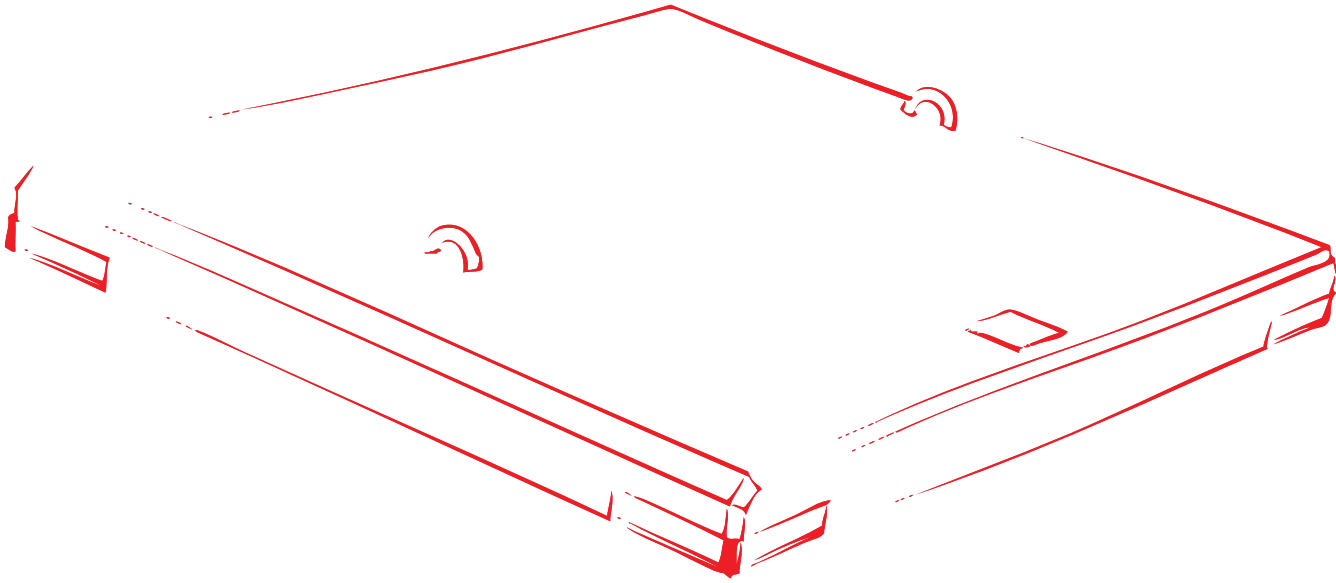
WOLFFKRAN

70000163/J

Slewing tower crane

WOLFF 355 B

Service & assembly



English

English

WOLFFKRAN

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1 Using this documentation

1.1 General instructions on usage

This manual is focused on providing comprehensive information to the owner, to operations scheduling, to operators of the slewing tower crane, and to service personnel in terms of

- the function principle
- the operation
- and the safe handling

of the product.



NOTICE

These operating instructions do not constitute a substitution for comprehensive training on the live equipment and control system as provided by qualified and authorized personnel.

Technical documentation

The technical documentation for the crane comprises four chapters:

- 1 Safety Manual & general
- 2 Technical data & site preparation
- 3 Crane Operators' Manual
- 4 Service & assembly

Those four operating manuals are supplemented with the following documents. This documentation is an integral component of the operating instructions in accordance with Directive 98/37/EC.

- Electrical circuit diagrams
- Parts list
- Undercarriage documentation
- Cross frame documentation
- Cross frame element documentation
- Climbing frame documentation



NOTICE

Safety manual

Read the safety manual before starting any type of work.

1.2 Request to read

Read these instructions with meticulous care to make sure that you understand all aspects before using the product.

These instructions are aimed on familiarizing you with the basic tasks involved with the product.

These instructions provide vital information in terms of the safe and proper usage of the product.

Compliance with those instructions helps you to:

- Avoid hazards
- Reduce repair work and downtimes
- Increase reliability and the useful life of the unit.

Operators must strictly comply with valid country-specific regulations governing accident prevention and environment protection at locations where the product is put to operation, irrespective of specifications issued in these operating instructions.

- The operating instructions form part of the slewing tower crane or of a component.
  - Observe the operating instructions.
  - Always have the operating instructions at hand at the slewing tower crane.
  - Submit the operating instructions to successive users.

1.3 Layout of the operating instructions

Notations, signs and symbols used

The signs and symbols in these operating instructions are intended to help you use the operating instructions and the machine quickly, safely and efficiently.

Action sequence

The defined task sequence facilitates the proper and safe operation of the slewing tower crane.

The instructions are presented as follows:

> The symbol draws your attention to conditions to be met in order to complete a specific task.

1) This is task 1.
2) This is task 2.

   → This symbol indicates an interim result. This improves orientation for more complex tasks.

3) This is task 3.

→ This symbol is used to indicate the result and successful completion of a task. This symbol is used to indicate the result and successful completion of a task.

Listing

- This list contains non-chronological items.

Cross-reference

Provides a cross-reference to additional information such as another operating manual.

NOTE



NOTICE

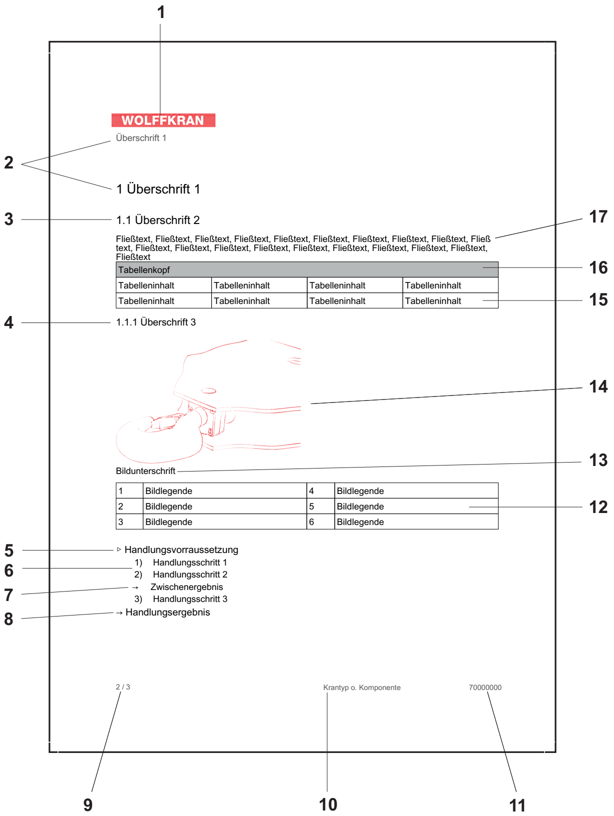
Note header

Info text

Draws your attention to user tips and to other particularly useful information. It is not keyword which indicates dangerous or harmful situations. The note informs you of the most efficient or practical use of the slewing tower crane and of these instructions.

1.4 Layout of a manual page

The diagram below shows an example of the page layout of this manual.



Page of the manual

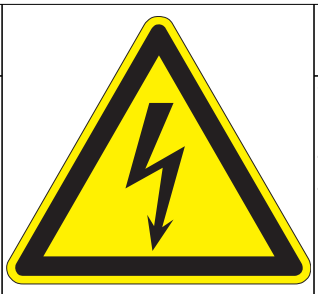
1	WOLFFKRAN company logo	10	Crane type or component
2	Chapter (H 1)	11	Document number
3	Section (H 2)	12	Caption
4	Section (H 3)	13	Underline
5	Precondition for action	14	Diagram
6	Action sequence	15	Table contents
7	Intermediate result	16	Table header
8	Result of action	17	Running text
9	Page number: Page X of Y		

1.5 Use of pictograms

This safety sign is used to highlight sources of danger.

The safety signs deployed in the manuals conform to the harmonized standard EN 61310, Part 2: Safety of Machine Indication, Marking and Actuation, and/or EC Directive 92/58/EEC on Minimum Requirements for the provision of Safety and/or health Signs at Work.

Additional danger warnings were integrated in accordance with DIN ISO 3864-2 Graphic symbols - Safety colors and safety signs - Part 2: Design principles for product safety labels, for application on the products in order to substantiate specifications in the safety instructions.

	**Warning of a general hazard** This warning sign highlights tasks which are subject to several sources of risk.		**Warning of dangerous electrical voltage** This warning sign highlights tasks which pose the risk of fatal injury through electrical shock.
	**Warning of falling objects** This warning sign highlights tasks which are subject to the risk of fatal injury through falling objects.		**Warning of rotary parts** This warning sign highlights tasks which are subject to the risk of fatal injury through rotating machine parts.
	**Warning of the risk of slipping** This warning sign highlights tasks which are subject to the risk of fatal injury through slipping.		**Warning of the risk of tripping** This warning sign highlights tasks which are subject to the risk of fatal injury through tripping.
	**Warning of the risk of falling** This warning sign highlights tasks which are subject the risk of fatal injury through falling.		**Warning of the risk of contusion** This warning sign highlights tasks which are subject to the risk of fatal injury through contusion.
	**Warning of suspended loads**		**Prohibition sign**

1.6 Description of safety instructions

Safety instructions and warning keywords

The following safety instructions and warning keywords are used in the manuals:

Imminent risk of serious injury and death.

Death or serious injuries.



⚠ DANGER

Type and source of hazards

Consequences

► Accident prevention

Possible risk to the health and life of personnel.

Death or serious injuries.



⚠ WARNING

Type and source of hazards

Consequences

► Accident prevention

Risk of harm to the health of human beings.

Minor injuries.



⚠ CAUTION

Type and source of hazards

Consequences

► Accident prevention

Risk of damage to the product.

Material damage.

CAUTION

Type and source of hazards

Consequences

► Accident prevention

The safety instructions comprise:



⚠ DANGER

Type and source of hazards

Consequences

► Accident prevention

Danger warnings are clearly identified in all of the technical documentation of the system. The danger areas of plants and/or machinery are clearly identified by means of warning signs, stickers and/or symbols (see the technical operating instructions of the corresponding manufacturer).

1.7 Overview of the operating manual

Readership and contents of the manuals

This manual provides reference information to authorized individuals who work on and with the slewing tower crane.

- OPS: Operations scheduling
- CO: Crane operator
- S: Service personnel

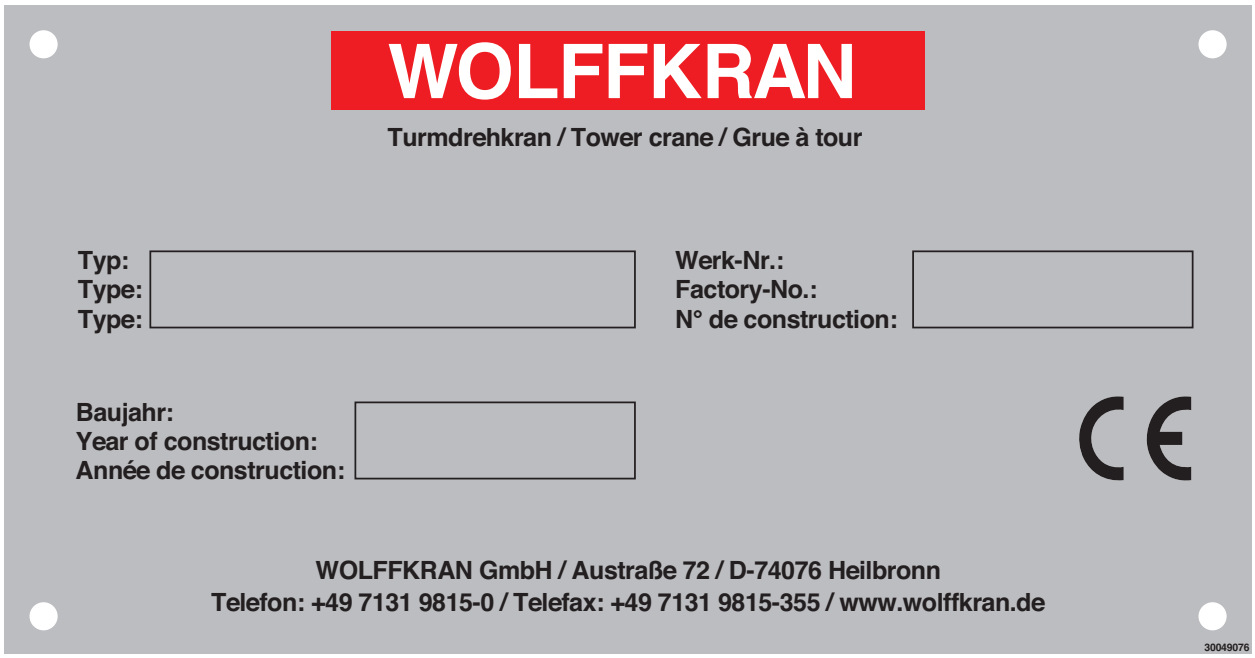
Operating Manual			
1 SM (Safety manual & general instructions)	2 TDM Technical data and site preparation	3 COM (Crane Operator's Manual)	4 SAM (Service & and assembly)
WP, CO, S	OPS, S	CO, S	S
(General) ▪ General safety information ▪ Other general information	(crane-specific) ▪ Technical data	(General) ▪ All information required for operation. ▪ Load carrying capacity tables are not included in this manual and are posted separately in the operator cabin	(General) Essential maintenance and assembly information

Manual topics

To get you started quickly with all tasks involved with the operation of the slewing tower crane, the manual provide an in-depth table of contents.

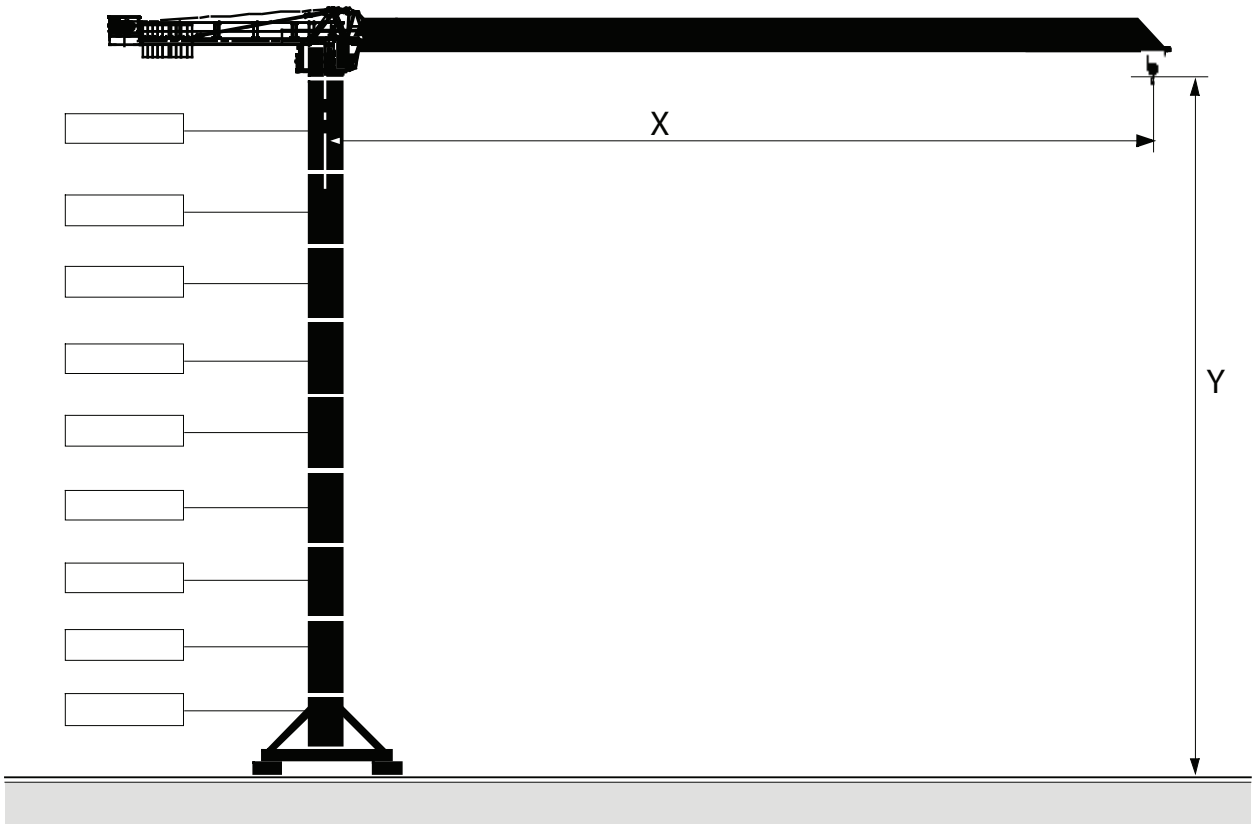
1.8 Data required for slewing tower crane support

Identification plate



Identification plate

Item	Data
Crane model, series:	Slewing tower crane
Type:	WOLFF
Factory ID:	...
Serial no.:	...



Tower configuration example

[X] Operating radius in ... m [Y] Hook height in ... m

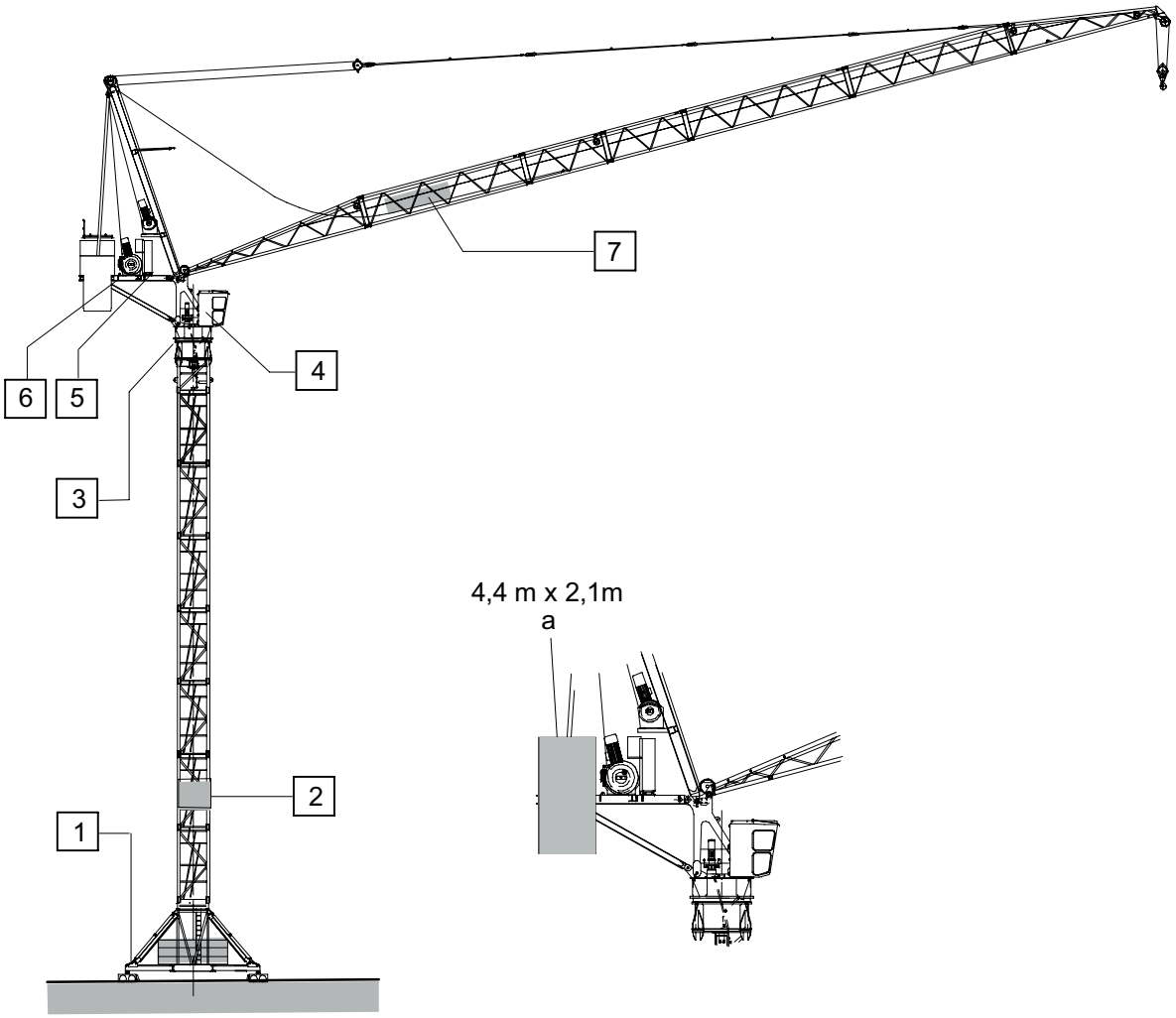
NOTICE

Non-standard assembly

Specify details of any non-standard tower assemblies.

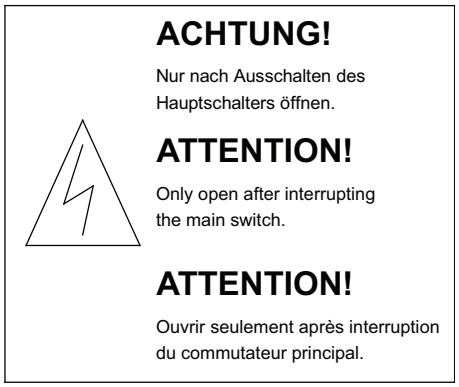
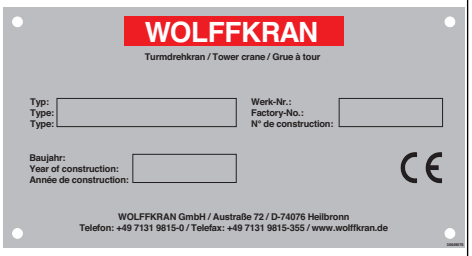
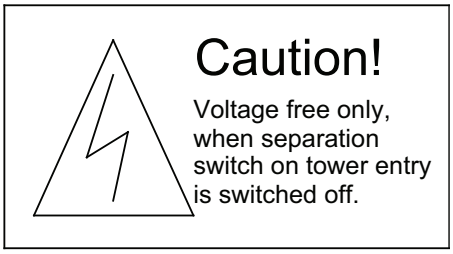
2 Crane data

2.1 Sings for slewing tower cranes



1	Crane base: ▪ Foundation ▪ Cross frame ▪ Cross frame element ▪ Undercarriage	5	Control cabinet
2	Tower	6	Counterjib
3	Tower head section	7	Jib
4	Operator cabin	a	▪ Advertising plate

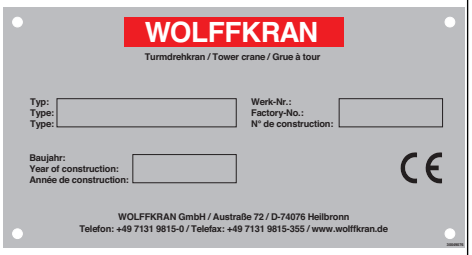
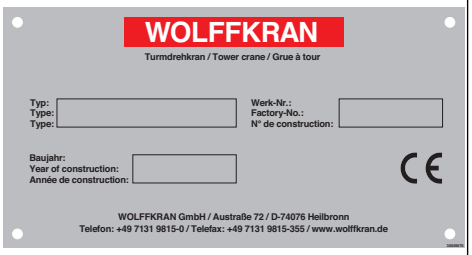
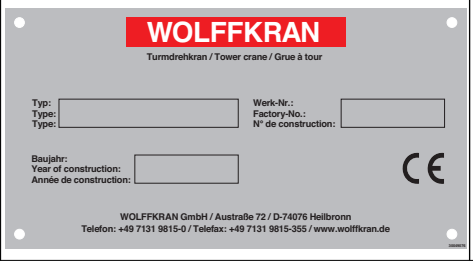
2.1.1 Crane base signs

Component	Plate	Illustration on plate	Ordering number
(Control cabinet, site distribution)	Lightning symbol	Achtung! Nur nach Ausschalten des Hauptschalters öffnen. Attention! Open only after disconnecting the main switch. Attention! Ouvrir seulement après interruption du commutateur principal. 	10012159
Undercarriage control cabinet	Identification plate	Type, serial no., year of production, WOLFFKRAN address 	30049076
Undercarriage control cabinet	Caution - De-energized	Caution! Only de-energized after the disconnector at the tower entry has been disconnected. 	10006232

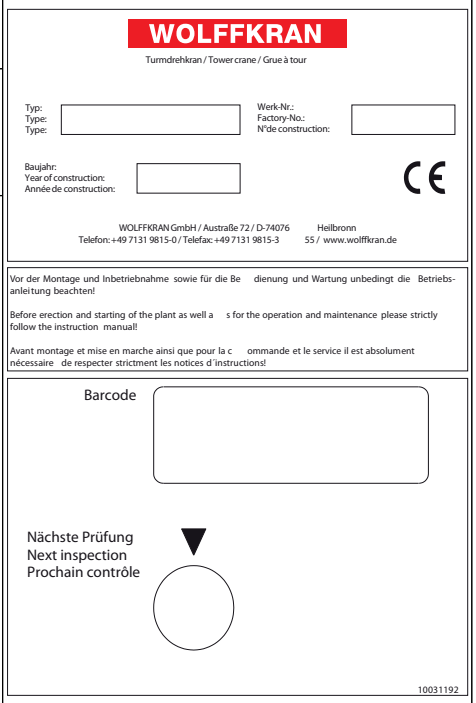
2.1.2 Tower signs

Component	Plate	Illustration on plate	Ordering number
At the bottom tower element	Danger! Beware of the crane (No entry to unauthorized persons)	Danger! Beware of the crane! No entry to unauthorized persons! Authorized persons must inform crane operator in advance. **Hazard from crane!** Unauthorized ascent prohibited! Authorized personnel must inform crane operator previously.	10010700
at the second tower element	1 Capacity label WOLFF 355 B		30044417

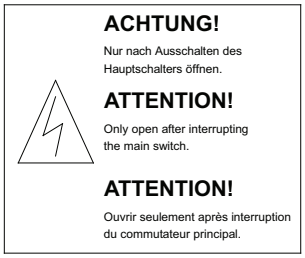
2.1.3 Tower head signs

Component	Plate	Illustration on plate	Ordering number
Inside the slewing frame	Identification plate	Type, serial no., year of production, WOLFFKRAN address 	30049076
Inside the tower head section	Identification plate	Type, serial no., year of production, WOLFFKRAN address 	30049076
At the luffing gear platform	Identification plate	Type, serial no., year of production, WOLFFKRAN address 	30049076

2.1.4 Operator cabin signs

Component	Plate	Illustration on plate	Ordering number
Inside	combination plate		10030716
Inside	Identification plate operator cabin 06		10031192
Inside	Safety note (Refer to operating instructions!)		
Inside	Bar code and date for next test		
Inside	Load carrying capacity table WOLFF 355B		30047401
Inside	Adhesive label at the monitor		30040935

2.1.5 Control cabinet signs

Component	Plate	Illustration on plate	Ordering number
Control cabinet front side	Identification plate	Type, serial no., year of production, WOLFFKRAN address 	30049076
Control cabinet front side	Lightning symbol	Achtung! Nur nach Ausschalten des Hauptschalters öffnen. Attention! Open only after disconnecting the main switch. Attention! Ouvrir seulement après interruption du commutateur principal. 	10012159
Control cabinet front side	Sound power level sign	< 30 kW: 97 dB > 30 kW: 98 dB	30045016 30045017

2.1.6 Counterjib signs

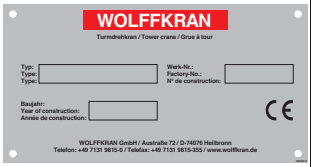


NOTICE

The color of the signs (white or black) will be selected depending on the color of the crane.

Component	Plate	Illustration on plate	Ordering number	
Inside the longitudinal beam	WOLFF adhesive film	WOLFF 355B	10006380	White
Inside the longitudinal beam	Adhesive film – 355B		30044420	White

2.1.7 Plates at the jib

Component	Plate	Illustration on plate	Ordering number
Inside the jib section 1	Identification plate	Type, serial no., year of production, WOLFFKRAN address 	30049076
Inside the jib section 1	WOLFF advertising plate		30042938

2.2 Ropes

(see also):

- Inspection of the cables [310]

2.2.1 Recommendation for ropes



NOTICE

The sorting order of the ropes listed below is of no significance with regard to their quality. You can also choose to use ropes of equivalent quality from other, approved manufacturers.

Trolley cranes

Crane type	Usage	Diepa	Casar
4517	Hoisting rope	915 CZ	Starlift
5014 5020.6 6015.6 6023.6 6031.12 7032.12 6531.6 6531.12 7532.12	Hoisting rope	1315 CZ	Eurolift
5020.8 6015.8 6023.8 6031.8 7032.8 6531.8 7532.8 6071 8033.8 8033.16 8033.20 8060.25 8060.50 8540.20 8540.40 9025	Hoisting rope	1315 CZ	Eurolift
4517 5014 5020 6015 6023 6031 7032 6531 7532 8033	Trolley rope	K 114	Unilift
6071 8060 8540 9025	Trolley rope	PZ 371	Turboplast

Luffing cranes

Crane type	Usage	Diepa	Casar
166 B 180 B 224 B 320 B 355 B 500 B 630 B 700 B 700 B custom 1250 B	Hoisting rope	1315 CZ	Eurolift
180 B 224 B	Luffing rope	SKZ 8	Stratoplast Parafit
320 B	Luffing rope	H 50	Parafit
355 B	Luffing rope	H 50	Turboplast Parafit
500 B	Luffing rope	H50	Turboplast
630 B 700 B 700 B custom	Luffing rope	H50	
1250 B	Luffing rope	H50	Turboplast
180 B 224 B 320 B 355 B 500 B 630 B 700 B 700 B custom 1250 B	Assembly brace rope	SKZ 8	Turbolift

2.2.2 Hoisting rope



NOTICE

When the hook travel is increased by 1 tower element (4.5 m), the required cable length increases by 4.5 m for a single cable fall, by 9.0 m for a dual cable fall and by 13.5 m for a threefold cable fall.

2.2.2.1 Requirements hoisting rope

Cable brand	Specification number
Hoisting rope	70000227
Reeving:	1-fall/ 2-fall
Multi layer spooling:	Yes
Use of a rope swivel:	Yes
Use with wedge end clamp:	Yes
Rope diameter: [mm]	26
Tolerance:	+2 %/ +4 %
Length: [m]	-
necessary minimum breaking force: [kN]	600
Strand surfaces:	ungalvanized, lubricated
Lay direction:	left
Rope end 1:	sharpened and welded
Rope end 2:	sharpened and welded

Basic equipment

Rope length	Layout
▪ 320 m	▪ Rope fall: double ▪ Jib: 60 m ▪ Tower height: 40.5 m

2.2.3 Luffing rope

2.2.3.1 Requirements luffing rope

Cable brand	Specification number
Luffing cable	70000273
Reeving:	8-fall
Multi layer spooling:	Yes
Use of a rope swivel:	No
Use with wedge end clamp:	Yes
Rope diameter: [mm]	22
Tolerance:	+2 % / +4 %
Length: [m]	195
necessary minimum breaking force: [kN]	370
Strand surfaces:	ungalvanized, lubricated
Lay direction:	left
Rope end 1:	sharpened and welded
Rope end 2:	sharpened and welded

2.2.4 Assembly brace rope

2.2.4.1 Requirements assembly brace rope

Cable brand	Specification number	
Assembly brace rope	70000285	
Multi layer spooling:	No	
Use of a rope swivel:	No	
Use with wedge end clamp:	No	
Rope diameter: [mm]	26	
Tolerance:	+2 %/ +4 %	
Length: [m]	29.60	
necessary minimum breaking force: [kN]	635	
Strand surfaces:	Galvanized	
Lay direction:	right	
Rope end 1:	Rope end with grouted solid thimble DIN 3091	
Rope end 2:	Rope end with grouted solid thimble DIN 3091	
Miscellaneous:	Bore diameter thimble [mm]	51
	Information: ▪ Length refers to the center to center thimble bore ▪ Ropes are used in pairs ▪ Keep the exact length	

2.3 Tool box

The tool box is stored in the tool compartment in the counterjib.

2.4 Bolts, spring retainers and cotter pins

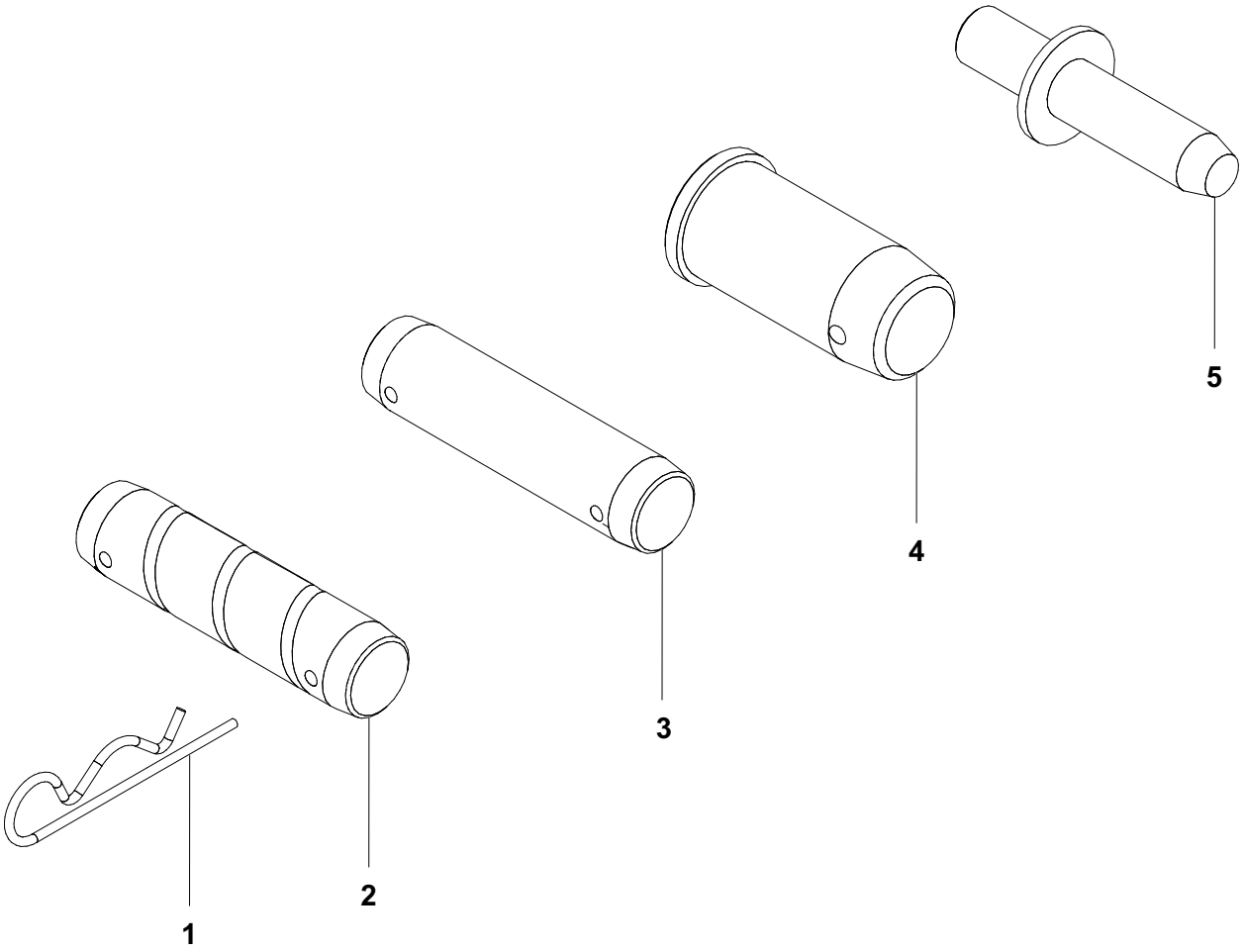


NOTICE

For ease of installation and increasing the service life of the bolts, these should be cleaned and greased before installing them.

2.4.1 Bolts and stub shaft

The following types of bolts are used with the slewing tower crane.



1	Spring retainers	4	Collar bolt
2	Bolt with grease pockets	5	Stub shaft (counterweight)
3	Knock-in bolts		

2.4.2 Spring retainers, linch pins and cotter pins

DANGER

Inadequately secured bolts by reused cotter pins.

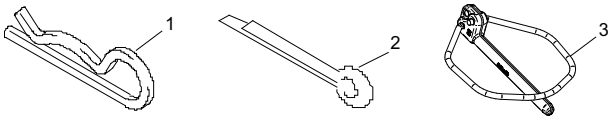
Falling components, severe injuries or death.

> The crane has been disassembled.

► Replace all used cotter pins with new cotter pins.

NOTICE

Spring retainers and linch pins can be used a number of times. Check the spring retainers and linch pins for damage and replace them, if necessary.



1	Spring retainers	3	Linch pin
2	Cotter pin		

2.4.3 List of bolts

Ref.	Screw joint		Bolts		Spring retainers		Cotter pin ISO 1234		Hole
			Qua-ntity	Dimensions	Qua-ntity		Qua-ntity		spacing
1	Jib	60 m	1	Ø95/80 x 255	1	Ø10/60-80			
			16	Ø95/80 x 237	16	Ø10/60-80			
		55 m	1	Ø95/80 x 255	1	Ø10/60-80			
			13	Ø95/80 x 237	4	Ø10/60-80			
		50 m	1	Ø95/80 x 255	1	Ø10/60-80			
			13	Ø95/80 x 237	4	Ø10/60-80			
		45 m	1	Ø95/80 x 255	1	Ø10/60-80			
			10	Ø95/80 x 237	10	Ø10/60-80			
		40 m	1	Ø95/80 x 255	1	Ø10/60-80			
			10	Ø95/80 x 237	10	Ø10/60-80			
		35 m	1	Ø95/80 x 255	1	Ø10/60-80			
			7	Ø95/80 x 237	7	Ø10/60-80			
		30 m	1	Ø95/80 x 255	1	Ø10/60-80			
			4	Ø95/80 x 237	4	Ø10/60-80			
2	Slewing frame		4	Ø100 x 280	8	Hex. screws M12x120 ISO 4014-8.8 galv.			
	Connecting				8	Hex. nut M12 ISO 4032-8 galv.			
	block				8	Counter nut M12 DIN 7967 cotter pin			
3	Connecting		4	Ø80x265	8	Ø10/60-80			
	block								
	- Counterjib								
4	Connecting		2	Ø80x280			4	Ø13x112	
	block		2	Ø 95/80 x 237	2	Ø10/60-80			
	-Upper								
	tower head section								
5	Connecting		2	Ø120x320	2	Axle retainer 190x12x190			
	block				2	Axle retainer 50x12x190			
	-Jib				8	Hex. screws M20x50 ISO 4017-8.8 galv.			
					8	Lock washer A 20 DIN 127			
6	Adapter		8	Ø70x295	16	Ø10/60-80			
	TV 20								
7	Mounting		8	Ø 60/50 x 122			8	Ø10x71	
	brace								
8	Operator cabin		2	Ø30x135	4	Ø5/30			
	suspension								

2.5 Screw joints



NOTICE

Observe special instructions when tightening the mounting screws at the slewing ring.

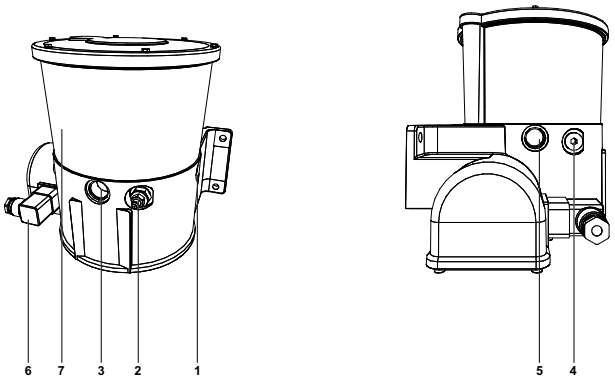
Always use screws from one single manufacturer (not different brands) for the slewing ring.

When HSFG screws are lost or replaced, do not use screws of a different strength class.

Before being installed at the plant, the bolts and nuts are with MoS2.

Quantity	Designation	Dimensions	Part no.
1	Cable clamp	26	10005835
16	Hexagonal head screw	M20 x 50	10002552
16	Hexagonal nut	M20	10001272
32	Washer	21	10001588
16	Lock nut	M20	10003010
2	Hexagonal head screw	M8 x 110	10001920
2	Hexagonal nut	M8	10001216
2	Circlip	A8	10002978
6	Hexagonal head screw	M6 x 20	10002039
6	Hexagonal nut	M6	10001215
6	Washer	A6.4	10001578
6	Circlip	A6	10005527
4	Hexagonal head screw	M16 x 35	10002133
4	Hexagonal nut	M16	10001219
4	Circlip	A16	10005310
2	Hexagonal head screw	M20x50-8.8	10002153
2	Hexagonal nut	M20-8	10001220
8	Washer	A20 200HV	10001538
Only if Hw28132FU is used:			
9	Extension sleeve	Ø 44.5/26.9x76	30023438
9	Hexagonal head screw	M24x160-10.9	10014479
9	Hexagonal nut	M24-10	10014447
18	Washer	24 HV	10005335

2.6 Piston pump for central lubrication



Specifications

Item	Data
Motor	
Operating voltage	24 V / 12 VDC
Fuse	3 A
Aggregate	
Max. counterpressure	300 bar
Allowable operating temperature	-25°C to + 75°C
Reservoir capacity	2.0 liters
Degree of protection acc. to DIN 40 050, part 9	IP 5K6K
Control system	
Pump activation time per cycle	1 to 2 minutes
Number of lubrication cycles per day	Approx. 10 to 20

3 HSFG screw joints

Screw connections are a part of the tower crane which are of considerable importance for its operating safety. Screw connections connect components and transfer forces.

Therefore, screw joints have to be carefully installed, cared for, serviced and checked by the service and assembly personnel.

The following instructions for use of high-strength friction grip (HSFG) screw joints have be observed.

High-strength friction grip (HSFG) screw joints

An HSFG screw joint consists of bolts, nuts, washers and, where applicable, expansion sleeves, for which all parts of the joint are produced using high-strength materials.

Such screw joint have to be tightened to a specified torque. A screw tensioning cylinder (preferably) or torque wrench is required for this work, which allows application of the specified torque or required initial tension.

HSFG screw joints - location of use

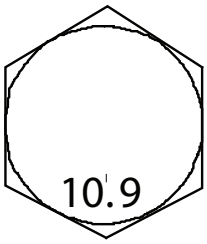
HSFG screw joints are used where it is necessary to transfer high forces from one component to another. For a slewing tower crane, these are usually the following components:

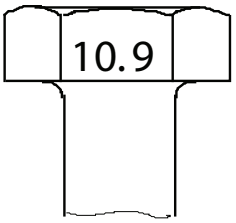
- Slewing ring
- Tower sections
- Also drive units such as slewing gear and hoisting gear.

HSFG screw joint - Torque

Tightening torques apply to greased (MoS2) HSFG screw joints with metric ISO threads according to DIN 13, Part 1, or ISO 261, with or without galvanic finish.

3.1 Identification of screws

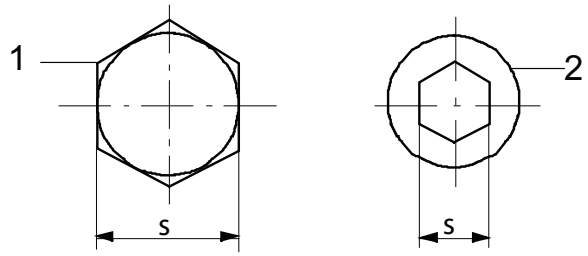




All parts of an HSFG screw joint are especially marked. Both grade and marking specifications are given in national and international standards.

The strength class, e.g. 8.8, 10.9 or 12.9 sg, must be indicated on the screw head. The screws must also be marked with the screw manufacturer's stamp of origin. This is usually placed near the strength class marking.

3.2 Head sizes



1	acc. to ISO 4014, 4017	2	acc. to ISO 4762

Thread nominal diameter (mm)	Head size s (mm) for		
	Screws according to DIN 4014/ 4017 and nuts according to DIN 4032	Screws according to DIN 14399-4 and nuts according to DIN ISO 14399-4	Allen screws according to ISO 4762
M 12	19	22	10
M 16	24	27	14
M 20	30	32	17
M 22	32	36	-
M 24	36	41	19
M 27	41	46	-
M30	46	50	22



NOTICE

Screws according to ISO 14399-4 and the associated nuts according to ISO 14399-4 have a larger head size than screws according to ISO 4014 and the associated nuts according to ISO 4032.

3.3 Identification of nuts

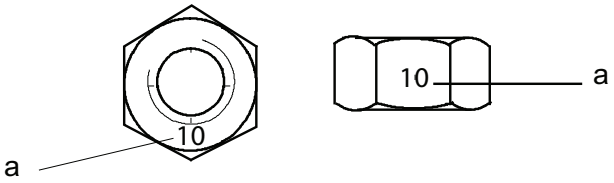
When selecting nuts, ensure that their strength class matches the strength of the screws. Examples:

- Nut 8 - screw 8.8
- Nut 10 - screw 10.9
- Nut 12 - screw 12.9

Please note that for HSFG screws, only full sets (screws, nuts, and washers) by the same manufacturer must be used (refer to DIN 18 800, part 1).

Strength class for nuts

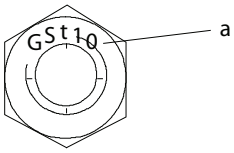
The strength class must be engraved on the contact surface or wrench surface, e.g. 8, 10, or 12.



a	Specification of strength class, e.g. 10		

Stamp of origin for nuts

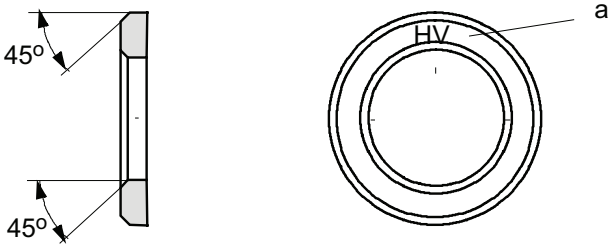
The nuts must also be marked with the nut manufacturer's stamp of origin. This is usually placed near the strength class marking.



a	Origin, e.g. GSt		

3.4 Identification of washers

	**⚠ CAUTION** Non-high strength washers are not used. Damage to contact surface and screw joint. 1) Only use washers made of high strength materials. 2) Only use washers that are chamfered on one side. 3) The chamfer must always face towards the screw head. 4) Do not use lock washers.

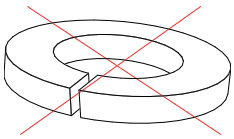


a	HSFG (HV) marking (bottom side)		

No use of lock washers.

WOLFFKRAN does not allow lock washers to be used for HSFG screw joints.

According to DIN 127, lock washers are considered to belong to the ineffective type of retaining elements.



3.5 Checking and lubricating HSFG screw joints



⚠ WARNING

Damaged screw joints

The slewing tower crane may overturn.

1) Do not use screw joints that were initially pre-torqued with too much torque.
2) Do not use screw joints showing corrosion at the stem or threads.
3) Do not use screw joints showing signs of damage.
4) Replace all screw joints of one joint level if one of these screws shows any damage.

> You want to install an HFSG screw joint.

1) Clean the screw joint.
2) Visually inspect the following details of an HSFG screw joint: the threads of both screw and nut, the way the nut fits to the screw, and the corner area between the screw stem and the contact surface of the screw stem.

   → The HSFG screw joint is in good condition.
3) Lubricate the screw and nut threads as well as the contact surface using a molybdenum disulfide (MoS_2) grease.

→ The HSFG screw joint is now ready to be installed.

3.6 Checking the HSFG screw joint



NOTICE

Any screw joint may become loose. This also applies to HSFG screw joints. Loosening of such HSFG screw joints results in partial or complete loss of the initial tension.

If the initial tension is partially or completely lost, the screw material will fatigue at a much higher rate. This poses the danger of screw fatigue fracture.

First checks (3 weeks after erection)

Due to settling processes in the screw joints it is necessary to perform an initial check on all HSFG screw joints on new slewing tower cranes and new crane parts after completing erection 3 weeks at the latest.

This check should cover 5 % of all screws in the connection.

This check should be accomplished with a torque wrench or power screwdriver. The nut (or screw) is retightened. Set the torque wrench to 100 % of the specified torque.

If the screws can be retightened, it is necessary to unscrew, grease again, and then re-assemble and tighten the connection to the rated torque.

The table indicates when the initial torque is sufficient, other screws are to be checked or, where applicable, replaced.

Angle for additionally tightening the screw (or nut) to achieve the test value [40]set	< 30°	Initial torque is sufficient
	30° - 60°	Initial torque is sufficient, check additional two screws in same joint.
	> 60°	Replace screw, check additional two screws in same joint.

Visual inspection (quarterly)

Repetitive checks must be accomplished in the form of visual checks quarter annually at the latest. Here, it is sufficient to ascertain whether screw connections have become loose by checking for visible gaps between the tensioned parts.

Recurrent inspections (during each erection, at least annually)Recurrent inspections (during each erection, at least annually)

Recurrent inspections are required each time the slewing tower crane is erected as well as at least once per year, however, even more frequently for multiple shift operation.

These inspections consist of loosening screw joints on a random basis by removing and checking the connection. Then the screw has to be lubricated, reinstalled and tightened to the specified torque.

3.7 Checking and tightening procedures for the screw joints of the ball race bearing

Perform the check or tighten the screws at that section of the ball race bearing that is subjected to pressure. This ensures that the screws are not subjected to a tensile force which would result in the ball race bearing lifting off the lower slewing frame or tower top lower part.

WOLFFKRAN therefore specifies the following checking and tightening instructions considering their feasibility at the construction site.

> You have made sure that the crane will not swivel during the procedure.

> You want to check the screw joints.

1) Pick up a valid load according to the load table.
2) Fix the slewing section using the slewing gear brake.
3) Move the load to the maximum operating radius allowable for its weight.
4) Retighten the screws at upper and lower slewing ring, seen in jib direction, in the area from mid tower to mid jib (2 x 90°).
   → You have checked and retightened the first part of the screw joints.
5) Leave the slewing part fixed.
6) Set down the load.
7) Luff the jib to the minimum operating radius.
8) Retighten the screws at upper and lower slewing ring, seen in counterjib direction, in the area from mid tower to mid jib (2 x 90°).
   → You have checked and retightened the second part of the screw joints.

→ You have checked and retightened the screw joints.



NOTICE

This can be performed much easier and under optimum conditions when the tower crane is disassembled.

4 Transport and storage

4.1 Haulage information

- Observe the highway code.
- Truck, min. payload of X t.
- Verify full functionality of all haulage equipment (self assembling crane), e.g. axles, brakes, steering, signaling and lighting fixtures are functioning properly before releasing the crane for transport!
- Take precautions against accidents by checking the safe storage of accessories and the retainers for loose parts prior to transportation of the slewing tower crane!
- Before starting to transport the slewing tower crane on public highways or passages, verify that it has been prepared for this haulage in compliance with the highway code!
- Always make sure that you have sufficient clearance to all sides when driving the vehicle, for example, below underpasses/ overhead power lines, or across bridges, or through tunnels!
- On slopes, do not attempt to drive the vehicle in transverse!
- Always maintain a sufficient clearance to construction pits and slopes!
- Store the bolts and spring retainers in the bolt storage compartment and put the small parts into the toolbox.

4.2 Unloading the components

> You want to unload the component from the truck.

1) Open the loading hatches and tarps of the truck.
2) Fasten the lifting tackle (2-fall or 4-fall) to the lifting eyes using the carabiners of the chain.
3) Use the round slings as attachment to suspend components from the frame.
4) Attach the guide rope with carabiner.
5) Engage the mounting lock (e.g. tower head section).
6) Open the tensioning belts and catches.
7) Slowly lift the components.
8) Unload the components from the truck.
9) Support the components using wooden planks or concrete counterweights.
   → You have successfully unloaded the components.
10) Protect the components against dirt and moisture

→ You have successfully unloaded and stored the components.

4.3 Loading the components onto a truck

> You want to load the components onto a truck.

> The components are removed.

> The components are placed on a substructure (wooden planks or concrete counterweights).

1) Apply grease into holes and onto bolts.
2) Store the bolts with the provided retaining elements in the bolt storage compartment.
3) Fasten the attachment (2-fall or 4-fall) to the lifting eyes using the load hooks of the chain.
4) Use the round slings as attachment to suspend components from the frame.
5) Attach the guide rope with carabiner.
6) Engage the mounting lock (e.g. tower head section).
7) Slowly lift the components.
8) Load the components onto the truck.
9) Protect the components against dirt and moisture
10) Close the tensioning belts and catches
11) Close the loading hatches and tarps of the truck.

→ You have successfully loaded and secured the components.

5 Assembly of substructure and tower

5.1 Test report for crane assembly/recurrent test (according to BGV D6)

Test report					
	On recurrent test according to BGV D6			On crane assembly	
Crane model:		**Werknummer:**		**Year of construction:**	
Construction site:		**Operator:**		**Persons involved:**	
Operating radius (m):		**Tower/hook height (m):**		**Foundation anchor type:**	
Undercarriage		**Track width (m):**		**Ballast (t):**	
KR / KRE:		**Track width (m):**		**Ballast (t):**	

Test instructions	**Deficien-cies**		**Deficiencies remedied**	
	Yes	**No**	**Date**	**By**
Operating manual / Crane test booklet				
Stability, substructure, minimum distance				
Crane track, limit switches				
Tower, bolts, spring retainers				
Operator cabin, ascents, side operating stand				
Slewing rim, mount				
Jib, jib position, signs				
Braces, jib, and counterjib				
Counter ballast, mount, arrangement				
Hoisting gear, slewing gear, trolley drive/luffing gear, brakes				
Cables, swivels, cable tensioners				
Limit switch for hoisting cable, trolley/luffing gear				
Electrical equipment and RCD switches				
Electric cables and connectors				
Warning devices, emergency stop, horn				
Load and load torque monitoring				
These test instructions are not necessarily complete and must be adapted to the crane to be tested.				

Maximum load at		m, with		kg set
Load torque at		m, with		kg set
Couplings		Set		Tested
Remarks:				

Test report						
Operating safety and/or stability are endangered	No		Yes			
Retesting required:	No		Yes		Until	
Test sticker attached:	No		Yes		Next test on:	
Test carried out:						
Expert/appraiser:	Operator:		Site manager:			
Name, date	Name, date		Name, date			
Distribution:						
1st sheet, white, customer / 2nd sheet, white, organization responsible for inspecting and repairing the leased crane / 3rd sheet, pink, branch office / 4th sheet, blue, mechanics						

5.2 Conditions for assembly



⚠ WARNING

High voltage on electrically conductive parts.

Risk of injury or death caused by electrical shock.

1) Request the applicable lightning protection regulations from local inspection authorities.

2) Conform to regional regulations governing the lightning protection of foundation structures.



⚠ WARNING

Non-oberservance of regulations.

Danger to life due to failure of safety equipment.

Changes in crane performance may entail danger to life.

1) Have any changes approved by local supervisory authorities.

2) If you have any questions, please consult WOLFFKRAN GmbH.



NOTICE

The maximum permitted wind velocity for operation is 12.5 m/s (45 km/h). This corresponds to force 6 on the Beaufort scale. Make allowances for the fact that gusts of wind with a velocity of 12.5 m/s must be expected as of Beaufort 5 (8.1 m/s to 10.6 m/s).

> Each crane component and all mounting hardware is available.

1) Check crane parts, tower elements, bolts, spring retainers and use only parts specified to be used for tower elements.
2) Clean the bolts and holes in the journals and sleeves.
3) Lubricate the bolts and holes using bolt grease.

   → You have prepared the bolts and holes.
   CAUTION! Keep greased parts clean for storage and use. Do not deposit greased parts on dirty ground because clinging dust and sand damages the surfaces of pin holes and bolts during assembly.

4) Fasten two wire slings to the corner posts.
   NOTICE! If a vehicle is available having sufficient capacity, several tower elements may be pre-assembled on ground. Fasten four wire slings to the corner posts using a four-fall wire attachment.
5) Connect the wire slings to the diagonal rods.
6) Attach a 2-fall wire attachment with shackles to the wire slings.
7) Take care of the ladder transitions between the tower elements.
8) Communicate via radio or by means of hand signals to carry out tower assembly.

→ You have successfully prepared the assembly of the tower.

The data required for tower assembly is given in the "Test report for crane assembly [53]".

Tower combinations

Contents	Item
Tower setup, type, and number of tower elements	Tower combination
Dimensions, weights of tower elements.	Tower elements
Location of bolts at the tower elements	Tower elements
Bolt dimensions	Tower elements
Required hook height of mobile crane.	Mobile crane
Location of catch hooks for climbing frame	Foundation
Assembly/disassembly platforms	

(see also):

- Test report for crane assembly/recurrent test (according to BGV D6) [53]

5.3 Assembling the tower



⚠ DANGER

Climbing device attached to the lower part of the tower head section lower part.

Increased wind surface. The slewing tower crane may overturn.

► Dismantle the climbing device after the climbing procedure is finished or lower the climbing device down on the ground or lower the climbing device down to the uppermost tower brace.



⚠ WARNING

Incorrect vertical alignment.

The slewing tower crane may overturn.

1) Check the alignment of the tower sections.

→ The maximum offset at the tower may not exceed 1‰.
That is, at a measured length of 2 m the valid offset of 2 mm must not be exceeded.

2) Perform a differential leveling at two planes.

5.3.1 Assembling the tower without climbing frame

> Each crane component and all mounting hardware is available.

> No external climbing frame will be used.

1) Align the bottom tower element or substructure, respectively.
2) Use a mobile crane to position the next tower element.
   NOTICE! A number of tower elements can be pre-assembled on ground, depending on the lifting capacity of the mobile crane. Use four wire slings and a 4-fall attachment.
3) Bolt the tower element.
   NOTICE! When using a TV33, threaded bolts have to be used instead of bolts.
4) Secure the bolts using the retaining elements provided.
   → You have successfully installed the tower element.
5) Repeat this procedure for the remaining tower elements.

→ You have successfully installed the tower elements.

5.3.2 Assembling the tower with external climbing frame

> Each crane component and all mounting hardware is available.

> An external climbing frame will be used.

1) Align the bottom tower element or substructure, respectively.
2) Use a mobile crane to position the next tower element.
3) Bolt the tower element.
4) Secure the bolts with the retaining elements provided for this purpose.
   → You have successfully installed the tower element.
   NOTICE! Use the mobile crane to install at least one additional tower element.
5) Attach the climbing frame in parallel to the building.
   NOTICE! Pay attention to position of catch hooks.

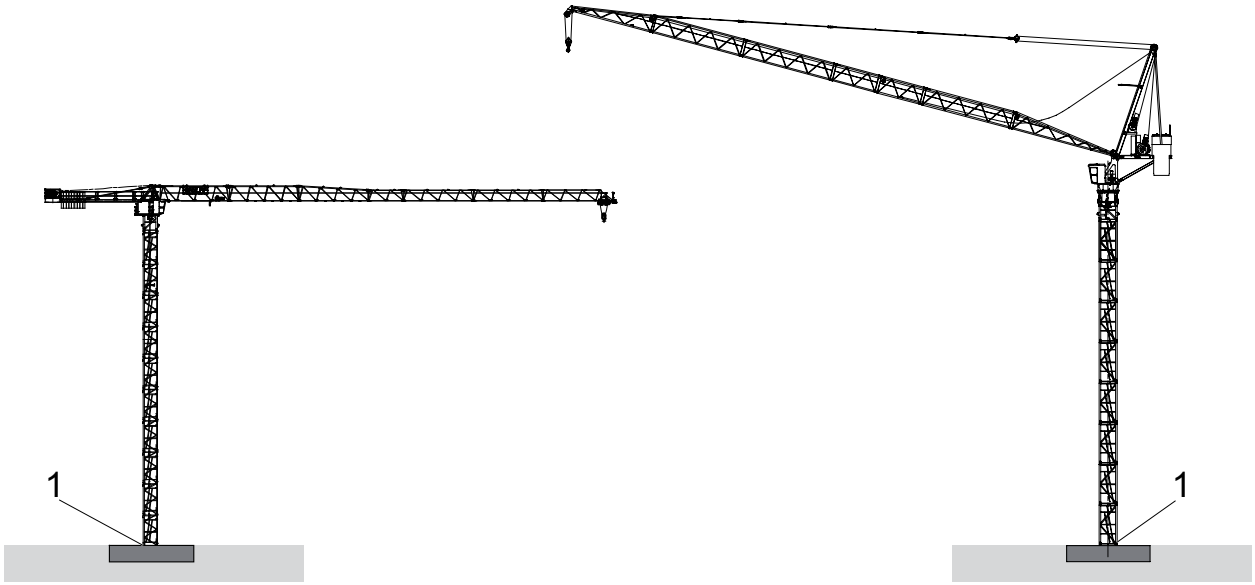
→ You have successfully installed the tower element.
DANGER! Please refer to the separate climbing frame description.

5.3.3 Assembling the tower with internal climbing frame

The data required and the instructions for tower assemblies with inner climbing frame is available in the separate description of the inner climbing frame.

DANGER! Observe the special tower combination for the inner climbing frame.

5.3.4 Assembling the tower on concrete foundation



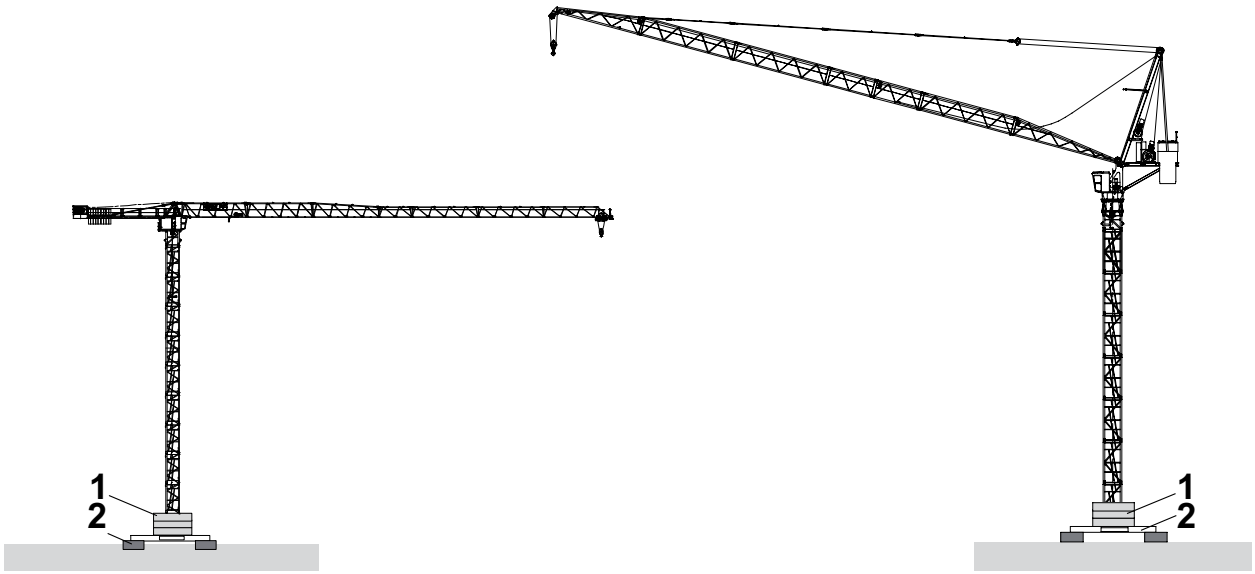
1	Concrete foundation		

> Each crane component and all mounting hardware is available.

1) Visually inspect the foundation and foundation anchors.
2) Use a mobile crane to position the first tower element.
3) Bolt the tower element.
4) Secure the bolts using the retaining elements provided.
   → You have successfully installed the tower element.
   NOTICE! Note the locations of the catch hooks and ladders at the tower.
5) Check the vertical alignment of the tower element.

→ You have successfully installed the first tower element.

5.3.5 Assembling the tower on a cross frame



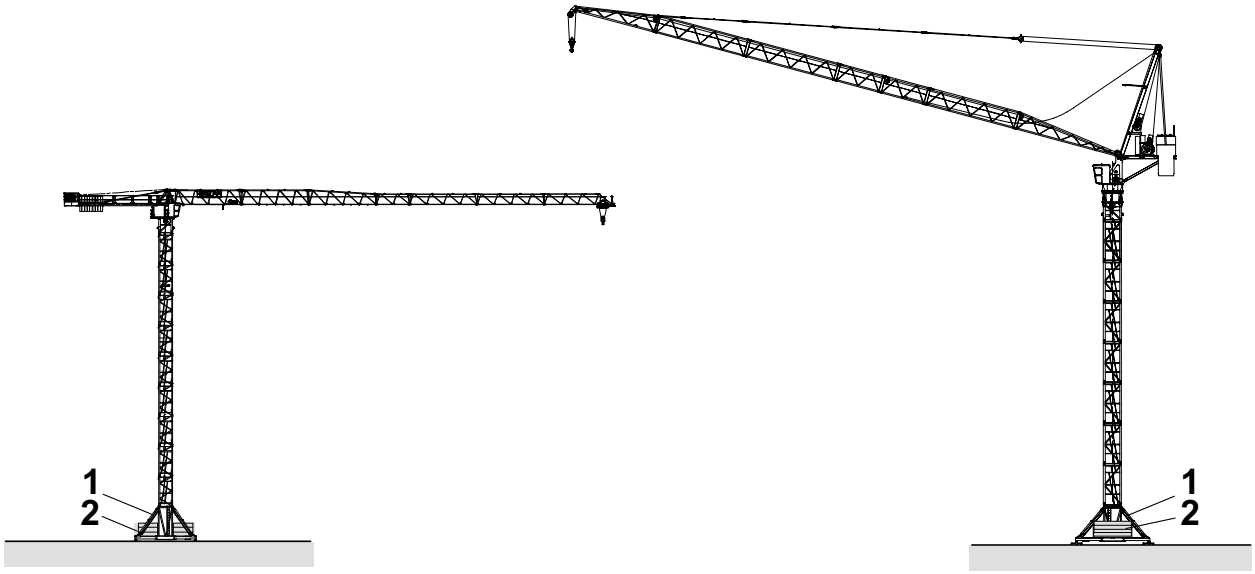
1	Ballast weights	2	Cross frame

> Each crane component and all mounting hardware is available.

1) Visually inspect the foundation.
2) Position and install the cross frame support on the prepared foundations.
3) Install the cross frame support to the foundation.
4) Use a mobile crane to position the first tower element.
5) Bolt the tower element using screws.
   → You have successfully installed the tower element.
   NOTICE! Note the locations of the catch hooks and ladders at the tower. Please refer to the cross frame assembly instructions.
6) Check the vertical alignment of the tower element.
7) Ballast the cross frame.
8) Secure the cross frame to the supporting points to prevent lateral movement.

→ You have successfully installed the first tower element.

5.3.6 Assembling the tower on a cross frame element



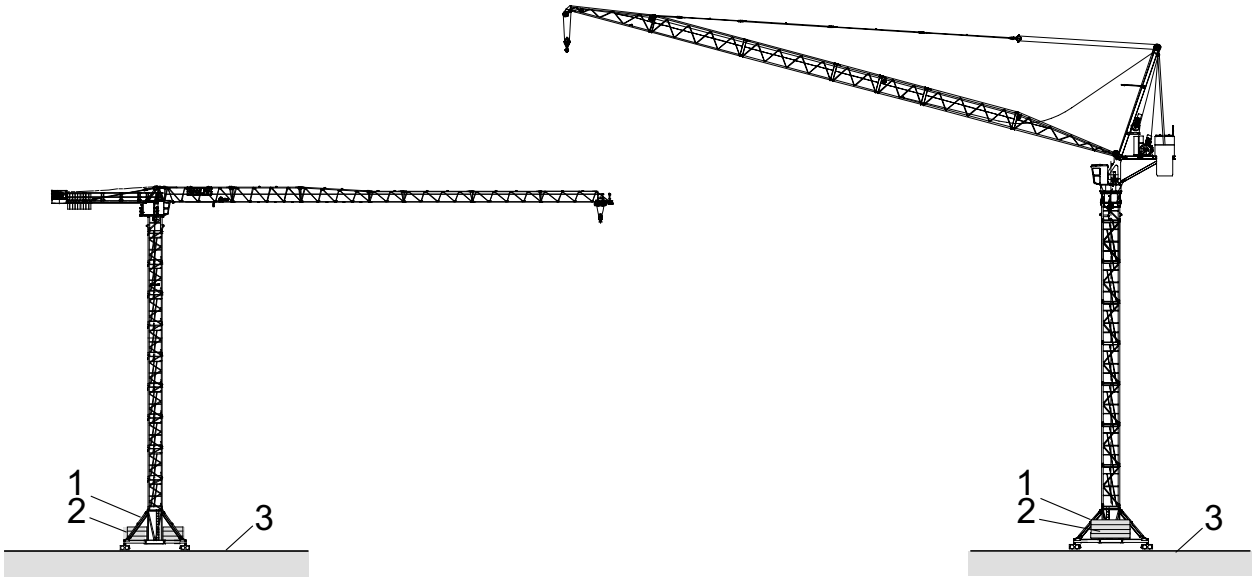
1	Cross frame element	2	Ballast weights

> Each crane component and all mounting hardware is available.

1) Visually inspect the foundation.
2) Pre-assemble the cross frame platform using the thrust plates.
3) Position the pre-assembled cross frame on the foundation.
4) Complete assembling the cross frame element.
5) Align the cross frame element.
6) Ballast the cross frame element.
7) Secure the cross frame element to the supporting points to prevent lateral movement.
   → You have successfully installed the cross frame element.
   NOTICE! Please refer to the assembly instructions for cross frame elements.
8) Use a mobile crane to position the first tower element.
9) Bolt the tower element.
10) Check the vertical alignment of the tower element.
    → You have successfully installed the tower element.
    NOTICE! Note the locations of the catch hooks and ladders at the tower.

→ You have successfully installed the first tower element.

5.3.7 Assembling the tower on the undercarriage



1	Undercarriage	3	Crane track
2	Ballast weights		

> Each crane component and all mounting hardware is available.

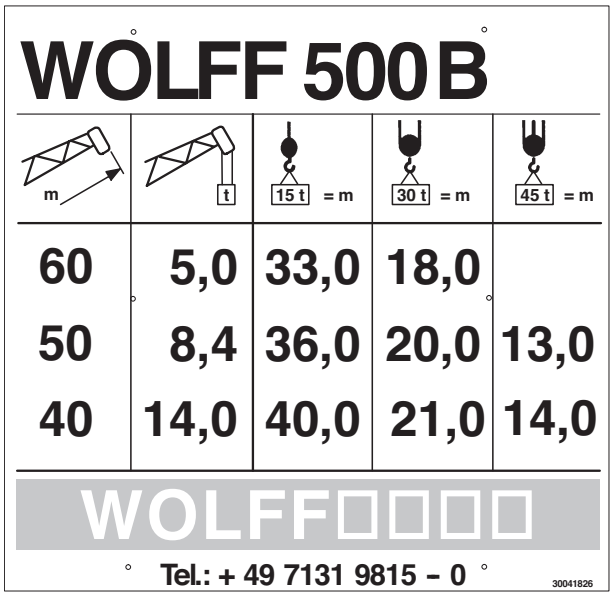
1) Visually inspect the crane track.
2) Pre-assemble the undercarriage using the drive gears.
3) Position the pre-assembled cross frame on the crane track.
4) Complete assembling the undercarriage.
5) Ballast the undercarriage.
6) Check again the tolerances of the crane track.

   → You have successfully installed the undercarriage.
   NOTICE! Please refer to the undercarriage assembly instructions.
7) Use a mobile crane to position the first tower element.
8) Bolt the tower element.
9) Check the vertical alignment of the tower element.

   → You have successfully installed the tower element.
   NOTICE! Note the locations of the catch hooks and ladders at the tower.

→ You have successfully installed the first tower element.

5.4 Attaching the lifting capacity signs to the tower



Example of a lifting capacity plate

> Both the first and second tower elements have been installed.

► Install the lifting capacity signs to the second tower element.
NOTICE! Ensure that the lifting capacity plate is visible with the respective jib length.

→ The lifting capacity plates have been installed.

6 Pre-assembly on ground

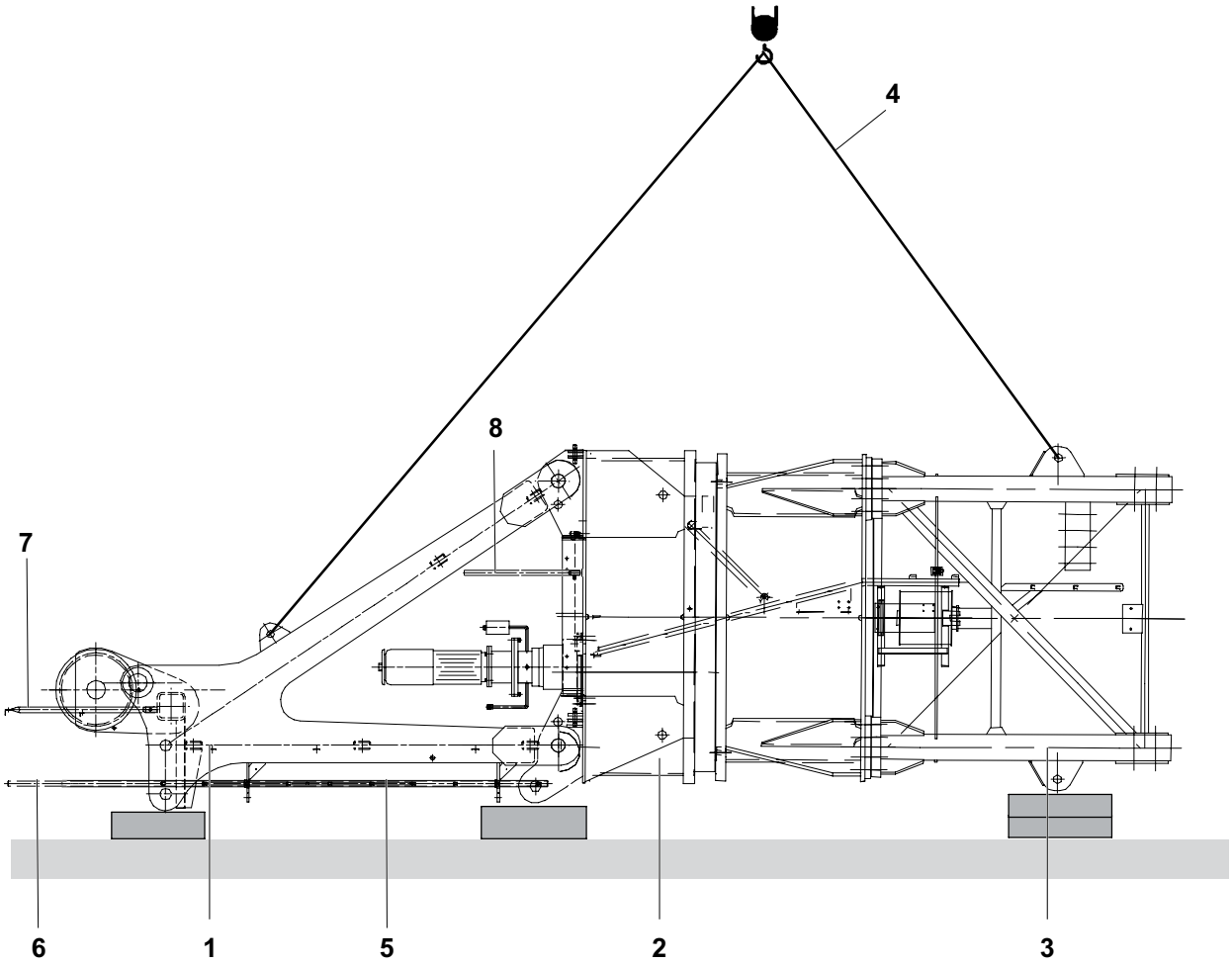
6.1 Pre-assembling the tower head section

6.1.1 Pre-assembling the lower part of tower head section

NOTICE

The following steps are only required if the lower part of the tower head section has been delivered separately.

> The components are unloaded.



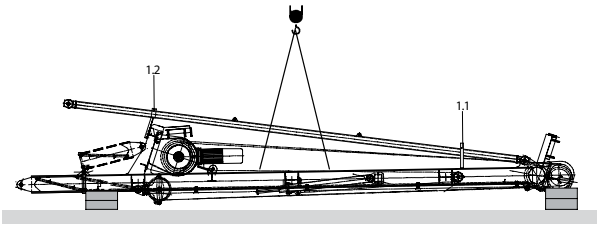
1) Prepare the substructure for the lower part of the tower head section.
2) Place the tower head section lower part on the substructure.
3) Remove the transport restraint at the ladder.

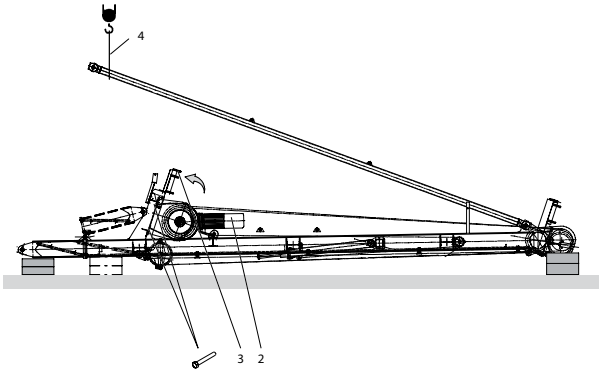
4) Swing the ladder outwards.
5) Secure the ladder using the screws (M16x35 ISO 4017-8.8).
6) Insert the ladder extension.
7) Secure the ladder extension using the screws (M20x60 ISO 4017-8.8).
   → You have pre-assembled the ladder.
8) Insert the standard railings and standard posts.
9) Secure the standard railings and standard posts using the screws ().
   → You have pre-assembled the standard railings and standard posts.
10) Check all mounting screws at the lower part of the tower head section.
11) If necessary, re-tighten the mounting screws and secure them.
12) Insert the strikers in the bolt storage compartment of the adapter.

→ You have successfully pre-assembled the tower head section lower part.

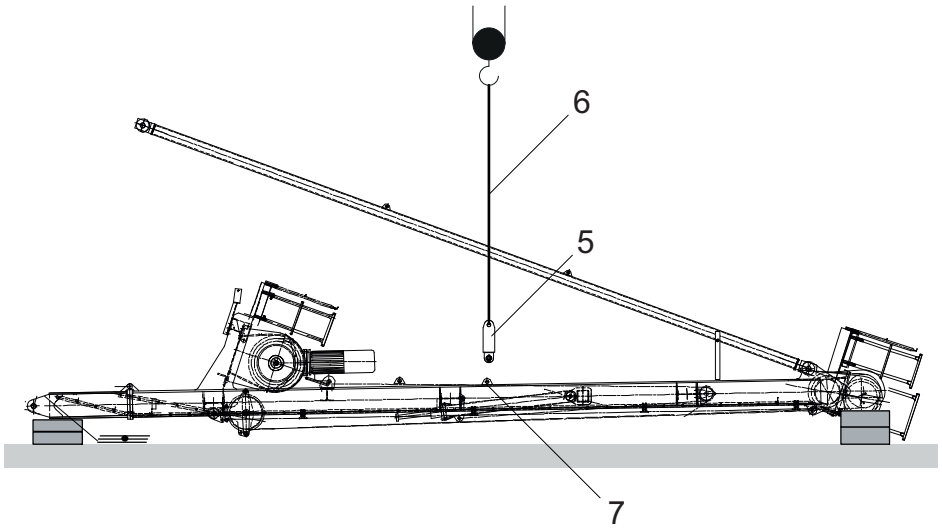
6.1.2 Pre-assembling the tower head section upper part

> The components are unloaded.





1) Prepare the substructure for the tower head section upper part.
2) Place the tower head section upper part on the substructure.
3) If necessary, fold out the lower part (1) of the tower head section upper part.
4) Bolt the lower part of the tower head section upper part using the screws (M 24 x 120, DIN 14399-10.9 (lubricated with MoS2)).
5) Pre-torque the screws to a torque of 800 Nm.
   → You have prepared the lower part of the tower head section upper part.
6) Remove the transport restraints 1 (1.1) and 2 (1.2) at the tie rods.
7) Using a sling (4), lift the tie rod 1 until you can insert the bolt at the transport restraint.
8) Bolt the tie rod 1.
9) Lower the sling (4) until you can remove it from the tie rod.
10) Repeat the above procedure for the second tie rod.
    → You have pre-assembled the tie rods.

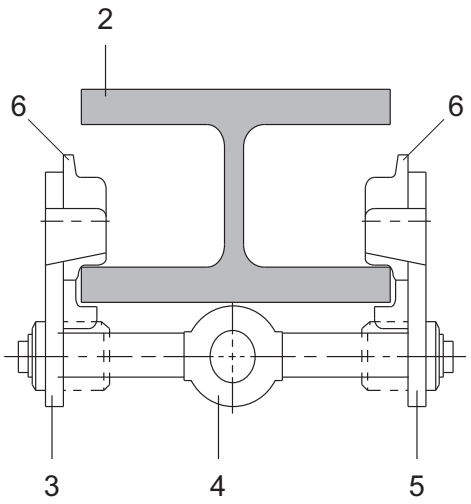


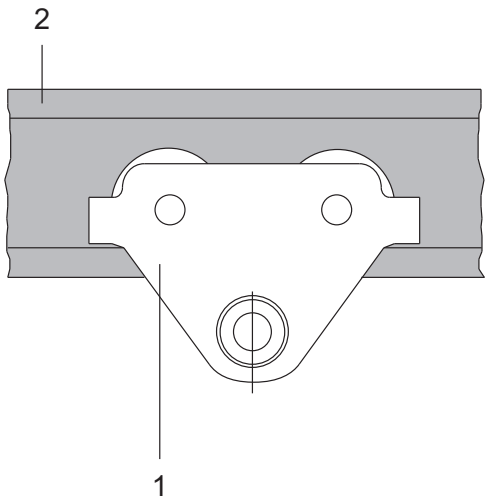
11) Suspend the auxiliary crane (5) using a 2-fall attachment (6).
NOTICE! The auxiliary crane at the tower head section is available as an option!
12) Using the bolts (Ø 30x105), bolt the auxiliary crane (5) to the clevis type eyelets (7) at the rear of the tower head section.
DANGER! If the eyelets (7) for bolting the auxiliary crane to the tower head section have a screwed connection, check the screws. The screws, lubricated with MoS2, must be tightened with a torque of 250 Nm.
13) Secure the bolts with linch pins (6x42).
14) Fold out the platform (3) at the luffing gear (2).
15) Secure the platform using the screws (M20x60 ISO 4014-8.8).
→ You have pre-assembled the platform.
16) Check the screws between the tower head section upper part and the luffing gear.
17) Tighten the screws if required.
18) If necessary, pre-torque the mounting screws to a tightening torque of 800 Nm.
→ You have checked the screws.
19) Insert the standard railings and standard posts to the platforms.
20) Secure the standard railings and standard posts using the screws (M12x35 ISO 4017-8.8).
21) Secure the screws using lock nuts.
→ You have pre-assembled the standard railings and standard posts.
22) Attach the holding rope (8).
23) Attach a 2-fall attachment (6) (2 m with shackle) to the upper attachment plates.
24) Carefully put up the tower head section upper part.
25) Check the fall protection.
26) Tension the rope of the fall protection if required.
→ You have pre-assembled the fall protection.
27) Fasten the ladder with hoop guard (9) using the screws (M16x35 ISO 4017-8.8).
28) Inspect the load measuring shaft for visible damage.

6 Pre-assembly on ground

→ You have successfully pre-assembled the tower head section.

6.1.3 Installing the monorail trolley





1	Monorail trolley	4	Clevis load bar
2	Beam	5	Side element 2
3	Side element 1	6	Castors

> The auxiliary crane has been assembled.

1) Bolt the clevis load bar (4) to the two side elements (3, 5).
   NOTICE! The clevis load bar (4) has a mating thread. You can adjust the distance between the side elements (3, 5) by turning the clevis load bar (4).
2) Engage the monorail trolley (1) into the beam (2) (see drawing).
3) Continue tightening the clevis load bar (4) until the castors (6) touch the beam (4) (see drawing).

→ You have installed the monorail trolley.

6.2 Pre-assembling the electrical system of the tower head section

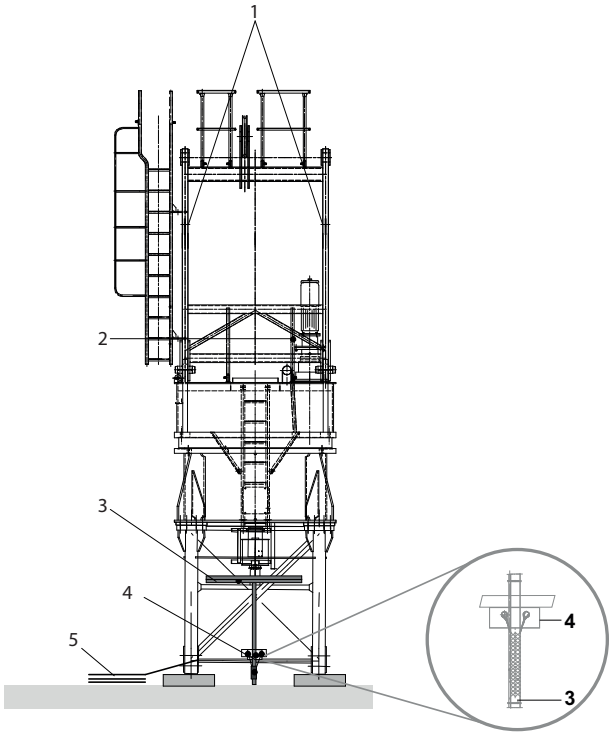


⚠ DANGER

Live electrical equipment

Risk of injury or death caused by electrical shock.

1) Always bond the slewing tower crane to ground.
2) Always use original fuses of the specified current rating.
3) Always allocate a skilled electrician to the work to be done.
4) Inspect the electrical equipment at cyclic intervals
5) Get appropriate First Aid instructions and information on precautions to be taken **before** starting work on live electrical equipment.
6) Disconnect the relevant unit components from the power supply.
7) Safeguard the work area against unintentional power on.
8) Connect the unit components to ground.
9) Fence off all adjacent live parts.



1	Lifting eyes	4	Mount for Kellem grip
2	Standard posts	5	Guide rope
3	Power and control line		

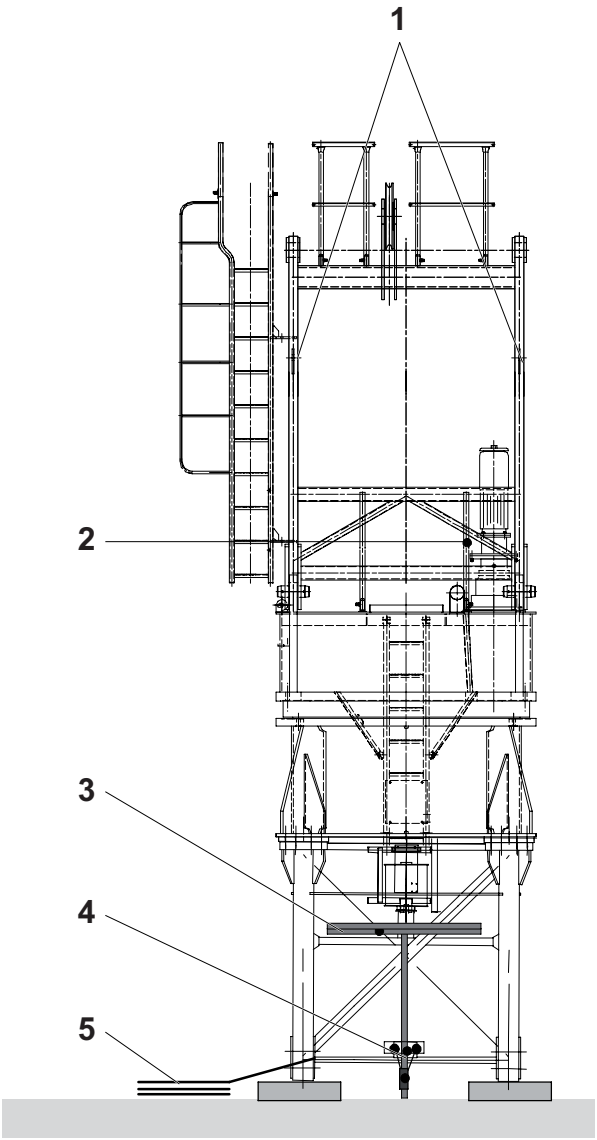
> Each crane component and all mounting hardware is available.

> The tower head section has been pre-assembled.

1) Connect the main power supply to the terminal box located in front of the slip ring system.
2) When you are using a mobile crane, connect the control wire to the terminal box located in front of the slip ring system.
3) Pull the main power supply cable through the Kellem grip.
4) Fasten the Kellem grip to the tower head section lower part.
5) Using cable ties, secure the control line to the main power supply cable.
6) Coil the loose cable ends.
7) Place the coiled cable ends in the tower head section lower part.
8) Secure the coiled cable ends in the tower head section lower part.

→ You have successfully pre-assembled the electrical equipment of the tower head section.

6.3 Attaching the tower head section lower part



1	Lifting eyes	4	Mount for Kellem grip
2	Standard posts	5	Guide rope
3	Power and control line		

> The tower head section lower part has been pre-assembled.

1) Attach a Two-point lifting tackle (13' 1-1/2" (4 m) with shackle) to the lifting points of tower head section lower part.
2) Put two wooden planks below the support surface of the two corner posts.
3) Slowly lift the tower head section lower part.
4) Securely put the tower head section lower part upright.

   → You have put the tower head section lower part upright.

5) Check the mounting screws (M30 ISO 4014-10.9) of the ball race bearing.
6) If necessary, pre-torque the mounting screws to a1600 Nm.

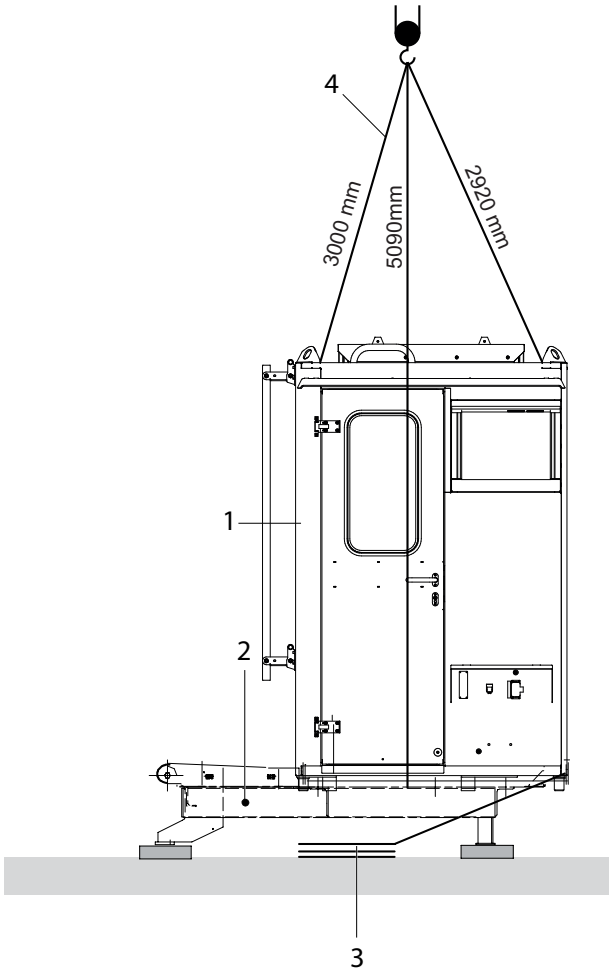
→ You have successfully put the tower head section lower part upright.

6.4 Pre-assembling the operator cabin and operator cabin platform

NOTICE

Always use the the lifting eyes at the front of the driver's cab.

For lifting the driver's cab, always take care that the front lifting eyes are used (in direction of front screen).



1	Driver's cab	3	Guide rope
2	Cab station	4	3-fall attachment (Ø 14 mm 1 x 2.92 m / 1 x 3.0 m / 1 x 5.09 m)

> The operator cabin and the operator cabin platform are not connected to each other.

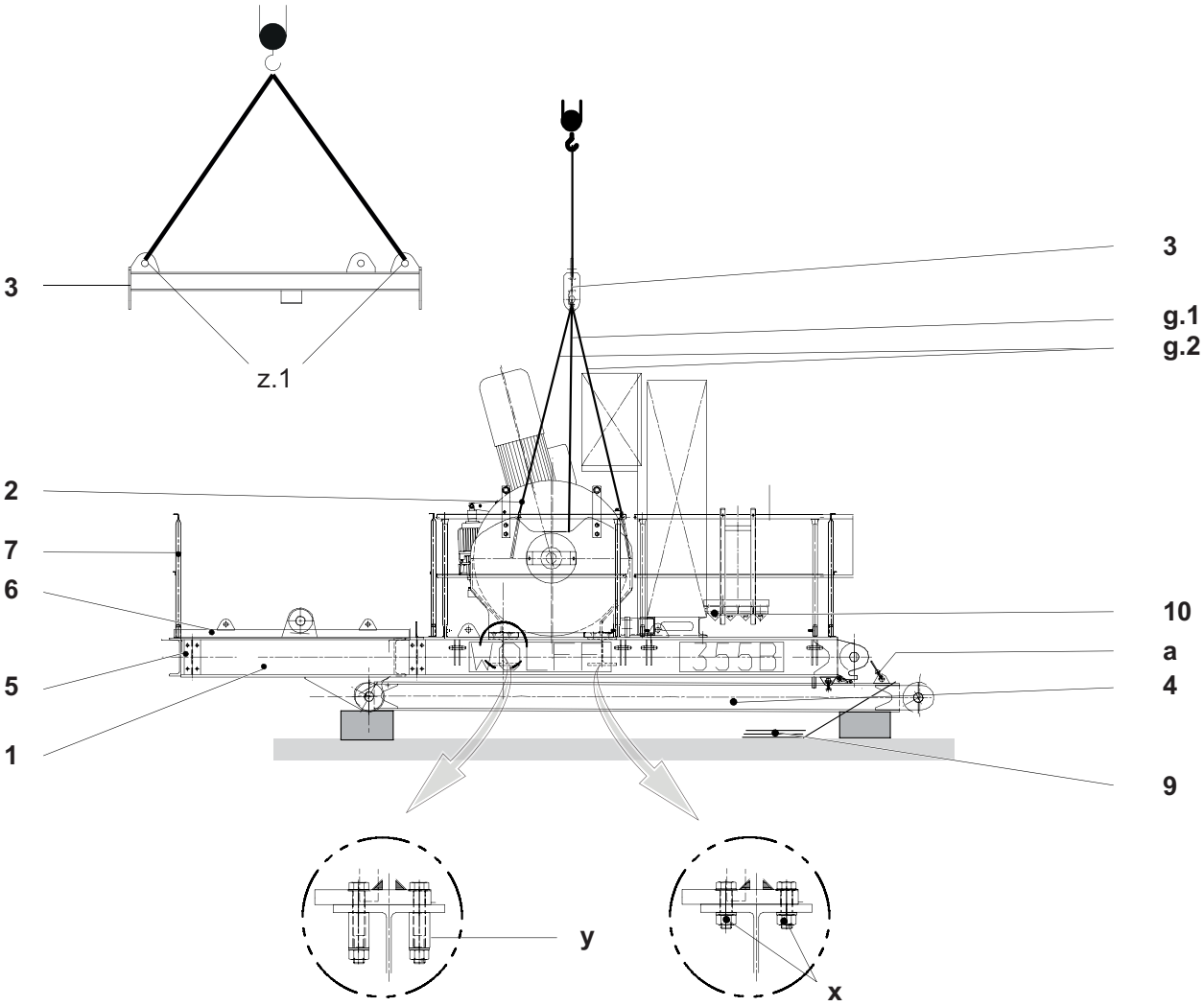
1) Connect the operator cabin (1) and the operator cabin platform (2) using the screws (M20x70 ISO 4014-8.8).
2) Insert the standard railings into the operator cabin platform (refer to OPM 2, Installing the standard railings).
3) Fasten the standard railings.

4) Secure the screws using lock nuts.
5) Attach a guide rope (3).
6) Attach a 3-fall attachment (4) to the operator cabin station and to the operator's cabin (see drawing).

→ You have successfully pre-assembled the operator cabin with operator cabin platform.

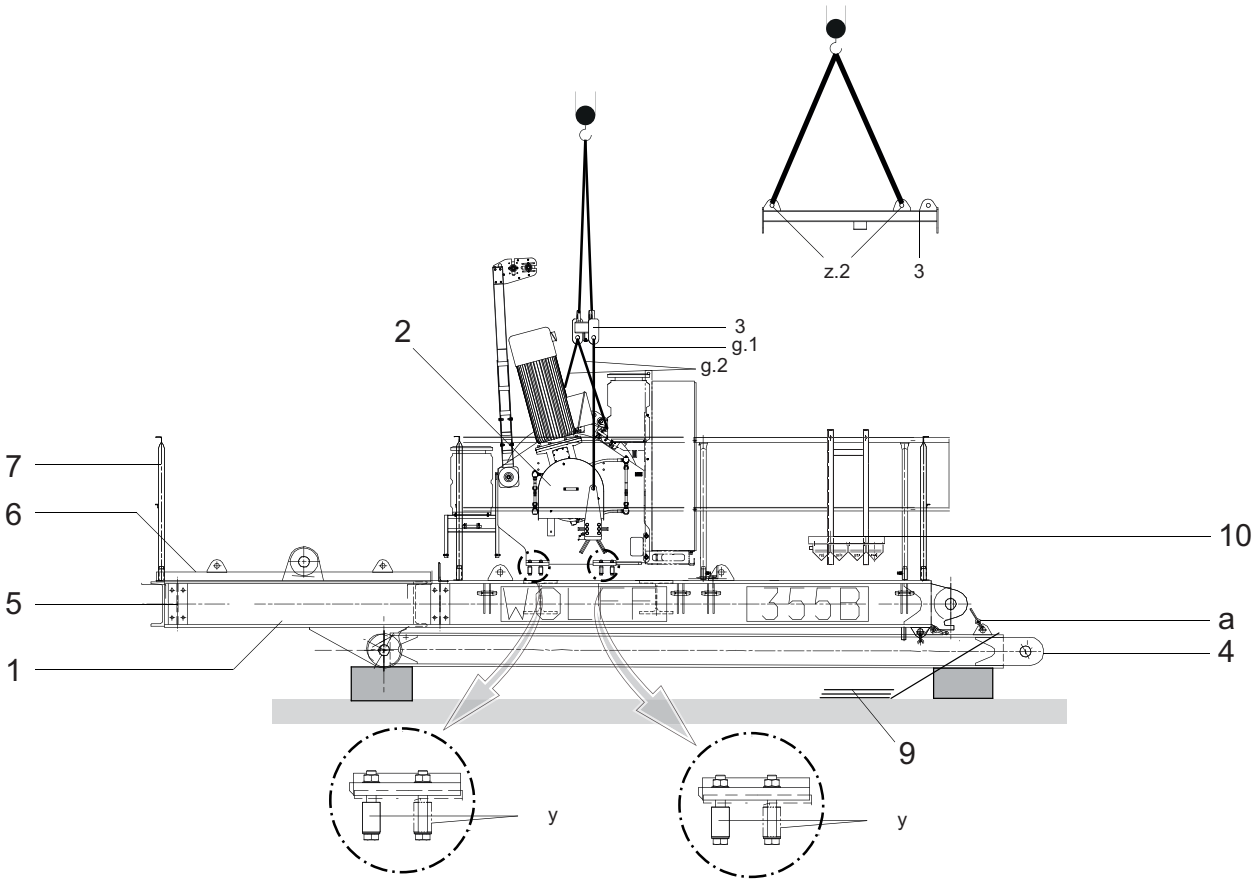
6.5 Pre-assembling the counterjib

Pre-assembly of the counterjib for Hw28110FU



1	Counterjib	10	Signal beacons
2	Hoist winch Hw28110FU	g.1	Attachment Ø20 mm x1.56 m
3	Mounting device	g.2	Attachment Ø18 mm x 1.30 m
4	Struts	a	Attachment ropeØ 8 mm x 1.735 m with shackle
5	Console for counterweight blocks	x	Hand-tighten the screws
6	Cover frame	y	Tighten the screws with a torque of 800 Nm, MoS2 lubricated
7	Standard railings	z.1	Attachment points for the 2-fall attachment when mounting the Hw28110FU
9	Guide rope		

Pre-assembly of the counterjib for Hw28132FU



1	Counterjib	9	Guide rope
2	Hoist winch Hw28132FU	10	Signal beacons
3	Mounting device	a	Attachment ropeØ 8 mm x 1.735 m with shackle
4	Struts	g.1	Attachment Ø 22 mm x 1.74 m
5	Console for counterweight blocks	g.2	Attachment Ø 20 mm x 1.52 m
6	Cover frame	y	Tighten the screws with a torque of 800 Nm, MoS2 lubricated
7	Standard railings	z.2	Attachment points for the 2-fall attachment when mounting the Hw28132FU

6.5.1 Preparing the substructure and putting down the counterjib

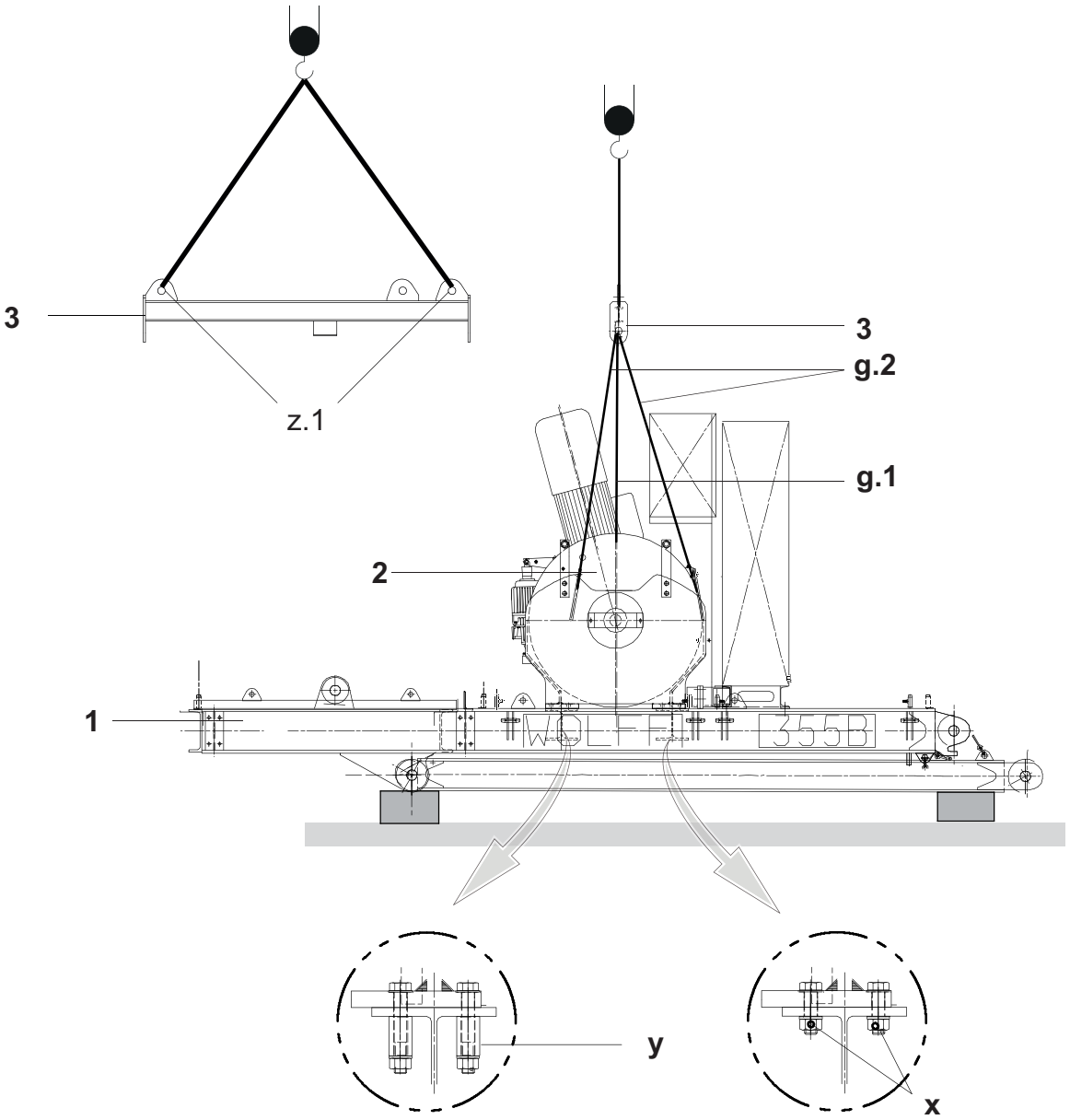
> Each crane component and all mounting hardware is available.

1) Prepare the substructures for the counterjib.
   NOTICE! When installing advertising plates, take into account the height of the substructure.
2) Attach the counterjib using the four-point lifting tackle.
3) Protect the counterjib against damage.
4) Lift the counterjib.
5) Place the counterjib on the substructures.

→ You have successfully placed the counterjib on the substructures.

6.5.2 Bolting the machine platform to the counterjib

6.5.2.1 Bolting the machine platform Hw28110FU to the counterjib



Mounting the Hw28110FU

1	Counterjib	g.2	Attachment Ø 18 mm x 1.30 m
2	Hoist winch Hw28110FU	x	Hand-tighten the screws
3	Mounting device	y	Tighten the screws with a torque of 800 Nm, MoS2 lubricated
g.1	Attachment Ø 20 mm x 1.56 m	z.1	Attachment points for the 2-fall attachment when mounting the Hw28110FU

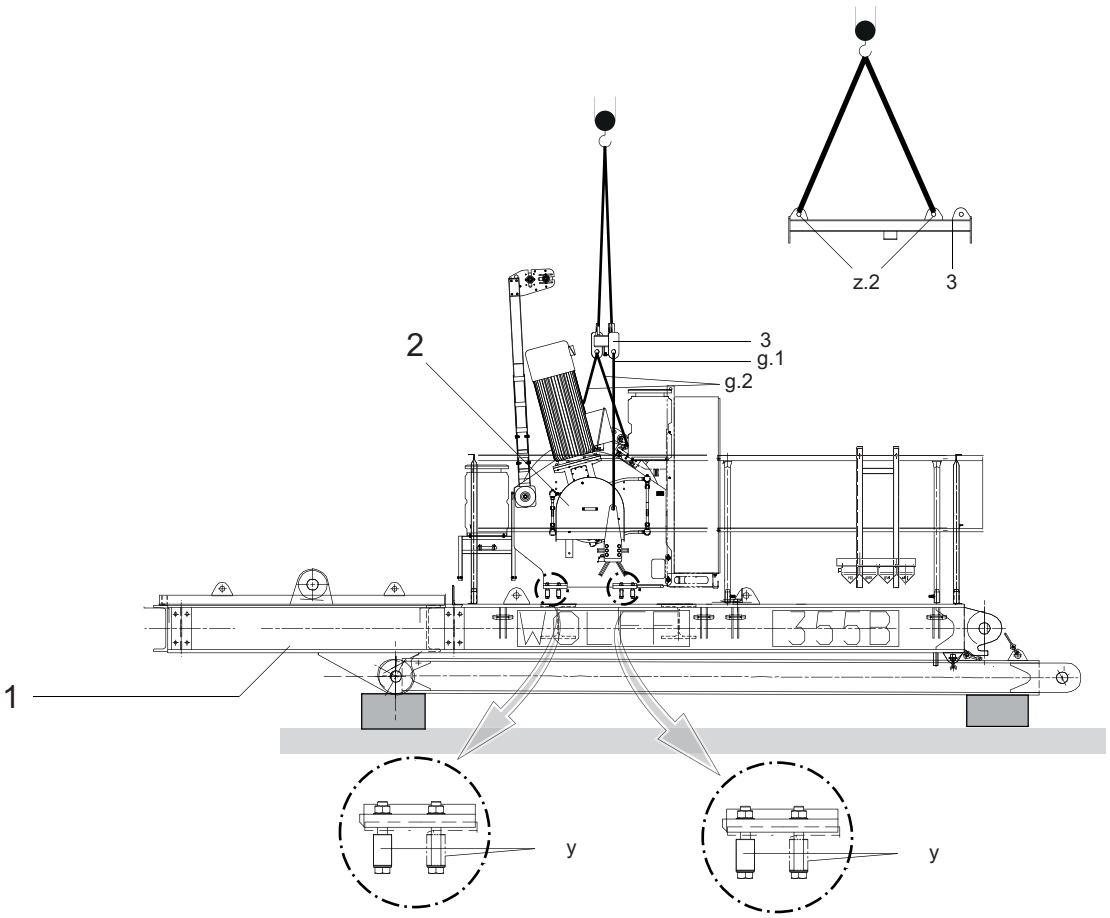
Mounting the machine platform Hw28110FU

> The machine platform and the counterjib are not connected with each other.

1) Attach the mounting device (3) with an 2-fall attachment.
   NOTICE! The mounting device is stored above the control cabinet of the Hw28110FU. Observe the attachment points (z.1.)!
2) Lift the mounting device (3) above the hoist winch Hw28110FU (2).
3) Attach the hoist winch Hw28110FU (2) with the attachment ropes (g.1 and g.2).
4) Engage the attachment ropes (g.1 and g.2) with the hoist winch Hw28110FU (2).
5) Lift the hoist winch (2) on the counterjib (1).
6) Bolt the machine platform to the counterjib by means of the screws (y) (M24x160 ISO 4014-10.9) and tighten the screws with an tightening torque of 800 Nm.
7) Bolt the machine platform to the counterjib by means of the screws (x) (M24x80 ISO 4014-10.9) and hand-tighten the screws.
8) Disconnect the attachment ropes (g.1 and g.2) and put the attachment ropes in the tool box of the crane.
9) Deposit the mounting device (3) on the control cabinet.

→ You have successfully bolted the machine platform to the counterjib.

6.5.2.2 Bolting the machine platform Hw28132FU to the counterjib



Mounting the Hw28132FU

1	Counterjib	g.2	Attachment Ø 20 mm x 1.52 m
2	Hoist winch Hw28132FU	y	Tighten the screws with a torque of 800 Nm, MoS2 lubricated
3	Mounting device	z.2	Attachment points for the 2-fall attachment when mounting the Hw28132FU
g.1	Attachment Ø 22 mm x 1.74 m		

Mounting the machine platform Hw28132FU

> The machine platform and the counterjib are not connected with each other.

1) Attach the mounting device (3) with an 2-fall attachment.
NOTICE! The mounting device is stored above the control cabinet of the Hw28132FU. Observe the attachment points (z.2.)!
2) Lift the mounting device (3) above the hoist winch Hw28132FU (2).
3) Attach the hoist winch Hw28132FU (2) with the attachment ropes (g.1 and g.2).
4) Engage the attachment ropes (g.1 and g.2) with the hoist winch Hw28132FU (2).

5) Lift the hoist winch (2) on the counterjib (1).
6) Bolt the machine platform to the counterjib by means of the screws (y) (M24x160 ISO 4014-10.9) and tighten the screws with an tightening torque of 800 Nm.
7) Disconnect the attachment ropes (g.1 and g.2) and put the attachment ropes in the tool box of the crane.
8) Deposit the mounting device (3) on the control cabinet.

→ You have successfully bolted the machine platform to the counterjib.

6.5.3 Pre-assembling the console for counterweight blocks and bolt supports

> After the assembly of the machine platform, the attachment is unhinged.

1) Install the cover frames into the holding fixtures for the counterweights in the counterjib.
2) Remove the transport restraint between the struts and the counterjib.
3) Inspect the attachment ropes (Ø 8 mm x 1.735 m with shackle) between the struts and the counterjib.
4) Fasten the side-mounted consoles for the counterweight blocks using the screws (M20x50 EN 14399 -10.9).
5) Tighten the screws with a torque of 450 Nm.
6) Bolt the side-mounted platforms to the counterjib.
7) Fasten the small transition platform using the screws (M20x50-8.8 ISO 4017), washers (A20 200HV ISO 7090) and nuts (M20-8 ISO 4032) to the first platform of the counter jib (at drivers's cab side)

→ You have successfully pre-assembled the consoles for the counterweight blocks.

6.5.4 Installing the standard railings and signal lights

> The consoles fpr the counterweight blocks have been pre-assembled.

1) Insert the standard railings (refer to OPM 2, Installing the standard railings).
2) Fasten the standard railings.
3) Secure the screws using lock nuts.
   → You have installed the standard railings.
4) Suspend the signal lights from the standard railing.
5) Fasten the signal lights using the screws (M12x130 ISO 4014-8.8).
6) Secure the screws using lock nuts.
   → You have pre-assembled the signal lights.

→ You now have successfully installed the standard railings and signal lights.

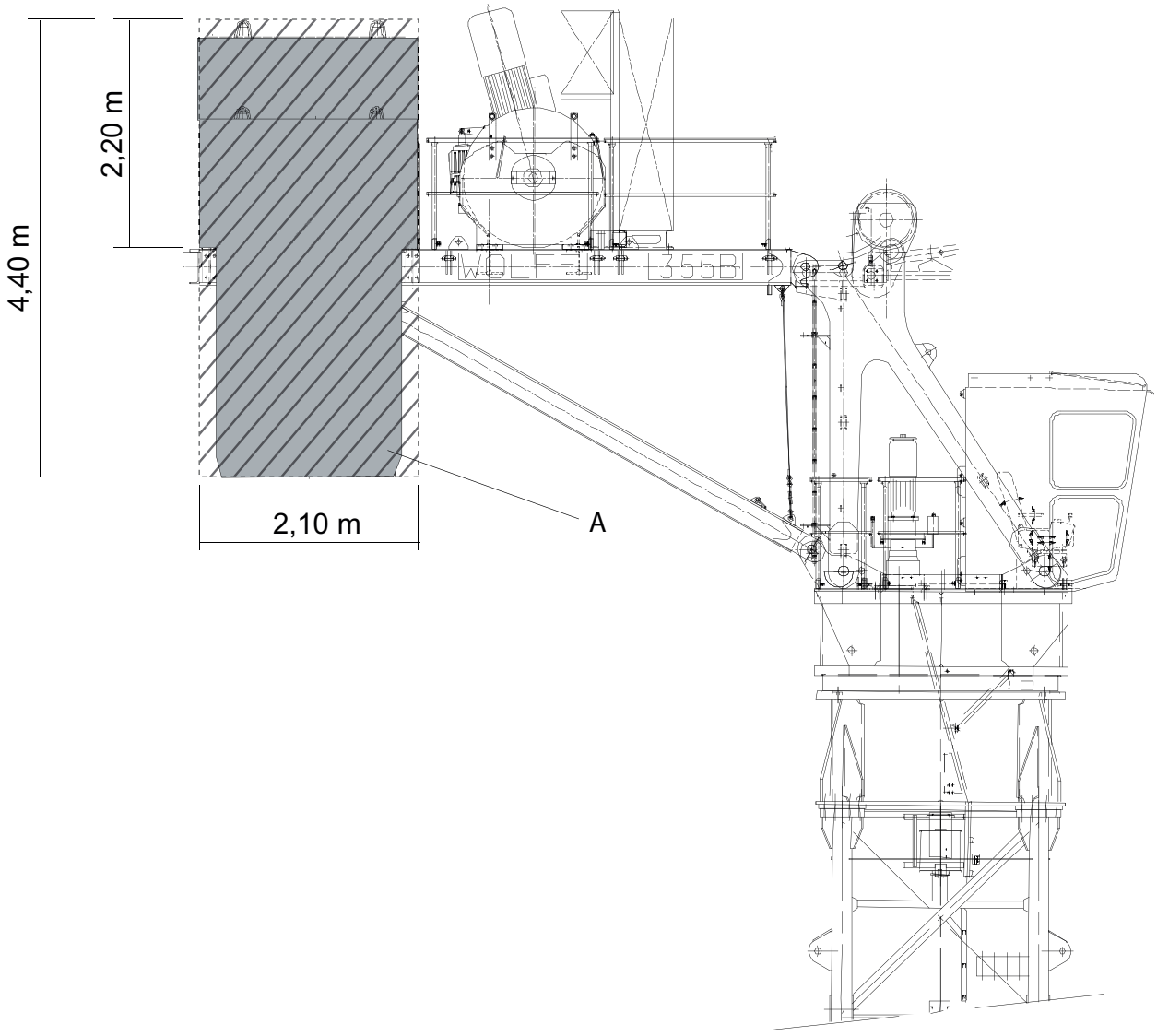
6.5.5 Attaching the four-point lifting tackle and guide rope

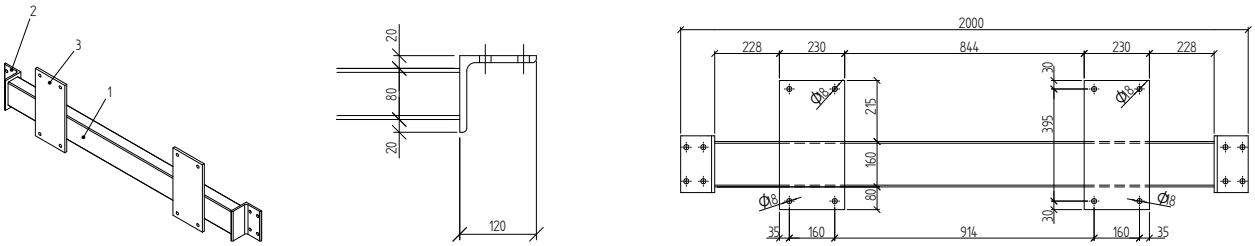
> The counterjib has been pre-assembled.

1) Attach the guide rope to the counterjib (refer to figure on page: [78]).
2) Use a sling (4x attachment rope Ø 24 mm x 3000 mm with shackles D 5650) to suspend the counterjib the mounting device in accordance with the counterjib attachment plan in OPM II, Technical Data and Preparation of Construction Site.
3) Lift the counterjib by 0.5 m.
   DANGER! Ensure that the counterjib is suspended horizontally in its transverse direction.

→ You have successfully attached the sling and the holding rope.

6.5.6 Attaching advertising signs to the counterjib





Hole pattern B

1	Backing braces	3	Flange
2	Connecting elbow		

Adapter / counterjib joint				
8	Hexagonal head screw	M16 x 60	ISO 4014-8.8	galvanized
16	Hexagonal nuts	M16	ISO 4032-8	galvanized
16	Washers	A17	ISO 7090	galvanized

> The 4-fall attachment and guide rope are attached.

1) Use the screws (M16 x 60 DIN 4014-8.8, galvanized) to mount the adapter elements to the prefabricated holes of the counterjib (hole pattern B).
NOTICE! The advertising sign must not be larger than the shadowed area (A).

2) Install the adapter elements to the advertising plate (1). The above hole pattern B determines the way how to install the plate.
WARNING! Observe the permitted total weight of 300 kg for the advertising signs.

→ You have successfully installed the advertising signs to the counterjib.

6.6 Pre-assembling the jib

DANGER

Risk of instant dropping of the jib in consequence of jammed assembly brace ropes.

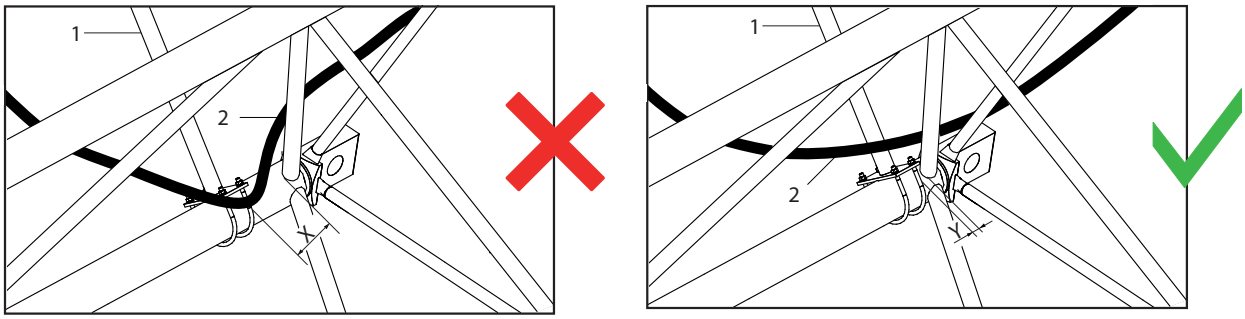
Risk of destruction of the brace ropes, death or serious injuries.
Incorrect assembly of the boom protectors may cause the assembly brace rope to get jammed between the struts at the jib and the boom protectors.
Correct assembly ensures that the jib cannot be blocked by a jammed assembly brace rope.

> You intend to assemble the boom protectors on the jib side without platforms.

1) Assemble the boom protectors as described in this chapter.

2) During the assembly, make sure to mount the boom protectors in as small a distance (Y) as possible.

→ The risk of jerky jib lowering, of damage to the jib or the assembly brace rods, and of injury to persons is now eliminated.



A B

1	Boom protector	B	Correct assembly of the boom protectors
2	Assembly brace rope	X	Incorrect: distance too big
A	Incorrect assembly of the boom protectors	Y	Correct: distance as small as possible

NOTICE

Assembly position support block for pulley block.

Install the support block for the pulley block so that it can be bolted to the last brace rod and placed on the support block.

Take care to the measure (X) of the pulley block (refer to figure).
The measure X is500 mm.

NOTICE

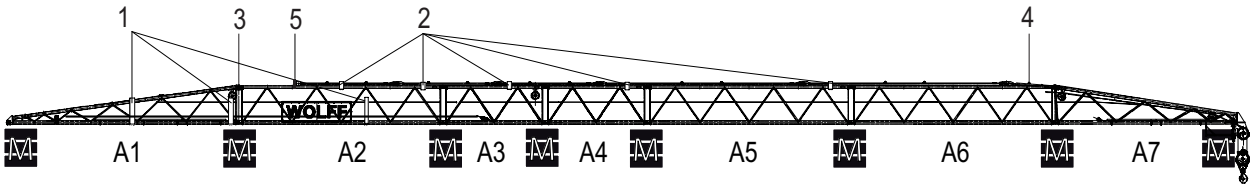
For assembly, the jib must always be supported at the pivot point by means of an assembly support.

NOTICE

Ensure that the connection points are at the same height.
The entire jib must always be supported at each joint by means of an assembly support.

The location as well as the markings and weights of the individual jib elements are specified in the attachment plan and the packing list.

Bolt the jib elements and secure them at the top and bottom chord with the appropriate retaining elements (see List of bolts, page: [39]).

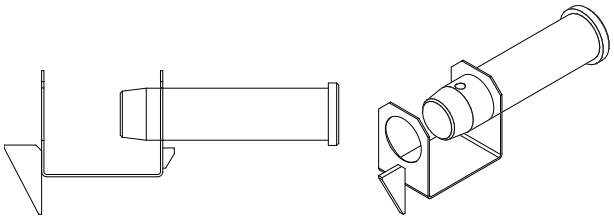


1	Assembly cable guide	5	Support block for pulley block
2	Brace storage compartment	M	Assembly supports
3	Top boom protector	A	Jib elements
4	Brace rod 1		

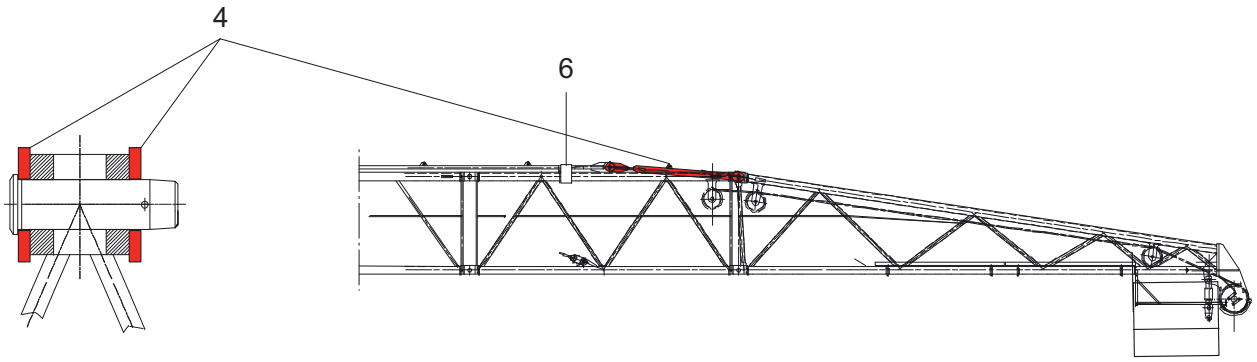
> Each crane component and all mounting hardware is available.

1) Suspend the jib elements using a 2-fall attachment.
2) Place the jib elements on the assembly blocks (refer to figure).

6 Pre-assembly on ground

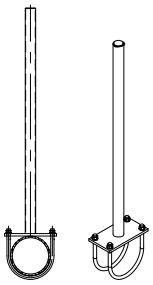


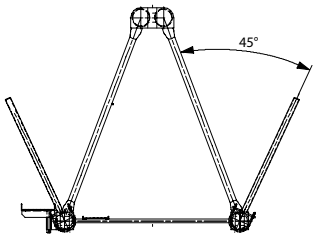
3) Install the top boom protectors (3) between the jib elements 1-2.
4) Bolt the jib element 1 to the following jib element and to the top boom protector (3) using the bolts (Ø 95/80x255).
5) Secure the bolts using the retaining elements provided (see List of bolts, page: [39]).
6) Bolt the jib element 1 to the following jib element at the bottom boom using the bolts (Ø 95/80x237).
NOTICE! Insert the collar bolts from outside to inside.
7) Secure the bolts using the retaining elements provided (see List of bolts, page: [39]).
8) Bolt the following jib elements (except jib element 6) to the following jib elements and to the potentially required top boom protectors (3) using the bolts (Ø 95/80x237).
9) Secure the bolts using the retaining elements provided (see List of bolts, page: [39]).
10) Bolt the following jib elements (except jib element 6) to the following jib element at the bottom boom using the bolts (Ø 95/80x237).
NOTICE! Insert the collar bolts from outside to inside.
11) Secure the bolts using the retaining elements provided (see List of bolts, page: [39]).



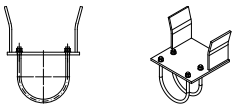
12) At the last jib element before the jib tip, mount the support block for brace rod 1 (6).
13) Secure the support block for brace rod 1 (6) using the brackets (16x580), lock washers (A 16) and nuts (M16-8 ISO 4032).
14) Bolt the jib element 6 to the preceding jib element and to the brace rod 1 (4) at the upper boom using the bolts (Ø 95/80x285).
15) Secure the bolts using the retaining elements provided (see List of bolts, page: [39]).
16) Bolt jib element 6 to the preceding jib element at the bottom boom using the bolts (Ø 95/80x237).
NOTICE! Insert the collar bolts from outside to inside.
17) Secure the bolts using the retaining elements provided (see List of bolts, page: [39]).

→ You have bolted the jib element to one another.

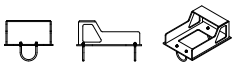




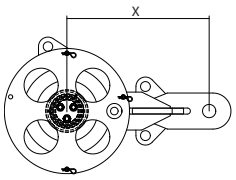
18) Swing the assembly rope guide (1) outward to an angle of 45°.
19) Tighten the screws of the assembly rope guide (1) hand-tight with a spanner.
    → You have installed the assembly rope guide.



20) Install the storage compartment for the brace rods (2) at the top boom (refer to figure).
21) Tighten the screws of the support (2) hand-tight with a spanner.
    → You have installed the storage compartment for the assembly rope guide.
22) Install the brace rods for the respective jib length using the appropriate bolts (refer to the Jib brace diagram of manual II - Technical data and site preparation).



23) Using the straps (16x521), install the storage compartment for the pulley block (5) at the top boom.
24) Secure the straps using counter-nuts (M16-8 ISO 4032) and lock washers (A 16).
25) Tighten the nuts hand-tight with a spanner.



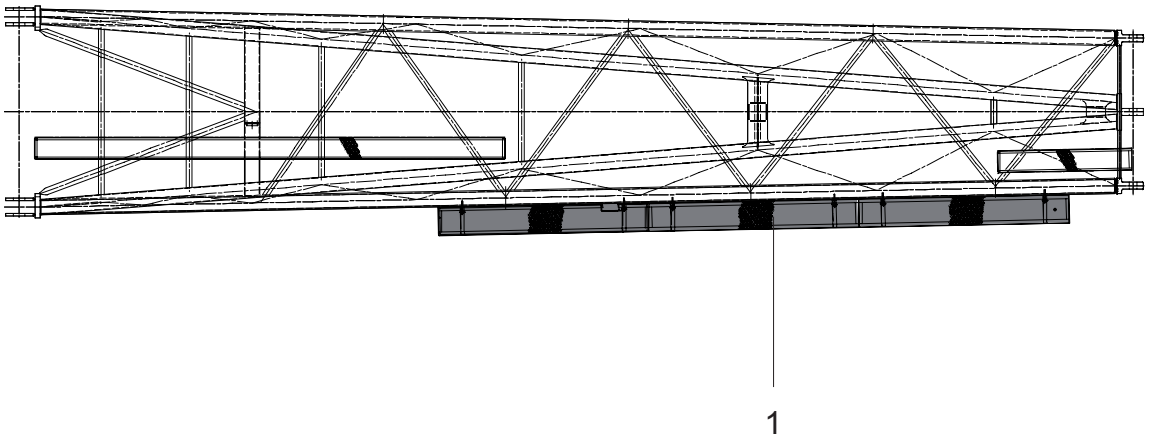
Exemplary illustration of the pulley block

26) Push the support block for the pulley block to the measure X (X=500 mm refer to figure) behind the last brace rod.
    → You have successfully installed the storage compartment for the pulley block.

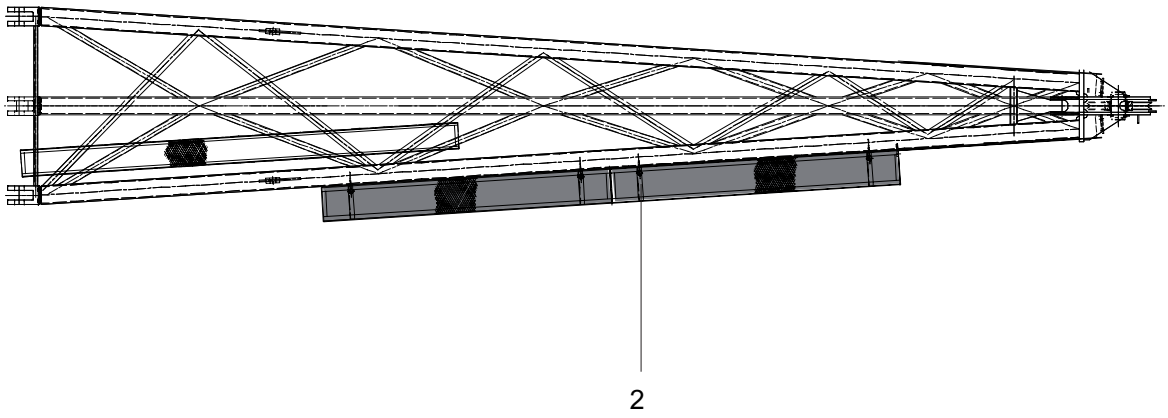
→ Follow the remaining steps for jib pre-assembly.

6.6.1 Installing the platforms

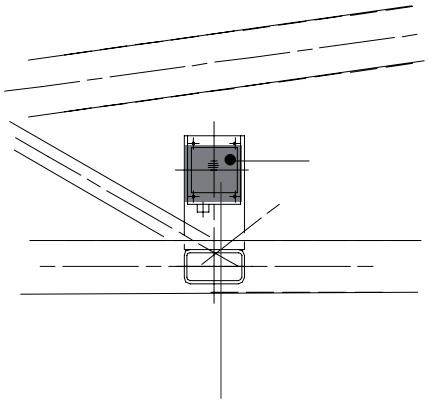
> The jib has been pre-assembled.



1) Install the three side-mounted platforms (1) to the jib element 1.
2) Secure the platforms using spring retainers.
   → You have installed the platforms for jib element 1.



3) Install the three side-mounted platforms (1) to the jib element 6.
4) Secure the platforms using spring retainers.
5) Fasten the two platforms (2) using the screws (M16x35 ISO 4017-8.8) to the jib element 6.
   → You have installed the platforms for jib element 6.



3

6) Inspect the inclination sensor (3) at the jib element 1 for visible damage.
WARNING! If damaged, replace the inclination sensor before installing the jib.

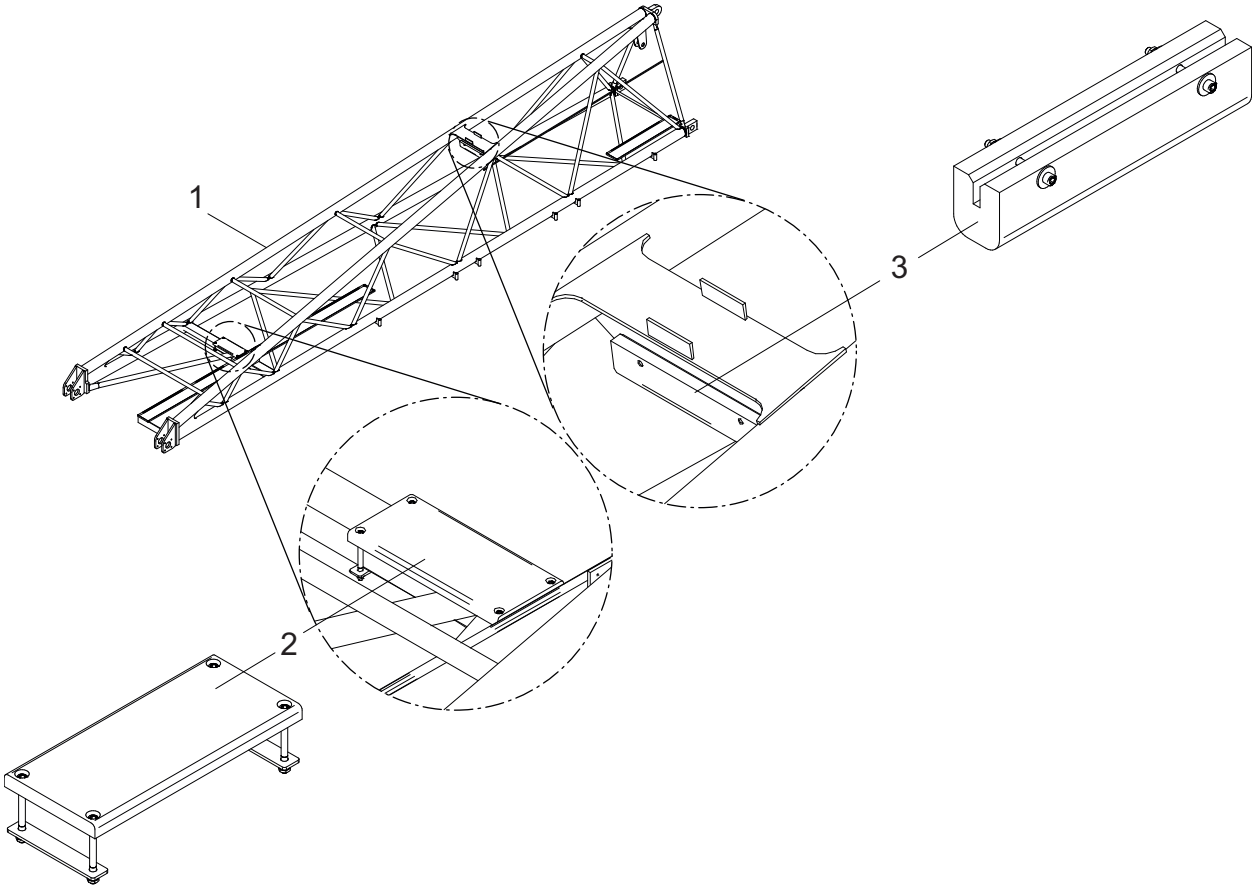
→ You have checked the inclination sensor.

→ You have successfully pre-assembled the inclination sensor and the platforms.

6.6.2 Mounting the scoring protection to jib section 1

NOTICE

The scoring protection is only required if hoist winch Hw28132FU is used.



1	Jib element 1	3	Top scoring protection
2	Bottom scoring protection		

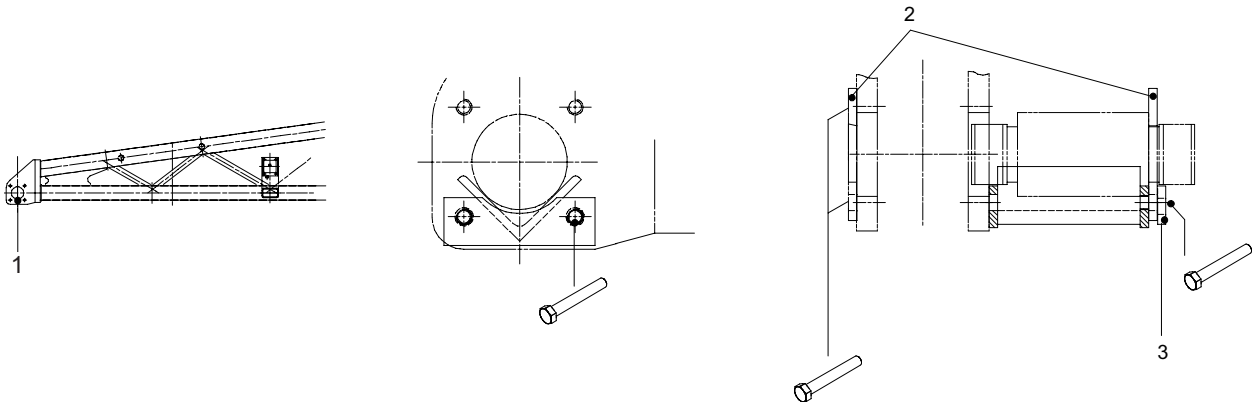
> You have installed the platforms.

1) Install the bottom scoring protection (2) by means of the strips (40x6x220), cylinder screws (M12x130-8.8 ISO 4762), washers (12-200HV ISO 7090), hexagonal nuts (M12-8 ISO 4032) and retaining nuts (M12 DIN 7967).
2) Drill 2 Ø 14 mm bores for the top scoring protection (3) into the plate at jib section 1 (1).
3) Install the top scoring protection (3) by means of the cylinder screws (M12x130-8.8 ISO 4762), washers (21-200HV ISO 9021), nuts (M12-8 ISO 4032) and retaining nuts (M12 DIN 7967).

→ You have installed the scoring protection for the hoisting rope.

6.6.3 Pre-assembling the bolt supports of the jib

> The platforms have been installed at the jib.

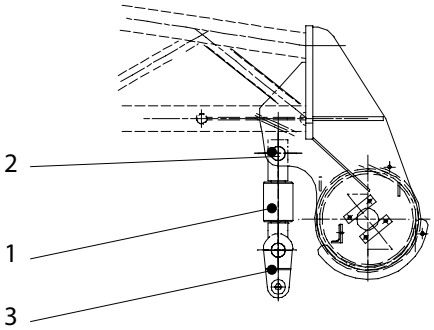


1) Fasten the bolt supports (1) using the screws (M20x40 ISO 4017-8.8) to the jib element 1.
2) Place the shaft (Ø 120x320) in the bolt support.
3) Secure the bolts using the shaft brackets (190x12x190) (2) (50x12x190) (3).
4) Fasten the shaft brackets (190x12x190) (2) using the screws (M20x40 ISO 4017-8.8).
5) Fasten the shaft brackets (50x12x190) (3) using the screws (M20x50 ISO 4017-8.8).

→ You have successfully installed the bolt support.

6.6.4 Pre-assembling the jib tip

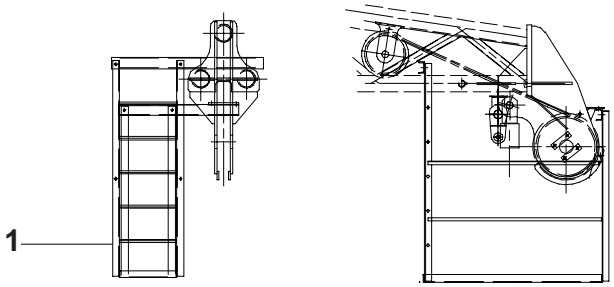
Installing the twist swivel



> The jib element 6 has been installed.

1) Bolt the twist swivel (1) and the shackle (3) to the jib element, using the bolt (Ø 75/62x215) (2)6.
2) Secure the bolt (2) using a spring retainer.
   → You have successfully installed the twist swivel.

Pre-assembling the assembly platforms

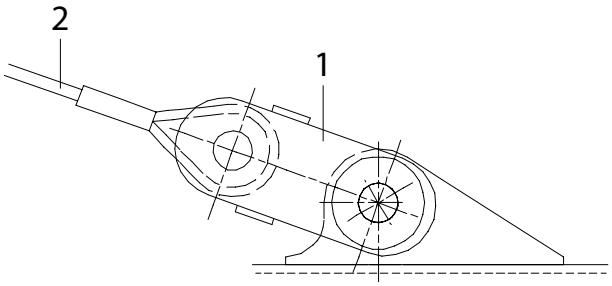


> The jib element 6 has been installed.

1) Deposit the mounting platforms (1) under the tip of the jib element.6 ab.
2) Connect the mounting platforms (1) using the screws (M16x35 ISO 4017-8.8) to the jib element6.

→ You have successfully installed the mounting platform.

Pre-assembling the assembly brace rope

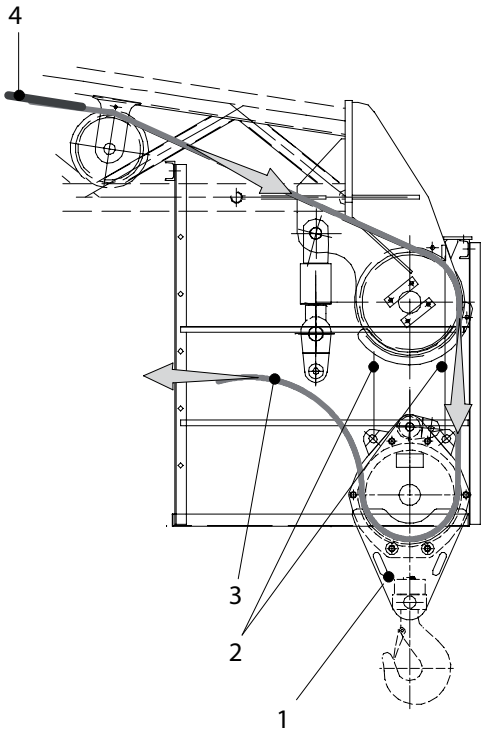


> Jib element 6 has been mounted.

1) Place the assembly brace ropes (2) in the jib.
NOTICE! Obtain the connecting points of the assembly brace ropes from the attachment diagram.
2) Bolts the assembly brace ropes (2) using the bolts (Ø 60/50x122) to the plates (1) at the jib element.
3) Secure the bolts using spring retainers.

→ You have successfully pre-assembled the assembly brace ropes.

6.6.5 Pre-assembling the hook block



1	Snatch block	3	Auxiliary assembly rope
2	Attachment ropes	4	Cable sock

> The jib tip has been pre-assembled.

1) Place the snatch block below the jib tip.
2) Fasten the attachment ropes with shackle (2) to the snatch block (1).
3) Engage the hangers of the attachment ropes (2) into the jib tip.
4) Reeve the auxiliary assembly rope (3) (nylon rope Ø 20 mm x 10 m with Kellem grip (4)) (see drawing).
5) Fasten the ends of the auxiliary assembly rope (3) to the top boom of the jib.

→ You have successfully pre-assembled snatch block.

7 Assembly



⚠ WARNING

Unprofessional assembly

The slewing tower crane may overturn.

1) Carry out the assembly operations without stopping in between.
2) Strictly adhere to the specified sequence of the assembly steps.
3) Make sure that no loose parts (e.g. bolts, cotter pins etc.) will remain at the crane.



NOTICE

After assembly, the slewing tower crane will be operational only when assembly switch 1SO is set to position 0 (with limited angle of rotation) or to position 2 (without limited angle of rotation), the slewing gear brakes are operational (lever unlocked), and all safety devices are properly set and checked.

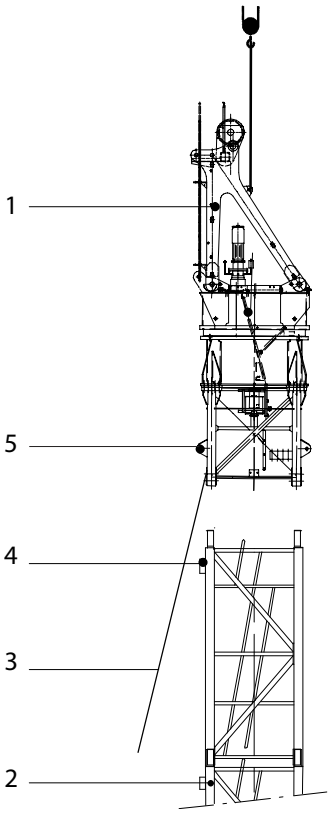


NOTICE

Leaving the attachment extension at the component for disassembly.

If you used attachment extensions during assembly (e.g. shackles, chains etc.) to compensate imbalances, leave them at the components. You can simplify the disassembly by leaving the attachment extensions at the components of the crane.

7.1 Mounting the tower head section lower part to the tower



> The tower has been assembled.

1) Mount the tower head section lower part to the tower.
2) Bolt the tower head section lower part to the tower using the bolts (Ø 70 x 295).
3) Secure the bolts.

→ You have successfully installed the tower head section lower part.

7.1.1 Lowering and securing the electric lines and secure

> The electric line is wound up in the tower head section.

1) Lower the electric lines outside the tower down to the tower base.
2) Properly secure the electric lines to the tower elements.

→ You have successfully lowered and secured the electric lines.

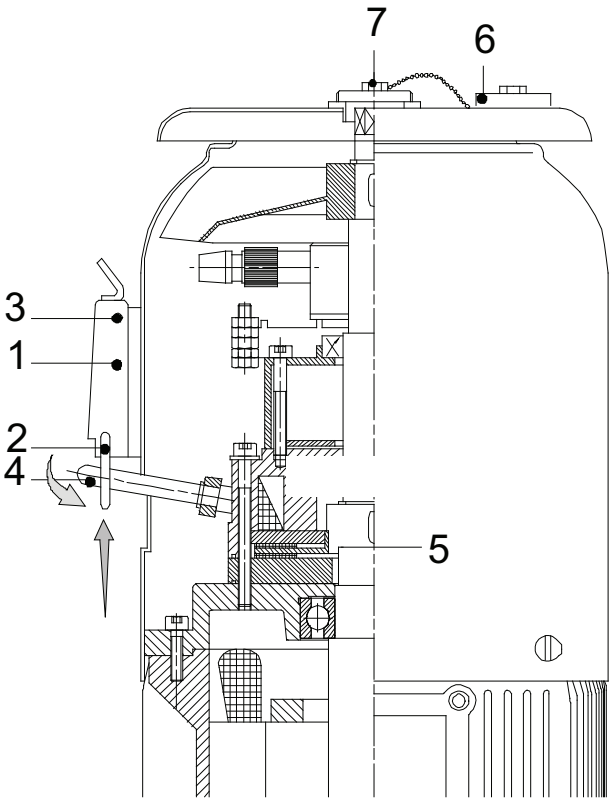
7.2 Turning the tower head

7.2.1 Turning the tower head

NOTICE

How to slew the tower head section without an operator cabin connected:

To slew the tower head section without operator cabin, you must release the slewing gear brakes. If an operator cabin has been mounted and power has been connected, you can slew the tower head section from the operator cabin (refer to: OPM 3, Crane Operator's Manual).



1	Locking lever	5	Slewing gear brake
2	Clamping strap	6	Cap
3	Retaining pin	7	Hexagonal head
4	Manual release lever up (brakes released)		

> You want to slew the tower head section by hand.

1) Release all slewing gear brakes (refer to page: [274]).
   → You have released the slewing gear brakes.
2) Turn the tower head section with hexagonal shaft (7).

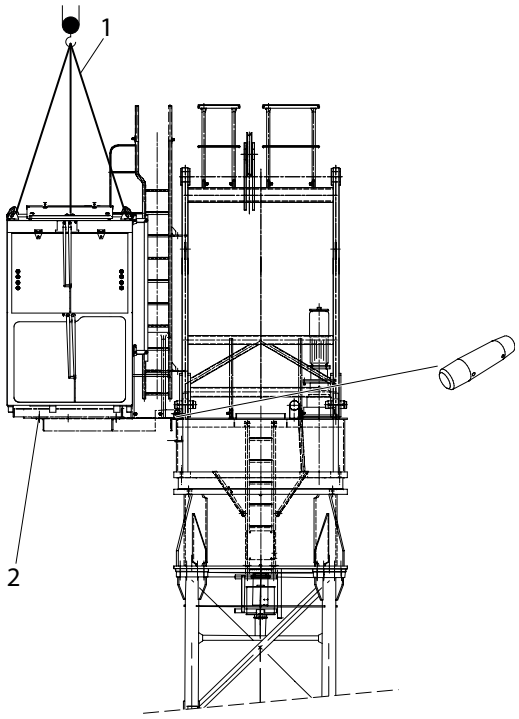
→ You have turned the tower head section.

3) Pull out the retaining pin (3).
4) Move down the locking lever (1).
5) Slide the clamping strap (2) over the manual release lever (4).
6) Move up the locking lever (1).
7) Secure the locking lever (1) with the retaining pin (3).
8) Repeat this procedure for all slewing gear brakes.

→ You have reset the slewing gear brakes operational.

→ You have successfully turned the tower head section by hand.

7.3 Installing the operator cabin



> The tower head section lower part has been installed.

1) Attach the operator's cabin and platform with the pre-assembled attachment (1).
2) Lift the operator cabin with operator cabin platform to the tower head section lower part until it can be bolted.
3) Bolt the operator cabin platform to the tower head section lower part using the bolts (Ø 30x135).
4) Secure the bolts using spring retainers.

→ You have successfully installed the operator cabin with operator cabin platform.

(see also):

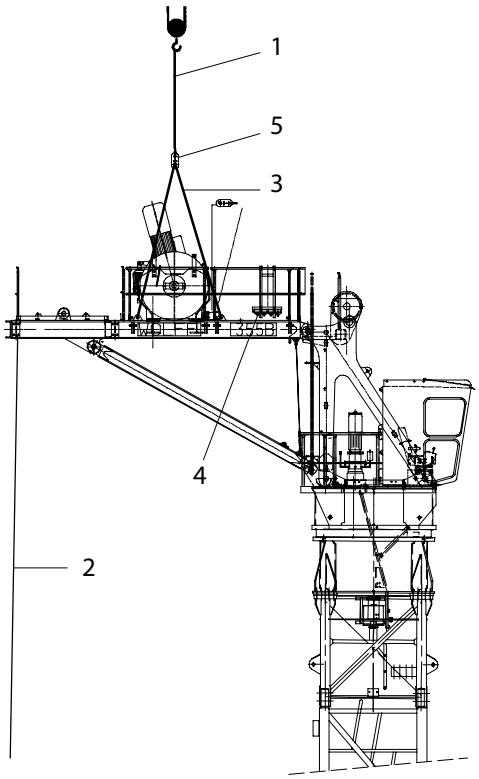
- List of bolts [39]

7.4 Installing the counterjib

NOTICE

Leaving the attachment extension at the component for disassembly.

If you used attachment extensions during assembly (e.g. shackles, chains etc.) to compensate imbalances, leave them at the components. You can simplify the disassembly by leaving the attachment extensions at the components of the crane.



Exemplary illustration with Hw28110FU

1	2-fall attachment	4	Signal beacons
2	Guide rope	5	Mounting device
3	4 attachment cables (Ø 24 mm x 3.0 mm with shackle)		

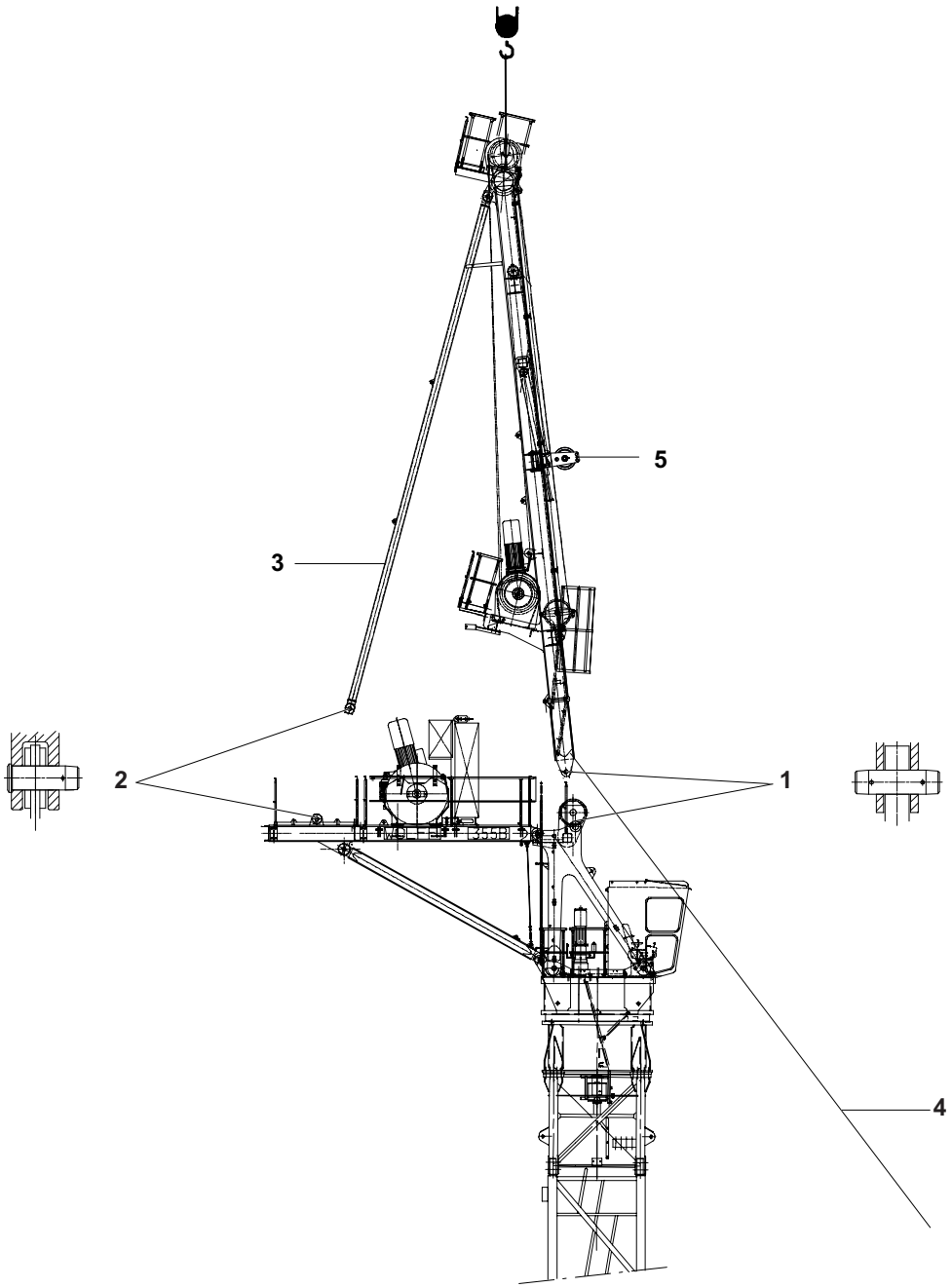
> The tower head section lower part has been installed.

1) Fold out the cover at the counterjib.
2) Before mounting the counterjib with pre-assembled Hw28132FU, disassemble the oil cooler (4 screws) and place the oil cooler onto the counterjib.
3) Suspend the counterjib to the mounting device (5).

4) Lift the counterjib to the tower head section lower part.
5) Bolt the counterjib to the connecting block using the (Ø 80x265).
6) Secure the bolts using cotter pins.
7) Carefully lower the counterjib.
8) Close the cover of the counterjib.
9) Remove the attachment ropes and the mounting device and secure the mounting device on the control cabinet.
10) Reinstall the oil cooler.
NOTICE! Only necessary, if the oil cooler was disassembled for mounting the counterjib.

→ You have successfully installed the counterjib.

7.5 Installing the tower head section upper part



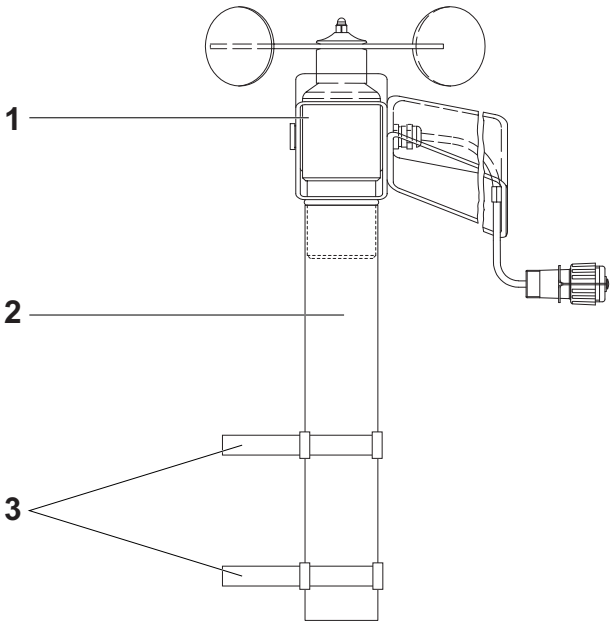
> The counterjib has been installed.

> The tower head section lower part has been installed.

> The jib has not been installed.

1) Attach a 2-fall attachment (2 m with shackle) to the upper attachment plates of the tower head section upper part.

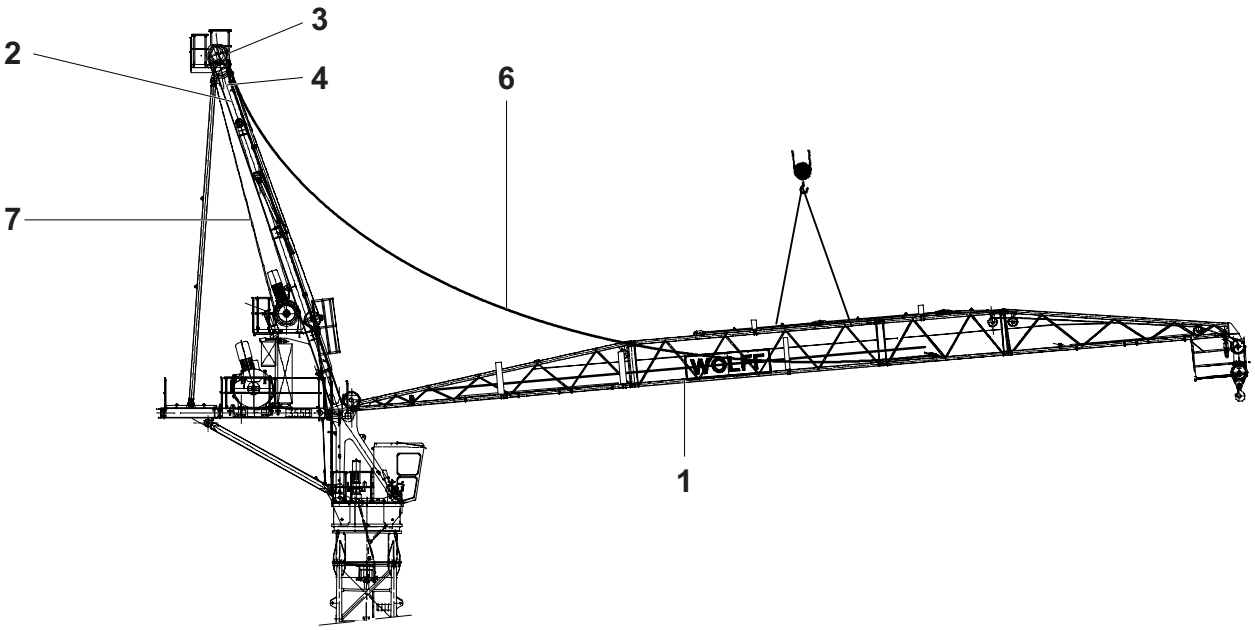
2) Lift the tower head section upper part to the lower part.
NOTICE! Use the guide rope (4) to prevent the tower head section upper part from turning.
3) Lower the tower head section upper part until it can be bolted to the connecting point 1.
4) At the connecting point 1, bolt the tower head section upper part to the tower head section lower part using the bolts (Ø 95/80x265).
5) Secure the bolts by means of cotter pins.
6) Further lower the tower head section upper part until it can be bolted to the connecting point 2.
7) At the connecting point 2, bolt the tower head section upper part to the tower head section lower part using the bolts (Ø 80x280).
NOTICE! Insert the bolts from outside to inside.
8) Secure the bolts by means of cotter pins.
→ You have installed the tower head section upper part.



9) Inspect the anemometer (1) for visible damage.
10) Install the anemometer (1) to the pipe (2).
11) Using the mounting clamps (3), fasten the pipe (2) at the standard rails of the platform on the tower head section upper part.

→ You have successfully installed the tower head section upper part.

7.6 Installing the jib



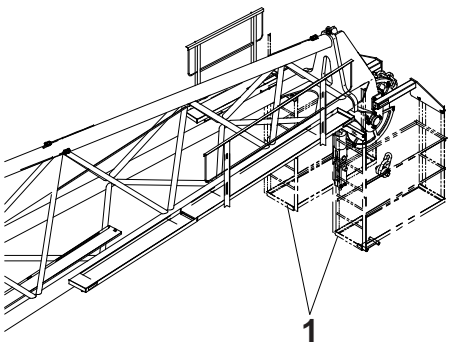
1	Jib	6	Assembly brace rope
2	tower head section	7	Pilot rope
3	Fixed point for assembly brace rope		

> The tower head section upper part has been installed.

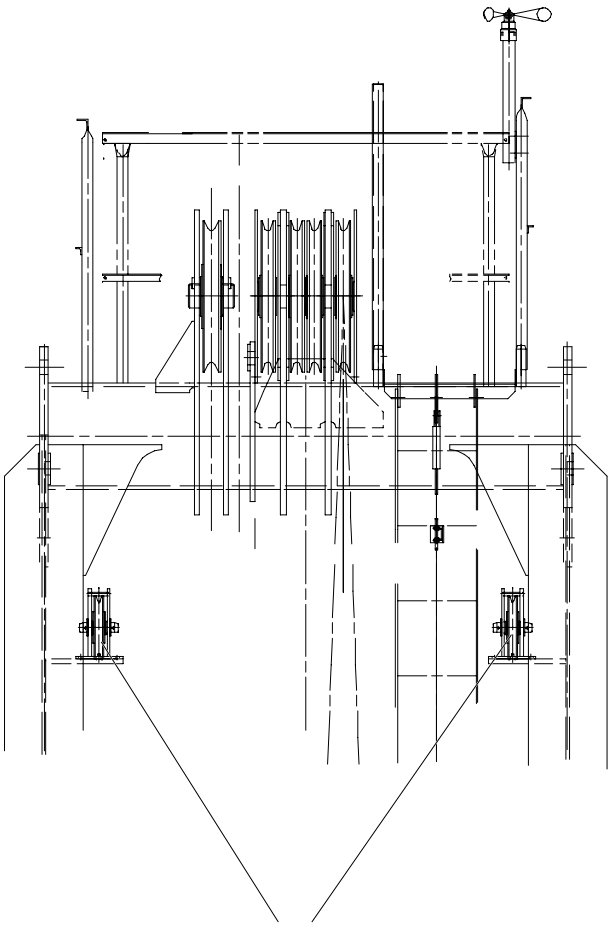
> The counterweights have not been installed.

> The slewing part is in the correct assembly position.

1) According to the attachment plan in OPM 2, suspend the jib.
2) Attach a guide rope to the jib element 1.
3) Lift the jib until you can mount the installation cabins at the jib tip.



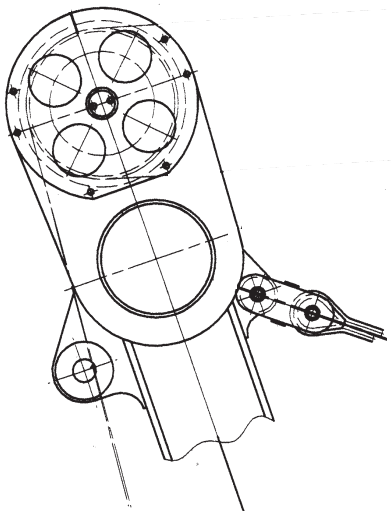
4) Deposit the mounting platforms (1) under the tip of the jib element.6 ab.
5) Connect the mounting platforms to the jib element (1) using the screws (M16x35 ISO 4017-8.8).6.
   → You have installed the mounting platforms.
6) Carefully lift the jib.
7) Check the center of gravity of the jib.
   DANGER! If the jib is not balanced, check the attachment points until the jib is exactly balanced horizontally.
8) Lift the jib to the pivot point at the tower head section.
9) Bolt the jib to the tower head section using the shafts (Ø 120x320).
10) Secure the shafts with the shaft brackets.
11) Pull the jib over by approx. 8 degrees.



4

12) Guide two pilot ropes using the guide pulleys (4) in the tower head section.
13) Pull the assembly brace rope up until it reaches the tower head section.

7 Assembly



1) Bolt the assembly brace rope to fixed point (3) at the tower head section using the bolts (Ø 60/50x122).
2) Secure the bolts using spring retainers.
3) Slowly lower the jib to its assembly position.
4) Install the electrical connections of the inclination sensor at the jib base.
5) Make the electrical connections for the luffing gear at the control cabinet.
6) Make the electrical connections for the load measuring shaft at the control cabinet.
7) Install the electrical connections of the anemometer.

→ You have successfully installed the jib.

7.7 Installing the counterweights

DANGER

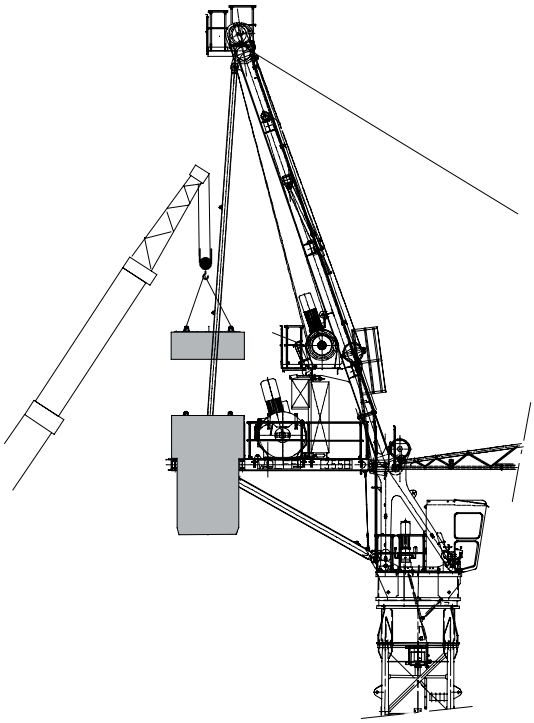
Risk of overturning of the slewing tower crane due to improper ballasting of the counterjib.

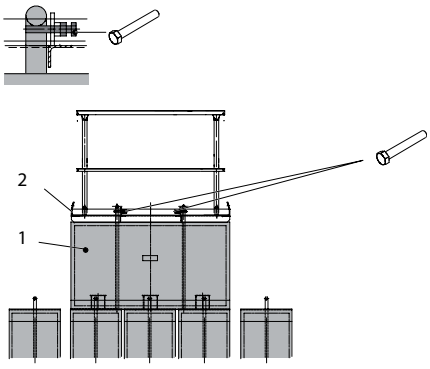
The slewing tower crane may overturn, resulting in severe injury and death.

> Comply with the instructions for arranging the counterweight in OPM II – Technical Data and Preparation of Construction Site – of the slewing tower crane.

1) With the hoist winch Hw28110FU, a horizontal 8.0 t concrete weight is used.

2) With the hoist winch Hw28132FU, a horizontal 6.2 t concrete weight is used.





> The counterjib has been installed.

> The machine platforms have been installed.

> The jib has been installed.

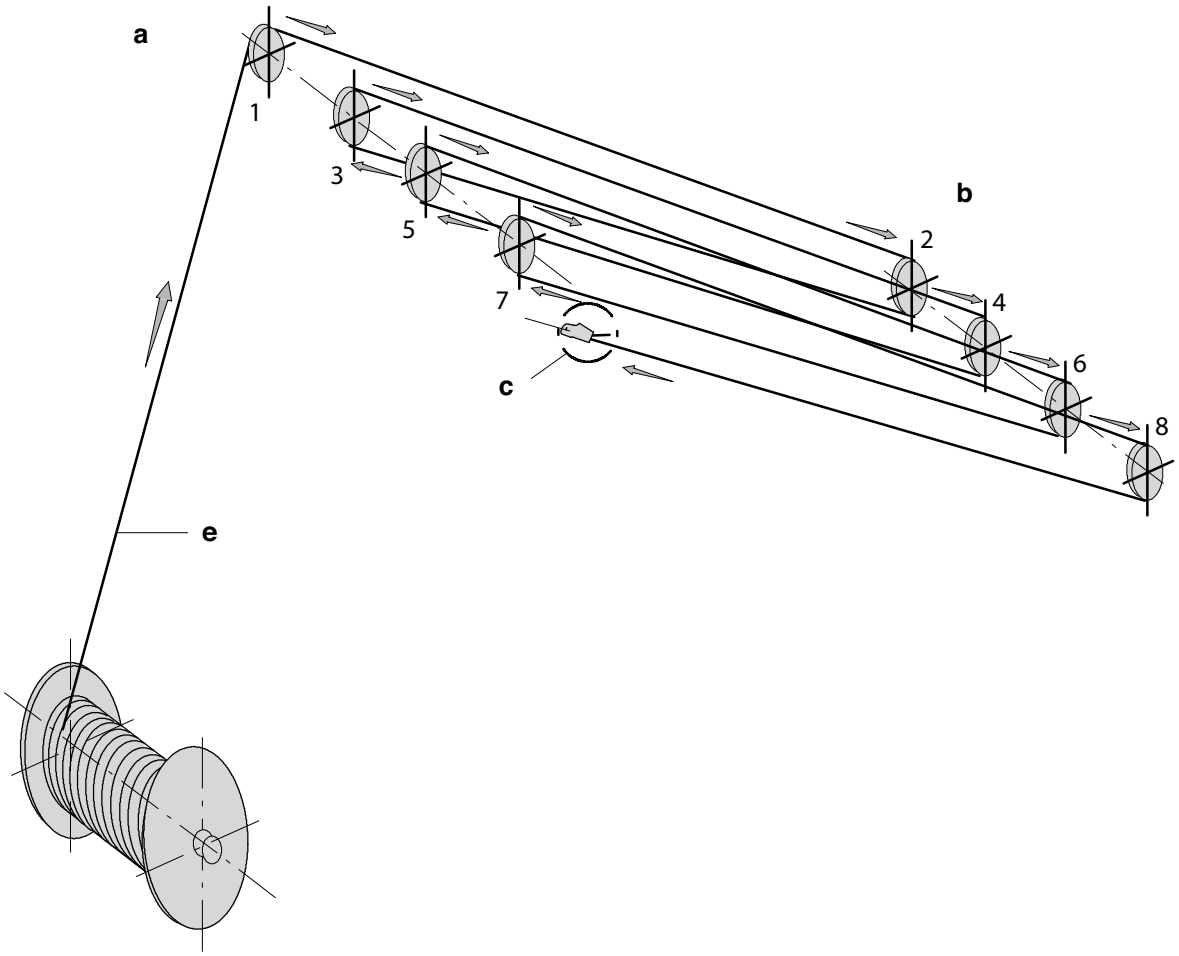
1) Remove the cover frame (1) from the holding fixture for the counterweights in the counterjib.

2) Suspend the 8 hanging ton concrete weight blocks using a 2-fall attachment.

3) Install the hanging 8 ton concrete weight blocks (refer to figure).
4) Use a 4-fall attachment to suspend the horizontal concrete weight.
CAUTION! With the hoist winch Hw28110FU, a horizontal 8.0 t concrete weight is used. With the hoist winch Hw28132FU, a horizontal 6.2 t concrete weight is used.
5) Place the horizontal concrete weight on the middle suspended counterweights (see drawing).
NOTICE! The horizontal counterweight should be deposited as far away from the rope swing-reduction device as possible.
6) Deposit the cover frame with the standard railing on the uppermost counterweight.
7) Fasten the screws in the straps of the counterweight.
8) Secure the screws using lock nuts.

→ You have successfully installed the counterweights.

7.8 Reeving the luffing rope



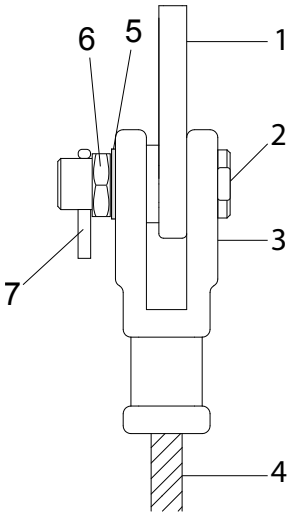
Reeving scheme of luffing rope

a	Tower head section	c	Fixed point
b	Pulley block	e	Luffing cable

> The pulley block has been reeved.

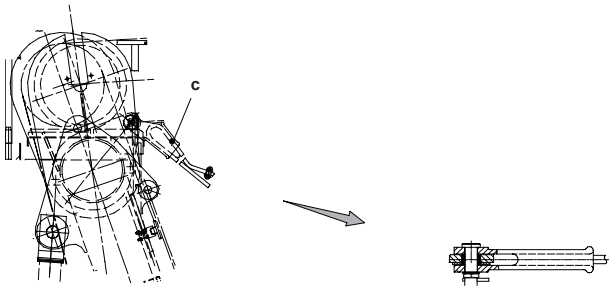
► Reeve the luffing rope (see reeving scheme)

7 Assembly



1	Connected plate on tower head section	2	Bolt Ø 33mm
3	Wedge end clamp	4	Luffing cable
5	Washer DIN125 M24	6	Nut DIN439 (ISO4035) M24-8
7	Cotter pin ISO 1234 6.3x45		

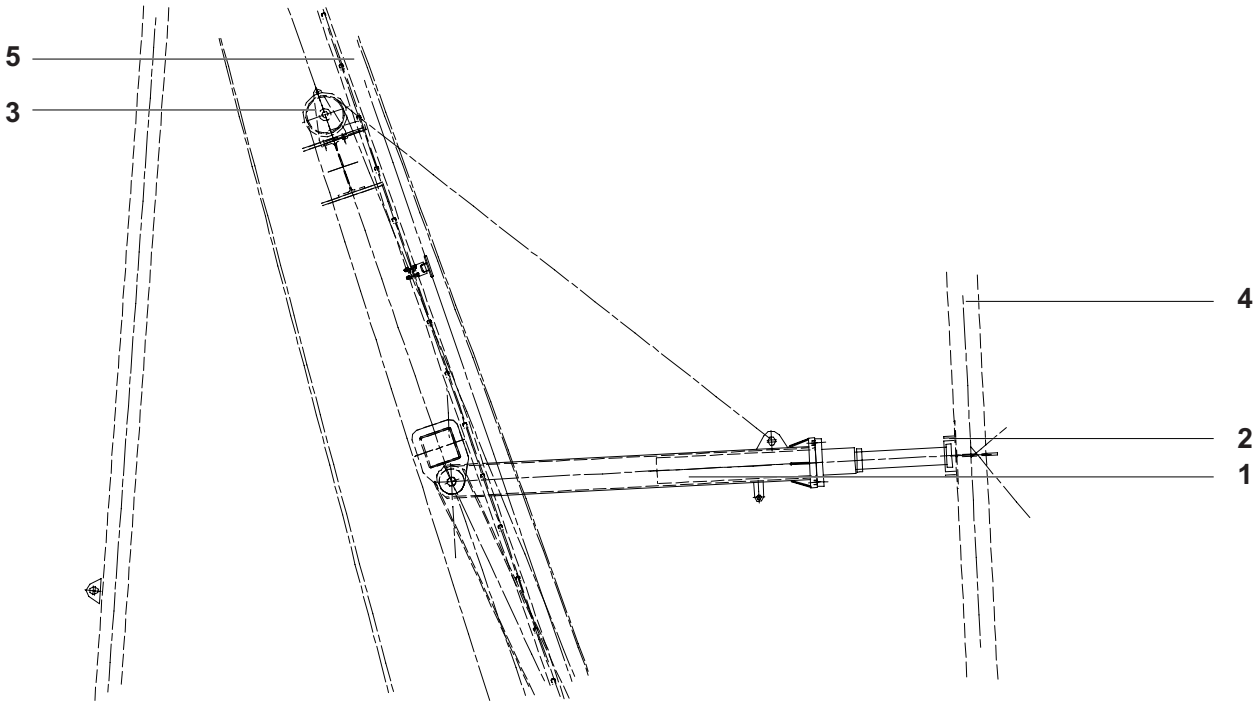
1) Bolt the wire rope anchorage (3) to the connected plate (1) on the tower head section.
2) Secure the bolt (2) using the washer (5), the nut (6) and the cotter pin (7).
   → You have successfully installed the wire rope anchorage..



3) Secure the loose rope end using a rope clamp (22 DIN 741).
4) Tighten the clamping screws (M 12 x 20 DIN 913) with a torque of 65 Nm.

→ You have successfully reeved the luffing rope.

7.9 Adjusting the shock absorbers



1	Shock absorbers	4	Jib
2	Holding fixture	5	Tower head section
3	Idler pulley		

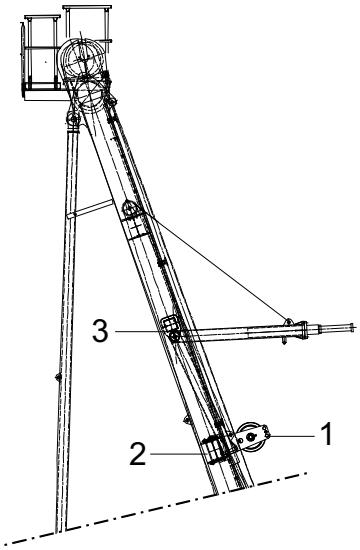
1) Remove the transport restraint at the jib attachment.
2) Re-reeve the cable winch (see drawing).
3) Pull the shock absorber (1) up by means of the cable winch (see drawing).
4) Retract the jib until there is a space of approx. 100 mm between the jib and the shock absorber.
NOTICE! The shock absorber (1) must fit into the holding fixture (2). If it does not fit, re-adjust the shock absorber.
5) Re-adjust the shock absorber with the cable winch until its upper and lower distance to the holding fixture (2) is identical.
6) Further retract the jib until the shock absorber is in contact with the holding fixture (2).
7) Check the setting and if necessary adjust the height of the shock absorber.

→ You have successfully adjusted the shock absorber.

7.10 Mounting the pulley block

NOTICE

The pulley block with rope pulley is only required if hoist winch Hw28132FU is used.



1	Pulley block with rope pulley	3	Support with shock absorber
2	Support		

> The shock absorber has been set.

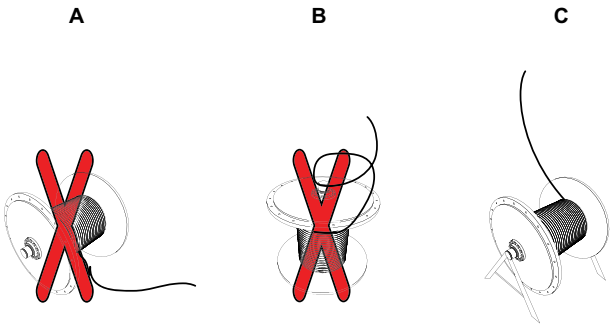
1) Mount the pulley block with rope pulley (1) at the support (2) below the support with shock absorber (3).
NOTICE! The pulley block should be located at a distance of approx. 260 mm from the center of the tower.
2) Using the plate (12x160x380), clamp the pulley block (1) to the support (2).
3) Secure the rope pulley (1) with the screws (M16x200-8.8 ISO 4014), washers (16-200HV ISO 7090) and nuts (M16-8 ISO 4032).

→ You have mounted the pulley block with rope pulley.

7.11 Installing the hoisting cable

	**⚠ CAUTION** Improper operations during hoisting rope installation The hoisting rope my be damaged. 1) Do not pull out the hoisting rope on ground (A). 2) Do not pull the hoisting rope over the flange of a drum laying flat (B).

	**NOTICE** During all assembly and installation work, generally ensure sure that the ropes are not twisted or damaged at the outside during winding off the ring or reel or during winding up there.



> Support the rope drum so that it can turn freely while unwinding the rope (C).

1) Connect the new hoisting rope to the old one using a Kellem grip.
2) Lift the new hoisting rope.

→ You have successfully installed the hoisting rope.

Using cable grips

When installing a new rope, always make sure that you do not transfer any twist existing in the old rope to the new rope. To this end, use non-rigid connections, for example cable grips, between the new and the old rope. Below, see two types of cable grips:



1



2

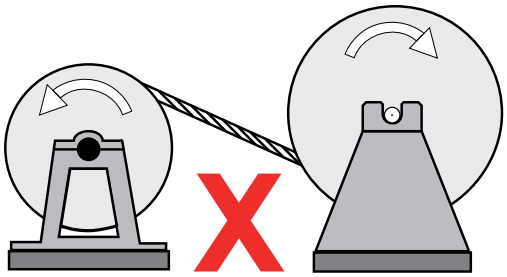
1	Strands welded to the cable grip	2	cable grip

With both options (1) and (2), there is not direct or rigid connection between the old and the new rope. This non-rigid connection prevents the risk of the twist from the old rope transferring to the new one. Option 1 furthermore has the benefit that the twists of the two stands can be counted after assembly so that you know by how many times the old rope has untwisted.

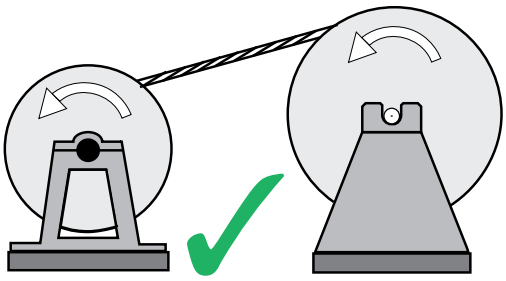
Proper winding up of rope

When winding and unwinding rope, ensure that you retain the bending direction of the rope. This makes it easier to wind up the rope on the drum. See below for the winding direction:

X

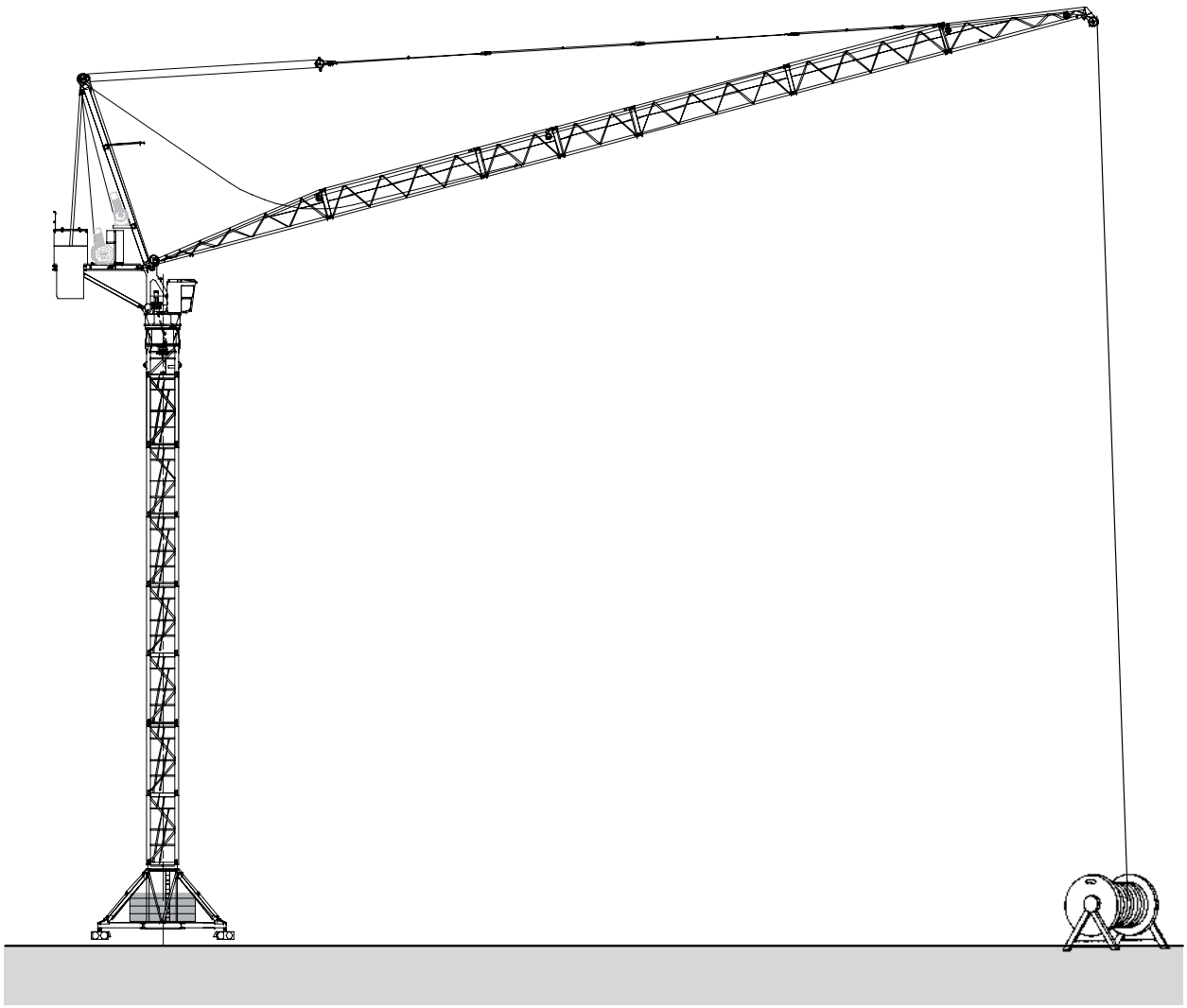


Y



X	Wrong: winding in opposite directions	Y	Right: winding in the same direction

Winding up on drum under load



To properly wind the rope onto the drum in a number of layers, it is necessary to ensure for multilayer reels that the rope is wound up under some pretension. This pretension can be achieved by braking the reel flange by means of a board.

If the bottom layers are too loose, the upper layers may be pulled between the below rope layers under load. This may severely damage the rope.

7.12 Installing the pulley block and reeving the hoisting rope

7.12.1 Installing the pulley block

> The jib has been installed.

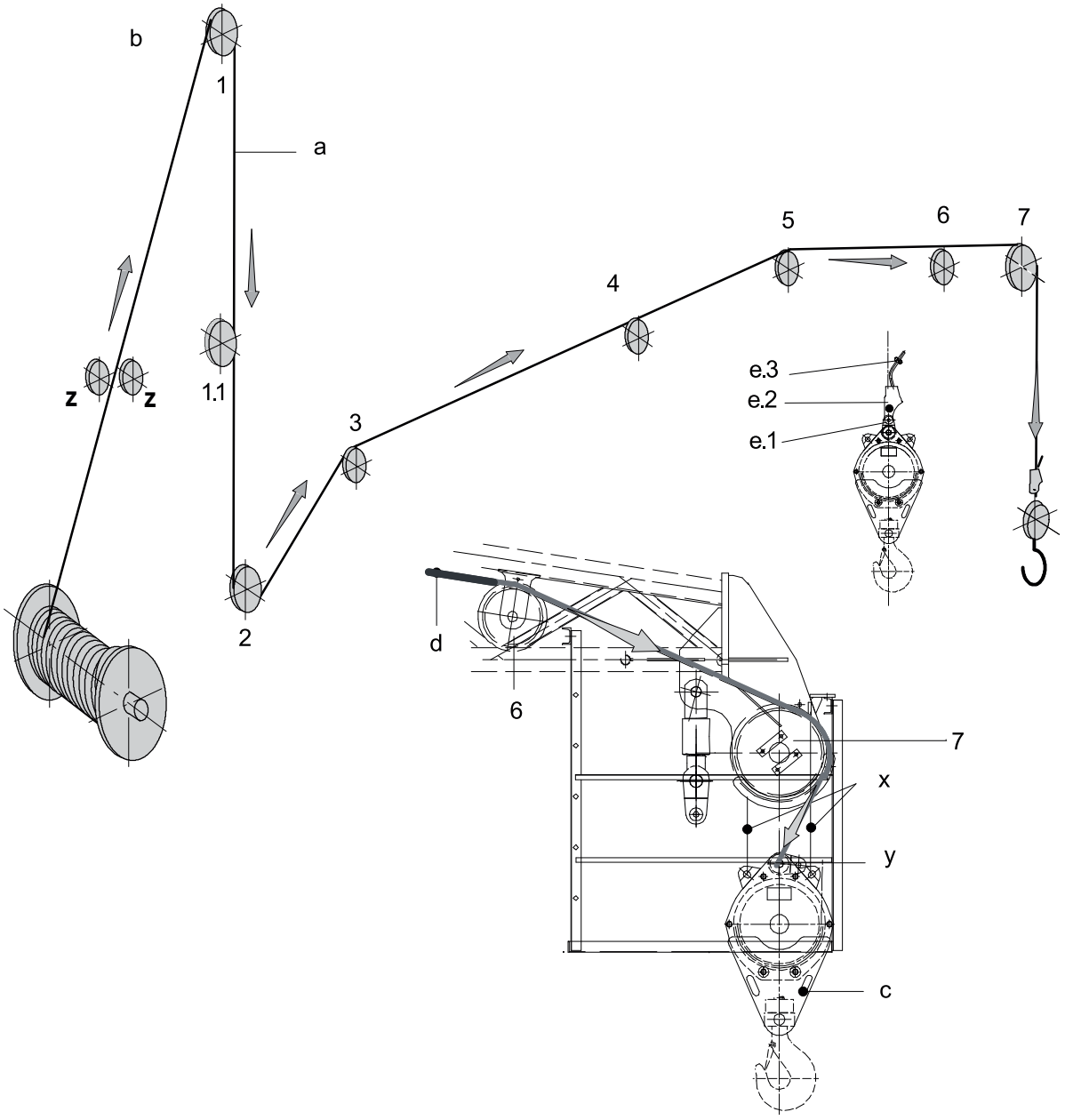
> The counterweight blocks have been installed.

> The pilot rope has been reeved.

1) Use a 2-fall attachment to suspend the pulley block (1).
2) Remove the pulley block from the tower head section.
3) Carefully lift the pulley block (1) to the connecting point of the brace on the jib.
   DANGER! While pulling the hoisting rope, wind off the luffing rope.
4) Bolt the pulley block to the bracing plate using the bolts (Ø 85/70x170).
5) Secure the bolt by means of cotter pins.
6) Carefully pull the luffing rope until the assembly brace ropes (3) will be slightly relieved.

→ You have successfully installed the pulley block.

7.12.2 Reeving the hoisting rope in 1-fall operation



a	Hoisting rope	y	Fixed point
b	Tower head section	e.1	Shackle
c	Snatch block	e.2	Wedge end clamp
d	cable grip	e.3	Cable clamp
x	Attachment ropes		

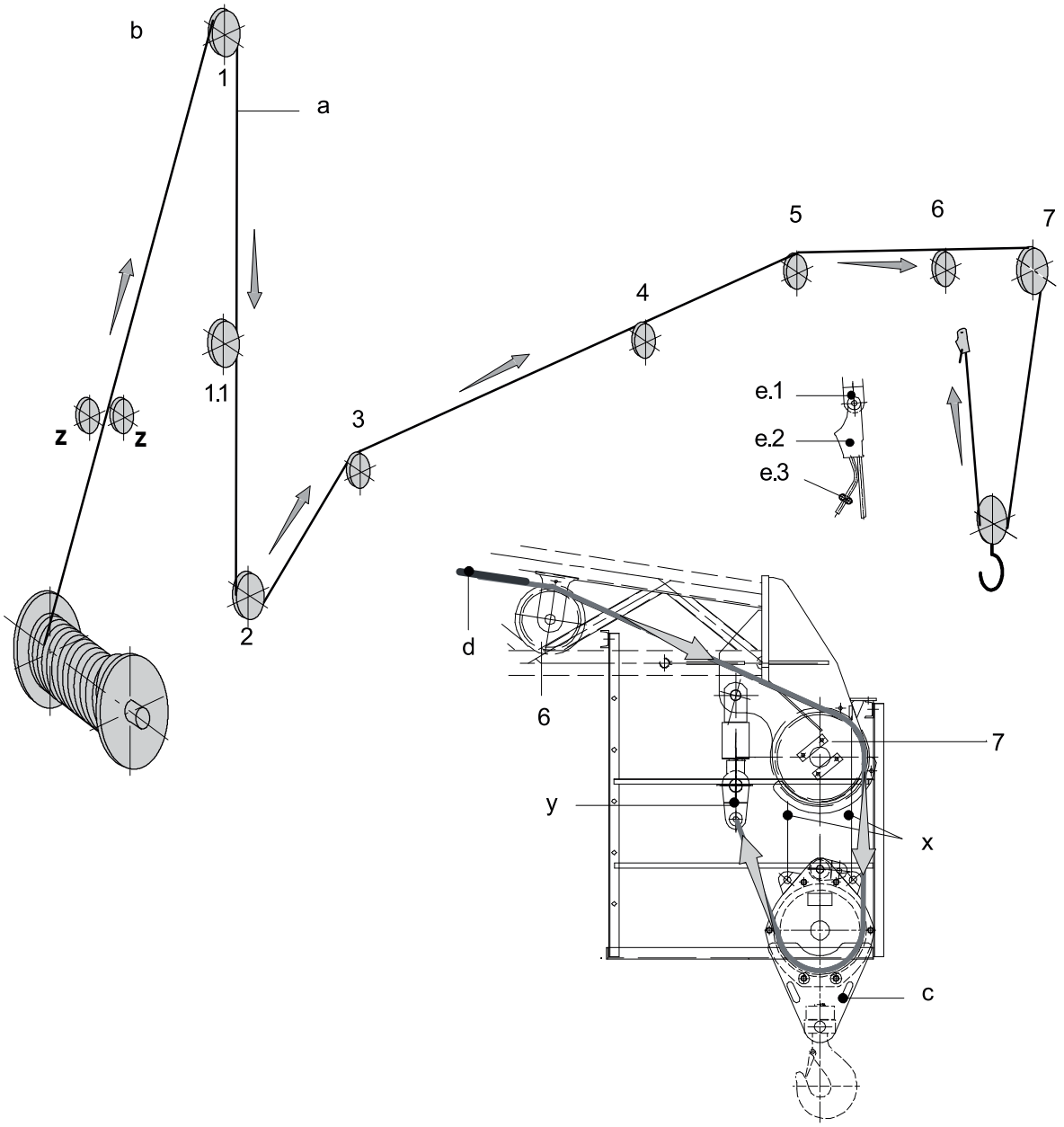
1.1	Not every slewing tower crane is equipped with a rope pulley! Will be retrofitted for use of Hw28132FU. Location = approx. 260 mm away from tower center	z	Rope pulleys rope swing-reduction device

> The pulley block has been installed.

1) Reeve the hoisting rope up to the jib tip (see drawing).
NOTICE! If you are using the hoist winch Hw28132FU with the hoisting rope swing-reduction device, you must additionally guide the hoisting rope through the top rollers of the hoisting rope swing-reduction device.
2) Using a Kellem grip, mount the hoisting rope with the auxiliary assembly rope in the jib tip.
3) Tighten the auxiliary assembly rope until the hoisting rope can be attached at the fixed point to the snatch block.
4) Remove the auxiliary assembly rope and the Kellem grip.
5) Mount the wedge end clamp at the end of the hoisting rope.
6) Secure the wedge end clamp using the cable clamp.
7) Bolt the shackle of the wedge end clamp to the fixed point, using the bolts (Ø 48x119).
8) Remove the attachment ropes at the jib tip.
9) Lower the bottom snatch block to ground.
10) Remove the attachment ropes at the snatch block.

→ You have successfully reeved the hoisting rope.

7.12.3 Reeving the hoisting rope in 2-fall operation



a	Hoisting rope	y	Fixed point
b	Tower head section	e.1	Shackle
c	Snatch block	e.2	Wedge end clamp
d	cable grip	e.3	Cable clamp
x	Attachment ropes		

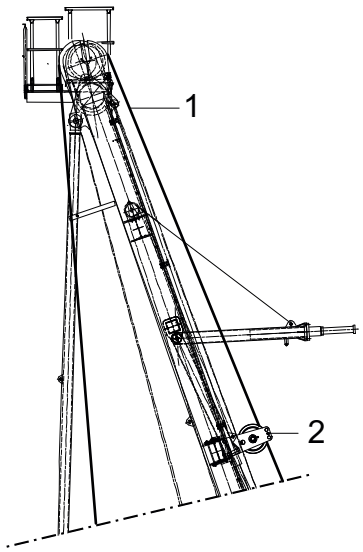
1.1	Not every slewing tower crane is equipped with a rope pulley! Will be retrofitted for use of Hw28132FU. Location = approx. 260 mm away from tower center	z	Rope pulleys rope swing-reduction device

> The pulley block has been installed.

1) Reeve the hoisting rope up to the jib tip (see drawing).
NOTICE! If you are using the hoist winch Hw28132FU with the hoisting rope swing-reduction device, you must additionally guide the hoisting rope through the top rollers of the hoisting rope swing-reduction device.
2) Using a Kellem grip, mount the hoisting rope with the auxiliary assembly rope in the jib tip.
3) Tighten the auxiliary assembly rope until the hoisting rope can be attached at the fixed point.
4) Remove the auxiliary assembly rope and the Kellem grip.
5) Mount the wedge end clamp at the end of the hoisting rope.
6) Secure the wedge end clamp using the cable clamp.
7) Bolt the shackle of the wedge end clamp to the fixed point, using the bolts (Ø 48x119).
8) Remove the attachment ropes at the jib tip.
9) Lower the bottom snatch block to ground.
10) Remove the attachment ropes at the snatch block.

→ You have successfully reeved the hoisting rope.

7.13 Positioning the pulley block



1	Hoisting rope	2	Pulley block

> You have successfully installed the hoisting rope.

1) Loosen the mounting screws at pulley block (2).
2) Push the roller block (2) up to the level of the passing hoisting rope (1).
3) Re-tighten the screws at the pulley block (2).
4) Remove the rope protection at the pulley block (2).
5) Deposit the hoisting rope (1) on the rope pulley of the pulley block (2).
6) Re-install the rope protection at the pulley block (2).

→ You have positioned the pulley block.

7.14 Using an auxiliary crane



⚠ DANGER

Use of the auxiliary crane

The auxiliary crane must only be used for maintenance work at the crane. Never use the auxiliary crane for any other building site jobs.

1) Stop the crane operation.
2) Secure the hazard area below the auxiliary crane.
3) Do not load the auxiliary crane beyond the specified SWL (Safe Working Load).
4) The SWL is based on the lifting equipment if used (electrical winch), sling gear, and the load to be transported.



NOTICE

Comply with the Safe Working Load

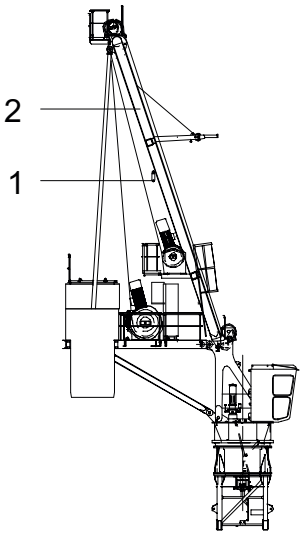
The auxiliary crane has a SWL (Safe Working Load) of 1.6 t.



NOTICE

The auxiliary crane is available as an option

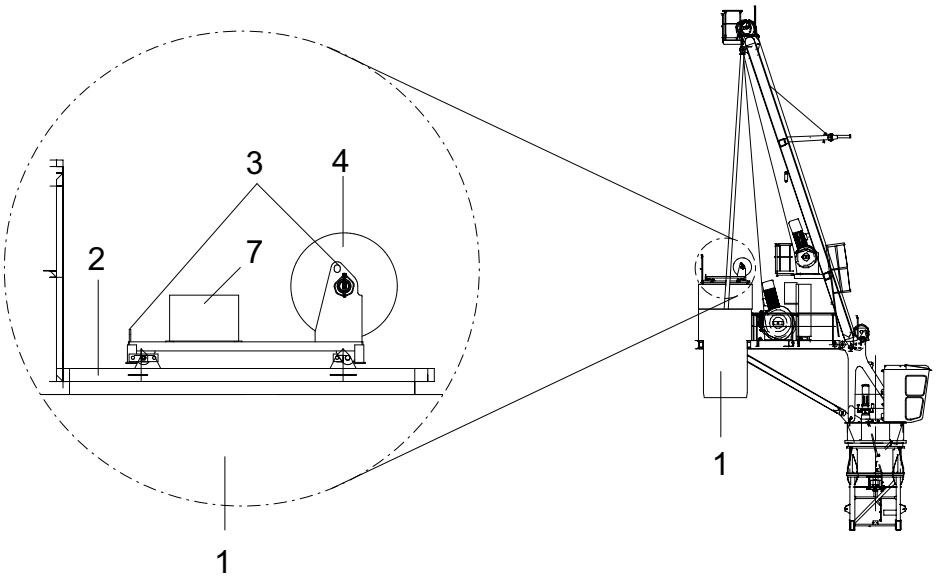
You can order the auxiliary crane from WOLFFKRAN under item no. 30055419.



1	Auxiliary crane	2	Upper tower head section

The auxiliary crane (1) at the tower head section upper part (2) should be mounted already during pre-assembly of the tower head section upper part (see page: [68])

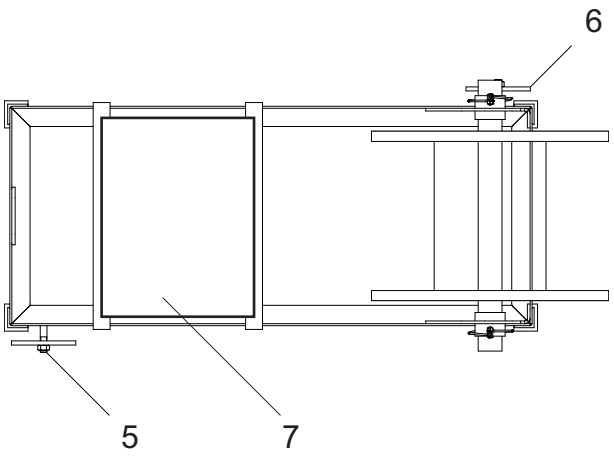
7.14.1 Mounting the rope reel



1	Counterweight block (horizontal)	4	Frame with rope reel
2	Cover frame with standard railings	7	Tool box (rope reel)
3	Attachment points for 3-fall attachment		

> You have installed the monorail trolley.

1) Use a 3-fall attachment to suspend the frame with rope reel (4) at the attachment points.
2) Lift the frame with rope reel (4) to the counterjib.
3) Deposit the frame with rope reel (4) on the cover frame with standard railings (2).

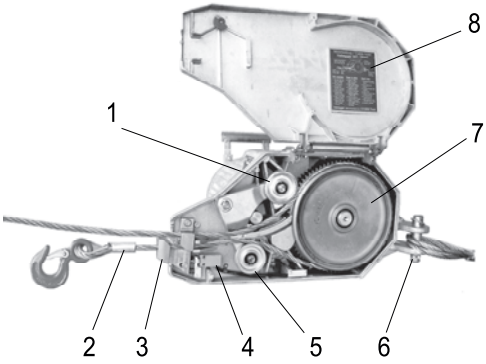


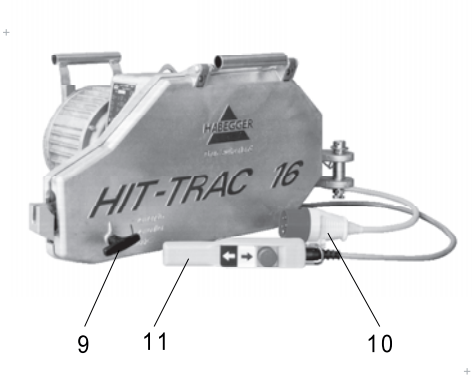
4) Using the retaining plates (50x12x190), secure the frame with rope reel (4) at the fastening points (5, 6) at the cover frame (2) on the horizontal counterweight block (1).
5) Secure the retaining plates using the screws (M20x110-10.9 ISO 4014) and the nuts (M20-8 ISO 4032).

→ You have installed the frame with rope reel.

7.14.2 Mounting the rope pulley

	NOTICE Only get the rope pulley out of the tool box when it is needed, and mount it only when required. If not in use, the rope pulley must be stored away in the tool box. ► Secure the tool box with a padlock!





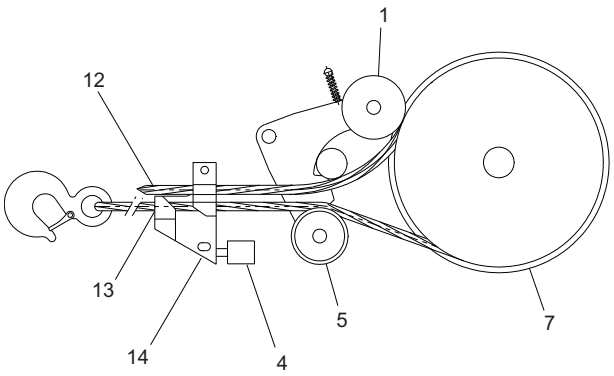
1	Pressure roller	7	Driving wheel
2	Pressing socket	8	Sign
3	Rope guidance	9	Cover
4	Limit switch 'Lift'	10	Three-phase current connector plug
5	Guide pulley	11	Control pendant
6	Anchor bolt		

> The frame with rope reel has been mounted.

1) Attach two shackles (shape A, 1600 kg) at the eyelet crossbeam of the monorail trolley.
2) Using a sling (12) and a shackle (13), suspend the rope pulley.



3) Using the anchor bolt (6), bolt the rope pulley with the shackles to the monorail trolley.
4) Connect the three-phase current connector plug (10) at the control cabinet at the counterjib. The cable to the control cabinet is in the tool box of the rope pulley.



5) Unlock the cover of the rope pulley at the cover (9) and fold the lid open.
6) On the horizontal counterweight block pull the rope from the rope reel to the rope pulley.
7) Make a sling from the rope with the hook (13) pointing down (see drawing).
8) Swing the hook rope (13) into the bottom guiding eyelet (14).
9) Insert the empty rope (12) in the top guiding eyelet (14) and under the pressure roller (1).
10) Insert the sling in the key slot of the driving wheel (7).
11) Guide the hook rope (13) over the guide pulley (5).
12) Using the motor, slightly tension the rope. Then, check it once more for proper rope position (see drawing).

13) Close the lid again and lock it with the cover (9).

→ You have installed the rope.

7.14.3 Technical data of the rope pulley

Item	Data
Traction force (lifting / lowering)	16 kN
Rope speed	approx. 10 m/min
Rope length	any
Rope path (lifting / lowering)	Limited by motor heat (30% power-on time)
Weight	57 kg
Transmission fluid	0.2 l / 80 W 90
Pull rope ▪ Type: ▪ Diameter: ▪ Breaking load:	 HABEGGER 4 x 25 FW galvanized 11.2 mm 88 kN
Drive motor ▪ Type: ▪ Power:	Electric motor S132-2-10 3 kW, 2820 rpm
Noise level	Measured values determined acc. to EN 50 144. The noise level of the motorized rope pulley may exceed 85 dB(A) during operation.
Voltage - nominal current Standard / degree of protection Power-on time with intermittent operation Drive assembly (DIN 15 020)	3 x 400 V - 6.8 A VDE 530 / IP 44 Power-on time = 30% 1 Cm DIN 15 020
Spring-loaded brake Nominal braking torque Anchor voltage	Lenze BFK 458-10 - 205 V 16 Nm 205 V

7.14.4 Operating the rope pulley



⚠ DANGER

Falling of loads off the rope pulley

Severe injuries or death by falling loads.

> You intend to use the rope pulley for the transport of loads.

1) Be sure never to unwind the entire rope from the reel! Pulling the entire rope into the rope pulley is forbidden!
2) Constantly monitor the rope, the rope pulley, and the load. In case of complications, immediately stop the rope pulley!
3) Make sure that the unloaded rope is pulled into the rope pulley without any obstacles or twisting.
4) Before starting to work, secure the hazard area below the rope pulley and the suspended load.
5) Shut down tower crane before starting to work at the rope pulley.



⚠ DANGER

Risk of contusion at the rope pulley.

Severe injuries to the limbs by getting drawn into the rope pulley.

> You have started to operate the rope pulley.

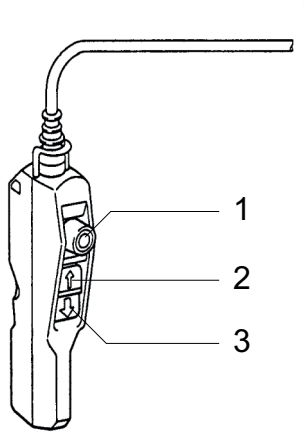
1) Take care never to touch the rope inserted into the rope pulley!
2) Make sure that no articles of clothing can be drawn into the rope pulley.



NOTICE

For operating the rope pulley, two operators are required as a minimum.

For operating the rope pulley, two operators are required as a minimum.
One person operates the pulley at the control pendant.
The second person winds the rope at the rope reel at the counterjib.



1	Emergency stop button	3	Lowering
2	Lifting		

> You intend to move a suspended load.

1) Press the Lifting button (2) to lift the load.
2) Release the Lifting button (2) to stop lifting.
   NOTICE! Press the Emergency stop button (1) in case of an emergency (such as wedging of the load).
3) Press the Lowering button (3) to lower the load.
4) Release the Lowering button (3) to stop lowering.
   NOTICE! Press the Emergency stop button (1) in case of an emergency (such as wedging of the load).

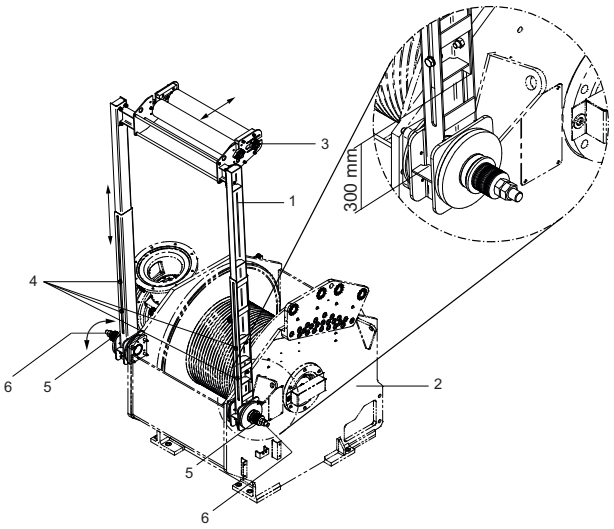
→ You have moved the load.

7.15 Adjusting the rope swing-reduction device

NOTICE

Adjusting the rope swing-reduction device

Before starting to adjust the rope swing-reduction device, mark the positions of all its specified components.
The height adjustment of the rope swing-reduction device (bottom edge rope swing-reduction device to pivot point) must be set to 300 mm (see drawing).
It is imperative that you contact WOLFFKRAN before changing the setting for the compression and the arrangement of the disk springs!



1	Rope swing-reduction device	4	Screws for the height adjustment
2	Hoist winch	5	Disk springs
3	Screws at the rope rollers	6	Nuts

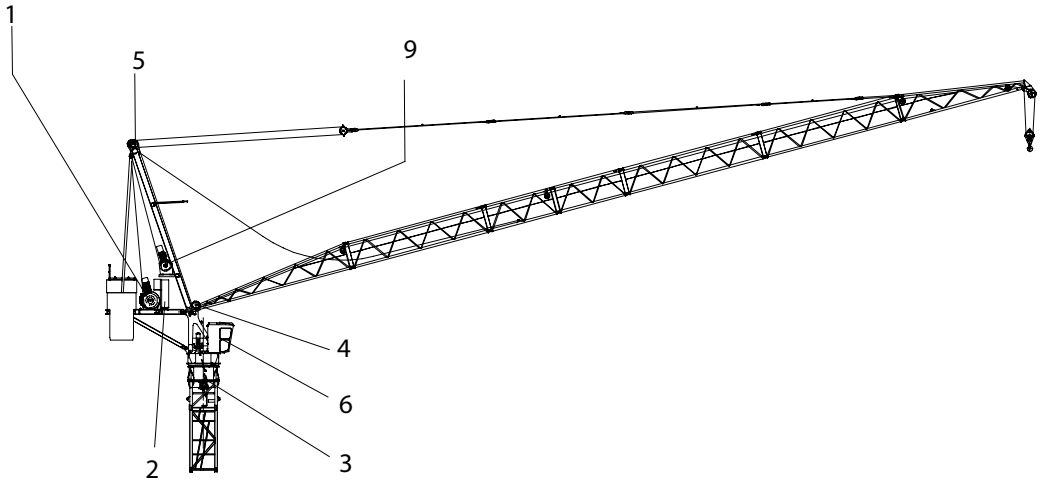
> You intend to adjust the rope swing-reduction device.

1) To adjust the clearance of the rope rollers, loosen the screws (3) and push the front rope roller to the desired position.
NOTICE! The rope rollers should be adjusted in such a way that the gap between the rope rollers and the rope is as small as possible. The rope roller must not touch and must run parallel to each other!
2) Re-tighten the screws (3).
3) To adjust the height of the rope swing-reduction device, loosen the screws (4) and push the rope swing-reduction device (1) to the desired position.
4) Re-tighten the screws (4).
5) To provide the default setting of the disk springs, loosen the nuts (6) until the disk springs are free.

6) Then, lightly turn the nuts (6) by hand so that they approach the disk springs until the disk springs have no more play.
7) Now, tighten the nuts (6) by another 1.5 rotations.
8) Next, counter the inner nut with the outer nut.

→ You have adjusted the rope swing-reduction device.

8 Crane control system



1	Hoisting height encoder - on the hoisting gear	5	Load metering shaft - – Shaft at hoisting rope idler pulley in tower head section Anemometer - mounted to the tower head section
2	Control cabinet with electronic crane control system and inverters	6	Monitor - in the operator cabin in front of the left control console
3	Slewing angle encoder - at the slip ring system	9	Luffing gear sensor – at luffing gear drum
4	Inclination sensor		

Electronic crane control system

The programmable logic controller (PLC) inside the control cabinet is the core component of the crane control system. The PLC receives the signals from the control consoles and uses these signals to control the inverters of the drives.

While working, the crane operator gets screen information on all position data such as operating radius, hook height, current hook load, and slewing angle.

Sensors

Sensors capture the various crane positions such as operating radius, hook height, and slewing angle. The load measuring shaft measures the load suspended from the load hook.

Load and load torque monitoring

The electronic load and load moment monitor checks the load moments resulting from the attached load and radius at all times and compares these values with the programmed limits. If the attached load approaches these limits, the crane operator is given a visual preliminary warning on the control console, simultaneously the speed of the motion which increases the load moment is reduced and switched off upon reaching the limit.

8.1 Slewing and radius limiting

⚠ WARNING

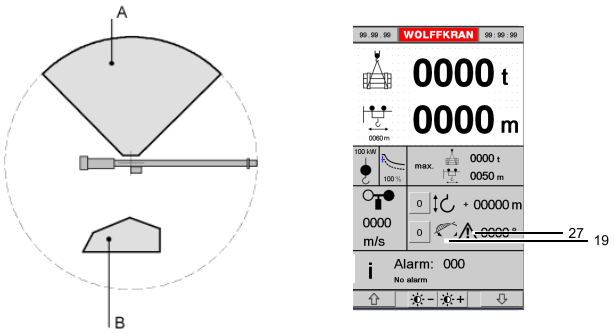
The slewing range and radius limitation does not work.

Inconsistence.

► Before each start of work, check the slewing range and radius limitation.

The slewing and operating radius limiting function supports crane operators by reducing the operating speeds if the movement approaches a closed area, and by stopping the traversing motion and applying the brakes as soon as the boundary is reached.

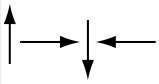
The crane can be programmed to prevent its operation in certain areas such as roads, buildings, or railroads tracks.



Examples of closed areas and monitor displays

A	Closed area A	19	Symbol of the slewing limiting function
B	Closed area B	27	Warning symbol of the approach to a closed area

Meaning of the symbols

	Slewing limitation (19) disabled
	Slewing limitation (19) enabled
	The load hook is within the closed area. The arrow indicates the possible direction of extension.
	Display of the warning triangle (27) indicates approach to the closed area. A beeper signal is generated simultaneously; this signal generator cannot be disabled.

Closed areas

Closed area	Consequences
A	This area is not allowed to be overrun.
B	The jib may may overrun the closed area if the load hook is before or behind the closed area.

Impact on the operating radius

When the load hook approaches the closed area, the speed for changing the operating range is infinitely reduced within the preliminary cutoff area and completely shut off at the boundary.

Impact on the slewing motion

The control system calculates the maximum allowable slewing velocity when the jib is is approaching the closed area.

The crane control system initiates a deceleration operation if the velocity limit is exceeded. That is, the jib reaches a standstill close to the boundary. If the braking operation is prolonged due to wind drag, the brake is automatically applied at the low velocity when the boundary is approached.

By recalculating the velocity, the control system detects situations in which the slewing gear drive either cannot or can only partially decelerate the slewing motion due to technical or other faults and then applies the slewing gear brakes to stop the movement.



⚠ DANGER

Approach to a closed area.

Inconsistence.

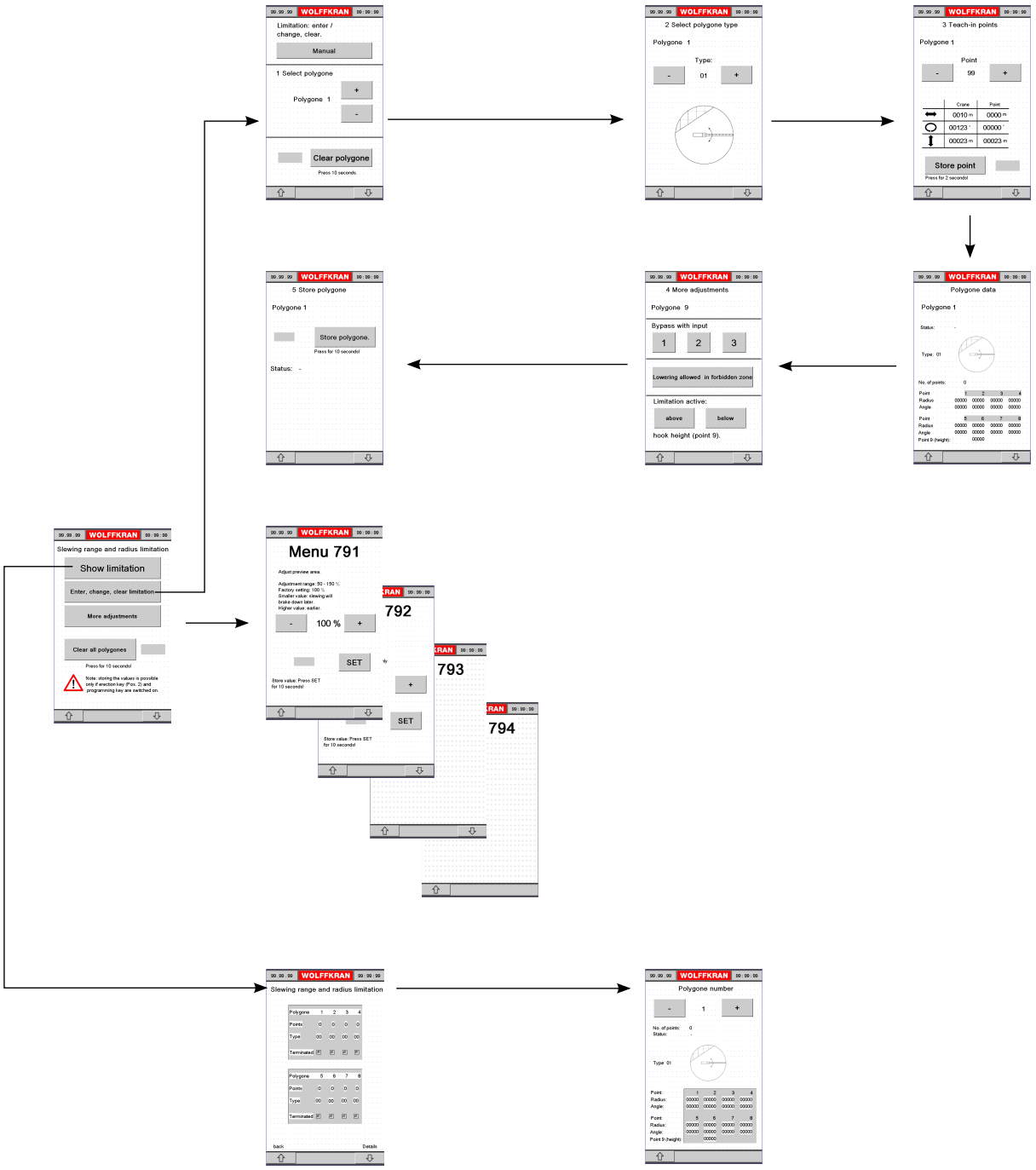
> You approach a closed area.

► Always approach the closed areas at low speed.
If the speed is too high the automatic braking by the slewing and radius limitation can cause the load to swing.That may hurt the closed area.

Special cases

- If the load hook is located in the closed area when the slewing tower crane is switched on, e.g. because the wind has turned the jib set in windvaning mode, all 4 symbols will appear, one after another. It is then necessary for the crane operator to move out of the closed area along the shortest way. The first motion direction of the slewing gear, trolley drive, or luffing gear the operator selected using the master switch is enabled, while the opposite direction is disabled.
- If the closed area in the direction proposed by the control system cannot be left without the risk of personal injury or damage to property, cycle power to the slewing tower crane off and on. The control system then enables all four directions. Lowering the load hook is disabled. For information on further procedures, refer to special case 1.

8.2 Overview of slewing range and radius limitation



Overview

This WOLFF slewing tower crane is equipped with adjustable slewing and radius limitation.

This allows certain portions of the operating range of the slewing tower crane to be restricted for work. Example: Railroad tracks.

The following chapters describe how to enter and change a limitation.

A series of points connected by straight lines is also called a polygon. Below, the limitation areas are also called polygons.

A polygon (the limitation area) is defined by at least 2 and a maximum of 8 points. To enter the limitation, move to each point and allow the control to save the values for the radius and angle of rotation of the jib.

After entering all points, save the polygon, whereby the control performs calculations once. Then the limitation can be switched on and tested.



⚠ WARNING

Slewing range and radius limitation does not work

Inconsistence.

1) Delete polygons that are no longer used.
2) When you have finished setting operations, switch off the programming and assembly switches.
3) Before each start of work, check the slewing range and radius limitation.

8.2.1 Slewing and radius limitation: modes of operation

Setting the slewing range and radius limitation

Refer to the following chapters.

Switching on the slewing range and radius limitation

> You want to switch on the slewing range and radius limitation.

> The slewing range and radius limitation is switched off.

1) Move the trolley (crane with jib) or luffing gear (crane with luffing jib) back away from stored limitation line.
2) In the control cabinet, set assembly switch 1S0 and programming switch 1S9 to "0".

→ The slewing range and radius limitation is switched on

Switching off the slewing range and radius limitation

> You want to switch off the slewing range and radius limitation.

> The slewing range and radius limitation is switched on

► In the control cabinet, set assembly switch 1S0 to "2" and programming switch 1S9 to "0".

→ The slewing range and radius limitation is switched off.

Prinicple of operation of the slewing range and radius limitation

Refer to chapter: Crane control [142].

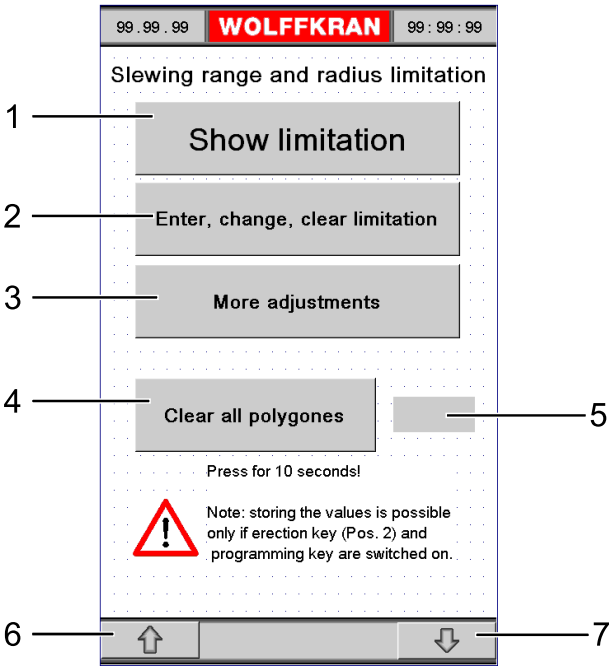
8.2.2 Slewing and radius limitation: Main menu

NOTICE

Up to 8 polygons with up to 8 points each can be stored.

NOTICE

After completing the adjustments, switch off the assembly and programming switches.



Main menu

1	Button: Go to display of set limitations.	5	Display: "OK" after limitation data has been deleted. Simultaneously, the beeper sounds for a few seconds.
2	Button: Go to display of slewing range and operating radius limitations.	6	Button: Go to previous page.
3	Button: Go to additional general settings.	7	Button: Go to next screen.
4	Button: Delete all polygons after confirming for 10 seconds.		

Going to the "Slewing range and operating radius limitations" page

> You wish to go to the "SLEWING RANGE AND OPERATING RADIUS LIMITATIONS" page.

1) Move assembly switch 1S0 in the control cabinet to position "2".

2) Move programming switch 1S9 in the control cabinet to position "1".
3) Select the SYSTEM page.
4) Press the ADJUSTMENTS button.
   → Now you have opened the ADJUSTMENTS page.
5) Press the SLEWING RANGE LIMITATION button.

→ Now you have opened the SLEWING RANGE AND OPERATING RANGE LIMITATIONS page.

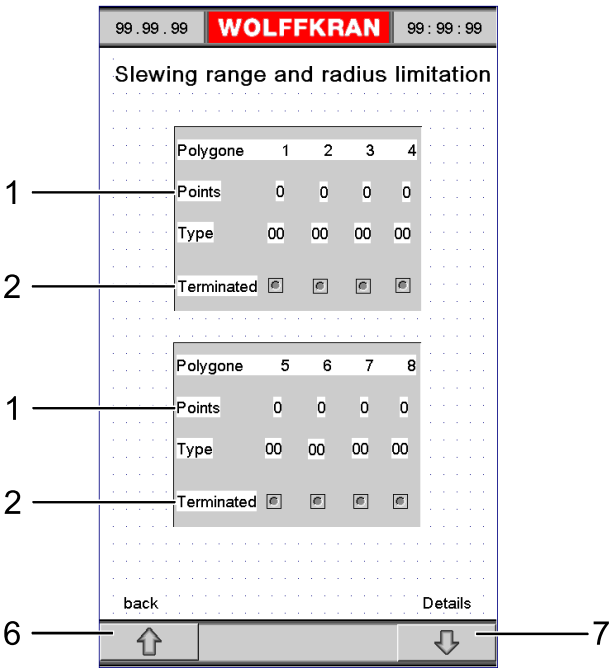
Going to the "System" page

> Currently you are on the SLEWING RANGE AND OPERATING RANGE LIMITATIONS page.

► Press the BACK button twice.

→ Now you have opened the SYSTEM page.

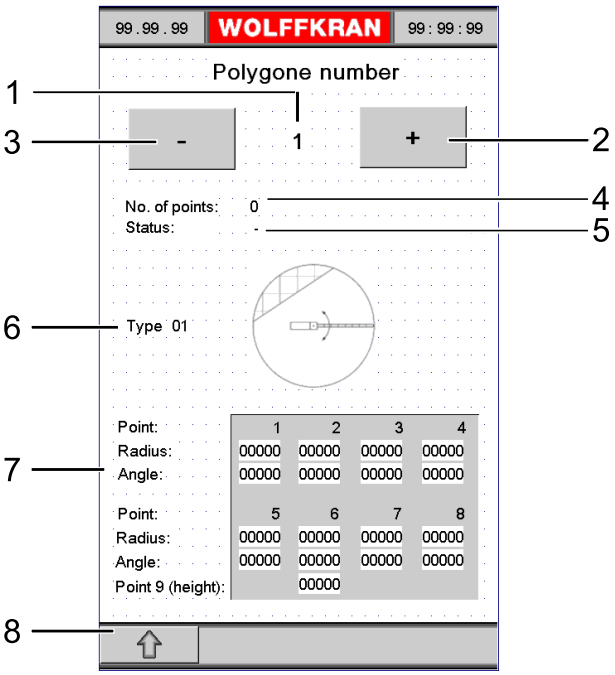
8.2.3 Slewing range and radius limitation: Display limitation



Displaying the limitation

1	Displays the number of points entered and type of polygons for each polygon.	6	Button: Go to previous page.
2	Displays whether the polygon is completed and thus active. ☐ Polygon is not active. ■ Polygon is active.	7	Button: Go to next screen.

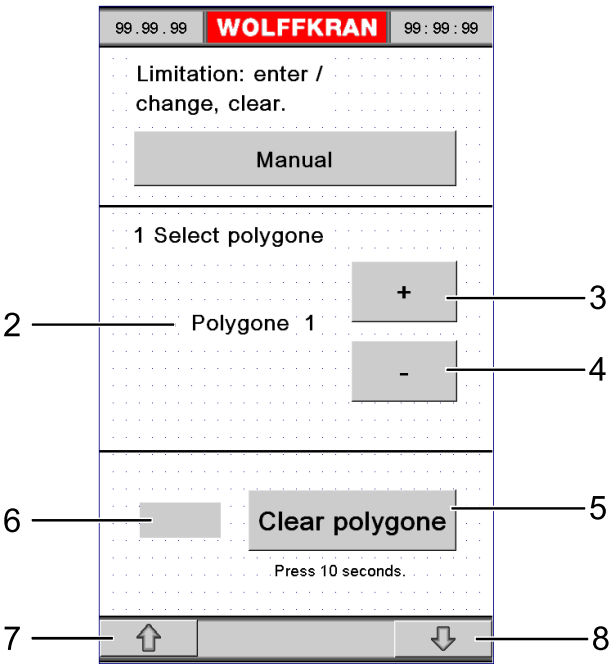
8.2.4 Slewing range and radius limitation: Display limitation - Details



Display limitation - Details

1	Displays the selected polygon. Range: 1 – 8.	5	Displays the status of the selected polygon. Meaning [160]
2	Button: Next polygon number.	6	Displays the polygon type. Number and graphic symbol.
3	Button: Previous polygon number.	7	Displays data for polygon points. For points 1 – 8: Radius and angle for each point. For point 9: Hook height.
4	Displays the number of points entered per polygon.	8	Button: Go to previous page.

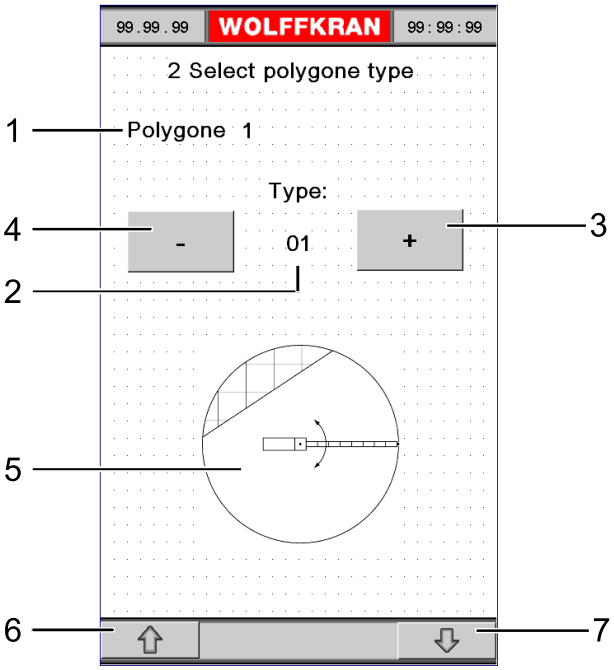
8.2.5 Slewing range and radius limitation: Enter limitation - Polygon number



Enter limitation - Polygon number

2	Display: Selected polygon. Range: 1 – 8.	6	Display: "OK" after limitation data has been deleted. Simultaneously, the beeper sounds for a few seconds.
3	Button: Select next polygon.	7	Button: Go to previous page.
4	Button: Select previous polygon.	8	Button: Go to next screen.
5	Button: Delete polygon. Deletion will be effective after the button has been held pressed for at least 10 seconds .		

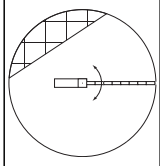
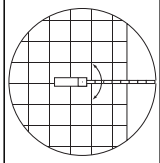
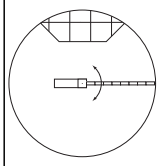
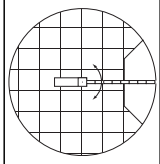
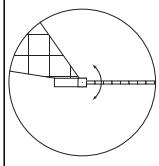
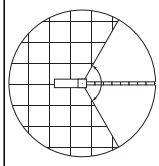
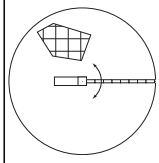
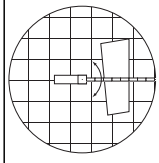
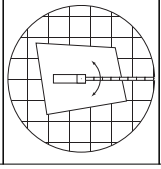
8.2.6 Slewing range and radius limitation: Enter limitation - Polygon type

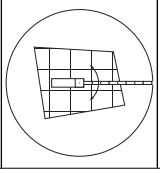


Enter limitation - Polygon type

1	Display: Selected polygon.	5	Displays the selected polygon type.
2	Display: Selected polygon type. Range: 1 – 10.	6	Button: Go to previous page.
3	Button: Select next polygon type. **NOTICE! When the polygon type is changed, all previous settings will be deleted!**	7	Button: Go to next screen.
4	Button: Select previous polygon type. **NOTICE! When the polygon type is changed, all previous settings will be deleted!**		

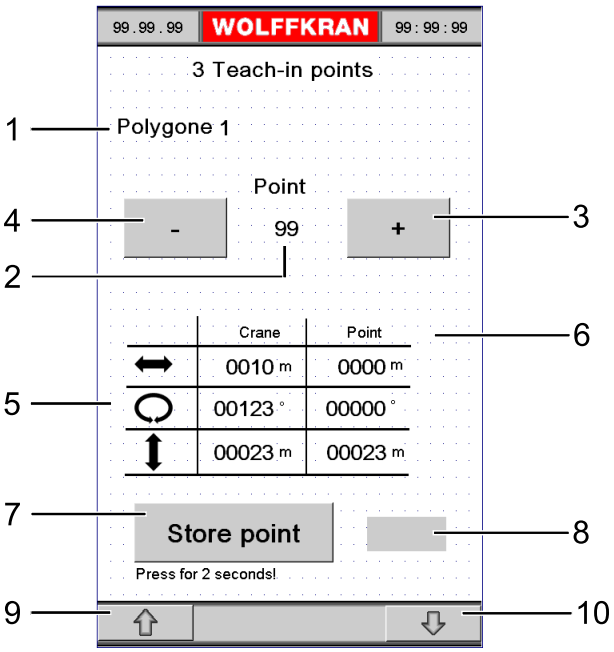
8.2.7 Polygon type overview

Type	Number of points[1]	Symbol	Description
1	2		Line limitation (circle segment). The restricted area does not include the crane center. **NOTICE! The points have to be entered for the maximum radius.**
2	2		Line limitation (circle segment). The restricted area includes the crane center. **NOTICE! The points have to be entered for the maximum radius.**
3	3 - 8		Limitation by two points at maximum radius. The restricted area does not include the crane center. **NOTICE! The first and last points have to be entered for the maximum radius.**
4	3 - 8		Limitation by two points at maximum radius. The restricted area includes the crane center. **NOTICE! The first and last points have to be entered for the maximum radius.**
5	2		Angular limitation (circle segment). Angle of the restricted area is less than 180 degrees. **NOTICE! When the polygon is saved, the control system automatically adds an additional third point for the minimum radius.**
6	2		Angular limitation (circle segment). Angle of restricted area is greater than 180 degrees. **NOTICE! When the polygon is saved, the control system automatically adds an additional third point for the minimum radius.**
7	3 - 8		Free shape. The restricted area does not include the crane center.
8	3 - 8		Free shape. The restricted area includes the crane center.
9	3 - 8		Limitation around the tower. The restricted area does not include the crane center.

Type	Number of points[1]	Symbol	Description
10	3 - 8		Limitation around the tower. The restricted area includes the crane center.

[1] If required, point 9 has to be taken into account – Hook height, above or below which this polygon is effective.

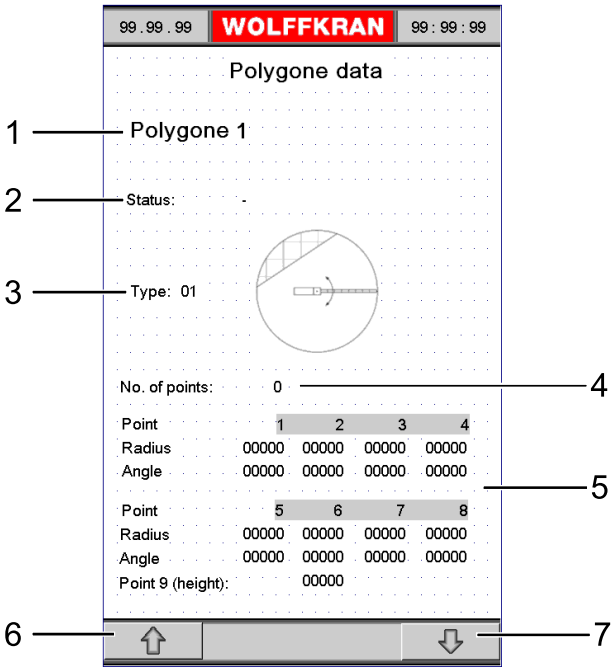
8.2.8 Slewing range and radius limitation: Enter limitation - Points



Enter limitation - Points

1	Display: Selected polygon.	6	Displays the data stored for selected point (point column): Radius, angle, hook height.
2	Display: Selected point. Range: 1 – 9.	7	Display: The current hook position is taken over for the selected point - after confirming for two seconds.
3	Button: Select next point. **NOTICE! The maximum number of points depends of the polygon type. Example: For a pure linear limitation, only 3 points (point 1, point 2 and point 9 - hook height) have to be entered.**	8	Display: "OK" when data has been saved. Simultaneously, the beeper sounds for a few seconds. **NOTICE! The display automatically changes to the next point!** **NOTICE! Thus, each point can be modified afterwards. After entering a point for a saved polygon, its status changes "modified". The modification becomes effective only after the polygon is saved!**
4	Button: Select previous point.	9	Button: Go to previous page.
5	Displays the current hook position (crane column) - Radius, angle, hook height.	10	Button: Go to next screen.

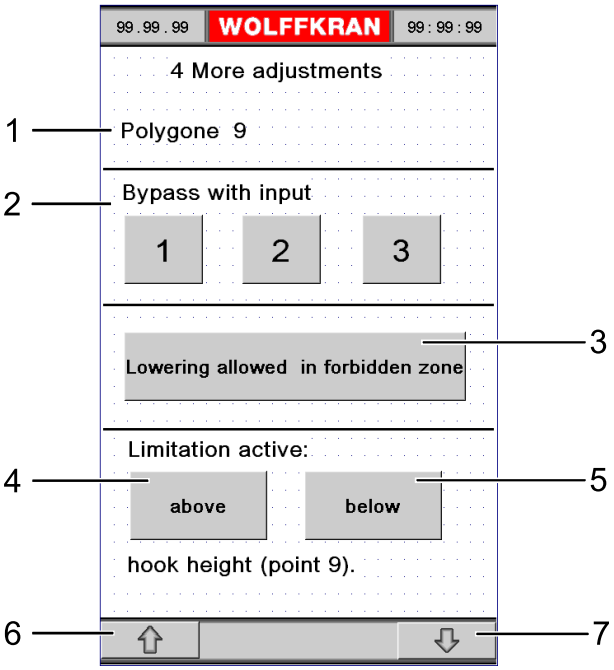
8.2.9 Slewing range and radius limitation: Enter limitation - Display point data



Enter limitation - Display point data

1	Displays the selected polygon.	5	Displays data for polygon points. For points 1 – 8: Radius and angle for each point. For point 9: Hook height.
2	Indication of the status of the selected polygon [160].	6	Button: Go to previous page.
3	Displays the polygon type. Number and graphic symbol.	7	Button: Go to next screen.
4	Displays the number of entered points.		

8.2.10 Slewing range and radius limitation: Enter limitation - Other settings

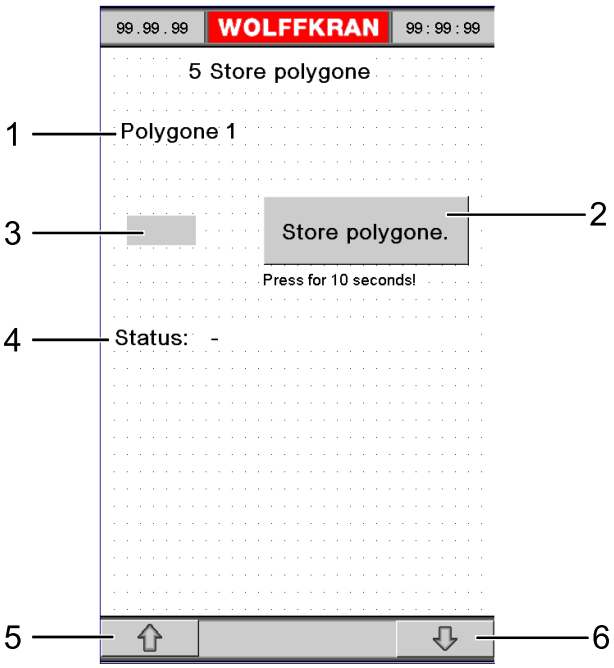


Enter limitation – Other settings

1	Display: Selected polygon.
2	Buttons: The polygon can be bypassed by input 1, 2, or 3. Example: The limitation can be affected by wheel frames or by enabling a polygon using an additional key switch. Default setting: Function is not active. Each time a key is pressed, the display changes to black lettering on white background or vice versa. Black letters on white background: Function is not active for this polygon. White letters on black background: Function is active for this polygon. Input 1, 2, 3: Refer to circuit diagram for slewing frame. 24 VDC connected to input: The polygon is bypassed. 0 VDC connected to input: The polygon is active.
3	Button: Lowering allowed in restricted area. With the function in active state, the hook can also be lowered in the restricted area. Default setting: Function is not active. Each time a key is pressed, the display changes to black lettering on white background or vice versa. Black letters on white background: Function is not active for this polygon. White letters on black background: Function is active for this polygon.

4+5	Buttons: Limitation is effective above or below hook height of point 9. This function is active only when point 9 was saved after entering the points. **NOTICE! If the limitation is effective above the hook height, the "hoisting" motion is locked upon reaching the restricted area. If the limitation is effective below the hook height, the "lowering" motion is locked upon reaching the restricted area.**
6	Button: Go to previous page.
7	Button: Go to next screen.

8.2.11 Slewing range and radius limitation: Enter limitation - Store polygon



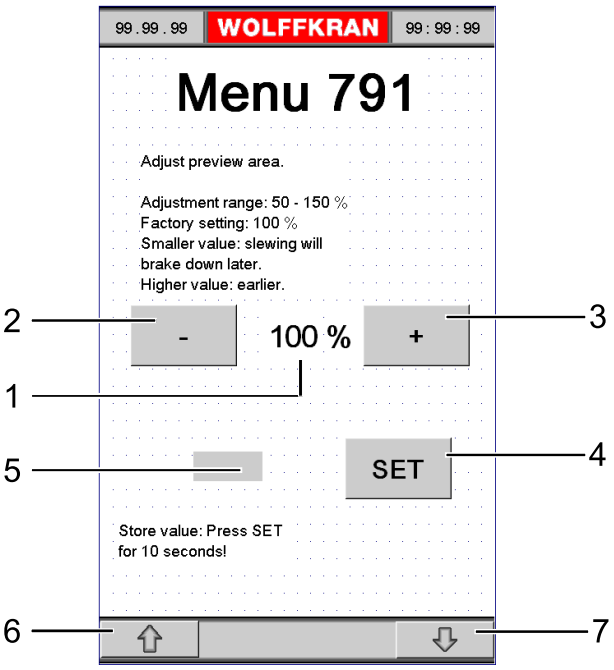
Enter limitation - Store polygon

1	Display: Selected polygon.	4	Display: Status [1]
2	Buttons: Save polygon after confirming for ten seconds. **NOTICE! If this button is greyed, the polygon data has not been changed and therefore does not require saving.**	5	Button: Go to previous page.
3	Display: "OK" when data has been saved. Simultaneously, the beeper sounds for a few seconds.	6	Button: Go to next screen.

[1]Status display meanings	
Status display	**Meaning**
Deleted:	No data available.
Modified:	Settings or points were changed without completing the polygon.
Completed:	Polygon is active.
Error - Points too close:	The minimum interval between two points of 1 meter has not been reached. The polygon cannot be completed with this data.
Error - Angle too small:	The minimum angle for an angular limitation (5 degrees) has not been reached. The polygon cannot be completed with this data.

[1]Status display meanings	
Status display	**Meaning**
Error - First/last point:	First and last points were not saved for maximum radius. This is required for some types of polygons. The polygon cannot be completed with this data.

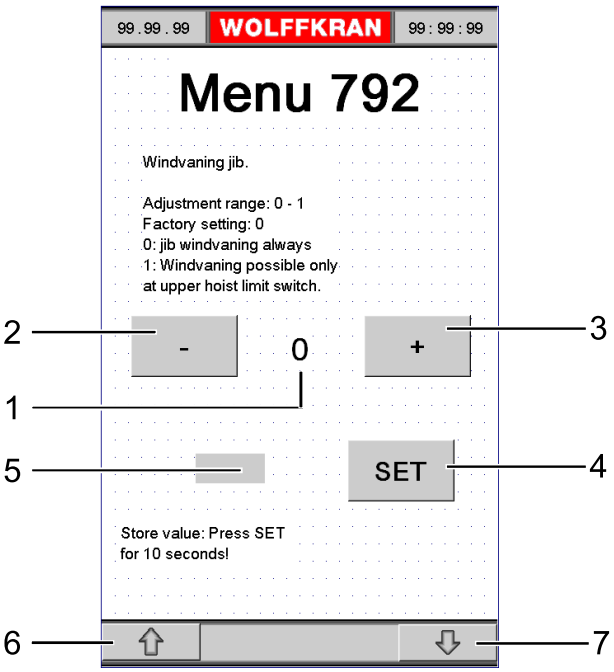
8.2.12 Slewing range and radius limitation: Enter limitation - Menu 791



Other settings - Menu 791

1	Display: This value is set. If the jib approaches the restricted area while turning, the slewing gear speed is reduced by an automatic counter-command. If the stopping path is not sufficient, the deceleration must start accordingly earlier. To achieve this, enter a larger value here. **NOTICE! The currently set value appears every time this page is selected for the first time.**	5	Display: "OK" if the value has been saved. Simultaneously, the beeper sounds for a few seconds.
2	Button: Decrease the value.	6	Button: Go to previous page.
3	Button: Increase the value.	7	Button: Go to next screen.
4	Button: Save value after confirming for ten seconds.		

8.2.13 Slewing range and radius limitation: Enter limitation - Menu 792



Other settings - Menu 792

1	Display: This value is set. 0: The crane windvaning can be enabled at any position. 1: Windvaning is possible only when the loaded hook is in its uppermost position (hoisting limit switch). **NOTICE! The currently set value appears every time this page is selected for the first time.**	5	Display: "OK" if the value has been saved. Simultaneously, the beeper sounds for a few seconds.
2	Button: Decrease the value.	6	Button: Go to previous page.
3	Button: Increase the value.	7	Button: Go to next screen.
4	Button: Save value after confirming for ten seconds.		

8.2.14 Slewing range and radius limitation: Enter limitation - Menu 793 - Reserved

No setting options available at the moment.

8.2.15 Slewing range and radius limitation: Enter limitation - Menu 794 - Reserved

No setting options available at the moment.

8.2.16 Checking the slewing range limitation

The limitation must be approached several times using different angles of rotation of the jib.

> The slewing range and radius limitation is enabled.

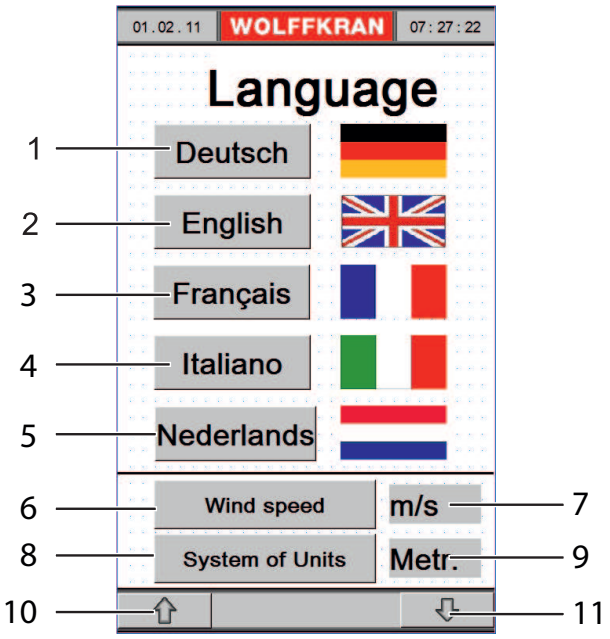
> You want to check the slewing range and radius limitation.

1) Using the jib, move the bottom snatch block against the limitation line.
2) Check whether the system is properly switched off.

→ You have successfully checked the slewing range limitation.

8.3 Crane control dialogs

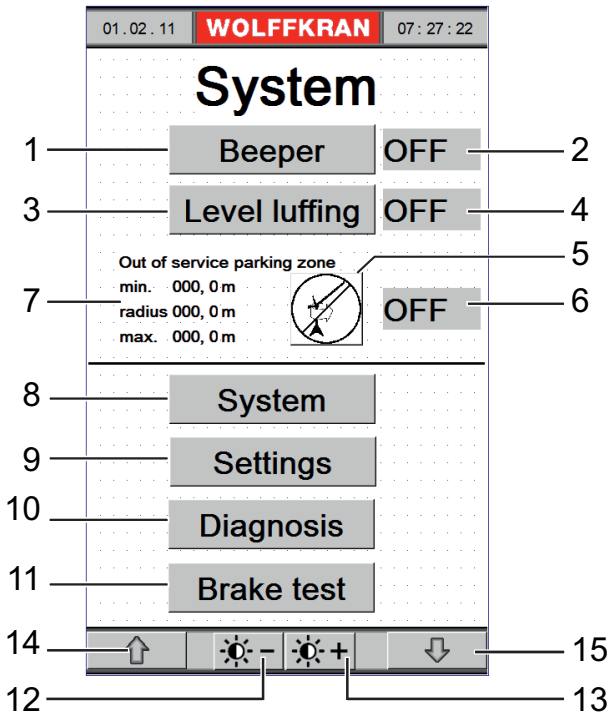
8.3.1 Language



Language selection

1	Button: German language	7	Physical unit of wind velocity m/s: meters per second km/h: kilometers per hour mph: miles per hour
2	Button: English language	8	Button: Choose system of units **NOTICE! Button only visible for US cranes.**
3	Taste: French language **NOTICE! Not visible for US cranes.**	9	System of units Metr.: Load in tons (t) and operating radius in meters (m) US: Load in short tons (tn) and operating radius in feet (ft)
4	Taste: Italian language **NOTICE! Not visible for US cranes.**	10	Button: Go to previous page.
5	Taste: Dutch language **NOTICE! Not visible for US cranes.**	11	Button: Go to next screen.
6	Button: A different unit is set each time the button is pressed.		

8.3.2 SYSTEM

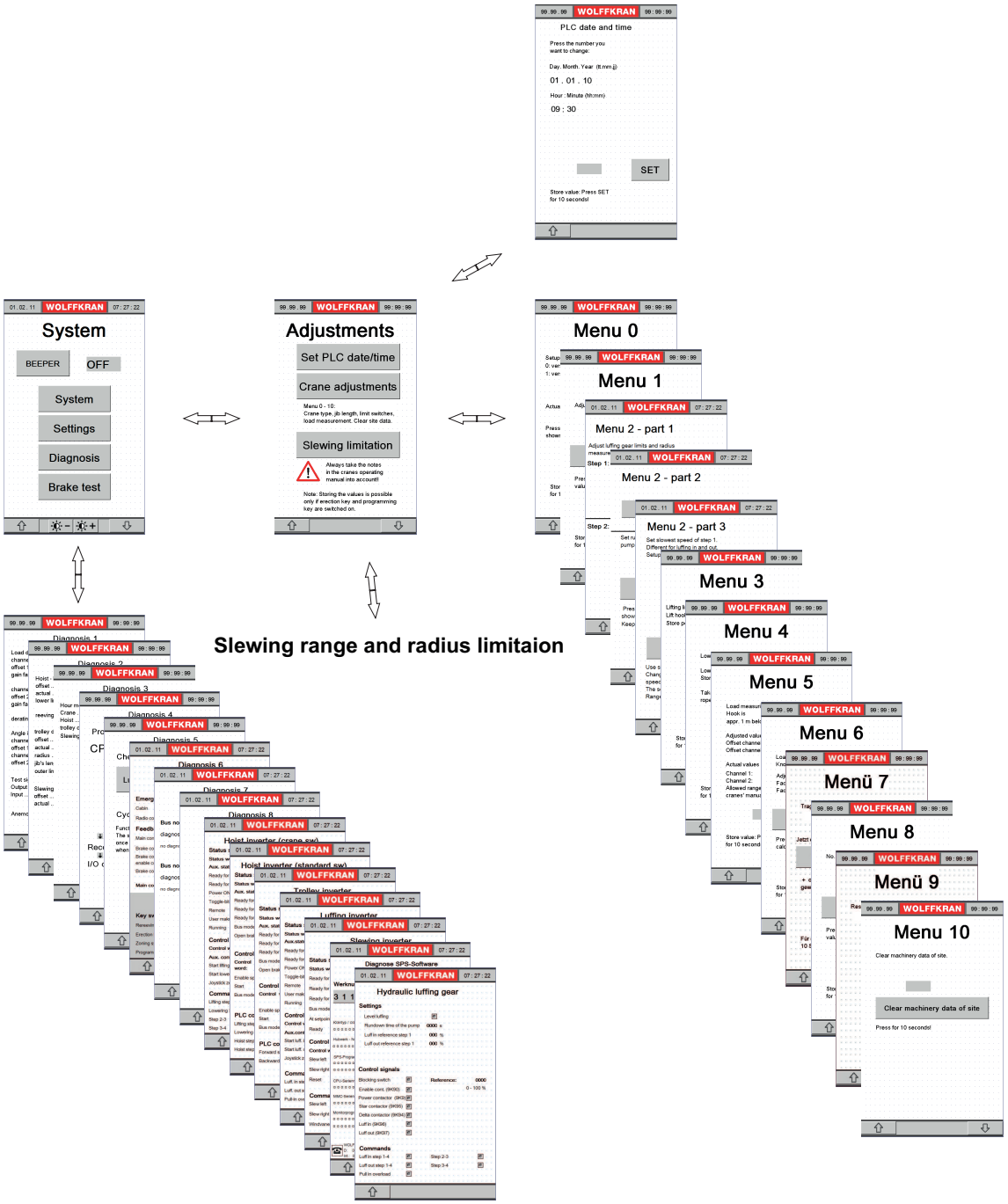


SYSTEM

1	Button: Enable / disable the beeper. **NOTICE! You can disable the beeper only for the error messages.**	9	The button is only active if programming switch 1S9 is enabled and service switch 1S0 is in position 1 or 2: Go to the overview of the setup for the crane and slewing / operating radius limitations. **WARNING! Switch in the control cabinet. All setup and adjustment work must be carried out by expert personnel only.**
2	Signal field: Beeper is enabled / disabled. OFF Beeper off for error messages ON Beeper on for error messages	10	The button is only active if the service switch is in position 1: Go to the diagnostics dialogs
3	Button: Horizontal load path	11	Button: Carry out brake test.
4	Signal field: OFF: The horizontal load path is switched off ON: The horizontal load path is switched on.	12	Reduces brightness in several steps.
5	Button: Slewing drive lock **NOTICE! The button is only visible if the slewing drive lock is enabled in menu 11 and the allowed out of service position is set.**	13	Increases brightness in several steps.

6	Signal field: Slewing drive lock ON: The jib shall be parked with closed slewing gear brakes and with one additional locked brake. OFF: The slewing tower crane shall be parked in windvaning mode. **NOTICE! The signal field is only visible if the slewing drive lock is enabled in menu 11.**	14	Button: Go to previous screen.
7	Out of service position Min.: The minimum allowable operating radius for parking the jib with closed slewing gear brakes and with additional linch pin lock. radius: current operating radius max.: max. allowable operating radius. **NOTICE! The signal field is only visible if the slewing drive lock is enabled in menu 11.** **NOTICE! There may be a slight deviation of the numerical values, when the values in settings menu 11 are entered in "feet (ft)", because the crane control calculates internal in the unit "meters (m)".**	15	Button: Go to next screen.
8	Button: Go to Setup screen.		

8.3.3 Overview

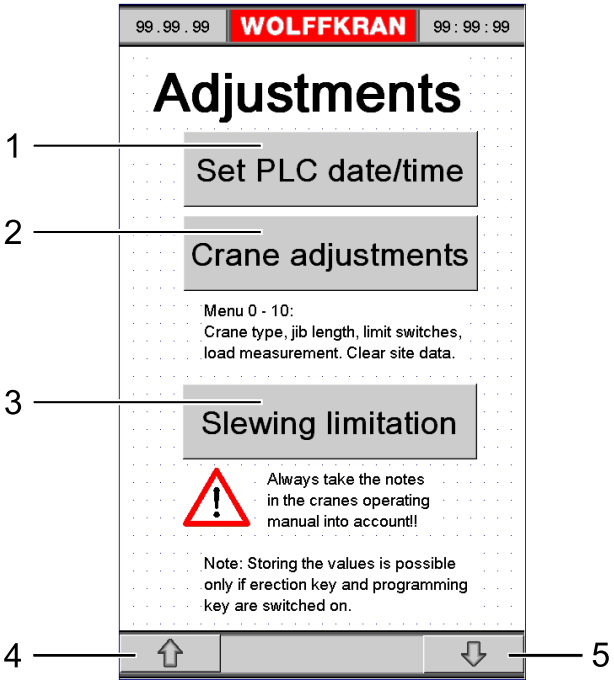


Overview of settings

8.3.4 Adjustments

NOTICE

After completing the adjustments, switch off the assembly and programming switches.



Adjustments

1	Button: Go to the PLC date / time settings	4	Button: Go to previous page.
2	Button is active only if programming switch 1S9 is enabled and assembly switch 1S0 is in position 1: Go to the adjustments for the slewing tower crane.	5	Button: Go to next screen.
3	Button is active only if programming switch 1S9 is enabled and assembly switch 1S0 is in position 2: Go to the adjustments for the slewing / jib radius limits.		

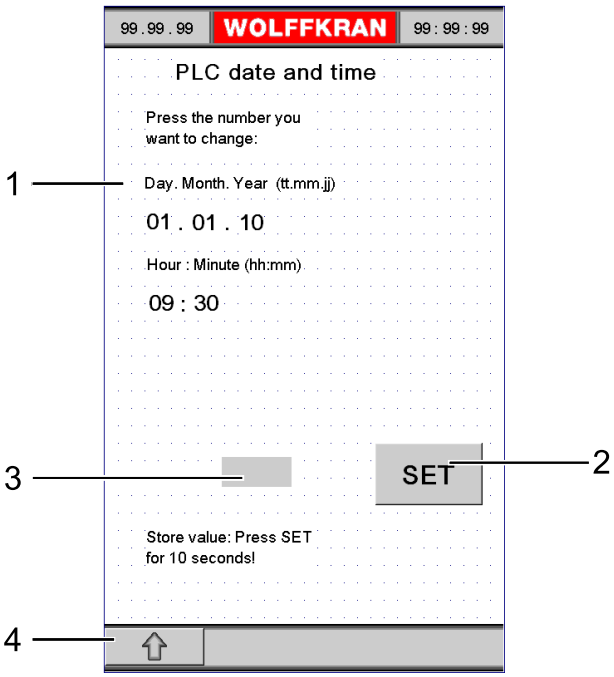
Going to ADJUSTMENTS page

> You want to modify the slewing tower crane adjustments.

1) Switch the assembly switch 1SO in the control cabinet to position 1.
2) Switch the programming switch 1S9 in the control cabinet to position 1.
3) Select the SYSTEM page.
4) Press the ADJUSTMENTS button.

→ You have now opened the adjustments dialog.

8.3.5 Set PLC date / time



Setting the PLC clock

1	When this page is selected, the time currently set is displayed. Change the desired value by pressing the figure. The input page appears.	3	Display: "OK" when value setting is applied. Simultaneously, the beeper sounds for a few seconds.
2	Button: Save settings. **NOTICE! Press and hold for at least ten seconds.**	4	Button: Go to adjustments overview.

The real-time clock in the PLC controls the cabin heater. Check its setting each time the crane has been assembled.

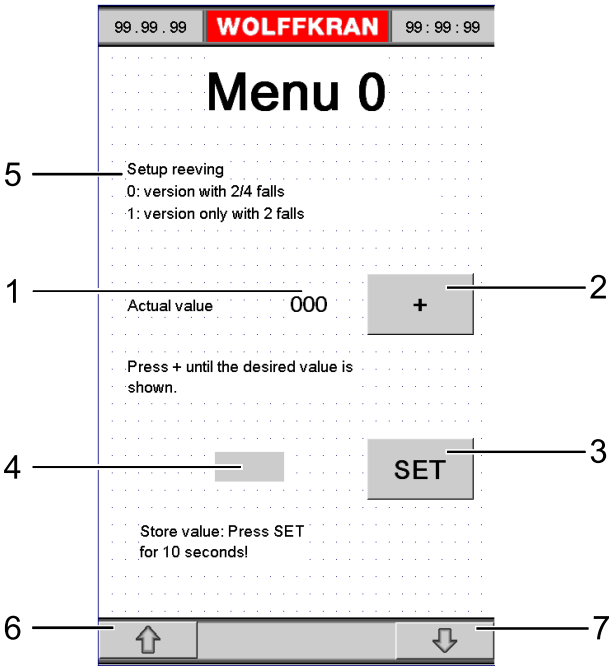
Example: Change "hour"

> How to modify the "hour" setting of the time.

1) Press "09".
   → The input page appears.
2) Enter the new value.
3) Complete your input by pressing the ENTER button.
   → **NOTICE! Press ESC to abort your entry without modifying the value.**

→ You have successfully changed the time.

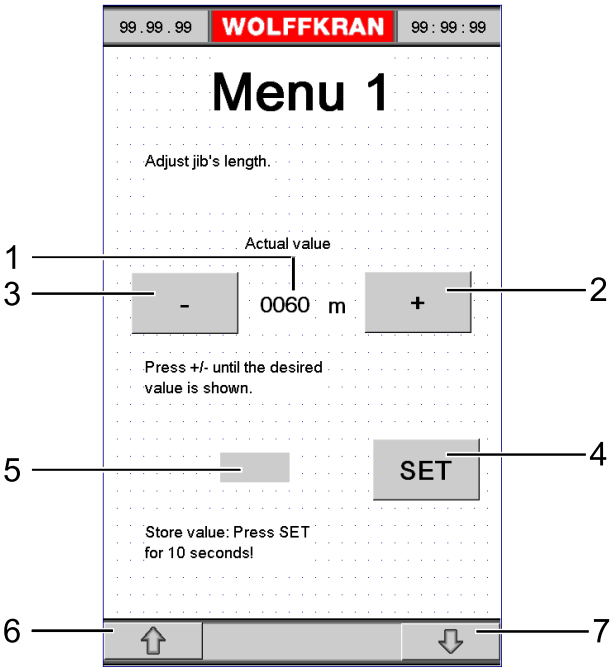
8.3.6 Menu 0: Indicate the version of the crane / set reeving mode



Menu 0

1	Enter the settings depending on the crane type. Each time this screen is called up for the first time, the currently set value will be indicated.	5	Trolley cranes: 0: Version with 2-/4-fall 1: Version only with 2-fall Luffing cranes: Setting range: 1-, 2-, 3-fall; 4=special version. Depending on crane type
2	Button: Change setting. Depending on the crane type, modifying this value may not be allowed.	6	Button: Go to previous page.
3	Button: Save setting. **NOTICE! Press and hold for at least ten seconds.** **NOTICE! After having changed the reeving mode, it is mandatory to set the load measurement again.**	7	Button: Go to next screen.
4	Display: "OK" when value setting is applied. Simultaneously, the beeper sounds for a few seconds.		

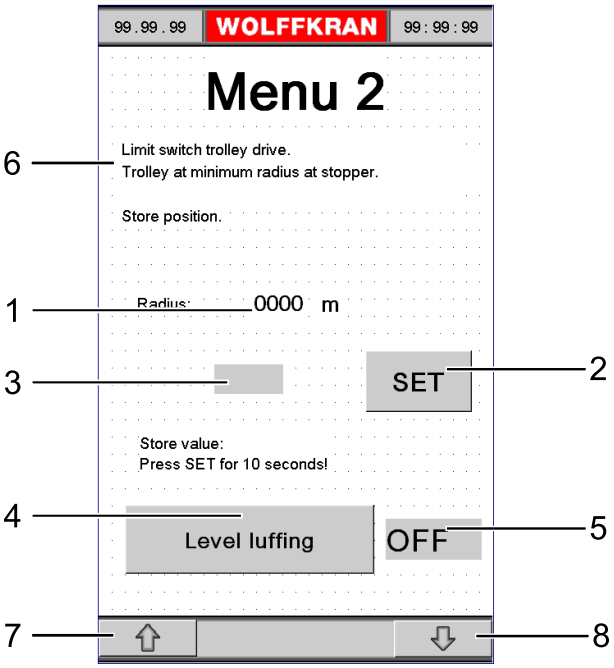
8.3.7 Menu 1: Adjust jib length



Menu 1

1	Display of set value. The currently set value appears every time this page is selected for the first time.	5	Display: "OK" when value setting is applied. Simultaneously, the beeper sounds for a few seconds.
2	Button: Increase value by 2.5 or 5 meters (depending on crane type)	6	Button: Go to previous page.
3	Button: Decrease value by 2.5 or 5 meters (depending on crane type)	7	Button: Go to next screen.
4	Button: Save setting. **NOTICE! Set actual jib length before saving.** **NOTICE! Press and hold for at least ten seconds.**		

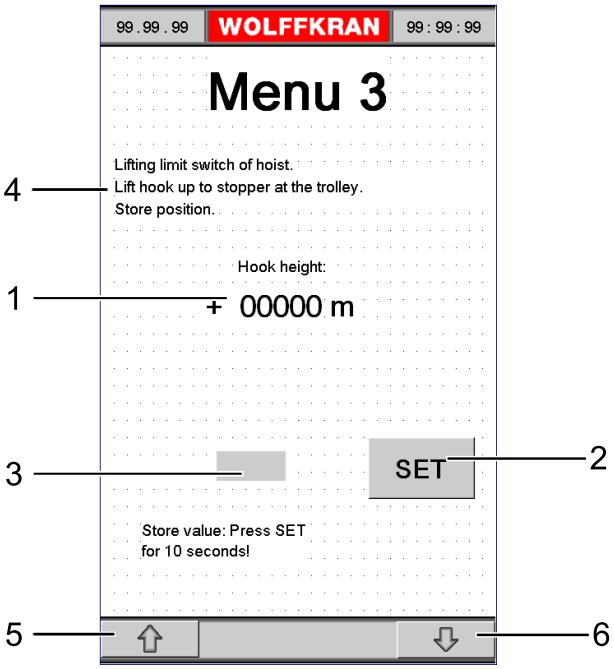
8.3.8 Menu 2: End switch trolley drive / luffing gear



Menu 2

1	The currently calculated jib radius is displayed. After saving, the display changes to show the minimum radius.	5	Signal field: OFF Horizontal load path switched off ON Horizontal load path switched on
2	Button: Save setting. **NOTICE! Before saving, carefully move the trolley to the inner stop (minimum radius).** **NOTICE! Press and hold for at least ten seconds.**	6	Trolley cranes: Indicated text: End switch trolley drive. Trolley drive in smallest operating radius at the stop. Luffing cranes: Indicated text: Set the end switch for luffing gear and operating range indication. Retract jib until it touches the stop.
3	Display: "OK" when value setting is applied. Simultaneously, the beeper sounds for a few seconds. The inner and outer limit switches for the trolley are now saved.	7	Button: Go to previous page.
4	**NOTICE! Only for luffing cranes.** Button: Switch Horizontal load path on/off	8	Button: Go to next screen.

8.3.9 Menu 3: Lifting limit switch of hoist



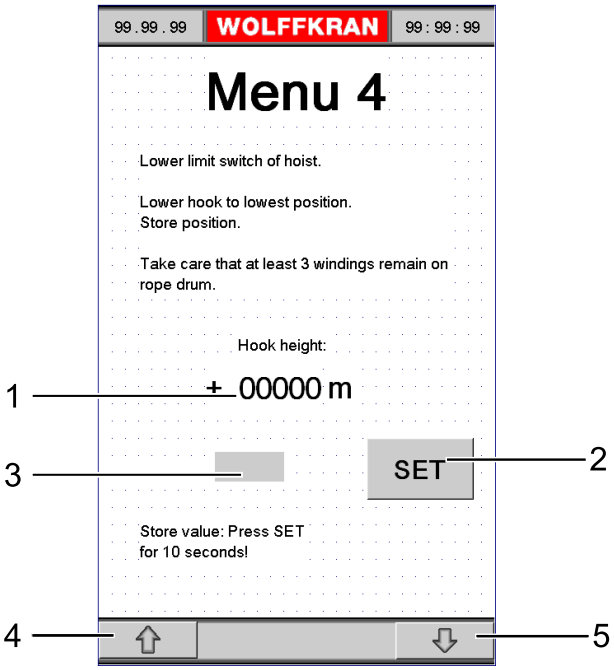
Menu 3

1	Display the currently calculated hook height. After saving, the display changes to a value between 0 m and 1 m.	4	Trolley cranes: Indicated text: End switch hoisting gear up. Lift snatch block up to the trolley stop. Save this position. Luffing cranes: Indicated text: End switch hoisting gear up. Lift snatch block up to approx. 2.5 m below jib tip. Save this position.
2	Button: Save setting. **NOTICE! Before saving, carefully move the hook to the stop of the trolley.** **NOTICE! Press and hold for at least ten seconds.** After saving menu 3, immediately perform the following step: Crane adjustment menu 5, load measurement zero setting. This saves one lowering and raising cycle of the bottom snatch block.	5	Button: Go to previous page.
3	Display: "OK" when value setting is applied. Simultaneously, the beeper sounds for a few seconds.	6	Button: Go to next screen.

(see also):

- Menu 5: Load measurement zero setting [180]

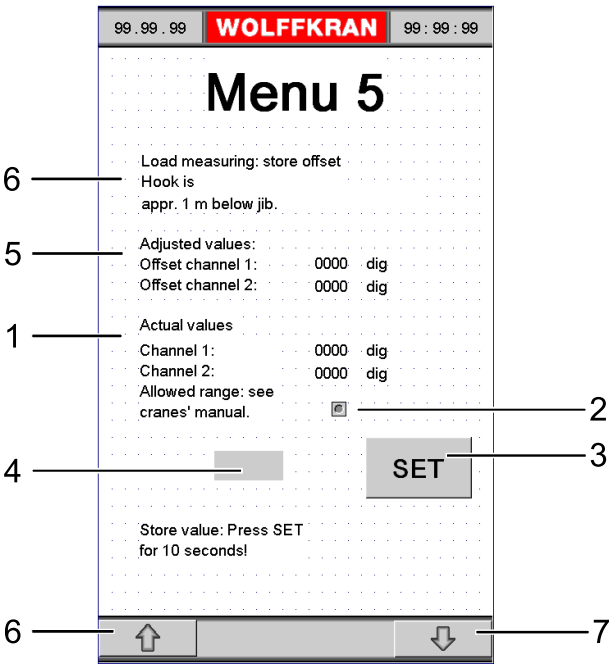
8.3.10 Menu 4 Lower limit switch of hoist



Menu 4

1	Display the currently calculated hook height.	4	Button: Go to previous page.
2	Button: Save setting. **NOTICE! Before saving, lower the bottom snatch block. The hook should hang free above ground.** When the load hook has reached the lowest hook position, it must be ensured that at least 3 windings are still present at the hoisting rope drum. **NOTICE! Press and hold for at least ten seconds.**	5	Button: Go to next screen.
3	Display: "OK" when value setting is applied. Simultaneously, the beeper sounds for a few seconds.		

8.3.11 Menu 5: Load measurement zero setting



Menu 5

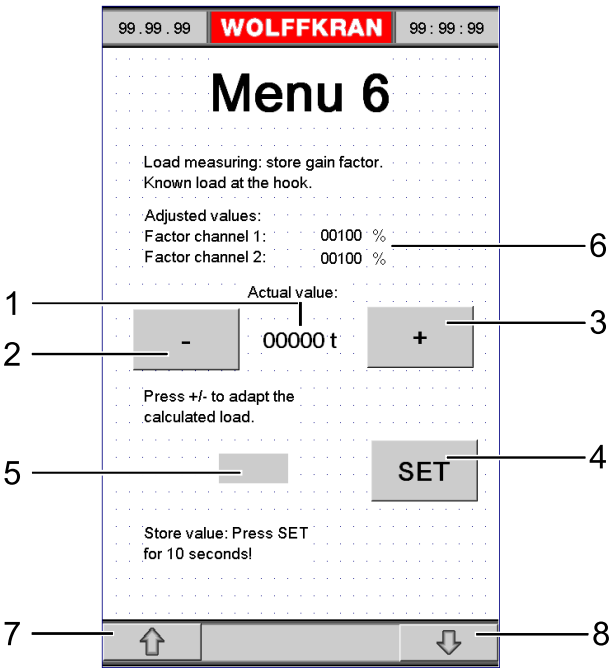
1	Actual value for both measuring axle channels is displayed.	5	Display of previously set value for load zero.
2	Display whether setting is in the allowed range.	6	Trolley cranes: Indicated text: Load measurement: Set zero point. Bottom snatch block is approx. 1 m below the jib. Luffing crane: Indicated text: Load measurement: Set zero point. Bottom snatch block is at the hoist end switch.
3	Button: Save setting. Bring the bottom snatch block (without load) to the height of the hoist end switch. **NOTICE! Trolley jib cranes whose reeving mode can be changed must always be set to 2-fall mode for this setting.** **NOTICE! Setting slewing tower cranes with slewing luffing jib in straight position** **NOTICE! Press and hold for at least ten seconds.**	7	Button: Go to previous page.

4	Display: "OK" when value setting is applied. Simultaneously, the beeper sounds for a few seconds.	8	Button: Go to next screen.

(see also):

- setting values [400]

8.3.12 Menu 6: Gain factor of load measurement



Menu 6

1	Display the calculated load.	5	Display: "OK" when value setting is applied. Simultaneously, the beeper sounds for a few seconds.
2	"-" button: Decrease the load value displayed.	6	Display the stored gain factors.
3	"+" button: Increase the load value displayed.	7	Button: Go to previous page.
4	Button: Save setting. **NOTICE! Press and hold for at least ten seconds.**	8	Button: Go to next screen.

How to set

> Load measurement zero must have been saved.

1) Suspend a known test load.
2) Lift the test load until it is freely suspended.
   → The test load is free from ground.
   Test load: at least 50 % of maximum lifting capacity and greater than peak supporting capacity.
3) Use buttons 2 and 3 to set the load reading.
   With hook heights over hook height 42 m, the load reading must be adapted to the additional height (see Setting values, page: [400]).
4) Press button 4 to save the setting.

→ You have successfully carried out the adjustment.

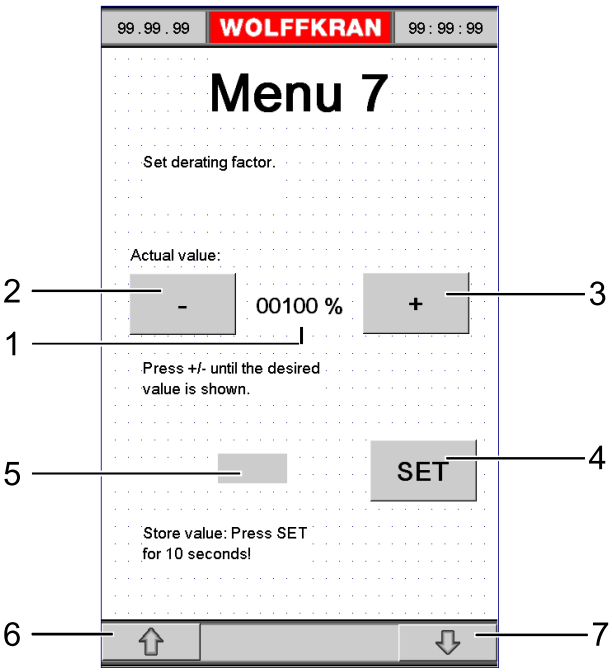
Checking and troubleshooting

> The load measurement cannot be adjusted using the buttons 2 and 3.

1) Check the weight of the test load.
2) Check the scale used for weighing the test load.
3) Check the routing of the hoisting rope.
4) Check the rope fall reeving.
   → If the previous points are found OK, replace the load measuring shaft.

→ You have successfully done the check.

8.3.13 Menu 7: Lifting capacity derating factor



Menu 7

1	Display the set lifting capacity reduction in percent. NOTE: ▪ 100 %: No reduction ▪ 50...99% reduction in terms of per cent of the maximum lifting capacity and the load in the load torque range pursuant to the lifting capacity (refer to OPM 2).	5	Display: "OK" when value setting is applied. Simultaneously, the beeper sounds for a few seconds.
2	Button: Decrease the lifting capacity in percent increments.	6	Button: Go to previous page.
3	Button: Increase the lifting capacity in percent increments.	7	Button: Go to next screen.
4	Button: Save settings. Note: Press and hold for at least ten seconds.		

8.3.14 Crane Adjustment: Check saved data

> You have done and saved the crane adjustments.

1) Check the load moment monitor [185].
2) Check the trolley travel end cutoff or operating range cutoff [185].
3) Check the hoisting end cutoff [186].
4) Check the lowering end cutoff [186].
5) Monthly check the load sensing [186].

→ You have successfully checked the saved data.



NOTICE

After completing the adjustments, switch off the assembly and programming switches.

(see also):

- Checking the load moment monitor [185]
- Checking the hoisting limit cutoff [186]
- Checking the lowering end cutoff [186]
- Checking the load sensing [186]

8.3.14.1 Checking the load moment monitor

> You have done and saved the crane adjustments.

1) In the control cabinet, set assembly switch 1S0 to "2".
2) Set programming switch 1S9 to "0".
3) Check whether the load display in the cabin matches the known test load attached.
4) For the load attached, obtain the minimum allowable operating radius from the lifting capacity table in cabin.
5) With test load attached, luff the jib out and check whether the load moment cutoff is activated at 110 % at the latest.
   → At 95 %, the preliminary warning will be activated and the luffing speed reduced. if not, repeat the setting procedures as per menus 0, 1, 2, 5, and 6.
6) In the control cabinet, set assembly switch 1S0 to "0".

→ You have successfully checked the load moment monitor.

8.3.14.2 Checking the operating range cutoff

> You have done and saved the crane adjustments.

1) In the control cabinet, set assembly switch 1S0 to "2".
2) Set programming switch 1S9 to "0".
   → You have changed to the operating mode.

3) Luff the jib to the minimum operating radius.
   → The jib has reached the minimum allowable operating range and cut off the luffing-in movement.
4) Luff the jib to the maximum operating radius.
   → The jib has reached the maximum allowable operating range and cut off the luffing-out movement.
5) if not, repeat the setting procedures as per menus 001 and 002.

→ You have successfully checked the operating radius end cutoff.

8.3.14.3 Checking the hoisting limit cutoff

> You have done and saved the crane adjustments.

1) In the control cabinet, set assembly switch 1S0 to "2".
2) Set programming switch 1S9 to "0".
3) Lift the bottom snatch block.
   → The snatch block comes to a standstill approx. 2.5 m before the stop.
   → If not, repeat the setting procedures as per menu 3.

→ You have successfully checked the hoisting limit cutoff.

8.3.14.4 Checking the lowering end cutoff

> You have done and saved the crane adjustments.

1) In the control cabinet, set assembly switch 1S0 to "2".
2) Set programming switch 1S9 to "0".
3) Lower the bottom snatch block.
   → The bottom snatch block should stop just above ground.
   → If not, repeat the setting procedures as per menu 4.

→ You have successfully checked the lowering limit cutoff.

8.3.14.5 Checking the load sensing

> You have done and saved the crane adjustments.

> The monthly check has to be done in any case.

1) In the control cabinet, set assembly switch 1S0 to "2".
2) Set programming switch 1S9 to "0".
3) Lift the snatch block to the uppermost hook position.
4) Operate the re-reeving key.
5) Read the two values for both measuring channels from the load display.
   Touching the "max. t" button will switch the display.
   Ensure that the allowable ranges of the setting values [400] are kept.
6) Switch off the re-reeving key at the control console.
   → Both values must be within the tolerance field.

→ If not, have the setting procedures as per menu 5 repeated by experts.

→ You have successfully checked the load measurement.

(see also):

- setting values [400]

8.3.14.6 Checking the load sensing

> You have done and saved the crane adjustments.

> The monthly check has to be done in any case.

1) In the control cabinet, set assembly switch 1S0 to "2".
2) Set programming switch 1S9 to "0".
3) Lift the hook block to the uppermost hook position.
4) Operate the re-reeving key.
5) From the load reading, read the values for the two measuring channels.
   Release the re-reeving key and turn it again to change the reading. Observe the permissible range of setting values [400].
6) Switch off the re-reeving key at the control console.

   → Both values must be within the tolerance field.

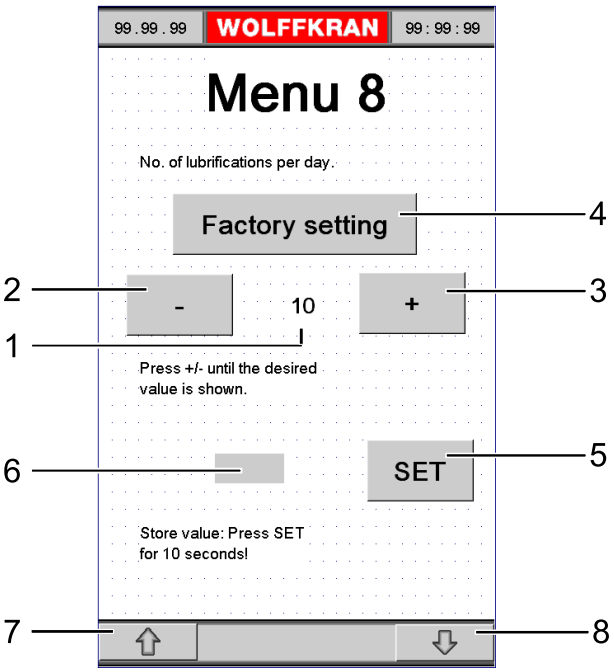
   → If not, have the setting procedures as per menu 5 repeated by experts.

→ You have successfully checked the load measurement.

(see also):

- setting values [400]

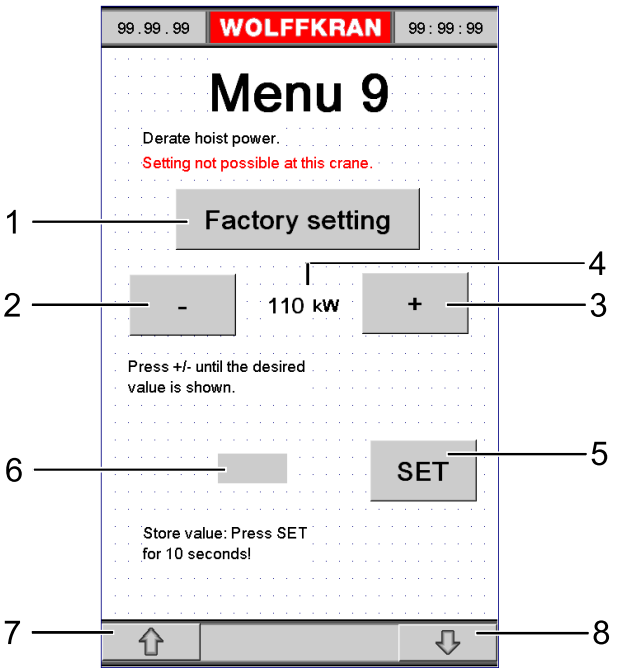
8.3.15 Menu 8: Electrical central lubrication



Menu 8

1	The number of lubrication cycles per day is displayed.	5	Button: Save setting. **NOTICE! Press and hold for at least ten seconds.**
2	Button: Decrease the number.	6	Display: "OK" when value setting is applied. Simultaneously, the beeper sounds for a few seconds.
3	Button: Increase the number.	7	Button: Go to previous page.
4	Button: Setting the number specified by the manufacturer.	8	Button: Go to next screen.

8.3.16 Menu 9: Adjusting hoisting gear output

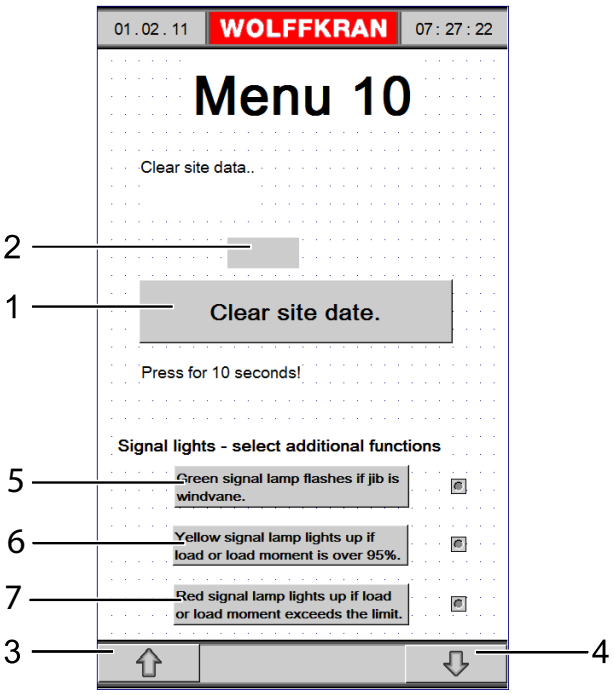


Menu 9

1	Button: Factory setting of the hoisting gear output to the rated value. **NOTICE! The red text "Setting not possible at this crane" can be seen only if cranes do not have that feature.**	5	Button: Save setting. **NOTICE! Press and hold for at least ten seconds.**
2	Button: Decrease the hoisting gear output by 1 kilowatt. **NOTICE! The smallest value to be set is half of the rated power of the motor.**	6	Display: "OK" when value setting is applied. Simultaneously, the beeper sounds for a few seconds.
3	Button: Increase the hoisting gear output by 1 kilowatt. **NOTICE! The greatest value to be set is half of the rated power of the motor.**	7	Button: Go to previous page.

4	Display of the set hoisting gear output in kilowatt (kW). **NOTICE! By reducing the hoisting gear output, the electrical power consumption of the crane and thus its total electrical load may be reduced. So you can work in weak networks. Contact WOLFFKRAN GmbH after-sales service for more detailed information.** **NOTICE! A smaller hoisting gear output reduces the speeds of hoisting operations indicated in the manual. The lowering speeds will not be affected. The acceleration time at lifting and lowering may be prolonged.**	8	Button: Go to next screen.

8.3.17 Menu 10: Clear machinery data of site



Menu 10

1	Button: Delete machinery data of site In addition to the machine data on the slewing tower crane life and the last 40 weeks of operation, the machine data is also stored for a certain time, e.g. construction site assignment. The malfunctions which occurred most recently are stored including date and time. Therefore, the machine data for the previous construction site should always be deleted every time the slewing tower crane is set up on a new site in order to ensure precise association of the machine data with the construction site assignment. **NOTICE! Press and hold for at least ten seconds.**	5	Button: Green signal light blinks at windvane function. Every time the button is pressed, the display of the signal field changes from grey to green. If its green, the green signal light of the crane blinks, as soon as the jib is in windvaning mode. If the field is grey (factory setting), the function is off.

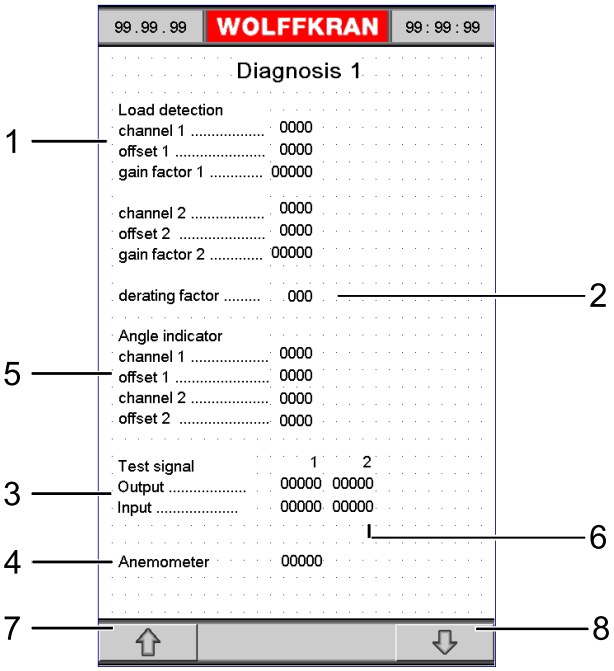
2	Display: "OK" when the data has been deleted. Simultaneously, the beeper sounds for a few seconds.	6	Button: Yellow signal light illuminates at 95 % lifting capacity/load torque. Every time the button is pressed, the display of the signal field changes from grey to green. If it's green, the yellow signal light of the crane illuminates as soon as the over load or load torque warning threshold is reached. If the field is grey (factory setting), the function is off.
3	Button: Go to previous page.	7	Button: Red signal light illuminates at switch-off due toload capacity/load torque. Every time the button is pressed, the display of the signal field changes from grey to green. If it's green, the red signal light of the crane illuminates as soon as the cutout values of over load or load torque are reached. If the field is grey (factory setting), the function is off.
4	Button: Go to next screen.		

8.4 Monitor Diagnosis Pages

8.4.1 Diagnosis 1

NOTICE

After completing the adjustments, switch off the assembly and programming switches.



Diagnosis 1

1	Load measuring shaft: Actual analog value and setting values for both channels.	5	**NOTICE! Only for luffing cranes.**
2	Setting value for lifting capacity derating.	6	**NOTICE! Only for luffing cranes.**
3	Test signal for analog value processing Output - OV20, input IV24	7	Button: Go to previous page.
4	Analog signal from anemometer.	8	Button: Go to next screen.

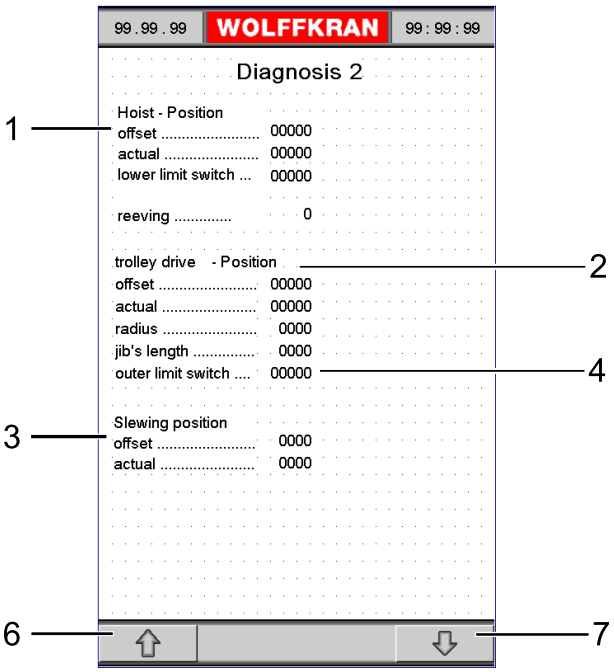
Going to the "Diagnosis 1" page

> You want to change to the DIAGNOSIS 1 page.

1) Set assembly switch 1S0 in the control cabinet to position "1".
2) Select the SYSTEM page.
3) Press the DIAGNOSIS button

→ Now you have opened the DIAGNOSIS 1 page.

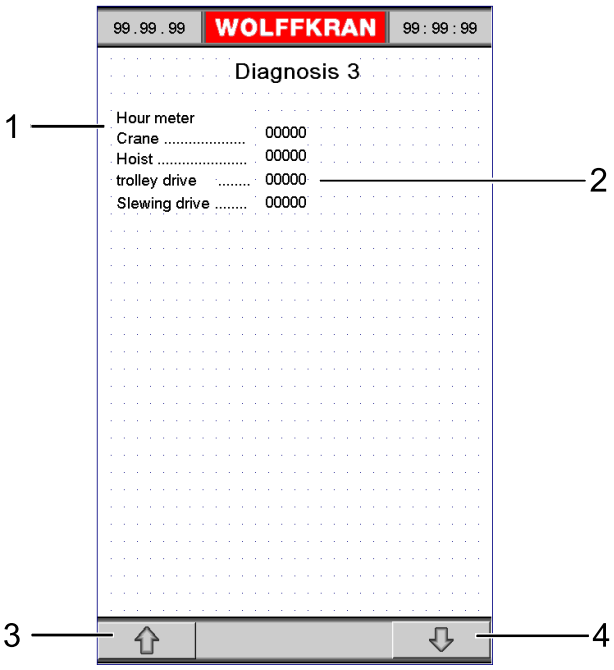
8.4.2 Diagnosis 2



Diagnosis 2

1	Displays the PLC internal values for hoisting gear position.	4	**NOTICE! Only for luffing cranes.**
2	Trolley cranes: Indicated text: Position of trolley drive. Luffing crane: Indicated text: Position of luffing gear Displays the PLC internal values for luffing gear position.	6	Button: Go to previous page.
3	Displays the PLC internal values for slewing gear position.	7	Button: Go to next screen.

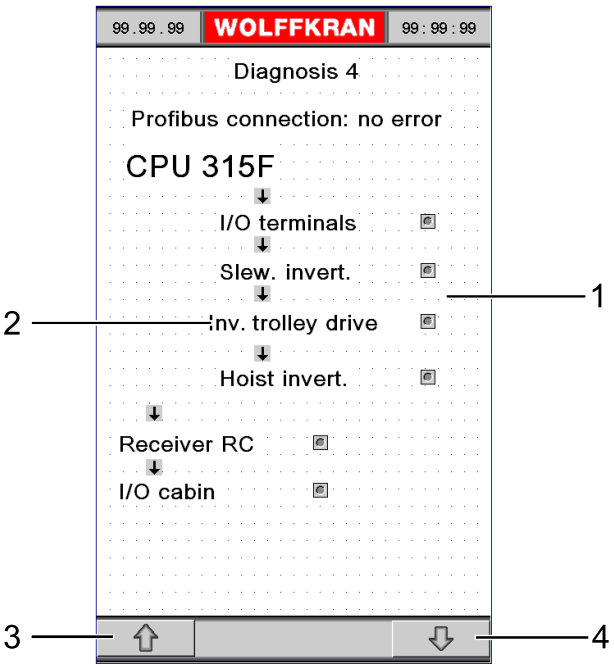
8.4.3 Diagnosis 3



Diagnosis 3

1	Operating hours for crane and individual drives.	3	Button: Go to previous page.
2	Trolley cranes: Indicated text: Trolley drive. Luffing crane: Indicated text: Luffing gear	4	Button: Go to next screen.

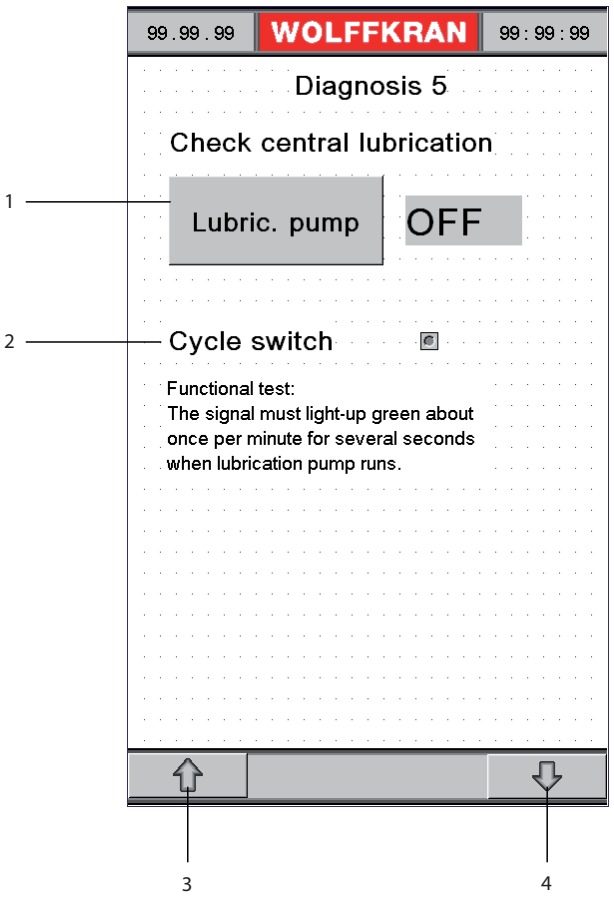
8.4.4 Diagnosis 4



Diagnosis 4

1	◉ No error in Profibus communication, devices available ◯ Error in Profibus communication or devices not available	3	Button: Go to previous page.
2	Trolley cranes: Indicated text: FU trolley drive. Luffing crane with derricking gear: Indicated text: FU derricking gear. Luffing crane with luffing gear: Indicated text: FU derricking gear not applicable.	4	Button: Go to next screen.

8.4.5 Diagnosis 5



1	Button lubrication pump: Test of central lubrication system.	3	Button: Go to previous monitor screen.
2	Cycle switch: Must light up in green at least one per minute while the lubrication pump is running.	4	Button: Go to next monitor screen.

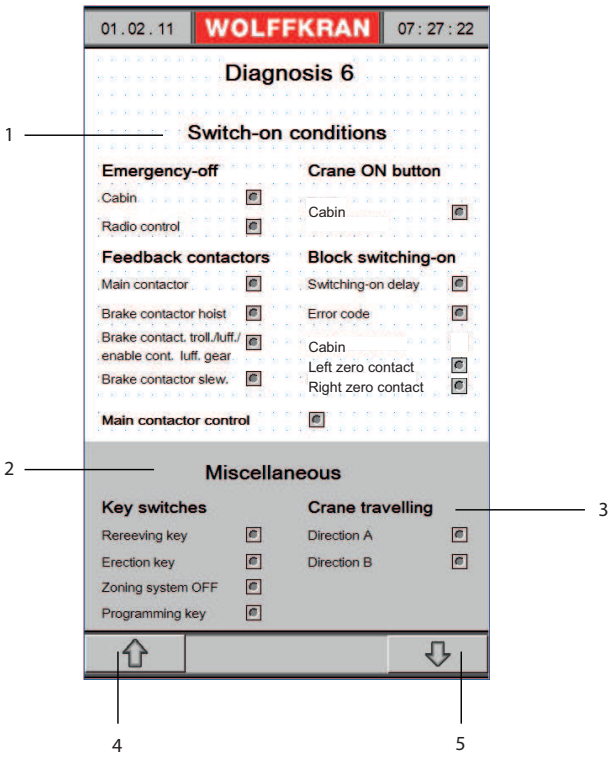
The crane control system governs the electrical central lubrication. Lubrication takes place approx. 10 times a day in one-hour intervals. The duration of a lubrication process depends on the crane type. Lubrication is started by a motion command from the slewing gewar.

The crane control system checks whether the lubrication has been completed successfully.

The signal of a proximity switch (cycle switch) integrated in the lubrication device must switch on and off at least once during a lubrication process. If this does not happen because there is not enough grease, or the grease has become viscous, the lubrication process is repeated several times.

If the lubrication is not successfully also on the following day, error message 740 will be indicated on the monitor. The error message can be reset by switching the voltage supply of the crane on and off.

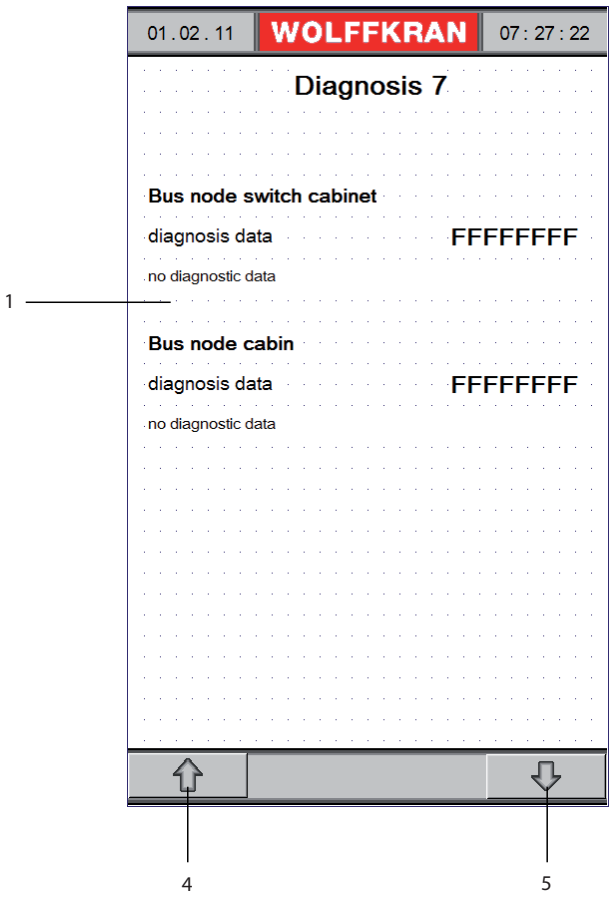
8.4.6 Diagnosis 6



Diagnosis 6

1	Switch on conditions To switch on the crane, all signal fields must be green.	4	Button: Go to previous monitor screen.
2	Miscellaneous Signal fields show the state of the key switches in the control cabinet.	5	Button: Go to next monitor screen.
3	Start crane traveling gear Display master switch control command drive gear.		

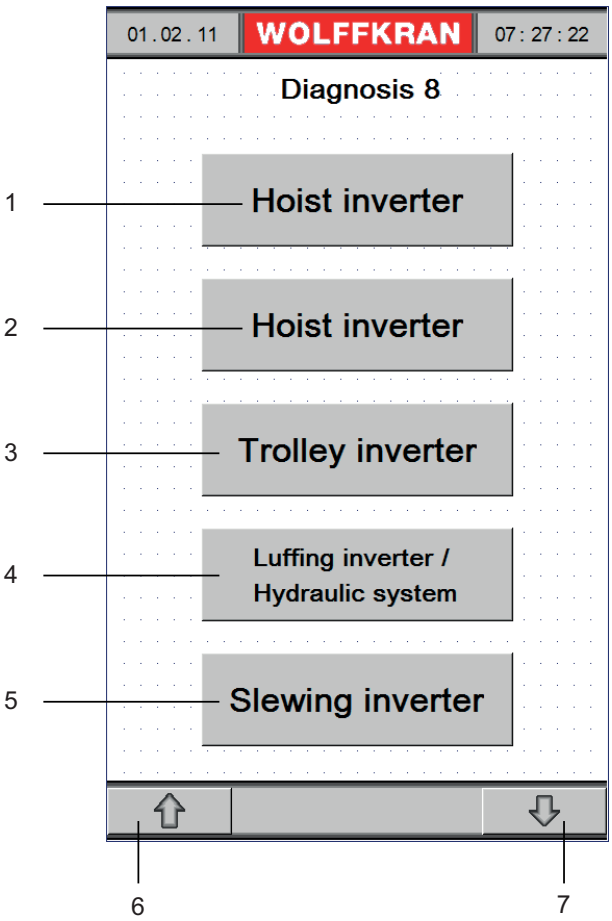
8.4.7 Diagnosis 7



Diagnosis 7

1	Diagnostic message field bus in the control cabinet and in the driver's cab. Display as a numeric value (hex) and, if possible, as a text message.	5	Button: Go to next monitor screen.
4	Button: Go to previous monitor screen.		

8.4.8 Diagnosis 8

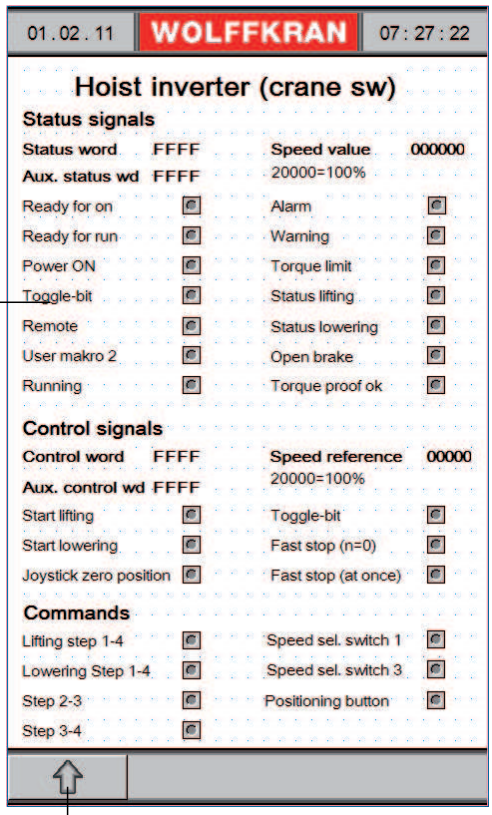


Diagnosis 8

1	Button: Go to Diagnosis page FC hoisting gear (crane software) **NOTICE! Button is displayed only for frequency controlled hoisting gear with crane software.**	5	Button: Go to Diagnosis page of inverter slewing gear.
2	Button: Go to Diagnosis page FC hoisting gear (standard software) **NOTICE! Button is displayed only for frequency controlled hoisting gear with standard software.**	6	Button: Go to previous monitor screen.
3	Button: Go to Diagnosis page FC traverse gear. **NOTICE! Button is displayed only for trolley cranes.**	7	Button: Go to next monitor screen.

4	Button: Go to Diagnosis page of inverter derricking gear / hydraulic luffing gear **NOTICE! Button is displayed only for luffing cranes**		

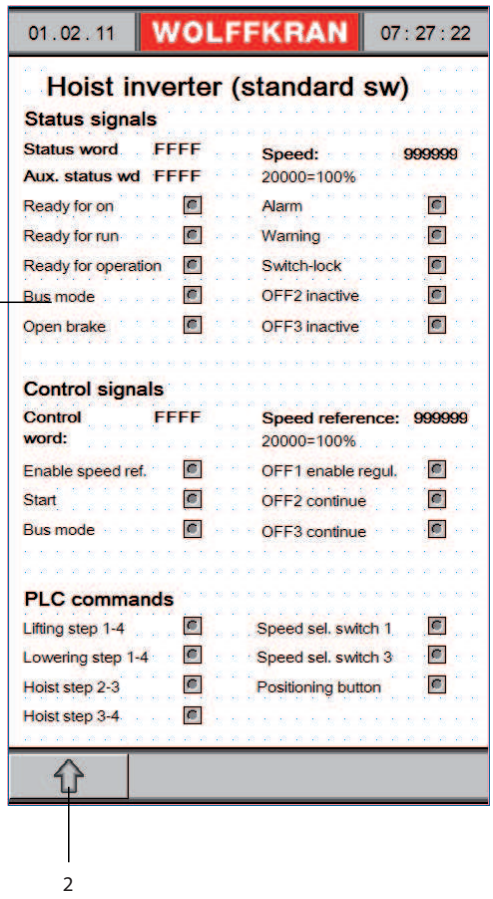
8.4.9 Diagnosis 9 FCHWK



Diagnosis 9 HWK

1	Display of various control and status signals, that are exchanged between the inverter and PLC via Profibus. Display of signals from the control console in the driver's cab.	2	Button: Go to previous monitor screen.

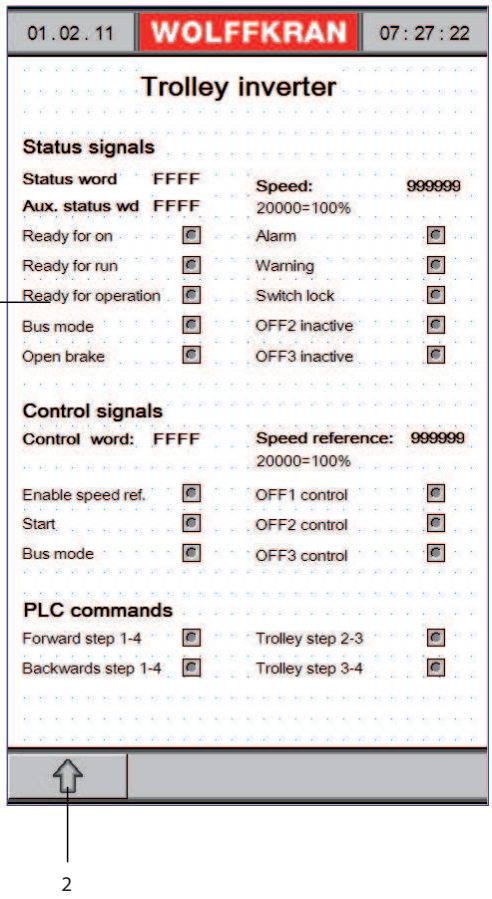
8.4.10 Diagnosis 9 FCHWS



Diagnosis 9 HWS

1	Display of various control and status signals, that are exchanged between the inverter and PLC via Profibus. Display of signals from the control console in the driver's cab.	2	Button: Go to previous monitor screen.

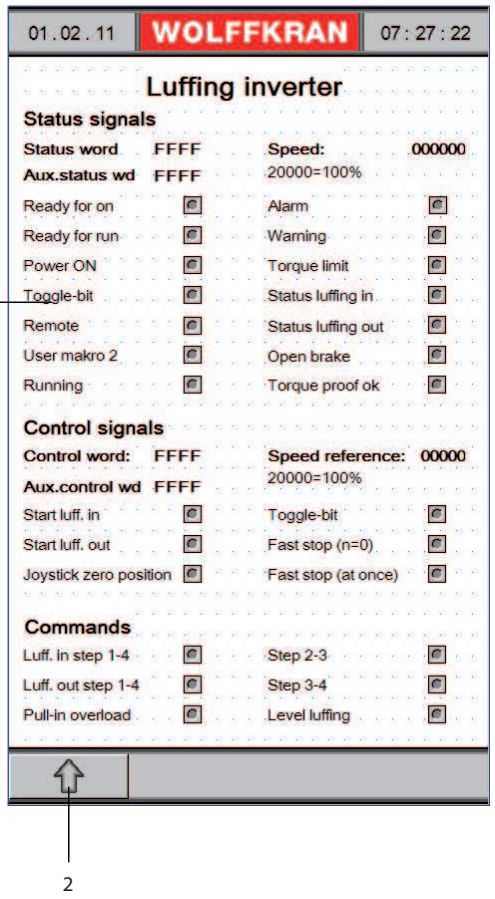
8.4.11 Diagnosis 10 FC TGW



Diagnosis 10 FCTGW

1	Display of various control and status signals, that are exchanged between the inverter and PLC via Profibus. Display of signals from the control console in the driver's cab.	2	Button: Go to previous monitor screen.

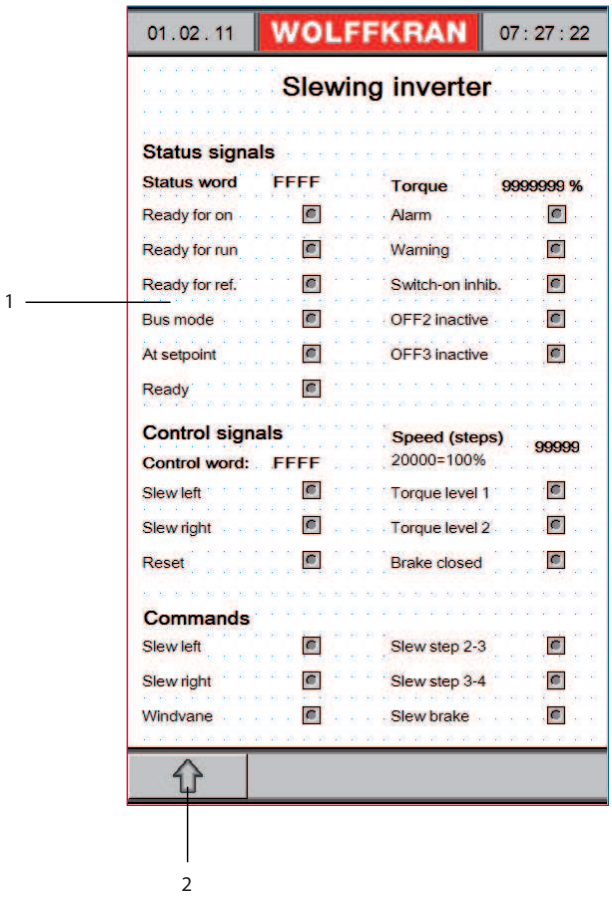
8.4.12 Diagnosis 10 FC LG



Diagnosis 10 FCLG

1	Display of various control and status signals, that are exchanged between the inverter and PLC via Profibus. Display of signals from the control console in the driver's cab.	2	Button: Go to previous monitor screen.

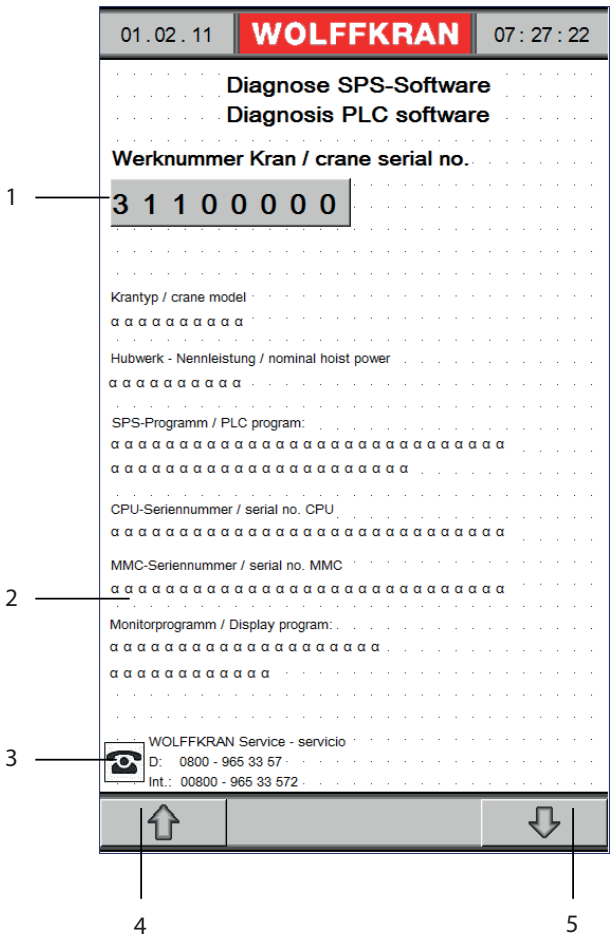
8.4.13 Diagnosis 10 FC SG



Diagnosis 10 FCSG

1	Display of various control and status signals, that are exchanged between the inverter and PLC via Profibus. Display of signals from the control console in the driver's cab.	2	Button: Go to previous monitor screen.

8.4.14 Diagnosis general



1	Input option and display for serial number of the crane. The crane chassis number can only be set in crane setting mode.	4	Button: Go to previous monitor screen.
2	Display of various crane and program data.	5	Button: Go to Diagnosis page 1.
3	Display phone number of WOLFFKRAN after-sales service.		

8.5 WOLFF-Boost

NOTICE

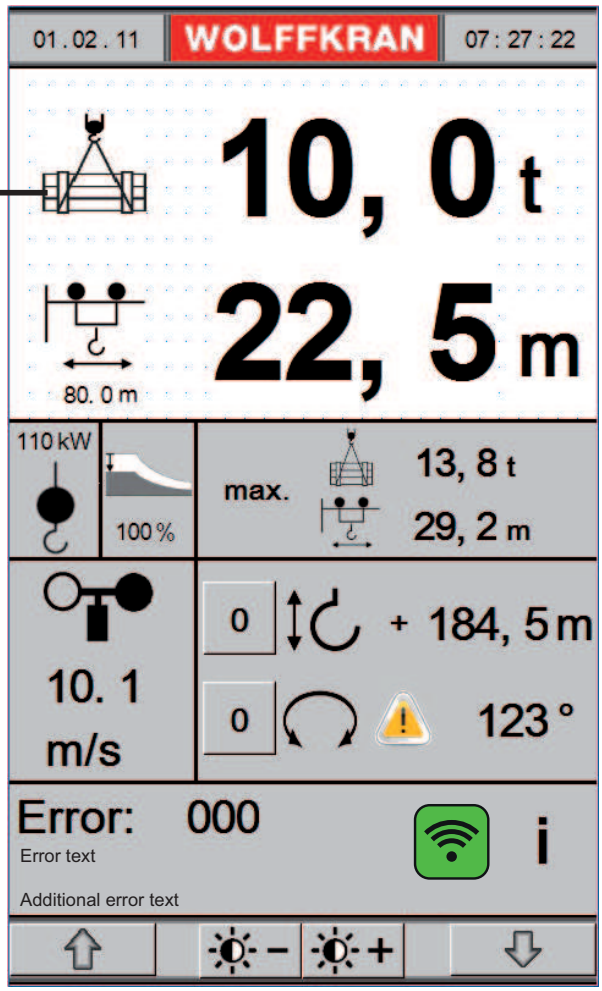
WOLFF-Boost cannot be enabled.

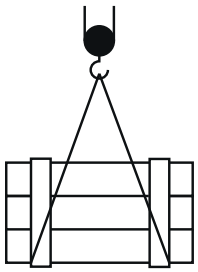
WOLFF-Boost cannot be enabled:

1) in the range of constant lifting capacity,
2) while the crane is operated via remote control,
3) in case of errors within a hoisting gear,
4) and during mounting.

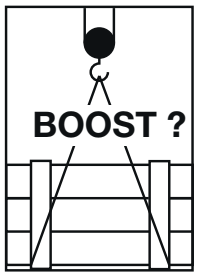
With the WOLFF-Boost function, the load is allowed to exceed the load torque range specified for the lifting capacities by up to 10%. This is, however, subject to the restriction that hoisting gear and trolley drive (trolley crane) respectively hoisting gear and derricking gear (luffing crane) must only be moved alternatingly.

2.1

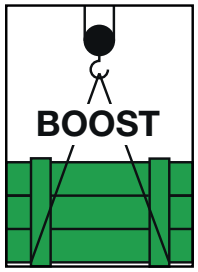




A



B



C

2.1	Load reading symbol	B	Button: Enable WOLFF-Boost
A	Boost disabled	C	WOLFF-Boost enabled

Switching on WOLFF-Boost

> WOLFF-Boost can be enabled after load torque monitoring has switched off. As soon as all drives have come to standstill, the load symbol in the display changes. It now shows a frame and can be used as a button.

► Press button (B) to enable the WOLFF-Boost.

→ The symbol color changes to green, and the frame starts flashing (C).

→ You have enabled the WOLFF-Boost function.

WOLFF-Boost is switched on

Effect:

- The overload warning buzzer switches off.
- The red background of the load reading turns yellow.
- The red signal lamp in the right control console switches off.

Now, a higher switch-off value of the load torque curve applies.

Hoisting gear and trolley/derricking/luffing gear can only be moved alternatingly.

The horizontal load path is switched off for derricking/luffing gears.

The travelling gear is locked.

In the maximum values window, the word "Boost" is displayed, and the new limit values for [9] and [13] are shown (for items [9] and [13], refer to the main view, page:).

Switching off WOLFF-Boost

The function is automatically disabled when the crane leaves the load torque switch-off range.

8.6 Description of the interface to external anti-collision system (AK)

CAUTION

Incorrect voltages applied to digital inputs.

Damage to the electronic control system of the slewing tower crane.

► Return only voltages of 0 V (terminal 1) or 24 V (terminal 2) via relay contacts.

Terminal strip 06X1 in control cabinet

06X1 Terminal	Signaling direction	Function
1	Crane => external anti-collision control	Power supply for digital input signals / 0 V
2	Crane => external anti-collision control	Power supply for digital input signals / 24 VDC
3	External anti-collision control => Crane	Stops trolley forward movement (extend the luffing gear) / Low active
4	External anti-collision control => Crane	Stops trolley back movement (retract the luffing gear) / Low active
5	External anti-collision control => Crane	Trolley drive (luffing gear) speed for approaching the limit switch / Low active
6	External anti-collision control => Crane	Stops slewing gear motion to left-hand side / Low active
7	External anti-collision control => Crane	Stops slewing gear motion to right-hand side / Low active
8	External anti-collision control => Crane	Slewing gear motion to left-hand side, step 1 / High active
9	External anti-collision control => Crane	Slewing gear motion to right-hand side, step 1 / High active
10	External anti-collision control => Crane	Slewing gear, step 2 / High active
11	External anti-collision control => Crane	Slewing gear, step 3 / High active
12	External anti-collision control => Crane	Apply the slewing gear brake / Low active
13	External anti-collision control => Crane	Anti-collision ON / High active
14	Crane => external anti-collision control	Slewing gear right or left motion command / High active
15	Crane => external anti-collision control	jib radius 4…20 mA / Current signal (available only with jib crane)
16	Crane => external anti-collision control	jib radius 4…20mA / Ground ((available only with jib crane)

- High-active corresponds to applying +24 V
- Low-active corresponds to applying 0 V / Ground

The interface signals become effective as soon as 24 V is present at terminal 13.

8.7 Special test with overload (up to max. 125 % of allowable lifting capacity)



⚠ WARNING

Special test with overload

The slewing tower crane may overturn.

1) Have the overload special tests carried out only by trained experts.
2) Note that any load, hoisting, trolley or luffing gear limitations are not effective during the overload test.
3) The maximum allowable wind speed during the special test is 8 m/s (28 km/h). This value corresponds to wind force 4 as per Beaufort scale. Make allowances for the fact that gusts of wind with a velocity of 8 m/s must be expected as of Beaufort 3 (3.5 m/s to 5.4 m/s).

Preparing for overload hoisting

> You want to hoist an overload.

1) Set the power disconnector at the control cabinet to position 0.
2) Turn the digital input E1.7 on, by installing a wire jumper from +24V (0X24,LB23) to 0A3/2 terminal 8.
3) Set the assembly switch 1S0 in the control cabinet to position I.
4) Set the power disconnector at the control cabinet to position I.

→ A value of 125 % will be displayed.

→ Now the overload hoisting can be performed.



NOTICE

Overload hoisting is possible only for a limited period of time at the slow operating speed.

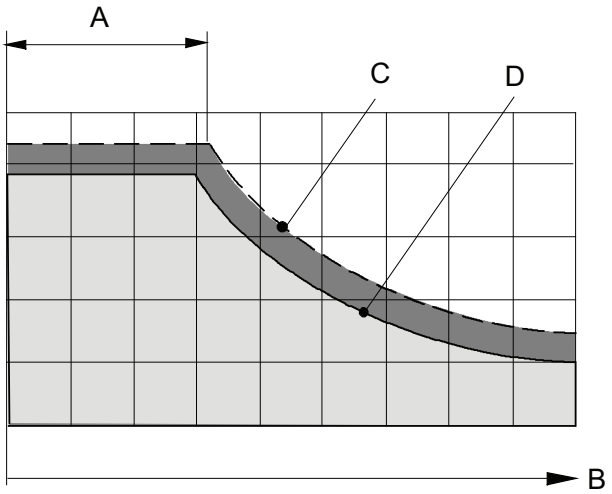
The standard overload protection (100-110 %) again becomes effective 30 minutes after bypassing and switching on the switch cabinet, in compliance with the safety regulations. In the event of a power failure or after switching off the power disconnector at the control cabinet or the main switch at the tower base, the default overload protection also becomes effective automatically. If it was not possible to carry out the overload test during the limited period of time, the steps described in "Preparing for overload hoisting" have to be performed again.

NOTICE

Overload hoisting can be done only up to 125 % of the allowable lifting capacity.

The allowable lifting capacity is given in the lifting capacity table.

If the test load is greater than the allowable constant maximum heavy load (inner lifting capacity range), the full value of the lifting capacity is no longer displayed on the monitor in the cabin.



A	Inner lifting capacity range	C	125 % lifting capacity curve
B	Operating radius[m]	D	100 % lifting capacity curve Lifting capacity table

Immediately after completing the overload test, ensure that the tower crane is returned to the default condition.

(see also):

- Operational readiness after overload hoisting [214]

8.8 Operational readiness after overload hoisting

> The overload hoisting was performed.

1) Set the power disconnector at the control cabinet to position 0.
2) Remove the wire jumper 0A3/2, terminal 8.
3) Set the assembly switch 1S0 in the control cabinet to position 0.
4) Set the power disconnector at the control cabinet to position I.

→ The slewing tower crane is again ready for operation.

9 Service and maintenance



⚠ WARNING

Covers and protective devices that are not installed in place.

Risk of serious contusion or fatal injury.

1) Reinstall all covers and protective devices after all work.

2) Only put an operational crane into operation.



⚠ CAUTION

Disposal of consumables and auxiliary materials.

Environmental pollution.

1) Adhere to environment protection regulations.

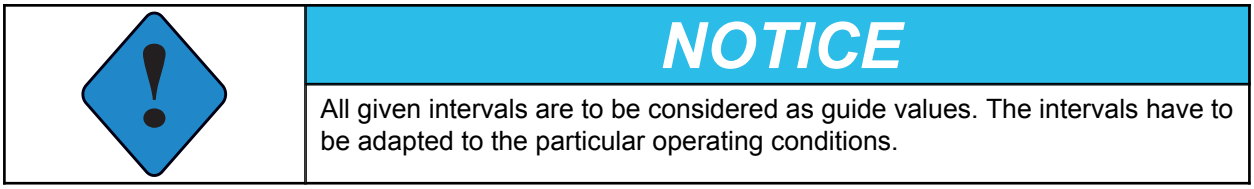
2) Recycle the consumables.



NOTICE

Under particularly severe demands, high dust development or extreme moisture it may be necessary to service the slewing tower crane more frequently than specified in the service instructions.

9.1 Maintenance schedule



Caption

Abbreviation	Meaning
CO	Crane operator: These jobs must be done by the crane operator.
S	Service: These jobs may only be done by service personnel. Please contact WOLFFKRAN for information.

Hoisting gear

Hw28110FU

Activity	Intervals	Remark	TBD by	Refer to page
Checking the connections of the toothed shaft at the drive	Once per year.	Visual inspection.	S	
Turning the winch into both directions	Weekly.		CO	
Checking mounting screws for tightness.	Monthly.		CO / S	
Checking the transmission internally and externally.	Every 3 years	Visual inspection.	CO / S	
General overhaul of the transmission	Every 10 years		S	
Check oil level	Weekly.		CO	Page:
Checking the oil quality	Every 1000 hours of operation or once per year		CO	Page:
Oil change.	Every 2000 hours of operation or once per year		CO / S	Page: [230]
Check transmission noise for any changes.	Daily.		CO	
Check transmission for leakage.	Monthly.	Visual inspection.	CO	
Lubricating the greasing point	semi-annually	Fill grease into the greasing nipple until the grease exits at the seal.	S	
Brake performance test	Daily.		CO	
Check brake for wear.	Every 3 months.		S	
Brake performance test	Daily.		CO	
Check fluid level of hydraulic unit.	Weekly.	This applies to hydraulic brakes only.	CO	Page: [246] Page: [260]
Check air gap and brake pads.	Each time the crane has been assembled. / Every 3 months.		S	Page: [235] Page: [246] Page: [260]
Check brake for wear.	Every 3 months.		S	
Brake mechanical test.	Each time the crane has been assembled. after adjustments	Also, the brake mechanical test must be done after longer standstill periods (>3 months).	S	Page: [235] Page: [246] Page: [260]
check brakes	Once per year.	by technical experts	S	

(see also):

- Checking the hydraulic unit [250]

Hw28132FU

Activity	Intervals	Remark	TBD by	Refer to page
Checking the connections of the toothed shaft at the drive	Once per year.	Visual inspection.	S	
Turning the winch into both directions	Weekly.		CO	
Checking mounting screws for tightness.	Monthly.		CO / S	
Checking the transmission internally and externally.	Every 3 years	Visual inspection.	CO / S	
General overhaul of the transmission	Every 10 years		S	
Check oil level	Weekly.		CO	Page:
Checking the oil quality	Every 1000 hours of operation or once per year		CO	Page:
Oil change.	First oil change at 200 hours of operation Second oil change at 1000 hours of operation / or within first 12 months Then, every 2000 hours of operation / at least once a year		S	Page: [230]
Check transmission noise for any changes.	Daily.		CO	
Check transmission for leakage.	Monthly.	Visual inspection.	CO	
Lubricating the greasing point	semi-annually	Fill grease into the greasing nipple until the grease exits at the seal.	S	
Brake performance test	Daily.		CO	
Check brake for wear.	Every 3 months.		S	
Brake performance test	Daily.		CO	
Check fluid level of hydraulic unit.	Weekly.	This applies to hydraulic brakes only.	CO	Page: [246] Page: [260]
Check air gap and brake pads.	Each time the crane has been assembled. / Every 3 months.		S	Page: [235] Page: [246] Page: [260]
Check brake for wear.	Every 3 months.		S	
Brake mechanical test.	Each time the crane has been assembled. after adjustments	Also, the brake mechanical test must be done after longer standstill periods (>3 months).	S	Page: [235] Page: [246] Page: [260]
check brakes	Once per year.	by technical experts	S	
Relubricating the greasing point	semi-annually		S	

Slewing gear

Activity	Intervals	Remark	TBD by	Refer to page
Brake performance test	Daily.		CO	
Check oil level	After startup, then weekly.	The transmission must be in standstill and the oil must be slightly warm.	CO	
Check transmission noise for any changes.	Monthly.		CO	
Check transmission for leakage.	Monthly.	Visual inspection.	CO	
Clean vent screw	Every 3 months.		CO	
Check brake for wear.	Every 3 months.		S	
Brake mechanical test.	Each time the crane has been assembled. after adjustments	Also, the brake mechanical test must be done after longer standstill periods (>3 months).	S	
Check air gap and brake pads.	Each time the crane has been assembled. / Once per year.		S	
check brakes	Once per year.	by technical experts	S	
Check for water in oil.	Every 400 hours of operation. / Once per year.	For details on checking the oil for water, please contact your lubricant supplier.	CO	
Check oil for abrasion particles.	Once per year. / Every 1000 hours of operation.		CO	
Oil change.	Once per year. / Every 2000 hours of operation .	When synthetic oil is used, the given intervals may be duplicated.	S	
Clean transmission casing.	As necessary. / Every 2 years.		CO	
Check mounting screws for tightness.	After 400 hours of operation, then every 2 years.	Visual inspection. Any screws found inoperative must be replaced by new ones of the same strength class and design.	CO / S	

Activity	Intervals	Remark	TBD by	Refer to page
Visual inspection of the inside and the outside of the transmission	Every 3 years	Visual inspection.	CO / S	
Checking the shaft connections for deformation	Once per year.	Visual inspection.	S	

(see also):

- Slewing gear brake [274]
- Changing the oil [272]

Derricking gear

Activity	Intervals	Remark	TBD by	Refer to page
Checking the connections of the toothed shaft at the drive	Once per year.	Visual inspection.	S	
Turning the winch into both directions	Weekly.		CO	
Checking mounting screws for tightness.	Monthly.		CO / S	
Checking the transmission internally and externally.	Every 3 years	Visual inspection.	CO / S	
General overhaul of the transmission	Every 10 years		S	
Check oil level	Weekly.		CO	-
Checking the oil quality	Every 1000 hours of operation or once per year		CO	-
Oil change.	Every 2000 hours of operation or once per year		CO / S	- [285]
Check transmission noise for any changes.	Daily.		CO	
Check transmission for leakage.	Monthly.	Visual inspection.	CO	
Brake performance test	Daily.		CO	
Check fluid level of hydraulic unit.	Weekly.	This applies to hydraulic brakes only.	CO	
Check brake for wear.	Every 3 months.		S	- [287]
Brake mechanical test.	Each time the crane has been assembled. after adjustments	Also, the brake mechanical test must be done after longer standstill periods (>3 months).	S	- [287]
check brakes	Once per year.	by technical experts	S	
Relubricating the greasing point	semi-annually		S	

Drive gear

Activity	Intervals	Remark	TBD by	Refer to page
Check transmission noise for any changes.	Daily.		CO	
Brake performance test	Daily.		CO	
Check fluid level of hydraulic unit.	Weekly.	This applies to hydraulic brakes only.	CO	
Check oil level	After startup, then monthly.		CO	
Check transmission for leakage.	After startup, then monthly.	Visual inspection.	CO	
Check casing temperature.	3 hours after startup, then monthly.		CO	
Check clutch.	Every 3 months.		S	
Check brake for wear.	Every 3 months.		S	
Check air gap and brake pads.	Each time the crane has been assembled. / Every 3 months.		S	
Check performance of oil level sensor.	Every 6 months. / After oil change.		S	
Clean vent screw	Every 6 months.		CO	
Check oil for abrasion particles.	Every 6 months.		CO	
Clean transmission casing.	Every 6 months.		CO	
Check mounting screws for tightness.	3 hours after startup, then every 6 months.	Visual inspection. Any screws found inoperative must be replaced by new ones of the same strength class and design.	CO / S	
Brake mechanical test.	Each time the crane has been assembled.	Also, the brake mechanical test must be done after longer standstill periods (>3 months).	CO / S	
Check for water in oil.	Every 400 hours of operation. / Once per year.	For details on checking the oil for water, please contact your lubricant supplier.	CO	
Check and adjust slipping clutch.	Once per year.		S	
Lubricate roller bearings in drive units.	Once per year. / Every 4000 hours of operation .		S	
Oil change.	Every 10000 hours of operation. / Every 2 years.	When synthetic oil is used, the given intervals may be duplicated.	S	
Replace roller bearing grease.	Including oil change.		S	

Slew bearing

Activity	Intervals	Remark	TBD by	Refer to page
Check exposed gears for lubrication.	Daily.		CO	
Filling the reciprocating pump of the central lubrication system	re-lubricate		CO	
Bleeding the reciprocating pump of the central lubrication system.	As necessary. / After each maintenance. / After longer standstill period (>2 weeks).		CO / S	
Lubricate exposed gears.	Weekly. / As necessary.		CO	
Check lubrication condition of ball race bearing.	Before each startup.	The ball race bearing must have a fresh collar of grease.	CO	
Check oil level of central lubrication system reciprocating pump.	Before each startup.	The oil level must not fall below the "Min" markiing.	CO	
Retighten the mounting screws of the ball race bearing.	After startup, then every 3 months.		S	

Ropes

Activity	Intervals	Remark	TBD by	Refer to page
Visually inspect the ropes.	Daily.	Particular attention should be paid to those rope portions that are bend over most of the idler pulleys or immediately run onto pulleys or onto the drum. In case of a wire breakage, the visual inspection must be carried out daily.	CO	
Visually inspect the rope end lockings.	Weekly.		CO	
Check the tension of the trolley drive ropes.	Every 2 weeks.	This check has to be done for jib cranes only.	CO	
Relubricate the ropes	As necessary. / Every 3 months .	For this, special lubricants or rope lubricants are used that are not subject to DIN classification.	CO	[311]
Visual inspection of the guide ropes.	Before each use.	Replace guide ropes when damaged	S	
Replace pilot ropes	Every 7 years		S	

Rope and idler pulleys



NOTICE

The roller bearings in the rope and guide pulleys without relubrication capability have a lifetime lubrication for maintenance-free operation.

Activity	Intervals	Remark	TBD by	Refer to page
Remove grease residues on pulleys.	After having lubricated the rope.		CO	
Check pulleys for damage.	Before each crane assembly. / Monthly.		CO / S	
Check groove profile for wear.	Before each crane assembly. / Monthly.		CO / S	[309]
Check pulleys for smooth and proper running.	Before each crane assembly. / Once per year.		CO / S	
Check the guard strap to prevent the ropes from jumping out.	Each time the crane has been assembled. / Once per year.		CO / S	

Bolts, shafts

Activity	Intervals	Remark	TBD by	Refer to page
Relubricate bolts (fitted with grease nipples).	Weekly.		CO	
Relubricate bolts (without grease nipples).	During assembly. / During disassembly.		CO / S	
Check bolts / shafts.	During assembly. / Weekly.	Visually inspect the bolts and bolt retainers.	CO / S	

Screw joints

Activity	Intervals	Remark	TBD by	Refer to page
Check tightness and tightening torque of all screws.	Every 3 months.	Any screws found inoperative must be replaced by new ones of the same strength class and design.	CO	

Snatch block

Activity	Intervals	Remark	TBD by	Refer to page
Check the load hook for deformation.	Each time the crane has been assembled. / Once per year.	Ensure that test is performed by a technical expert. The checks have to be entered into the crane test booklet.	S	

Activity	Intervals	Remark	TBD by	Refer to page
Check the snatch block for surface cracks.	Each time the crane has been assembled. / Once per year.	Ensure that test is performed by a technical expert.	S	
Check the snatch block for wear.	Each time the crane has been assembled. / Once per year.	Ensure that test is performed by a technical expert.	S	
Check the threads, shank, and hook retainer for corrosion notches.	Each time the crane has been assembled. / Once per year.	Ensure that test is performed by a technical expert.	S	

Electrical systems

Activity	Intervals	Remark	TBD by	Refer to page
Check terminal screws at terminal strips, contactors, and retaining screws fore proper tightness.	Each time the crane has been assembled. / Once per year.	Ensure that test is performed by an electrical expert.	S	
Visually inspect all electrical systems.	Each time the crane has been assembled. / Once per year.	Ensure that test is performed by an electrical expert.	S	[316]

Rope pulley (optional)

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Activity	Intervals	Remark	TBD by	Refer to page
General visual inspection	At start of work	drive system housing anchor bolt draw shackle	S	
Check of bolts & screws	After initial operation		S	
Cleaning of driving wheel	As necessary		S	
Direction of rotation of motor	At start of work	Button UP = driving wheels rotates counter-clockwise	S	
Re-lubrication gear ring	As necessary	Use gear ring grease	S	
Rope check	At start of work	Visual inspection: Pressing socket Eye hook with retaining element Check wear limit	S	
Rope cleaning	As necessary		S	
Check oil level	As necessary		S	
Have the rope pulley, rope and accessories checked	Every 2 years	By manufacturer or authorized institute	S	
Have the rope pulley, rope and accessories checked	As required with frequent use	by technical experts	S	

Rope slow-down device (optional)

Activity	Intervals	Remark	TBD by	Refer to page
Lubricate the bearing	Monthly	Remove excess grease	S	

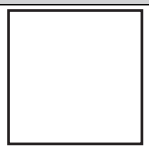
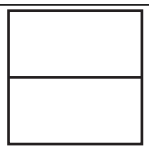
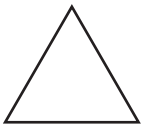
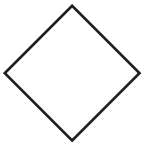
(see also):

- Slewing gear brake [274]
- Changing the oil [272]
- Checking the hydraulic unit [250]

9.2 Lubricating instructions

9.2.1 Identification

Identification according to DIN 51 502

Type	DIN 51 502	ISO	SAE	GO
	Identification according to DIN 51 502	**Identification according to International Organization for Standardization**	**Identification according to American Society of Automotive Engineers**	**Identification according to standard lubricants to be used for construction machines of the German construction industry**
Mineral oil (lubricating oils, special oils)	 + identifying letters	ISO + viscosity class	SAE + viscosity value	GO + viscosity value
Synthetic or partly synthetic fluids	 + identifying letters	ISO + viscosity class	SAE + viscosity value	GO + viscosity value
Mineral oil based grease lubricants	 + identifying letters	ISO + viscosity class	SAE + viscosity value	GO + viscosity value
Synthetic oil based grease lubricants	 + identifying letters	ISO + viscosity class	SAE + viscosity value	GO + viscosity value

Identifying letters according to DIN 51 502

Type of lubricant	Application / Property	Identifying letter
Mineral oils		
Minerals oils B	Containing bitumen	B
Minerals oils C	Circulating oils	C
Hydraulic oils H	Hydraulics	H
Synthetic or partly synthetic fluid		
Lubricating oil HC	Circulating oil	HC
Grease lubricant (mineral oil)		

Type of lubricant	Application / Property	Identifying letter
Grease lubricant K	Grease lubricant for roller bearings, friction bearings, and sliding surfaces	K
Grease lubricant (synthetic fluid)		
Grease lubricant HC	Grease lubricant for roller bearings, friction bearings, and sliding surfaces	HC

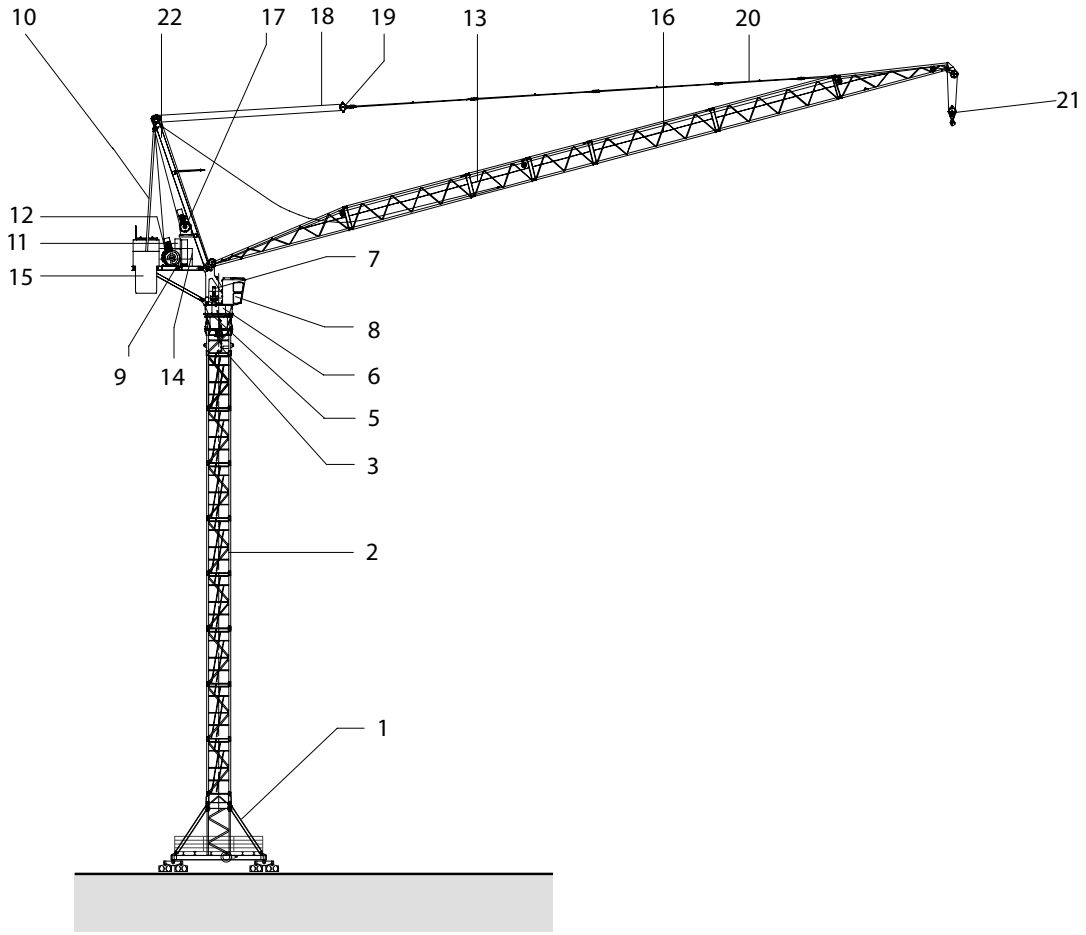
Additional identifying letter according to DIN 51 502

Lubricants					
Additional identifying letter	Explanation				
F	For lubricants containing solid lubricant additives (e.g. graphite, molybdenum-disulfide)				
L	For lubricating oils containing additives for increasing the protection against corrosion and/or aging resistance.				
P	For lubricants containing additives for decreasing friction and wear in the area of mixed friction and/or increasing the load-carrying capacity.				
Grease lubricants					
Consistency parameters	Worked penetration (1 unit - 0.1 mm)	Additional identifying letter	Maximum service temperature	Additional parameters	Minimum service temperature
000	445 to 475	C	60 °C	-10	–10 °C
00	400 to 430	D	60 °C	-20	–20 °C
0	355 to 385	E	80 °C	-30	–30 °C
1	310 to 340	F	80 °C	-40	–40 °C
2	265 to 295	G	100 °C	-50	–50 °C
3	220 to 250	H	100 °C	-60	–60 °C
4	175 to 205	K	120 °C		
5	130 to 160	M	120 °C		
6	85 to 115 (unworked penetration)	N	140 °C		
		P	160 °C		
		R	180 °C		
		S	200 °C		
		T	220 °C		
		U	above 220 °C		

9.2.2 Viscosity classes

ISO viscosity class acc. to DIN 51 519	Midpoint viscosity parameter incl. limiting deviation of ±10 %	Kinematic viscosity in mm²/s			Dynamic viscosity in mm²/s
		At 20 °C	At 40 °C	At 50 °C	At 40 °C
ISO VG 2	2	≈ 3.3	2.2	≈ 1.3	≈ 2.0
ISO VG 3	3	≈ 5	3.2	≈ 2.7	≈ 2.9
ISO VG 5	5	≈ 8	4.6	≈ 3.7	≈ 4.1
ISO VG 7	7	≈ 13	6.8	≈ 5.2	≈ 6.2
ISO VG 10	10	≈ 21	10	≈ 7	≈ 9.1
ISO VG 15	15	≈ 34	15	≈ 11	≈ 13.5
ISO VG 22	22	-	22	≈ 15	≈ 18
ISO VG 32	32	-	32	≈ 20	≈ 29
ISO VG 46	46	-	46	≈ 30	≈ 42
ISO VG 68	68	-	68	≈ 40	≈ 61
ISO VG 100	100	-	100	≈ 60	≈ 90
ISO VG 150	150	-	150	≈ 90	≈ 135
ISO VG 220	220	-	220	≈ 130	≈ 200
ISO VG 320	320	-	320	≈ 180	≈ 290
ISO VG 460	460	-	460	≈ 250	≈ 415
ISO VG 680	680	-	680	≈ 360	≈ 620
ISO VG 1000	1000	-	1000	≈ 510	≈ 900
ISO VG 1500	1500	-	1500	≈ 740	≈ 1350

9.2.3 Overview of lubricating points



1	Substructure: Drive gear	11	Assembly brace rope
5	Ball race bearing	12	Hoisting gear
7	Slewing gear	17	Luffing gear

9.2.4 Lubricants and quantities



⚠ CAUTION

Mixing of mineral and synthetic oils

Serious damage to gear.

1) Do not mix synthetic oils with mineral oil based oils.

2) If you want to replace mineral oil by synthetic fluid or vice versa, completely drain used oil and flush the gear before filling in the new oil type.



NOTICE

Any quantities given are to be considered guide values. For the actual oil capacity, refer to the identification plate on the transmission.



NOTICE

The oil type of the initial filling can be obtained from the identification plate of the transmission.



NOTICE

The maintenance intervals given refer to using mineral oils. When synthetic oils are used, the maintenance intervals are duplicated or triplicated. Please note the remark in the maintenance schedule.



NOTICE

Operating /oils sump temperature of transmissions with 100% duty cycle – heavy exposure to external heat sourceswhich exceed the ambient temperature by approx. +50°C.

Transmission	Transmission type	Quantity	Identification	
HW 28110 FU	Hoisting gear transmission Planetary gear transmission	18 liters	CLP 220	CLP HC 220
	Hoisting gear transmission Pinion gear transmission	4 liters	CLP 150	CLP HC 150
	Grease nipple	Fill grease in until the grease exits at the seal.	K 2K -20	

Transmission	Transmission type	Quantity	Identification	
HW 28132 FU	Hoisting gear transmission Planetary gear transmission	24.5 liters	CLP 220	CLP HC 220
	Hoisting gear transmission Pinion gear transmission	13.5 liters	CLP 220	CLP HC 220
	Grease nipple	Fill grease in until the grease exits at the seal.	K 2K -20	
Transmission	**Transmission type**	**Quantity**	**Identification**	
EW 1575 FU	Luffing gear transmission Planetary gear transmission	8 liters	CLP 220	CLP HC 220
	Pinion gear transmission	4 liters	CLP 150	CLP HC 150
	Grease nipples of the transmission	Fill grease in until the grease exits at the seal.	K 2K -20	
Transmission	**Transmission type**	**Quantity**	**Identification**	
DW 55 DD 30	Slewing gear transmission Planetary gear transmission	14.0 liters	CLP 220	CLP HC 220
Transmission	**Transmission type**	**Quantity**	**Identification**	
CNSO 120	Drive gear Worm gear transmission	-	CLP 220	-

Torque converter	Torque converter type	Quantity	Identification	
-	Turbo torque converter	1.95 liters	HLP 32	-
Lubricating point		**Quantity**	**Identification**	
Running system of the ball race bearing		-	K 2K-30	-

Lubricating point	Quantity	Identification
Ball race bearing splines	-	 -



⚠ CAUTION

Incompatible rope lubricants.

The wire ropes may be damaged.

► For lubricating ropes, only use those lubricants that are compatible with the previously used lubricant.

Lubricating point		Quantity	Identification
All ropes		-	Special lubricants
e.g.			
DIEPA ropes (all types)	▪ Elaskon - Elaskon 30		
CASAR Starlift			
CASAR Eurolift			
CASAR Unilfit			
CASAR Turbolift	▪ Fuchs Lubritech - CEDRACON		
CASAR Stratoplast			
CASAR Paraplast			
CASAR Superplast			
CASAR Turboplast			

Lubricating point	Quantity	Identification
Bolt joints	-	 -

Lubricating point	Quantity	Identification
Lubricating points at system components.	-	Please note the separate system component related documentation.

9.2.5 Selecting lubricant brands



NOTICE

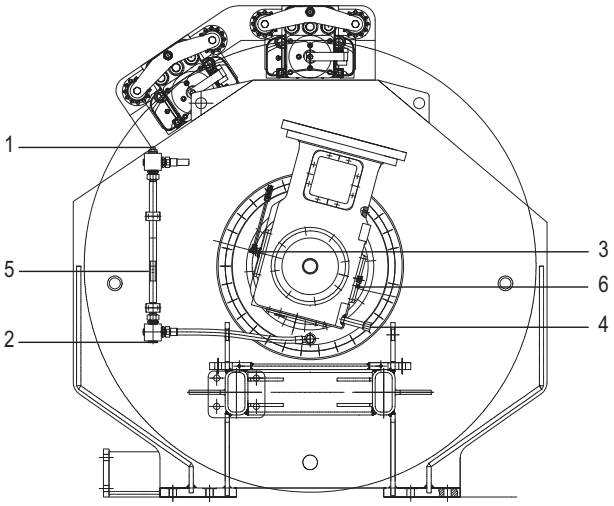
The sorting order of the lubricants listed below is of no significance with regard to their quality. You can also choose to use ropes of equivalent quality from other, approved manufacturers.

Identification	Aral	BP	Shell
CLP 150	Degol BG 150 Plus	Energol GR-XP 150	-
CLP 220	Degol BG 220 Plus	Energol GR-XP 220	Omala F 220
CLP 320	Degol BG 320 Plus	Energol GR-XP 320	Omala F 320
CLP HC 150	Degol PAS 150	Enersyn EP-XF 150	Omala HD 150
CLP HC 220	Degol PAS 220	Enersyn EP-XF 220	Omala HD 220
CLP HC 320	Degol PAS 320	Enersyn EP-XF 320	Omala HD 320
HLP 32	Vitam GF 32	Energol HLP 32	Tellus Oil C22
K 2K-30	Aralub HLP 2	Energrease LS-EP 2	Alvani EP (LF) 2

Identification	Aral	BP	Shell
	Aralub MKA-Z 1	Energrease LC 2	Malleus OGH

9.3 Hoisting gear

9.3.1 Changing the oil Hw28110FU



1	Oil filler screw (planetary gear transmission)	4	Oil drain plug (bevel input stage)
2	Oil drain plug (planetary gear transmission)	5	Oil level indicator (planetary gear transmission)
3	Oil filler screw (bevel input stage)	6	Oil bleeder (bevel input stage)

> The regular interval is due.

> The transmission has been in operation for 2000 hours.

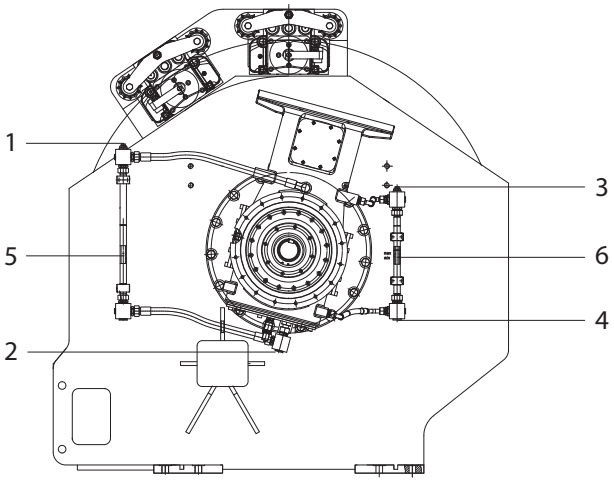
> The transmission still has its operating state temperature.

1) Place an appropriate container beneath the oil drain plug (3) of the planetary gear transmission.
2) Remove the oil drain plug (2).
3) Completely drain the oil.
4) Reinstall the oil drain plug (3) of the planetary gear transmission.
5) Dispose of the oil in an environmentally compatible manner.
   → You have successfully drained the oil.
6) Place an appropriate container beneath the oil drain plug (4) at the bevel input stage.
7) Remove the oil drain plug (4).
8) Completely drain the oil.
9) Reinstall the oil drain plug (4).
10) Dispose of the oil in an environmentally compatible manner.
    → You have successfully drained the oil.
11) Remove the oil filler screw (1) and the hose at the oil level indicator (5) of the planetary gear transmission.

12) Using a funnel or hose, fill in oil until the oil level is between the "Min" and "Max" markings at the oil level indicator (5).
13) Re-install the oil filler screw (1) and the hose to the oil level indicator (5).
14) Unscrew the oil filler screw (3) and the oil bleeder (6) at the bevel input stage.
15) Using a funnel or hose, keep filling oil until oil leaks from the oil overflow (6) of the bevel input stage.
16) Reinstall the oil bleeder (6) und dispose of the leaked oil in an environmentally sound manner.
17) Re-install the oil filler screw (3) of the bevel input stage.

→ You have successfully changed the oil.

9.3.2 Changing the oil Hw28132FU



1	Oil filler (planetary gear transmission)	4	Oil drain plug (bevel input stage)
2	Oil drain plug (planetary gear transmission)	5	Oil sight glass (planetary gear transmission)
3	Oil fine fill (bevel input stage)	6	Oil sight glass (bevel input stage)

> The regular interval is due.

> The transmission has been in operation for 2000 hours.

> The transmission still has its operating state temperature.

1) Place an appropriate container beneath the oil drain plug (2).
2) Remove the oil drain plug (2).
3) Completely drain the oil.
4) Reinstall the oil drain plug (3) of the planetary gear transmission.
5) Dispose of the oil in an environmentally compatible manner.
   → You have successfully drained the oil.
6) Place an appropriate container beneath the oil drain plug (4) at the bevel input stage.
7) Remove the oil drain plug (4).
8) Completely drain the oil.
9) Reinstall the oil drain plug (4).
10) Dispose of the oil in an environmentally compatible manner.
    → You have successfully drained the oil.
11) Remove the oil filler screw (1).
12) Using a funnel or hose, fill in oil until the oil level is between the "Min" and "Max" markings at the oil level indicator (5).
13) Re-install the oil filler screw (1).
14) Unscrew the oil filler screw (3) of the bevel input stage.

15) Using a funnel or hose, fill in oil until the oil level is between the "Min" and "Max" markings at the oil level indicator (5).

16) Re-install the oil filler screw (3).

→ You have successfully changed the oil.

9.3.3 Hoisting gear brake



⚠ DANGER

Improper brake sevice.

Brakes may fail.

1) Have the brakes serviced only by trained persons.
2) Observe accident prevention regulations and safety precautions.
3) In case of further malfunctions, contact WOLFFKRAN service department.



⚠ DANGER

Lowering operations are out of control.

The slewing tower crane may overturn.

Risk of serious contusion or fatal injury.

1) Make sure that no load is suspended from the load hook.
2) Lower the snatch block to ground.
3) Secure the hoisting cable against unwinding.



⚠ WARNING

Cleaning the brakes.

Brakes may fail.

1) Do not use petrol or solvents for cleaning the brakes.
2) Solely clean the brakes dryly.

9.3.3.1 Hoisting gear brake TE 500/ 201/ 6



NOTICE

Hoisting gear brake Hw28110FU.

This brake is used at the hoisting gear Hw28110FU.

9.3.3.1.1 Specification

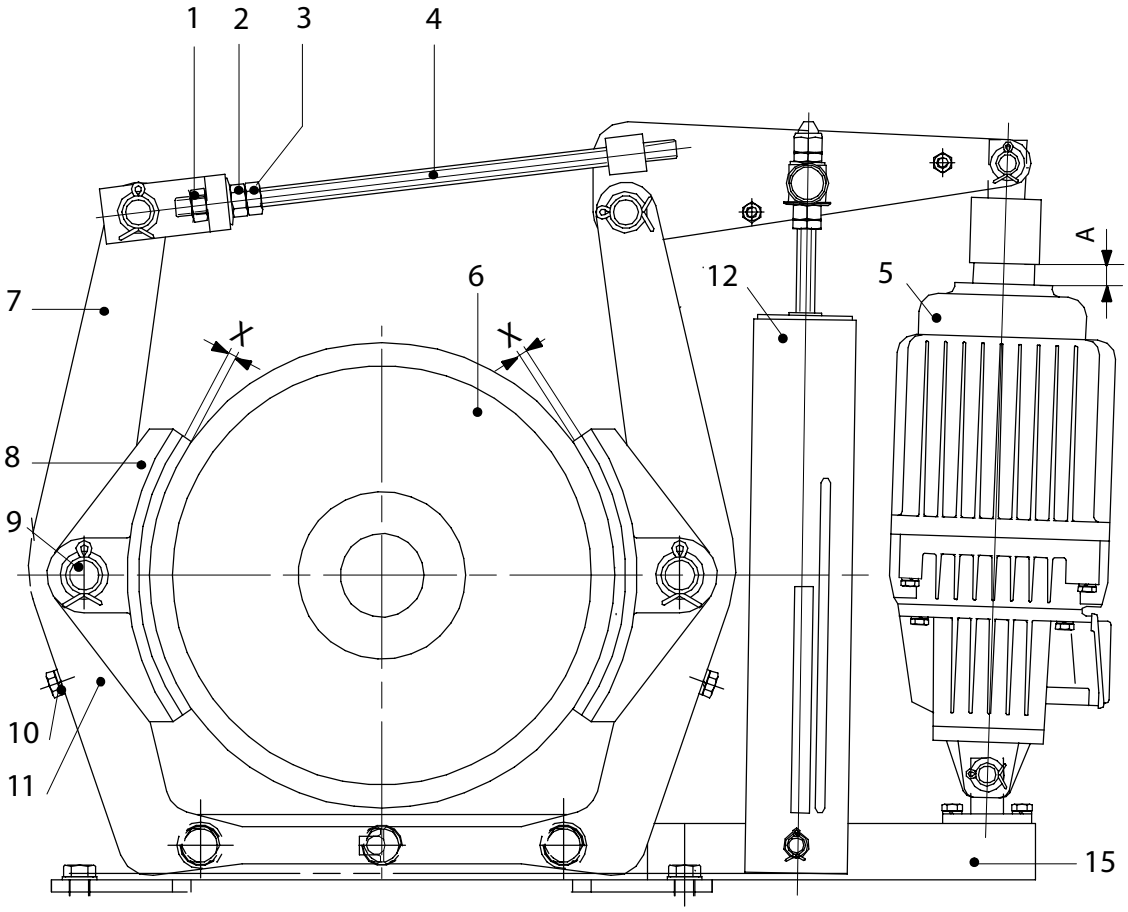
Design

Outer shoes with:

- ELDRO hoisting gear
- Fixed torque
- Optical wear monitoring function
- Emergency release

Item	Technical data
Braking torque	4900 Nm
Rotor residual speed	approx. 100 min -1
ELDRO	Hoisting gear Ed 201/6 with C spring set
Hoisting force	2000 N
Rated current	1.3 A at 400 V, 50 Hz
Power consumption	450 Watt

9 Service and maintenance



Hoisting gear brake TE 500/ 201/ 6

1	Nut	8	Brake shoe
2	Nut	9	Bolts
3	Lock nut	10	Screw
4	Tie rod	11	Spring retainer
5	ELDRO Ed 201/6c	12	spring tube assembly
6	Brake drum	A	Reference dimension (min. 25 mm, max. 33 mm)
7	Brake lever	X	Brake pad

9.3.3.1.2 Checking the brake

> The crane has been assembled.

> The routine inspection has to be done.

> The annual inspection interval is due.

1) Set the power disconnector at the control cabinet to position "0".
2) Remove the brake cover.

3) Check the brake shoes.
NOTICE! If X = 5 mm is reached or if the brake shoes are damaged, replace brake shoes.

   → You have successfully checked the brake pad.

4) Check the braking torque at the scale of the expansion pipe unit.
NOTICE! The breaking torque must be 4900 Nm (Reference top of spring preasure plate).

5) Check the reference dimension (A).
NOTICE! If the reference dimension differs, adjust this dimension.

   → You have successfully checked the reference dimension (A).

6) Set the power disconnector to position "I".

7) Release the brake [243].

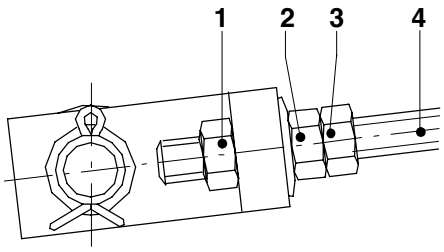
8) Ensure that the hinged pins can move freely.

9) Check the air gap between the rotor and the brake shoes.

10) Install the brake cover.

→ You have successfully checked the brake.

9.3.3.1.3 Adjusting the reference dimension



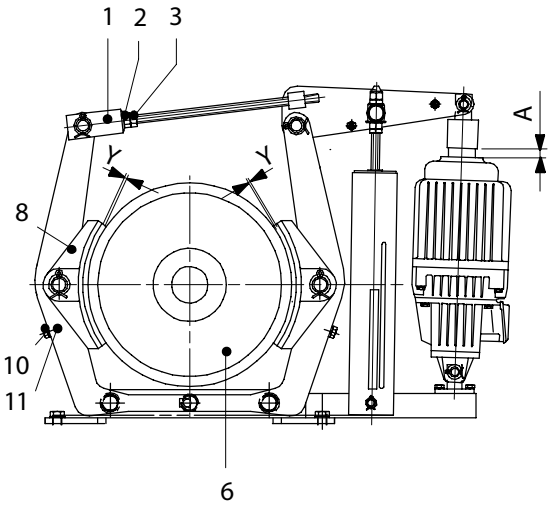
> The reference dimension (A) is not 33 mm, as specified.

1) Set the power disconnector at the control cabinet to position "0".
2) Remove the brake cover.
3) To open the brake levers (7) turn the nut (3) direction of the nut (2).
   WARNING! Make sure you do not solve the counter of the nuts (2)(3).
4) To close the brake levers (7) turn the nut (2) direction of the nut (3) (opposite to open).
   WARNING! Make sure you do not solve the counter of the nuts (2)(3).
5) Tighten the nut (2) until the reference dimension (A) of 33 mm (2nd notch) at the piston rod (4) is achieved.
6) Check the reference dimension (A) and the braking toque on the spring unit (12).
   NOTICE! In case of an incorrect reference dimension, repeat the above adjusting procedure.
7) Set the power disconnector at the control cabinet to position I.
8) Release the brake electrical.
9) Set the power disconnector at the control cabinet to position 0.
10) Check the reference dimension (A) and the braking toque on the spring unit (12).
11) In case of an incorrect reference dimension, repeat the above adjusting procedure.
    NOTICE! It may be necessary to repeat the adjusting procedure several times.

→ You have successfully adjusted the reference dimension.

9.3.3.1.4 Replacing wear parts

	**⚠ WARNING** Cleaning the brakes. Brakes may fail. 1) Do not use petrol or solvents for cleaning the brakes. 2) Solely clean the brakes dryly.



1	Nut	10	Screw
2	Nut	11	Spring retainer
3	Nut	Y	Air gap
6	Brake drum	A	Reference dimension
8	Brake shoes		

> The brake must be free of torque.

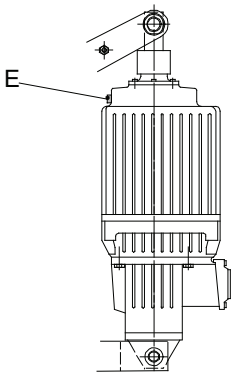
1) Set the power disconnector at the control cabinet to position "0".
2) Remove the brake cover.
3) Turn the nut (2) direction of the nut (3) until the brake levers (7) opened so wide that you can dismantle the brake shoes (8).
DANGER! Make sure you do not solve the counter of the nuts (2)(3).
4) Remove the brake shoes (8).
→ You have removed the brake shoes.
5) Clean the brake drum (6) and the brake shoes (8).
NOTICE! Ensure that the brake drum (6) and the new brake shoes (8) are free of oil and grease.
→ You have cleaned the rotor and the brake shoes.
6) Install the new brake shoes (8).

7) To close the brake levers (7) turn the nut (2) direction of the nut (3) (opposite to open).
WARNING! Make sure you do not solve the counter of the nuts (2)(3).
8) Tighten the nut (2) until the reference dimension (A) of 33 mm (2nd notch) at the piston rod (4) is achieved.
9) Check the reference dimension (A) and the braking toque on the spring unit (12).
NOTICE! In case of an incorrect reference dimension, repeat the above adjusting procedure.
10) Set the power disconnector at the control cabinet to position I.
11) Release the brake electrical.
12) Set the power disconnector at the control cabinet to position 0.
13) Check the reference dimension (A) and the braking toque on the spring unit (12).
14) In case of an incorrect reference dimension, repeat the above adjusting procedure.
NOTICE! It may be necessary to repeat the adjusting procedure several times.
→ You have successfully adjusted the reference dimension.
15) Check the brake and readjust the brake, if necessary (see mechanical brake test, page: [244])
16) Do a test run before commissionig.
NOTICE! After a few braking cycles without load, start initially with a small load and slowly increase to maximum load. This serves to break in the new brake linings. The brake linings should have a contact pattern of at least 70 %.

→ You have successfully replaced the wear parts.

9.3.3.1.5 ELDRO hoisting gear Ed 201/6 with C spring set

	**⚠ WARNING** Loss of operating ability. Changes to technical/operating values Crane equipment failure. ► Do not open the overflow plug without being explicitly authorized to do so.



E	Filler and overflow plug		

Fluid filling / fluid type

The ELDRO unit 5 comes with "SHELL TELLUS 10" hydraulic fluid.

- Temperature range = from -25°C to + 50° C
- Fluid type: HL 10, DIN 51524
- Fluid quantity: 9.4 liters (up to overflow plug)

	**NOTICE** For refilling, other brands of class HL 10 DIN 51524 may also be used.

Filling the ELDRO unit

> The Eldro unit is standing upright.

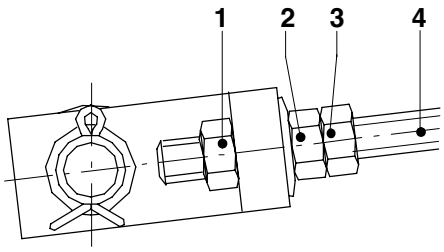
1) Open the filler and overflow plug.
2) Fill the Eldro unit up to filler and overflow plug (E).
3) Perform several hoisting operations to prevent air from being entrapped.
4) Verify the fluid level and replenish, if necessary.

5) Tightly close the filler and overflow plug.
CAUTION! In case of an oil leak (for example leaking shaft seal at the piston rod), the Eldro unit must be replaced immediately.

6) Check the brakes.

→ You have successfully refilled the Eldro unit.

9.3.3.1.6 Emergency release



> Malfunction present at the brake.

> Failure of crane power supply.

> A load is suspended from the load hook.

1) Set the power disconnector at the control cabinet to position "0".
2) Remove the brake cover.
3) Carefully loosen the nut (3) by turning the nut (3) direction the nut (2) until the load slowly starts to move.
4) Interrupt the lowering process by individual stops (turn back the nut (3) (direction the nut (2)).
   WARNING! Avoid excessive acceleration of the load and heating of the brake.
   → You have performed the emergency release.
5) Adjust the reference dimension to the specified value (Refer to page [238]).
6) Install the brake cover.
7) Set the power disconnector at the control cabinet to position "I".

→ You have successfully completed the emergency release.

9.3.3.1.7 Mechanical brake test



⚠ WARNING

Falling load.

Risk of serious contusion or fatal injury.

1) Keep off suspended loads.
2) Take into account any surfaces exposed to wind.
3) Keep off loads that are going to be lifted.
4) Make sure that persons are prevented from getting under suspended loads.
5) Only entrust experienced persons with attaching loads.
6) Keep your hands within the area of the crane controls when transporting loads.
7) Do not switch off the crane.

> The brake must be checked.

1) Suspend the maximum allowable load.
2) Move the master switch on the right-hand control console until the load is lifted by approx. 1.5 m.
3) For lowering, move the master switch on the right-hand control console to the end of its travel.
4) Press the pushbutton (7) to simulate an emergency stop.
   → After a short period of coasting, the load should be stopped and held reliably.
   → Attend to the system errors (Refer to page [245]) if after a short period of coasting, the load should not be stopped and not held reliably.

→ You have successfully checked the brake.

9.3.3.1.8 Malfunctions

Brake does not work.

- Brake surface is not free of oil or grease.
- Brake pads worn out.
- Nut (1) is loose.
- Reference dimension (A) too small.
- Brake spring in ELDRO unit (5) defective.

Brake does not release

- Nut (2) is loose.
- ELDRO unit (5) defective.

9.3.3.2 Hoisting gear brake BSFI 210 - MS20R - 100



DANGER

Hydraulic unit.

Hands may be crushed.

1) When working on disc brakes, never reach between the unlocked piston and the rotor.

2) Lock the piston using the locking pin or the nut.

3) When working on a disc brake, ensure that the rotor is secured against rotation.

→ Make sure that the hook block is secured against uncontrolled lowering.



NOTICE

Hoisting gear brake Hw28132FU.

This brake is used at the hoisting gear Hw28132FU.

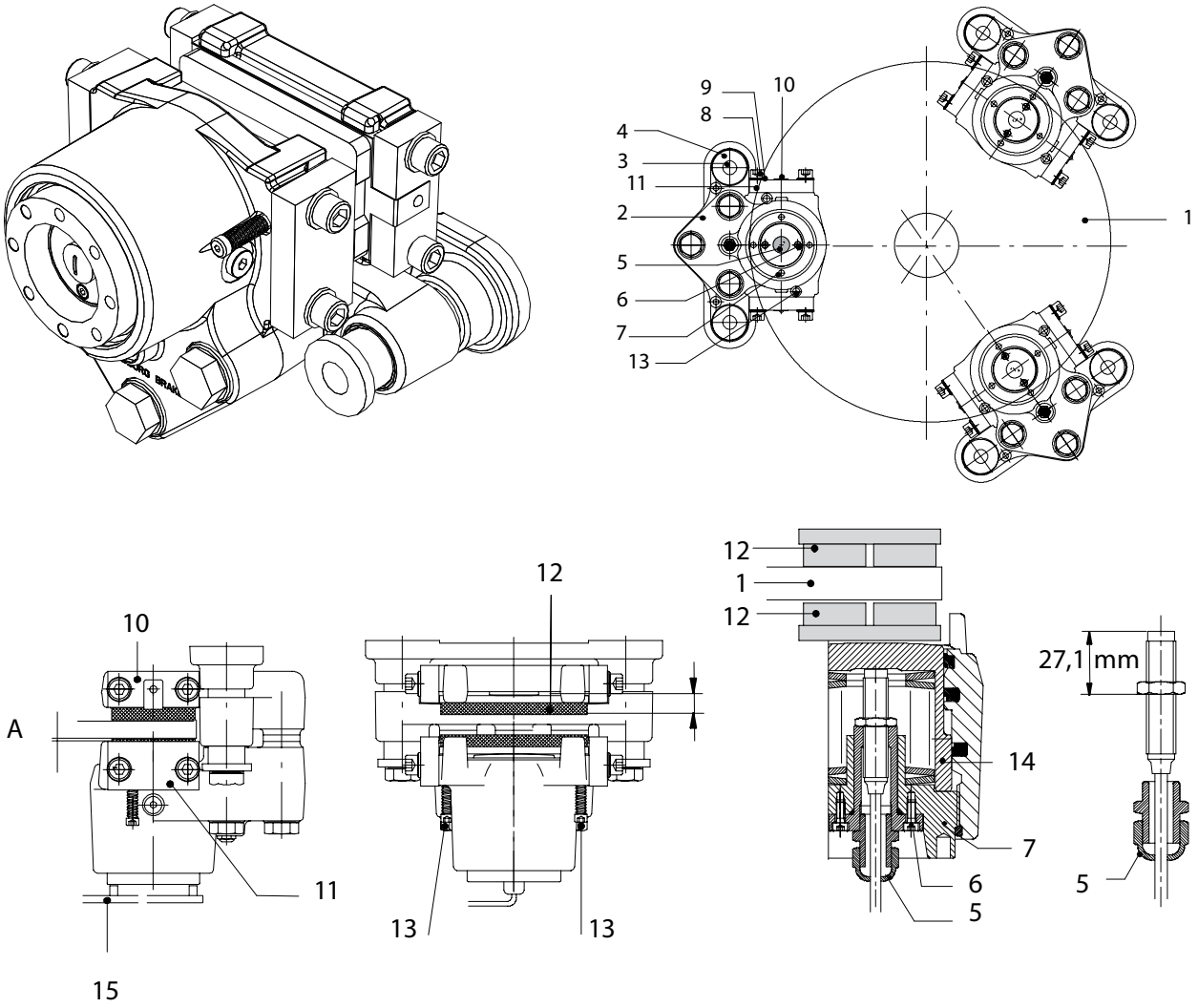
9.3.3.2.1 Technical data

Design

Closed-circuit operated disc brake with

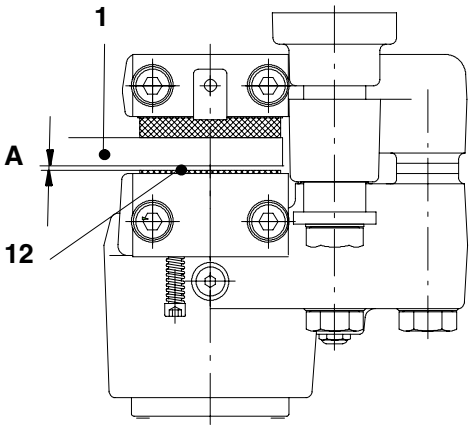
- Wear monitor
- Emergency release

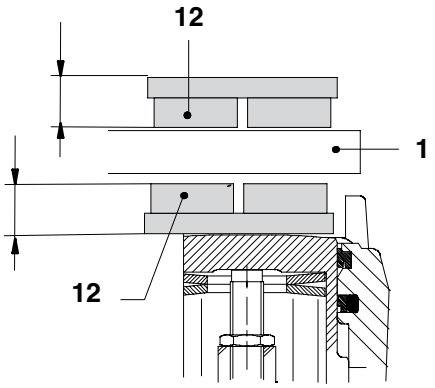
Item	Technical data
Braking torque (3 calipers)	4750 Nm (1.0 mm air gap)
Residual torque (3 calipers)	4400 Nm (2.0 mm air gap)
Braking torque per caliper	1583 Nm / friction coefficient of 0.353
Residual speed	ca. 100 min^{-1}
Pump capacity	1.4 liters/min – 180 bar
Motor voltage	400 V AC
Valve voltage	110 V AC
Motor power	800 W



1	Brake disc	9	Washer
2	Caliper, complete	10	Pad support with retaining plate
3	Hexagonal head screw	11	Pad support
4	Washer	12	Brake pad
5	Indicator	13	Cylinder head screw with return spring
6	Cylinder head screw	14	Piston
7	Setting screw	15	Special wrench
8	Cylinder head screw	A	Air gap

9.3.3.2.2 Inspecting the brake





1	Rotor	A	Air gap
12	Brake pads		

> The crane has been assembled.

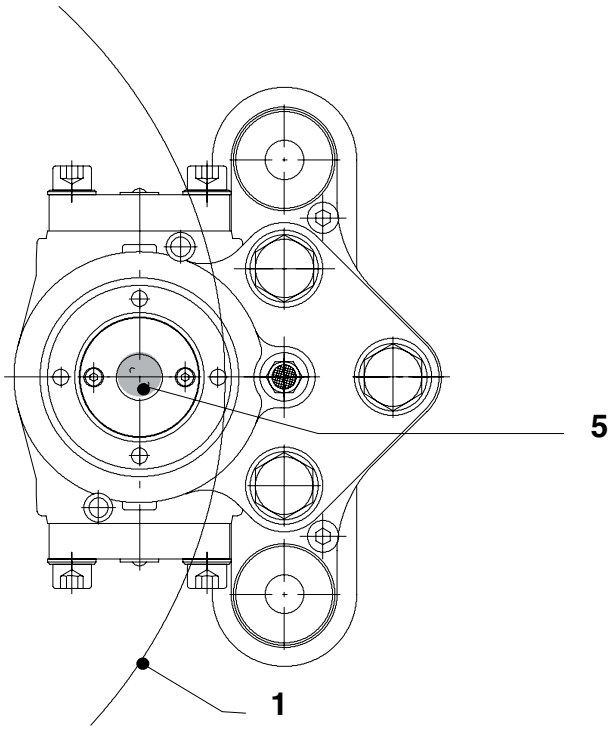
> The routine inspection has to be done.

> The annual inspection interval is due.

1) Release the brake [255].
2) Remove the covers at brake and hydraulic unit.
3) Push the caliper outwards.
4) Using a feeler gauge, check the air gap (A) between the rotor (1) and the outer brake pad (12).
   WARNING! If an air gap (A) of approx. 1.8 mm is present, re-adjust the brake.
5) Check the brake pads (12).
   WARNING! If the minimum thickness of 9 mm is reached or if the brake pads are damaged, the brake pads have to be replaced.
6) Release the brake [255].
7) Install the covers at brake and hydraulic unit.

→ You have successfully checked the brake.

9.3.3.2.3 Wear monitor



1	Rotor	5	Indicator

The brake wear is monitored by means of the indicator (5).

With an air gap (A) of 2.0 mm, the yellow warning light on the right-hand control console (operator cabin) illuminates. The required minimum braking torque (residual torque) is still available.

The brake has to be adjusted.

WARNING! The indicator (5) must not be readjusted (27.1 mm).

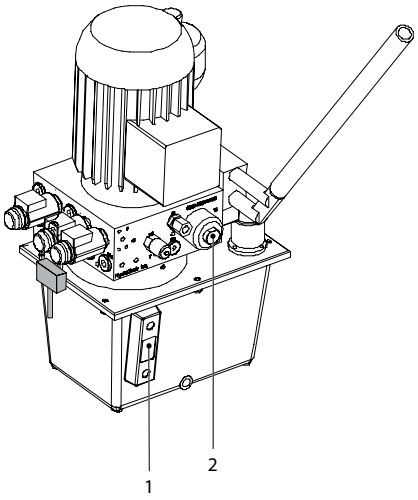
9.3.3.2.4 Checking the hydraulic unit

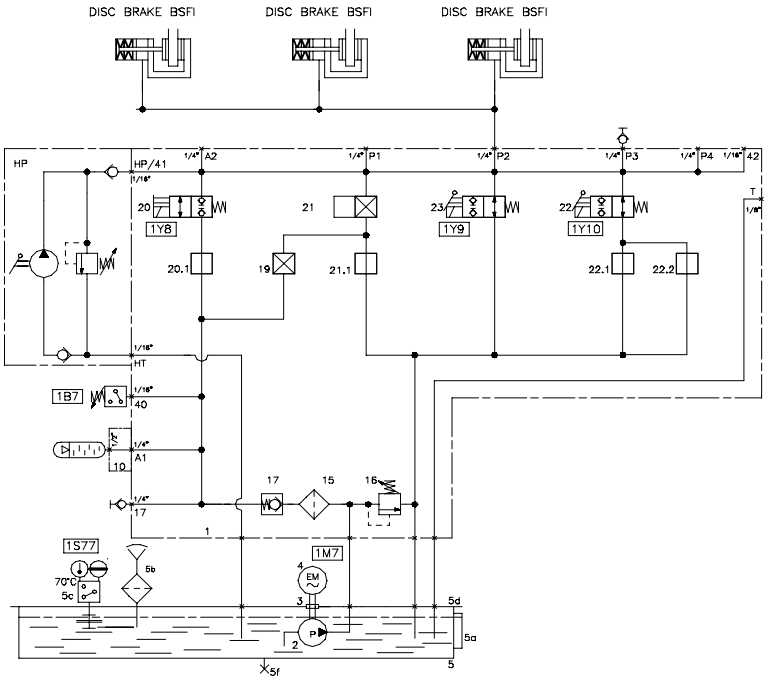
CAUTION

No regular inspection of the hydraulic unit.

The pump may be destroyed.

► Regularly check the hydraulic unit.





1	Oil gauge glass	2	Oil filter (model: 003D010BN3HC)

1) Check the hydraulic fluid level at the oil gauge glass (1).
CAUTION! The oil level should reach the middle of the oil gauge glass (1); top up if necessary.
2) Place a collection tray below the filter that can hold approx. ½ l hydraulic fluid.
3) Remove the oil filter cap.
4) Pull out the filter element.
5) Inspect the filter element.
6) If necessary, remove and replace the old filter element by a new one.
7) Clean the filter element.
8) Install the filter element.
9) Install the filter cap.

→ You have successfully checked the hydraulic unit.

9.3.3.2.5 Adjusting the air gap

DANGER

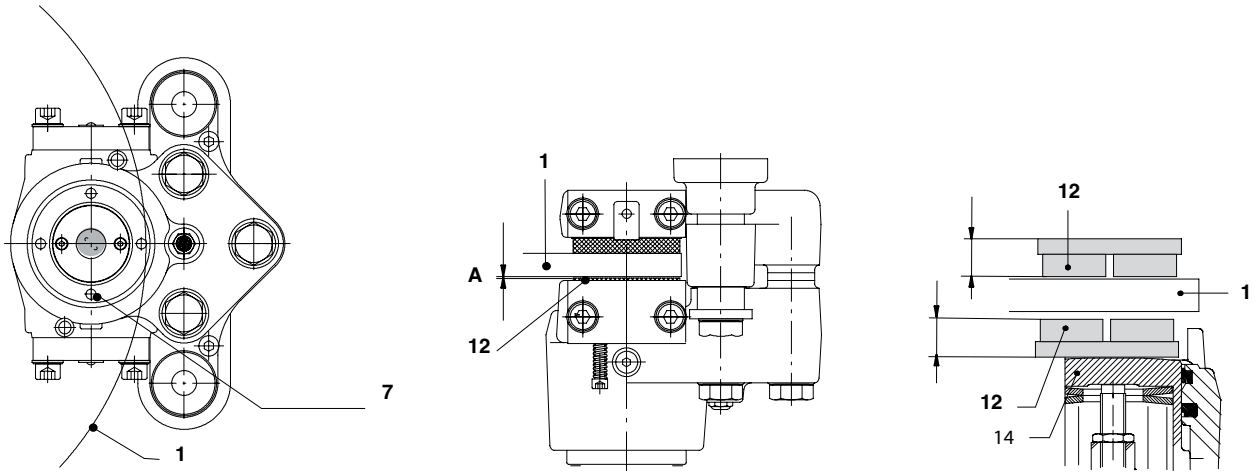
Incomplete maintenance

Risk of fatal injury through failure of safety equipment.

► Check the air gap at all calipers.

NOTICE

The air gap (A) may be adjusted as long as the minimum thickness of the brake pads (12) of 9 mm is not reached. To avoid downtimes of the slewing tower crane, the brake pads should be replaced before reaching the minimum thickness.



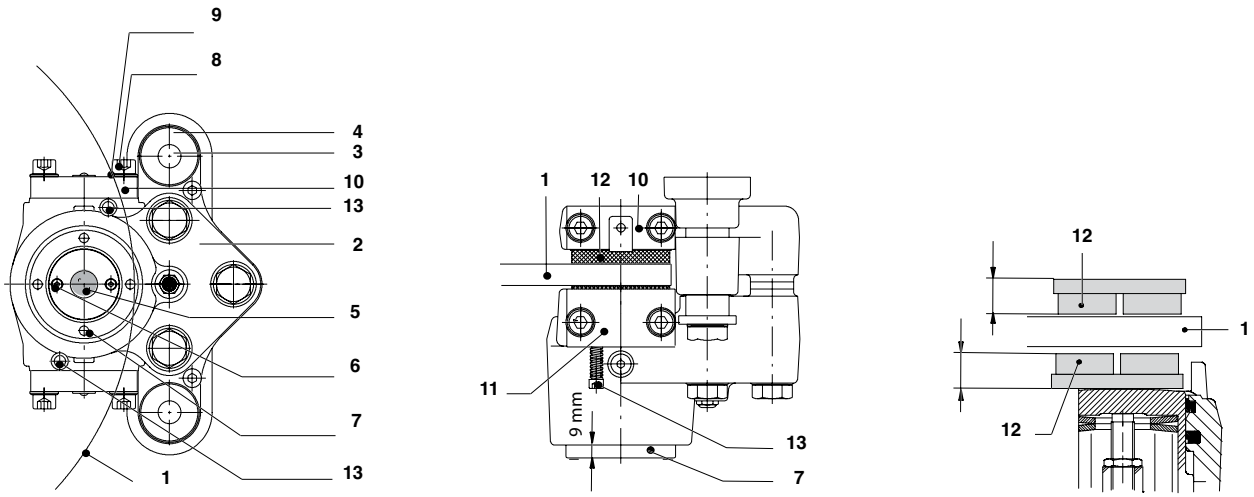
1	Rotor	14	Piston
7	Setting screw	A	Air gap
12	Brake pads		

1) Set the power disconnector at the control cabinet to position "0".
2) Remove the cover.
3) Remove the special wrench from the door of the hydraulic unit cover.
4) Insert the special wrench into the setting screw (7).
5) Screw the setting screw (7) into the housing until you feel some marked resistance.
   NOTICE! The setting screw is touching the piston.
6) Turn the setting screw (7) backwards for half a turn.
7) Release the brake [255].
8) Check the air gap (A) between the rotor (1) and the brake pads (12).
   WARNING! The air gap must be 1 mm.

9) If necessary, readjust the brake until an air gap of 1 mm is achieved.
10) Place the special wrench in the door of the hydraulic unit.
11) Install the cover.
12) Check the brake and readjust the brake, if necessary (see mechanical brake test, page: [258])

→ You have successfully adjusted the air gap.

9.3.3.2.6 Replacing wear parts



1	Brake disc	8	Mounting screws
2	Caliper	9	Washer
3	Hexagonal head screw	10	Brake pad support
4	Washer	11	Brake pad support
5	Indicator	12	Brake pad
6	Cylinder head screws	13	Cylinder head screw with return spring
7	Setting screw (special wrench required)		

Quantity	Designation	Dimensions		Usage
4	Hexagonal head screws	M10x35	DIN 612-8.8	Brake pad support (10)
4	Washers	A10.5	DIN 125	

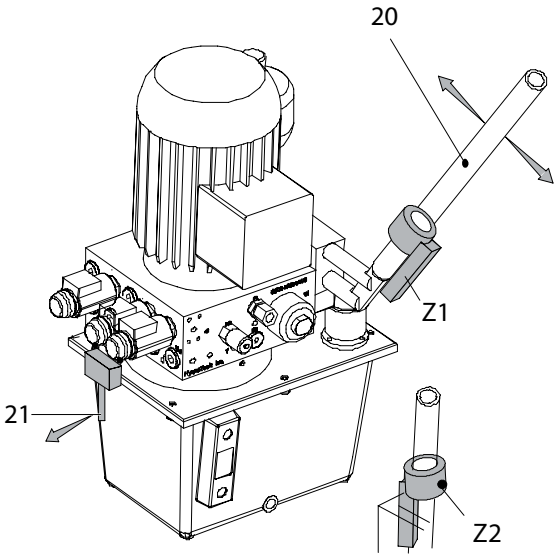
1) Set the power disconnector at the control cabinet to position "0".
2) Remove the covers.
3) Remove the cylinder head screws (6).
4) Remove the indicator (5) with receptacle.
5) Protect the indicator (5) against damage.
   WARNING! The setting of the indicator (5) must not be changed (27.1 mm).
6) Screw the setting screw (7) out by 9 mm.
   DANGER! The brake has not been released and must not be screwed out of the housing by more than 9 mm.
7) Release the brake [255].
8) Remove the cylinder head screws (13) with return spring.
9) Remove the upper mounting screws (8).
10) Remove the brake pad supports (10)(11).
11) Remove the old brake pads (12).
12) Clean the brake and the rotor.
    DANGER! Ensure that the rotor and brake pads are free of oil and grease.

→ You have removed the wear parts.

13) Carefully install the new brake pads (12) into the caliper (2).
14) Install the cylinder head screws (13) with return spring.
15) Install the brake pad support (10) using the retaining clip.
16) Install the brake pad support (11) using the retaining clips.
17) Remove the special wrench from the door of the hydraulic unit cover.
18) Insert the special wrench into the setting screw (7).
19) Turn the setting screw (7) backwards for half a turn.
20) Install the indicator (5) with the holding fixture.
WARNING! The setting of the indicator (5) must not be changed (27.1 mm).
21) Install the cylinder head screws (6).
22) Set the power disconnector at the control cabinet to position I.
23) Release the brake [255].
24) Check the air gap (A) between the rotor (1) and the brake pads (12).
WARNING! The air gap must be 1 mm.
25) If necessary, readjust the brake until an air gap of 1 mm is achieved.
26) Place the special wrench in the door of the hydraulic unit.
27) Re-install the covers.
28) Check the brake and readjust the brake, if necessary (see mechanical brake test, page: [258])

→ You have successfully adjusted the air gap.

9.3.3.2.7 Manual release



20	Manual release lever	Z1	Position OPEN Lock trunnion outside
21	Lever – valves 23 and 22	Z2	Position CLOSED Trunnion inside

> A brake malfunction has occurred.

> Failure of crane power supply.

> A load is suspended from the load hook.

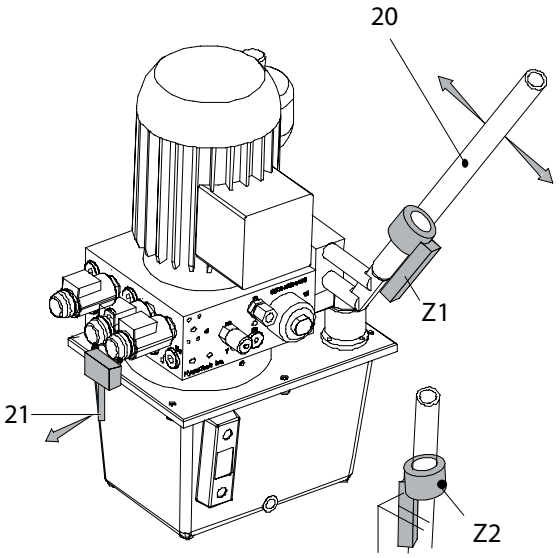
> The brake is free of torque.

> The motor is not running.

1) Set the power disconnector at the control cabinet to position "0".
2) Remove the cover of the hydraulic unit.
3) Push the lock at the manual release lever (20) upwards, until the trunnion of the lock comes free.
4) Rotate the lock until the trunnion is facing outside (refer to figure – Z1).
5) Completely pull the lever (21) to the outside.
6) Use the manual release lever (20) to pump until the brake is completely released.
   → You have released the brake.
7) Completely push the lever (21) to the inside.
8) Rotate the trunnion of the lock to the inside (refer to figure – Z2).
9) Re-install the cover of the hydraulic unit.
10) Set the power disconnector at the control cabinet to position "I".

→ You have successfully completed the manual release procedure.

9.3.3.2.8 Emergency release



20	Manual release lever	Z1	Position OPEN Lock trunnion outside
21	Lever – valves 23 and 22	Z2	Position CLOSED Trunnion inside

> A brake malfunction has occurred.

> Failure of crane power supply.

> A load is suspended from the load hook.

> The brake is free of torque.

> The motor is not running.

1) Set the power disconnector at the control cabinet to position "0".
2) Open the door of the cover above the hydraulic unit or remove the cover completely.
3) Push the lock at the manual release lever (20) upwards until the trunnion of the lock comes free.
4) Rotate the lock until the trunnion is facing outside (refer to figure – Z1).
5) Completely pull the lever (21) to the outside.
6) Use the manual release lever (20) to pump until the load slowly starts to move.
7) Stop the lowering process in regular intervals by releasing the lever (21).
   NOTICE! Thus, an excessive acceleration of the load will be avoided.
8) Repeat the procedure until the load has been lowered.
9) Completely push the lever (21) to the inside.
10) Rotate the trunnion of the lock to the inside (refer to figure – Z2).
11) Close the door of the hydraulic unit cover or re-install the removed cover.
12) Set the power disconnector at the control cabinet to position I.

→ You have successfully completed the manual release procedure.

9.3.3.2.9 Mechanical brake test



⚠ WARNING

Falling load.

Risk of serious contusion or fatal injury.

1) Keep off suspended loads.
2) Take into account any surfaces exposed to wind.
3) Keep off loads that are going to be lifted.
4) Make sure that persons are prevented from getting under suspended loads.
5) Only entrust experienced persons with attaching loads.
6) Keep your hands within the area of the crane controls when transporting loads.
7) Do not switch off the crane.

> The brake must be checked.

1) Suspend the maximum allowable load.
2) Move the master switch on the right-hand control console until the load is lifted by approx. 1.5 m.
3) For lowering, move the master switch on the right-hand control console to the end of its travel.
4) Press the pushbutton (7) to simulate an emergency stop.

→ After a short period of coasting, the load should be stopped and held reliably.

→ You have successfully checked the brake.

9.3.3.2.10 Malfunctions

Malfunction	Cause	Remedy
Brake does not release Brake does not work.	Brake pads worn out.	Replace breake pads [253].
	Air gap too large.	Readjust air gap [251].
Brake engaging slowly.	Air gap between the brake pad and rotor too large.	Readjust air gap [251].
	Control system in hydraulic system. Valve positioned incorrectly.	Check all valves for correct positioning.
	Abnomal quantities of contaminants.	Check and clean pipes, hoses, and valves.
	High viscosity of fluid in brake system.	Check whether fluid complies with recommendations.
Long braking time or long braking distance. Insufficient braking force.	Too high load or too high velocity.	Check load and velocity.
	Air gap too large.	Readjust air gap [251].
	Oil, paint, or grease adhering to rotor or brake pad.	Clean rotor and replace brake pads [253].
		Check brake for leakage.
	Not all calipers are connected.	Check system.
	Incorrect or damaged spring set.	Replace calipers.
Leakage.	Gaskets worn out.	Replace calipers or hydraulic unit.
Erratic brake pad wear.	Caliper incorrectly aligned.	Check alignment and clip.
	Rotor is not planar.	Verify irregularities and replace rotor, if necessary.
Excessive brake pad wear.	Increased intensity of brake usage.	Verify crane operation.
	Air gap too small.	Readjust air gap [251].
	Brake does not hold.	Check fluid pressure.
		Check motions of brake pads, pistons, and guides.

(see also):

- Manual release [255]

9.3.3.3 Hoisting gear brake SHI 107 FC



DANGER

Hydraulic unit.

Hands may be crushed.

1) When working on disc brakes, never reach between the unlocked piston and the rotor.
2) Lock the piston using the locking pin or the nut.
3) When working on a disc brake, ensure that the rotor is secured against rotation.

→ Make sure that the hook block is secured against uncontrolled lowering.



NOTICE

This brake is an optional second brake.

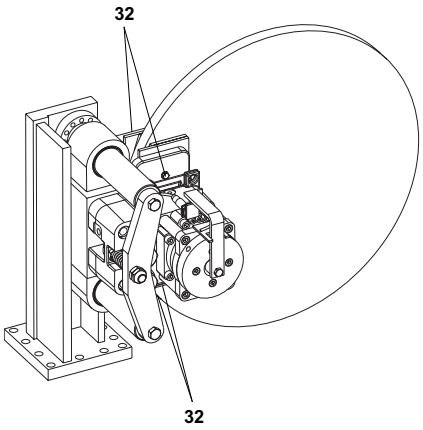
9.3.3.3.1 Specification

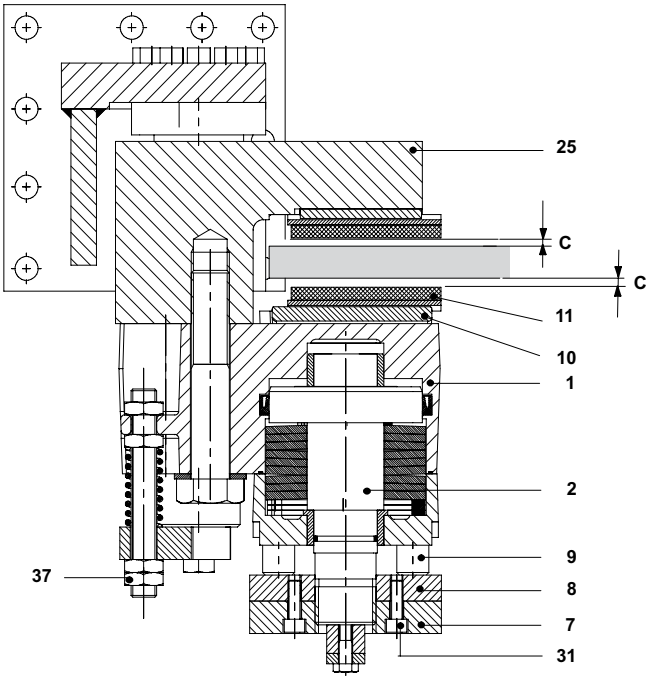
Design

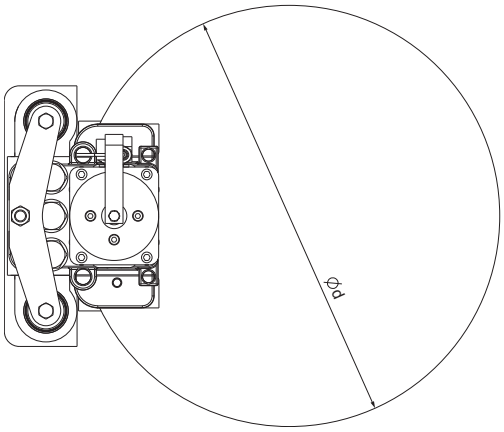
Spring-operated, hydraulically released disc brake in floating caliper design with:

- Emergency release

Item	Technical data
Braking torque (2 calipers) Hw28110FU	140 kNm
Braking torque per caliper Hw28110FU	70 kNm
Braking torque (2 calipers) Hw28132FU	170 kNm
Braking torque per caliper Hw28132FU	85 kNm
Air gap (per side)	0.5 mm
Pump capacity	3.0 liters/min – 205 bar
Motor voltage	400 VAC
Valve voltage	24 VDC
Motor power	1.5 kW



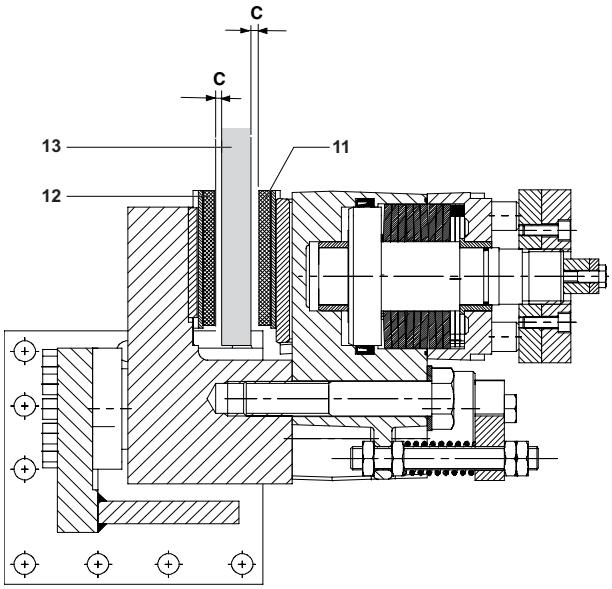




1	Casing	11	Brake pad
2	Piston	25	Pressure pad
7	Setting screw	31	Locking screw
8	Thrust plate	37	Setting screw
9	Thrust screw	d	Rotor diameter
10	Pad support	c	Air gap

9.3.3.3.2 Inspecting the brake

	**⚠ DANGER** Lowering operations are out of control. The slewing tower crane may overturn. Risk of serious contusion or fatal injury. 1) Make sure that no load is suspended from the load hook. 2) Lower the snatch block to ground. 3) Secure the hoisting cable against unwinding.



11	Inner brake pad	13	Rotor
12	Outer brake pad	c	Air gap

> The crane has been assembled.

> The regular inspection interval is due.

1) Release the brake.
2) Use a feeler gauge to check the air gap (c) between the inner brake pad (11) and the rotor (13).
3) If the air gap differs, readjust the air gap [264].
4) Use a feeler gauge to check the air gap (c) between the outer brake pad (12) and the rotor (13).
5) If the air gap differs, readjust the air gap [264].
6) Apply the brake.

→ You have successfully checked the brake.

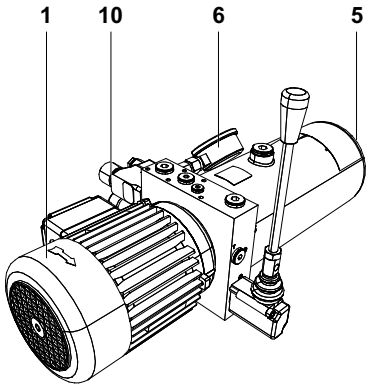
9.3.3.3.3 Checking the hydraulic unit

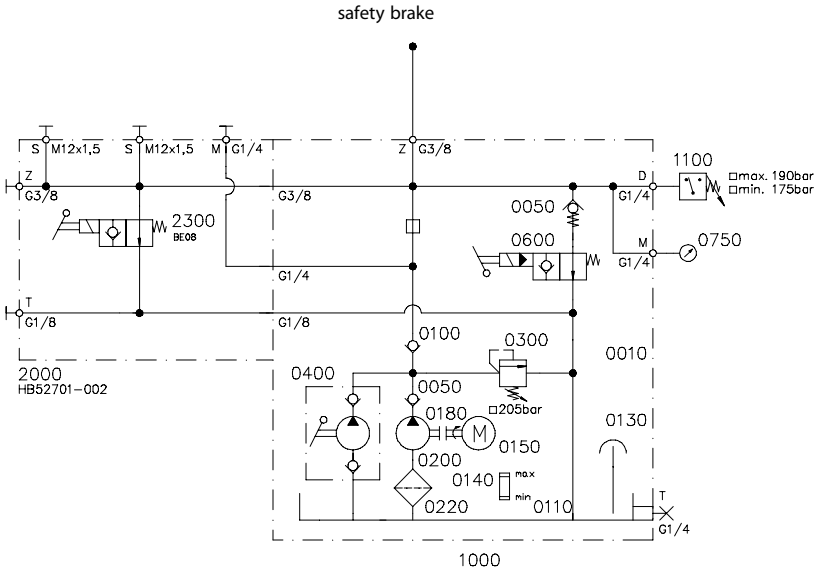
CAUTION

No regular inspection of the hydraulic unit.

The pump may be destroyed.

► Regularly check the hydraulic unit.





1	Motor	6	Pressure gauge
5	Hydraulic fluid dipstick	10	Hydraulic port

1) Check the hydraulic fluid level using the hydraulic fluid dipstick (5).

2) Set the power disconnector at the control cabinet to position "I".
NOTICE! With the correct setting of the pressure switch, the electric motor is switched off at a maximum pressure of 190 bar and - while the pressure is decreasing - switched on at a minimum pressure of 175 bar.

3) Check hydraulic system for leakage.

→ You have successfully checked the hydraulic unit.

9.3.3.3.4 Adjusting the air gap



⚠ DANGER

Making adjustments to brakes

Risk of fatal injury through failure of safety equipment.

> The brakes should be adjusted or serviced.

► The crane must be put out of service for every adjustment and service operation at brakes.



⚠ DANGER

Incomplete maintenance

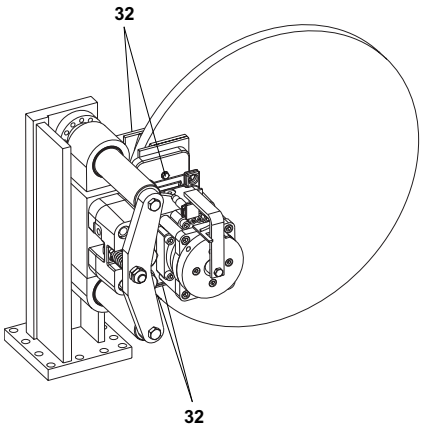
Risk of fatal injury through failure of safety equipment.

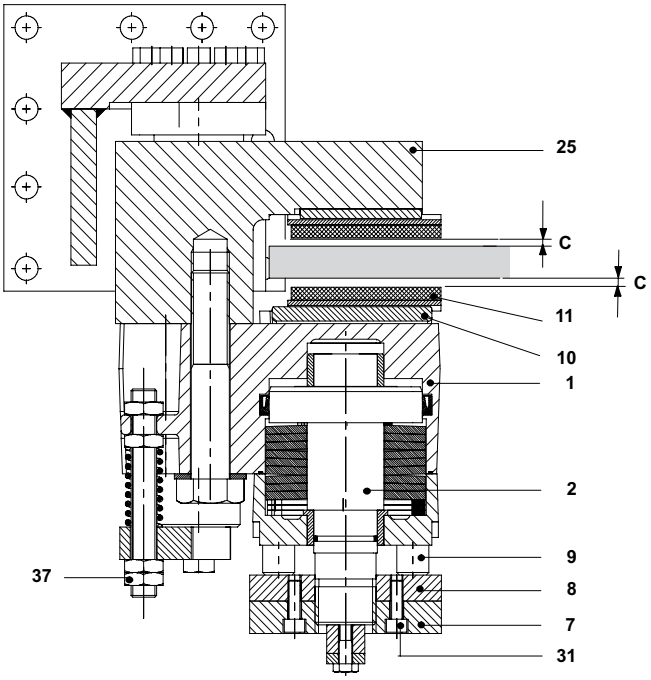
► Check the air gap at all calipers.

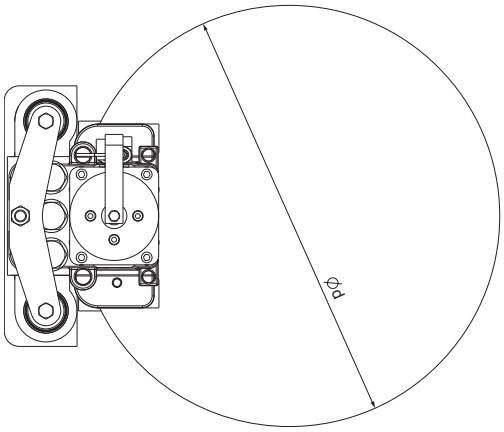


NOTICE

The air gap (c) may be adjusted for any number of times until the brake pads (11)(12) have reached the minimum thickness of 3 mm. To avoid downtimes of the slewing tower crane, the brake pads should be replaced before reaching the minimum thickness.







1	Casing	25	Counterholder
2	Piston	31	Locking screw
7	Setting screw	32	Pad support screw
8	Thrust plate	37	Setting nut
9	Thrust screw	d	Rotor diameter
10	Pad support	c	Air gap
11	Brake pad		

> Re-adjust the air gap.

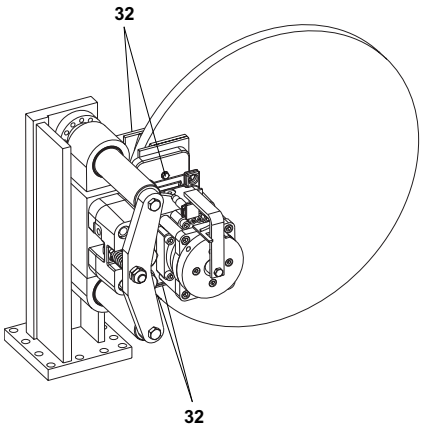
> Center the brake pads.

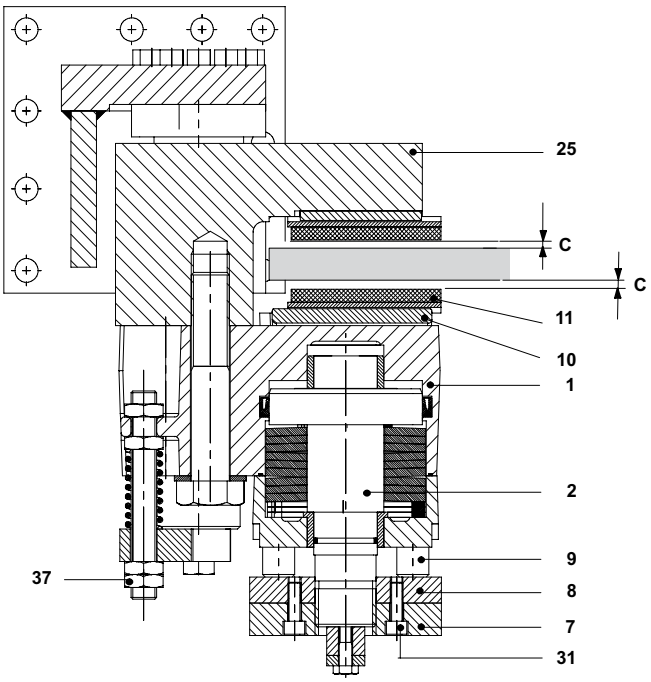
1) Set the power disconnector at the control cabinet to position "I".
2) Release the brake.
3) Remove the locking screws (31) from the thrust plate (8).
4) Turn the setting nut (37), until the brake lining (11) is in contact with the counterholder (25) of the brake disc.

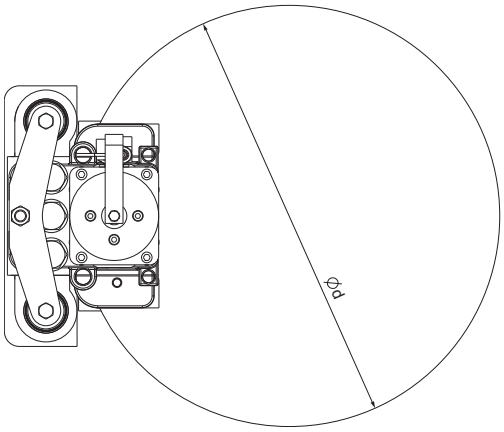
5) Turn the setting screw (7) until the total air gap (total air gap = 2 x air gap per side) between the brake lining (11) and the brake disc is adjusted.
6) Install the locking screws (31) into the thrust plate (8).
7) Install the setting nut (37).
8) Using the setting nut (37), evenly distribute the air gap (c) on both sides of the rotor.
9) Apply the brake.
10) Release the brake.
11) Check the air gap each side.
NOTICE! The sum of the two measured values per brake corresponds to the measured total air gap per brake.
12) If the air gap each side differs, readjust it using the setting nut (37).
13) If the measured total air gap differs from the specified total air gap (air gap = 2 x air gap each side), it is required to completely perform the activity described in this chapter again.

→ You have adjusted the air gap.

9.3.3.3.5 Replacing wear parts







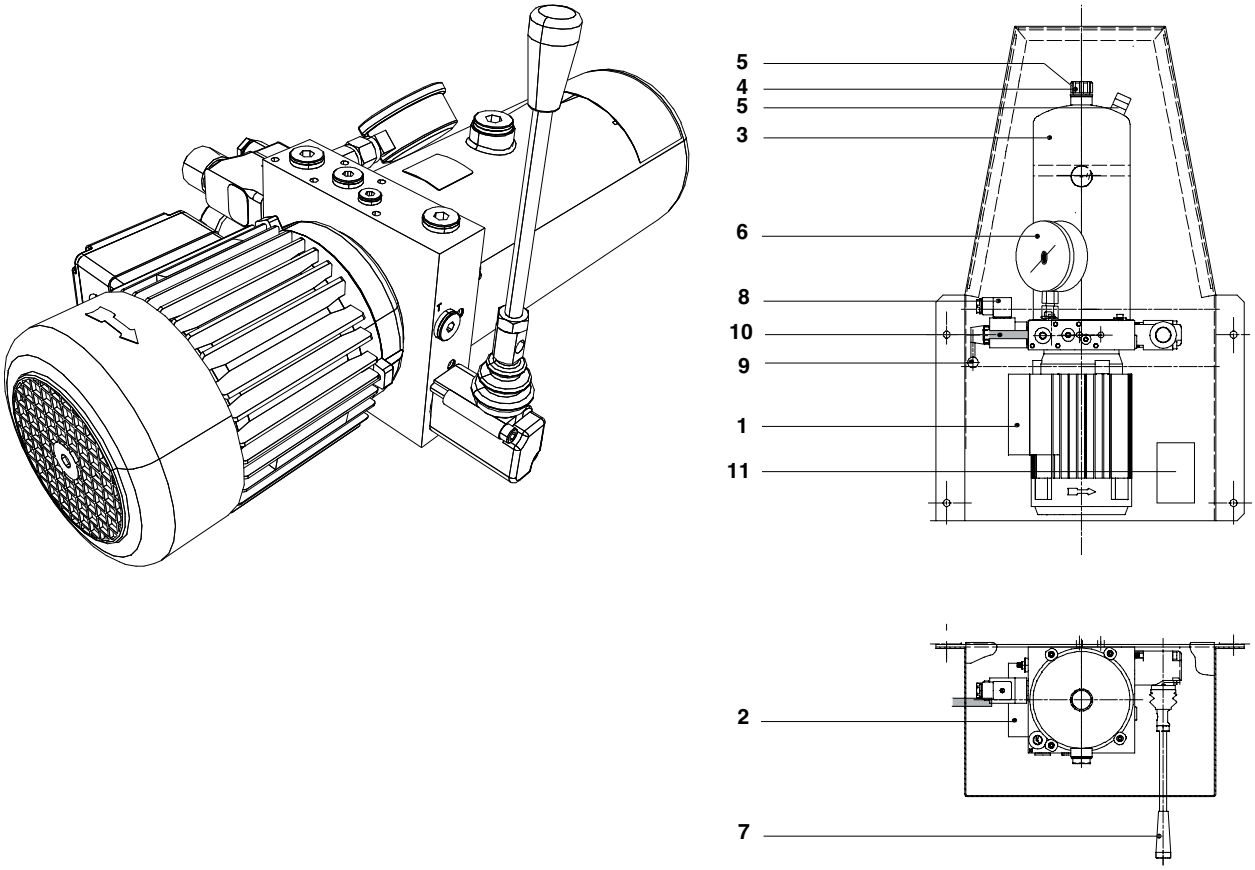
1	Casing	25	Counterholder
2	Piston	31	Locking screw
7	Setting nut	32	Pad support screw
8	Thrust plate	37	Setting nut
9	Thrust screw	d	Rotor diameter
10	Pad support	c	Air gap
11	Brake pad		

1) Set the power disconnector at the control cabinet to position "I".
2) Release the brake.
3) Remove the locking screws (31) from the thrust plate (8).
4) Turn the setting nut (7) backwards until the pad support (10) is in contact with the encasing, and there is a space of 6 mm between the thrust plate (8) and the setting nut (7).
5) Manually pull back the thrust plate (8) and the pad support (10).
6) Remove the pad support screws (32).

7) Remove the brake linings (11) from the feather key guide.
   → You have removed the old brake pad.
8) Clean the key groove.
9) Install the new brake linings (11) into the feather key guides.
10) Secure the brake linings (11) using the brake lining support screws (32).
11) Adjust the air gap [264].
12) Check the brake [262].

→ You have successfully replaced the brake pads.

9.3.3.3.6 Emergency release



1	Electric motor	7	Manual release lever
2	Control block	8	Pressure switch
3	Hydraulic reservoir	9	Manual emergency unit
4	Vent screw	10	Hydraulic port
5	Hydraulic fluid dipstick	11	Terminal box
6	Pressure gauge		

> A brake malfunction has occurred.

> Failure of crane power supply.

> A load is suspended from the load hook.

> The brake is free of torque.

> The motor is not running.

1) Set the power disconnector at the control cabinet to position "0".
2) Remove the manual release lever (7) from the side-mounted receptacle.
3) Install the manual release lever (7) into the manual pump (refer to figure).
4) Push the levers of the manual emergency unit (9) to the outside.

5) Use the manual release lever (7) to pump until the load slowly starts to move.
6) Stop the lowering process in regular intervals by releasing the levers of the manual emergency unit (9).
   NOTICE! Thus, an excessive acceleration of the load will be avoided.
7) Repeat the procedure until the load has been lowered.
8) Release the levers of the manual emergency unit (9).
9) Remove the manual release lever (7) from the manual pump.
10) Attach the manual release lever (7) to the side-mounted receptacle.
11) Set the power disconnector at the control cabinet to position I.

→ You have successfully completed the manual release procedure.

9.3.3.3.7 Malfunctions

Malfunction	Cause	Remedy
Brake does not release Brake does not work.	Brake pads worn out.	Replace breake pads [267].
	Air gap too large.	Readjust air gap [264].
Brake engaging slowly.	Air entrapped in hydraulic system.	Bleed hydraulic system at the highest point and at the brake.
	Air gap between the brake pad and rotor too large.	Readjust air gap [264].
	Control system in hydraulic system. Valve positioned incorrectly.	Check all valves for correct positioning.
	Abnomal quantities of contaminants.	Check and clean pipes, hoses, and valves.
	High viscosity of fluid in brake system.	Check whether fluid complies with recommendations.
Long braking time or long braking distance. Insufficient braking force.	Too high load or too high velocity.	Check load and velocity.
	Air gap too large.	Readjust air gap [264].
	Oil, paint, or grease adhering to rotor or brake pad.	Clean rotor and replace brake pads [267].
		Check brake for leakage.
	Not all calipers are connected.	Check system.
	Incorrect or damaged spring set.	Replace calipers.
Leakage.	Gaskets worn out.	Replace calipers or hydraulic unit.
Erratic brake pad wear.	Caliper incorrectly aligned.	Check alignment and clip.
	Rotor is not planar.	Verify irregularities and replace rotor, if necessary.
Excessive brake pad wear.	Increased intensity of brake usage.	Verify crane operation.
	Air gap too small.	Readjust air gap [264].
	Brake does not hold.	Check fluid pressure.
		Check motions of brake pads, pistons, and guides.

9.4 Slewing gear

9.4.1 Changing the oil



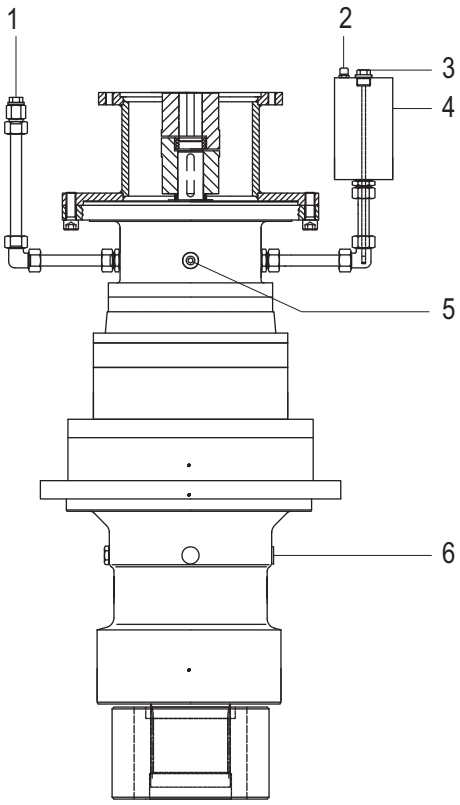
⚠ WARNING

Hot process and auxiliary materials.

Burns.

1) Handle hot process materials with appropriate care.

2) Insulate the system sections thermally.



1	Filler neck	4	Fluid reservoir
2	Vent	5	Oil overflow
3	Oil dipstick	6	Oil drain

> The regular oil change interval is due.

> The transmission still has its operating state temperature.

1) Place an appropriate container beneath the oil drain plug (6).

2) Remove the oil drain plug (6).
3) Collect the draining oil and dispose of it in an environmentally compatible manner.
4) Reinstall the oil drain plug (6).
   → You have drained the oil of the slewing gear transmission.
5) Remove the vent filter at the fluid reservoir (4) and the filler neck (1).
6) Open the oil overflow (5).
7) Using a funnel or hose, keep filling oil into the filler neck (1) until oil leaks from the oil overflow (5).
8) Re-lock the oil overflow (5).
9) Collect any oil leaked into the oil overflow (5) and dispose of it in an environmentally compatible manner.
10) Keep filling in oil until the oil level is between the "Min" and the "Max" markings at the oil dipstick (3) in the fluid reservoir (4).
    NOTICE! The oil level must be between the "Min" and "Max" markings.

→ You have successfully completed the oil change.

9.4.2 Slewing gear brake



⚠ DANGER

Improper brake sevice.

Brakes may fail.

1) Have the brakes serviced only by trained persons.
2) Observe accident prevention regulations and safety precautions.
3) In case of further malfunctions, contact WOLFFKRAN service department.



⚠ WARNING

Cleaning the brakes.

Brakes may fail.

1) Do not use petrol or solvents for cleaning the brakes.
2) Solely clean the brakes dryly.

9.4.2.1 Slewing gear brake ROBA-stop-M/ 891.065.1

9.4.2.1.1 Specifications

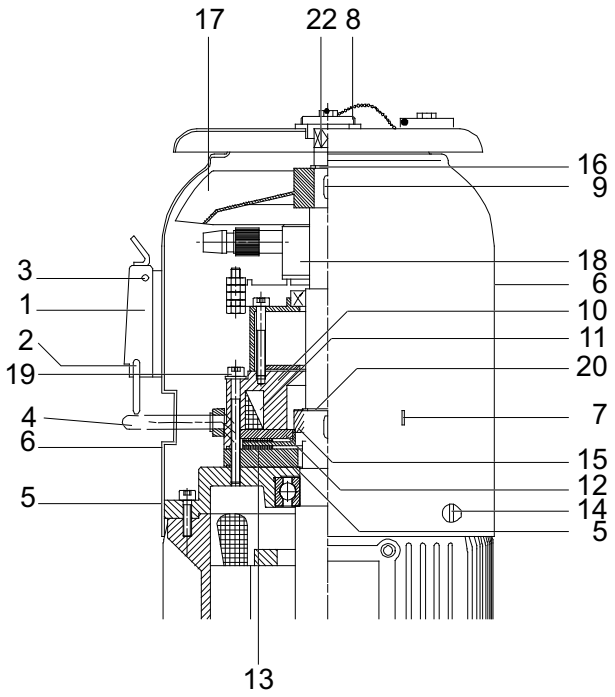
Design

Electromagnetic two-surface slewing gear brake with:

- Spring-loaded brake
- Fixed torque
- Optical wear monitoring function

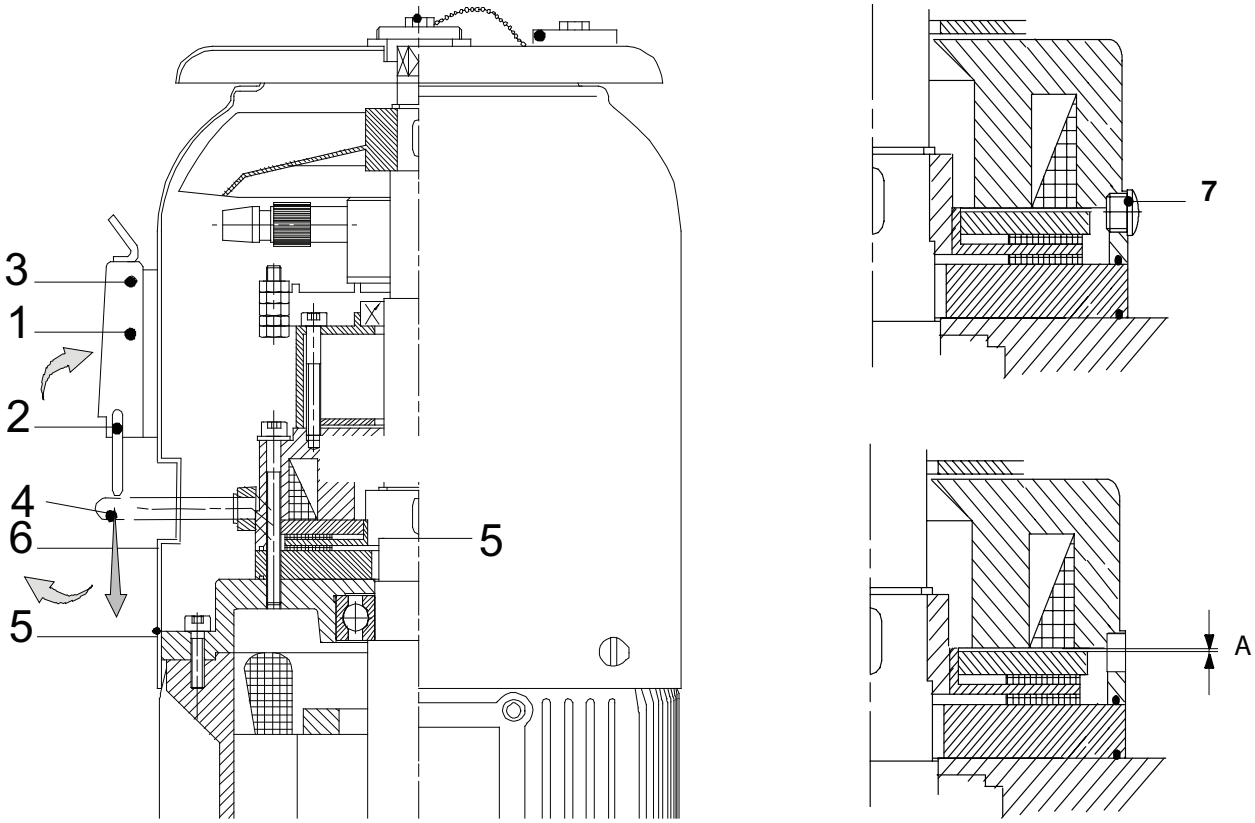
Item	Technical data
Braking moment (must not be altered)	95 Nm
Coil tension	104 Volt DC
Power consumption	120 Watt

9 Service and maintenance



1	Locking lever	12	Anchor plate
2	Clamping strap	13	Rotor
3	Retaining pin	14	Flange
4	Manual release lever	15	Hub
5	Mounting screw	16	Retaining ring
6	Cover hood	17	Fan
7	Screw plug	18	Windvaning
8	Cap	19	Cylinder head screw
9	Key	20	Retaining ring
10	Solenoid part, complete	21	O-ring
11	Solenoid	22	Motor shaft SW 17 mm

9.4.2.1.2 Checking the brake



1	Locking lever	5	Mounting screw
2	Clamping strap	6	Cover hood
3	Retaining pin	7	Screw plug
4	Manual release lever	A	Air gap

> The crane has been assembled.

> The routine inspection has to be done.

> The annual inspection interval is due.

1) Set the power disconnector at the control cabinet to position "0".
2) Unscrew the manual release lever (4).
3) Remove the mounting screws (5).
4) Remove the cover hood (6).
5) Remove the plug (7).
6) Remove the abrasion deposits.
7) Use a feeler gauge to check the air gap (A).
   → You have successfully checked the air gap.
   → When the air gap is 0.85 mm, the rotor (13) must be replaced.

8) Install the plug (7).
9) Install the cover hood (6).
10) Tighten the mounting screws (5).
11) Install the manual release lever (4).
12) Set the power disconnector to position "I".

→ You have successfully checked the brake.

9.4.2.1.3 Releasing the slewing gear brake

> A brake malfunction has occurred.

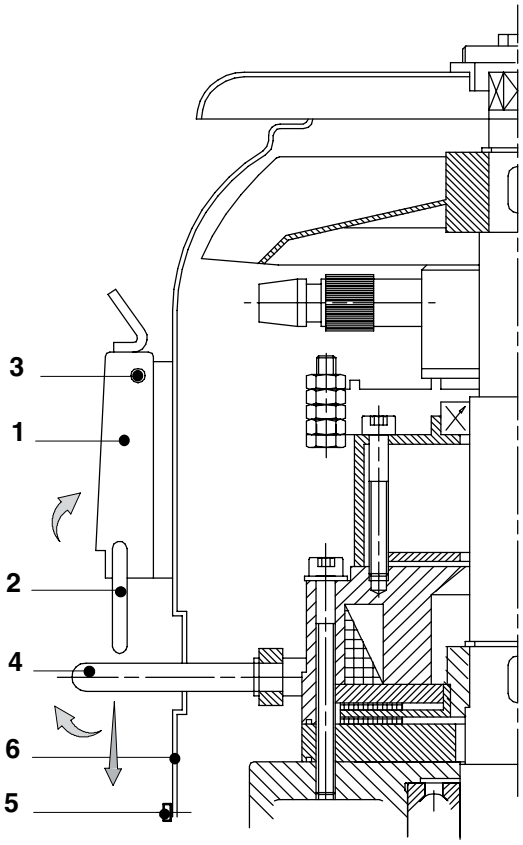
> Failure of crane power supply.

> No load is suspended from the load hook.

> The load hook is in uppermost position.

> You want to slew the tower head section by hand.

1) Set the power disconnector at the control cabinet to position "0".
2) Pull out the retaining pin (3).
3) Move down the locking lever (1).
4) Slide the clamping strap (2) over the manual release lever (4).
5) Move up the locking lever (1).
6) Insert the retaining pin (3).
   → You have successfully released the slewing gear brake.
   NOTICE! Repeat this procedure for all slewing gear brakes.
7) Pull out the retaining pin (3).



8) Move up the locking lever (1).

9) Remove the clamping strap (2) above the manual release lever (4).

10) Move down the locking lever (1).

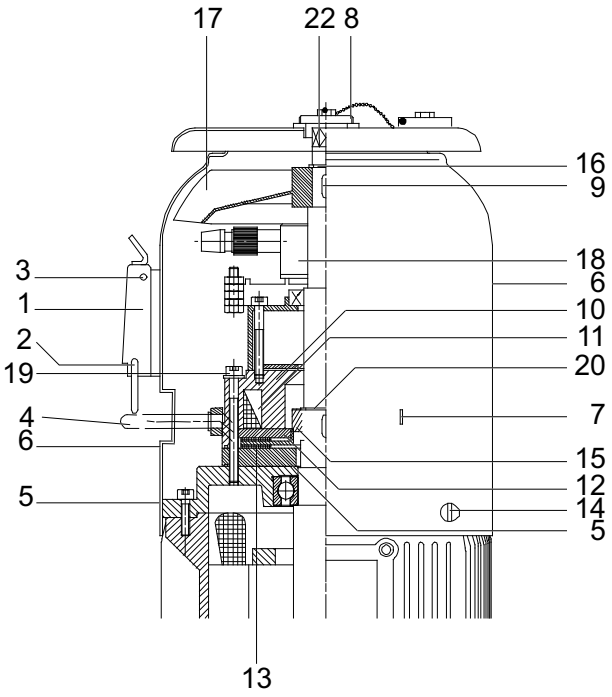
11) Insert the retaining pin (3).

→ Now, the brake is ready for operation again.
NOTICE! Repeat this procedure for all slewing gear brakes.

9.4.2.1.4 Replacing wear parts

NOTICE

The rotor (13) including brake pad, anchor plate (12), and hub (15) are subject to wear.



> The brake must be free of torque.

1) Set the power disconnector at the control cabinet to position "0".
2) Unscrew the manual release lever (4).
3) Remove the mounting screws (5).
4) Remove the cover hood (6).
5) Remove the retaining ring (16).
6) Carefully pull off the fan (17).
7) If applicable, remove the encoder:
   Remove the clamping screw between encoder and motor shaft.
8) Disconnect the electrical connectors.
9) Remove the mounting screws (19).
10) Carefully remove the brake including windvaning.
11) Take off the rotor (13).
12) Check the hub (15) and remove it, if necessary.

→ You have successfully removed the brake.

13) Clean the brake and flange at the motor, until the rotor (13) and braking surfaces (12) (14) are free of oil and grease.

→ You have successfully cleaned rotor (13) and brake.

14) Carefully slide the new hub (15) onto the motor shaft.

15) Axially secure the hub by means of the retaining ring (20)
NOTICE! The splines must not be damaged.

16) Slide the new rotor (13) onto the hub (15) without applying force.
NOTICE! It should be possible to move the rotor (13) easily by hand in axial direction on the splined hub (15).

17) If necessary, insert a new O-ring (21) into solenoid part (10).

18) Carefully slide the brake over the rotor hub (13).

19) Check the proper seating and condition of the O-ring (21).

20) Using the cylinder head screws (19) (M8x90, DIN 912-8.8), bolt the brake to the motor.

21) Pre-torque the cylinder head screws (19) to 22 Nm.

22) If applicable, install and clamp the encoder.

23) Install the electrical connections of the brake with windvaning and, if applicable, of the sensor.

24) Check the key.

25) Carefully install the fan (17).

26) Install the retaining ring (16).

27) Install the cover hood (6).

28) Tighten the mounting screws (5).

29) Install the manual release lever (4).

30) Set the power disconnector at the control cabinet to position I.

31) Check the brake and readjust the brake, if necessary (see mechanical brake test, page: [283])

→ You have successfully replaced the wear parts.

9.4.2.1.5 Mechanical brake test

> The brake must be checked.

> No load is suspended from the load hook.

> The load hook is in uppermost position.

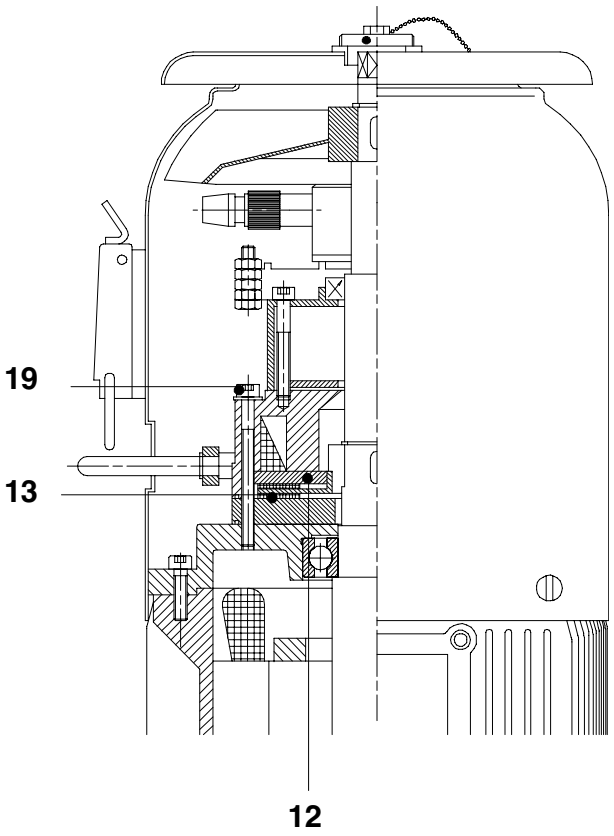
> The load hook is in maximum operating radius.

1) Move the master switch at the left-hand control console to the end of its travel, until the maximum slewing speed is reached.
2) Press the pushbutton (7) to simulate an emergency stop.

→ After a short period of coasting, the slewing motion should be stopped and the position held reliably.

→ You have successfully checked the brake.

9.4.2.1.6 Malfunctions



Brake does not work.

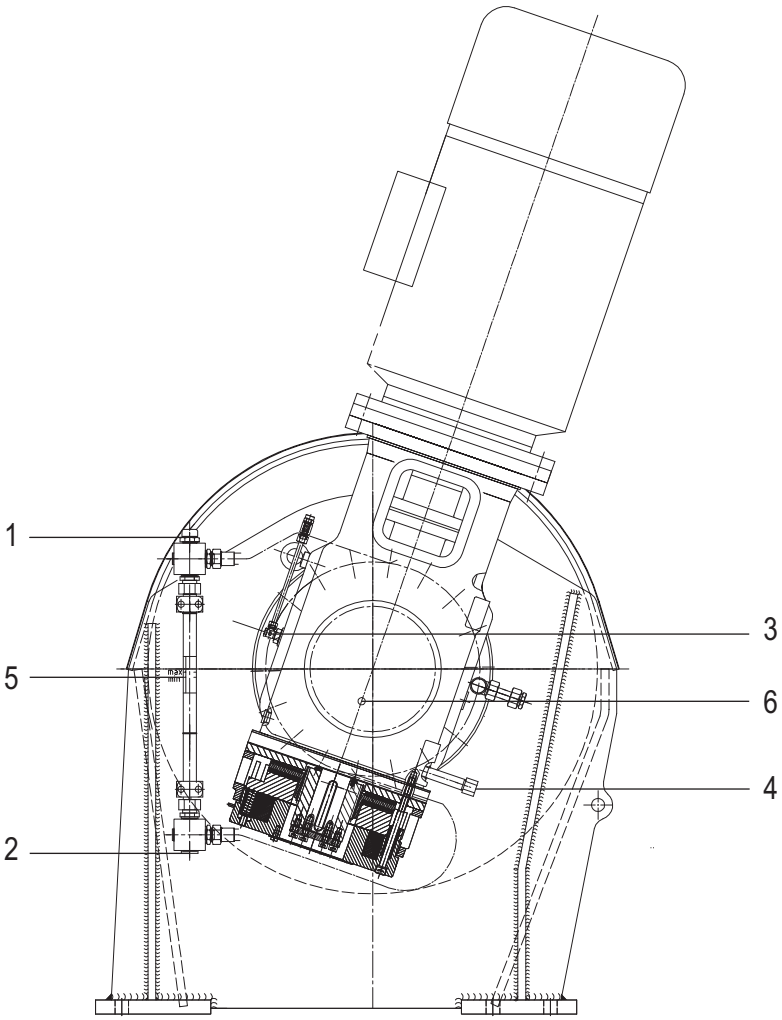
- Brake surface is not free of oil or grease.
- Brake pads worn out.
- Air gap too large.
- Electrical malfunctions.

Brake does not release.

- Brake pads worn out.
- Rotor (13) stuck in axial direction.
- Air gap to small.
- Cylinder head screw (19) tightened too much.
- Anchor plate (12) warped.
- Incorrect voltage applied to coil.
- Open coil circuit.

9.5 Derricking gear

9.5.1 Changing the oil



1	Oil fill screw (pinion gear transmission)	2	Oil drain plug (pinion gear transmission)
3	Oil filler screw (bevel input stage)	4	Oil drain plug (bevel input stage)
5	Oil level indicator	6	Oil bleeder (bevel input stage)

1) The regular interval is due.
2) The transmission has been in operation for 2000 hours.
3) The transmission still has its operating state temperature.
4) Place an appropriate container beneath the oil drain plug (2).
5) Remove the oil drain plug (2).
6) Completely drain the oil.
7) Reinstall the oil drain plug (2) at the pinion gear transmission.
8) Dispose of the oil in an environmentally compatible manner.

→ You have successfully drained the oil.

9) Place an appropriate container beneath the oil drain plug (4) at the bevel input stage.
10) Remove the oil drain plug (4).
11) Completely drain the oil.
12) Reinstall the oil drain plug (4).
13) Dispose of the oil in an environmentally compatible manner.

→ You have successfully drained the oil.

14) Remove the oil filler screw (1) and the hose at the oil level indicator (5).
15) Using a funnel or hose, fill in oil until the oil level is between the "Min" and "Max" markings at the oil level indicator (5).
16) Re-install the oil filler screw (1) and the hose to the oil level indicator (5).
17) Unscrew the oil filler screw (3) and the oil bleeder (6) at the bevel input stage.
18) Keep filling oil into the bevel input stage until oil leaks from the oil bleeder (6).
19) Reinstall the oil bleeder (6) und dispose of the leaked oil in an environmentally sound manner.
20) Re-install the oil filler screw (3).

→ You have successfully changed the oil.

9.5.2 Luffing gear brake



⚠ DANGER

Improper brake sevice.

Brakes may fail.

1) Have the brakes serviced only by trained persons.
2) Observe accident prevention regulations and safety precautions.
3) In case of further malfunctions, contact WOLFFKRAN service department.



⚠ WARNING

Cleaning the brakes.

Brakes may fail.

1) Do not use petrol or solvents for cleaning the brakes.
2) Solely clean the brakes dryly.

9.5.2.1 Luffing gear brake ROBA-stop/863.412.1

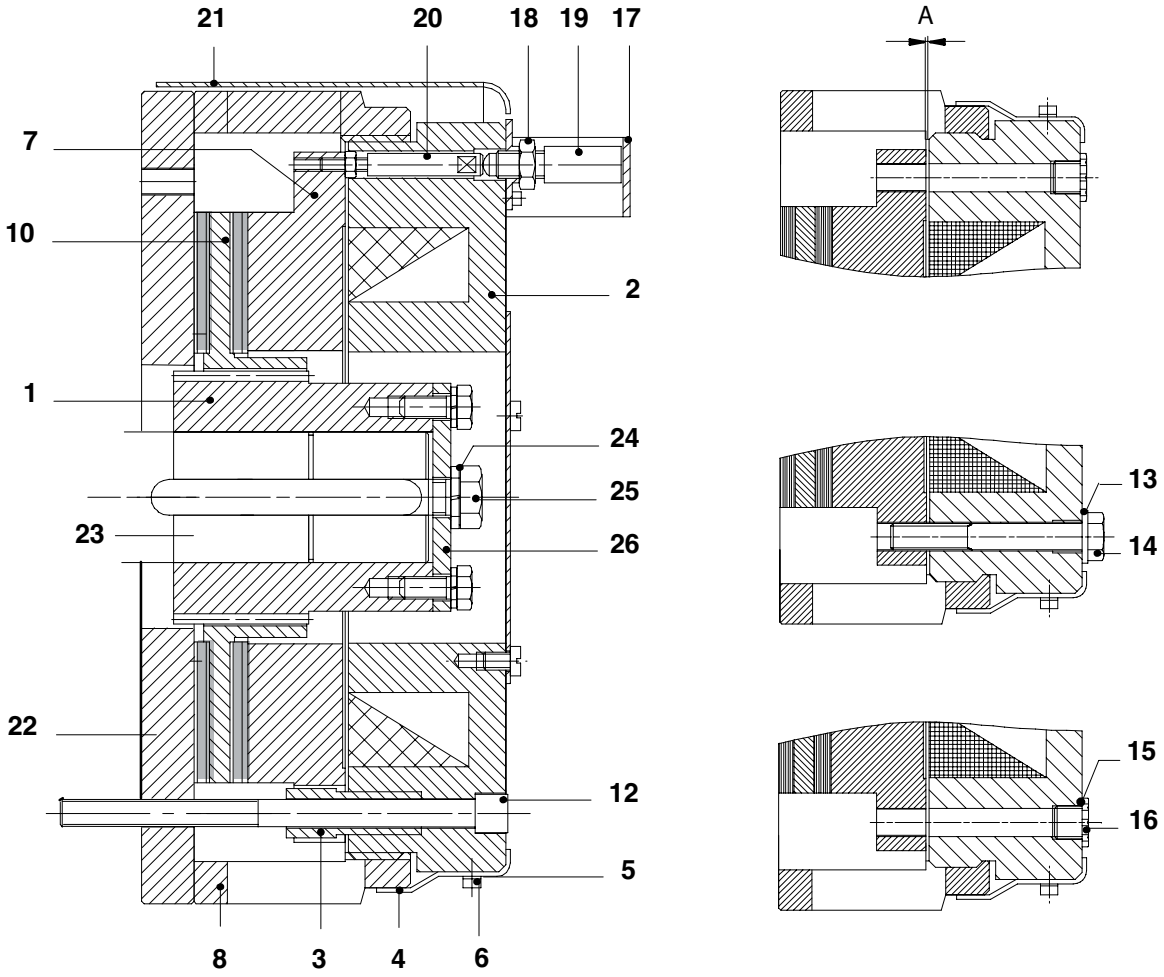
9.5.2.1.1 Technical data

Design

Fail-safe spring-loaded brake

- Spring-loaded brake
- Fixed torque
- Wear monitor
- Emergency release

Item	Specifications
Braking torque	1000 Nm
Fixed torque	800 Nm
Residual speed	Approx. 100 min^{-1}
Spulenspannung	170 Volt, 50/60 Hz
Power consumption	210 Watt



1	Splined hub	15	Copper sealing ring
2	Coil support	16	Screw plug
3	Guide bushing	17	Retaining strap
4	Retaining plate	18	Hexagonal head screw
5	Lock washer	19	Micro switch
6	Clamping screw	20	Bolts
7	Anchor plate	21	Guard plate
8	Threaded spacer ring	22	Flange plate
9	Shoulder screw	23	Gear shaft
10	Rotor	24	Lock washer
12	Mounting screw	25	Hexagonal head screw
13	Washer	26	Cover plate
14	Hexagonal head screw	A	Air gap 0.4 - 1.5 mm

9.5.2.1.2 Inspecting the brake

> The crane has been assembled.

> The routine inspection has to be done.

> The annual inspection interval is due.

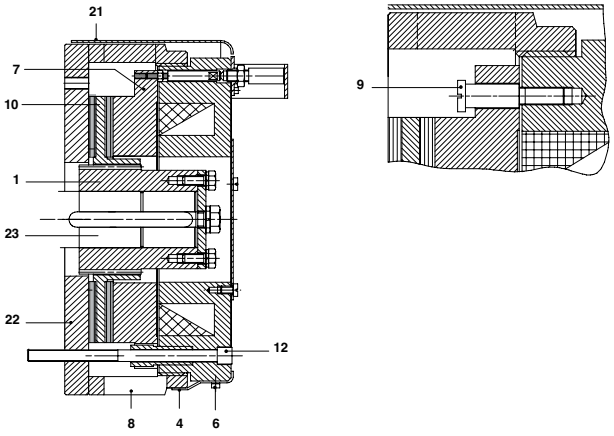
1) Set the power disconnector at the control cabinet to position "0".
2) Remove the guard plate (21).
3) Remove the abrasion deposits.
4) Through the large hole in the threaded spacer ring (8), use a feeler gauge to check the air gap.
   NOTICE! If you measure an air gap (A) of 1.2 mm, the brake has to be adjusted.
5) Check the rotor [10].
   NOTICE! If the minimum thickness (B) of 20.1 mm is reached or if the brake pads are damaged, replace the rotor.
6) Install the guard plate (21).
7) Set the power disconnector to position "I".

→ You have successfully checked the brake.

9.5.2.1.3 Adjusting the air gap

NOTICE

The air gap (A) may be adjusted as long as the minimum thickness of the rotor (10) of 20.1 mm is not reached or the threaded spacer ring (8) is not touching the collar of the coil support (2). To avoid downtimes of the slewing tower crane, the rotor (10) should be replaced before reaching the minimum thickness.



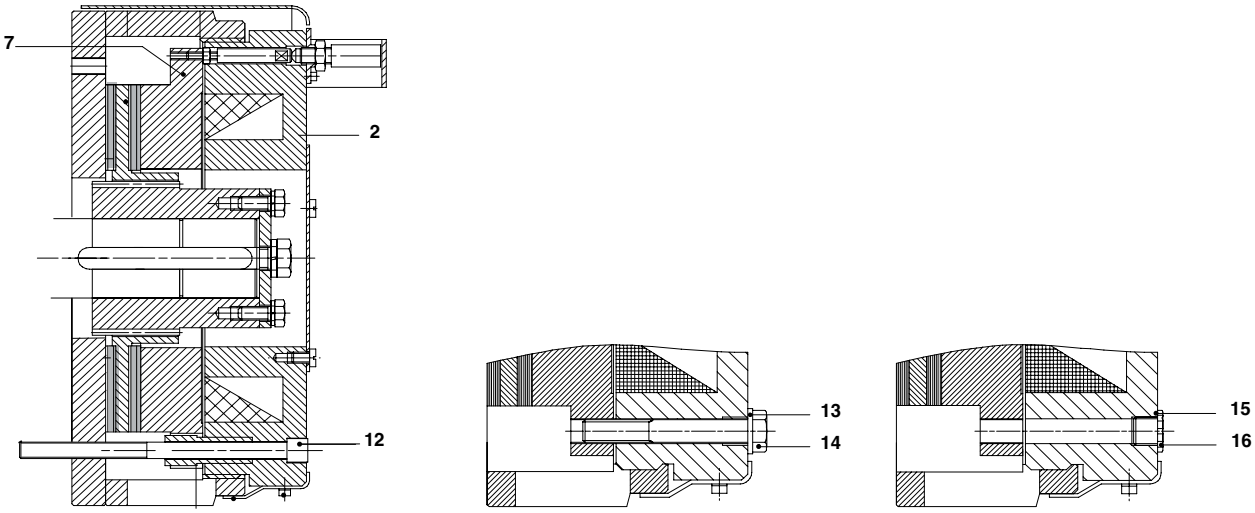
> The brake is free of torque.

1) Set the power disconnector at the control cabinet to position "0".
2) Remove the guard plate (21).

3) Loosen mounting screws (12).
4) Loosen the clamping screw (4).
5) Remove the retaining plate (4).
6) Turn the threaded spacer ring (8) to left until a nominal air gap of 0.4 mm is reached.
   NOTICE! One increment on the scale of the threaded spacer ring (8) corresponds to an air gap adjustment of 0.05 mm.
7) Tighten the retaining plate (4).
8) Evenly tighten the mounting screws (12).
9) Pretension the mounting screws (12) to 40 Nm.
10) Using a feeler gauge, verify the air gap (a) of 0.4 mm at three points.
    Adjust the brake, if necessary.
    → You have adjusted the air gap.
11) Tighten the clamping screw (6).
12) Install the guard plate (21).
13) Set the power disconnector to position "I".
14) Check the brake and readjust the brake, if necessary (see mechanical brake test, page: [295])

→ You have successfully adjusted the air gap.

9.5.2.1.4 Emergency release



> A brake malfunction has occurred.

> Failure of crane power supply.

1) Set the power disconnector at the control cabinet to position "0".
2) Remove the plugs (16) at the front face of coil support (2).
3) Insert the manual release screws (14) with the disc (13) in the two empty bores of the brake.
NOTICE! The manual release screws (M12 x 90 DIN 931-8.8) are located at the brake side.
4) Install the manual release screws (14) into the threads of the anchor plate (7) until the screw head including washer touches the coil support.
5) Carefully and evenly tighten the manual release screws (14) until the jib starts to move.
WARNING! Interrupt lowering by means of several stops (turning back the manual release screws).
6) After completion of the emergency release, remove the two manual release screws (14) and washers (13).
7) Deposit the manual release screws (14) and washers (13) at the side of the brake.
8) Plug the holes, using the plugs (16) and a copper sealing ring (15).

→ You have successfully released the the brake.

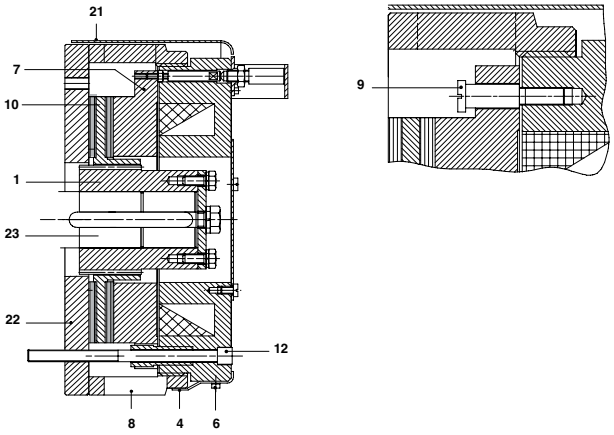
9.5.2.1.5 Replacing wear parts

	**NOTICE** With an air gap (A) of 1.5 mm, the yellow warning light on the right-hand control console (operator cabin) illuminates. The brake does not release now and has to be adjusted.

NOTICE

The rotor (10) and splined hub (1) are subject to wear.
The anchor plate [7] should be replaced by the manufacturer only.

The brake wear is monitored by the micro switch (19).



> The brake must be free of torque.

1) Set the power disconnector at the control cabinet to position "0".
2) Remove the guard plate (21).
3) Remove the mounting screws (12).
4) Remove the brake.
5) Check the clearance between rotor (10) and splined hub (1).
6) Remove the rotor (10).
7) Check the splined hub (1) and remove it, if necessary.
8) Remove retaining ring (15), if necessary.
   → You have successfully removed the wear parts.
9) Clean the brake and mounting side at the gear until the rotor (10) and braking surfaces (7) (22) are free of oil and grease.
   → You have cleaned the rotor and the brake.
10) Carefully slide the new hub (1) onto the transmission shaft (23).
11) Axially secure the hub by means of the retaining ring.
    NOTICE! The splines must not be damaged.
12) Slide the new rotor (10) onto the hub (1) without applying force.
    NOTICE! It should be possible to move the rotor (10) easily by hand in axial direction on the splined hub (1).
13) Carefully slide the brake onto the hub (1).
14) Loosen the clamping screw (6).
15) Remove the retaining plate (4).

16) Turn threaded spacer ring (8) to right.
17) Using the mounting screws (12) (M12 x150 DIN 912-8.8), bolt the brake to the flange plate.
18) Using a feeler gauge, verify the air gap of 0.4 mm at three different points.
19) Pretension the mounting screws (12) to a tightening torque of 40 Nm.
20) Using a feeler gauge, verify the air gap of 0.4 mm at three different points.
21) Install the guard plate (21).
22) Set the power disconnector to position "I".
23) Check the brake and readjust the brake, if necessary (see mechanical brake test, page: [295])

→ You have successfully replaced the wear parts.

9.5.2.1.6 Mechanical brake test



⚠ WARNING

Falling load.

Risk of serious contusion or fatal injury.

1) Keep off suspended loads.
2) Take into account any surfaces exposed to wind.
3) Keep off loads that are going to be lifted.
4) Make sure that persons are prevented from getting under suspended loads.
5) Only entrust experienced persons with attaching loads.
6) Keep your hands within the area of the crane controls when transporting loads.
7) Do not switch off the crane.

> The brake must be checked.

1) Suspend the maximum allowable load.
2) Move the master switch on the left-hand control console until the load is lifted by approx. 1.5 m.
3) Move the master switch on the left-hand control console to its full travel.
4) Press the pushbutton (7) while the jib is still luffing out.

→ After a short period of coasting, the jib should be stopped and held reliably.

→ You have successfully checked the brake.

9.5.2.1.7 Malfunctions

Brake does not work.

- Brake surface is not free of oil or grease.
- Brake pads worn out.
- Air gap too large.
- Manual release screws of emergency release have not been removed.
- Electrical malfunctions.

Brake does not release

- Brake pads worn out.
- Rotor stuck in axial direction.
- Air gap too large.
- Cylinder head screw (12) tightened too much.
- Anchor plate (7) warped.
- Incorrect voltage applied to coil.

- Open coil circuit.
- Rectifier faulty.
- Electrical malfunctions.

9.5.2.2 Luffing gear brake 75 BHN 22



NOTICE

This brake is an optional second brake.

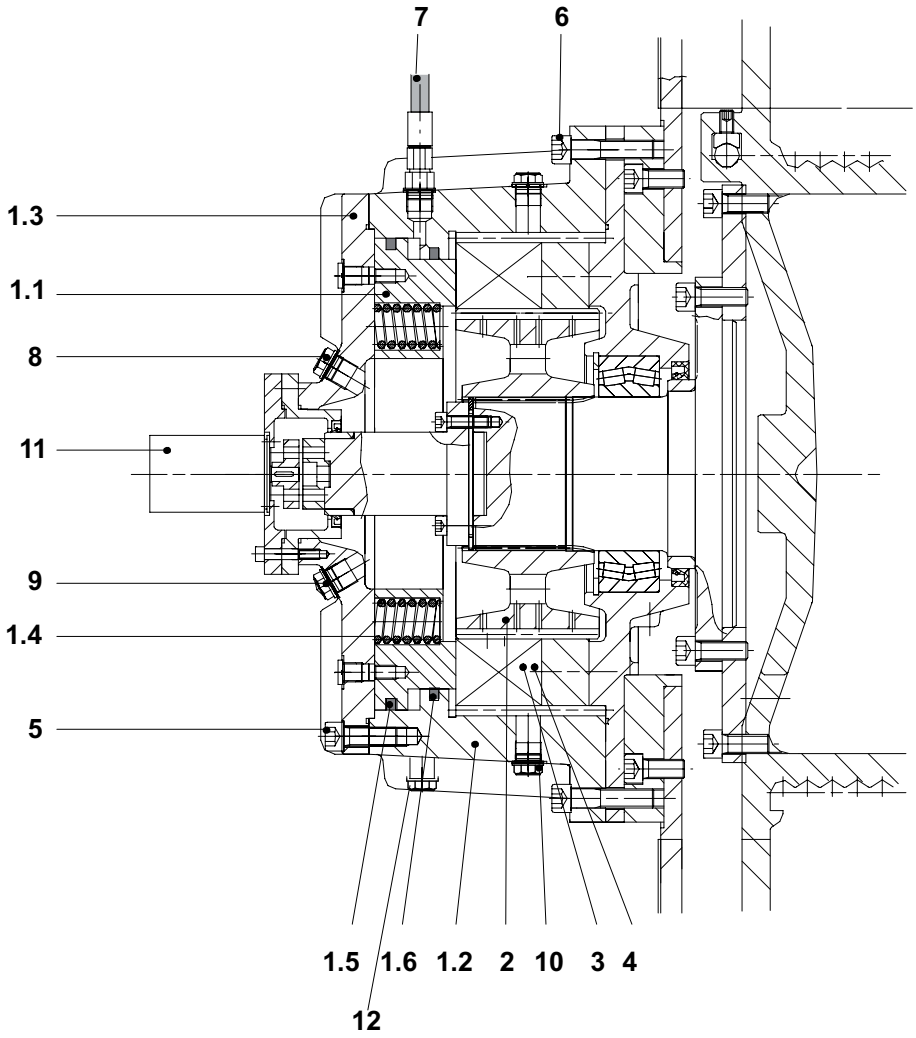
9.5.2.2.1 Specification

Design

Hydraulically releasing multi-disc brake with:

- Fixed torque
- Emergency release

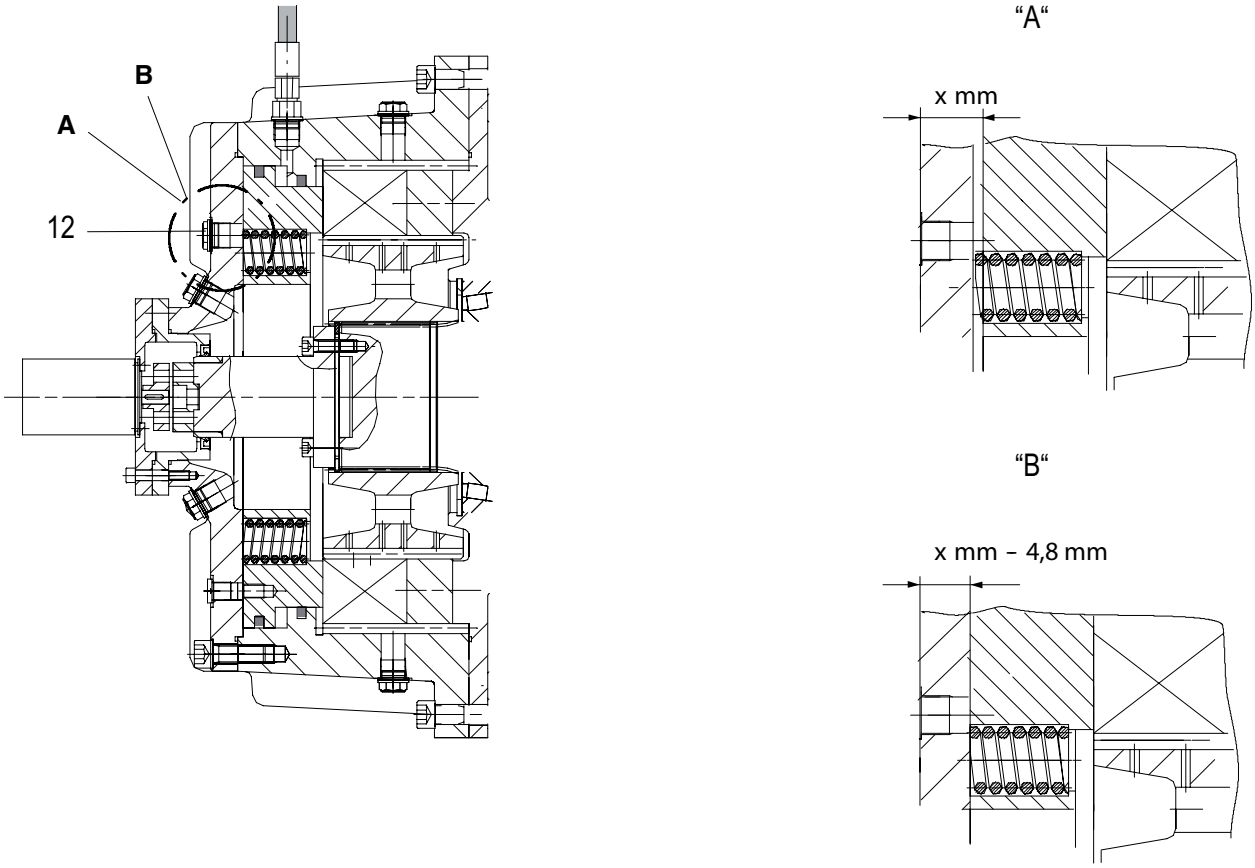
Item	Technical data
Dynamic braking torque (wet-running)	52 kNm
Static braking torque (wet-running)	48 kNm



1.1	Piston	5	Cylinder head screw
1.2	Cylinder	6	Mounting screw
1.3	Cover	7	Hydraulic hose
1.4	Compression spring	8	Oil inlet
1.5	Sealing ring, inside	9	Oil level indicator
1.6	Sealing ring, outside	10	Oil drain plug (multi-discs)
2	Disc support	11	Absolute encoder
3	External disc	12	Oil drain plug
4	Internal disc		

9.5.2.2.2 Checking the brake

	⚠ DANGER Lowering operations are out of control. The slewing tower crane may overturn. Risk of serious contusion or fatal injury. 1) Make sure that no load is suspended from the load hook. 2) Lower the snatch block to ground. 3) Secure the luffing rope against unwinding.



12	Screw plug with seal	W	Brake open
A	Brake closed		

> The crane has been assembled.

> The regular inspection interval is due.

1) Set the power disconnector at the control cabinet to position "0".
2) Remove the plug and seal (12).

3) Use a feeler gauge to check the air gap between the outer corner of the encasing and the piston.
4) Set the power disconnector to position "I".
5) Release the brake.
   → The piston is in contact with the encasing.
6) Use a feeler gauge to check the air gap between the outer corner of the encasing and the piston.
   → The air gap must be smaller than 4.8 mm.
7) Mount the seal and the plugs (12).

→ You have successfully checked the brake.

(see also):

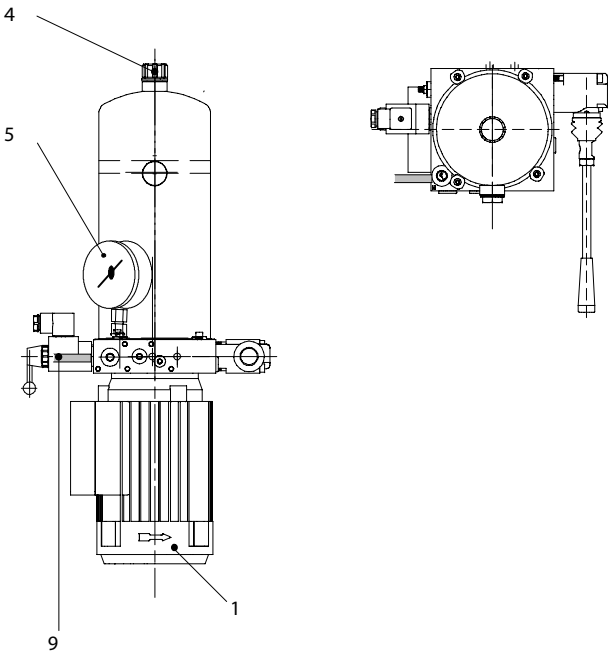
- Mechanical brake test [295]

9.5.2.2.3 Maintaining the brake

Oil types for the brake

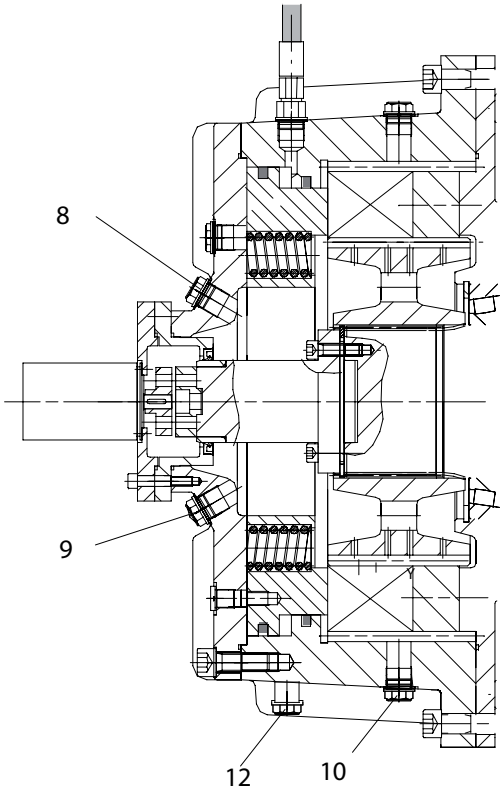
Manufacturer	Oil type (HLP 46)
Aral	Kosmol TL 68
	ATF 33ATF 33
BP	Energol HL 46
	Autran G
Shell	Morlina 46
	ATF Donax TA

> The brake has 2000 - 3000 hours of operation.

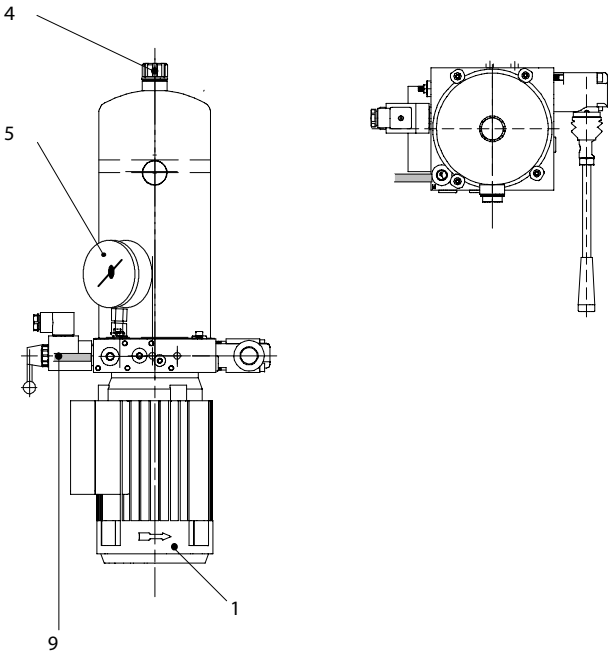


1) Set the power disconnector at the control cabinet to position "0".
2) Remove the hydraulic unit.
3) Turn the hydraulic unit over until the hydraulic fluid leaks from the tank.
4) Collect the oil in an appropriate container.
5) Re-install the hydraulic unit.

→ You have drained the oil of the hydraulic unit.



6) Place an appropriate container beneath the oil drain plug (12) of the brake.
7) Open the oil drain plug (12) of the brake.
8) Collect the oil in an appropriate container.
9) Close the oil drain plug (12).
   → You have drained the oil of the brake.



10) Remove the vent screw and the hydraulic fluid dipstick (4).
11) Fill hydraulic fluid into the tank and check the hydraulic fluid level using the hydraulic fluid dipstick.
CAUTION! Only use the hydraulic fluids listed at the start of this chapter.
12) Install the vent screw and the hydraulic fluid dipstick (4).
13) Check the hydraulic unit. [303]

→ You have successfully maintained the brake.

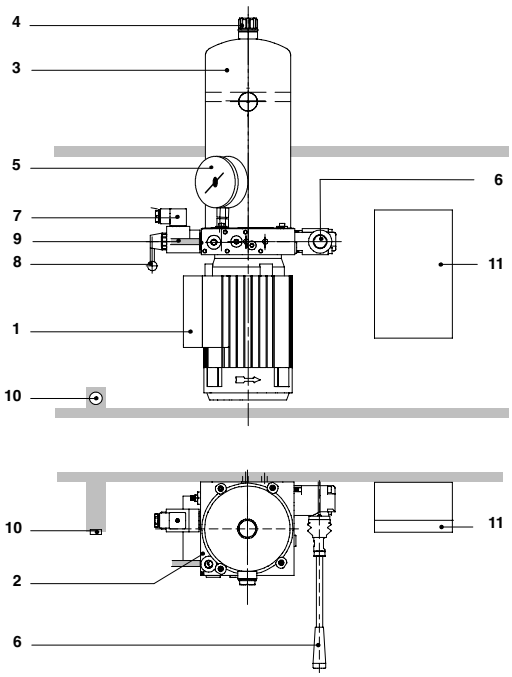
9.5.2.2.4 Checking the hydraulic unit

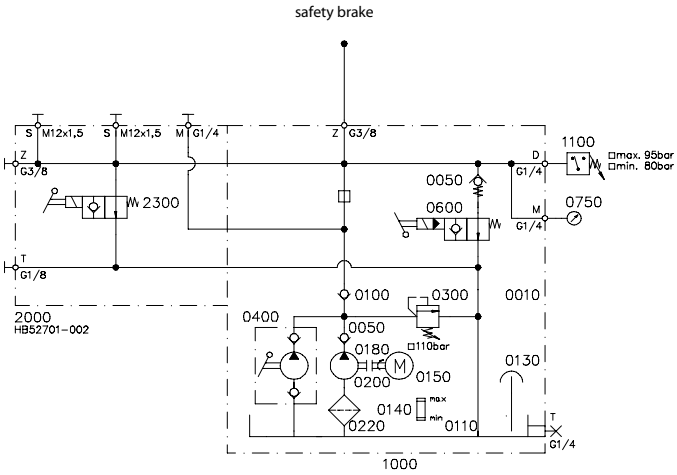
CAUTION

No regular inspection of the hydraulic unit.

The pump may be destroyed.

► Regularly check the hydraulic unit.

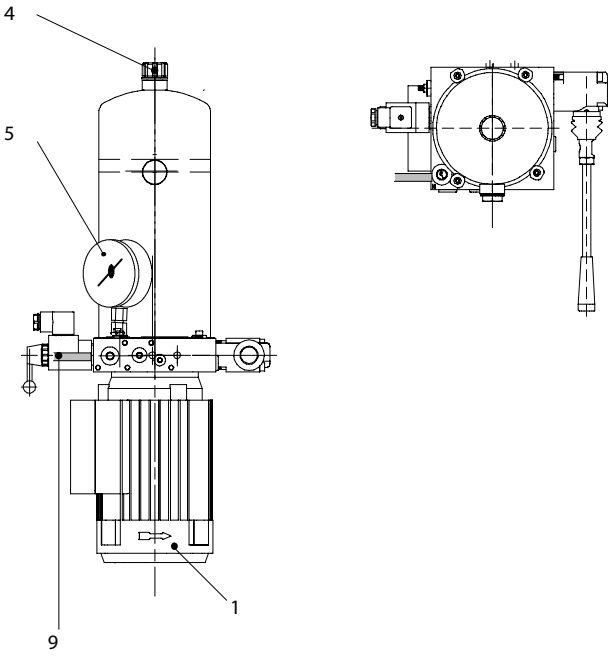




1	Motor	7	Pressure switch
2	Control unit	8	Manual emergency unit
3	Hydraulic reservoir	9	Hydraulic connection
4	Vent screw with hydraulic fluid dipstick	10	Screw plug
5	Pressure gauge	11	Terminal box
6	Manual release lever		

Item	Specifications
Motor	400 V, 50 Hz, 1.5 kW
Maximum pressure	95 bar
Minimum pressure	80 bar
Flow rate	9.0 l/min
Tank capacity	4.0 liters

9 Service and maintenance

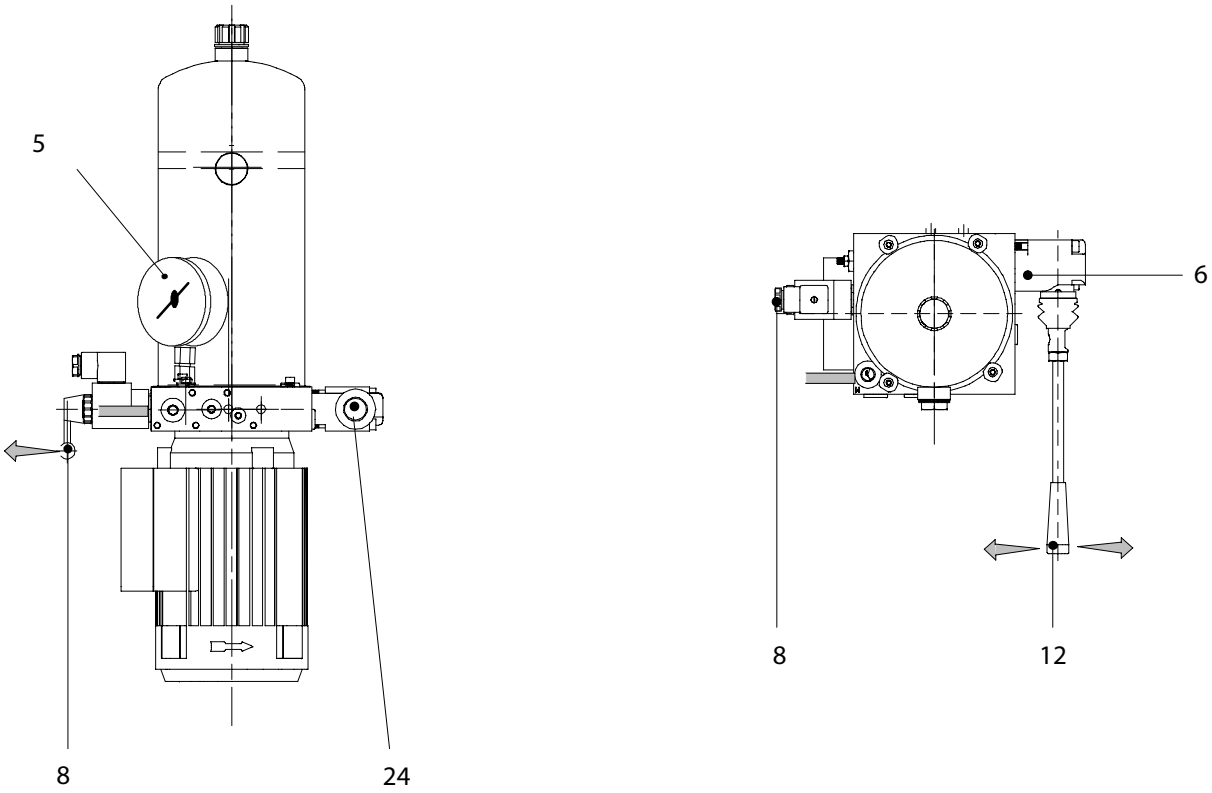


4	Vent screw with hydraulic fluid dipstick	9	Hydraulic connection
5	Pressure gauge	1	Motor

1) Check the hydraulic fluid level using the hydraulic fluid dipstick (4).
2) Set the power disconnector at the control cabinet to position "I".
   NOTICE! With the correct setting of the pressure switch, the electric motor is switched off at a maximum pressure of 95 bar and - while pressure is decreasing - switched on at a minimum pressure of 80 bar.
3) Check hydraulic system for leakage.

→ You have successfully checked the hydraulic unit.

9.5.2.2.5 Emergency release



5	Pressure gauge	12	Manual pump
8	Manual emergency unit	8	Manual emergency unit
6	Manual release lever		

> A brake malfunction has occurred.

> Failure of crane power supply.

> A load is suspended from the load hook.

> The brake is free of torque.

> The motor is not running.

1) Set the power disconnector at the control cabinet to position "0".
2) Push the levers of the manual emergency unit (8) to the outside.
3) Use the manual release lever (6) to pump until the load slowly starts to move.
4) Stop the lowering process in regular intervals by releasing the levers of the manual emergency unit (9).
   NOTICE! Thus, an excessive acceleration will be avoided.
5) Repeat the procedure until the load has been lowered.
6) Release the levers of the manual emergency unit (8) and the manual vent lever (6).
7) Set the power disconnector at the control cabinet to position "I".

→ You have successfully completed the manual release procedure.

9.5.2.2.6 Malfunctions

Malfunction	Cause	Remedy
Brake does not release Brake does not work.	Brake pads worn out.	Replace breake pads.
	Air gap too large.	Readjust air gap.
Brake engaging slowly.	Air entrapped in hydraulic system.	Bleed hydraulic system at the highest point and at the brake
	Air gap between the brake pad and rotor too large.	Readjust air gap.
	Control system in hydraulic system. Valve positioned incorrectly.	Check all valves for correct positioning.
	Abnomal quantities of contaminants.	Check and clean pipes, hoses, and valves.
	High viscosity of fluid in brake system.	Check whether fluid complies with recommendations.
Long braking time or long braking distance. Insufficient braking force.	Too high load or too high velocity.	Check load and velocity.
	Air gap too large.	Readjust air gap.
	Oil, paint, or grease adhering to rotor or brake pad.	Clean rotor and replace brake pads.
		Check brake for leakage.
	Not all calipers are connected.	Check system.
	Incorrect or damaged spring set.	Replace calipers.
Leakage.	Gaskets worn out.	Replace calipers or hydraulic unit.
Erratic brake pad wear.	Caliper incorrectly aligned.	Check alignment and clip.
	Rotor is not planar.	Verify irregularities and replace rotor, if necessary.
Excessive brake pad wear.	Increased intensity of brake usage.	Verify crane operation.
	Air gap too small.	Readjust air gap.
	Brake does not hold.	Check fluid pressure.
		Check motions of brake pads, pistons, and guides.

9.6 Drive gear



NOTICE

Perform the maintenance operations according to the separate operating instructions of the system component.

9.7 Ropes and pulleys

9.7.1 Checking the cable pulleys

CAUTION

Faulty cable pulleys or faulty guard straps.

The slewing tower crane may be damaged.

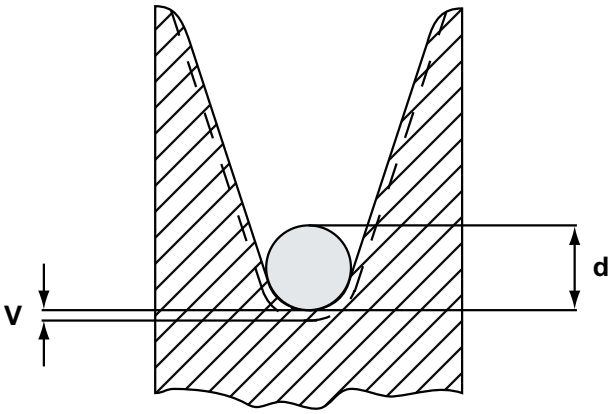
The cable may jump out.

The cable may be damaged.

► Immediately replace faulty cable pulleys and guard straps.

Pulley diameter

Type of pulley	Pulley Ø (mm)
Pulley	500
Pulley	330
Luffing rope pulley	500



d	Rope diameter	V	Groove profile wear

> The crane has been assembled.

> The regular inspection interval is due.

1) Remove any grease residues from the pulleys.
2) Check the pulleys for easy and proper running (bearing play).
   NOTICE! The bearings of the pulleys are maintenance-free.
3) Check the pulleys for wear and cracks.
4) Check the groove profile of the pulleys for wear.
   NOTICE! Guide value for wear: V = 0.15 x d.
5) Check the guard straps for preventing the ropes from jumping out.

→ You have successfully checked the pulleys and guard straps.

9.7.2 Inspection of the cables

The following inspections have to be done on the wire ropes:

> During his daily visual inspection, the crane operator noticed damage or changes.

> The crane has been assembled.

> The regular inspection interval is due.

> The rope was newly installed and one week has passed.

> The rope was subjected to exceptional loads.

> The crane was out of operation for a longer period.

> An accident or damage in conjunction with the rope drives has occurred.

► Ensure that the rope drive is inspected by experts for its operating safety.

→ The rope as been inspected.

(see also):

- Ropes [29]

9.7.3 Lubricating the wire ropes



⚠ WARNING

Cleaning with solvents

The wire ropes may be damaged.

Falling objects

► Do not use solvents to clean wire ropes

> The wire ropes are soiled.

> Lubricate the ropes at cyclic intervals, depending on operating conditions.

1) Clean soiled wire ropes.
2) Lubricate the wire ropes along their entire length (Recommended lubricants).
   → You have re-lubricated the wire ropes
3) Perform several no-load runs (with minimum/maximum operating radius, raising and lowering the snatch block).

→ The wire rope is operative once more.

(see also):

- Lubricating instructions [221]

9.7.4 Wear limit of wire ropes



NOTICE

Information on calculation of the number of broken wires

The mechanisms used by WOLFFKRAN are classified in mechanism group 1 AM. For the number of supporting wires in outer strands of the ropes, refer to the rope certificates in the crane inspection log.

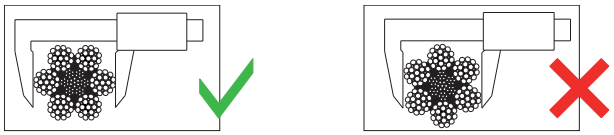
Wear limit (DIN 15020)

Immediately replace the wire rope in the following cases of damage:

- Broken wires
  - The wire rope must be replaced if the maximum number of wire breaks according to DIN 15020 was reached or exceeded.
  - The rope has to be replaced as well in case multiple wire breakages have occurred.
  - The following table serves for evaluating the number of broken wires.

Number of supporting wires in outer strands of the rope [n]	Number of visible broken wires at wear limit							
	Classification of mechanisms 1Em, 1Dm, 1Bm, 1Am				Classification of mechanisms 2m, 3m, 4m, 5m			
	Ordinary lay		Lang lay		Ordinary lay		Lang lay	
	Over a length of		Over a length of		Over a length of		Over a length of	
	6 d	30 d	6 d	30 d	6 d	30 d	6 d	30 d
up to 50	2	4	1	2	4	8	2	4
51 to 75	3	6	2	3	6	12	3	6
76 to 100	4	8	2	4	8	16	4	8
101 to 120	5	10	2	5	10	19	5	10
121 to 140	6	11	3	6	11	22	6	11
141 to 160	6	13	3	6	13	26	6	13
161 to 180	7	14	4	7	14	29	7	14
181 to 200	8	16	4	8	16	32	8	16
201 to 220	9	18	4	9	18	35	9	18
221 to 240	10	19	5	10	19	38	10	19
241 to 260	10	21	5	10	21	42	10	21
261 to 280	11	22	6	11	22	45	11	22
281 to 300	12	24	6	12	24	48	12	24
over 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	0.04 x n	0.08 x n

- Reduction in diameter
  - A wire rope showing a diameter reduction across longer sections due to structural changes by 15 % or more (compared to rated dimensions) has to be replaced.
  - While measuring the rope diameter (e.g. with a sliding caliper) make sure that you use the right position (refer to figure):



A B

A	Correct	W	Incorrect

- Corrosion
  - Always replace ropes showing excessive loss of lifting capacity or operational strength as a result of corrosion. In this case, the wire rope has to be replaced if its diameter is reduced by 10 % compared to the rated dimension, even if no wire breaks are found.
- Abrasion
  - Always replace ropes showing excessive loss of breaking load or operational strength as a result of metal abrasion. In this case, the wire rope has to be replaced if its diameter is reduced by 10 % compared to the rated dimension, even if no wire breaks are found.
- Rope deformation
  - Replace ropes showing cork screw type deformation, coils and loops, loose wires, knots, necking, curly deformation, kinks, buckles, and the effect of heat (wire ropes that were exposed to excess heat).



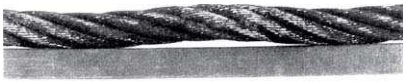
Flattened portion



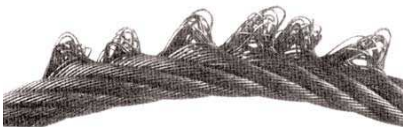
Kinks



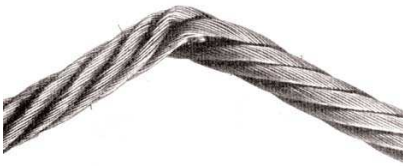
Basket deformation



Cork screw type deformation



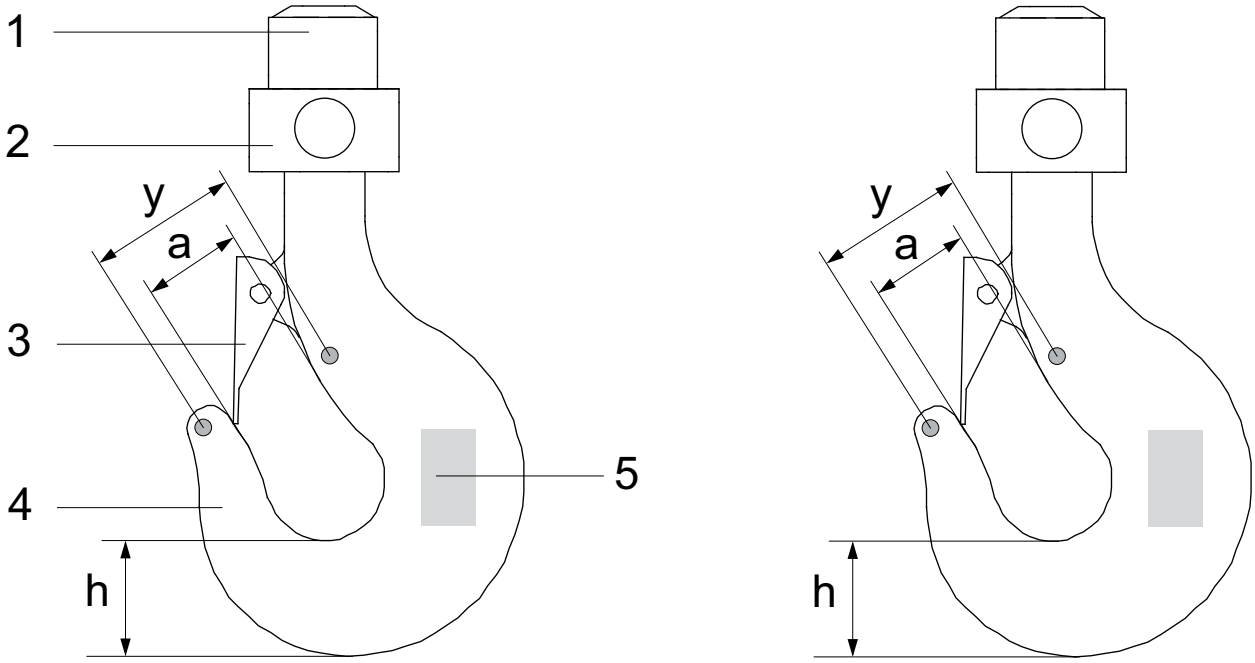
Formation of loops



Bend

9.8 Load hook

The load hook size can be determined from the designation at the load hook.



1	Load hook nut	4	Load hook
2	Load hook crossbeam	5	Identification plate
3	Hook jaw retainer		

Load hook rating plates

Line number	Item
1	Manufacturer symbol
2	Hook number
3	Material and batch number
4	DIN 15401

Specified dimensions

In addition to the dimensions "a", "h" and "y", the values for the permissible axial play between the load hook and load hook nut are also specified for ISO threads according to DIN 13 and round threads according to DIN 15 403.

Load hook dimensions

Load hook number	a (mm)	y (mm) [1)]	h (mm)	Thread	Allowable axial play (mm) (mm)
2.5	50	90	58	M36	0.13
4	56	105	67	M42	0.15
5	63	115	75	M45	0.16
6	71	130	85	RD 50x6	0.1
8	80	145	95	Rd 50x5	0.1
10	90	160	106	RD 64x8	0.1
12	100	180	118	RD 72x8	0.1
16	112	228	132	RD 80x10	0.2
20	125	225	150	Rd 90x10	0.2

[1)] Dimension “y” may deviate from the value shown in the table.

The deviating dimension is stamped on the load hook shank.

Wear

Wear notches and faulty places must be ground smooth (free of notches).

The wear should not be greater than 5 % of the height "h".

Wear to the load hook nut, load hook thread or retaining elements is not permissible (permissible axial play should not be exceeded).

If the permissible axial play is exceeded, replace with new load hook with load hook nut.

It is not permissible to weld the load hook, e.g. to repair wear.

Corrosion

Check the threads, machined shank and hook retainer for corrosion notching.

9.9 Electrical systems



⚠ DANGER

Live electrical equipment

Risk of injury or death caused by electrical shock.

1) Always bond the slewing tower crane to ground.
2) Always use original fuses of the specified current rating.
3) Always allocate a skilled electrician to the work to be done.
4) Inspect the electrical equipment at cyclic intervals
5) Get appropriate First Aid instructions and information on precautions to be taken **before** starting work on live electrical equipment.
6) Disconnect the relevant unit components from the power supply.
7) Safeguard the work area against unintentional power on.
8) Connect the unit components to ground.
9) Fence off all adjacent live parts.



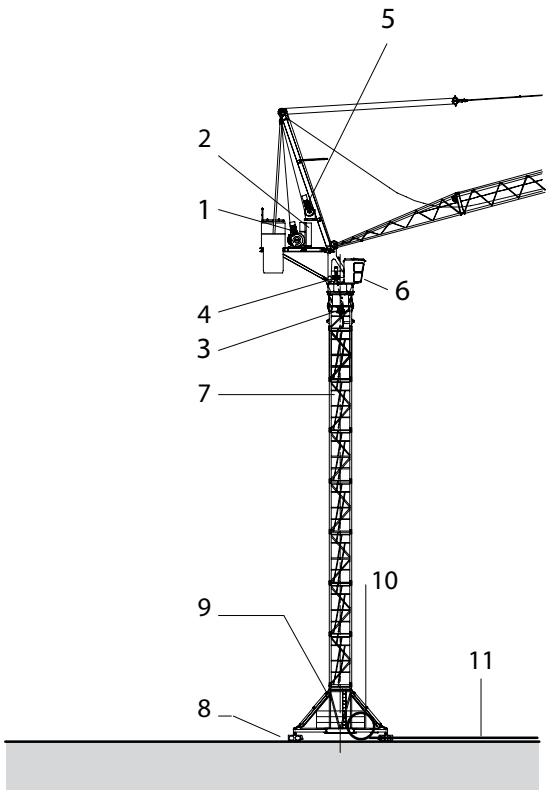
⚠ DANGER

Voltage at the terminals.

Risk of injury or death caused by electrical shock.

1) Any installation or maintenance operations must be done only by qualified electricians.
2) Be careful, parts of the control cabinet are energized even if the main switch is off.
3) Never attempt to perform work on the inverter, motor cable or motor when power is switched on.
4) When line power is present at the frequency converter input, a lethally high voltage is present at the motor cable connections, regardless of whether or not the motor is running.
5) Lethally dangerous DC voltage (greater than 500 V) is present on the brake control contacts (UDC +, UDC -, R + and R -).
6) Depending on the external wiring, dangerous voltages (115 V, 220 V or 230 V) are present the terminals of relay outputs RO1 and RO3.
7) After disconnecting power supply, wait five minutes to allow the DC link capacitors to discharge.
8) Before starting work, measure the voltage between terminals UDC+ and UDC- by means of a multimeter (minimum internal resistance 1 MOhm) to ensure that no voltage is present.
9) Never perform any work on the control cables when power is present at the inverter or external control circuits. Externally fed control circuits can lead to dangerous voltages in the inverter even when power supply to the inverter is switched off.
10) Do not make any insulation or voltage withstand tests on the frequency inverter or by frequency converter modules.
11) Before performing insulation tests, disconnect the cable connections at the inverter.
12) After reconnecting the motor cable, always check to ensure that the phase sequence is correct.

9 Service and maintenance



- Contactors do not require special maintenance.
- The switching elements should remain rough. They must not be greased .
- Black coloring at the contacts is no damage. Therefore never file contacts .
- Ensure that terminal screws at terminal strips (including unused terminals), contactors, and retaining screws are properly tightened. Loose parts such as terminal screws fallen out can result in dangerous malfunctions.
- Loose contact points, burned fuses, and screws represent a major hazard.

10 Disassembly

10.1 Crane disassembly log

Disassembly log				
Crane model:	**Werknummer:**		**Year of construction:**	
Construction site:	**Operator:**		**Persons involved:**	
Operating radius (m):	**Tower/hook height (m):**		**Foundation anchor type:**	
Undercarriage	**Track width (m):**		**Ballast (t):**	
KR / KRE:	**Track width (m):**		**Ballast (t):**	

Test instructions	**Deficiencies**		**Deficiencies remedied**	
	Yes	**No**	**Date**	**By**
General condition, complete steel structure	›	›		
Electrical performance test	›	›		
Hoisting gear	›	›		
Slewing gear	›	›		
Trolley drive / luffing gear	›	›		
Travelling gear	›	›		
Oil levels in all transmissions	›	›		
Check of all brakes	›	›		
Check of windvaning	›	›		
Check of hoisting rope	›	›		
Check of trolley drive rope	›	›		
Check of luffing rope	›	›		
Check of assembly brace ropes	›	›		
Electrical check of operator cabin	›	›		
Check of all limit switches (HG, TG, LG, FG)	›	›		
Operating manual present	›	›		
Spare parts list present	›	›		
Crane test booklet present	›	›		
Railing complete	›	›		
Contamination of various components (concrete)	›	›		
Operator cabin cleaned	›	›		
Lubrication of ball race bearing	›	›		
Lubrication of all ropes	›	›		
General lubrication condition	›	›		
Condition of brushes (slip ring and motor)	›	›		
Wireless control unit	›	›		

10 Disassembly

Damage or missing parts caused by operator.	No	›	Yes	›
Shock absorbing chain installed, W 160 B, W 500 B, W 900 B, W 320 B	No	›	Yes	›
Other complaints				

Mechanic:	**Site manager:**	
Name, date	Name, date	
Distribution:		
1st sheet, white, customer / 2nd sheet, white, organization responsible for inspecting and repairing the leased crane / 3rd sheet, pink, branch office / 4th sheet, blue, mechanics		

10.2 Conditions for disassembly



⚠ DANGER

Live electrical equipment

Risk of injury or death caused by electrical shock.

► Have operations on electrical systems carried out only by a qualified electrician.



⚠ DANGER

Risk of falling

Risk of falling with fatal consequences.

1) Do not lift any persons alongside with suspended loads.
2) Do not use the lifting equipment to carry persons.



⚠ WARNING

Falling load.

Risk of serious contusion or fatal injury.

1) Keep off suspended loads.
2) Take into account any surfaces exposed to wind.
3) Keep off loads that are going to be lifted.
4) Make sure that persons are prevented from getting under suspended loads.
5) Only entrust experienced persons with attaching loads.
6) Keep your hands within the area of the crane controls when transporting loads.
7) Do not switch off the crane.



⚠ WARNING

Unprofessional assembly

The slewing tower crane may overturn.

1) Carry out the assembly operations without stopping in between.
2) Strictly adhere to the specified sequence of the assembly steps.
3) Make sure that no loose parts (e.g. bolts, cotter pins etc.) will remain at the crane.



⚠ WARNING

Unsecure drive gear.

The slewing tower crane may overturn.

► Tighten the rail tongs.



⚠ CAUTION

Open connectors.

Electrical parts may be damaged.

► Use the caps to cover all connectors when disconnected.



NOTICE

WOLFFKRAN allocates expert personnel to support the assembly and disassembly of WOLFF slewing tower cranes and of WOLFF components and, on customer request, for the training of personnel with insufficient experience.

The data required for tower disassembly is given in the following tables:

Contents	Item
Dimensions, weights of tower elements.	Please also refer to OPM 2 / Tower elements.
Required hook height of mobile crane.	Please also refer to OPM 2 / Mobile crane.
Dimensions, weights of crane parts	Please also refer to OPM 2 / Packing list.

10.3 Disassembling the slewing gear

10.3.1 Disassembling the hoisting cable and bottom snatch block

1) Lower the bottom hook block to ground.
2) Engage the attachment ropes at the hook block.
3) Set assembly switch 1S0 in the control cabinet to position "I".
4) Slowly move the jib to its assembly position.
5) Slightly pull the luffing gear so that the assembly brace ropes will be slightly relieved.
6) Lift the hook block to highest possible position.
7) Engage the hangers of the attachment ropes into the jib tip.
8) Remove the hoisting rope from the fixed point (y).
9) Wind up the hoisting rope in a controlled manner on hoisting rope drum.

→ You have successfully disassembled the hook block and hoisting rope.

10.3.2 Disassembling the pulley block

> The hoisting rope has been removed.

> The counterweight blocks have been installed.

> The hook block has been removed.

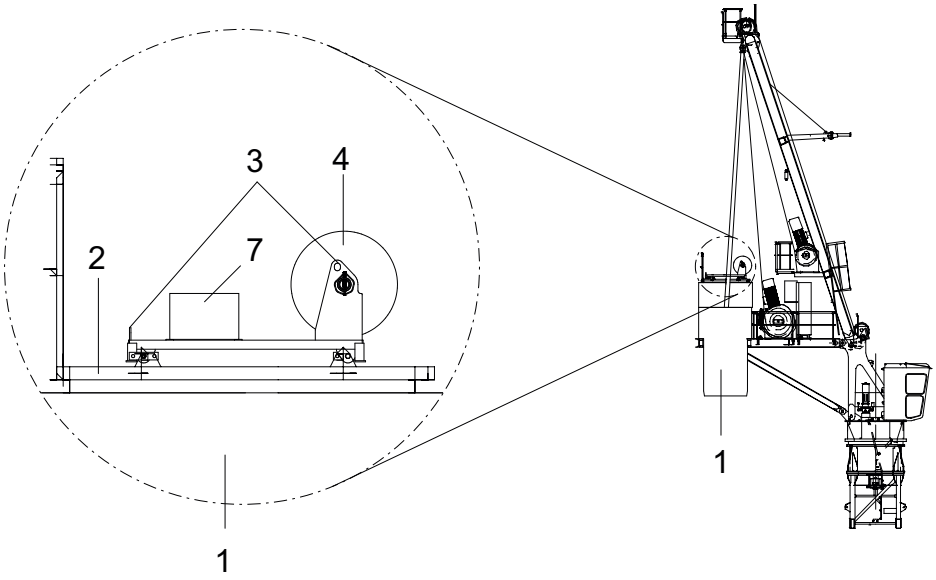
1) Carefully luff the jib until it is retained by the assembly brace ropes.
2) Continue luffing to further lower the pulley block until is sits on the jib.
3) Use a 1-fall attachment to suspend the pulley block.
4) Remove the bolts between the pulley block and the brace rod.
5) Using the truck-mounted crane, bring the pulley block to the tower head section while retracting the luffing rope in a controlled manner.
6) Bolt the pulley block to the tower head section.
7) Secure the bolts using spring retainers.
8) Disconnect the electrical wires for the jib.
9) Coil the electrical wires and protect them from damage.

→ You have successfully disassembled the pulley block.

10.3.3 Disassembling the rope reel

NOTICE

This step is only required if you used the auxiliary crane at the tower head section and if the frame with rope reel has been mounted.



1	Counterweight block (horizontal)	4	Frame with rope reel
2	Cover frame with standard railings	7	Tool box
3	Attachment points for 3-fall attachment		

> The rope pulley has been disassembled.

1) Use a 3-fall attachment to suspend the frame with rope reel (4) at the attachment points.
2) Secure the rope wound up on the rope reel.
3) Loosen the two fastenings of the frame with rope reels (4).
4) Store the retaining elements in the tool box (7).
5) Lift the frame with rope reel (4) off the counterjib.

→ You have disassembled the cover frame and the frame with rope reel.

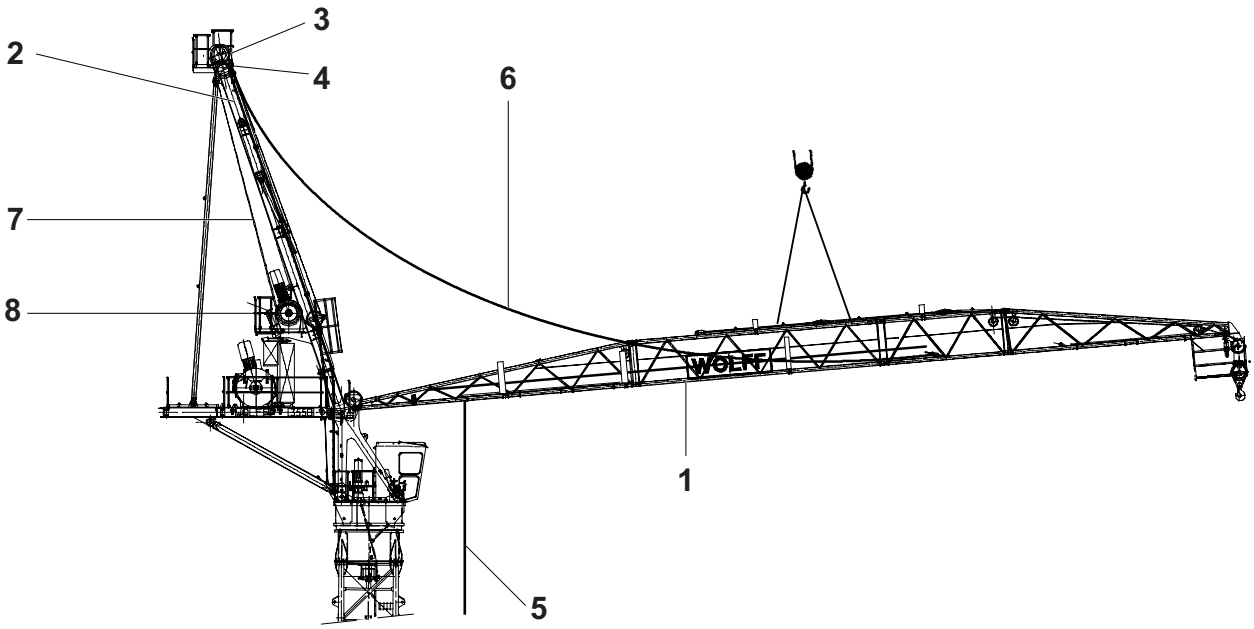
10.3.4 Disassembling the counterweights

> The pulley block has been disassembled.

1) Loosen the screws at the cover frame until you can remove the cover frame.
2) Remove the cover frame and deposit it on the counterjib.
3) Remove the counterweight blocks from inside to outside one after another.
4) Place the counterweight blocks on the prepared ground surface.
5) Protect the counterweight blocks from damage.
6) Repeat this procedure for all counterweight blocks.
7) Replace the cover frame in the free holding fixture in the counterjib.

→ You have successfully disassembled the counterweight blocks.

10.3.5 Disassembling the jib



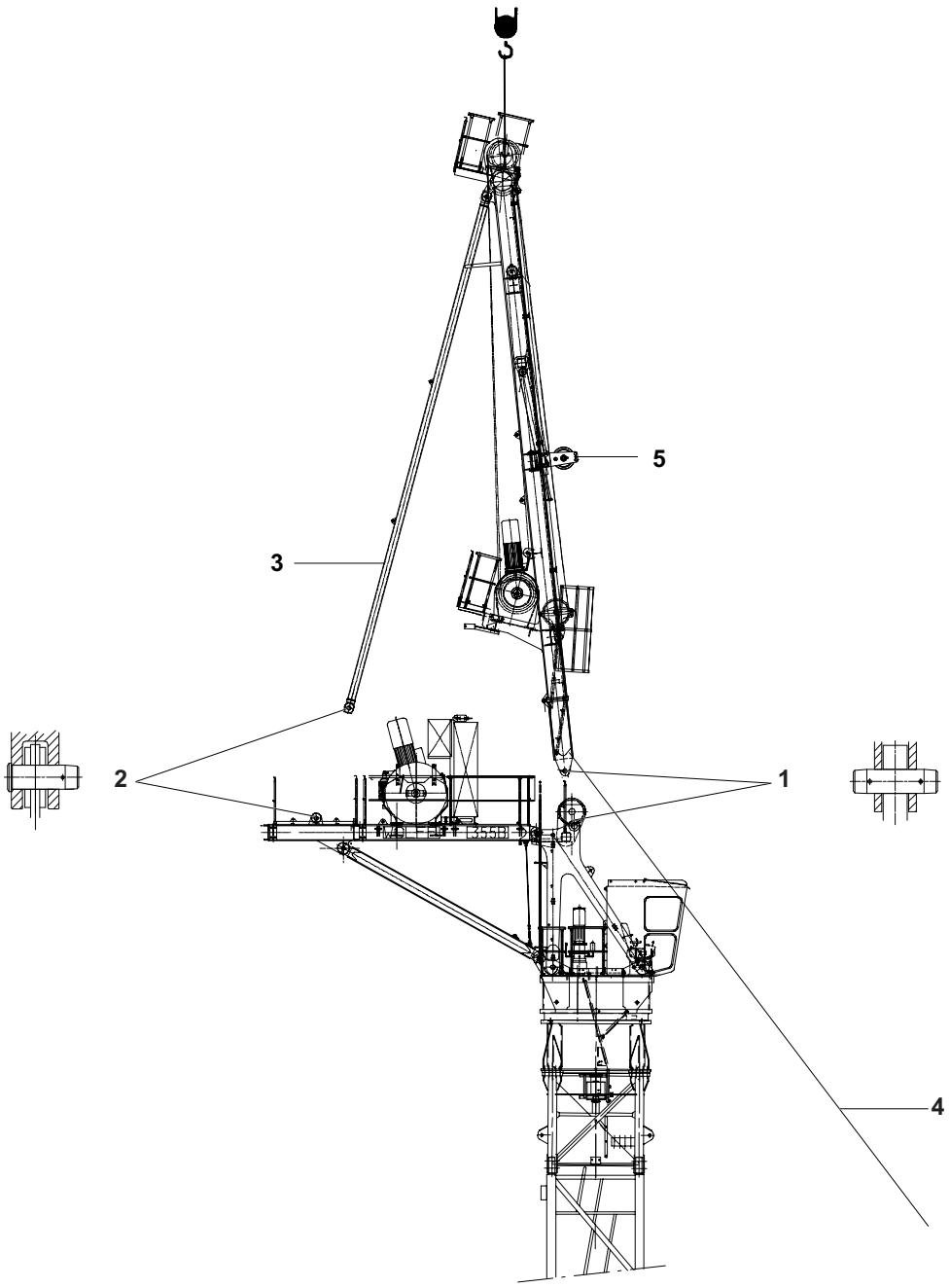
1	Jib	5	Guide rope
2	tower head section	6	Assembly brace rope
3	Fixed point for assembly brace rope	7	Pilot rope
4	Idler pulley	8	Luffing gear

> The counterweights have been removed.

1) Disconnect the electrical wires for the jib.
2) Coil the electrical wires and protect them from damage.
3) Turn the slewing tower crane until the jib (1) can be removed.
4) Release the slewing gear brakes.
5) Attach a guide rope (5) to the jib (1).
6) Suspend the jib (1) according to the attachment plan in**Operating Manual 2 - Technical data and site preparation**.
7) Pull the jib (1) over by approx. 8 degrees.
8) Using the idler pulleys (4) in the tower head section, guide the pilot rope (7) to the assembly brace ropes (6).
9) Fasten the pilot rope (7) to the assembly brace ropes (6).
10) Lightly tension the pilot rope (7) and remove the bolts of the assembly brace ropes (6) at the fixed points (3).
11) Slowly lower the assembly brace ropes (6) to the jib (1).
12) Release the pilot rope (7) from the assembly brace ropes (6) and wind the rope up to the rope pulley at the luffing gear (8).

→ You have successfully removed the assembly brace ropes.

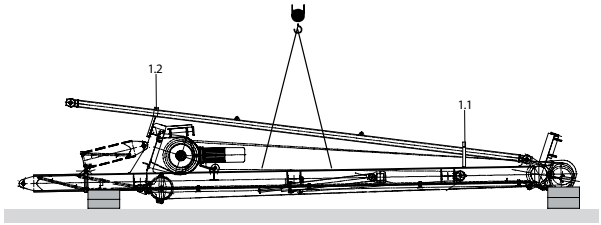
10.3.6 Disassembling the tower head upper section

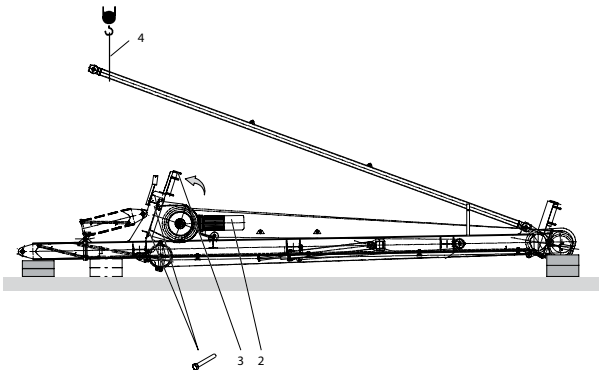


> The jib has been removed.

1) Disconnect the electrical wires for the tower head section upper part.
2) Coil the electrical wires and protect them from damage.
3) Remove the anemometer and protect it against dirt and damage.
4) Remove the pulley block (5) and store it in the tool box.

5) Attach a 2-fall attachment (2 m with shackle) to the upper attachment plates of the tower head section upper part.
6) Attach a guide rope to the tower head section upper part and prevent the tower head section upper part from turning.
7) Slightly lift the tower head section upper part so that the bolts (2) can be removed.
8) Remove the bolts (2).
9) Remove the bolts (1).
10) Lift the tower head section upper part and swing the tower head section upper away from the tower head section lower part.
11) Place the tower head section upper part on the prepared ground surface.
12) Remove the ladder with safety cage.
13) Put the the tower head section down in forward direction.





14) If required for transport, swing the lower part of the upper tower head section back.
15) Swing the platforms at the luffing gear up.
16) Remove the bolts of the transport restraint (1.2).
17) Suspend the tie rod using a sling.
18) Remove the bolts of the transport restraint (1.1).
19) Lower the tie rod to the transport restraint (1.2).
20) Repeat the above procedure for the second tie rod.
21) Secure the tie rods with the bolts of the transport restraints (1.1) (1.2).

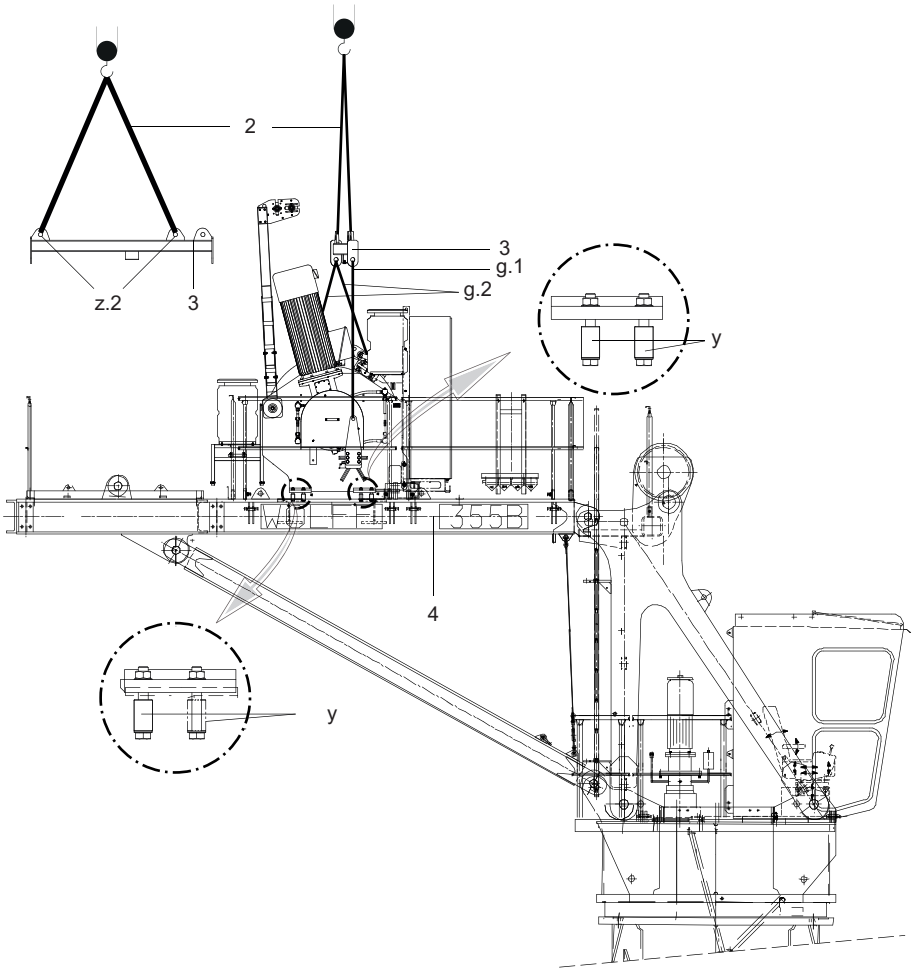
→ You have successfully removed the tower head section upper part.

10.3.7 Disassembling the hoist winch

NOTICE

Disassembling the hoist winch and the counterjib individually

It is impossible to disassemble the counterjib completely together with the hoist winch Hw28132FU. For this reason, you must disassemble the hoist winch before disassembling the counterjib.

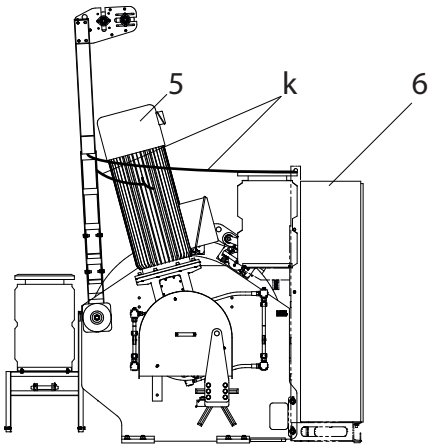


Disassembling the Hw28132FU

2	2-fall attachment	g.2	2x attachment rope Ø20 mm x 1.52 m
3	Mounting device	y	Tighten the screws M24x160-10.9, lubricated with MoS2, with 800 Nm
4	Counterjib	z.2	Attachment points for 2-fall attachment for assembly of Hw28132FU
g.1	1x attachment rope Ø 22 mm x 1.74 m		

> The tower head section upper part has been disassembled.

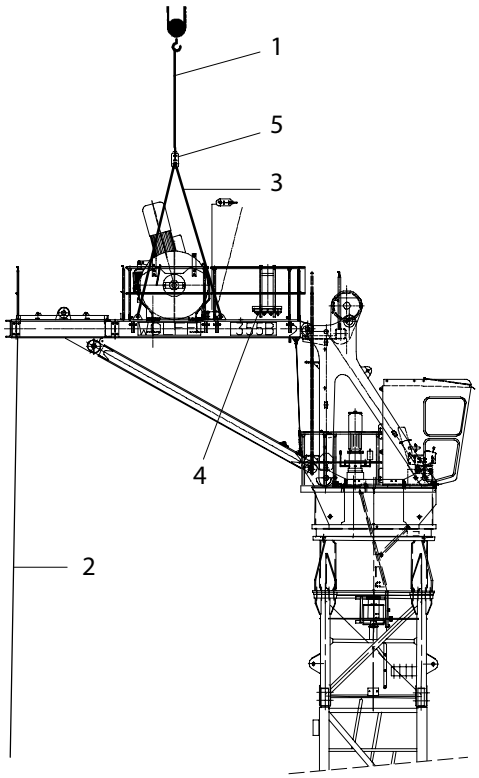
1) Disconnect the electrical wires.



2) Using the karabiners, attach the chains (k) to the ring eyelet of the motor (5) and at the control cabinet (6) and at the rope swing-reduction device.
3) Attach the mounting device (3) to the attachment points (z.2) using a 2-fall attachment (2).
4) Use the attachment ropes (g.1 and g.2) to attach the hoist winch Hw28132FU (2).
5) Engage the attachment ropes (g.1 and g.2) at the mounting device (3).
6) Unscrew the screws (y) at the hoist winch Hw28132FU.
7) Lift the hoist winch Hw28132FU off the counterjib (4).
8) Lower the hoist winch Hw28132FU to ground.
9) Disconnect the attachment ropes (g.1 and g.2) from the hoist winch Hw28110FU.
10) Store the attachment ropes (g.1 and g.2) in the tool box of the crane.

→ You have disassembled the hoist winch Hw28132FU.

10.3.8 Disassembling the counterjib

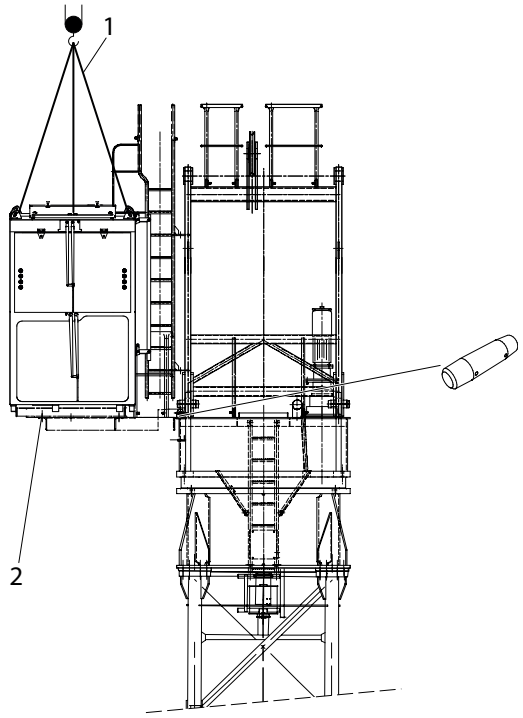


Representation by way of example: with Hw28110FU

1) Disconnect the electrical wires for the counterjib.
2) Coil the electrical wires and deposit them in the cable storage compartment on the counterjib.
3) Attach a guide rope (2) for positioning the counterjib.
4) Disconnect the mounting device (3) from the control cabinet.
5) Suspend the counterjib (5) in accordance with the counterjib attachment plan (see counterjib attachment plan, OPM II, Technical Data and Preparation of Construction Site).
6) Swivel the cover between the counterjib and the tower head section back.
7) Use a bolt driver to remove the bolts between the strut and the connecting block.
8) Use a bolt driver to remove the bolts between the counterjib and the tower head section.
9) Leave the bolt drivers in the bores as a locking device.
   WARNING! Only remove the bolt driver when the jib floats horizontally. In case the counterjib is touching at the top or bottom pivot points, this can be corrected by slightly lifting or lowering the counterjib.
10) Remove the bolt drivers only when the counterjib has been suspended properly.
11) Slowly swing the counterjib away.
12) Place the counterjib on the prepared ground surface.
13) Install the transport restraint at the struts-

→ You have successfully removed the counterjib.

10.3.9 Disassembling the operator cabin station

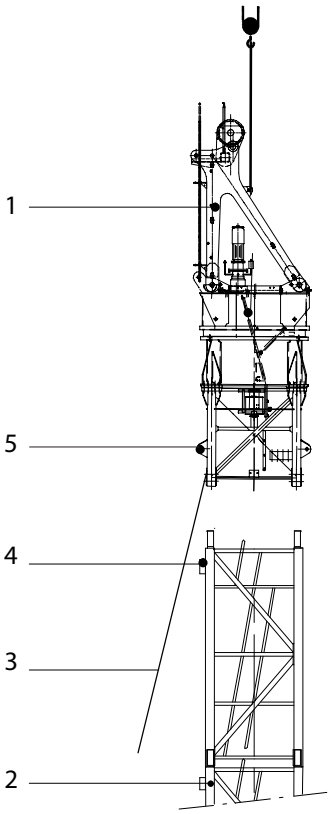


> The counterjib has been removed.

1) Attach a guide rope (2) to the operator cabin platform.
2) Attach the operator cabin with the attachment provided for this purpose (1) (see Pre-assembly, page: [76]).
3) Slightly lift the operator cabin with operator cabin platform.
4) Remove the operator cabin platform.
5) Place the operator cabin with operator cabin platform on the prepared ground surface.
6) Disassemble the operator cabin from the operator cabin platform, if this is necessary for transport.

→ You have successfully disassembled the operator cabin platform.

10.3.10 Disassembling the tower head section lower part



> The operator cabin with operator cabin platform has been removed.

1) Disconnect the electrical wires for the tower base.
2) Attach a guide rope to the tower head section lower part.
3) Use a 2-fall attachment (4 m with shackle) to suspend the tower head section lower part.
4) Remove the bolts between the tower head section lower part and the tower.
5) Slowly swing the tower head section lower part away.
6) Place the tower head section lower part on the prepared ground surface.
7) Remove the ladder extension at the ladder.
8) Swing the ladder inwards and secure the ladder.

→ You have successfully removed the tower head section lower part.

10.4 Disassembling the tower

Disassembly guide for all tower elements and joining frames up to tower system 29 (2.9 m tower elements)

> The jib has been removed.

> The counterjib has been removed.

> The operator cabin station has been removed.

> The tower head section has been removed.

1) Attach two wire slings to the corner posts of the uppermost tower element.
2) Connect the wire slings to the diagonal rods.
3) Attach a 2-fall wire attachment with shackles to the wire slings.
4) Remove the retaining elements of the bolts between the uppermost tower element and the tower.
5) Remove the bolts between the uppermost tower element and the tower.
6) Deposit the bolts in the bolt storage compartment of the tower element.
7) Secure the bolts using the retaining elements which have just been removed.
8) Lift the tower element.
9) Place the tower element on the prepared ground surface.
10) Protect the tower element against dirt and damage.
    → You have removed the tower element.
11) Repeat this procedure for the remaining tower elements.

→ You have successfully disassembled the tower.

10.5 Disassembling individual assemblies



⚠ CAUTION

Disposal of consumables and auxiliary materials.

Environmental pollution.

1) Adhere to environment protection regulations.
2) Recycle the consumables.

> The jib has been disassembled.

> The counterjib has been disassembled.

> The operator cabin station has been disassembled.

> The tower head section has been disassembled.

> The tower has been disassembled.

1) Remove the assembly brace ropes, assembly rope guides, hook block, brace plates, and platforms from the jib.
2) Disassemble the individual jib elements.
3) Remove the signal lights, standard railings, support blocks, and platforms from the counterjib.
4) Remove the standard railings and standard posts from the tower head section upper part.
5) Remove the standard railings from the tower head section lower part.
6) Remove the standard railings from the operator cabin platform.

   → You have disassembled the individual assemblies.
7) Visually inspect all crane parts.
8) Correct all deficiencies found before the crane is assembled the next time.

   → You have checked the crane parts.
9) Clean and lubricate the free holes for the bolts.
10) Grease lubricate the free holes for the bolts.
11) Check all hardware (bolts, screws, nuts, spring retainers, etc.) for completeness and good condition.
12) Replace damaged hardware.
13) Clean all bolts.
14) Grease lubricate the bolts.
15) Store all small parts in the transport crate.
16) Store the bolts in a container with anti-corrosive oil.
17) Dispatch the individual parts in the order in which they will be needed for the next assembly.

→ You have successfully disassembled the individual assemblies.

11 Crane control troubleshooting



⚠ DANGER

Live electrical equipment

Risk of injury or death caused by electrical shock.

► Have operations on electrical systems carried out only by a qualified electrician.

Overview of the effects on the crane functions

Effect	Meaning
1	Switch off main power circuit - Switch off main contactor 0K1.
2	Lockout device. Temporarily switch off the main switch 0Q1 to reset the effect of the malfunction. Or: Briefly set assembly switch 1S0 to position "1".
2.1	This error can also be reset using the re-reeving key switch 1S124.
3	Overload: Trolley forward movement and lifting functions are disabled.
4	Single motion disabled.
4.1	This error can also be reset using the re-reeving key switch 1S124.
5	**WARNING! Refer to instructions in operating manual!**

List of errors

001	Effect	3
	BMK	3B1
	PLC I/O	EW20, EW22
	Cause	Load metering shaft: The two measuring signals do not match.
	Error indication - additional texts	Difference load signal 1 and 2 too great. Load calculation error (Stand./Fails. program) Operating radius calculation error (Stand./Fails. program)
	Remedy	Setting in menu 5. Setting in menu 6. Check plug connections and wiring. Check analog inputs EW20 or EW22. Replace metering shaft.
002	Effect	1
	BMK	0A3
	PLC I/O	Profibus
	Cause	Communication to field bus terminals in control cabinet failed.
	Error indication - additional texts	

002	Remedy	Check: ▪ plug / socket, ▪ power supply, ▪ bus address, ▪ terminating resistor at the respective device and upstream bus devices, refer to circuit diagram.
003	Effect	1
	BMK	05A4
	PLC I/O	PROFIBUS
	Cause	Communication to field bus terminals in operator cabin failed.
	Error indication - additional texts	
	Remedy	Check: ▪ plug / socket, ▪ power supply, ▪ bus address, ▪ terminating resistor at the respective device and upstream bus devices, refer to circuit diagram.
004	Effect	4
	BMK	1N9
	PLC I/O	PROFIBUS
	Cause	Communication to hoisting gear inverter failed.
	Error indication - additional texts	
	Remedy	Check: ▪ plug / socket, ▪ power supply, ▪ bus address, ▪ terminating resistor at the respective device and upstream bus devices, refer to circuit diagram.
005	Effect	4
	BMK	6N9 / 9N9
	PLC I/O	PROFIBUS
	Cause	Communication to trolley drive / luffing gear inverters failed.
	Error indication - additional texts	
	Remedy	Check: ▪ plug / socket, ▪ power supply, ▪ bus address, ▪ terminating resistor at the respective device and upstream bus devices, refer to circuit diagram.
006	Effect	4

006	BMK	7N9
	PLC I/O	PROFIBUS
	Cause	Communication to slewing gear inverter failed.
	Error indication - additional texts	
	Remedy	Check: ▪ plug / socket, ▪ power supply, ▪ bus address, ▪ terminating resistor at the respective device and upstream bus devices, refer to circuit diagram.
007	Effect	1
	BMK	04A4
	PLC I/O	PROFIBUS
	Cause	Communication to radio receiver failed.
	Error indication - additional texts	
	Remedy	Check: ▪ plug / socket, ▪ power supply, ▪ bus address, ▪ terminating resistor at the respective device and upstream bus devices, refer to circuit diagram.
008	Effect	4
	BMK	0A1/1
	PLC I/O	Read out hardware diagnosis with Step7,
	Cause	Travel distance sensing assembly error.
	Error indication - additional texts	
	Remedy	On SSI, check SM338 card for: ▪ Wiring, ▪ power supply, ▪ Use Step 7 to retrieve hardware diagnostics, ▪ Replace card.
009	Effect	4
	BMK	0F05, 1P9
	PLC I/O	E0.0
	Cause	Fuse for 24 V sensors blown.
	Error indication - additional texts	
	Remedy	Repair overload or short circuit condition. Switch on the circuit breaker.

010	Effect	5
	BMK	0T2
	PLC I/O	E0.7
	Cause	Transformer too hot.
	Error indication - additional texts	
	Remedy	Allow to cool down. Check thermo contact wiring.
011	Effect	4
	BMK	0K01
	PLC I/O	Input "voltage control" (depends on crane) or PROFIBUS
	Cause	Phase failure, phase unbalance, or low voltage in supply line.
	Error indication - additional texts	Low voltage DC link inverter hoisting gear Voltage control relay 0K01 blown
	Remedy	Check the power supply, also under load. Check setting of sense of rotation relay 0K01. LED K2, yellow, illuminated if internal relay K2 is active. Clockwise rotating field at input. Anti-clockwise rotating field is NO error. LED K1, yellow, illuminated if internal relay K1 is active and the input power is error-free. LED alarm, red, illuminated when low voltage occurs, flashing when phase unbalance occurs or is off when phase failure occurs. OR The PLC evaluates the DC bus voltage of the inverter of the hoisting gear. Error if it falls below 500 VDC. This corresponds to 20% low voltage. Measure the DC bus voltage and compare it to the value indicated on the control panel.
012	Effect	1
	BMK	1S73 or 1S10, 1K71 or 1K010, 9S73 or 9S1/9S2, 9K71 or 9K090 9X70 or 92X70
	PLC I/O	E18.6 or E18.7
	Cause	At least one safety limit switch is actuated. The crane is switched off via control contactors 0K100/0K1. This is a hard-wired functionality.
	Error indication - additional texts	

012	Remedy	If E 18.6 = 1, the safety limit switch of the hoisting gear is actuated. If E 18.7 = 1, the safety limit switch of the traverse gear / luffing gear is actuated. For leaving this position: ▪ Turn on key switch 1S7 in the control cabinet. ▪ Switch on the crane and leave the position: ▪ Then turn off 1S7. Check whether connection from luffing gear safety limit switch is made at 9X70 or 92X70. Check safety limit switch adjustments. Check wiring and performance of switches and auxiliary contactors.
014	Effect	1
	BMK	1/5/6/7/9S5
	PLC I/O	FH. E13.0 and E13.2 FFS: E0.6
	Cause	Error in master switch zero position.
	Error indication - additional texts	Left control console: simultaneous motion command and zero contact. Right control console: simultaneous motion command and zero contact. Left control console: no motion command and no zero contact. Right control console: no motion command and no zero contact. "Motion command" relay (remote control) and zero contacts (bus): ON "Motion command" relay (remote control) and zero contacts (bus): OFF
	Remedy	During operation with operator cabin, check zero contacts and control contacts in control consoles. Check movement commands (Profibus) and movement command signals (E0.6) during operation with remote control (FFS). NOTE: Fault also occurs when master switch is actuated slightly for a moment without motion starting. This means: Zero contact = 0, but no motion command detected yet.
018	Effect	1
	BMK	0K1
	PLC I/O	A4.0, E4.0

018	Cause	Contactor faulty, switching state and feedback information do not match.
	Error indication - additional texts	Feedback signal from contactor ON is faulty. Feedback signal from contactor OFF is faulty.
	Remedy	Check contactor. Check: ▪ Feedback contact open circuit, ▪ Contactor faulty, ▪ Input card faulty, ▪ Output card faulty,
020	Effect	1
	BMK	1K7 or 1K700
	PLC I/O	A4.1, E1.1
	Cause	Contactor faulty, switching state and feedback information do not match.
	Error indication - additional texts	Feedback signal from contactor ON is faulty. Feedback signal from contactor OFF is faulty.
	Remedy	Check contactor. Check: ▪ Feedback contact open circuit, ▪ Contactor faulty, ▪ Input card faulty, ▪ Output card faulty,
021	Effect	1
	BMK	6K70 / 9K7 or 9K70 Luffing crane with hydraulic cylinder: 9K90, 9K9, 9K94, 9K95, 9K96, 9K97
	PLC I/O	A4.2, E2.3. Luffing crane with hydraulic cylinder: see wiring diagram.
	Cause	Contactor faulty, switching state and feedback information do not match.
	Error indication - additional texts	Feedback signal from contactor ON is faulty. Feedback signal from contactor OFF is faulty. Luffing crane with hydraulic cylinder: two signals per contactor.
	Remedy	Check contactor. Check: ▪ Feedback contact open circuit, ▪ Contactor faulty, ▪ Input card faulty, ▪ Output card faulty,

022	Effect	1
	BMK	7K7
	PLC I/O	A4.3, E2.4
	Cause	Contactor faulty, switching state and feedback information do not match.
	Error indication - additional texts	Feedback signal from contactor ON is faulty. Feedback signal from contactor OFF is faulty.
	Remedy	Check contactor. Check: ▪ Feedback contact open circuit, ▪ Contactor faulty, ▪ Input card faulty, ▪ Output card faulty,
024	Effect	1
	BMK	1A20
	PLC I/O	PROFIBUS E1.6 or E18.5 or E19.7
	Cause	Brake chopper not operative. The error is delayed when the crane is switched on.
	Error indication - additional texts	
	Remedy	Only for external brake chopper. Visually check: ▪ Jumper X2/12 present? ▪ Voltage selection jumper correctly set? For built-in and external choppers: ▪ Short circuit in brake resistor? ▪ Brake chopper overheated? ▪ Control electronics failed? ▪ Brake chopper IGBT module faulty?
028	Effect	1
	BMK	5K520+5K510
	PLC I/O	E2.0 / A0.5 E2.1 / A0.6
	Cause	Contactor faulty, switching state and feedback information do not match.
	Error indication - additional texts	Feedback signal from contactor 5K510 ON is faulty. Feedback signal from contactor 5K510 OFF is faulty. Feedback signal from contactor 5K520 ON is faulty. Feedback signal from contactor 5K520 OFF is faulty.

028	Remedy	Check contactor. Check: ▪ Feedback contact open circuit, ▪ Contactor faulty, ▪ Input card faulty, ▪ Output card faulty,
040	Effect	5, 4
	BMK	0B30, 0B70
	PLC I/O	E0.1, E0.2 E19.0, E19.1
	Cause	WARNING! Control cabinet temperature too high (above 55° C). Control cabinet temperature too low (below 0°C). This warning message appears briefly when the slewing tower crane is switched on, and then every 30 minutes. NOTE: During cold winter days, this warning message may appear at the beginning of crane operation even if the heater is operating properly. Permanent display of an error message with ambient temperature sensor connected: Ambient temperature below 20 °C.
	Error indication - additional texts	Control cabinet temperature too high. Control cabinet temperature too low. Ambient temperature too low for crane operation.
	Remedy	Check control cabinet and heater fan (filter fan 0M81, 0M82, contactor 0K08, thermostat 0B08, heater 0E08). Clean or replace filter mats. Check thermostat settings. The table of the setting values is located at the beginning of the circuit diagram. With ambient temperature sensor (-20°C): ▪ Put down the load. ▪ Lift empty hook. ▪ Set crane in windvaning mode and switch crane off. ▪ Only after ambient temperature has increased, the crane is allowed to be used again.
080	Effect	1
	BMK	1Y7, 1K7 / 1K700, 1N9, 1M9, 1U60 / 1U90
	PLC I/O	Read out hardware diagnosis with Step7,

080	Cause	Hoisting gear: Self-startup monitor. Rope drum rotates even though brake is applied. NOTE: Monitor function may also be enabled for emergency stop or emergency off. NOTE: Monitor function may also be enabled when absolute encoder is plugged in with assembly switch OFF.
	Error indication - additional texts	
	Remedy	Subsequent error after inverter error? Check: ▪ Absolute encoder, ▪ Brake performance, ▪ Actuation of brake.
081	Effect	1
	BMK	6Y7 / 9Y7, 6K7 / 6K70 / 9K7, 6N9 / 9N9, 6M9 / 9M9, 6U90 / 9U60
	PLC I/O	Read out hardware diagnosis with Step7,
	Cause	Trolley drive / derricking gear: Self-startup monitor. Rope drum rotates even though brake is applied.NOTE:Monitor function may also be enabled for emergency stop or emergency off.NOTE:Monitor function may also be enabled when absolute encoder is plugged in with assembly switch OFF. Hydraulic luffing gear: Self-startup monitor. Piston moves though no valve is actuated. Recognition via length sensor at hydraulic cylinder.
	Error indication - additional texts	
	Remedy	Trolley drive/derricking gear: Subsequent error after inverter error? Does the highly swinging load erratically pull the trolley over the load? Check: ▪ Absolute encoder, ▪ Brake performance, ▪ Actuation of brake. Hydraulic luffing gear Check: ▪ Length sensor ▪ Hydraulics ▪ Valve actuation.

082	Effect	1
	BMK	7N9 / 7M9
	PLC I/O	PROFIBUS
	Cause	Slewing gear drive starts up without motion command: Only with slewing and operating radius limitations switched ON: While approaching the limit, automatic deceleration does not work or takes too much time.
	Error indication - additional texts	
	Remedy	Switch off local operation (at the control panel). Check slewing range and operating radius limitations. Wind speed too high?
100	Effect	4
	BMK	1U60 / 1U90, 0A1/1
	PLC I/O	Profibus
	Cause	Error during data transfer of hoisting gear position.
	Error indication - additional texts	
	Remedy	The sensor is located at the rope drum or motor shaft. Sensor or SSI card faulty. Signal error: Check wire and shield contacts.
101	Effect	4
	BMK	1U90 / 1U60
	PLC I/O	0A1/1
	Cause	Error message of SSI card. Malfunction in hoisting gear absolute encoder: Sensor, sensor wire, or SSI card faulty.
	Error indication - additional texts	
	Remedy	Check hoisting gear absolute encoder: ▪ Sensor power supply, ▪ Connection at SSI card, ▪ Wiring / connection wire ▪ For testing, connect another sensor or replacement sensor. ▪ Replace the sensor. Switch the main switch off and on. The sensor is located at the rope drum or motor shaft.
104	Effect	3
	BMK	3B1
	PLC I/O	EW20, EW22
	Cause	Load increase too fast. Load breaking free or hooking in.

104	Error indication - additional texts	
	Remedy	Restart after zero position of master switch.
108	Effect	4
	BMK	1U90 / 1U60, 0A1/1
	PLC I/O	Profibus
	Cause	The absolute encoder at the hoisting gear senses the rotation of the rope drum or of the motor. Its value changes too fast or into wrong direction. Error in absolute encoder, signal cable, or SSI card.
	Error indication - additional texts	Jump error. Direction error.
	Remedy	Check: ▪ Direction of rotation, ▪ 24 V power supply (0G1), ▪ Signal cable, plug / socket, and SSI card, ▪ Mechanical mount, ▪ Replace absolute encoder.
110	Effect	4
	BMK	1U90 / 1U60, 0A1/1
	PLC I/O	Profibus
	Cause	The absolute encoder at the hoisting gear senses the rotation of the rope drum or of the motor. Its value does not change during crane motion. Hoisting gear does not start running in spite of motion command. Error in absolute encoder, signal cable, or SSI card sensor mount loose.
	Error indication - additional texts	At startup. At constant rpm
	Remedy	Check: ▪ Coupling between absolute encoder and motor or rope drum. ▪ 24 V power supply (OG1). ▪ Signal cable, plug / socket, and SSI card / PLC inputs. ▪ Does the motor fail to start up after release of the brake? ▪ Brake stuck?
111	Effect	5
	BMK	1N9
	PLC I/O	Profibus

111	Cause	Warning: Power supply too weak. Reduction of hoisting gear output to 80% until the next stop.
	Error indication - additional texts	
	Remedy	Only in cranes with output control. The PLC evaluates the DC bus voltage of the inverter of the hoisting gear. If the voltage falls below 550 VDC, corresponding to 10% low voltage, the system attempts to stabilize it by aborting the acceleration or reducing the speed. Major voltage dips: see error 011. Check power supply, system fuses, line cross section and line length. Measure the DC bus voltage and compare it to the value indicated on the control panel. If the values do not roughly correspond, the inverter is defective. Setting a lower hoisting gear output (menu 9).
114	Effect	4
	BMK	1N9
	PLC I/O	PROFIBUS
	Cause	The inverter controls the brake by means of the "Brake" signal. Error if inverter does not switch on the signal after start command. Error if inverter does not switch off the signal after stopping. 355B/630B: Additional brake does not open.
	Error indication - additional texts	At opening of brake. At closing of brake. Brake or additional brake does not open.
	Remedy	Check signals between PLC and inverter. Replace controller card. 355B/630B with additional brake: Check setting and function of proximity switches. 5014 hoisting gear brake with switch which indicates whether the brake is open. Check switch, wiring and digital inputs.
118	Effect	4
	BMK	1N9, 1M9, 1U90
	PLC I/O	Profibus

118	Cause	Hoisting gear overspeed. Speed in the area before limit switch too high. Hoisting gear does not decelerate fast enough when stopping or in a slower speed level. Brake does not close after stopping. During deceleration/stop, the speed is not decreasing uniformly.
	Error indication - additional texts	Drive does not decelerate. Speed at test point 50% within ramp before limit switch. Speed at test point 25% within ramp before limit switch. Speed in the area before limit switch too high. Overspeed >120% of permissible speed. Absolute speed above limit. Or no uniform deceleration.
	Remedy	Check signals between PLC and inverter. Check rpm setpoint / rpm actual value.
120	Effect	5, 4
	BMK	1Y7, 1S71, 1K710
	PLC I/O	E1.2 / E0.4
	Cause	Check wear at hoisting gear brake. Fault during brake test
	Error indication - additional texts	Monitoring of brake lining wear. Brake test: Insufficient braking force.
	Remedy	Brake air gap too large and requires readjustment. Right-hand control console: Yellow warning light illuminated. If brake is OK: Micro switch faulty?
121	Effect	4.1
	BMK	1M9 / 1R090, 1N9
	PLC I/O	PROFIBUS
	Cause	Hoisting gear motor: Temperature protection tripped.
	Error indication - additional texts	
	Remedy	Allow motor to cool down. Check external fan for proper operation. Emergency operation: Operate re-reeving key-operated switch (1S124) on right-hand control console. Only slow motion is possible. PTC resistor is connected to inverter: Check wiring and connection.
122	Effect	4
	BMK	1Q7, 1Q91, 12Q7, 12Q70
	PLC I/O	E1.0

122	Cause	Hoisting gear: Circuit breaker for brake tripped. Hoisting gear: Circuit breaker for external fan tripped. Hoisting gear: Additional brake applied.
	Error indication - additional texts	
	Remedy	Overload or short circuit in devices connected downstream (refer to circuit diagram). Check setting according to table in circuit diagram. Cycle circuit breaker OFF/ON.
124	Effect	4
	BMK	1Q9, 1X….., E1.4
	PLC I/O	E3.7 E3.6
	Cause	Connections at hoisting gear motor, hoisting gear brake, or sensor not made. OR hoisting gear fuse monitor tripped. OR circuit breaker of hoisting or derricking gear open.
	Error indication - additional texts	Fuse monitoring. Circuit breaker of hoisting or luffing gear open. Connectors not fully plugged.
	Remedy	Insert connectors. Check jumpers in plugs. OR Check fuses in 1Q9. Check performance of fuse monitor. Green LED illuminated, when phases (at least L2 and L3) are ok and fuses are ok. LED not illuminated when L2 / L3 failed or fuses are blown. Red LED is illuminated when phases (at least L2 and L3) are ok but 1 - -3 fuses are blown. LED not illuminated when Phases and fuses are ok. LED not illuminated when L2 / L3 failed and fuses are blown. OR Close circuit breaker. Check switch position monitor for proper operation.
128	Effect	4

128	BMK	1K75 or 12K7 1M72 or 12M7 1S72 or 12S70
	PLC I/O	A1.4 E18.0
	Cause	Hydraulic pump of additional brake is continuously running for more than 10 seconds. Functional description: 1. When the hoisting gear is started, the output is enabled. 2. The pump will run until the operating pressure is achieved (pressure switch operates). 3. In case of pressure drop, the pressure switch will start the pump again. 4. But this must not last longer than a few seconds.
	Error indication - additional texts	At first brake. At additional brake.
	Remedy	Check control and wiring of motor. Check performance and wiring of pressure switch. Check for leakage. Replace pump unit.
141	Effect	4
	BMK	1N9
	PLC I/O	PROFIBUS
	Cause	Hoisting gear inverter faulty.

141	Error indication - additional texts	4210 - ACS 800 TEMP - IGBT temperature too high CHOPP FLR - Only with brake chopper in inverter 4110 - COMPUTER TEMP - Control card temperature 3210- DC OVERVOLTAGE - Intermediate circuit voltage too high 3220 - DC UNDERVOLTAGE - Intermediate circuit voltage too low 7302 - ENCODER A<>B - Speed measurement error 2330 - EARTH FAULT- Unsymmetrical system load INV OVERLOAD - Inverter overload 7301 - SENSOR ERROR - Speed measurement error KOMM. FEHLER - Data transmission control card channel 1 7510 - COMM MODULE - cycl. communication FU-PLC 2340 - SHORT CIRCUIT - IGBT, cable, motor MAS OSC FLT - Monitoring Profibus toggle bit MOM ERROR: Drive cannot reach set value. FF56 - MOTOR PHASE - Motor phase(s) not present MO OVERSPEED - Monitoring (P61.3) exceeded 3130 - MAINS PHASE - Mains voltage instable. No phase. FFA1 - USER - User macro not saved 5210 - PPCC LINK - No U_DC. Internal comm. error 2211 - CURRENT MEAS - Current transformer output current 5310 - KEYBOARD - Control panel/DriveWindow interrptd. TORQ PR FLT - Torque does not reach test value (P66.2). OVERFREQUENCY - Motor runs above max. rpm 2310 - OVERCURRENT - Motor current not under control If no additional text is indicated, the error message must be read from the control panel of the inverter.
	Remedy	Read error message from inverter. To do this, plug in control panel. Cause: Refer to Chapter "Inverter troubleshooting". Also check inverter error memory. Reset the error: ▪ Cycle crane power OFF/ON. ▪ Or press RESET button at control panel. ▪ Or operate re-reeving key switch (1S124) on right-hand control console. Switch off local mode at inverter.
144	Effect	5
	BMK	1R20 or 1R21 or 9R20

144	PLC I/O	E1.3 or E19.2
	Cause	Overtemperature at resistor unit. Only slow lowering oft he load is possible.
	Error indication - additional texts	
	Remedy	Allow resistor unit to cool down. Error in temperature switch of resistor unit. Check wire.
148	Effect	5
	BMK	1N9
	PLC I/O	Profibus
	Cause	Overtemperature or fault of the brake chopper in the inverter. Only slow lowering and moving of the load is possible.
	Error indication - additional texts	
	Remedy	Let the brake chopper in the inverter cool down.
180	Effect	1R20 or 1R21
	BMK	E1.3
	PLC I/O	E19.3 or E19.4
	Cause	Hoisting gear brake hydraulics. Fluid level too low or fluid temperature to high.
	Error indication - additional texts	Oil level too low. Oil level too high.
	Remedy	Check fluid level. Allow fluid to cool down. Check cables.
181	Effect	4 or 5
	BMK	1B92 or 1B71
	PLC I/O	EW34 or E19.7
	Cause	Oil level too high. Line filter clogged
	Error indication - additional texts	
	Remedy	Allow to cool down. Check line filter. Change oil and replace line filter.
201	Effect	3
	BMK	0A3/7 or 0A3/8 3B1
	PLC I/O	EW20 / EW22

201	Cause	Excessive load signal. Load metering shaft, wiring, or analog card faulty.
	Error indication - additional texts	Channel 1. Channel 2. Channel 1 and channel 2.
	Remedy	Signals: Refer to monitor diagnostics screen. DC measurement EW20 or EW22. Error if current = 20 mA. Check 24VDC voltage supply. Check connection, electric cables, and plugs / sockets of metering shaft. Replace the metering shaft.
202	Effect	3
	BMK	3B1 0A3/7 or 0A3/8
	PLC I/O	EW20 EW22
	Cause	Load signal below limit. Load metering shaft not plugged. Load metering shaft, wiring, or analog card faulty. Slack rope, hook block laid down.
	Error indication - additional texts	Channel 1. Channel 2. Channel 1 and channel 2. Slack rope.
	Remedy	Check zero setting for load measurement and repeat, if necessary. Check connection, electric cables, and plug / sockets of metering shaft for continuity. Operate re-reeving key switch (1S124) on right-hand control console. Verify that hoisting rope is correctly wound up on hoisting rope drum.
220A	Effect	3
	BMK	0A3/7 or 0A3/8
	PLC I/O	AW20 EW24

220A	Cause	Using the reference current measurement, the PLC checks the operation of the analog input and output cards. Every five seconds, the analog output alternately provides a small and large signal which is read by the input card. Error: Larger signal not in allowable range.
	Error indication - additional texts	Smaller than threshold. Greater than threshold.
	Remedy	Signals: Refer to monitor diagnostics page. DC measurement EW24. Signal should change every five seconds. Error if lower current is not 4.5-4.6 mA. Error if higher current is not 19.3-19.5 mA. Check 24 V power supply (0G1). Check wiring. Replace faulty analog input or output module.
220B	Effect	3
	BMK	0A3/7 or 0A3/8
	PLC I/O	AW20 EW24
	Cause	Using the reference current measurement, the PLC checks the operation of the analog input and output cards. Every five seconds, the analog output alternately provides a small and large signal which is read by the input card. Error: Lower signal is not in allowable range.
	Error indication - additional texts	Smaller than threshold. Greater than threshold.

220B	Remedy	Signals: Refer to monitor diagnostics page. DC measurement EW24. Signal should change every five seconds. Error if lower current is not 4.5-4.6 mA. Error if higher current is not 19.3-19.5 mA. Check 24 V power supply (0G1). Check wiring. Replace faulty analog input or output module.
221	Effect	3
	BMK	0A3/11, 0A3/8
	PLC I/O	AW22, EW32
	Cause	Using the reference current measurement, the PLC checks the operaton of the analog input and output cards. Every five seconds, the analog output alternately provides a small and large signal which is read by the input card. Error: Higher or lower signal are not in allowable ranges.
	Error indication - additional texts	High reference current below limit. High reference current above limit. Low reference current below limit. Low reference current above limit.
	Remedy	Signals: Refer to monitor diagnostics page, DC measurement EW32. Signal should change every five seconds. Error if lower current is not 4.5-4.6 mA. Error if higher current is not 19.3-19.5 mA. Check 24 V power supply (0G1). Check wiring. Replace faulty analog input or output module.
240	Effect	3
	BMK	9U60, 9A3
	PLC I/O	EW34
	Cause	Signal from the length sensor of the hydraulic cylinder out of range. Actual value 4 mA or smaller. Actual value 20 mA or greater.
	Error indication - additional texts	Signal below range. Signal above range.

240	Remedy	Check: ▪ Verify correct sensor installation. During operation, it should never be fully extended or retracted. ▪ 24 V power supply (0G1) ▪ Check signal cables, plugs / sockets, and PLC inputs. ▪ Function check of length sensor using Diagnosis page 2 - current position of luffing gear (monitor in operator cabin). Length 0-200 mm should result in numerical value 0-4095. If not, look for cable break or short-circuit. Replace length sensor and/or signal conditioning module and/or analog input module.
301	Effect	3
	BMK	6U90 / 9U60
	PLC I/O	0A1/1 (luffing crane 0A3/3)
	Cause	Trolley drive/derricking gear: The absolute encoder at the trolley drive / derricking gear senses the rotations of rope drum and uses this information to calculate the current operating radius. Sensed operating radius too large. Hydraulic luffing gear: The length sensor at hydraulic cylinder indirectly measures piston position. The calculated position is not within a sensible value range.
	Error indication - additional texts	
	Remedy	Trolley drive/derricking gear: ▪ Check settings for jib length and absolute encoder. ▪ Check signal cables, plugs / sockets, and PLC inputs. ▪ Check 24 V DC power supply. ▪ Replace absolute encoder. Hydraulic luffing gear: ▪ Check the fastening of the linear sensor. ▪ Check signal cables, plugs / sockets, and PLC inputs. ▪ Check 24 V DC power supply. ▪ Check the calibration of the linear sensor - menu 2, step 1 ▪ Check the function of the linear sensor and the signal evaluation 9A3 and the analog input. ▪ Replace the linear sensor and the signal evaluation.
302	Effect	3

302	BMK	6U90 / 9U60
	PLC I/O	0A1/1 (luffing crane 0A3/3)
	Cause	Trolley drive/derricking gear: The absolute encoder at the trolley drive / derricking gear senses the rotations of rope drum and uses this information to calculate the current operating radius. Sensed operating radius too small. Hydraulic luffing gear: The length sensor at hydraulic cylinder indirectly measures piston position. The calculated position is not within a sensible value range.
	Error indication - additional texts	
	Remedy	Trolley drive/derricking gear: ▪ Check settings for jib length and absolute encoder. ▪ Check signal cables, plugs / sockets, and PLC inputs. ▪ Check 24 V DC power supply. ▪ Replace absolute encoder. Hydraulic luffing gear: ▪ Check the fastening of the linear sensor. ▪ Check signal cables, plugs / sockets, and PLC inputs. ▪ Check 24 V DC power supply. ▪ Check the calibration of the linear sensor - menu 2, step 1 ▪ Check the function of the linear sensor and the signal evaluation 9A3 and the analog input. ▪ Replace the linear sensor and the signal evaluation.
308	Effect	3
	BMK	3R9
	PLC I/O	EW28 or EW30
	Cause	The inclination sensor at the jib senses the iib angle. From this value, the control system calculates the current operating radius. Deviation between both measuring channels above limit.
	Error indication - additional texts	Difference channel 1 and channel 2 too great. Error in operating range calculation (Stand./Fails. program)

308	Remedy	Check: ▪ 24 V power supply (0G1) ▪ Check signal cables, plugs / sockets, and PLC inputs. ▪ Verify correct sensor installation. Repeat setting menu 2 for luffing gear limit switches. Replace inclination sensor.
310	Effect	4
	BMK	6U90 / 9U60,
	PLC I/O	0A1/1 (luffing crane 0A3/3)
	Cause	Trolley drive/derricking gear: The absolute encoder at the trolley drive / derricking gear senses the rotations of rope drum or of the motor. Its value changes too fast or into wrong direction. Hydraulic luffing gear: The length sensor at hydraulic cylinder indirectly measures piston position. Pursuant to the calculation, the piston moves too fast or in wrong direction.
	Error indication - additional texts	Jump error. Direction error.
	Remedy	Trolley drive/derricking gear: Error in absolute encoder, signal cable, or SSI card. Check: ▪ Direction of rotation, ▪ 24 V power supply (0G1), ▪ Signal cable, plug / socket, and SSI card, ▪ Mechanical mount, ▪ Replace absolute encoder. Hydraulic luffing gear: ▪ Check: ▪ Direction of piston movement, ▪ 24 V power supply (0G1), ▪ signal cable, plug / socket, and analog input, ▪ Mechanical mounting of sensor, ▪ Function of direction contactors for luffing-in and luffing-out. ▪ Hydraulics, control card, proportional valve current.
320	Effect	4 / 4.1
	BMK	6U90 / 9U60

320	PLC I/O	0A1/1 (luffing crane 0A3/3)
	Cause	Trolley drive/derricking gear: The absolute encoder at the trolley drive senses the rotations of rope drum or of the motor. Its value does not change during crane motion. Trolley drive / luffing gear does not start running in spite of motion command. Brake does not release. Error in absolute encoder, signal cable, PLC input, or SSI card; sensor mount loose. Hydraulic luffing gear: The length sensor at hydraulic cylinder indirectly measures piston position. Pursuant to the calculation, the piston does not move or moves too slow in spite of motion command.
	Error indication - additional texts	At startup. At constant rpm/speed.
	Remedy	Trolley drive/luffing gear Check: ▪ Coupling between absolute encoder and motor or rope drum. ▪ 24 V power supply (OG1). ▪ Signal cable, plug / socket, and SSI card / PLC inputs. ▪ Does the motor fail to start up after release of the brake? ▪ Brake stuck? Hydraulic luffing gear Check: ▪ Setting of speed level 1 too low? Refer to settings menu 2. ▪ Oil temperature too low? ▪ Hydraulics, control card, proportional valve current.
341	Effect	3
	BMK	3R9
	PLC I/O	EW28
	Cause	Signal from channel 1 of inclination sensor out of range. Actual value 4 mA or 20 mA.
	Error indication - additional texts	Signal below range. Signal above range.

341	Remedy	Check: ▪ 24 V power supply (0G1) ▪ Check signal cables, plugs / sockets, and PLC inputs. ▪ Verify correct sensor installation. Repeat setting menu 2 for luffing gear limit switches. Replace inclination sensor.
342	Effect	3
	BMK	3R9
	PLC I/O	EW30
	Cause	Signal from channel 2 of inclination sensor out of range. Actual value 4 mA or 20 mA
	Error indication - additional texts	Signal below range. Signal above range.
	Remedy	Check: ▪ 24 V power supply (0G1) ▪ Check signal cables, plugs / sockets, and PLC inputs. ▪ Verify correct sensor installation. Repeat setting menu 2 for luffing gear limit switches. Replace inclination sensor
344	Effect	3
	BMK	0A1
	PLC I/O	internally
	Cause	PLC error / error tables
	Error indication - additional texts	
	Remedy	Cycle main switches 0Q2 and 0Q02 OFF / ON.
348	Effect	4
	BMK	3R9 and 9U60
	PLC I/O	---

348	Cause	Derricking gear: ▪ Derricking gear, slack rope. ▪ From the rope drum rpm (9U60), the crane control system calculates the theoretical inclination angle of the jib and compares this value with the actual value received from the inclination sensor (3R9). Error if deviation is above limit. ▪ Error if the inclination sensor value does not change with luffing operations of the jib. Hydraulic luffing gear: The length sensor at hydraulic cylinder indirectly measures the jib angle. Error if this angle is significantly smaller than the angle measured with the inclination sensor.
	Error indication - additional texts	Check whether inclination sensor follows. Angle check inclination sensor.
	Remedy	Derricking gear: Luff in the jib Check whether the luffing rope is wound up correctly. Check: ▪ 24 V power supply (0G1) ▪ Check signal cables, plugs / sockets, and PLC inputs. ▪ Verify correct sensor installation. Repeat setting menu 2 for luffing gear limit switches. Replace inclination sensor. Hydraulic luffing gear Check: ▪ 24 V power supply (0G1) ▪ Check signal cables, plugs / sockets, and PLC inputs. ▪ Correct mounting of length sensor and inclination sensor. ▪ Function check of inclination sensor using Diagnosis page 1 (monitor in operator cabin). Angle of 0-90° mm should result in numerical value 0-4095. ▪ Function check of length sensor using Diagnosis page 2 - current position of luffing gear (monitor in operator cabin). Length 0-200 mm should result in numerical value 0-4095. ▪ Repeat settings in menu 2 (length sensor and inclination sensor). ▪ Replace length sensor or inclination sensor.
401	Effect	3
	BMK	0A1

401	PLC I/O	----
	Cause	Error in crane settings. Invalid jib length set. Or pure two-fall operation set and four-fall reeving recognized.
	Error indication - additional texts	
	Remedy	Check setting for crane version and repeat. Check current reeving mode. Check setting for jib length and repeat.
402	Effect	5
	BMK	1S0
	PLC I/O	E4.1
	Cause	Assembly switch in position "1".
	Error indication - additional texts	
	Remedy	The key switch must not be switched ON during crane operation. DANGER! It bypasses all safety devices. Set key switch to position "0" (slewing limitation ON) or position "2" (slewing limitation OFF).
404	Effect	5
	BMK	1S124
	PLC I/O	FH: E40.4 FFS: Profibus
	Cause	Re-reeving key operated.
	Error indication - additional texts	
	Remedy	Use the key-operated switch only briefly for re-reeving or acknowledging errors.
408	Effect	3
	BMK	0A1
	PLC I/O	---
	Cause	Checksum errors for setting values.
	Error indication - additional texts	
	Remedy	Repeat crane setup. Enter new setup data (menu 7, slewing limitation). Check all settings. Replace CPU, if necessary
410	Effect	3
	BMK	0A1
	PLC I/O	---

410	Cause	Luffing crane After having changed the reeving mode in (menu 0) or the jib length (menu 1), it is mandatory to set the load measurement again (menus 5 and 6). Reason: Different snatch block weights. Trolley crane with manual re-reeving Error of rope fall recognition. Changing contactors 1K241 or 1K242 are not enabled. The two position switches indicate different setup conditions.
	Error indication - additional texts	
	Remedy	Use menus 5 and 6 for setup. Verify load moment disable. Plug the re-reeving bolts correctly into the bolt storage. Check the contactors. Are both switches actuated or not actuated? The digital inputs E0.4 and E1.4 must be different. Check switches, wires, and plug/socket.
420	Effect	1
	BMK	1N9, 6N9, 7N9, 9N9, 1A20 inverter internal chopper or external chopper
	PLC I/O	PROFIBUS
	Cause	After switching on the slewing tower crane: One or all inverters or brake unit not operational. Brake chopper shorted.
	Error indication - additional texts	Only inverter HG not operative. Only inverter TD/DG not operative. Only inverter SG not operative. Inverter HG and inverter TD/DG not operative. Inverter HG and inverter SG not operative. Inverter TD/DG and inverter SG not operative. All inverters not operative. Chopper malfunction.

420	Remedy	Check power supply: Feed line = 400 V? Transformer 0T2 output voltage = 460 V?“ Check main switch 0Q2, main contactor 0K1, fuse 1Q9. Brake unit faulty: Check brake unit for short circuit. Does resistor unit 1R20 heat up without braking operations? Error or malfunction in inverter. Which inverter is not ready for operation? For this purpose, observe input signals. Read error message from inverter. To do this, plug in control panel. Cause: Refer to Chapter "Inverter troubleshooting".
440	Effect	1
	BMK	0K1
	PLC I/O	---
	Cause	PLC error. Or: Two control points active because both emergency-off switches for operator cabin and remote control unit are released. New from September 2012 with introduction of the new operator cabin FHWE06: Error no longer applicable. For cranes where operator cabin and remote control unit can be connected simultaneously, the emergency off pushbutton in the operator cabin must be released for remote control operation. This is applicable vice versa for operation via operator cabin if a remote control unit has been connected and switched on. This is due to the applicable regulations.
	Error indication - additional texts	Emergency off remote control and operator cabin released simultaneously. (For versions older than new operator cabin FHWE06). Remote control and operator cabin: Emergency stop and emergency off released. (For new operator cabin FHWE06 and up). Program sequence error.
	Remedy	Press emergency off switch of the non-active control panel. (For versions older than new operator cabin FHWE06). Release the emergency stop (remote control) and emergency off. (For new operator cabin FHWE06 and up). Cycle main switches 0Q2 and 0Q02 at control cabinet OFF/ON.
480	Effect	5
	BMK	1S9
	PLC I/O	E1.5

480	Cause	Programming key switch in position "1".
	Error indication - additional texts	---
	Remedy	Warning message if programming key switch 1S9 in control cabinet is switched on, but assembly switch 1S0 is not in position "1" or "2". 1S9 is allowed to be switched on only during setup operations.
600	Effect	4
	BMK	6U90 / 9U60, 0A1/1
	PLC I/O	PROFIBUS
	Cause	Error during data transfer of trolley drive / luffing gear position.
	Error indication - additional texts	---
	Remedy	The sensor is located at the rope drum or motor shaft. Sensor or SSI card faulty. Signal error: Check wire and shield contacts.
601	Effect	4
	BMK	6U90 / 9U60, 0A1/1
	PLC I/O	Profibus
	Cause	Error message of SSI card. Trolley drive / luffing gear absolute encoder malfunction: Sensor, sensor wire, or SSI card faulty.
	Error indication - additional texts	
	Remedy	Check absolute encoder: ▪ Sensor power supply, ▪ Connection at SSI card, ▪ Wiring / connecting line For testing, connect another sensor or replacement sensor. Replace the sensor. Switch the main switch off and on. The sensor is located at the rope drum or motor shaft.
614	Effect	4
	BMK	6N9
	PLC I/O	PROFIBUS
	Cause	The inverter controls the brake using the "Brake" signal. Error if inverter does not switch on the signal after start command. Error if inverter does not switch off the signal after stopping.
	Error indication - additional texts	At opening of brake. At closing of brake.

614	Remedy	Check signals between PLC and inverter. Replace controller card.
618	Effect	4
	BMK	6N9, 6M9, 6U90
	PLC I/O	Profibus
	Cause	Drive does not decelerate fast enough when stopping or in a slower speed level. ▪ Speed at test point 50% within ramp before limit switch too high. ▪ Speed in the area before limit switch too high. ▪ Speed above limit > 120% of permissible V-max load.
	Error indication - additional texts	Drive does not decelerate. Speed in the area before limit switch too high.
	Remedy	Check signals between PLC and inverter. Check rpm setpoint / rpm actual value.
621	Effect	4.1
	BMK	6N9, 6M9
	PLC I/O	PROFIBUS
	Cause	Trolley drive motor: Temperature protection tripped.
	Error indication - additional texts	
	Remedy	Allow motor to cool down. Fan impeller damaged? Emergency operation: Operate re-reeving key-operated switch (1S124) on right-hand control console. Only slow motion is possible. PTC resistor is connected to inverter: Check wiring and connection.
622	Effect	4
	BMK	6Q7
	PLC I/O	E2.2
	Cause	Trolley drive: Circuit breaker tripped.
	Error indication - additional texts	
	Remedy	Overload or short circuit in brake 6Y7. Check setting according to table in circuit diagram. Cycle circuit breaker OFF/ON.
641	Effect	4
	BMK	6N9
	PLC I/O	Profibus
	Cause	Malfunction in trolley drive / luffing gear inverter.

641	Error indication - additional texts	4210 - ACS 800 TEMP - IGBT temperature too high CHOPP FLR - Only with brake chopper in inverter 4110 - COMPUTER TEMP - Control card temperature 3210- DC OVERVOLTAGE - Intermediate circuit voltage too high 3220 - DC UNDERVOLTAGE - Intermediate circuit voltage too low 7302 - ENCODER A<>B - Speed measurement error 2330 - EARTH FAULT- Unsymmetrical system load INV OVERLOAD - Inverter overload 7301 - SENSOR ERROR - Speed measurement error KOMM. FEHLER - Data transmission control card channel 1 7510 - COMM MODULE - cycl. communication FU-PLC 2340 - SHORT CIRCUIT - IGBT, cable, motor MAS OSC FLT - Monitoring Profibus toggle bit MOM ERROR: Drive cannot reach set value. FF56 - MOTOR PHASE - Motor phase(s) not present MO OVERSPEED - Monitoring (P61.3) exceeded 3130 - MAINS PHASE - Mains voltage instable. No phase. FFA1 - USER - User macro not saved 5210 - PPCC LINK - No U_DC. Internal comm. error 2211 - CURRENT MEAS - Current transformer output current 5310 - KEYBOARD - Control panel/DriveWindow interrptd. TORQ PR FLT - Torque does not reach test value (P66.2). OVERFREQUENCY - Motor runs above max. rpm 2310 - OVERCURRENT - Motor current not under control If no additional text is indicated, the error message must be read from the control panel of the inverter.
	Remedy	Read error message from inverter. To do this, plug in control panel. Cause: Refer to Chapter "Inverter troubleshooting". Also check inverter error memory. Reset the error: Cycle crane power OFF/ON. Or press RESET button at control panel. Or operate re-reeving key switch (1S124) on right-hand control console. Switch off local mode at inverter.
700	Effect	4
	BMK	7U60, 0A1/1

700	PLC I/O	Profibus
	Cause	Error during data transfer of jib position.Error during data transfer of jib position.
	Error indication - additional texts	
	Remedy	The sensor is located on the slip ring system. Sensor or SSI card faulty. Signal error: Check wire and shield contacts.
701	Effect	4
	BMK	7U60, 0A1/1
	PLC I/O	Profibus
	Cause	Error message of SSI card. Malfunction in slewing angle absolute encoder: Sensor, sensor wire, or SSI card faulty.
	Error indication - additional texts	
	Remedy	Check slewing gear absolute encoder: ▪ Sensor power supply, ▪ Connection at SSI card, ▪ Wiring / connecting line (for testing, connect another sensor or replacement sensor). Replace the sensor. Switch the main switch off and on. The sensor is located on the slip ring system.
702	Effect	4
	BMK	7U60
	PLC I/O	---
	Cause	Jib turns too fast in close vicinity of limitation. Jib cannot be decelerated/stopped. This may be caused by strong wind.
	Error indication - additional texts	
	Remedy	Error active only when slewing and operating radius limitations are switched on (assembly switch 1S0 in position "0").
708	Effect	4
	BMK	7U60
	PLC I/O	Profibus

708	Cause	The absolute encoder at the slip ring system senses the jib angle against the tower. Its value changes too fast. Cause: Tower vibration or error in absolute encoder, signal cable, or PLC input.
	Error indication - additional texts	
	Remedy	Error active only when slewing and operating radius limitations are switched on (assembly switch 1S0 in position "0"). Check: ▪ 24 V power supply (0G1) ▪ Signal cable, plug / socket, and SSI card. ▪ Mechanical mount. ▪ Operator should adapt his/her operating behaviour. Setting the slewing gear selector switch on the left-hand control console to a lower level might be an option. Replace absolute encoder.
710	Effect	4
	BMK	7U60 / 7U50
	PLC I/O	Profibus
	Cause	The absolute encoder at the slip ring system senses the jib angle against the tower. Its value does not change during crane motion. Slewing gear does not start up after motion command. Error in absolute encoder, signal cable, or SSI card; sensor mount loose.
	Error indication - additional texts	
	Remedy	Error active only when slewing and operating radius limitations are switched on (assembly switch 1S0 in position "0"). Check: ▪ Coupling between absolute encoder and slip ring system. ▪ 24 V power supply (0G1) Check signal cables, plugs / sockets, and PLC inputs.
712	Effect	4
	BMK	---
	PLC I/O	---
	Cause	Hook in closed area. Error only with slewing and operating radius limitations switched on.

712	Error indication - additional texts	
	Remedy	Leave closed area in direction of arrow indicated on monitor Note: As long as the hook is in the closed area, the slewing gear brake will immediately close when the master switch is released!
720	Effect	4
	BMK	---
	PLC I/O	---
	Cause	Invalid checksum for setting values of slewing limitation. Error only with slewing and operating radius limitations switched on.
	Error indication - additional texts	
	Remedy	Re-enter and save limitation. If no limits are desired, delete all delimiters (polygons).
721	Effect	4.1
	BMK	7N9, 72M9 / 71M9
	PLC I/O	PROFIBUS
	Cause	Slewing gear motor: Temperature protection tripped.
	Error indication - additional texts	
	Remedy	Allow motor to cool down. Fan impeller damaged? Emergency operation: Operate re-reeving key-operated switch (1S124) on right-hand control console. Only slow motion is possible. PTC resistor is connected to inverter: Check wiring and connection.
728	Effect	4
	BMK	
	PLC I/O	EB128-175, AB128-175
	Cause	Anti-collision interface with menu 794 switched on.
	Error indication - additional texts	Z1 Anti-collision interface - initialization of serial module Z2 Anti-collision interface - did not receive data in time Z3 Anti-collision interface - module error parity, frame, overrun Z4 Anti-collision interface - overrun buffer Z5 Anti-collision interface - telegram number of digits Z6 Anti-collision interface - telegram frame STX, ETX Z7 Anti-collision interface - telegram counter "sign-of-life" Z8 Anti-collision interface - telegram incorrect check sum Z9 Anti-collision interface - Profibus error, or assembly not present

728	Remedy	This monitoring function is only active if the interface with menu 794 is enabled. Additional equipment must be installed in the control cabinet and this equipment has to be connected to an external anti-collision system. Z1: Module could not be reset to standard values. Check: module type. Is the module plugged in correctly? A faulty initialization is repeated in intervals of 5 seconds. Z2: The bus node is present and properly connected. No answer returned to the request message of the external anti-collision system. Check connection/signal wires. Z3-Z4: Error in received data. Check signal cables. Connection and shielding ok? Z5-Z8: Error in received telegram. Check error counter on diagnosis side.If counter counts up continuously, then software error or protocol error in anti-collision system. With single errors, check wiring and shielding. Z9: Bus node with serial interface module installed in control cabinet? Check: voltage supply, Profibus node, terminating resistors, flash code field bus node.
740	Effect	5
	BMK	07M09, 07K09, 07S09, 07K091
	PLC I/O	A0.1, E0.3
	Cause	Lubrication cycle not completed properly.
	Error indication - additional texts	
	Remedy	Check grease stock. Check vehicle fuse 07F09. Check signal from cycle switch. Monitor diagnostics pages – Setup mode: Switch on lubrication pump and observe cycle switch signal. The signal must change 1 to 2 times per minute. Check wiring. Cycle main switches 0Q2 and 0Q02 at control cabinet OFF/ON.
741	Effect	4
	BMK	7N9, 71M9 / 72M9
	PLC I/O	PROFIBUS
	Cause	Malfunction in slewing gear inverter

741	Error indication - additional texts	4210 - ACS 800 TEMP - IGBT temperature too high CHOPP FLR - Only with brake chopper in inverter 4110 - COMPUTER TEMP - Control card temperature 3210- DC OVERVOLTAGE - Intermediate circuit voltage too high 3220 - DC UNDERVOLTAGE - Intermediate circuit voltage too low 7302 - ENCODER A<>B - Speed measurement error 2330 - EARTH FAULT- Unsymmetrical system load INV OVERLOAD - Inverter overload 7301 - SENSOR ERROR - Speed measurement error KOMM. FEHLER - Data transmission control card channel 1 7510 - COMM MODULE - cycl. communication FU-PLC 2340 - SHORT CIRCUIT - IGBT, cable, motor MAS OSC FLT - Monitoring Profibus toggle bit MOM ERROR: Drive cannot reach set value. FF56 - MOTOR PHASE - Motor phase(s) not present MO OVERSPEED - Monitoring (P61.3) exceeded 3130 - MAINS PHASE - Mains voltage instable. No phase. FFA1 - USER - User macro not saved 5210 - PPCC LINK - No U_DC. Internal comm. error 2211 - CURRENT MEAS - Current transformer output current 5310 - KEYBOARD - Control panel/DriveWindow interrptd. TORQ PR FLT - Torque does not reach test value (P66.2). OVERFREQUENCY - Motor runs above max. rpm 2310 - OVERCURRENT - Motor current not under control If no additional text is indicated, the error message must be read from the control panel of the inverter.
	Remedy	Read error message from inverter. To do this, plug in control panel. Cause: Refer to Chapter "Inverter troubleshooting". Also check inverter error memory. Reset the error: ▪ Cycle crane power OFF/ON. ▪ Or press RESET button at control panel. ▪ Or operate re-reeving key switch (1S124) on right-hand control console. Switch off local mode at inverter.
742	Effect	5
	BMK	09B9, 0A3/7

742	PLC I/O	EW26
	Cause	Wind speed above 15 m/sec for more than 20 seconds.
	Error indication - additional texts	
	Remedy	Check anemometer: ▪ 24 V DC power supply, ▪ fuse 09F09, ▪ plug / socket, ▪ In standstill mode, measure DC current at analog input. Current should be 4 mA. Replace anemometer.
744	Effect	4
	BMK	7B07
	PLC I/O	E19.0, E19.2
	Cause	Ladder cover open.
	Error indication - additional texts	
	Remedy	Close ladder cover. Check proximity sensor at ladder cover. With closed cover, it must be actuated. LED indicator must illuminate.
901	Effect	5
	BMK	9S90
	PLC I/O	E18.3
	Cause	Warning: Oil level too low.
	Error indication - additional texts	
	Remedy	Check oil level, top up oil.
902	Effect	Maximum luffing speed is reduced by half.
	BMK	9S90
	PLC I/O	E18.4
	Cause	Warning: Oil temperature too high. Error message is indicated after five minutes. If input = 0, an optional oil cooler is enabled.
	Error indication - additional texts	
	Remedy	
903	Effect	4
	BMK	9S91
	PLC I/O	E19.3
	Cause	Oil level too low.
	Error indication - additional texts	

903	Remedy	Check oil level, top up oil.
904	Effect	4.1
	BMK	9S91
	PLC I/O	E19.4
	Cause	Oil level too high.
	Error indication - additional texts	
	Remedy	Allow fluid to cool down. Check the function of the (optional) oil cooler and its actuation by contactor 9K92. Check circuit breaker 9Q92 of the optional oil cooler. Check oil level, top up if required.
905	Effect	4
	BMK	9B70
	PLC I/O	E18.7
	Cause	Hydraulics line filter clogged.
	Error indication - additional texts	
	Remedy	
906	Effect	4
	BMK	9S94, 9S95, (9S96, 9S97 option only)
	PLC I/O	E19.5, E19.6, (E19.7 option only)
	Cause	Ball valve for suction pipe and ventilation not open
	Error indication - additional texts	
	Remedy	Open the ball cock. Check function and sensing distance of the proximity switches.
907	Effect	4
	BMK	9S01
	PLC I/O	E36.1
	Cause	Key-operated switch "Luffing gear lock" enabled. The switch is in the control cabinet and must be enabled before accessing the jib. When enabled, the key can be pulled off.
	Error indication - additional texts	
	Remedy	Check that there are no people or loose material on the jib. Then, switch off the key-operated switch.
914	Effect	4
	BMK	9N9
	PLC I/O	PROFIBUS

914	Cause	The inverter controls the brake by means of the "Brake" signal. ▪ Error if inverter does not switch on the signal after start command. ▪ Error if inverter does not switch off the signal after stopping.
	Error indication - additional texts	At opening of brake. At closing of brake.
	Remedy	Check signals between PLC and inverter.
918	Effect	4
	BMK	Derricking gear: 9N9, 9M9, 9U60 Luffing crane: 9U60, hydraulic
	PLC I/O	---
	Cause	Derricking gear speed above limit. Excessive piston speed luffing gear. ▪ Speed in the area before limit switch too high. ▪ The drive unit does not decelerate fast enough when stopping or in a slower speed level. ▪ Brake does not close after stopping.
	Error indication - additional texts	Drive does not decelerate. Speed in the area before limit switch too high. Overspeed >120% of permissible speed.
	Remedy	Frequency-controlled derricking gear ▪ Check signals between PLC and inverter. ▪ Check rpm setpoint / rpm actual value. Hydraulic luffing gear ▪ Does the luffing gear react to the different speed levels specified by the master switch? ▪ Does the luffing gear stop max. 3 seconds after the master switch is set to zero position? ▪ Check of set ▪ Check of proportional valve current from control card 0A1 to proportional valve 9Y1.
920	Effect	5
	BMK	9Y7, 9S71
	PLC I/O	E1.2
	Cause	Check wear at luffing gear brake. Error during brake test of trolley drive or derricking gear.
	Error indication - additional texts	Monitoring of brake lining wear. Brake test: Insufficient braking force.

920	Remedy	Brake air gap too large and requires readjustment. Right-hand control console: Yellow warning light illuminated. If brake is OK: Proximity switch faulty?
921	Effect	4.1
	BMK	9N9, 9M9 / 9R090
	PLC I/O	
	Cause	Derricking gear motor: Temperature protection tripped. Hydraulic luffing gear: Motor of hydraulic unit - temperature protection tripped.
	Error indication - additional texts	
	Remedy	Allow motor to cool down. Fan impeller damaged? Emergency operation: Operate re-reeving key-operated switch (1S124) on right-hand control console. Only slow motion is possible. PTC resistor is connected to inverter: Check wiring and connection.
922	Effect	4
	BMK	9Q7, 9Q70 (luffing crane 9Q90)
	PLC I/O	E2.2
	Cause	Derricking gear or luffing gear: circuit breaker tripped. Derricking gear: Circuit breaker of additional brake tripped.
	Error indication - additional texts	
	Remedy	Overload or short circuit in devices connected downstream (refer to circuit diagram). Check setting according to table in circuit diagram. Cycle circuit breaker OFF/ON.
924	Effect	4
	BMK	9Q9, 9X… E2.6
	PLC I/O	E1.6 E3.6
	Cause	Luffing gear fuse monitor enabled. OR Circuit breaker of hoisting or luffing gear open. Operating mode not defined. OR Electrical connection of luffing not properly made.
	Error indication - additional texts	

924	Remedy	Check fuses in 9Q9. Check performance of fuse monitor. Green LED illuminated, when phases (at least L2 and L3) are ok and fuses are ok. LED not illuminated when L2 / L3 failed or fuses are blown. ReEd LED is illuminated when phases (at least L2 and L3) are ok but 1 - 3 fuses are blown. LED not illuminated when Phases and fuses are ok. LED not illuminated when L2 / L3 failed or fuses are blown. Close circuit breaker. Check switch position monitor for proper operation. Ensure that electrical connections of luffing gear are properly made. Check connections for motor, brake, and incremental sensor.
928	Effect	4
	BMK	9K75, 9M72, 9S72
	PLC I/O	A1.6 E18.3
	Cause	Hydraulic pump of additional brake is continuously running for more than 10 seconds. Functional description: ▪ When the hoisting gear is started, the output is enabled. ▪ The pump will run until the operating pressure is achieved (pressure switch operates). ▪ In case of pressure drop, the pressure switch will start the pump again. But this must not last longer than a few seconds.
	Error indication - additional texts	
	Remedy	Check control and wiring of motor. Check performance and wiring of pressure switch. Check for leakage. Replace pump unit.
941	Effect	4
	BMK	9N9
	PLC I/O	PROFIBUS
	Cause	Malfunction in luffing gear inverter.

941	Error indication - additional texts	4210 - ACS 800 TEMP - IGBT temperature too high CHOPP FLR - Only with brake chopper in inverter 4110 - COMPUTER TEMP - Control card temperature 3210- DC OVERVOLTAGE - Intermediate circuit voltage too high 3220 - DC UNDERVOLTAGE - Intermediate circuit voltage too low 7302 - ENCODER A<>B - Speed measurement error 2330 - EARTH FAULT- Unsymmetrical system load INV OVERLOAD - Inverter overload 7301 - SENSOR ERROR - Speed measurement error KOMM. FEHLER - Data transmission control card channel 1 7510 - COMM MODULE - cycl. communication FU-PLC 2340 - SHORT CIRCUIT - IGBT, cable, motor MAS OSC FLT - Monitoring Profibus toggle bit MOM ERROR: Drive cannot reach set value. FF56 - MOTOR PHASE - Motor phase(s) not present MO OVERSPEED - Monitoring (P61.3) exceeded 3130 - MAINS PHASE - Mains voltage instable. No phase. FFA1 - USER - User macro not saved 5210 - PPCC LINK - No U_DC. Internal comm. error 2211 - CURRENT MEAS - Current transformer output current 5310 - KEYBOARD - Control panel/DriveWindow interrptd. TORQ PR FLT - Torque does not reach test value (P66.2). OVERFREQUENCY - Motor runs above max. rpm 2310 - OVERCURRENT - Motor current not under control If no additional text is indicated, the error message must be read from the control panel of the inverter.
	Remedy	Read error message from inverter. To do this, plug in control panel. Cause: Refer to Chapter "Inverter troubleshooting". Also check inverter error memory. Reset the error: ▪ Cycle crane power OFF/ON. ▪ Or press RESET button at control panel. ▪ Or operate re-reeving key switch (1S124) on right-hand control console. Switch off local mode at inverter.

12 Frequency-controlled drives



NOTICE

All drives of this WOLFF slewing tower crane are frequency-controlled.

Advantages

- All speed values are infinitely variable.
- Jerk-free acceleration and deceleration by means of ramp functions.
- Electric braking. The mechanical brake is applied close to zero speed.
- Low power consumption.

DC link

- The inverter of the hoisting gear drive converts the mains voltage into a DC voltage and uses this voltage to charge the DC link capacitors.
- They also feed the DC voltage through the DC link to the smaller inverters of the slewing gear.
- The advantage is that the power generated at the drive units can be made available to other drive units, if required.
- Excess power is eliminated by means of brake chopper in a brake shunt.

Waiting time before crane restart

- When the crane is switched off, the DC link capacitors are discharged at a low rate.
- It must be ensured that - before the next start of the crane - the DC link capacitors are discharged to a large extent and that the charging resistors have cooled down.
- For this reason, the crane cannot be restarted until a short waiting time of approx. 30 seconds has elapsed.

Deactivation the fans in the control cabinet

- Each inverter disables its fan when the drive is stopped and the ambient temperature is low enough.

Power shut-off delay for motors

- Current flow is maintained for a specified period of time after the motor has reached a standstill. The inverters maintain their magnetization current.
- Advantage: Accelerated drive restart at the next master switch signal.



NOTICE

Creaking noise develops in the motor as a result of magnetization. This noise is normal and does not imply malfunction.

Control panel

- Can be used for all inverters in the control cabinet
- Disconnect from hoisting gear inverter if required.
- Disconnect plug adapter. For this, press down the latch.
- Connect adapter to desired inverter and to control panel.
- Language: On the converters for the hoisting gear and trolley drive, it is possible to set the control panel to various languages (parameter 99.01).

Actual value signals

- Here, the signals are listed which are available from the inverter as actual values. A difference is made among the individual drives.

Troubleshooting

The messages are listed which appear on the control panel as warning or error messages from the inverter. A difference is made among the individual drives.



NOTICE

The following sections were taken from the original documentation for the inverters with approval by ABB.

12.1 Inverter - Troubleshooting

12.1.1 Frequency converters error messages

Error	Error code			Cause	Remedy
	HW/EW	KFW	SG		
ACS 800 TEMP	4210	4210	4210	Internal temperature of ACC 800 too high. The level for actuating an excessive temperature error for the inverter output stage is 125 °C	Check ambient conditions. Check air flow and fan operation. Check heat sink fins for dust deposits. Compare motor output with power requirement for device.
CHOPP FLR		--	--	Only at brake choppers that are built into the frequency inverters.	
DC OVERVOL	3210	3210	3210	Intermediate circuit DC voltage too high.	Check brake chopper and resistor. Check delay time. Check line power for static or transient overvoltages.
DC UNDER-VOL	3220	3220	3220	Intermediate circuit DC voltage too low. The following causes may apply: Line power phase failure, tripped circuit breaker or error in bridge rectifier.	Check power supply and fuses. - Check DC capacitors for leakage.

Error	Error code			Cause	Remedy
	HW/EW	KFW	SG		
ENCODER A<>B	7302	7302	---	Speed measurement alarm detected. This error may result from the following causes: Loose cable connection, interruption in communication with RTAC, defective pulse sensor, difference between internally calculated speed and actual speed too high (> 20%), missing pulse sensor signals (when motor does not turn) during start within time defined by parameter. 50.4 ENCODER VERZÖG, while drive is in limit range for motor current or torque. Variations in pulse frequency from sensor too large within 1 ms (unrealistic speed readings, e.g. due to signal distortions).	Check settings for parameter group 50. Check pulse emitter and wiring including phase setting on channels A and B. The signal for the signal 2.17 DREHZAHL GEMESSEN must correspond to the internally calculated speed 1.02 DREHZAHL when the motor rotates (during test set parameter 70.3 GEBER DREHZ AKTIV to YES). If it is not, reverse the channels A and B. Check fiber optic cable connection between RMIO card and RTAC module. Check for highly emissive components nearby. RTAC module bolted to inverter? (Ground connection)
SHORT TO GROUND (programmable malfunction 30.10)	2330	2330	2330	The load on the supplying line is unbalanced. This may result from the following causes: Malfunction in motor, motor cable or internal malfunction.	Check motor. Check motor cable.
FC OVERLOAD				Inverter overload status.	Check pulse emitter, sensor connections (A and B) on RTAC module (if used). Check brake function.

Error	Error code			Cause	Remedy
	HW/EW	KFW	SG		
SENSOR ERROR	7301	7301	x	Speed measurement alarm detected. This error may result from the following causes: Loose cable connection, interruption in communication with RTAC, defective pulse sensor, difference between internally calculated speed and actual speed too high (> 20%), missing pulse sensor signals (when motor does not turn) during start within time defined by parameter. 50.4 ENCODER VERZÖG, while drive is in limit range for motor current or torque. Variations in pulse frequency from sensor too large within 1 ms (unrealistic speed readings, e.g. due to signal distortions).	Check settings for parameter group 50. Check pulse emitter and wiring including phase setting on channels A and B. The sign for the signal 2.17 DREHZAHL GEMESSEN must coincide with the internally calculated speed 1.02 DREHZAHL when the motor rotates. If it is not, reverse the channels A and B. Check for highly emissive components nearby. RTAC module bolted to inverter? (Ground connection)
COMM.ERROR				Data transfer error on the control card channel CH1. Electromagnetic disturbance.	Check all installed E/A modules. Check units for proper grounding. Check whether equipment with electromagnetic radiation is present in vicinity. In one case it was observed that the error initially rare then ever occured. Cause: control card failure
COMM MODULE	7510	7510	7510	Communication between drive and field bus adapter module failed.	Field bus adapter: Check settings and connector/socket.
SHORT CIRCUIT	2340	2340	2340	Short circuit in motor wiring or in motor.	Check motor and motor cable.
				Output bridge of inverter is faulty.	Check output semiconductor and current measurement transducer. If the IGBT is faulty, also replace the INT card.

Error	Error code			Cause	Remedy
	HW/EW	KFW	SG		
MAS OSC FLT		---	---	It is an additional connection control. The hoisting gear send a signal through the Profibus to the PLC . The PLC send the signal back. Error message, if the connection is interrupted.	Check the Profibus-wiring.
MOM FLR		---	---	RPM error.	Check motor and motor cable. Check pulse emitter, sensor connections (A and B) on RTAC module (if used). Check brake function.
MOT ÜBERDREHZ	P61.3	---	---	If the value defined in MOT ÜBERDREHZ LEV (61.3) is exceeded, the drive is switched off immediately.	Check motor and motor cable. Check pulse emitter, sensor connections (A and B) on RTAC module (if used). Check brake function.
MOTOR PHASE (programmable malfunction 30.10)	FF56	FF56	FF56	One motor phase failed. This may result from the following causes: Malfunction in motor, motor cable, thermistor relay (if present) or internal error.	Check motor and motor cable. Check thermistor relay (if present). Check malfunction parameter MOTOR PHASE. Disable this protective function.
LINE PHASE	3130	3130	3130	Intermediate circuit DC voltage oscillates. Failure of one line power phase, tripped circuit breaker or error in bridge rectifier. The unit is switched off when the DC ripple is 13 % of the DC voltage.	Check line power connection and line fuses.
NUTZER	FFA1	---	FFA1	Error message, if the PLC try to switch over the set of parameters but this don't functioning in the frequency inverter. There are no saved user macros or the file is corrupt.	The frequency inverter must be reconfigured.
PPCC LINK	5210	5210	5210	Internal current measurement on card or communication error between RMIO and RINT cards.	Check cards and wiring. If RMIO card is supplied with power from external, ensure that power supply is switched on.

Error	Error code			Cause	Remedy
	HW/EW	KFW	SG		
STRL B TEMP	4110	4110	4110	RMIO control card temperature less than -15...0 °C or higher than +73...82 °C.	Check air circulation and ventilation.
STROM MESS	---	2211	---		
TASTATUR	5310	5300	x	The communication is broken while the drive is controlled through the control panel or the software DriveWindow.	Check the connection of the control panel CDP312R or check the connection of DriveWindow at the PC. Re-insert control panel into installation socket and switch-off the local control. Give the control back to the frequency inverter, before you switch-off DriveWindow.
TORQ PR FLT		---	---	Torque does not reach defined test value within time DREHMTST FLR VERZ (66.2).	Check motor and motor cable.
FREQUENCY TOO HIGH	---	---		Motor running above max. allowable speed.	Check brake chopper and resistor for proper function.
OVERCURRENT	2310	2310	2310	Output current too high.	Check motor load. Check sensor and cable. Check acceleration time. Check motor and motor cable.

12.1.2 Warnings, slewing gear

Warning	Cause	Remedy
ACS 800 TEMP 9.04 AW_1, bit 4	Inverter temperature too high. A warning message is generated if the inverter temperature exceeds 115 °C.	Check ambient conditions. Check air flow and fan operation. Check heat sink fins for dust deposits. Compare motor output with power requirement for device.
ENCODER ERB 9.04 AW_1, bit 5	Speed measurement alarm detected. This error may result from the following causes: Loosened cable connection, faulty pulse emitter.	Check the pulse encoder and its cabling (including CH A and CH B phasing). The sign of signal 1.03 SPEED MEASURED must be the same as internal actual speed 1.02 SPEED ESTIMATED. If it is not, reverse the channels A and B. Check the proper earthing of equipment. Check for highly emissive components nearby.
MOT STARTING	Motor ID run started. This warning is part of the ID run.	Wait until drive reports that motor identification is completed.
KOMM MODUL 9.05 AW_2, bit 11	Communication between drive and field bus adapter module failed.	Field bus adapter: Check settings and connector/socket.

12.1.3 Error message - slewing gear

Error	Cause	Remedy
ACS 800 TEMP 9.01 FW_1, bit 3	Inverter temperature too high. The level for actuation of an excessive temperature error for the converter output stage is 125 °C.	Check ambient conditions. Check air flow and fan operation. Check heat sink fins for dust deposits. Compare motor output with power requirement for device.
CABIN TEMP F 9.02 FW_2, bit 7	RMIO card (NTC resistor) has detected that temperature in control cabinet is too high or too low. Ambient temperature too high (> 73 °C).	Provide for sufficient cooling.
DC OVERVOLT 9.02 FW_2, bit 2	DC voltage in intermediate circuit too high.	Check brake or chopper resistor (if present).
DC UNDERVOLT 9.02 FW_2, bit 2	DC voltage in intermediate circuit too low. Line phase, fuse, or rectifier failure.	Check line power connection and line fuses.
EARTH FAULT 9.01 FW_1, bit 4	The load on the supplying line is unbalanced. This may result from the following causes: Malfunction in motor, motor cable or internal malfunction.	Check motor. Check motor cable.
ENCODER FLT 9.02 FW_2, bit 5	Error in speed measurement. May be caused by loose cable, connection discontinuity, faulty pulse emitter, or actual value measured too high.	Check pulse emitter and wiring, pulse emitter interface module and wiring as well as settings for parameter group 50.
MOTOR PHASE 9.02 FW_2, bit 15	One of the motor phases is lost due to fault in the motor, motor cable, thermal relay (if used) or internal fault.	Check motor and motor cable. This error may occur with smaller motors (< 30 kW) at slow speeds. In this case, disable the protective function.
MOT TEMP 9.01 FW_1, bit 6	Overtemperature. Actuation temperature for thermal module exceeded.	Check motor output, motor load and motor cooling.
OVER SWFREQ 9.02 FW_2, bit 9	Error because of too high switching frequency. May be caused by faulty plug-in cards.	Replace RMIO card. Replace NINT card.
OVERCURRENT 9.01 FW_1, bit 1	Output current too high.	Check motor load. Check motor and motor cable (including phases).
OVERFREQ 9.01 FW_1, bit 1	Motor running above max. allowable speed.	Check brake chopper.

Error	Cause	Remedy
PPCC LINK 9.02 FW_2 bit 11	Malfunction in fiber optic cable connection to INT card.	Check fiber optic cable or galvanic connection. With assemblies R2 to R6, the connection is of galvanic type. If RMIO card is supplied with power from external, ensure that power supply is switched on.
SHORT CIRC 9.01 FW_1, bit 0	Short circuit in motor wiring or in motor.	Check motor and motor cable.
	Output bridge of inverter is faulty.	Check output semiconductor and current measurement transducer. If the IGBT is faulty, also replace the INT card.
SUPPLY PHASE 9.02 FW_2, bit 0	Intermediate circuit line voltage oscillates due to absence of one line phase, tripped circuit breaker or internal malfunction in bridge rectifier.	Check line fuses. Check for unbalance in line power supply.
KOMM MODUL 9.02 FW_2, bit 12	Cyclic communication with inverter and master station failed.	Check status of field bus communication. Refer to Chapter "Field bus control" or manual for respective field bus adapter. Check cable connections. Check whether master can communicate.

12.1.4 Other messages, slewing gear

Message	Cause	Remedy
ID MAGN REG	Acx 800 ready to start ID magnetization.	This warning belongs to the normal start-up procedure. The warning belongs to parameter 99.07- verification.
ID MAGN	Acx 800 ID magnetization enabled.	Wait 20 to 60 seconds.
ID DONE	Acx 800 has performed ID magnetization and is ready for operation.	-

12.2 RTAC module diagnostics

The RTAC-01 module has three diagnostic LEDS. CHA (green) and CHB (green) LEDs indicate the activities in channel A and B. WD/ INIT LED (yellow) indicates the status of the module.

WD/ INIT LED

The WD/ INIT LED illuminates when the Inverter configures the module during startup.

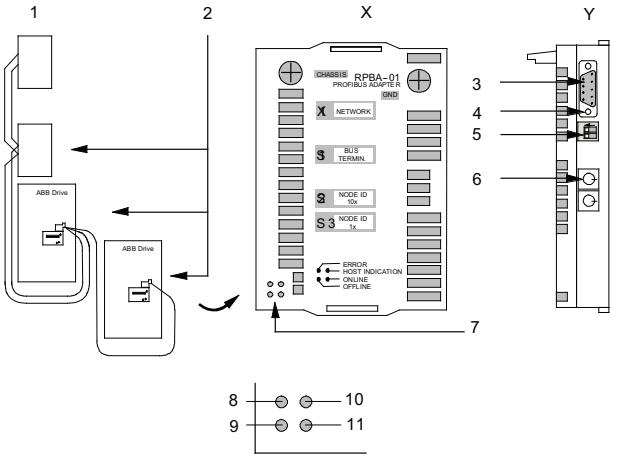
If the LED does not go out after one second:

- Configuration has failed.
- Power supply to inverter.
- A hardware error is present in the module.
  - The 38-pin connector must be plugged in correctly.
  - Contact WOLFFKRAN service department.

Installation of I/O module adapter

- No connection to inverter.
  - Check whether inverter is switched on.
  - Check node address.
  - Check whether fiber optic cable is properly connected (transmitters connected to receivers) and if plugs are plugged in correctly.
  - Check fiber optic cable for contamination and cracks.
  - The 38-pin connector must be plugged in correctly.
  - The adapter must be fastened to the inverter (ground connection)
  - Re-test using new fiber optic cables.
  - Contact WOLFFKRAN service department.

12.3 RPBA (Profibus) module diagnostics



X	Top view	Y	Side view
1	PROFIBUS master	7	Diagnostics LEDs (LED indicators)
2	SLAVE stations	8	ERROR
3	Bus connection X1	9	OFF-line
4	Mounting screw (GND) frame	10	Host indication
5	DIP switches for setting the bus termination	11	ON-line
6	Rotary switch for setting the node address		

LED indicators

The RPBA-01 module is equipped with three diagnostic LEDs. The LEDs are described below.

Name	Color	Function	
ERROR	Red	Flashing at 1 Hz:	Configuration error: Internal configuration error.
		Flashing at 2 Hz:	Error in user parameter data: Length/contents of user parameter data set when initializing the module does not correspond to length/contents set during configuration of line power. Check whether selected DP mode and GSD file used are compatible.
		Flashing at 4 Hz:	Error in initialization of PROFIBUS communication ASICs.
		Off:	No diagnostic information available.
ON-line	Green	Illuminated:	Module is ON-line and data transfer possible.
		Off:	No diagnostic information available.
OFF-line	Red	Illuminated:	Module is OFF-line and data transfer is not possible.
		Off:	Module not OFF-line.
Host indication (Host display)	Green	Illuminated:	Connection ready for transfer
	Red	Illuminated:	Continuous connection error
		Flashing:	Only intermittent connection error

12.4 Brake accessory - Troubleshooting

A malfunction in the resistance brake circuit prevents rapid deceleration of motor and can also lead to the inverter switching into error mode.

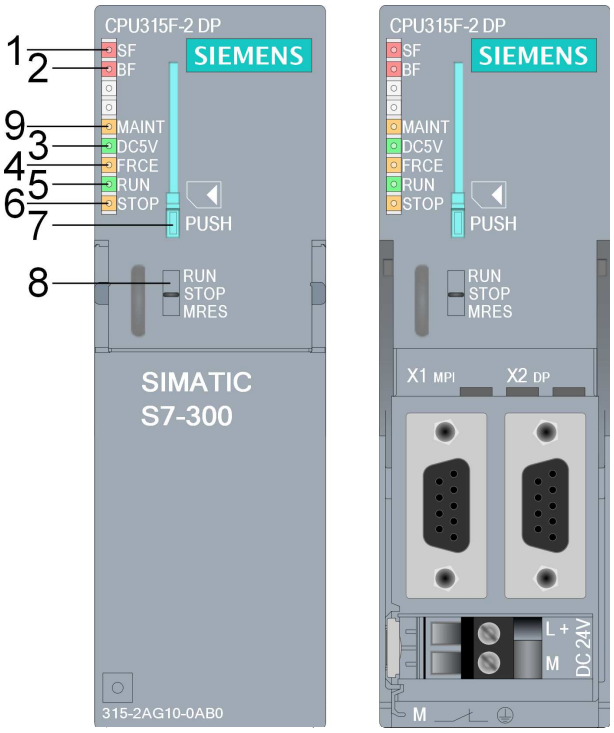
If the electronic control (NBRC) for the brake accessory has recognized a malfunction, the break resistor is disconnected from the intermediate circuit and the switchover contact on the relay output opens. The relay output is used to display of the following malfunctions:

- Brake resistor or resistance cable short-circuited.
- Short circuit in power transistor (IGBT),
- Brake accessory control module failure,
- Enable input signal for brake accessory switched off.

Note that the brake accessory is not capable of switching off a short-circuit current.

Malfunction	Cause	Remedy
Power supply for ACS 800 switched off by relay output for brake accessory.	Brake accessory or resistor overheated (see below). Short circuit in resistor or high-voltage cables. No signals at NBRC control module enable input. Brake accessory electronic control failure, Brake accessory damaged, cannot disconnect resistor from intermediate circuit.	Check connections. Let units cool down. Check high-voltage cable and resistor. Check whether enable input is ON. Contact WOLFFKRA service department.
Brake accessory not functioning.	Voltage level set too high.	Check voltage setting.
ACS 800 switches to UNDERVOLTAGE malfunction.	Chopper voltage set too low.	Check voltage setting.

13 PLC/ CPU Diagnostics LEDs



1	SF = General error, programming error or error in assembly that is able to be diagnosed.	6	STOP = Illuminates constantly in STOP mode, flashes slowly when bootstrap reset is requested, and flashes rapidly when bootstrap reset has been performed.
2	BF = Bus error illuminates e.g. for line discontinuity, flashes for station failure	7	MMC card slot
3	DCV5= Display of 5 V power supply	8	Switch
4	FRCE = Illuminates when force request is active.	9	MAINT=Maintenance requirement exists (available at CPU 312, 314, 315-2 DP, V3.0 but without function)
5	RUN = Flashes when CPU starts up and illuminates constantly in RUN mode.		

Diagnostics using LEDs

The diagnostics using LEDs is an initial aid for troubleshooting.

		LED			
SF	**DC 5V**	**FRCE**	**RUN**	**STOP**	**Meaning**
Off	Off	Off	Off	Off	No power supply to CPU. Remedy: Ensure that the power supply is connected to the line power and switched on. Ensure that the CPU is connected to the power supply and switched on.
Off	On	X	Off	On	CPU stopped. Remedy: Start CPU.
On	On	X	Off	On	CPU stopped, STOP status triggered by an error. Remedy: Refer to table below, evaluation of SF LED. Error detected. Errors
X	On	X	Off	Flashing (0.5 Hz)	CPU requests bootstrap reset.
X	On	X	Off	Flashing (2 Hz)	CPU is booting.
X	On	X	Flashing (2 Hz)	On	CPU is starting up.
X	On	X	Flashing (0.5 Hz)	On	CPU stopped by programmed breakpoint.
On	On	X	X	X	Hardware error, remedy: Refer to tables below, evaluation of SF LED. Error detected. Errors
X	X	On	X	X	Force function enabled. Force the value. Inform WOLFFKRAN.
Flashing	Flashing	Flashing	Flashing	Flashing	In your CPU is an internal system error. Follow these steps: Turn the mode switch to position STOP. Perform a NETWORK-OFF-ON. Turn the mode switch to position RUN. If the error remains contact WOLFFKRAN.

X = state irrelevant

Evaluation of SF LED

Possible error	CPU response	Possible remedies
Assembly disconnected or connected during operation.	CPU goes to STOP.	Tighten assembly and restart CPU.

Possible error	CPU response	Possible remedies
An assembly that is able to be diagnosed has reported a diagnostic alarm.	Call for SM (software module) 82. CPU goes to STOP if SM 82 is not loaded.	Response to diagnostic event depends on parameter settings for assembly.
Access to non-existing or faulty assembly. Plug loose (software or hardware error).	Call for OB 122 for direct periphery access. CPU goes to STOP if OB is not loaded.	Create SM 85, address of affected assembly is in SM start information. Replace affected assembly, fasten plug or eliminate program error.
Memory card faulty.	CPU goes to STOP and requests bootstrap reset.	

BF LED illuminated

Possible error	CPU response	Possible remedies
Bus error (physical error)	Call for SM 86 (if CPU in RUN mode). CPU goes to STOP if SM 86 is not loaded.	Check bus cable for short circuit or discontinuity.
DP interface error		
Bus short circuit present.		Evaluate diagnostics.

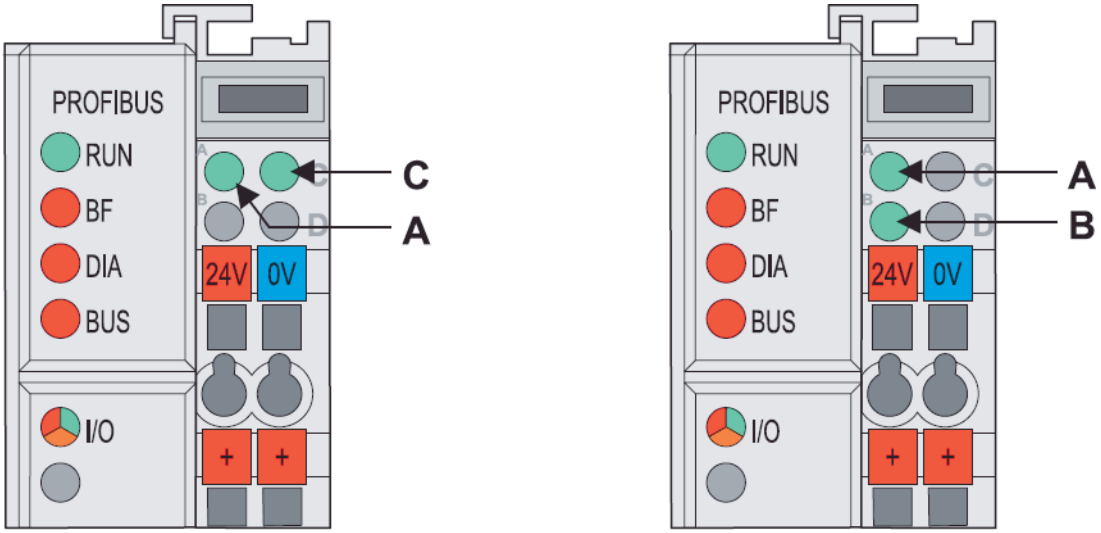
BF LED flashing

Possible error	CPU response	Possible remedies
CPU is DP master: ▪ Failure of connected station. ▪ At least one of the assigned slaves is not accessible.	Call for SM 86 (if CPU in RUN mode). CPU goes to STOP if SM 86 is not loaded.	▪ Check whether bus cable is connected to CPU or whether there is a bus cable discontinuity ▪ Wait until CPU has booted. If LED does not stop flashing, check DP slaves or evaluate DP slave diagnostics.

14 Bus nodes or input/output modules

LED signaling

For on-site diagnostics, the coupler has a number of LEDs which indicate the operating status of the coupler or the entire node.



The upper group (RUN, BF, DIA, BUS) signals the operating status of PROFIBUS communication.

The lower LED (I/O) indicates the internal status of the entire node.

LEDs A and C or B indicate the status of the power supply.

Field bus status 1

The upper four LEDs signal the operating status of PROFIBUS communication.

LED	Color	Meaning
RUN	Green	The RUN ED indicates to the user whether the field bus coupler has been properly initialized.
BF	Red	The BF LED indicates whether PROFIBUS communication is working properly.
DIA	Red	The DIA LED indicates external diagnostics.
BUS	Red	The BUS LED indicates a design error.

Field bus status 2

		LED			
RUN	BF	DIA	BUS	Meaning	Remedy
Off	Off	Off	Off	Coupler not supplied with operating voltage or hardware error present.	Check power supply for bus coupler. Replace bus coupler, if necessary.
On	On	*	Off	PROFIBUS interface started; Baud rate not yet detected.	Check whether PROFIBUS is connected. Replace bus coupler, because hardware error present.

		LED			
RUN	**BF**	**DIA**	**BUS**	**Meaning**	**Remedy**
On	Off	*	Off	Coupler is exchanging data.	Everything OK.
On	*	On	*	Coupler reports that a diagnostics message is still present.	Data exchange operating properly. Diagnostic information present, e.g. cable discontinuity at analog input terminal.
* not relevant					

Node status

The I/O LED indicates operation of the node and signals errors occurring.

I/O	Meaning
Green	Data cycle on terminal bus
Off	No data cycle on terminal bus
Red	Coupler hardware error
Red flashing	Startup: Terminal bus initializing. Operation: General terminal bus error
Red flashing cyclically	Error message for terminal bus reset and internal error
Orange	FLASH access of bus coupler firmware

After switching on the power supply, the coupler initializes. During initialization, the I/O LED is flashing red. After successful initialization, the I/O LED illuminates continuously green. On error, the I/O LED continues to flash red.

Power supply status

Two green LEDs are located at the input stage for the coupler. The upper left LED (A) indicates the status of the system supply. The upper right LED (C) or lower left LED (B) indicates the status of the field supply (LED position depends on manufacturing process).

System supply status

LED A		
Green	System supply OK.	
Off	System supply missing	Check power supply (24 V and 0 V)

Field supply status

LED C or B		
Green	Field supply OK	
Off	Field supply missing	Check power supply (24 V and 0 V)

15 setting values

Setting values, load measurement zero setting, menu 5

Crane type		Actual values, allowable range for zero setting	Current reading
355B	1-fall	100 ... 224 dig	4.4 ... 4.8 mA
	2-fall	76 ... 170 dig	4.3 ... 4.65 mA

Correction for load reading at hook height greater 42 m

For h> 42 m, the load reading must be set by ... t higher for each ... m difference in height.
Refer to menu 6.

Crane type		Adjustment interval	Adjustment of load reading
355B	1-fall	30 m	0.1 t
	2-fall	30 m	0.2 t
	3-fall	30 m	0.3 t

Checking the load sensing

Crane type		Tolerance fields, display field 1, calculation field
355B	1-fall	100 - 224
	2-fall	76 - 170

Separate circuit diagrams are attached.

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