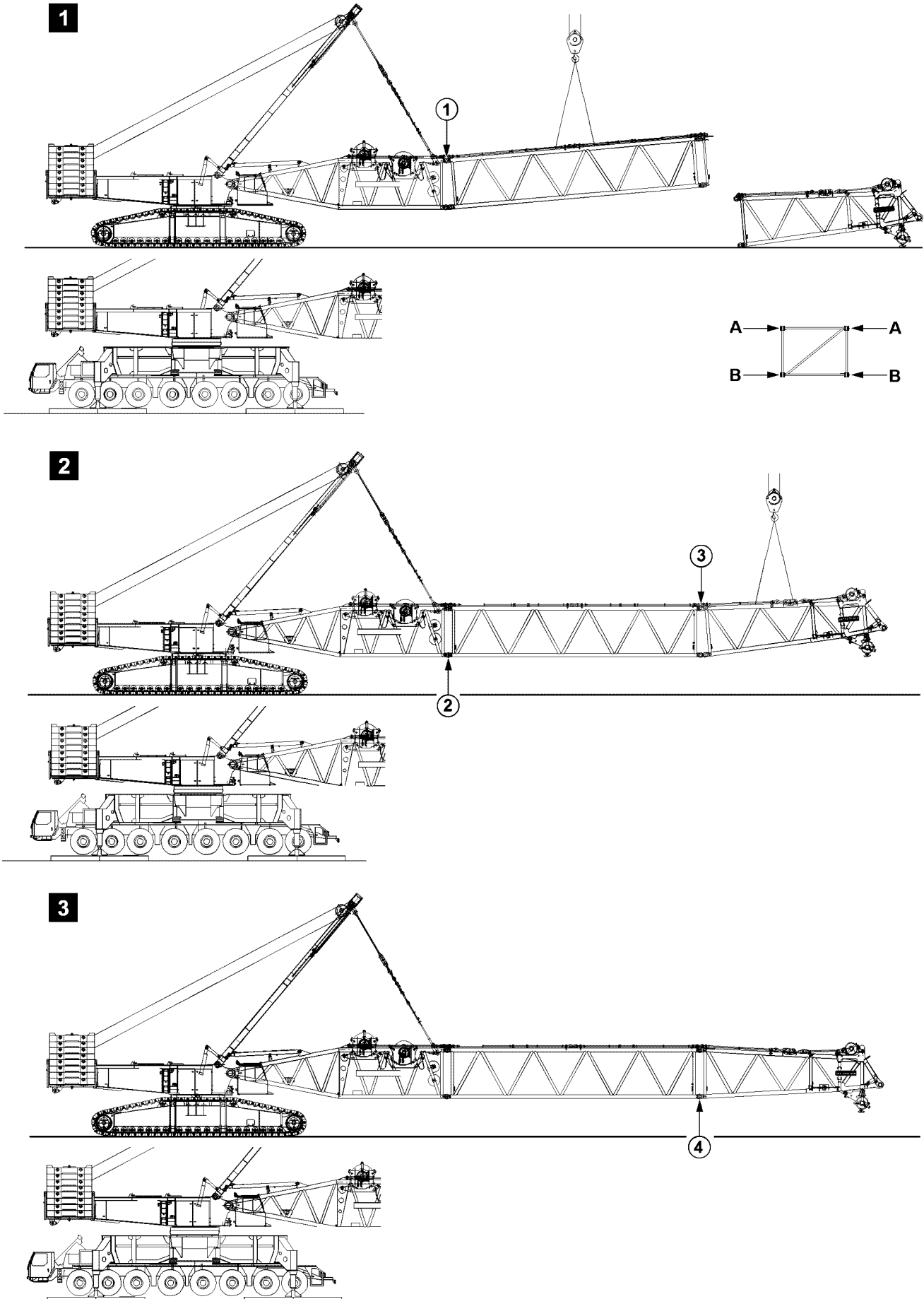


Fig.198182: Example for cranes with lattice mast booms

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15.14 Flying assembly / disassembly of lattice sections

15.14.1 Flying assembly of lattice sections

The illustrations serve as examples. The illustrations may differ depending on the crane.



WARNING

Danger of fatal injury when assembling booms!

If the pins are not pinned in the given sequence, then lattice sections may suddenly fold down or fall down.

Personnel can be killed or seriously injured.

▶ Pins must be pinned in the order specified.

- ▶ Pin and secure pins at both sides (level **A**) at point **1**, illustration **1**.
- ▶ Pin and secure pins at both sides (level **B**) at point **2**, illustration **2**.
- ▶ Pin and secure pins at both sides (level **A**) at point **3**, illustration **2**.
- ▶ Pin and secure pins at both sides (level **B**) at point **4**, illustration **3**.

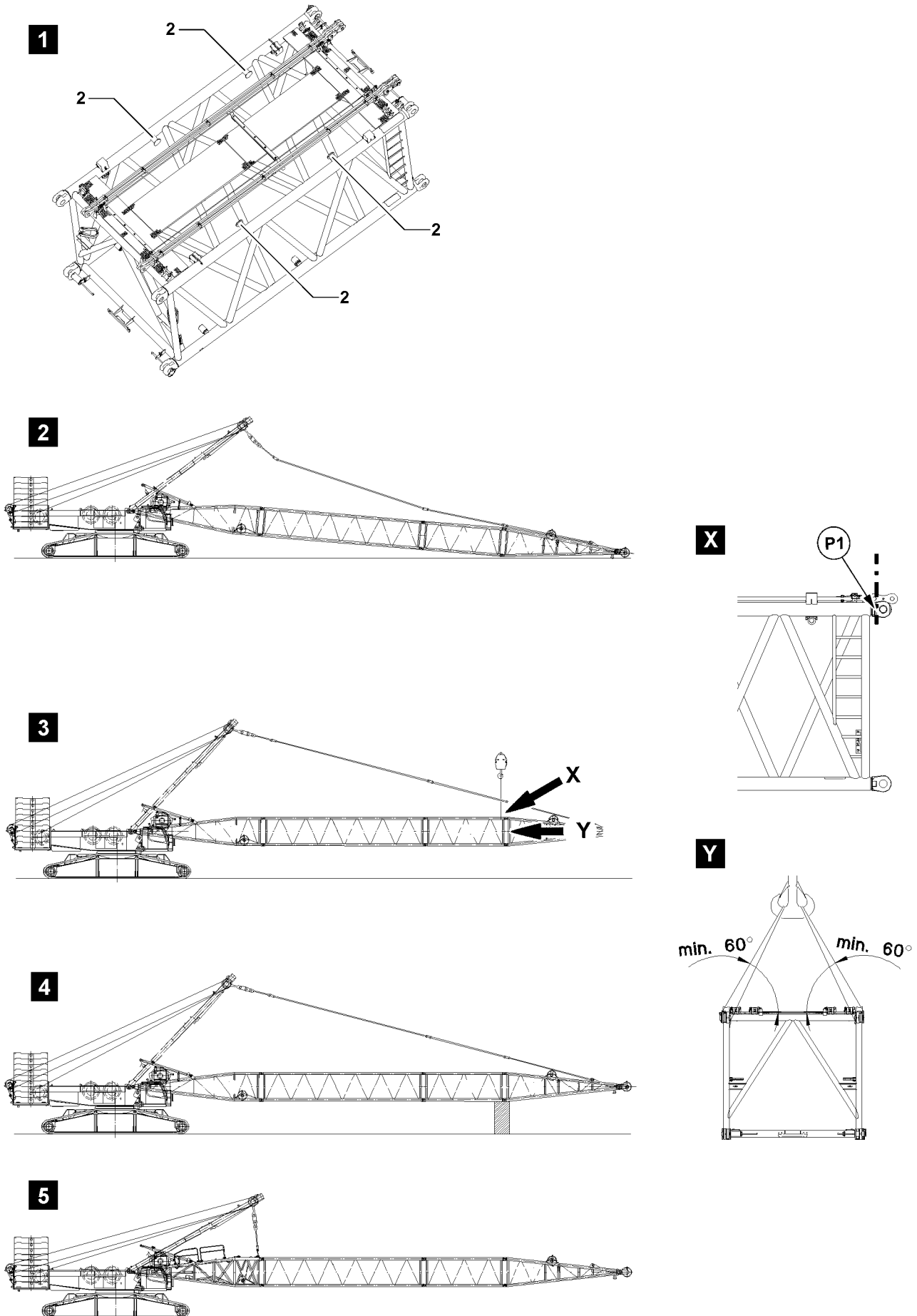


Fig.111448: Guying the pivot section with the SA-frame

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15.14.2 Flying disassembly of lattice sections

The illustrations serve as examples. The illustrations may differ depending on the crane.

The flying disassembly of lattice sections can be used on:

- Derrick boom
- Main boom

Make sure that the following prerequisite is met:

- Before guying the pivot section, secure the boom properly to prevent it from falling down!

Guying the pivot section in flying mode with the SA-frame

- ▶ Place the boom on the ground, see illustration 2.
or



WARNING

Lattice section incorrectly attached!

If the fastening equipment is attached on the bits **2** when securing the boom, then the bits will be overloaded. The lattice section will be damaged.

The boom can fall down.

Personnel can be severely injured or killed.

If the auxiliary crane is used to secure the boom for flying disassembly:

- ▶ Do **not** fasten the lattice section on the bits **2**, see illustration 1.
- ▶ Attach the fastening equipment in the area of point **P1** on both sides on the lattice section, see detail **X**.
- ▶ Make sure that the long fastening equipment is used, so that the angle between the cross section of lattice section and guyed fastening equipment is at least 60°, see detail **Y**.

Secure the boom with the auxiliary crane, see illustration 3.

or



WARNING

Falling boom!

If the boom is not properly and securely supported from below, then the boom can fall down.

- ▶ Support the boom properly and safely with suitable material.

Support the boom, see illustration 4.

Result:

- The guy rods can be disassembled.

- ▶ Place down, secure and disassemble the guy rods.
- ▶ Pin and secure the guy rods SA-frame on the pivot section.
- ▶ Tighten the guy rods SA-frame until the boom is in horizontal position.

Result:

- Pivot section is guyed in flying mode with the SA-frame, see illustration 5.
- The lattice sections can be disassembled in flying mode.

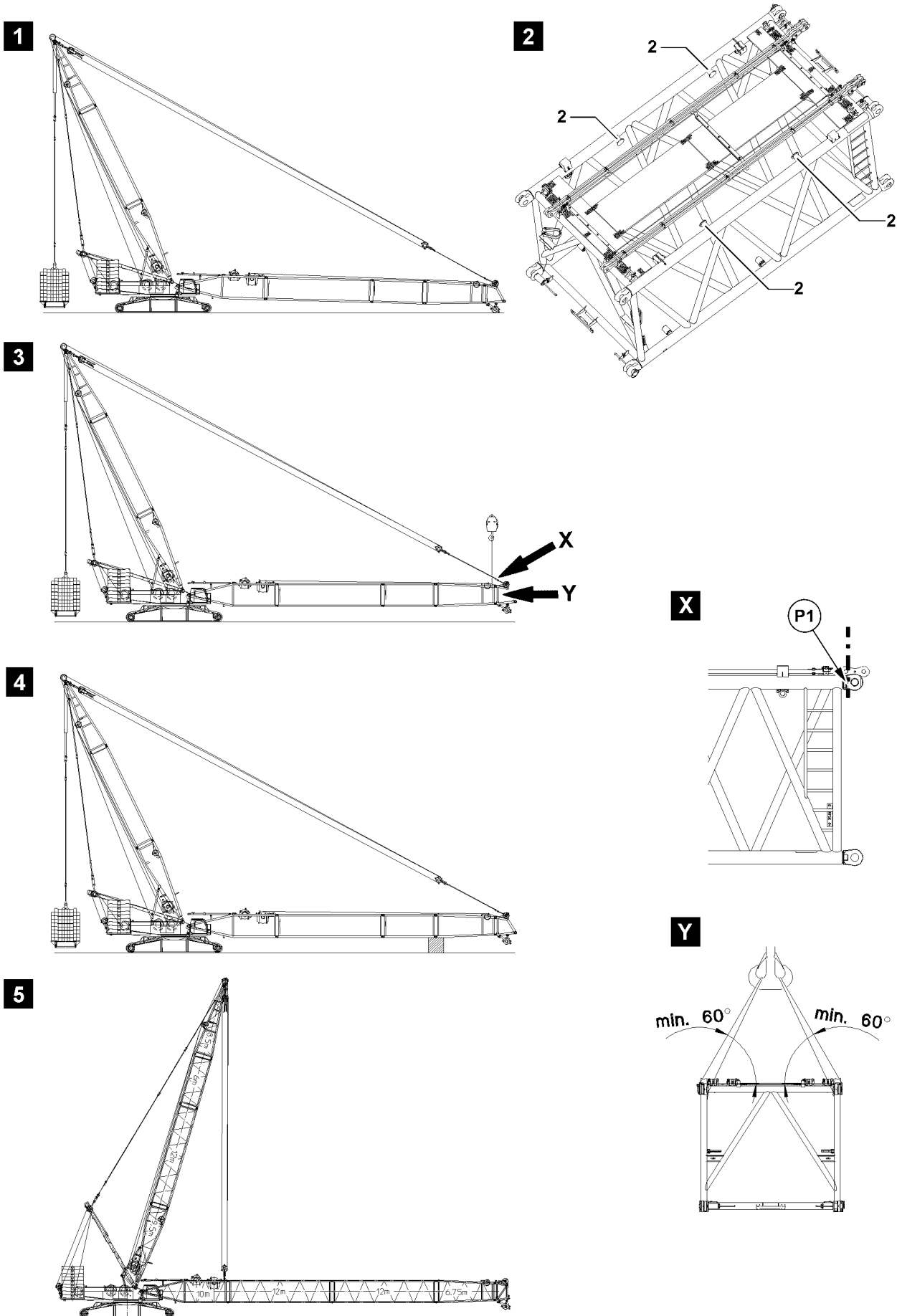


Fig.111449: Guying the pivot section with the derrick boom

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Guying the pivot section in flying mode with the derrick boom

- ▶ Place the boom on the ground, see illustration 1.
- or

**WARNING**

Lattice section incorrectly attached!

If the fastening equipment is attached on the bitts **2** when securing the boom, then the bitts will be overloaded. The lattice section will be damaged.

The boom can fall down.

Personnel can be severely injured or killed.

If the auxiliary crane is used to secure the boom for flying disassembly:

- ▶ Do **not** fasten the lattice section on the bitts **2**, see illustration 2.
- ▶ Attach the fastening equipment in the area of point **P1** on both sides on the lattice section, see detail **X**.
- ▶ Make sure that the long fastening equipment is used, so that the angle between the cross section of lattice section and guyed fastening equipment is at least 60°, see detail **Y**.

Secure the boom with the auxiliary crane, see illustration 3.

or

**WARNING**

Falling boom!

If the boom is not properly supported from below, then the boom can fall down.

- ▶ Support the boom properly and safely with suitable material.

Support the boom, see illustration 4.

Result:

- The guy rods can be disassembled.
- ▶ Place down, secure and disassemble the guy rods.
- ▶ Pin and secure the luffing pulley block on the pivot section.
- ▶ Tighten the control rope until the boom is in horizontal position.

Result:

- Pivot section is guyed in flying mode with the derrick boom, see illustration 5.
- The lattice sections can be disassembled in flying mode.

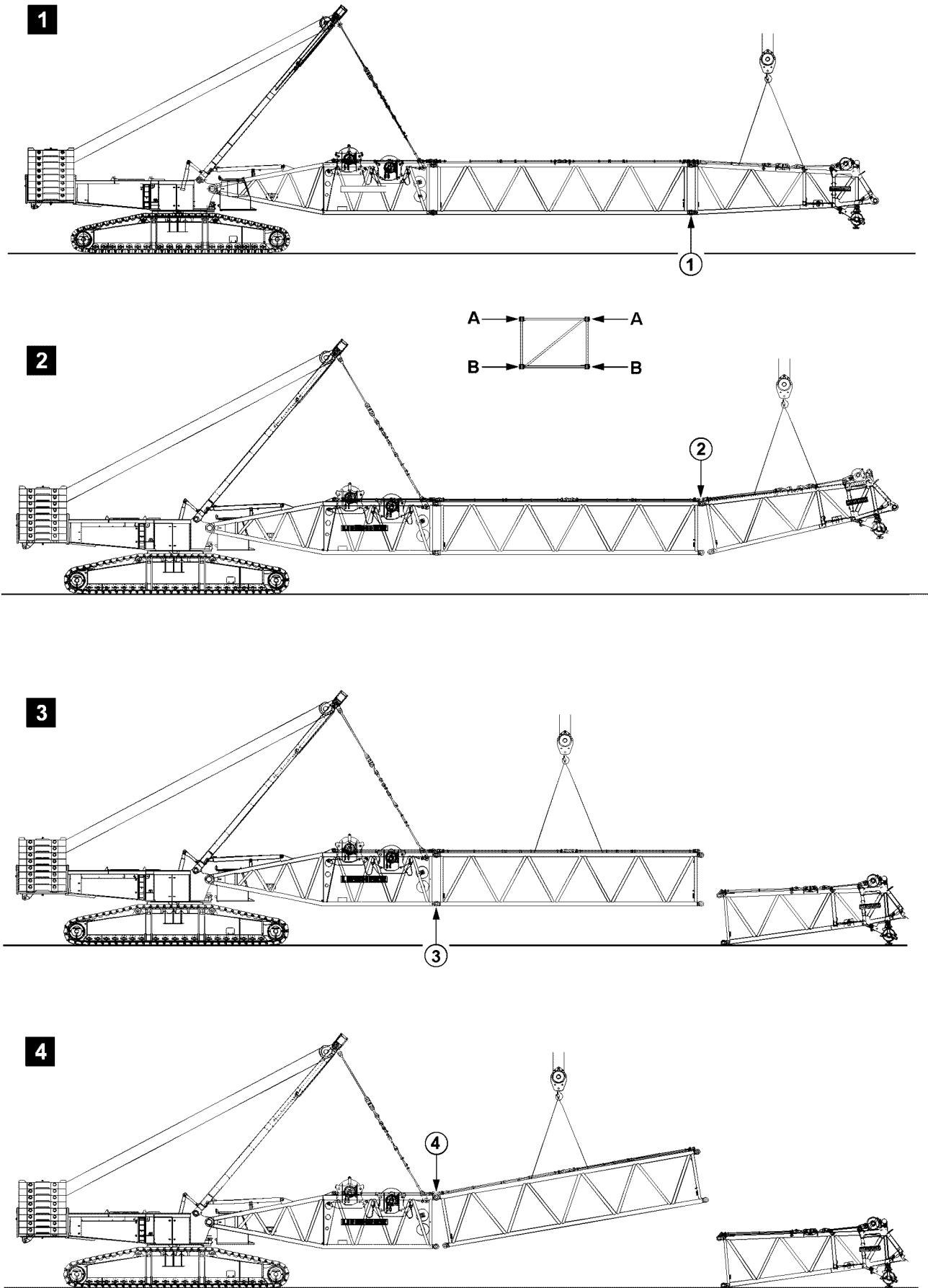


Fig.105511: Example for cranes with lattice mast booms

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Unpinning the lattice components



WARNING

Danger of fatal injury when disassembling booms!

If the pins are not unpinned in the given sequence, then lattice sections may suddenly fold down or fall down.

Personnel can be killed or seriously injured.

▶ Pins must be unpinned in the order specified.

- ▶ Release and unpin the pins at both sides (level **B**) at point **1**, illustration 1.
- ▶ Release and unpin the pins at both sides (level **A**) at point **2**, illustration 2.
- ▶ Release and unpin the pins at both sides (level **B**) at point **3**, illustration 3.
- ▶ Release and unpin the pins at both sides (level **A**) at point **4**, illustration 4.

15.15 Assembly / disassembly of boom systems for supporting on ascending terrain (assembly / disassembly schematic)



Note

- ▶ The following assembly steps are simplified and are examples and may not match your crane exactly.



WARNING

Danger of fatal injury when assembling / disassembling booms!

If the pins are not pinned / unpinned in the specified sequence, then lattice sections may suddenly fold down or fall down.

Personnel can be killed or seriously injured.

- ▶ Pin / unpin pins in the specified sequence, see section „Assembly of lattice sections“.
- ▶ Observe all safety technical notes in section „Assembly / disassembly“.
- ▶ Make sure that there are no persons within the danger zone.

15.15.1 Assembly of boom systems on ascending terrain

Make sure that the following prerequisites are met:

- The lattice sections are properly assembled.
- An auxiliary crane with sufficient load bearing capacity if available.



Fig. 121635: Boom - pivot section installed on turntable and placed on the ground

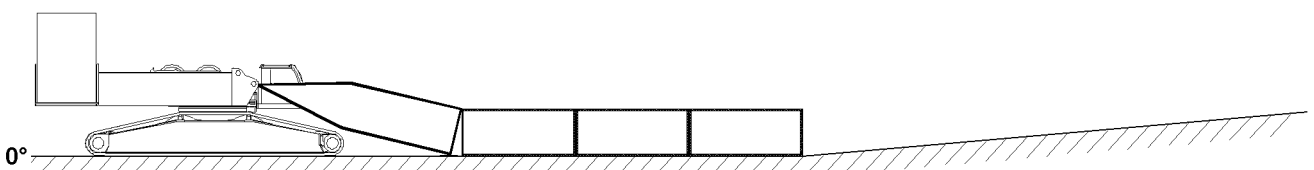


Fig. 121636: Boom - intermediate sections installed on boom - pivot section and placed on the ground

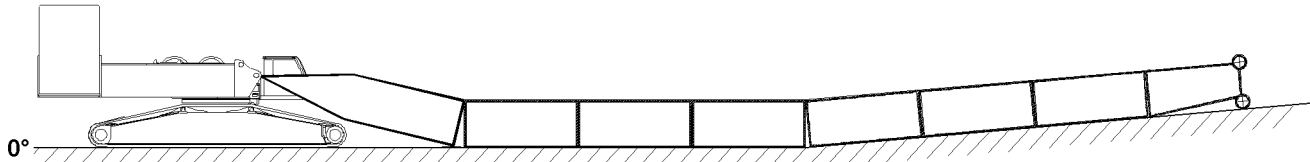


Fig.121637: Boom - intermediate sections installed and placed in ascending terrain

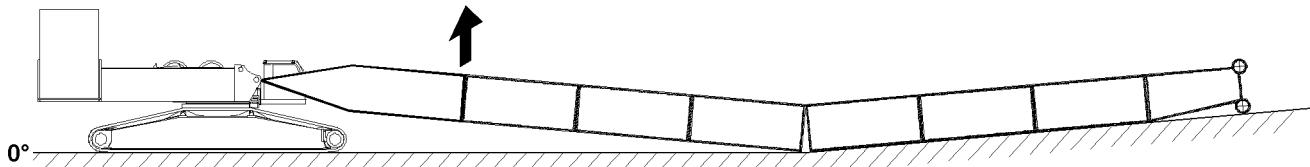


Fig.121638: Lifting and close the boom system in the area of the boom - pivot section

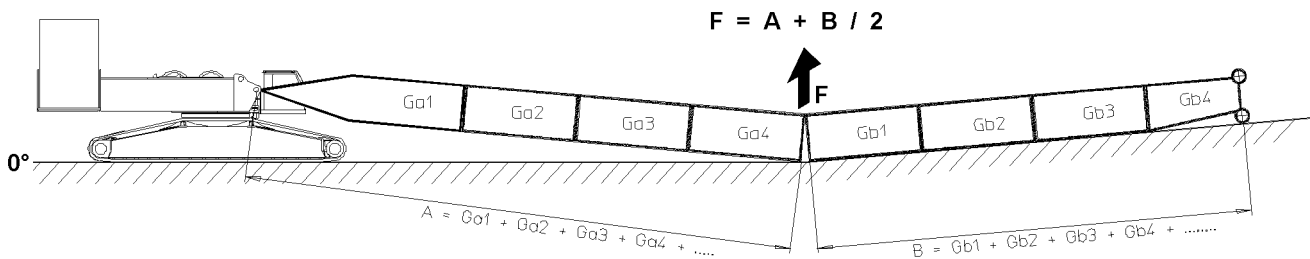


Fig.121645: Calculation of force for the closing procedure of the boom system



Note

- ▶ The abbreviations Ga1, Ga2, ... and Gb1, Gb2, ... are for the weights of the individual lattice sections.
- ▶ The weights of the lattice sections are noted on the welded on weight tags on the lattice sections.

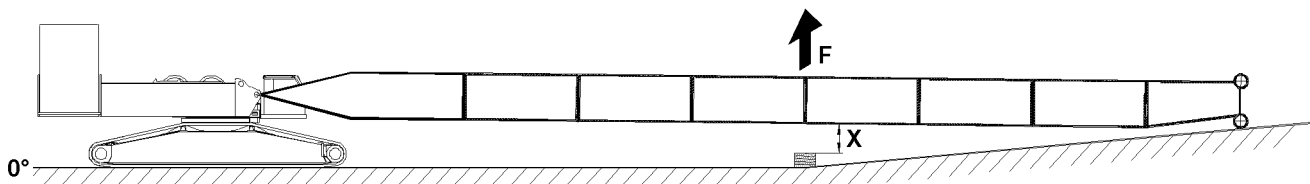


Fig.121639: Lifting and close the boom system // Support the boom system



Note

- ▶ The height of the substructure or dimension X is noted on the respective boom assembly chapter, see Crane operating instructions, chapter 5.38 or chapter 5.39.
- ▶ Support the boom system properly after the closing procedure.

15.15.2 Disassembly of boom systems on ascending terrain

Make sure that the following prerequisites are met:

- An auxiliary crane with sufficient load bearing capacity if available.

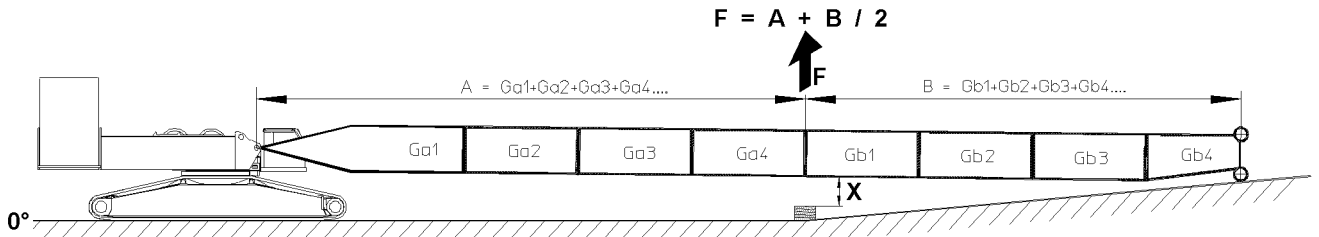


Fig.121651: Calculation of force for opening the boom system // Lift the boom system // Remove the substructure// Open the boom system



Note

- ▶ The abbreviations Ga1, Ga2, ... and Gb1, Gb2, ... are for the weights of the individual lattice sections.
- ▶ The weights of the lattice sections are noted on the welded on weight tags on the lattice sections.

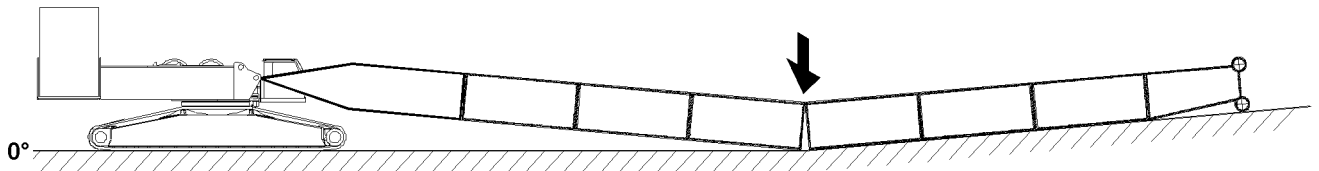


Fig.121657: Placing the boom system down

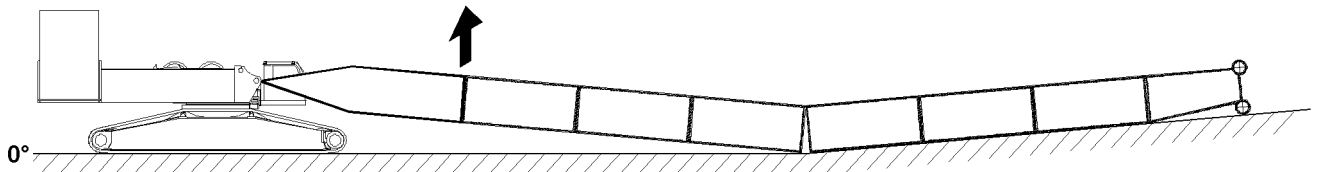


Fig.121652: Lifting and opening the boom system

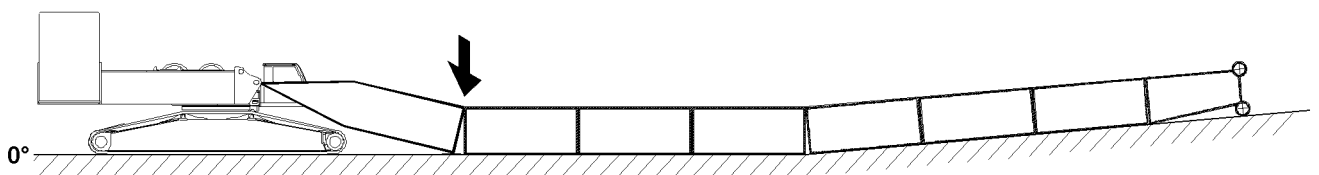


Fig.121653: Placing the boom system down

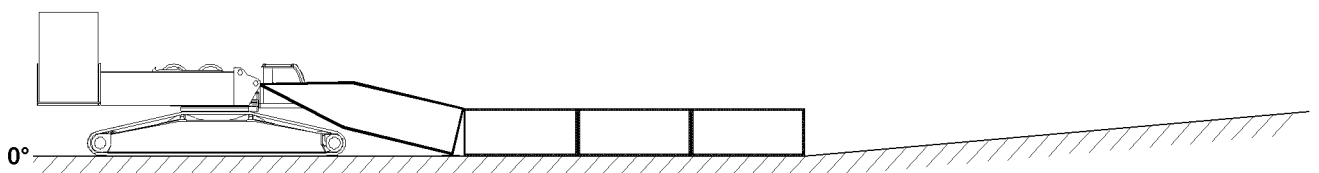


Fig.121636: Disassembling and removing the boom - intermediate sections with the end section

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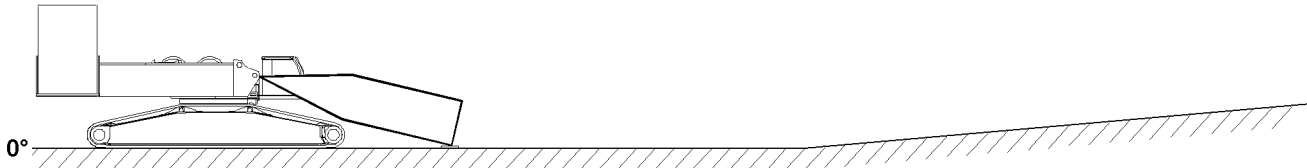


Fig.121635: Disassembling and removing the boom - intermediate sections to the boom - pivot section

- ▶ Disassemble and remove the boom - pivot section.

15.16 Assembly / disassembly of boom systems for supporting on descending terrain (assembly / disassembly schematic)



Note

- ▶ The following assembly steps are simplified and are examples and may not match your crane exactly.



WARNING

Danger of fatal injury when assembling / disassembling booms!

If the pins are not pinned / unpinned in the specified sequence, then lattice sections may suddenly fold down or fall down.

Personnel can be killed or seriously injured.

- ▶ Pin / unpin pins in the specified sequence, see section „Assembly of lattice sections“.
- ▶ Observe all safety technical notes in section „Assembly / disassembly“.
- ▶ Make sure that there are no persons within the danger zone.

15.16.1 Assembly of boom systems on descending terrain

Make sure that the following prerequisites are met:

- The lattice sections are properly assembled.
- An auxiliary crane with sufficient load bearing capacity if available.

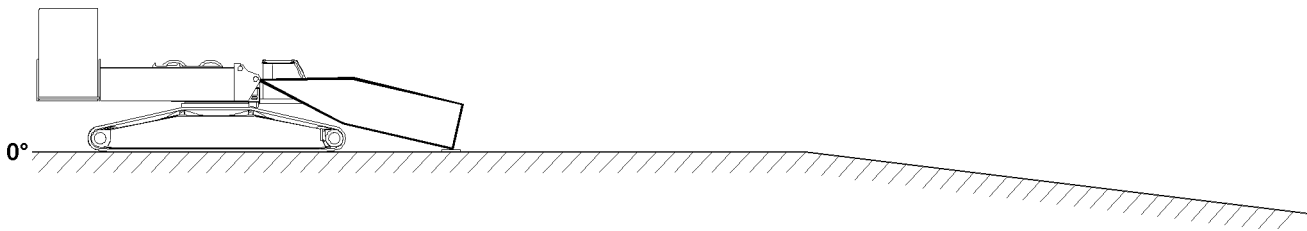


Fig.121640: Boom - pivot section installed on turntable and placed on the ground

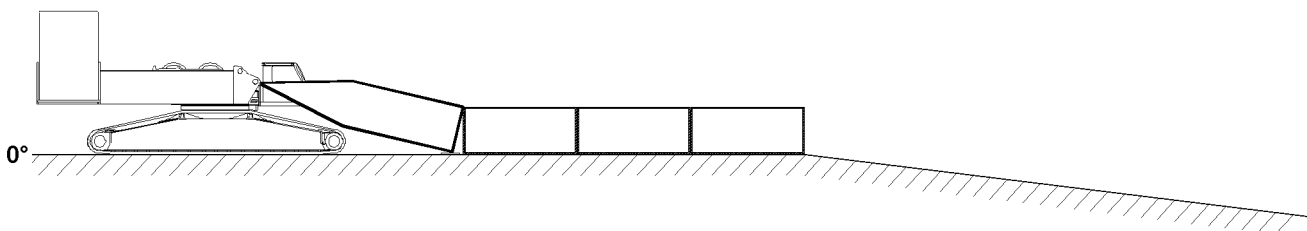


Fig.121641: Boom - intermediate sections installed on boom - pivot section and placed on the ground

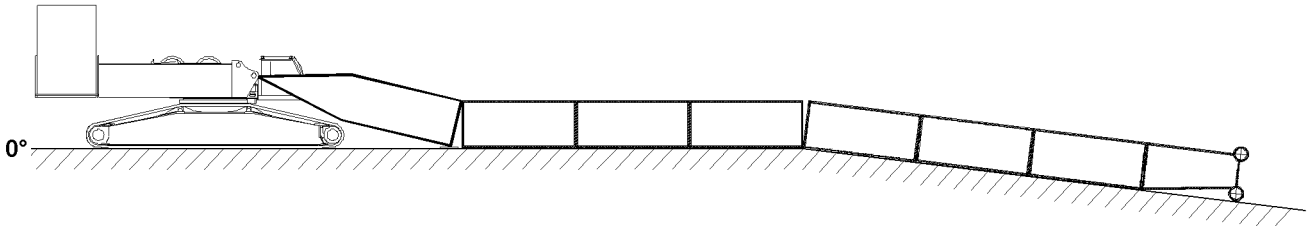


Fig.121642: Boom - intermediate sections installed and placed in descending terrain

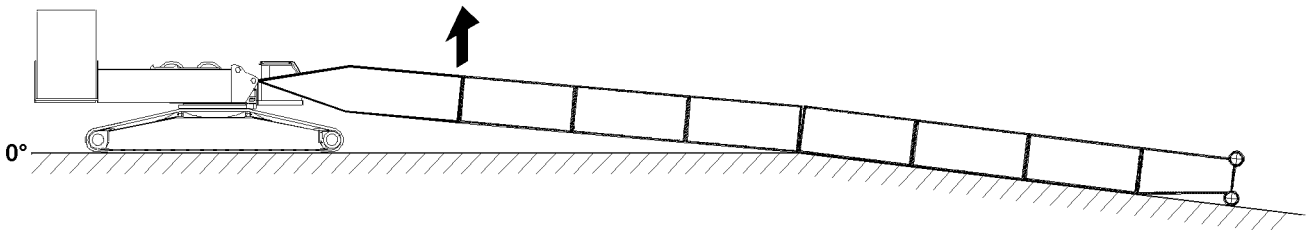


Fig.121643: Lifting and close the boom system in the area of the boom - pivot section

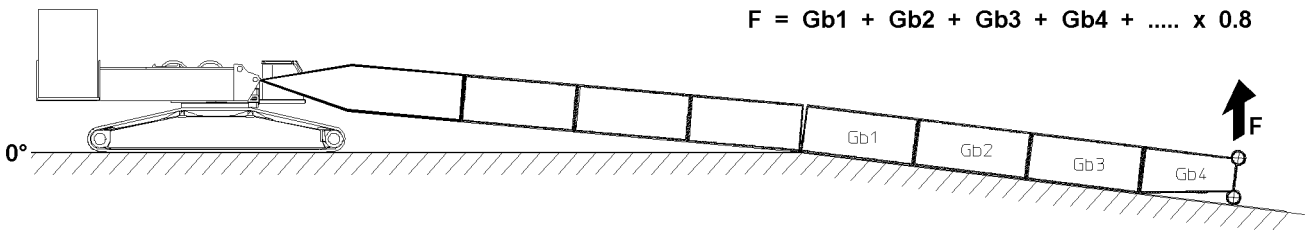


Fig.121646: Calculation of force for the closing procedure of the boom system



Note

- ▶ The abbreviations Gb1, Gb2, ... are for the weights of the individual lattice sections.
- ▶ The weights of the lattice sections are noted on the welded on weight tags on the lattice sections.

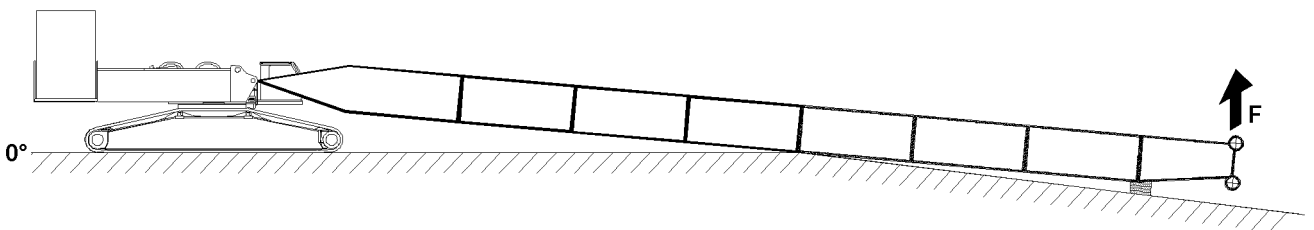


Fig.121644: Lifting and close the boom system // Support the boom system



Note

- ▶ The height of the substructure depends on the lay of the terrain and the resulting incline of the boom system.
- ▶ Support the boom system properly after the closing procedure.

15.16.2 Disassembly of boom systems on descending terrain

Make sure that the following prerequisite is met:

- An auxiliary crane with sufficient load bearing capacity if available.

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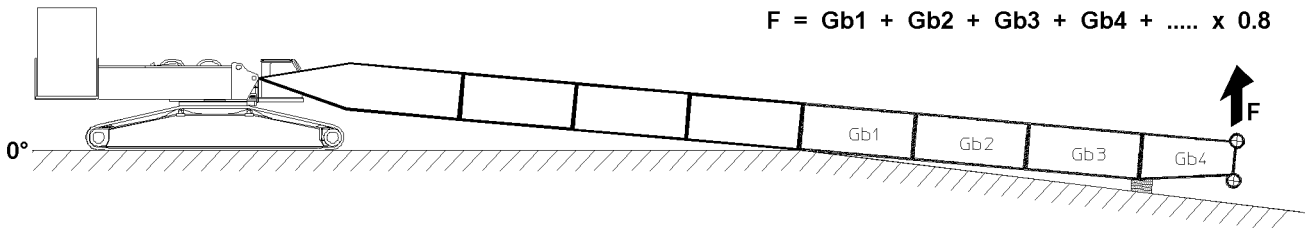


Fig.121654: Calculation of force for opening the boom system // Lift the boom system // Remove the substructure// Open the boom system



Note

- ▶ The abbreviations Gb1, Gb2, ... are for the weights of the individual lattice sections.
- ▶ The weights of the lattice sections are noted on the welded on weight tags on the lattice sections.

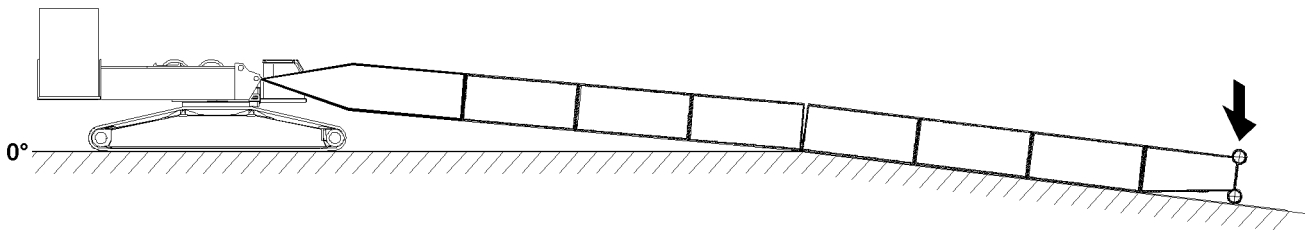


Fig.121658: Placing the boom system down

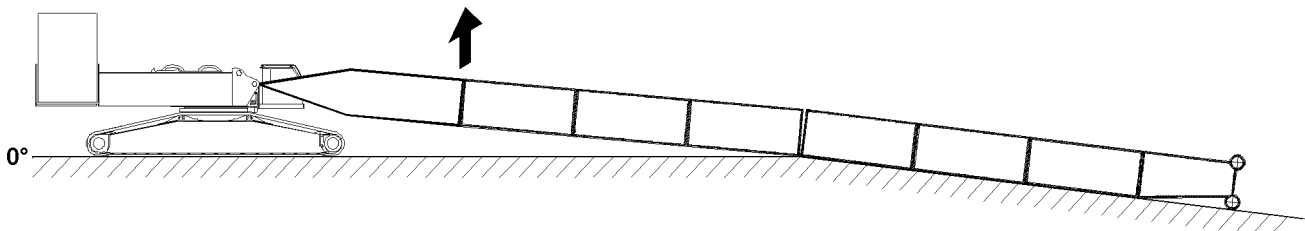


Fig.121655: Lifting and opening the boom system

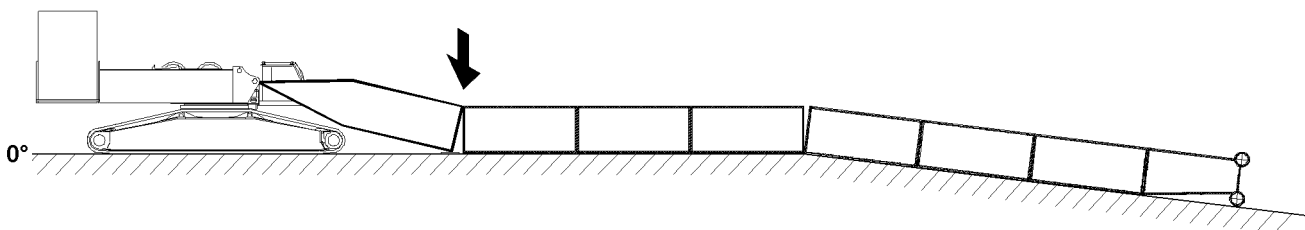


Fig.121656: Placing the boom system down

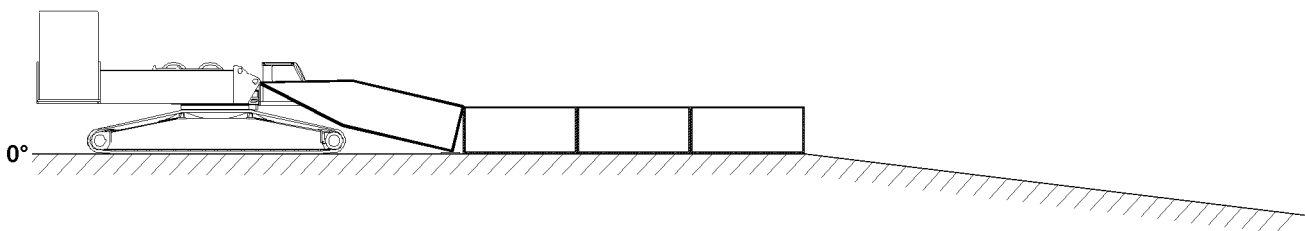


Fig.121641: Disassembling and removing the boom - intermediate sections with the end section

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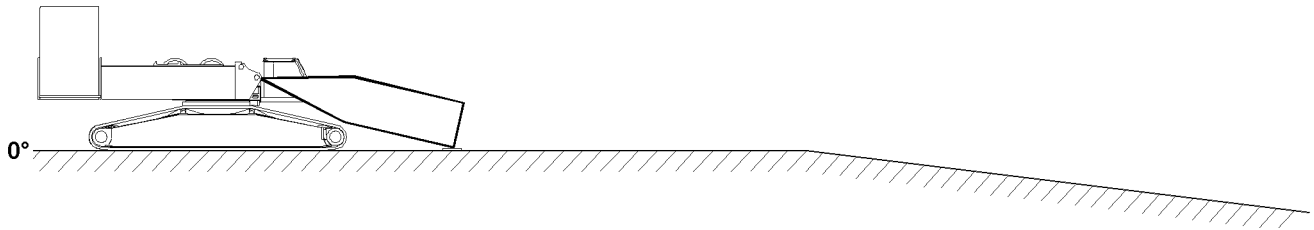


Fig.121640: Disassembling and removing the boom - intermediate sections to the boom - pivot section

- ▶ Disassemble and remove the boom - pivot section.

16 Erection / take down



WARNING

The crane can topple over!

Due to an unforeseen occurrence, for example: Sudden strong wind or storm can lead to dangerous operating situations, up to toppling the crane.

Personnel can be severely injured or killed.

- ▶ The boom must be able to be placed down at any time with its current equipment, observe the erection and take down charts.
- ▶ The counterweights and / or ballasts required for this must always be in direct vicinity of the crane.
- ▶ The crane operator must ensure that the required counterweight and / or the required ballast is carried along when driving the crane with the equipment in place and that the boom can be placed down at any time.



WARNING

Danger of fatal injury!

- ▶ Incorrectly installed or non-functioning limit switches as well as falling parts (pins, cotter pins, ice etc.) can cause accidents.

16.1 Erection / take down for mobile cranes

Make sure that the following prerequisites are met:

- The crane is properly supported.
 - The crane is horizontally aligned.
 - The counterweight has been installed on the turntable according to the load chart or the erection / take down charts.
 - The derrick ballast (suspended ballast or ballast trailer ballast) is installed according to the load chart or the erection / take down charts.
 - The telescopic boom is fully telescoped in.
 - The boom has been installed according to the load chart and the Crane operating instructions.
 - The hoist rope has been correctly placed in the rope pulleys and prevented from jumping out with the rope retaining pins.
 - All limit switches have been correctly installed and are fully functional.
 - All pin connections have been secured.
 - No personnel is within the danger zone.
 - There are no loose parts on the boom or the auxiliary boom.
 - In winter, the exposed rope pulleys must be kept free of snow, frost and ice.
 - In winter, the telescopic boom, the auxiliary boom and their associated components (limit switches, cable drum, flashing beacon, wind speed sensor etc.) must be kept free of ice and snow.
- ▶ Check if all prerequisites have been met.

16.2 Erection / take down for crawler cranes

Make sure that the following prerequisites are met:

- The crane is horizontally aligned.
 - The crane is properly supported (cranes with support).
 - The counterweight has been installed on the turntable according to the load chart.
 - The central ballast has been installed according to the load chart.
 - The counterweight is installed according to the load chart or the erection / take down charts.
 - The derrick ballast (suspended ballast or ballast trailer ballast) is installed according to the load chart or the erection / take down charts.
 - The boom has been installed according to the load chart and the Crane operating instructions.
 - The hoist rope has been correctly placed in the rope pulleys and prevented from jumping out with the rope retaining pins.
 - All limit switches have been correctly installed and are fully functional.
 - All pin connections have been secured.
 - No personnel is within the danger zone.
 - There are no loose parts on the boom or the auxiliary boom.
 - In winter, the exposed rope pulleys must be kept free of snow, frost and ice.
 - In winter, the boom, the auxiliary boom and their associated components (limit switches, cable drum, flashing beacon, wind speed sensor etc.) must be kept free of ice and snow.
- ▶ Check if all prerequisites have been met.

16.3 Rigging the guy rods on lattice booms on placed down boom system



WARNING

Danger of fatal injury due to damaged guy rods!

If the boom system is placed on the ground or a load bearing substructure in strong wind or longer downtime, the guy rods can be damaged due to wind influence on the boom guying. This wind influenced oscillations can lead to fatigue on the guy rods.

As a result, the guy rods could break or rip off under load - for example when erecting the boom system or in crane operation. The boom system can therefore fall uncontrolled forward onto the ground. Personnel can be severely injured or killed.

- ▶ Make sure that the guy rods are placed completely on the lattice sections and relieved when the boom systems are placed on the ground.
- ▶ Make sure that freely suspended guy rods are rigged on the lattice boom.
- ▶ Make sure that the upper pulley block is rigged on the lattice boom in Derrick operating modes.
- ▶ Make sure, that the guying on the luffing lattice jib is removed on lattice mast cranes.
- ▶ Make sure that the guy rods are inspected before resuming crane operation and that no damage or cracks are present.
- ▶ Make sure that the maintenance intervals of the guy rods are adhered to.



Note

- ▶ In case of strong wind or longer downtimes of the crane, the boom system must be placed on the ground or on a load bearing substructure.
- ▶ The guying must be relieved and the guy rods must be placed on the transport receptacles.
- ▶ The following illustrations are examples and may not match your crane exactly.

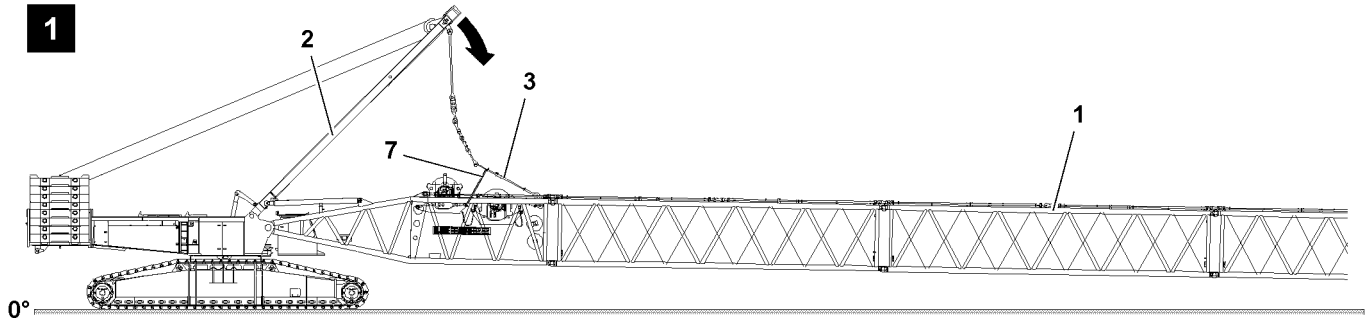


Fig.120722: Guying placed in transport receptacle and SA-frame guying relieved

- ▶ Place the guy rods on the lattice sections 1: Luff the SA-frame 2 to the front until the guying is placed completely in the transport receptacles on the lattice sections and the SA-frame guying 3 is relieved, see illustration 1.
- ▶ To minimize side oscillation of the SA-frame guying 3 due to wind influence: Rig the SA-frame guying 3 with suitable rigging straps / ropes 7 against the boom, see illustration 1.

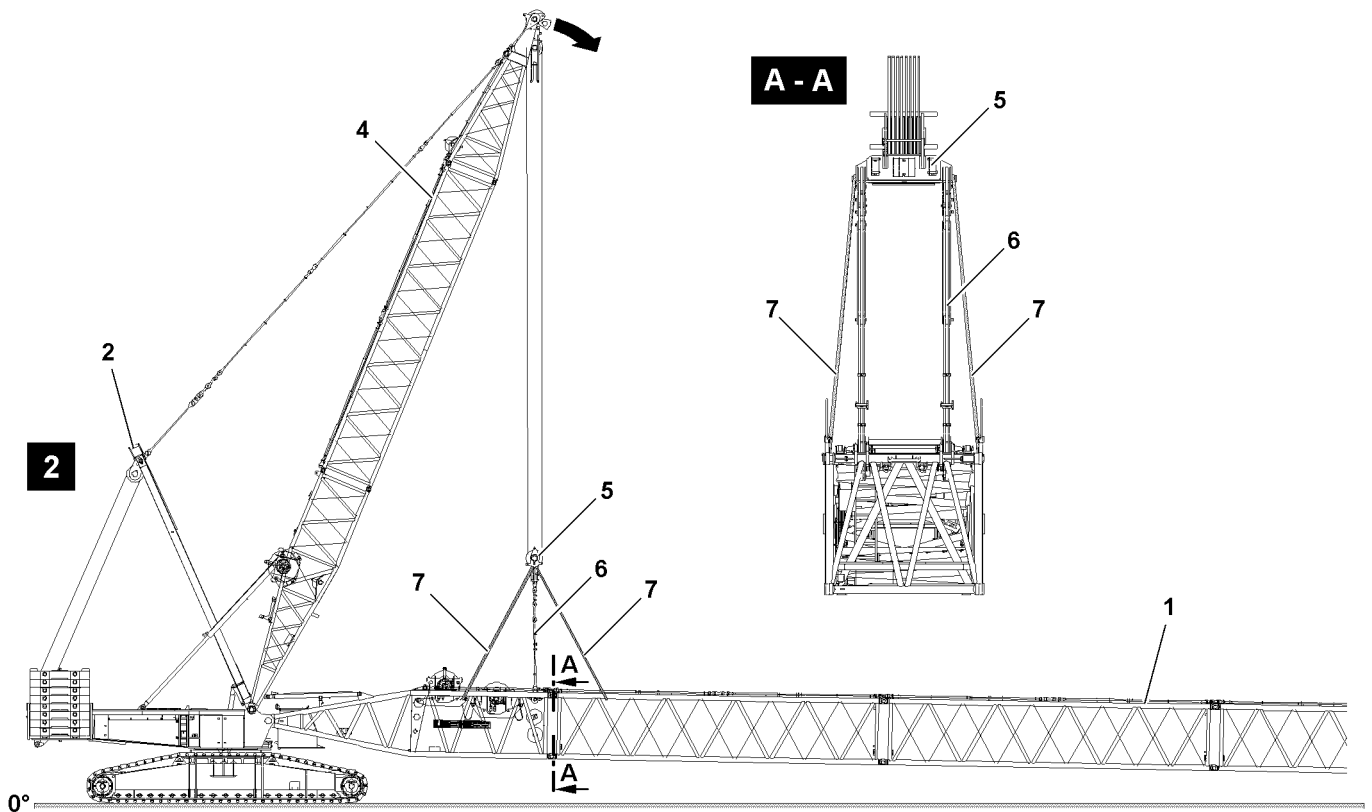


Fig.120771: Guying placed in transport receptacle and upper pulley block rigged against the boom

- ▶ Place the boom system down and - if present - release the derrick guying to the derrick ballast.
- ▶ Place the guy rods on the lattice sections 1: Luff the D-boom 4 down to the front until the main boom guying is placed completely in the transport receptacles on the lattice sections and the upper pulley block 5 is positioned over the S-pivot section, see illustration 2.
- ▶ To minimize side oscillation of the upper pulley block 5 due to wind influence: Rig the upper pulley block 5 with suitable rigging straps / ropes 7 against the boom, see illustration 2.

For lattice mast cranes with luffing lattice jib the following applies:

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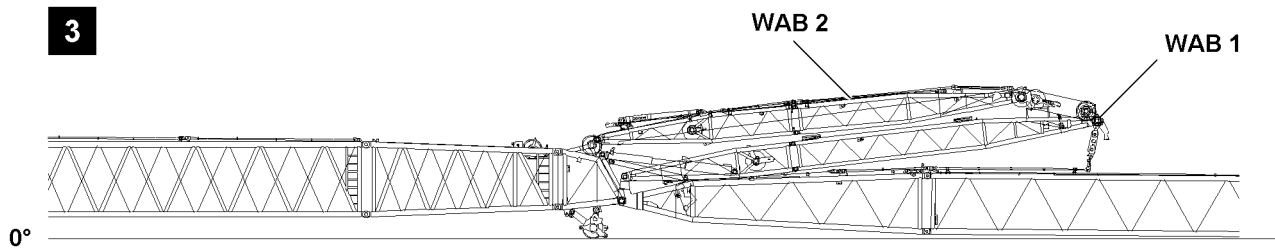


Fig.120821: Guying in transport receptacle(s) and WA-frames placed down to the front (example crane with lattice mast)



WARNING

Danger of accident when removing the W-guying!

When placing down and removing the guying dangerous situations can arise.

- ▶ Make sure that the danger notes in the respective chapter of the Crane operating instructions are observed.

- ▶ Remove the guy rods on the luffing lattice jib and place them into the transport receptacles.
- ▶ Place the WA-frames (WA-frame 1 **WAB 1** and WA-frame 2 **WAB 2**) down to the front.

For telescopic cranes with luffing lattice jib the following applies:

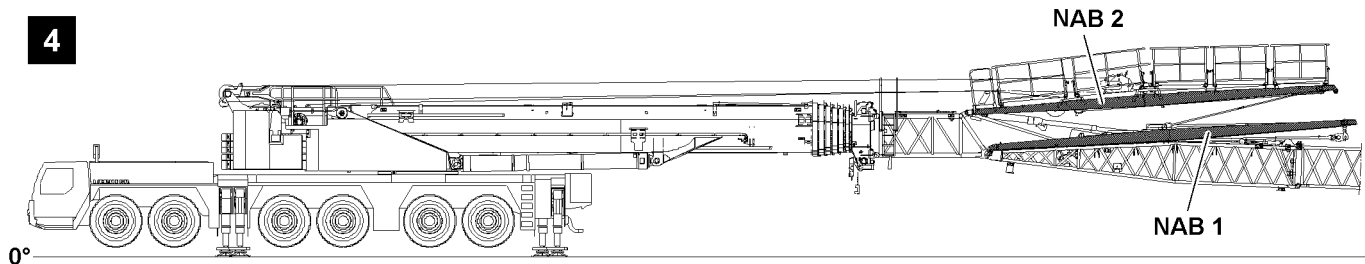


Fig.121261: Guying in transport receptacle(s) and NA-frames placed down to the front (example telescopic crane)



WARNING

Danger of accident when placing the NA-frames down!

When placing the guy rods as well as the NA-frames down dangerous situations can arise.

- ▶ Make sure that the danger notes in the respective chapter of the Crane operating instructions are observed.
- ▶ Spool the jib control winch out and place the NA-frames down to the front so that the guy rods are relieved.

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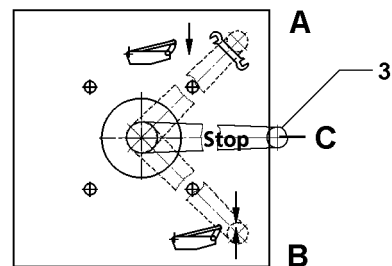
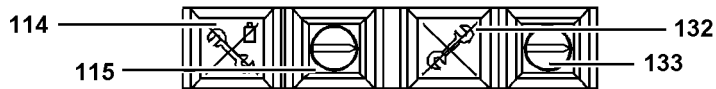
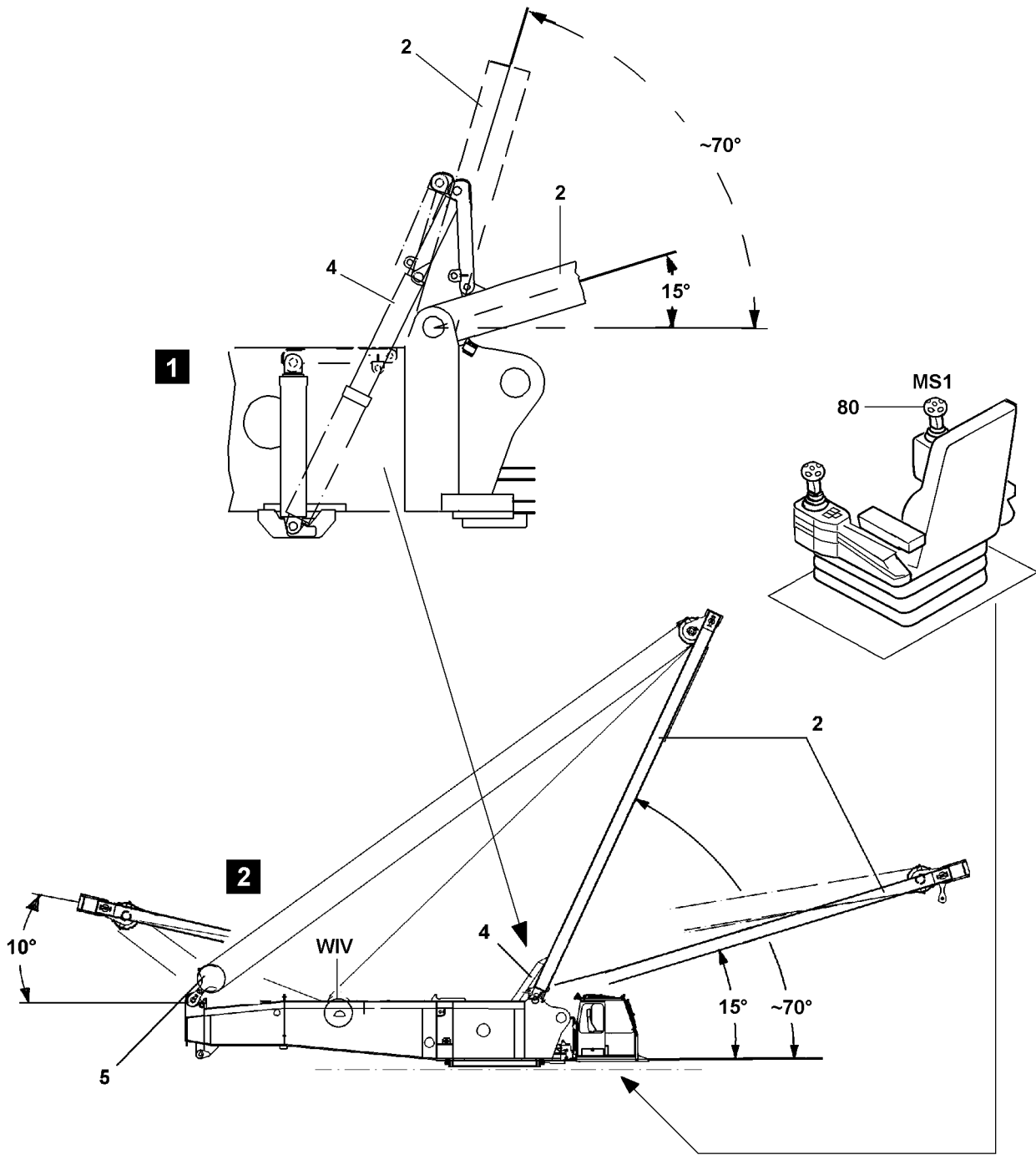


Fig.108587

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1 SA-frame



Note

- ▶ The SA-frame is used in assembly operation to assemble the crawler track, see chapter 3.01 of the crane operating instructions!
- ▶ Otherwise, the SA-frame serves in the assembly operation for closing boom systems and for guying the boom with flying assembly of lattice jibs, see chapter 5.38 of the crane operating instructions!

Switch positions of the ball cock 3:		
Switch position	Function	
A	Lower the SA-frame	Transport position
C	SA-frame stop, cylinder stop	Erection cylinders are blocked
B	Erecting the SA-frame	Assembly and operating position

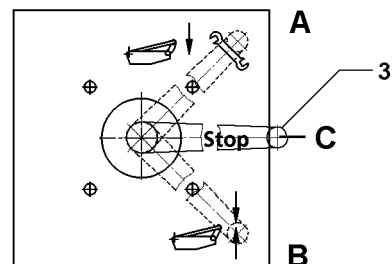
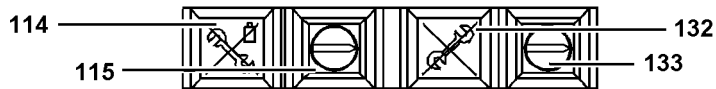
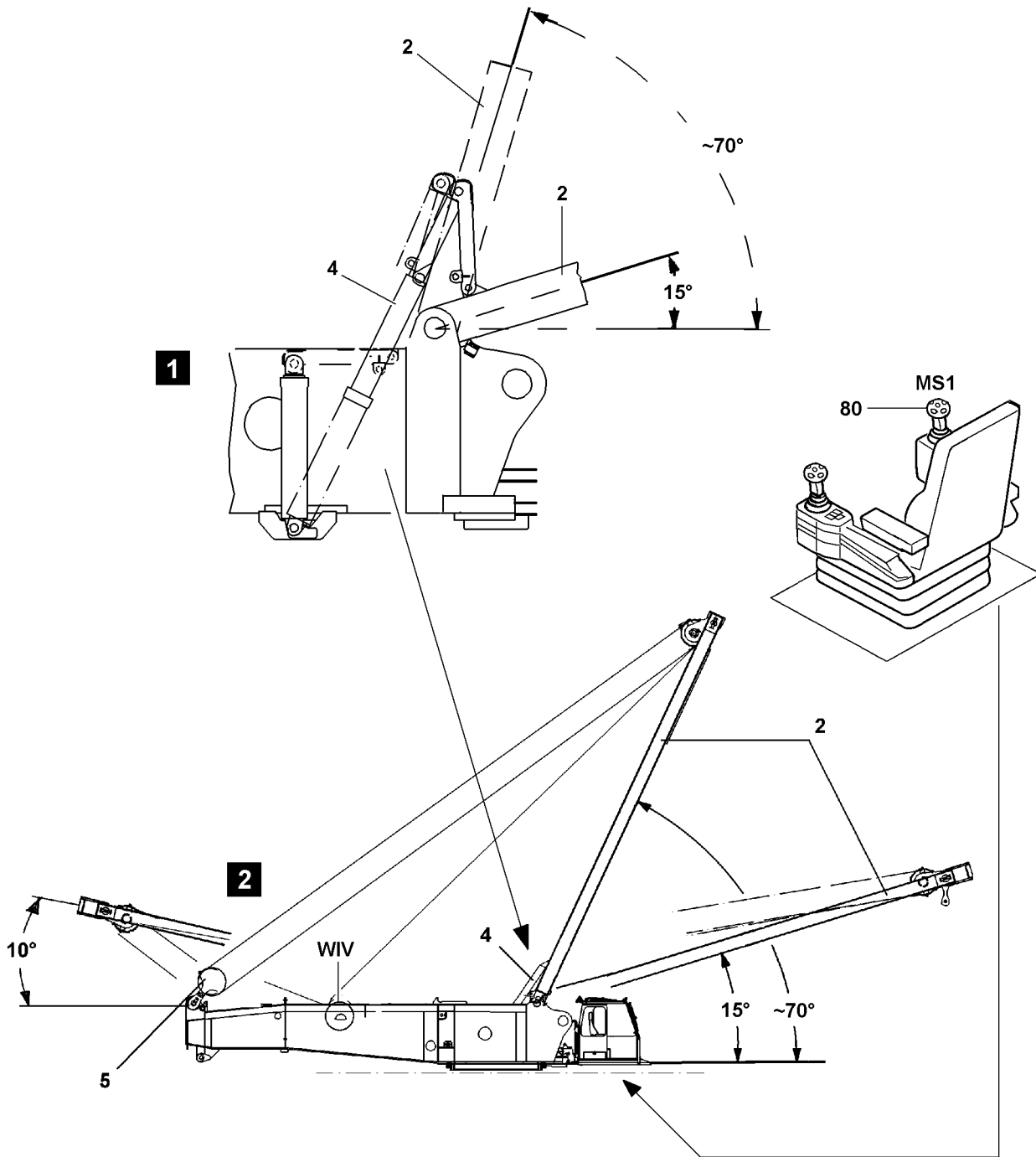


Fig.108587

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1.1 Erecting the SA-frame

1.1.1 Erection procedure

Make sure that the following prerequisites are met:

- the turntable is assembled,
- the SA-frame is in transport position,
- winch 1 and winch 2 are built into the turntable,
- there is no counterweight on the turntable,
- winch 4 is reeved on the SA-frame roller set,
- the engine is running,
- the assembly key button **133** is actuated, the indicator light in the button **132** lights up,
- the crawler assembly key button **115** is actuated, the indicator light in the button **114** lights up,
- monitor assembly conditions.



Note

- ▶ When the erection cylinders are extended, the SA-frame is located approx. 70° to the horizontal to the front, illustration 1!



Note

- ▶ Due to the own weight of the SA-frame and by spooling out winch 4 simultaneously, the SA-frame is lowered to the front!
- ▶ After reaching SA-frame position 15°, switch off of the movement winch 4 takes place „spool out“ and an operating error is displayed!
- ▶ If the minimum pressure of 30 bar falls below in the erection cylinder, switch off of winch 4 takes place and an operating error is displayed!



WARNING

Independent lowering of the SA-frame!

By a false stop-cock setting during the erection procedure, the SA-frame can lower backward by itself! Personnel can be severely injured or killed!

It can result in slack cable build-up!

- ▶ Ball valve **4** must stand in position **B** during assembly of the crane operation!
- ▶ Ball cock position **A** „lower“ and ball cock position **C** „stop“ are only permissible when lowering the SA-frame onto the turntable (transport position)!

- ▶ Set the ball cock **3** into position **B**.
- ▶ Secure stop cock **3** in position **B**, for example with a padlock, against unauthorized activation!
- ▶ Move master switch MS1 **80** in direction X+.

Result:

- Spool out winch 4 **WIV** and SA-frame **2** is erected through the erection cylinder **4** up to 70° forward, see illustration 1.

When the SA-frame is erected forward to 70°:

- ▶ Move master switch MS1 **80** in direction X+.

Result:

- Spool out winch 4 **WIV** and the SA-frame is lowered forward by its own weight.

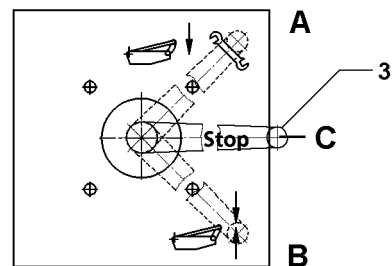
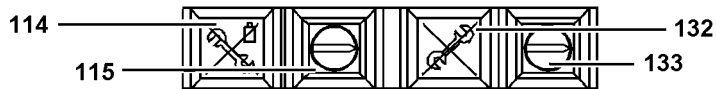
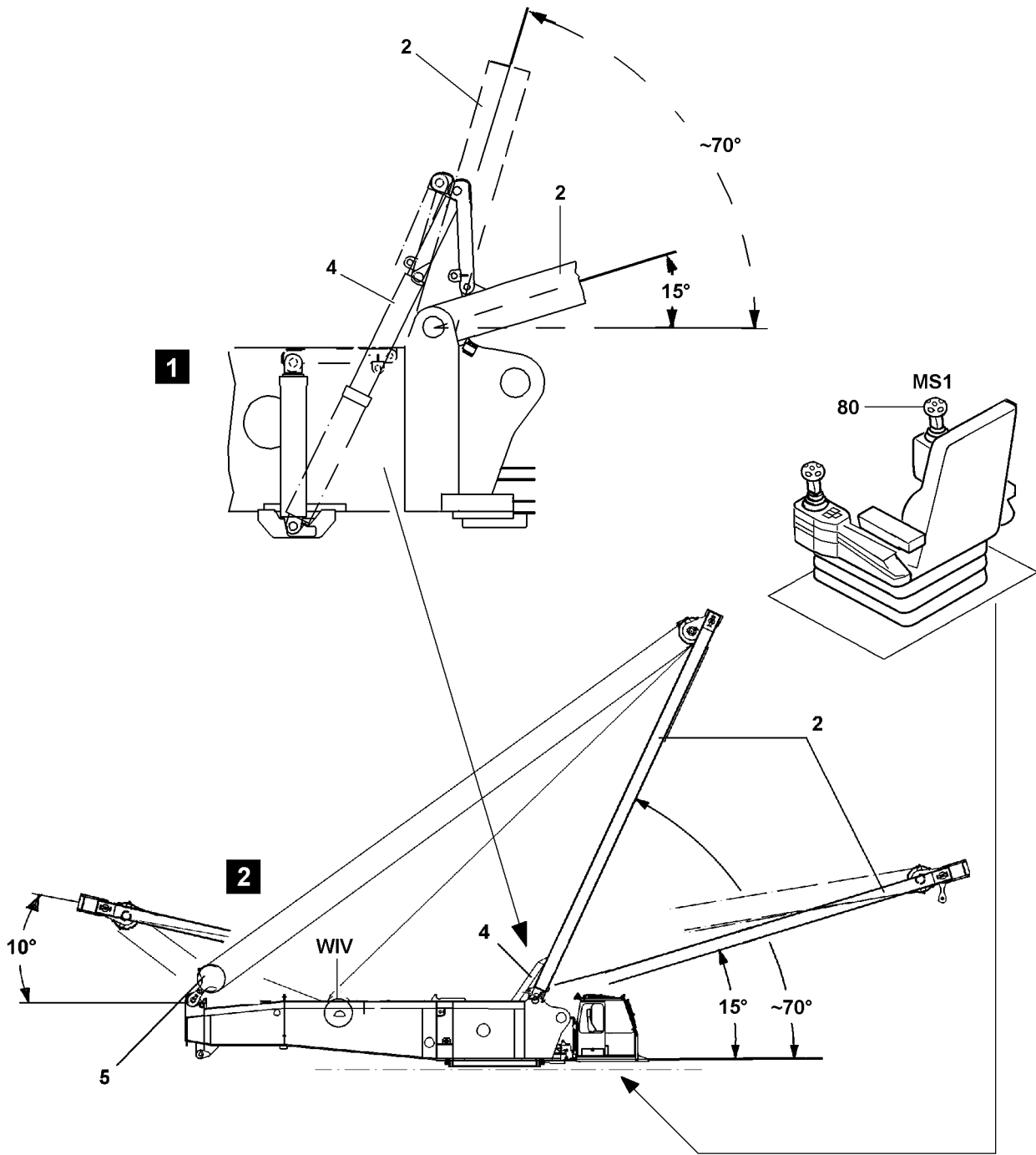


Fig.108587

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1.2 Placing the SA-frame onto the turntable

1.2.1 Take down procedure

Make sure that the following prerequisites are met:

- the ball cock **3** is in position **B**,
- the ball cock **3** is secured in position **B** against unauthorized operation.



WARNING

Danger of fatal injury from SA-frame!

During the take down of the SA-frame, personnel can be severely injured or killed!

- ▶ The crane operator must make sure that no persons or objects are within the danger zone!

- ▶ Move master switch MS1 **80** in direction X-.

Result:

- Winch 4 spools up.
- The SA-frame **2** is pulled back against the pressure in the erection cylinder.

When the SA-frame **2** is found circa 10° before transport position, illustration **2**:

- ▶ Set the master switch MS1 **80** to zero position.



WARNING

Independent lowering of the SA-frame!

Through a false ball cock setting during the erection procedure, the SA-frame can lower backward by itself!

Personnel can be severely injured or killed!

It can result in slack cable build up and to destruction of crane components!

- ▶ Ball valve **4** must stand in position **B** during assembly of the crane operation!
- ▶ Ball cock position **A** „lower“ and ball cock position **C** „stop“ are only permissible when lowering the SA-frame onto the turntable (transport position)!

- ▶ Switch over ball cock **3** from position **B** after position **A**.

Result:

- The SA-frame **2** lowers itself slowly on the turntable.

When the SA-frame **2** is lowered completely onto the turntable:

- ▶ Carefully spool out winch 4 in order to avoid slack cable build up.
- ▶ Lay down SA-frame **2** completely onto the turntable.
- ▶ Secure ball cock **3** in position **A**, for example with a padlock, against unauthorized activation.

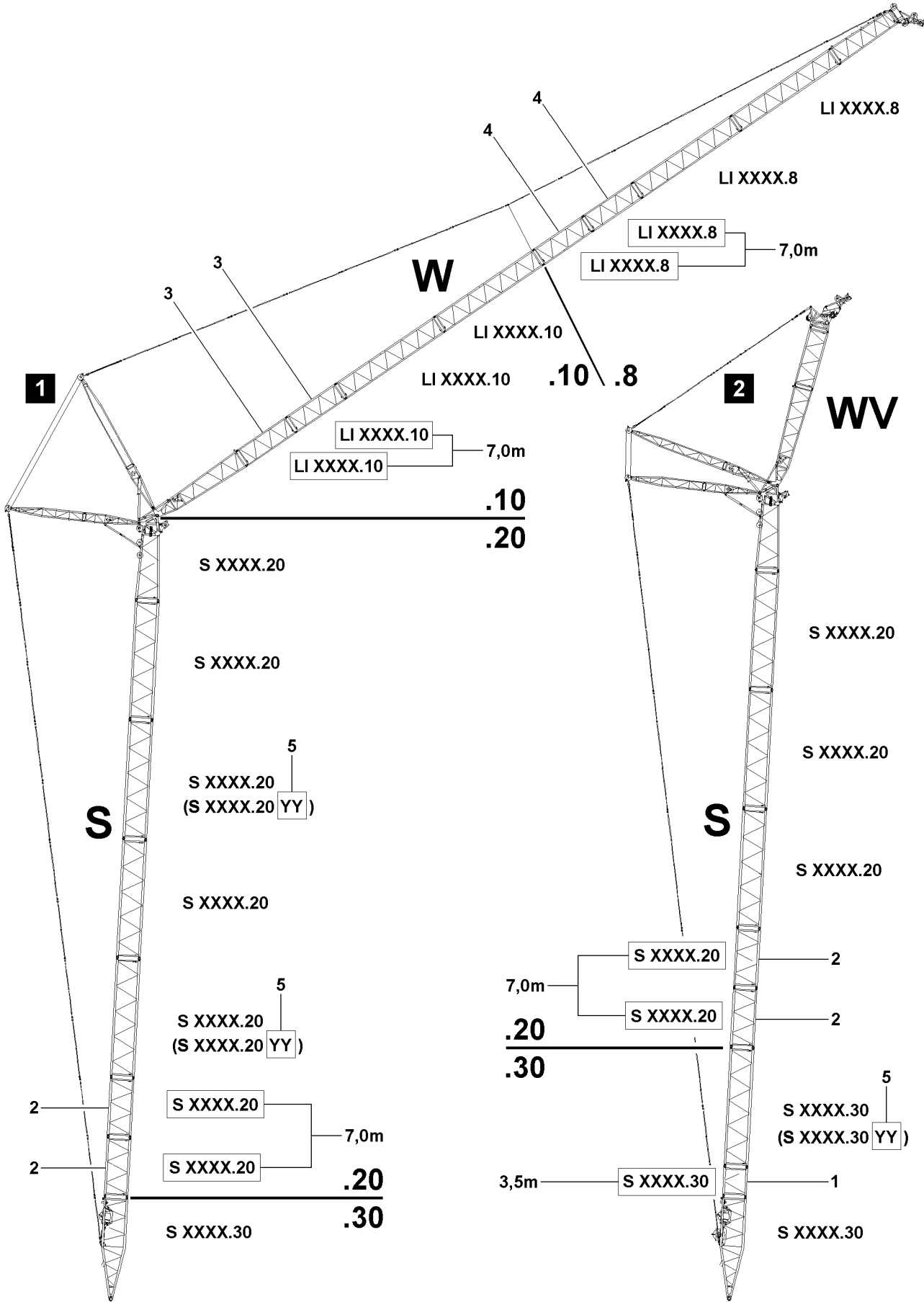


Fig.116151

LWE/LR 1750-000/12812-15-02/en

1 Boom components



Note

- ▶ For boom components including associated system dimensions, lengths and component weights refer to the Crane operating instructions, chapter 1.03.

2 Arrangement of intermediate sections on the boom



Note

- ▶ The following description is an example and may not exactly match to your crane.
- ▶ Lengths, weights and system dimensions of the intermediate sections are examples and may differ from the data on your crane.
- ▶ For exact crane data refer to the respective rod plan.
- ▶ For dimensions and weights of crane components, see Crane operating instructions, chapter 1.03.



WARNING

Boom can break off!

The arrangement of the intermediate sections on booms or boom systems are based on extensive static calculations. If the arrangement of the intermediate sections according to the rod plan is not observed, the crane can collapse, the boom can break off or the crane can topple over.

Death, severe bodily injuries, property damage.

- ▶ Always carry out the arrangement of the intermediate sections according to the rod plan.
- ▶ If an auxiliary guying is required for a certain boom length, then it must always be installed according to the rod plan on the position defined in the rod plan.

General specifications for the configuration of booms or boom systems:

- With the same system dimension, two short intermediate sections with a length of 3.5 m are heavier than one single intermediate section with a length of 7.0 m.
- With the same system dimension, two short intermediate sections with a length of 7.0 m are heavier than one single intermediate section with a length of 14.0 m.
- With the same system dimension, two short intermediate sections with a length of 3.5 m can be replaced by one single intermediate section with a length of 7.0 m.
- With the same system dimension, two short intermediate sections with a length of 7.0 m can be replaced by one single intermediate section with a length of 14.0 m.
- For intermediate sections with the same system dimension but different lengths, always install the short intermediate sections on the bottom in the boom, due to their weight, in direction of the slewing ring, see also illustration 1 and illustration 2.
- The heavier one intermediate section is, the higher is the value of the last two digits on the system dimension plate.
- Pay attention to the last two letters following the letter combinations (YY) 5 on the last two letters on the system dimension plate and observe them.

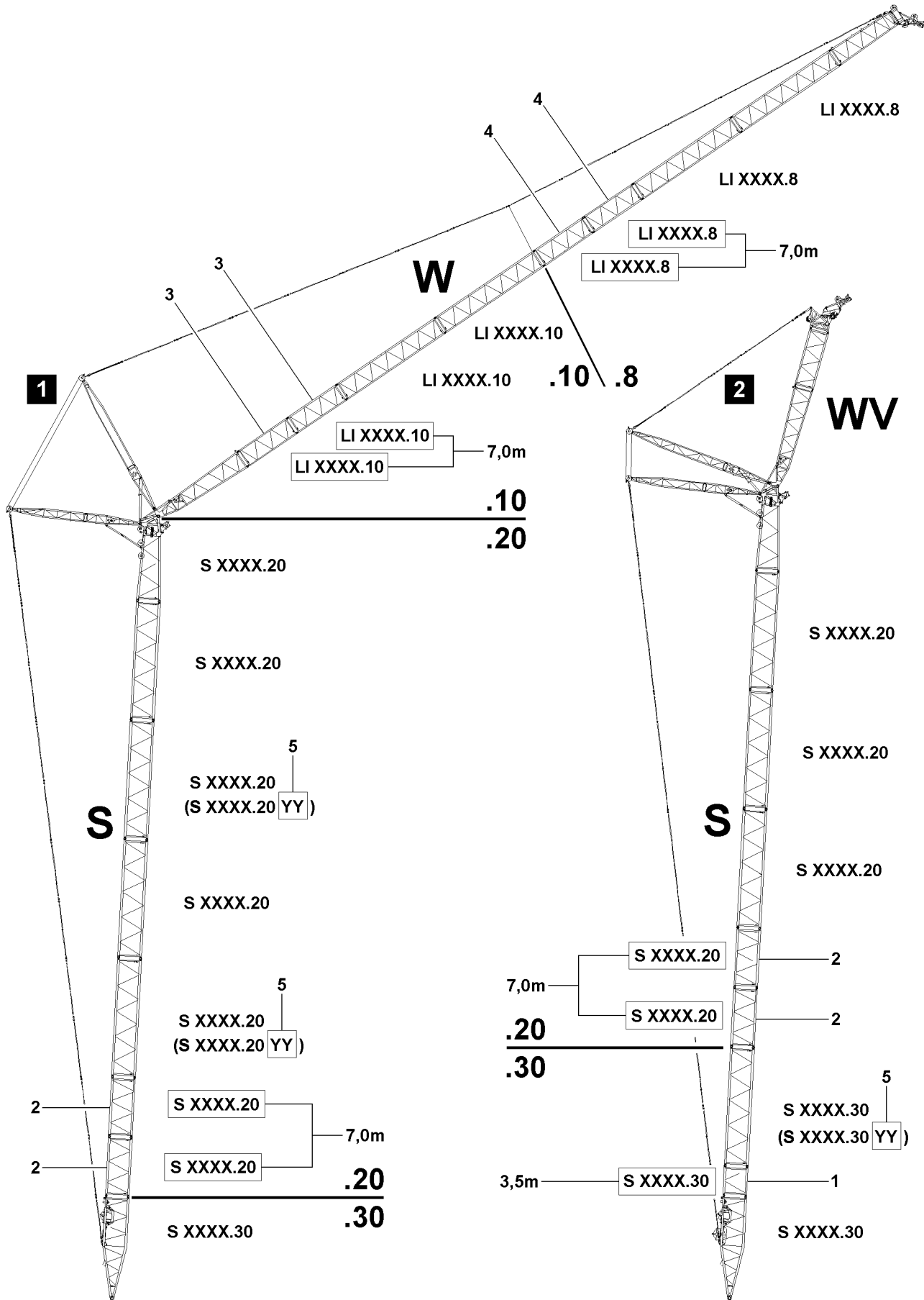


Fig.116151

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System dimensions and assignment				
Position	System		Heavy	Light
1	S XXXX	.30	X	
2	S XXXX	.20		X
3	LI XXXX	.10	X	
4	LI XXXX	.8		X
5	S XXXX	.40 YY	X	

2.1 Arrangement of intermediate sections



WARNING

Danger of accidents due to incorrectly assembled intermediate sections!

- ▶ Any other arrangement of the intermediate sections and guy rods than specified in the operating instructions or the rod plans is prohibited.
- ▶ There is the danger that intermediate sections are mixed up, they are differently sized and do not differ externally.
- ▶ The intermediate sections differ externally only by the welded on plates (.8, .10, .12, .16, .20, .25, .30, .40 YY).
- ▶ When assembling the boom, it must be ensured that the intermediate sections are arranged and installed according to their description as stated on the rod plan.
- ▶ Observe and adhere to the additional letter combinations (YY) **5** on the system dimension plate of the intermediate sections at assembly of the intermediate sections.



WARNING

Arrangement of intermediate sections!

If the arrangement of the intermediate sections is not carried out according to the rod plan, then the boom can be overloaded, bend down and break off.

Death, severe bodily injuries, property damage.

This could result in high property damage.

- ▶ For intermediate sections with the same system dimension but different length the shorter intermediate sections must always be installed on the bottom in the boom, in direction of the rotary connection, except if another installation position is specified in the rod plan.
- ▶ The specifications in the rod plan must be adhered to in any case.

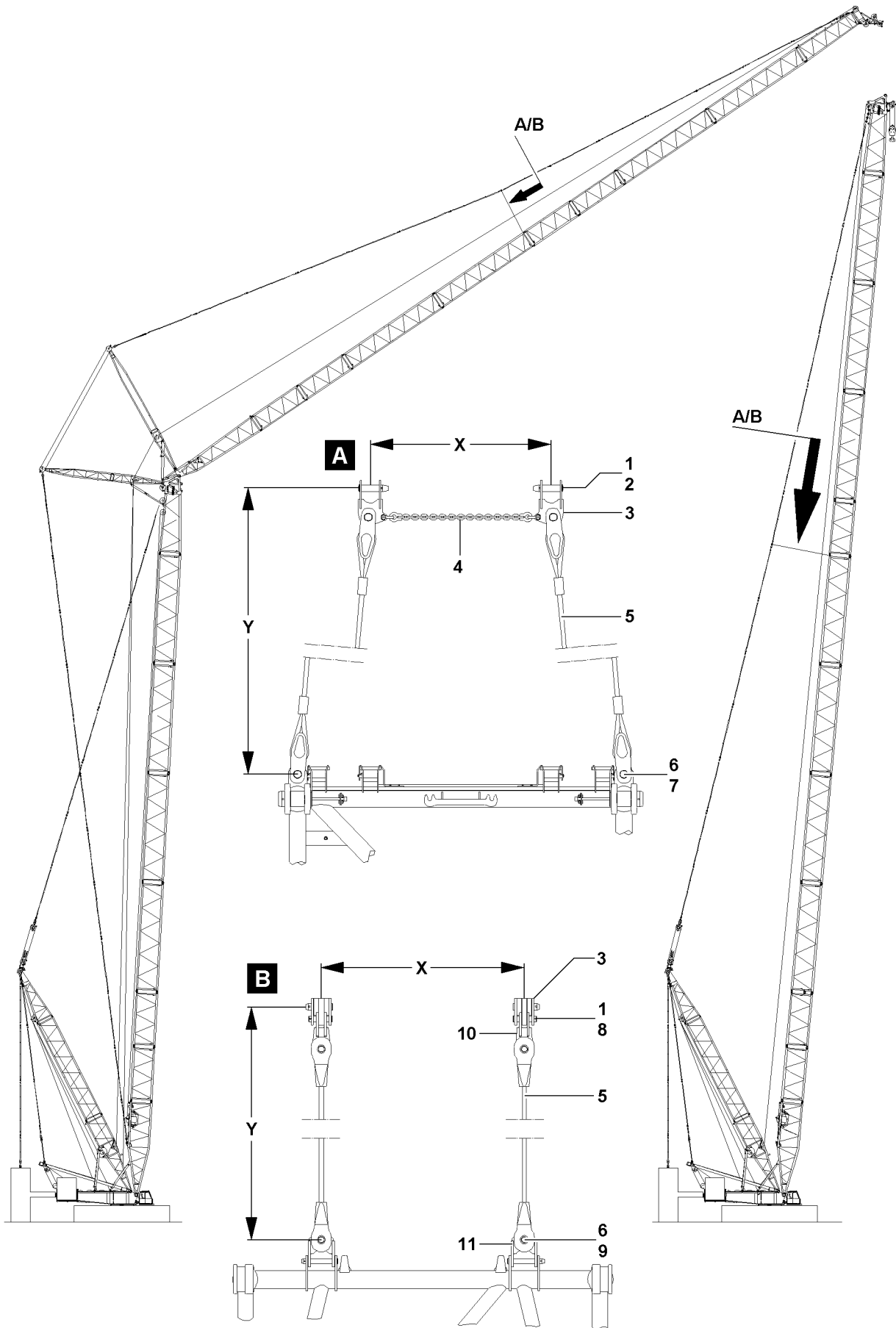


Fig.112270

LWE/LR 1750-000/12812-15-02/en

3 Auxiliary guying



Note

- ▶ The following description is an example and may not exactly match to your crane.
- ▶ For exact crane data refer to the respective rod plan.

3.1 Installing the auxiliary guying

The auxiliary guying, in regards to safe crane operation - especially for long boom systems - is of vital importance.

The auxiliary guying is a deciding factor in relieving the boom, or the boom system during erection and take down as well as during crane operation.



WARNING

The crane can topple over!

If the auxiliary guying is not installed or not installed on the position specified in the rod plan, then the crane can collapse, the boom can break off or the crane can topple over.

- ▶ If an auxiliary guying is specified in the rod plan for the required boom length, then it must be installed on the respective position.
- ▶ Make sure that the auxiliary guying is always completely installed and that all pins are properly pinned and secured.



Note

- ▶ The boom lengths, for which an auxiliary guying is required, can be seen in the rod plan.
- ▶ Depending on the crane type: To install the auxiliary guying, remove the standard lugs and install the „Lugs for the auxiliary guying“.

Components of auxiliary guying, illustration A	
Position	Description
1	Pin
2	Spring retainer
3	Bracket
4	Chain
5	Rope
6	Pin
7	Spring retainer

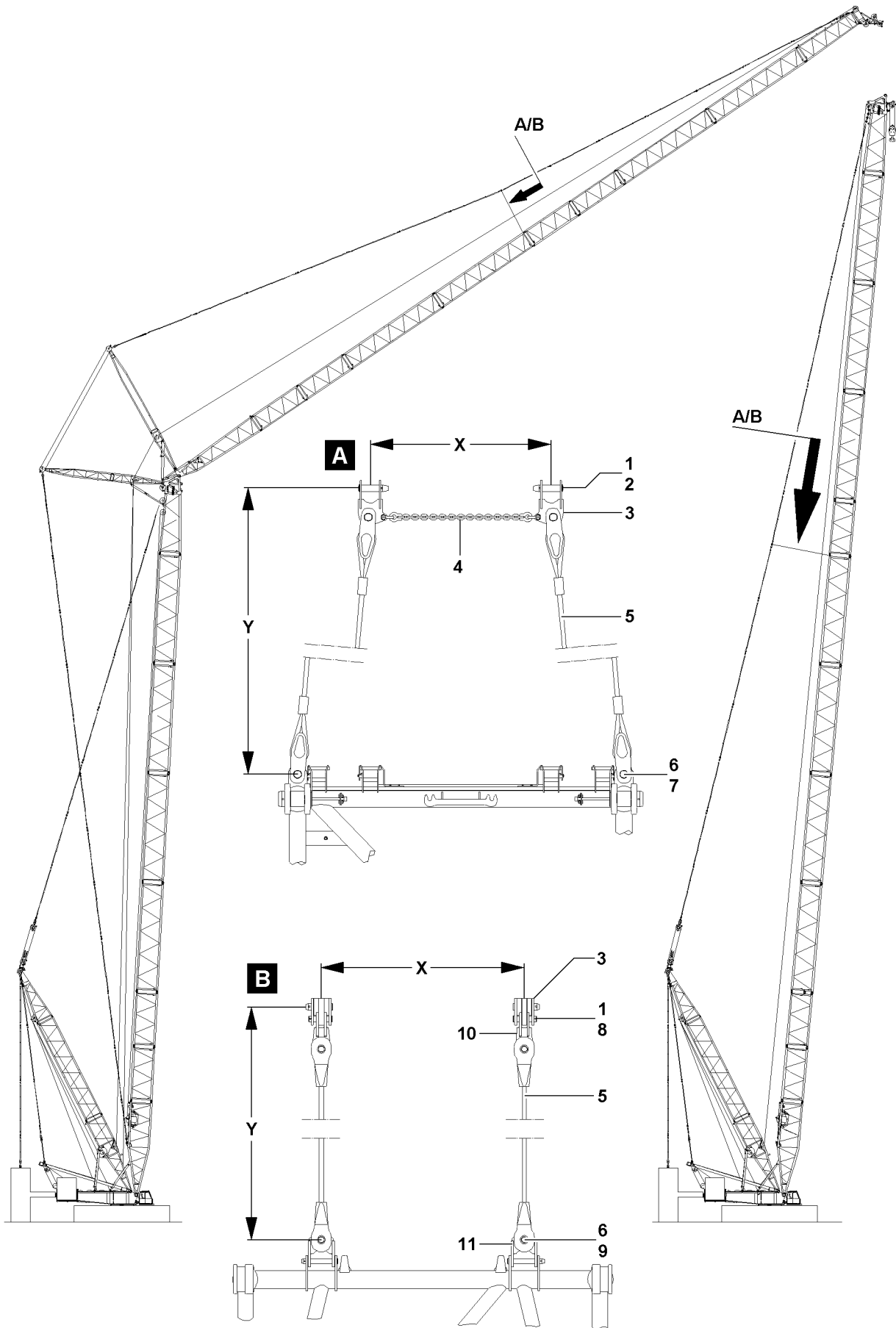


Fig.112270

LWE/LR 1750-000/12812-15-02/en

Components of auxiliary guying, illustration B	
Position	Description
1	Pin
3	Bracket
5	Rope
6	Pin
8	Locking pin
9	Locking pin
10	Cross-shaped lug
11	Cross-shaped lug

The lugs **3** must be installed in the guying instead of the standard lugs. The auxiliary guying is installed on the lugs **3**.

The guy ropes **5** are pinned on top on the lugs **3** of the guying or on the cross-shaped lugs **10**. The guy ropes **5** are pinned on the bottom on the lugs / connector points on the boom, see illustration **A** or on the cross-shaped lugs **11**, see illustration **B**.

- ▶ Install the guy ropes: Pin the guy ropes on top on the guying with pin **1** and secure with spring retainer **2**, see illustration **A**.

or

- Install the guy ropes: Pin the guy ropes on top on the guying with pin **1** and secure with locking pin **8**, see illustration **B**.

When the guy ropes **5** are pinned and secured on the lugs **3** of the guying or on the cross-shaped lugs **10**:

- ▶ Pin the guy ropes **5** on the lugs / connection points on the boom, see illustration **A** with pin **6** and secure with locking spring **7**.

or

- Pin the guy ropes **5** on the cross-shaped lugs **11** on the boom, see illustration **B** with pin **6** and secure with locking pin **9**.



WARNING

The crane can topple over!

If the chain **4** is not installed in connection with the auxiliary guying, then the guying can be damaged, the boom can break off and the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The auxiliary guying must be installed according to the rod plans.
- ▶ If a chain **4** is specified in the rod plan, then it must always be installed in connection with the auxiliary guying, otherwise the guy rods will be pulled apart.

- ▶ Recheck the proper and complete assembly of the auxiliary guying before erecting the boom / boom system.

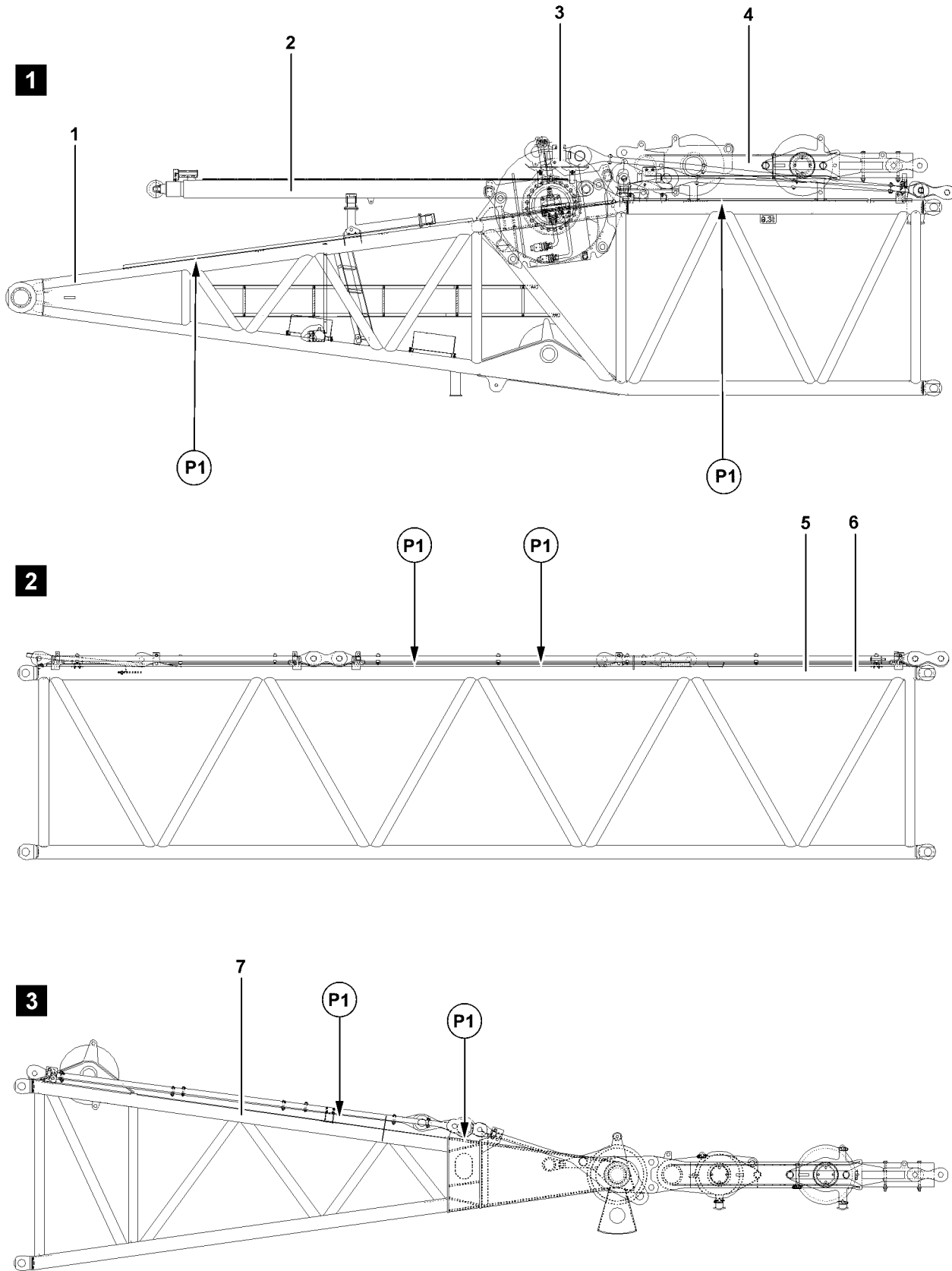


Fig.111658

LWE/LR 1750-000/12812-15-02/en

1 Components and fastening points

1.1 D-pivot section

The D-pivot section consists of:

Position	Component	Weight ¹⁾
1	D-pivot section without rods	6.3 t
2	D-relapse cylinder - 2x	1.8 t
3	Winch 3 with rope	8.8 t
4	D-pulley blocks	4.5 t

1) The stated weights are approximate.

1.2 D-intermediate section

Position	Component	Weight ¹⁾
5	D-intermediate section 10 m	7.0 t
6	D-intermediate section 14 m	8.6 t

1) The stated weights are approximate.

1.3 D-end section

Position	Component	Weight ¹⁾
7	D-end section	12.0 t

1) The stated weights are approximate.

1.4 Fastening points D-pivot section



WARNING

Danger of accident due to incorrect attachment!

Life-threatening situations can arise due to improper or incorrect attachment of the corresponding components!

Personnel can be severely injured or killed!

► Attach the components on the intended fastening points **P1**!

Fig.195219

LWE/LR 1750-000/12812-15-02/en

2 Assembly



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited!



WARNING

Falling components!

If unsecured or non-supported components are installed or removed, they can fall down! Personnel can be severely injured or killed!

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Support the boom and components before pinning / unpinning!
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ Do not disengage the auxiliary crane until each component is pinned on and secured!
- ▶ It is prohibited to lean a ladder against the component being disassembled!



WARNING

Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

Fig.195219

LWE/LR 1750-000/12812-15-02/en

NOTICE

Damage of derrick boom and SA-bracket!

If the SA-bracket is pulled by winch 4 (intake gear) to the rear in direction of the turntable, then the derrick boom and the SA-bracket can be severely damaged!

Expensive and extensive repairs can result!

- ▶ As long as the guying between the SA-bracket and the assembled D-pivot section or between the SA-bracket and the assembled D-boom is **not** assembled and guyed, do not pull the SA-bracket to the rear in direction of the turntable!

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The counterweight has been installed on the turntable according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual crane configuration.
- No main boom is assembled on the turntable.

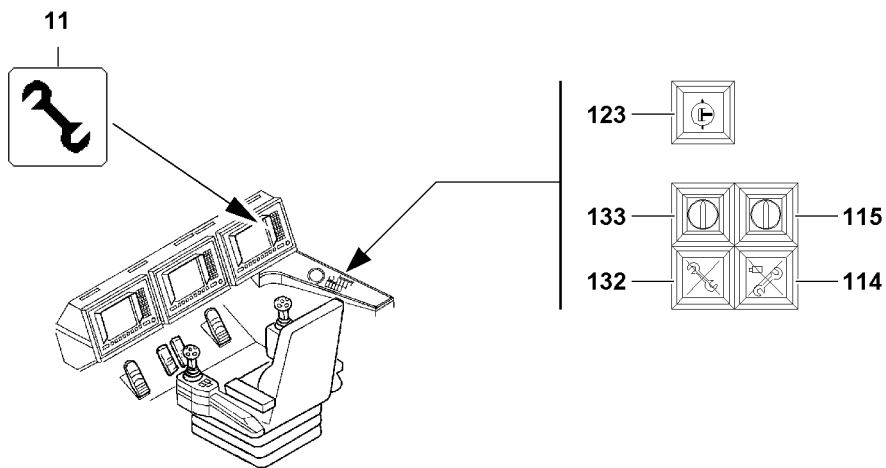
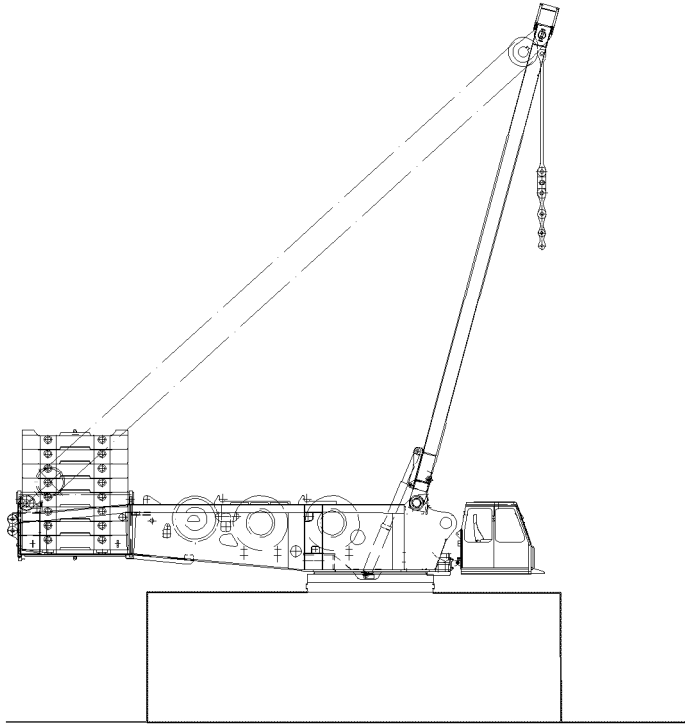


Fig.111672

LWE/LR 1750-000/12812-15-02/en

2.1 Assembling the D-boom

2.1.1 Turning the turntable into assembly position



DANGER

The crane can topple over!

If the following conditions are not met before turning the turntable - **without** installed D-boom, the crane can topple over!

Personnel can be severely injured or killed!

▶ Observe the data in the erection and take down charts!

▶ Turn the turntable in longitudinal direction of the travel gear or to the side.

2.1.2 Exceeding the LICCON overload protection for assembly



WARNING

Assembly with activated assembly key button!

If the assembly key button is turned on, the hoist limit switch and the LICCON overload protection is bypassed!

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be severely injured or killed!

This could result in high property damage!

▶ The actuation of the assembly key button **133** is only permitted for assembly tasks!

▶ The assembly key button may only be operated by persons who are aware of the consequences of a bypass!

▶ If the assembly key button **133** is turned on, the hoist limit switch and the LICCON overload protection is bypassed!

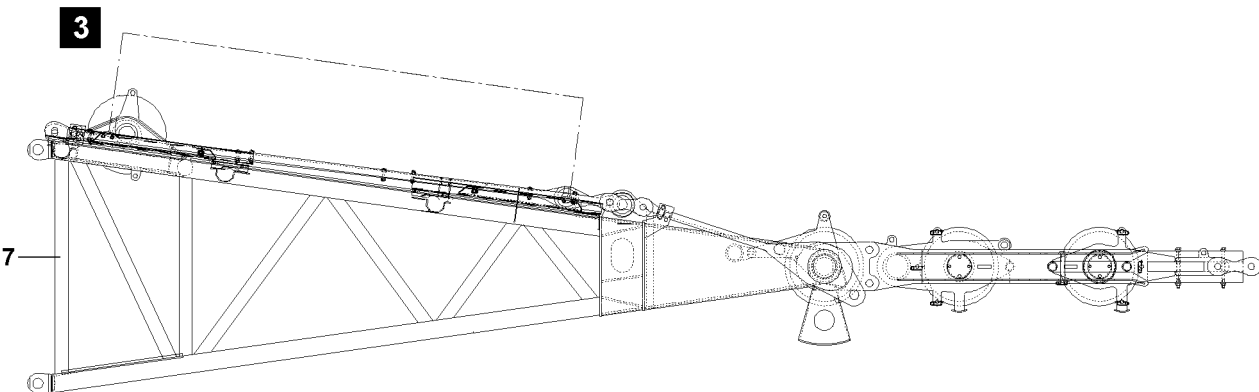
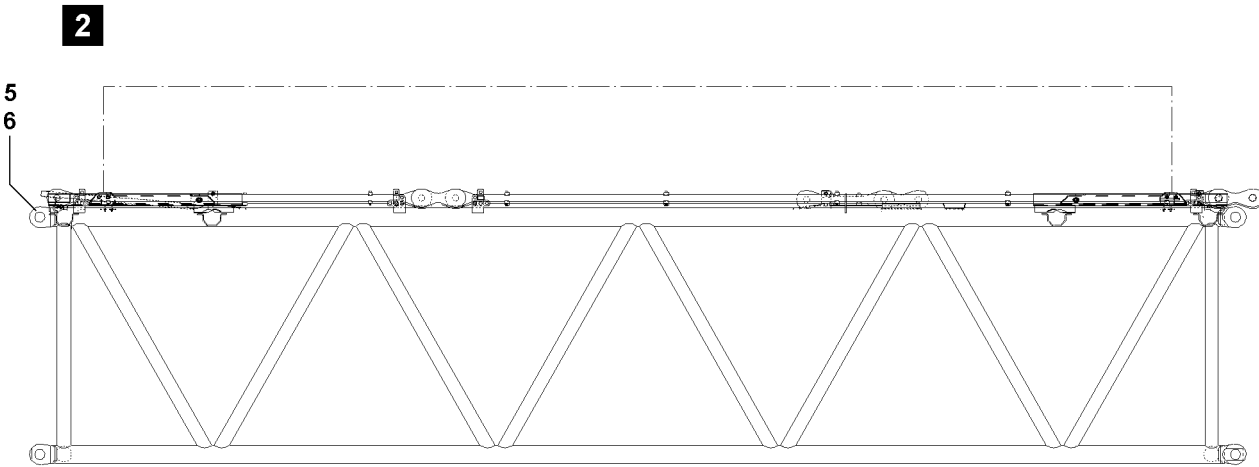
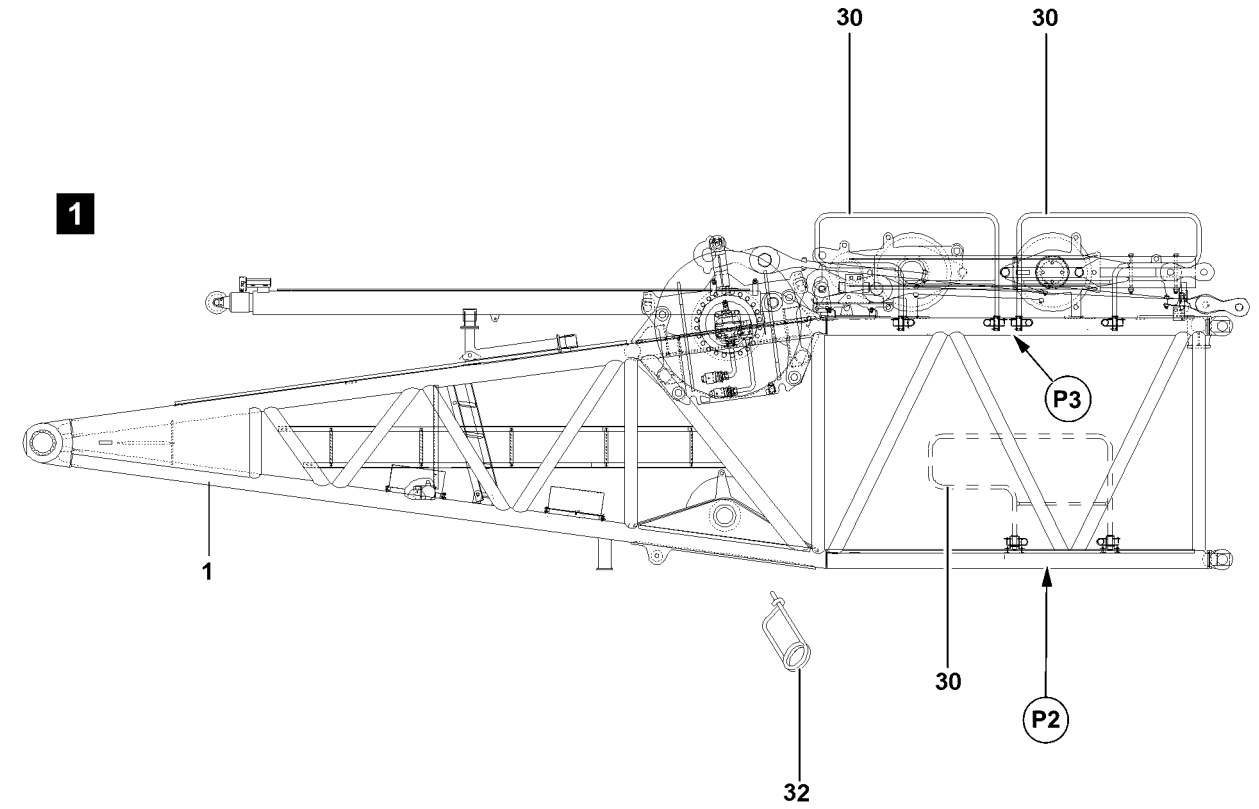
▶ Crane operation with the assembly key button **133** turned on is strictly prohibited!

▶ The assembly key button **133** must be removed immediately after carrying out the assembly work and handed to an authorized person!

▶ Turn the assembly key button **133** to the right.

Result:

- The LICCON overload protection is exceeded.
- The indicator light **132** lights up.
- The assembly icon **11** appears on the LICCON monitor.



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Fig.111660

2.2 Assembling the fall protection equipment on the D-pivot section

- ▶ Release the railing in the transport retainer point **P2** on the D-pivot section 1: Remove the spring retainers **32**, see illustration 1.
- ▶ Remove the railing from the transport retainer point **P2** and insert into the intended fastening points, point **P3** on the D-pivot section 1.
- ▶ Secure the railing **30** in the fastening points, point **P3**, with spring retainers **32**.

2.3 Assembling the fall protection equipment on the D-intermediate section and on the D-end section

See illustration 2 and illustration 3.



Note

- ▶ Observe the notes, see Crane operating instructions, chapter 2.06 and / or chapter 6.50!
-

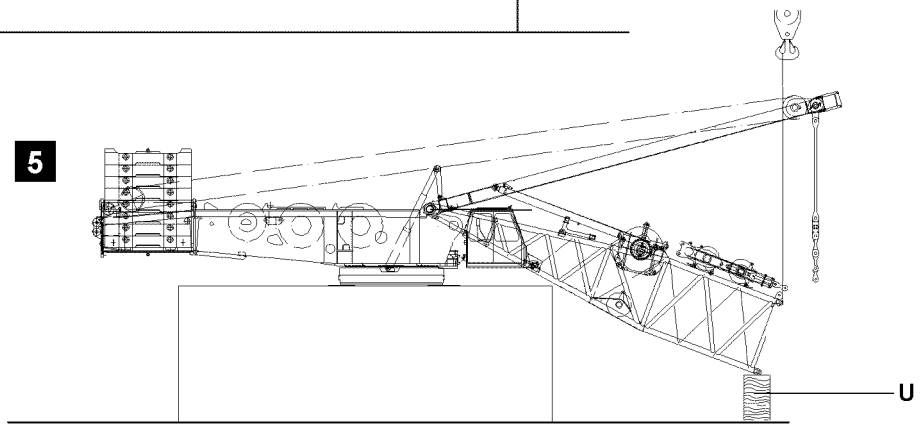
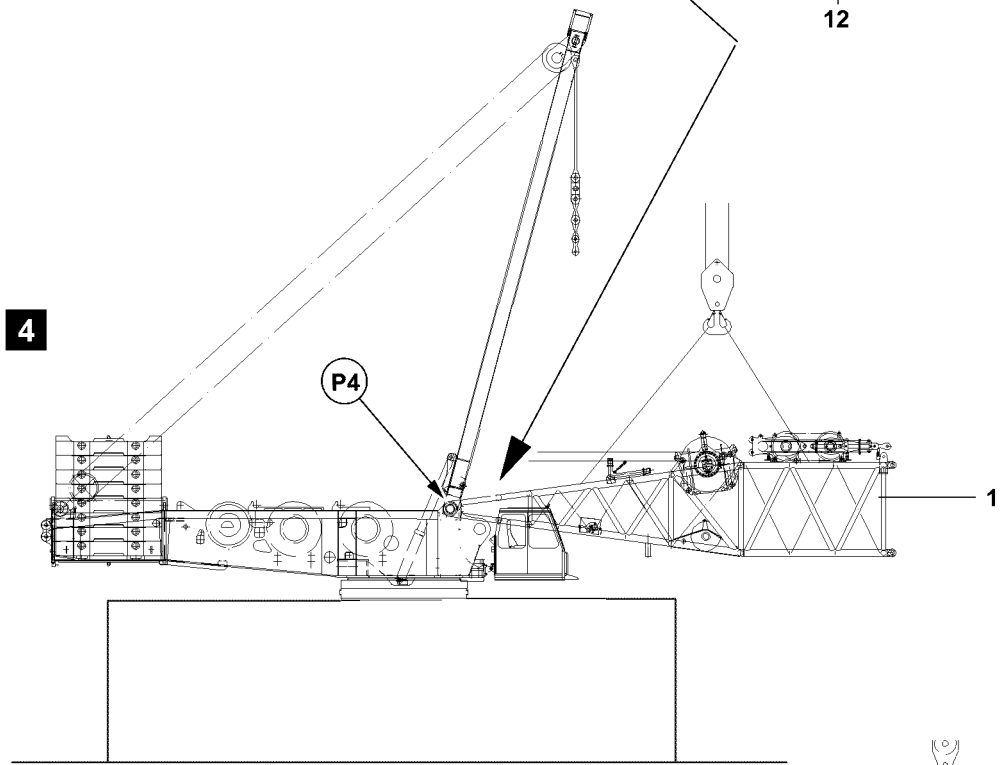
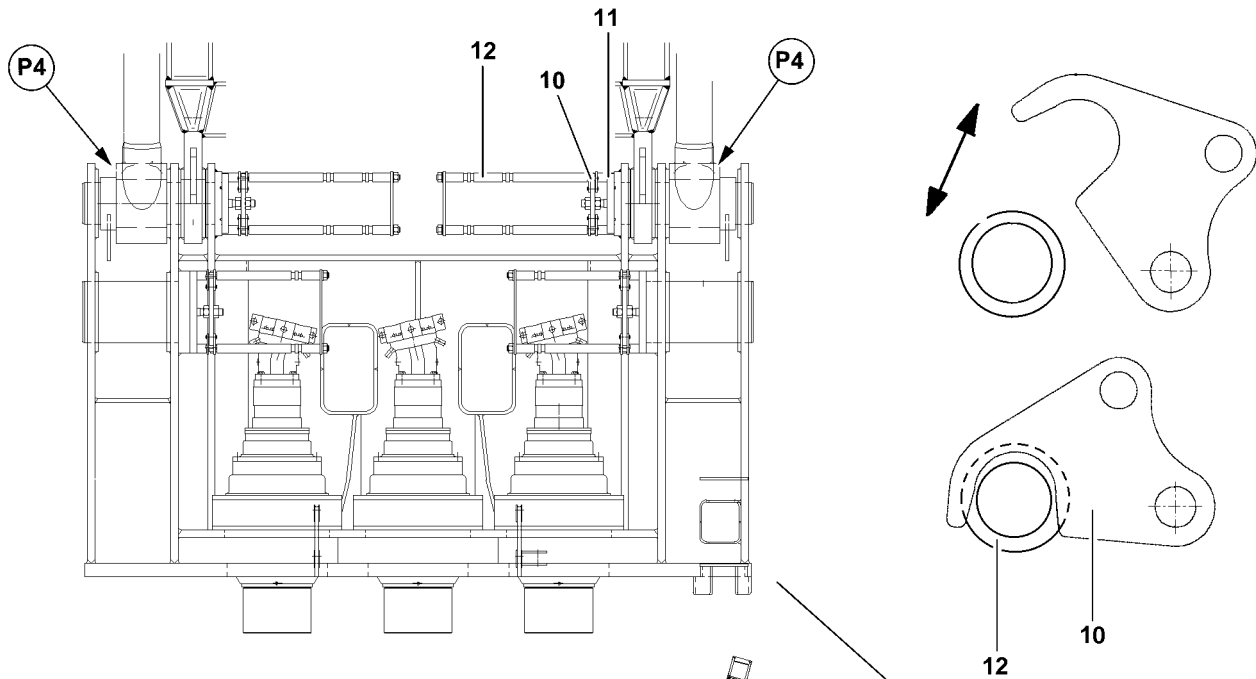


Fig.111661

LWE/LR 1750-000/12812-15-02/en

2.4 Pinning the D-pivot section on the turntable



DANGER

Danger of fatal accidents due falling components!

If the pin connections are not visually inspected, the pins can loosen up by themselves and cause components to fall down!

Personnel can be severely injured or killed!

- ▶ All pins must be secured after assembly with the intended safety elements! Check visually!
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15!

Make sure that the following prerequisites are met:

- The SA-bracket is erected to approx. 100°.
- The pins **11** on the turntable are unpinned.

- ▶ Hang the D-pivot section **1** onto the auxiliary crane and swing in to the pin points **P4** on the turntable, see illustration **4**.



WARNING

Falling D-pivot section!

Due to non-secured or insufficiently secured connector pins, the D-pivot section can fall down!

Personnel can be severely injured or killed!

- ▶ The pins **11** must be secured after the pinning procedure on the turntable by folding the retaining hooks **10** into the guide **12**!

- ▶ Move the D-pivot section **1** in on the turntable.
- ▶ Open both retaining hooks **10** from the guide **12**.



Note

- ▶ Operation of radio remote control (only available for the LR-crane), see Crane operating instructions, chapter 6.08!

- ▶ Actuate the radio remote control and insert the connector pins **11**.
- ▶ Secure the pins **11** by folding the retaining hooks **10** into the guide **12**.

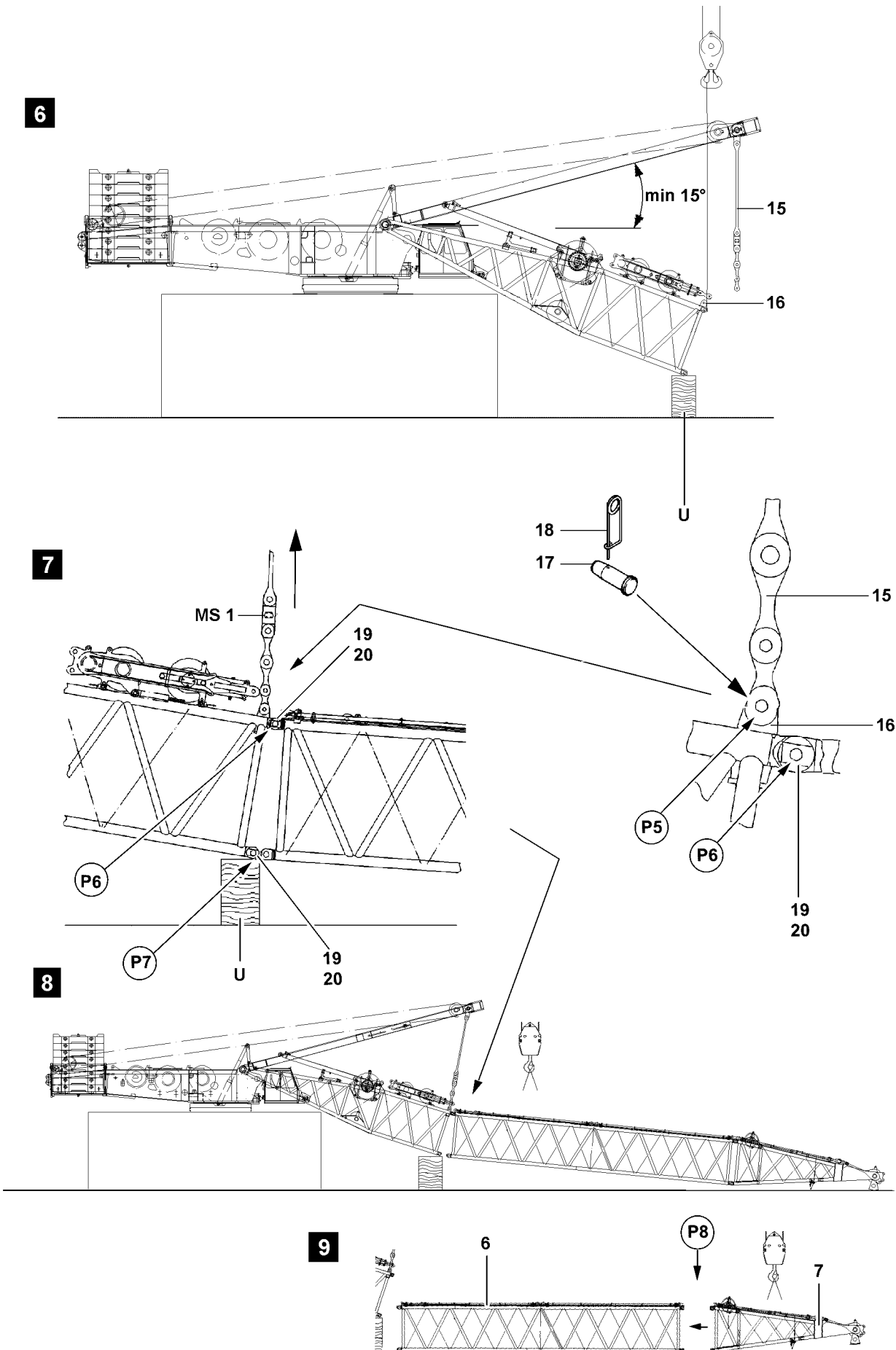
NOTICE

Damage to the D-pivot section!

Property damage can occur on the D-pivot section by placing the assembled pivot section on the ground!

- ▶ The D-pivot section may not be placed directly on the ground!
- ▶ When placing the D-pivot section down, always use a sufficiently load bearing and large enough base support!

- ▶ Place the D-pivot section carefully with the auxiliary crane on the support **U**!
- ▶ Remove the auxiliary crane!



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Fig.111662

2.5 Assembling the guy rods from the SA-bracket

Make sure that the following prerequisites are met:

- The D-pivot section is pinned and secured on the turntable.
- The D-pivot section is placed on the support **U**.

▶ Luff the SA-bracket down to the front, see Crane operating instructions, chapter 5.02.

Connect the guy rods **15** on the assembly bracket **16** on the D-pivot section, point **P5**:

▶ Insert the pin **17** and secure with spring retainer **18**, see illustration 7.

2.6 Installing the D-lattice sections on the D-pivot section

Make sure that the following prerequisite is met:

- The guy rods **15** are pinned and secured on the assembly bracket **16** on the D-pivot section, point **P5**.



Note

- ▶ Always support the D-lattice sections sufficiently for easier installation!
- ▶ Pin and unpin the D-lattice sections with the pin pulling device, see Crane operating instructions, chapter 5.30!

▶ Attach the D-end section **7** on the auxiliary crane and align on the D-intermediate section **6**.

When the pin bores on the D-intermediate section and on the D-end section, point **P8** align:

- ▶ Insert and secure the pins on top and bottom and secure with spring retainers.
- ▶ Assemble the D-lattice sections and the respective guy rods to the required length.
- ▶ Hook the derrick boom on the auxiliary crane and align on the D-pivot section.

When the pin bores on the D-pivot section and on the derrick boom, point **P6** align:

- ▶ Insert the pin **19** and secure with spring retainer **20**.
- ▶ Luff the D-pivot section up until it can be pinned on the D-pivot section, point **P7**, see illustration 7.
- ▶ Erect the SA-bracket until the pin bores on the D-pivot section and on the D-intermediate section "on the bottom" align, point **P7**: Insert the pins **19** on both sides at point **P7** and secure with spring retainers **20**, illustration 7.

When the pins are properly pinned and secured on all D-lattice sections:

- ▶ Luff the SA-bracket down and unpin the guy rods **15** on the assembly bracket **16** on the D-pivot section.

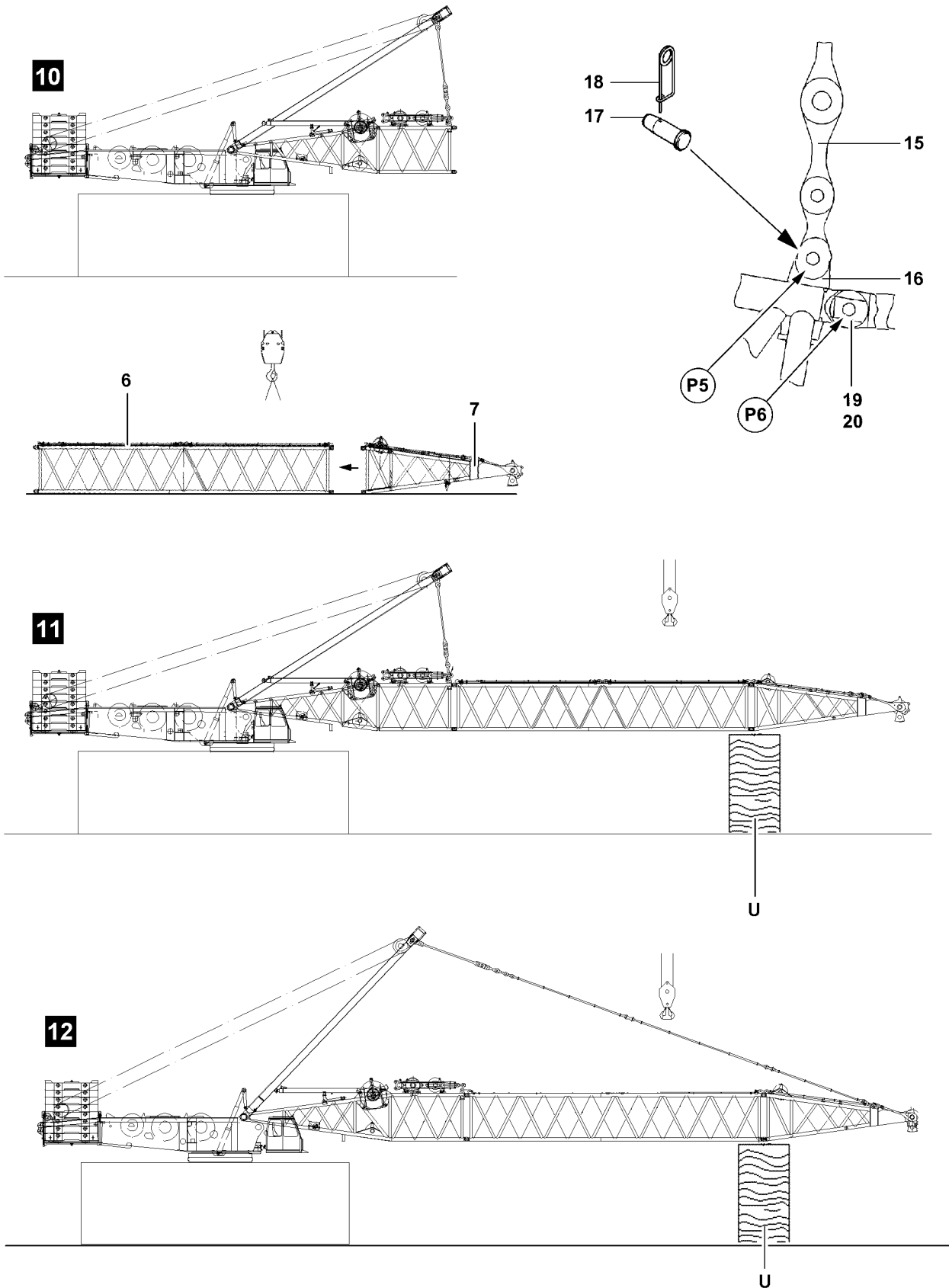


Fig.111663

LWE/LR 1750-000/12812-15-02/en

2.7 Assembling the derrick boom in flying mode

Make sure that the following prerequisites are met:

- The D-pivot section is pinned and secured on the turntable.
- The guy rods **15** are pinned and secured on the assembly brackets **16** on the D-pivot section.
- The D-pivot section is horizontally guyed.

Pin and secure the D-intermediate section and the D-end section or the D-intermediate section and the complete D-end section on the D-pivot section.

- ▶ Insert and secure the pins on top and bottom.



WARNING

Mortal danger due to folding down of derrick boom!

If the derrick boom is not properly supported with stable materials or held by an auxiliary crane before unpinning the guy rods, then the derrick boom can fold down suddenly!

In addition, the derrick boom can be severely damaged!

Personnel can be severely injured or killed!

- ▶ The crane operator must ensure that the derrick boom is supported properly with stable materials or that it is held by an auxiliary crane!

When the D-lattice sections or the preassembled assembly unit are installed and secured on the D-pivot section:

- ▶ Fasten the derrick boom on the auxiliary crane or support it with stable materials.
- ▶ Lower the SA-bracket to the front, see Crane operating instructions, chapter 5.02.

Result:

- The guy rods are relieved.

Separate the guy rods **15** on the assembly bracket **16**:

- ▶ Remove the spring retainer **20** and unpin the pin **19**.
- ▶ Lower the SA-bracket to the front.

Connect the guy rods from the D-boom with the guy rods from the SA-bracket:

- ▶ Insert the pin and secure with spring retainer.
- ▶ Erect the SA-bracket and tension the guy rods between the SA-bracket and the D-boom.



DANGER

Mortal danger due to folding down of derrick boom!

- ▶ Before removing the auxiliary crane, the crane operator must ensure that the derrick boom is safely held by the guy rods!

When the guy rods are tensioned between the SA-bracket and the D-end section:

- ▶ Remove the auxiliary crane.

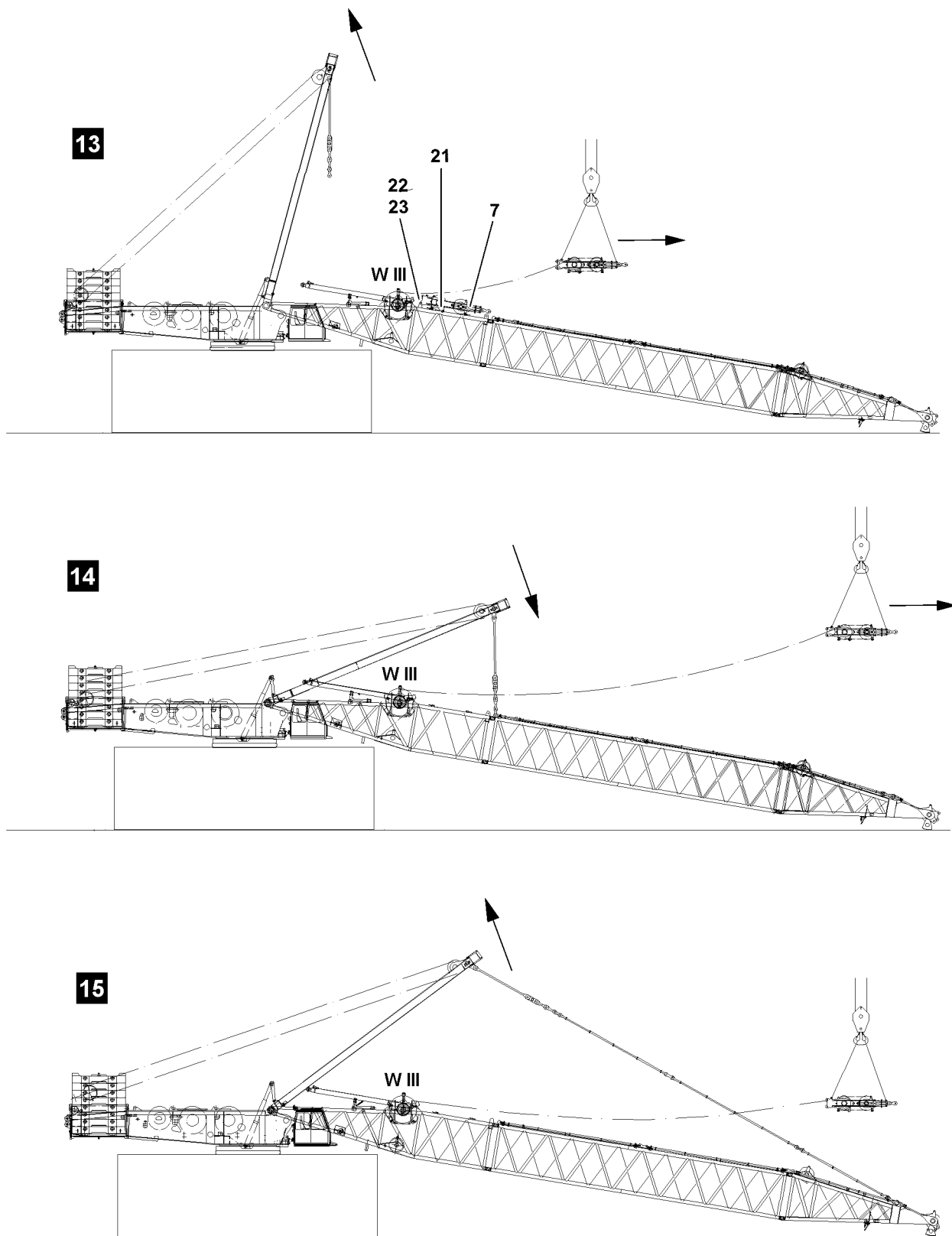


Fig.111664

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2.8 Assembling the guy rods



Note

- ▶ Assemble the D-guy rods according to the rod plan!
- ▶ The numbering on the rod plan must be identical to the numbering on the guy rods!



WARNING

Neglectful inspection and maintenance of guy rods!

If the regular inspection and maintenance of the guy rods is not carried out or is carried out only in irregular intervals, then severe accidents can occur due to existing and unrecognized damage to the guy rods!

Personnel can be severely injured or killed!

- ▶ Check the guy rods before every assembly, see Crane operating instructions, chapter 8.15!

Make sure that the following prerequisite is met:

- The derrick boom is placed on the ground.

- ▶ Luff the SA-bracket up for easier assembly of the pulley block 7.



WARNING

Slipping pulley block!

By unpinning the pulley block on the D-pivot section, the pulley block can start to slip!

Personnel can be severely injured or killed!

- ▶ The pulley block must be secured by an auxiliary crane before unpinning on the D-pivot section!

- ▶ Fasten the pulley block onto the auxiliary crane.

- ▶ Unpin the pulley block on the D-pivot section: Release and unpin the pin 22 on the transport retainer 21.

NOTICE

Danger of slack rope formation!

If winch 3 is spooled out too quickly when pulling the pulley block, slack rope can form!

- ▶ The hoist rope must be tensioned during the entire pulling procedure!

- ▶ Pull the pulley block with the auxiliary crane to the D-end section while spooling out winch 3 at the same time, see illustration 13.



DANGER

Risk of accident!

- ▶ The pins of the derrick guy rods may only be pinned from the „inside“ to the „outside“!

- ▶ Luff the SA-bracket down to the front and pin and secure the guy rods from the SA-bracket with the guy rods from the derrick boom, see illustration 14.

Tension the guy rods between the SA-bracket and the D-end section.

- ▶ Actuate winch 4, see illustration 15.

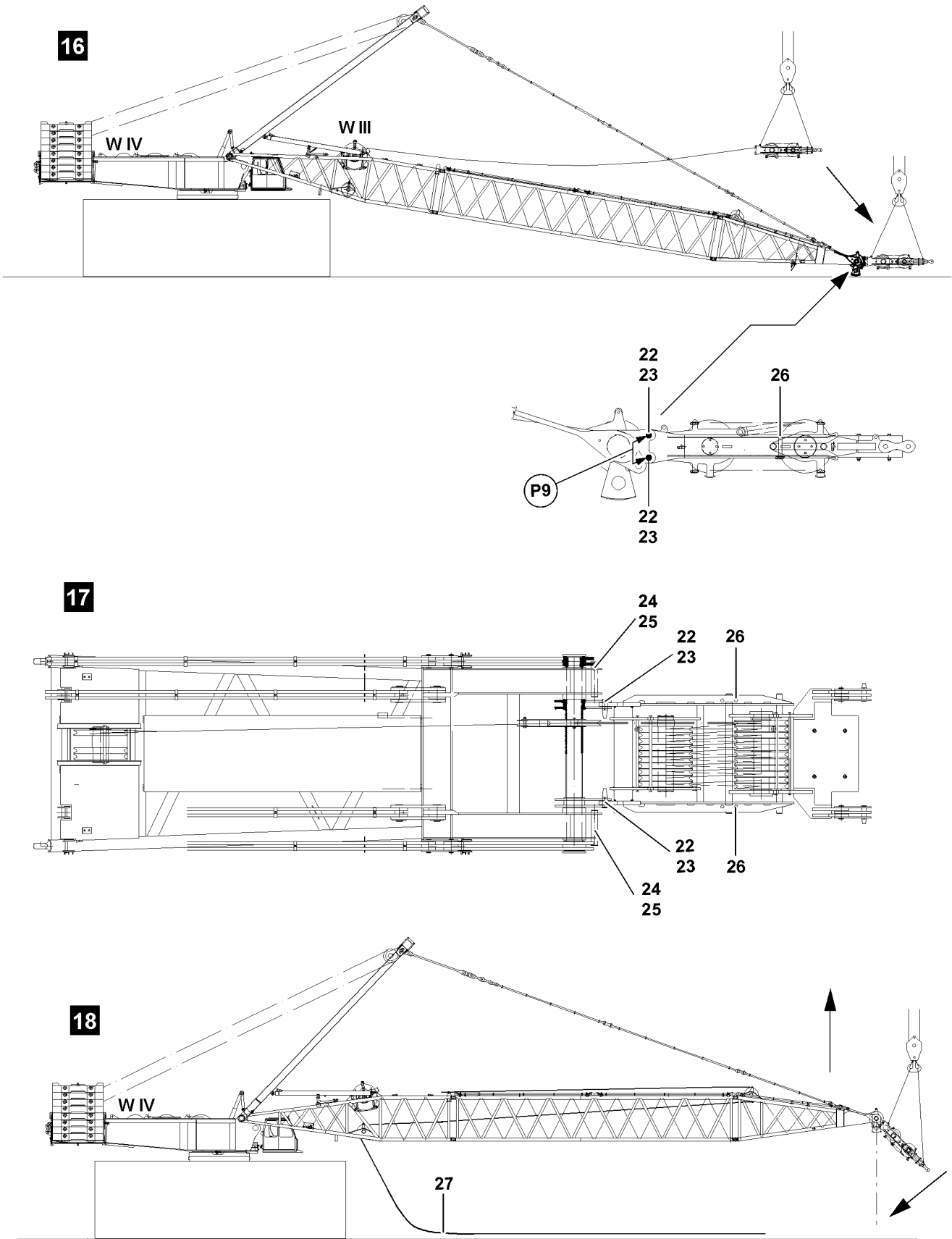


Fig.111665

LWE/LR 1750-000/12812-15-02/en

2.9 Assembling the pulley block

For assembly move the pulley block with the auxiliary crane from the D-pivot section to the D-end section and pin on the D-end section in horizontal direction. When the D-boom is lifted off the ground, the lock of the pulley block is released and lowered with the auxiliary crane into „down“ position.

Make sure that the following prerequisites are met:

- The D-boom is placed on the ground.
- The guy rods between the SA-bracket and the D-end section are tensioned
- The pulley block hangs on the auxiliary crane.

- ▶ Pull the pulley block with the auxiliary crane to the D-end section while spooling out winch 3 **WIII** at the same time and align on the pin bores, points **P9**, see illustration **16**.
- ▶ Insert the pins **22** on both sides „on top“ and „bottom“ and secure with spring retainers **23**, point **P9**.

Lock the pulley block horizontally on the D-end section.

- ▶ Insert the pins **24** on both sides and secure with spring retainers **25**.

Luff the derrick boom up to the horizontal, see illustration **17**:

- ▶ Spool the winch 4 up.

When the derrick boom is erected to the horizontal:

- ▶ Fasten the pulley block onto the auxiliary crane.

When the pulley block is safely held by the auxiliary crane:

- ▶ Release and unpin the pins **24** on both sides.
- ▶ Lower the pulley block carefully with the auxiliary crane, see illustration **17**.
- ▶ Spool up winch 3 **WIII** until the control rope is slightly tensioned between the upper pulley block and the lower pulley block.
- ▶ Unpin the pins **26** on both sides.

Result:

- The upper and the lower pulley block are held by the control rope.
- ▶ Remove the auxiliary crane.



DANGER

Falling hoist rope!

If the following conditions are not met before erecting the D-boom, the hoist rope can fall down due to its own weight!

Personnel can be severely injured or killed!

- ▶ Enough hoist rope must be guided over the rope pulleys so that the hoist rope is **not** pulled back and falls down when erecting the D-boom!
- ▶ Pull the hoist rope **27** with the assembly winch over the rope pulleys in the D-end section and the D-pivot section, see Crane operating instructions, chapter 4.06.
- ▶ Luff the D-boom up until the pulley block hangs freely.

Fig.195219

LWE/LR 1750-000/12812-15-02/en

2.10 Establishing the electrical connections

Make sure that the following prerequisite is met:

- The D-boom is completely assembled.



Note

- ▶ To establish the electrical connections, see Electric wiring diagram!

- ▶ Establish the electrical connections.
- ▶ Make sure that all electrical connections on the boom are established.

2.11 Establishing the hydraulic connections

The hydraulic connections are made with quick-release couplings.

When connecting hydraulic lines with quick-release couplings, make sure that the coupling procedure is carried out correctly.



WARNING

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!

Personnel can be severely injured or killed!

- ▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!

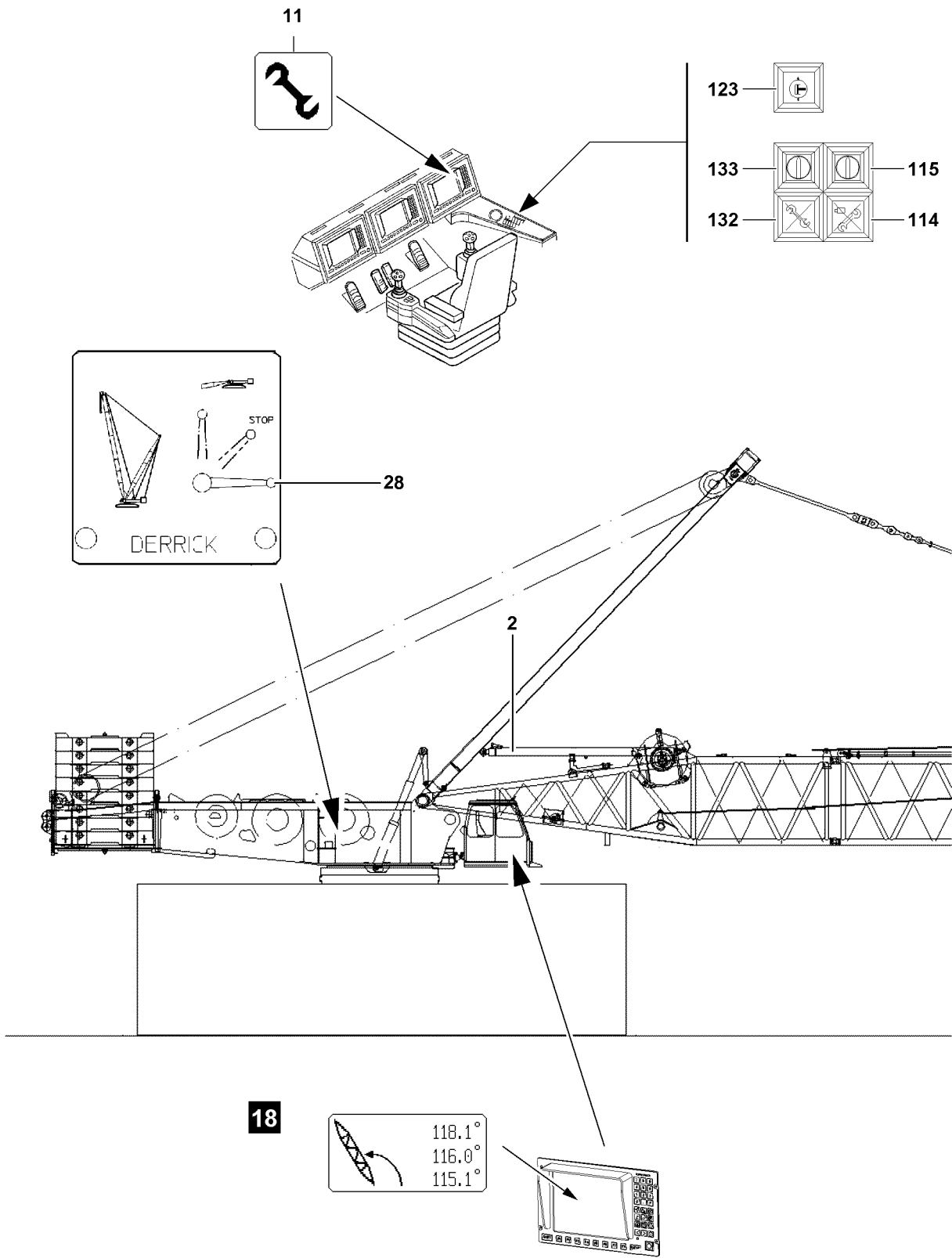


WARNING

Loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
- ▶ Connect the coupling components (sleeve and connector) and screw together with the hand-tightened nut.
- ▶ Tighten the hydraulic coupling by hand. Rotate the hand-tightened nut until it reaches a tangible, fixed stop position.
- ▶ Establish the hydraulic connection to the D-relapse cylinders.



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Fig.111673

2.12 Checking the function of the safety devices



WARNING

Non-functioning safety devices!

If the function of the safety devices is defective, personnel can be severely injured or killed!

▶ Crane operation with non-functioning safety devices is **prohibited!**



Note

▶ The function of the individual limit switches must be checked before erection!

▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual!



Note

▶ If a function check on the limit switches or on the safety devices does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked!

▶ If no visible connection errors or component defects can be found, contact **LIEBHERR Service!**

Make sure that the following prerequisites are met:

- All electrical connections have been made.
- The crane engine is running.
- The corresponding operating mode is set on the LICCON monitor.

2.12.1 Checking the limit switch D-boom „Steepest position“



Note

▶ The limit switch functions have to be checked individually before erection!

▶ Cover the limit switch initiators on the D-relapse cylinders individually with a metal plate.

Result:

- The spool up function of the hoist winch turns off.
- The icon „Derrick boom angle“ appears on LICCON monitor 1, see illustration 18.
- The limit switch is functioning.

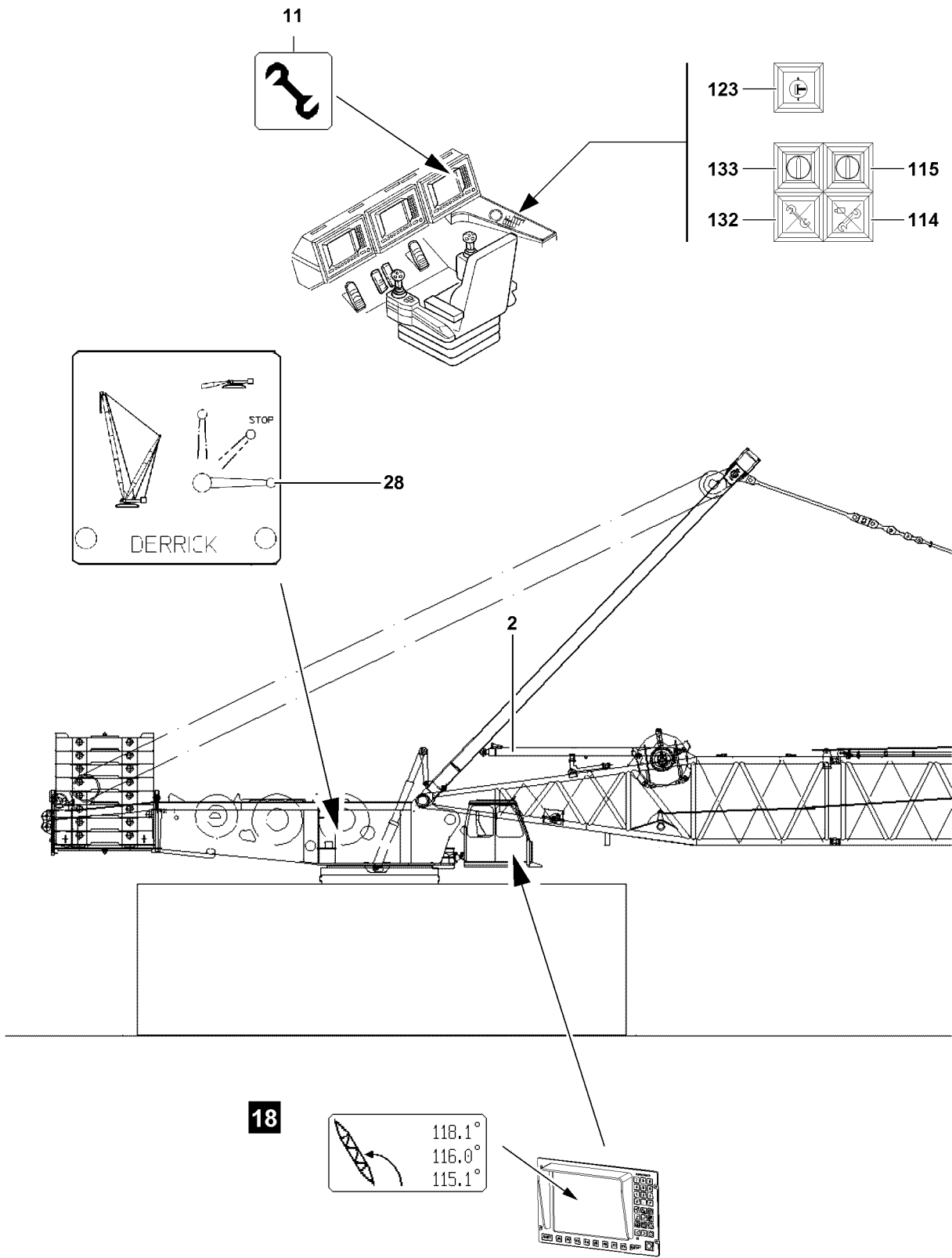


Fig.111673

LWE/LR 1750-000/12812-15-02/en

2.13 Erecting the D-boom



DANGER

The crane can topple over!

- ▶ It is not permitted to turn the crane during the erection procedure!
- ▶ Observe the data in the erection and take down charts!



WARNING

The crane can topple over!

If the following conditions are not met before erecting the D-boom, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Observe the safety technical notes, see Crane operating instructions, chapter 5.01!
- ▶ Extend the D-relapse cylinder **2** before erection!
- ▶ Do not allow slack cable to build up on the winch **3**!
- ▶ The ball valve cabinet must be locked!
- ▶ Always pull the key on the ball valve cabinet and hand it to an authorized person!



WARNING

Falling hoist rope!

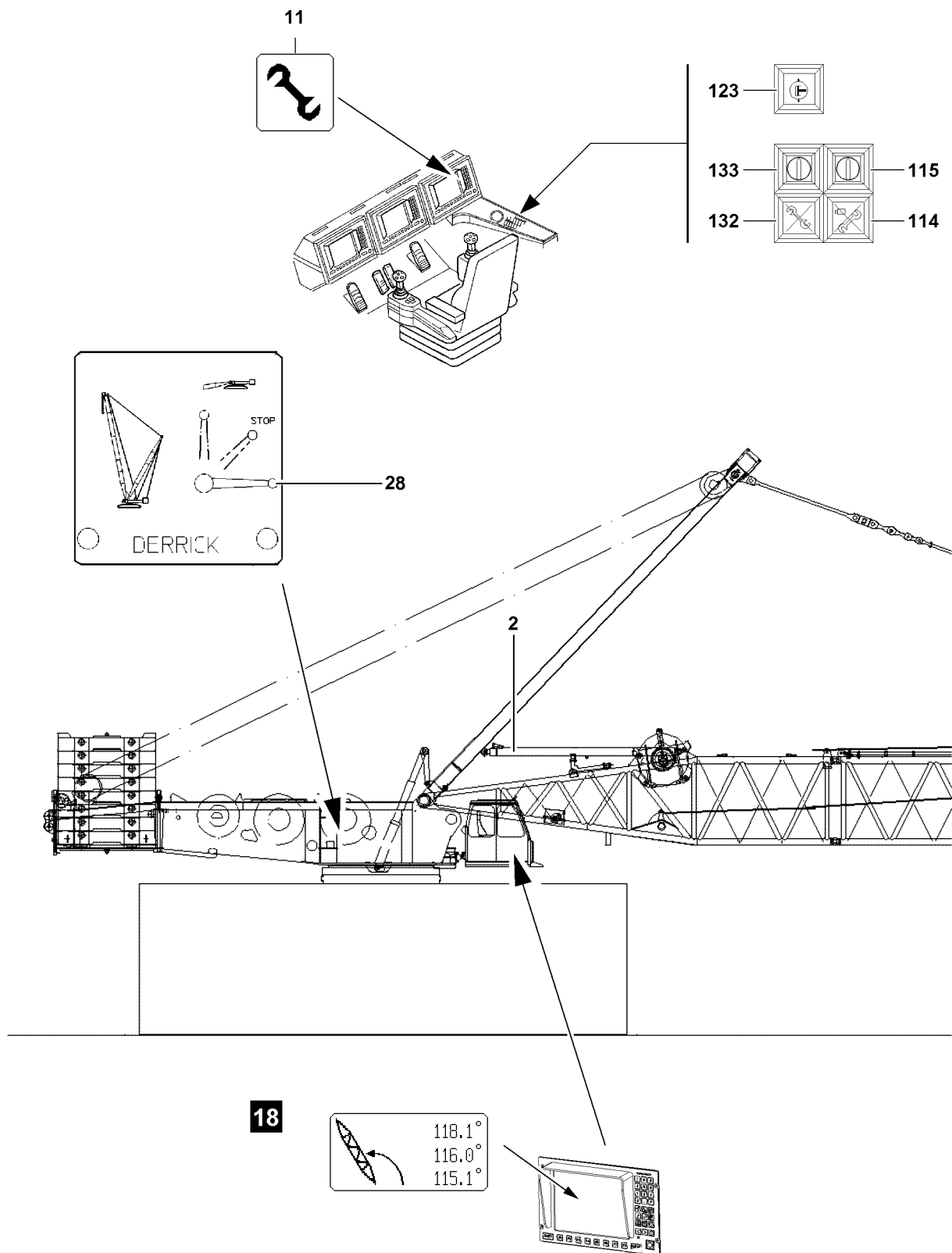
If the hoist rope is not reeved with the respective length over the D-boom before the erection procedure, then it can fall backward due to its own weight!

Personnel can be severely injured or killed!

- ▶ Reeve the hoist rope before the erection procedure with sufficient length on the D-boom!
- ▶ The hoist rope must be constantly monitored during erection!
- ▶ Do not step into the danger zone!

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- All electrical connections have been made.
- All limit switches are functioning.
- The counterweight has been installed on the turntable according to the load chart.
- All pin connections have been secured.
- The folding consoles of the D-relapse cylinders are in operating position.
- The D-relapse cylinders on the D-pivot section are extended.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual crane configuration.
- The LICCON overload protection is exceeded.
- The assembly icon **11** is visible on the LICCON monitor.
- No personnel is within the danger zone.



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Fig.111673

2.13.1 Extending the D-relapse cylinder



WARNING

Mortal danger due to the D-boom!

If the D-relapse cylinders are not extended before erecting the D-boom, then the D-boom can fall backward!

Personnel can be severely injured or killed!

- ▶ The D-relapse cylinders must be extended before erection of the D-boom!
- ▶ The ball valve must be secured during crane operation to prevent unintended actuation!

The piston rod on the D-relapse cylinder must be extended by actuating the ball valve **28**.

Ball valve positions	
Horizontal	Crane operation, extend the piston rod
Vertical	Assembly, retract the piston rod
45°	STOP (the piston rod cannot be retracted / extended)

Make sure that the following prerequisite is met:

- All hydraulic connections have been made.
- ▶ Move the ball valve **28** into horizontal position.

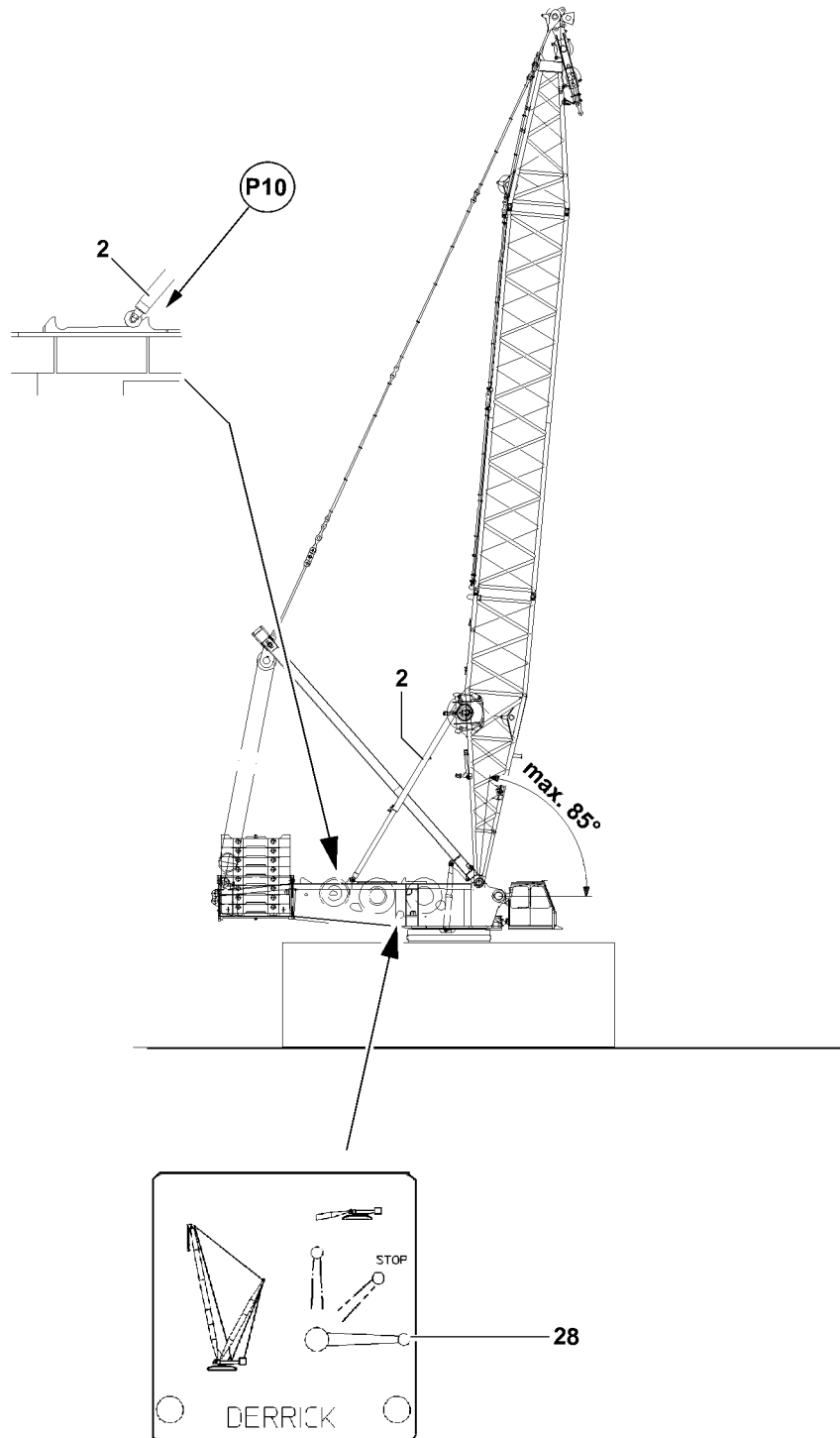
Result:

- The piston rods of the D-relapse cylinders **2** extend.



Note

- ▶ The ball valve is secured by closing the cabinet door and removing the key!
- ▶ Close the cabinet door and pull the key.
- ▶ Hand the key to an authorized person.



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Fig.111667

2.13.2 Erection procedure

Make sure that the following prerequisites are met:

- The D-relapse cylinders **2** are fully extended before erection.
- The control rope of winch 3 is properly reeved on the pulley block and properly secured on the rope fixed point.
- The pins between the upper pulley block and the lower pulley block are unpinned.



Note

- ▶ During the erection procedure it must be ensured that the D-relapse cylinders **2** engage past the first stop (point **10**) into the second rail on the D-relapse retainer!
-



DANGER

The crane can topple over!

- ▶ It is not permitted to turn the crane superstructure during erection procedure!
 - ▶ Do not allow slack cable to build up on the winch 3!
 - ▶ Do not erect the D-boom further than maximum 85° to the horizontal!
-
- ▶ Actuate winch 4 and erect the D-boom to an angle range of 75° to 85°.

Fig.195219

LWE/LR 1750-000/12812-15-02/en

3 Disassembly



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited!



WARNING

Falling components!

If unsecured or non-supported components are installed or removed, they can fall down! Personnel can be severely injured or killed!

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Support the boom and components before pinning / unpinning!
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ Do not disengage the auxiliary crane until each component is pinned on and secured!
- ▶ It is prohibited to lean a ladder against the component being disassembled!



WARNING

Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

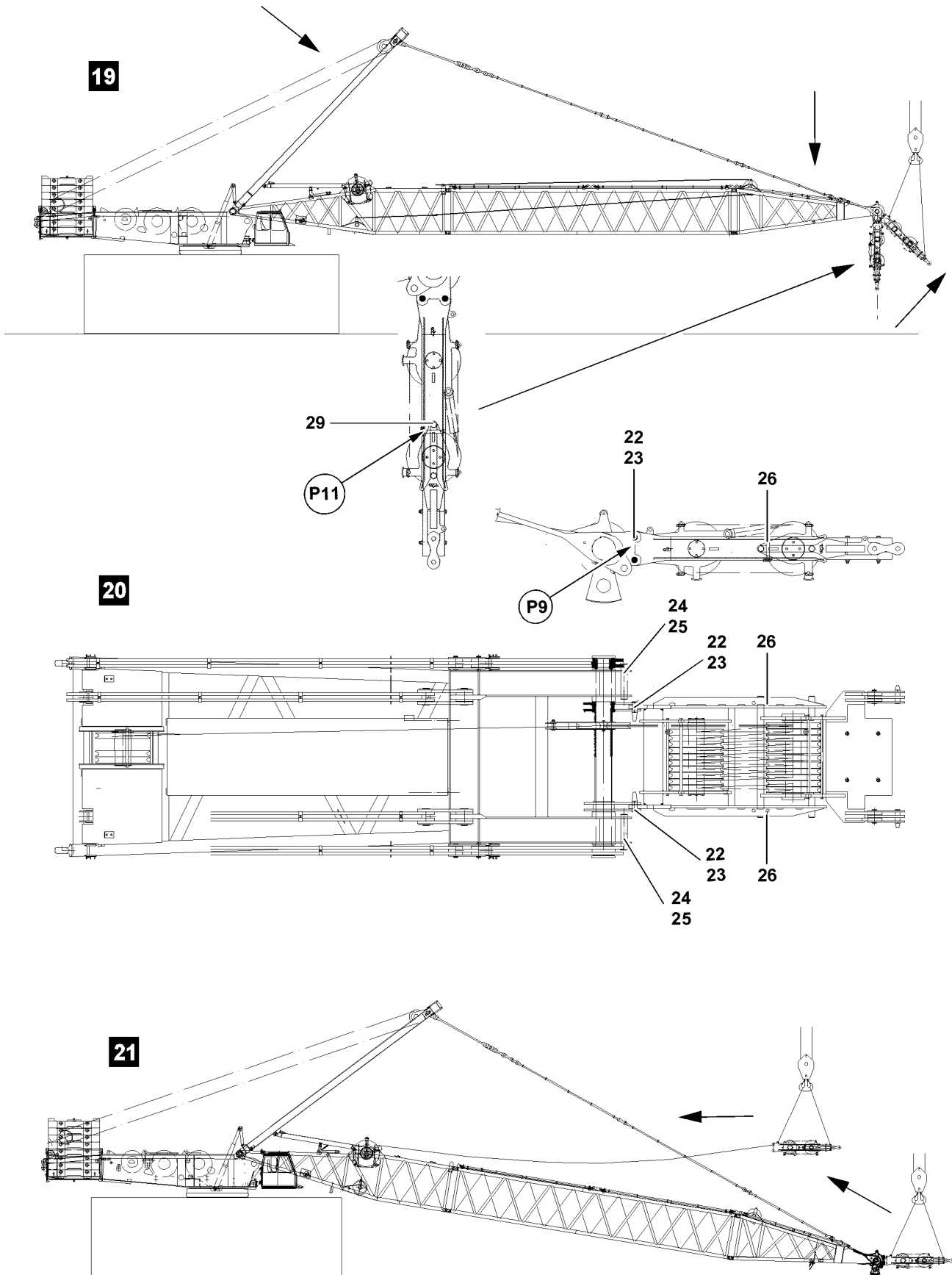


Fig.111668

LWE/LR 1750-000/12812-15-02/en

3.1 Disassembling the D-boom



WARNING

Falling boom!

If the D-boom is not properly supported before disassembly or held with an auxiliary crane, then the D-boom can fall down when it is unpinned!

Personnel can be severely injured or killed!

- ▶ Before supporting the D-boom, the ground condition must be checked regarding load bearing capability and level!

If the ground condition is not classified as sufficient:

- ▶ Support the D-boom properly and safely with suitable material!

3.1.1 Luffing the D-boom down

NOTICE

Damage to the pulley block!

If the D-boom is luffed down too quickly „to the front“, significant damage can occur on the pulley block and on the D-end section!

- ▶ Luff the D-boom down carefully to the front!
- ▶ Luff the D-boom down to the front until the pulley block is just above the ground.

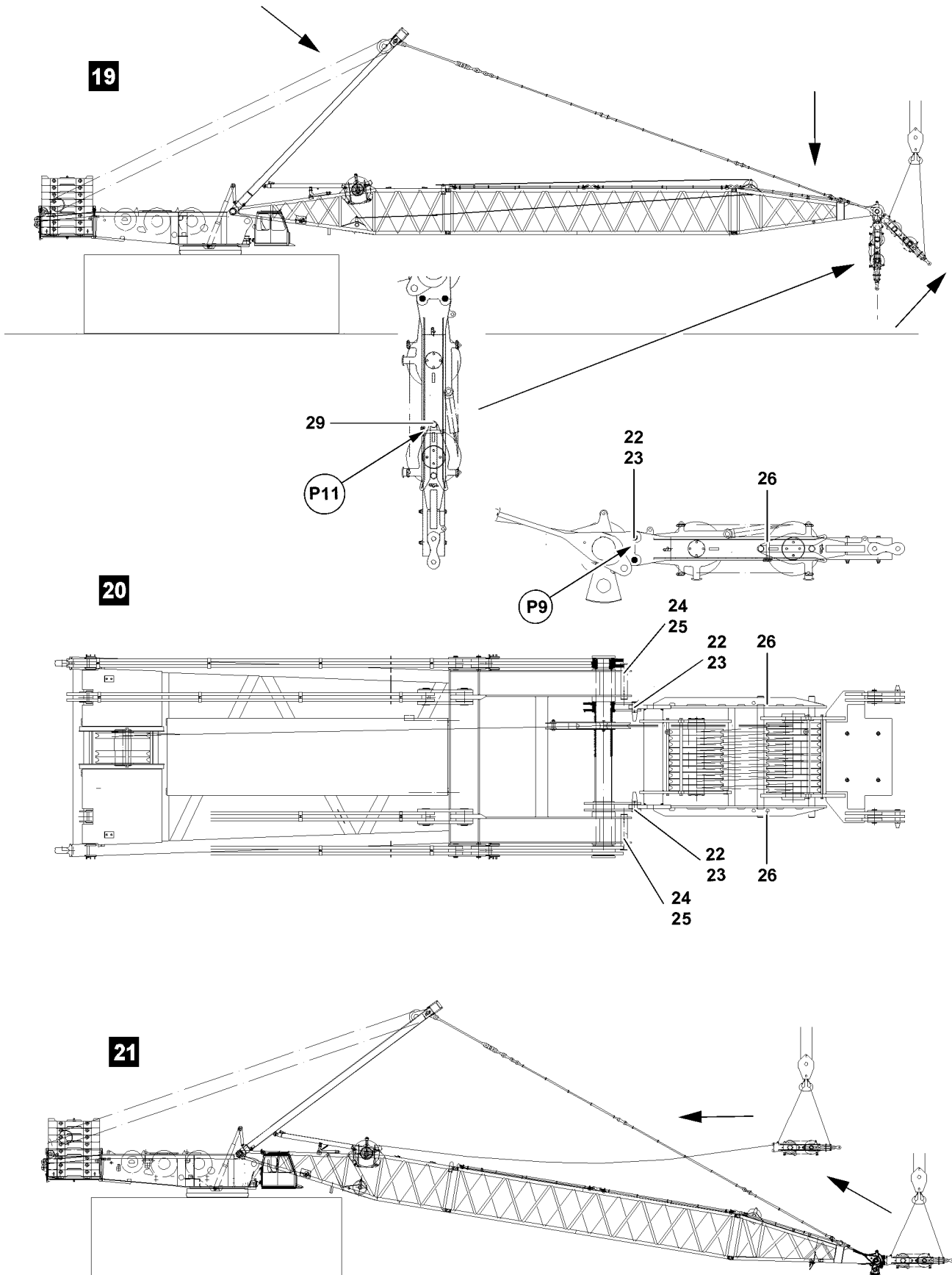


Fig.111668

LWE/LR 1750-000/12812-15-02/en

3.1.2 Pinning the upper pulley block with the lower pulley block

Make sure that the following prerequisites are met:

- The main boom is completely disassembled.
- The upper pulley block hangs in reeved condition above the ground level.
- The pins **26** on the bracket of the lower pulley block are unpinned.

The upper pulley block must be pinned with the lower pulley block before the complete pulley block can be placed in the transport receptacle on the D-pivot section.

- ▶ Luff the D-boom down slowly and spool up winch 3 at the same time until the upper pulley block has moved together with the lower pulley block.

When the upper pulley block is approx. 150 mm before the stop of the lower pulley block:

- ▶ Luff the D-boom down slowly and carefully until the upper pulley block is in contact with the ground.

NOTICE

Danger of property damage on the pulley block!

If the D-boom is luffed down too quickly, then significant property damage can occur on the upper as well as the lower pulley block!

- ▶ Always use a guide when connecting the upper and lower pulley block!
 - ▶ Carry out all crane movements slowly and with utmost caution!
 - ▶ When the guide pin **29** reaches the stop at point **11**, stop the luff down movement of the D-boom immediately!
-

When the upper pulley block is in contact with the ground:

- ▶ Luff the D-boom down slowly and carefully until the guide pin **29** is entered to the stop at point **11**.

When the guide pin touches on the stop, point **11**, of the lower pulley block:

- ▶ Stop the luff down movement immediately.
- ▶ Pin the pins **26** on both sides on the bracket of the lower pulley block and secure with spring retainer.

Result:

- The upper pulley block is connected with the lower pulley block and now forms the „Transport unit“ pulley block.

3.1.3 Disassembling the pulley block

- ▶ Pull the pulley block up with the auxiliary crane, see illustration **19**.
- ▶ Luff the derrick down until the D-end section is laying on the ground, see illustration **21**.



Note

The pulley block can be fastened on both sides horizontally on the D-end section with the pin **24**!

- ▶ Insert the pins **24** on both sides and secure with spring retainers **25**!
 - ▶ When the pulley block is fastened, it must be hung again on the auxiliary crane before unpinning!
 - ▶ Remove spring retainers **25** and unpin the pins **24** on both sides!
-

Remove the pulley block from the D-end section:

- ▶ Remove the spring retainers **22** and unpin the pins **24** on both sides.
- ▶ Swing the pulley block out with the auxiliary crane.

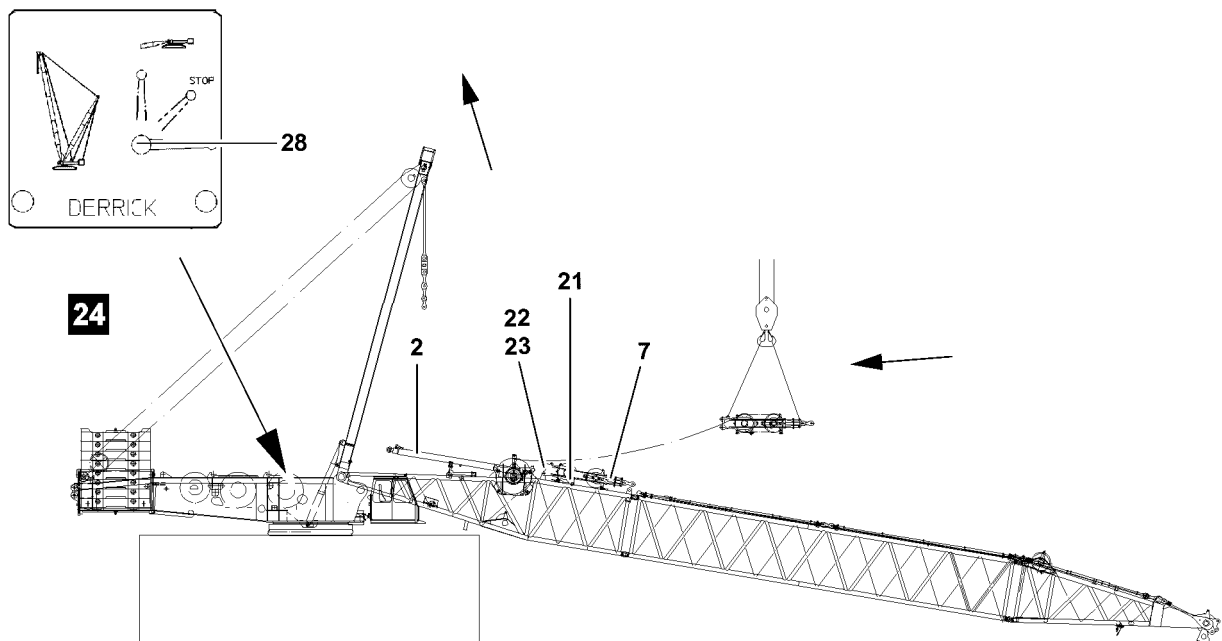
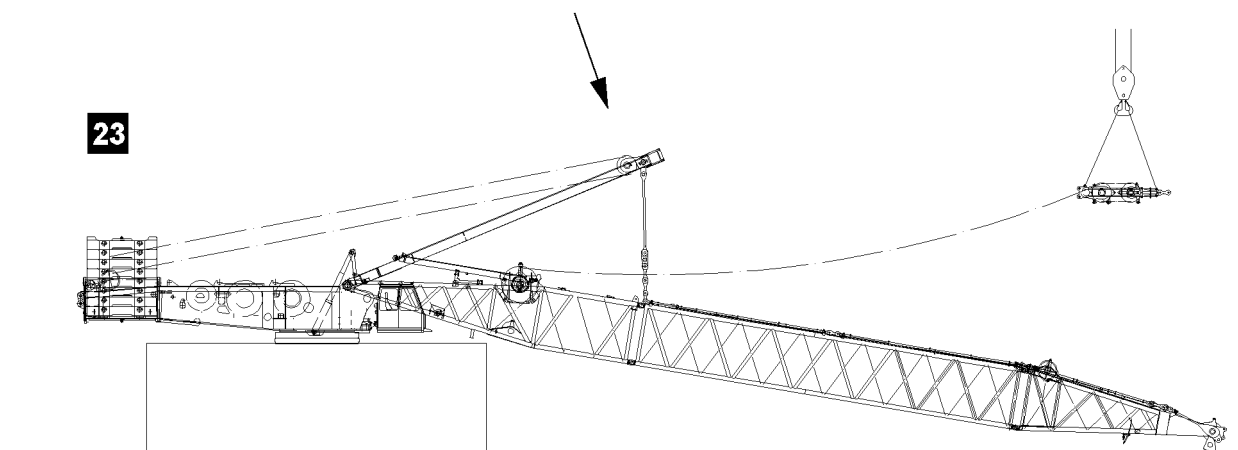
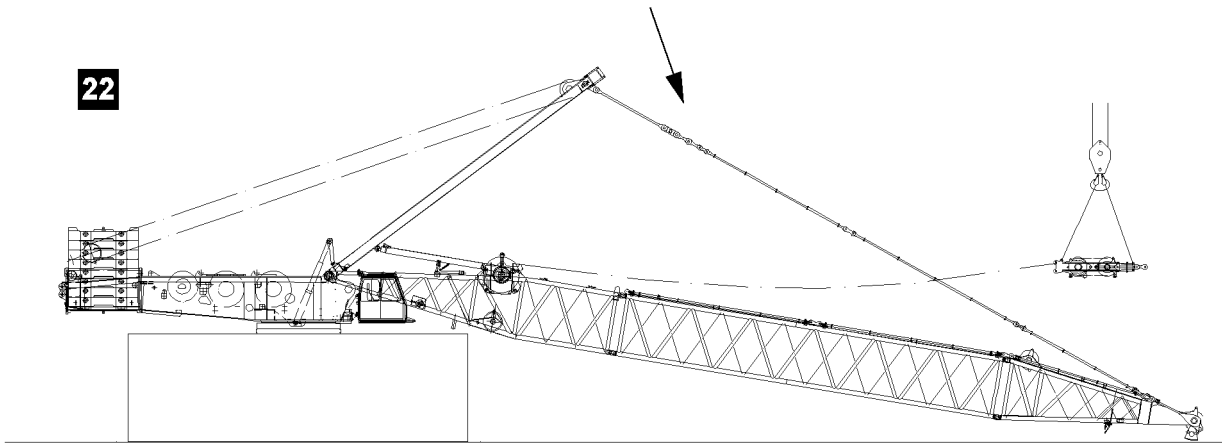


Fig.111669

LWE/LR 1750-000/12812-15-02/en

3.1.4 Disassembling the D-guy rods

- ▶ Place the guy rods into the transport retainers of the D-intermediate sections: Lower the SA-bracket to the front.
- ▶ Luff the SA-bracket forward until it can be unpinned on the guy rods, see illustration **23**.
- ▶ Pin and secure the guy rods in the transport retainers.
- ▶ Luff the SA-bracket for easier assembly of the pulley blocks on the D-pivot section, see illustration **24**.

3.1.5 Placing the pulley block into the transport retainer on the D-pivot section

Make sure that the following prerequisites are met:

- The lower and the upper pulley block are pinned together as a "Transport unit" pulley block.
- The rope retaining pins on the D-end section are released and unpinned.
- The guy rods are placed in the transport retainers and secured.
- The SA-bracket is luffed up to approx. 75° to 85°.
- The D-boom is lying fully on the ground (on the support).

NOTICE

Danger of slack rope formation!

If winch 3 is spooled up too slowly when pulling the pulley block, slack rope can form!

- ▶ The hoist rope must be slightly tensioned during the entire pulling procedure!
-

- ▶ Pull the pulley block **7** with the auxiliary crane to the D-pivot section while spooling out winch 3 at the same time.
- ▶ Place the pulley block into the transport retainer **21** on the D-pivot section, see illustration **24**.

Secure the pulley block in the transport retainer:

- ▶ Insert the pin **22** and secure with spring retainer **23**.

3.1.6 Retracting the D-relapse cylinder

The piston rod on the D-relapse cylinder must be retracted by actuating the ball valve **28**.

- ▶ Move the ball valve **28** into vertical position.

Result:

- The piston rod of the D-relapse cylinder retracts.

Fig.195219

LWE/LR 1750-000/12812-15-02/en

3.1.7 Disconnecting the electrical connections

- ▶ Disconnect all electrical connections on the D-boom properly and store the plug and cable properly.

3.1.8 Disconnecting the hydraulic connections

When releasing hydraulic lines with quick-release couplings, make sure that the uncoupling procedure is carried out correctly.



WARNING

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!

Personnel can be severely injured or killed!

- ▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!
-
- ▶ Release the hydraulic coupling by hand.
 - ▶ Disconnect the hydraulic connection.

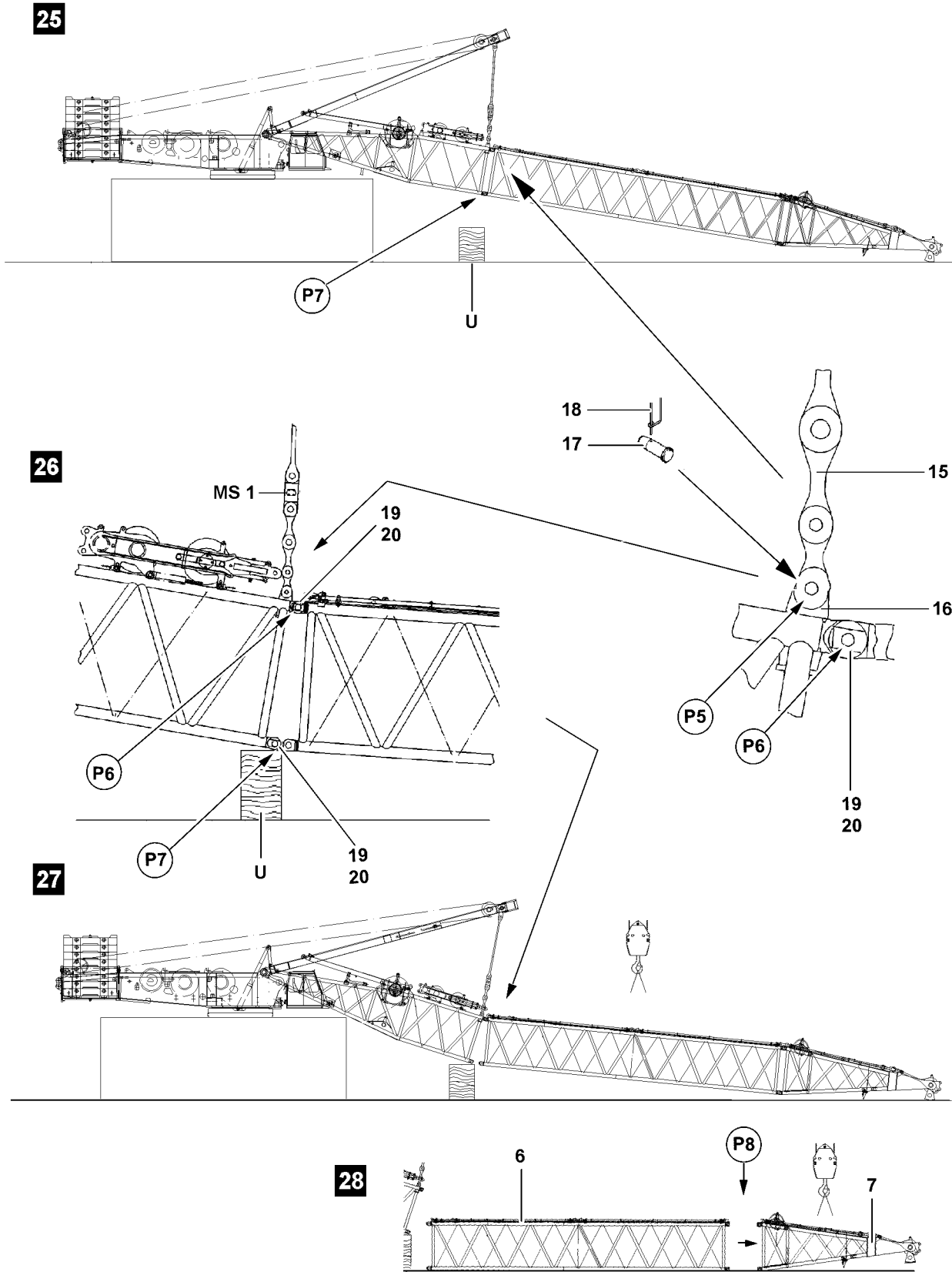


Fig.111670

3.1.9 „Open“ the D-boom and place it down

Make sure that the following prerequisites are met:

- The guy rods are placed in the transport retainers and secured.
- The pulley block is pinned and secured in the transport retainer.
- The D-relapse cylinders are retracted.
- The support **U** is positioned under the D-pivot section.

▶ Luff the SA-bracket down to the front, see Crane operating instructions, chapter 5.02.

Connect the guy rods **15** from the SA-bracket on the assembly bracket **16** on the D-pivot section, point **P5**:

- ▶ Insert the pin **17** and secure with spring retainer **18**.
- ▶ Luff the SA-bracket up until the guying between the SA-bracket and the D-pivot section is tensioned.



WARNING

Falling D-boom!

When unpinning the D-boom on the D-pivot section, the D-boom can fall down!

Personnel can be severely injured or killed!

- ▶ It is prohibited for anyone to remain under the D-boom during the unpinning procedure!
- ▶ Make sure that the D-boom is safely held by the guying!

- ▶ Unpin the D-pivot section and the D-intermediate section: Release and unpin the pins **19** on both sides „on the bottom“.
- ▶ Luff the SA-bracket down and place the D-pivot section carefully on the support **U**, see illustration **26**.
- ▶ Fasten the D-boom on the auxiliary crane.

When the D-boom is safely held by the auxiliary crane:

- ▶ Release and unpin the pins **19** on both sides „on top“.
- ▶ Place the D-boom carefully on the ground, see illustration **28**.



WARNING

Tipping lattice sections!

When the lattice sections are unpinned, they can tip over, depending on the ground or the support!

Personnel can be severely injured or killed!

- ▶ The lattice sections must be safely held by the auxiliary crane before unpinning them!
- ▶ The tackle must be tensioned before unpinning!

- ▶ Disassemble the D-end section and the D-intermediate section, point **P8**, see illustration **28**.

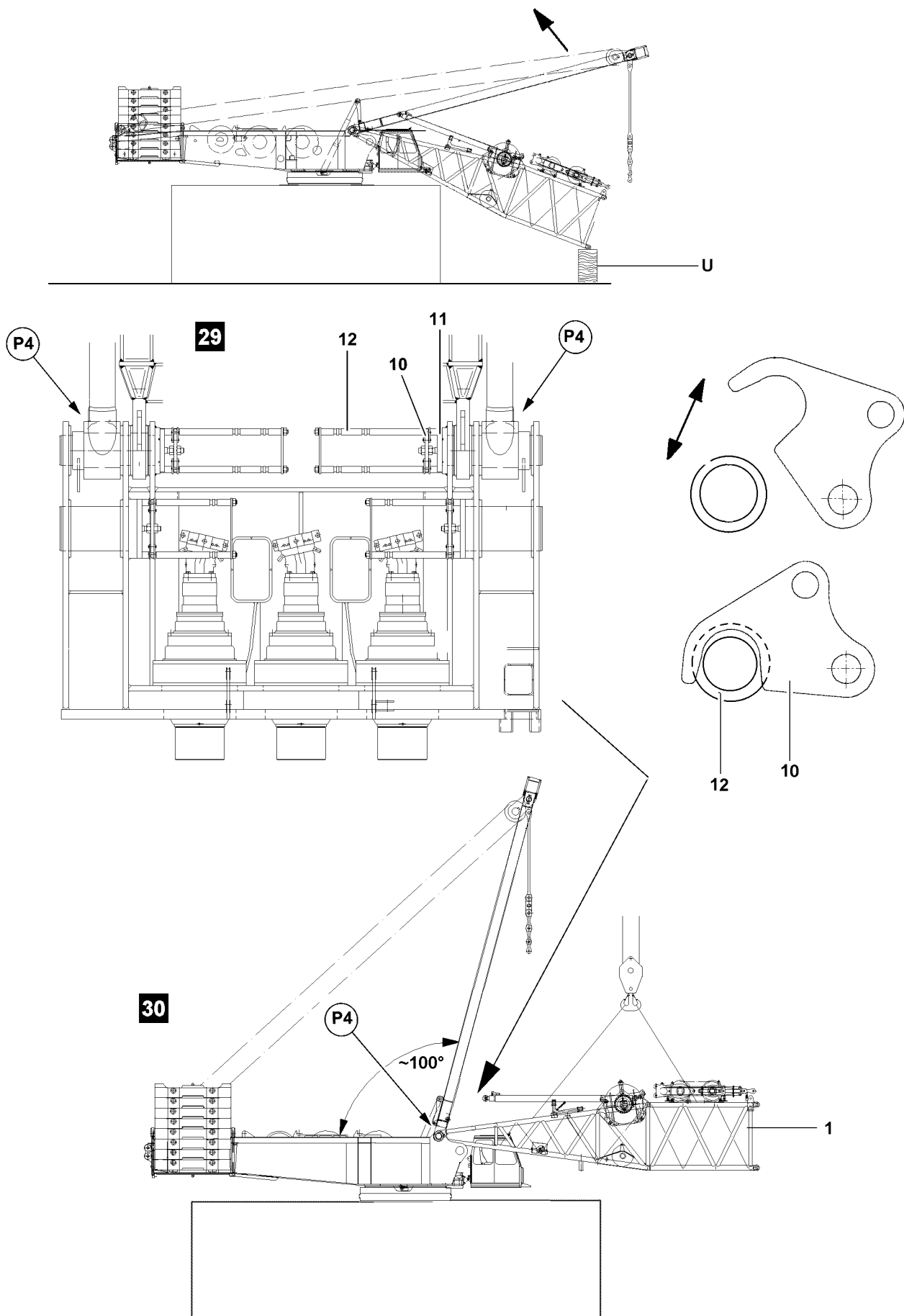


Fig.111671

LWE/LR 1750-000/12812-15-02/en

3.1.10 Unpinning the D-pivot section

Make sure that the following prerequisite is met:

- The SA-bracket is erected to approx. 100°.
- ▶ Fasten the D-pivot section on the fastening points on the auxiliary crane, see illustration **30**.
- ▶ Pull the D-pivot section up with the auxiliary crane to the horizontal.
- ▶ Open both retaining hooks **10** from the guide **12**.



Note

- ▶ Operation of radio remote control (only available for the LR-crane), see Crane operating instructions, chapter 6.08!

-
- ▶ Actuate the radio remote control and unpin the pin **11**.
 - ▶ Secure the pins **11** by folding the retaining hooks **10** into the guide **12**.
 - ▶ Carefully swing the D-pivot section out from the turntable with the auxiliary crane and place it on the ground!
 - ▶ Remove the auxiliary crane!

3.2 Disassembling the fall protection equipment on the D-pivot section



Note

- ▶ To retain the transport dimensions on the D-pivot section, remove the fall protection equipment!

The railings must be removed after disassembly of the D-pivot section and stored in the transport retainer.

- ▶ Insert the railings in the intended transport retainers on the D-pivot section and secure with spring retainers.

3.3 Disassembling the fall protection equipment on the D-boom



Note

- ▶ Observe the notes, see Crane operating instructions, chapter 2.06 and / or chapter 6.50!
-

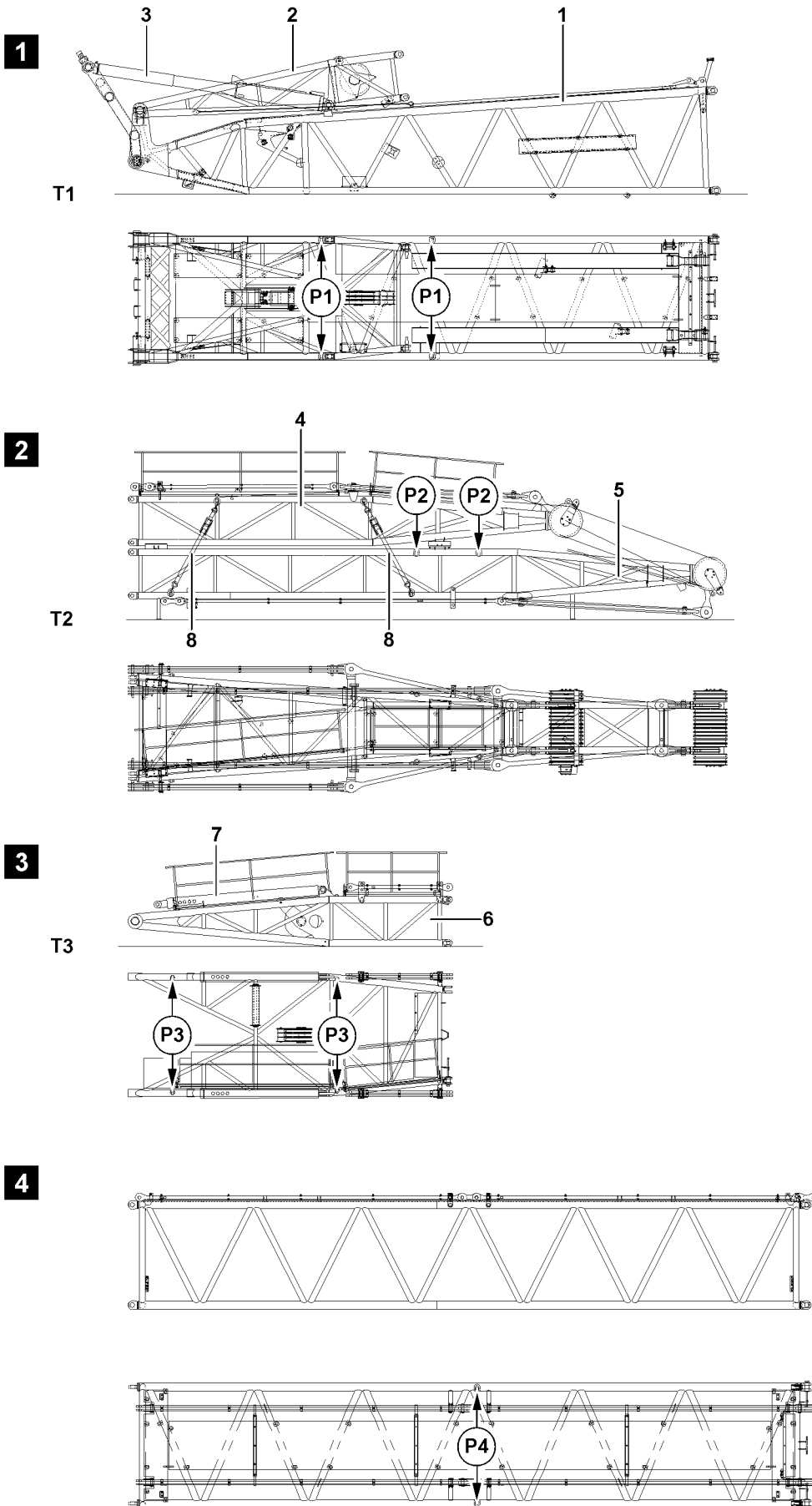


Fig.111632

LWE/LR 1750-000/12812-15-02/en

1 Component overview W-boom system

The transport unit **T1** consists of:

- 1 W-pivot section
- 2 WA-bracket 1, pivot section
- 3 W-relapse retainer

The transport unit **T2** consists of:

- 4 WA-bracket 2, end section
- 5 WA-bracket 1, end section
- 8 Lashing belts

The transport unit **T3** consists of:

- 6 WA-bracket 2, pivot section
- 7 Relapse support

2 Weights W-transport units

Position	Component	Weight
T1	Transport unit 1	10.6 t
T2	Transport unit 2	8.4 t
T3	Transport unit 3	2.2 t

3 Fastening points components W-system

Fastening points	
P1	For transport unit 1, see illustration 1
P2	For transport unit 2, see illustration 2
P3	For transport unit 3, see illustration 3
P4	LI-intermediate section, see illustration 4

Fig.195219

LWE/LR 1750-000/12812-15-02/en

4 Assembling the W-boom system



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling! If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited!



WARNING

The lattice sections can fall down!

If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel!

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right!**
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom!
- ▶ Secure the pins in the bearing points and the receptacles!
- ▶ It is prohibited to lean the ladder against the components being disassembled!
- ▶ Do not remove the fastening equipment and the auxiliary crane until each component is pinned on and secured!



WARNING

Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be caught and severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

Fig.195219

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Neglected inspection and maintenance on guy rods!

If the regular inspection and maintenance of the guy rods is not carried out or is carried out only in irregular intervals, then severe accidents can occur due to existing and unrecognized damage to the guy rods!

Personnel can be severely injured or killed!

- ▶ Check the guy rods before every assembly, see Crane operating instructions, chapter 8.15!

NOTICE

Property damage!

- ▶ Always insert the pins of the guy rods from the „inside“ to the „outside“!

**Note**

- ▶ By supporting the components during assembly / disassembly, ground unevenness is compensated for and the material is protected.
- ▶ The W-intermediate sections are pinned and unpinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30!

**Note**

- ▶ Assembly of boom combinations, see rod plans!
- ▶ Assembly and retention of S-guy rods, see rod plans! The numbering on the rod plans must be identical to the numbering on the guy rods!

The W-boom system can be assembled on the following basic configurations:

- S-operation
- SDB-operation

Make sure that the following prerequisites are met:

- The crane is aligned in horizontal direction.
- An assembly scaffolding / work platform is available.
- The S-boom is assembled.
- The derrick boom and derrick ballast are assembled.
- The counterweight is installed on the turntable and on the derrick according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual crane configuration.
- An auxiliary crane is available.

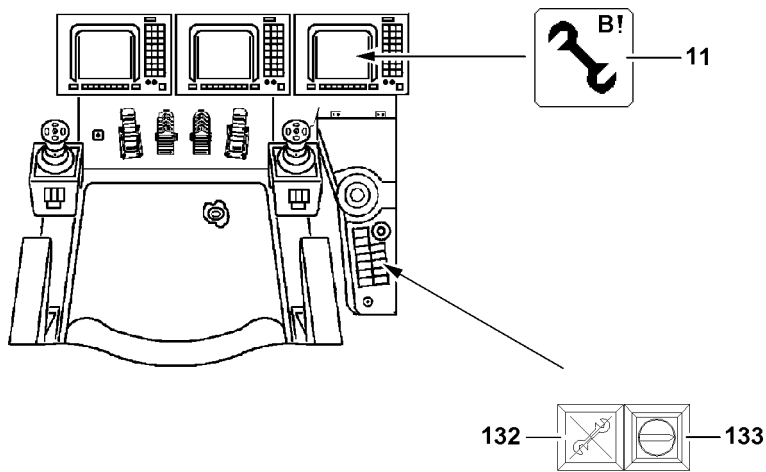


Fig.112201

LWE/LR 1750-000/12812-15-02/en

4.1 Adding the operating mode „Assembly“



WARNING

Risk of fatal injury at crane operation with turned on assembly key button!

If the assembly key button is turned on, the hoist limit switch and the LICCON overload protection is bypassed!

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be killed!

This could result in high property damage!

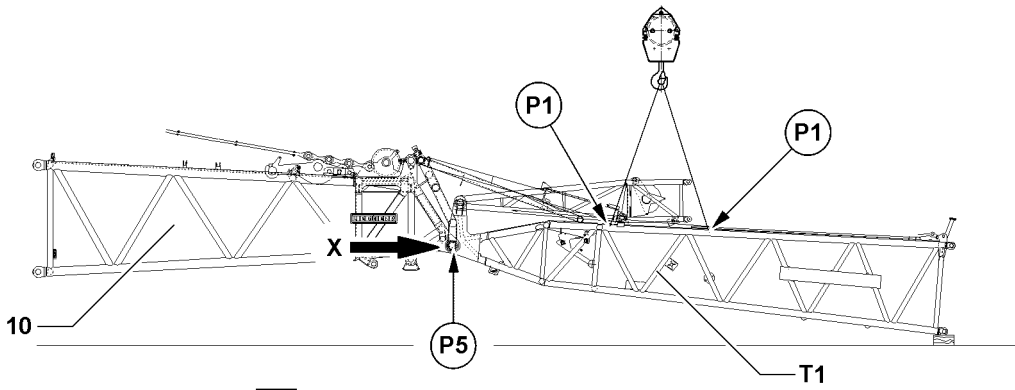
- ▶ The actuation of the assembly key button **133** is only permitted for assembly tasks!
 - ▶ The assembly key button **133** may only be operated by persons who are aware of the consequences of a bypass!
 - ▶ Crane operation with the assembly key button **133** turned on is strictly prohibited!
 - ▶ The assembly key button **133** must be removed immediately after carrying out the assembly work and handed to an authorized person!
-

- ▶ Actuate the assembly key button **133**.

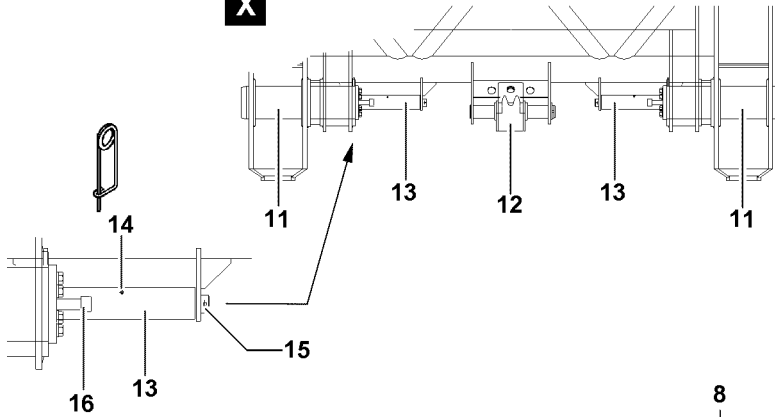
Result:

- The LICCON overload protection is bypassed.
- The indicator light **132** in the button lights up.
- The assembly icon **11** appears on the LICCON monitor.

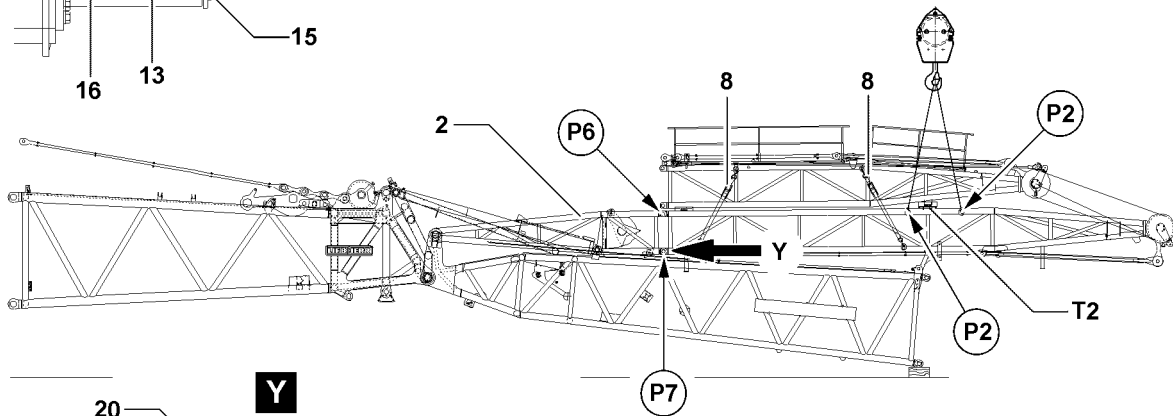
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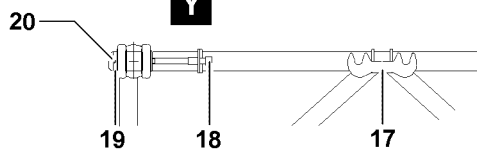
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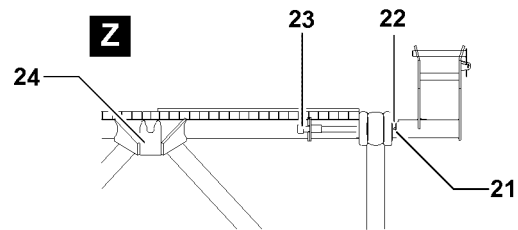
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Y



Z



3

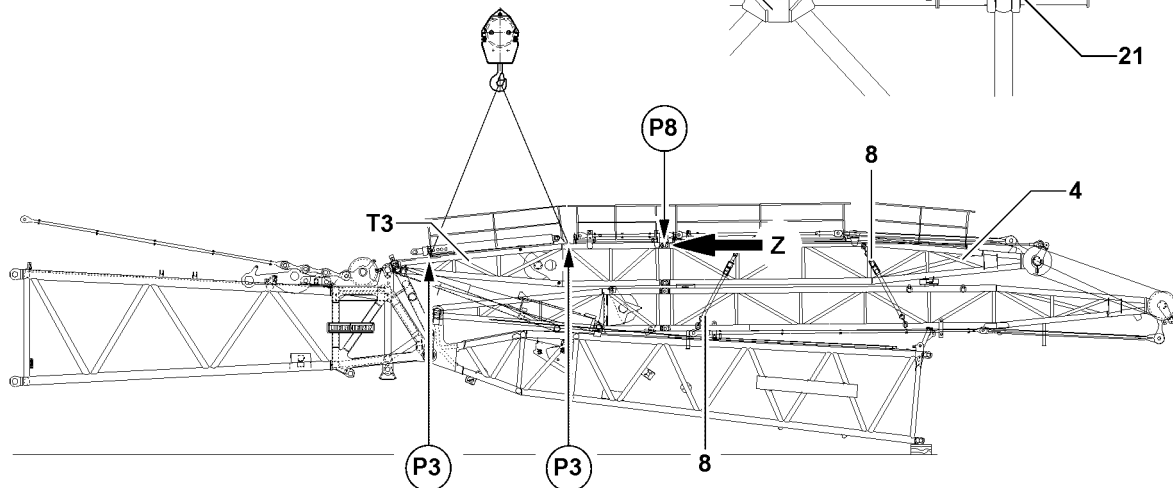


Fig.111634

LWE/LR 1750-000/12812-15-02/en

4.2 Assembling the W-transport units

4.2.1 Assembling the W-transport unit 1

See illustration 1

- ▶ Attach the auxiliary crane on the fastening points **P1** on the transport unit **T1**.
- ▶ Remove the retaining plate **13**: Remove the spring retainer **14** and pull the retaining plate **13** from the pin.

Result:

- The pin **11** can be pinned.



Note

- ▶ The retainer **12** can be offset to the left or right when the piston stroke of the pin pulling cylinder is not sufficient to pin or unpin the pin **11** completely!
- ▶ Hang the pin pulling cylinder on the retainer **12** and screw **16**, see detail **X**.
- ▶ Pin the transport unit **T1** on the S-end section **10**: Insert the pins **11** on both sides on point **P5**.
- ▶ Secure the pins **11**: Slide the retaining plate **13** over the pin **15** and secure with spring retainer **14**.

4.2.2 Assembling the W-transport unit 2

See illustration 2

Make sure that the following prerequisite is met:

- The lashing belts **8** are tightly rigged on transport unit 2.



WARNING

Slipping component!

If the lashing belts are not present or insufficiently secured while raising the transport unit 2, the end section of the WA-bracket 2 can slide down. Personnel can be severely injured or killed!

- ▶ Make sure that the lashing belts **8** on the transport unit **T2** are tightly secured!
- ▶ Attach the auxiliary crane on the fastening points **P2** on the transport unit **T2**.
- ▶ Hang the pin pulling cylinder on the retainer **17** and screw **18**, see detail **Y**.
- ▶ Pin the transport unit **T2** on the WA-bracket 1 pivot section **2** „on top“: Insert the pin **19** on both sides on points **P6** and secure with spring retainer **20**.
- ▶ Pin the transport unit **T2** on the WA-bracket 1 pivot section **2** „on the bottom“.

4.2.3 Assembling the W-transport unit 3

See illustration 3

- ▶ Attach the auxiliary crane on the fastening points **P3** on the transport unit **T3**.
- ▶ Hang the pin pulling cylinder on the retainer **24** and screw **23**, see detail **Z**.
- ▶ Pin the transport unit **T3** on the WA-bracket 2 end section **4**: Insert the pin **22** on both sides at point **P8** and secure with spring retainer **21**.
- ▶ Remove lashing belts **8** on the transport unit **T2**.

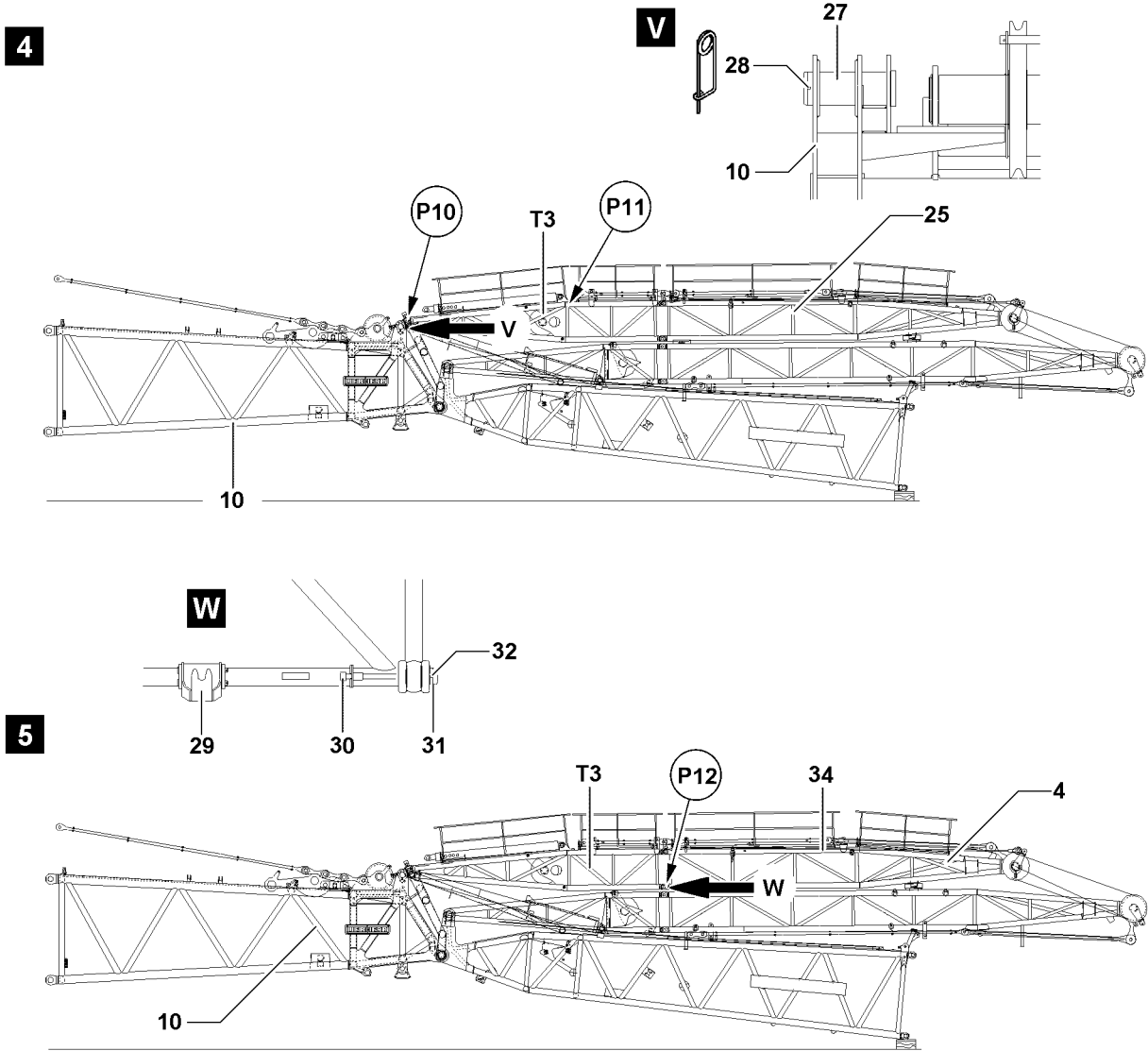


Fig.111635

LWE/LR 1750-000/12812-15-02/en

4.2.4 Pinning the W-transport units together

Ensure that the following prerequisite is met:

- The pins **33** are released, see detail **V**.

See illustration **4**

- ▶ Attach the auxiliary crane on the fastening points **P11** on the transport unit **T3**.

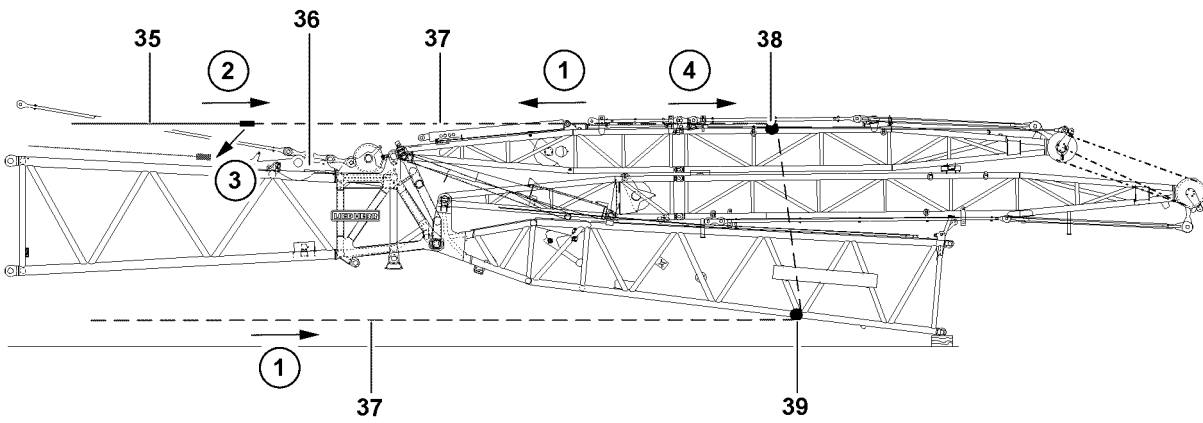
The pinning position between the transport unit and the S-end section is established by:

- Luffing the S-boom up or down.
- Positioning of the WA-bracket 2 **25** with the auxiliary crane.
- ▶ Position the WA-Bock 2 **25** until the pin points **P10** align.
- ▶ Pin the transport unit **T3** on the S-end section **10**: Insert the pin **27** on both sides at point **P10** and secure with spring retainer **28**.

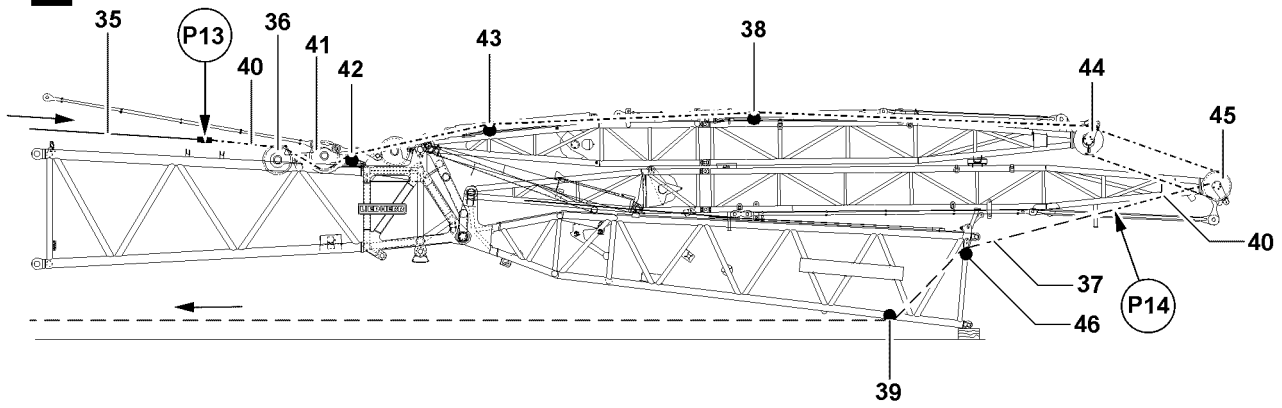
See illustration **5**

- ▶ Lift the transport unit **T3** with auxiliary crane until the pin points **P12** align.
- ▶ Hang the pin pulling cylinder on the retainer **29** and on the screw **30**.
- ▶ Pin the transport unit **T3** on the WA-bracket 2 end section **4**: Insert the pin **31** on both sides at point **P12** and secure with spring retainer **32**.

6



7



8

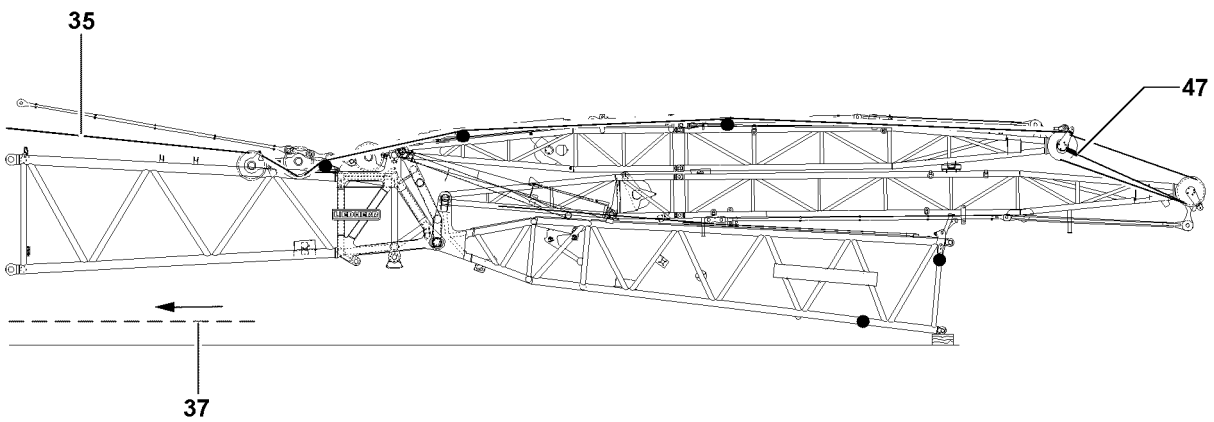


Fig.111982

LWE/LR 1750-000/12812-15-02/en

4.3 Reeving the W-control rope in

NOTICE

Slack rope formation!

The control rope can become damaged due to slack rope formation.

- ▶ Make sure that the rope does not slacken up when spooling the W-control rope out!
- ▶ Make sure that the W-control rope remains tensioned when spooling out!



Note

- ▶ Reeving, see reeving plan!

4.3.1 Getting the W-control rope with the assembly rope

Rope run for the assembly rope **37**, see illustration **6**.

- ▶ Pull the assembly rope **37** for the assembly winch over the roller **39** and the roller **38** up to winch **5**, action step **1**.
- ▶ Connect the assembly rope **37** with the W-control rope **35** from winch **5**.
- ▶ Pull the W-control rope **35** up to the rope pulley **36** on the S-boom: Spool the assembly winch up and simultaneously spool winch **5** out, action step **2**.
- ▶ Separate the W-control rope **35** from the assembly rope **37** and lay it down in front of the rope pulley **36**, action step **3**.
- ▶ Pull the assembly rope **37** back up to the roller **39** and lay on the ground, action step **4**.

4.3.2 Reeving the W-control rope in

Make sure that the following prerequisites are met:

- The intake ropes are interconnected on the WA-bracket **2**.
- The intake role is reeved in on the W-roller sets.



Note

- ▶ Before reeving in the W-control rope, the rope retaining pins of the rope pulley **42**, pulley set **44** and pullet set **45** must be released and unpinned!



Note

- ▶ For simplify the reeving, the W-pulley sets are raised with an auxiliary crane!

Rope run for the intake rope **40** and the assembly rope **37**, see illustration **7**.

- ▶ Connect the W-control rope **35** and the intake rope **40** on point **P13**.
- ▶ Lay the intake rope **40** on the rope pulley **36** and the under the rope pulley **41**.
- ▶ Pull the assembly rope **37** over the roller **46** to the point **P14**.
- ▶ Connect the assembly rope **37** and the intake rope **40** on point **P14**.

See illustration **8**

- ▶ Pull the W-control rope **35** in and hook it on the rope fixed point **47**.
- ▶ Spool the assembly rope **37** on the assembly winch.

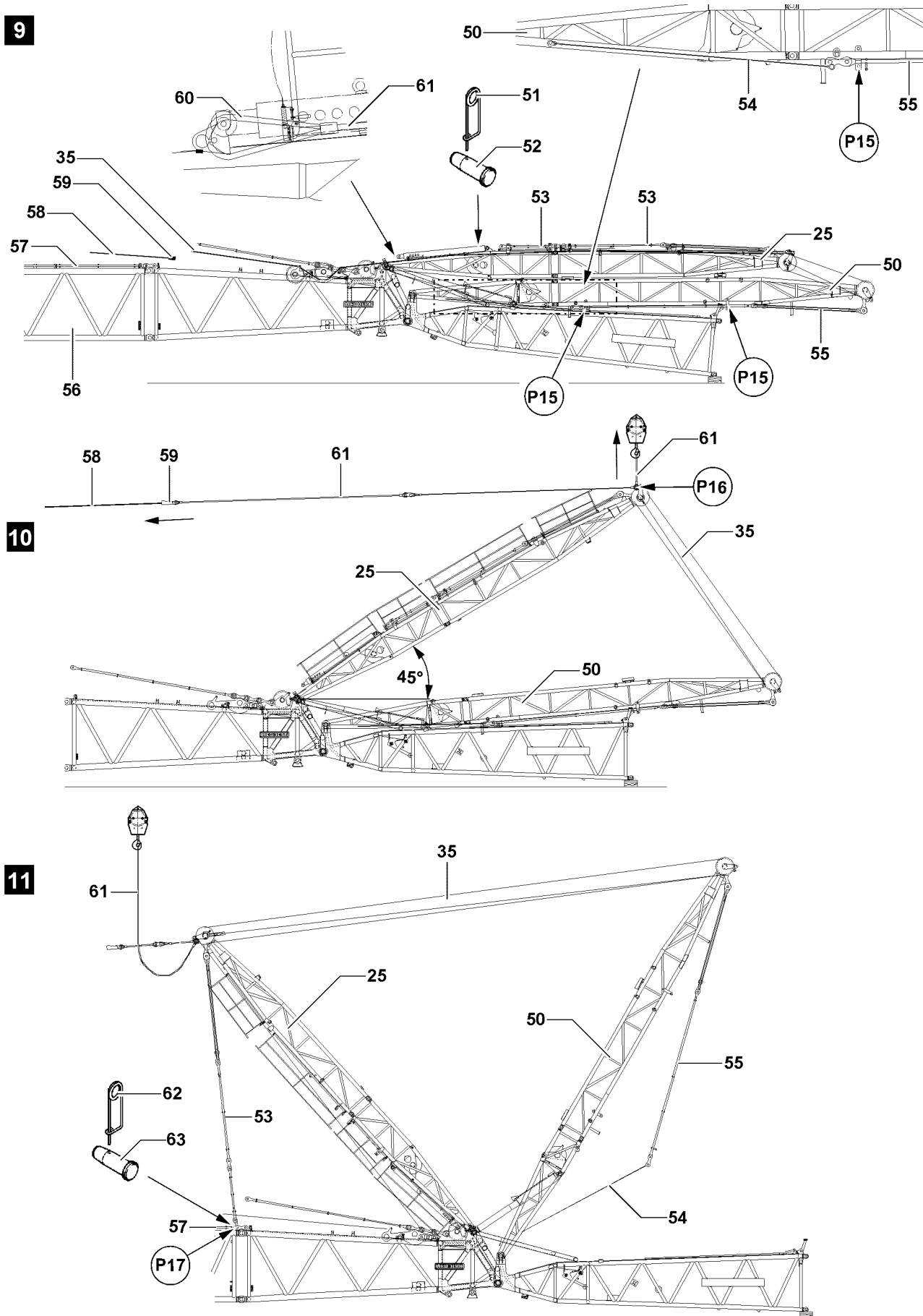


Fig.111983

LWE/LR 1750-000/12812-15-02/en

4.4 Assembling the guy rods WA-bracket 2

NOTICE

Property damage!

- ▶ Always insert the pins of the guy rods from the „inside“ to the „outside“!

Make sure that the following prerequisite is met:

- The WA-bracket 2 **25** is lying on the WA-bracket 1 **50**.



Note

- ▶ Additional guy rods for certain operating modes, see Rod plan!

Fastened on the pulley set on point **P16**, see illustration **10**, are the two ropes **61**:

- The first rope is used to lift the WA-bracket 2 **25** with the auxiliary crane.
- The second rope is used to erect the WA-bracket 2 **25** with the hoist rope **58**.

See illustration **9**

- ▶ Release and unpin transport retainers of the W-guy rods **57** on the S-lattice sections **56** on both sides.

If required according to the rod plan:

- ▶ Pin and secure the additionally required guy rods.
- ▶ Release and unpin the transport retainers for the W-guy rods **53** on the WA-bracket 2 **25** on both sides.
- ▶ Pin the W-guy rods **53** on the WA-bracket 2 **25** together: Insert the pin **52** on both sides from the „inside“ to the „outside“ and secure with spring retainer **51**.
- ▶ Hook the lock **59** on the first rope **61** and secure.
- ▶ Make sure that the two parts of the ropes **61** are connected to each other and that they are secured.
- ▶ Hang the hoist rope **58** in the lock **59** on the rope **61** and secure.

Result:

- The WA-bracket 2 is connected with the hoist rope.
- ▶ Ensure that the WA-bracket 1 **50** and the guy rods **55** are secured with the assembly ropes **54**, see illustration **11**.
- ▶ Release and unpin the transport retainers on the guy rods **55** on point **P15**.

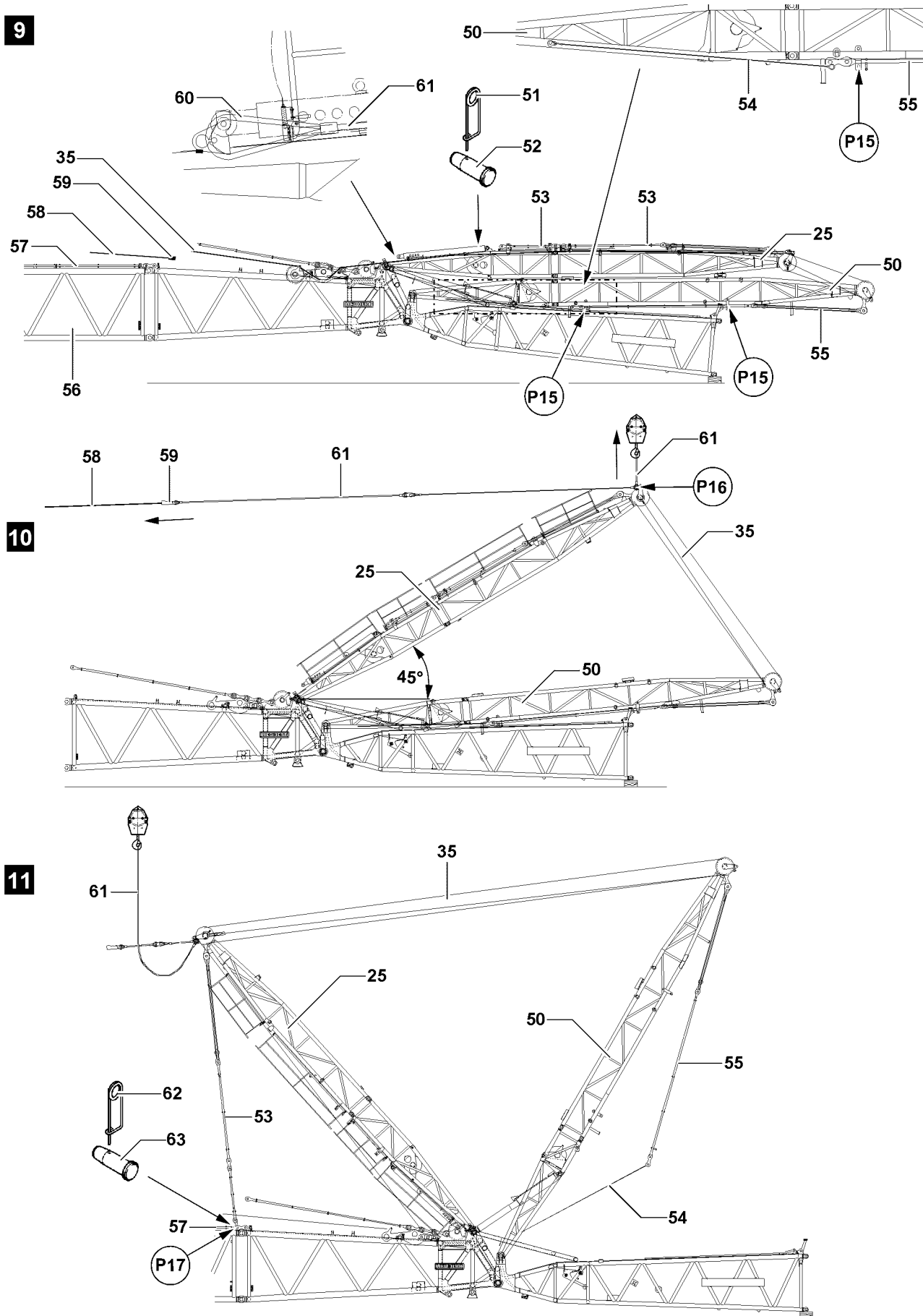


Fig.111983

LWE/LR 1750-000/12812-15-02/en

See illustration **10**



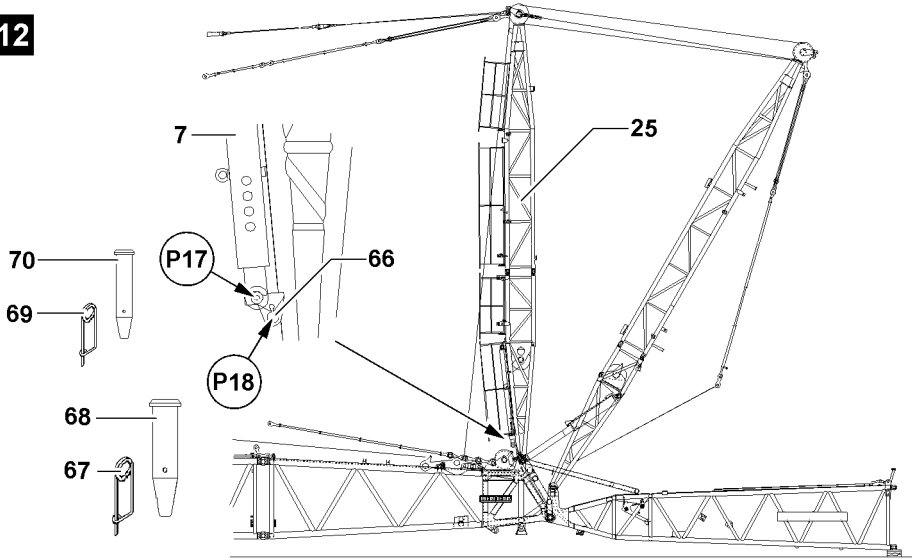
Note

- ▶ While spooling out the W-control rope, the WA-bracket 1 **50** is lifted up with the auxiliary crane in order to prevent slack rope formation!
-
- ▶ Fasten the second rope **61**, which is attached on point **P16** onto the auxiliary crane.
 - ▶ Spool out the W-control rope **35** and simultaneously lift the WA-bracket 2 **25** with auxiliary crane to approximately 45°.
 - ▶ Tension the hoist rope **58** until the WA-bracket 2 **25** is held by the hoist rope.

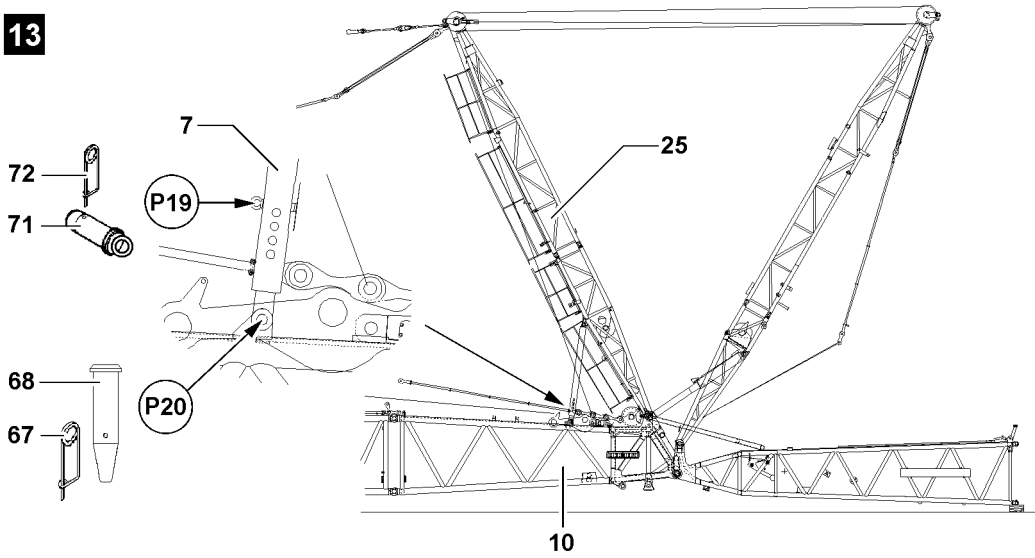
See illustration **11**

- ▶ Lower the rope **61** with the auxiliary crane.
- ▶ Offset the auxiliary crane so that the WA-bracket 2 can be pulled back, see illustration.
- ▶ Spool the W-control rope **35** out and pull the WA-bracket 2 **25** back at the same time with the hoist rope until the W-guy rods move away from the WA-bracket 2 and hang down vertically.
- ▶ Remove the auxiliary crane.
- ▶ Spool the W-control rope **35** out and simultaneously pull back the WA-bracket 2 **25** with the hoist rope until the guy rods **53** and the W-guy rods **57** can be pinned together on point **P17**.
- ▶ Pin the W-guy rods **53** on the W-guy rods **57**: Insert the pin **63** on both sides at point **P17** from the „inside“ to the „outside“ and secure with spring retainer **62**.

12



13



14

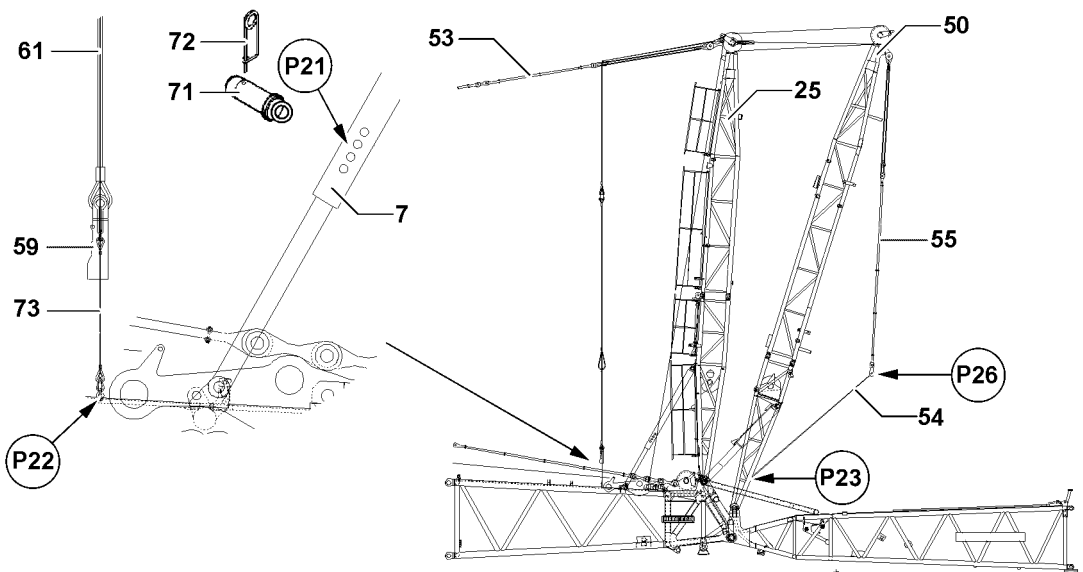


Fig.111984

LWE/LR 1750-000/12812-15-02/en

4.5 Pinning the relapse supports

See illustration 12

- ▶ Erect the WA-bracket 2 **25** vertically: Spool the W-control rope up and simultaneously spool out the hoist rope.



WARNING

Uncontrolled swinging of the relapse supports!

If the relapse supports are unpinned without the WA-bracket 2 standing vertically, the relapse supports can swing without control. Personnel can be severely injured or killed!

- ▶ Unpin the relapse supports **7** after the WA-bracket 2 **25** is erected vertically!

- ▶ Unpin the relapse supports **7** on point **17**: Remove the spring retainer **69** and unpin the pin **70**.

The pin **68** and the spring retainer **67** to pin the relapse support are in the retainer **66**.

See illustration 13

- ▶ Spool the W-control rope out and pull the WA-bracket 2 **25** back with the hoist rope at the same time until the relapse supports **7** can be pushed in by hand to point **P20** on the S-end section **10**.
- ▶ Pin the relapse supports **7** on point **20**: Insert the pins **68** on both sides and secure with spring retainers **67**.

NOTICE

Damage of WA-bracket 2!

If the pin for the connection is not unpinned before erection of WA-bracket 2, the WA-bracket 2 can be damaged!

- ▶ Unpin the pin **71** before erection of the WA-bracket 2 **25**!

- ▶ Unpin the relapse supports: Remove the spring retainer **72** and unpin the pin **71** on point **P19**.

See illustration 14

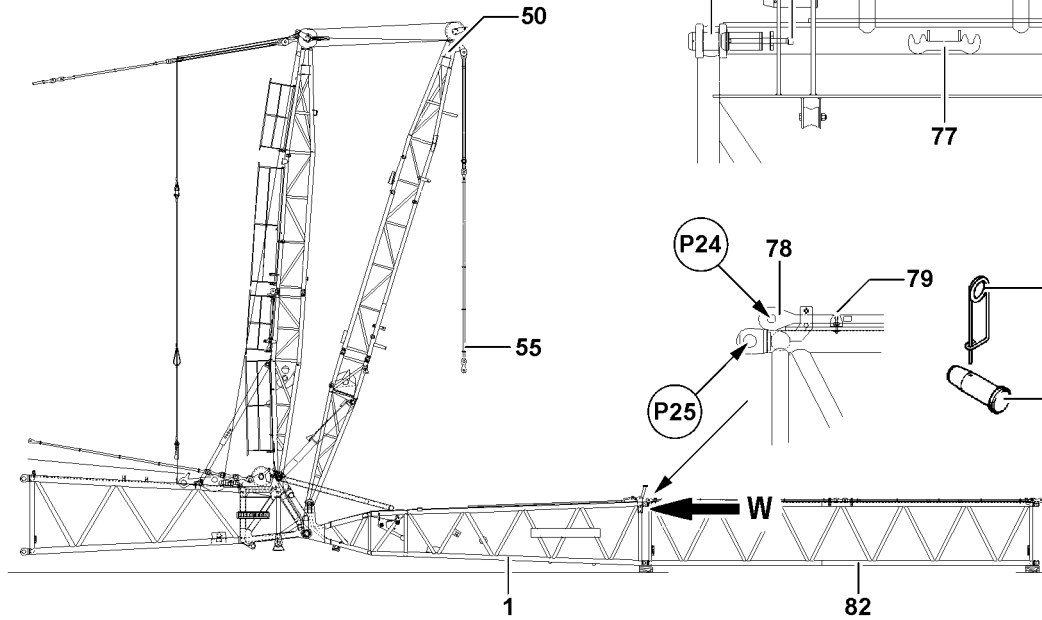
- ▶ Erect the WA-bracket 2 **25** until the guy rods **53** tension and the WA-bracket 2 **25** is standing vertically: Spool the W-control rope up.
- ▶ Lower the WA-bracket 1 **50** until the LICCON computer system turns the movement off.
- ▶ Lower the WA-bracket 1 **50** until the pin **71** in the next bore on the relapse support **7** can be pinned on point **P21**.

Result:

- The relapse supports are extended as far as possible and can be pinned.

- ▶ Pin the relapse supports **7** on both sides in maximum possible length: Insert the pin **71** on bore at point **P21** and secure with spring retainer **72**.
- ▶ Raise / lower the WA-bracket 1 **50** until the guy rods hang vertically.
- ▶ Unhook the rope **54** on point **P23**.
- ▶ Spool the hoist rope up and place it on the S-boom until the rope **61** hangs vertically.
- ▶ Unpin the hoist rope on the lock **59**.
- ▶ Hook the rope **73** on the lock **59** and secure.
- ▶ Fasten the ropes **61** on both sides on the S-end section **10** on point **P22**.
- ▶ Lower the WA-bracket 1 **50** until the rope **54** can be unhooked.
- ▶ Unhook the rope **54** on point **26**.

15



W

16

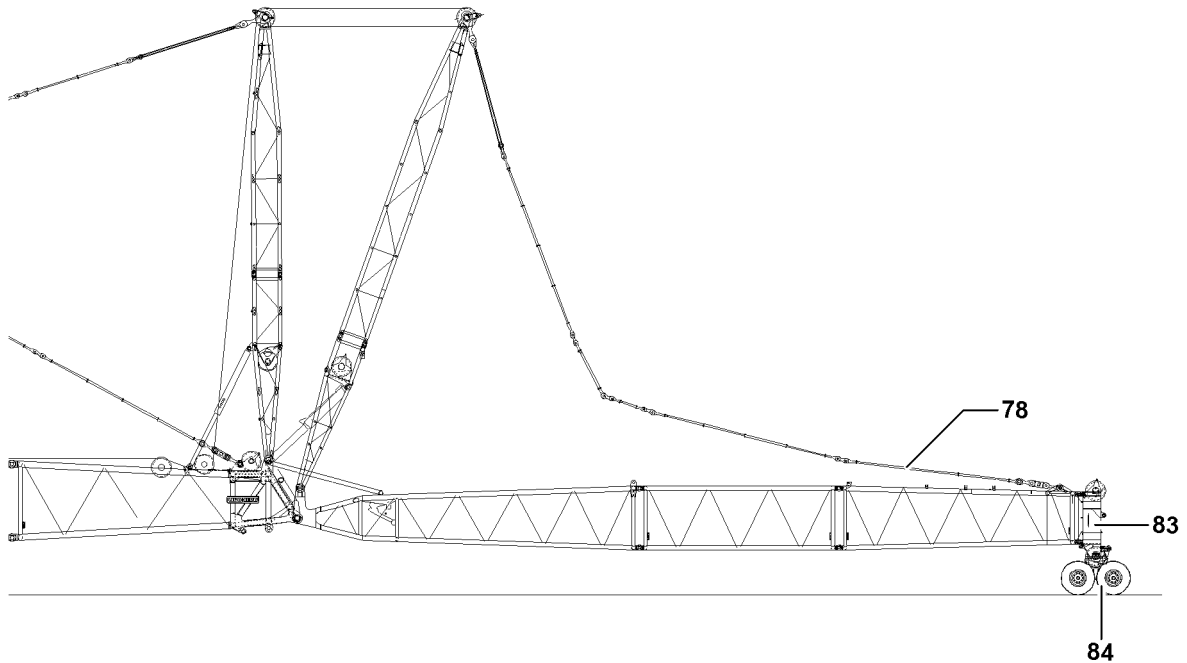


Fig.111985

LWE/LR 1750-000/12812-15-02/en

4.6 Assembling the W-lattice jib



Note

- ▶ During assembly of the W-lattice jib, adhere to the pin sequence, see Crane operating instructions, chapter 5.01!

4.6.1 Assembling the W-lattice sections

See illustration 15

- ▶ Position the LI-intermediate section **82** with the auxiliary crane on the W-pivot section **1** until the pin points on point **P25** align.
- ▶ Hang the pin pulling cylinder in the retainer **77** and screw **76**, see detail **W**.
- ▶ Pin the LI-intermediate section **82** on the W-pivot section **1** „on top“: Insert the pin **81** on both sides at point **P25** and secure with spring retainer **80**.
- ▶ Pin the LI-intermediate section **82** on the W-pivot section **1** „on the bottom“.

Make sure that the following prerequisite is met, illustration **16**:

- The S-end section **83** has been placed in the pulley cart **84** at assembly of the W-lattice jib, see Crane operating instructions, chapter 5.15.



Note

- ▶ The air pressure in the tires of the pulley cart is 9 bar !



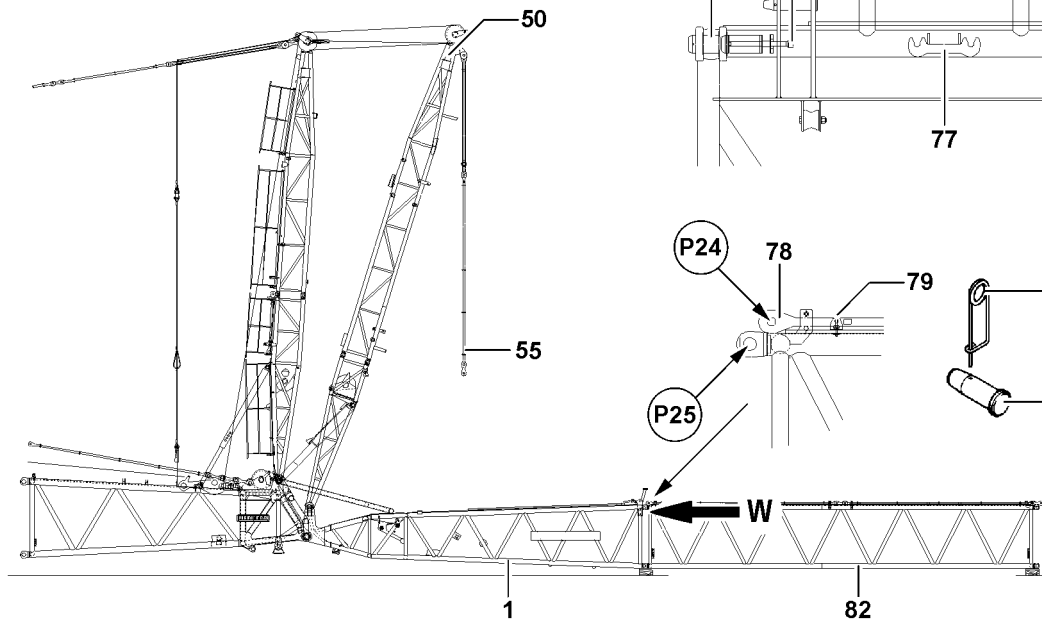
WARNING

Falling components!

If the intermediate sections are incompletely pinned, then components can fall down. Personnel can be severely injured or killed!

- ▶ Make sure that all components of the boom are completely pinned and secured!
- ▶ Assemble the W-lattice jib to the required length.
- ▶ Spool the hoist rope out and pull it to the LI-end section, see Reeving plan.

15



16

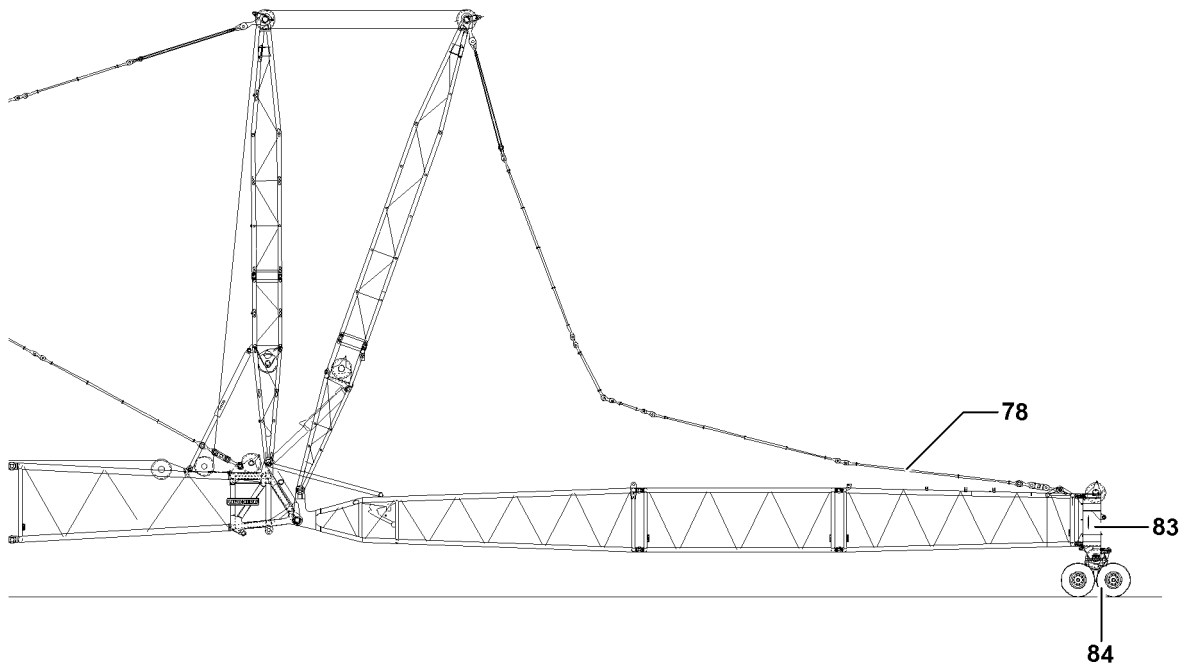


Fig.111985

LWE/LR 1750-000/12812-15-02/en

4.6.2 Assembling the W-guy rods

The W-guy rods are placed and secured for transport on the W-lattice sections. Before assembly of the W-guy rods, the transport retainers must be released.

See illustration **15**

- ▶ Release and unpin the transport retainers **79** of the W-guy rods **78**.



Note

- ▶ The guy rods for the LI-intermediate sections are pinned to each other starting from the fixed point on the end section of the boom.
-

NOTICE

Property damage!

- ▶ Always insert the pins of the guy rods from the „inside“ to the „outside“!
-

- ▶ Pin and secure the guy rods for all LI-intermediate sections.

When all guy rods for the W-boom system are pinned together:

- ▶ Lower the WA-bracket **1 50** until the guy rods **55** can be pinned on the guy rods **78** on point **P24**: Spool the W-control rope out.
- ▶ Pin the guy rods **55** on the guy rods **78**: Insert the pin **81** on both sides at point **P24** and secure with spring retainer **80**.
- ▶ Lift the W-guy rods: Spool the W-control rope up.

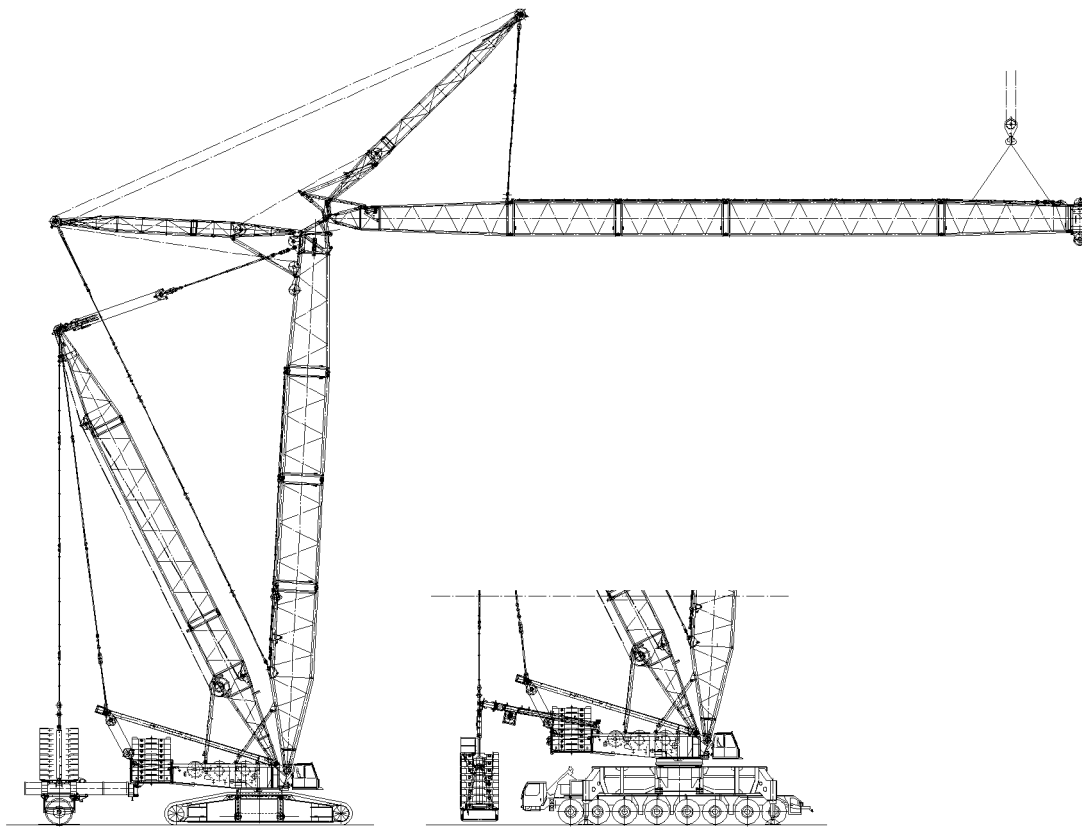


Fig.111986

LWE/LR 1750-000/12812-15-02/en

4.7 Assembling the W-lattice jib in flying mode

**Note**

- ▶ It is possible to assemble the W-boom in flying mode in space restricted conditions on the job site!

**DANGER**

Improper assembly!

The crane can be severely damaged! Personnel can be severely injured or killed!

- ▶ The W-assembly in flying mode may only be carried out after consultation and written approval by **Liebherr Werk Ehingen GmbH!**
- ▶ The W-assembly in flying mode may only be carried out by authorized and trained expert personnel!

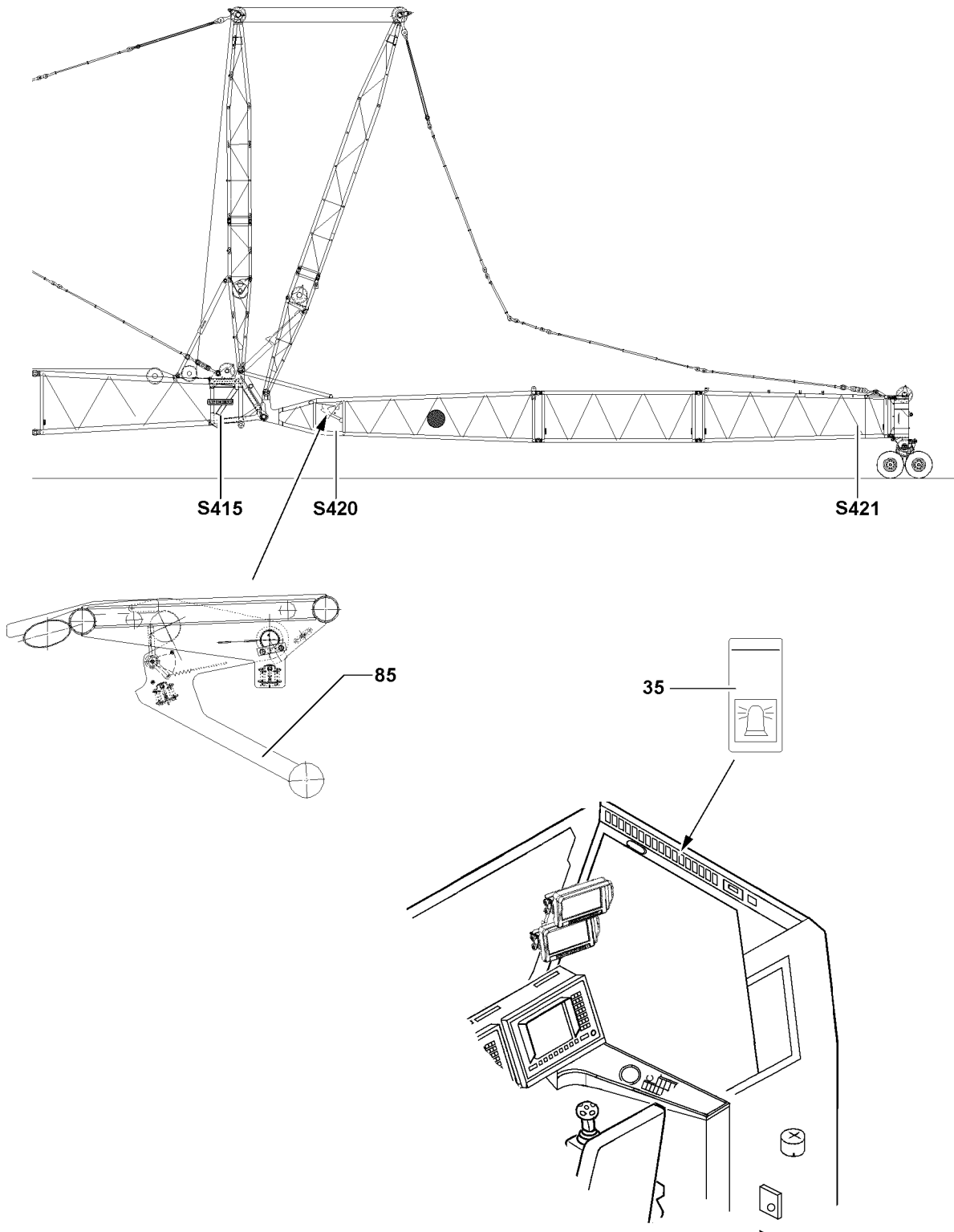


Fig.111987

LWE/LR 1750-000/12812-15-02/en

4.8 Establishing the electrical connections

Make sure that the following prerequisite is met:

- The W-boom is completely assembled.
- The airplane warning light and the wind speed sensors are installed.



CAUTION

Damage to the electrical connection on the cable drum!

If the electrical connection from the cable drum to the terminal box on the W-pivot section is established first before the connection to the terminal box on the LI-end section, then the electrical connection will be damaged when spooling out the cable drum!

- ▶ Establish first the electrical connection from the cable drum on the W-pivot section to the terminal box on the LI-end section and then the electrical connection from the terminal box to the cable drum on the W-pivot section!
-



Note

- ▶ To establish the electrical connections on the W-boom, see Electric wiring diagram!
-

- ▶ Establish the electrical connections.
- ▶ Make sure that all electrical connections on the boom are established.

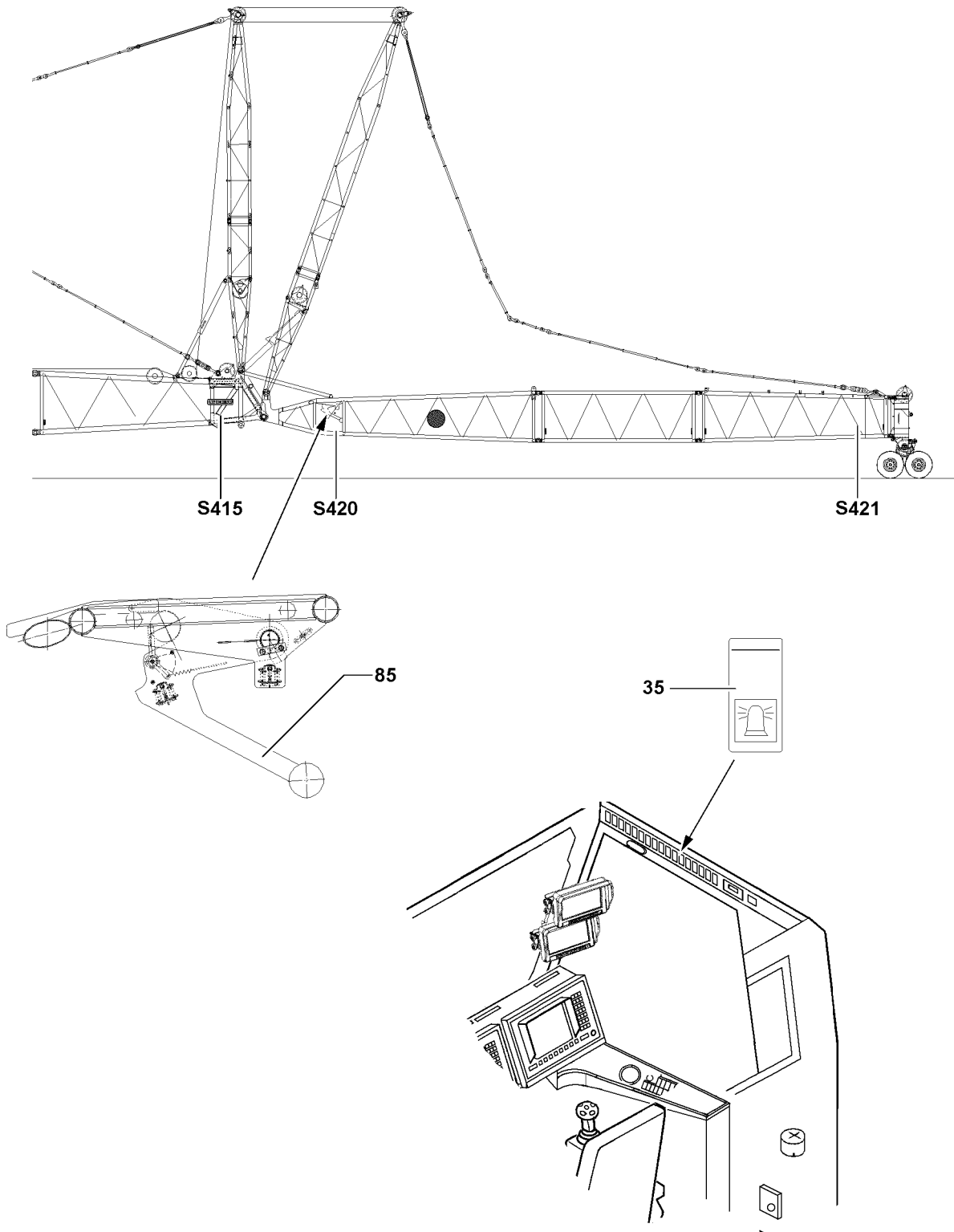


Fig.111987

LWE/LR 1750-000/12812-15-02/en

4.9 Checking the function of the safety devices



WARNING

Non-functioning safety devices!

If the function of the safety devices is defective, personnel can be severely injured or killed!

- ▶ Crane operation with non-functioning safety devices is **prohibited!**



Note

- ▶ The function of the individual limit switches must be checked before erection!
- ▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual!



Note

- ▶ If a function check on the limit switches or on the safety devices does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked.
- ▶ If no visible connection errors or component defects can be found, contact **LIEBHERR** service!

Make sure that the following prerequisites are met:

- All electrical connections have been made.
- The crane engine is running.
- The corresponding operating mode is set in the LICCON computer system.

4.9.1 Checking the wind speed sensor

- ▶ Check the movement and the function of the wind speed sensor.

4.9.2 Checking the airplane warning light

- ▶ Turn on the airplane warning light on with the switch **35**.
- ▶ Check the function visually.

4.9.3 Checking the oscillation guard



DANGER

Tipping lattice jib!

If the easy movement on the pendulum of the mechanical relapse support is not checked before erection or not re-established, if necessary, then the mechanical relapse support will not engage in steep lattice jib position. As a result, the lattice jib can tip to the rear!

Personnel can be severely injured or killed!

- ▶ Check the easy movement of the pendulum **5** of the mechanical relapse support in the entire swing range before erection!
- ▶ If the pendulum does not move easily: Make the pendulum **5** easy to move!
- ▶ Check the oscillation guard **5** for easy movement.

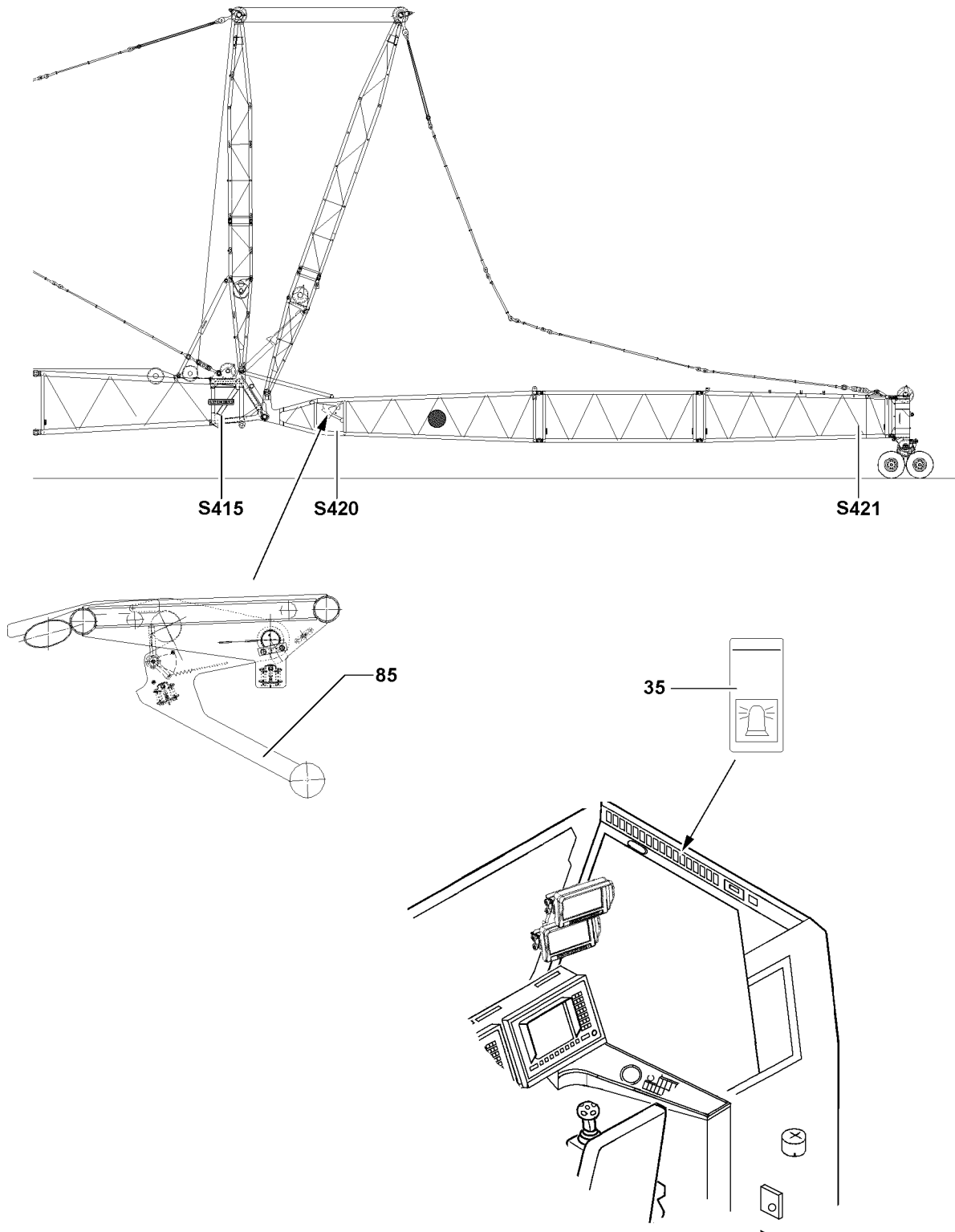


Fig.111987

LWE/LR 1750-000/12812-15-02/en

4.9.4 Checking the hoist limit switch on the pulley head



Note

- ▶ When replacing or changing a hoist limit switch (HES), the corresponding hoist limit switch must have the correct bus address and the correct software version in order to be detected again by the bus system (LSB)!

- ▶ Actuate the hoist limit switch manually on the pulley head.

Result:

- The spool up function of the hoist winch turns off.
- The „Hoist top“ icon appears on the LICCON monitor.
- The limit switch is functioning.

4.9.5 Checking the limit switches



Note

- ▶ The limit switch functions have to be checked individually before erection!

Testing the limit switch W-lattice jib „Steepest position“, relapse cylinder

- ▶ Cover the limit switch initiators individually with a metal plate, see Crane operating instructions, chapter 8.12!

Result:

- The „Boom limitation“ icon appears on the LICCON monitor.
- The spool up function of winch 5 turns off.

Testing the limit switch W-lattice jib „Steepest position“, relapse cylinder

- ▶ Cover the limit switch initiators individually with a metal plate, see Crane operating instructions, chapter 8.12!

Result:

- The „Boom limitation“ icon appears on the LICCON monitor.
- The spool up function of winch 5 turns off.

Testing the limit switch flap W-lattice jib „Steepest position“, relapse cylinder

- ▶ Cover the limit switch initiators individually with a metal plate, see Crane operating instructions, chapter 8.12!

Result:

- The „Boom limitation“ icon appears on the LICCON monitor.
- The spool up function of winch 5 turns off.

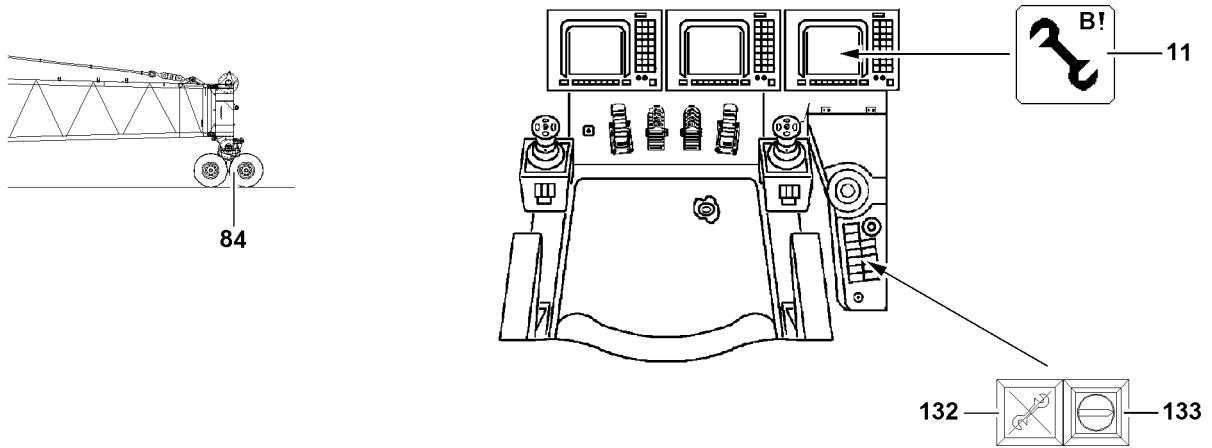
4.9.6 Checking the limit switch S-boom „Steepest position“

- ▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

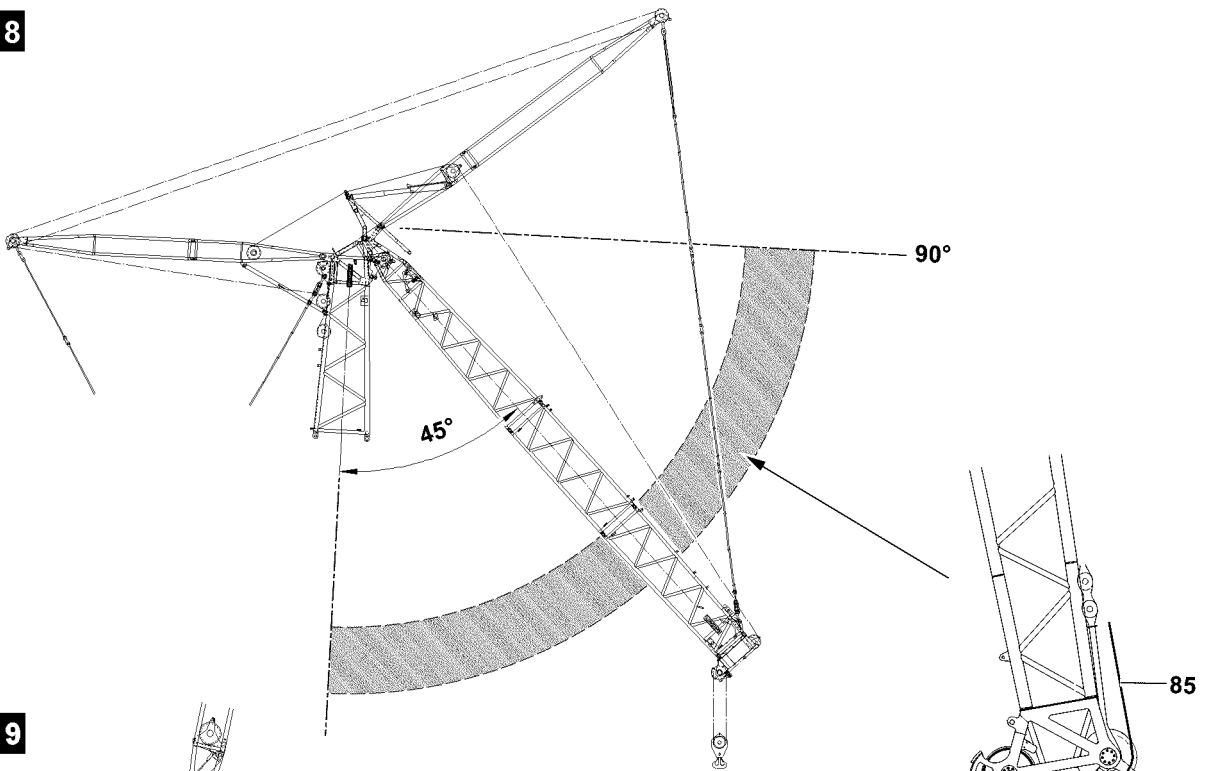
Result:

- The limit switch is actuated manually.
- The spool up function of winch 4 (control winch) turns off.
- The „Boom limitation“ icon appears on the LICCON monitor.
- The limit switch is functioning.

17



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19

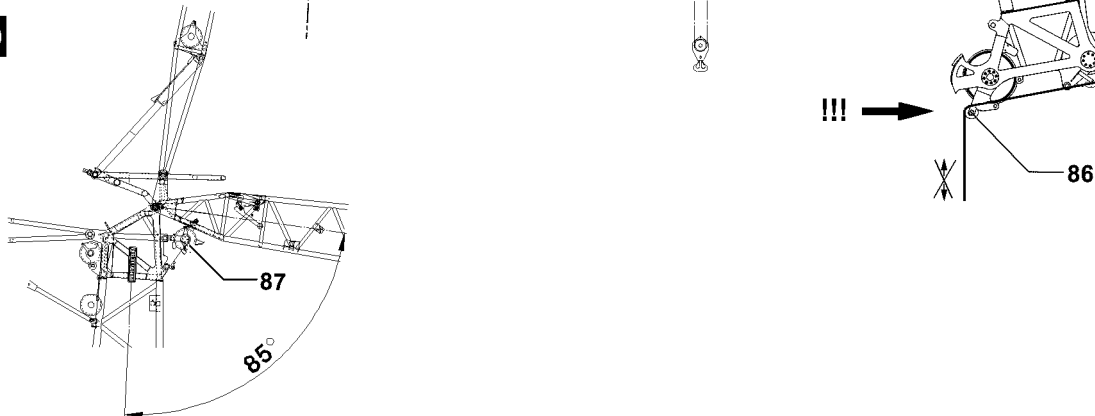


Fig.112202

LWE/LR 1750-000/12812-15-02/en

4.10 Erecting the boom



DANGER

The crane can topple over!

- ▶ It is not permitted to turn the crane during erection!
- ▶ Observe the data in the erection and take down charts!
- ▶ Observe the safety technical notes, see Crane operating instructions, chapter 5.01!



DANGER

Danger of tipping over if the oscillation guard is hard to move!

If the oscillation guard is hard to move, the mechanical relapse retainer will no longer function. The W-lattice jib can tip backwards uncontrolled and cause the crane to topple over!

- ▶ Crane operation with hard to move oscillation guard is prohibited!



WARNING

The crane can topple over!

If the following conditions are not met before erecting the boom, the crane can topple over. Personnel can be severely injured or killed!

- ▶ The lattice jib must roll on the ground with its entire weight!
- ▶ Spool the lattice jib control out so that the guy rods sag slightly!
- ▶ Do not allow slack cable to build up on the control winch!
- ▶ Move the relapse cylinder out before erection!



WARNING

Falling hoist rope!

If the hoist rope before the erection procedure is not properly secured onto the corresponding length on the W-lattice jib, it can fall down backward on the basis of its own weight. Personnel can be severely injured or killed!

- ▶ Reeve in the hoist rope with sufficient length on the W-lattice jib before the erection process!
- ▶ The hoist rope must be constantly monitored during erection!
- ▶ Do not step into the danger zone!



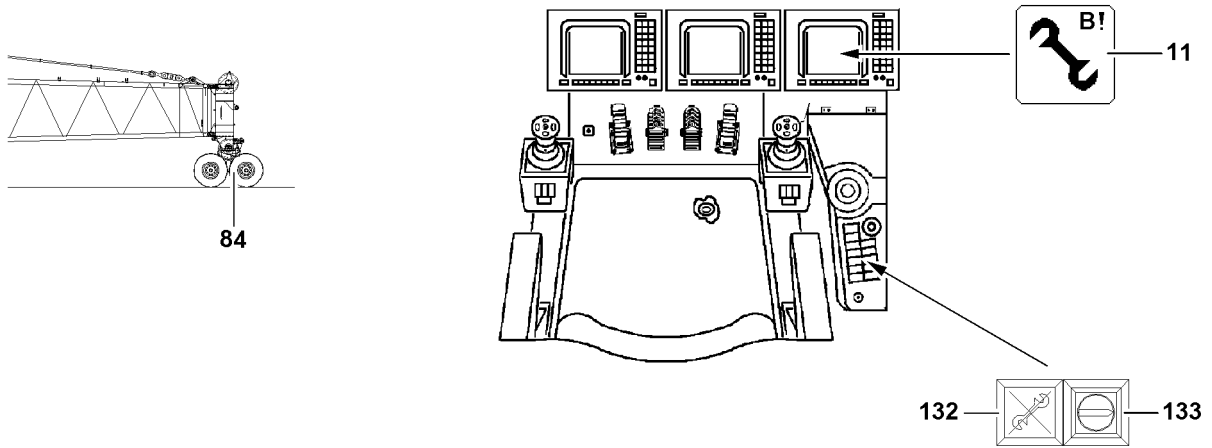
WARNING

The SW-system is overloaded!

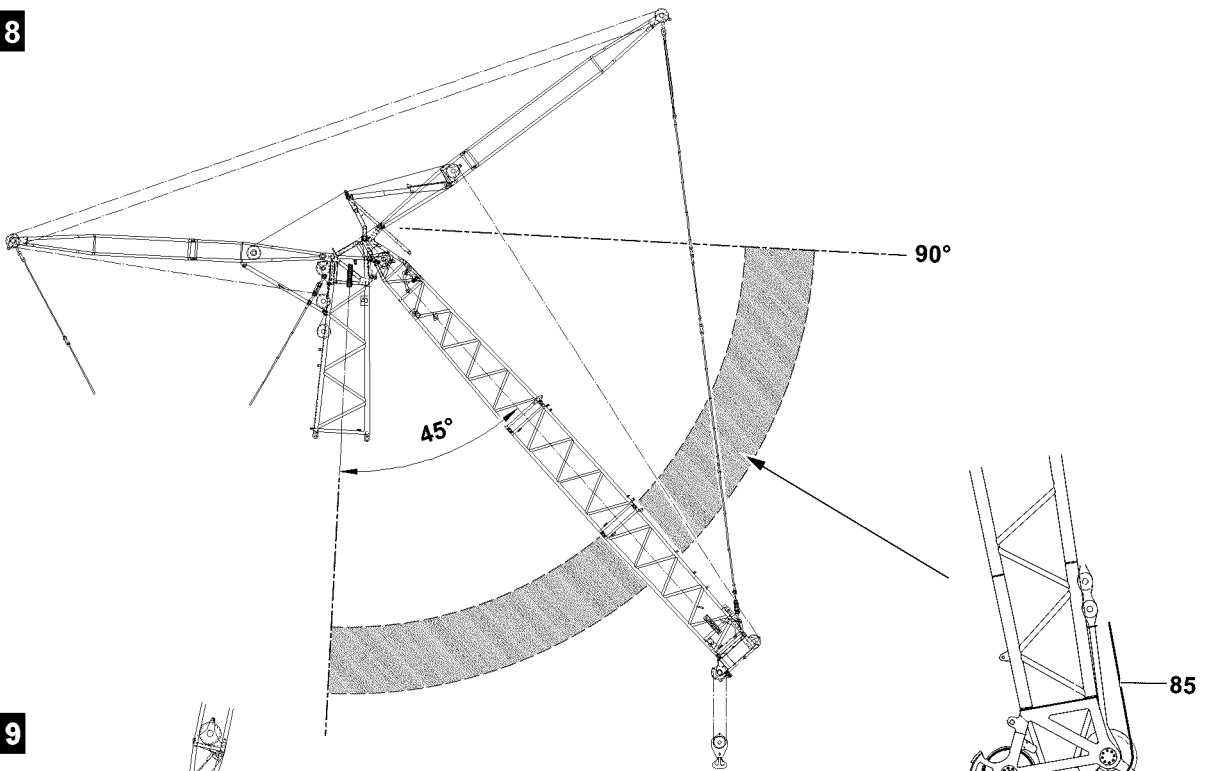
If the maximum forces on the SW-boom system are exceeded, personnel can be severely injured or killed!

- ▶ Adjust the W-lattice jib control so that the maximum forces are not exceeded!
- ▶ Make sure that the maximum permissible forces on the W-guying (test point 2) are not exceeded, see Erection and take down chart!
- ▶ Do not allow slack cable to build up on the control winch!

17



18



19

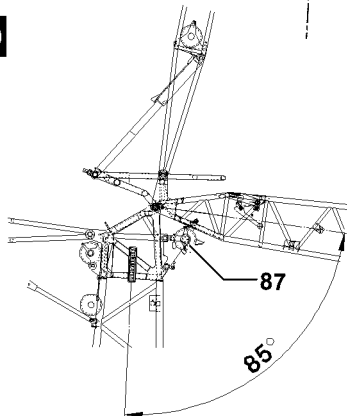


Fig.112202

LWE/LR 1750-000/12812-15-02/en

Make sure that the following prerequisites are met:

- The W-lattice jib is fully assembled.
- The pulley cart **84** is assembled on the LI-end section, see illustration **17**.
- The crane is aligned in horizontal direction.
- All electrical connections have been established.
- All limit switches are functioning.
- The oscillation guard has been checked and is easily movable.
- The counterweight has been installed on the turntable and on the derrick, according to the load chart.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- There are no loose parts on the boom or the lattice jib.
- Boom, lattice jib and safety devices are free from snow and ice.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual crane configuration.
- The assembly key button **133** is actuated.
- The indicator light in the button **132** „Assembly“ lights up.
- The assembly icon **11** is visible on the LICCON monitor.
- No personnel is within the danger zone.

4.10.1 Reeving in the hook block

The erection process is carried out until:

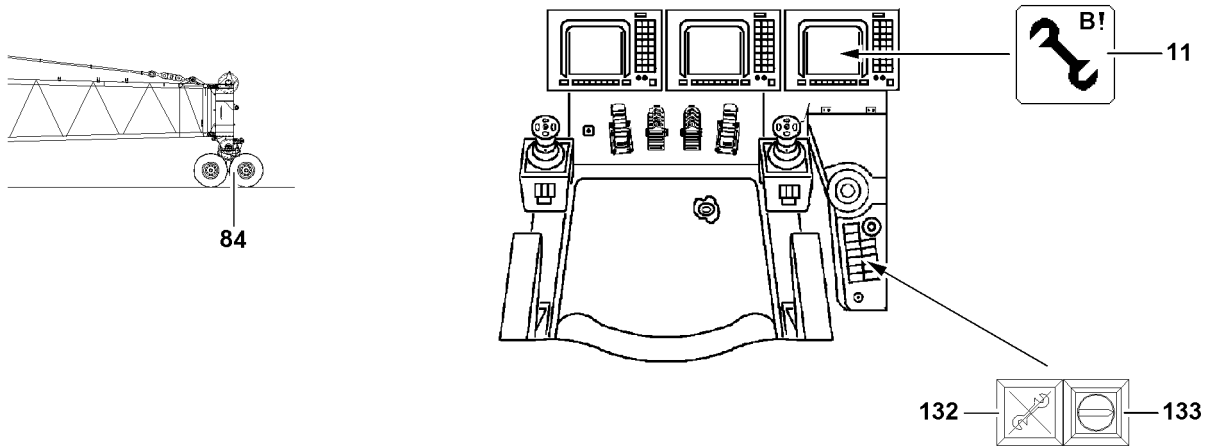
- Without pulley set on the S-end section: Until the S-boom and the W-lattice jib form an angle of approximately 45° (switch position „W-lattice jib bottom“), see illustration **18**.
 - **or** with pulley set **87** on the S-end section: Until the S-boom and the W-lattice jib form an angle of approximately 85° (switch position „W-lattice jib bottom“), see illustration **19**.
 - **or** the LI-end section lifts off from the ground.
- ▶ Luff the S-boom up and simultaneously spool the W-control rope out so that the LI-end section remains on the ground with the pulley cart.
 - ▶ When the erection angle is reached or before the LI-end section lifts off the ground:
 - ▶ Release the pulley cart from the LI-end section: Remove the pulley cart, see Crane operating instructions, chapter 5.15!
 - ▶ Luff the S-boom up until the LI-end section lifts off the roller cart.
 - ▶ Check the actual load on the LICCON monitor.

Problem remedy

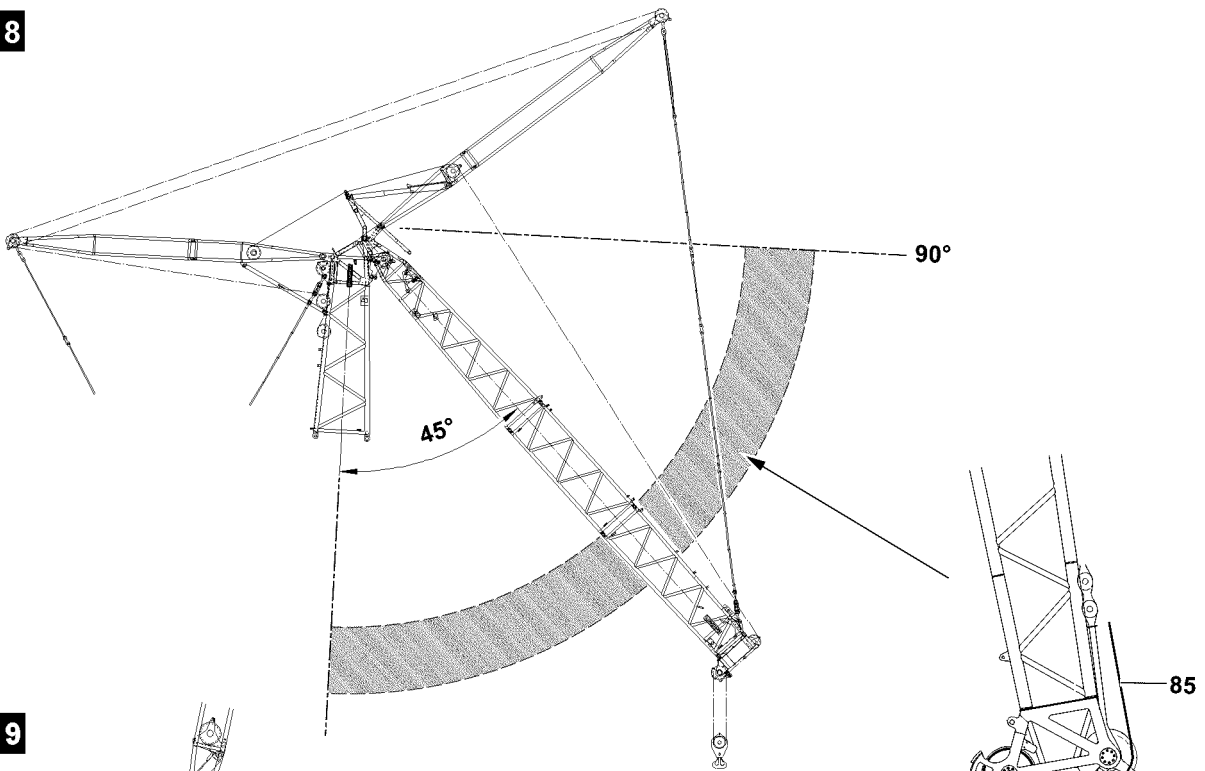
Actual load on the LICCON monitor is larger than 0.0 t !

- ▶ Observe the notes for input of hook block weight, see Crane operating instructions, chapter 4.02!
-
- ▶ Reeve in the hook block properly and secure the hoist rope on the rope fixed point, for reeving, see reeving plan.
 - ▶ Attach the hoist limit switch weight.
 - ▶ Enter the weight of the hook block into the LICCON computer system!

17



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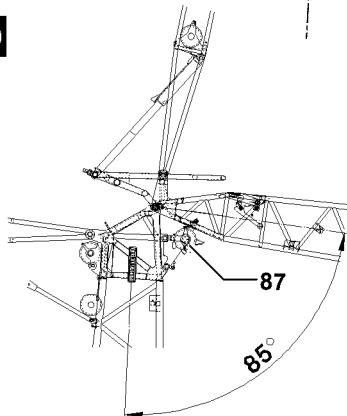


Fig.112202

LWE/LR 1750-000/12812-15-02/en

4.10.2 Erecting the boom

Make sure that the following prerequisite is met:

- The weight of the hook block has been entered into the LICCON computer system.



DANGER

The crane can topple over!

In crane operation with exceeded LICCON overload protection, the crane can topple over.

- ▶ Personnel can be severely injured or killed!
- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook!



WARNING

Unutilized guy rods on boom!

If guy rods are on the lattice sections which are not used for operation, then there is a risk of accidents!

Personnel can be severely injured or killed!

Guy rods can loosen up and fall down!

The load chart is invalid!

The load display of the LICCON computer system shows the incorrect value!

The weight of the boom is too large for erection!

- ▶ Disassembly and remove unutilized guy rods on the transport retainers before erecting the boom!

NOTICE

Damage to the hoist rope!

If the hoist rope **85** are reeved on the hook block and redirected over the small guard rollers **86**, the hoist gear may no longer be driven. During spooling up or spooling out, the hoist rope can become damaged!

- ▶ Do not spool up or spool out the hoist rope **85**, if the angle between the S-boom and the W-lattice jib is less than 90°, see illustration **18**!



Note

- ▶ When the lowest operating position of the W-lattice jib is reached, the LICCON overload protection is activated!
- ▶ In the maximum load icon appears a load number in „t“ instead of the display „???“!

- ▶ Luff the boom up to the lowest operating position.

When the boom has reached the lowest operating position:

- ▶ Turn the assembly key button **133** off: Press the button **132**.

Result:

- The LICCON overload protection is active.
- The indicator light in the button **132** turns off.
- The assembly icon **11** on the LICCON monitor turns off.

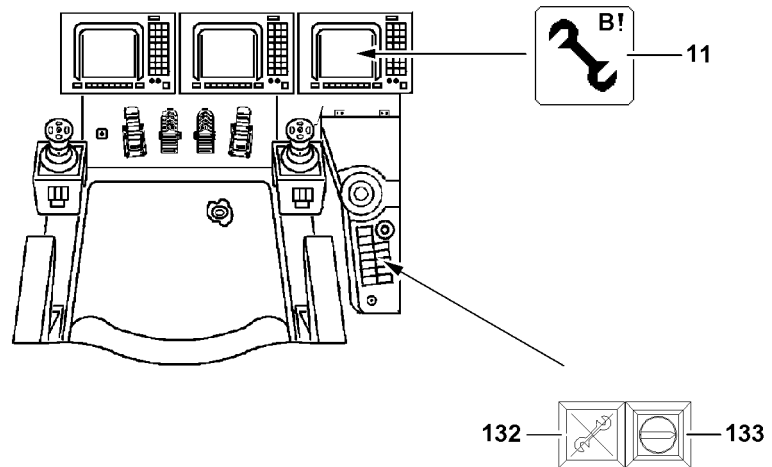
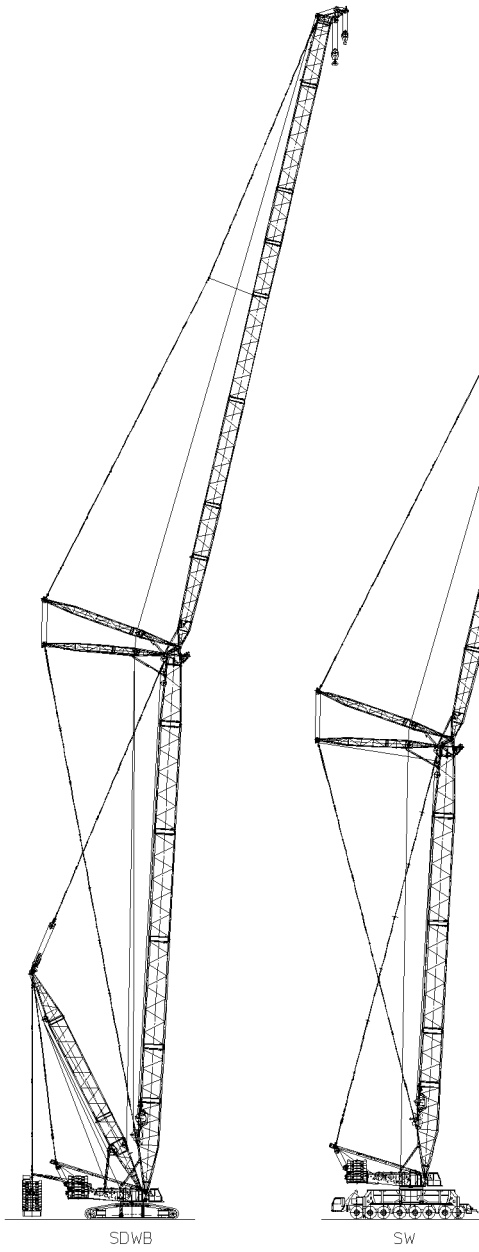


Fig.112203

LWE/LR 1750-000/12812-15-02/en

5 Operating the crane

5.1 Preparing for crane operation

**Note**

- ▶ Observe the notes, see Crane operating instructions, chapter 4.05, chapter 4.08 and chapter 5.01!

Make sure that the following prerequisites are met:

- The LICCON overload protection has been set according to the data in the load chart.
- The assembly key button **133** is turned off.

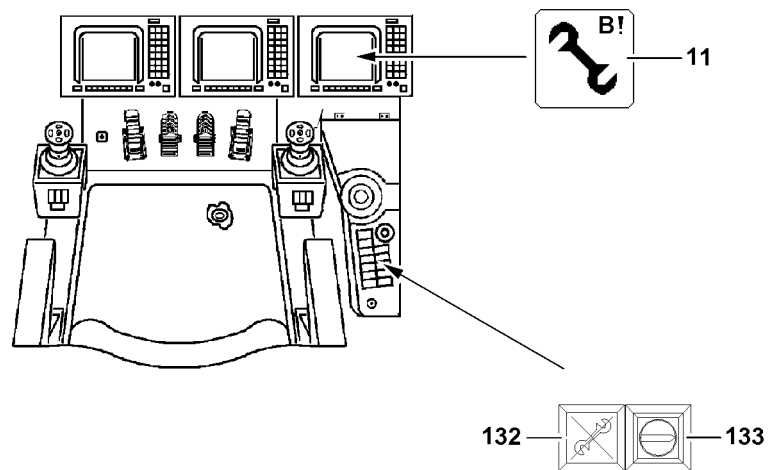
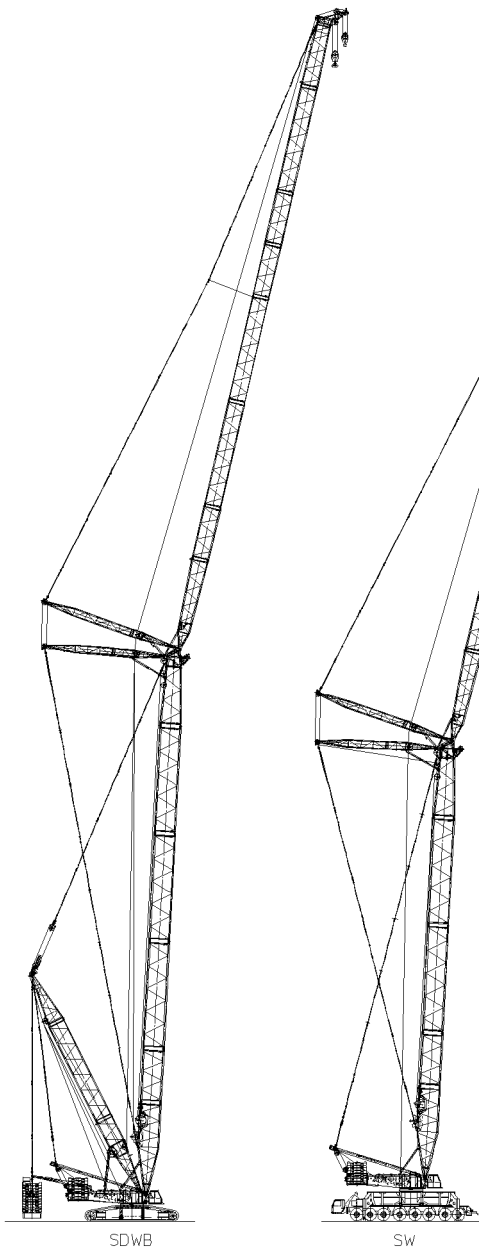
**WARNING**

The crane can topple over!

- ▶ Check the horizontal position of the crane before and during operation!
- ▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation!

5.2 Checking the settings

- ▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
- ▶ Check the hoist limit switch by running against the hoist limit switch weight.
- ▶ Check the function of the limit switches on the relapse cylinders.



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Fig.112203

6 Disassembling the W-boom system



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling! If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited!



WARNING

The lattice sections can fall down!

If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel!

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right!**
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom!
- ▶ Secure the pins in the bearing points and the receptacles!
- ▶ It is prohibited to lean the ladder against the components being disassembled!
- ▶ Do not remove the fastening equipment and the auxiliary crane until each component is pinned on and secured!



WARNING

Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be caught and severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

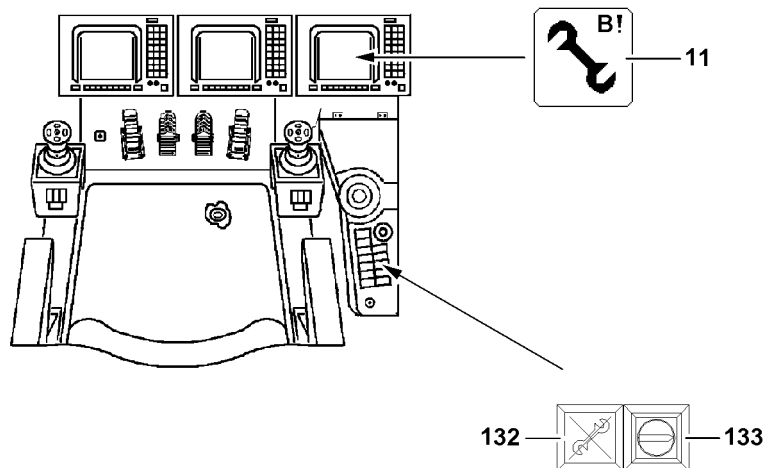
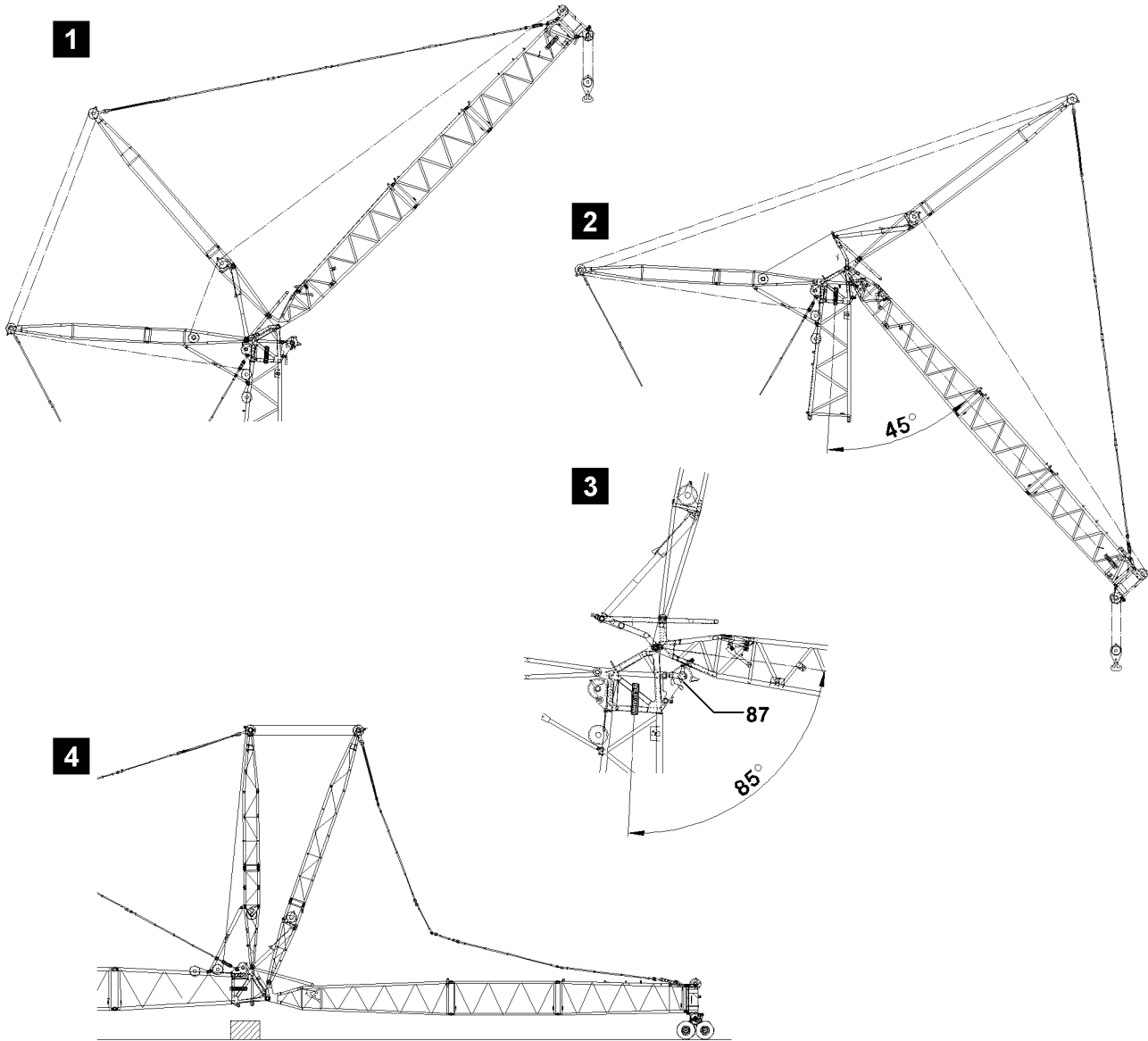


Fig.112204

LWE/LR 1750-000/12812-15-02/en

**Note**

- ▶ By supporting the components during assembly / disassembly, ground unevenness is compensated for and the material is protected!

**Note**

- ▶ The LI-intermediate sections are pinned and unpinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30!

**WARNING**

Risk of accident!

Personnel can be severely injured or killed!

- ▶ For pinning and unpinning with the pin pulling device, observe and follow the warning guidelines, see Crane operating instructions, chapter 5.30!

6.1 Laying the W-lattice jib down

**WARNING**

The crane can topple over!

If the following conditions are not met before taking down the boom, the crane can topple over and fatally injure personnel!

- ▶ Observe the safety technical notes, see Crane operating instructions, chapter 5.01!
- ▶ Observe the data in the erection and take down charts!

**WARNING**

The SW-system is overloaded!

If the maximum forces on the SW-boom system are exceeded, personnel can be severely injured or killed!

- ▶ Adjust the W-lattice jib control so that the maximum forces are not exceeded!
- ▶ Make sure that the maximum permissible forces on the W-guying (test point 2) are not exceeded, see Erection and take down chart!
- ▶ Do not allow slack cable to build up on the control winch!

NOTICE

Damage of boom components!

Taking down the boom system can lead to a collision between the hook block and the pulley head!

The boom components can be severely damaged!

- ▶ Luff the boom system down at the same time and spool the hoist winch out!

Make sure that the following prerequisite is met:

- The S-boom is in operating position, see illustration 1.
- The LICCON overload protection has been set according to the data in the load chart.
- The hook block is approx. 5 m below the pulley head of the lattice jib.
- The pulley cart is available.
- An auxiliary crane is available.

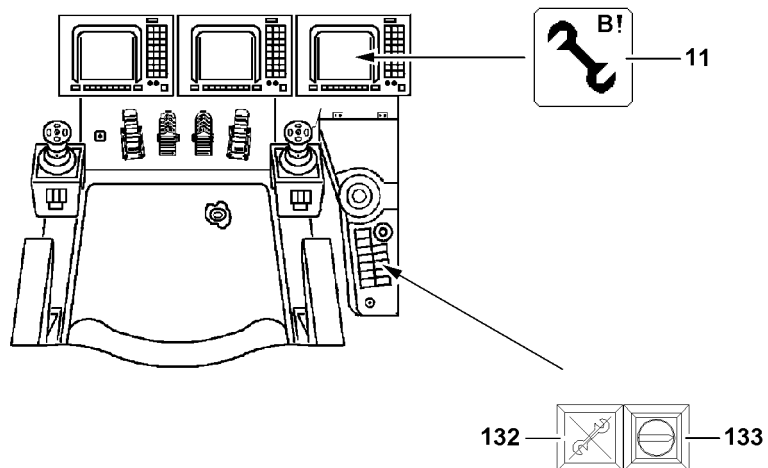
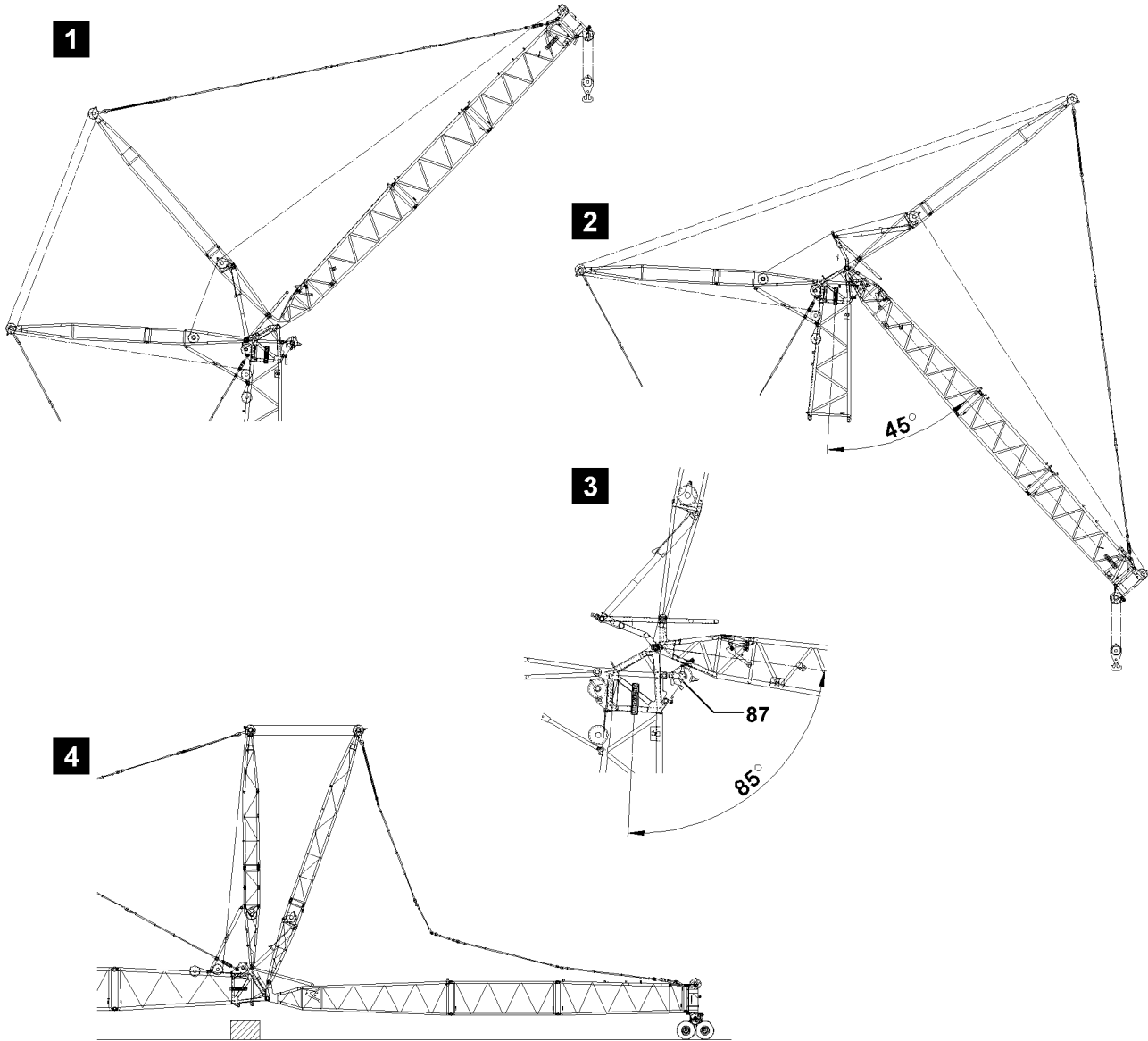


Fig.112204

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6.1.1 Luffing the W-lattice jib down



Note

- ▶ The luff down movement is turned off as soon as the lowest operating position is reached!
- ▶ When the lowest operating position of the W-lattice jib is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“!
- ▶ In the crane operating screen appear alarm functions!

- ▶ Luff the W-lattice jib down to the „lowest“ operating position.

Result:

- The luff down movement is turned off.
- The „STOP“ icon appears on the LICCON monitor.
- The horn icon appears on the LICCON monitor.



WARNING

Crane operation with added assembly key button!

If the assembly key button is turned on, the hoist limit switch and the LICCON overload protection is bypassed!

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be killed!

This could result in high property damage!

- ▶ The actuation of the assembly key button **133** is only permitted for assembly tasks!
- ▶ The assembly key button **133** may only be operated by persons who are aware of the consequences of a bypass!
- ▶ Crane operation with the assembly key button **133** turned on is strictly prohibited!
- ▶ The assembly key button **133** must be removed immediately after carrying out the assembly work and handed to an authorized person!

When the boom has reached the lowest operating position:

- ▶ Actuate the assembly key button **133**.

Result:

- The LICCON overload protection is deactivated.
- The indicator light in the button **132** lights up.
- The assembly icon **11** appears on the LICCON monitor.

The luff down procedure is carried out until:

- Without pulley set on the S-end section: Until the S-boom and the W-lattice jib form an angle of approximately 45° (switch position „W-lattice jib bottom“), see illustration **2**.
- **or** with pulley set **87** on the S-end section: Until the S-boom and the W-lattice jib form an angle of approximately 85° (switch position „W-lattice jib bottom“), see illustration **3**.
- **or** the hook block can be reeved out.
- ▶ Luff the W-lattice jib down as specified.

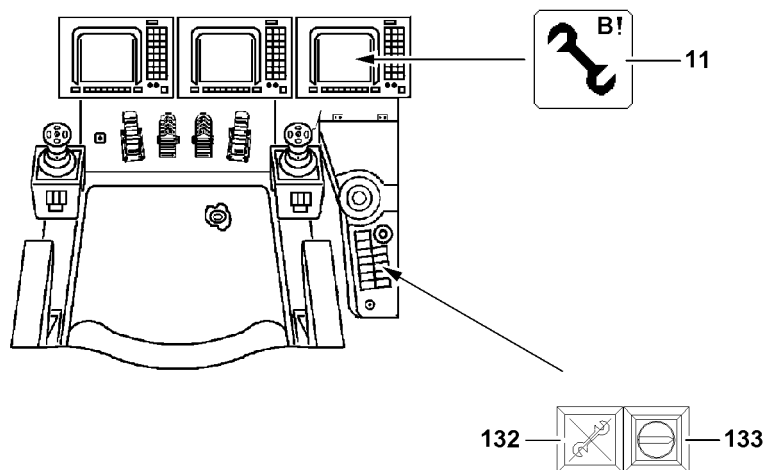
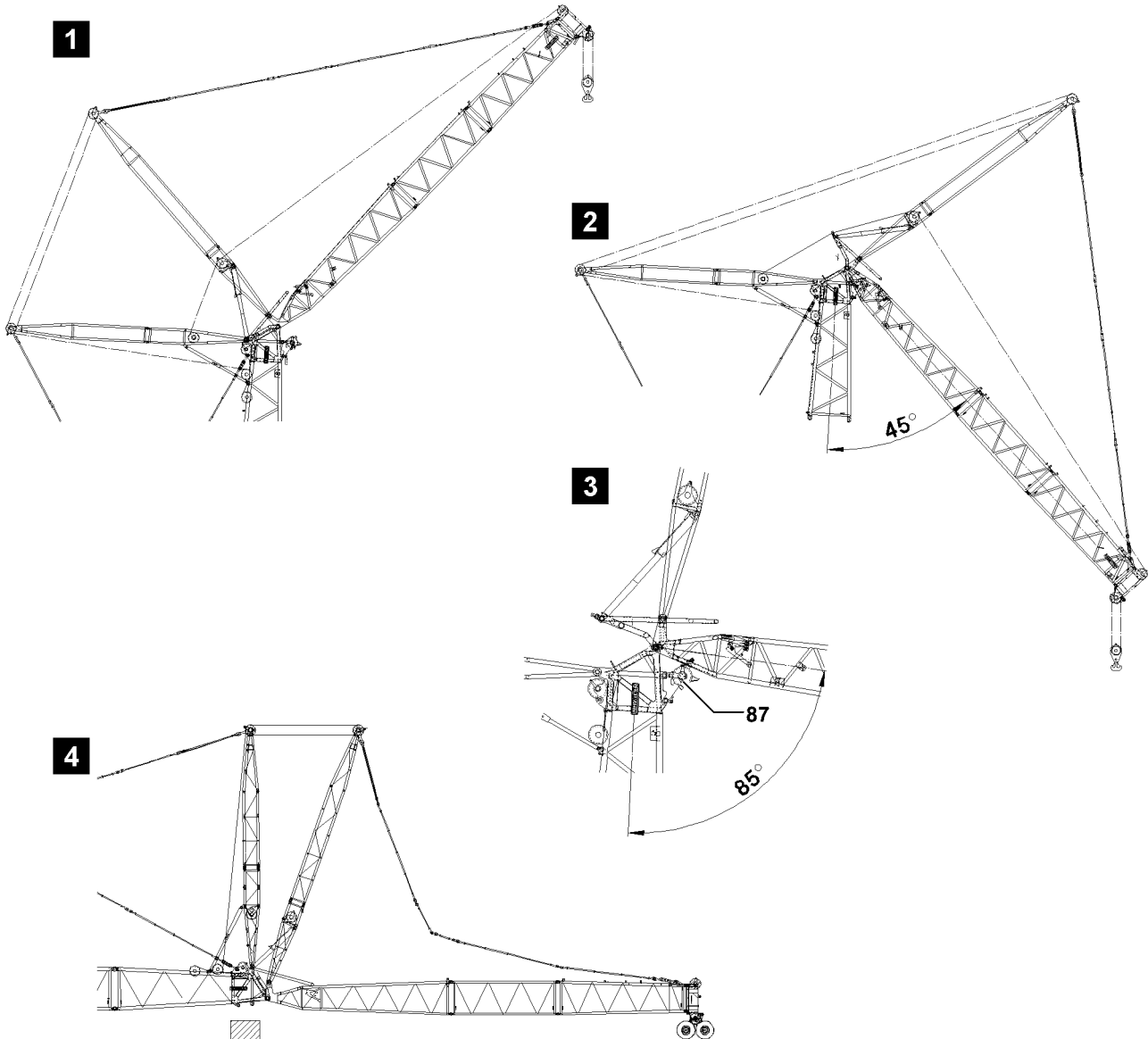


Fig.112204

LWE/LR 1750-000/12812-15-02/en

6.1.2 Laying the W-lattice jib down

If the hook block has not yet touched the ground:

- ▶ At the same time, spool the hoist winch out and luff the S-boom down until the hook block touches the ground.
- ▶ Remove the hoist limit switch weight.
- ▶ Unreeve and remove the hook block.



Note

- ▶ The air pressure in the tires of the pulley cart is 9 bar !

If the W-lattice jib is vertically on the pulley cart, the W-guying is tensioned slightly so that the pulley cart rolls forward.

- ▶ Luff the S-boom up until the S-end section lies on the roller cart.
- ▶ Assemble the LI-end section on pulley cart, see Crane operating instructions, chapter 5.15.



WARNING

The crane can topple over!

If the following conditions are not met before taking down the boom, the crane can topple over. Personnel can be severely injured or killed!

- ▶ Spool the lattice jib control out so that the guy rods sag slightly!
- ▶ The lattice jib must roll on the ground with its entire weight!
- ▶ Do not allow slack cable to build up on the control winch!
- ▶ Do not pull the hook block along on the ground!

- ▶ Continue to luff down the S-boom and simultaneously spool the W-control rope out so that the guy rods sag slightly.
- ▶ Lower the S-boom until the S-boom head is laying the support on the ground, see illustration 4.



WARNING

Risk of accident!

- ▶ Make sure that no personnel is within the danger zone!
- ▶ Secure the hoist rope with the assembly rope and spool it up slowly over the rope pulleys of the WA-brackets to the S-end section!

- ▶ Place the hoist rope on the S-end section.

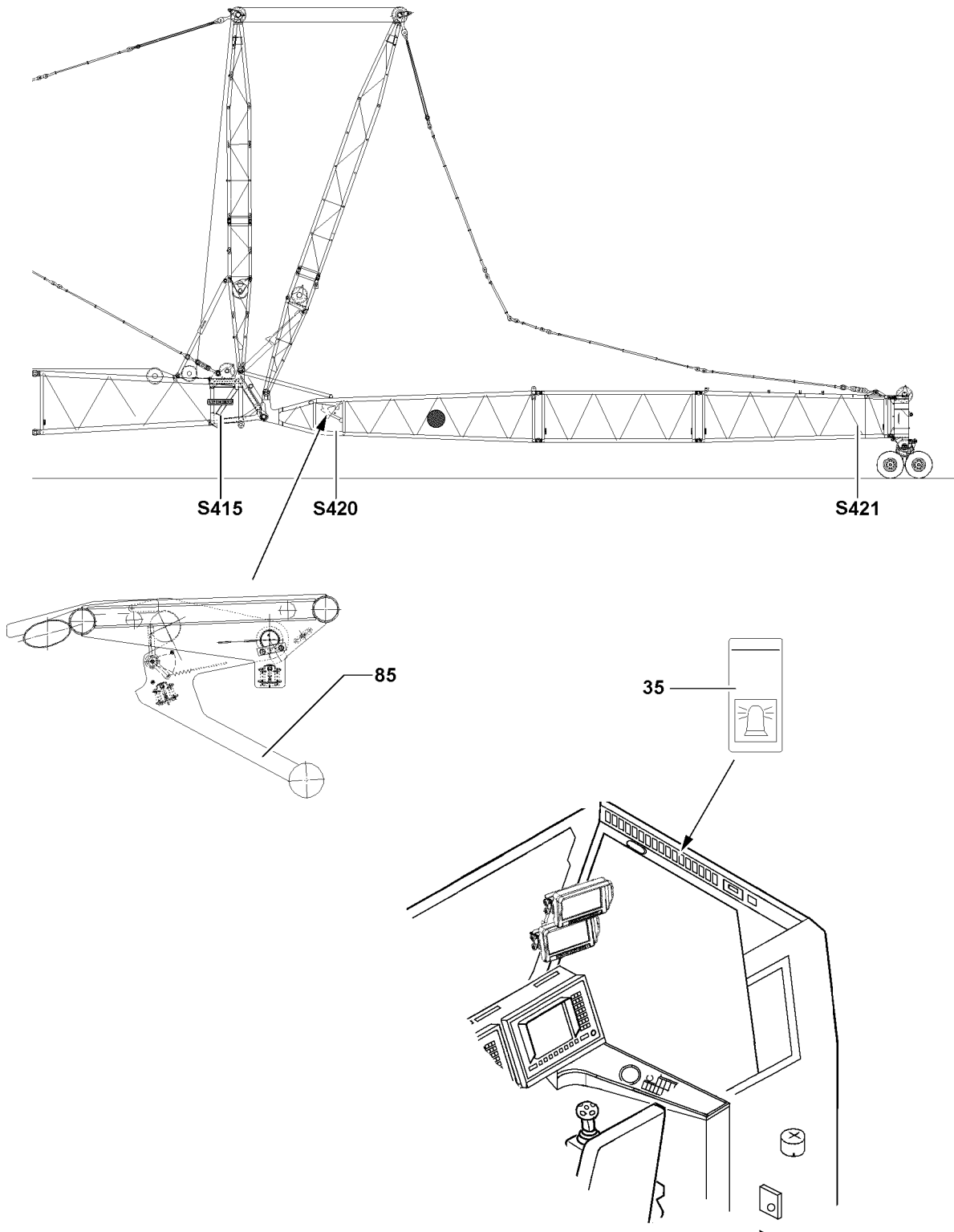


Fig.111987

LWE/LR 1750-000/12812-15-02/en

6.2 Disconnecting the electrical connections

Make sure that the following prerequisite is met:

- The S-boom has been placed down.

NOTICE

Damage to cable drum or cable!

If the electrical connection between the terminal box W-pivot section and cable drum is not separated before spooling up the cable drum, the electrical connection will be damaged!

If the cable of the cable drum is not properly spooled up on the cable drum after unplugging the LI-end section, then the cable drum or the cable can be significantly damaged!

- ▶ Disconnect the electrical connection from the cable drum to the terminal box on the W-pivot section first and then disconnect the electrical connection from the terminal box on the LI-end section to the cable drum!
 - ▶ After unplugging, spool the cable onto the cable drum!
-
- ▶ Disconnect the electrical connections.
 - ▶ After unplugging, spool the cable onto the cable drum and secure it to prevent it from spooling out inadvertently.
 - ▶ Secure the cable: Reestablish the electrical connection between the terminal box and the cable drum on the W-pivot section.

5

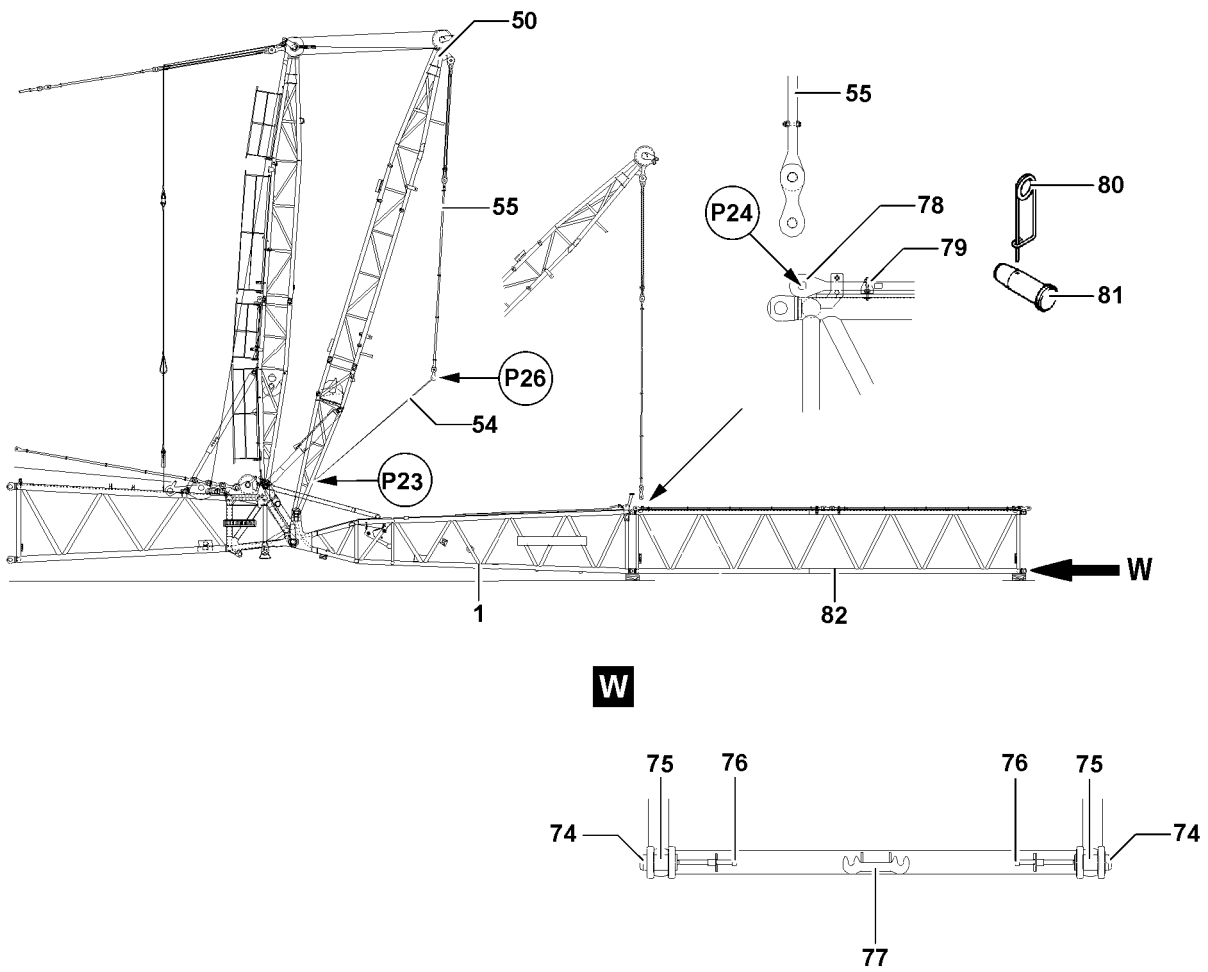


Fig.111991

LWE/LR 1750-000/12812-15-02/en

6.3 Disassembling the W-lattice jib



WARNING

Falling components!

If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be killed or seriously injured!

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Support the remaining assembled boom or secure it with the auxiliary crane!
- ▶ Secure the components which are being removed with the auxiliary crane!
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ It is prohibited to lean a ladder against the component being disassembled!
- ▶ During disassembly of the W-lattice jib, adhere to the unpinning sequence, see Crane operating instructions, chapter 5.01!

6.3.1 Disassembling the W-guy rods

Make sure that the following prerequisite is met:

- The transport retainers on the LI-lattice sections are unpinned.

- ▶ Place the W-guy rods in the transport retainers on the LI-intermediate sections: Lower the WA-bracket 1 **50**.
- ▶ Lower the WA-bracket 1 **50** until the guy rods **78** and guy rods **55** in point **P24** can be unpinned: Spool the W-control rope out.
- ▶ Separate the guy rods **78** and the guy rods **55** on both sides on point **P24**: Remove the spring retainer **80** and unpin the pin **81**.
- ▶ Hook the assembly rope **54** on point **P26**.
- ▶ Erect the WA-bracket 1 **50** until the assembly rope **54** can be hooked on point **P23**: Spool the W-control rope up.
- ▶ Hook the assembly rope **54** on point **P23**.
- ▶ Unpin the W-guy rods on the LI-intermediate sections from each other.

When all W-guy rods are separated:

- ▶ Secure the W-guy rods in the transport retainers on the LI-intermediate sections.

6.3.2 Disassembling the W-lattice section

See illustration 5

- ▶ Support the W-boom or secure it with the auxiliary crane.
- ▶ Release the pulley cart from the LI-end section: Remove the pulley cart, see Crane operating instructions, chapter 5.15.
- ▶ Secure the components for disassembly with the auxiliary crane.
- ▶ Hook the pin pulling cylinder on the retainer **77** and on the screw **76**, see detail **W**.
- ▶ Unpin the LI-end section and the LI-intermediate sections „on the bottom“: Remove the spring retainer **74** and unpin the pin **75**.
- ▶ Unpin the LI-end section and the LI-intermediate sections „on top“.
- ▶ Disassemble the W-lattice jib to the W-pivot section **1**.

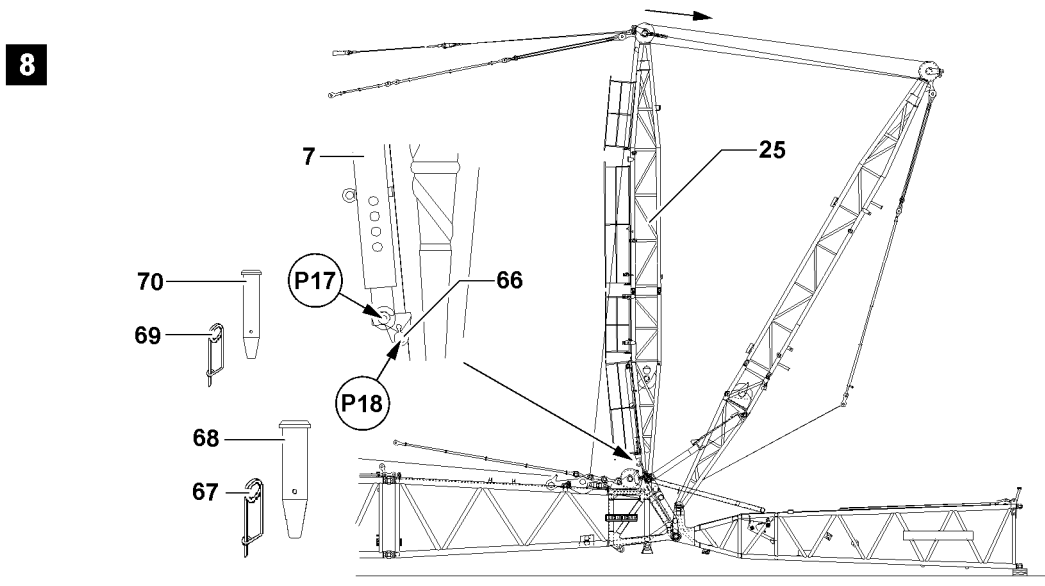
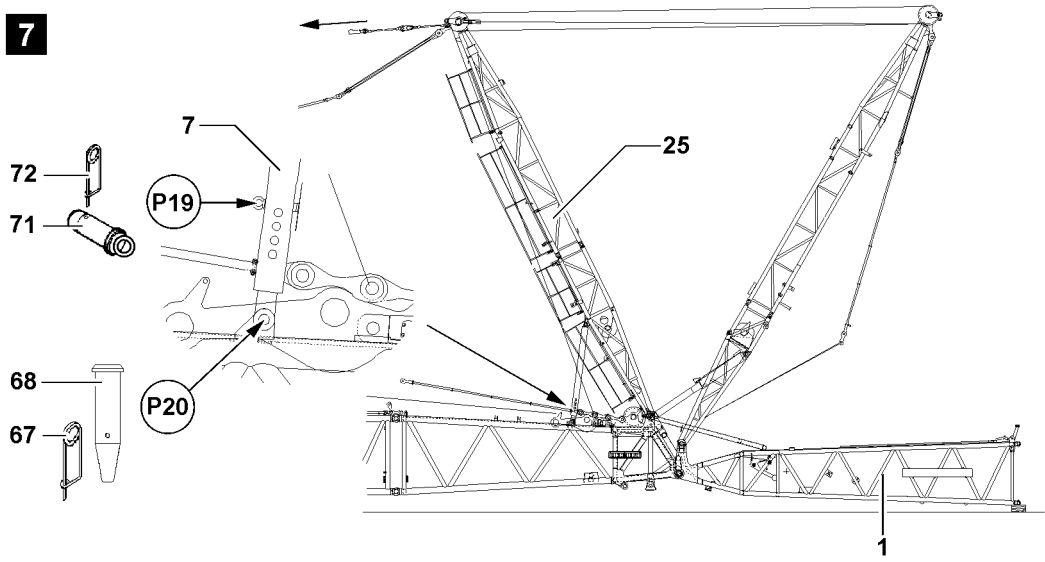
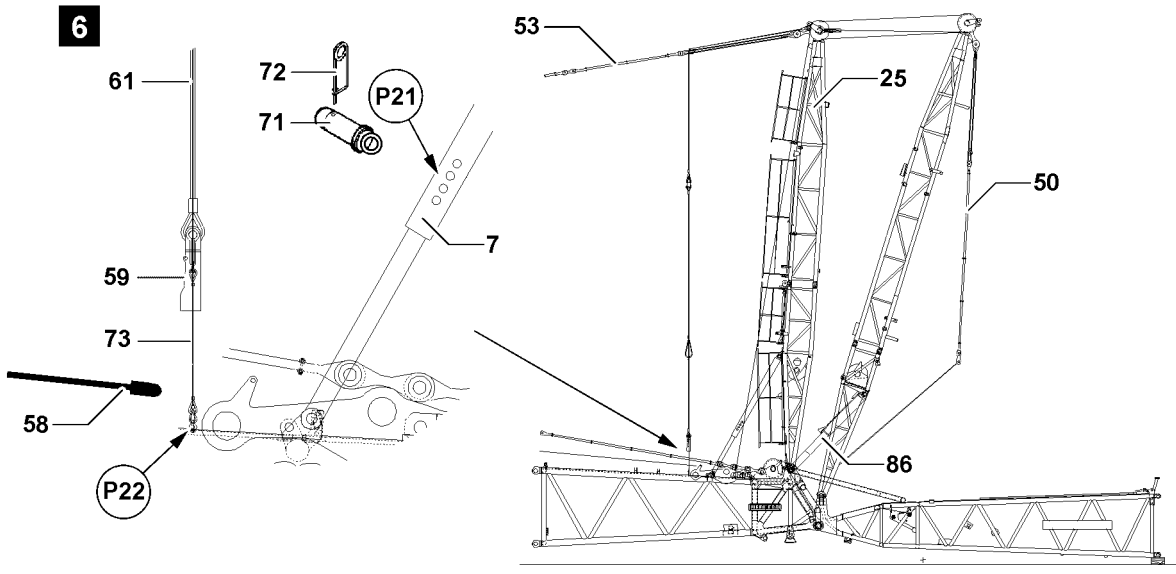


Fig.112151

LWE/LR 1750-000/12812-15-02/en

6.4 Unpinning the relapse supports

See illustration 6

- ▶ Erect the WA-bracket 1 **50** until the relapse cylinder **86** is completely retracted.

Result:

- The relapse supports **7** are relieved: The pin **71** can be unpinned.

NOTICE

Damage of WA-bracket 2!

If the pin **71** on the relapse supports is pinned when the WA-bracket 2 is not pulled back, then the WA-bracket 2 can be damaged!

- ▶ Unpin the pins **71** on both sides before the WA-bracket 2 **25** is pulled back!
-

- ▶ Remove the spring retainer **72** on both sides and unpin the connecting pins **71**.

Fastened on the S-end section on point **P22**, see illustration 6 are the two ropes **61**:

- The first rope is used to pull back the WA-bracket 2 **25** with the hoist rope **58**.
- The second rope is used to secure the WA-bracket 2 **25** with the auxiliary crane at take down.

- ▶ Unhook the ropes **73** on point **P22**.
- ▶ Unhook the rope **73** on the lock **59** and remove.
- ▶ Hook the hoist rope **58** in the lock **59** on the first rope **61**.

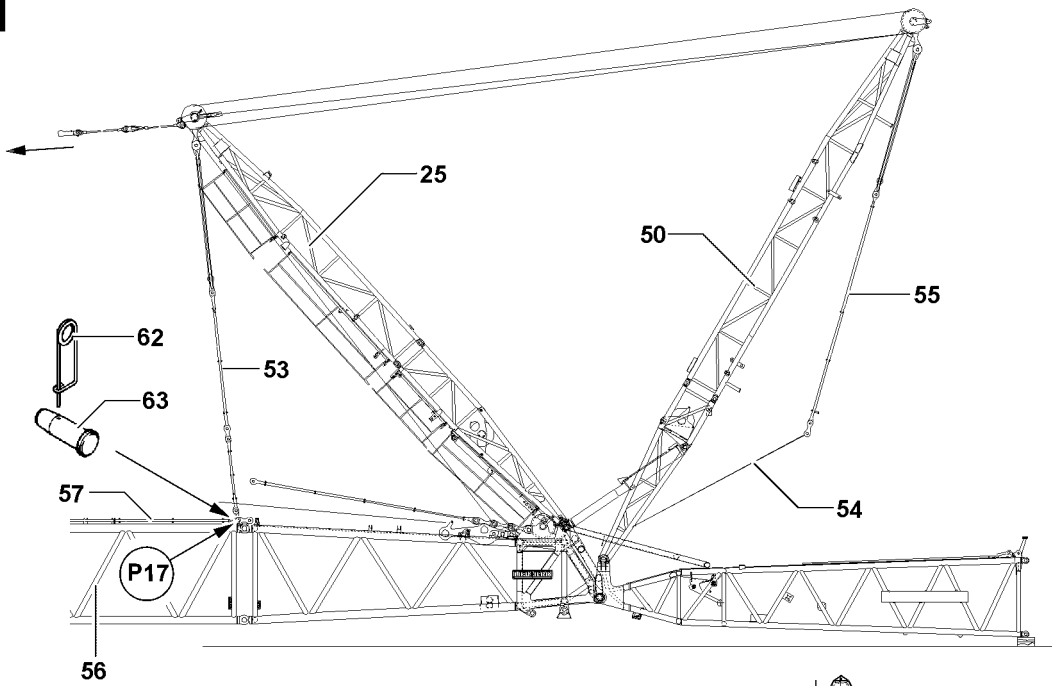
See illustration 7

- ▶ Pull the WA-bracket 2 **25** backward: Spool the W-control rope out and spool the hoist rope **58** up until the relapse supports **7** are pushed in and can be pinned.
- ▶ Insert the pin **71** on point **P19** and secure with spring retainer **72**.
- ▶ Unpin the relapse supports **7** on both sides on the point **P20**: Remove the spring retainer **67** and unpin the pin **68**.

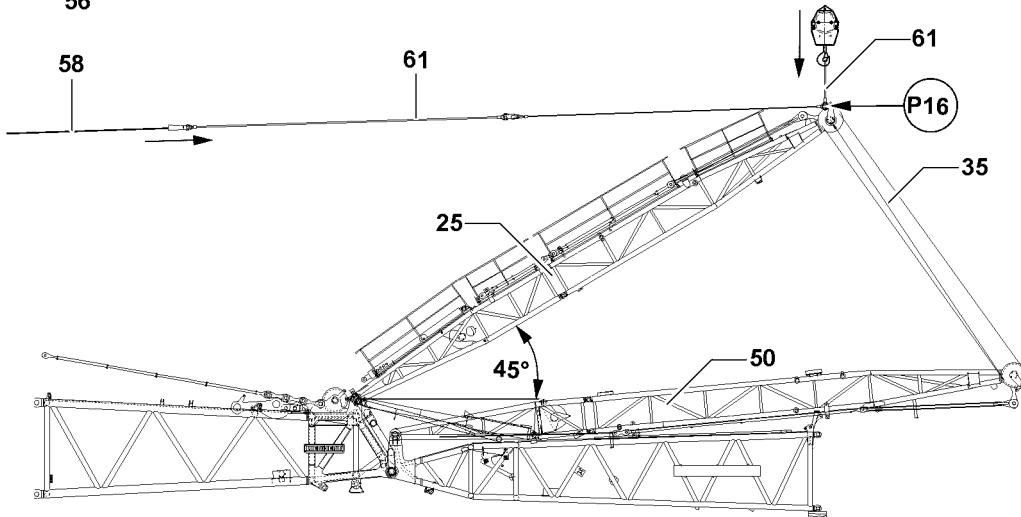
See illustration 8

- ▶ Erect the WA-bracket 2 **25** vertically: Spool the W-control rope up and simultaneously spool out the hoist rope **60**.
- ▶ Pin the relapse supports **7** on both sides on point **17**: Insert the pin **70** and secure with spring retainer **69**.
- ▶ Insert the pin **68** on point **18** on the retainer **66** and secure with spring retainer **67**.

9



10



11

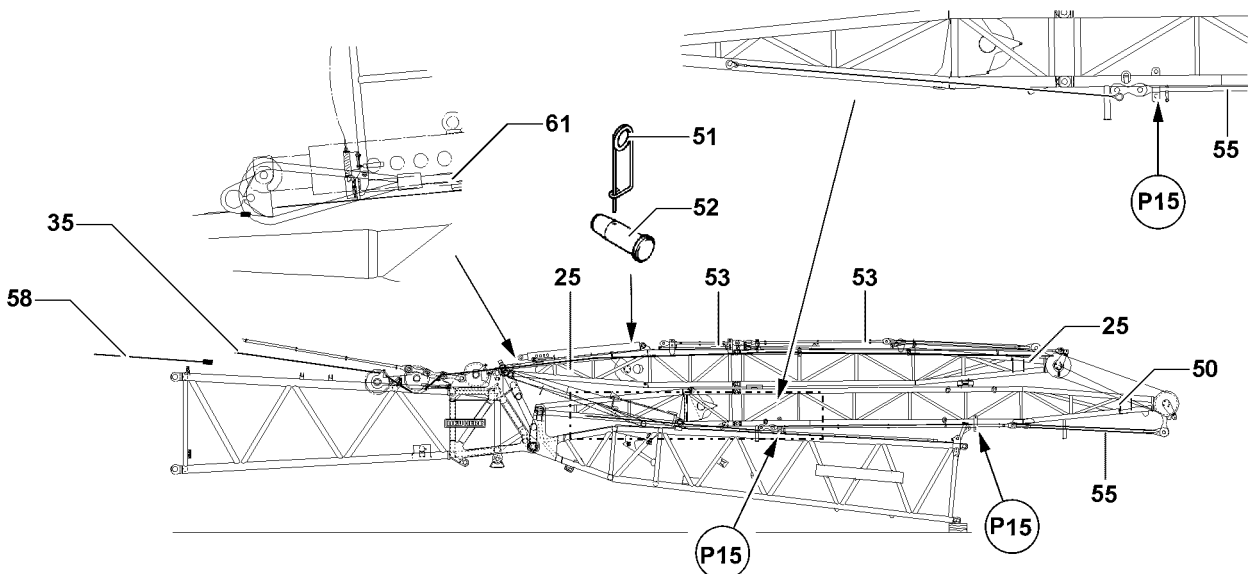


Fig.112152

LWE/LR 1750-000/12812-15-02/en

6.5 Disassembling the WA-bracket 2 guy rods

See illustration 9

- ▶ Pull the WA-bracket 2 **25** back until the W-guy rods **53** hang down vertically: Spool the W-control rope out and simultaneously spool up the hoist rope.
- ▶ Release the transport retainers of the W-guy rods on the S/SL-boom and unpin.
- ▶ Place the W-guy rods **57** in the transport retainers on the S/SL-boom **56**.
- ▶ Separate the W-guy rods **57** on the point **P17** from the W-guy rods **53**: Remove the spring retainer **62** and unpin the pin **63**.
- ▶ Secure the W-guy rods **57** in the transport retainers on the S/SL-boom **56**.

See illustration 10



WARNING

WA-bracket 2 folding downward!

If WA-bracket 2 is not held with the auxiliary crane at 45° while placing down, it can fold downward. Personnel can be severely injured or killed!

- ▶ Fasten the WA-bracket 2 **25** on the auxiliary crane and secure it!



Note

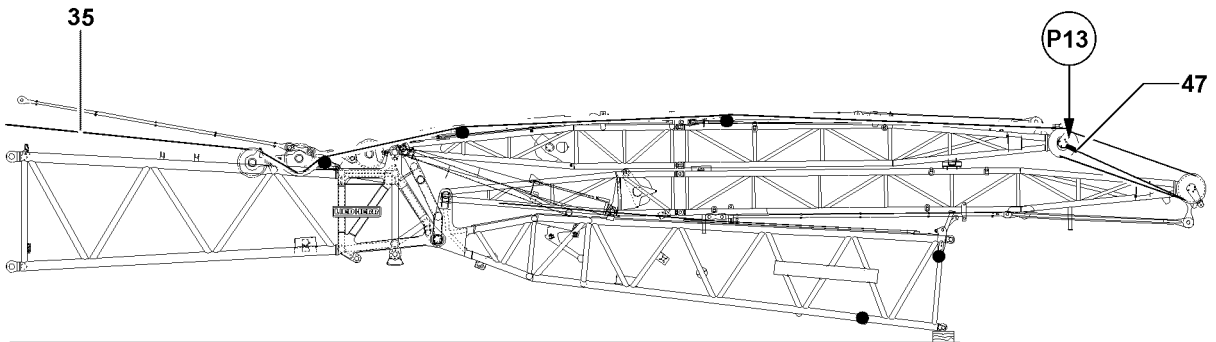
- ▶ While spooling up the W-control rope, hold the WA-bracket 2 **25** with the auxiliary crane on tension to prevent slack rope formation!

- ▶ Erect the WA-bracket 2 **25** and tilt it forward by 45°: Spool the W-control rope **35** up and simultaneously spool out the hoist rope **58**.
- ▶ Secure the WA-bracket 2 **25**: Fasten the second rope **61** on the auxiliary crane.
- ▶ Position the auxiliary crane vertically over point **P16** and tension the rope **61**.
- ▶ Spool the hoist rope **58** out until the rope **61** is relieved and the WA-bracket 2 **25** can be placed down.

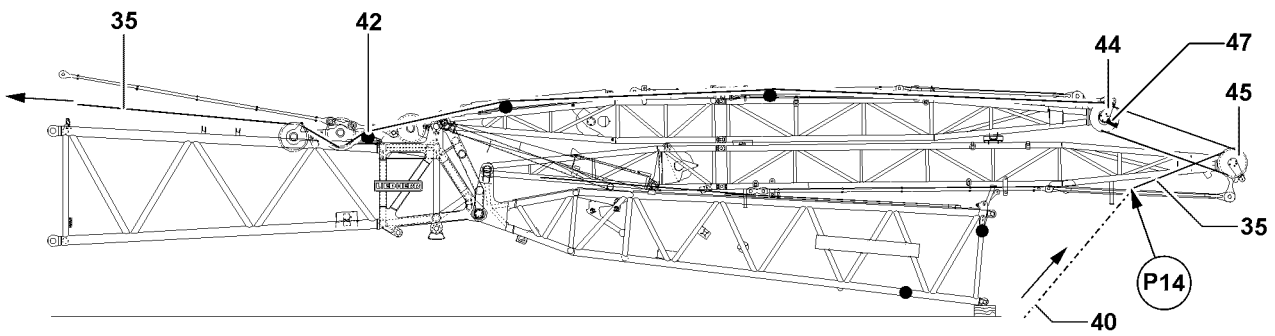
See illustration 11

- ▶ Place the WA-bracket 1 **50** down.
- ▶ Secure the W-guy rods **55** in retainers on point **P15** on the WA-bracket 1 **50**.
- ▶ Place the WA-bracket 2 **25** down with the auxiliary crane on the WA-bracket 1 **50**, spool the W-control rope **35** up and simultaneously spool the hoist rope **58** out.
- ▶ Secure the rope **61** on the WA-bracket 2 **25** and separate it from the hoist rope **58**.
- ▶ Spool the hoist rope **58** up.
- ▶ Separate the W-guy rods **53** on the WA-bracket 2 **25**: Remove the spring retainer **51** and unpin the pin **52**.
- ▶ Secure the W-guy rods **53** with transport retainers on the WA-bracket 2 **25**.

12



13



14

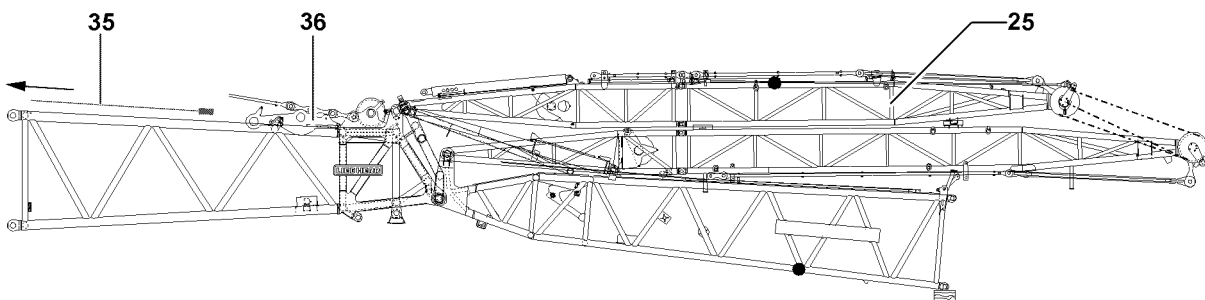


Fig.112153

LWE/LR 1750-000/12812-15-02/en

6.6 Unreeving the W-control rope

NOTICE

Slack rope formation!

The control rope can be damaged if the ropes are slack!

- ▶ Do not allow slack rope formation while spooling the W-control rope up!
- ▶ When spooling the W-control rope up, keep the rope tight!



Note

- ▶ Before unreeving in the W-control rope, the rope retaining pins of the rope pulley **42**, pulley set **44** and pullet set **45** must be released and unpinned, see illustration **13**!

6.6.1 Unreeving the W-control rope on the pulley sets

Make sure that the following prerequisite is met:

- The intake rope for the pulley sets is available.

See illustration **12**

- ▶ Unhook the W-control rope **35** on point **P13** on the lock **47**.

See illustration **13**

- ▶ Pull the intake rope **40** to point **P14**.
- ▶ Connect the intake rope **40** and the W-control rope **35** on point **P14**.
- ▶ Spool the W-control rope **35** up and pull the intake rope in on the pulley set **44** and on the pulley set **45**.
- ▶ Hook the intake rope **40** on the lock **47**.
- ▶ Separate the W-control rope **35** on the pulley set **44** from the intake rope **40**.
- ▶ Pin and secure the rope retaining pins on the pulley sets.

6.6.2 Pulling the W-control rope from the WA-bracket 2

Make sure that the following prerequisite is met:

- The intake rope for the WA-bracket 2 is available.

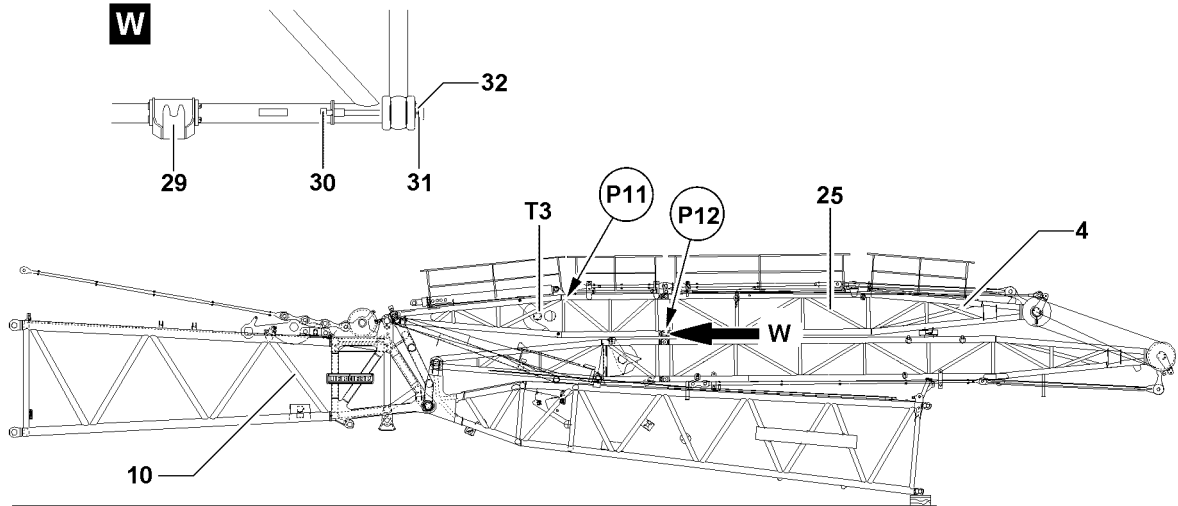
See illustration **14**

- ▶ Pull the W-control rope **35** from the WA-bracket 2 **25** and spool onto winch 5.
- ▶ Pin and secure the rope retaining pins on the rope pulley **42**.

Result:

- The W-assembly units can be disassembled.

15



16

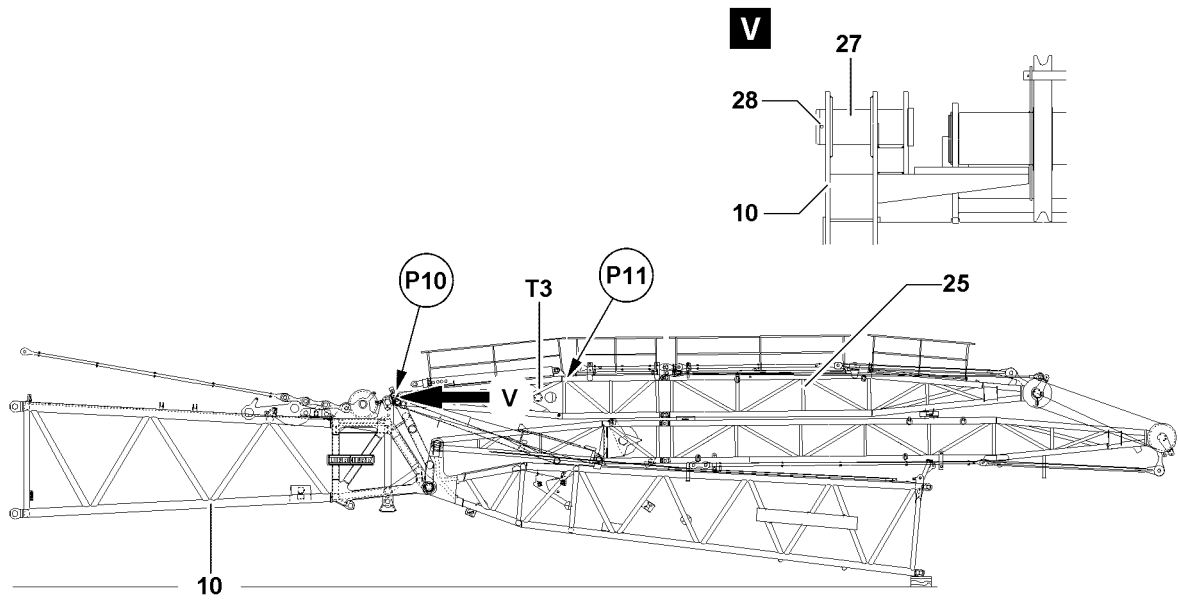


Fig.112154

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6.7 Disassembling the W-transport units

6.7.1 Separating the WA-bracket 2

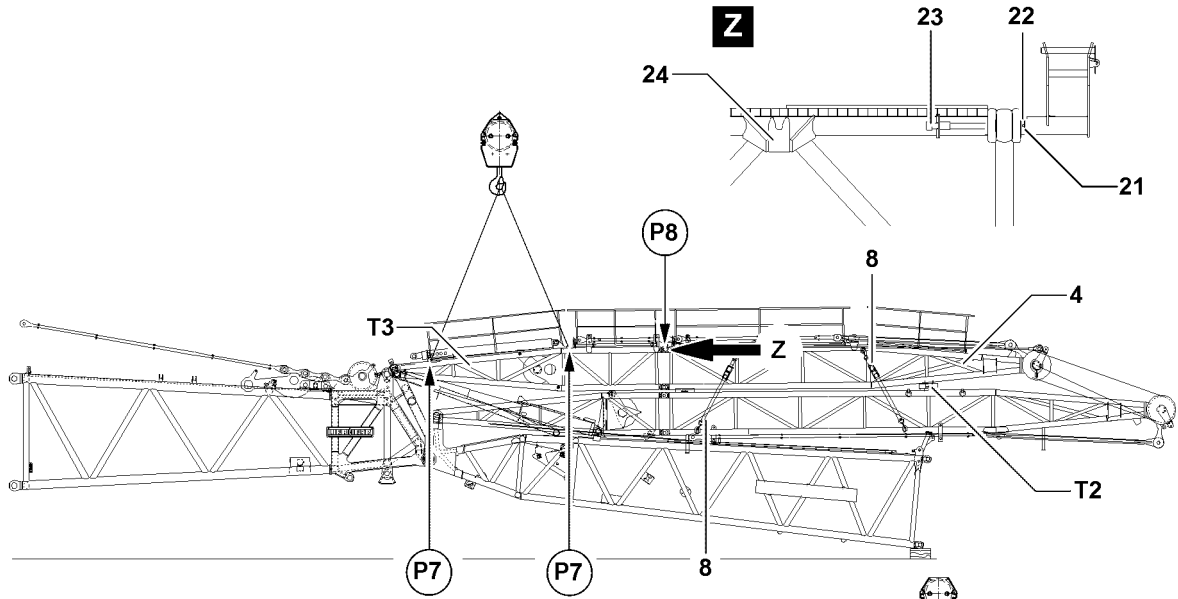
See illustration 15

- ▶ Secure and slightly lift the WA-bracket 2 **25** with the auxiliary crane on point **P11** until it can be unpinned on point **P12**.
- ▶ Hang the pin pulling cylinder on the retainer **29** and on the screw **30**.
- ▶ Disconnect the transport unit **T3** and the WA-bracket 2 end section **4**: Remove the spring retainer **31** on both sides on point **P12** and unpin the pin **32**.

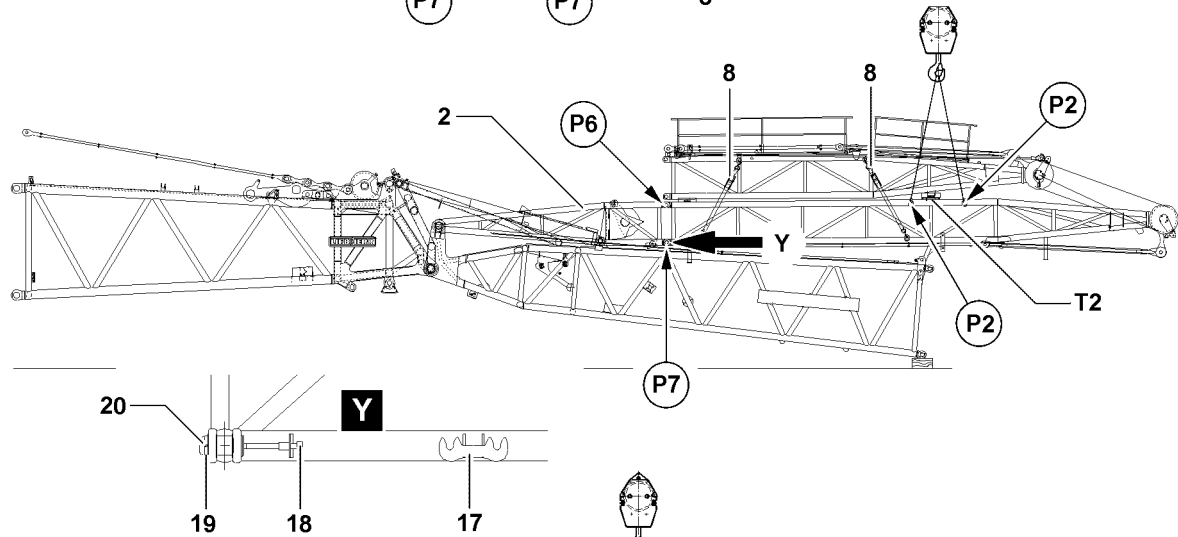
See illustration 16

- ▶ Disconnect the transport unit **T3** and the S-end section **10**: Remove the spring retainer **28** on both sides on point **P10** and unpin the pin **27**.

17



18



19

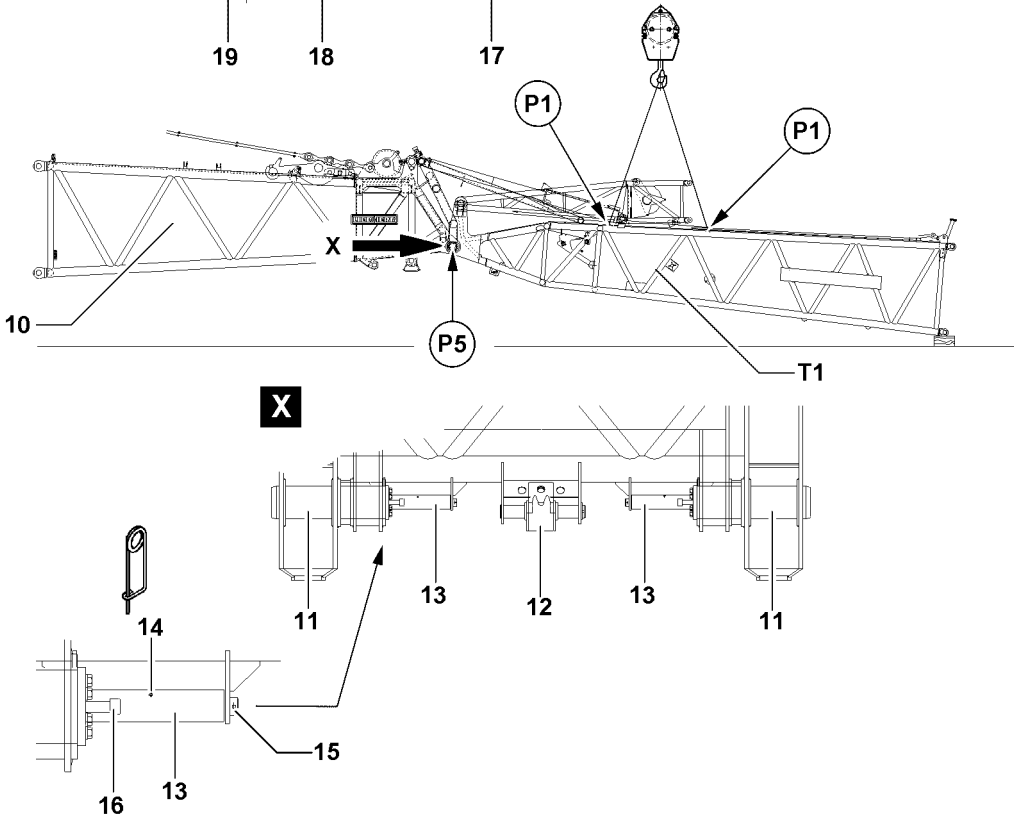


Fig.112155

LWE/LR 1750-000/12812-15-02/en

6.7.2 Disassembling the W-transport unit 3

See illustration 17

- ▶ Secure the transport unit **T2** with the lashing belts **8**.
- ▶ Attach and secure the auxiliary crane on the fastening points **P7** on the transport unit **T3**.
- ▶ Hang the pin pulling cylinder on the retainer **24** and on the screw **23**.
- ▶ Disconnect the transport unit **T3** and the WA-bracket 2 end section **4** „on top“: Remove the spring retainer **21** on both sides on point **P8** and insert the pin **22**.
- ▶ Remove the transport unit **T3** with the auxiliary crane.

6.7.3 Disassembling the W-transport unit 2

See illustration 18

Make sure that the following prerequisite is met:

- The lashing belts **8** are tightly rigged on the transport unit **T2**.



WARNING

Slipping component!

If the lashing belts are not present or insufficiently secured while raising the transport unit **T2**, the end section of the WA-bracket 2 can slide down.

Personnel can be severely injured or killed!

- ▶ Make sure that the lashing belts **8** on the transport unit **T2** are tightly secured!

- ▶ Attach and secure the auxiliary crane on the fastening points **P2** on the transport unit **T2**.
- ▶ Hang the pin pulling cylinder on the retainer **17** and on the screw **18**.
- ▶ Disconnect the transport unit **T2** and the WA-bracket 1 pivot section **2** „on the bottom“: Remove the locking pin **19** on both sides on point **P7** and unpin the pin **18**.
- ▶ Disconnect the transport unit **T2** and the WA-bracket 1 pivot section **2** „on top“ on point **P6**.
- ▶ Remove the transport unit **T2** with the auxiliary crane.

6.7.4 Disassembling the W-transport unit 1

See illustration 19

- ▶ Attach and secure the auxiliary crane on the fastening points **P1** on the transport unit **T1**.
- ▶ Remove the retaining plate **13**: Remove the spring retainer **14** and pull the retaining plate **13** from the pin **15**.

Result:

- The pin **11** can be unpinned.



Note

- ▶ The retainer **12** can be offset to the left or right when the piston stroke of the pin pulling cylinder is not sufficient to pin or unpin the pin **11** completely!
- ▶ Hang the pin pulling cylinder on the retainer **12** and screw **16**, see detail **X**.
- ▶ Disconnect the transport unit **T1** and the S-end section **10**: Unpin pin **11** on both sides on point **P5**.
- ▶ Remove the transport unit **T1** with the auxiliary crane.
- ▶ Secure the pins **11** when they are unpinned: Slide the retaining plate **13** on both sides over the pin **15** and secure with spring retainer **14**.

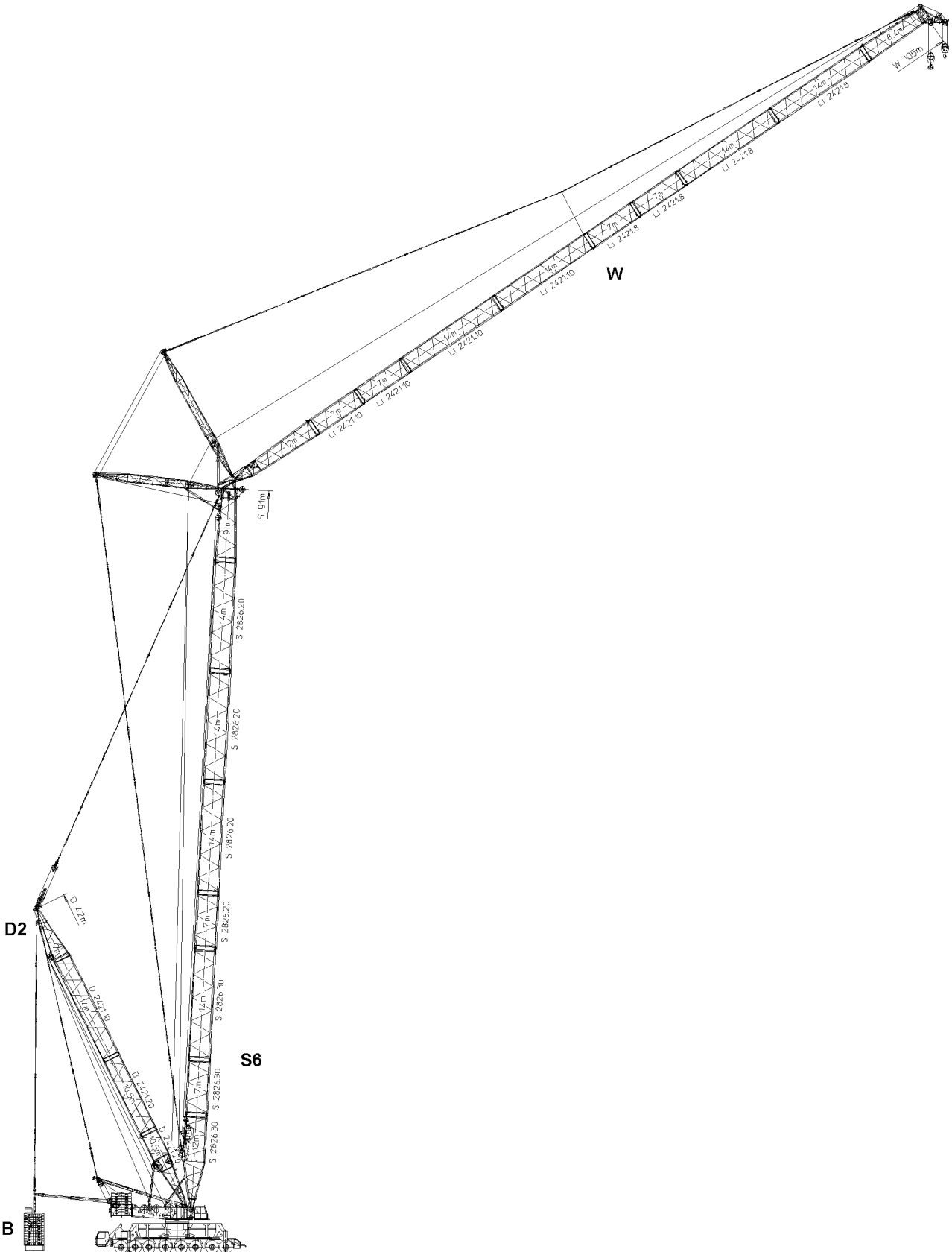


Fig.114937: S6D2W / S6D2WB

LWE/LR 1750-000/12812-15-02/en

7 W-lattice jib in operating mode S6D2WB (only for LG 1750)

The operating mode **S6D2WB** differs from the operating mode SDWB by a reinforced S-boom and by another derrick boom length. The W-guying however is identical.

Derrick boom lengths	
SD-operation	S6D2-operation
31.5 m	42.0 m

7.1 Assembling the W-lattice jib



WARNING

The crane can topple over!

If danger notes are not observed, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Observe and adhere to the danger notes during assembly of the S6D2WB-boom system!



Note

- ▶ The assembly of the W-lattice jib on the S6D2-boom system is identical to the assembly on the SD-boom system!

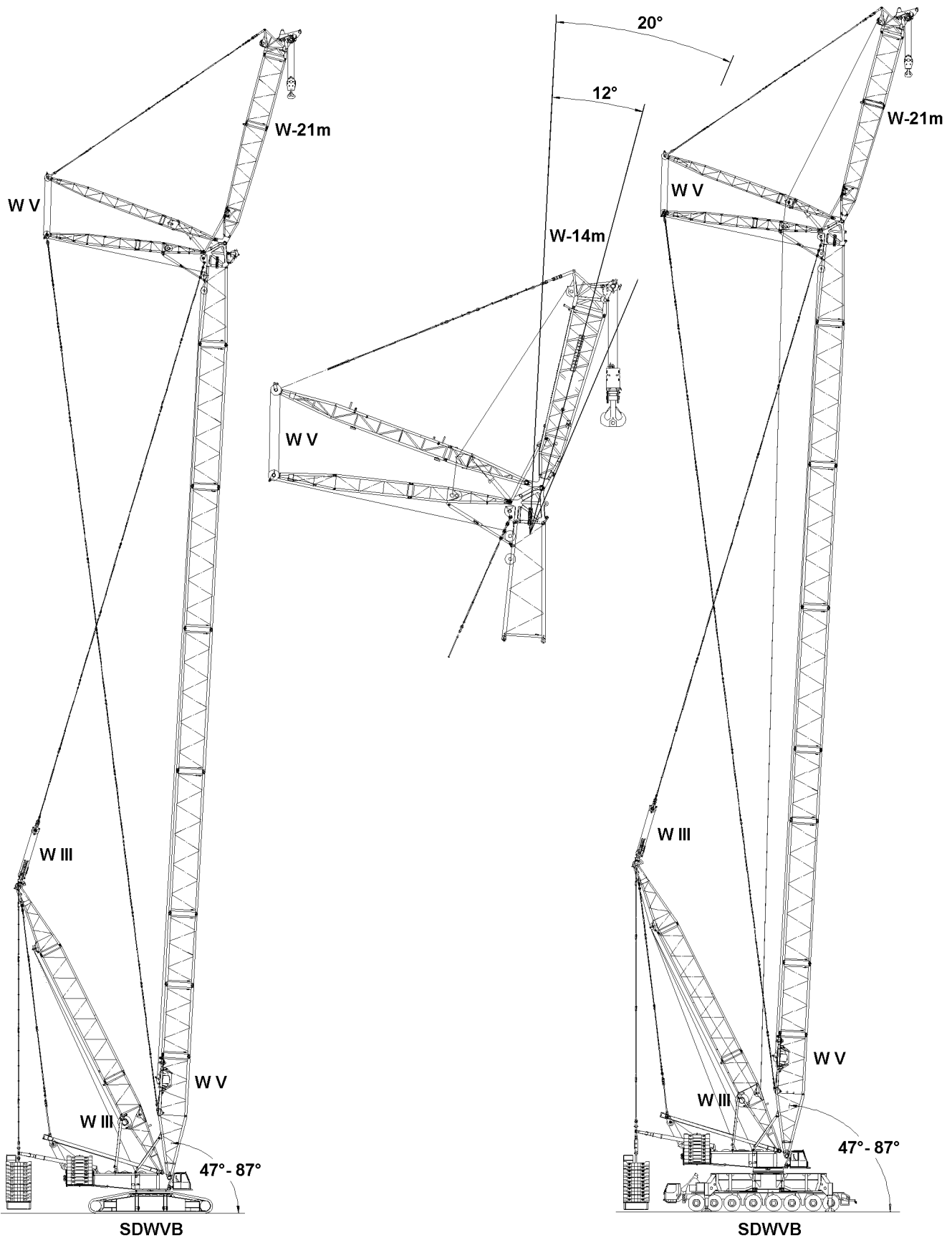


Fig.111641

LWE/LR 1750-000/12812-15-02/en

1 WV-lattice jib

This chapter refers to the SDW-boom systems with the following WV-lattice jib lengths:

- 14 m
- 21 m



Note

- For the WV-lattice jibs W-14 and W-21 additional guy rods must be installed according to the rod plan!
-

The operating positions of the WV-lattice jib to the S-boom are:

- 12 °
- **or** 20 °

The adjustment of the WV-lattice jib is made by winch 5 **W V**.

The adjustment of the S-boom, together with the WV-lattice jib is made by winch 3 **W III**.

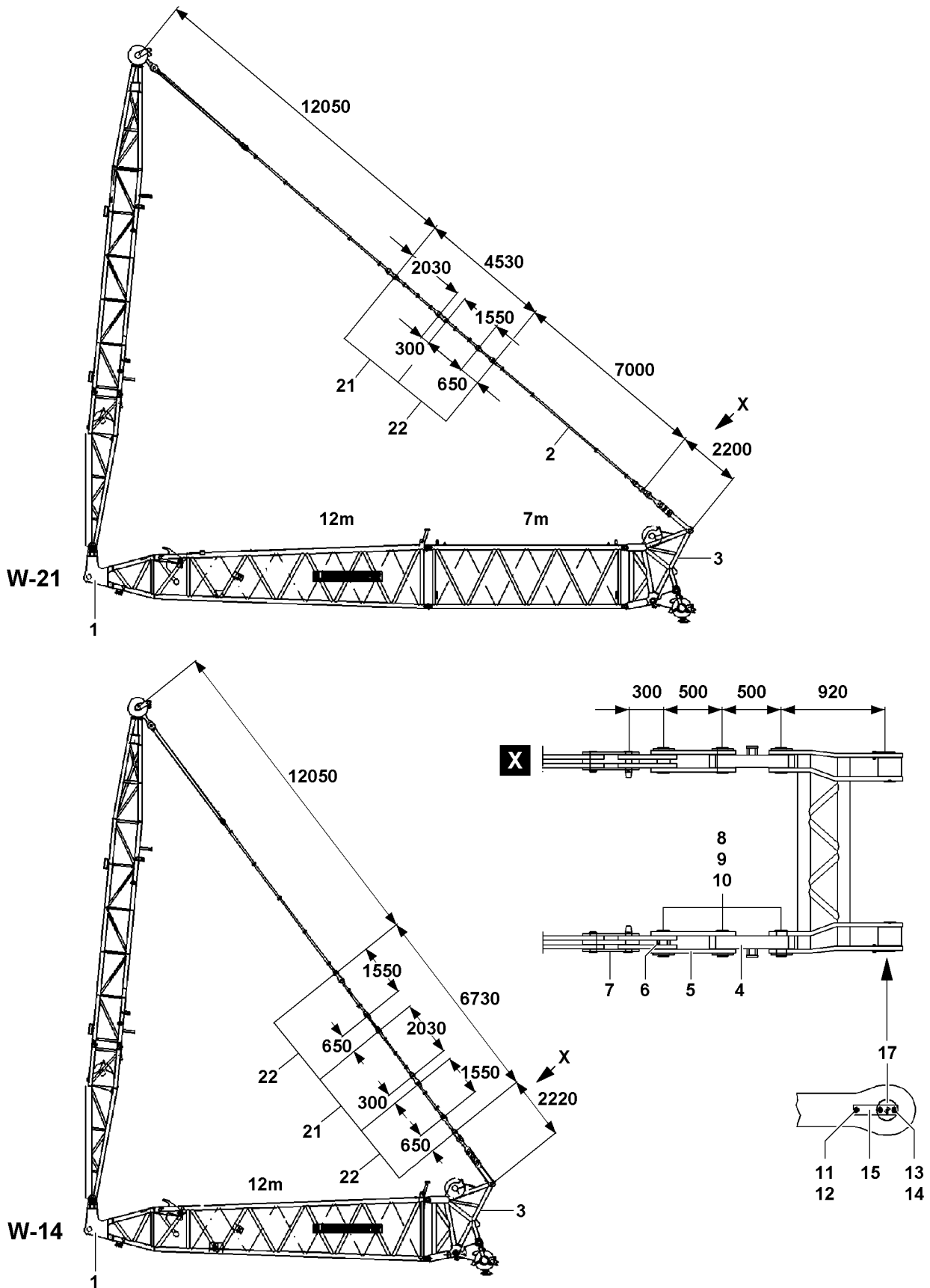


Fig.111647

LWE/LR 1750-000/12812-15-02/en

1.1 Components

Component overview	
Position	Description
1	Assembly unit, consisting of three transport units
2	Guy rod 7000 mm
3	W-adapter for pulley head 600 t / 400 t
4	Pull test bracket
5	Lug 500 mm
6	Pipe
7	Lug 300 mm
8	Pin
9	Retaining ring
10	Washer
11	Nut
12	Screw
13	Lock washer
14	Screw
15	Plate
16	Pin
21	Guy rod 2330 mm
22	Guy rod 2200 mm

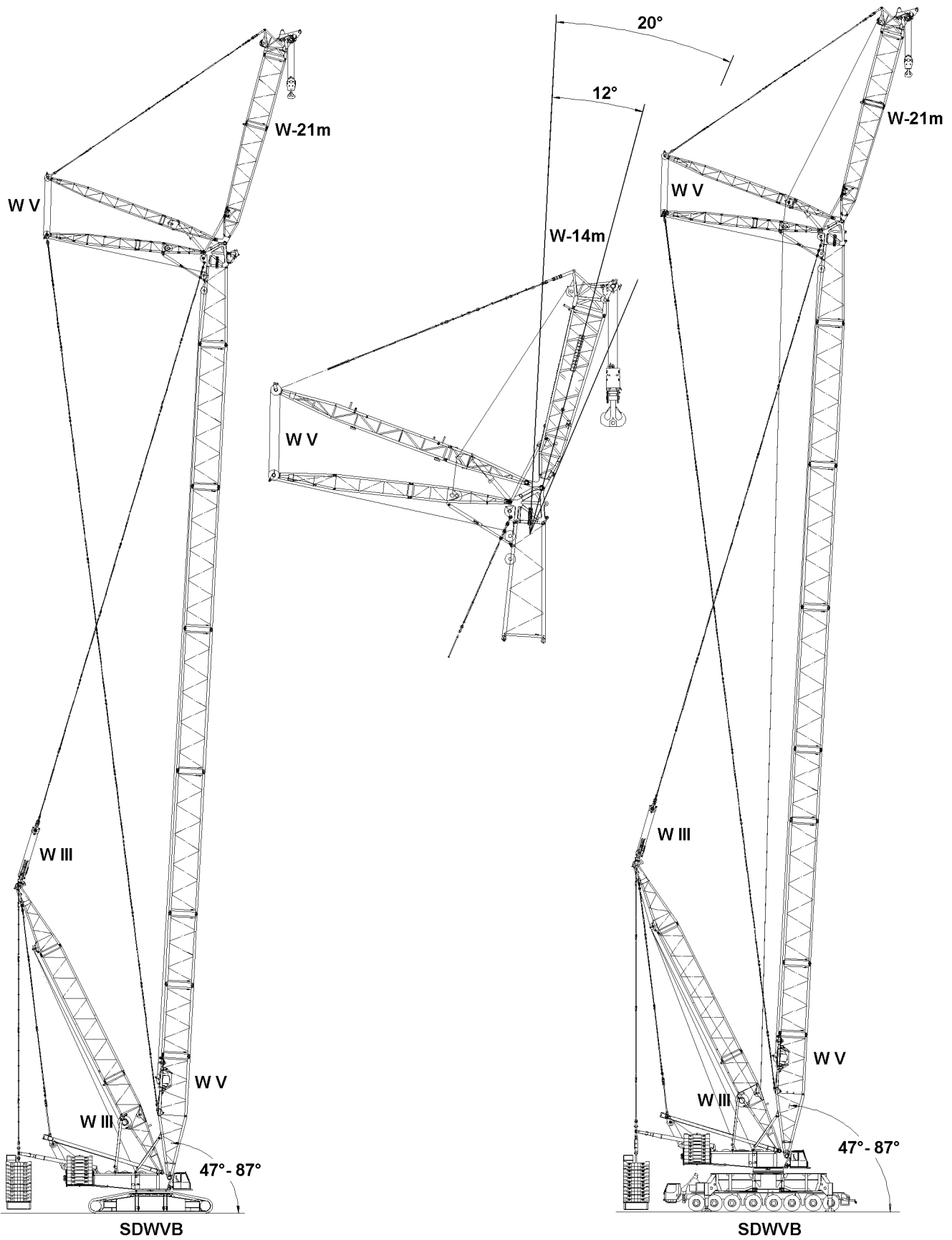


Fig.111641

LWE/LR 1750-000/12812-15-02/en

2 Assembling the WV-boom system



WARNING

Risk of falling!

During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- ▶ All assembly work must be carried out using suitable aids (lifting platforms, scaffolding, ladder, auxiliary crane, etc.)!
- ▶ If work cannot be carried out on the ground or using such aids, then assembly personnel must be secured with the personal fall arrest system (see Crane operating instructions, chapter 2.04) to protect against falling! The personal fall arrest system must be attached in the corresponding fastening points on the crane (see Crane operating instructions, chapter 2.06)!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!



WARNING

Falling components!

If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be severely injured or killed!

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Support the boom and components before pinning / unpinning!
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ Do not disengage the auxiliary crane until each component is pinned on and secured!
- ▶ It is prohibited to lean a ladder against the component being disassembled!



WARNING

Danger of crushing!

Components can swing during assembling. Hands can be crushed or severed!

- ▶ Make sure that the components do not swing back and forth during assembly!



WARNING

Neglected inspection and maintenance on guy rods!

If the regular inspection and maintenance of the guy rods is not carried out or is carried out only in irregular intervals, then severe accidents can occur due to existing and unrecognized damage to the guy rods!

Personnel can be severely injured or killed!

- ▶ Check the guy rods before every assembly, see Crane operating instructions, chapter 8.15!

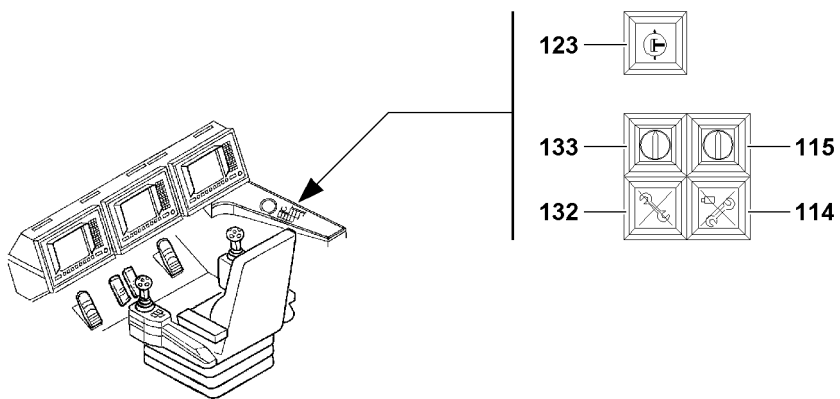
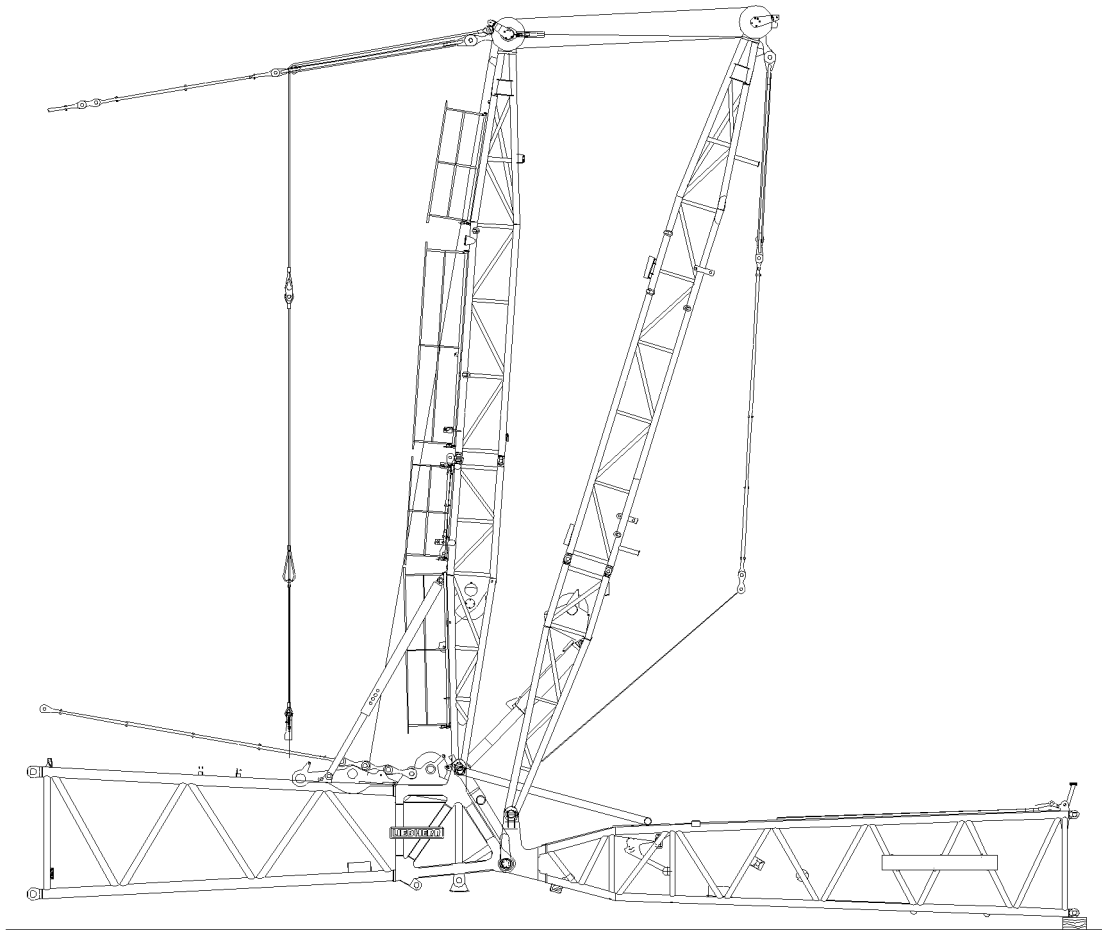


Fig.111736

LWE/LR 1750-000/12812-15-02/en

**Note**

- ▶ By supporting the components during assembly / disassembly, ground unevenness is compensated for and the material is protected!

**Note**

- ▶ The intermediate sections are pinned and unpinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30!

NOTICE

Property damage!

- ▶ Always insert the pins of the guy rods from the „inside“ to the „outside“!

**Note**

- ▶ The S-guy rods must be assembled and secured according to the separately supplied assembly drawings! The numbering on the assembly drawings must be identical to the numbering on the guy rods!

**Note**

- ▶ The boom combinations must be assembled according to the separately supplied rod and assembly plans!

**WARNING**

Assembly with activated assembly key button!

When the assembly key button is engaged, the LICCON overload protection is exceeded!

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be severely injured or killed!

This could result in high property damage!

- ▶ The assembly key button **133** may only be operated by persons who are aware of the consequences of a bypass!
- ▶ Press the assembly key button **133** only when the set up status was correctly entered into the LICCON computer system!
- ▶ Observe the erection / take down charts!
- ▶ Crane operation with the assembly key button **133** turned on is strictly prohibited!
- ▶ If the assembly key button **133** is turned on, the hoist limit switch and the LICCON overload protection is bypassed!

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- The SD-boom combination is assembled, see Crane operating instructions, chapter 5.04 or chapter 5.38 and chapter 5.05.
- The counterweight has been installed on the turntable according to the load chart.
- The derrick ballast is placed on the suspended ballast or the ballast trailer according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual crane configuration.
- The LICCON overload protection is exceeded.
- The assembly icon **11** is visible on the LICCON monitor.
- An auxiliary crane is available.

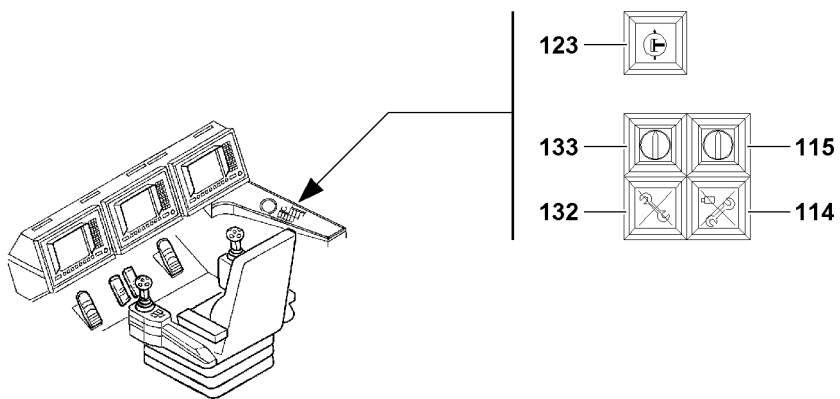
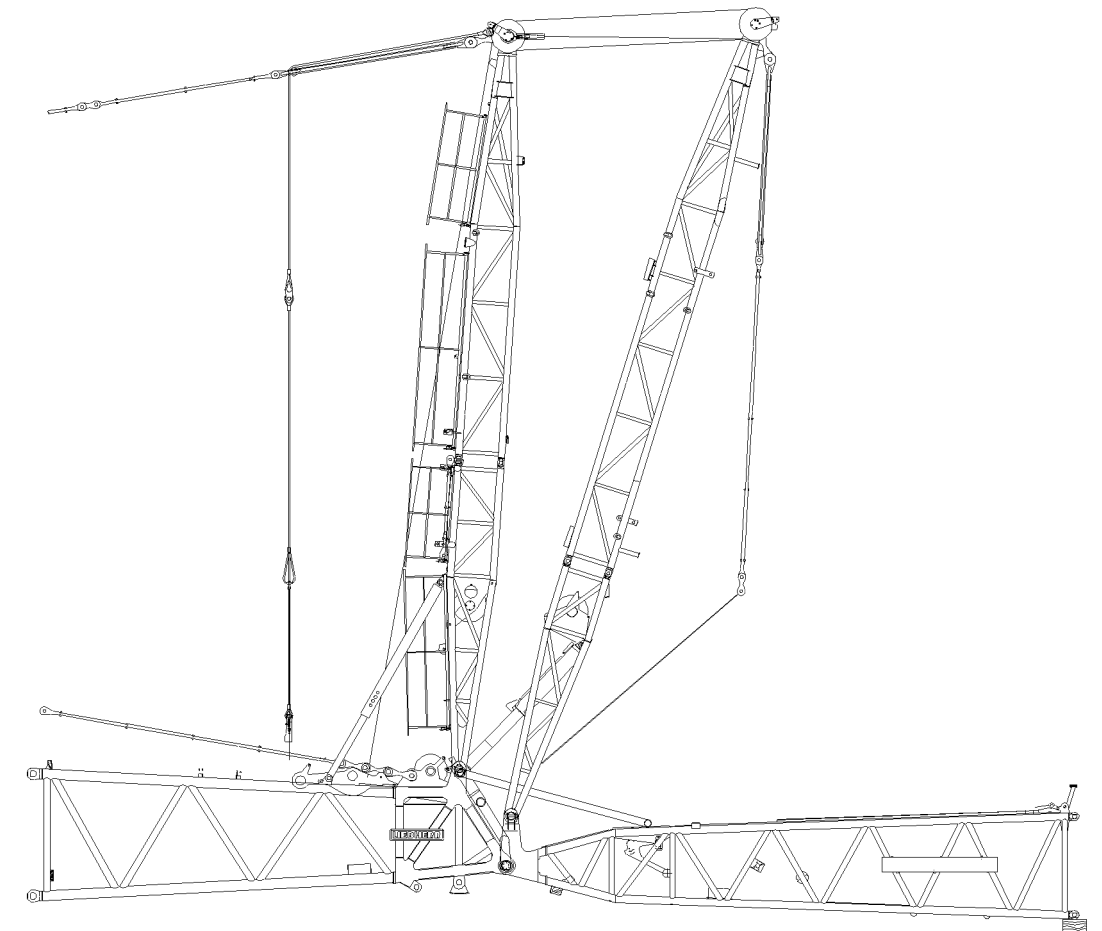


Fig.111736

LWE/LR 1750-000/12812-15-02/en

2.1 Assembling the W-transport units

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

2.2 Reeving the W-control rope in

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

2.3 Assembling the guy rods WA-bracket 2

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

2.4 Pinning the relapse supports

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

2.5 Assembling the WV-lattice jib

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

2.6 Establishing the electrical connections

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

► Additionally observe the electric wiring diagram!

2.7 Checking the function of the safety devices

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

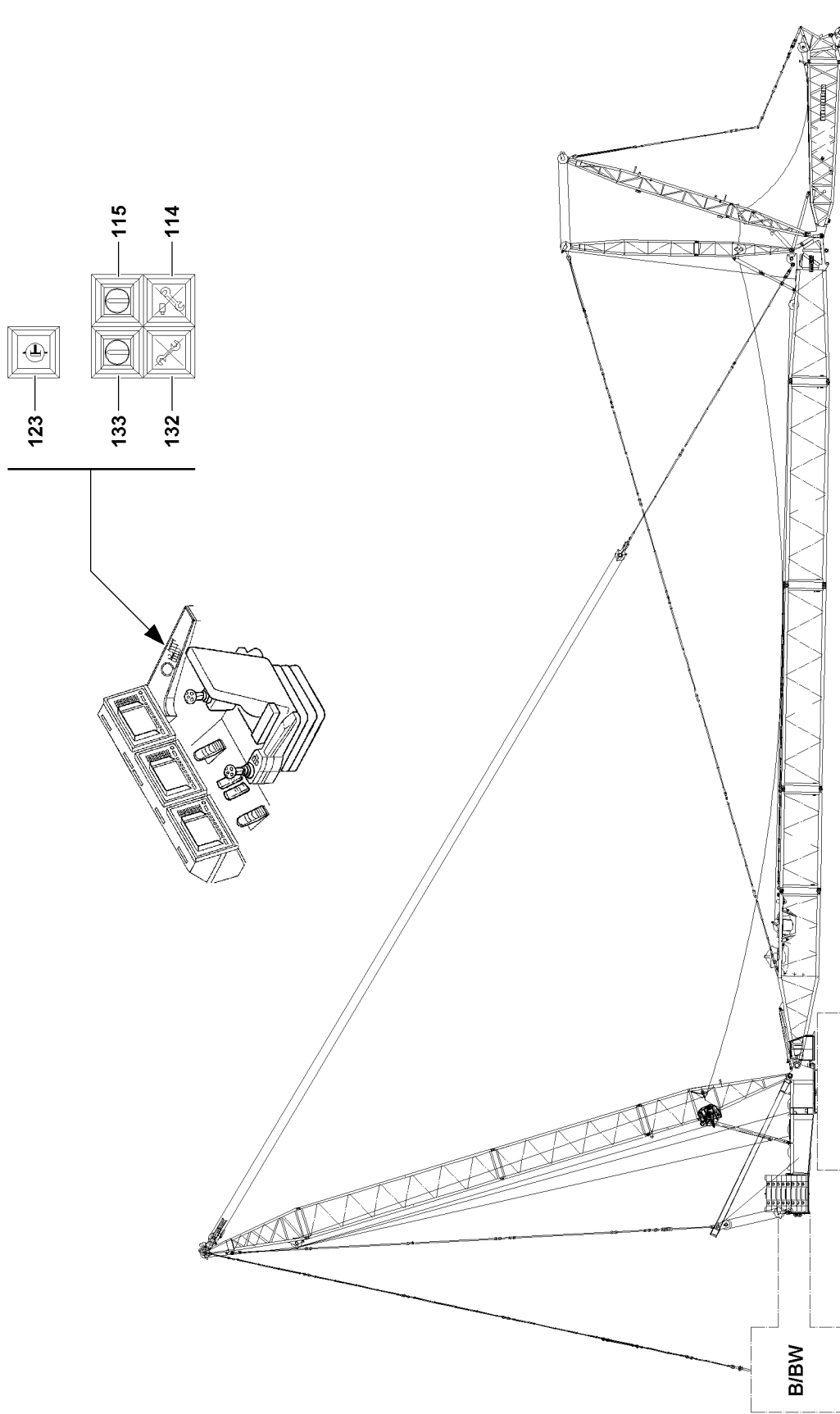


Fig.111737

LWE/LR 1750-000/12812-15-02/en

2.8 Erecting the boom



Note

- ▶ The erection procedure in this chapter refers to the WV-lattice jibs W-14 and W-21!



DANGER

The crane can topple over!

- ▶ It is not permitted to turn the crane during the erection procedure!
- ▶ Observe the data in the erection and take down charts!
- ▶ Observe the safety technical notes, see Crane operating instructions, chapter 5.01!



DANGER

The crane can topple over!

For certain boom lengths, the mechanical auxiliary supports must be assembled (only for LR-crane), see Erection and take down charts!

- ▶ The boom must be erected or taken down „to the side“ „in the direction“ of the mechanical auxiliary supports!
- ▶ Always erect or take down according to the data in the **erection and take down charts!**



DANGER

Tipping lattice jib!

If the easy movement on the pendulum of the mechanical relapse support is not checked before erection or not re-established, if necessary, then the mechanical relapse support will not engage in steep lattice jib position. As a result, the lattice jib can tip to the rear!

Personnel can be severely injured or killed!

- ▶ Check the easy movement on the pendulum **40** of the mechanical relapse support before erection!
- ▶ If the pendulum does not move easily: Make the pendulum **40** easy to move!



WARNING

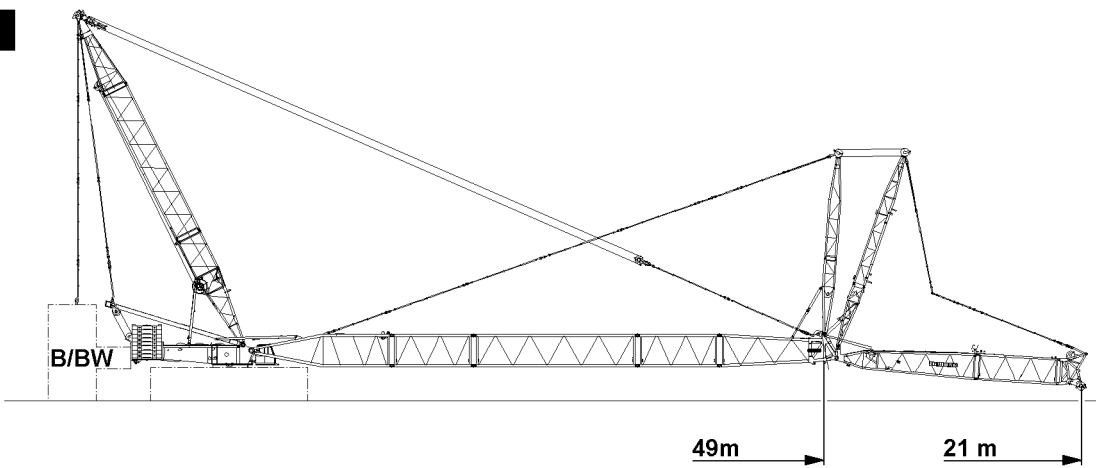
The crane can topple over!

If the following conditions are not met before erecting the boom, the crane can topple over!

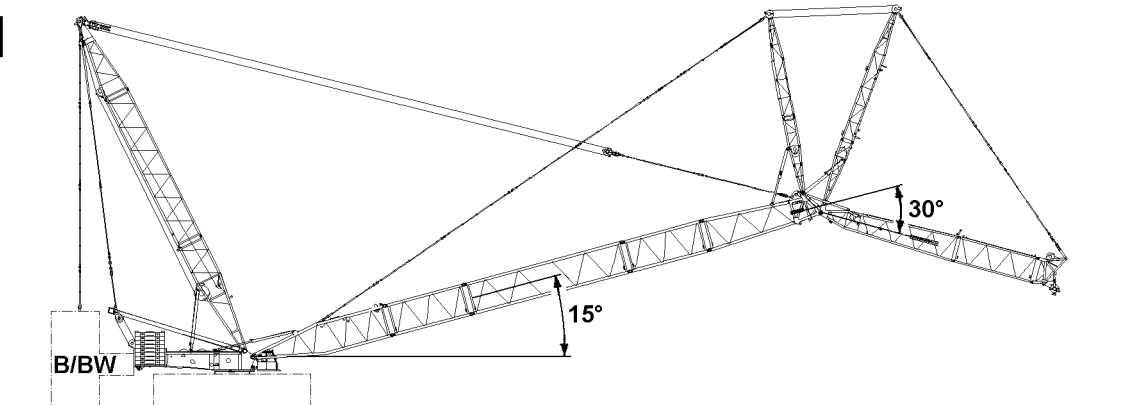
Personnel can be severely injured or killed!

- ▶ Spool the lattice jib control out so that the guy rods sag slightly!
- ▶ Do not allow slack cable to build up on the control winch!
- ▶ Move the relapse cylinder out before erection!

1



2



3

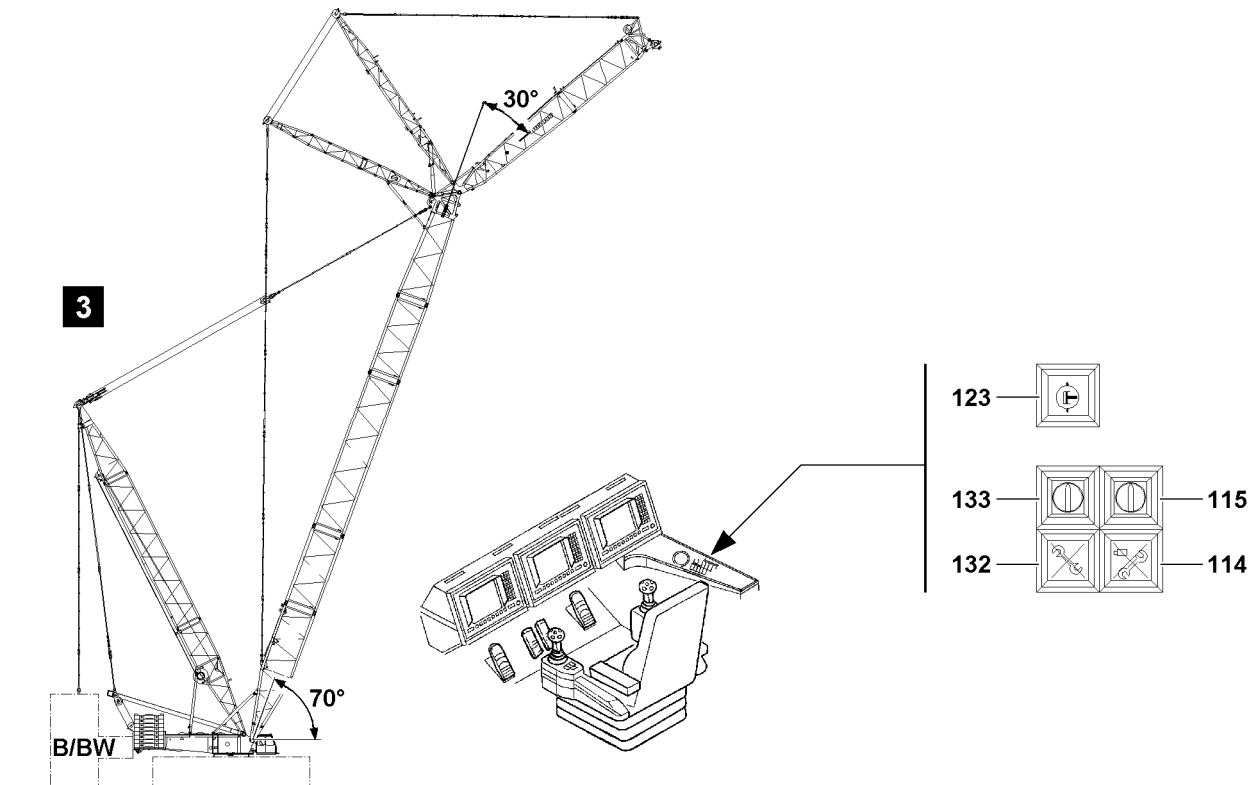


Fig.111738

LWE/LR 1750-000/12812-15-02/en

Make sure that the following prerequisites are met:

- The WV-lattice jib is fully assembled.
- No personnel is within the danger zone.
- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- All electrical connections have been established.
- All limit switches are functioning.
- The counterweight has been installed to the turntable according to the load chart.
- The derrick ballast is placed according to the data in the erection and take down charts.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- There are no loose parts on the boom or the lattice jib.
- Boom, lattice jib and safety devices are free from snow and ice.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual crane configuration.
- The LICCON overload protection is exceeded.
- The assembly icon **11** is visible on the LICCON monitor.



WARNING

Falling hoist rope!

If the hoist rope is not properly secured with a corresponding length on the WV-lattice jib before the erection procedure, then it can fall backward due to its own weight!

Personnel can be severely injured or killed!

- ▶ Reeve in the hoist rope with sufficient length on the WV-lattice jib before the erection procedure!
- ▶ The hoist rope must be constantly monitored during erection!
- ▶ Do not step into the danger zone!



WARNING

The crane can topple over!

If the S-relapse cylinders are not extended before erecting the boom, then the boom can fall down towards the rear during crane operation and the crane can topple over!

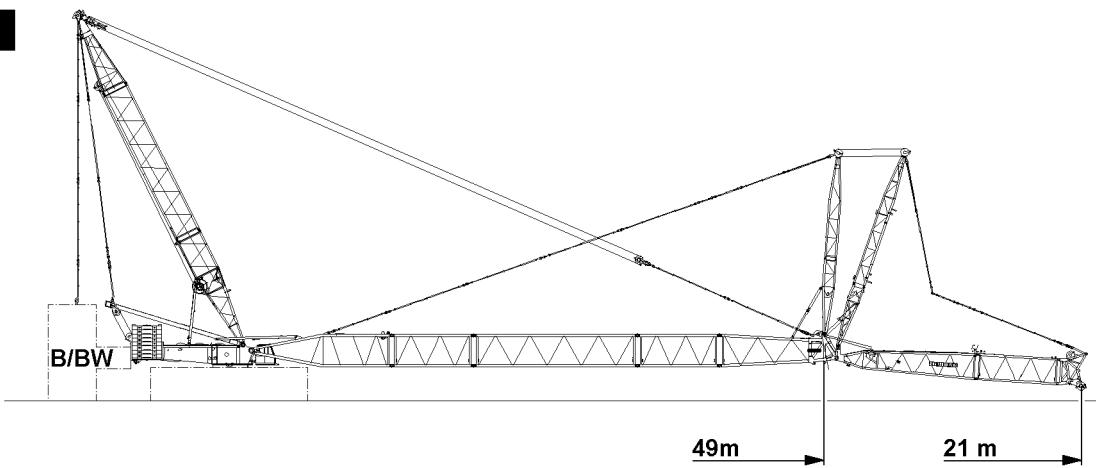
Personnel can be severely injured or killed!

- ▶ Extend the S-relapse cylinder before erecting the boom, see Crane operating instructions, chapter 5.07!
- ▶ Luff the S-boom down until the hook block can be reeved.
- ▶ Reeve in the hook block properly and secure the hoist rope on the rope fixed point, for reeving, see separate reeving plans.
- ▶ Attach the hoist limit switch weight.

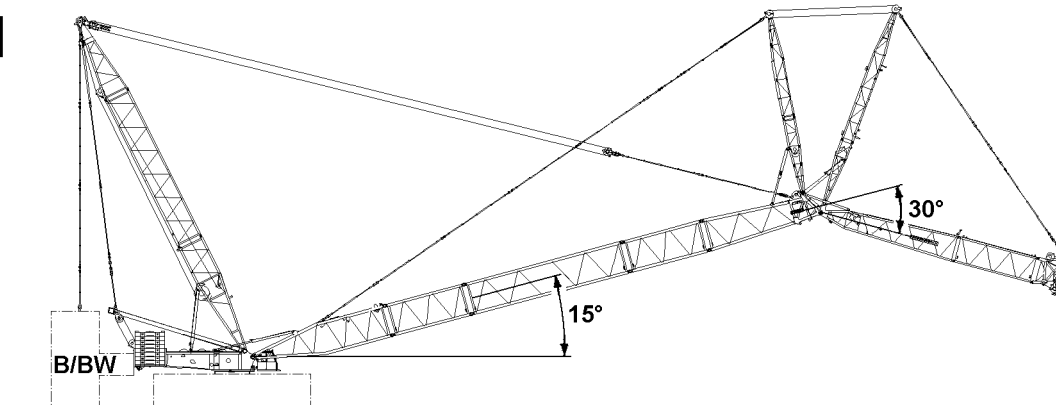
See illustration 2

- ▶ Luff the S-boom up to 15 °.

1



2



3

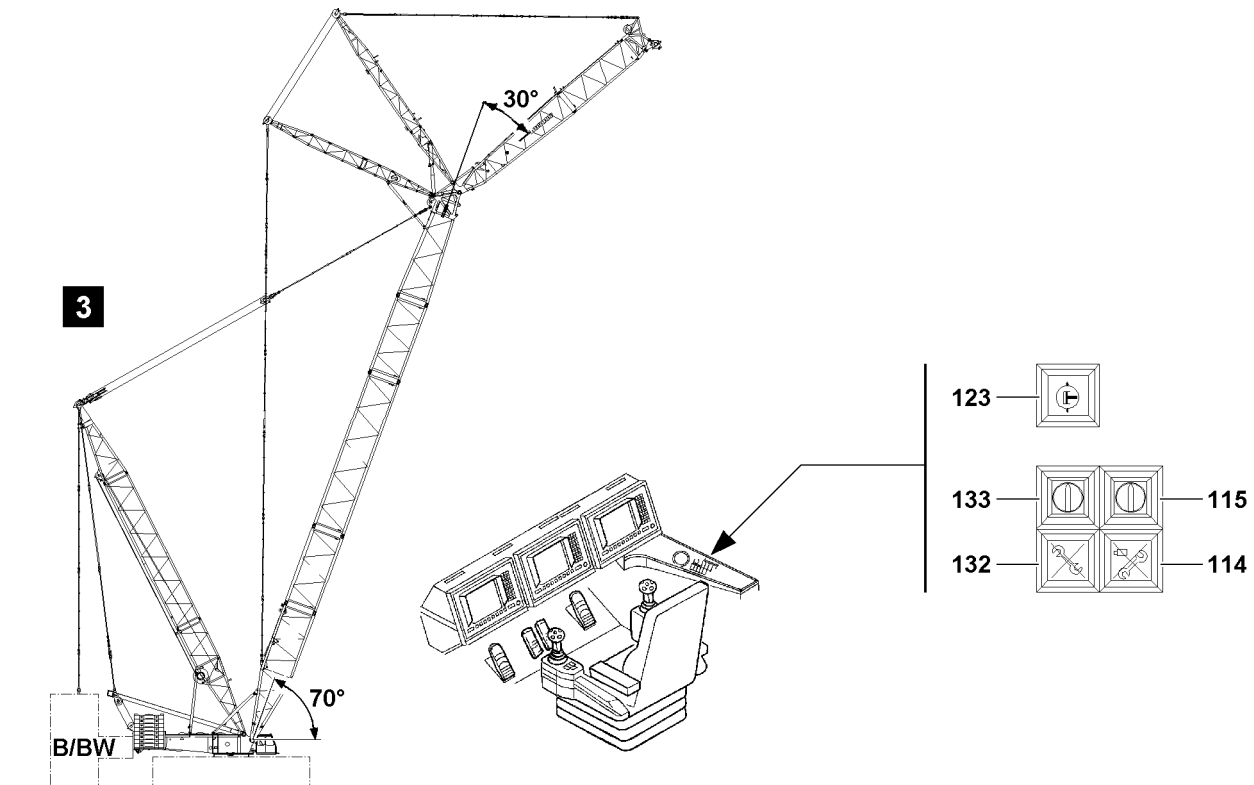


Fig.111738

LWE/LR 1750-000/12812-15-02/en

**WARNING**

The crane can topple over!

If the angle between the boom and the lattice jib is smaller than or equal to 30° , then the mechanical relapse support will collide with the flap on the oscillating guard. The crane can topple over!

Personnel can be severely injured or killed!

- ▶ Make sure that the angle between the S-boom and the WV-lattice jib is more than 30° during the erection procedure!
- ▶ The angle between the S-boom and the WV-lattice jib may not fall below 30° during the erection procedure!
- ▶ Perform a visual inspection during erection!

- ▶ Lower the WV-boom to -15° (the angle between the S-boom and the WV-lattice jib is 30°).

See illustration 3

**DANGER**

The crane can topple over!

In crane operation with exceeded LICCON overload protection, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Crane operation with exceeded overload protection is prohibited!
- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook!

**Note**

- ▶ When the lowest operating position of the WV-lattice jib is reached, the LICCON overload protection is activated!
- ▶ In the maximum load icon appears a load number in „t“ instead of the display „???“!

- ▶ Luff the S-boom up to the lowest operating position.

When the S-boom has reached the lowest operating position:

- ▶ Make sure that the assembly icon 11 on the LICCON monitor turns off.

Result:

- The LICCON overload protection is active.
- ▶ Luff the S-boom up to 70° .
- ▶ Luff the WV-lattice jib to 12° or 20° operating position.
- ▶ Luff the S-boom up into operating position.

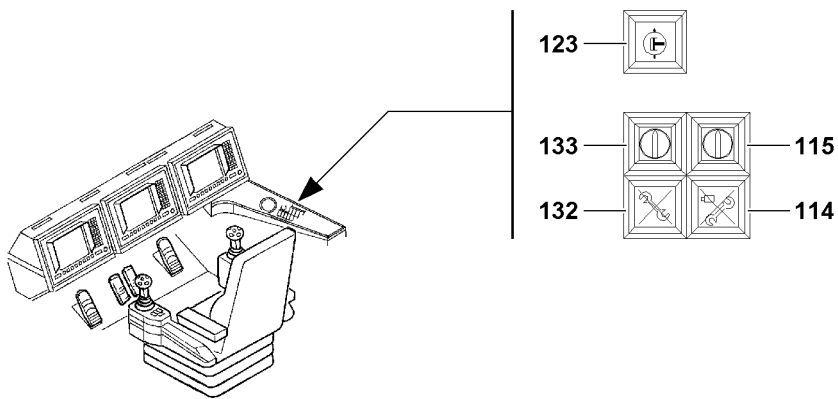
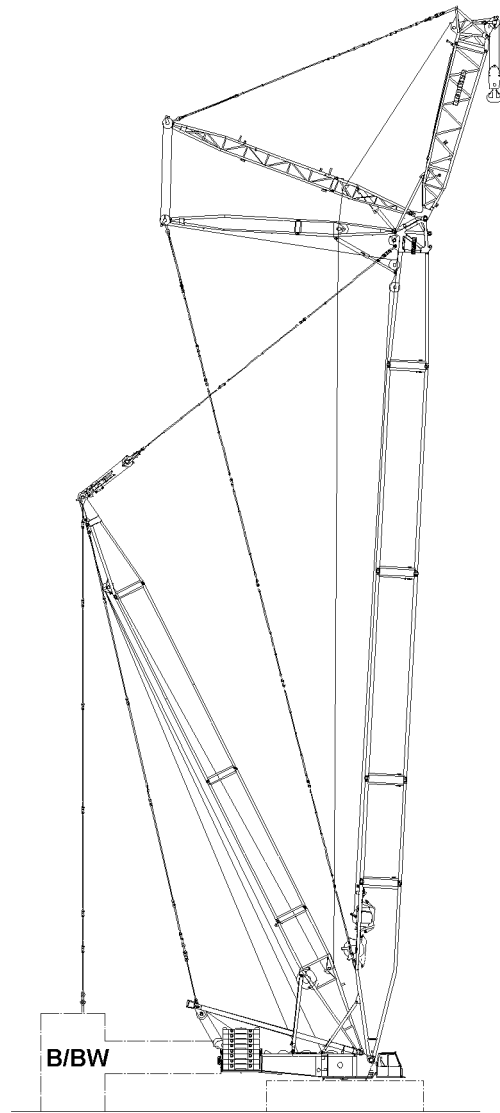


Fig.111739

LWE/LR 1750-000/12812-15-02/en

3 Operating the crane

3.1 Preparing for crane operation

**Note**

- ▶ Observe the notes, see Crane operating instructions, chapter 4.05, chapter 4.08 and chapter 5.01!

Make sure that the following prerequisites are met:

- The LICCON overload protection is active.
- The LICCON overload protection has been set according to the data in the load chart.

**WARNING**

The crane can topple over!

- ▶ Check the horizontal position of the crane before and during operation!
- ▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation!

3.2 Checking the settings

- ▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
- ▶ Check the hoist limit switch by running against the hoist limit switch weight.
- ▶ Check the function of the limit switches on the relapse cylinders.

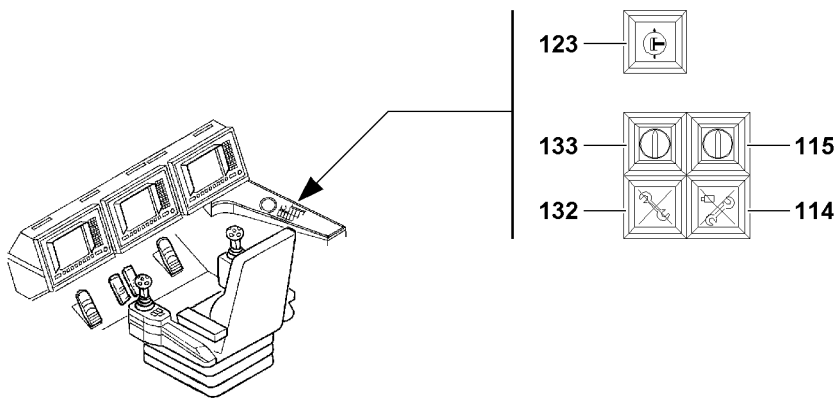
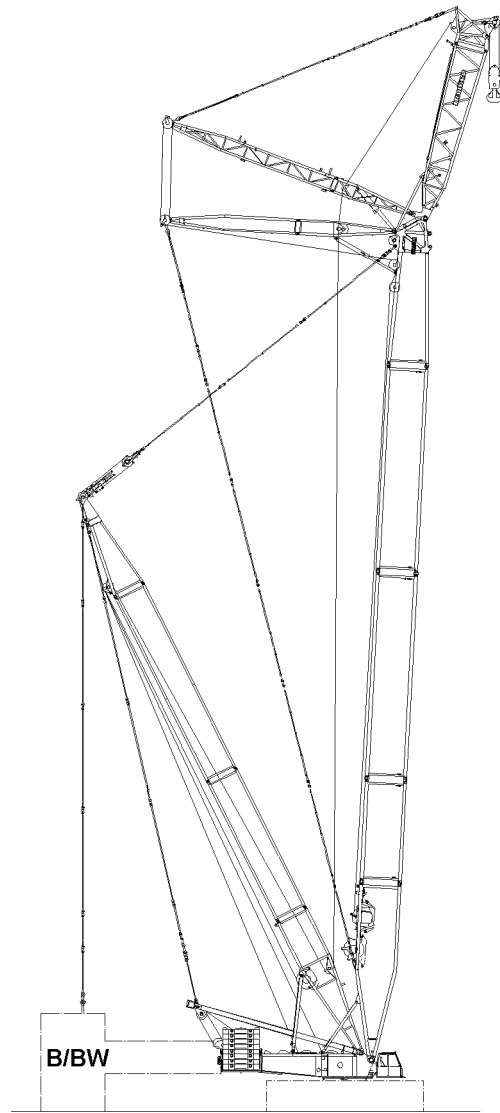


Fig.111739

LWE/LR 1750-000/12812-15-02/en

4 Disassembling the WV-boom system



WARNING

Risk of falling!

During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer severe or fatal injuries!

- ▶ All assembly work must be carried out using suitable aids (lifting platforms, scaffolding, ladder, auxiliary crane, etc.)!
- ▶ If work cannot be carried out on the ground or using such aids, then assembly personnel must be secured with the personal fall arrest system (see Crane operating instructions, chapter 2.04) to protect against falling! The personal fall arrest system must be attached in the corresponding fastening points on the crane (see Crane operating instructions, chapter 2.06)!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!



WARNING

Falling components!

If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be killed or seriously injured!

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Support the boom and components before pinning / unpinning!
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ Do not disengage the auxiliary crane until each component is pinned on and secured!
- ▶ It is prohibited to lean a ladder against the component being disassembled!



WARNING

Danger of crushing!

Components can swing during assembling. Hands can be crushed or severed.

- ▶ Make sure that the components do not swing back and forth during assembly!

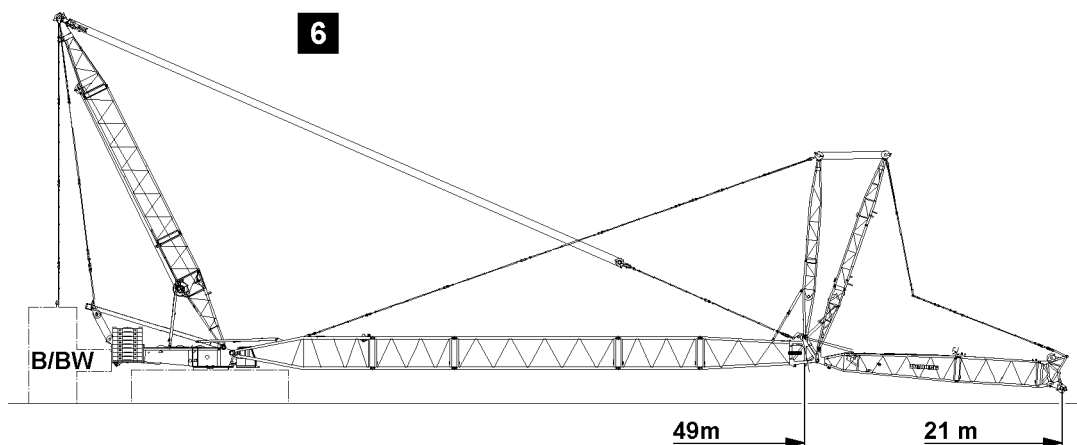
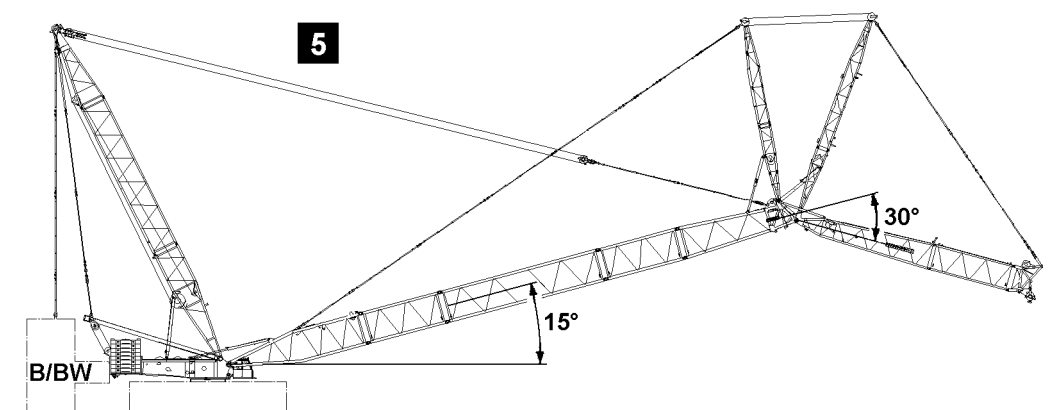
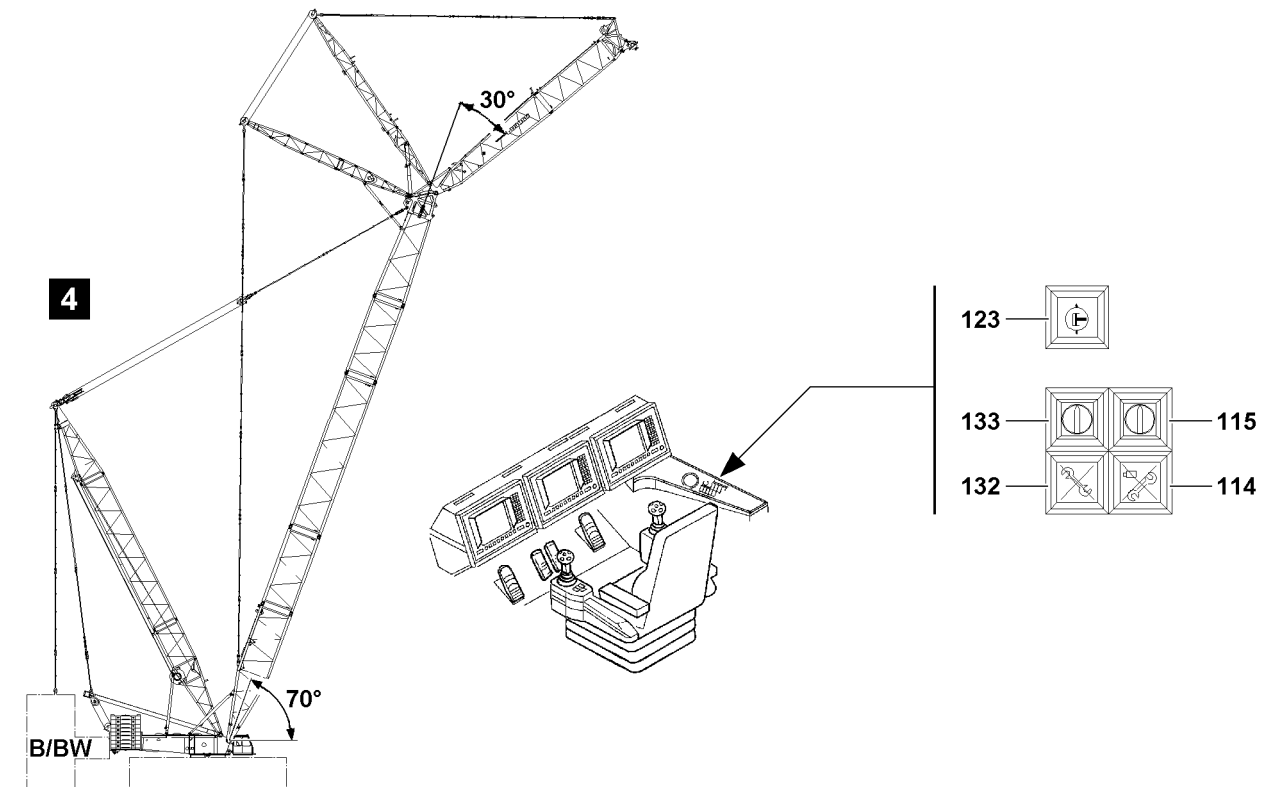


Fig.111740

LWE/LR 1750-000/12812-15-02/en

**Note**

- ▶ By supporting the components during assembly / disassembly, ground unevenness is compensated for and the material is protected!

**Note**

- ▶ The intermediate sections are pinned and unpinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30!

**WARNING**

Risk of accident!

Personnel can be severely injured or killed!

- ▶ For pinning and unpinning with the pin pulling device, observe and follow the warning guidelines, see Crane operating instructions, chapter 5.30!

Make sure that the following prerequisites are met:

- The LICCON overload protection is exceeded.
- The LICCON overload protection has been set according to the data in the load chart.
- The assembly icon **11** is visible on the LICCON monitor.
- An auxiliary crane is available.

4.1 Placing the WV-lattice jib down

**DANGER**

The crane can topple over!

For certain boom lengths, the mechanical auxiliary supports must be assembled (only for LR-crane), see Erection and take down charts!

- ▶ The boom must be erected or taken down „to the side“ „in the direction“ of the mechanical auxiliary supports!
- ▶ Always erect or take down according to the data in the **erection and take down charts!**

**WARNING**

The crane can topple over!

If the following conditions are not met before taking down the boom, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Observe the safety technical notes, see Crane operating instructions, chapter 5.01!
- ▶ Observe the data in the erection and take down charts!

NOTICE

Damage of boom components!

Taking down the boom system can lead to a collision between the hook block and the pulley head.

The boom components can be severely damaged!

- ▶ Luff the boom system down at the same time and spool the hoist winch out!

Make sure that the following prerequisites are met:

- The S-boom is in operating position.
- The hook block is approx. 5 m below the pulley head of the lattice jib.

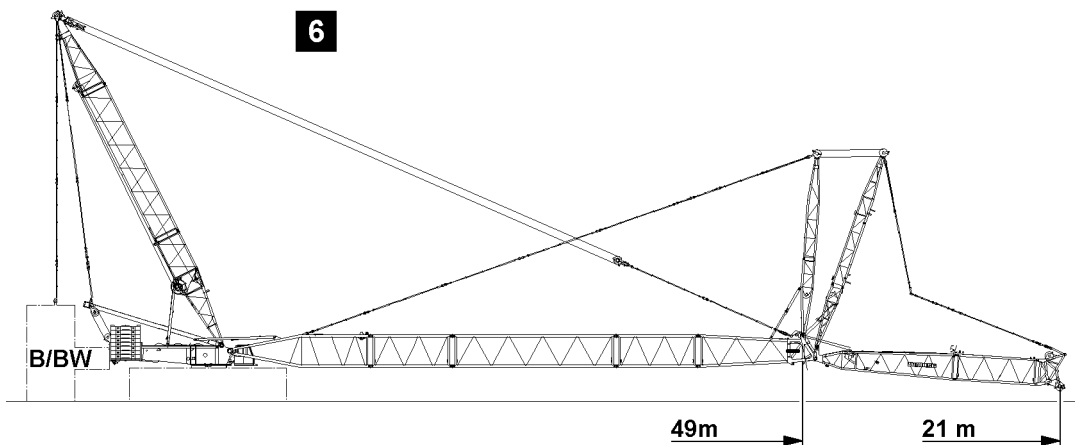
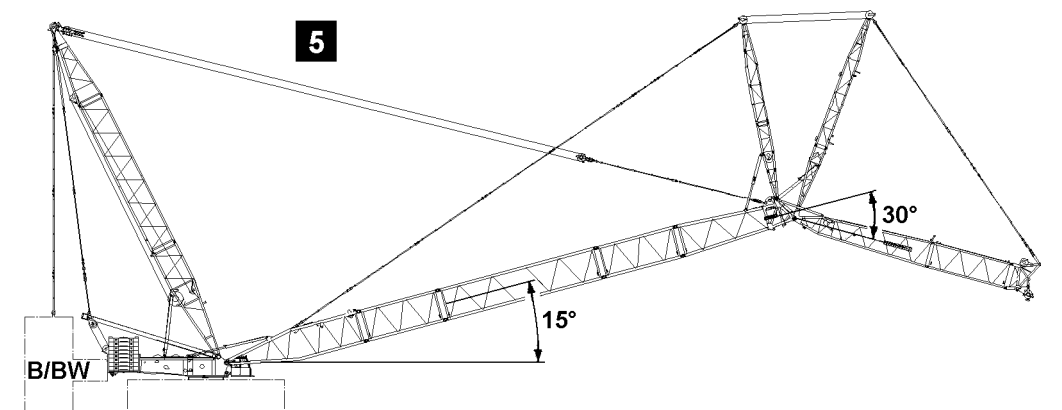
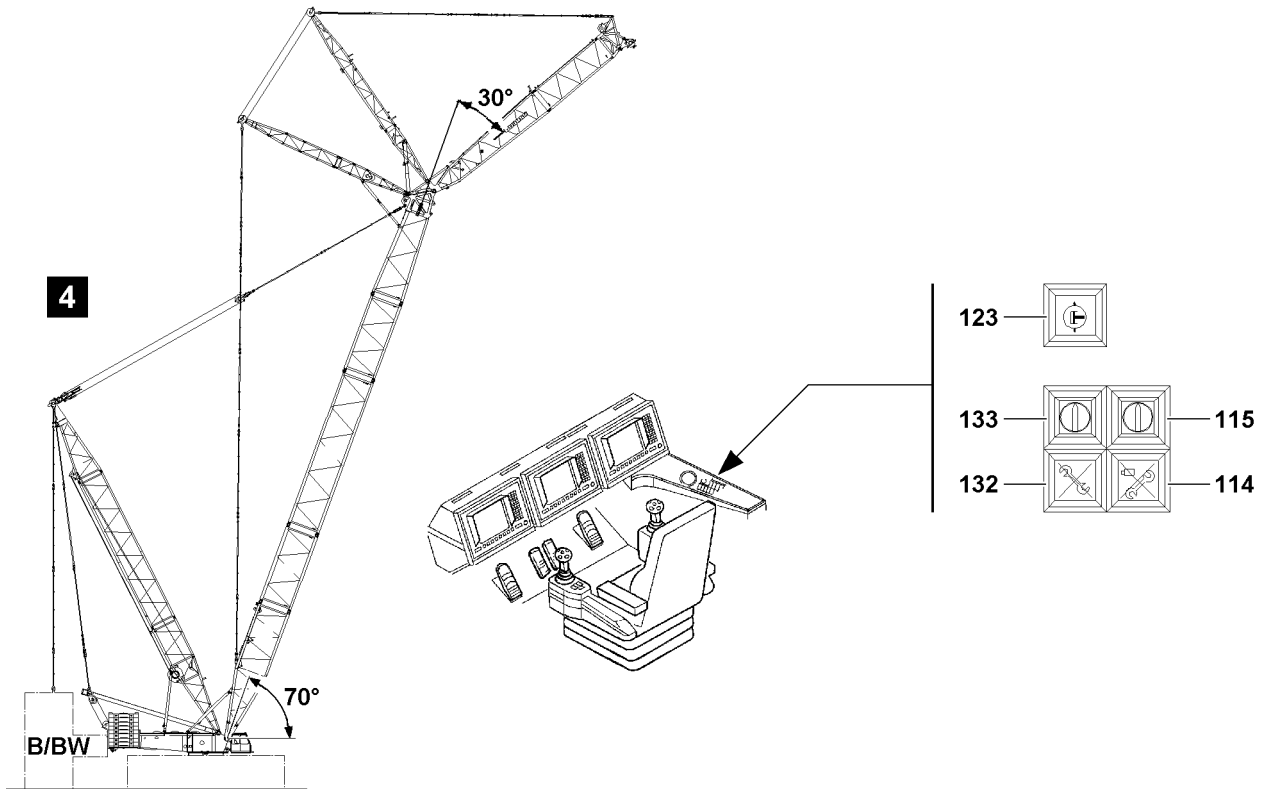


Fig.111740

LWE/LR 1750-000/12812-15-02/en

4.1.1 Luffing the WV-lattice jib down

- ▶ Luff the S-boom down to 70°, see illustration 4.



WARNING

The crane can topple over!

If the angle between the boom and the lattice jib is smaller than or equal to 30°, the mechanical re-lapse support will collide with the flap on the oscillating guard!

The crane can topple over!

Personnel can be severely injured or killed!

- ▶ Make sure that the angle between the S-boom and the WV-lattice jib is more than 30° during the take down procedure!
- ▶ Make sure that the angle between the S-boom and the WV-lattice jib does not fall below 30° during the take down procedure!
- ▶ Perform a visual inspection during erection!

- ▶ Luff the WV-lattice jib down to approx. 30° to the S-boom, see illustration 5.



Note

- ▶ The luff down movement is turned off as soon as the lowest operating position is reached!
 - ▶ When the lowest operating position of the WV-lattice jib is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“!
 - ▶ In the crane operating screen appear alarm functions!
- ▶ Luff the WV-lattice jib down to the „lowest“ operating position.

Result:

- The luff down movement is turned off.
- The „STOP“ icon appears on the LICCON monitor.
- The horn icon appears on the LICCON monitor.



WARNING

Assembly with activated assembly key button!

When the assembly key button is engaged, the LICCON overload protection is exceeded!

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be severely injured or killed!

This could result in high property damage!

- ▶ The assembly key button **133** may only be operated by persons who are aware of the consequences of a bypass!
- ▶ Press the assembly key button **133** only when the set up status was correctly entered into the LICCON computer system!
- ▶ Observe the erection / take down charts!
- ▶ Crane operation with the assembly key button **133** turned on is strictly prohibited!
- ▶ If the assembly key button **133** is turned on, the hoist limit switch and the LICCON overload protection is bypassed!

When the WV-lattice jib has reached the „lowest“ operating position:

- ▶ Turn the assembly key button **133** to the right.

Result:

- The LICCON overload protection is deactivated.
- The assembly icon **11** appears on the LICCON monitor.

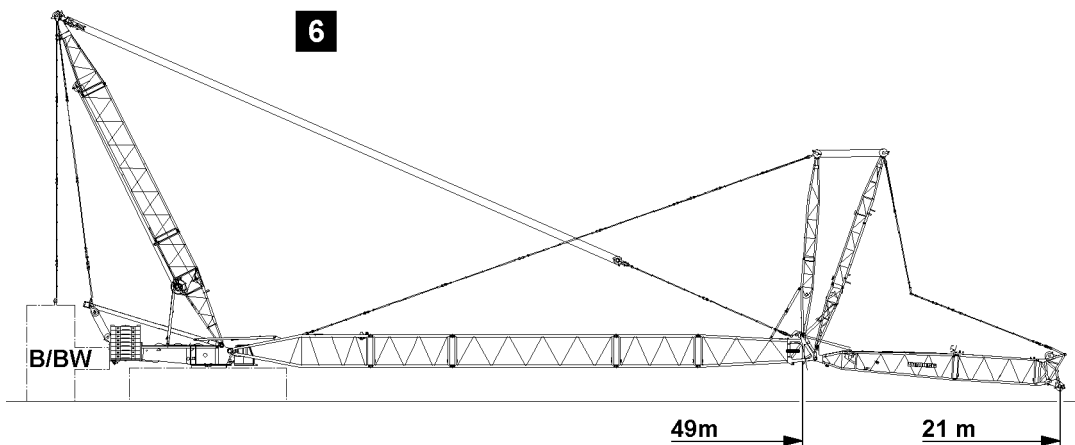
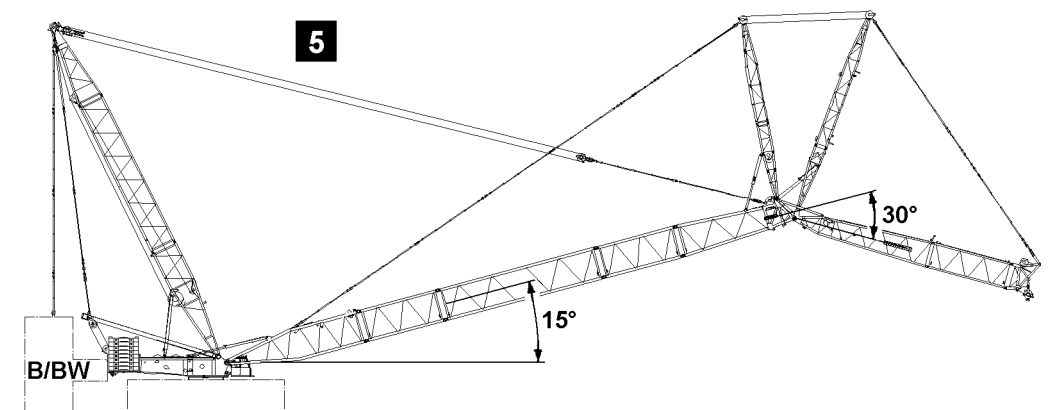
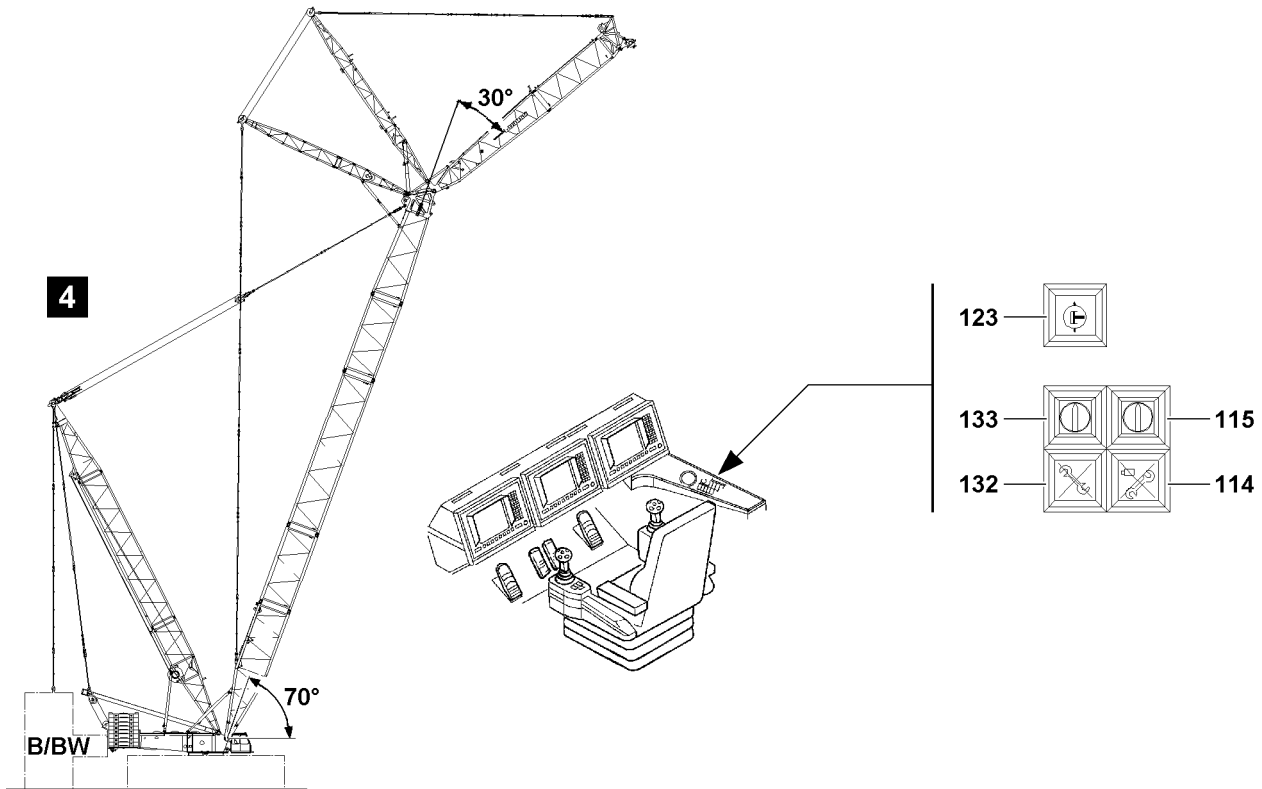


Fig.111740

LWE/LR 1750-000/12812-15-02/en

4.1.2 Placing the WV-lattice jib down

If the hook block has not yet touched the ground:

- ▶ At the same time, spool the hoist winch out and luff the S-boom down until the hook block touches the ground.
- ▶ Remove the hoist limit switch weight.
- ▶ Unreeve the hook block.
- ▶ Luff the S-boom down until SW-end section is laying on the ground.



WARNING

The crane can topple over!

If the following conditions are not met before taking down the boom, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Spool the lattice jib control out so that the guy rods sag slightly!
- ▶ Do not allow slack cable to build up on the control winch!
- ▶ Do not pull the hook block along on the ground!

- ▶ Continue to luff down the S-boom and simultaneously spool the WV-lattice jib control out so that the guy rods sag slightly.
- ▶ Luff the S-boom down until the S-boom head is laying on the support on the ground.



WARNING

Risk of accident!

- ▶ Make sure that no personnel is within the danger zone!
 - ▶ Secure the hoist rope with the assembly rope and pull it back slowly over the rope pulleys in the WA-brackets and lower it toward the W-connector head!
- ▶ Lay the hoist rope down.

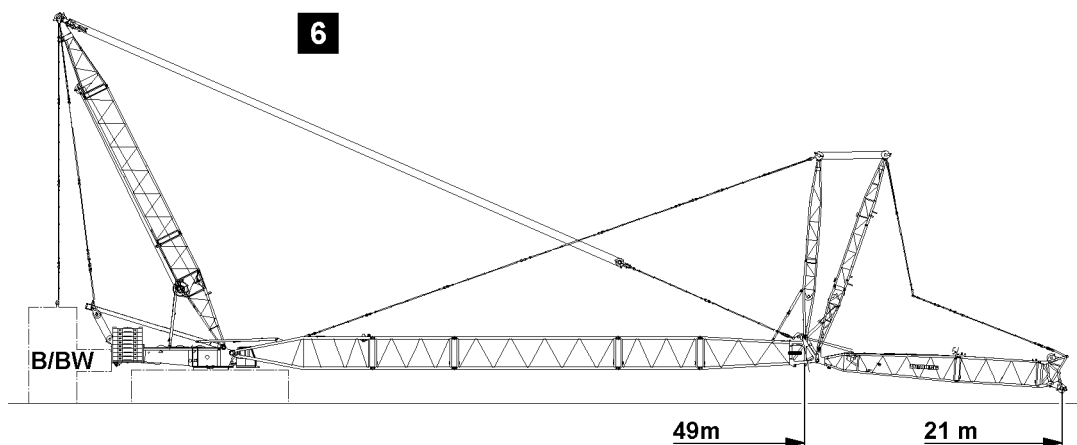
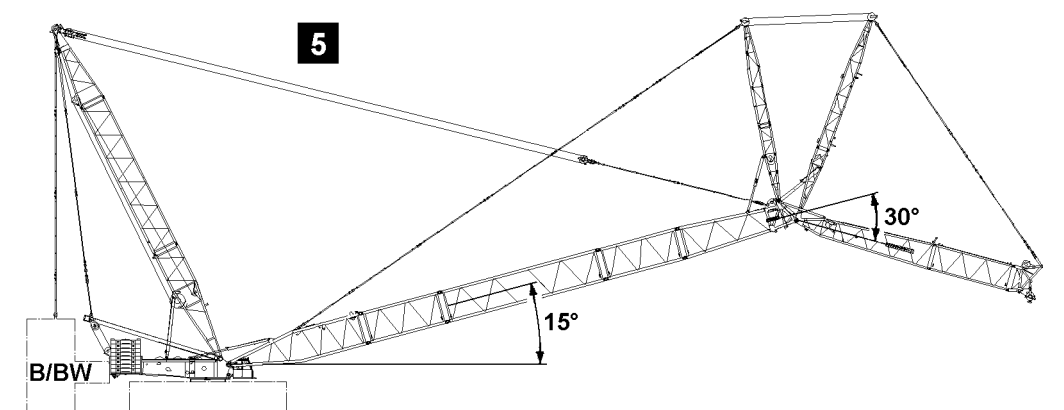
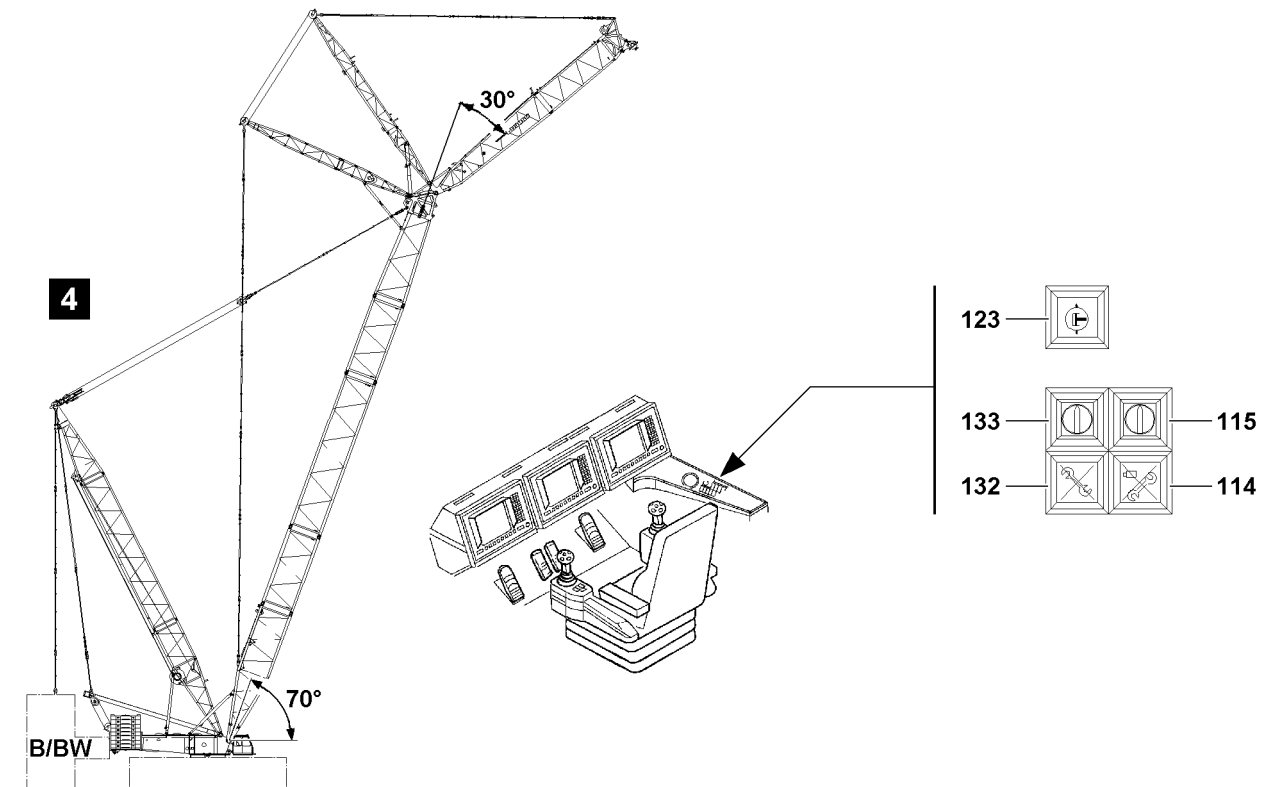


Fig.111740

LWE/LR 1750-000/12812-15-02/en

4.2 Disconnecting the electrical connections

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

4.3 Disassembling the WV-lattice jib

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

4.4 Unpinning the relapse supports

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

4.5 Disassembling the WA-bracket 2 guy rods

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

4.6 Unreeving the W-control ropes

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

4.7 Disassembling the W-transport units

**Note**

► Observe the instructions, see Crane operating instructions, chapter 5.07!

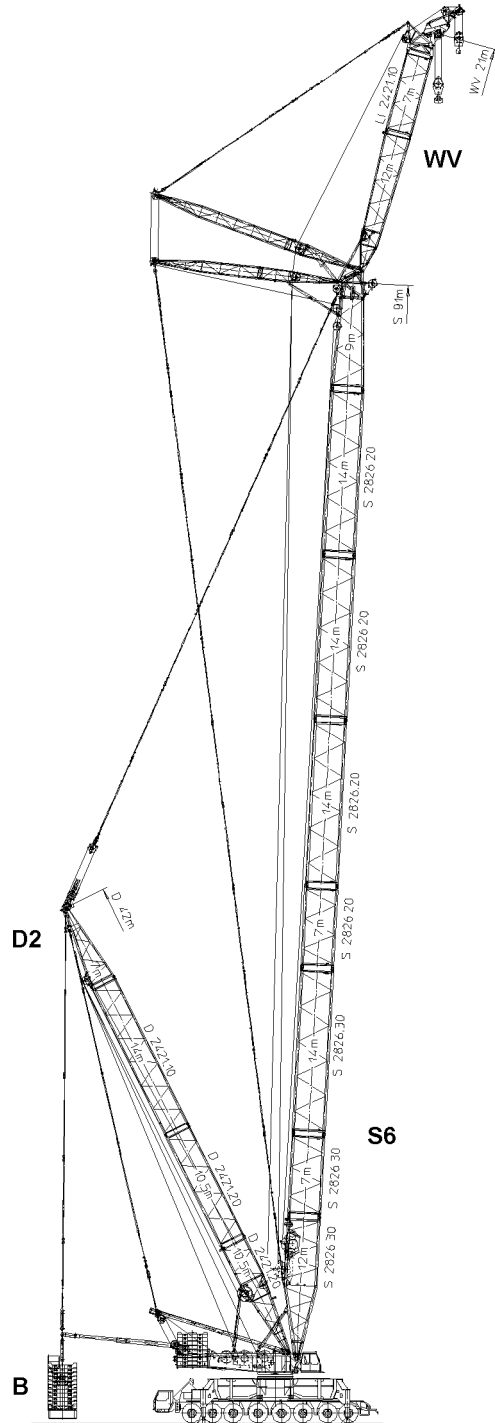


Fig.114936: S6D2WV / S6D2WVB

LWE/LR 1750-000/12812-15-02/en

5 WV-lattice jib in operating mode S6D2WVB (only for LG 1750)

The operating mode **S6D2WVB** differs from the operating mode SDWVB by a reinforced S-boom and by another derrick boom length. The WV-guying however is identical.

Derrick boom lengths	
SD-operation	S6D2-operation
31.5 m	42.0 m

5.1 Assembling the WV-lattice jib



WARNING

The crane can topple over!

If danger notes are not observed, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Observe and adhere to the danger notes during assembly of the S6D2WVB-boom system!



Note

- ▶ The assembly of the WV-lattice jib on the S6D2-boom system is identical to the assembly on the SD-boom system!

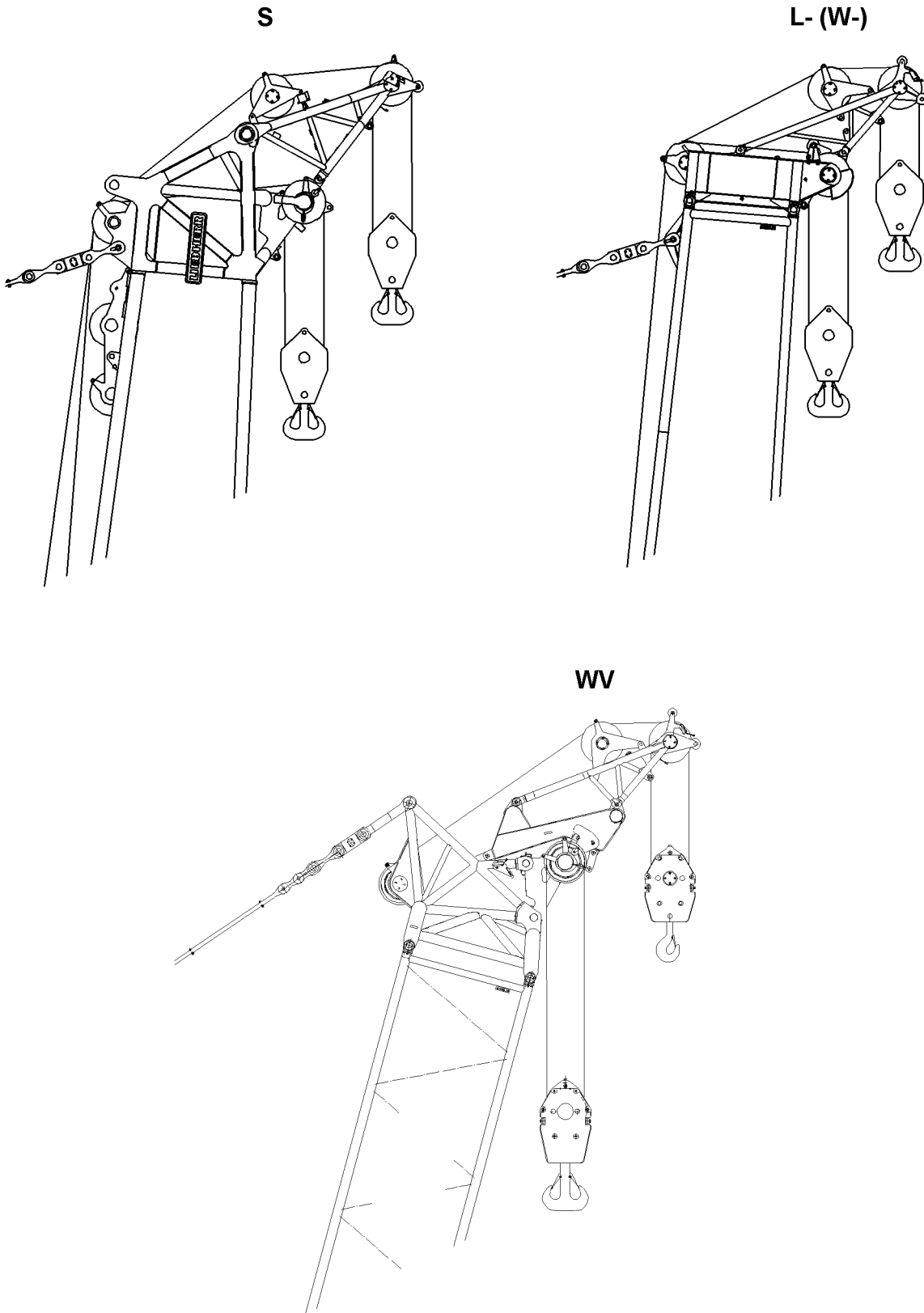


Fig.104486

LWE/LR 1750-000/12812-15-02/en

1 Installing the boom nose 60 t on the boom

1.1 Installing the boom nose



WARNING

Risk of falling!

During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!



WARNING

Falling components!

If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be severely injured or killed!

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Support the boom and components before pinning / unpinning!
- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left** and **right**!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ Do not disengage the auxiliary crane until each component is pinned on and secured!
- ▶ It is prohibited to lean a ladder against the component being disassembled!



WARNING

Danger of impact / crushing!

When installing / removing counterweight components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be caught and severely injured or killed as a result!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

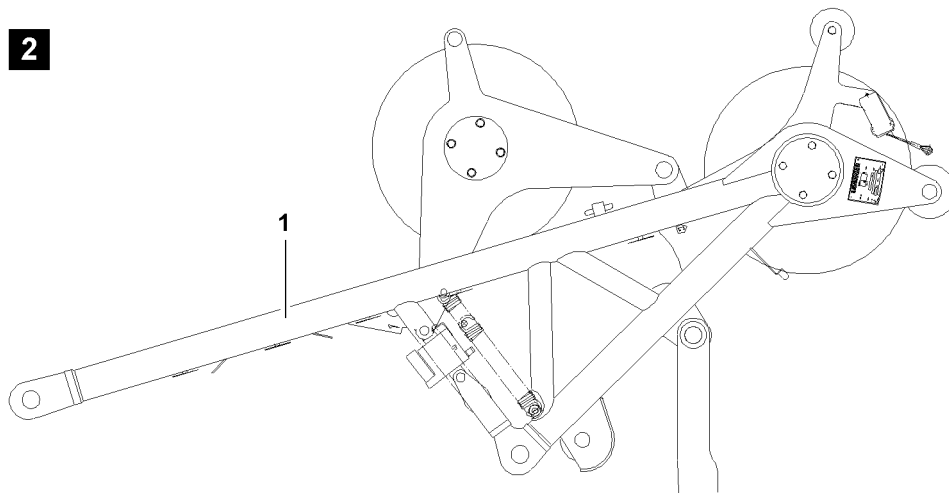
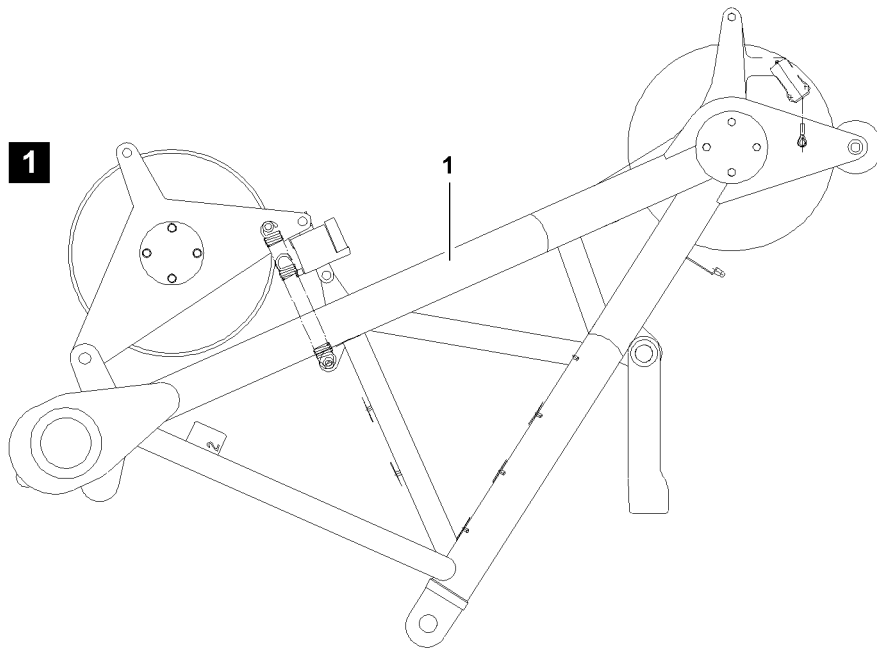


Fig.111812

LWE/LR 1750-000/12812-15-02/en

**Note**

- ▶ The respective boom combination, in connection with the boom nose 60 t , must be assembled according to the supplied rod plans!
- ▶ Assembling the boom combination, see Crane operating instructions, chapter 5.38 or chapter 5.39 or chapter 5.07 or chapter 5.08!

1.2 Variations of boom nose and their use

**Note**

- ▶ The boom nose 60 t 1 is available in two variations!
- ▶ The boom nose variation of the S-end section can **not** be installed on the L-, W or WV-end section, see illustration 1!
- ▶ The boom nose variation for the L-end section can be installed on the W- as well as on the W-adapter, see illustration 2!

	Use of boom nose 60 t	
	Variation 1 (illustration 1)	Variation 2 (illustration 2)
S-end section	X	
L-end section		X
W-end section		X
W-adapter		X

1.3 Assembly prerequisites for boom nose(s)

**WARNING**

Assembly with bypassed / exceeded LICCON overload protection!

With bypassed / exceeded LICCON overload protection, the crane can collapse due to overload, the boom can break off or the crane can topple over!

Personnel can be severely injured or killed!

This could result in high property damage!

- ▶ The LICCON overload protection may only be bypassed / exceeded by persons who are aware of the consequences of a bypass!
- ▶ Bypass / exceed the LICCON overload protection only when the set up status of the crane has been correctly entered into the LICCON computer system!
- ▶ Observe the erection / take down charts!
- ▶ Crane operation with bypassed / exceeded LICCON overload protection is strictly prohibited!

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- The boom including the respective end section 1 are installed.
- The boom is placed on a load-bearing support.
- The counterweight has been installed on the turntable according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.
- An auxiliary crane is available.

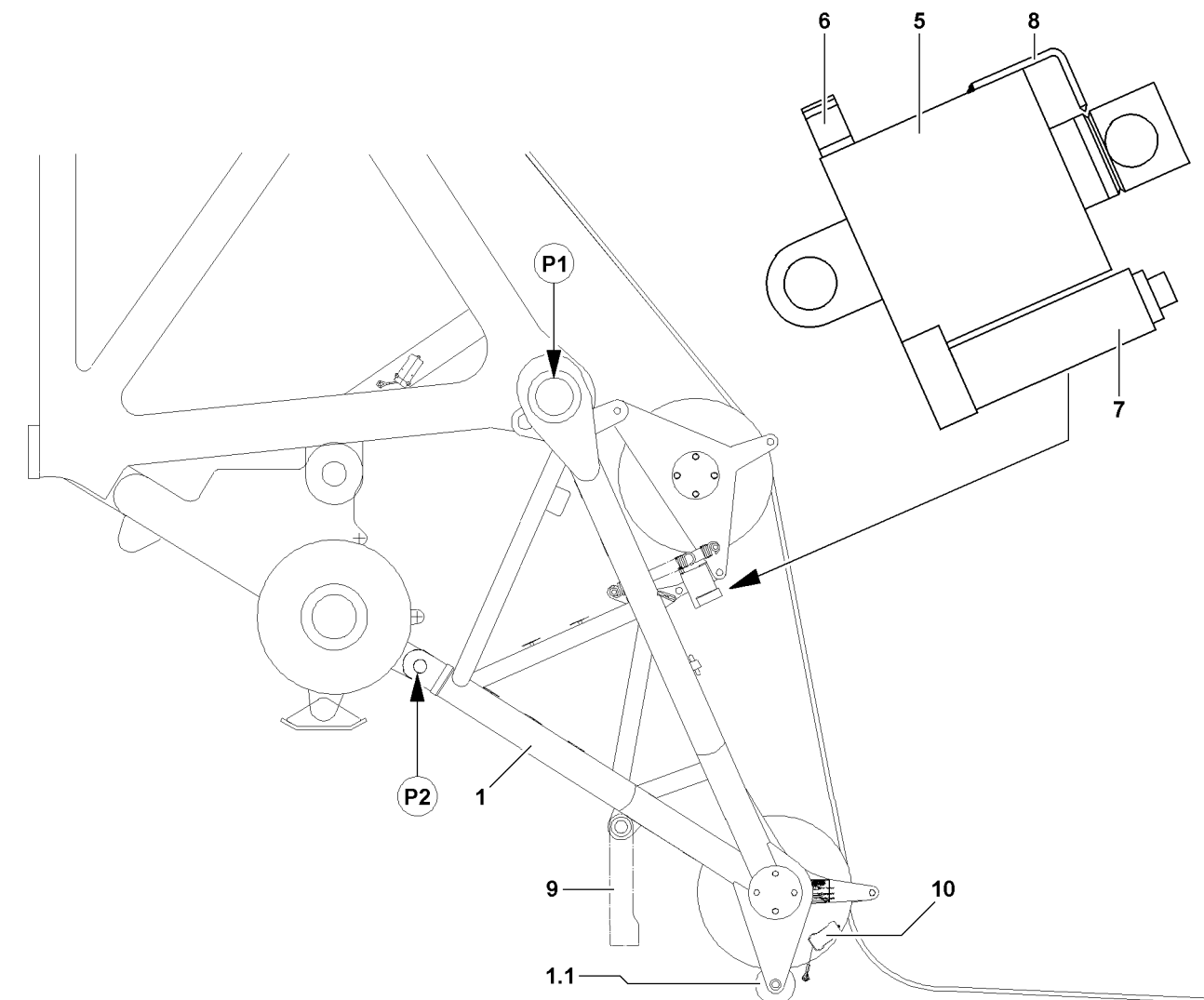
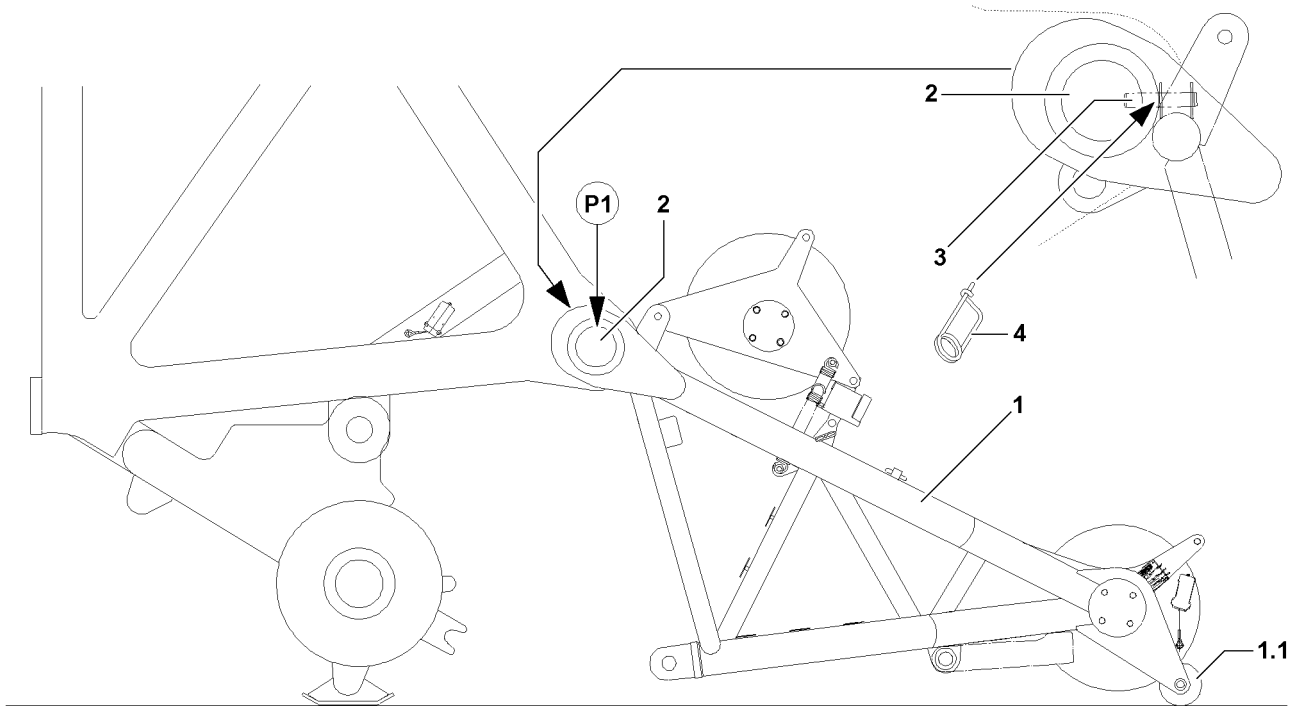


Fig.111811

LWE/LR 1750-000/12812-15-02/en

2 Boom nose 60 t on S-end section

2.1 Installing the boom nose 60 t on the S-end section

Position	Description
1	Boom nose 60 t
1.1	Roller
2	Pin
3	Retaining pin
4	Spring retainer
5	Test cylinder
6	Measuring point
7	Pressure sensor
8	Pointer
9	Rope fixed point (rope lock)
10	Hoist limit switch
20	S-end section

Weight of boom nose 60 t
1100 kg

Make sure that the following prerequisites are met:

- The boom head is laying on the ground.
- An auxiliary crane is available.
- ▶ Swing the boom nose 60 t **1** with the auxiliary crane in to the pin points, point **P1**, on the S-end section **20**.
- ▶ Pin the boom nose 60 t on the S-end section **20** on both sides at point **P1** „on top“: Insert the pins **2**.

When the pins **2** are pinned on both sides:

- ▶ Secure the pins **2** on both sides with retaining pins **3** and locking pins **4**.
- ▶ Carefully place the boom nose 60 t **1** with the auxiliary crane on the ground.
- ▶ Remove the auxiliary crane.
- ▶ Pull the hoist rope over the rope pulleys of the boom nose 60 t **1**, see Reeving plan.



Note

- ▶ When the boom nose 60 t is installed and reeved on the S-end section, continue the assembly according to section „Lifting the boom off the ground“!

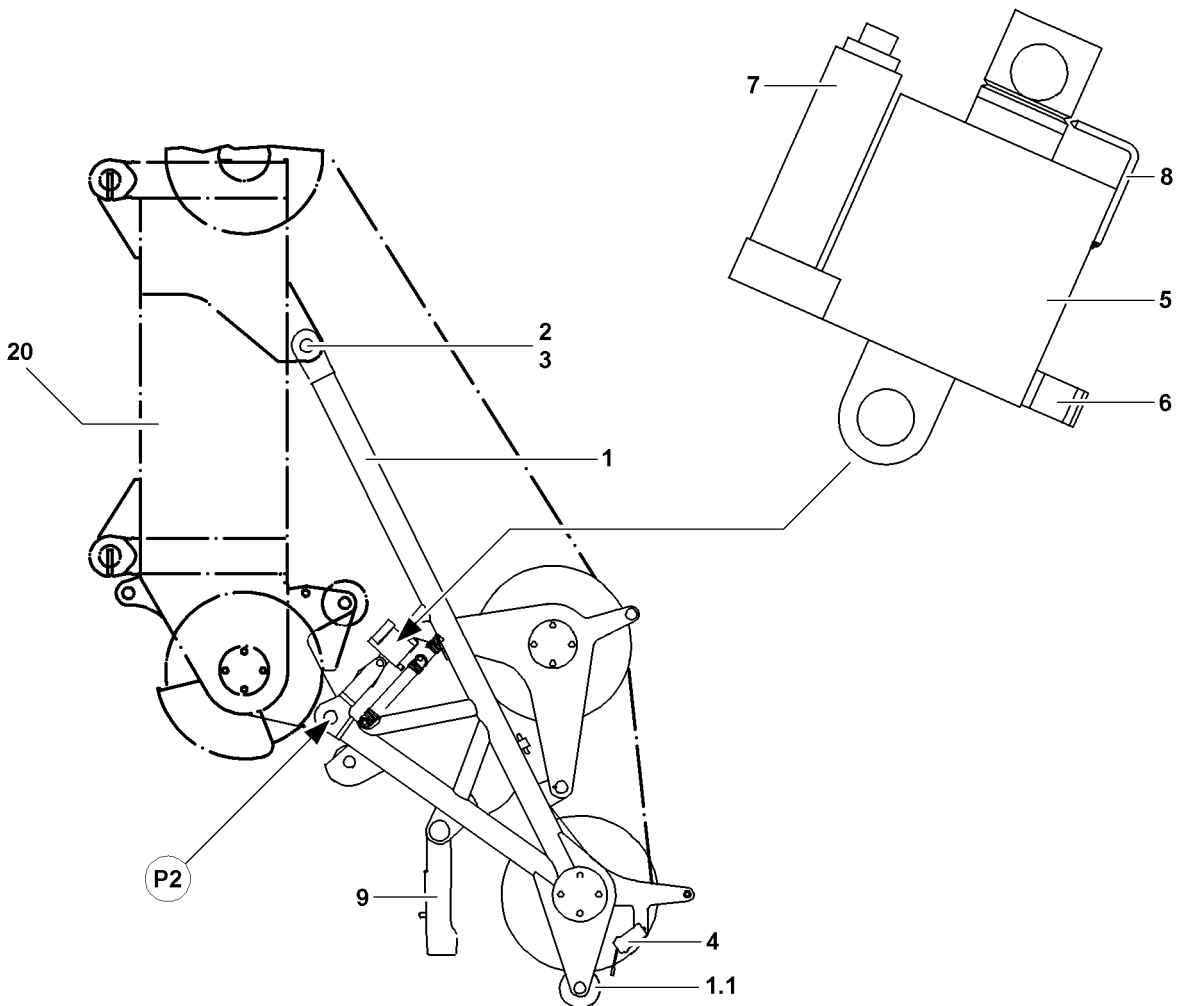
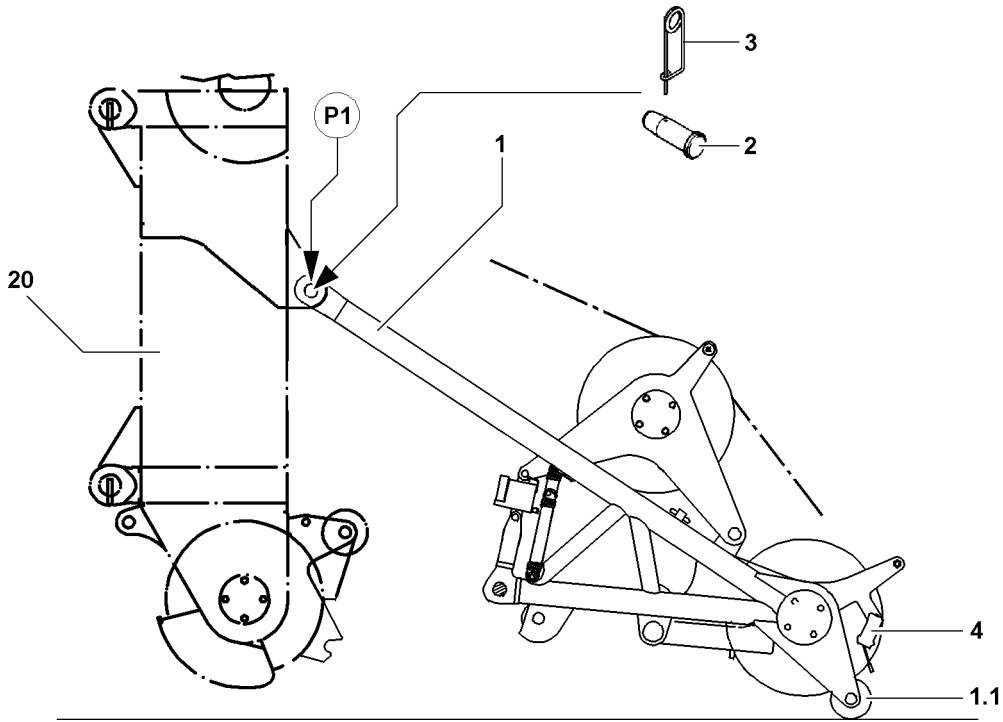


Fig.111813

LWE/LR 1750-000/12812-15-02/en

3 Boom nose 60 t on the L- / W-end section

3.1 Installing the boom nose 60 t on the L- / W-end section

Position	Description
1	Boom nose 60 t
1.1	Roller
2	Pin
3	Spring retainer
4	Hoist limit switch
5	Test cylinder
6	Measuring point
7	Pressure sensor
8	Pointer
9	Rope fixed point (rope lock)
20	L-end section / W-end section

Weight of boom nose 60 t
770 kg

Make sure that the following prerequisites are met:

- The boom head is laying on the ground.
- An auxiliary crane is available.
- ▶ Swing the boom nose 60 t **1** with the auxiliary crane in to the pin points, point **P1**, on the L- / W-end section **20**.
- ▶ Pin the boom nose 60 t on the L- / W-end section **20** on both sides at point **P1** „on top“: Insert the pins **2**.

When the pins **2** are pinned on both sides:

- ▶ Secure the pins **2** on both sides with spring retainers **3**.
- ▶ Carefully place the boom nose 60 t **1** with the auxiliary crane on the ground.
- ▶ Remove the auxiliary crane.
- ▶ Pull the hoist rope over the rope pulleys of the boom nose 60 t **1**, see Reeving plan.



Note

- ▶ When the boom nose 60 t is installed and reeved on the L- / W-end section, continue the assembly according to section „Lifting the boom off the ground“!

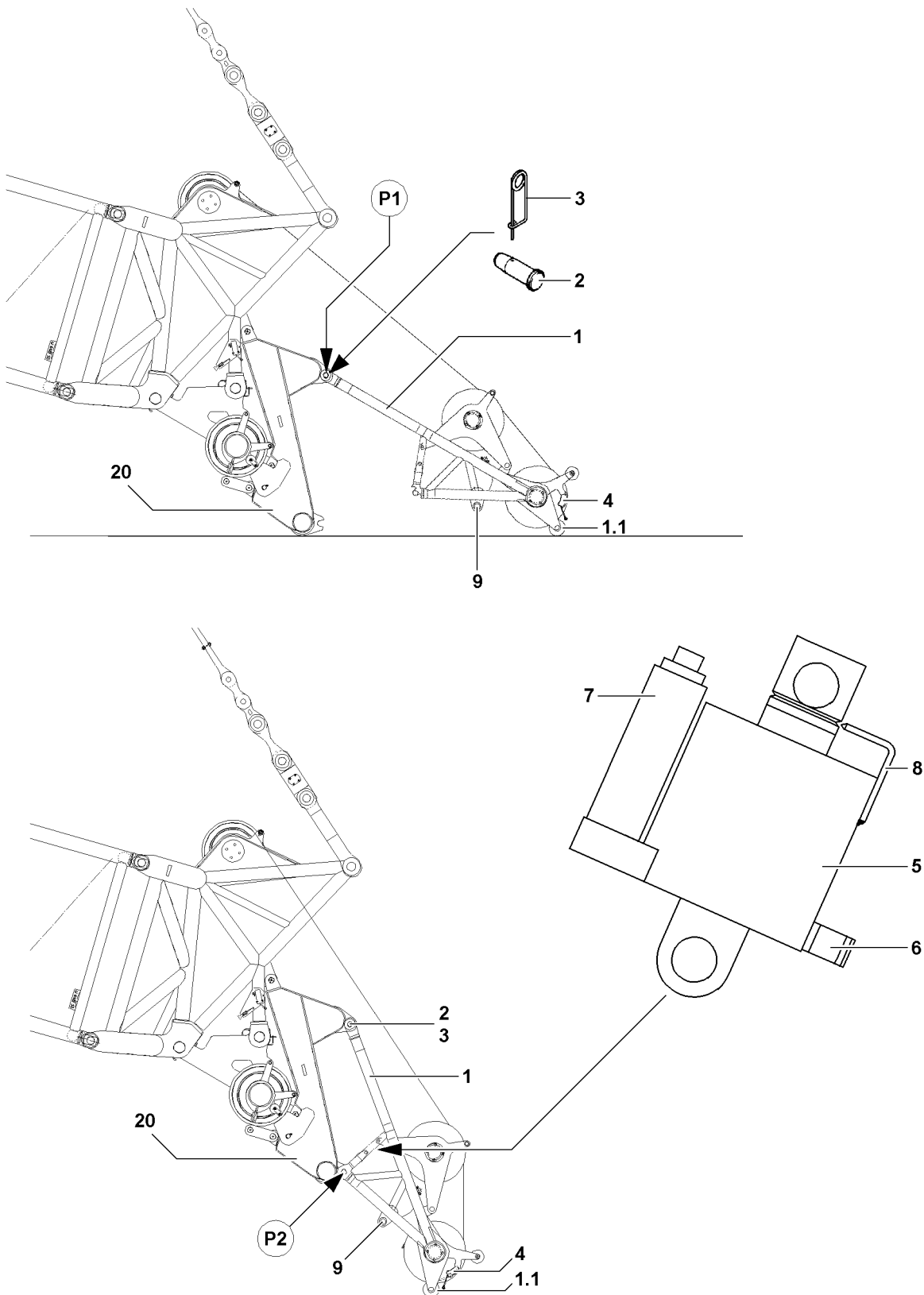


Fig.111814

LWE/LR 1750-000/12812-15-02/en

4 Boom nose 60 t on the SW-adapter

4.1 Installing the boom nose 60 t on the W-adapter

Position	Description
1	Boom nose 60 t
1.1	Roller
2	Pin
3	Spring retainer
4	Hoist limit switch
5	Test cylinder
6	Measuring point
7	Pressure sensor
8	Pointer
9	Rope fixed point (rope lock)
20	W-adapter

Weight of boom nose 60 t
770 kg

Make sure that the following prerequisites are met:

- The boom head is laying on the ground.
- An auxiliary crane is available.
- ▶ Swing the boom nose 60 t **1** with the auxiliary crane in to the pin points, point **P1**, on the W-adapter **20**.
- ▶ Pin the boom nose 60 t on the W-adapter **20** on both sides at point **P1** „on top“: Insert the pins **2**.

When the pins **2** are pinned on both sides:

- ▶ Secure the pins **2** on both sides with spring retainers **3**.
- ▶ Carefully place the boom nose 60 t **1** with the auxiliary crane on the ground.
- ▶ Remove the auxiliary crane.
- ▶ Pull the hoist rope over the rope pulleys of the boom nose 60 t **1**, see Reeving plan.



Note

- ▶ When the boom nose 60 t is installed and reeved on the W-adapter, continue to assembly according to section „Lifting the boom off the ground“!

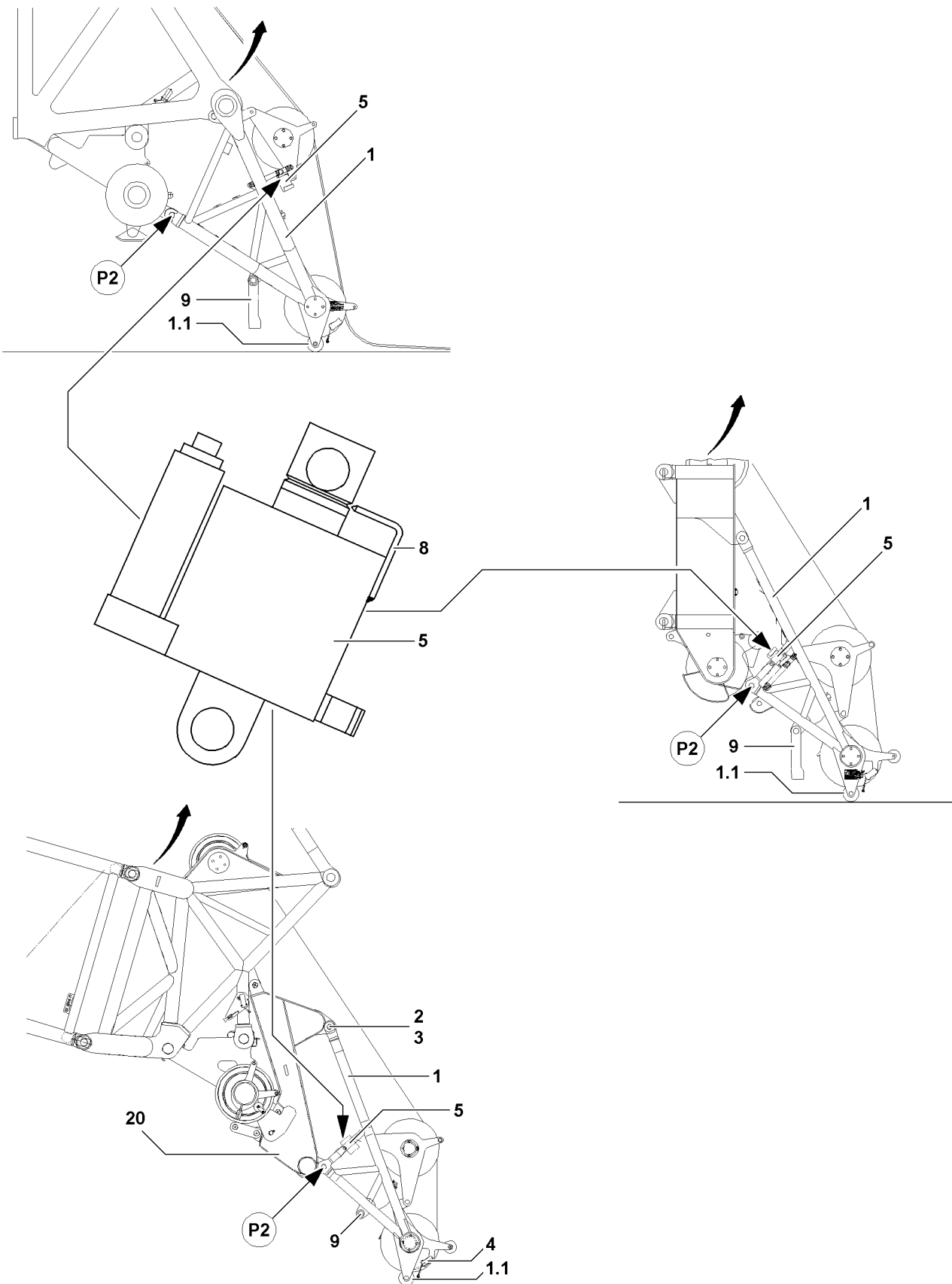


Fig.111815

LWE/LR 1750-000/12812-15-02/en

5 Lifting the boom off the ground

5.1 Lifting the boom off



WARNING

The crane can topple over!

During erection of the respective boom or the boom systems, the crane can be overloaded and topple over!

Personnel can be severely injured or killed!

- ▶ Observe the data in the erection and take down charts!
- ▶ It is prohibited to turn the crane superstructure while erecting the boom!

- ▶ Luff the boom up carefully.

Result:

- Due to its own weight, the boom nose 60 t runs on the rollers **1.1** slowly toward the „inside“.
- ▶ Luff up the boom until the boom nose 60 t **1** lifts off the ground.

Result:

- The boom nose 60 t **1** supports itself at point **P2** on the respective end section or on the W-adap-ter.

NOTICE

Damage of boom nose 60 t !

After the boom nose 60 t **1** is installed on the end section **20**, the boom combination may be placed on the ground again only with utmost caution, otherwise the boom nose 60 t can be severely damaged!

- ▶ Place the boom combination on the ground only with utmost caution!
- ▶ Carefully place the boom combination down.

Result:

- The boom nose 60 t **1** folds out automatically when it is placed down and runs on the rollers **1.1** toward the „outside“.

6 Establishing the electrical connections

6.1 Establishing the connections

NOTICE

Damage to the electrical connection on the cable drum!

If the electrical connection from the cable drum on the S-pivot section to the terminal box on the S-pivot section is established first before the connection to the terminal box on the respective end section, the electrical connection can be damaged when spooling out the cable drum!

- ▶ Establish first the electrical connection from the cable drum in the S-pivot section to the terminal box on the respective end section and then the electrical connection from the terminal box in the S-pivot section to the cable drum in the S-pivot section!



Note

- ▶ To establish the electrical connections, use the electrical wiring diagram!

Make sure that the following prerequisites are met:

- The boom is fully assembled.
- The airplane warning light and the wind speed sensor are assembled.

- ▶ Establish the electrical connections.
- ▶ Make sure that all electrical connections on the boom are established.

7 Checking the function of the safety devices

7.1 Checking the safety devices



WARNING

Non-functioning safety devices!

If the function of the safety devices is defective, personnel can be severely injured or killed!

- ▶ Crane operation with non-functioning safety devices is **prohibited!**



Note

- ▶ The function of the individual limit switches must be checked before erection!
- ▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual!



Note

- ▶ If a function check on the limit switches or on the safety devices does not lead to the desired shut offs, then the plug connections on the terminal boxes or the components itself must be checked!
- ▶ If no visible connection errors or component defects can be found, contact **LIEBHERR Service!**

Make sure that the following prerequisites are met:

- All electrical connections have been made.
- The crane engine is running.
- The corresponding operating mode is set on the LICCON monitor.

7.1.1 Checking the wind speed sensor

- ▶ Test the movement and the function of the wind speed sensor.

7.1.2 Checking the airplane warning light

- ▶ Turn the airplane warning light on.
- ▶ Visually check functionality.

7.1.3 Checking the hoist limit switch on the pulley head



Note

- ▶ When replacing or changing a hoist limit switch (HES), the corresponding hoist limit switch must have the correct bus address and the correct software version in order to be detected again by the bus system (LSB)!

- ▶ Actuate the hoist limit switch manually on the pulley head.

Result:

- The spool up function of the hoist winch turns off.
- The icon „Hoist top“ appears on the LICCON monitor 0.
- The limit switch is functioning.

7.1.4 Checking the limit switch S-boom „Steepest position“



Note

- ▶ The limit switch functions have to be checked individually before erection!

- ▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

Result:

- The limit switch is actuated manually.
- The spool up function of winch 4 turns off.
- The icon „Boom limitation“ appears on the LICCON monitor 0.
- The limit switch is functioning.

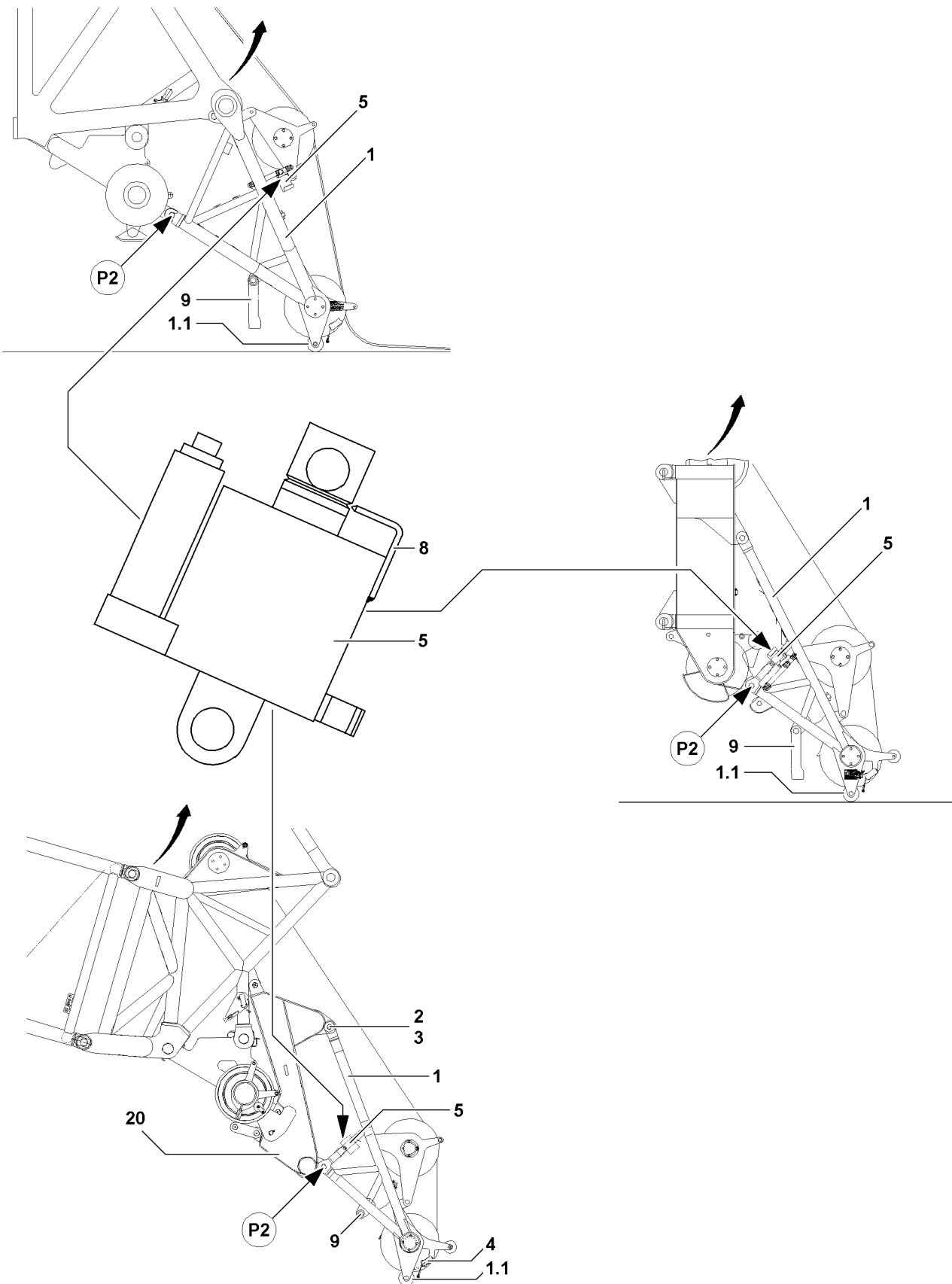


Fig.111815

LWE/LR 1750-000/12812-15-02/en

8 Erecting the boom

8.1 Erection procedure



DANGER

The crane can topple over!

- ▶ It is prohibited to turn the crane superstructure while erecting the boom!
- ▶ Observe the data in the erection and take down charts!



WARNING

The crane can topple over!

If the following conditions are not met before erecting the boom, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Observe the safety technical notes, see Crane operating instructions, chapter 5.01!
- ▶ Extend the S-relapse cylinders before erecting the boom combinations!
- ▶ Do not allow slack cable to build up on the control winch!



WARNING

Falling hoist rope!

If the hoist rope is not reeved before the erection procedure with the corresponding length on the boom nose 60 t, then it can fall down backward due to its own weight!

Personnel can be severely injured or killed!

- ▶ Reeve the hoist rope with sufficient length on the boom nose 60 t before the erection procedure!
- ▶ The hoist rope must be constantly monitored during the erection procedure!
- ▶ Do not step into the danger zone!

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- All electrical connections have been established.
- All limit switches are functioning.
- The counterweight has been installed to the turntable according to the data in the erection and take down chart.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- There are no loose parts on the boom.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual crane configuration.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.

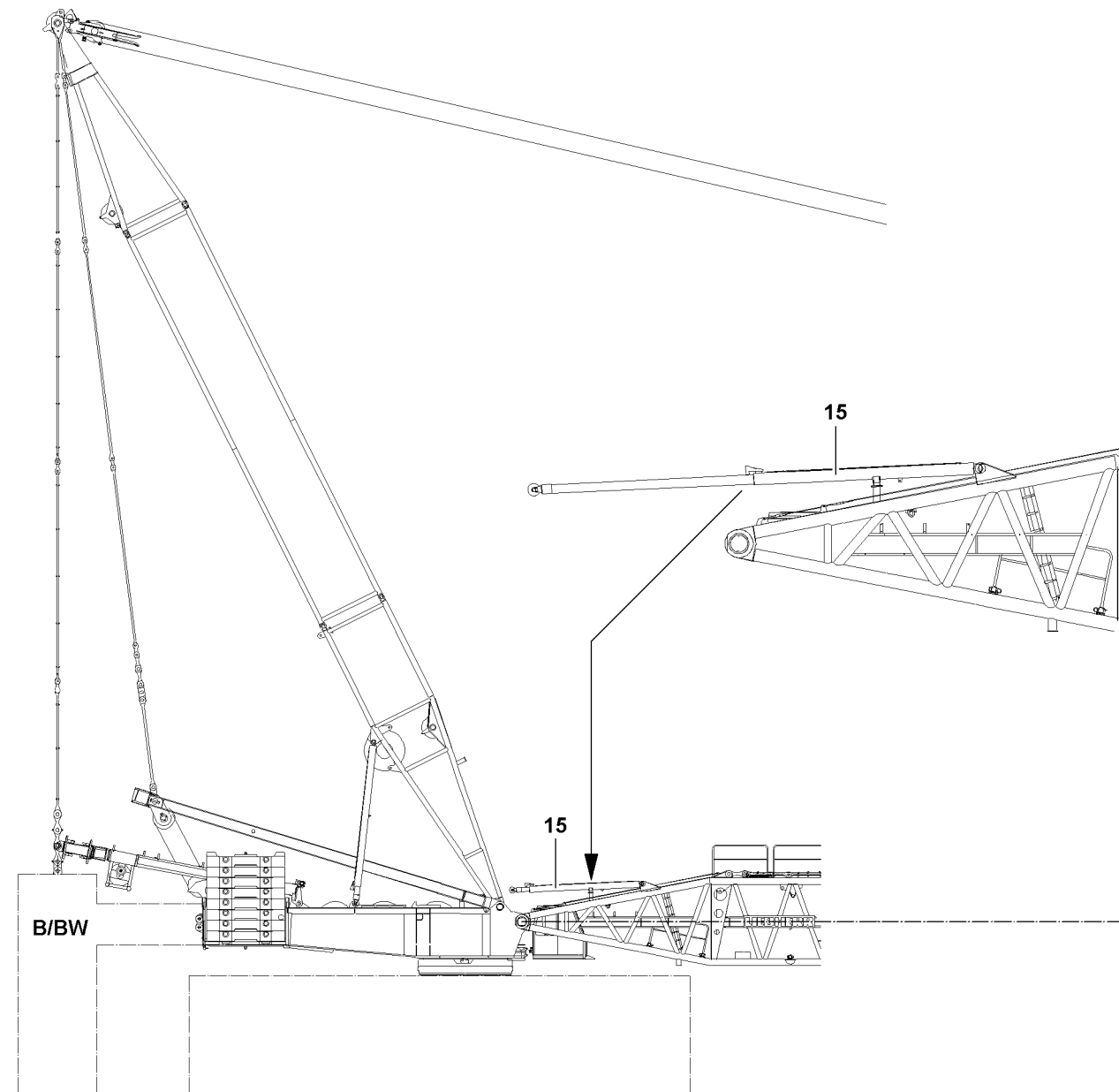


Fig.111819

LWE/LR 1750-000/12812-15-02/en

8.1.1 Extending the S-relapse cylinder



WARNING

The crane can topple over!

If the S-relapse cylinders **15** are not extended before erecting the boom, then the boom can fall down towards the rear during crane operation and the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Extend the S-relapse cylinders **15** before erecting the boom!
-



WARNING

The crane can topple over!

If the danger notes for erection of the boom or the boom systems in the following chapters are not observed, then the crane can topple over!

Personnel can be severely injured or killed!

Boom nose installed on S-end section:

- ▶ Observe and adhere to the danger notes for erection in the Crane operating instructions, chapter 5.38 and chapter 5.39!

Boom nose installed on L-end section:

- ▶ Observe and adhere to the danger notes for erection in the Crane operating instructions, chapter 5.38 and chapter 5.39!

Boom nose installed on W-end section:

- ▶ Observe and adhere to the danger notes for erection in the Crane operating instructions, chapter 5.07!

Boom nose installed on W-adapter:

- ▶ Observe and adhere to the danger notes for erection in the Crane operating instructions, chapter 5.07 and chapter 5.08!
-

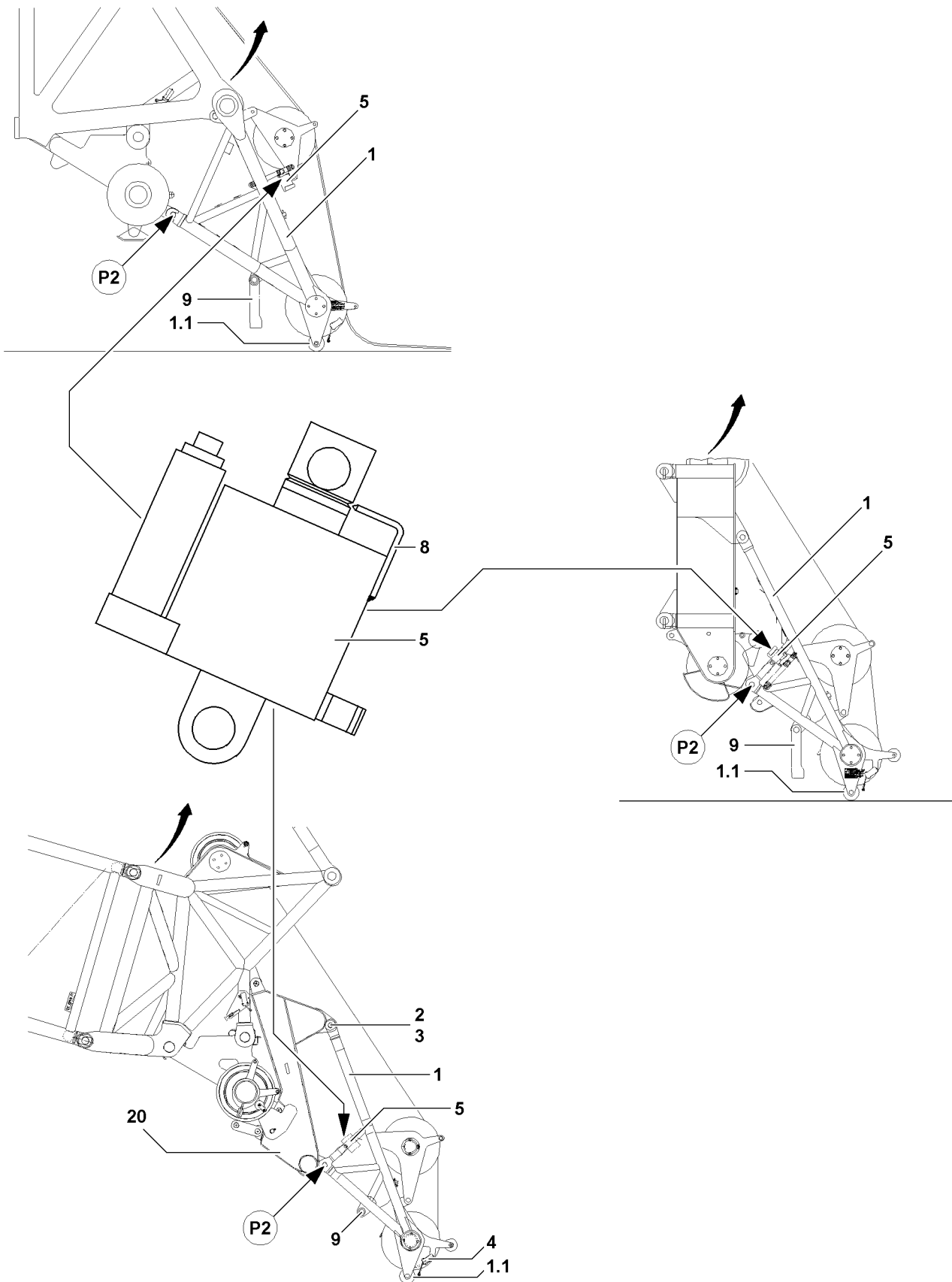


Fig.111815

LWE/LR 1750-000/12812-15-02/en

8.1.2 Erecting the boom



WARNING

Overload of crane!

If the pointer **8** is not at the height of the zero mark (notch) of the test cylinder **5** at operation of the boom nose 60 t **1**, non-exact or incorrect values will be determined when the load is weighed, due to incorrect test values!

The load display on the LICCON monitor does not match the actual load on the load hook or on the hook block!

The crane can be overloaded and topple over!

Personnel can be severely injured or killed!

- ▶ Make sure that the pointer **8** before erecting the boom or before operating the boom nose 60 t **1** is exactly on the zero mark (notch) of the test cylinder **5**!
- ▶ If the pointer **8** is not on the zero mark of the test cylinder **5**, contact the Service Department at LIEBHERR-Werk Ehingen GmbH!



DANGER

The crane can topple over!

- ▶ It is prohibited to turn the crane superstructure while erecting the boom!
- ▶ Observe the data in the erection and take down charts!

Reeving in the hook block

- ▶ Reeve in the hook block properly and secure the hoist rope on the rope fixed point with the required rope end connection, for reeving, see Reeving plans.
- ▶ Insert and secure the rope retaining pin.
- ▶ Attach the hoist limit switch weight, see section Crane operating instructions, chapter 4.06!

Erection



WARNING

The crane can topple over!

In crane operation with exceeded LICCON overload protection, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook!



Note

- ▶ When the lowest operating position of the boom is reached, the LICCON overload protection is activated!
- ▶ In the maximum load icon appears a load number in „t“ instead of the display „???“!
- ▶ Luff the boom up to the lowest operating position.

When the boom has reached the lowest operating position:

- ▶ Make sure that the assembly icon turns off on the LICCON monitor.

Result:

- The LICCON overload protection is active.

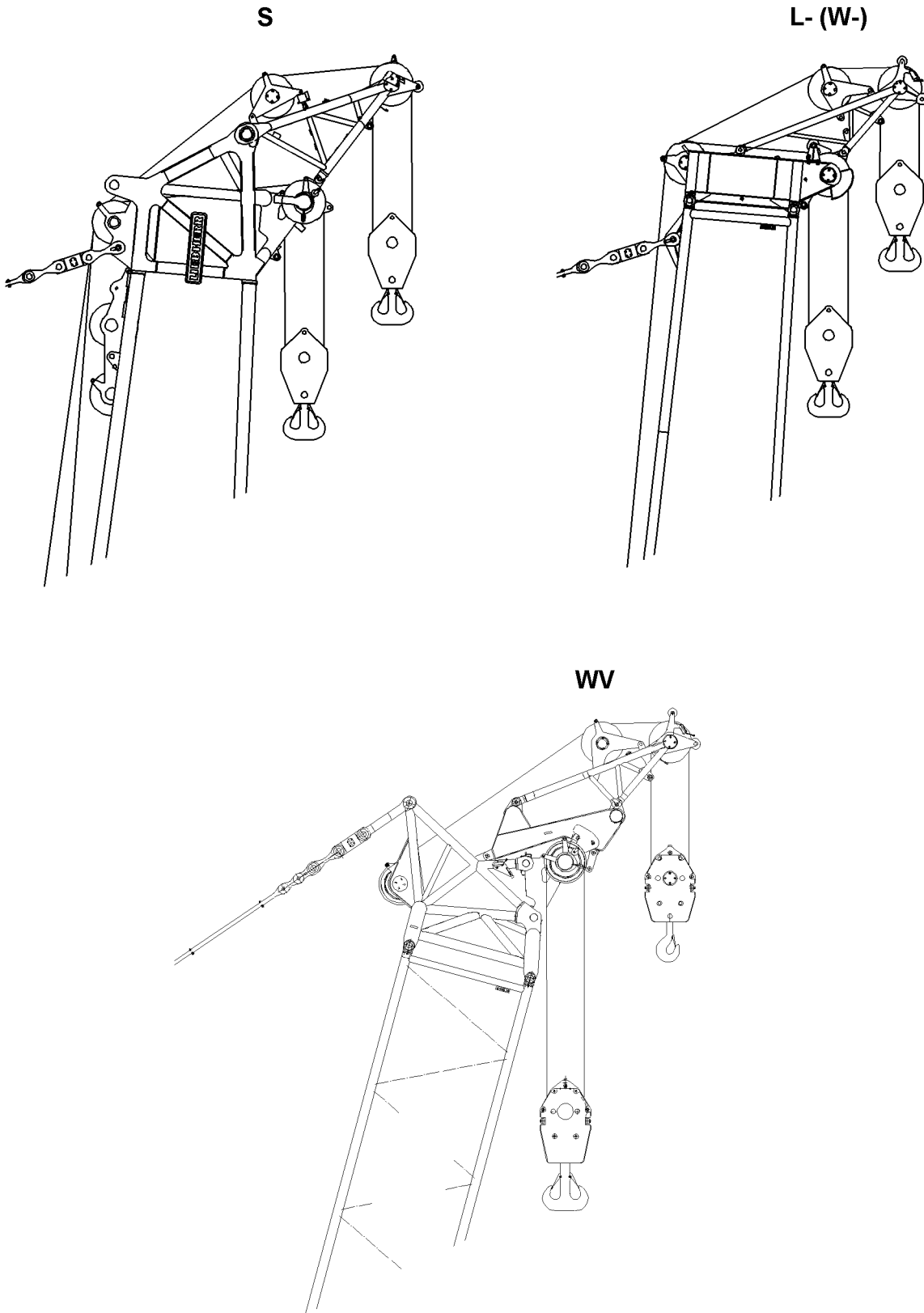


Fig.104486

LWE/LR 1750-000/12812-15-02/en

9 Operating the crane

9.1 Preparing for crane operation

**Note**

- ▶ Observe the notes, see Crane operating instructions, chapter 4.05, chapter 4.08 and chapter 5.01!

Make sure that the following prerequisites are met:

- The LICCON overload protection is active.
- The LICCON overload protection has been set according to the data in the load chart.

**WARNING**

The crane can topple over!

- ▶ Check the horizontal position of the crane before and during operation!
- ▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation!

9.2 Checking the settings

- ▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
- ▶ Check the hoist limit switch by running against the hoist limit switch weight.
- ▶ Check the function of the limit switches on the relapse cylinders.

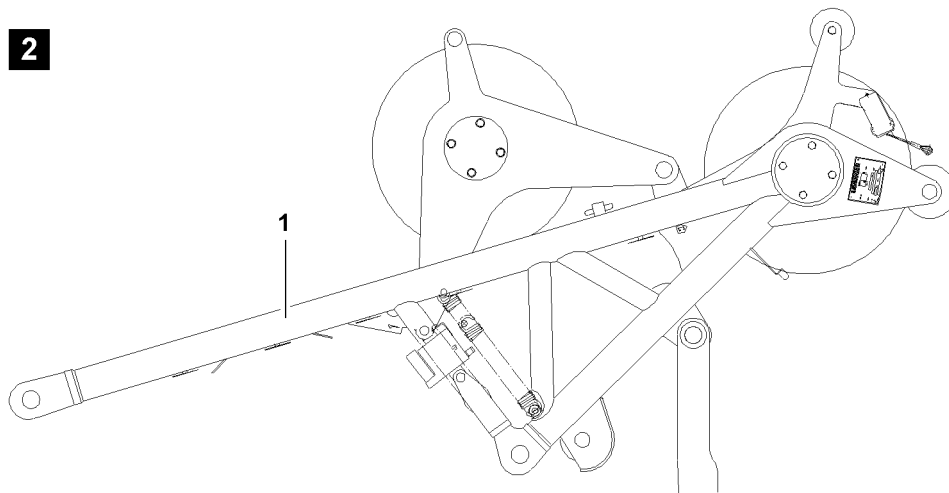
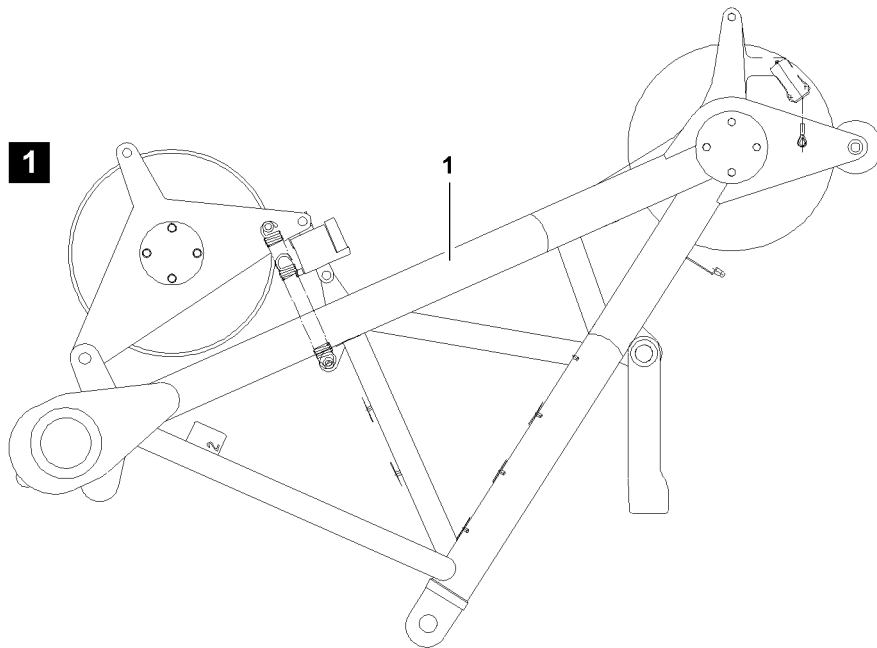


Fig.111812

LWE/LR 1750-000/12812-15-02/en

10 Disassembling the 60 t boom nose



WARNING

Risk of falling!

During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!



WARNING

The lattice sections can fall down!

If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel!

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right!**
- ▶ Do not stand under the booms or within the entire danger zone during the boom pinning and unpinning procedure!
- ▶ Safely secure the pins in the bearing points as well as receptacles!
- ▶ It is prohibited to lean the ladder against the component being disassembled!



WARNING

Danger of crushing!

When assembling crane components, limbs can be crushed or even severed due to oscillation of components!

- ▶ Make sure that the components do not swing back and forth during assembly!



DANGER

The components can fall down!

If the corresponding components are disengaged from the auxiliary crane before the corresponding component is pinned, the corresponding component can fall down and fatally injure personnel!

- ▶ Do not disengage the auxiliary crane until the corresponding component is pinned and secured!

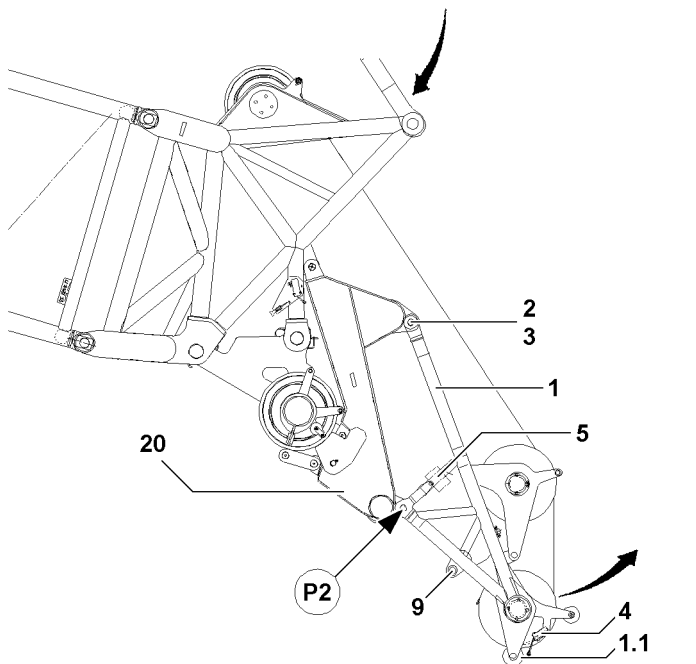
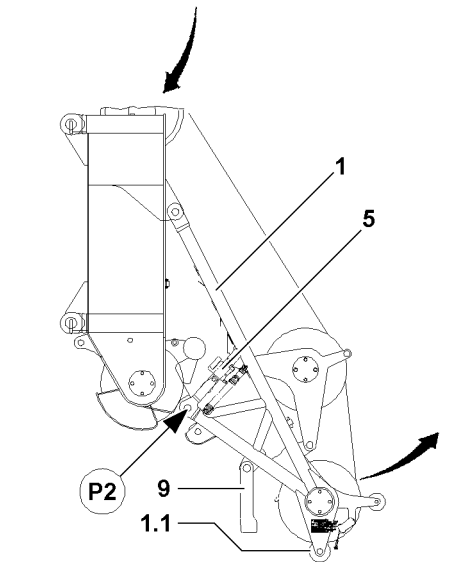
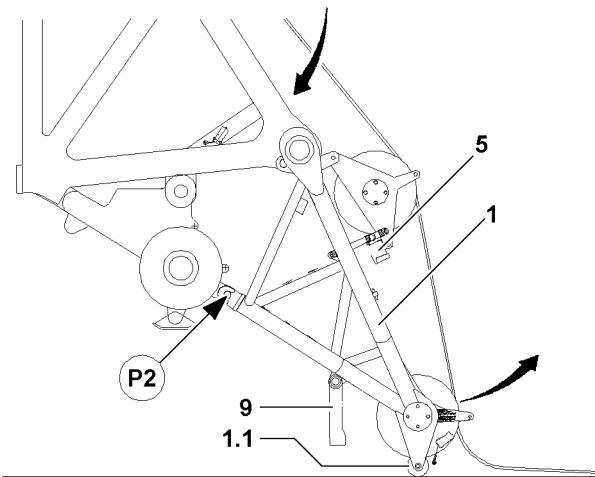


Fig.111816

LWE/LR 1750-000/12812-15-02/en

10.1 Placing the boom down



WARNING

The crane can topple over!

If the following conditions are not met before taking down the boom, the crane can topple over and fatally injure personnel!

- ▶ Observe the safety technical notes, see Crane operating instructions, chapter 5.01!
 - ▶ Observe the data in the erection and take down charts!
-

NOTICE

Damage of boom components!

Taking down the boom system can lead to a collision between the hook block and the pulley head.

The boom components can be severely damaged!

- ▶ Luff the boom system down at the same time and spool the hoist winch out!
-

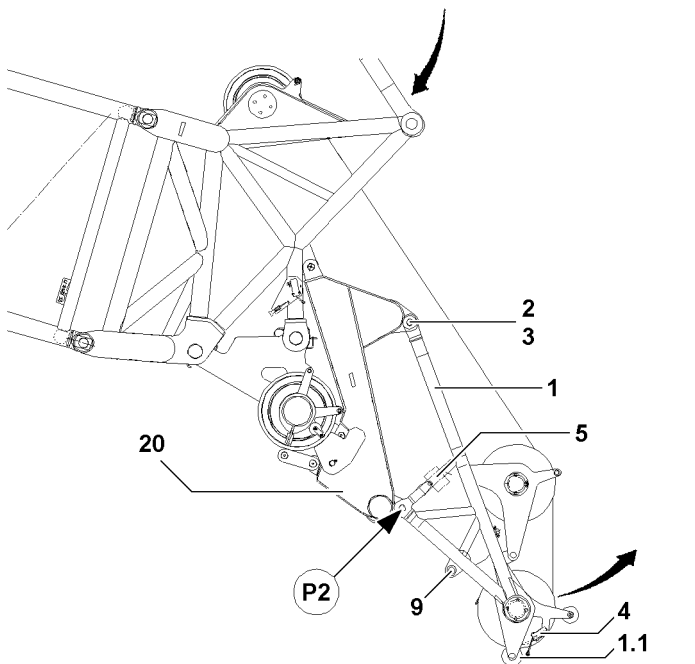
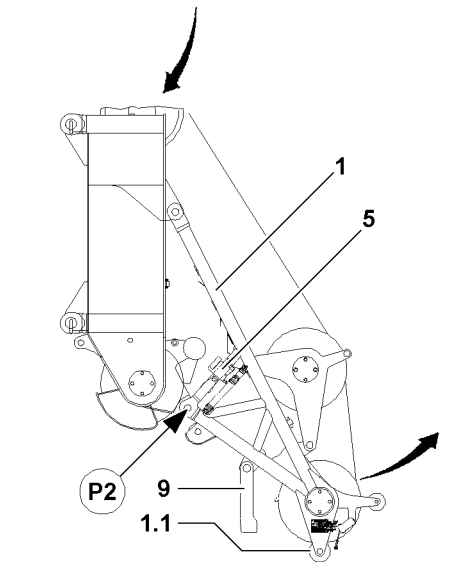
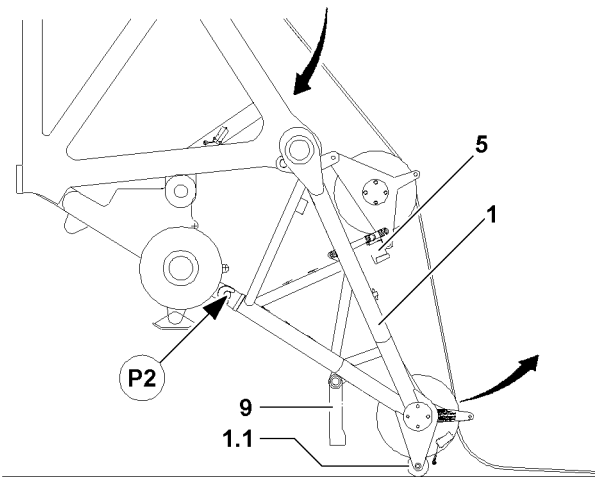


Fig.111816

LWE/LR 1750-000/12812-15-02/en

10.1.1 Lower boom



WARNING

The crane can topple over!

If the danger notes for take down of the boom or the boom systems in the following chapters are not observed, then the crane can topple over!

Personnel can be severely injured or killed!

Boom nose installed on S-end section:

- ▶ Observe and adhere to the danger notes in the Crane operating instructions, chapter 5.38 and chapter 5.39!

Boom nose installed on L-end section:

- ▶ Observe and adhere to the danger notes in the Crane operating instructions, chapter 5.38 and chapter 5.39!

Boom nose installed on W-end section:

- ▶ Observe and adhere to the danger notes in the Crane operating instructions, chapter 5.07!

Boom nose installed on W-adapter:

- ▶ Observe and adhere to the danger notes in the Crane operating instructions, chapter 5.07 and chapter 5.08!

-
- ▶ Luff the boom down according to the instructions in the above chapters.



WARNING

Assembly with bypassed / exceeded LICCON overload protection!

With bypassed / exceeded LICCON overload protection, the crane can collapse due to overload, the boom can break off or the crane can topple over!

Personnel can be severely injured or killed!

This could result in high property damage!

- ▶ The LICCON overload protection may only be bypassed / exceeded by persons who are aware of the consequences of a bypass!
- ▶ Bypass / exceed the LICCON overload protection only when the set up status of the crane has been correctly entered into the LICCON computer system!
- ▶ Observe the erection / take down charts!
- ▶ Crane operation with bypassed / exceeded LICCON overload protection is strictly prohibited!

-
- ▶ At the same time, spool the hoist winch out and luff the boom down until the hook block touches the ground.

10.1.2 Unreeving the hook block

- ▶ Remove the hoist limit switch weight and unreeve the hook block.
- ▶ Carefully luff the boom down until the boom nose 60 t is just above the ground with the rollers 1.1.

When the rollers 1.1 are just above the ground:

- ▶ Luff the boom down slowly until the boom nose 60 t folds out by itself.
- ▶ Continue to luff down the boom.

Result:

- The boom nose 60 t runs on the rollers 1.1 toward the „outside“.
- ▶ Place the boom on the support base.

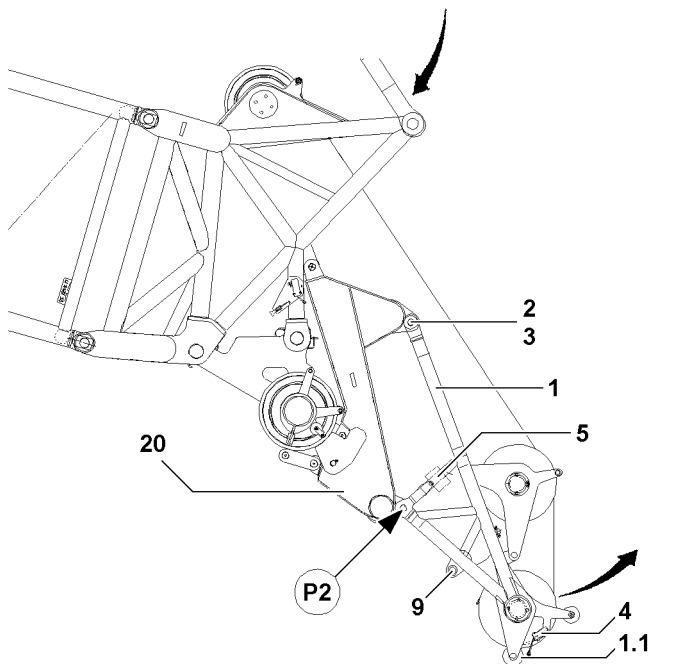
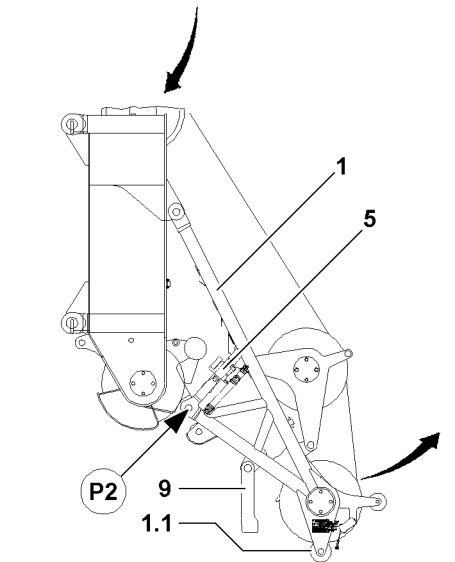
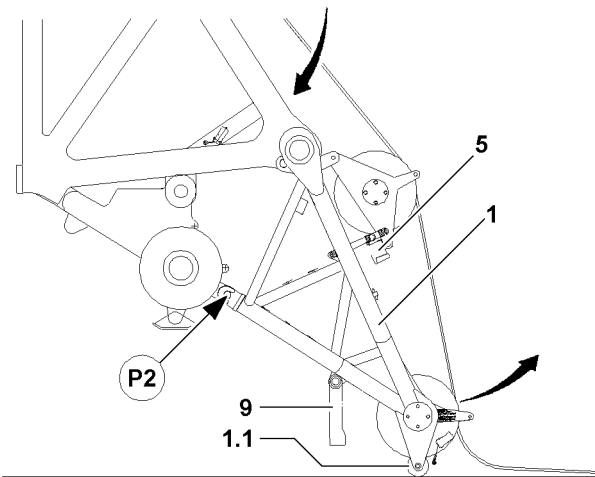


Fig.111816

LWE/LR 1750-000/12812-15-02/en

10.1.3 Spool the hoist rope up



WARNING

Falling hoist rope!

By spooling the hoist rope up, personnel can be severely injured or killed!

- ▶ All rope retaining pins / pipes on the boom nose 60 t **1** have been removed!
- ▶ All rope retaining pins / pipes on the respective end section / W-adapter **20** and on the boom have been removed!
- ▶ Slowly spool up the hoist rope over the rope pulleys back to the winch!
- ▶ Make sure that no personnel is within the danger zone!

NOTICE

Overspooled winch!

If the rope is pulled under the winch when spooling up, then the adjustment of the cam limit switch changes!

A new adjustment by **LIEBHERR Service** must be made!

- ▶ Stop the winch in time, with sufficient rope reserve!
- ▶ Do not overspool the winch!

- ▶ Spool the hoist rope up.

10.2 Disconnecting the electrical connections

Make sure that the following prerequisite is met:

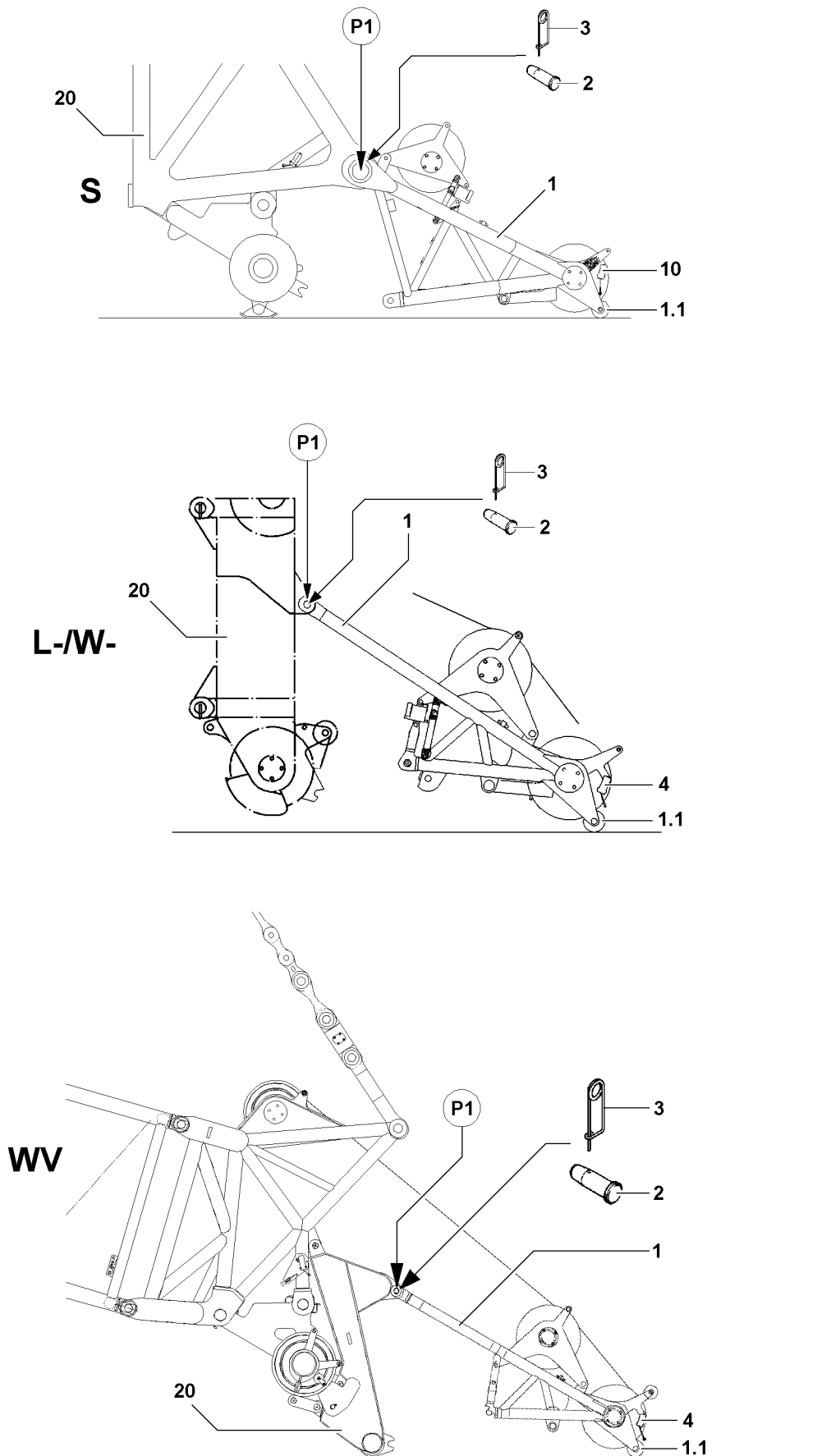
- The boom is properly placed down as specified.

NOTICE

Damage to the electrical connections on the cable drum!

If the electrical connection from the cable drum on the S-pivot section to the terminal box on the respective end section is disconnected and spooled up, then the electrical connection from the cable drum to the terminal box on the S-pivot section can be damaged!

- ▶ Disconnect the electrical connection from the cable drum to the terminal box on the S-pivot section first and then the electrical connection from the terminal box to the respective end section!
- ▶ Store the cable from the terminal box on the S-pivot section properly.
- ▶ Spool the cable drum up and secure it to prevent inadvertent spooling out.



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Fig.111821

10.3 Disassembling the 60 t boom nose

**WARNING**

Folding down boom!

If the following conditions are not met before disassembling the boom nose 60 t **1**, the boom can fold down!

Personnel can be severely injured or killed!

- ▶ Support the boom during disassembly with suitable materials!

Make sure that the following prerequisites are met:

- The boom is placed on a load-bearing support.
 - The boom nose 60 t **1** is laying on the ground.
 - All electrical connections are separated on the boom.
- ▶ Attach the boom nose 60 t **1** on the auxiliary crane.
 - ▶ Lift the boom nose 60 t **1** with the auxiliary crane until the boom nose 60 t hangs horizontally.
 - ▶ Release and unpin the pins **2** on the boom nose 60 t **1** at point **P1**.

When the pins **2** are unpinned:

- ▶ Remove the boom nose 60 t **1** with the auxiliary crane.

**Note**

- ▶ Disassembling the boom, see Crane operating instructions, chapter 5.38 or chapter 5.39 or chapter 5.07 or chapter 5.08!
-
- ▶ Disassemble the boom properly.

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Procedure in case of slack rope

1.1 Lowering the hook block if slack rope forms

If the hook block can no longer be lowered due to slack rope formation, then the following steps must be carried out.

1.1.1 Spooling up loose hoist rope

- ▶ Spool up loose hoist rope between the boom head and the winch carefully onto the winch.



Note

- ▶ A slight rope slack must remain between the boom head and the winch!
-

1.1.2 Luffing the boom down

NOTICE

Danger of collision!

When luffing the boom down, the hoist rope length can shorten and pull the hook block against the boom head.

- ▶ Monitor the distance of the hook block to the boom head!
-

- ▶ Luff the boom down carefully.

Result:

- The hoist rope between the boom head and the winch is tensioned.

1.1.3 Lowering the hook block

- ▶ Lower the hook block carefully with the hoist gear.

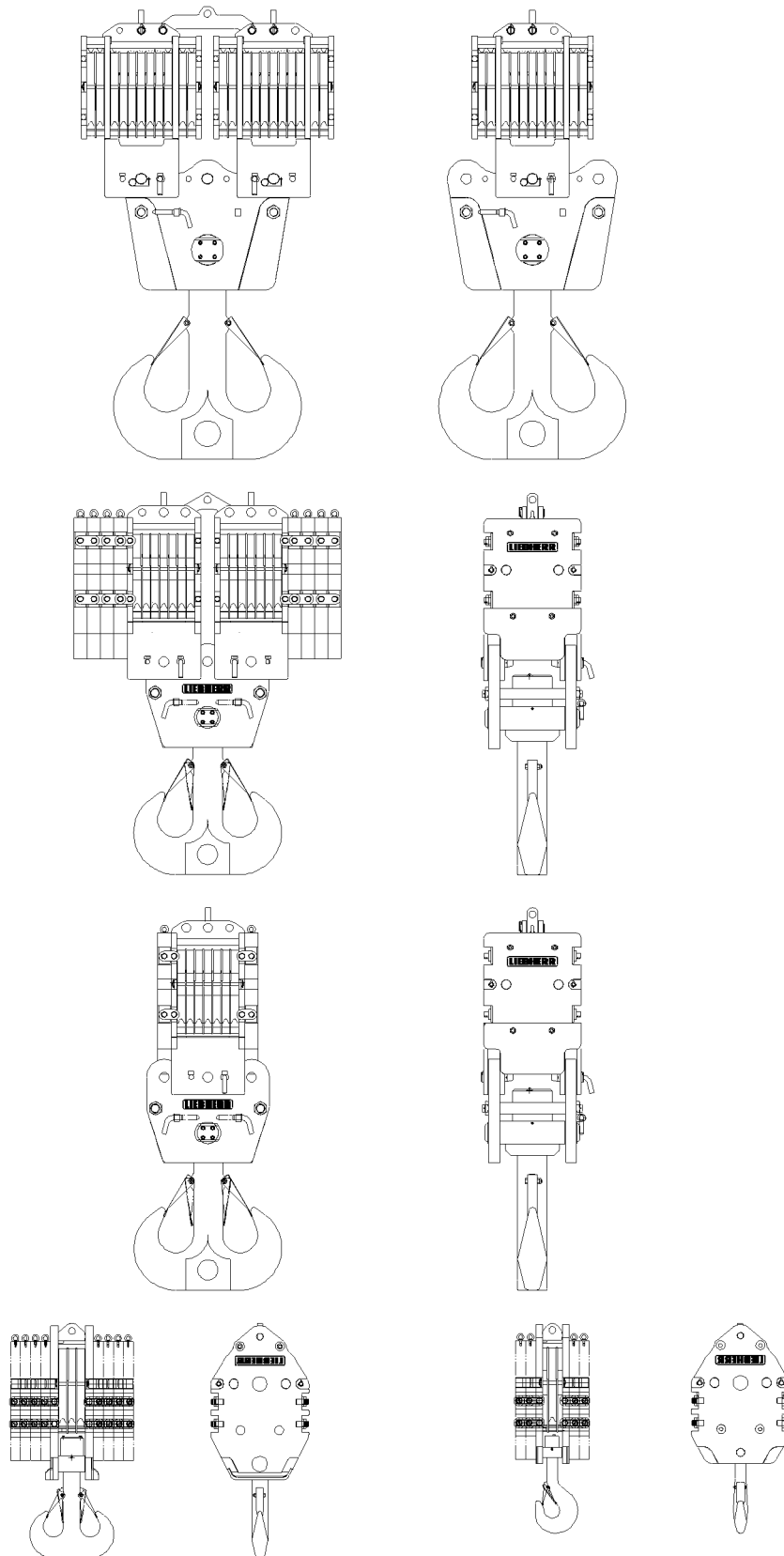


Fig.108122

LWE/LR 1750-000/12812-15-02/en

2 Hook block overview

2.1 Handling of hook blocks



Note

- ▶ For the load hooks and hook blocks approved for this crane type refer to the separate load chart manual!
- ▶ The hook blocks shown in this chapter are only examples and can differ from your hook block in type and number of rope pulleys. The different assembly and disassembly procedures are therefore only an example of the description for a number of different hook blocks!



DANGER

Hook block weights!

If the data in the erection and take down charts as well as the load charts are not observed, dangerous situations up to toppling of the crane can occur!

Personnel can be severely injured or killed, in addition, high property damage can result!

- ▶ Observe the data in the erection and take down charts!
- ▶ The specifications in the load charts must be adhered to!
- ▶ The crane operator bears the sole and full responsibility for the adherence to the data in the erection and take down charts as well as the load charts!

Differently sized hook blocks can be used for various loads.

NOTICE

Rope damage due to insufficient hook block weight!

If the hook block weight is too low to tighten the hoist rope sufficiently, spooling problems may occur on the winches when lowering and lifting the hook block due to slack rope formation!

The hoist rope can be damaged!

- ▶ In order to prevent spooling problems on the winches, the hook block weight may be increased with auxiliary weights, if necessary!
- ▶ If problems develop in the assembly and set up conditions due to the weight increase of the hook block, auxiliary weights must be removed again!

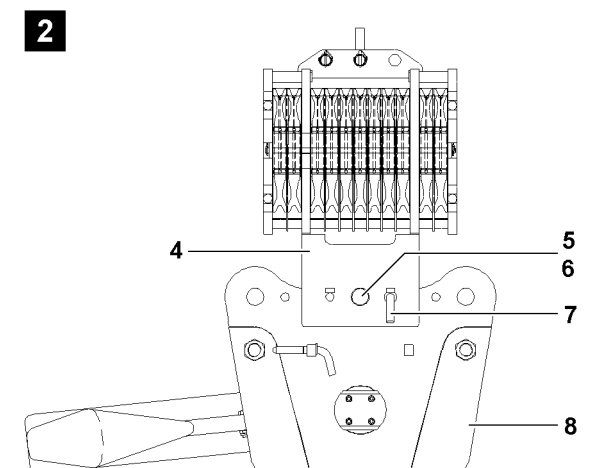
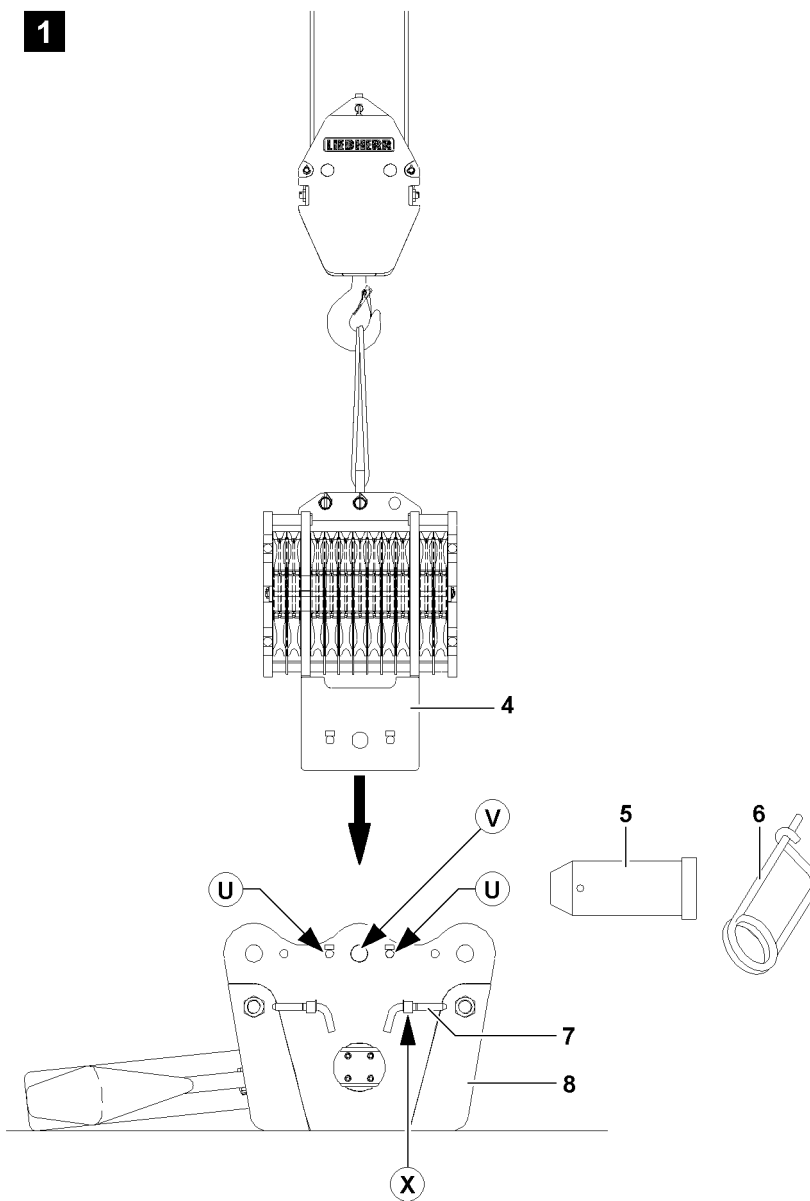


Fig.108123

LWE/LR 1750-000/12812-15-02/en

3 Installing a double hook block for single operation

3.1 Installing the hook block

If the hook blocks are to be used in single operation, then the pulley block **4** must be installed centered on the cross brace **8**.

3.1.1 Installing the pulley block on cross brace

Make sure that the following prerequisites are met:

- The ground is sufficiently load bearing to take on the weight of the hook block safely.
- The ground is level and horizontal.
- The cross brace **8** is placed on the ground, see illustration **1**.



DANGER

Risk of tipping the pulley block!

If the retaining pins **7**, during assembly of the pulley block **4** are not pinned on the cross brace, then the pulley block tips to the side when the auxiliary crane is removed!

Personnel remaining in the danger zone can be severely injured or killed!

- ▶ Insert the retaining pins **7** into the bores **U** on the hook block!
- ▶ Make sure before removing the auxiliary crane that the pulley block is properly pinned and secured!

- ▶ Attach the pulley block **4** onto the auxiliary crane, illustration **1**.
- ▶ Position pulley block **4** on the cross brace **8** and align the pin bore **V**.
- ▶ Insert the pin **5** on point **V** and secure with spring retainer **6**.
- ▶ Unpin the retaining pin **7** from the transport receptacle (point **X**).
- ▶ Insert the retaining pins **7** into one of the bores (point **U**) on the cross brace **8**, illustration **1**.

When the pulley block **4** is secured by the retaining pins **7** at point **U**:

- ▶ Remove the auxiliary crane.

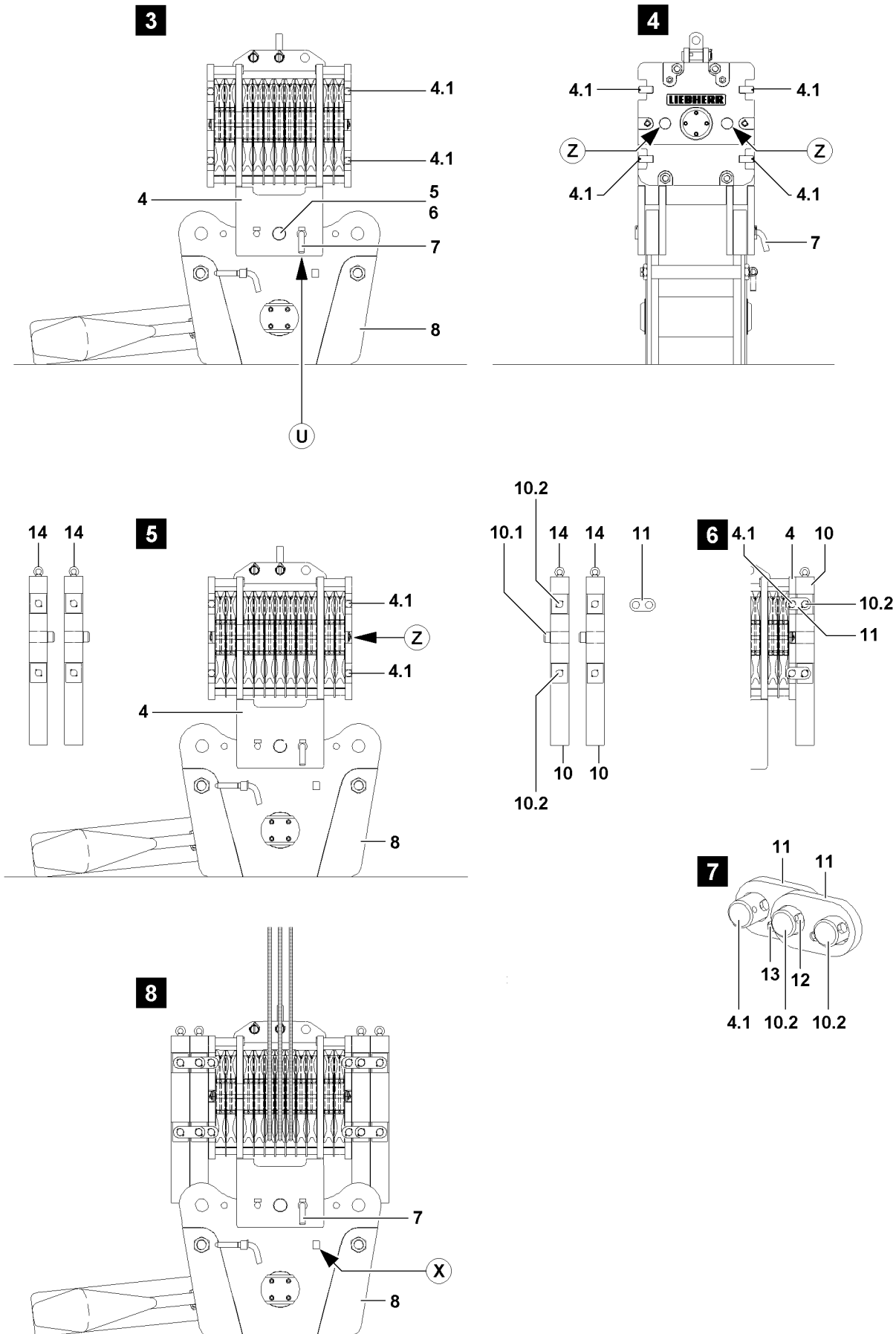


Fig.108141

LWE/LR 1750-000/12812-15-02/en

3.1.2 Installing the auxiliary weights



Note

- ▶ The own weight for each auxiliary weight is marked on the auxiliary weight!



WARNING

Toppling of hook block!

If the auxiliary weights are installed one-sided, the hook block can topple over!

Personnel can be severely injured or killed!

- ▶ The auxiliary weights may only be installed **individually** and alternating left and right on the pulley block!
- ▶ When the required auxiliary weight is installed on the pulley block, the difference between the left and right side may never be more than one auxiliary weight!
- ▶ Asymmetrical installation of auxiliary weights is prohibited!
- ▶ Do not exceed the maximum permissible own weight of the hook block! The maximum permissible own weight is engraved on ballastable hook blocks. See „Engraving WT max.“.

Make sure that the following prerequisites are met:

- The hook block is placed on the ground.
- The pulley block **4** is properly installed and secured.
- The retaining pin **7** is pinned and secured at point **U**.



WARNING

Falling auxiliary weights!

If the auxiliary weights are not properly installed on the pulley block, then they can fall down during installation or in crane operation!

Personnel can be severely injured or killed!

- ▶ Standing under a suspended auxiliary weight is prohibited!
- ▶ Make sure that the auxiliary weights are properly installed and secured!
- ▶ Crane operation with insufficiently secured auxiliary weights is prohibited!

- ▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane, illustration **5**.



WARNING

Danger of crushing!

When swinging the auxiliary weights to the pulley block, personnel can be severely injured or killed!

Fingers, hands and arms can be crushed or severed!

- ▶ It is prohibited for anyone to remain between the pulley block and the auxiliary weight!
- ▶ Swing auxiliary weights in to the pulley block with utmost caution and at the least possible speed!

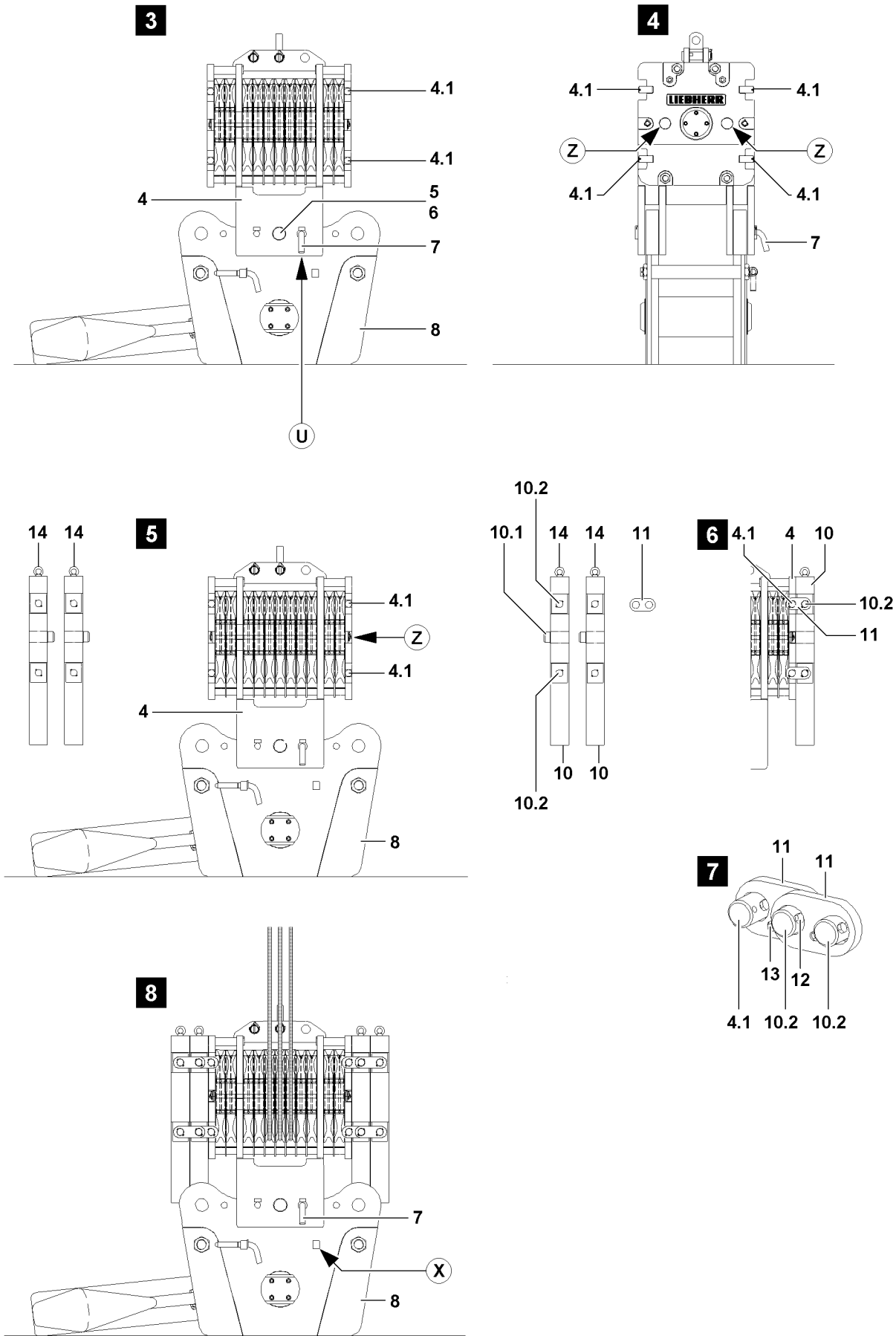


Fig.108141

LWE/LR 1750-000/12812-15-02/en

- ▶ Align the auxiliary weight **10** on the pulley block **4**.
- ▶ Move the centering pin **10.1** of the auxiliary weight into the centering bores **Z** on the pulley block **4**, illustration **6**.

**WARNING**

Falling auxiliary weights!

If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!

Personnel can be severely injured or killed!

- ▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!
- ▶ Always install or remove the mounting brackets **11** alternately!

▶ Install the mounting brackets **11** on the side and connect the pulley block **4** with the auxiliary weight **10**, illustration **7**.

▶ Secure the mounting brackets **11** with screws **12** and lock nuts **13**, illustration **7**.

**Note**

- ▶ Additional auxiliary weights must be connected with the mounting brackets **11**!

**WARNING**

Falling auxiliary weights!

The auxiliary weights can fall down by removing the auxiliary crane!

Personnel can be severely injured or killed!

- ▶ Remove the auxiliary crane only when it is ensured that the auxiliary weight **10** is properly secured with the mounting brackets **11**!

When the respective auxiliary weight is properly installed and secured:

- ▶ Remove the auxiliary crane.

3.1.3 Preparing the hook block for crane operation

**Note**

- ▶ The reeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!
- ▶ Observe the „permissible hook block weights“ in the erection and take down charts!

▶ Reeve the hoist rope according to the instructions in chapter 4.06 of the Crane operating instructions and the reeving plans!

NOTICE

Retaining pins **7** pinned when lifting the load!

If the retaining pin **7** is not unpinned before crane operation, then the retaining pin **7** may be shorn off when lifting the load!

- ▶ Unpin the retaining pin **7** from the hook block before crane operation!

When the hook block is properly reeved and has been lifted off the ground:

- ▶ Unpin the retaining pin **7** and pin and secure into the transport receptacle (point **X**), illustration **8**.

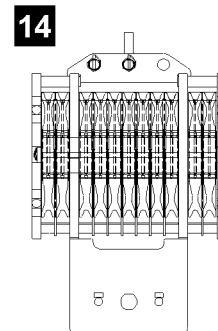
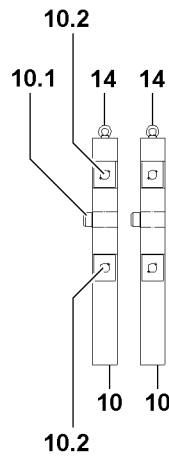
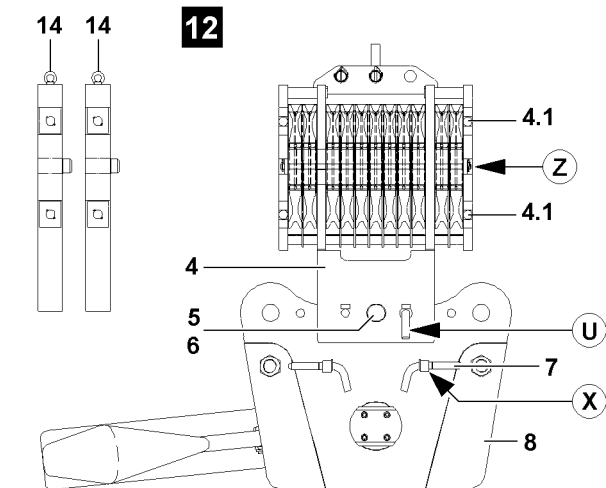
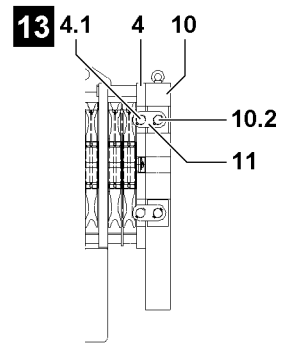
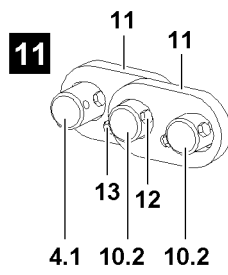
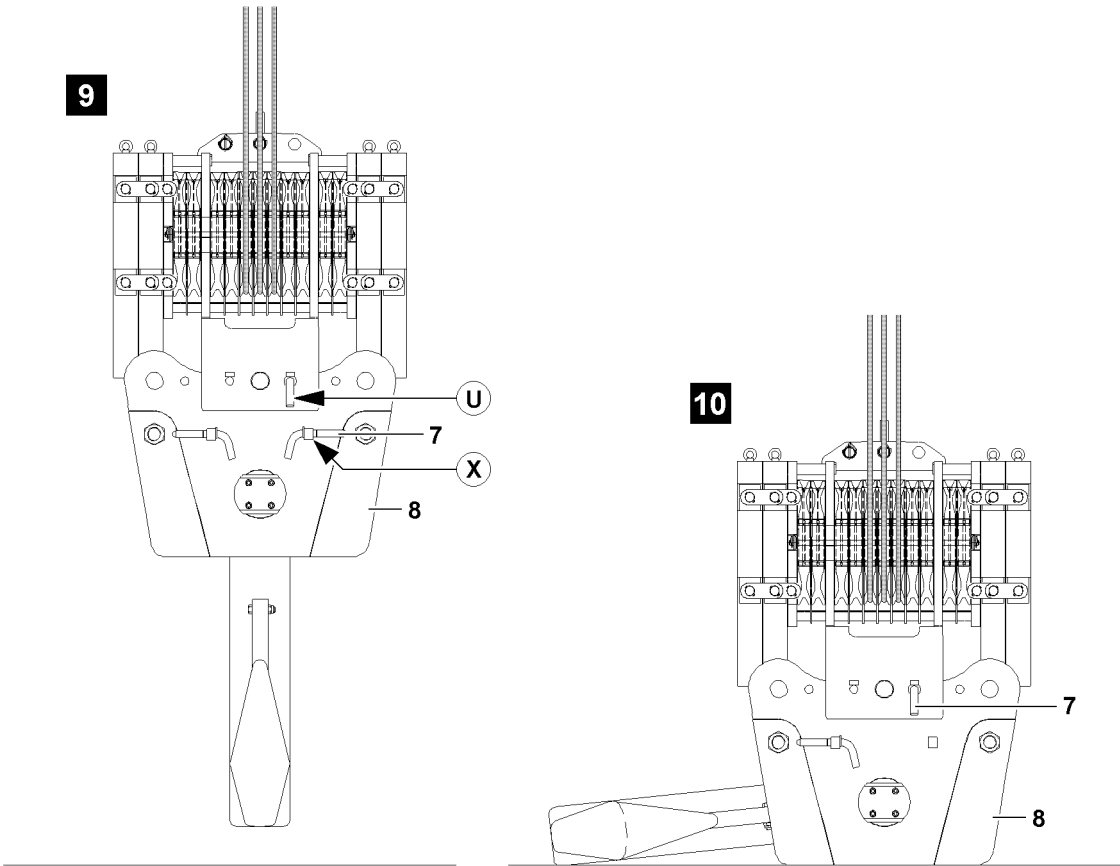


Fig.108142

LWE/LR 1750-000/12812-15-02/en

3.2 Removing the hook block

3.2.1 Preparing the hook block for removal



Note

- ▶ The unreeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!
- ▶ Observe the „permissible hook block weights“ in the erection and take down charts!

NOTICE

Retaining pin 7 unpinned when setting down the hook block!

If the retaining pin 7 - before setting the hook block on the ground - is not pinned, then the pulley block tips away to the side when it is set down!

Personnel can be severely injured or killed!

- ▶ Insert and secure the retaining pin 7, before setting the hook block on the ground, at point **U**!

Make sure that the following prerequisites are met:

- The ground is sufficiently load bearing to take on the weight of the hook block and the auxiliary weights safely.
- The ground is level and horizontal.

- ▶ Lower the hook block completely to the ground.

When the hook block was placed down on the ground properly:

- ▶ Unreeve the hoist rope according to chapter 4.06 of the Crane operating instructions!

3.2.2 Removing the auxiliary weights



Note

- ▶ The own weight for each auxiliary weight is marked on the auxiliary weight!



WARNING

Toppling of hook block!

If the auxiliary weights are removed one-sided, the hook block can topple over!

Personnel can be severely injured or killed!

- ▶ The auxiliary weights may only be removed **individually** and alternating left and right on the pulley block!
- ▶ The difference between the left and the right side at removal of the auxiliary weights may never be more than one auxiliary weight!
- ▶ Asymmetrical removal of auxiliary weights is prohibited!

Make sure that the following prerequisite is met:

- The retaining pin 7 is pinned and secured at point **U**.



WARNING

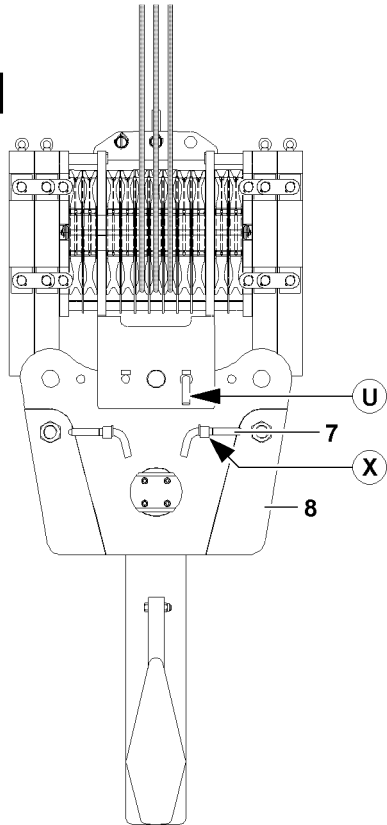
Falling auxiliary weights!

If the auxiliary weights on the pulley block are not properly removed, then they can fall down at removal!

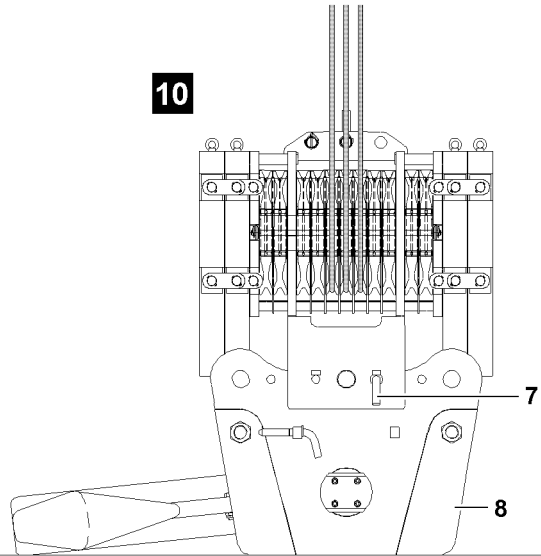
Personnel can be severely injured or killed!

- ▶ Standing under a suspended auxiliary weight is prohibited!
- ▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane.
- ▶ Tension the fastening equipment carefully.

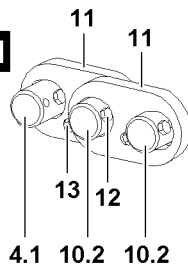
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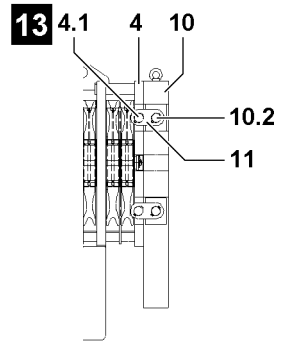
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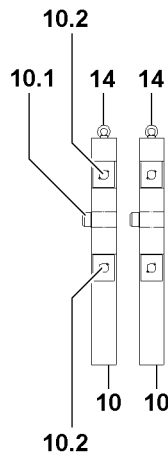
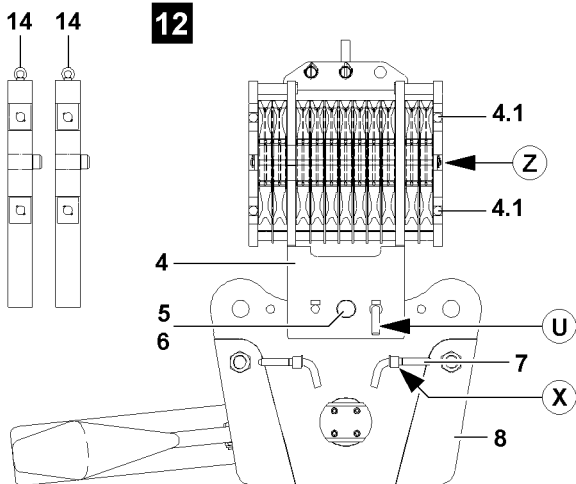
11



13



12



14

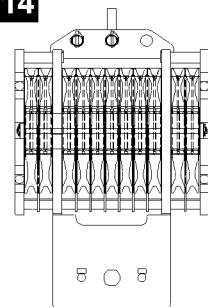


Fig.108142

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Oscillating auxiliary weights!

During the removal of the auxiliary weights, the auxiliary weights can start to swing back and forth!
Personnel can be severely injured or killed!

- ▶ It is prohibited for anyone to remain in the danger zone!
- ▶ Make sure that the auxiliary weight which is being removed is properly attached on the auxiliary crane before releasing the mounting brackets!
- ▶ Angular pull is prohibited!

When the fastening equipment is tensioned on the auxiliary weight:

- ▶ Release the screw connection on the mounting brackets of the outermost auxiliary weight and remove the screws.

**WARNING**

Falling auxiliary weights!

If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!

Personnel can be severely injured or killed!

- ▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!
- ▶ Always install or remove the mounting brackets **11** alternately!

- ▶ Pull the mounting brackets **11** off to the side.

**WARNING**

Falling auxiliary weights!

If additional auxiliary weights which are being removed are released, then these auxiliary weights can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure, before removing the outermost auxiliary weight, that the other auxiliary weights are secured with the mounting brackets!

If additional mounting brackets must be removed to release the outermost auxiliary weight:

- ▶ Reinstall the mounting brackets again immediately, so that only the auxiliary weight which is being removed is released.
- ▶ Lift the auxiliary weight with the auxiliary crane from the pulley block.
- ▶ Place the auxiliary weight onto the ground.
- ▶ Remove the auxiliary crane.
- ▶ Remove additional auxiliary weights as described above.

3.2.3 Removing the pulley block on cross brace

Make sure that the following prerequisite is met:

- The auxiliary weights have been removed.

- ▶ Attach the pulley block **4** on the auxiliary crane.
- ▶ Tension the fastening equipment carefully.
- ▶ Unpin the retaining pin **7** at point **U** and pin into the transport receptacle on the cross brace, point **X**, illustration **12**.
- ▶ Release and unpin the pin **5**.
- ▶ Swing the pulley block **4** out with auxiliary crane.
- ▶ Place the pulley block **4** on the ground, illustration **14**.
- ▶ Remove the auxiliary crane.

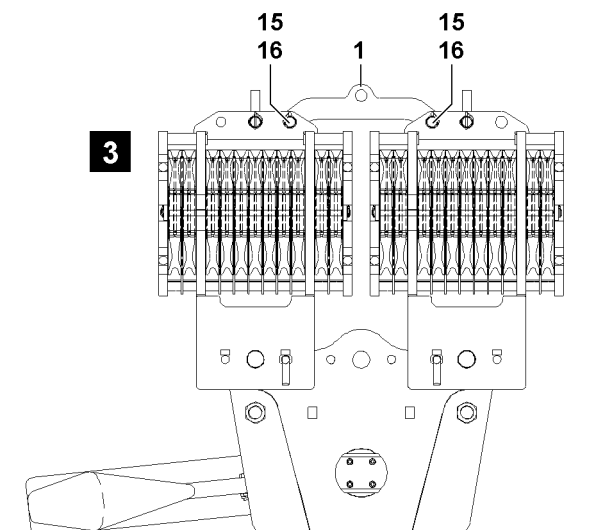
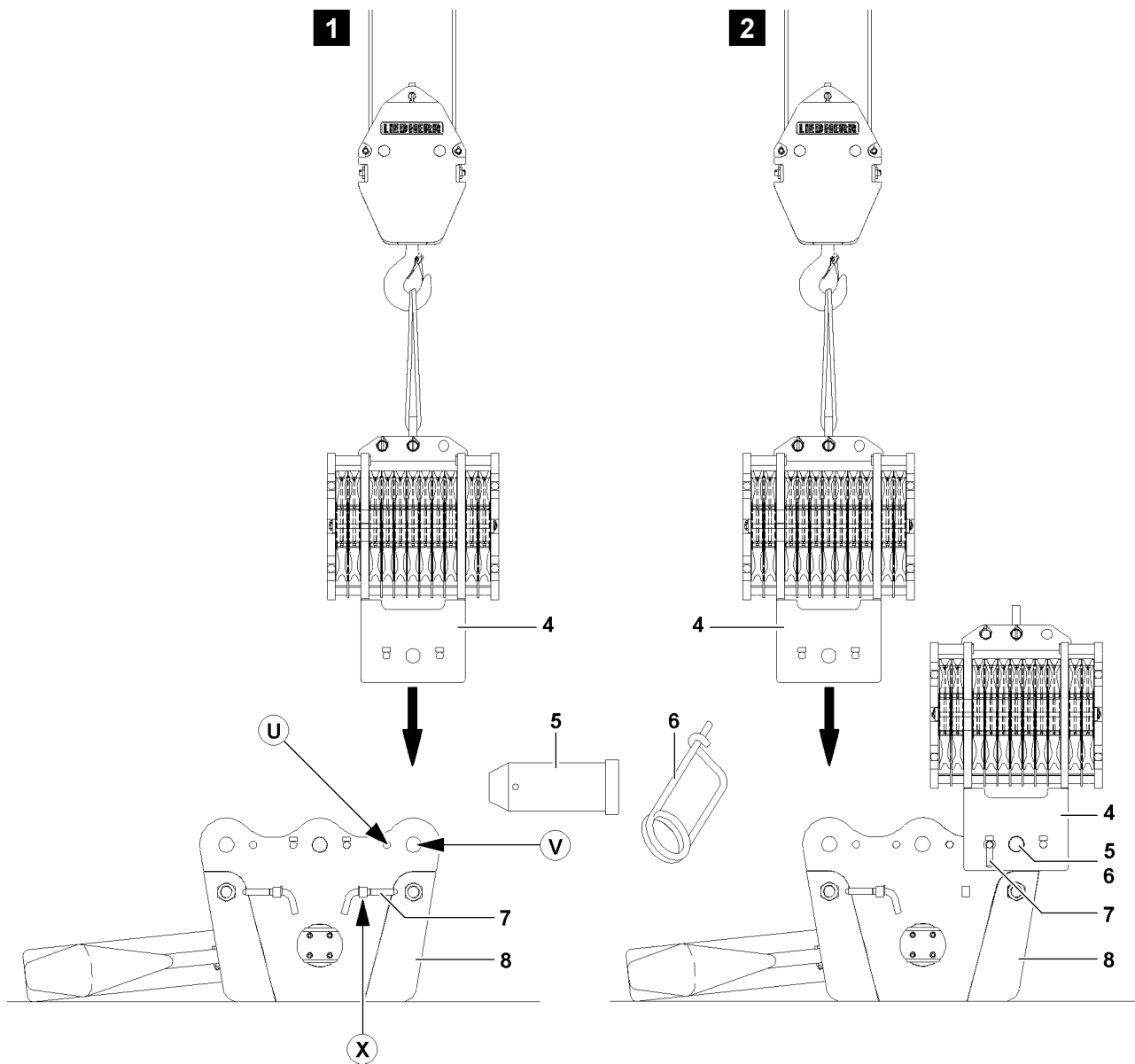


Fig.108121

LWE/LR 1750-000/12812-15-02/en

4 Installing a double hook block for parallel operation

4.1 Installing the hook block

If the hook blocks are to be used in parallel operation, then the pulley blocks **4** must be installed on the left and right on the cross brace **8**.

4.1.1 Installing the pulley blocks on the cross brace

Make sure that the following prerequisites are met:

- The ground is sufficiently load bearing to take on the weight of the hook block safely.
- The ground is level and horizontal.
- The cross brace **8** is placed on the ground, see illustration **1**.



DANGER

Risk of tipping the pulley blocks!

If the retaining pins **7**, during assembly of the pulley blocks **4** are not pinned on the cross brace, then the pulley blocks tip to the side when the auxiliary crane is removed!

Personnel remaining in the danger zone can be severely injured or killed!

- ▶ Insert the retaining pins **7** into the bores **U** on the hook block!
- ▶ Make sure before removing the auxiliary crane that the pulley blocks are properly pinned and secured!



Note

- ▶ The installation of two pulley blocks **4** is identical and is described on the example of one pulley block!

- ▶ Attach the pulley block **4** onto the auxiliary crane, illustration **1**.
- ▶ Position pulley block **4** on the cross brace **8** and align the pin bore **V**.
- ▶ Insert the pin **5** on point **V** and secure with spring retainer **6**.
- ▶ Unpin the retaining pin **7** from the transport receptacle (point **X**).
- ▶ Insert the retaining pins **7** into the bores (point **U**) on the cross brace **8**, illustration **1**.

When the pulley block **4** is secured by the retaining pins **7** at point **U**:

- ▶ Remove the auxiliary crane, illustration **2**.
- ▶ Install the second pulley block.

4.1.2 Installing the block connector

Make sure that the following prerequisite is met:

- The two pulley blocks **4** are installed and secured on the cross brace **8**.

Both pulley blocks **4** are pinned with the block connector **1**.

- ▶ Attach the block connector **1** on the auxiliary crane.
- ▶ Position the block connector **1** with auxiliary crane in pin position, illustration **3**.
- ▶ Insert the pins **15** on both sides on the pulley blocks **4** and secure with linch pin **16**, illustration **3**.

When the block connector **1** is pinned and secured properly:

- ▶ Remove the auxiliary crane.

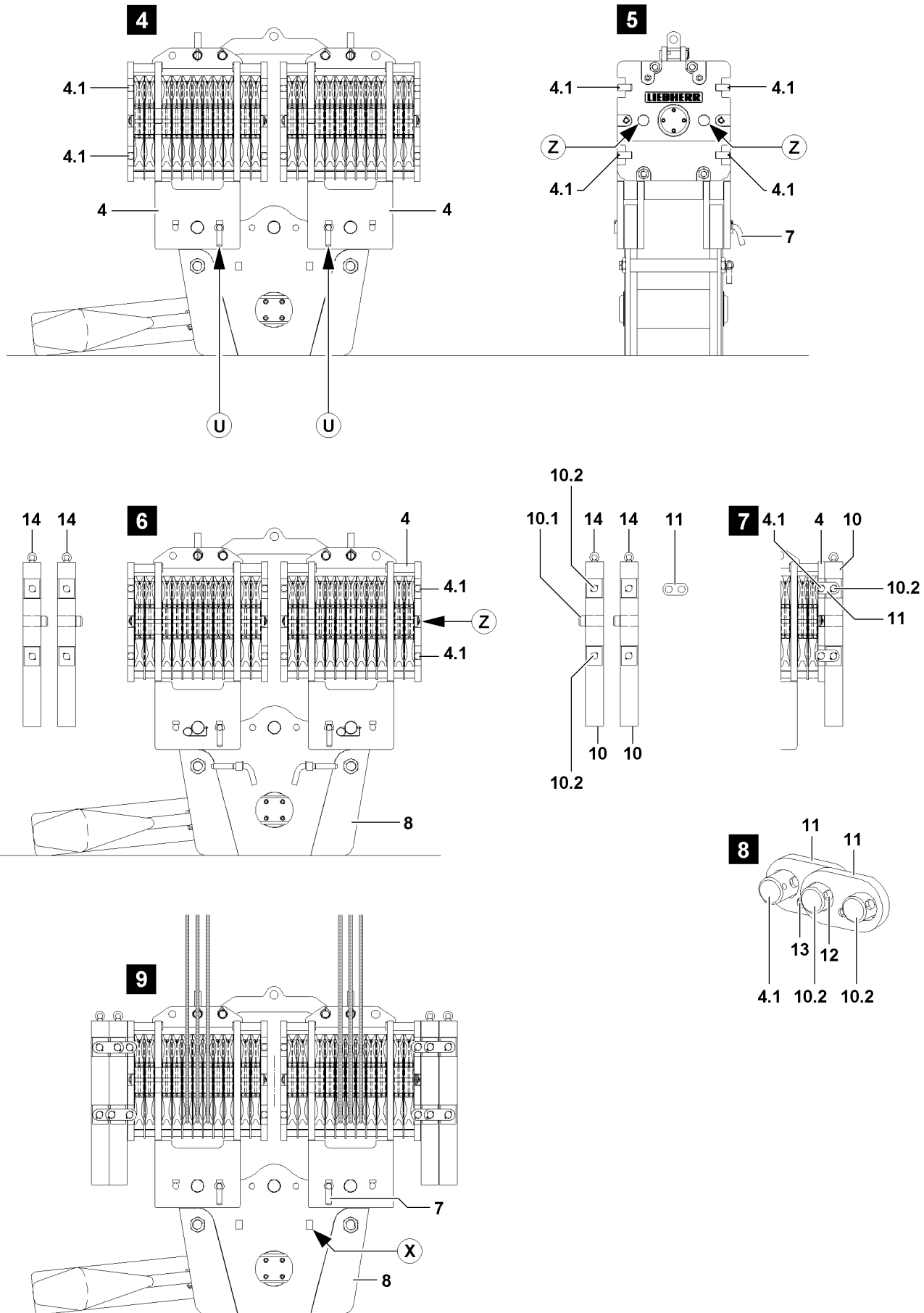


Fig.108120

LWE/LR 1750-000/12812-15-02/en

4.1.3 Installing the auxiliary weights



Note

- ▶ The own weight for each auxiliary weight is marked on the auxiliary weight!



WARNING

Toppling of hook block!

If the auxiliary weights are installed one-sided, the hook block can topple over!

Personnel can be severely injured or killed!

- ▶ The auxiliary weights may only be placed **individually** and alternating left and right on the pulley blocks of the hook block!
- ▶ When the required auxiliary weight is installed on the pulley blocks, the difference between the left and right side may never be more than one auxiliary weight!
- ▶ Asymmetrical installation of auxiliary weights is prohibited!
- ▶ Do not exceed the maximum permissible own weight of the hook block! The maximum permissible own weight is engraved on ballastable hook blocks. See „Engraving WT max.“.

Make sure that the following prerequisites are met:

- The hook block is placed on the ground.
- The pulley blocks **4** are properly installed and secured.
- The retaining pins **7** are pinned in and secured at point **U**.
- The block connector **1** is properly installed and secured.



WARNING

Falling auxiliary weights!

If the auxiliary weights on the pulley blocks are not properly installed, then they can fall down during installation or during crane operation!

Personnel can be severely injured or killed!

- ▶ Standing under a suspended auxiliary weight is prohibited!
 - ▶ Make sure that the auxiliary weights are properly installed and secured!
 - ▶ Crane operation with insufficiently secured auxiliary weights is prohibited!
-
- ▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane.



WARNING

Danger of crushing!

When swinging the auxiliary weights to the pulley block, personnel can be severely injured or killed!

Fingers, hands and arms can be crushed or severed!

- ▶ It is prohibited for anyone to remain between the pulley blocks and the auxiliary weight!
- ▶ Swing auxiliary weights in to the pulley block with utmost caution and at the least possible speed!

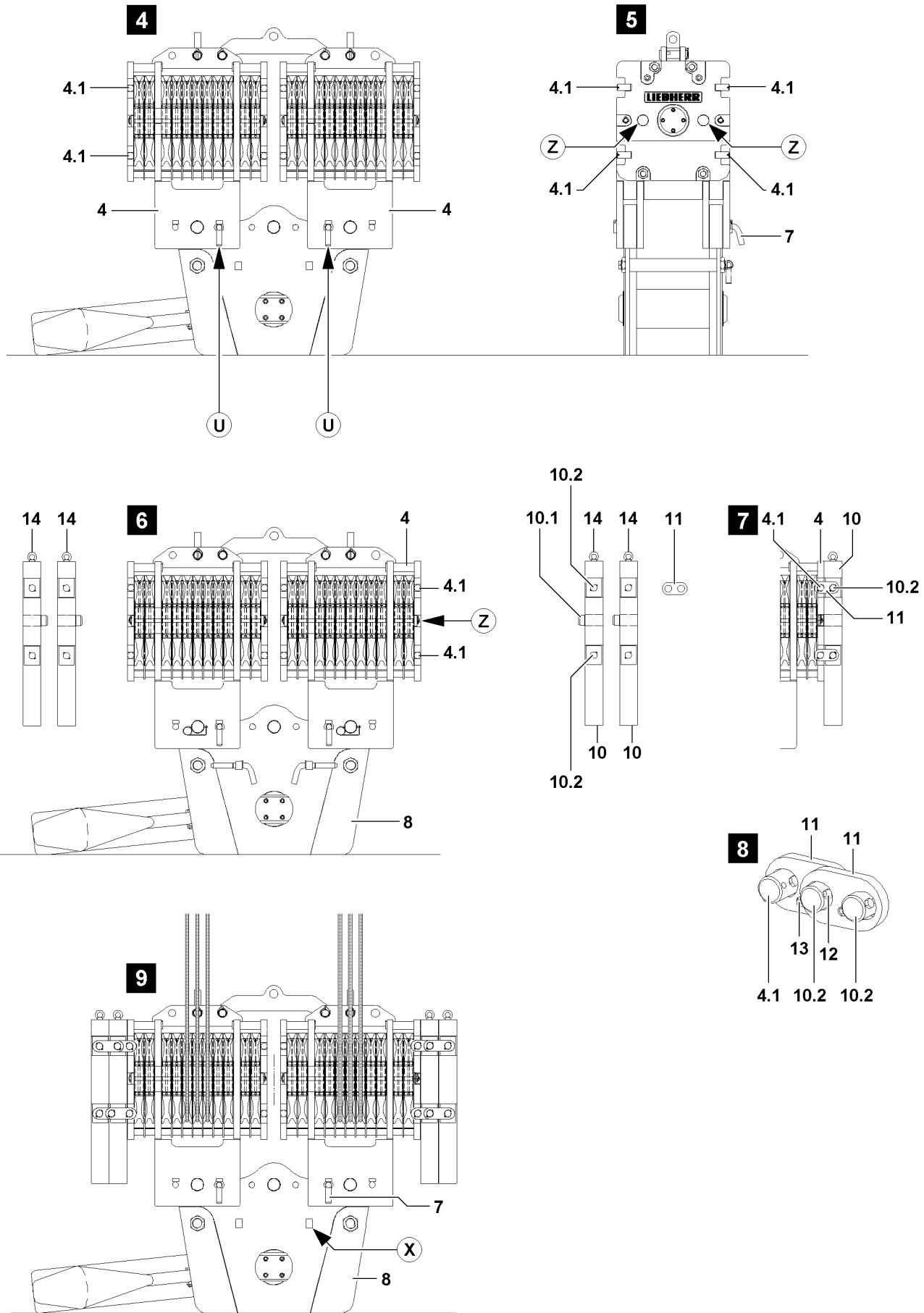


Fig.108120

LWE/LR 1750-000/12812-15-02/en

- ▶ Align the auxiliary weight **10** on the pulley block **4**.
- ▶ Move the centering pin **10.1** of the auxiliary weight into the centering bores **Z** on the pulley block **4**, illustration **7**.

**WARNING**

Falling auxiliary weights!

If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!

Personnel can be severely injured or killed!

- ▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!
- ▶ Always install or remove the mounting brackets **11** alternately!

- ▶ Install the mounting brackets **11** on the side and connect the pulley block **4** with the auxiliary weight **10**, illustration **8**.

- ▶ Secure the mounting brackets **11** with screws **12** and lock nuts **13**, illustration **8**.

**Note**

- ▶ Additional auxiliary weights must be connected with the mounting brackets **11**!

**WARNING**

Falling auxiliary weights!

The auxiliary weights can fall down to the side when the auxiliary crane is removed!

Personnel can be severely injured or killed!

- ▶ Remove the auxiliary crane only when it is ensured that the auxiliary weight **10** is properly secured with the mounting brackets **11**!

When the respective auxiliary weight is properly installed and secured:

- ▶ Remove the auxiliary crane.

4.1.4 Preparing the hook block for crane operation

**Note**

- ▶ The reeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!
- ▶ Observe the „permissible hook block weights“ in the erection and take down charts!

- ▶ Reeve the hoist rope according to the instructions in chapter 4.06 of the Crane operating instructions and the reeving plans!

NOTICE

Retaining pins **7** pinned when lifting the load!

If the retaining pins **7** are not unpinned before the crane operation, then the retaining pins **7** may be shorn off when lifting the load!

- ▶ Unpin the retaining pin **7** from the hook block before crane operation!

When the hook block is properly reeved and has been lifted off the ground:

- ▶ Unpin the retaining pin **7** and pin and secure into the transport receptacle (point **X**), illustration **9**.

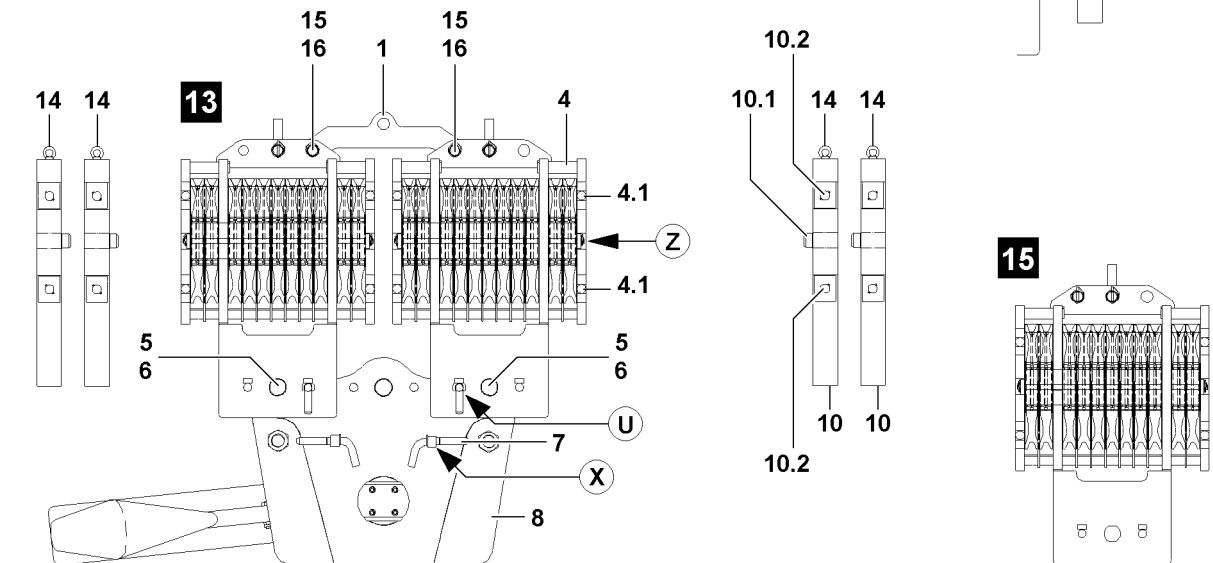
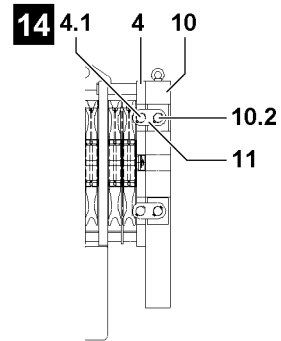
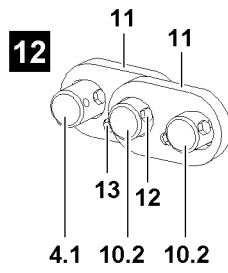
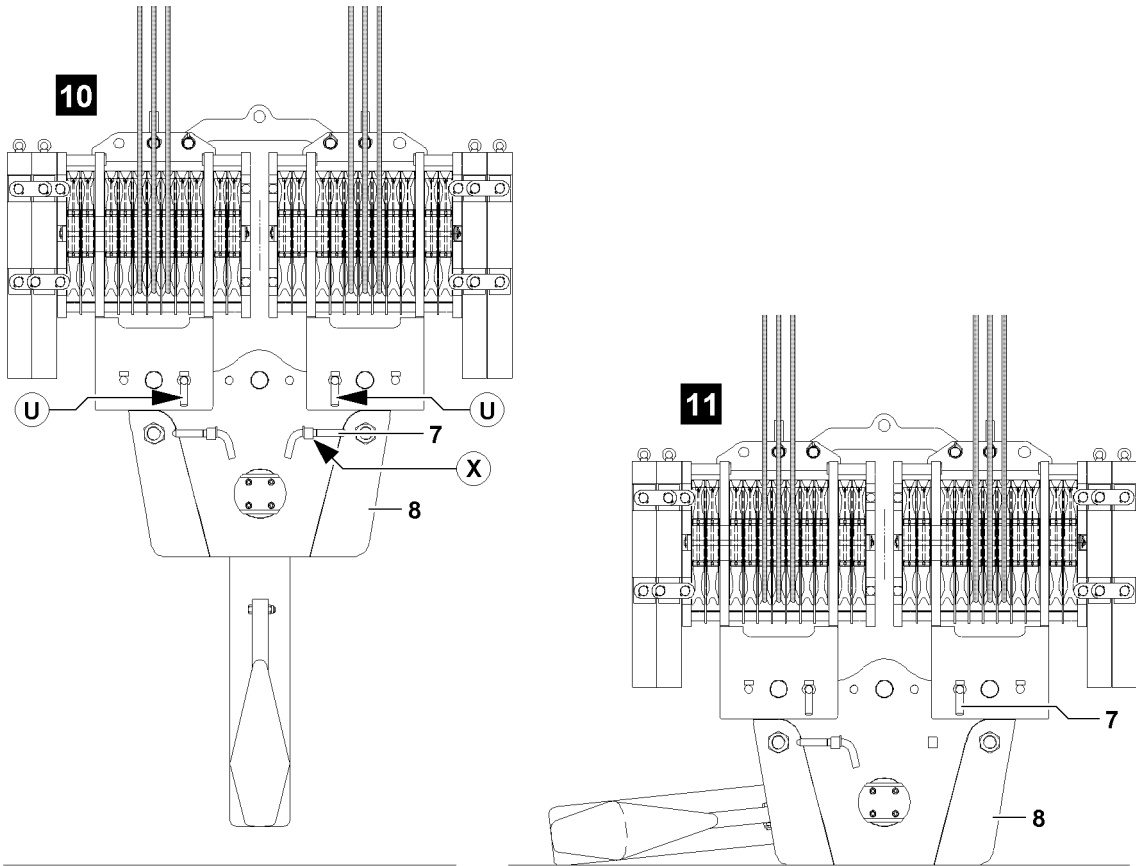


Fig.108143

LWE/LR 1750-000/12812-15-02/en

4.2 Removing the hook block

4.2.1 Preparing the hook block for removal



Note

- ▶ The unreeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!
- ▶ Observe the „permissible hook block weights“ in the erection and take down charts!

NOTICE

Retaining pin 7 unpinned when setting down the hook block!

If the retaining pin 7 - before setting the hook block on the ground - is not pinned, then the pulley blocks tip away to the side when the hoist rope is unreeved!

Personnel can be severely injured or killed!

- ▶ Before setting the hook block on the ground, insert and secure the retaining pins 7 on both pulley blocks at point U!

Make sure that the following prerequisites are met:

- The ground is sufficiently load bearing to take on the weight of the hook block and the auxiliary weights safely.
- The ground is level and horizontal.

- ▶ Lower the hook block completely to the ground.

When the hook block was placed down on the ground properly:

- ▶ Unreeve the hoist rope(s) according to chapter 4.06 of the Crane operating instructions!

4.2.2 Removing the auxiliary weights



Note

- ▶ The own weight for each auxiliary weight is marked on the auxiliary weight!



WARNING

Toppling of hook block!

If the auxiliary weights are removed one-sided, the hook block can topple over!

Personnel can be severely injured or killed!

- ▶ The auxiliary weights may only be removed **individually** and alternating left and right on the pulley blocks of the hook block!
- ▶ The difference between the left and the right side at removal of the auxiliary weights may never be more than one auxiliary weight!
- ▶ Asymmetrical removal of auxiliary weights is prohibited!

Make sure that the following prerequisites are met:

- The retaining pins 7 are pinned and secured on both sides at point U.
- The block connector 1 has been removed.

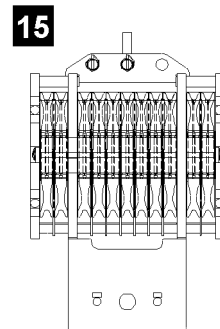
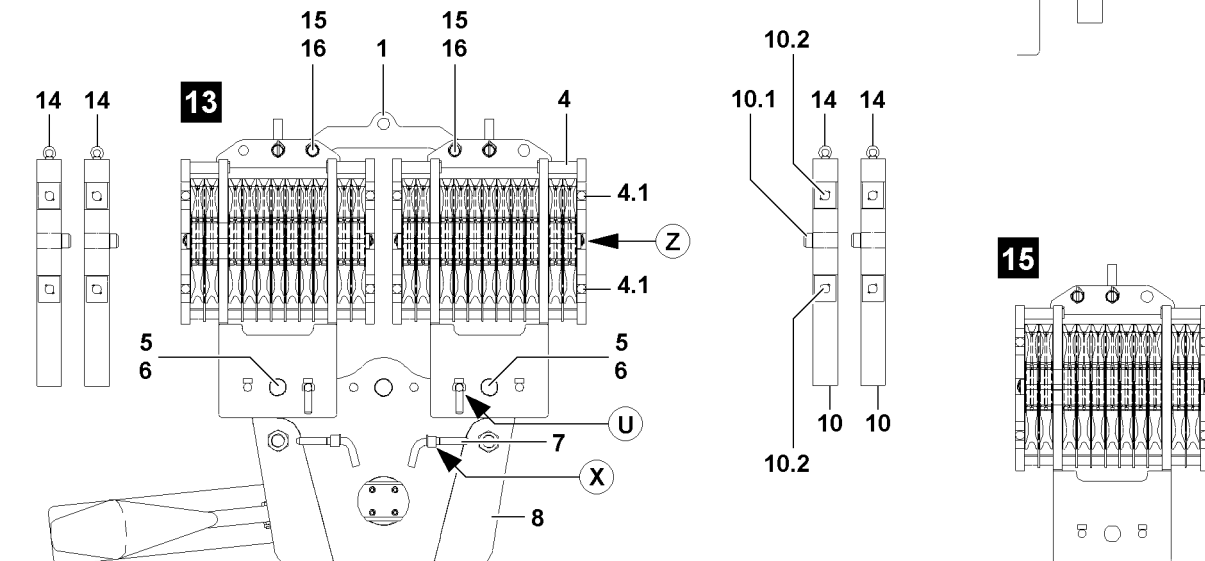
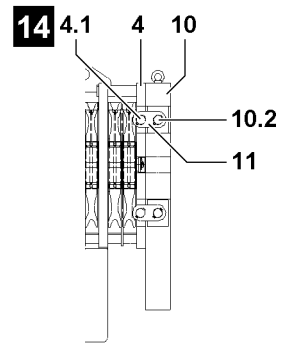
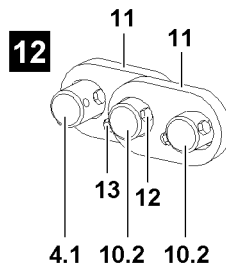
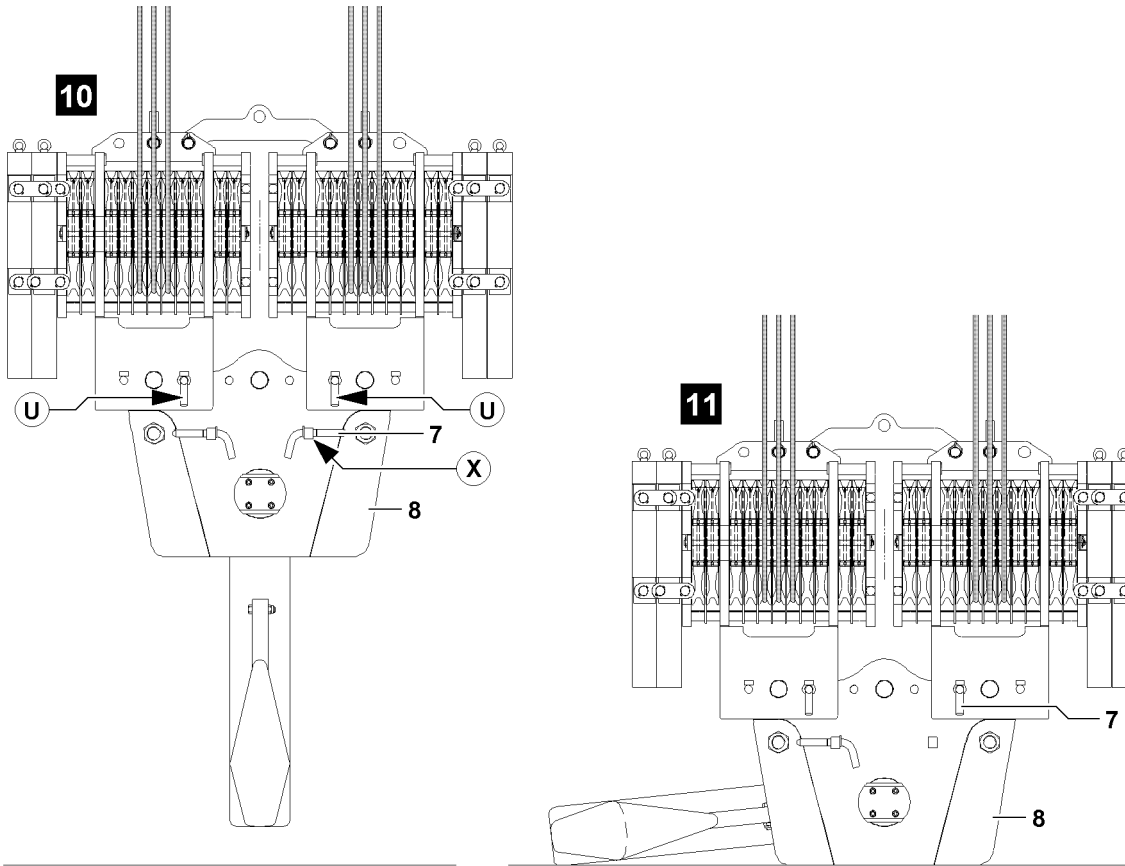


Fig.108143

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Falling auxiliary weights!

If the auxiliary weights on the pulley blocks are not properly removed, then they can fall down at removal!

Personnel can be severely injured or killed!

▶ Standing under a suspended auxiliary weight is prohibited!

▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane.

▶ Tension the fastening equipment carefully.

**WARNING**

Oscillating auxiliary weights!

During the removal of the auxiliary weights, the auxiliary weights can start to swing back and forth!

Personnel can be severely injured or killed!

▶ It is prohibited for anyone to remain in the danger zone!

▶ Make sure that the auxiliary weight which is being removed is properly attached on the auxiliary crane before releasing the mounting brackets!

▶ Angular pull is prohibited!

When the fastening equipment is tensioned on the auxiliary weight:

▶ Release the screw connection on the mounting brackets of the outermost auxiliary weight and remove the screws.

**WARNING**

Falling auxiliary weights!

If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!

Personnel can be severely injured or killed!

▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!

▶ Always install or remove the mounting brackets **11** alternately!

▶ Pull the mounting brackets **11** off to the side.

**WARNING**

Falling auxiliary weights!

If additional auxiliary weights which are being removed are released, then these auxiliary weights can fall down!

Personnel can be severely injured or killed!

▶ Make sure, before removing the outermost auxiliary weight, that the other auxiliary weights are secured with the mounting brackets **11**!

If additional mounting brackets **11** must be removed to release the outermost auxiliary weight:

▶ Reinstall the mounting brackets again immediately, so that only the auxiliary weight which is being removed is released.

▶ Lift the auxiliary weight with the auxiliary crane from the pulley block.

▶ Place the auxiliary weight onto the ground.

▶ Remove the auxiliary crane.

▶ Remove additional auxiliary weights as described above.

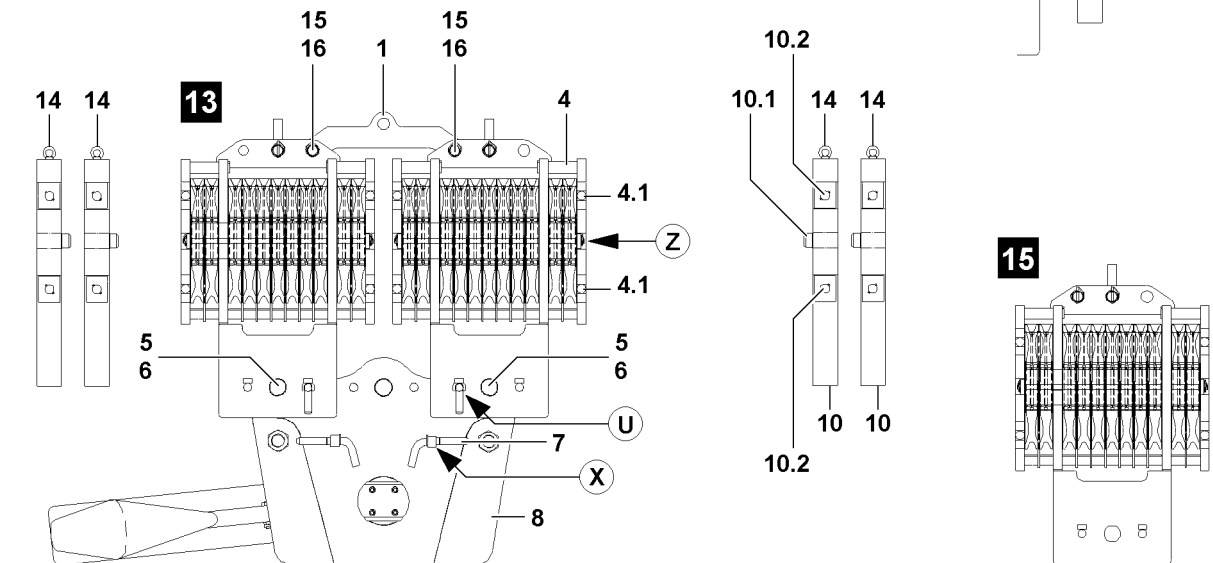
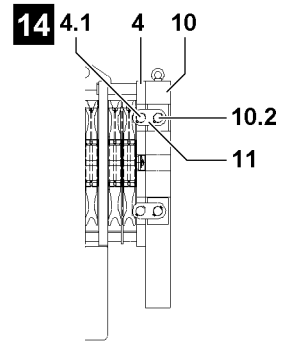
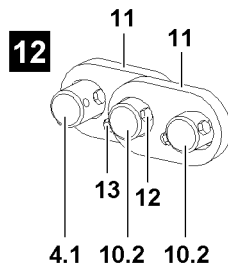
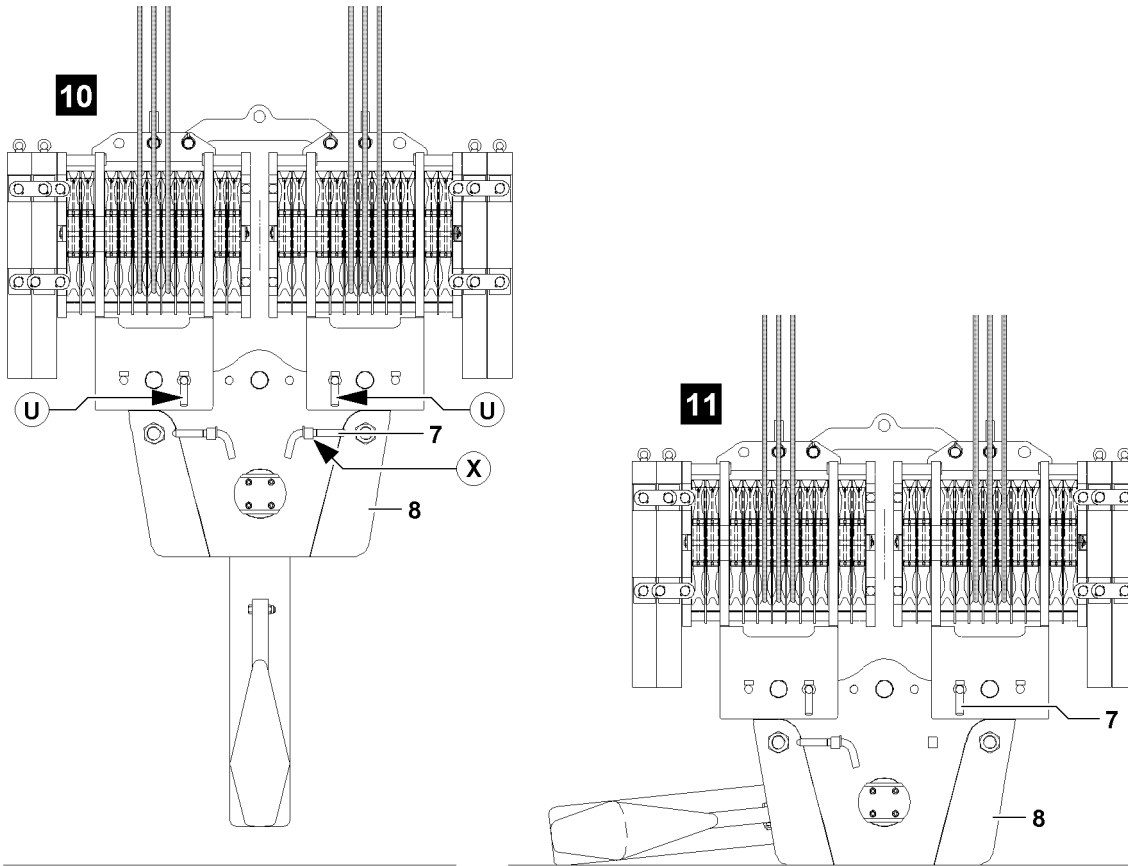


Fig.108143

LWE/LR 1750-000/12812-15-02/en

4.2.3 Removing the block connector

- ▶ Attach the block connector **1** on the auxiliary crane.



DANGER

Risk of tipping the pulley blocks!

If the retaining pins **7**, during removal of the block connector **1** are not pinned on the pulley blocks, then the pulley blocks tip to the side when the block connector is removed!

Personnel remaining in the danger zone can be severely injured or killed!

- ▶ Insert the retaining pins **7** into the bores **U** on the hook block!
- ▶ Make sure before removing the block connector that the pulley blocks are properly pinned and secured!

- ▶ Release and unpin the pins **15** on both sides on the pulley blocks **4**.
- ▶ Remove the block connector **1** on the auxiliary crane.
- ▶ Place the block connector **1** onto the ground.
- ▶ Remove the auxiliary crane.

4.2.4 Removing the pulley blocks on the cross brace



Note

- ▶ The removal of two pulley blocks is identical and is described on the example of one pulley block!

Make sure that the following prerequisites are met:

- The auxiliary weights have been removed.
- The block connector has been removed.

- ▶ Attach the pulley block **4** on the auxiliary crane.
- ▶ Tension the fastening equipment carefully.
- ▶ Unpin the retaining pin **7** at point **U** and pin into the transport receptacle on the cross brace, point **X**, illustration **13**.
- ▶ Release and unpin the pin **5**.
- ▶ Swing the pulley block **4** out with auxiliary crane.
- ▶ Place the pulley block **4** on the ground.
- ▶ Remove the auxiliary crane.
- ▶ Remove the second pulley block.

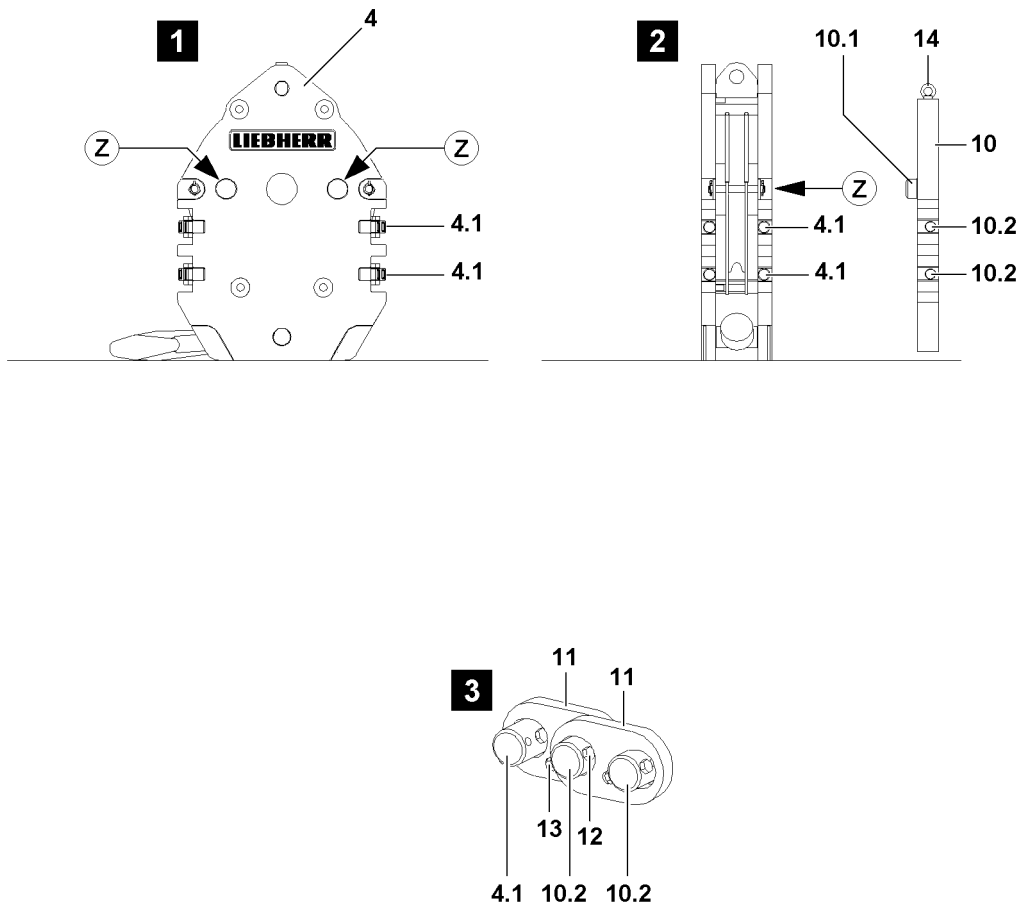


Fig.108146

LWE/LR 1750-000/12812-15-02/en

5 Single hook blocks

5.1 Installing the single blocks

5.1.1 Installing the auxiliary weights



Note

- ▶ The own weight for each auxiliary weight is marked on the auxiliary weight!



WARNING

Toppling of hook block!

If the auxiliary weights are installed one-sided, the hook block can topple over!

Personnel can be severely injured or killed!

- ▶ The auxiliary weights may only be installed **individually** and alternately on the left and right on the hook block!
- ▶ When the required auxiliary weight is installed on the hook block, the difference between the left and right side may never be more than one auxiliary weight!
- ▶ Asymmetrical installation of auxiliary weights is prohibited!
- ▶ Do not exceed the maximum permissible own weight of the hook block! The maximum permissible own weight is engraved on ballastable hook blocks. See „Engraving WT max.“.

Make sure that the following prerequisite is met:

- The hook block is placed on the ground.



WARNING

Falling auxiliary weights!

If the auxiliary weights are not properly installed on the hook block, then they can fall down during installation or in crane operation!

Personnel can be severely injured or killed!

- ▶ Standing under a suspended auxiliary weight is prohibited!
- ▶ Make sure that the auxiliary weights are properly installed and secured!
- ▶ Crane operation with insufficiently secured auxiliary weights is prohibited!

- ▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane.



WARNING

Danger of crushing!

When swinging the auxiliary weights to the hook block, personnel can be severely injured or killed!

Fingers, hands and arms can be crushed or severed!

- ▶ It is prohibited for anyone to remain between the hook block and the auxiliary weight!
- ▶ Swing auxiliary weights in to the hook block with utmost caution and at the least possible speed!

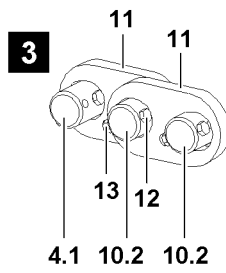
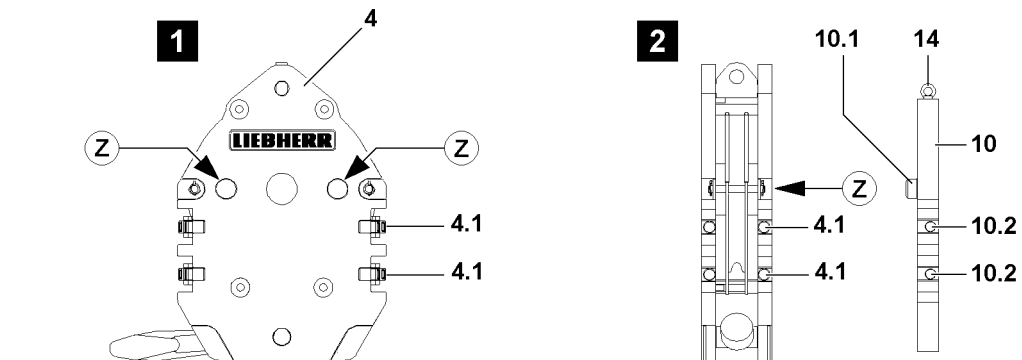


Fig.108146

- ▶ Align the auxiliary weight **10** on the hook block.
- ▶ Move the centering pin **10.1** of the auxiliary weight into the centering bores **Z** on the hook block.

**WARNING**

Falling auxiliary weights!

If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!

Personnel can be severely injured or killed!

- ▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!
- ▶ Always install or remove the mounting brackets **11** alternately!

- ▶ Install the mounting brackets **11** on the side and connect the hook block with the auxiliary weight **10**, illustration **3**.
- ▶ Secure the mounting brackets **11** with screws **12** and lock nuts **13**, illustration **3**.

**Note**

- ▶ Additional auxiliary weights must be connected with the mounting brackets **11**!

**WARNING**

Falling auxiliary weights!

The auxiliary weights can fall down by removing the auxiliary crane!

Personnel can be severely injured or killed!

- ▶ Remove the auxiliary crane only when it is ensured that the auxiliary weight **10** is properly secured with the mounting brackets **11**!

When the respective auxiliary weight is properly installed and secured:

- ▶ Remove the auxiliary crane.

5.1.2 Preparing the hook block for crane operation

**Note**

- ▶ The reeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!
- ▶ Observe the „permissible hook block weights“ in the erection and take down charts!
- ▶ Reeve the hoist rope according to the instructions in chapter 4.06 of the Crane operating instructions and the reeving plans!

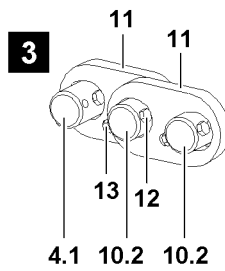
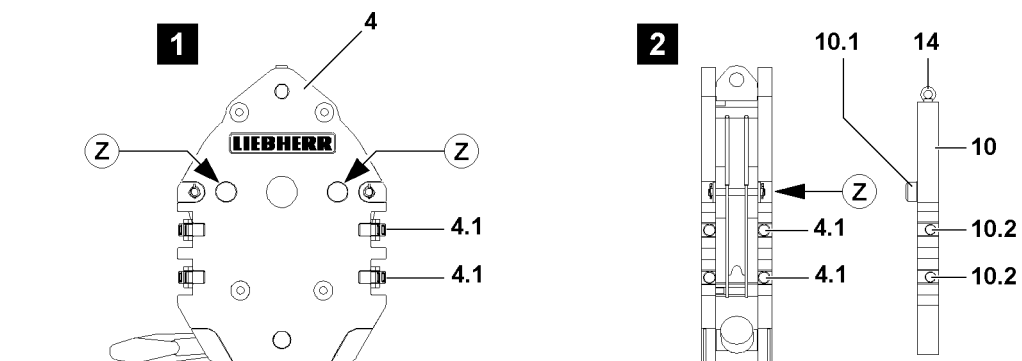


Fig.108146

LWE/LR 1750-000/12812-15-02/en

5.2 Removing the single blocks

5.2.1 Preparing the hook block for removal



Note

- ▶ The unreeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!
- ▶ Observe the „permissible hook block weights“ in the erection and take down charts!

Make sure that the following prerequisites are met:

- The ground is sufficiently load bearing to take on the weight of the hook block and the auxiliary weights safely.
 - The ground is level and horizontal.
- ▶ Lower the hook block completely to the ground.

When the hook block was placed down on the ground properly:

- ▶ Unreeve the hoist rope according to chapter 4.06 of the Crane operating instructions!

5.2.2 Removing the auxiliary weights



Note

- ▶ The own weight for each auxiliary weight is marked on the auxiliary weight!



WARNING

Toppling of hook block!

If the auxiliary weights are removed one-sided, the hook block can topple over!

Personnel can be severely injured or killed!

- ▶ The auxiliary weights may only be removed **individually** and alternately on the left and right on the hook block!
- ▶ The difference between the left and the right side at removal of the auxiliary weights may never be more than one auxiliary weight!
- ▶ Asymmetrical removal of auxiliary weights is prohibited!



WARNING

Falling auxiliary weights!

If the auxiliary weights on the pulley block are not properly removed, then they can fall down at removal!

Personnel can be severely injured or killed!

- ▶ Standing under a suspended auxiliary weight is prohibited!

- ▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane.
- ▶ Tension the fastening equipment carefully.

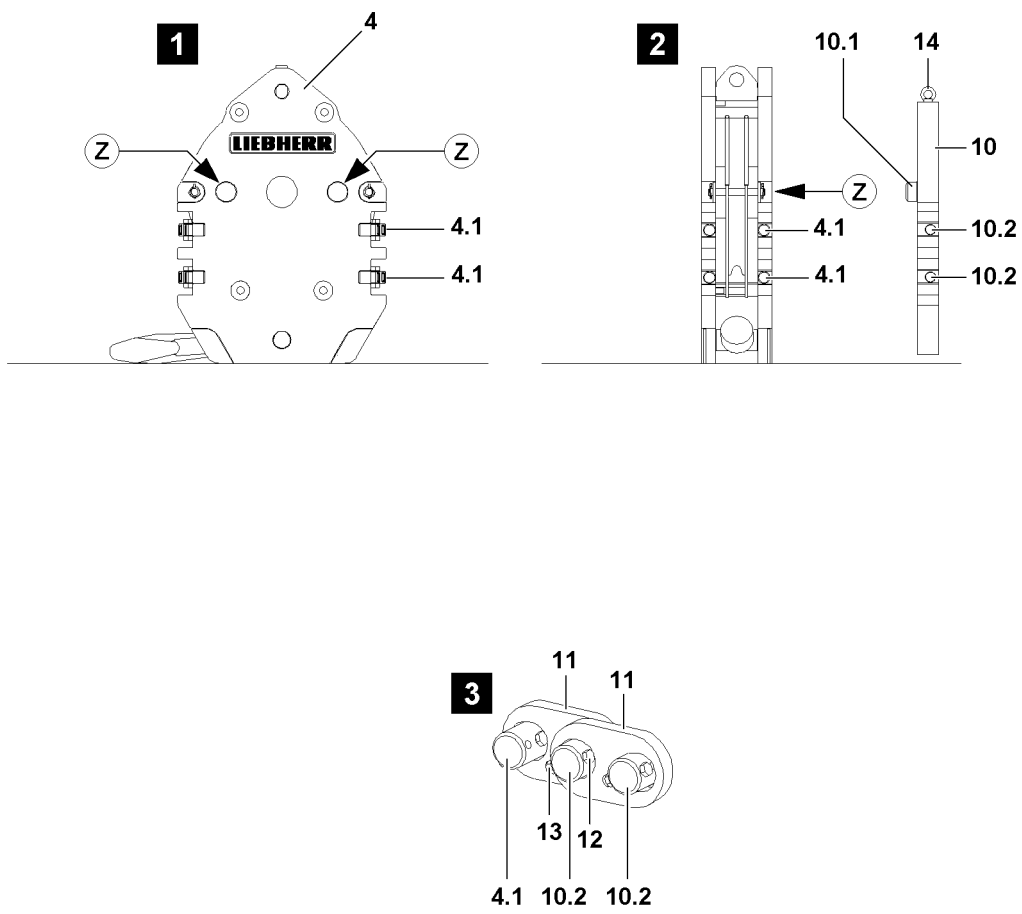


Fig.108146

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Oscillating auxiliary weights!

During the removal of the auxiliary weights, the auxiliary weights can start to swing back and forth!
Personnel can be severely injured or killed!

- ▶ It is prohibited for anyone to remain in the danger zone!
- ▶ Make sure that the auxiliary weight which is being removed is properly attached on the auxiliary crane before releasing the mounting brackets!
- ▶ Angular pull is prohibited!

When the fastening equipment is tensioned on the auxiliary weight:

- ▶ Release the screw connection on the mounting brackets of the outermost auxiliary weight and remove the screws.

**WARNING**

Falling auxiliary weights!

If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!

Personnel can be severely injured or killed!

- ▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!
- ▶ Always install or remove the mounting brackets **11** alternately!

- ▶ Pull the mounting brackets **11** off to the side.

**WARNING**

Falling auxiliary weights!

If additional auxiliary weights which are being removed are released, then these auxiliary weights can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure, before removing the outermost auxiliary weight, that the other auxiliary weights are secured with the mounting brackets!

If additional mounting brackets must be removed to release the outermost auxiliary weight:

- ▶ Reinstall the mounting brackets **11** again immediately, so that only the auxiliary weight which is being removed is released.
- ▶ Lift the auxiliary weight with the auxiliary crane from the hook block.
- ▶ Place the auxiliary weight onto the ground.
- ▶ Remove the auxiliary crane.
- ▶ Remove additional auxiliary weights as described above.

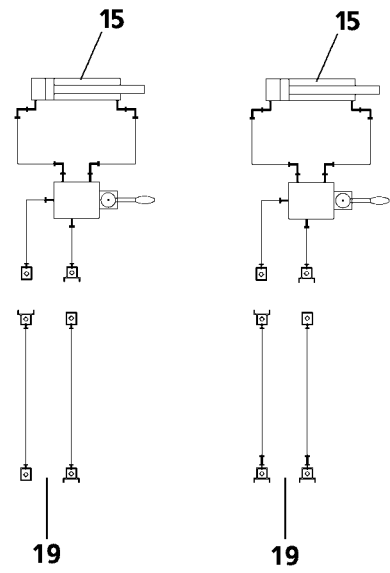
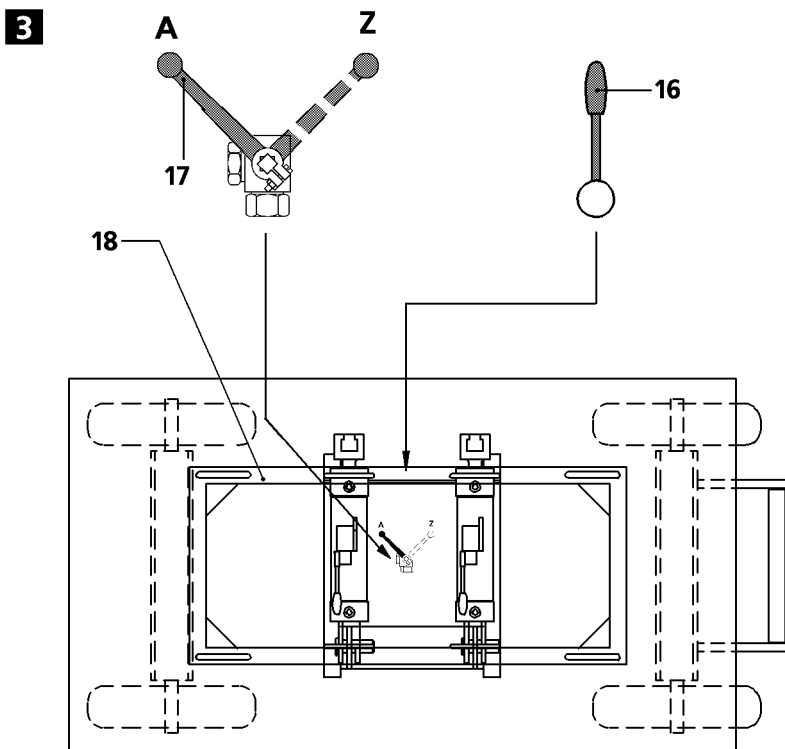
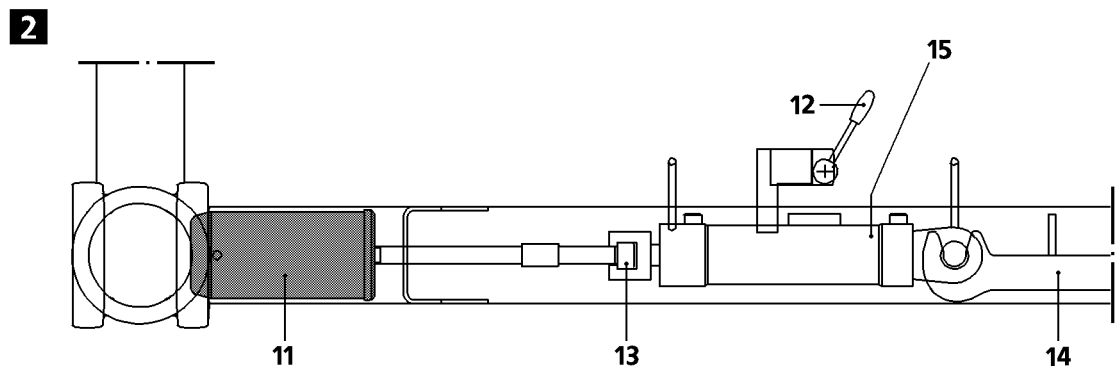
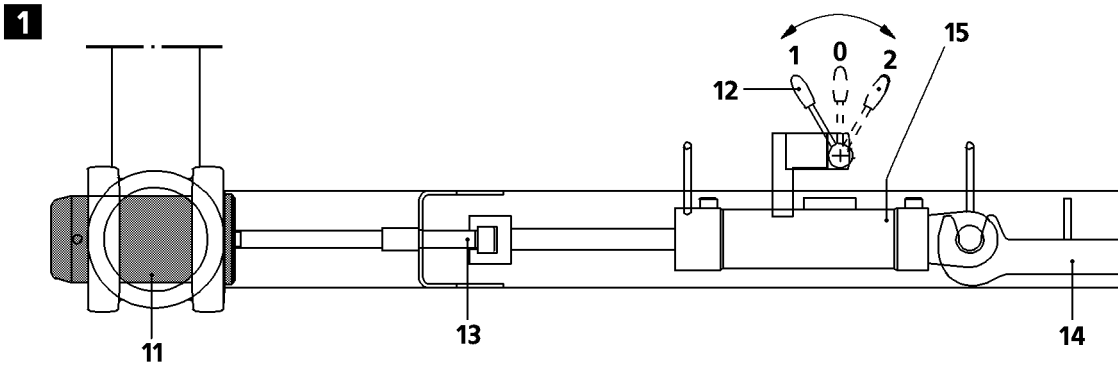


Fig.108585

1 Pin pulling device

The pin pulling device consists of:

- Pin pulling cylinder **15**, see illustration **1**.
- Hydraulic component **18**, see illustration **3**.



DANGER

Danger of accident!

When you disassemble unsecured or unsupported crane parts, they can fall down!

Personnel can be severely injured or killed!

- ▶ Never stand **under** unsecured or unsupported crane parts and unpin the pins!
- ▶ Never unpin the connecting pins on unsecured or unsupported booms!
- ▶ Do not stand under the crane parts or within the complete danger zone during the pinning and unpinning procedure!
- ▶ Do not lean the ladder against the crane part being disassembled!



WARNING

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!

Personnel can be severely injured or killed!

- ▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!



WARNING

Loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!

- ▶ Check that the quick couplings have been properly connected before using the crane!
- ▶ Assemble coupling components (sleeve and connector) and screw together with the hand-tightened nut!
- ▶ Tighten the hydraulic coupling by hand. Rotate hand-tightened nut until it reaches a tangible, fixed stop position!

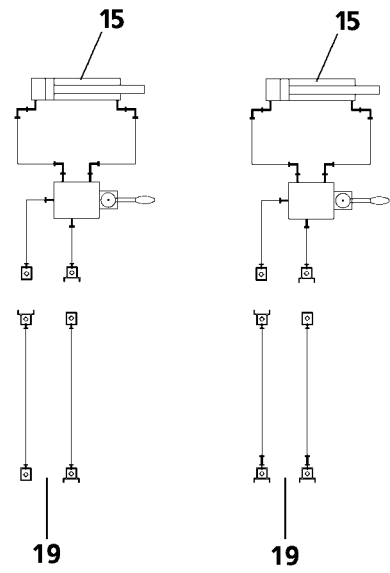
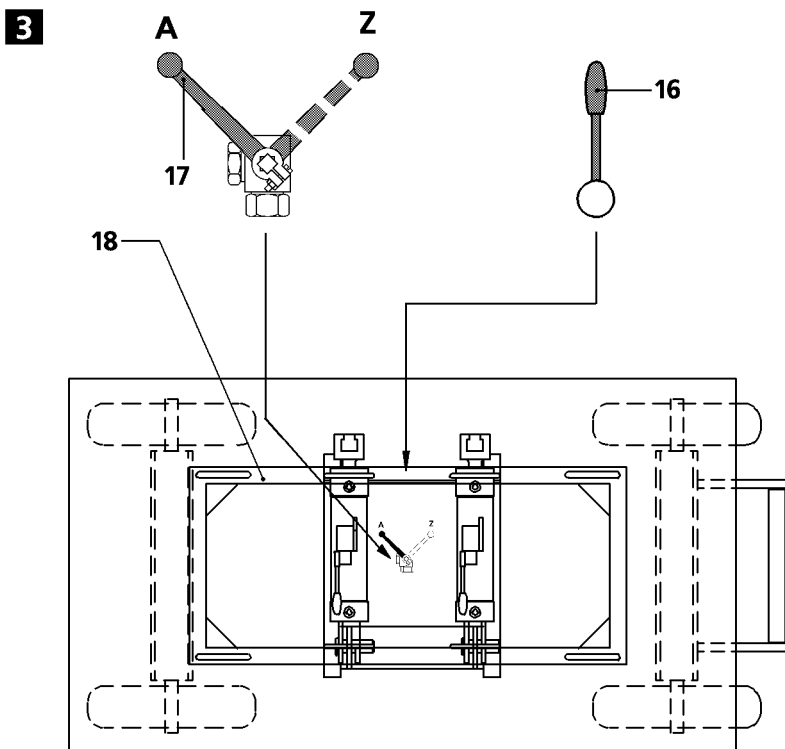
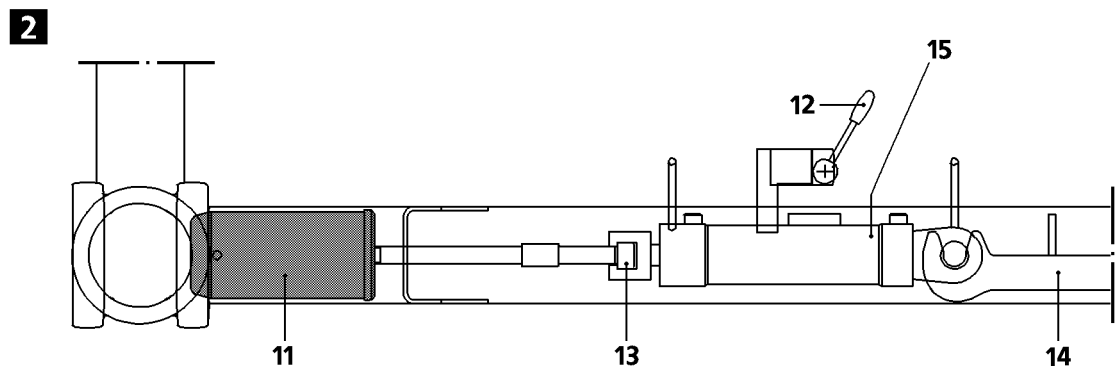
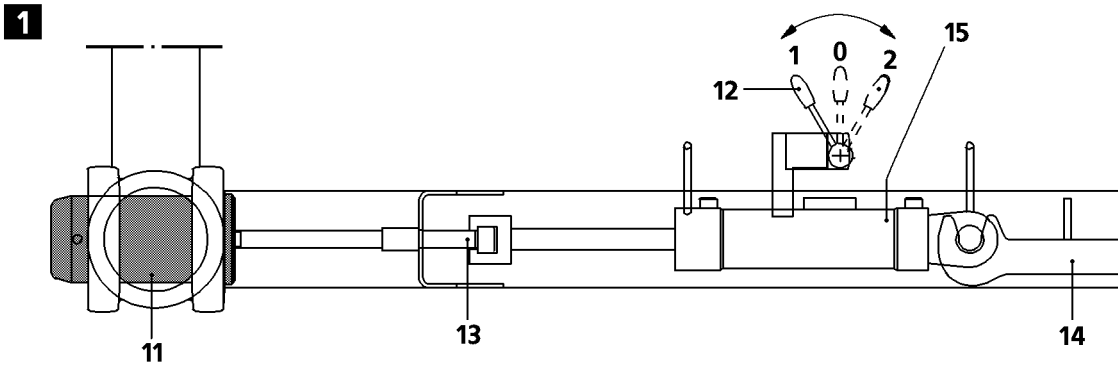


Fig.108585

1.1 Hydraulic oil level



Note

- ▶ The hydraulic oil tank is filled when starting the hydraulic aggregate.
- ▶ Check the hydraulic oil level, see Operating and maintenance instructions for the Hydraulic aggregate.

NOTICE

Emerging hydraulic oil!

When the hydraulic aggregate is changed and / or the operational crane hydraulic is connected, then there is a danger that the hydraulic oil is supplied during the working process into the hydraulic tank circuit and thus forwarded into the hydraulic tank of the hydraulic aggregate.

The forwarded hydraulic oil quantity exceeds the tank volume of the hydraulic aggregate. Hydraulic oil runs over and contaminates the environment.

- ▶ Make sure that the hydraulic aggregate is separated from the hydraulic circuit of the crane before hydraulic components are actuated via the crane hydraulic.
- ▶ Make sure, before the hydraulic aggregate is separated from the crane, that the working process is ended with the same hydraulic aggregate.
- ▶ Make sure that the identical amount of hydraulic oil is in the hydraulic oil tank of the hydraulic aggregate after application than before.

1.2 Pinning and unpinning with pin pulling device



Note

- ▶ Observe the information in the Operating and Maintenance manual of the hydraulic aggregate **18!**
- ▶ The engine rpm can be adjusted using a separate speed regulator on the hydraulic aggregate **18.**

1.2.1 Pinning and unpinning the pins on the boom sections

Make sure that the following prerequisites are met:

- The hydraulic connections **19** from the hydraulic aggregate **18** to the pin pulling cylinders **15** are established, see illustration **3**.
- The levers **12** on the pin pulling cylinders **15** are set on **position 0**, see illustration **1**.
- ▶ Fasten pin pulling cylinder **15** between retainer **14** and pull screw **13**, see illustration **1**.
- ▶ Start the engine from the hydraulic aggregate **18**, see illustration **3**.
- ▶ Switch the ball valve **17** to position **Z**, see illustration **3**.



WARNING

Falling components!

When pinning / unpinning the pins on the lattice sections, components can fall down. Personnel can be killed or seriously injured.

- ▶ During the pinning / unpinning procedure of the lattice sections, do not step into the danger zone!
- ▶ Actuate pin pulling cylinder **15** exclusively for pinning and unpinning on the hydraulic aggregate **18** with lever **16**, see illustration **3**.

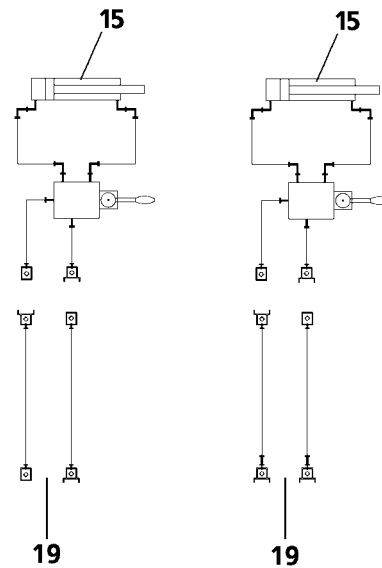
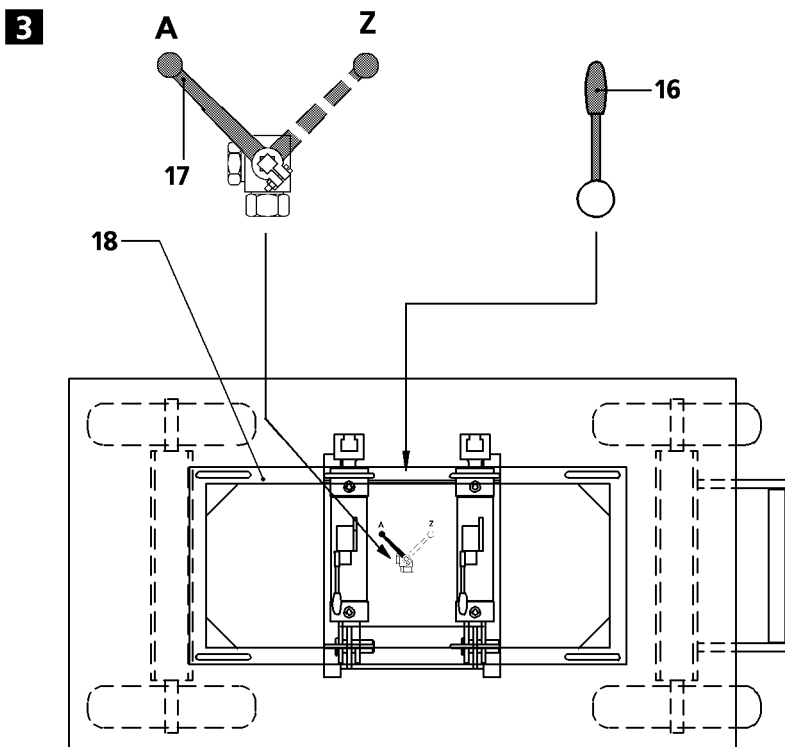
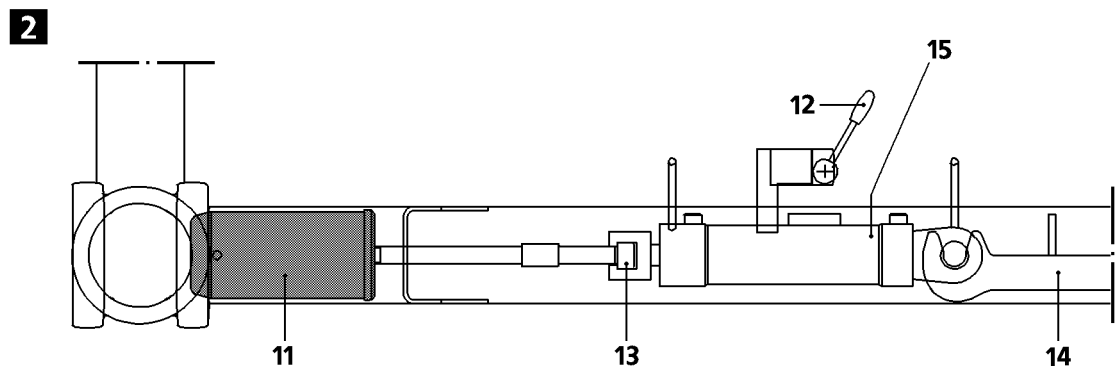
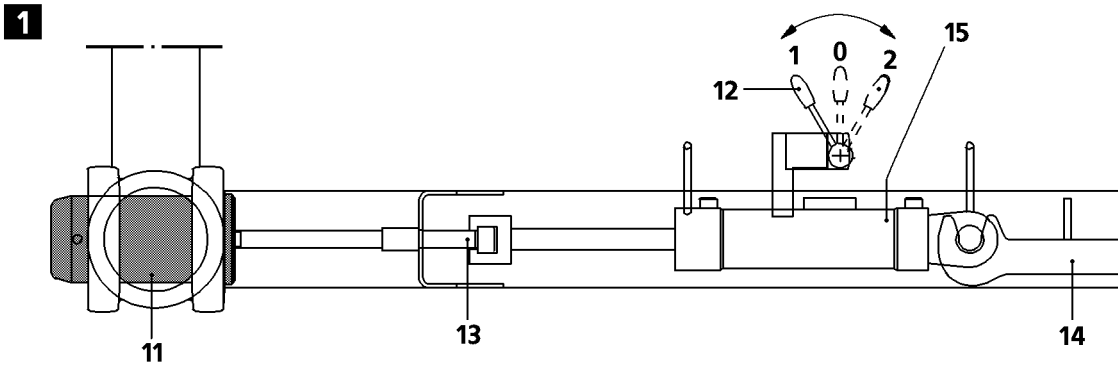


Fig.108585

When it should be pinned (illustration 1):

- ▶ Set the lever **12** on the pin pulling cylinders **15** to **position 1**.

When it should be unpinned (illustration 2):

- ▶ Set the lever **12** on the pin pulling cylinders **15** to **position 2**.

Result:

- Pin pulling cylinders **15** are ready for use



Note

- ▶ Make sure that the levers **12** are set to the correct position.
-

Pin / unpin pin **11** with hydraulic aggregate **18**:

- ▶ Actuate lever **16** on the hydraulic aggregate **18** with the right operating mode.

1.3 Ending operation with pin pulling device

- ▶ The levers **12** on the pin pulling cylinders **15** are set to **position 0**, see illustration 1.
- ▶ Turn the engine off from hydraulic aggregate **18**.
- ▶ Close ball valve **17** on position **A**, see illustration 3.
- ▶ Remove hydraulic connections **19** and protect connections from contamination.
- ▶ Remove pin pulling cylinder **15** between retainer **14** and pull screw **13**, see illustration 1.

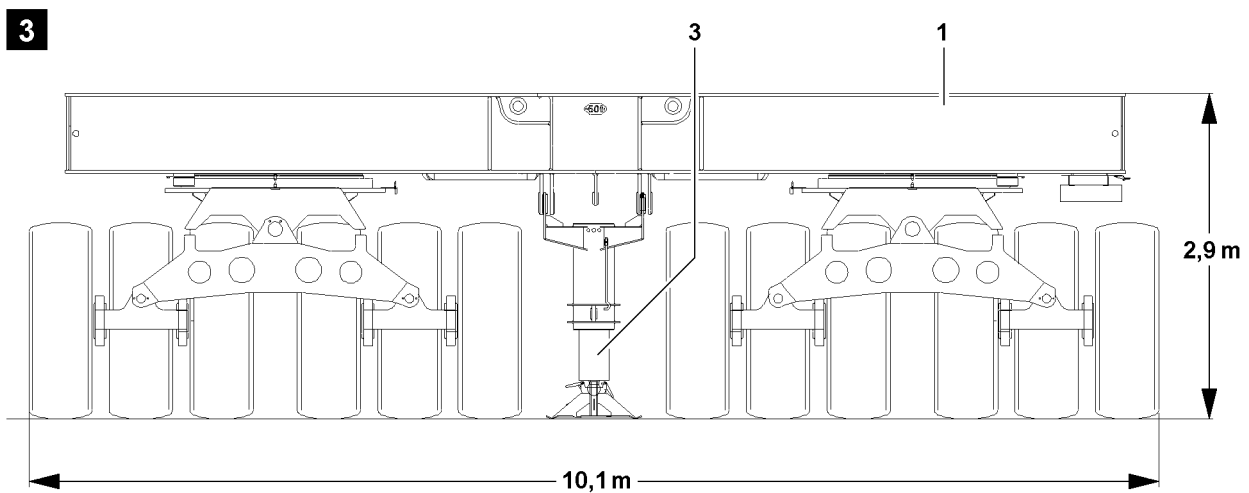
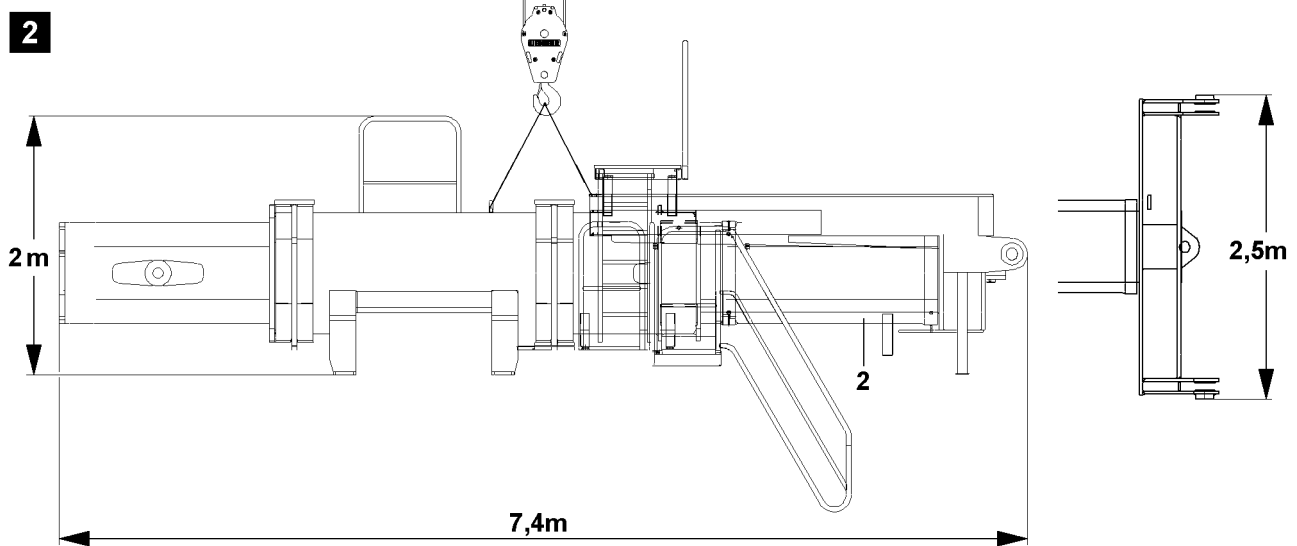
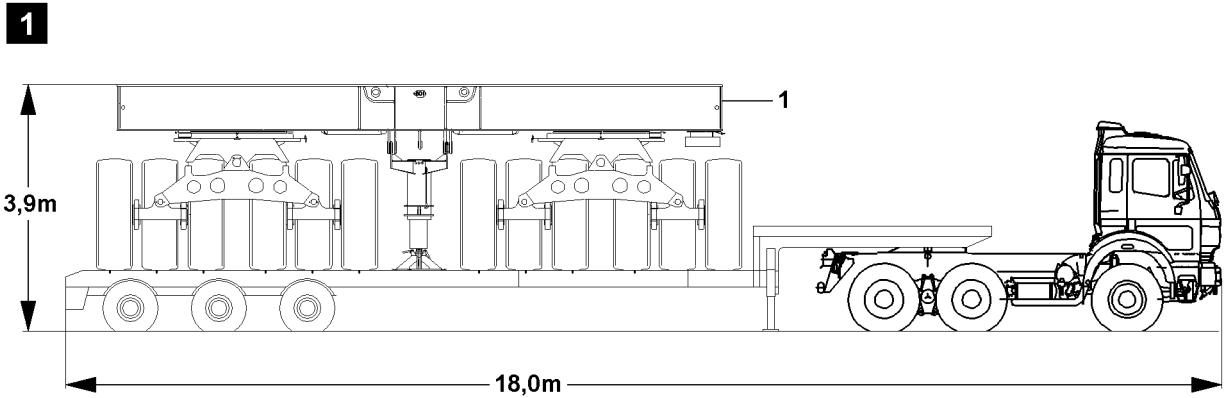


Fig.109207

LWE/LR 1750-000/12812-15-02/en

1 Component description and general notes

Ballast trailer, complete, consisting of:

- 2 axle lines with 2 each oscillating wheel sets
- **1** Ballast trailer
- **2** Ballast trailer guide
- **3** Support cylinder

Hydraulic telescopable ballast trailer guide for ballast trailer radii of R 13 m - R 18 m.

The pull cylinders are assembled on the ballast trailer and can be actuated under load.

Hydraulic, mechanical steering is electronically adjustable for:

- Towing
- Circular driving
- Parallel driving
- Manual steering adjustment

1.1 Components, weights

See illustration 2 and illustration 3.

Position	Components	Weight
1	Ballast trailer including support cylinder 3	49.6 t
2	Ballast trailer guide	21.2 t

1.2 Dimensions

See illustration 1, illustration 2 and illustration 3.

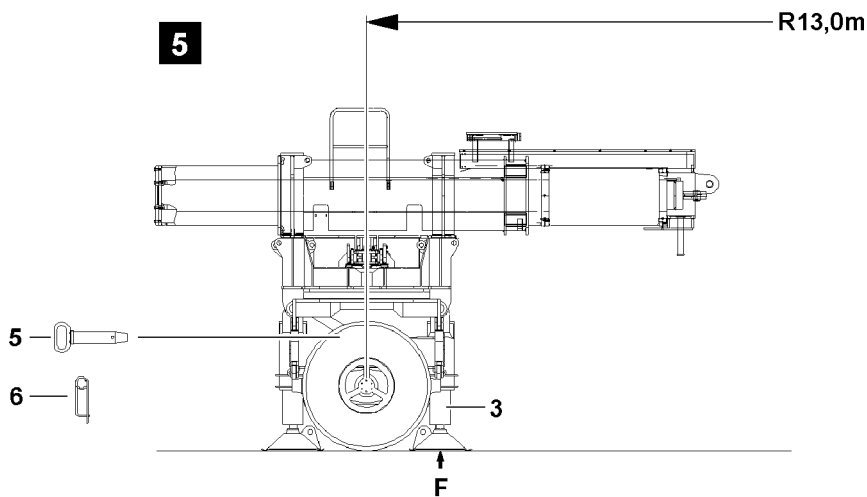
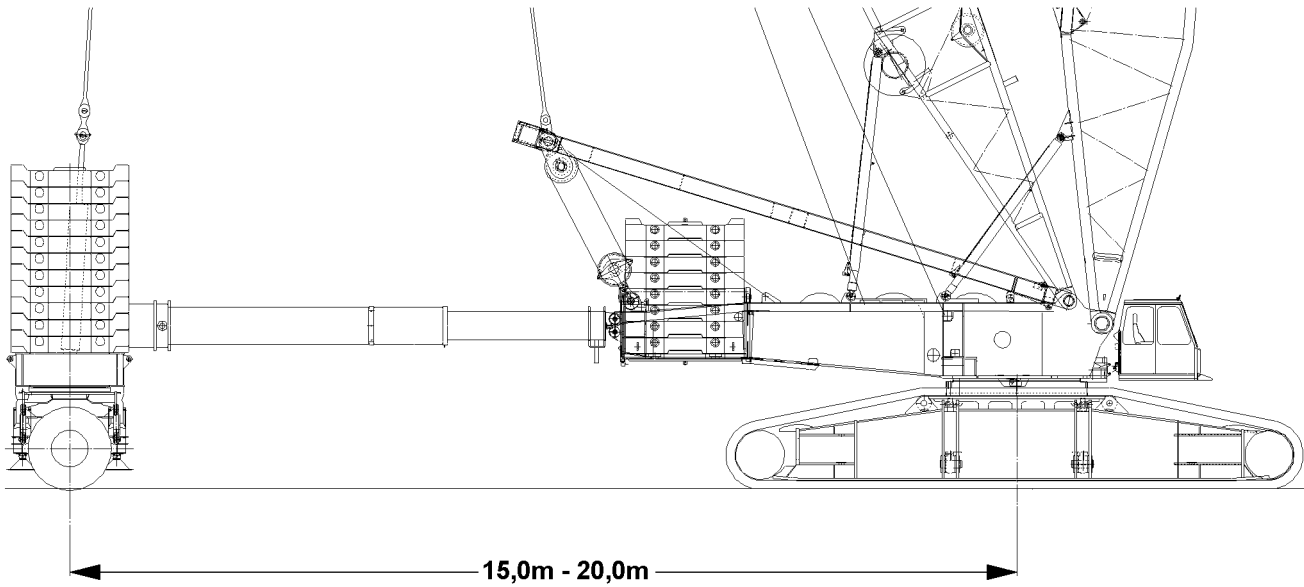
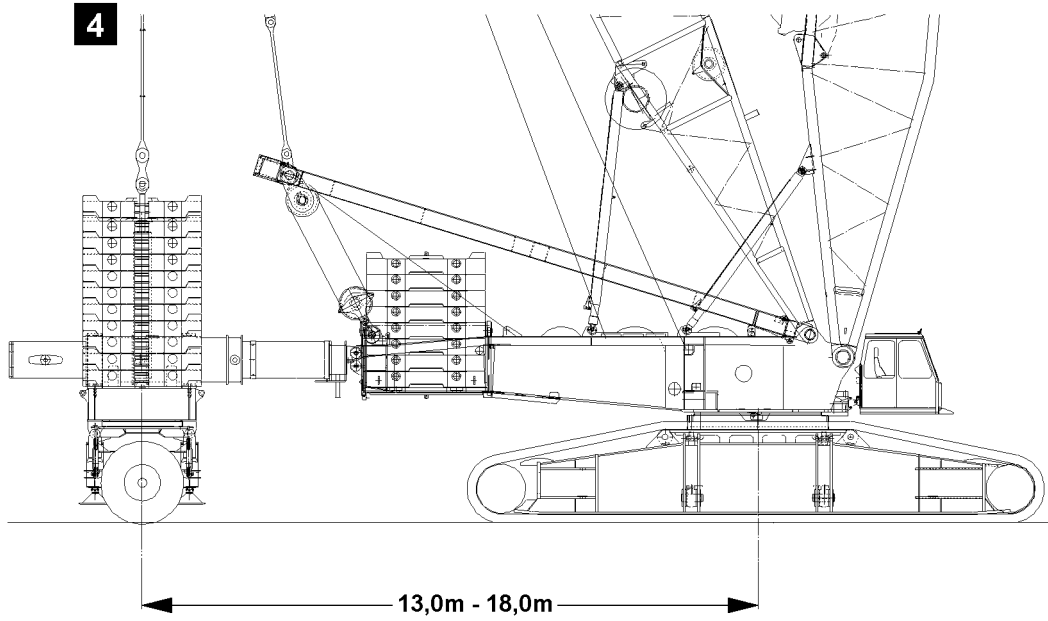


Fig.109208

LWE/LR 1750-000/12812-15-02/en

1.3 Radii

Ballast trailer radius
13.0 m
15.0 m
18.0 m
20.0 m

1.4 Stability and tipping safety for ballast trailer not assembled on the turntable

Make sure that the following prerequisites are met:

- The ballast trailer guide is hydraulically fully retracted.
- The ballast trailer is supported and aligned in horizontal direction.



WARNING

Danger of tipping the ballast trailer!

If the ballast trailer is not installed on the turntable and the ballast trailer guide is not fully moved in, then the ballast trailer can tip over!

Personnel can be severely injured or killed!

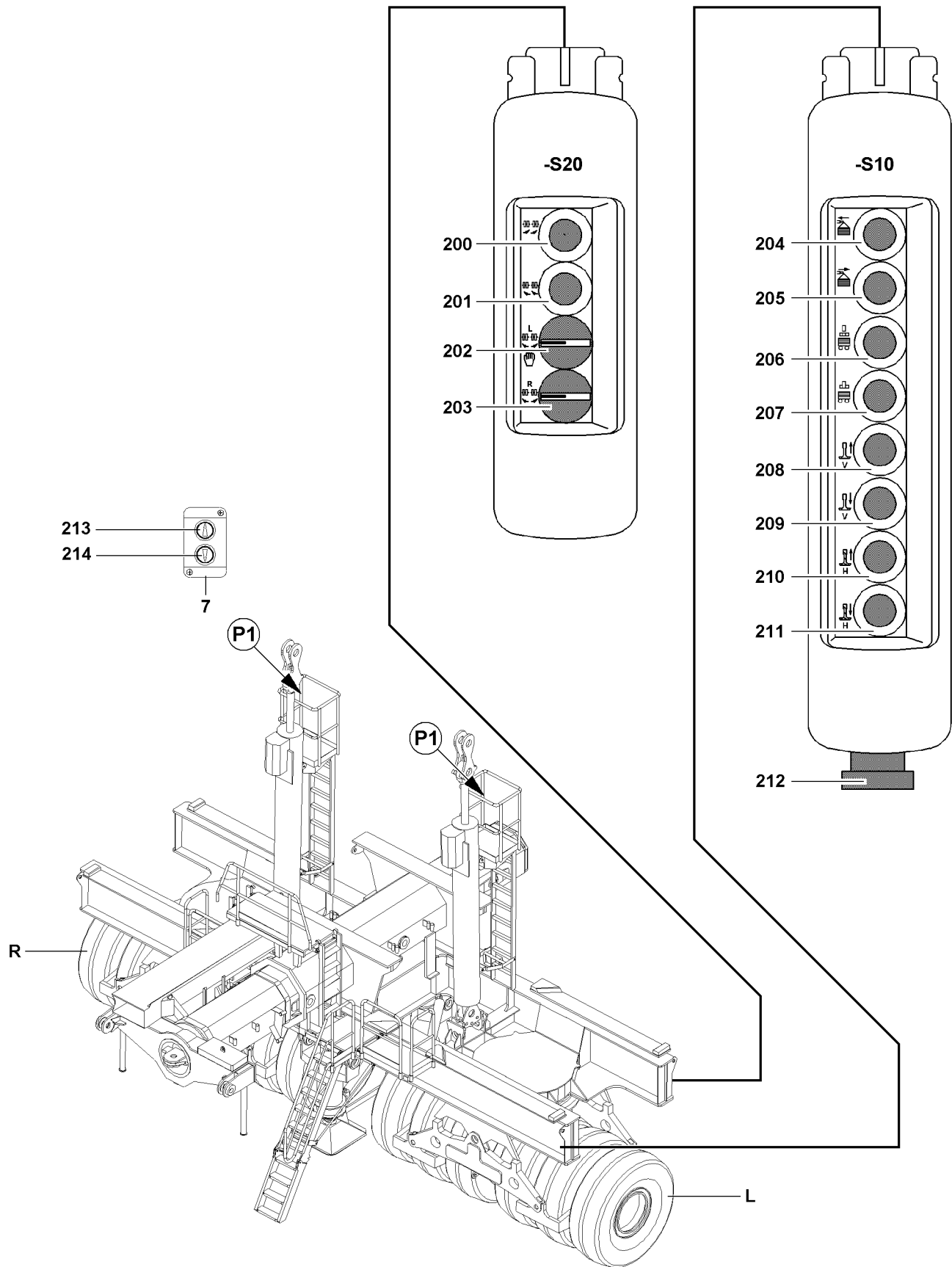
- ▶ Before removal of the ballast trailer on the turntable, the locking pin **5** must be pinned on the strut of the ballast trailer and secured with the spring retainer **6**!
- ▶ The ballast trailer guide must be fully moved in before removal of the ballast trailer on the turntable!
- ▶ The support cylinders **3** are moved out to the point where the tires are relieved!

Illustration	Ballast trailer radius	Ballast	Maximum support pressure F
5	R = 13.0 m	0 t	43.6 t



Note

- ▶ The maximum support pressure **F** can vary, depending on the equipment of the ballast trailer!



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Fig.109209

1.5 Control elements on the control panels

Control panel - S20

200	Button	• Corrective steering, turn wheel sets to left
201	Button	• Corrective steering, turn wheel sets to right
202	Rotary switch	• Turn the wheel set on the left side L to the right or left • Manual operation for assembly or emergency operation
203	Rotary switch	• Turn the wheel set on the right side R to the right or left • Manual operation for assembly or emergency operation

Control panel - S10

204	Button	• Ballast trailer, move the guide cylinder in
205	Button	• Ballast trailer, move the guide cylinder out
206	Button	• Ballast trailer on turntable - unpin
207	Button	• Ballast trailer on turntable - pin
208	Button	• Move the front support cylinder in
209	Button	• Move the front support cylinder out
210	Button	• Move the rear support cylinder in
211	Button	• Move the rear support cylinder out
212	Switch	• EMERGENCY OFF



Note

- On every work pedestal, on points **P1**, a switch housing **7** for „Moving the pull cylinder in / out“ is installed!

213	Button	• Move the pull cylinder in, lift the ballast trailer
214	Button	• Move the pull cylinder out, lower the ballast trailer

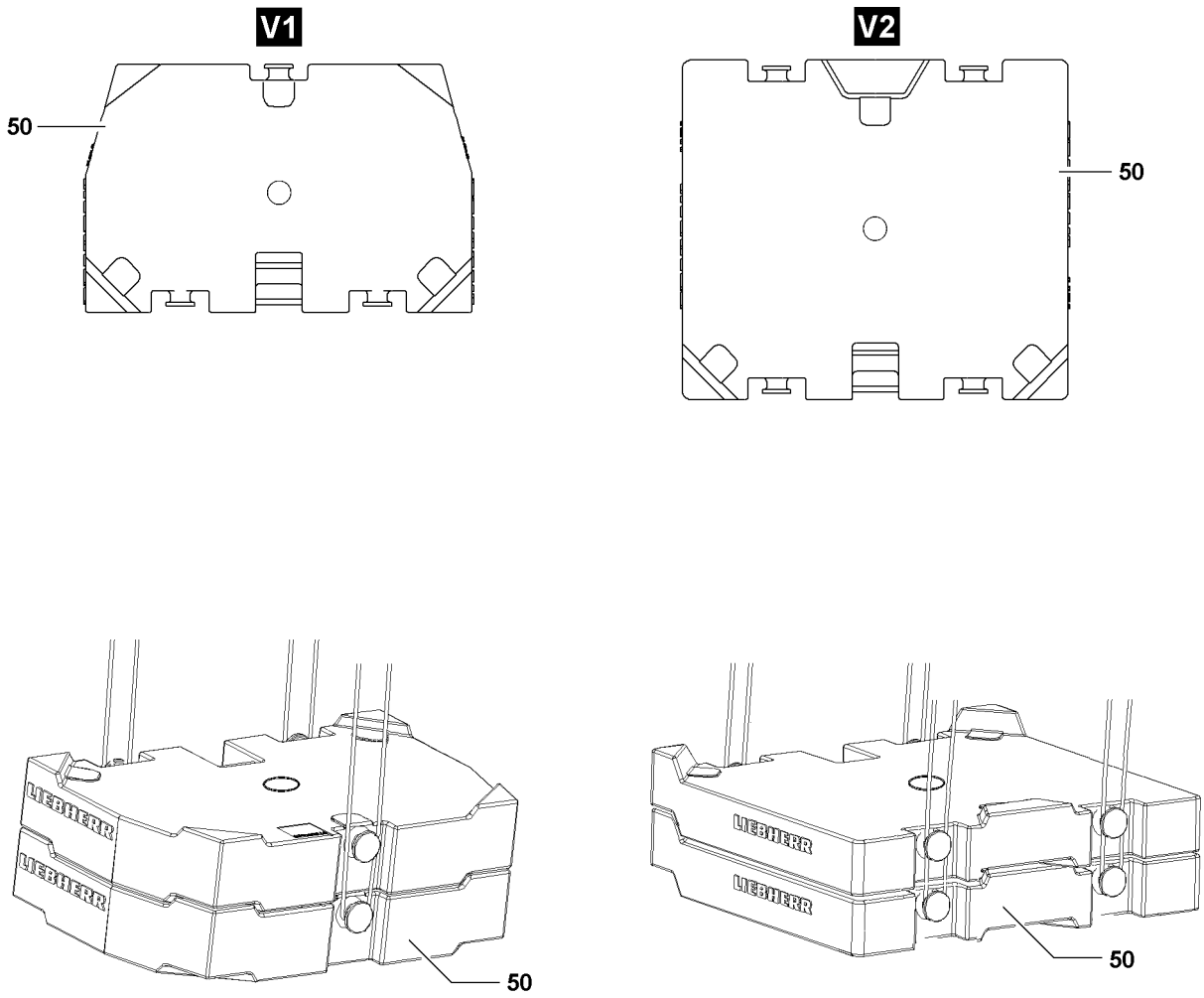


Fig.112547

LWE/LR 1750-000/12812-15-02/en

2 Permissible ballast assemblies



WARNING

Overload fastening points ballast plates!

If more than the permissible number of ballast plates are lifted together, then the fastening points can be overloaded!

The ballast plates and components can fall down!

Personnel can be severely injured or killed!

► Attach only the maximum permissible number of ballast plates per lift!

Individual weight Ballast plate	Maximum number of same ballast plates per hoist via bitt
10.0 t	2
12.5 t	2

2.1 Ballast plates



Note

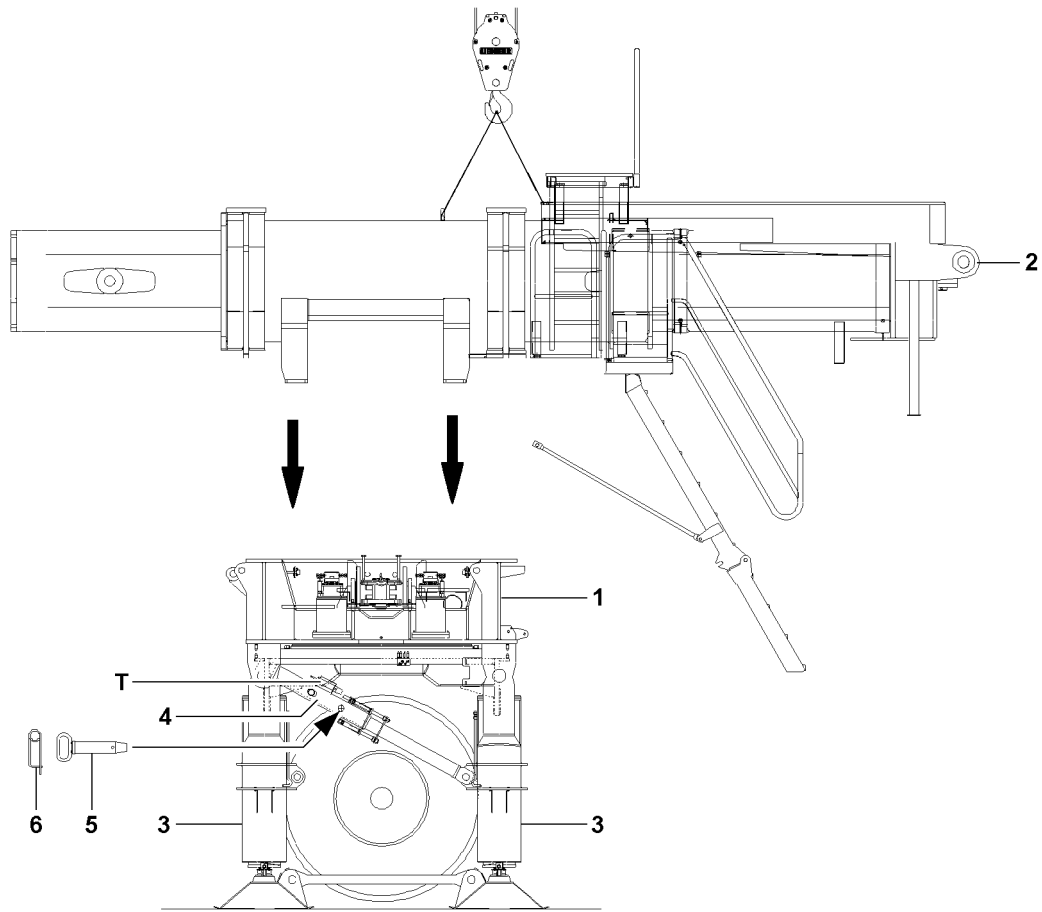
► The ballast plates are marked with their own weights!

The ballast plates are placed as a ballast stack on the ballast trailer.

Ballast plates are available in variation **V1** and variation **V2**:

Ballast plate	Weight
Variation V1	10 t
Variation V2	12.5 t

1



2

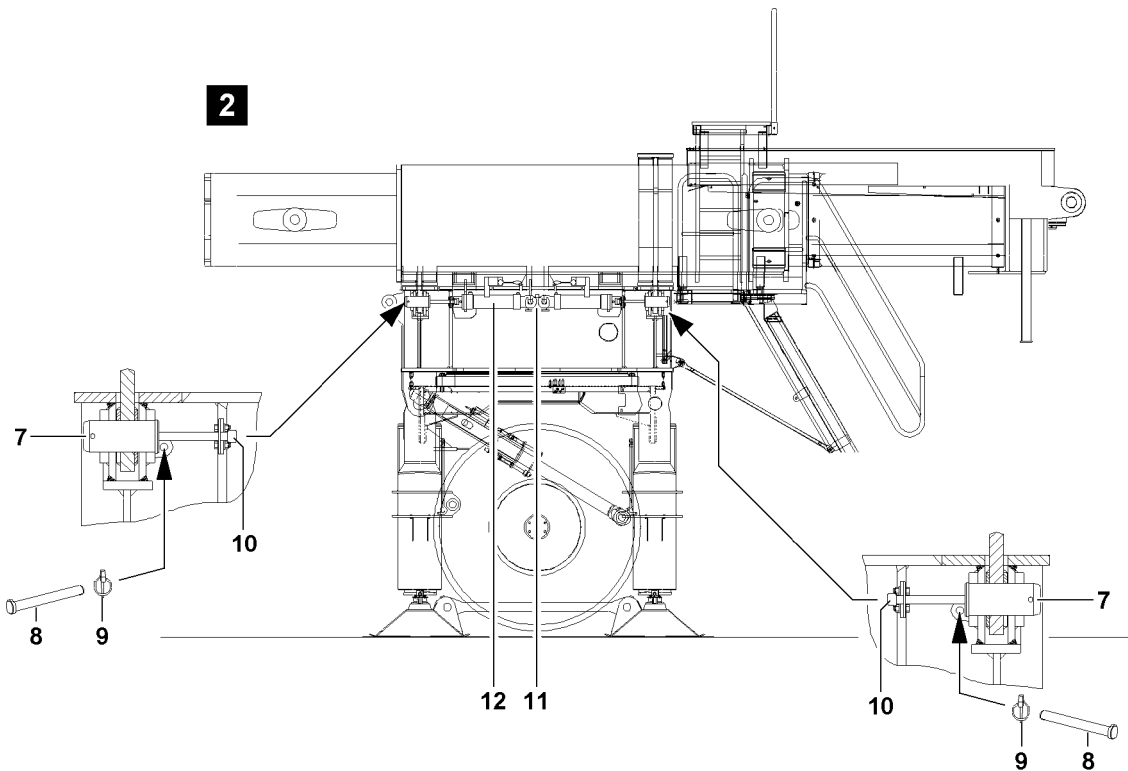


Fig.109210

LWE/LR 1750-000/12812-15-02/en

3 Assembling the ballast trailer



WARNING

Risk of falling!

During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling! If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids!
 - ▶ If fall protection equipment is available, then it must be used, see Crane operating instructions, chapter 2.06!
 - ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the permissible fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04!
 - ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06!
 - ▶ Only step on the aids, ladders and catwalks with clean shoes!
 - ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice!
 - ▶ It is prohibited to walk on the telescopic or an auxiliary boom without suitable protective devices!
-



WARNING

Danger of tipping the ballast trailer!

Due to improperly carried out assembly or improper assembly conditions, the ballast trailer can tip over!

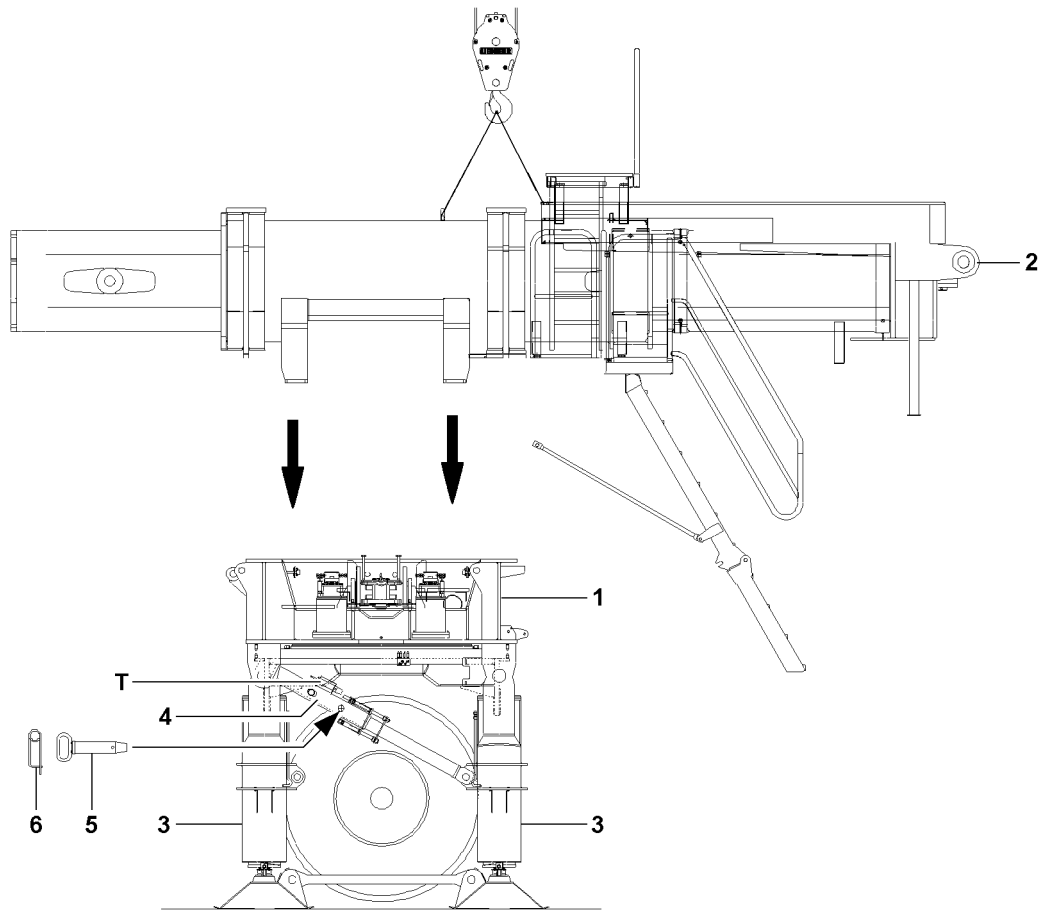
Personnel can be severely injured or killed!

- ▶ The assembly of the ballast trailer may only be carried out by authorized personnel!
 - ▶ Carry out the assembly of the ballast trailer only on level ground of sufficient load bearing capacity!
 - ▶ The ballast trailer has **no** brake system! The ballast trailer must be supported with the support cylinders if it is **not** pinned on the turntable!
-

Make sure that the following prerequisites are met:

- The placement location must be level and have adequate load bearing capacity.
- An auxiliary crane is available.

1



2

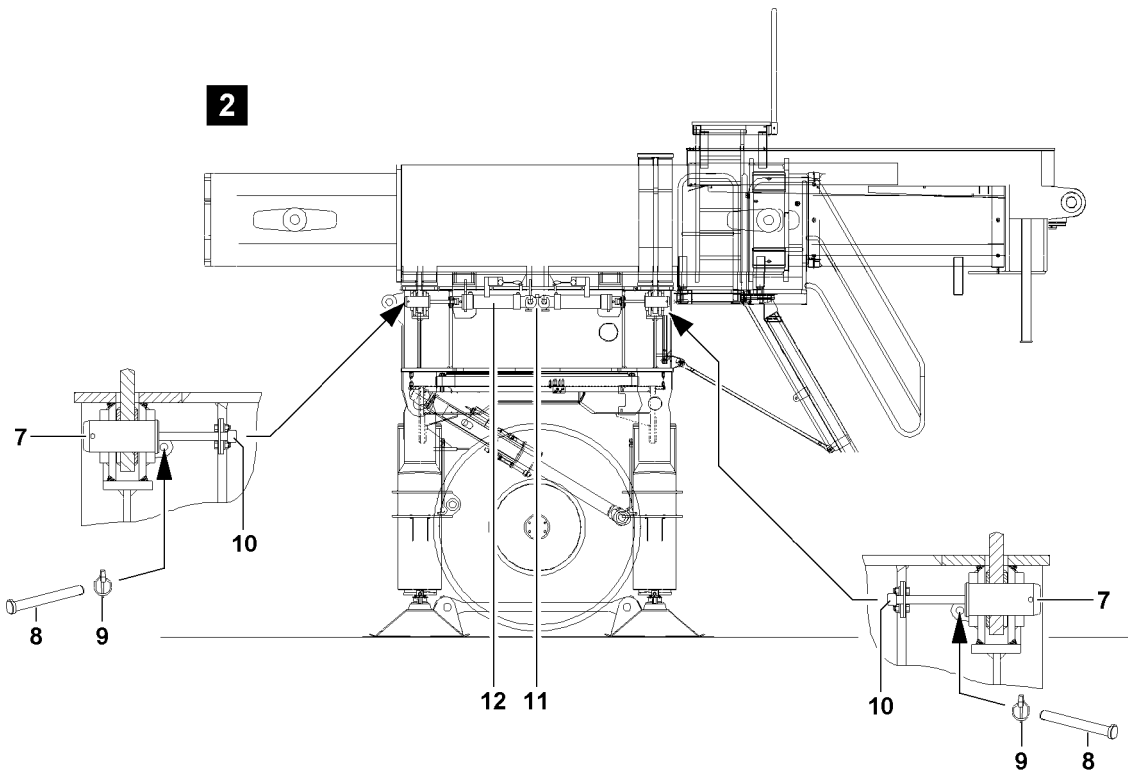


Fig.109210

LWE/LR 1750-000/12812-15-02/en

3.1 Pre-assembling the ballast trailer



Note

- ▶ Park the ballast trailer for assembly of the ballast trailer guide on level ground with sufficient load bearing capacity in the vicinity of the crane!
- ▶ Observe the safety guidelines, see Crane operating instructions, chapter 2.15!

Make sure that the following prerequisites are met:

- The locking pin **5** is pinned in and secured in the strut **4**.
- The ballast trailer is supported with the support cylinders **3** and aligned in horizontal direction.



DANGER

Danger of tipping over!

If the safety guidelines for the stability and tipping safety are not observed and the strut **4** is not pinned with the locking pin **5**, there is a danger of tipping over!

- ▶ Observe the specified stability and tipping safety for ballast trailer not assembled on the turntable!
- ▶ The strut **4** must be pinned and secured with the locking pin **5**!

3.1.1 Assembling the ballast trailer guide

Make sure that the following prerequisites are met:

- The ballast trailer guide **2** is fully moved in.
- The retaining pins **8** are released and unpinned (4x), illustration **2**.
- The connector pins **7** are unpinned (4x), illustration **2**.



WARNING

Mortal danger due to tipping ballast trailer!

Due to unsecured or insufficiently secured connector pins, the ballast trailer guide can loosen up from the ballast frame and the ballast trailer can tip over!

Personnel can be severely injured or killed!

Significant property damage can occur on the crane and on the ballast trailer!

- ▶ Make sure before starting any crane work with the ballast trailer, that all **four** connector pins **7** are properly pinned and secured!

- ▶ Attach the ballast trailer guide **2** on the auxiliary crane and swing it in and lower it to the pin points on the ballast frame **1**, see illustration **1**.

- ▶ Attach the pin pulling cylinder **12** to the retainer **11** and hook into the screw head **10**.

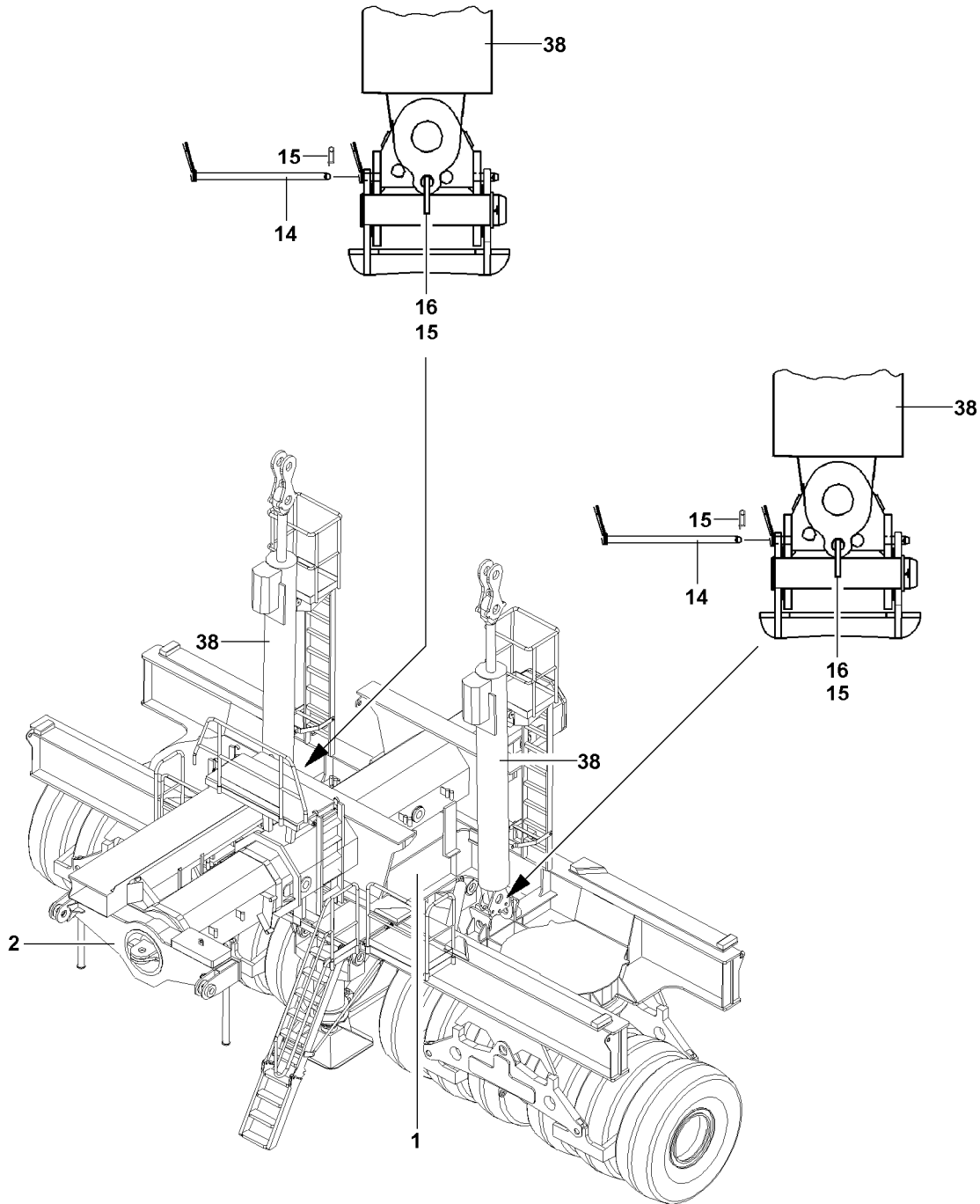
- ▶ Establish the hydraulic connection of the pin pulling cylinder **12** to the hydraulic aggregate, see Crane operating instructions, chapter 5.30.

When the ballast trailer guide **2** is lying completely on the ballast frame **1** and the pin bores align:

- ▶ Actuate the lever on the pin pulling cylinder **12** and insert the connector pin **7**.
- ▶ Secure the connector pins **7**: Insert the retaining pin **8** and secure with linch pin **9**.

When all four connector pins **7** are pinned in and secured:

- ▶ Remove the auxiliary crane.
- ▶ Fold the access to the ballast trailer down into operating position.



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Fig.109341

3.1.2 Bringing the pull cylinder on the ballast trailer into operating position

The pull cylinder **38** are placed and secured in transport position on the ballast frame.

Make sure that the following prerequisites are met:

- The ballast trailer guide **2** is assembled and secured on the ballast frame **1**.
- The access to the ballast trailer is in operating position.
- The stability and tipping safety of the ballast trailer is ensured.



WARNING

Risk of falling!

If the following notes are not observed, the assembly personnel can fall off the ballast trailer and be severely injured or killed!

- ▶ Use only the access on the ballast trailer!
- ▶ Step on the access with utmost caution!

- ▶ Release and unpin the retaining pin **14**.
- ▶ Attach the pull cylinder **38** onto the auxiliary crane.
- ▶ Erect the pull cylinder **38** with the auxiliary crane to the vertical position.



DANGER

Tipping pull cylinder!

If the erected pull cylinder **38** is not secured on both sides with the retaining pin **14** and retaining pin **16**, the pull cylinder **38** will tip to the side when the auxiliary crane is removed!

Personnel can be severely injured or killed!

- ▶ Make sure, before removing the auxiliary crane on the pull cylinders **38**, that both retaining pin **14** and retaining pin **16** are always pinned and secured, **check visually!**

When the pull cylinder **38** is erected vertically:

- ▶ Pin in the retaining pin **14** and retaining pin **16** and secure with spring retainer **15**.

When the retaining pin **14** and the retaining pin **16** are pinned and secured:

- ▶ Remove the auxiliary crane.

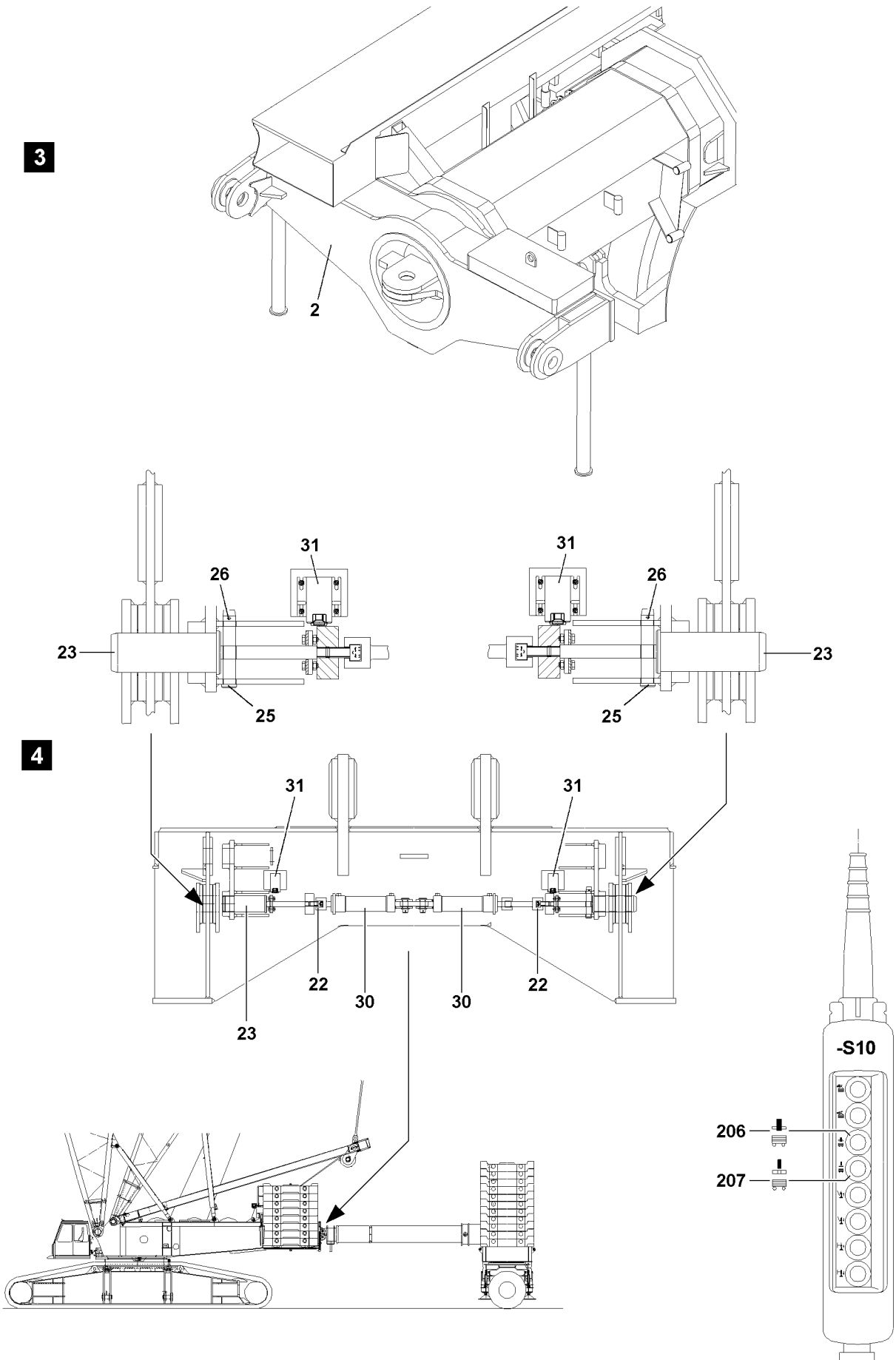


Fig.109211

LWE/LR 1750-000/12812-15-02/en

3.2 Pinning the ballast trailer on the turntable

Make sure that the following prerequisites are met:

- The crane is positioned in axial alignment, as close as possible to the ballast trailer guide.
- The crane engine is turned off.
- The ballast trailer is supported.

3.2.1 Establishing the electrical connection from the ballast trailer to the turntable



Note

- ▶ For assembly of the ballast trailer, the electrical connection from the ballast trailer to the turntable must be established to be able to control the support cylinders, if necessary!
- ▶ The „Ballast UP / DOWN“ release is available, independent if the ballast trailer is assembled, providing the conditions in the shut off diagram are fulfilled!
- ▶ The „Ballast UP“ release allows the entry of the pull and support cylinders!
- ▶ The release „Ballast DOWN“ allows the extension of the pull and support cylinders!
- ▶ This means, the support cylinders and the pull cylinders can be moved, even if the „Ballast trailer pinned“ signal is not yet present!



Note

- ▶ To establish the electrical connections, use the separate electrical wiring diagram!
- ▶ Establish the electrical connections.

3.2.2 Establishing the hydraulic connection from the ballast trailer to the turntable

When hydraulic lines are connected and disconnected with quick-release couplings, make ensure that the coupling procedure is being performed correctly.



DANGER

Risk of accident due to loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
- ▶ Release the pressure in the hydraulic system before connecting and disconnecting: Turn the engine off and wait for short time.
- ▶ Combine the coupling components (sleeve and connector) and screw them together with the hand-tightened nut.
- ▶ Tighten hydraulic coupling by hand: Rotate hand-tightened nut until it reaches a tangible, fixed stop position.

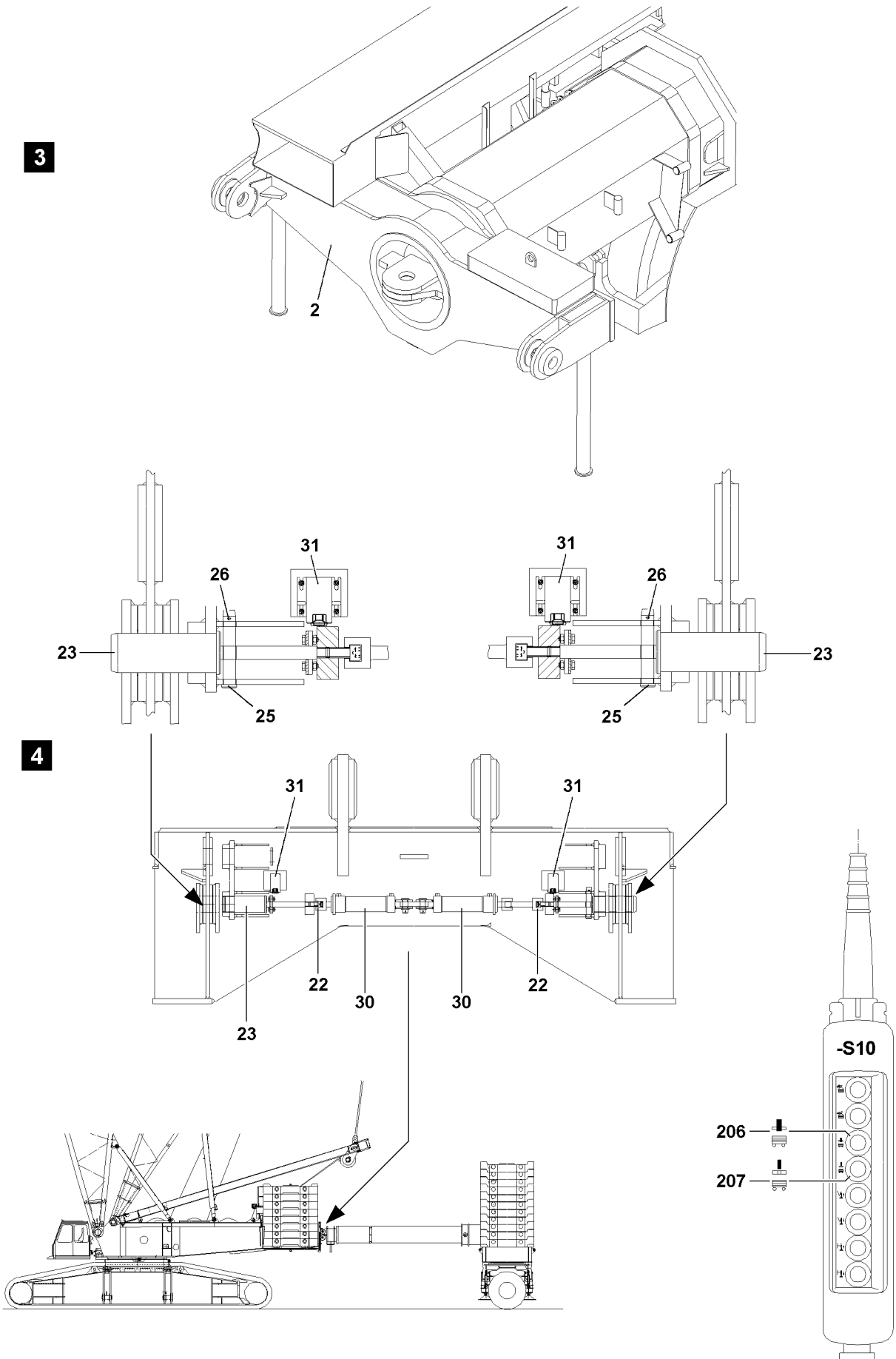


Fig.109211

LWE/LR 1750-000/12812-15-02/en

3.2.3 Aligning the ballast trailer

Make sure that the following prerequisites are met:

- The electrical and hydraulic connections from the turntable to the ballast trailer are established.
 - The connector pins **23** are unpinned.
 - The crane has been moved to the pin points on the ballast trailer guide.
- ▶ Align the ballast trailer by lifting or lowering it in such a way that the pin bores on the turntable and the ballast trailer guide align.



Note

- ▶ To be able to align the pin bores between the turntable and the ballast trailer guide, it may be necessary to „swing“ the turntable somewhat, check visually!



DANGER

Danger due to operating error!

When „Swinging“ the turntable, severe accidents can occur!

Personnel can be severely injured or killed!

Significant damage can occur on the crane and on the ballast trailer!

- ▶ Initiate all movements with utmost caution and at the least possible speed!
 - ▶ It is prohibited to stand in the danger zone while „Swinging“!
- ▶ Align the ballast trailer until the pin bores align.

3.2.4 Pin procedure

Make sure that the following prerequisites are met:

- The ballast trailer is aligned on the turntable.
- The pin bores between the turntable and the ballast trailer guide align.

NOTICE

Damage to the pin pulling device!

If the retaining pins **25** are not unpinned before the pin procedure, the pin pulling device **22** can be damaged!

- ▶ The retaining pins **25** on the pin pulling device **22** must be released and unpinned before pinning the connector pins **23**!
- ▶ Release the retaining pins **25** and unpin at both sides.
- ▶ Press the button **207** on the control panel **-S10**.

Result:

- The pin pulling cylinders **30** move out.
- The connector pins **23** move out and the ballast trailer is pinned on the turntable.

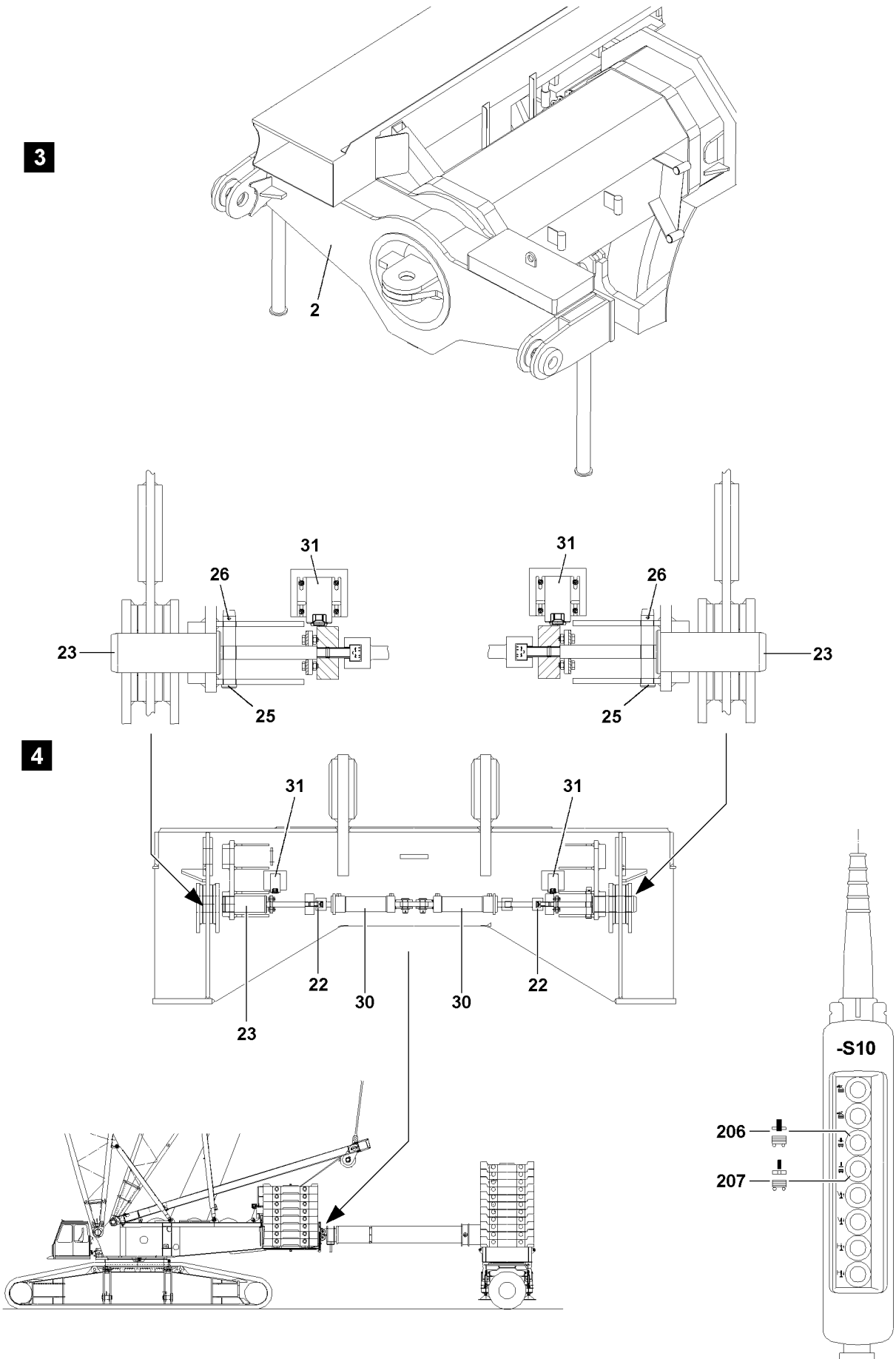


Fig.109211

LWE/LR 1750-000/12812-15-02/en

**Note**

- ▶ The crane control system recognized with the left and right limit switch initiators **31** of the pin points, if the connector pins **23** on the turntable are fully pinned!
- ▶ If both connector pins **23** are fully and correctly pinned, the crane control, via the limit switch initiators **31** receives the message, „Ballast trailer installed on left“ and „Ballast trailer installed on right.“ Which means: The turntable can no longer be turned and the crawler cannot be moved!
- ▶ After pinning, it must be checked again if the electrical and hydraulic connector lines are fully and correctly connected!
- ▶ The control release for the crane is only made when the wheels sets are in one of the required positions, „Circular driving“, „Towing“ or „Parallel driving“!

**DANGER**

Danger due to operating error!

If only one connector pin **23** is pinned and if the crane control therefore has only one message „Ballast trailer installed“ from a limit switch initiator, then the turntable can be turned anyway and the crane can be moved!

Personnel can be severely injured or killed!

The crane or the ballast trailer can be severely damaged!

- ▶ Carry out all movements with utmost caution and at the least possible speed!

When the ballast trailer is pinned on the turntable on both sides:

- ▶ Secure the connector pins **23** through the retaining pins **25**, see illustration **3**.
- ▶ Pin in the retaining pin **25** on the safety device.
- ▶ Secure the retaining pins **25** with lynch pins **26**.

Problem remedy

The second connector pin **23** cannot be pinned?

You did not align the ballast trailer exactly before assembly.

- ▶ Slightly lift or lower the ballast trailer via the support cylinder.
- ▶ Carefully telescope the ballast trailer guide in or out.
- ▶ Carefully swing the turntable after.

When the second pin bore aligns between the turntable and ballast trailer guide **2**:

- ▶ Pin in the second connector pin **23** with the pin pulling device.

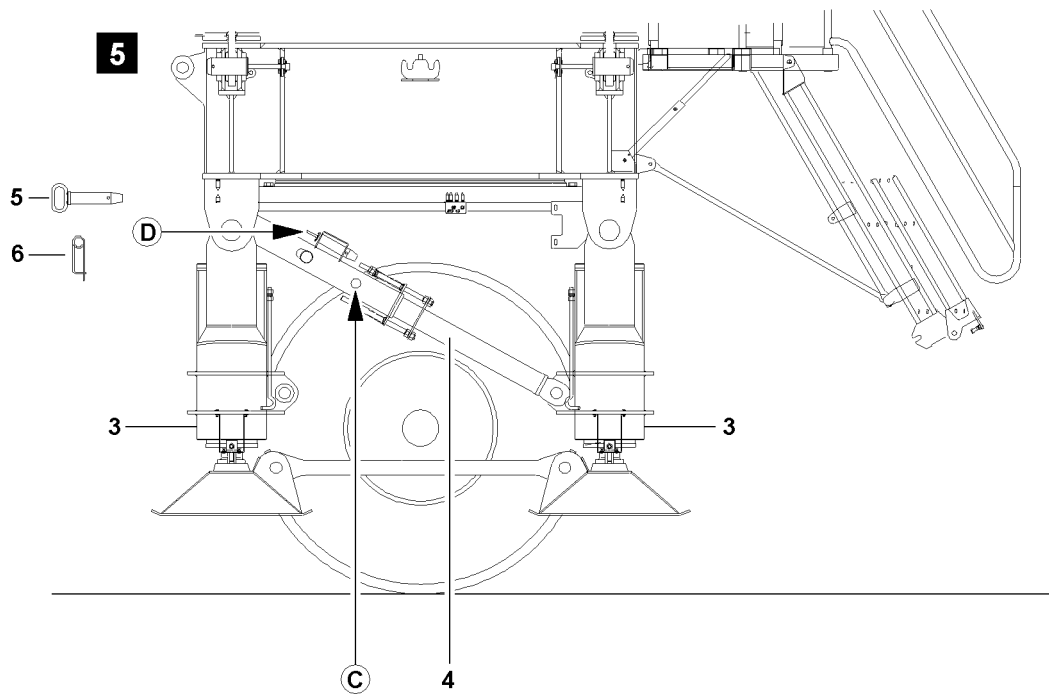
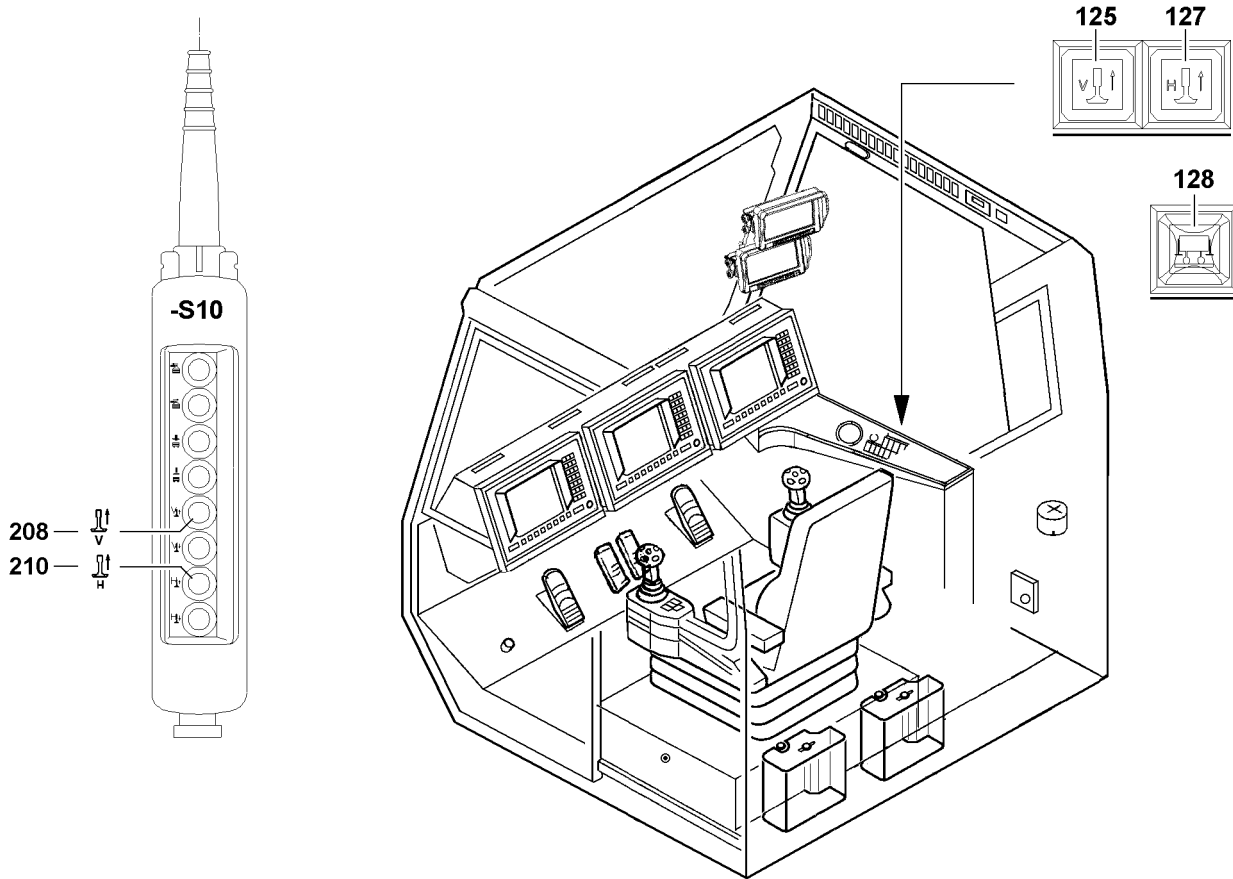


Fig.109212

LWE/LR 1750-000/12812-15-02/en

3.3 Moving the support cylinders in



Note

- ▶ The support cylinders **3** can be moved in via the control panel **-S10**, or via the corresponding button on the instrument panel of the crane operator's cab!
- ▶ When the pin procedure between the ballast trailer and the turntable is completed, move the support cylinders **3** in!

Make sure that the following prerequisites are met:

- The ballast trailer is pinned and secured on the turntable on both sides.
- The electrical and hydraulic connections are connected.

Move the support cylinders **3** in completely on the front and rear:

- ▶ Press the button **125** and button **127** in the crane operator's cab.
or
Press the button **208** and button **210** on the control panel **-S10**.

Result:

- The support cylinders **3** move in.



Note

- ▶ The locking pin **5** can only be unpinned if the support cylinders **3** are relieved!

When the support cylinders **3** are relieved:

- ▶ Release and unpin the locking pin **5** on the strut **4** at point **C**.
- ▶ Insert the locking pin **5** into the transport retainer, point **D**, and secure with spring retainer **6**.

NOTICE

Damage of ballast trailer!

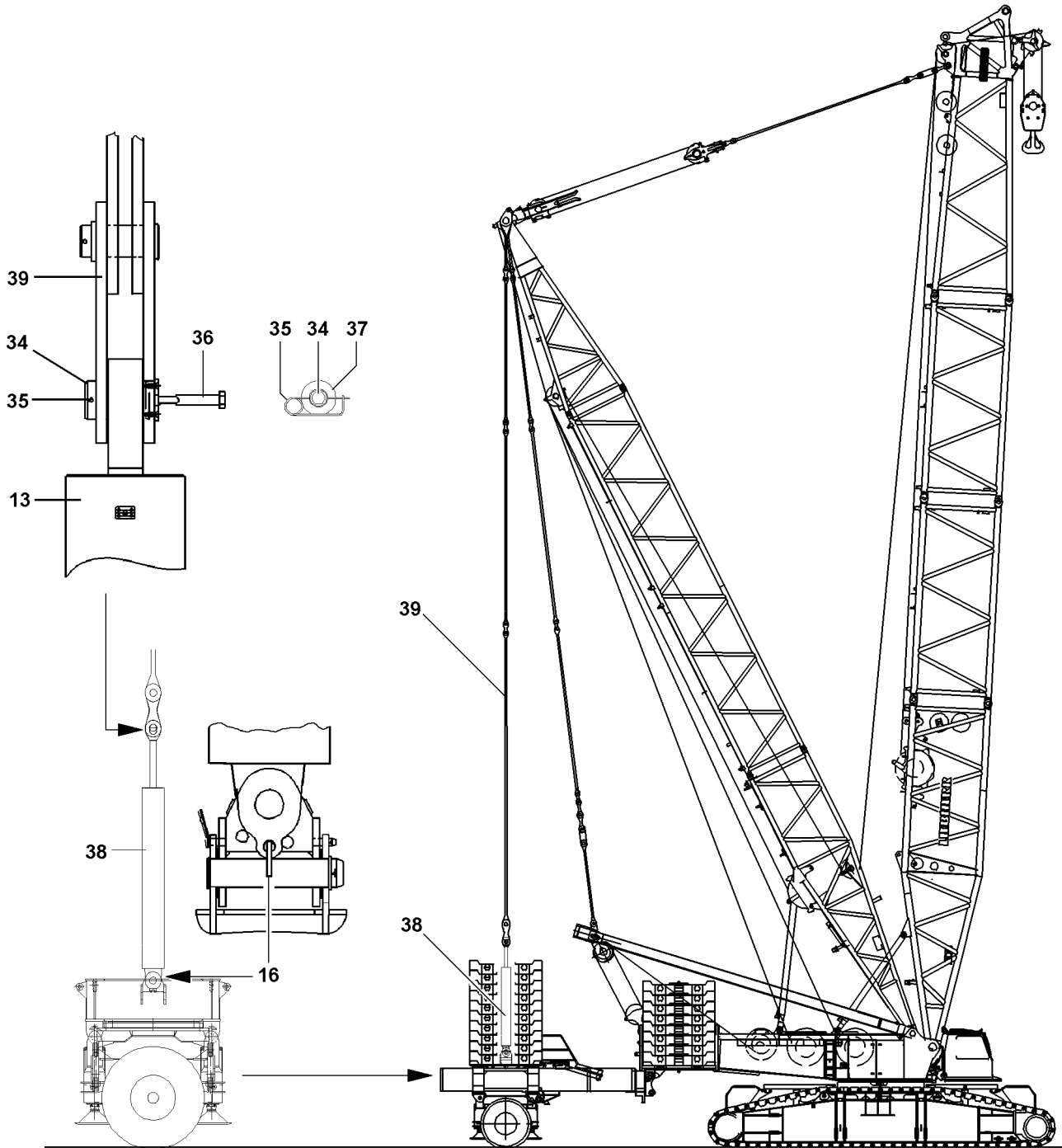
If the following notes are not observed, the support cylinders of the ballast trailer can be significantly damaged!

- ▶ Unpin the locking pins **5** as soon as the ballast trailer is assembled on the turntable and the support is relieved!
- ▶ When the ballast trailer is assembled and ballasted on the turntable, then the locking pin **5** **must** be unpinned so that the level between the strut **4** and the support cylinders **3** can be adjusted!
- ▶ Supporting the ballasted ballast trailer with pinned strut **4** is prohibited!

- ▶ Move the support cylinders **3** in all the way.

Result:

- The warning light **128** („Ballast trailer support moved in“) lights up.



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Fig.109213

3.4 Assembling the ballast trailer guying

Make sure that the following prerequisites are met:

- The derrick boom radius is 13 m.
- The ballast trailer radius is 13 m.
- The pull cylinders **38** on the ballast trailer are in operating position and are pinned and secured, see section „Bringing the guy rods on the ballast trailer into operating position“.
- The guy rods on the derrick boom are pinned and secured.



Note

- ▶ The ballast trailer guy rods must be assembled and secured according to the separately supplied assembly drawings. The numbering on the assembly drawings must be identical to the numbering on the guy rods!

The guy rods **39** of the derrick boom are to be pinned with the pull cylinders **38** on the ballast trailer. The connector pins **34** are held in „pulled“ condition by the allen screws **36** in pin position.

- ▶ Unpin the connector pin **34**: Remove the spring retainer **35** and unpin connector pins **34** on both sides.
- ▶ Position the guy rods **39** over the pull cylinders **38**.
- ▶ Align the guy rods **39** on the pull cylinders **38**.
- ▶ Pin the guy rods **39** on both sides with the pull cylinders **38**: Pin in the connector pins **34**.
- ▶ Secure the connector pins **34** with washer **37** and spring retainer **35**.



DANGER

Toppling guy rods!

When the retaining pins **16** are removed, the pull cylinders **38** tip to the side!

Personnel can be severely injured or killed!

- ▶ Before unpinning the retaining pin **16**, make sure that the entire derrick guying is properly pinned and secured!
- ▶ It is **prohibited** to unpin the retaining pins **16** as long as it is not ensured that the guy rods **39** are pinned and secured with the pull cylinders **38**, check visually!
- ▶ For crane operation with ballast trailer, the retaining pins **16** must be unpinned!

- ▶ When the guy rods **39** are pinned and secured with the pull cylinders **38** on both sides:
- ▶ Release and unpin the retaining pin **16**.

7

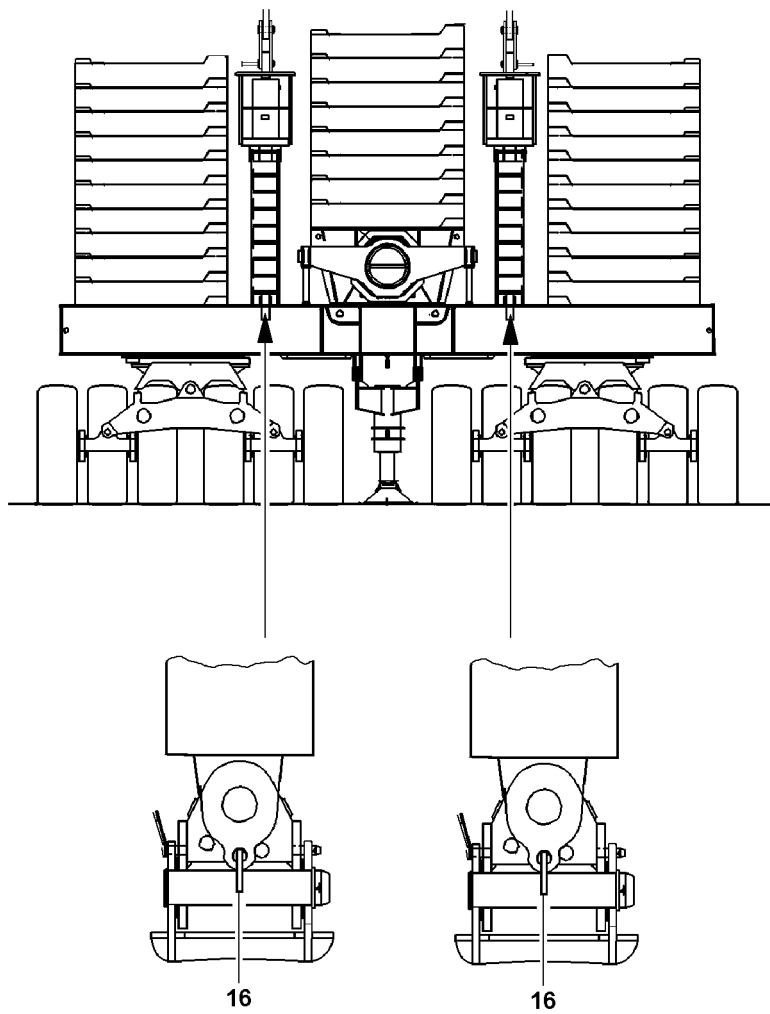


Fig.109342

3.5 Ballasting the ballast trailer



Note

- ▶ The ballast plates are marked with their own weights!



WARNING

The crane can topple over!

If the following danger notes are not observed, the ballast plates or the ballast stack can slip on the ballast trailer and fall down!

The crane can topple over and personnel can be severely injured or killed!

- ▶ The ground on which the ballast trailer is ballasted must be level and have adequate load-bearing capacity!
- ▶ Place the ballast plates always symmetrically, in reference to the longitudinal axis!
- ▶ The outer ballast stacks must weigh the same and be the same height after ballasting!
- ▶ The ballast stacks may only be stacked to three times the height of the ballast plate width!
- ▶ When ballasting on and off in **suspended condition**, the weight difference between the left and right ballast stack may be no more than maximum 20.0 t !
- ▶ The outer ballast stacks can differ in stack height from the inner ballast stacks!
- ▶ The maximum permissible total weight of the ballast trailer may not exceed 350 t !
- ▶ Secure all ballast plates so they cannot move and fall down!



WARNING

Damaged ballast plates!

Damage on the ballast plates can cause the fastening equipment to release!

The ballast plates and components can fall down!

Personnel can be severely injured or killed!

- ▶ Do not use damaged ballast plates and replace them immediately!



WARNING

Danger of toppling the ballast stack!

Lopsided stacked ballast plates create instability in the ballast stack!

The ballast plates can tip from the base trailer and cause the crane to topple over!

Personnel can be severely injured or killed!

- ▶ Make sure that the ballast plates are placed correctly in the centerings!



WARNING

Impermissible combination of ballast plates!

Combining ballast plates of variation **V1** and variation **V2** creates instability in the ballast stack!

The ballast plates can tip from the base trailer and cause the crane to topple over!

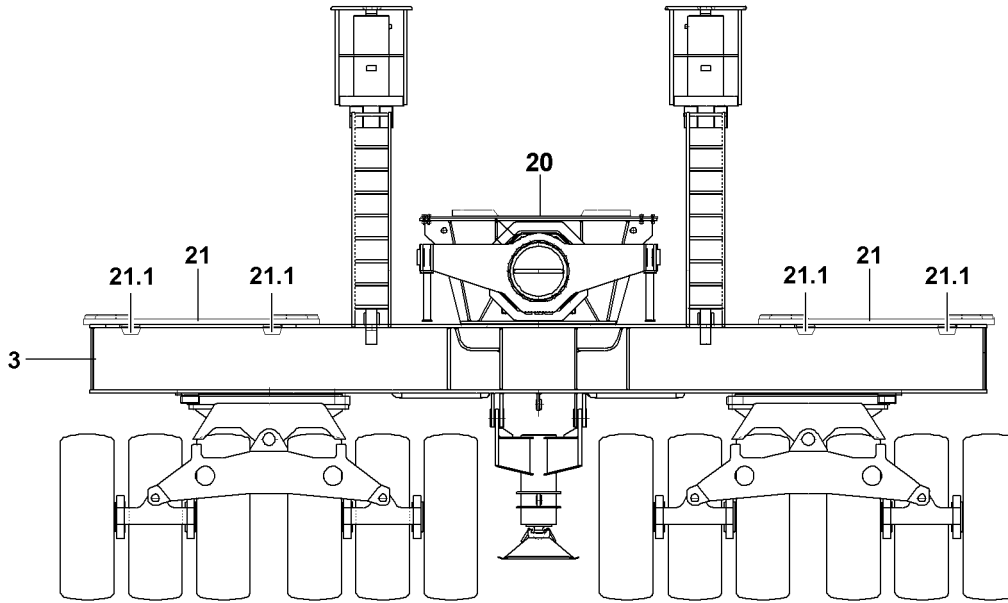
Personnel can be severely injured or killed!

- ▶ Only ballast plates of the same variation may be stacked on each other!

Make sure that the following prerequisites are met:

- The ballast trailer is pinned and secured on the turntable on both sides.
- The ballast trailer is properly pinned and secured to the derrick ballast guying.
- The retaining pins **16** are unpinned.
- An auxiliary crane is available.

8



9

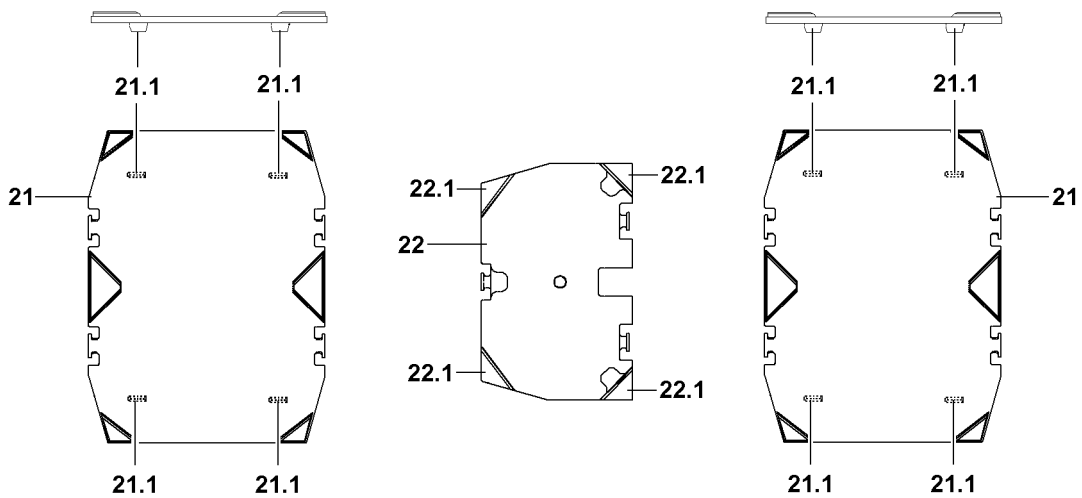
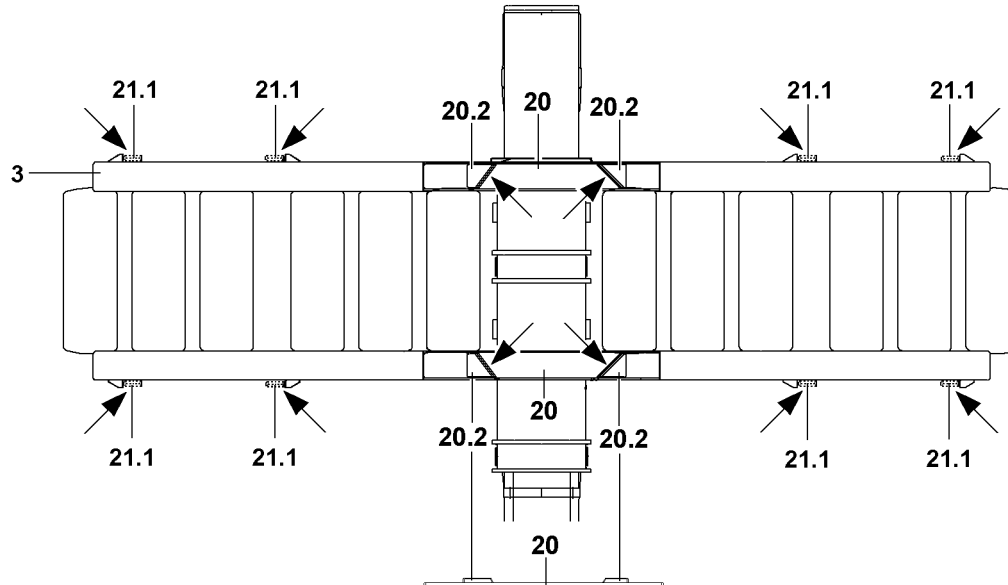


Fig.109479

LWE/LR 1750-000/12812-15-02/en

3.5.1 Ballasting the 10.0 t ballast plates

**Note**

- ▶ The ballast plates are marked with their own weights!

**WARNING**

Danger of toppling the ballast stack!

Personnel can be severely injured or killed by toppling ballast stacks!

- ▶ During ballasting observe even distribution of the ballast plates!
- ▶ Observe correct centering of the ballast plates!
- ▶ First, establish the ballast stack in the middle of the ballast trailer, then place the ballast stacks evenly on the left and right!

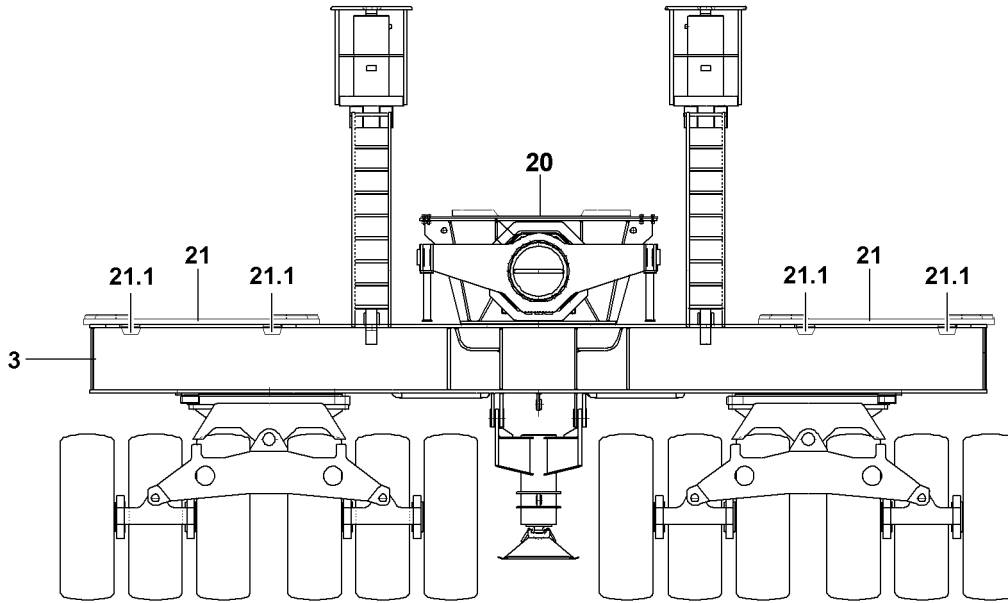
**Note**

- ▶ For determining the correct ballast weight, use the LICCON job planner!

**Note**

- ▶ The ballast plates may only be distributed in layers on the ballast stacks, always left and right!
- ▶ The ballast stacks must have the identical stack heights left and right according to ballasting and have the identical ballast weight!

8



9

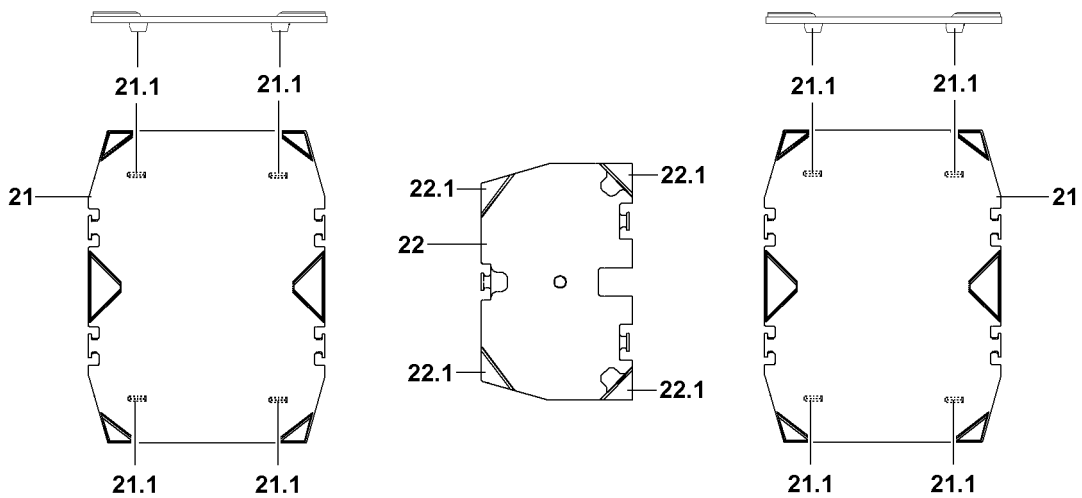
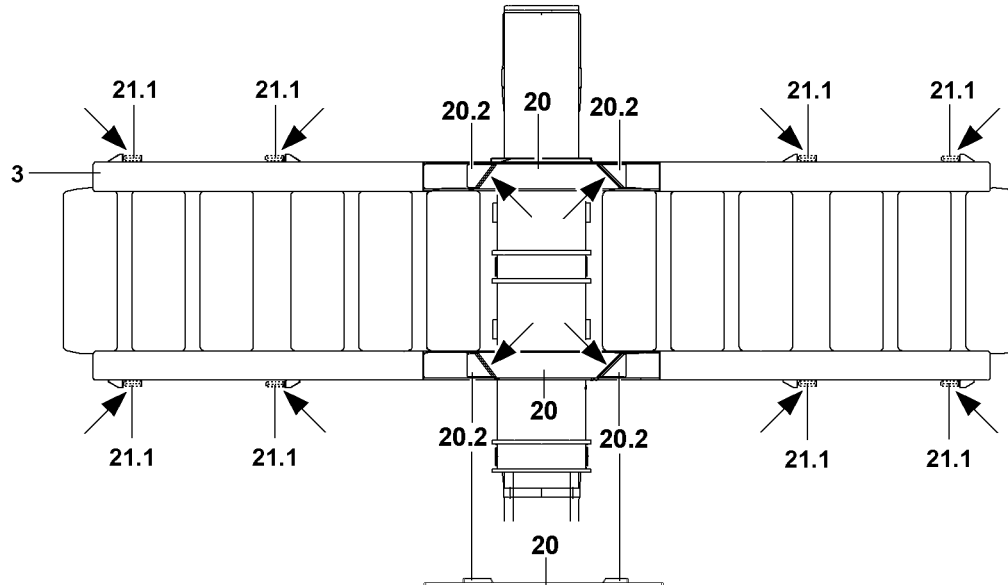


Fig.109479

LWE/LR 1750-000/12812-15-02/en

Placing the centering plates* on the ballast trailer

When using the 10.0 t ballast plates, the centering plates **20** and the centering plates **21** and the centering plate **22** must be used.

The centering plates are used to take up the 10.0 t ballast plates securely in order to prevent slipping during crane operation.



WARNING

The crane can topple over!

Through improperly placed centering plates, individual ballast plates or the ballast stacks can slip or fall down and cause the crane to topple over!

Personnel can be severely injured or killed!

- ▶ Place the centering plates properly on the ballast trailer, visual inspection!
- ▶ Crane operation with improperly placed centering plates is prohibited!

Placing the center centering plate

Make sure that the following prerequisite is met:

- The two centering plates **20** for the 10.0 t ballast plates are installed, see illustration **9**.
- ▶ Attach the centering plate **22** on the auxiliary crane.



Note

- ▶ Observe correct installation position of the centering plate **22**, see illustration **9**!
- ▶ The centerings **22.1** and the centering plate **22** must be positioned in the centerings **20.2** of the centering plates **20** according to illustration **9**, visual inspection!
- ▶ Position the centering plate **22** in the centerings **20.2** of the centering plates **20**, see illustration **9**.
- ▶ Place the centering plate **22** in the centerings **22.2**.

When the centering plate **22** is seated flat on the centering plates **20**:

- ▶ Remove the auxiliary crane.

Placing the outer centering plates



Note

- ▶ Placing of the two outside-lying centering plates **21** on the ballast trailer **3** is identical and is only described on the basis of a centering plate!
- ▶ Attach the centering plate **21** on the auxiliary crane.



Note

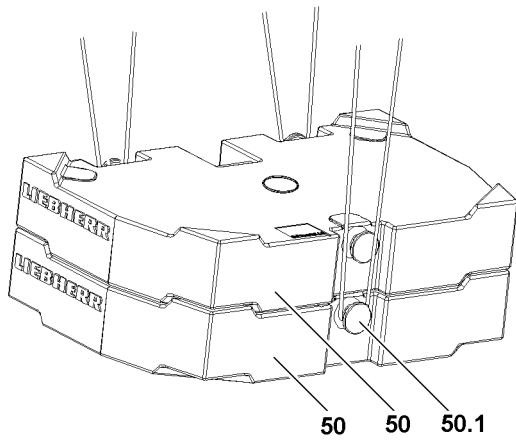
- ▶ Observe the correct installation position of the centering plate **21**, see illustration **8** and illustration **9**!
- ▶ The centerings **21.1** must be positioned according to illustration **9** on the frame of the ballast trailer **3**, visual inspection!
- ▶ Position the centering plate **21** on the frame.
- ▶ Lower the centering plate **21** on the frame of the ballast trailer **3**.

If the centering plate lays flat on the frame of the ballast trailer:

- ▶ Remove the auxiliary crane.

13

V1



17

V2

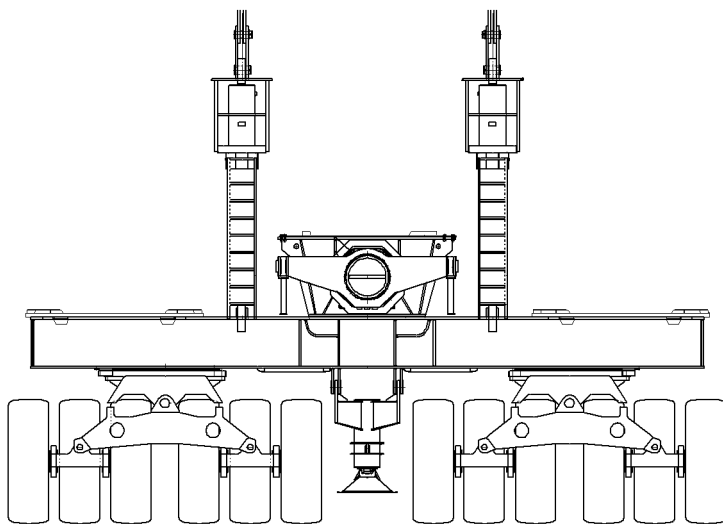
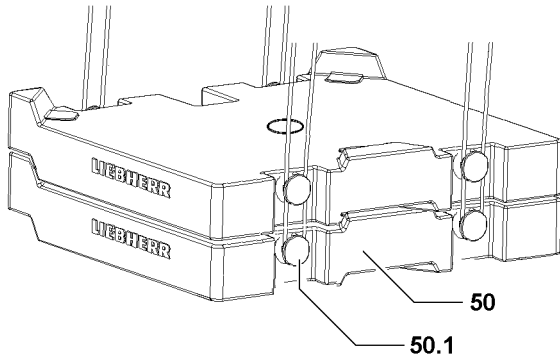


Fig.112548

LWE/LR 1750-000/12812-15-02/en

Placing the ballast plates, fastening points: Bitt



WARNING

Overloaded ballast plates!

If more than the permissible loads are lifted, the bits **50.1** are overloaded!

The ballast plates can be damaged and fall down!

Personnel can be severely injured or killed!

- ▶ Observe the section „Permissible ballast assemblies“ in this chapter!
-



WARNING

Incorrect handling of the fastening equipment!

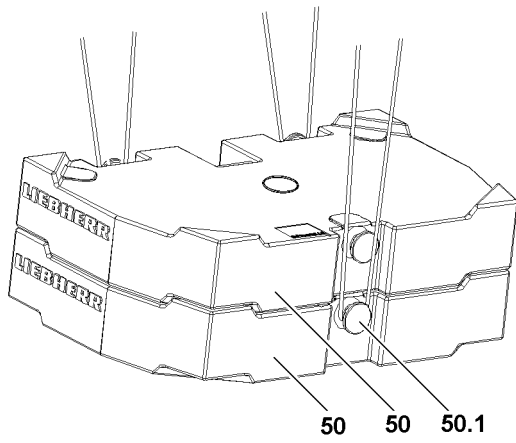
If fastening equipment cannot be attached correctly and / or if it is not secured sufficiently to prevent it from loosening up, the ballast plates can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that the fastening equipment is correctly attached on the bits **50.1** and that it is secured sufficiently to prevent it from loosening up!
-
- ▶ Attach the ballast plates or ballast assembly, illustration **13** on the auxiliary crane.
 - ▶ Lift the ballast plates or the ballast assembly and place it carefully on the centerings on the ballast trailer or on another ballast plate in the ballast stack.

13

V1



17

V2

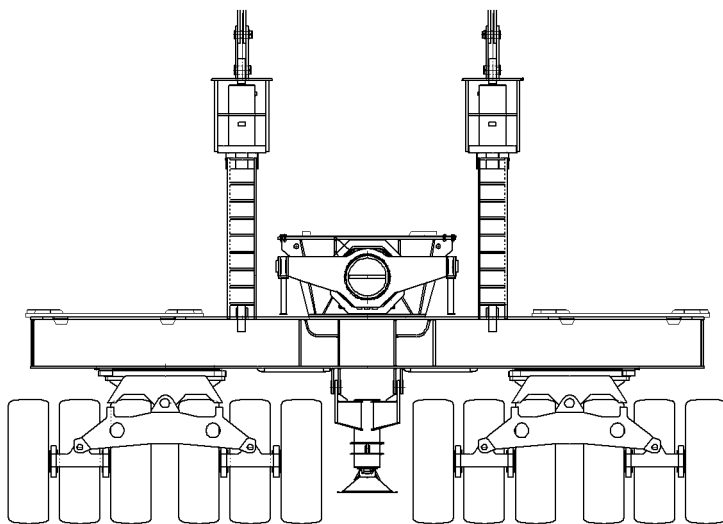
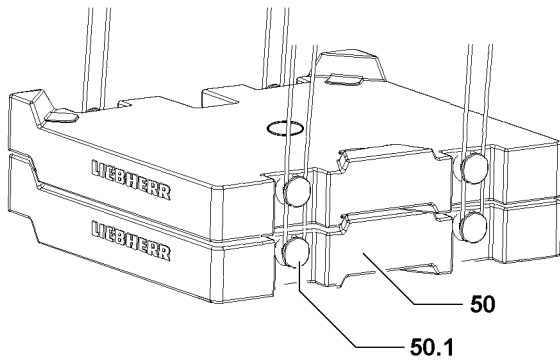


Fig.112548

LWE/LR 1750-000/12812-15-02/en

3.5.2 Placing 12.5 t ballast plates, fastening points: Bitt



Note

- ▶ The ballast plates are marked with their own weights!
 - ▶ The ballast plates are placed directly on the centerings on the ballast trailer frame!
-



WARNING

Overloaded ballast plates!

If more than the permissible loads are lifted, the bits **50.1** are overloaded!

The ballast plates can be damaged and fall down!

Personnel can be severely injured or killed!

- ▶ Observe the section „Permissible ballast assemblies“ in this chapter!
-



WARNING

Incorrect handling of the fastening equipment!

If fastening equipment cannot be attached correctly and / or if it is not secured sufficiently to prevent it from loosening up, the ballast plate can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that the fastening equipment is correctly attached on the bits **50.1** and that it is secured sufficiently to prevent it from loosening up!
-
- ▶ Attach the ballast plate, see illustration **17** on the auxiliary crane.
 - ▶ Lift the ballast plate and place it carefully on the centerings on the ballast trailer or on another ballast plate in the ballast assembly.
-

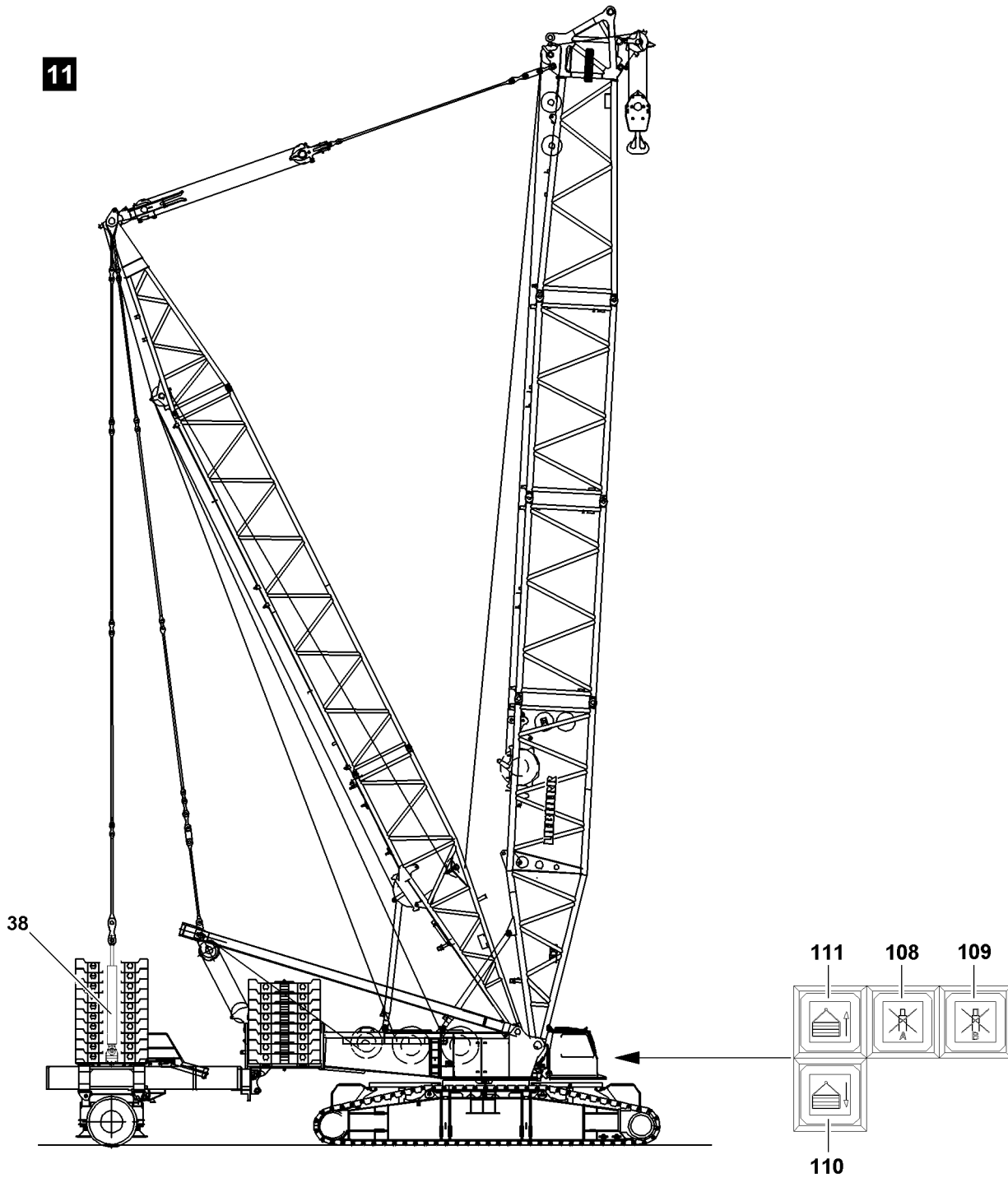


Fig.109215

LWE/LR 1750-000/12812-15-02/en

3.6 Lifting and lowering the ballast trailer with the pull cylinders

The pull cylinders **38** can only be controlled from the crane operator's cab.



Note

- ▶ If the ballast trailer is raised via the button **111** or lowered via the button **110**, then the horizontal alignment of the ballast trailer is automatically regulated by a level sensor!
- ▶ For a ballast utilization of **more than** or **equal to** 90 %, the level regulator regulates the ballast trailer level to $\pm 0.45^\circ$!
- ▶ At a ballast utilization of **less than** 90 %, the level sensor regulates the ballast trailer level to $\pm 2.5^\circ$! This makes it possible to set the ballast trailer down to a ground slope of 2.5° !



DANGER

Risk of accident!

If the following notes are not observed, personnel can be severely injured or killed!

In addition, damage can occur on the ballast trailer!

- ▶ When lifting or lowering the ballast trailer, pay attention to the horizontal alignment of the ballast trailer!
- ▶ When lifting or lowering the ballast trailer, the forces in the ballast guyings must be regularly checked on the LICCON monitor! If the difference of the forces between the „Derrick ballast guying A“ and „Derrick ballast guying B“ are too large, an acoustical warning will be issued and the values on the LICCON monitor blink, see also section „Difference force monitoring of ballast guying“!
- ▶ When pressing the button **108** („Cylinders A on the derrick ballast stop“) or the button **109** („Cylinders B on the derrick ballast stop“) then the level sensor is bypassed and the ballast trailer can be included within the limited angle range. This is only permitted when setting down the ballast trailer on uneven ground and applying utmost caution!

3.6.1 Lifting the ballast trailer

- ▶ Press the button **111**.

Result:

- The ballast trailer is raised.

3.6.2 Lowering the ballast trailer

- ▶ Press the button **110**.

Result:

- The ballast trailer is lowered.

3.6.3 Stopping the pull cylinder on the derrick ballast

- ▶ Press the button **108**.

Result:

- The pull cylinder (A) on the derrick ballast is stopped.

- ▶ Press the button **109**.

Result:

- The pull cylinder (B) on the derrick ballast is stopped.

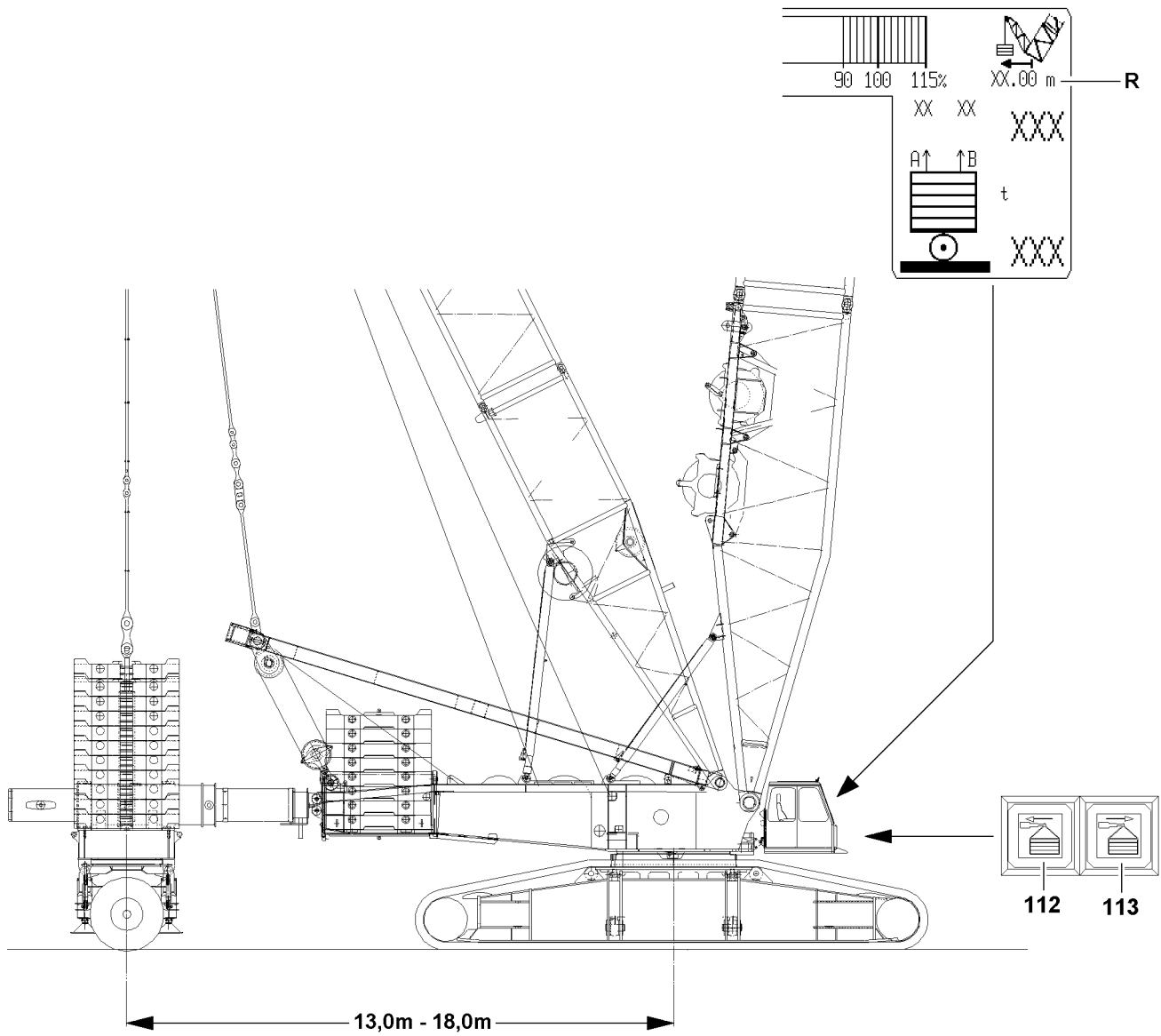


Fig.109216

LWE/LR 1750-000/12812-15-02/en

4 Setting the ballast trailer radii

The ballast trailer can be telescoped hydraulically steplessly from 13 m to 18 m or from 15 m to 20 m.

The ballast trailer is equipped with a telescopable ballast trailer guide. This allows the derrick ballast radius to be adjusted to suit the environment or type of lifting work. The derrick ballast radius **R** is displayed on the LICCON monitor.



Note

- ▶ The release for telescoping the ballast trailer guide out and in is only given when the wheel sets are in „Towing“ mode, see section „Towing“!
- ▶ If the ballast trailer is supported for installation on the turntable, then it is possible to telescope the ballast trailer guide out and in with reduced pressure!
- ▶ When telescoping the ballast trailer guide out, monitor the derrick ballast radius **R** on the LICCON monitor constantly!
- ▶ The crane operator may not blindly rely on the derrick ballast radius measurement, he must think for himself and check if the length sensor measure functions correctly, see Crane operating instructions, chapter 4.02!

4.1 Telescoping the ballast trailer guide 13 m to 18 m

4.1.1 Telescoping the ballast trailer guide out

Make sure that the following prerequisite is met:

- The wheel sets of the ballast trailer are in „Towing“ position.

- ▶ Press the button **113**.

Result:

- The ballast trailer guide moves out.

- ▶ Observe the force display in the derrick guying $F_{1_{min}}-F_{1_{max}}$.

4.1.2 Telescoping the ballast trailer guide in

Make sure that the following prerequisite is met:

- The wheel sets of the ballast trailer are in „Towing“ position.

- ▶ Press the button **112**.

Result:

- The ballast trailer guide moves in.

- ▶ Observe the force display in the derrick guying $F_{1_{min}}-F_{1_{max}}$.

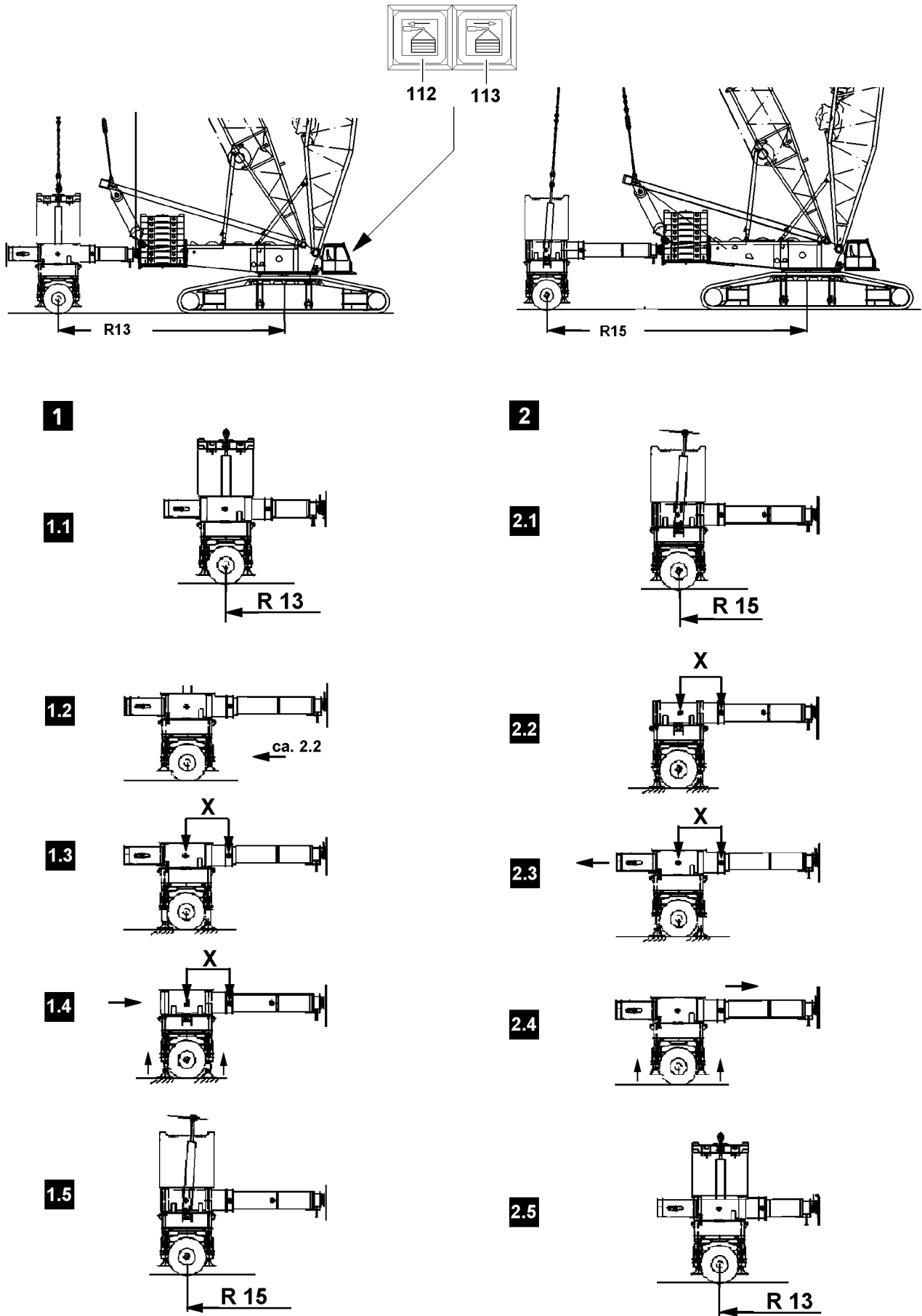


Fig.109591

LWE/LR 1750-000/12812-15-02/en

4.2 Telescoping the ballast trailer guide 15 m to 20 m

4.2.1 Changing the ballast trailer guide from R 13 m to R 15 m , illustrations 1

Make sure that the following prerequisite is met:

- The ballast trailer is in position R 13 m , see illustration 1.1.
- ▶ Relieve the guy rods, see illustration 1.1.
- ▶ Extend the ballast trailer approx. 2.2 m , see illustration 1.2.
- ▶ Pin the struts on the support cylinders with locking pins, see illustration 1.3.
- ▶ Support the ballast trailer, see illustration 1.3.
- ▶ Unpin the guide tube on points **X** with the pin pulling device, see illustration 1.3.
- ▶ Align the ballast trailer with the support cylinders - visual inspection on the guide tube, see illustration 1.3.
- ▶ Move the guide tube in, see illustration 1.4.
- ▶ Pin the guide tube on points **X** with the pin pulling device, see illustration 1.4.
- ▶ Unpin the struts, see illustration 1.4.
- ▶ Move the support in, see illustration 1.4.

Result:

- The ballast trailer is in position R 15 m , see illustration 1.5.
- The ballast trailer guide can be telescoped out to position R 20 m.
- ▶ Press the button **113**.

Result:

- The ballast trailer guide moves out.
- ▶ Observe the force display in the derrick guying $F1_{min}$ - $F1_{max}$.

4.2.2 Changing the ballast trailer guide from R 15 m to R 13 m , illustrations 2

Make sure that the following prerequisite is met:

- The ballast trailer is in position 15 m , see illustration 2.1.
- ▶ Relieve the guy rods, see illustration 2.1.
- ▶ Pin the struts on the support cylinders with locking pins, see illustration 2.2.
- ▶ Support the ballast trailer, see illustration 2.2.
- ▶ Unpin the guide tube on points **X** with the pin pulling device, see illustration 2.2.
- ▶ Align the ballast trailer with the support cylinders - visual inspection on the guide tube, see illustration 2.3.
- ▶ Move the guide tube out, see illustration 2.3.
- ▶ Pin the guide tube on points **X** with the pin pulling device, see illustration 2.3.
- ▶ Move the support in, see illustration 2.4.
- ▶ Unpin the struts, see illustration 2.4.
- ▶ Press the button **112** and telescope the guide tube in to R 13 m , see illustration 2.4.

Result:

- The ballast trailer is in position R 13 m , see illustration 2.5.
- ▶ Observe the force display in the derrick guying $F1_{min}$ - $F1_{max}$.

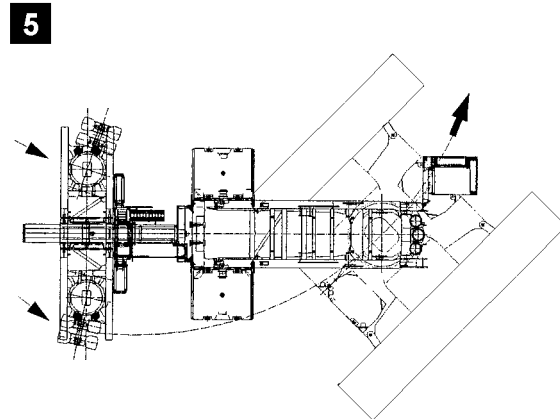
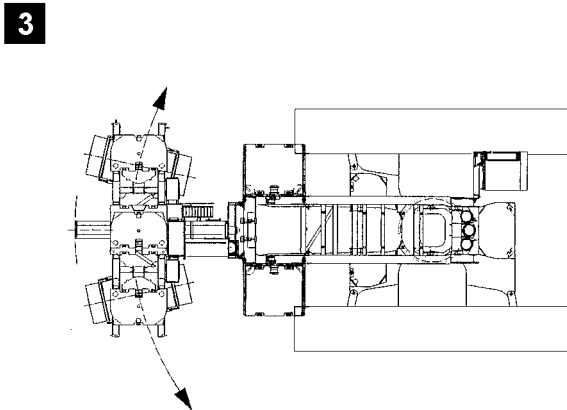
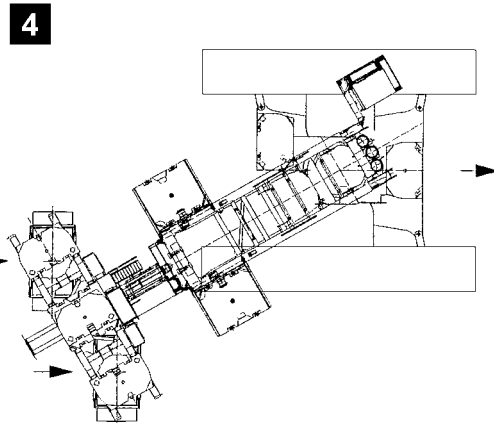
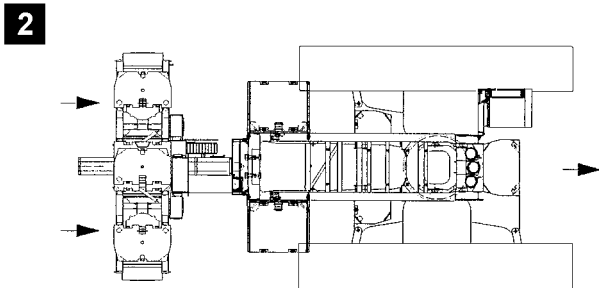
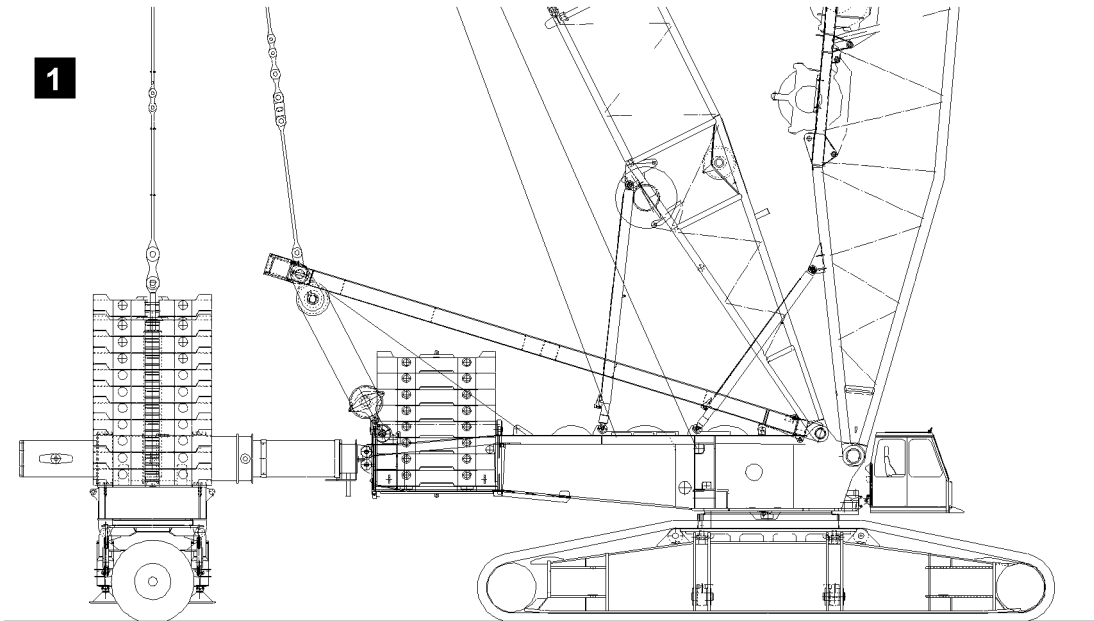


Fig.109217

LWE/LR 1750-000/12812-15-02/en

5 Steering programs

The ballast trailer has the following computer controlled steering programs:

- Towing, illustration **2**
- Circular driving, illustration **3**
- Parallel driving, illustration **4**
- Corrective steering, illustration **5**

The steering programs „Towing“, „Circular driving“ and „Parallel driving“ can only be actuated from the crane operator's cab.



WARNING

Danger when moving the wheel sets on the ballast trailer!

When moving the wheel sets on the ballast trailer, personnel can be severely injured or killed!

- ▶ The crane operator as well as any operating personnel must make sure that there are no persons within the danger zone - between the wheel sets!
 - ▶ It is prohibited for anyone to remain between the wheel sets for all setting / adjustment work on the ballast trailer!
 - ▶ It is prohibited to anyone to remain between the wheel sets when selecting the various steering programs!
-

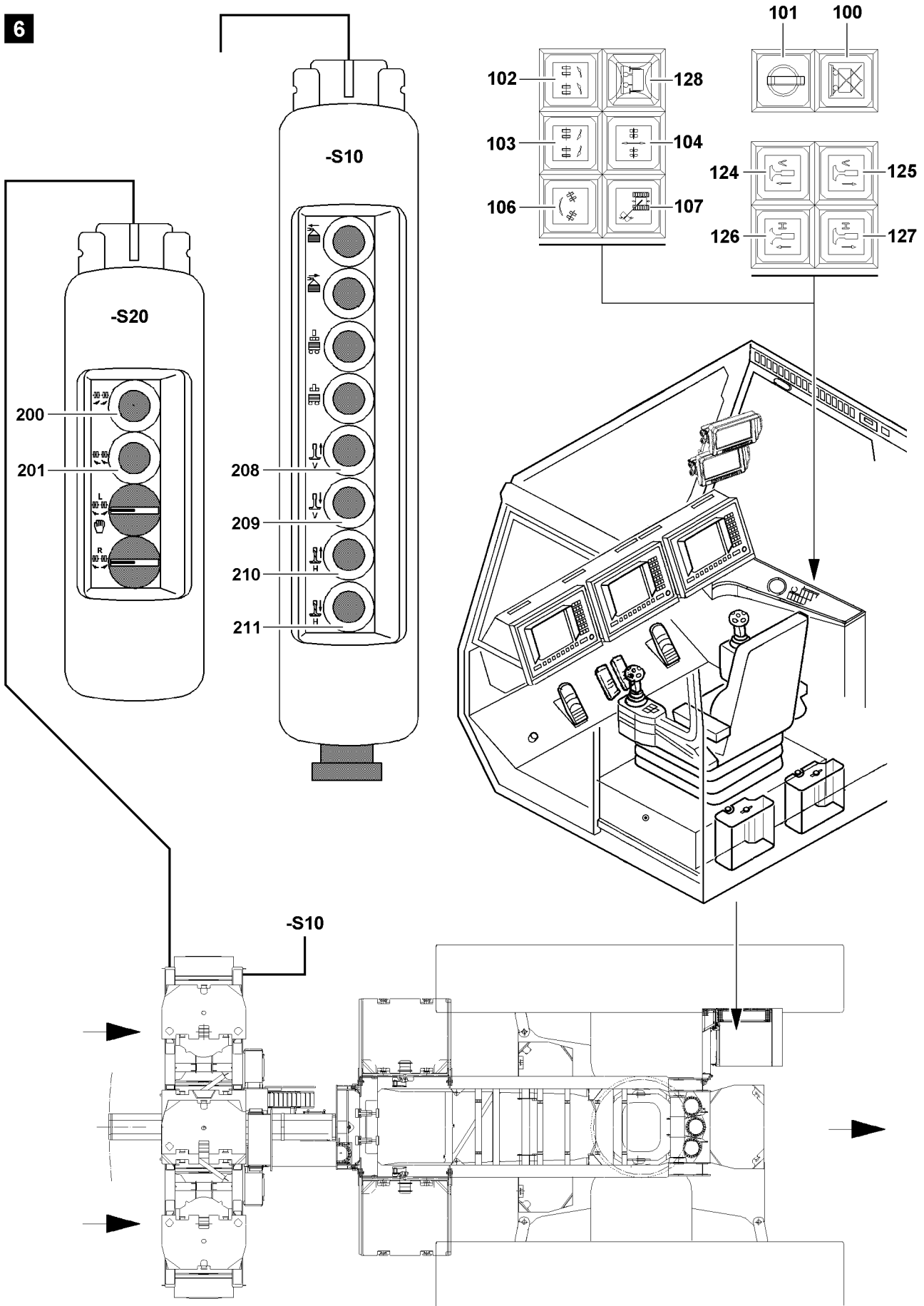


Fig.109218

LWE/LR 1750-000/12812-15-02/en

5.1 Notes to change the wheel sets



Note

- ▶ The buttons for the setting of the various steering programs are in the instrument panel of the crane operator's cab, see Crane operating instructions, chapter 4.01!

Moving the wheel sets for „Towing“ is made with the button **104**.

Moving the wheel sets for „Circular driving“ is made with the button **106**.

Moving the wheel sets for „Parallel driving“ is made with the button **107**.

The wheel sets are resteeered „to the right“ with the button **103** from the crane operator's cab, or with the button **201** from the control panel **-S20** on the ballast trailer.

The wheel sets are resteeered „to the left“ with the button **102** from the crane operator's cab, or with the button **200** from the control panel **-S20** on the ballast trailer.

The manual change of the wheel sets for assembly purposes is only possible with the buttons on the control panel **-S20** on the ballast trailer.



Note

- ▶ If the ballast trailer is suspended, the wheel sets can be positioned in any mode, if the key button **101** „Ballast trailer lifted off“ was turned on! Turning and driving the crane is possible!

NOTICE

Danger of accidents when turning or driving!

If the lifted off ballast trailer scrapes on the ground - with turned on key button **101** - when turning or driving the crane, then the ballast trailer and the crane can be significantly damaged!

- ▶ If the ballast trailer has been lifted off the ground, the key button **101** „Ballast trailer lifted off“ is actuated, then it must be checked that the wheels do **not scrape on the ground!** An instructed person must check visually!
- ▶ It is prohibited for anyone to remain in the danger zone!

5.2 Adjustment procedure

The adjustment procedure for the various steering programs is identical.



Note

- ▶ If the ballast trailer is **not loaded**, the wheel sets can be changed without relieving the tires!
- ▶ If the ballast trailer is **loaded**, the ballast trailer must be raised first with the support cylinders until the tires are relieved!



DANGER

Risk of accident from overloading the crane!

By raising the ballast trailer with the support cylinders, the force at test point 1 (MS1) can increase to the permissible maximum value. The extension of the support cylinders is then turned off!

- ▶ Monitor the actual force display of test point 1 (MS1) on the LICCON monitor and stop the extension of the support cylinders in time before the shut off, see Crane operating instructions, chapter 4.02!
- ▶ Actuate the support cylinders from the crane operator's cab and at the same time, monitor the „Actual force display of test point 1 (MS1)“ on the LICCON monitor.
- ▶ Before reaching the maximum operating force, „F1_{max-operation}“: Stop the extension of the support cylinders.

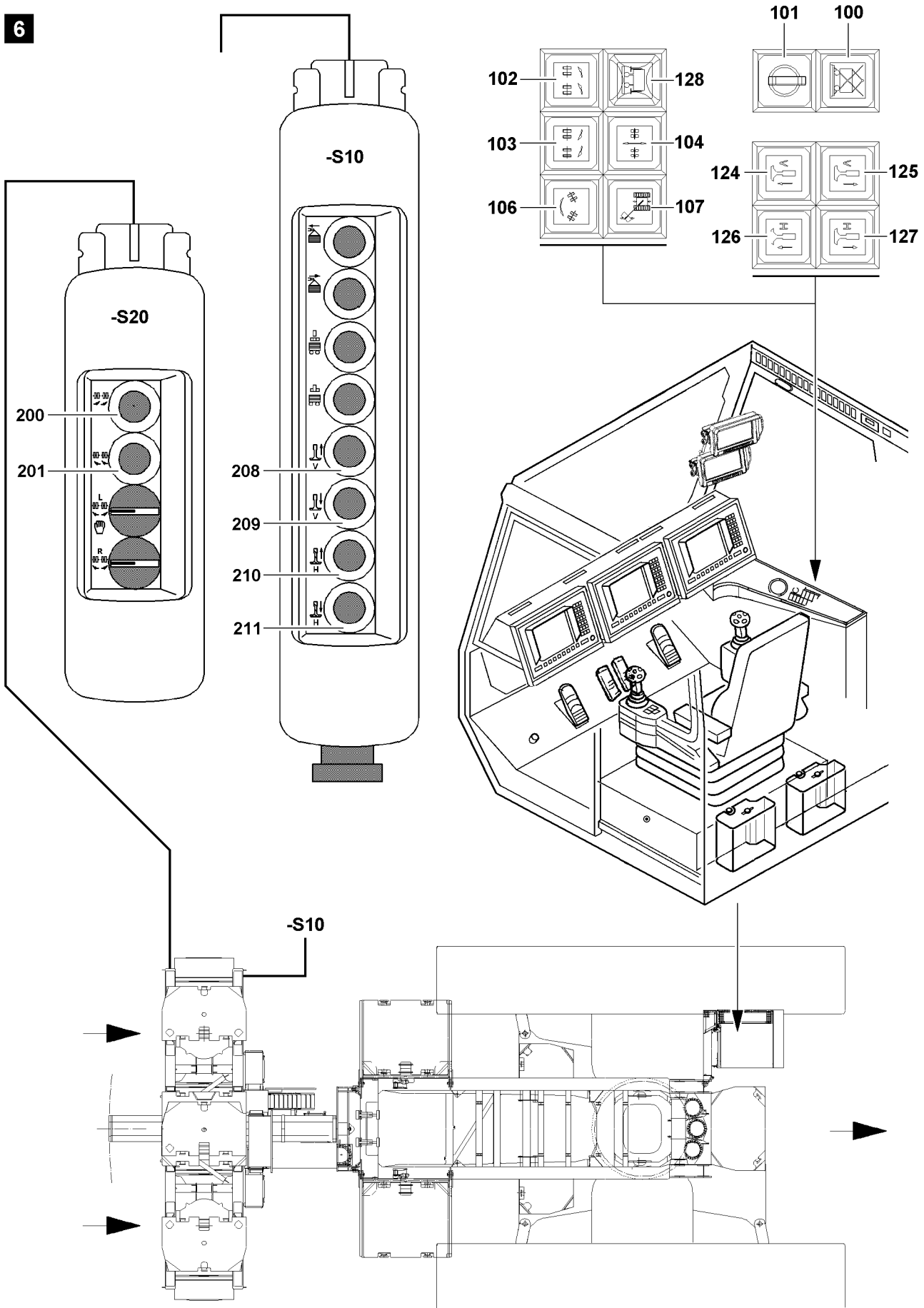


Fig.109218

LWE/LR 1750-000/12812-15-02/en

5.3 Towing

5.3.1 Lifting the ballast trailer with the support cylinders



Note

- ▶ The support cylinders of the ballast trailer must always be moved out evenly!

Move the front and rear support cylinders out:

- ▶ Press the button **124** and button **126** in the crane operator's cab.
or
Press the button **209** and button **211** on the control panel **-S10**.

5.3.2 Aligning the wheel sets in towing position

Make sure that the following prerequisite is met:

- The ballast trailer is raised via the support cylinders to the point where the wheel sets are relieved.
- ▶ Press the button **104**.

Result:

- The wheel sets of the ballast trailer are aligned in towing position.
- During the turning procedure of the wheel sets, the indicator light in the button **104 blinks**.
- When the towing position is reached, the indicator light in the button **104 lights up**.

5.3.3 Lowering the ballast trailer with the support cylinders



Note

- ▶ The support cylinders of the ballast trailer must always be moved in evenly!

Move support cylinders in completely on the front and rear:

- ▶ Press the button **125** and button **127** in the crane operator's cab.
or
Press the button **208** and button **210** on the control panel **-S10**.

Result:

- The support cylinders move in.

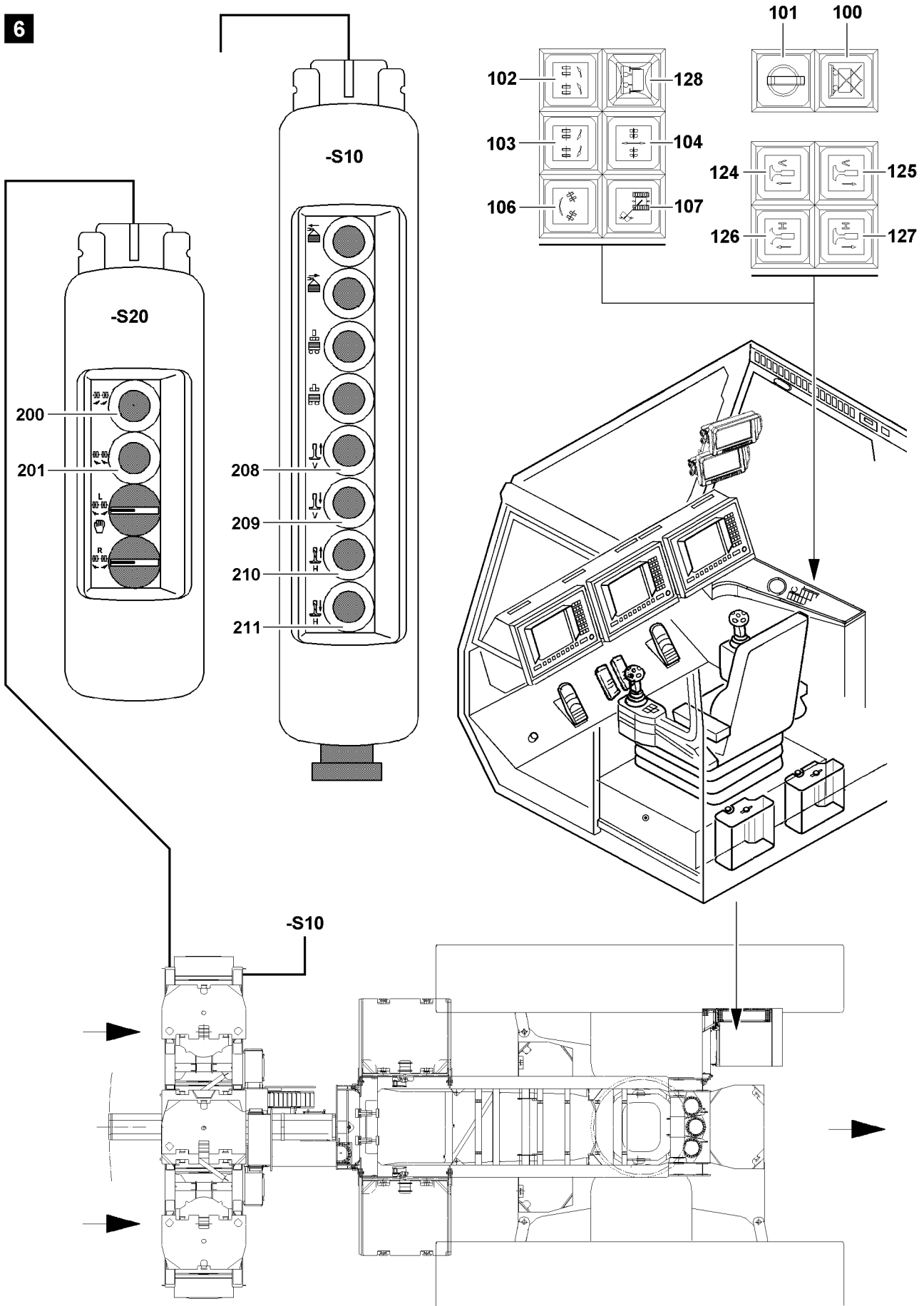


Note

- ▶ The release to drive the crane in steering program „Towing“ is only made when both wheel sets are in driving direction (neutral position) and the support cylinders are fully moved in!
- ▶ Check the settings of the wheel sets and the support cylinders before driving the crane!
- ▶ Move the support cylinders in completely.

Result:

- The warning light **128** („Ballast trailer support moved in“) **lights up**.



LWE/LR 1750-000/12812-15-02/en

5.3.4 Corrective steering the wheel sets

NOTICE

Damage of ballast trailer!

When the wheel sets are resteered at a standstill, the ballast trailer can be damaged!

- ▶ If the ballast trailer is ballasted, the corrective steering of the wheel sets at a standstill is **prohibited!**
 - ▶ When the ballast trailer is ballasted, the corrective steering of the wheel sets is only permissible while driving!
 - ▶ Monitor the distortion of the tires!
-



Note

- ▶ Changing from the steering program „Towing“ into the steering program „Corrective steering“ and back is possible while driving the crawler!
 - ▶ If the steering program „Corrective steering“ is switched into the steering program „Towing operation“ then the indicator light **blinks** on the „Button“ **104** until the towing operation position of the wheel sets is achieved!
 - ▶ If one of the wheel sets deviates from the specified limit angle, the „Indicator light in the button“ **104** blinks and the wheel sets must be reset as described above!
 - ▶ **The following generally applies:** The wheel sets only move if either the button **103**, the button **102**, or the button **104** in the crane operator's cab, or the button **200** or the button **201** on the control panel is pressed in the respective steering program or if the crawler is driven!
-

6

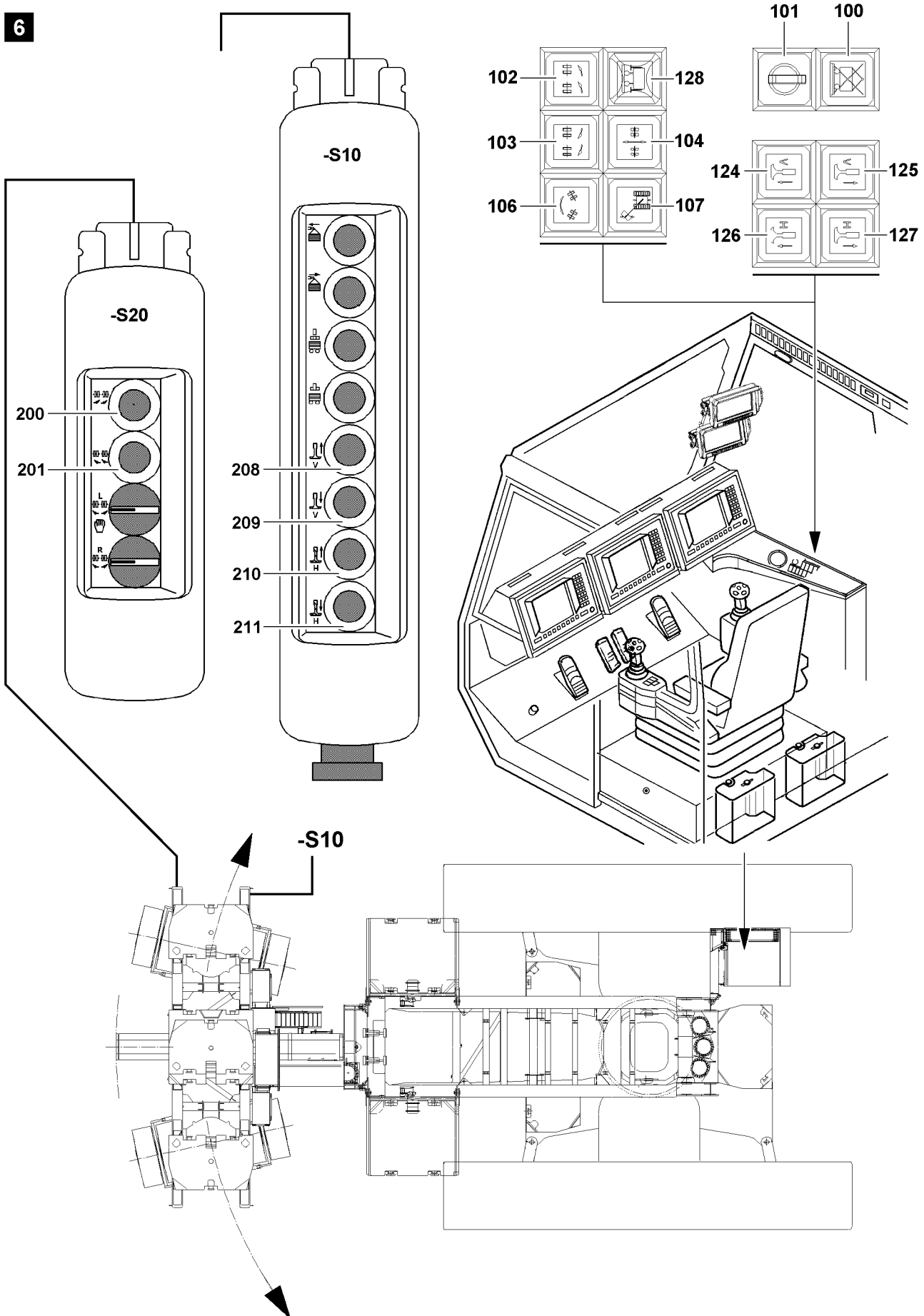


Fig.109219

LWE/LR 1750-000/12812-15-02/en

5.4 Circular driving

Make sure that the following prerequisite is met:

- The ballast trailer guide is telescoped out to the required derrick ballast radius.

5.4.1 Lifting the ballast trailer with the support cylinders

**Note**

- ▶ See section Towing operation!

5.4.2 Aligning wheel sets into circle driving position

Make sure that the following prerequisite is met:

- The ballast trailer is raised via the support cylinders to the point where the wheel sets are relieved.

- ▶ Press the button **106**.

Result:

- The ballast trail wheel sets are aligned in the circular driving position.
- During the turning procedure of the wheel sets, the indicator light in the button **106 blinks**.
- If the circular driving position is achieved, the indicator light in the button **106 lights up**.

**Note**

- ▶ If one of the wheel sets deviates from the specified limit angle, the indicator light in the button **106** blinks and the wheel sets must be reset as described above!

- ▶ Press the button **106** again.

5.4.3 Lowering the ballast trailer with the support cylinders

**Note**

- ▶ See section Towing operation!

**Note**

- ▶ The release for turning the turntable in the steering program „Circular driving“ is only made when both wheel sets are in turning position (circular driving) and the support cylinders are completely moved in!
- ▶ Check the settings for the wheel sets and support cylinders before inspecting turning of the turntable!

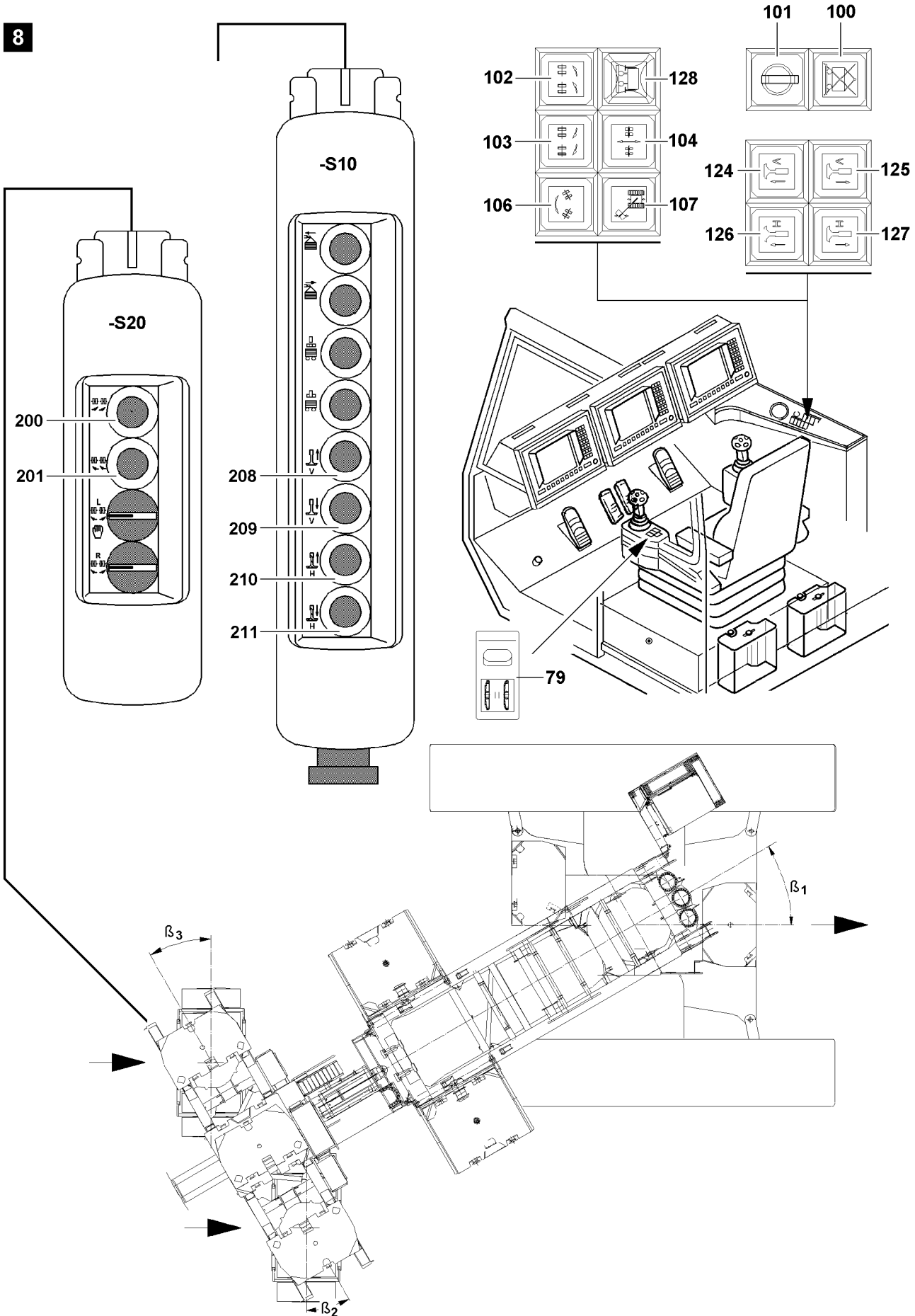


Fig.109220

LWE/LR 1750-000/12812-15-02/en

5.5 Parallel driving

NOTICE

Danger of damage to the crane and the ballast trailer!

Due to steering movements on the crawler tracks while driving parallel, the crane and the ballast trailer can be significantly damaged!

- ▶ For parallel driving, steering the crawler track is **prohibited!**
- ▶ For parallel driving, the side tire distortion on the wheel sets must be observed by an instructed person over the entire travel route of the crane. If the tires distort by more than 100 mm, then the position of the wheel sets must be corrected!



Note

- ▶ Independently of whether the ballast trailer stands on the ground or is lifted from the ground, the wheel sets must always stand in a „Parallel driving“ position!
- ▶ With deviated position for the wheel sets, steering switches itself off!
- ▶ For crane procedures in „Parallel driving“ the switch **79** is to be activated on the control panel left!



Note

- ▶ The travel drive of the crawler is locked until the wheel sets are in parallel position!
- ▶ During crawler drive, the slewing gear brake on the crane is engaged and the hydraulic concentric operational is opened!
- ▶ If the angle deviates β_2 and β_3 in relation to β_1 by more than the permissible limit angle, the crawler track is stopped, the indicator light in the button **107** flashes!
- ▶ Only through renewed alignment of the wheel sets on the required angle specified, the crawler track can be driven again!
- ▶ If the switch **79** „Crawler parallel driving“ is turned on, the crawler moves straight forward on appropriate terrain! This simplifies driving the crane with ballast trailer in the steering program „Parallel driving“!

5.5.1 Lifting the ballast trailer with the support cylinders



Note

- ▶ See section Towing operation!

8

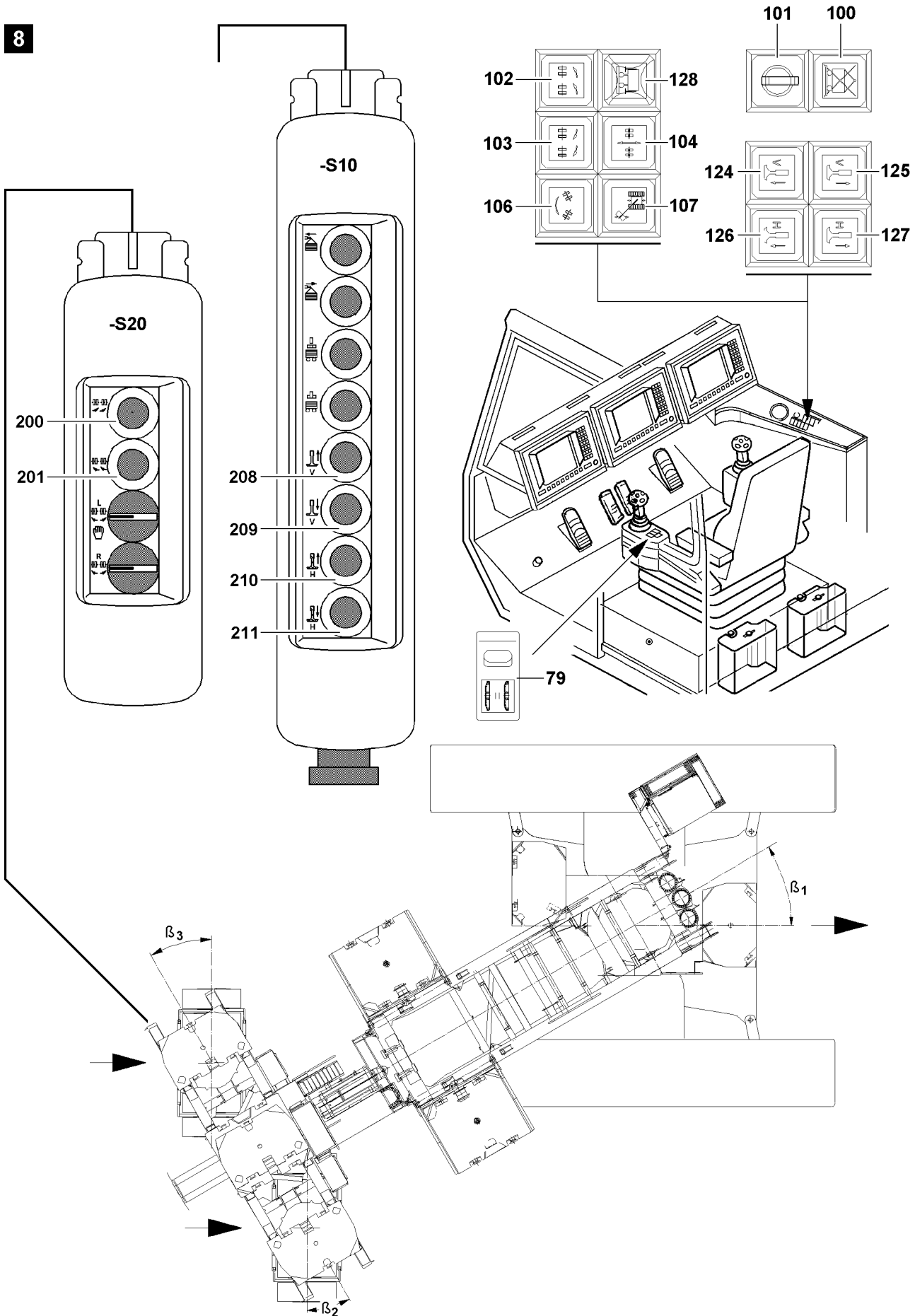


Fig.109220

LWE/LR 1750-000/12812-15-02/en

5.5.2 Align wheel sets into parallel driving position

Make sure that the following prerequisite is met:

- The ballast trailer is raised via the support cylinders to the point where the wheel sets are relieved.

▶ Press the button **107**.

Result:

- The ballast trailer wheel sets are aligned in the parallel driving position.
- During the turning procedure of the wheel sets, the indicator light in the button **107 blinks**.
- If the parallel travel position is achieved, the indicator light in the button **107 lights up**.



Note

- ▶ If one of the wheel sets deviates from the specified limit angle, the indicator light in the button **107** blinks and the wheel sets must be reset as described above!

▶ Check the parallel position of the wheel sets.

5.5.3 Lowering the ballast trailer with the support cylinders



Note

- ▶ See section Towing operation!
-

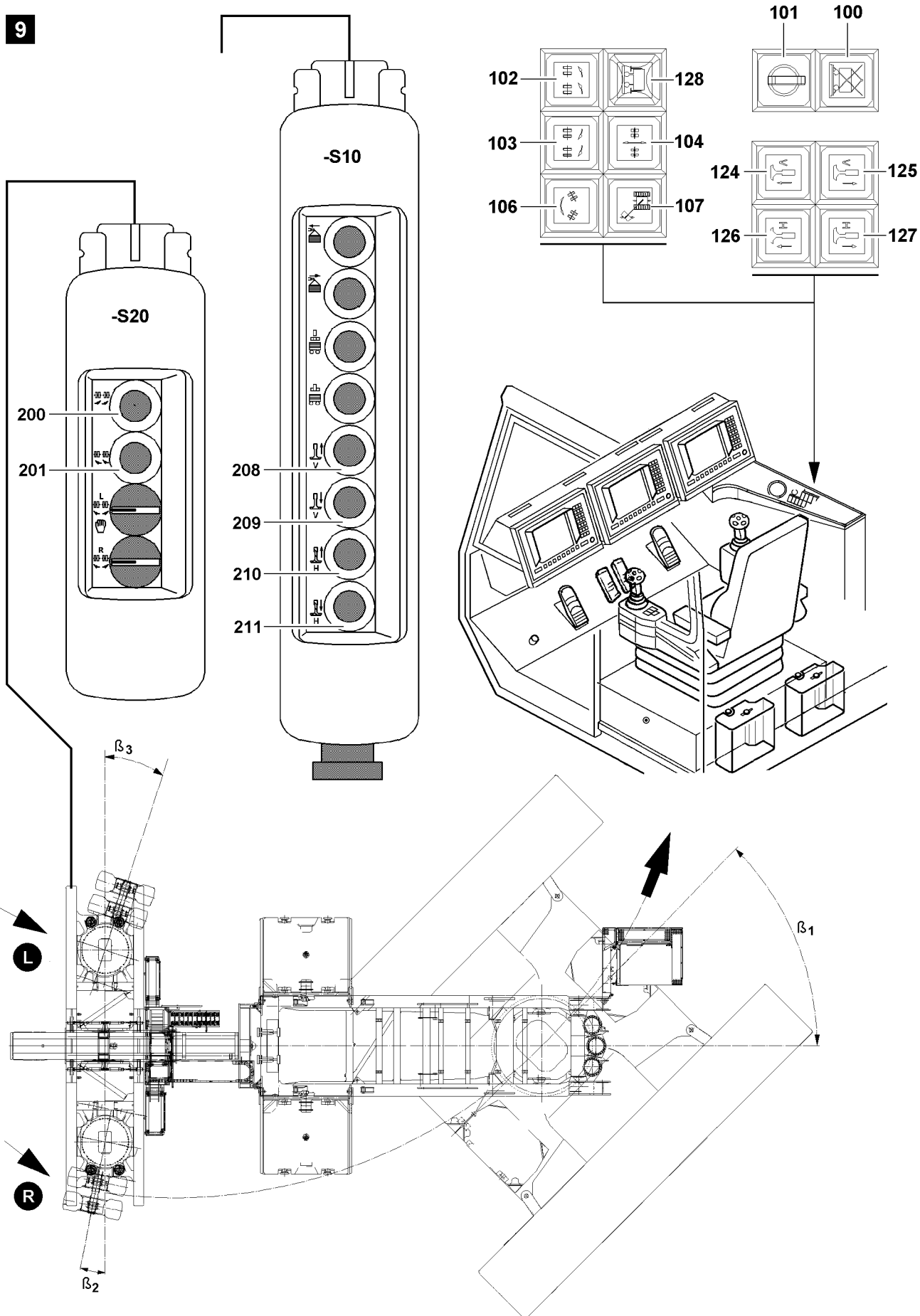


Fig.109221

LWE/LR 1750-000/12812-15-02/en

5.6 Corrective steering

Make sure that the following prerequisite is met:

- Crawler operation is turned on.

5.6.1 Steering and corrective steering of the wheel sets

Make sure that the following prerequisites are met:

- The steering program „Towing“ is selected **and** the wheel sets are found in towing position.
- The indicator light in the button **104** lights up.

Turn wheel sets to the right:

- ▶ Press the button **103** in the crane operator's cab.
or
Press the button **200** on the control panel **-S20**.

Turn wheel sets to the left:

- ▶ Press the button **102** in the crane operator's cab.
or
Press the button **201** on the control panel **-S20**.

The right wheels set is regulated by the computer controlled steering program in such a way that a steering center is always present. The angle β_1 is determined by the travel of the crawler and the angle β_3 is determined by the steering of the operator, whereby the angle β_2 is continually corrected. Switching from the steering program „Corrective steering“ into the steering program „Towing“ and back, after achieving the towing position, is possible while driving the crawler! If the steering program „Corrective steering“ is selected from the steering program „Towing“ the indicator light in the button **103** and the indicator light in the button **102** lights up.



Note

- ▶ The left wheel set can be steered to the specified limit angle β_3 . It is not possible to steer beyond this limit angle!
- ▶ The right wheel set is reregulated according to the steering center. If the right wheel set (corrective steering) cannot follow the left wheel set, the left wheel set is halted until the right wheel set (corrective steering) has caught up!
- ▶ If the right wheel set still deviates from the specified limit angle, the indicator light in the button **103** and the indicator light in the button **102** blinks and you must begin again with „Towing“!
- ▶ If the crawler is driven and exceeds the angle β_1 , the turntable automatically switches the specified value into the steering program „Towing“. The indicator light in the button **103**, the indicator light in the button **102** and the indicator light in the button **104** blinks!
- ▶ When the towing position is reached, manual corrective steering can continue. The indicator light in the button **104** lights up!
- ▶ **The following generally applies:** The wheel sets only move during corrective steering if either the button **103** or the button **102** from the crane operator's cab, **or** the button **200** or the button **201** on the control panel is pressed in the respective steering program or if the crawler is driven!

- ▶ Check the settings.

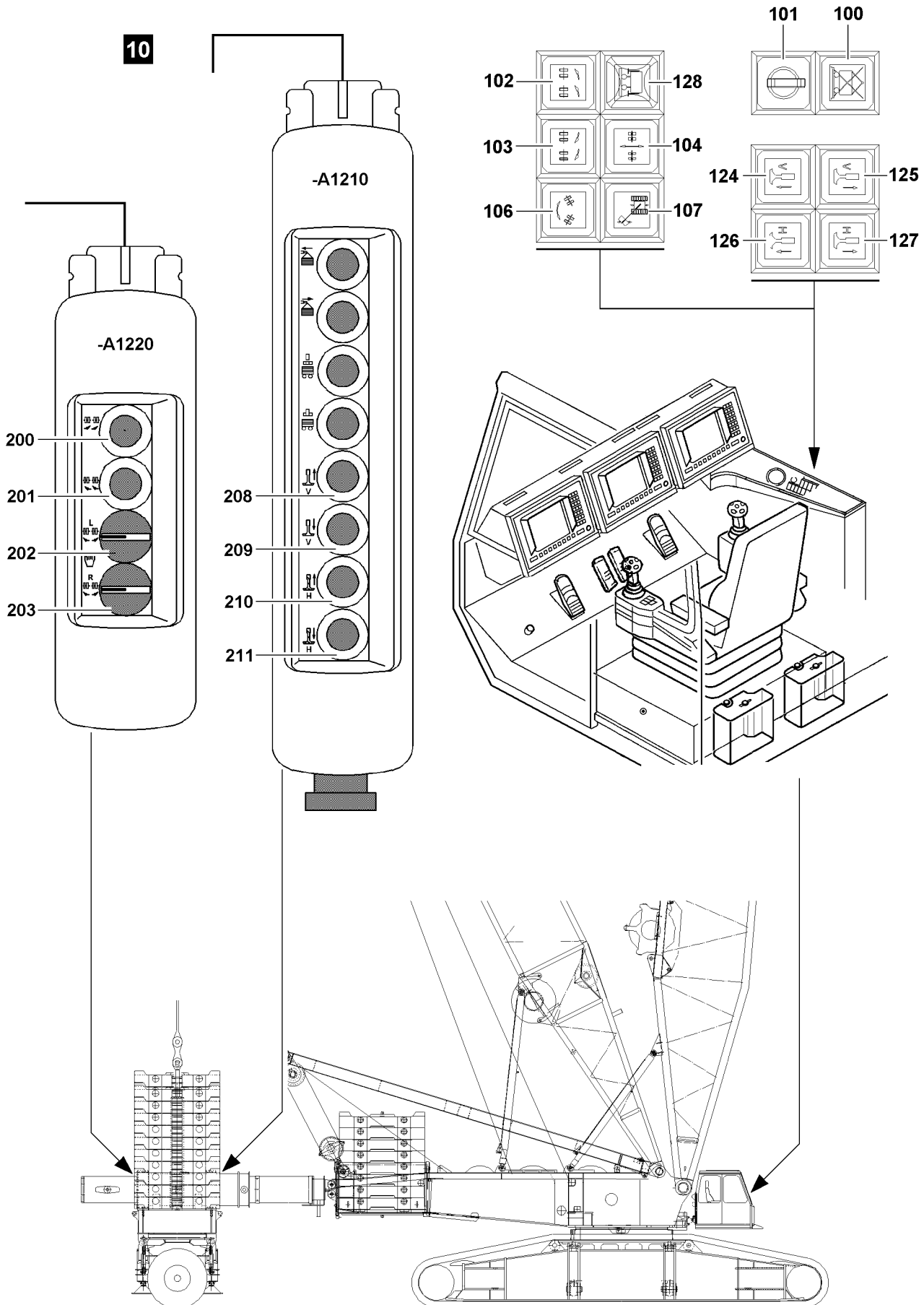


Fig.109222

LWE/LR 1750-000/12812-15-02/en

5.7 Manual operation for assembly

The ballast trailer is equipped with a program which allows for each wheel set to be turned individually at assembly.

5.7.1 Lifting the ballast trailer with the support cylinders

**Note**

▶ See section Towing operation!

5.7.2 Setting the wheel sets

For setting the wheel sets, the rotary switch on the control panel **-S20** is to be activated.

▶ Turn rotary switch **202** to the right.

Result:

– Turn left wheel set to right.

▶ Turn rotary switch **202** to the left.

Result:

– Turn left wheel set to the left.

▶ Turn rotary switch **203** to the right.

Result:

– Turn right wheel set to right.

▶ Turn rotary switch **203** to the left.

Result:

– Turn right wheel set to the left.

5.7.3 Lowering the ballast trailer with the support cylinders

**Note**

▶ See section Towing operation!

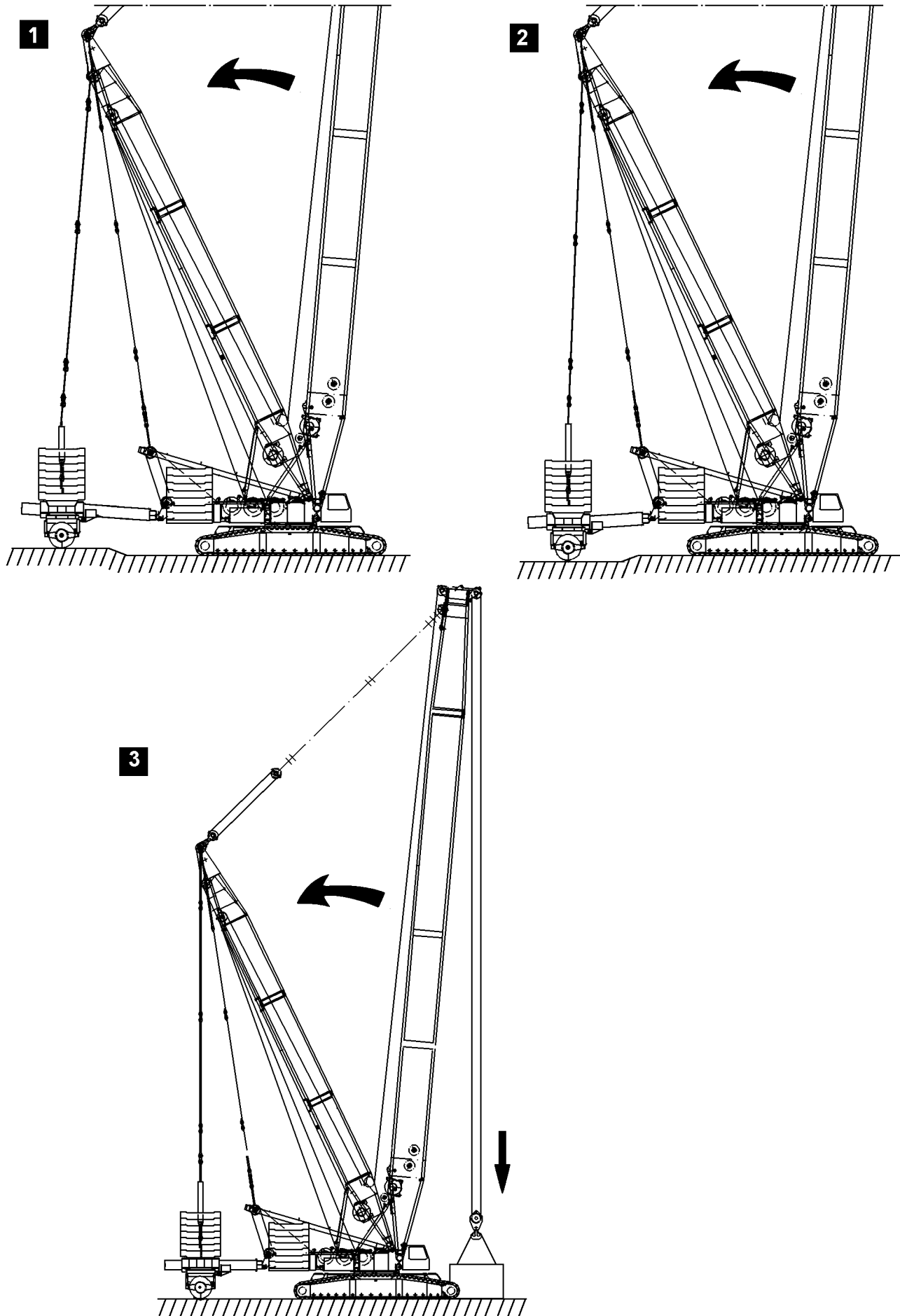


Fig.191997

LWE/LR 1750-000/12812-15-02/en

6 Driving with the ballast trailer

6.1 Driving



Note

- ▶ It is only permitted to drive the ballast trailer on level ground capable of supporting the load!
- ▶ Driving over obstacles is not permitted!



DANGER

The crane can topple over!

In case of non-permissible level difference between the ballast trailer travel route and the crane position level, the entire crane system can be pulled back suddenly!

The relapse cylinders can thereby run into the mechanical block position be significantly damaged!

The crane can topple over and personnel can be severely injured or killed!

- ▶ Do not exceed or fall below the permissible level difference between the ballast trailer travel path and the crane placement level!

6.1.1 Pressure monitoring in extension cylinder

Due to the propelling force of the crawler gear during forward and backward travel, the extension cylinder in the ballast trailer guide can be overloaded in the pull and push direction if the ballast trailer drives over uneven ground or slopes.



Note

- ▶ If the maximum permissible pressure in the extension cylinder is exceeded, a bell will sound and an error message appears!
- ▶ There is **no** shut off!

NOTICE

Piston rod on block!

If the piston rod of the extension cylinder is already on block through telescoping out or in of the ballast trailer guide, no pressure monitoring occurs!

The extension cylinder can be significantly damaged!

- ▶ It is prohibited to move the piston rod in or out up to the block position!

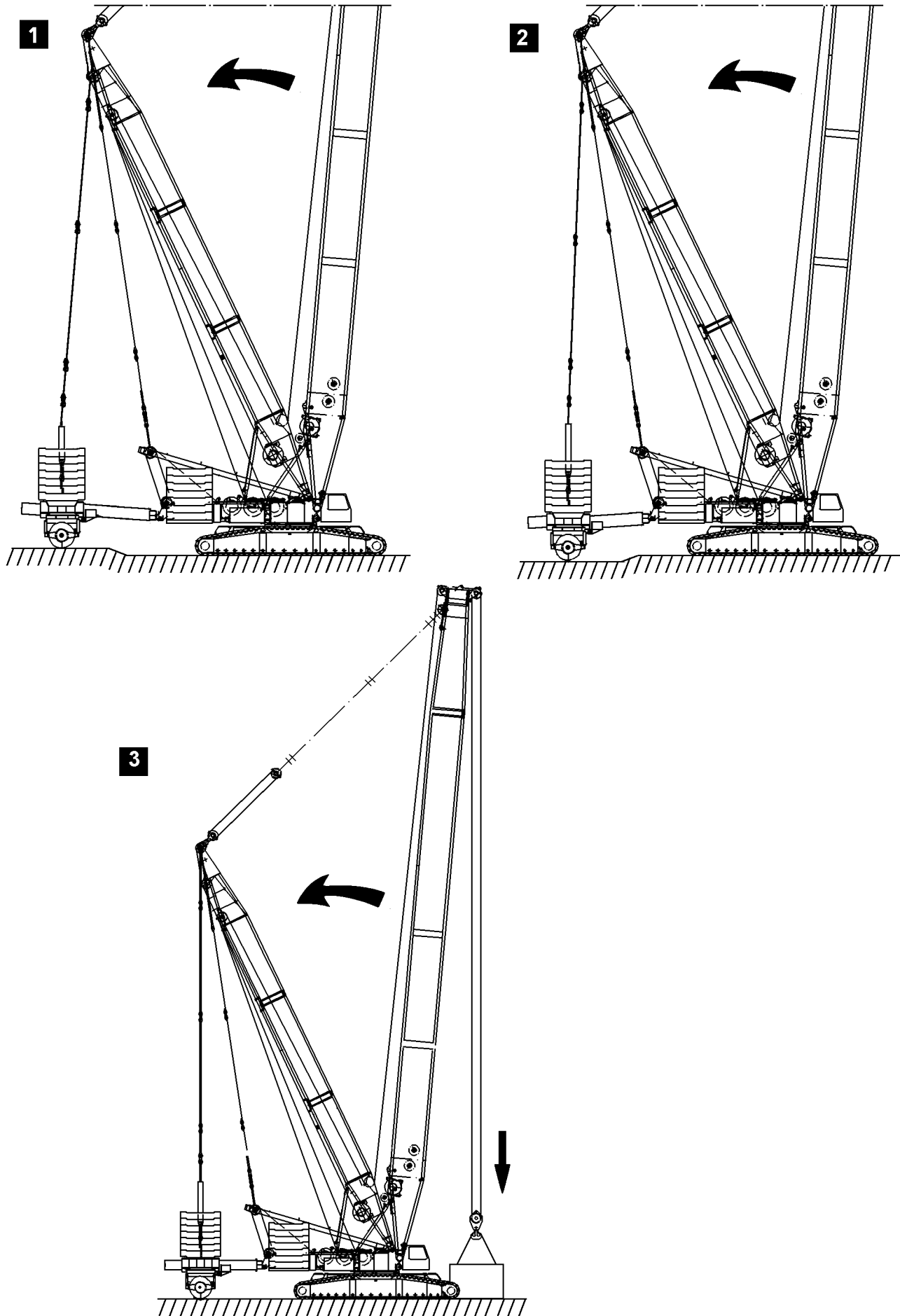


Fig.191997

LWE/LR 1750-000/12812-15-02/en

6.2 Safety guidelines for travel operation

6.2.1 Relapse cylinder

When the steepest operating position of the main boom is reached, luffing up is turned off by the LIC-CON overload protection in all operating modes.



Note

- ▶ However, there are cases when the relapse cylinders move mechanically to stop position, due to a movement of the entire crane system to the rear!

6.2.2 Block position relapse cylinders

NOTICE

Danger of damages to the relapse cylinder and the boom!

Through level difference between the ballast trailer and crane route, the boom can suddenly be pulled backward and the relapse cylinder can go into the block position!

The relapse cylinder or the boom can be damaged!

- ▶ Make sure before taking up the driving mode, or before turning the crane superstructure, that the crane driving track or the ballast trailer circular path is even and capable of supporting the load!

In normal crane operation without bypass of the LICCON overload protection, a block position is not possible. Should a block position still occur, the movement is turned off and the boom limitation symbol shown on the operating screen indicates which block position has been started up.

With this boom limitation icon it is to be determined which limit switch on which relapse cylinder has been actuated. Reverse the last movement which was carried out until the corresponding limit switch is released again.

6.2.3 Case 1



Note

- ▶ Refer to illustration 1!

When driving or turning the crane with steeply positioned boom, the ballast trailer can be lowered, due to the level differences. This causes the whole boom system to be pulled backward and there is a risk of reaching the block position in the relapse cylinders. The same risk applies when turning if the ballast trailer sinks due to level differences.



Note

- ▶ By the signals „Main boom relapse cylinder on block“ or „Derrick relapse cylinder on block“ the drive and turn movements of the „Crawler driving“ and „Turning“ are automatically turned off!

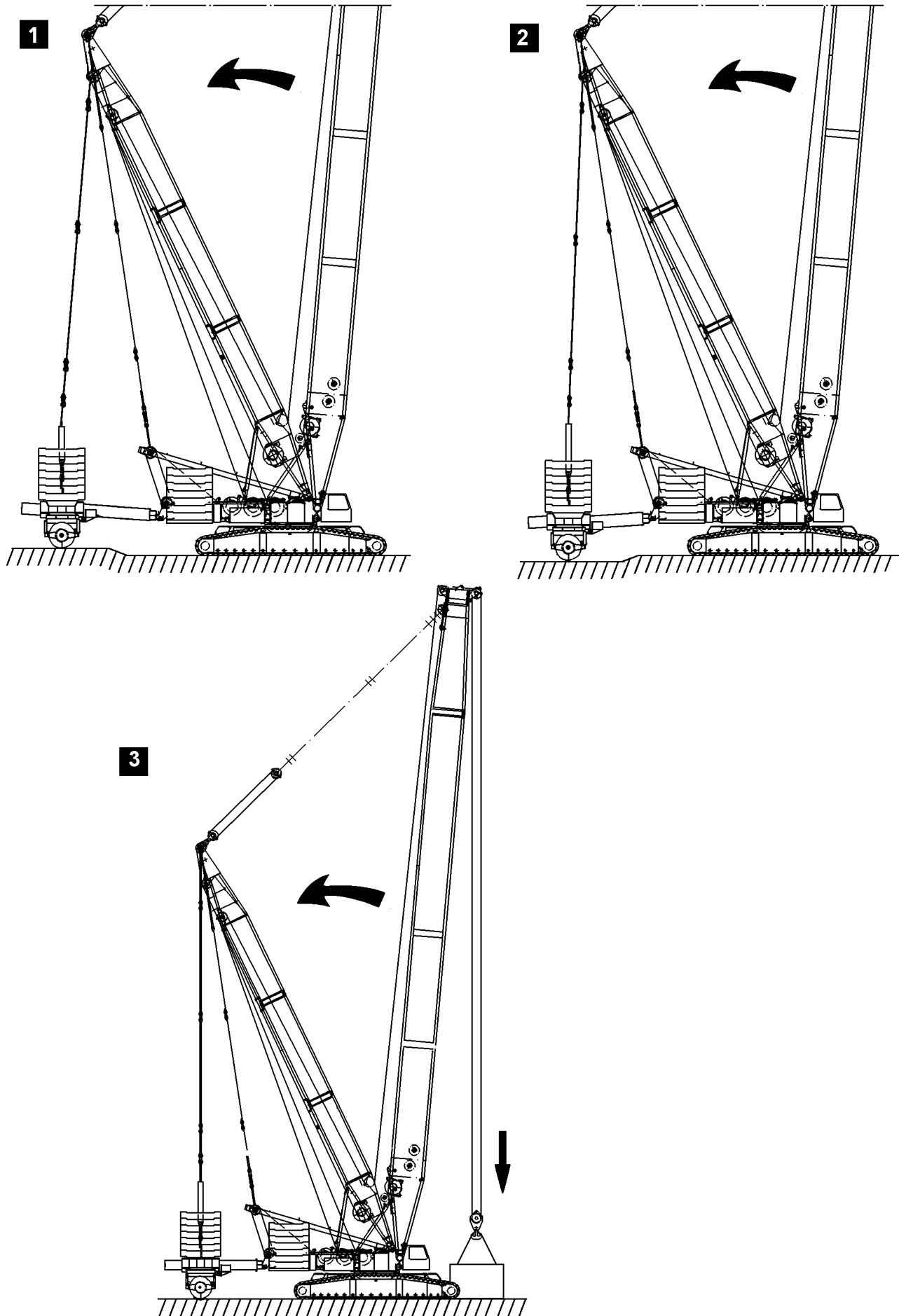


Fig.191997

LWE/LR 1750-000/12812-15-02/en

6.2.4 Case 2



Note

- ▶ Refer to illustration 2!

If the level under the crane increases, the boom system is also pulled back. There is a risk that the relapse cylinders reach the block position.



Note

- ▶ Due to the signals „Main boom relapse cylinder on block“ or „Derrick relapse cylinder on block“, the drive and turn movements of the crawler are automatically tuned off in operation with the ballast trailer!

6.2.5 Case 3



Note

- ▶ Refer to illustration 3!

When the load is set down with the hoist gear, the crane is relieved. This causes the booms to move backward, refer to section „Monitoring lowest force F1“.

6.3 Maximum permissible ground unevenness



WARNING

The crane can topple over!

By exceeding the maximum permissible value for ground unevenness while driving the crane, the crane can topple!

Personnel can be severely injured or killed!

- ▶ The permissible ground unevenness may not be exceeded!

Level change between placement surface of the crane and the ballast trailer during towing, parallel and circular driving may not exceed a maximum permissible value.



Note

- ▶ The level difference of the ballast trailer route in relation to the crane route during **towing** and **parallel driving** may be no more than maximum ± 250 mm !
- ▶ The level difference of the ballast trailer route in relation to the crane route during **circular driving** may be no more than maximum ± 250 mm - with a constant uphill or downhill slope over a 90° slewing range!

6.3.1 Compensate for ground unevenness

The maximum permissible ground unevenness can be compensated with the pull cylinders by lifting or sinking the ballast trailer.



Note

- ▶ The pull cylinders are operated from the crane operator's cab!

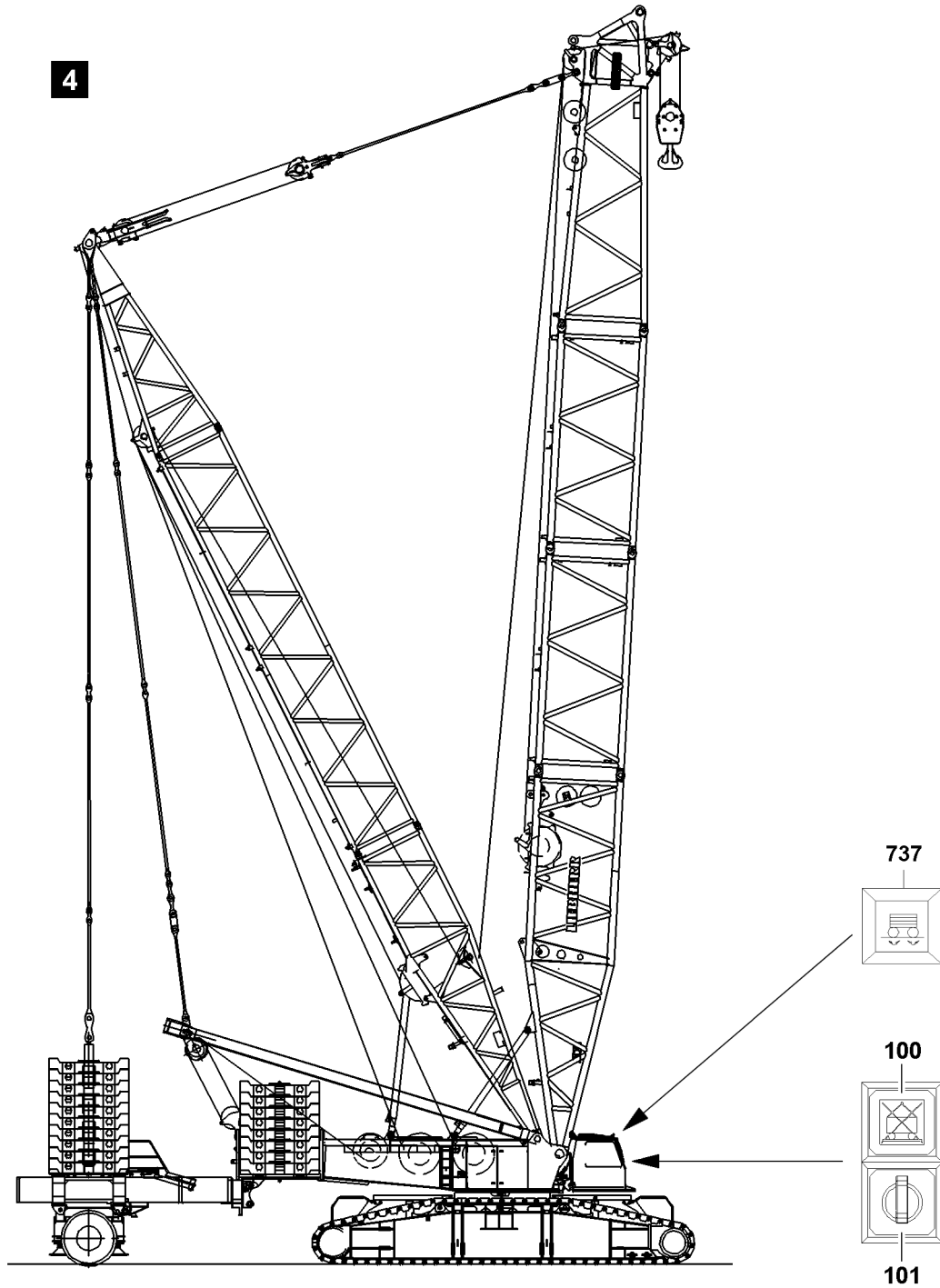


Fig.109223

LWE/LR 1750-000/12812-15-02/en

6.4 Key button „Ballast trailer lifted off“

When „Crawler driving“ and key button **101** is not operated, i.e. „Ballast trailer not lifted off“, the slewing gear brake and hydraulic concentric running of the slewing gear are opened. For „Drive crawler“ with **lifted off ballast trailer** (constant visual check), the key button **101** „Ballast trailer lifted off“ must be turned on.



DANGER

Risk of accident

If the ballast trailer is lifted from the ground during crawler driving in the steering program „Towing“, there exists the danger that the wind turns the turntable to the side during „Crawler driving“!

- ▶ After lifting the ballast trailer, the key button **101** „Ballast trailer lifted off“ must be switched on, so that the „Crawler driving“ the slewing gear brake remains closed, however the hydraulic concentric running remains open!
- ▶ If, when „Driving the crawler“, the ballast trailer scrapes on the ground or gets stuck on the ground, so that the turntable twists with the ballast trailer against the crawler track, the slewing brake can slip. The slewing gear will not be damaged!
- ▶ However, if the wheel sets of the ballast trailer are not aligned in „Towing position“, the ballast trailer or the crane will be damaged!



Note

- ▶ When the function „Ballast trailer lifted off“ is turned on, the warning light in the button **100** blinks, it is possible to turn the turntable or to drive the crane even though the wheel sets of the ballast trailer are not set on „Circular driving“, „Towing“ or „Parallel driving“.

„Ballast trailer lifted off“ switched on:

- ▶ Press key button **101** „Ballast trailer lifted off“.

Result:

- The warning light in the button **100** blinks.
- The ballast trailer icon on LICCON monitor 1 is represented „Suspended“.

„Ballast trailer lifted off“ switched off:

- ▶ Press the button **100**.

Result:

- The warning light in the button **100** turns off.
- The ballast trailer icon on LICCON monitor 1 is represented „On the ground“ (placed down).

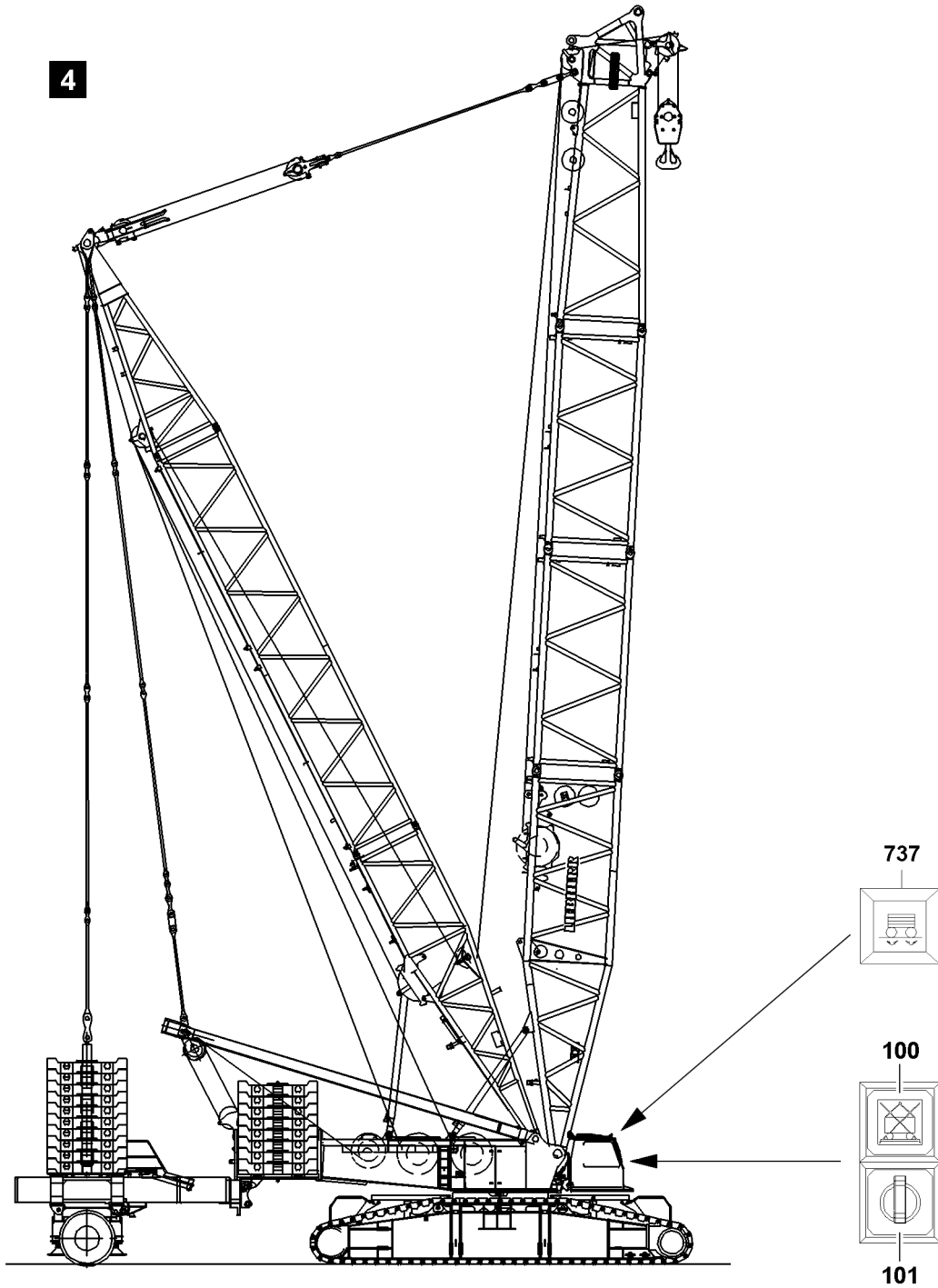


Fig.109223

LWE/LR 1750-000/12812-15-02/en

6.5 Defined ballast trailer operation



DANGER

Risk of accident!

If the ballast trailer is operated in an undefined condition, it can result in severe accidents up to toppling of the crane!

Personnel can be severely injured or killed!

- ▶ The ballast trailer must always be in a defined condition!
- ▶ Operation of the ballast trailer in an undefined state is prohibited!

The ballast trailer may not be raised or set down when driving, rather this be done **before** driving off.

6.5.1 Ballast trailer lifted off

„Ballast trailer defined lifted from the ground“ means:

The ballast trailer is lifted from the ground and the key button **101** „Ballast trailer lifted off“ is pressed. Thereby, the slewing brake does **not** open during „Crawler driving“ and the wind can during „Crawler driving“, the turntable does not turn.

Make sure that the following prerequisites are met:

- The ballast trailer has been lifted off the ground.
- The key button **101** is pressed.
- The warning light in the button **100** flashes.

6.5.2 Ballast trailer on the ground

„Ballast trailer defined lifted on the ground“ means:

That the ballast trailer and its residual load are resting on the ballast trailer tires and the key button **101** is **not** pressed. This residual load is large enough to prevent the wind from turning the turntable, if the slewing brake is open during operation of „Crawler driving“.

Make sure that the following prerequisites are met:

- The ballast trailer is found with a residual load on the ground.
- The key button **101** is **not** pressed.
- The warning light in the button **100** does **not** flash.

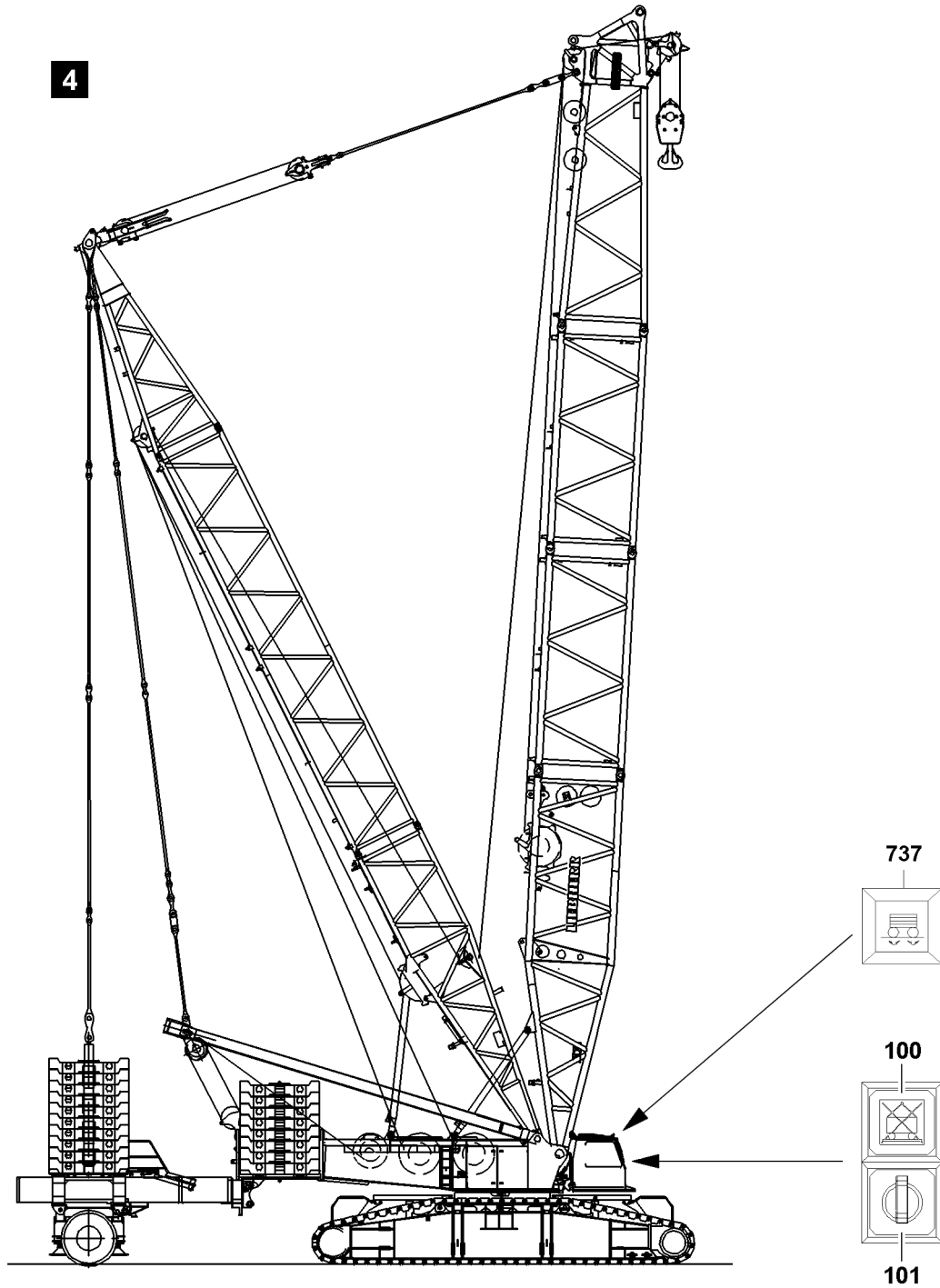


Fig.109223

LWE/LR 1750-000/12812-15-02/en

6.6 Non-defined ballast trailer operation



DANGER

Risk of accident!

If the ballast trailer is operated in an undefined condition, it can result in severe accidents up to toppling of the crane!

Personnel can be severely injured or killed!

- ▶ The ballast trailer must always be in a defined condition!
- ▶ Operation of the ballast trailer in an undefined state is prohibited!

6.6.1 Ballast trailer lifted off



Note

- ▶ Only operate ballast trailer in a defined condition!

„Ballast trailer undefined lifted from the ground“ means:

That the ballast trailer with a residual load of approx 1 t lies on the ballast trailer tires and the key button **101** is pressed. As a result, the slewing brake does **not** open when cornering the „Crawler“ and the ballast trailer tires or the slewing brake slip.

6.6.2 Ballast trailer on the ground



Note

- ▶ Only operate ballast trailer in a defined condition!



DANGER

Swinging load!

Personnel can be killed or severely injured by swinging loads!

- ▶ Operation of the ballast trailer in an undefined state is prohibited!

„Ballast trailer undefined on the ground“ means: That the ballast trailer with a residual load of approx. 1 t lies on the ballast trailer tires and the key button **101** is **not** pressed. This residual load is so small that the wind can turn the turntable, if the slewing brake opens when actuating „Drive crawler“.

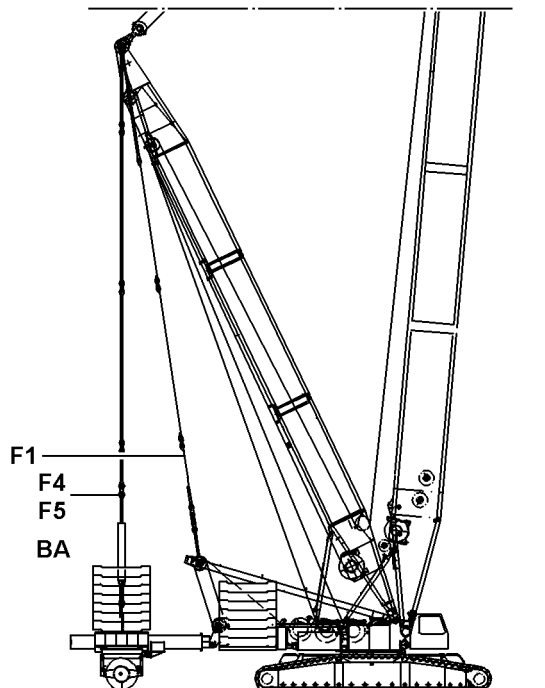
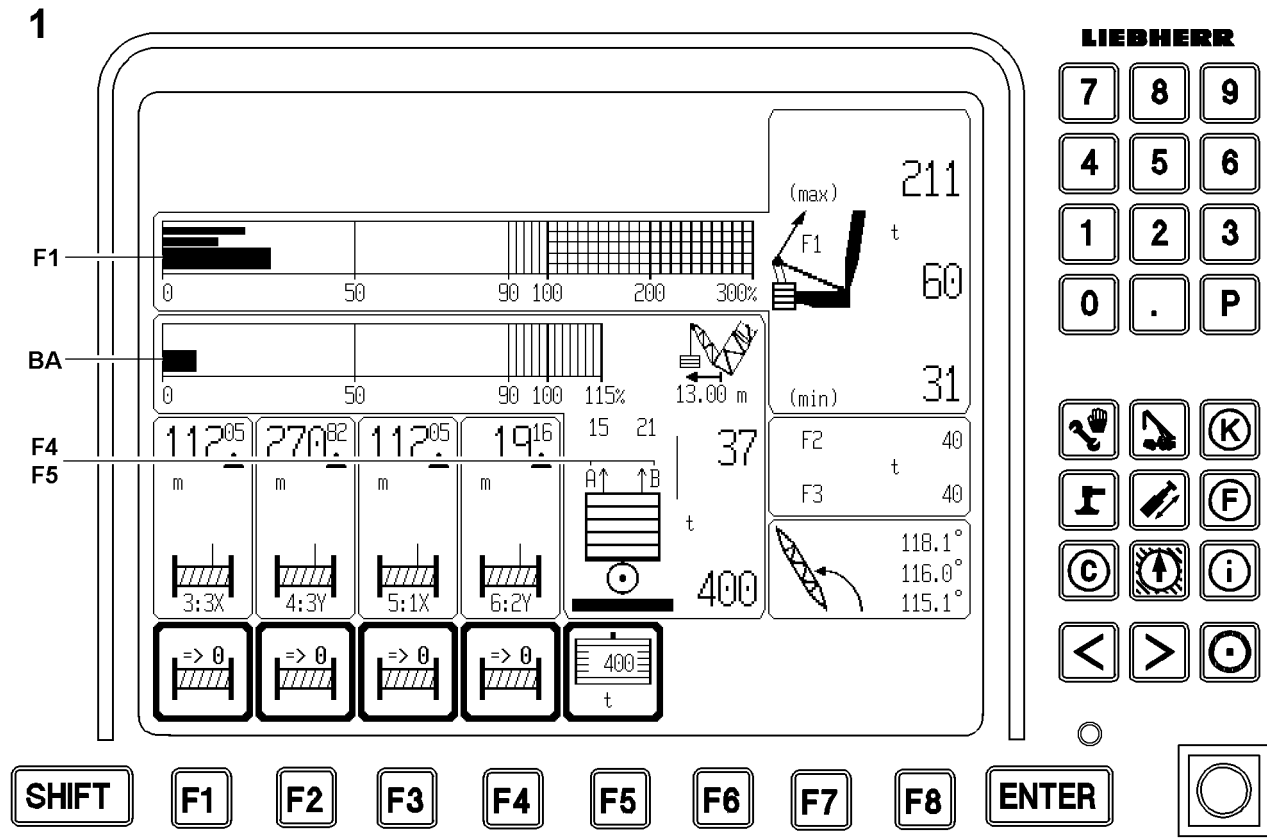


Fig.109224

LWE/LR 1750-000/12812-15-02/en

7 Crane operation with derrick ballast

7.1 Safety guidelines



Note

- ▶ The test points must be checked for function before taking on crane operation!
- ▶ The weight of the load to be lifted must be known!
- ▶ The placement level of the ballast trailer may be no more than maximum 250 mm above or 250 mm below the placement level of the crane!
- ▶ There may be no obstacles within the slewing range of the crane, the suspended derrick ballast and the load!
- ▶ The lift off of the derrick ballast must be monitored by the crane operator or a guide!
- ▶ Before setting down the load and the suspended derrick ballast, the crane operator must make sure that a safe placement is ensured!
- ▶ The level of the ballast trailer, at the end of the load lift, must be level, horizontal and have sufficient load bearing capacity to safely take on the weight of the ballast trailer!



DANGER

Danger of accidents due to diagonal pull!

The crane can topple over by angular pulling of the load!

Personnel can be severely injured or killed!

- ▶ Angular pull is prohibited!
- ▶ When taking up the load, it must be ensured that the derrick ballast, the center of rotation of the turntable and the load are in one line!

When lifting the load, the guying between the derrick ballast and derrick end section must be relieved to the point where the actual force $F1$ ($F1_{\text{actual}}$) is larger than the $F1$ minimum force ($F1_{\text{min}}$).



DANGER

Risk of accident!

If the guying between the SA-bracket and the derrick end section is without force ($F1_{\text{min}}$ is fallen below), then this can lead to uncontrolled movements of the boom system and cause the crane to topple over!

- ▶ The guying between the SA bracket and the derrick end section, test point 1 **F1**, may never be without power!
- ▶ The $F1$ -minimum force ($F1_{\text{min}}$) may not be fallen below!

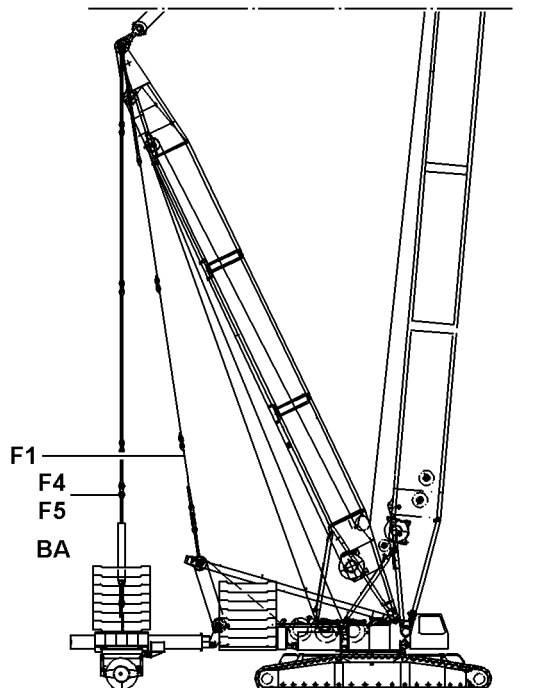
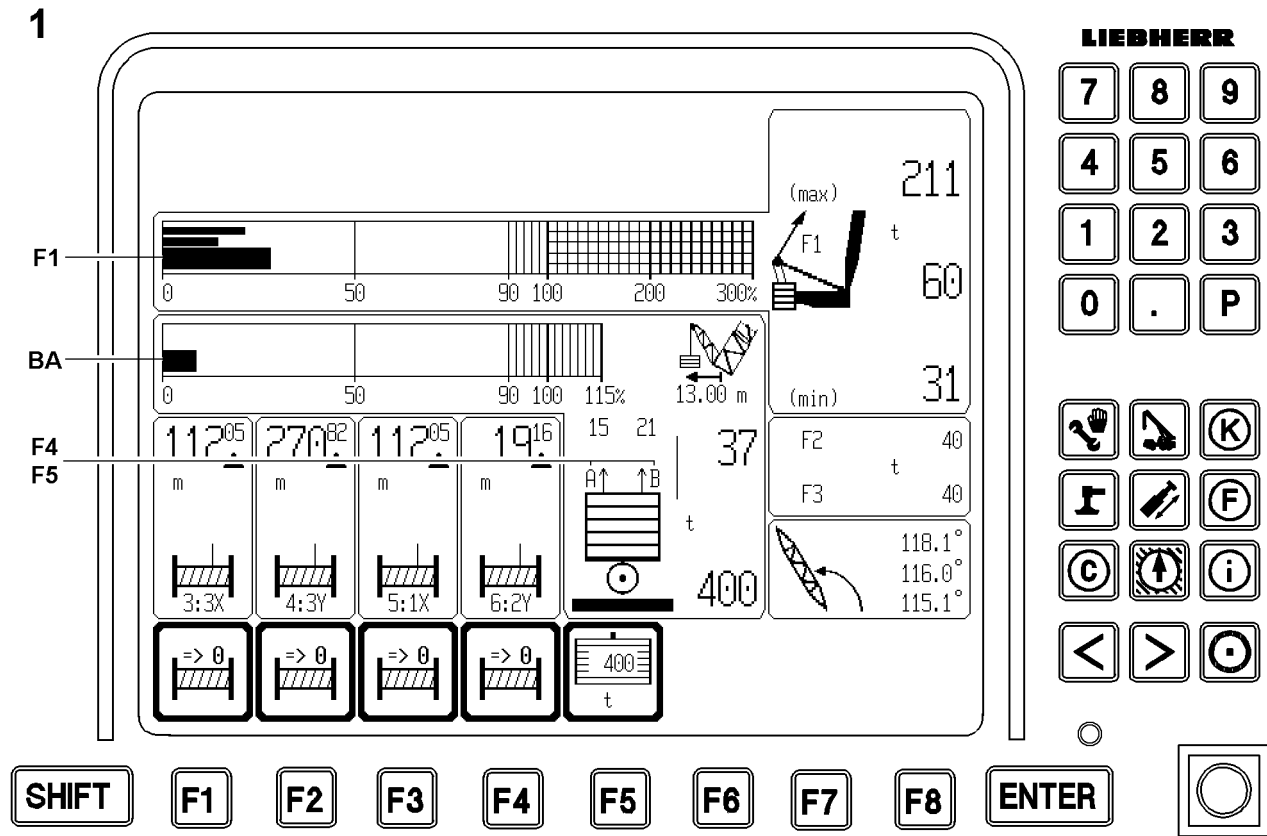


Fig.109224

LWE/LR 1750-000/12812-15-02/en

7.2 LICCON overload protection

On cranes with derrick ballast, during operation also under load, by increasing or reducing the derrick ballast, the maximum load or the minimum load required for the balance of the crane, can be increased or decreased.



Note

- ▶ The suspended ballast and the ballast trailer are generally described as **derrick ballast!**
- ▶ The fixed compensation weight which is assembled on the turntable is generally described as the **counterweight!**

Make sure that the following prerequisites are met:

- The required derrick ballast according the load chart is placed and exactly entered and confirmed in the LICCON overload protection.
- The D-boom is in crane operating position.

7.2.1 Presettings

- ▶ Adjust the LICCON overload protection according to the data in the load chart and confirm.



Note

- ▶ Enter the actually present derrick ballast weight in the LICCON overload protection!
- ▶ Enter the actually present reeving in the LICCON overload protection!
- ▶ Enter the derrick ballast weight and derrick ballast radius into the LICCON overload protection, see Crane operating instructions, chapter 4.02 and chapter 4.03!



DANGER

Danger of accident due to set-up parameters!

Dangerous operational situations can occur due to an incorrect ballast entry!

Personnel can be severely injured or killed!

- ▶ The set derrick ballast value must correspond to the actual derrick ballast weight added!
- ▶ All settings carried out in the „Configuration“ program, must agree with the actual settings on the crane!
- ▶ Checking the settings!

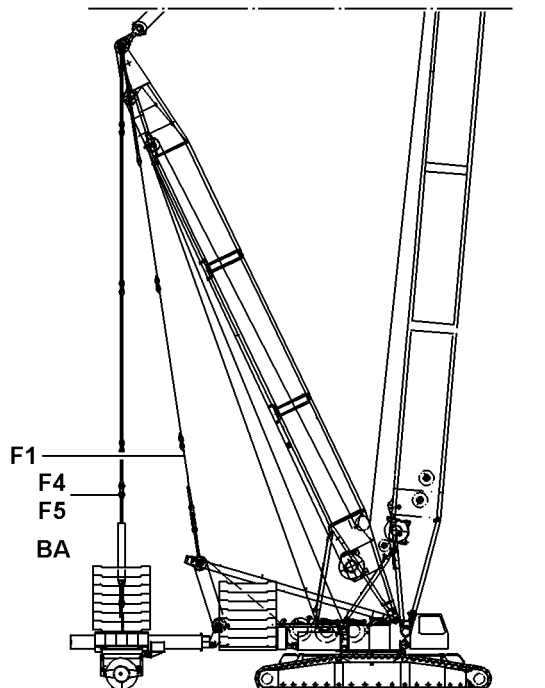
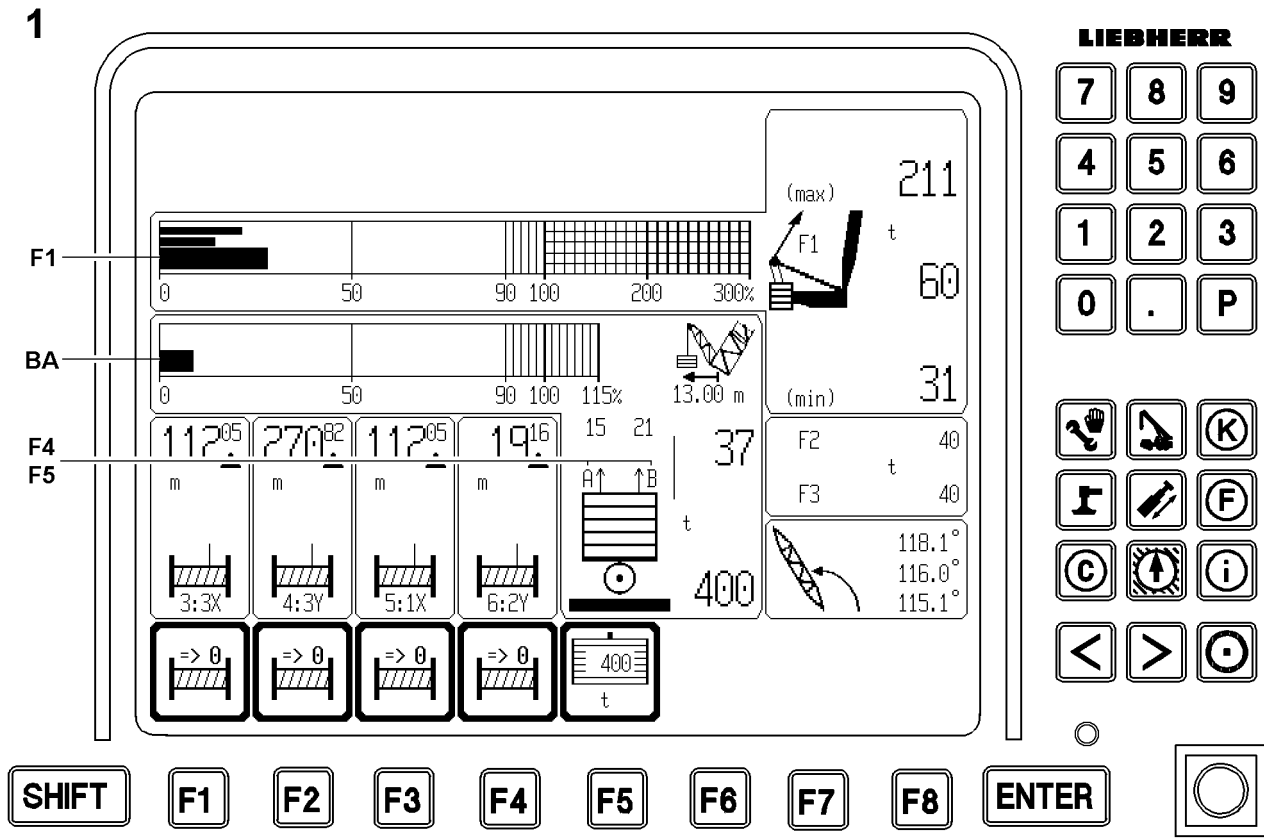


Fig.109224

LWE/LR 1750-000/12812-15-02/en

7.2.2 Crane operation



Note

- ▶ For crane operation with derrick ballast, the data must be observed and adhered to, see Crane operating instructions, chapter 4.02!
-



WARNING

Danger of toppling the crane!

The jerky execution / braking of turning maneuvers can cause the load or suspended derrick ballast to swing!

This can cause the boom to break off or the crane to topple over!

Personnel can be severely injured or killed!

- ▶ There may be no persons or obstacles within the slewing range of the derrick ballast!
 - ▶ During the turning, a guide must watch the main boom, D-boom and derrick ballast for a danger of collision!
 - ▶ When turning with a load and suspended derrick ballast, the turning movement must be initiated or slowed down extremely carefully!
-



Note

- ▶ For crane operation, observe the section „Lifting and lowering the ballast trailer with pull cylinders“ and „Difference force monitoring of the ballast guying“!
-

- ▶ Observe the move out condition of the pull cylinder and the inclination of the ballast trailer.

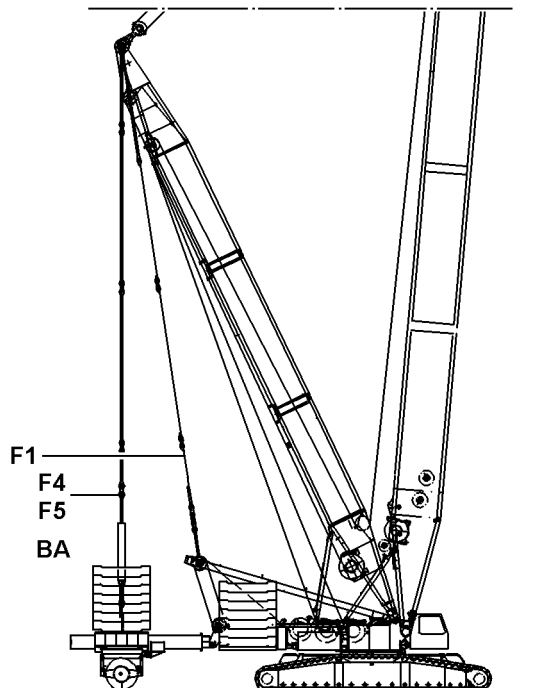
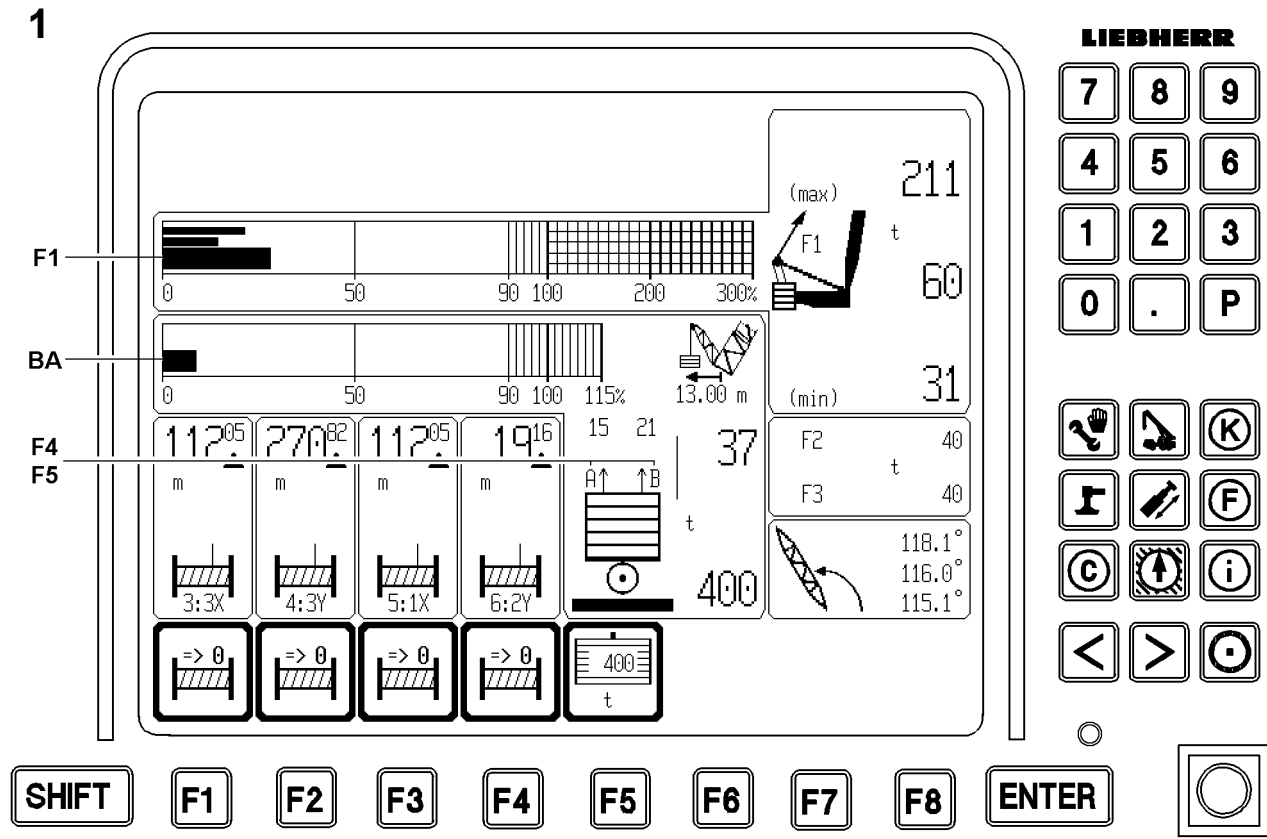


Fig.109224

LWE/LR 1750-000/12812-15-02/en

7.3 Determination of forces in operating mode with derrick ballast

In all operating modes with derrick ballast, the load is divided between the guy rods from the derrick head to the SA-bracket (F1) and the derrick ballast (F4/5).



Note

▶ See Crane operating instructions, chapter 4.02!

7.3.1 Force F1 (test point 1) between guying SA-bracket - derrick end section

The force F1 (test point 1) is determined in the guy rods from the SA-bracket to the derrick head by 2 force test boxes and is shown on the LICCON monitor as total force of the guying.

From the „Operating force“ (F1) and the „Maximum operating force“ ($F1_{\text{max-operation}}$) results the F1-utilization. This is shown on the LICCON monitor on the utilization bar in percent.

7.3.2 Force F4/F5 (test point 4/5) guying derrick ballast - derrick end section

The forces F4/F5 (test point 4/5) are effective in the guy rods from the derrick ballast to the derrick head.

The existing forces in the guy rods (A = left and B = right) are calculated from the three pressure sensors, which are installed on the pull cylinders and shown in the LICCON monitor as individual forces.

The ballast being pulled is calculated from the forces in each guying, i.e. the proportion of ballast which is pulled up by the guying. The remaining part is on the ground. The derrick ballast utilization results from the pulled ballast and the placed ballast. This is shown on the LICCON monitor with a utilization bar (BA in %).

Pull cylinder on block



DANGER

The crane can topple over!

By completely moving one or both pull cylinders in (block position moved in), the pressure increases strongly on the ring surface of the pull cylinder and the weighing of the currently pulled derrick ballast is incorrectly calculated and displayed!

The LICCON overload protection therefore assumes that a larger derrick ballast is pulled than is actually the case, and calculates a too large carried load as a result!

An overload of the crane is recognized too late by the LICCON overload protection and the crane can topple!

Personnel can be severely injured or killed!

- ▶ If the pull cylinder are in block position „Moved in“, **crane operation is explicitly prohibited!**
- ▶ The forces in the derrick ballast guying A and B are to be carefully observed on LICCON monitor!
- ▶ Potentially encountered error reports are to be heeded!



WARNING

The LICCON overload safety device shuts off too early!

By moving one or two pull cylinder completely out (block position moved out), the LICCON overload protection calculates and insufficient load-bearing capacity!

Possible shut off by the LICCON overload protection takes place too early!

- ▶ If the pull cylinders are in block position „Moved out“, crane operation on the basis of reduced load-bearing capacity is not meaningful!

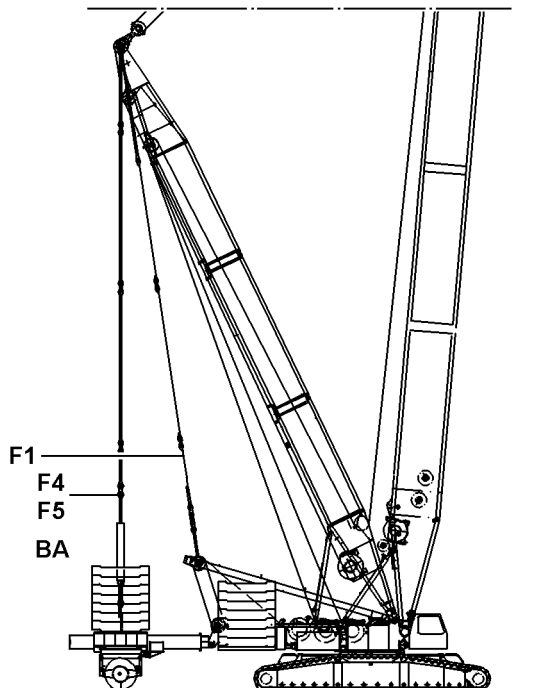
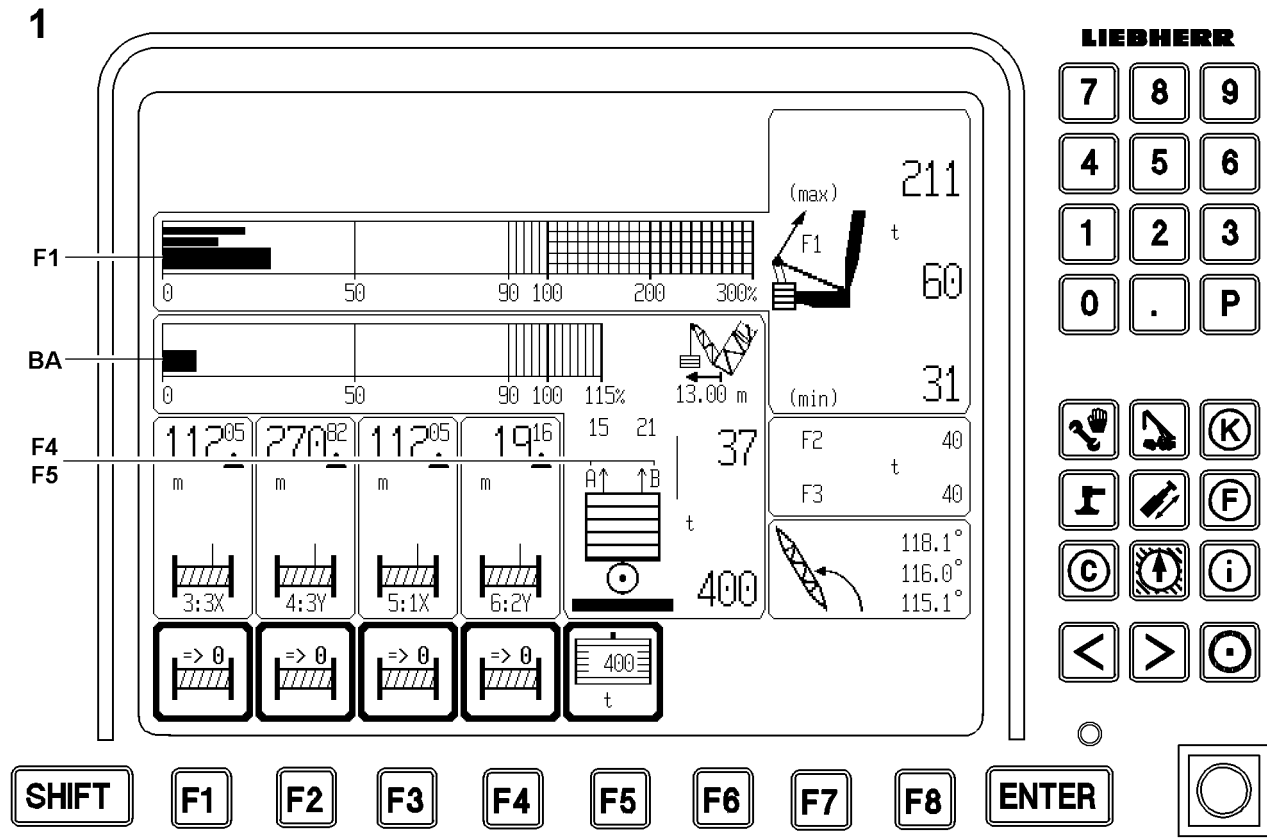


Fig.109224

LWE/LR 1750-000/12812-15-02/en

7.3.3 Monitoring of minimum force F1

If more than 50 % of the set derrick ballast is being pulled (ballast utilization bar > 50 %) and the force drops below the minimum value $F1_{\min}$ (test point 1) fall below, all crane **movements that increase load torque** switch off.



DANGER

Risk of accident!

It is prohibited to let the minimum force $F1_{\min}$ (test point 1) fall below if more than 50 % of the derrick ballast is pulled. If this is not observed, in case of force-free guying of test point 1 (F1) and **derrick ballast on the ground**, the derrick ballast can suddenly lift off the ground due to the increased load moment and the boom system can suddenly move forward! This will result in the load swinging violently and could damage the boom and cab!

- ▶ Do not fall below the minimum force - $F1_{\min}$!

If more than 90 % of the set derrick ballast is being pulled (ballast utilization bar greater than 90 %) and the force drops below the minimum value $F1_{\min}$ (test point 1) fall below, all crane **movements that increase load torque** and all **crane movements that decrease load torque** switch off. Thereby, the movement winch „spool out“ is switched off.



DANGER

Risk of accident!

It is prohibited to let the minimum force $F1_{\min}$ (test point 1) fall below if more than 90 % of the derrick ballast is pulled. If this is not observed and the guying on test point 1 (F1) is slack and the suspended derrick ballast is suddenly set down on the ground and the boom system suddenly moves back due to the reduction of the load moment of the derrick ballast! Thereby the relapse cylinders can be pressed on block and be overloaded. The relapse cylinders on the boom and D-boom may become damaged! This will result in the load swinging violently and could damage the boom and cab!

- ▶ Do not fall below the minimum force - $F1_{\min}$!



Note

- ▶ By actuating the assembly key button, the test point 1 - minimum force ($F1_{\min}$) is reduced by several tons, this allows one to reverse the manoeuvre and retreat from the situation in which the $F1_{\min}$ shut off occurred.
- ▶ This is the only exception on the crane, where, after a shut off, a load moment increasing movement may be continued with the assembly key button!



DANGER

Risk of accident!

If the LICCON overload protection is bypassed, there is no further protection against crane overload! There is an increased danger of accidents!

Personnel can be severely injured or killed!

- ▶ The crane operator carries complete and sole responsibility for its handling upon bypass of LICCON overload protection!

After a shut off via $F1_{\min}$ the force F1 on the test point 1 must be increased through a movement. If the derrick ballast is suspended, this can be achieved by setting down the ballast.

If the assembly key button is already pressed and the F1 force under the reduced minimal force by the assembly key button $F1_{\min}$ sinks further, then $F1_{\min}$ switch off is no longer bypassed.

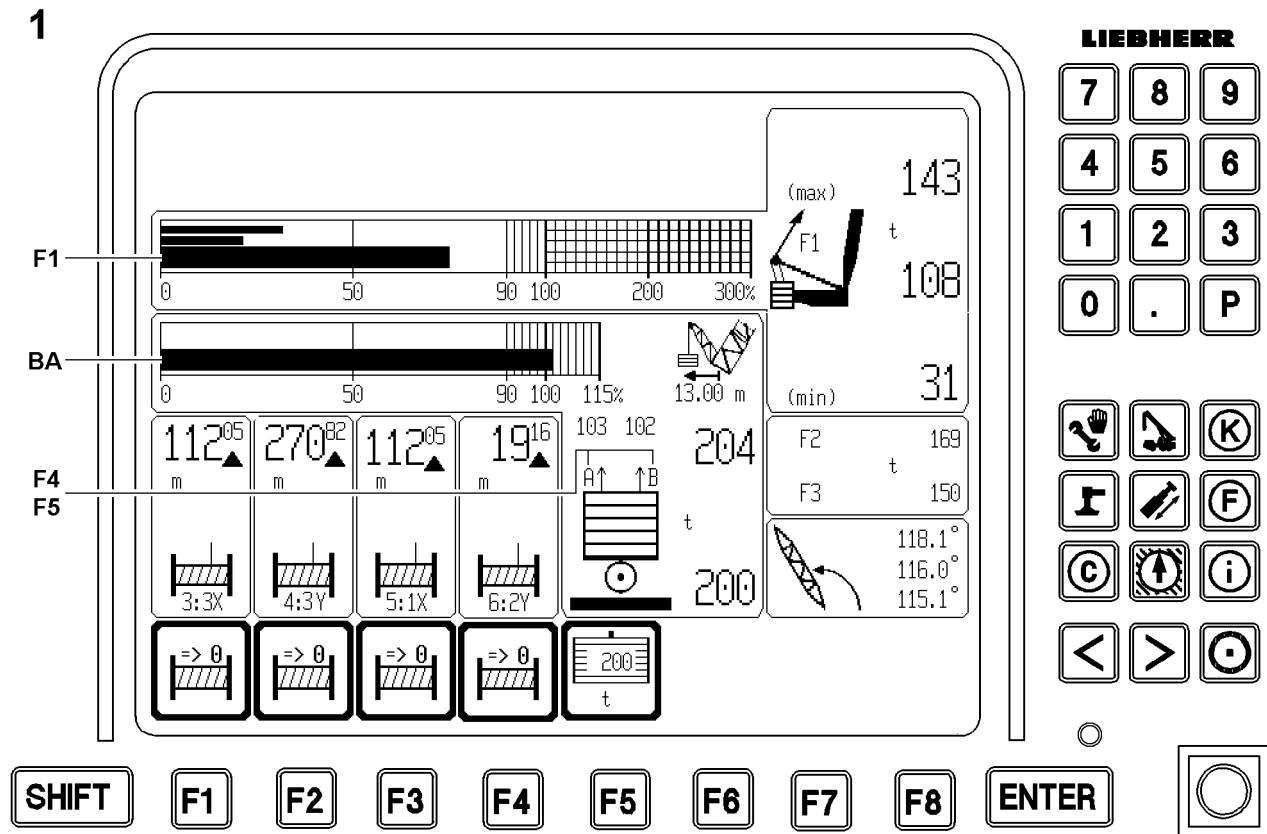
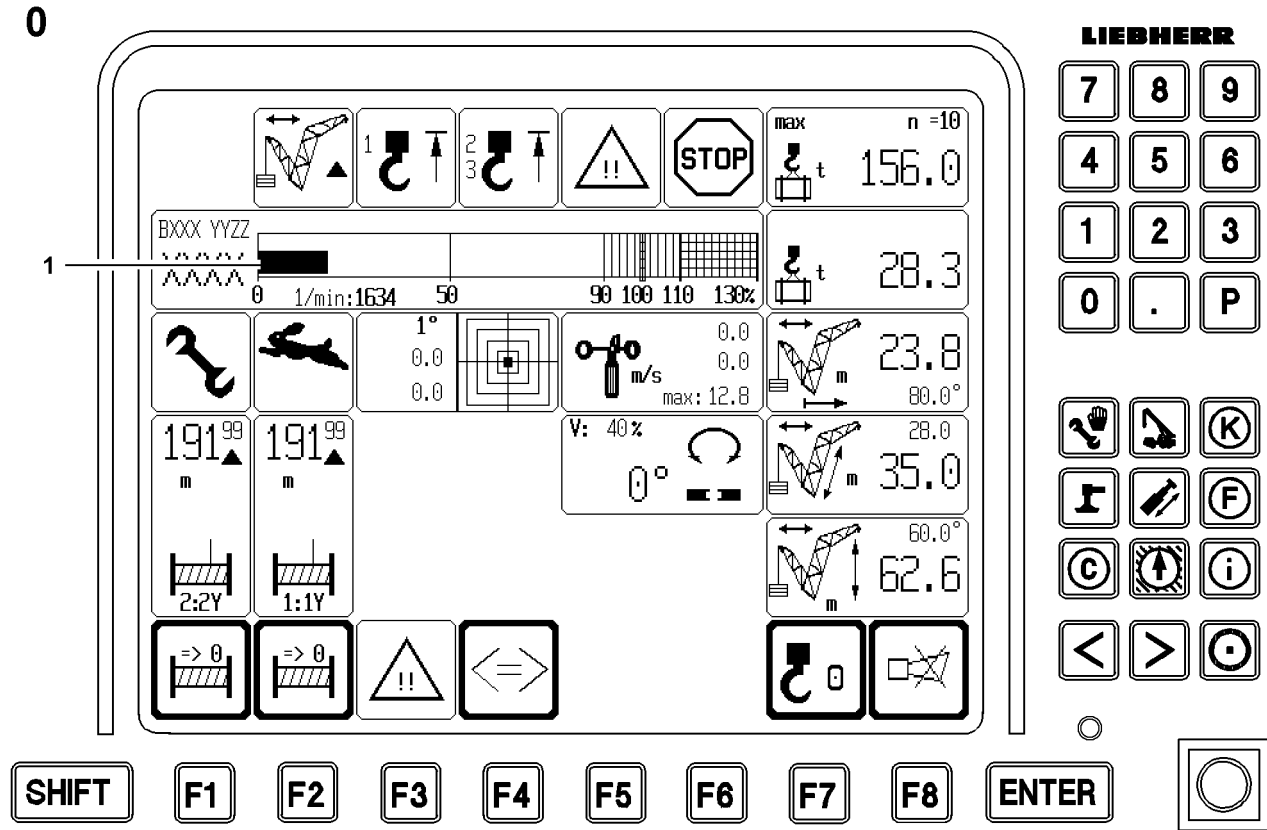


Fig.109225

LWE/LR 1750-000/12812-15-02/en

7.4 Overload monitoring in operating modes with derrick ballast

In operating modes with derrick ballast, the „Maximum load for the current crane condition“ is monitored two ways:

1. Monitoring of maximum load on the LICCON monitor 0.
2. Monitoring of test point 1-operational maximum force LICCON monitor 1.

7.4.1 Monitoring of maximum load on the LICCON monitor 0

It monitors the „Maximum load according to load chart and reeving“.

In operating modes with derrick ballast, this is the maximum load of the current crane condition. It is shown on LICCON monitor 0. The current utilization of the crane results from the load utilization bar (1) on LICCON monitor 0.

If the load utilization bar reaches 90 %, an advance warning is given in the form of a „Caution icon“ and a „SHORT HORN“ on LICCON monitor 0.

At 100 % on the load utilization bar, the shut off of all load moment increasing movements with the „Stop icon“ and the acoustical warning „HORN“ occurs on LICCON monitor 0.



Note

- ▶ The „Maximum load for the current crane condition“ can then no longer be increased!

7.4.2 Monitoring of test point 1-operational maximum force (= $F1_{max}$ operation)

It is shown on LICCON monitor 1. When $F1$ is greater than $F1_{max-shut\ off\ value}$ shut off of all movements which could increase load torque with the stop icon and the acoustic warning „HORN“ by LICCON monitor 1.



Note

- ▶ The maximum load can be safely monitored by the „LICCON overload protection“ itself!
- ▶ At 90 % „ $F1_{max}$ -utilization“ an advance warning is given in the form of a caution icon and a „HORN“ on LICCON monitor 1!
- ▶ At 100 % „ $F1_{max}$ -utilization“ a shut off occurs of all load moment increasing movements with the stop icon and the acoustic warning „HORN“ on LICCON monitor 1!
- ▶ If the „Maximum load according to the load chart and the reeving“ is not reached (utilization bar 1), then the maximum load of the current crane condition can still be increased!

If the „Maximum load according to the load chart and the reeving“ is not reached (utilization bar 1), then the maximum load of the current crane condition can still be increased by:

- Pulling up the derrick ballast, if the derrick ballast is not already suspended and the currently pulled ballast is still smaller than the optimum ballast.
- Telescoping out the derrick ballast if the added ballast is still lower than the optimum ballast.
- Increasing the derrick ballast by adding additional ballast plates if the placed ballast is still smaller than the optimum ballast.

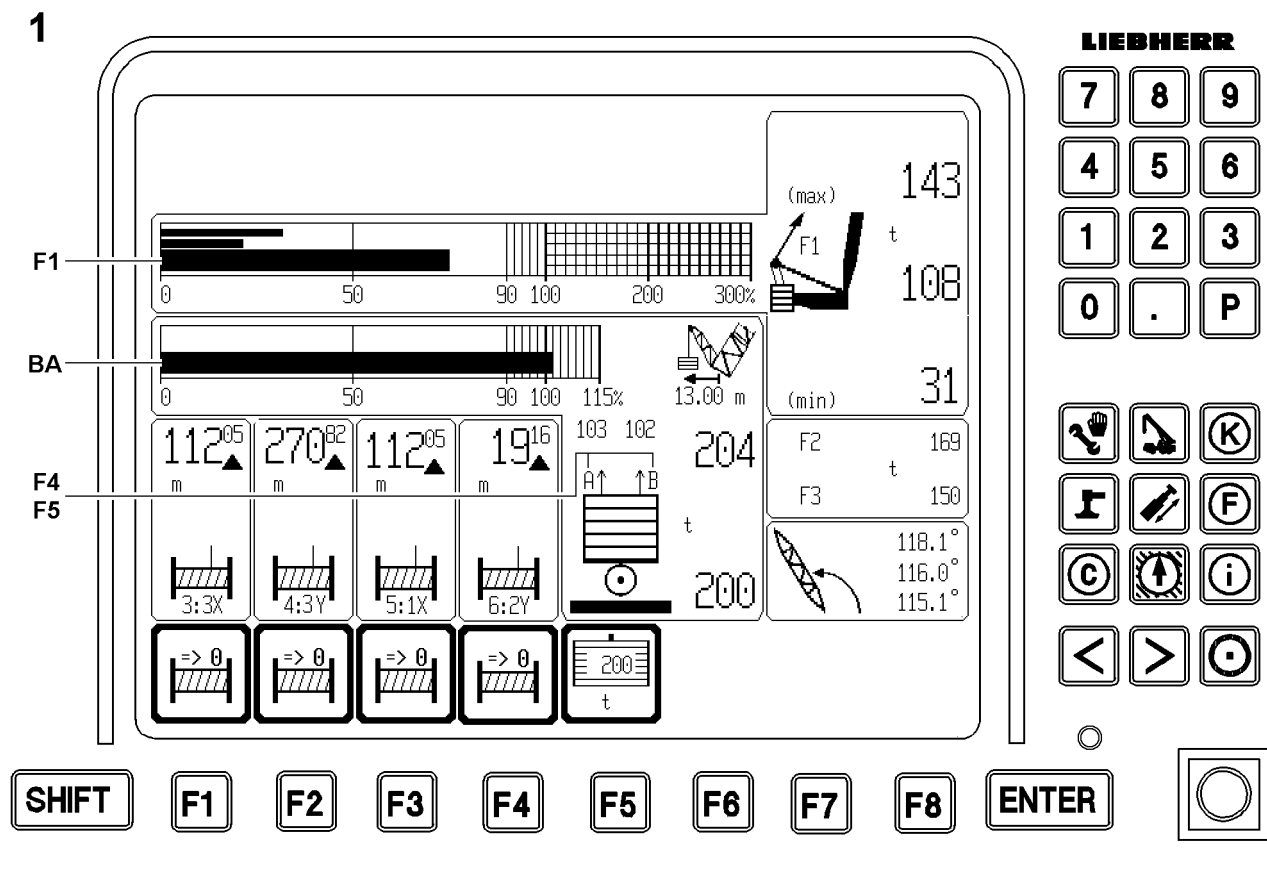
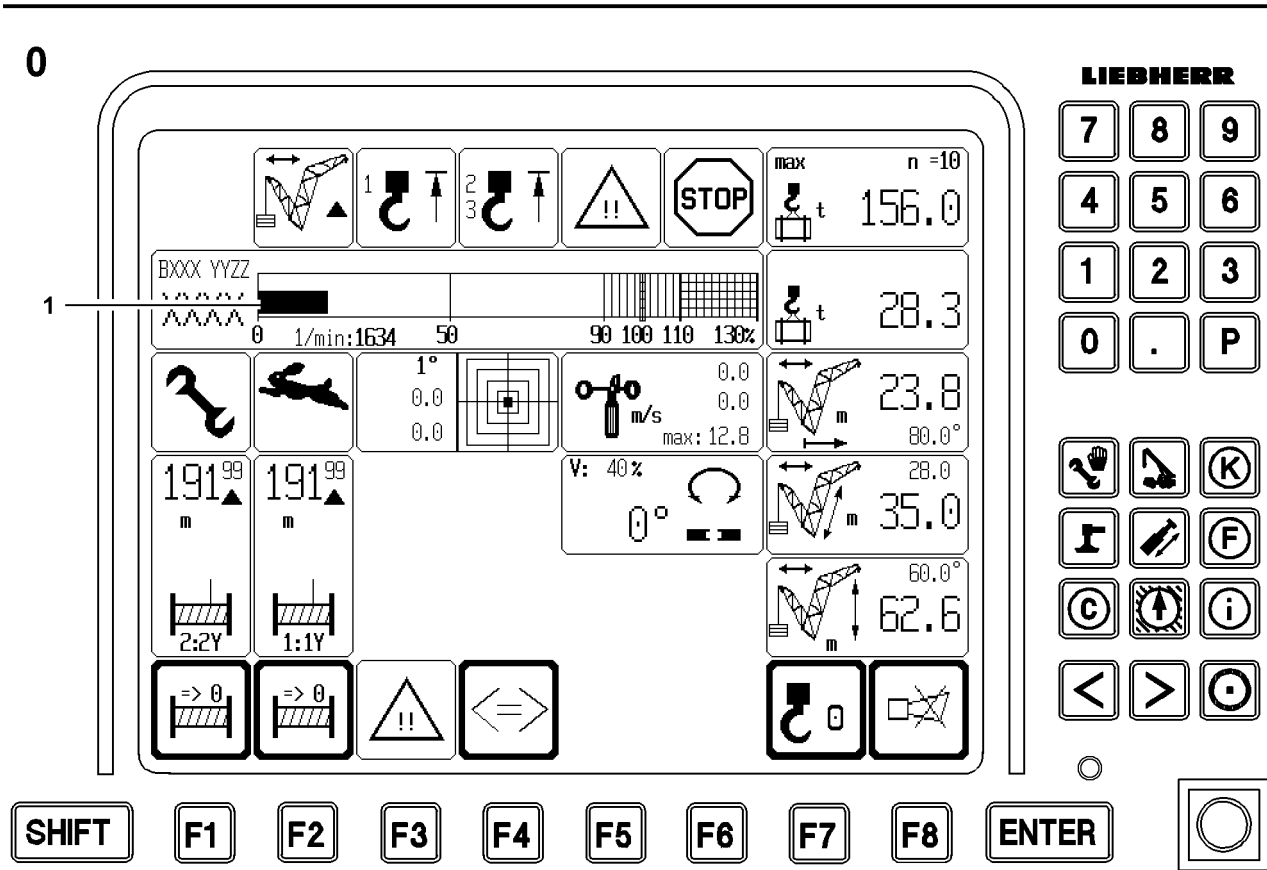


Fig.109225

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Risk of accident!

- ▶ Measuring point 1-operation-maximum force not only depends on the current crane configuration but also on the derrick ballast pulling force measured by the pressure sensors!
- ▶ If the pulled derrick ballast increases, the maximum permitted $F_{1_{\max}}$ removes force and vice-versa!
- ▶ It is therefore important to carefully monitor the ballast weighing process and the value for the pulled derrick ballast to ensure it is plausible!

**DANGER**

The crane can topple over!

If the pulled ballast value has been incorrectly determined and is too low, the calculated $F_{1_{\max}}$ may be too high and the crane could be overloaded without this becoming evident!

- ▶ Carefully monitor the displays on the LICCON monitor!

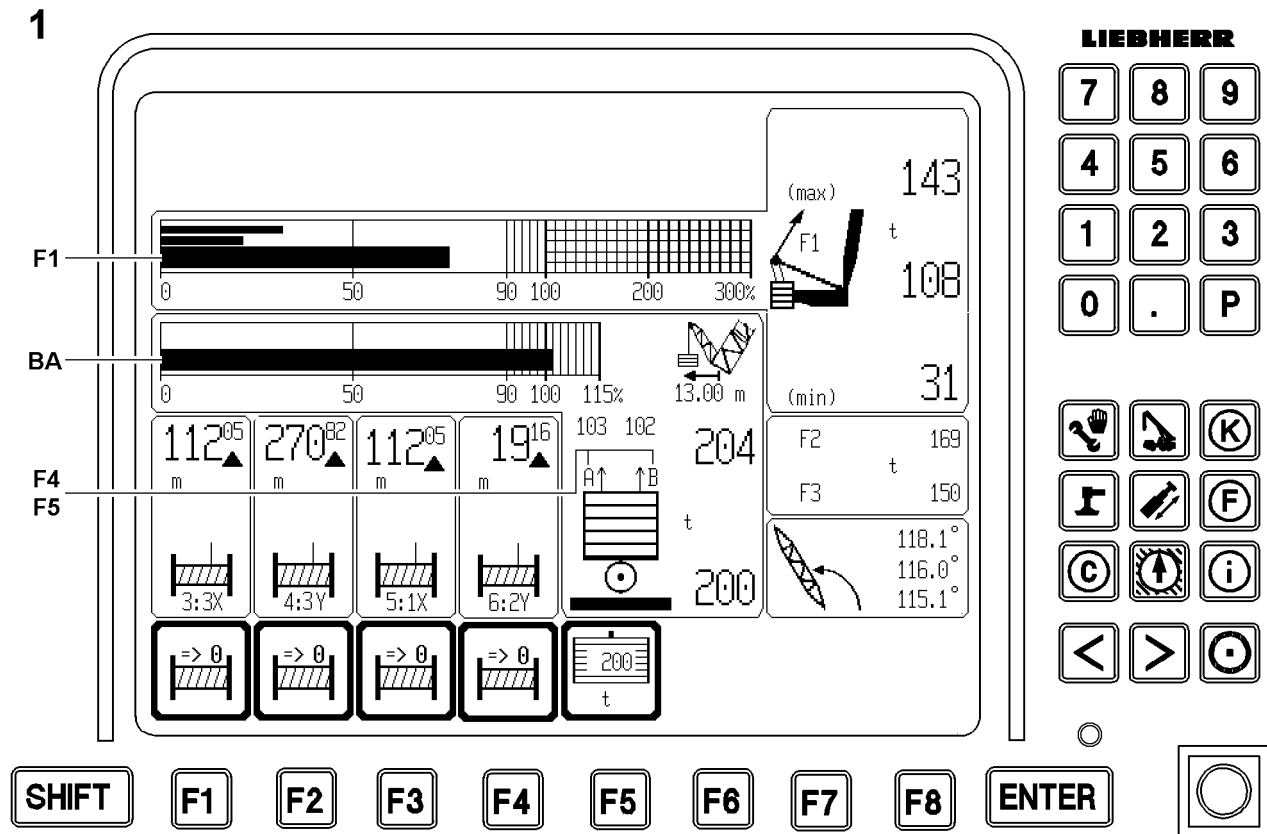
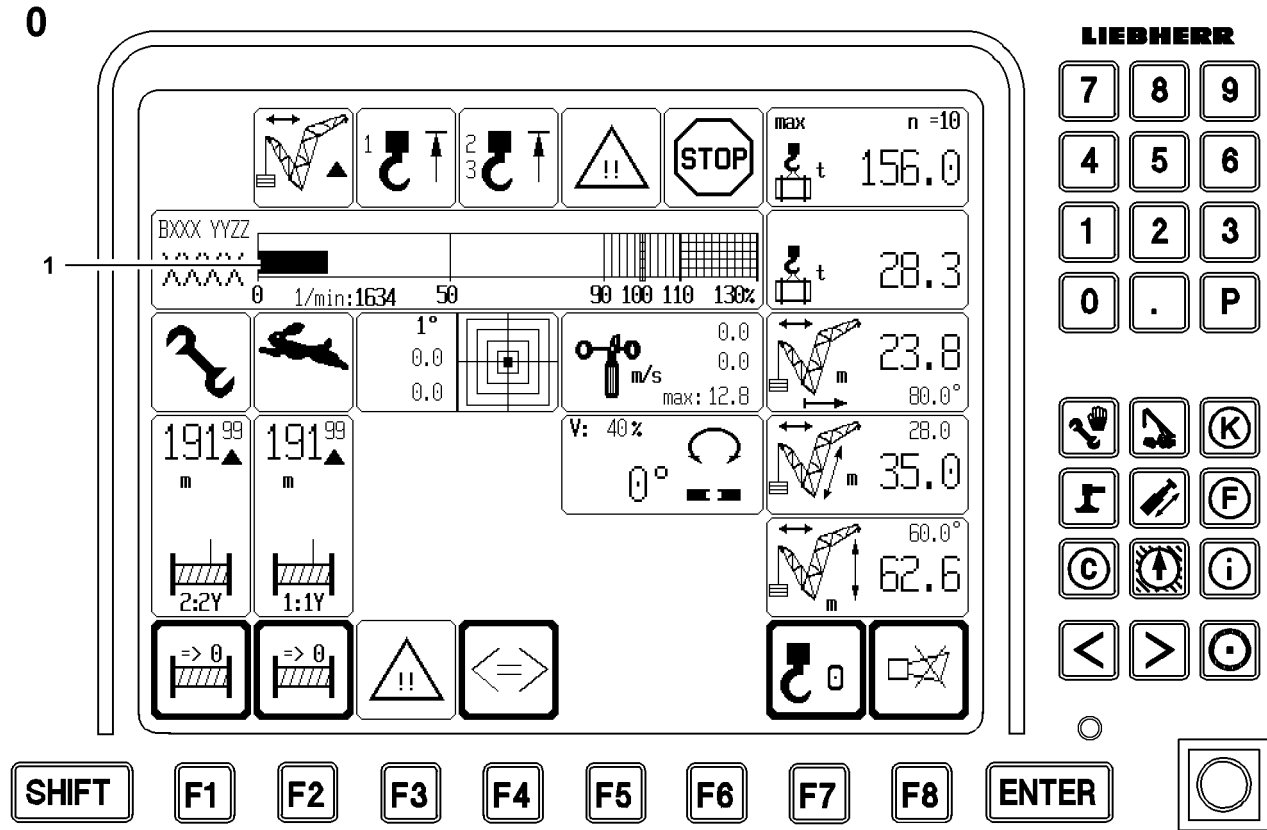


Fig.109225

LWE/LR 1750-000/12812-15-02/en

7.4.3 Utilization conditions

The current utilization of the crane results from the load utilization bar **1** on LICCON monitor 0 and the utilization bar **F1** on LICCON monitor 1.

The maximum load of the „Current crane condition“ is reached when the load utilization bar **1** has reached 100 % **or** when the utilization bar **F1** has reached 100 %.

The maximum load of the „Current crane equipment“ is reached when the load utilization bar **1** has reached 100 % **or** when the utilization bar **F1** has reached 100 % and the derrick ballast is suspended. (Derrick ballast utilization bar display **BA** is on 100 % when the ballast input value and the ballast weighing are correct).



DANGER

The crane can topple over!

When the assembly key button is turned on, the LICCON overload protection is bypassed and is thereby no longer effective!

The crane can be overloaded unnoticed and topple over!

Personnel can be severely injured or killed!

- ▶ When the assembly key button is turned on, only load moment reducing crane movements may be carried out up to a permissible operating and load range!
- ▶ The assembly key button must be turned off immediately after reaching the permissible load range!
- ▶ The crane operator alone is responsible completely for his actions during bypass of LICCON overload protection!



Note

- ▶ The movement „Ballast up“ or „Ballast down“ requires utmost attention by the crane operator!

The bypass of the maximum load according to the load chart and reeving (load utilization bar 1 at 100 %) can be bypassed by:

1. The bypass key button on the LICCON monitor 0.
2. Assembly key button in the instrument panel.
3. **Note:**

The test point 1-assembly-maximum force shut off (= F1 max-assembly) cannot be bypassed.

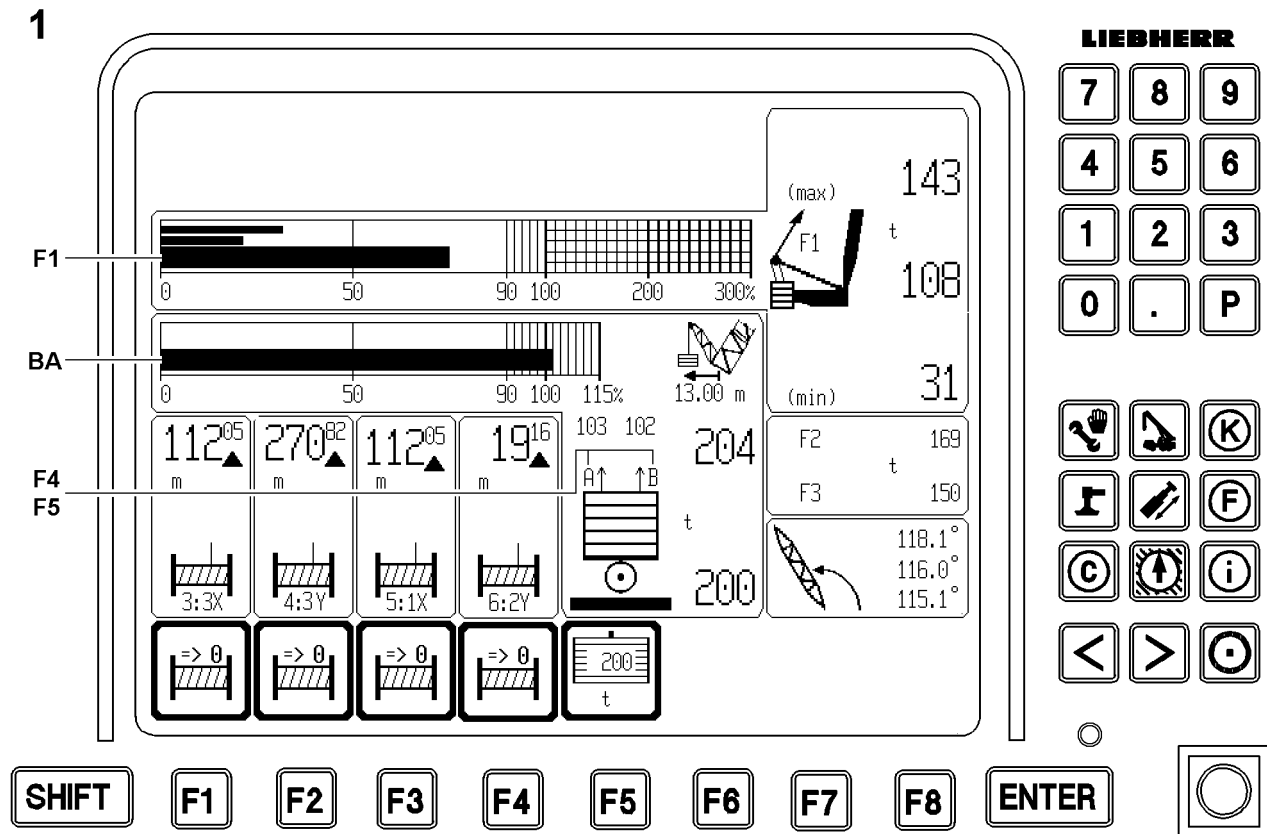
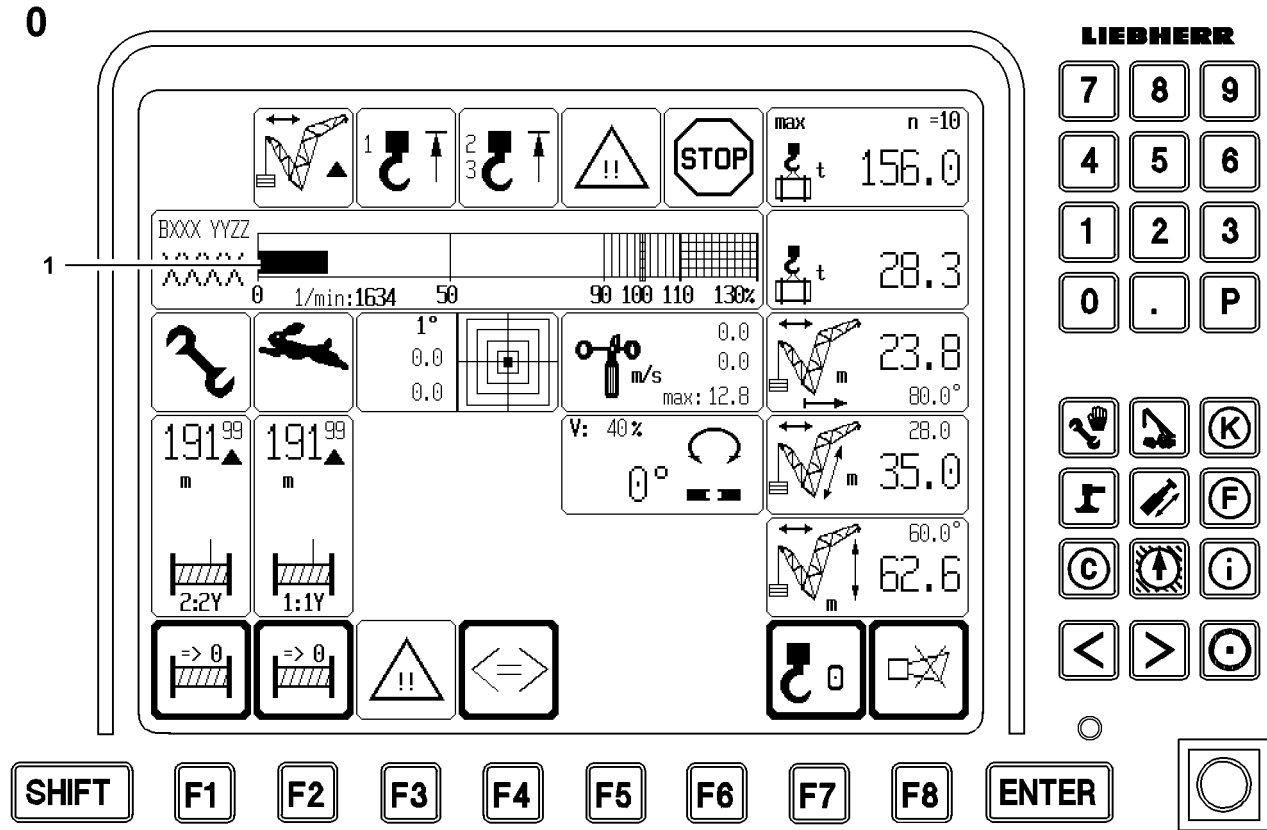


Fig.109225

LWE/LR 1750-000/12812-15-02/en

7.5 Checking the length sensor value on the ballast trailer



CAUTION

Risk of accident!

If the derrick ballast radius is measured incorrectly, due to the incorrect radius, a maximum load capacity and a F1-operational-max load force which are too large will be calculated!

The crane will be overloaded unnoticed and can topple!

Personnel can be severely injured or killed!

- ▶ The crane driver may not rely blindly on the derrick ballast radius measurement, but he must think for himself and check, if the measurement is still working correctly!
 - ▶ If the derrick ballast is fully telescoped out or in, the display „Derrick ballast radius“ must show almost the end position of the radius 13 m or 20 m !
-



Note

- ▶ When telescoping the ballast trailer guide, the indicator must change the display „Derrick ballast radius“ on the LICCON monitor corresponding to the movement of the derrick ballast! If this is not the case, the crane operator can immediately notice if the length sensor rope drum jams when spooling in or out!
- ▶ When telescoping the derrick ballast in and out, the „Derrick ballast radius“ display must be observed carefully on the LICCON monitor.

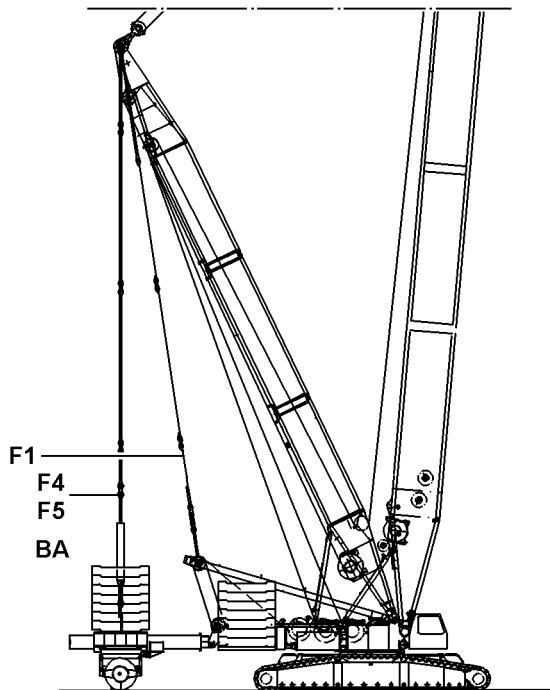
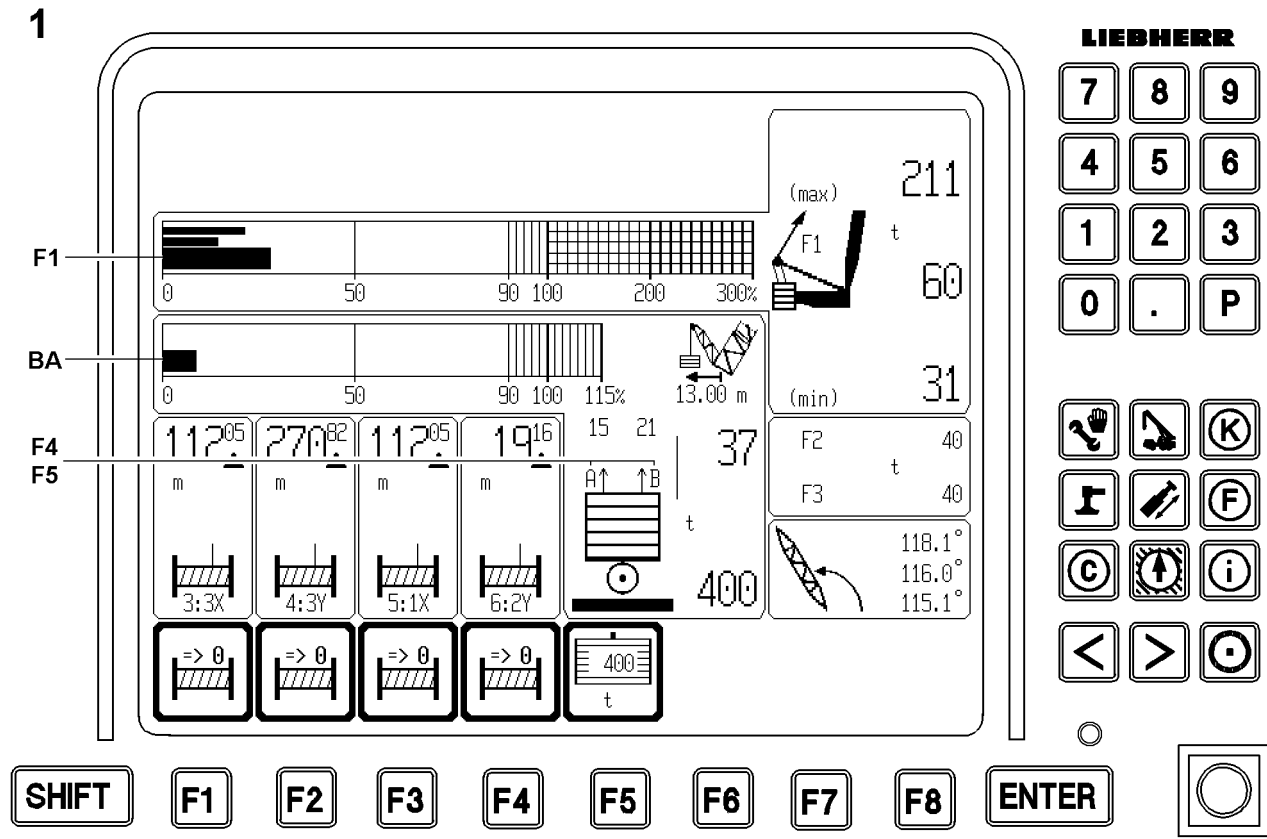


Fig.109224

LWE/LR 1750-000/12812-15-02/en

7.6 Difference force monitoring of ballast guying

In operating modes with derrick ballast, the difference between the forces on derrick guying A and B is monitored on LICCON monitor 1. If the difference exceeds a permissible value, an acoustical warning is issued and the two force values blink.



WARNING

Risk of accident from damaged crane components!

Too high a difference in the derrick ballast guying A and B can have the result that the derrick ballast arrives in an impermissible inclined position, and thereby the derrick end section, the ballast guide or other crane components may be damaged!

Personnel can be severely injured or killed!

- ▶ The forces in the derrick ballast guying A and B are to be carefully observed on LICCON monitor!
- ▶ If the specified limit value is exceeded, there occurs **no shut off** of crane movements!

Exceeding the limit value can have the following causes:

- Taking on the load: By relieving the tires on the ballast trailer or flexing of the turntable.
- The ground under the derrick ballast is uneven.
- The crane is leaning to one side.
- The derrick ballast has been loaded one-sided.
- The force measurement in one derrick ballast guying is incorrect.

The crane driver must recognize the correct cause and take countermeasures:

- Error message appears.
- The error, which caused the one-sided force, must be remedied.
- In case of small ground unevenness only, the following measure is permissible:
Lock one pull cylinder and with the other pull cylinder lift the derrick ballast or „Derrick ballast lower“ activate until the difference between the forces A and B is smaller.
- In case of implausible sensor values: Check whether the ballast weighing pressure sensors or inputs for the ballast weighing are faulty. If necessary, pull out the sensor or replace the CPU.

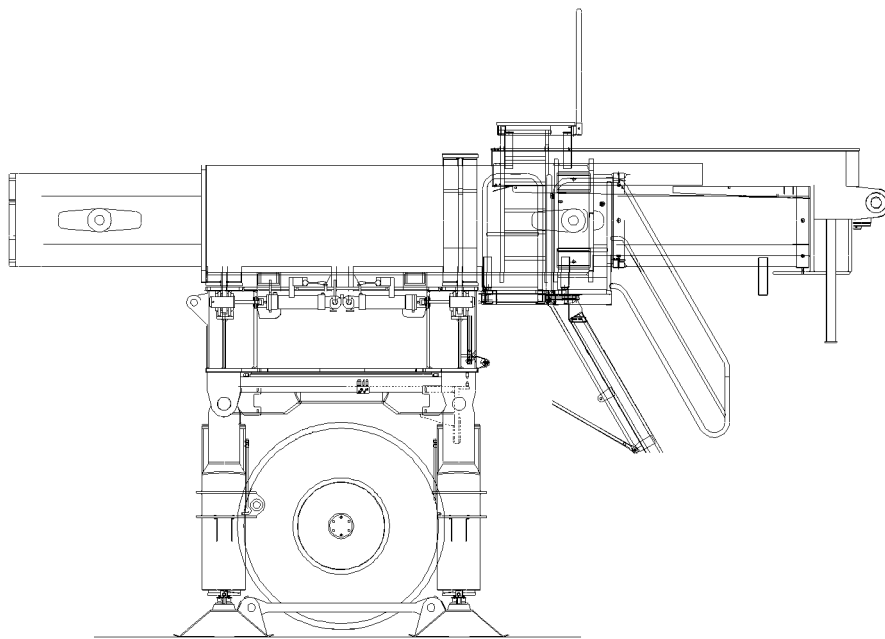


Fig.109335

LWE/LR 1750-000/12812-15-02/en

8 Disassembling the ballast trailer



WARNING

Risk of falling!

During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling! If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids!
- ▶ If fall protection equipment is available, then it must be used, see Crane operating instructions, chapter 2.06!
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the permissible fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04!
- ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06!
- ▶ Only step on the aids, ladders and catwalks with clean shoes!
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice!
- ▶ It is prohibited to walk on the telescopic or an auxiliary boom without suitable protective devices!

Make sure that the following prerequisites are met:

- The boom equipment is placed down.
- The ballast trailer guide is fully telescoped in.
- The ballast plates on the ballast trailer are removed.
- An auxiliary crane and a lifting platform are available.



Note

- ▶ Observe the data in the erection and take down charts when placing the boom equipment down!



WARNING

Danger of tipping the ballast trailer!

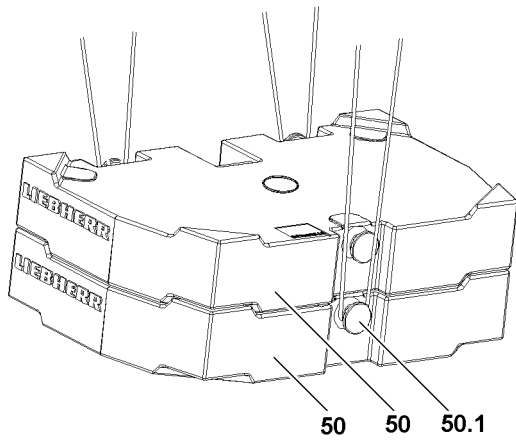
If the ballast trailer is unpinned on the turntable, there is a danger of tipping over!

Personnel can be severely injured or killed!

- ▶ Ballast trailer disassembly may only be carried out by authorized experts!
- ▶ The disassembly of the ballast trailer may only be conducted on a level and load-bearing surface!
- ▶ The ballast trailer has **no** brake system! The ballast trailer must be supported with the support cylinders if it is **not** pinned on the turntable!
- ▶ From unpinning the ballast trailer on the turntable, it must be ensured that the condition and stability of the ballast trailer is ensured, refer to section „Condition and stability with ballast trailers not assembled on the turntable“!

13

V1



17

V2

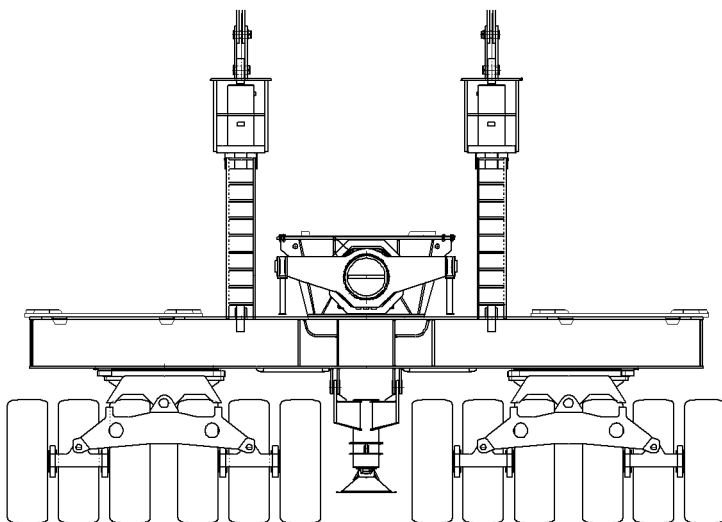
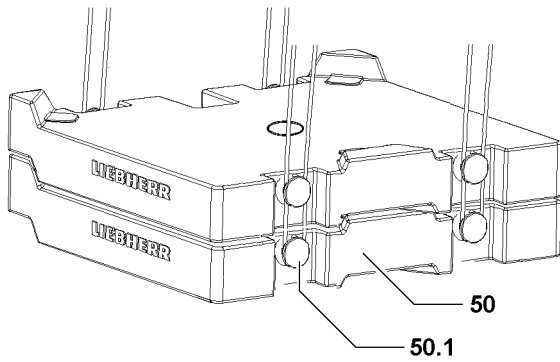


Fig.112548

LWE/LR 1750-000/12812-15-02/en

8.1 Removing the ballast plates



Note

- ▶ The ballast plates are marked with their own weights!



WARNING

Danger of toppling the ballast stack!

Personnel can be severely injured or killed by toppling ballast stacks!

- ▶ Take the ballast plates evenly from the ballast trailer!
- ▶ First take the left and right ballast stack off evenly, then remove the ballast stack in the middle of the ballast trailer!

8.1.1 Removing the ballast plates, fastening points: Bitt



WARNING

Overloaded ballast plates!

If more than the permissible loads are lifted, the bitts **50.1** are overloaded!

The ballast plates can be damaged and fall down!

Personnel can be severely injured or killed!

- ▶ Observe the section „Permissible ballast assemblies“ in this chapter!



WARNING

Incorrect handling of the fastening equipment!

If fastening equipment cannot be attached correctly and / or if it is not secured sufficiently to prevent it from loosening up, the ballast plates can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that the fastening equipment is correctly attached on the bitts **50.1** and that it is secured sufficiently to prevent it from loosening up!



Note

- ▶ Fastening points for ballast plates variation **V1**, see illustration **13**!
- ▶ Fastening points for ballast plates variation **V2**, see illustration **17**!

- ▶ Attach the ballast plates or ballast assembly on the auxiliary crane.

- ▶ Lift the ballast plate(s) or ballast assembly from the ballast stack or from the ballast trailer and place on a suitable storage location.

8.1.2 Removing the centering plates* from the ballast trailer

When all ballast plates have been removed from the ballast trailer:

- ▶ Attach the centering plates on auxiliary crane and lift them off the ballast trailer.

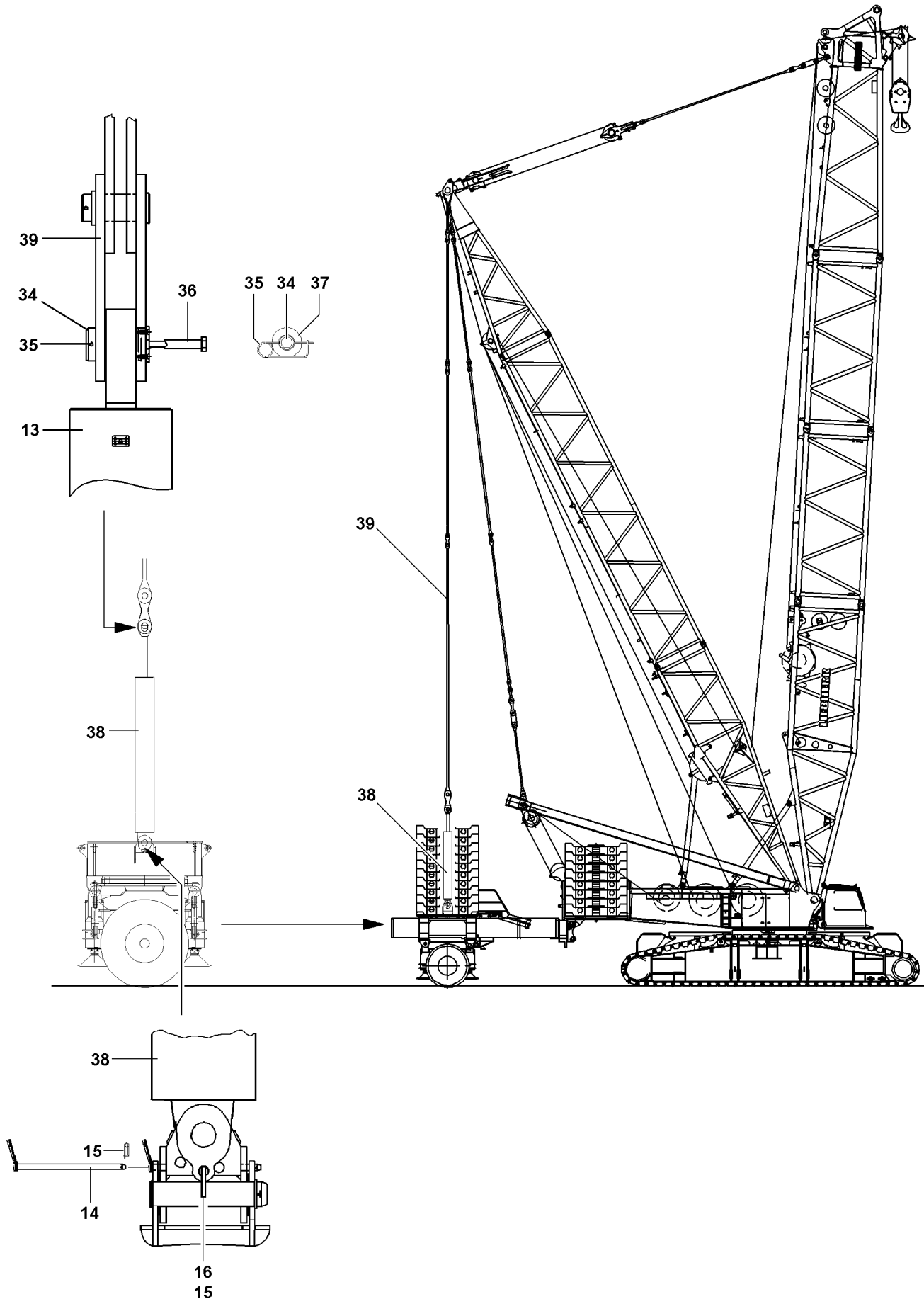


Fig.109337

LWE/LR 1750-000/12812-15-02/en

8.2 Disassembling the ballast trailer guying

8.2.1 Unpinning the guy rods

Make sure that the following prerequisites are met:

- The ballast trailer guide is fully moved in.
- The derrick radius and the ballast trailer radius are identical (13.0 m).
- The guy rods hang vertically.
- The guy rods are relieved by moving the pull cylinders out.



WARNING

Risk of accident due to swaying guy rods!

The guy rods can sway during the unpinning procedure!

Personnel can be severely injured or killed!

- ▶ Set the derrick boom and derrick ballast to the same radius before unpinning!
- ▶ If this is not possible, secure the guy rods against swaying with the auxiliary crane!



DANGER

Toppling guy rods!

If the retaining pins **16** before unpinning of the guy rods **39** are not pinned on the cross strap, the pull cylinders **38** tip away to the side!

Personnel can be severely injured or killed!

- ▶ Make sure before unpinning the connector pins **34** that the retaining pins **16** are pinned and secured on both sides!
 - ▶ It is **prohibited** to unpin connector pins **34** as long as it is not ensured that the retaining pins **16** are correctly pinned and secured, visual inspection!
-
- ▶ Insert the retaining pin **16** and secure with spring retainer **15**.
 - ▶ Unpin the guy rods **39** on the pull cylinders **38**.
 - ▶ Remove the spring retainer and unpin the connector pins **34**.
 - ▶ Move the pull cylinder **38** in.

8.2.2 Bringing the guy rods on the ballast trailer into transport position

Make sure that the following prerequisites are met:

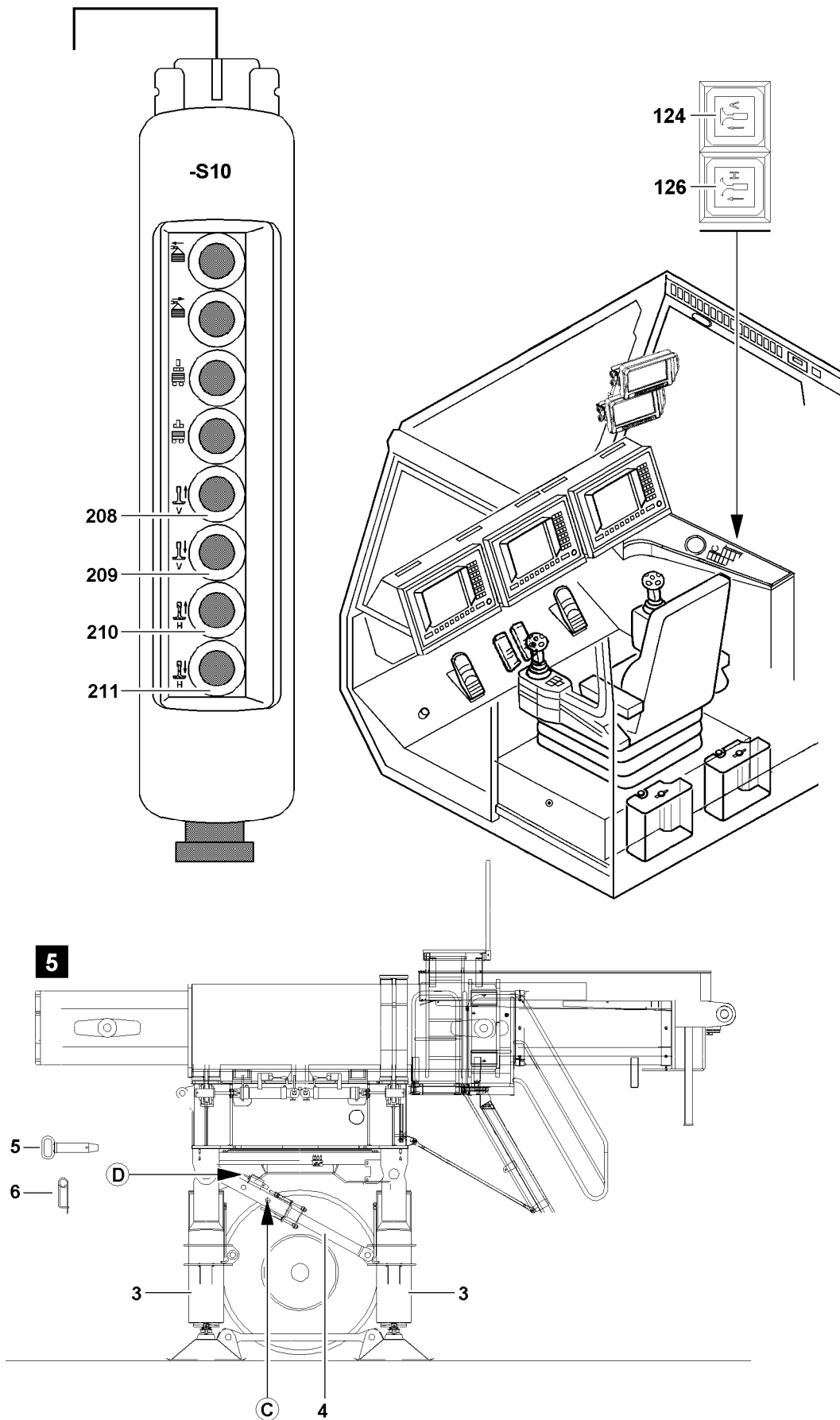
- The guy rods **39** are unpinned.
- The pull cylinders **38** are moved in.
- ▶ Attach the pull cylinder **38** onto the auxiliary crane.

When the pull cylinders **38** is securely attached on the auxiliary crane:

- ▶ Release and unpin the retaining pin **14** and retaining pin **16**.
- ▶ Place the pull cylinder **38** with the auxiliary crane to the side.

When the pull cylinder **38** is laterally placed on the ballast trailer:

- ▶ Insert the retaining pin **14** and retaining pin **16** and secure with spring retainers **15**.
- ▶ Remove the auxiliary crane.



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Fig.109338

8.3 Supporting the ballast trailer

The ballast trailer must be supported before unpinning it from the turntable.

Before supporting the ballast trailer, the locking pin **5** must be pinned and secured on the strut **4**.

Make sure that the following prerequisites are met:

- The ballast plates and the guy rods are disassembled.
- The ballast trailer guide is fully moved in.
- The crane is aligned in horizontal direction.

8.3.1 Pinning the strut on the ballast trailer



WARNING

Risk of tipping the ballast trailer!

If the strut **31** is not pinned before ballast trailer disassembly with point **C** the ballast trailer can tip over!

Personnel can be severely injured or killed!

▶ Always pin the strut **31** before disassembly of the ballast trailer!

▶ Release and unpin the locking pin **32** from the transport receptacle **D**.

▶ Pin locking pin **32** into operating position **C** and secure with spring retainer **33**.

8.3.2 Moving the support cylinders out

Move the front and rear support cylinders out:

- ▶ Press the button **124** and button **126** in the crane operator's cab.
or
Press the button **209** and button **211** on the control panel **-S10**.
- ▶ Check the moved out support cylinder visually.

6

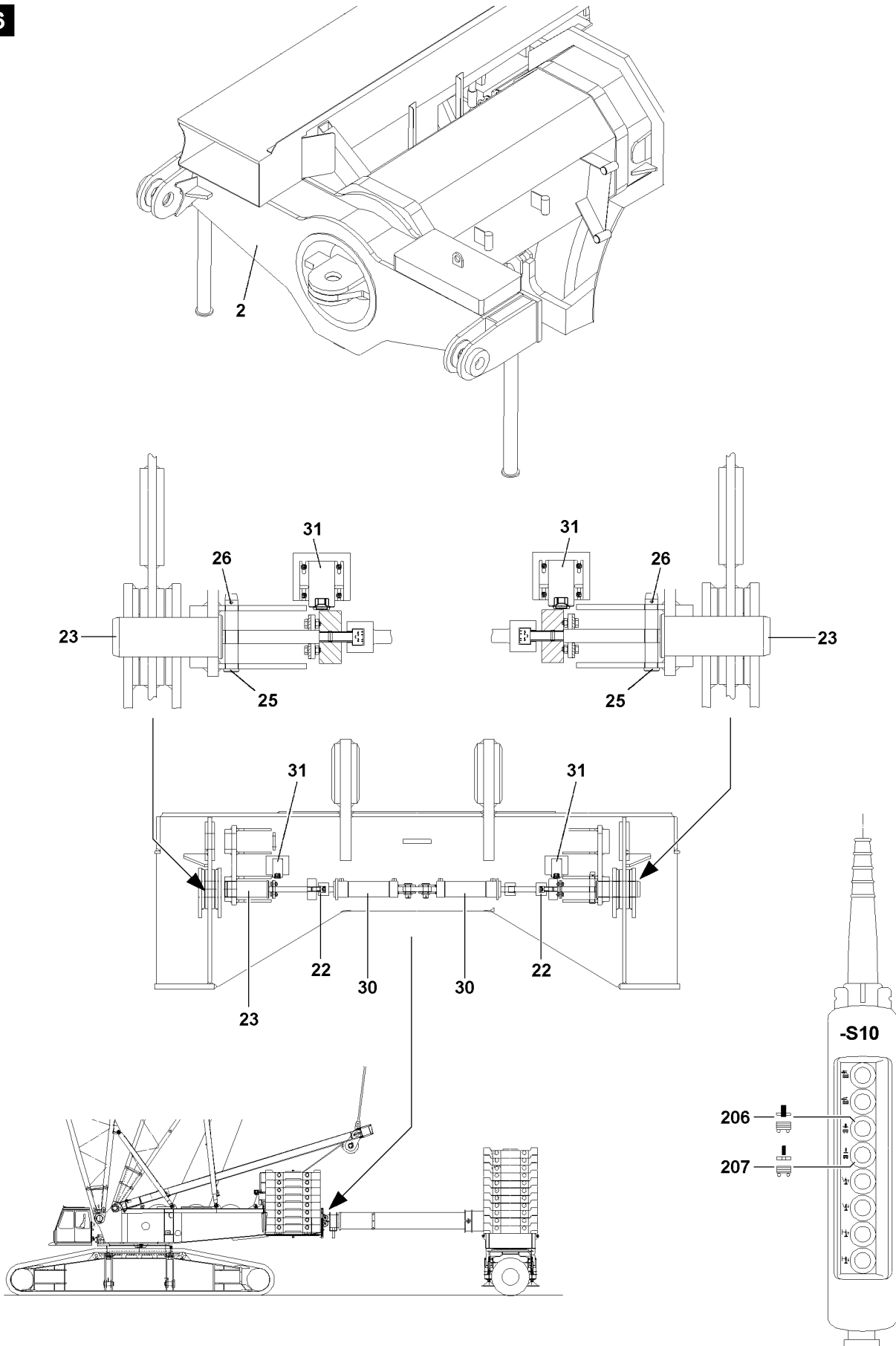


Fig.109339

LWE/LR 1750-000/12812-15-02/en

8.4 Unpinning the ballast trailer on the turntable

Make sure that the following prerequisites are met:

- The ballast trailer is supported.
- The electrical and hydraulic connections are present.

8.4.1 Unpinning procedure

NOTICE

Damage to the retaining pins!

If the retaining pins **25** are not unpinned before the unpinning procedure, the pin pulling device can be damaged!

- ▶ The retaining pins **25** must be released and unpinned on both sides before pinning the connector pins **23**!

If the connector pins **25** are completely unpinned in on both sides:

- ▶ Press the button **206** on the control panel **-S10**.

Result:

- The pin pulling cylinders move in.
- The connector pins **23** are unpinned on the turntable.

NOTICE

Damage to the ballast trailer or to the turntable!

If through distortion upon unpinning of the ballast trailer on the turntable only a connector pin **23** unpins (signal „Ballast trailer installed“ is no longer present), the crane steering is no longer recognized, although the ballast trailer is still connected with the second connector pins **23** with the turntable!

Due to the missing error signal, „Ballast trailer installed“, it is possible to turn the turntable, to drive the crane or to telescope the ballast trailer guide out / in!

This could significantly damage both the crane and the ballast trailer!

- ▶ All crane movements are to be limited to a „Minimal degree“ and must be driven with extreme caution and the smallest possible speed!
- ▶ After unpinning of the second connector pin **23**, it must again be checked whether both connector pins are completely unpinned!

-
- ▶ Perform a visual inspection.

If the ballast trailer guide has been telescoped out during the unpinning procedure:

- ▶ Move the ballast trailer guide all the way in.

6

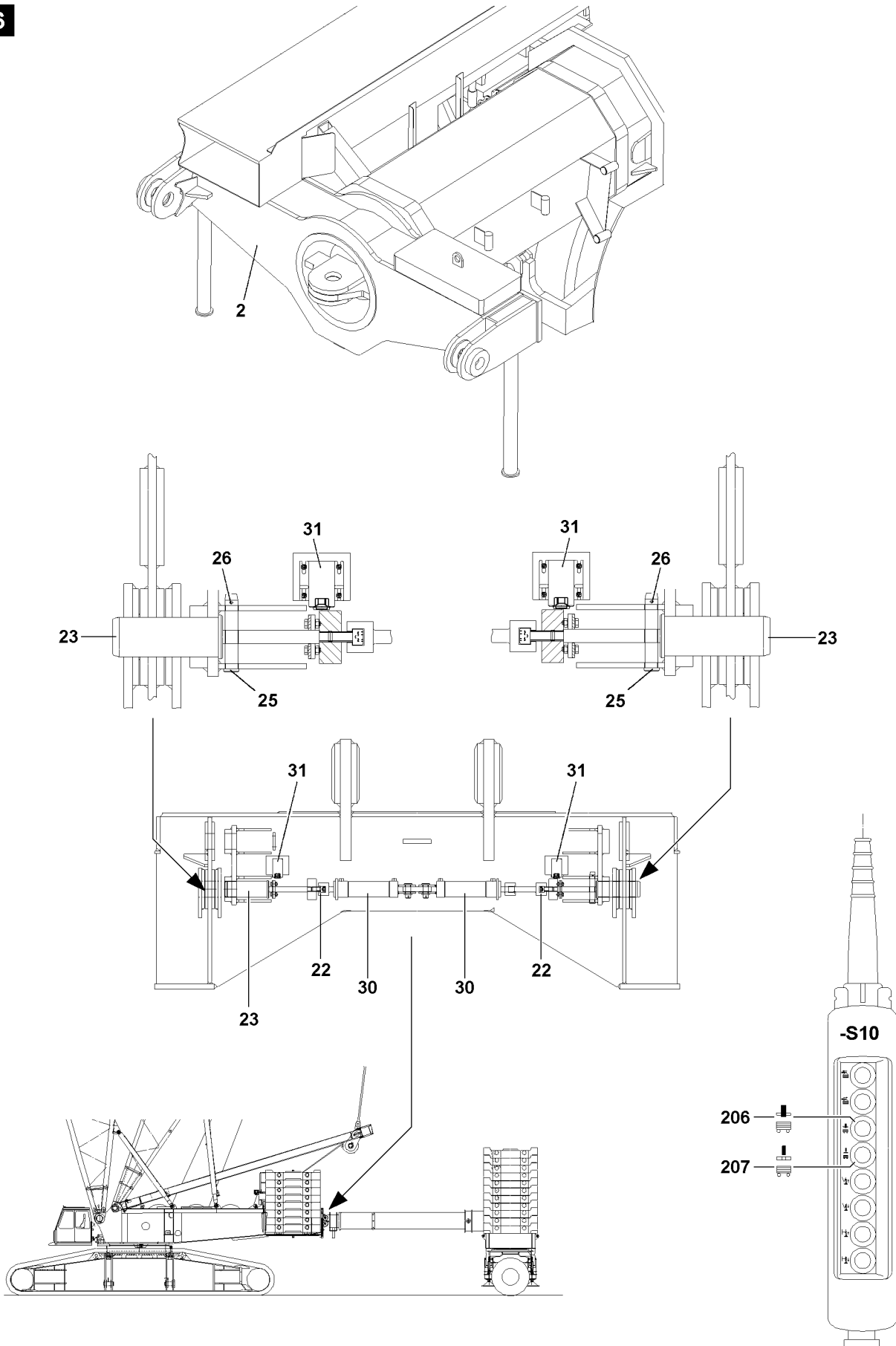


Fig.109339

LWE/LR 1750-000/12812-15-02/en

8.4.2 Releasing the electrical connection from the ballast trailer to the turntable



Note

- ▶ Release the electrical connections only when the ballast trailer is completely unpinned on the turntable, which means both connector pins **23** must be unpinned.

Make sure that the following prerequisite is met:

- The ballast trailer is completely unpinned on the turntable.
- ▶ Disconnect the electrical connections and store carefully on the ballast trailer.

8.4.3 Loosening the hydraulic connections from the ballast trailer to the turntable

When hydraulic lines are connected and disconnected with quick-release couplings, make ensure that the coupling procedure is being performed correctly.



DANGER

Risk of accident due to loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious injury due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
- ▶ Release the pressure in the hydraulic system before connecting and disconnecting. Turn the engine off and wait for short time.
- ▶ Unscrew coupling components (sleeve and connector) by using hand-tightened nut.
- ▶ Disconnect the coupling sections.
- ▶ Store hydraulic hoses on the ballast trailer correctly.
- ▶ Protect the coupling sections with caps to prevent contamination and damage.

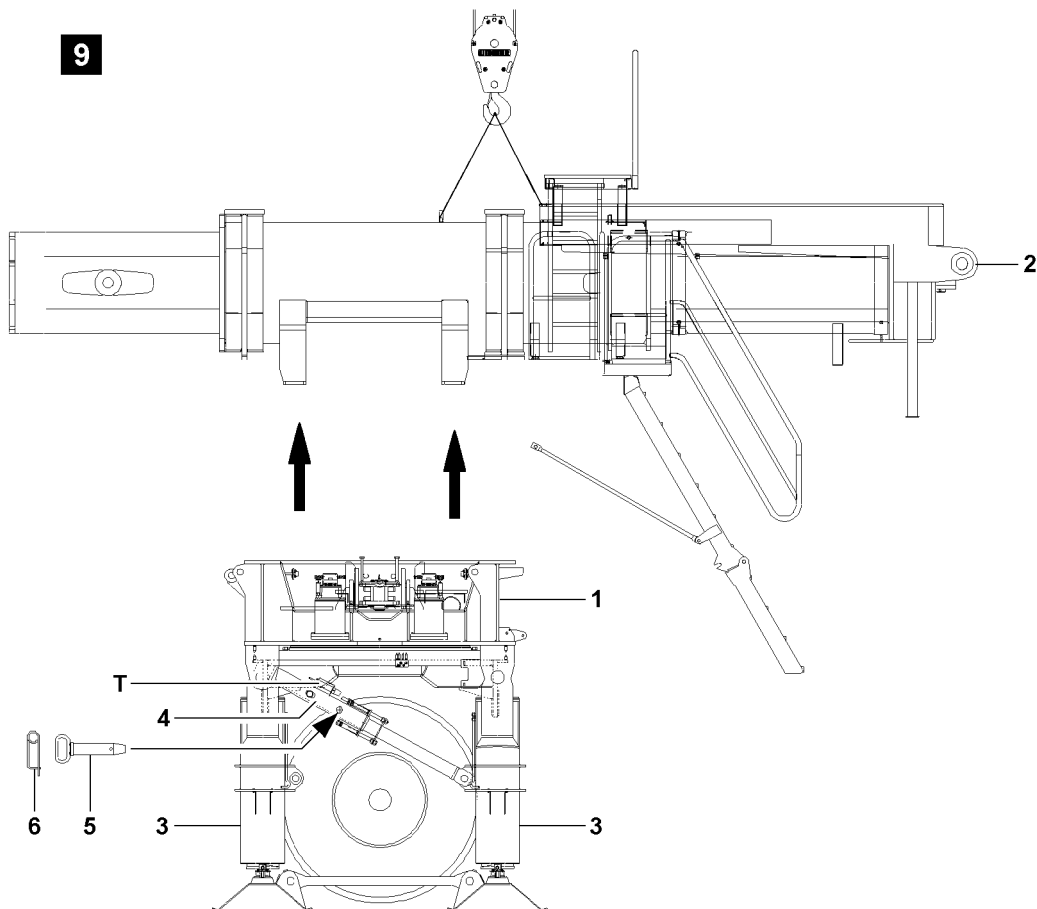
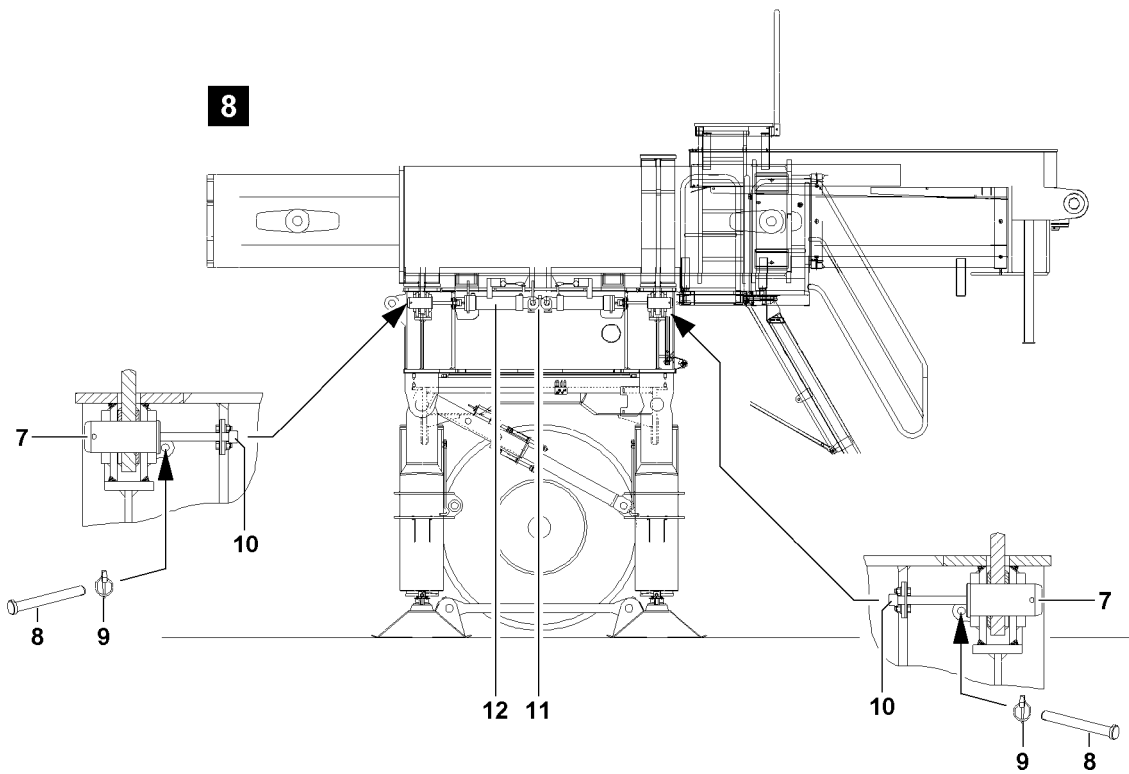


Fig.109340

LWE/LR 1750-000/12812-15-02/en

8.5 Disassembling the ballast trailer guide

Make sure that the following prerequisites are met:

- The locking pin **5** is pinned in and secured in the strut **4**.
- The ballast trailer is supported with the support cylinders **3** and aligned in horizontal direction.
- The wheel sets are relieved.
- The ascent for the ballast trailer is in transport position.



WARNING

Danger of tipping the ballast trailer!

If the stability and tipping safety guidelines for the ballast trailer are not observed, the ballast trailer can tip over!

Personnel can be severely injured or killed!

- ▶ See section „Observe the stability and tipping resistance when ballast trailer is not fitted to the turntable“.

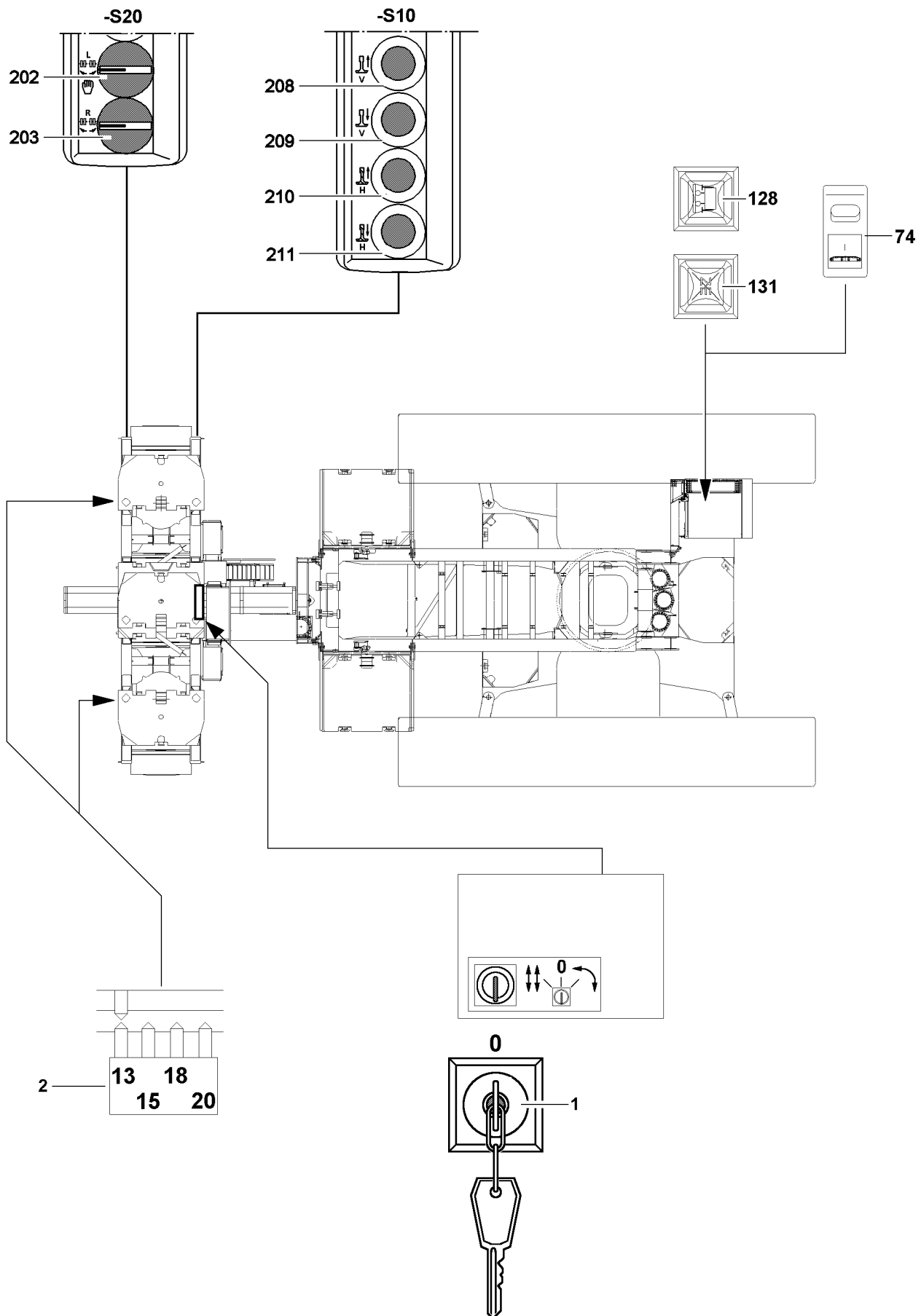
- ▶ Attach the ballast trailer guide **2** on the auxiliary crane.
- ▶ Tension the fastening equipment carefully.
- ▶ Attach the pin pulling cylinder **12** to the retainer **11** and hook into the screw head **10**.
- ▶ Establish the hydraulic connection of the pin pulling cylinder **12** to the hydraulic aggregate, see Crane operating instructions, chapter 5.30.
- ▶ Remove linchpin **9** on the retaining pins **8**, see illustration **8**.
- ▶ Unpin the retaining pins **8**.

When the retaining pins **8** are unpinned and the fastening equipment on the ballast trailer guide **2** are tensioned:

- ▶ Apply lever on the pin pulling cylinder and unpin connector pins **7**.

When all four connector pins **7** are completely unpinned:

- ▶ Lift and swing ballast trailer guide **2** with auxiliary crane from the ballast trailer, see illustration **9**.
- ▶ Disassemble ascent for the ballast trailer.
- ▶ Place ballast trailer guide **2** on suitable and sufficiently load-bearing support.
- ▶ Remove the auxiliary crane.



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Fig.109531

9 Emergency operation with a defective CPU

9.1 Emergency operation of ballast trailer

With a defect on the ballast trailer CPU, a warning light **131** is lit, the electronic steering of the ballast trailer can no longer be steered.

The signal „Towing“ and „Circular driving“ are no longer sent by the ballast trailer control to the crane control.

However, by actuating the key switch **1** in the switch box on the ballast trailer, the central unit can be bypassed.

Key switch positions

- 0 (center) = no emergency operation
- I (left) = emergency operation towing
- II (right) = emergency operation circular driving

NOTICE

Damage of ballast trailer!

By activating the key switch **1** the signal „Towing“ or „Circular driving“ is released in crane steering, although the wheel sets could potentially be incorrectly aligned!

This can result in severe property damage on the ballast trailer or on the crane!

- ▶ Operate the key switch **1** only if the electronics fail!
 - ▶ Before driving the crane, inspect the alignment of the wheel sets!
 - ▶ All driving movements may only be conducted with utmost caution, minimum acceleration and careful braking!
 - ▶ If the key switch **1** is activated, then the crane operator bears the full and sole responsibility for his actions!
-



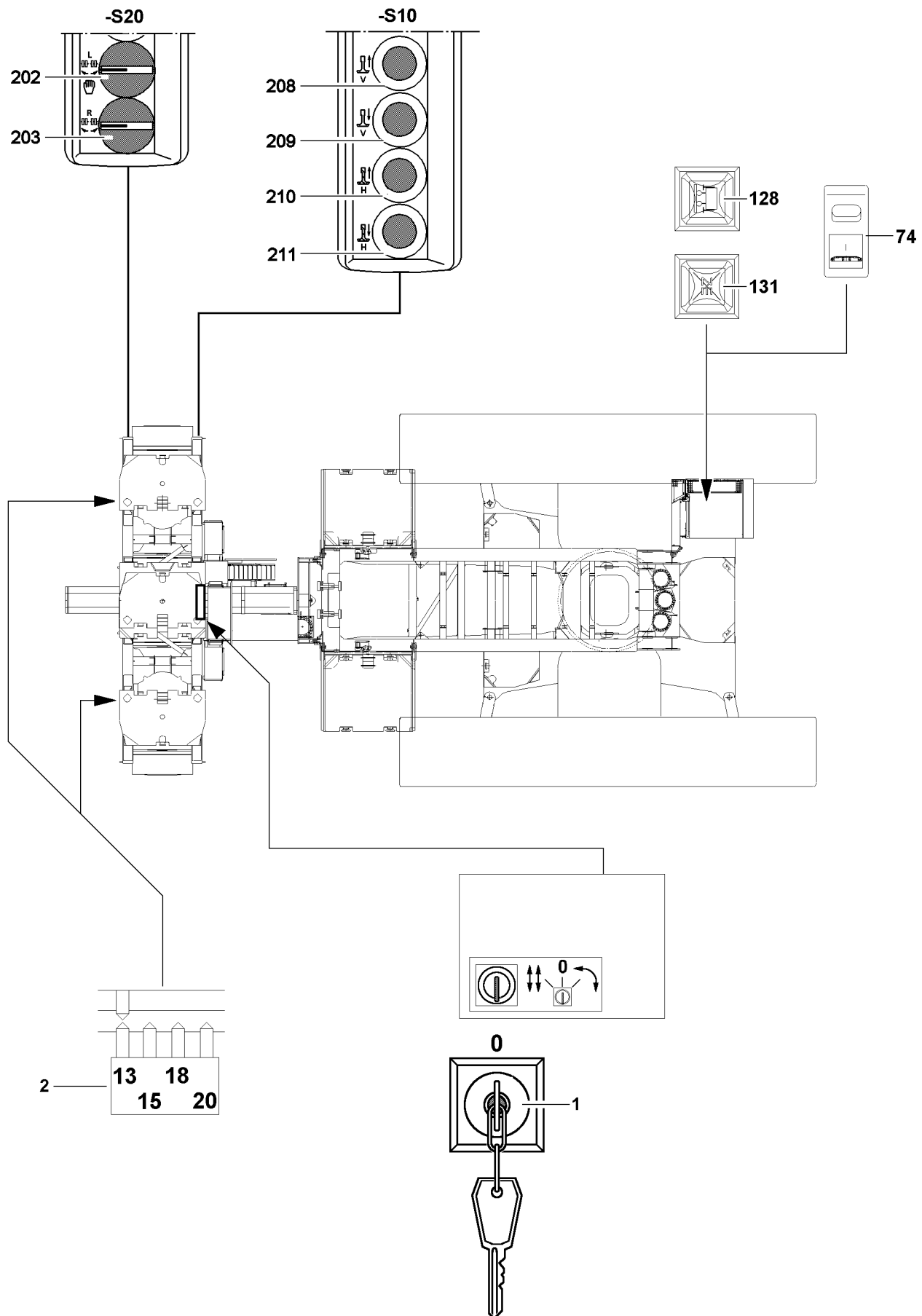
WARNING

Danger of accident due to faulty operation!

If the key switch **1** is activated, there is an increased danger of accidents due to the bypassed ballast trailer control!

Personnel can be severely injured or killed!

- ▶ It is prohibited to remain within the danger zone of the ballast trailer!
 - ▶ The alignment of wheel sets is to be monitored manually, visual inspection!
 - ▶ Observe the angle scale on the ballast trailer!
 - ▶ Emergency operation should only be carried out by authorized personnel. They must be aware of all related supervisory tasks and hazards!
 - ▶ If the key switch **1** is activated, then the crane operator bears the full and sole responsibility for his actions!
-



LWE/LR 1750-000/12812-15-02/en

Fig.109531

9.2 Emergency operation - towing

Make sure that the following prerequisites are met:

- The ballast trailer is properly installed.
- Crawler operation is turned on (switch **74**).

9.2.1 Lifting the ballast trailer with the support cylinders



Note

- ▶ The support cylinders of the ballast trailer must always be moved out evenly!

Move the front and rear support cylinders out:

- ▶ Press button **209** and button **211**.

9.2.2 Aligning the wheel sets in towing position

To be able to align the wheel sets in towing position, the ballast trailer must be lifted with the support cylinders.

Make sure that the following prerequisite is met:

- The ballast trailer is raised via the support cylinders to the point where the wheel sets are relieved.
- ▶ Turn the key switch **1** on the ballast trailer to the „left“.

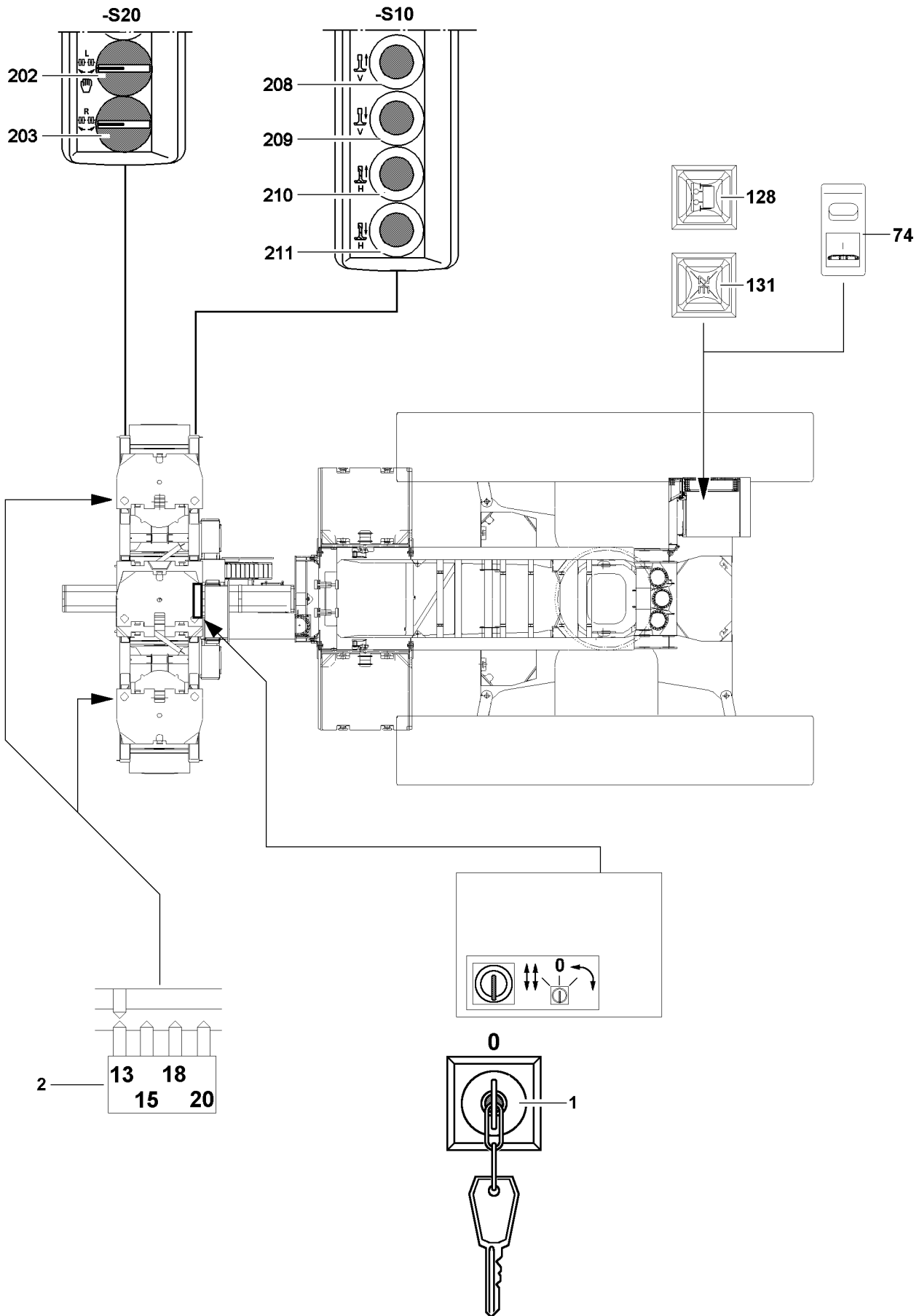


Note

- ▶ By activating the key switch **1** into position „left“, the order „Towing“ is passed on to the crane and emergency operation is switched on!
- ▶ During emergency operation the support can only be activated control panel **-S10** on the ballast trailer!

When the wheel sets are relieved:

- ▶ Activate the rotary switch **202** on the control panel **-S20** and align the left wheel set into towing position.
- ▶ Activate the rotary switch **203** on the control panel **-S20** and align the right wheel set into towing position.
- ▶ Check the settings.



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Fig.109531

9.2.3 Lowering the ballast trailer with the support cylinders

**Note**

- ▶ The support cylinders of the ballast trailer must always be moved in evenly!

Move support cylinders in completely on the front and rear:

- ▶ Press button **208** and button **210**.

Result:

- The support cylinders move in.
- ▶ Move the support cylinders in completely.

Result:

- The warning light **128** („Ballast trailer support moved in“) **lights up**.

9.2.4 Towing

Make sure that the following prerequisites are met:

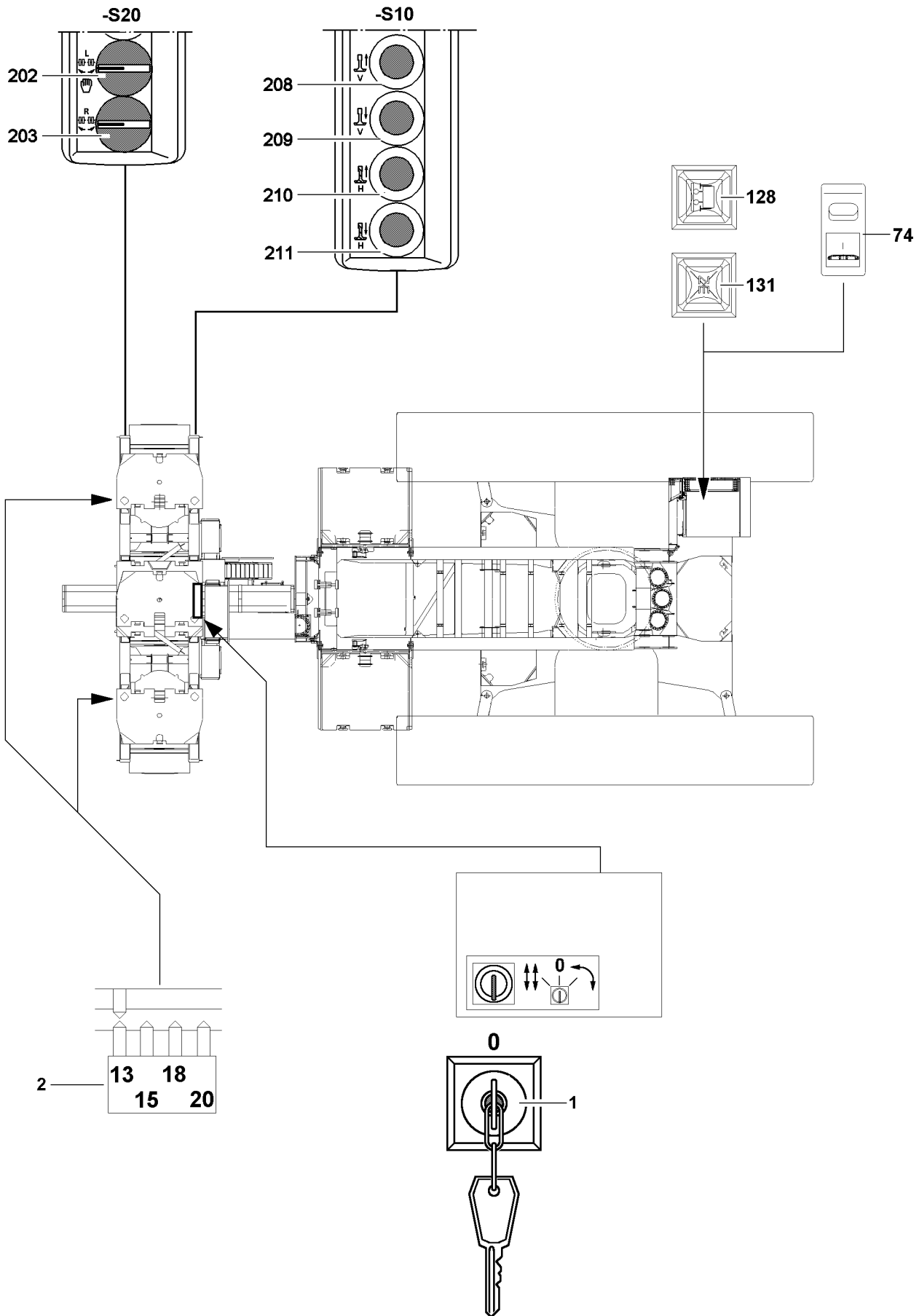
- The wheel sets are in the towing position.

NOTICE

Damage of ballast trailer!

If the angle settings on the wheel sets are not monitored during driving in emergency operation, it can lead to significant damages to the wheel sets!

- ▶ The angle settings **2** on the wheel sets are to be constantly inspected!
- ▶ Constantly monitor the alignment of the wheel sets constantly during travel!
- ▶ If the wheel sets become excessively deformed, they are to be re-aligned!



LWE/LR 1750-000/12812-15-02/en

Fig.109531

9.3 Emergency operation - circular driving

Make sure that the following prerequisites are met:

- The ballast trailer is properly installed.
- Crawler operation is turned on (switch **74**).

9.3.1 Lifting the ballast trailer with the support cylinders



Note

- ▶ The support cylinders of the ballast trailer must always be moved out evenly!

Move the front and rear support cylinders out:

- ▶ Press button **209** and button **211**.

9.3.2 Aligning wheel sets into circle driving position

So that the wheel sets in circular driving position can be aligned, the ballast trailer must be lifted with the support cylinders.

Make sure that the following prerequisite is met:

- The ballast trailer is raised via the support cylinders to the point where the wheel sets are relieved.
- ▶ Turn the key switch **1** on the ballast trailer to the „right“.

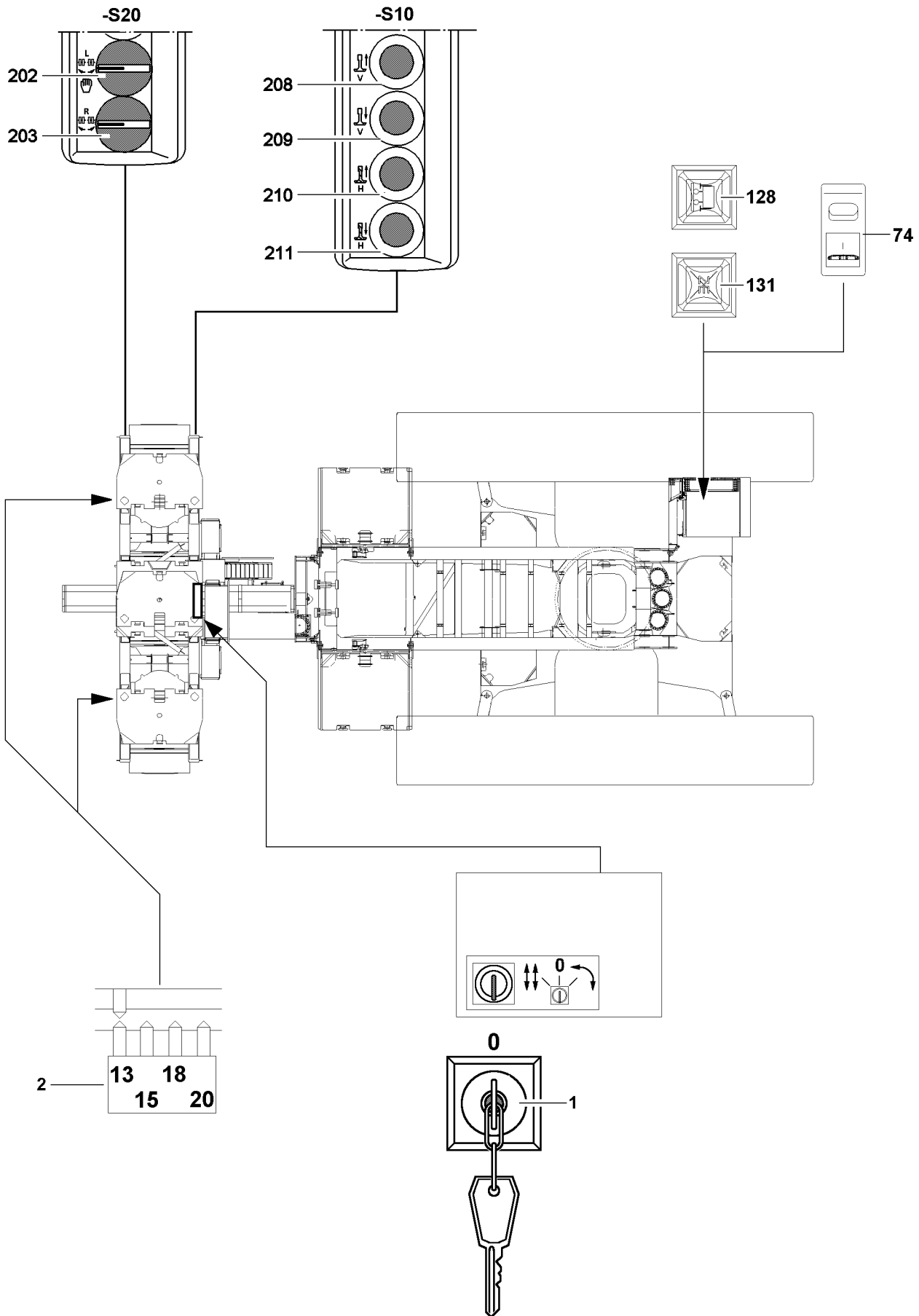


Note

- ▶ By activating the Key switch **1** into position „right“, the order „Circular driving“ is passed on to the crane and emergency operation is switched on!
- ▶ During emergency operation the support can only be activated control panel **-S10** on the ballast trailer!

When the wheel sets are relieved:

- ▶ Activate the rotary switch **202** on the control panel **-S20** and align the left wheel set into circular driving.
- ▶ Activate the rotary switch **203** on the control panel **-S20** and align the right wheel set into circular driving.
- ▶ Check the settings.



LWE/LR 1750-000/12812-15-02/en

Fig.109531

9.3.3 Lowering the ballast trailer with the support cylinders



Note

- ▶ The support cylinders of the ballast trailer must always be moved in evenly!
-

Move support cylinders in completely on the front and rear:

- ▶ Press button **208** and button **210**.

Result:

- The support cylinders move in.
- ▶ Move the support cylinders in completely.

Result:

- The warning light **128** („Ballast trailer support moved in“) **lights up**.

9.3.4 Circular driving

Make sure that the following prerequisites are met:

- The wheel sets are in the circular driving position.

NOTICE

Damage of ballast trailer!

If the angle settings on the wheel sets are not monitored during driving in emergency operation, it can lead to significant damages to the wheel sets!

- ▶ The angle settings **2** on the wheel sets are to be constantly inspected!
 - ▶ Constantly monitor the alignment of the wheel sets constantly during travel!
 - ▶ If the wheel sets become excessively deformed, they are to be re-aligned!
-

10 Maintenance intervals for the ballast trailer



Note

- ▶ See Crane operating instructions, chapter 7.02!
-

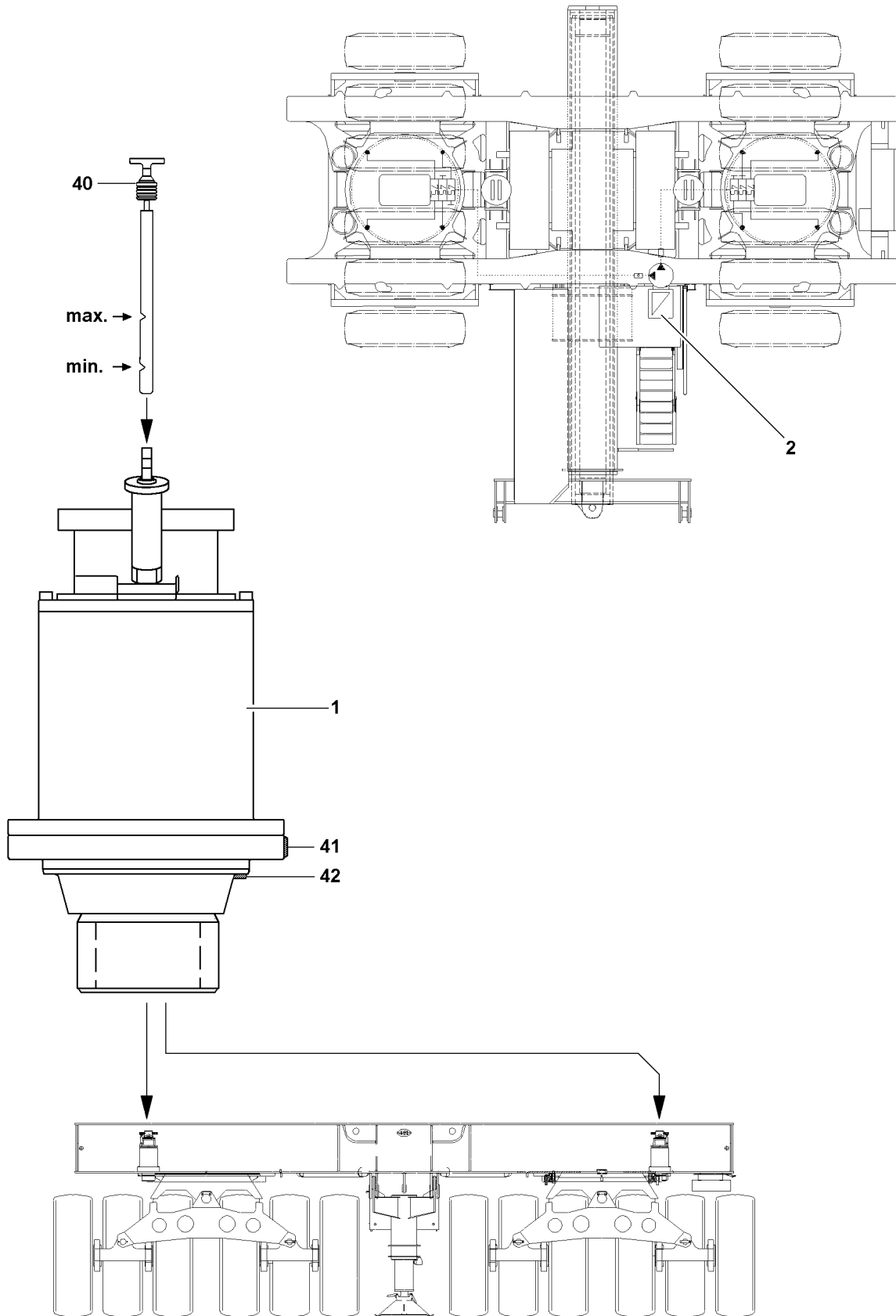


Fig.109561

LWE/LR 1750-000/12812-15-02/en

11 Maintenance

11.1 Ballast trailer tires

11.1.1 Ballast trailer tires



Note

▶ See Crane operating instructions, chapter 2.15!

11.1.2 Ballast trailer tires and disk wheels



Note

▶ See Crane operating instructions, chapter 8.01!

11.2 Hydraulic hose lines



Note

▶ See Crane operating instructions, chapter 7.05!

11.3 Slewing gear

Please maintain utmost cleanliness during all work to prevent dirt from entering the interior of the gear system.

11.3.1 Checking the oil level

Make sure that the following prerequisites are met:

– The ballast trailer is in horizontal position.

- ▶ Remove the dipstick **40** and wipe it off.
- ▶ Reinsert the dipstick **40** and pull it out again.

The oil level must be between the min. and max. mark on the dipstick **40**.

- ▶ Check the oil level.

NOTICE

Danger of gear damage!

If the oil level has dropped below the minimum mark, add engine oil as specified in the lubrication chart until the oil level is between the minimum and maximum marks!

If the required minimum marks are fallen below, the gearing is destroyed!

- ▶ Top off oil, wait a short time and then check the oil level again!

- ▶ Reinsert the oil dipstick **40**.
-

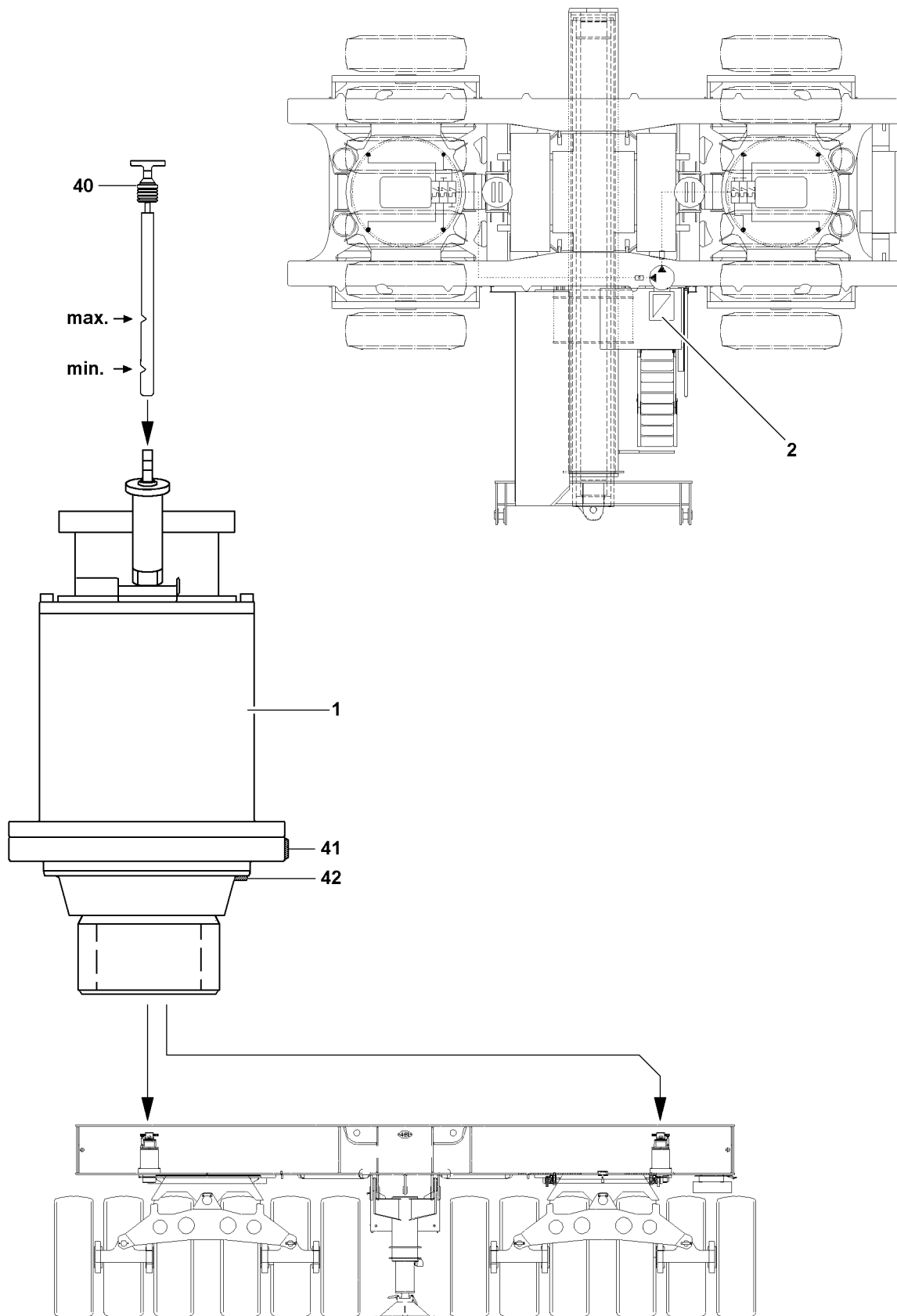


Fig.109561

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11.3.2 Changing the oil



Note

- ▶ On the slewing gear as desired, the gear oil at the oil drain plug **41** or at the oil drain plug **42** or be released from both oil drain plugs at the same time!

Make sure that the following prerequisites are met:

- The ballast trailer is in horizontal position.
- The slewing gear is warm.
- ▶ Open the oil filler port by unscrewing the dipstick **40**.
- ▶ Remove the oil drain plug **41** and oil drain plug **42** and drain the oil completely with the seal ring loosened.
- ▶ Clean the oil drain plug **41** and sealing surface on the housing.
- ▶ Clean the oil drain plug **42** and sealing surface on the housing.
- ▶ Reinstall the oil drain plug **41** and the oil drain plug **42** with a new seal and tighten.
- ▶ Add oil as specified in the lubricant chart at the oil filler port until the oil level is between the minimum and maximum mark on the oil dipstick **40**.
- ▶ Close the oil filler port by screwing in the oil dipstick **40**.
- ▶ Check the oil level as described in the section „Check oil level“.

11.4 Central lubrication system



Note

- ▶ See Crane operating instructions, chapter 7.05!

12 Fill quantities

13 Fill quantities for ballast trailer

The specified fill quantities (change quantities) are orientation values. The markings on the dipsticks, inspection ports or sight gauges are decisive for filling.

NOTICE

Danger of property damage!

- ▶ Do not mix synthetic oils with mineral oils!

Position	Components	Fill quantity
1	Slewing gear	4.4 l
2	Central lubrication system	2.5 kg

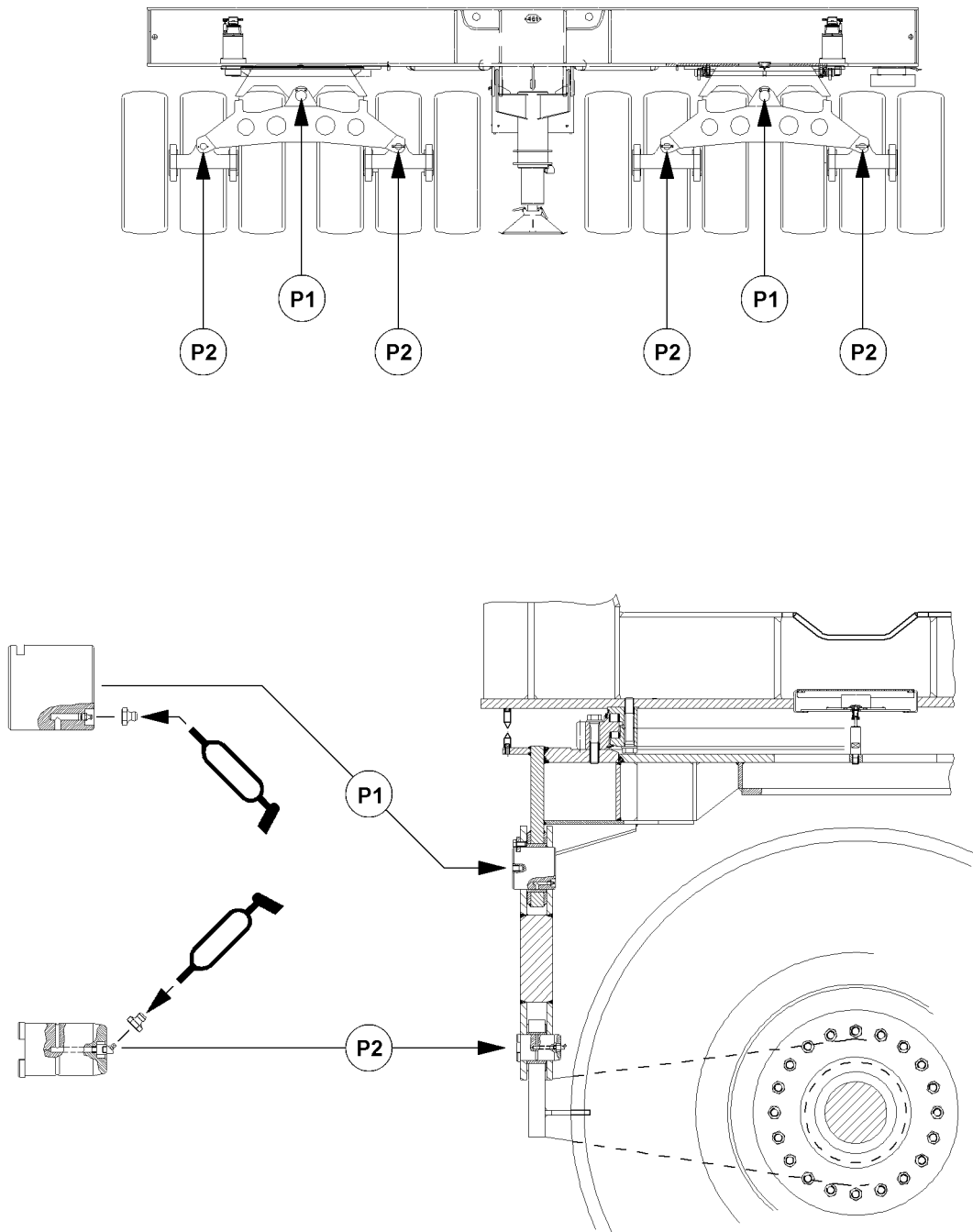


Fig.108967

LWE/LR 1750-000/12812-15-02/en

14 Lubrication chart

14.1 Lubrication chart Ballast trailer*



Fig.107729



Note

▶ The lube points are marked with this icon!

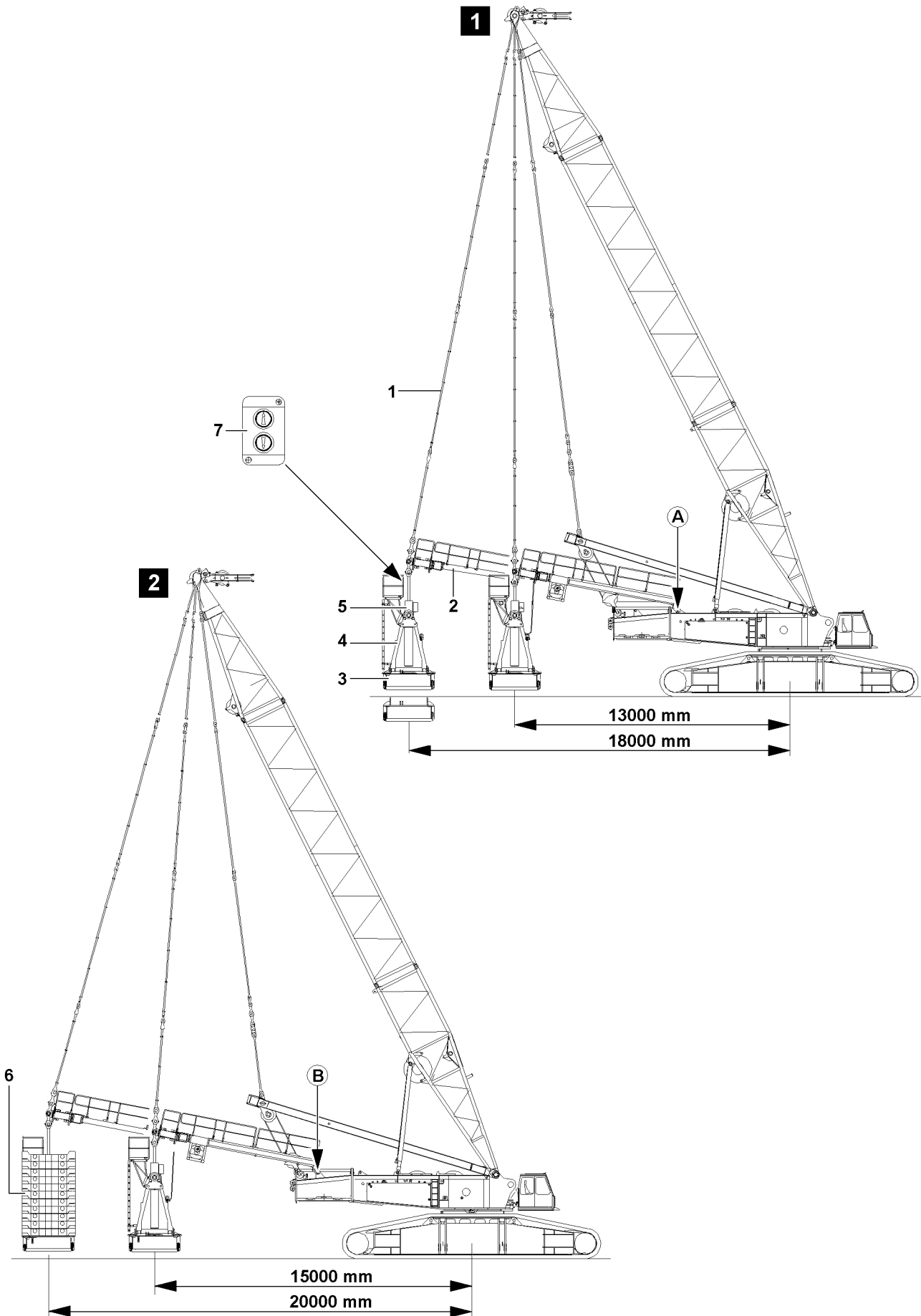


Fig.107525

LWE/LR 1750-000/12812-15-02/en

1 Description and component overview

The hydraulic telescopic suspended ballast guide **2**, can be telescoped out by 5000 mm steplessly.

Depending upon the guide frame pivot point to the turntable, the derrick ballasting radii between 13.0 m and 18.0 m (pivot point **A**), and 15.0 m and 20.0 m (pivot point **B**), are possible.



Note

- ▶ The suspended ballast and ballast trailer are generally referred to as the derrick ballast!
- ▶ The fixed compensation weight which is assembled on the turntable is generally referred to as the counterweight!

The derrick boom angle, the derrick ballast radius, the derrick ballast weight and the derrick ballast utilization are displayed on LICCON monitor 1.

After assembly on the ground, the derrick ballast is raised for crane operation using the pull cylinders **5** assembled on the ballast pallet **3**.

For crane operation with derrick ballast, see chapter 4.02 of the crane operating instructions.

1.1 Component overview derrick ballast and ballast pallet

Please refer to illustration 1 and illustration 2!

Position	Components
1	Derrick ballast guying
2	Guide
3	Ballast pallet
4	Erection rack
5	Pull cylinder
6	Ballast plates
7	Control panel

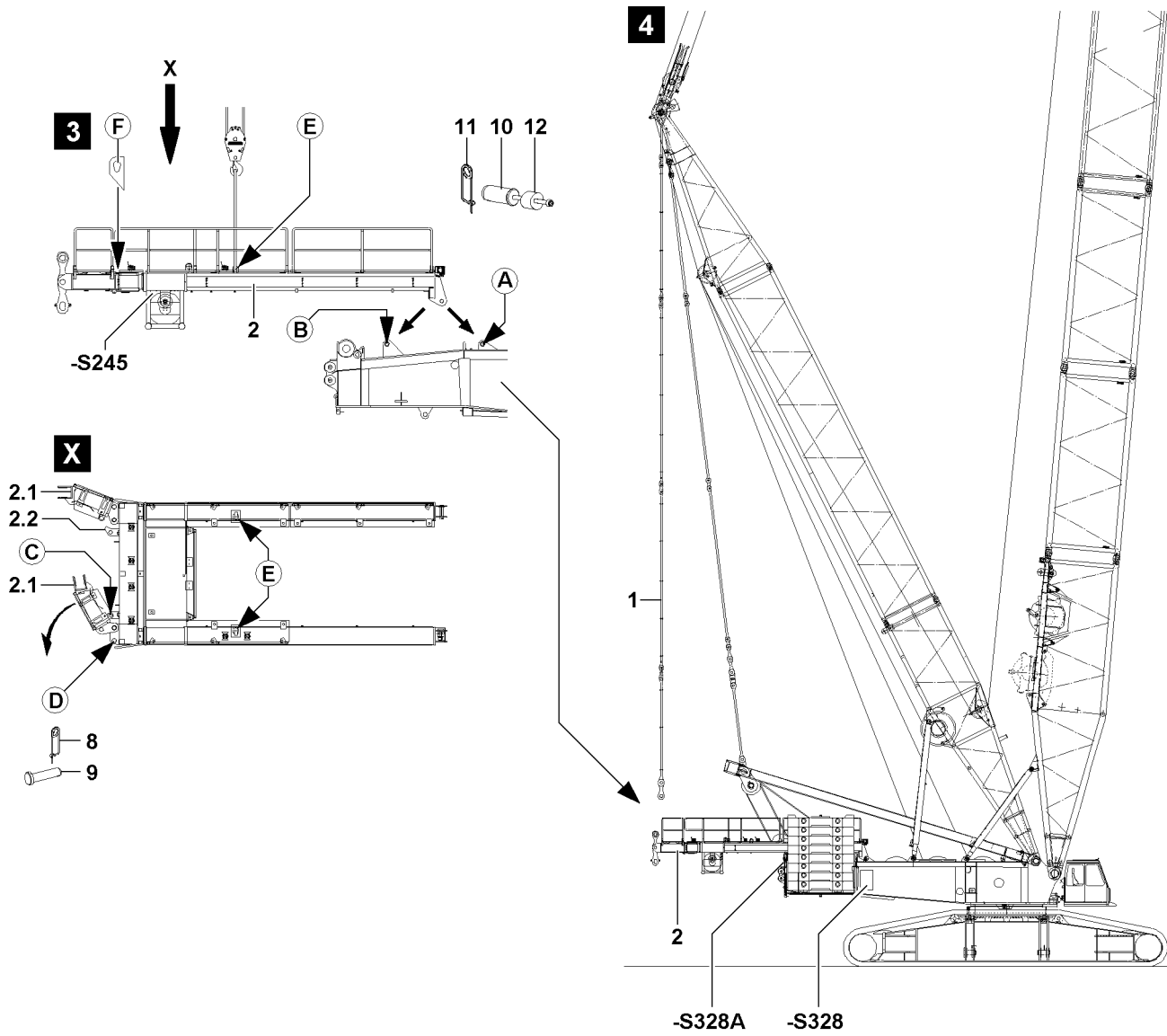


Fig.107524

LWE/LR 1750-000/12812-15-02/en

2 Assembly



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved catch systems to avoid falling, see crane operating instructions chapter 2.04!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Only step on aids and antfall guards with clean shoes!
- ▶ Keep aids and antfall guards clean and free from snow and ice!
- ▶ During all assembly / disassembly work, maintenance work and inspections, travel or crane operation is prohibited!



WARNING

Danger of crushing!

While assembling, hands can be crushed or even severed by swing movements of the components!

- ▶ Make sure that the components do not swing back and forth during assembly!



WARNING

Falling crane components!

If a crane component is disengaged from the auxiliary before it is properly assembled and secured, it can fall down!

Personnel can be severely injured or killed!

- ▶ Only disengage the auxiliary crane after the relevant crane component is properly assembled and secured, visual inspection!

Make sure that the following prerequisites are met:

- the crane is aligned in horizontal direction,
- the boom and the derrick boom are assembled on the turntable,
- the derrick boom is erected,
- the counterweight has been installed to the turntable according to the load chart,
- the LICCON overload protection has been set according to the data in the load chart,
- an auxiliary crane is available.

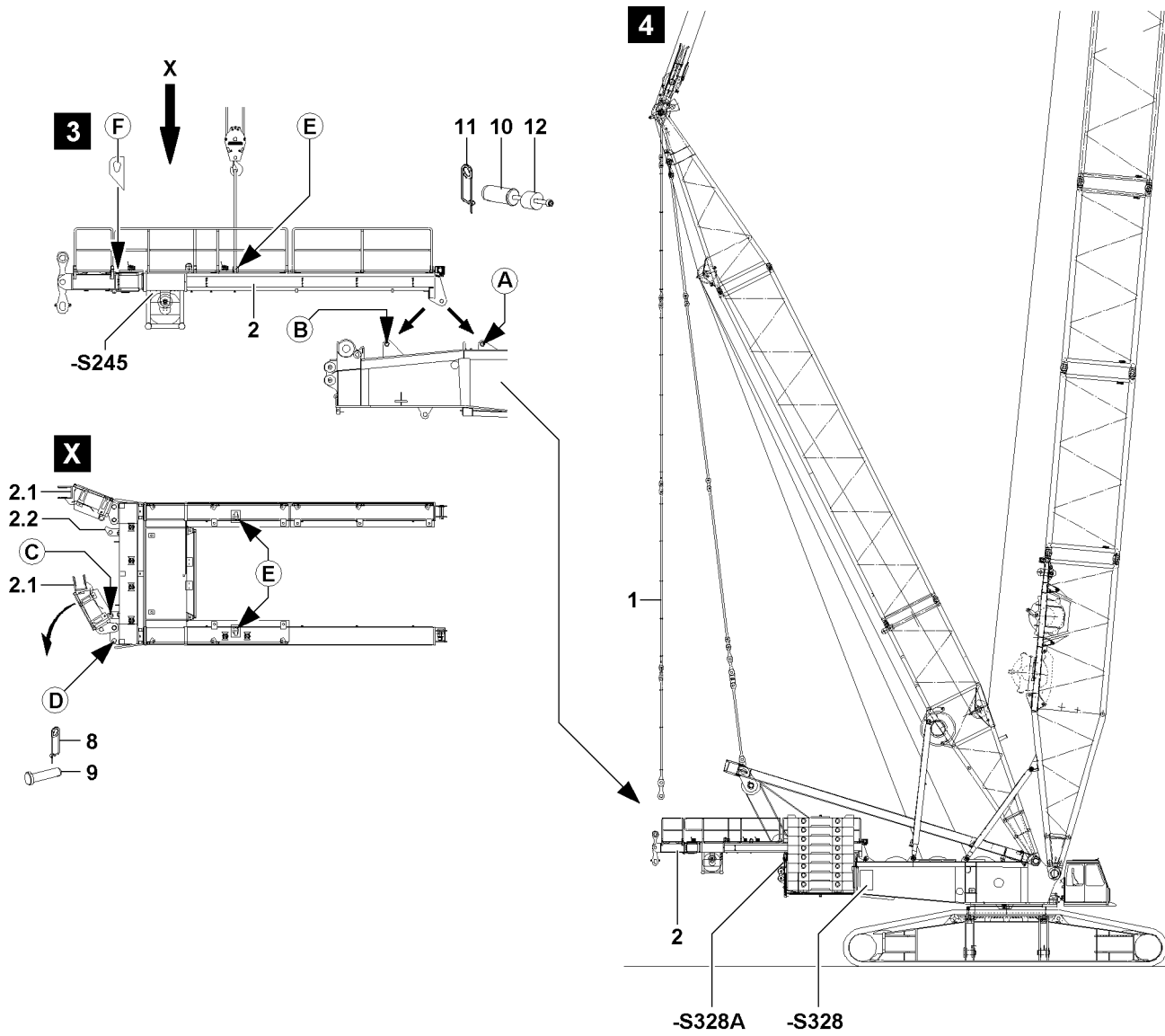


Fig.107524

LWE/LR 1750-000/12812-15-02/en

2.1 Pre-assembling guide frame

So that the transport width of the guide frame **2** can be maintained, the slewing arms **2.1** are folded and secured in transport position outside to inside, please refer to illustration **X**.

Bring and secure slewing arms **2.1** into operating position for crane operation.

- ▶ Release and unpin the locking pin **8** left and right at point **C**.
- ▶ Fold slewing arms **2.1** into operating position (in direction of arrow) to the outside.

When the slewing arms **2.1** are in operating position:

- ▶ Pin in the locking pin **8** at point **D** and secure with spring retainer **9**.

NOTICE

Risk of damage to railings!

The can be severely damaged if the railings are not brought and secured into operating position before assembly of the guide frame to the turntable!

- ▶ Bring and secure railings into operating position before assembly of the guide frame to the turntable!

-
- ▶ Remove spring retainers on the railings.
 - ▶ Swing railings upward into operating position.
 - ▶ Secure railings in operating position with spring retainers.

2.2 Installing the guide frame onto the turntable

Pinning point	Possible derrick ballast radii
A	13 m to 18 m
B	15 m to 20 m

Make sure that the following prerequisites are met:

- the slewing arms **2.1** are pinned in operating position and secured,
- all guard rails are pinned and secured in operating position.

- ▶ Attach the guide frame **2** onto the lashing lugs, point **E**, on the auxiliary crane, illustration **3**, illustration **X**.

NOTICE

Risk of property damages!

By swinging in the guide frame to the bolting points on the turntable, the crane components can be substantially damaged!

- ▶ Swinging the guide frame with the auxiliary crane is to be carried out with the greatest possible caution and at the slowest speed!
-

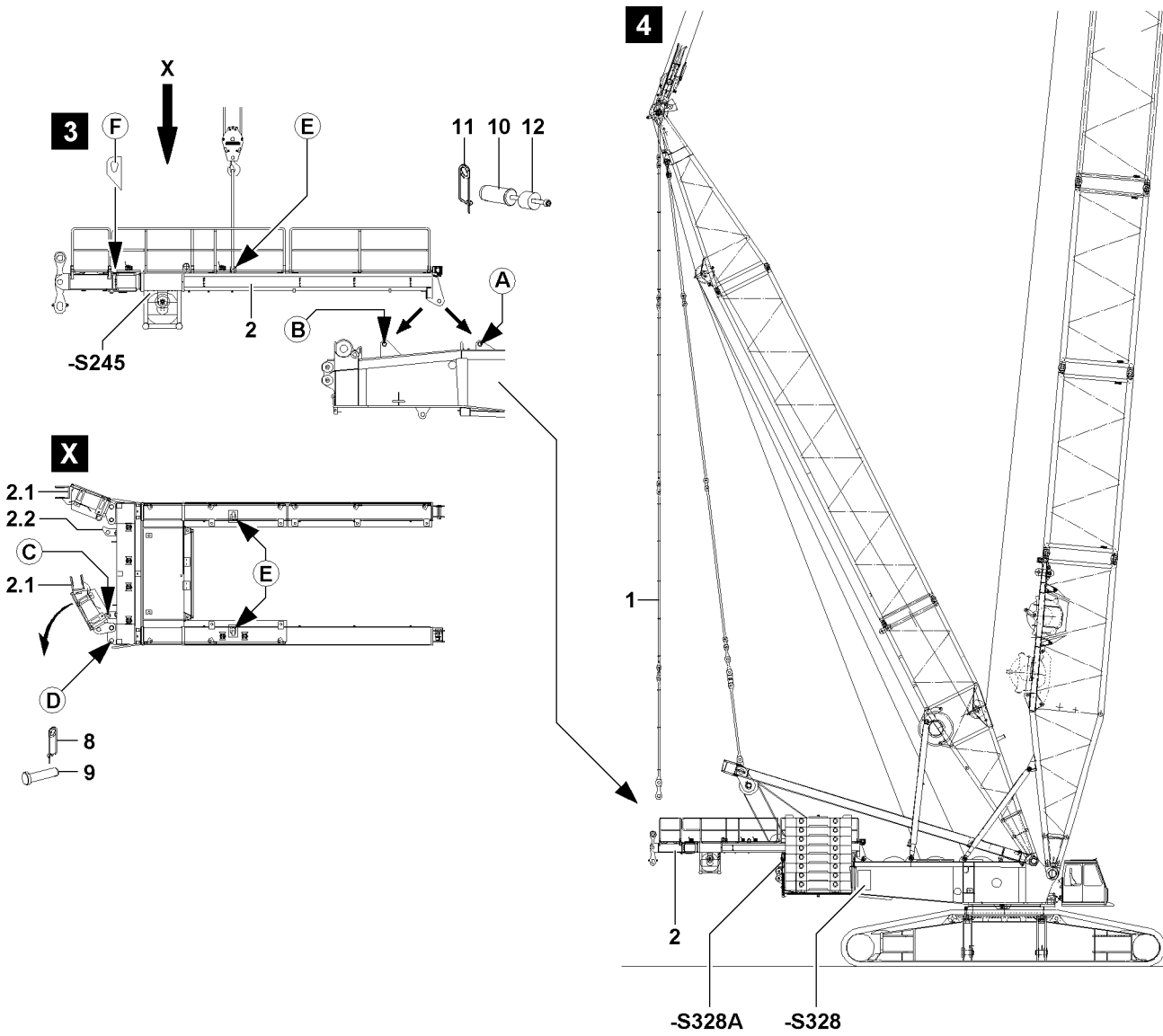


Fig.107524

LWE/LR 1750-000/12812-15-02/en

- ▶ Swing in the guide frame **2** with the auxiliary crane to the pinning point **A** on the turntable, illustration 4.
- or**
- ▶ Swing in the guide frame **2** with the auxiliary crane to the pinning point **B** on the turntable, illustration 4.

When the guide frame **2** is in the desired pinning position:

- ▶ Pin in the pins **10** on the corresponding pinning point with the striker **12** from the inside to the outside.
- ▶ Secure the pin **10** with spring retainer **11**.

When the guide frame is pinned and secured on both sides on the turntable:

- ▶ Lower guide frame **2** on the mounting to the turntable, illustration 4.
- ▶ Remove the auxiliary crane.
- ▶ Fold down lashing lugs, point **E**, onto the guide frame **2**.
- ▶ Remove hydraulic hose lines from the hose brackets on the guide frame **2**.

2.3 Establishing the hydraulic connection from the guide frame to the turntable

When hydraulic lines are connected and disconnected with quick-release couplings, make sure that the coupling procedure is carried out correctly.



DANGER

Risk of accident due to loss of pressure or leakage!

Incorrectly coupled or incompletely coupled quick-release couplings (particularly return lines) as well as self-loosening of quick-release couplings can result in serious injury due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
-
- ▶ Release the pressure in the hydraulic system before connecting and disconnecting. Turn the engine off and wait several minutes!
 - ▶ Assemble coupling components (sleeve and connector) and screw together using hand-tightened nut!
 - ▶ Tighten hydraulic coupling by hand!
 - ▶ Rotate hand-tightened nut until it reaches a tangible, fixed stop position!

2.4 Establishing the electrical connection from the guide frame to the turntable

Ensure that the following prerequisite is met:

- the guide frame is assembled completely to the turntable, pinned and secured.



Note

- ▶ For production of the electrical connections, the separate electrical diagram is to be employed!
 - ▶ Heed the installation locations of the terminal boxes for the various derrick ballast radii!
 - ▶ If the guide frame is not pinned to the pin points **A**, use terminal box **-S328** on the turntable!
 - ▶ If the guide frame is not pinned to the pin points **B**, use terminal box **-S328A** on the turntable!
-
- ▶ Insert length sensor terminal box **-S328** to the turntable.
 - or**
 - ▶ Insert length sensor terminal box **-S328A** to the turntable.
 - ▶ Establish connection from the terminal box **-S245** on the guide frame to the turntable.

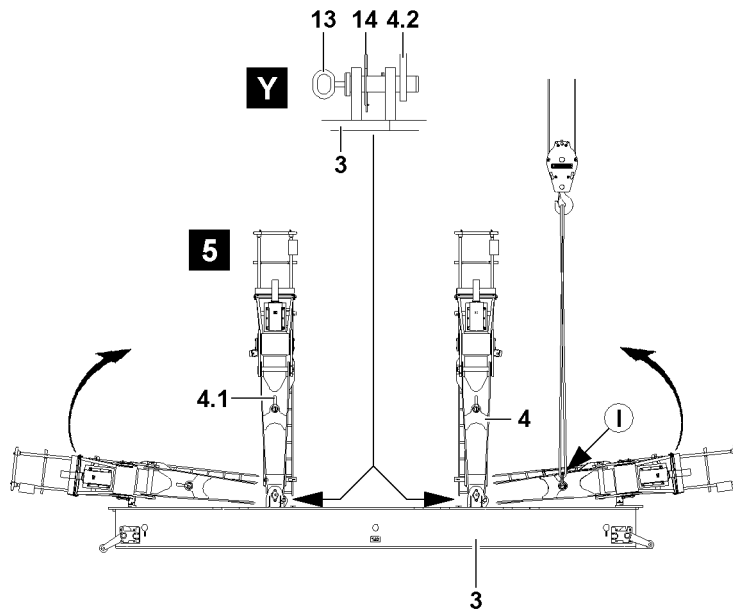


Fig.107529

LWE/LR 1750-000/12812-15-02/en

2.5 Pre-assemble the ballast pallet

Align ballast pallet with auxiliary crane to the crane longitudinal axis and lower within the slewing range of the ballast trailer.

Finally, erect and secure the erection racks.

2.5.1 Align ballast pallet in assembly position and lower



Note

▶ The attachment hook for transport of the ballast pallet may be found inside the steel structure!

- ▶ Attach ballast pallet on the four attachment hooks on the auxiliary crane.
- ▶ Align ballast pallet with auxiliary crane to longitudinal axis of the crane or to the turntable.
- ▶ Lower ballast pallet in crane slewing range.
- ▶ Remove the auxiliary crane.

2.5.2 Set up erection racks



Note

▶ Erection of the erection racks **4** is identical for both erection racks and is described using the example of an erection rack!



WARNING

Risk of fatal injury when assembling / disassembling the erection racks!

Using improper assembly / disassembly of erection racks can result in tipping!

Personnel can be severely injured or killed!

- ▶ Never unpin the retaining pins **13** of unsecured or unsupported erection racks!
- ▶ Standing under the erection racks **4** or in the entire danger zone is prohibited during pinning or unpinning!

Ensure that the following prerequisite is met:

- the retaining pins **13** are found in the position „unpinned“.

- ▶ Attach the erection rack on the eye hooks **4.1**, point **I** on the auxiliary crane.
- ▶ Erect the erection rack **4** with the auxiliary crane to the vertical position.

When the erection rack **4** is in the desired vertical position:

- ▶ Pin in the retaining pins **13** on the bracket **4.2** and secure with spring retainer **14**, see illustration **Y**.



WARNING

Tipping erection racks!

Through improper securing of the erection racks, they can tip over upon removal of the auxiliary crane!

Personnel can be severely injured or killed!

- ▶ Ensure that the erection racks with the retaining pins **13** are properly pinned and secured!

When the erection rack **4** is pinned and secured properly:

- ▶ Remove the auxiliary crane.



Note

▶ Proceed with the erection of the second erection rack, as described above!

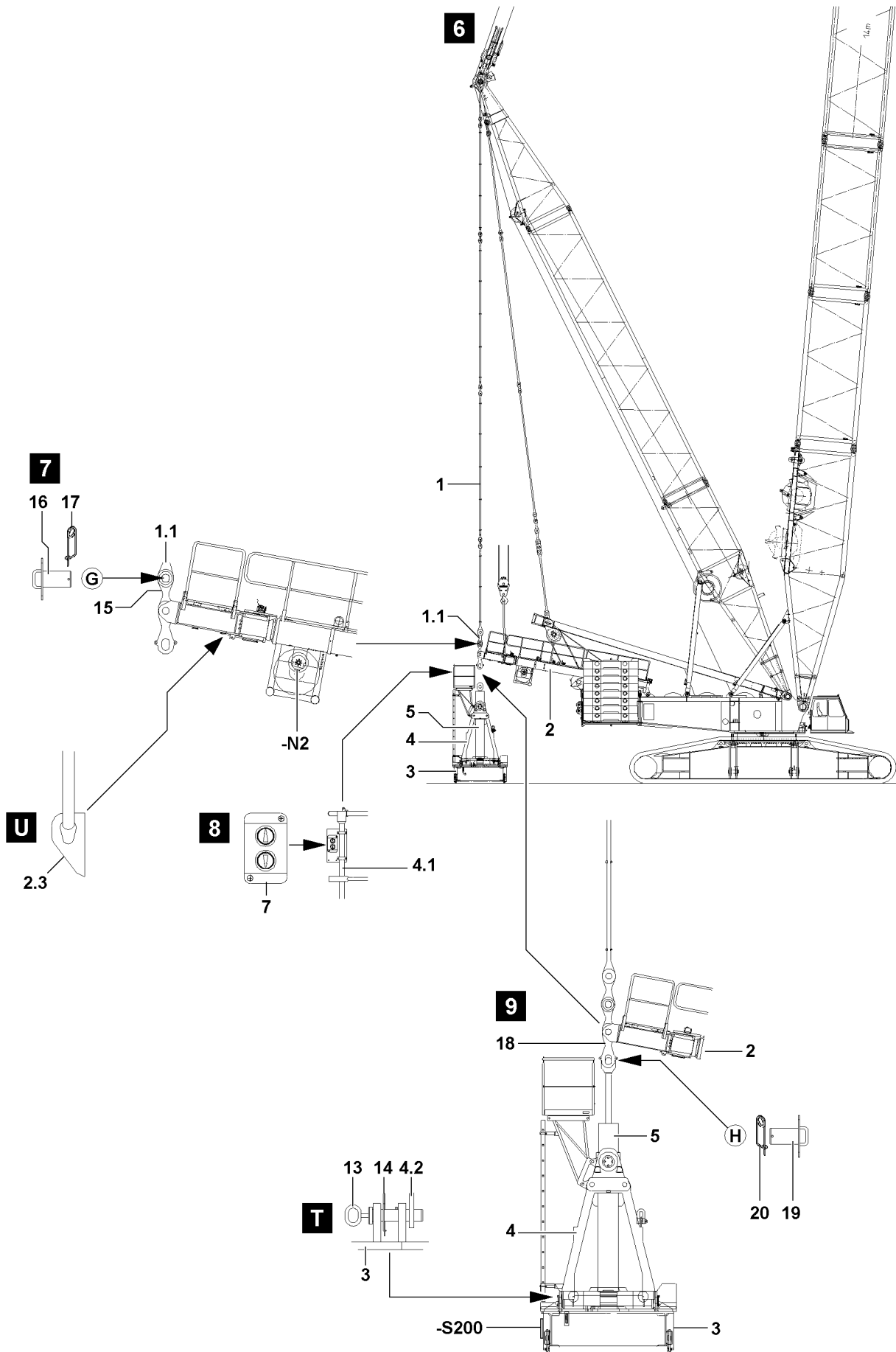


Fig.107528

LWE/LR 1750-000/12812-15-02/en

2.6 Installing the ballast pallet



WARNING

Toppling ballast pallet!

Uneven ground can cause the ballast pallet to sink into the ground during assembly!

This can lead to toppling of the ballast stack during ballasting of the ballast pallet and can lead to life-threatening injuries or death to personnel!

- ▶ Ensure that the subsoil is level and sufficiently capable of supporting the load, in order to securely accept the ballast pallet inclusive of the ballast plates!

2.6.1 Installing guide frame to derrick ballast guying

- ▶ Lower derrick boom backward into operating position.
- ▶ Attach the auxiliary crane on the attachment points **2.3** on the guide frame, see illustration **U**.
- ▶ Lift the guide frame **2** with the auxiliary crane.
or
Telescope out the guide frame **2** at low speed.

If the retaining pins of the lugs **1.1** and the lugs **15** align:

- ▶ Pin in the pins **16** on both sides with point **G** and secure with spring retainer **17**, see illustration **7**.

When the lugs **1.1** are securely pinned and secured with the lugs **15**:

- ▶ Remove the auxiliary crane.

2.6.2 Establishing hydraulic connections from the guide frame to the pull cylinders in the ballast pallet

When hydraulic lines are connected and disconnected with quick-release couplings, make sure that the coupling procedure is carried out correctly.



DANGER

Risk of accident due to loss of pressure or leakage!

Incorrectly coupled or incompletely coupled quick-release couplings (particularly return lines) as well as self-loosening of quick-release couplings can result in serious injury due to component failure!

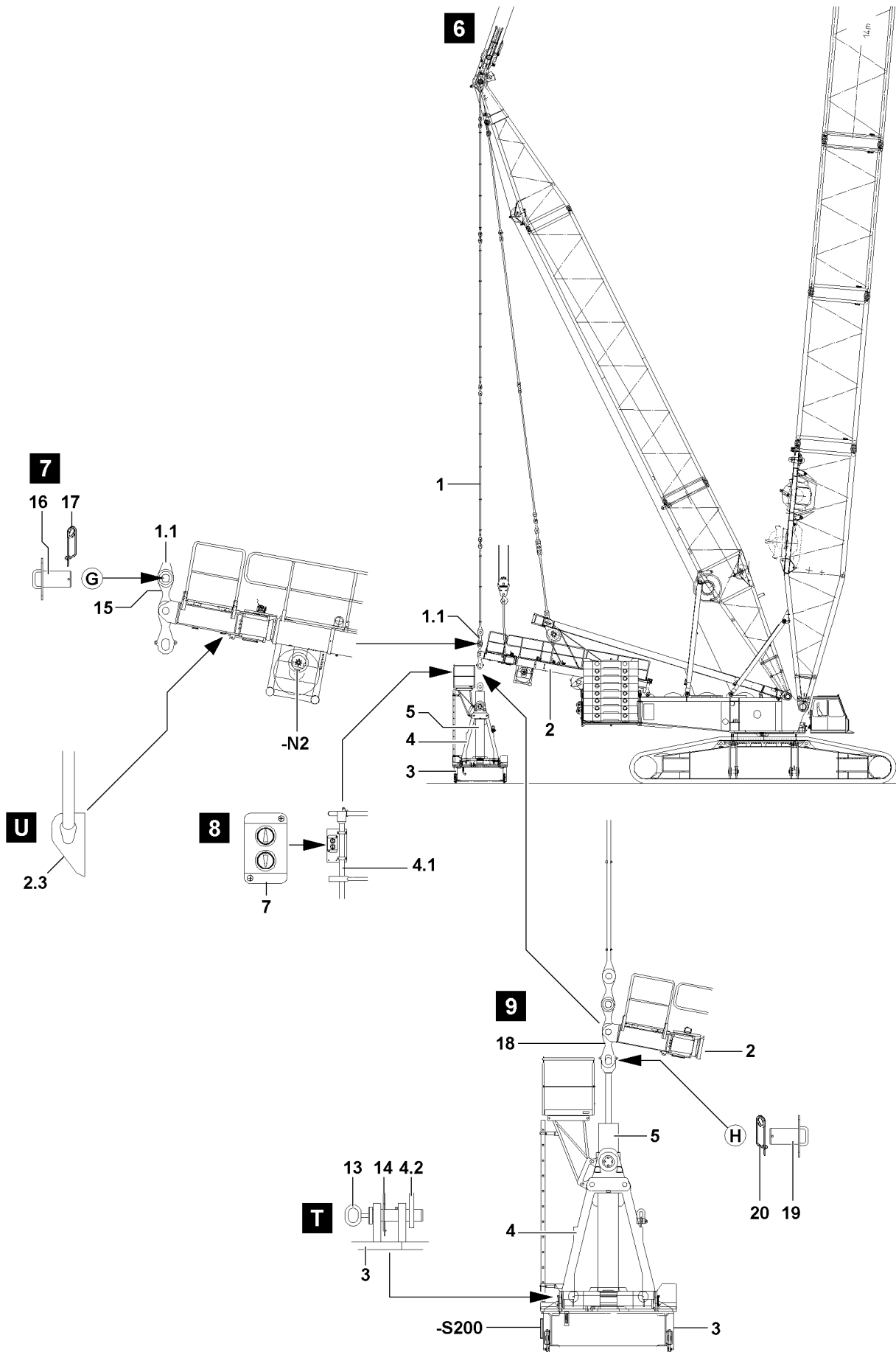
- ▶ Check that the quick-release couplings have been properly connected before taking up the crane work!
-
- ▶ Release the pressure in the hydraulic system before connecting and disconnecting. Turn the engine off and wait several minutes!
 - ▶ Assemble coupling components (sleeve and connector) and screw together using hand-tightened nut!
 - ▶ Tighten hydraulic coupling by hand!
 - ▶ Rotate hand-tightened nut until it reaches a tangible, fixed stop position!

2.6.3 Establishing the electrical connection from the guide frame to the ballast pallet



Note

- ▶ For establishing the electrical connections, the separate electrical diagram is to be employed!
-
- ▶ Establish connection from the terminal box **-S200** on the ballast pallet to the cable drum **-N2** on the guide frame.



LWE/LR 1750-000/12812-15-02/en

Fig.107528

2.6.4 Installing ballast pallet to guide frame

Make sure that the following prerequisites are met:

- the guide frame is pinned and secured to the derrick ballast guying,
- the ballast pallet is in assembly position,
- the erection racks are erected, properly pinned and secured,
- the hydraulic connections to the ballast pallet are established,
- the electrical connections to the ballast pallet are established.

▶ Start the crane engine.

Extend pull cylinder **5** piston rods and pin with lugs **18** on the guide frame.



Note

- ▶ The pull cylinder **5** piston rods can be operated from the crane operator's cab as well as directly on the corresponding ballast pallet control panels **7**, see illustration **8**!
- ▶ Thee control panels **7** may be found on the pedestals **4.1** of the erection racks **4**!
- ▶ Only the relevant pull cylinder can be operated on the control panel **7**!

▶ Extend the pull cylinder **5** piston rods, see illustration **9**.

If the piston rod pin borings align with pin borings lugs **18**:

- ▶ Pin in the pins **19** on both sides with point **H** and secure with spring retainer **20**, see illustration **9**.

NOTICE

Damage to the ballast pallet!

If the retaining pins **13** are not unpinned before taking up work on the crane, it can result in property damages in the area of the ballast pallet **3** and the erection racks **4**!

- ▶ First, unpin retaining pins **13**, if it is ensured that the pull cylinder **5** piston rods are securely pinned and secured with the lugs **18** on the guide frame **2**, see illustration **9**!
- ▶ Release retaining pins **13** and unpin up to stop position.
- ▶ Secure retaining pins **13** in a position „unpinned“ with spring retainer **14**.

Fig.195219

LWE/LR 1750-000/12812-15-02/en

2.7 Functional control before lifting the derrick ballast

Make sure that the following prerequisites are met:

- the hydraulic connections from the derrick ballast and the turntable are established,
- the electrical connections from the derrick ballast to the turntable are established,
- the ground contact rollers must move easily.



WARNING

Risk of fatal injury if the derrick ballast touches the ground!

If the crane movements „turntable turn“ and „driving the crawler“ are not turned off upon derrick ballast contact with the ground, the ballast stack or individual ballast plates can topple!

Personnel can be severely injured or killed!

- ▶ Make sure that upon touching the floor of the derrick ballast, at least a ground contact switch is actuated and the crane movements „turn turntable“ and „driving the crawler“ turns off, visual inspection!
- ▶ There may be no persons, objects or obstacles within the slewing range of the derrick ballast!

2.7.1 Limit switch „Derrick ballast on ground“

- ▶ Manually actuate the ground contact switch individually.

Result:

- „Turntable turning“ switch off.
- „Crawler driving“ turns off.
- The warning light lights up.

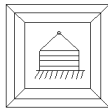


Fig.104666: Warning lights „Derrick ballast on ground“

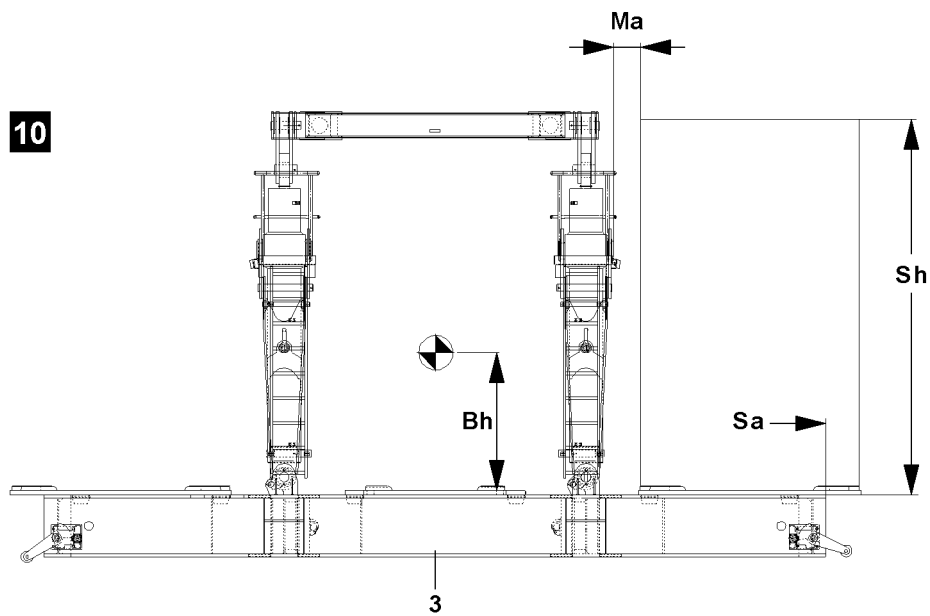


Fig.107527

2.8 Ballasting the ballast pallet



WARNING

The crane can topple over!

If the following hazard warnings are not observed, ballast plates or ballast stacks on the ballast pallet can slide and fall down!

The crane can topple over and personnel can be severely injured or killed!

- ▶ The subsoil, where the ballast pallet is set, must be level and have adequate load-bearing capacity!
- ▶ Always distribute ballast plates symmetrically, based on the longitudinal axis!
- ▶ Always ballast the intermediary ballast stacks in suspended condition first and unballast these ballast stacks last!
- ▶ The outside ballast stacks must weigh the same and be the same height after ballasting!
- ▶ The permissible weight difference between right and left stack may amount with ballasting and unballasting a maximum 20.0 t !
- ▶ The maximum permissible ballast centre of gravity height **Bh** of 2000 mm may not be exceeded!
- ▶ The maximum permissible stack height **Sh** of 4500 mm , measured from the upper edge of the ballast pallet, may not be exceeded!
- ▶ The maximum permissible weight of the ballast plates of 390 t may not be exceeded!
- ▶ The ballast plates must be secured to prevent them from moving or falling down!
- ▶ The distances of the centre of gravity of the outside ballast stacks are to be maintained and must be identical between left and right stack!
- ▶ Immediately replace damaged ballast plates with new ballast plates!

NOTICE

Damage to the pull cylinder!

If the minimum clearance of the ballast stacks to the pull cylinders is exceeded, the pull cylinders can be substantially damaged!

- ▶ The minimum clearance **Ma** of the ballast stacks to the pull cylinders must amount to at least 300 mm !

Centre of gravity distance Sa	Maximum permissible ballast weight per stack (left/right)		
	152 t	160 t	170 t
800 mm	X		
865 mm		X	
1000 mm			X

Ensure that the following prerequisites are met:

- the ballast pallet is assembled on the guide frame and is lowered onto the ground,
- an auxiliary crane is available.

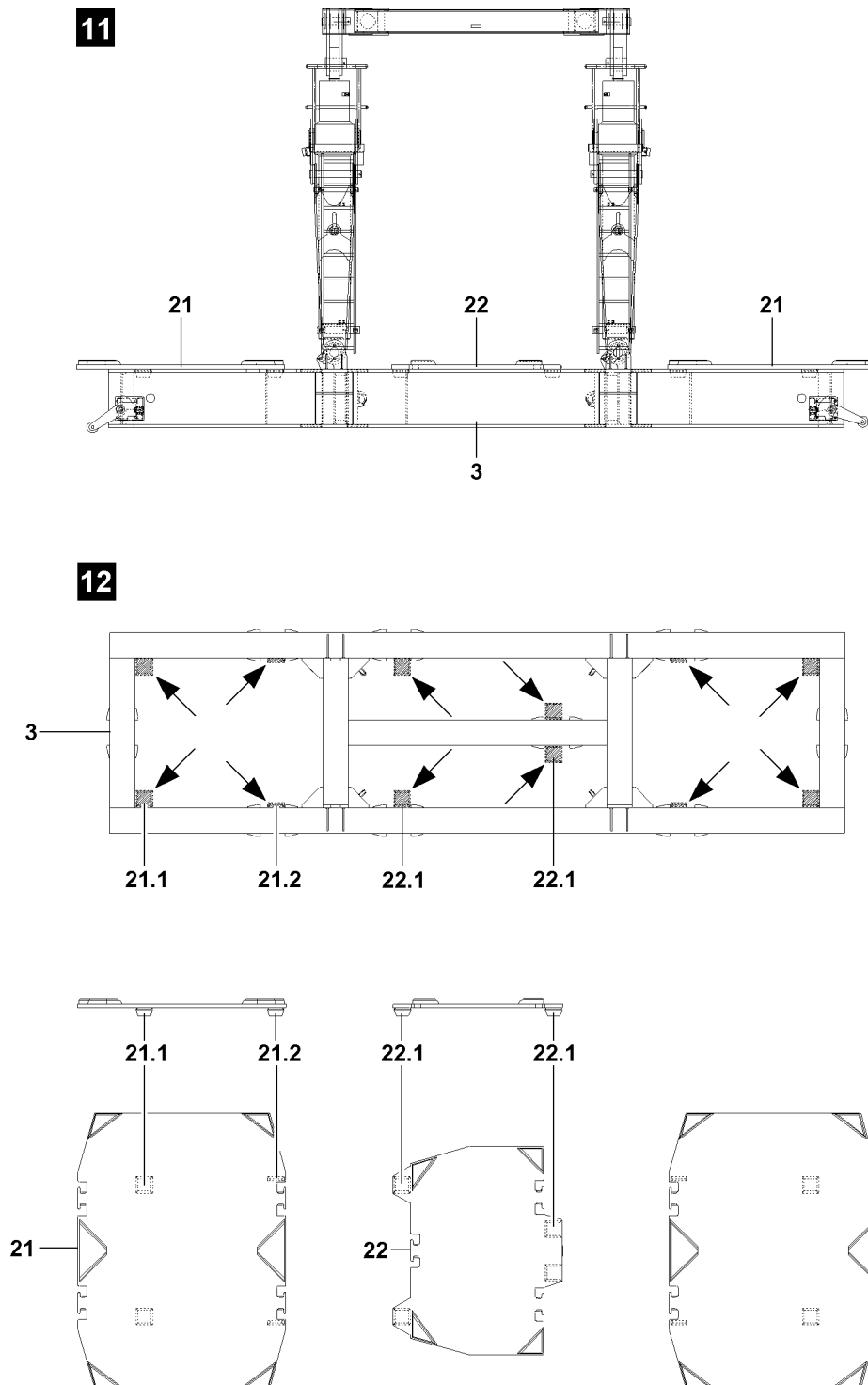


Fig.107530

LWE/LR 1750-000/12812-15-02/en

2.8.1 10.0 t Ballasting ballast plates



Note

- ▶ The ballast plates are marked with their own weights!

Place centring plates* on ballast pallet

When using the 10.0 t ballast plates, the centring plates **21** and the centring plate **22** must be used.

The centring plates serve to take up the 10.0 t ballast plates securely, in order to prevent slipping during crane operation.



WARNING

The crane can topple over!

Through improperly laid centring plates, individual ballast plates or the ballast stacks can slip or fall down and lead to toppling of the crane!

Personnel can be severely injured or killed!

- ▶ Place the centring plates properly on the ballast pallet, visual inspection!
- ▶ Crane operation with improperly laid centring plates is prohibited!

Lay central centring plate

- ▶ Attach the centring plate **22** on the auxiliary crane.



Note

- ▶ Observe correct installation position of the centring plate, see illustration **11!**
- ▶ The centrings **22.1** must be positioned according to illustration **12** on the frame of the ballast pallet **3**, visual inspection!

- ▶ Position centring plate **22** and place into the frame of the ballast pallet **3**.
- ▶ Lower centring plate **22** onto the frame of the ballast pallet **3**.

If the centring plate lies flatly on the frame of the ballast pallet:

- ▶ Remove the auxiliary crane.

Place outside centring plates



Note

- ▶ Placing of the two outside-lying centring plates **21** on the ballast pallet **3** is identical and is only described on the basis of a centring plate!

- ▶ Attach the centring plate **21** on the auxiliary crane.



Note

- ▶ Observe correct installation position of the centring plate, see illustration **11!**
- ▶ The centrings **21.1** and the centrings **21.2** must be positioned according to illustration **12** on the frame of the ballast pallet **3**, visual inspection!

- ▶ Position centring plate **21** and place into the frame of the ballast pallet **3**.
- ▶ Lower centring plate **21** onto the frame of the ballast pallet **3**.

If the centring plate lights flatly on the frame of the ballast pallet:

- ▶ Remove the auxiliary crane.

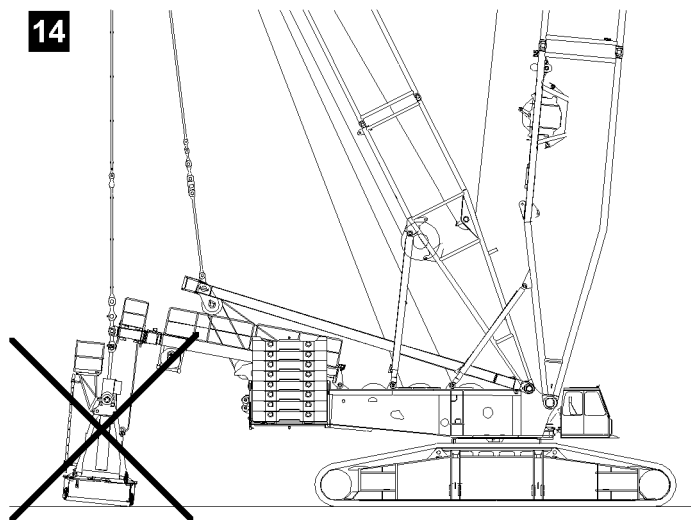
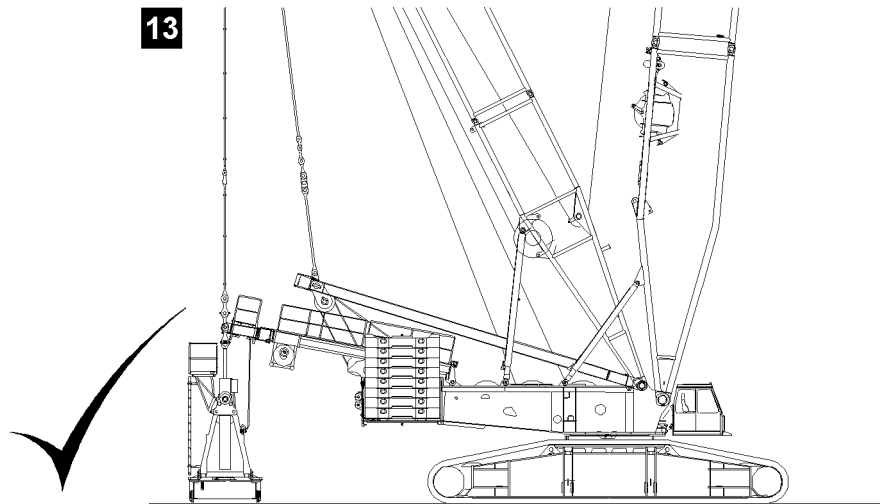


Fig.107531

LWE/LR 1750-000/12812-15-02/en

Place the ballast plates



WARNING

Danger of toppling the ballast stack!

Personnel can be killed or severely injured by toppling ballast stacks!

- ▶ Before ballasting the ballast pallet, it must lie properly on the ground, illustration **13**!
 - ▶ Ballasting of the ballast pallet, as represented in illustration **14**, is prohibited!
 - ▶ During ballasting observe even distribution of the ballast plates!
 - ▶ Observe correct centring of the ballast plates!
 - ▶ First, establish the ballast stack in the middle of the ballast pallet, then distribute the ballast stacks left and right uniformly!
-



Note

- ▶ For determining the correct ballast weight, use the LICCON job planner!
-

Distribute ballast plates with the auxiliary crane on the centring plate in the middle of the ballast pallet.

- ▶ Distribute ballast plates with the auxiliary crane in the middle of the ballast pallet.
-



Note

- ▶ The ballast plates may only be distributed in layers on the ballast stacks, always left and right!
 - ▶ The ballast stacks must have the identical stack heights left and right according to ballasting and have the identical ballast weight!
-

If the ballast stack in the middle of the ballast pallet is completely placed:

- ▶ Distribute ballast plates left and right in layers up to the required derrick ballast weight.

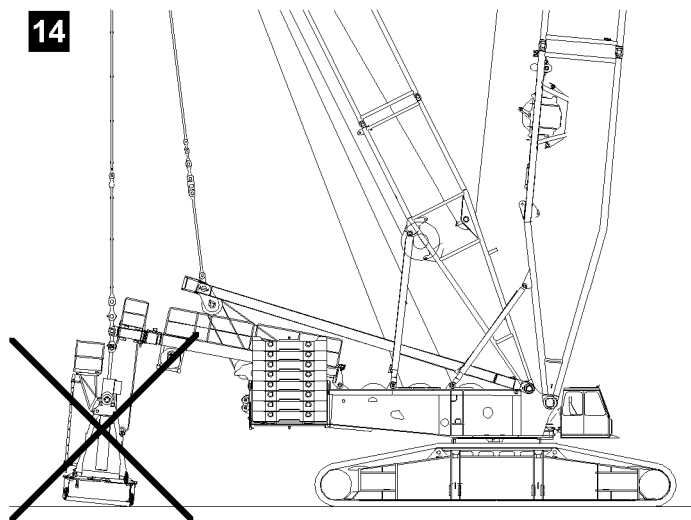
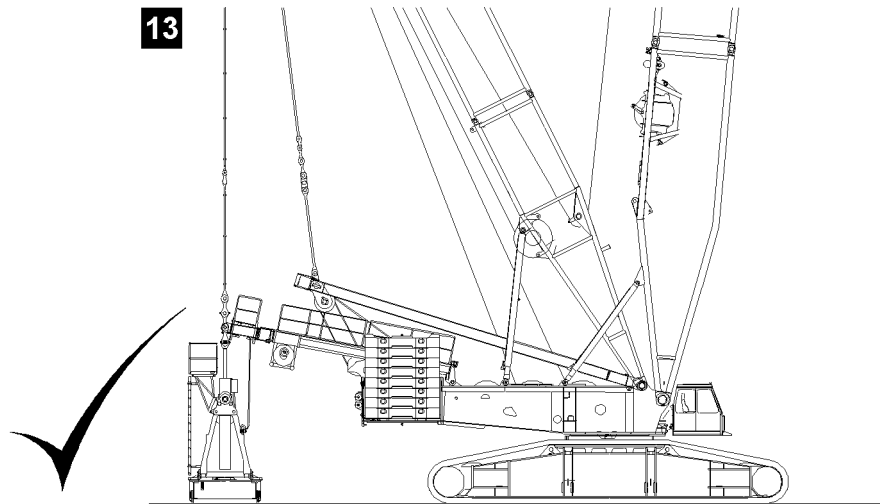


Fig.107531

LWE/LR 1750-000/12812-15-02/en

2.8.2 12.5 t Ballasting ballast plates



Note

- ▶ The ballast plates are marked with their own weights!
- ▶ The ballast plates are distributed directly upon the centrings on the ballast pallet frame!

Place the ballast plates



WARNING

Danger of toppling the ballast stack!

Personnel can be killed or severely injured by toppling ballast stacks!

- ▶ Before ballasting the ballast pallet, it must lie properly on the ground, illustration **13**!
- ▶ Ballasting of the ballast pallet, as represented in illustration **14**, is prohibited!
- ▶ During ballasting observe even distribution of the ballast plates!
- ▶ Observe correct centring of the ballast plates!
- ▶ First, establish the ballast stack in the middle of the ballast pallet, then distribute the ballast stacks left and right uniformly!



Note

- ▶ For determining the correct ballast weight, use the LICCON job planner!

Distribute ballast plates with the auxiliary crane on the centrings in the middle of the ballast pallet.

- ▶ Distribute ballast plates with the auxiliary crane in the middle of the ballast pallet.



Note

- ▶ The ballast stacks must have the identical stack heights left and right according to ballasting and have the identical ballast weight!

If the ballast stack in the middle of the ballast pallet is completely placed:

- ▶ Distribute ballast plates left and right.

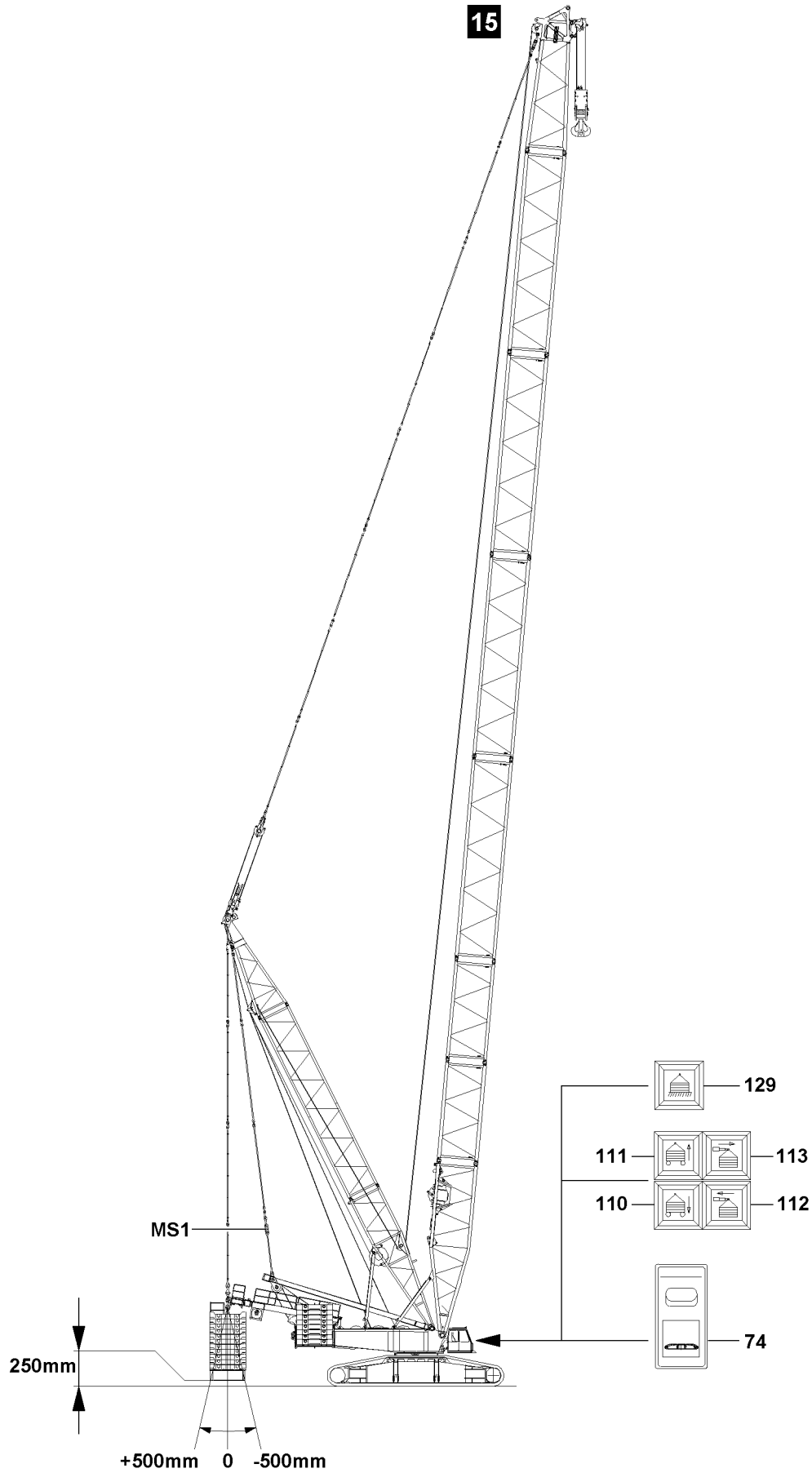


Fig.107526

LWE/LR 1750-000/12812-15-02/en

2.9 Lift the derrick ballast from the ground



WARNING

The crane can topple over!

If the derrick ballast is lifted up by the **maximum permissible** 250 mm from the ground, the crane can be toppled upon ripping of the load backward!

If the following notes are not observed, personnel can be severely injured or killed!

- ▶ There may be no personnel, objects or obstacles within the entire slewing range of the crane, derrick ballast and the load!
- ▶ Do not lift derrick ballast more than 250 mm from the ground!
- ▶ The subsoil in the entire working area of the crane - including the derrick ballast and the load - must be even and of sufficient load carrying capacity, in order to be able to securely accept the encountered ground pressures and weight loads!



Note

- ▶ Lifting of the derrick ballast is to be observed by a guide!



WARNING

The crane can topple over!

If the minimal force F1-min, with derrick ballast turned off on the ground and derrick guying without power, is fallen below, the boom system can abruptly move forward with increasing load moment and suddenly lift the derrick ballast from the ground!

This will result in the load swinging violently, whereby the crane can topple or be severely damaged!

Personnel can be severely injured or killed!

- ▶ The guying between the SA frame and the derrick end section, (test point 1 **MS1**), may never be without power!
- ▶ The minimal force F1-min may not be fallen below!
- ▶ When taking on the load, the guying of the derrick ballast to the derrick end section must at a maximum be slightly tensioned, so that initially the minimum force F1-min test point 1 **MS1**, is exceeded!

- ▶ Press the button **111** in the crane operator's cab.

Result:

- The derrick ballast is lifted off the ground.
- Warning lights **129** „suspended ballast on ground“ extinguishes.

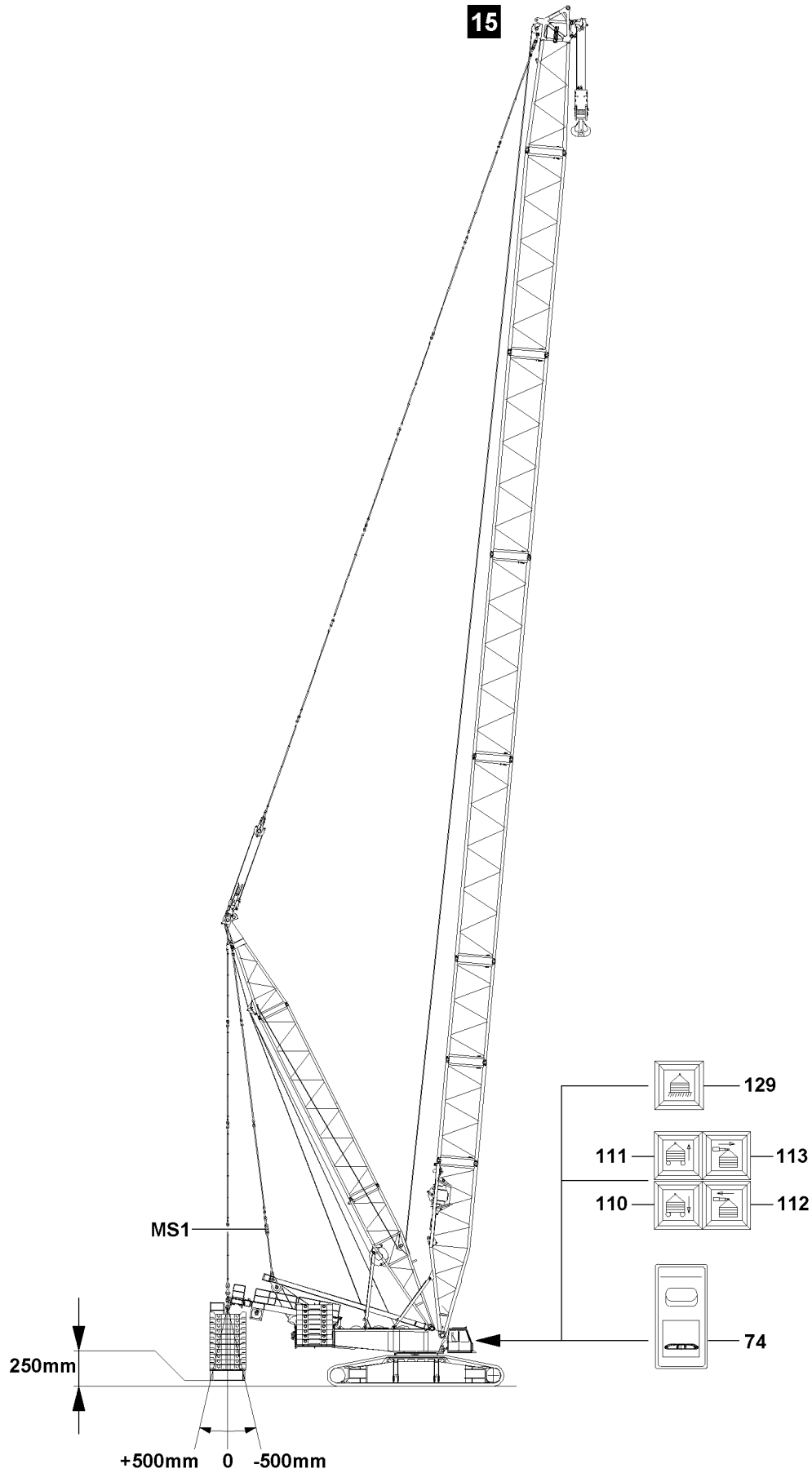


Fig.107526

LWE/LR 1750-000/12812-15-02/en

2.10 Telescoping the derrick ballast to the required derrick ballast radius



WARNING

Risk of fatal injury!

By remaining in the danger zone of the derrick ballast, personnel can be severely injured or killed!

- ▶ Remaining in the crane danger zone, particularly in the derrick ballast danger zone is forbidden!
- ▶ Ensure that there are no people, objects or obstacles within the crane danger zone!
- ▶ The derrick ballast must be lifted from the ground before telescoping and the warning lights **111** „suspended ballast on the ground“ are extinguished!



WARNING

The crane can topple over!

A false length path measurement of the derrick ballast radius can lead to toppling the crane!

Personnel can be severely injured or killed!

- ▶ The derrick ballast radius display on LICCON-Monitor 1 is to be observed continuously during telescoping!
- ▶ The crane operator may not simply rely on the derrick ballast radius measurement, instead he should also be pro-active and check whether the measurement is still working correctly, see section „Checking the length sensor value on the derrick ballast“!



Note

- ▶ The derrick ballast radius display on LICCON-Monitor 1 and the telescoping cylinder is to be observed continuously during telescoping!

2.10.1 Hydraulically telescoping out the guide frame

Ensure that the following prerequisite is met:

- the derrick ballast has been lifted off the ground.

- ▶ Press the button **113** in the crane operator's cab.

Result:

- The telescoping cylinder on the guide frame extends.

When the required derrick ballast radius is reached:

- ▶ Release the button **113** in the crane operator's cab.

2.10.2 Hydraulically telescoping in the guide frame

Ensure that the following prerequisite is met:

- the derrick ballast has been lifted off the ground.

- ▶ Press the button **112** in the crane operator's cab.

Result:

- The telescoping cylinder on the guide frame retracts.

When the required derrick ballast radius is reached:

- ▶ Release the button **112** in the crane operator's cab.

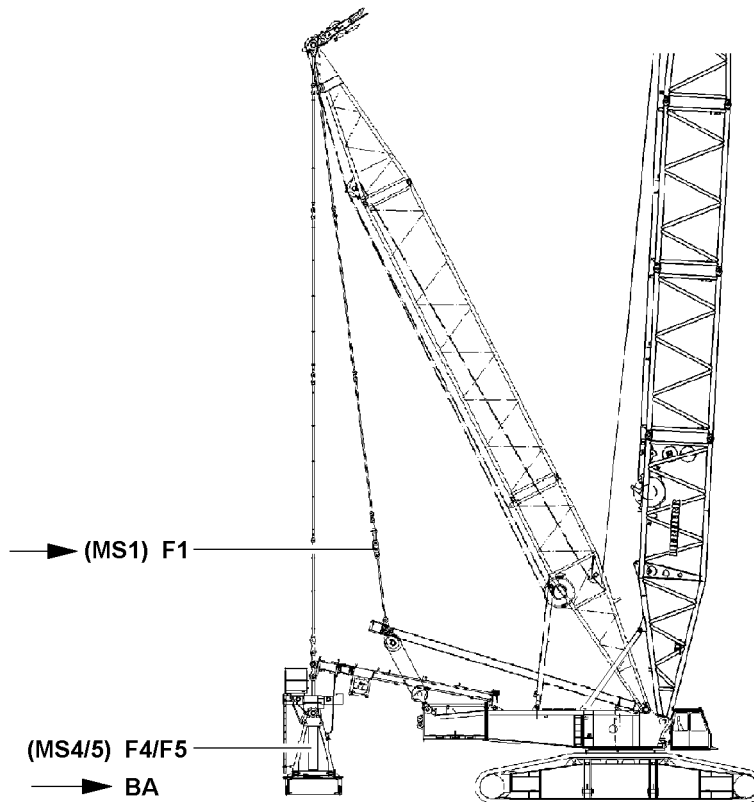
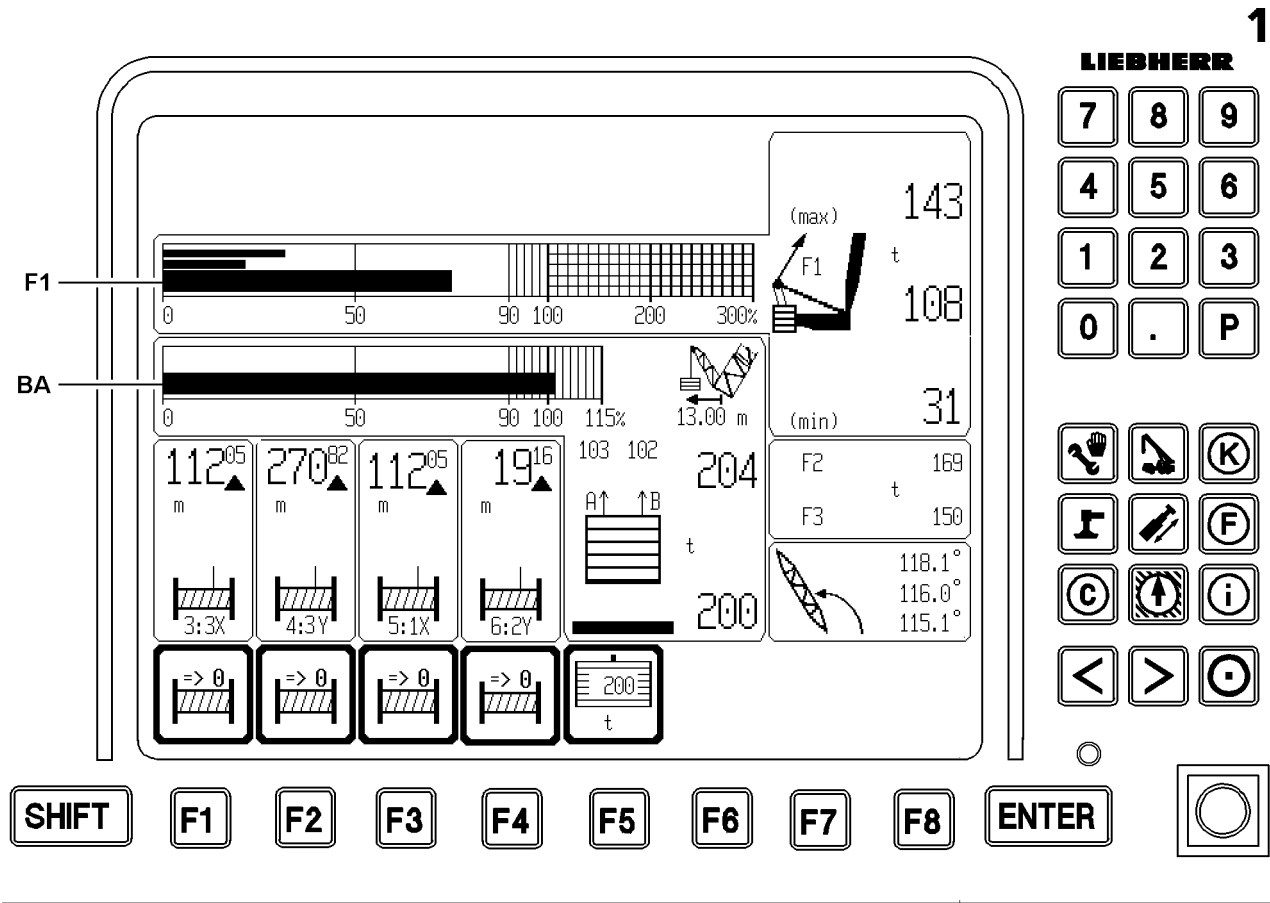


Fig.107835

LWE/LR 1750-000/12812-15-02/en

3 Crane operation with derrick ballast

Make sure that the following prerequisites are met:

- the test points are checked for function,
- the crane is aligned in horizontal direction,
- the weight of the load to be lifted is known,
- the required derrick ballast is placed according to the load chart,
- the derrick boom is found in operating position.

3.1 Settings

- ▶ Set and confirm the load chart for the upcoming crane operation on the LICCON monitor.
- ▶ Set and confirm the weight of the actually placed derrick ballast on the LICCON monitor.



Note

- ▶ Setting the derrick ballast, see the crane operating instructions chapter 4.03!
 - ▶ The required derrick ballast must be recorded according to the data in the load chart or by the crane job planner!
-



WARNING

The crane can topple over!

Incorrect ballast weight entry can lead to dangerous operating situations!

- ▶ The set derrick ballast must match the actually placed derrick ballast!
-

- ▶ Compare the set derrick ballast against the actual derrick ballast!

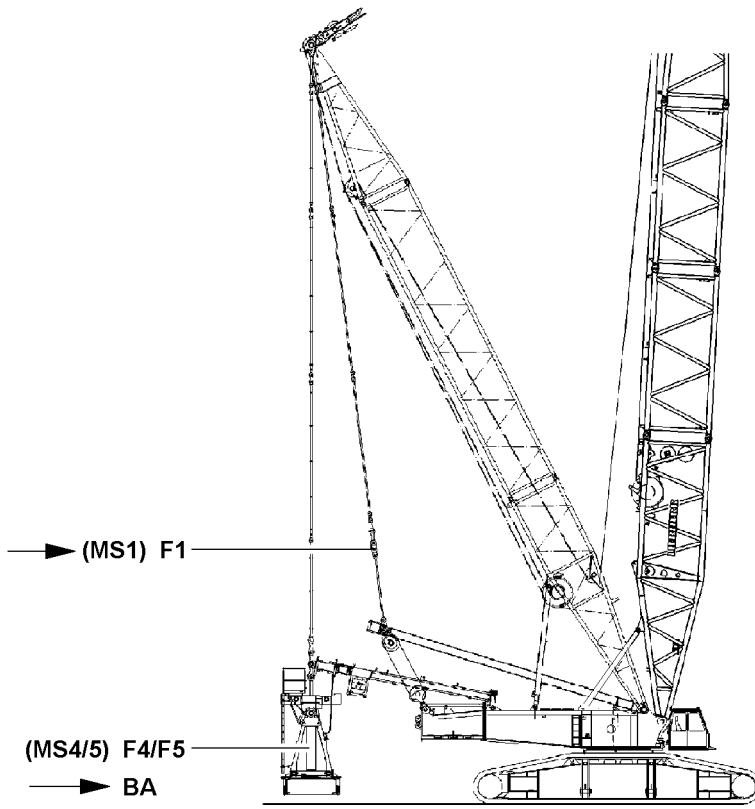
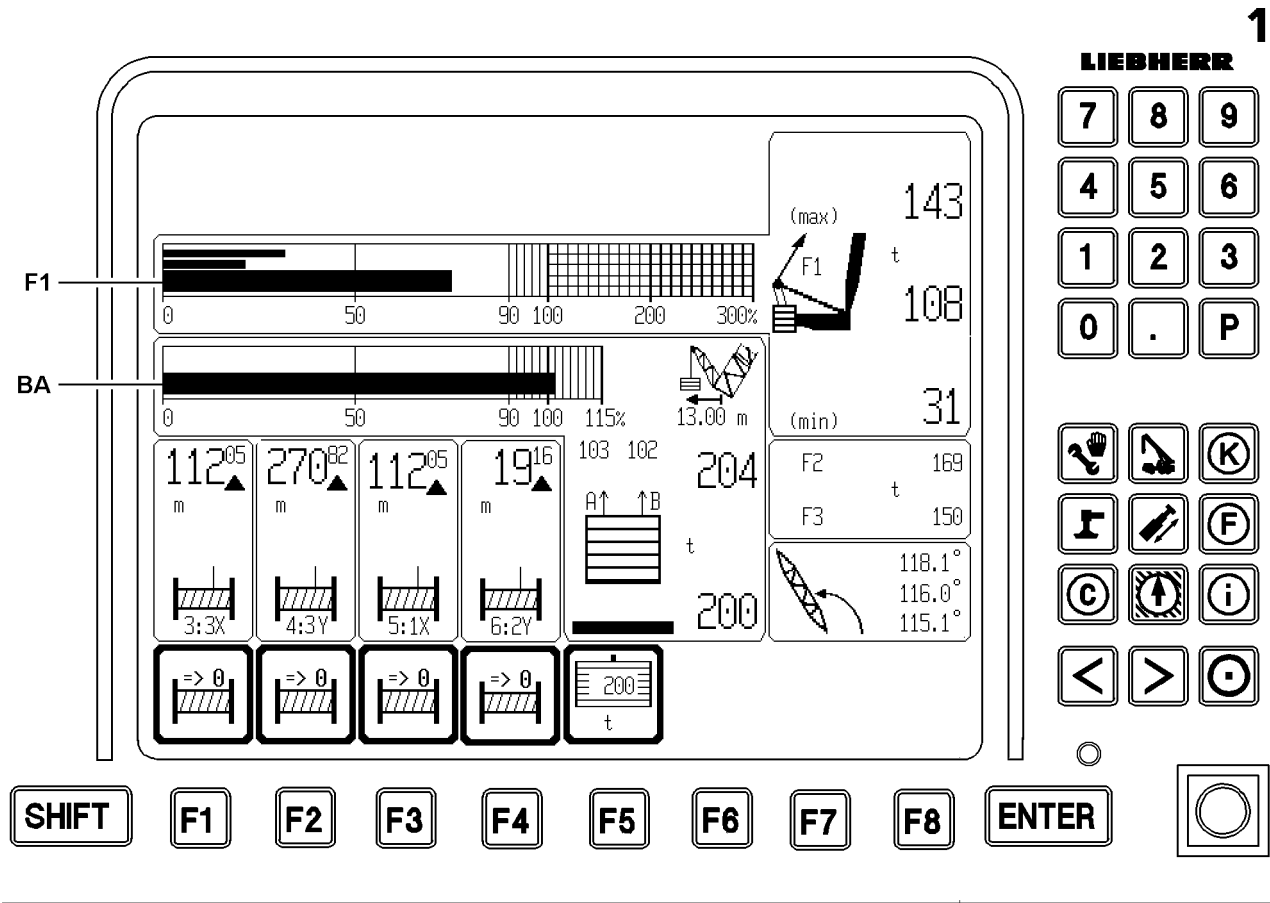


Fig.107835

LWE/LR 1750-000/12812-15-02/en

3.2 Crane operation



Note

- ▶ For crane operation with derrick ballast, the data in chapter 4.02 of the crane operating instructions must be observed and maintained!



WARNING

The crane can topple over!

The jerky execution / braking of turning manoeuvres can cause the load or suspended derrick ballast to lead to swinging!

This can lead to severe property damages or cause the crane to topple over!

Personnel can be severely injured or killed!

- ▶ There may be no persons, objects or obstacles within the slewing range of the derrick ballast!
- ▶ During the turn, a guide must monitor the boom, derrick boom and derrick ballast for any danger of collision.
- ▶ When turning with a load and suspended derrick ballast, the turning movement must be initiated or slowed down extremely sensitively!
- ▶ Do not lift derrick ballast more than 250 mm from the ground!



Note

- ▶ If the suspended derrick ballast has to swing above any obstructions or be set down at a different level to the crane, it is possible to raise or lower the suspended derrick ballast using the pull cylinders!
- ▶ Activation of the pull cylinders takes place from the crane operator's cab!



WARNING

The crane can topple over!

If the derrick ballast in the crane operation operates via the control panels on the ballast pallet, important crane data cannot be viewed!

The crane can topple over and personnel can be severely injured or killed!

- ▶ It is prohibited to to operate the derrick ballast in crane operation from the control panels!
- ▶ The derrick ballast must always be maintained in a horizontal position when it is raised or lowered using the pull cylinders!
- ▶ The crane operator must ensure that the pull cylinders extend / retract uniformly!

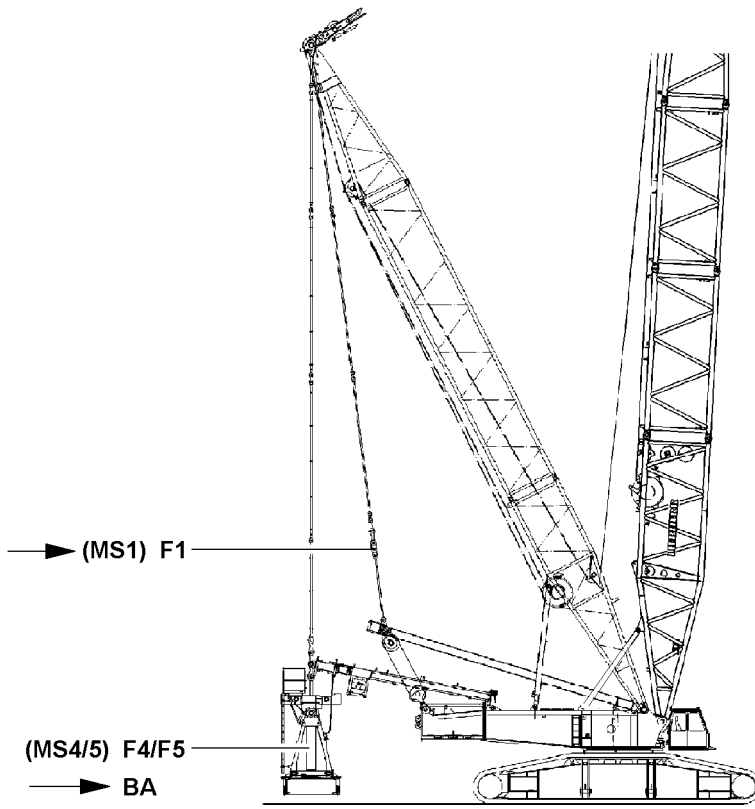
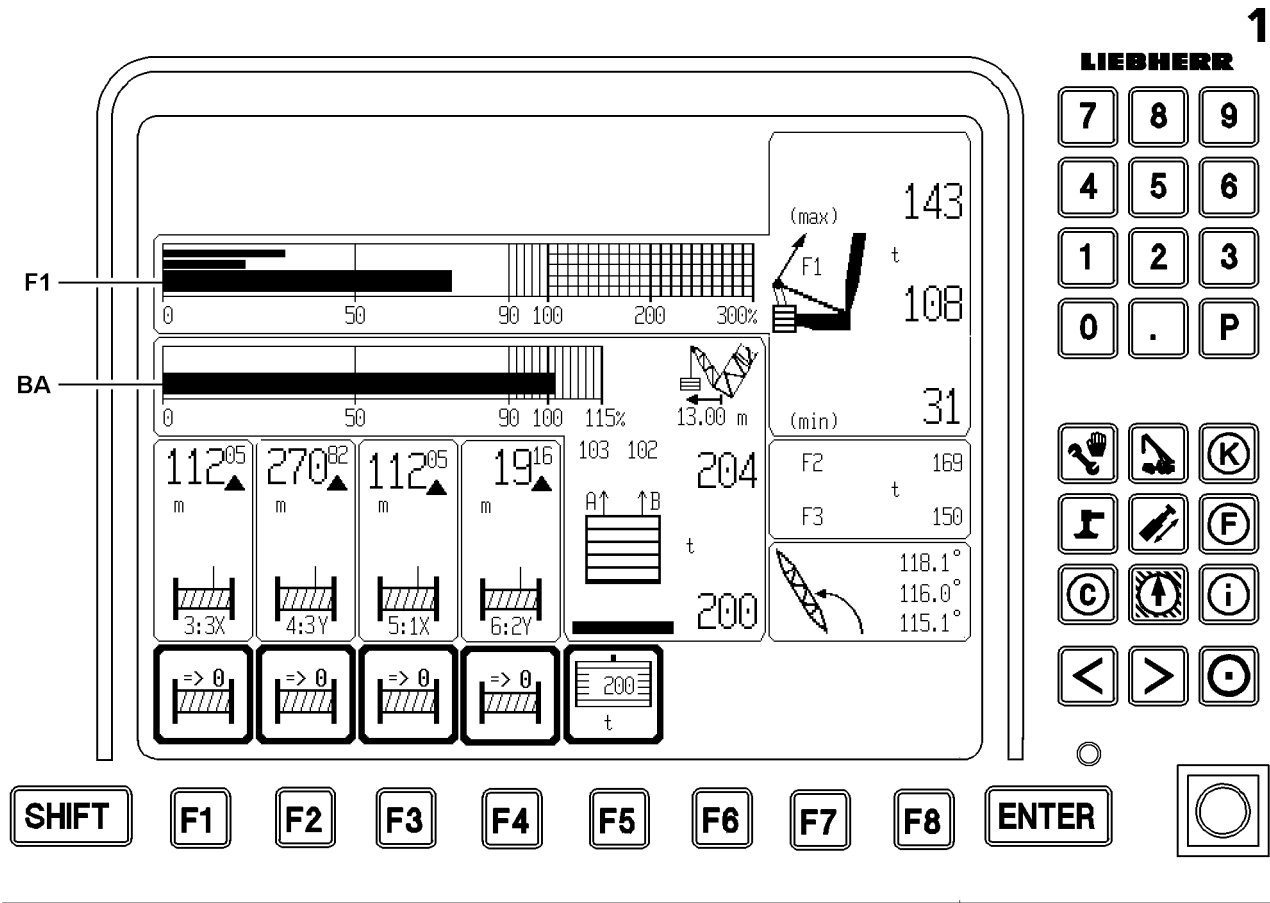


Fig.107835

LWE/LR 1750-000/12812-15-02/en

3.3 Crane operation with derrick ballast

In all operating modes with derrick ballast, the load is divided between the guy rods from the derrick head to the SA-frame – test point1 **MS1** (F1) – and to the derrick ballast **MS4/MS5**.

The load of the crane is monitored by test point **MS1** 1 (F1), in the guying from the SA-frame to the derrick head. If the force becomes too high, then all movements, which increase the load momentum are turned off.

The force distribution can be changed by the following procedures:

- Taking on the load: By flexing of the turntable.
- By raising or lowering the derrick ballast with the pull cylinders.
- By ballasting derrick ballast plates on or off.



WARNING

Risk of accident!

- ▶ Before setting down the load and suspended derrick ballast, the crane operator must make sure that it can be safely set down!

- There should not be any persons, objects or obstacles within the slewing range of the crane, ballast trailer, suspended derrick ballast and load.
- When picking up the load, **make sure** to avoid diagonal pull, i.e. the derrick ballast, the centre of rotation of the turntable and the load must be in one line! To ensure this, operate the cylinder to lift and set down the derrick ballast (ballast pallet) before adding any ballast plates.

3.4 Monitoring of minimum force F1

If more than fifty percent of the set derrick ballast is pulled (ballast utilization bar shows a ballast utilization of greater than fifty percent) and the minimum F1-min **MS1** (F1) is fallen below, all crane movements are turned off.



DANGER

The crane can topple over!

- ▶ It is prohibited to fall below the minimum force F1-min **MS1**, if more than fifty percent of the derrick ballast is being pulled. If this is not observed, the derrick ballast can suddenly lift off the ground with loose tension of test point 1 **MS1** (F1) and „derrick ballast on the ground“ through increasing the load momentum of the derrick ballast!
- ▶ Simultaneously, the boom system can move suddenly forward!
- ▶ This causes the load to swing strongly!
- ▶ The crane can topple over and personnel can be severely injured or killed!

If more than ninety percent of the set derrick ballast is pulled (ballast utilization bar shows a ballast utilization of greater than ninety percent) and the minimum force F1-min **MS1** (F1) is fallen below, all crane movements that increase load momentum and all movements that decrease load momentum are turned off. All hoist gear movements are also turned „off“.

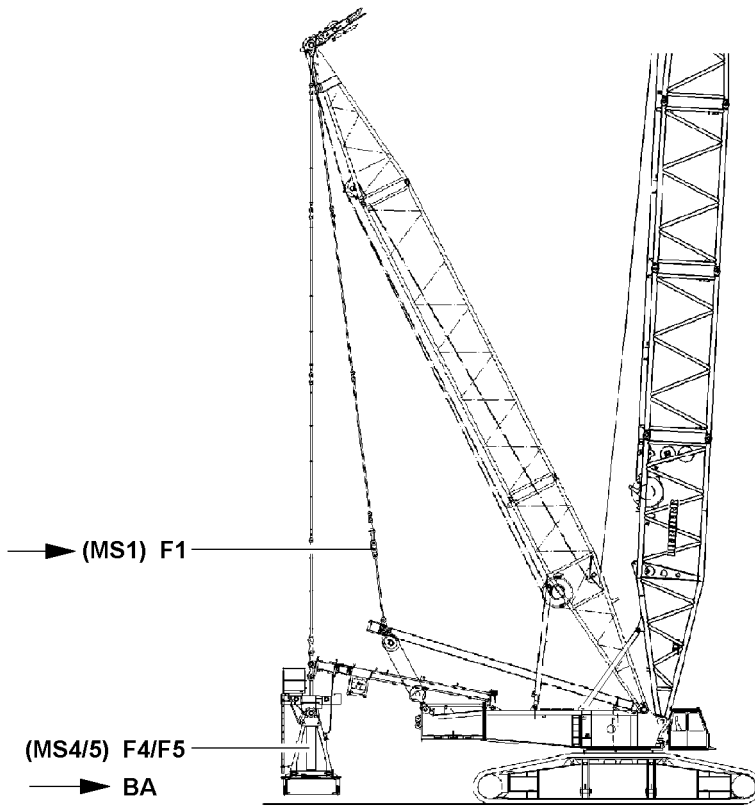
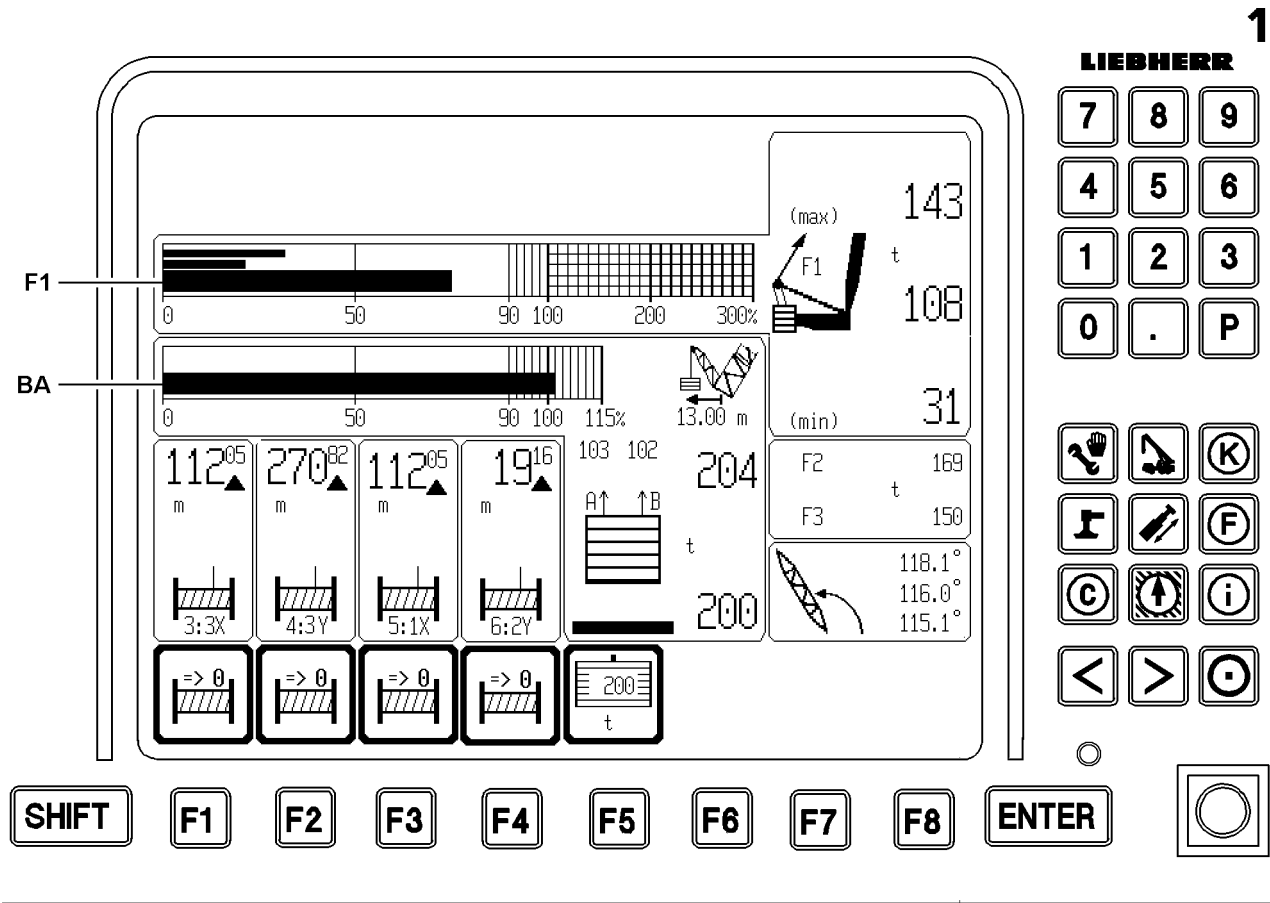


Fig.107835

LWE/LR 1750-000/12812-15-02/en

**DANGER**

The crane can topple over!

- ▶ It is prohibited to fall below the minimum force F1-min **MS1**, if more than ninety percent of the derrick ballast is being pulled. If this is not observed and the load torque is increased when the guying is slack at test point **MS1** (F1) and the „suspended derrick ballast“, the derrick ballast can suddenly drop to the ground through decreasing load momentum, causing the boom system to suddenly lurch backward!
- ▶ Thereby the relapse cylinders can be pressed on block and be overloaded!
- ▶ The relapse cylinders on the boom and derrick may become damaged!
- ▶ This causes the load to swing strongly!
- ▶ The crane can topple over and personnel can be severely injured or killed!

This danger condition can only be overcome:

- By lowering the suspended derrick ballast to the ground using the pull cylinders.

or:

- Ballast pallets are unloaded to reduce the derrick ballast utilisation and increase the load at test point 1 **MS1** (F1).

**DANGER**

The crane can topple over!

Through misuse of the assembly key switch, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ The crane operator alone is responsible completely for his actions upon using the assembly key switch!
- ▶ When the assembly key button is turned on, only load moment decreasing crane movements up to a permissible load range can be carried out!
- ▶ When the permissible load range is reached, the assembly key button must be turned off again immediately!
- ▶ When the assembly key button is turned on, the load moment limiter is no longer effective!

3.5 Force F1 (test point 1) between guying SA-frame - Derrick end section

The force F1 **MS1** is determined in the guy rods from the SA-frame to the derrick head by two force test boxes and is shown on the LICCON as total force of the guying.

From the operating force F1 and the force F1-operational maximum force results the F1 utilization.

This is shown on the LICCON monitor in the utilization bar **F1** (in percent).

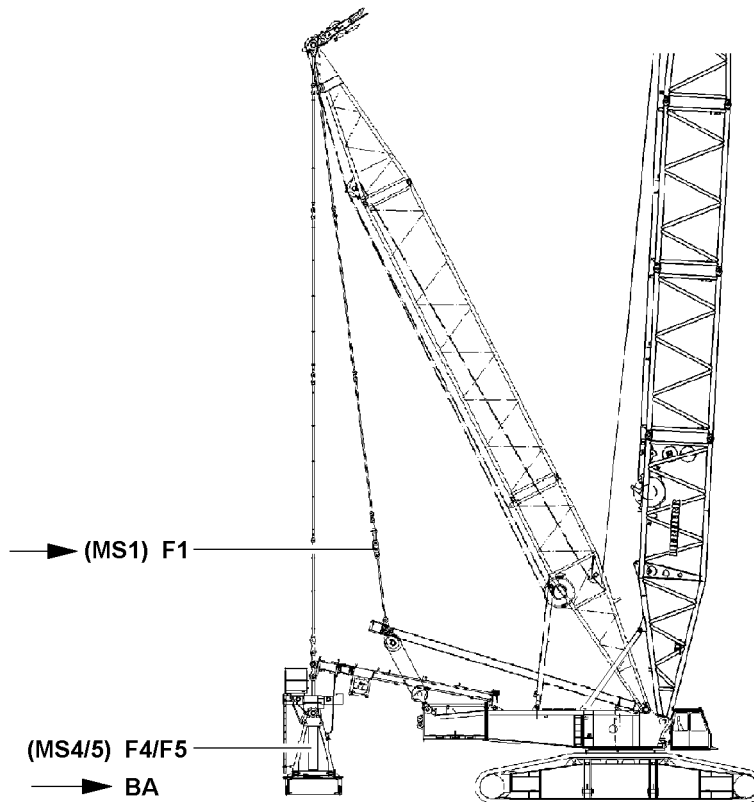
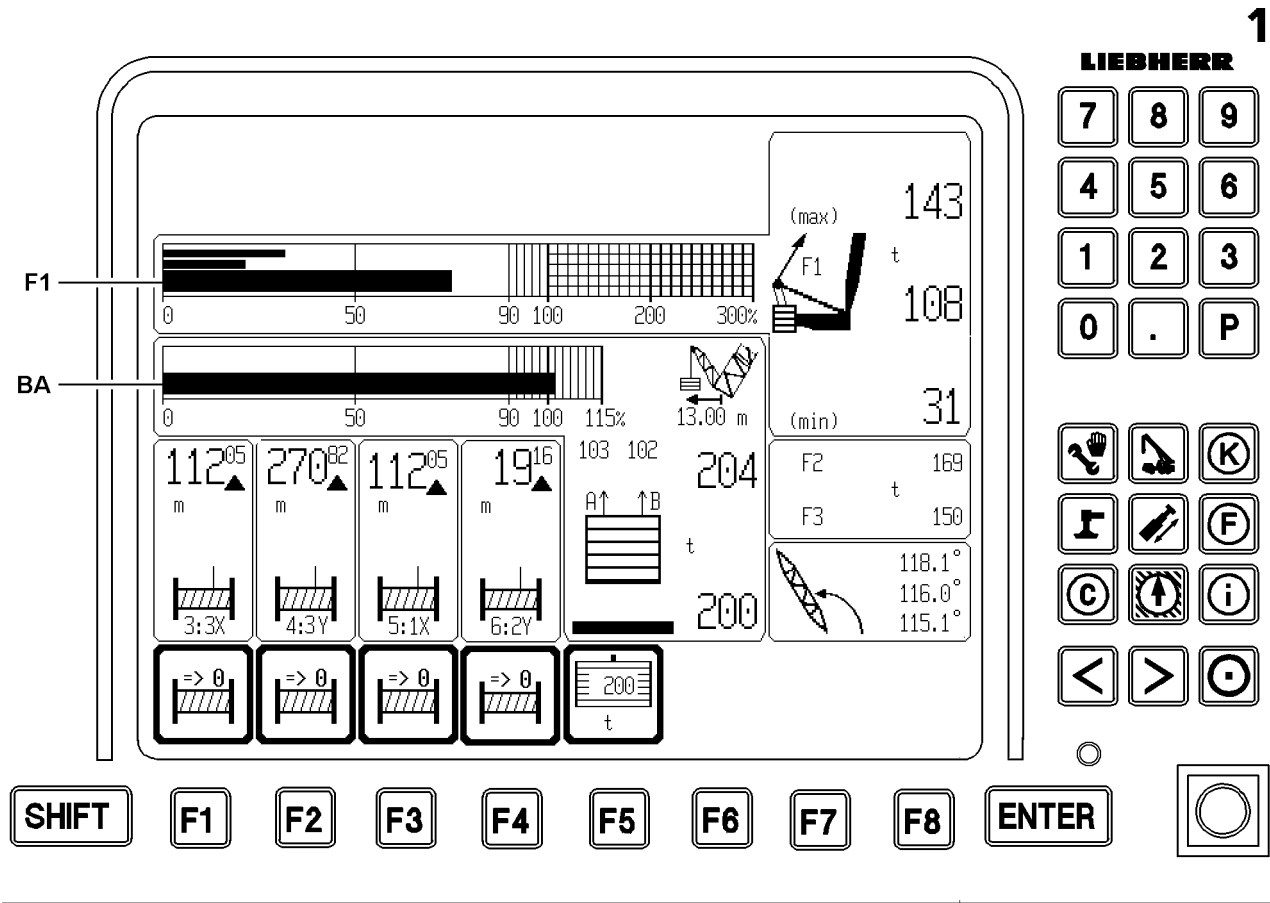


Fig.107835

LWE/LR 1750-000/12812-15-02/en

3.6 Force F4/F5 (MS4/MS5) guying derrick ballast - Derrick end section

The forces F4 **MS4** and F5 **MS5** on the guy posts from the derrick ballast to the derrick head.

The existing forces in the guy rods (**A** = left and **B** = right) are calculated from the three pressure sensors, which are installed on the pull cylinders and shown in the LICCON monitor as individual forces.

The pulled derrick ballast is calculated from the forces of the individual guying, which means the part of the derrick ballast pulled upward by the guying. The remaining part is on the ground. The derrick ballast utilization results from the pulled ballast and the placed ballast.

This is shown on the LICCON monitor in the utilization bar **BA** (in percent).

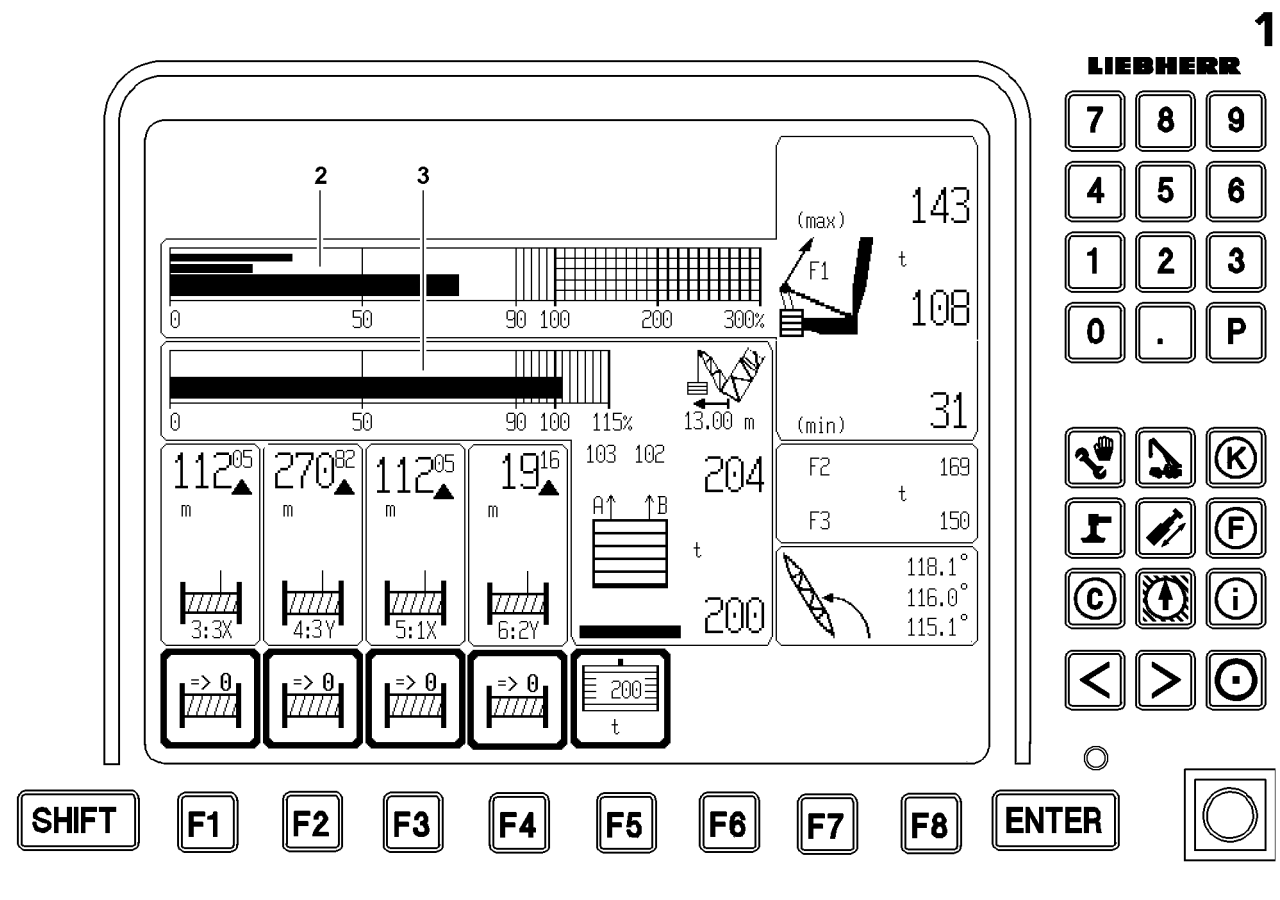
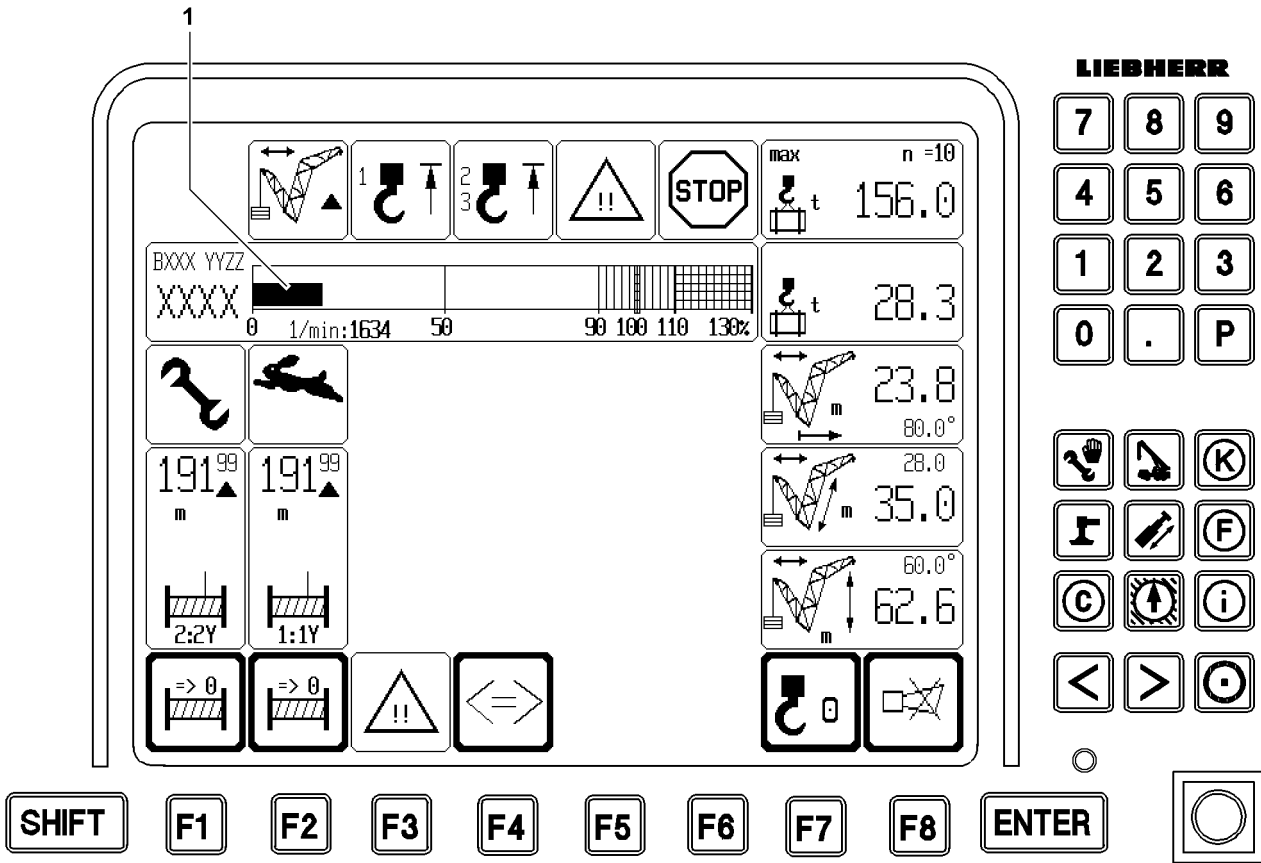


Fig.107901

LWE/LR 1750-000/12812-15-02/en

3.7 Overload monitoring in operating mode with derrick ballast

In operating modes with derrick ballast, the „maximum load for the current crane condition“ is monitored two ways:

1. Monitoring of maximum load on the LICCON monitor 0.
2. Monitoring of test point 1-operational maximum force LICCON monitor 1.

3.7.1 Monitoring of maximum load on the LICCON monitor 0

It monitors the „maximum load according to load chart and reeving“.

In operating modes with derrick ballast, this is the maximum load of the current crane condition. It is shown on LICCON monitor 0. The current utilization of the crane results from the load utilization bar **1** on LICCON monitor 0.

If the load utilization bar reaches 90 %, an advance warning is given in the form of a „caution icon“ and a „SHORT HORN“ on monitor 0.

At 100 % on the load utilization bar, the shut off of all load moment increasing movements with the „stop icon“ and the acoustical warning „HORN“ occurs on LICCON monitor 0.



Note

- ▶ The „maximum load of the current crane condition“ can possibly be increased further, refer to section utilisation conditions!

3.7.2 Monitoring of test point 1-operational maximum force (= F1 max)

It is shown on monitor 1.

At ninety percent $F1_{max}$ -utilization **2** an advance warning is given in the form of a caution icon and a „SHORT HORN“ on LICCON-Monitor 1.

At 100 % $F1_{max}$ -shut off of all load moment increasing movements take place with the „Stop-icon“ and the acoustic warning „HORN“ on LICCON-Monitor 1.

If the „maximum load according to the load chart and the reeving“ is not reached (utilization bar **1**), then the „maximum load of the current crane condition“ can still be increased by:

- Pulling up the derrick ballast, if the derrick ballast is not already suspended and the currently pulled derrick ballast is still smaller than the optimum derrick ballast.
- Telescoping out the derrick ballast if the added derrick ballast is still lower than the optimum ballast.
- Increasing the derrick ballast by adding additional ballast plates if the placed ballast is still smaller than the optimum ballast.

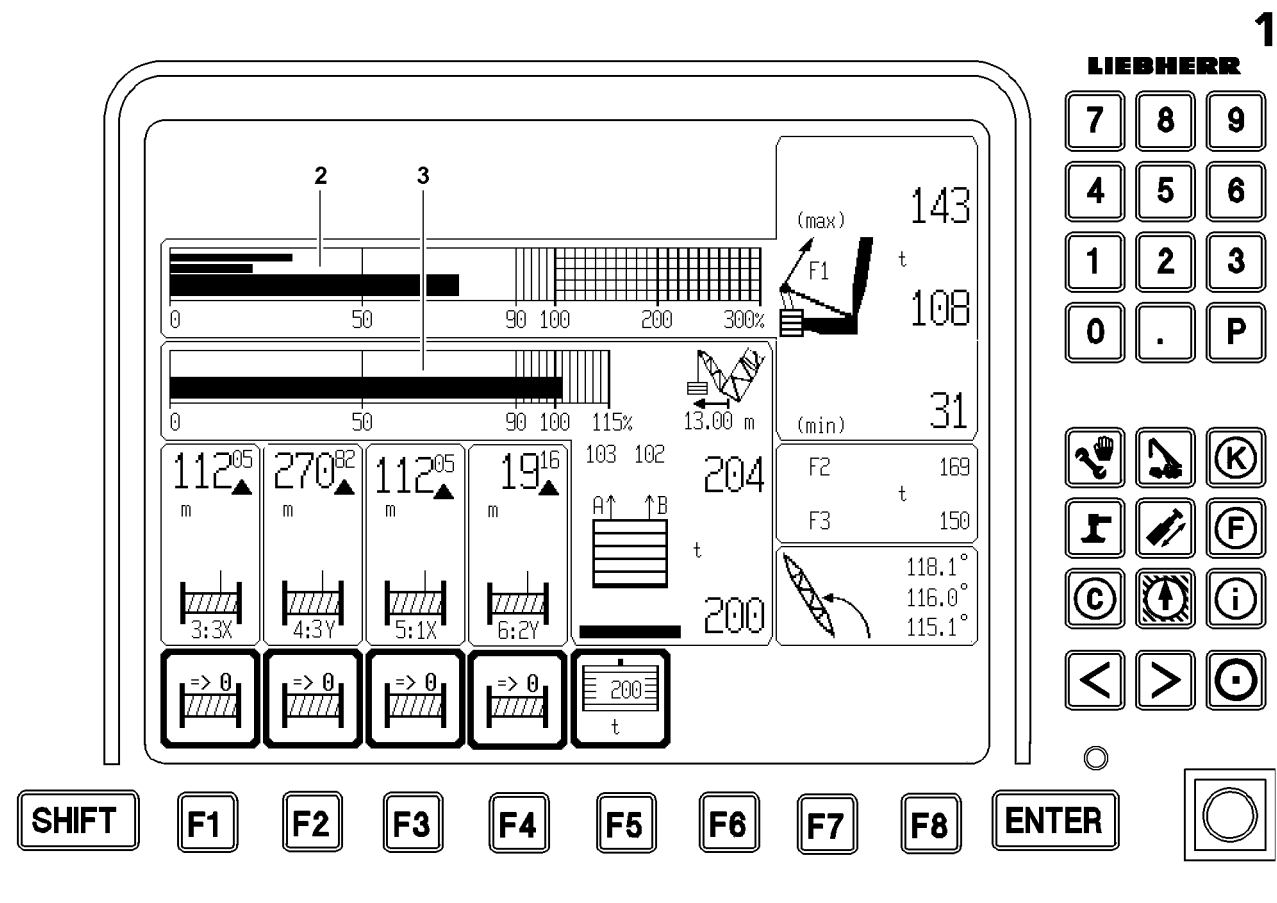
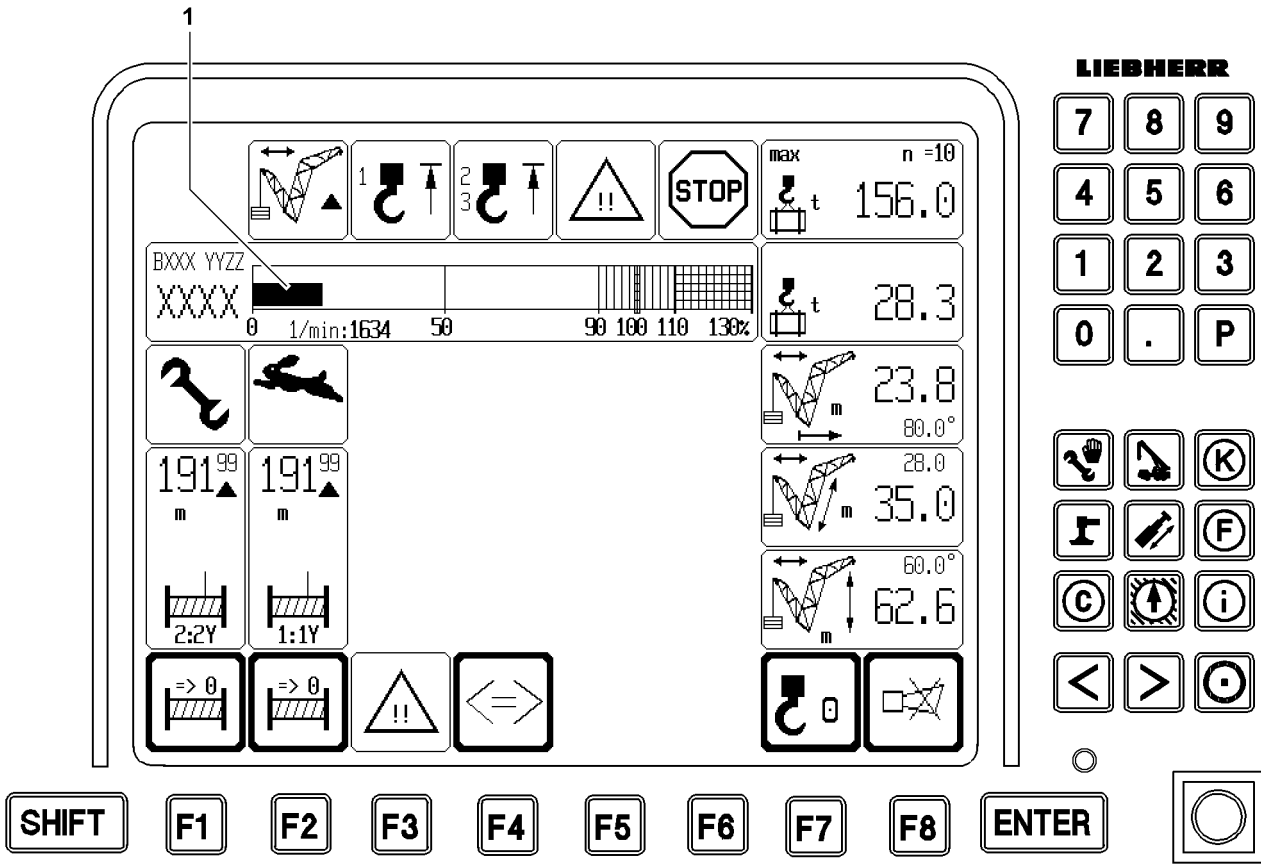


Fig.107901

LWE/LR 1750-000/12812-15-02/en

3.8 Utilization conditions

The current utilization of the crane results from the load utilization bar **1** on LICCON monitor 0 and the F1-utilization bar **2** on LICCON monitor 1.

The „maximum load of the current **crane condition**“ is reached when the load utilization bar **1** has reached 100 % or when the F1- utilization bar **2** has reached 100 %.

The „maximum load of the current **crane equipment**“ is reached when the load utilization bar **1** has reached 100 % or when the F1- utilization bar **2** has reached 100 % and the derrick ballast is suspended (ballast utilization bar **3** at 100 %, if the ballast input value and the ballast weighing are correct).

The „maximum load according to the load chart and the reeving“ (100 % limit of load utilization bar) and the maximum load according to F1_{max} operation (100 % limit of the F1 utilization bar) can be bypassed by the following measures:

1. Bypass key button D on the LICCON monitor 0:
Hold key switch button in the position „right touching“ to bypass the „maximum permitted load according to the load chart and reeving“ and the hoist limit switch, please refer to description in chapter 4.02 of the crane operating instructions.
2. Assembly key switch in the instrument panel:
Activate assembly key switch „maximum load-carrying capacity according to the load chart and reeving“, the test point 1-operational maximum force (= F1_{max}-operation) and a number of other limit values and limit switches are bypassed.
Test point 1-assembly-maximum force (= F1_{max}-assembly) cannot be bypassed (see chapter 4.04 of the crane operating instructions).



DANGER

The crane can topple over!

When the assembly key button is turned on, the LICCON overload protection is bypassed and is thereby no longer effective!

The crane can be overloaded unnoticed and topple over!

Personnel can be severely injured or killed!

- ▶ When the assembly key button is turned on, only load moment decreasing crane movements up to a permissible operating and load range can be carried out!
- ▶ Turn the assembly key button is immediately switched off after reaching the permissible load range!
- ▶ The crane operator alone is responsible completely for his actions during bypass of LICCON overload protection!



Note

- ▶ The movement „raise ballast“ or „lower ballast“ requires utmost attention by the crane operator!

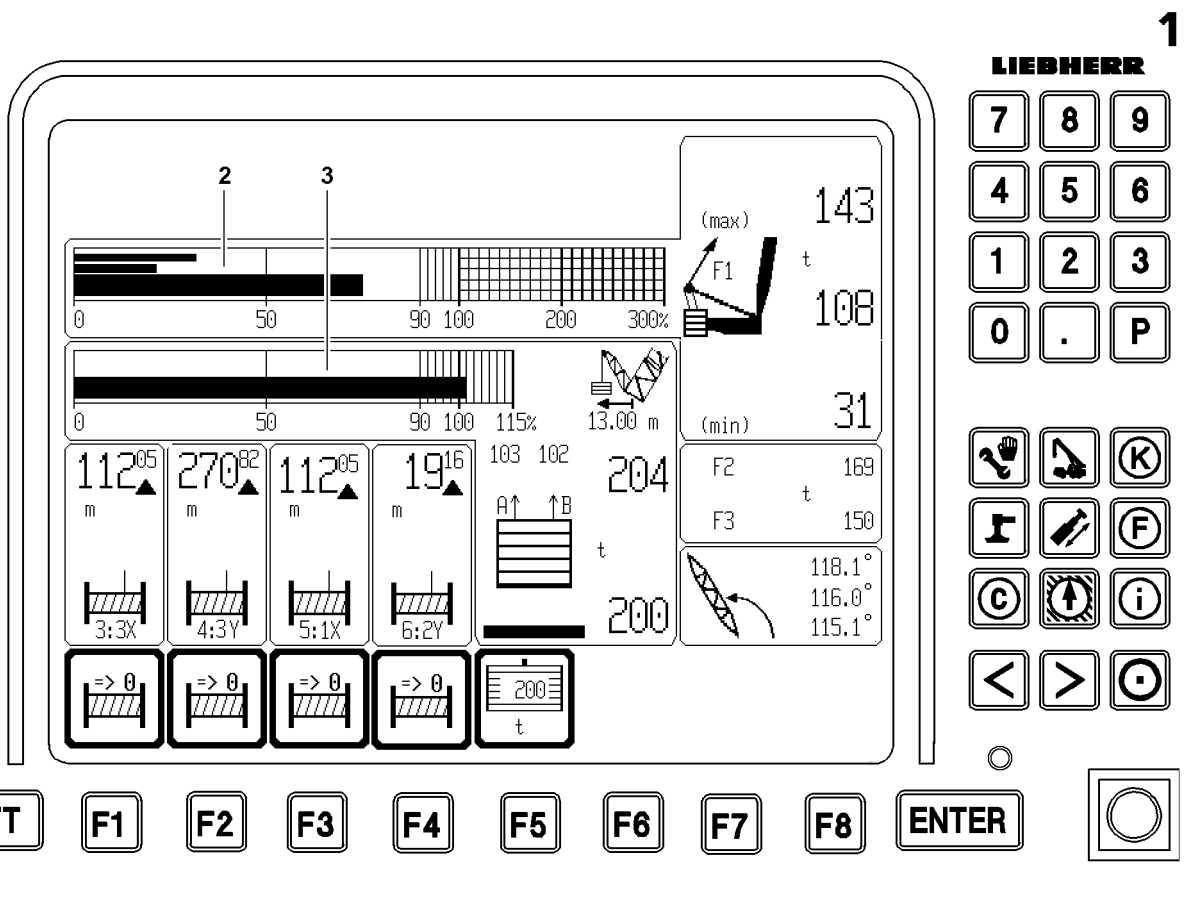
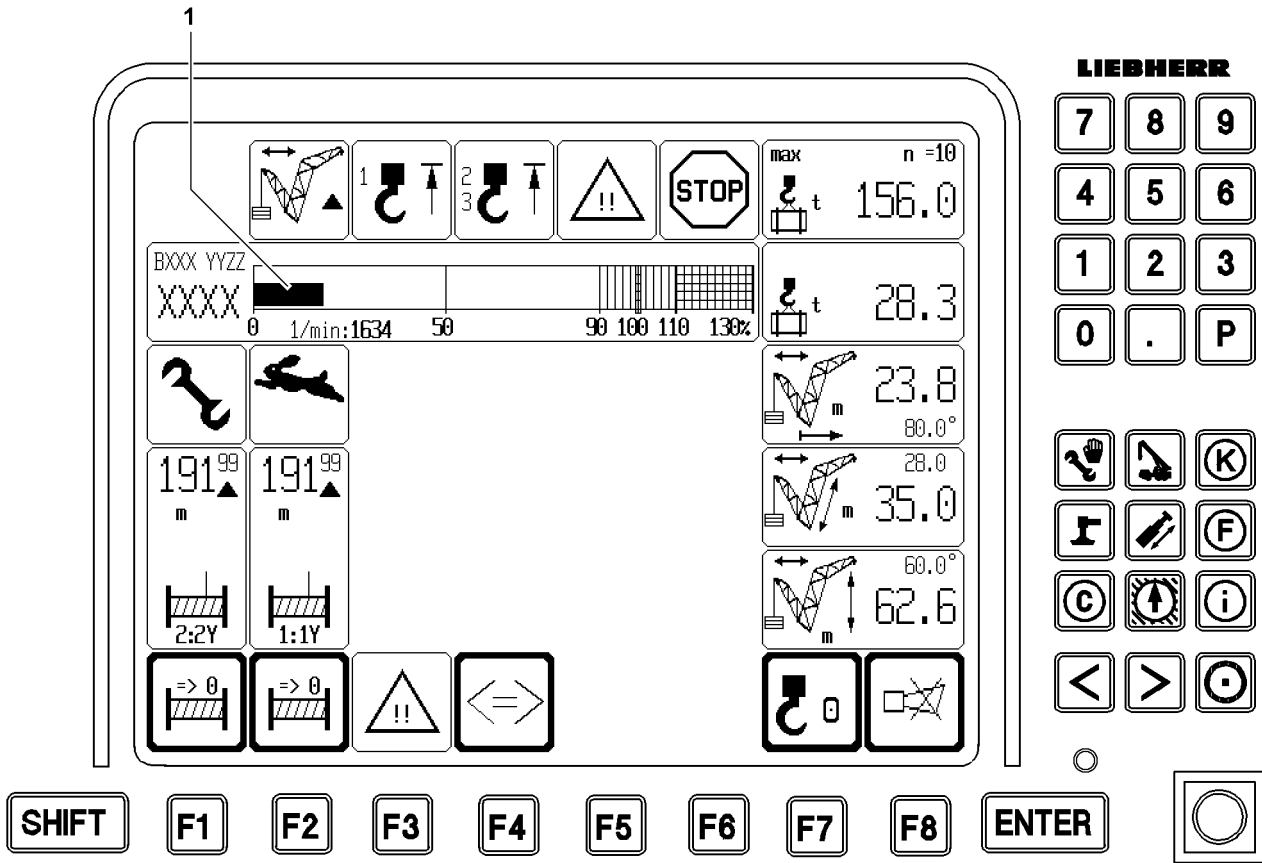


Fig.107901

LWE/LR 1750-000/12812-15-02/en

3.9 Checking the length sensor value on the derrick ballast

**CAUTION**

Risk of accident!

If the derrick ballast radius is measured incorrectly, a maximum load and a F1-operational-max load carrying capacity will be calculated due to the incorrect radius!

The crane will be overloaded unnoticed and can topple!

Personnel can be severely injured or killed!

- ▶ The crane driver may not rely blindly on the derrick ballast radius measurement, but he must think for himself and check, if the measurement is still working correctly!
 - ▶ With completely telescoped in / out derrick ballast, the display „derrick ballast radius“ must approximately show the corresponding end position!
-

**Note**

- ▶ When telescoping the suspended ballast guide, the indicator must change the display „Derrick ballast radius“ on the LICCON monitor corresponding to the movement of the derrick ballast! If this is not the case, the crane operator can immediately notice if the length sensor rope drum jams when spooling in or out!
- ▶ When telescoping the derrick ballast in and out, the „derrick ballast radius“ display must be observed carefully on the LICCON monitor.

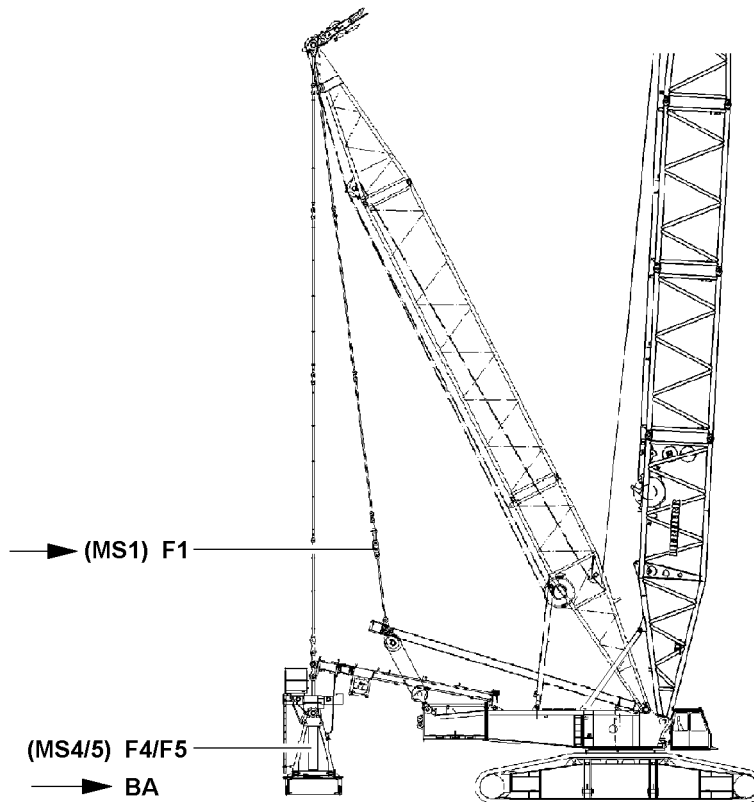
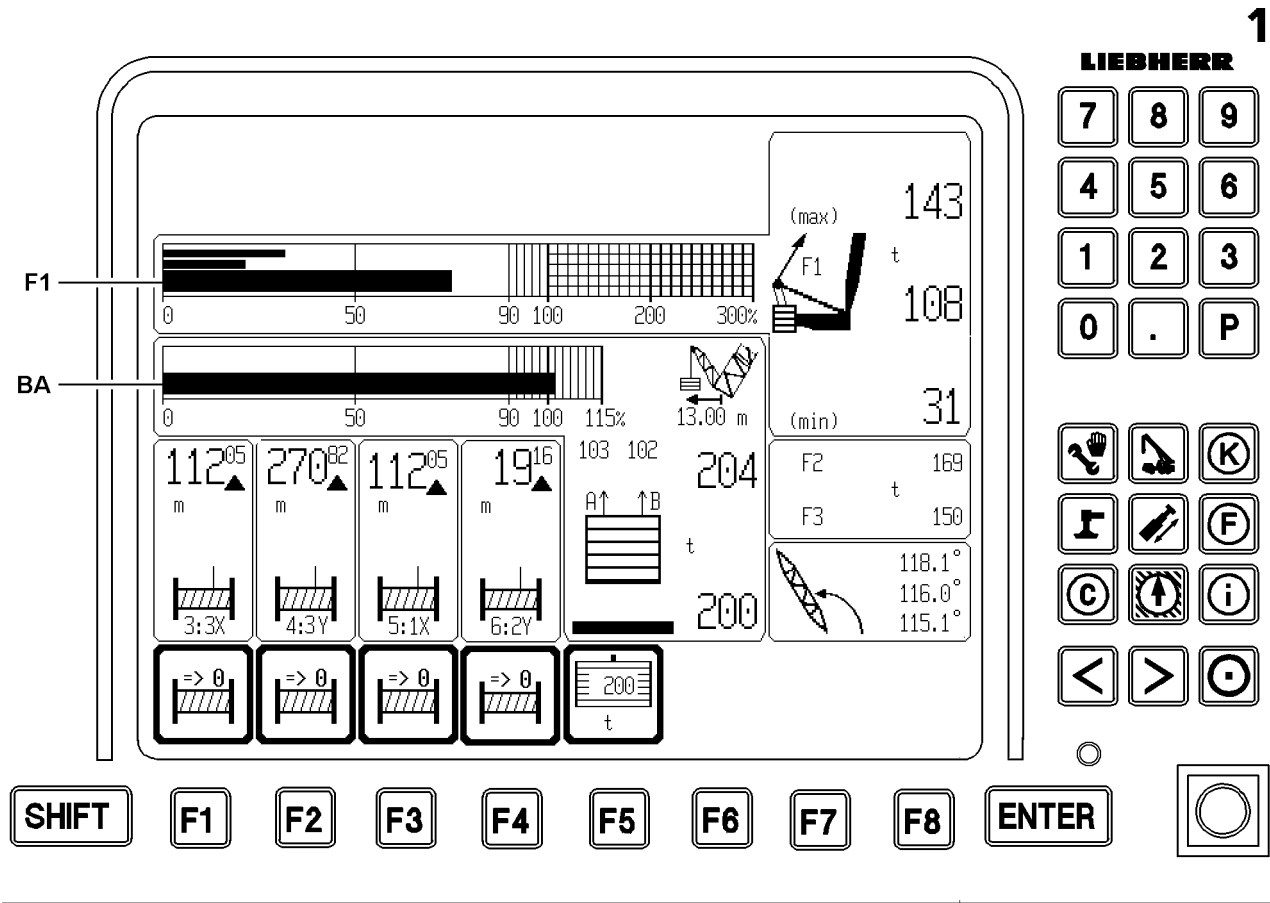


Fig.107835

LWE/LR 1750-000/12812-15-02/en

3.10 Differential force monitoring for derrick ballast guying

In operating modes with derrick ballast, the difference between the forces on derrick guying A and B is monitored on LICCON monitor 1. If the difference exceeds a permissible value, an acoustical warning is issued and the two force values blink.



WARNING

Risk of accident from damaged crane components!

Too high a difference in the derrick ballast guying A and B can have the result that the derrick ballast arrives in an impermissible inclined position, and thereby the derrick end section, the ballast guide or other crane components may be damaged!

Personnel can be severely injured or killed!

- ▶ The forces in the derrick ballast guying A and B are to be carefully observed on LICCON monitor!
- ▶ If the specified limit value is exceeded, there occurs **no shut off** of crane movements!
- ▶ The maximum permissible length difference A and B, in relation to the extension conditions on the pull cylinders, may not exceed 40 mm !

Exceeding the limit value can have the following causes:

- Flexing on the turntable.
- The ground under the derrick ballast is uneven.
- The crane is leaning to one side.
- The derrick ballast has been loaded on one side.
- Incorrect force measurement in one of the derrick ballast guying is incorrect.

The crane driver must recognize the correct cause and take countermeasures:

- Error message appears.
- The error, which caused the one-sided force, must be remedied.
- In case of small ground unevenness only, the following measure is permissible:
Lock one pull cylinder and with the other pull cylinder lift the derrick ballast or „derrick ballast lower“ activate until the difference between the forces A and B is smaller.
- In case of implausible sensor values: Check whether the ballast weighing pressure sensors or inputs for the ballast weighing are faulty. If necessary, pull out the sensor or replace the CPU.

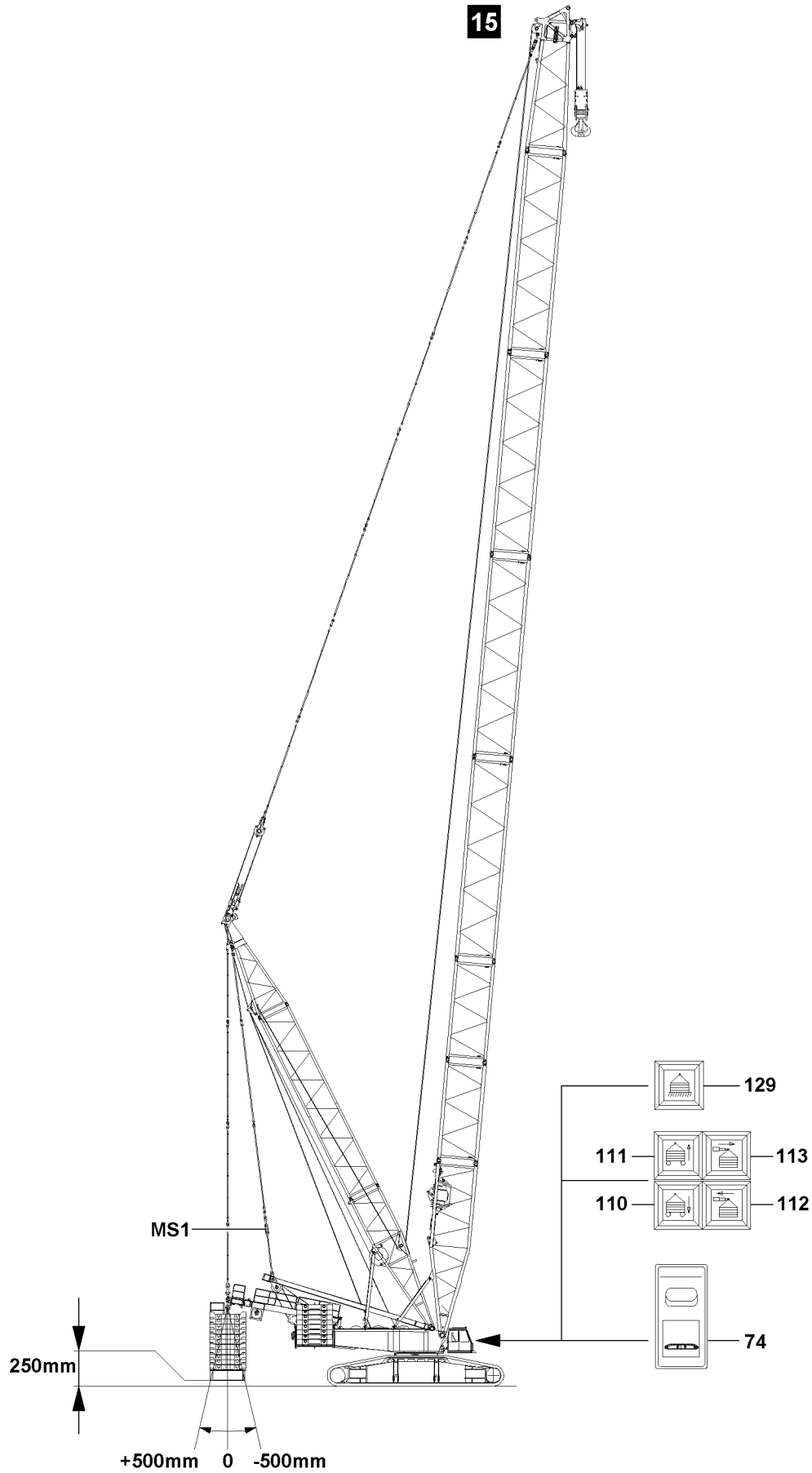


Fig.107526

LWE/LR 1750-000/12812-15-02/en

4 Crawler operation with derrick ballast

4.1 Driving the crawler

Driving with raised, suspended derrick ballast.

Make sure that the following prerequisites are met:

- the derrick ballast has been lifted off the ground,
- the derrick ballast symbol on LICCON monitor 1 represents a suspended state,
- the derrick ballast is horizontally aligned,
- the sub-surface is able to support the weight of the crane, the load and the derrick ballast.



Note

- ▶ The hazard warnings described in chapter 4.10 of the crane operating instructions must be observed!
- ▶ Release for driving the crawler takes place when all 4 ground contact rollers are no longer **in contact with the ground!**
- ▶ The crawler operation must be added with the switch **74!**



DANGER

The crane can topple over!

If the following hazard warnings are not observed while driving with the derrick ballast, the crane can topple over!

- ▶ No persons or objects may be in the danger zone!
- ▶ The driving area should be monitored by cameras or a supervisor!
- ▶ Only drive at the lowest possible speed!
- ▶ Avoid jerky driving movements!
- ▶ The attached load and suspended derrick ballast must be secured to prevent it from swinging!
Should the derrick ballast swing more than ± 500 mm, use the pull cylinders to immediately set the derrick ballast down on the ground! Do not exceed the upper load threshold at measuring point 1!
- ▶ Steering manoeuvres are prohibited!
- ▶ Uphill or downhill travel is prohibited!

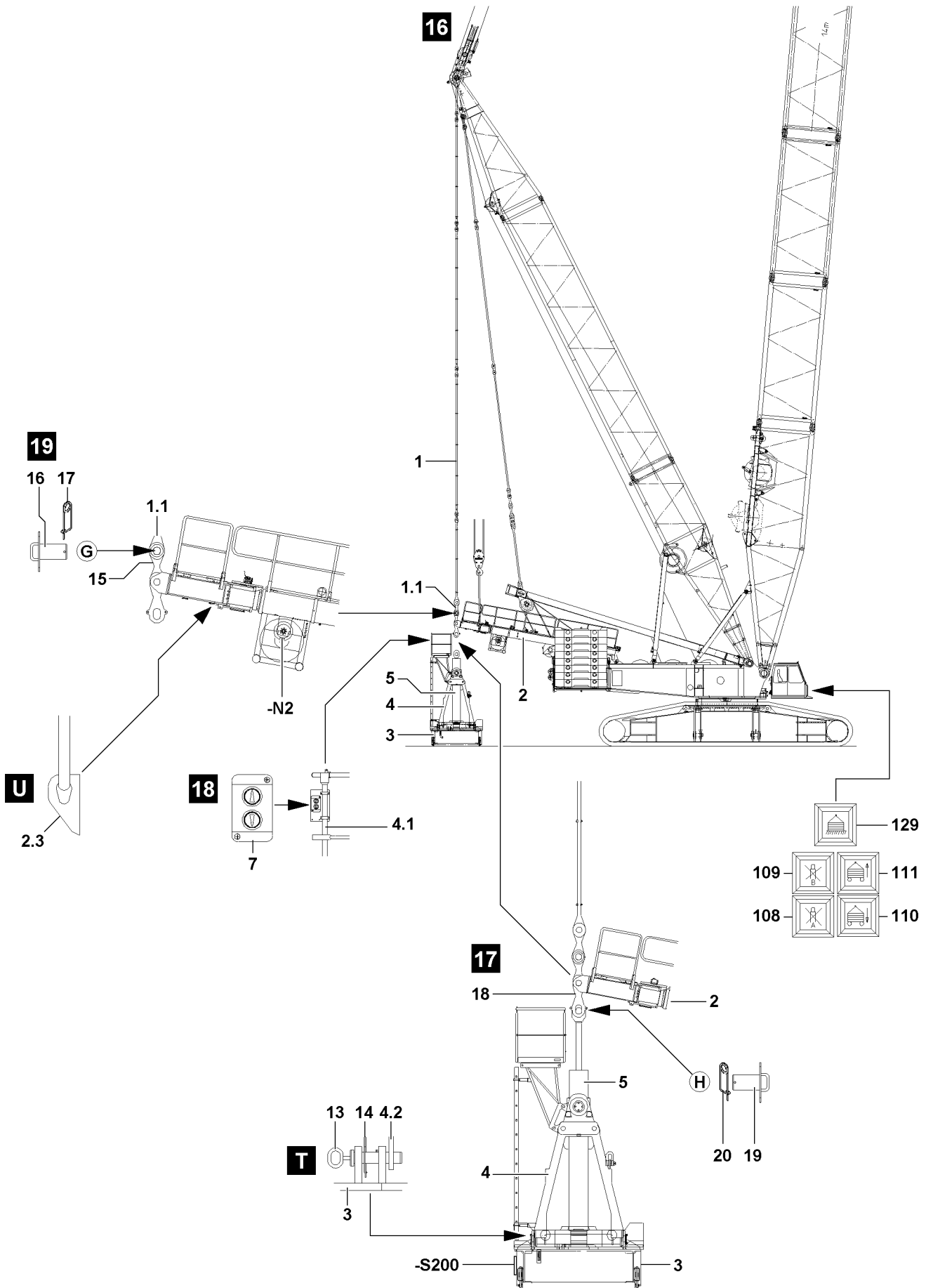


Fig.107532

LWE/LR 1750-000/12812-15-02/en

5 Disassembly



WARNING

Danger of crushing!

While assembling, hands can be crushed or even severed by swing movements of the components!

- ▶ Make sure that the components do not swing back and forth during assembly!

Ensure that the following prerequisite is met:

- the derrick ballast should be set down on a surface which is level, horizontal and of sufficient load carrying capacity.



DANGER

The crane can topple over!

The surface on which the derrick ballast is set down must be level, horizontal and of sufficient load bearing capacity, otherwise the ballast stacks can tip over!

Personnel can be severely injured or killed!

- ▶ Check the horizontal position of the crane during the set down procedure!
- ▶ Check the horizontal position of the derrick ballast during the set down procedure!
- ▶ Constantly check the differential forces in the guying on the LICCON monitor!
- ▶ It is strictly prohibited for anyone to stand under the derrick ballast or in any part of the danger zone during the set down procedure!

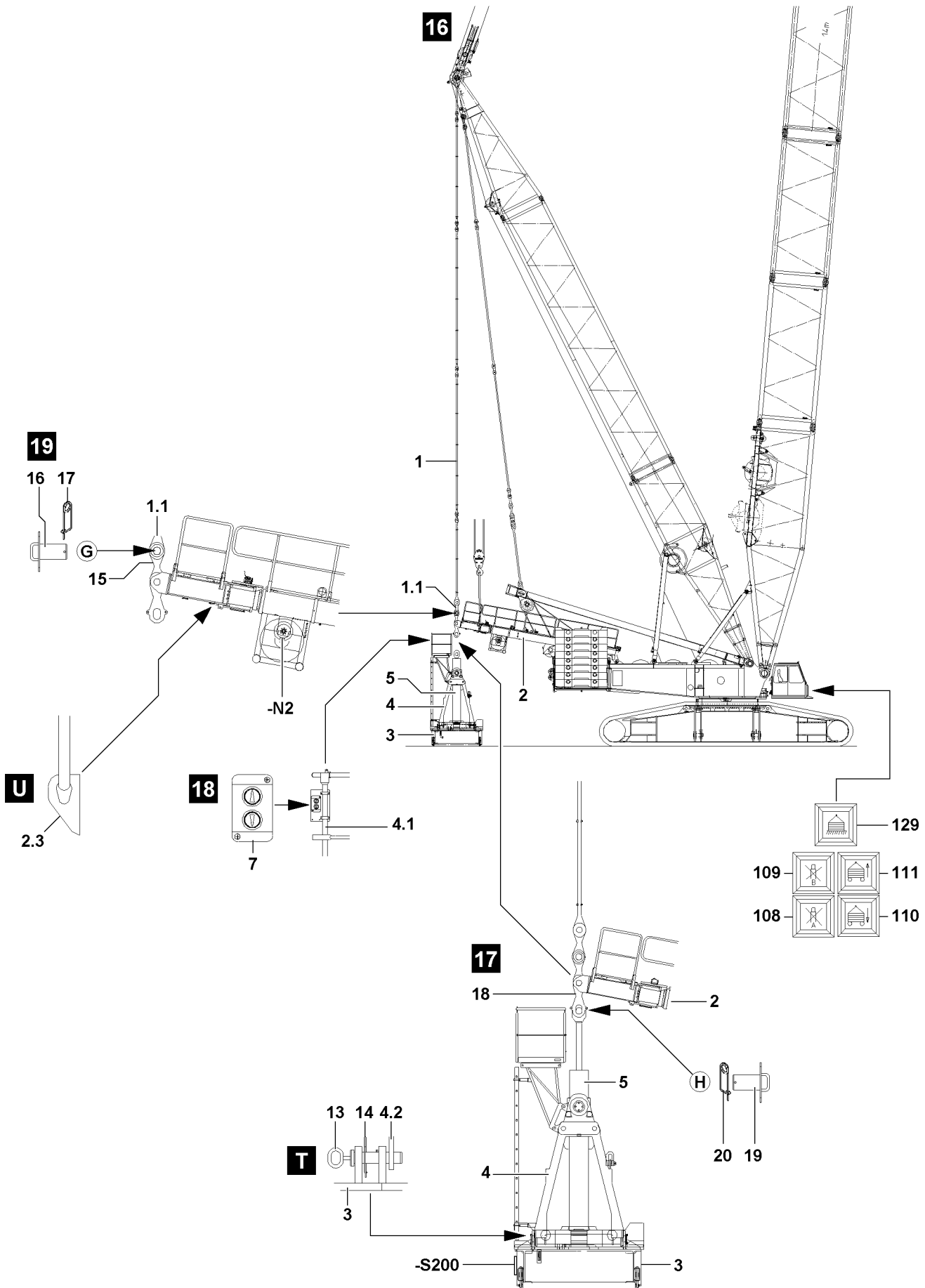


Fig.107532

LWE/LR 1750-000/12812-15-02/en

5.1 Setting the ballast pallet down



Note

- ▶ The guide frame must be completely telescoped in before setting down the ballast pallet onto the ground. For each pin point on the turntable, the derrick ballast radius stands at 13 m or at 15 m !
- ▶ The derrick ballast radius and the derrick boom radius must be identical!

Make sure that the following prerequisites are met:

- the guide frame is fully telescoped in,
- the derrick boom radius and the derrick ballast radius are identical,
- setting down of the derrick ballast and the load is observed by a guide.

- ▶ Press the button **110**.

Result:

- The piston rods of the pull cylinders extend.
- The derrick ballast is lowered.



Note

- ▶ If the ballast pallet leans at an angle and if there is a difference in the forces in the derrick ballast guying, re-align the ballast pallet until it is horizontal!

- ▶ Press the button **108**.

or

- Press the button **109**.

Result:

- The corresponding pull cylinder is blocked.

- ▶ Extend or retract unblocked cylinders by activating the button **110** or the button **111** until the ballast pallet is horizontally aligned.

When the ballast pallet is horizontally aligned:

- ▶ Activate button **110** and lower ballast pallet onto the ground with the pull cylinders until the warning light **129** illuminates.

Result:

- The crane movements „turning the turntable“ and „driving the crawler“ turn off.
- The crane movement „derrick ballast down“ is switched off.

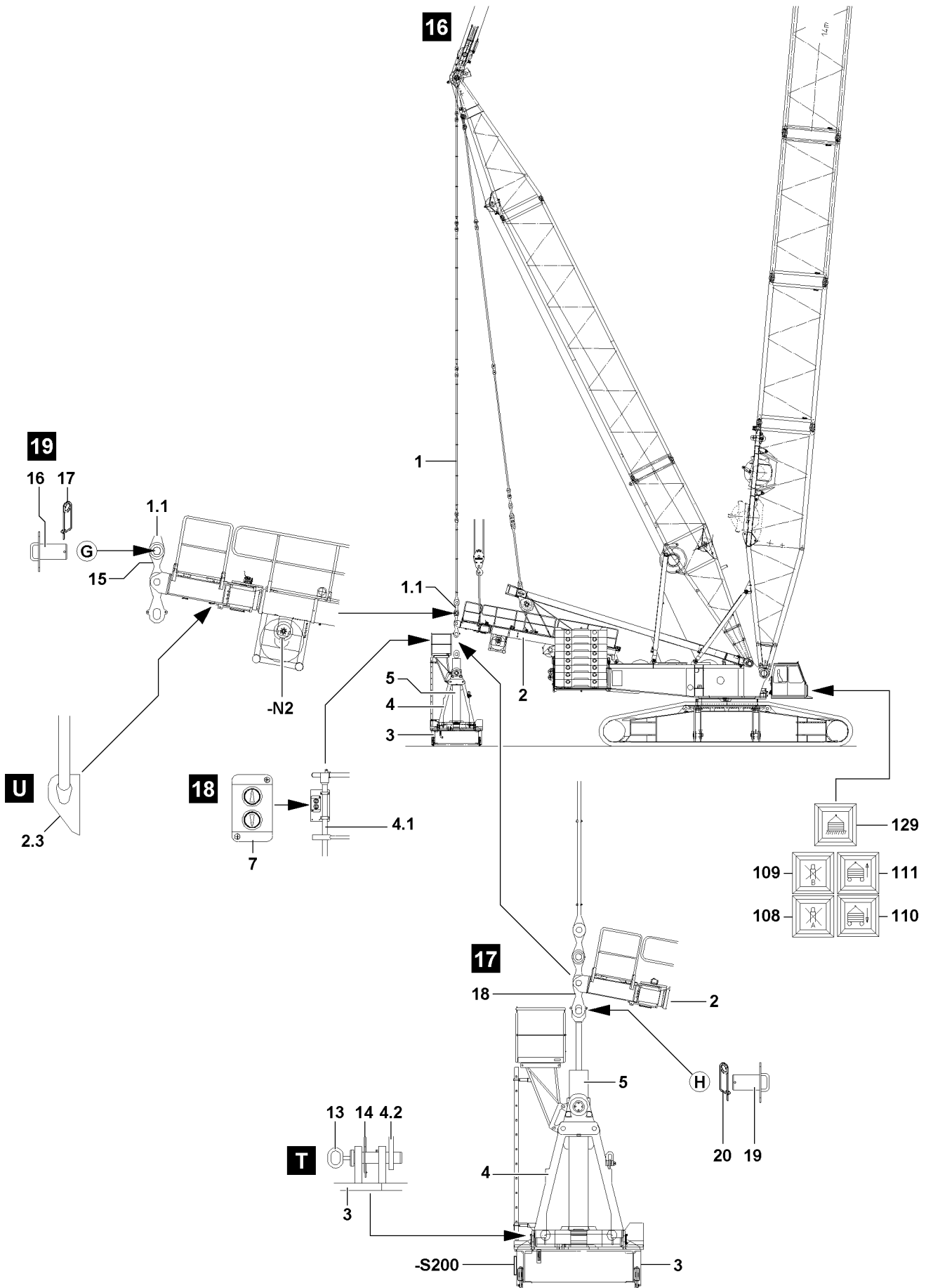


Fig.107532

LWE/LR 1750-000/12812-15-02/en

5.2 Removing the ballast plates from the ballast pallet



Note

- ▶ The ballast plates are marked with their own weights!

Ensure that the following prerequisites are met:

- the derrick ballast is completely set down onto the ground.



DANGER

Risk of accident!

If more than the specified loads are lifted with the ropes, then they or the studs will be overloaded and the ballast plates can fall down!

Personnel can be severely injured or killed!

- ▶ Do not exceed the maximum permissible load of the tackle, observe manufacturer's data!
- ▶ Remove ballast plates simultaneously from the ballast pallet!
- ▶ Remove the ballast plates individually!
- ▶ Immediately replace damaged ballast plates with new ballast plates!

- ▶ Remove the ballast plates from the ballast pallet with the auxiliary crane.

5.3 Removing the centring plates* from the ballast pallet

When all ballast plates have been removed from the ballast pallet:

- ▶ Attach the centring plates on auxiliary crane and raise from ground.

5.4 Disassembling the ballast pallet on the guide frame

Make sure that the following prerequisites are met:

- the ballast pallet is ballasted down,
- the ballast pallet is placed on the ground,
- an auxiliary crane is available.



DANGER

Risk of fatal injury due to toppling erection racks!

If the erection racks are **not** secured before disassembly of the ballast pallet on the guide frame with the retaining pins **13** the erection racks topple!

Personnel can be severely injured or killed!

- ▶ Pin erection racks before disassembly on the guide frame with retaining pins **13** and secure with spring retainer **14**!
- ▶ Before unpinning the piston rods on the guide frame, perform a visual inspection!

- ▶ Remove the spring retainer **20** on pin **19**.
- ▶ Unpin pin **19** at point **H**.

When the pins are **19** unpinned of both sides of point **H**:

- ▶ Retract pull cylinder **5** completely.

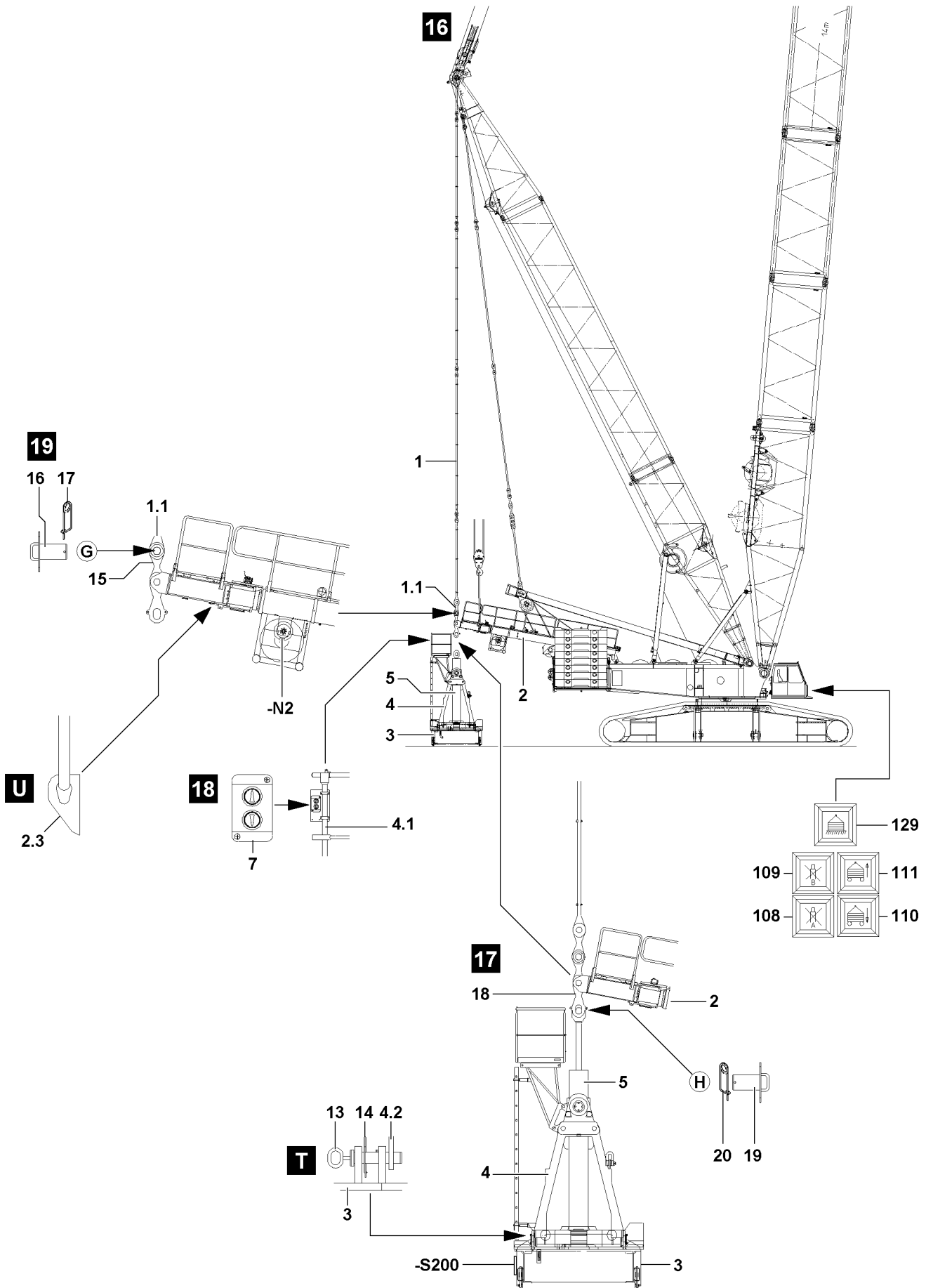


Fig.107532

LWE/LR 1750-000/12812-15-02/en

5.5 Disconnect electrical connection from the ballast pallet to the guide frame



Note

- ▶ Disconnect the electrical connections only when the ballast trailer is completely unpinned on the guide frame, which means both pins **19** must be unpinned!

Ensure that the following prerequisite is met:

- the ballast pallet is completely unpinned on the guide frame.
- ▶ Disconnect the electrical connections and store cable properly.

5.6 Disconnect electrical connection from the ballast pallet to the guide frame

When hydraulic lines are connected and disconnected with quick-release couplings, make sure that the coupling procedure is carried out correctly.



DANGER

Risk of accident due to loss of pressure or leakage!

Incorrectly coupled or incompletely coupled quick-release couplings (particularly return lines) as well as self-loosening of quick-release couplings can result in serious injury due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
- ▶ Release the pressure in the hydraulic system before connecting and disconnecting. Turn the engine off and wait several minutes.
- ▶ Loosen coupling components (sleeve and connector) by using hand-tightened nut.
- ▶ Separate coupling components.
- ▶ Store hydraulic hoses on the guide frame correctly.
- ▶ Fitting the coupling components with protective cap against contamination and damage.

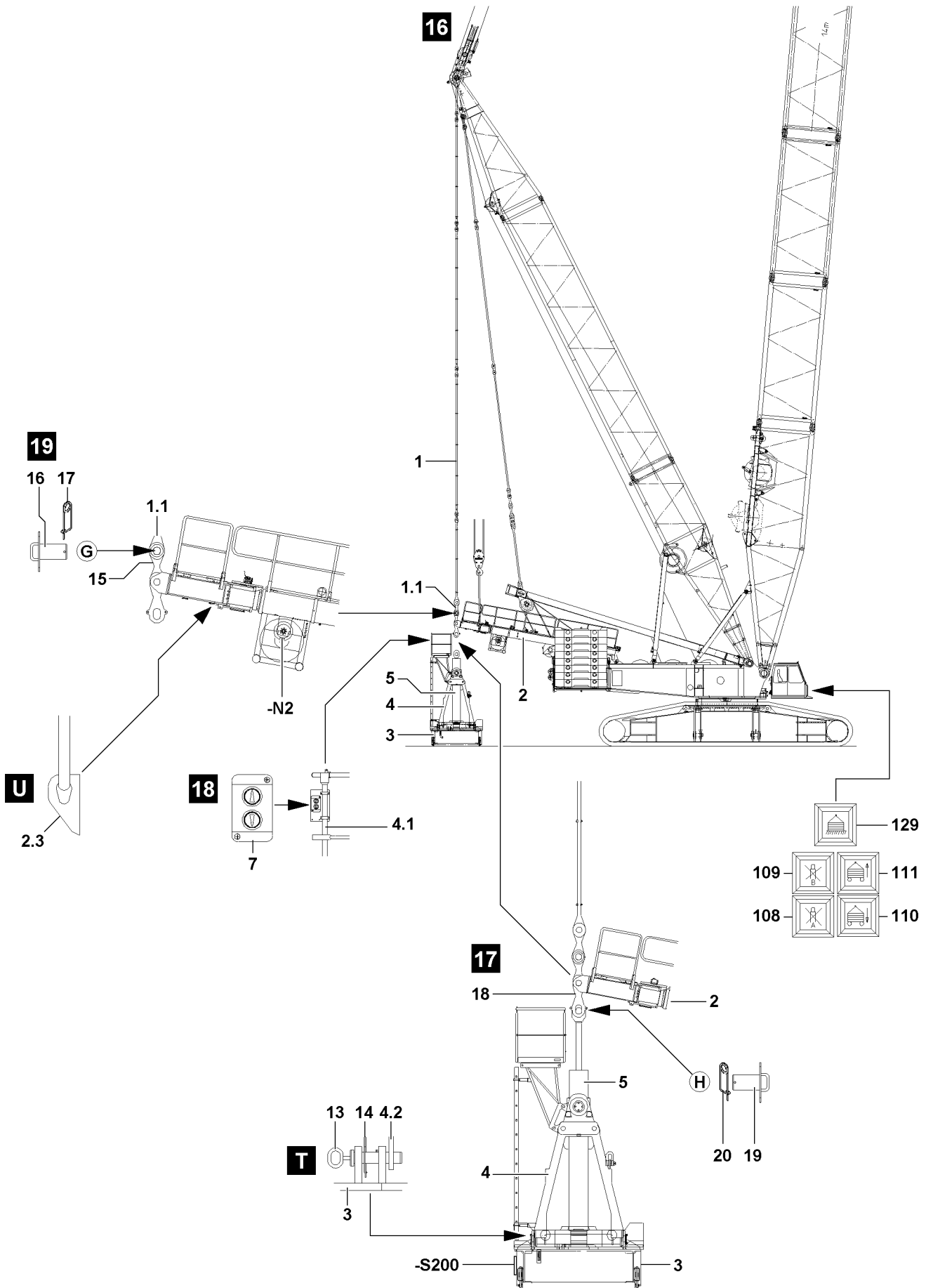


Fig.107532

LWE/LR 1750-000/12812-15-02/en

5.7 Disassembling the derrick ballast guying on the guide frame

For disassembly of the derrick ballast guying on the guide frame, it is required to raise the guide frame with the auxiliary crane until the derrick ballast guying is relieved and the connection pins can be unpinned.

- ▶ Attach the guide frame **2** onto the lashing lugs **2.3** on the auxiliary crane, see illustration **U**.
- ▶ Lift the guide frame **2** with the auxiliary crane.

When the derrick ballast guying **1** is relieved:

- ▶ Remove the spring retainer **17** on both sides and unpin the pin **16** at point **G**.

When the pins **16** are completely unpinned:

- ▶ Carefully place guide frame **2** on the support on the turntable with auxiliary crane.

When the guide frame **2** lies completely on the turntable:

- ▶ Remove the auxiliary crane.

5.8 Release the electrical connection from the guide frame to the turntable



Note

- ▶ Disconnect electrical connections first after the derrick ballast guying is disassembled and the guide frame is completely placed on the turntable!
- ▶ Disconnect the electrical connections and store on the guide frame properly.

5.9 Loosen the hydraulic connections from the guide frame to the turntable

When hydraulic lines are connected and disconnected with quick-release couplings, make sure that the coupling procedure is carried out correctly.



DANGER

Risk of accident due to loss of pressure or leakage!

Incorrectly coupled or incompletely coupled quick-release couplings (particularly return lines) as well as self-loosening of quick-release couplings can result in serious injury due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
- ▶ Release the pressure in the hydraulic system before connecting and disconnecting. Turn the engine off and wait several minutes.
- ▶ Screw coupling components (sleeve and connector) by using hand-tightened nut.
- ▶ Separate coupling components.
- ▶ Store hydraulic hoses on the guide frame correctly.
- ▶ Fitting the coupling components with protective cap against contamination and damage.

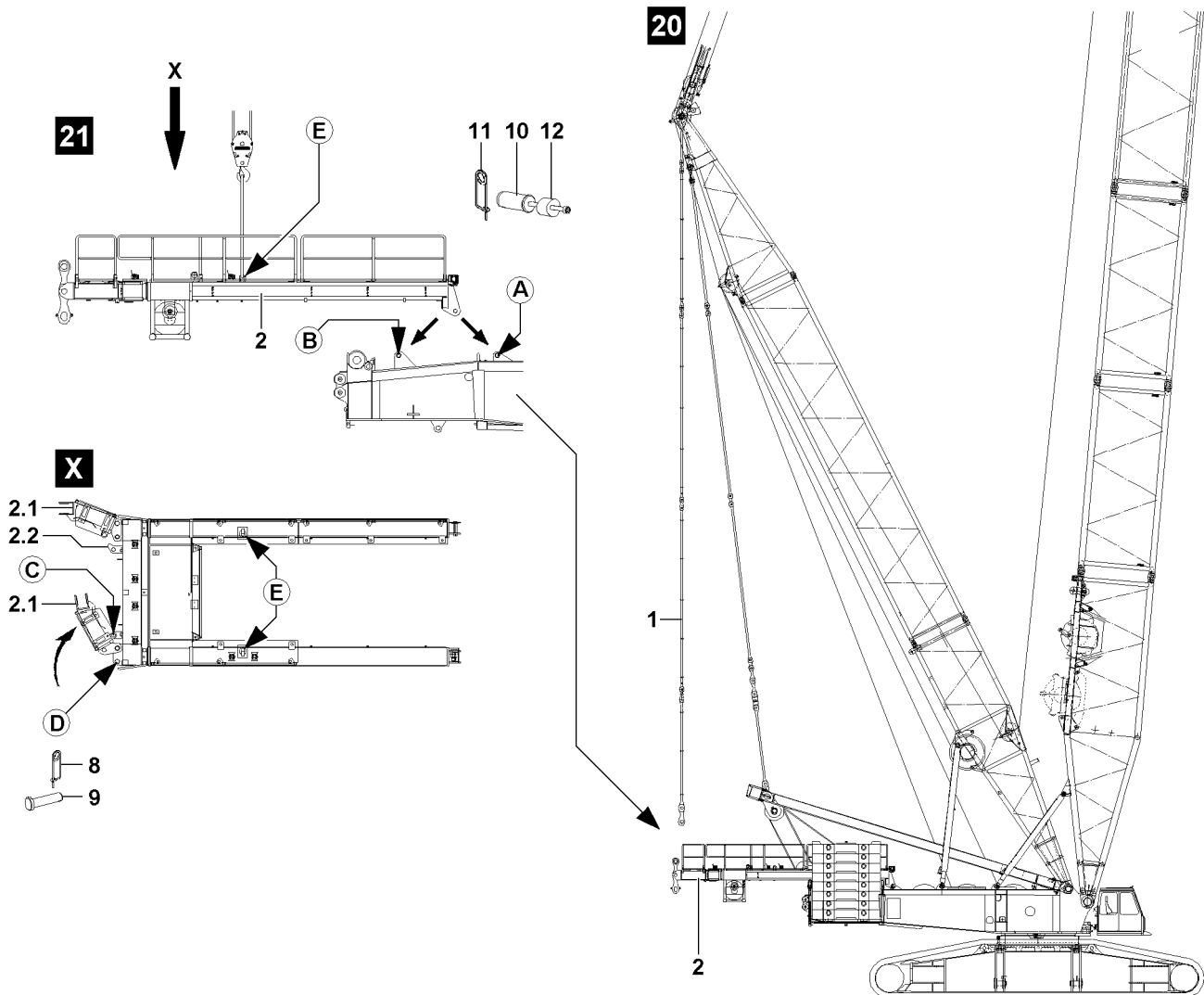


Fig.107533

LWE/LR 1750-000/12812-15-02/en

5.10 Disassembling the guide frame on the turntable

- ▶ Attach the guide frame **2** onto the lashing lugs, point **E** on the auxiliary crane.
- ▶ Carefully tension the tackle.

When the tackle is tensioned:

- ▶ Remove spring retainer **11** on both sides and unpin pins **10**.

NOTICE

Damage to crane!

By swinging out the guide frame **2**, severe property damages in the area of the turntable or the guide frame can result!

- ▶ Swing out guide frame carefully and with the least possible speed!

-
- ▶ Raise guide frame **2** and swing out on the turntable.
 - ▶ Place the guide frame **2** to prevent tipping.
 - ▶ Remove the auxiliary crane.

5.11 Fold in slewing arms on the guide frame

In order to re-establish the transport width after disassembly of the guide frame, the slewing arms **2.1** - are to be moved and re-secured into transport position - after crane operation.

Move and secure the slewing arms **2.1** into transport position.

- ▶ Release locking pins **8** on both sides of point **D** and unpin.
- ▶ Fold slewing arms **2.1** into transport position (in direction of arrow) to the inside.

When the slewing arms **2.1** are in transport position:

- ▶ Pin in the locking pin **8** left and right at point **C** and secure with spring retainer **9**.

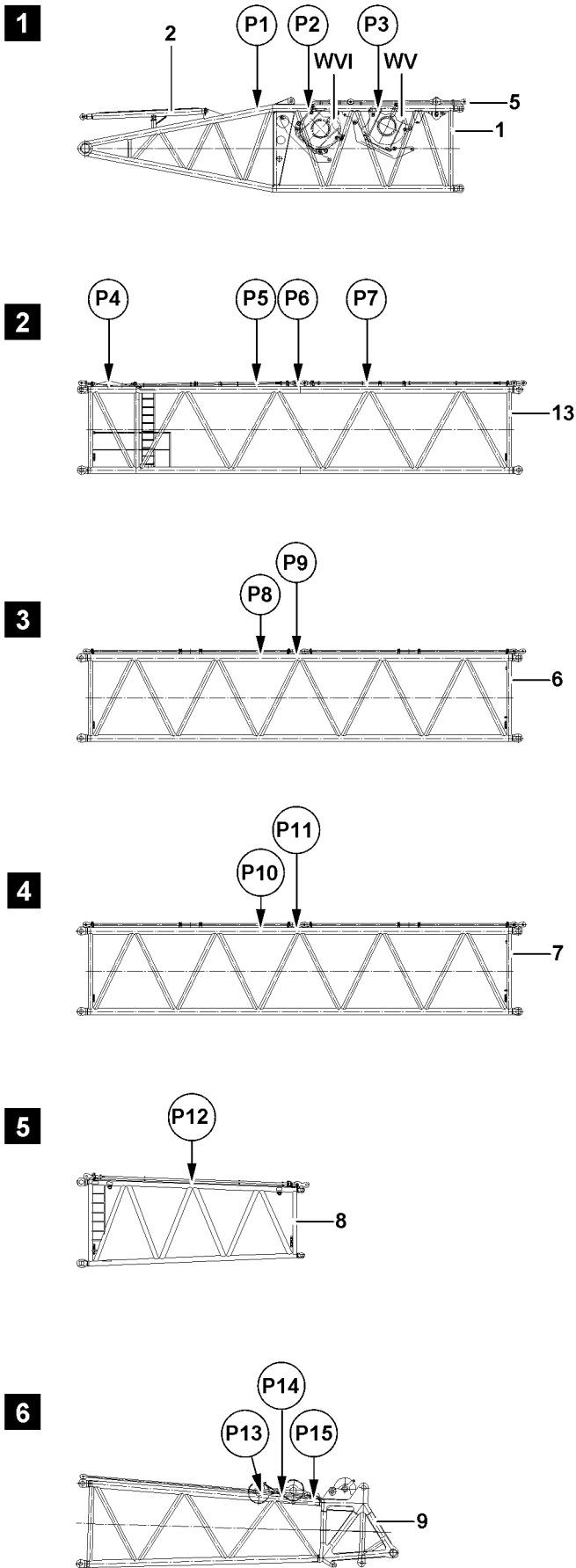


Fig.112549

LWE/LR 1750-000/12812-15-02/en

1 Component overview S-/SL-boom

Examples for components of S-/SL-boom:

- 1 S-pivot section
 - Pivot section with winch 5 **WV**, winch 6 **WVI** and W-guy rods **5**, see illustration **1**
- 2 S-relapse retainer
 - See illustration **1**
- 13 S-intermediate section 2826.20
 - Intermediate section 14 m with guy bracket on point **P4** for flying assembly, see illustration **2**
- 6 S-intermediate section 2826.30
 - Intermediate section 14 m , reinforced intermediate section for S-system, see illustration **3**
- 7 S-intermediate section 2826.20
 - Intermediate section 14 m , standard intermediate section for S-system, see illustration **4**
- 8 SL-reducer section
 - See illustration **5**
- 9 S-end section
 - See illustration **6**

2 Fastening points S-/SL-components



WARNING

Component incorrectly attached!

Life-threatening situations can arise due to improper or incorrect attachment of the corresponding components!

Personnel can be severely injured or killed!

▶ Attach the components only on the intended fastening points on both sides!

▶ Attachment of components and description of fastening points, see Crane operating instructions, chapter 5.01!

Component	Fastening point	Illustration
S-pivot section, without winches	P1 and P2	1
S-pivot section, with winches	P1 and P3	1
S-intermediate section 2826.20 for flying assembly	P5 and P6	2
S-intermediate section, without usage	P7	2
S-intermediate section 2826.30, reinforced	P8 and P9	3
S-intermediate section 2826.20	P10 and P11	4
SL-reducer section	P12	5
S-end section, without pulley set	P13 and P14	6
S-end section, with pulley set	P13 and P15	6

Fig.195219

LWE/LR 1750-000/12812-15-02/en

3 Assembling the S/SL boom



Note

- ▶ The assembly is described on the example of the S-boom!



WARNING

Risk of falling!

During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling! If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids!
- ▶ If fall protection equipment is available, then it must be used, see Crane operating instructions, chapter 2.06!
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the permissible fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04!
- ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06!
- ▶ Only step on the aids, ladders and catwalks with clean shoes!
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice!
- ▶ It is prohibited to walk on the telescopic or an auxiliary boom without suitable protective devices!



WARNING

The lattice sections can fall down!

If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel!

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right!**
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom!
- ▶ Secure the pins in the bearing points and the receptacles!
- ▶ It is prohibited to lean the ladder against the components being disassembled!
- ▶ Do not remove the fastening equipment and the auxiliary crane until each component is pinned on and secured!



WARNING

Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be caught and severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

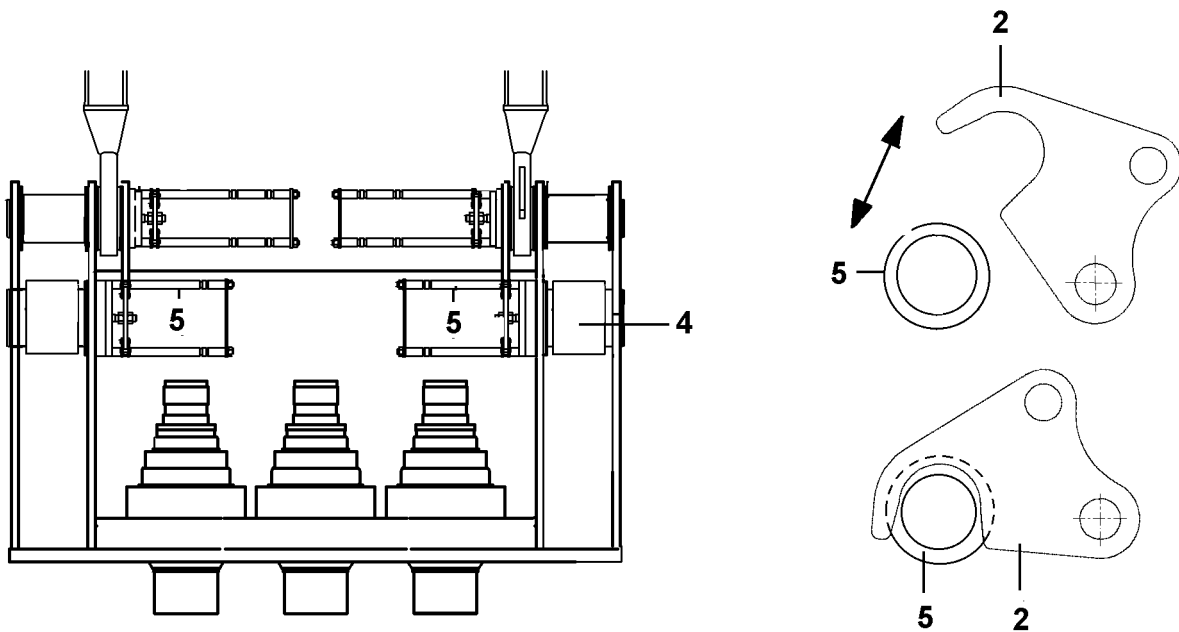
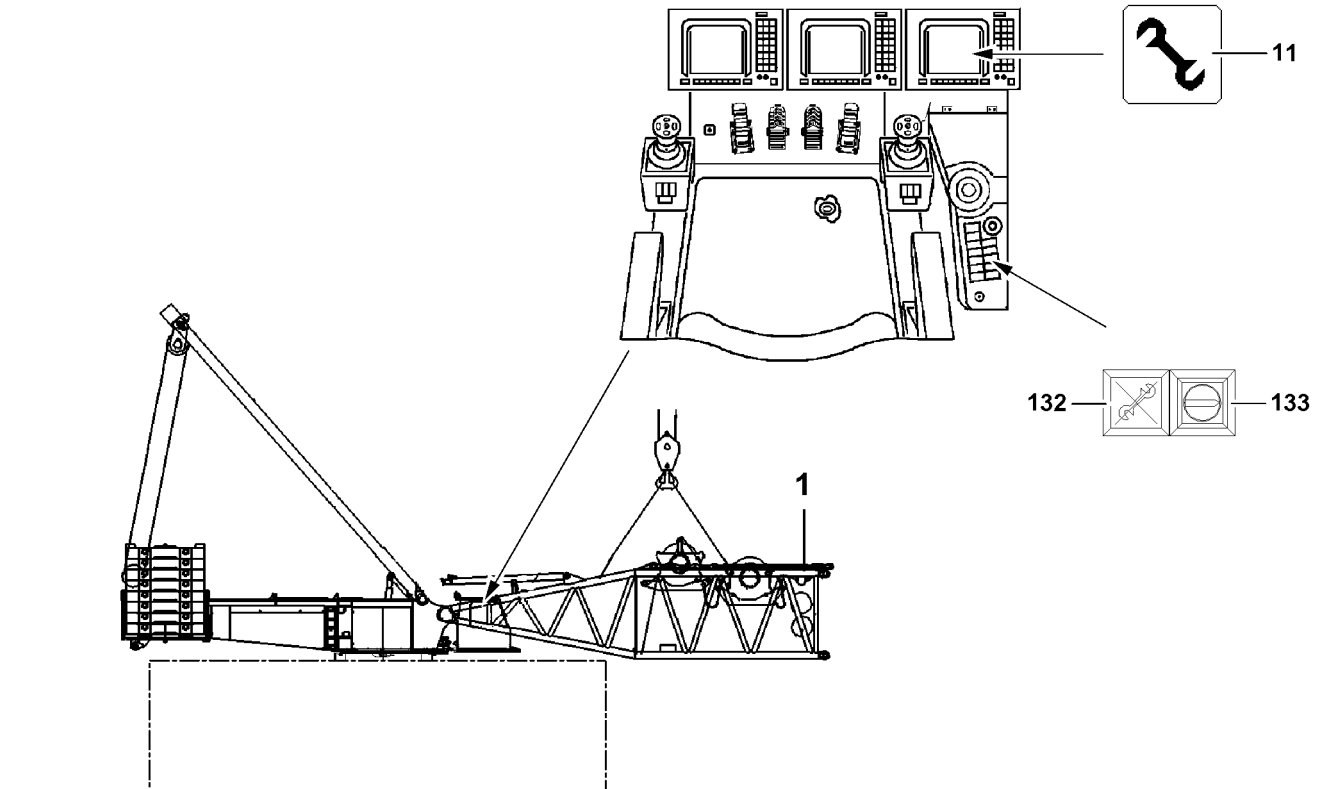


Fig.111629

LWE/LR 1750-000/12812-15-02/en

**WARNING**

The crane can topple over!

- ▶ The turntable may not be turned during the assembly of the boom!
- ▶ Observe the assembly instructions, see Crane operating instructions, chapter 3.06!

**WARNING**

Risk of accident!

If the following instructions are not observed, personnel can be severely injured or killed!

- ▶ Assembly of boom combinations, see Rod plan and Assembly plan!
- ▶ Depending on the condition of the ground, the boom and the lattice sections must be supported from below for the assembly of the boom!
- ▶ Observe the Safety technical notes, see Crane operating instructions, chapter 5.01!

Make sure that the following prerequisites are met:

- The crane is aligned in horizontal direction.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The counterweight has been installed on the turntable according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.

3.1 Turning the turntable into assembly position

- ▶ Turn the turntable in longitudinal direction of the crawler travel gear or to the side, see Erection and take down charts.

3.2 Adding the operating mode „Assembly“

**WARNING**

Risk of fatal injury at crane operation with turned on assembly key button!

If the assembly key button is turned on, the hoist limit switch and the LICCON overload protection is bypassed!

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be killed!

This could result in high property damage!

- ▶ The actuation of the assembly key button **133** is only permitted for assembly tasks!
- ▶ The assembly key button **133** may only be operated by persons who are aware of the consequences of a bypass!
- ▶ Crane operation with the assembly key button **133** turned on is strictly prohibited!
- ▶ The assembly key button **133** must be removed immediately after carrying out the assembly work and handed to an authorized person!

- ▶ Actuate the assembly key button **133**.

Result:

- The LICCON overload protection is bypassed.
- The indicator light in the button **132** lights up.
- The assembly icon **11** appears on the LICCON monitor.

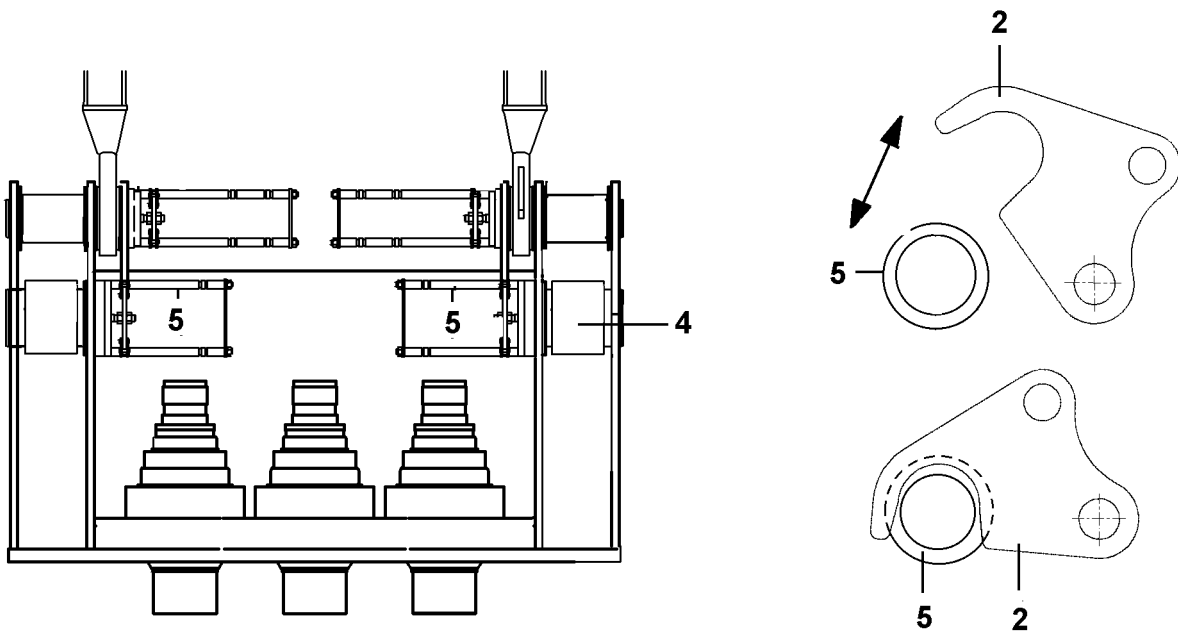
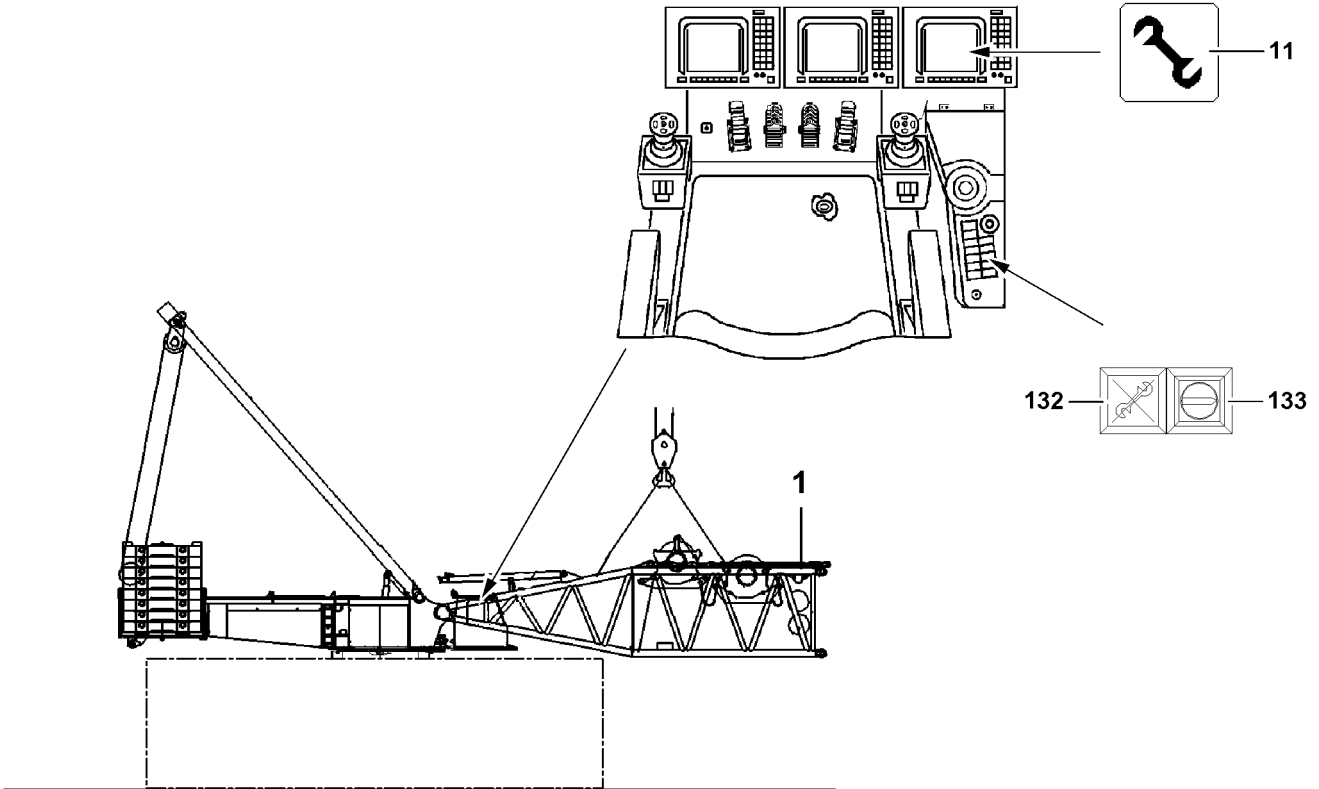


Fig.111629

LWE/LR 1750-000/12812-15-02/en

3.3 Pinning the S-pivot section on the turntable



WARNING

General danger notes!

- ▶ Support the S-boom during assembly with suitable materials!
- ▶ All pins are to be secured after assembly with the intended safety elements!
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15!

Make sure that the following prerequisite is met:

- The pins **4** are unpinned.

- ▶ Hang the S-pivot section **1** onto the auxiliary crane and swing in to the pin points on the turntable.

The pin pulling cylinders on the turntable are actuated with the radio remote control (only available for LR-cranes).



Note

- ▶ For operation of the radio remote control, see Crane operating instructions, chapter 6.08!



WARNING

The S-pivot section can fold downward!

Due to non-secured or insufficiently secured connector pins, the S-pivot section can fold down. Personnel can be severely injured or killed!

- ▶ Secure the pins **4** between the S-pivot section **1** and the turntable after the pinning procedure with the retaining hook **2**!

- ▶ Fold the retaining hook **2** out on the guides **5**.

- ▶ Insert the pins **4** on both sides.

When the pins **4** are completely pinned on the left and right on the S-pivot section **1**:

- ▶ Secure the pins **4**: Fold the retaining hook **2** in on the left and right on the guides **5**.

NOTICE

Damage to the S-pivot section!

When the installed S-pivot section is placed on the ground, the S-pivot section can be damaged!

- ▶ Slowly place the S-pivot section **1** with the auxiliary crane and at low speed on the ground!
- ▶ Before placing it on the ground, support the S-pivot section **1**!

- ▶ Carefully place the S-pivot section **1** on the support.

- ▶ Remove the auxiliary crane.

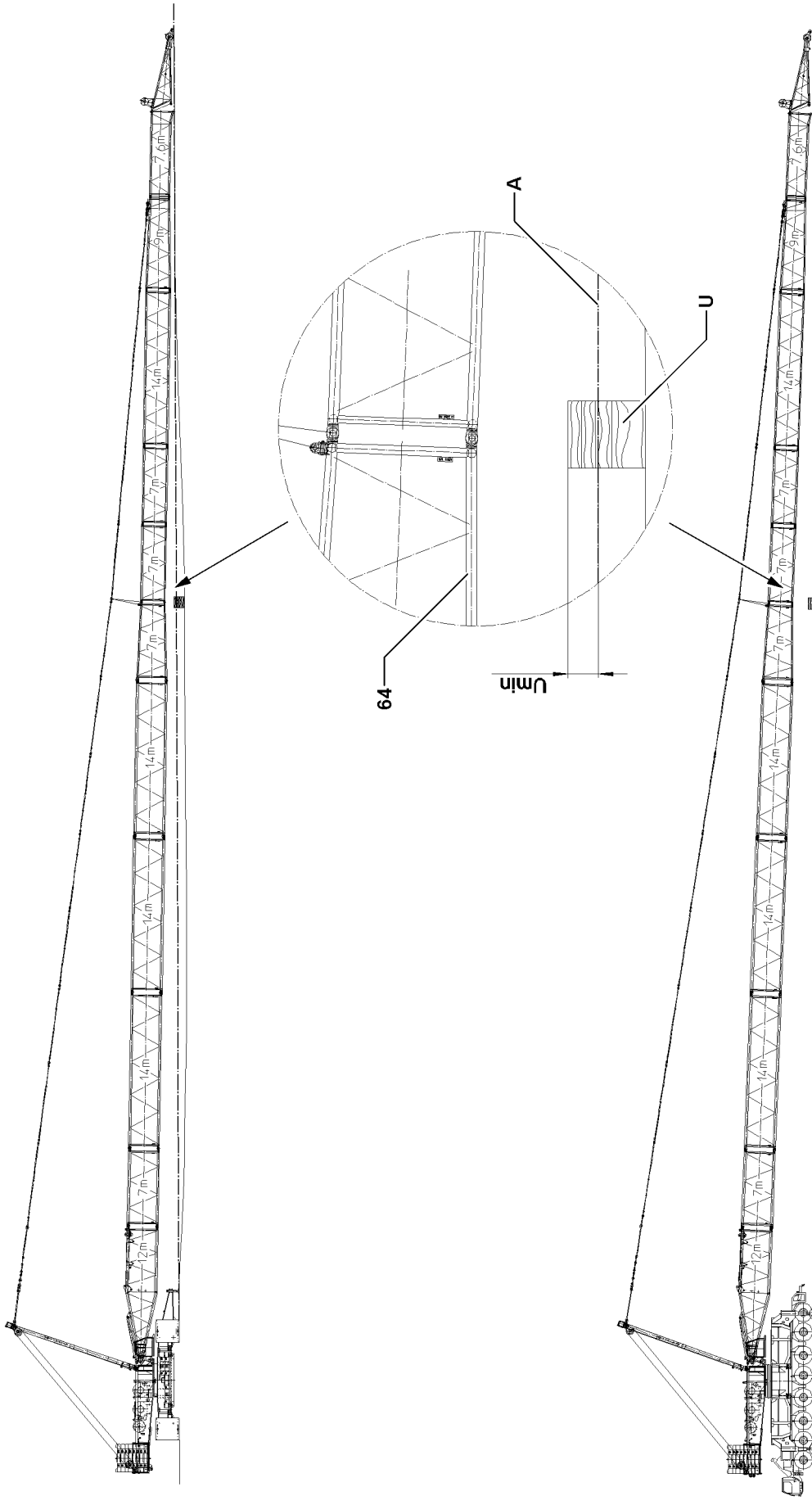


Fig. 111626

LWE/LR 1750-000/12812-15-02/en

3.4 Supporting the S/SL-boom combination for erection

NOTICE

Overload of boom!

If the SL-boom is not supported before the erection procedure, then the boom will be overloaded! The crane will be damaged during erection!

- ▶ For boom lengths SL/SL2, larger than 104 m, a support base must be used!
- ▶ Support the boom with suitable material of sufficient load bearing capacity!



Note

- ▶ The alignment level **A** is the placement level of the crane!



Note

- ▶ The boom combination must be supported on the reducer section **64** with the lug for the auxiliary guying until the dimension U_{min} above the alignment level **A**, see illustration and the following charts!

LR-crane	Boom system	U_{min}	Equipment
	SL-105 m	0.0 m to 0.3 m	- Adapter 7.6 m - Boom nose 100 t

LG-crane	Boom system	U_{min}	Equipment
	SL-105 m	Larger than 1.10 m	- Adapter 7.6 m - Boom nose 100 t
	SL-112 m	Larger than 0.90 m	
	SL-115.5 m	Larger than 0.90 m	

- ▶ Make sure that the upper edge of the base support **U** is dimension U_{min} above the alignment level **A**.
- ▶ Place the SL/SL2-boom combination on the supporting base **U**.

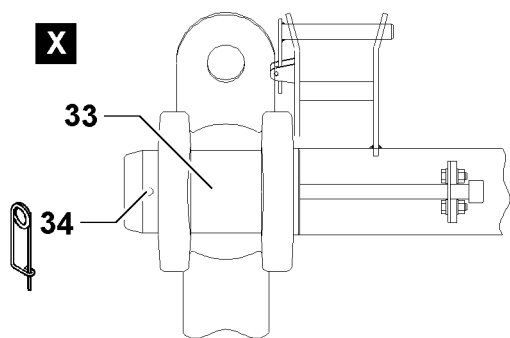
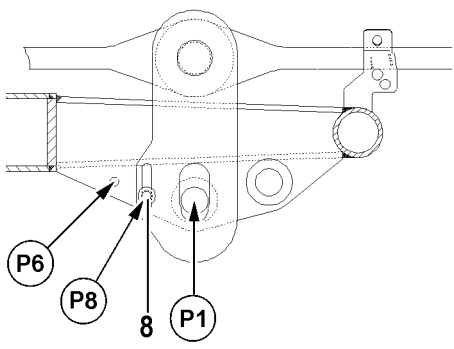
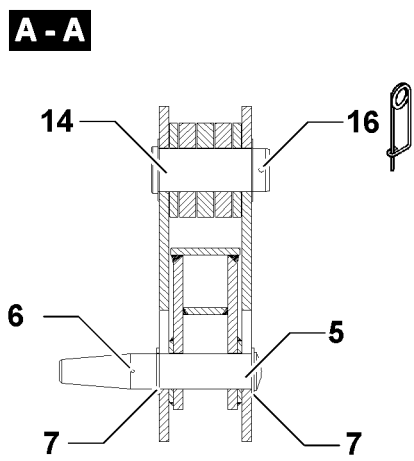
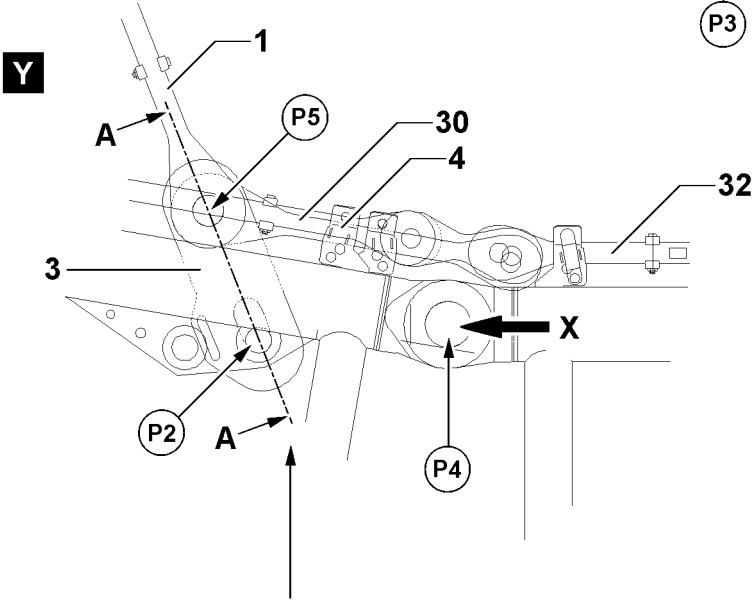
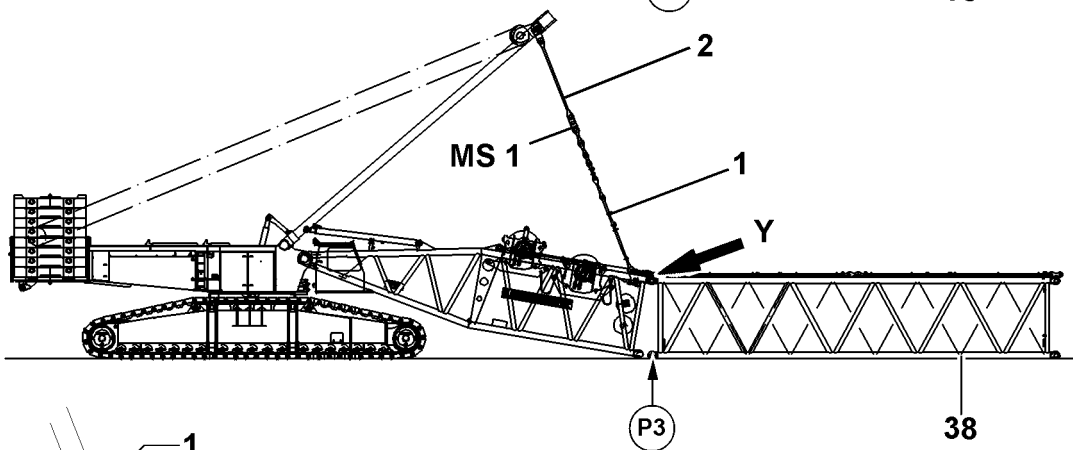
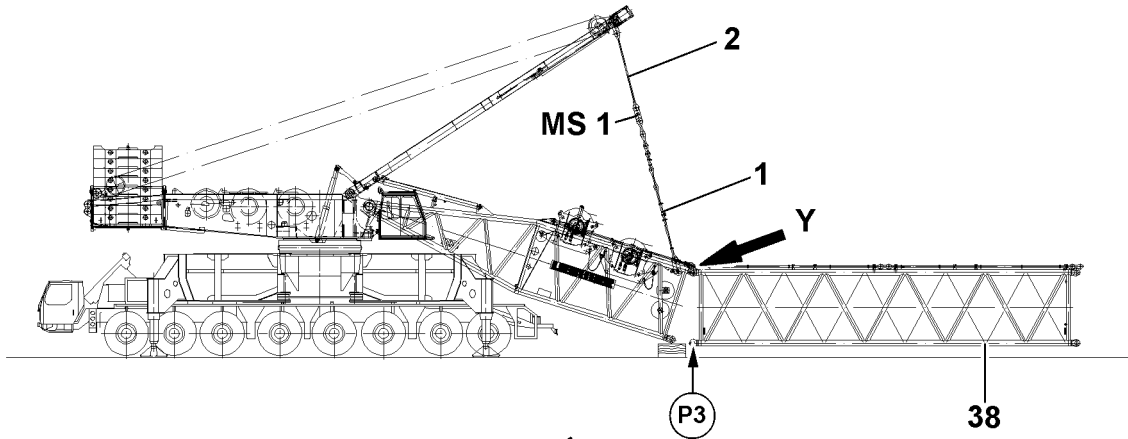


Fig.112553

LWE/LR 1750-000/12812-15-02/en

3.5 Assembling the S-lattice sections

The assembly of the lattice sections is carried out in various ways:

- „Closing“ the boom.
- Assembling the lattice sections in „Flying mode“.



WARNING

General danger notes!

- ▶ Support the S-boom during assembly / disassembly with suitable materials!
 - ▶ All pins are to be secured after assembly with the intended safety elements!
 - ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15!
 - ▶ Secure the boom with support or auxiliary crane, see Crane operating instructions, chapter 5.01!
 - ▶ It is prohibited for anyone to remain under the booms or within the complete danger zone during the pinning and unpinning procedure of the lattice section!
-



Note

- ▶ For weights of intermediate sections with placed guy rods, see Crane operating instructions, chapter 1.03!
 - ▶ The intermediate sections are pinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30!
-

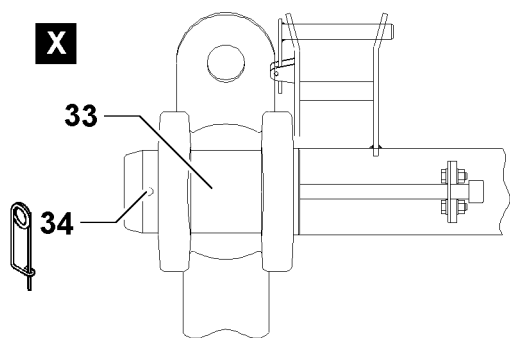
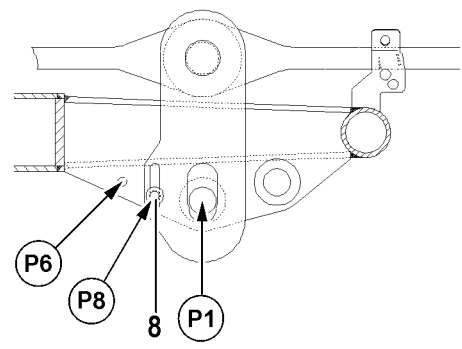
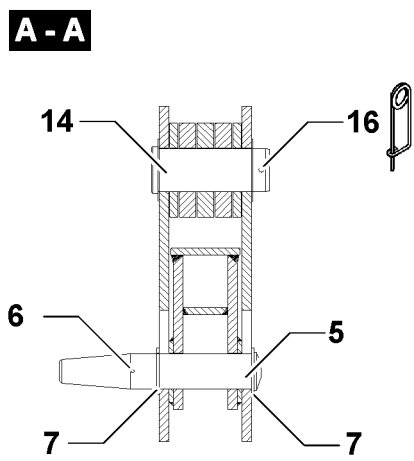
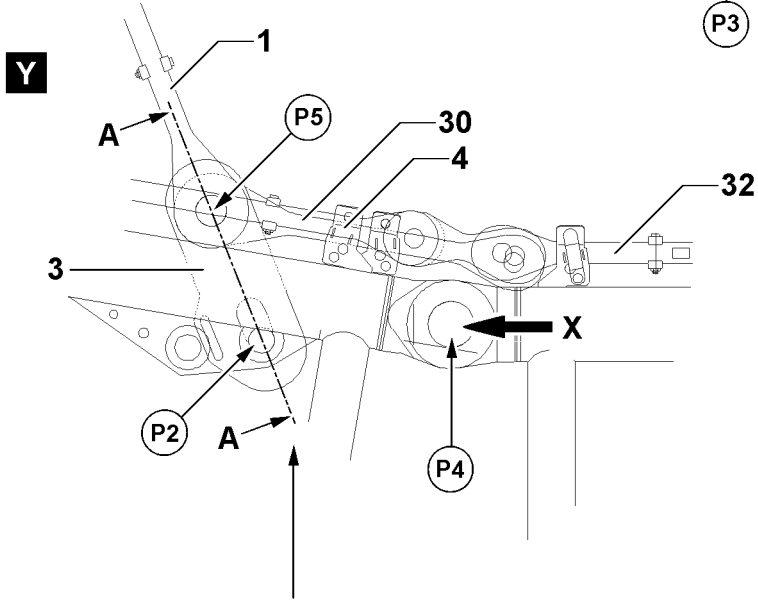
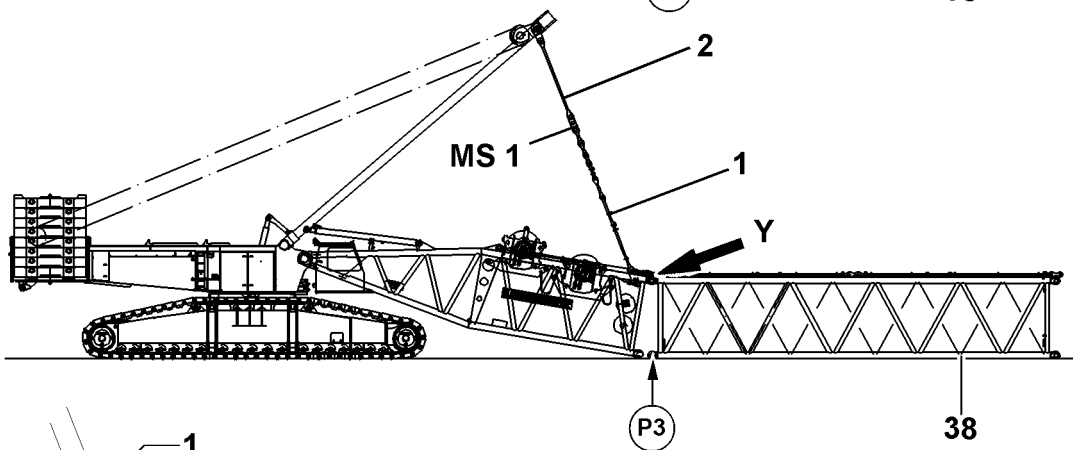
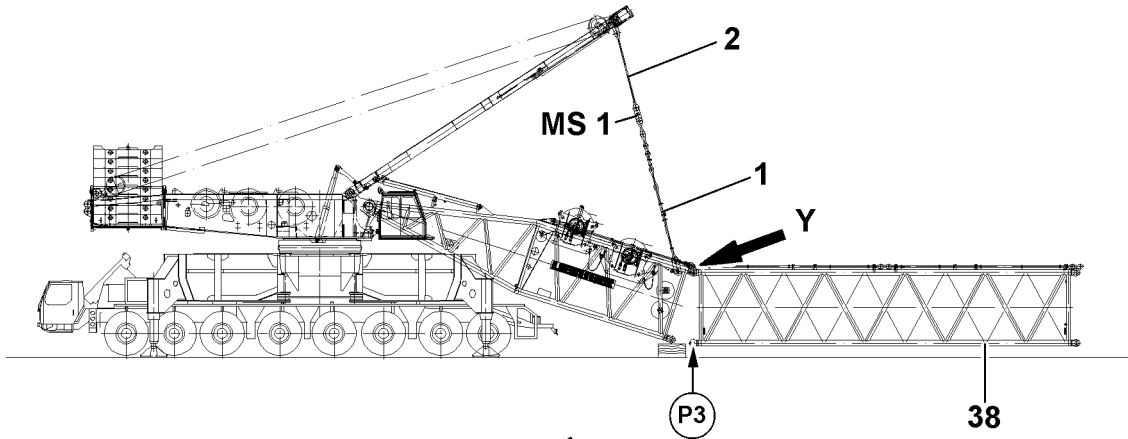


Fig.112553

LWE/LR 1750-000/12812-15-02/en

3.5.1 Assembling the S-lattice sections („close“ boom)

Make sure that the following prerequisites are met:

- The S-pivot section is pinned and secured on the turntable.
- The S-pivot section is placed on the ground.
- The auxiliary crane is removed.

Connecting the guy rods SA-frame with the guy rods S-pivot section

NOTICE

Assembly bracket secured in transport position!

When the assembly bracket **3** is secured in transport position at assembly or operation, components will be damaged!

- ▶ Assemble the transport retainer **8** before assembly and before operation in transport position on point **P6**, see detail **Y**!



Note

- ▶ Flying assembly with derrick: The assembly bracket **3** is pinned on point **P1**!

- ▶ Release the assembly bracket **3**: Disassemble the transport retainer **8** on both sides on point **P8** and assemble on point **P6**.
- ▶ Unpin the assembly bracket **3** on the S-pivot section: Remove the spring retainer **6** and unpin the pin **5** on both sides on point **P1**.

When pinning the pin **5**, you have to use the washers **7**, see sectional **A-A**.

- ▶ Pin the assembly bracket **3** on the S-pivot section: Insert the pins **5** on both sides on point **P2** and secure.
- ▶ Unpin the transport retainers **4** for the guy rods.
- ▶ Lower the SA-bracket to the front until the guy rods **2** hang freely over the guy rods **1** of the S-intermediate section.
- ▶ Pin the guy rods **2** of the SA-bracket with the guy rods **1** of the S-pivot section and secure.
- ▶ Make sure that the guy rod **1**, guy rod **4** and assembly bracket **3** are pinned with each other, point **P5** see detail **D**.
- ▶ Make sure that the assembly bracket **3** is secured with spring retainer **16**.
- ▶ Erect the SA-bracket to the point where the guy rods are completely tensioned, see illustration.

Pinning the S-intermediate section on the S-pivot section above

- ▶ Attach the S-intermediate section on the auxiliary crane and align on the S-pivot section until the pin bores align.

When the pin bores on the S-pivot section and on the S-intermediate section align:

- ▶ Pin the S-intermediate section on the S-pivot section „on top“: Insert the pin **33** on both sides at point **P4** and secure with spring retainer **34**, see detail **X**.

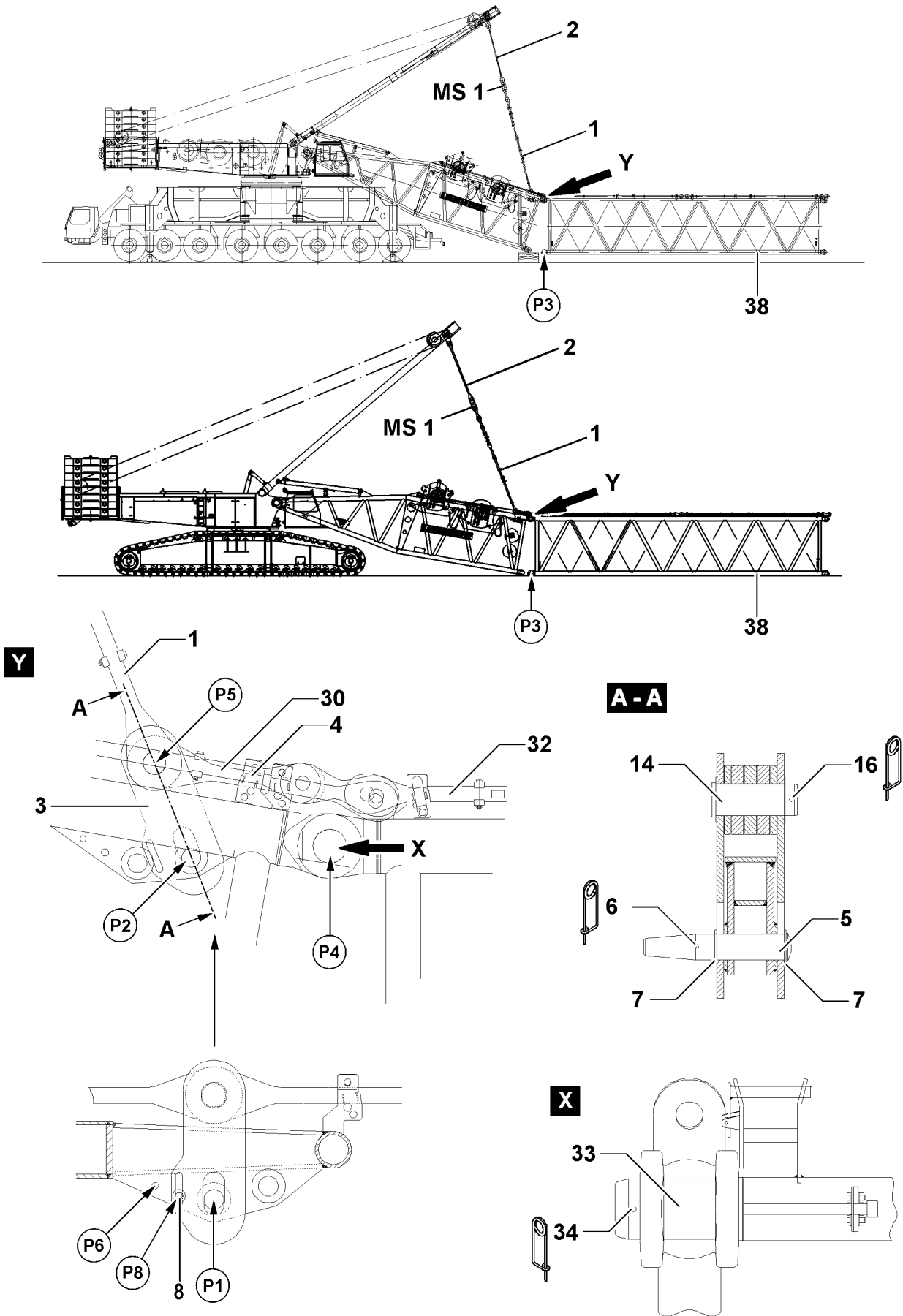


Fig.112553

LWE/LR 1750-000/12812-15-02/en

Closing the boom



WARNING

The crane can topple over!

If the following conditions are not met, the crane can topple over or be significantly damaged!

Personnel can be severely injured or killed!

- ▶ The end section of the corresponding S/SL-boom combination may **not** lift off the ground during the „Closing procedure“!
- ▶ Boom combinations only to a certain system length may be closed with the SA-frame, see the following chart!

Crane	Boom system	Maximum system length	Equipment
LR	S	84 m	- with S- and WA-bracket II guy rods - base support on S-pivot section and on S-end section
	SL	98 m	- with S-guy rods - base support on S-pivot section and on L-end section
LG	S	91 m	- with S- and WA-bracket II guy rods - base support on S-pivot section and on S-end section
	SL	98 m	- with S-guy rods
			- base support on S-pivot section and on L-end section
	SL	105 m	- with S-guy rods - base support on S-pivot section, on L-end section and on the end of the reducer section

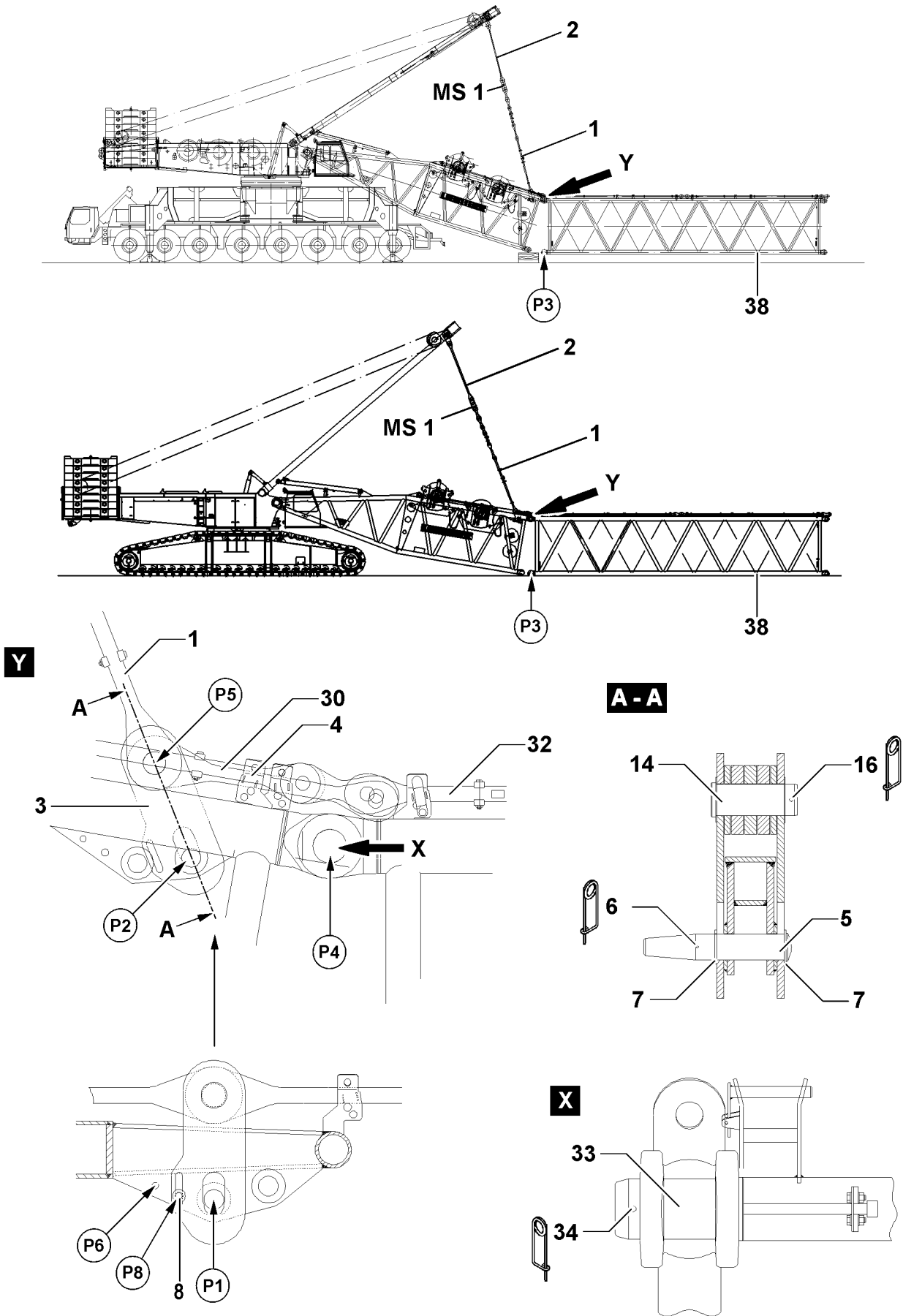


Fig.112553

LWE/LR 1750-000/12812-15-02/en

**Note**

- ▶ The actual force on the test point **MS1** - which is exerted during the closing procedure of the boom system - is shown on the LICCON monitor 1!
- ▶ The actual force is noted and kept ready for the disassembly of the boom system!
- ▶ During the boom disassembly, the guying is tensioned with the noted actual force (assembly) so that the connector pins of the intermediate sections can be unpinned!

**Note**

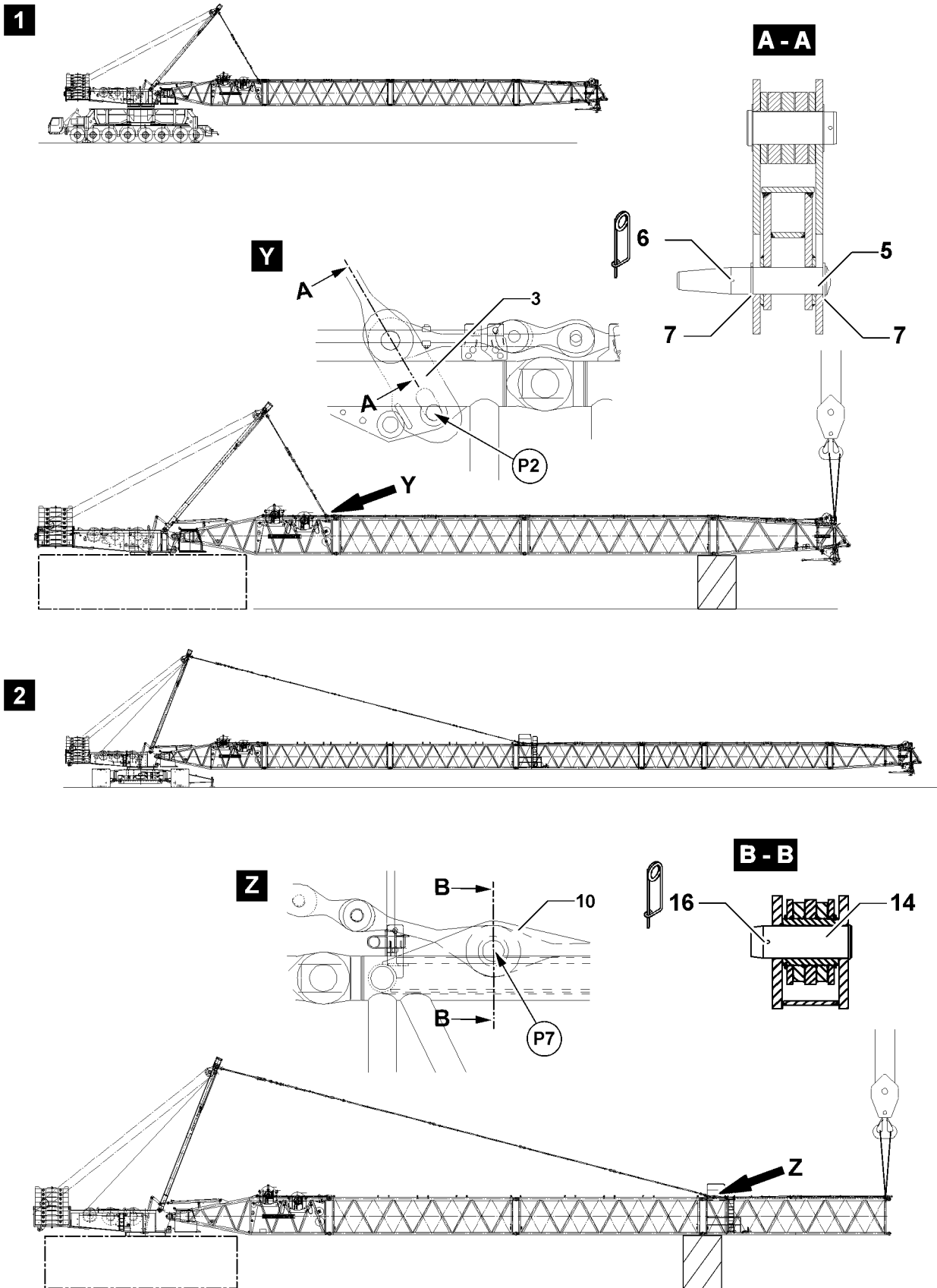
- ▶ The guy rods of the intermediate sections are only assembled after the closing procedure!
- ▶ The brackets **30** and guy rods **32** are not pinned for the closing procedure!

The S-boom must be assembled to the required length before the S-boom can be closed. The assembly is described on the example of an intermediate section.

- ▶ Position the S-intermediate section with the auxiliary crane on the S-pivot section until the pin points align.
- ▶ Pin the S-lattice sections with each other: Insert the pin **33** on both sides „on top“ and secure with spring retainer **34**, see detail **X**.
- ▶ Pin the S-lattice sections with each other: Insert the pin **33** on both sides „on the bottom“ and secure with spring retainer **34**, see detail **X**.

When the S/SL-boom combination is assembled to the desired length:

- ▶ Lift the S-pivot section **1** with the SA-bracket until the pin bores on the „bottom“ align at point **P3**.
- ▶ Read the actual force of the test point **MS1** on the LICCON monitor and note.
- ▶ Pin the S-lattice section on the S-pivot section „on the bottom“: Insert the pin **33** on both sides at point **P3** and secure with spring retainer **34**, see detail **X**.



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Fig.112554

3.5.2 Assembling the S-lattice sections in „Flying mode“

If spatial prerequisites on the job site are limited for the assembly of the S-boom, or if they are limited by buildings or similar, then the S-boom can be installed in flying mode.

For the flying assembly, a differentiation is made between the guy points on the boom:

- Guying on S-pivot section, see illustrations 1.
- Guying on the S-intermediate section 14 m 2620.20 for flying assembly, see illustrations 2.



WARNING

General danger notes!

- ▶ Support the S-boom during assembly / disassembly with suitable materials!
- ▶ All pins are to be secured after assembly with the intended safety elements!
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15!
- ▶ Secure the boom with support or auxiliary crane, see Crane operating instructions, chapter 5.01!
- ▶ It is prohibited for anyone to remain under the booms or within the complete danger zone during the pinning and unpinning procedure of the lattice section!



WARNING

Impermissible boom lengths guyed!

If impermissible boom lengths are guyed on the assembly brackets, then significant property damage can occur on the crane! Personnel can be severely injured or killed!

- ▶ The maximum permissible boom lengths for the „Flying assembly“ may not be exceeded!
- ▶ Pin the guy rods either on the assembly brackets 3, point P2, illustration 1 or the assembly brackets 10, point P7, illustration 2!
- ▶ The data in the erection and take down charts as well as the load charts must be observed!



Note

- ▶ For weights of intermediate sections with placed guy rods, see Crane operating instructions, chapter 1.03!



Note

- ▶ When guying on the S-pivot section, you have to use the washer 7 when inserting the pin 5, see illustration 1, sectional A-A!
- ▶ For guying on the S-pivot section, the pin 5 is inserted on both sides on the assembly brackets 3 on point P2 and secured with the spring retainer 6!
- ▶ For guying on the S-intermediate section 14 m 2620.20 for flying assembly, the pin 14 is inserted on both sides on the assembly brackets 10 on point P7 and secured with the spring retainer 16!

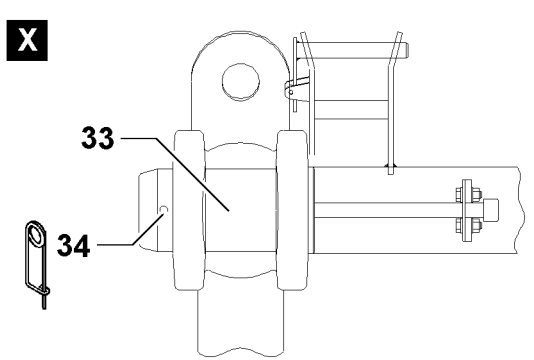
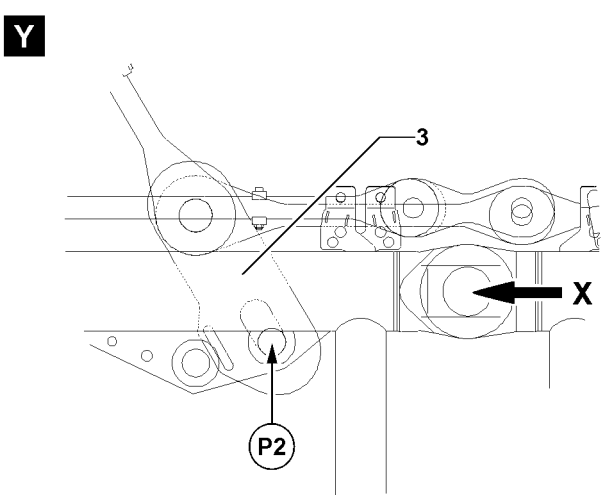
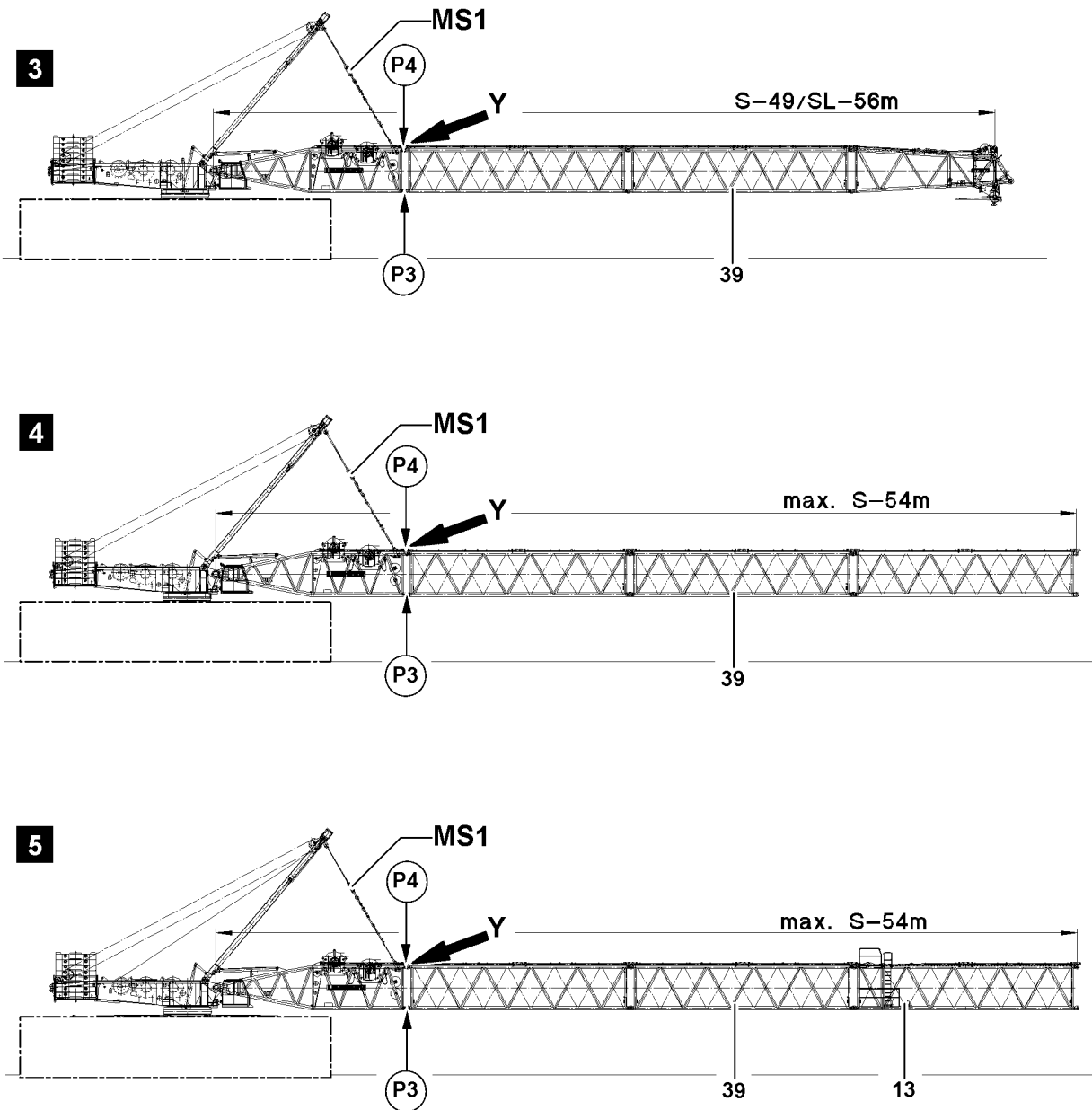


Fig.112555

LWE/LR 1750-000/12812-15-02/en

Assembling the S-intermediate sections in „Flying mode“ on the S-pivot section



WARNING

The crane can topple over!

If the following conditions are not met, the crane can topple over or be significantly damaged!

Personnel can be severely injured or killed!

- ▶ For the „flying“ boom assembly, the maximum permissible total force on the test point **MS1** may **not** be exceeded. The „Actual force“ is shown on LICCON monitor 1!
- ▶ The „flying“ boom assembly is only permissible up to a certain system length, observe the following charts!
- ▶ The data in the erection and take down charts as well as the load charts must be observed!

LR-crane	Turntable in travel direction, ZB _{min} ²⁾ 45 t			
Boom system	Maximum system length	Equipment (without hook block)	Maximum force MS1	Minimum DB _{min} ¹⁾
S	49 m	- with S- and WA-bracket II guy rods - with end section	160 t	120 t
S	54 m	- with S- and WA-bracket II guy rods - with intermediate section 2826.20 with guy brackets - without end section	160 t	120 t
SL	56 m	- with S-guy rods - with L-end section	160 t	120 t

1) This counterweight must be at least installed on the turntable for „Flying assembly“.

2) This central ballast must be at least installed on the crawler center section for „Flying assembly“.

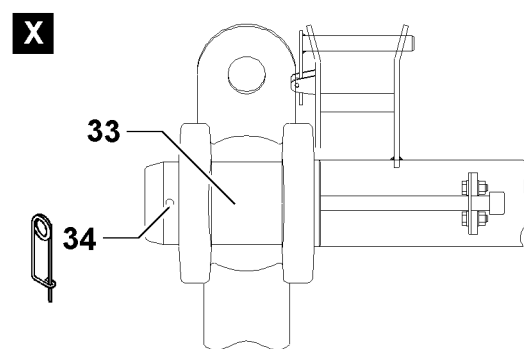
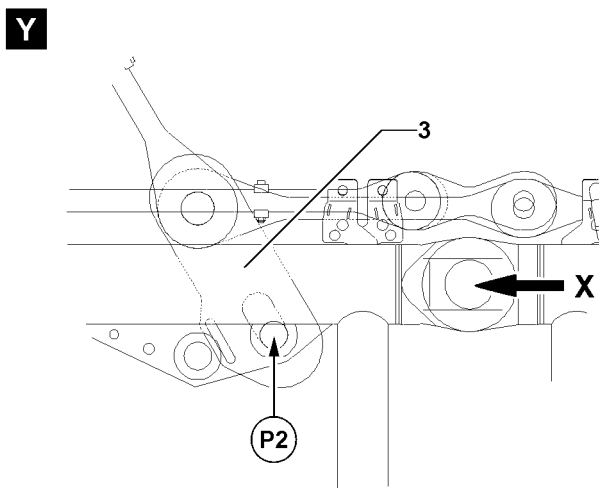
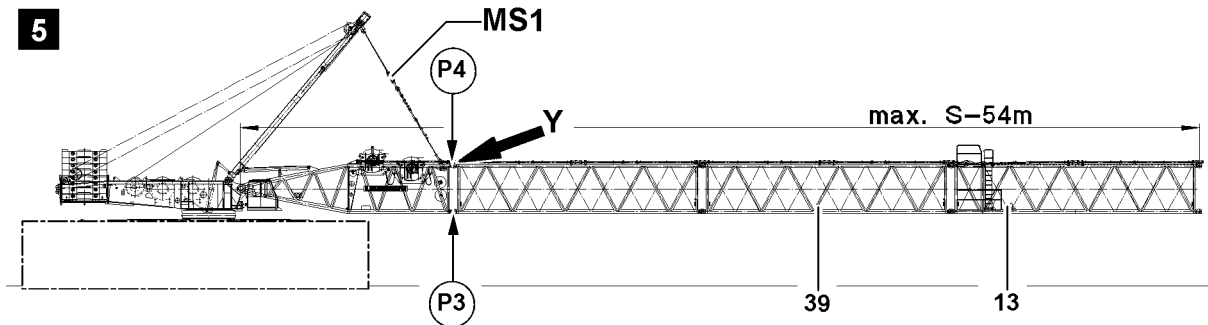
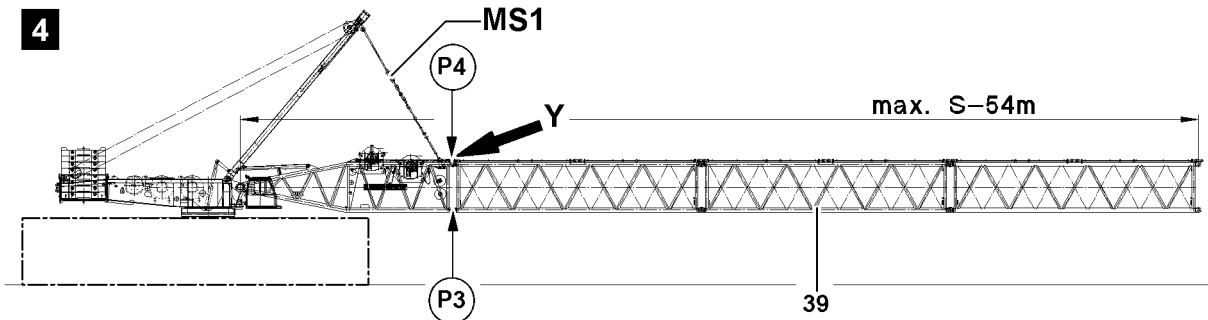
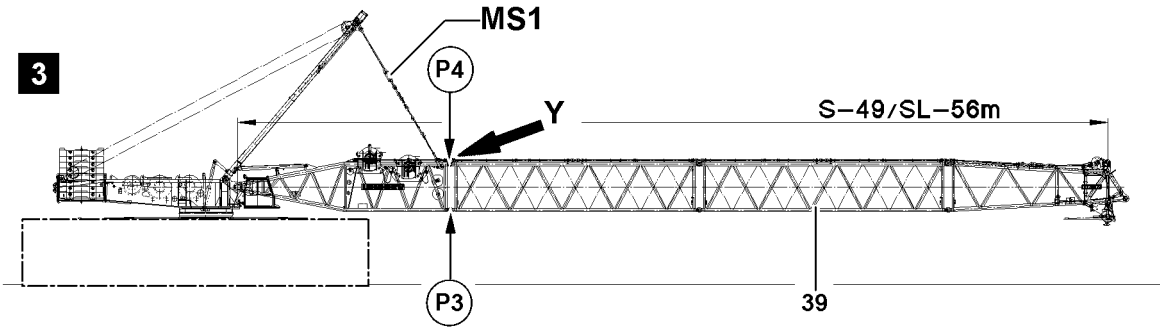


Fig.112555

LWE/LR 1750-000/12812-15-02/en

LG-crane	Turntable in travel direction				
Boom system	Maximum system length	Equipment (without hook block)	Maximum force MS1	DB _{min} ¹⁾	Support base
S	49 m	- with S- and WA-bracket II guy rods - with end section	160 t	70 t	12 m x 12 m
				45 t	16 m x 16 m
S	54 m	- with intermediate section 2826.20 with guy brackets - with S- and WA-bracket II guy rods - without end section	160 t	120 t	12 m x 12 m or 16 m x 16 m
SL	56 m	- with S-guy rods - with L-end section	160 t	70 t	12 m x 12 m
				45 t	16 m x 16 m

1) This counterweight must be at least installed on the turntable for „Flying assembly“.

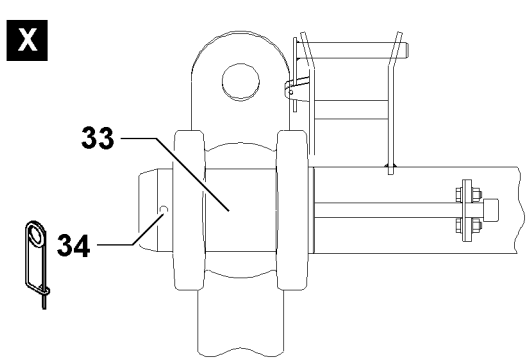
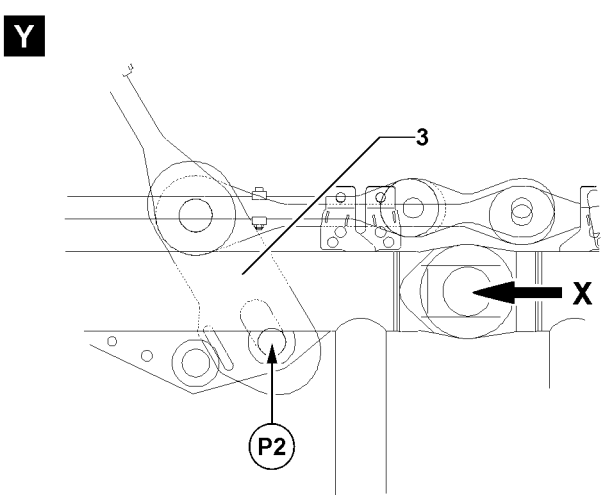
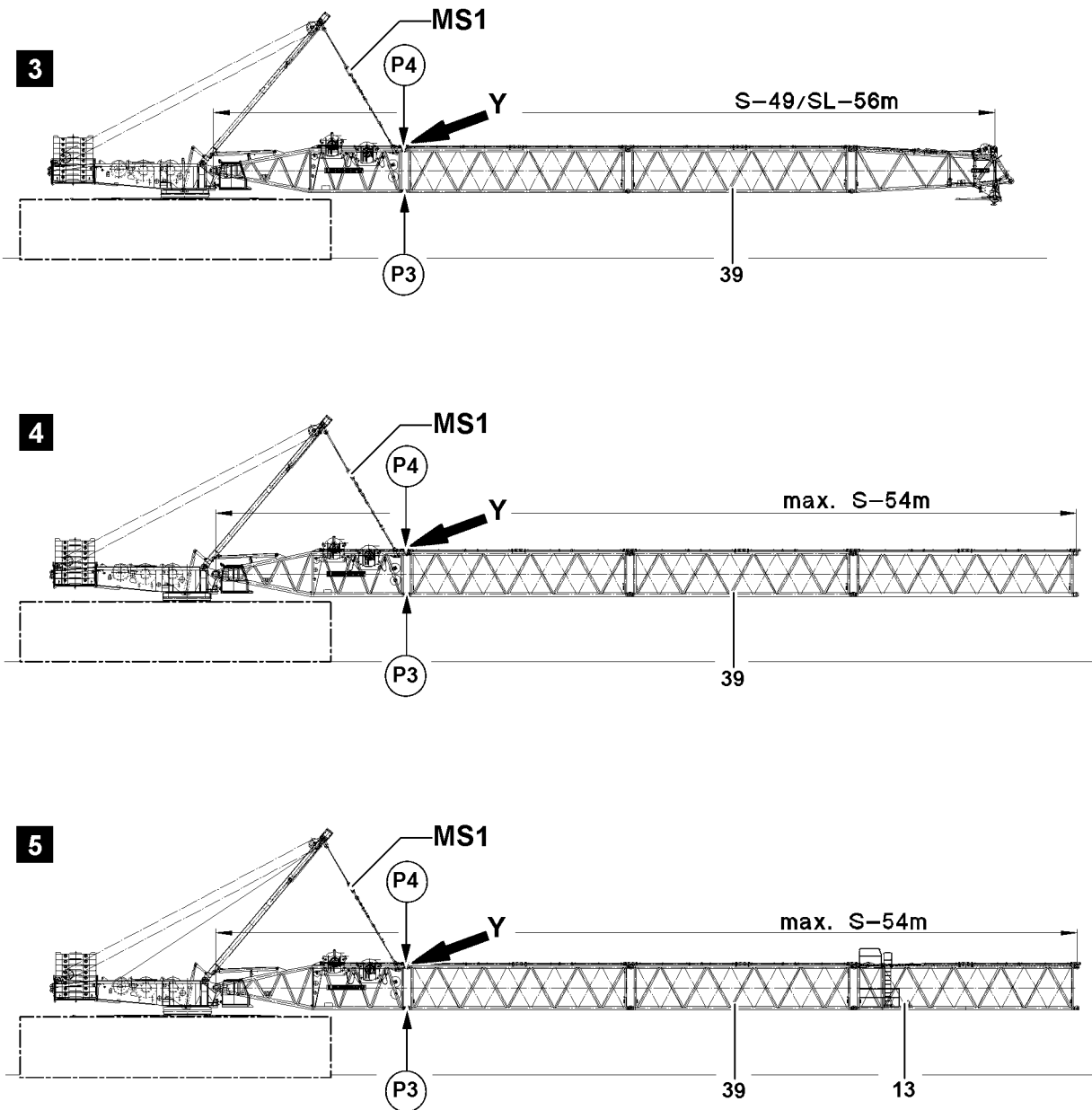


Fig.112555

LWE/LR 1750-000/12812-15-02/en

Make sure that the following prerequisites are met:

- The S-pivot section is pinned and secured on the turntable.
- The S-pivot section is pinned on the assembly brackets **3** on point **P2** with the guy rods and is in horizontal position, see illustration **3**, detail **Y**.
- An auxiliary crane is available.



WARNING

Falling components!

If unsecured or non-supported components are installed or removed, they can fall down! Personnel can be killed or seriously injured!

- ▶ During pinning and unpinning of the intermediate sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Before unpinning: Support crane components and boom!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ It is prohibited to lean a ladder against the crane section which is being disassembled!



Note

- ▶ The „Actual force“ is shown on LICCON monitor!
- ▶ The flying assembly of the intermediate sections is made without hook block!

For „flying“ assembly of the intermediate sections, they can be installed individually or as preassembled boom unit on the S-pivot section.

- ▶ Attach intermediate sections **39** or preassembled boom unit **39** on the auxiliary crane.
- ▶ Lift the intermediate sections **39** or preassembled boom unit **39** with the auxiliary crane and position on the S-pivot section until the pin points align.

When the pin points between the S-pivot section and the intermediate section or the preassembled boom unit align „on top“ and „bottom“:

- ▶ Pin the intermediate sections „on top“: Insert the pin **33** on both sides at point **P4** and secure with spring retainer **34**, see detail **X**.
- ▶ Pin the intermediate sections „on the bottom“: Insert the pin **33** on both sides at point **P3** and secure with spring retainer **34**, see detail **X**.

When the pins are properly pinned and secured on „top“ and „bottom“ between the S-pivot section and the S-intermediate section or the preassembled boom unit:

- ▶ Remove the auxiliary crane.

If additional lattice sections are assembled:

- ▶ Assemble additional lattice sections the same way as described in this section.

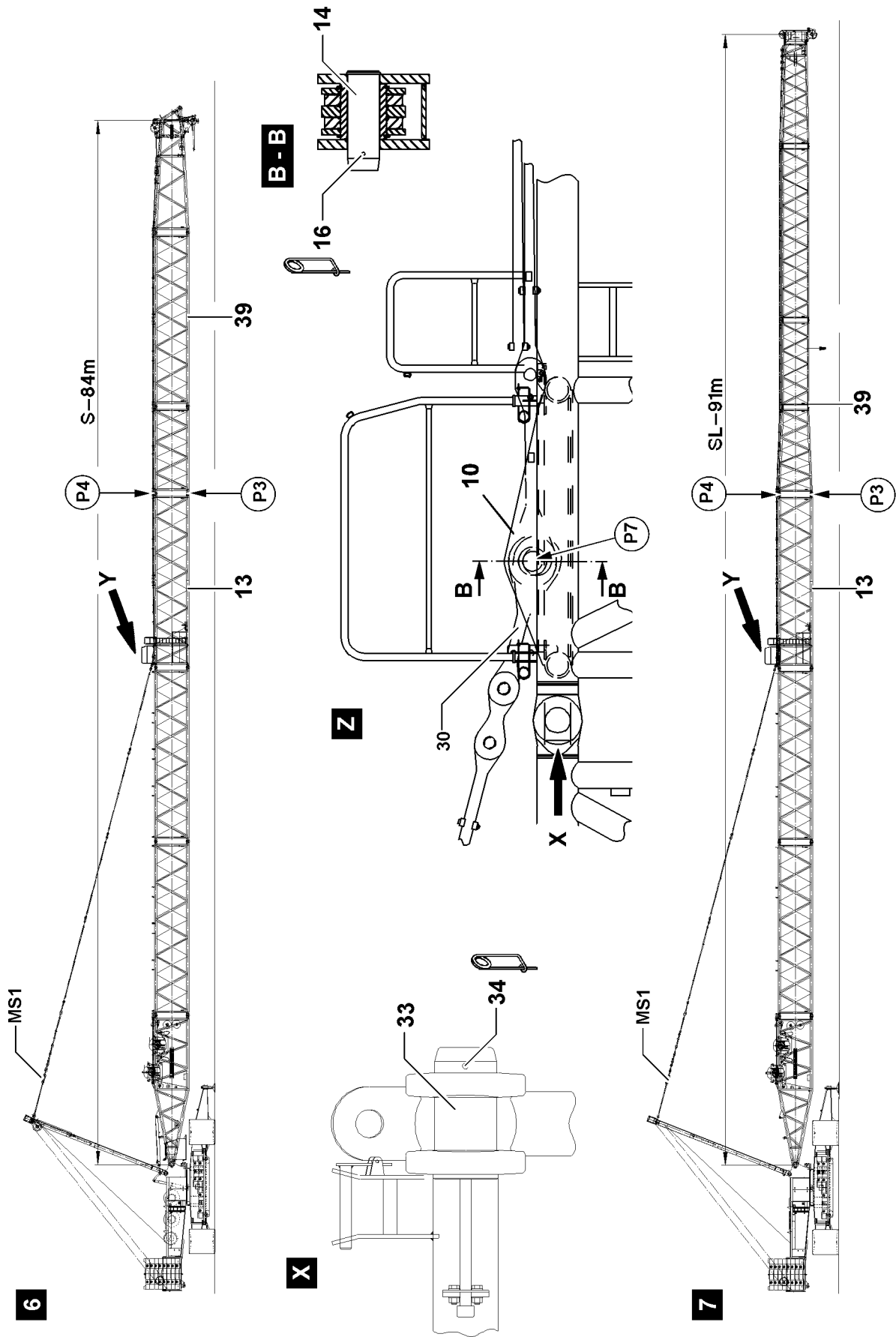


Fig.112552

LWE/LR 1750-000/12812-15-02/en

Assembling the S-intermediate sections in „flying“ mode on the intermediate section 14 m 2826.20



WARNING

The crane can topple over!

If the following conditions are not met, the crane can topple over or be significantly damaged!

Personnel can be severely injured or killed!

- ▶ For the „flying“ boom assembly, the maximum permissible total force on the test point **MS1** may **not** be exceeded. The „Actual force“ is shown on LICCON monitor 1!
- ▶ The „flying“ boom assembly is only permissible up to a certain system length, observe the following charts!
- ▶ The data in the erection and take down charts as well as the load charts must be observed!



Note

- ▶ The guy rods of the SA-bracket are pinned on the intermediate section 2826.20 **13** with the guy brackets **30**!

LR-crane	Turntable vertical to the travel direction, ZB _{min} ²⁾ 45 t			
Boom system	Maximum system length	Equipment (without hook block)	Maximum force MS1	DB _{min} ¹⁾
S	77 m	- with S- and WA-bracket II guy rods	325 t	170 t
S	84 m	- with S-guy rods	325 t	170 t
SL	91 m		290 t	120 t

1) This counterweight must be at least installed on the turntable for „Flying assembly“.

2) This central ballast must be at least installed on the crawler center section for „Flying assembly“.

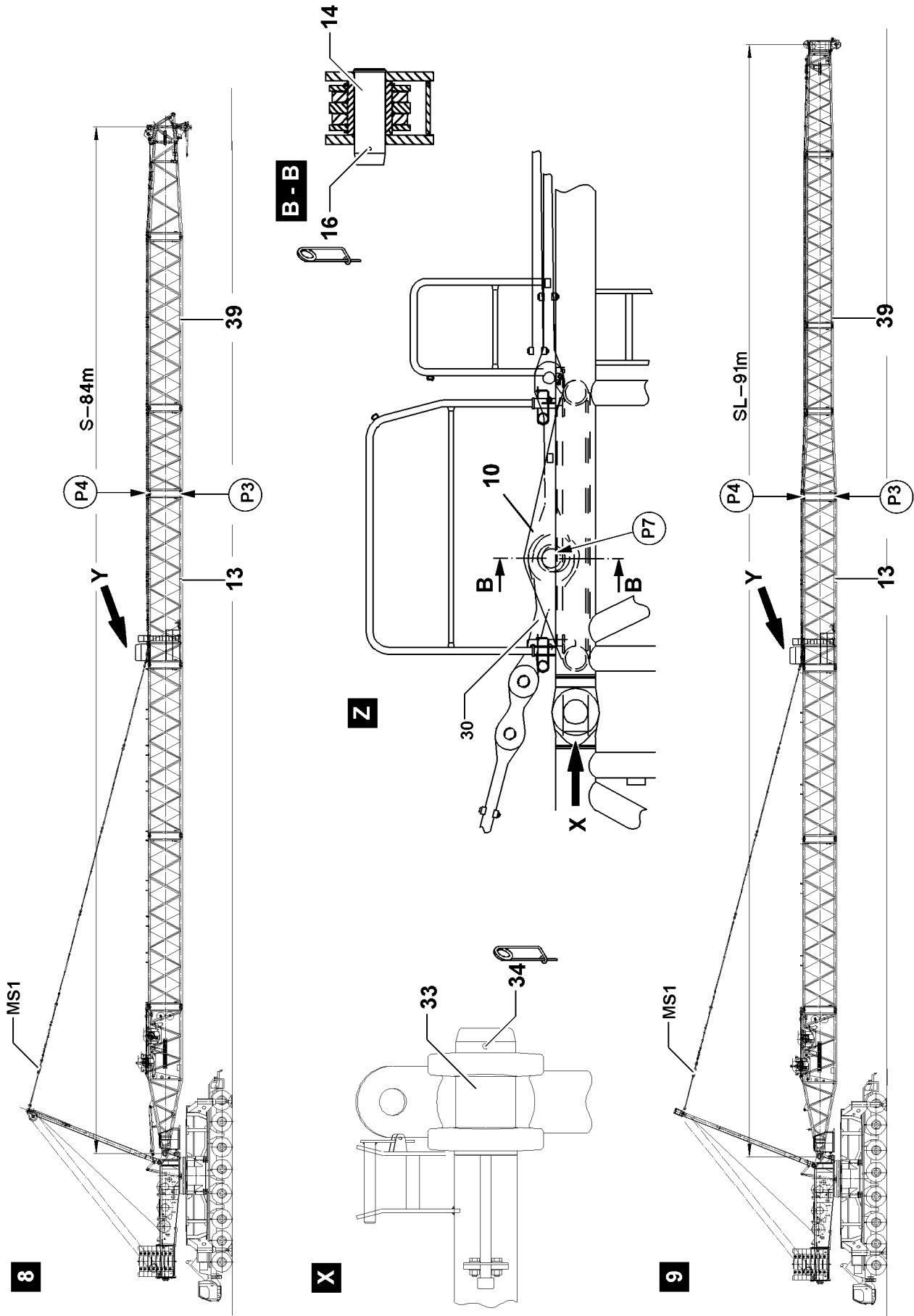


Fig.112558

LWE/LR 1750-000/12812-15-02/en

LG-crane	Turntable in travel direction				
Boom system	Maximum system length	Equipment (without hook block)	Maximum force MS1	DB _{min} ¹⁾	Support base
S	77 m	- with S- and WA-bracket II guy rods	325 t	195 t	16 m x 16 m
				245 t	12 m x 12 m
S	84 m	- with S-guy rods	325 t	195 t	16 m x 16 m
				245 t	12 m x 12 m
SL	91 m		290 t	170 t	16 m x 16 m
				220 t	12 m x 12 m

1) This counterweight must be at least installed on the turntable for „Flying assembly“.

Make sure that the following prerequisites are met:

- The S-pivot section is pinned and secured on the turntable.
- The intermediate section 14 m 2826.20 with the assembly brackets **10** is pinned on point **P7** with the guy rods **30** on the SA-bracket and is in horizontal position, see illustration **8**, detail **Z**.
- An auxiliary crane is available.



WARNING

Falling components!

If unsecured or non-supported components are installed or removed, they can fall down! Personnel can be killed or seriously injured!

- ▶ During pinning and unpinning of the intermediate sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Before unpinning: Support crane components and boom!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ It is prohibited to lean a ladder against the crane section which is being disassembled!



Note

- ▶ The „Actual force“ is shown on LICCON monitor!
- ▶ The flying assembly of the intermediate sections is made without hook block!

For „flying“ assembly of the intermediate sections, they can be installed individually or as preassembled boom unit on the intermediate section **13**.

- ▶ Attach intermediate sections **39** or preassembled boom unit **39** on the auxiliary crane.
- ▶ Lift the intermediate sections **39** or preassembled boom unit **39** with the auxiliary crane and position on the S-pivot section until the pin points align.

When the pin points between the S-intermediate section **13** and the intermediate sections **39** or the preassembled boom unit **39** align „on top“ and „bottom“:

- ▶ Pin the intermediate sections „on top“: Insert the pin **33** on both sides at point **P4** and secure with spring retainer **34**, see detail **X**.
- ▶ Pin the intermediate sections „on the bottom“: Insert the pin **33** on both sides at point **P3** and secure with spring retainer **34**, see detail **X**.

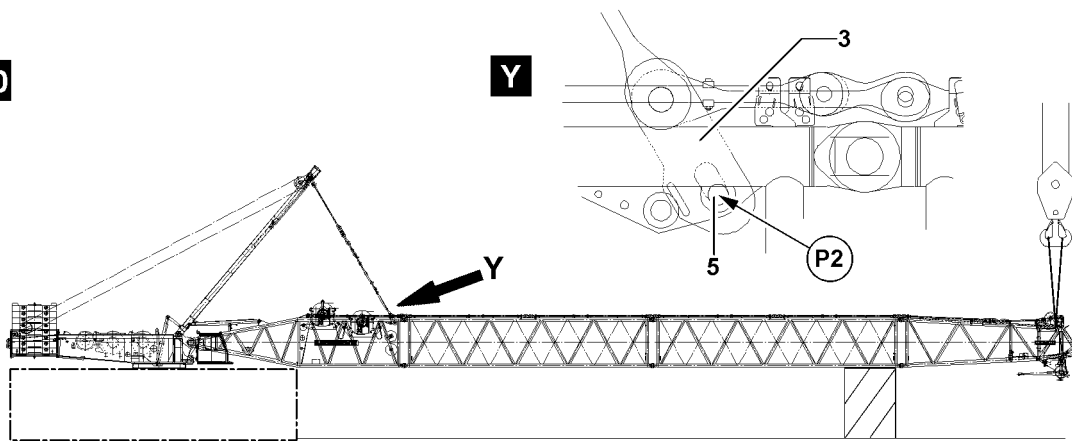
When the pins are properly pinned and secured on „top“ and „bottom“ between the S-intermediate section **13** and the intermediate sections **39** or the preassembled boom unit **39**:

- ▶ Remove the auxiliary crane.

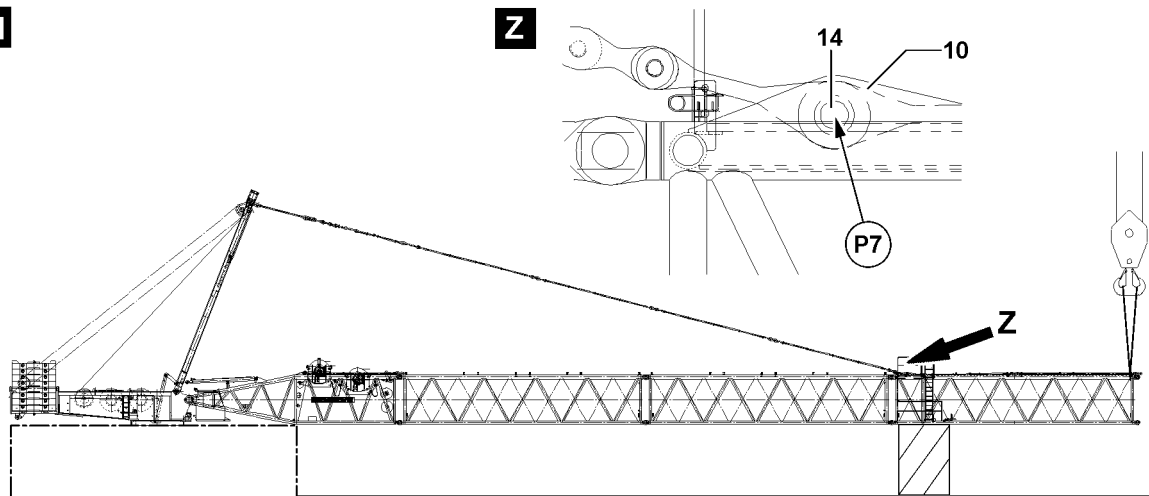
If additional lattice sections are assembled:

- ▶ Assemble additional lattice sections the same way as described in this section.

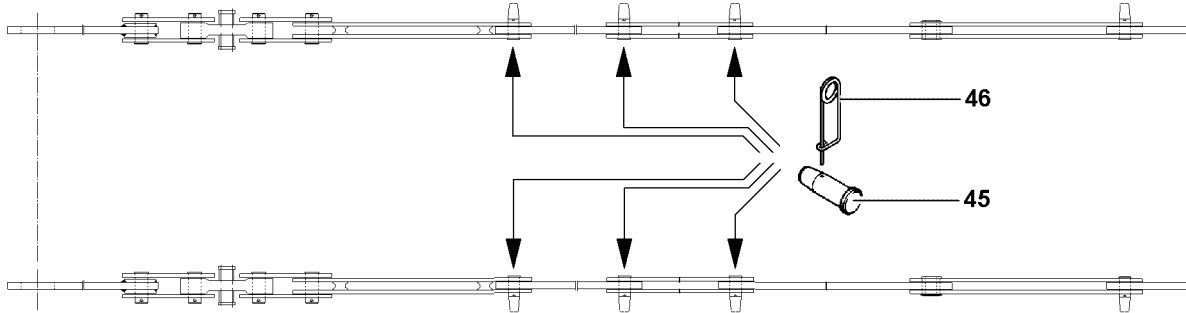
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11



12



13

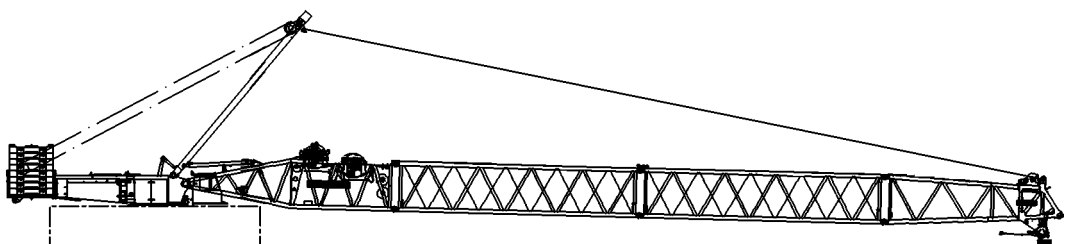


Fig.112556

LWE/LR 1750-000/12812-15-02/en

3.6 Assembling the S-guy rods



WARNING

Neglected inspection and maintenance on guy rods!

If the regular inspection and maintenance of the guy rods is not carried out or is carried out only in irregular intervals, then severe accidents can occur due to existing and unrecognized damage to the guy rods!

Personnel can be severely injured or killed!

- ▶ Check the guy rods before every assembly, see Crane operating instructions, chapter 8.15!
- ▶ The S-guy rods must be assembled and secured, see Rod plan. The numbering in the rod plan must be identical to the numbering on the guy rods!

Make sure that the following prerequisites are met:

- The boom is guyed on point **P5** on the S-pivot section, see illustration **10**, detail **Y**.
- **Or** the boom is guyed on point **P7** on the S-intermediate section 14 m 2620.20 for flying assembly, see illustration **11**, detail **Z**.
- **Or** the boom is laying on the ground with tensioned guy rods, see illustration **13**.



WARNING

Falling components!

If the intermediate sections are incompletely pinned or secured, then components can fall down!

Personnel can be severely injured or killed!

- ▶ Make sure that the intermediate sections or preassembled boom unit are pinned and secured on the S-pivot section!
- ▶ Make sure that the intermediate sections or preassembled boom unit is supported with suitable materials, secured with the auxiliary crane or the boom is placed on the ground!

When the boom is **not** laying on the ground:

- ▶ Support the boom or secure it with the auxiliary crane.
- ▶ Relieve the guy rods: Lower the SA-frame somewhat to the front.

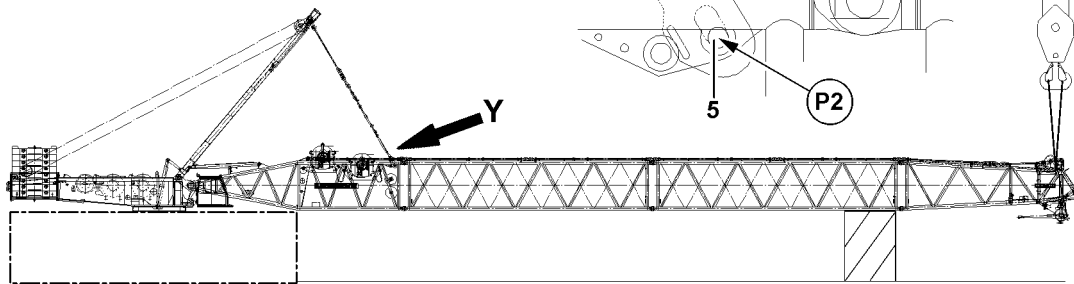
Result:

- The guy rods between the SA-frame and the S-pivot section or the S-intermediate section for flying assembly are relieved.

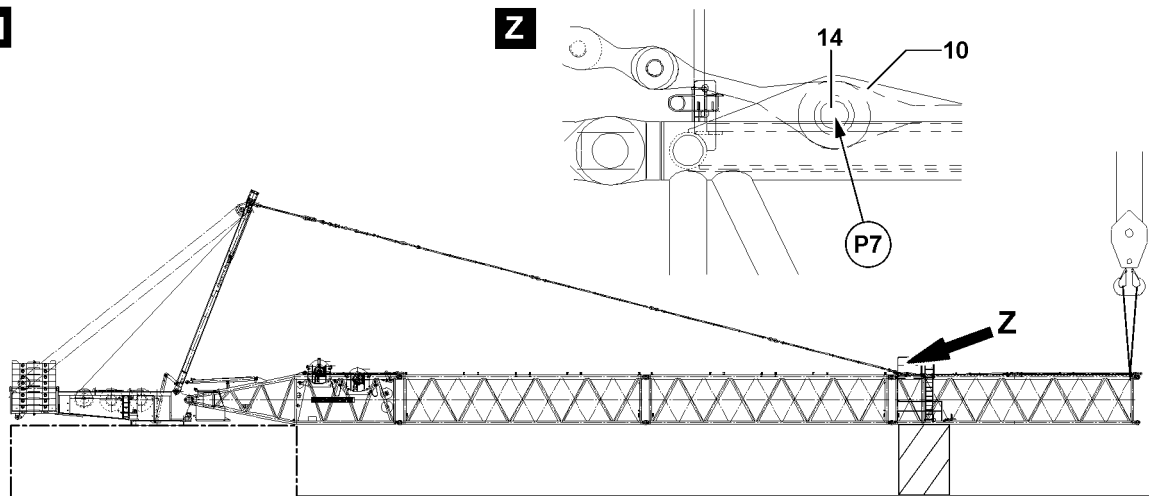
The guy rods are placed and secured for transport on the S-intermediate sections. Before assembly of the guy rods, you must remove the transport retainers.

- ▶ Release and unpin transport retainers for the guy rods.

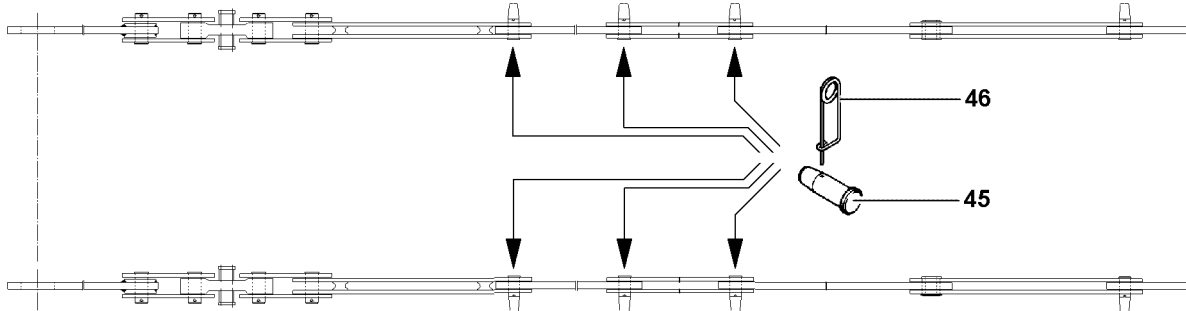
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11



12



13

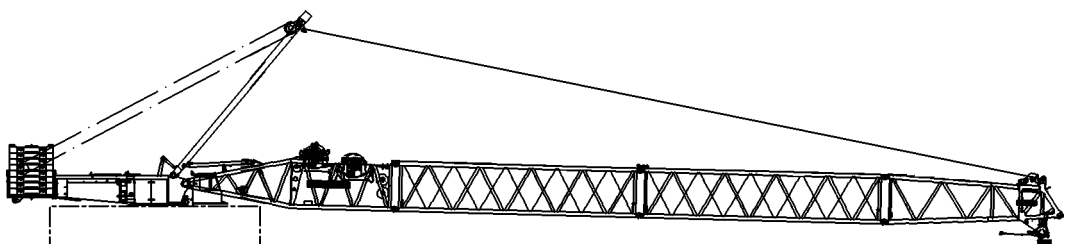


Fig.112556

LWE/LR 1750-000/12812-15-02/en

NOTICE

Property damage!

If the pins of the guy rods are not pinned from the „inside“ to the „outside“, the hoist rope can scrape on the pin and be damaged!

- ▶ Always insert the pins of the guy rods from the „inside“ to the „outside“, see Rod plan and illustration **12**!

**Note**

- ▶ The guy rods of the S-intermediate sections are pinned to each other starting from the fixed point on the end section of the boom!

- ▶ Pin the guy rods of all intermediate sections: Insert the pin **45** from the „inside“ to the „outside“ and secure with spring retainer **46**.

**WARNING**

The boom can fold downward!

By unpinning the guy rods on the assembly brackets **3** or the assembly brackets **10**, the boom can fold down!

Personnel can be severely injured or killed!

- ▶ Unpin the guy rods on the assembly brackets **3**, point **P5** or the assembly brackets **7**, point **P7** when it is ensured that the intermediate sections are supported with suitable materials or are held by the auxiliary crane or the boom is placed on the ground!

- ▶ Make sure that all guy rods of the boom system are pinned and secured.

When the boom is guyed on the S-pivot section:

- ▶ Release and unpin the pins **5** on the assembly brackets **3**.
- or**

When the boom is guyed on the S-intermediate section:

Release and unpin the pins **14** on the assembly brackets **10**.

- ▶ Erect the SA-frame until the guy rods between the SA-frame and the S-end section tension, see illustration **13**.
- ▶ Remove the auxiliary crane.

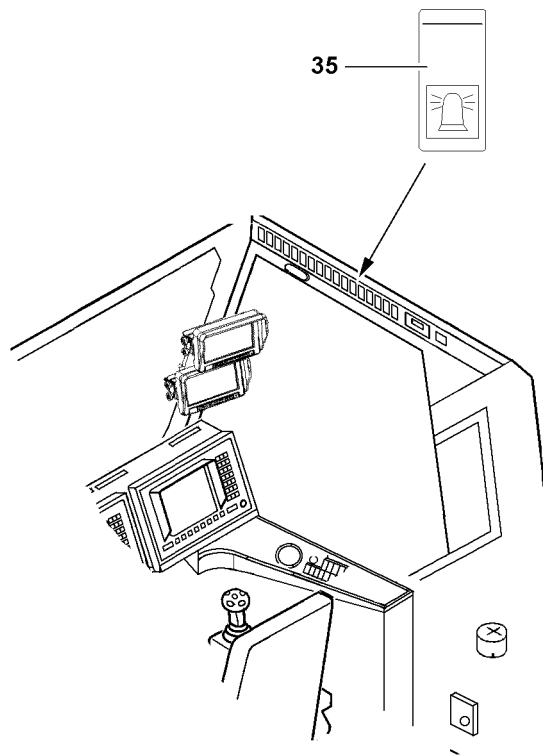
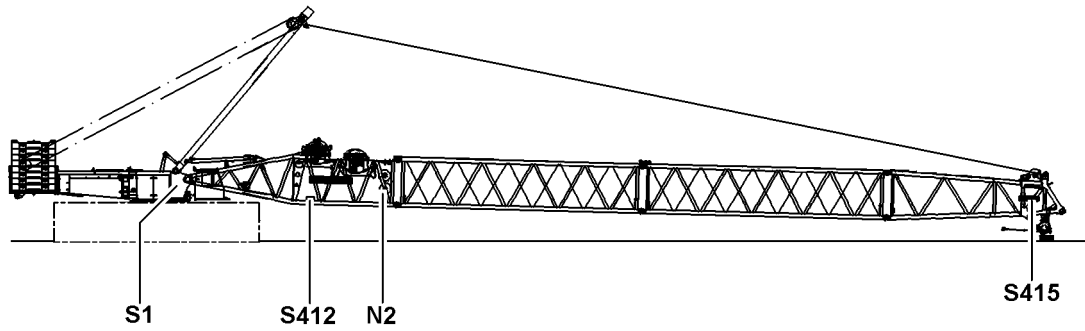


Fig.111624

LWE/LR 1750-000/12812-15-02/en

3.7 Establishing the electrical connections

NOTICE

Damage to the electrical connection on the cable drum!

If the electrical connection from the cable drum on the S-pivot section to the terminal box on the S-pivot section is established first before the connection to the terminal box on the S-end section, the electrical connection can be damaged when spooling out the cable drum!

- ▶ Establish first the electrical connection from the cable drum in the S-pivot section to the terminal box on the S-end section and then the electrical connection from the terminal box in the S-pivot section to the cable drum!



Note

- ▶ To establish the electrical connections on the S-boom, see Electric wiring diagram!

Make sure that the following prerequisites are met:

- The S-boom is completely assembled.
- The airplane warning light and the wind speed sensor are assembled.
- ▶ Establish the electrical connections.
- ▶ Make sure that all electrical connections on the boom are established.

3.8 Establishing the hydraulic connections to the boom

When connecting hydraulic lines with quick-release couplings, make sure that the coupling procedure is carried out correctly.



WARNING

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!

Personnel can be severely injured or killed!

- ▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!



WARNING

Loss of pressure or leakage!

Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!

- ▶ Check that the quick-release couplings have been properly connected before using the crane!
- ▶ Connect the coupling components (sleeve and connector) and screw together with the hand-tightened nut.
- ▶ Tighten the hydraulic coupling by hand. Rotate the hand-tightened nut until it reaches a tangible, fixed stop position.
- ▶ Establish the hydraulic connections.

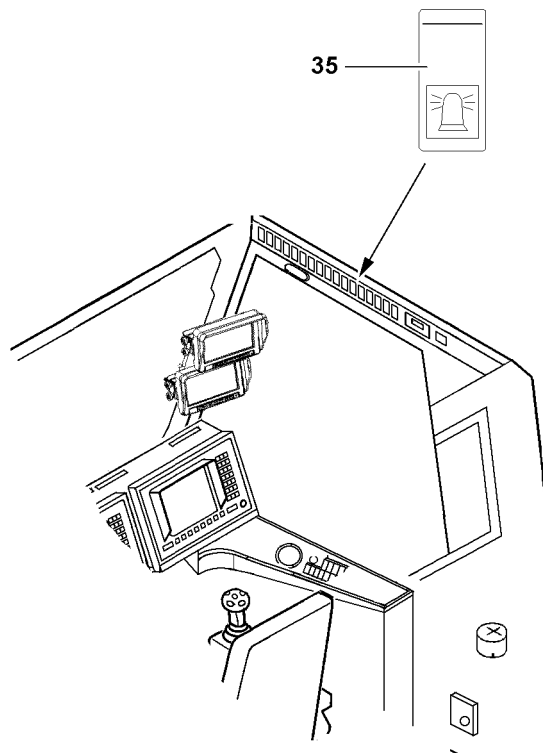
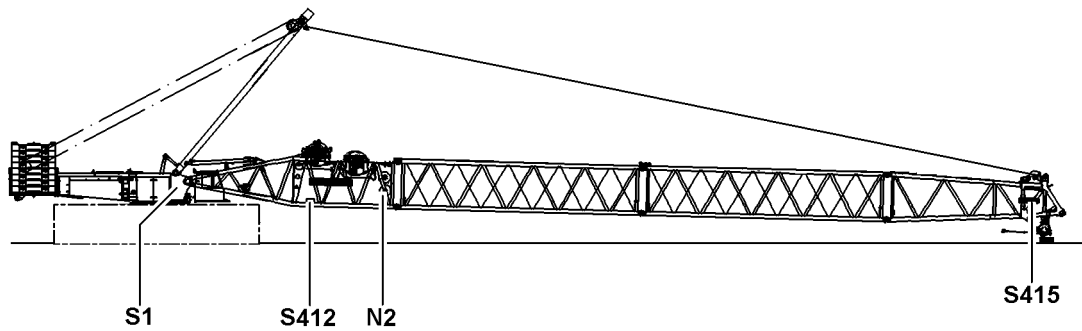


Fig.111624

LWE/LR 1750-000/12812-15-02/en

3.9 Checking the function of the safety devices

**WARNING**

Non-functioning safety devices!

If the function of the safety devices is defective, personnel can be severely injured or killed!

▶ Crane operation with non-functioning safety devices is **prohibited!**

**Note**

▶ The function of the individual limit switches must be checked before erection!

▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual!

**Note**

▶ If a function check on the limit switches or on the safety devices does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked. If no visible connection errors or component defects can be found, contact Liebherr Service!

Make sure that the following prerequisites are met:

- All electrical connections have been made.
- The crane engine is running.
- The corresponding operating mode is set on the LICCON monitor.

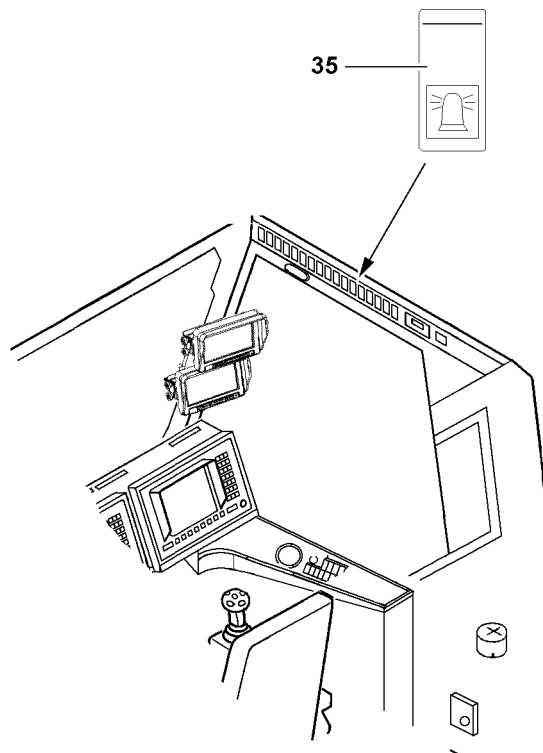
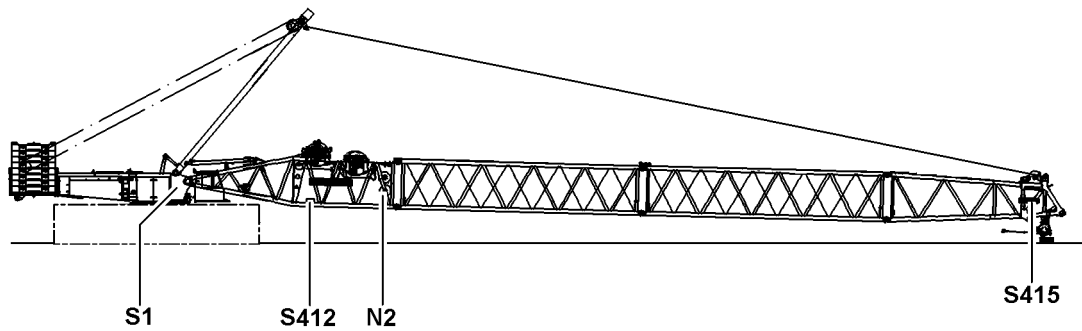


Fig.111624

LWE/LR 1750-000/12812-15-02/en

3.9.1 Checking the wind speed sensor

- ▶ Test the movement and the function of the wind speed sensor.

3.9.2 Checking the airplane warning light

- ▶ Turn on the airplane warning light on with the button **382**.
- ▶ Check the function visually.

3.9.3 Checking the hoist limit switch on the pulley head



Note

- ▶ When replacing or changing a hoist limit switch (HES), the corresponding hoist limit switch must have the correct bus address and the correct software version in order to be detected again by the bus system (LSB)!
-
- ▶ Actuate the hoist limit switch manually on the pulley head.

Result:

- The spool up function of the hoist winch turns off.
- The icon „Hoist top“ appears on the LICCON monitor 0.
- The limit switch is functioning.

3.9.4 Checking the limit switch S-boom „steepest position“

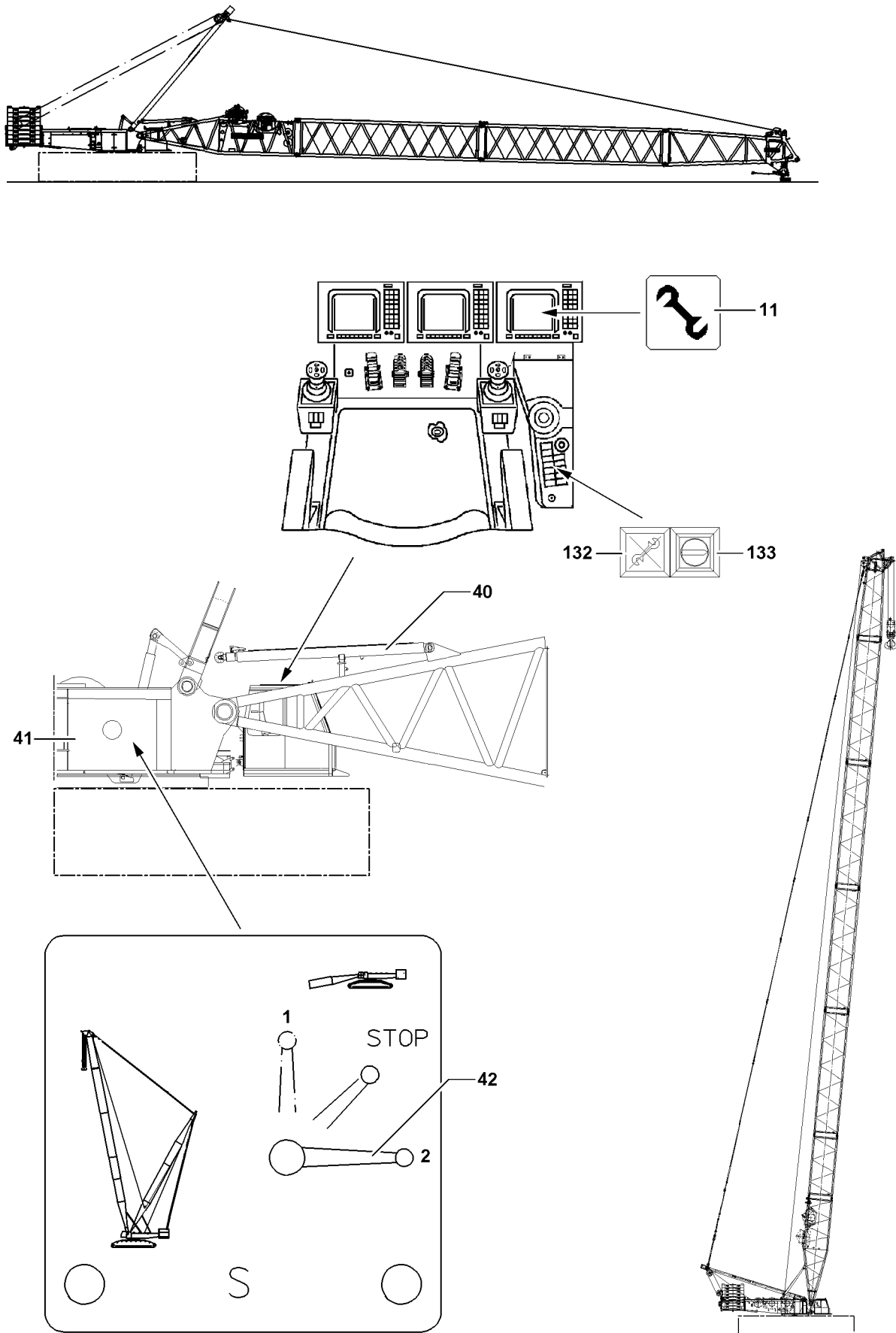


Note

- ▶ The limit switch functions have to be checked individually before erection!
-
- ▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

Result:

- The limit switch is actuated manually.
- The spool up function of winch IV (control winch) turns off.
- The icon „Boom limitation“ appears on the LICCON monitor 0.
- The limit switch is functioning.



LWE/LR 1750-000/12812-15-02/en

Fig.111630

3.10 Erecting the S-boom



WARNING

The crane can topple over!

If the following conditions are not met before erecting the boom, the crane can topple over! Personnel can be severely injured or killed!

- ▶ It is not permitted to turn the crane during erection!
- ▶ Observe the data in the erection and take down charts!
- ▶ Observe the Safety technical notes, see Crane operating instructions, chapter 5.01!
- ▶ Extend the S-relapse cylinder before erection!
- ▶ Do not allow slack rope to form on the control winch!



WARNING

Unutilized guy rods on boom!

If guy rods are on the lattice sections which are not used for operation, then there is a risk of accidents!

Personnel can be severely injured or killed!

Guy rods can loosen up and fall down!

The load chart is invalid!

The load display of the LICCON computer system shows the incorrect value!

The weight of the boom is too large for erection!

- ▶ Disassemble and remove unutilized guy rods on the transport retainers before erecting the boom!

NOTICE

Overload of boom!

If the SL-boom is not supported before the erection procedure, then the boom will be overloaded! The crane will be damaged during erection!

- ▶ For boom lengths SL/SL2, larger than 104 m, a support base must be used!
- ▶ Support the boom with suitable material of sufficient load bearing capacity!
- ▶ Observe the support height U_{min} , see section „Supporting the S/SL-boom combination for erection“!

Make sure that the following prerequisites are met:

- The crane is aligned in horizontal direction.
- All electrical connections have been established.
- All limit switches are functioning.
- The counterweight has been installed to the turntable according to the load chart.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- There are no loose parts on the boom.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual crane configuration.
- The assembly key button **133** is actuated.
- The indicator light in the button **132** „Assembly“ lights up.
- The assembly icon **11** lights up on the LICCON monitor.
- No personnel is within the danger zone.

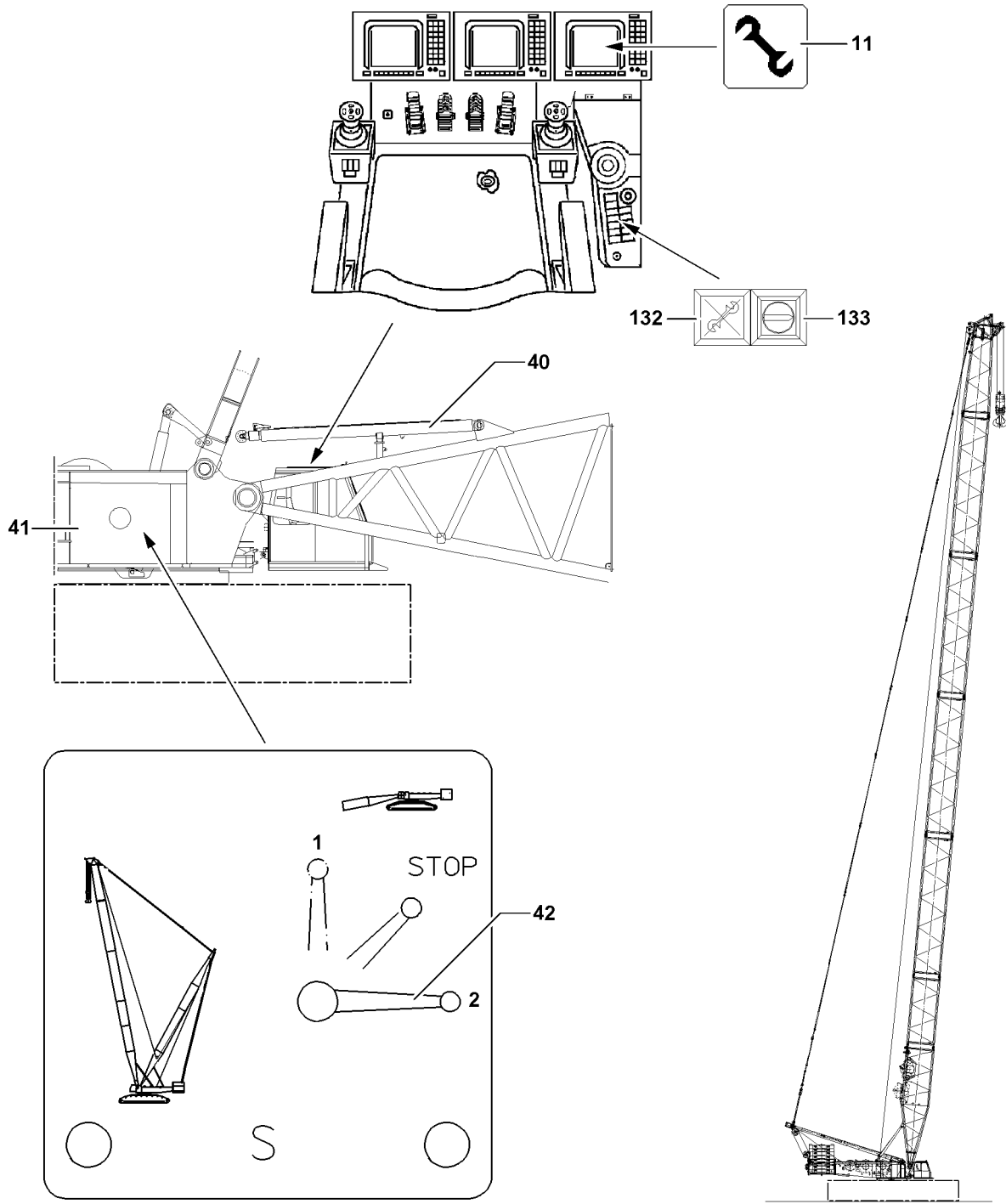
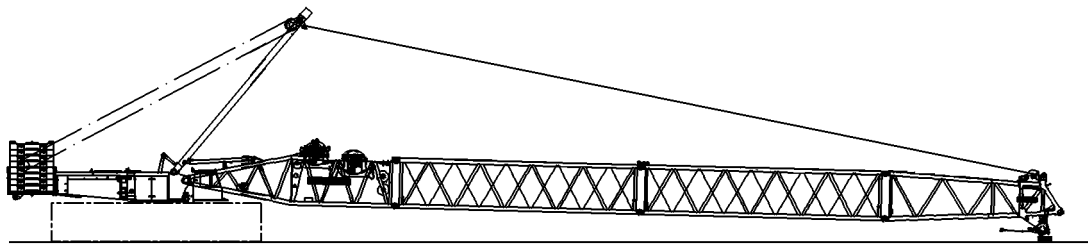


Fig.111630

LWE/LR 1750-000/12812-15-02/en

3.10.1 Extending the S-relapse cylinder



WARNING

The crane can topple over!

If the S-relapse cylinders are not extended before erecting the S-boom, then the S-boom can fall off to the rear in crane operation and the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Extend the S-relapse cylinders **40** before erecting the S-boom!
- ▶ Secure the ball valve **42** during crane operation to prevent inadvertent actuation!

Ball valve positions	
2	Crane operation, extend the piston rod
1	Assembly, retract the piston rod
STOP	The piston rod cannot be retracted / extended

The piston rods on the S-relapse cylinders **40** can be extended with the ball valve **42**.

- ▶ Set the ball valve **42** to **Position 2**.

Result:

- The piston rods of the S-relapse cylinders **40** extend.



Note

- ▶ The ball valve **42** is secured by closing the cabinet door **41** and removing the key!

- ▶ Close the cabinet door **41** and pull the key.
- ▶ Hand the key to an authorized person.

3.10.2 Reeving in the hook block

- ▶ Erect the boom until the end section lifts off the ground.
- ▶ Check the actual load on the LICCON monitor.

Problem remedy

Actual load on the LICCON monitor is larger than 0.0 t !

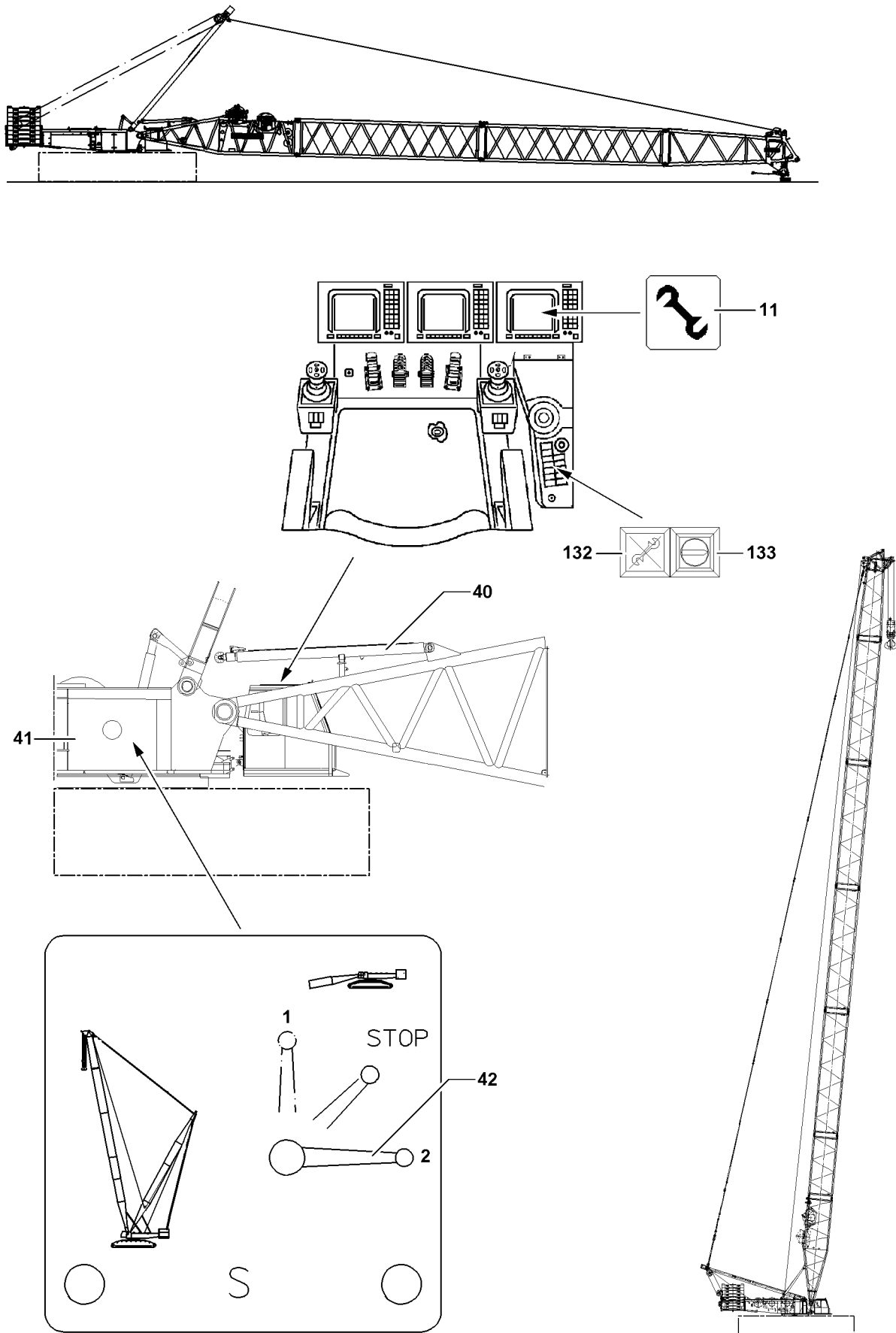
- ▶ Observe the notes for input of hook block weight, see Crane operating instructions, chapter 4.02!



Note

- ▶ Hoist rope reevings, see Crane operating instructions, chapter 4.06 and Reeving plan!

- ▶ Reeve in the hook block properly and secure the hoist rope on the rope fixed point, for reeving, see reeving plan.
- ▶ Attach the hoist limit switch weight.
- ▶ Enter the weight of the hook block into the LICCON computer system!



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Fig.111630

3.10.3 Erecting the S-boom



WARNING

The crane can topple over!

In crane operation with exceeded LICCON overload protection, the crane can topple over! Personnel can be severely injured or killed!

- ▶ When the lowest operating position of the boom is reached, turn off the assembly key button **133** immediately!
- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook!

If required in the erection and take down chart:

- ▶ Carry the hook block along with the auxiliary crane!



Note

- ▶ When the lowest operating position of the boom is reached, the LICCON overload protection is activated!
- ▶ The displays on the LICCON monitor turn off!
- ▶ In the maximum load icon appears a load number in „t“ instead of the display „???“!

- ▶ Luff the boom up to the lowest operating position.

When the boom has reached the lowest operating position:

- ▶ Turn the assembly key button **133** off: Press the button **132**.

Result:

- The LICCON overload protection is active.
- The indicator light in the button **132** turns off.
- The assembly icon **11** on the LICCON monitor turns off.

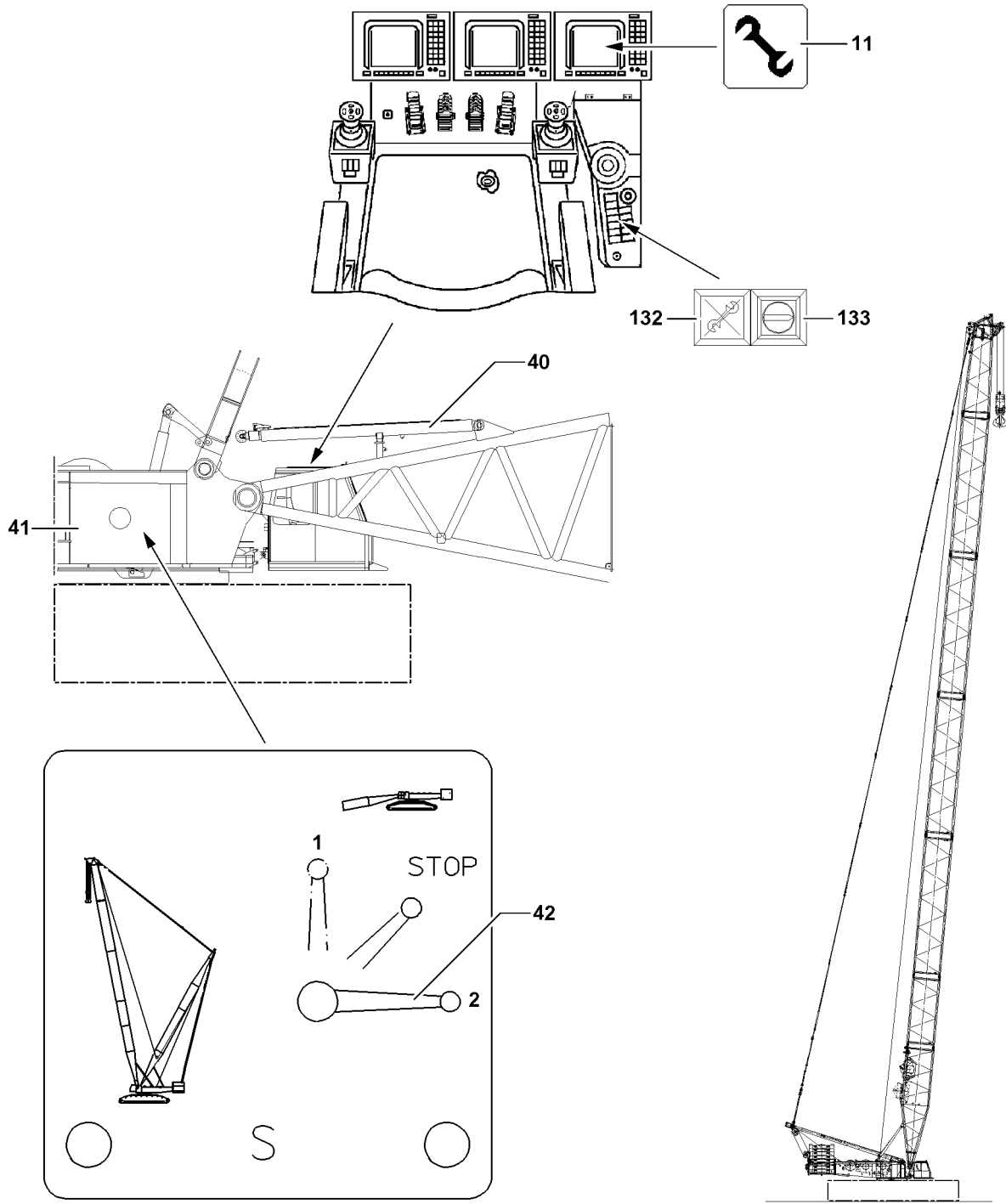
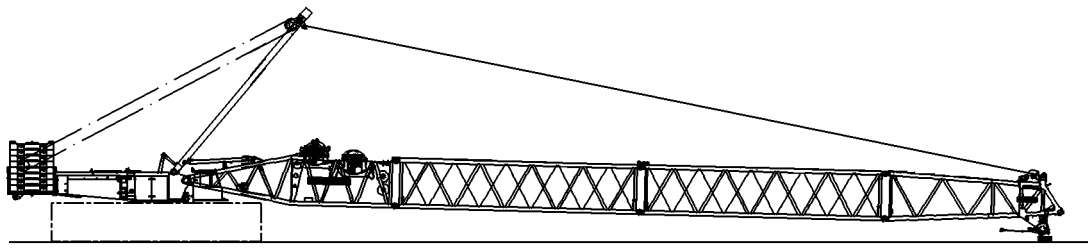


Fig.111630

LWE/LR 1750-000/12812-15-02/en

4 Operating the crane

4.1 Preparing for crane operation

**Note**

- ▶ Observe the notes in the chapters, see Crane operating instructions, chapter 4.05, chapter 4.08 and chapter 5.01!

Make sure that the following prerequisites are met:

- The LICCON overload protection is active.
- The LICCON overload protection has been set according to the data in the load chart.

**WARNING**

The crane can topple over!

- ▶ Check the horizontal position of the crane before and during operation!
- ▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation!

4.2 Checking the settings

- ▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
- ▶ Check the hoist limit switch by running against the hoist limit switch weight.
- ▶ Check the function of the limit switches on the relapse cylinders.

Fig.195219

LWE/LR 1750-000/12812-15-02/en

5 Disassembling the S/SL boom



Note

- ▶ The disassembly is described on the example of the S-boom!



WARNING

Risk of falling!

During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling! If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids!
- ▶ If fall protection equipment is available, then it must be used, see Crane operating instructions, chapter 2.06!
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the permissible fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04!
- ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06!
- ▶ Only step on the aids, ladders and catwalks with clean shoes!
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice!
- ▶ It is prohibited to walk on the telescopic or an auxiliary boom without suitable protective devices!



WARNING

The lattice sections can fall down!

If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel!

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right!**
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom!
- ▶ Secure the pins in the bearing points and the receptacles!
- ▶ It is prohibited to lean the ladder against the components being disassembled!
- ▶ Do not remove the fastening equipment and the auxiliary crane until each component is pinned on and secured!



WARNING

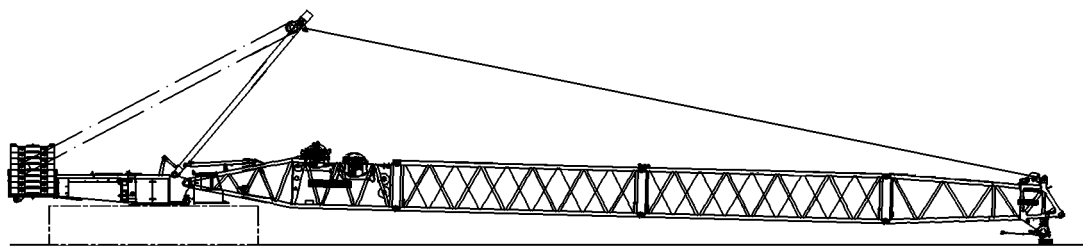
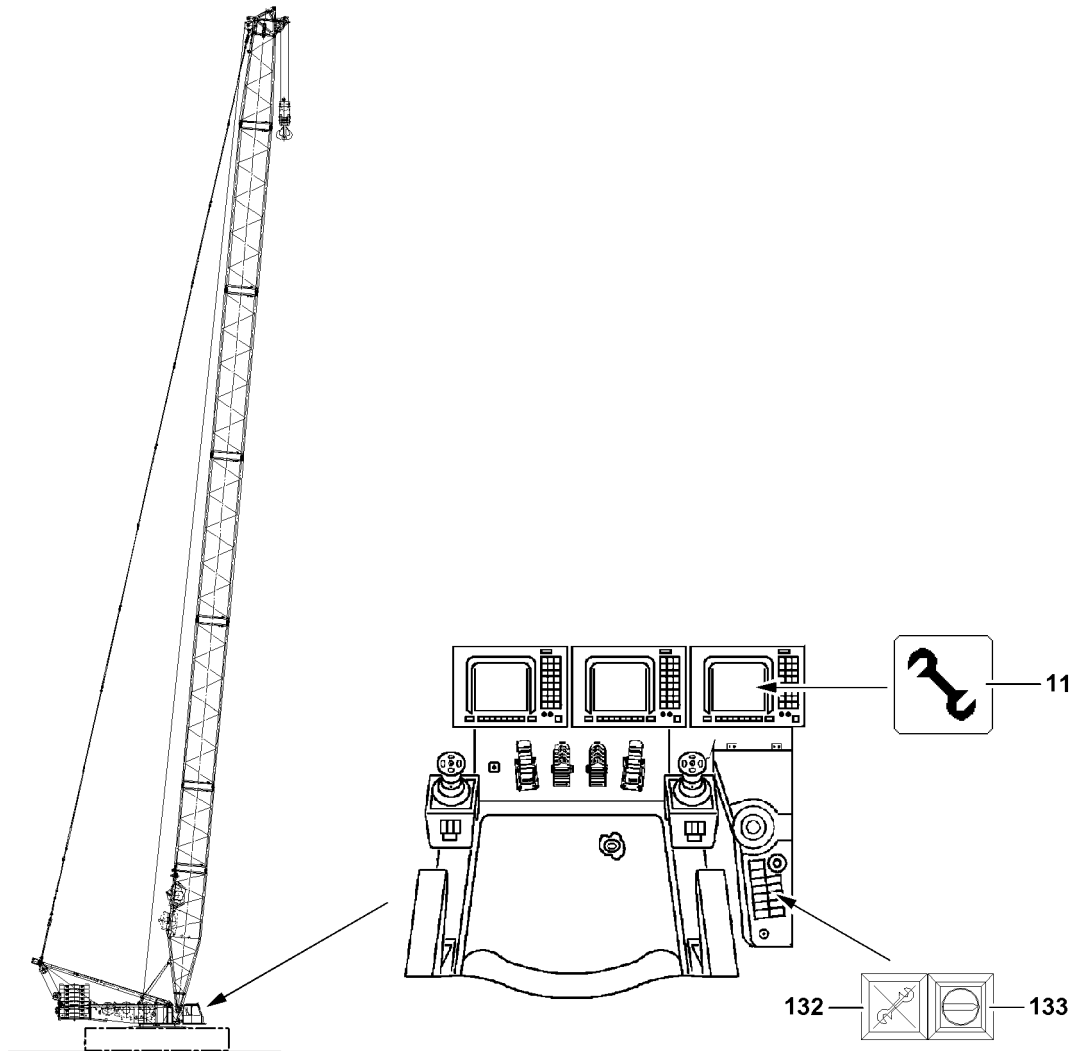
Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be caught and severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!



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Fig.111631

5.1 Turning the turntable into disassembly position

- ▶ Turn the turntable in longitudinal axle of the crawler travel gear against the travel direction or vertically to the crawler travel gear, see Erection and take down chart.

5.2 Taking the S-boom down



WARNING

The crane can topple over!

If the following conditions are not met before taking down the boom, the crane can topple over and fatally injure personnel!

- ▶ The turntable may not be turned during the disassembly of the boom!
- ▶ Observe the Safety technical notes, see Crane operating instructions, chapter 5.01!
- ▶ Observe the data in the erection and take down charts!

If required in the erection and take down chart:

- ▶ Carry the hook block along with the auxiliary crane!

NOTICE

Damage of boom components!

Taking down the boom system can lead to a collision between the hook block and the pulley head. The boom components can be severely damaged!

- ▶ Luff the boom system down at the same time and spool the hoist winch out!



Note

- ▶ Depending on the condition of the ground, the boom and the lattice sections must be supported from below for the disassembly of the boom!

Make sure that the following prerequisites are met:

- The crane is aligned in horizontal direction.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The counterweight has been installed to the turntable according to the erection chart.
- The LICCON overload protection has been set according to the data in the load chart.

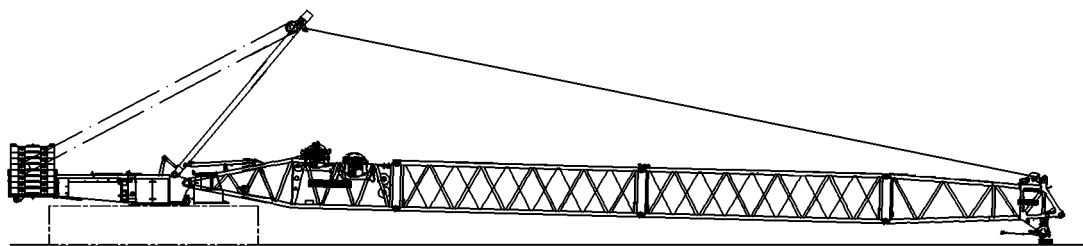
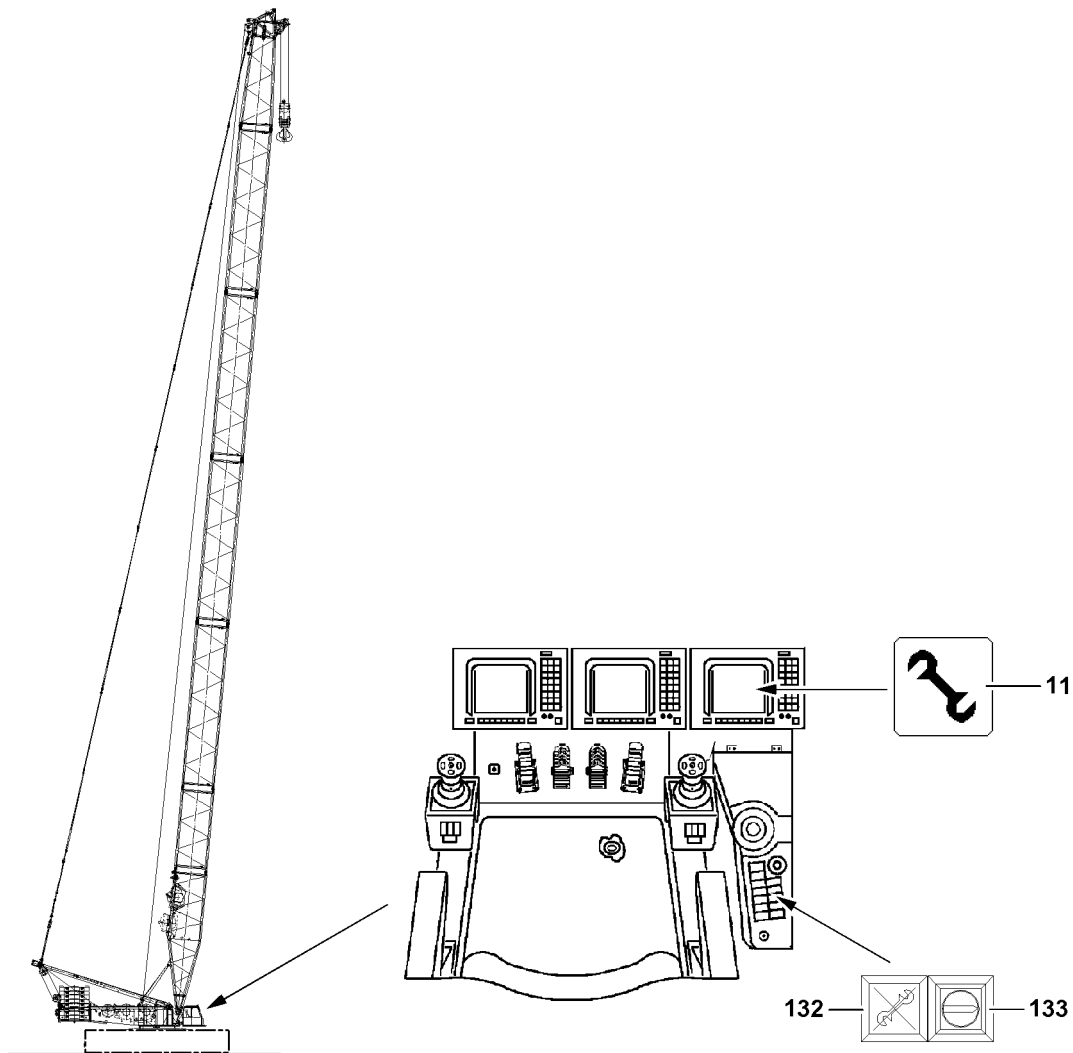


Fig.111631

LWE/LR 1750-000/12812-15-02/en

5.2.1 Luffing the S-boom down



Note

- ▶ The luff down movement is turned off as soon as the lowest operating position is reached!
- ▶ When the lowest operating position of the S-boom is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“!
- ▶ In the crane operating screen appear alarm functions!

- ▶ Luff the S-boom down to the „lowest“ operating position.

Result:

- The luff down movement is turned off.
- The „STOP“ icon appears on the LICCON monitor.
- The horn icon appears on the LICCON monitor.



WARNING

Crane operation with added assembly key button!

If the assembly key button is turned on, the hoist limit switch and the LICCON overload protection is bypassed!

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be killed!

This could result in high property damage!

- ▶ The actuation of the assembly key button **133** is only permitted for assembly tasks!
- ▶ The assembly key button **133** may only be operated by persons who are aware of the consequences of a bypass!
- ▶ Crane operation with the assembly key button **133** turned on is strictly prohibited!
- ▶ The assembly key button **133** must be removed immediately after carrying out the assembly work and handed to an authorized person!

When the boom has reached the lowest operating position:

- ▶ Actuate the assembly key button **133**.

Result:

- The LICCON overload protection is deactivated.
- The indicator light in the button **132** lights up.
- The assembly icon **11** appears on the LICCON monitor.
- ▶ At the same time, spool the hoist winch out and luff the S-boom down until the hook block touches the ground.

5.2.2 Unreeving the hook block

- ▶ Remove the hoist limit switch weight and unreeve the hook block.

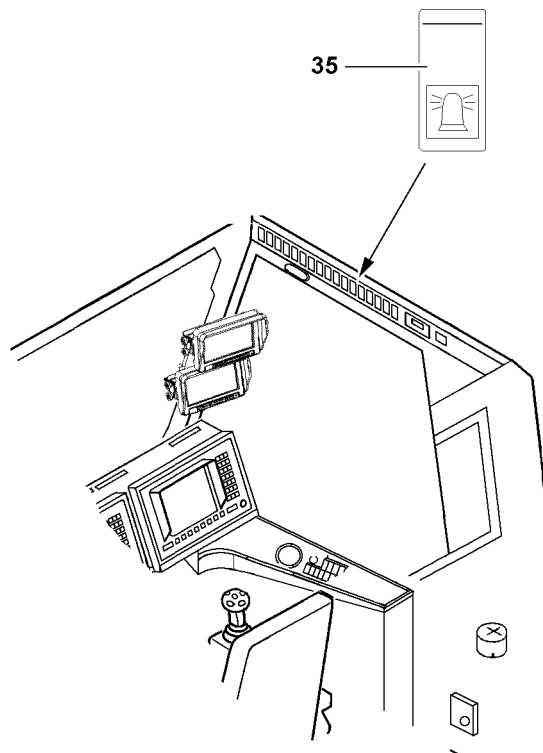
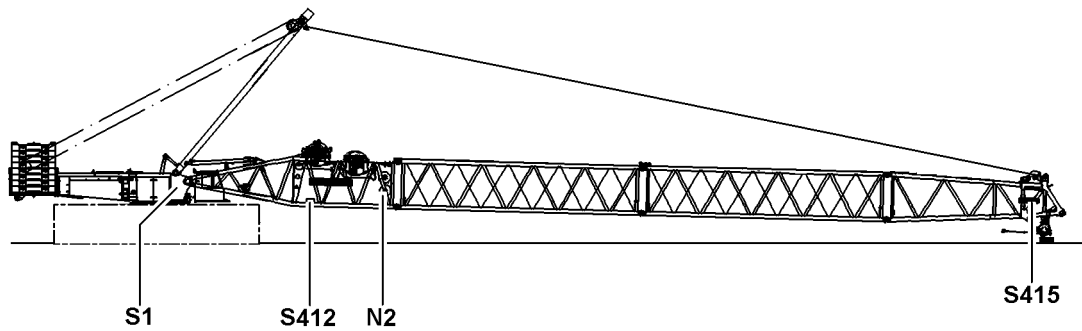


Fig.111624

LWE/LR 1750-000/12812-15-02/en

5.2.3 Spooling the hoist rope up

NOTICE

Overspooled winch!

If the rope is pulled under the winch when spooling up, the settings of the cam limit switch are not longer correct and there is an increased danger of accidents!

As a result, extensive adjustment work on the cam limit switch is required!

- ▶ All rope retaining pins / pipes on the S-boom are removed!
- ▶ Slowly spool up the hoist rope over the rope pulleys back to the winch!
- ▶ Stop the winch in time, with sufficient rope reserve!
- ▶ Do not overspool the winch!

-
- ▶ Spool the hoist rope up.

5.3 Disconnecting the electrical connections on the boom

Make sure that the following prerequisite is met:

- The S-boom has been placed down.

NOTICE

Damage to cable drum or cable!

If the cable of the cable drum is not properly spooled up on the cable drum after unplugging the S-end section, then the cable drum or the cable can be significantly damaged!

- ▶ Spool the cable drum up after unplugging!

-
- ▶ Spool the cable drum up and secure it to prevent inadvertent spooling out.
 - ▶ Make sure that all electrical connections on the S-boom have been disconnected.

5.4 Disconnecting the hydraulic connection on the boom

When releasing hydraulic lines with quick-release couplings, make sure that the coupling procedure is carried out correctly.



WARNING

Pressure in the hydraulic lines!

If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!

Personnel can be severely injured or killed!

- ▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!

-
- ▶ Install the coupling components (sleeve and connector) with the hand-tightened nut.
 - ▶ Disconnect the hydraulic connections.
 - ▶ Install dust caps on the quick-release couplings.

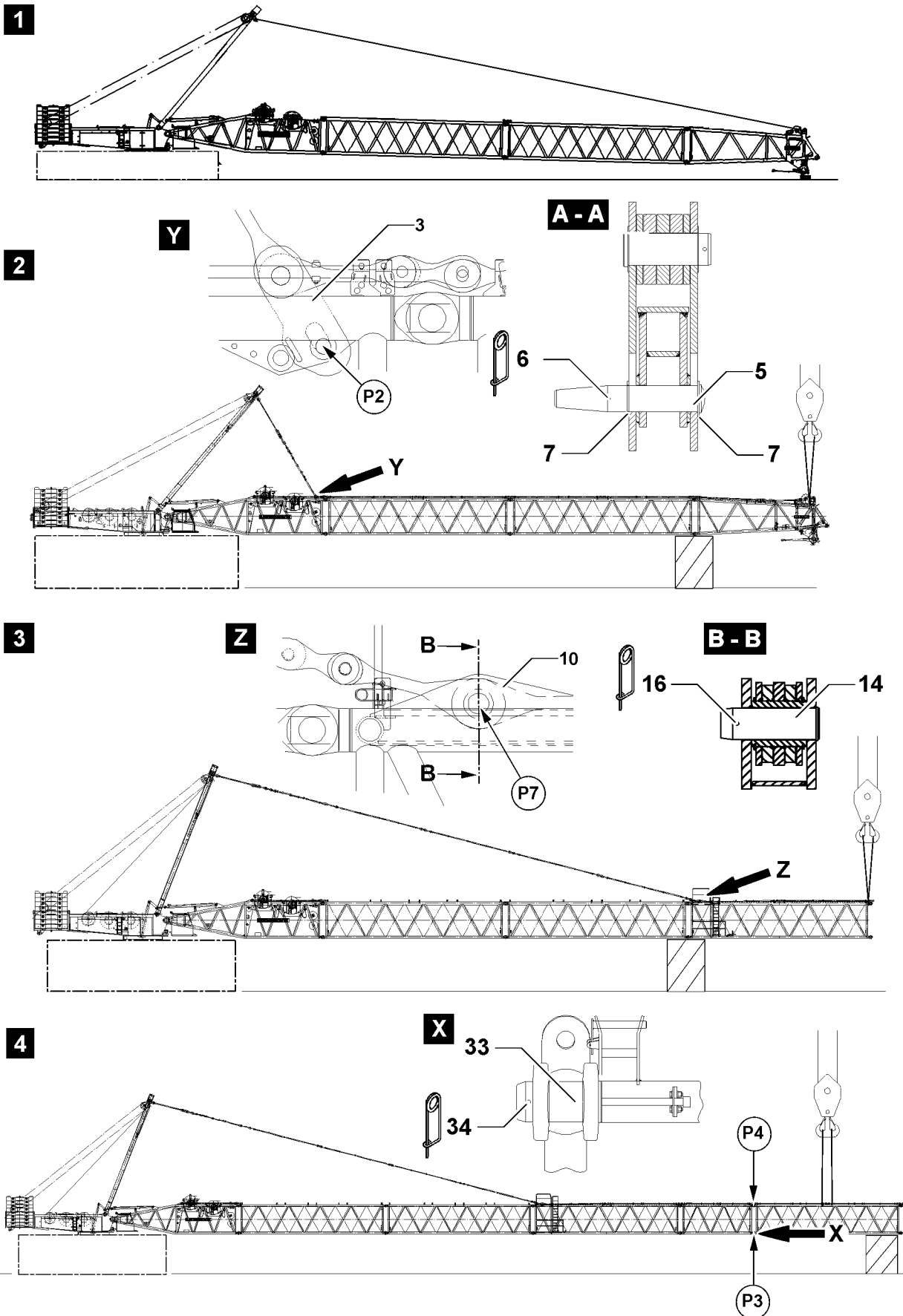


Fig.112557

LWE/LR 1750-000/12812-15-02/en

5.5 Disassembling the S-lattice sections

The disassembly of the lattice sections is carried out in various ways:

- Disassembling the lattice sections in „Flying mode“.
- „Opening“ the boom.



WARNING

General danger notes!

- ▶ Support the S-boom during assembly / disassembly with suitable materials!
- ▶ All pins are to be secured after assembly with the intended safety elements!
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15!
- ▶ Secure the boom with support or auxiliary crane, see Crane operating instructions, chapter 5.01!
- ▶ It is prohibited for anyone to remain under the booms or within the complete danger zone during the pinning and unpinning procedure of the lattice section!



Note

- ▶ For weights of intermediate sections with placed guy rods, see Crane operating instructions, chapter 1.03!
- ▶ The intermediate sections are unpinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30!

Make sure that the following prerequisite is met:

- All electrical and hydraulic connections are separated on the boom.

5.5.1 Disassembling the S-intermediate sections in flying mode

If spatial prerequisites on the job site are limited for the disassembly of the S-boom, or if they are limited by buildings or similar, then the S-boom can be removed in flying mode.

For the flying disassembly, a differentiation is made between the guy points on the boom:

- Guying on S-pivot section, see illustration 3.
- Guying on S-intermediate section for flying assembly, see illustration 4.



WARNING

Impermissible boom lengths guyed in flying mode!

If impermissible boom lengths are guyed on the assembly brackets, then severe property damage can occur on the crane! Personnel can be severely injured or killed!

- ▶ The maximum permissible boom lengths for the „Flying assembly“ may not be exceeded, see section „Assembling the S-lattice sections“!
- ▶ For the „flying“ boom assembly, the maximum permissible total force on the test point **MS1** may **not** be exceeded, see section „Assembling the S-lattice sections in flying mode“!
- ▶ Pin the guy rods either on the assembly brackets **3**, point **P2**, or the assembly brackets **10**, point **P7**!
- ▶ The data in the erection and take down charts as well as the load charts must be observed!

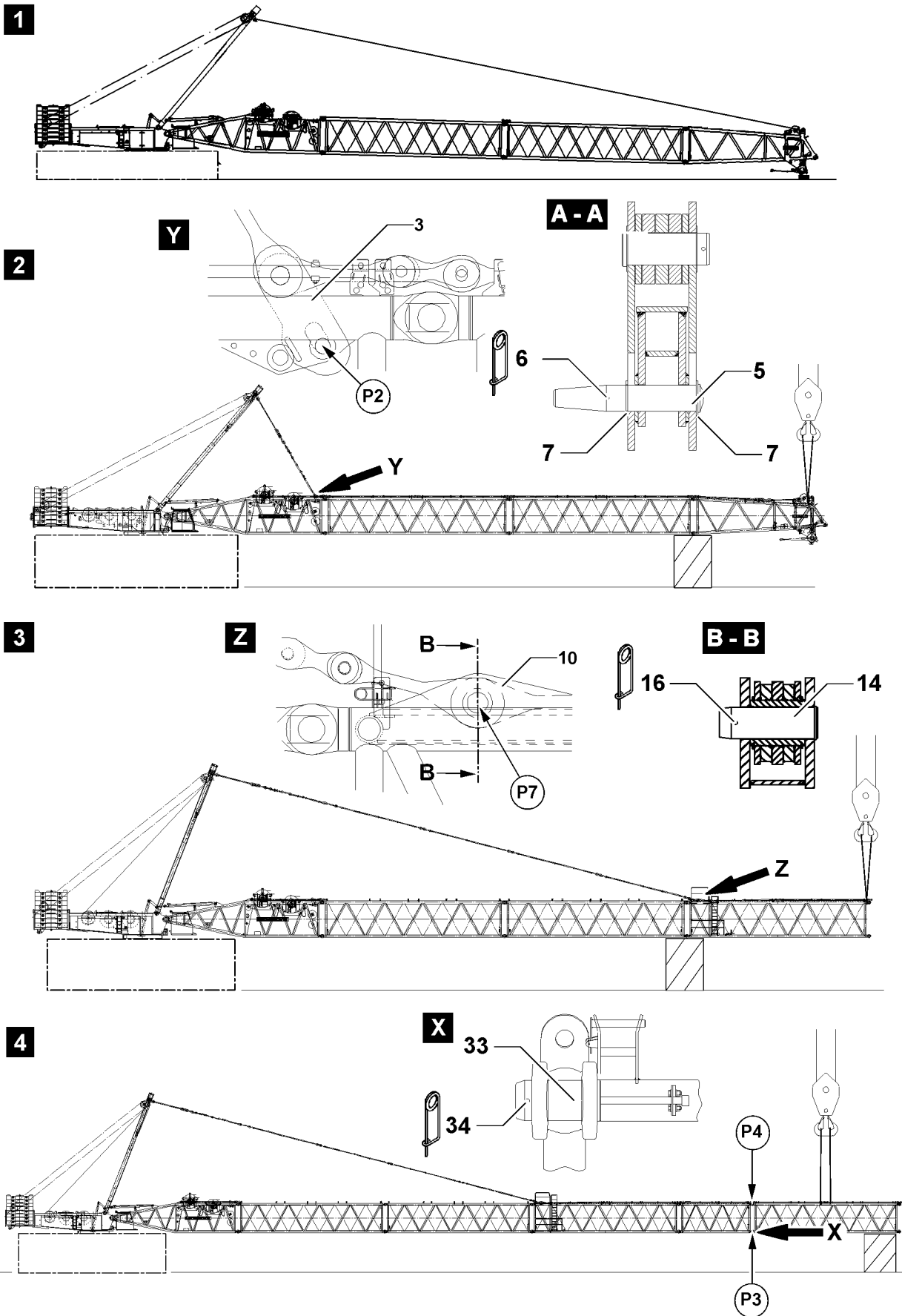


Fig.112557

LWE/LR 1750-000/12812-15-02/en

**WARNING**

The boom can fold downward!

By unpinning the guy rods on the assembly brackets **3** or the assembly brackets **23**, the boom can fold down!

Personnel can be severely injured or killed!

- ▶ Unpin the guy rods on the assembly brackets **3**, point **P2** or the assembly brackets **10**, point **P7** when it is ensured that the intermediate sections are supported with suitable materials or are secured with the auxiliary crane or the boom is placed on the ground!

Make sure that the following prerequisites are met:

- The boom is in horizontal position.
- The guy rods are tensioned.
- Suitable materials to support the boom are available.
- An auxiliary crane is available.

Guying the S-boom in „Flying mode“

- ▶ Support the boom or secure it with the auxiliary crane.

**Note**

- ▶ The guy rods must be placed down to the point where the boom can be guyed on the assembly brackets **3** on point **P2** or the assembly brackets **10** on point **P7**!

- ▶ Make sure that the transport retainers for the guy rods on the intermediate sections are unpinned.
- ▶ Luff the SA-frame down and place the guy rods on the S-intermediate sections in the transport retainers.

Guying on the S-pivot section: When pinning the pin **5**, you have to use the washers **7**, see illustration **2**, sectional **A-A**.

When the boom is guyed on the S-pivot section:

- ▶ Pin the guy rods on the assembly brackets **3**: Insert the pin **5** on point **P2** and secure with spring retainer **6**.

When the boom is guyed on the S-intermediate section:

- ▶ Pin the guy rods on the assembly brackets **10**: Insert the pin **14** on point **P7** and secure with spring retainer **16**.
- ▶ Disassemble the guy rods, which are laying on the boom and secure them in the transport retainers.

Result:

- The S-intermediate sections can be disassembled.

Disassembling the S-intermediate section

The „flying“ disassembly is described on the example of one intermediate section, see illustration **4**.

- ▶ Secure the S-intermediate section with the auxiliary crane.
- ▶ Unpin the S-intermediate section on both sides „on the bottom“ at point **P3**: Remove the spring retainer **34** and unpin the pins **33**.
- ▶ Unpin the S-intermediate section on both sides „on top“ at point **P4**: Remove the spring retainer **34** and unpin the pins **33**.
- ▶ Remove the S-intermediate section.

If additional lattice sections are disassembled:

- ▶ Disassemble additional lattice sections the same way as described in this section.

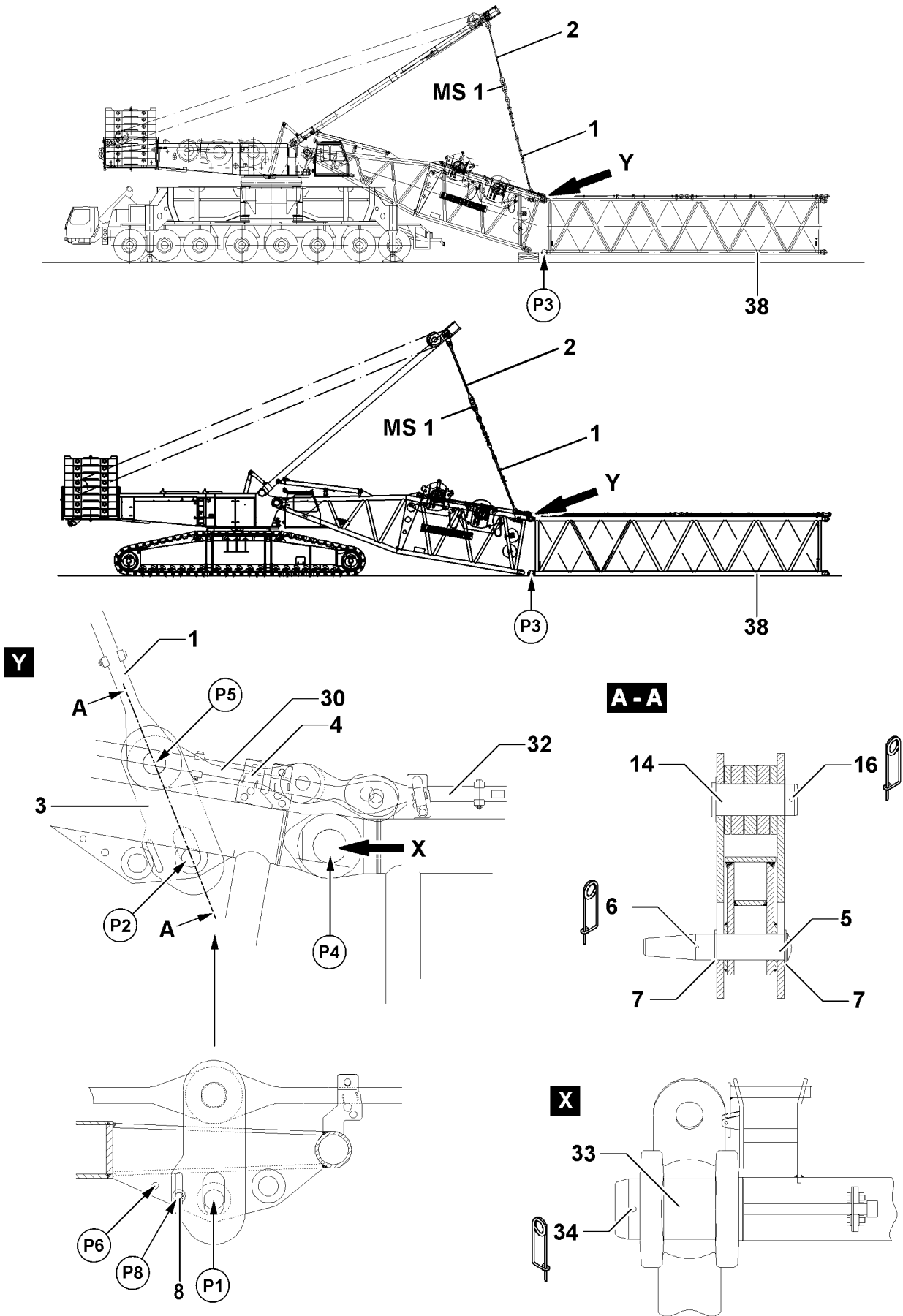


Fig.112553

LWE/LR 1750-000/12812-15-02/en

5.5.2 Disassembling the S-lattice sections („open“ boom)



WARNING

The crane can topple over!

If the following conditions are not met, the crane can topple over or be significantly damaged!

Personnel can be severely injured or killed!

- ▶ The end section of the corresponding S/SL-boom combination may **not** lift off the ground during the „Closing procedure“!
- ▶ With the SA-frame, boom combinations only to certain system lengths may be lifted / opened, see section „Assembling S-lattice sections (close boom)“!

Make sure that the following prerequisites are met:

- The guy rods are tensioned.
- Suitable materials to support the boom are available.
- An auxiliary crane is available.

Pinning the guy rods on the S-pivot section



Note

- ▶ The guy rods must be placed down to the point where the guy rods can be pinned on the assembly brackets **3** on point **P2**!

- ▶ Luff the SA-frame down and place the boom on the support on the ground.
- ▶ Make sure that the transport retainers for the guy rods on the intermediate sections are unpinned.
- ▶ Luff the SA-frame down and place the guy rods on the S-intermediate sections in the transport retainers.

When pinning the pin **5**, you have to use the washers **7**, see illustration.

- ▶ Pin the guy rods **1** on the assembly brackets **3** on the S-pivot section: Insert the pin **5** and secure with spring retainer **6**, see detail **Y**.
- ▶ Unpin the guy rods, which are laying on the boom and secure them individually with the transport retainers.

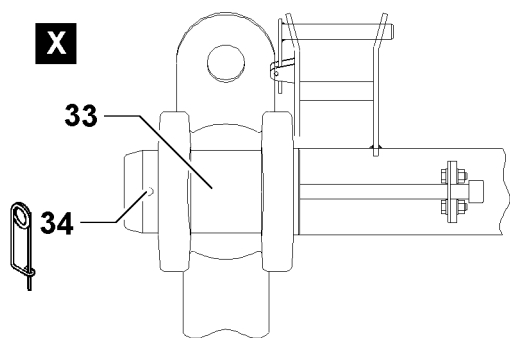
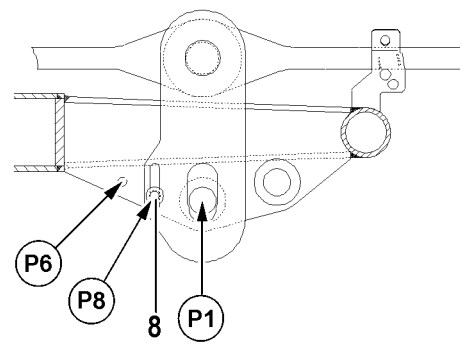
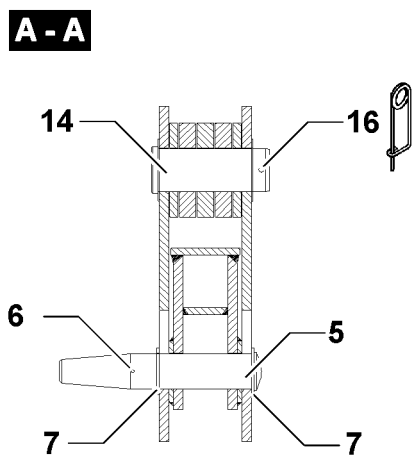
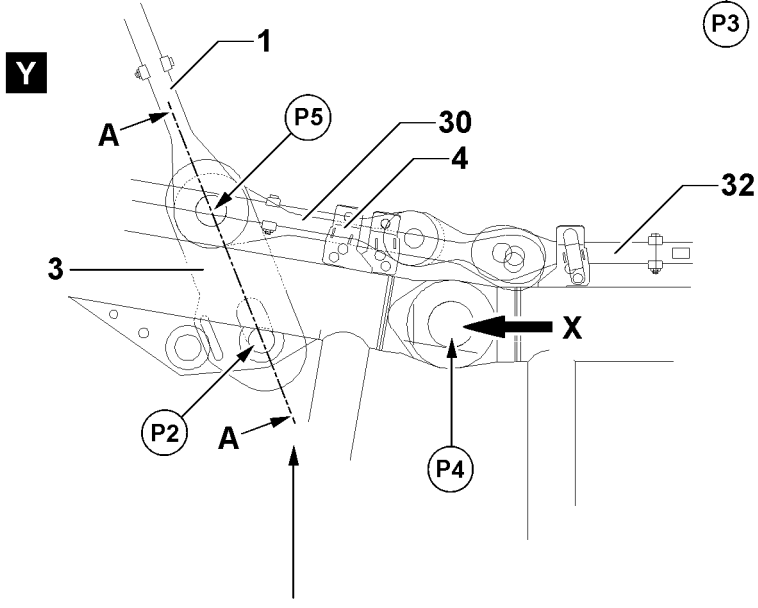
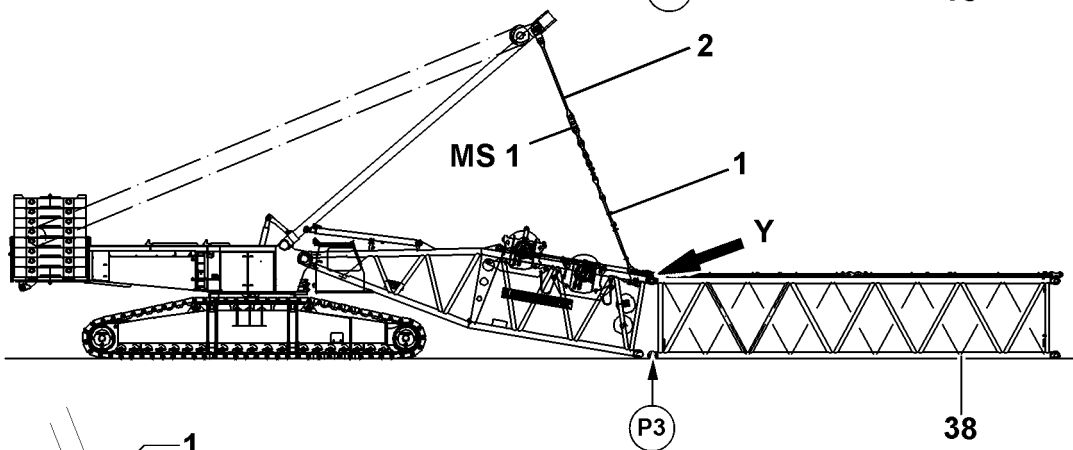
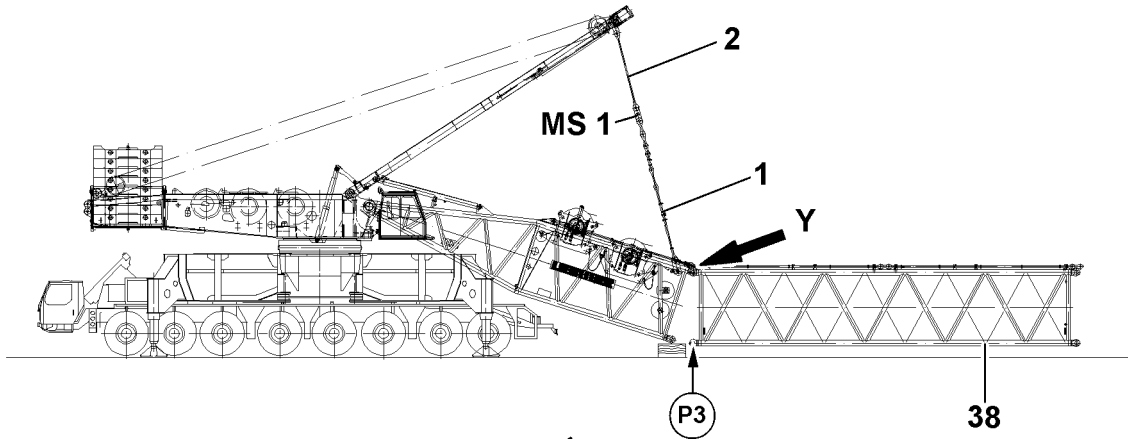


Fig.112553

LWE/LR 1750-000/12812-15-02/en

„Opening“ the S-boom



Note

- ▶ The ACTUAL force on test point **MS1** is shown on LICCON monitor 1!
 - ▶ Tension the guying on the SA-frame with the same force as for assembly, see the actual force which was measured and noted at assembly on test point **MS1**!
 - ▶ The pins can be pulled easier and the pins and lugs are therefore not damaged!
-
- ▶ Lift the SA-frame and tension the guy rods until the force on test point **MS1** corresponds to the force at assembly.
 - ▶ Unpin the S-pivot section on both sides „on the bottom“ at point **P3**: Remove the spring retainer **34** and unpin the pin **33**, see detail **X**.
 - ▶ Lower the S-boom until the intermediate sections and the S-pivot section are laying on the support on the ground.
 - ▶ Unpin the S-pivot section on both sides „on top“ at point **P4**: Remove the spring retainer **34** and unpin the pin **33**, see detail **Y**.
 - ▶ Lower the SA-frame and place the guy rods **1** in the transport retainers on the S-pivot section.
 - ▶ Unpin the guy rods **1** on the guy rods **2** of the SA-bracket.
 - ▶ Secure guy rods **1** in the transport retainers.

NOTICE

Assembly bracket in operating position!

If the assembly bracket **3** is in operating position during transport, components can be damaged!

- ▶ Secure the assembly bracket **3** before transport with the transport retainer **8** on point **P8**, see detail **Y**!
-
- ▶ Unpin the assembly bracket **3** on the S-pivot section: Remove the spring retainer **6** and unpin the pin **5** on point **P2**, see detail **Y**.

When pinning the pin **5**, you have to use the washers **7**, see sectional **A-A**.

- ▶ Pin the assembly bracket **3** on the S-pivot section: Insert the pin **5** on point **P1** and secure with spring retainer.
- ▶ Secure the assembly bracket **3**: Disassemble the transport retainer **8** on point **P6** and assemble on point **P8**.

Result:

- The S-lattice sections can be disassembled.

Disassembling the S-lattice sections

The disassembly is described on the example of one intermediate section, see detail **X**.

- ▶ Unpin the S-intermediate section on both sides „on the bottom“: Remove the spring retainer **34** and unpin the pins **33**.
- ▶ Unpin the S-intermediate section on both sides „on top“: Remove the spring retainer **34** and unpin the pins **33**.
- ▶ Remove the S-intermediate section.

If additional lattice sections are disassembled:

- ▶ Disassemble additional lattice sections the same way as described in this section.

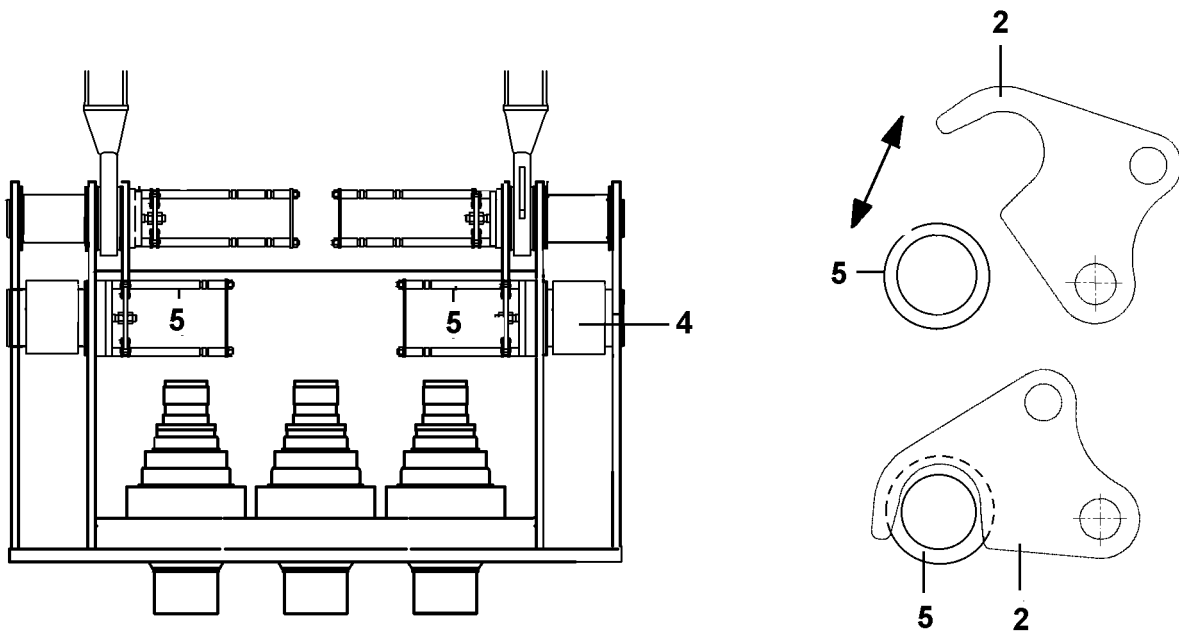
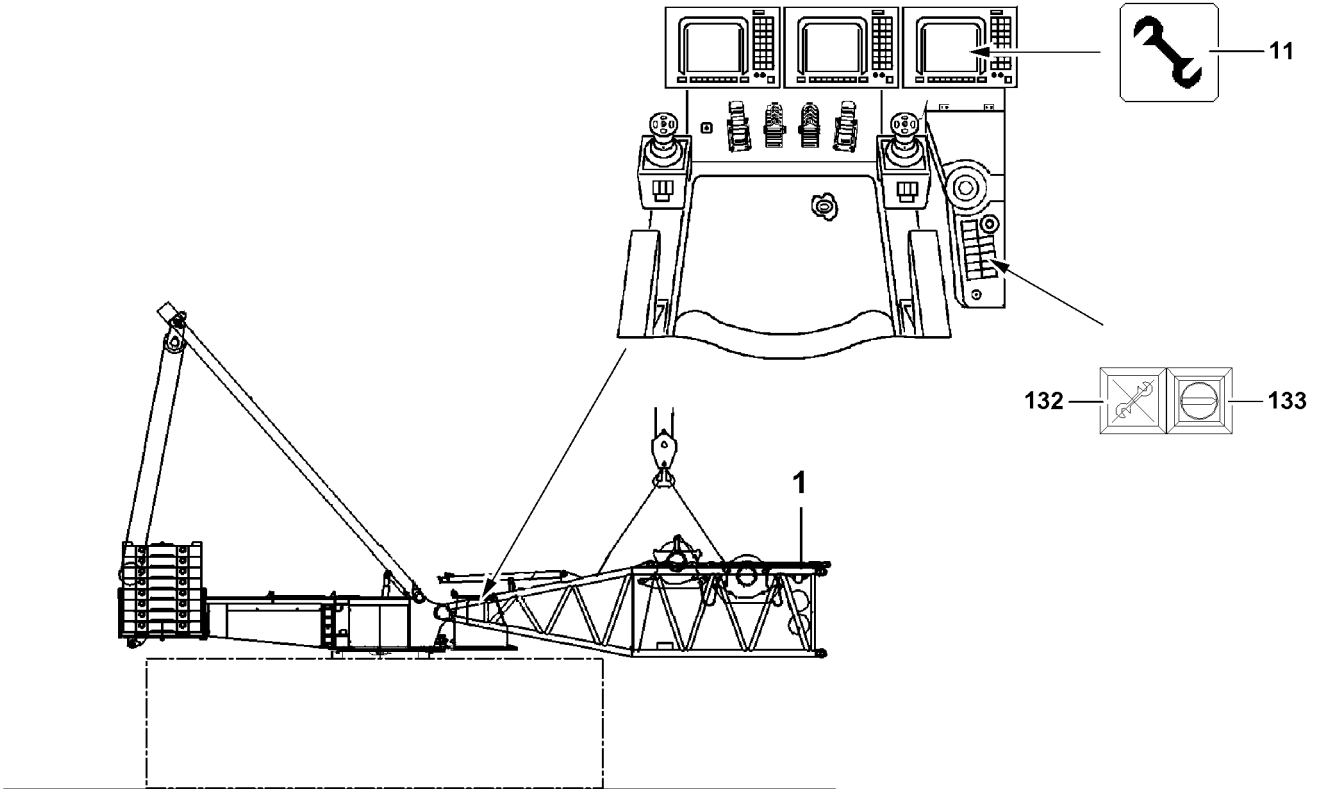


Fig.111629

LWE/LR 1750-000/12812-15-02/en

5.6 Disassembling the S-pivot section



WARNING

General danger notes!

- ▶ Support S-pivot section during disassembly with suitable materials!
- ▶ Insert and secure all pins after disassembly in the intended transport receptacles!
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15!

Make sure that the following prerequisite is met:

- The SA-frame is erected to the point where the S-pivot section can be disassembled without obstructions.
- ▶ Attach the S-pivot section **1** on the auxiliary crane.
- ▶ Lift the S-pivot section **1** with the auxiliary crane to the horizontal.

The pin pulling cylinders on the turntable are actuated with the radio remote control (only available for LR-cranes).



Note

- ▶ For operation of the radio remote control, see Crane operating instructions, chapter 6.08!



WARNING

The S-pivot section can fold downward!

If the S-pivot section is not secured before unpinning the pins, then it will fold down! Personnel can be severely injured or killed!

- ▶ Make sure that the S-pivot section is secured with the auxiliary crane before unpinning the pin **4**!
- ▶ Release the pin **4**: Fold the retaining hook **2** out on the guides **5**.
- ▶ Unpin the pins **4** on both sides.

When the pins **4** are completely unpinned on the left and right on the S-pivot section **1**:

- ▶ Secure the pins **4**: Fold the retaining hook **2** in on the left and right on the guides **5**.

NOTICE

Property damage on the turntable and on the S-pivot section!

- ▶ Slowly swing the S-pivot section out with the auxiliary crane and at low speed on the turntable!
- ▶ Carefully place the S-pivot section **1** down.
- ▶ Remove the auxiliary crane.

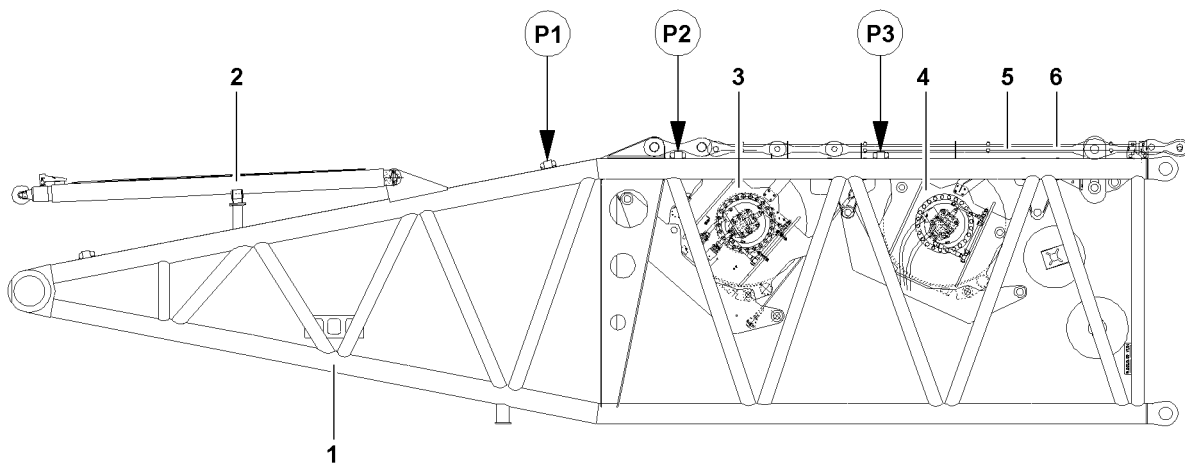


Fig.112044

LWE/LR 1750-000/12812-15-02/en

1 Component overview S-pivot section

Position	Component	Weight
1	S-pivot section	15.05 t
2	S-relapse retainer	1.30 t
3	Winch 6 including rope	6.40 t
4	Winch 5 including rope	9.50 t
5	WA-frame 2 guy rods	0.66 t
6	S-guy rods	0.67 t
	S-pivot section complete	33.58 t ¹⁾

1) The stated overall weights are approximate.

2 Fastening points

Fastening points	
P1 + P2	For S-pivot section without winches
P1 + P3	For S-pivot section with one or two winch(es)

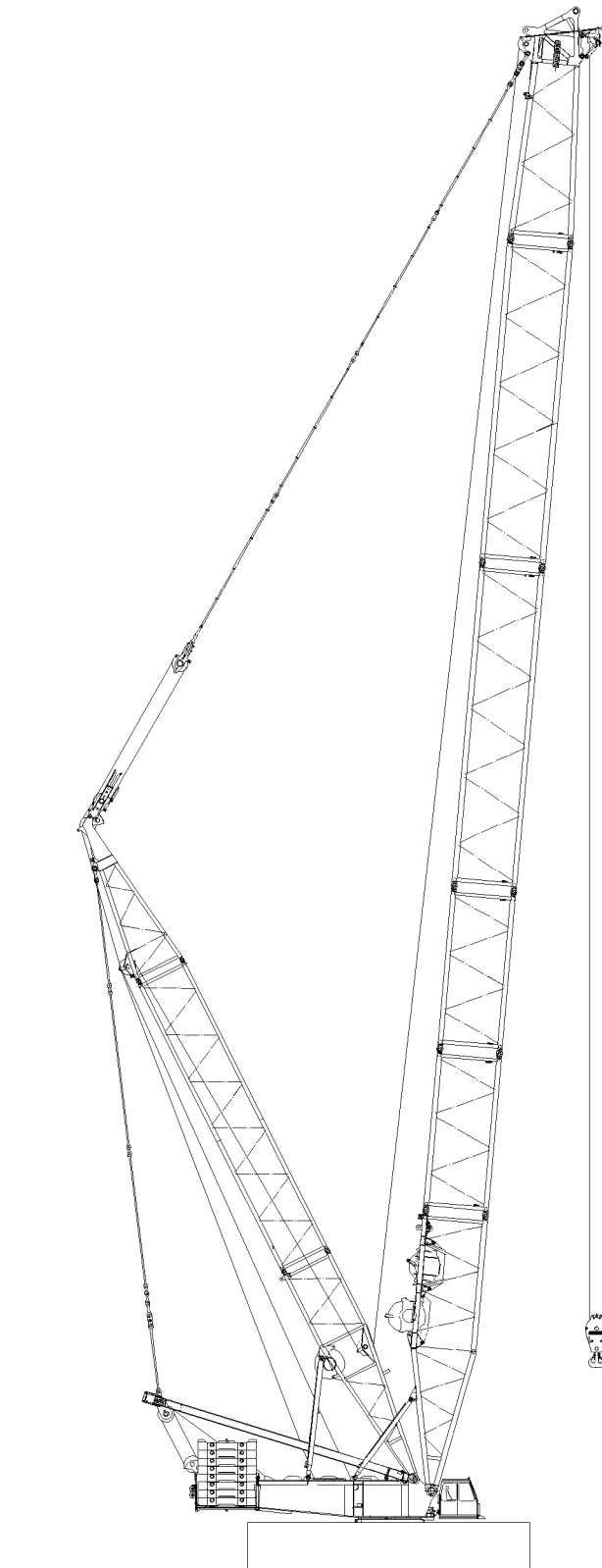


Fig.112046

LWE/LR 1750-000/12812-15-02/en

3 Assembling the SLD/SD-boom



Note

- ▶ The assembly is described on the example of the S-boom.



WARNING

Danger of falling!

During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids.
- ▶ If fall arrest equipment is available, then it must be used, see Crane operating instructions, chapter 2.06.
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the specified fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04.
- ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ Remaining on as well as under a suspended load is prohibited.
- ▶ Remaining on or within crane components (for example: At assembly of boom sections, lattice sections) which are moved during lifting, lowering, turning or closing procedures is strictly prohibited.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ It is prohibited to step on the boom system or an auxiliary boom without suitable protective devices.
- ▶ Stepping and walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.



WARNING

The lattice sections can fall down!

If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel.

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- ▶ Secure the pins in the bearing points and the receptacles.
- ▶ It is prohibited to lean the ladder against the component being disassembled.
- ▶ Do not remove the fastening equipment and the auxiliary crane until each component is pinned on and secured.

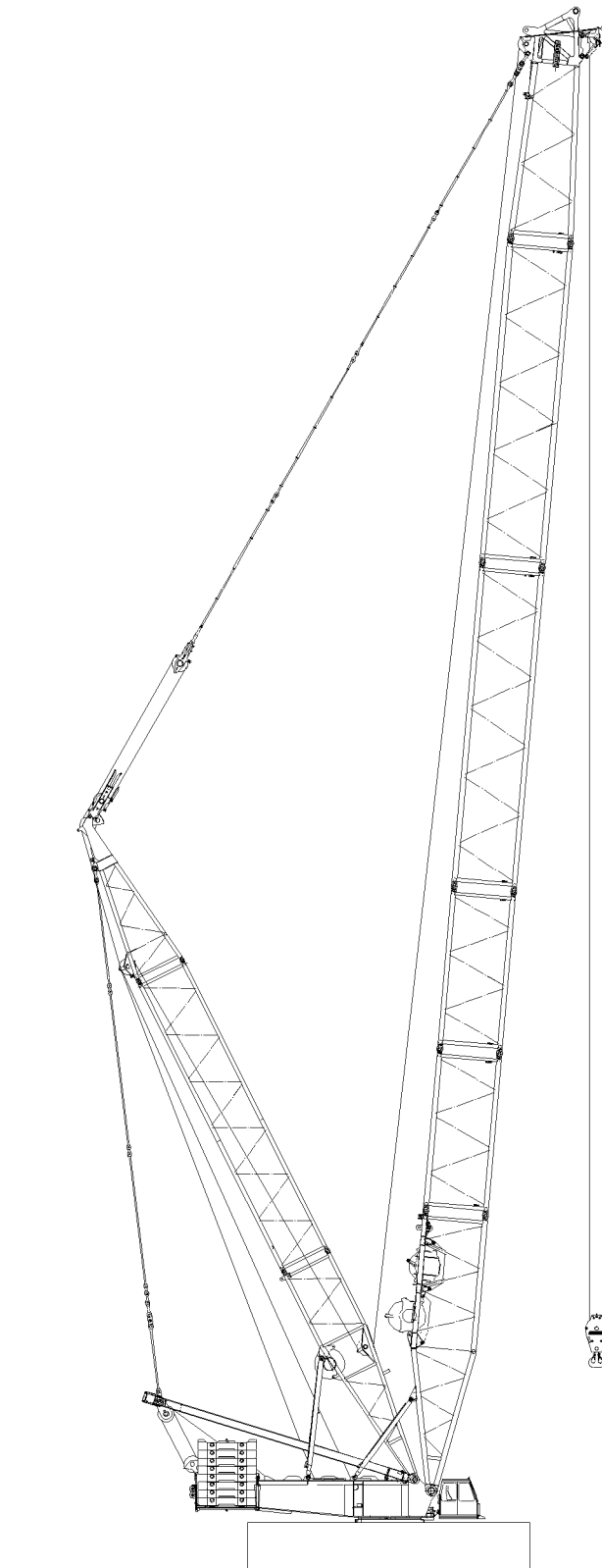


Fig.112046

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.

Personnel can be caught and severely injured or killed.

- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is aligned in horizontal direction to avoid the support beams from swinging by themselves (only on connection with crane support or for the LG-crane).
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

**WARNING**

The crane can topple over!

If the turntable is turned during the assembly of the boom, then the crane can topple over and be severely damaged.

Personnel can be severely injured or killed.

- ▶ The turntable may not be turned during the assembly of the boom.

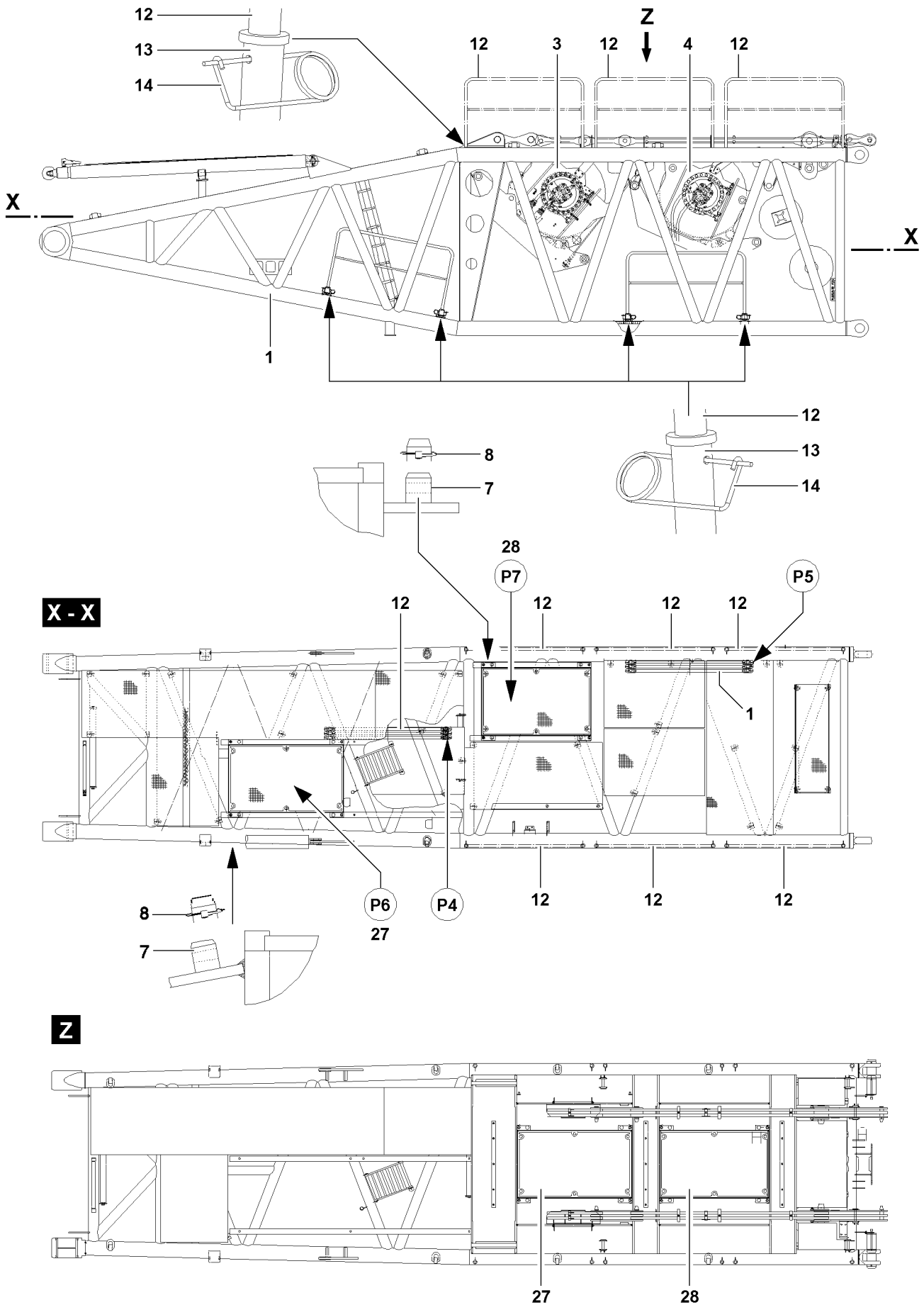


Fig.112057

LWE/LR 1750-000/12812-15-02/en

3.1 Assembling the railing on the S-pivot section



WARNING

Danger of falling!

During assembly and disassembly of the railings **12**, personnel must be secured with appropriate aids to prevent them from falling (for example: with personal protective equipment).

Even for assembly of protective devices there is a danger of falling.

Assembly personnel can fall and be severely injured or killed.

- ▶ For assembly and disassembly work, maintenance and inspection work on the S-pivot section, all railings **12** must be assembled and secured.
- ▶ Step on the S-pivot section **1** only with „clean shoes“.



Note

- ▶ See Crane operating instructions, chapter 2.06.

- ▶ Remove the railing **12** on the S-pivot section **1** from the transport position **P4** and transport position **P5** and bring into operating position: Insert the railing **12** into the mounting pipes **13** and secure with spring retainer **14**.

3.2 Assembling the catwalks



WARNING

Disassembled or incompletely assembled catwalks!

If the catwalks are not assembled if the winches are missing or not completely assembled, then personnel can fall and be severely injured or killed.

- ▶ For each non-assembled winch on the S-pivot section: Assemble the catwalks.
- ▶ The catwalks may only be accessed when they are pinned and secured in operation position, check visually.

Catwalks are assigned to the openings for the winches:

- **27** Winch 6 – catwalk
- **28** Winch 5 – catwalk



Note

- ▶ If one or both winches are installed in operation position on the S-pivot section, then the disassembled catwalks must be placed in the respective receptacles and secured.

Make sure that the following prerequisites are met:

- The railings are pinned in operating position and secured.
- The assembly personnel is secured to prevent them from falling.

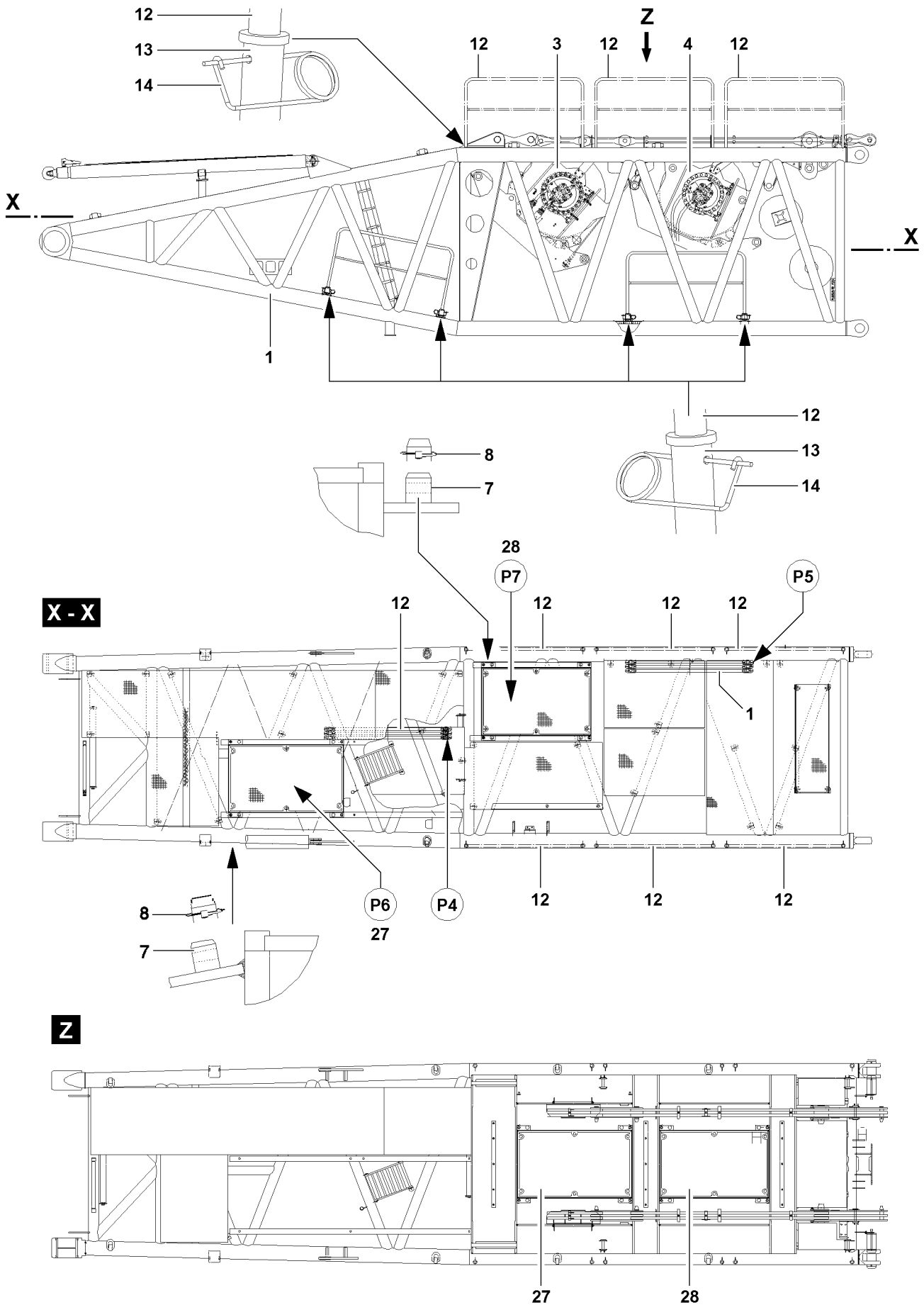


Fig.112057

LWE/LR 1750-000/12812-15-02/en

3.2.1 S-pivot section without winches

Make sure that the following prerequisite is met:

- The catwalks are in the transport receptacles.

Remove the catwalks with the auxiliary crane from the transport receptacles and installed them individually in operating position.

- ▶ Remove the catwalk **27** and catwalk **28** with the auxiliary crane from the transport receptacle.
- ▶ Install and secure the catwalks in operating position - over the installation opening of the respective winch.

3.2.2 S-pivot section before installation of winches

Make sure that the following prerequisites are met:

- Winch 5 is in transport position.
- Winch 6 is in transport position.
- The catwalk **27** and catwalk **28** are pinned and secured in operating position.

- ▶ Fasten the respective catwalk on the auxiliary crane.
- ▶ Release the catwalk on the centering pins: Remove the locking pin **8**.
- ▶ Lift the catwalk with the auxiliary crane from the operating position.
- ▶ Place the catwalk with the auxiliary crane in transport position **P6** or in transport position **P7** and secure with locking pin **8**.

Result:

- The respective winch can be installed.

3.3 Assembling the winch(es) on the S-pivot section

Make sure that the following prerequisite is met:

- The catwalks are in the transport receptacles.

- ▶ Fasten the required winch on the auxiliary crane.
- ▶ Bring the winch into operating position with the auxiliary crane, pin and secure.

When the winch is pinned and secured:

- ▶ Remove the auxiliary crane.
- ▶ Establish the electrical connections from the terminal box in the S-pivot section to the winches.
- ▶ Establish the hydraulic connections to the winches.

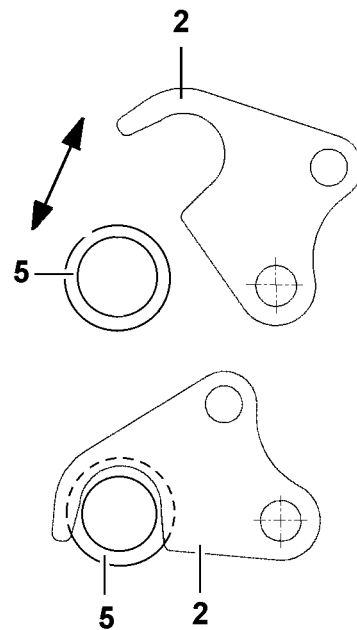
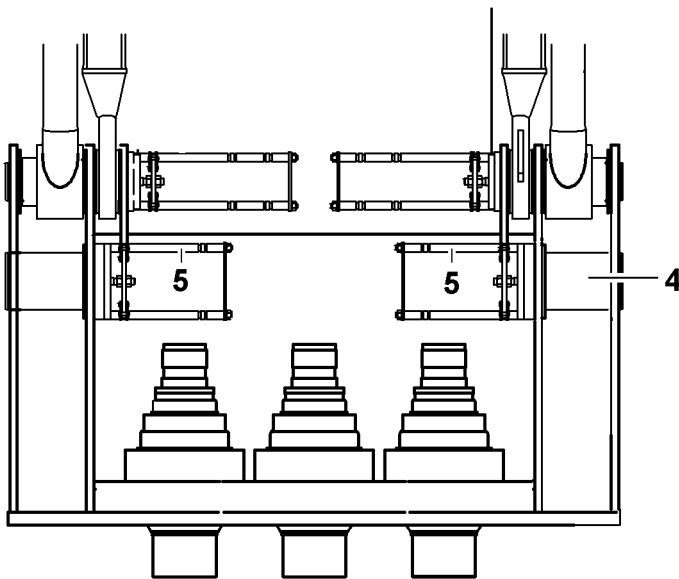
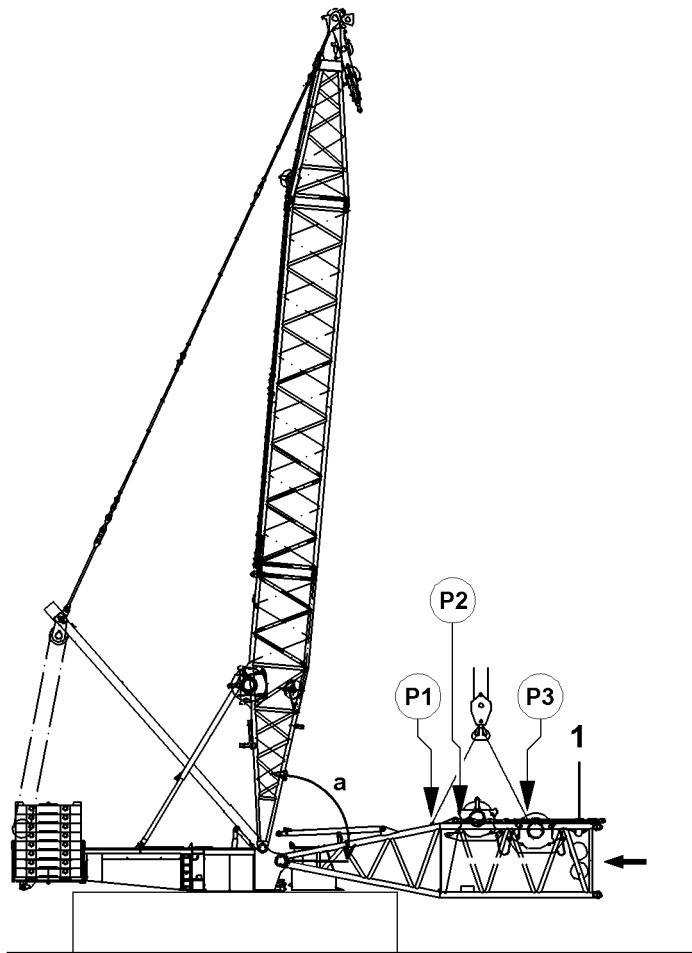


Fig.120031

LWE/LR 1750-000/12812-15-02/en

3.4 Assembling the SLD/SD-boom

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The counterweight has been installed on the turntable according to the load chart.
- The D-boom is completely assembled and erected on the turntable, see Crane operating instructions, chapter 5.05.
- The LICCON overload protection has been set according to the data in the load chart.

3.4.1 Turning the turntable into assembly position



WARNING

The crane can tip over!

If the specifications in the erection and take down charts as well as in the assembly conditions are not observed, the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Observe the assembly conditions, see Crane operating instructions, chapter 3.06.
- ▶ Turn the turntable in longitudinal direction of the crawler travel gear or to the side before installation.
- ▶ Make sure that the specifications in the erection and take down charts are observed.



Note

- ▶ If the turntable is turned to the side for the assembly of the boom, then boom and lattice sections must be supported, depending on the ground condition.
- ▶ Turn the turntable in longitudinal direction of the crawler travel gear or to the side.

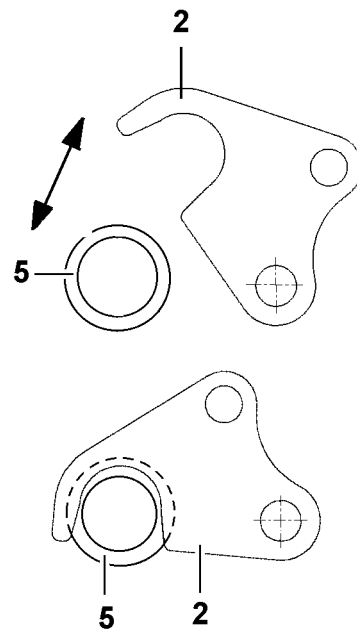
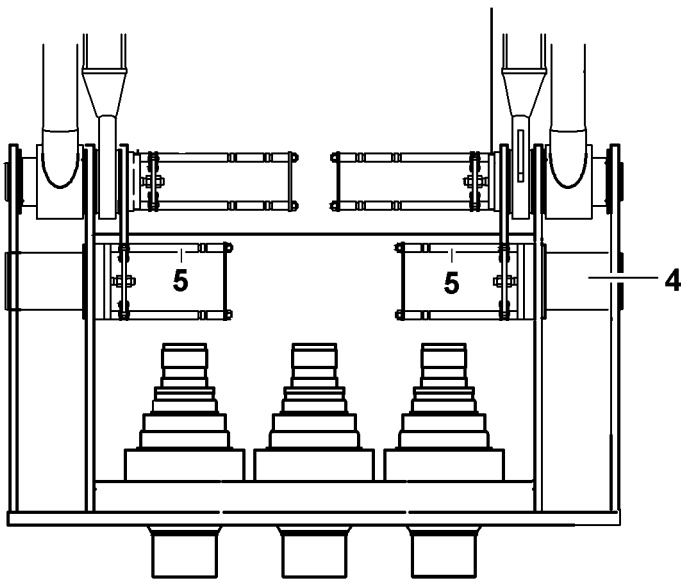
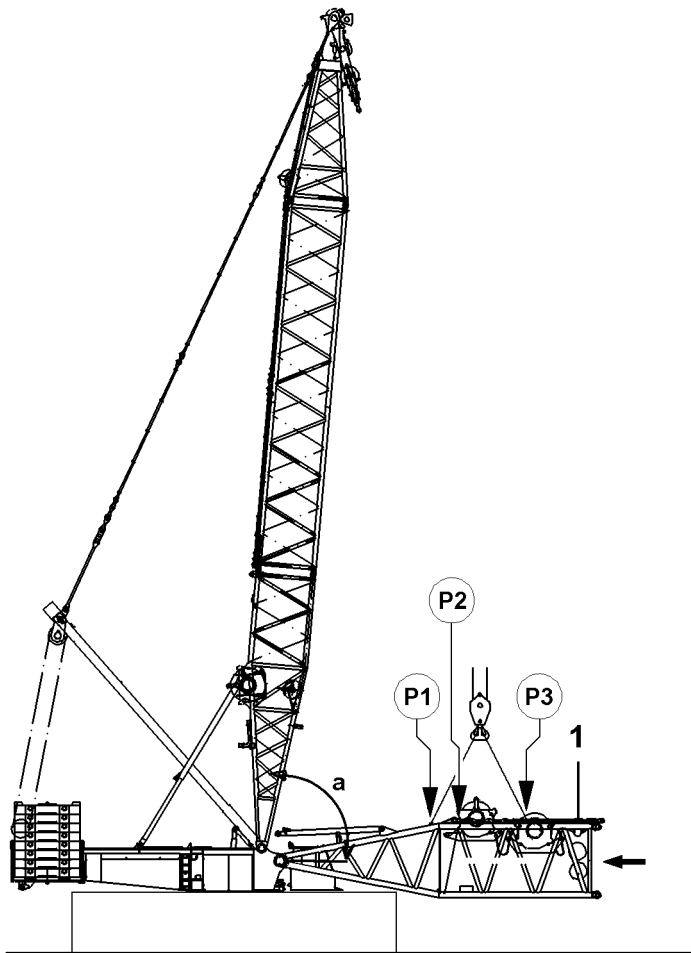


Fig.120031

LWE/LR 1750-000/12812-15-02/en

3.4.2 Exceeding the shut off limits of the LICCON overload protection for assembly operation



WARNING

Danger of accident due to function „Exceeding the shut off limits of the LICCON overload protection“! If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.

Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

- ▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

- The shut off limits of the LICCON overload protection are exceeded.
- The assembly icon appears on the LICCON monitor.



Note

- ▶ See Crane operating instructions, chapter 4.02.

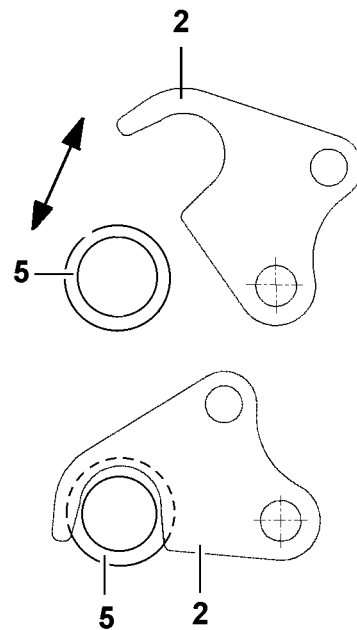
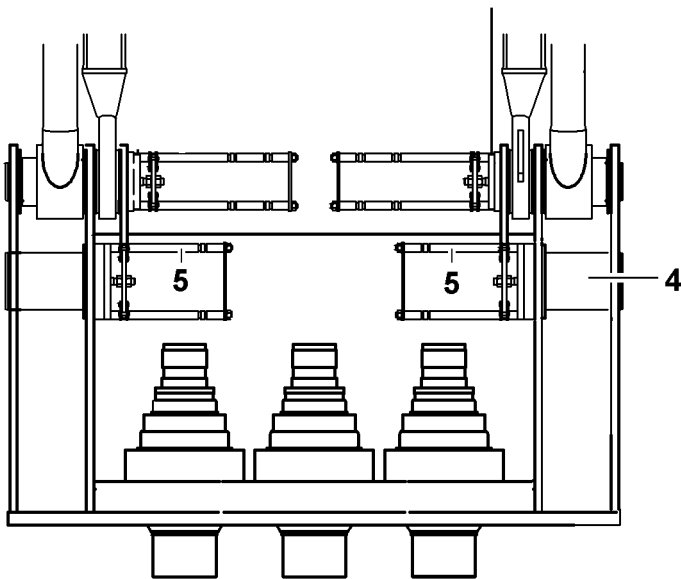
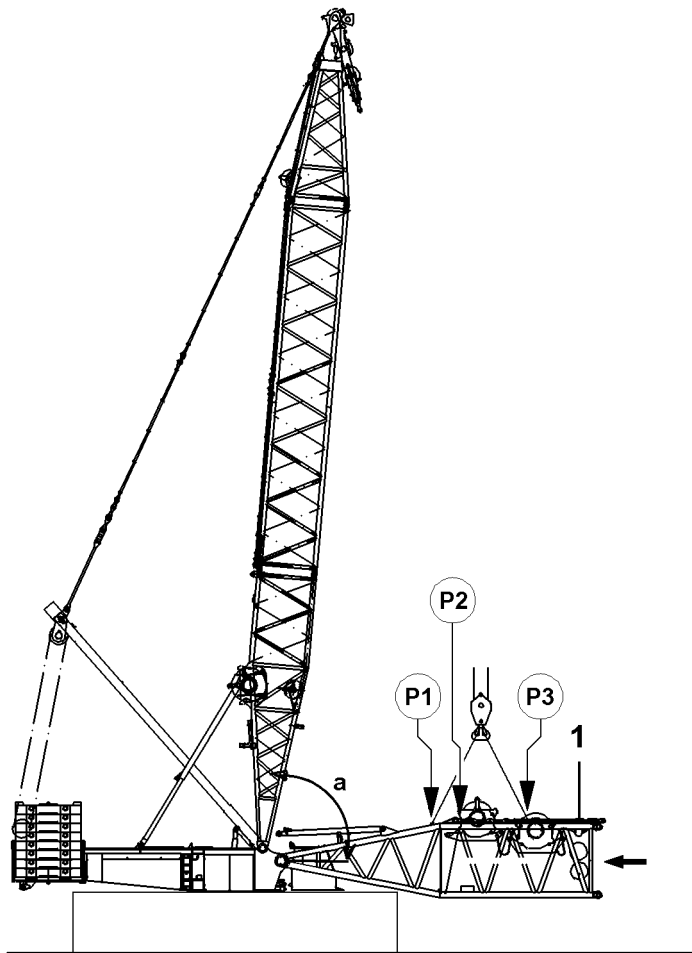


Fig.120031

LWE/LR 1750-000/12812-15-02/en

3.4.3 Pinning the S-pivot section on the turntable



WARNING

General danger notes!

- ▶ Support the S-boom during assembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended safety elements.
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15.

Make sure that the following prerequisite is met:

- The connector pins **4** on the turntable are unpinned.



Note

- ▶ Select the fastening points on the S-pivot section in such a way that the S-pivot section hangs horizontally on the auxiliary crane at assembly, see section „Fastening points“.

- ▶ Fasten the S-pivot section **1** on the fastening points **P1** and the fastening points **P2** on the auxiliary crane and swing in to the pin points on the turntable.

or

- Fasten the S-pivot section **1** on the fastening points **P1** and the fastening points **P3** on the auxiliary crane and swing in to the pin points on the turntable.

The pin pulling cylinders are actuated with the radio remote control (only available for LR-crane).



Note

- ▶ For operation of the radio remote control, see Crane operating instructions, chapter 6.08.



WARNING

Falling S-pivot section!

Due to non-secured or insufficiently secured connector pins, the S-pivot section can fall down. Personnel can be severely injured or killed.

- ▶ Secure the connector pins **4** between the S-pivot section **1** and the turntable after the pinning procedure with the retaining hook **2**.

- ▶ Fold the retaining hook **2** out on the guides **5**.
- ▶ Insert the connector pins **4** on both sides: Actuate the radio remote control.

When the connector pins **4** are completely pinned on the left and right on the S-pivot section **1**:

- ▶ Secure the connector pin **4**: Fold the retaining hook **2** in on the left and right on the guides **5**.

NOTICE

Damage to the S-pivot section!

When the installed S-pivot section is placed on the ground, the S-pivot section can be damaged.

- ▶ Before placing the S-pivot section down on the ground, make sure that the S-pivot section cannot collide with the crane components during the take down procedure.
- ▶ Slowly place the S-pivot section **1** with the auxiliary crane and at low speed on the ground.
- ▶ Before placing it on the ground, support the S-pivot section **1**.

- ▶ Carefully place the S-pivot section **1** on the support.
- ▶ Remove the auxiliary crane.

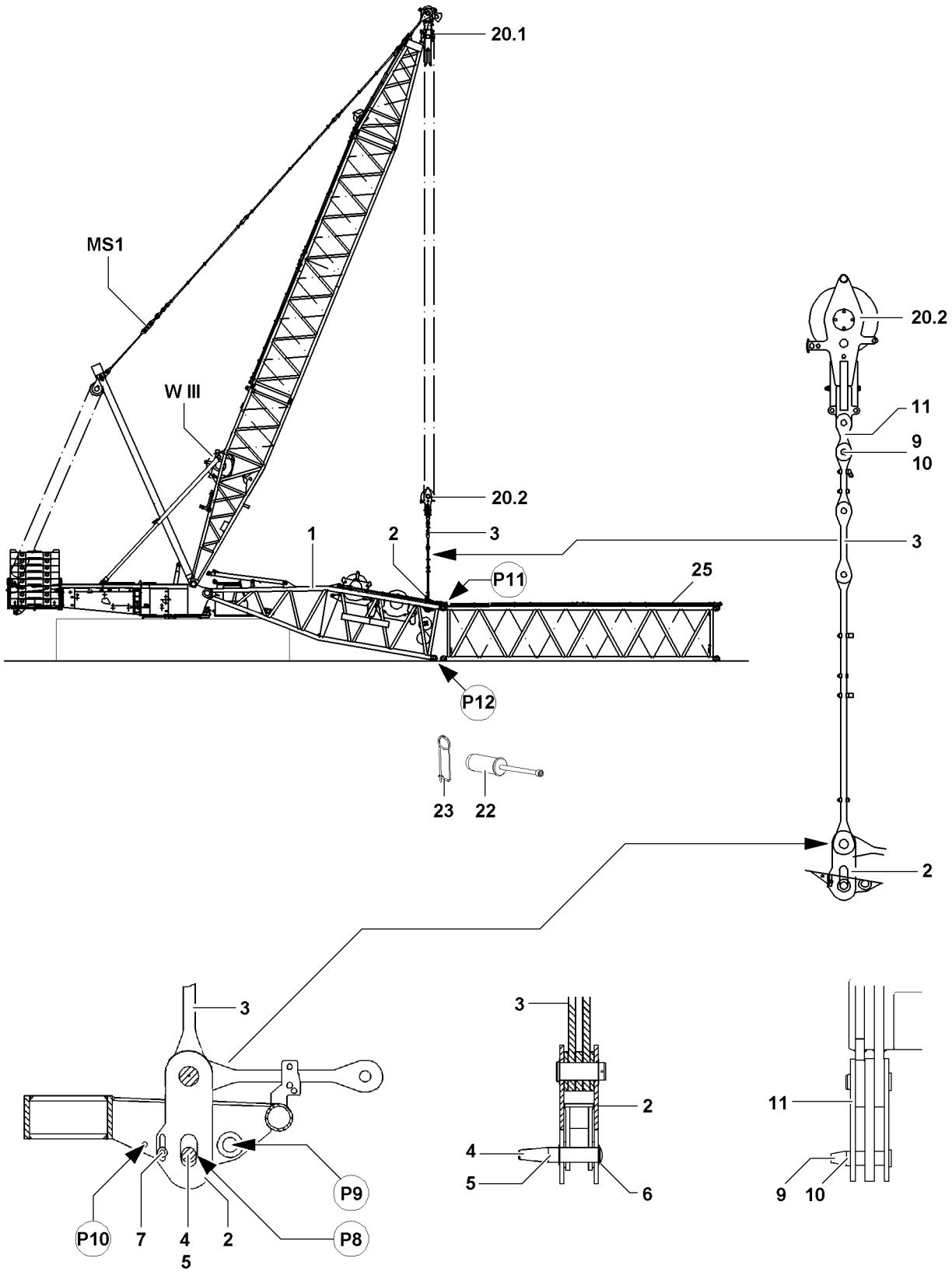


Fig.120032

LWE/LR 1750-000/12812-15-02/en

3.4.4 Pinning the upper pulley block on the S-pivot section

To be able to „close“ the S-boom combination after assembly, it is necessary to luff the D-boom down to the front and to lower the upper pulley block via the control winch 3 **W III** to the S-pivot section 1 and to pin with the guy rods.

Make sure that the following prerequisites are met:

- The S-pivot section 1 is pinned and secured on the turntable.
- The S-pivot section 1 is placed on the ground on the support base.
- The auxiliary crane is removed.

NOTICE

Damage of crane components!

During the assembly and crane operation, the transport retaining pin 7 must be unpinned, otherwise crane components can be damaged.

- ▶ Insert the transport retaining pin 7 in park position, point **P10**, and secure.
-



Note

- ▶ Pin point **P8** for flying assembly of S-boom with derrick.
 - ▶ Pin point **P9** for flying assembly of S-boom with SA-frame.
-
- ▶ Luff the D-boom down to the front until the upper pulley block **20.2** hangs freely over the assembly bracket 2 of the S-pivot section 1.
 - ▶ Pin and secure the upper pulley block **20.2** with the guy rods 3: Pin and secure the assembly bracket 2. Use pin 4, washer 6 and spring retainer 5.
 - ▶ Carefully spool up winch 3 **WIII** until the guy rods 3 are slightly tensioned.

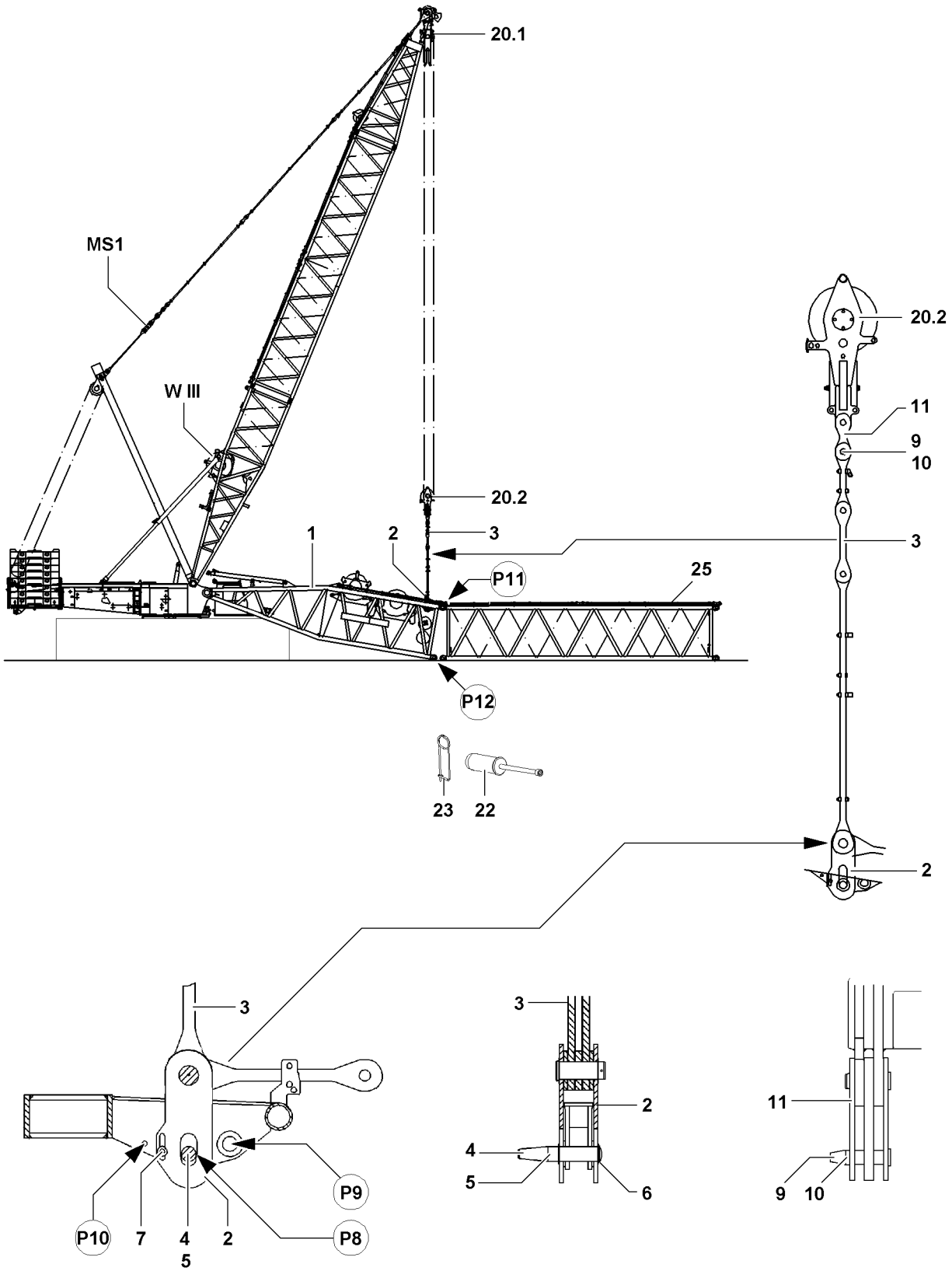


Fig.120032

LWE/LR 1750-000/12812-15-02/en

3.4.5 Assembling the S-intermediate sections on the S-pivot section

Make sure that the following prerequisites are met:

- The S-pivot section **1** is pinned and secured on the turntable.
- The S-pivot section **1** is placed on the ground on the support base.
- The upper pulley block **20.2** is pinned and secured with the guy rods **3**.
- The auxiliary crane is removed.



Note

- ▶ The S-intermediate sections are pinned with the pin pulling device, see Crane operating instructions, chapter 5.30.
- ▶ Support the S-intermediate sections from below for easier assembly / disassembly.



WARNING

General danger notes!

- ▶ All pins are to be secured after assembly of the S-intermediate sections with the intended safety elements.

Pin the S-intermediate section **25** on the S-pivot section **1** „on top“.

- ▶ Attach the S-intermediate section **25** to the auxiliary crane and align on the S-pivot section **1**.

When the pin bores on the S-pivot section **1** and on the S-intermediate section **25** „on top“ (point **P11**) align:

- ▶ Insert the pin **22** from the inside to the outside and secure with spring retainer **23**.

Assemble the S-boom to the required length and pin and secure the intermediate section „on top“ and „bottom“.

- ▶ Insert the pin **22** from the inside to the outside and secure with spring retainer **23**.



WARNING

The crane can topple over!

If the following conditions are not met, the crane can topple over or be significantly damaged.

Personnel can be severely injured or killed.

- ▶ With the upper pulley block, with placed S-guy rods, boom length to maximum S 140 m or SL 98 m may be closed.
- ▶ With the upper pulley block, in connection with placed WA-frame 2 and S-guy rods, a maximum boom length of S 91 m may be closed.
- ▶ Non-required guy rods must be removed from the lattice sections, see Crane operating instructions, chapter 5.01.
- ▶ The end section of the corresponding SL/S-boom combination may **not** lift off the ground during the „closing procedure“.

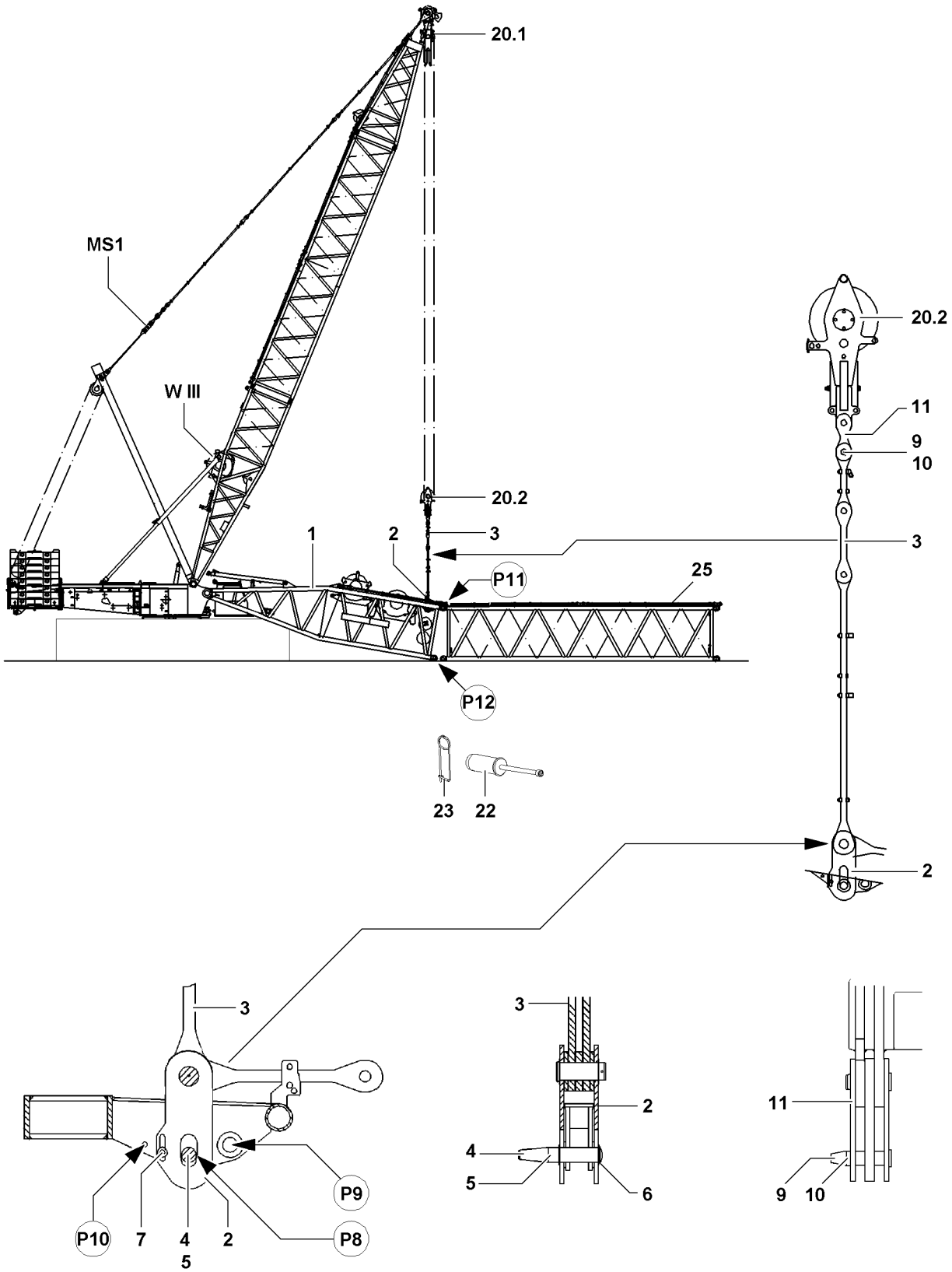


Fig.120032

LWE/LR 1750-000/12812-15-02/en

When the SL/S-boom combination is assembled to the desired length:

- ▶ Lift the S-pivot section **1** with the upper pulley block **20.2** until the pin bores on the „bottom“ align at point **P12**.
- ▶ Insert the pin **22** from the inside to the outside and secure with spring retainer **23**.



WARNING

Mortal danger due to folding down of boom!

By unpinning the upper pulley block **20.2** on the guy rods **3**, the boom can suddenly fold down if the boom is not pinned at point **P12** „on the bottom“.

Personnel can be severely injured or killed.

- ▶ It is prohibited for anyone to remain under the raised boom combination during the pinning / unpinning procedure.
- ▶ Unpin the upper pulley block **20.2** only when it is ensured that the S-pivot section **1** is pinned and secured „on top“ and „bottom“ with the S-intermediate section **25**.

When the S-boom system is „closed“:

- ▶ Slowly lower the upper pulley block **20.2** until the guy rods **3** are relieved.
- ▶ Release and unpin the guy rods **3** on the upper pulley block **20.2**.
- ▶ Place and secure the guy rods **3** in the transport retainers on the S-pivot section.

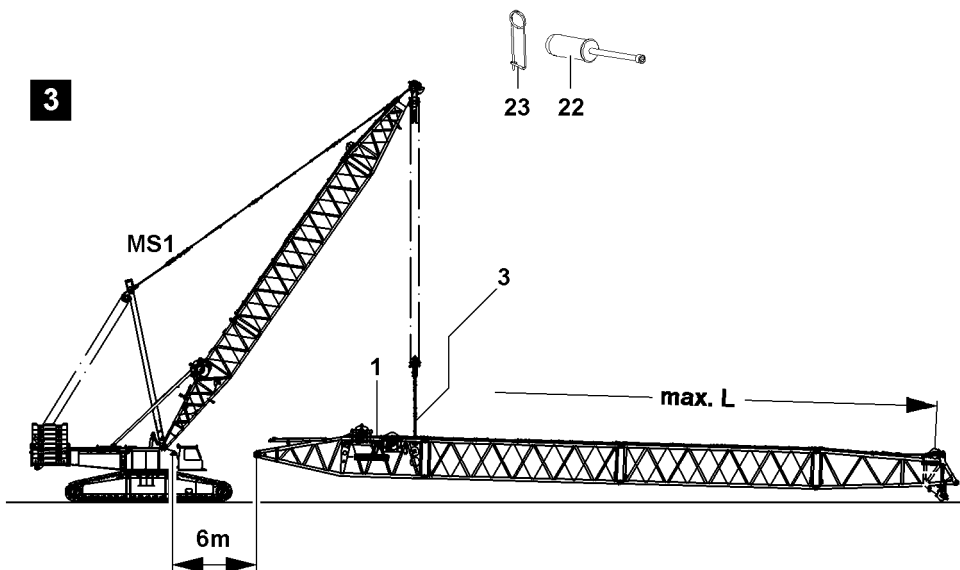
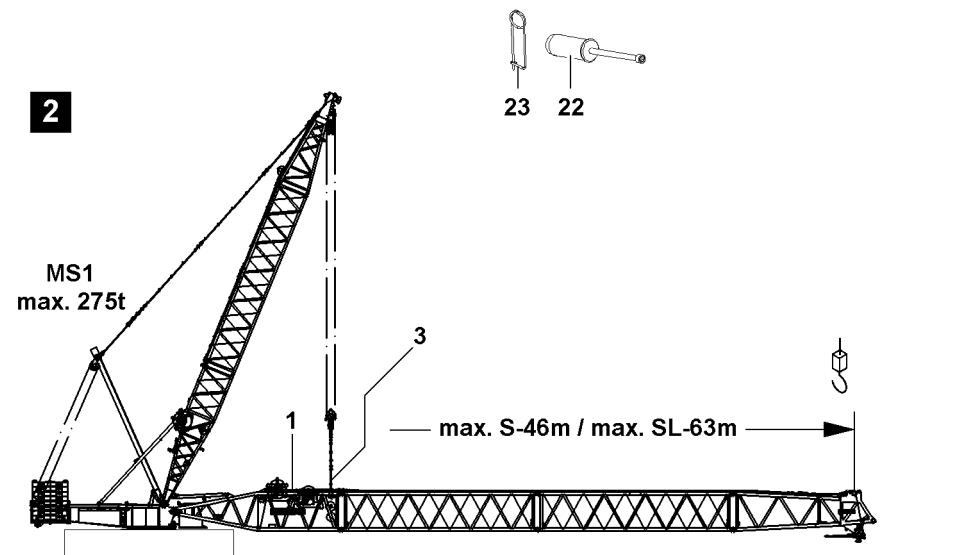
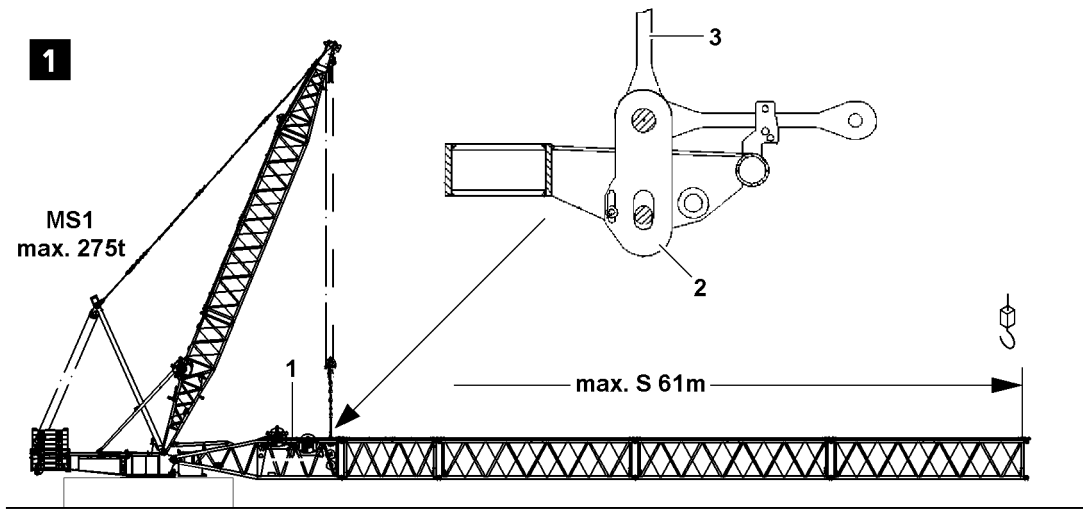


Fig.112572

LWE/LR 1750-000/12812-15-02/en

3.5 Assembling the SL/S-boom in Flying mode (guying on S-pivot section)

If spatial prerequisites on the job site are limited for the assembly of the S-boom, or if they are limited by buildings or similar, then the S-boom can be installed in flying mode.



WARNING

General danger notes!

- ▶ Support the S-boom during assembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended safety elements.
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15.



WARNING

The crane can topple over!

If the following conditions are not met, the crane can topple over or be significantly damaged. Personnel can be severely injured or killed.

- ▶ For the „Flying mode“ boom assembly, the maximum permissible total forces on the test point **MS1** may **not** be exceeded. The „Actual forces“ are shown on LICCON monitor 1.
- ▶ The „flying mode“ boom assembly is only permissible to certain system lengths.
- ▶ The maximum permissible system lengths may **not** be exceeded, observe to the following charts.



Note

- ▶ Weights of the individual lattice sections, see Crane operating instructions, chapter 1.03.

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The counterweight has been installed on the turntable according to the load chart.
- The D-boom is completely assembled and erected on the turntable, see Crane operating instructions, chapter 5.05.
- The LICCON overload protection has been set according to the data in the load chart.

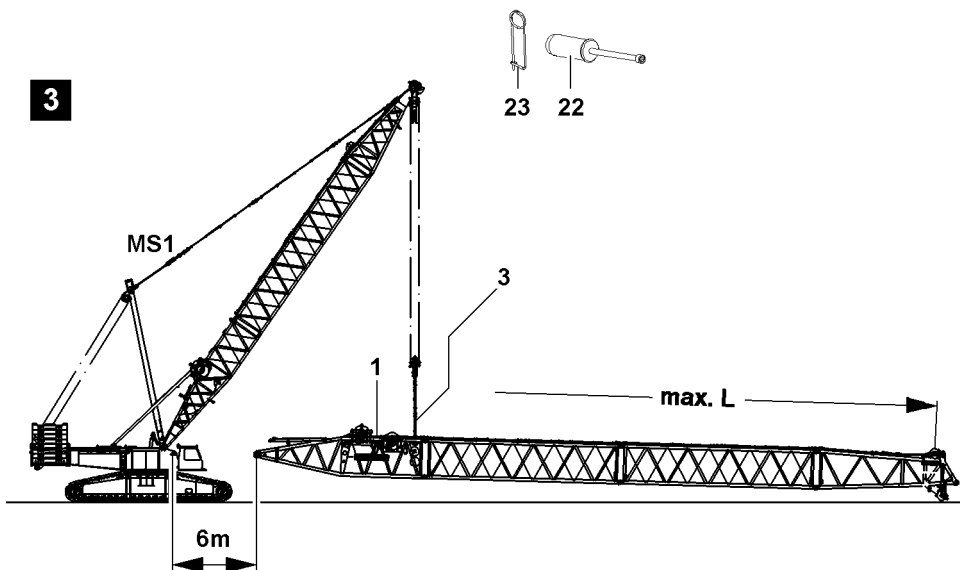
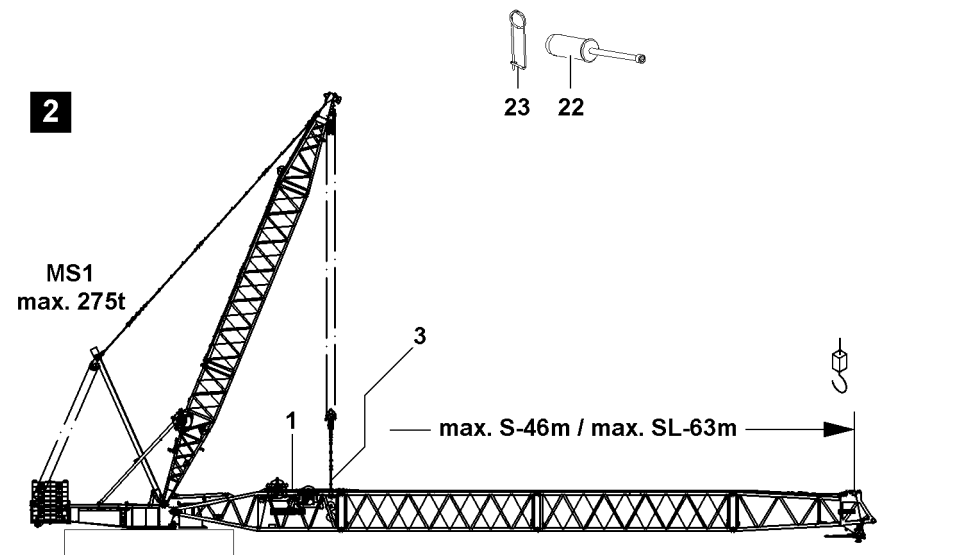
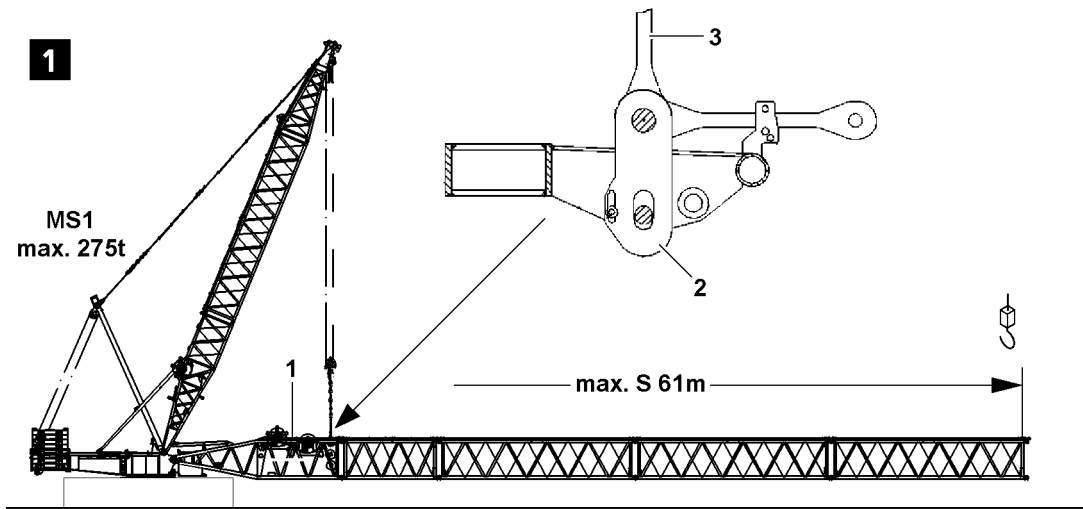


Fig.112572

LWE/LR 1750-000/12812-15-02/en

Maximum permissible system lengths for a maximum total force MS1 of 275 t / 285 t ⁶⁾					
Support base 12 m x 12 m or 16 m x 16 m ⁴⁾					
Boom system	Maximum system length	Equipment	DB _{min} ¹⁾	ZB _{min} ^{2), 3)}	Illustration
S(D)	49.0 m	- with end section - without hook block - with S- and WA-frame 2 guy rods	120 t 70 t ⁴⁾	45 t	2
	61 m	- without end section - without hook block - with S- and WA-frame 2 guy rods	120 t 145 t ⁶⁾	45 t	1
SL(D)	63.0 m	- with S-guy rods	120 t 70 t ⁴⁾	45 t	2

- 1) This counterweight must be at least installed on the turntable for „flying assembly“.
 2) This central ballast must be at least installed on the crawler center section for „flying assembly“.
 3) For LG-crane no ZB is possible.
 4) Only valid for LG-crane with 31.5 m derrick boom.
 6) Only valid for LG-crane with 42 m derrick boom.



Note

► The following chart overview is valid only for the LR-crane.

Maximum permissible system lengths for a maximum total force MS1 of 175 t / (245 t)					
Boom system	Maximum system length	Equipment	DB _{min} ¹⁾	ZB _{min} ²⁾	Illustration
S(D)	91.0 m	- with end section - without hook block - with S- and WA-frame 2 guy rods	70 t / (120 t)	20 t / (45 t)	3
	140 m	- with S-guy rods	70 t / (120 t)	20 t / (45 t)	3
SL(D)	98.0 m	- with S-guy rods	70 t / (120 t)	20 t / (45 t)	3

- 1) This counterweight must be at least installed on the turntable for „flying assembly“.
 2) This central ballast must be at least installed on the crawler center section for „flying assembly“.

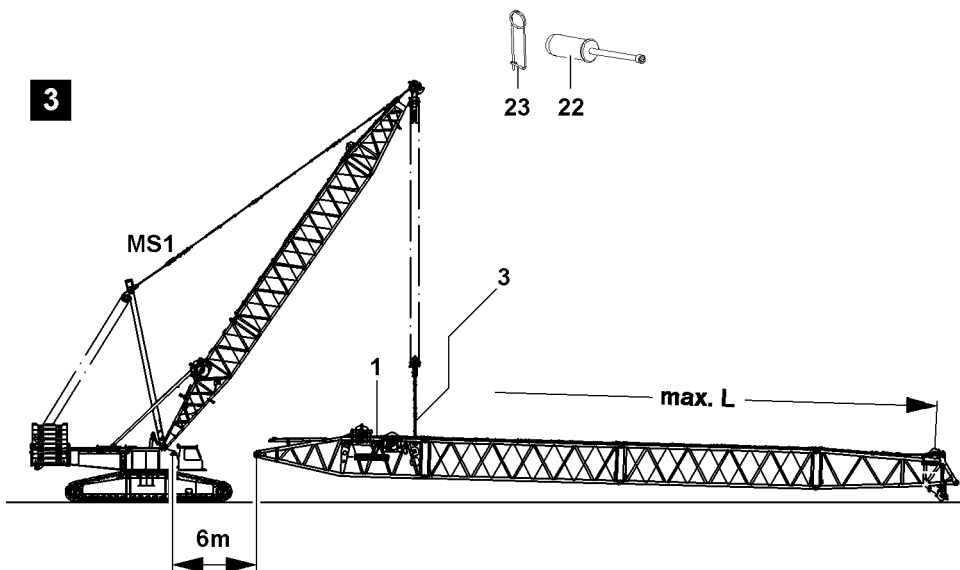
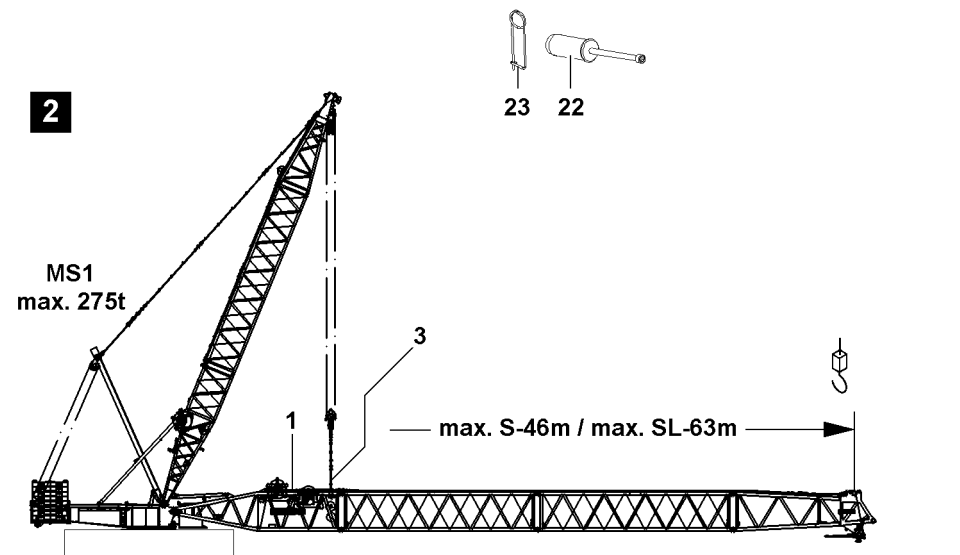
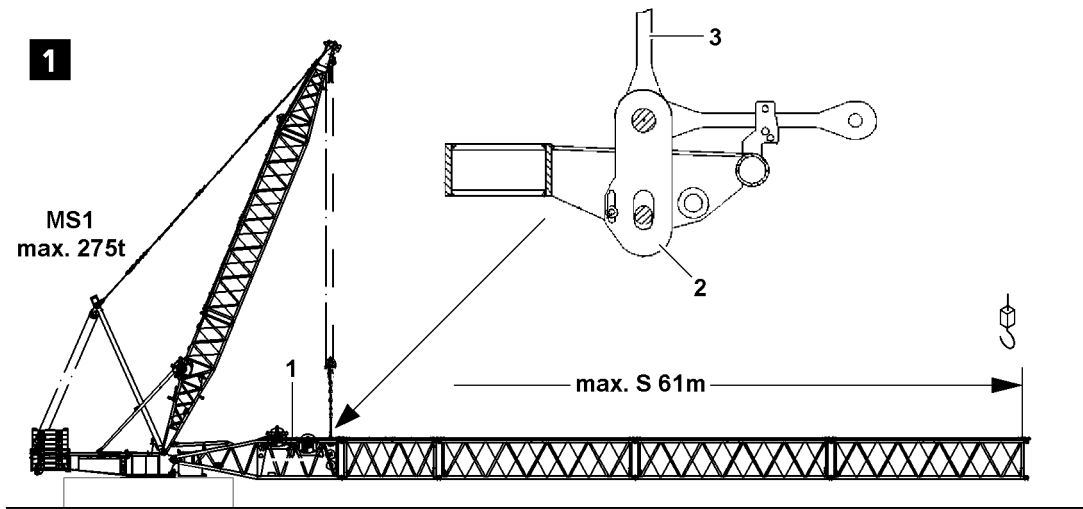


Fig.112572

LWE/LR 1750-000/12812-15-02/en

3.5.1 Assembling the S-intermediate sections in flying mode on the S-pivot section

In „Flying mode“ assembly, the intermediate sections can be pinned and secured with the auxiliary crane individually or as a preassembled unit on the S-pivot section.



WARNING

Impermissible boom lengths!

If impermissible boom lengths are installed on the crane, significant property damage can occur on the crane.

Personnel can be severely injured or killed.

- ▶ The maximum permissible boom lengths for the „flying assembly“ may not be exceeded.
- ▶ The data in the erection and take down charts as well as the load charts must be observed.

Make sure that the following prerequisites are met:

- The S-pivot section is pinned and secured on the turntable.
- The S-pivot section is horizontally tensioned.
- The counterweight is placed according to the specifications.
- The central ballast is placed according to the specifications.
- An auxiliary crane is available.



WARNING

Falling components!

If unsecured or non-supported components are assembled or disassembled, they can fall down.

Personnel can be severely injured or killed.

- ▶ During pinning and unpinning of the intermediate sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
 - ▶ Before unpinning: Support the components and boom.
 - ▶ Secure the pins in the storage locations and in the receptacles.
 - ▶ It is prohibited to lean a ladder against the crane section which is being disassembled.
-
- ▶ Attach the S-intermediate sections or preassembled boom unit on the auxiliary crane.
 - ▶ Lift the S-intermediate sections or the preassembled boom unit with the auxiliary crane and position on the S-pivot section **1**.

When the pin points between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit align on „top“ and „bottom“:

- ▶ Insert the pins **22** „on top“ and „bottom“ and secure with spring retainer **23**.

When the pins between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit are properly pinned and secured „top“ and „bottom“:

- ▶ Place the boom on the support base.
- ▶ Remove the auxiliary crane.

When the boom is safely placed on the support or held by an auxiliary crane:

- ▶ Slowly lower the upper pulley block **20.2** until the guy rods **3** are relieved.
- ▶ Release and unpin the guy rods **3** on the upper pulley block **20.2**.
- ▶ Place, pin and secure the guy rods **3** in the transport retainers on the S-pivot section.



Note

- ▶ Assembly of guy rods, see section „Assembling the guy rods“.

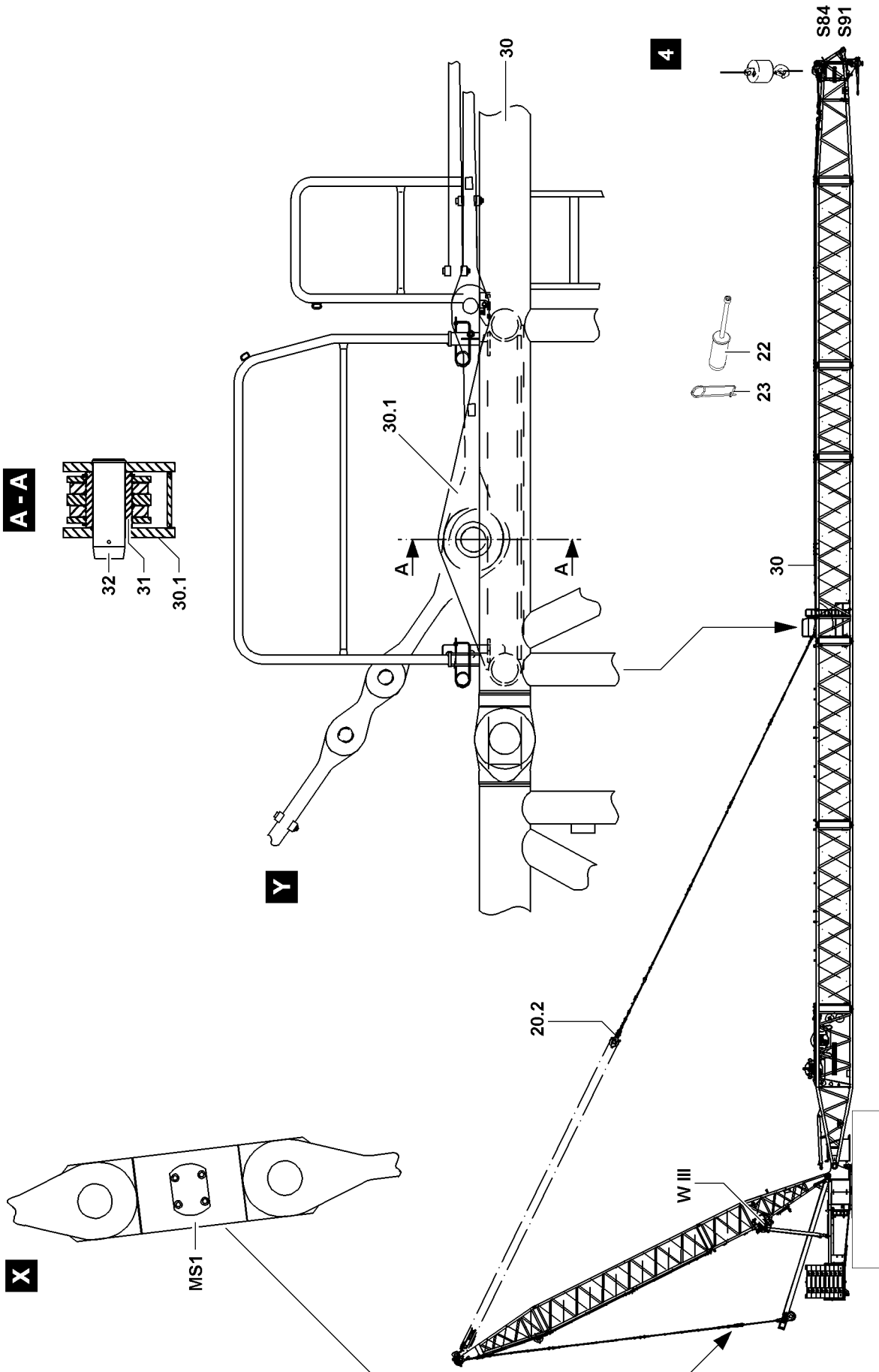


Fig.112050

LWE/LR 1750-000/12812-15-02/en

3.6 Assembling the SL/S-boom 84 m and 91 m in flying mode (guying on flying assembly intermediate section)

If spatial prerequisites on the job site are limited for the assembly of the S-boom, or if they are limited by buildings or similar, then the S-boom can be installed in flying mode.



WARNING

General danger notes!

- ▶ Support the S-boom during assembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended safety elements.
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15.



Note

- ▶ Weights of the individual lattice sections, see Crane operating instructions, chapter 1.03.



WARNING

The crane can topple over!

If the following conditions are not met, the crane can topple over or be significantly damaged. Personnel can be severely injured or killed.

- ▶ For the flying boom assembly, the maximum permissible total force on the test point **MS1** (F1) may **not** be exceeded. The „actual force“ is shown on LICCON monitor 1.
- ▶ The flying boom assembly is only permissible up to a certain system length, observe the following charts.
- ▶ The data in the erection and take down charts as well as the load charts must be observed.

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- The S-pivot section is pinned and secured on the turntable.
- The counterweight is placed according to the specifications.
- The central ballast is placed according to the specifications.
- The S-intermediate sections are installed up to the flying assembly intermediate section.
- The boom system is tensioned horizontally on the flying assembly intermediate section.
- An auxiliary crane is available.

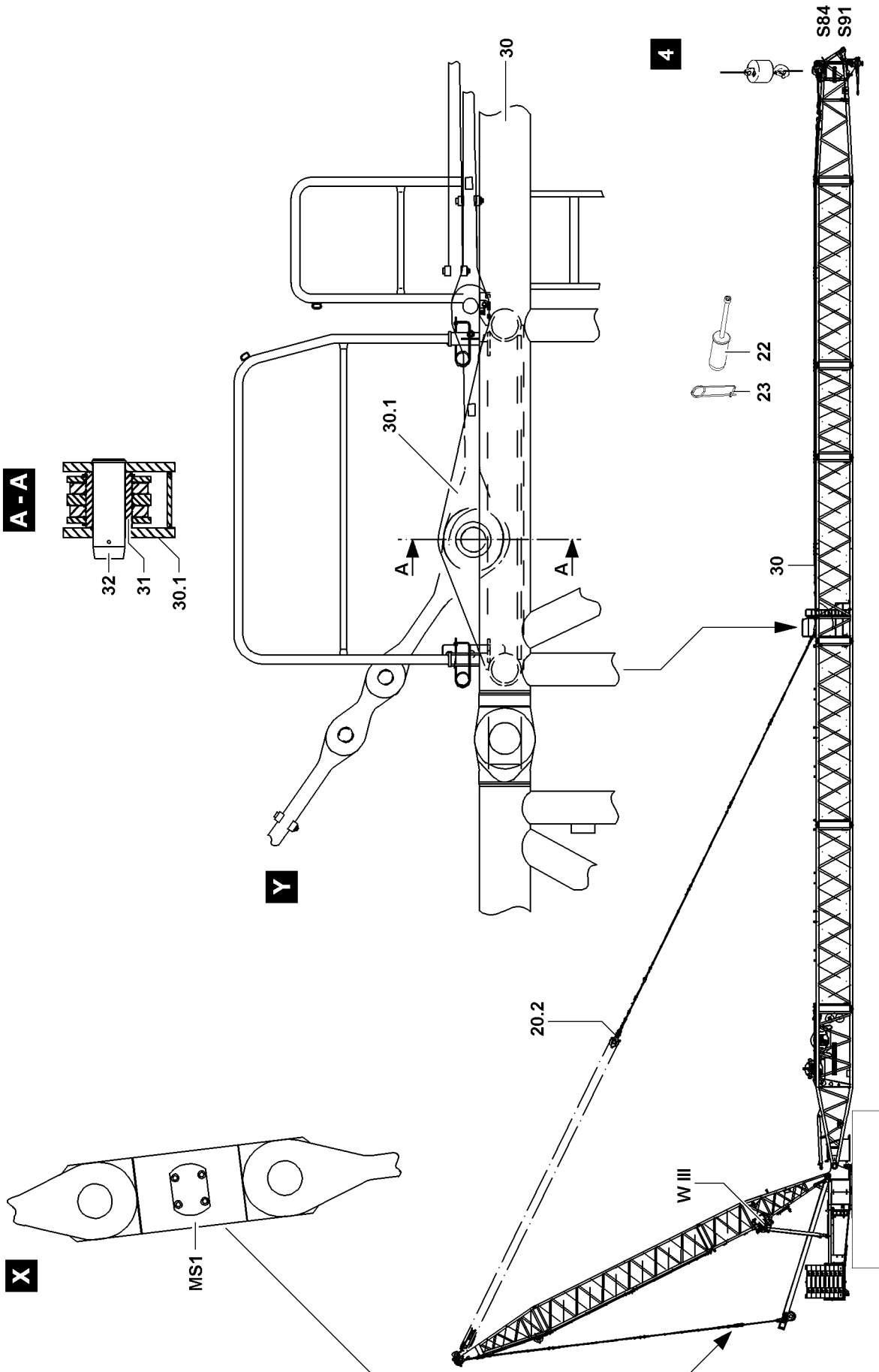


Fig.112050

LWE/LR 1750-000/12812-15-02/en

3.6.1 Assembling the S-intermediate sections in flying mode on the flying assembly intermediate section

Maximum permissible system lengths for a maximum total force MS1 of 410 t					
Boom system	Maximum system length	Equipment	DB _{min} ¹⁾	ZB _{min} ^{2), 3)}	Illustration
S(D)	84.0 m	- support base 12.0 m x 12.0 m ⁴⁾ - without hook block - with S- and WA-frame 2 guy rods - with end section	245 t	95 t	4
	91 m	- support base 16.0 m x 16.0 m ⁴⁾ - without hook block - with S- and WA-frame 2 guy rods - with end section ⁵⁾ Note: A derrick ballast of at least 100 t , at a derrick ballast radius of 13 m is required.	220 t	95 t	4

1) This counterweight must be at least installed on the turntable for „flying assembly“.

2) This central ballast must be at least installed on the crawler center section for „flying assembly“.

3) For LG-crane no ZB is possible.

4) Only valid for LG-crane.

5) Only valid for LR-crane.

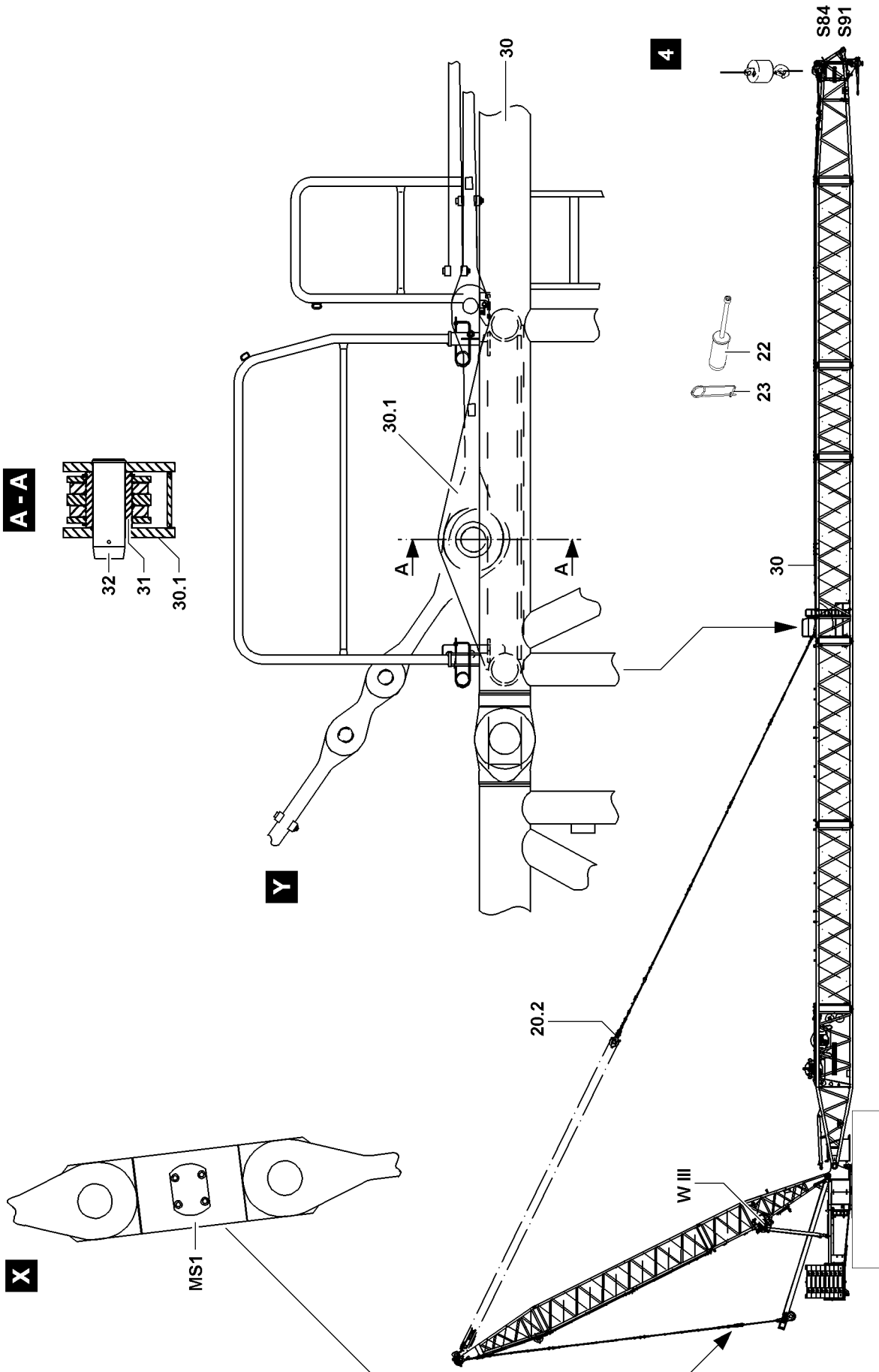


Fig.112050

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Falling components!

If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be severely injured or killed.

- ▶ During pinning and unpinning of the intermediate sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Before unpinning: Support the components and boom.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ It is prohibited to lean a ladder against the crane section which is being disassembled.

**Note**

- ▶ The „Actual force“ is shown on the LICCON monitor.
- ▶ The flying assembly of the intermediate sections is made without hook block.

**WARNING**

The crane can topple over!

If the derrick boom is luffed up to more than 85° to the horizontal, then the crane can topple over. Personnel can be severely injured or killed.

- ▶ Make sure that the derrick boom at S-boom assembly is not luffed up by more than maximum 85° to the horizontal.

**Note**

- ▶ To improve accessibility at S-boom assembly, the derrick boom must be luffed up to 75° to maximum 85° to the horizontal.

- ▶ Attach the S-intermediate sections or preassembled boom unit on the auxiliary crane.
- ▶ Lift the S-intermediate sections or the preassembled boom unit with the auxiliary crane and position on the S-pivot section **1**.

When the pin points between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit align on „top“ and „bottom“:

- ▶ Insert the pins **22** „on top“ and „bottom“ and secure with spring retainer **23**.

When the pins between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit are properly pinned and secured „top“ and „bottom“:

- ▶ Place the boom on the support base.

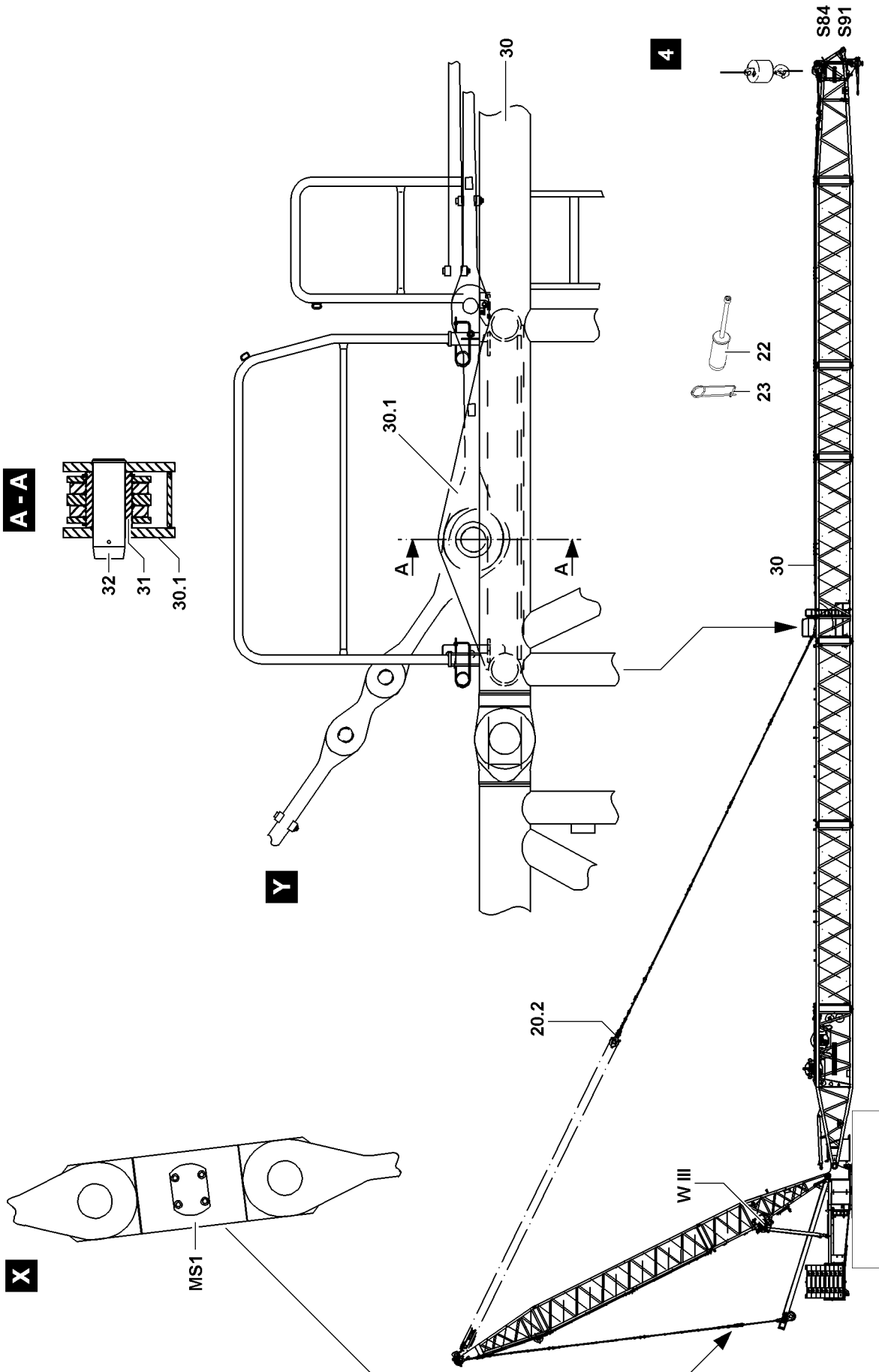


Fig.112050

LWE/LR 1750-000/12812-15-02/en

- ▶ Remove the auxiliary crane.

When the boom is safely placed on the support or held by an auxiliary crane:

- ▶ Slowly lower the upper pulley block **20.2** to the S-pivot section or to the boom.
- ▶ Pin the guy rods of the intermediate sections with each other.
- ▶ Pin and secure the guy rods on the upper pulley block **20.2** and on the consoles **30.1** through the hollow axle **31**.
- ▶ Insert and secure pin **32**.



WARNING

Overload of crane!

If the guy rods and the rope of winch 3 **W III** are tensioned when luffing up the derrick boom into operating position, then the crane can be overloaded.

- ▶ Make sure, when luffing up the derrick boom into operating position, that the guy rods and the rope of winch 3 **W III** always sag slightly.
 - ▶ Make sure that no slack rope forms.
-
- ▶ Luff the derrick into operating position, 115° to 118°.



Note

- ▶ The S-intermediate section for flying assembly **30** as compared to standard intermediate sections weighs approximately 1.4 t more.
 - ▶ The additional weight of the S-intermediate sections for flying assembly **30** is not taken into account in the load charts and must therefore be added to the load to be lifted, as applicable.
-
- ▶ Spool up winch 3 **W III** until the guying between the upper pulley block **20.2** and the S-intermediate section for flying assembly **30** is tensioned and the auxiliary crane is relieved.
 - ▶ Pay attention to the horizontal alignment of the boom.

When the boom is tensioned horizontally:

- ▶ Remove the auxiliary crane.

Install the additional S-/L-intermediate sections and the respective end section, depending on the permissible boom length, individually or fully preassembled on the S-intermediate section for flying assembly **30**.



Note

- ▶ Note and observe the maximum permissible boom lengths for flying assembly.
-
- ▶ Assemble the S-intermediate sections or L-intermediate sections on the S-intermediate section for flying assembly **30**: Use pin **22** and spring retainer **23**.

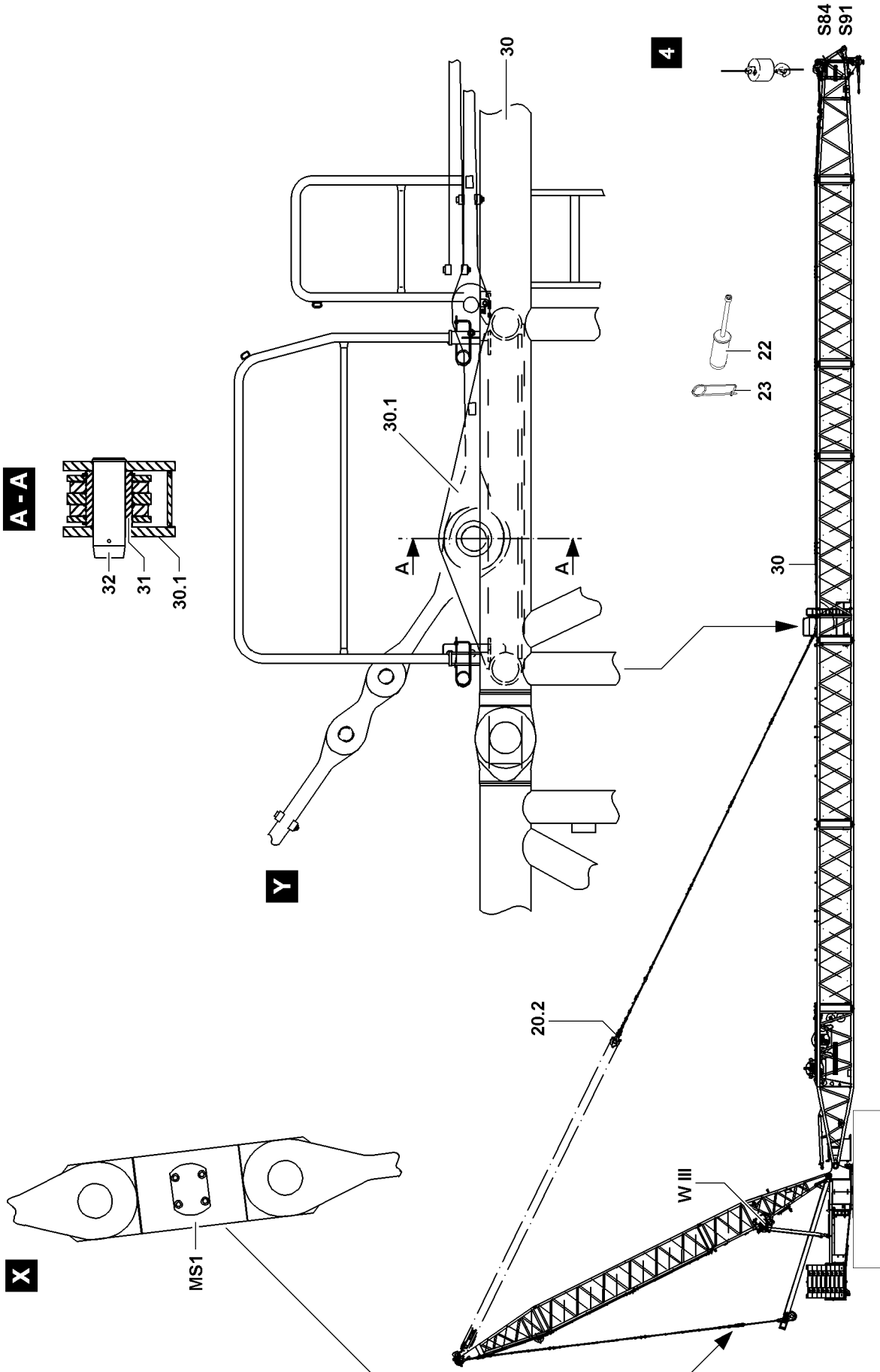


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**WARNING**

Unutilized guy rods on boom!

If the guy rods, which are not needed for crane operation, are on the lattice sections, then they can release and fall down during crane operation.

Personnel can be severely injured or killed.

The load display of the LICCON computer system shows a value which is too high.

The weight of the boom is too large for erection.

- ▶ Disassemble and remove unutilized guy rods on the transport retainers before erecting the boom.

- ▶ Pin and secure the guy rods with each other.
- ▶ Hang the assembled boom onto the auxiliary crane.

or

Support the assembled boom from below with materials of adequate load bearing capacity.

- ▶ Spool out winch 3 **W III** until the guying between the upper pulley block **20.2** and the S-intermediate section for flying assembly **30** is relieved.

**DANGER**

The boom can fold downward!

If the pins **32** on the brackets **30.1** are unpinned, then the boom can fold down by itself.

Personnel can be severely injured or killed.

- ▶ Make sure that the boom is safely held with the auxiliary crane or that it is supported with stable materials before the pins **32** are unpinned.

- ▶ Unpin the pins **32** from the consoles **30.1**.

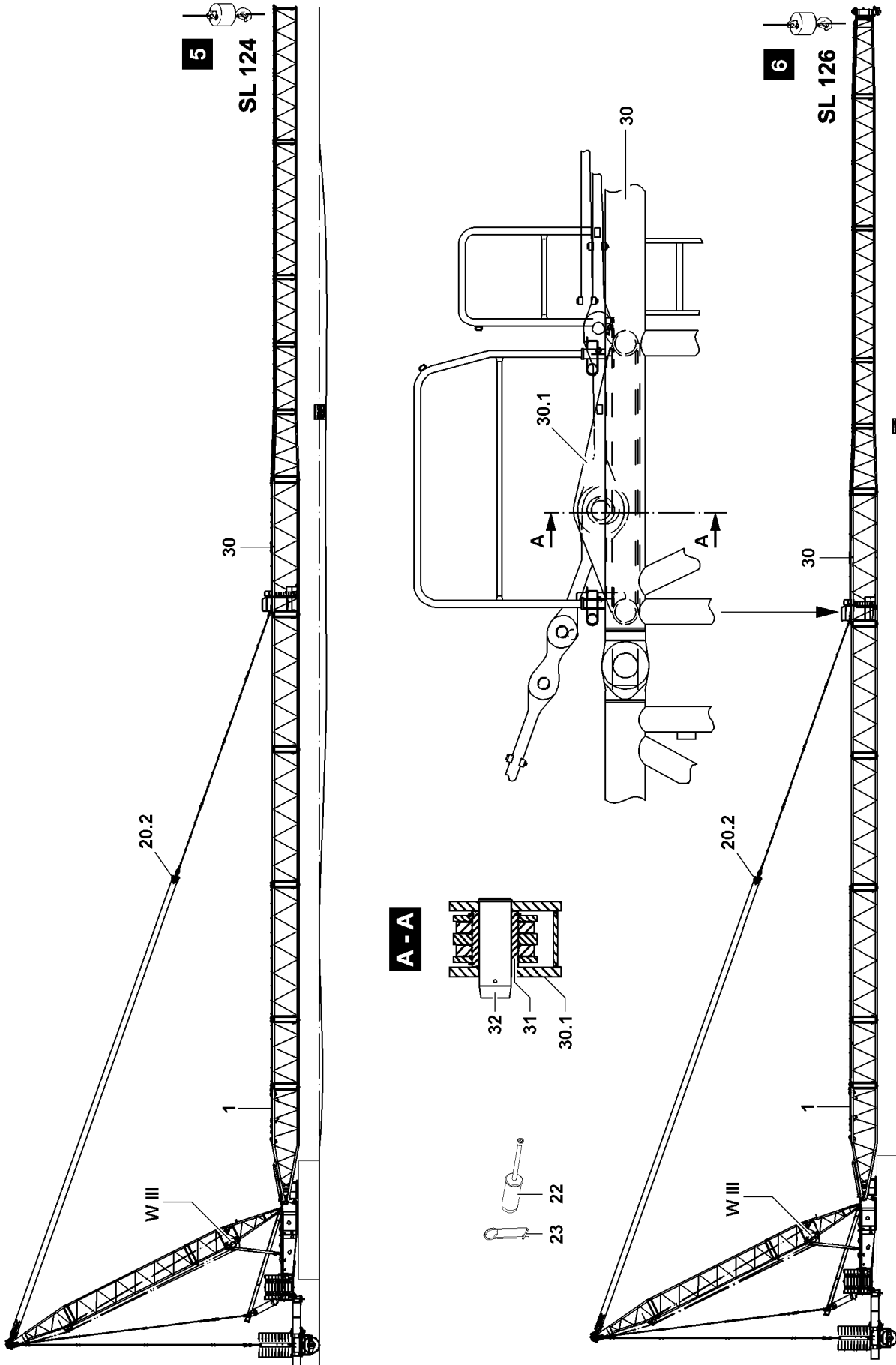


Fig.112051

LWE/LR 1750-000/12812-15-02/en

3.7 Assembling the SLD-boom 98 m to 133 m in flying mode (guying on flying assembly intermediate section)

If spatial prerequisites on the job site are limited for the assembly of the S-boom, or if they are limited by buildings or similar, then the S-boom can be installed in flying mode.



WARNING

General danger notes!

- ▶ Support the S-boom during assembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended safety elements.
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15.



Note

- ▶ Weights of the individual lattice sections, see Crane operating instructions, chapter 1.03.



WARNING

Impermissible boom lengths guyed!

If impermissible boom lengths are guyed on the assembly brackets, then significant property damage can occur on the crane.

Personnel can be severely injured or killed.

- ▶ The maximum permissible boom lengths for the „flying assembly“ may not be exceeded.
- ▶ The data in the erection and take down charts as well as the load charts must be observed.

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- The S-pivot section is pinned and secured on the turntable.
- The S-pivot section is horizontally tensioned.
- The counterweight is placed according to the specifications.
- The central ballast is placed according to the specifications.
- An auxiliary crane is available.

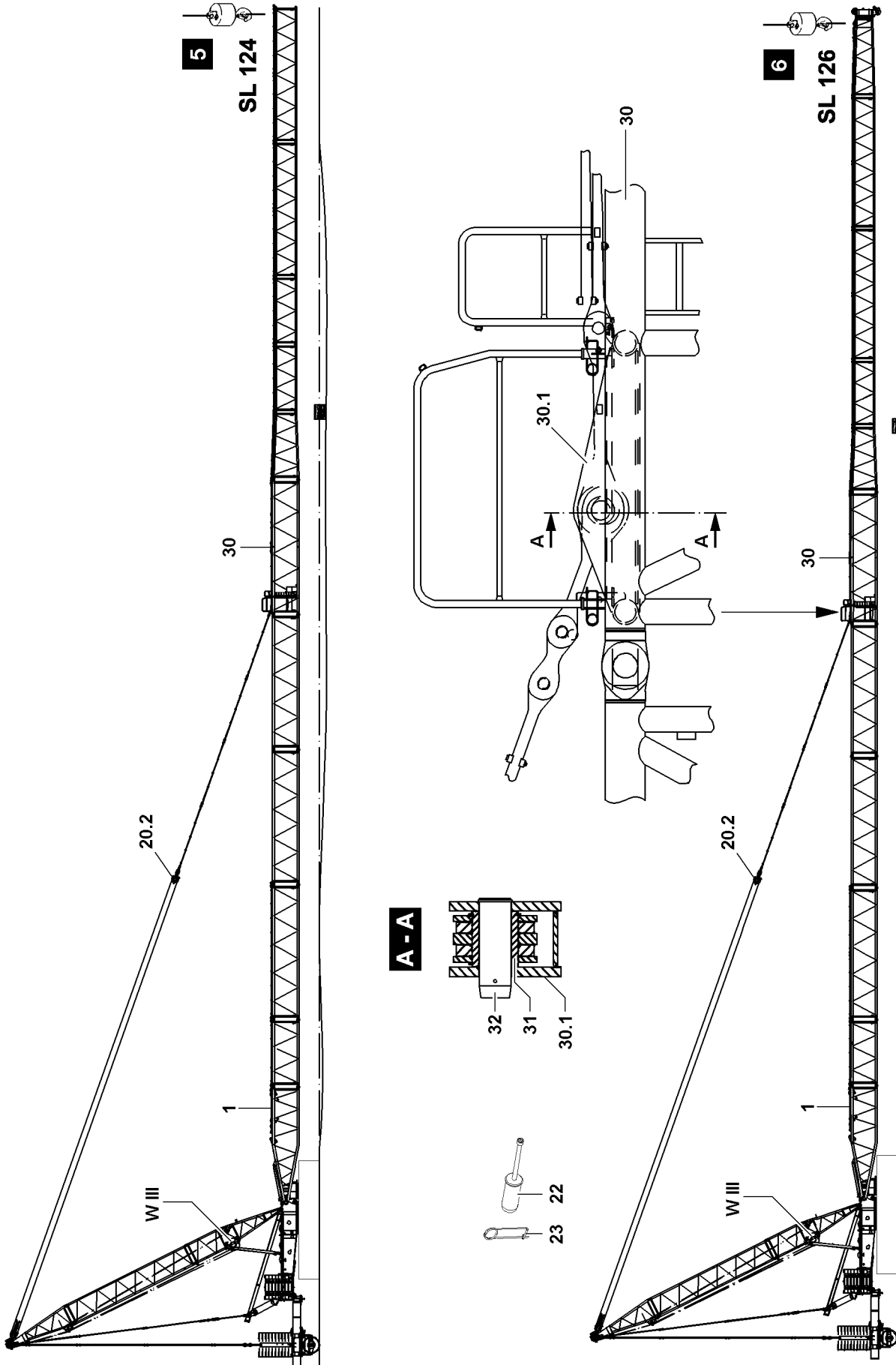


Fig.112051

LWE/LR 1750-000/12812-15-02/en

3.7.1 Flying boom assembly without and with end section

Flying assembly without end section



WARNING

The crane can topple over!

If the required minimum derrick ballast is not installed on the crane in the respective derrick ballast radius, then the crane can topple over.

Personnel can be severely injured or killed.

► A derrick ballast of at least 200 t , at a derrick ballast radius of 13 m is required.

Maximum permissible system lengths					
Boom system	Maximum system length	Equipment	DB _{min} ¹⁾	ZB _{min} ^{2), 3)}	Illustration
SL(D)	124.0 m	- without end section - without hook block - with S-guy rods	170 t	45 t	5

1) This counterweight must be at least installed on the turntable for „flying assembly“.

2) This central ballast must be at least installed on the crawler center section for „flying assembly“.

3) For LG-crane no ZB is possible.

	Support U _{min} depending on boom length				
	SL-boom length				
	103 m	110 m	117 m	124 m	—
LG-crane	U _{min} = 1.10 m	U _{min} = 0.90 m	U _{min} = 0.80 m	U _{min} = 0.60 m	—
LR-crane	Support U _{min} 0.3 m to 0.7 m over alignment level Note: Up to including SL- 98 m , the boom does not have to be supported from below.				

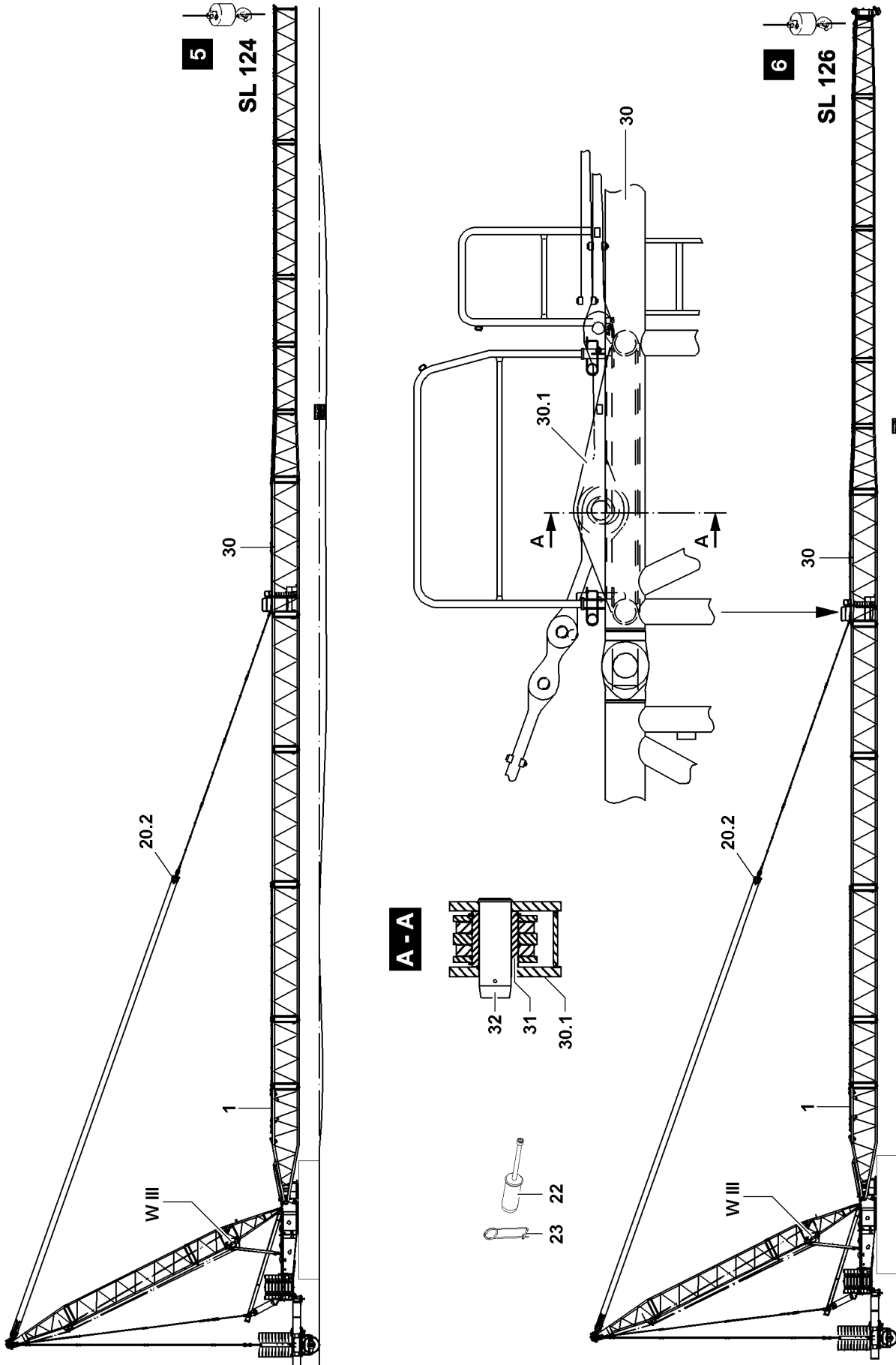


Fig.112051

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Flying assembly with end section



WARNING

The crane can topple over!

If the required minimum derrick ballast is not installed on the crane in the respective derrick ballast radius, then the crane can topple over.

Personnel can be severely injured or killed.

► A derrick ballast of at least 200 t, at a derrick ballast radius of 13 m is required.

Maximum permissible system lengths					
Boom system	Maximum system length	Equipment	DB _{min} ¹⁾	ZB _{min} ^{2), 3)}	Illustration
	126.0 m	- with end section - without hook block - with S-guy rods	170 t	45 t	6

1) This counterweight must be at least installed on the turntable for „flying assembly“.

2) This central ballast must be at least installed on the crawler center section for „flying assembly“.

3) For LG-crane no ZB is possible.

	Support U _{min} depending on boom length				
	SL-boom length				
	105 m	112 m	119 m	126 m	133 m
LG-crane	U _{min} = 1.10 m	U _{min} = 0.90 m	U _{min} = 0.80 m	U _{min} = 0.60 m	U _{min} = 0.50 m
	Note: Up to including SL- 98 m , the boom does not have to be supported from below.				
LR-crane	Support U _{min} 0.3 m to 0.7 m over alignment level				
	Note: Up to including SL- 98 m , the boom does not have to be supported from below.				

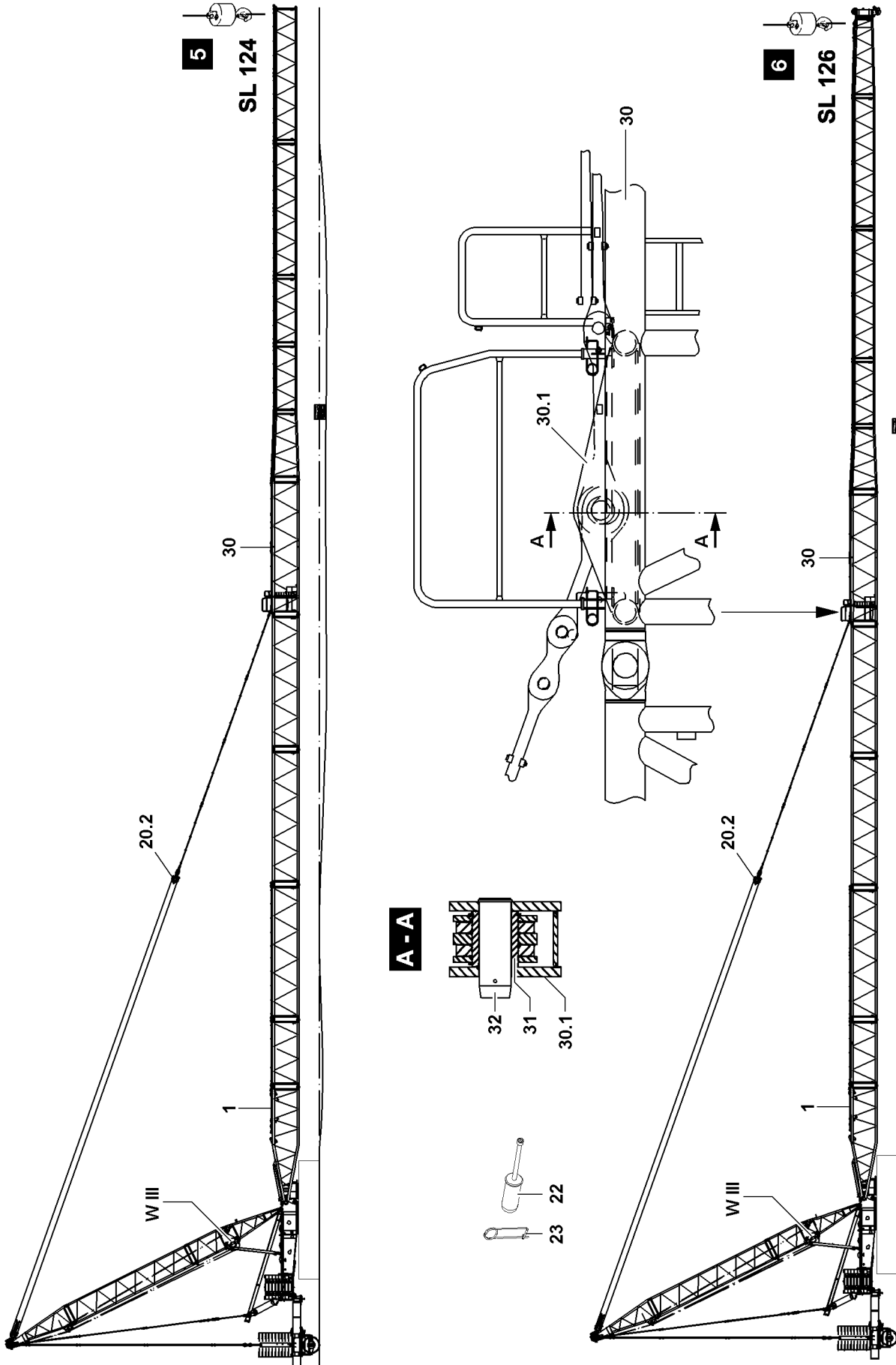


Fig.112051

LWE/LR 1750-000/12812-15-02/en

3.7.2 Assembling the boom

**WARNING**

Falling components!

If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be severely injured or killed.

- ▶ During pinning and unpinning of the intermediate sections, it is prohibited for anyone to remain **under or on** the components as well as within the entire danger zone.
- ▶ Before unpinning: Support the components and boom.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ It is prohibited to lean a ladder against the crane section which is being disassembled.

**Note**

- ▶ The „Actual force“ is shown on the LICCON monitor.
- ▶ The flying assembly of the intermediate sections is made without hook block.

**WARNING**

The crane can topple over!

If the derrick boom is luffed up to more than 85° to the horizontal, then the crane can topple over. Personnel can be severely injured or killed.

- ▶ Make sure that the derrick boom at S-boom assembly is not luffed up by more than maximum 85° to the horizontal.

**Note**

- ▶ To improve accessibility at S-boom assembly, the derrick boom must be luffed up to 75° to maximum 85° to the horizontal.

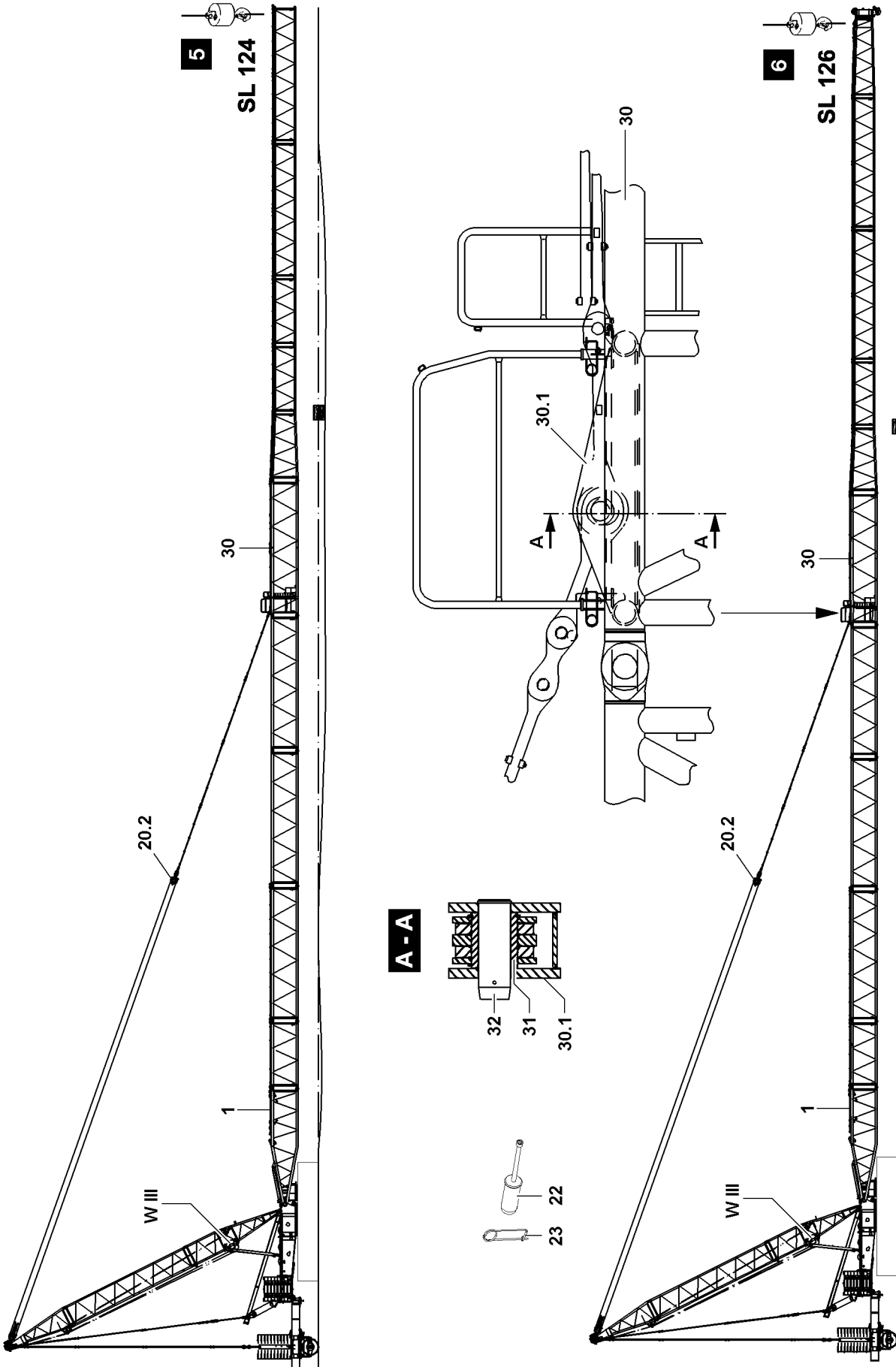


Fig.112051

LWE/LR 1750-000/12812-15-02/en

- ▶ Attach the S-intermediate sections or preassembled boom unit on the auxiliary crane.
- ▶ Lift the S-intermediate sections or the preassembled boom unit with the auxiliary crane and position on the S-pivot section **1**.

When the pin points between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit align on „top“ and „bottom“:

- ▶ Insert the pins **22** „on top“ and „bottom“ and secure with spring retainer **23**.

When the pins between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit are properly pinned and secured „top“ and „bottom“:

- ▶ Place the boom on the support base.
- ▶ Remove the auxiliary crane.

When the boom is safely placed on the support or held by an auxiliary crane:

- ▶ Slowly lower the upper pulley block **20.2** to the S-pivot section or to the boom.
- ▶ Pin the guy rods of the intermediate sections with each other.
- ▶ Pin and secure the guy rods on the upper pulley block **20.2** and on the consoles **30.1** through the hollow axle **31**.
- ▶ Insert and secure pin **32**.



DANGER

The boom can fold downward!

If the pins **32** on the brackets **30.1** are unpinned, then the boom can fold down by itself.

Personnel can be severely injured or killed.

- ▶ Make sure that the boom is safely held with the auxiliary crane or that it is supported with stable materials before the pins **32** are unpinned.

- ▶ Unpin the pins **32** from the consoles **30.1**.

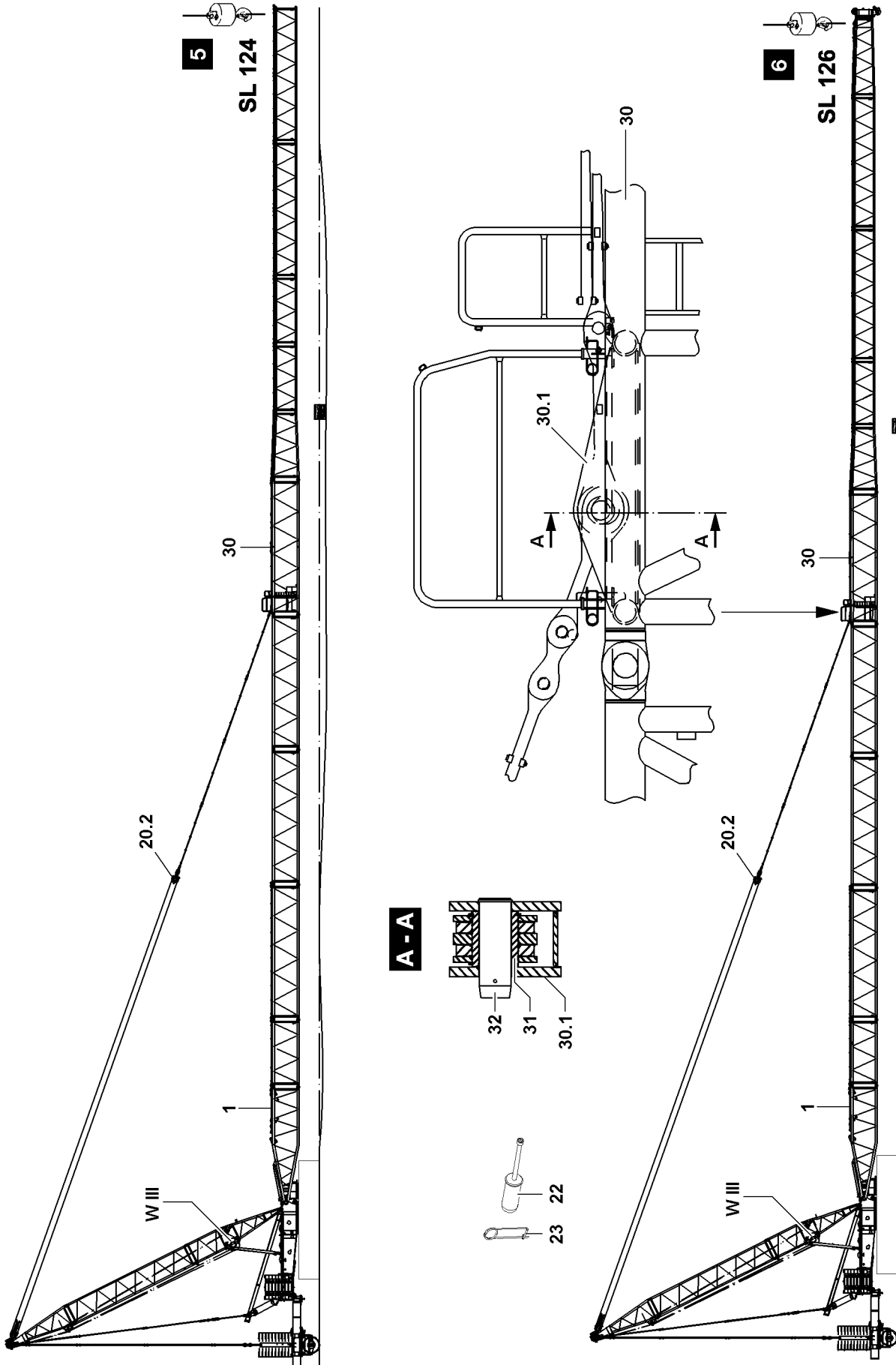


Fig.112051

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Overload of crane!

If the guy rods and the rope of winch 3 **W III** are tensioned when luffing up the derrick boom into operating position, then the crane can be overloaded.

- ▶ Make sure, when luffing up the derrick boom into operating position, that the guy rods and the rope of winch 3 **W III** always sag slightly.
- ▶ Make sure that no slack rope forms.

- ▶ Luff the derrick into operating position, 115° to 118°.

**Note**

- ▶ The S-intermediate section for flying assembly **30** as compared to standard intermediate sections weighs approximately 1.4 t more.

- ▶ The additional weight of the S-intermediate sections for flying assembly **30** is not taken into account in the load charts and must therefore be added to the load to be lifted, as applicable.

- ▶ Spool up winch 3 **W III** until the guying between the upper pulley block **20.2** and the S-intermediate section for flying assembly **30** is tensioned and the auxiliary crane is relieved.

- ▶ Pay attention to the horizontal alignment of the boom.

When the boom is tensioned horizontally:

- ▶ Remove the auxiliary crane.

Install the additional S-/L-intermediate sections and the respective end section, depending on the permissible boom length, individually or fully preassembled on the S-intermediate section for flying assembly **30**.

**Note**

- ▶ Note and observe the maximum permissible boom lengths for flying assembly.
- ▶ The required support (U_{min}) for erection of the boom systems must be adhered to.

- ▶ Assemble the S-intermediate sections or L-intermediate sections on the S-intermediate section for flying assembly **30**: Use pin **22** and spring retainer **23**.

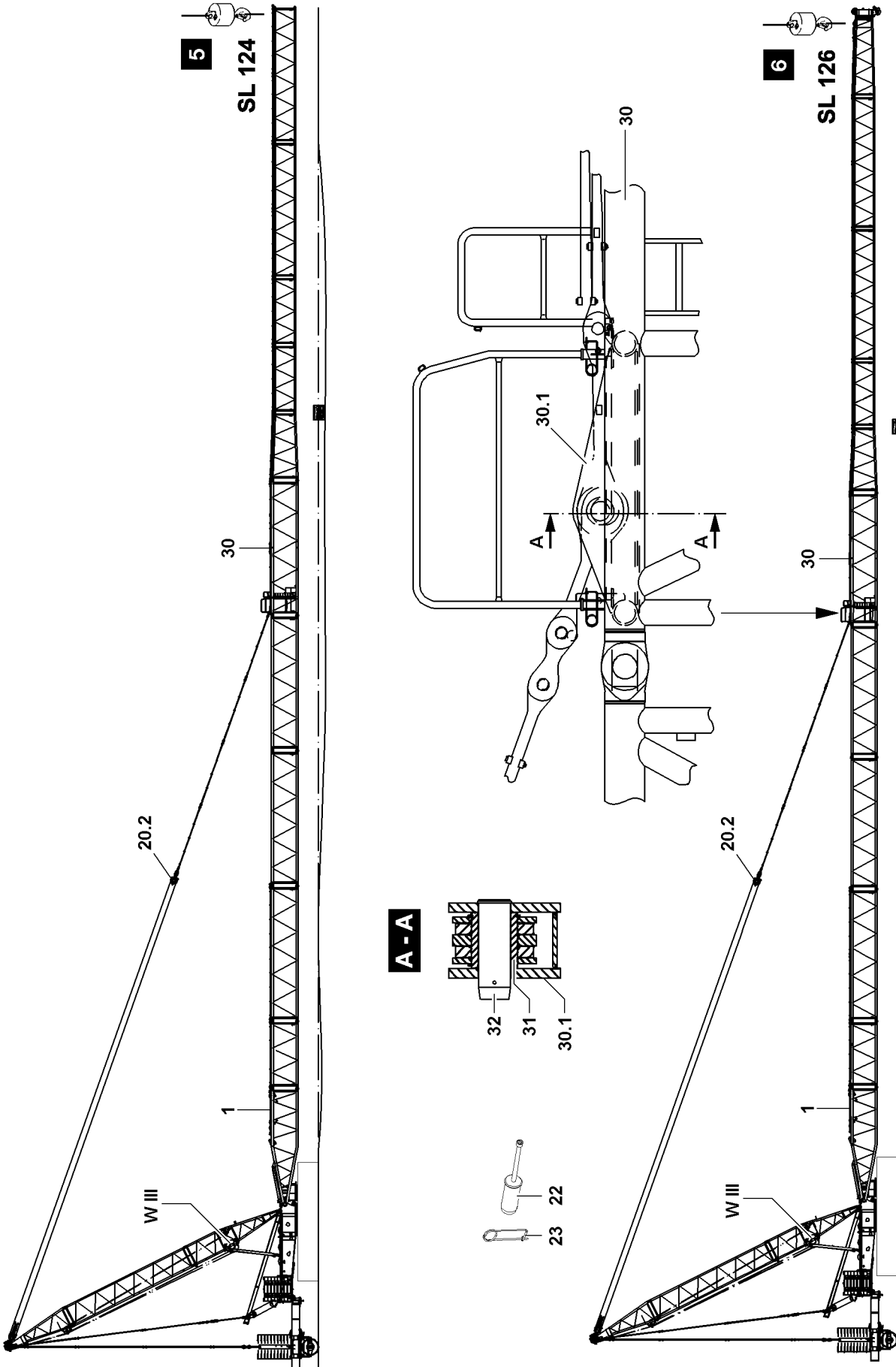


Fig.112051

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Unutilized guy rods on boom!

If guy rods are on the lattice sections which are not used for operation, then there is a danger of accidents.

Personnel can be severely injured or killed.

Guy rods can loosen up and fall down.

The load display of the LICCON computer system shows the incorrect value.

The weight of the boom is too large for erection.

▶ Disassemble and remove unutilized guy rods on the transport retainers before erecting the boom.

▶ Pin and secure the guy rods with each other.

▶ Hang the assembled boom onto the auxiliary crane.

or

Support the assembled boom from below with materials of adequate load bearing capacity.

▶ Spool out winch 3 **W III** until the guying between the upper pulley block **20.2** and the S-intermediate section for flying assembly **30** is relieved.

**DANGER**

The boom can fold downward!

If the pins **32** on the brackets **30.1** are unpinned, then the boom can fold down by itself.

Personnel can be severely injured or killed.

▶ Make sure that the boom is safely held with the auxiliary crane or that it is supported with stable materials before the pins **32** are unpinned.

▶ Unpin the pins **32** from the consoles **30.1**.

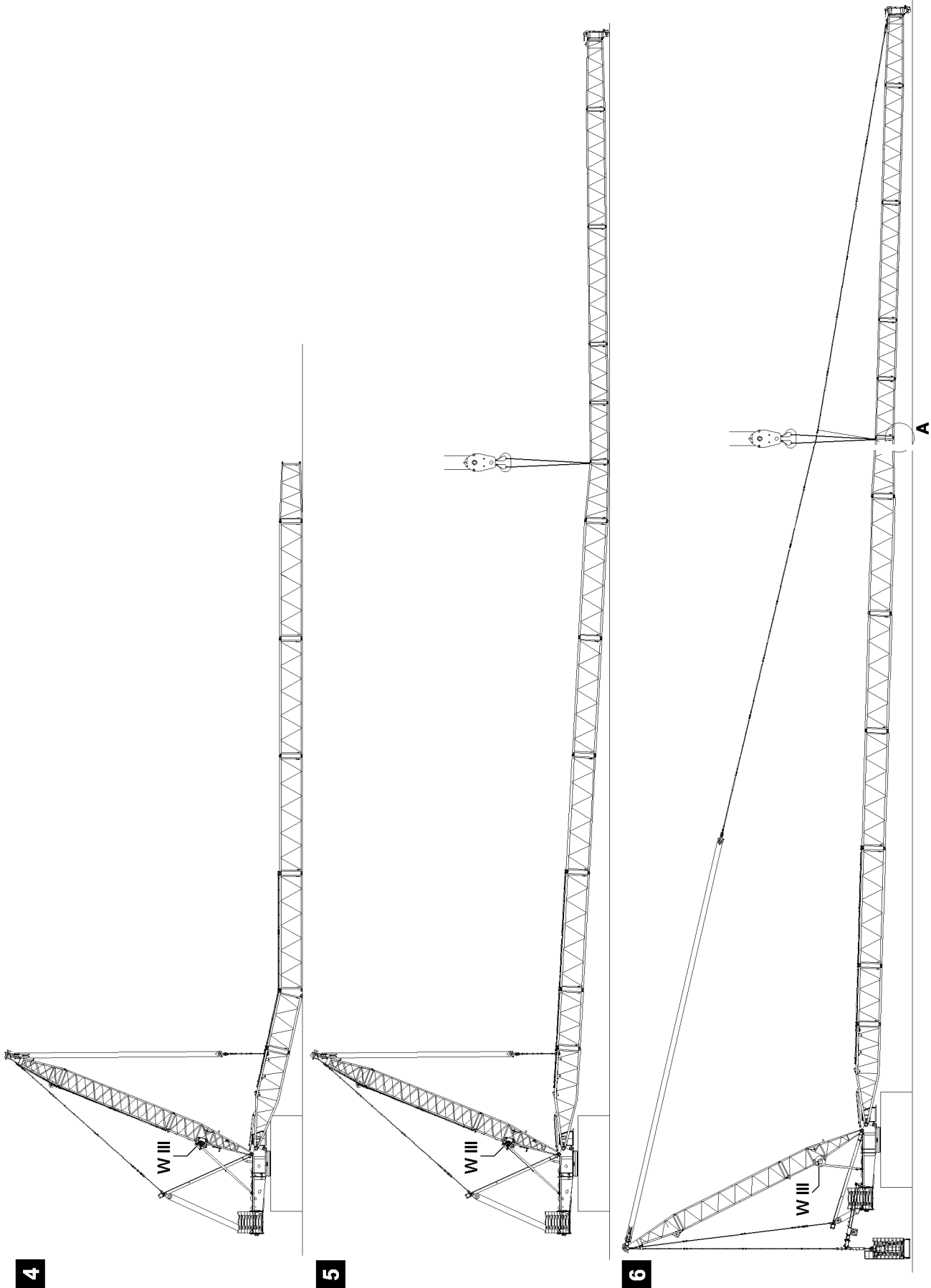


Fig.112059

LWE/LR 1750-000/12812-15-02/en

3.8 Closing boom systems



WARNING

The crane can topple over!
 If the crane is not supported and ballasted according to the load chart when closing the respective boom systems, then the crane can topple over.
 Personnel can be severely injured or killed.
 ► The following prerequisites must be adhered to.

Make sure that the following prerequisites are met:

- The crane is supported.
 (only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- The counterweight is placed according to the specifications.
- The central ballast is placed according to the specifications.
- If required:
 The derrick ballast is placed according to the specifications.
 The derrick ballast is on the required derrick ballast radius.
- An auxiliary crane is available.

3.8.1 Closing the SLD-boom 105 m to SLD 133 m



Note

- Booms up to a boom length of SLD- 98 m can be closed without support from below.
- Up to a boom length SLD- 126 m , the L-end section may lift off the ground when closing the boom.



WARNING

The crane can topple over!
 When closing the boom length SLD- 133 m and the L-end section lifts off the ground, then the crane can topple over.
 Personnel can be severely injured or killed.
 ► Make sure that the L-end section remains on the ground when closing the SLD- 133 m boom.

	Support U_{min} depending on boom length				
	SL-boom length				
	105 m	112 m	119 m	126 m	133 m
LG/LR-crane	$U_{min} = 1.10 \text{ m}$	$U_{min} = 0.90 \text{ m}$	$U_{min} = 0.80 \text{ m}$	$U_{min} = 0.60 \text{ m}$	$U = 0.50 \text{ m}$
	Note: Up to including SL- 98 m , the boom does not have to be supported from below.				

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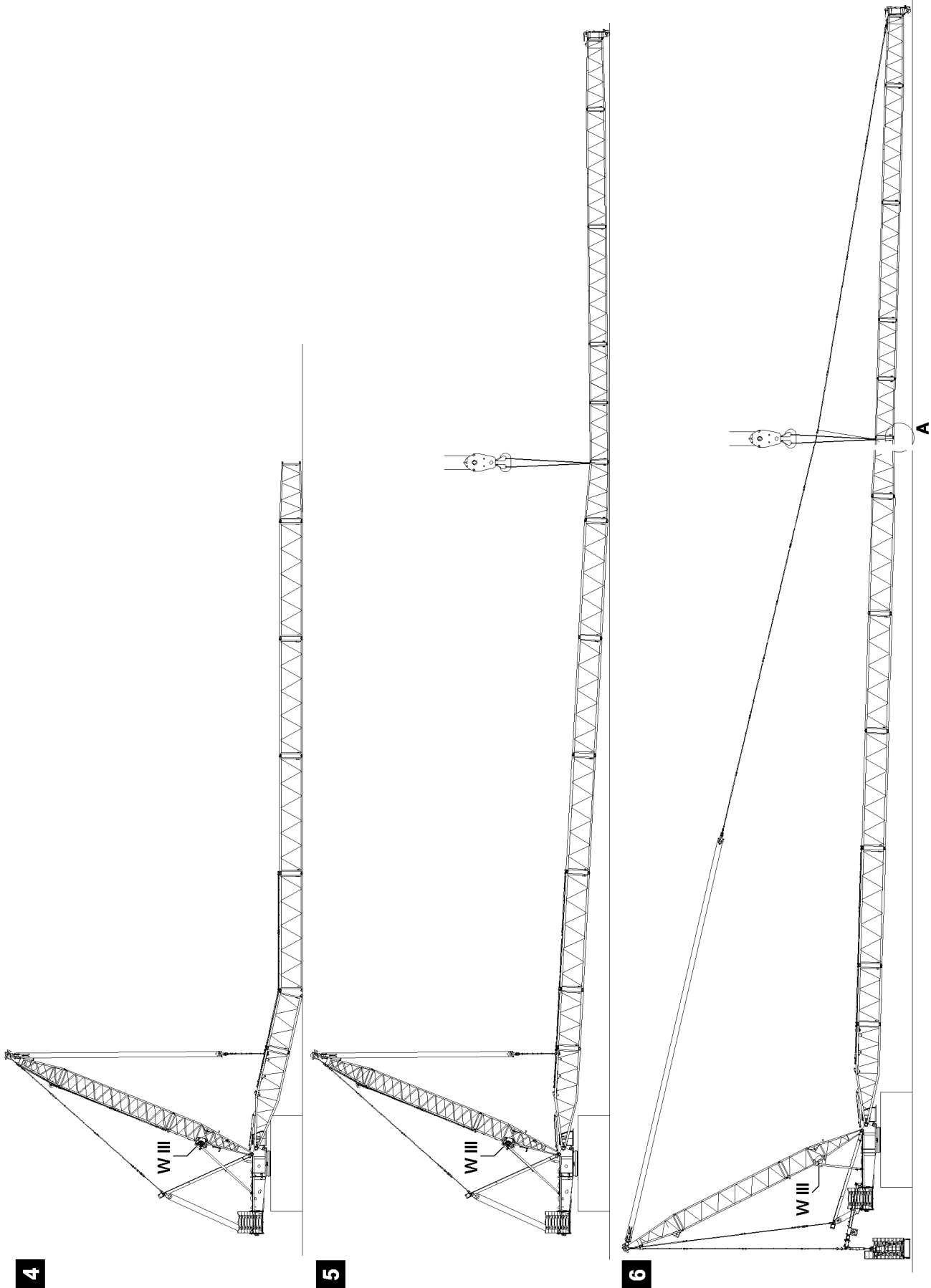


Fig.112059

LWE/LR 1750-000/12812-15-02/en

Illustration 4:

- ▶ Assemble the SL-boom up to the reducer section.
- ▶ Close the partial boom by spooling up winch 3 **W III**.

Illustration 5:

- ▶ Assemble the remaining boom system completely (to maximum SL- 133 m).

**Note**

- ▶ The required auxiliary crane for closing and holding the boom system must have a minimum load carrying capacity of 60 t.

- ▶ Fasten the auxiliary crane on the reducer section.
- ▶ Close the boom system with the auxiliary crane.
- ▶ Hold the boom with the auxiliary crane.
- ▶ Install the guying.
- ▶ Luff the derrick boom up until the SL-boom is safely held by the guying.

When the SL-boom is safely held by the guying:

- ▶ Remove the auxiliary crane.
- ▶ Erect the boom completely (see section Erection procedure).

Illustration 6:

- ▶ Place the boom down: Before placing the boom down completely, fasten the auxiliary crane on the boom.

NOTICE

Damage to crane!

If the boom is not held by an auxiliary crane when placing it down, then the crane can be overloaded. Crane components can be damaged.

- ▶ Make sure that the SL-boom is safely held by the auxiliary crane before the L-end section reaches the ground **or** the boom has reached a distance of 0.5 m to 1.1 m to the alignment level **A**.
- ▶ Fasten the auxiliary crane on the SL-boom.

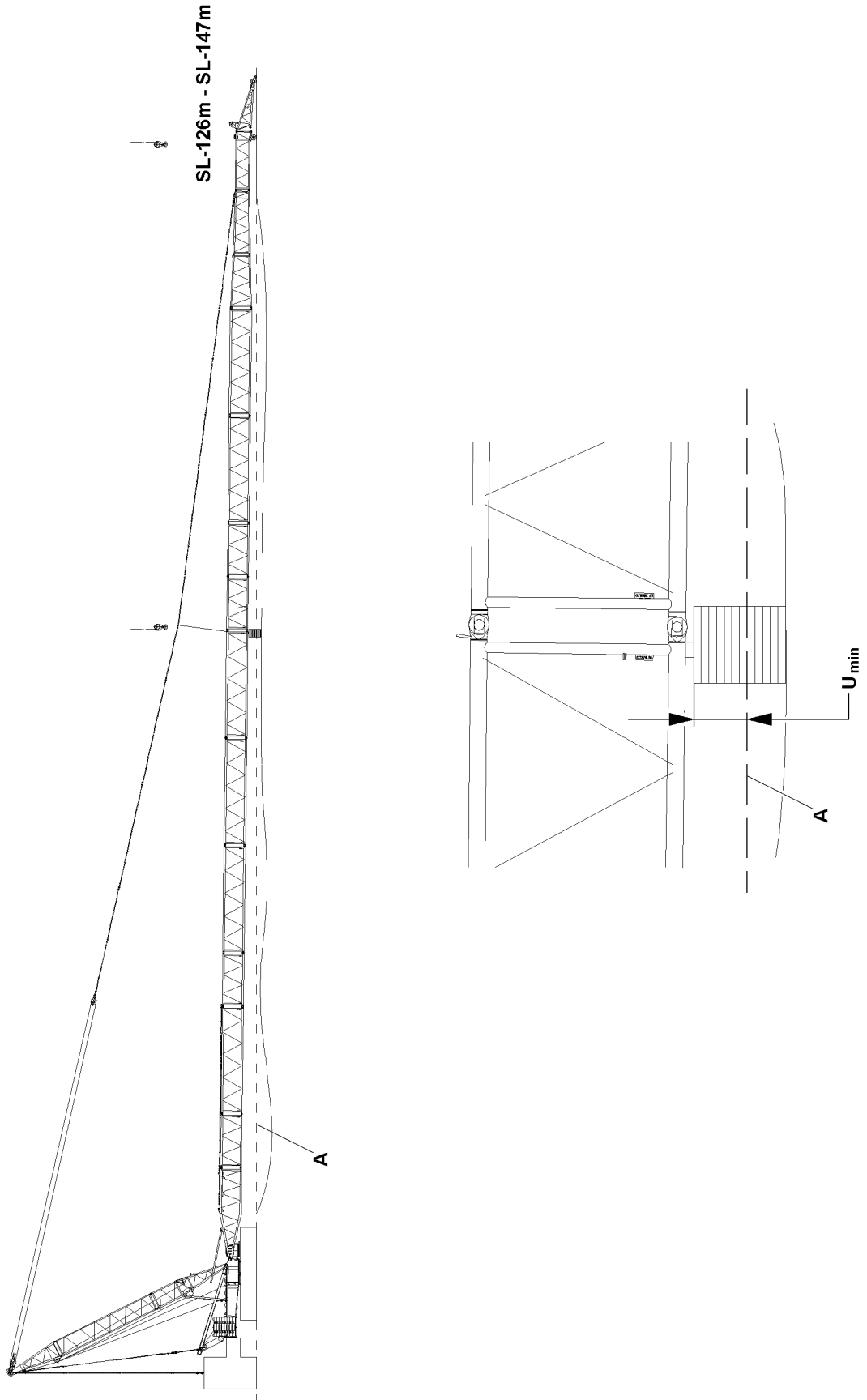


Fig.112061

LWE/LR 1750-000/12812-15-02/en

3.8.2 Closing the SL7DHS 126 m to 147 m

The boom combinations must be erected or taken down according to the erection and take down charts! The boom combinations, depending on the boom lengths, must be supported from below to a certain height, support **U_{min}**.

	Support U_{min}
LG-crane	1.0 m
	Note: Up to a boom length of SL- 119 m erection is possible without support.
LR-crane	0 m to 0.4 m



WARNING

The crane can topple over!

If the following conditions are not met before erecting the boom, the crane can topple over. Personnel can be severely injured or killed.

- ▶ Observe the technical safety notes, see Crane operating instructions, chapter 5.01.
 - ▶ Observe the specifications in the erection and take down charts.
 - ▶ It is not permitted to turn the crane during the erection procedure.
 - ▶ Extend the S-relapse cylinders before erecting the boom combination.
-
- ▶ Close the boom system with the auxiliary crane.

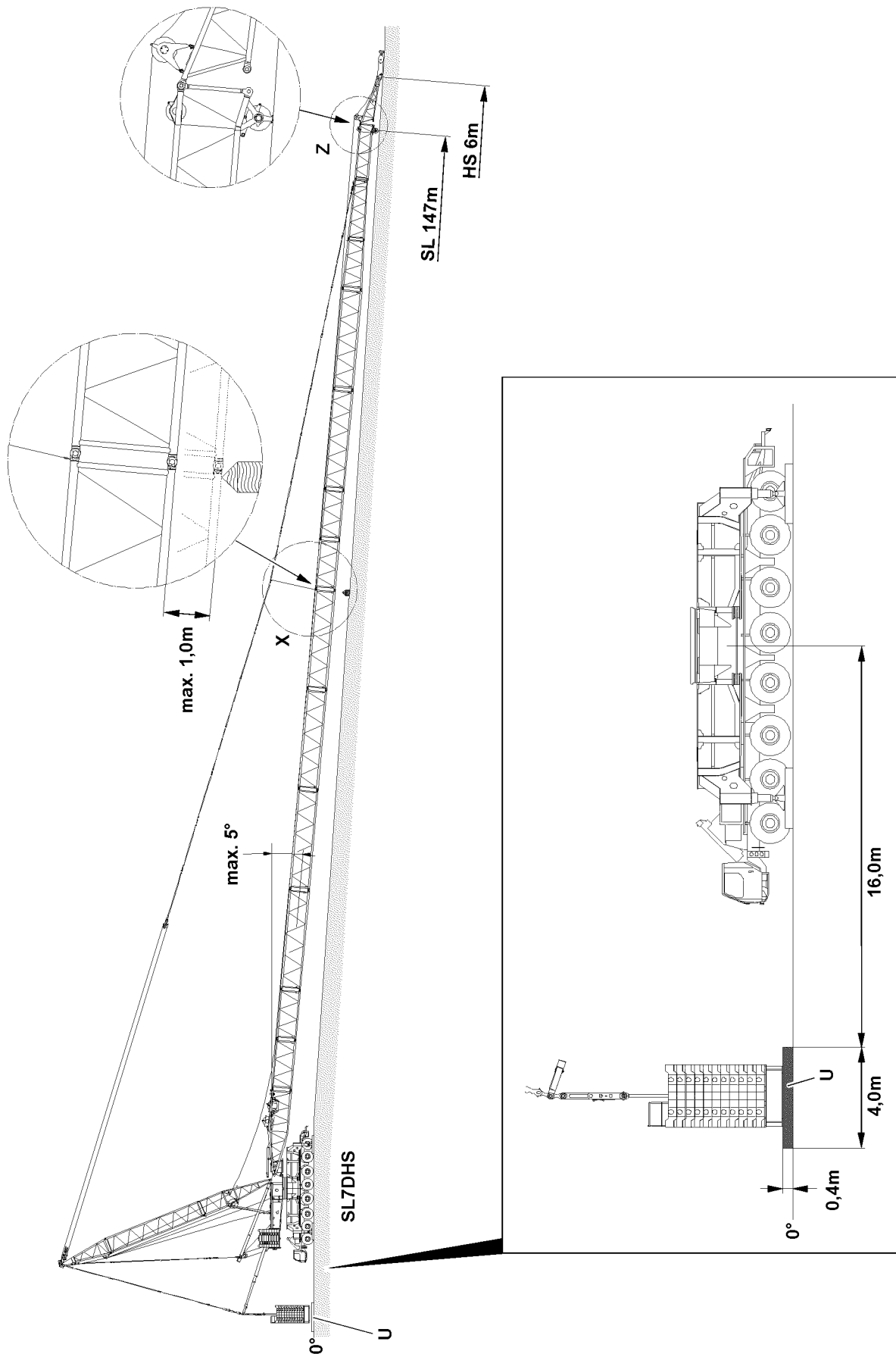


Fig.120891

LWE/LR 1750-000/12812-15-02/en

3.8.3 Assembling the SL7DHS-boom system in an incline



WARNING

The crane can topple over!

If the crane is not horizontal, then it can be overloaded when erecting / taking down the boom system and topple over.

Personnel can be severely injured or killed.

- ▶ Make sure that the placement level of the crane is level and horizontal.
- ▶ Make sure that the crane is completely supported and horizontally aligned.
- ▶ Make sure that the suspended ballast pallet is supported with stable and load bearing materials to 0.4 m above the placement level of the crane, support **U**.
- ▶ Make sure that the support **U** of the suspended ballast pallet has a minimum width of 4.0 m.
- ▶ Make sure that the distance of 16.0 m is retained between the suspended ballast support **U** to the center of rotation of the crane.
- ▶ Make sure that the maximum permissible incline of the main boom angle of -5° is not exceeded at boom assembly / disassembly.
- ▶ Make sure that the maximum permissible deflection of the respective boom system of 1.0 m is not being exceeded, see the following chart and detail **X**.
- ▶ Make sure that all movements of the crane are actuated slowly and anticipatorily.
- ▶ Support the boom systems with suitable material of sufficient load bearing capacity.

Maximum permissible deflection of boom system		
Boom system	Length	Maximum permissible deflection at X
SL7DHS	126.0 m to 147.0 m	1.0 m

NOTICE

Damage to crane!

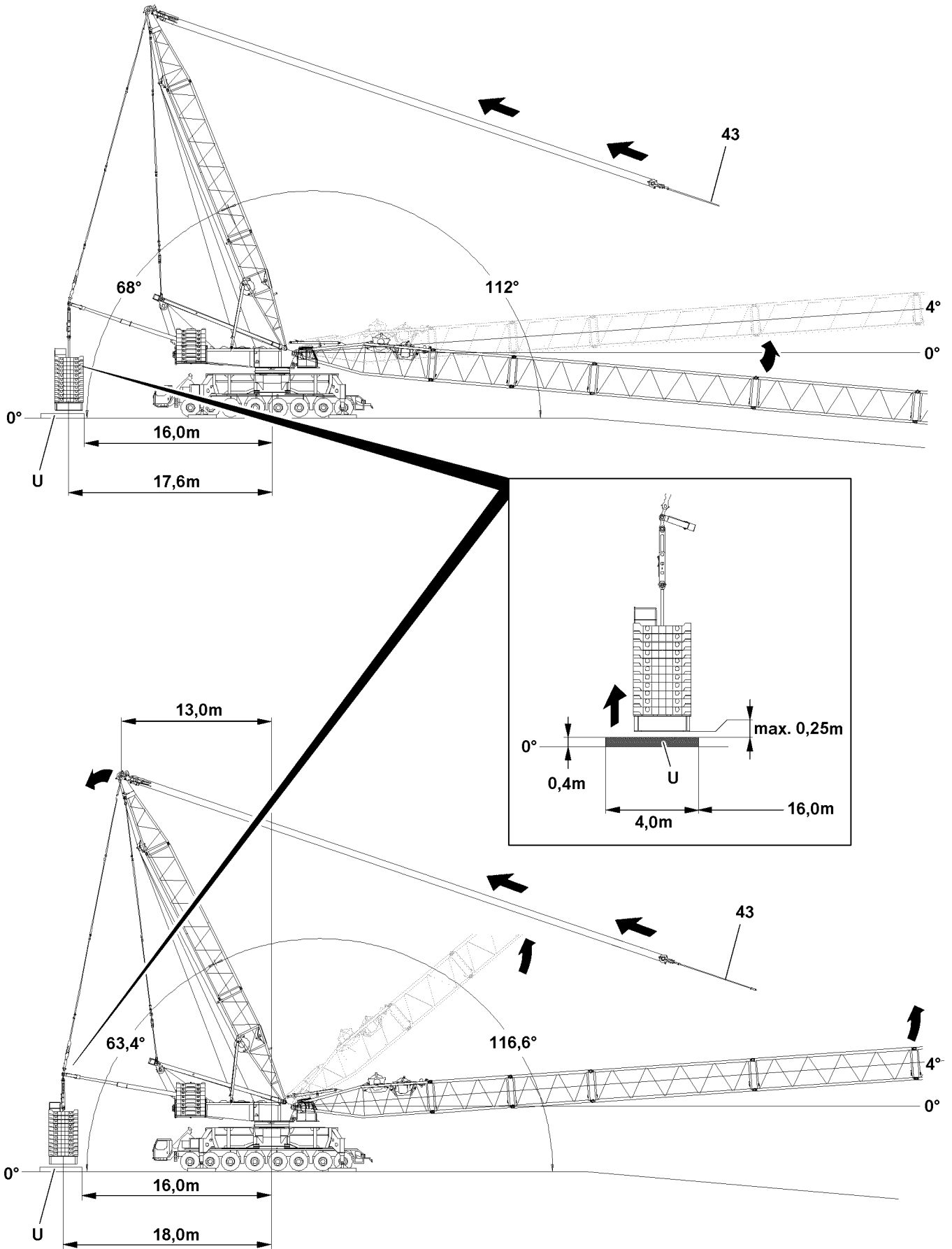
If the support of the boom system at **X** is not carried out properly and in the required height, then the boom system can be damaged due to excessive deflection.

- ▶ Make sure that the support at **X** is carried out in such a way that the deflection does **not** exceed the maximum permissible value.



Note

- ▶ Assemble the SL7DHS-boom according to Crane operating instructions, chapter 5.39.



LWE/LR 1750-000/12812-15-02/en

Fig.120892

Erecting the SL7DHS-boom to the horizontal

Make sure that the following prerequisites are met:

- The boom system is properly supported.
- The support on the main boom is properly set up, pay attention to the maximum permissible deflection.



DANGER

The crane can topple over!

In crane operation with exceeded LICCON overload protection, the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.



WARNING

The crane can topple over!

If the specifications in the erection and take down charts are disregarded, the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Observe the Erection and take down charts.

- ▶ Assemble the guy rods properly, see Crane operating instructions, chapter 5.39.

When the guy rods on the SL7D-boom are properly installed and secured:

- ▶ Set the derrick boom to 68°.



WARNING

The crane can topple over!

If the suspended ballast is lifted by the more than the maximum permissible 0.25 m off the support **U**, then the crane can be topple to the rear if the load rips off.

- ▶ Do not lift the suspended ballast by more than 0.25 m off the support **U**.

- ▶ Assemble and lift the suspended ballast properly, see Crane operating instructions, chapter 5.36.

- ▶ Assemble the auxiliary jib HS properly on the main boom.

When the auxiliary jib HS is properly installed and secured:

- ▶ Erect the boom system to **minimum** 0° to **maximum** 4° to the horizontal.



WARNING

Danger of accident due to boom!

During the derrick boom adjustment, if the main boom is luffed up at the same time, then dangerous situations can arise.

Personnel can be severely injured or killed.

- ▶ Make sure during the adjustment of the derrick boom to 63.4°, that the main boom is held **between** 0° and 4°.

When the boom system is between 0° and 4° to the horizontal:

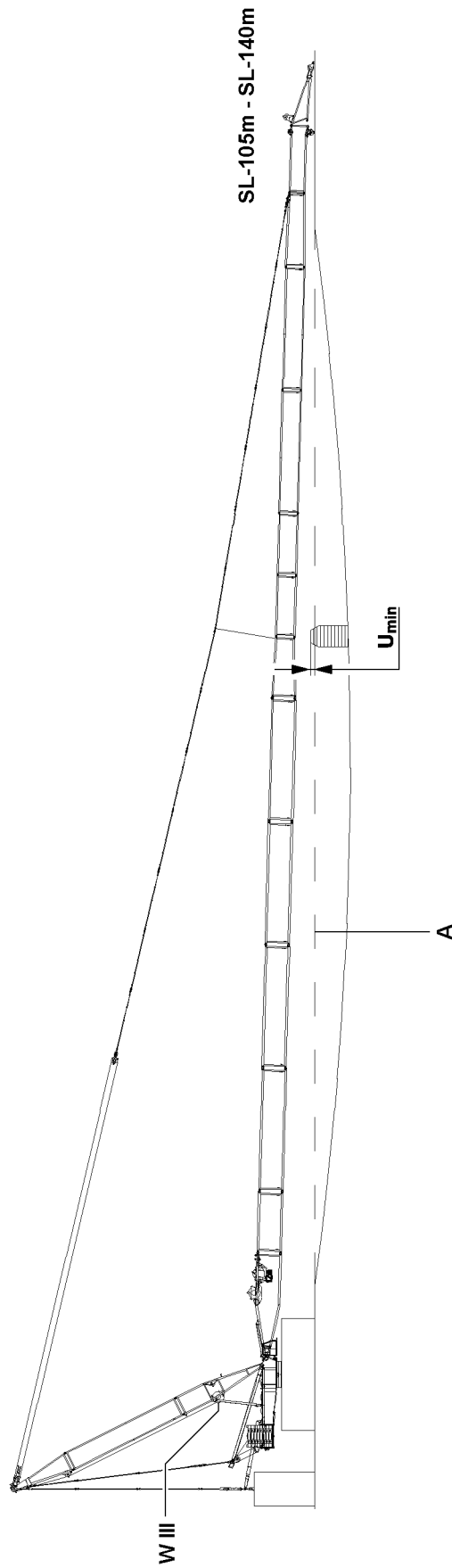
- ▶ Set the derrick boom to 63.4° to the rear.

Result:

- The derrick boom is on a derrick radius of 13.0 m.

When the derrick boom is on a derrick radius of 13.0 m:

- ▶ Erect the boom system, see Erection and take down charts and section „Erecting the boom system“.



LWE/LR 1750-000/12812-15-02/en

Fig.112060

3.8.4 Closing the SL8DHS 105 m to 140 m

The boom combinations must be erected or taken down according to the erection and take down charts! The boom combinations, depending on the boom lengths, must be supported from below to a certain height, support **U_{min}**.



Note

- ▶ Up to a boom length SL8- 119 m , the L-end section may lift off the ground when closing the boom.

	Support U_{min}
LG-crane	0.6 m to 1.0 m
LR-crane	0 m to 0.4 m



WARNING

The crane can topple over!

If the following conditions are not met before erecting the boom, the crane can topple over. Personnel can be severely injured or killed.

- ▶ Observe the technical safety notes, see Crane operating instructions, chapter 5.01.
- ▶ Observe the specifications in the erection and take down charts.
- ▶ Make sure that the L-end section of the SL8D-boom 126 m does **not** lift off the ground when closing.
- ▶ It is not permitted to turn the crane during the erection procedure.
- ▶ Extend the S-relapse cylinders before erecting the boom combination.

- ▶ Close the boom system with the auxiliary crane.

3.9 Establishing the electrical connections

NOTICE

Damage to the electrical connection on the cable drum!

If the electrical connection from the cable drum to the terminal box on the S-pivot section is established first before the connection to the terminal box on the S-end section, the electrical connection can be damaged when spooling out the cable drum.

- ▶ Establish first the electrical connection from the cable drum in the S-pivot section to the terminal box on the S-end section and then the electrical connection from the terminal box in the S-pivot section to the cable drum.



Note

- ▶ To establish the electrical connections on the S-boom, use the Electric wiring diagram.

Make sure that the following prerequisites are met:

- The S-boom is completely assembled.
- The airplane warning light and the wind speed sensor are assembled.
- ▶ Establish the electrical connections.
- ▶ Make sure that all electrical connections on the boom are established.

3.10 Establishing the hydraulic connections

When connecting and releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

**DANGER**

Danger of accident due to loss of pressure or leakage!

Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.

- ▶ Check that the quick couplings have been properly connected before using the crane.

**Note**

- ▶ To connect or release the hydraulic lines with quick couplings, see Crane operating instructions, chapter 5.01.

- ▶ Release the pressure in the hydraulic system before connecting or disconnecting. Turn the engine off and wait for short time.
- ▶ Assembling coupling components (sleeve and connector) by using hand-tightened nut.
- ▶ Connect coupling components.

3.11 Function check

**WARNING**

Non-functioning safety devices!

If the function of the safety devices is defective, personnel can be severely injured or killed.

- ▶ Crane operation with non-functioning safety devices is **prohibited**.

**Note**

- ▶ The function of the individual limit switches must be checked before erection of the boom system.
- ▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual.

**Note**

- ▶ If a function check on the limit switches or on the safety devices does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked. If no visible connection errors or component defects can be found, contact LIEBHERR Service.

Make sure that the following prerequisites are met:

- All electrical connections have been made.
- The crane engine is running.
- The corresponding operating mode is set on the LICCON monitor.
- The actuator levers of the limit switches have been checked for easy movement and are lubricated.

3.11.1 Wind speed sensor

- ▶ Check the movement and the function of the wind speed sensor.

3.11.2 Airplane warning light

- ▶ Turn the airplane warning light on, see Crane operating instructions, chapter 4.01.
- ▶ Check the function visually.

3.11.3 Hoist limit switch

- ▶ Actuate the hoist limit switch manually on the pulley head.

Result:

- The hoist winch turns off in upward movement.
- The hoist top icon on the LICCON monitor 0 blinks.

3.11.4 Checking the limit switch D-boom „Steepest position“



Note

▶ The limit switch functions have to be checked individually before erection.

▶ Cover the limit switch initiators on the D-relapse cylinders individually with a metal plate.

Result:

- The limit switch is actuated manually.
- The spool up function of winch 4 (control winch) turns off.
- The icon „Boom limitation“ appears on the LICCON monitor 0.

3.11.5 Checking the limit switch S-boom „Steepest position“



Note

▶ The limit switch functions have to be checked individually before erection.

▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

Result:

- The limit switch is actuated manually.
- The spool up function of winch 3 turns off.
- The icon „Boom limitation“ appears on the LICCON monitor 0.

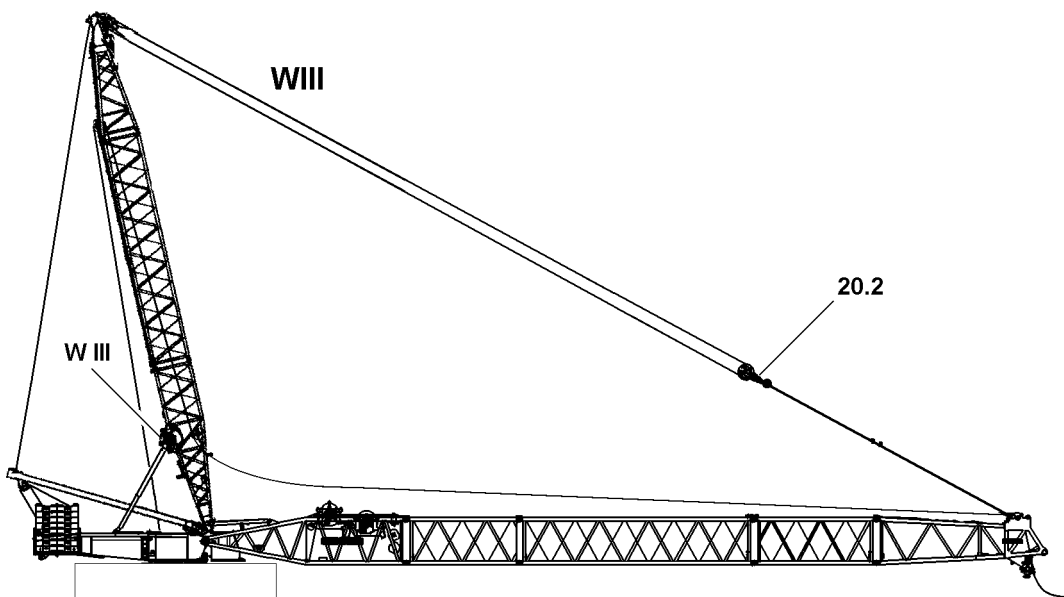
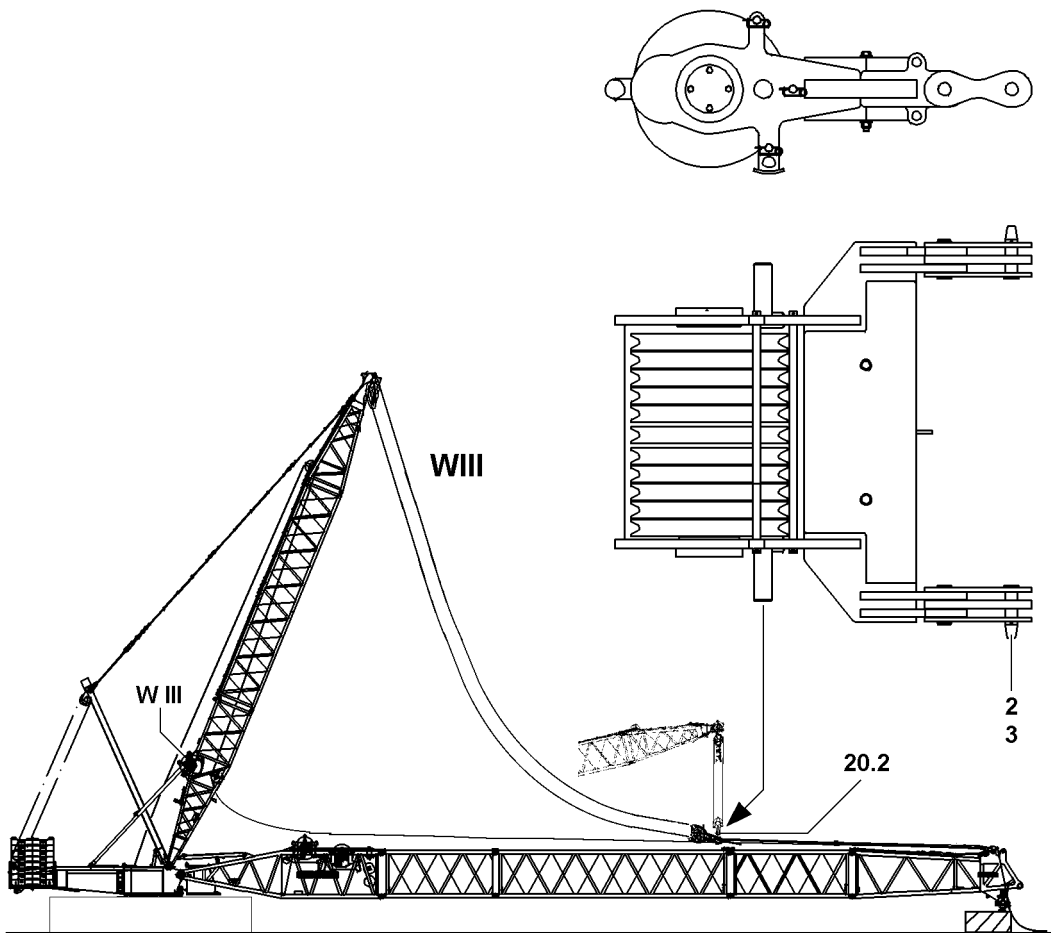


Fig.112062

LWE/LR 1750-000/12812-15-02/en

3.12 Assembling the guy rods



WARNING

Neglected inspection and maintenance on guy rods!

If the regular inspection and maintenance of the guy rods is not carried out or only in irregular intervals, then severe accidents can occur due to existing and not recognized damage on the guy rods. Personnel can be severely injured or killed.

- ▶ The guy rods must be checked before every assembly, see Crane operating instructions, chapter 8.15.



Note

- ▶ The guy rods must be installed and secured according to the separately supplied rod plans. The numbering on the rod plans must be identical to the numbering on the guy rods.

Make sure that the following prerequisites are met:

- The S-boom is completely assembled.
- All lattice sections are properly pinned with each other.
- All pin connections have been secured.
- The upper pulley block **20.2** is unpinned on the S-pivot section.

- ▶ Luff the D-boom down to the front.
- ▶ Lower the upper pulley block **20.2** to the boom: Spool out winch **3 W III**.

The guy rods are placed and secured for transport on the corresponding intermediate sections. Before assembly, the transport retainers must be released.

- ▶ Release the transport retainers on the guy rods.

NOTICE

Danger of property damage!

If the pins of the guy rods are not pinned from the „inside“ to the „outside“, the hoist rope can scrape on the pins and be damaged.

- ▶ Always pin in the pins of the guy rods from the „inside“ to the „outside“.
- ▶ Pay attention to the special rod plan.



Note

- ▶ The guy rods of the S-/L-intermediate sections are pinned with each other and secured starting from the brackets on the fixed point of the respective end section or starting from the brackets on the L-adapter.

- ▶ Pin and secure the guy rods for the intermediate sections according to the Rod plan.
- ▶ Pin and secure the guy rods with the upper pulley block **20.2**.

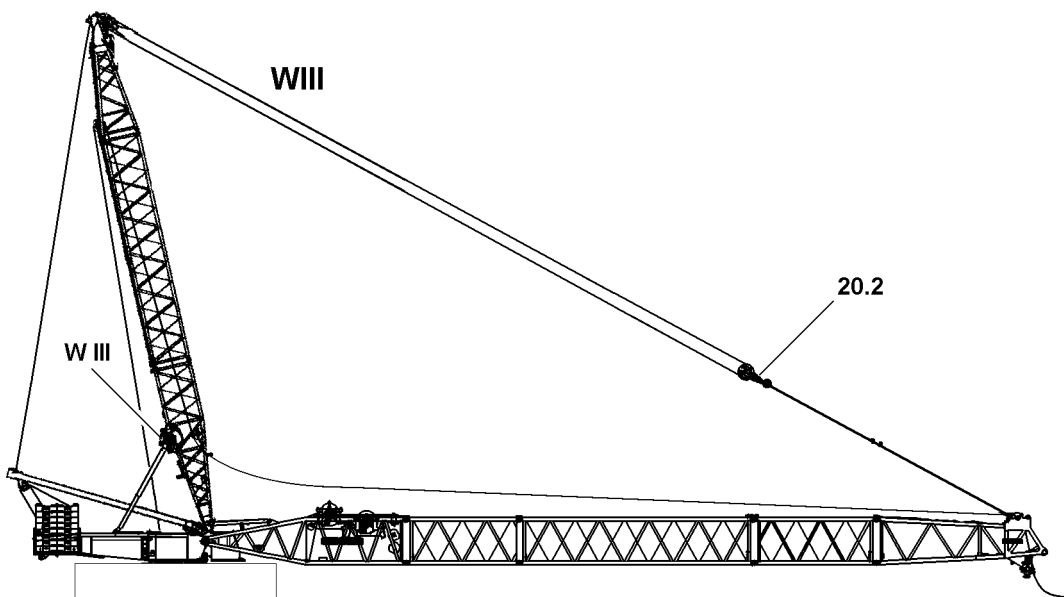
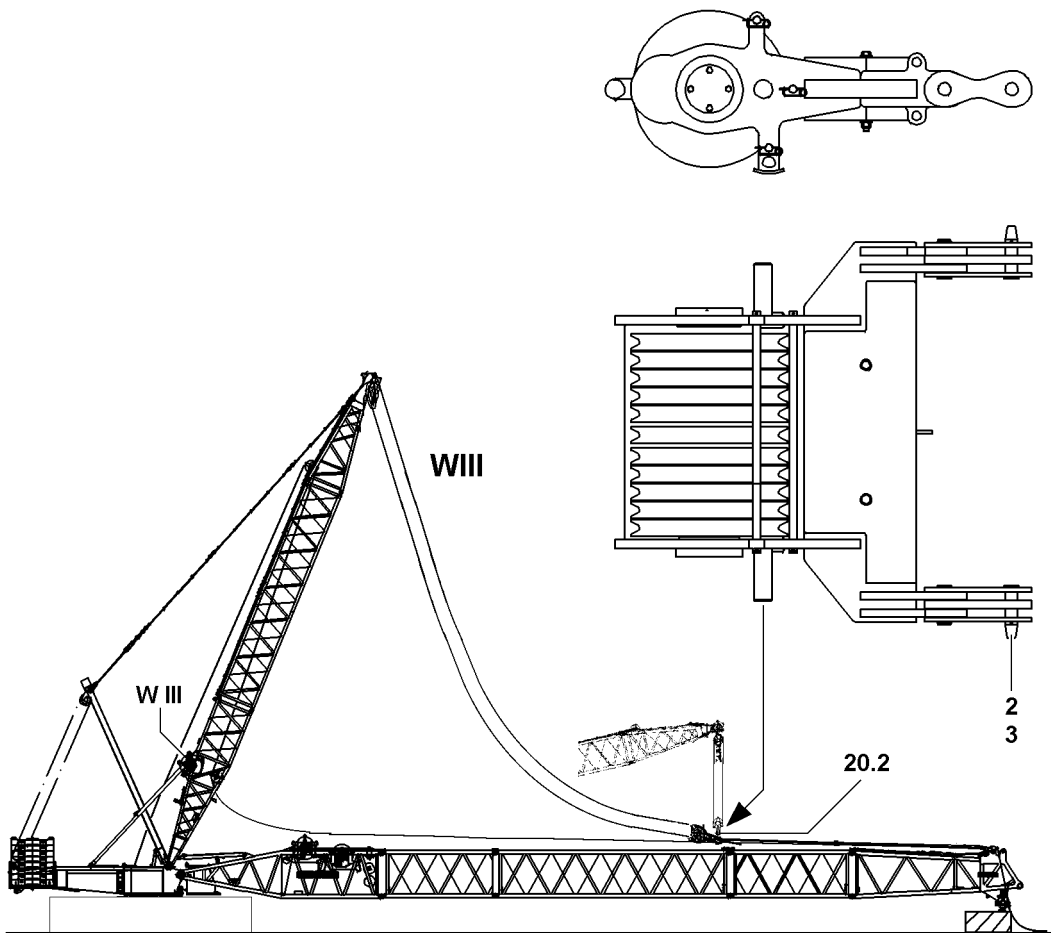


Fig.112062

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Falling boom!

If the auxiliary guying is not assembled on the boom or not according to the specifications, then the boom can buckle downward, break off and fall down.

Personnel can be severely injured or killed.

- ▶ Make sure that the auxiliary guying is assembled correctly, see Rod plan.

- ▶ Assemble the auxiliary guying.

**Note**

- ▶ The S-boom must remain on the ground when erecting the derrick boom and may **not** be pulled up along.

When the guy rods are pinned and secured with the upper pulley block **20.2**:

- ▶ Erect the D-boom to operating position and at the same time, spool out winch 3 **W III**.

When the D-boom has reached the operating position:

- ▶ Tension the guying between the D-boom and the boom head or the L-adapter.

**WARNING**

The boom can suddenly fold down!

If the following notes are not observed, the boom can suddenly fold down when the auxiliary boom or the supporting base is removed.

Personnel can be severely injured or killed.

- ▶ Remove the auxiliary boom or the supporting base only if it is ensured that the D-boom is in operating position and the S-boom is safely being held by the guying.

When the boom is safely held by the guying:

- ▶ Remove the auxiliary crane on the boom head or on the L-adapter.

or

Remove the support.

- ▶ Guide the hoist rope over the rope pulley(s) on the boom head, see Reeving plans.

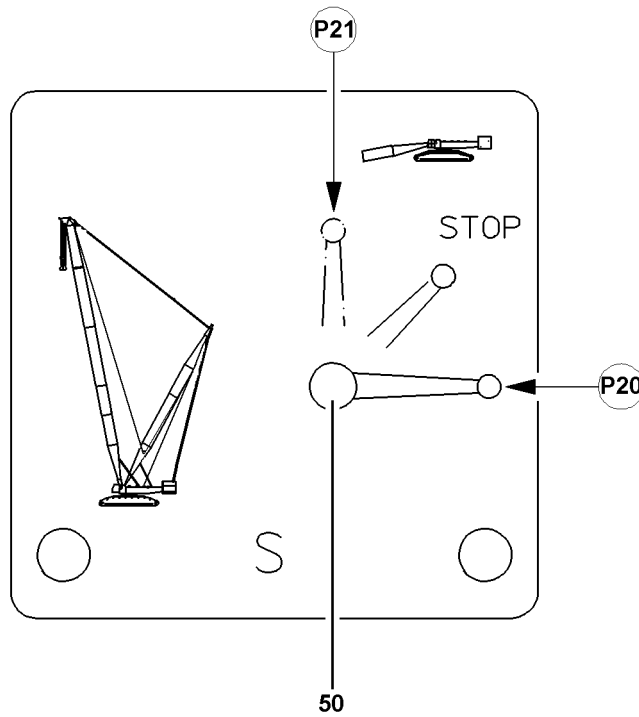
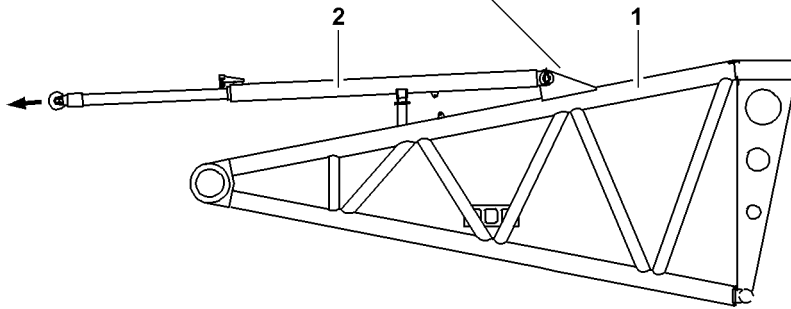
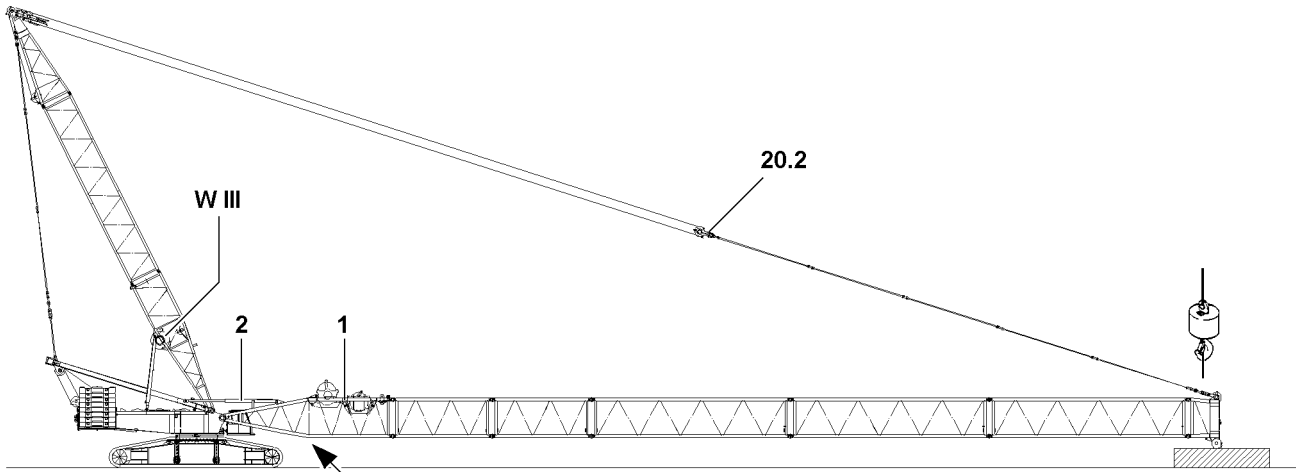


Fig.112054

LWE/LR 1750-000/12812-15-02/en

4 Erecting the boom system

4.1 Erecting the boom



WARNING

The crane can topple over!

In crane operation with exceeded LICCON overload protection, the crane can topple over. Personnel can be severely injured or killed.

- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

If required in the erection and take down chart:

- ▶ Carry the hook block along with the auxiliary crane.



WARNING

The crane can topple over!

If the following conditions are not met before erecting the boom, the crane can topple over. Personnel can be severely injured or killed.

- ▶ Observe the technical safety notes, see Crane operating instructions, chapter 5.01.
- ▶ Extend the S-relapse cylinders before erecting the boom combination.
- ▶ Do not allow slack rope formation on the control winch.



WARNING

Falling hoist rope!

If the hoist rope is not reeved with the respective length over the S-boom before the erection procedure, then it can fall backward due to its own weight.

Personnel can be severely injured or killed.

- ▶ Reeve in the hoist rope with sufficient length on the S-boom before the erection process.
- ▶ The hoist rope must be constantly monitored during erection.
- ▶ Do not step into the danger zone.

NOTICE

Overload of boom!

If the SL-boom is not supported before the erection procedure, then the boom will be overloaded! The crane will be damaged during erection!

- ▶ Carry out the support for the different boom lengths always according to the specifications.
- ▶ Support the boom with suitable material of sufficient load bearing capacity.

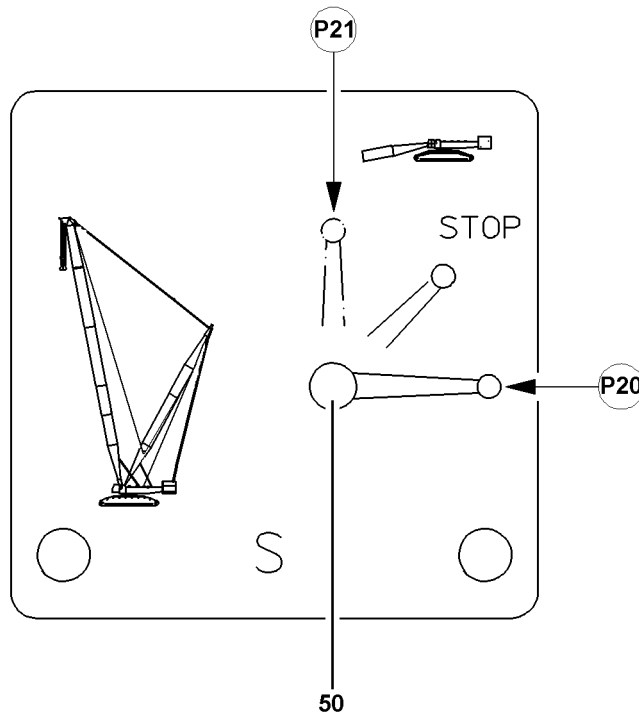
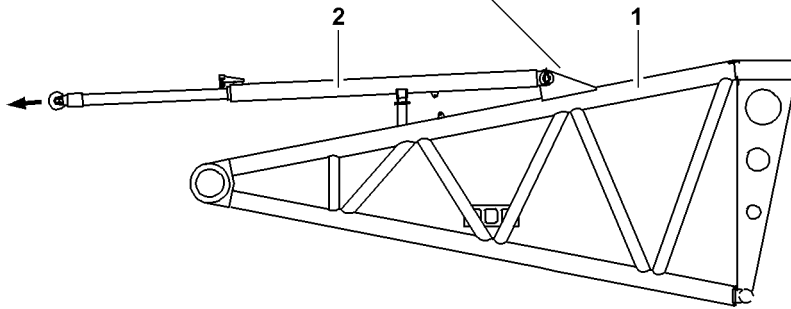
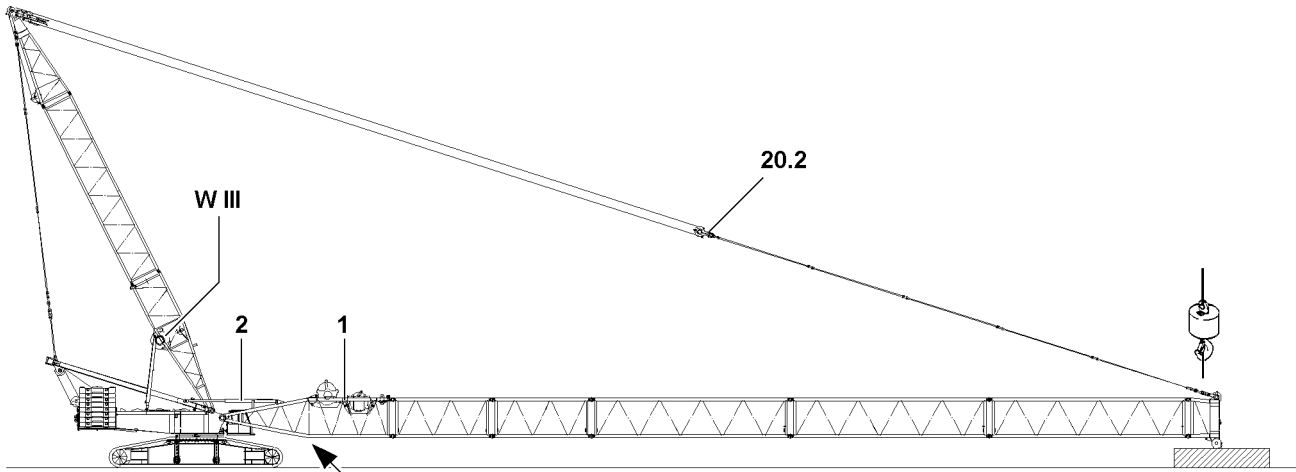


Fig.112054

LWE/LR 1750-000/12812-15-02/en

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- All electrical connections have been made.
- All limit switches are functioning.
- The central ballast is installed according to the erection and take down charts.
(not possible for LG-crane)
- The counterweight has been installed on the turntable according to the erection and take down chart.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- Non-required guy rods are disassembled.
- There are no loose parts on the boom.
- The boom is free of snow and ice.
- The LICCON overload protection has been adjusted according to the data in the load chart.
- The load weighing was carried out on the boom and the hook block weight has been entered on the LICCON monitor, see Crane operating instructions, chapter 4.02.
- The LICCON overload protection settings have been compared with the actual set up configuration.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.
- No personnel is within the danger zone.

4.1.1 Moving the S-relapse cylinders out

NOTICE

Damage of the relapse cylinder!

By extending the S-relapse cylinder, a collision with the D-relapse cylinders can occur.

This can result in severe damage on the relapse cylinders.

- ▶ Extend the S-relapse cylinders only when the D-boom is in operating position.
-

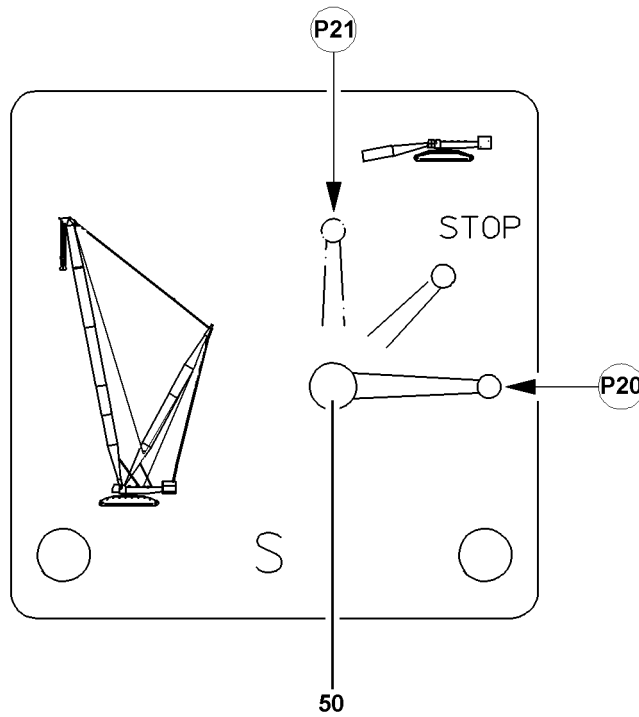
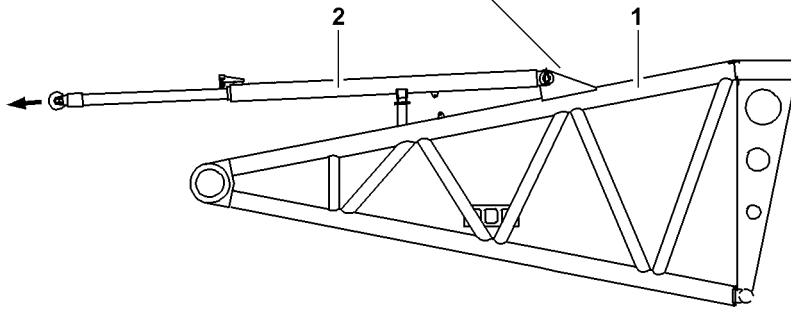
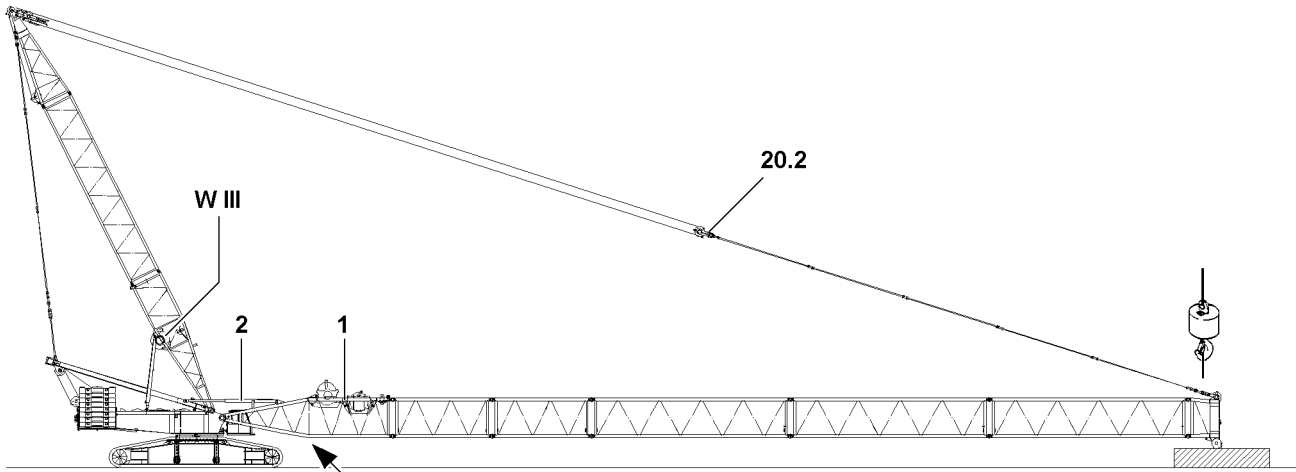


Fig.112054

LWE/LR 1750-000/12812-15-02/en

**WARNING**

The crane can topple over!

If the S-relapse cylinders are not extended before erecting the boom, then the boom can fall to the rear in crane operation and the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Extend the S-relapse cylinders before erecting the S-boom.
- ▶ Secure the ball valve **50** during crane operation to prevent inadvertent actuation.

Ball valve positions	
Position (P)	Function
20	Crane operation, extend the piston rod
21	Assembly, retract the piston rod
STOP	The piston rod cannot be retracted / extended

Make sure that the following prerequisite is met:

- All hydraulic connections have been made.

- ▶ Set the ball valve **50** to position **P20**.

Result:

- The piston rods of the S-relapse cylinders **2** extend.

**Note**

- ▶ The ball valve **50** is secured by closing the cabinet door and removing the key.

When the piston rods of the S-relapse cylinders **2** are fully extended:

- ▶ Close the cabinet door and pull the key.
- ▶ Hand the key to an authorized person.

4.1.2 Erection procedure



DANGER

The crane can topple over!

- ▶ It is prohibited to turn the crane superstructure while erecting the boom.
- ▶ Adhere to the specifications in the erection and take down charts.

Make sure that the following prerequisite is met:

- The load weighing was carried out on the boom and the hook block weight has been entered on the LICCON monitor, see Crane operating instructions, chapter 4.02.

Reeving in the hook block

- ▶ Erect the boom until the end section lifts off the ground.



WARNING

Falling hoist rope!

If the hoist rope is not reeved with the respective length over the S-boom before the erection procedure, then it can fall backward due to its own weight.

Personnel can be severely injured or killed.

- ▶ Reeve the hoist rope before the erection procedure with sufficient length on the D-boom.
 - ▶ The hoist rope must be constantly monitored during erection.
 - ▶ Do not step into the danger zone.
-
- ▶ Reeve in the hoist rope properly and secure on the rope fixed point, for reeving, see Reeving plan.
 - ▶ Pin and secure the rope retainers on the rope pulleys.
 - ▶ Attach the hoist limit switch weight.

Erecting the boom



WARNING

The crane can topple over!

In crane operation with exceeded LICCON overload protection, the crane can topple over.

There is then no additional protection against crane overload.

Personnel can be severely injured or killed.

- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.
- ▶ Crane operation with deactivated LICCON overload protection is prohibited.



Note

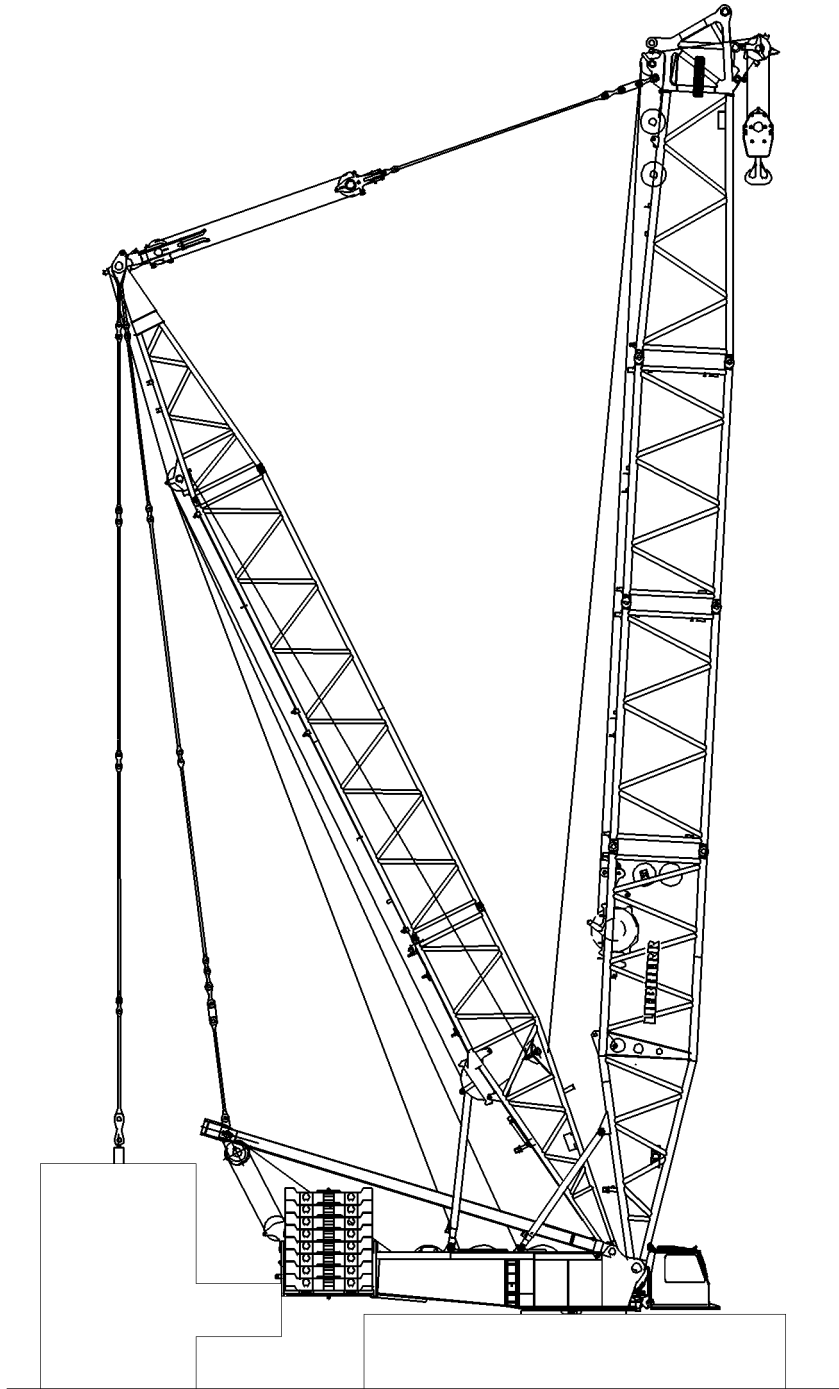
- ▶ When the lowest operating position of the boom is reached, the LICCON overload protection is activated.
 - ▶ In the maximum load icon appears a load number in „t“ instead of the display „???“.
-
- ▶ Luff the boom up to the lowest operating position.

When the boom has reached the lowest operating position:

- ▶ Make sure that the assembly icon on the LICCON monitor turns off.

Result:

- The LICCON overload protection is active.



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Fig.112063

5 Operating the crane

5.1 Preparing for crane operation

**Note**

- ▶ Observe the notes, see Crane operating instructions, chapter 4.02, chapter 4.05, chapter 4.08 and chapter 5.01.

Make sure that the following prerequisites are met:

- The LICCON overload protection is active.
- The LICCON overload protection has been set according to the data in the load chart.

**WARNING**

The crane can topple over!

- ▶ Check the horizontal position of the crane before and during operation.
- ▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation.

5.1.1 Checking the settings

- ▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
- ▶ Check the hoist limit switch by running against the hoist limit switch weight.
- ▶ Check the function of the limit switches „Boom steep“ on the relapse cylinders.

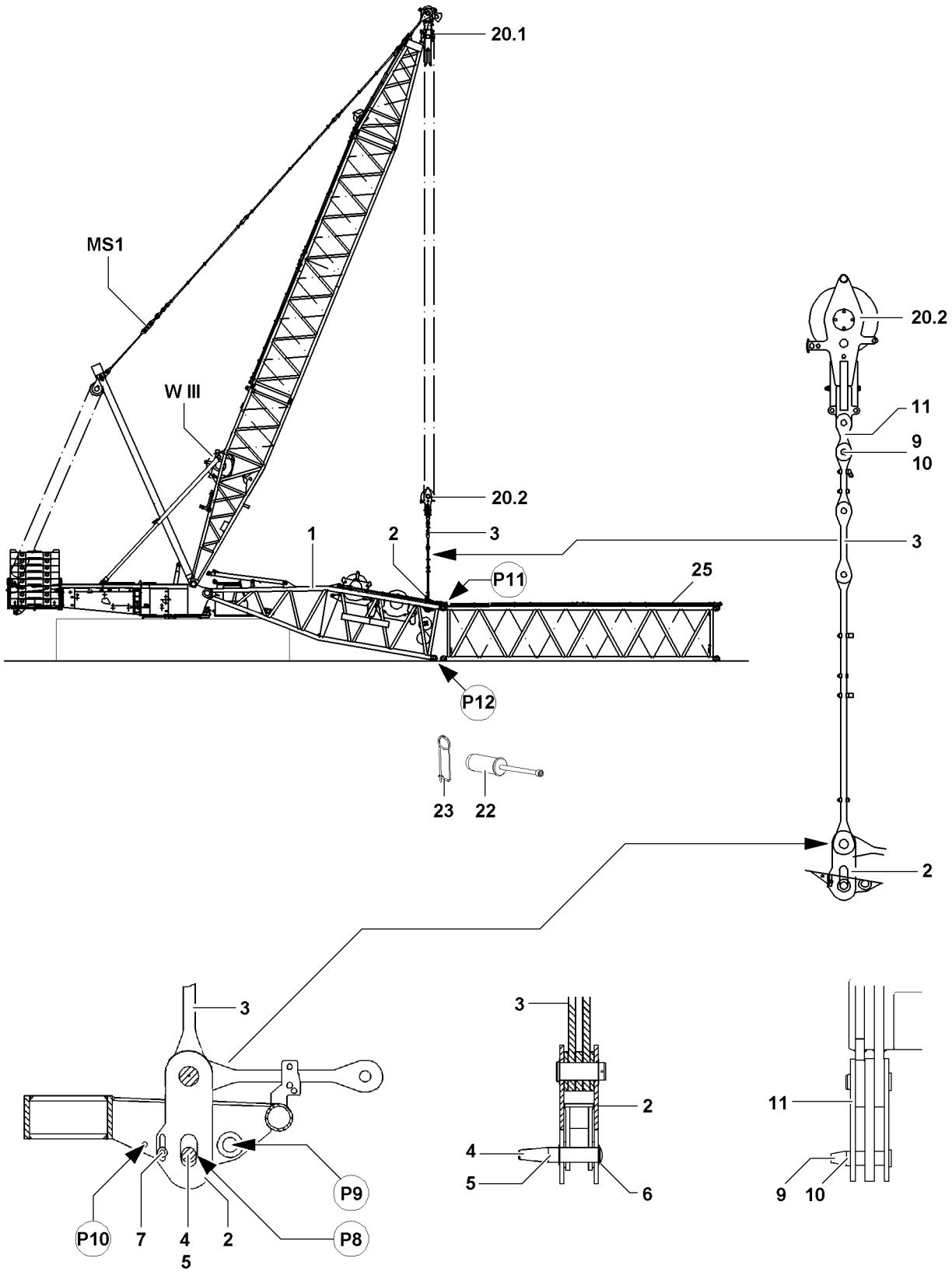


Fig.120032

LWE/LR 1750-000/12812-15-02/en

6 Disassembling the SLD/SD-boom



Note

- ▶ The disassembly is described on the example of the S-boom.



WARNING

Danger of falling!

During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids.
- ▶ If fall arrest equipment is available, then it must be used, see Crane operating instructions, chapter 2.06.
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the specified fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04.
- ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ Remaining on as well as under a suspended load is prohibited.
- ▶ Remaining on or within crane components (for example: At assembly of boom sections, lattice sections) which are moved during lifting, lowering, turning or closing procedures is strictly prohibited.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ It is prohibited to step on the boom system or an auxiliary boom without suitable protective devices.
- ▶ Stepping and walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.



WARNING

The lattice sections can fall down!

If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel.

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- ▶ Safely secure the pins in the storage locations as well as in the receptacles.
- ▶ It is prohibited to lean the ladder against the component being disassembled.



WARNING

Danger of crushing!

When disassembling crane components, limbs can be crushed or even severed due to oscillation of components.

- ▶ Make sure that the components do not swing back and forth during disassembly.

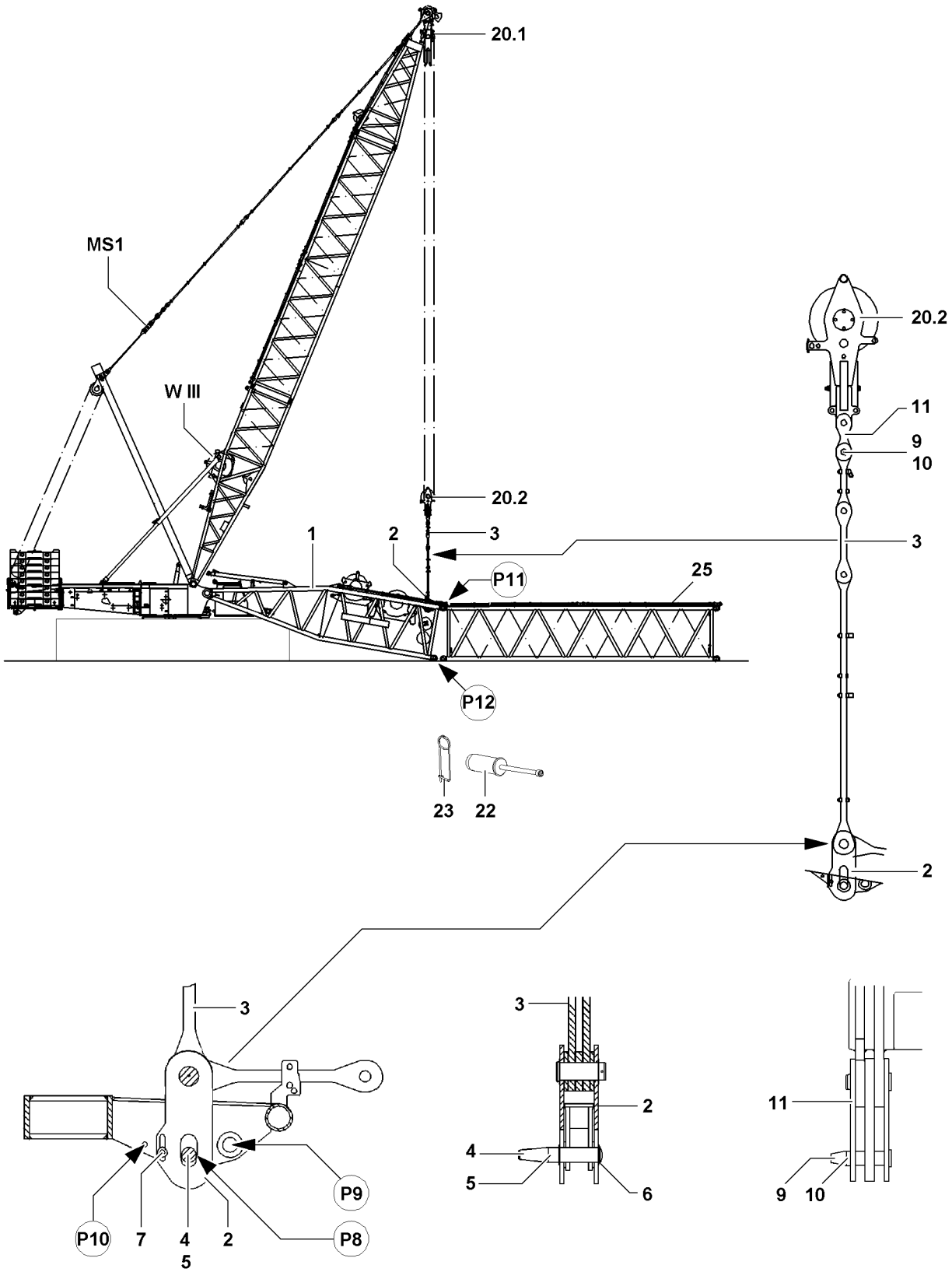


Fig.120032

LWE/LR 1750-000/12812-15-02/en

6.1 Taking the S-boom down



WARNING

The crane can topple over!

If the following conditions are not met before taking down the S-boom, the crane can topple over. Personnel can be severely injured or killed.

- ▶ Observe the technical safety notes, see Crane operating instructions, chapter 5.01.
- ▶ Observe the specifications in the erection and take down charts.

NOTICE

Damage of boom components!

Taking down the boom system can lead to a collision between the hook block and the pulley head. Boom components can be severely damaged.

- ▶ Luff the boom system down at the same time and spool the hoist winch out.
- ▶ When luffing the boom system down, the D-boom must remain in operating position until the S-end section is laying on the ground or on a support or it is safely held by an auxiliary crane.



Note

- ▶ The luff down movement is turned off as soon as the lowest operating position of the S-boom is reached.
- ▶ When the lowest operating position of the S-boom is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“.
- ▶ In the crane operating screen appear alarm functions.

- ▶ Luff the boom down to the **lowest** operating position.

Result:

- The luff down movement is turned off.
- The „STOP“ icon appears on the LICCON monitor.
- The horn icon appears on the LICCON monitor.



WARNING

Danger of accident due to function „Exceeding the shut off limits of the LICCON overload protection“! If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.

Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

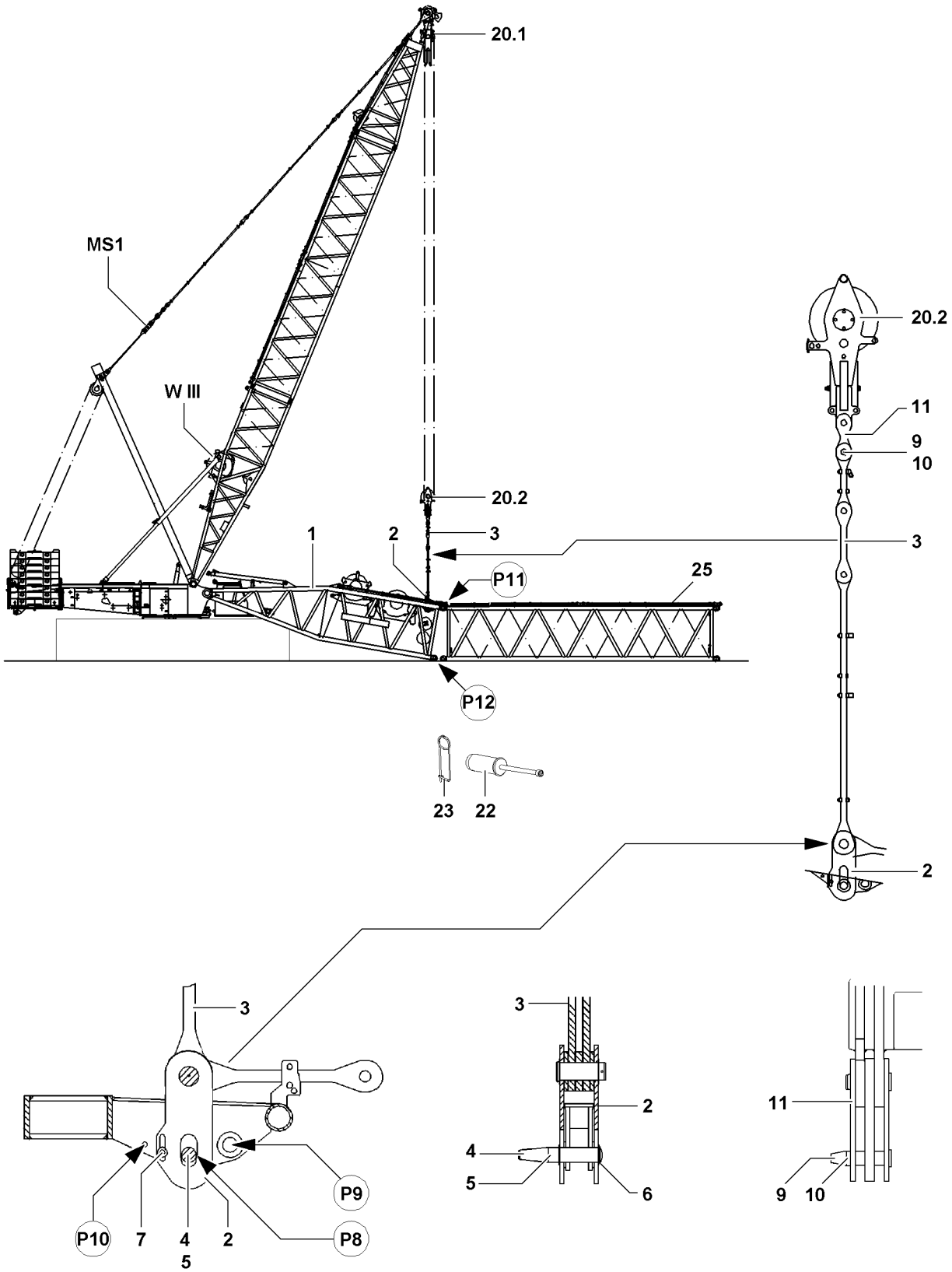


Fig.120032

LWE/LR 1750-000/12812-15-02/en

- ▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

- The shut off limits of the LICCON overload protection are exceeded.
- The assembly icon appears on the LICCON monitor.
- ▶ At the same time, spool the hoist winch out and luff the S-boom down until the hook block touches the ground.
- ▶ Remove the hoist limit switch weight and unreeve the hook block.

**Note**

- ▶ See Crane operating instructions, chapter 4.02.

**WARNING**

Overload of boom!

If the boom is not supported in the area of the auxiliary guying according to specification when placing it down, then the crane can be overloaded, the boom can break off and fall down.

Personnel can be severely injured or killed.

- ▶ Make sure that the boom system is supported according to specification, observe dimension U_{min} for the respective boom system.
- ▶ The derrick boom must remain in operating position when placing down the S/SL-boom until the S/SL-boom is placed on the support.

- ▶ Luff the S/SL-boom down until the boom or the boom head is laying on the support.

**WARNING**

Spooling up of hoist rope!

By spooling the hoist rope up, personnel can be severely injured or killed.

- ▶ All rope retaining pins / pipes on the S-boom are removed.
- ▶ Slowly spool up the hoist rope over the rope pulleys back to the winch.
- ▶ No one may be present in the danger zone.

NOTICE

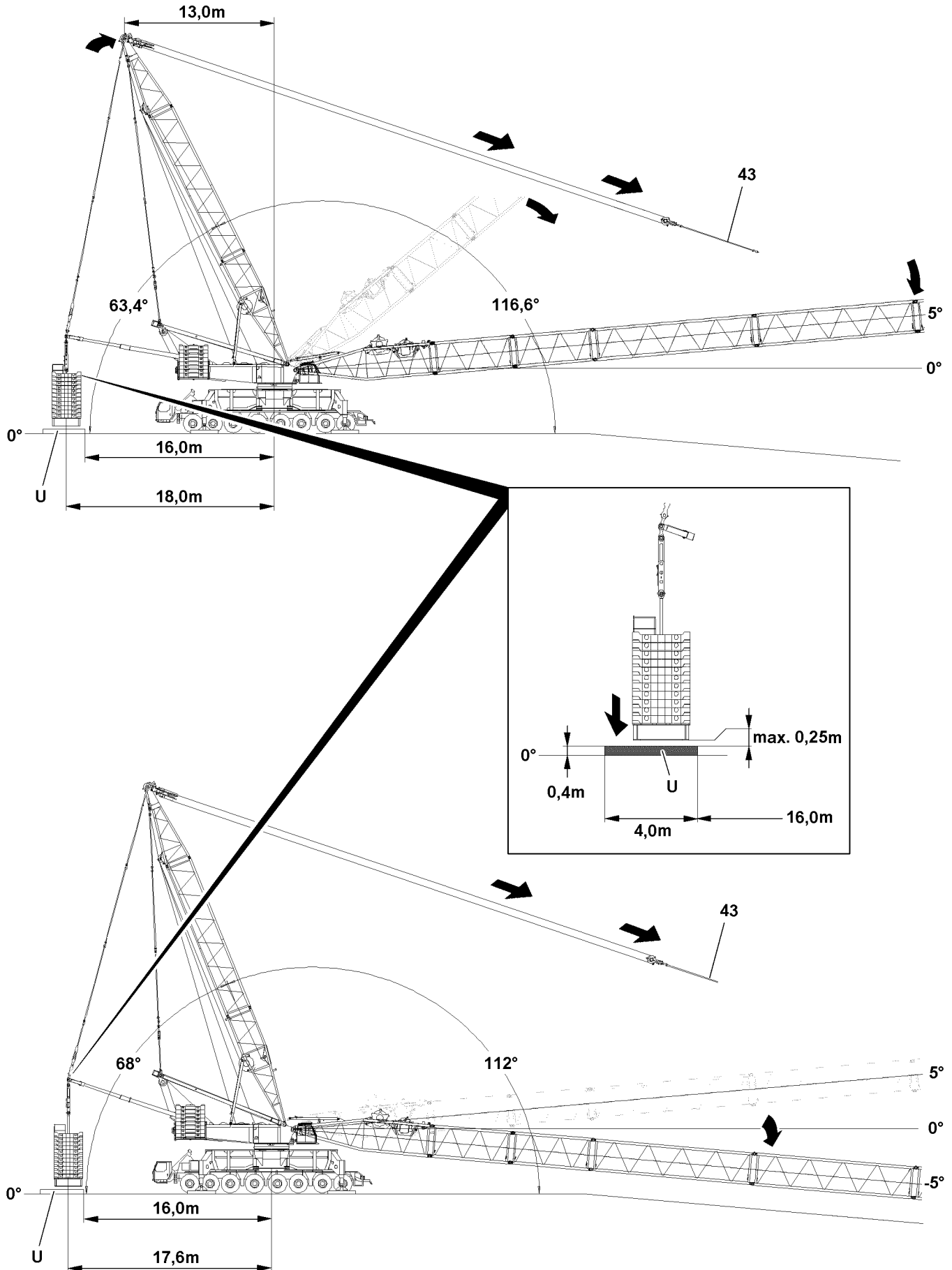
Overspooled winch!

If the hoist rope is pulled under the winch when spooling up, then the adjustment of the cam limit switch can change.

A new adjustment by **Liebherr Service** is required.

- ▶ Stop the winch in time, with sufficient rope reserve.
- ▶ Do not overspool the winch.

- ▶ Spool the hoist rope up.



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Fig. 120893

6.2 Placing the SL7DHS-boom system down in an incline



WARNING

The crane can topple over!

If the crane is not horizontal, then it can be overloaded when erecting / taking down the boom system and topple over.

Personnel can be severely injured or killed.

- ▶ Make sure that the placement level of the crane is level and horizontal.
- ▶ Make sure that the crane is completely supported and horizontally aligned.
- ▶ Make sure that the suspended ballast pallet is supported with stable and load bearing materials to 0.4 m above the placement level of the crane, support **U**.
- ▶ Make sure that the support **U** of the suspended ballast pallet has a minimum width of 4.0 m.
- ▶ Make sure that the distance of 16.0 m is retained between the suspended ballast support **U** to the center of rotation of the crane.
- ▶ Make sure that the maximum permissible incline of the main boom angle of -5° is not exceeded at boom assembly / disassembly.
- ▶ Make sure that the maximum permissible deflection of the respective boom system of 1.0 m is not being exceeded, see the following chart and detail **X**.
- ▶ Make sure that all movements of the crane are actuated slowly and anticipatorily.
- ▶ Support the boom systems with suitable material of sufficient load bearing capacity.

Maximum permissible deflection of boom system		
Boom system	Length	Maximum permissible deflection at X
SL7DHS	126.0 m to 147.0 m	1.0 m

NOTICE

Damage to crane!

If the support of the boom system at **X** is not carried out properly and in the required height, then the boom system can be damaged due to excessive deflection.

- ▶ Make sure that the support at **X** is carried out in such a way that the deflection does **not** exceed the maximum permissible value.



Note

- ▶ Disassemble the SL7DHS-boom according to Crane operating instructions, chapter 5.39.



WARNING

The crane can topple over!

If the suspended ballast is lifted by the more than the maximum permissible 0.25 m off the support **U**, then the crane can be topple to the rear if the load rips off.

- ▶ Do not lift the suspended ballast by more than 0.25 m off the support **U**.

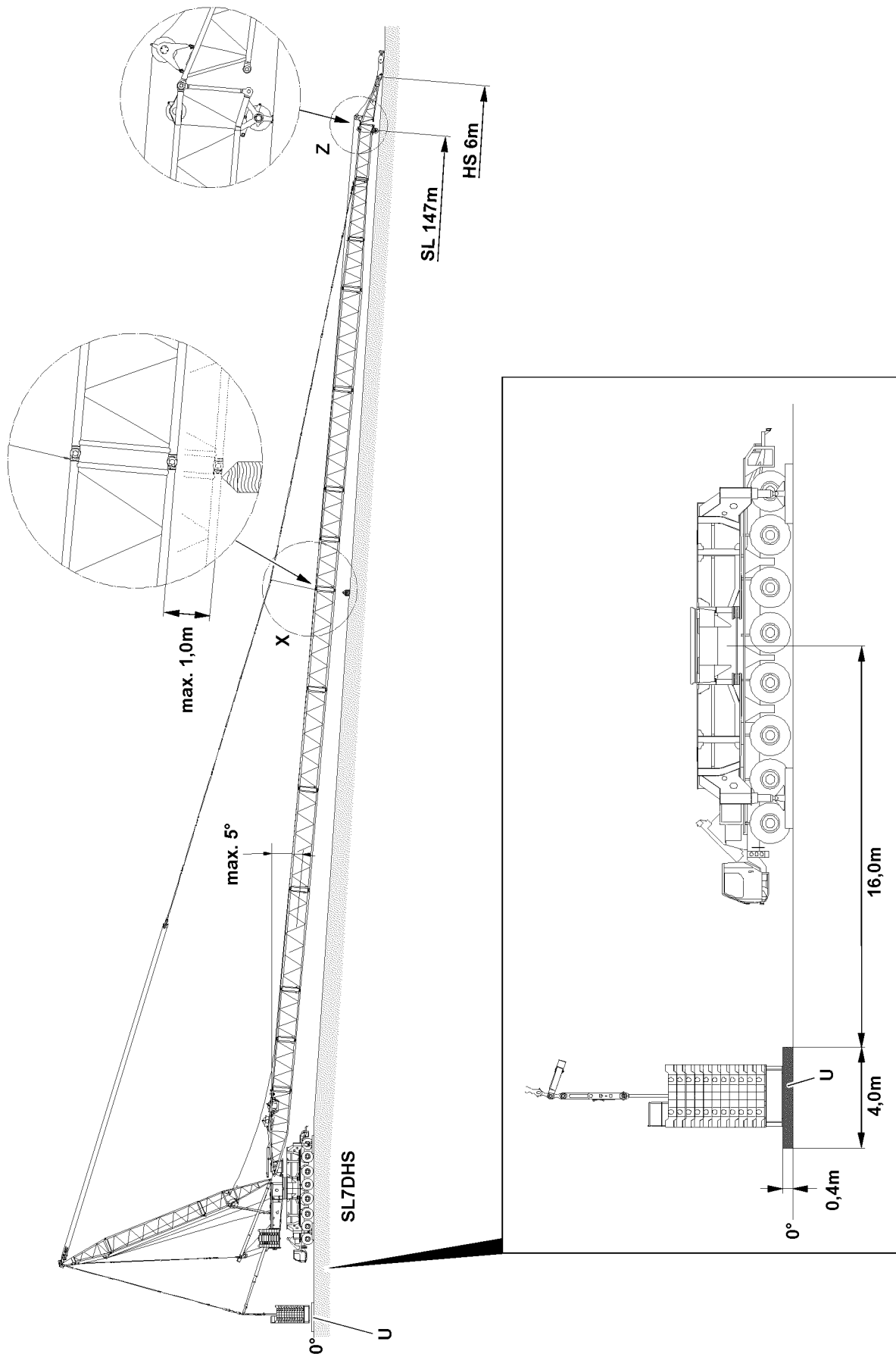


Fig.120891

Make sure that the following prerequisites are met:

- The suspended ballast is lifted off from the support **U**.
- The derrick boom is on 63.4° (derrick radius of 13.0 m).
- The support on the main boom is properly set up, pay attention to the maximum permissible deflection.



DANGER

The crane can topple over!

In crane operation with exceeded LICCON overload protection, the crane can topple over.

Personnel can be severely injured or killed.

- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.



WARNING

The crane can topple over!

If the specifications in the erection and take down charts are disregarded, the crane can topple over.

Personnel can be severely injured or killed.

- ▶ Observe the Erection and take down charts.

- ▶ Luff the main boom down to the „lowest operating position“.

Result:

- The luff down movement is turned off.
- The „STOP“ icon appears on the LICCON monitor.
- The „horn“ icon appears on the LICCON monitor.



WARNING

Overload of crane!

If the main boom is luffed down too far at a derrick boom angle of 63.4°, then the crane can be overloaded.

Personnel can be severely injured or killed.

- ▶ Luff the main boom down to maximum 5°.

- ▶ Luff the main boom down to 5°.



WARNING

Danger of accident due to boom!

During the derrick boom adjustment, if the main boom is luffed down at the same time, then dangerous situations can arise.

Personnel can be severely injured or killed.

- ▶ Make sure during the adjustment of the derrick boom to 68°, that the main boom is held to 5°.
- ▶ Make sure that the supports of the main boom are properly made, pay attention to the chart with the maximum permissible deflection of the boom system.

When the main boom is at 5°.

- ▶ Set the derrick boom to 68°.

When the derrick boom is at 68°:

- ▶ Place the main boom down to maximum -5° to the horizontal.

When the main boom is properly placed down:

- ▶ Set the suspended ballast pallet down on the ground.
- ▶ Disassemble the boom system, see section „Disassembling the SLD/SD-boom“.
- ▶ Disassemble the suspended ballast, see Crane operating instructions, chapter 5.36.

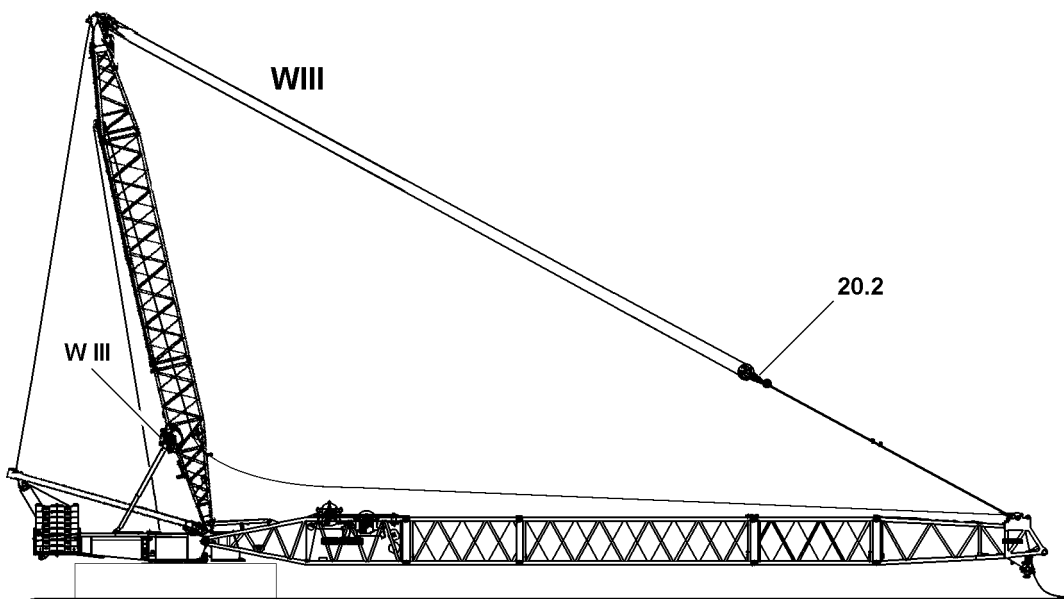
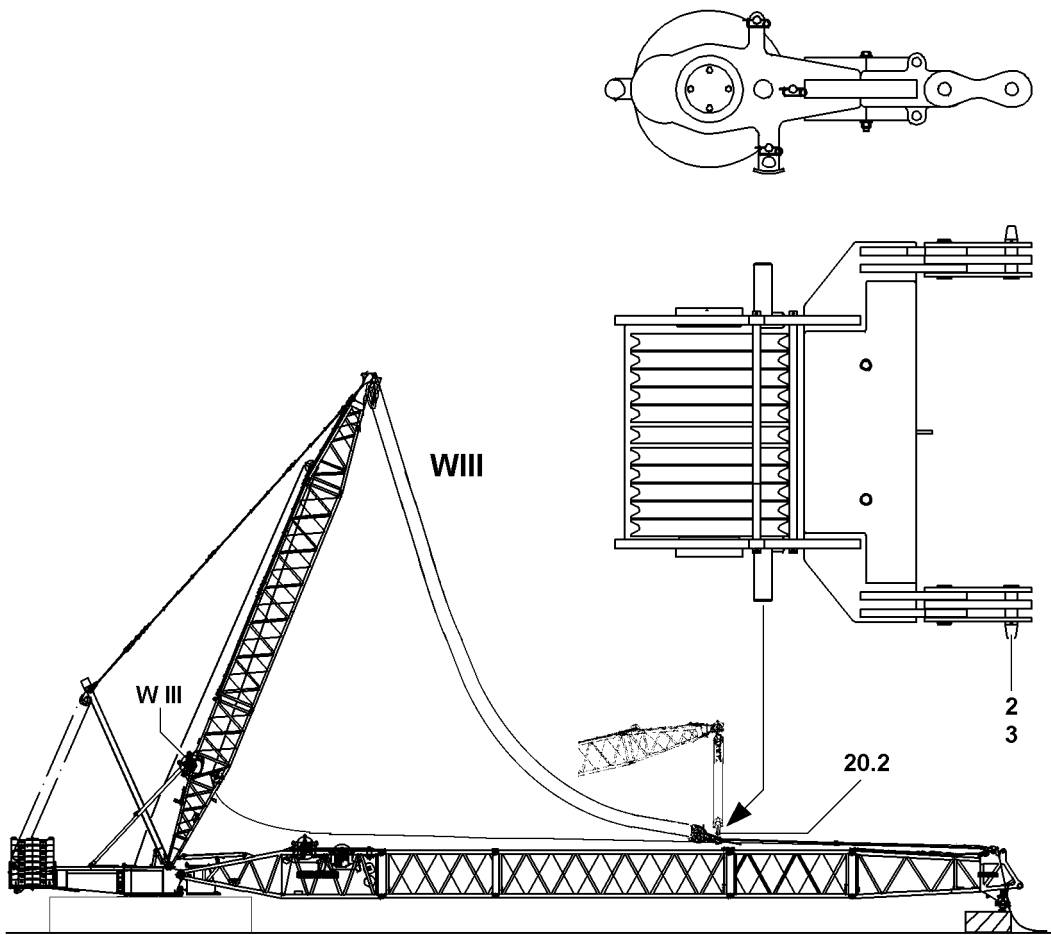


Fig.112062

LWE/LR 1750-000/12812-15-02/en

6.3 Disconnecting the electrical connections

Make sure that the following prerequisite is met:

- The S-boom is placed on the support / supports.

NOTICE

Damage to cable drum or cable!

If the cable of the cable drum is not properly spooled up on the cable drum after unplugging the S-end section, then the cable drum or the cable can be significantly damaged.

- ▶ Spool the cable drum up after unplugging.

-
- ▶ Spool the cable drum up and secure it to prevent inadvertent spooling out.
 - ▶ Disconnect the electrical connections and store the plugs and cables properly.

6.4 Disassembling the guy rods

- ▶ Relieve the guying: Luff the D-boom down to the front and at the same time spool out winch 3.

When the guying is relieved:

- ▶ Disassemble the auxiliary guying (if present on the boom).
- ▶ Unpin the upper pulley block **20.2** on the guy rods.
- ▶ Place the guy rods on the intermediate sections and secure with transport retainers.
- ▶ Disconnect the guy rods according to their association to the intermediate sections.

NOTICE

Damage to the intermediate sections!

- ▶ Do not pull the upper pulley block **20.2** over the intermediate sections, rather guide them with the auxiliary crane.

When the guy rods are placed in the transport retainers and secured:

- ▶ Erect the D-boom and spool the hoist rope up at the same time.

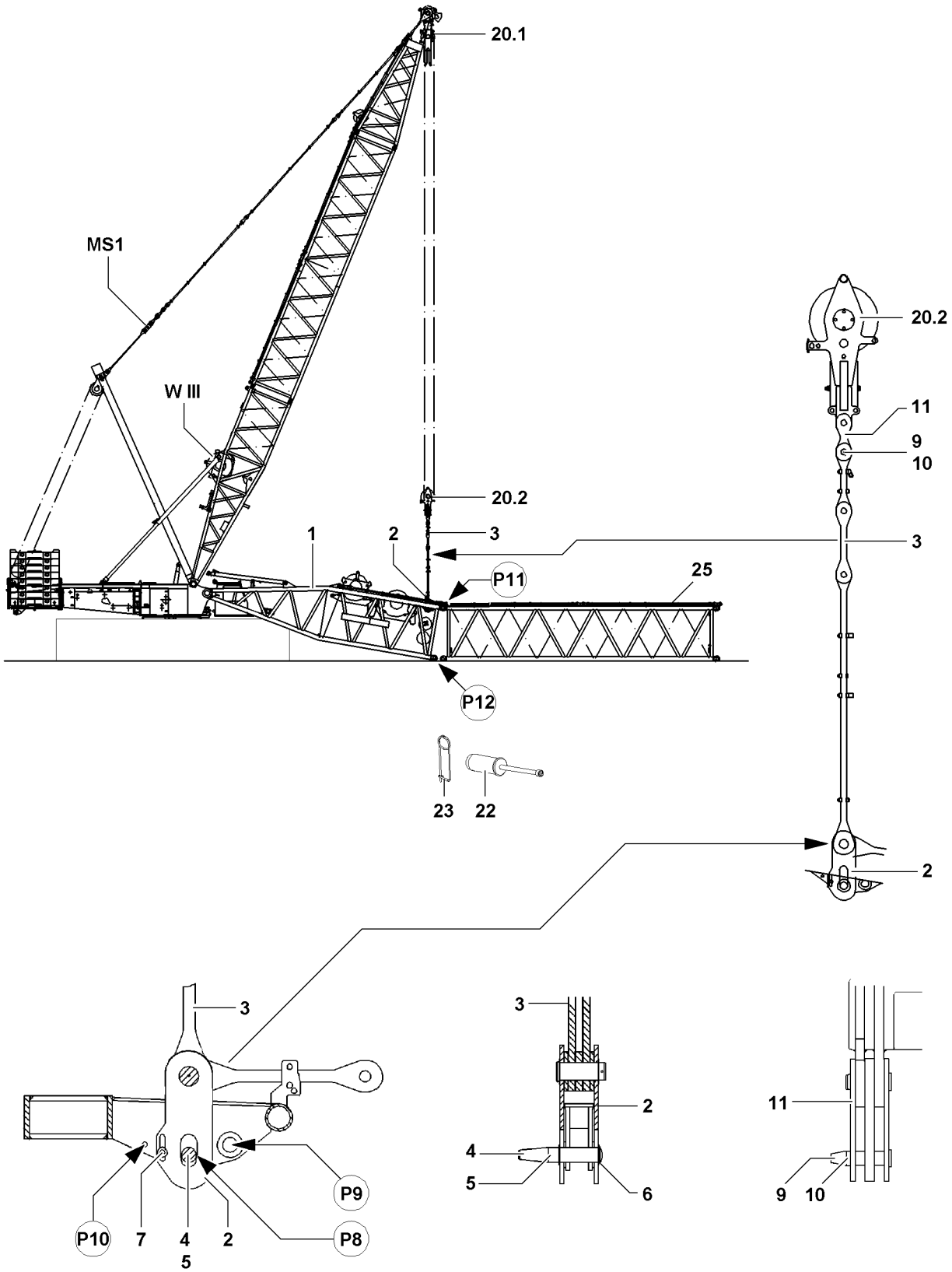


Fig.120032

LWE/LR 1750-000/12812-15-02/en

6.5 Disassembling the S-boom



WARNING

The boom can suddenly fold down!

If the following conditions are not met before disassembling the boom, the boom can fold down. Personnel can be severely injured or killed.

- ▶ Support the S-boom during disassembly with suitable materials.
- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.

Make sure that the following prerequisites are met:

- All electrical and hydraulic connections have been disconnected.
- The auxiliary guying is disassembled.
- The guy rods have been disassembled and placed in the transport retainers.
- ▶ Lower the upper pulley block **20.2** until it is over the assembly brackets **2** on the S-pivot section **1**.
- ▶ Pin and secure the upper pulley block **20.2** with the guy rods **3**: Pin and secure the assembly bracket **2**. Use pin **4**, washer **6** and spring retainer **5**.



WARNING

The crane can topple over!

If the following conditions are not met, the crane can topple over or be significantly damaged. Personnel can be severely injured or killed.

- ▶ The maximum permissible total force on test point **MS1** may **not** be exceeded.
- ▶ Lifting the following boom length is permissible if the maximum permissible total forces on test point 1 (MS1) are observed, observe the following chart.



Note

- ▶ The ACTUAL force on test point **MS1** is shown on LICCON monitor 1.
- ▶ Tension the guy rods on the SA-frame with the same force as during the assembly.
- ▶ For this, refer the ACTUAL force at the test point (MS1) measured and recorded during the assembly.
- ▶ The pins can be pulled easier and the pins and lugs are therefore not damaged.



Note

- ▶ Unpin the intermediate sections with the pin pulling device, see Crane operating instructions, chapter 5.30.

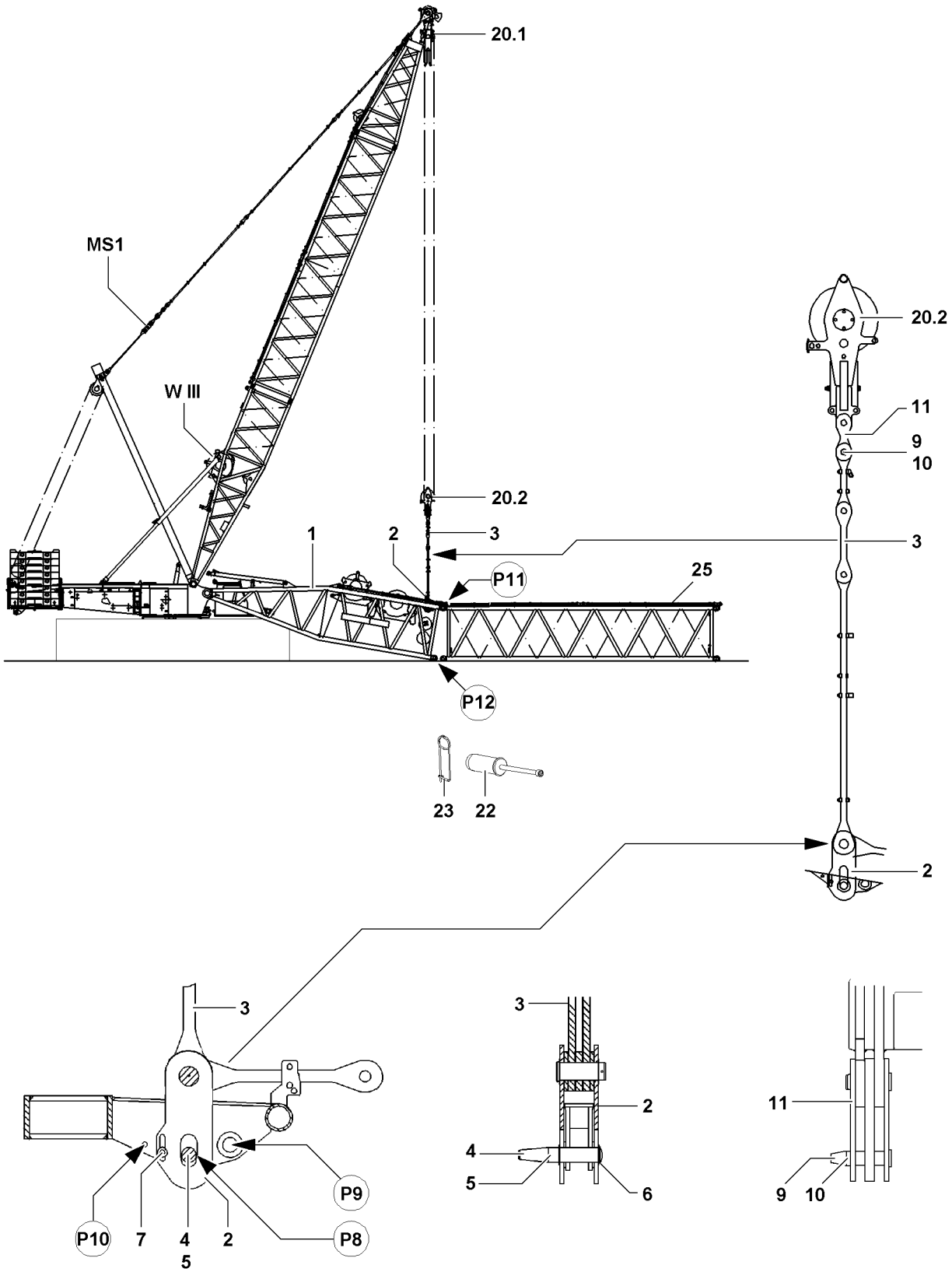


Fig.120032

LWE/LR 1750-000/12812-15-02/en

NOTICE

Danger of property damage!

If the maximum permissible total forces is not observed when lifting the boom system for disassembly, then crane components can be severely damaged.

- ▶ Reassemble long booms to the required length for flying disassembly on the ground.
- ▶ Do not exceed the maximum permissible total forces.

-
- ▶ Lift the S-boom from the supporting base or off the ground by spooling up winch 3.

When the S-boom has been lifted off the ground and is safely held by winch 3:

- ▶ Unpin the S-pivot section **1** and S-intermediate section **25** at point **P12** on both sides: Remove the locking pin **23** and unpin the pin **22**.

When the pins **22** are unpinned at point **P12**:

- ▶ Carefully place the S-boom on the ground.

When the S-boom is laying on the ground:

- ▶ Unpin the S-pivot section **1** and S-intermediate section **25** at point **P11** on both sides: Remove the locking pin **23** and unpin the pin **22**.
- ▶ Remove the S-intermediate section **25** with the auxiliary crane.
- ▶ Unpin the upper pulley block **20.2** on the guy rods **3**: Remove the spring retainer **10** and unpin the pin **9**.
- ▶ Place and secure the guy rods **3** in the transport receptacles on the S-pivot section.

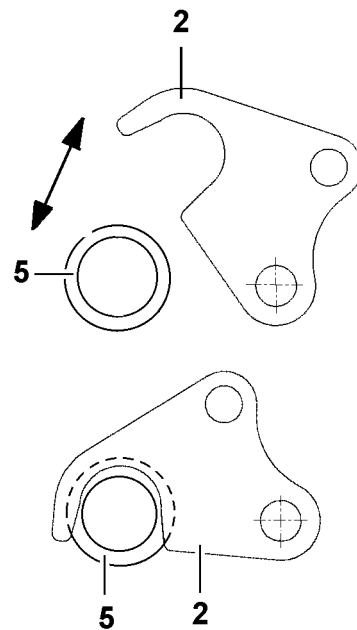
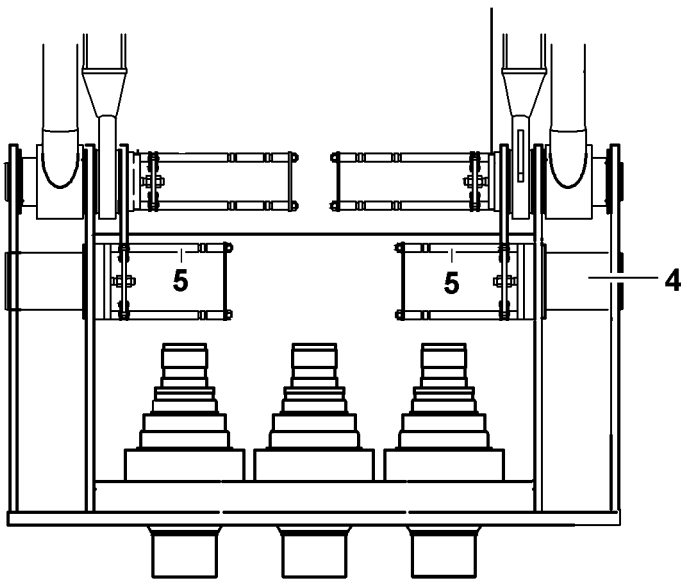
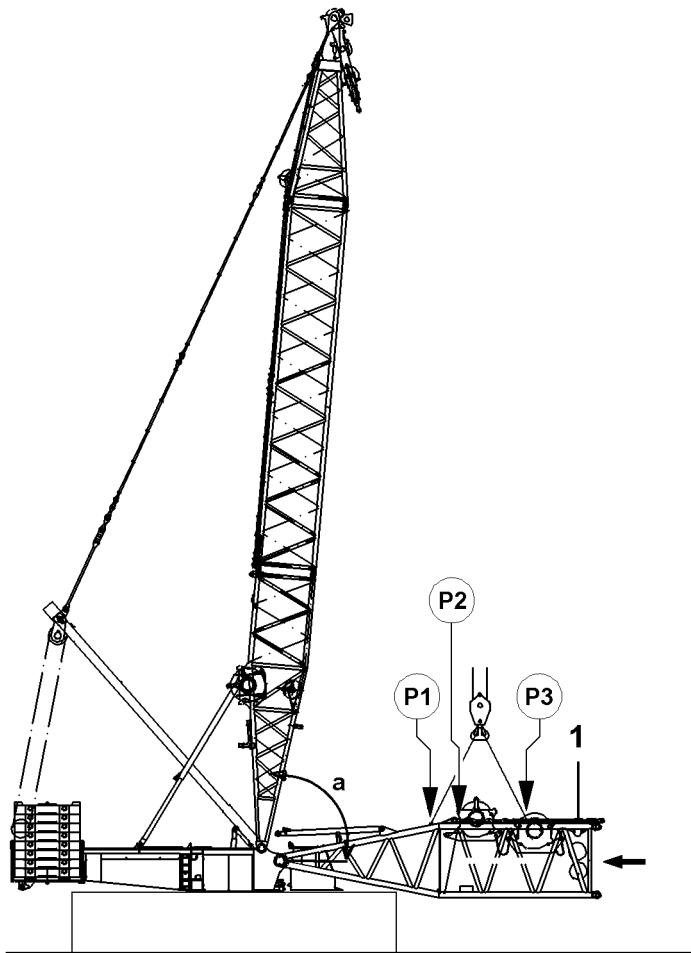


Fig.120031

LWE/LR 1750-000/12812-15-02/en

6.6 Unpinning the S-pivot section on the turntable



WARNING

General danger notes!

- ▶ Insert and secure all pins after disassembly in the intended transport receptacles.

Make sure that the following prerequisites are met:

- The D-boom is erected to the point where the S-pivot section can be disassembled without obstructions.
- The guy rods are separated from the S-pivot section to the upper pulley block and placed in the transport receptacles and secured.



Note

- ▶ Select the fastening points on the S-pivot section in such a way that the S-pivot section hangs horizontally on the auxiliary crane at assembly. See section „Fastening points“.

- ▶ Attach the S-pivot section **1** on the fastening points **P1** and fastening points **P3** on the auxiliary crane.

or

Attach the S-pivot section **1** on the fastening points **P1** and fastening points **P2** on the auxiliary crane.

- ▶ Lift the S-pivot section **1** with the auxiliary crane to the horizontal.
- ▶ Establish the hydraulic connection to the pin pulling device.



WARNING

Falling pivot section!

- ▶ Make sure that the S-pivot section is safely held by the auxiliary crane before unpinning the pins **4**.

When the S-pivot section is safely held by the auxiliary crane:

- ▶ Release the pin **4**: Fold the retaining hook **2** out.
- ▶ Hook the pin pulling cylinder **6** in the receptacles.



Note

- ▶ The pin pulling cylinders are actuated with the radio remote control.

- ▶ Unpin the connector pins **4** on both sides with the hydraulic pin pulling cylinder **6**.

When the connector pins **4** are fully unpinned on both sides:

- ▶ Secure the connector pin **4**: Fold the retaining hook **2** in on the left and right on the guides.
- ▶ Disconnect the hydraulic connections to the pin pulling device.

NOTICE

Damage of the turntable and the S-pivot section!

- ▶ Slowly swing the S-pivot section out with the auxiliary crane and at low speed on the turntable.
- ▶ Before placing it on the ground, support the S-pivot section.

- ▶ Place the S-pivot section with the auxiliary crane on the support on the ground.
- ▶ Remove the auxiliary crane.



Note

- ▶ Disassemble the D-boom, see Crane operating instructions, chapter 5.05.

Fig.195219

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1 Component overview



WARNING

Danger of accident!

At assembly of the boom, the composition of the lattice sections for the boom systems must be observed.

If this is not observed, there is an increased danger of accidents.

- ▶ The welded on tags on the intermediate sections with the system identifications must be strictly observed.
-

The HS-operating modes consist of S- or L-lattice sections and additional adapter for auxiliary jib and assembled auxiliary jib HS.

The operating mode SL2 is viewed as a pure SL-operating mode. It has no roller set on the „Adapter for the auxiliary jib“, just the roller set on the auxiliary jib HS.

The other operating modes differ in the composition of the lattice sections for the respective boom systems, the guy points of the auxiliary guying and in the different maximum load capacities on the „Adapter for the auxiliary jib“ (100 t or 120 t) or the different maximum load capacities on the auxiliary jib HS (100 t or 120 t).

1.1 SL-operating modes with assembled auxiliary jib

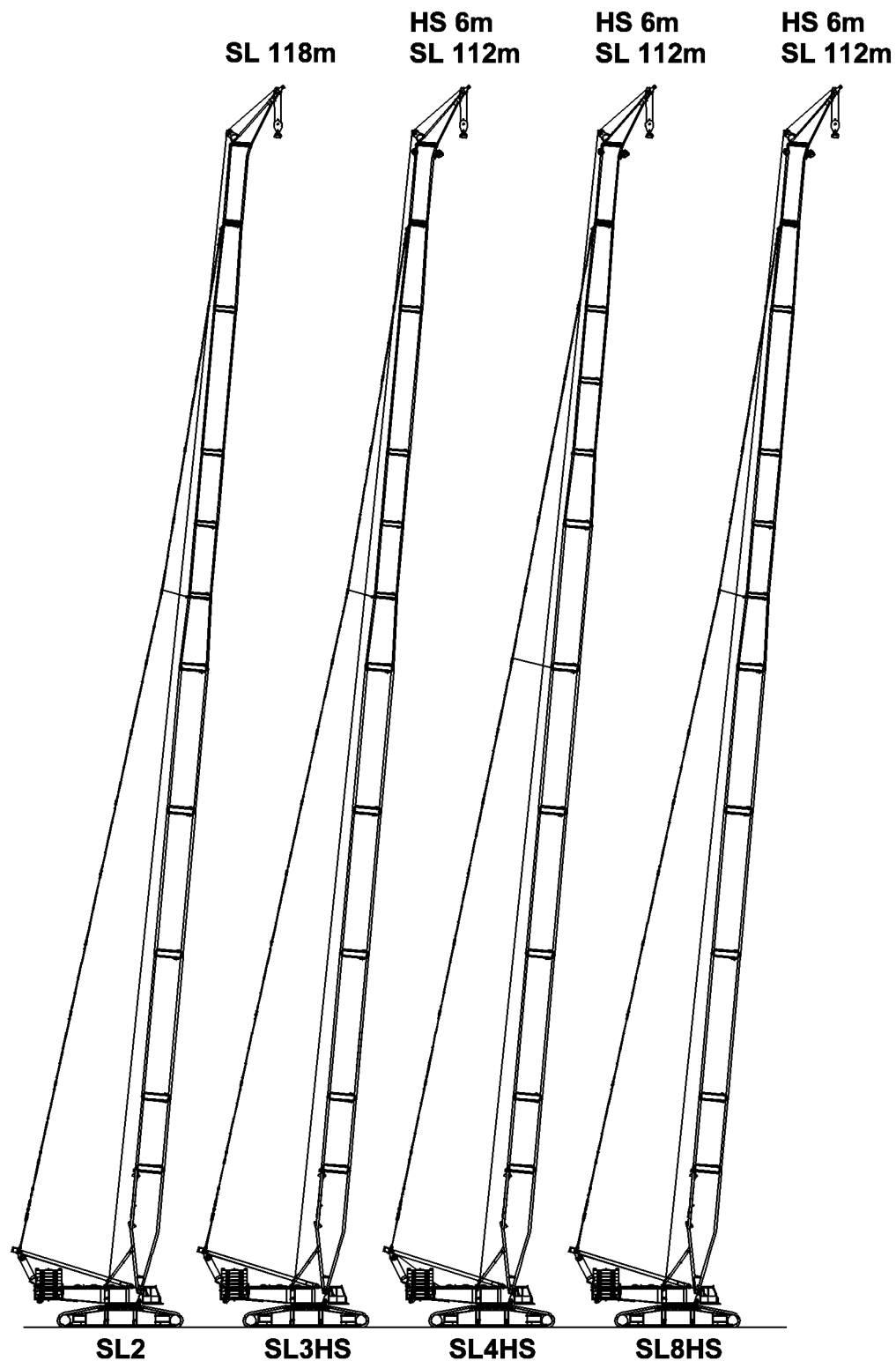


Fig.144252: SL-operating modes with auxiliary jib

Operating mode: SL2
Operating mode: SL3HS

Operating mode: SL4HS
Operating mode: SL8HS

Operating modes	Adapter			Auxiliary jib		Derrick B / BW (only for erection)
	without roller set	with roller set 100 t	with roller set 120 t	with roller set 100 t	with roller set 120 t	
SL2	X			X		
SL3HS		X		X		
SL4HS			X		X	
SL8HS			X		X	

1.2 SL-operating modes with derrick and assembled auxiliary jib

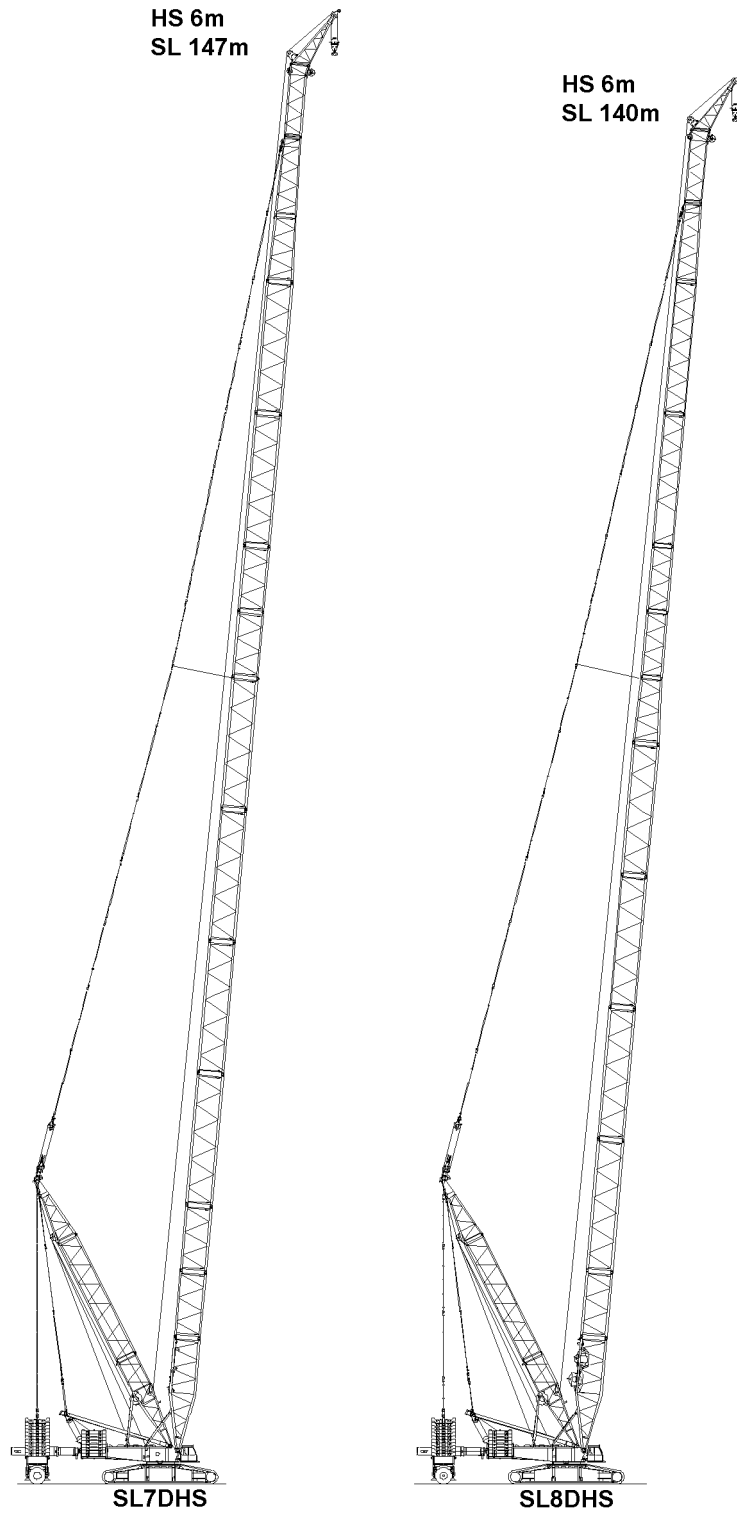


Fig.144253: SL-operating modes with derrick and auxiliary jib

Operating mode: SL7DHS

Operating mode: SL8DHS

LWE/LR 1750-000/12812-15-02/en

Operating modes	Adapter			Auxiliary jib		Derrick B / BW (only for erection)
	without roller set	with roller set 100 t	with roller set 120 t	with roller set 100 t	with roller set 120 t	
SL7DHS			X		X	X
SL8DHS			X		X	X
SDW2HS			X		X	X

1.3 Components

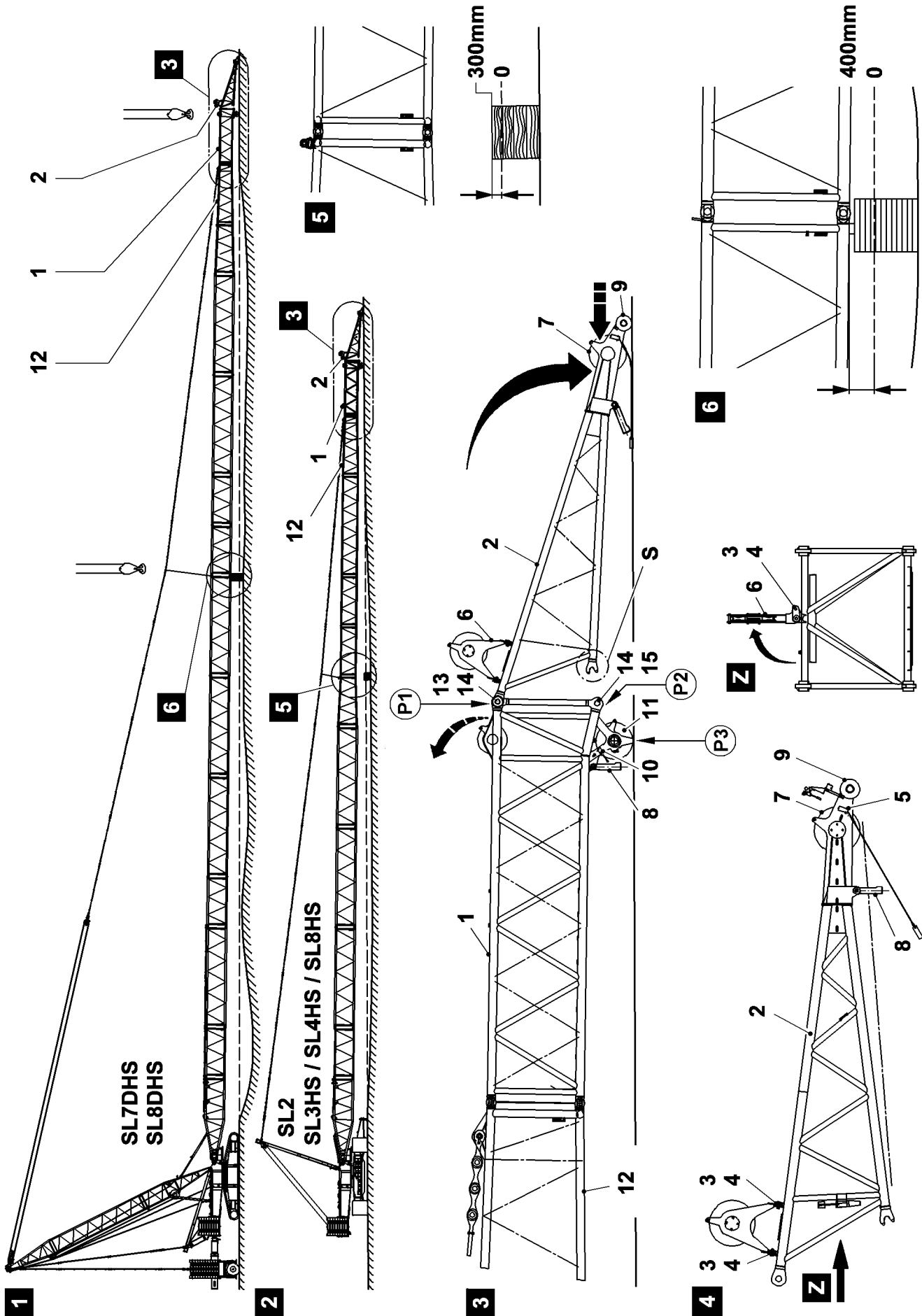


Fig.144254

Position	Description	Weight
1	Adapter for auxiliary jib 100 t / 120 t	3.66 t
2	Auxiliary jib 100 t / 120 t	2.50 t
3	Pin 30 mm x 95 mm	
4	Spring retainer 3 mm	
5	Hoist limit switch	
6	Pulley retainer	
7	Roller set Auxiliary jib HS	
8	Rope fixed point (rope lock)	
9	Track roller	
10	Hoist limit switch	
11	Roller set adapter	
12	L-adapter	5.3 t
13	Pin 90 mm x 200 mm	
14	Spring retainer 8 mm	
15	Pin 100 mm x 180 mm	

2 Assembling the auxiliary jib



DANGER

The crane can topple over!

The boom combinations must be assembled according to the „Separately supplied set up drawings“. Any other arrangement of the lattice sections and the guy rods than specified in the set up drawings is prohibited.

At assembly of the intermediate sections, it must be observed that they are assembled according to their identification.

- ▶ Assemble the lattice sections and guy rods as noted in the set up drawings.



WARNING

Danger of falling!

During assembly and disassembly, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, personnel could fall and suffer life-threatening injuries.

- ▶ All assembly work from a height of 2 m must normally be carried out using suitable aids (lifting platforms, scaffolding, ladders, auxiliary crane etc.). The height above which assembly / disassembly work must be carried out with aids depends on national regulations. The national regulations must be adhered to.
- ▶ If work cannot be carried out using these aids or from the ground, the assembly personnel must be protected from falling with suitable means (such as safety belts, work platforms).

**DANGER**

Danger of accident at assembly / disassembly of booms!

When you disassemble unsecured or unsupported booms, then the booms can fall down and kill or severely injure personnel.

- ▶ Never unpin the pins under unsecured or unsupported booms.
- ▶ Never unpin the connecting pins on unsecured or unsupported booms.
- ▶ Do not stand under the booms or within the complete danger zone during the pinning and unpinning procedure of the booms.
- ▶ Secure the pins in the bearing points as well as in the receptacles.
- ▶ Do not lean the ladder against the component being disassembled.

**DANGER**

Falling components!

If a component is assembled or disassembled without it being secured with the auxiliary crane to prevent it from falling, the component can fall and kill personnel.

- ▶ Secure components before disassembly with the auxiliary crane to prevent them from falling.

2.1 Assembly

**WARNING**

The crane can topple over!

Erect the boom combinations according to the data in the erection and take down charts.

If this is not observed, the crane can topple over.

- ▶ Erect the SL- / SLD boom combinations according to the data in the erection and take down charts.

Make sure that the following prerequisites are met:

- The SL-booms are assembled according to the set up drawings on the crane.
- The SLD-boom is assembled according to the set up drawings on the crane.
- The required SL-boom length is assembled.
- The SL-boom is guyed on the L-adapter **12**, see illustration **1**, illustration **2**, illustration **3**.
- The SL(D)-boom (SL3HS / SL4HS / SL8HS / SL7DHS / SL8DHS), for the assembly of the auxiliary jib HS, is laying additionally on the support legs on point **P3** of the adapter **1** for the auxiliary jib. The support legs are located on the pulley bearing of the adapter for the auxiliary jib, see illustration **1**, illustration **2**, illustration **3**.
- The adapter **1** for the auxiliary jib HS **2** is pinned and secured on the L-adapter **12**, see illustration **2**.
- ▶ Hang the auxiliary jib HS **2** on the auxiliary crane.
- ▶ Pin and secure the auxiliary jib HS **2** on the adapter for the auxiliary jib **1** on top on point **P1**, see illustration **3**.
- ▶ Pin the pin **13** with the pin pulling device and secure with spring retainer **14**, see illustration **3**.
- ▶ Place the auxiliary jib HS **2** with the auxiliary crane on the ground, see illustration **3**.
- ▶ Remove the auxiliary crane.
- ▶ Insert the pin **15** on the bottom at point **P2** on the adapter for the auxiliary jib and secure with spring retainer **14**, see illustration **3**.
- ▶ Erect the pulley retainer **6** on the auxiliary jib **2**, pin and secure. Use the pin **3** and spring retainer **4**, see illustration **4** and illustration **Z**.
- ▶ Pull the hoist rope over the rope pulley in the pulley retainer **6** to the rope pulley **7** on the auxiliary jib HS **2**, see illustration **3** and illustration **Z**.
- ▶ Luff the SL- / SLD-boom up slowly.

Result:

- The auxiliary jib HS **2** runs on the rollers **9** to the inside, see illustration **3**.

- ▶ Luff up the SL-boom until the auxiliary jib HS **2** has lifted off the ground.

Result:

- The fork head **S** supports itself on the pin **15** at point **2**, see illustration **3**.

- ▶ Luff the boom up to the operating position, according to the load chart.



CAUTION

The auxiliary jib can be damaged!

After the auxiliary jib HS 2 is lifted off the ground, the SL- / SLD-boom must be luffed down carefully or placed down.

When placing it on the ground, the auxiliary jib HS 2 folds automatically from the fork connection and runs outward on the rollers 9.

If this is not observed, the auxiliary jib HS 2 can be damaged.

- ▶ Luff down or place the auxiliary jib HS 2 down carefully.
-
- ▶ Luff or place the SL- / SLD-boom down carefully.

2.2 Establishing the electrical and hydraulic connections on the boom system

2.2.1 Establishing the electrical connections

NOTICE

Danger of damage of electrical connections!

If the electrical connection between the terminal box and the S-pivot section and the cable drum in the S-pivot section is established before the auxiliary jib is installed and electrically connected, then the electric connection can be damaged.

- ▶ Make sure that the electric connection between the terminal box in the S-pivot section and the cable drum in the S-pivot section is only established **after** assembly and the connection of the electric wiring for the auxiliary jib.



Note

- ▶ To establish the electrical connections on the boom system: Use the Electrical wiring diagram.

Make sure that the following prerequisites are met:

- The boom system is completely assembled and placed on the substructure
- ▶ Establish the electrical connections.
- ▶ Make sure that all electrical connections on the boom system are established.



WARNING

Malfunction if dummy plugs are not installed!

If the dummy plugs on the non-required electrical connections are not installed, then malfunctions or functional limitations can occur on the crane.

- ▶ Make sure that all non-required electrical connections, which have a dummy plug are closed off with dummy plugs.
 - ▶ Pay attention to the Electrical wiring diagram.
-
- ▶ As a rule, close off on-required electrical connections (for example for accessories which cannot be installed) with the respective dummy plugs.

NOTICE

Property damage due to dirt and / or corrosion!

If non-required electrical connections are not closed off with the respective protective caps, then dirt and / or corrosion can damage the electrical connections.

This could result in malfunctions.

- ▶ Make sure that all non-required electrical connections are always closed off properly.
 - ▶ Pay attention to the Electrical wiring diagram.
-
- ▶ Close electrical connections, which have no dummy plugs, properly off with the corresponding protective caps.

2.2.2 Establishing the hydraulic connections

When connecting and releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.



DANGER

Danger of accident due to loss of pressure or leakage!

Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.

- ▶ Check that the quick couplings have been properly connected before using the crane.



Note

- ▶ To connect or release the hydraulic lines with quick couplings, see Crane operating instructions, chapter 5.01.

- ▶ Release the pressure in the hydraulic system before connecting or disconnecting. Turn the engine off and wait for short time.
- ▶ Assembling coupling components (sleeve and connector) by using knurled nut.
- ▶ Connect coupling components.

2.3 Checking the function of the safety equipment



WARNING

Non-functioning safety equipment!

If the function of the safety equipment is defective, personnel can be severely injured or killed.

- ▶ Crane operation with non-functioning safety equipment is **prohibited**.



Note

- ▶ The function of the individual limit switches must be checked before erection.
- ▶ The function of the limit switch initiators must be checked in the test system, see separate „Diagnostics“ manual.



Note

- ▶ If a function check on the limit switches or on the safety equipment does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked. If no visible connection errors or component defects can be found, contact **LIEBHERR** Service.

Make sure that the following prerequisites are met:

- All electrical connections have been made.
- The crane engine is running.
- The corresponding operating mode is set on the LICCON monitor.

2.3.1 Checking the wind speed sensor



Note

- ▶ For HS-operating modes, the wind speed sensor must always be installed and connection, otherwise the LICCON overload protection reports an error.

- ▶ Check the movement and the function of the wind speed sensor.

Result:

- The „wind speed“ icon appears on the LICCON monitor.

2.3.2 Checking the airplane warning light

- ▶ Turn the airplane warning light on and check the function visually.

2.3.3 Checking the hoist limit switch

**Note**

▶ When replacing or changing a hoist limit switch (HES), the corresponding hoist limit switch must have the correct bus address and the correct software version in order to be detected again by the bus system (LSB).

▶ Actuate the hoist limit switch manually on the pulley head.

Result:

- The spool up function of the hoist winch turns off.
- The „Hoist top“ icon appears on the LICCON monitor.
- The limit switch is functioning.

2.3.4 Checking the limit switch S-boom „steepest position“

**Note**

▶ The limit switch functions have to be checked individually before erection.

▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

Result:

- The limit switch is actuated manually.
- The spool up function of winch IV (control winch) turns off.
- The icon „Boom limitation“ appears on the LICCON monitor.
- The limit switch is functioning.

2.4 Erecting the boom

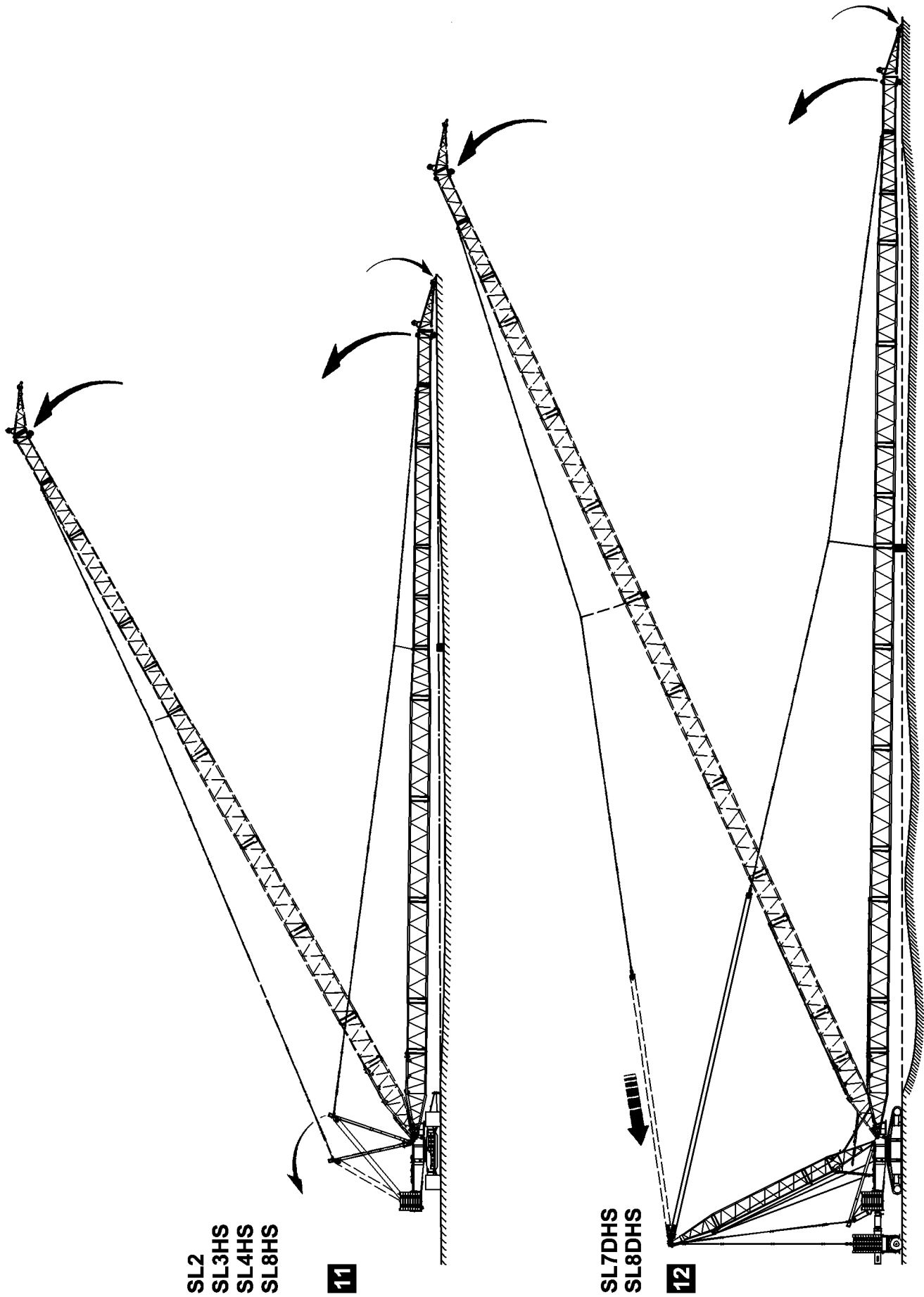


Fig.144255

LWE/LR 1750-000/12812-15-02/en

**DANGER**

The crane can topple over!

If the following notes are not observed, the crane can topple over.

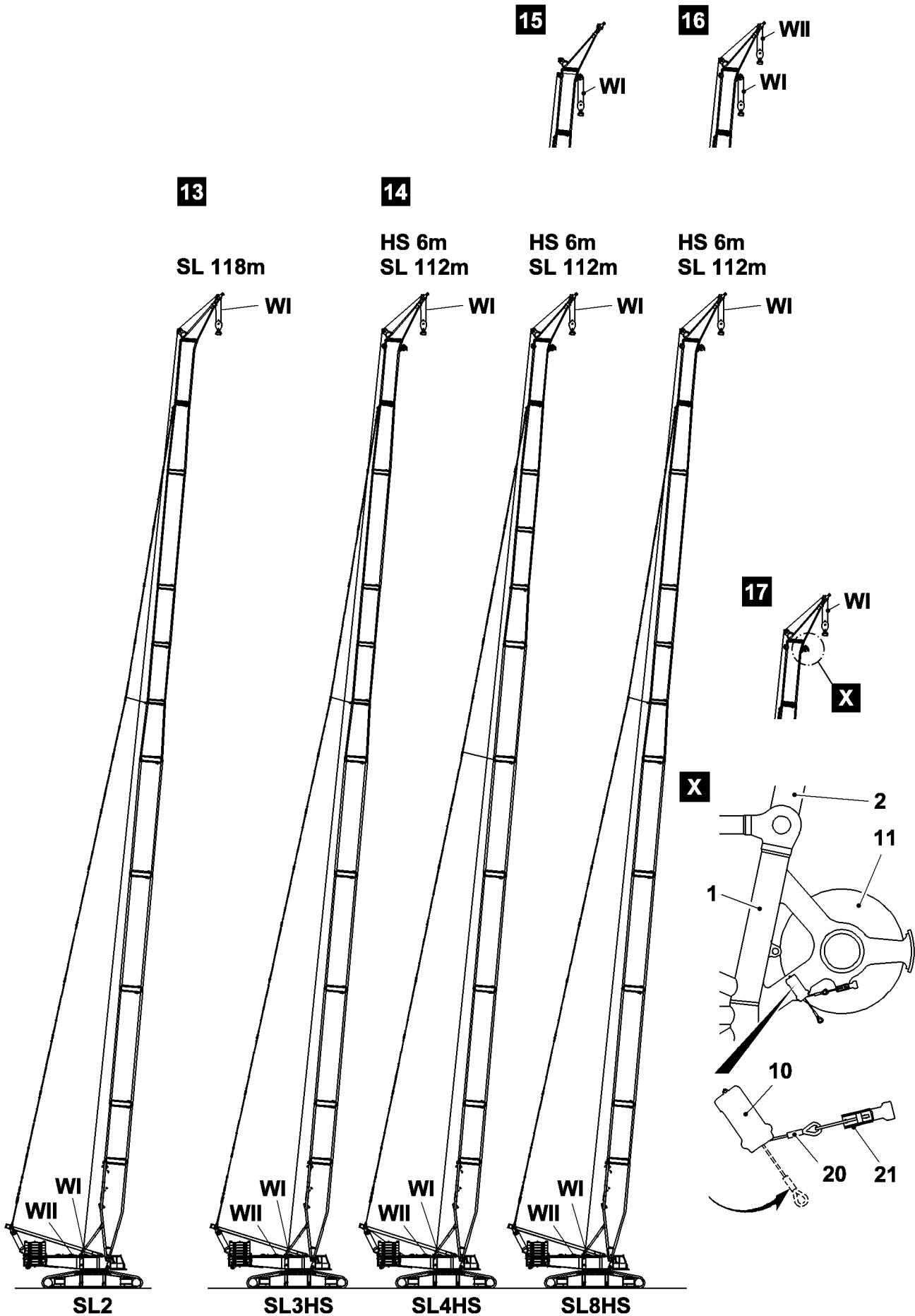
- ▶ The boom combination must be erected according to the information in the erection and take down charts.
- ▶ The SL7DHS-boom combination must always be erected with the derrick ballast, ballast trailer or suspended ballast, according to the erection and take down charts.
- ▶ The SL8DHS-boom combination must always be erected with the derrick ballast, ballast trailer or suspended ballast, according to the erection and take down charts.
- ▶ After erecting the SL7DHS-boom combination into operating position, the entire derrick ballast must be removed from the ballast trailer or from the suspended ballast pallet.
- ▶ After erecting the SL8DHS-boom combination into operating position, the entire derrick ballast must be removed from the ballast trailer or from the suspended ballast pallet.
- ▶ Before starting crane operation, remove the ballast trailer or the suspended ballast pallet from the crane.
- ▶ The crane may only be operated in operating mode SL7DHS when the entire derrick ballast, including the ballast trailer or the suspended ballast pallet has been removed.
- ▶ The crane may only be operated in operating mode SL8DHS when the entire derrick ballast, including the ballast trailer or the suspended ballast pallet has been removed.
- ▶ Before placing the SL7DHS-boom combination down, the ballast trailer or the suspended ballast must be installed on the crane and ballasted according to the erection and take down charts.
- ▶ Before placing the SL8DHS-boom combination down, the ballast trailer or the suspended ballast must be installed on the crane and ballasted according to the erection and take down charts.

**Note**

- ▶ Erection of boom combinations, see also Crane operating instructions, chapter 5.04.

Make sure that the following prerequisites are met:

- The crane is horizontally aligned.
- The suspended ballast or the ballast trailer is installed on the crane.
- All electrical connections have been established.
- All limit switches are functioning.
- The counterweight has been installed to the turntable according to the load chart.
- All pin connections are secured.
- There are no loose parts on the boom.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual set up configuration.



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Fig.108705

3 Operating the crane

3.1 Preparing for crane operation with HS-operating modes



WARNING

The crane can topple over!

- ▶ Check the horizontal position of the crane before and during operation.
- ▶ Make sure to observe the data in the load charts.
- ▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation.
- ▶ If winch 2 **WII** is reeved with small reevings, steep boom positions and small radii of the SL-boom, then the load on the load hook is larger than is shown on the LICCON. The load torque limiter recognizes an overload of the crane too late.



Note

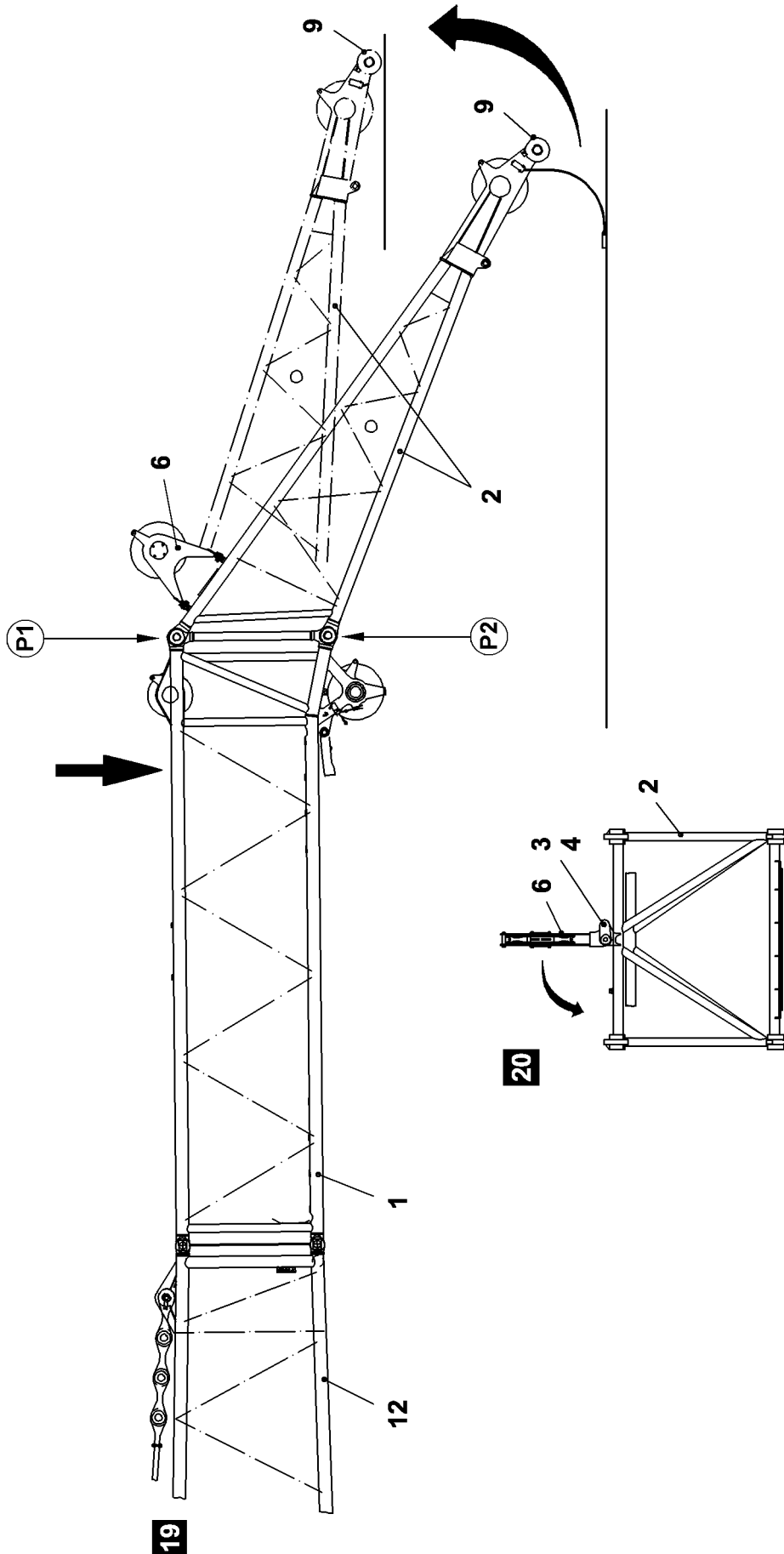
- ▶ In HS-operating modes, the hoist rope from winch 1 **WI** must be reeved on the auxiliary jib **HS**, see illustration 14.
- ▶ For crane operation with reeved in adapter for the auxiliary jib **HS**, reeve in winch 1 **WI**.
- ▶ For two hook operation, winch1 **WI** must be reeved on the adapter for the auxiliary jib and winch 2 **WII** on the auxiliary jib **HS 2**, see illustration 16.
- ▶ The hoist limit switch **10** on the adapter for the auxiliary jib must always be connected on the LICCON computer system, see illustration 17 and illustration X.
- ▶ If no hoist rope is reeved on the adapter for the auxiliary jib in HS-operation modest, then the hoist limit switch **10** must be released on the adapter, see illustration 17 and illustration X.
- ▶ Attach the hoist limit switch rope **20** with hook closure **21** under tension and release the hoist limit switch **10**, see illustration X.

Make sure that the following prerequisites are met:

- The LICCON overload protection has been set according to the data in the load chart.
- The corresponding operating mode is set and confirmed on the LICCON computer system.
- The hoist limit switch **10** on the adapter for the auxiliary jib is connected on the LICCON computer system.

3.2 Checking the settings

- ▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
- ▶ Check the hoist limit switch by running against the hoist limit switch weight.
- ▶ Check the function of the limit switches on the jib stop cylinders.



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Fig.108703

4 Disassembling the auxiliary jib



WARNING

Danger of falling!

During assembly and disassembly, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, personnel could fall and suffer life-threatening injuries.

- ▶ All assembly work from a height of 2 m must normally be carried out using suitable aids (lifting platforms, scaffolding, ladders, auxiliary crane etc.). The height above which assembly / disassembly work must be carried out with aids depends on national regulations. The national regulations must be adhered to.
- ▶ If work cannot be carried out using these aids or from the ground, the assembly personnel must be protected from falling with suitable means (such as safety belts, work platforms).



WARNING

The crane can topple over!

Always ballast and take down boom combinations according to the data in the erection and take down charts.

Before placing the SL7DHS or the SL8DHS boom combination down, the ballast trailer or the suspended ballast pallet must be installed on the crane and ballasted according to the erection and take down charts.

If this is not observed, the crane can topple over.

- ▶ Always ballast and take down boom combinations according to the data in the erection and take down charts!

Make sure that the following prerequisites are met:

- The respective HS-boom combination is placed down.
- The electrical connection to the auxiliary jib HS 2 are disconnected.
- The hoist limit switch weight on the auxiliary jib HS 2 is removed.
- The hoist rope on the auxiliary jib HS 2 is unreeved.
- The auxiliary crane is available.

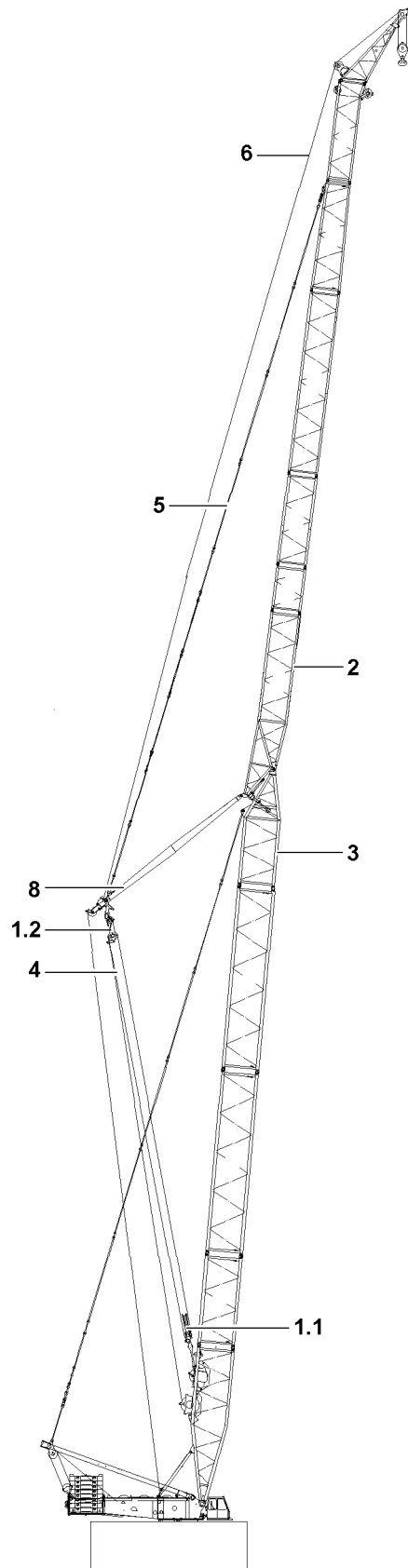
4.1 Disassembly

NOTICE

Damage of auxiliary jib!

The boom combination must be placed down on the ground carefully, so that the auxiliary jib can fold up automatically on the fork connection at point **P2** and move out on the rollers **9**, see illustration **19**.

- ▶ Lower the boom combination carefully on the ground.
- ▶ Release and unpin the pins **3**, see illustration **20**.
- ▶ Fold the pulley retainer **6** down, see illustration **20**.
- ▶ Hang the auxiliary jib HS **2** on the auxiliary crane.
- ▶ Release the pin on top on point **P1** and unpin with the pin pulling device.
- ▶ Remove the auxiliary jib HS **2**.



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Fig.111791

1 Components

The SLK-articulated boom is in crane operation:

- Guyed with the pulley blocks (lower pulley block **1.1** and upper pulley block **1.2**) via the KA-bracket **8** to the S-pivot section.
- Fixed guyed with the guy rods via the KA-bracket **8** to the L-adapter.
- Secured with two mechanical relapse supports.

1.1 SLK-boom

Position	Component	Weight ¹⁾
1	K-pulley block	2.5 t
1.1	Lower pulley block	
1.2	Upper pulley block	
2	K-assembly unit with KA-bracket	15.7 t
3	K-adapter	9.0 t
4	K-adjustment	
5	K-guy rods	
6	Hoist rope	

1) The stated weights are approximate.

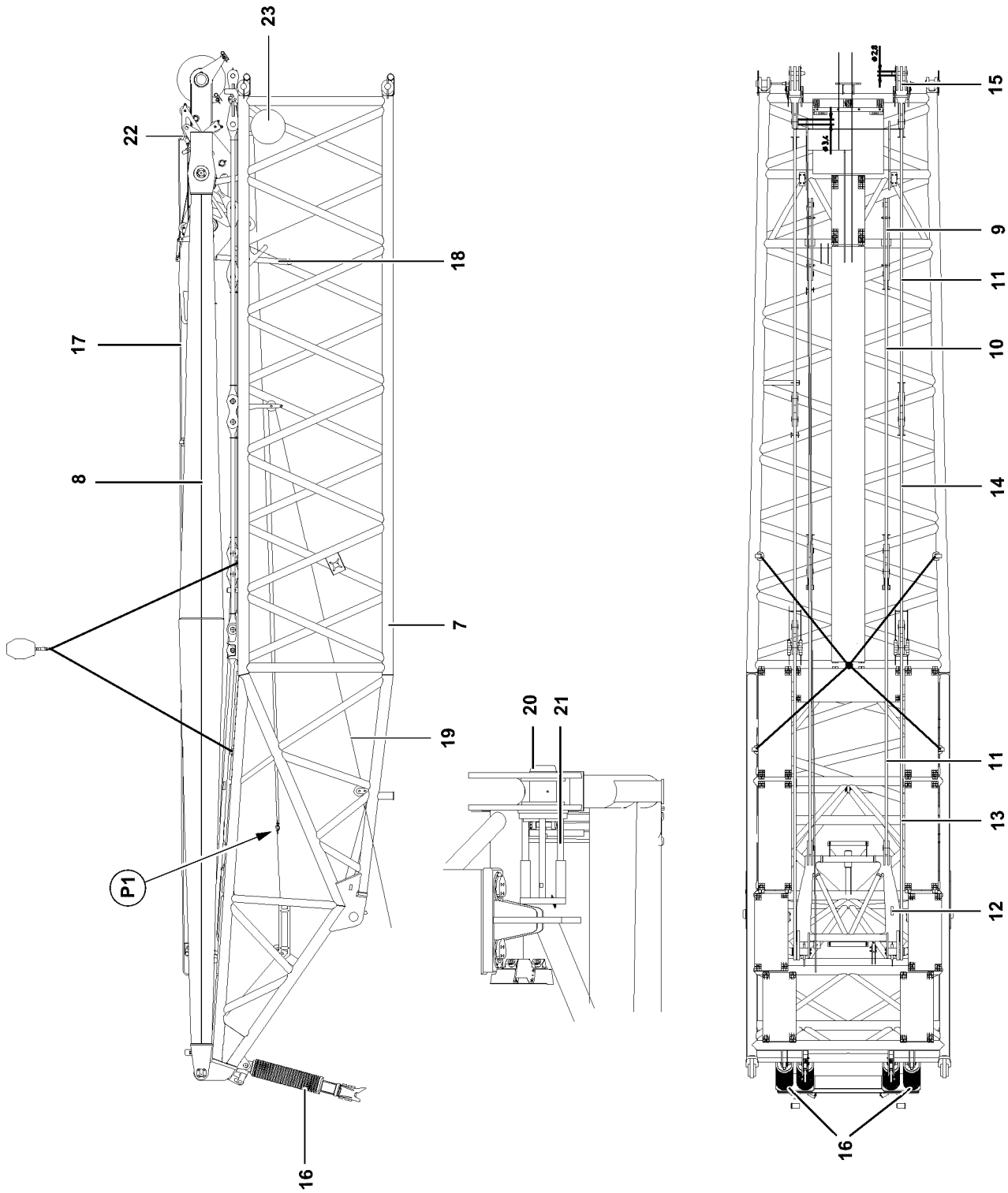


Fig.111793

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1.2 K-assembly unit

Position	Component	Weight ¹⁾
7	K-pivot section	
8	KA-bracket	
9	Lug 1.0 m	
10	Guy rod 4.0 m	
11	Guy rod with lug 4.3 m	
12	Cross bar 1.0 m	
13	Guy rod 4.4 m	
14	Guy rod with lug 3.3 m	
15	Lug 0.7 m	
16	K-relapse retainer, mechanical	
17	Fastening rope 24 m	
18	Assembly support	
19	Rope assembly winch	
20	Pin	
21	Pin pulling device	
22	Hook for pulley block lock	
23	Rope drum, spring loaded	
Total weight:		15.7 t

1) The stated weights are approximate.



Note

Connection point **P1!**

- ▶ In crane operation, the rope of the spring loaded rope drum **23** must be connected with the hook adjustment rope!
- ▶ For assembly, the rope from the assembly winch **19** in the turntable must be connected with the hook adjustment rope!

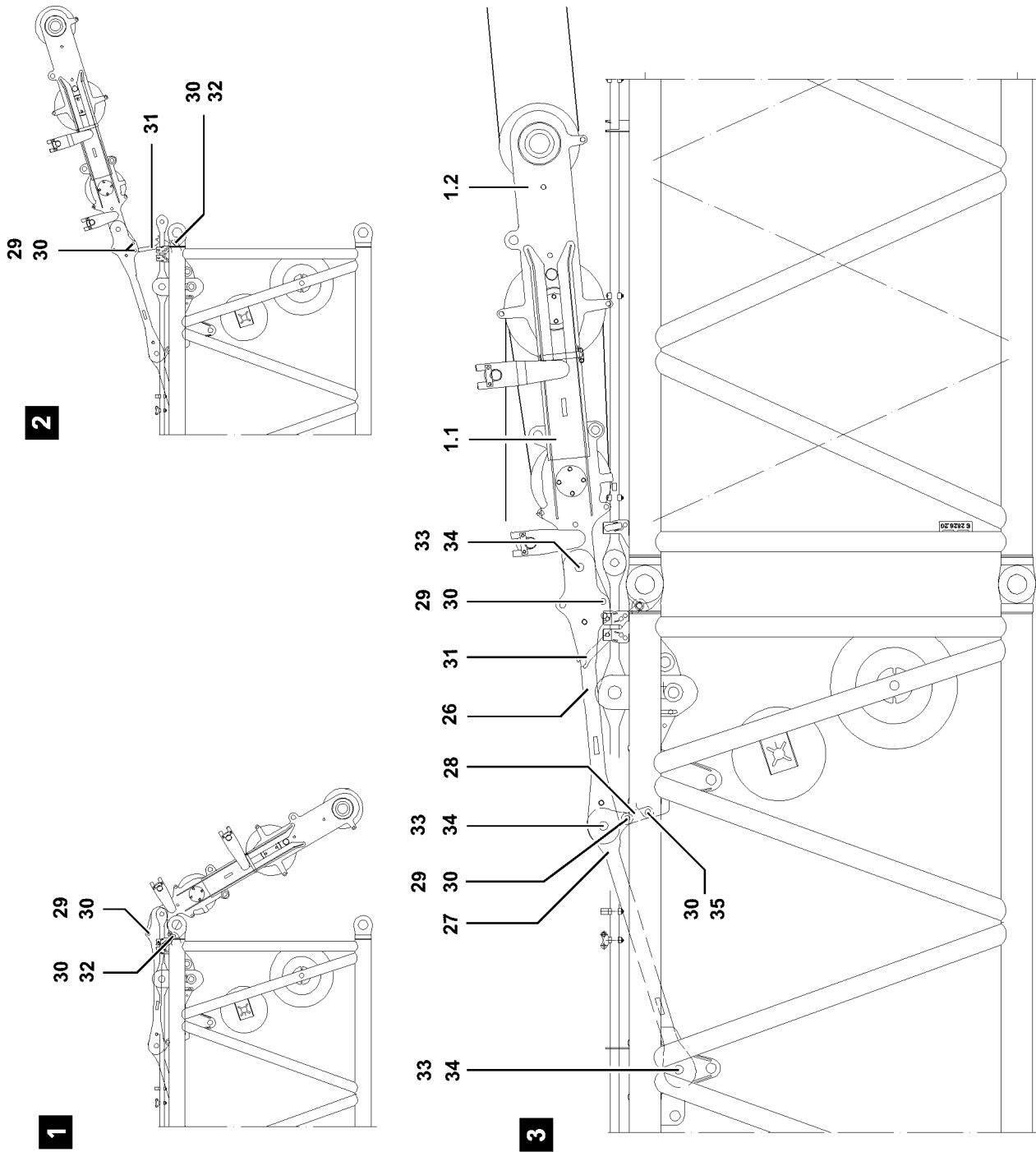


Fig.111792

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1.3 K-pulley block

Position	Component	Weight ¹⁾
26	Guy rod 1.8 m	
27	Guy rod 1.77 m	
28	Support for guy rods	
29	Pin	
30	Spring retainer	
31	Support assembly position	
32	Pin	
33	Pin	
34	Spring retainer	
35	Pin	
Total weight:		2.5 t

1) The stated weights are approximate.



Note

► Pulley block in transport position, see illustration 1!



Note

► Pulley block in assembly position, see illustration 2!



Note

► Pulley block in operating position, see illustration 3!



Note

► In operating position, the support 31 must be folded in!

Fig.195219

LWE/LR 1750-000/12812-15-02/en

2 Assembly



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited!



WARNING

Falling components!

If unsecured or non-supported components are installed or removed, they can fall down! Personnel can be severely injured or killed!

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Support the boom and components before pinning / unpinning!
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ Do not disengage the auxiliary crane until each component is pinned on and secured!
- ▶ It is prohibited to lean a ladder against the component being disassembled!



WARNING

Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

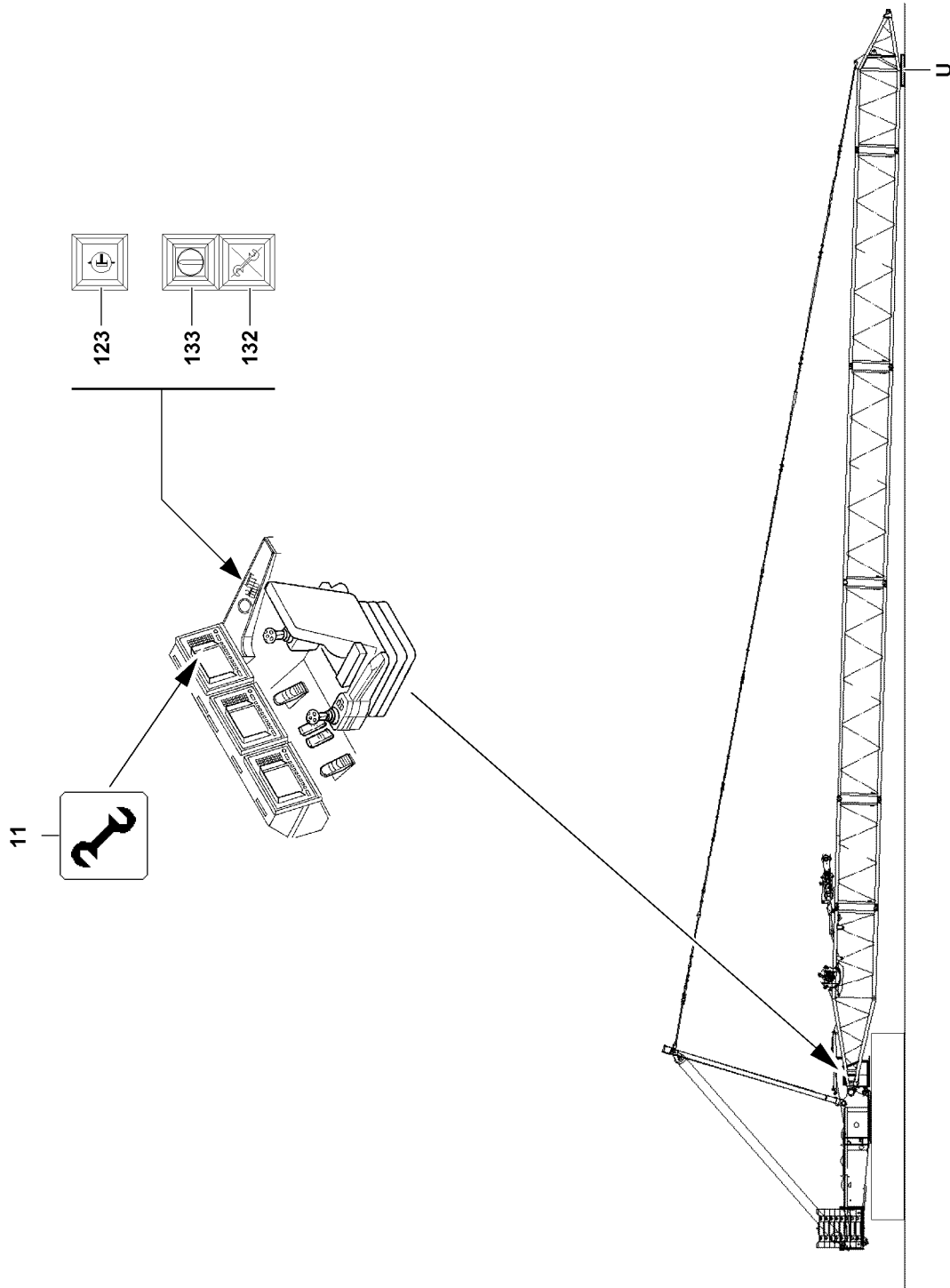


Fig.112037

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**WARNING**

Danger of accident due to incorrect attachment!

Life-threatening situations can arise due to improper or incorrect attachment of the corresponding components!

Personnel can be severely injured or killed!

- ▶ Attach the components on the intended fastening points!

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- The S-boom is assembled, see Crane operating instructions, chapter 5.38.
- The K-boom is assembled on the S-boom.
- The upper pulley block is installed on the S-pivot section.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The counterweight has been installed on the turntable according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual crane configuration.
- The S-boom is laying on the support **U**.

2.1 Exceeding the LICCON overload protection for assembly

**WARNING**

Assembly with activated assembly key button!

If the assembly key button is turned on, the hoist limit switch and the LICCON overload protection is exceeded!

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be severely injured or killed!

This could result in high property damage!

- ▶ The actuation of the assembly key button **133** is only permitted for assembly tasks!
- ▶ The assembly key button **133** may only be operated by persons who are aware of the consequences of a bypass!
- ▶ Press the assembly key button **133** only when the set up status was correctly entered into the LICCON computer system!
- ▶ Observe the erection / take down charts!
- ▶ Crane operation with the assembly key button **133** turned on is strictly prohibited!
- ▶ After assembly work is completed, the assembly key button **133** must be pulled immediately and turned over to an authorized person!

- ▶ Turn the assembly key button **133** to the right.

Result:

- The LICCON overload protection is exceeded.
- The hoist limit switches are bypassed.
- The assembly icon **11** appears on the LICCON monitor.

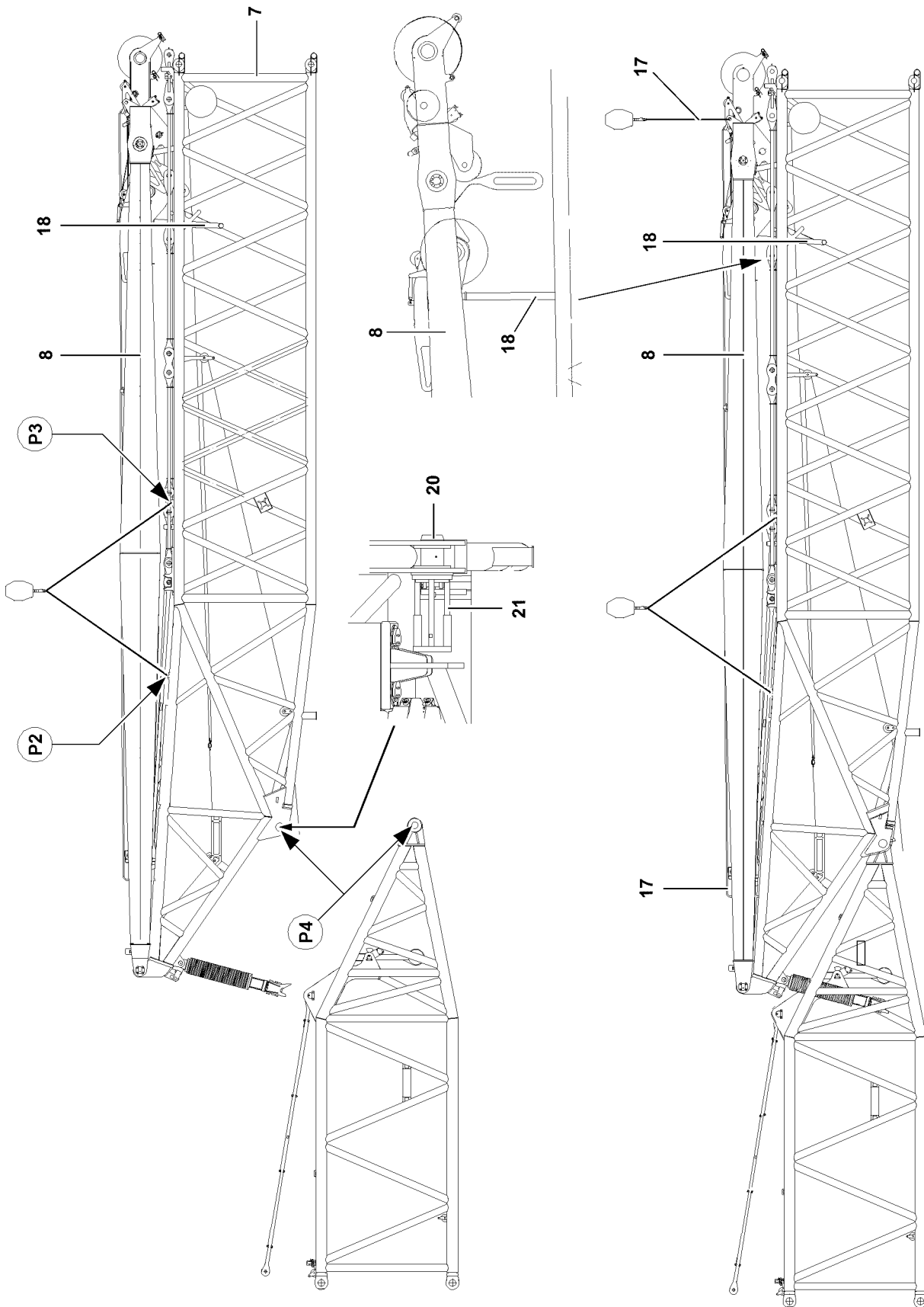


Fig.111795

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2.2 Pinning the K-assembly unit on the K-adapter

- ▶ Luff the S-boom up somewhat for better accessibility and assembly of the K-assembly unit.
- ▶ Attach the K-assembly unit with the auxiliary crane on the K-pivot section **7** on both sides on points **P2** and points **P3**.
- ▶ Swing the K-assembly unit with the auxiliary crane in to the pin points **P4** on the K-adapter.



WARNING

Falling components!

If the components are incompletely pinned or secured, then components can fall down!

Personnel can be severely injured or killed!

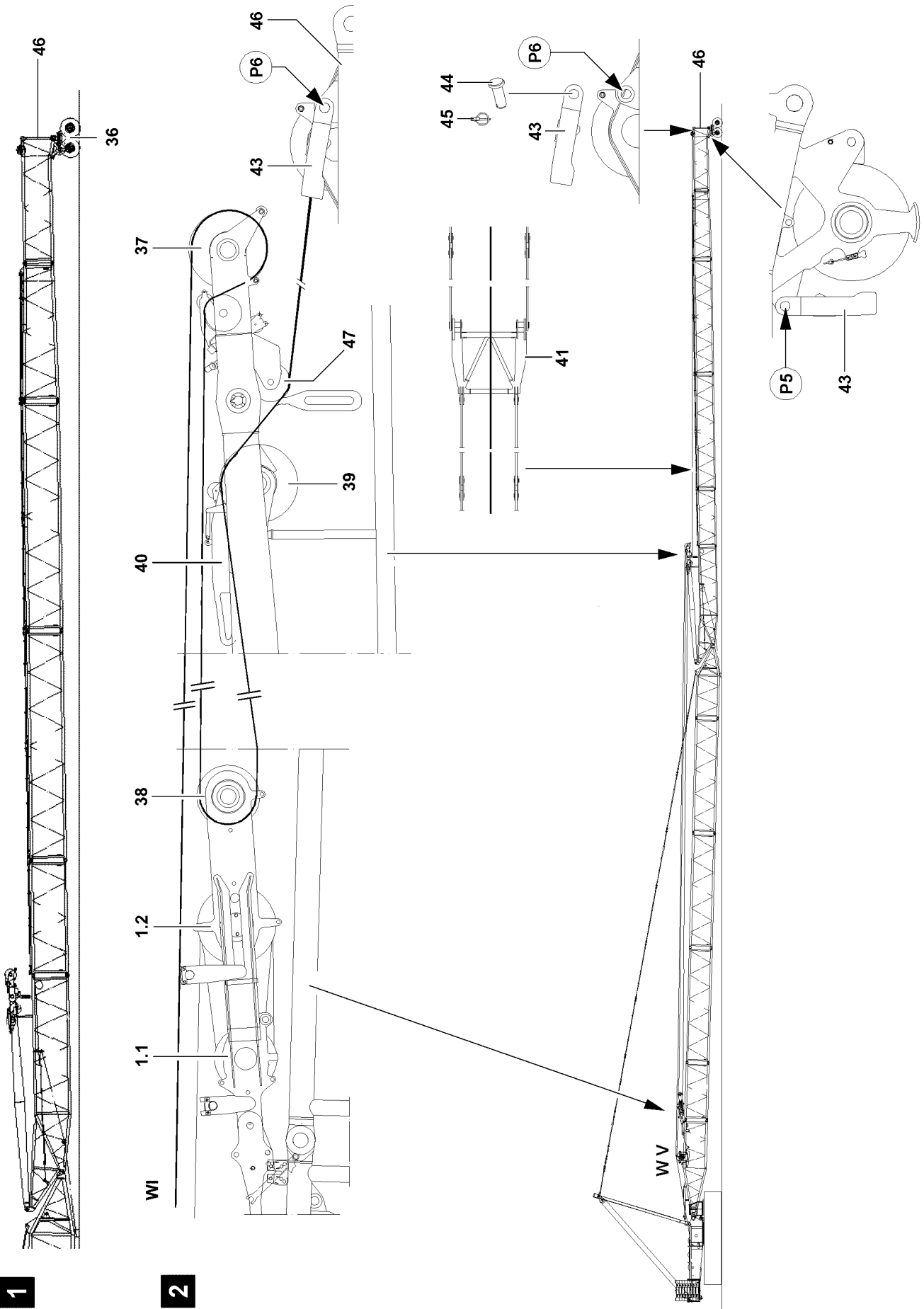
- ▶ Make sure that all components are completely pinned and secured!
-

Pinning the K-assembly unit with the K-adapter:

- ▶ Pin and secure the pin **20** with the hydraulic pin pulling device **21**.
- ▶ Attach the fastening rope **17** on the auxiliary crane.
- ▶ For simpler assembly of the K-lattice jib: Set the KA-bracket **8** with the auxiliary crane on the assembly support **18**.

When the KA-bracket is standing safely on the assembly support **18**:

- ▶ Remove the auxiliary crane.



1

2

Fig.111796

LWE/LR 1750-000/12812-15-02/en

2.3 Assembling the K-lattice jib

Make sure that the following prerequisite is met:

- The K-assembly unit is pinned and secured with the K-adapter.



Note

- ▶ Always support the LI-lattice sections sufficiently for easier installation!

Pin the LI-intermediate sections with the pin pulling device:

- ▶ Insert and secure the pin, see Crane operating instructions, chapter 5.30.
- ▶ Pin and secure the guy rods.



Note

- ▶ Install the pulley cart **36**, see Crane operating instructions, chapter 5.61!
- ▶ Place the K-lattice jib with the K-end section on the pulley cart **36**, see illustration **1**.

2.4 Reeving in the hoist rope



Note

- ▶ The winch **5 W V** is operated in SLK-operation on the installation position of winch **6**!

Make sure that the following prerequisites are met:

- The K-pulley block is pinned and secured on the S-pivot section.
- The rope of winch **5 W V** is completely reeved and secured on the K-pulley block, see Crane operating instructions, chapter 4.06 and reeving plans.
- The rope retaining pins on the rope pulley **38** of the upper pulley block **1.2** and on the rope pulleys in the KA-bracket are unpinned.
- ▶ Unpin the rope lock **43** at point **P5** and pin at point **P6** with pin **44**.
- ▶ Secure the pin **44** with lynch pin **45**.

Reeve in the hoist rope of winch **1 W I** on the K-pulley block and on the KA-bracket:

- ▶ Guide the hoist rope over the front rope pulley **37** on the KA-bracket and back to the rope pulley **38** on the upper pulley block **1.2**, see illustration **2**.
- ▶ From the rope pulley **38** in the upper bock, pull the hoist rope **over** the rope pulley **39** and **under** the rope pulley **47** in the KA-bracket to the front.



WARNING

Damage to the hoist rope!

If the hoist rope is not guided at assembly over the protective roller of the cross bar **41**, then the hoist rope can be damaged!

Personnel can be severely injured or killed!

- ▶ Guide the hoist rope always over the protective roller on the cross bar **41**!

- ▶ Guide the hoist rope to the rope lock **43** on the rope fixed point **P6**, see illustration **2**.
- ▶ Hook the hoist rope with the lock clamp on the rope lock **43** properly and secure, see Crane operating instructions, chapter 4.06.

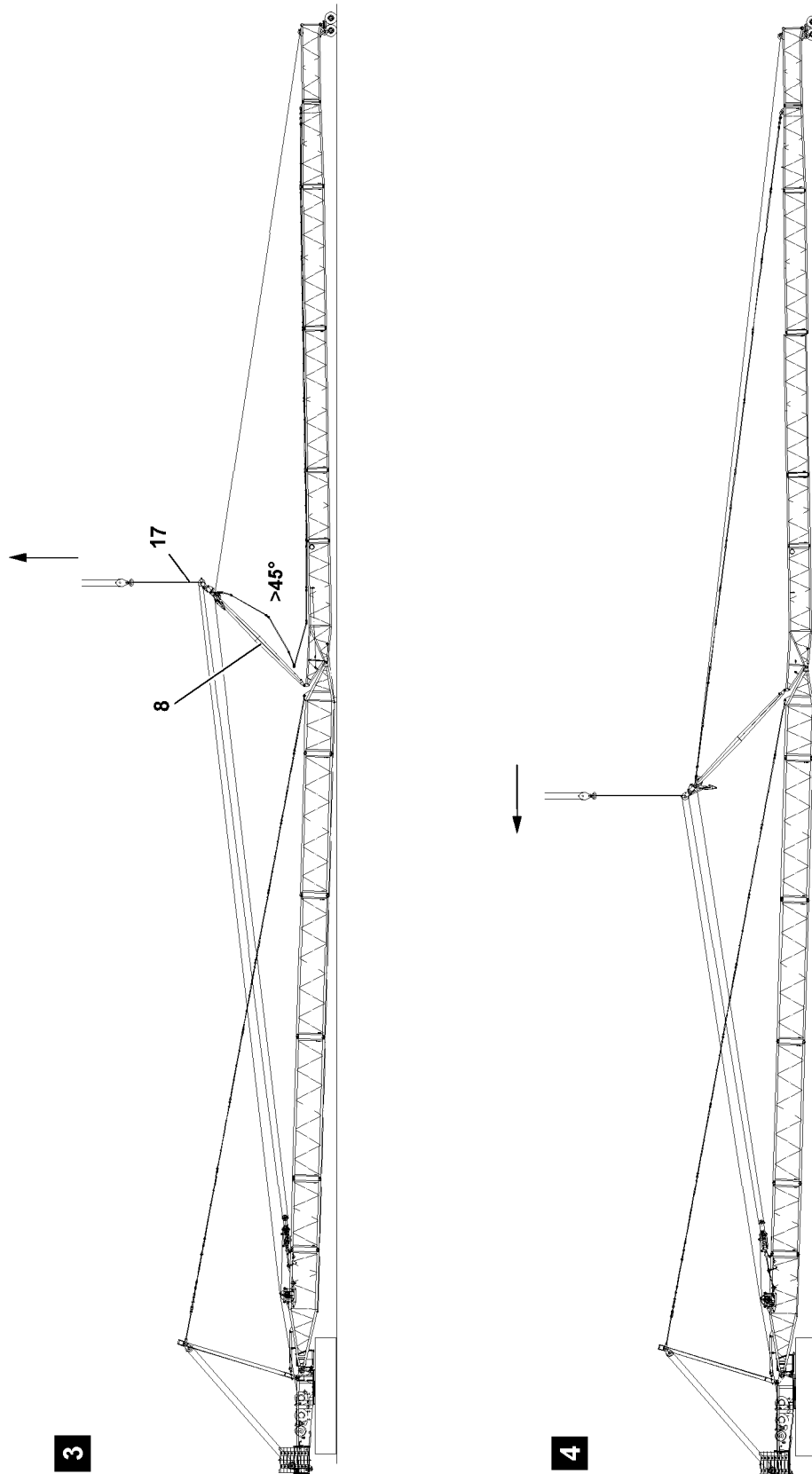


Fig.111797

LWE/LR 1750-000/12812-15-02/en

2.5 Erecting the KA-bracket

Make sure that the following prerequisites are met:

- The hoist rope is reeved, pinned and secured.
- The K-guy rods are pinned and secured.

- ▶ Attach the fastening rope **17** on the auxiliary crane.

NOTICE

Danger of slack rope formation!

- ▶ When erecting the KA-bracket, watch for slack rope formation of the hoist winch!

- ▶ Spool the hoist winch up at the same time and lift the KA-bracket **8** with the auxiliary crane to approximately 45°, see illustration **3**.



WARNING

KA-bracket folding downward!

If the KA-bracket is not held with the auxiliary crane while pulling it back, it can fold downward!

Personnel can be severely injured or killed!

- ▶ Hold the KA-bracket with the auxiliary crane until the guy rods are tensioned!

- ▶ Pull the KA-bracket **8** back with the auxiliary crane while spooling up the hoist winch at the same time.

Result:

- The guy rods are tensioned, see illustration **4**.

- ▶ Remove the auxiliary crane.

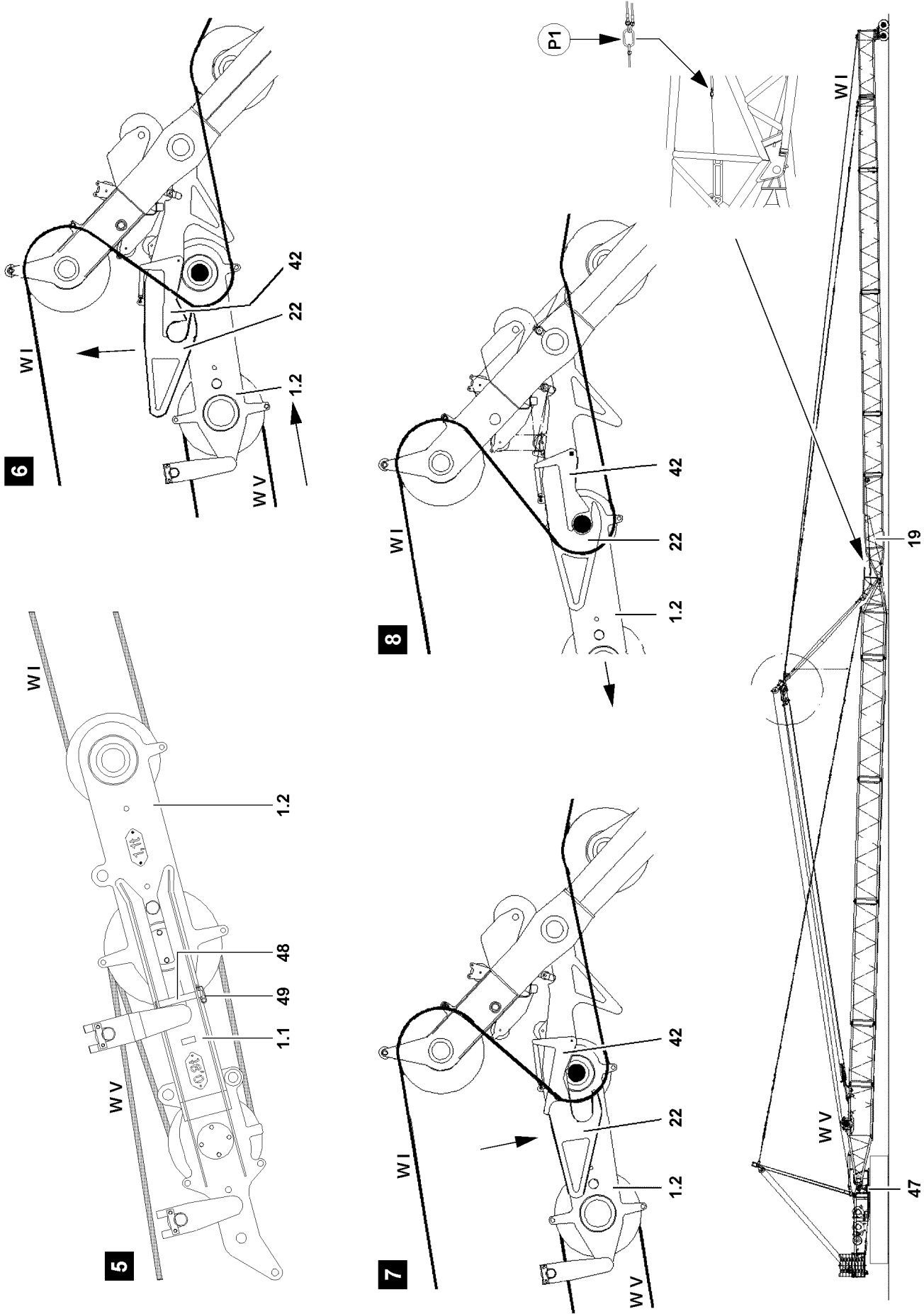


Fig.111798

LWE/LR 1750-000/12812-15-02/en

2.6 Connecting the upper pulley block with the KA-bracket

Make sure that the following prerequisites are met:

- The pulley block is completely reeved in (winch 5 **W V**).
- The retaining pins **48** of the lower pulley block **1.1** are unpinned.
- ▶ Connect the rope of the assembly winch **19** with the hook adjustment rope at point **P1** and pull the hook **22** up with the assembly winch, see illustration **6**.
- ▶ Pull the upper pulley block **1.2** with the hoist rope **W I** to the hook **22**.
- ▶ Lower the hook with the assembly winch in such a way that it is laying on the axle of the upper pulley block **1.2**, see illustration **7**.



WARNING

Secure the upper pulley block!

If the locking lever **42** is not correctly engaged after assembly of the upper pulley block on the hook **22**, then the upper pulley block **1.2** can release itself during crane operation from the hook **22**! Personnel can be severely injured or killed!

- ▶ Make sure that the locking lever **42** is completely engaged, check visually!
- ▶ Pull the axle of the upper pulley block **1.2** completely into the hook **22** until the locking lever **42** engages.

Result:

- The upper pulley block **1.2** is secured, see illustration **8**.
- ▶ Unhook the rope of the assembly winch **19** at point **P1** and hook it in on the K-pivot section.

2.7 Establishing the electrical connections

Make sure that the following prerequisite is met:

- The SLK-boom is fully assembled.



Note

- ▶ To establish the electrical connections, see Electric wiring diagram!
- ▶ Establish the electrical connections.
- ▶ Make sure that all electrical connections on the boom are established.

2.8 Checking the function of the safety devices



WARNING

Non-functioning safety devices!

If the function of the safety devices is defective, personnel can be severely injured or killed!

- ▶ Crane operation with non-functioning safety devices is **prohibited**!



Note

- ▶ The function of the individual limit switches must be checked before erection!
- ▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual!



Note

- ▶ If a function check on the limit switches or on the safety devices does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked!
- ▶ If no visible connection errors or component defects can be found, contact **LIEBHERR** Service!

Make sure that the following prerequisites are met:

- All electrical connections have been made.
- The crane engine is running.
- The corresponding operating mode is set on the LICCON monitor.

2.8.1 Checking the wind speed sensor

- ▶ Check the movement and the function of the wind speed sensor.

2.8.2 Checking the airplane warning light

- ▶ Turn the airplane warning light on.
- ▶ Check the function visually.

2.8.3 Hoist limit switch



Note

- ▶ When replacing or changing a hoist limit switch, the corresponding hoist limit switch must have the correct bus address and the correct software version in order to be detected by the bus system!

- ▶ Manually actuate the hoist limit switch.

Result:

- The spool up function of the hoist winch turns off.
- The icon „Hoist top“ appears on the LICCON monitor.
- The limit switch is functioning.

2.8.4 Checking the limit switch K-lattice jib „on top“

- ▶ Cover the limit switch initiators individually with a metal plate.

Result:

- The limit switch is actuated manually.
- The spool up function of the hoist winch turns off.
- The icon appears on the LICCON monitor.
- The limit switch is functioning.

2.8.5 Checking the limit switch K-lattice jib „on the bottom“

- ▶ Cover the limit switch initiators individually with a metal plate.

Result:

- The limit switch is actuated manually.
- The spool out function of the hoist winch turns off.
- The icon appears on the LICCON monitor.
- The limit switch is functioning.

2.8.6 Checking the limit switch SL-boom „Steepest position“



Note

- ▶ The limit switch functions have to be checked individually before erection!

- ▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

Result:

- The limit switch is actuated manually.
- The control winch movement „spool up“ turns off.
- The icon appears on the LICCON monitor.
- The limit switch is functioning.

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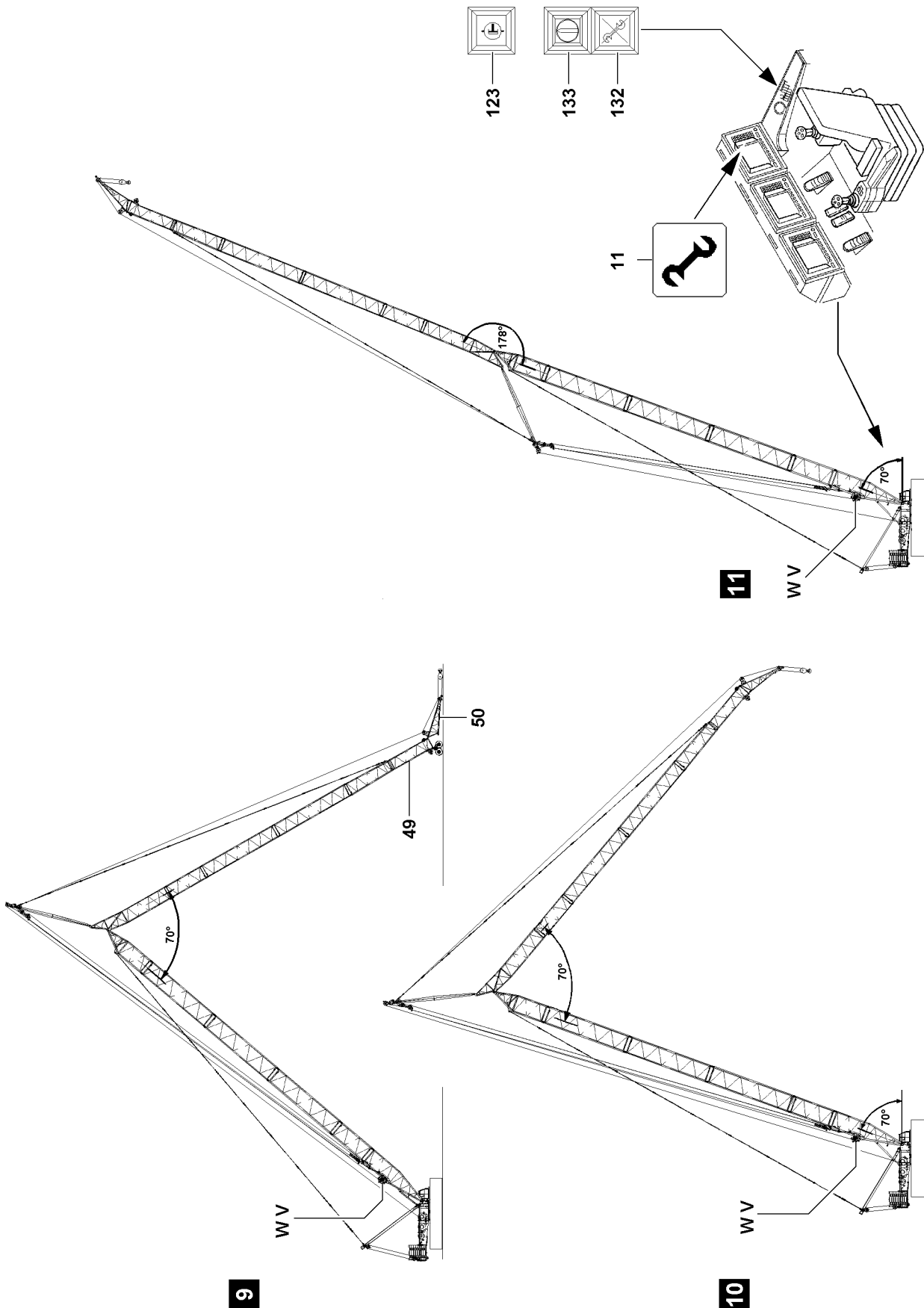


Fig.112038

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2.9 Erecting the SLK-boom



WARNING

The crane can topple over!

If the following conditions are not met before erecting the SLK-boom, the crane can topple over!

Personnel can be severely injured or killed!

- ▶ Observe the safety technical notes, see Crane operating instructions, chapter 5.01!
- ▶ Extend the S-relapse cylinder before erection!
- ▶ Pay attention to slack rope formation!

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- All electrical connections have been made.
- All limit switches are functioning.
- The counterweight has been installed on the turntable according to the load chart.
- The K-lattice jib is installed according to the load chart.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual crane configuration.
- The LICCON overload protection is exceeded.
- The assembly icon **11** is visible on the LICCON monitor.
- There are no loose parts on the boom and the lattice jib.
- No personnel is within the danger zone.

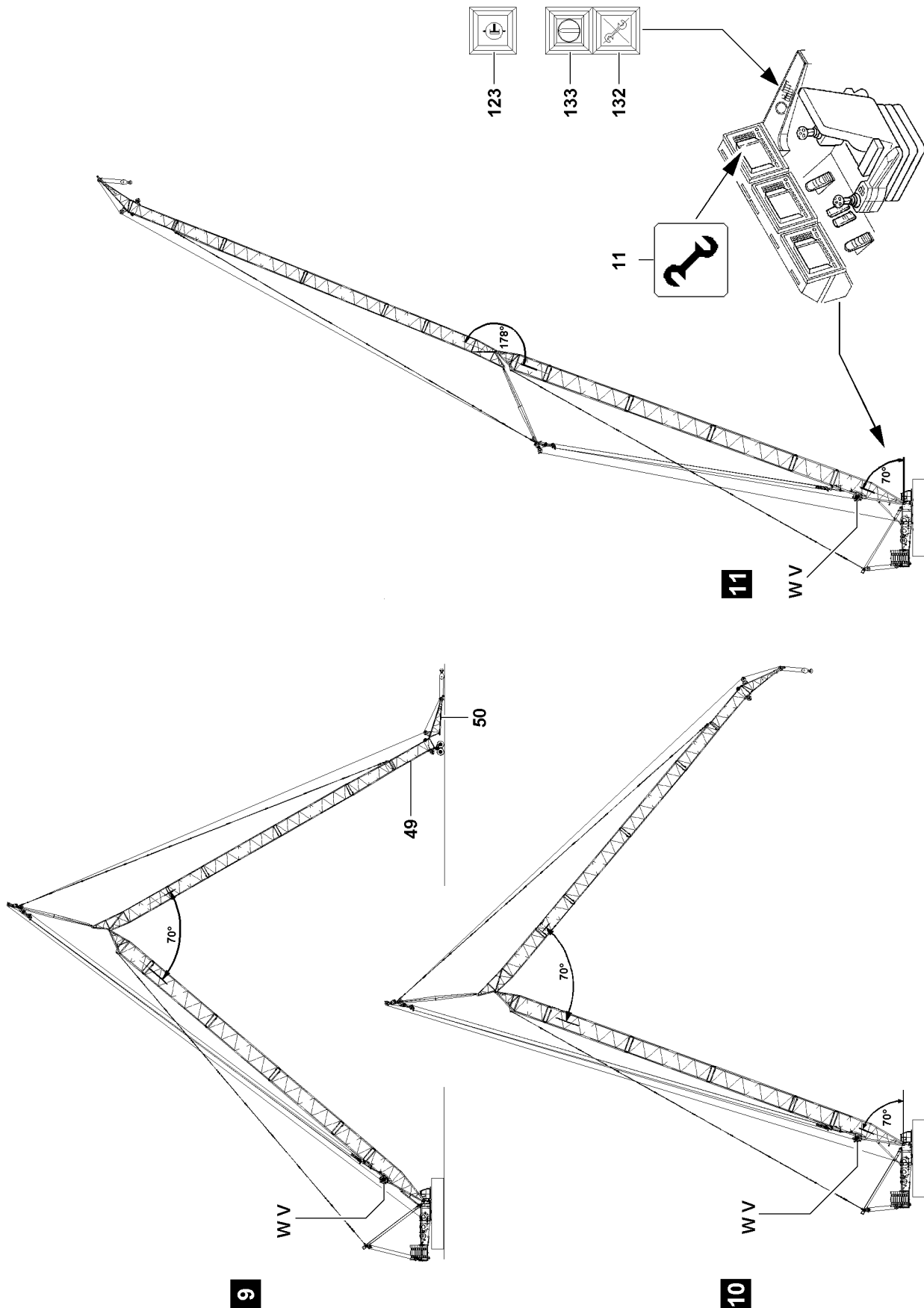


Fig.112038

LWE/LR 1750-000/12812-15-02/en

2.9.1 Erection procedure



DANGER

The crane can topple over!

- ▶ It is not permitted to turn the crane during the erection procedure!
 - ▶ Observe the data in the erection and take down charts!
-



DANGER

The crane can topple over!

In crane operation with exceeded LICCON overload protection, the crane can topple over!
Personnel can be severely injured or killed!

- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook!
-

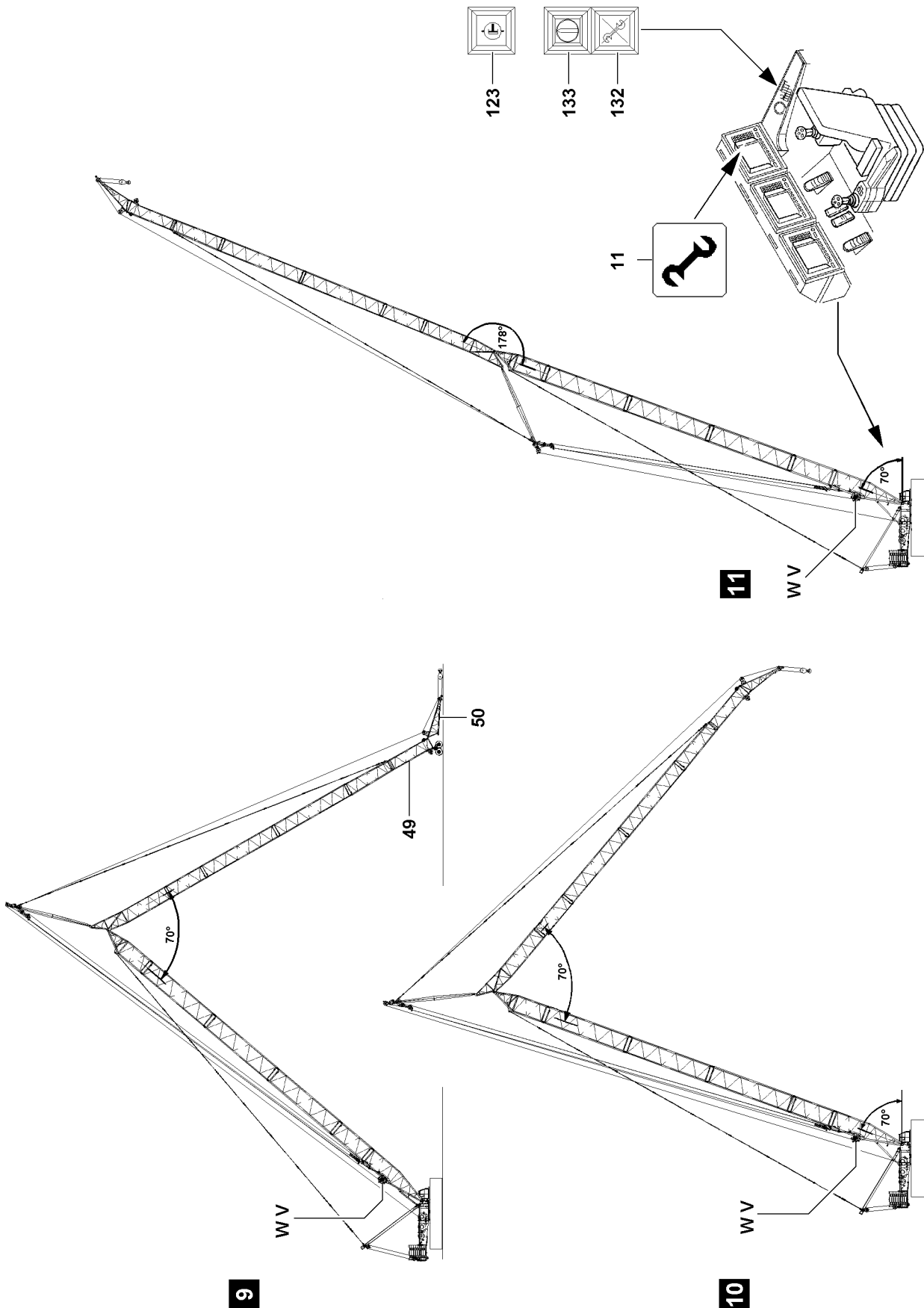


Fig.112038

LWE/LR 1750-000/12812-15-02/en

Luff the SL-boom up:

- ▶ Actuate the master switch.



WARNING

Overload of crane!

If the lattice jib is lifted off the ground when luffing up and not carried on the ground on the pulley cart with its entire weight, then the crane can be overloaded and topple over!

Personnel can be severely injured or killed!

- ▶ Lower the lattice jib adjustment in such that guy rods always sag slightly!
- ▶ Do not allow slack rope to build up on the winch **5 W V**!

- ▶ At the same time, spool out winch **5 W V** to hold the K-lattice jib on the ground with the adapter for the boom nose **49** placed on the pulley cart, see illustration **9**.



WARNING

Lift off of the K-lattice jib from the ground!

If the K-lattice jib lifts off the ground with the pulley cart before the angle between the SL-boom and the K-lattice jib has reached the 70°, dangerous situations can occur!

Personnel can be severely injured or killed!

- ▶ Make sure that the pulley cart is removed before lifting the K-lattice jib off the ground!
- ▶ Never lift the pulley cart off the ground by the K-lattice jib!
- ▶ Remove the pulley cart, see Crane operating instructions, chapter 5.61!

- ▶ Carry out this procedure until the SL-boom and the K-lattice jib form an angle of 70° or the adapter for the boom nose **49** has lifted off the ground first.
- ▶ Remove the pulley cart.

When the pulley cart is removed:

- ▶ Lift the K-lattice jib off the ground.
- ▶ Continue to luff the SL-boom up.
- ▶ Reeve in the hoist rope between the pulley head on the boom nose 120 t **50** and the hook block, see Reeving plan.
- ▶ Attach the hoist limit switch weight.
- ▶ Luff the SL-boom up to 70° to the horizontal, see illustration **10**.

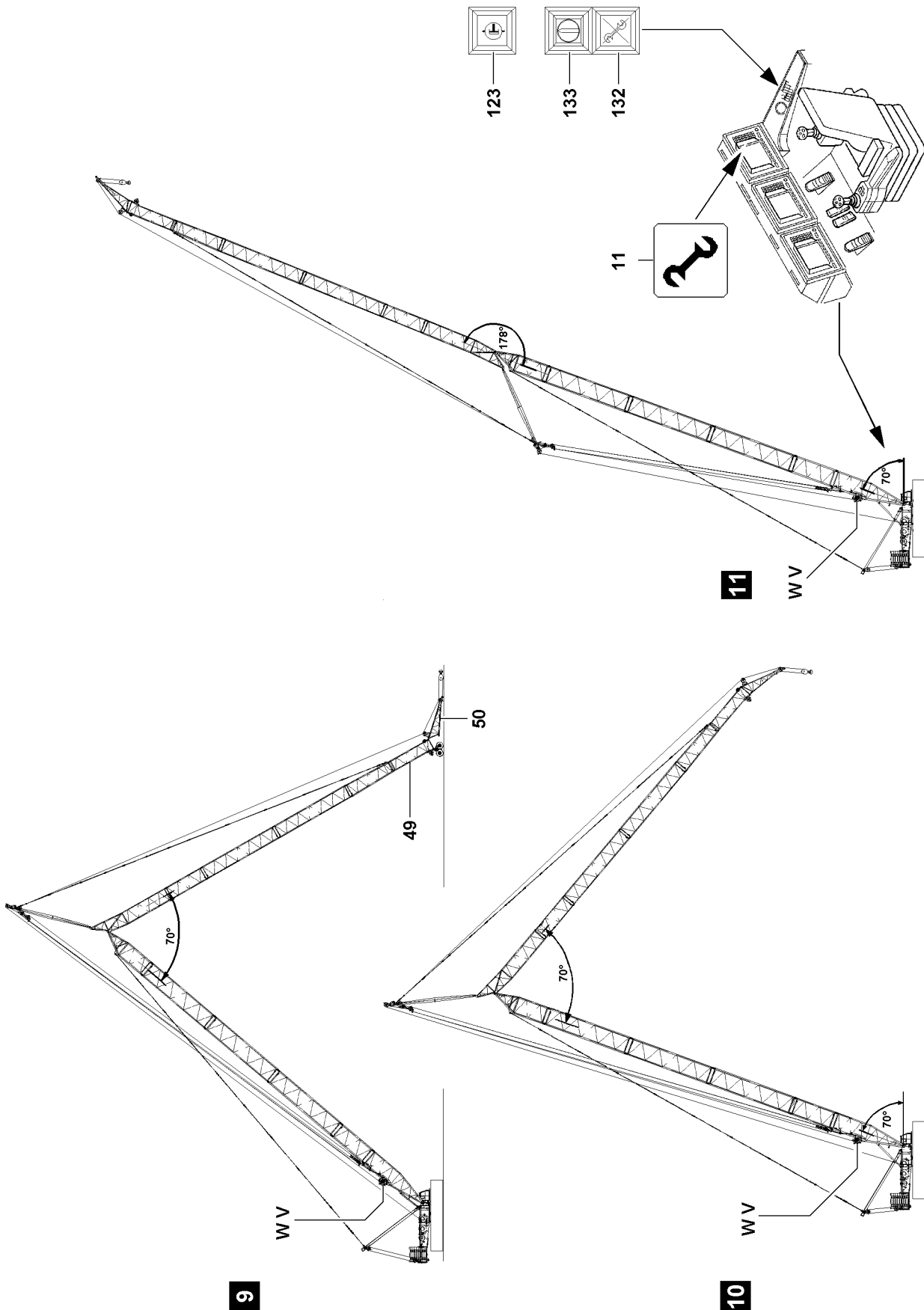


Fig.112038

LWE/LR 1750-000/12812-15-02/en

NOTICE

Release of K-lattice jib!

- ▶ The release to luff up the K-lattice jib is given when the SL-boom is erected to 70°!
 - ▶ At a SL-boom angle of more than 72°, the winch 5 **W V** cannot be spooled up any longer and the K-lattice jib cannot be erected!
-

NOTICE

Collision of hook block!

- ▶ When erecting the boom system, the hoist winch must be spooled up at the same time to prevent a collision of the hook block with the pulley head of the boom nose 120 t **50!**
-

**Note**

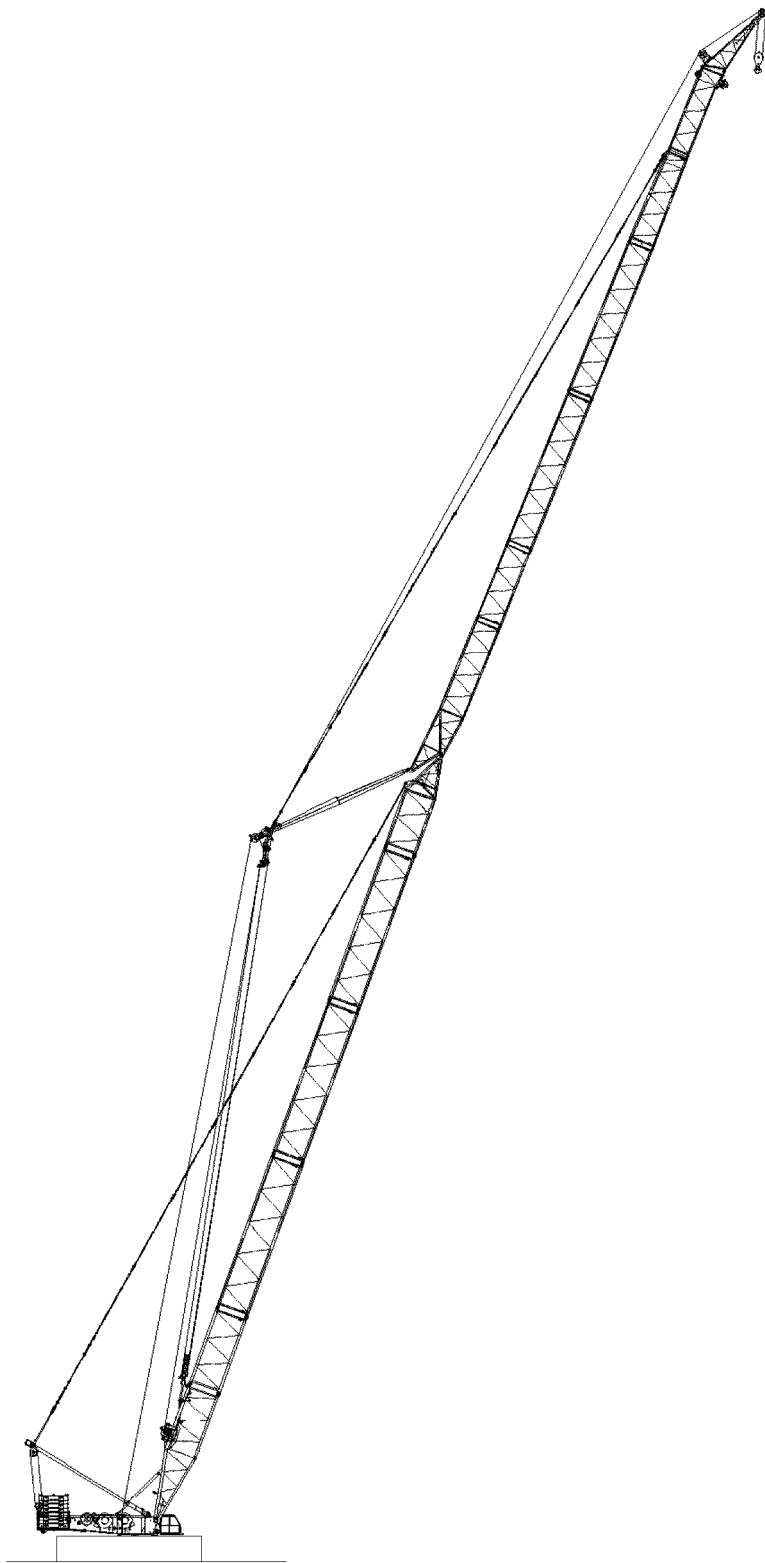
- ▶ When the lowest operating position of the boom is reached, the LICCON overload protection is activated!
 - ▶ In the maximum load icon appears a load number in „t“ instead of the display „???“!
-
- ▶ Luff up the K-lattice jib to the operating position.

When the boom has reached the lowest operating position:

- ▶ Make sure that the assembly icon **11** on the LICCON monitor turns off.

Result:

- The LICCON overload protection is active.



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Fig.112039

3 Crane operation



Note

- ▶ Observe the notes in the chapters, see Crane operating instructions, chapter 4.05, chapter 4.08 and chapter 5.01!

Make sure that the following prerequisites are met:

- The LICCON overload protection is active.
- The LICCON overload protection has been set according to the data in the load chart.



WARNING

The crane can topple over!

- ▶ Check the horizontal position of the crane before and during operation!
- ▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation!

3.1 Checking the settings

- ▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
- ▶ Check the hoist limit switch by running against the hoist limit switch weight.
- ▶ Check the function of the limit switches „Boom steep“ on the relapse cylinders.

Fig.195219

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4 Disassembly



WARNING

Risk of falling!

During assembly and disassembly, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited!



WARNING

Falling components!

If unsecured or non-supported components are installed or removed, they can fall down! Personnel can be severely injured or killed!

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Support the boom and components before pinning / unpinning!
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ Do not disengage the auxiliary crane until each component is pinned on and secured!
- ▶ It is prohibited to lean a ladder against the component being disassembled!



WARNING

Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth!

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!

Personnel can be severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

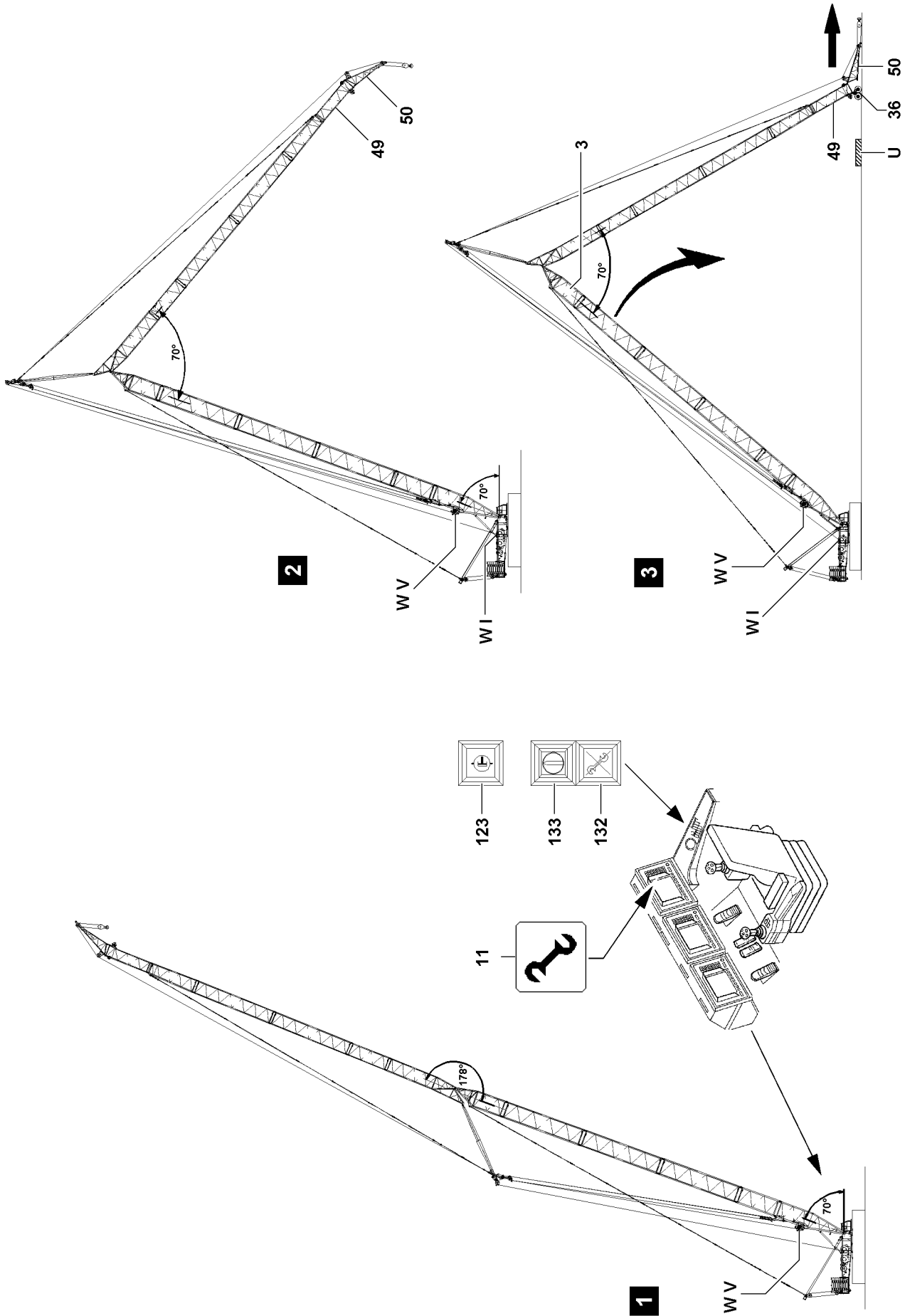


Fig.112040

LWE/LR 1750-000/12812-15-02/en

4.1 Taking down the SLK-boom



WARNING

Risk of accident!

If the following instructions are not observed, personnel can be severely injured or killed!

- ▶ The turntable may not be turned during the disassembly of the boom!
- ▶ Observe the safety technical notes, see Crane operating instructions, chapter 5.01!
- ▶ Observe the data in the erection and take down charts!

NOTICE

Damage of boom components!

Taking down the boom system can lead to a collision between the hook block and the pulley head!

There is the danger that boom components may be significantly damaged!

- ▶ When taking down the boom system, always spool out the hoist winch at the same time!

4.1.1 Take down procedure

Make sure that the following prerequisites are met:

- The crane is supported.
(only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The counterweight has been installed on the turntable according to the erection and take down chart.
- The LICCON overload protection has been set according to the data in the load chart.



Note

- ▶ The luff down movement is turned off as soon as the lowest operating position is reached!
- ▶ When the lowest operating position of the boom is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „??“!
- ▶ In the crane operating screen appear alarm functions!

- ▶ Luff the SLK-boom down to the „lowest“ operating position.

Result:

- The luff down movement is turned off.
- The „STOP“ icon appears on the LICCON monitor.
- The „Horn“ icon appears on the LICCON monitor.

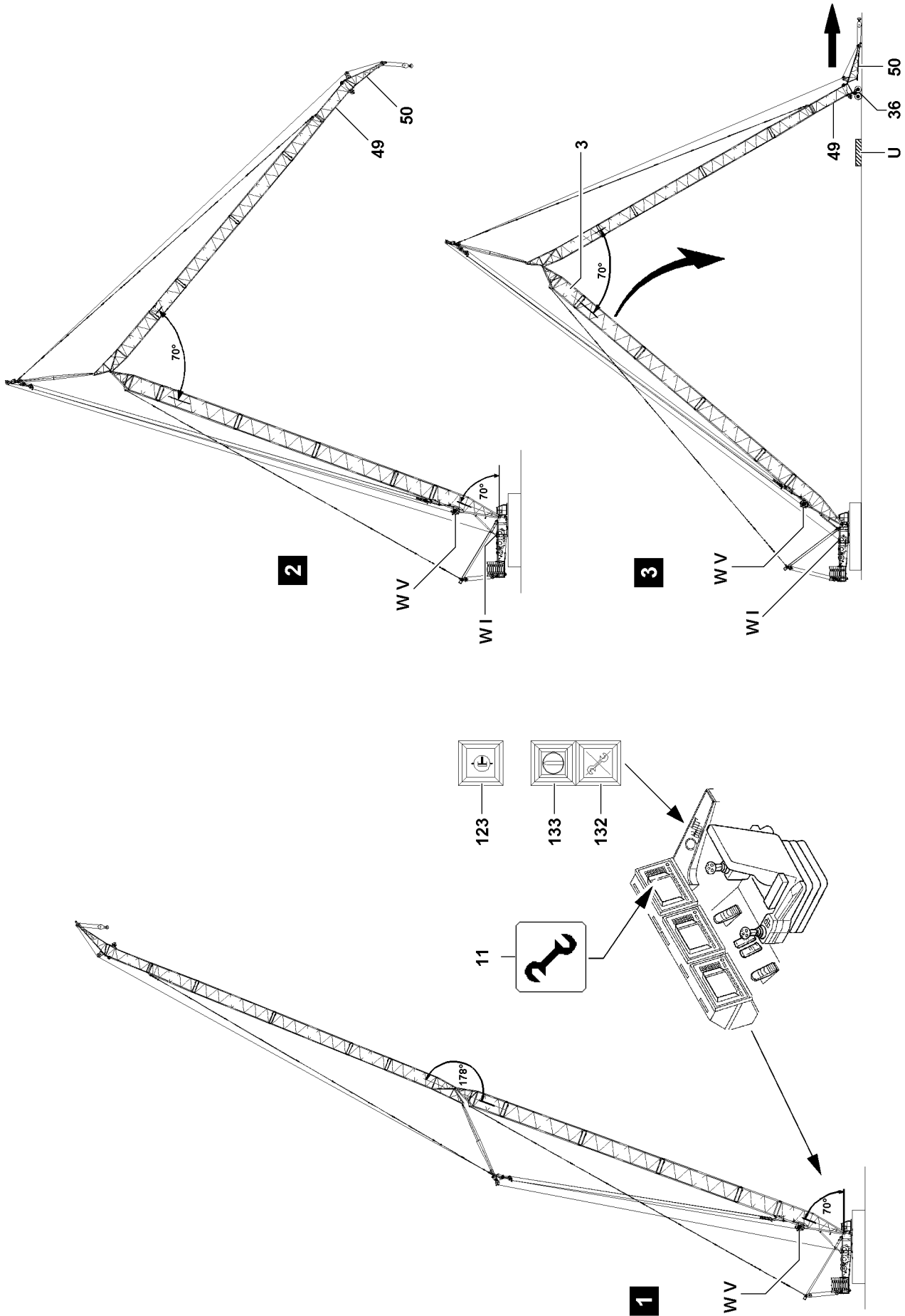


Fig.112040

LWE/LR 1750-000/12812-15-02/en

**WARNING**

Assembly with activated assembly key button!

When the assembly key button **133** is engaged, the LICCON overload protection is exceeded!

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be severely injured or killed!

This could result in high property damage!

- ▶ The assembly key button **133** may only be operated by persons who are aware of the consequences of a bypass!
- ▶ Press the assembly key button **133** only when the set up status was correctly entered into the LICCON computer system!
- ▶ Observe the erection / take down charts!
- ▶ Crane operation with the assembly key button **133** turned on is strictly prohibited!

When the SLK-boom has reached the „lowest“ operating position:

- ▶ Turn the assembly key button **133** to the right.

Result:

- The LICCON overload protection is deactivated.
- The assembly icon **11** appears on the LICCON monitor.
- ▶ Luff the K-lattice jib down until an angle of approximately 70° is reached between the SL-boom and the K-lattice jib, illustration **2**.

NOTICE

Release of K-lattice jib!

- ▶ The release to luff down the K-lattice jib is given when the SL-boom is luffed down to 70° to the horizontal!
- ▶ At a SL-boom angle of more than 72°, the winch **5 W V** cannot be spooled out any longer and the K-lattice jib cannot be luffed down!

NOTICE

Collision of hook block!

- ▶ When luffing down the boom system, the hoist winch must be spooled out at the same time to prevent a collision of the hook block with the pulley head of the boom nose 120 t **50!**
- ▶ At the same time, spool the hoist winch out and continue to luff the SLK-boom down until the hook block touches the ground.
- ▶ Remove the hoist limit switch weight.
- ▶ Unreeve the hook block.

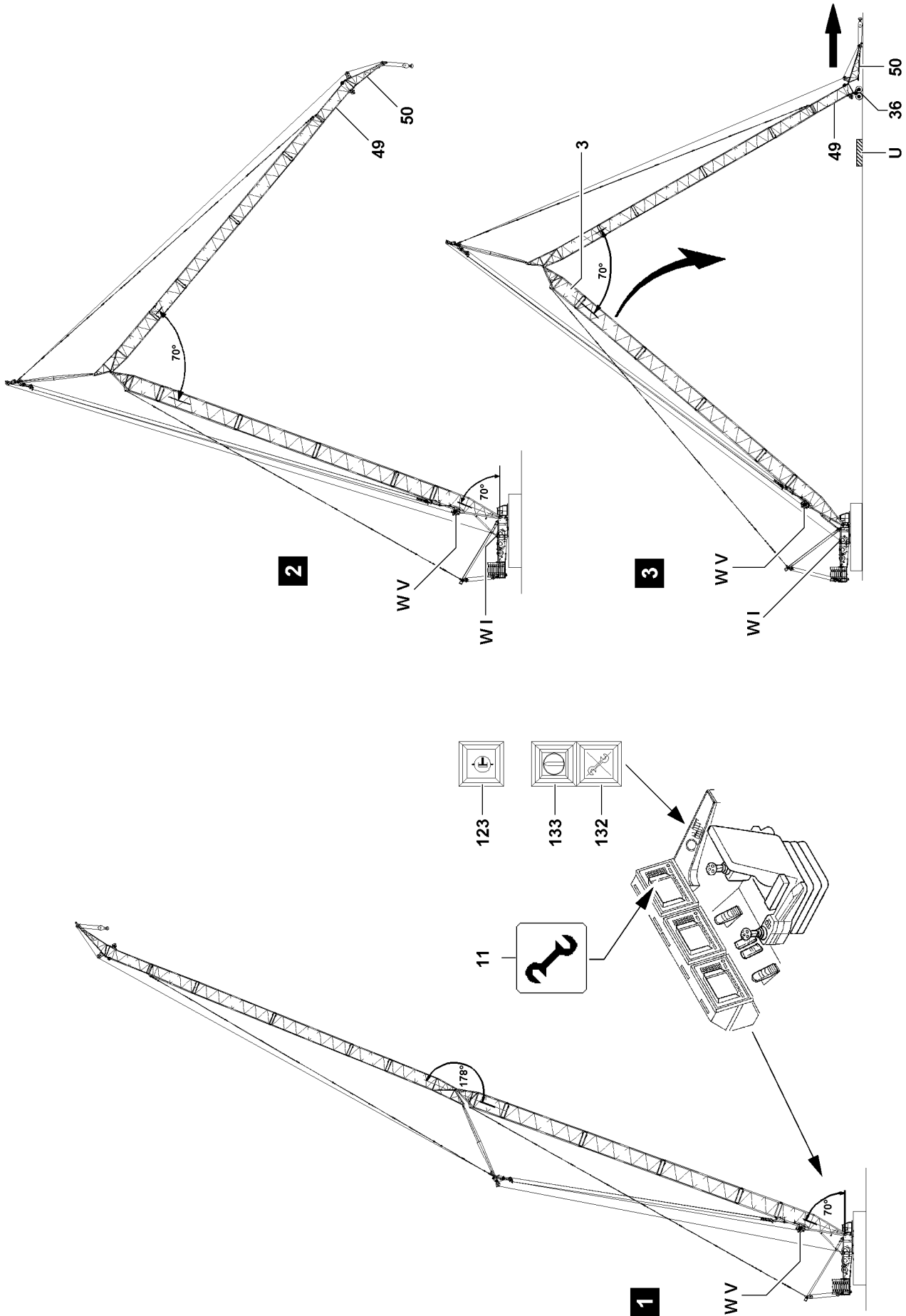


Fig.112040

LWE/LR 1750-000/12812-15-02/en

NOTICE

Damage of the boom nose 120 t **50**!

The boom combination must be placed down on the ground carefully, so that the boom nose 120 t **50** can fold up automatically on the fork connection and move out on the rollers, see illustration **3**.

- ▶ Lower the boom combination carefully on the ground.

When the boom nose 120 t **50** is folded outward, illustration **3**:

- ▶ Luff the SL-boom down until the pulley cart can be installed on the adapter for the boom nose **49**.
- ▶ Install the pulley cart, see Crane operating instructions, chapter 5.61!

**Note**

- ▶ When the K-lattice jib is laying on the pulley cart, tension the K-guying somewhat so that the pulley cart can roll forward!

**WARNING**

Overload of crane!

If the K-lattice jib is carried on the pulley cart with its entire weight when luffing down, then the crane can be overloaded and topple over!

Personnel can be severely injured or killed!

- ▶ Lower the SL-boom carefully and at slow speed!
- ▶ Do not allow slack rope to build up on the winch1 **W I** and winch 5 **W V**!
- ▶ Lower the SL-boom until the K-adapter **3** is laying on the support **U**.
- ▶ Disassemble the boom nose 120 t **50**.

4.2 Disconnecting the electrical connections

Make sure that the following prerequisites are met:

- The SLK-boom has been placed down.
- The boom nose 120 t **50** is disassembled.
- ▶ Disconnect the electrical connections.

NOTICE

Damage to cable drum or cable!

If the cable of the cable drum is not properly spooled up on the cable drum after unplugging, then the cable drum or the cable can be significantly damaged!

- ▶ Make sure that the cable drum is completely spooled up after unplugging!
- ▶ Spool the cable drum up and secure it to prevent inadvertent spooling out.
- ▶ Make sure that all electrical connections on the boom have been disconnected.

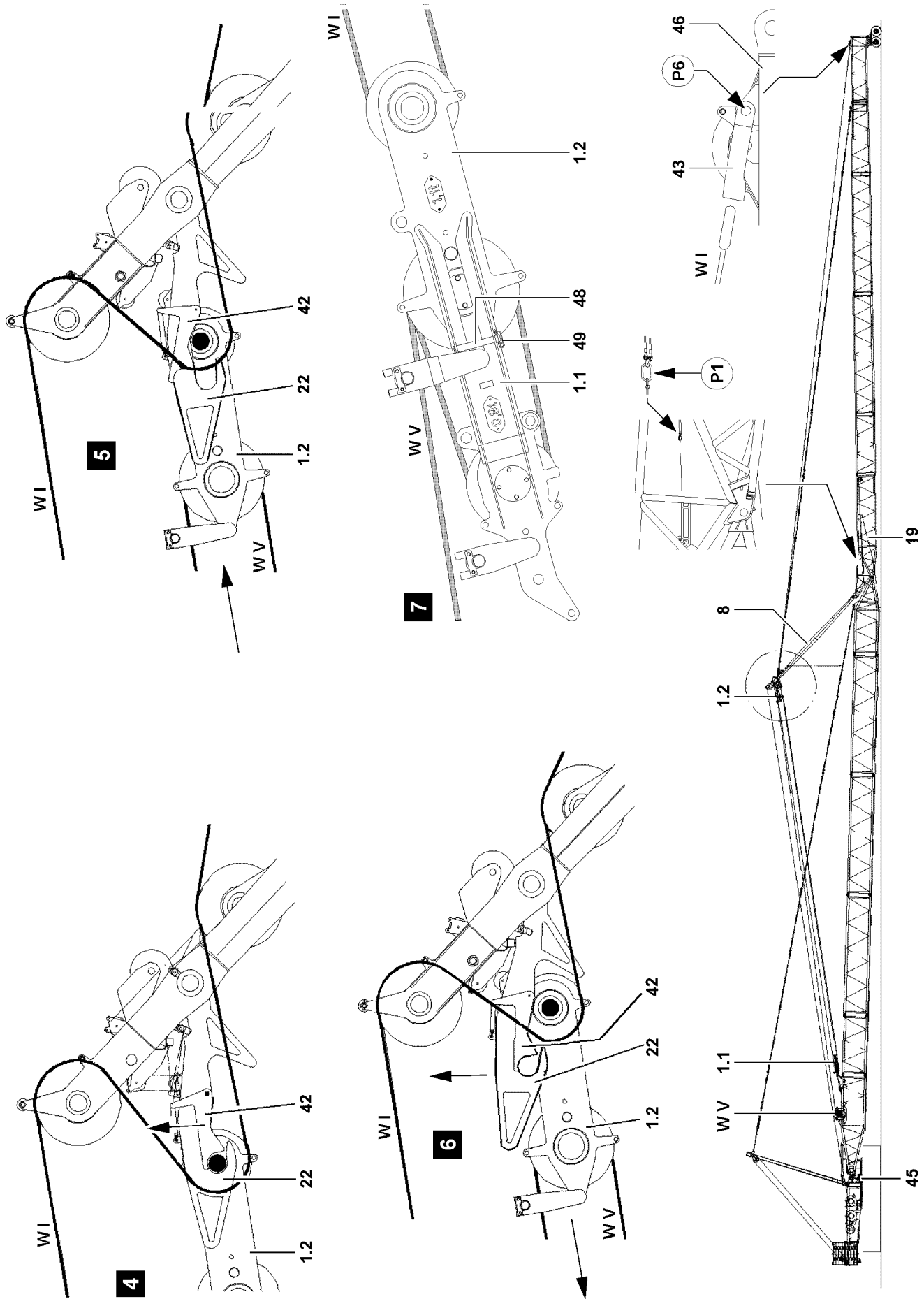


Fig.111802

LWE/LR 1750-000/12812-15-02/en

4.3 Disconnecting the upper pulley block from the KA-bracket

Make sure that the following prerequisite is met:

- The electrical connections on the K-lattice jib have been separated and are properly stored.
- ▶ Spool the hoist rope (winch 1 **W I**) up until the lock clamp is approximately at the height of point **P6**.
- ▶ Hook the hoist rope with the lock clamp on the rope lock **43** at point **P6** and secure.
- ▶ Tension the hoist rope carefully so that the hoist rope still has a minimum slack.
- ▶ Release the locking lever **42** for the retention of the upper pulley block **1.2** by pulling it manually.
- ▶ Pull the locking lever **42** up, see illustration 4.

Result:

- The axle of the upper pulley block **1.2** is released.
- ▶ Pull the upper pulley block **1.2** with the hoist rope from the receptacle on the hook **22**, see illustration 5.
- ▶ Connect the rope of the assembly winch **19** with the hook adjustment rope at point **P1** and pull the hook **22** up with the assembly winch, see illustration 6.

NOTICE

Damage of crane components!

When „pulling“ the upper pulley block **1.2** back - to the lower pulley block **1.1** in the S-pivot section - crane components can be severely damaged!

It can result in slack rope build-up!

- ▶ Carry out all movements with utmost caution and at the least possible speed!
 - ▶ A guide must monitor the pull back of the upper pulley block **1.2**!
-



Note

- ▶ When pulling the upper pulley block **1.2** back from the KA-bracket **8** to the lower pulley block **1.1** on the S-pivot section, the hoist rope (winch 1 **W I**) must be spooled out and the control rope (winch 5 **W V**) must be spooled up simultaneously!

- ▶ Pull the upper pulley block **1.2** with the control rope (winch 5 **W V**) to the lower pulley block **1.1** in the S-pivot section.

When the upper pulley block **1.2** is centered in bracket of the lower pulley block **1.1** and „moved in“ to the stop, see illustration 7:

- ▶ Insert the retaining pin **48** and secure with spring retainer **49**.

Result:

- The lower pulley block is pinned with the upper pulley block.
- ▶ Unhook the rope of the assembly winch **19** at point **P1**.

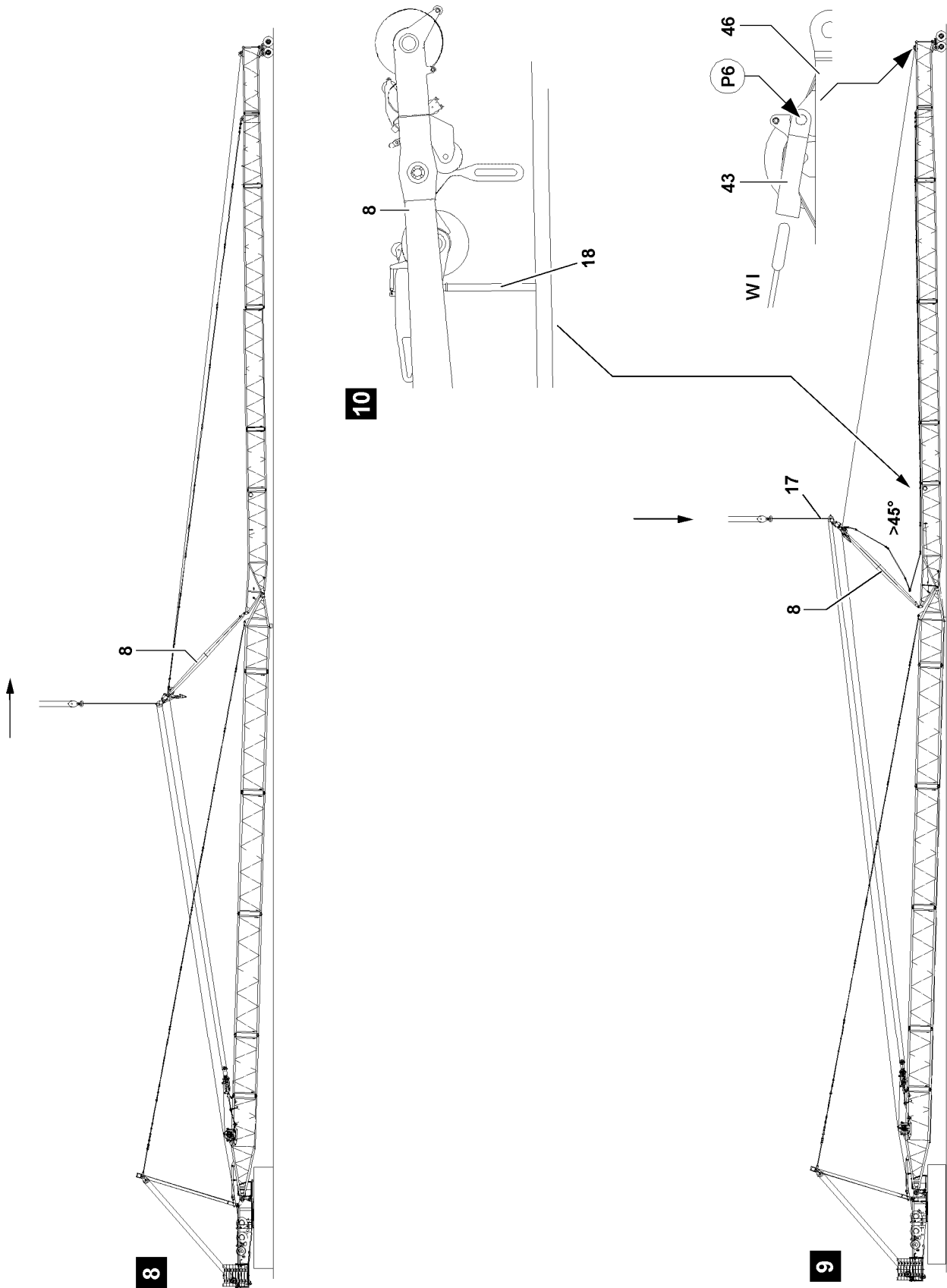


Fig.111803

LWE/LR 1750-000/12812-15-02/en

4.4 Placing the KA-bracket down

Make sure that the following prerequisites are met:

- The upper pulley block **1.2** is pinned with the lower pulley block **1.1** in the S-pivot section.
- An auxiliary crane is available.

- ▶ Attach the fastening rope **17** on the auxiliary crane.

NOTICE

Danger of slack rope formation!

- ▶ When erecting and taking down the KA-bracket **8**, watch for slack rope formation of the hoist winch!
-

- ▶ Spool the hoist winch out and erect the KA-bracket **8** simultaneously with the auxiliary crane to the vertical and then lower it to approximately 45°, see illustration **9**.
- ▶ Unpin the KA-bracket guy rods on the guy rods of the K-lattice jib.
- ▶ Spool the hoist winch out and lower the KA-bracket **8** simultaneously with the auxiliary crane on the assembly support **18**, see illustration **10**.
- ▶ Remove the auxiliary crane.
- ▶ Unhook the lock clamp of the hoist rope (winch **1 W I**) on the rope lock **43** of the adapter for the auxiliary jib **46**.

4.5 Disassembling the K-lattice jib

Make sure that the following prerequisites are met:

- The guy rods are separated.
- An auxiliary crane is available.



Note

- ▶ Always support the LI-lattice sections sufficiently for easier removal!
-

Unpin the LI-intermediate sections with the pin pulling device:

- ▶ Unpin the pins, see Crane operating instructions, chapter 5.30.
-



Note

- ▶ Remove the pulley cart **36**, see Crane operating instructions, chapter 5.61!
-

- ▶ Remove the auxiliary crane.

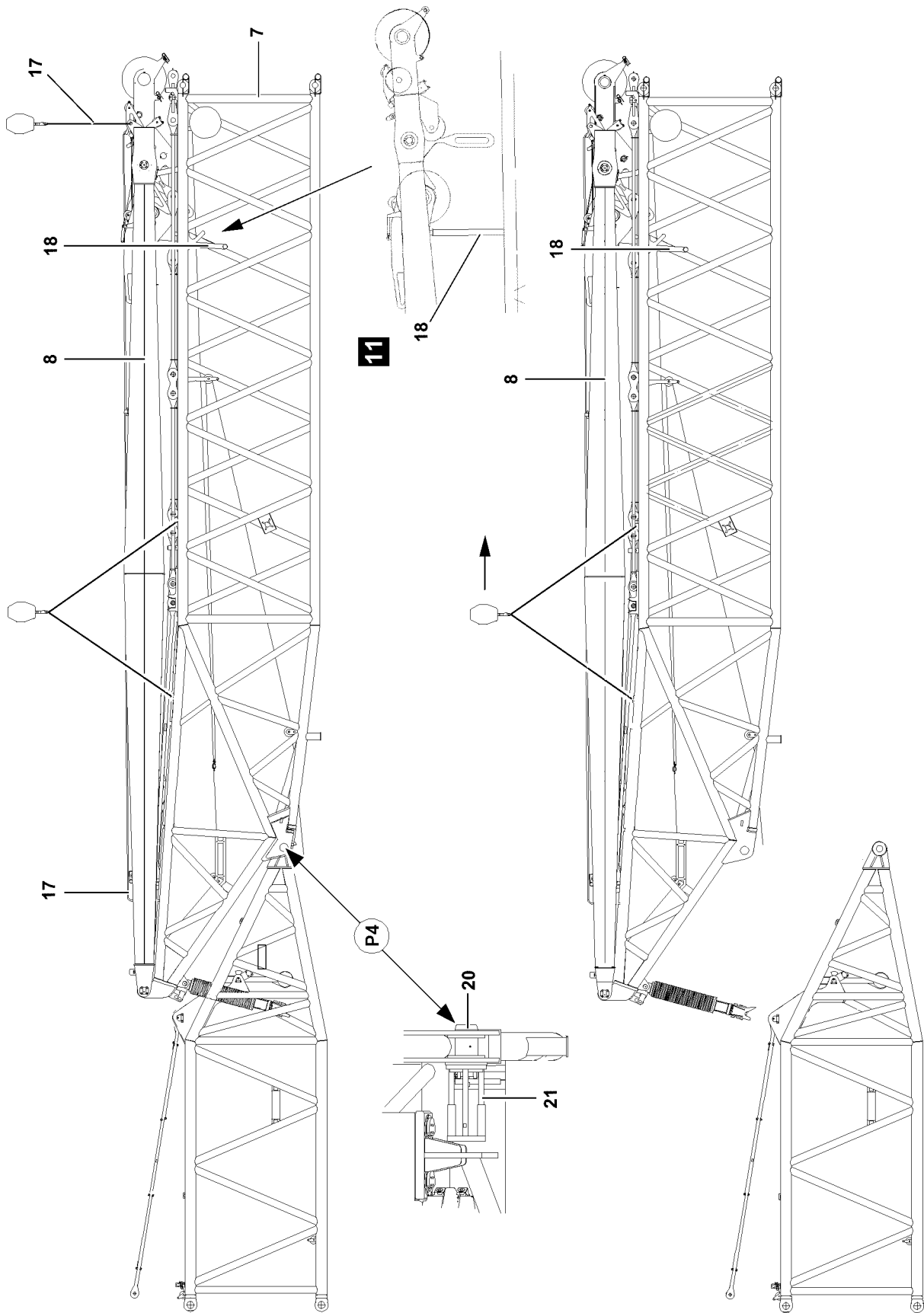


Fig.111804

LWE/LR 1750-000/12812-15-02/en

4.6 Unpinning the K-assembly unit on the K-adapter

Make sure that the following prerequisites are met:

- The lattice sections on the K-boom are disassembled.
- An auxiliary crane is available.
- ▶ Luff the S-boom up somewhat for easier disassembly of the K-assembly unit.
- ▶ Attach the fastening rope **17** on the auxiliary crane.
- ▶ Raise the KA-bracket **8**.
- ▶ Push the assembly support **18** to the side and place the KA-bracket completely on the K-pivot section **7**, see illustration **11**.
- ▶ Fasten the K-assembly unit on the auxiliary crane on the K-pivot section **7**.



WARNING

Falling components!

When unpinning the K-assembly unit on the K-adapter, the K-assembly unit can fall down!

Personnel can be severely injured or killed!

- ▶ It is prohibited for anyone to remain under the K-assembly unit during the unpinning procedure!
- ▶ Make sure that the K-assembly unit is safely held by the auxiliary crane!

Unpin the K-assembly unit on the K-adapter on both sides on pin point **P4**:

- ▶ Release the pins **20** and unpin with the hydraulic pin pulling device **21**.
- ▶ Swing the K-assembly unit to the side and place it down.
- ▶ Remove the auxiliary crane.

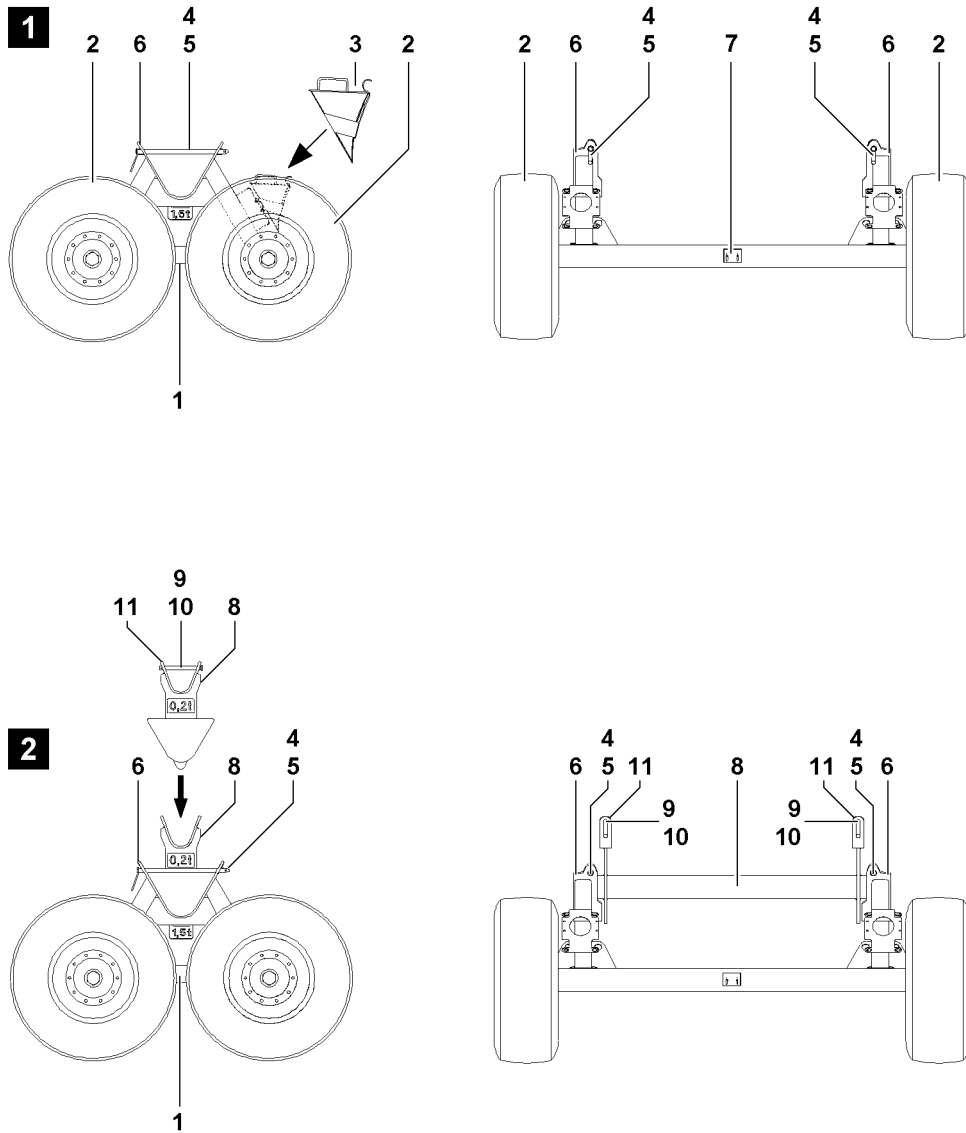


Fig.108265

LWE/LR 1750-000/12812-15-02/en

1 Components of pulley cart

Position	Description	Use
1	Pulley cart	Erection of boom system with W-lattice jib
2	Tires	
3	Wedge	
4	Retaining pin	
5	Locking pin	
6	Receptacle	
7	Axle	
8 ¹⁾	Adapter for pulley cart*	Assembly of auxiliary jib Erecting the boom system with the auxiliary jib
9 ¹⁾	Retaining pin	
10 ¹⁾	Locking pin	
11 ¹⁾	Receptacle	
17	Adapter for F-jib*	Erecting the boom system with F-jib

1) Required for SLK-operation

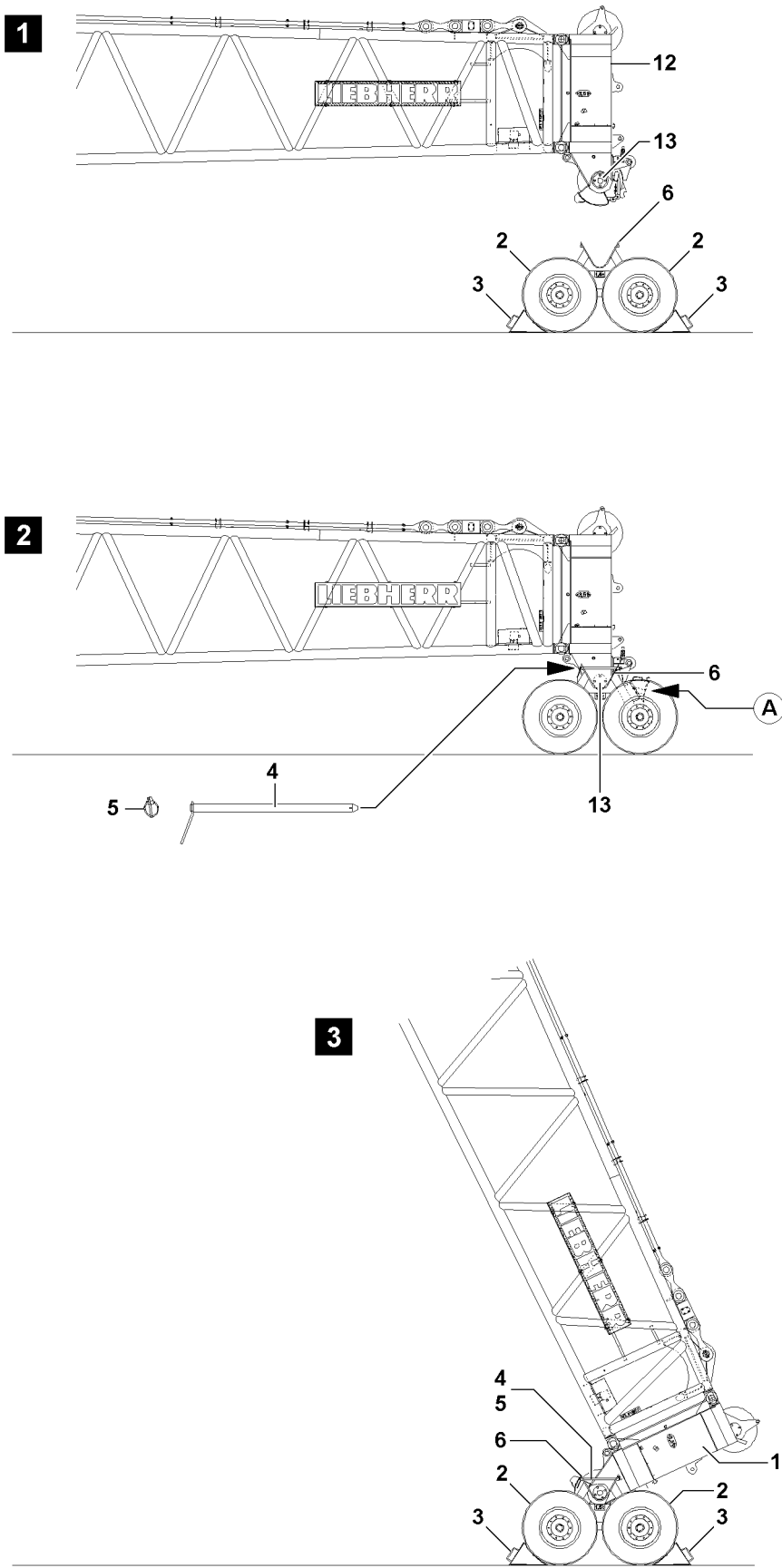


Fig.108264

LWE/LR 1750-000/12812-15-02/en

2 Installing / removing the roller cart from W-boom head

2.1 Installing the pulley cart

Place the pulley cart **1** under the W-end section **12** and affix with wedges **3**.

- ▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
- ▶ Secure the pulley cart **1** with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **1**.
- ▶ Release the retaining pins **4** on the receptacles **6** and unpin.
- ▶ Slowly lower the W-boom until the studs **13** of the W-end section **12** are placed in the receptacles **6** of the pulley cart, illustration **2**.

Secure the studs **13** in the receptacles **6** of the pulley cart.

- ▶ Insert the pin **4** at receptacles **6** and secure with locking pin **5**, illustration **2**.
- ▶ Remove the wedges **3** on the wheels.
- ▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.

2.2 Removing the pulley cart

When the boom system has reached a certain angle between the S-boom and the W-lattice jib, then the pulley cart is no longer required. Before luffing the boom system all the way up, remove the pulley cart on the W-end section.



WARNING

Overload of crane!

If the pulley cart is not removed before erecting the boom system all the way, the crane can be overloaded and topple over!

Personnel can be severely injured or killed!

- ▶ Remove the pulley cart before lifting the boom system from the ground!

-
- ▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
 - ▶ Secure the pulley cart with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **3**.
 - ▶ Release the retaining pin **4**: Remove the locking pin **5**.
 - ▶ Unpin the retaining pin **4** on the receptacle **6**.
 - ▶ Luff the boom system up.

When the boom system is luffed up:

- ▶ Remove the wedges **3** on the wheels.
- ▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.
- ▶ Insert the retaining pin **4** in the receptacle **6** and secure with locking pins **5**.
- ▶ Remove the pulley cart.

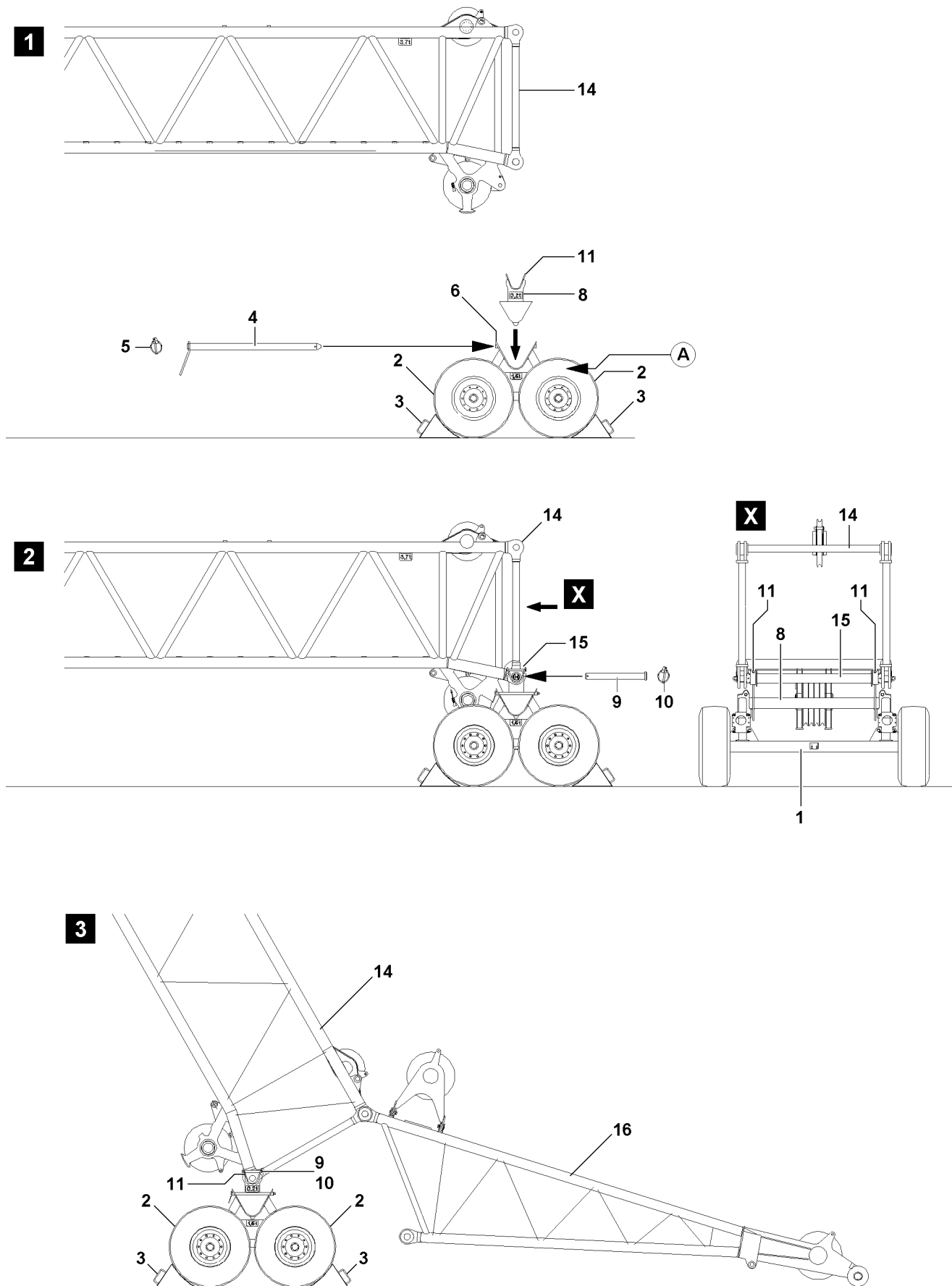


Fig.108275

LWE/LR 1750-000/12812-15-02/en

3 Installing / removing the pulley cart on the adapter for the auxiliary jib

3.1 Installing the „adapter for the pulley cart“ on the pulley cart

The adapter for the pulley cart **8** is required to erect the SLK-boom combinations. To prevent the pulley set of the adapter for the auxiliary jib **14** from laying on the steel construction of the pulley cart, the receptacle **6** on the pulley cart must be raised. This elevation can be obtained by installing the adapter for the pulley cart **8**.

- ▶ Attach the adapter for the pulley cart **8** on the auxiliary crane.
- ▶ Release the retaining pins **4** on the pulley cart on both sides and unpin.
- ▶ Align the adapter for the pulley cart **8** on the receptacles **6** on the pulley cart.
- ▶ Lower the adapter for the pulley cart **8** in the receptacles **6** on the pulley cart.

When the adapter for the pulley cart **8** is completely lowered in the receptacles **6** on the pulley cart:

- ▶ Insert the retaining pin **4** and secure with locking pin **5**.
- ▶ Remove the auxiliary crane.

3.2 Installing the pulley cart on the „adapter for the auxiliary jib“

Make sure that the following prerequisite is met:

- The adapter for the pulley cart **8** is properly installed and secured on the pulley cart.

Place the pulley cart under the adapter for the auxiliary jib **14** and affix with wedges **3**.

- ▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
- ▶ Secure the pulley cart with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **1**.
- ▶ Lower the adapter for the auxiliary jib **14** slowly until the pipe **15** is laying in the receptacles **11** on the adapter for the pulley cart **8**, illustration **2**, illustration **X**.

Secure the pipe **15** in the receptacles **11** on the adapter for the pulley cart **8**.

- ▶ Insert the pin **9** at receptacles **11** and secure with locking pin **10**, illustration **2**.
- ▶ Remove the wedges **3** on the wheels.
- ▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.

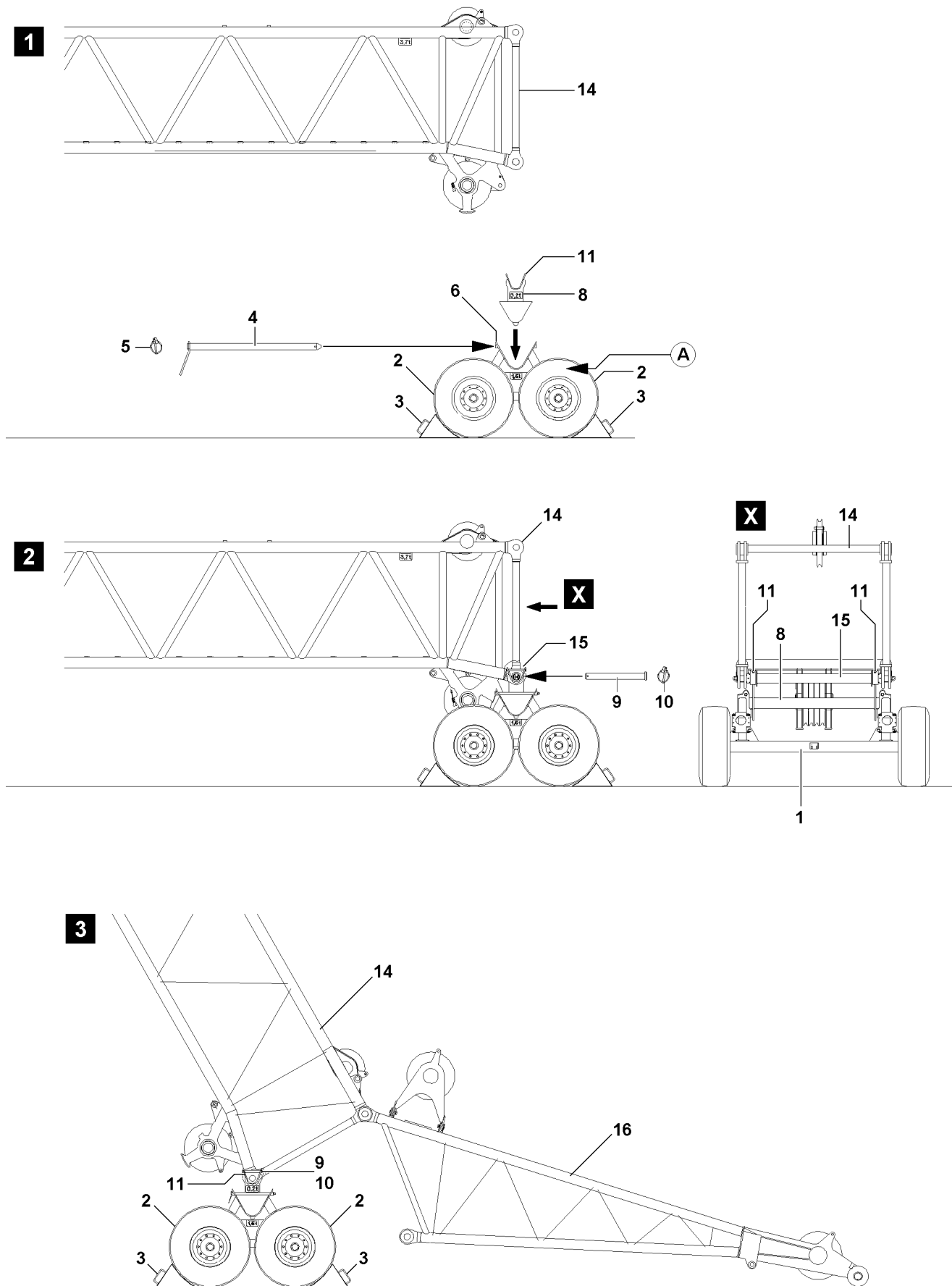


Fig.108275

LWE/LR 1750-000/12812-15-02/en

3.3 Removing the pulley cart on the „adapter for the auxiliary jib“

When the boom system has reached a certain angle between the SL-boom and the K-lattice jib, then the pulley cart is no longer required. Before lifting the boom system off, the pulley cart must be removed on the adapter for the auxiliary jib **14**.



WARNING

Overload of crane!

If the pulley cart is not removed before erecting the boom system all the way, the crane can be overloaded and topple over!

Personnel can be severely injured or killed!

▶ Remove the pulley cart before lifting the boom system from the ground!

- ▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
- ▶ Secure the pulley cart with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **4**.
- ▶ Release the retaining pin **9**: Remove the locking pin **10**.
- ▶ Release the retaining pin **9** on the receptacle **11** and unpin.
- ▶ Luff the boom system up.

When the boom system is luffed up:

- ▶ Remove the wedges **3** on the wheels.
- ▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.
- ▶ Insert the retaining pin **9** in the receptacle **11** and secure with locking pins **10**.
- ▶ Remove the pulley cart.

3.4 Removing the „adapter for the pulley cart“* on the pulley cart

- ▶ Attach the adapter for the pulley cart **8** on the auxiliary crane.
- ▶ Release the retaining pins **4** on the pulley cart on both sides and unpin.
- ▶ Lift the adapter for the pulley cart **8** and place it on a pallet or a suitable support.
- ▶ Remove the auxiliary crane.
- ▶ Insert the retaining pin **4** in the receptacles **6** and secure with locking pins **5**.

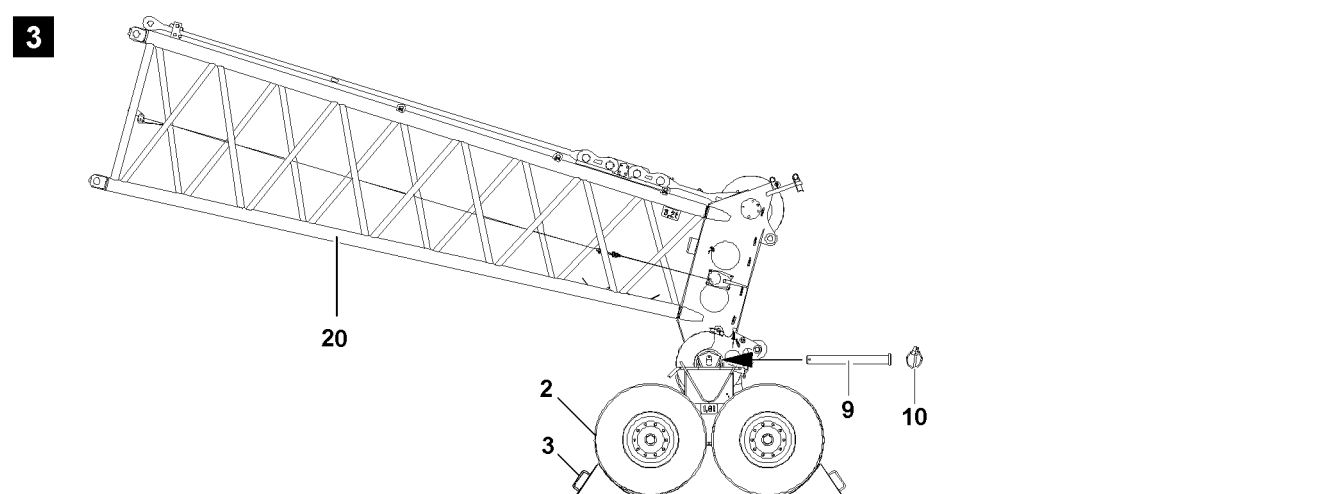
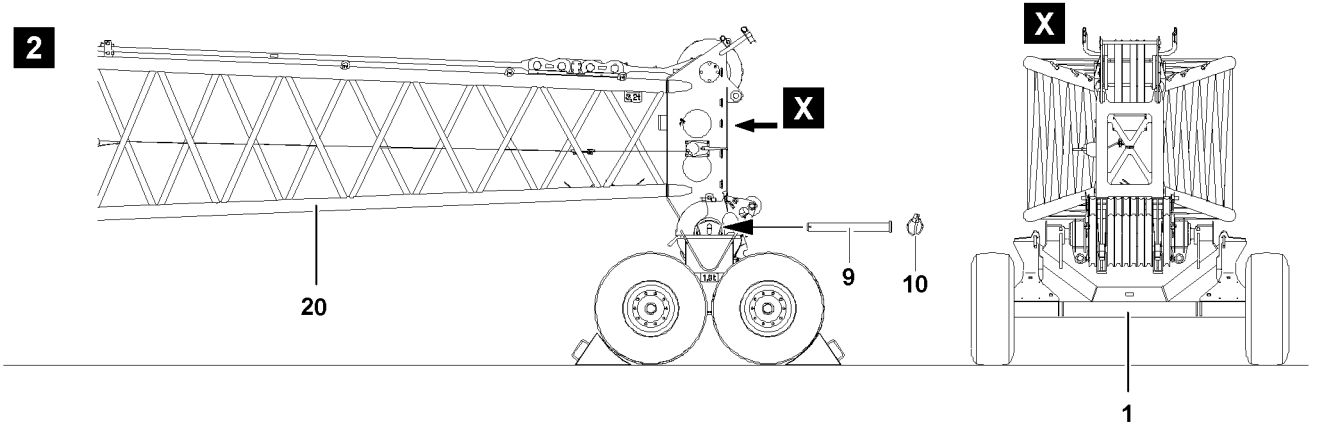
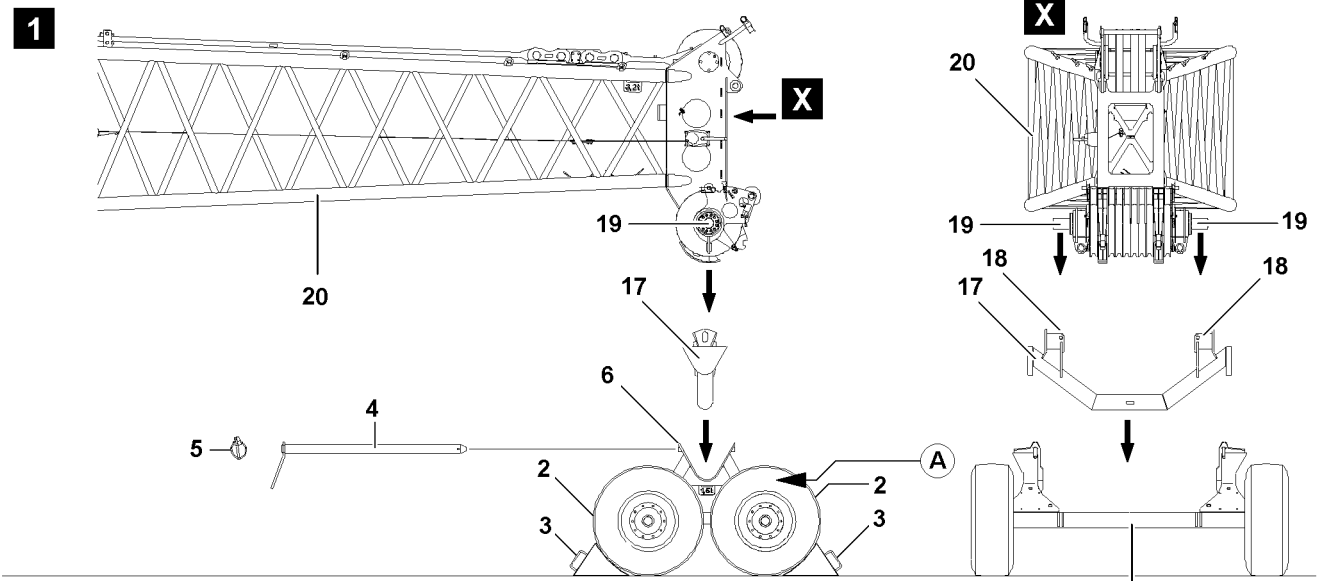


Fig.120169

LWE/LR 1750-000/12812-15-02/en

4 Installing / removing the pulley cart on the F-end section.

4.1 Assembling the „adapter for F-jib*“ on the pulley cart

The F-jib **20** can be erected by using the pulley cart. Place first the adapter for the F-jib into the pulley cart and secure.

- ▶ Fasten the adapter for F-jib **17** on the auxiliary crane.
- ▶ Release the retaining pins **4** on the pulley cart on both sides and unpin.
- ▶ Align the adapter for F-jib **17** on the receptacles **6** on the pulley cart.
- ▶ Lower the adapter for F-jib **17** in the receptacles **6** on the pulley cart.

When the adapter for F-jib **17** is completely lowered in the receptacles **6** on the pulley cart:

- ▶ Insert the retaining pin **4** and secure with locking pin **5**.
- ▶ Remove the auxiliary crane.

4.2 Installing the pulley cart

Place the pulley cart **1** under the F-jib **20** and affix with wedges **3**.

- ▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
- ▶ Secure the pulley cart **1** with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **1**.
- ▶ Release and unpin the pins **9** on the receptacles **18**.
- ▶ Slowly lower the F-jib **20** until the studs **19** of the F-jib **20** are laying in the receptacles **18** of the adapters for F-jib, illustration **2**.

Secure the studs **19** in the receptacles **18** of the adapter for the F-jib.

- ▶ Insert the pin **4** at receptacles **18** and secure with locking pin **5**, illustration **2**.
- ▶ Remove the wedges **3** on the wheels.
- ▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.

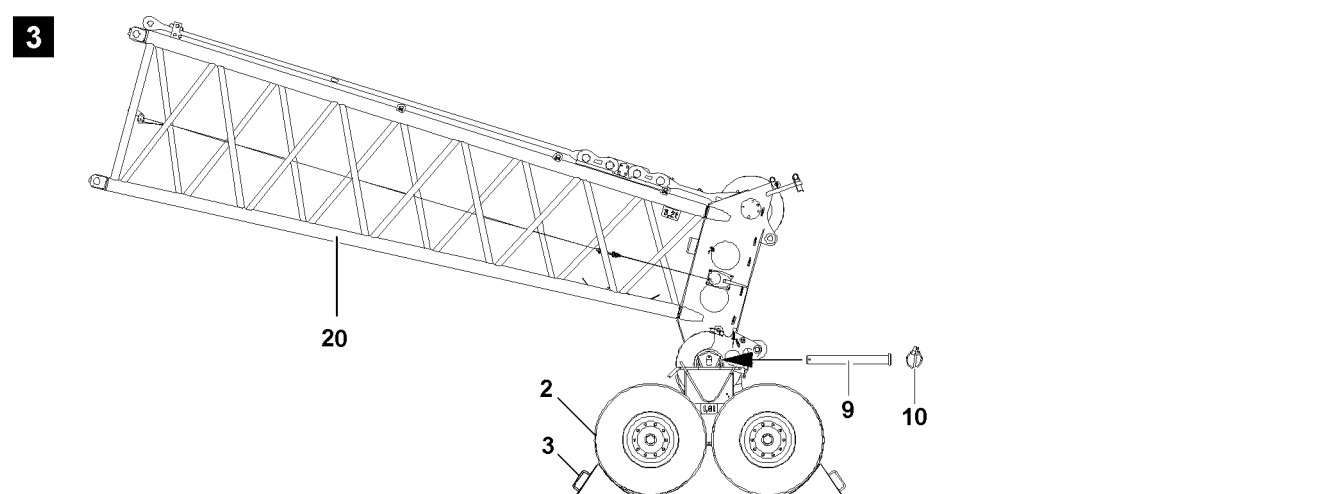
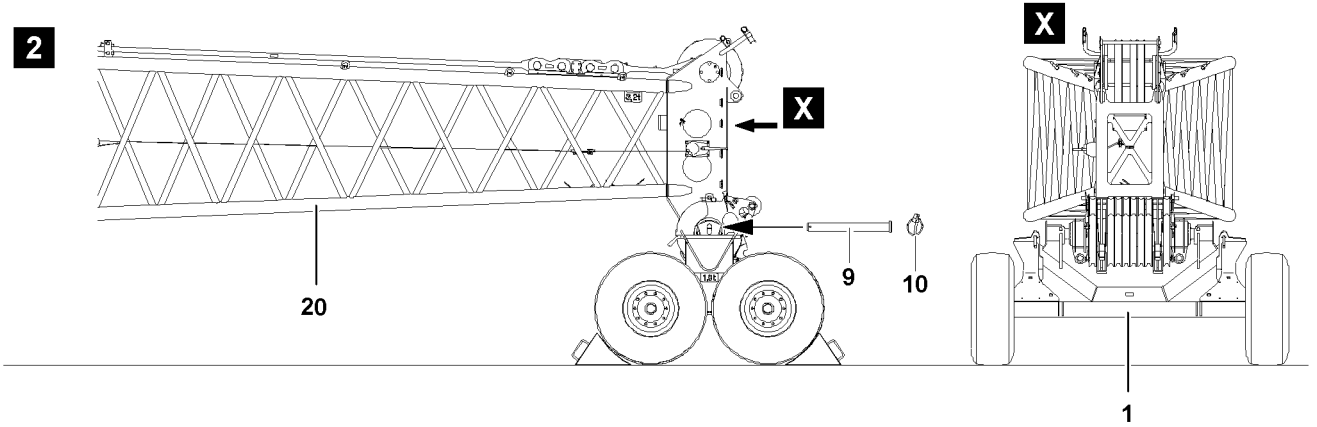
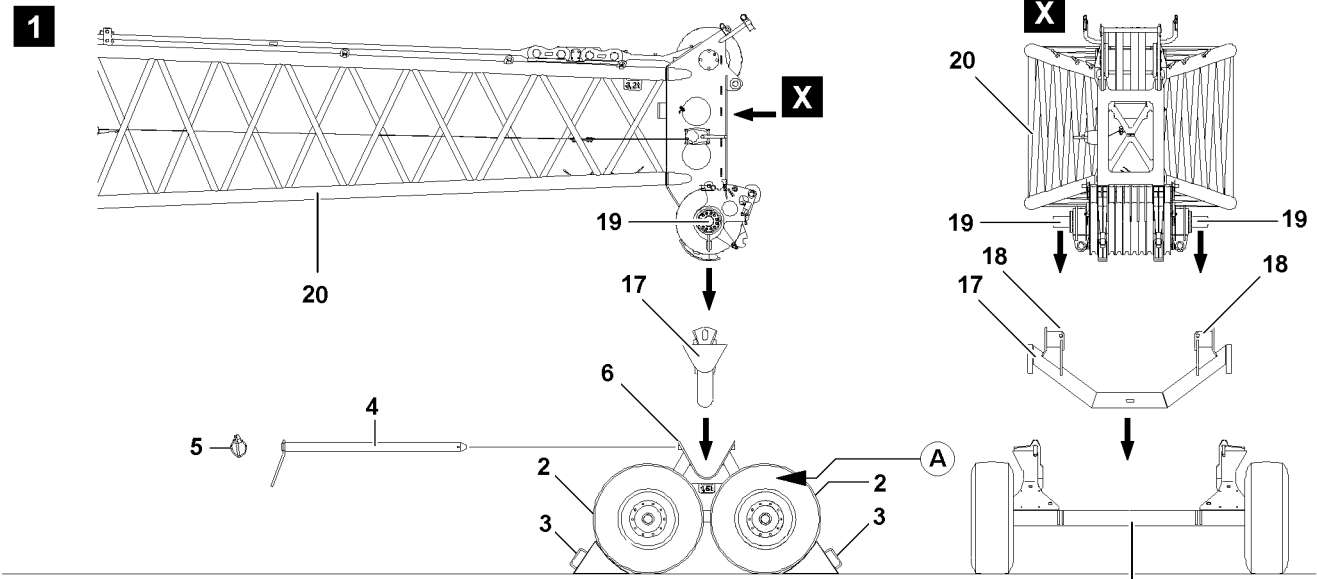


Fig.120169

LWE/LR 1750-000/12812-15-02/en

4.3 Removing the pulley cart

When the boom system has reached a certain angle between the main boom and the F-jib, then the pulley cart is no longer required. Before luffing the boom system all the way up, remove the pulley cart on the F-jib.



WARNING

Overload of crane!

If the pulley cart is not removed before erecting the boom system all the way, the crane can be overloaded and topple over.

Personnel can be severely injured or killed.

▶ Remove the pulley cart before lifting the boom system off the ground.

- ▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
- ▶ Secure the pulley cart with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **3**.
- ▶ Release the pin **9**: Remove the locking pin **10**.
- ▶ Unpin the pin **9** on the receptacle **18**.
- ▶ Luff the boom system up.

When the boom system is luffed up:

- ▶ Remove the wedges **3** on the wheels.
- ▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.
- ▶ Insert the pin **9** in the receptacle **18** and secure with locking pin **10**.
- ▶ Remove the pulley cart.

4.4 Disassembling the „adapter for F-jib“* on the pulley cart

- ▶ Fasten the adapter for F-jib **17** on the auxiliary crane.
- ▶ Release the retaining pins **4** on the pulley cart on both sides and unpin.
- ▶ Lift the adapter for the F-jib **17** and place it on a pallet or a suitable support.
- ▶ Remove the auxiliary crane.
- ▶ Insert the retaining pin **4** in the receptacles **6** and secure with locking pins **5**.

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LWE/LR 1750-000/12812-15-02/en

6 Additional equipment

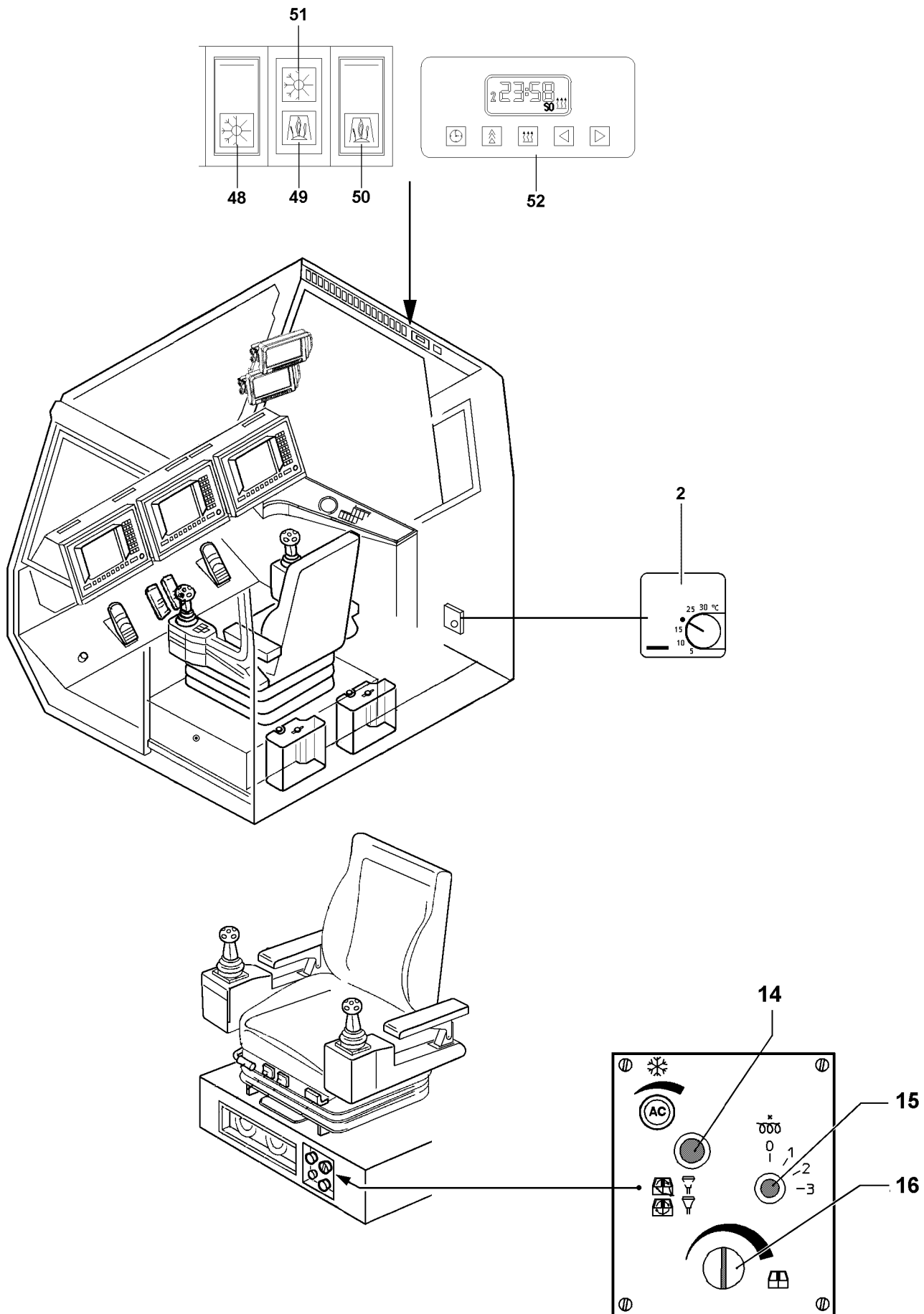


Fig.108314

LWE/LR 1750-000/12812-15-02/en

1 Heating the crane operator's cab

The cab can be heated with two heaters, which are independent of each other:

- Engine-dependent heater.
- Engine-independent auxiliary heater, for outside temperatures of up to -40 °C, WEBASTO; Thermo 90 S.*

The individual adjustment of the heater (for both engine-dependent and engine-independent auxiliary heaters*) is carried out with the control elements under the crane operator's seat as well as via switches and indicator lights on the instrument panel.

NOTICE

Risk of damage to the heater control units* when carrying out electrical welding work on the crane!

- ▶ Disconnect the negative and positive cables from the batteries and connect the positive cables to the vehicle ground.
-

1.1 Heater operation

1.1.1 Adjusting the temperature

The cab is heated with the engine coolant.

- ▶ Set the knob **16**.

1.1.2 Adjusting the ventilation

- ▶ Set the blower with the 3-stage rotary switch **15**.

Result:

- The air volume will be regulated.

1.1.3 Adjusting the recirculated air / fresh air

- ▶ Actuate the changeover switch **14**.

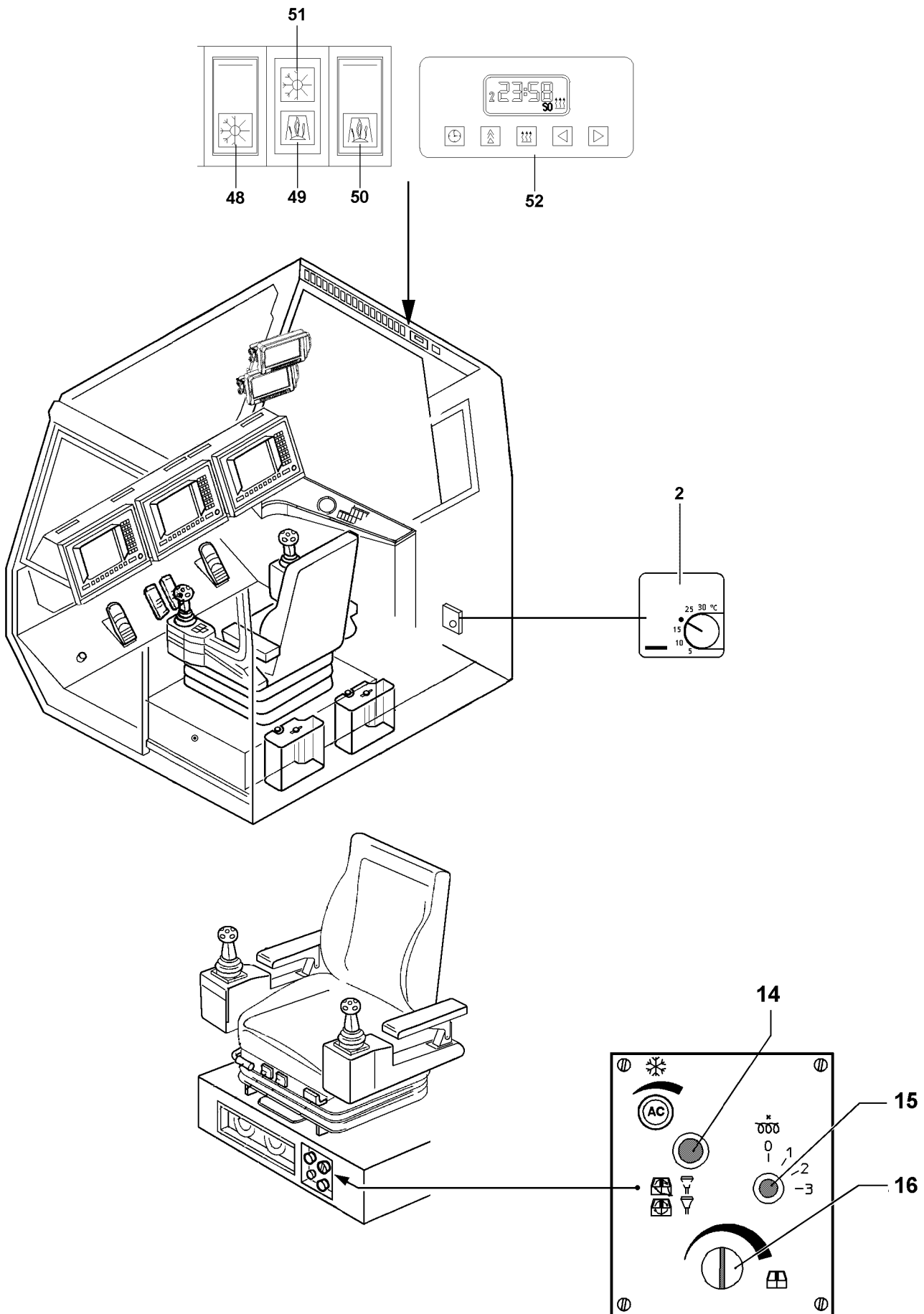


Fig.108314

LWE/LR 1750-000/12812-15-02/en

1.2 Operating the engine-independent auxiliary heater*

The engine-independent auxiliary heater is used to heat the cab when the engine is turned off and as auxiliary heater* at low ambient temperatures, if the engine-dependent heating is insufficient.

For detailed description of the auxiliary heater* refer to the enclosed manufacturer's operating instructions.

In summer run the auxiliary heater* once a month for approx. 15 to 20 minutes.

Carry out maintenance work on the auxiliary heater* as outlined in the enclosed manufacturer's operating instructions.

1.2.1 Start up

NOTICE

Risk of damage to auxiliary heater!

- ▶ Fill all units with sufficient service fluids for winter operation, as specified in the lubricant chart.
-



DANGER

Risk of poisoning and suffocation in enclosed areas!

- ▶ Operate the heater, even with a timer, only in closed areas such as garages or workshops if an exhaust suction system is present.
-



DANGER

Risk of explosion!

In areas where combustible fumes or dust could form, such as in the vicinity of storage areas for fuel, coal, wood dust or grain storage or similar and in the vicinity of filling stations or tank depots, there is a risk of explosion.

- ▶ Turn off the heater.
-

- ▶ Set the knob **16** to „warm“.
- ▶ Actuate the switch **50**.

Result:

- The function control on the switch **50** lights up.
 - The indicator light **49** lights up.
-

1.2.2 Turning off

- ▶ Actuate the switch **50**.

Result:

- The function control on the switch **50** turns off.
 - Each time the auxiliary heater is turned off, it continues to run up to 150 seconds longer.
-

NOTICE

Danger of property damage!

- ▶ Turn the battery master switch off only when the heater after run is over.
-

- When the after run is over:
The indicator light **49** turns off.

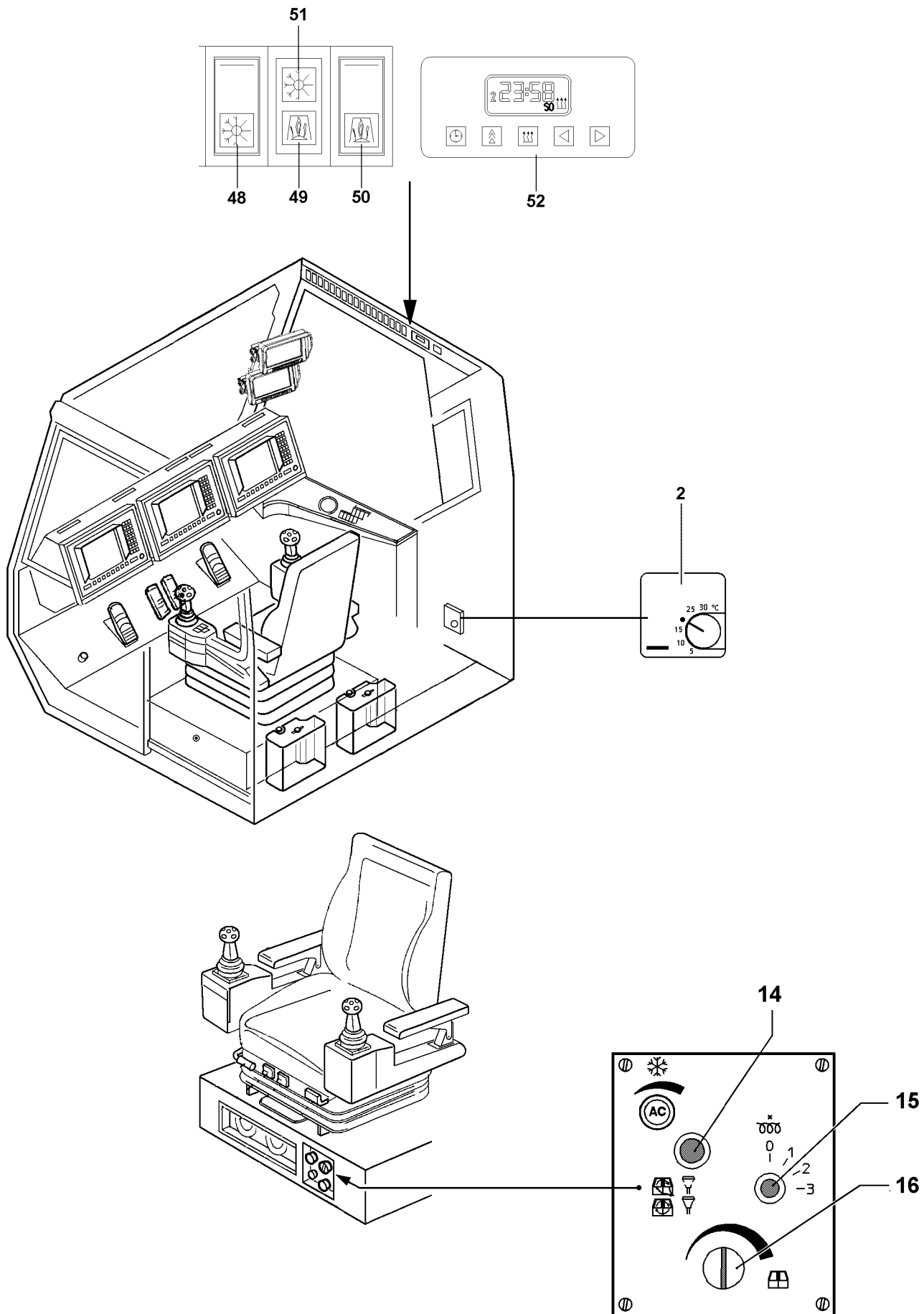


Fig.108314

LWE/LR 1750-000/12812-15-02/en

1.2.3 Operation with timer*

For a detailed description of the timer **52** refer to the enclosed manufacturer's operating instructions.

- ▶ Set the required turn-on time, temperature and duration of heater operation on the timer **52**.
- ▶ Open or close the air vents, as desired.

Result:

- Upwards or downwards air distribution will be selected.
- ▶ Set the knob **16** to „warm“.

1.2.4 Operating the thermostat*

Ensure that the following prerequisite is met:

- the knob **16** is set to „warm“.
- ▶ Turn the thermostat **2** to the desired temperature.

1.2.5 Venting the system

When refilling the system, it should be carefully vented.

- ▶ Add coolant into the expansion tank for the heater system according to the lubricant chart.
- ▶ Start the engine.
- ▶ Set the knob **16** to „warm“.
- ▶ Check the expansion tank for air bubbles.

Result:

- The heating system is vented as soon as no more air bubbles rise up.

- ▶ Set the knob **16** to „cold“.
- ▶ Check the expansion tank for air bubbles.

Result:

- The circuit is vented as soon as no more air bubbles rise up.

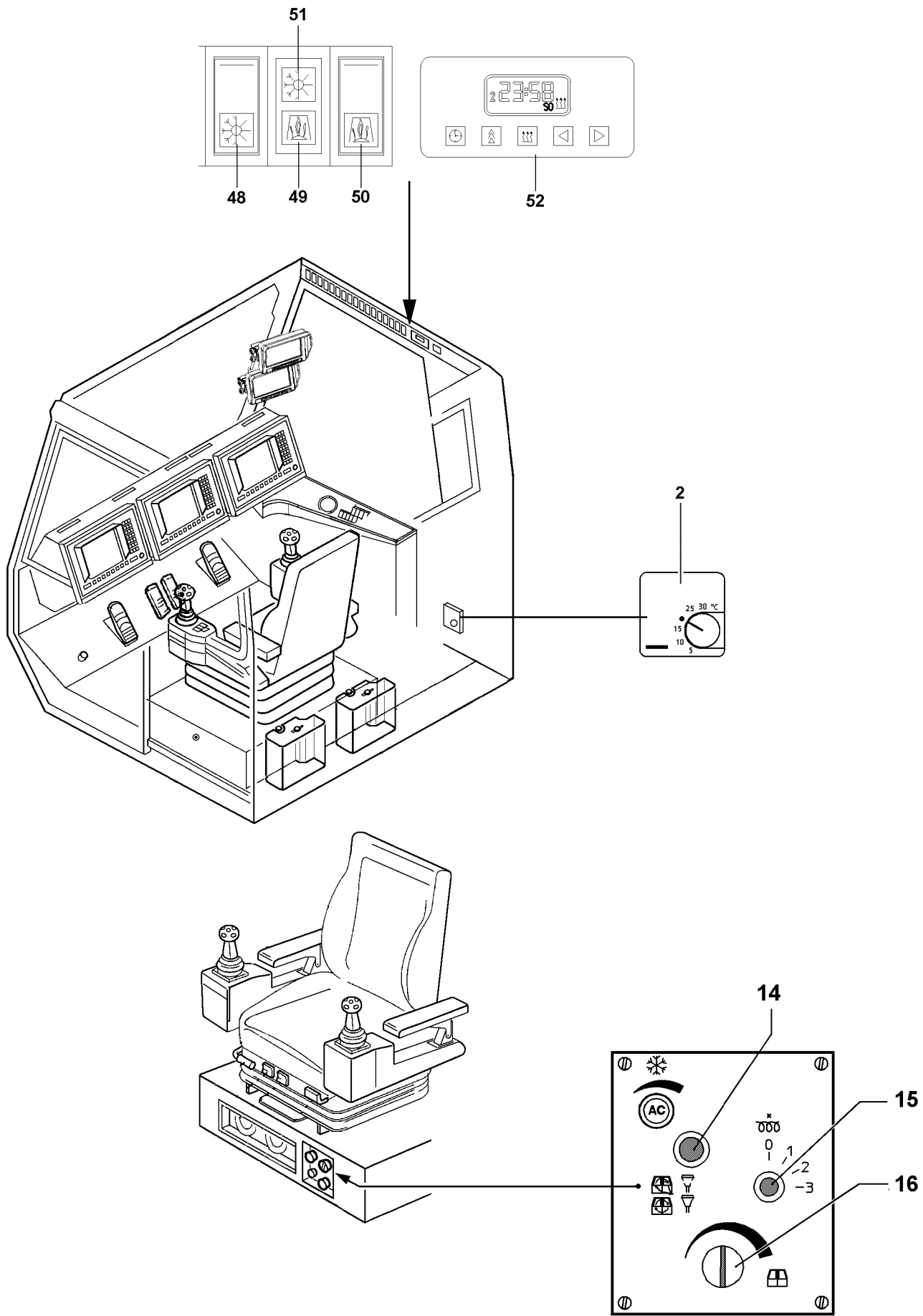


Fig.108314

LWE/LR 1750-000/12812-15-02/en

1.3 Air conditioning system* operation

For a detailed description of the air conditioning system*, refer to the enclosed manufacturer's operating instructions.

Carry out maintenance work on the air conditioning system* according to the enclosed manufacturer's operating instructions.

1.3.1 Start up

Make sure that the following prerequisites are met:

- the battery master switch is turned on
- the engine is running
- the air intake opening for recirculated air operation is clear

▶ Open or close the air vents, as desired.

Result:

- Upwards or downwards air distribution will be selected.

▶ Close both windows and the cab door.

▶ Set the changeover switch **14** for fresh air / recirculated air to recirculated air operation.

▶ Actuate the switch **48**.

Result:

- The indicator light **51** lights up.

- The air conditioning system* is turned on and ready to operate.

▶ Open the appropriate air vent for upward air distribution.

▶ Turn on the fan with the rotary switch **15**.

▶ Regulate the temperature with the knob **16**.

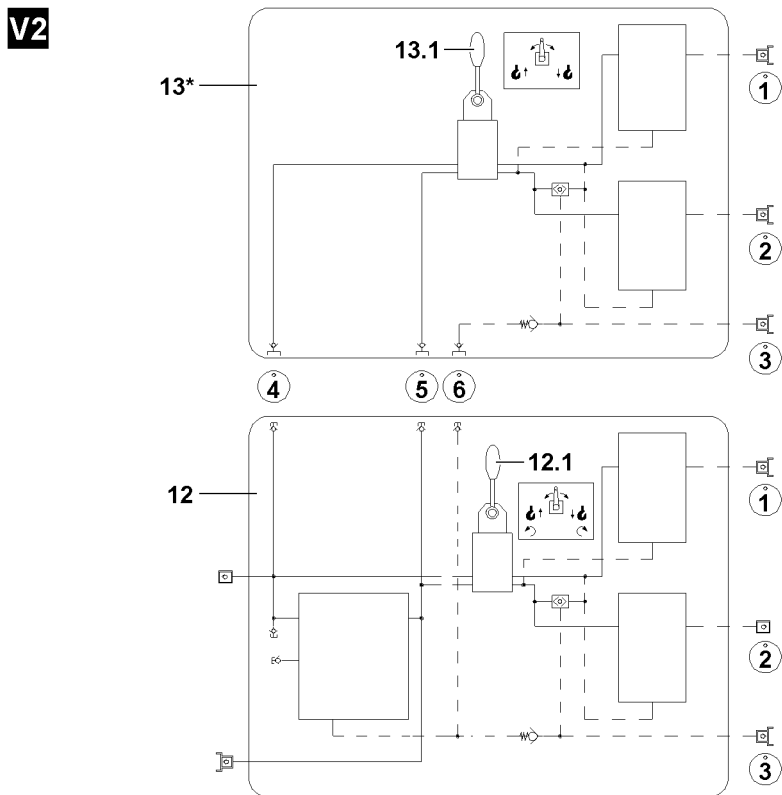
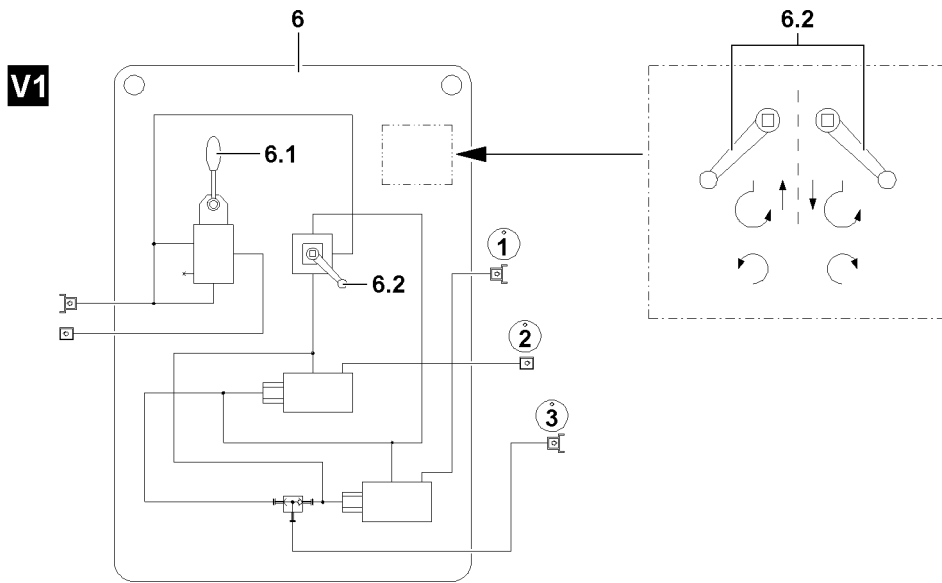


Fig.109407

LWE/LR 1750-000/12812-15-02/en

1 Emergency operation



Note

► The illustrations in this chapter are examples and may not apply exactly to your crane!



Note

► Before you start with preparations for emergency operation, check which of the following assembly plates you have available to carry out the emergency operation!

There are two **different** variations of assembly plates.

With variation 1 **V1**, all winches, which are equipped with the respective auxiliary hydraulic for emergency operation and the slewing gear can be actuated, each individually.

With variation 2 **V2**, which consists of two assembly plates, all winches, which are equipped with the respective auxiliary hydraulic for emergency operation can be actuated, each individually, **or** winch 1 **WI** and winch 2 **WII** can be actuated in parallel operation or the slewing gear can be actuated individually.



Note

► Observe the following charts!

	Variation 1 (V1)	Variation 2(V2)
	each in individual operation	each in individual operation
Winch 1	X	X
Winch 2	X	X
Winch 1II2 ¹⁾	—	X
Winch 3	X	X
Winch 4	X	X
Winch 5	X	X
Winch 6	X	X
Slewing gear	X	X

1) Parallel operation Winch 1 and winch 2 (1II2)

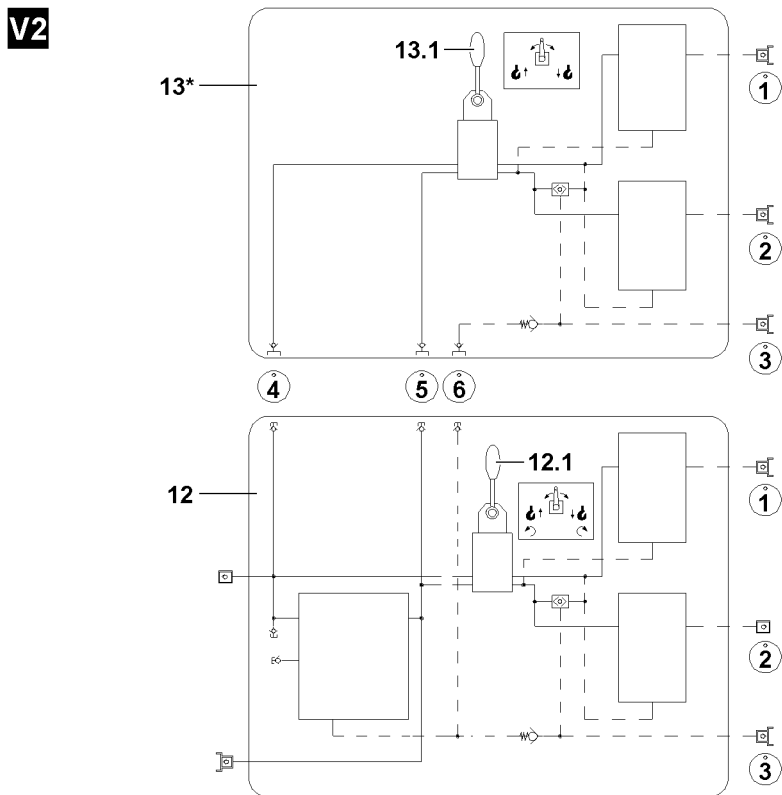
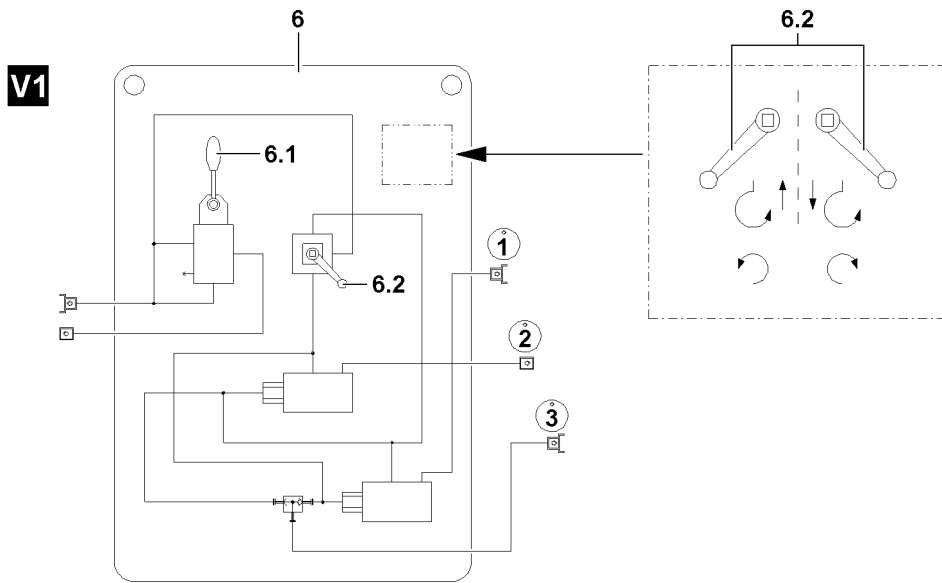


Fig.109407

LWE/LR 1750-000/12812-15-02/en

1.1 General danger notes



DANGER

Significant accident risk during emergency operation!

During an emergency operation, crane movements are no longer monitored by the LICCON computer system!

In the event of improper operation or deliberate misuse, the crane can topple over!

There is an increased risk of accident if the following danger notes are not observed!

Personnel can be severely injured or killed!

This could result in high property damage!

► All hazard warnings are to be observed and maintained!

General danger notes!

1. **Emergency operation of the crane superstructure may only be carried out:**

- To remove a dangerous situation.
- After consultation with customer service at LIEBHERR-Werk Ehingen GmbH.
- By authorized personnel who are knowledgeable of the hydraulic circuit diagram, the connection diagram and carrying out emergency operation.
- By authorized personnel who are aware of the risks of emergency operation.
- To carry out load reducing movements.

2. The danger zone must be blocked off!

3. No persons or objects may remain in the danger zone!

4. If a load is on the hook, then it must first be set down to relieve the boom!

5. During emergency operation, all safety devices, with the exception of „winch spooled out“ are automatically bypassed!

6. In the event of a defect or failure of the LICCON computer system, each step must be carried out and monitored with extreme caution and care, since a visual check on the LICCON monitor is no longer possible. Visual check!

7. All crane movements must be travelled with extreme caution and at the lowest speed!

8. The crane operator must be in visual contact with auxiliary personnel or guides person!



Note

Please note!

► The hydraulic supply for the crane can, to the extent that the crane has been equipped, take place through an emergency unit*. If this is not the case, the crane must be taken down by using additional auxiliary cranes!



WARNING

The crane can topple over!

► The boom may only be luffed down if the stability of the crane permits this action, observe information in the load tables and maintain them!

► When taking down the boom, the information in the erection and take down charts are to be observed and followed!

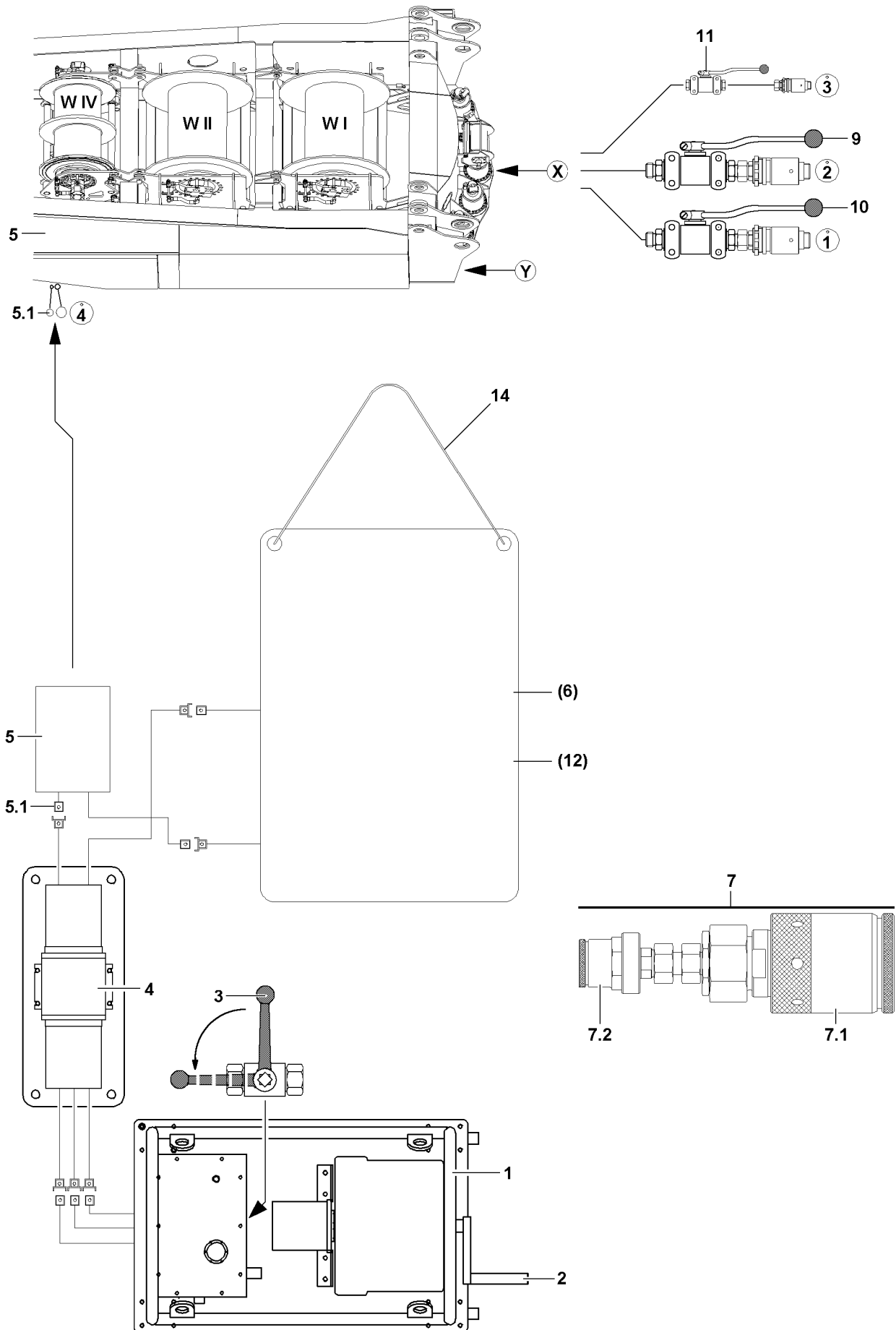


Fig.109408

LWE/LR 1750-000/12812-15-02/en

1.2 Handling of assembly plates



WARNING

Falling assembly plates!

Non-secured assembly plates can fall down when carrying out the emergency operation!

Personnel can be severely injured or killed!

- ▶ For emergency operation, secure the assembly plates with the chains **14** to prevent them from falling down!
- ▶ Do not secure the assembly plates near movable crane components!

1.3 Prerequisites for emergency operation



Note

- ▶ On the basis of different line diameters on the hydraulic lines, false couplings are prevented, additionally the hydraulic connections are identified with numbers!

Make sure that the following prerequisites are met:

- The hydraulic circuit diagram is available.
- The hydraulic system is functioning.
- An emergency operation aggregate **1** is available.
- A „Hydraulic transformer **4**“ is available.
- The assembly plate(s) are available.
- Reducer sections **7** (adapter) are available.
- The dust plugs for the hydraulic connections are removed.

1.4 Establishing the hydraulic connections



WARNING

Danger due to hydraulic pressure!

If the hydraulic lines are pressurized when releasing the connections, it can lead to severe injuries to assembly personnel!

- ▶ Relieve the pressure in the hydraulic lines before releasing!
- ▶ Establish the hydraulic connections from the emergency operation aggregate* **1** to the transformer **4**.
- ▶ Establish the hydraulic connection from the transformer **4** to the (suction line) on the turntable **5** of the crane, connection **5.1**.
- ▶ Hydraulic connection (return line, number **4**) from the turntable of the crane to the assembly plate **6** or to the assembly plate **12**.
- ▶ Establish the hydraulic connection (pressure line) from the transformer **4** to the assembly plate **6** or to the assembly plate **12**.

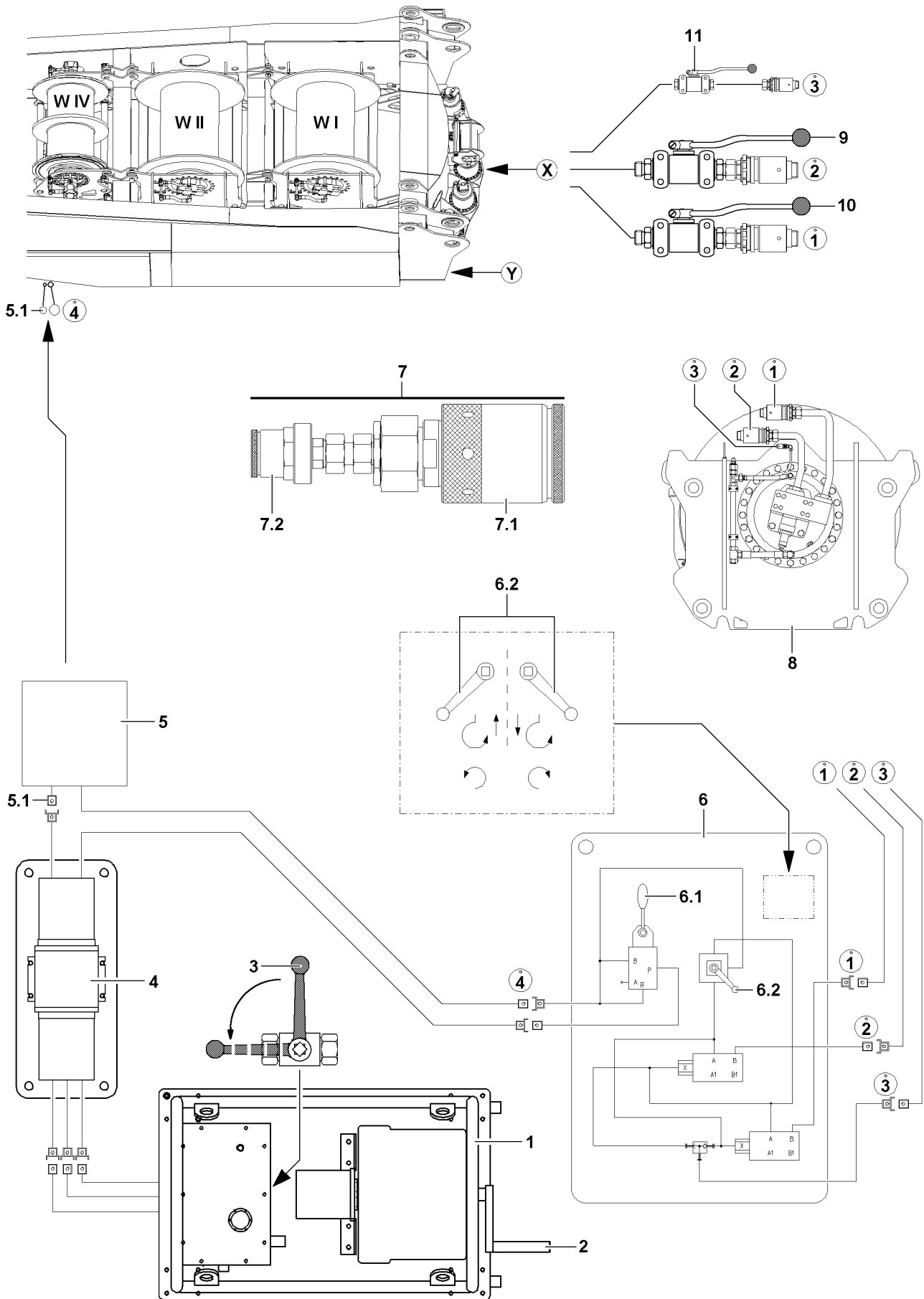


Fig.108301

LWE/LR 1750-000/12812-15-02/en

2 Emergency operation with assembly plate Variation 1 (V1)



Note

- ▶ The procedure of the emergency operation - except winch 4 on the LR1600/2 and LR1600/2-W - is identical for all winches and is described on the example of one winch!

Exception LR1600/2 and LR1600/2-W:

- ▶ Before emergency operation of winch 4 **W IV** on the LR1600/2 and LR1600/2-W, in addition to the hydraulic connections to lift, lower and for the control pressure of the brake, a control line must be connected, see section: „Emergency operation of winch 4 **W IV** on the LR1600/2 and LR1600/2-W!“

To carry out the emergency operation, use an emergency operation aggregate **1**, a hydraulic transformer **4** and the assembly plate **6**.

2.1 Functional selection on the assembly plate

With the ball valve **6.2** on the assembly plate **6** the following movements are preselected:

- Lift or lower
- Turn left or right
- ▶ Preselect crane movement: Activate ball valve **6.2** in the corresponding direction.

Moving the hand lever **6.1** determines the speed of the each crane movement.

- ▶ Operate the hand lever **6.1** and carry out the respective crane movement carefully.

2.2 Start the emergency operation aggregate

- ▶ Turn the crank **2** on the emergency operation aggregate* **1**.
- ▶ Switch the ball valve **3** to „horizontal“ position.



Note

- ▶ The engine rpm on the emergency operation aggregate can be set via a separate speed regulator!

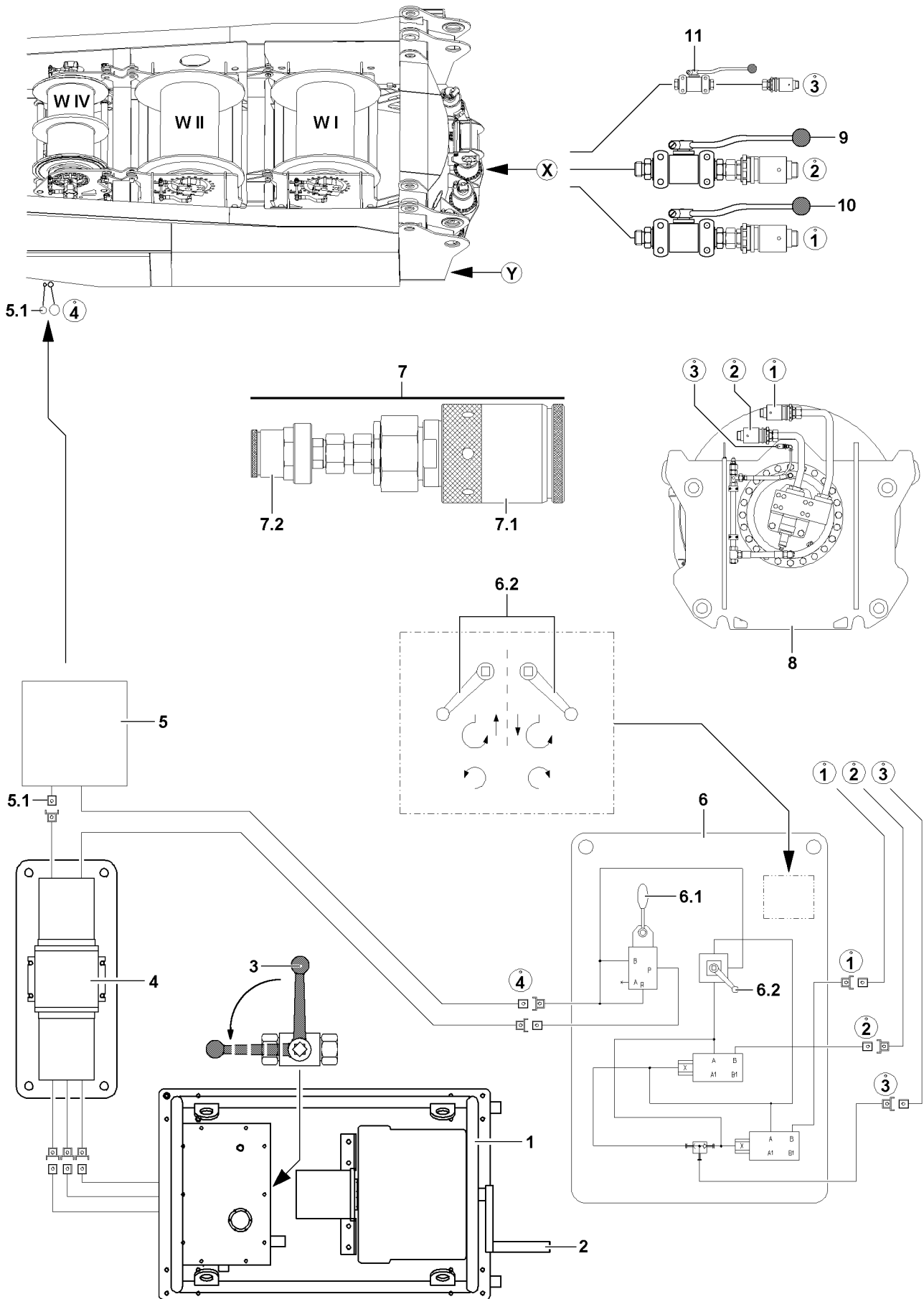


Fig.108301

LWE/LR 1750-000/12812-15-02/en

2.3 Emergency operation of winch 4 on the LR1600/2 and LR1600/2-W



WARNING

Emergency operation winch 4 **W IV!**

- ▶ Observe the section „Emergency operation of winch 4 (W IV) on the LR1600/2 and LR1600/2-W“!
-

2.4 Emergency operation winches

2.4.1 Establishing the hydraulic connections to the winch

Make sure that the following prerequisite is met:

- The pressure in the hydraulic system has been relieved.
- ▶ Release the hydraulic connections on the corresponding winch.
- ▶ Install the reducer sections **7** (adapter) with coupling sleeve **7.1** on the connection **1** and on the connection **2** of the winch **8**.



Note

- ▶ Observe the numbering of the hydraulic lines!
- ▶ Establish the hydraulic connections for the assembly plate **6** (connection **1**, connection **2** and brake **3**) to the winch **8**.

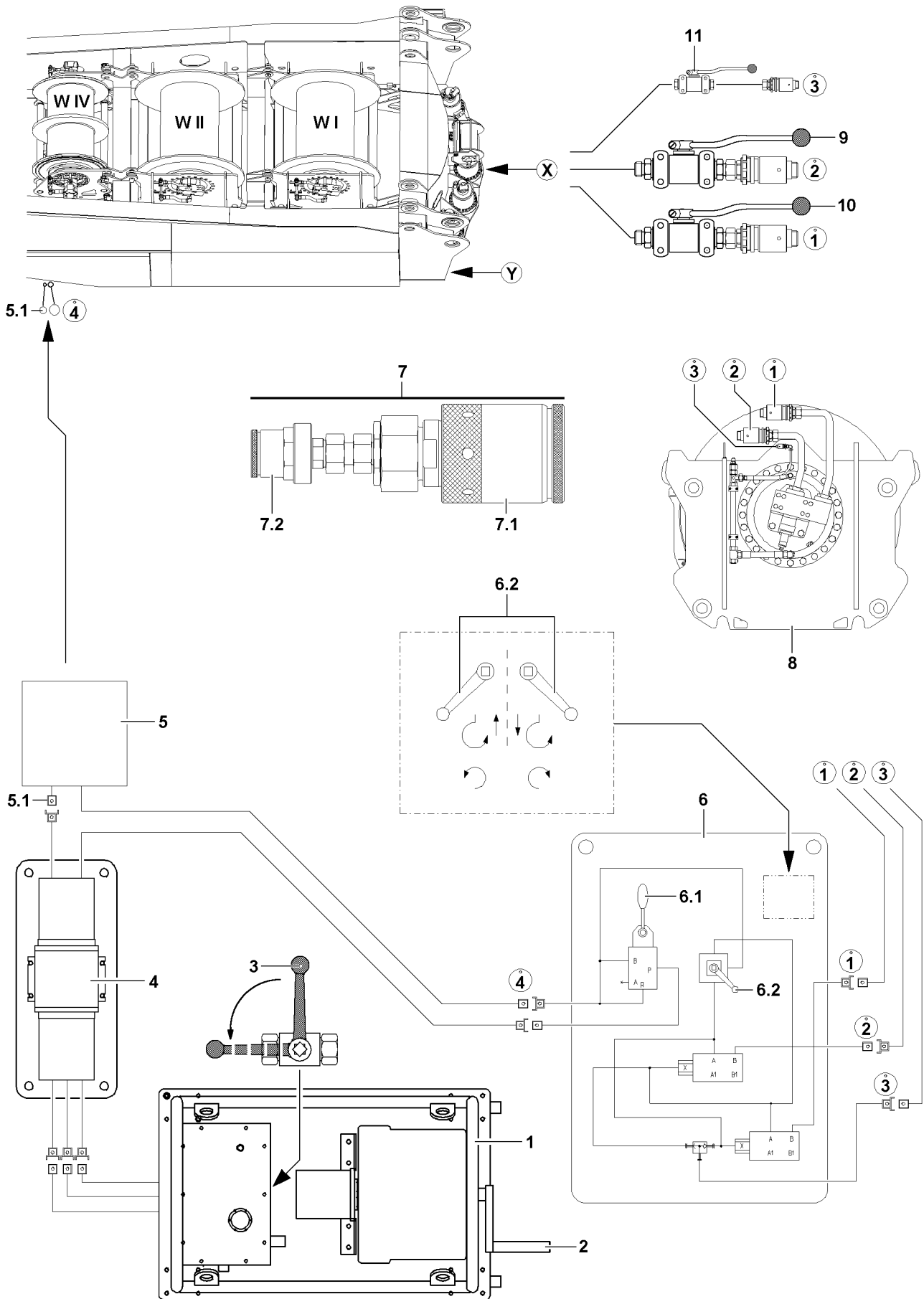


Fig.108301

LWE/LR 1750-000/12812-15-02/en

2.4.2 Spooling the winch out

- ▶ Set the ball valve **6.2** for the assembly plate **6** on „lower“.
- ▶ Move the manual lever **6.1** carefully.

Result:

- The winch spools out.

2.4.3 Spooling the winch up

- ▶ Set the ball valve **6.2** for the assembly plate **6** on „lift“.
- ▶ Move the manual lever **6.1** carefully.

Result:

- The winch spools up.

2.5 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:

- The emergency operation is completed.
 - The pressure in the hydraulic system has been relieved.
 - ▶ Disconnect the hydraulic connections from the winch **8** to the assembly plate **6**.
 - ▶ Remove the reducer sections **7** (adapter).
 - ▶ Close off the hydraulic connections of the winch **8** with dust caps.
- or**
- ▶ Reconnect the winch **8** onto the hydraulic system of the crane.

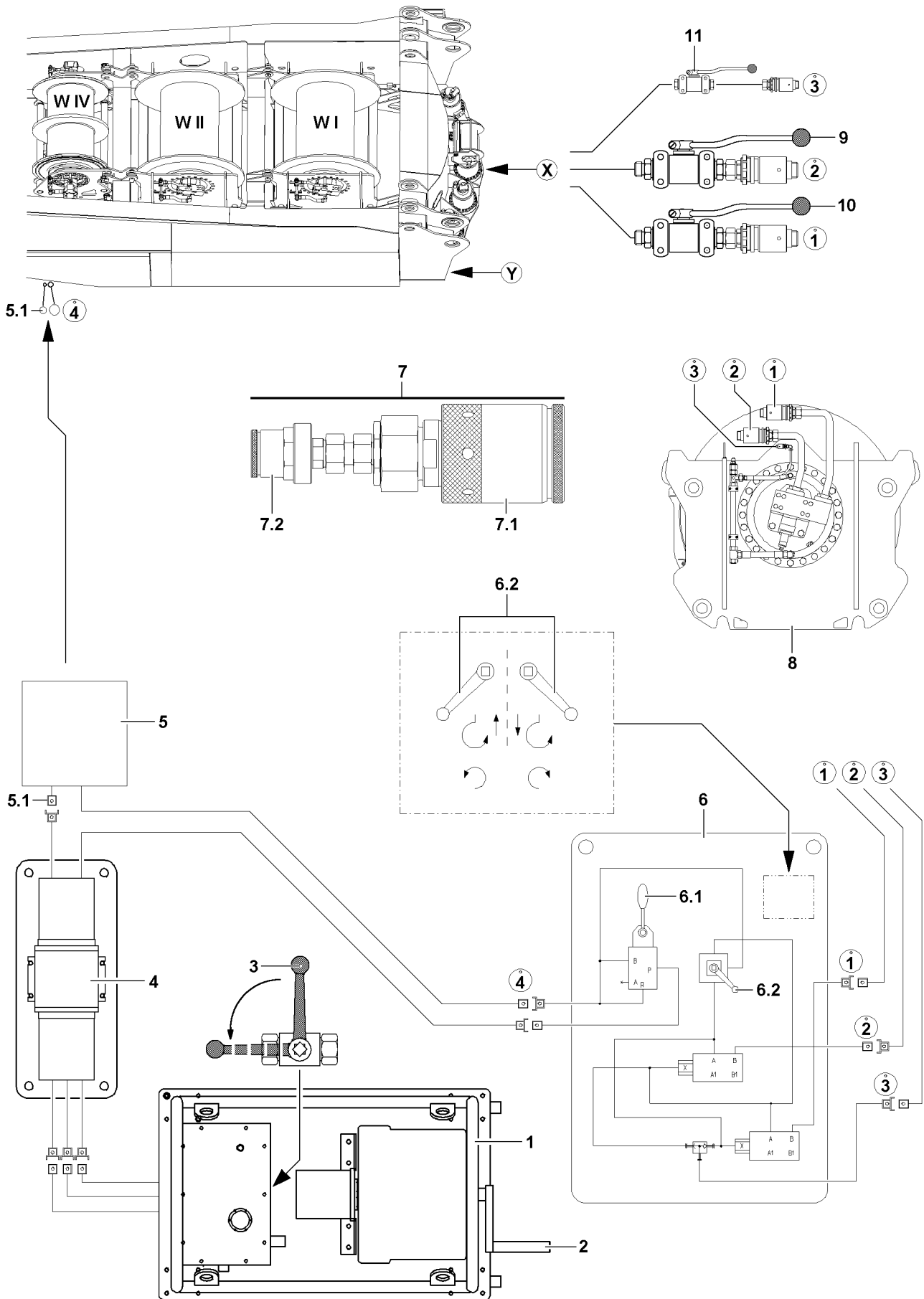


Fig.108301

LWE/LR 1750-000/12812-15-02/en

3 Emergency operation of slewing gear(s) with assembly plate Variation 1 (V1)



WARNING

Danger due to hydraulic pressure!

If the hydraulic lines are pressurized when releasing the connections, it can lead to severe injuries to assembly personnel!

- ▶ Relieve the pressure in the hydraulic lines before releasing!



Note

- ▶ For each crane type, the installation position of the ball valves for emergency operation of the slewing gear on the turntable varies!
- ▶ Possible installation positions of the ball valve: Point **X** or point **Y**!

3.1 Establishing the hydraulic connection to the slewing gears

Make sure that the following prerequisite is met:

- The pressure in the hydraulic system has been relieved.



Note

- ▶ Observe the numbering of the hydraulic lines!
- ▶ Establish the hydraulic connections of the assembly plate **6** (connection **1**, connection **2** and brake **3**) to the „Ball valves“ on the turntable.

3.2 Turning the turntable to the left

- ▶ Set the ball valve **9** into emergency operation position.
- ▶ Set the ball valve **10** into emergency operation position.
- ▶ Set the ball valve **11** into emergency operation position.
- ▶ Set the ball valve **6.2** for the assembly plate **6** on „turn left“.
- ▶ Move the manual lever **6.1** carefully.

Result:

- The turntable turns to the left.

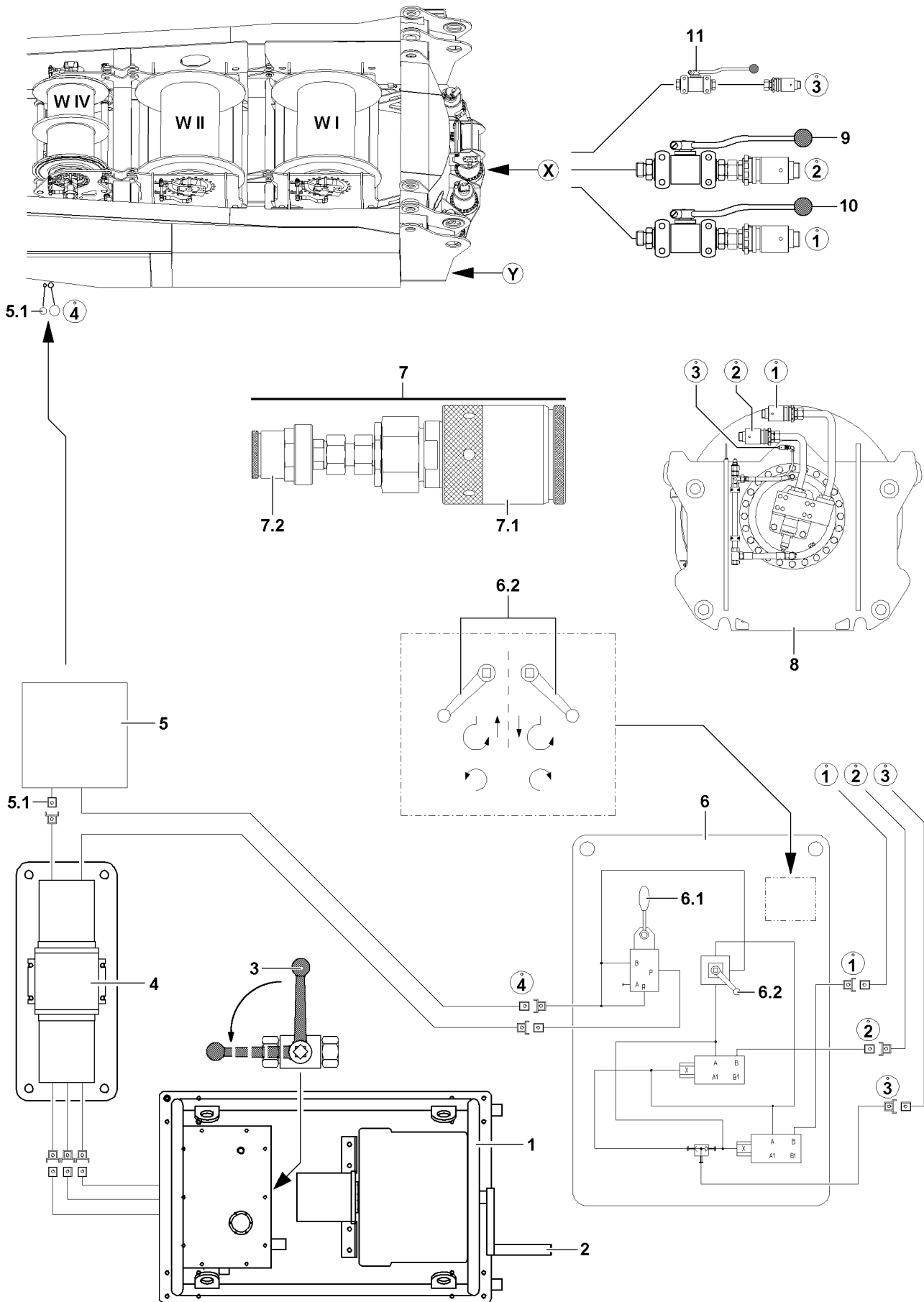


Fig.108301

LWE/LR 1750-000/12812-15-02/en

3.3 Turning the turntable to the right

- ▶ Set the ball valve **9** into emergency operation position.
- ▶ Set the ball valve **10** into emergency operation position.
- ▶ Set the ball valve **11** into emergency operation position.
- ▶ Set the ball valve **6.2** for the assembly plate **6** on „turn right“.
- ▶ Move the manual lever **6.1** carefully.

Result:

- The turntable turns to the right.

3.4 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:

- The emergency operation is completed.
- The pressure in the hydraulic system has been relieved.

Disconnect the hydraulic connections to the assembly plate **6**.

- ▶ Reposition the ball valve **9** in position for crane operation.
- ▶ Reposition the ball valve **10** in position for crane operation.
- ▶ Reposition the ball valve **11** in position for crane operation.

When the ball valve **9**, ball valve **10** and ball valve **11** are repositioned into crane operation position:

- ▶ Disconnect the hydraulic connections to the assembly plate **6**.
- ▶ Close off the hydraulic connections with dust plugs.

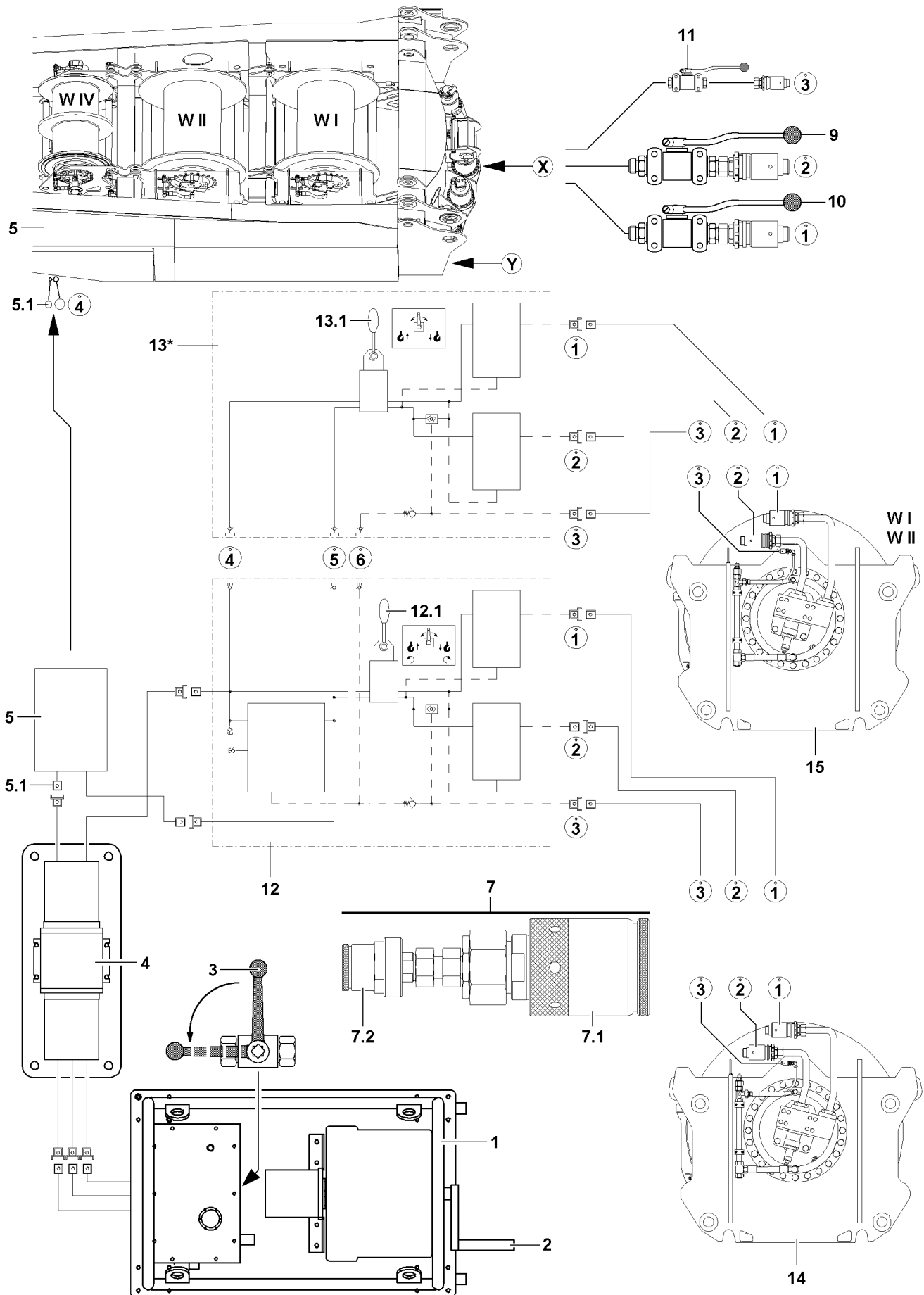


Fig.109393

LWE/LR 1750-000/12812-15-02/en

4 Emergency operation with assembly plate(s) Variation 2 (V2)



Note

- ▶ The procedure of the emergency operation - except winch 4 on the LR1600/2 and LR1600/2-W - is identical for all winches and is described on the example of one winch!

Exception LR1600/2 and LR1600/2-W:

- ▶ Before emergency operation of winch 4 **W IV** on the LR1600/2 and LR1600/2-W, in addition to the hydraulic connections to lift, lower and for the control pressure of the brake, a control line must be connected, see section: „Emergency operation of winch 4 **W IV** on the LR1600/2 and LR1600/2-W!“

To carry out the emergency operation, use an emergency operation aggregate **1**, a hydraulic transformer **4** and the assembly plate **12**. To carry out the emergency operation from winch **1 W I** and winch **2 W II** in parallel operation (1||2), in addition to the assembly plate **12**, the assembly plate **13** is needed. Connect the assembly plate **12** with the assembly plate **13** hydraulically on hydraulic connections 4, 5 and 6.

4.1 Start the emergency operation aggregate

- ▶ Turn the crank **2** on the emergency operation aggregate* **1**.
- ▶ Switch the ball valve **3** to „horizontal“ position.



Note

- ▶ The engine rpm on the emergency operation aggregate can be set via a separate speed regulator!

4.2 Emergency operation of winch 4 on the LR1600/2 and LR1600/2-W



WARNING

Emergency operation winch 4 **W IV**!

- ▶ Observe the section „Emergency operation of winch 4 (W IV) on the LR1600/2 and LR1600/2-W“!

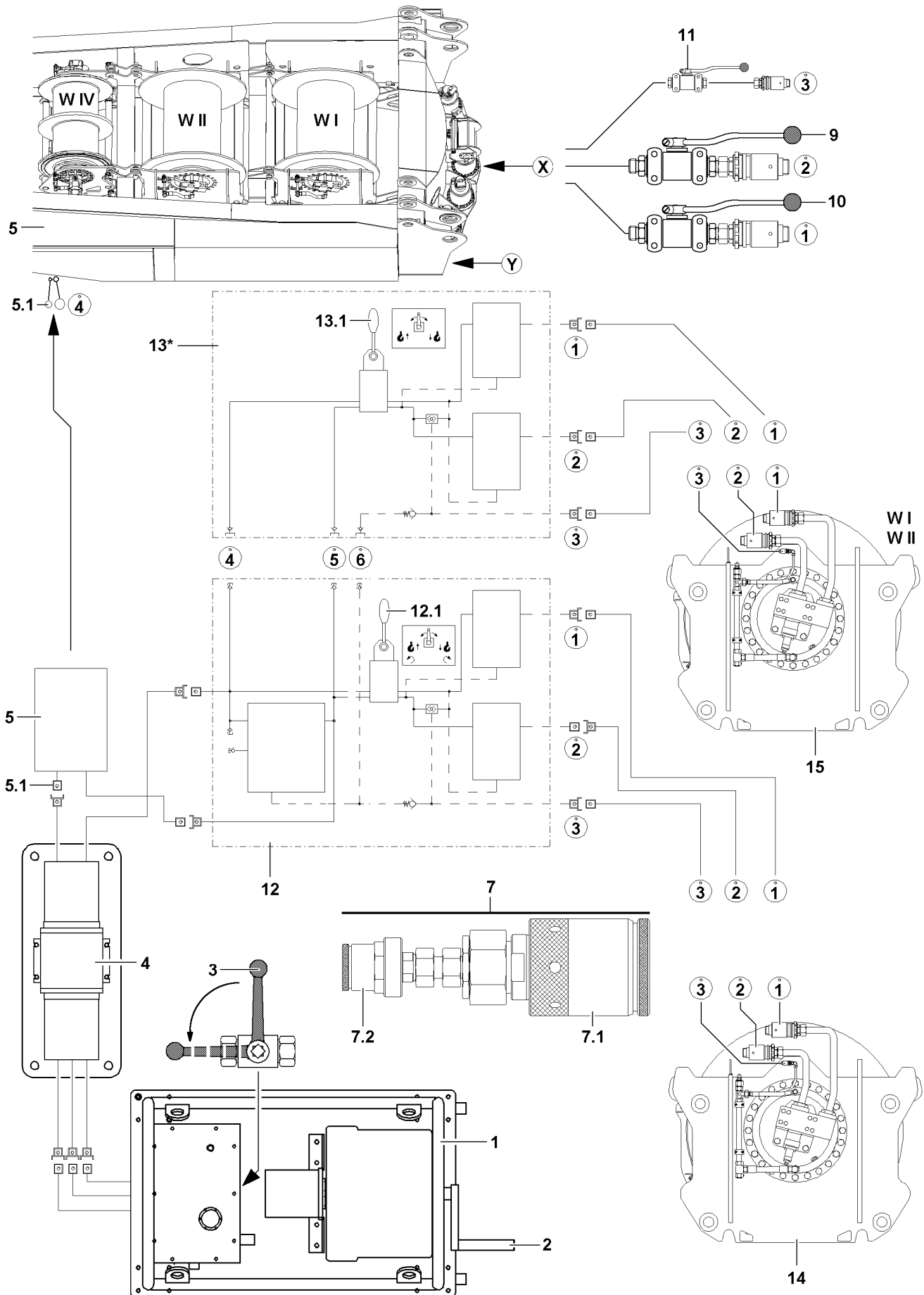


Fig.109393

LWE/LR 1750-000/12812-15-02/en

4.3 Emergency operation of winches, individual operation

**Note**

- ▶ The crane movements are actuated and the speed of the respective crane movement is determined via the ball valve **12.1** and ball valve **13.1**!

4.3.1 Establishing the hydraulic connections to the winch

Make sure that the following prerequisite is met:

- The pressure in the hydraulic system has been relieved.
- ▶ Release the hydraulic connections on the corresponding winch.
- ▶ Install the reducer sections **7** (adapter) with coupling sleeve **7.1** on the connection **1** and on the connection **2** of the respective winch.

**Note**

- ▶ Observe the numbering of the hydraulic lines!
- ▶ Establish the hydraulic connection of the assembly plate **12** (connection **1**, connection **2** and brake **3**) to the respective winch.

4.3.2 Spooling the winch out

- ▶ Set the ball valve **12.1** for the assembly plate **12** on „lower“.

Result:

- The winch spools out.

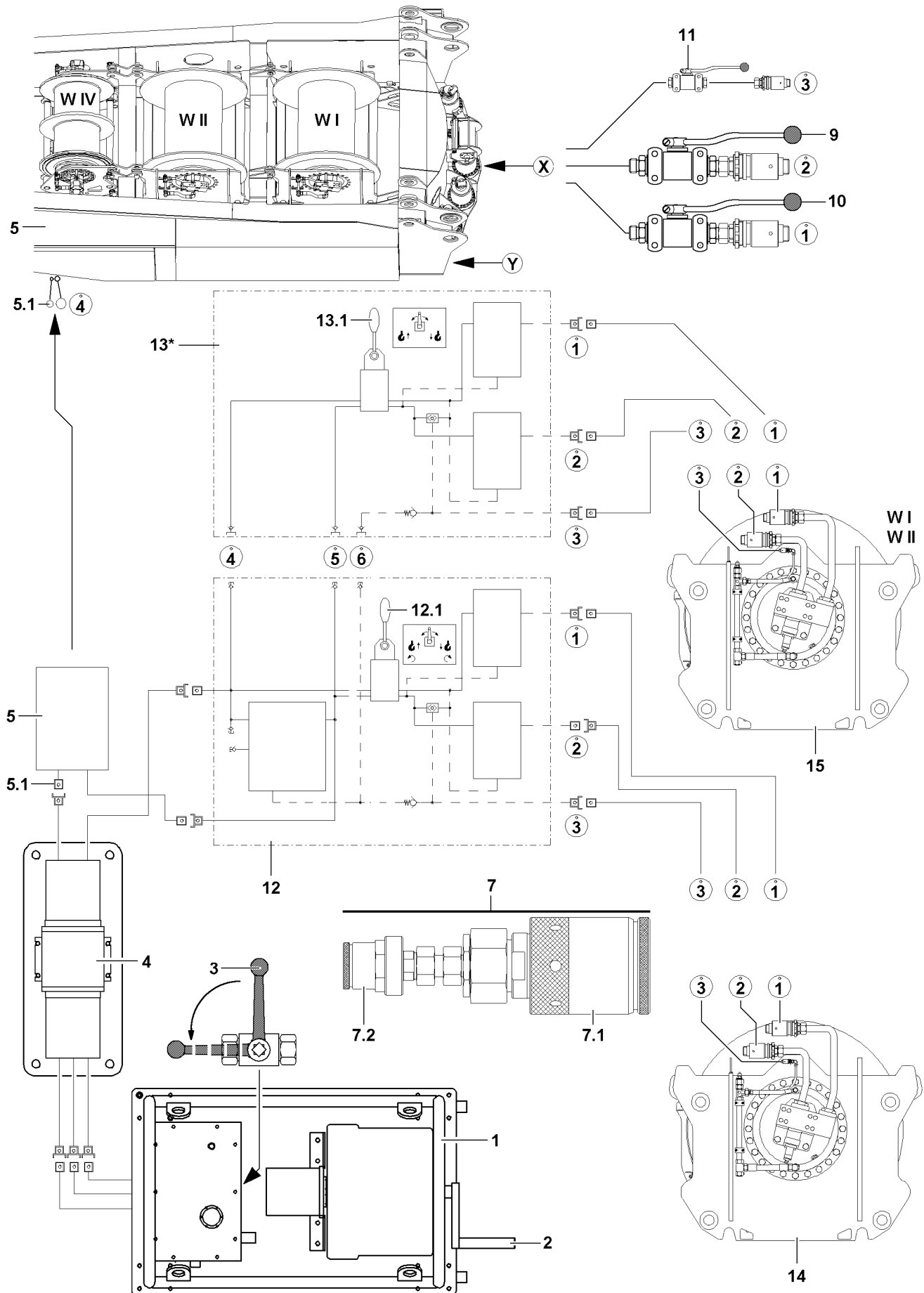


Fig.109393

LWE/LR 1750-000/12812-15-02/en

4.3.3 Spooling the winch up

- ▶ Set the ball valve **12.1** for the assembly plate **12** on „lift“.

Result:

- The winch spools up.

4.3.4 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:

- The emergency operation is completed.
 - The pressure in the hydraulic system has been relieved.
 - ▶ Separate the hydraulic connections from the respective winch to the assembly plate **12**.
 - ▶ Remove the reducer sections **7** (adapter).
 - ▶ Close off the hydraulic connections of the winch with dust plugs.
- or**
- Reconnect the winch to the hydraulic system of the crane.

4.4 Emergency operation of winches, parallel operation winch 1|12



Note

- ▶ The crane movements are actuated and the speed of the respective crane movement is determined via the ball valve **12.1** and ball valve **13.1**!



WARNING

Risk of accident!

If the following notes are not observed, dangerous situations can arise!

Personnel can be severely injured or killed!

- ▶ If winch 1 and winch 2 are actuated in emergency operation in parallel operation, then it must be ensured that the hook blocks are horizontally aligned!
- ▶ Always actuate winch 1 and winch 2 simultaneously!

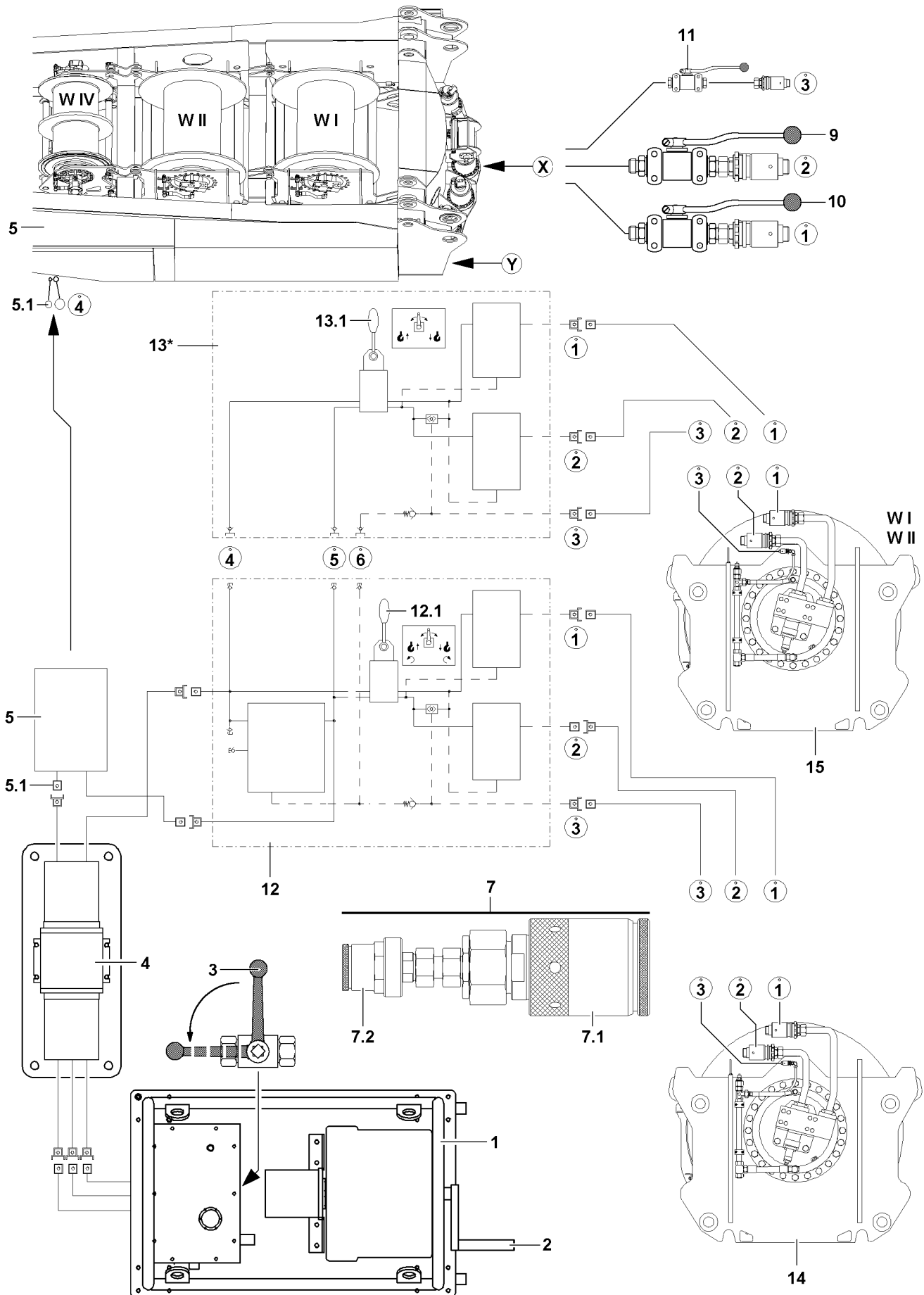


Fig.109393

LWE/LR 1750-000/12812-15-02/en

4.4.1 Establishing the hydraulic connections to the winches

Make sure that the following prerequisite is met:

- The pressure in the hydraulic system has been relieved.
- ▶ Release the hydraulic connections on winch 1 and winch 2.
- ▶ Install the reducer sections **7** (adapter) with coupling sleeve **7.1** on the connection **1** and on the connection **2** of the respective winch.



Note

- ▶ Observe the numbering of the hydraulic lines!
-
- ▶ Establish the hydraulic connections for the assembly plate **12** (connection **1**, connection **2** and brake **3**) to winch 1.
or
Establish the hydraulic connections for the assembly plate **12** (connection **1**, connection **2** and brake **3**) to winch 2.
 - ▶ Establish the hydraulic connections for the assembly plate **13** (connection **1**, connection **2** and brake **3**) to winch 1.
or
Establish the hydraulic connections for the assembly plate **13** (connection **1**, connection **2** and brake **3**) to winch 2.

4.4.2 Spooling the winches out



Note

- ▶ Check which winch you have connected to which assembly plate!

- ▶ Set the ball valve **12.1** for the assembly plate **12** on „lower“.

Result:

- Winch 1 **or** winch 2 spools out.

- ▶ Set the ball valve **13.1** for the assembly plate **13** on „lower“.

Result:

- Winch 2 **or** winch 1 spools out.

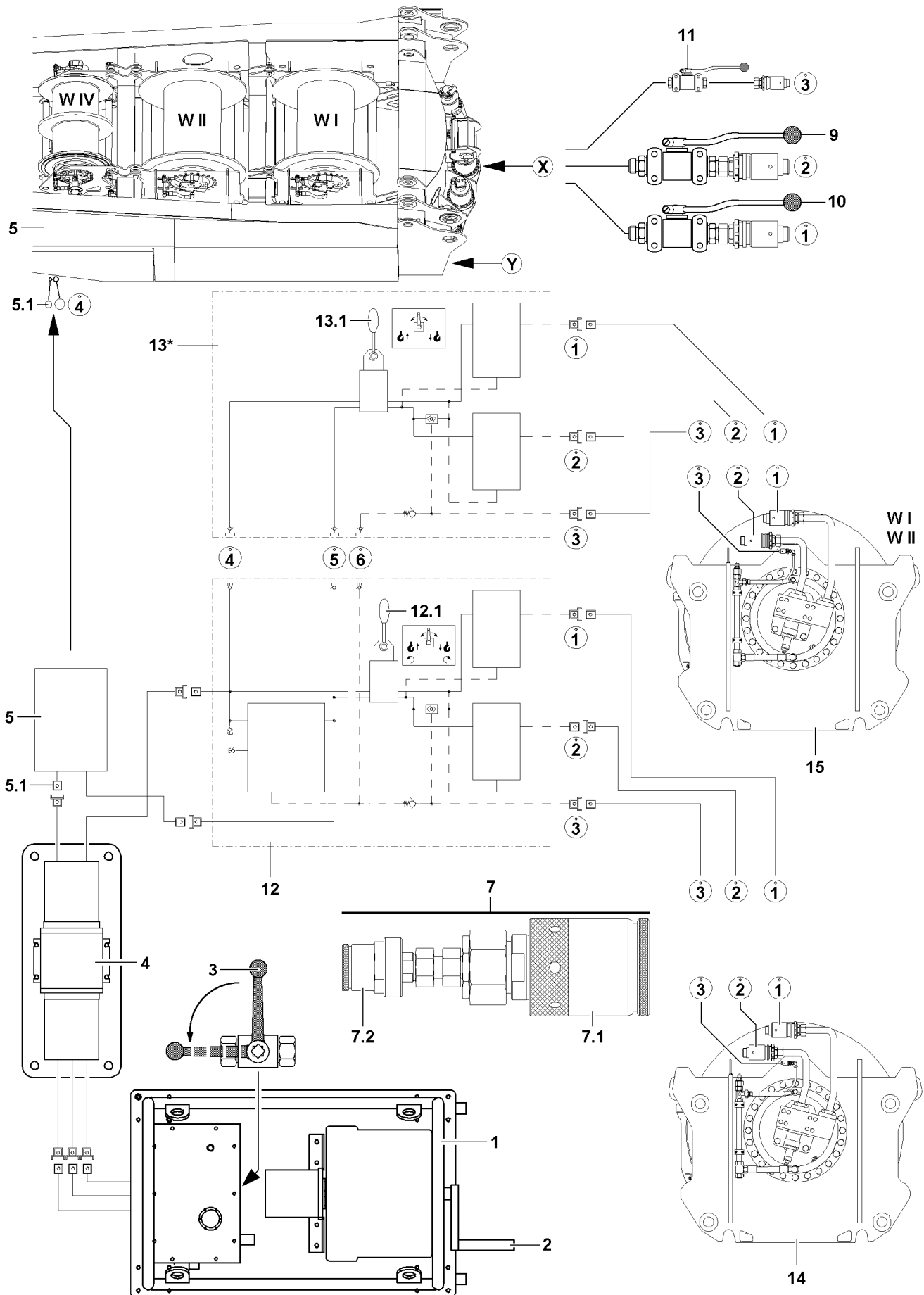


Fig.109393

LWE/LR 1750-000/12812-15-02/en

4.4.3 Spooling the winches up

- ▶ Set the ball valve **12.1** for the assembly plate **12** on „lift“.

Result:

- Winch 1 **or** winch 2 spools up.

- ▶ Set the ball valve **13.1** for the assembly plate **13** on „lift“.

Result:

- Winch 2 **or** winch 1 spools up.

4.4.4 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:

- The emergency operation is completed.
- The pressure in the hydraulic system has been relieved.
- ▶ Disconnect the hydraulic connections of winch 1 and winch 2 to the respective assembly plates.
- ▶ Remove the reducer sections **7** (adapter).
- ▶ Close off the hydraulic connections of the winches with dust plugs.
or
Reconnect the winches to the hydraulic system of the crane.

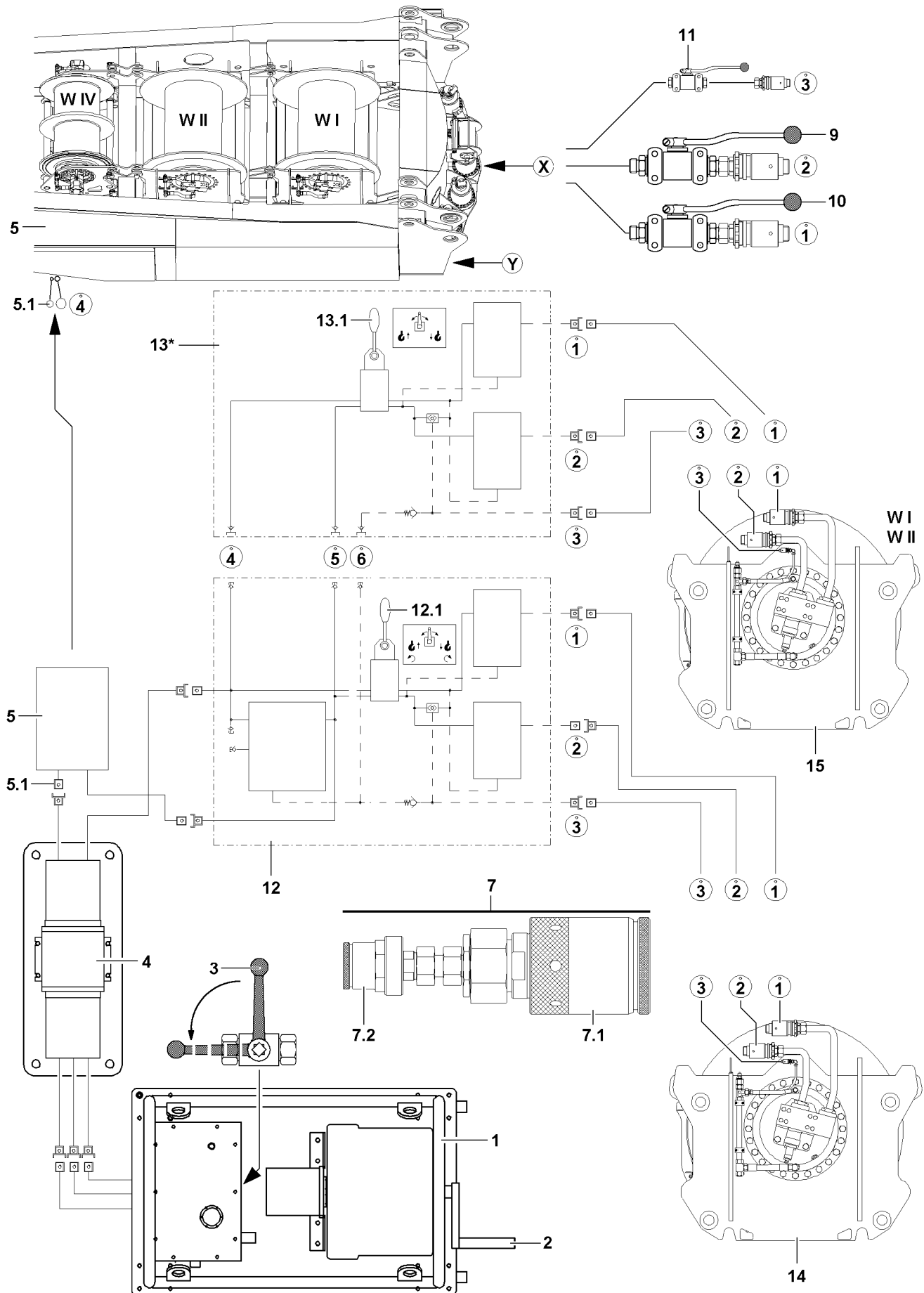


Fig.109393

LWE/LR 1750-000/12812-15-02/en

5 Emergency operation slewing gear(s) with assembly plate(s) Variation 2 (V2)



WARNING

Danger due to hydraulic pressure!

If the hydraulic lines are pressurized when releasing the connections, it can lead to severe injuries to assembly personnel!

- ▶ Relieve the pressure in the hydraulic lines before releasing!



Note

- ▶ For each crane type, the installation position of the ball valves for emergency operation of the slewing gear on the turntable varies!
- ▶ Possible installation positions of the ball valve: Point **X** or point **Y**!



Note

- ▶ The slewing movement is actuated and the speed of the slewing movement is determined via the ball valve **12.1**!

5.1 Establishing the hydraulic connection to the slewing gears

Make sure that the following prerequisite is met:

- The pressure in the hydraulic system has been relieved.



Note

- ▶ Observe the numbering of the hydraulic lines!
- ▶ Establish the hydraulic connections of the assembly plate **12** (connection **1**, connection **2** and brake **3**) to the „Ball valves“ on the turntable.

5.2 Turning the turntable to the left

- ▶ Set the ball valve **9** into emergency operation position.
- ▶ Set the ball valve **10** into emergency operation position.
- ▶ Set the ball valve **11** into emergency operation position.
- ▶ Set the ball valve **12.1** for the assembly plate **12** on „turn left“.

Result:

- The turntable turns to the left.

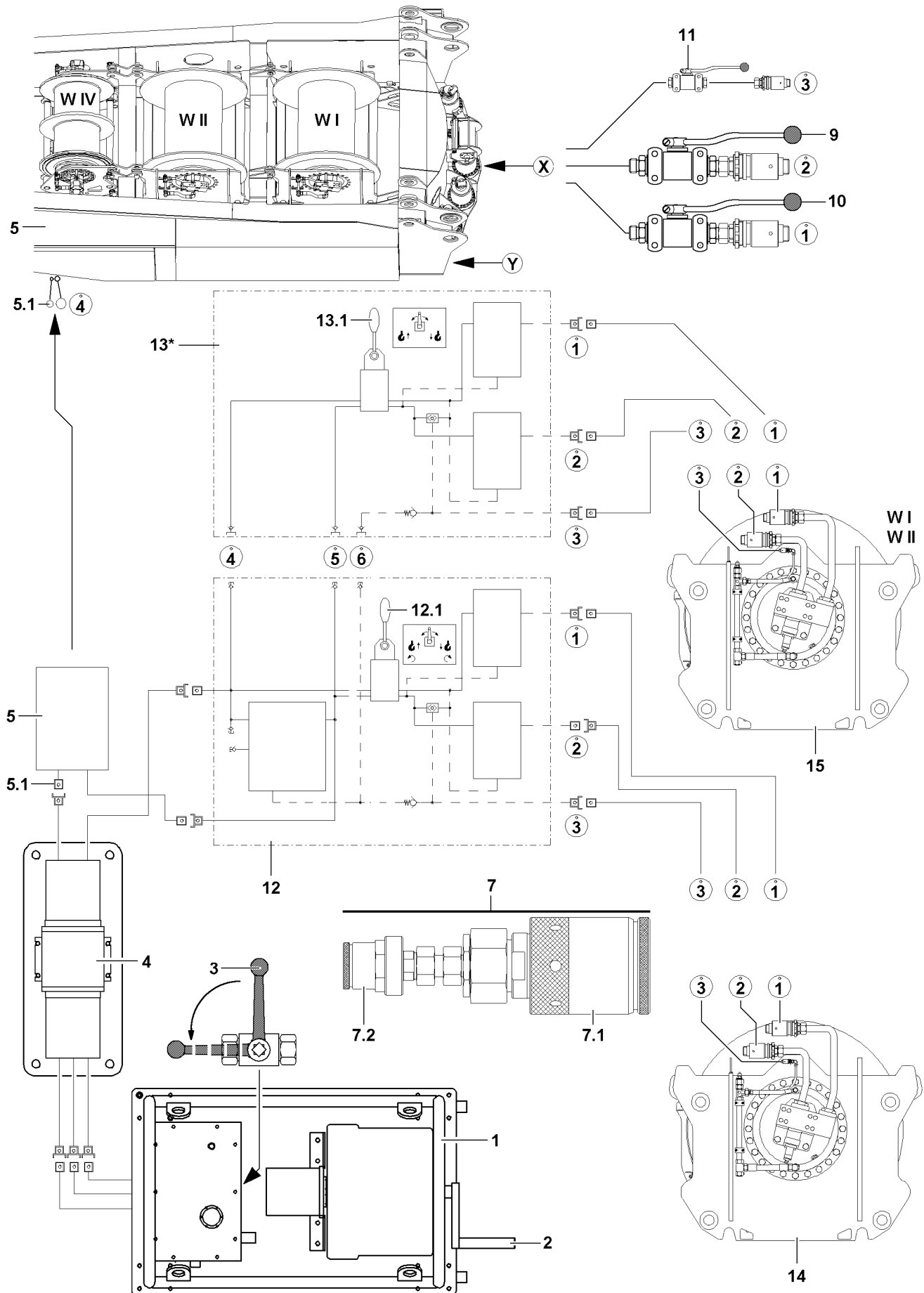


Fig.109393

LWE/LR 1750-000/12812-15-02/en

5.3 Turning the turntable to the right

- ▶ Set the ball valve **9** into emergency operation position.
- ▶ Set the ball valve **10** into emergency operation position.
- ▶ Set the ball valve **11** into emergency operation position.
- ▶ Set the ball valve **12.1** for the assembly plate **12** on „turn right“.

Result:

- The turntable turns to the right.

5.4 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:

- The emergency operation is completed.
- The pressure in the hydraulic system has been relieved.

Disconnect the hydraulic connections to the assembly plate **12**.

- ▶ Reposition the ball valve **9** in position for crane operation.
- ▶ Reposition the ball valve **10** in position for crane operation.
- ▶ Reposition the ball valve **11** in position for crane operation.

When the ball valve **9**, ball valve **10** and ball valve **11** are repositioned into crane operation position:

- ▶ Disconnect the hydraulic connections to the assembly plate **12**.
- ▶ Close off the hydraulic connections with dust plugs.

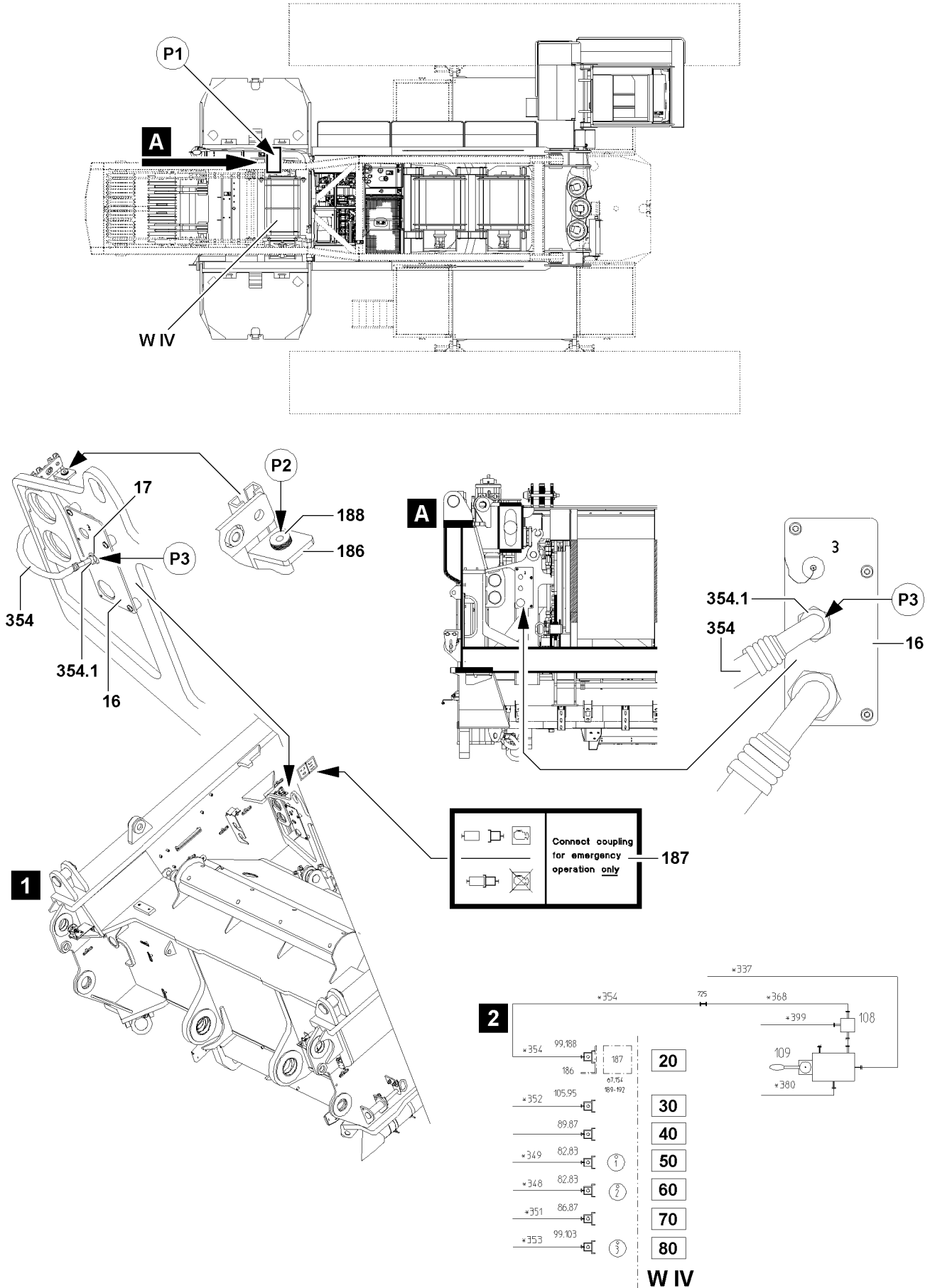


Fig.112453

LWE/LR 1750-000/12812-15-02/en

6 Emergency operation of winch 4 (W IV) on the LR1600/2 and LR1600/2-W

NOTICE

Damage of crane components!

If the hydraulic hose (control line) **354** for the emergency operation is not connected properly, then hydraulic parts or crane components can be damaged!

- ▶ Make sure, before starting the emergency operation, that the hydraulic hose **354** is properly connected!

6.1 Emergency operation winch 4 (WIV)

6.1.1 Establishing the hydraulic connections to winch 4 (WIV)



Note

- ▶ The hydraulic connections to winch 4 - connection 1, connection 2 and brake - have been established, see section „Emergency operation of winches“!
- ▶ Pay attention to the different variations of the assembly plates!

Before emergency operation of winch 4 **W IV**, in addition to the hydraulic connections for the emergency operation of the winch, the hydraulic hose **354** must be connected.

Make sure that the following prerequisites are met:

- The hydraulic connections to winch 4 are established.
- The hydraulic hose **354** is in park position, point **P2**.
- ▶ Release the hydraulic hose **354** with the fitting **354.1** on the plug **188** (park position), point **P2**.
- ▶ Guide the hydraulic hose **354** to the front to the connector plate **16**.
- ▶ Connect the hydraulic hose **354** with the fitting **354.1** on the supply line **17**, point **P3**, of the connector plate **16**.



Note

- ▶ Observe the notes in the sections „Emergency operation of winches“!

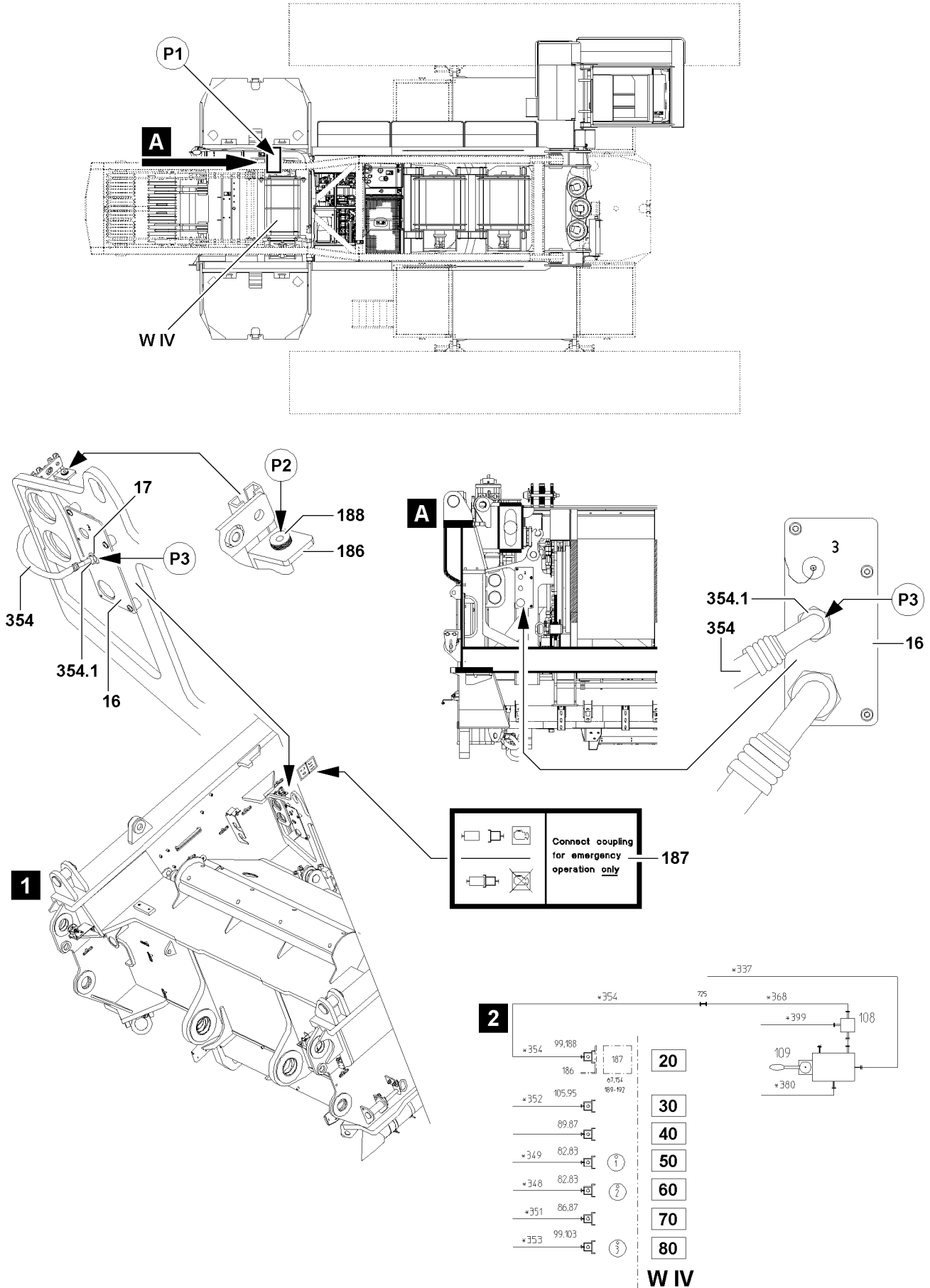


Fig.112453

LWE/LR 1750-000/12812-15-02/en

6.1.2 Spooling the winch out

- ▶ See section: „Emergency operation with assembly plate Variation 1 (V1)“
or
- ▶ See section: „Emergency operation with assembly plate Variation 2 (V2)“

6.1.3 Spooling the winch up

- ▶ See section: „Emergency operation with assembly plate Variation 1 (V1)“
or
- ▶ See section: „Emergency operation with assembly plate Variation 2 (V2)“

6.2 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:

- The emergency operation is completed.
- The pressure in the hydraulic system has been relieved.
- ▶ Disconnect the hydraulic connections from the winch 4 to the assembly plate.
- ▶ Remove the reducer sections (adapter).
- ▶ Close off the hydraulic connections of the winch 4 **W IV** with dust caps.
or
Reconnect the winch 4 **W IV** onto the hydraulic system of the crane.
- ▶ Disconnect the hydraulic hose **354** at point **P3**.
- ▶ Bring the hydraulic hose **354** in parking position: Install the fitting **354.1** onto the plug **188**.

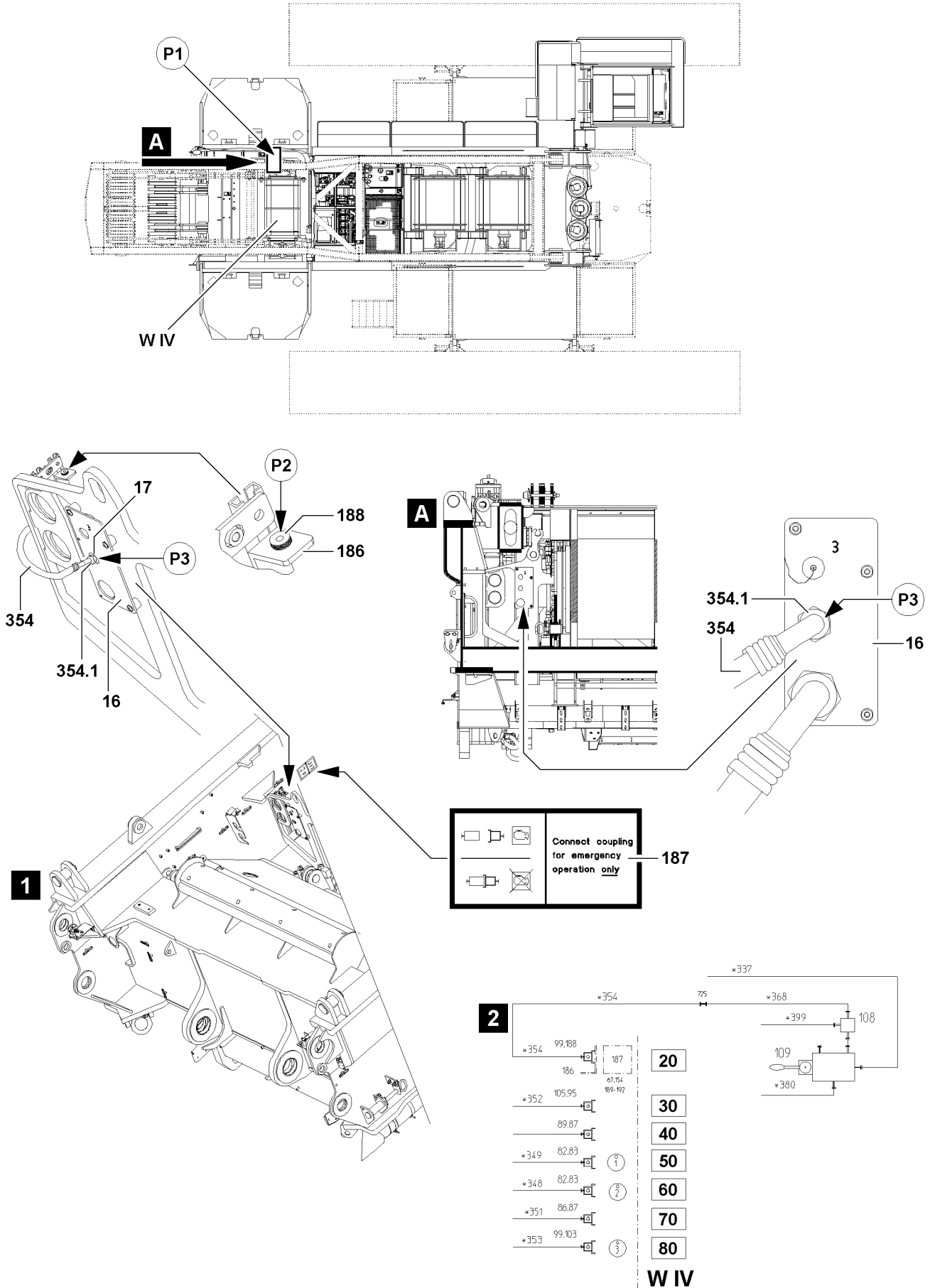


Fig.112453

LWE/LR 1750-000/12812-15-02/en

6.3 Connection schematic for emergency operation, illustration 2



Note

- ▶ See also Hydraulic schematic!

Position	Connection / description
20	Control pressure SA-frame
50	Lifting
60	Lowering
80	Replenishing pressure brake

7 Ending emergency operation

7.1 Procedure

- ▶ Turn the emergency operation aggregate* 1 off.
- ▶ Close the ball valve 3.
- ▶ Disconnect the hydraulic connections and close them off with dust plugs.

Empty page!

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7 Service and maintenance

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Technical safety instructions



WARNING

Maintenance instructions **not** adhered to!

Death, severe injury, increased wear and failure of components.

- ▶ Observe the following listed safety notes and the generally applicable safety rules!
- ▶ Adhere to the maintenance intervals.
- ▶ Carry out only applicable maintenance tasks.
- ▶ Repair and maintenance tasks are to be carried out carefully.
- ▶ For aggregates and components: Follow the operating instructions of the manufacturer.

1.1 Description of intervals and tasks



Note

- ▶ Fill quantities and descriptions of service items and lubricants are specified in the Service fill.

The maintenance intervals and scope of maintenance are described in several chapters.

For crane maintenance, observe the following chapters:

- Crane operating instructions, chapter 7.02: Maintenance intervals - Crane chassis ¹⁾
- Crane operating instructions, chapter 7.02.50: Maintenance intervals Ballast trailer*¹⁾
- Crane operating instructions, chapter 7.03: Maintenance intervals - Crane superstructure ¹⁾
- Crane operating instructions, chapter 7.03.50: Maintenance intervals - Crane boom ¹⁾
- Crane operating instructions, chapter 7.04: Maintenance instructions - Crane chassis ²⁾
- Crane operating instructions, chapter 7.05: Maintenance instructions - Crane superstructure ²⁾
- Crane operating instructions, chapter 7.05.50 Maintenance guidelines - Crane boom ²⁾
- Crane operating instructions, chapter 7.06: Fill quantities, lubrication chart
- Crane operating instructions, chapter 7.07: Service items and lubricants

¹⁾ These chapters contain a list of maintenance intervals for all maintenance tasks.

²⁾ For aggregates, observe and adhere to additionally to the instructions of the manufacturer.

1.2 Definition of „Checking“

The action of „Checking“ includes all required task in connection with the maintenance, for example:

- Determining a specified value
- Cleaning
- Adjusting
- Refilling
- Replacing

1.3 Maintenance intervals

Use the following rules for interval determination:

- Carry out maintenance and inspection tasks on the crane chassis after reaching the specified driven mileage, operating hours or calendar intervals. The interval which occurs first is the deciding factor.
- Carry out maintenance and inspection tasks on the crane superstructure after reaching the specified operating hours or calendar intervals. The interval which occurs first is the deciding factor.
- The maintenance intervals complement each other. If a higher interval is coming up, then carry out the tasks according to the lower interval also.

1.4 Securing against operation



WARNING

Impermissible driving or crane operation during maintenance or repair tasks!

Death, severe injury, severe property damage.

- ▶ Make sure that driving and crane operation is not possible during maintenance and repair tasks.
- ▶ Show clearly with signs that maintenance or repair tasks are being carried out on the mobile crane.
- ▶ Use signs which show without a doubt that it is prohibited to drive and operate the crane.
- ▶ Adhere to the national regulations regarding tagging on mobile crane and signs.
- ▶ Turn the engine on the crane superstructure and the crane chassis off!
- ▶ Apply the „parking brake crane chassis“.

If possible:

- ▶ Lock the driver's cab and the crane cab.
- ▶ Hand the ignition key from the crane superstructure and the crane chassis to an authorized person.

1.5 Personnel



WARNING

Unauthorized and untrained expert personnel!

Improper maintenance, personal injury, property damage.

- ▶ Observe and follow the personnel requirements for the respective maintenance task.

If there are no personnel requirements:

- ▶ The crane operator can perform the maintenance task.
- ▶ Have the repair tasks performed exclusively by authorized and trained expert personnel.
- ▶ Make sure that only authorized persons are within the danger zone.

Maintenance tasks may only be carried out by expert, authorized and trained employees.

An expert is someone who possesses the required expert knowledge for performing a certain task. Requirements regarding the technical qualification depends on the type of task.

Requirements regarding the technical qualification of a person:

- Corresponding professional training
- Professional experience or a currently performed corresponding professional activity
- Participation in training to keep the expert knowledge up to date.

1.6 Securing against falls



WARNING

Personnel is **not** secured against falls!

During maintenance tasks on the crane superstructure or boom, personnel must be secured with appropriate safety measures to prevent them from falling. If this is **not** observed, working personnel can fall and be killed or severely injured.

- ▶ For all tasks on the crane where there is a danger of falling, take suitable safety measures.
- ▶ The crane superstructure or the boom may **not** be accessed without suitable aids.
- ▶ Suitable aids are, for example: Lifting platforms, scaffoldings, ladders, assembly platforms, auxiliary crane.
- ▶ If railings are present on the crane superstructure, then they must be swung into operating position and secured for all tasks. See Crane operating instructions, chapter 2.06.
- ▶ Only step on such aids with clean shoes.
- ▶ Keep aids clean, free of snow and ice.
- ▶ If tasks cannot be carried out using these aids or from the ground, then the maintenance personnel must be protected from falling using approved fall arrest systems. See Crane operating instructions, chapter 2.04.
- ▶ It is prohibited to step on the driver's cab or cab roof and specially marked surfaces. See Crane operating instructions, chapter 2.05.

**WARNING**

Dirty slip-resistant mats!

Fall

- ▶ Keep slip-resistant mats clean and free of snow and ice!
- ▶ Only step on slip-resistant mats with clean shoes!
- ▶ Replace or renew missing or damaged slip-resistant mats!

1.7 Preventing fires

**WARNING**

Excess fuel, excess oil in engine compartment during operation!

Death, severe injury, fire damage.

- ▶ Check the diesel engine after repairs and Service tasks but also in regular intervals for leaking oil and fuel.
- ▶ Make sure that the V-area of the Diesel engine is free of oil and fuel.
- ▶ Do **not** spill any service fluids over the hot components.

**WARNING**

Disregard of general safety regulations during tasks on the fuel system or on the electrical system!

Severe burns, fire damage.

- ▶ Disconnect the battery from the power supply.
- ▶ Do **not** smoke.
- ▶ Do **not** work near open flames.
- ▶ Keep a functioning fire extinguisher ready.

**WARNING**

Insulation (sound insulation) are contaminated with solvents or foreign matter!

Solvents, engine oils, gear oils, hydraulic oils or fuels can ignite the insulation.

Severe burns, fire damage.

- ▶ Remove any polluted insulation **immediately** and **replace immediately** with **Original Liebherr spare parts**.

1.8 Protecting from burns

**WARNING**

Hot surfaces!

Severe burns.

- ▶ Let any components to be maintained or inspected cool off.
- ▶ Let hot components cool off.
- ▶ Avoid contact with hands and skin.
- ▶ Wear personal protective equipment and suitable protective gloves.

**WARNING**

Hot Service fluids!

Severe burns.

- ▶ Let hot service fluids cool off.
- ▶ Avoid contact with hands, skin and eyes.
- ▶ Wear personal protective equipment and suitable protective gloves.

**WARNING**

Electric short circuit!

Severe burns.

- ▶ Prevent short circuits in the electrical system, especially on the battery.
- ▶ Replace or change missing or defective protective insulation.

1.9 Protecting from scalding



WARNING

Cooling system is pressurized!
When the coolant reservoir is opened, hot coolant can escape explosively.
Severe scalding.

When the engine is warm:

- ▶ Do **not** open the cover of the coolant reservoir.
- ▶ To protect face, hands and arms from hot steam of hot coolant, cover the cap with a large rag when opening.

1.10 Rotating parts



WARNING

Rotating parts, ignition system on running engine!
The cooler fan can turn on suddenly.
Death, severe injury.

- ▶ Proceed especially careful.
- ▶ Do **not** reach into rotating parts.
- ▶ Never reach into the cooler fan when the engine is warm.

1.11 Protecting from aggressive environmental conditions

NOTICE

Aggressive environmental conditions!

When using cranes under aggressive environmental conditions, for example at places with maritime climates and particularly salty air, hydraulic cylinders can corrode and thereby be destroyed or severely damaged.

Elaborate and expensive repairs.

If the crane is taken out of operation for an extended period of time:

- ▶ Take down the crane.
- ▶ Fully retract all crane hydraulic cylinders.

When hydraulic cylinders can **not** be retracted completely:

- ▶ Protect exposed areas of the piston rod from corrosion, for example with grease.
- ▶ Grease any exposed areas on the piston rods, for example on luffing cylinders and ballasting cylinders, especially carefully.

1.12 Use of suitable operating fluids



WARNING

Operating fluids **not** suitable for ambient temperature!
Death, severe injuries, property damage.

- ▶ Adjust the operating fluids in time to the ambient temperatures.

1.13 Replacing damaged crane components



WARNING

Damaged crane components **not** replaced!
Death, severe injury, failure of components.

- ▶ Maintain crane components according to the data in the maintenance intervals, the maintenance guidelines and the chart for service items and lubricants.
- ▶ Replace damaged crane components immediately.

1.14 After replacement of components

Type of oil, see data tag and supplied „Service fill“.

The following instructions must be observed when replacing components such as engine, gear or axle:



WARNING

Maintenance of a replaced component **not** carried out!

- ▶ Before start up, be sure to refill with the correct type of oil to the center of the minimum / maximum mark.
- ▶ Carry out first maintenance. See chapter „Maintenance intervals“.
- ▶ Adhere to regular maintenance intervals.
- ▶ Follow the break-in instructions. See Crane operating instructions, chapter 2.02.

1.15 Tire size

When changing certain tire sizes, the mobile crane must be modified.

Contact Liebherr customer service to change the following tire sizes:

- From 385/95 R 25 to 445/95 R 25
- From 385/95 R 25 to 525/80 R 25
- From 445/95 R 25 to 385/95 R 25
- From 525/80 R 25 to 385/95 R 25

2 Warranty and coverage

NOTICE

Maintenance intervals and maintenance guidelines **not** adhered to, impermissible lubricants used!
Damage, failure of crane components.

The warranty for the respective crane component is voided.

- ▶ Maintain crane components according to the data in the maintenance intervals, the maintenance guidelines and the chart for service items and lubricants.

NOTICE

Not using Original Liebherr spare parts and **not** using Original Liebherr Service items!

In the event that replacement parts are used that are **not** Original Liebherr replacement parts and **not** Original Liebherr service items and lubricants, Liebherr-Werk Ehingen GmbH disclaims all liability for system functionality as well as for the parts.

- ▶ Use exclusively Original Liebherr spare parts.



Note

- ▶ Original Liebherr replacement parts have been tested for crane operation and may be used without risking safety.

The buyer is entitled to warranty or coverage only:

- when exclusively Original Liebherr spare parts are used.
- when Liebherr Service items and Liebherr lubricants are used for the Liebherr crane.

3 Liebherr Service

Liebherr mobile cranes, whether truck-mounted, mobile or crawler cranes - are technically advanced products, which prove their worth daily even under tough conditions.

The high technical standards of these cranes provide functional security, resistance to failure and ease of maintenance.

Liebherr is continuously developing the drive and control components. The combination of well proven units and modern manufacturing methods produces cranes that are safe to operate and easy to maintain.

Several hundred cranes are built every year for the international market, supported by international service.

Liebherr's „After Sales Service“ plays an important role at Liebherr in ensuring operational readiness and high crane availability.

With Liebherr, Service begins when the crane is handed over. Your crane operators will be professionally trained in line with their level of knowledge and we devote much time to this.

We also train your workshop staff in all crane-specific matters, because we know that they can deal with more than just minor repairs themselves. Often there are specialists who can quickly and reliably carry out crane repairs.

We have special service advisers available who will solve any problems you may have. This phone contact saves time and money. You should take advantage of it as soon as possible.

Our service technicians are specialists with years of experience, who can be deployed from local support points. Naturally these experts have specialized knowledge and special tools.

But before you call these specialists, it is worth making use of the facilities for getting advice mentioned above.

4 Taking an oil sample



Note

- ▶ Liebherr recommends taking oil samples for the gears, engines and hydraulic system in regular intervals.
- ▶ Based on the trend analysis of the oil analysis results, changes can be determined in the lubricity of the oil and increased component wear.



WARNING

Tasks on components and operating fluids at operating temperature!
Burns.

- ▶ Carry out all tasks with utmost caution.
- ▶ Wear protective clothing.

Make sure that the following prerequisites are met:

- Oil has a normal operating temperature
- ▶ Always take oil in the same location.
- ▶ Take oil always according to the same method.
- ▶ Do **not** take oil right after an oil change.
- ▶ Do **not** take oil immediately after larger amounts of oil have been added.



Note

Recommendation:

- ▶ Fill oil into original sample containers.
- ▶ Fill oil exclusively in a clean and dry sample container.

5 Cleaning

5.1 Exhaust system

NOTICE

Ingress of water, steam or cleaning substances into the SCR-module!

Sensors for exhaust aftertreatment can be destroyed, the coating of the SCR catalytic converter can be washed off.

- ▶ Before cleaning, let the SCR system cool off (surface temperature 50 °C).
- ▶ Before cleaning, cover all openings.
- ▶ Make sure that **no** fluids and **no** dirt gets into the tailpipe opening of the SCR module.
- ▶ During cleaning, keep sufficient distance to the tailpipe opening.

5.2 Insulation (sound insulation)

NOTICE

Improper cleaning (tools or cleaning methods)!

Insulation can be destroyed or damaged.

- ▶ Remove severe contamination with suitable tools, for example with soft plastic scrapers.
- ▶ Do **not** use tools with sharp edges.
- ▶ Use steam cleaners **exclusively** with extreme caution and with a sufficient distance to the insulation and with low water pressure.
- ▶ Do **not** use solvents for cleaning.



Note

- ▶ Sound insulation may **not** be removed!

Sound insulation in the area of engines and other noise sources is an integral part of the total construction. Sound insulation limits the noise generation of vehicles and the sound level in the workplace to the legally specified values in connection with sound insulation and the design of the equipment. Sound insulation is therefore an integral part for the construction permits for the machines.

From a construction point of view, sound insulation has been designed to be maintenance-free. Sound insulation has been equipped with surfaces that repel dirt, oil and water. Sound insulation is very flame-resistant and in part, depending on application, is fireproof.

For these reasons, sound insulation requires no care. Any small dirt deposits can be disregarded, as the acoustic effectiveness of the parts is not reduced.

5.3 Slip-resistant mats

- ▶ Before every access: Check the slip-resistant mats for slip resistance and cleanliness.
- ▶ If dirty: Clean the slip-resistant mats with a brush with hard plastic bristles.
- ▶ For cleaning the surfaces, use commercially available cleaners.
- ▶ Flush with water.

5.4 Driver's cab and crane cab



Note

- ▶ The steering wheel, center console, instrument panel cover, floor covering and dirty upholstery in the driver's cab and the crane cab should only be cleaned with warm water mixed with dishwashing detergent!
- ▶ Do not use any scouring agents!

5.5 Ladders

- ▶ Remove any dirt on the ladders.
- ▶ Make sure that the grooves on the rungs are free of dirt.

6 Disposal

6.1 Service items and lubricants



WARNING

Operating items and lubricants are dangerous waste products!

- ▶ Dispose of operating fluids and lubricants separately.
- ▶ Service items and lubricants may **not** be disposed of in the ground, bodies of waters, wastewater systems, sewers or in the groundwater.
- ▶ Dispose of operating items and lubricants in an environmentally safe manner.
- ▶ When disposing operating items and lubricants observe and follow the valid regulations of the relevant authorities.

Service items and lubricants are:

- Fuels
- Coolant
- Urea
- Engine oils, gear oils
- Hydraulic fluids
- Brake fluids
- Window washer concentrate
- Greases

6.2 Batteries



WARNING

Batteries contain harmful substances!

- ▶ Do **not** dispose of batteries in regular household trash.
- ▶ Collect batteries separately and send them for environmentally safe disposal.
- ▶ Leave batteries at a qualified workshop or at a collection points for used batteries.

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1 Maintenance and inspection schedule



Note

- ▶ Carry out maintenance work after reaching the specified operating hours or calendar intervals. The interval which occurs first is the deciding factor.
- ▶ The maintenance intervals complement each other. If a higher interval is coming up, then carry out the work according to the lower interval also.
- ▶ The operating hour meter of the crawler travel gear is the determining factor for the operator hour intervals.
- ▶ The „crawler travel gear“ operating hour meter* is located in the control cabinet.

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	10 h	100 h	1000 h	Daily	Weekly	Annually		
Safety systems								
						X	Personal protective equipment Follow the instructions of the manufacturer	□
						X	Height rescue system Follow the instructions of the manufacturer	
Fall protection equipment								
						X	Check protection points	□
						X	Check safety ropes	
						X	Check the ladders for technically immaculate condition	
						X	Check railings, steps and pedestals for safe function	
						X	Check catwalks and open mesh flooring for safe function	
Crane surface								
					X		Check accessible surfaces for cleanliness	□
						X	Check accessible surfaces for completeness and slip resistance	
						X	Check labels for completeness and legibility	
Rigging and fastening points								
				X ²⁾			Check condition and mounting	□
						X	Check for continued suitability by expert	

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	10 h	100 h	1000 h	Daily	Weekly	Annually		
Travel gear								<input type="checkbox"/>
		X					Check for leaks	
	X						Grease the sprocket bearing if it is not lubricated via the central lubrication system	
		X					Check the mounting screws for tight seating	
		500 h					Check the gear oil via oil analysis	
200 h			1000 h			Every 4 years	Replacing the gear oil	
Crawler carrier								<input type="checkbox"/>
		X					Check track rollers, carrier rollers with oil lubrication for leaks	
	X						Grease the track rollers, carrier rollers if it is not lubricated via the central lubrication system	
	X				Every 4 weeks		Check the wear on the roll off surfaces of the track rollers / carrier rollers, replace the track rollers / carrier rollers if necessary	
	X				Every 4 weeks		Check for wear on the glide rails	
						X	Grease guide rails on sliding section	
						X	Lubricate the consoles	
					Every 4 weeks		Lubricate the connector pins between crawler carrier and crawler center section or crawler carrier and cross carriers	
Track chain								<input type="checkbox"/>
		X					Check the retainer of the connector pins	
		X					Check for damage	
	X				Every 4 weeks		Check the chain tension, retension the track chain if necessary	
	X						Check the wear on the bores of the track pads, replace track pads if necessary	
	X						Check the wear on the connector pins of the track pads, replace pins if necessary	
	X				Every 4 weeks		Check the wear on the roll off surfaces of the track pads / track rollers, replace track pads if necessary	

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	10 h	100 h	1000 h	Daily	Weekly	Annually		
Assembly support								
					X		Check the hydraulic cylinder for leaks	□
						X	Check support beam for ease of movement, grease	
						X	Lubricate the bearing points of the support beams	
						X	Check sight gauge, adjust if necessary	
Crane support								
					X		Check the hydraulic cylinder for leaks	□
						X	Check support beams for ease of movement, grease	
						X	Lubricate the struts	
						X	Lubricate the mounting pins on the struts	
						X	Lubricate the support pad bearing	
Pin connections								
						Every 2 months ³⁾	Check the retainer of the pin connections	□
						Every 2 months ³⁾	Check the pins and / or connector elements for damage, visual inspection	
						Every 2 months ³⁾	Check the retaining elements for damage, visual inspection	
Rotary connection								
			X				Lubricate	□
Hydraulic cylinder								
					X		Check for leaks	□
Hydraulic hose lines								
				X			Check for leaks and damage	□
						X	Have safe working condition checked by expert	
Central lubrication system								
				X			Check grease supply of central lubrication system. Fill the reservoir if the grease supply has dropped below 1/4 of the reservoir content.	□
		X					Check for correct function	

- 2) before every start-up: Checking visually
- 3) for cranes used for a long period of time

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1 Maintenance and inspection schedule



Note

- ▶ Carry out maintenance work after reaching the specified operating hours or calendar intervals. The interval which occurs first is the deciding factor!
- ▶ The maintenance intervals complement each other. If a higher interval is coming up, then carry out the work according to the lower interval also!

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	10 h	100 h	1000 h	Daily	Weekly	Annually		
Fall protection equipment								
						X	Check protection points	
						X	Check safety ropes	
						X	Check the ladders for technically immaculate condition	
						X	Check railings, steps and pedestals for safe function	
						X	Check catwalks and open mesh flooring for safe function	
Ballast trailer surface								
					X		Check accessible surfaces for cleanliness	
						X	Check accessible surfaces for completeness and slip resistance	
						X	Check labels for completeness and legibility	
Rigging and fastening points								
				X ²⁾			Check condition and mounting	
						X	Check for continued suitability by an authorized inspector, inspection expert	
Tires								
					X		Check for external damage and distortion	
					X		Check the tire pressure	
	X						Check lug nuts for tight seating, retighten if necessary	
						Every 5 years	Replace tires; have further service life confirmed by a tire manufacturer expert	
Axle link								
						X	Lubricate	
Hydraulic cylinder								
					X		Check for leaks	

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	10 h	100 h	1000 h	Daily	Weekly	Annually		
Hydraulic hose lines								
				X			Check for leaks and damage	
						X	Check for a safe condition by an authorized inspector, inspection expert	
Travel drive								
						X	Check the mounting screws for tight seating	
					X		Check for leaks	
						X	Checking the oil level	
						Every 5 years	Change the gear oil if necessary	
Slewing gear								
						X	Check the mounting screws for tight seating	
					X		Check for leaks	
						X	Checking the oil level	
						Every 5 years	Change the gear oil if necessary	
Central lubrication system								
				X			Check grease supply of central lubrication system. Fill the reservoir if the grease supply has dropped below 1/4 of the reservoir content.	
						X	Check for correct function	
Pin connections								
						Every 2 months ³⁾	Check the retainer of the pin connections	
						Every 2 months ³⁾	Check the pins and / or connector elements for damage, visual inspection	
						Every 2 months ³⁾	Check the retaining elements for damage, visual inspection	
Emergency control								
						X	Check for correct function	

²⁾ before every start-up: Checking visually

³⁾ for cranes used for a long period of time

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1 Maintenance and inspection schedule



Note

- ▶ Carry out maintenance work after reaching the specified operating hours or calendar intervals. The interval which occurs first is the deciding factor!
- ▶ The maintenance intervals complement each other. If a higher interval is coming up, then carry out the work according to the lower interval also!

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Safety systems								□
						X	Personal protective equipment Follow the instructions of the manufacturer	
						X	Height rescue system Follow the instructions of the manufacturer	
Fall protection equipment								□
						X	Check protection points	
						X	Check safety ropes	
						X	Check the ladders for technically immaculate condition	
						X	Check railings, steps and pedestals for safe function	
						X	Check catwalks and open mesh flooring for safe function	
Crane surface								□
					X		Check accessible surfaces for cleanliness	
						X	Check accessible surfaces for completeness and slip resistance	
						X	Check labels for completeness and legibility	
Rigging and fastening points								□
				X ²⁾			Check condition and mounting	
						X	Check for continued suitability by an authorized inspector, inspection expert	
Load handling equipment and assembly aids								□
				X ²⁾			Check for cracks, damage, wear and distortion	
						X	Check for continued suitability by an authorized inspector, inspection expert	

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Fastening equipment and load securing devices								<input type="checkbox"/>
				X ²⁾			Observe and adhere to the manufacturer's instructions	
Fire extinguishing system								<input type="checkbox"/>
						X	Carry out a visual inspection of the system For all other maintenance tasks, observe the instructions of the fire extinguisher manufacturer.	
						Every 5 years	Replace trigger elements and extinguisher tank.	
Diesel engine								<input type="checkbox"/>
				X			Checking the oil level For all other maintenance tasks, observe the instructions of the engine manufacturer	
Cooling system								<input type="checkbox"/>
				X			Check the coolant level in the expansion tank	
			6000 h			Every 4 years	Replace the coolant if filled with Liebherr Antifreeze OS Mix	
			3000 h			Every 2 years	Replacing the coolant	
SCR Exhaust aftertreatment								<input type="checkbox"/>
			4500 h			Every 2 years	Replace foam and filter element of urea pump	
Engine independent heater (auxiliary heater)								<input type="checkbox"/>
				X			Check the fluid level in the expansion tank	
						Every 4 weeks ⁸⁾	Operate and check the function for 10 minutes with the engine cold and the highest fan stage	
						X ⁹⁾	Operate and burn-free for 15 minutes with the engine cold and the highest fan stage	
						X	Carry out maintenance work before and after every heating period	
						Every 2 years	Replace the fluid for the heating system	
				X			Check the fill level of the fuel container	

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Air filter								
					X		Check monitoring device	□
						X	Clean, change the filter insert Observe the instructions of the engine manufacturer	
Slewing ring connection								
	X						Lubricate the gears	□
						X ¹⁾	Lubricating the slewing ring connection	
					Every 6 months ¹⁾		Drain water on the water drain bores of the slewing ring connection (only LTM 11200-9.1, LTR 11200)	
250 h			1500 h			X	Check the mounting screws for tight seating	
						X	Checking the tilt play	
Winches								
250 h			X			X	Check the mounting screws for tight seating	□
				X			Check for leaks	
					X ⁶⁾		Checking the oil level	
250 h			3000 h			Every 4 years	Replacing the gear oil	
			1500 h			X	Lubricate the space between V-ring / winch bearing (only LR 11000)	
			200 h			X	Check the condition of the tooth flanks; determining factor are the operating hours of the winch (only for winches with gear ring drive)	
						X	Check the remaining theoretical service life by an authorized inspector	
						Every 4 years	Check the remaining theoretical utilization life by an inspection expert	
Winch brakes								
				X			Check for leaks	□
						X	Check for correct function	
Relapse supports								
					Every 3 months ^{5), 6)}		Lubricating the bearings	□
X ^{2), 6)}							Check the oscillation guard for easy movement	

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First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Relapse cylinder								□
X ^{2), 6)}					X		Check for leaks	
					Every 3 months ^{5), 6)}		Lubricating the bearings	
X ^{2), 6)}		X				X	Check pretension pressure (nitrogen)	
X ^{2), 6)}		X				X	Check the oil quantity	
Pneumatic springs								□
X ^{2), 5), 6)}		X				X	Check for correct function	
A-frame								□
		X					Lubricate the bearing	
X ^{2), 6)}						X	Check the lever for the limit switch on the A-frame 3 for easy movement and reset of spring	
X ^{2), 6)}						X	Check the rods with guide rail on the A-frame 2 and A-frame 3 for easy movement and distortion	
Counterweight								□
1000 km		or 10,000 km				X	Check tightening torque of mounting screws	
Concrete ballast plates (ballast container) (only LR 13000)								□
				X			Check for damage	
						Every 5 years	Check by licensing agency	
Ballasting								□
	X					X	Lubricating the bearings	
						X	Check the swing play (only LTM 11200-9.1)	
						X	Check the braid ropes (only LTM 11200-9.1)	
Press on pulleys of rope winches								□
	X					X	Grease guides	
Rope pulleys								□
					X ^{5), 6)}		Check groove base for cleanliness	
			X			X	Check for wear, damage, cracks and easy movement	
			3000 h			Every 3 years	Lubricate the bearings	

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Carrier rollers								
				X ²⁾			Check for damage and distortion	□
			X			X	Check for wear, damage and easy movement	
			X			X	Check the mounting screws for tight seating	
Crane cab								
				X			Check instruments for function	□
				X			Check indicator lights for function	
						X	Replace the filter insert for switch cabinet ventilation	
						X	Replace filter insert in water heater	
				X			Check fluid level in expansion tank of engine regulation	
		X				X	Check the sliding or incline device for function	
		X				X	Lubricate the bearings of the sliding or incline device	
		X				X ⁷⁾	Check the lift device (telescope arm) for function	
		X				X ⁷⁾	Lubricate the bearings of the lift device and telescope arm	
Window washing bays, camera washing bays								
				X			Check the fluid level in the reservoir for the washing bays	□
Overload protection								
				X			Check for correct function	□
		X				X	Check length sensor for function	
		X				X	Check length sensor rope for damage	
Remote diagnostics device								
						X	Check for correct function	□
						X	Check the validity of the SIM card	

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Electrical system								
						X	Cable connections	□
					Every 6 months ³⁾		Service the batteries	
					Every 6 months ³⁾		Empty the acid container	
						X ⁵⁾	Replace the interior compartment filter of the switch cabinet ventilation	
Fuel system								
				X			Check for leaks	□
						X	Check condition and mounting	
						X	Drain off water and sediments	
						X	Clean preliminary filter for auxiliary fuel pump	
	Every 50 h						Check fuel preliminary filter, drain off water if necessary	
		Every 1000 h					Replace preliminary fuel filter	
Slewing gear								
250 h			X			X	Check the mounting screws for tight seating	□
				X			Check for leaks	
					X		Checking the oil level	
250 h			3000 h			Every 4 years	Replacing the gear oil	
Slewing gear brakes								
				X			Check for leaks	□
						X	Check for correct function	
Turntable lock								
		X				X	Grease	□
		X				X	Check for correct function	
Bearings								
						X	Checking the retaining elements	□

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Pin connections								
						Every 2 months ¹⁰⁾	Check the retainer of the pin connections	□
						Every 2 months ¹⁰⁾	Check the pins and / or connector elements for damage, visual inspection	
						Every 2 months ¹⁰⁾	Check the retaining elements for damage, visual inspection	
Pump distributor gear								
				X			Check for leaks	□
					X		Checking the oil level	
500 h			1500 h			X	Replacing the gear oil	
Hydraulic hose lines								
				X			Check for leaks and damage	□
						X	Check for a safe condition by an authorized inspector, inspection expert	
Hydraulic system								
				X			Checking the oil level	□
					X		Check for leaks	
250 h		X				X	Replace the servo pressure and replenishing pressure filter inserts	
250 h		X				X	Replace return filter inserts (only for cranes with open hydraulic circuit)	
250 h		X				X	Replace bleeder filter of hydraulic tank	
500 h			X			X	Check hydraulic oil, required degree of purity: 20/18/15 Take oil sample and have it tested by oil supplier	
Hydraulic cylinder								
					X		Check for leaks	□
					Every 3 months ^{5), 6)}		Lubricating the bearings	
Hydraulic pressure accumulator (nitrogen)								
		X ⁴⁾				X ⁴⁾	Check pretension pressures	□

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First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Compressed air system								□
					X		Check for leaks	
					X		Check operating pressure	
					X		Check shut off pressure	
					X		Check operation of automatic drain valve	
						X	Replace air dryer granular cartridges	
						X	Clean air dryer preliminary filter	
Central lubrication system								□
					Every 6 months ¹⁾		Carrying out an intermediate lubrication	
		X					Check for correct function	
					X		Check the grease container fill level	
Emergency control								□
						X	Check for correct function	
Suspended ballast								□
						X	Check the fall protection equipment	
						X	Check frame, suspension and guide section for distortion and cracks	

- ¹⁾ if the crane is not moved: every 3 months
²⁾ before every start-up: Checking visually
³⁾ in hot climate zones: every 3 months
⁴⁾ observe maintenance instructions - crane superstructure, chapter 7.05
⁵⁾ and as necessary
⁶⁾ and during assembly
⁷⁾ in Great Britain: every 6 months
⁸⁾ outside of the heating period
⁹⁾ during the heating period
¹⁰⁾ for cranes used for a long period of time

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1 Maintenance and inspection schedule



Note

- ▶ Carry out maintenance work after reaching the specified operating hours or calendar intervals. The interval which occurs first is the deciding factor!
- ▶ The maintenance intervals complement each other. If a higher interval is coming up, then carry out the work according to the lower interval also!

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Safety systems								
						X	Personal protective equipment Follow the instructions of the manufacturer	□
						X	Height rescue system Follow the instructions of the manufacturer	
Fall protection equipment								
						X	Check protection points	□
						X	Check safety ropes	
						X	Check the ladders for technically immaculate condition	
						X	Check railings, steps and pedestals for safe function	
						X	Check catwalks and open mesh flooring for safe function	
Surface of crane boom								
					X		Check accessible surfaces for cleanliness	□
						X	Check accessible surfaces for completeness and slip resistance	
						X	Check labels for completeness and legibility	
Rigging and fastening points								
				X ²⁾			Check condition and mounting	□
						X	Check for continued suitability by an authorized inspector, inspection expert	
Load handling equipment and assembly aids								
				X ²⁾			Check for cracks, damage, wear and distortion	□
						X	Check for continued suitability by an authorized inspector, inspection expert	

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First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Fastening equipment and load securing devices								<input type="checkbox"/>
				X ²⁾			Observe and adhere to the manufacturer's instructions	
Lattice sections								<input type="checkbox"/>
						X	Check cracks, damage and distortion	
						X	Check protection points	
						X	Check safety ropes	
						X	Check railings and pedestals for safe function	
						X	Check catwalks and open mesh flooring for safe function	
X ⁶⁾						X	Grease the lube points of lattice sections	
Guy rods								<input type="checkbox"/>
						X	Check for cracks, damage and distortion by an authorized person	
						Every 4 years	Check cracks, damage and distortion by an authorized inspector	
						X	Checking the retaining elements	
						X	Check labels for completeness and legibility	
X ⁶⁾						X	Grease the lube points of guy rods	
Fiber guy ropes								<input type="checkbox"/>
					Every 3 months ⁷⁾		Check braid and intermediate layers for damage and distortion	
					Every 3 months ⁷⁾		Check rope end connections for cracks, damage and distortion	
					Every 3 months ⁷⁾		Check rope grommet transitions for damage and distortion	
Relapse supports								<input type="checkbox"/>
					Every 3 months ^{5), 6)}		Lubricating the bearings	
X ^{2), 6)}							Check the oscillation guard for easy movement	

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Relapse cylinder								<input type="checkbox"/>
X ^{2), 6)}					X		Check for leaks	
					Every 3 months ^{5), 6)}		Lubricating the bearings	
X ^{2), 6)}		X				X	Check pretension pressure (nitrogen)	
X ^{2), 6)}		X				X	Check the oil quantity	
Hydraulic hose lines								<input type="checkbox"/>
				X			Check for leaks and damage	
						X	Check for a safe condition by an authorized inspector, inspection expert	
Hydraulic cylinder								<input type="checkbox"/>
					X		Check for leaks	
					Every 3 months ^{5), 6)}		Lubricating the bearings	
Hydraulic pressure accumulator (nitrogen)								<input type="checkbox"/>
		X ⁴⁾				X ⁴⁾	Check pretension pressures	
Rope pulleys								<input type="checkbox"/>
					X ^{5), 6)}		Check groove base for cleanliness	
			X			X	Check for wear, damage, cracks and easy movement	
			3000 h			Every 3 years	Lubricate the bearings	
Carrier rollers								<input type="checkbox"/>
				X ²⁾			Check for damage and distortion	
			X			X	Check for wear, damage and easy movement	
			X			X	Check the mounting screws for tight seating	
Auxiliary guying								<input type="checkbox"/>
						X ⁶⁾	Check the rope connection between the guy point and the lattice section	
						X ⁶⁾	Check cracks, damage and distortion	

First maintenance after	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
	250 h	500 h	1000 h	Daily	Weekly	Annually		
Pin connections								
						Every 2 months ⁸⁾	Check the retainer of the pin connections	□
						Every 2 months ⁸⁾	Check the pins and / or connector elements for damage, visual inspection	
						Every 2 months ⁸⁾	Check the retaining elements for damage, visual inspection	
Crane ropes								
				X			Check for damage and distortion	□
					Monthly ⁵⁾		Check, grease by expert personnel	
						X	Check by an authorized inspector	
						Every 4 years	Check by an inspection expert	
Hook blocks								
			X			X	Check rope pulleys for distortion, wear, damage and cracks	□
			3000 h			Every 3 years	Lubricate rope pulley bearings	
	100 h				Every 3 months ⁵⁾		Lubricate pressure bearings	
	100 h				Every 3 months ⁵⁾		Lubricate radial bushing	
	100 h				Every 3 months ⁵⁾		Lubricate suspension of hook beam	
					Every 6 months ⁵⁾		Replace batteries on incline sensor	
						X	Check distance dimension (y)	
						X	Check for distortion, wear, damage and cracks by an authorized person	
						Every 4 years	Check for distortion, wear, damage and cracks by an inspection expert	

²⁾ before every start-up: Checking visually

⁴⁾ observe maintenance instructions - crane superstructure, chapter 7.05

⁵⁾ and as necessary

⁶⁾ and during assembly

- 7) by authorized and trained expert personnel with boom placed down and before every erection procedure
- 8) for cranes used for a long period of time

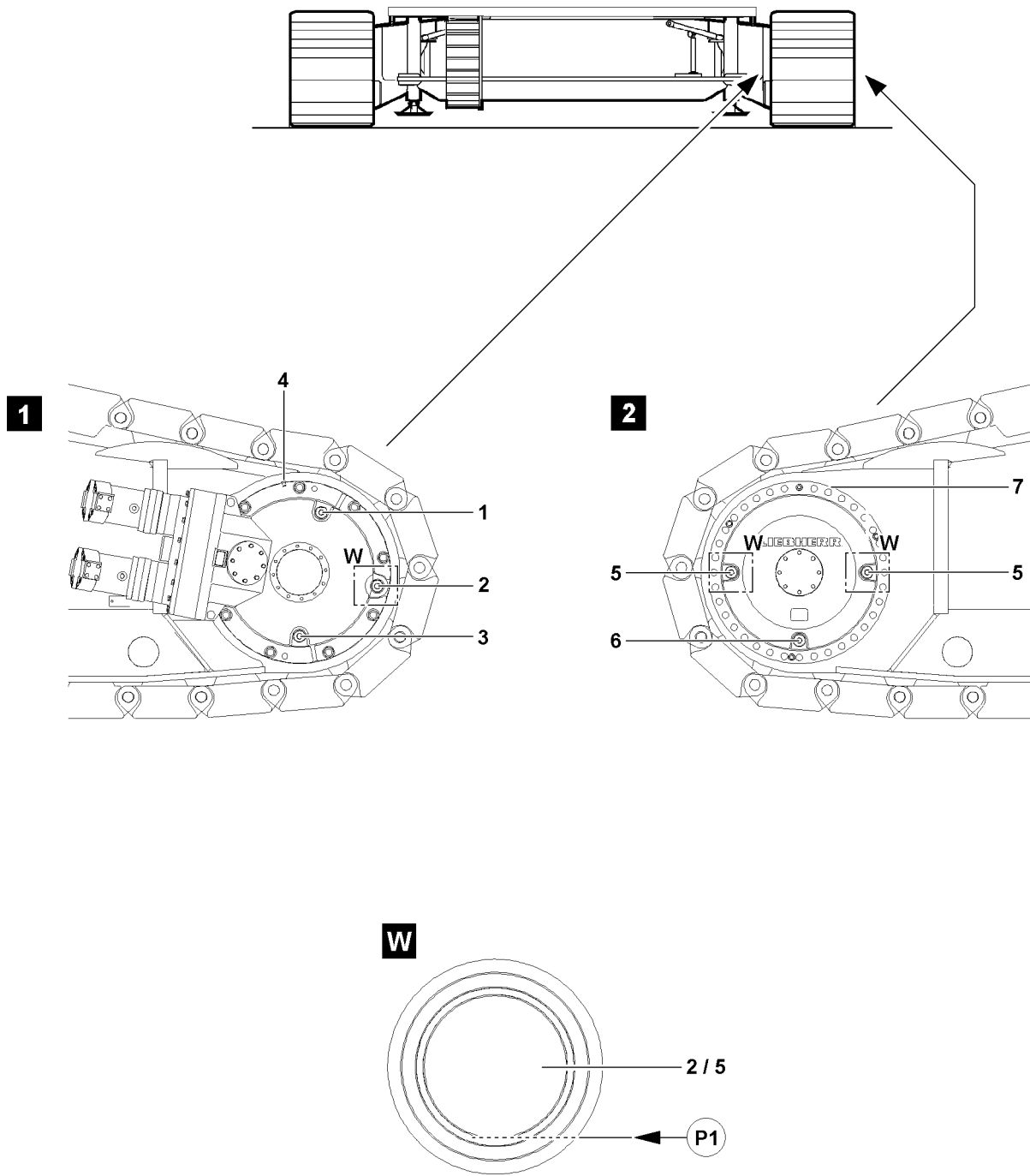


Fig.110049

LWE/LR 1750-000/12812-15-02/en

1 Servicing the travel gear



Note

- ▶ Use service items and lubricants according to the chart, see Crane operating instructions, chapter 7.07.
- ▶ Observe the maintenance intervals, see Crane operating instructions, chapter 7.02.

The travel gear consists of:

- Miter gear with brake, illustration 1
- Planetary gear, illustration 2



WARNING

Danger of burns during maintenance and inspection work!

Severe burns can result due to the travel gear and oils at operating temperatures.

- ▶ Avoid direct body contact to heated components and fluids.

NOTICE

Dirt in travel gear!

If any dirt gets inside of the travel gear, gear damage can occur.

- ▶ Make sure that no dirt gets into the inside of the travel gear during maintenance work.

The following maintenance openings are on the miter gear with brake, see illustration 1:

- 1 Oil filler plug, oil filler port
- 2 Oil level plug, oil level port
- 3 Oil drain plug, oil drain port
- 4 Grease lubrication miter gear

The following maintenance openings are on the planetary gear, see illustration 2:

- 5 Oil level plug, oil level port
- 6 Oil drain plug, oil drain port
- 7 Grease lubrication planetary gear



Note

- ▶ No separate oil filler port is located on the planetary gear, the oil level port is used for this purpose.
- ▶ Oil level ports on planetary gears and miter gears can be constructed differently.
- ▶ The planetary gear and the miter gear have separate, different sized oil chambers. The oil levels in the gear must be checked independently of each other.

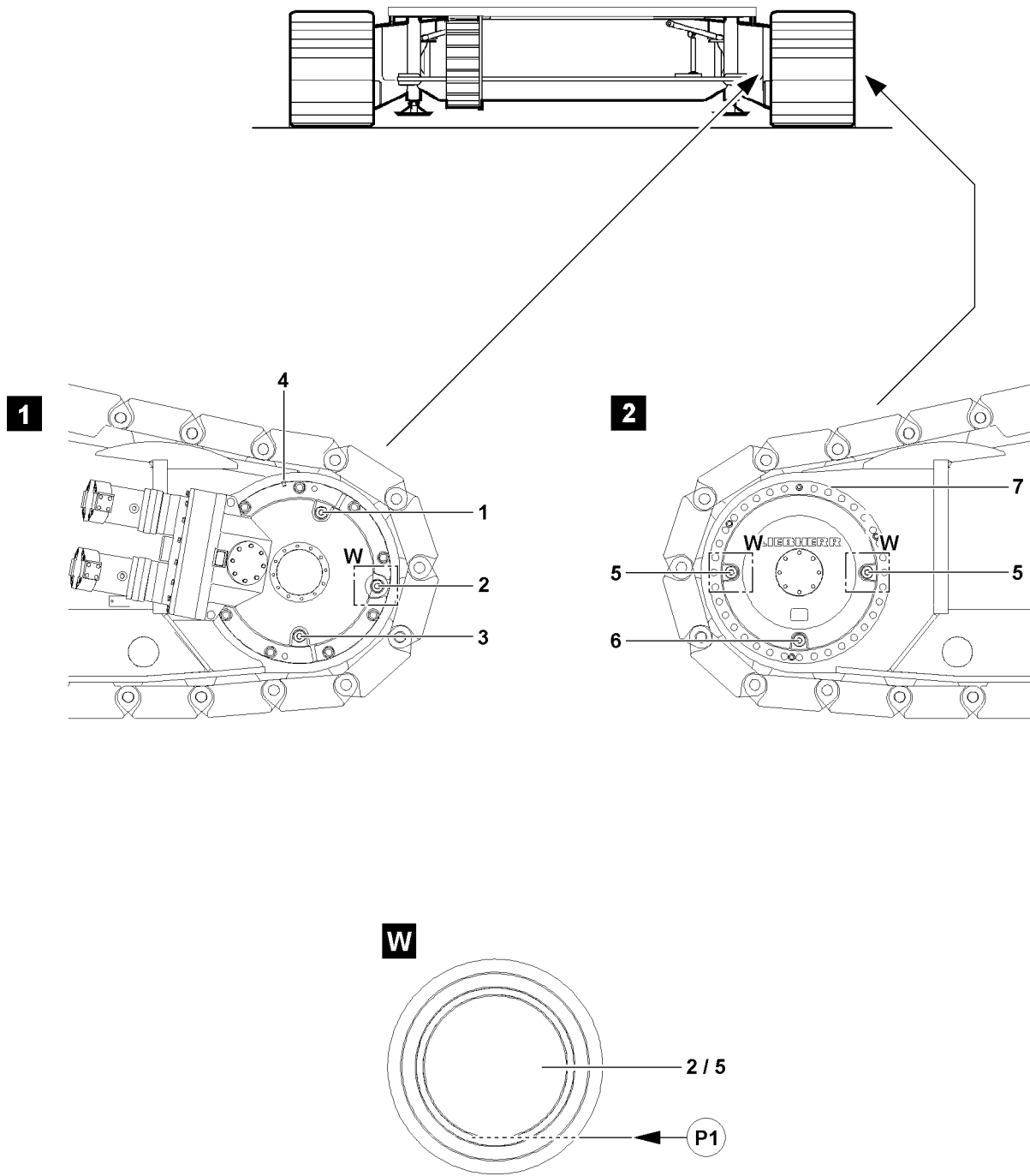


Fig.110049

LWE/LR 1750-000/12812-15-02/en

1.1 Checking for leaks

- ▶ Check visually to ensure that the travel gears do not leak.

1.2 Checking the oil level

NOTICE

Damage to the travel gear!

If seals are used repeatedly, it can result in loss of oil.

Due to loss of oil, the travel gears can wear significantly and / or be damaged.

- ▶ Use the seals on the maintenance ports only once.
-

NOTICE

Varying oil level in planetary gear!

Depending on the position of the gears in the planetary gear, the oil level can vary slightly upward.

When opening the oil level plug, oil can emerge despite correct fill quantity.

- ▶ The fill height must be at least at the height of the point **P1**.
 - ▶ If any oil emerged during the check, replace the same amount.
-

Make sure that the following prerequisites are met:

- The crane is in horizontal position.
 - The travel gear is at a standstill.
-



Note

- ▶ To ensure a reliable oil level check, it must be ensured that the travel gears have been at a standstill for at least two minutes. This ensures that the oil has returned to the oil chamber completely.
-

- ▶ Open the oil level port carefully.
-

NOTICE

Insufficient oil fill quantity!

If the oil level drops below the fill level on point **P1**, the travel gears can be damaged.

- ▶ Add gear oil until the oil level is again on the fill level on point **P1**.
-

If gear oil must be added:

- ▶ Add oil on the oil filler port.
- ▶ If the oil level is on the fill level on point **P1**, then the oil level on the travel gear is OK.
- ▶ Close the maintenance ports tightly.

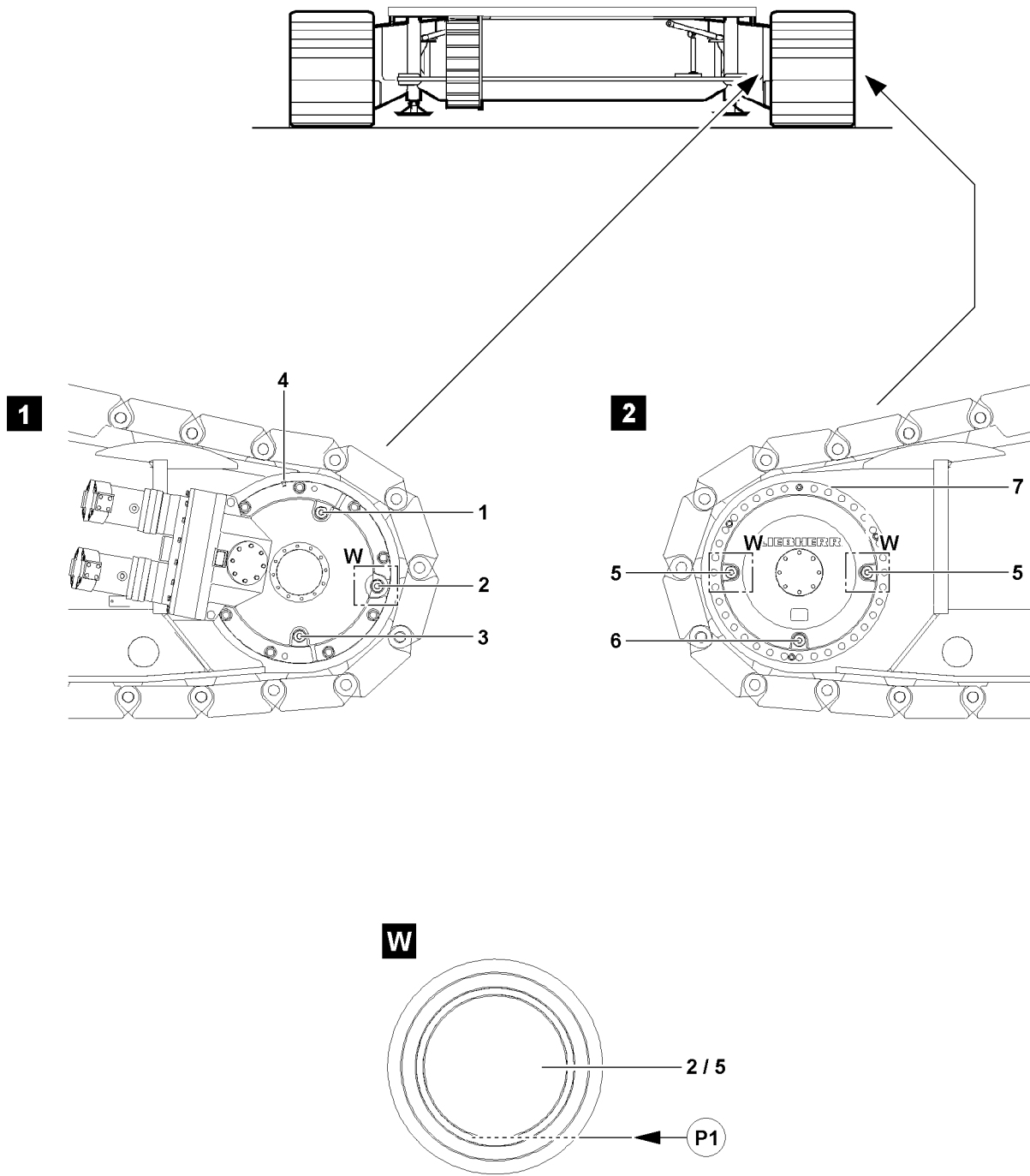


Fig.110049

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1.3 Changing the oil

NOTICE

Damage to the travel gear!

If seals are used repeatedly, it can result in loss of oil.

Due to loss of oil, the travel gears can wear significantly and / or be damaged.

▶ Use the seals on the maintenance ports only once.

1.3.1 Changing oil on the miter gear

Make sure that the following prerequisites are met:

- The crane is in horizontal position.
- The travel gear must be at a standstill.
- The travel gear is at operating temperature.
- A container to catch the used oil is available.



Note

- ▶ When selecting the container to catch the use oil, make sure that the container is sufficiently sized to be able to catch all the used oil.
 - ▶ For fill quantity of miter gear, see Crane operating instructions, chapter 7.06.
-

- ▶ Remove the oil filler plug **1**.
 - ▶ Remove the oil drain plug **3** and drain oil into a suitable container.
-



Note

- ▶ Allow the miter gear to empty completely.
- ▶ Clean the oil drain plug **3** and the sealing surface.
- ▶ Close off the oil drain port **3** tightly.
- ▶ Open the oil level port **2**.
- ▶ Add oil on the oil filler port **1** until it „stands“ at the height of the fill level on point **P1** of the oil level port **2** or until it starts to run over.
- ▶ Clean the sealing surfaces.
- ▶ Close off the oil level port **2** tightly.
- ▶ Close off the oil fill port **1** tightly.

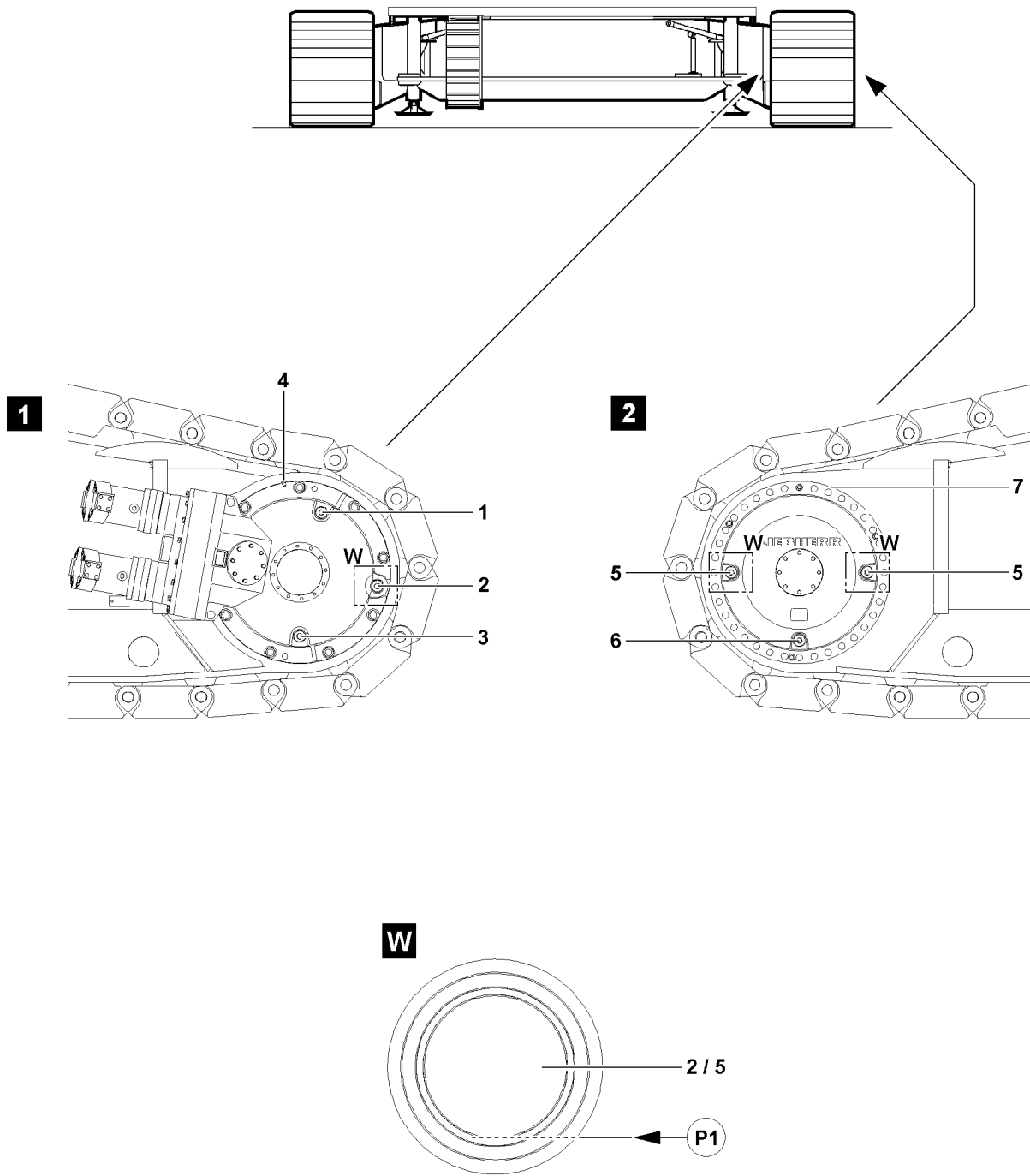


Fig.110049

LWE/LR 1750-000/12812-15-02/en

1.3.2 Changing oil on the planetary gear

Make sure that the following prerequisites are met:

- The crane is in horizontal position.
- The travel gear must be at a standstill.
- The travel gear is at operating temperature.
- A container to catch the used oil is available.

**Note**

- ▶ When selecting the container to catch the use oil, make sure that the container is sufficiently sized to be able to catch all the used oil.
- ▶ For fill quantity of planetary gear, see Crane operating instructions, chapter 7.06.

-
- ▶ Remove the oil level plugs **5**.
 - ▶ Remove the oil drain plug **6** and drain oil into a suitable container.

**Note**

- ▶ Allow the planetary gear to empty completely.
-
- ▶ Clean the oil drain plug **6** and the sealing surface.
 - ▶ Close off the oil drain port **6** tightly.
 - ▶ Add oil on the oil level port **5** until it „stands“ at the height of the fill level **P1** of the oil level ports **5** or until it starts to run over.
 - ▶ Clean the sealing surfaces.
 - ▶ Close off the oil level ports **5** tightly.

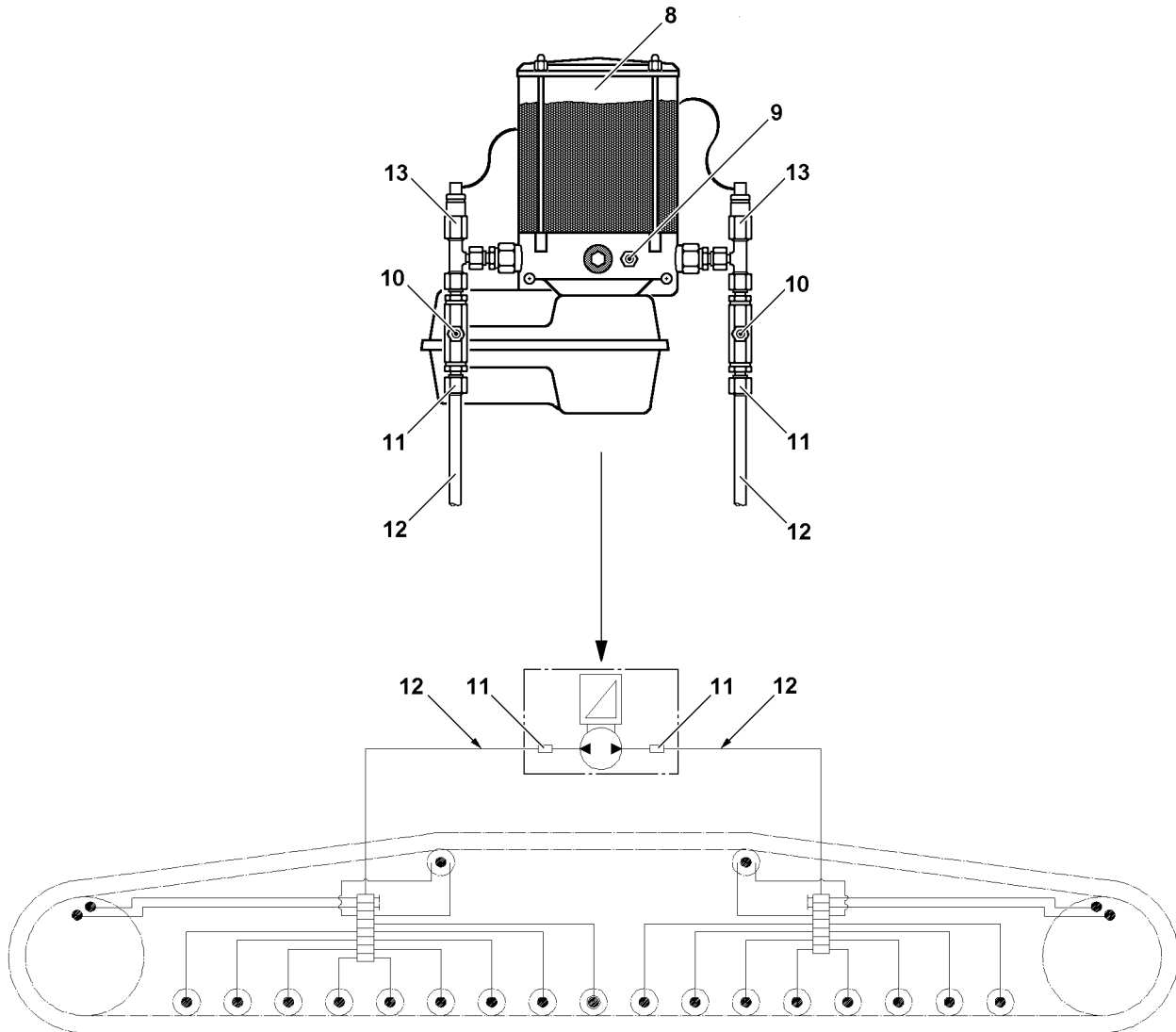


Fig.110102

LWE/LR 1750-000/12812-15-02/en

2 Servicing the central lubrication system of the crawler carrier



Note

- ▶ The illustrations in this chapter are examples and may not apply exactly to your crane.
- ▶ Use service items and lubricants according to the chart, see Crane operating instructions, chapter 7.07.
- ▶ Observe the maintenance intervals, see Crane operating instructions, chapter 7.02.

If the crane is driven via the crawler travel gear, then the central lubrication system for the crawler carrier turns on automatically and supplies all grease points with the correct amount of grease.

NOTICE

Insufficient lubrication!

The lubrication film is removed over time due to environmental influences.

Due to insufficient lubrication, the crawler carriers are exposed to significant wear and can be damaged.

- ▶ If the crawler carriers are not moved for a period of more than three months, then it must be lubricated every quarter, possibly with an external grease pump.



Note

- ▶ When putting the crane back into service after an extended downtime, check the central lubrication system for function.
- ▶ When working on the central lubrication system, observe utmost cleanliness.
- ▶ Every crawler carrier has a separate grease pump with several lubrication circuits.
- ▶ Every lubrication circuit has its own main line **12**.

On the grease pump, see illustration, there are the following maintenance relevant components:

- 8** Grease container
- 9** Grease fitting
 - Filling the grease container
- 10** Grease fitting
 - Fill the lube lines
- 11** Main line connection
- 12** Main line
- 13** Pressure relief valve

2.1 Filling the grease container

NOTICE

Insufficient lubrication!

In case of insufficient lubrication, the grease lubrication points can run dry.

This could result in high property damage.

- ▶ Fill the grease container **8** before it is completely empty.



Note

- ▶ Do not deplete the grease container **8**.
- ▶ If the grease container **8** is empty, the central lubrication system must be bled.
- ▶ Fill the grease container **8** with an external grease pump via the grease fitting **9**.

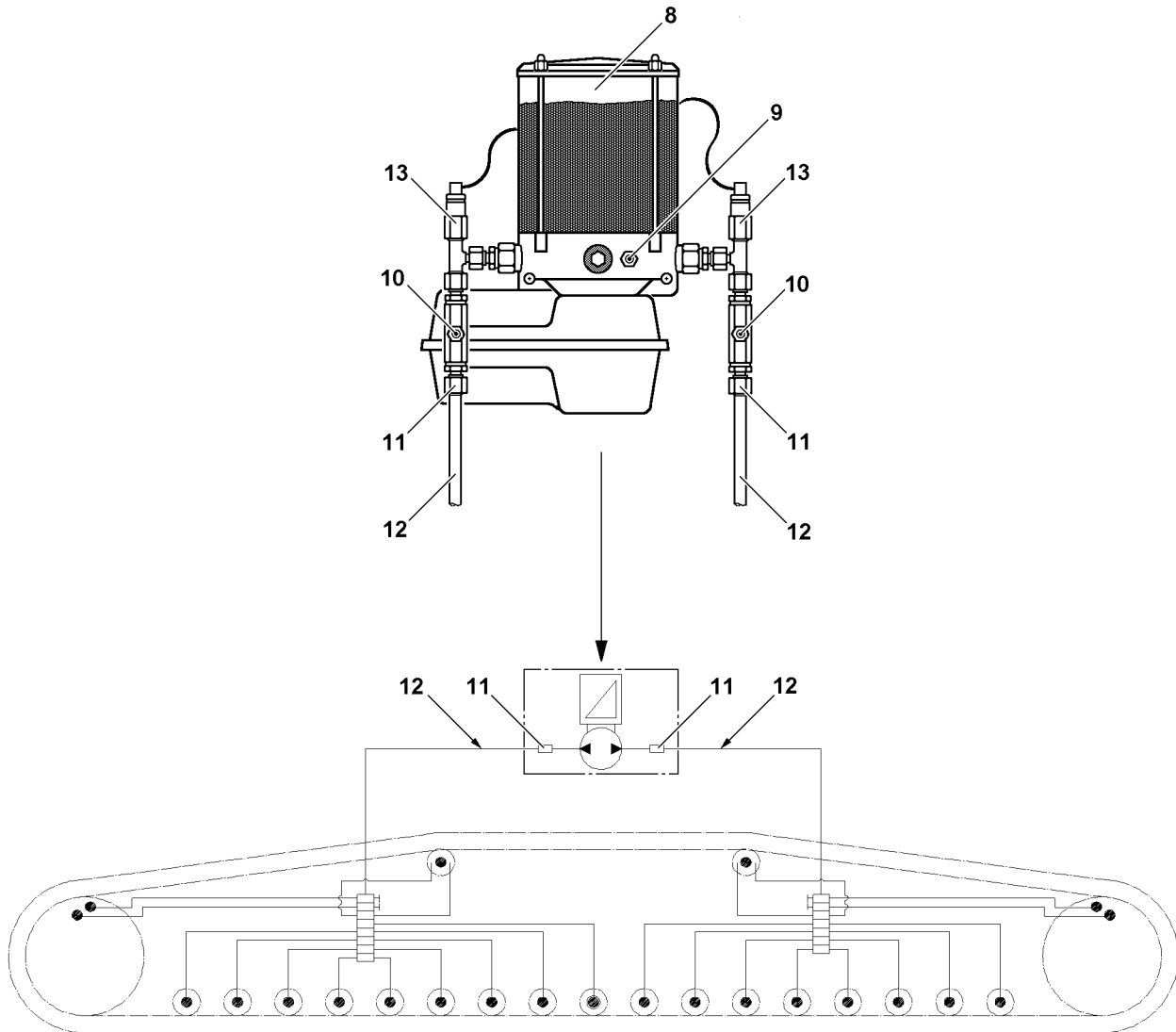


Fig.110102

LWE/LR 1750-000/12812-15-02/en

2.2 Bleeding the central lubrication system

NOTICE

Insufficient lubrication!

If there is air in the grease pump, lubrication points can run dry.

- ▶ Bleed the central lubrication system carefully.

The central lubrication system of the crawler travel gear can be bled two ways:

- By actuation of the grease pump by simulating the crawler operation.
- By separate actuation of the grease pump with the aid of the electric wiring diagram.

2.2.1 Bleeding by simulating crawler operation



WARNING

Crane can start to drive unintentionally!

If the foot rocker in the crane operator's cab or the manual control lever on the radio remote control console* is moved too far while bleeding the grease pump, then the track chain can start to move.

The crane can start to drive and catch personnel.

Death, severe bodily injuries, property damage.

- ▶ Actuate the foot rocker carefully while bleeding the grease pump.
- ▶ Watch the emergence of grease from the grease pump from a safe position.

- ▶ Fill the grease container **8** with an external grease pump via the grease fitting **9**.
- ▶ Fill the main lines **12** with an external grease pump via the grease fittings **10** until grease free of air bubbles emerges on all grease points.



Note

- ▶ Carry out the bleeding procedure individually for each main line connection **11**.
- ▶ Every crawler carrier has a separate grease pump.

- ▶ Unscrew the main line **12** from the main line connection **11**.
- ▶ Start the crane engine.
- ▶ Select crawler operation.
- ▶ Actuate the foot rocker / manual control lever of the crawler carrier of the grease pump which is being bled only so far that the track chain does not start to move.

Result:

- The grease pump starts to supply.
- The acoustic signal crawler operation sounds.
- ▶ Actuate the foot rocker / manual control lever only until grease free of air bubbles emerges on the main line connection **11**.
- ▶ Reconnect the main line **12**.
- ▶ Actuate the foot rocker / manual control lever again until grease emerges again on at least one of the lube points in the bled lubrication circuit.

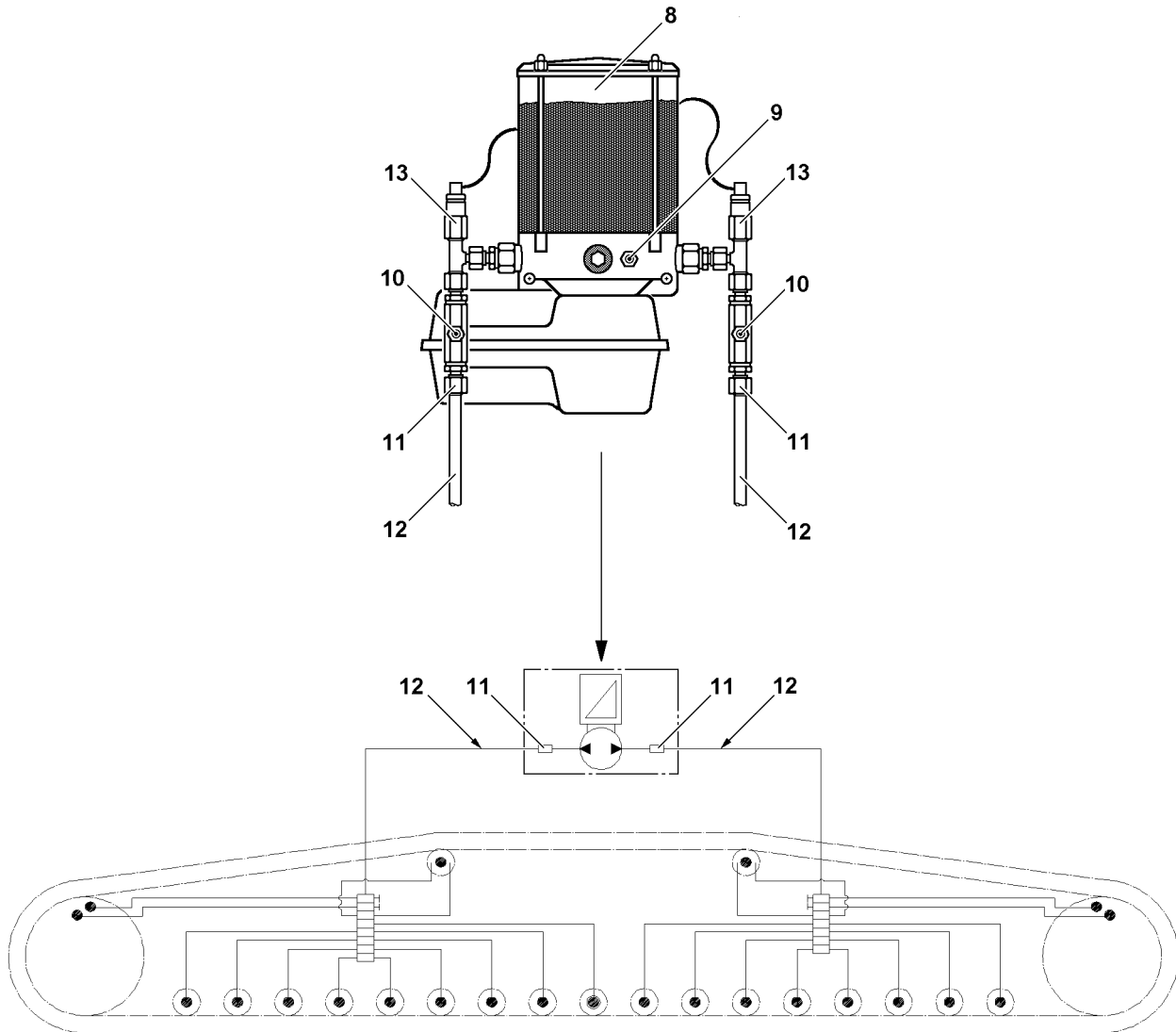


Fig.110102

LWE/LR 1750-000/12812-15-02/en

2.2.2 Bleeding by separate actuation of the grease pump



Note

- ▶ Work on the electrical system of the crane may only be carried out by authorized and trained expert personnel.

Make sure that the following prerequisite is met:

- The separate electric wiring diagram of the crane is available.
- ▶ Fill the grease container **8** with an external grease pump via the grease fitting **9**.
- ▶ Fill the main lines **12** with an external grease pump via the grease fittings **10** until grease free of air bubbles emerges on all grease points.



Note

- ▶ The bleeding procedure must be carried out individually for every main line connection **11**.
- ▶ Every crawler carrier has a separate grease pump.

- ▶ Unscrew the main line **12** from the main line connection **11**.
- ▶ Actuate the grease pump separately, see crane electric wiring plan.

Result:

- The grease pump starts to supply.
- ▶ Actuate the grease pump until grease free of air bubbles emerges on the main line connection **11**.
- ▶ Reconnect the main line **12**.
- ▶ Actuate the grease pump again until grease emerges again on at least one of the lube points in the bled lubrication circuit.

2.3 Bleeding repaired lubrication lines

NOTICE

Insufficient lubrication!

If there is air in the lubrication lines, lubrication points can run dry.

- ▶ If the lubrication lines are repaired or replaced, make sure that they are completely filled with grease.
- ▶ Fill lubrication lines completely with grease before installation.
- ▶ Check repaired lubrication lines for function and leaks.

2.4 Intermediate lubrication of crawler carriers

- ▶ Fill the main line **12** with an external grease pump via the grease fitting **10** until grease free of air bubbles emerges on all grease points.
or
Actuate the foot rocker / manual control lever in crawler operation until the grease pump starts to supply, but the track chain does not yet start to move. Continue actuation until grease emerges on all lube points.

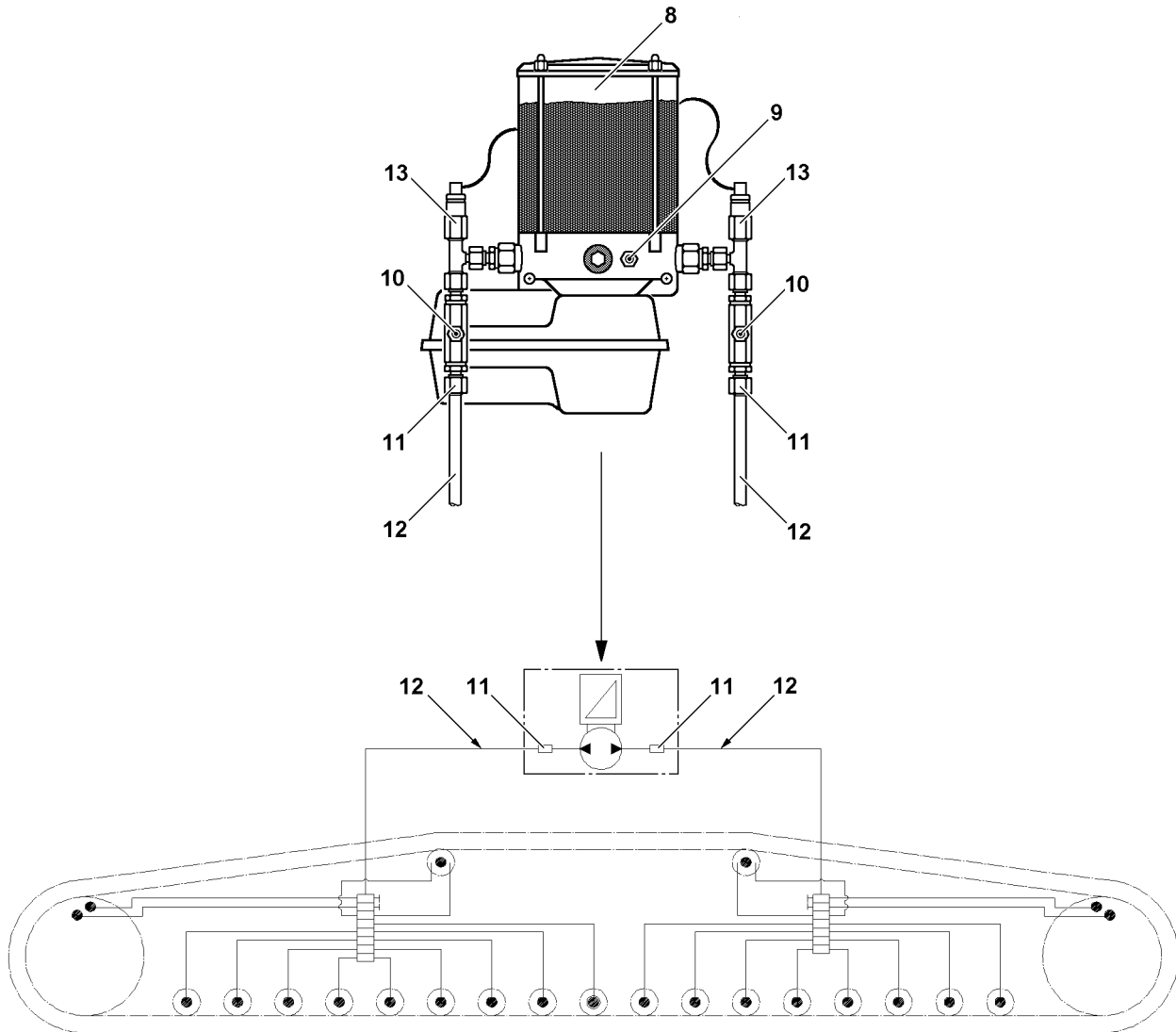


Fig.110102

LWE/LR 1750-000/12812-15-02/en

2.5 Troubleshooting on the central lubrication system

Problem	Cause	Remedy
The grease pump does not work	Electrical line interrupted, grease pump defective.	Fix or replace the electrical line, replace the grease pump
Grease pump operates, but does not deliver	Air cushion in delivery piston, minimum fill level fallen below, grease pump element defective	Bleed grease pump, fill reservoir, replace grease pump element
No grease collar on all lube points	Grease pump does not work, system blocked	See „Grease pump does not work“ or „Grease emerges via pressure relief valve“
No grease collar on several lube points	Supply lines to secondary distributors broken or leaking, screw connections leaking	Replace lines, tighten or replace screw connections
No grease collar on one lube point	Associated lube line broken or leaking, screw connection leaking	Replace line, tighten or replace screw fitting
Grease pump speed reduced	High system pressure, low ambient temperature	Check the system / bearing points, if no damage is found: grease intermediately once or twice, if necessary ¹⁾
Grease escapes at the pressure relief valve	System pressure too high, distributor blocked, system blocked, defective valve spring on pressure relief valve	Check system, replace distributor, repair blocked / seized bearing point, replace pressure relief valve

1) See section „Intermediate lubrication of crawler carriers“.

If a problem cannot be remedied, contact the Service Dept. at Liebherr-Werk Ehingen.

3 Servicing the track chain



Note

► The illustrations in this chapter are examples and may not apply exactly to your crane.

In crawler operation, the components of the crawler travel gear are subject to wear caused by operation.

In order to continuously guarantee safe and effective crane operation, components must be checked at the specified maintenance intervals and replaced if necessary, see the Crane operating instructions, chapter 7.02.



WARNING

Maintenance intervals exceeded!

Failure to observe the specified maintenance intervals can lead to increased crane failure time as well as to damage on the crawler travel gear.

Death, severe bodily injuries, property damage.

- Make sure that the maintenance intervals in the Crane operating instructions chapter 7.02 are observed.
- The crane operator is responsible for complying with the maintenance intervals, properly performing the specified maintenance tasks as well as initiating the corresponding measures as a result of the inspection results.

3.1 Tensioning the track chain

The track chain must be retensioned at the latest when three track pads **2** at point **P2** are laying flat on the glide rails **1.1** on the crawler carrier **1**.

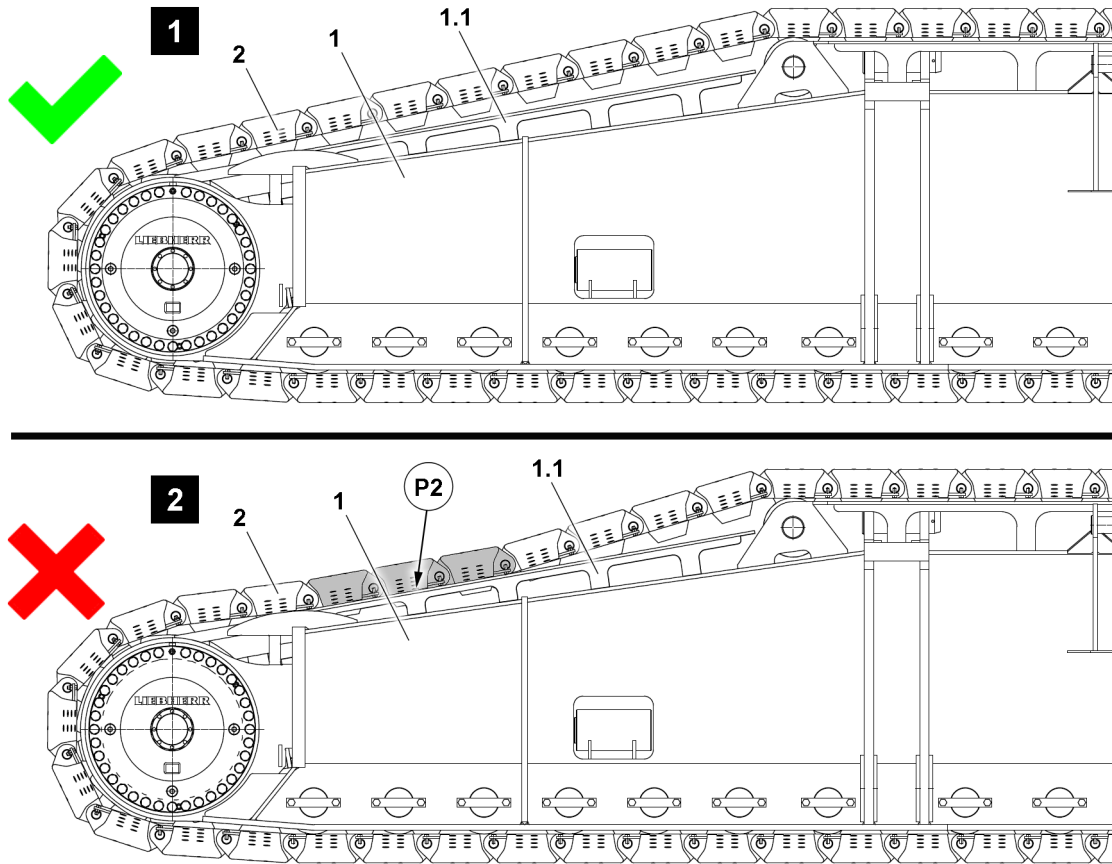


Fig.128221: Chain tension OK, illustration 1 // Track chain too slack, illustration 2

NOTICE

Damage to the track chain!

If the chain tension is not checked within the specified maintenance intervals, the track chain or the steel structure of the crawler carrier can be damaged.

- ▶ Observe and adhere to the maintenance intervals, see the Crane operating instructions, chapter 7.02.
- ▶ If **three** of the track pads **2** of the track chain lie flat on the glide rails **1.1** on the crawler carrier **1** (see point **P2**), then the track chain must be retensioned **immediately**.

The following applies in the case of crawler carriers **1** without glide rails **1.1** or with worn glide rails **1.1**:

- ▶ Make sure that the track pad cams never come into contact with the base steel structure of the crawler carrier. Always retension the track chain early on.

The following applies:

- ▶ The crane driver bears full responsibility for damage resulting from a non-tensioned track chain.

NOTICE

Glide rails worn!

If the glide rails on the crawler carriers are worn to the extent that the remaining material can be deformed or could break under the weight of the track chain, this could result in capital property damage to the crawler travel gear.

- ▶ Retension the track chain early on.
- ▶ Make sure that worn glide rails are replaced early on, please contact Customer Service at LIEBHERR-Werk Ehingen GmbH.

**Note**

- ▶ By extending the tension cylinder **14**, the sliding section **17** of the crawler carrier is moved in direction of the arrow.
- ▶ The chain tension is held by spacer plates **16**.

NOTICE

Foreign matter in track chains!

Foreign matter in the track chains and on the travel drive can cause damage.

- ▶ Before tensioning the track chains, check the track chains and the travel drives for foreign particles, such as rocks, and clean them, if necessary.

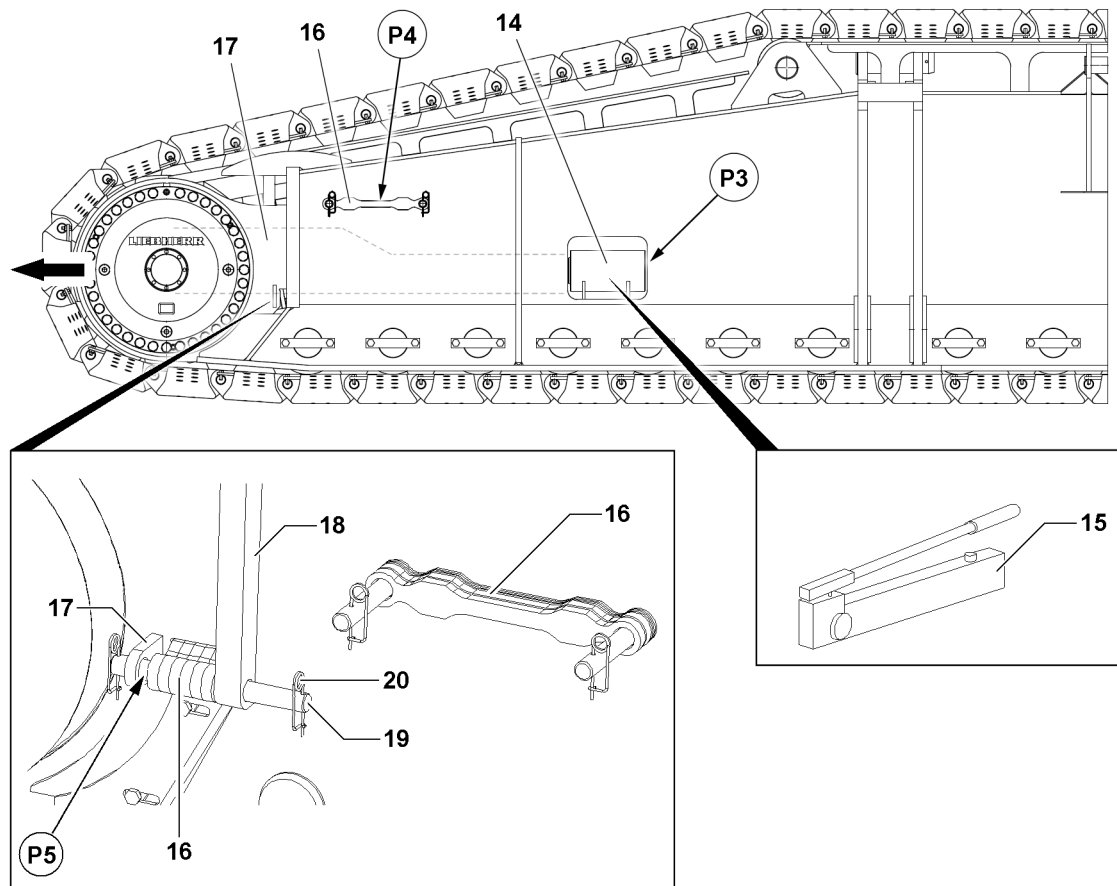


Fig.127103: Tensioning the track chain

Make sure that the following prerequisites are met:

- The crane is in horizontal position.
- The tension cylinder **14** is placed into the cylinder receptacle on point **P3**, see illustration.
- ▶ Extend the tension cylinder **14** with the hand pump **15** until the hand pump lever can no longer be moved.

Result:

- The track chain is tensioned.
- ▶ Remove the spacer plates **16** from the transport receptacle on point **P4**.
- ▶ On point **P5**, insert as many spacer plates **16** as fit into the gap between the sliding section **17** and the crawler carrier **18**.
- ▶ Secure the spacer plates **16** with pin **19** and spring retainer **20**.

**WARNING**

Danger of crushing!

When releasing the tension cylinder **14**, body parts, such as: Fingers, hands and arms can be crushed or severed.

- ▶ When relieving the tension cylinder **14**, any work on the crawler carrier is prohibited.
- ▶ Relieve the tension cylinder **14** again.
- ▶ After the tension procedure, drive the crawler back and forth about one crawler length in operating mode „Straight forward travel“.

Result:

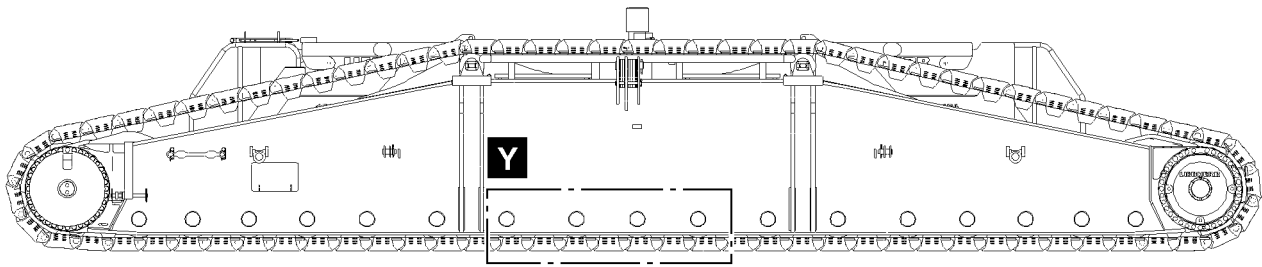
- The tension of the track chain is reduced.
- ▶ Check the distance of the track chain to the steel construction of the crawler carrier again at point **P2**.

**Note**

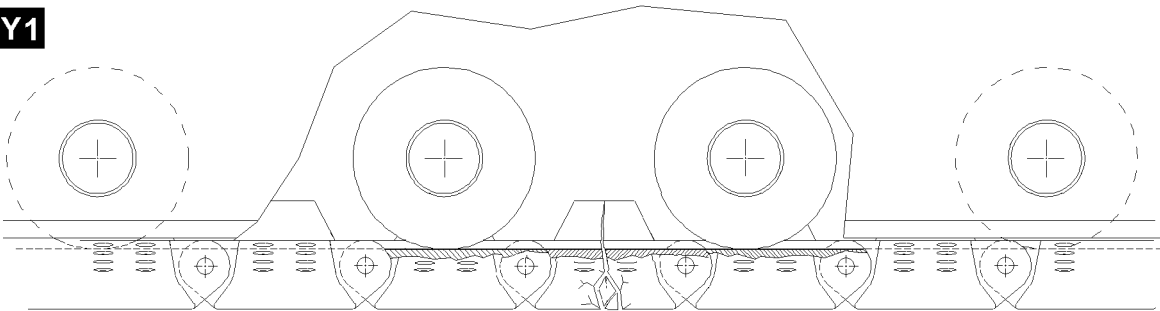
- ▶ If necessary, repeat the tension procedure of the track chain and insert additional spacer plates **16**.
- ▶ If the lift on the tension cylinder **14** is no longer sufficient to tension the track chain, then trained expert personnel must remove one track pad.
- ▶ Take the relieved tension cylinder **14** from the cylinder receptacle on the crawler carrier **P3**.

Empty page!

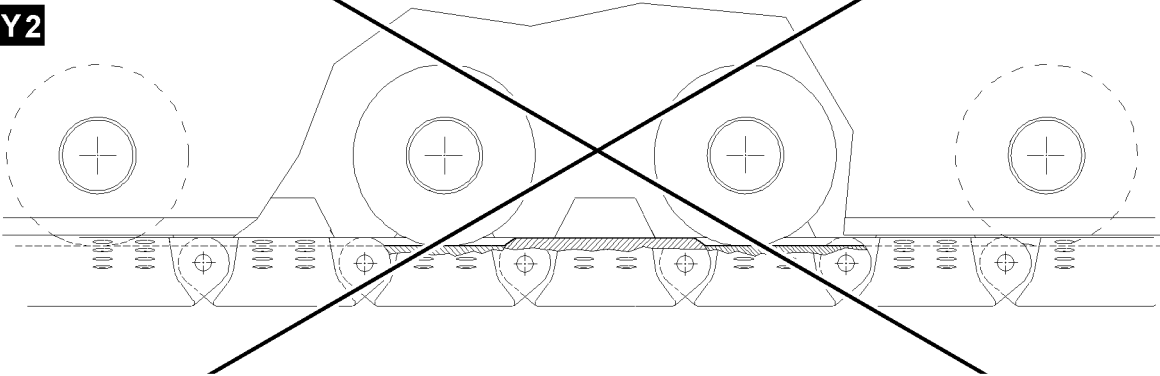
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Y1



Y2



Y3

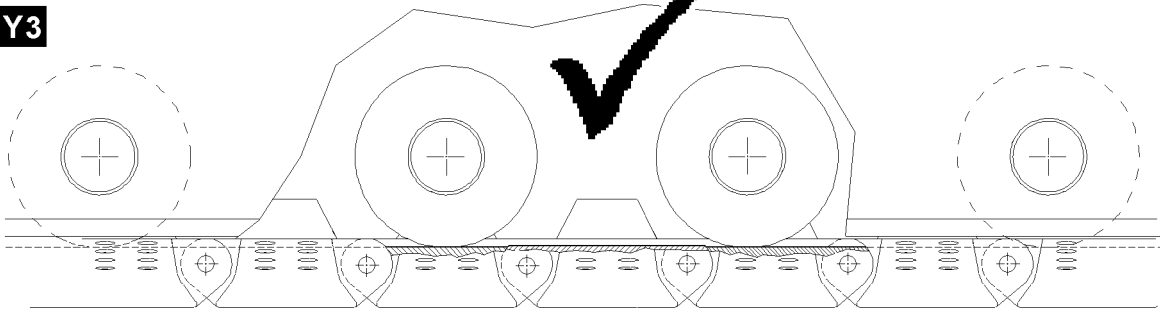


Fig.109917

LWE/LR 1750-000/12812-15-02/en

3.2 Checking wear on the track chain



WARNING

Track chain can be ripped off!

If the wear limit on the track pads **21**, pins **22** or track rollers **23** is exceeded, then the track chain can break off during crawler operation.

The crane can topple over.

Death, severe bodily injuries, property damage.

- ▶ Random checks of the track pads **21**, pins **22** and track rollers **23** must be carried out within the specified intervals.
- ▶ During the random inspection of the track rollers, the first and last track roller on the crawler carrier must be included in the inspection.
- ▶ If a wear limit on the component is reached, then the component must be replaced or remachined.

NOTICE

Significant wear of crawler travel gear!

If an individual track pad **21** must be replaced then it may not be replaced with a track pad **21** that shows a much lower degree of wear.

Significant height differences between the individual track pads **21**, see illustration **Y2**, lead to an increased mechanical stress on the track pads **21** and the track rollers **23** of the crawler carrier.

- ▶ Replace a defective track pad **21** with a track pad **21** that shows a similar degree of wear, see illustration **Y3**.



Note

- ▶ Due to the break-in period of the components toward each other, a larger stretch of the track chains occurs on a new crawler travel gear. For that reason, it may be necessary to remove a track pad **21** earlier to be able to tension the track chain correctly.

The wear of the track pad **21**, pin **22** and track rollers **23** depends a various factors:

- Length of travel route
- Frequency of driving in curves
- Friction ratios track pad **21** - ground
- Evenness of the ground
- Type of ground
- Load bearing capacity of the ground / base
- Position of the total center of gravity
- Load on the hook
- Placed ballast on the crane

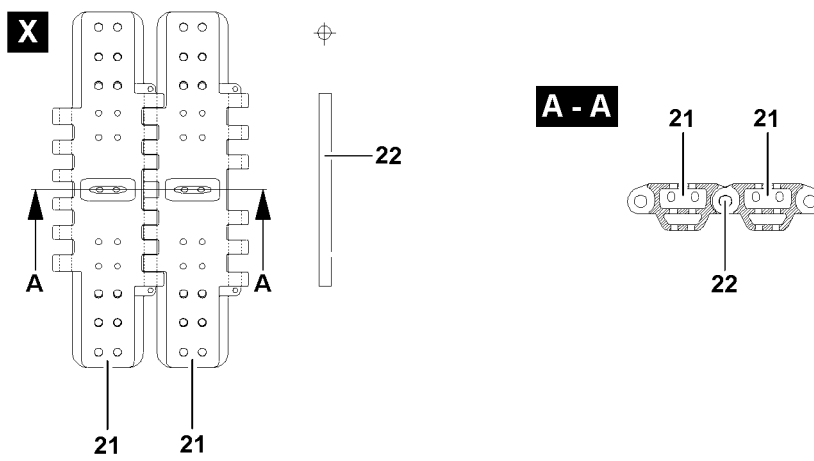
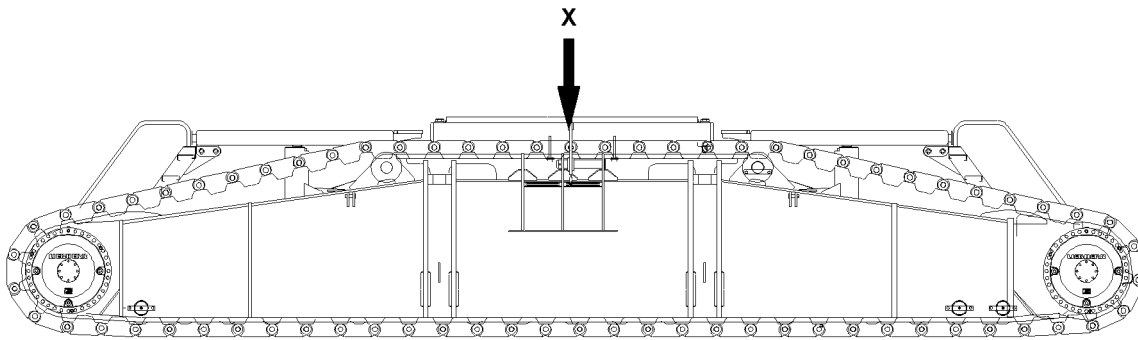


Fig.110103

3.2.1 Checking the wear on the connections of the track pads

NOTICE

Damage to the sprocket!

If the wear limit on the connections to the track pads is reached, it can lead to increased wear on the sprocket and on the transporting lugs of the track pads due to excessive chain stretch.

Expensive and extensive repairs can result.

- ▶ The random inspection of the pin diameter must be made within the specified intervals.
- ▶ If one pin **22** falls below the minimum permissible dimension, then it must be replaced with a new pin **22**.
- ▶ The random inspection of the bore diameter must be made within the specified intervals.
- ▶ If the bore diameter exceeds the maximum permissible dimension, then the track pad **21** must be replaced.

The track pads **21** of the crawler track are connected by pins **22**.

Wear limit bore for the track pad	
Initial diameter	53 mm
Maximum permissible upper limit	56 mm

Pin wear limit	
Initial diameter	50 mm
Maximum permissible minimum dimension	49 mm

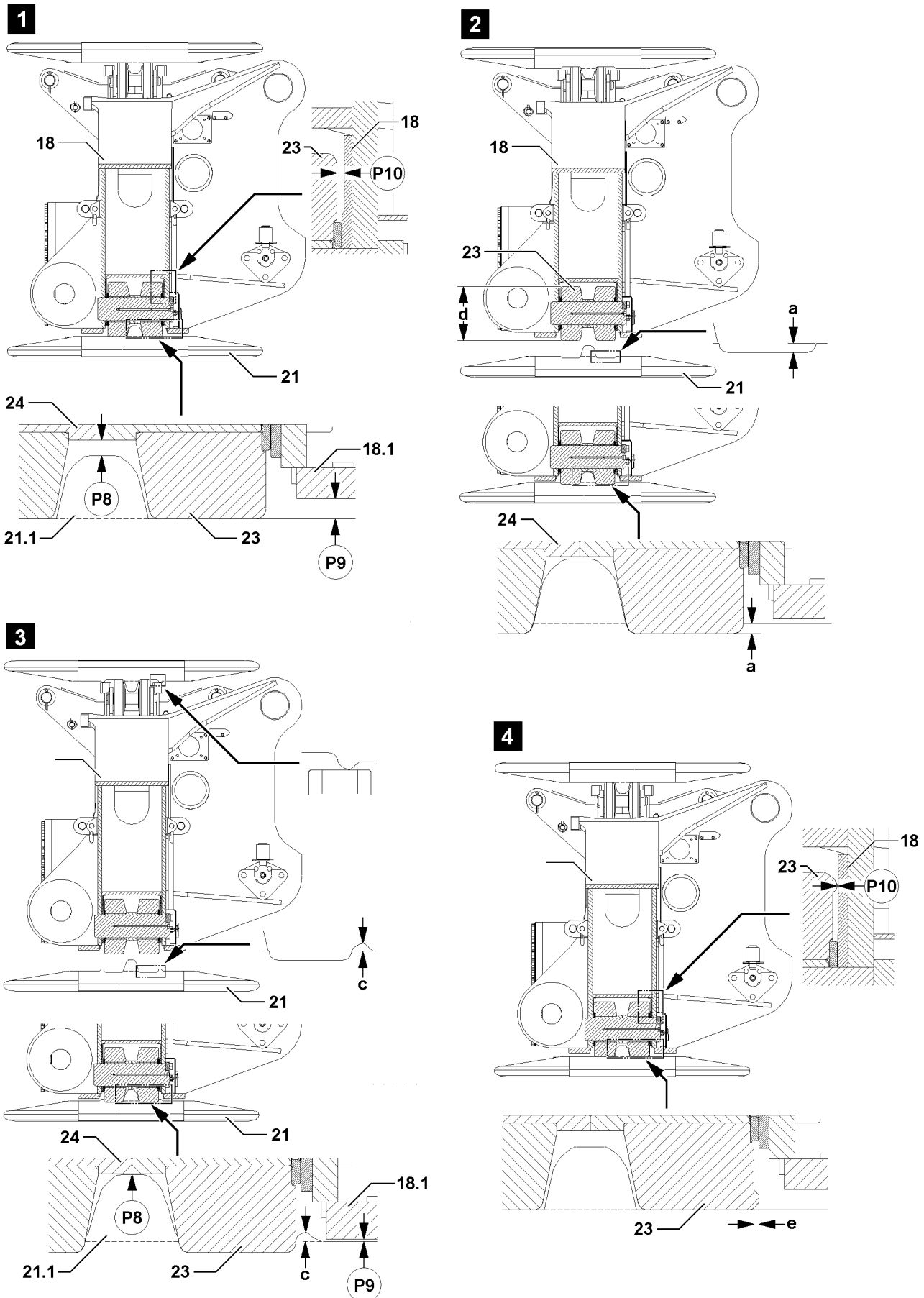


Fig.109882

LWE/LR 1750-000/12812-15-02/en

3.2.2 Checking the wear on the roll off surfaces of the track pads / track rollers

NOTICE

Destruction of track pad!

If a track pad **21** is not fixed or replaced after reaching the wear limit, then the track pad **21** will be destroyed and can cause damage to the crawler carrier **18**.

This could result in high property damage.

▶ Fix or replace the track pad **21** after reaching the wear limit.

NOTICE

Failure of track rollers!

If the track rollers **23** are not replaced after reaching the wear limit, then they can fail and cause damage to the crawler carrier **18** and track pad **21**.

This could result in high property damage.

▶ Replace track rollers **23** after reaching the wear limit.

NOTICE

Increased wear!

If the bulges on the track pads **21** and the track rollers **23** become too large, see illustration **3** and illustration **4**, then it results in increased wear on the crawler travel gear.

This could result in high property damage.

▶ Grind off / remove bulges in time.

If the wear limits are not adhered to, the minimum distances are fallen below:

- On point **P8** between the transport cams **21.1** and track roller body **24**
- On point **P9** between the track pad **21** and base belt **18.1**
- On point **P10** between the track rollers **23** and crawler carrier **18**

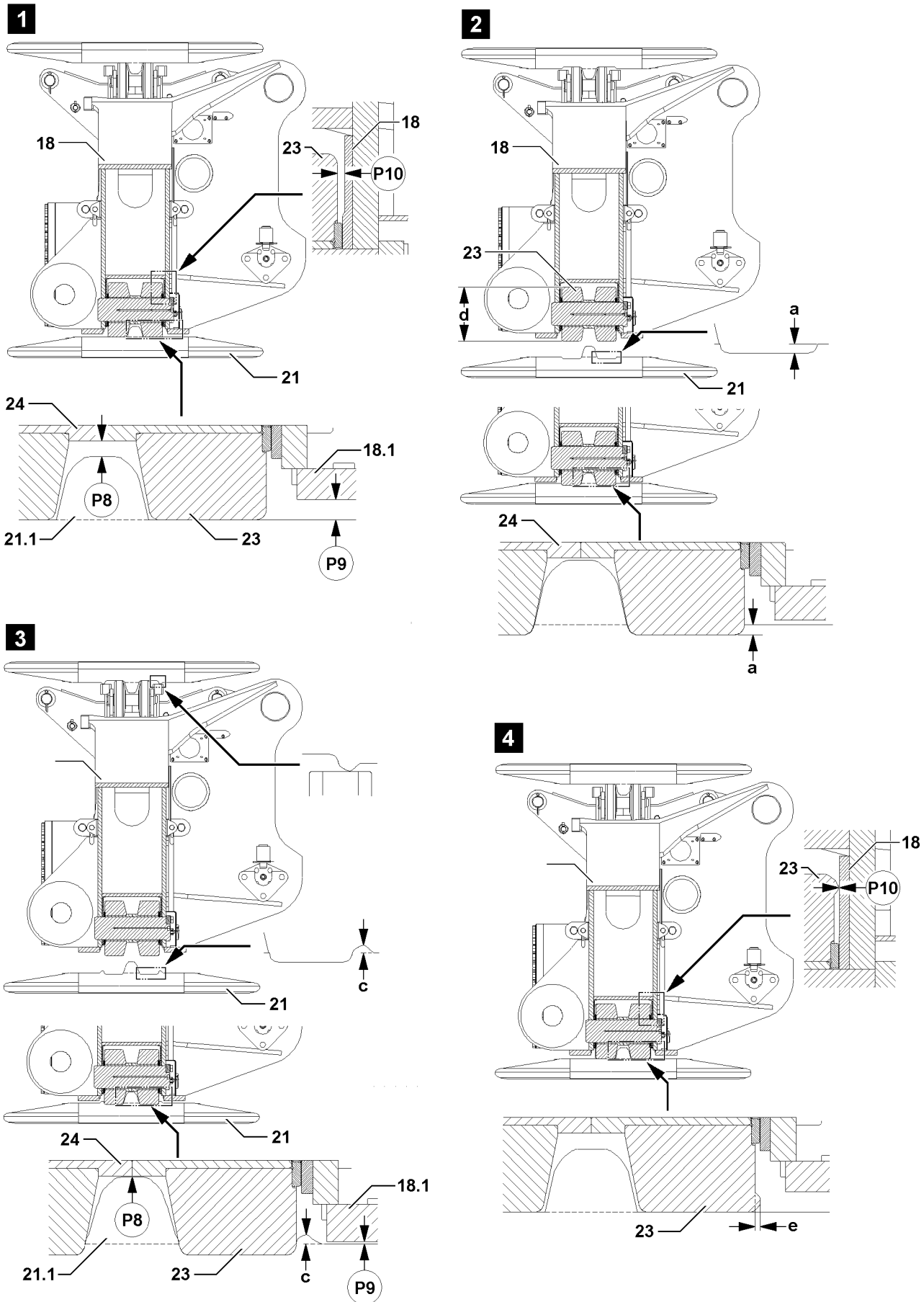


Fig.109882

LWE/LR 1750-000/12812-15-02/en

Wear limit track pad	
Maximum permissible run in depth a	4 mm
Maximum permissible bulge c	1)

Wear limit track roller	
Initial diameter	340 mm
Permissible minimum diameter d (measured in the center of the running surface)	338 mm
Maximum permissible bulge e	3 mm ²⁾

1) As soon as the bulge scrapes on the base belt of the crawler carrier, **grind bulge off**.

2) Valid for all track systems: If the bulge is larger than 3 mm , **grind the bulge off**.



WARNING

Danger of injury due to improper procedure!

- ▶ All work on the track chains must be carried out by trained expert personnel.



Note

- ▶ Track pads that have reached the maximum run in depth, or whose running surface is heavily worn, can be repaired by repair welds according to welding guideline or repair instructions of **LIEBHERR-Werk Ehingen GmbH**.
- ▶ Damage on sprocket and track pads - caused by operational wear - can be repaired by repair welds according to welding guidelines or repair instructions of **LIEBHERR-Werk Ehingen GmbH**.
- ▶ Please contact the Service Dept. at **LIEBHERR-Werk Ehingen GmbH**.
- ▶ Replace worn track rollers **23**.
- ▶ Grind off excessive bulges, see illustration **3** and illustration **4**.

4 Ladders



Note

- ▶ The following listed ladders are examples and may not match your crane exactly.



WARNING

Danger of falling!

If the following safety notes are **not** observed, personnel can fall down.

Death, severe bodily injuries, property damage.

- ▶ Observe and adhere to the installation and safety guidelines for ladders.
- ▶ Observe and adhere to the safety signs on the ladders.
- ▶ Install and secure the ladders properly.
- ▶ Do **not** use damaged ladders and replace them immediately.
- ▶ Repair the ladder exclusively through authorized service facilities.

4.1 Lubricating ladders

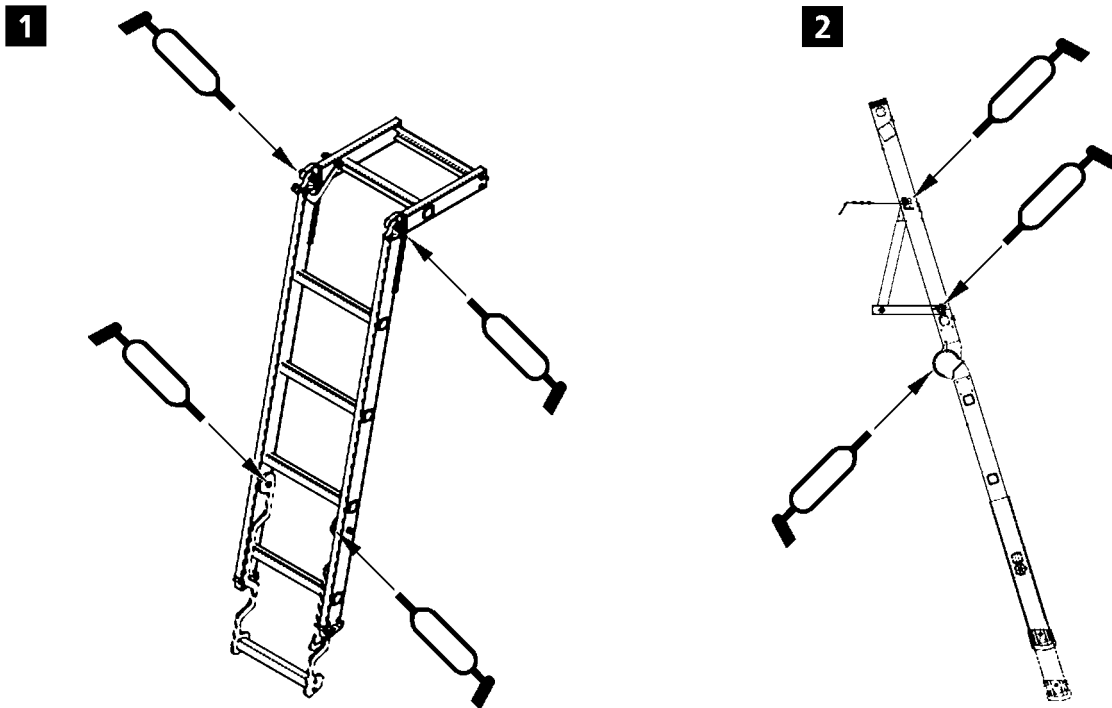


Fig.109766

- ▶ Grease joints and pivot points on the ladders regularly and check them for easy movement, see illustration 1 and illustration 2.
- ▶ Repairs and maintenance work on the ladder must be made by expert personnel.

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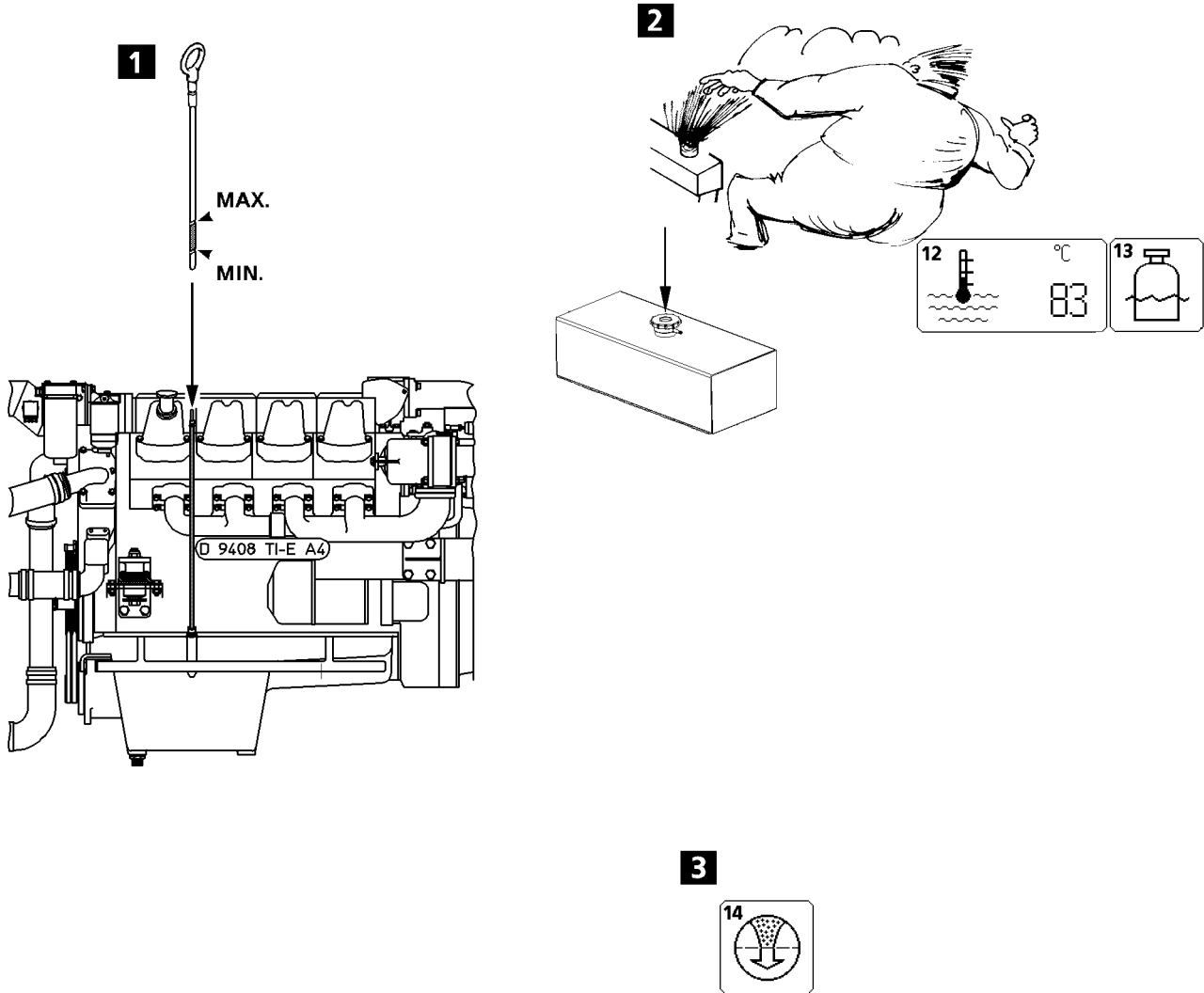


Fig.111596

LWE/LR 1750-000/12812-15-02/en

1 Crane engine

Never step on fuel lines during maintenance or repair work in the engine area!



DANGER

Danger of fire!

- ▶ Make sure that the engine area is kept free of diesel fuel!
 - ▶ Extreme cleanliness is vital, particularly during filter changes and bleeding. Wipe up any spilled fuel!
 - ▶ When replacing the filter, it is recommended to put down cleaning rags before removing the filter in order to absorb fuel!
-

1.1 Engine oil

1.1.1 Checking the oil level

Make sure that the following prerequisites are met:

- The crane is in horizontal position.
 - The engine is turned off and the oil has collected in the oil pan.
- ▶ Remove the dipstick **1** and wipe it off.
 - ▶ Reinsert the dipstick **1** and pull it out again.

The oil level must be between the min. and max. marks on the dipstick **1**.

- ▶ Check the oil level.
-

NOTICE

Risk of damaging the engine!

If the oil level has dropped below the minimum mark, add engine oil according to the lubrication chart until the oil level is between the minimum and maximum marks!

- ▶ Add engine oil and check again!
-

- ▶ Reinsert the dipstick **1**.

1.1.2 Changing the oil

Refer to the separate operating instructions for „LIEBHERR Diesel engines“.

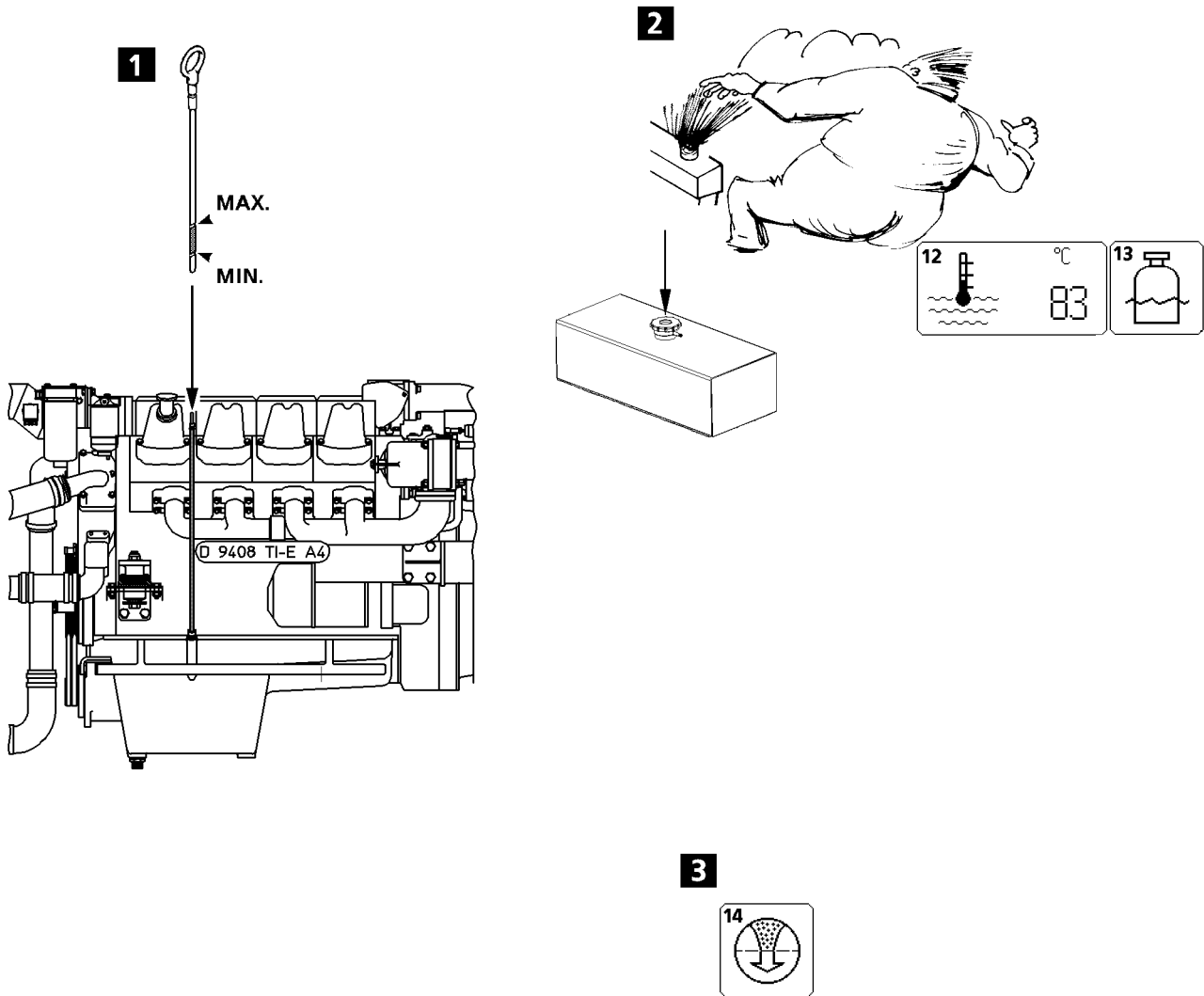


Fig.111596

LWE/LR 1750-000/12812-15-02/en

1.2 Engine coolant

The coolant level is monitored by the LICCON computer system. If the coolant level is too low the „Low coolant level“ **13** icon appears on the LICCON monitor.

The crane's engine coolant temperature can be read on the LICCON monitor in [°] on the „Engine coolant temperature“ icon.



WARNING

Danger of skin burns!

▶ Check the coolant only when the engine is cold!

- ▶ Turn the cap **2** on the filler neck of the water cooler expansion tank to the 1st notch.
- ▶ Release excess pressure.
- ▶ Remove the cap **2**.
- ▶ Check the coolant level.

Add coolant as specified in the lubrication chart only on the filler neck of the water cooler expansion tank.

▶ Add coolant to overflow level if necessary.

1.3 Air filter

The air filter **1** is monitored by the LICCON computer system. If the vacuum increases in the intake line due to dirty filter units, the „Air filter contaminated“ **14** icon is displayed on the LICCON monitor.

If the „Air filter contaminated“ **14** icon appears:

▶ Clean or replace the filter insert.

1.4 Diesel particle filter*



DANGER

Danger of igniting the diesel particle filter*!

▶ The diesel particle filter* may only be regenerated under the supervision of operating personnel!

Carry out the operation and maintenance of the diesel particle filter* according to the separate operating instructions of the diesel particle filter* manufacturer.

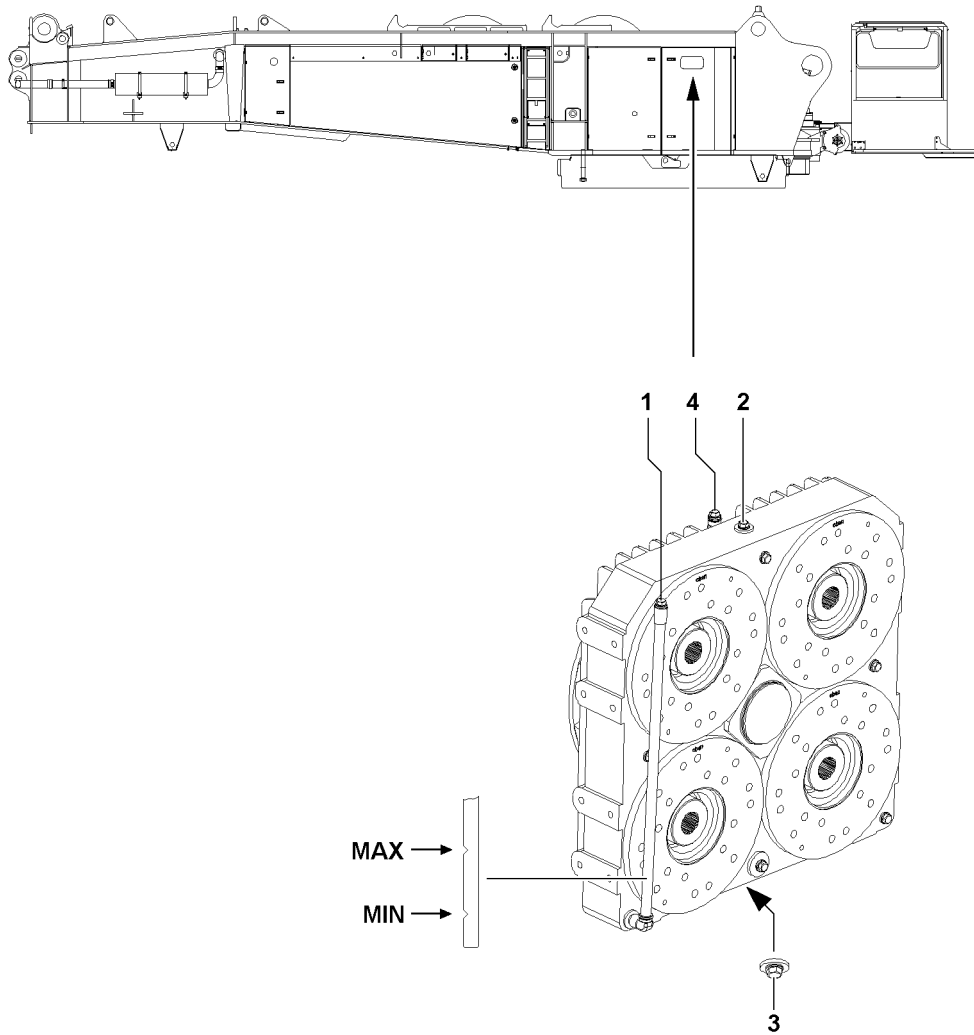


Fig.111597

2 Pump distributor gear

Maintain utmost cleanliness during all work to prevent any dirt from entering the inside of the gear.

2.1 Checking the oil level

**Note**

- ▶ Make sure that the crane is in horizontal position!

- ▶ Remove the dipstick **1** and wipe it off.
- ▶ Reinsert the dipstick **1** and pull it out again.

The oil level must be between the min. and max. marks on the dipstick **1**.

- ▶ Check the oil level.

NOTICE

Danger of gear damage!

If the oil level has dropped below the minimum mark, add engine oil as specified in the lubrication chart until the oil level is between the minimum and maximum marks!

- ▶ Add oil and check again!

- ▶ Reinsert the dipstick **1**.

2.2 Changing the oil

Make sure that the following prerequisites are met:

- The crane is in horizontal position.
- The gear is warm.

- ▶ Remove the oil filler plug **2** and the breather screw **4**.
- ▶ Remove the oil drain plug **3** and drain the oil.
- ▶ Install the oil drain plug **3** with new seal and tighten.
- ▶ Add oil as specified in the lubrication chart on the oil filler plug **2** until the oil level is between the min. and max. marks on the dipstick **1**.
- ▶ Install the oil filler plug **2** and the breather screw **4** with new seal.
- ▶ Check the oil level.

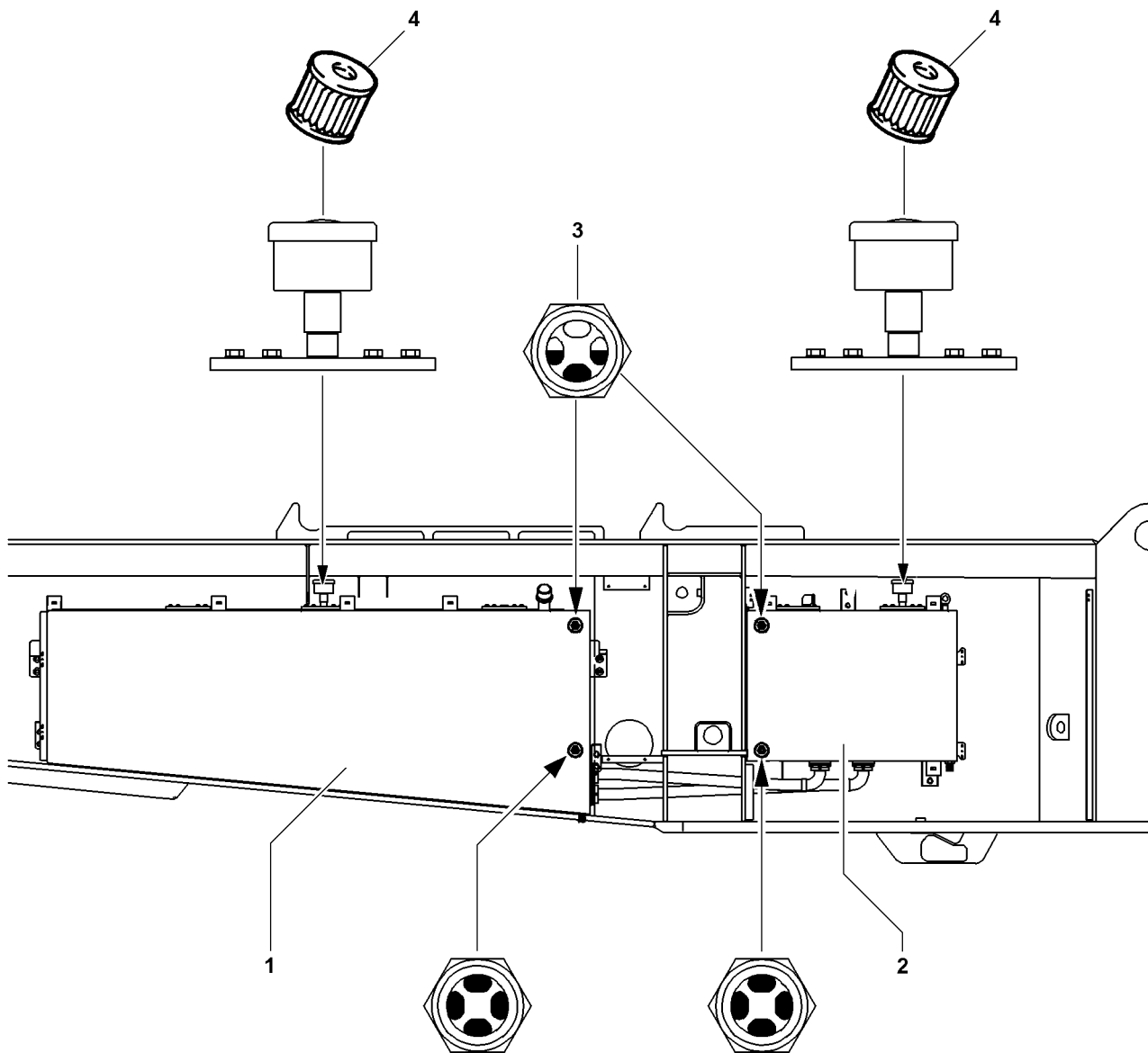


Fig.192306

3 Hydraulic system

When adding oil, observe utmost cleanliness.

3.1 Hydraulic oil tank / auxiliary oil tank*

3.1.1 Checking the oil level

NOTICE

Damage to the hydraulic oil tank!

If the hydraulic cylinders are not completely retracted when checking the oil level, there is a danger of overfilling!

When retracting the hydraulic cylinders, excess oil is discharged via the tank breather!

If the hydraulic cylinders are retracted too quickly, the hydraulic oil tank can be destroyed!

▶ Make sure that all hydraulic cylinders are completely retracted before checking the oil!

Make sure that the following prerequisites are met:

- The crane is in horizontal position.
- All hydraulic cylinders are fully retracted.

The oil level must be in the center of the oil level sight gauge **3**.

▶ Check the oil level on the oil level sight gauge **3** of hydraulic oil tanks.

Problem remedy

No oil is visible in the oil level sight gauge **3**?

▶ Add oil as specified in the lubrication chart with a fine mesh filter until the oil level on the hydraulic oil tank **1** is visible in the center of the oil level sight gauges **3**.



Note

▶ After adding oil, wait for approx. two minutes until the oil is distributed evenly in the hydraulic oil tank **1** and in the auxiliary oil tank **2**!

▶ If necessary, check oil level again!

3.1.2 Checking the vent / breather filter

▶ Open the cover on the hydraulic oil tank **1** and on the auxiliary oil tank **2** with the turn lock.

▶ Check the filter **4** for impurities (visual inspection).

In the event of heavy contamination:

▶ Replace the filter **4**.

▶ Close the cover with the turn lock again.

3.2 Diaphragm reservoirs

Various diaphragm reservoirs are installed in the hydraulic system. The pretension pressures are specified in the hydraulic circuit diagram as well as on the individual diaphragm reservoirs. The pretension pressure must be measured separately in each diaphragm reservoir.

NOTICE

Risk of damaging the hydraulic system!

If the ambient temperatures fluctuate considerably, for example after transfer to countries with extremely hot or cold temperatures or in countries with considerable differences between the summer and winter temperatures, the accumulator pressures may change!

▶ Check the accumulator pressures and correct if necessary!

Make sure that the following prerequisite is met:

- The crane engine is turned off.
This relieves the diaphragm reservoir at the fluid side.



DANGER

Risk of explosion!

The pressure in the nitrogen cylinder must be less than the maximum permissible operating pressure of the accumulator or the pressure gauge. Otherwise install a pressure reducer between the cylinder and the filling device!

- ▶ Do not use air or oxygen to fill the diaphragm reservoir!

The pretension pressure in the hydraulic reservoirs may only be checked by an expert with appropriate training and equipment. In addition, the national regulations for pressurized container inspections must also be observed.

- ▶ Check the pretension pressure with a testing and filling device and correct, if necessary.

3.3 Hydraulic hose lines

The hydraulic hose lines must be checked according to ISO 9927-1 by an **experienced technician** or **expert mechanic**, as required, depending on the duration of use and the operating conditions, but at least once a year.

Experienced technicians are persons who:

- possess sufficient knowledge about cranes due to their professional background and experience.
- are familiar with the relevant settings to detect any abnormal deviations from the nominal condition.
- have undergone special training.

Expert mechanics are mechanics, who:

- are experienced in the design, construction or maintenance of cranes.
- possess sufficient knowledge about the relevant settings and standards.
- are fully equipped to perform inspections.
- are able to assess the safety status of the crane.
- can decide which action needs to be taken to ensure the crane can continue to be operated safely.



Note

- ▶ The applicable national regulations must also be complied with!

3.3.1 Checking the hydraulic hoses within area of responsibility of the German employer's liability insurance associations

At least once a year, an **expert** must inspect the hydraulic hoses to ensure they are in operationally safe condition. The crane must be inspected by an **authorized inspector** every four years from the day it was first licensed. After the 12th year of operation, the crane must be inspected by the authorized inspector annually.

The **expert** or **authorized inspector** must document the fact that the hydraulic hoses can continue to be used in the crane!

An expert is someone:

- whose technical training and experience means that he has adequate knowledge in the field of hydraulic hoses and hose systems.
- who is familiar with the relevant occupational health and safety regulations.
- who is familiar with the relevant accident prevention guidelines.
- who is familiar with the directives and generally accepted technical regulations (e.g. DIN standards, VDE regulations, technical regulations of other EU member states or other countries that have signed the European Economic Community agreement).
- who can properly assess whether hydraulic hoses and hose systems are deemed safe in accordance with the guidelines and regulations stated above.

Authorized inspector(s) is / are:

- an authorized expert employed by the technical supervisory authorities.

- in Hamburg this is the Amt für Arbeitsschutz (office for occupational health and safety).
- in Hessen these are the technical supervisory offices.
- an authorized expert appointed by the professional associations.

3.3.2 Examples of possible defects in hose lines



DANGER

Risk of fire or accident!

If problems are discovered during inspections, then they must be remedied immediately or suitable measures are to be taken. Failure to do this can result in serious injury to persons, death or damage to property!

► Remedy problems or take suitable measures!

- Damage to the outer layer as far as the intermediate later (e.g. chafing, cuts and cracks).
- Outer layer brittleness (crack formation of the hose material).
- Deformation that differs from the natural shape of the hose or hose line, in depressurized as well as in pressurized condition or in bends, for example layer separation, bubbling, crushing or kinking.
- Leaks.
- Failure to follow installation instructions.
- Damage or deformation of hose fittings that inhibit the function and strength of the fitting or the hose / fitting connection.
- Hose slipping out of fitting.
- Fitting corrosion that inhibits function and strength.
- Storage time or usage period exceeded.

3.3.3 Maintenance of hose lines

- We recommend to check all hoses, hose lines and screw fittings daily, but at least every two weeks for leaks and externally recognizable signs of damage.
- Damaged parts must be replaced immediately! Oil spray can lead to injuries and fires!
- Hydraulic lines and hoses may not be repaired!
- Hoses that have already been used as a part of a hose line may not be reinstalled in hose lines.
- Always use Original Liebherr spare parts when replacing hoses and hose lines.
- Always ensure that the hoses are routed free of torsion. If high pressure hoses are being used, attach the screws of half clamps or full flange at both ends of the hose and then tighten.
- When using high pressure hoses with a bent fitting, tighten the end with the bent fitting first when tightening the flanges, then the end with the straight fitting.
- Any mounting clamps in the hose center may be attached and tightened only thereafter.
- Route the hoses in such a way that chafing with other hoses or other structures is prevented. Maintain a minimum clearance of approximately $\frac{1}{2}$ the outer diameter of the hose to other parts. The clearance should never be less than 10 mm to 15 mm.

3.3.4 Replacing the hose lines



DANGER

Risk of fire or accident!

Failure to replace hose lines at appropriate intervals can cause serious injury to persons, death or damage to property!

► Replace hose lines according to appropriate intervals!

This must be documented in the crane's log book by the **expert** or the **authorized inspector**.

The service life of a hose line may not exceed six years, including a storage period of a maximum of two years (pay attention to the manufacturing date on the hoses). The duration of use can also be defined by the **expert** or **authorized inspector** in accordance with existing test and empirical data in the individual application areas, taking the usage conditions into consideration.

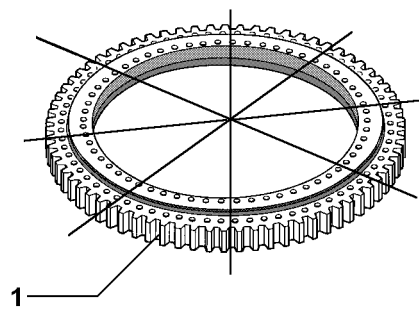
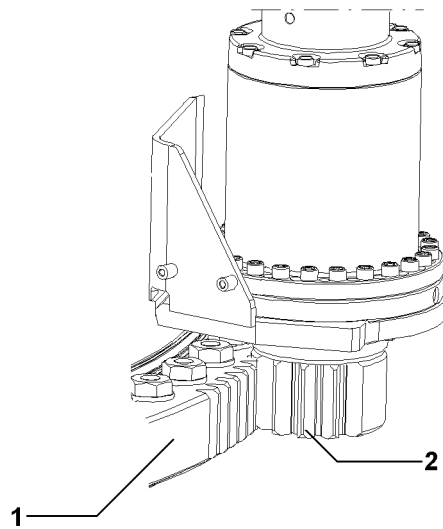


Fig.108069

4 Slewing ring connection

4.1 Lubricate the slewing ring connection

Perform lubrication with extreme care before and after long operating intervals, particularly before and after any winter break, in order to provide the best possible corrosion protection.

If the crane has not been moved for more than 3 months, then it must be lubricated every 3 months with an external grease pump until grease emerges from all grease points, see also section of „Central lubrication system“. Then the relevant crane movement must be repeated several times and the lubrication procedure must be carried out again.

- ▶ Lubricate the slewing ring connection.

4.2 Lubricating the gear ring and the slewing gear pinion

Before and after extended breaks in service, grease the gear ring **1** and the slewing gear pinion **2** to ensure the best possible protection from corrosion.

- ▶ Grease the gear ring **1** and the slewing gear pinion **2** externally.

4.3 Tilt play of roller ring connection

The wear of the roller ring connection is determined by measuring the „tilt play“ with the ring installed.



Note

- ▶ The determination of the „Tilt play“ must be carried out according to the **test instructions of Liebherr-Werk Ehingen GmbH!**
 - ▶ Contact the Service Dept. at **Liebherr-Werk Ehingen GmbH** for **test instructions!**
-

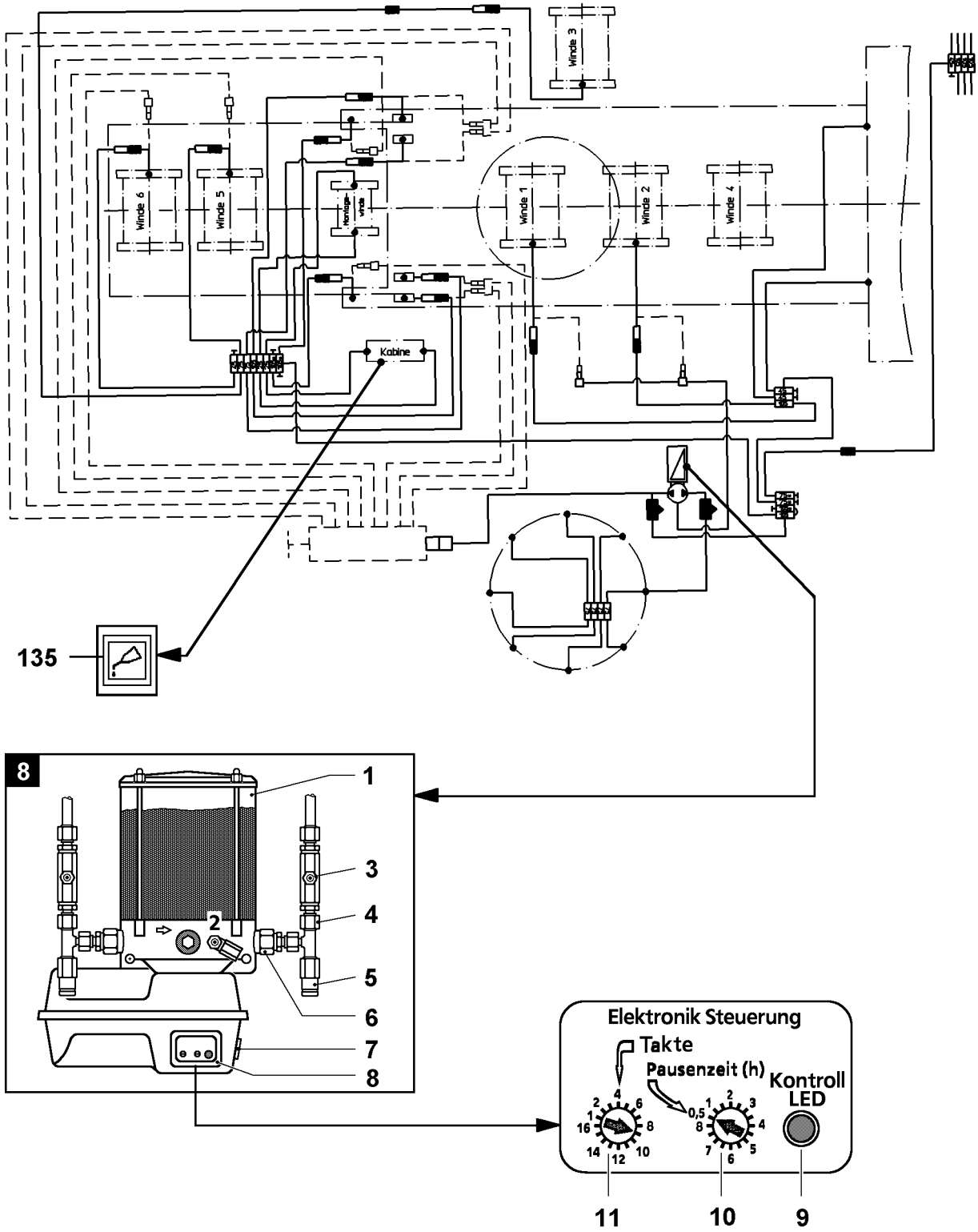


DANGER

Danger of accident if tilt play of roller ring connection is too large!

If the permissible tilt play of 2.0 mm is exceeded, then safe crane operation is no longer possible.

- ▶ Replace the roller ring connection if the tilt play is larger than 2.0 mm !
-



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Fig.192309

5 Central lubrication system

The crane superstructure is equipped with a central lubrication system. All grease points (refer to the guide on the left), the roller slewing ring, the bearing of the pivot section, the bearings of the luffing cylinder and the hoist winches are automatically supplied with the correct grease quantity.

If the crane has not been moved for more than 3 months, then it must be lubricated every 3 months with an external grease pump until grease emerges from all grease points. Then the relevant crane movement must be repeated several times and the lubrication procedure must be carried out again.

- Pump operation period: 9 cycles.
- Break period: 0.5 hours.



Note

- ▶ Cleaning is permitted in washing bays or with steam cleaners!

5.1 Components of the system

- **1** Grease container
- Grease fitting **2**: Filling the central lubrication pump.
- Grease fitting **3**: Filling the lube lines.
- **4** Pump outlet
- **5** Pressure relief valve
- **6** Pump element
- **7** Push button
- **8** Control
- LED **9** (yellow)
- Latched switch **10**: Pause time (h).
- Latched switch **11**: Cycles.

5.2 Setting the lubrication and break periods.

The LED **9** on the engine protection housing blinks in a 0.5 second cycle during the lubrication process. The lubrication and pause time is set at the factory. The times can possibly be changed by using the latched switch **10** and latched switch **11**.

- ▶ Turn on the engine ignition.

Result:

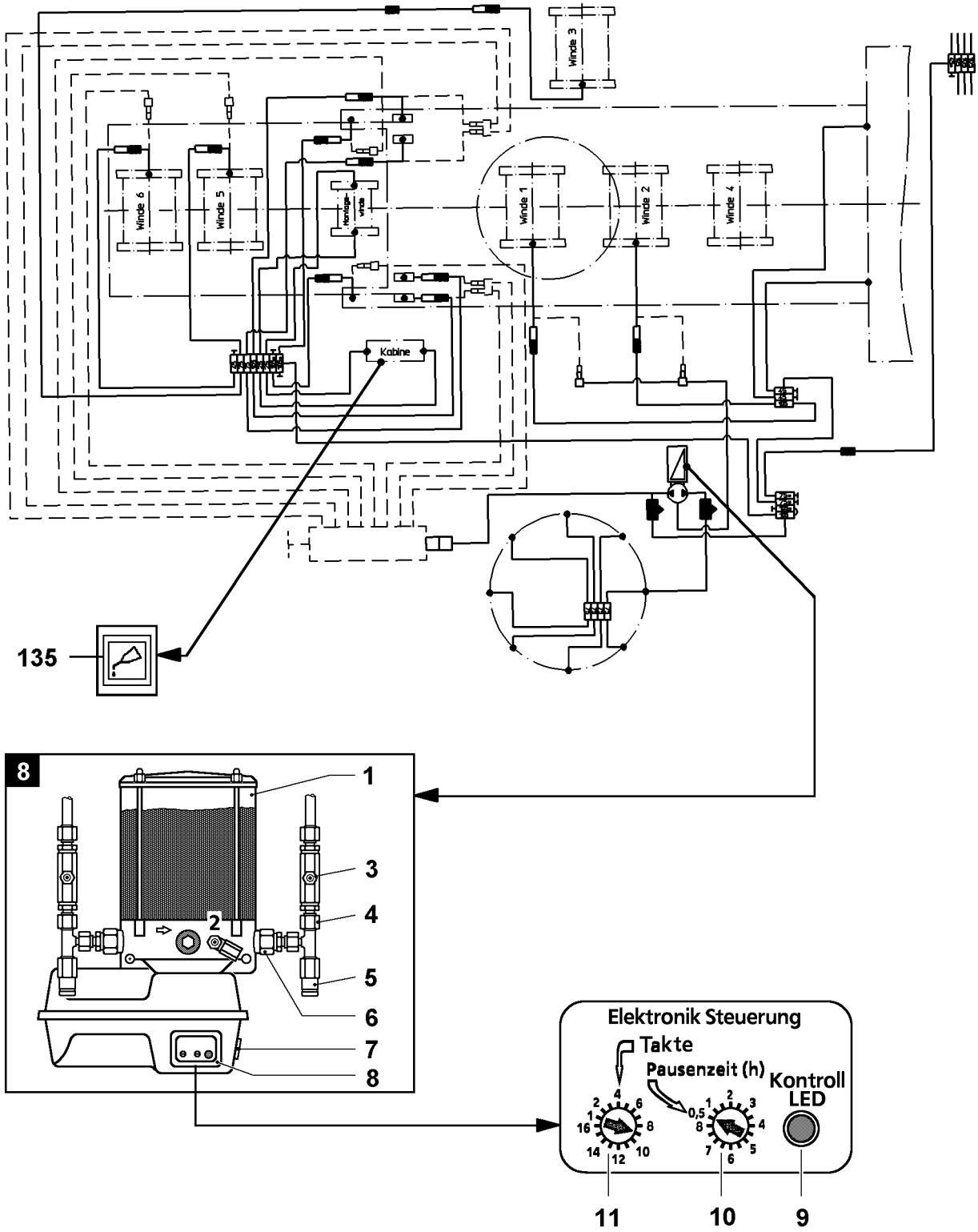
- When turning the ignition on, the LED **9** lights up for approximately 2 seconds and displays the operational readiness of the control **8**.

5.3 Function check

- ▶ Start the engine.
- ▶ Trigger 2 or 3 grease pulses using the push button **7**.

Result:

- Grease emerges on the grease points.
- If the system is blocked but the electric pump is properly functioning, the grease emerges through the pressure relief valve **5**.



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Fig.192309

5.4 Cycle control

The central lubrication system is progressively monitored. This means that a proximity switch converts the piston strokes of the central lubrication system distributor into electric control signals and relays them to the control unit. If the control signals are not present or incomplete, the indicator light **135** displays a malfunction or a problem by blinking.

5.4.1 Blinker code - cycle control

The LED **9** performs the equivalent function of the control light **135**.

During operation

- Ignition on, ready for operation:
The indicator light **135** lights up for 1.5 s and turns off.
- Lubrication active:
The indicator light **135** lights up for 0.5 s and is off for 0.5 s etc.

In case of a problem

- Excess pressure error:
The indicator light **135** lights up for 2 s and is off for 4 s etc.
- Engine defect:
The control light **135** lights up continuously.
- Error in monitoring time cycle input:
The indicator light **135** lights up for 1 s and is off for 1 s etc.

5.5 Access into the automatic lubrication (intermediate lubrication)

This allows intermediate lubrication processes to be carried out after crane washing, or the grease lines are re-filled with grease after a repair.

- ▶ With the ignition turned on, press the red button **7** on the engine protection housing of the pump.

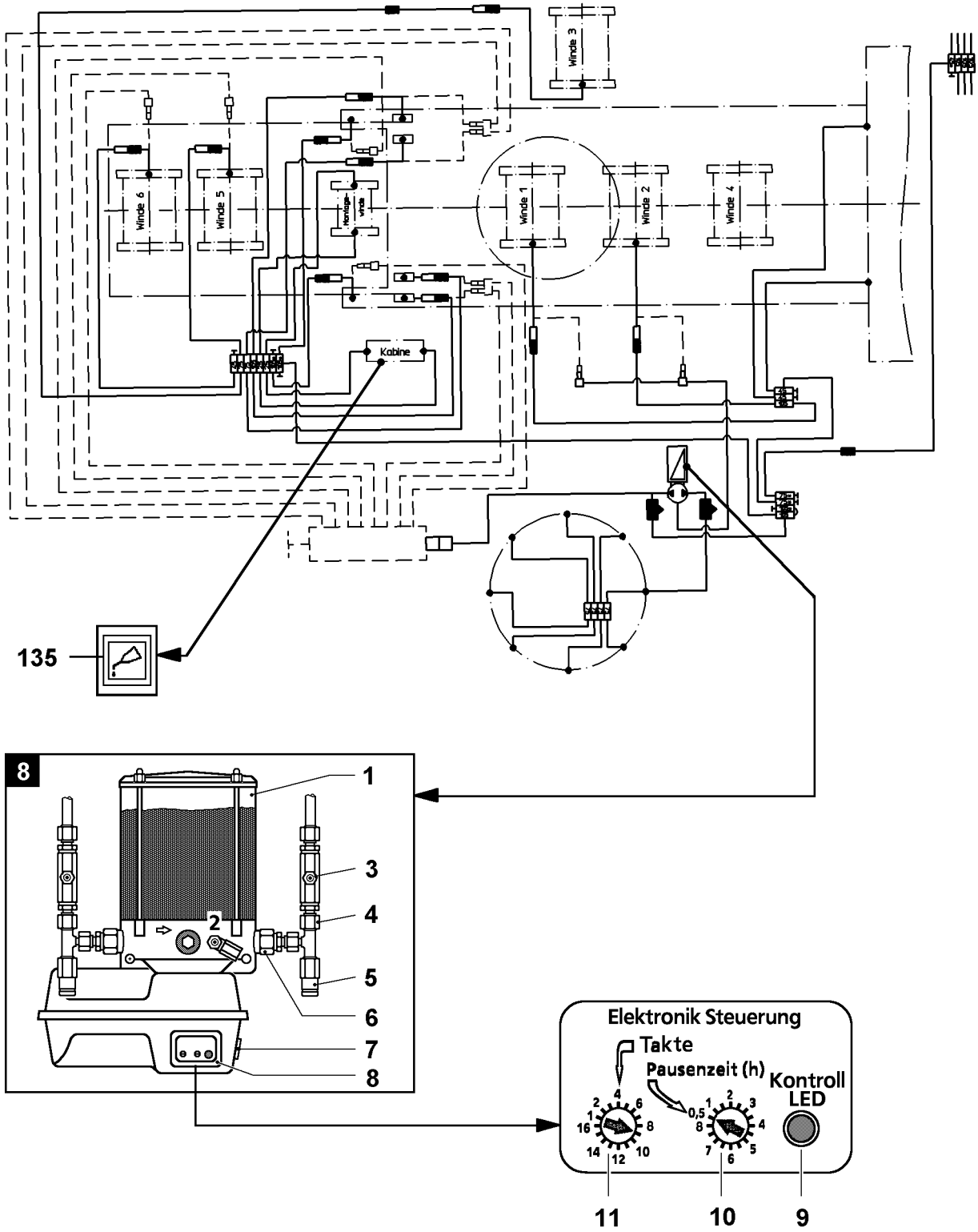
5.6 Filling the grease container



CAUTION

Risk of damage due to insufficient lubrication!

- ▶ There must be sufficient grease in the grease container **1** at all times.
 - ▶ Observe utmost cleanliness when filling the grease container **1**!
-
- ▶ Fill the grease container **1** with a grease pump via the grease fitting **2** on the central lubrication pump.



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Fig.192309

5.7 Bleeding the central lubrication system

If the grease container **1** has been emptied, then it may be necessary to bleed the central lubrication system.

- ▶ Fill the grease container **1**.
- ▶ Unscrew the main line from the pump outlet **4**.
- ▶ Trigger additional lubricating pulses until there are no more air bubbles in the emerging grease at the pump outlet **4**.
- ▶ Reconnect the main line.
- ▶ Trigger an additional lubricating process.

5.8 Filling the lubrication lines



CAUTION

Risk of damage due to insufficient lubrication!

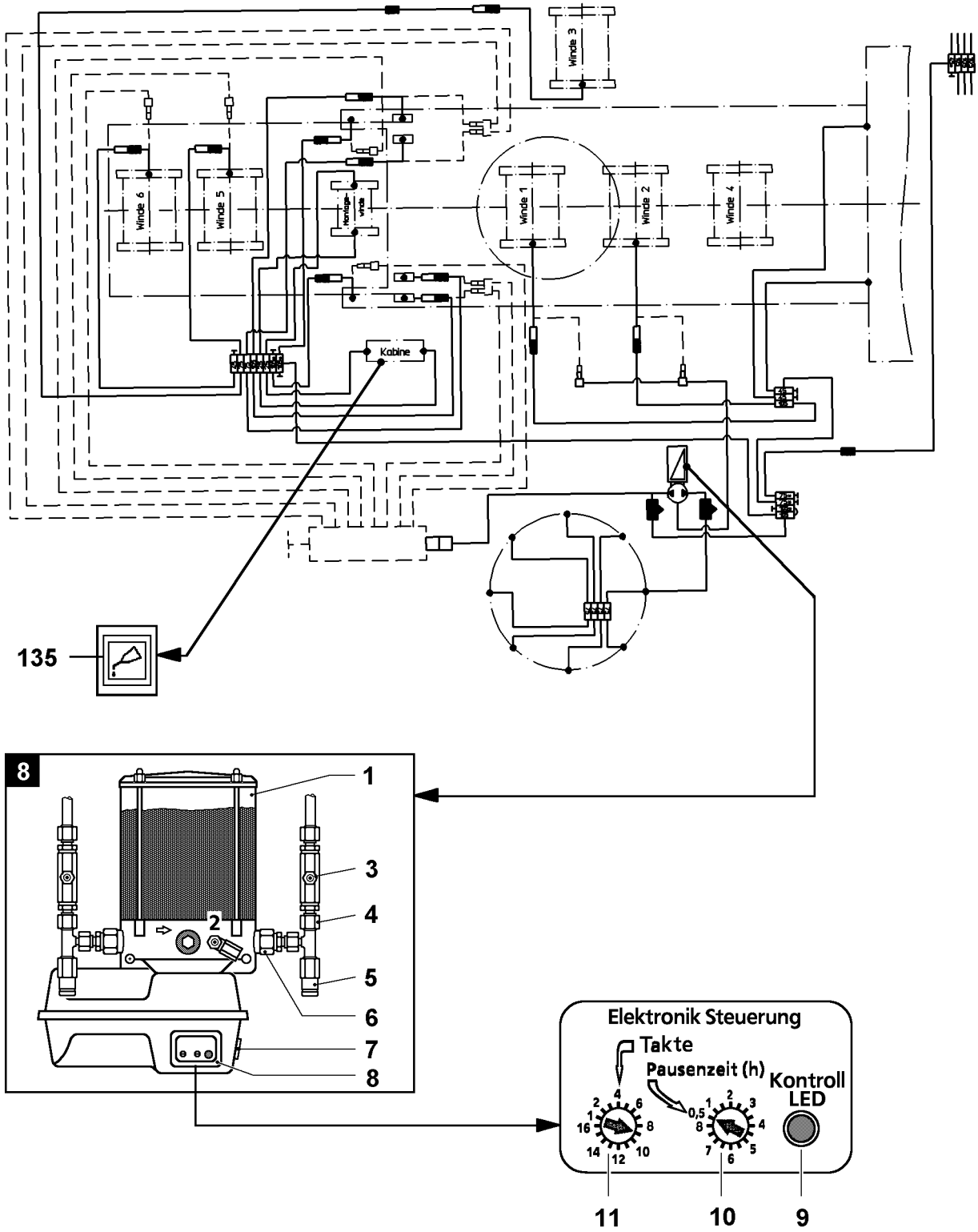
The lubrication lines must be refilled after any repair on components, which are lubricated with grease. If this is not observed, the component may run dry.

- ▶ Sufficient grease must be available in the grease lines after every repair on greased components.
- ▶ Observe utmost cleanliness when filling the grease lines!

- ▶ Add grease with an external grease pump via the grease fitting **3**.

or

With the ignition turned on, press the red button **7** on the engine protection housing of the pump.



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Fig.192309

5.9 Troubleshooting on the central lubrication system

Problem	Cause	Remedy
Pump is not working.	Integrated electronic control defective, electrical line interrupted, pump defective.	Replace lower part of motor protection housing, replace electrical line, replace pump.
Pump operates, but does not deliver.	Air cushion in delivery piston has dropped below minimum fill level, pump element defective.	Bleed pump, fill reservoir, replace pump element.
No grease collar on all lube points.	Pump not operating, interval time too high or cycle time too short, system blocked.	See „Pump not operating“, reduce interval time or increase number of cycles, refer to „Grease emerges on pressure relief valve“.
No grease collar on several lube points.	Supply lines to secondary distributors broken or leaking, screw connections leaking.	Replace lines, tighten or replace screw connections.
No grease collar on one lube point.	Associated lube line broken or leaking, screw connection leaking.	Replace line, tighten or replace screw fitting.
Pump speed reduced.	Higher system pressure, lower ambient temperature.	Check system / bearing points, no damage: Try 1 or 2 intermediate lubrication operations.
Grease escapes at the pressure relief valve.	System pressure too high, progressive distributor blocked, system blocked, defective valve spring.	Check system, replace distributor, repair blocked / seized bearing point, replace pressure relief valve.
Indicator light lights up constantly.	Engine is overloaded.	Consult Liebherr or BekaMax customer service.
Indicator light blinks in 0.5 second cycle.	Error in the monitoring period from cycle start.	Proximity switch is defective, possibly consult Liebherr or BekaMax customer service.

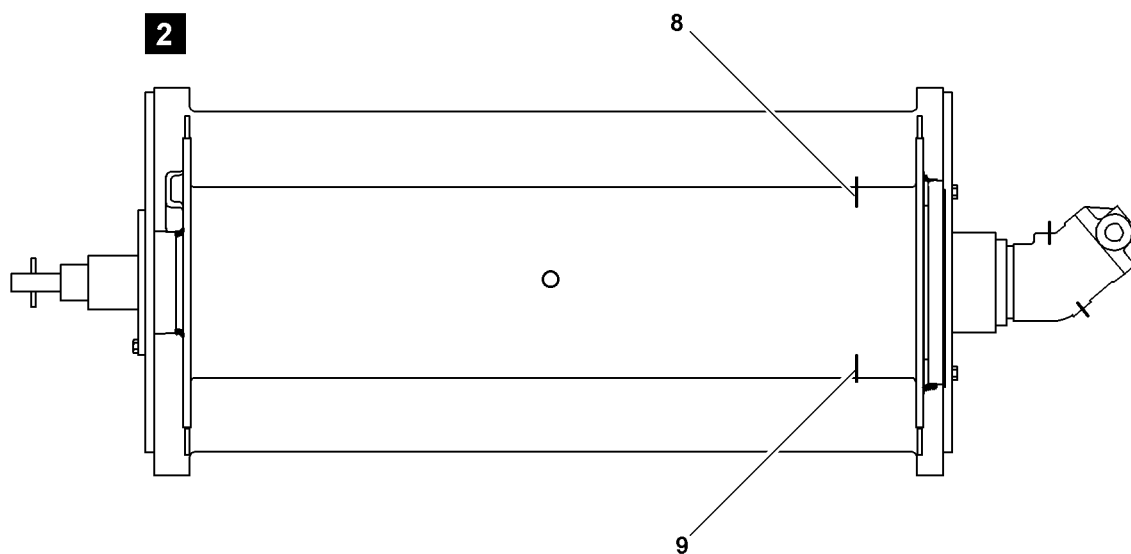
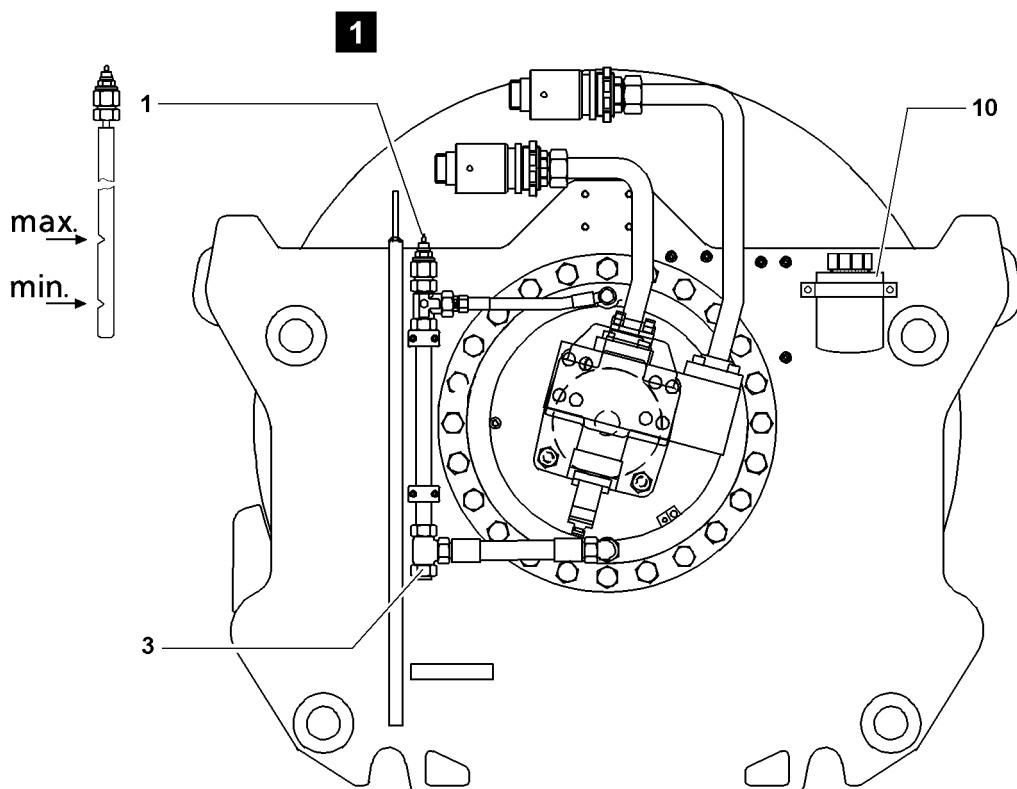


Fig.108071

LWE/LR 1750-000/12812-15-02/en

6 Hoist gear 1 to 6, illustration 1

Maintain utmost cleanliness during all work to prevent any dirt from entering the inside of the gear.

6.1 Overflow container

When the oil heats up in the hydraulic motor for the winches, the oil can enter the overflow container 4 via a check valve, but cannot flow back into the hydraulic system after cooling off. For this reason the oil that has collected in the overflow container 4 must be disposed of at regular intervals.

6.2 Winch

Make sure that the following prerequisites are met:

- The winch is inactive.
- The crane is in horizontal position.

6.2.1 Checking the oil level

- ▶ Unscrew, remove and wipe off the dipstick 1.



Note

- ▶ Do not insert the dipstick 1 to measure!

- ▶ Reinsert the dipstick 1 and pull it out again.

The oil level must be between the min. and max. mark on the dipstick 1.

- ▶ Check the oil level.

NOTICE

Danger of gear damage!

If the oil level has dropped below the minimum mark, add engine oil as specified in the lubrication chart until the oil level is between the minimum and maximum marks!

- ▶ Add oil and check again!

- ▶ Reinsert the oil dipstick 1.

6.2.2 Oil change

- ▶ Turn the dipstick 1 and pull it out.
- ▶ Remove the oil drain plug 3 and drain the oil into a suitable container.
- ▶ Install the oil drain plug 3 with new seal and tighten.
- ▶ Add oil as specified in the lubrication chart at the oil filler port until the oil level is between the minimum and maximum mark on the dipstick 1.
- ▶ Install the dipstick 1 and tighten.
- ▶ Check the oil level as described above.

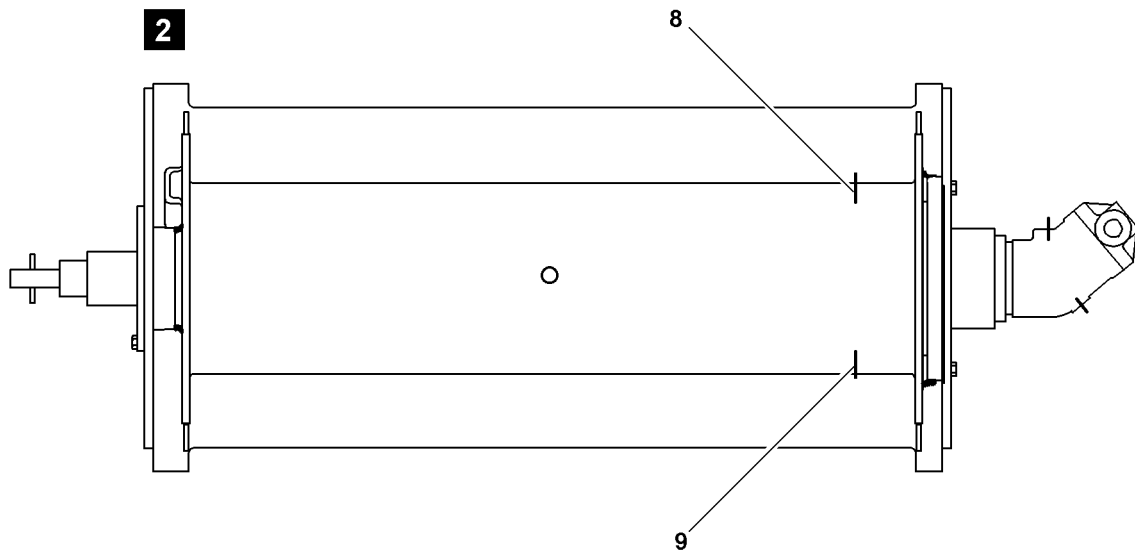
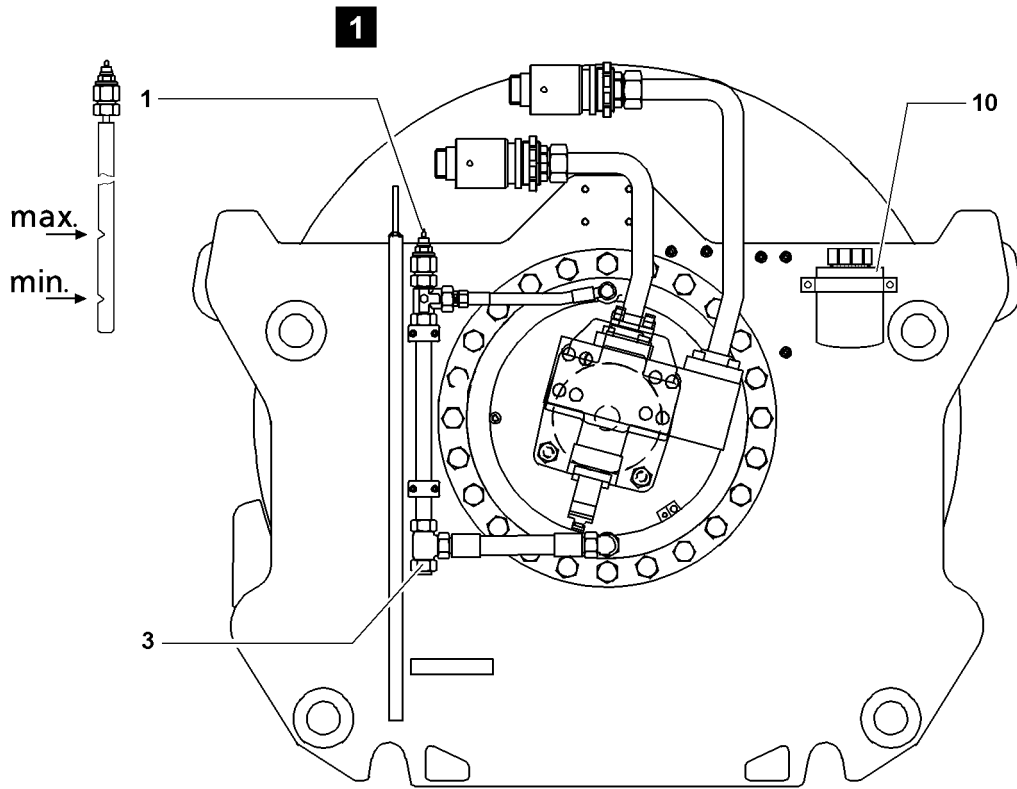


Fig.108071

LWE/LR 1750-000/12812-15-02/en

7 Assembly winch, illustration 2

7.1 Oil change



Note

▶ Make sure that the assembly winch has been spooled out!

- ▶ Remove the oil filler plug **8**.
- ▶ Remove the oil drain plug **9** and drain the oil into a suitable container.
- ▶ Install the oil drain plug **9** with new seal and tighten.
- ▶ Add oil as specified on the lubrication chart on the oil filler plug **8**.
- ▶ Install the oil filler plug **8** with new seal and tighten.

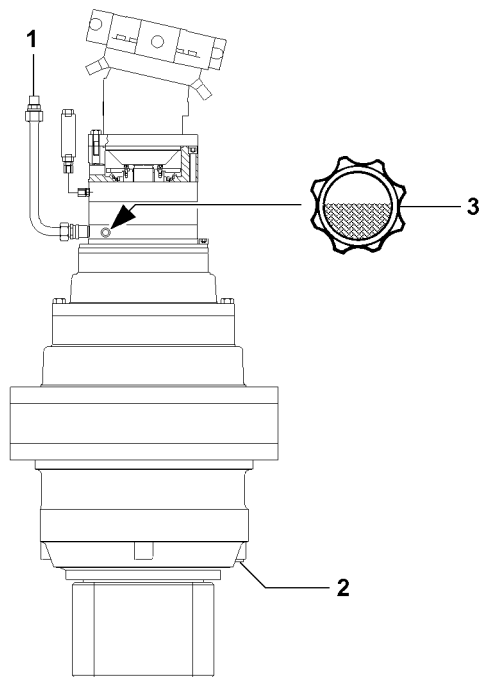


Fig.108072

8 Slewing gear

Maintain utmost cleanliness during all work to prevent any dirt from entering the inside of the gear.

8.1 Checking the oil level

Make sure that the following prerequisites are met:

- The crane is in horizontal position.
- The slewing gear is inactive.



Note

- ▶ The oil level must be in the center of the oil level sight gauge **3**!

- ▶ Check the oil level on the oil level sight gauge **3**.

NOTICE

Danger of gear damage!

If the oil level on the oil level sight has dropped to the point that it is no longer recognizable, then oil as specified on the lubrication chart must be added until the oil level is again in the center of the oil level sight gauge!

- ▶ Add oil and check again!

- ▶ Check the oil level on the oil level sight gauge **3**.

8.2 Changing the oil

Make sure that the following prerequisites are met:

- The crane is in horizontal position.
- The gear is warm.

- ▶ Remove the oil filler plug / breather screw **1**.
- ▶ Remove the oil drain plug **2** with the seal ring and drain the oil.
- ▶ Clean the oil drain plug **2** and sealing surface on the housing.
- ▶ Install the oil drain plug **2** with new seal ring and tighten.
- ▶ Add oil as specified on the lubrication chart on the oil filler port **1** until the oil is in the center of the oil level sight gauge **3**.
- ▶ Install the oil filler plug / breather screw **1**.
- ▶ Check the oil level as described above.

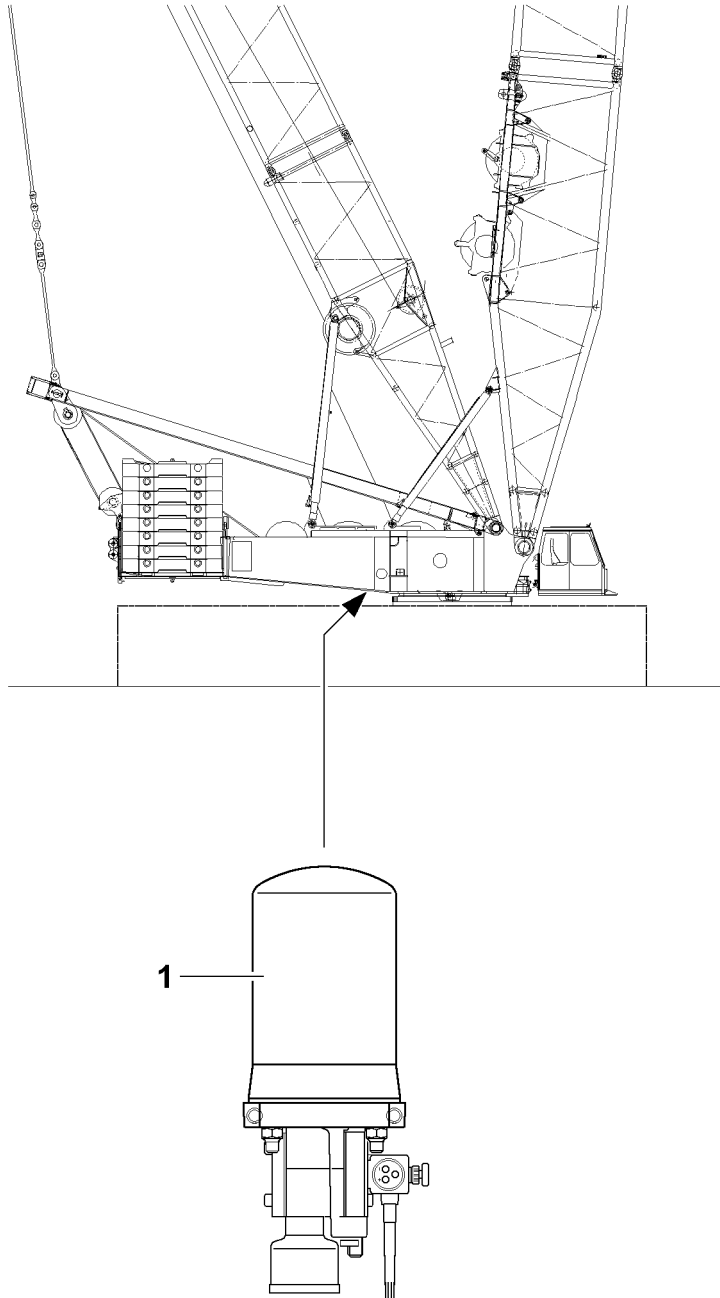


Fig.108073

9 Air dryer of the compressed air system of the crane superstructure

9.1 Replacing the granular cartridge



CAUTION

Risk of accident due to pretensioned granular cartridge!

The granular cartridge 1 is under spring tension!

▶ Caution when replacing the granular cartridge!

▶ Replace the granular cartridge 1 once per year.

10 Electrical system - Lighting

The maintenance of the electrical system is essentially limited to replacing defective fuses and bulbs and maintaining the batteries.

NOTICE

Damage to electrical system!

Never short circuit defective fuses with wire or similar items!

▶ Always replace defective fuses with fuses of the same amperage!

▶ If there is a repeat problem with the same fuse, check the electrical system!

10.1 Battery maintenance



DANGER

Risk of fatal injury!

▶ Always disconnect the batteries from the power circuits when working on the electrical system of the crane and during all welding work!

▶ Keep batteries dry and clean.

▶ Do not bring oil, grease, fuel or solvents into contact with the battery casting compound.

▶ Release dirty terminals, clean and grease them with an acid-free and acid-resistant grease.

▶ Check the acid levels in batteries at least once a year. In summer and in hot climate zones, check it at least twice a year.

▶ On conventional batteries, check electrolyte level at regular intervals and add distilled water to the specified „max mark“, if necessary.

When adding distilled water:

▶ Measure the acid concentration only after 30 minutes. The acid temperature for measuring should be + 20 °C if possible.

Proceed as follows when checking the battery charge:

Specific weight	Charge condition
1.28/1.23*	Well charged
1.20/1.16*	Semi-charged, recharge
1.12/1.08*	Discharged, recharge immediately

* in tropical countries

Reduced battery performance requires greater power requirements.

- ▶ Ensure that batteries are well charged, particularly during the colder months.

10.2 Mixing battery acid

- ▶ Ensure that work area is well ventilated.



DANGER

Risk of explosion!

- ▶ When mixing battery acid, always pour distilled water into the container first, then the concentrated sulphuric acid!
- ▶ Observe this order, otherwise explosions and spattering can occur!

- ▶ Stir the mixture with an acid-proof stick (glass or plastic).

Desired acid concentration kg/l	1.23	1.24	1.25	1.26	1.27	1.28
Volume ratio of concentrated sulphuric acid (96 %) to distilled water	1:3.8	1:3.6	1:3.4	1:3.2	1:3.0	1:2.8

When adding the battery acid, the acid level should be 15 mm above the top edge of the battery plates and the temperature of the acid should be approximately 15 °C.

- ▶ Add battery acid to battery.

Wait approximately 20 minutes before connecting the battery. By that time, it will be balanced out.

- ▶ Connect the battery after approximately 20 minutes.

10.3 Removing and recharging the battery



WARNING

Danger of injuries!

- ▶ Do not place tools on batteries and keep open flames away!

10.3.1 Removing the battery

Make sure that the following prerequisites are met:

- The engine is turned off.
- All electrical users are turned off.

NOTICE

Damage to alternator!

- ▶ Do not disconnect batteries unless the engine has been turned off!
- ▶ Carry out work in well ventilated rooms and avoid sparks.
- ▶ Disconnect the negative terminal first (ground cable), then the positive terminal.
- ▶ Remove the battery.
- ▶ Avoid spark formation caused by electrostatic charge. To avoid this, touch the ground support point in the driver's cab.
- ▶ Do not tilt or shake the battery.

10.3.2 Recharging the battery

NOTICE

Damage to battery!

- ▶ Recharge only with direct current, the strength of which does not exceed 1/10 of the battery capacity!

Recharging example: A battery with 170 Ah should be charged with a maximum charging current of 17.0 A.

- ▶ Frozen batteries must be thawed out before charging.
- ▶ Remove all plugs before charging.
- ▶ Provide ventilation during charging (risk of oxyhydrogen gas explosion!).
- ▶ Connect the battery to a battery charger (positive to positive and negative to negative).
- ▶ Turn on the battery charger after connecting the battery.

Stop charging immediately if:

- The acid temperature exceeds 55 °C (casing more than warm to the touch).
 - The battery starts to give off gas.
 - The acid concentration or the charging voltage has not changed for 2 hours.
- ▶ Turn the battery charger off after charging, then remove the connector cables individually from battery and battery charger.

10.3.3 Installing the battery

- ▶ Reinstall the battery tightly in the vehicle.
- ▶ Avoid spark formation caused by electrostatic charge. To avoid this, touch the ground support point in the driver's cab.
- ▶ Connect the positive terminal to the battery first, then the negative terminal (ground cable).
- ▶ Check that the terminals are tightly seated (low transfer resistance).
- ▶ Grease the terminals and terminal posts with acid-free and acid-resistant grease (use corrosion protection even for modern maintenance-free batteries).

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Lattice mast boom



WARNING

Danger of falling!
Death, severe injuries.

- ▶ For all work on the crane where there is a danger of falling, suitable safety measures must be taken, see Crane operating instructions, chapter 2.06.



Note

- ▶ The following illustration is an example and may not exactly match to your crane.

1.1 Lubricating the pin bores on the lattice sections and guy rods

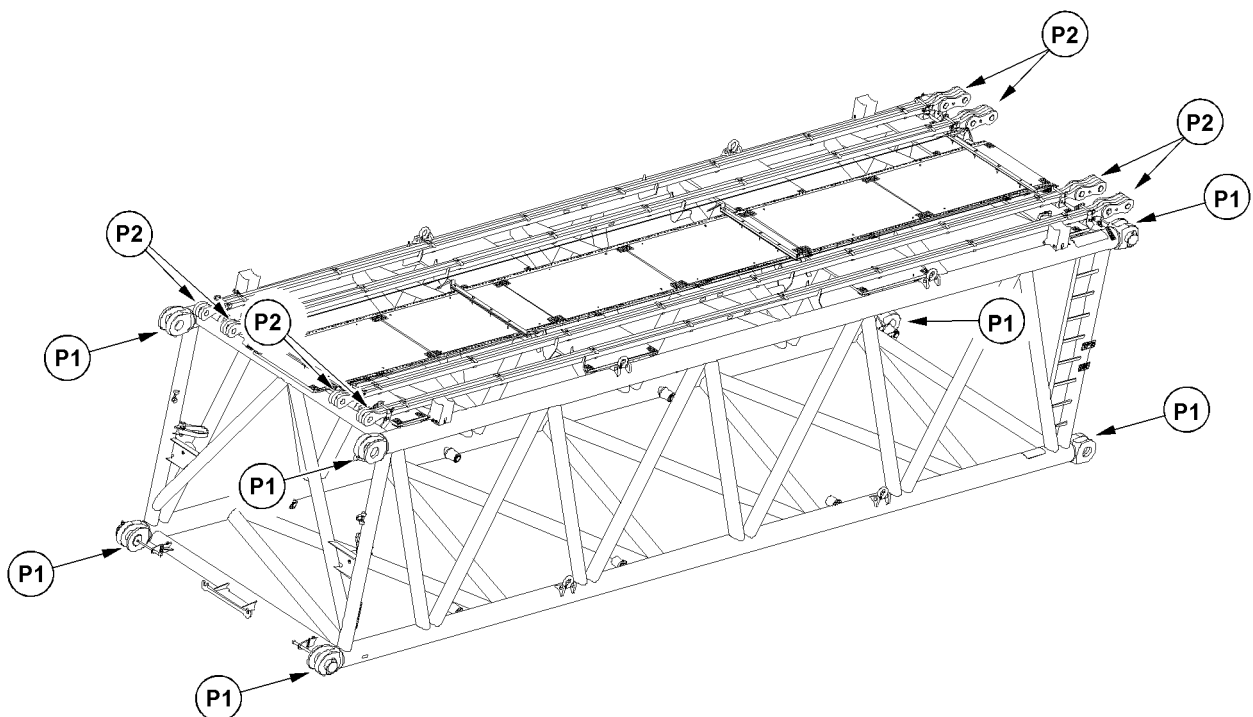


Fig.123861: Lube points on boom lattice sections and guy rods



Note

- ▶ For the pin bores on the lattice sections (points **P1**) and the guy rods (points **P2**), use special grease as lubricant. See Service fill and Crane operating instructions, chapter 7.07.
- ▶ Apply the grease on the pin bores over the entire circumference.
- ▶ The lubrication of the pin bores on the boom lattice sections and the guy rods is made before assembly or after disassembly.

Make sure that the following prerequisites are met:

- The lattice sections are not installed on the crane.
- The lattice sections are playing on a load bearing support on the ground.
- ▶ Grease the pin bores on the boom lattice sections and the guy rods.

2 Rope pulleys and guide pulleys

2.1 Check bearings for easy movement

Stiff or blocked rope pulleys or compensation pulleys wear rapidly and unevenly and cause serious rope abrasion.

Ineffective compensation pulleys can lead to irregular rope tension.

- ▶ Check the rope pulleys for proper movement in their bearings.

When rope pulleys are **not** easily moveable in their bearings:

- ▶ Fix the bearings.

2.2 Checking for mechanical damage

Ropes can cause mechanical damage, such as stress marks.

- ▶ Check guide pulleys and rope pulleys for mechanical damage.

3 Crane ropes

3.1 Personal protective equipment



WARNING

Injury due to wires and skin irritation due to lubricant!

- ▶ When working with ropes, always wear work gloves.



WARNING

Injuries if protective equipment is **not** worn!

- ▶ Wear hard hat, safety shoes and safety glasses.

3.2 Safe and problem-free operation



WARNING

Wear, overload, incorrect use, damage, improper maintenance!

Failure of ropes. Death, severe injuries, property damage.

- ▶ Prevent failure of ropes: Observe and adhere to the following notes.

Carry out the following measures to ensure safe and problem-free rope operation.

- Service ropes and rope end connections regularly according to the maintenance intervals.
- Check ropes and rope end connections regularly according to the inspection intervals.
- When it is determined that the ropes should be withdrawn from service, do **not** continue to use them further.
- Exclude contact of rope with components except rope drive elements.
- Exclude contact of rope with structural parts, power lines or other objects within the surrounding area.
- Avoid corrosive and chemical surroundings.
- Avoid excessive soiling.
- Avoid excessive heat influence.
- Ensure proper condition of all elements of rope drive.
- Ensure proper spooling formation on the rope drum.
- Use the entire rope length of hoist ropes.
- Avoid slack rope formation on the drum.
- Do **not** bring outer twists into the rope.
- Avoid shock relief of the rope, such as sudden set down of the load.

- Avoid **non-permissible** angular pull, for example by pulling the load at an angle.

3.3 Temperature operating limits

Adhere the temperature operating limits for steel ropes. The determining factors are wire material, lubricant, rope end connections. See Manufacturer's specifications.

3.4 Qualification Maintenance personnel

Make sure that the following prerequisites are met:

- The maintenance personnel is trained and instructed in maintenance tasks.
- The maintenance personnel is assigned (authorized) for the maintenance by the crane operator.

3.5 Damage on rope

Rope removal criteria: If severe damage reduces the operational safety, then the rope can reach the removal criteria.

This section provides an overview for possible damage on the rope. For clearer illustration, the distortions on the illustrations are exaggerated.

The displayed ropes show a condition, which is far above the removal criteria.

Damage on the rope causes uneven load distribution in the affected areas.

Damage on the rope is most often localized.

Typical examples for damage, which can be recognized during maintenance work:

- Broken strands
- Wire breaks
- Reduction of rope diameter
- Localized increase of rope diameter
- Corrosion
- Flattenings
- Corkscrew-like distortion
- Basket formation
- Protruding, distorted inlay or braiding
- Loop formation
- Kinking, rope loops (grommets) pulled closed
- Buckles
- Influence of heat or electrical voltage, such as arcing

3.5.1 Broken strands

A strand consists of several individual wires.

When a complete braid is broken, then the rope must be taken down.

3.5.2 Broken wire

Externally visible broken wires are the result of wear caused by operation.

Additional types of broken wires:

- Broken wire in the inside of the rope
- Broken wire in the strand valleys
- Broken wire on a rope connection

A broken wire does not endanger the safety of the rope.

3.5.3 Reduction of rope diameter

The rope diameter changes due to abrasion, settling and external influences.

Abrasion of cover wires of outer strands of rope due to frictional contact. Especially in those areas where ropes are in contact with the rope pulleys during start up or slow down of the load.

Wear is increased by lack of or incorrect lubrication and the effect of dust.

Abrasion reduces the tensile strength of steel ropes because the cross section of the steel is reduced.

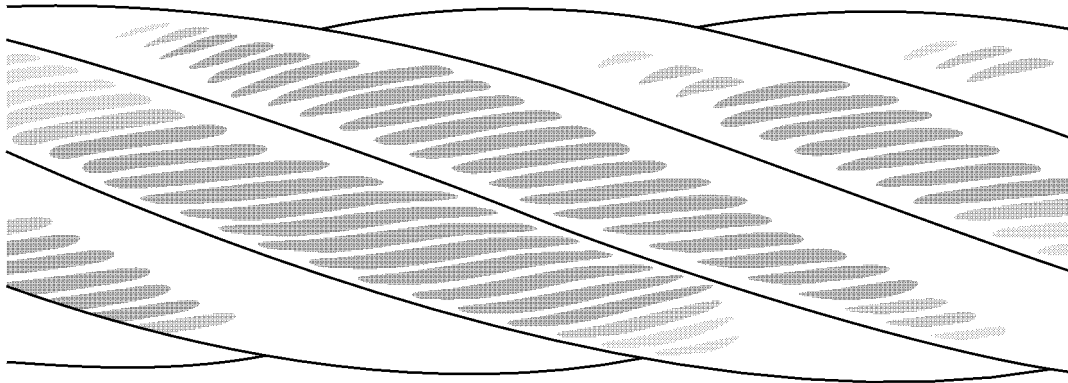


Fig.121001: External abrasion on the rope

When the rope diameter is reduced, the rope must be checked by **expert personnel for crane rope inspection**.

3.5.4 Localized increase of rope diameter

An increase, which occurs over a longer area of the rope can be caused by absorption of moisture in the fiber insert or due to corrosion in the inside of the rope.

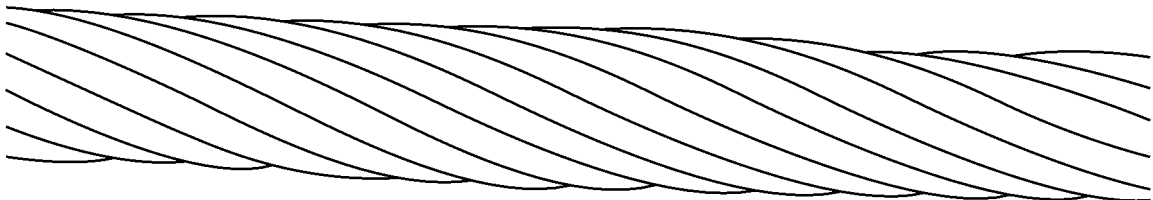


Fig.120992: Increase of rope diameter

When a localized increase of the rope diameter is present, then the rope must be checked by **expert personnel for crane rope inspection**.

3.5.5 Corrosion

Corrosion occurs due to insufficient lubrication, in maritime climates and in an atmosphere polluted by industrial fumes.

External corrosion is indicated by a rough wire surface. A superficial rust film can be wiped off.

Significant corrosion reduces the strength and elasticity of the rope due to the reduction of the rope diameter.

Inner corrosion is hard to detect.

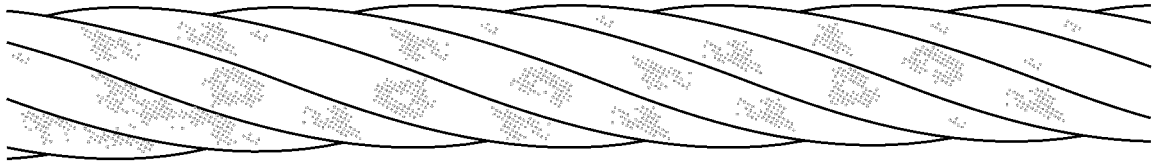


Fig.120994: External corrosion

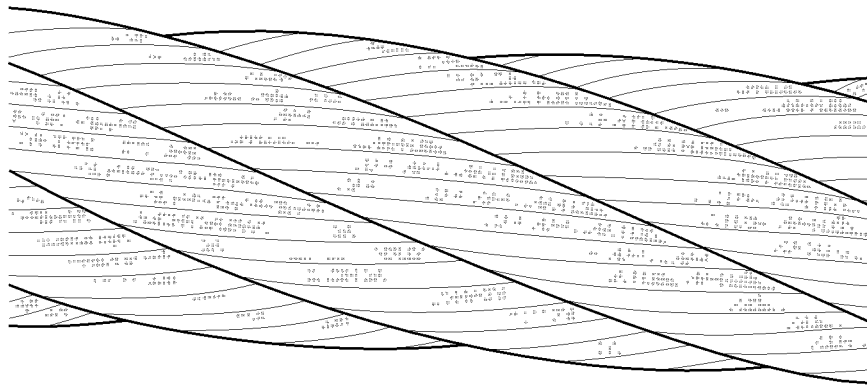


Fig.120995: Magnification of external corrosion for better depiction

When significant corrosion is present, the rope must be checked by **expert personnel for crane rope inspection**.

3.5.6 Flattening

Flattening occurs when the rope runs through the rope pulleys. In this area the rope wears quicker. Corrosion occurs faster on retaining ropes and guy ropes.

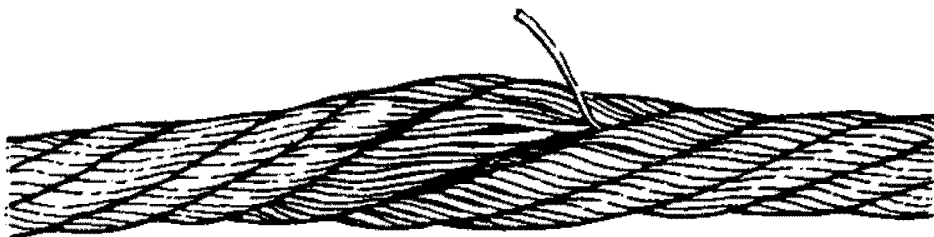


Fig.120997: Localized limited flattening, which leads to broken wires (single layer rope)

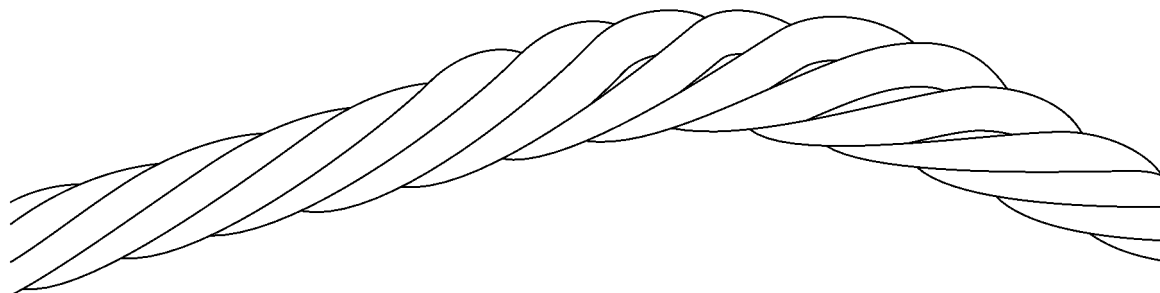


Fig.120996: Flattenings on multi layer spoolings

When flattening is present, the rope must be checked by **expert personnel for crane rope inspection**.

3.5.7 Corkscrew-like distortion

Distortion where the rope is in the form of a corkscrew along its longitudinal axis.

Corkscrew-like distortion causes rope wear, broken wires and bearing damage on rope pulleys.



Fig.120988: Corkscrew-like distortion

When corkscrew-like distortion is present, the rope must be checked by **expert personnel for crane rope inspection**.

3.5.8 Basket formation

This distortion occurs due to different layers between the outer strand layers and the inside of the rope.

Causes for basket formation are high angular pull angles during the run over the rope pulleys and run-in rope pulleys. Even load distribution over the entire cross section is not possible.

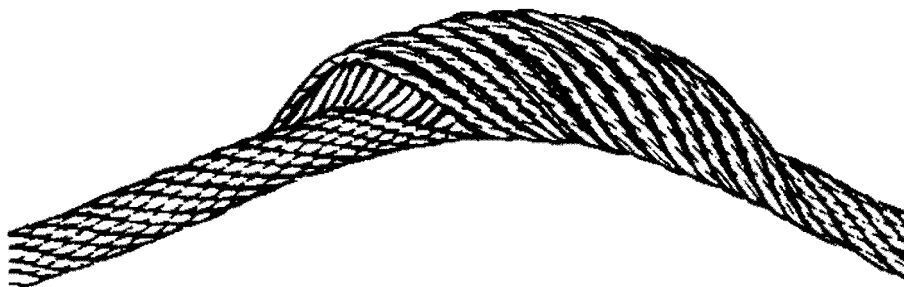


Fig.120989: Basket formation

When basket formation is present, then the rope must be taken down.

3.5.9 Protruding, distorted inlay, braiding

This distortion is a special form of basket formation: The insert or the core of the rope protrudes between the external braids or an external braid protrudes from the rope banding.

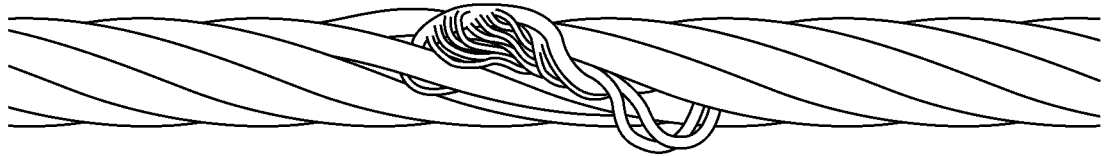


Fig.120990: Protrusion of an insert (rope single layer)



Fig.120991: Distorted or protruding strand

When the insert or a strand protrudes or is distorted, place the rope down. Have **expert personnel for crane rope inspection** check if the rope area with the distortion can be removed.

3.5.10 Loop formation

At loop formation individual wires protrude from the rope banding, when no broken wire ends can be seen.

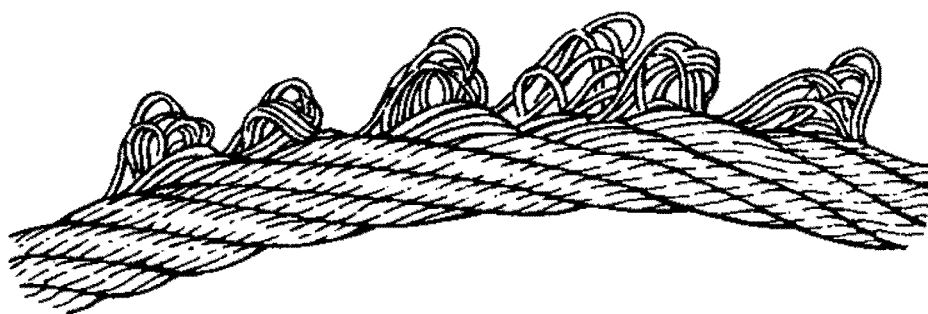


Fig.120993: Emergence of individual wires

When loop formation is present, take the rope down.

3.5.11 Kinking, rope loops (grommets) pulled closed

Deformation, where a loop has formed in the rope, without the possibility to rotate around its own axis during a load. The rope is subjected to more wear.

The rope is deformed. The strength remains only in part.

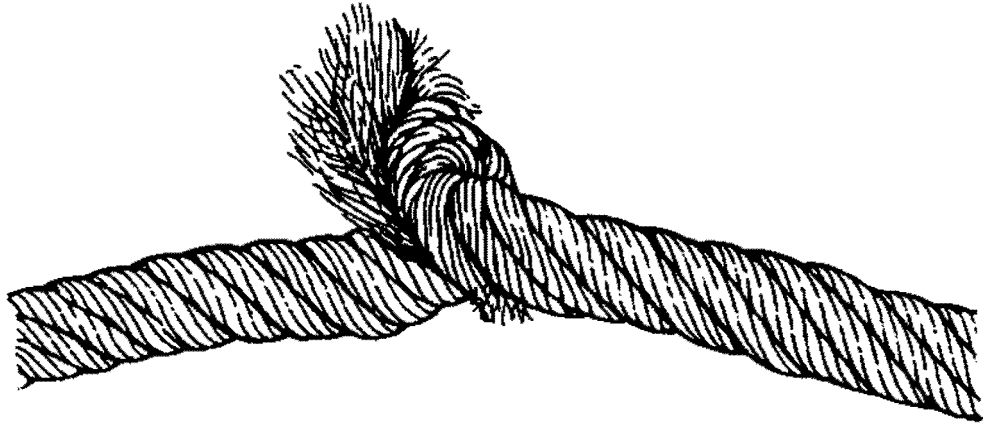


Fig.120998: Severe kinking or knots

When kinking or rope loops are present, place the rope down.

3.5.12 Buckles

Buckles are angular deformations. The rope was damaged due to external influences. Strong deformations of the rope cause stronger wear.

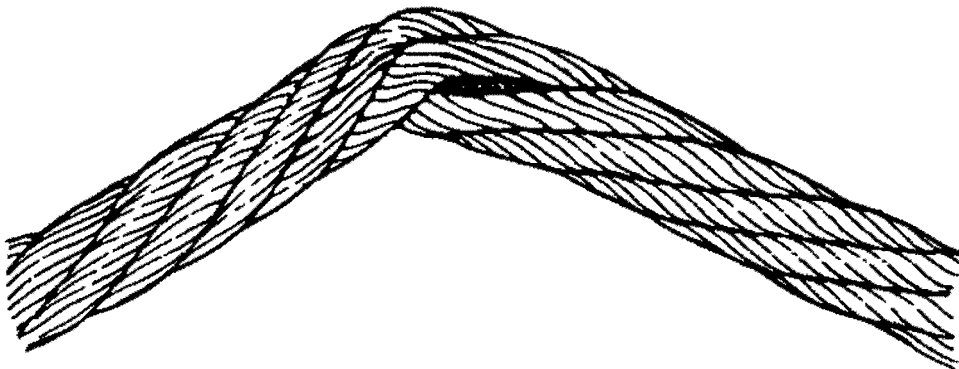


Fig.120999: Severe buckle

When buckles are present, take the rope down.

3.5.13 Effects of heat, arcs

Damage caused to the rope by welding work, for example.

Unusual heat impact is visible by tempering colors and loss of lubricant.

When heat impact has occurred on the rope, then the rope must be taken down.

3.6 Checking the ropes



WARNING

Operation with damaged rope!
Failure of rope. Death, severe injury, property damage.

When damage, wear and deformations are present:

- ▶ Have **expert personnel for crane rope inspection** determine if the rope has to be taken down.

The following sections describe the tasks for **daily visual inspection**.

The crane operator can carry out a daily visual inspection if he is sufficiently trained in the tasks and considered to be able to do so.

3.6.1 Intervals

Intervals and situations where the daily visual inspection must be made:

- Daily, before starting to work
- In case of change of the reeving of the crane rope due to
 - Transport
 - New reeving
 - Removal and installation

3.6.2 Areas

The rope must be checked over the entire length.

The following areas must be checked with special diligence:

- Rope end connections
- Safety coils and fixed point on the winch
- Areas of the rope which run through the hook block
- Areas of the rope which run over the rope pulleys or laying on the rope pulleys
- Areas of the rope which are spooled on the winch, especially cross over areas
- Areas of the rope which are laying above the compensation pulleys
- Areas of the rope which are subjected to abrasion due to external components
- All areas of the rope which are subjected to temperatures above 60°C

3.6.3 Documentation of rope condition

Every visible change of the wire rope must be documented in the crane records.

3.6.4 Checking the lubrication



WARNING

Missing lubrication!

Functional problems. Inner and outer corrosion.

- ▶ Lubricate the rope regularly.
- ▶ Make sure that the rope is lubricated all around.
- ▶ Select manual or automatic lubrication procedures.

The lubrication must be checked at least once a **month**.

When the rope shows signs of drying out:

- ▶ Lubricate the rope, see section „Lubricating the rope“.

3.6.5 Check for wear and distortion

- ▶ Check all visible parts of the rope for wear and distortion.
- ▶ Check the rope end connections and fixed points especially carefully for wear, damage, cracks and distortion.
- ▶ Check pressed together rope end connection for slipping and traces on the rope.



Note

- ▶ The maximum permissible number for broken wires over a certain rope length may not be exceeded.
- ▶ Determine the maximum permissible number of broken wires, see Crane operating instructions, chapter 8.04.
- ▶ Check the rope end connection and rope area near the rope end connection for broken wires.

When broken wires are present on the rope:

- ▶ Remove the broken wire, see section „Removing broken wires“.

When broken wires or damage is present on the rope end connection:

- ▶ Document visible changes of the rope condition.
- ▶ Have the rope checked by **expert personnel for crane rope inspection**.

When the rope can be shortened without reducing the operational safety:

- ▶ Shorten the rope, see section „Shortening the rope“.

3.6.6 Checking the rope drive for spooling problems

Lacking pretension of the rope on the winch can cause spooling problems in multi layer spooling.

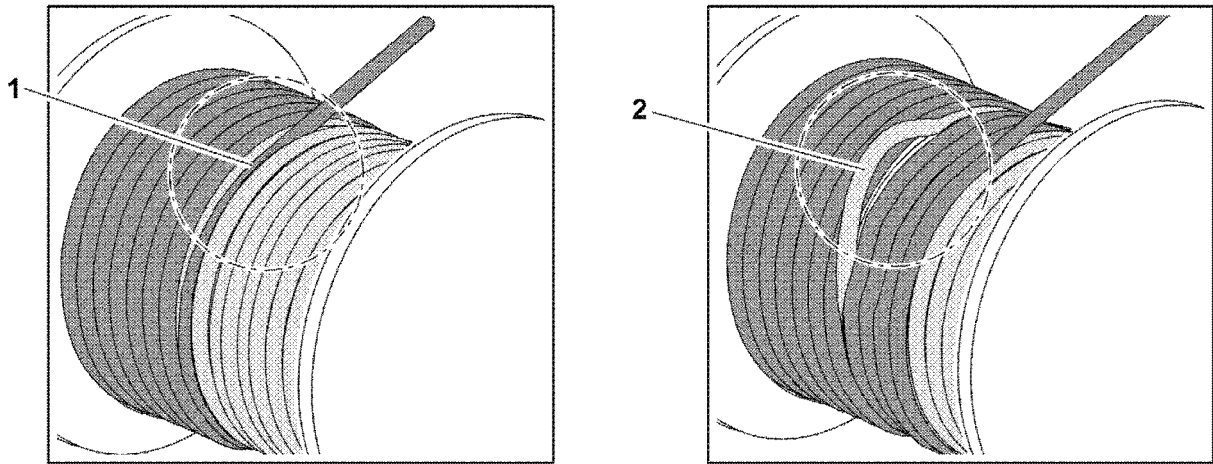


Fig.120967: Possible spooling problems on the rope winch

- 1** Cutting into the lower rope layers **2** Loop formation in the lower rope layers

- ▶ Check the spooling behavior of rope on the rope winch for cutting into the lower rope layers **1**.
- ▶ Check the spooling behavior of rope on the rope winch for loop formation in the lower rope layers **2**.

When spooling defects are found:

- ▶ Renew the pretension, see section „Renewing the pretension of hoist ropes“.
- ▶ Document visible changes of the rope condition.
- ▶ Have the rope checked by **expert personnel for crane rope inspection**.

3.6.7 Checking the position

- ▶ Check the correct position of the rope on the rope pulleys.

When the rope is **not** correctly laying on the rope pulley:

- ▶ Have the rope and rope pulley checked by **expert personnel for crane rope inspection**.

3.6.8 Checking for corrosion

A superficial „rust film“ can be wiped off.

- ▶ Do **not** clean the rope with solvents or cleaners.
- ▶ Clean the rope solely with a wire hand brush.
- ▶ Check rope for corrosion.

When the rope shows a rough surface:

- ▶ Document visible changes of the rope condition and have the rope checked by **expert personnel for crane rope inspection**.

If there is any uncertainty regarding the condition of the rope:

- ▶ Place the rope down or contact Liebherr Service.

3.6.9 Checking for flattenings

In the cross over area of the spooled up rope layers on the winch the rope is stressed more. The rope can be flattened as a result.

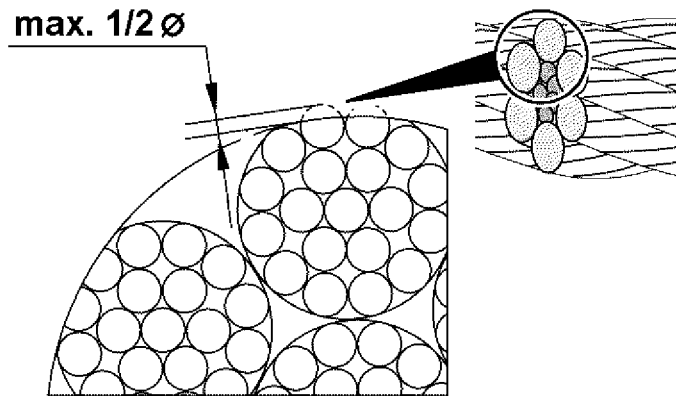


Fig.120966: Maximum flattening of wires on the outer strands

- ▶ Check the rope in the ascent zones of the rope spooling on the winch for flattenings.

When the outer braids are flattened more than half of the wire diameter:

- ▶ Document visible changes of the rope condition.
- ▶ Have the rope inspected by **expert personnel for crane rope inspection** or place the rope down.

When the rope can be shortened without reducing the operational safety:

- ▶ Shorten the rope on the rope drum fixed point, see section „Shortening the rope“.

3.7 Checking the control rope for distortions

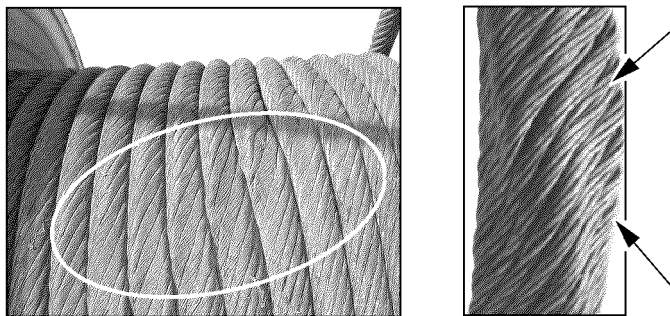


Fig.114002: Distortion on control ropes

- ▶ Check the first rope layer of the control rope for crushed areas and distortions.

When distortions are present:

- ▶ Have the rope checked by **expert personnel for crane rope inspection**.

3.8 Lubricating the rope



WARNING

Missing lubrication!

Functional problems. Inner and outer corrosion.

- ▶ Lubricate the rope regularly.
- ▶ Make sure that the rope is lubricated all around.
- ▶ Select manual or automatic lubrication procedures.

NOTICE

Too much or incorrect lubricant!

Excessive soiling. Wear on rope, on rope pulley and on winch. Recognition of take down criteria is impeded.

- ▶ Use lubricant, which is compatible with the rope and the original lubricant.

- ▶ Do **not** clean the rope with solvents or cleaners.
- ▶ Clean the rope solely with a wire hand brush.

Areas, which must be lubricated especially well are bending zones on winch and rope pulleys.

- ▶ Lubricate the rope.

3.9 Removing broken wires

NOTICE

Broken wires!

Damage of other components in crane operation, for example rope pulleys and compensation pulleys.

- ▶ Remove broken wires.

Make sure that the following prerequisite is met:

- Suitable pliers are on hand.

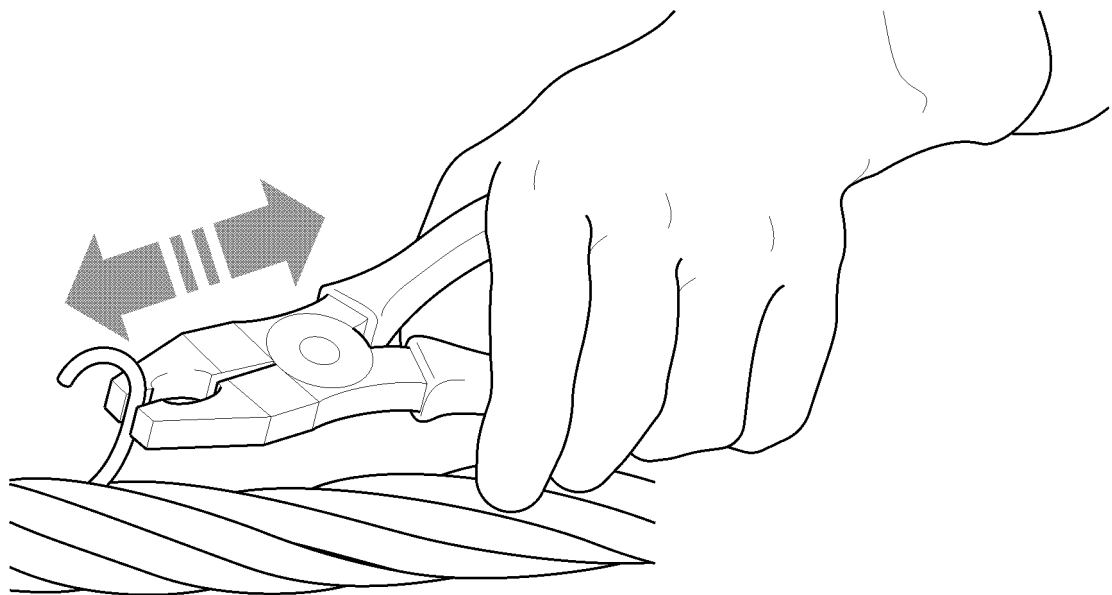


Fig.120979: Remove broken wire

- ▶ Grasp the wire on the upper end with pliers. Bend the wire back and forth until the wire breaks off in the braid valley.

The position of a broken wire is important for subsequent inspection. Individual broken wires are counted and are recorded later in the evaluation for withdrawal from service.

- ▶ Document the position of the broken wires in the crane record. Inspection checklist, see chapter 8.04.

3.10 Turning an extremely rotation-resistant hoist rope out



WARNING

Damage of rope due to incorrect procedure!

- ▶ Use extreme caution for the following procedures.
- ▶ Observe the following instructions exactly.

The cause for the turn-in of the hook block can have various reasons.

Check the crane for the following peculiarities:

- Scrub marks: Are hoist rope scrub marks present on the crane components? If scrub marks are present, check the hoist rope run and correct it.
- Rope pulleys: Did the groove diameter become too small?
 - Groove diameter dimensional stability must be present.
 - If this is not the case, the rope pulley must be replaced.
- Rope lubrication: Has the hoist rope been sufficiently lubricated? If the rope surface is dry, the hoist rope must be re-lubricated.

If the crane does not display other peculiarities, the hoist rope must be spun out.

The following sections describe two methods of how to spin out the hoist rope. The methods must be applied in the described sequence.

3.10.1 Spinning out with single strand reeving

- ▶ Reeve in the single strand hoist rope.
- ▶ Extend the boom to the maximal boom length and hook height.
- ▶ Lower hooks to approximately 1 m above the ground and allow the hoist rope to spin out.
- ▶ With an empty hook block, carry out one complete hoist cycle.
- ▶ Lower the hook again to approximately 1 m above the ground and allow the hoist rope to spin out again.
- ▶ Reeve the number of strands of hoist rope carefully and spin free where the twisting of the hook block is largest.
- ▶ Distribute the spin out to the entire rope length: Run at least two entire hoist cycles at maximum boom length and hook height.



Note

When the hook block continues to turn in:

- ▶ Spin the rope out, see section „Spinning out by turning the hook block out“.

3.10.2 Spinning out by turning out the hook block

Make sure that the following prerequisite is met:

- The hook block is reeved with the number of strands where the twisting is the largest.
- ▶ Extend the boom completely and lower the hook block.
- ▶ Attach a load of approximately 10 % of the nominal rope pull on the hook block.

Before lifting the load, a helper must rotate the twisted hook block to a straight position by hand until the rope strands no longer touch each other.

- ▶ Continue to turn the hook block by one entire turn.

Result:

- The rope strands touch again.

NOTICE

The hook block turns back under load in a straight position!

When the hook block turns back in a straight position:

- ▶ Release the hook block.
-
- ▶ Hold the hook block in the prescribed position until the load lifts off the ground.
 - ▶ Move the load until approximately 15 m before the uppermost hook position of the completely extended boom.
 - ▶ Lower load and set it down.

3.11 Renewing the pretension of hoist ropes

**WARNING**

Lacking pretension of the rope on the winch!

Excessive rope wear in the lower spooling layers, gap formation, rope cutting in.

When the lower rope layers on the winch are hardly used or **not**:

- ▶ Renew the pretension in the entire rope regularly.

Make sure that the following prerequisites are met:

- A reeving is selected where the entire rope length can be spooled.
- Clean spooling pattern on the drum at spooling.

**Note**

Recommendation!

- ▶ The rope application is the most economical when the entire rope length is utilized.

When only a part of the rope length is used for a longer period of time:

- ▶ Use a proportionally shorter rope.
-
- ▶ Spool the rope out until three safety coils.
 - ▶ Spool the rope up with a rope tensile force of 10 % of the maximum rope tensile force.

3.12 Shortening the rope

**WARNING**

Distortions and mechanical damage!

Operational safety significantly disturbed, uneven load distribution within the rope.

- ▶ Have the manufacturer check if the distorted and damaged area can be severed.

Visible form changes often occur localized or in short rope sections.

When a safe operation of the rope is ensured, a distorted and damaged area can be severed.

To shorten the rope there are different prerequisites:

- Rope shows flattenings
- Broken wires occur solely within the area of the rope end connection, the remaining rope is undamaged

**DANGER**

Minimum number of remaining coils on the winch fallen below!

Rope releases or rips off, falling load. Death, severe injury, property damage.

- ▶ Make sure, after shortening the rope that **at least three remaining coils** remain on the winch in all working positions of the crane.

Make sure that the following prerequisite is met:

- The rope was shortened by authorized and trained expert personnel.

Multi layer spooling: When the rope on the fixed point on the winch is shortened by half the winch diameter, then the service life of the rope increases significantly.

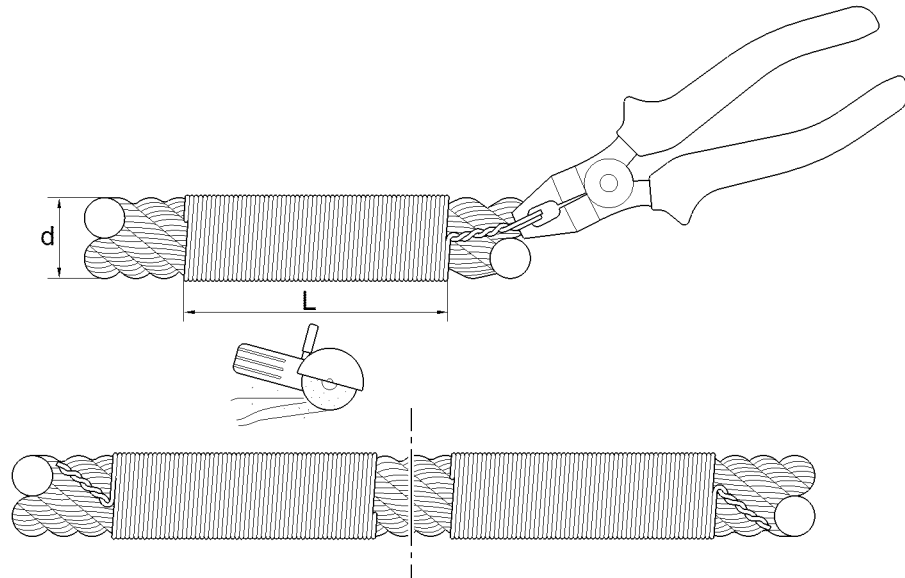


Fig.120972: Tie the rope before shortening it

d Rope nominal diameter

L Length of tie, at least 2d

The length of the tie **L** must be at least 2 times the rope nominal diameter ($2d$).

The shortening of the rope in this section applies to a single layer rope. On rotation-resistance, parallel roped ropes it may be necessary to tie several times to prevent the rope from jumping open when it is cut.

- ▶ Tie the rope on both sides with wire.
- ▶ Twist the end of the wire with the pliers to prevent them from releasing.



WARNING

Danger of injury due to flying sparks!

- ▶ Wear safety glasses and safety gloves.
- ▶ Separate the rope vertically to the rope axis.
- ▶ Fasten the end connections on the rope according to the manufacturer's instructions.
- ▶ Remove the tie on both ends of the separation from the rope.

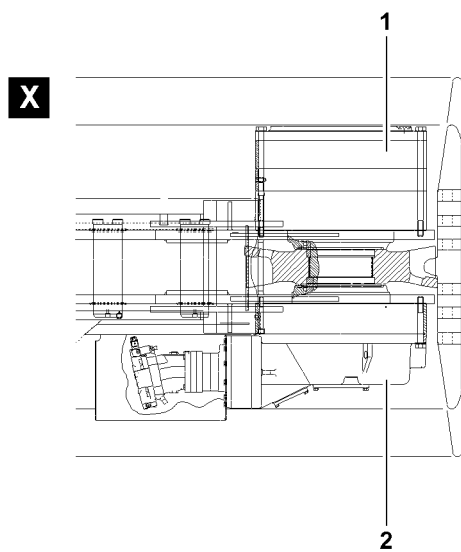
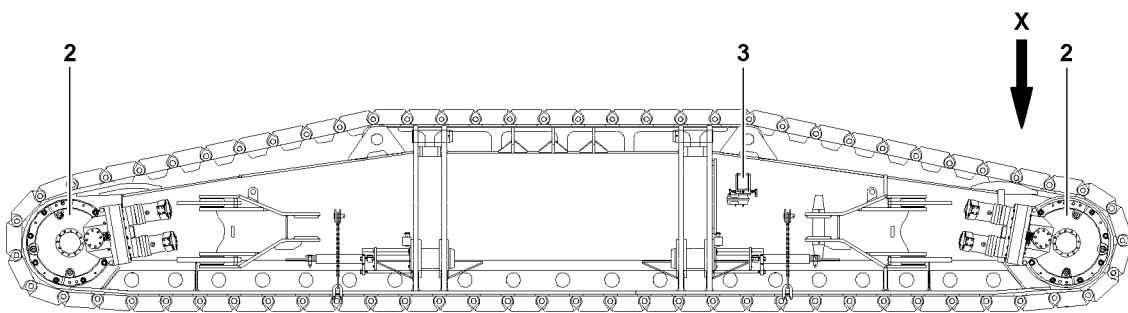
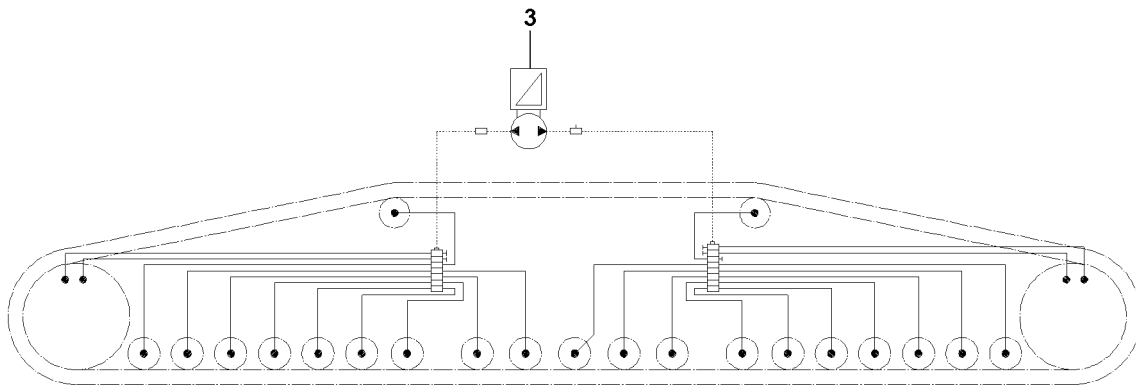


Fig.108022

LWE/LR 1750-000/12812-15-02/en

1 Fill quantities

1.1 Crawler chassis fill quantities

The specified fill quantities (change quantities) are orientation values. The marks on the dipsticks, inspection ports and sight gauges are decisive for filling.

NOTICE

Danger of property damage!

► Do not mix synthetic oils with mineral oils!

Position	Component	Fill quantity
1	Planetary gear	42 l
2	Miter gear	30 l
3	Central lubrication system	2.5 kg

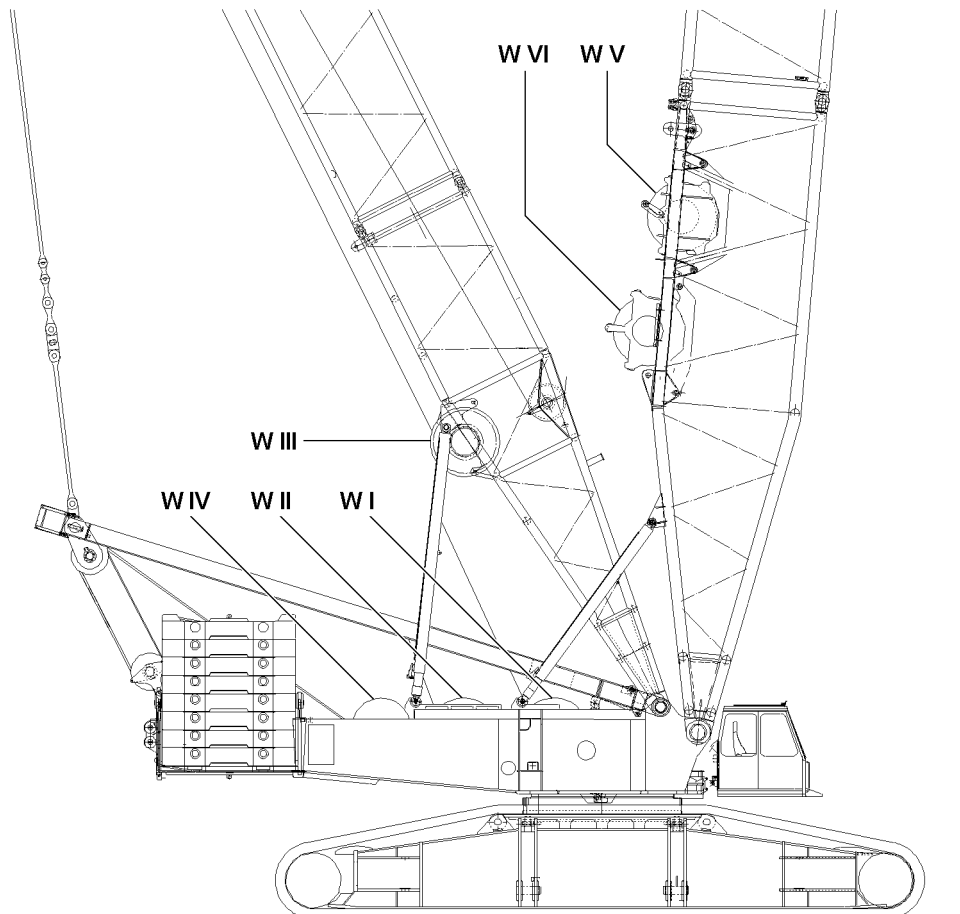
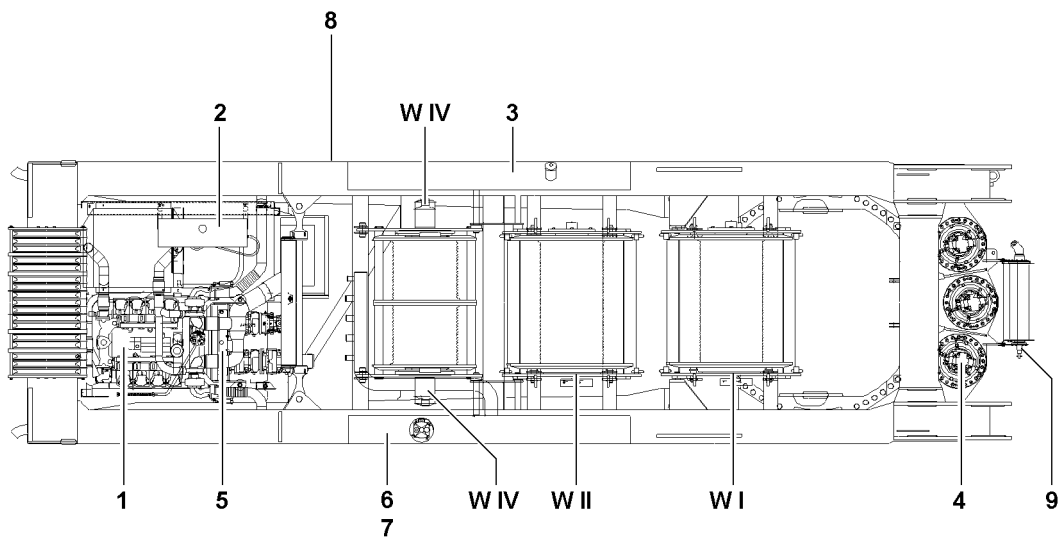


Fig.108023

LWE/LR 1750-000/12812-15-02/en

1.2 Fill quantities crane superstructure

The specified fill quantities (change quantities) are orientation values. The marks on the dipsticks, inspection ports and sight gauges are decisive for filling.

NOTICE

Danger of property damage!

► Do not mix synthetic oils with mineral oils!

Position	Component	Fill quantity
1	Diesel engine	32 l
2	Cooling system	80 l
3	Fuel tank	820 l
4	Slewing gear	28 l
5	Pump distributor gear	6 l
6	Hydraulic oil tank ¹	770 l
7	Hydraulic oil tank ¹ with crane support	1020 l
8	Central lubrication system	4 kg
9	Assembly winch	0.4 l
W I	Winch W I	22 l
W II	Winch W II	22 l
W III	Winch W III	23 l
W IV	Winch W IV (double winch)	2 X 15 l
W V	Winch W V	23 l
W VI	Winch W VI	22 l

¹ When the oil level is checked, all hydraulic cylinders must be retracted. The oil level must be in the center of the sight gauge.

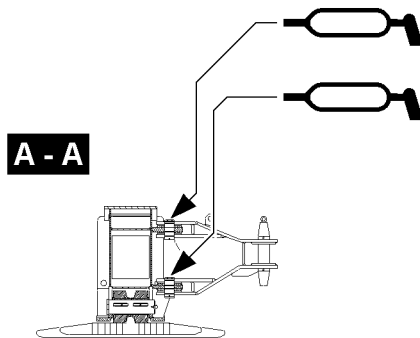
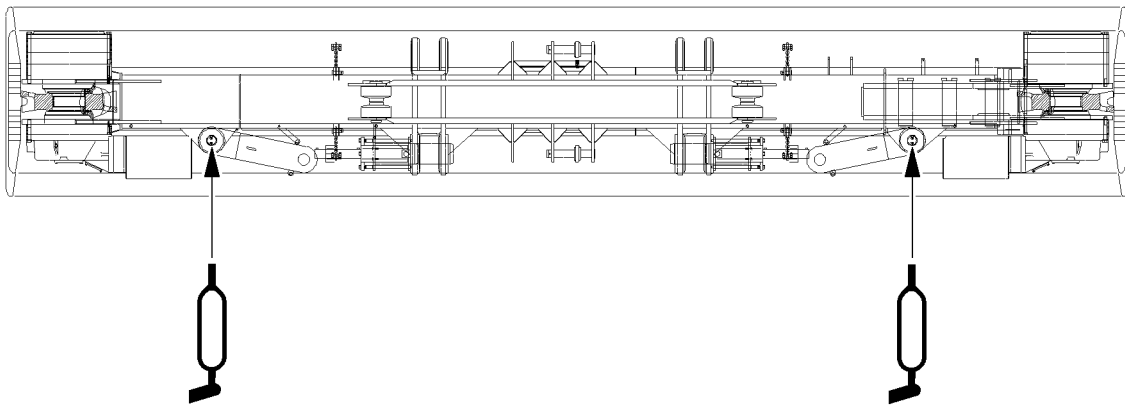
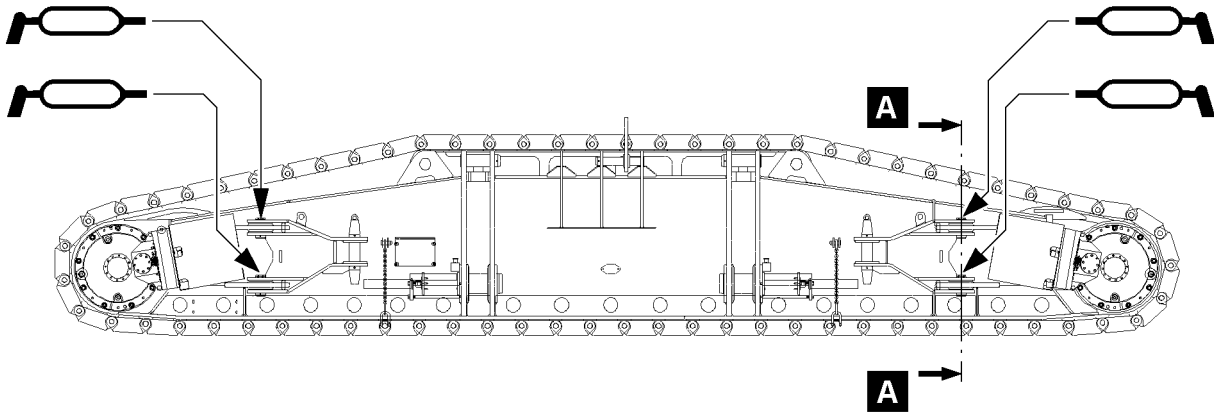


Fig.108148

LWE/LR 1750-000/12812-15-02/en

2 Lubrication schedule

2.1 Lubrication schedule - Crawler chassis

2.1.1 Lubrication schedule - Crawler carrier

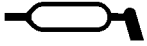


Fig.107729



Note

▶ The lube points are marked with this icon.

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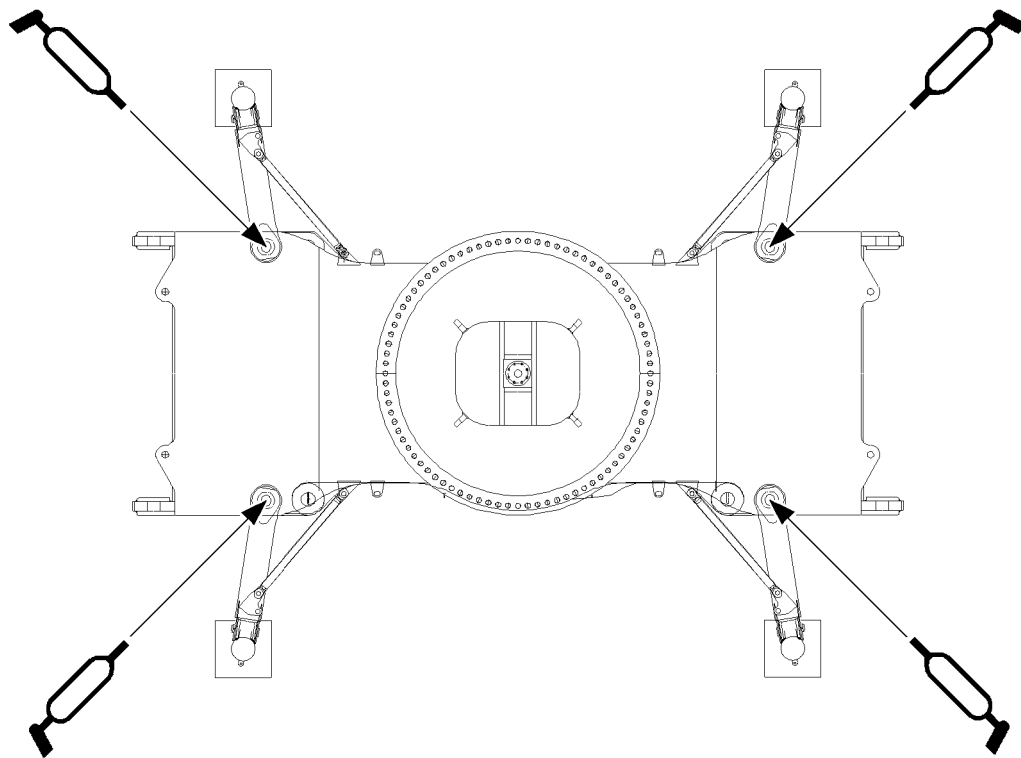
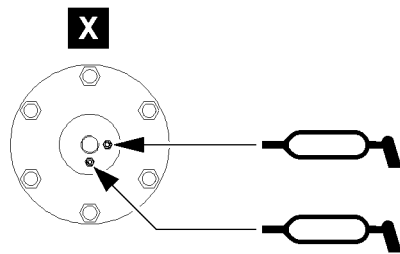
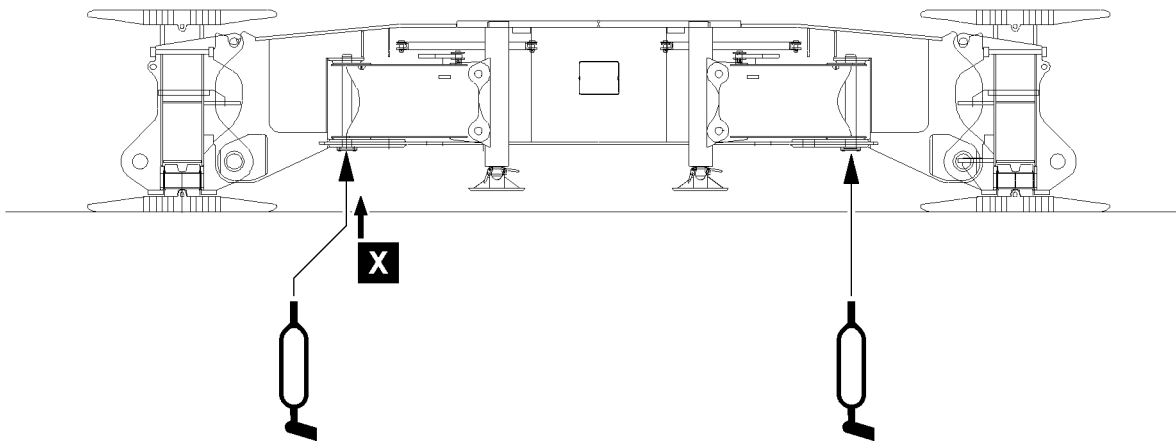


Fig.108149

LWE/LR 1750-000/12812-15-02/en

2.1.2 Lubrication schedule Assembly support*

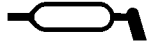


Fig.107729



Note

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Note

▶ The grease fittings on the assembly supports are not present with all cranes!

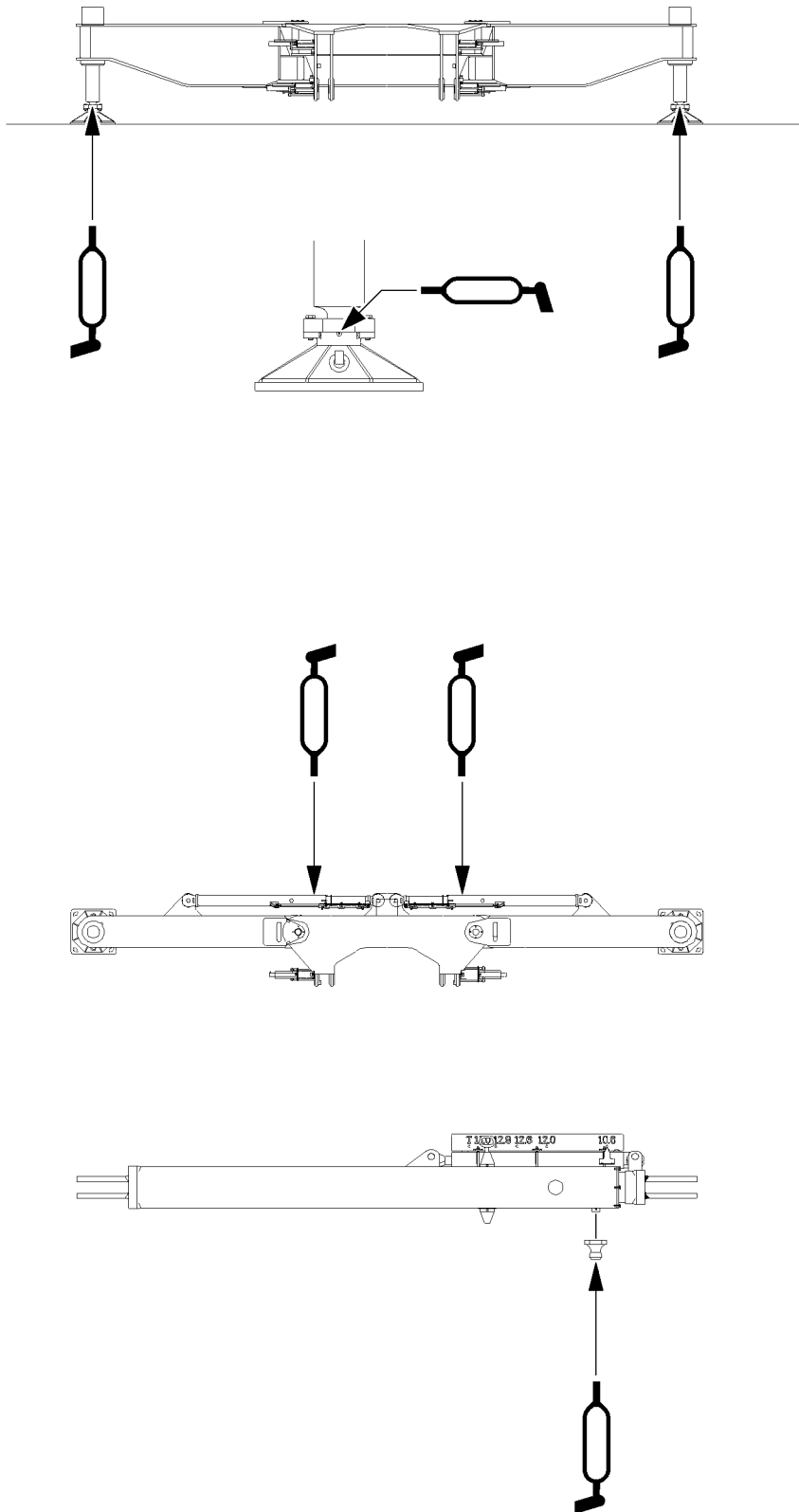


Fig.108150

2.1.3 Lubrication schedule crane support

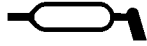


Fig.107729



Note

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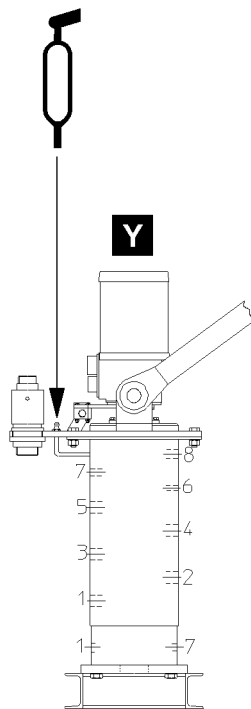
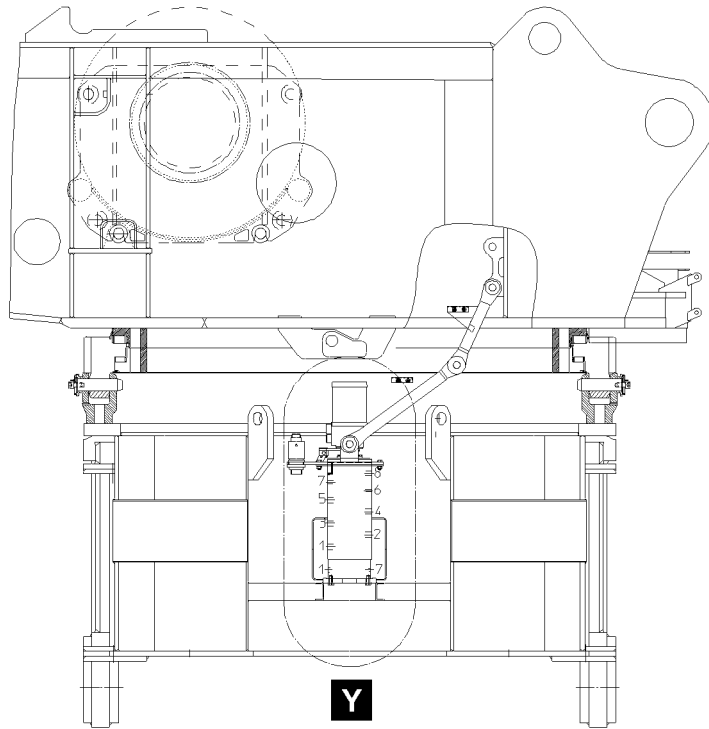


Fig.108151

LWE/LR 1750-000/12812-15-02/en

2.1.4 Lubrication schedule rotary connection

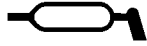


Fig.107729



Note

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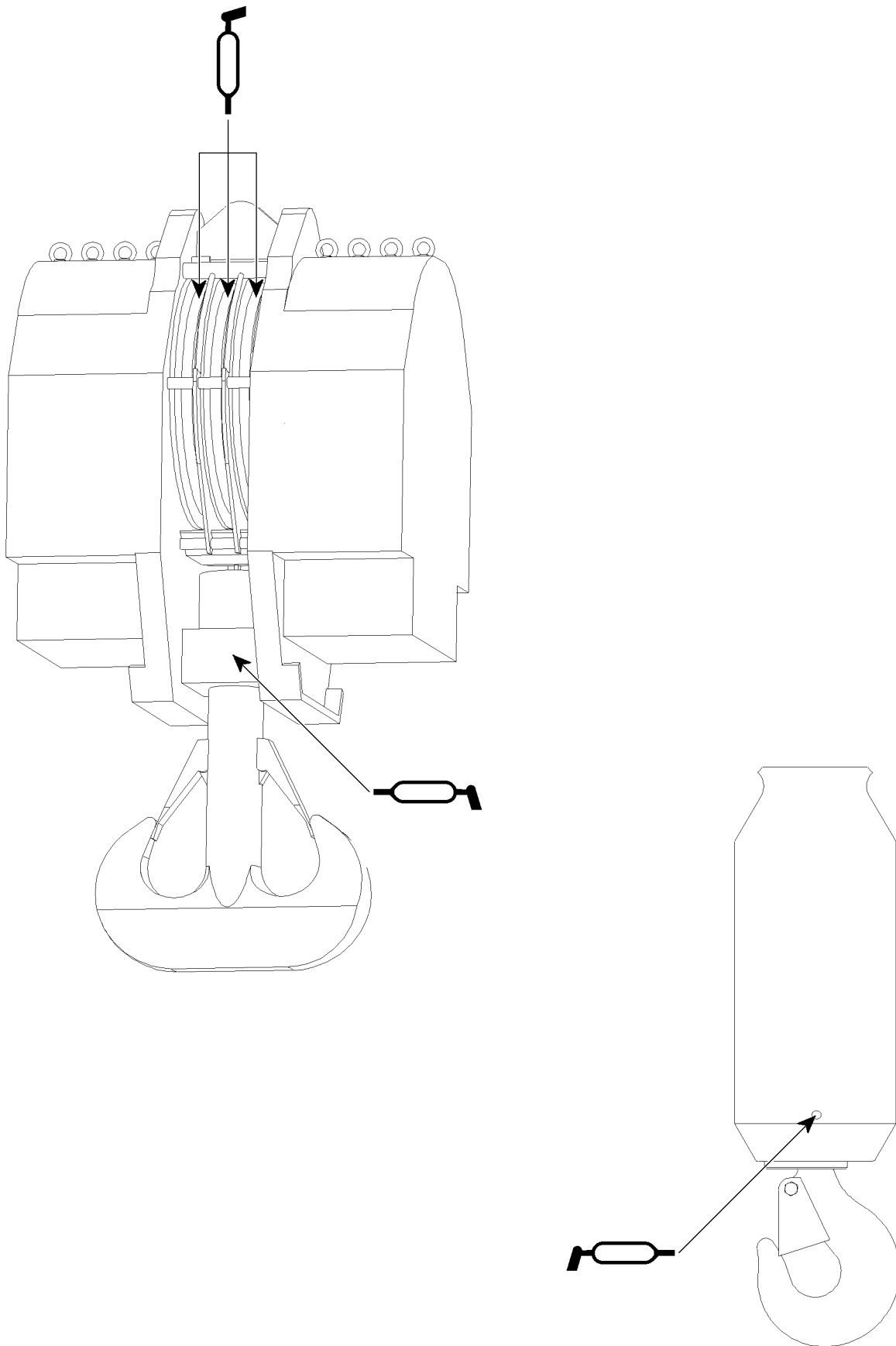


Fig.108145

2.2 Lubrication schedule - Equipment

2.2.1 Lubrication schedule Hook block / load hook

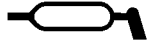
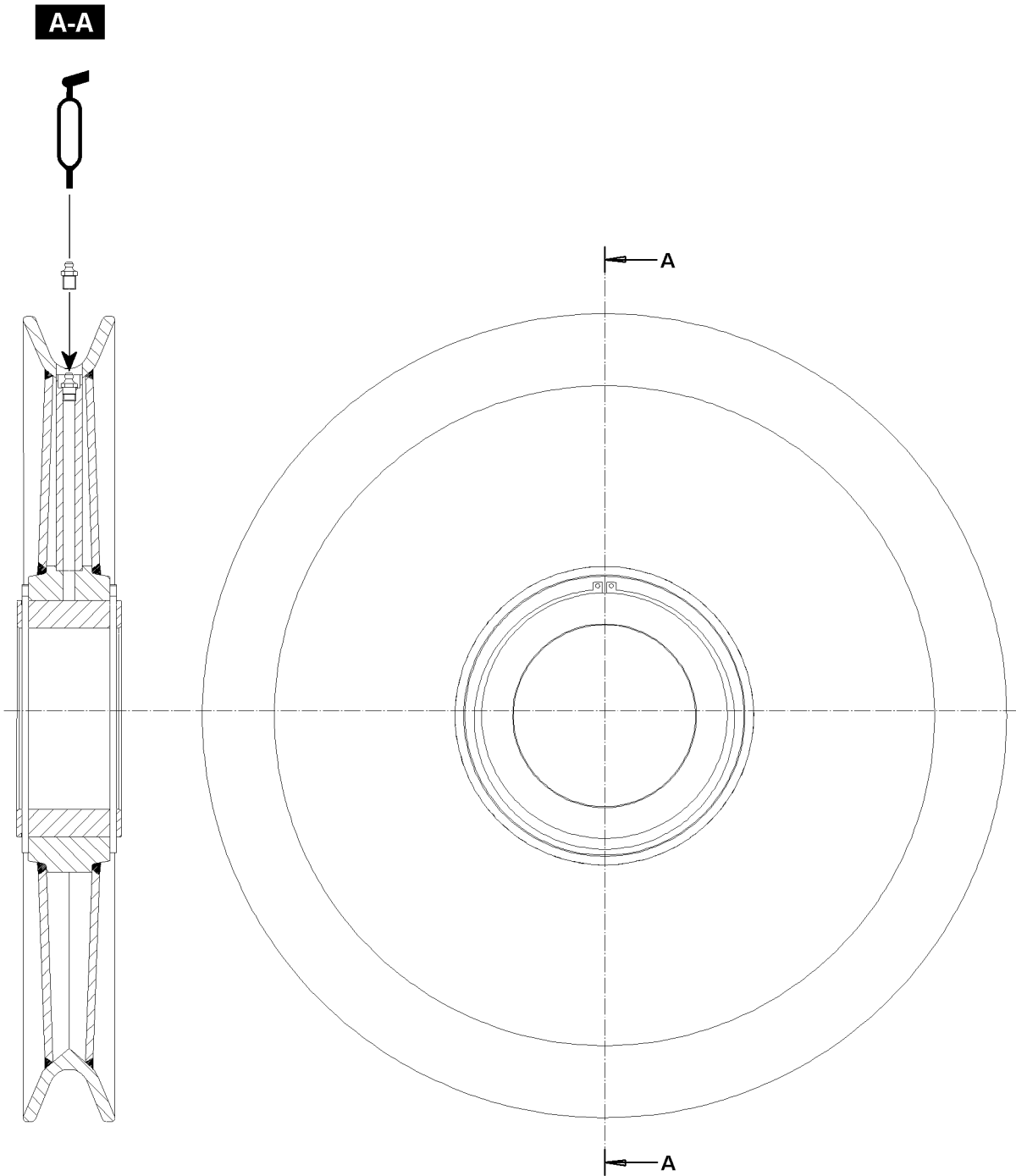


Fig.107729



Note

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LWE/LR 1750-000/12812-15-02/en

Fig.108928

2.2.2 Lubrication schedule for rope pulley



Note

- ▶ The rope pulley shown in this chapter is only an example and can deviate in type and version from other rope pulleys. The lubrication schedule is generally valid for all rope pulleys.
-



Fig.107729

**Note**

- ▶ The lube points are marked with this icon.
-

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Specified service fluids and lubricants for Liebherr cranes

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
1.1	Diesel engine with Exhaust aftertreatment US Tier 4, EU-Stage IV LMB D936 A7-04, D944 A7-04, D946 A7-04, D9508 A7-04 MTU 6R 1000 Euro V ECE R.49, K LMB D936 A7-50, D946 A7-50, D9508 A7-50	LWE Id. No.: 10871536 Liebherr Motoroil 5W-30 SAE 5W-30 and ACEA E6 or: SAE 10W-40 and ACEA E6 Observe the instructions of the engine manufacturer	LWE Id. No.: 10871536 Liebherr Motoroil 5W-30 SAE 5W-30 and ACEA E6 or: SAE 10W-40 and ACEA E6 Observe the instructions of the engine manufacturer Below -20 °C with pre-heating
		Note: To improve the cold start ability of the diesel engine at an ambient temperature below -10 °C , we recommend the use of Liebherr Motoroil 5W-30, LWE-Id no.: 10871536	
1.2	Diesel engine with Exhaust aftertreatment US Tier 4 interim, EU-Stage III B LMB D936 A7 SCR, D934 A7 SCR, D856 A7 SCR, D9508 A7 SCR MTU/Mercedes Benz OM 906, OM 926	LWE Id. No.: 10663796 Liebherr Motoroil 10W-40 low ash SAE 10W-40 low ash and ACEA E6 Observe the instructions of the engine manufacturer	LWE Id. No.: 11100934 Liebherr Motoroil 5W-30 low ash SAE 5W-30 low ash and ACEA E6 Observe the instructions of the engine manufacturer Below -20 °C with pre-heating
		Note: To improve the cold start ability of the diesel engine at an ambient temperature below -10 °C , we recommend the use of Liebherr Motoroil 5W-30 low ash, LWE-Id no.: 11100934	
1.3	Diesel engine without Exhaust aftertreatment US Tier 3, EU-Stage IIIA such as 1.2 or optionally also LMB D936 A6, D934 A6, D846 A7, D9508 A7 MTU/Mercedes Benz OM 906	LWE Id. No.: 861005308 Liebherr Motoroil 10W-40 SAE 10W-40 and ACEA E4 Observe the instructions of the engine manufacturer	LWE Id. No.: 10871536 Liebherr Motoroil 5W-30 SAE 5W-30 and ACEA E4 Observe the instructions of the engine manufacturer Below -20 °C with pre-heating
		Note: To improve the cold start ability of the diesel engine at an ambient temperature below -10 °C , we recommend the use of Liebherr Motoroil 5W-30, LWE-Id no.: 10871536	

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
1.4	Diesel engine without Exhaust aftertreatment Power band H and I ECE R.96 LMB D936 A7-03, D944 A7-03, D946 A7-03, D9508 A7-03	LWE Id. No.: 10871536 Liebherr Motoroil 5W-30 SAE 5W-30 and ACEA E4 or: SAE 10W-40 and ACEA E4 Observe the instructions of the engine manufacturer	LWE Id. No.: 10871536 Liebherr Motoroil 5W-30 SAE 5W-30 and ACEA E4 or: SAE 10W-40 and ACEA E4 Observe the instructions of the engine manufacturer Below -20 °C with pre-heating
Note: To improve the cold start ability of the diesel engine at an ambient temperature below -10 °C , we recommend the use of Liebherr Motoroil 5W-30, LWE-Id no.: 10871536			
1.5	Diesel engine without Exhaust aftertreatment US Tier 2, EU-Stage II Cummins QSK 23	LWE Id. No.: 861005308 Liebherr Motoroil 10W-40 SAE 10W-40 and Cummins Engineering Standard CES 20078, 20077, 20076, 20075, 20071 SAE 10W-40 and API CI-4, CH-4, CF-4 SAE 10W-40 and ACEA E7, E5, E3, E2 Observe the instructions of the engine manufacturer	LWE Id. No.: 10871536 Liebherr Motoroil 5W-30 SAE 5W-30 and Cummins Engineering Standard CES 20078, 20077, 20076, 20075, 20071 SAE 5W-30 and API CI-4, CH-4, CF-4 SAE 5W-30 and ACEA E7, E5, E3, E2 Observe the instructions of the engine manufacturer Below -20 °C with pre-heating
Note: To improve the cold start ability of the diesel engine at an ambient temperature below -10 °C , we recommend the use of Liebherr Motoroil 5W-30, LWE-Id no.: 10871536			
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	Axle drive ZF DK-7	LWE Id. No.: 861901008 Liebherr Gear Hypoid 90 EP ZF TE-ML 05	LWE Id. No.: 10425142 Liebherr Syntogear Plus 75W-90 ZF TE-ML 05
4.1	Vehicle distributor gear KESSLER VG 1800, VG 2400, VG 2550, VG 2600, VG 2700, VG 3750, VG 3751 W 3750, 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

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
4.2	Vehicle distributor gear with PTO for crane drive KESSLER VG 2700 with PTO VG 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
4.3	Vehicle distributor gear ZF Passau, STEYR PUCH VG 1200, VG 1600, VG 2000, VG 3800	LWE Id. No.: 861901008 Liebherr Gear Hypoid 90 EP ZF TE-ML 19	LWE Id. No.: 10425142 Liebherr Syntogear Plus 75W-90 ZF TE-ML 19
5	Miter gear for crane drive	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
6	Offset gear (drop box) ZF Passau, STEYR PUCH	LWE Id. No.: 861901008 Liebherr Gear Hypoid 90 EP ZF TE-ML 19	LWE Id. No.: 10425142 Liebherr Syntogear Plus 75W-90 ZF TE-ML 19
7.1	Pump distributor gear filled with mineral gear oil	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
7.2	Pump distributor gear filled with synthetic gear oil	LWE Id. No.: 861901208 Liebherr Gear PG 220 CLP PG 220, DIN 51517-3 WARNING: May not be mixed with other oils!	LWE Id. No.: 10664125 Liebherr Gear PG 150 CLP PG 150, DIN 51517-3 WARNING: May not be mixed with other oils!
7.3	Pump distributor gear LTC 1055-3.1	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
8.1	Powershift transmission ZF torque converter WG 120, WG 150, WG 180, WG 181, WG 200, WG 201	LWE Id. No.: 861005308 Liebherr Motoroil 10W-40 ZF TE-ML 03	LWE Id. No.: 861900608 Liebherr Hydraulic-Gear ATF ZF TE-ML 03 Below -20 °C run until warm according to operating instructions

LWE/LR 1750-000/12812-15-02/en

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
8.2	Powershift transmission ZF torque converter WG 251* ZF ERGOPOWER WG 210, WG 260, WG 310 * also for ambient temperatures above -10 °C	LWE Id. No.: 861900608 Liebherr Hydraulic-Gear ATF ZF TE-ML 03	LWE Id. No.: 861900608 Liebherr Hydraulic-Gear ATF ZF TE-ML 03 Below -20 °C run until warm according to operating instructi- ons
9	Powershift transmission CLARK	LWE Id. No.: 861005308 Liebherr Motoroil 10W-40 SAE 10W-40 and ACEA E4	LWE Id. No.: 861900608 Liebherr Hydraulic-Gear ATF ATF Dexron II D and ALLI- SON C4 Below -20 °C run until warm according to operating instructi- ons
10	Offset gear (drop box) ALLISON	LWE Id. No.: 861005308 Liebherr Motoroil 10W-40 SAE 10W-40 and API CF, ACEA E4	LWE Id. No.: 861900608 Liebherr Hydraulic-Gear ATF ATF Dexron II D or ALLI- SON C4 Below -20 °C run until warm according to operating instructi- ons
11.1	Automatic transmission ALLISON CLBT 740, CLBT 750, CLBT 754, CLBT 755 HT 755, HD 4560	LWE Id. No.: 861900608 Liebherr Hydraulic-Gear ATF ATF Dexron III or ALLISON C4	LWE Id. No.: 861903708 CASTROL Transynd ATF Dexron III or ALLISON C4 Below -20 °C run until warm according to operating instructi- ons
11.2	Automatic transmission ZF	LWE Id. No.: 861900608 Liebherr Hydraulic-Gear ATF ZF TE-ML 14	LWE Id. No.: 861900608 Liebherr Hydraulic-Gear ATF ZF TE-ML 14 Below -20 °C run until warm according to operating instructi- ons
12	Automatic transmission ZF AS-Tronic ZF TC-Tronic (basic gear) ZF TC-Tronic HD (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 gear ac- cording to operating instructi- ons

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
13.1	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 gear according to operating instructions
13.2	Torque converter coupling ZF TC 2	LWE Id. No.: 861900608 Liebherr Hydraulic-Gear ATF ZF TE-ML 14	LWE Id. No.: 861900608 Liebherr Hydraulic-Gear ATF ZF TE-ML 14
14	Transmission ZF ECO-Split	LWE Id. No.: 10218305 ZF-Ecofluid M ZF TE-ML 02	LWE Id. No.: 10218305 ZF-Ecofluid M ZF TE-ML 02
15	Slewing gear	LWE Id. No.: 861901208 Liebherr Gear PG 220 CLP PG 220, DIN 51517-3 WARNING: May not be mixed with other oils!	LWE Id. No.: 861901208 Liebherr Gear PG 220 CLP PG 220, DIN 51517-3 WARNING: May not be mixed with other oils!
16.1	Rope winch	LWE Id. No.: 861901208 Liebherr Gear PG 220 CLP PG 220, DIN 51517-3 WARNING: May not be mixed with other oils!	LWE Id. No.: 861901208 Liebherr Gear PG 220 CLP PG 220, DIN 51517-3 WARNING: May not be mixed with other oils!
16.2	Rope winch LR 13000	LWE Id. No.: 11000948 Liebherr Universal grease 9900 KPF2N-25, DIN 51502	LWE Id. No.: 11000948 Liebherr Universal grease 9900 KPF2N-25, DIN 51502
17	Winch of Telescopic boom guying	LWE Id. No.: 861901208 Liebherr Gear PG 220 CLP PG 220, DIN 51517-3 WARNING: May not be mixed with other oils!	LWE Id. No.: 861901208 Liebherr Gear PG 220 CLP PG 220, DIN 51517-3 WARNING: May not be mixed with other oils!
18.1	Crane hydraulics Crane chassis and crane superstructure Observe exceptions, see 18.2	LWE Id. No.: 861903508 Liebherr Hydraulic 37 HVLP, DIN 51524-3	LWE Id. No.: 10293807 Liebherr Hydraulic Plus Arctic HVLPD HC, DIN 51524-3

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
18.2	Crane hydraulics Crane chassis and crane superstructure LTM 11200-9.1 LTR 11200 LR 13000, LR 11000, LR 1600/2, LR 1600/2-W LTC 1055-3.1	LWE Id. No.: 10293807 Liebherr Hydraulic Plus Arctic HVLPD HC, DIN 51524-3	LWE Id. No.: 10293807 Liebherr Hydraulic Plus Arctic HVLPD HC, DIN 51524-3
19	Brake system if hydraulically actuated	LWE Id. No.: 861000108 DOT 4 SAE J 1703e	LWE Id. No.: 861000108 DOT 4 SAE J 1703e
20	Clutch actuator	LWE Id. No.: 861000108 DOT 4 SAE J 1703e	LWE Id. No.: 861000108 DOT 4 SAE J 1703e
21	King pin bearing Gear shaft if not maintenance-free	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
22.1	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
22.2	Rope pulley bearing	LWE Id. No.: 10296825 Liebherr Universal grease Arctic KPFHC1N-60, DIN 51502	LWE Id. No.: 10296825 Liebherr Universal grease Arctic KPFHC1N-60, DIN 51502
23	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
24.1	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
24.2	Slewing ring connection 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

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
25.1	Support plate with equalization if not self-lubricating	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
25.2	Glide shoes for cab guidance on vehicle frame 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
26	Sliding beam Plastic glide bearing Beam for track adjustment	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
27.1	Telescopic boom Plastic glide bearing Corner guide top	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
27.2	Telescopic boom Outer glide bearing Lower shell Inner glide bearing (only during assembly)	LWE Id. No.: 861303308 Liebherr Special grease 1336 KP2K-30, DIN 51502 Spray grease	LWE Id. No.: 861303308 Liebherr Special grease 1336 KP2K-30, DIN 51502 Spray grease
27.3	Telescopic boom LTC 1045-3.1 LTM 1050-3.1	LWE Id. No.: 11651459 Bechem Berulub TCG 1 V	LWE Id. No.: 11651459 Bechem Berulub TCG 1 V
28	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
29	Guide rail on Telescoping cylinder	LWE Id. No.: 861303308 Liebherr Special grease 1336 KP2K-30, DIN 51502 Spray grease	LWE Id. No.: 861303308 Liebherr Special grease 1336 KP2K-30, DIN 51502 Spray grease
30	Gear ring rotary connection Slewing gear drive pinion	LWE Id. No.: 861007708 RHS-Fluid OGPFOS-20, DIN 51502	LWE Id. No.: 861007708 RHS-Fluid OGPFOS-20, DIN 51502
31	Running rope	LWE Id. No.: 10173371 Liebherr WR-Lube SC Adhesive grease	LWE Id. No.: 10173371 Liebherr WR-Lube SC Adhesive grease

LWE/LR 1750-000/12812-15-02/en

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
32	Radiator fluid Diesel engine and heating system	LWE Id. No.: 10871121 Liebherr Antifreeze OS Mix Pre-mixed corrosion inhibitor / antifreeze WARNING: May not be diluted and / or mixed with other corrosion inhibitors / anti-freeze!	LWE Id. No.: 10871121 Liebherr Antifreeze OS Mix Pre-mixed corrosion inhibitor / antifreeze WARNING: May not be diluted and / or mixed with other corrosion inhibitors / anti-freeze!
33.1	Travel gears Crawler crane	See data tag	See data tag
33.2	Travel gears telescope crawler crane	See data tag	See data tag
34	Recovery winch	See data tag and manufacturer's instructions	See data tag and manufacturer's instructions
35	Recovery winch rope	See manufacturer's instructions	See manufacturer's instructions
36	Steering uncoupling LTC 1045-3.1 LTC 1050-3.1	LWE Id. No.: 10800345 Teflon Spray	LWE Id. No.: 10800345 Teflon Spray

Empty page!

LWE/LR 1750-000/12812-15-02/en

Fig.197077

LWE/LR 1750-000/12812-15-02/en

1 Procedure to follow in case of a problem

This chapter answers the following questions:

- What to do in case of a problem?
- Which data is important for communication with Liebherr Service?
- Which displays and component groups are relevant for error diagnostics?
- Which measures are to be taken in clear problem cases?
- How to proceed in case of error messages of the LICCON computer system?
- How can an error diagnostics be carried out?
- Which measures are to be taken for defective components?



WARNING

Incorrect operation!

Incorrect operation of the crane can result in death or serious injuries!

- ▶ The crane may only be operated by authorized expert personnel trained on mobile cranes by Liebherrwerk Ehingen!



WARNING

Measures without the help of Liebherr Service!

Measures in case of a problem, which are carried out without consulting Liebherr Service can cause damage to the crane. Personnel can be severely injured or killed!

- ▶ If problems remain or in case of error messages, consult Liebherr Service to determine the cause of the problem and further procedure.



Note

Error diagnostics without the help of Liebherr Service!

- ▶ For information regarding error diagnostics and error remedy, see „Diagnostics manual“.



Note

- ▶ The monitor illustrations in this section are only examples. The error codes shown in the monitor illustrations and the corresponding error descriptions might not exactly match the crane.

1.1 Procedure to follow in case of a problem

- ▶ Observe and adhere to the notes and instructions in this chapter.
- ▶ Before contacting Liebherr Service: Determine relevant data about the problem.
- ▶ Carry out the error diagnostics with the aid of Liebherr Service or the „Diagnostics manual“.
- ▶ Follow the instructions given by Liebherr Service.
- ▶ After error diagnostics: Replace defective components, which are supplied as spare parts.

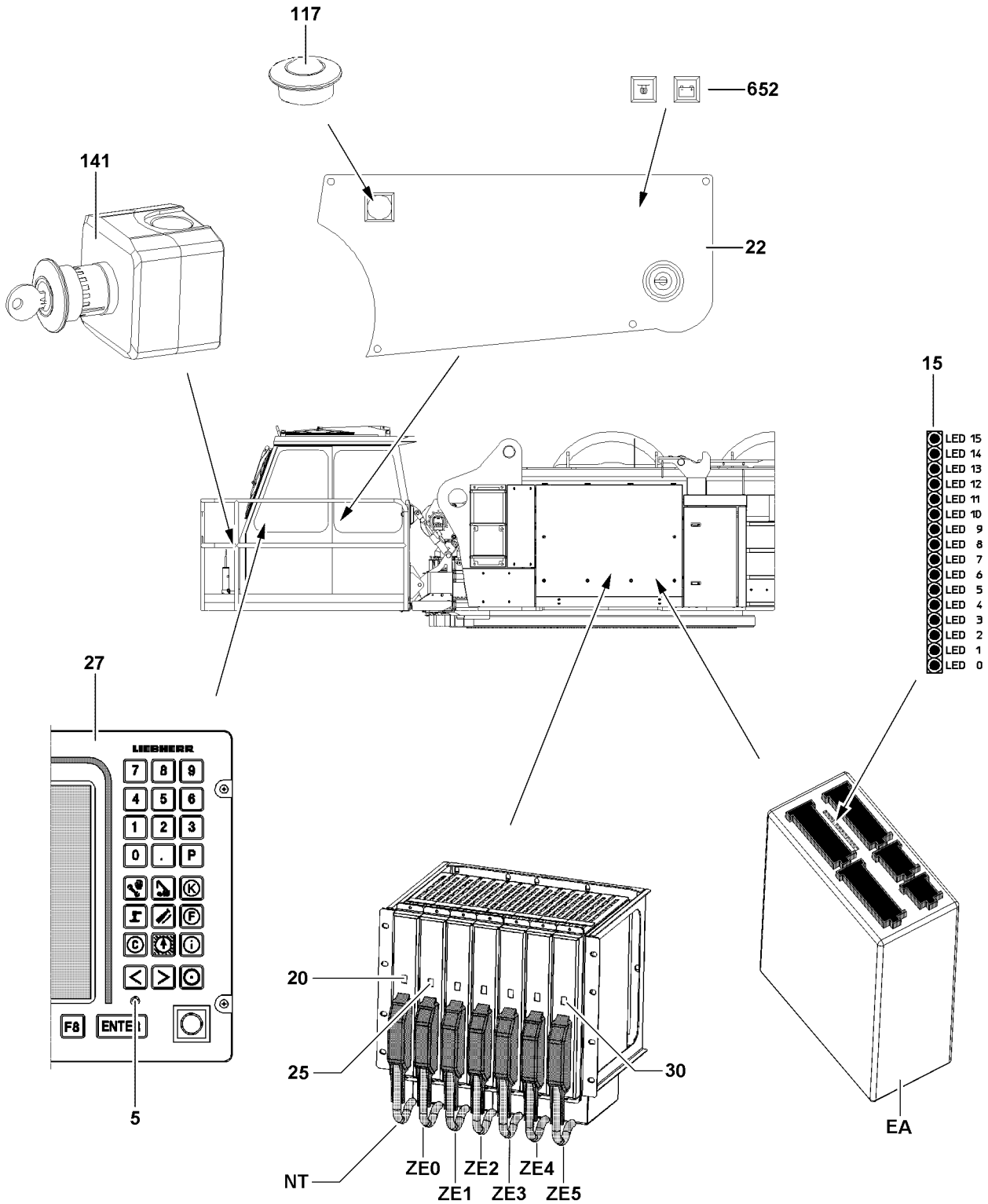


Fig.108791

LWE/LR 1750-000/12812-15-02/en

1.2 Overview of displays and component groups for error diagnostics

Various displays and component groups allow the crane driver:

- To localize error messages
- To communicate quicker and more precise with Liebherr Service
- With the aid of the „Diagnostics manual“: Diagnostics and remedy errors



Note

Error diagnostics without the help of Liebherr Service!

- ▶ For information regarding error diagnostics and error remedy, see „Diagnostics manual“.

- 5** LED
- 15** LED display I / O module
- 20** LED display power supply
- 22** Instrument panel
- 27** LICCON monitor
- 117** EMERGENCY OFF switch in the crane operator's cab
- 141** EMERGENCY OFF switch on the crane operator's cab
- EA** I / O module
- NT** Power supply
- ZE** CPUs
 - CPU 0 **ZE0** to CPU 5 **ZE5**
 - LED displays CPU
 - LED display CPU0 **25** to LED display CPU5 **30**

1.3 Which data is required by Liebherr Service?

If the assistance of Liebherr Service is required, always provide the following information:

- Crane type
- Crane number
- Complete error number and any error message displayed on the LICCON monitor **27**
- For certain errors: LED displays of power supply **NT** and CPUs **ZE**
- Application conditions of the crane
- Action during which the error occurs
- Frequency of error

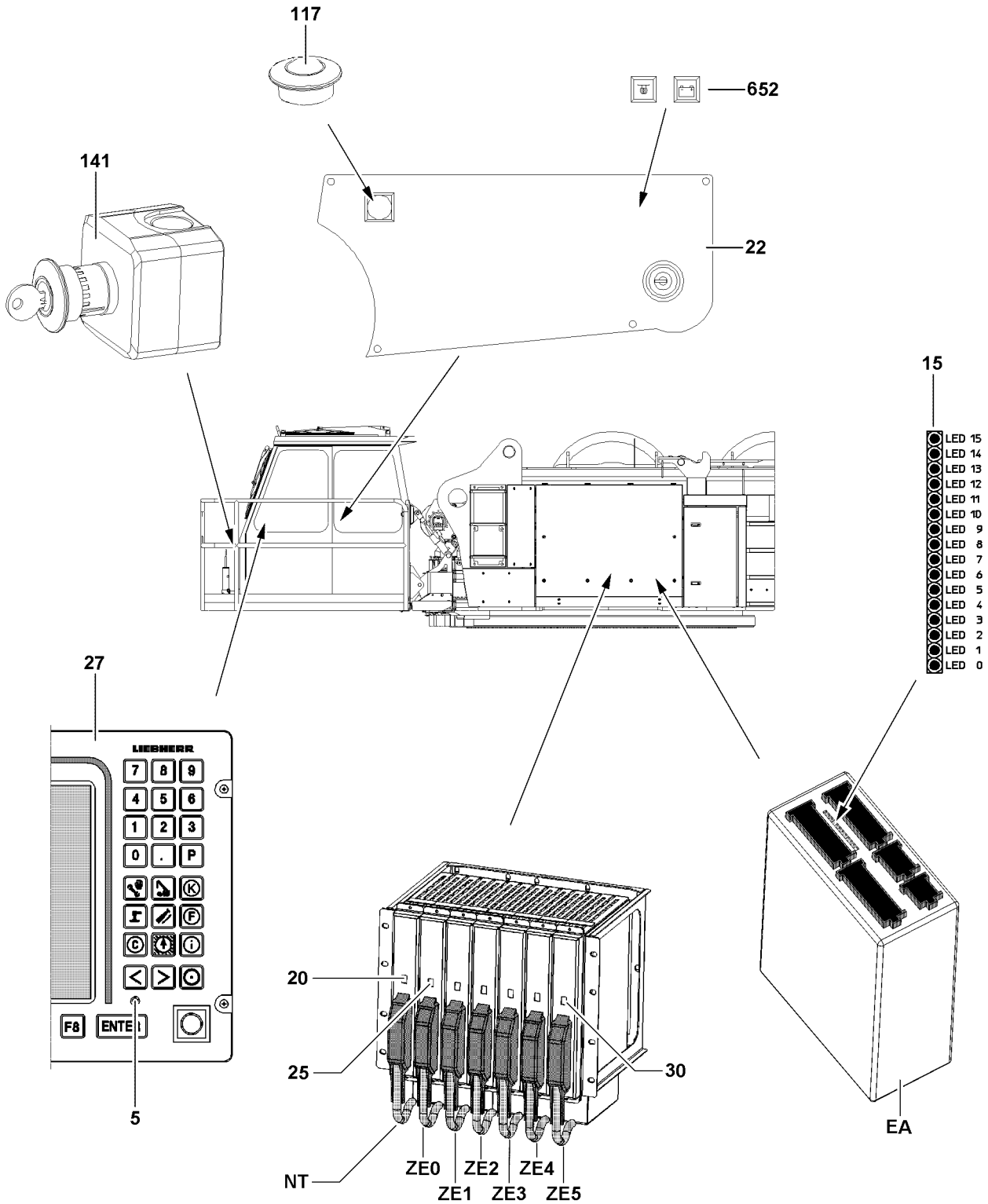


Fig.108791

LWE/LR 1750-000/12812-15-02/en

2 Measures in clear problem cases

Measures, which are taken in clear problem cases, are described in this section.



Note

- ▶ If a problem occurs, which is not described in this chapter:
- ▶ Contact Liebherr Service to determine the cause of the problem and further procedure.

Clear problem cases are:

- Engine does not start.
- Hydraulic, electric or engine failed.
- An alarm function occurs.
- LICCON computer system shows an error message.

2.1 The engine does not start?

- ▶ Make sure that the EMERGENCY OFF switch **117** and the EMERGENCY OFF switch **141** are not actuated.
- ▶ Make sure that the crane driver is seated on the crane driver's seat.
- ▶ Turn the ignition off.
- ▶ Start the engine again.

If the engine still cannot be started:

- ▶ Monitor the indicator lights **652** on the instrument panel **22**.



Note

- ▶ For Problem remedy, see chapter 4.03, section „Starting the engine and turning it off“.

If the error cannot be remedied:

- ▶ Contact Liebherr Service to determine the cause of the problem and further procedure.

2.2 Have the hydraulic, electric or engine failed?



Note

- ▶ Is the equipment for hydraulic emergency control part of the scope of delivery, the crane can be taken down when the crane hydraulic, crane electric and crane engine failed.
- ▶ For emergency control, see chapter 6.05.

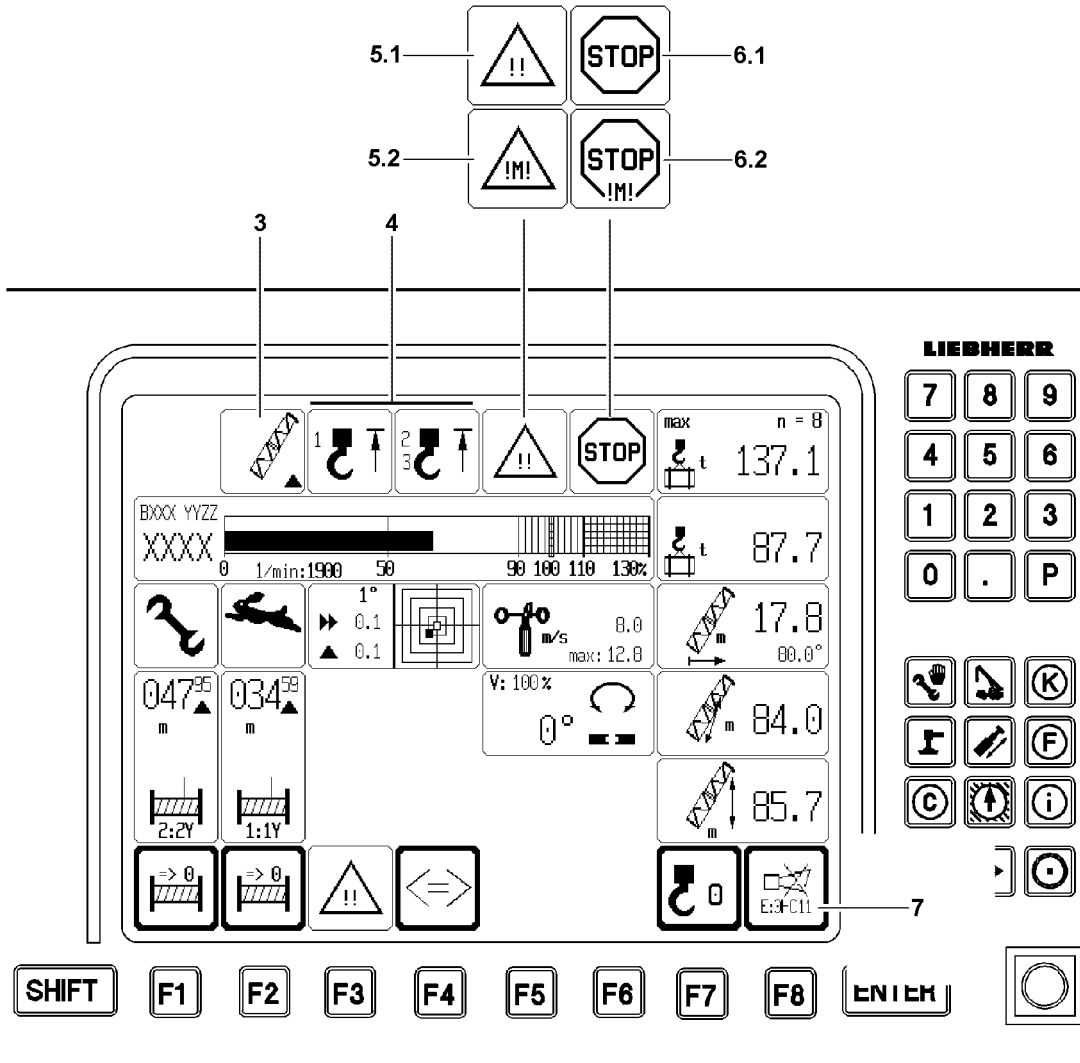


Fig.109972

LWE/LR 1750-000/12812-15-02/en

2.3 Did an alarm function occur?



Note

- ▶ For a detailed description of alarm functions, see chapter 4.02.
- ▶ In case of an alarm function, an error message 7 with LICCON error code appears at the same time.

The following alarm functions are indicated by blinking icons on the LICCON monitor 0:

- 3 Boom limitation
- 4 Hoist top limit switch
- Advance warning load 5.1 / Advance warning engine 5.2
- Stop load 6.1 / Stop engine 6.2

The limit ranges of the crane movements are monitored by:

- Hoist limit switch
- Angle sensors
- Pressure sensors
- Pull test brackets (force measuring boxes)
- Wind sensor
- Inductive sensors

If the limit ranges for these sensors are exceeded, the crane movements are turned off (LMB-STOP).

The load moment limiter (LMB) is a program of the LICCON computer system to monitor the permissible load moment. If the permissible load moments of the load chart are exceeded, the LMB-STOP turns the crane movements off.



Note

- ▶ In case of certain shut offs, you can only continue to work by bypassing the safety devices.



WARNING

Risk of accident!

Personnel can be severely injured or killed!

- ▶ All instructions and data in chapter 4.04 must be observed and adhered to!



DANGER

Bypassing the overload protection!

If the overload protection is bypassed, there is no further protection against crane overload!

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be severely injured or killed!

This could result in high property damage!

- ▶ It is only permitted to bypass the overload safety device during assembly or in emergencies!
- ▶ The bypass may only be carried out by persons who are aware of the effects of their acts regarding the bypass of the overload protection!
- ▶ Bypassing the overload protection requires the presence of the crane supervisor and must be performed with utmost caution!
- ▶ Crane operation with bypassed overload safety device is prohibited!
- ▶ Contact Liebherr Service to determine the cause of the problem and further procedure.

If a LMB-STOP occurs due to boom limitation:

- ▶ Carry out load moment reducing crane movements.

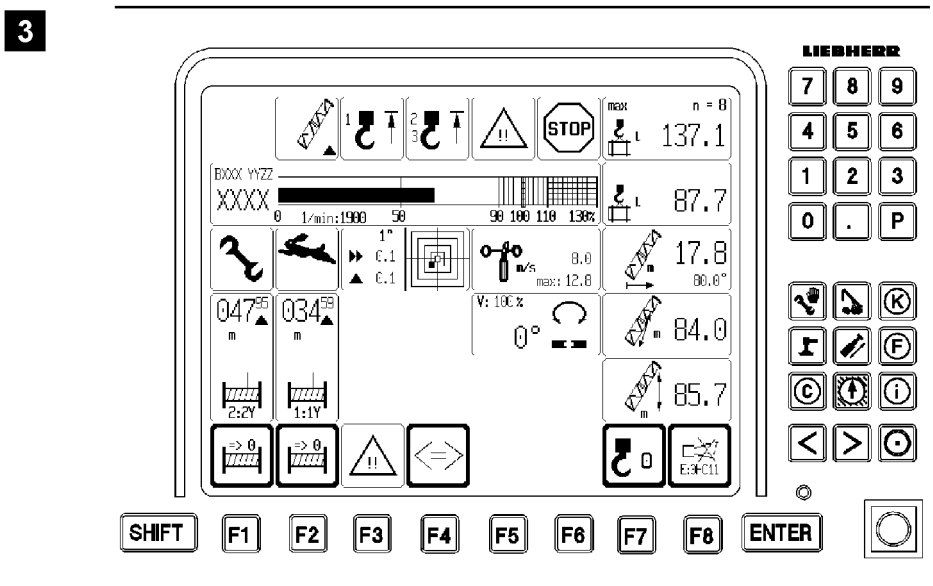
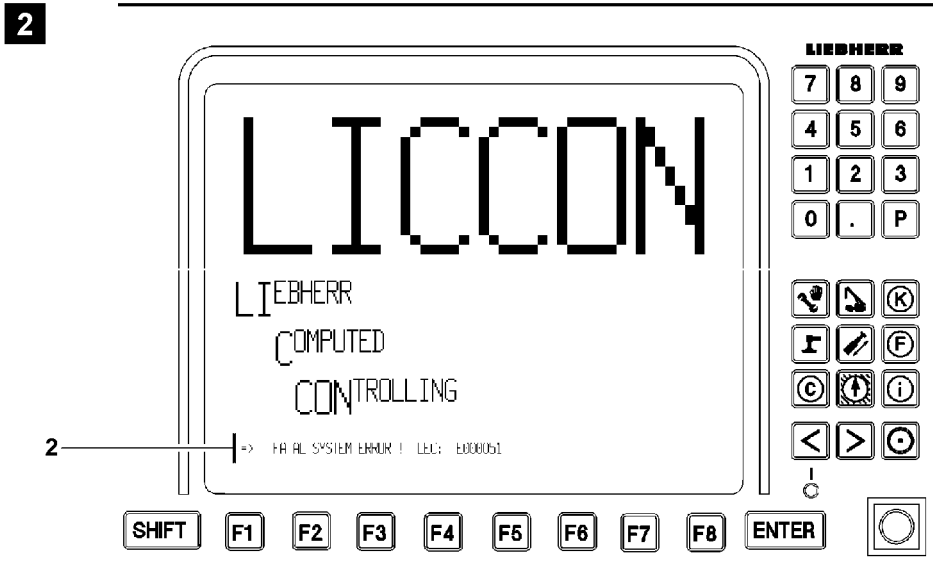
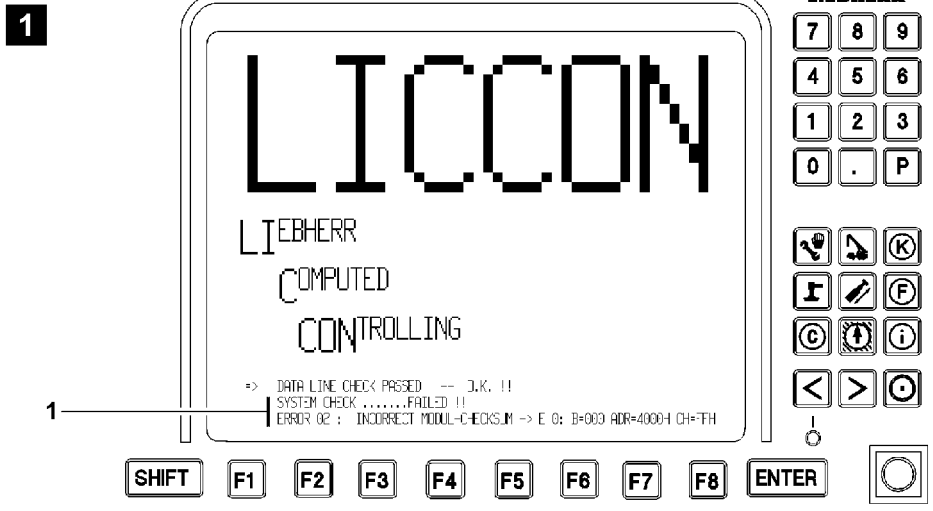


Fig.109973

LWE/LR 1750-000/12812-15-02/en

2.4 LICCON computer system shows an error message?



WARNING

Risk of accident!

Personnel can be severely injured or killed!

The crane can be severely damaged or destroyed!

▶ All instructions and data in chapter 4.04 must be observed and adhered to!

Examples of error messages:

- While the LICCON computer system starts up, see error display illustration 1, example 1.
- During operation, see error display illustration 2, example 2.
- During operation, see operating screen illustration 3, example 3.

Differentiation of error messages on the LICCON monitor:

- Error without LICCON Error Code (LEC), see example 1.
- Error with LICCON Error Code (LEC), see example 2 and example 3.

Differentiation of errors in crane operation:

- Errors which lead to shut down: The shut down icon is shown.
- Errors which do not lead to shut down: The crane operator is warned.

2.4.1 Remediating temporary errors during system start



Note

▶ While the LICCON computer system starts, temporary errors can occur, see illustration 1.

Errors, which occur temporarily, can have the following causes:

- Loosen contact
- Fluctuations in the power supply
- Error message can be a subsequent error

▶ Turn the LICCON computer system off and restart it after waiting for at least 5 s.

▶ Repeat this procedure up to three times (wait 2 min after 3 start attempts).

If the same error view appears several times:

▶ Turn the LICCON computer system off.

▶ Call up the test system, see section „Calling up the test system program“.

▶ Contact Liebherr Service to determine the cause of the problem and further procedure.

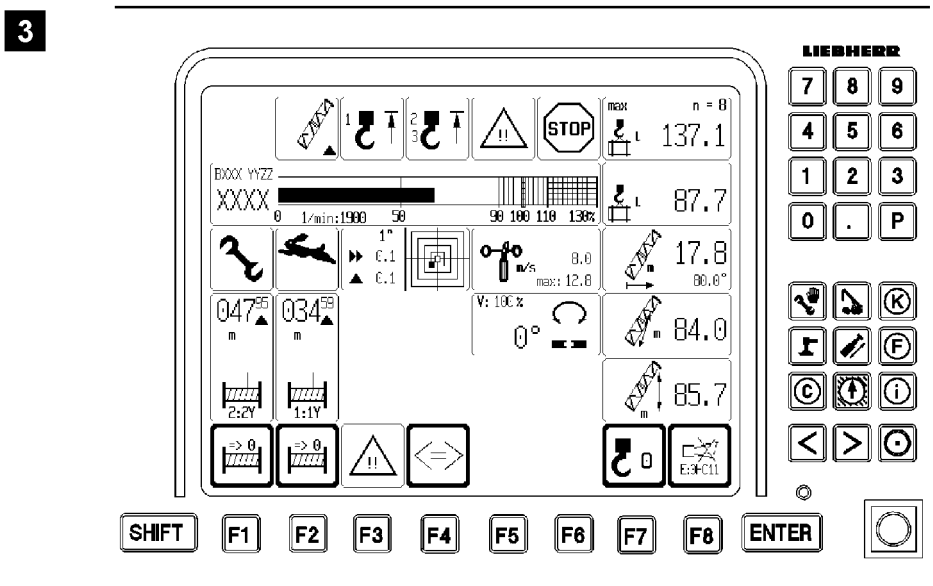
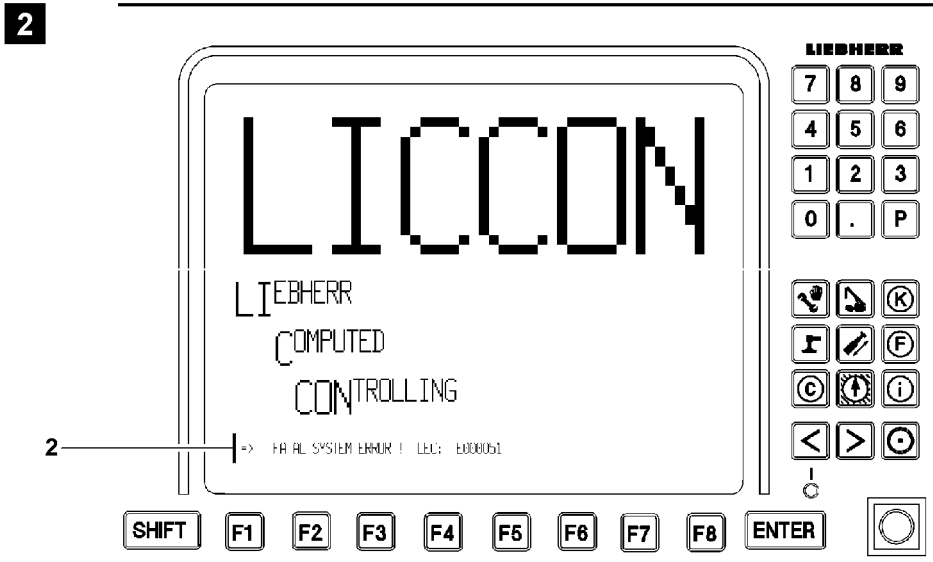
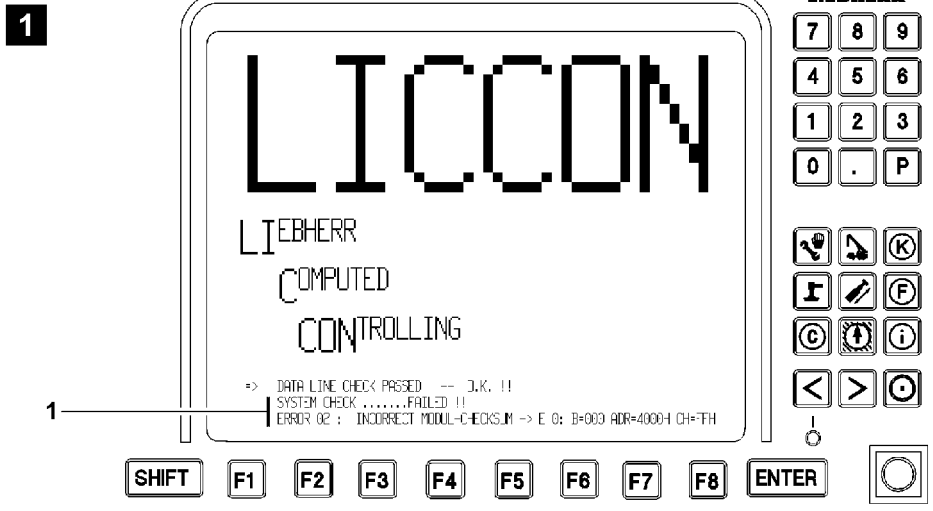


Fig.109973

LWE/LR 1750-000/12812-15-02/en

2.4.2 Procedure in case of error messages with LEC

Two different types of errors are differentiated with the LEC:

- Operating errors - Error code starts with a „B“.
- System errors / application errors - Error code starts with an „E“.

A LEC is always 6-digit.

Example of an error code: E:OHC11	
Element	Description
E:	Error class
0	CPU
HC11	I / O module and number, or processor of CPU

If an error code starts with a „B“:

- ▶ Correct the operating error.

If an error code starts with an „E“:

- ▶ Call up the test system, see section „Calling up the test system program“.
- ▶ Contact Liebherr Service to determine the cause of the problem and further procedure.

4

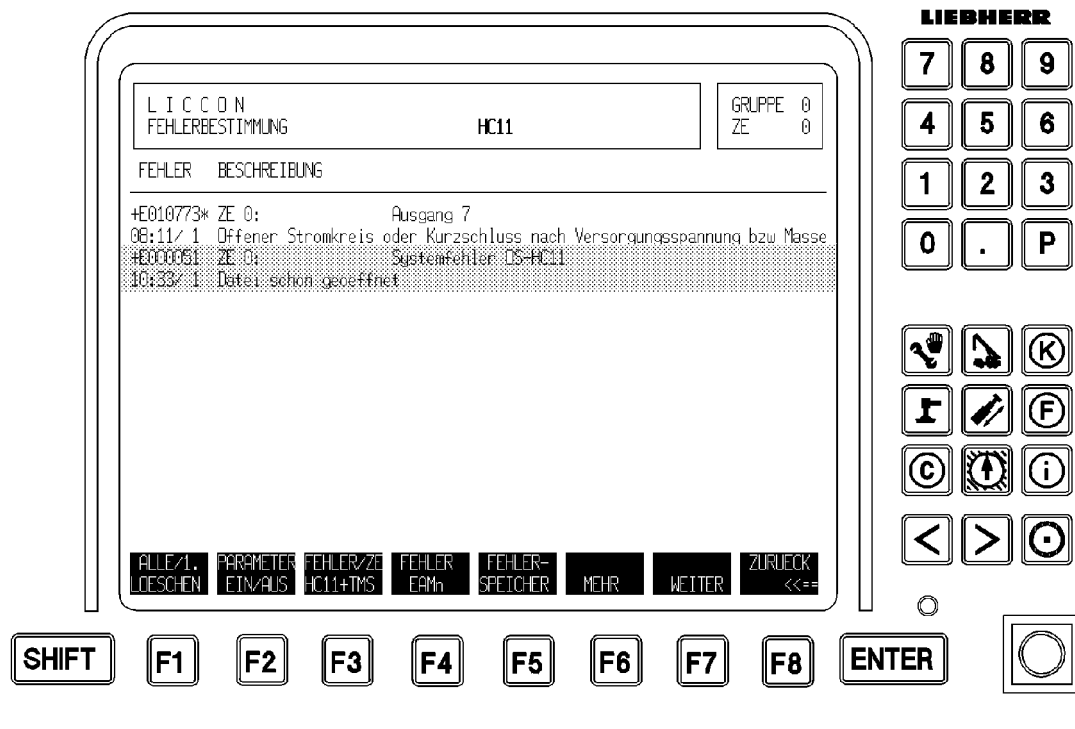


Fig.106381

2.4.3 Calling up the „Test system“ program

Error messages of the LICCON computer systems with LEC are described in the error determination screen, illustration 4. To do so, change into the test system program.

Listed errors in the error determination screen are differentiated by:

- Active errors - Error code starts with a „+“ .
- Inactive errors - Error code starts with a „-“ .



Note

- ▶ Active errors have higher priority than inactive errors and must be taken care of.
-

Calling up the „Test system“ from the operating screen

Make sure that the following prerequisites are met:

- Error message visible in the icon element „Horn“, see illustration 3.
- Warning signal „Horn“ is audible.

- ▶ Press function key **F8** once.

Result:

- Horn is turned off.

- ▶ Press function key **F8** twice.

Result:

- Change into the error determination screen.
- Listing of errors with LEC and error text.

Calling up the „Test system“ after an error screen

Make sure that the following prerequisites are met:

- The operating screen changes into the error screen (system error), see illustration 2.
- Crane functions are interrupted.

or:

- Error screen, while the LICCON computer system starts up, see illustration 3.

- ▶ Turn the LICCON computer system off.

- ▶ Turn the LICCON computer system back on after approx. 5 s.

Result:

- Change into the error determination screen.
- Listing of errors with LEC and error text.

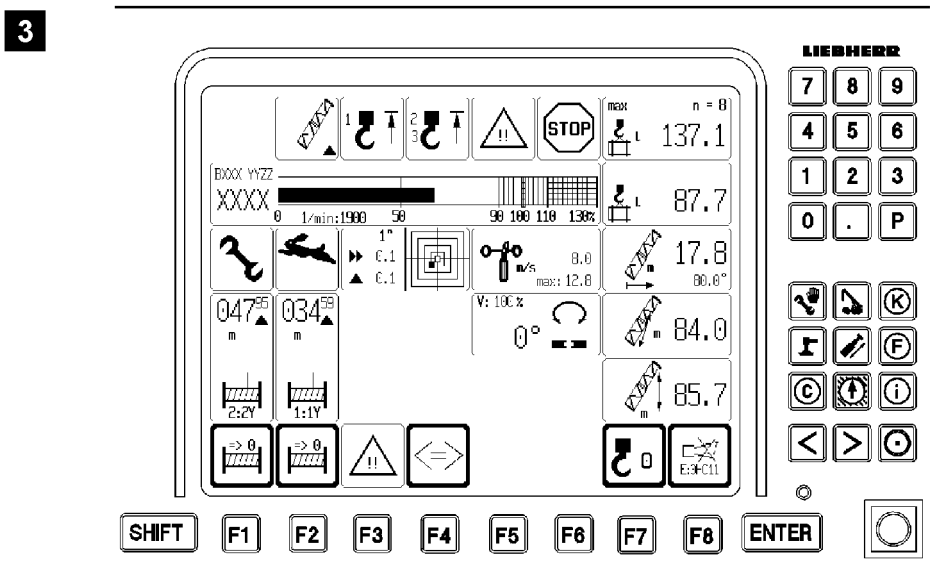
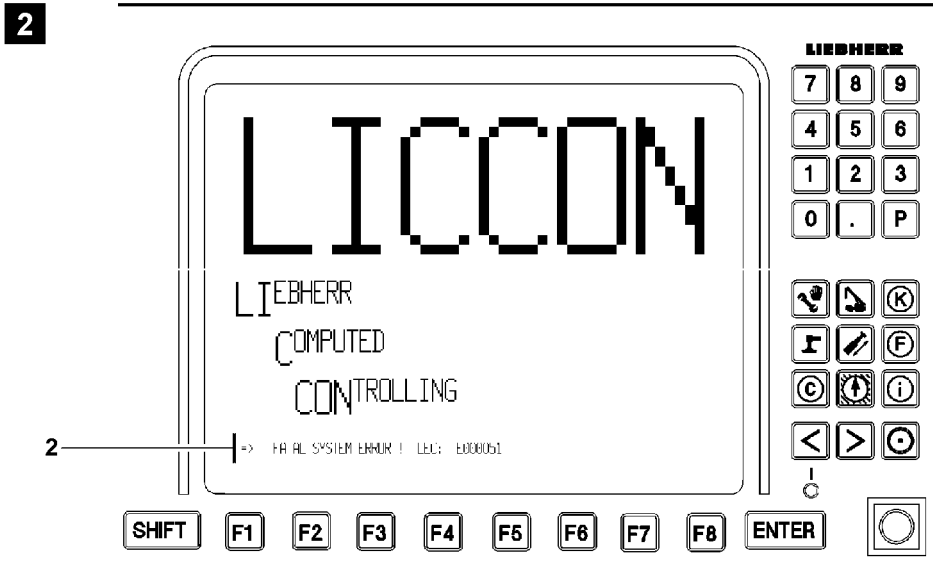
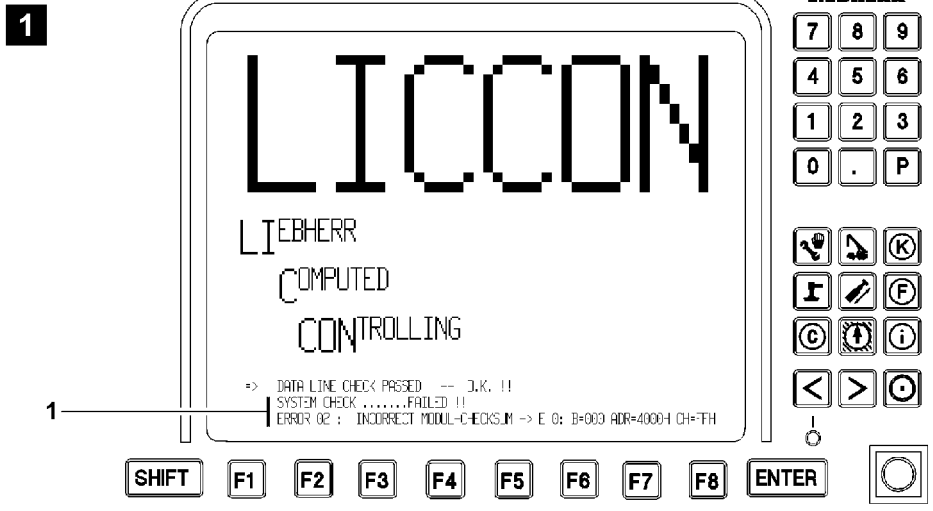


Fig.109973

LWE/LR 1750-000/12812-15-02/en

3 Carrying out an error diagnostics

Several possibilities exist for an error diagnostics:

- With the help of Liebherr Service.
- With the help of Liebherr Service via remote diagnostics.
- Without the help of Liebherr Service.

3.1 Error diagnostics with the help of Liebherr Service

3.1.1 Error diagnostics by phone

- ▶ Contact Liebherr Service to determine the cause of the problem and further procedure.
- ▶ Follow the instructions given by Liebherr Service.

3.1.2 Remote diagnostics

The remote diagnostics makes it possible for Liebherr Service to check Liebherr cranes from a remote location in case of problems.

Activation of the remote diagnostics device is first carried out by Liebherr Service.

Make sure that the following prerequisites are met:

- The crane operator has a valid SIM-card (telephone card for mobile telephones) from a current mobile network operator.
- The telephone number of the data service is known.
- The PIN code request of the SIM-card is deactivated.
- The SIM-card is installed in the GSM module.
- For information for remote diagnostics, see „Diagnostics manual“.
- Follow the instructions given by Liebherr Service.



Note

- ▶ For information for remote diagnostics, see „Diagnostics manual“.
 - ▶ Follow the instructions given by Liebherr Service.
-

3.2 Error diagnostics without the help of Liebherr Service



WARNING

Measures without the help of Liebherr Service!

Measures in case of a problem, which are carried out without consulting Liebherr Service can cause damage to the crane. Personnel can be severely injured or killed!

- ▶ If problems remain or in case of error messages, consult Liebherr Service to determine the cause of the problem and further procedure.
-



Note

Error diagnostics without the help of Liebherr Service!

- ▶ For information regarding error diagnostics and error remedy, see „Diagnostics manual“.
-

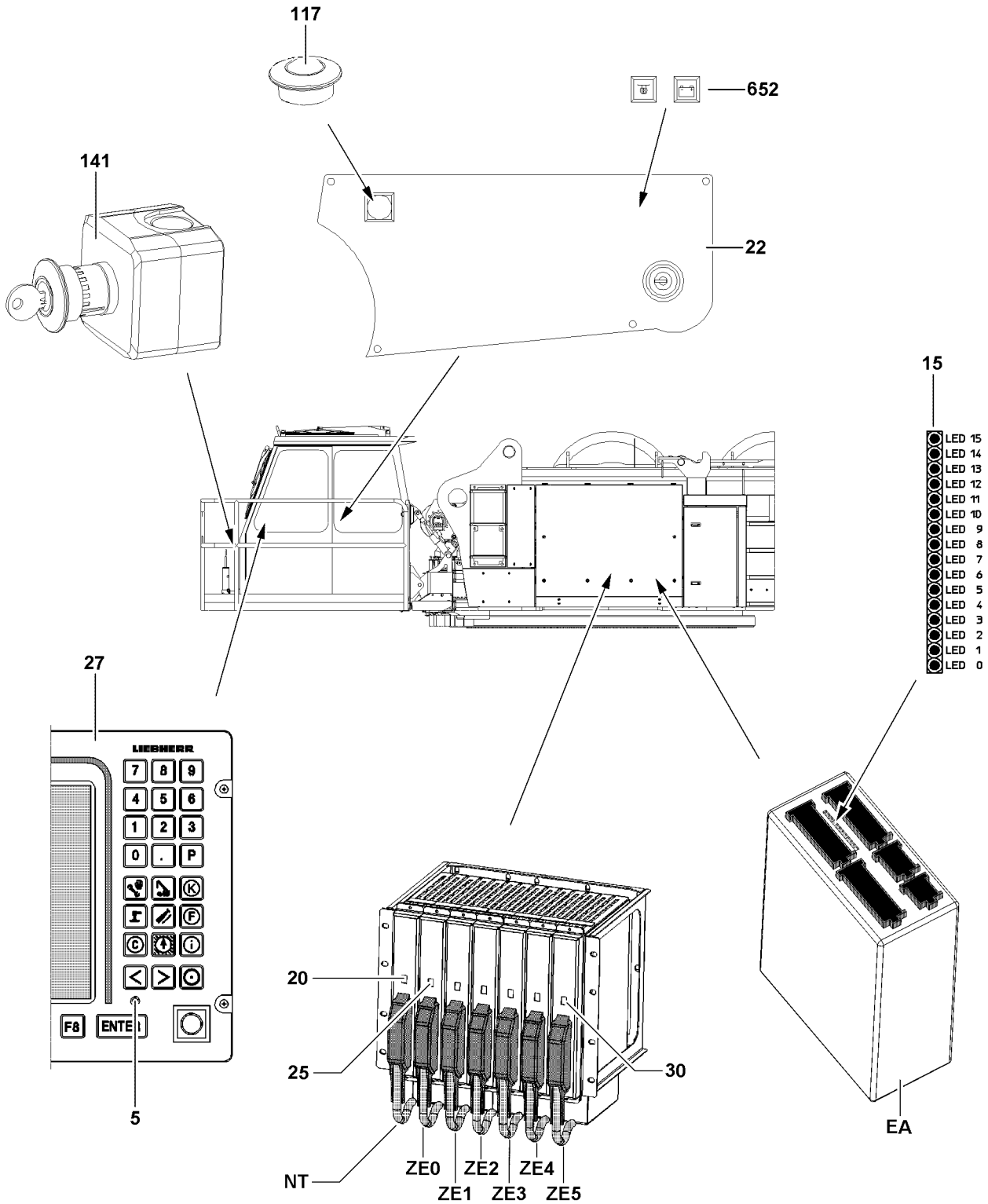


Fig.108791

LWE/LR 1750-000/12812-15-02/en

4 Measures for defective components

The following components are part of the scope of delivery as spare parts:

- **27** LICCON monitor
- **NT** Power supply
- **ZE** CPU



WARNING

Danger to life if original attachment parts are **not** used!

If the crane is operated with attachment parts, which are **not** original, then the crane can fail and cause fatal accidents!

Crane components can be damaged!

- ▶ Operate the crane only with original attachment parts!
- ▶ Crane operation with attachment parts, which do **not** belong to the crane is prohibited!



DANGER

The crane permit and the manufacturer's warranty will become void!

If any original installed parts are modified, manipulated or replaced (e.g. removal of parts, installation of non-original Liebherr parts), both the crane permit and the manufacturer's warranty will become void.

- ▶ Leave installed original parts unchanged!
- ▶ Do not remove installed original parts!
- ▶ Use only Original Liebherr spare parts!



Note

- ▶ For instructions describing the replacement of a defective LICCON monitor, a defective power supply **NT** or a defective CPU **ZE**, see „Diagnostics“ manual.

Make sure that the following prerequisites are met:

- Error diagnostics has been carried out.
- Defective component has been determined.

4.1 Is the LICCON monitor defective?

- ▶ Replace LICCON monitor with a functioning substitute monitor.

4.2 Is the power supply defective?



Note

- ▶ When replacing the power supply unit **NT**, transfer the Common memory of the removed power supply **NT**.
- ▶ A spare power supply unit is located in the switch cabinet crane control.
- ▶ The power must be turned off when replacing the power supply **NT**. When pulling out the power supply unit plug from the socket, the stand-by power supply of the module will be interrupted. In other words, a cold start results. The stored set-up state data and the adjusting events will be lost.
- ▶ Replace the power supply **NT** with a functioning power supply.

4.3 Is the CPU defective?



Note

- ▶ When replacing the central processing unit **ZE**, transfer the program memory of the removed central processing unit **ZE**.
- ▶ A spare central processing unit is located in the switch cabinet crane control.
- ▶ The power must be turned off when replacing the central processing unit **ZE**. When pulling out the central processing unit **ZE** from the module carrier, the stand-by power supply of the module will be interrupted. In other words, a cold start results. The stored set-up state data and the adjusting events will be lost.

- ▶ Replace the CPU **ZE** with a functioning spare CPU.

4.4 Is the electrical connection of a cable drum interrupted?



WARNING

Interrupted electrical connection!

If the electrical connection of a cable drum is interrupted, then this causes a shut off (LMB STOP). No further crane movements are possible.

- ▶ Contact Liebherr Service to determine further procedure.

4.5 Is a sensor or limit switch defective?

Certain crane functions are monitored with two sets of sensors and limit switches.



Note

- ▶ For double version: If only one of the two limit switches or sensor defective, then work can continue with the crane.

- ▶ Replace the defective limit switch or sensor.



Note

- ▶ For single version: If a limit switch or sensor is defective, then this causes a shut off (LMB STOP).
- ▶ For double version: If both limit switches or sensors are defective, then this causes a shut off (LMB STOP).



WARNING

Bypassing the overload protection!

If the overload protection is bypassed, there is no further protection against crane overload!

In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be severely injured or killed!

This could result in high property damage!

- ▶ It is only permitted to bypass the overload protection for assembly or in emergencies!
- ▶ The bypass may only be carried out by persons who are aware of the effects of their acts regarding the bypass of the overload protection!
- ▶ Bypassing the overload protection requires the presence of the crane supervisor and must be performed with utmost caution!
- ▶ Missing values must be monitored manually and must match the load chart.
- ▶ Crane operation with bypassed overload safety device is prohibited!
- ▶ Contact Liebherr Service to determine the cause of the problem and further procedure.
- ▶ All instructions and data in chapter 4.04 must be observed and adhered to!

- ▶ Contact Liebherr Service to determine further procedure.

8 Inspections of cranes

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 General information

This crane was tested at the manufacturer's facilities prior to shipment in accordance with the valid ISO, FEM and DIN Standards and DGUV 52 (DGUV 309-001).

The safety level achieved during initial start up may not be attainable during operation.

Examples of the root cause of such deviations include; e.g., wear and tear, corrosion, effects of external forces, changes in the environment and changes to the mode of operation.

The operator is responsible for taking the necessary steps to ensure that the level of safety is maintained.

Periodic inspections are regulated nationally in the BetrSichV.

The crane operator is therefore obligated to have the crane inspected by an **authorized inspector**, at intervals depending on the operational conditions but at least once per year, from the first day of vehicle registration.

Every 4 operating years, in the 13th operating year and thereafter at least annually, from the first day of vehicle registration, the crane must be inspected by an **inspection expert**.

Periodic inspection are principally a visual inspection, where the inspector (either type) appraises the condition of the crane and its components.



WARNING

There is a risk of weakening the supporting components when major changes or repairs are made to the crane!

- ▶ In this case, the operator must have the crane reinspected by an inspection expert before placing it back into service!

In addition, all respective local and national regulations also apply.

Authorized inspector

Authorized inspectors are those persons who through their professional training, their professional experience and their recent professional activity have the necessary knowledge for the inspection of work equipment.

Authorized inspector for pressure tanks

Authorized inspector for pressure tanks are authorized inspectors who additionally:

- Have relevant technical professional training.
- Have at least one year of experience with the manufacture, assembly, operation or maintenance of the equipment or components to be inspected in accordance with BetrSichV.
- Keep their knowledge about pressure-related hazards up to date by participating in training or instruction, in particular with regard to the following topics:
 - Design and manufacturing processes
 - Equipment and safeguarding concepts
 - Assembly, installation and operation / use
 - Destined use
 - Risk assessment
 - Inspections, inspection periods, inspection procedures including assessment of the results
 - Relevant influences and damage symptoms found in practice

Inspection expert

Inspection experts are authorized inspectors who also:

- Have completed training as an engineer or have equivalent knowledge and experience in the subject area with which their activities are involved.
- Have at least three years of experience in the design, construction, maintenance or inspection of cranes, of which at least half a year were involved in the inspection activities of an inspection expert.
- Possess sufficient knowledge of the relevant regulations and rules.
- Have the necessary facilities for inspection and documentation.
- Keep their professional knowledge up to date.

To ensure the high safety standard of the crane, it is recommended, no later than the 12th year, in the 20th year, in the 26th year and then every 4 years, to have the crane undergo a **general inspection** by an **inspection expert**. At that time, in addition to the usual scope of inspection, all load carrying parts of the crane - the complete steel structure with all welding seams as well as all components and connecting devices - are to be subjected to a complete visual inspection. The following procedural notes for repeat inspections are to be observed for that.

The purpose of the inspections is to avoid accidents by detecting deficiencies early on. Any deficiencies found by the inspector must be documented, corrected and subsequently reinspected.

A number of important examples of items that are particularly important during the periodic crane inspections are listed in the following. We wish to advise that the **authorized inspectors** or **inspection experts** take sole responsibility for the crane inspections that they carry out.



Note

- ▶ The inspection may not be solely limited to the following positions shown in the sample construction illustrations. Rather the **entire** crane structure must be subjected to a careful inspection!

In the Crane operating instructions, chapter 8.90 is a checklist to assist the inspector during the periodic inspections of Liebherr mobile and crawler cranes.

If the inspector has any questions they should be directed through the Service Department of Liebherr-Werk Ehingen GmbH to the technical departments.



WARNING

Danger of accident!

- ▶ Adhere to the following inspection guidelines and intervals.

2 Inspection of carrying crane structures, especially steel structures

2.1 Basic principles and procedure



DANGER

Danger of fatal injury!

The crane structures, particularly steel constructions, have to be checked by an **authorized inspector** or **inspection expert** at least once a year. If this is not the case, they could fail and cause fatal injury or seriously damage the crane!

- ▶ Crane structures, particularly steel constructions must be checked by an **authorized inspector** or an **inspection expert** at least once a year!
- ▶ Shorten the inspection intervals when the crane is subjected to above-average load spectrums, for example when handling large material quantities or frequently erecting long boom systems.
- ▶ When the crane was subjected to excessive operating loads; e.g., due to an unusual impact, the crane structure, especially the steel structures must be inspected immediately!

Crane structures, especially steel structures, such as booms, turntables, chassis, support equipment (e.g., sliding beams or folding outriggers) must be carefully inspected, at the very least during the annual recommended crane inspections. Inspect welding seams especially through an intensive visual inspection.

If paint damage with corrosion (rust) is found on load carrying parts of the crane structure, especially on telescopic booms, lattice booms, lattice jibs, pull rods etc., then the rust must be removed, primed and painted.

During an electrolyte process, such as corrosion in combination with water, an atomic hydrogen is created, which causes to hydrogen induced corrosion with resulting cracks on high tensile fine grain construction steel.

If disassembly and assembly work on the crane is required to carry out the inspections, then they must be carried out by taking the manufacturer's data into account or in coordination with the crane manufacturer.

We would like to point out that the framework of mobile cranes is designed for a limited number of stress work cycles. This also determines the utilization or service life of the framework. The service life is not determined solely by the number of stress cycles. It also depends on the loads (load spectrum) applied during the time in operation.

Liebherr mobile and crawler cranes are designed for specific characteristics and movements, such as constant deployment of drive forces, only occasional operation and load conditions according to EN 13000.

Liebherr mobile and crawler cranes are designed for assembly operation and, according to grouping in class A1 according to ISO 4301-1, they can only take on a limited number of work cycles ($N = 63000$) with a collective class Q1 = light ($k_p = 0.125$).

Example of a load collective according to grouping in collective class Q₁ = light ($k_p = 0.125$).

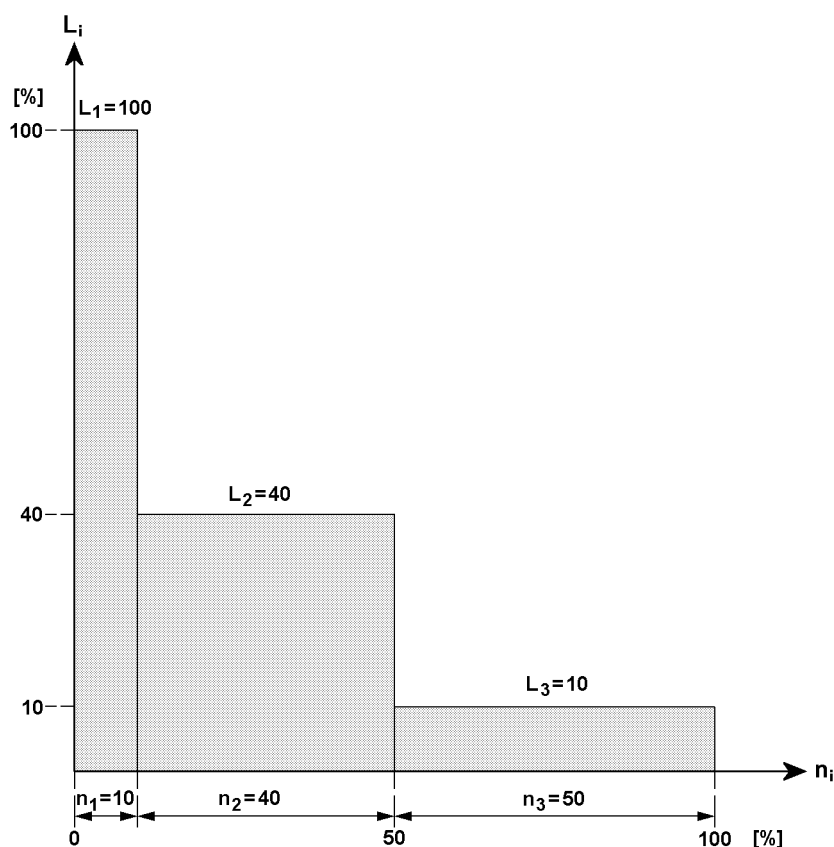


Fig. 104716

L_i: Load proportion in relation to maximum load [%] **n_i:** Load cycles in relation to maximum number [%]



Note

- ▶ The service life of Liebherr mobile and crawler cranes can be drastically reduced, for example when used in magnet, grapple or material handling applications!
- ▶ Repeated inspection of crane structure, especially the steel structure and the welding seams must then be carried out in shorter intervals than specified.

For that reason, the steel structures and the welding joints must be subjected to a visual intensive inspection by the **authorized inspector** or **inspection expert** during the specified periodic inspections.

If any damage (such as cracks or suspicion of cracks) are apparent on any part of the steel structure, the total extent of the damage must be determined by qualified specialists using appropriate material

testing methods, such as magnetic crack detection, ultrasound or x-rays. Thereafter, the qualified personnel must determine whether or not the damaged area can be repaired by welding or by other means.

The following diagrams are samples of the load-bearing welding structures. The welding joints or seams or steel structural zones that require inspection may be present more than once and in various forms. The joints or zones must be inspected all around at the locations identified by arrows.



Note

- ▶ The scope and extent of all inspections remain the sole responsibility of the inspectors!
- ▶ The scope and results of tests should be documented to permit reproducibility. This documentation forms part of the crane records and should be safely stored during the entire service life of the crane!
- ▶ The following diagrams are provided to assist the inspector. The illustrations are only examples and are not necessarily 100 % complete!

2.2 Repair welding

Defects such as cracks or permanent deformation on load-bearing steel components must be immediately reported to the Service Department at **Liebherr-Werk Eningen GmbH**.

The defect must immediately be appraised by an inspection expert according to standard welding technology rules. The inspection expert must immediately ascertain if the crane can continue to be safely operated due to danger of accident until a repair welding is performed.

Repair welding may solely be made in consultation and under the instructions of the Customer Service at **Liebherr-Werk Eningen GmbH** by authorized and trained expert personnel.



WARNING

Repair welding **not** according to regulations!
Death, severe bodily injuries, property damage.

- ▶ Contact Customer Service at **Liebherr-Werk Eningen GmbH**.
- ▶ Coordinate the procedure for repair welding with **Liebherr-Werk Eningen GmbH**.



Note

Exclusion of liability!

For repair welding, which were not carried out by personnel from **Liebherr-Werk Eningen GmbH** or by authorized personnel from **Liebherr-Werk Eningen GmbH**, **Liebherr-Werk Eningen GmbH** excludes any liability, for system functionality as well as for the parts.

- ▶ Have repair welding made solely by personnel of **Liebherr-Werk Eningen GmbH** or by personnel authorized by **Liebherr-Werk Eningen GmbH**.

2.3 Example for test points

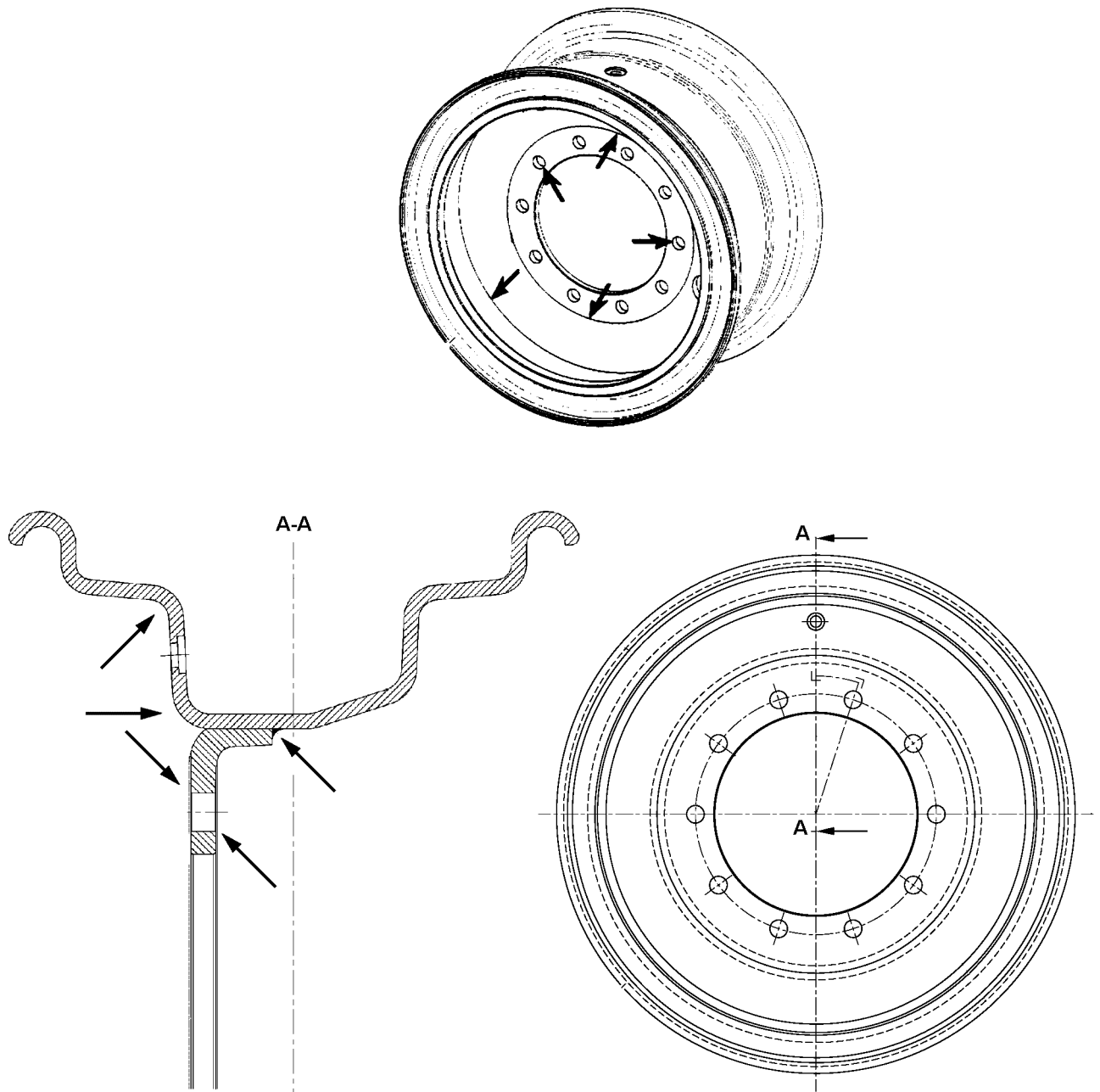


Fig.118052: Example for 1-part disk wheel

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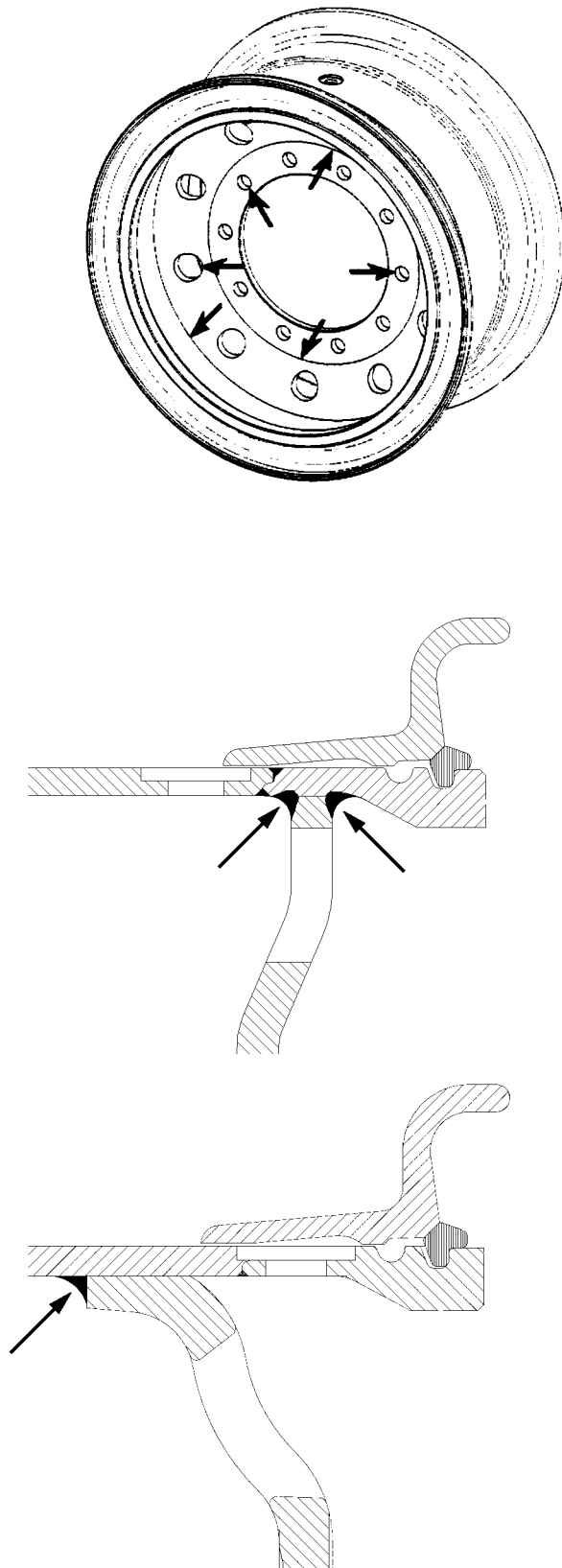
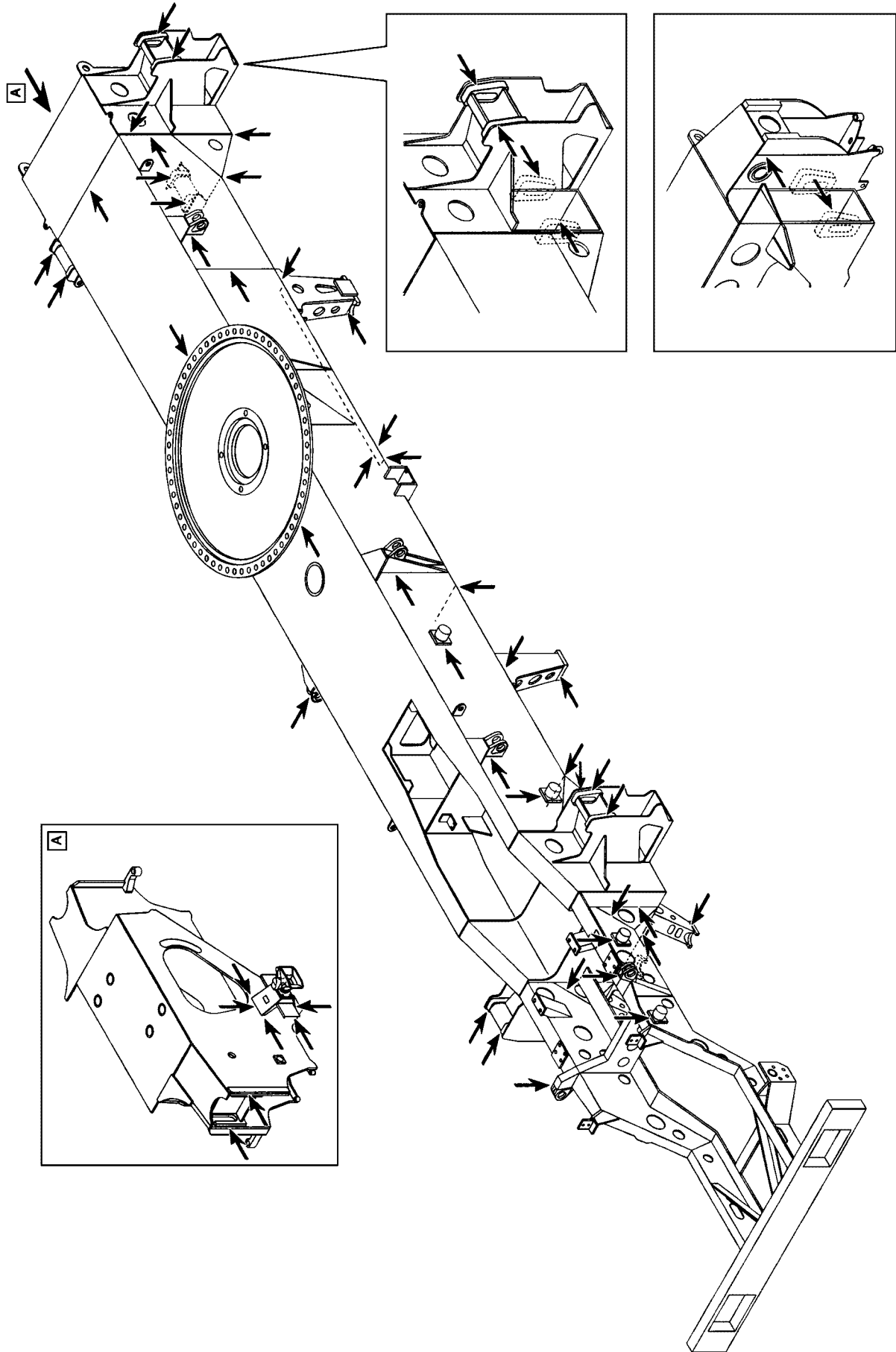


Fig.118053: Example for 3-part disk wheel

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LWE/LR 1750-000/12812-15-02/en

Fig.185046: Example for vehicle frames

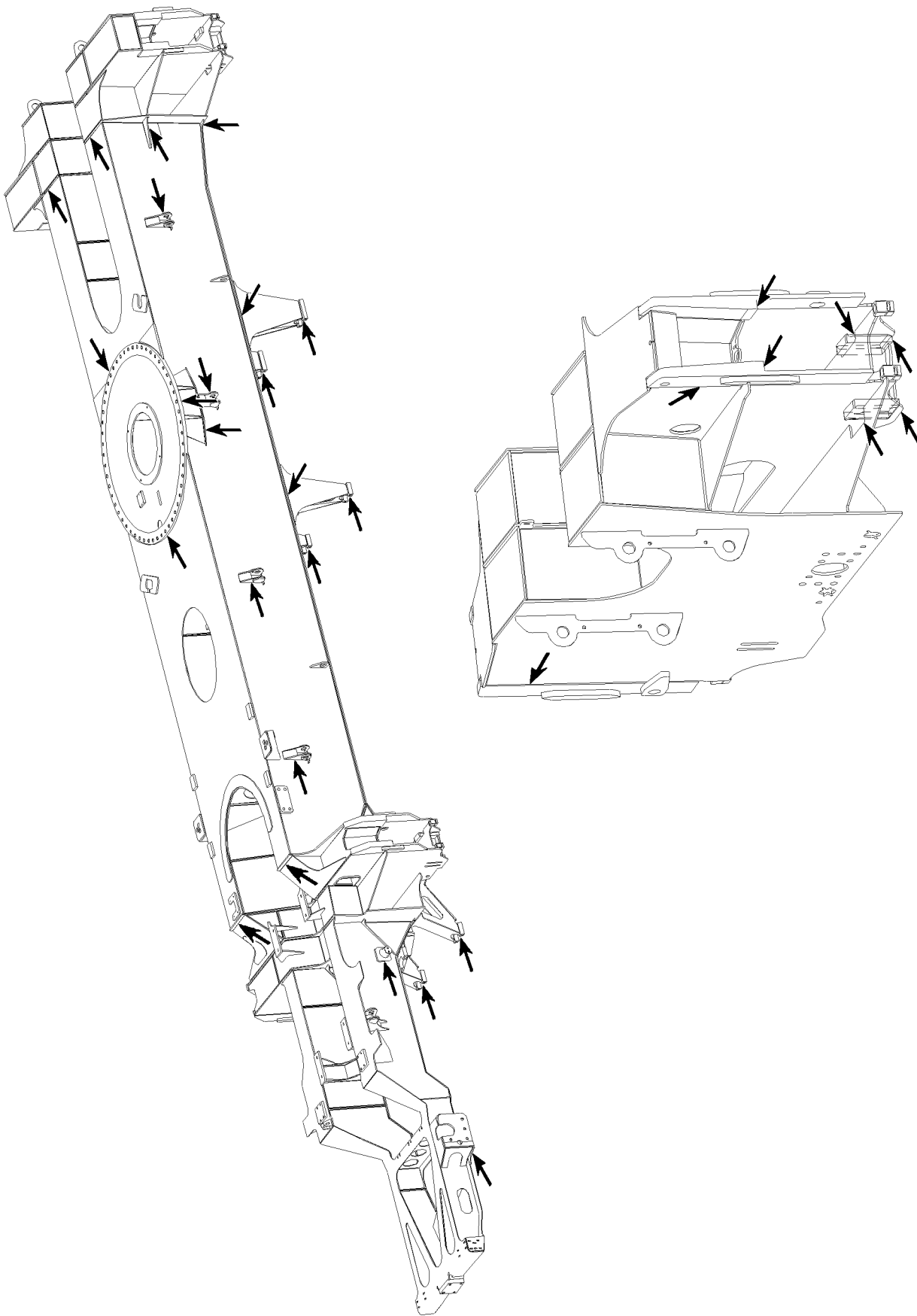
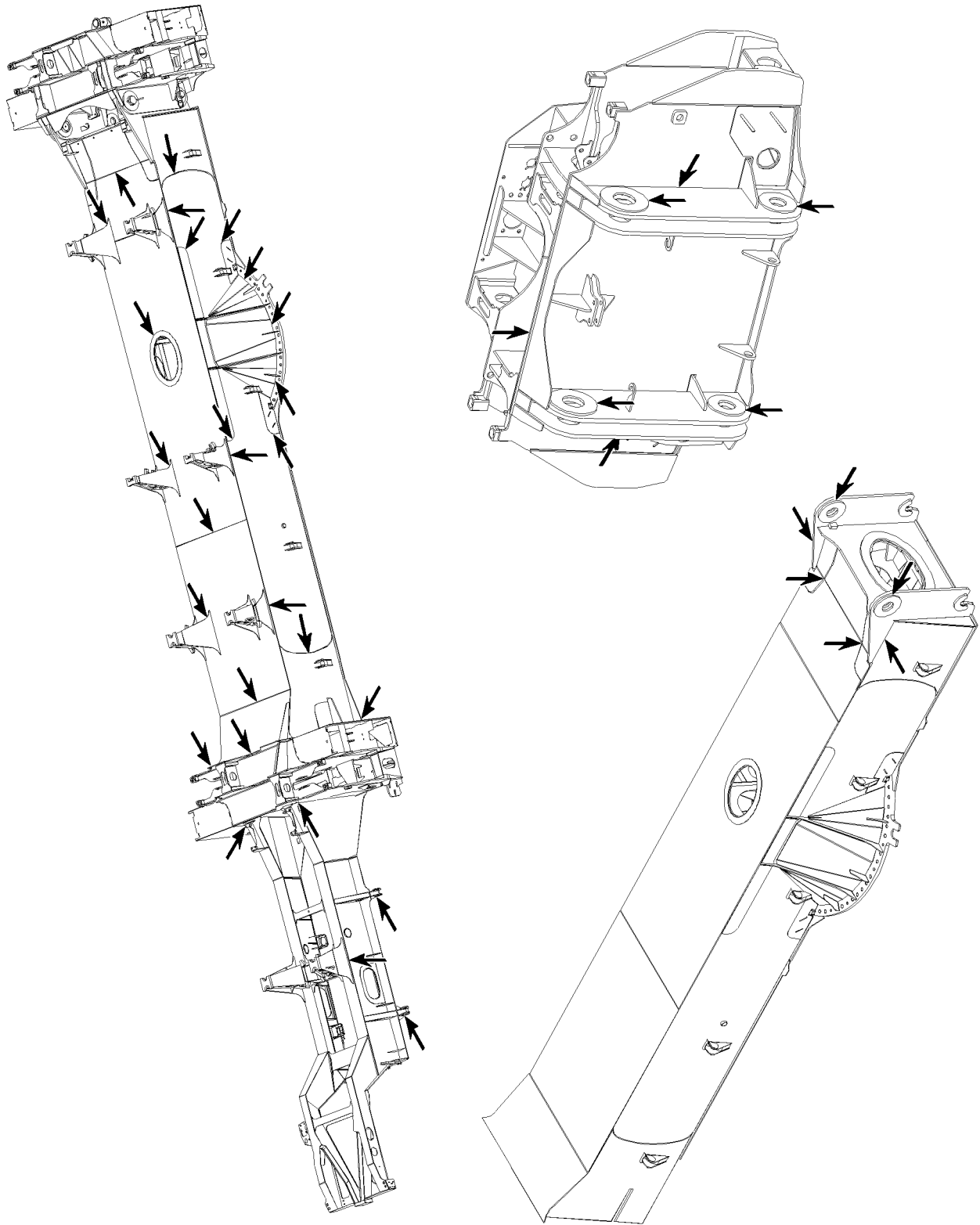


Fig.105702: Example for vehicle frames

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.105719: Example for vehicle frames

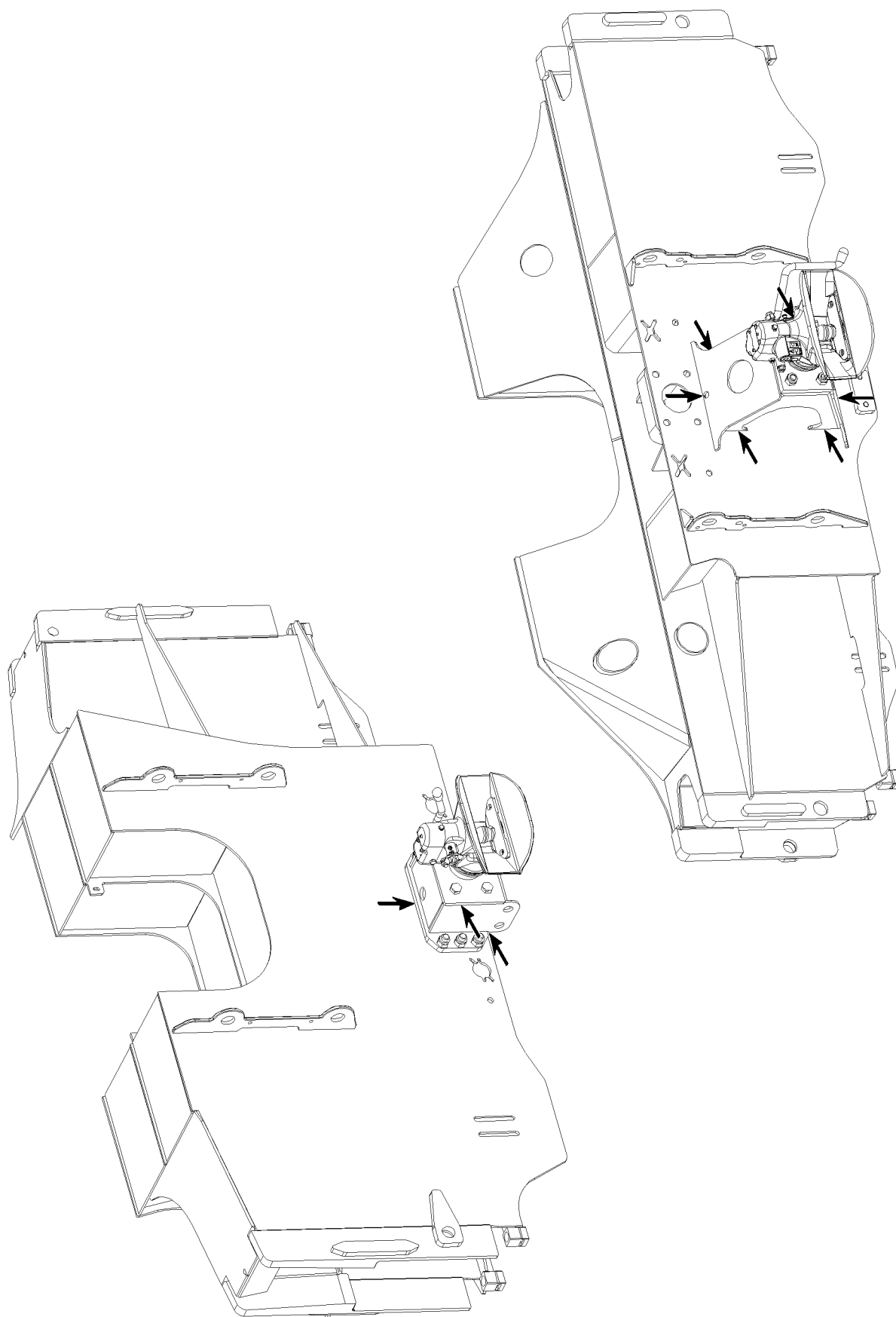
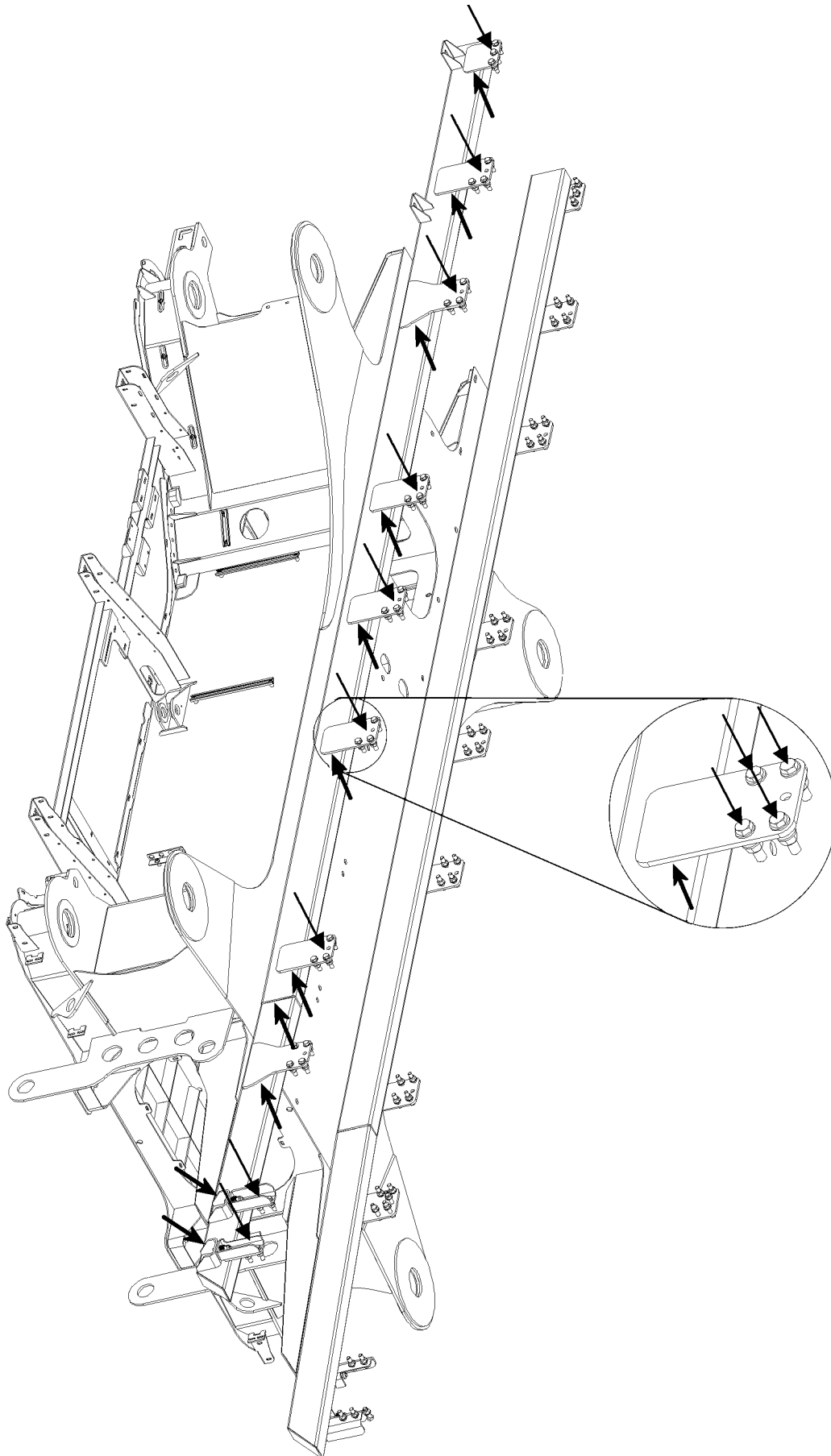


Fig.105687: Example for tow coupling

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.113940: Example for intermediate frame

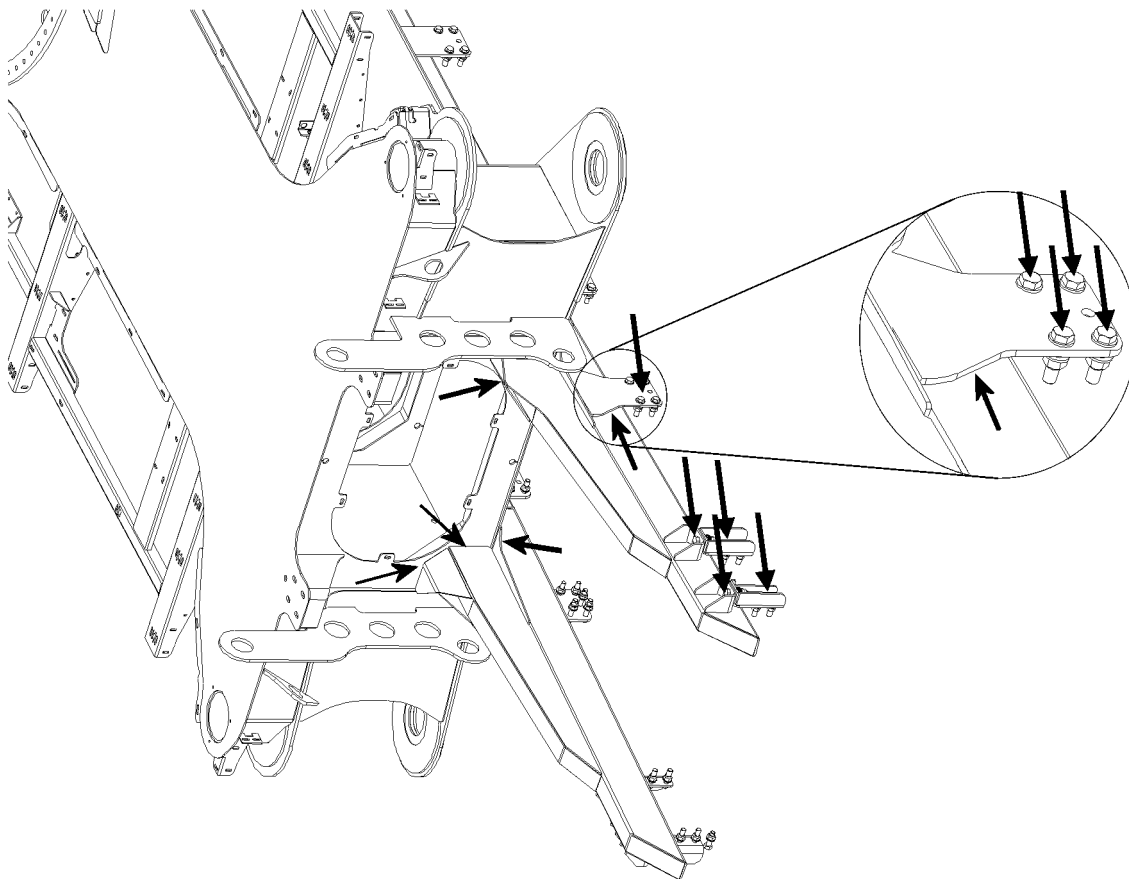
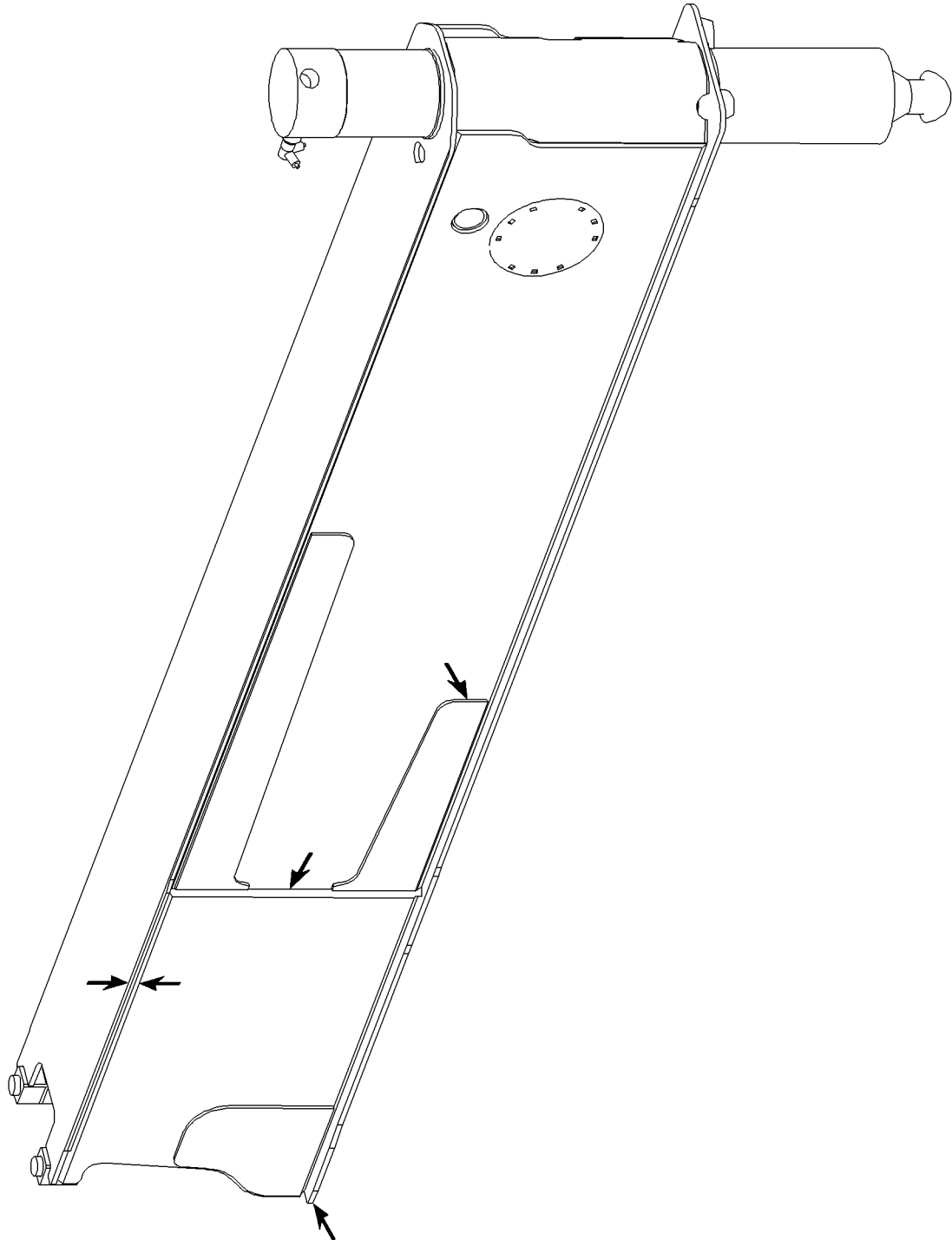


Fig.114000: Example for intermediate frame



LWE/LR 1750-000/12812-15-02/en

Fig.105698: Example for sliding beam

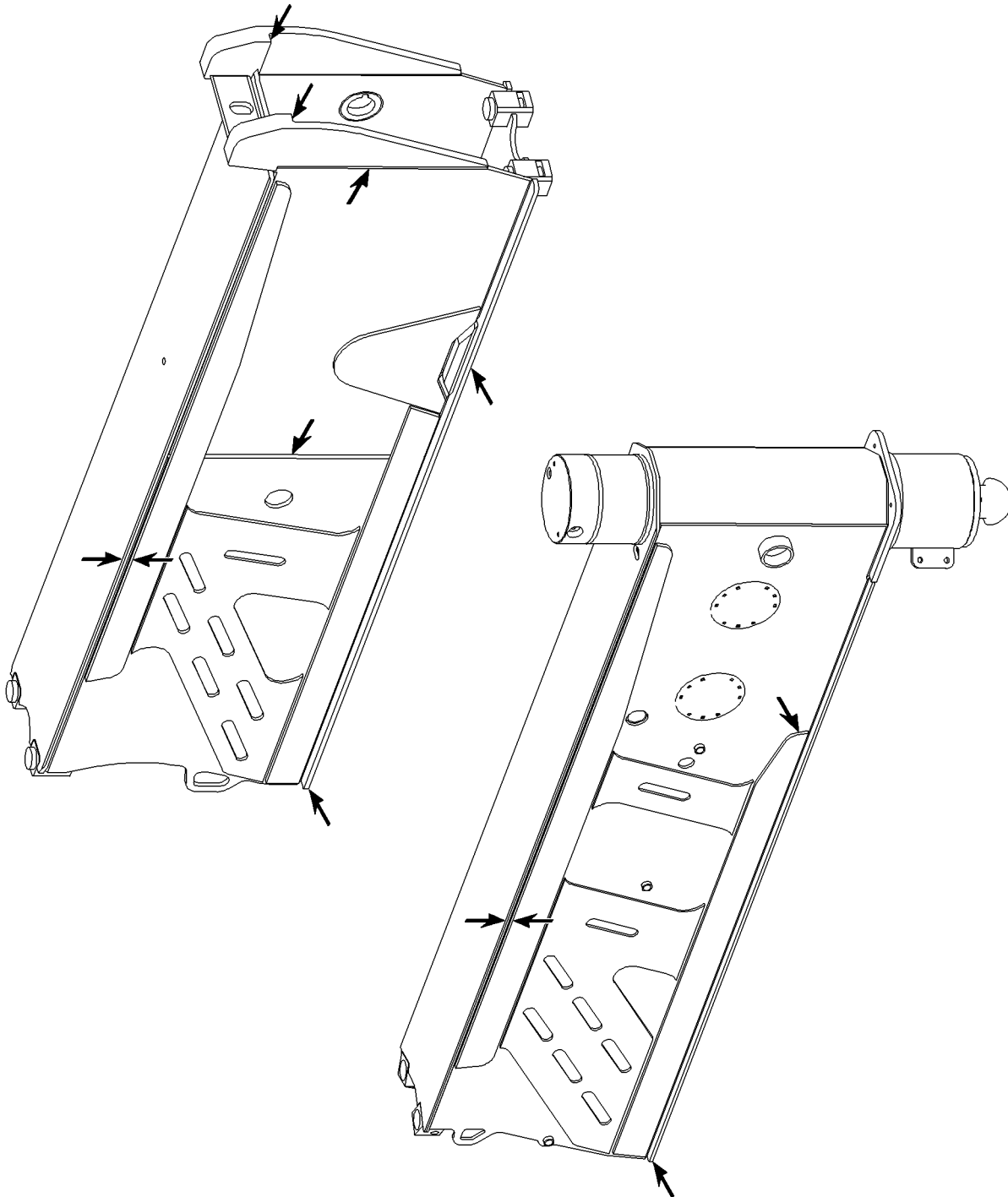
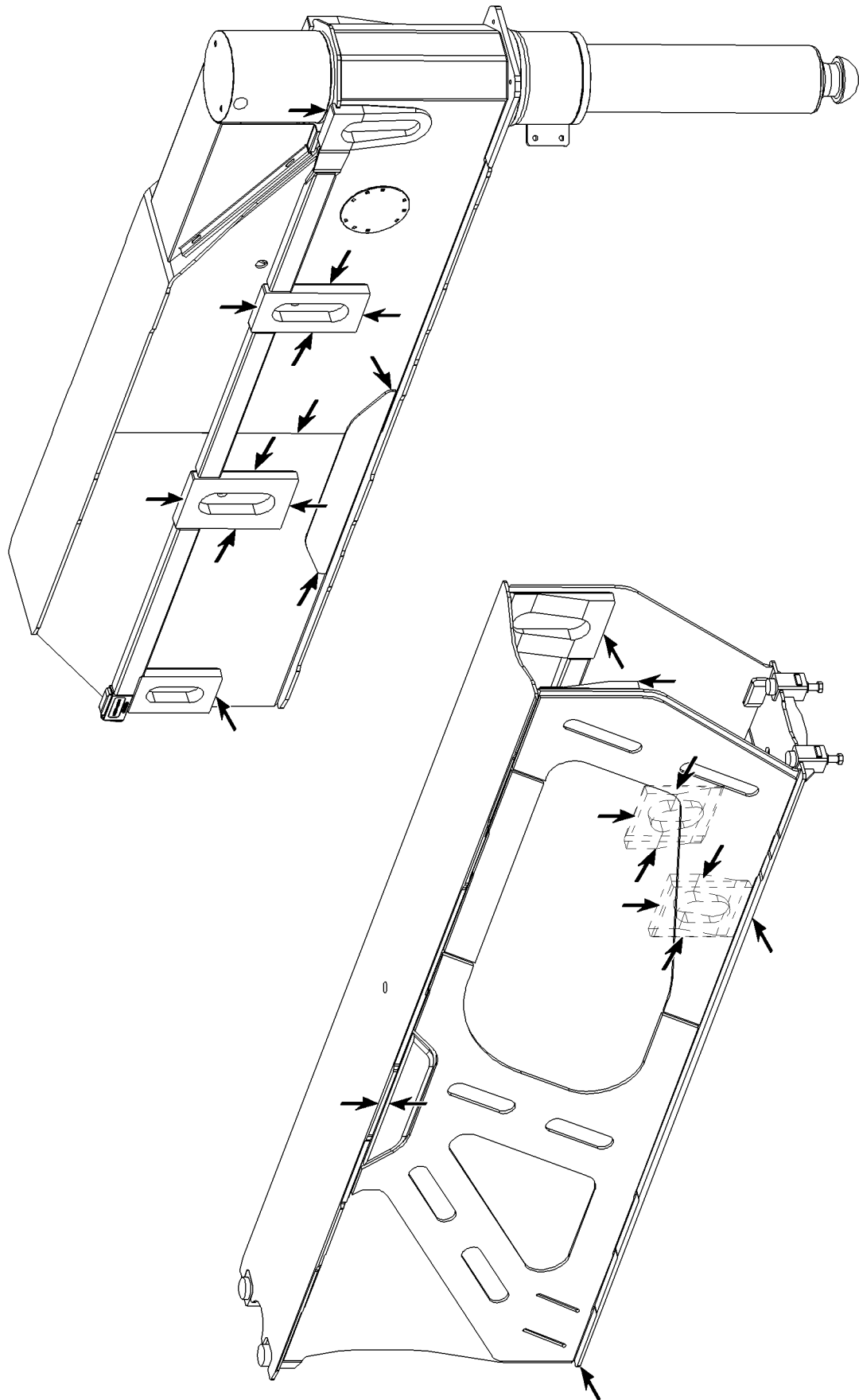


Fig.105717: Example for sliding beam



LWE/LR 1750-000/12812-15-02/en

Fig.105718: Example for sliding beam

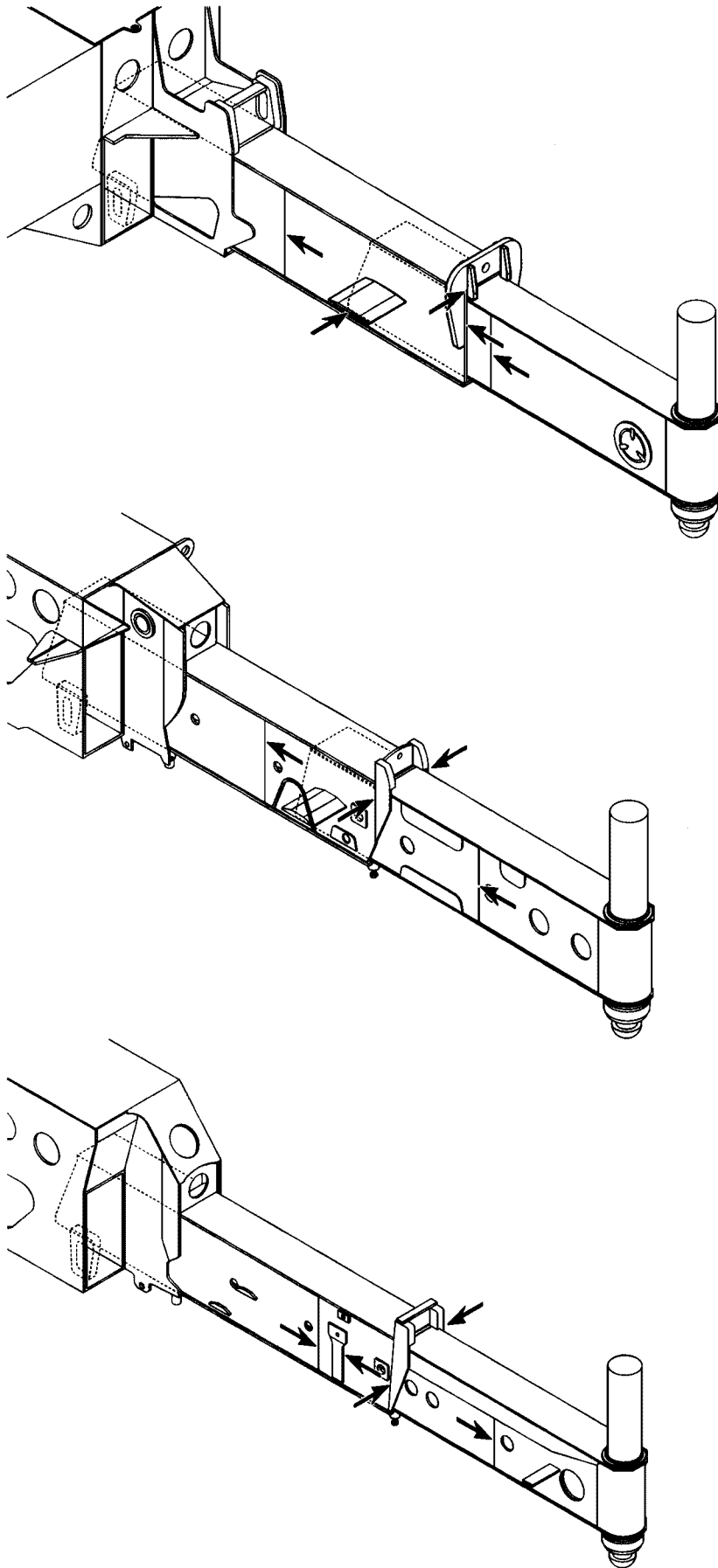
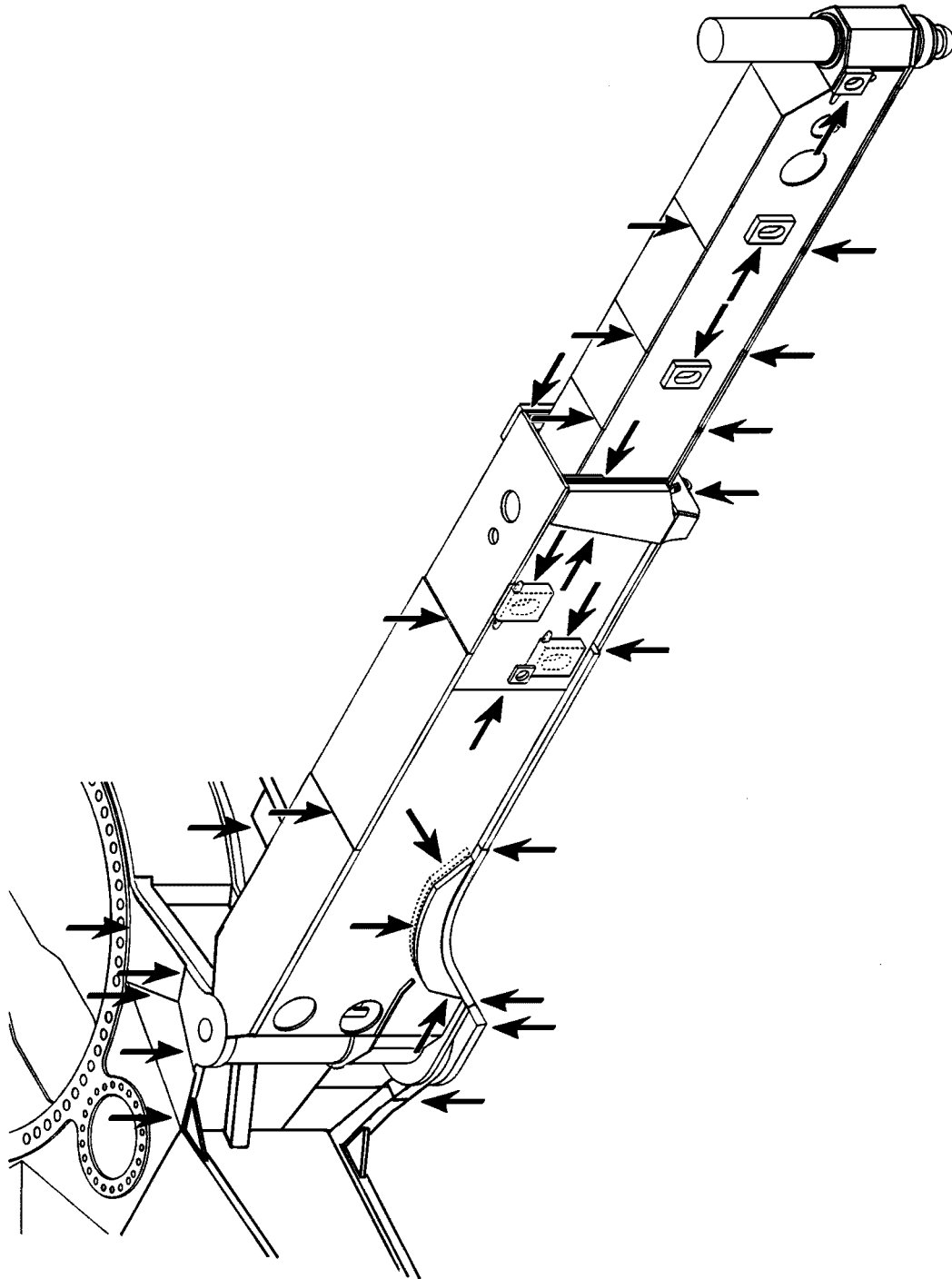


Fig.185047: Example for sliding beam



LWE/LR 1750-000/12812-15-02/en

Fig.185060: Example for swingable sliding beam

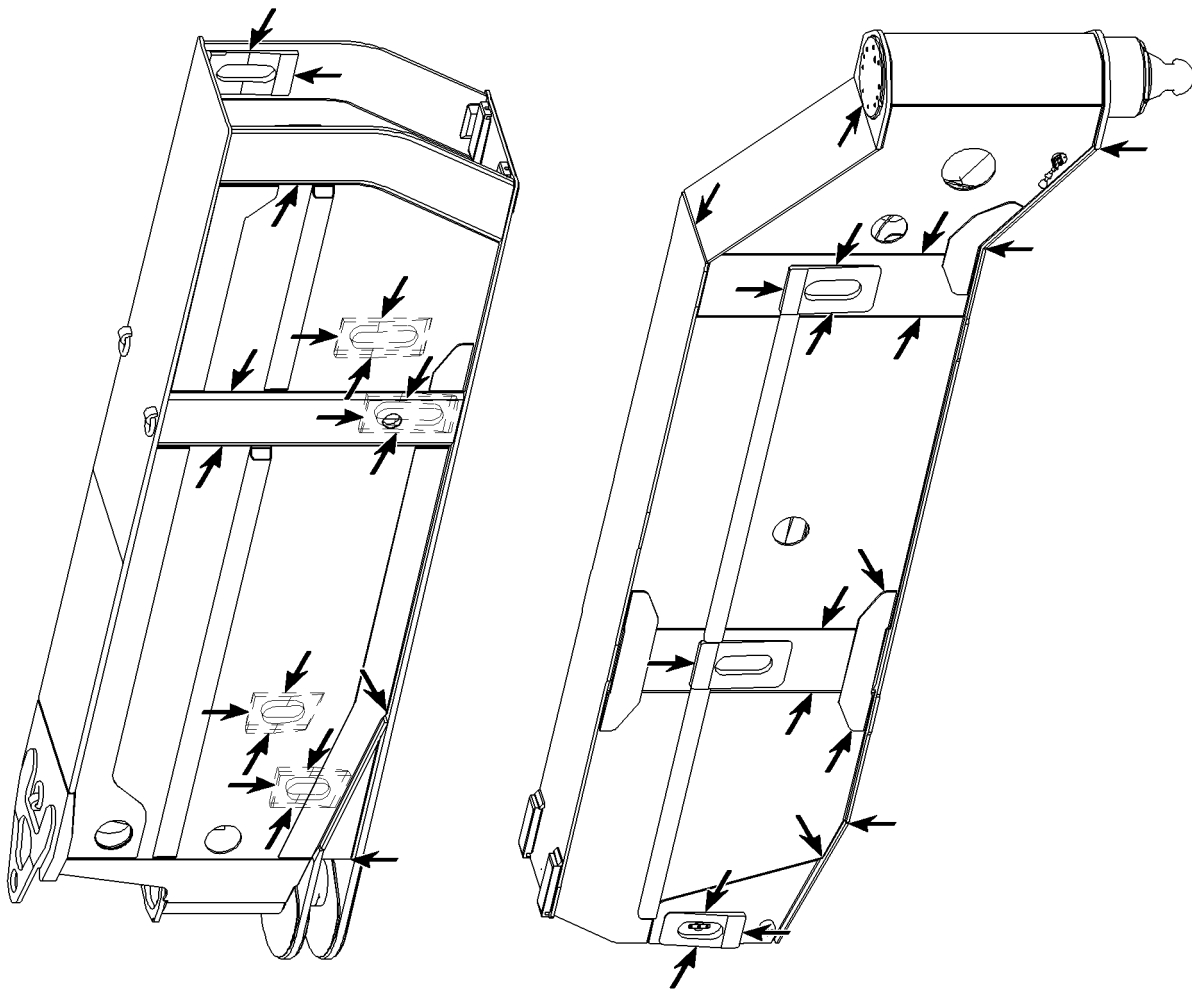
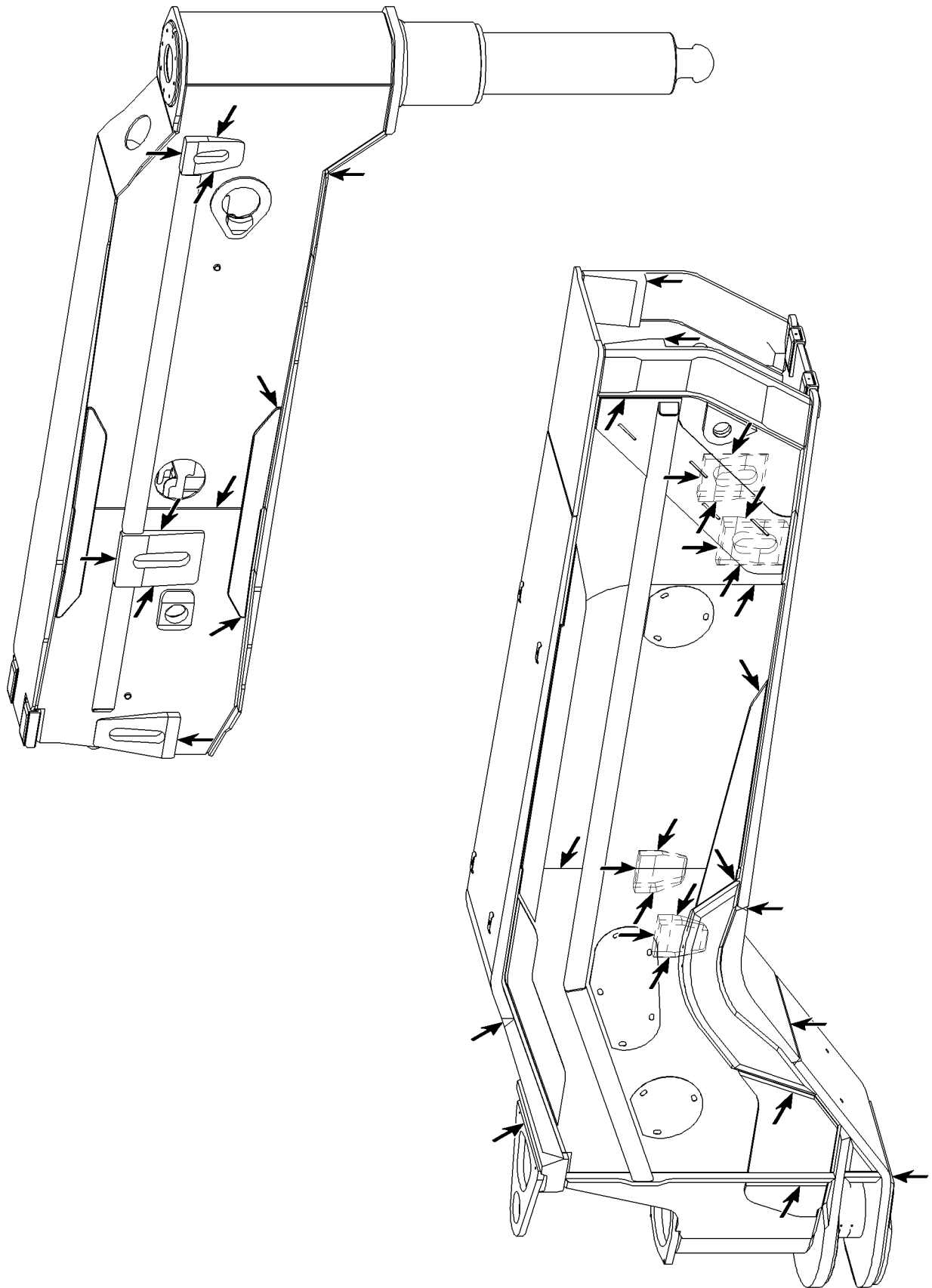


Fig.105690: Example for swingable sliding beam



LWE/LR 1750-000/12812-15-02/en

Fig.105704: Example for swingable sliding beam

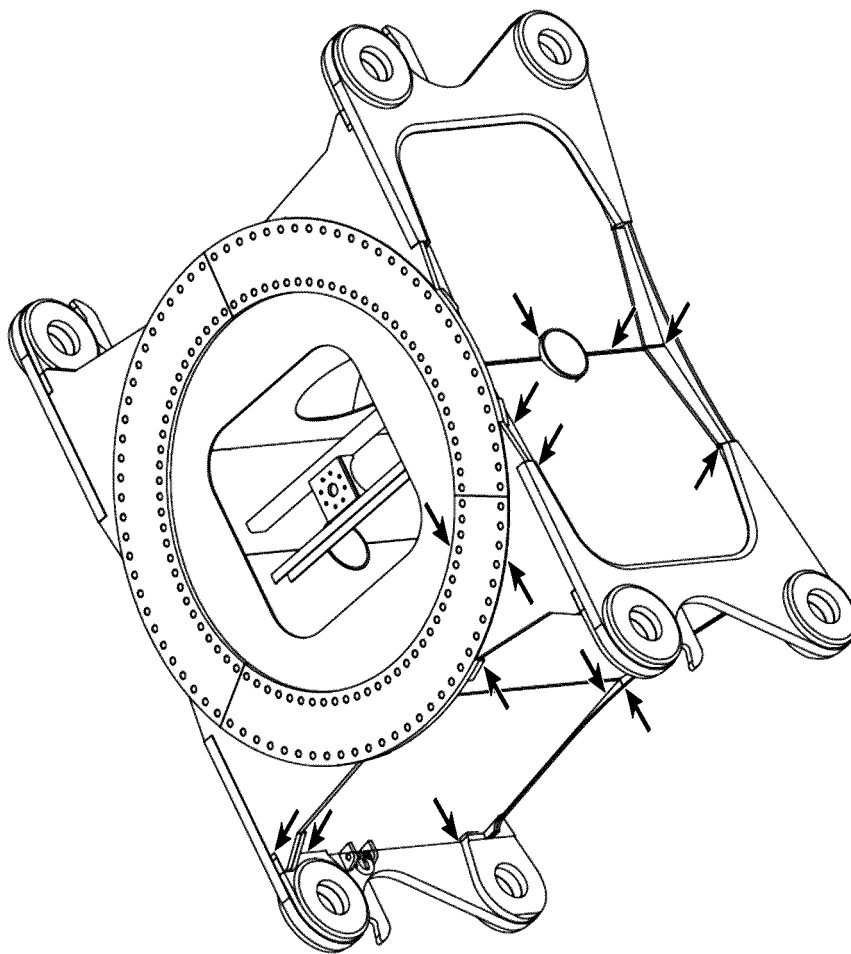
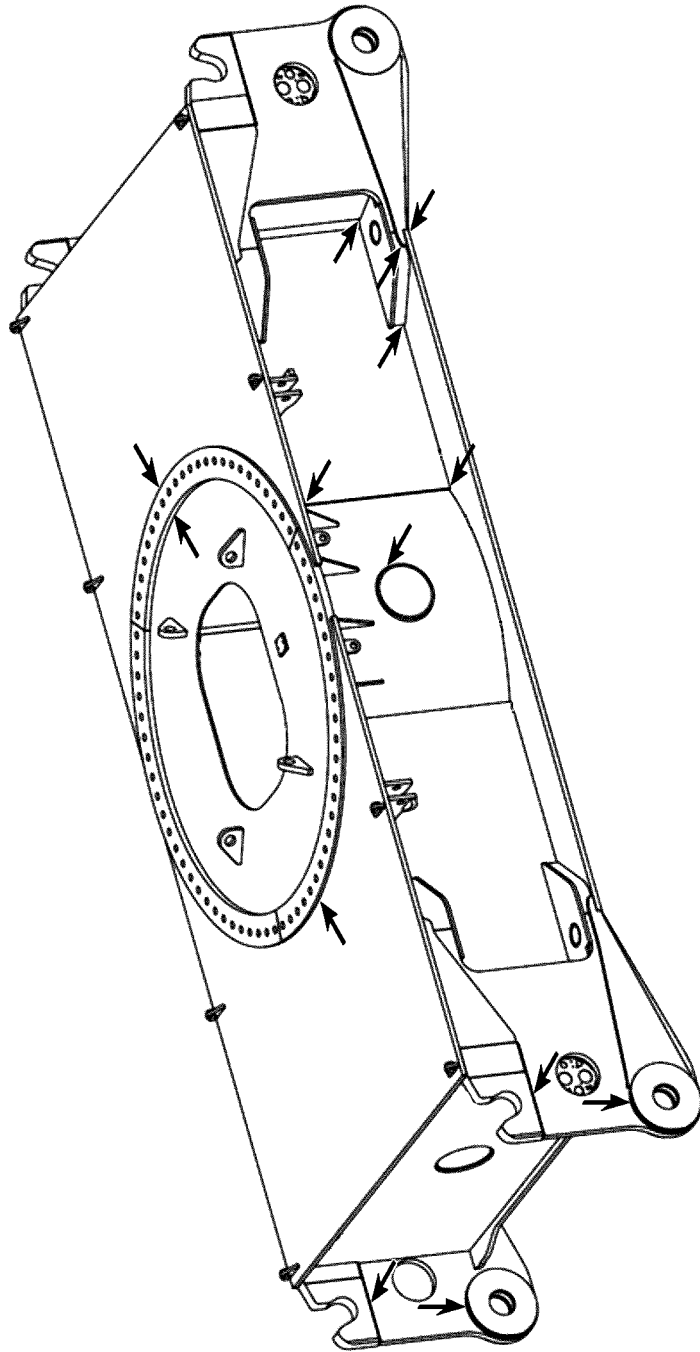


Fig.105725: Example for crawler center section

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.105726: Example for crawler center section

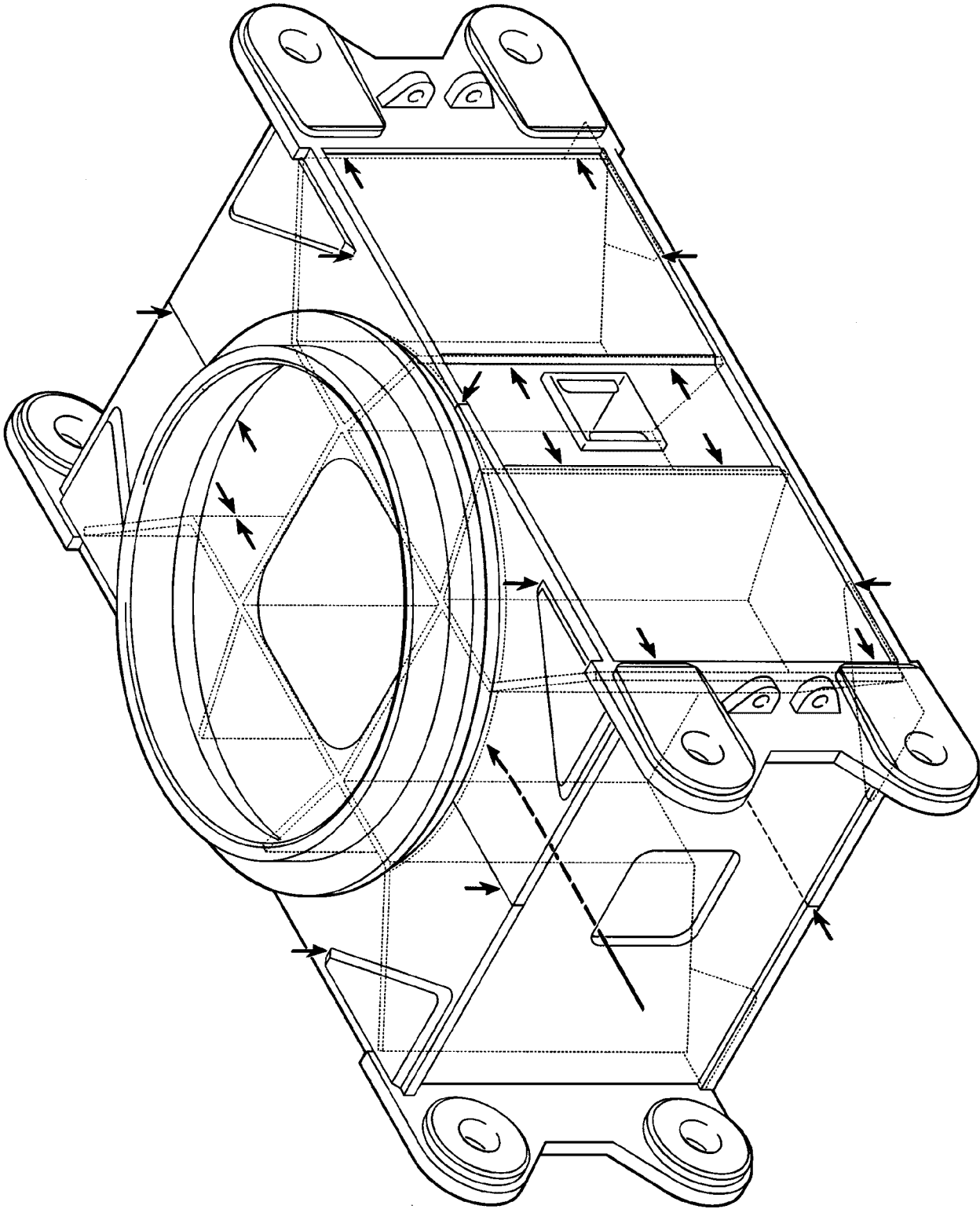
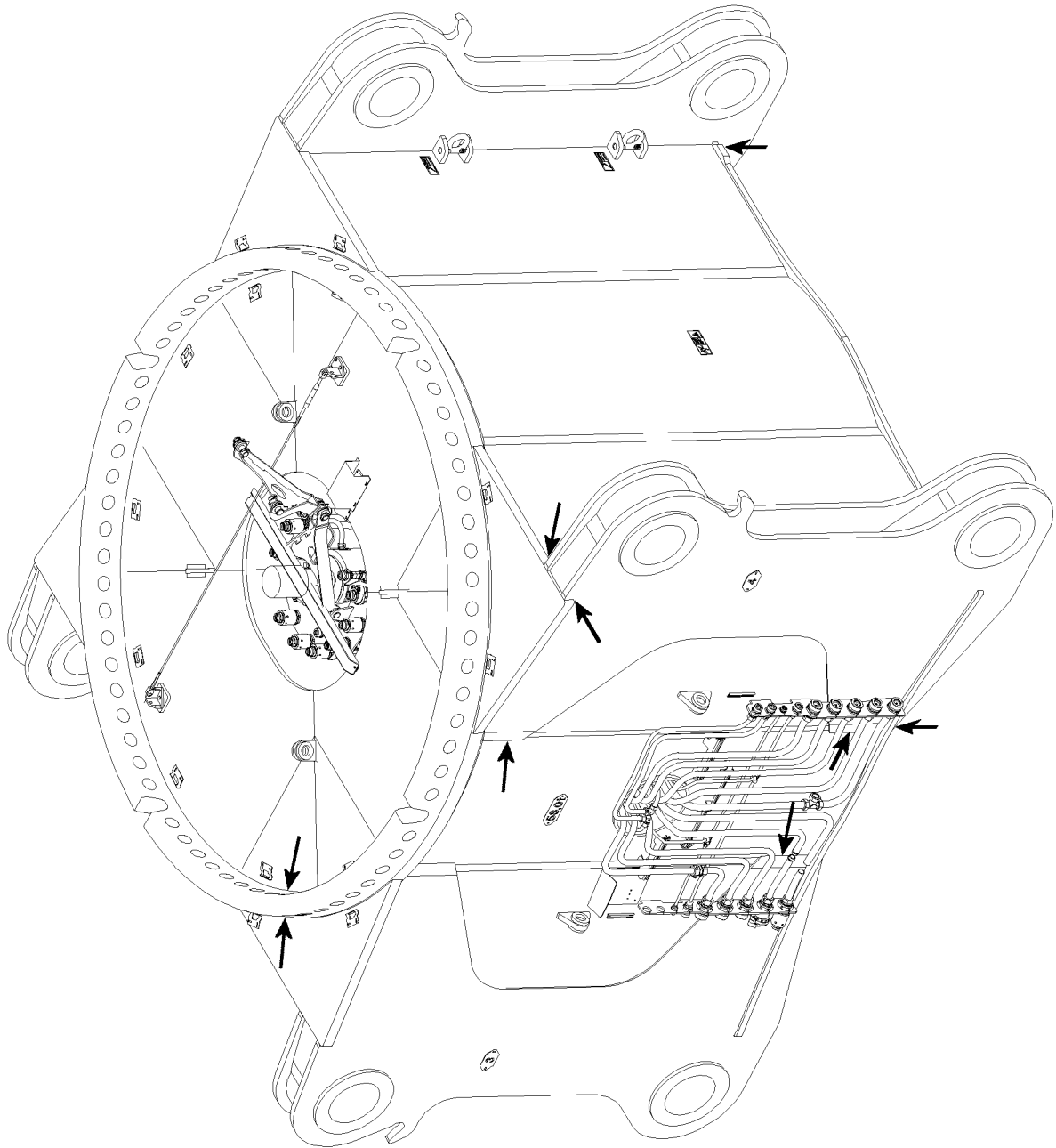


Fig.187347: Example for crawler center section

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LWE/LR 1750-000/12812-15-02/en

Fig.115920: Example for crawler center section

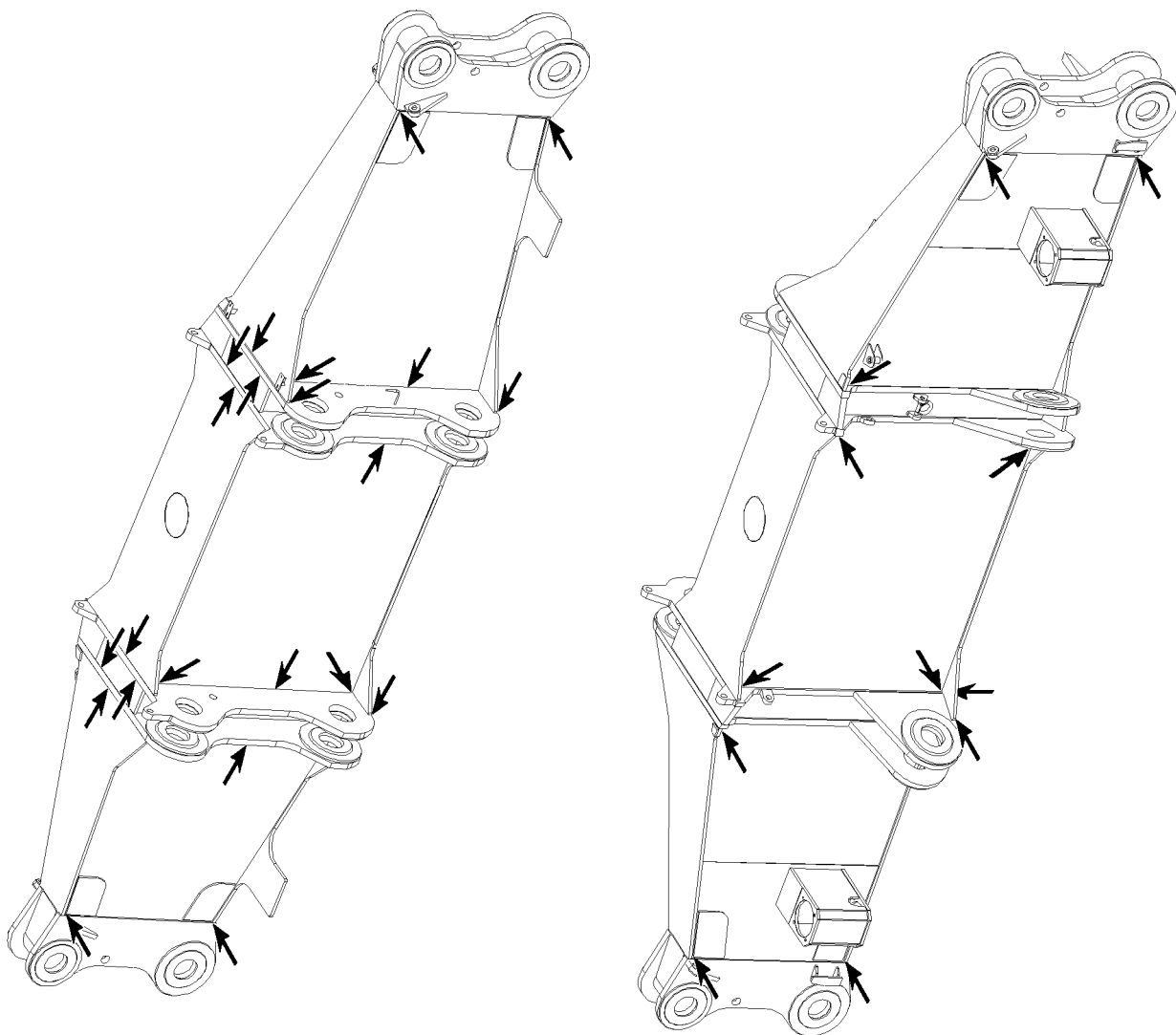
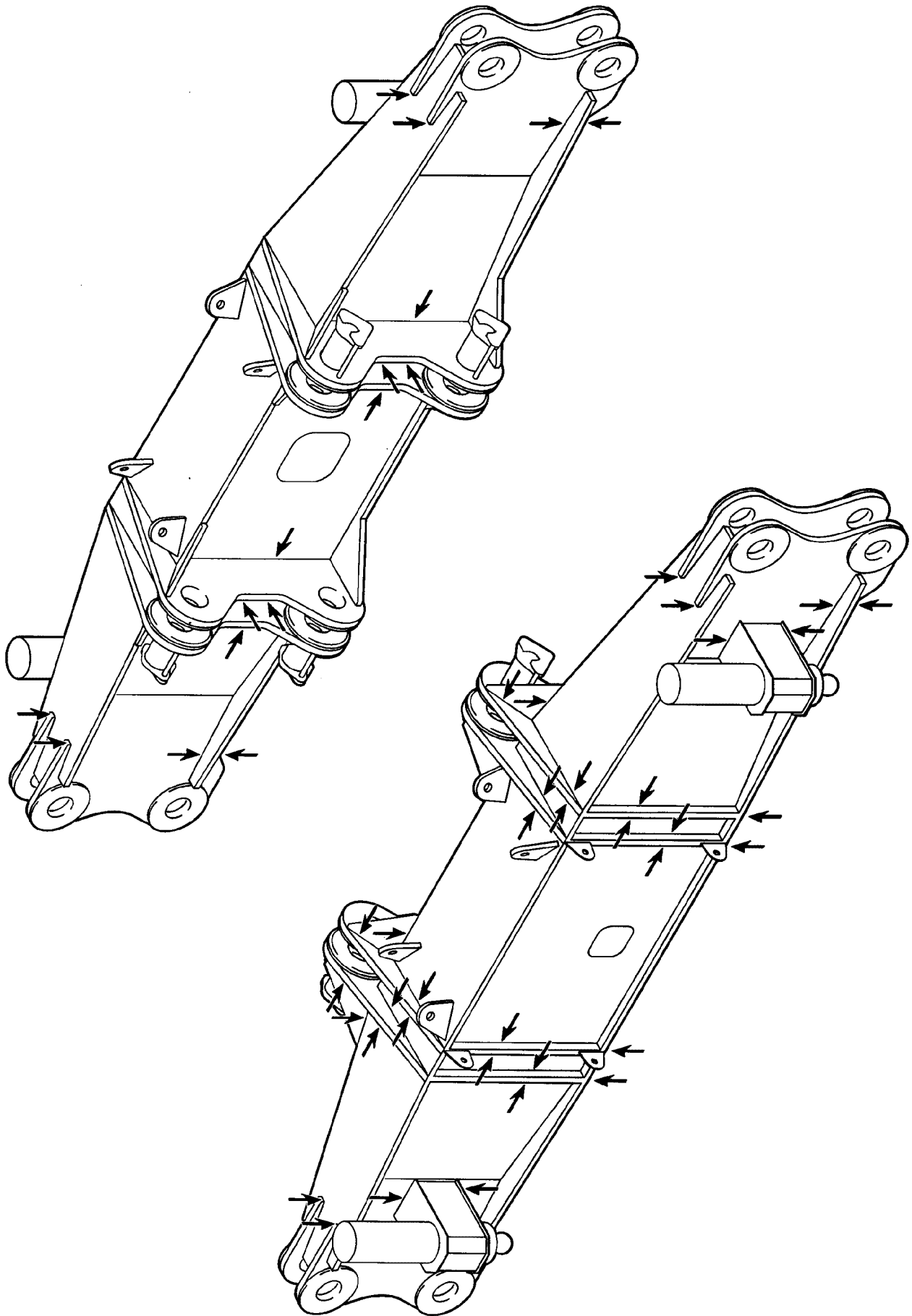


Fig.105727: Example for cross carrier



LWE/LR 1750-000/12812-15-02/en

Fig.187348: Example for cross carrier

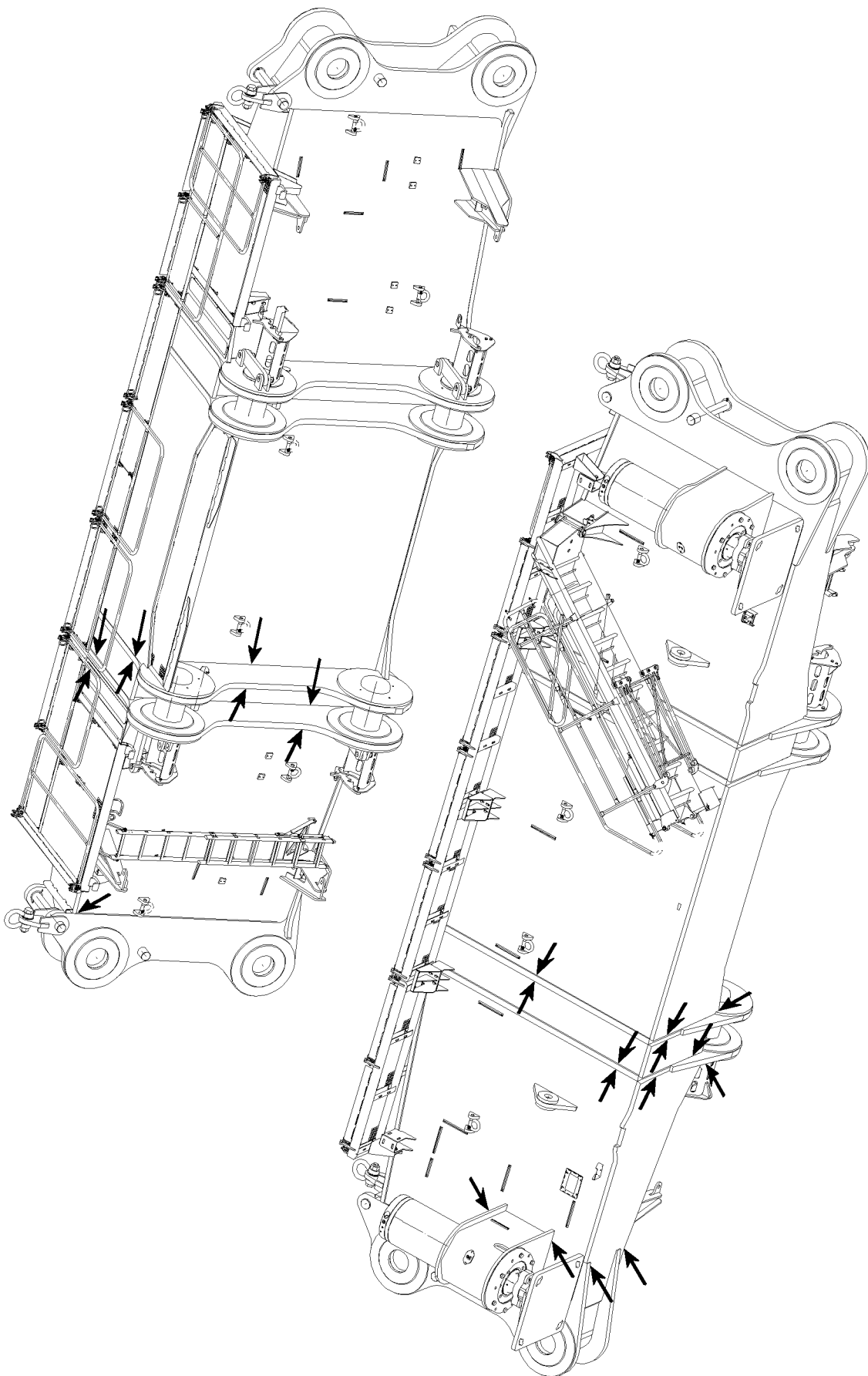
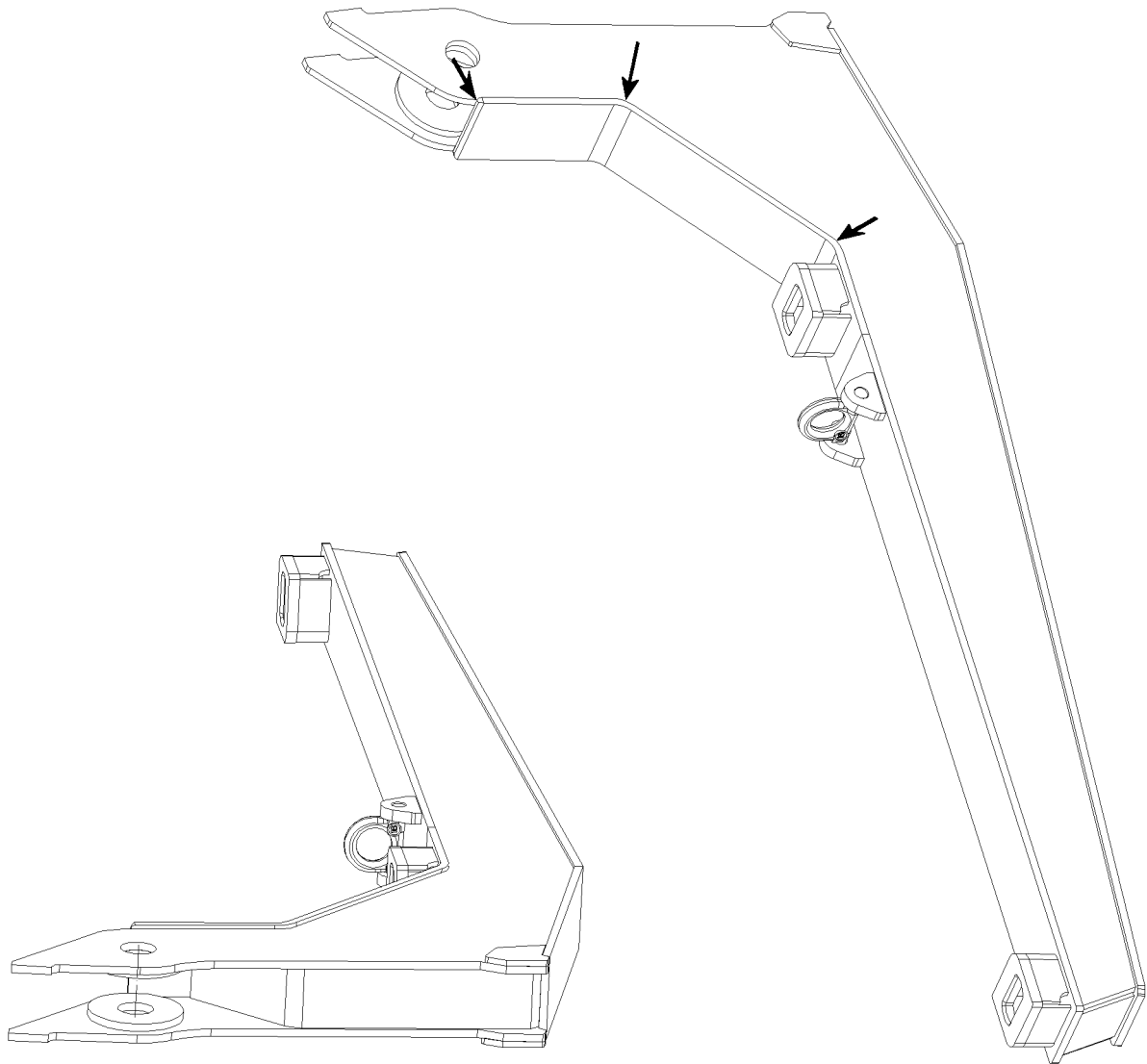


Fig.115921: Example for cross carrier

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.115919: Example for carrier for central ballast

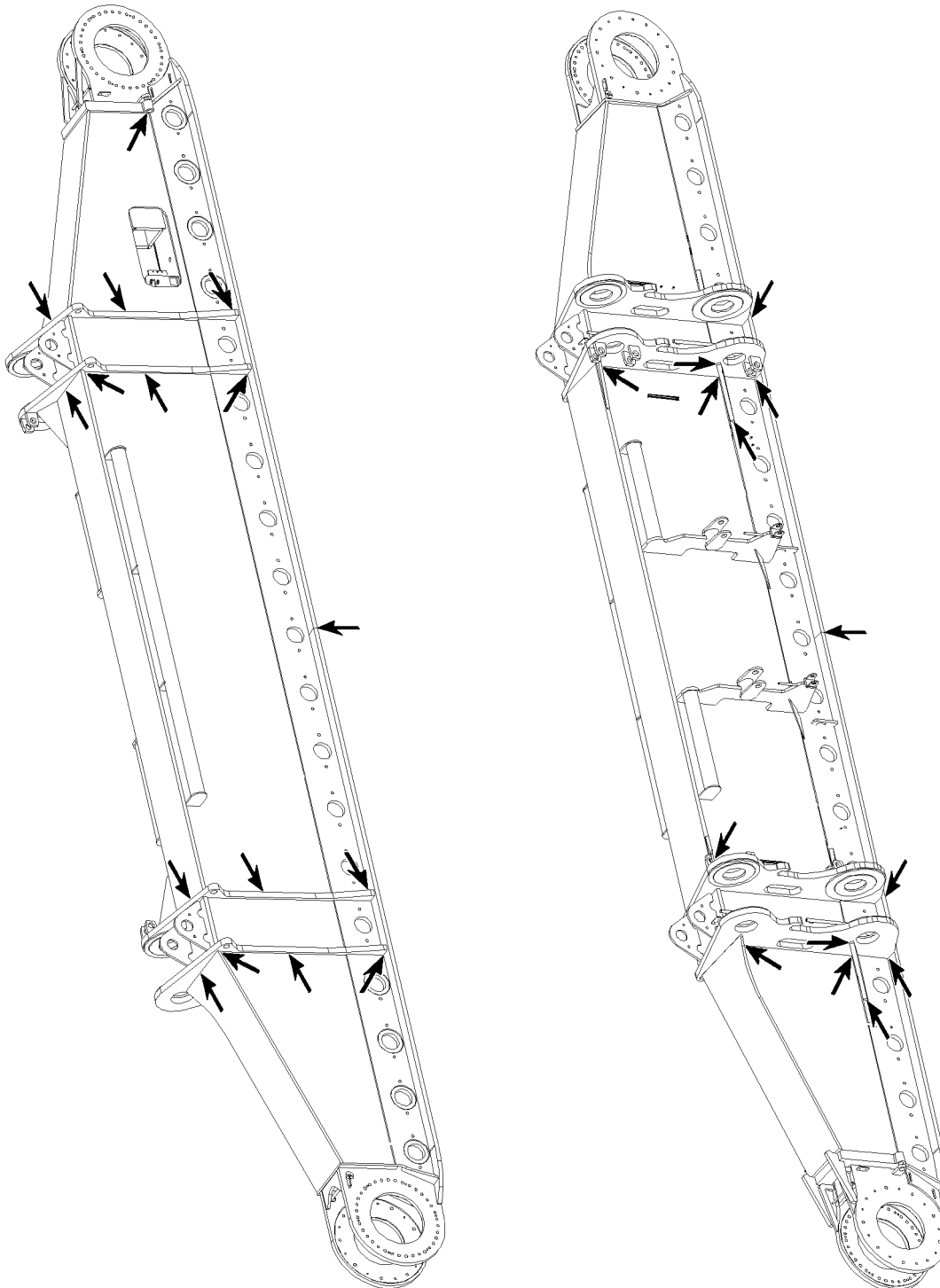
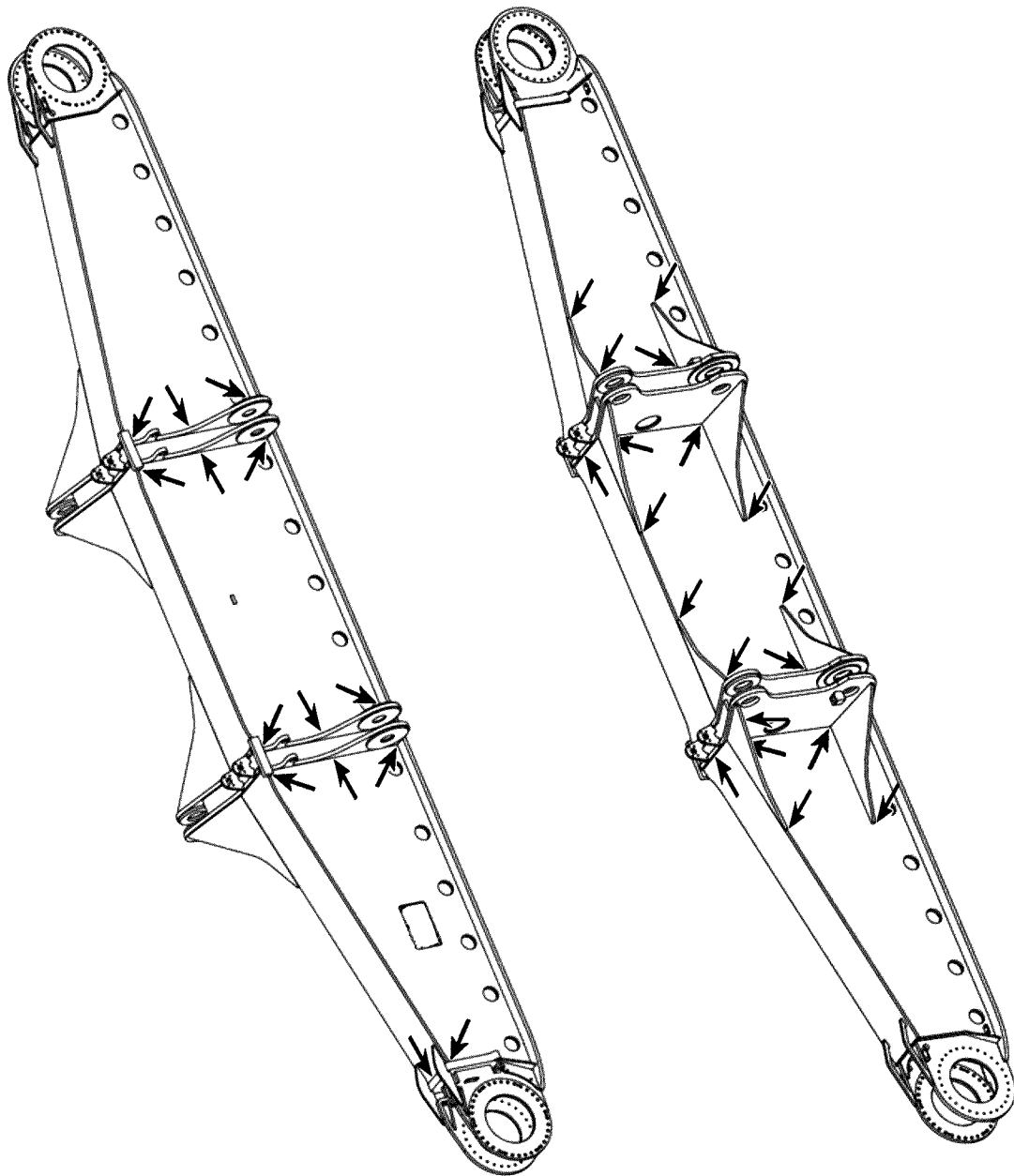


Fig.105728: Example for crawler carrier

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.105729: Example for crawler carrier

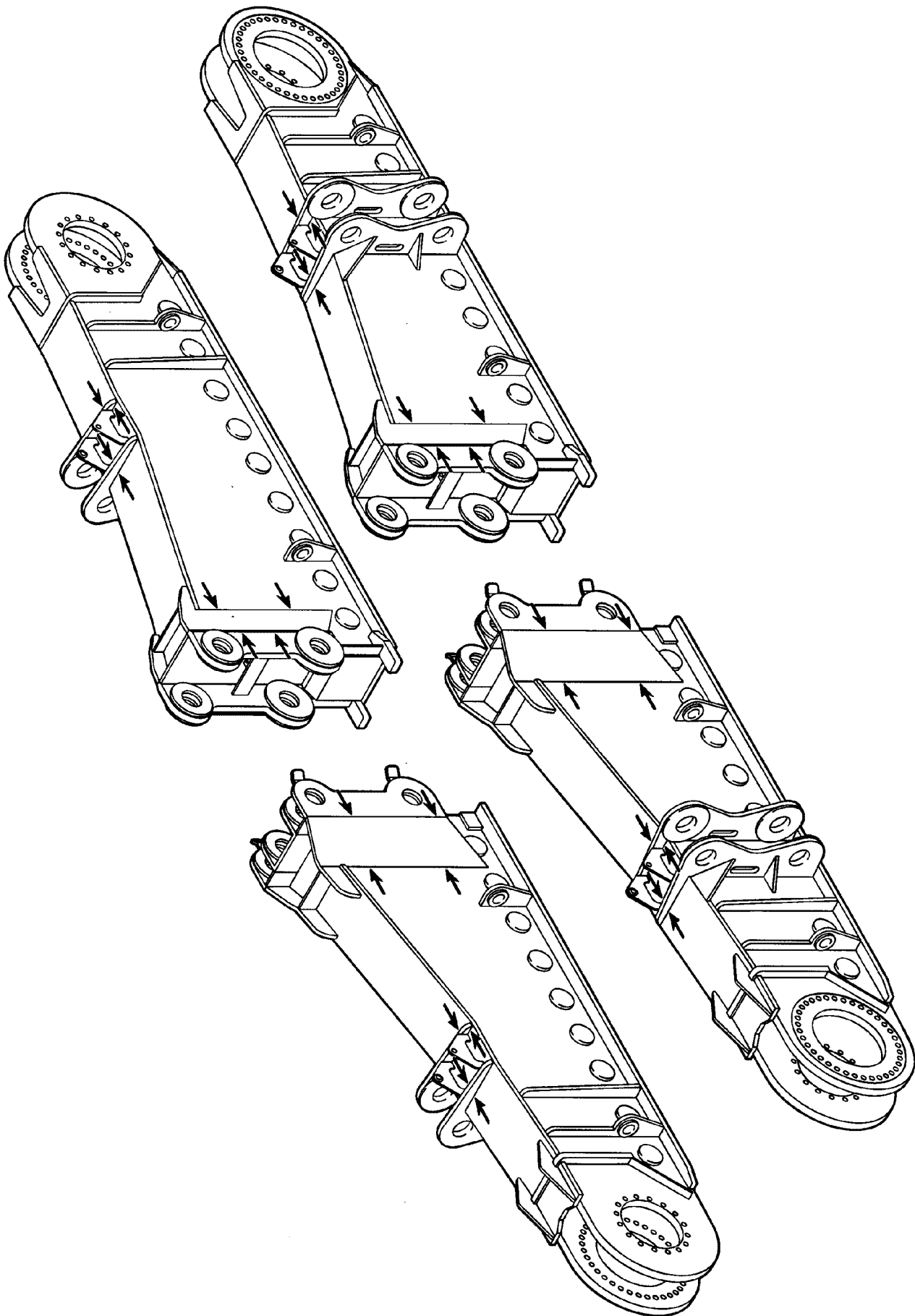
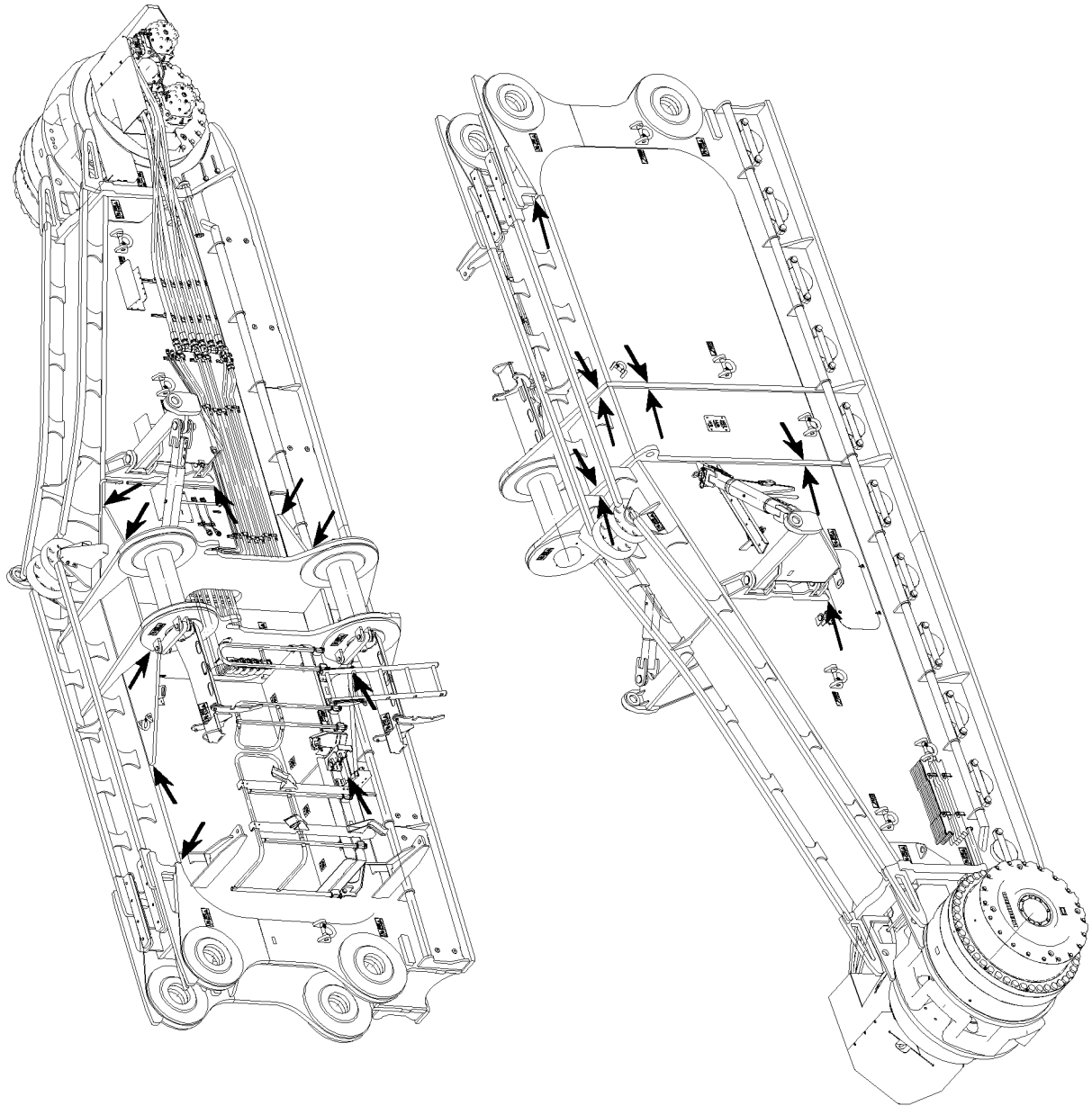


Fig.187349: Example for crawler carrier

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LWE/LR 1750-000/12812-15-02/en

Fig.115917: Example for crawler carrier

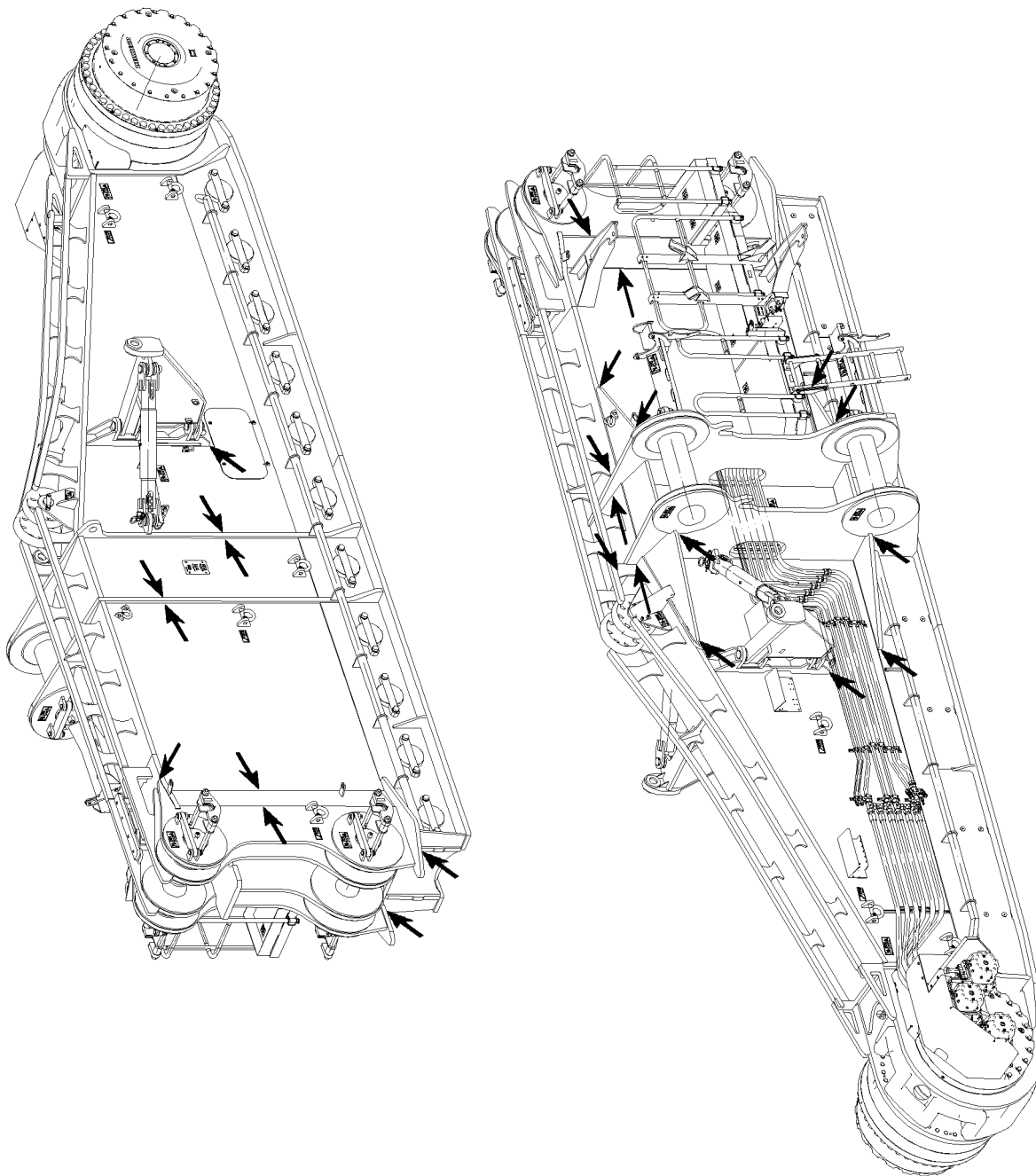
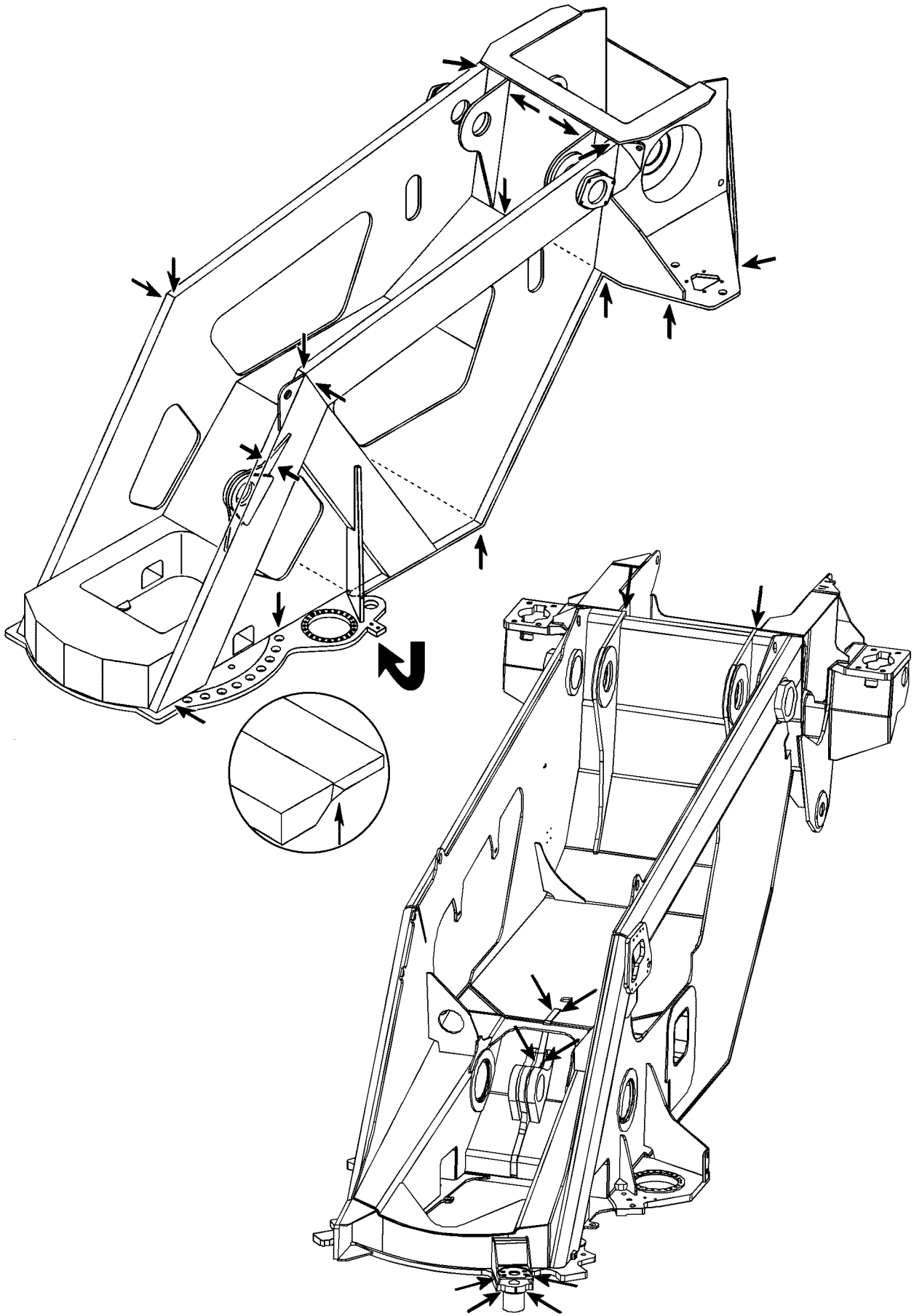


Fig.115918: Example for crawler carrier



LWE/LR 1750-000/12812-15-02/en

Fig.185048: Example for turntable frame

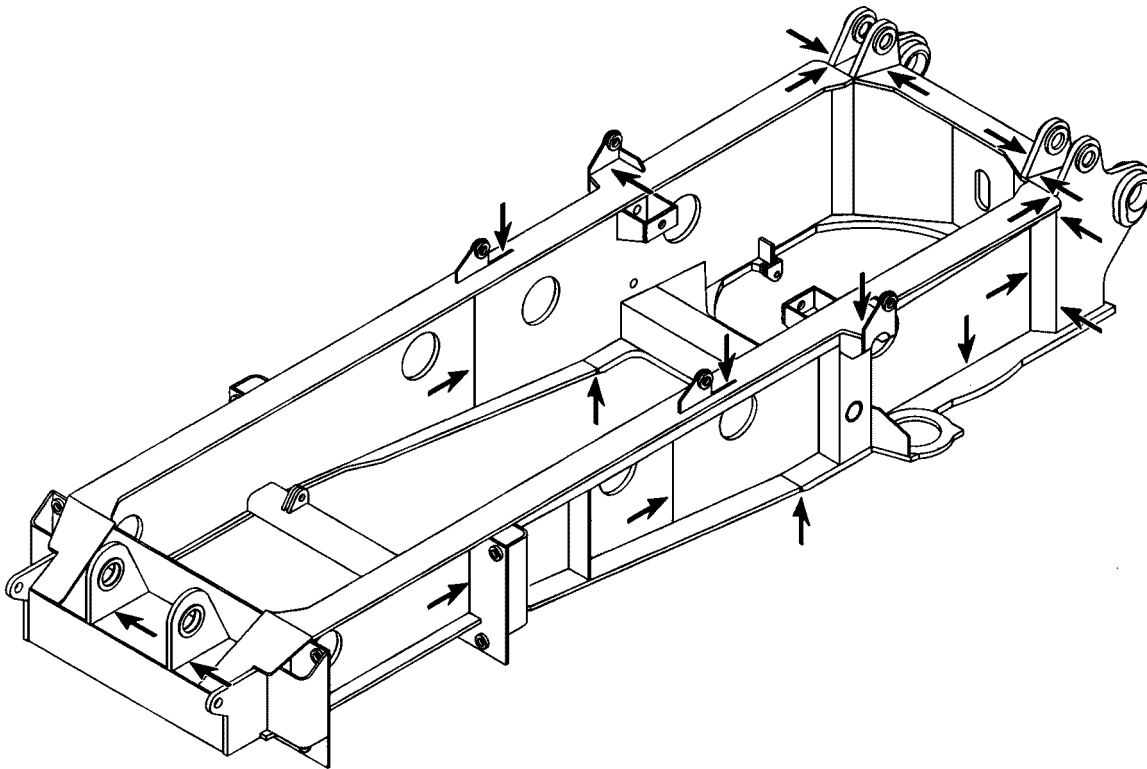


Fig.185049: Example for turntable frame

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LWE/LR 1750-000/12812-15-02/en

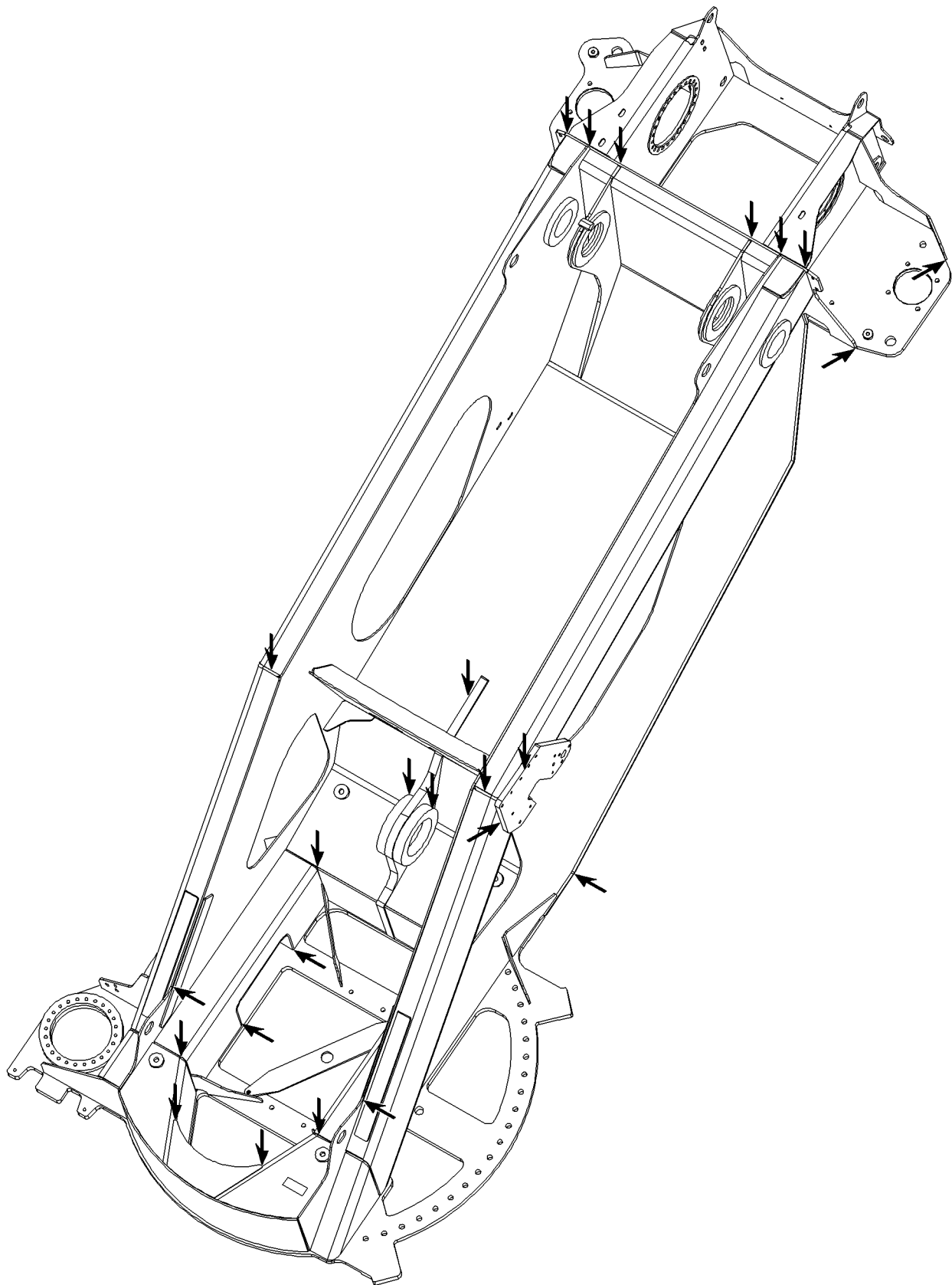


Fig.105700: Example for turntable frame

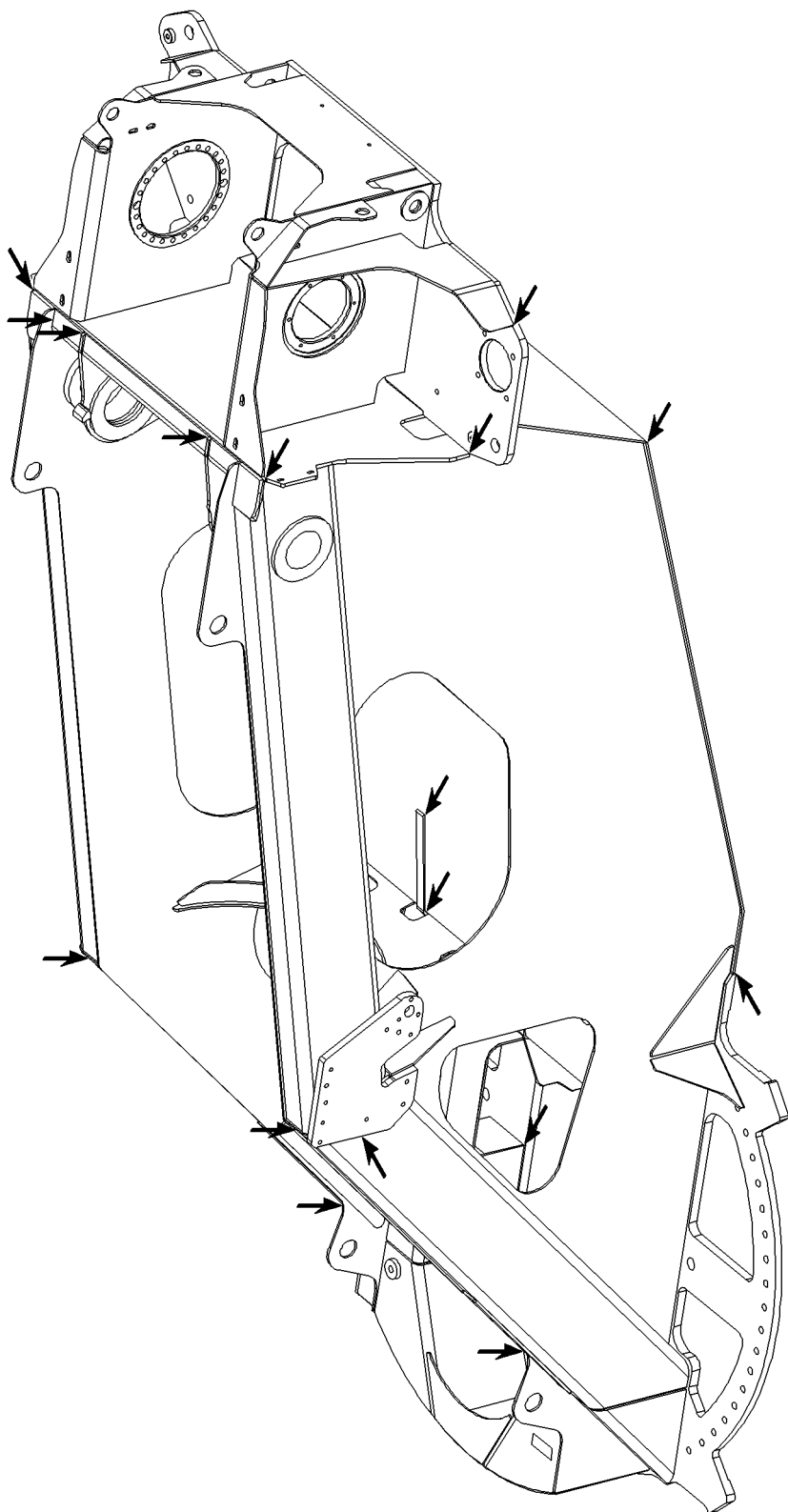
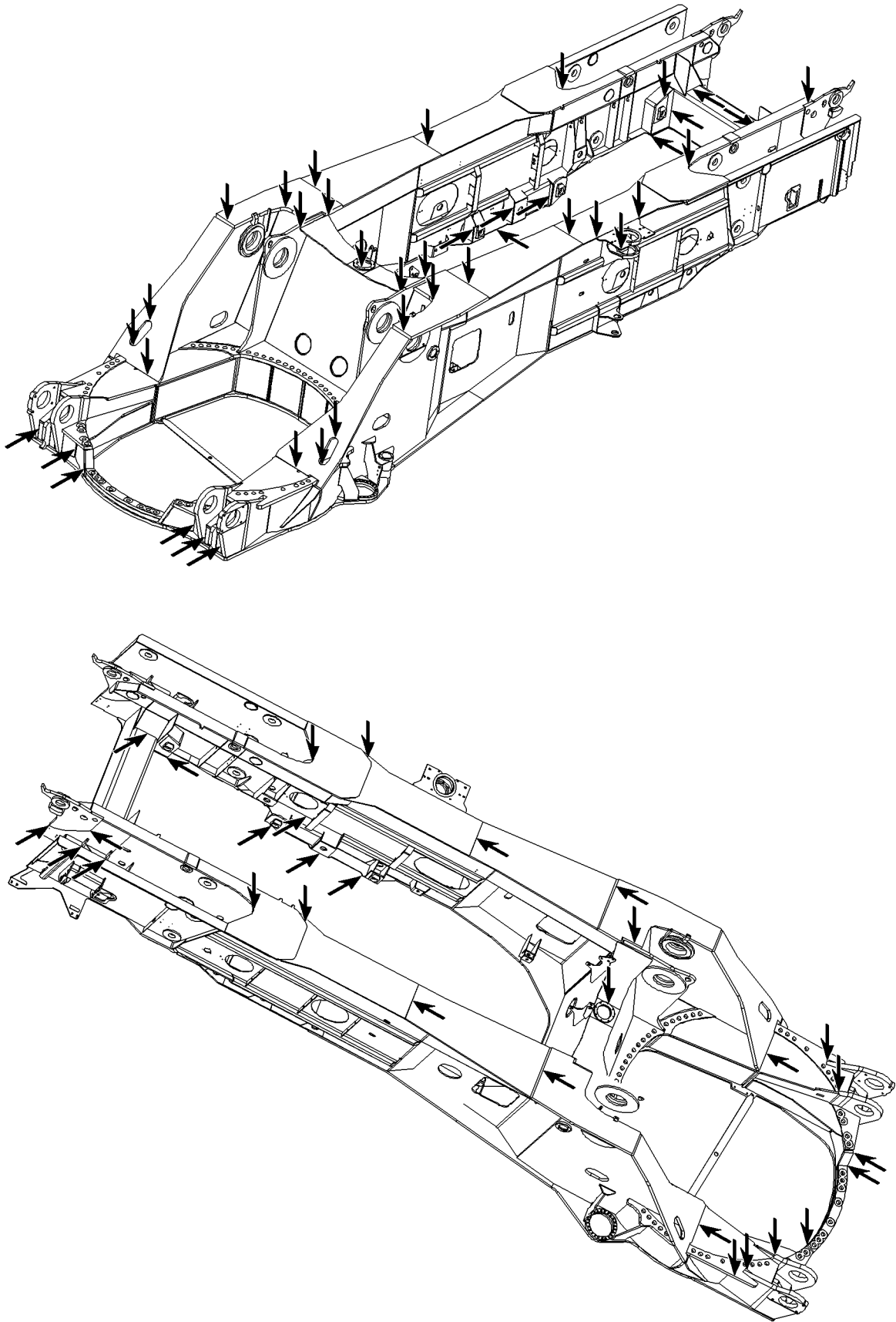
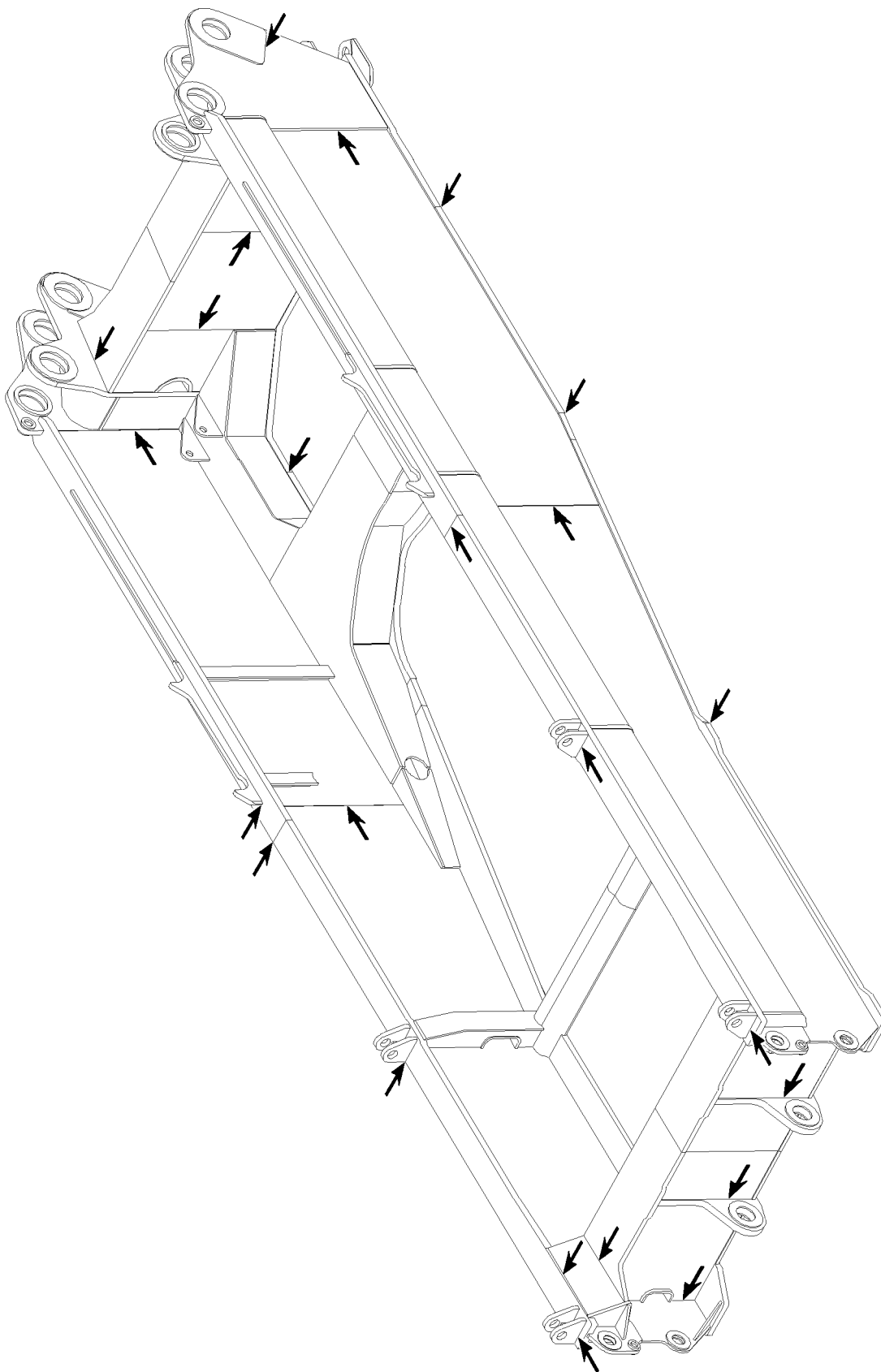


Fig.105701: Example for turntable frame



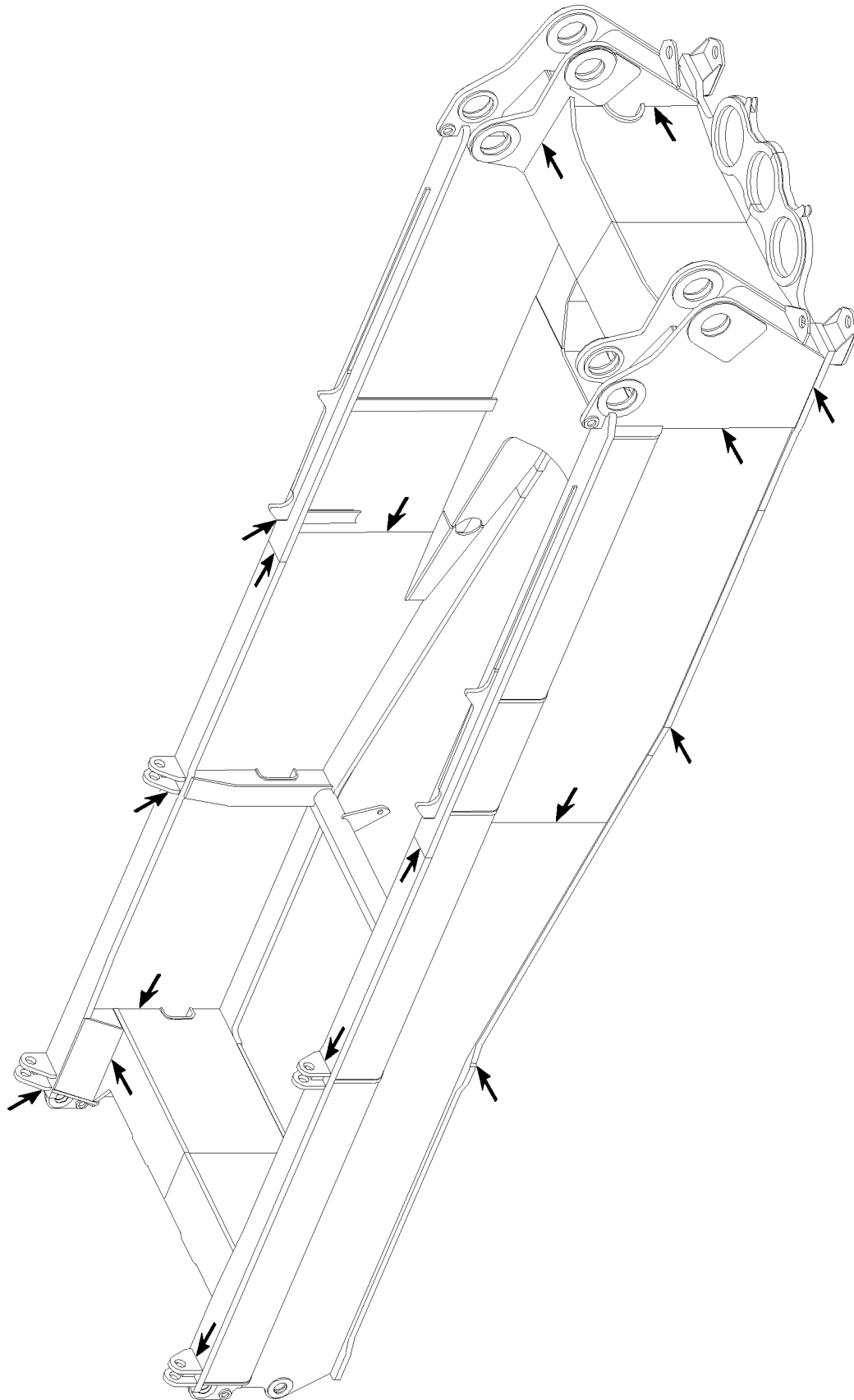
LWE/LR 1750-000/12812-15-02/en

Fig.105706: Example for turntable frame



LWE/LR 1750-000/12812-15-02/en

Fig.105694: Example for turntable frame



LWE/LR 1750-000/12812-15-02/en

Fig.105695: Example for turntable frame

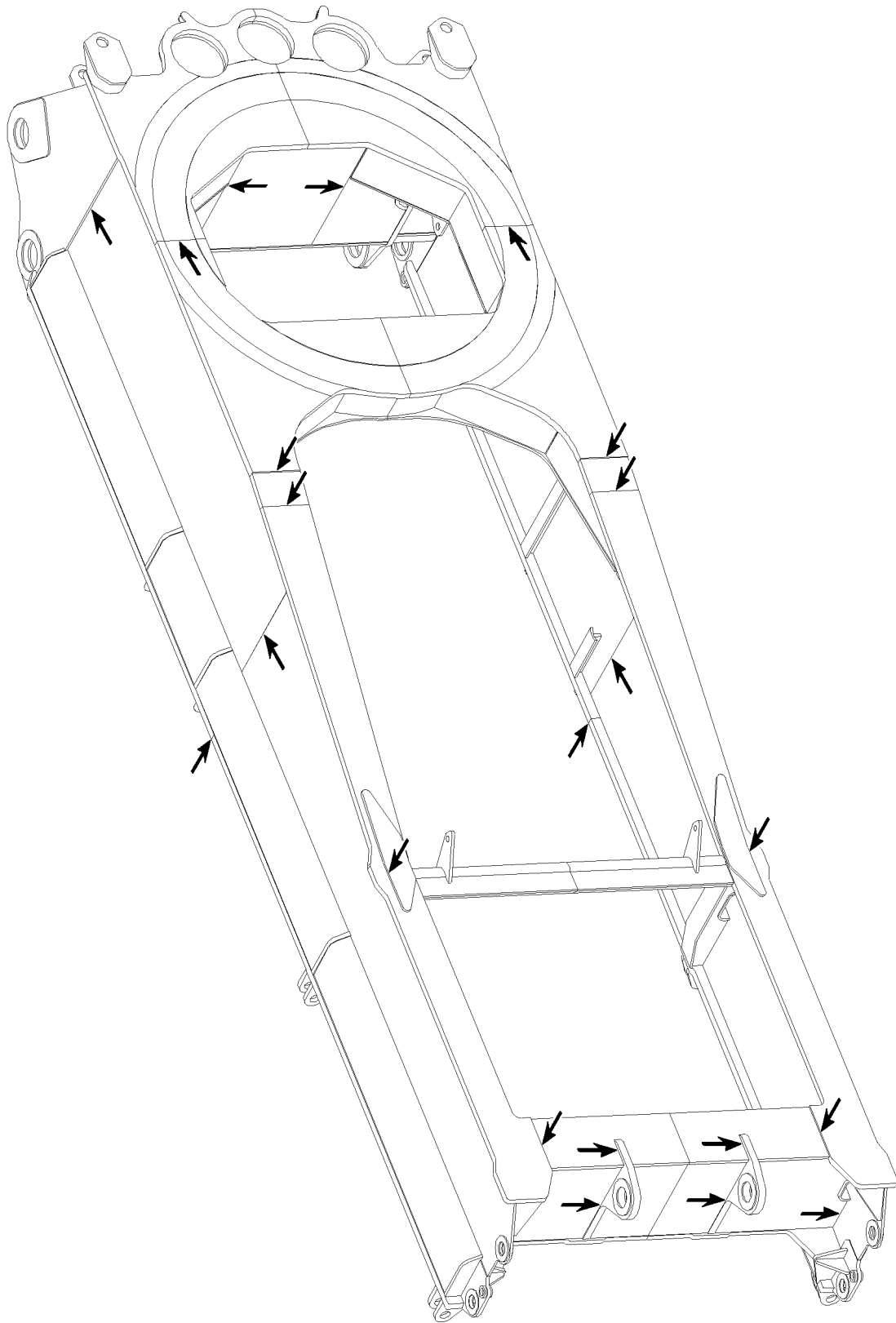
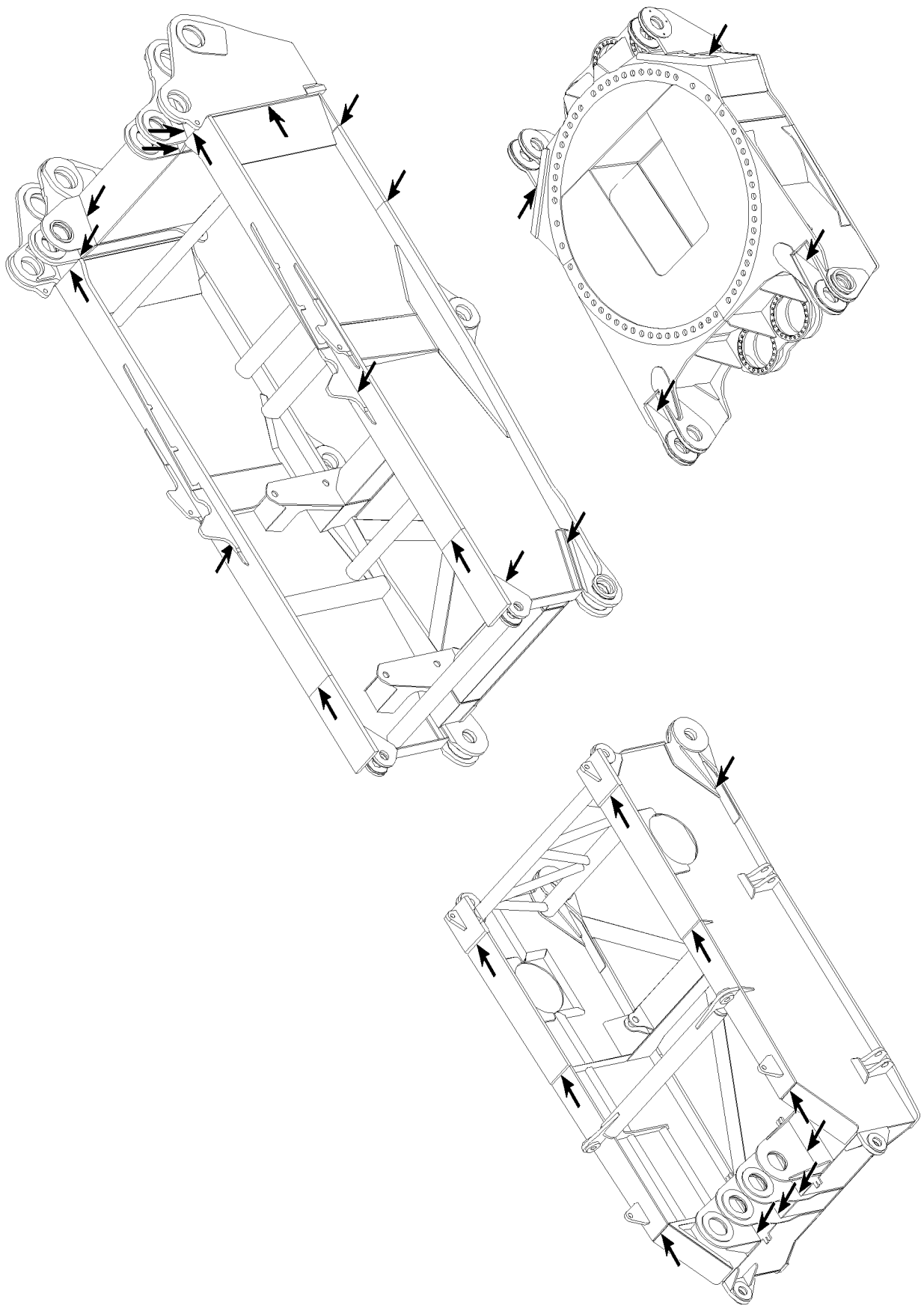


Fig.105696: Example for turntable frame

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.105691: Example for turntable frame

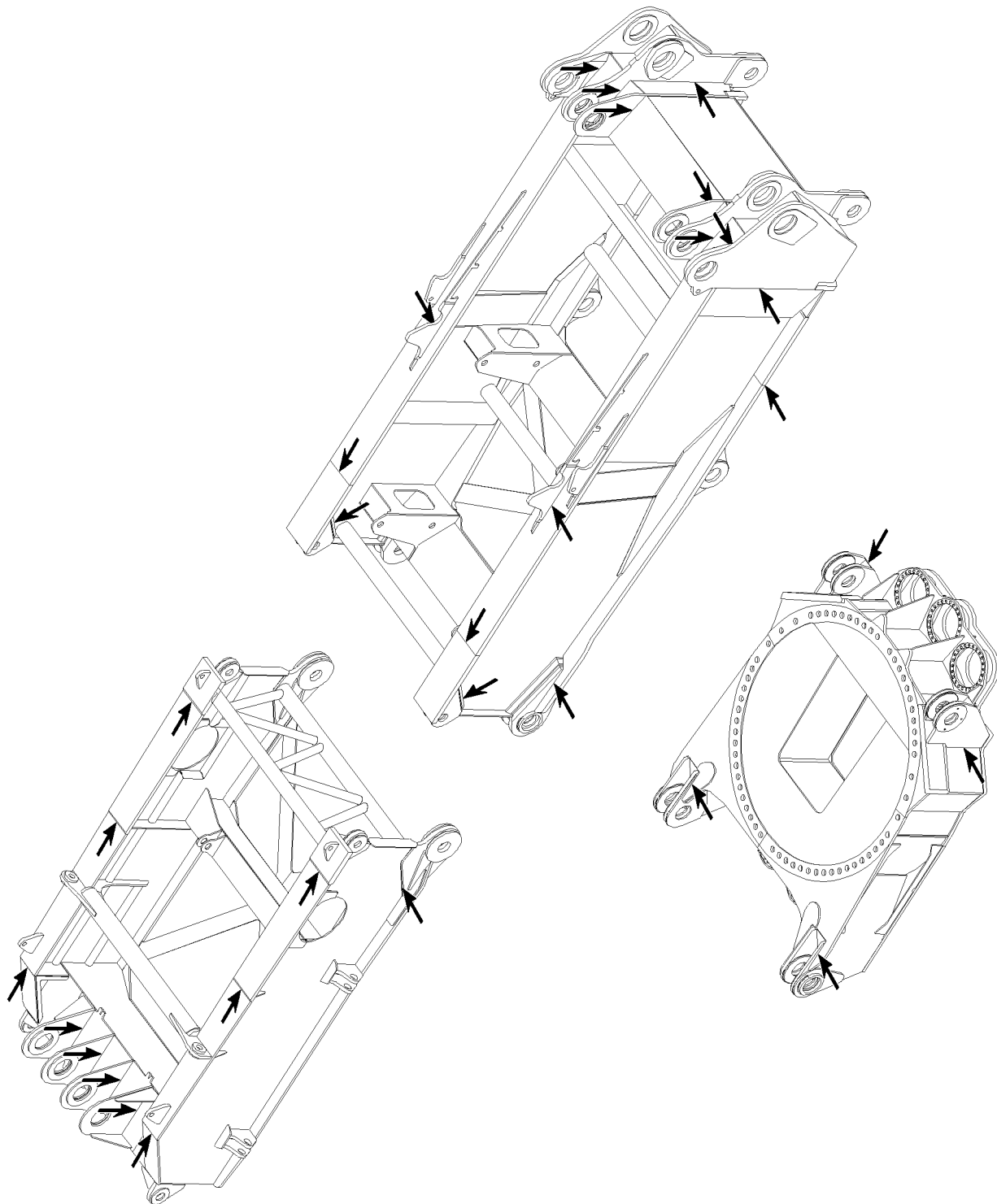
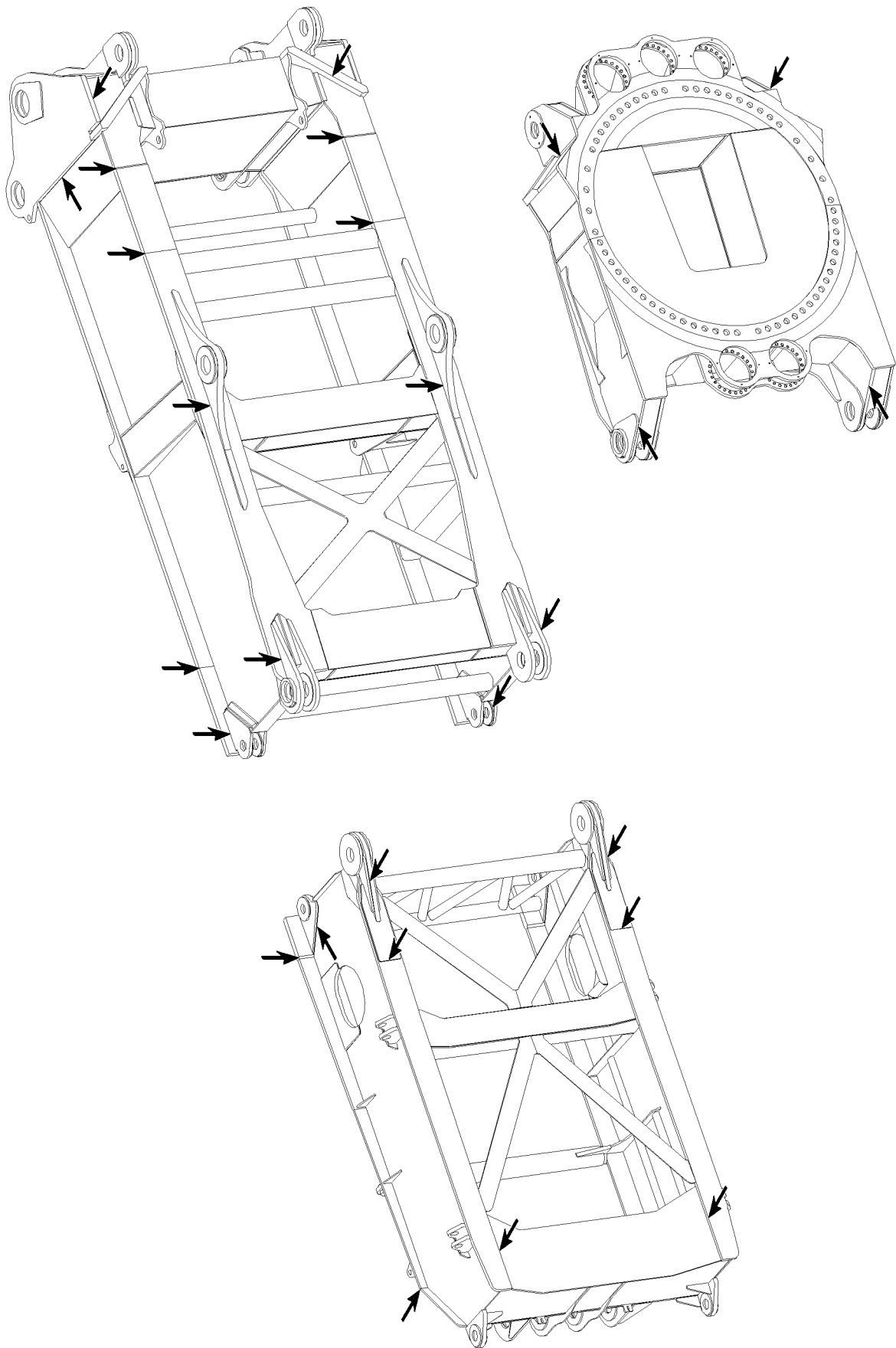


Fig.105692: Example for turntable frame



LWE/LR 1750-000/12812-15-02/en

Fig.105693: Example for turntable frame

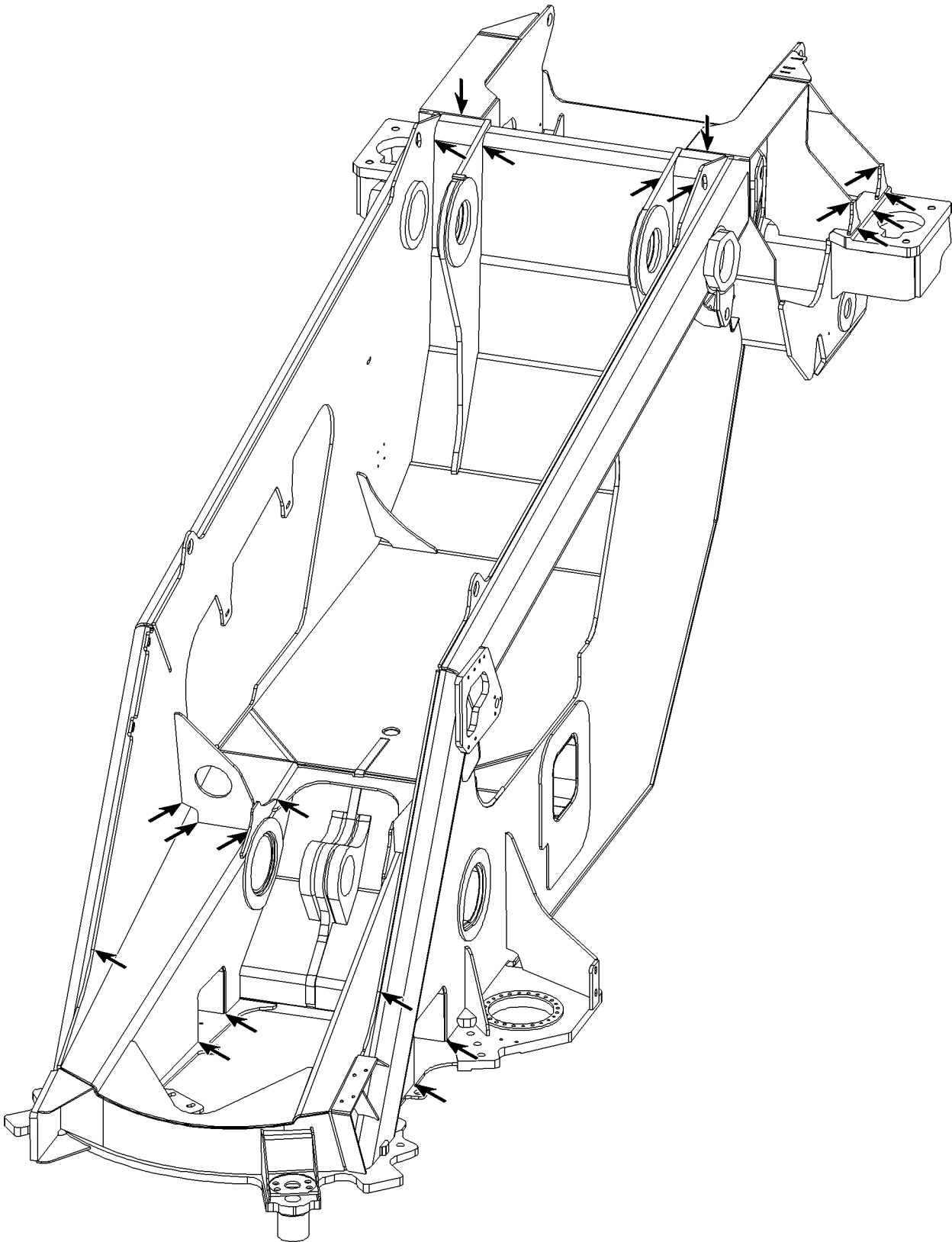
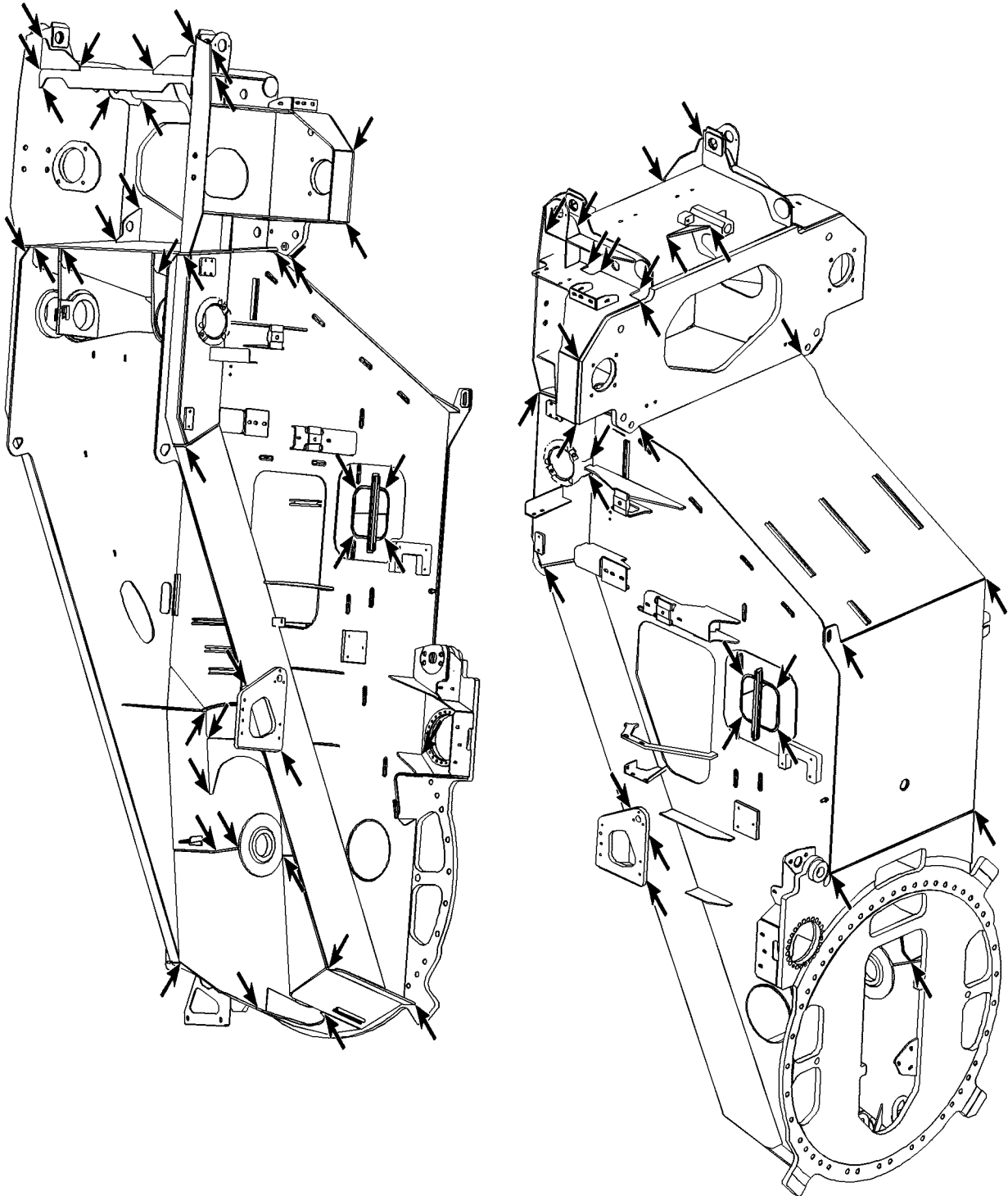


Fig.105722: Example for turntable frame

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.105932: Example for turntable frame

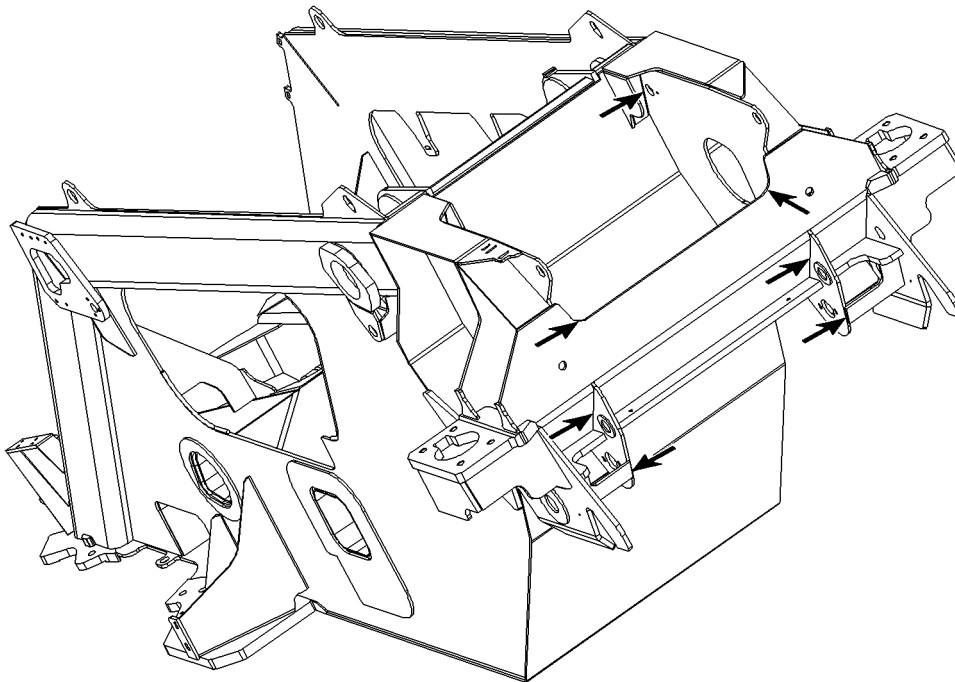
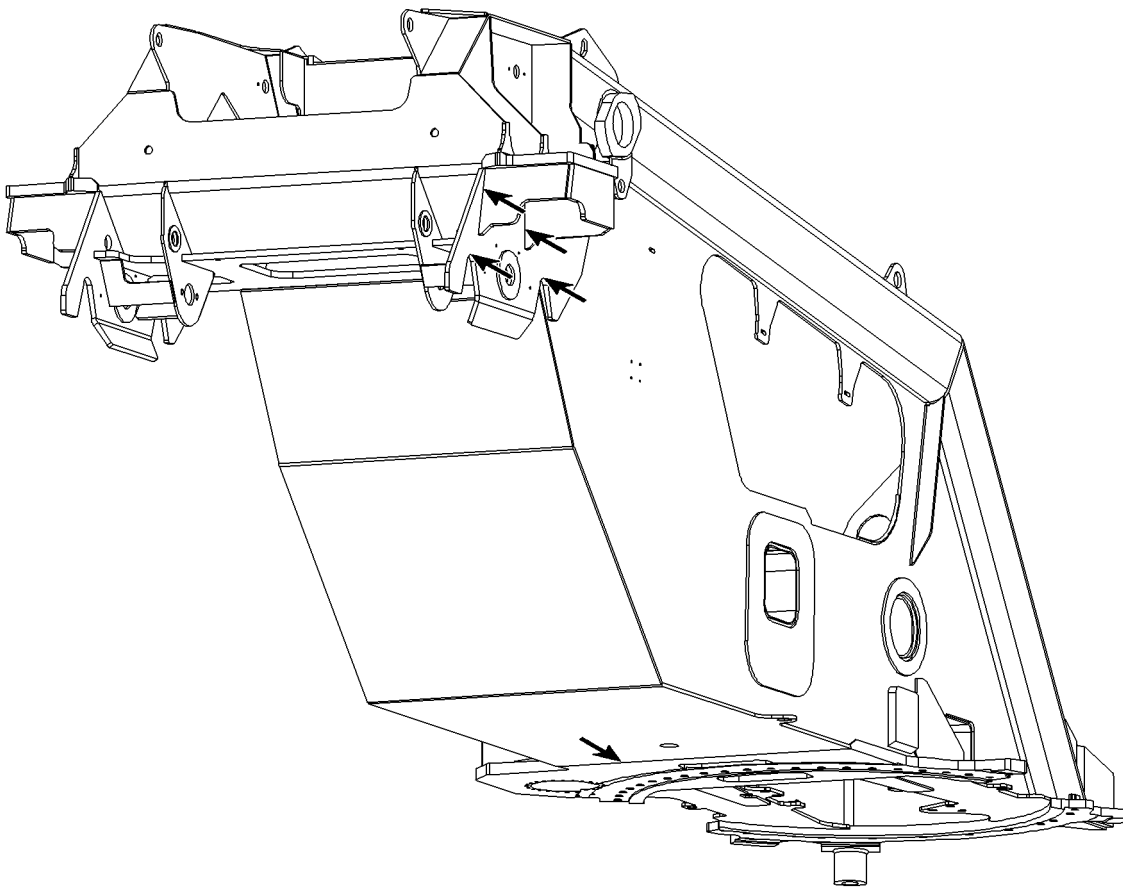
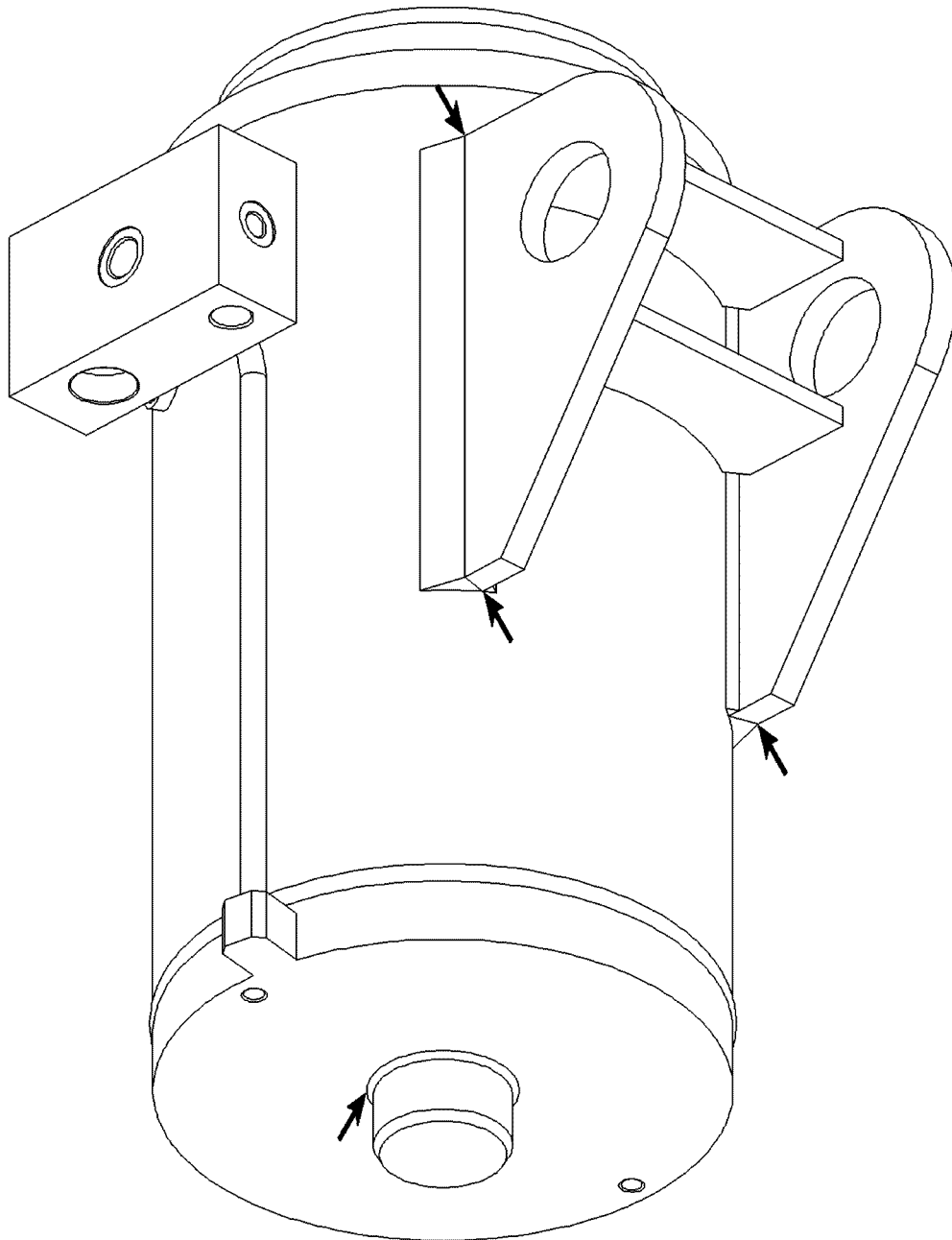


Fig.105723: Example for turntable frame



LWE/LR 1750-000/12812-15-02/en

Fig.105801: Example for ballast cylinder

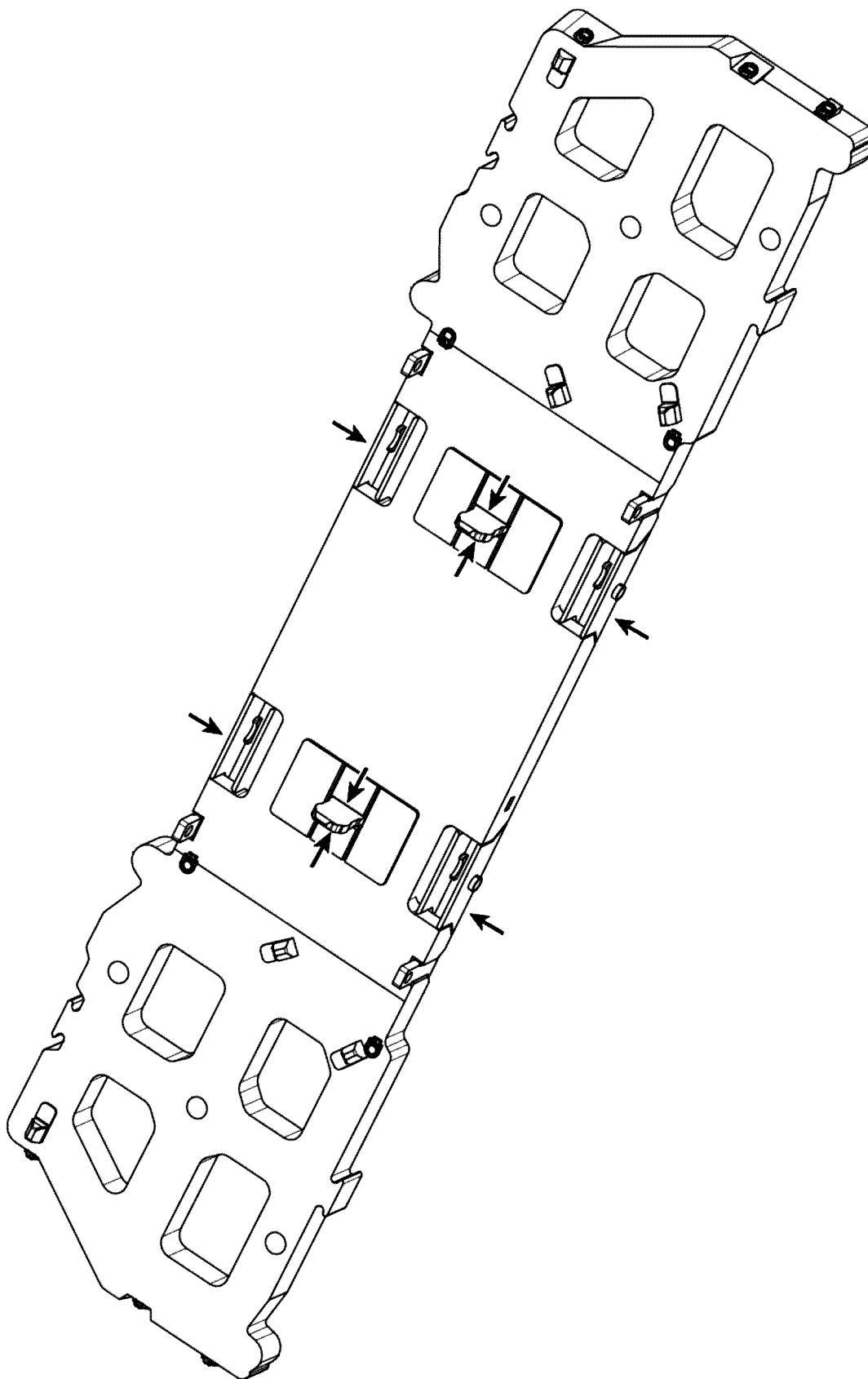
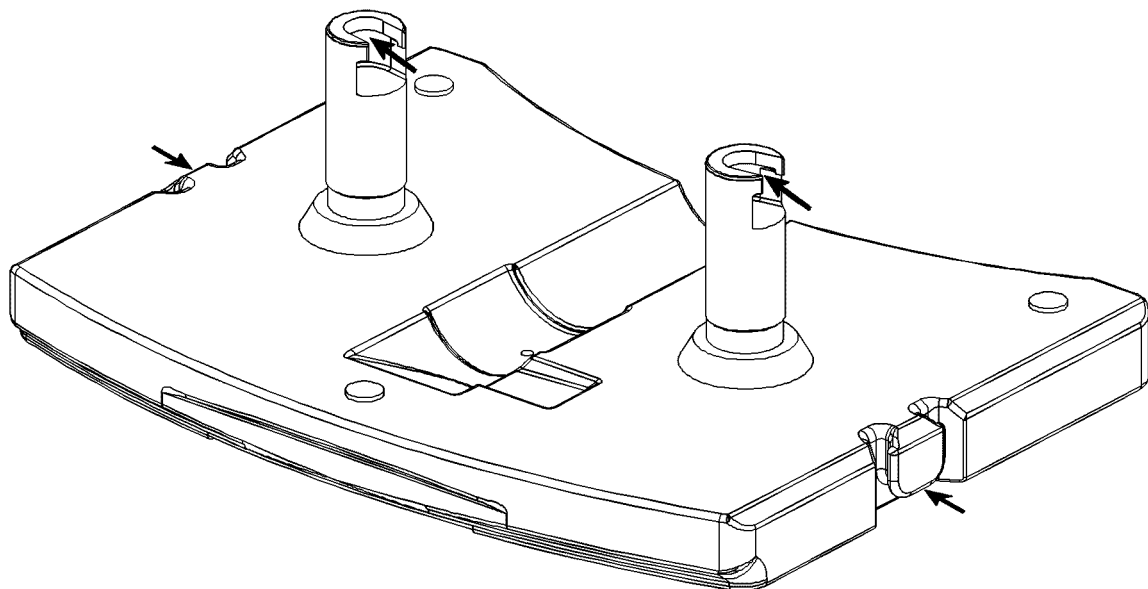
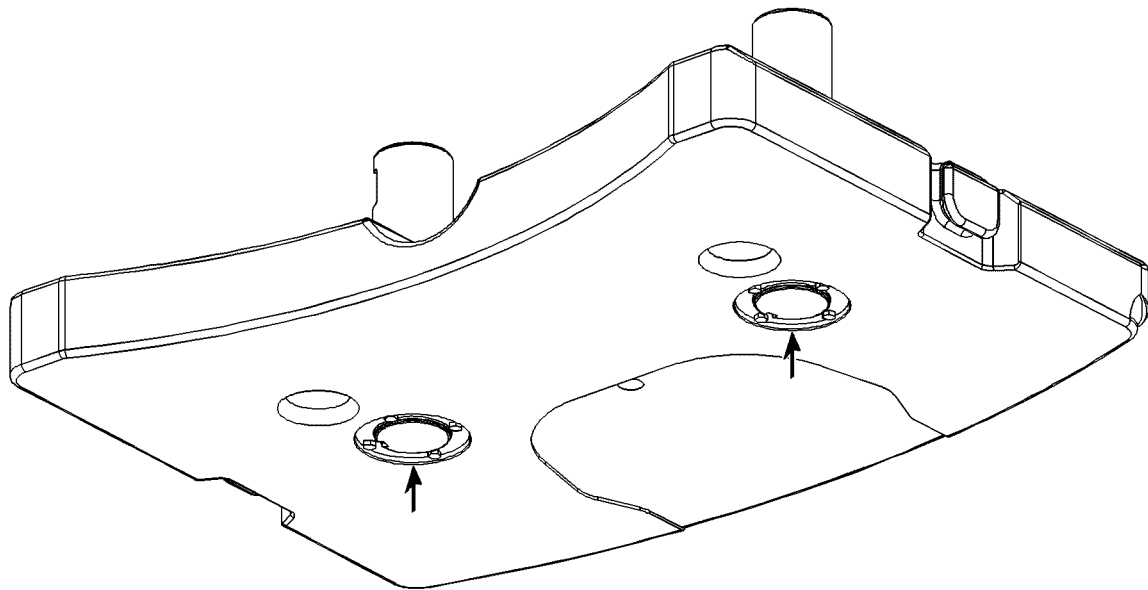


Fig.105705: Example for mounting plate

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.105807: Example for base plate

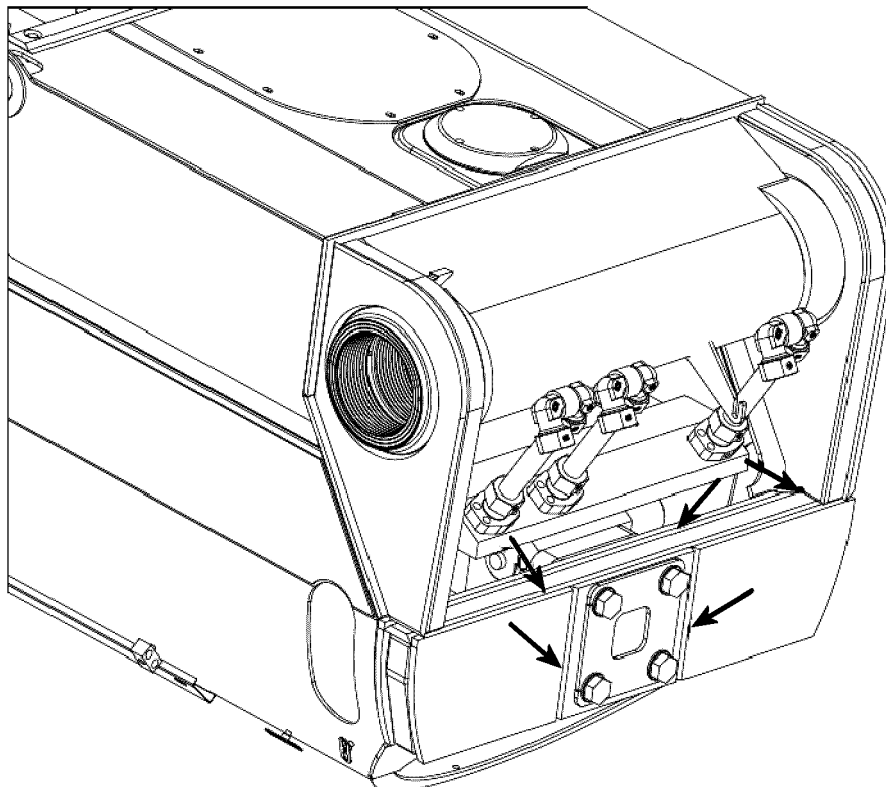
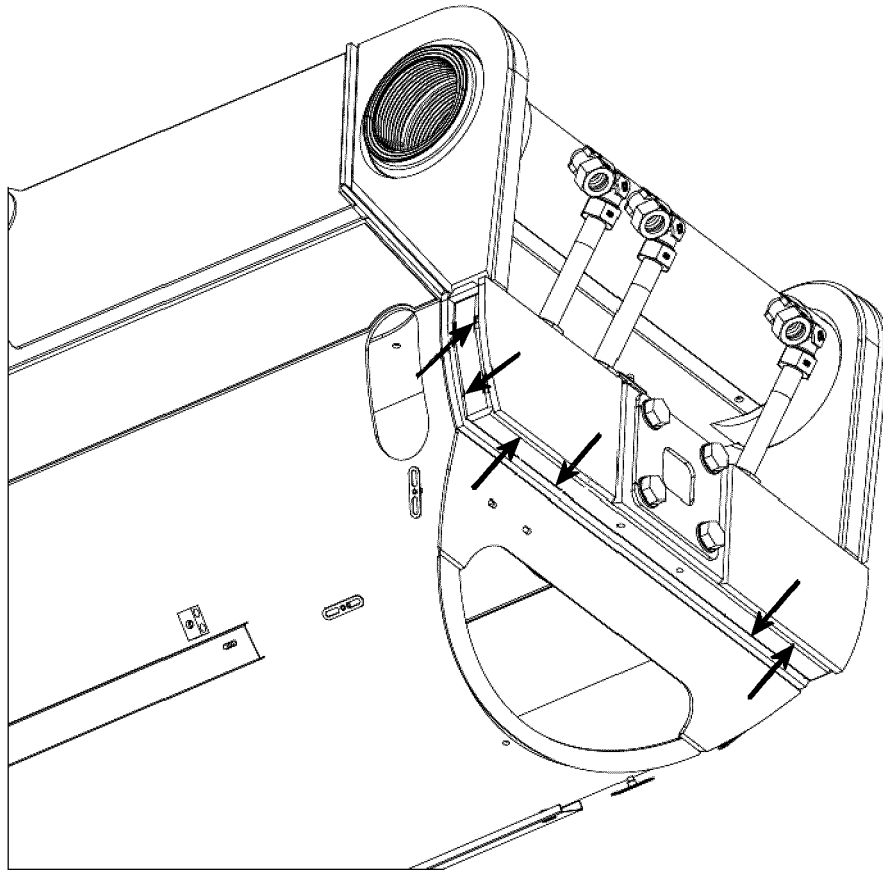
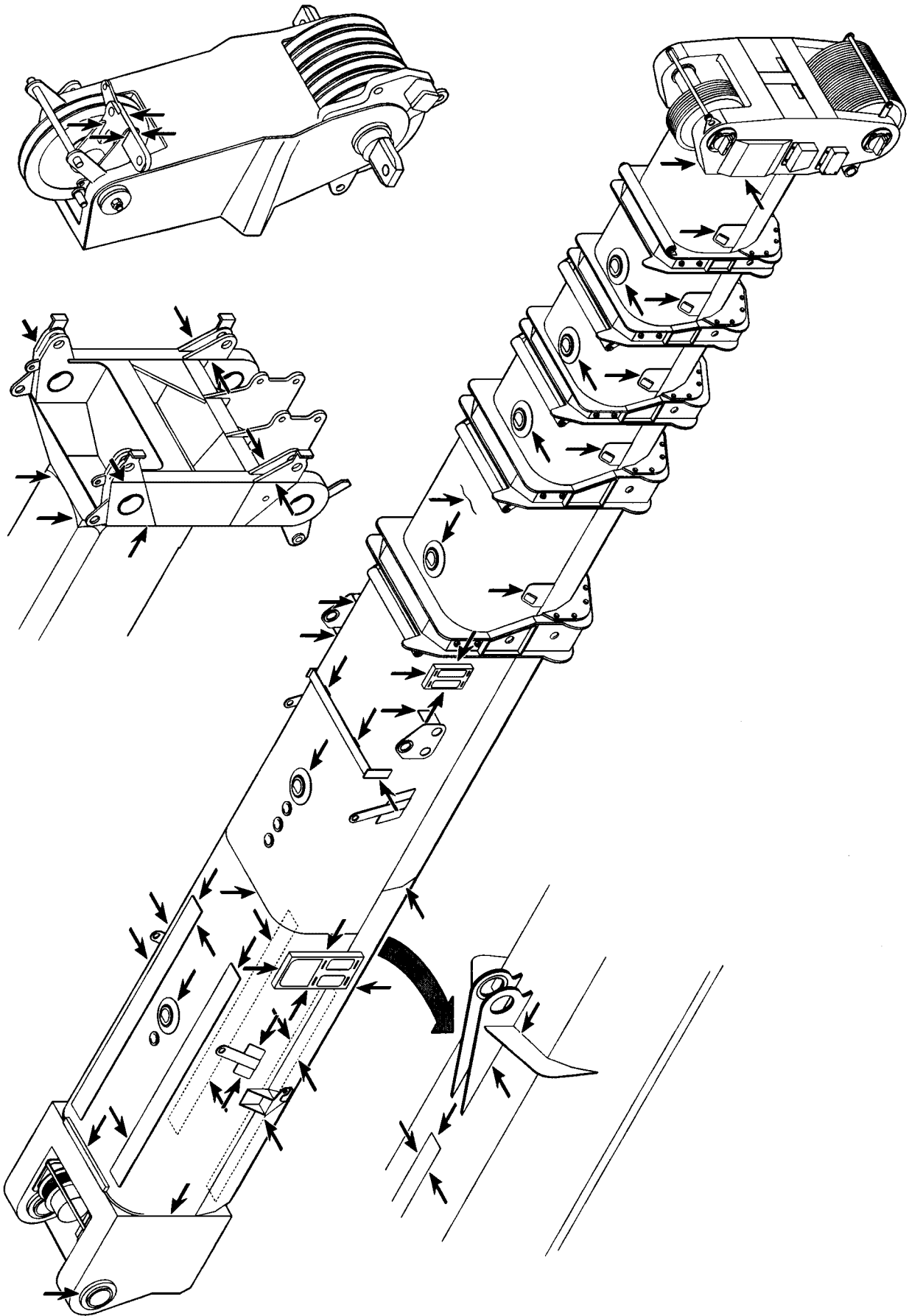


Fig.120273: Example for pivot section

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.185050: Example for telescopic boom

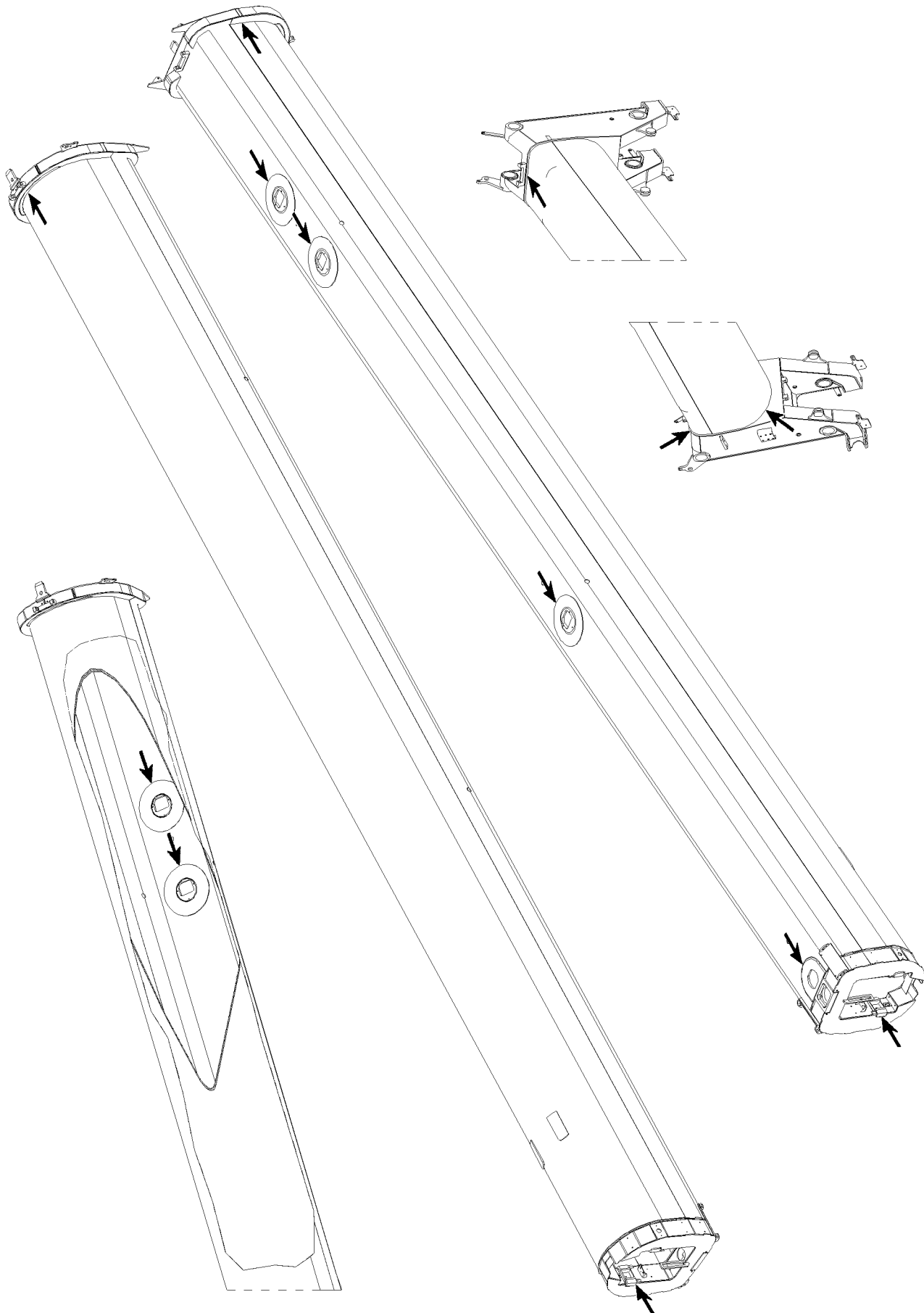
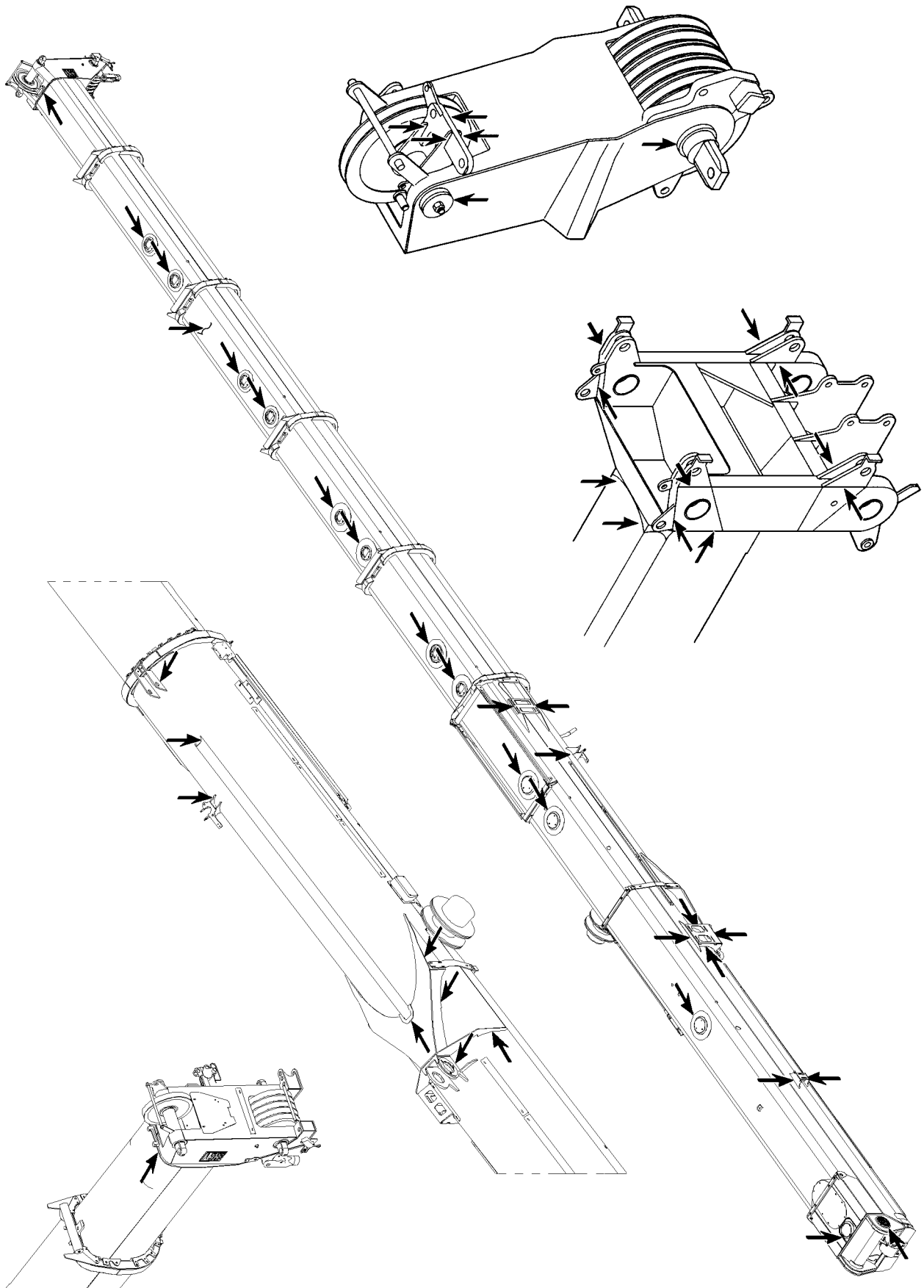


Fig.105710: Example for telescopic boom

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.105711: Example for telescopic boom

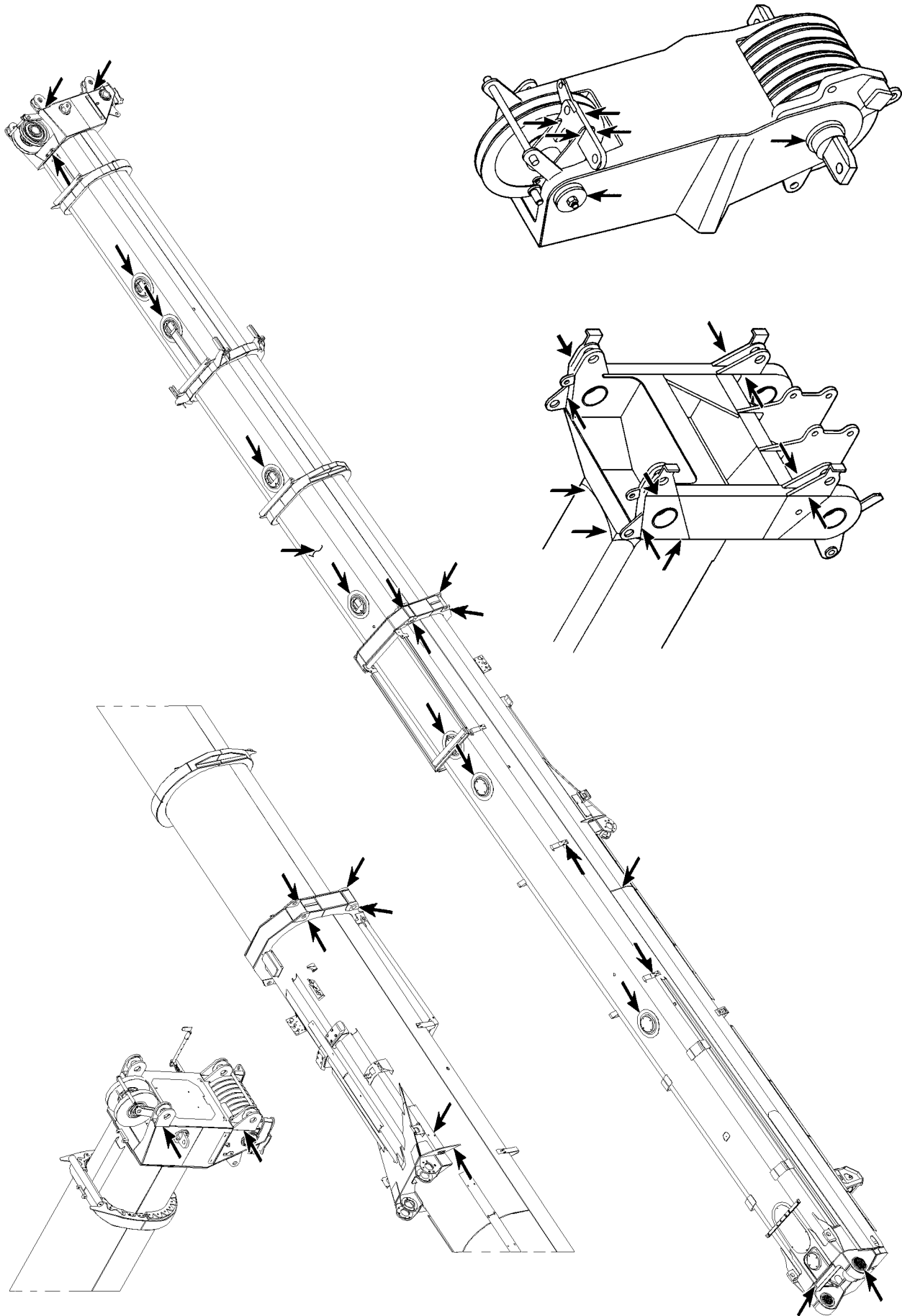
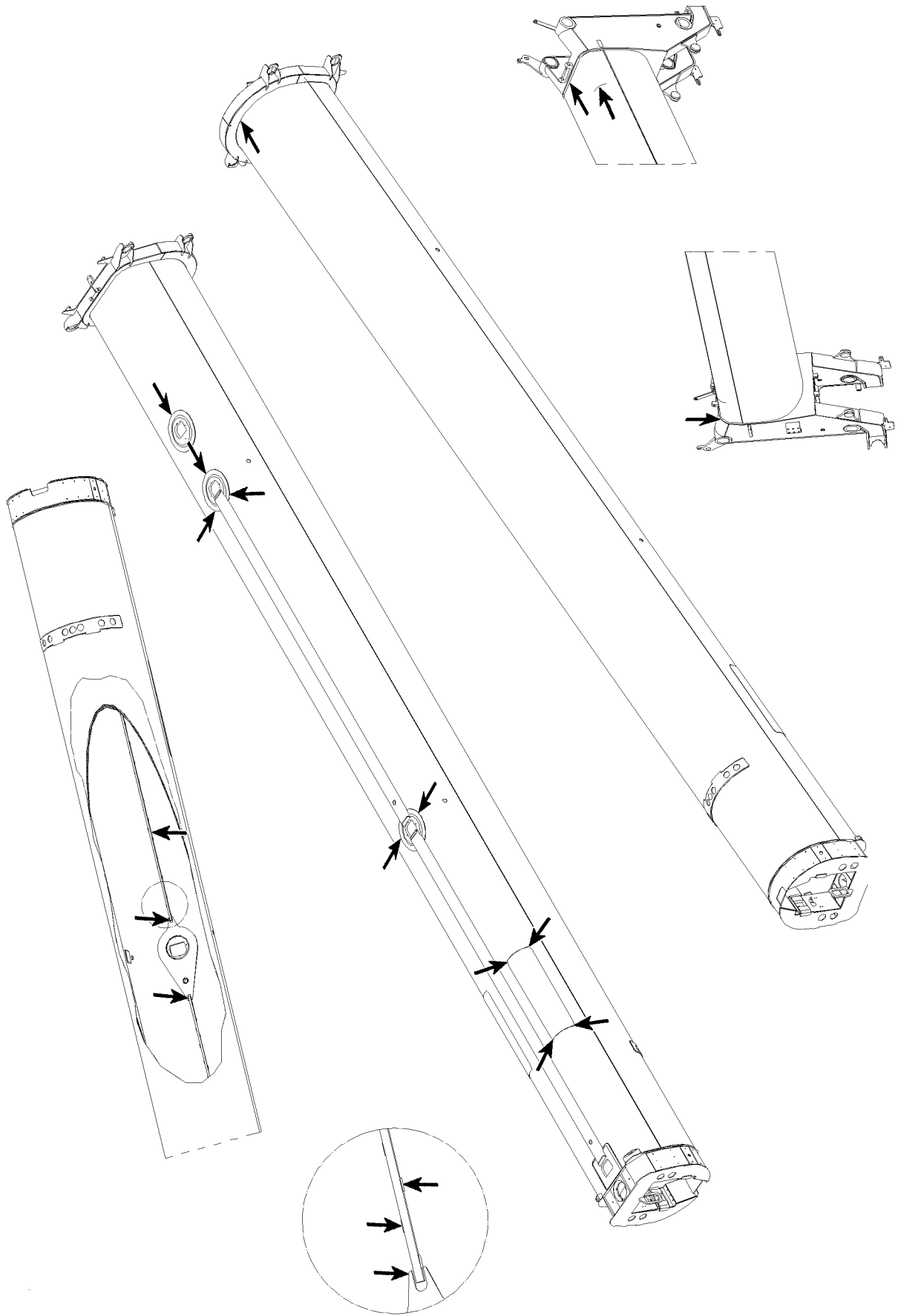


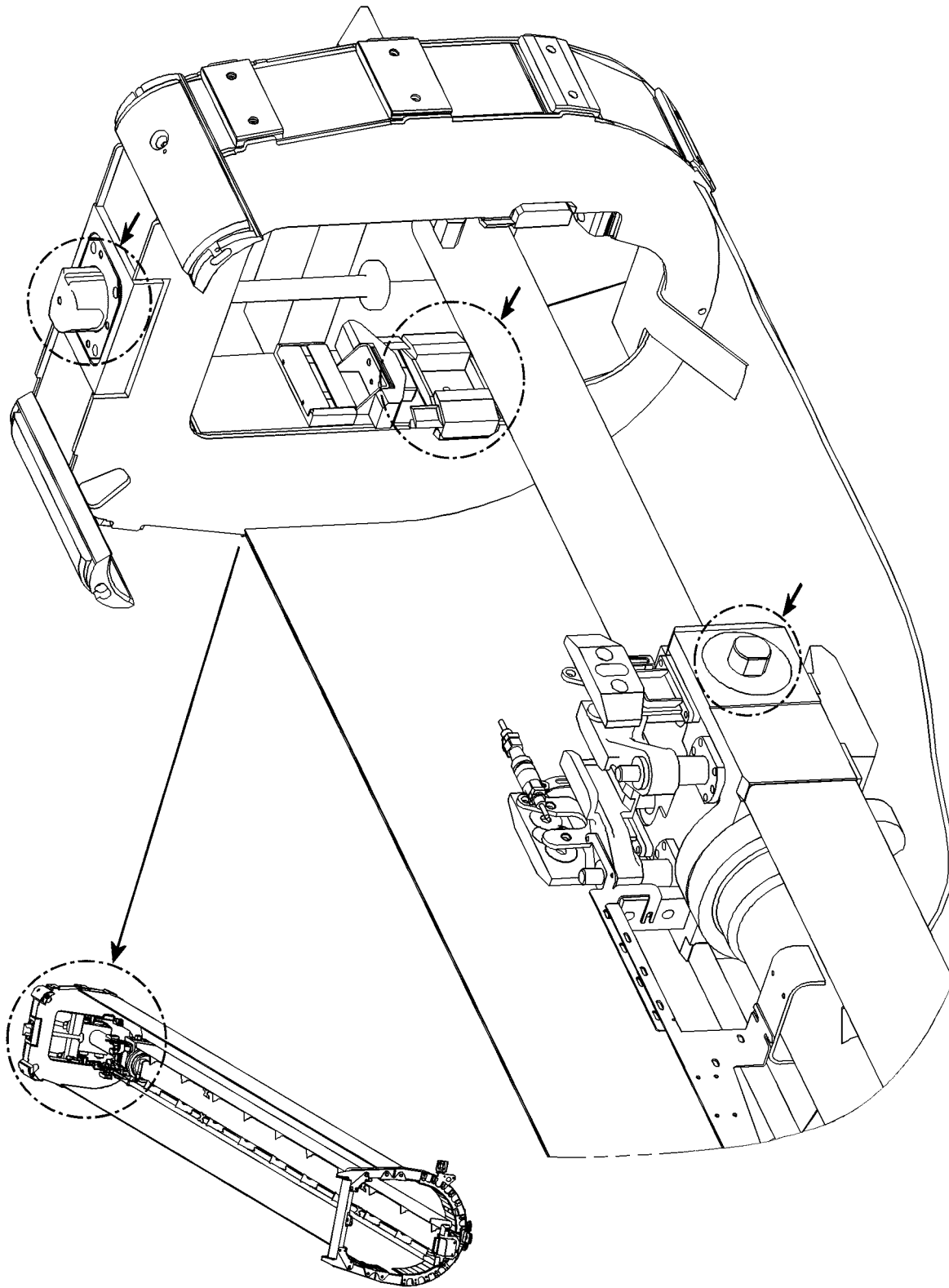
Fig.105720: Example for telescopic boom

LWE/LR 1750-000/12812-15-02/en



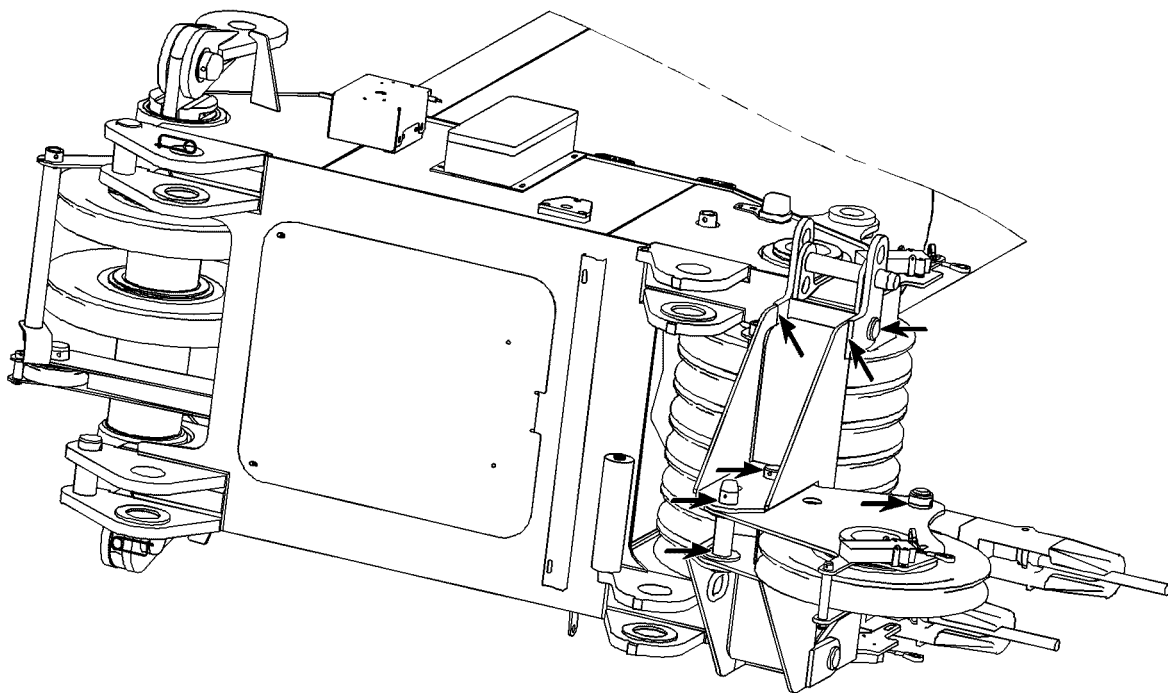
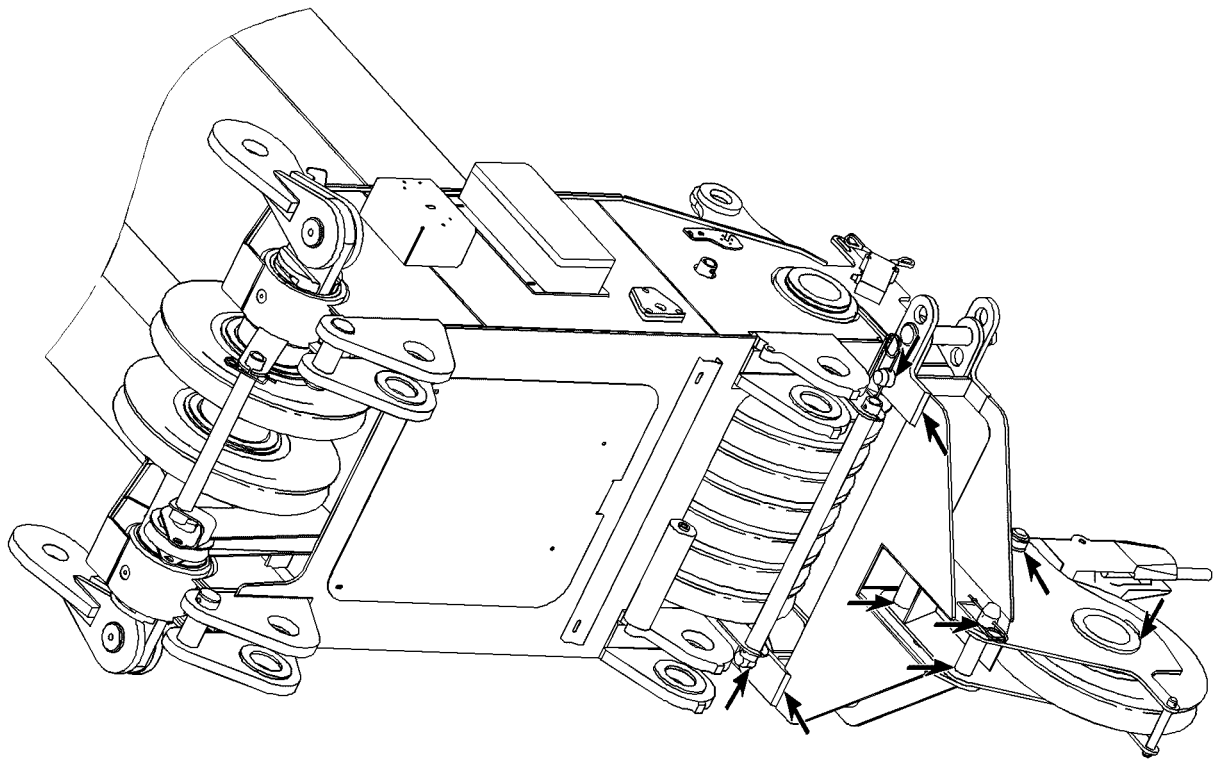
LWE/LR 1750-000/12812-15-02/en

Fig.105721: Example for telescopic boom



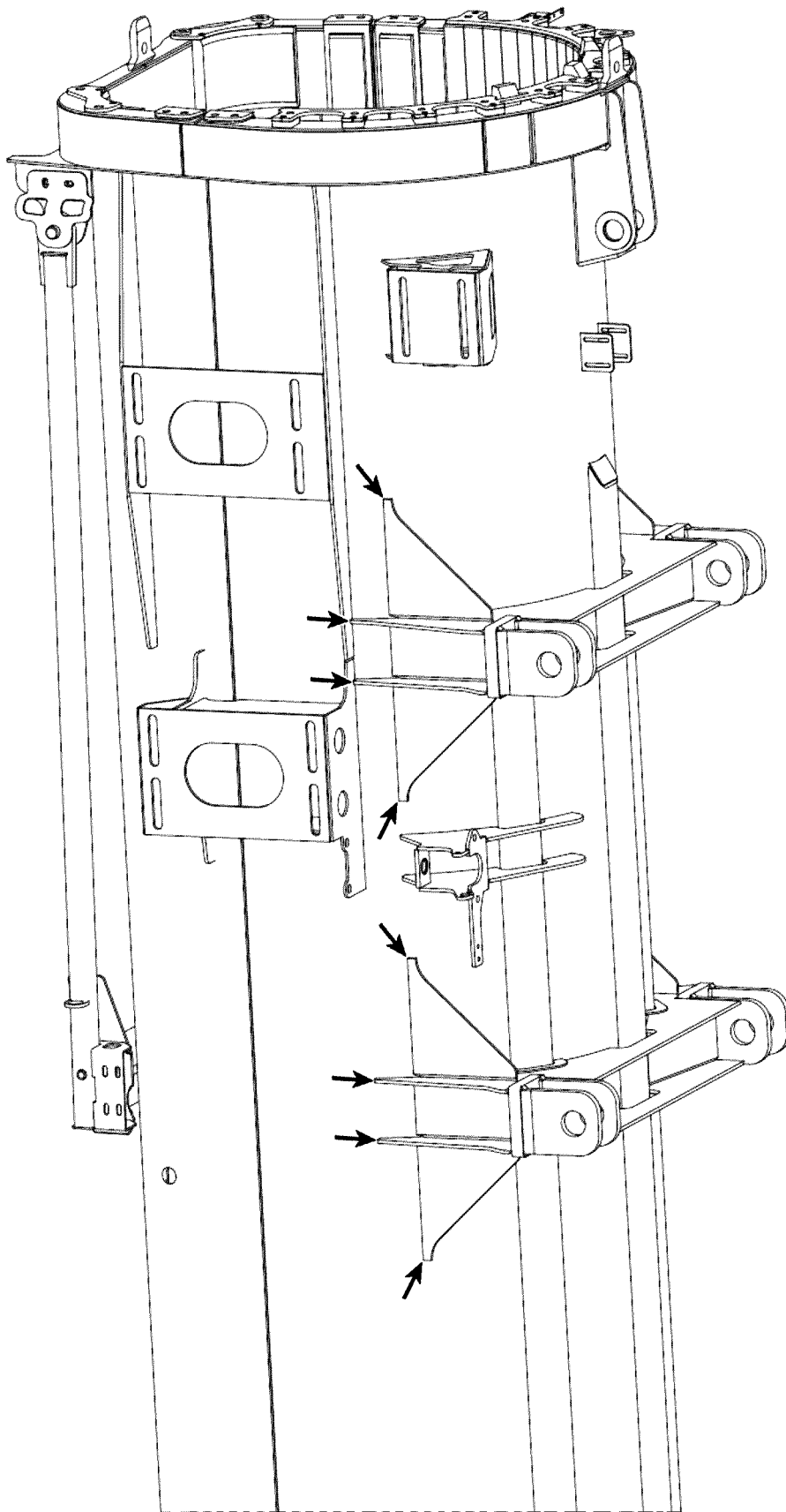
LWE/LR 1750-000/12812-15-02/en

Fig.105891: Example for push out mechanics telescopic boom



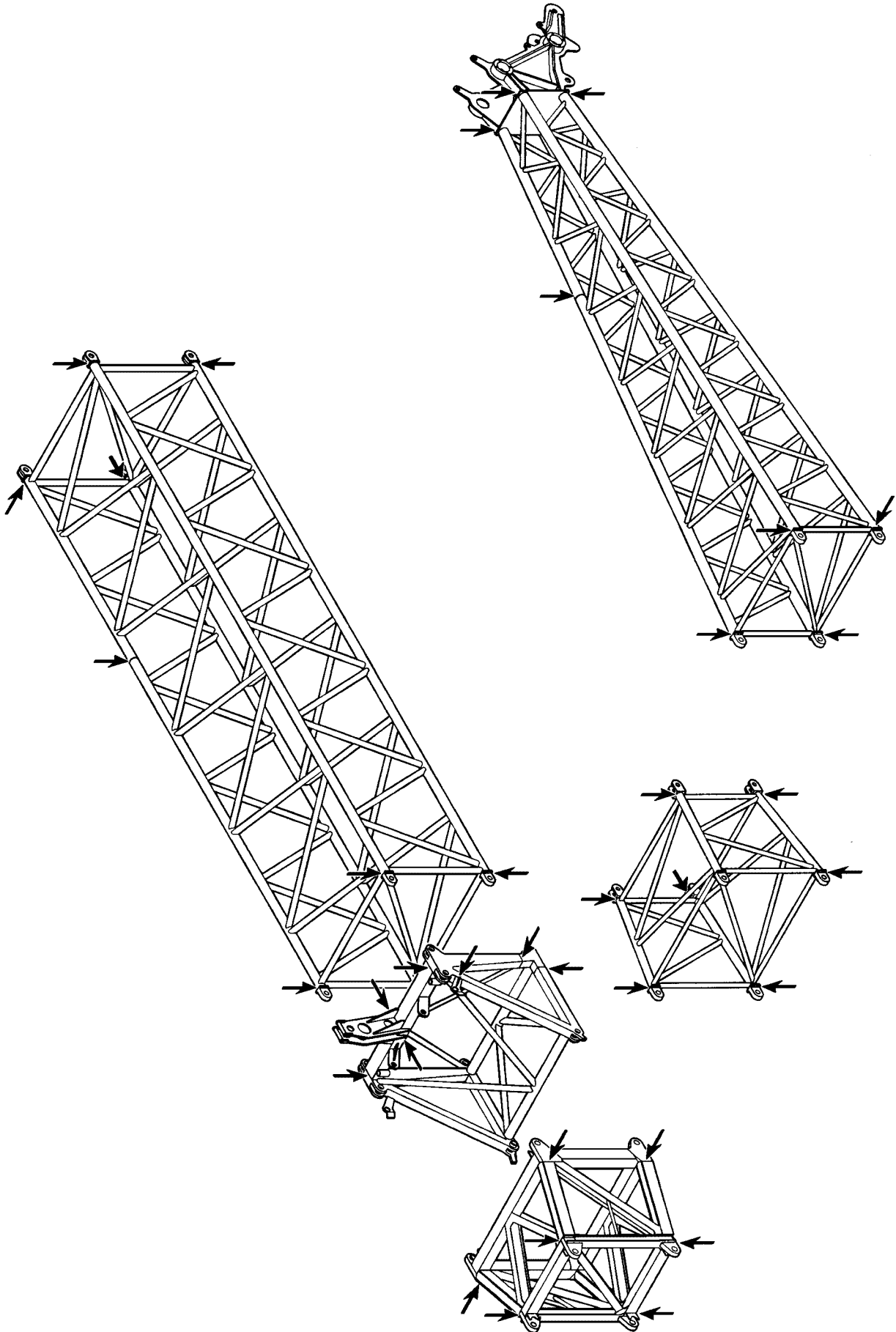
LWE/LR 1750-000/12812-15-02/en

Fig.105892: Example for boom nose



LWE/LR 1750-000/12812-15-02/en

Fig.105689: Example for dolly console



LWE/LR 1750-000/12812-15-02/en

Fig.185051: Example for lattice jib

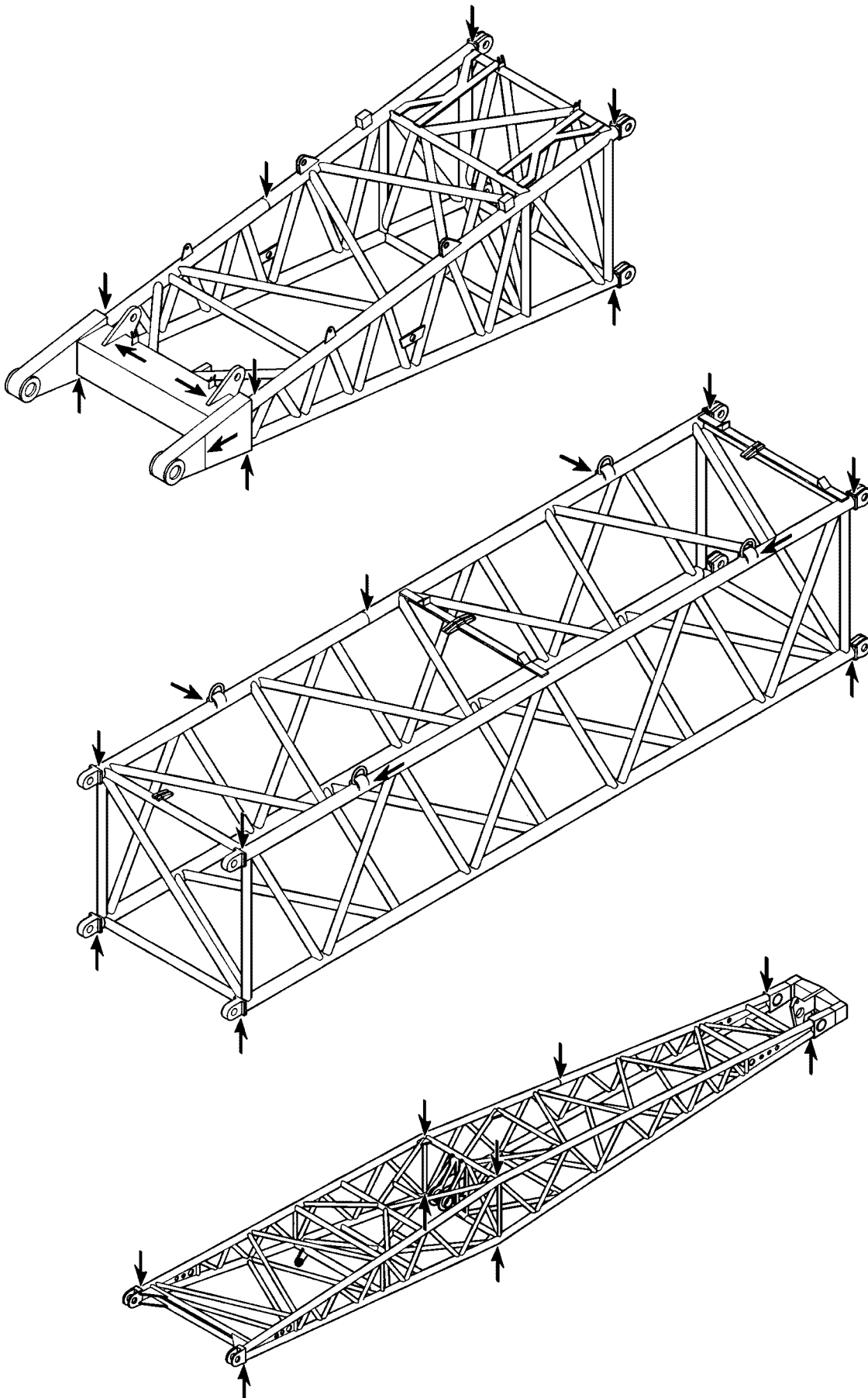
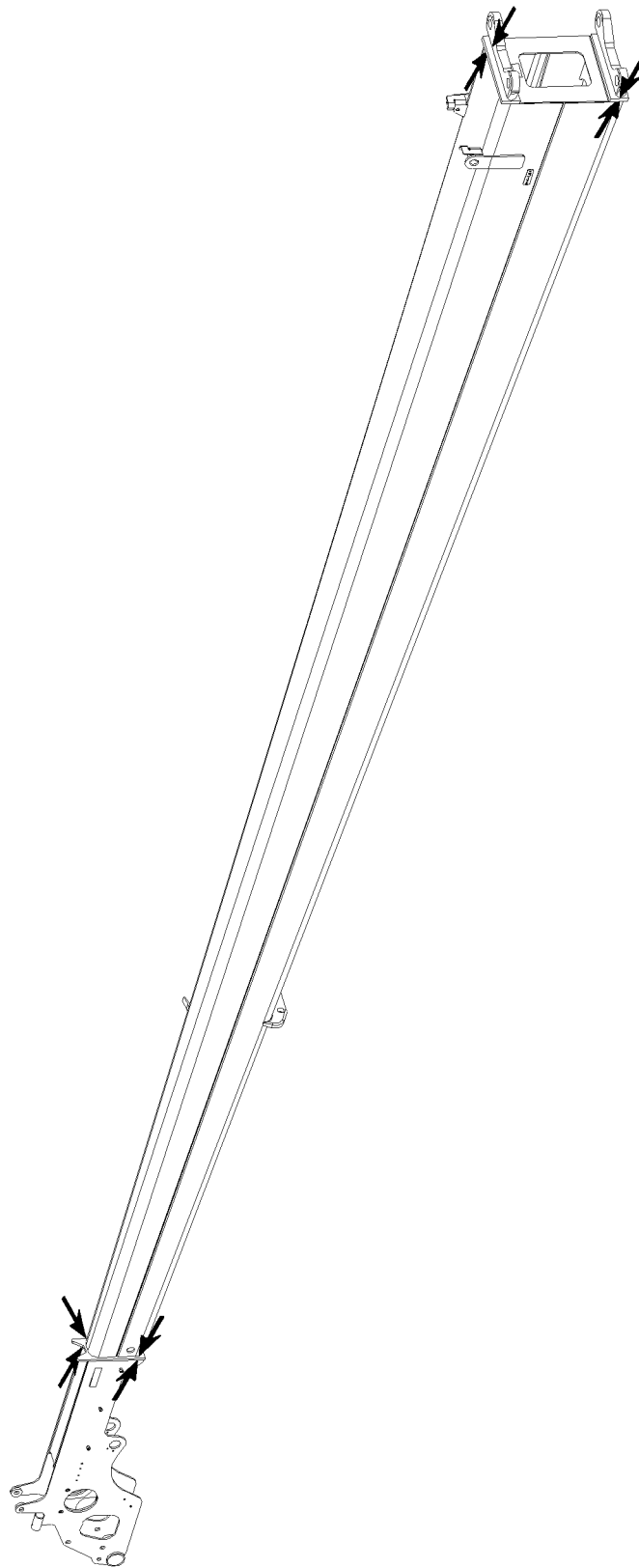


Fig.185052: Example for NA / WA-frame

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.105713: Example for end section

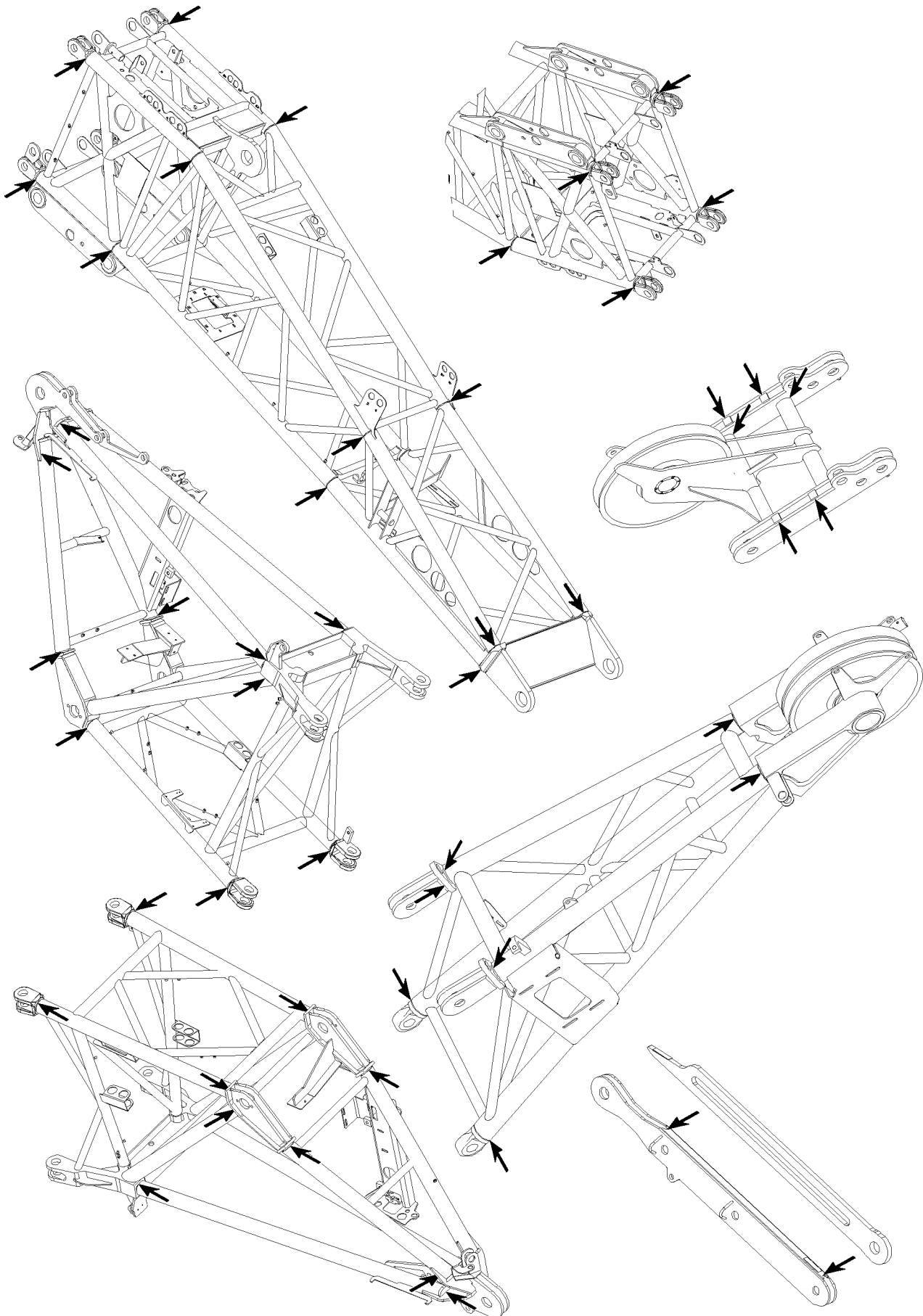
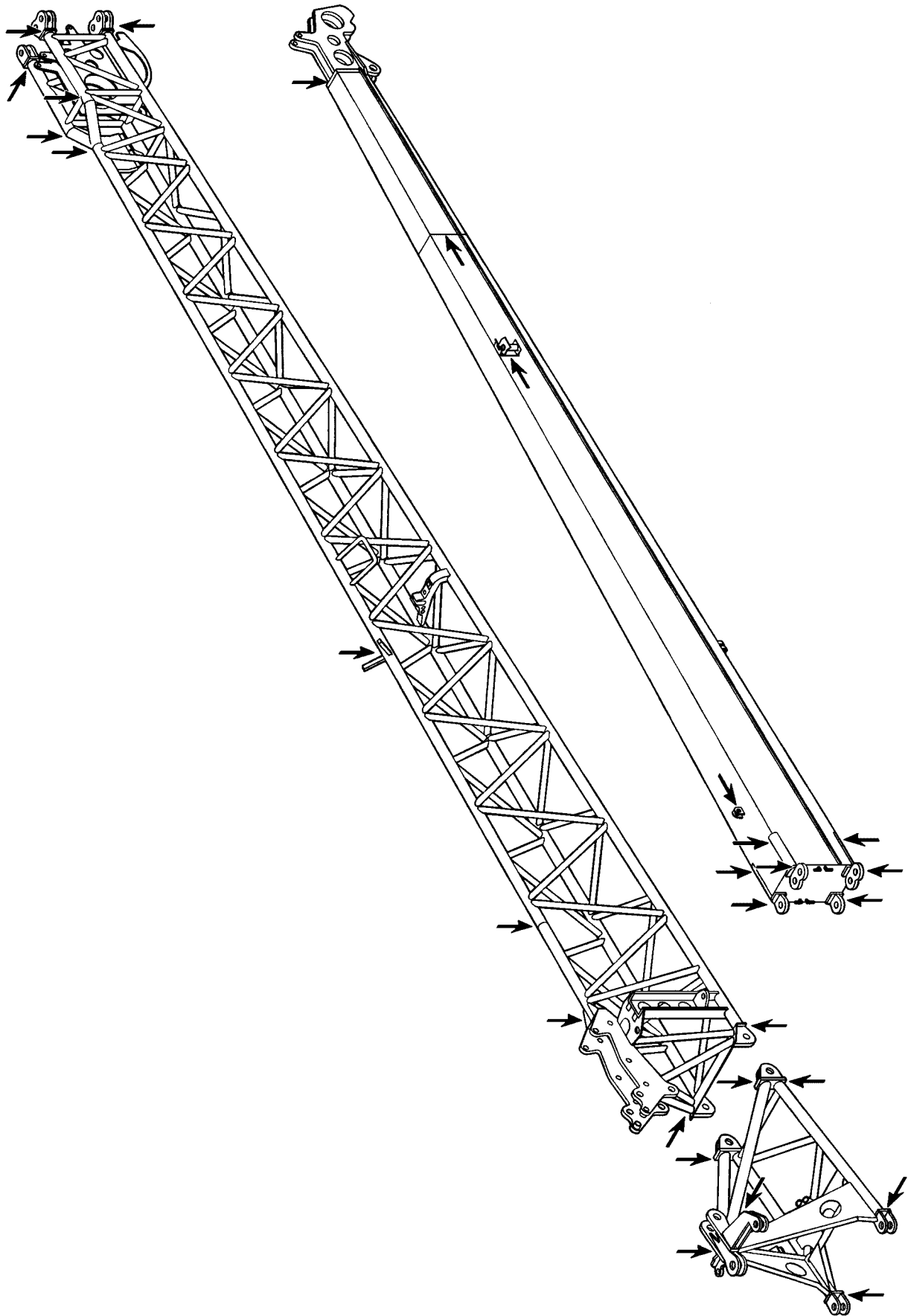


Fig.105836: Example for pivot section, adapter and boom nose



LWE/LR 1750-000/12812-15-02/en

Fig.185058: Example for folding jib

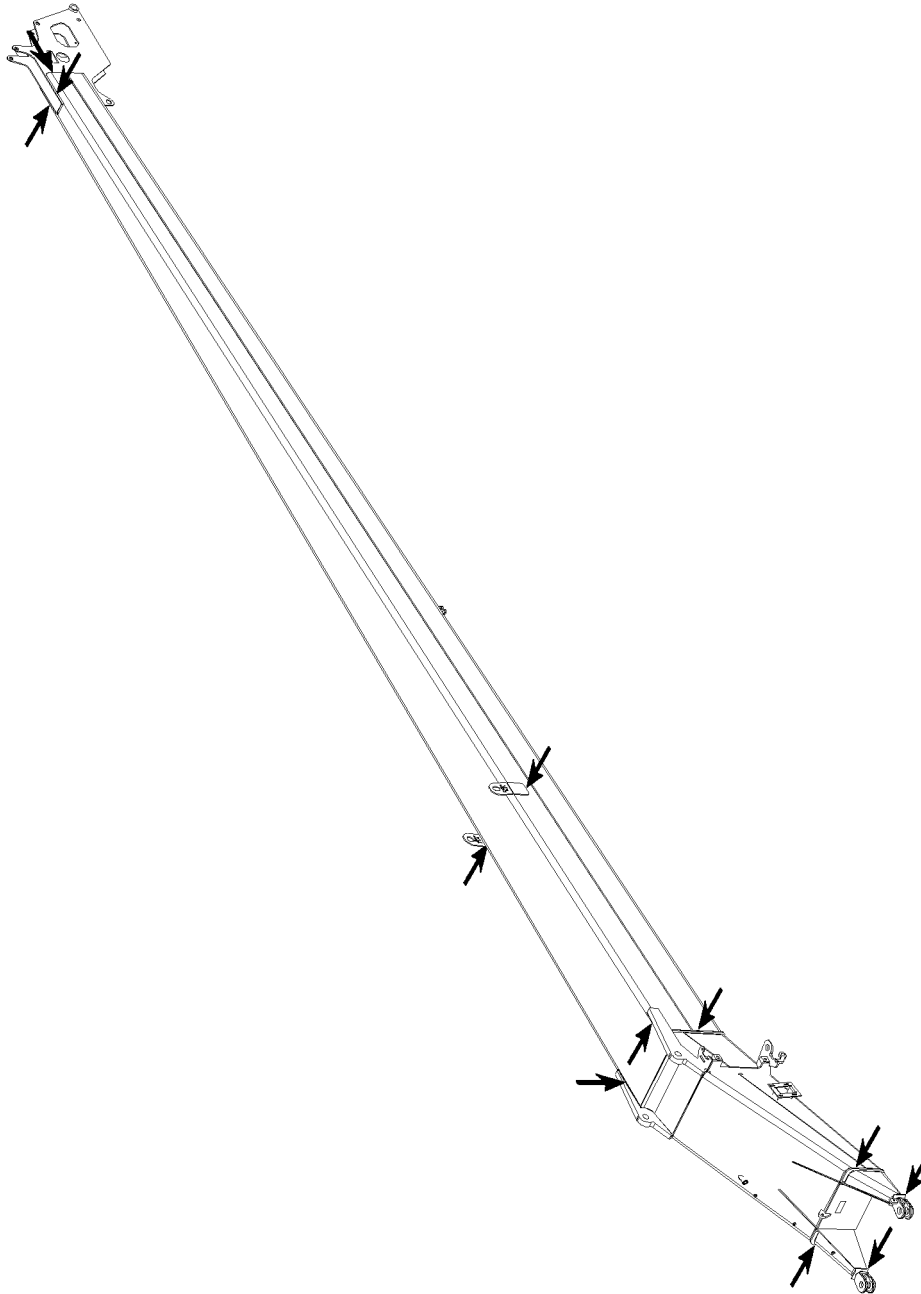
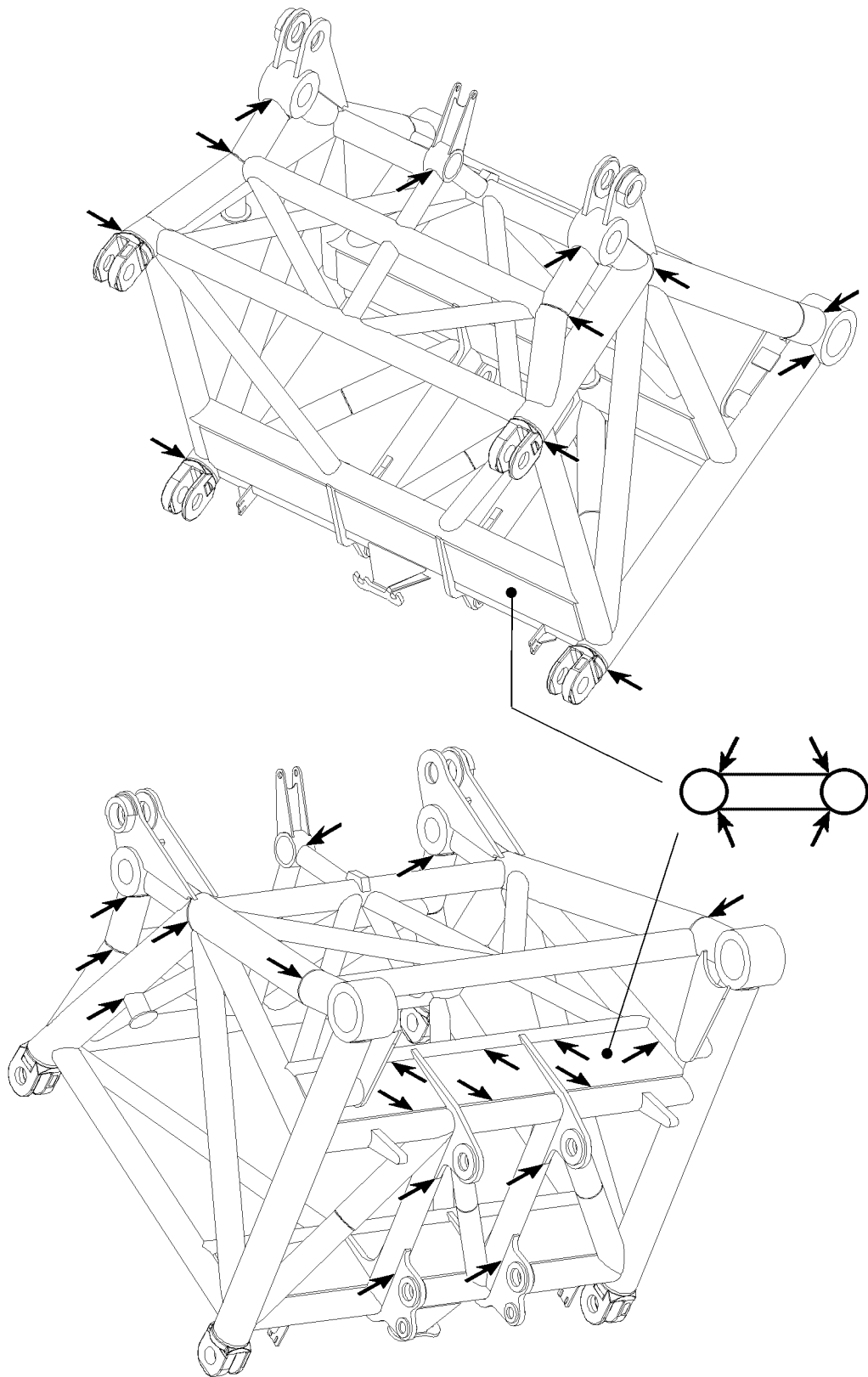


Fig.105697: Example for folding jib

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Fig.105732: Example for W-connector head

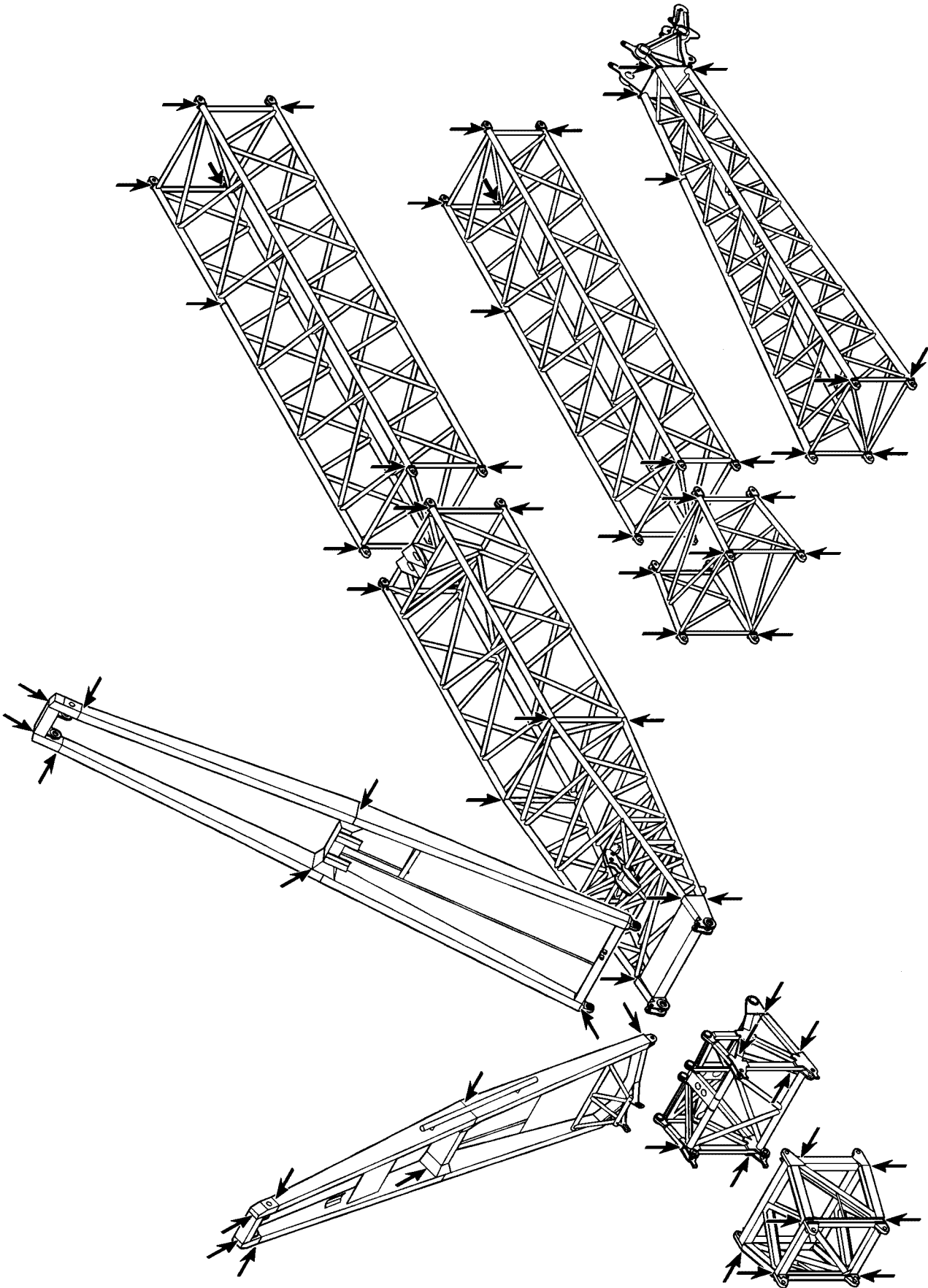
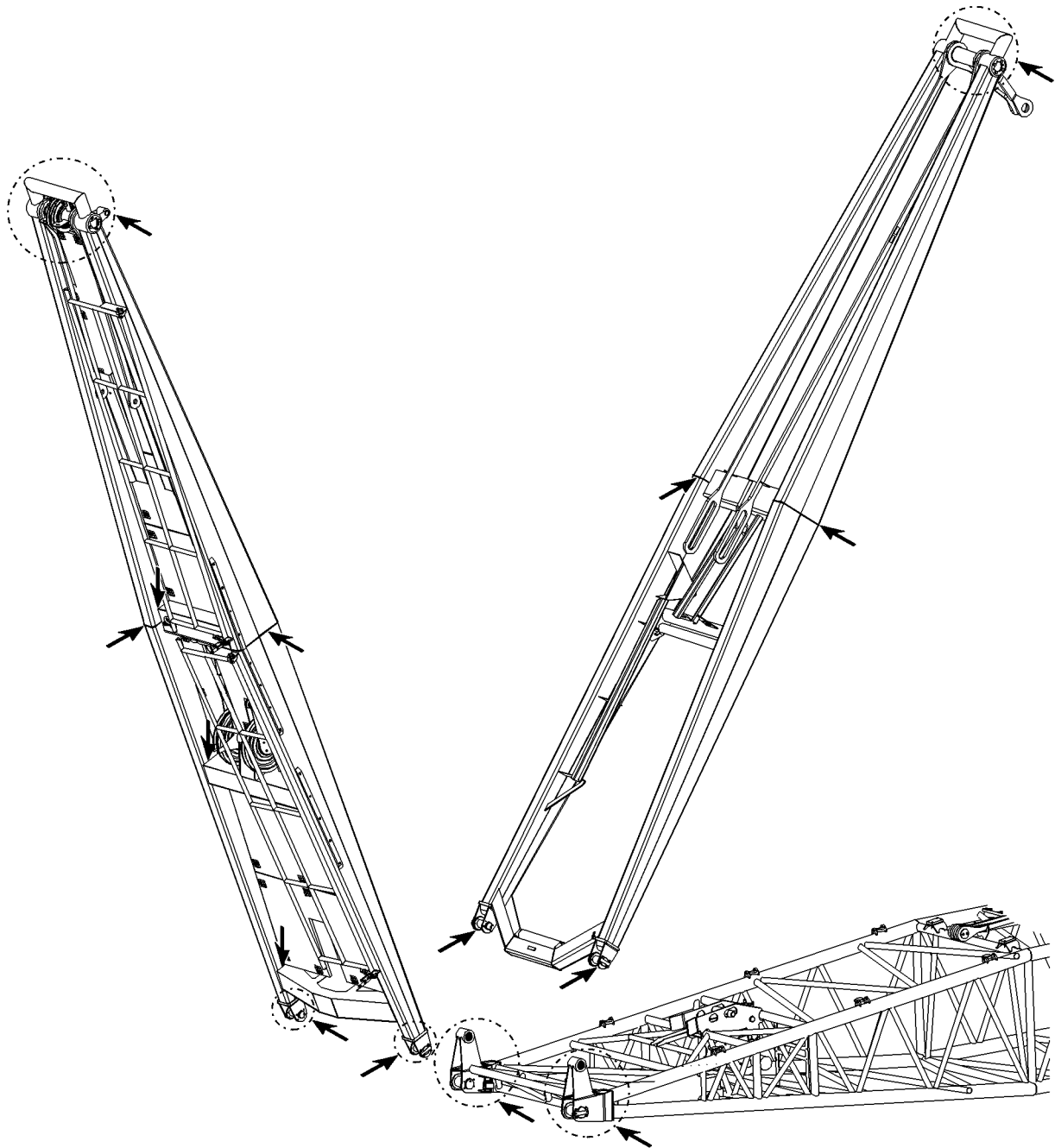


Fig.185053: Example for assembly unit with lattice jib

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LWE/LR 1750-000/12812-15-02/en

Fig.105838: Example for NA frames

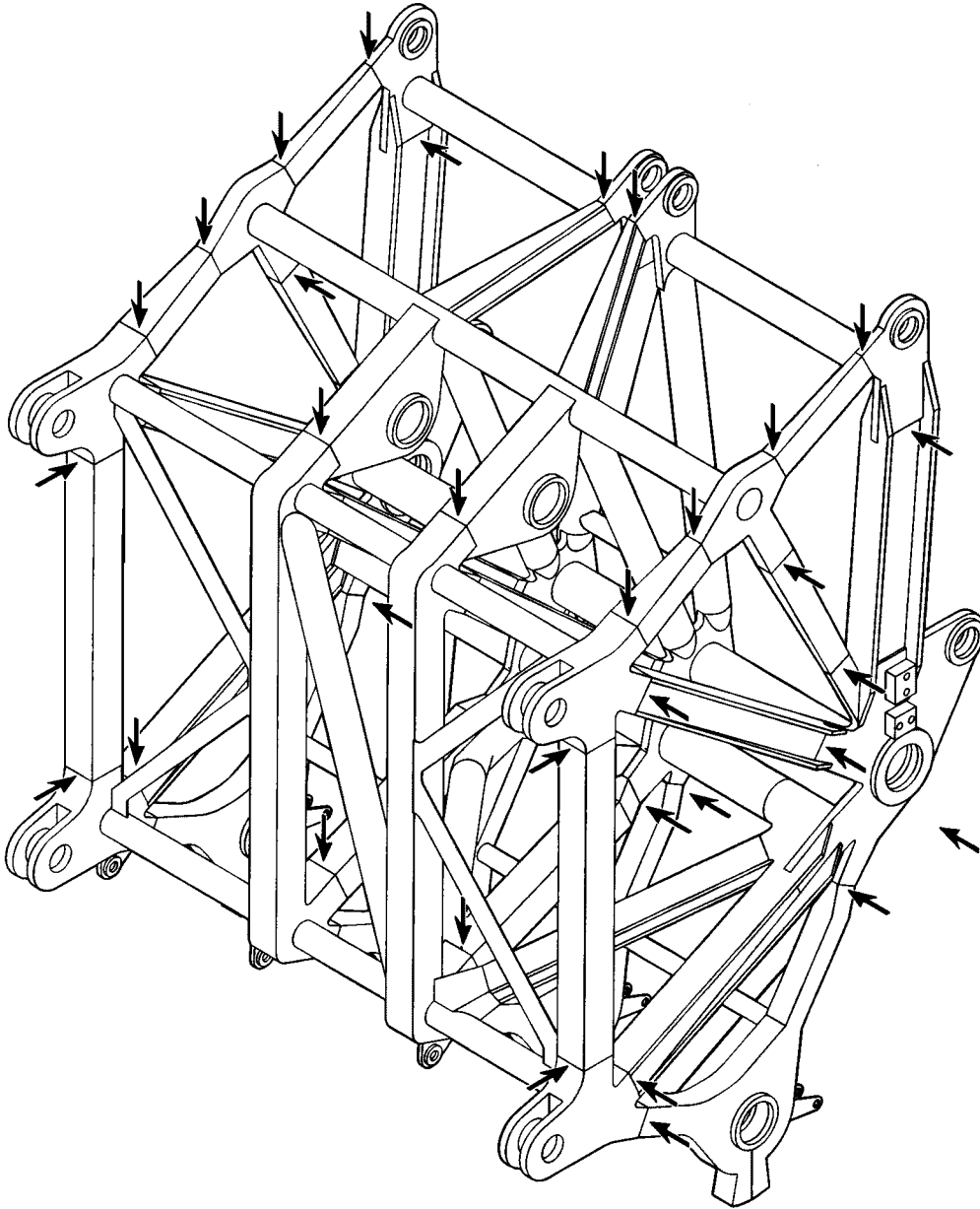
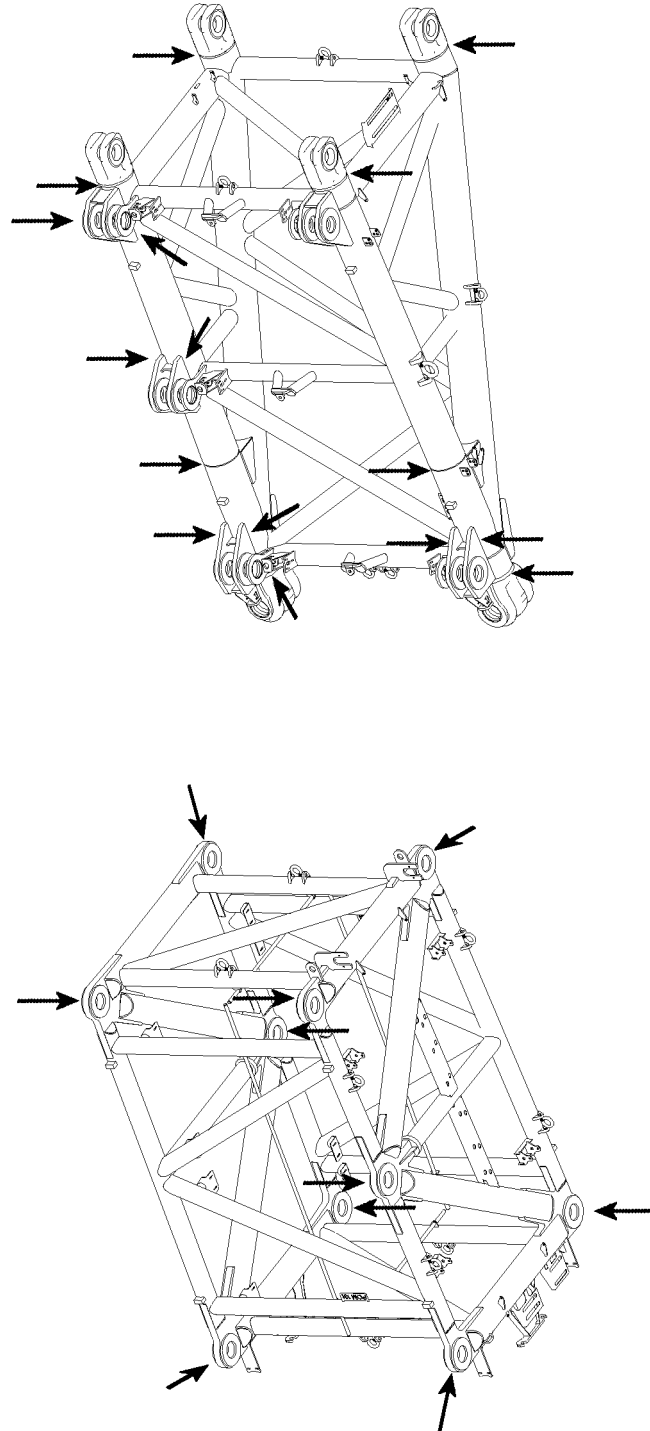


Fig.185054: Example for pulley head

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LWE/LR 1750-000/12812-15-02/en

Fig.116609: Example for P-adapter

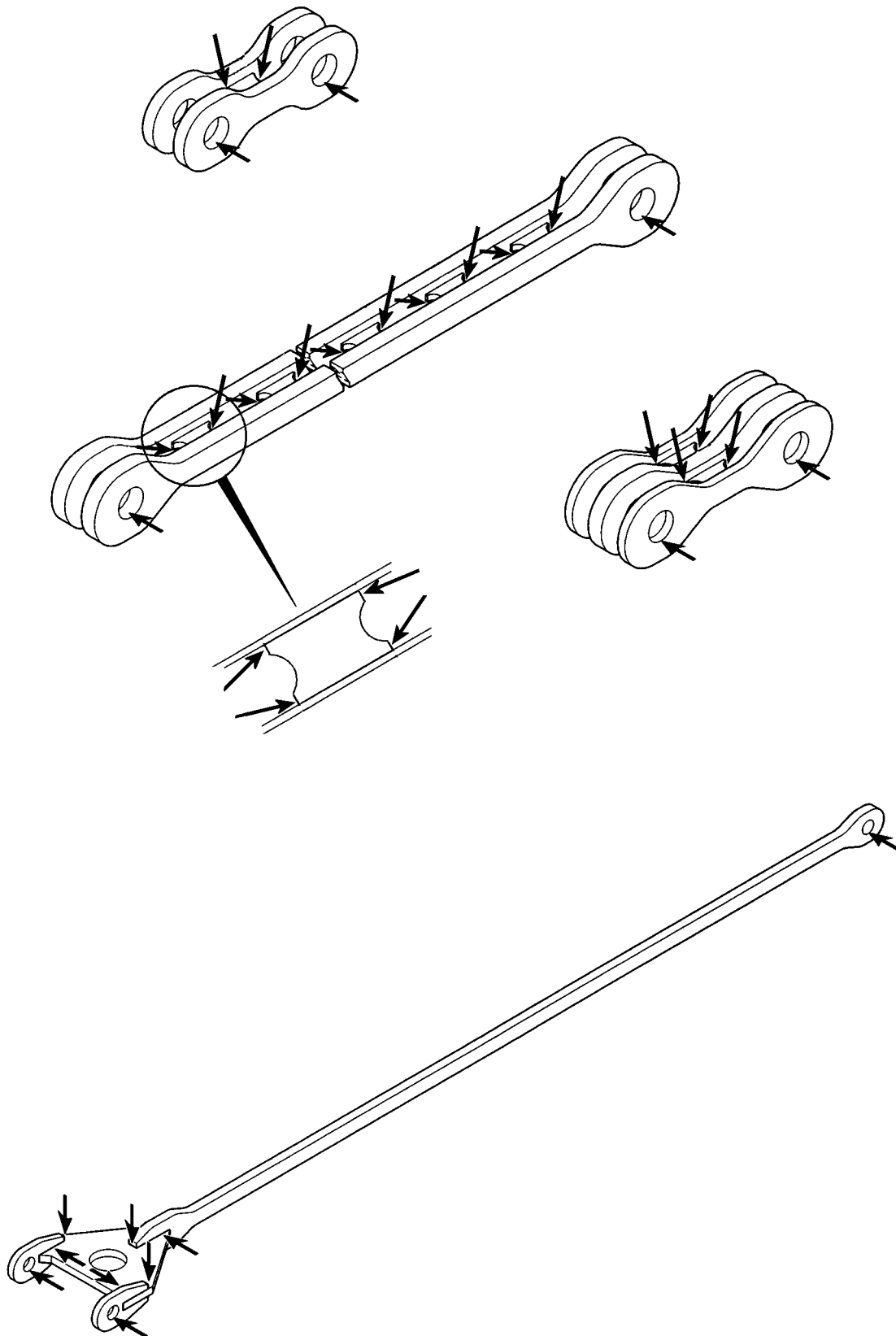
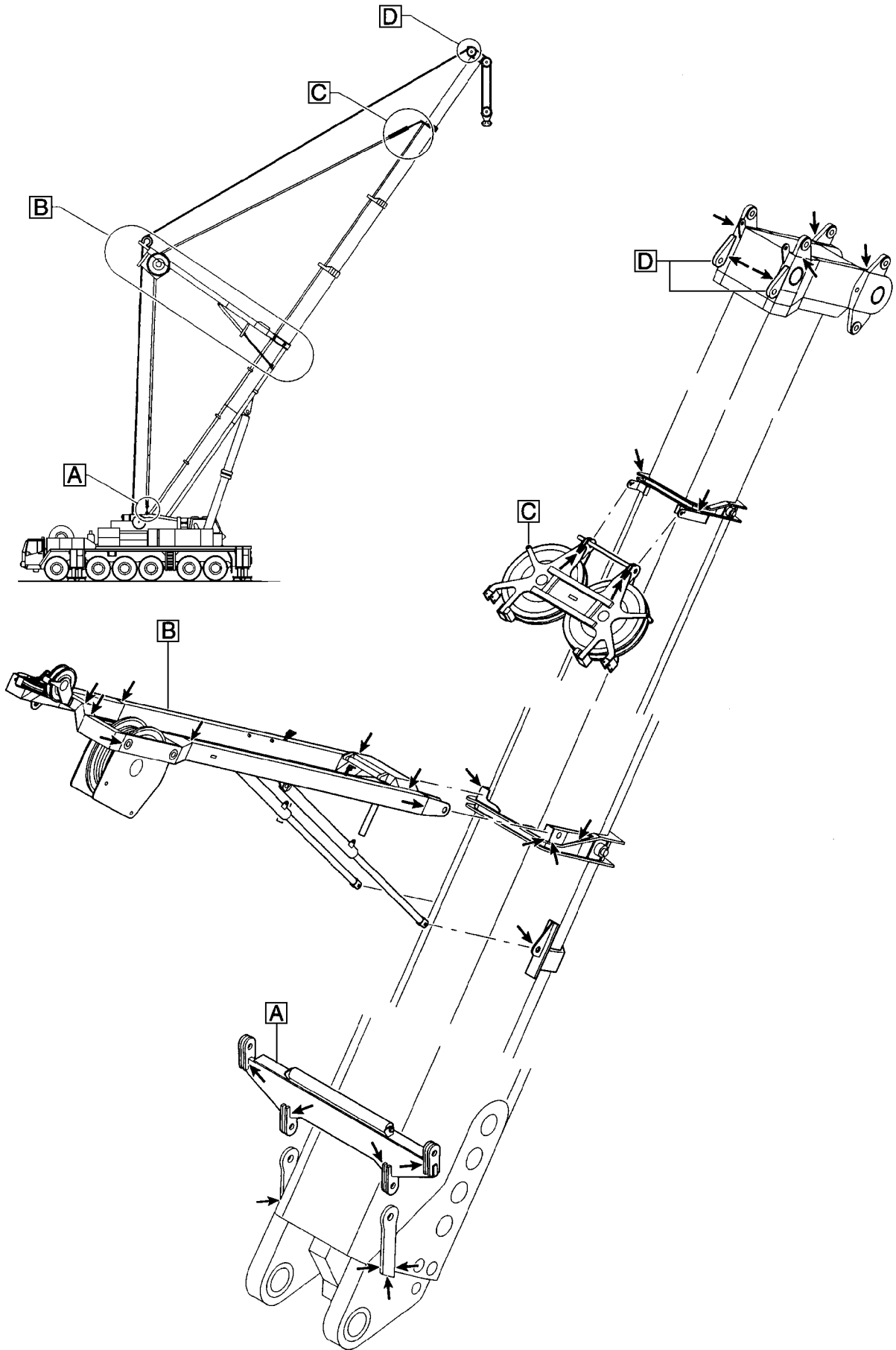


Fig.185055: Example for guy rod

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LWE/LR 1750-000/12812-15-02/en

Fig.185059: Example for TA-guying

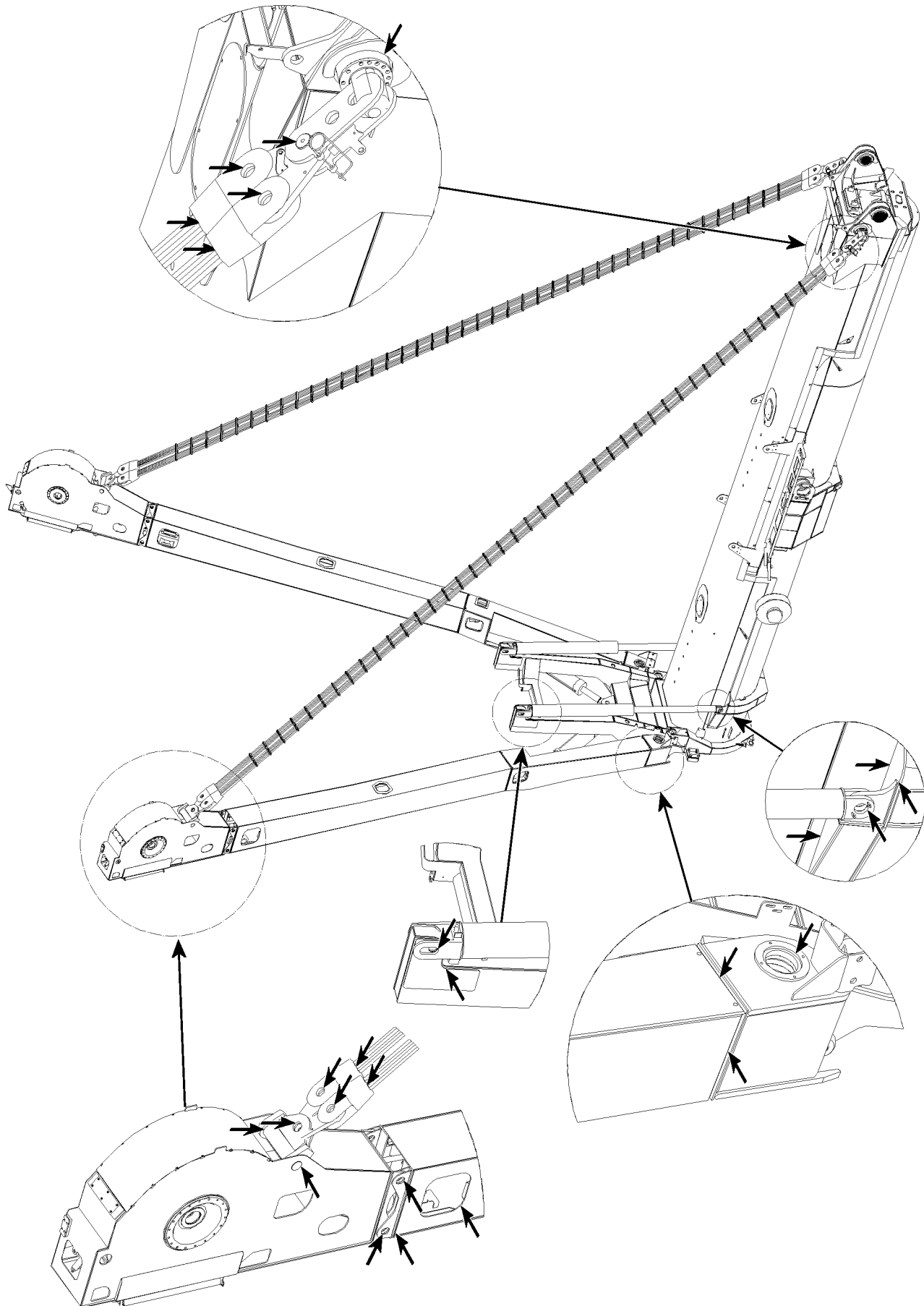
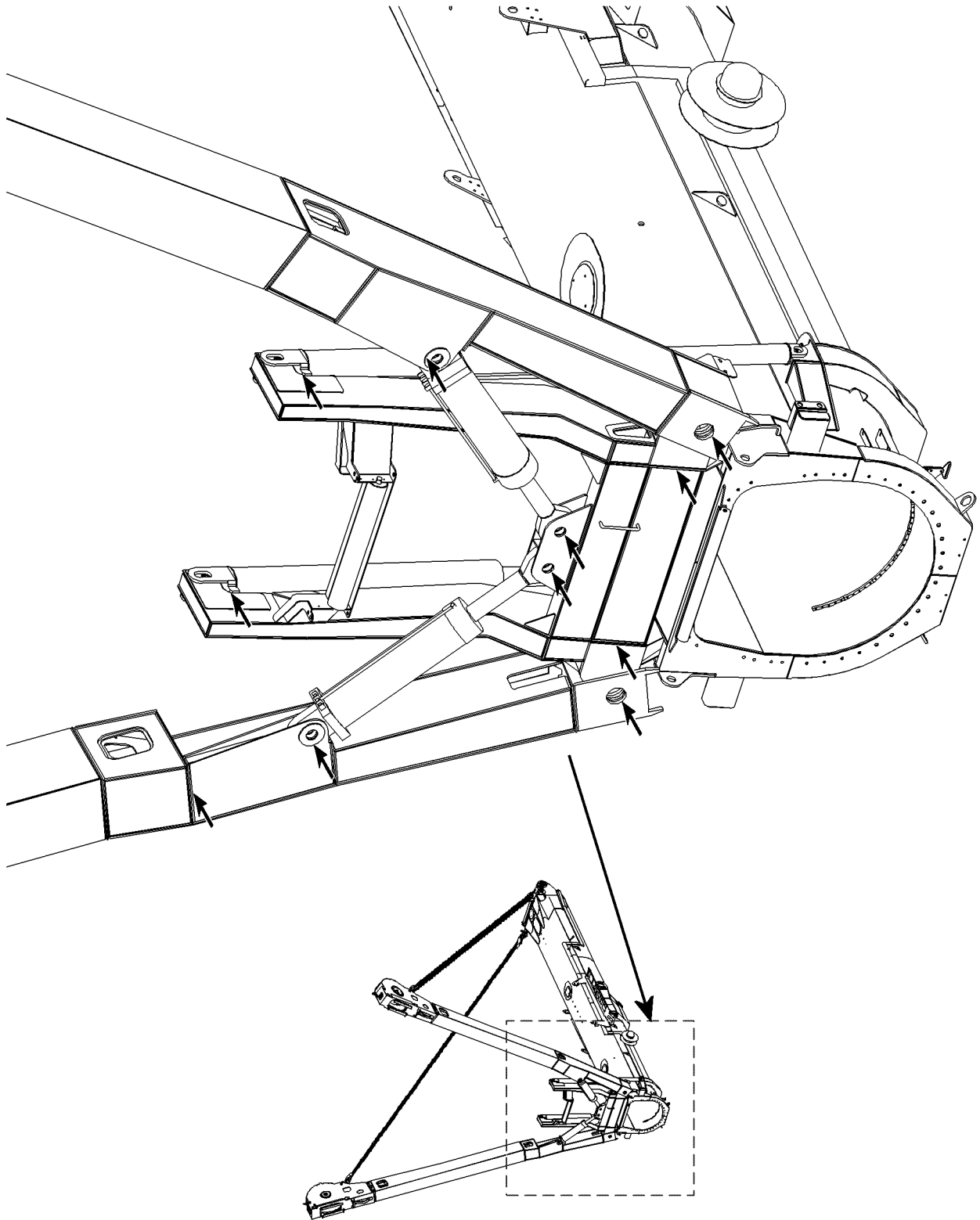


Fig.105707: Example for TY-guying

LWE/LR 1750-000/12812-15-02/en



LWE/LR 1750-000/12812-15-02/en

Fig.105708: Example for TY-guying

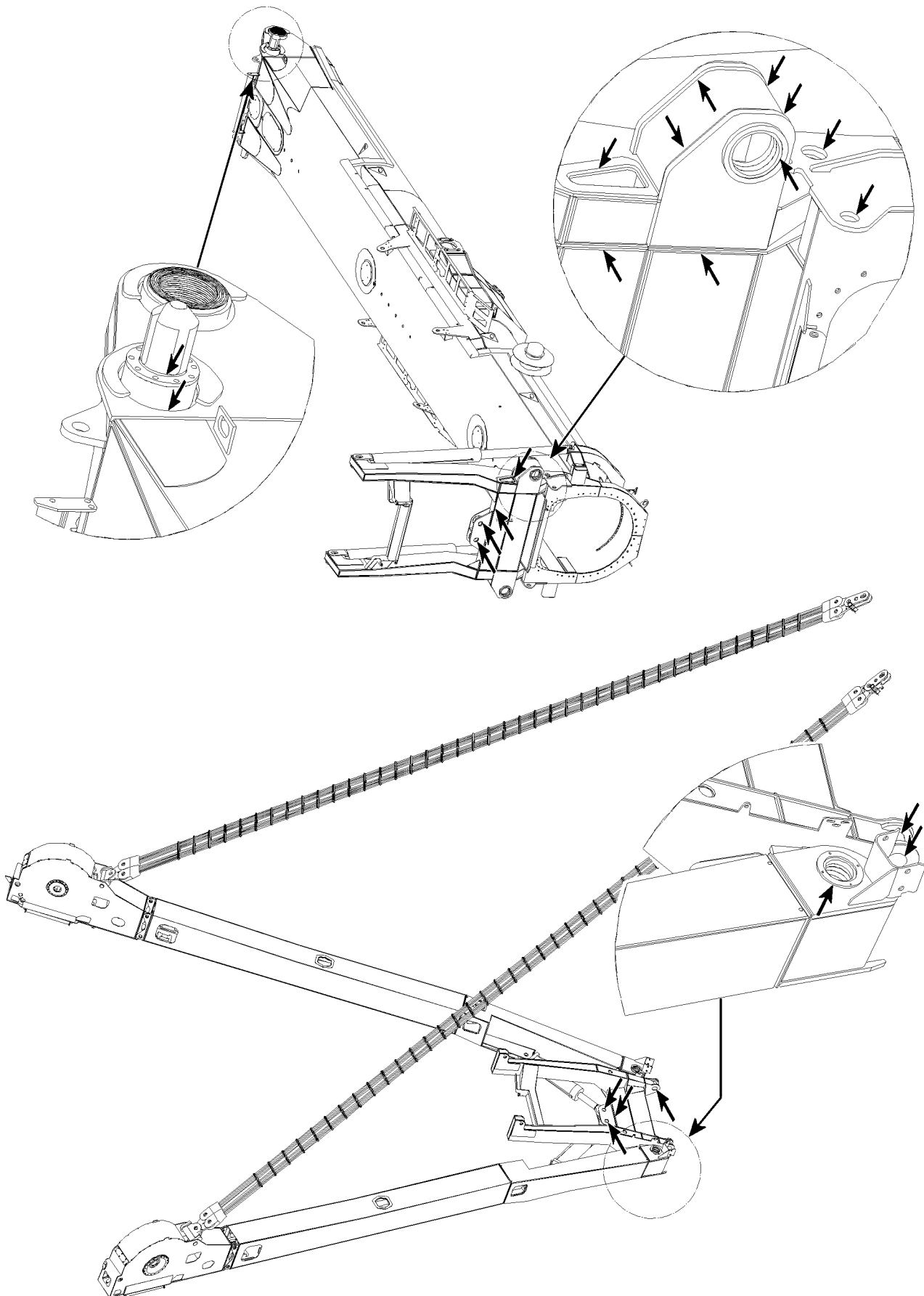


Fig.105709: Example for TY-guying

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2.4 Rigging and fastening points

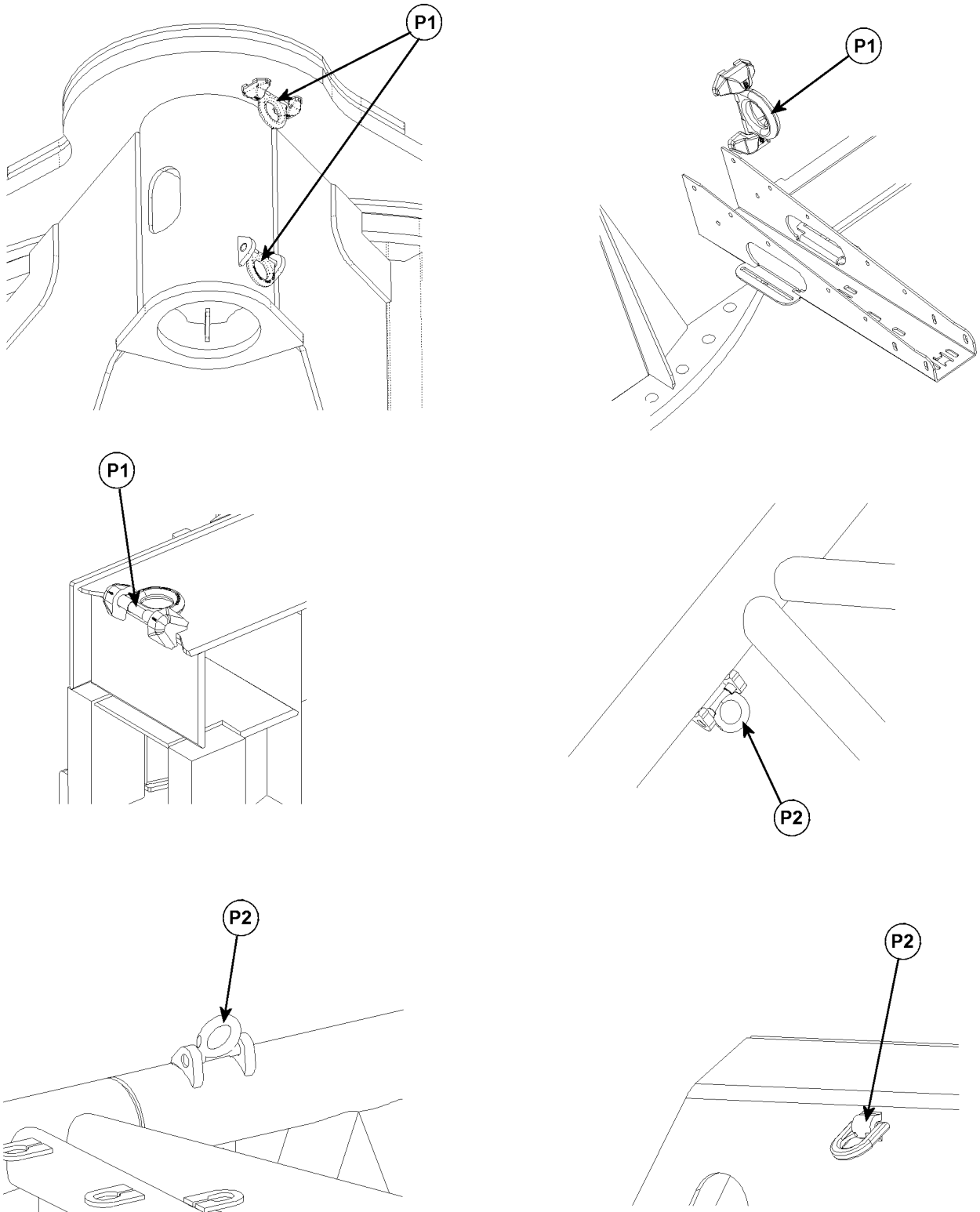


Fig.121160: Examples for rigging and fastening points

P1 Rigging points

P2 Fastening points

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**WARNING**

Unsafe rigging point or fastening point!

The mobile crane or component can rip free and fall down!

When a rigging point or fastening point is not safe for operation:

- ▶ Have the rigging point or fastening point replaced by authorized and trained expert personnel.
- ▶ Avoid damage on the rigging device due to sharp-edged exposure.

Make sure that the following damage does **not** occur:

- Crushing points
- Shearing points
- Catch points
- Impact points

Inspection criteria:

- Completeness of rigging point.
- Distortion of carrying parts.
- Mechanical damage such as severe nicks.
- Changes in diameter due to wear.
- Significant corrosion (pitting)
- Cracks on carrying parts.
- Cracks or other damage on the welding seam.

Check the rigging points **P1** and fastening points **P2** before every start up and at regular intervals.

2.5 Inspecting the lattice sections

**Note**

- ▶ The illustration is only an example and is valid for all lattice sections!
- ▶ Check all diagonal and frame pipe connections!
- ▶ Check all bores of the fork - finger connections!

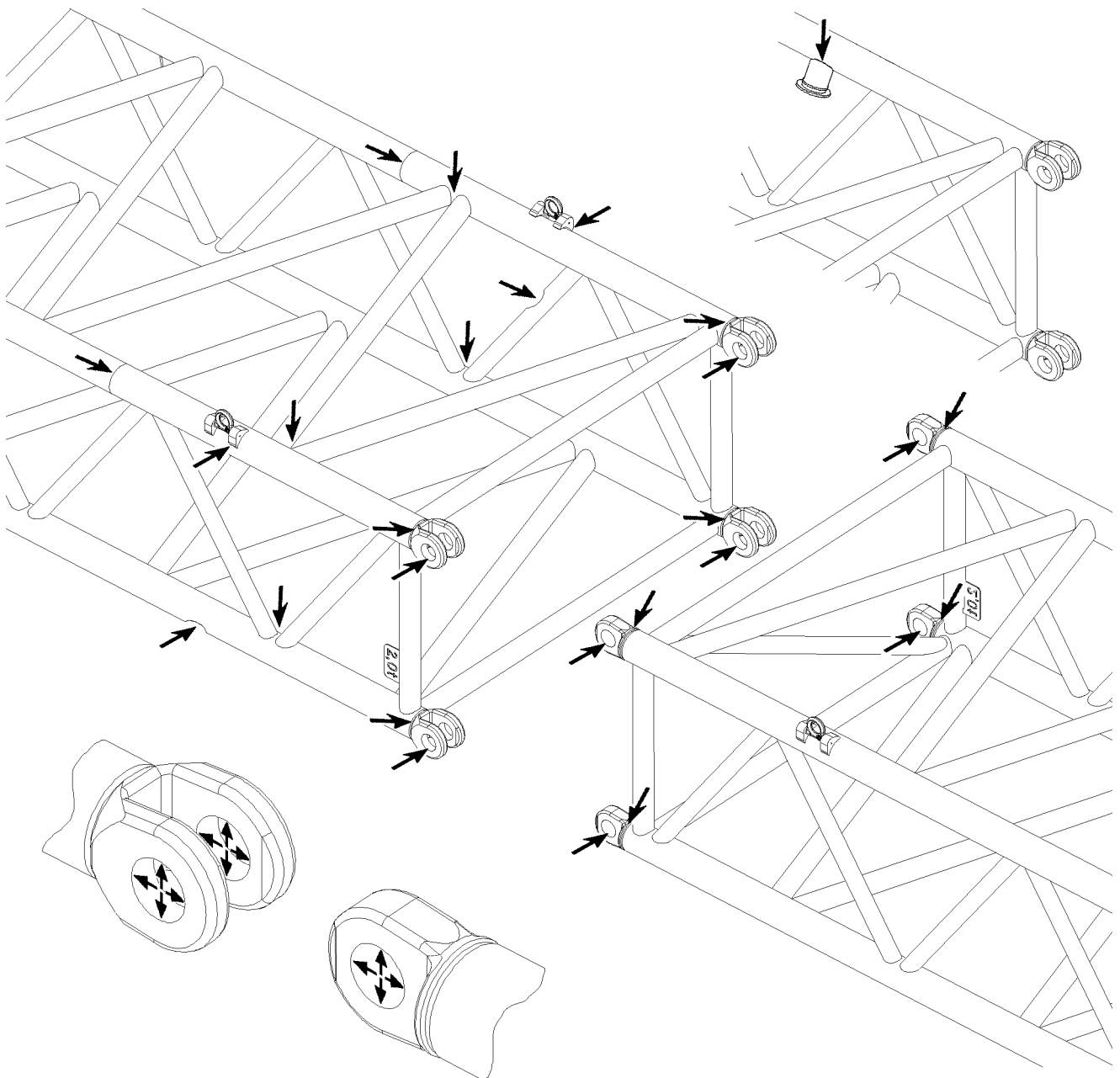


Fig.121023: Example for lattice sections

3 Inspection of locking system of telescopic boom

3.1 For cranes with pneumatic boom locking system

- For inspection of function, see chapter 8.11.
- For inspection of pin wear pattern, see chapter 8.11.
- For inspection of wear, see chapter 8.11.
- For inspection of safety control, see chapter 8.11.

3.2 For cranes with telescopic boom system Telematik

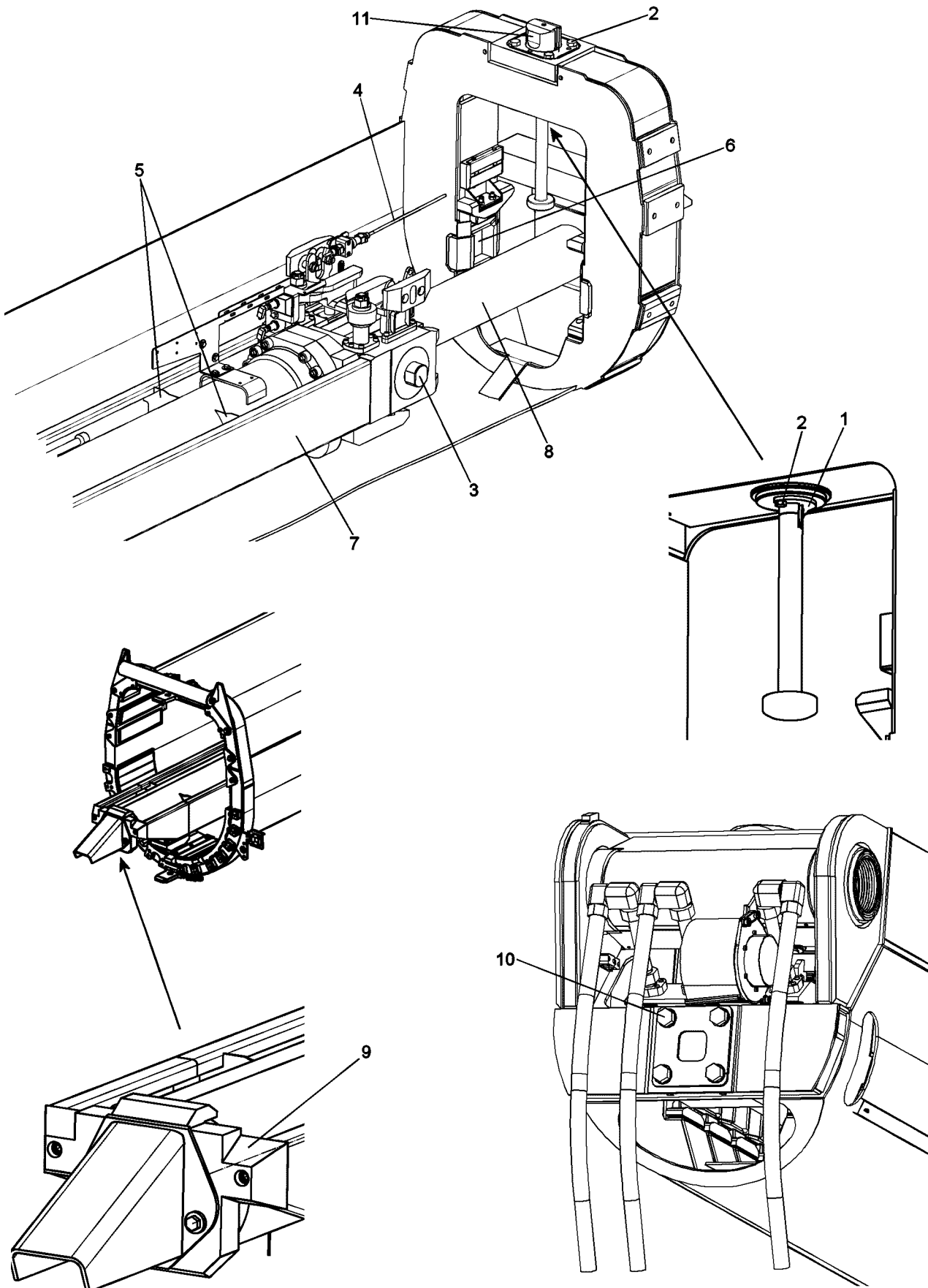


Fig. 109286

LWE/LR 1750-000/12812-15-02/en

- Inspection of the pull knob safety **1** and all mounting screws **2** for tight seating
- Inspection of twist guards of cylinder pinning **3** and the telescopic boom pinning **11**
- Inspection of the length sensor rope **4** for damage
- Inspection of the cylinder barrel in the area of all welding seams **5** for crack formation
- Inspection of the locking pockets **6** for damage
- Grease the guide rail **7**
- In case of leakage: Inspection of the piston rod **8** for grooves
- Inspection of the wear pattern on the cylinder pinning **3** and the telescopic boom pinning **11**
- Inspection of guide rail **7** for distortion of contour
- Inspection of plastic guide **9** on cylinder bottom for damage
- Inspection of all mounting screws **10** on the push out cylinder for tight seating

4 Inspection of safety ropes and anchor points

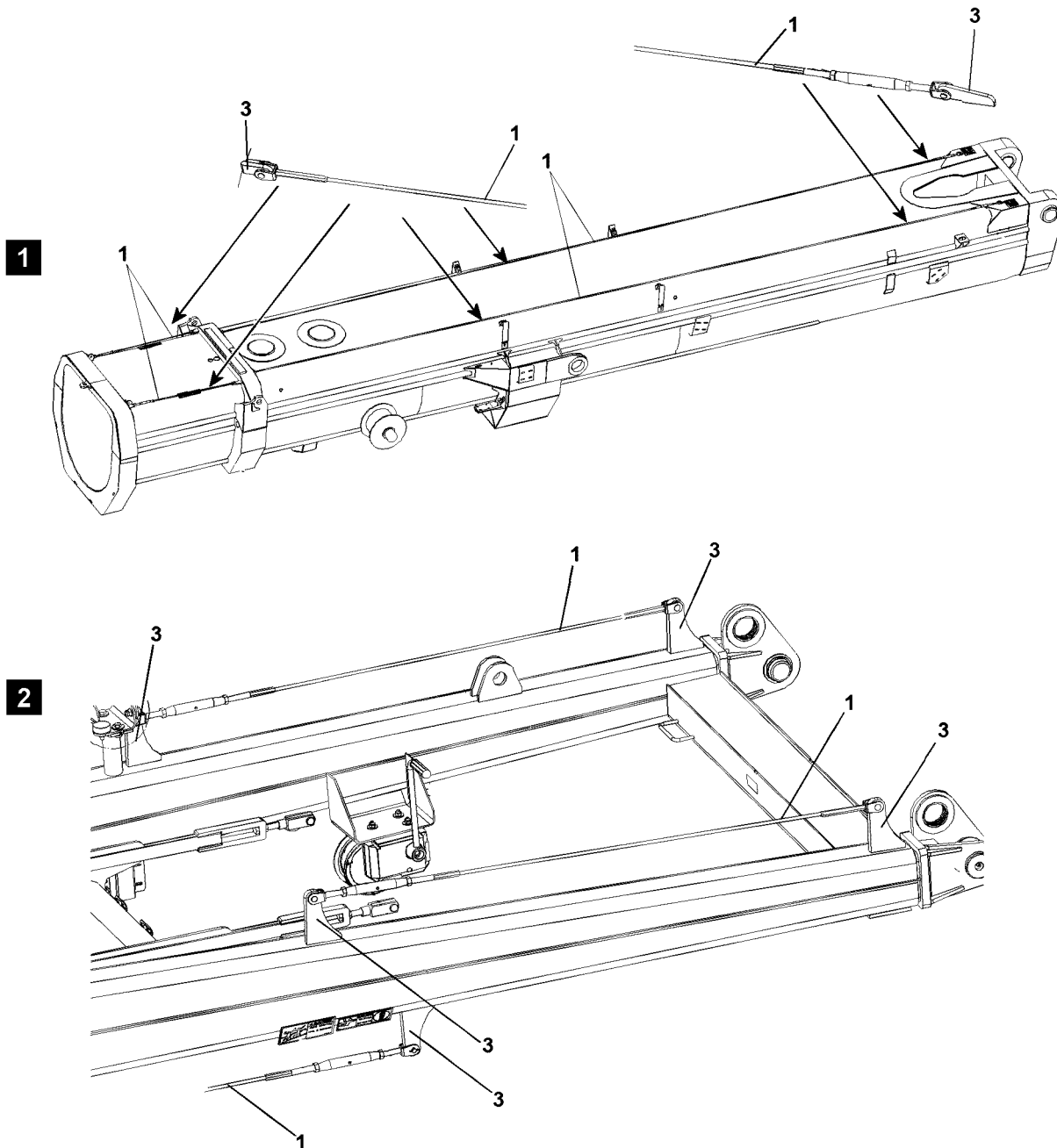


Fig.127130



WARNING

Danger of falls due to damaged safety ropes or anchor points!

The safety ropes **1** and anchor points **3** must be checked **at least once a year** by **authorized inspectors** for safety and damage!

If any defects are found on the safety ropes **1** or anchor points **3** during the inspections, then the safety ropes **1** or anchor points **3** must be replaced immediately by authorized and trained specialists! If this is not observed, assembly personnel could be killed or fatally injured in a fall!

- ▶ The rope pretension on the safety ropes must be 800 N !
- ▶ Have damaged safety ropes **1** or anchor points **3** replaced immediately by trained expert personnel!



Note

Document the inspections in writing!

- The scope and results of tests should be documented to permit reproducibility. This documentation forms part of the crane records and should be safely stored during the entire service life of the crane.

4.1 Checking of rope pretension on telescopic booms, illustration 1

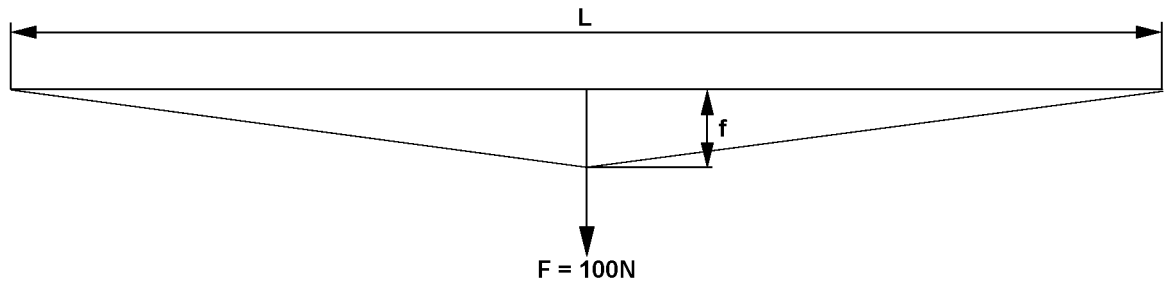


Fig.112738

The rope pretension must be 800 N. This can be checked with the aid of a spring balance, which is pulled centered on the safety rope. If the specified deflection (f) depending on the rope length (L) according to the following charts results for the raised load $F = 100 N$ then the rope pretension of 800 N is set correctly.

Rope pretension is 800 N if:					
Rope length (L)	1.0 m	1.5 m	2.0 m	2.5 m	3.5 m
Deflection (f)	15 mm	25 mm	30 mm	40 mm	55 mm

Rope pretension is 800 N if:					
Rope length (L)	5.5 m	7.5 m	9.5 m	11.5 m	13.5 m
Deflection (f)	85 mm	115 mm	145 mm	180 mm	215 mm

4.2 Inspection of rope pretension on lattice sections, illustration 2

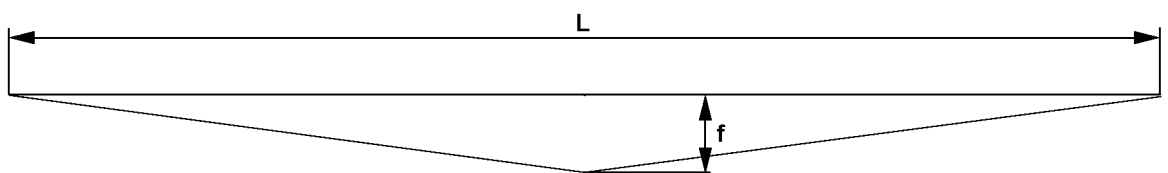


Fig.117747

The rope pretension is 800 N , if a sag (f) according to the chart is present on the safety rope according to the rope length (L).

Rope pretension is 800 N if:					
Rope length (L)	1.0 m	1.5 m	2.0 m	2.5 m	3.5 m
Deflection (f)	0	1 mm	2 mm	3 mm	6 mm

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Rope pretension is 800 N if:					
Rope length (L)	5.5 m	7.5 m	9.5 m	11.5 m	13.5 m
Deflection (f)	15 mm	28 mm	45 mm	66 mm	90 mm

5 Inspection of load handling equipment and assembly aids



WARNING

Load handling equipment and / or assembly aids **not** inspected!

Death, severe bodily injuries, property damage.

- ▶ Inspect load handling equipment and / or assembly aids at least once a year.

The recurring inspection of the load handling equipment and / or assembly aids must be carried out once a year.

The inspections of load handling equipment and / or assembly aids must be recorded.

The welding seams must be subjected to a visual inspection.

Inspect load handling equipment and assembly aids for:

- Damage
- Wear
- Cracks

Replace damaged, worn or ripped load handling equipment and assembly aids immediately.

Repairs on load handling equipment and assembly aids may solely be made in consultation and under the instructions of the Customer Service at **Liebherr-Werk Ehingen GmbH** by authorized and trained expert personnel.



Note

- ▶ Document the scope of the inspection and the results in writing and comprehensibly.
- ▶ Save the documentation as a part of the crane records for the entire service life of the crane.

6 Inspection of fastening equipment



WARNING

Fastening equipment **not** inspected!

Death, severe bodily injuries, property damage.

- ▶ Inspect the fastening equipment at least once a year.

The recurring inspection of the fastening equipment must be carried out once a year.

The inspections of the fastening equipment must be recorded.

The welding seams must be subjected to a visual inspection.

Inspect the fastening equipment according to the specifications of the corresponding regulations and standards.

Replace damaged, worn or ripped fastening equipment immediately.



Note

- ▶ Document the scope of the inspection and the results in writing and comprehensibly.
- ▶ Save the documentation as a part of the crane records for the entire service life of the crane.

7 Inspection of diaphragm reservoir



Note

- ▶ The national regulations for pressurized container inspection must be observed!

The inspection of the diaphragm reservoir for specified gas pressure must be carried out by an **authorized inspector**, see chapter 7.04 and chapter 7.05.

8 Inspection of relapse cylinders



WARNING

- Fatal accidents due to defective relapse cylinders!
Loss of oil or corrosion can damage the relapse cylinders!
Safe crane operation is no longer ensured!
- ▶ Crane operation with defective relapse cylinders is prohibited!

8.1 Pressure test of relapse cylinders

The relapse cylinders must be inspected annually by an **authorized inspector**. The purpose of the inspections is to avoid accidents by detecting deficiencies early on.

8.2 Checking the gas pressure and oil fill before operation



WARNING

- Fatal accidents due to defective relapse cylinders!
Loss of oil or corrosion can damage the relapse cylinders!
Safe crane operation is no longer ensured!
- ▶ Before every start-up: Carry out a visual inspection for leaks, damage and corrosion on the relapse cylinders.
 - ▶ If any defects are found, the relapse cylinders must be inspected by the cylinder manufacturer!

The gas pressure and the oil fill must be checked by an **authorized inspector** for pressure tanks.

8.3 Inspection of the safety controls on the relapse cylinders

Inspecting the interlocking system or limit switches on the relapse cylinders and the boom A-frames, see Chapter 8.12.

9 Inspection of rope pulleys

9.1 Checking for damage and cracks



DANGER

- Danger of accident in case of damage or cracks!
- ▶ Replace rope pulley immediately!

Check the entire rope pulley assemblies for damage and cracks once a year.

If rope pulleys are subjected to any impacts (e.g., with buildings) or are otherwise overloaded, they must be visually inspected for damage or cracks immediately.

9.2 Checking the groove diameter

NOTICE

Worn rope pulleys!

The functionality and service life of the rope is reduced. Damage on rope.

- ▶ Before placing the rope, check the groove diameter of rope pulleys.

Visible wear on rope pulleys:

- Reduced groove diameter
- Negative impressions of the rope profile in the groove

Make sure that the following tools are available:

- Groove caliber

Make sure that the following prerequisites are met:

- All components to be inspected are cleaned.
- The rope does **not** obstruct the inspection of the components



Note

- ▶ The actual groove diameter **must** be larger than the actual diameter of the rope!

The groove diameter of rope pulleys and winches must be at least 6 % larger than the nominal rope diameter.

Check the rope pulleys with a groove caliber for wear. When wear exists on the rope grooves: Fix the rope pulleys or replace.

10 Inspection of carrier rollers

10.1 Checking visually



DANGER

Damaged carrier rollers!

Breakage and falling components. Death, severe bodily injuries, property damage.

- ▶ Carry out a visual inspection according to the maintenance intervals.
- ▶ Replace the carrier roller immediately.

The visual inspection must be carried out according to the following criteria:

- Wear
- Damage
- Cracks

Visible wear on carrier rollers:

- Negative imprints of the rope profile on the circumference of the carrier rollers
- Lead-in tracks

10.2 Checking the depth of the lead-in tracks



DANGER

Worn carrier rollers!

Breakage and falling components. Damage to ropes. Death, severe bodily injuries, property damage.

- ▶ Check the depth of the lead-in tracks.
- ▶ Replace worn carrier rollers immediately.

Make sure that the following prerequisites are met:

- All components to be inspected are cleaned.
- The rope does **not** obstruct the inspection of the components.

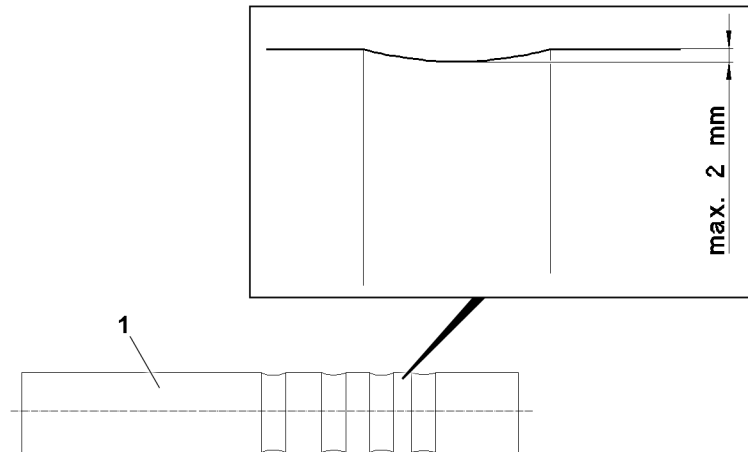


Fig.124864: Permissible depth of the lead-in tracks

1 Carrier roller

The depth of the lead-in tracks may be maximum 2 mm.

10.3 Checking bearings for easy movement

Stiff or blocked carrier rollers wear unevenly and cause serious rope abrasion.

Ineffective carrier rollers can lead to irregular rope tension.

Tasks to check the carrier rollers:

- Check the carrier rollers for proper movement in their bearings.
- When carrier rollers are **not** easily moveable in their bearings: Fix the bearings.

10.4 Checking the tightening torque

The tightening torque of screws must be checked according to maintenance interval.

11 Inspection of extension conditions of sliding beams

The extension conditions of the sliding beams must be inspected annually by an **authorized inspector**.

Check the extension conditions on every sliding beam:

- Check if the position 0 % of the LICCON display matches the actual condition of the sliding beam.
- Check if the position 100 % of the LICCON display matches the actual condition of the sliding beam.

12 Inspection of the function of the overload protection

Position the longest boom at minimum and maximum radius: Check the load indicator, using the hook block as a test load.

The display reading may not deviate by more than 10 % off the true load value at these two extreme positions.

Measure the indicated radius for the longest boom at its minimum radius and at a boom angle of 45°.

The indicator readings may not deviate more than 10 % off the measured boom radius.

13 Inspecting the pin connections



WARNING

Pin connections **not** inspected!

Death, severe bodily injuries, property damage.

- ▶ Inspect the pin connections at least once a year.

The recurring inspection of all pin connections must be carried out once a year.

The inspections of the pin connection must be recorded.

Check the pin connections for:

- Properly secured pin connections
- Damage to the pins and / or connector elements
- Damage to the retaining elements

Replace damaged pins immediately.

Immediately replace damaged, bent or broken retaining elements.

Only replace damaged pins with identical pins.

Only replace damaged retaining elements with identical retaining elements.



Note

- ▶ Document the scope of the inspection and the results in writing and comprehensibly.
- ▶ Save the documentation as a part of the crane records for the entire service life of the crane.

14 Inspection of slewing ring connection

14.1 Checking the tilt play

The wear of the slewing ring connection is determined by measuring the tilt play with the ring installed.

The permissible tilt play depends on the type of slewing ring connection.



WARNING

The tilt play of the slewing ring connection is too large!

If the permissible tilt play is exceeded, then safe crane operation is **no** longer possible.

Death, severe bodily injuries, property damage.

When the permissible tilt play is exceeded:

- ▶ Replace the slewing ring connection.

The determination of the tilt play must be carried out according to the **test instructions** of **Liebherr-Werk Ehingen GmbH**.

Request the test instructions and permissible tilt play: Contact Liebherr Service.

15 Inspection of the mounting of the load bearing equipment

15.1 Check the mounting screws for tight seating

The mounting screws must be checked for a tight fit during the annual crane inspection.

The mounting screws are pre-stressed at the factory, so that no loosening of the screw connections will occur during normal crane operation.

The screw connection may become overloaded and the mounting screws may be permanently stretched if the crane is overloaded or if the load is pulled free. The mounting screws must be checked immediately for a tight fit after an overload.

Check the tightening torque of the mounting screws of load bearing equipment for a tight fit:

- Slewing ring connection
- Winches
- Slewing gears
- Transmission
- Trailer coupling

If a mounting screw can be tightened, then the mounting screw is loose. Follow the instructions in section „Checking the mounting screws for damage“.

15.2 Checking the mounting screws for damage

Completely unscrew the loose mounting screws and check in detail for damage.

Completely unscrew the adjacent mounting screws and check in detail for damage.

Replace the mounting screw if any of the following damage is present:

- The mounting screw is stretched by more than 2 % (in relation to its original length).
- Cracks, permanent deformation or other damage is visible on the mounting screw.
- The mounting screw is uneven.
- There is pitting.
- The thread is hard to move.

If there is **no** damage, reuse the checked mounting screws (expansion screws) a maximum of two times.

16 Inspection of the tele extension with eccentric, illustration 1

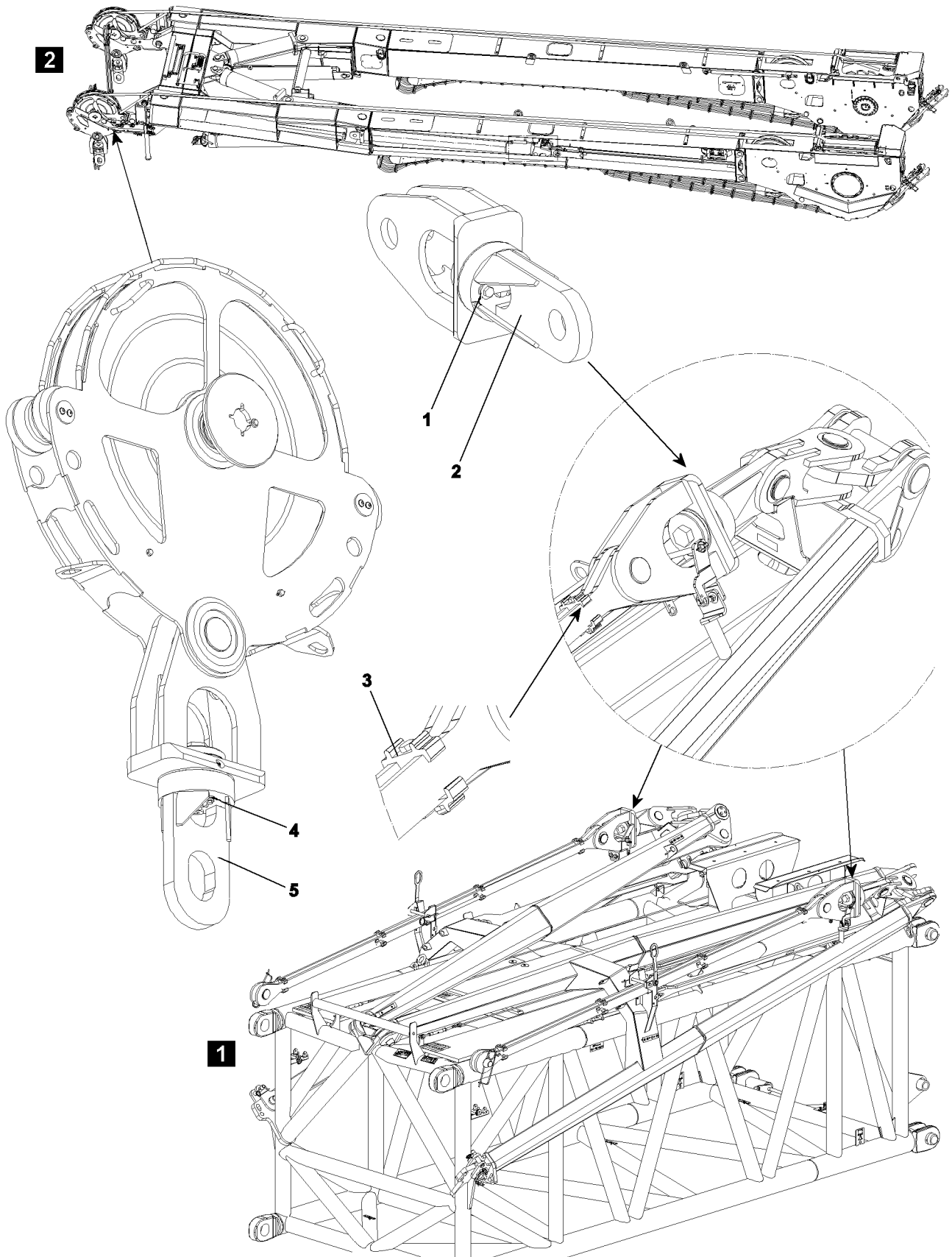


Fig.109096

LWE/LR 1750-000/12812-15-02/en

- Inspection of twist guard **1** for damage and loose screw connection.
- Inspection of swivel **2** for easy turnability.
- Inspection of all clamps **3** for damage and function.

17 Inspection of change over pulleys, illustration 2

- Inspection of twist guard **4** for damage and loose screw connection.
- Inspection of swivel **5** for easy turnability.

18 Inspection of the oil and fuel tanks

Visually check the oil and fuel tanks at least once a year for leaks and safe mounting.

Repairs may only be carried out by authorized and trained specialists.

Improper repairs; e.g., welding, hard or soft soldering is not permitted, particularly if the Service department at Liebherr-Werk Ehingen GmbH has not been consulted!

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Inspecting the hoist and retracting winches

The hoist and retracting winches are designed in sealed planetary gear version. These gears are sized for long service life and the drive shafts and gears are rated for endurance.

Even though the hoist and retracting winches are designed for long life, an external visual inspection is not adequate, since their life can be significantly affected by bad maintenance (insufficient oil), using oil that does not meet specification requirements, defective seals, improper operation or overloading.

The annual inspection must therefore be carried out by an **expert** in accordance with the following requirements.

The winches must be inspected by an **authorized inspector** every four years after the initial license.

Within the territorial validity of the BGV D6, after the 10th year in operation, counted from the first day of initial license, when the theoretical utilization time is not over, the winches must be checked annually by an **authorized inspector**.

1.1 Checking the groove diameter



WARNING

Worn winches!

Damage of flanged disks, high rope wear, operational problems. Broken rope, falling load.

► Before placing the rope, check the groove diameter of winches.

Visible wear on winches:

- Reduced groove diameter
- Mechanical damage, for example scrub marks or scouring on flanged disks

Make sure that the following tools are available:

- Groove caliber

Make sure that the following prerequisites are met:

- All components to be inspected are cleaned
- The rope does **not** obstruct the inspection of the components



Note

► The groove radius may **not** be smaller than the actual diameter of the rope.

The groove diameter of rope pulleys and winches must be at least 6 % larger than the nominal rope diameter.

Check winches with a groove caliber for wear. When wear is present: Fix the winch or replace.

1.2 Inspection intervals

At least once a year, see Crane operating instructions, chapter 7.03.

1.3 Checking the oil level

Check the oil level with the dipstick.

For hoist and retracting winches **without** a dipstick, we recommend that the oil is drained and the amount compared to the specified oil quantity.

1.4 Evaluating oil color

Assume that the oil has been overheated if it is black and / or a burnt oil smell is detected. Change the oil.

1.5 Checking for solid foreign substances

In general, the oil must be analyzed by a qualified laboratory.

For simple testing, the following procedure can be used:

- Drip the used oil on a specified filter fleece.
- Visual inspection with a magnifying glass may reveal coarse particles.
- If coarse particles are found: Have the components of the oil analyzed by a qualified laboratory.

NOTICE

Danger of property damage!

- ▶ Repairs may only be carried out by authorized and especially trained personnel.
 - ▶ Replace damaged parts and change the gear oil.
-

1.6 Visual inspection for leaks

The gears must be checked for leaks, since oil losses - in addition to polluting the environment - can lead to gear failure.

1.7 Inspecting the gear brakes

Check the brakes each time the gears are inspected.

In order to do so, proceed as follows:

- Attach a load, which creates 40 % of the maximum rope pull in the uppermost layer of the coil and raise it just off the ground.
- Remove the plug on the brake vent magnet.
This means the brake remains applied when activated.
- Activate the winch in the lowering direction.



Note

- ▶ The brake may not slip, in other words, the winch may not turn. If the brake slips, contact the Service department at Liebherr-Werk Ehingen GmbH!
 - ▶ Only operate the crane after it has been checked and approved for use by the Service department at Liebherr Werk Ehingen GmbH!
-

NOTICE

Danger of property damage!

- ▶ Only qualified personnel with specialized knowledge may be used to evaluate gears and brakes!
-

1.8 Documenting the completed inspection

The results of the annual inspections and maintenance work, including the steps taken, must be documented by the competent or authorized inspector, including attachments from the inspection labs and qualified service companies if applicable.

This documentation must be filed in the crane inspection log under the heading "Periodic inspections".

2 Inspection of the auxiliary reeving winch, recovery winch and spare wheel winch

The inspection of the auxiliary reeving winch, recovery winch and spare wheel winch regarding scope and content is made according to the manufacturer's instructions.

- Inspect the auxiliary reeving winch, recovery winch and spare wheel winch according to the manufacturer's instructions.

- Request data about the service life of the auxiliary reeving winch, recovery winch and spare wheel winch from the respective manufacturer.

3 Monitoring the winches

3.1 Theoretical service life

The designer of your crane used a theoretical total operating time when designing and sizing the winches. This resulted in the theoretical service life of the equipment.

The winches of your crane are classified according to ISO 4301/1 as follows:

Winches	Classification
Power train group:	M3
Load spectrum:	L1
Load spectrum factor Km:	0.125
Theoretical service life D:	3200 h



Note

- ▶ The „theoretic service life“ is not equal to the real (true) service life of a winch!

The actual life of the winch is affected by many additional outside factors; for example:

- Overloads caused by unapproved use of the crane.
- Inadequate maintenance: Oil is not changed in a timely manner
- Improper operation:
 - Extreme acceleration or deceleration of the load
 - Load falling into the ropes
- Maintenance errors:
 - Using the wrong type of oil
 - Too much or too little oil
 - Contamination during oil change
- Assembly errors during repair and maintenance
- Undetected leakage
- Incorrectly set safety equipment
- Hidden damage from accidents
- Extreme environmental conditions:
 - Extreme low or high temperatures
 - Corrosive atmosphere
 - Dust and dirt

3.2 Used proportion of the theoretical service life

The crane operator is obligated to carry out an inspection of the crane at least once a year.

At this time, the actually used part of the theoretical service life must also be calculated. If necessary, the crane operator must contract an authorized inspector.

For the determination of the used part of the theoretical service life, the actual operating conditions (load spectrum) and the hoist gear operating hours for each inspection interval are to be determined. The operator is responsible for the documentation in the crane inspection log.

3.2.1 Determining the operating conditions (load spectrum)

The load spectrum of the crane is divided into groups, please refer to ISO 4301/1.

Select one of the following load spectrums and record it in the crane inspection log for the respective inspection interval based on the actual operating conditions. A more precise determination of the load spectrum is permissible.

Load spectrum class: Light L1

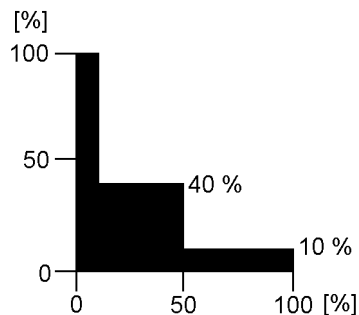


Fig.195234: Graphic illustration Load spectrum L1

Definition:

Power train or parts thereof are subjected to maximum stress only in exceptional cases, but normally only operate at very light loads.

Operating time rates:

- 10 % of the time at maximum load (dead load and 1/1 working load)
- 40 % of the time with dead load and 1/3 working load
- 50 % of the time only with dead load

Factor of load spectrum:

$K_m = 0.125$



Note

- Load spectrum L1 with load spectrum factor $K_m = 0.125$ is normally applied to cranes used for assembly operations!

Load spectrum class: Medium L2

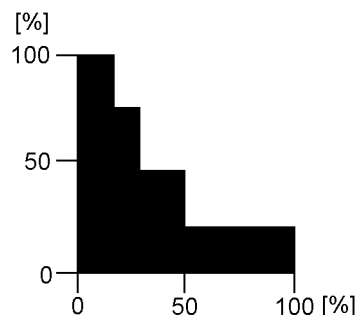


Fig.195235: Graphic illustration Load spectrum L2

Definition:

Power train or parts thereof are subjected to maximum load relatively often, but normally only operate at light load.

Operating time rates:

- 1/6 of the time at maximum load (dead load and 1/1 working load)
- 1/6 of the time with dead load and 2/3 working load

1/6 of the time with dead load and 1/3 working load
 50 % of the time only with dead load

Factor of load spectrum:
 $K_m = 0.25$

Load spectrum class: Heavy L3

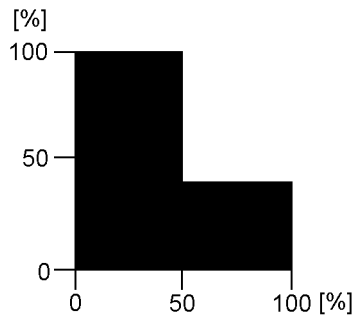


Fig.195236: Graphic illustration Load spectrum L3

Definition:

Power train or parts thereof are frequently subjected to maximum load and normally operate at medium load.

Operating time rates:

50 % of the time at maximum load (dead load and 1/1 working load)
 50 % of the time only with dead load

Factor of load spectrum:
 $K_m = 0.5$

Load spectrum class: Very heavy L4

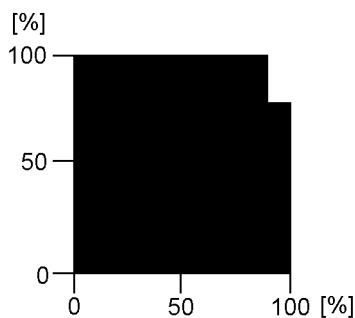


Fig.195237: Graphic illustration Load spectrum L4

Definition:

Power train or parts thereof are regularly subjected to near maximum loads.

Operating time rates:

90 % of the time at maximum load (dead load and 1/1 working load)
 10 % of the time only with dead load

Factor of load spectrum:
 $K_m = 1$

3.2.2 Determining the effective operating hours T_i

The effective operating hours calculated as follows must be entered into the crane inspection log for the respective inspection interval.

There are four different scenarios:

1. Operating hour meter installed on every winch.
If an operating hour meter is installed on every winch, the effective operating hours T_i can be read directly during each inspection.
2. Operating hour meter installed for the overall crane drive.
The winch proportion of the total superstructure operating hours must be estimated.
For cranes used in assembly operations, the operating time for the hoist winches can be estimated generally at 20 % of the total operating hours of the superstructure.
3. One operating hour meter is used for both the crane engine and the crane drive.
The winch proportion of the total crane operating hours must be estimated.
For cranes used in assembly operations, the operating time for the superstructure can be estimated at 60 % of the total operating hours of the crane. If the hoist winch proportion is estimated at 20 % of the superstructure operating hours (see previous item), then the result in relation to the **total** operating hours of the crane is: 12 %.
4. No operating hour meter installed.
In this case, the operator must estimate and document the actual operating hours of the winch.
The approximate percentages stated above normally apply to main hoist winches. For auxiliary hoist winches or boom control winches, the proportion of the total operating hours can be significantly less and should therefore be estimated by the operator.

3.2.3 Determining the used proportion of the theoretical service life

For an inspection interval i (max. 1 year), the actually used proportion S_i of the theoretical Service life is derived from the formula:

$$S_i = \frac{K_{m_i}}{K_m} \times T_i$$

Fig.195230

Abbreviation	Explanation
S_i	Used proportion of the theoretical service life.
K_m	Load spectrum factor that was used to calculate the winch rates. This factor is provided in the Operating instructions.
K_{m_i}	Load spectrum factor for inspection interval i according to section „Determining the operating conditions“.
T_i	Effective operating hours for inspection interval i according to section „Determining the effective operating hours T_i “.

The actually used proportion is subtracted from the remaining theoretical service life D_i after each inspection interval (see example).

If the remaining theoretical service life is not long enough to cover the next projected operating period, a general overhaul of the winch is required.

If the theoretical service life D has been reached (see chapter on „Theoretical service life“), then the winch may only be operated after conducting a general overhaul.

A general overhaul of the winch is required not later than 10 years after commissioning.

The general overhaul must be arranged by the operator and carried out by the manufacturer or the manufacturer's authorized representatives and must be documented in the inspection log. After the

general overhaul, the manufacturer or the manufacturer's authorized representative will define a new theoretical service life D.

When the design life has not been reached after 10 years, continued operation of the winch without a general overhaul is acceptable, when the crane's authorized inspector has confirmed the accuracy of the actual usage calculation by signing the crane inspection log at each authorized inspection interval.

In such a case, the authorized crane inspector must thoroughly inspect the winch. This comprises at least:

- External visual inspection (leakage, damage, deformation, etc.).
- Oil check, especially for metal residues.
- Load test at minimum and maximum rope tension and at maximum possible speed in both cases. At least one layer must be spooled up. Pay particular attention to any unusual noises during this load test.

The authorized crane inspector must confirm this inspection in the crane inspection log and must make a statement regarding suitability of the winch for continued operation. The next inspection must take place at the end of the 12th operating year and annually thereafter.

3.3 Example

According to the manufacturer's operating manual, a mobile crane with a separate operating hour meter for the crane engine and the crane drives is classified as follows:

- Power train group: M3
- Load spectrum class: Light L1
- Factor of load spectrum: $K_m = 0.125$
- Theoretical service life: $D = 3200$ h

Actual usage proportion S of the theoretical service life is calculated using the individual inspection intervals as follows:

3.3.1 First inspection (first year)

The crane was used for assembly work during the past year:

Load spectrum L1, in other words $K_{m1} = 0.125$.

The superstructure operating hour meter indicates 800 h. The winch was operated about 20 % of the time; i.e. $T_1 = 160$ h.

The actual usage proportion S of the theoretical service life at the time of the first inspection is therefore:

$$S_1 = \frac{0,125}{0,125} \times 160 \text{ h} = 160 \text{ h}$$

Fig.195231

Remaining theoretical service life:

$$D_1 = 3200 \text{ h} - 160 \text{ h} = 3040 \text{ h}$$

The above values are recorded in the crane inspection log.

3.3.2 Second inspection (second year)

The crane was used at a harbor for unloading work:

Load spectrum L3, in other words $K_{m2} = 0.5$.

The superstructure operating hour meter indicates 2000 h ; i.e., during this period:

2000 h – 800 h = 1200 h (800 h were used in the first year of operation)

The winch was operated about 40 % of the time; i.e. $T_2 = 480$ h.

The actual usage proportion S_2 of the theoretical service life at the time of the second inspection is therefore:

$$S_2 = \frac{0,5}{0,125} \times 480 \text{ h} = 1920 \text{ h}$$

Fig.195232

Remaining theoretical service life:

$$D_2 = 3040 \text{ h} - 1920 \text{ h} = 1120 \text{ h}$$

3.3.3 Third inspection (third year)

The crane was used for assembly work and occasionally at a harbor for unloading work:

Load spectrum L2, in other words $Km_3 = 0.25$.

The superstructure operating hour meter indicates 3000 h ; i.e., during this period:

$$3000 \text{ h} - 2000 \text{ h} = 1000 \text{ h} \text{ (2000 h were used in the first two years of operation)}$$

The winch was operated about 30 % of the time; i.e. $T_3 = 300 \text{ h}$.

The actual usage proportion S_3 of the theoretical service life at the time of the third inspection is therefore:

$$S_3 = \frac{0,25}{0,125} \times 300 \text{ h} = 600 \text{ h}$$

Fig.195233

Remaining theoretical service life:

$$D_3 = 1120 \text{ h} - 600 \text{ h} = 520 \text{ h}$$

3.4 Chart for determining the theoretically remaining service life

Chart 1 includes an example.

The remaining theoretical service life is to be documented in chart 2.

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Chart to determine the remaining theoretical service life of winch No. 1 (Main hoist winch)

Crane type: LTM 1050
 Fabrication No.: 0010 540 08
 Put in service: 12345
 Serial number of winch according to data tag: 0815
 Last general overhaul performed on:
 Configuration data of winch (see Operating Manual):
 Drive gear group: M 3
 Load collective: L 1
 Factor of load collective Km: 0.125
 Theoretical service life D: 3200 hrs.

S_i = Used part of theoretical service life since last inspection
 D_i = Remaining theoretical service life
 D_{i-1} = Remaining theoretical service life after previous inspection
 Km = Factor of load collective, which was taken for calculation of winch.
 This factor is to be taken from the Operating Manual
 Km_i = Factor of load collective in inspection interval i
 T_i = Effective operating hours in inspection interval i

(*) In the following pages, carry over the last line from the previous page.

Inspection interval No. (max. annually)	Date of initial service data of inspection	Operating conditions since last inspection (load collective)	Factor of load collective	Total crane operating hours	Operating hours of super-structure	Operating hours of super-structure since last inspection	Operating hours of winch	Operating hours of winch since last inspection T_i	Used part of theoretical service life D_i : $S_i = \frac{Km_i}{Km} \times T_i$	Remaining theoretical service life $D_i = D_{i-1} - S_i$	Name of inspector	Signature	Remarks	Name of expert	Signature
(*) 0	10.06.90	-	-	-	0	0	-	0	0	3200					
1	05.06.91	L1	0,125	-	800	800	-	160 (20% of 800)	160	3040	Müller				
2	20.05.92	L3	0,5	-	2000	1200	-	480 (40% of 1200)	1920	1120	Huber				
3	18.05.93	L2	0,25	-	3000	1000	-	300 (30% of 1000)	600	520	Mater				
4															

CAUTION: Perform general overhaul at least once every 10 years! In case of deviation, see guidelines in this chapter.

General overhaul last performed on :

Fig.121551-en: Chart 1

Chart to determine the remaining theoretical service life of winch No.

- Crane type:
- Fabrication No.:
- Put in service:
- Serial number of winch according to data tag:
- Last general overhaul performed on:
- Configuration data of winch (see Operating Manual):
 Drive gear group: M.....
 Load collective: L.....
- Factor of load collective Km :
- Theoretical service life D :
- S_i = Used part of theoretical service life since last inspection
 D_i = Remaining theoretical service life
 D_{i-1} = Remaining theoretical service life after previous inspection
 Km = Factor of load collective, which was taken for calculation of winch.
 This factor is to be taken from the Operating Manual
 Km_i = Factor of load collective in inspection interval i
 T_i = Effective operating hours in inspection interval i
- *) In the following pages, carry over the last line from the previous page.

Inspection interval No. (max. annually)	Date of initial service data of inspection	Operating conditions since last inspection (load collective)	Factor of load collective	Total crane operating hours	Operating hours of super-structure	Operating hours of super-structure since last inspection	Operating hours of winch	Operating hours of winch since last inspection T_i	Used part of theoretical service life D : $S_i = \frac{Km_i}{Km} \times T_i$	Remaining theoretical service life $D_i = D_{i-1} - S_i$	Name of inspector	Signature	Remarks	Name of expert	Signature	
i			Km_i	[h]	[h]	[h]	[h]	[h]	[h]	[h]						
(*)																

CAUTION: Perform general overhaul at least once every 10 years! In case of deviation, see guidelines in this chapter.

General overhaul last performed on :

Empty page!

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Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Crane ropes

This chapter applies, for example, for the following crane ropes:

- Hoist ropes
- Control ropes for the boom system
- Control ropes of the telescopic boom with rope mechanism: Pull-out ropes and return ropes
- Guy ropes for boom system

2 Importance of inspection

Rope removal criteria: If severe damage reduces the operational safety, then the rope has reached the removal criteria.

The importance of regular inspections is demonstrated by:

- Evaluation of operational safety of ropes
- Determination of rope removal criteria
- Determination of next inspection

3 Personal protective equipment



WARNING

Wires and lubricant!

Severe injury and skin irritation.

- ▶ When working with ropes, always wear work gloves.



WARNING

Protective equipment **not** worn!

Severe injuries.

- ▶ Wear hard hat, safety shoes and safety glasses.

4 Qualification Inspection personnel

Make sure that the following prerequisites are met:

- Inspection personnel are **expert personnel for crane rope inspection**.
- **Expert personnel for crane rope inspection:**
 - Are trained in the inspection of crane ropes according to **DIN ISO 4309** and have practical experience in the evaluation of rope removal criteria.
 - Have practical experience in the evaluation of rope removal criteria according to **DIN ISO 4309**.
- The inspection personnel is assigned (authorized) for the maintenance by the crane operator.

5 Unscheduled inspection

In the following situations the rope must be inspected:

- after unusual strain
- if non-visible damage is suspected
- when a rope or the rope end connection is damaged
- when the rope has been placed again after removal
- when the rope has been out of service for longer than three months

6 Intervals

Intervals for crane inspection:

- according to determination by **expert personnel for crane rope inspection**
- or **at least once a year**



Note

- ▶ Shortening the inspection interval: The older a rope is the more frequently will wire breaks occur.

Determining factors for determination of inspection intervals are:

- Legal regulations in the country where the crane is operated
- Climate conditions under which the rope drive is utilized
- Power train group
- Results of previous inspections on current or comparable machine and under comparable operating conditions
- Frequency and type of use of a rope
- Service life of rope

7 Areas



WARNING

Broken wires and distortions on ropes in cross over areas!

Rope performance can be greatly reduced. Rope breakage. Death, severe injuries, property damage.

- ▶ Inspection rope cross over areas especially diligently.

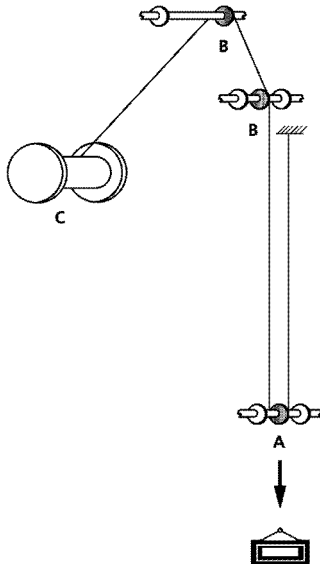


Fig.120969: Important inspection areas for multi layer spooled up ropes

- | | |
|--|---|
| <p>A Rope sections, which run in the area of the load rise into the lower rope pulleys (the load is raised here).</p> <p>B Rope intake on the first rope pulley in the area of the load rise</p> | <p>C Rope sections, which are subjected in the cross over areas to the strongest effects (maximum deflection angle).</p> |
|--|---|

The rope must be checked over the entire length.

The following areas must be checked with special diligence:

- Rope end connections
- Safety coils and fixed point on the winch
- Areas of the rope which run through the hook block.
- Areas of the rope that run over the rope pulleys or lay on the rope pulleys.
- Areas of the rope that are spooled on the winch, especially cross over areas.
- Areas of the rope which are laying above the compensation pulleys.
- Areas of the rope which are subjected to abrasion due to external components.
- All areas of the rope that are subjected to temperatures above 60 °C.

8 Documenting inspection results



Note

- ▶ Document the results of the inspections in an inspection checklist.
- ▶ Form for an inspection checklist, see section „Current checklist“.

9 Wire ropes and rope end connections



WARNING

Wire rope with impermissible rope end connection!

The wire rope can fail. The load can fall down.

Death, severe bodily injuries, property damage.

- ▶ Select the permissible rope type for the respective application.
- ▶ Select the permissible rope end connection for the respective rope type.
- ▶ Observe and adhere to the warning display on the lock.

Wire rope application	Rope type
Hoist rope	Rotation-resistant rope
Guy rope or control rope	Non-rotation resistant rope
Auxiliary rope or assembly rope	Non-rotation resistant rope

Rope type depending on the application

The type of rope that is selected determines the corresponding rope end connections.

9.1 Rotation-resistant ropes with rope end connections

Use rotation-resistant ropes as **hoist ropes**.

Rotation-resistant ropes are special ropes that produce extremely little torque and twisting at the rope end connection when they are under strain.

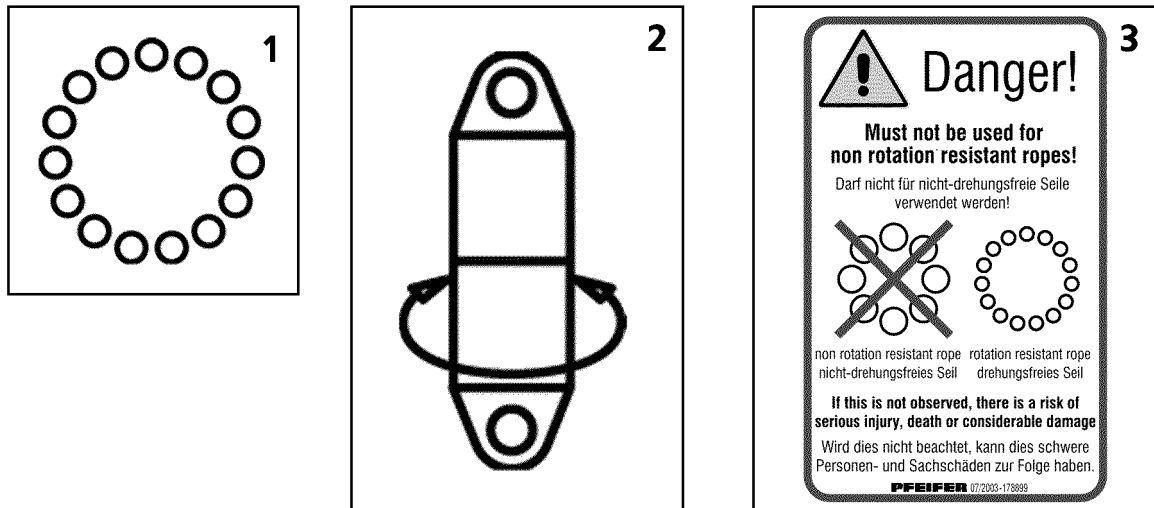


Fig.195653: Symbols for rotation-resistant ropes with rope end connections

- 1 Rotation-resistant rope symbol 3 Warning display on the PFEIFER lock
2 Rotating rope end connection symbol

Typical rotation-resistant rope structures are wire ropes with 15 to 18 outer strands. Rotation-resistant ropes are symbolically depicted with 15 outer strands (circles), see illustration 1.

9.1.1 Non-rotating rope end connection



Note

- In the case of a rotation-resistant ropes, Liebherr recommends the use of a lock **without** a swivel or a wedge lock. This can reduce the stress on the hoist ropes.

9.1.2 Rotating rope end connection



Note

- In the case of rotation-resistant ropes, Liebherr recommends **not** using a lock **with** a swivel and **not** to use a twist compensator / swivel.

To reduce a problematic turning behavior, the following rope end connections can be used in an individual case and after consultation with Liebherr customer service:

- Lock **with** swivel
- Twist compensator / swivel

9.2 Non-twisting ropes with rope end connections



WARNING

Wire rope with impermissible rope end connection!

The wire rope can fail. The load call fall down.

Death, severe bodily injuries, property damage.

- Use a lock **without** a swivel or a wedge lock.
- **Never** use a lock **with** a swivel with non-twisting rope.
- **Never** use a twist compensator / swivel with a non-twisting rope.

Use non-twisting ropes as **guy ropes** or **control ropes**, **auxiliary ropes** or **assembly ropes**.

Non-twisting ropes generate high torque levels on the rope end connection under strain. For this reason, the rope ends must be protected from twisting using an appropriate rope end connection to prevent the wire rope from unscrewing under strain.

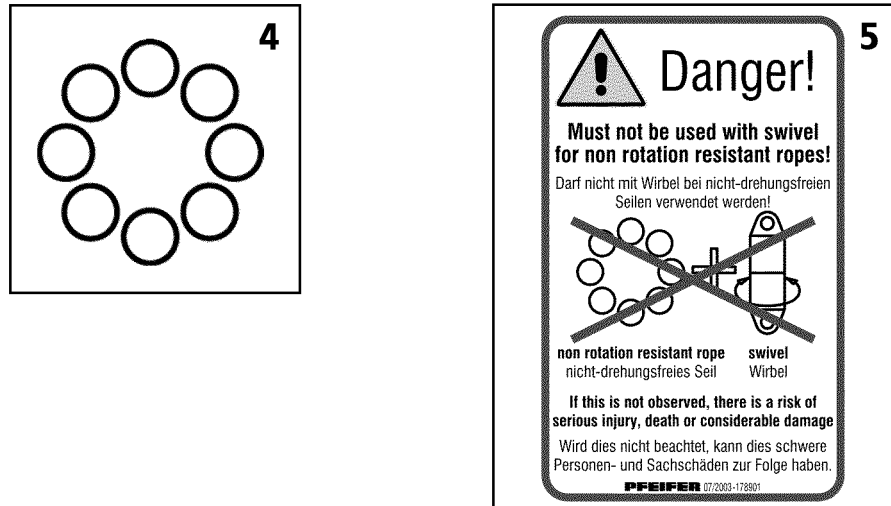


Fig.195654: Symbols for non-twisting ropes with rope end connections

- 4 Non-twisting rope symbol
- 5 Warning display on the PFEIFER lock / wedge lock

Typical non-twisting rope structures are wire ropes with 8 or ten outer strands. Non-twisting ropes are symbolically depicted with eight outer strands (circles), see illustration 4.

Only use non-twisting ropes with the following **non-twisting** rope end connections:

- Lock **without** swivel
- Wedge lock

A non-rotating rope end connection is also the mounting of the rope on the fixed point of the winch drum.

10 Degree of severity

The deciding factor for the removal criteria is which removal criteria are resented and to which degree they occur.

When various removal criteria are **not** present to a full degree, then the removal criteria must be evaluated as a total entity. For every individual removal criteria a degree of severity must be determined (percentage value).

For a certain rope section the sum of individual degrees of severity results in a **combined degree of severity**, see section „Combined degree of severity“.

When the combined degree of severity is more than 100 %, then the rope must be taken down.

11 Abbreviations Rope diameter

Abbreviations	Description
Rope nominal diameter d	Rope diameter, identification of rope
Reference diameter d_{ref}	Measured rope diameter of a straight rope section, directly after placing the rope
6d	Length of 6-fold rope nominal diameter
30d	Length of 30-fold rope nominal diameter

Abbreviations Rope diameter

12 Distortions and mechanical damage



WARNING

Distortions and mechanical damage!

Operational safety significantly disturbed, uneven load distribution within the rope.

- ▶ Have the manufacturer check if the distorted and damaged area can be severed.

Visible form changes often occur localized or in short rope sections.

When a safe operation of the rope is ensured, a distorted and damaged area can be severed.

13 Removal criteria Overview

The following chart provides an overview between removal criteria and the respective method for inspection. The degree is described, when the removal criteria is reached.

The removal criteria is described in detail in the subsequent sections.



Note

When the rope for parallel operation has reached the removal criteria:

- ▶ Often, both ropes must be replaced. The new rope has a larger diameter and other elongation characteristics.

Removal criteria	Degree for removal criteria	Inspection method
Broken strands	One strand is broken	Visual check
Broken wires on ropes, which run over rope pulleys and are spooled in multiple layers	Maximum number of broken wires reached, see Section Determining the number of broken wires	Count
Broken wire in the strand valleys	Two or more broken wires in strand valleys, on the contact points of two neighboring strands within an angular length (corresponds approx. to 6d)	Count
Broken wires in the area of the rope end connection	Two or more broken wires, according to decision of expert personnel for crane rope inspection	Visual inspection, test with marlin spike
Broken wire nests	On occurrence	Visual check
Reduction rope diameter at even diameter reduction	Maximum reduction of rope diameter reached	Measurement, calculation
Localized increase of rope diameter	Maximum increase of rope diameter reached	Measurement
Significant corrosion	Surface of rope is significantly affected or rust film emerges, according to decision of expert personnel for crane rope inspection	Visual check
Corkscrew-like distortion	Maximum permissible distortion reached	Measurement, calculation
Basket formation	On occurrence	Visual check
Wires or bunches of wires protruding from the rope	On occurrence, if more than one wire protrudes from the rope	Visual check

Removal criteria	Degree for removal criteria	Inspection method
Flattenings	Larger than half of the diameter of the outer strand, according to decision of expert personnel for crane rope inspection	Visual check
Loop formation	Loops on several wires	Visual check
Kinking or remaining distortion	On occurrence	Visual check
Buckles or contusions	On occurrence, according to decision of expert personnel for crane rope inspection	Visual check
Heat influence, electric voltage	Bluish discoloration, broken or melted wires	Visual check
Damage on rope end connections: Material cracks, deformation, wear, corrosion, traces of slipping between the locking clamp and rope	According to decision of expert personnel for crane rope inspection	Visual inspection
Combined degree of severity	Degree of severity 100 % or above, according to decision of expert personnel for crane rope inspection	Calculation of individual degrees of severity

Removal criteria Overview

14 Checking for broken strands

A strand consists of several individual wires.

If a complete strand is broken:

- ▶ Take the rope down.

15 Determining the number of broken wires

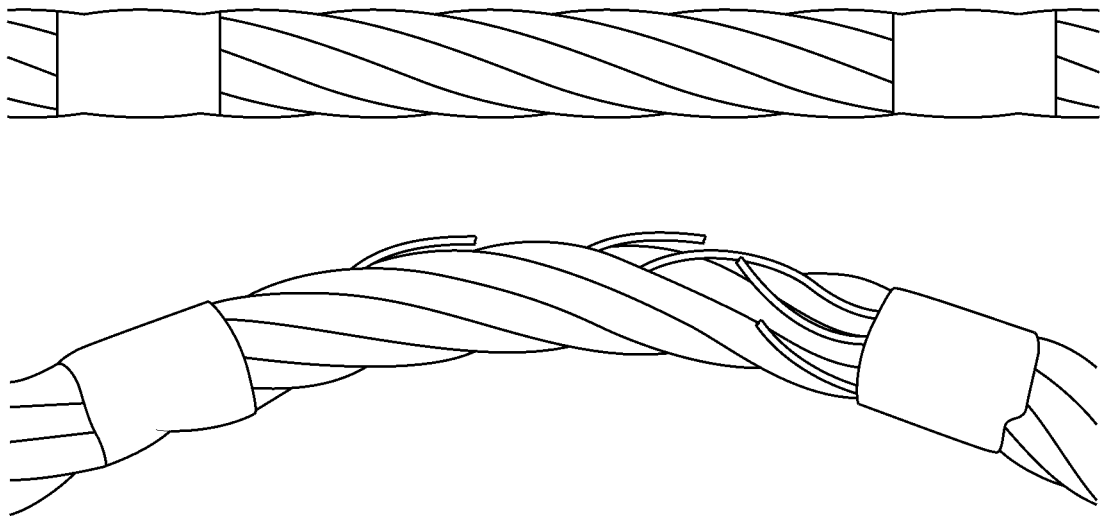


Fig.120980: Determine broken wires by bending

By bending the rope, broken wires can be recognized better.

Make sure that the following prerequisites are met:

- The rope is clean.
- Inspection checklist is on hand.

15.1 Scattered occurring broken wires

The following different rope types each have their own chart for the permissible number of broken wires:

- Single layer and parallel roped ropes
- Rotation resistant ropes

The charts in this section are valid exclusively for **scattered occurring broken wires**.

15.1.1 Wire break increase rate

The wire break increase rate is an increase of broken wires, which can skyrocket with increasing use of the rope.

- ▶ Include the inspection checklists for the previous inspection and use it to draw a conclusion for the wire break rate increase.

15.1.2 Single layer and parallel roped ropes

Rope category number RCN	Total number of load carrying wires in the outer strand layer of rope ¹ n	Number of visible outer wire breaks ²					
		Rope sections, which run over steel pulleys and / or spool up on a single layer spooling drum (coincidental distribution of broken wires)				Rope sections, which spool up on a multi layer drum ³	
		Class M1 to M4, or class unknown ⁴				All classes	
		Lang lay		Even lay		Lang lay and even lay	
		Over a length of 6d ⁵	Over a length of 30d ⁵	Over a length of 6d ⁵	Over a length of 30d ⁵	Over a length of 6d ⁵	Over a length of 30d ⁵
01	$n \leq 50$	2	4	1	2	4	8
02	$51 \leq n \leq 75$	3	6	2	3	6	12
03	$76 \leq n \leq 100$	4	8	2	4	8	16
04	$101 \leq n \leq 120$	5	10	2	5	10	20
05	$121 \leq n \leq 140$	6	11	3	6	12	22
06	$141 \leq n \leq 160$	6	13	3	6	12	26
07	$161 \leq n \leq 180$	7	14	4	7	14	28
08	$181 \leq n \leq 200$	8	16	4	8	16	32
09	$201 \leq n \leq 220$	9	18	4	9	18	36
10	$221 \leq n \leq 240$	10	19	5	10	20	38
11	$241 \leq n \leq 260$	10	21	5	10	20	42
12	$261 \leq n \leq 280$	11	22	6	11	22	44

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Rope category number RCN	Total number of load carrying wires in the outer strand layer of rope ¹ n	Number of visible outer wire breaks ²					
		Rope sections, which run over steel pulleys and / or spool up on a single layer spooling drum (coincidental distribution of broken wires)				Rope sections, which spool up on a multi layer drum ³	
		Class M1 to M4, or class unknown ⁴				All classes	
		Lang lay		Even lay		Lang lay and even lay	
		Over a length of 6d ⁵	Over a length of 30d ⁵	Over a length of 6d ⁵	Over a length of 30d ⁵	Over a length of 6d ⁵	Over a length of 30d ⁵
13	281 ≤ n ≤ 300	12	24	6	12	24	48
	n > 300	0.04 x n	0.08 x n	0.02 x n	0.04 x n	0.08 x n	0.16 x n

Note: Ropes with outer strands in the Seale type, number of wires per strand 19 or less (for example 6 × 19 Seale), are classified in this chart as two lines over the line, which would be defined due to the number of load carrying wires in the outer strands.

Number of visible broken wires (reached or exceeded) for removal criteria is reached, for **single-layer** and **parallel roped ropes** according to **DIN ISO 4309**

- 1) For the purpose of this international standard, fill wires are not considered to be load carrying wires and are not included in the value for n.
- 2) A broken wire has two ends (counted as one wire).
- 3) The values apply for damage in the cross over areas and the layers of coils due to deflection angles (not for rope sections, which run only over rope pulleys and do not spool up on the winch).
- 4) For ropes on drive gears of groups M5 to M8 twice the number of broken wires listed can be used.
- 5) d = Rope nominal diameter

- ▶ Check the rope over the entire length for visible broken wires.

When visible broken wires are scattered present:

- ▶ On the point of a broken wire, mark the rope sections on a length of 30d in both directions.
- ▶ Count visible broken wires in the marked rope sections and record them.
- ▶ Take the RCN (Rope category number) from the manufacturer's documentation of the rope.

When the make for rotation-resistant ropes is **not** listed in the chart:

- ▶ Determine the total number of load carrying wires in the rope: Add all wires in the strands of the outer layer, do **not** count fill wires.
- ▶ Compare the number of broken wires of each marked rope section 30d with the number of broken wires in the chart.

When the number of visible broken wires is smaller than listed in the chart:

- ▶ Within the rope section with the most broken wires: Mark the rope section with the most broken wires on a length of 6d.
- ▶ Count visible broken wires in the marked rope sections 6d and record them.
- ▶ Compare the number of broken wires of the marked rope section with the number of broken wires in the chart.

When the number of visible broken wires is equal to or larger than that listed in the chart:

- ▶ Take the rope down.
- ▶ Enter the results in the inspection checklist.

15.1.3 Rotation resistant ropes

Rope category number RCN	Total number of load carrying wires in the outer strands of rope ¹ n	Number of visible outer wire breaks ²			
		Rope sections, which run over steel pulleys and / or spool up on a single layer spooling drum (coincidental distribution of broken wires)		Rope sections, which spool up on a multi layer drum ³	
		Over a length of 6d ⁴	Over a length of 30d ⁴	Over a length of 6d ⁴	Over a length of 30d ⁴
21	4 strands $n \leq 100$	2	4	2	4
22	3 or 4 strands $n \geq 100$	2	4	4	8
	At least 11 strands in the outer layer				
23-1	$71 \leq n \leq 100$	2	4	4	8
23-2	$101 \leq n \leq 120$	3	5	5	10
23-3	$121 \leq n \leq 140$	3	5	6	11
24	$141 \leq n \leq 160$	3	6	6	13
25	$161 \leq n \leq 180$	4	7	7	14
26	$181 \leq n \leq 200$	4	8	8	16
27	$201 \leq n \leq 220$	4	9	9	18
28	$221 \leq n \leq 240$	5	10	10	19
29	$241 \leq n \leq 260$	5	10	10	21
30	$261 \leq n \leq 280$	6	11	11	22
31	$281 \leq n \leq 300$	6	12	12	24
	$n > 300$	6	12	12	24

Note: Ropes with outer strands in Seale type, number of wires in each strand 19 or less (for example 18 × 19 Seale - WSC), are classified in this chart as two lines over the line, which would be defined due to the number of load carrying wires in the outer strands.

Number of visible broken wires (reached or exceeded) is achieved in the rope removal criteria, for **rotation-resistant** ropes according to **DIN ISO 4309**

1) For the purpose of this international standard, fill wires are not considered to be load carrying wires and are not included in the value for n.

2) A broken wire has two ends (counted as one wire).

3) The values apply for damage in the cross over areas and the layers of coils due to deflection angles (not for rope sections, which run only over rope pulleys and do not spool up on the drum).

4) d = Rope nominal diameter

- ▶ Check the rope over the entire length for visible broken wires.

When visible broken wires are scattered present:

- ▶ On the point of a broken wire, mark the rope sections on a length of 30d in both directions.
- ▶ Count visible broken wires in the marked rope sections and record them.
- ▶ Take the RCN (Rope category number) from the manufacturer's documentation of the rope.

When the make for rotation-resistant ropes is **not** listed in the chart:

- ▶ Determine the total number of load carrying wires in the rope: Add all wires in the strands of the outer layer, do **not** count fill wires.

- ▶ Compare the number of broken wires of each marked rope section 30d with the number of broken wires in the chart.

When the number of visible broken wires is smaller than listed in the chart:

- ▶ Within the rope section with the most broken wires: Mark the rope section with the most broken wires on a length of 6d.
- ▶ Count visible broken wires in the marked rope sections 6d and record them.
- ▶ Compare the number of broken wires of the marked rope section with the number of broken wires in the chart.

When the number of visible broken wires is equal to or larger than that listed in the chart:

- ▶ Take the rope down.
- ▶ Enter the results in the inspection checklist.

15.2 Broken wire in the strand valleys

The broken wires in these areas point to the fact that the condition in the inside of the rope is deteriorating.

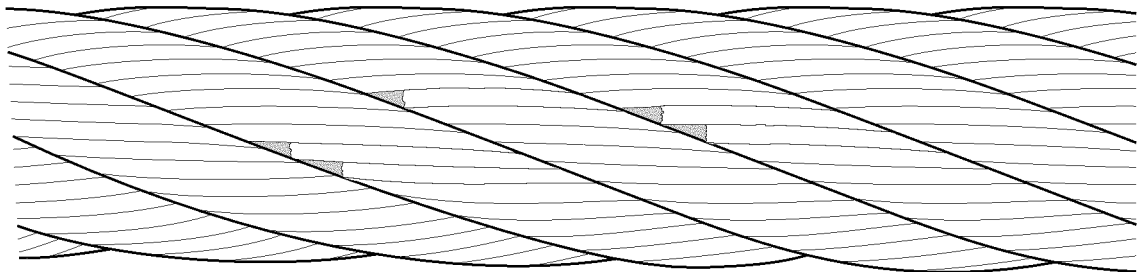


Fig.121005: Broken wire in the strand valleys

When two or more broken wires occur within a 6d long rope section:

- ▶ Take the rope down.

15.3 Broken wires on rope end connections

- ▶ Check the area near the rope end connections and carefully check for broken wires.

Loose wires are a sign of broken wires in the rope end connection.

- ▶ Use a marlin spike to check for loose wires.

When broken wires are near a rope end connection and two or more wires are affected:

- ▶ Take the rope down.

or

When the remaining rope lengths fulfil the minimum number of remaining coils in all operating positions:

- ▶ Shorten the rope, see chapter 7.05.50.
- ▶ Attach the rope end connection.

15.4 Broken wires in rope sections, which are not spooled up on the winch

When the broken wires are concentrated on one or two strands, the removal criteria can be present at fewer broken wires as noted in the chart (rope section in length of 6d).

- ▶ Have the rope removal criteria determined by **expert personnel for crane rope inspection**.

15.5 Broken wire nests

When broken wires are very close to each other or when the broken wires are concentrated on one strand, then the rope must be taken down, even at fewer broken wires than noted in the chart (rope section 6d).

- ▶ Have the rope removal criteria determined by **expert personnel for crane rope inspection**.

16 Checking the rope end connection

The removal criteria are evaluated by the **expert personnel for crane rope inspection**.

Check for broken wires, see section „Broken wires on rope end connections“.

16.1 Pressed rope end connection

Example of a pressed rope end connection: Locking clamp.

- ▶ Check the rope end connections for signs of possible slipping between the locking clamp and the wire rope.
- ▶ Check the rope end connections for material cracks.
- ▶ Check rope end connections for corrosion, deformation and wear.

16.2 Enlarged rope end connection

Example of an enlarged rope end connection: Locking cast sleeve.

- ▶ If present: Remove the beam.
- ▶ Check rope end connections for corrosion, deformation and wear.

If the rope connection is on a flat rope:

- ▶ Check the cone setting, see chapter 8.04.10.

16.3 Detachable rope end connection

Example of a detachable rope end connection: Wedge lock.

- ▶ Check that the rope end connections are fit tightly and correctly installed.
- ▶ Check the wire rope inside and at the outlet of the rope end connection. Check the rope according to the removal criteria in this chapter.

17 Checking of rope diameter

17.1 Even reduction of rope diameter



WARNING

Spooling problems due to reduced rope diameter!

- ▶ Take the rope down even when the removal criteria according to **DIN ISO 4309** has not yet been reached.

The values in this section do **not** apply for rope sections, which were damaged in cross over areas due to multi layer spooling on a winch.

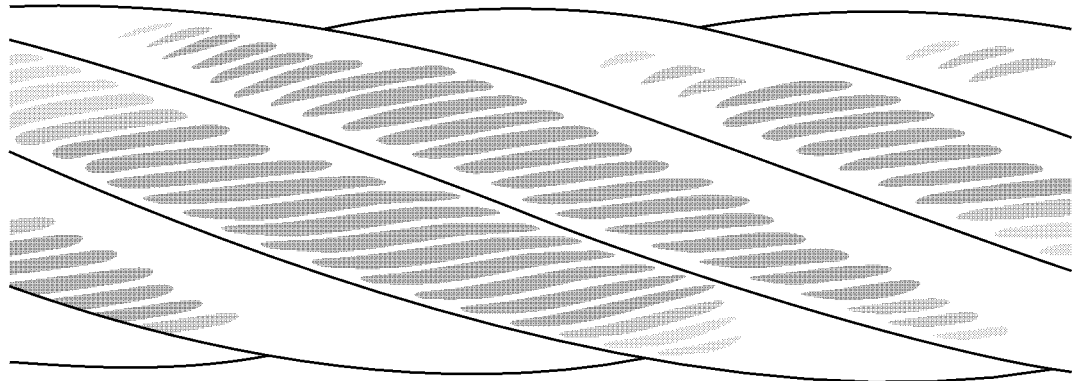


Fig.121001: External abrasion on the rope

The rope diameter changes due to abrasion, settling and external influences.

Abrasion of cover wires of outer strands of rope due to frictional contact. Especially in those areas where ropes are in contact with the rope pulleys during start up or slow down of the load.

Wear is increased by lack of or incorrect lubrication and the effect of dust.

Abrasion reduces the tensile strength of steel ropes because the cross section of the steel is reduced.

Additional possible causes for reduction of rope diameter:

- Wear in the inside of the rope
- Wear of fiber insert
- Breakage of a steel insert
- Broken inner strands

This section is valid solely for the following ropes:

- Ropes, which spool up on single layer winches
- Ropes, which run through a steel rope pulley

$$d_v = \frac{d_{ref} - d_m}{d} \times 100 \%$$

Fig.121372: Formula Reduction of rope diameter

d_v = even reduction of rope diameter
 d_{ref} = rope diameter, which was determined before placement

d_m = measured rope diameter
 d = rope nominal diameter: Take value from inspection checklist

The following chart applies exclusively for ropes, which spool up on single layer winches and / or run through a steel rope pulley.

Rope type	Even reduction of diameter d_v (in percentages of rope nominal diameter d)	Classification of degree of severity	
		Description	%
	Less than 6 %	—	0
Single layer rope with fiber insert	6 % and above, but less than 7 %	Light	20
	7 % and above, but less than 8 %	Medium	40
	8 % and above, but less than 9 %	High	60
	9 % and above, but less than 10 %	Very high	80
	10 % and above	Rope removal criteria	100

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Rope type	Even reduction of diameter d_v (in percentages of rope nominal diameter d)	Classification of degree of severity	
		Description	%
Single layer rope with steel insert or parallel roped rope	Less than 3.5 %	—	0
	3.5 % and above, but less than 4.5 %	Light	20
	4.5 % and above, but less than 5.5 %	Medium	40
	5.5 % and above, but less than 6.5 %	High	60
	6.5 % and above, but less than 7.5 %	Very high	80
	7.5 % and above	Rope removal criteria	100
Rotation-resistant rope	Less than 1 %	—	0
	1 % and above, but less than 2 %	Light	20
	2 % and above, but less than 3 %	Medium	40
	3 % and above, but less than 4 %	High	60
	4 % and above, but less than 5 %	Very high	80
	5 % and above	Rope removal criteria	100

Degree of severity and removal criteria depending on rope type and even diameter reduction according to DIN ISO 4309

The medium value from the smallest and the largest measured diameter results in the value for d_m .

- ▶ Measure rope diameter on several locations and calculate measured diameter d_m .
- ▶ Calculate even reduction d_v of rope diameter with formula.
- ▶ Read the degree of severity in the chart, depending on the rope type.
- ▶ Document the degree of severity in the inspection checklist.

When the degree of severity has reached 100 %:

- ▶ Take the rope down.

17.2 Localized reduction of rope diameter

Localized reductions of rope diameter point to the fact that a rope insert may have failed, for example.

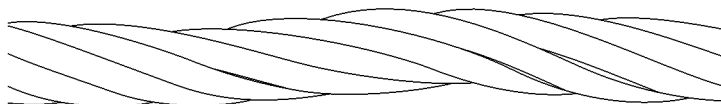


Fig. 120983: Localized reduction of rope diameter

- ▶ Check the rope for localized reduction of rope diameter.

When a localized reduction of the rope diameter is found:

- ▶ Take the rope down.

17.3 Localized increases of rope diameter

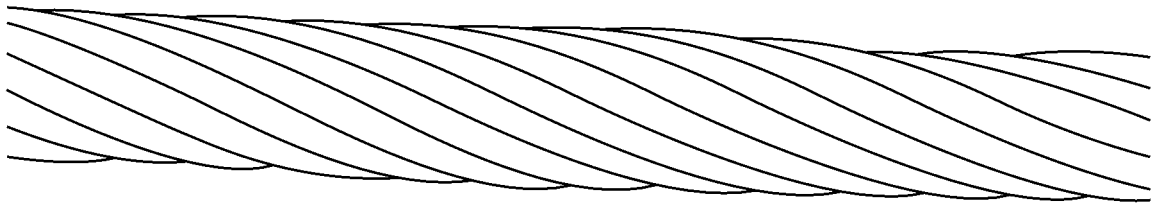


Fig. 120992: Localized increase of rope diameter

An increase over a longer area of the rope can be caused by absorption of moisture in the fiber insert or due to corrosion in the inside of the rope.

Rope insert	Maximum increase of rope diameter during operation
Steel	5 %
Fiber	10 %

► Check the rope for increases in rope diameter.

When the increases exceed the maximum values:

► Take the rope down.

18 Corrosion

Corrosion occurs due to insufficient lubrication, in maritime climates and in an atmosphere polluted by industrial fumes.

External corrosion is indicated by a rough wire surface. A superficial rust film can be wiped off.

Significant corrosion reduces the strength and elasticity of the rope due to the reduction of the rope diameter.

Inner corrosion is hard to detect.

Do **not** use solvents to clean the rope.

Make sure that the following prerequisite is met:

- Rope is cleaned (wiped and brushed).

18.1 External corrosion

The various types of corrosion are classified and noted with the classification for removal criteria in percentages:

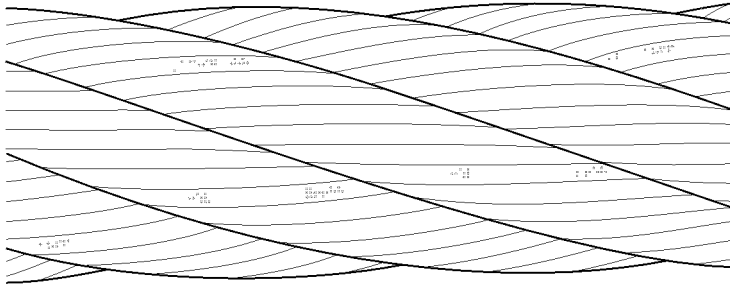


Fig.120984: Surface light corrosion: Classification 0 % of removal criteria

Superficial light corrosion (rust film) can be wiped off.

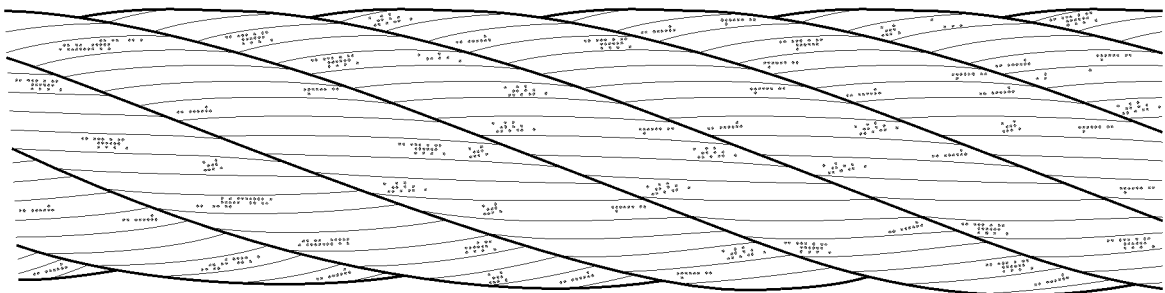


Fig.120985: Surface feels rough: Classification 20 % of removal criteria

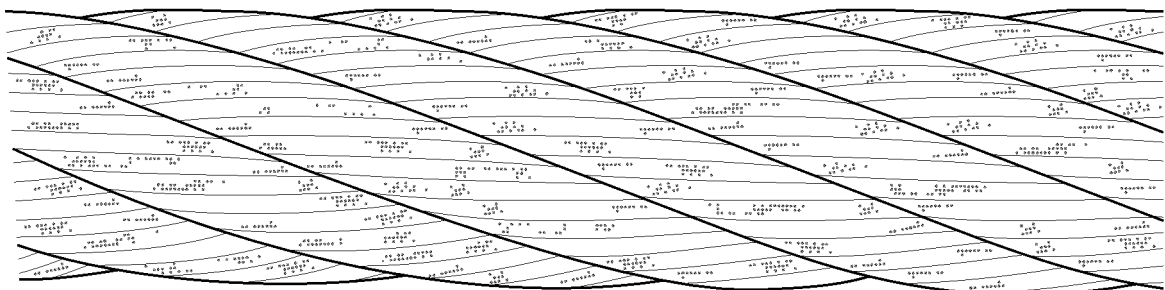


Fig.120986: Surface feels very rough: Classification 60 % of removal criteria

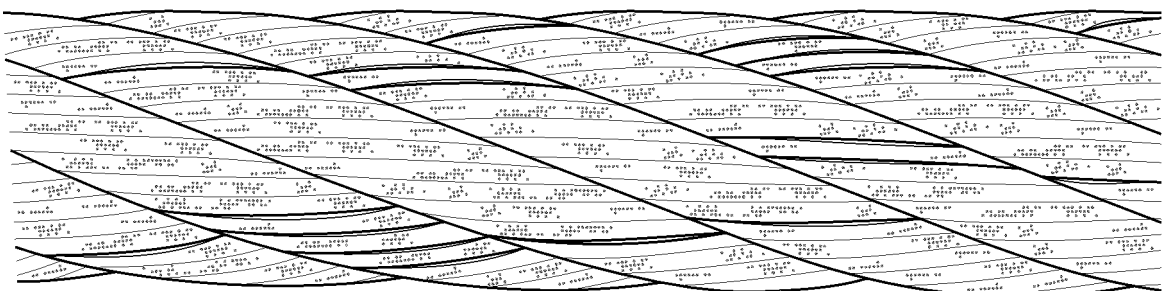


Fig.120987: Surface very decayed, spaces between individual wires can be easily recognized: Classification 100 % of removal criteria

When 100 % of removal criteria is reached:

- ▶ Take the rope down.

18.2 Internal corrosion

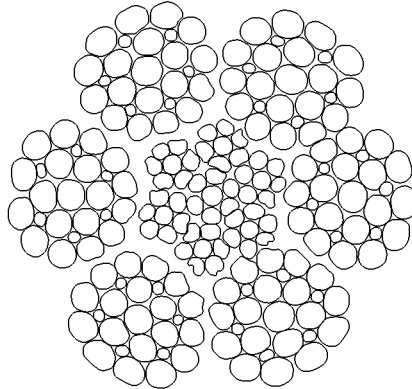


Fig.120982: Corrosion in the inside of the rope

Internal corrosion is present when clearly visible corrosion particles migrate between the valleys of the outer strands: Classification 100 % removal criteria.

When internal corrosion is found:

- ▶ Have the rope removal criteria evaluated by **expert personnel for crane rope inspection** or place the rope down.

18.3 Friction corrosion

Friction corrosion occurs as a type of brown powder, which migrates from the inside of the rope to the outside: Classification 100 % of removal criteria.

- ▶ Check the rope diligently for friction corrosion.

If friction corrosion is found:

- ▶ Have the rope removal criteria evaluated by **expert personnel for crane rope inspection** or place the rope down.

19 Corkscrew-like distortion



Fig.120988: Corkscrew-like distortion

Distortion where the rope is in the form of a corkscrew along its longitudinal axis.

Effects of corkscrew-like distortion:

- Irregular rope drive
- Rope wear
- Broken wire
- Bearing damage on rope pulleys

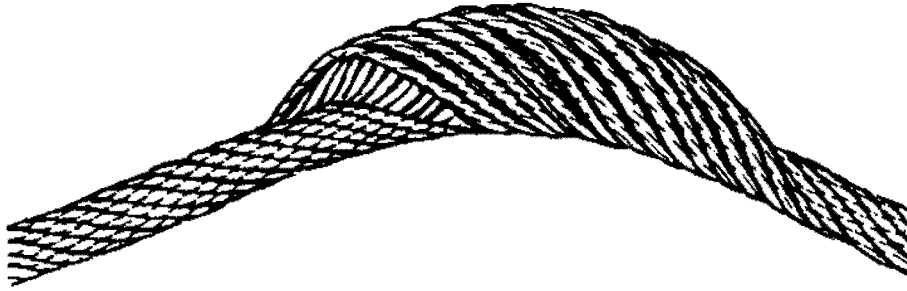


Fig.120989: Basket formation

► Check the entire rope for basket formation.

When basket formation is present:

► Take the rope down.

21 Protruding, distorted insert or strand

This distortion is a special form of basket formation. The insert or the core of the rope protrudes between the outer strands or an outer strand protrudes from the rope banding.

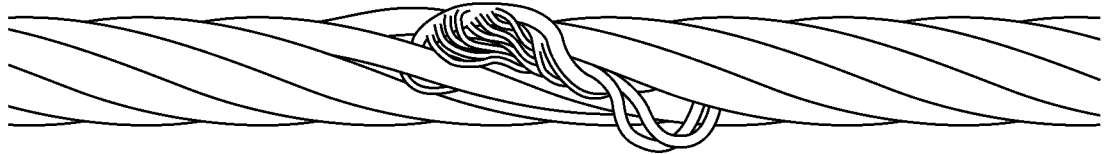


Fig.120990: Protrusion of an insert (rope single layer)



Fig.120991: Distorted or protruding strand

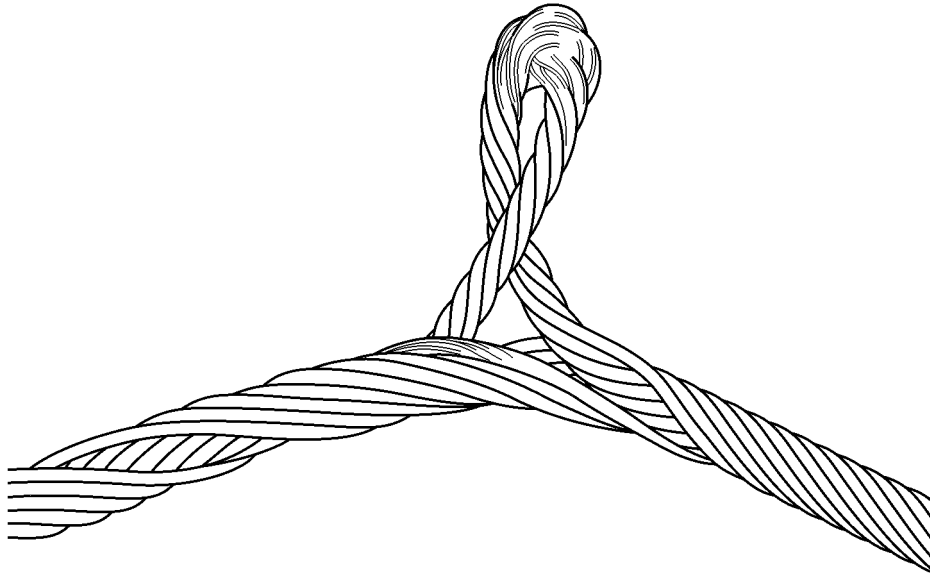


Fig.121373: Protrusion of rope insert on rotation-resistant rope

When the insert or a strand protrudes or is distorted, place the rope down. Have authorized inspector for crane rope inspection check if the rope area with the distortion can be removed.

- ▶ Check the entire rope for protruding, distorted insert or strand.

When protruding, distorted insert or braid is present:

- ▶ Take the rope down.
- ▶ Have **expert personnel for crane rope inspection** check if the rope area with the distortion can be removed.

22 Loop formation

At loop formation individual or several wires protrude from the rope and bulge upward (bird-caging).

These areas are most often on the opposite side of the rope pulley groove.

Make sure that the following prerequisite is met:

- There are **no** broken wire ends present.

If only a core wire of the rope insert protrudes through the outer strands, then the rope does not have to be taken down when:

- The wire can be removed.
- The wire does not disturb other elements of the rope drive.

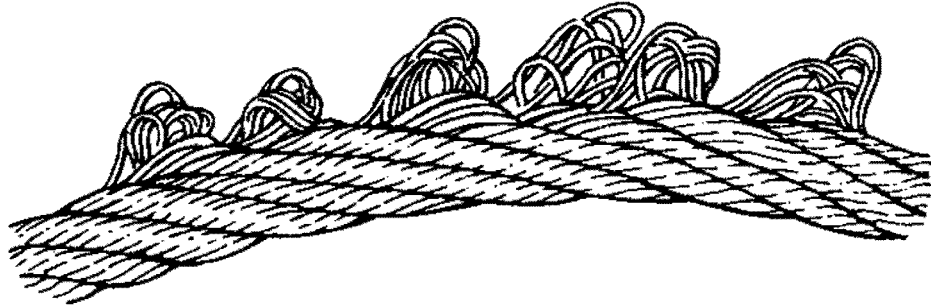


Fig.120993: Emergence of individual wires

▶ Check rope for loop formation.

When solely a core wire protrudes:

▶ Remove the core wire.

When several wires are affected from the loop formation:

▶ Take the rope down.

23 Kinking or rope loops pulled closed

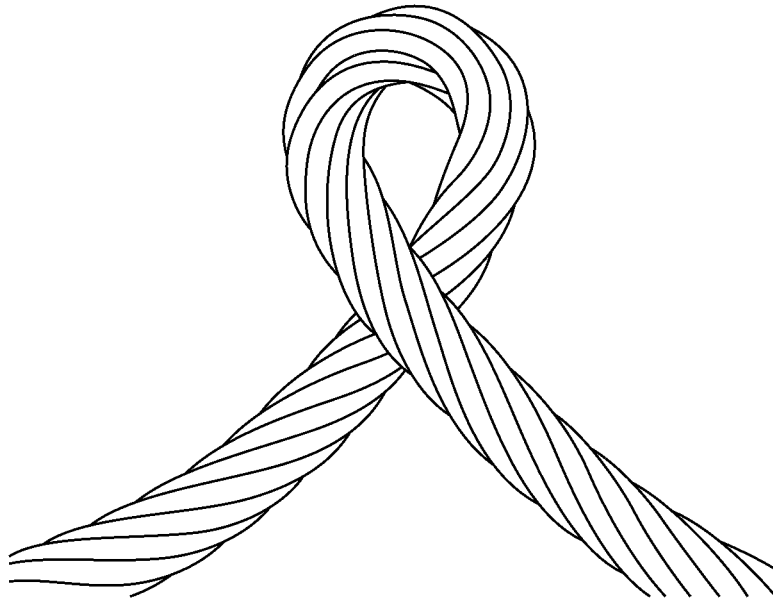


Fig.121007: Kinking or rope loop pulled closed

At this deformation a loop has formed in the rope, without the possibility to rotate around its own axis during a load. The rope is subjected to more wear.

The rope is significantly distorted. The strength remains only in part.

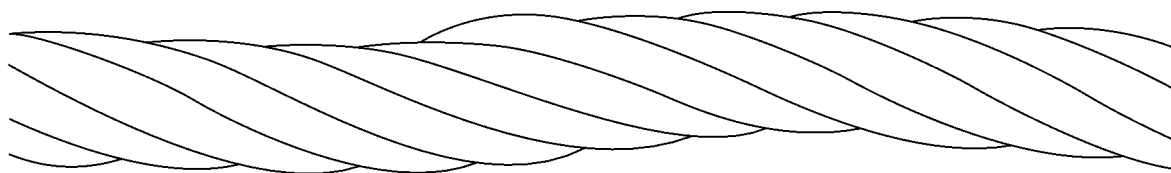


Fig.121002: Positive Kinking

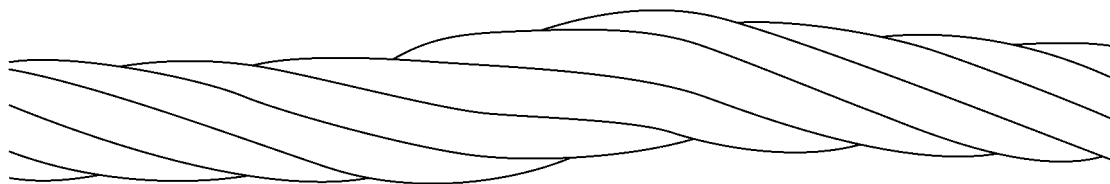


Fig.121003: Negative Kinking

- ▶ Check the rope for kinking or rope loops pulled closed.

When kinking or rope loops pulled closed occur:

- ▶ Take the rope down.

24 Buckles

Buckles are angular deformations. The rope was damaged due to external influences. Strong deformations of the rope cause stronger wear.

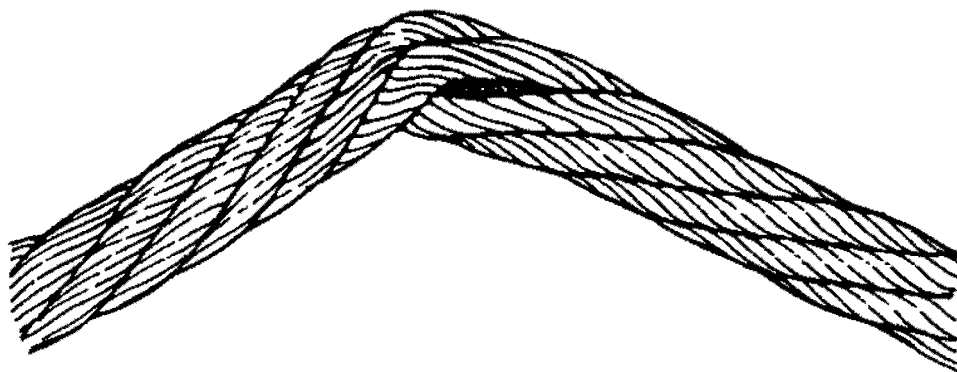


Fig.120999: Severe buckle

A buckle is a serious matter if a fold is visible on the underside of the rope.

When buckles are present:

- ▶ Have the rope inspected by **expert personnel for crane rope inspection**.

When a distortion and degree of severity permits further operation:

- ▶ Shorten the inspection interval.

When the removal criteria is reached:

- ▶ Take the rope down.

25 Effects of heat, arcs

Damage caused to the rope by welding work, for example.

Exceptional thermal effect is visible through tempering colors, the loss of lubricant and by localized melting of wires.

When thermal effect has occurred on the rope:

- ▶ Take the rope down.

26 Combined degree of severity



Note

- ▶ For a method to determine the effect of a combined degree of severity and damage on the rope, see **DIN ISO 4309**.

When the condition of the rope deteriorates, then often a combination of various causes occurs.

To determine the degree of severity, the **expert personnel for crane rope inspection** must:

- take different damage within a rope section into account
- evaluate the entire effect of the damage and the distortions
- decide about the operational safety of the rope
- evaluate if inspection intervals must be adjusted
- decide if the rope must be taken down

When the combined degree of severity is more than 100 %, then the rope must be taken down.

27 Flattenings

Effects of flattenings on the rope:

- Rope sections with flattenings, which move **over the rope pulleys** tend to higher wear and a higher number of broken wires.
- Rope pulleys can be damaged.
- Flattenings on **stationary ropes** (guy ropes boom) promote quicker corrosion, especially in the areas where the outer strands have opened.

Flattened rope sections must be checked in shorter intervals for broken wires and corrosion.

27.1 Shorting the intervals

- ▶ Check the entire rope for flattenings.

When flattenings are present on stationary ropes:

- ▶ Shorten the intervals for rope inspection.

When it is **not** possible to shorten the intervals for the rope inspection:

- ▶ Take the rope down.

27.2 Improper mechanical damage

An improper mechanical damage occurs, for example, when the rope is trapped.

- ▶ Take the rope down immediately or shorten it, see chapter 7.05.50.

27.3 Operational transverse pressure

Operational transverse pressure causes flattenings, for example in the incline range of multi layer spooling.

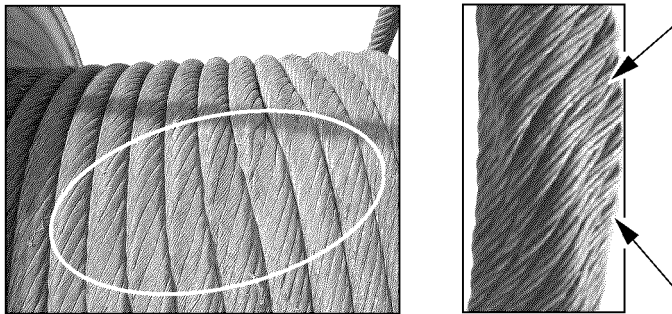


Fig.114002: Flattenings

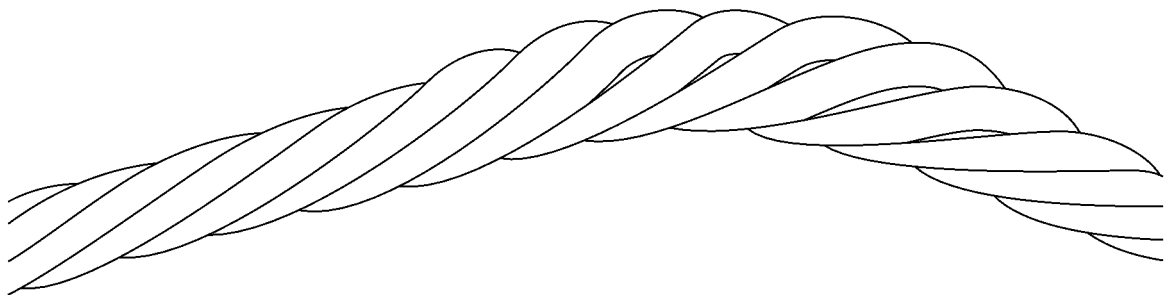


Fig.120996: Flattenings on multi layer spoolings

- ▶ Check the first rope layer of the winches for crushed areas and distortions.

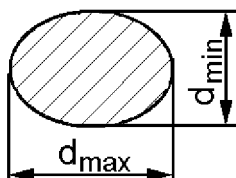


Fig.121006: Largest and smallest diameter on the distortion area

$$V = \frac{d_{\max} - d_{\min}}{d} \times 100 \%$$

Fig.121374: Formula to calculate the distortion

V Rope distortion in percentages

d_{ma} Largest diameter of distortion area

d Rope nominal diameter

x

d_{mi} Smallest diameter of distortion area

n

When distortions are present:

- ▶ Determine the number of broken wires See section „Determining the number of broken wires“.

When the number of permissible broken wires is exceeded:

- ▶ Take the rope down.
- ▶ Calculate the distortion V with the formula and document it in the inspection checklist.

When distortion V is larger than 5 %:

- ▶ Check the rope before every assembly and erection procedure.

When distortion V is larger than 10 %:

- ▶ Document the degree of severity of 50 % in the inspection checklist.

When distortion V is larger than 20 %:

- ▶ The degree of severity of 100 % is reached: Take the rope down.

28 Current checklist

Crane and use:		RCN ³⁾ :	Installation date:				
Rope application:		Nominal diameter:	Take-down date:				
Brand name:	<input type="radio"/> Right hand <input type="radio"/> Lang's lay	<input type="radio"/> Left hand <input type="radio"/> Ordinary lay	Minimum tensile strength				
Make ¹⁾ :	<input type="radio"/> IWRC <input type="radio"/> Bare	<input type="radio"/> FC <input type="radio"/> Galvanized	Permissible number of visible external broken wires				
Direction of lay ¹⁾ :	<input type="radio"/> IWRC <input type="radio"/> Bare	<input type="radio"/> FC <input type="radio"/> Galvanized	Datum diameter				
Intermediate layer ¹⁾ :	<input type="radio"/> IWRC <input type="radio"/> Bare	<input type="radio"/> FC <input type="radio"/> Galvanized	Permissible diameter reduction:				
Wire surface ¹⁾ :	<input type="radio"/> IWRC <input type="radio"/> Bare	<input type="radio"/> FC <input type="radio"/> Galvanized	6d: 30d:				
Rope end connections:							
Date	Visible external broken wires		Corrosion	Damage, deformation	Combined severity level ²⁾	Name of expert for the wire rope inspection	Signature
	Number in length of	Position in the rope					
JJ/MM/TT	6d 30d	6d 30d	Severity level ²⁾	Position in the rope	Severity level ²⁾	Position in the rope	Severity level ²⁾

1) Check where applicable.
 2) State extent of damage; slight or 20%; medium or 40%; high or 60%; very high or 80%; take-down or 100%
 3) RCN = Rope Category Number

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Fig.121370-en: Form for current checklist

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Fig.195219

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1 Safety guidelines



DANGER

Death, severe injury, property damage due to welding on load hooks!

- ▶ Do **not** weld load hooks to repair wear.
- ▶ Replace the load hook in case of impermissible wear.
- ▶ Contact Liebherr Service.

Make sure that the following regulation is followed:

- Do **not** carry out any welding work on load hooks, for example to repair wear.

2 Inspection intervals

By recognizing defects in time, accidents are prevented.

An inspection must be made before operation.

Load hooks must be inspected as needed, but at least once a year by an expert.

The load hook must be inspected every 4 years by an expert.

3 Inspecting and monitoring the load hook

Any defects found must be remedied and documented.

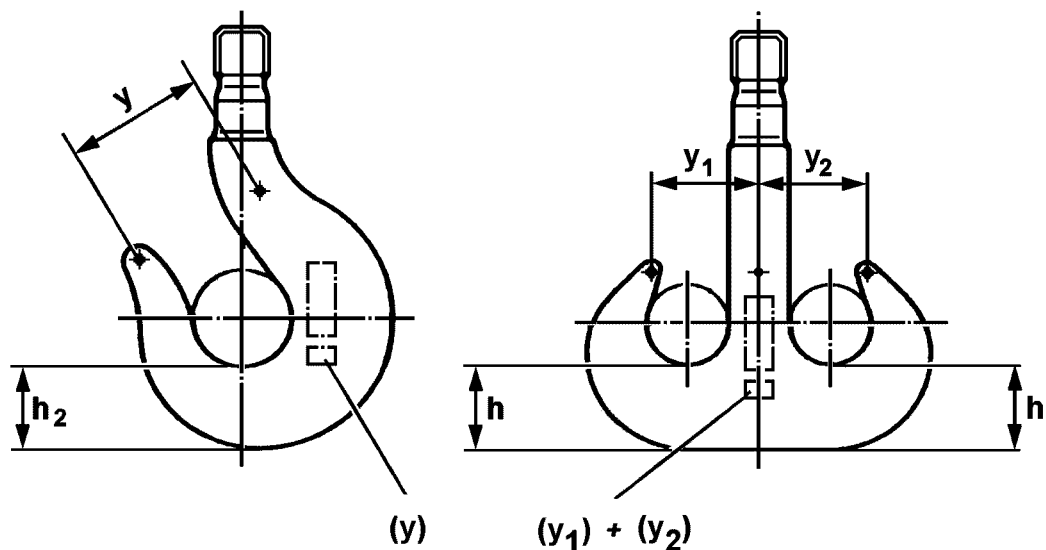


Fig.121531: Description of measured distances of load hooks

3.1 Checking the load hook for distortion



DANGER

Death, severe injury, property damage due to expansion of hook jaw!

- ▶ Replace the load hook in case of impermissible expansion.
- ▶ Contact Liebherr Service.

The initial dimension (**y**) for the single hook is marked on the load hook.

The initial dimension (**y₁**) and the initial dimension (**y₂**) for the double hook is marked on the load hook.

The expansion of the hook jaw may not exceed more than 10 % in reference to the initial dimension (**y**) or the initial dimension (**y₁**) and the initial dimension (**y₂**).

- ▶ Measure dimension **y** or dimension **y₁** and dimension **y₂** from center punch to center punch.
- ▶ Check for dimensional accuracy within the permissible tolerance.

3.2 Checking the load hook for surface cracks



DANGER

Death, severe injury, property damage due to surface cracks and damage on the load hook!

- ▶ Replace the load hook in case of surface cracks and damage.
- ▶ Contact Liebherr Service.

When distortions are found on the hook jaw:

- ▶ Check the load hook for surface cracks with a suitable procedure.
- ▶ Check the load hook for damage

3.3 Checking the load hook for wear



DANGER

Death, severe injury, property damage due to wear on the hook base!

- ▶ Replace the load hook in case of impermissible wear.
- ▶ Contact Liebherr Service.

The wear on the hook base may be no more than 5 % of the initial nominal dimension **h₂** for single hooks or initial nominal dimension **h** for double hooks.

The initial nominal dimensions **h₂** for single hooks and **h** for double hooks are listed in the chart.

Hook Number	Single hook h ₂ [mm]	Double hook h [mm]
4	67	—
5	75	—
6	85	75
8	95	85
10	106	95
12	118	106
16	132	118
20	150	132
25	170	150
32	—	170

Hook Number	Single hook h_2 [mm]	Double hook h [mm]
40	—	190
50	—	212
63	—	236
80	—	265
100	—	300
125	—	335
160	—	375
200	—	425
250	—	475
320	—	545

Initial nominal dimensions h_2 for single hooks and h for double hooks

- ▶ Measure dimension h_2 for single hooks or dimension h for double hooks.
- ▶ Check for dimensional accuracy within the permissible tolerance.

3.4 Checking load hooks for corrosion and wear



DANGER

Death, severe injury, property damage due to corrosion and wear on the thread!

- ▶ Replace load hooks which are **not** dimensionally accurate.

When wear or impermissible axial play on the hook nut is present:

- ▶ Replace the hook nut.
- ▶ Contact Liebherr Service.

To check the threads regarding corrosion and wear, the hook nut must be unscrewed from the hook shaft.

- ▶ Check the load hook thread and hook nut for corrosion and wear.

When reconditioning work is required to remove corrosion notches:

- ▶ Carry out a test for dimensional accuracy.

Fig.195219

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1 Safety guidelines



WARNING

Damaged and leaky hydraulic hose lines!
Fire, accidents, death, severe injury, property damage.

If leaky areas are found:

- ▶ Have these leaky areas inspected immediately by authorized and trained expert personnel and remedied.

If damage is found:

- ▶ Have the hydraulic hose lines replaced exclusively by authorized and trained expert personnel.

If it is determined that the service life is over:

- ▶ Have the hydraulic hose lines replaced exclusively by authorized and trained expert personnel.

Make sure that the following prerequisite is met:

- A **competent person for hydraulic hose lines** inspects the hydraulic hose lines.

A **competent person for hydraulic hose lines** has the following knowledge:

- Knowledge and experience in hydraulic and mechanics
- Knowledge of all requirements regarding valid standards:
 - ISO 8331
 - ISO 2230
 - ISO 1402
 - ISO/TR
 - EN 853 to EN 857
 - National regulations
- **or:** Knowledge of all requirements regarding the valid German standards, for example:
 - DIN 20066:202-10
 - BGR 237 Feb 2008, BG-Regulation

2 Inspection intervals

The inspection of hydraulic hose lines must be carried out in the following intervals:

- when the crane is **up to 10 years** old, at least one inspection every twelve months
- when the crane is **older than 10 years**, at least one inspection every six months

3 Checking the end of the service life

Hydraulic hose lines have a limited service life.

When hydraulic hose lines are properly stored, installed and used, then the manufacturer guarantees a service life of at least 10 years.

The life expectancy of hydraulic hose lines can deviate significantly from the noted service life of hydraulic hose lines.



Note

Special case: Active rear axle steering!

- ▶ The life expectancy of hydraulic hose lines is six years, including a storage period of maximum two years.

The life expectancy of a hydraulic hose line depends on various factors:

- Environmental influences, for example: Temperature, humidity, corrosive air
- Use

- Working cycles
- Number of bending cycles
- Friction
- Fluid

The following factors reduce the life expectancy significantly:

- Heat
- Repeated bending under pressure

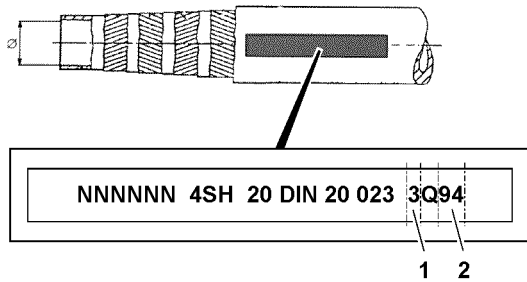


Fig.120159: Example for identification of hydraulic hose lines

The manufacturing date is marked on the fixtures or fittings.

- ▶ Read the quarter **1** of manufacture.
- ▶ Read the year **2** of manufacture.

When the life expectancy of a hydraulic hose line has been exceeded, then a **competent person** can decide **not** to replace the hydraulic hose line. Document the decisions, see section „Documenting the inspection“.

When the end of the service life is determined:

- ▶ Have the hydraulic hose lines replaced exclusively by authorized and trained expert personnel.

4 Inspecting the hydraulic hose lines for damage

Hydraulic hose lines must be replaced when one of the following damage is present:

- Damage on 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, rotational stress
- Leakages
- Damage or distortion of hose fixtures or hose fitting (seal is endangered)
- Movement between hose and hose line, hose working itself loose from the fixture or the fitting
- Requirements for installation **not** observed
- Corrosion of fixture or fitting (solidness or function of fitting is endangered)

When the hydraulic hose line is **not** completely accessible:

- ▶ Remove the hydraulic hose line.

When the hydraulic hose line is protected with a protective hose:

- ▶ Check the hose protection for abrasion. Abrasion on a hose protective hose can indicate abrasion on the hydraulic hose line.
- ▶ Check hydraulic hose lines for distortion in pressureless and pressurized status and during bending.

When the hydraulic hose line is slightly damaged, then a **competent person** can decide **not** to replace the hydraulic hose line. Document the decisions, see section „Documenting the inspection“.

If damage is found:

- ▶ Have the hydraulic hose lines replaced exclusively by authorized and trained expert personnel.

5 Inspecting the hydraulic hose lines for leaks

- ▶ Check the crane for escaped hydraulic oil.
- ▶ Check the crane for leaks by visually checking the ground under the crane.

When the hydraulic system leaks:

- ▶ Have these leaks inspected immediately by authorized and trained expert personnel and remedied.
or
Contact Liebherr Service.

6 Documenting the inspection

Make sure that the following prerequisite is met:

- A **competent person for hydraulic hose lines** documents noticeable observations.

The following data about hydraulic hose lines is documented:

- Installation location
- Condition
- Date
- Time
- ▶ Document noticeable observations comprehensibly.

When the life expectancy of a hydraulic hose line has been exceeded or if the hydraulic hose line is slightly damaged, then a **competent person** can decide **not** to replace the hydraulic hose line.

When the hydraulic hose line is **not** replaced:

- ▶ Document decisions and replacements comprehensibly.
- ▶ Document the date for the next inspection comprehensibly.

7 Replacing hydraulic hose lines

To ensure maximum safety, sealing and service life, the following guidelines apply for replacement of hydraulic hose lines.



WARNING

Impermissible spare parts!

Death, severe injury, property damage.

- ▶ Do **not** use repaired or used hydraulic hose lines.
- ▶ Use exclusively Original Liebherr spare parts.
- ▶ Use exclusively hydraulic hose lines according to manufacturer's specification (including fixtures, rubber piece goods and manufacturing process).

NOTICE

Routing of hydraulic hose lines changed!

Abrasion. Incorrect bending radius. Stress. Shortened service life.

- ▶ Keep the routing of hydraulic hose lines.
- ▶ Inspect the hydraulic hose lines according to intervals.

- ▶ Adhere to the hose bending radii according to the manufacturer's specifications.
- ▶ Ensure the routing of hydraulic hose lines according to manufacturer's specifications (pressureless and pressurized condition).
- ▶ Ensure the distance between lines and structures.

If necessary:

- ▶ Check moving parts in the area of hydraulic hose lines.

When the hydraulic hose line is installed in straight direction:

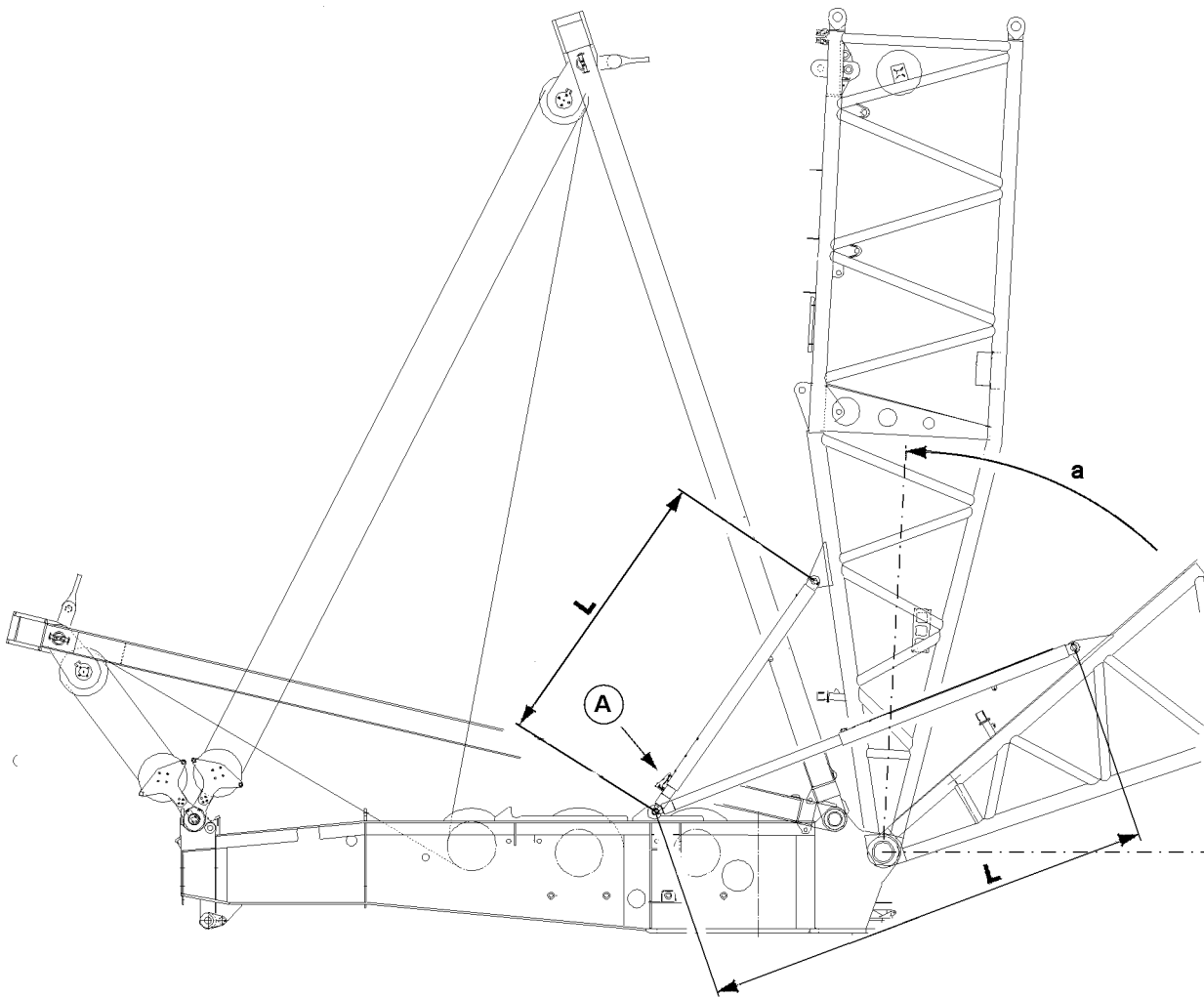
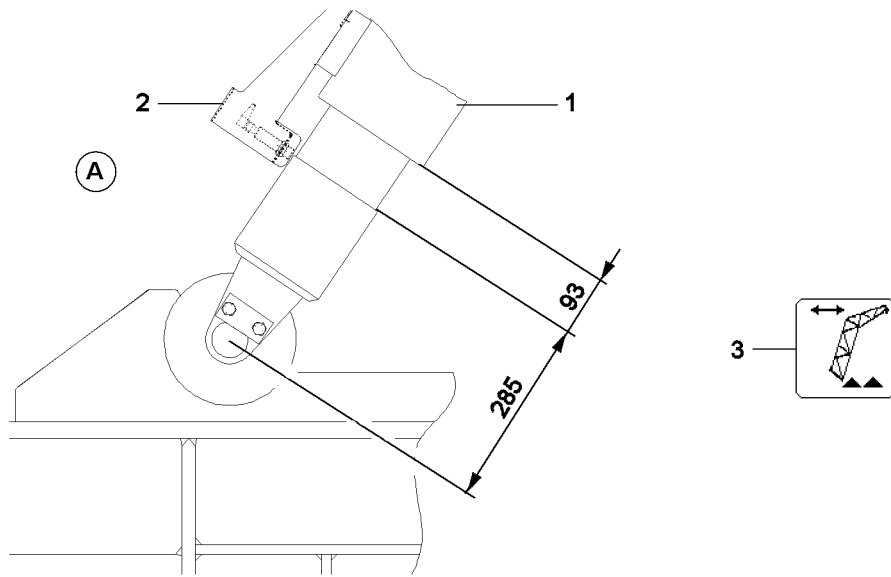
- ▶ Ensure a sag of the hose.
- ▶ Avoid mechanical tension and twisting of the hose during installation.
- ▶ Fasten the hydraulic hose line according to manufacturer's specification.
- ▶ Do not cross hydraulic hose lines for high pressure and low pressure.
- ▶ Keep hydraulic hose lines away from hot components.

When hydraulic hose lines are in a surrounding with high temperatures:

- ▶ Install protective insulation according to manufacturer's specifications.

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Fig.107959

1 S-boom relapse retainer

Two hydraulic cylinders prevent the boom from falling backward.

They are controlled on high or low pressure, depending on the operating mode or boom length.



Note

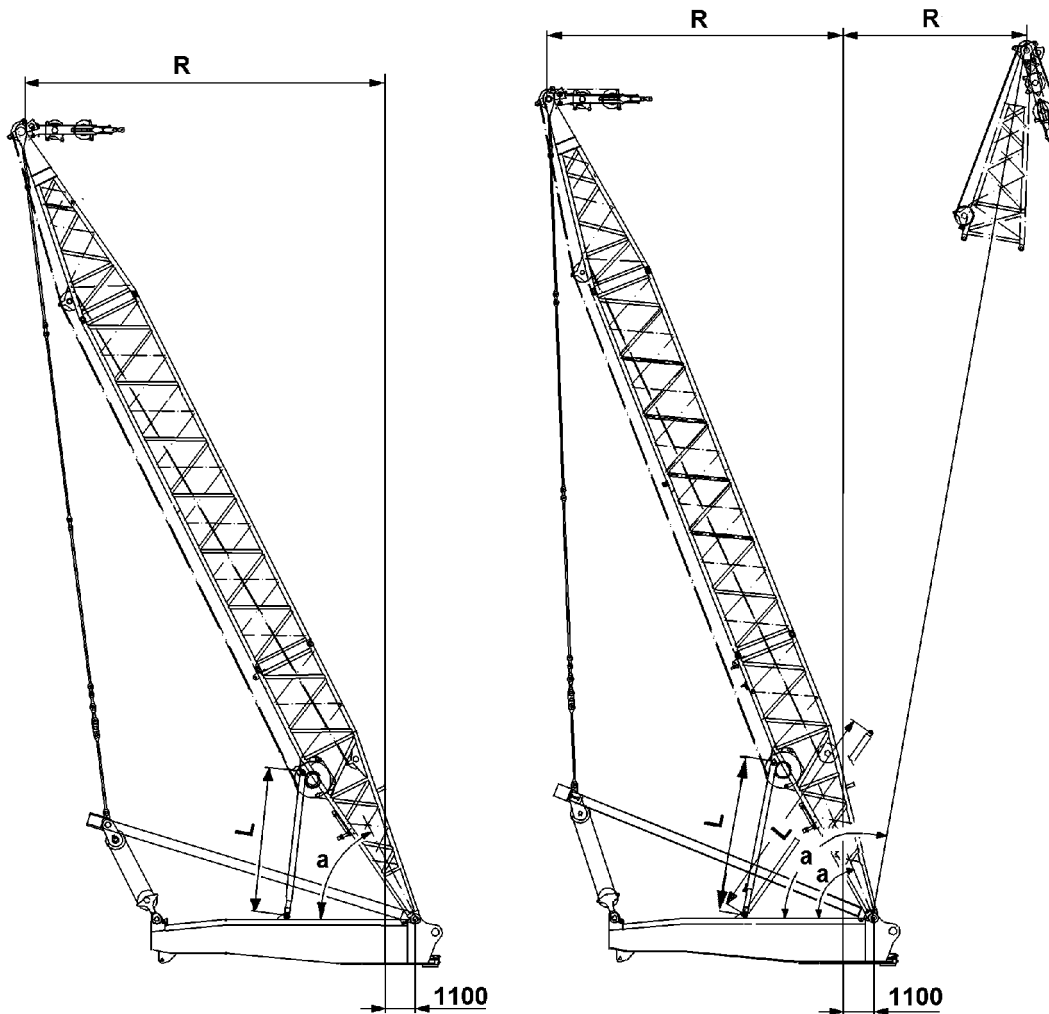
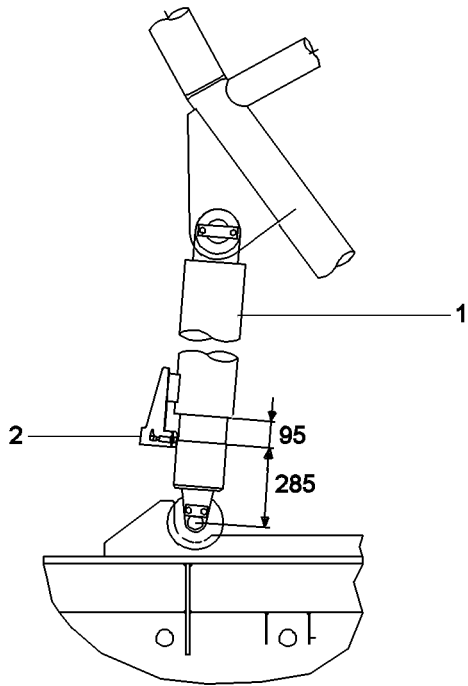
- ▶ In the steepest boom position, the luffing up movement is turned off by activating the limit switches on the cylinders **1**.

1.1 Checking limit switch initiators for function

Limit switch initiators are individually covered with a metal plate **2** on the S-relapse cylinder **1**.

- The S-boom movement „luff up“ must switch off.
- The icon **3** must appear on the LICCON monitor.

	Angle a	Cylinder length L
Steepest position	87°	4051 mm
Electric switch position	88°	3998 mm
Block position	89°	3940 mm
Cylinder extended	29.7°	6490 mm



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Fig.190844

2 Derrick relapse retainer

Two hydraulic cylinders prevent the derrick from falling backward.



Note

► Upon activating the limit switches on the cylinders 1, winch 4 „spool up“ is turned off.

2.1 Checking limit switch initiators for function

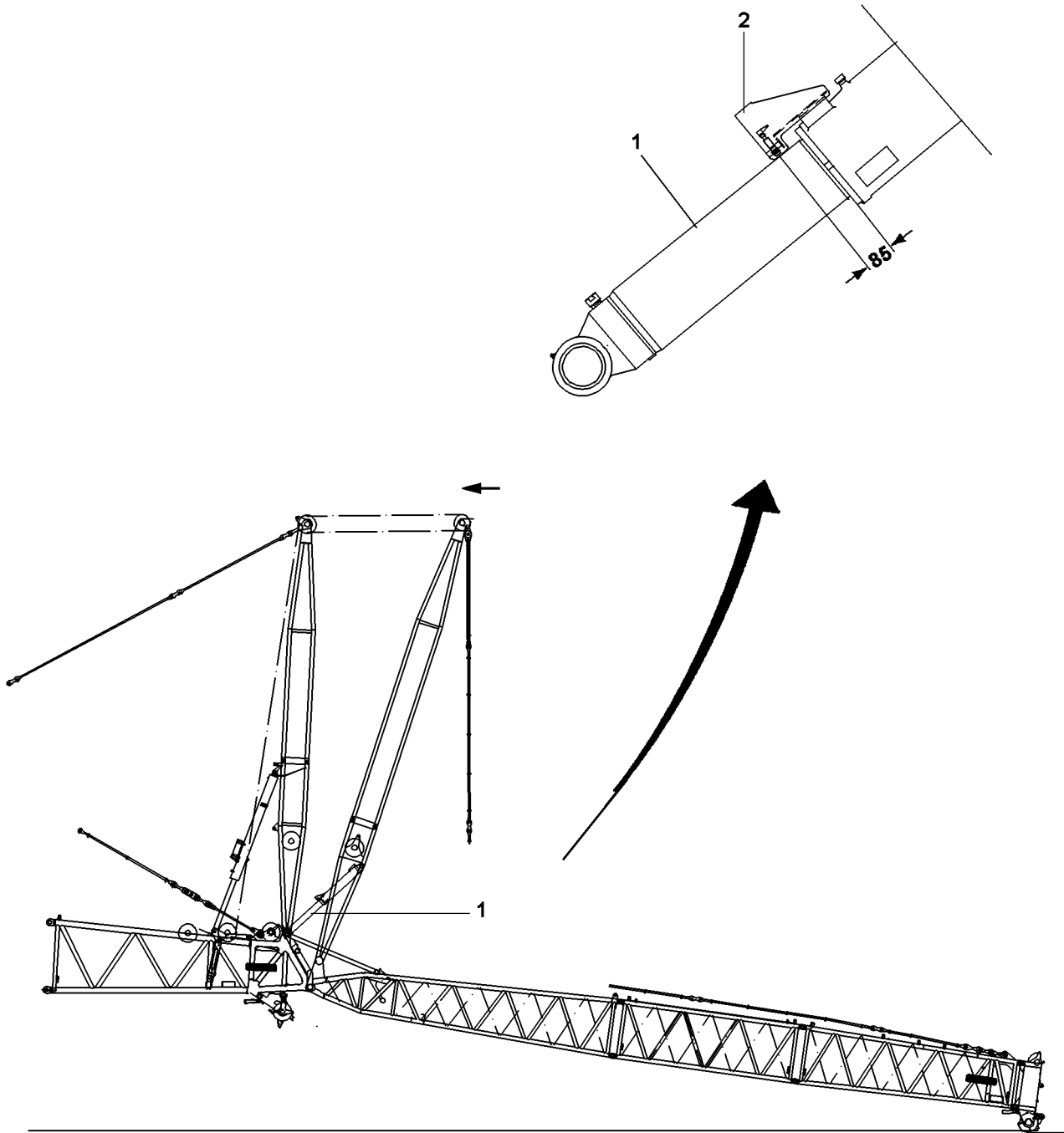
Individually cover limit-switch initiators 2 on the D-relapse cylinder 1 with a metal plate.



Note

► Derrick movement,, luff up,“ spool out winch 4, must switch off.

	Slewing radius R	Angle a	Cylinder length L
Cylinder extended	6.6 m	100°	7920 mm
R min. only LD,SLD,SD	10.5 m	68.4°	5582 mm
Nominal position	13.0 m	63.4°	5185 mm
Electric switch position	14.0 m	61.4°	5020 mm
Block position	14.4 m	60.5°	4950 mm



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Fig.192157

3 W-lattice jib

3.1 Checking limit switch initiators for function

Individually cover Limit switch initiators **2** on the W-relapse cylinder **1** with a metal plate.



Note

▶ The movement, W-adjusting winch „spool out,“ must switch off.

3.2 Checking limit switch initiators on switch point „steepest position“

Before erecting the boom, check the function of the limit switch initiators **2** in installed condition. Pull up both WA-frames to the specified dimension until the switch contact opens, see illustration.

- The W-control winch „spool up“ movement must turn off.
- The icon must appear on the LICCON monitor.

After successful test, reset the WA-frames to set up condition.

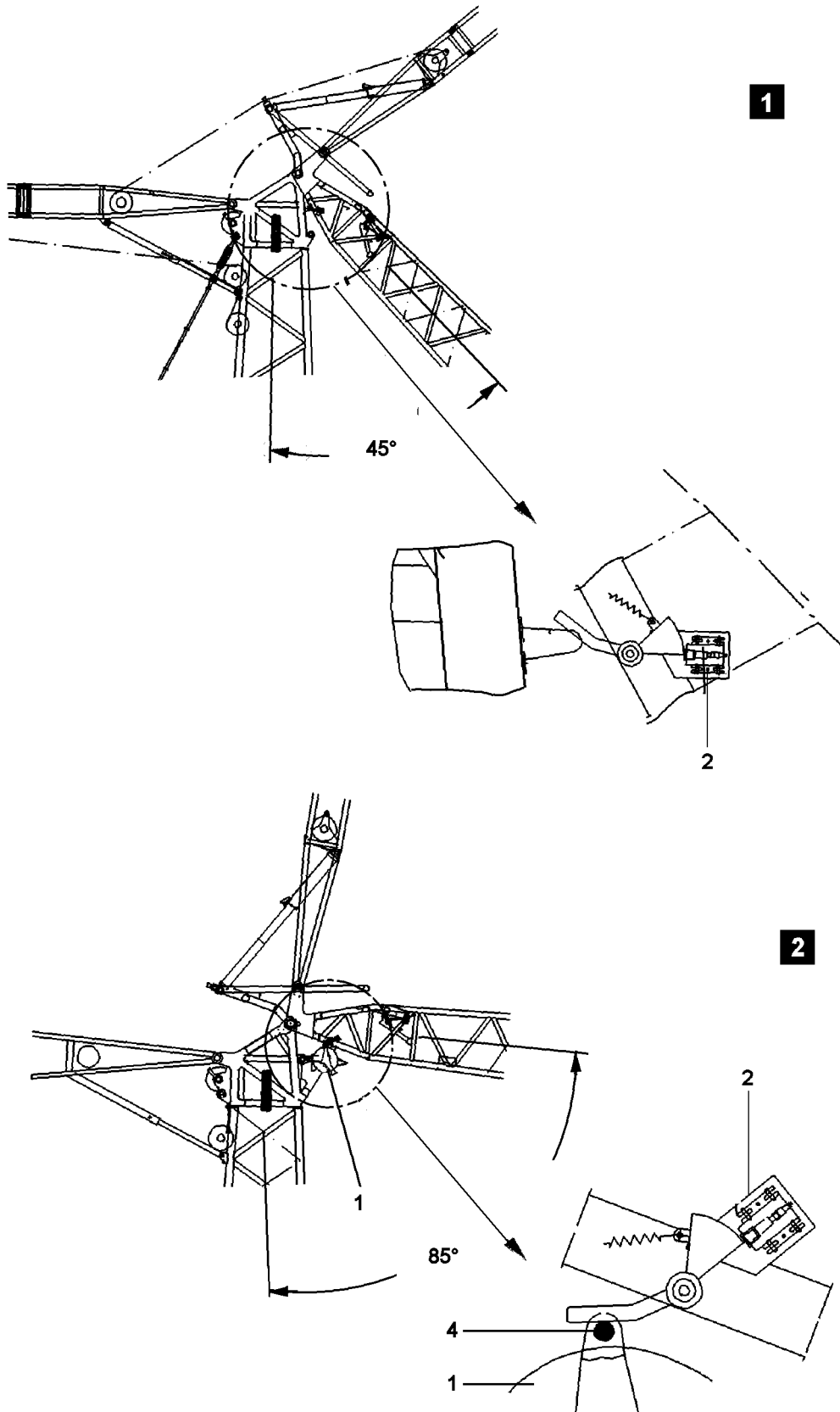


Fig.192739

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3.3 W-lattice jib „downward, without pulley set, illustration 1“

**Note**

- ▶ Switch setting, W-lattice jib „downward“, approximately 45°!
- ▶ The movement, W-adjusting winch „spool out“ must switch off!

3.4 W-lattice jib „downward, with pulley set, illustration 2“

**Note**

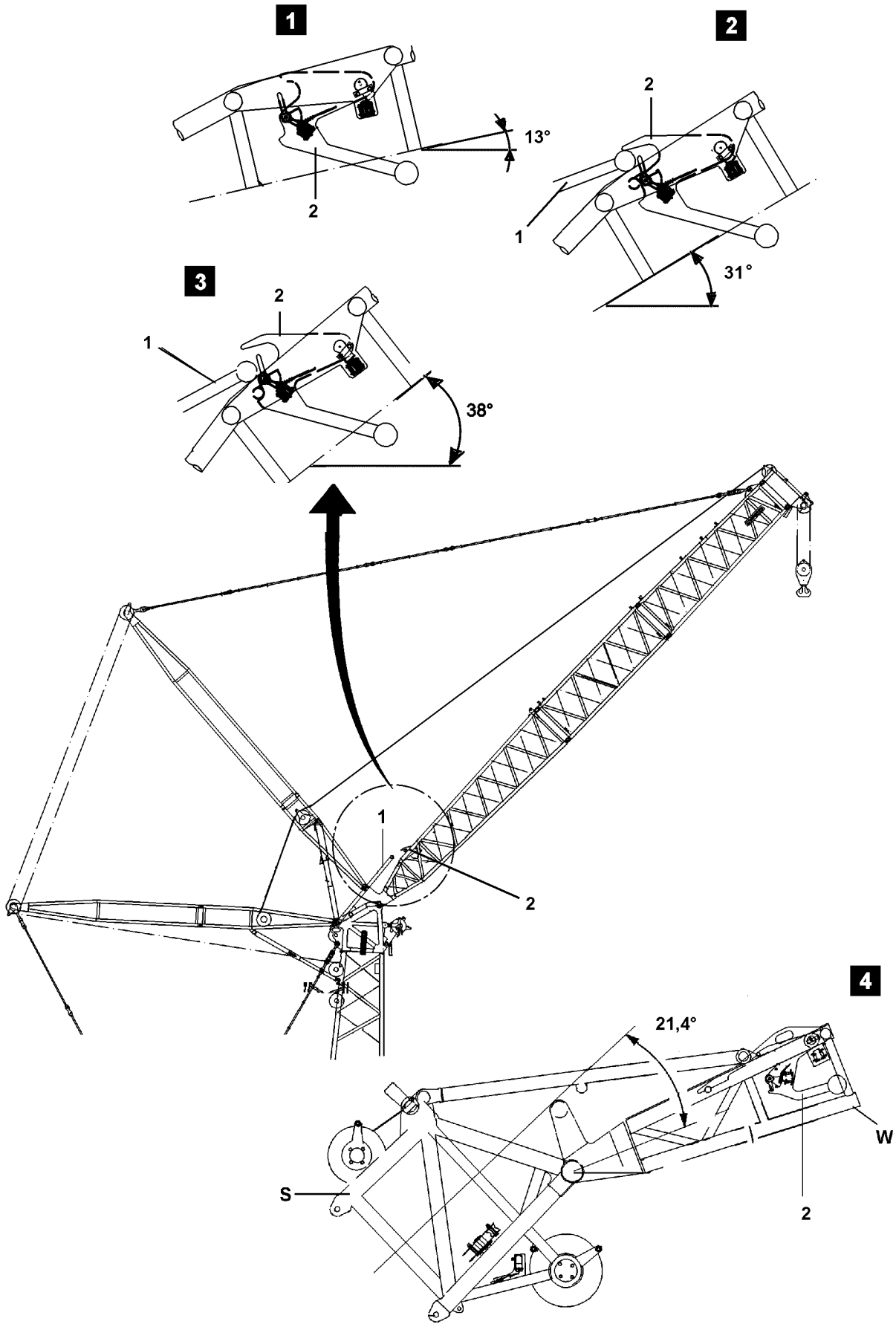
- ▶ Switch setting, W-lattice jib „downward“, approximately 85°!
- ▶ The movement, W-adjusting winch „spool out“ must switch off!

**WARNING**

Collision danger while the rope guard 4 is not assembled on the pulley set 4!

While the rope guard 4 is not assembled, no turning off of movement takes place, W-adjusting winch „spool out“!

- ▶ Crane operation without rope guard 4 on the pulley set 4 is prohibited!
- ▶ Before erection, the rope guard 4 must be assembled and inspected!



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Fig.198383

3.5 Function check of limit switch initiators on the mechanical relapse retainer

Mechanical relapse support **1**.

Oscillating safety **2** for mechanical relapse support.

In addition to the relapse cylinders, the lattice jib is also secured by a mechanical relapse support **1**, which engages in steepest lattice jib position into the flap of the oscillating safety **2**. The luffing up movement is turned off by the actuated limit switches on the oscillation guard.



WARNING

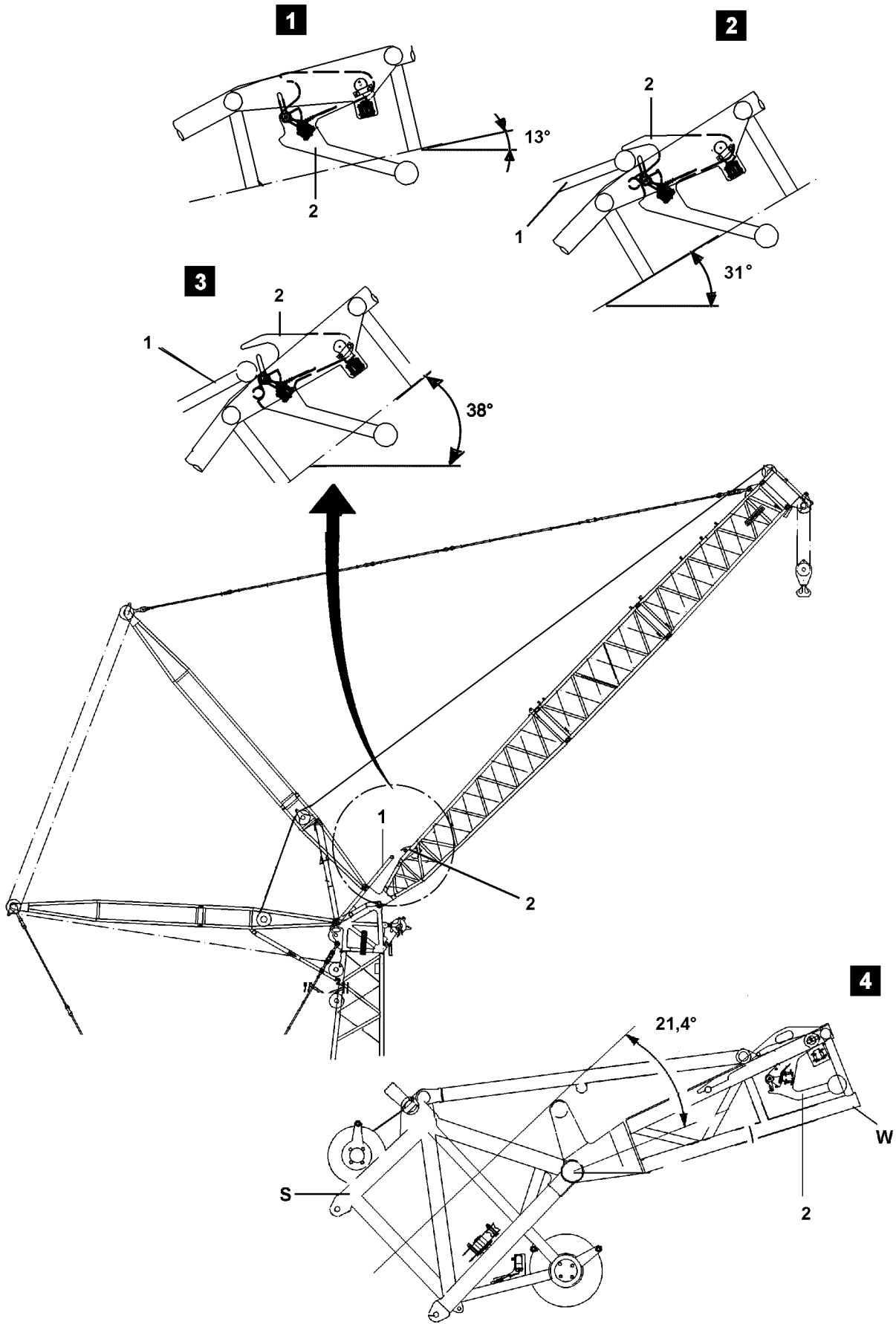
Danger of tipping over if the oscillation guard is hard to move!

If the oscillation guard **2** is hard to move, the mechanical relapse retainer will no longer function. The W-lattice jib can tip backwards uncontrolled and cause the crane to topple over!

- ▶ Crane operation with hard to move oscillation safety **2** is prohibited!
 - ▶ Before erection, the pendulum of the mechanical relapse retainer must be checked for easy movement over the complete swing range of the pendulum.
-

Depending on the lattice jib position (boom position = 87°), the flap on the oscillation safety is swung out by the weight of the pendulum:

- 13° the flap is swung in, see illustration **1**.
- 31° the flap can be pushed open, see illustration **2**.
- 38° the flap is swung out, see illustration **3**.
- 21.4° the flap is at collision, see illustration **4**.



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Fig.198383

3.6 Flap of oscillating safety 2 on collision with mechanical relapse support 1

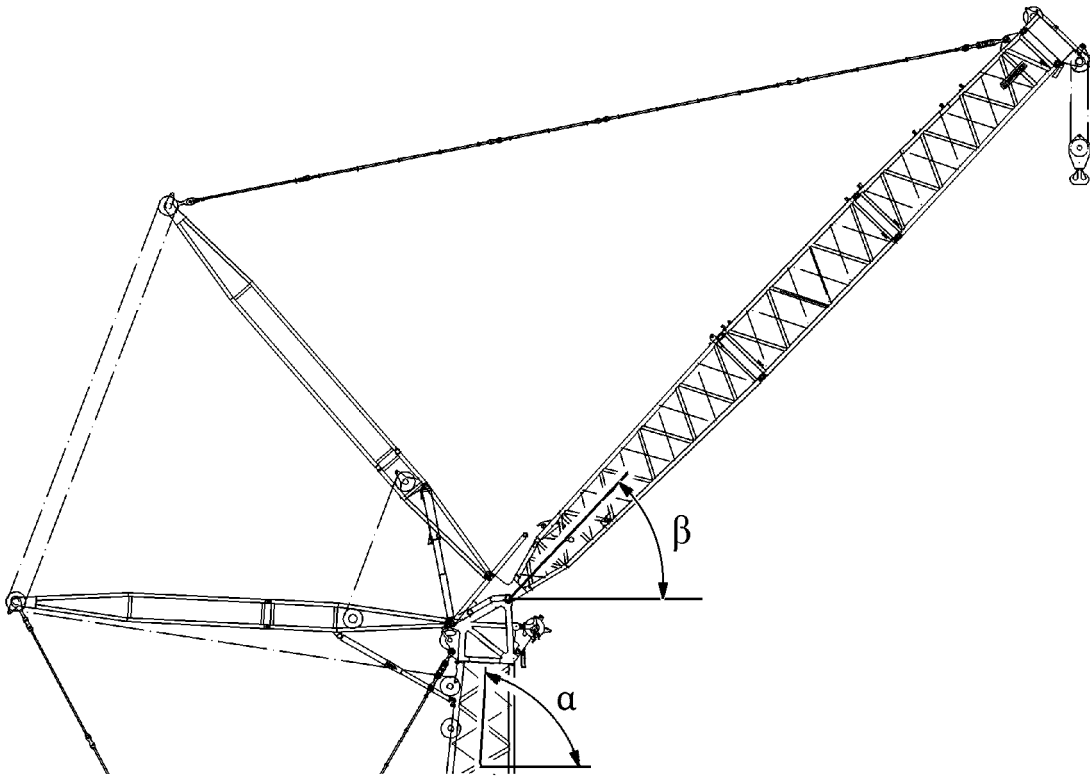
**WARNING**

Risk of collision!

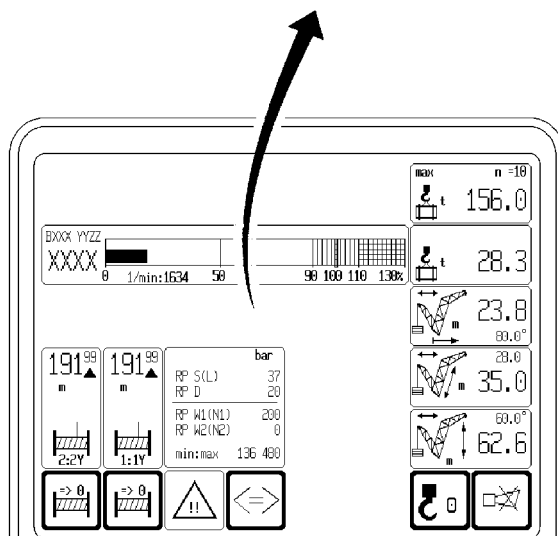
If the angle between boom and lattice jib is smaller than or equal to 21.4°, the mechanical relapse support collides **1** with the flap on the oscillation guard **2**. The lattice jib can tip backward uncontrolled and cause the crane to topple over!

Personnel can be killed!

- ▶ Never exceed the angle 21.4° when luffing up!
 - ▶ Carry out visual inspection!
-



bar	
RP S(L)	37
RP D	20
RP W1(N1)	200
RP W2(N2)	0
min:max	136 490



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Fig.190804

1 Checking jib stop cylinder pressure

The jib stop cylinder pressure must be checked using the LICCON operation display before and after crane operation, „see diagnosis“.

The actual pressure displayed on the LICCON operation display must correspond with the target pressure in the table.



Note

- ▶ The specified target pressure depends on the outside temperature.
- ▶ The maximum permitted difference between the target pressure and the actual pressure is +/- 10 bar.

The jib stop cylinder pressure is checked as follows:

- Checking cylinder pressure with „jib stop extended to maximum limit“
- Checking cylinder pressure with „jib stop in test position“

1.1 Checking cylinder pressure with „jib stop extended to maximum limit“

- Set main boom and lattice jib to angles specified in table.
- Compare target pressure in table with actual pressure in LICCON operation display.

„Extend jib stop to maximum limit“								
Boom angle α	Lattice jib angle β	Cylinder length	Stroke	Target pressure				
				-40° C	-20° C	0° C	20° C	40° C
87°	44,6°	5050 mm	0 mm	107,3 bar	116,5 bar	125,7 bar	134,9 bar	144,1 bar

1.2 Testing cylinder pressure with „jib stop in test position“

- Set main boom and lattice jib to angles specified in table.
- Compare target pressure in table with actual pressure in LICCON operation display.

„Jib stop in test position“								
Boom angle (α)	Lattice jib angle (β)	Cylinder length mm	Stroke mm	Target pressure				
				-40° C	-20° C	0° C	20° C	40° C
87°	46°+2°	4997 mm	53 mm	110,0 bar	119,5 bar	129,0 bar	138,4 bar	147,9 bar

Fig.195219

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1 Safety guidelines



WARNING

Damaged guy rods!

Accident. Death, severe injury, property damage.

▶ Crane operation with damaged guy rods **1** is prohibited.

▶ Replace damaged guy rods **1**.

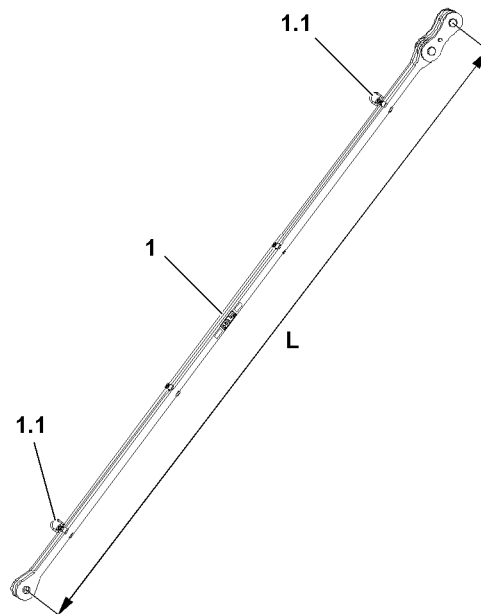


Fig.123845: Guy rod

Make sure that the following prerequisites are met:

- **Authorized and trained expert personnel** checks the guy rods **1**.
- A checklist for documentation of the inspection is on hand

2 Inspection intervals

The inspection of the guy rods **1** must be carried out in the following intervals:

- One inspection of the guy rods every 12 months by an expert.
- One inspection of the guy rods every four years by an authorized inspector.

After a load rip-off or overload of the crane:

- immediate inspection of guy rods by an expert

3 Checking the guy rods

3.1 Inspection



Note

- ▶ All inspections of the guy rods **1** must be documented.

The guy rods must be inspected in removed condition.

**WARNING**

The guy rods **1** can be ripped off!

If a damaged guy rod **1** is used further, it can rip off in crane operation.

Death, severe injury, property damage.

- ▶ Crane operation with damaged guy rods is prohibited.
- ▶ Repairs on guy rods **1** (for example: through welding) are prohibited.
- ▶ Replace damaged guy rods immediately.
- ▶ If one of the following stated damage is found, then the guy rods **1** may no longer be used.

3.2 Cracks and dents

- ▶ Check the guy rods **1** thoroughly through a visual inspection for cracks and dents.

Problem remedy

Damage to guy rods is not clearly evidenced through a visual inspection?

- ▶ Check the respective areas of the guy rods thoroughly, for example with a magnetic particle test.
- ▶ If damage is found: Replace the guy rods **1** immediately.

3.3 Elongation

**Note**

- ▶ The initial dimension **L** of the guy rods **1** refers to the bore spacing of the pin bores.
- ▶ The initial dimension **L** of the guy rods **1** is listed in the separate rod plan.
- ▶ Check the elongation of the guy rods **1** by measuring the guy rods.

**WARNING**

The guy rods can be ripped off!

The permissible elongation of the guy rods **1** may be a maximum of 0.2 %, for example 14 mm , at an initial dimension **L** of 7000 mm.

Death, severe injury, property damage.

- ▶ If the maximum permissible elongation is reached or exceeded: Replace the guy rods **1** immediately.
- ▶ If an elongation of the guy rods of more / equal to 0.2 % of the initial dimension **L** is proven: Replace the guy rods **1** immediately.

3.4 Wear

- ▶ Check the bores, pins and pin retainers for signs of wear.
- ▶ If respective wear is present in the stated areas: Replace the guy rods **1** immediately.

3.5 Ductile deformation

- ▶ If a guy rod **1** shows any ductile deformation: Replace the guy rod **1** immediately.

3.6 Paint / coating

- ▶ The guy rods **1** must be checked for paint damage or corrosion.
- ▶ If damage is present on the paint finish / coating: Repair the paint / coating of the guy rods **1** expertly.

NOTICE

Danger of property damage!

- ▶ Never store guy rods **1** in or near aggressive media, for example: Seawater.
- ▶ Always store the guy rods **1** properly and outside of aggressive media.

3.7 Fastening points

- ▶ Check the fastening points **1.1** of the guy rods **1** for damage.
- ▶ Replace damaged fastening points **1.1**.

Fig.195219

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1 Safety guidelines



WARNING

Damaged ladders!
Accident. Death, severe injury, property damage.

If damage is found:

- ▶ Have ladders repaired by authorized and trained expert personnel.

If it is determined that the ladder cannot be repaired:

- ▶ Scrap the ladder immediately.

Make sure that the following prerequisite is met:

- **Authorized and trained expert personnel** checks the ladders.

The authorized and trained expert personnel has the following expertise:

- Knowledge, experience and abilities in repairing ladders
- Is familiar with the necessary prerequisites as determined by the contractor for the inspection of ladders
- Has the knowledge about the type, scope and intervals for the required inspections as determined by the contractor

2 Inspection intervals

The inspection of ladders must be carried out in the following intervals:

- The contractor determines the **required** intervals
- But there must be at least one inspection every **12 months**

Intervals depend on:

- Operating conditions
- Frequency of use
- Operational demands during use
- Frequency and severity of defects found during previous inspections

3 Inspecting ladders

Make sure that the following prerequisites are met:

- Ladder inspection sheets are on hand. For blank form, see section „Inspection form for the inspection of ladders and steps“
- Check lists are on hand. For blank form, see section „Check list for the inspection of ladders and steps“
- ▶ For every ladder and every step: Enter the data in the ladder inspection form.
or
Get the ladder inspection form for ladders or steps.
- ▶ Check the ladders and steps according to the check list and document the results.
- ▶ Collect the ladder inspection forms and check lists in the crane documentation.

4 Inspection sheet and check list

The following is shown, as an example: Inspection form and check list for the inspection of ladders and steps.

4.1 Inspection form for the inspection of ladders and steps

Ladder control sheet	
Stock no. of the ladder/steps	
Location/installation location	
Ladder type	Stepladder
	Leaning ladder
	Leaning ladder with overshoot
	Vertical ladder
	Vertical ladder with overshoot aid
	Platform ladder
	Steps
Material of the ladder	Aluminium
	Plastic
	Steel
	Stainless steel
Number of rungs/stairs	
Ladder length/ladder shortened to	
Manufacturer/dealer	
Article/type number	
Date of purchase	
Date of discard	
Name of representative	
Next inspection	

Control sheet for inspecting ladders and steps

Fig.121361-en

4.2 Check list for the inspection of ladders and steps

Inspection criteria	1st Inspection	2nd Inspection	3rd Inspection	4th Inspection	5th Inspection
1. Beams					
Deformation					
Damage (for example cracks)					
Sharp edges, splinters, burrs					
Wear					
Protective treatment					
2. Rungs/stairs/platform					
Deformation					
Damage					
Sharp edges, splinters, burrs					
Connection to the beam (for example, flanging, screw/rivet connections, welding seam)					
Wear (for example, stepping surfaces, platform overlay)					
3. Spreader safety					
Completeness/fastening					
Functionality					
Damage					
4. Fitting parts					
Damage/corrosion					
Completeness/fastening					
Functionality					
Wear					
Lubrication (mechanical parts)					

Fig.121362-en

Inspection criteria	1st Inspection	2nd Inspection	3rd Inspection	4th Inspection	5th Inspection
5. Ladder/stands/pulleys					
Completeness/fastening					
Wear/damage					
Functionality					
6. Accessories (for example, beam extension, base expansion, wall support)					
Completeness/fastening					
7. Identification					
Operating instructions (for example, pictogram)					
8. Inspection result					
Ladder OK and usable					
Repair necessary					
Discard ladder immediately					
Comments					
Next inspection (month/year)					
Ladder inspected					
Date					
Signature					

Check list for inspecting ladders and steps

Fig.121363-en

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Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Inspection chart for recurring inspections of Liebherr cranes

The following is a checklist to assist the inspector during the periodic inspections of Liebherr mobile and crawler cranes.

Company:	Inspector:
Crane manufacturer: Liebherr	Crane type:
Serial number:	Stock number:
Year of construction:	Date:
Inspector's signature for No. 1 to 22:	

1. inspection category: Crane document						
Component to be inspected	A	B	C	D	E	Comments
Crane inspection log						
Operating and installation instructions						
Crane control log						
Load chart manual						
Job planner						

2. inspection category: Signs / identification						
Component to be inspected	A	B	C	D	E	Comments
Factory tag						
Load data						
Operating instruction label						
Prohibition and command signs						
Other safety signs						

3. inspection category: Travel gear ¹						
Component to be inspected	A	B	C	D	E	Comments
Frame ²						
Supports ³						
Axles						
Wheels						
Tires						
Bearings						
Transmission						
Universal drive shaft						
Leaf springs / springs						
Shock absorbers						

3. inspection category: Travel gear ¹						
Component to be inspected	A	B	C	D	E	Comments
Steering						
Brakes						
Hydraulic axle suspension						

4. inspection category: Chassis ¹						
Component to be inspected	A	B	C	D	E	Comments
Coverings						
Accessible surfaces						
Counterweight holders ²						
Towing devices						
Accesses, ladders						
Holding devices, handles						
Platforms, railings						
Retainer for hook block ²						
Boom support ²						

5. inspection category: Chassis - driver's cab ¹						
Component to be inspected	A	B	C	D	E	Comments
Doors						
Windows / windshields						
Window wipers						
Mirrors						
Seat						
Heater						
Ventilation						
Sound absorber						
Trip recorder						
First aid kit						
Spare bulbs						
Hazard warning triangle						
Safety vest						

6. inspection category: Chassis - drive ¹						
Component to be inspected	A	B	C	D	E	Comments
Combustion engine						
Exhaust system						
Fuel tank						

6. inspection category: Chassis - drive ¹						
Component to be inspected	A	B	C	D	E	Comments
Urea container						
Fuel container						
Filters						
Sound absorber						
Engine mount						
Oil levels						
Fuel lines						
Urea lines						
Fuel lines						

7. inspection category: Chassis - hydraulics ¹						
Component to be inspected	A	B	C	D	E	Comments
Oil container						
Filter with maintenance indicator						
Pumps						
Motors						
Valves						
Lines						
Hoses						
Cylinder						
Pressure limiting valves						

8. inspection category: Chassis - compressed air system ¹						
Component to be inspected	A	B	C	D	E	Comments
Compressor						
Filters						
Air tanks						
Valves						
Lines						
Hoses						
Cylinder						

9th inspection category: Chassis - electrical system ¹						
Component to be inspected	A	B	C	D	E	Comments
Motors						
Generators						
Battery						

9th inspection category: Chassis - electrical system ¹						
Component to be inspected	A	B	C	D	E	Comments
Switches / buttons						
Lines						
Fuses						
Resistors						
Lighting						
Brake lights						
Blinkers						
Tail lights						
Working lights						
Signaling systems						
Indicator lights						
Battery switch						
Limit switches: Transmission, steering, drive train						
Support pressure indicator ²						

10th inspection category: Chassis - control systems ¹						
Component to be inspected	A	B	C	D	E	Comments
Engine regulation						
Transmission						
Couplings						
Circuits						
Brakes						
Steering						
Control displays						
Engine shut off line						
Control of supports ²						
Axle suspension						
Crane leveling						
Rear axle steering						

11th inspection category: Superstructure						
Component to be inspected	A	B	C	D	E	Comments
Frame						
Coverings						
Treads						
Bearings						

11th inspection category: Superstructure						
Component to be inspected	A	B	C	D	E	Comments
Counterweights						
Relapse retainer						
Slewing ring connection: Tilt play						
Slewing ring connection: Mounting screws						
Slewing ring connection: Gears						
Slewing gear: Mounting screws						
Slewing gear: Gears						

12th inspection category: Superstructure - crane operator's cab						
Component to be inspected	A	B	C	D	E	Comments
Doors						
Windows / windshields						
Window wipers						
Mirrors						
Seat						
Heater						
Ventilation						
Muffler						
Joystick for working functions						
Gear shifts						
Safety: Crushing / shear locations						

13th inspection category: Superstructure - Retaining and protection devices						
Component to be inspected	A	B	C	D	E	Comments
Accesses, ladders						
Handles						
Coverings						
Covers						
Hatches						
Treads						

14th inspection category: Superstructure - drive train						
Component to be inspected	A	B	C	D	E	Comments
Combustion engine						
Exhaust system						
Fuel tank						
Urea container						

14th inspection category: Superstructure - drive train						
Component to be inspected	A	B	C	D	E	Comments
Fuel container						
Filters						
Sound absorber						
Engine mount						
Fuel lines						
Urea lines						
Fuel lines						

15. inspection category: Superstructure - hydraulic system						
Component to be inspected	A	B	C	D	E	Comments
Oil container						
Filters						
Pumps						
Motors						
Valves						
Lines						
Hoses						
Cylinder						
Pressure limiting valves						
Lowering brake valves						
Brake control: Hoist gear						
Brake control: Slewing gear						

16th inspection category: Superstructure - electrical system						
Component to be inspected	A	B	C	D	E	Comments
Motors						
Generators						
Batteries						
Switches / buttons						
Lines						
Fuses						
Resistors						
Lighting						
Signal lights						

17. inspection category: Superstructure - control systems						
Component to be inspected	A	B	C	D	E	Comments
Engine regulation						
Transmission						
Flexible couplings						
Circuits						
Engine shut off line						
Control displays						

18. inspection category: Superstructure - rope drives						
Component to be inspected	A	B	C	D	E	Comments
Winch 1 ³						
Winch 2 ³						
Winch 3 ³						
Winch 4 ³						
Winch 5 ³						
Winch 6 ³						
Assembly winches ³						
Rope pulleys						
Rope end connection						
Rope for winch 1						
Rope for winch 2						
Rope for winch 3						
Rope for winch 4						
Rope for winch 5						
Rope for winch 6						
Rope for assembly winches						
Guy ropes						

19th inspection category: Superstructure - hook						
Component to be inspected	A	B	C	D	E	Comments
Pulleys						
Rope guards on pulleys						
Axle support						
Load hook						
Load hook mounting						
Hook retention						

20th inspection category: Superstructure - safety and switch systems						
Component to be inspected	A	B	C	D	E	Comments
Hoist emergency limit switch I						
Hoist emergency limit switch II						
Lowering emergency limit switch I						
Lowering emergency limit switch II						
Boom emergency limit switch I						
Boom emergency limit switch II						
Luffing jib: Boom limit switch I						
Luffing jib: Boom limit switch II						
Load torque limiter						
Angle display: Boom						
Angle display: Luffing jib						
Angle display: Slewing gear						
Safety devices: Control						
Working range limitation						
Pressure sensors						
Speed sensor						
Wind sensor						
Sliding beam monitoring						
Support pressure indicator						
Incline display						
Length indicator: Radius, boom length						
Emergency off system						
Engine stop						

21th inspection category: Boom						
Component to be inspected	A	B	C	D	E	Comments
Weld structure						
Rope pulleys						
Change over pulleys feed mechanism						
Luffing cylinder						
Telescoping cylinder						
Boom extension ropes						
Boom retraction ropes						
Boom bearings						
Boom pinning						
Guy rods						
Guy ropes						

21th inspection category: Boom						
Component to be inspected	A	B	C	D	E	Comments
Control ropes						
Guide ropes						
Safety ropes						
Relapse cylinders						
Pin connections						

22. inspection category: Equipment						
Component to be inspected	A	B	C	D	E	Comments
Weld structure						
Rope pulleys						
Relapse cylinder						
Relapse support						
Oscillation guard						
A-frame bearings						
Pinning of components						
Guy rods with pinning						
Rods with guide rail on A-frame 2 and A-frame 3						
All limit switches with switch mechanism						
Pin connections						

Inspection chart for periodic inspections of Liebherr mobile and crawler cranes

Inspection criteria:

- A = Present / complete
- B = Condition / maintenance
- C = Function
- D = Repair / replace
- E = Re-inspection required

Evaluation:

- Satisfactory = x
- Unsatisfactory = -
- Not required = 0

Comments:

- ¹ Inspection of the crane carrier vehicle road worthiness is also fulfilled if it has already been certified by the road traffic department certification authority. For cranes that are not certified for use on public roads, an expert or authorized inspector must conduct the required tests to validate the vehicle's road worthiness.
- ² These inspections must be carried out by an authorized inspector even if it has passed the road traffic department test and is certified.
- ³ Inspection of the winches with respect to the actually used proportion of their design life.

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LWE/LR 1750-000/12812-15-02/en

90 Attachment

LWE/LR 1750-000/12812-15-02/en

Fig.195219

LWE/LR 1750-000/12812-15-02/en

1 Preface

This crane may only be used in flawless technical condition and according to its mission as well as with constant awareness of safety and dangers. Any problems, which could affect safety must be fixed immediately.



Note

- ▶ Modifications on the crane may only be made with written approval by Liebherr-Werk Ehingen GmbH.

1.1 Changes and updates for Operating instructions

Changes and updates for Operating instructions, which you receive in the circular as Customer information, must be filed in the Operating instructions for the respective crane under chapter 90.05.



Note

Procedure after receiving customer information!

- ▶ Attach the decals **1**, which are enclosed in the customer information to the footer of the respective chapter. See following example.
- ▶ Fill out the update confirmation form in chapter 90.05 of the operating instructions,
- ▶ Insert changes and updates under chapter 90.05 of the operating instructions.



Fig.113870

Example:

A change or update affects the Crane operating instructions, chapter 2.04.

- ▶ Attach the decal **1** in the footer of chapter 2.04.

Fig.195219

LWE/LR 1750-000/12812-15-02/en

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