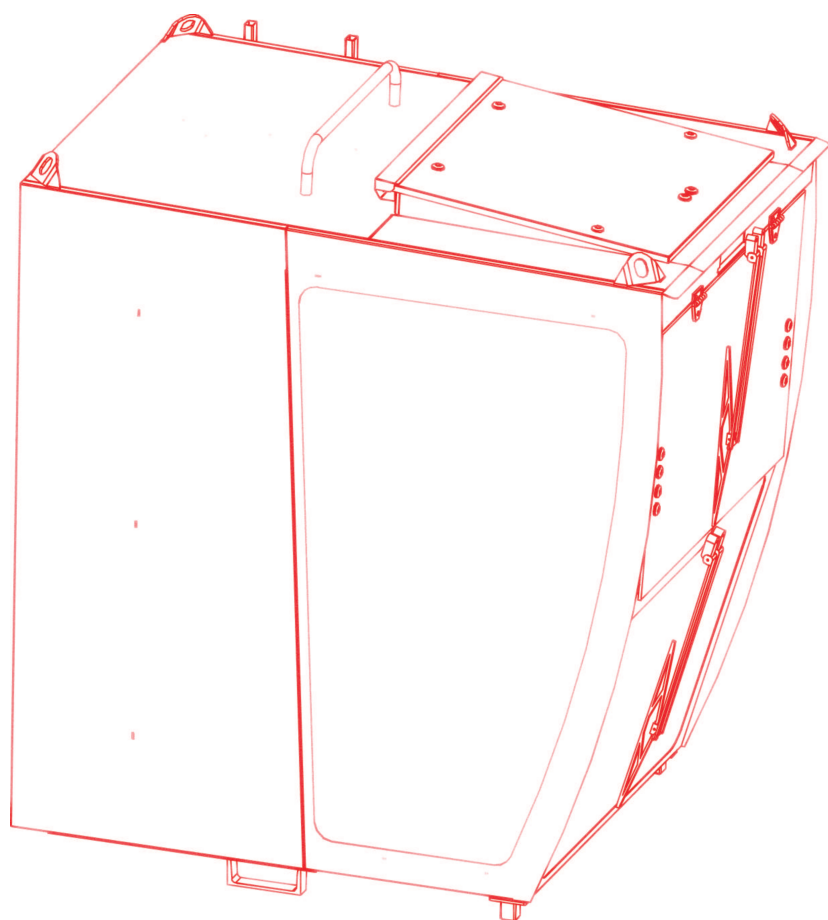


Slewing tower crane

WOLFF 355 B

Crane operator's manual



English

English



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Stand: 11/2014

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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 Using this documentation

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

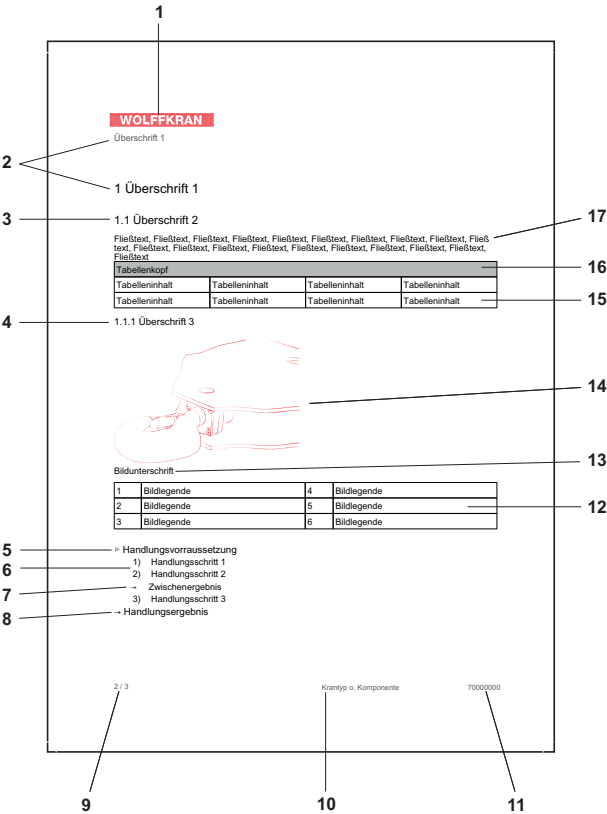
	NOTICE
	Note header Info text

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 Using this documentation

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 to 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 Using this documentation

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 Using this documentation

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



Turmdrehkran / Tower crane / Grue à tour

Typ:

Type:

Type:

Werk-Nr.:

Factory-No.:

N° de construction:

Baujahr:

Year of construction:

Année de construction:



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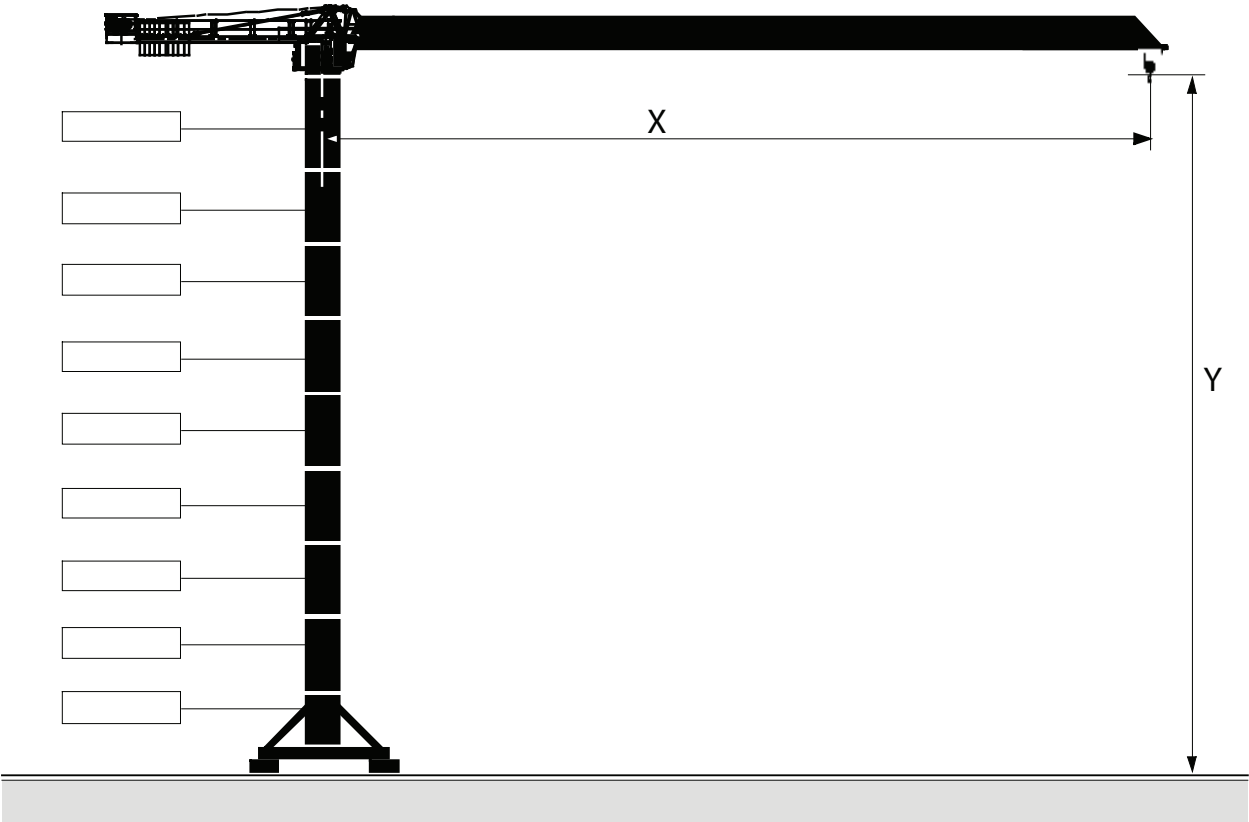
Telefon: +49 7131 9815-0 / Telefax: +49 7131 9815-355 / www.wolffkran.de

30049076

Identification plate

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

1 Using this documentation



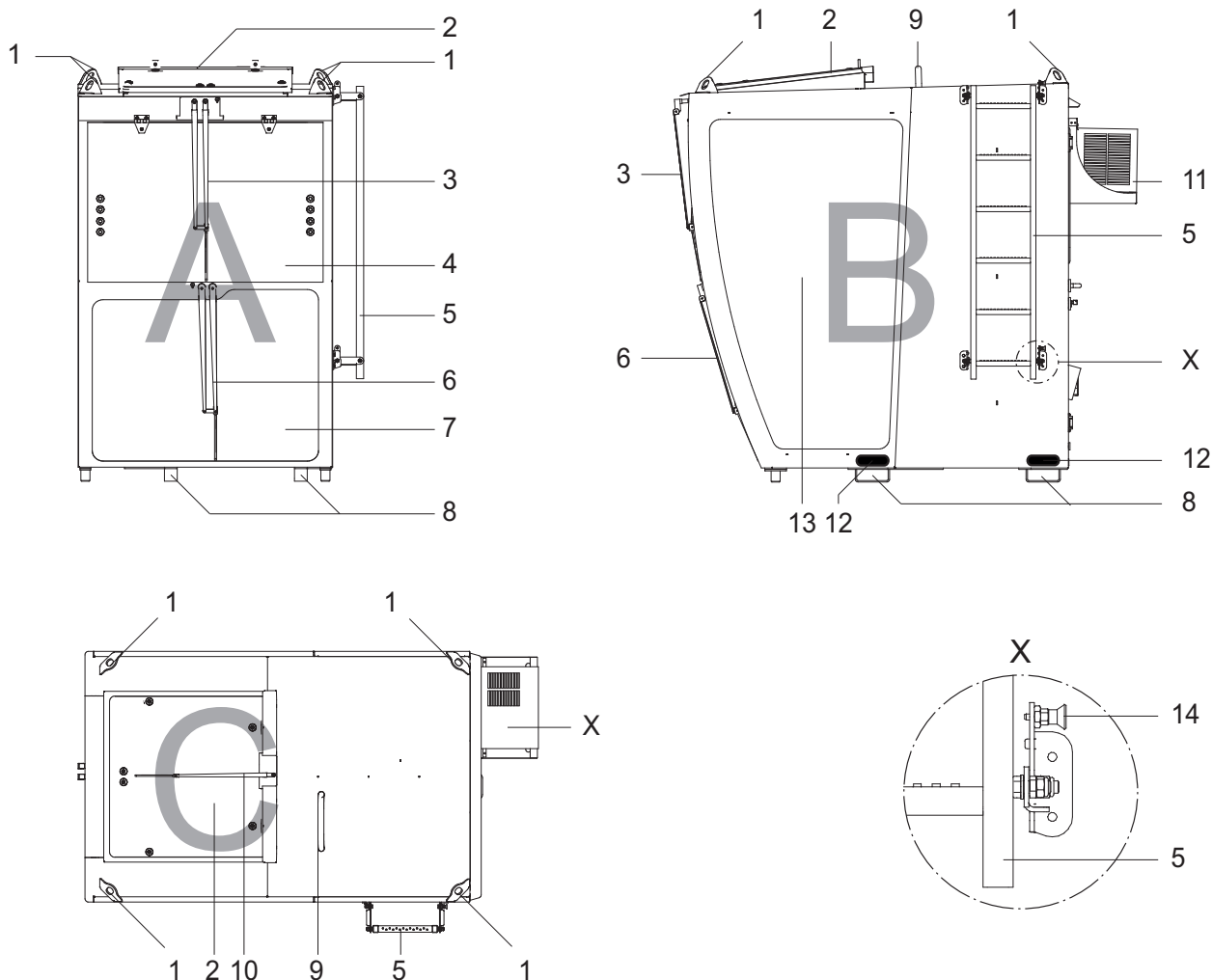
Tower configuration example

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

	NOTICE
	Non-standard assembly Specify details of any non-standard tower assemblies.

2 Operating and control elements

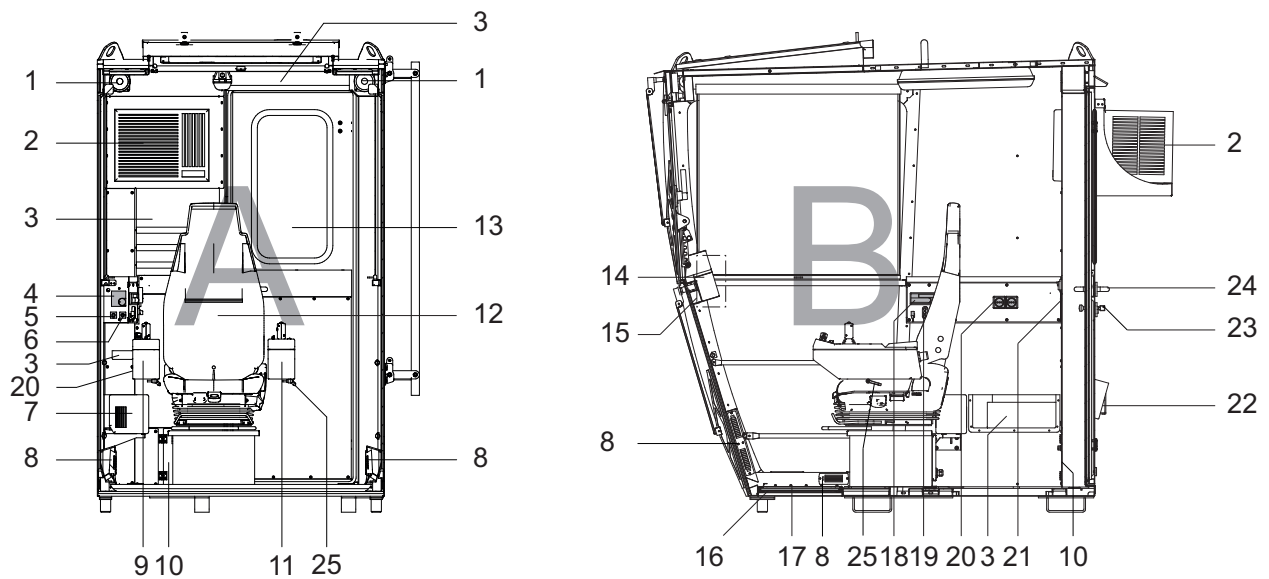
2.1 Operator cabin FHE 06



Exterior view

1	Lifting eyes	7	Front screen (bottom)	13	Side screen
2	Roof screen, folding	8	Shoes for fork-lift truck	14	Retaining pin for ladder
3	Front screen wiper (top) with washer system	9	Safety bracket for personal protective equipment DANGER! No clevis type eyelet!	A	Front view
4	Front screen (folds upwards)	10	Roof screen wiper	B	Side view
5	Ladder, folding	11	A/C unit (optional)	C	Top view
6	Front screen wiper (bottom) with washer system	12	Rubber bump (mark for fork-lift truck)	X	Detail X

2 Operating and control elements

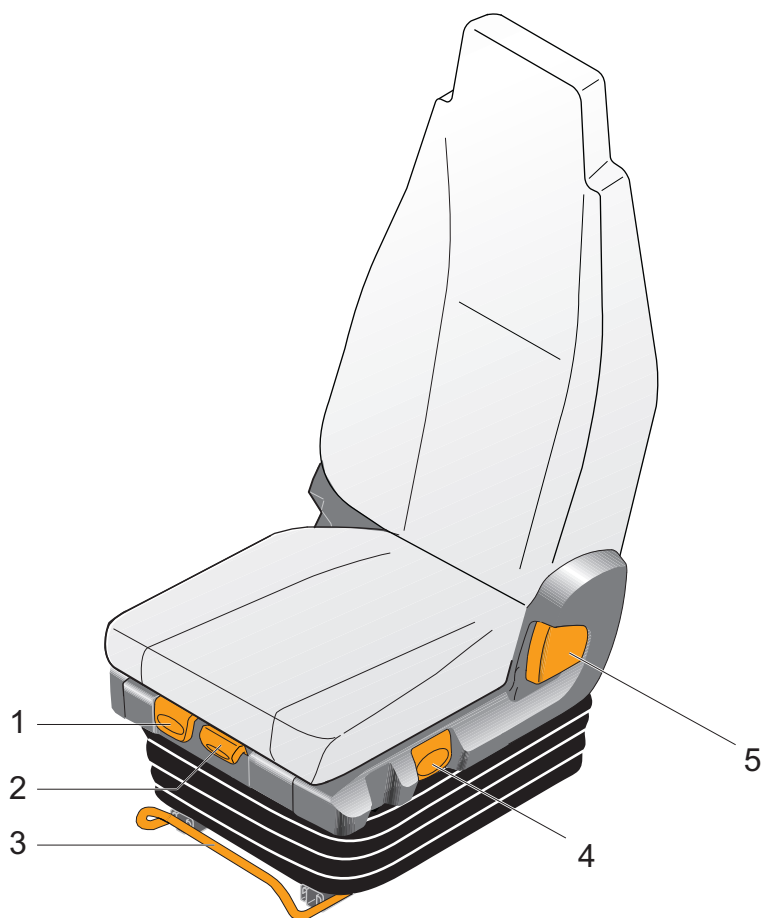


Interior view

1	Loudspeaker	10	Water tank (window washer)	19	Handsfree set (Bluetooth)
2	A/C unit (optional)	11	Left control console (hinged, folds up)	20	Power outlets (230 V, 10 A)
3	Storage compartments	12	Seat	21	Socket (230 V, 10 A) and light switch
4	Thermostat (heater) adjustable from 5°C to 30°C	13	Door (lockable), with window	22	Plug-in connection for electrical cables to the control cabinet
5	Heating switch	14	Computer (right-hand side, option)	23	Door lock (opens from the inside even if locked)
6	Ventilation switch	15	Monitor (left-hand side)	24	Door handle
7	Drinks cooler/heater	16	Floor grid	25	Length adjustment for control console, right-hand side
8	Ventilation / heating aperture	17	Floor screen (folding)	A	Front view
9	Right control console	18	Radio	B	Side view

Max. power consumption of all sockets 3 kW.

2.2 Adjusting the cabin seat



1	Inclination adjustment	4	Height adjustment
2	Seat cushion depth adjustment	5	Backrest adjustment
3	Horizontal adjustment		

Adjusting the seat inclination

> How to change the inclination of the seat:

- 1) Pull up the lever (1).
 - 2) Put weight on the front section of the seat and relieve it again to set the seat to the desired inclination.
 - 3) Let the lever (1) snap home as soon as you have reached the desired inclination.
- You completed the seat inclination adjustment.

2 Operating and control elements

Adjusting the seat cushion depth

> How to adjust the depth of the seat cushion:

- 1) Pull up the lever (2).
 - 2) Push the seat cushion forward and back until you reach the desired seat cushion position.
 - 3) Let the lever (2) snap home as soon as you have reached the desired seat cushion depth.
- You completed the seat cushion depth adjustment.

Adjusting the horizontal seat position

> How to adjust the horizontal seat position:

- 1) Pull up the lever (3).
 - 2) Move the seat to the desired position.
 - 3) Let the lever (3) snap home as soon as the seat has reached the desired position.
- You completed the horizontal seat position adjustment.

Adjusting the seat height

> How to adjust the seat height:

- 1) Pull up the lever (4).
→ The seat moves up.
 - 2) Let the lever (4) snap home as soon as you have reached the desired seat height.
 - 3) Press the lever (4) down.
→ The seat lowers.
 - 4) Let the lever (4) snap home as soon as you have reached the desired seat height.
- You completed the seat height adjustment.

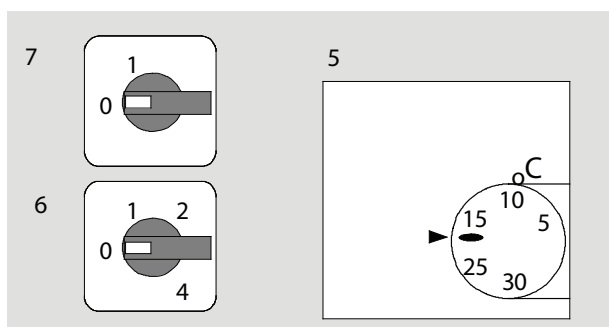
Adjusting the backrest

> How to adjust the backrest:

- 1) Pull the lever (5) forward.
 - 2) Sit in the chair and push back against the backrest until it is in the desired position.
 - 3) Release the lever (5) as soon as the backrest is in the desired position.
- You completed the backrest adjustment.

2.3 Adjusting the cabin heating and ventilation

	NOTICE
	Make sure that you do not obstruct the side air vents.



5	Thermostat	7	Switch 7 (heating)
6	Switch 6 (ventilation)		

	NOTICE
	For safety reasons, the heating is deactivated automatically after the crane has been idle for a specific period of time. It can always be restarted by operating a master switch.

Deactivating the heating

- > How to deactivate the cabin heating.
- ▶ Turn the switch (7) to 0 position.
- The heating shuts down.

Activating the heating.

- > How to activate the heating of the operator cabin.
- 1) Set the temperature as required on the thermostat (5).
- 2) Turn the switch (7) to 1 position.
- The heating is now active and runs up to the temperature you set.

Deactivating the ventilation

- > How to deactivate the cabin ventilation.
- ▶ Turn the switch (6) to 0 position.

2 Operating and control elements

→ The ventilation shuts down.

Activating the ventilation

> How to activate the ventilation.

► Set the selector switch (6) to a position between 1 and 4.

→ The ventilation is now activated.

NOTICE! Use the ventilation to control the heating power output by the active heating. Select level 1 or 2 to maintain room temperature. You can raise the temperature inside the operator cabin by selecting level 3 or 4.

Setting up the automatic heater control system

	NOTICE This setup can only function properly if the correct time was set at the crane controller and power to the slewing tower crane is not shut down for the night.
---	--

> How to set up the preheating temperature for the next working day.

1) At the end of work, set the temperature as required on the thermostat (5).

2) Turn the switch (7) to position 1.

3) Turn the selector switch (6) to one of the positions 1 to 4.

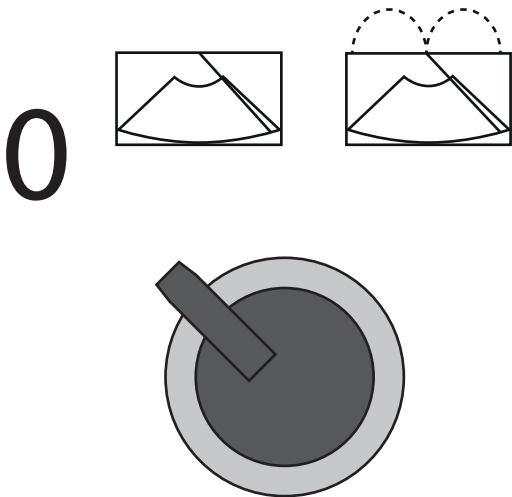
NOTICE! The heater is automatically switched off after a certain time has elapsed.

→ The heater is automatically switched on at the time you set (setting range 00:00 to 23:00 h) (also refer to page: [100]).

2.4 Using and topping up the window washer

2.4.1 Using the window washer

The selector switch for using the window washer for the upper front screen is in the top row of switches at the left-hand side control console.

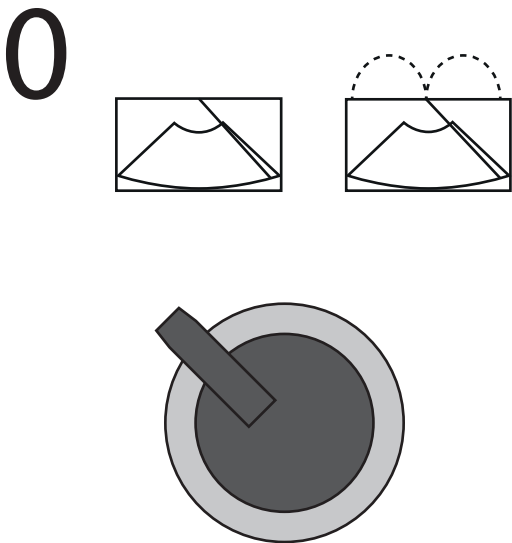


Window washer upper front screen

Position	Illustration	Description
1	0	Position 'Off'
2		Position of the top front wiper
3		Position of the window washer + top front wiper

2 Operating and control elements

The selector switch for using the window washer for the bottom front screen is in the bottom row of switches at the left-hand side control console.



Window washer bottom front screen

Position	Illustration	Description
1	0	Position 'Off'
2		Position of the bottom front wiper
3		Position of the window washer + bottom front wiper

Switching on the front wiper

- > How to switch on the top or bottom front wiper:
 - ▶ Set the respective selector switch to position 2.
 - You switched the front wiper on.

Switching on the window washer

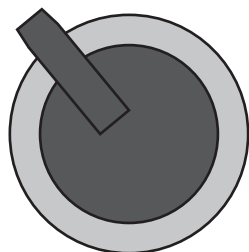
- > How to switch on the top or bottom window washer:
 - ▶ Set the respective selector switch to position 3.
 - You switched the window washer on.

Switching the window wiper or washer off

- > How to switch off the window wiper or washer:
 - ▶ Set the respective selector switch to position 1.
 - You switched off the window wiper or washer.

2 Operating and control elements

0



Roof screen wiper

Position	Illustration	Description
1	0	Position 'Off'
2		Position of the roof screen wiper

Switching on the roof screen wiper

> How to switch on the roof screen wiper:

► Set the selector switch to position 2.

→ You switched the roof screen wiper on.

Switching off the roof screen wiper

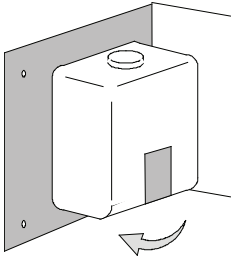
> How to switch off the roof screen wiper:

► Set the selector switch to position 1.

→ You switched the roof screen wiper off.

2.4.2 Topping up the water reservoir of the windshield wiper unit

The water reservoir is installed on the rear of the operator cabin.

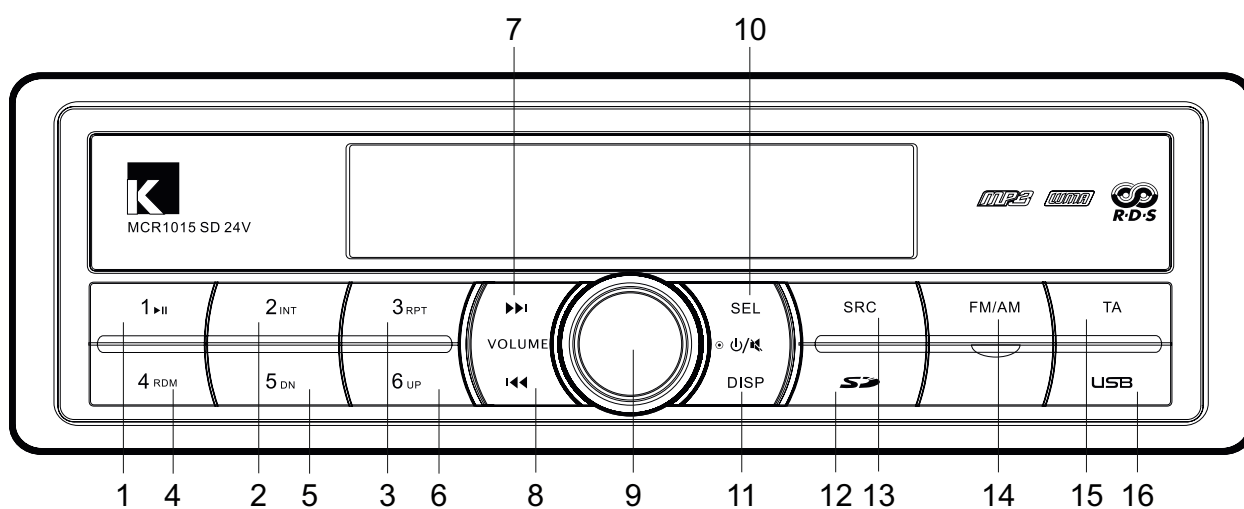


- > The water reservoir of the windshield wiper unit is empty.
- 1) Open the panel on the rear of the operator cabin.
- 2) Top up the washing water reservoir.
- 3) Close the panel.
- You refilled the water reservoir.

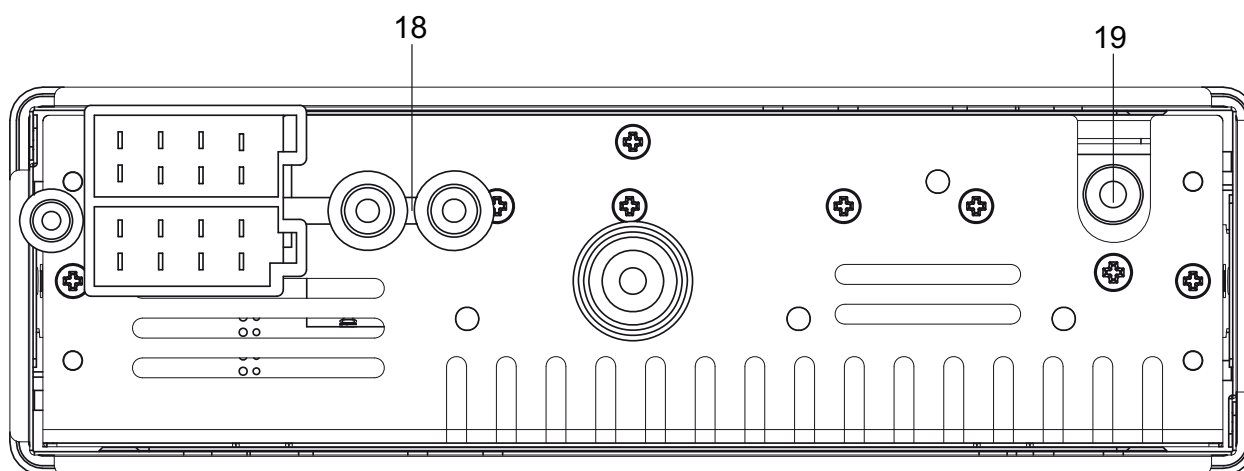
2 Operating and control elements

2.5 Radio

2.5.1 How to operate



Control elements of the radio



Rear of the radio

1	Play / Pause	11	Press to indicate time of day Hold to set time of day Radio mode: Display of PTY Info / system time / radio station MP3 mode: Display of folder name / file name / ID 3 TAG / time
2	Intro replay (10 sec.)	12	SD card slot
3	MP3 repeat mode	13	Input selection Radio SD card (if plugged in) USB (if connected) AUX input
4	MP3 random mode	14	In radio mode, press once or repeatedly to select the band FM 1 FM 2 FM 3 AM 1 AM 2 Hold to automatically set the stations with the strongest signals to memory keys 1 to 6
5	Last MP3 folder	15	Recognition of traffic radio stations
6	Previous MP3 folder	16	USB slot
7	Radio mode: Auto station scan forward MP3 mode next song	17	Press radio station keys 1 - 6 to change to next preset station. Keep pressed for more than 2 seconds to store current radio station.
8	Radio mode: Auto station scan backward MP3 mode previous song	18	AUX IN
9	Switching on Mute When switched on, press and keep pressed to switch off Volume setting (turn the knob)	19	Antenna
10	Push to select VOL / LOUD / PTY / AF / BAS / TRE / BAL / FAD and turn volume knob to change settings Hold to select EQ preset: EQ OFF / CLASSIC / POP / ROCK / FLAT, turn volume knob to select		

2 Operating and control elements

2.5.1.1 MP3 play

Previous / next song

- ▶ Press the << (8)/ >> (7) key to listen to the previous or next song.

Fast-forward / rewind

- ▶ Keep the << (8)/ >> (7) key pressed to fast-forward or rewind.

Quick search for MP3 title

- 1) Press the DN key (5) to go to the previous MP3 file.
- 2) Press the DN key (6) to go to the next MP3 file.

2.5.1.2 Setting the clock

- 1) Press the DISP key (11) until the clock is displayed.
- 2) Keep the DISP key (11) pressed for longer than 2 seconds.
→ The minutes display flashes.
- 3) Now, use the volume control knob (9) to set the minutes.
- 4) Press the DISP key (11).
→ The hour display flashes.
- 5) Now, use the volume control knob (9) to set the hours.
- 6) Press the DISP key (11).
→ The setting process is confirmed and completed.

2 Operating and control elements

2.5.1.3 System settings

- > The clock is not indicated.
- 1) Keep the DISP key (11) pressed for longer than 2 seconds.
 - The system menu is indicated.
- 2) Now, use the volume control knob (9) to change the settings.
 - BEEP → TAVOL → RETUNE

BEEP

- 1) Set BEEP to "on" to switch the key sound on.
- 2) Set BEEP to "off" to switch the key sound off.
 - The key sound is switched on / off.

TAVOL

- Now, you can use the volume control knob (9) to change the volume of the traffic radio announcements.

RETUNE

Set the time interval for the TA search in FM mode.

- Retune-L: long, time interval is 180 seconds
- Retune-S: short, time interval is 45 seconds

2.5.1.4 Radio station settings

Automatic station scan

Press the << (8)/ >> (7) keys to automatically change to the previous or next available radio station.

Manual station scan

- 1) Keep the << (8)/ >> (7) keys pressed for longer than 2 seconds.
- 2) Press the << (8)/ >> (7) keys for a step-by-step scan.

Manual saving of radio stations

NOTICE! Up to 30 stations can be saved.

- Push and hold the buttons 1-6 (1-6) in FM 1 / FM 2 / FM 3 / AM 1 / AM 2 mode.
- The current radio station is saved to the respective memory key (1-6).

2 Operating and control elements

2.5.1.5 RDS

- 1) Press the SEL key (10) to set AF.
- 2) Turn the volume knob (9) to switch the AF function on or off.
→ AF is switched on / off.
- 3) Press the SEL key (10) to set PTY.
- 4) Turn the volume knob (9) to indicate NEWS.
→ NEWS is indicated.
- 5) Press the memory keys 1-6 (1-6) to make the following settings:
→ 1-SPORT/ 2-DRAMA/ 3-CULTURE/ 4-WEATHER/ 5-TRAVEL/ 6-SOCIAL
- 6) Turn the volume knob (9) to indicate POP M.
→ POP M is indicated.
- 7) Press the memory keys 1-6 (1-6) to make the following settings:
→ 1-ROCK/ 2-EASY/ 3-LIGHT/ 4-CLASSICS/ 5-JAZZ/ 6-FOLK
→ AF and PTY are set.

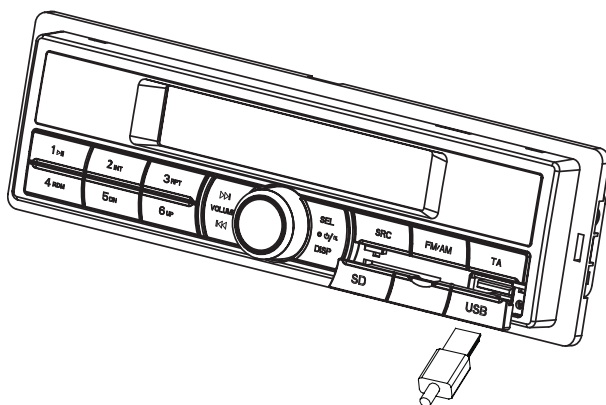
2.5.1.6 EQ/ LOUD mode

- 1) Keep the SEL key (10) pressed for longer than 2 seconds.
→ The EQ menu is indicated.
- 2) Turn the volume knob (9) to make settings.
→ EQ OFF/ CLASSIC/ POP/ ROCK/ FLAT
→ The EQ is set.

2 Operating and control elements

2.5.2 Overview of USB/ SD functions

	NOTICE
	1) Supports SD / MMC cards. 2) Supports USB flash memory 2 in 1. 3) FAT 16/ FAT 32 file system can be used. 4) USB 1.1/ USB 2.0 support. 5) WMA support. 6) Maximum number of MP3 files: 1000. Maximum number of folders: 999. 7) Max. supported USB memory size: 8 GB. Best performance with a maximum of 500 songs and 30 folders. 8) Not all types of USB devices are supported.



USB radio

- 1) Plug a USB / SD memory into the respective slot (12 (16)).
 - The display indicates USB / SD.
 - Playing starts automatically.
- 2) To interrupt playing from a USB / SD device, use the SRC key (13) to switch to another input source (radio, AUX).
- 3) Then, disconnect the USB / SD device.

2.5.3 Technical data

Power supply	24 V DC
Maximum power	4 x 10 W
Loudspeaker impedance	4 Ω
Power consumption in standby mode	≤ 5 mA
Weight	0.8 kg
Dimensions (W x D x H) [mm]	178 x 119.8 x 50

2 Operating and control elements

2.5.4 Troubleshooting

Malfunction	Cause	Remedy
Unit does not start	Cable not properly connected Fuse blown	Check cable connections. Replace fuse.
No sound	Volume is turned off Radio is set to mute	Change the volume. Un-mute the radio.
No reception	Antenna not properly connected	Properly connect the antenna.
Bad reception	Antenna defective Antenna not fully extended	Replace the antenna by a new one. Fully extend the antenna.
Preset radio stations are lost	Power supply not properly connected	Properly connect the power supply.
USB / SD memory devices cannot be plugged in	Wrong side of USB / SD memory devices faces up	Turn the USB / SD memory device around and plug it in in proper position.
USB / SD memory device cannot be read	NTFS format is not supported	Check whether the file system is in FAT or FAT32 format.

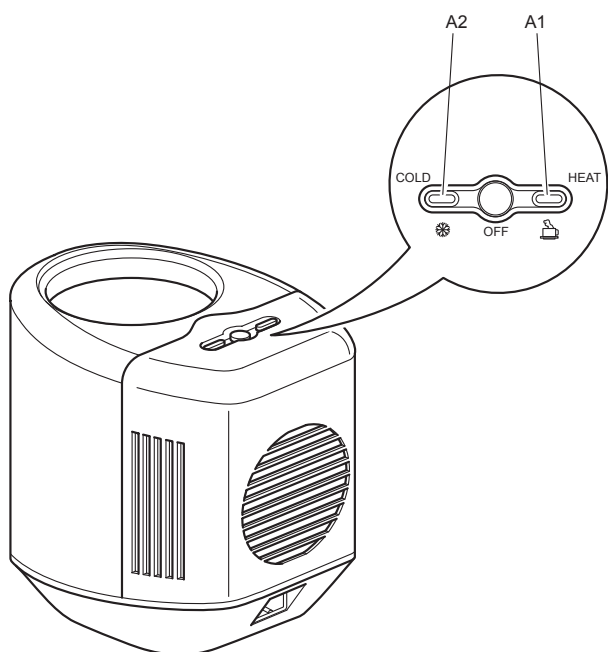
2.6 Drinks cooler

CAUTION

Improper cleaning.

Damage to the drinks cooler.

- 1) Never clean the device under running water.
- 2) Do not use aggressive or abrasive agents or hard tools to clean the device.



Drinks cooler

Cooling of drinks

NOTICE! The cooling function of the device does not switch off automatically. The drinks may freeze.

- 1) Press the COLD key (A2).
 - The operation indicator lights up.
 - The device starts cooling.
- 2) To stop cooling, press the OFF key.
 - The operation indicator goes out.
 - The device stops cooling.

2 Operating and control elements

	! WARNING Risk of scalding and bursting cups due to heating. Scalding or serious injuries due to heated liquids. > You want to heat a drink. 1) Always open the container of the drink before heating. 2) The drink may be up to 60°C hot. Let the drink cool down before drinking.
---	--

Heating of drinks

NOTICE! Always open the bottle before heating.

1) Press the HEAT key (A1).

→ The operation indicator lights up.

→ The device starts heating.

NOTICE! The device automatically stops heating when the drink has reached a temperature of approx. 60°C. This prevents overheating of the device. The device resumes heating when the temperature of the drink drops.

2) To stop heating, press the OFF key.

→ The operation indicator goes out.

→ The device stops heating.

2.7 Handsfree set

2.7.1 Setting up a Bluetooth connection

How to set up a Bluetooth connection for the first time

NOTICE! The handsfree set has a memory which saves the IDs of up to 8 cell phones. When another cell phone connection is saved, the oldest memory entry will be deleted.

NOTICE! 2 cell phones can be connected to the handsfree set simultaneously. The cell phone connected last has priority.

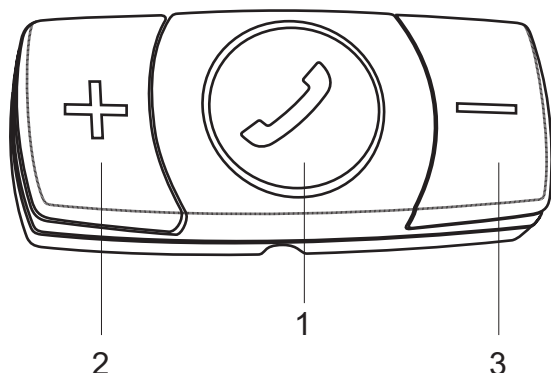
> How to set up a Bluetooth connection for the first time:

- 1) Enable the Bluetooth function of your cell phone.
- 2) Run a search for Bluetooth devices.
 - A device with the name CC 9048 is found.
- 3) Enter the PIN number 1234.

→ A connection between the handsfree set and your cell phone is set up via Bluetooth.

2 Operating and control elements

2.7.2 Using the handsfree set



1	Center key	3	Minus key
2	Plus key		

Status	Description	Press Plus key 1 x
Standby	When the handsfree set is not connected to the cell phone.	Volume up
Connected	When the handsfree set is connected to the cell phone (or 2 cell phones); no call has been set up.	
Ringing	When the handsfree set is connected to the cell phone and an incoming call is announced.	
Active call	When the handsfree set is connected to the cell phone and you are making a call.	

Status	Description	Press Minus key 1 x
Standby	When the handsfree set is not connected to the cell phone.	Volume down
Connected	When the handsfree set is connected to the cell phone (or 2 cell phones); no call has been set up.	
Ringing	When the handsfree set is connected to the cell phone and an incoming call is announced.	
Active call	When the handsfree set is connected to the cell phone and you are making a call.	

Status	Description	Press Receiver key 1 x
Standby	When the handsfree set is not connected to the cell phone.	Auto connection on / off.
Select language	After reset to factory settings.	Select current language.
Connected	When the handsfree set is connected to one or two cell phones.	Calling the voice tags stored in the cell phone (language selection).
Incoming calls		Taking a call.

Status	Description	Press Receiver key 1 x
Incoming calls	When the handsfree set is connected to the cell phone and you are making a call.	Ending the first call and taking the incoming call.
Active call		Ending the call.

Status	Description	Keep Receiver key pressed for 2 seconds
Standby	When the handsfree set is not connected to the cell phone.	Multipoint on / off (1 x beep = off, 2 x beep = on)
Connected	When the handsfree set is connected to one or two cell phones.	Cutting the connection between the handsfree set and the cell phone(s).
Incoming calls		Rejecting a call.
	When the handsfree set is connected to the cell phone and you are making a call.	Rejecting the second incoming call.
Active call		Switching from handsfree mode to private mode and back

Status	Description	Press Receiver key 2 x
Connected	When the handsfree set is connected to one or two cell phones.	Redial.
Active call		Setting

Status	Description	Keep Plus and Minus keys pressed for 4 seconds
Standby	When the handsfree set is not connected to the cell phone.	Audio options (1 x beep, 2 x beep, 3 x beep)
Connected	When the handsfree set is connected to one or two cell phones.	Switching DSP* on and off in the cell phone (1 x beep = off, 2 x beep = on)
Active call		Switching DSP on and off in the handsfree set

Status	Description	Keep Plus key pressed for 10 seconds
Standby	When the handsfree set is not connected to the cell phone.	Voice tags on / off (1 x beep = off, 2 x beep = on)

Status	Description	Keep Minus key pressed for 10 seconds
Standby	When the handsfree set is not connected to the cell phone.	Reset to factory settings

2 Operating and control elements

Status	Description	Keep Plus and Center keys pressed for 4 seconds
Standby	When the handsfree set is not connected to the cell phone.	AUX-IN on / off (1 x beep = off, 2 x beep = on)
Connected	When the handsfree set is connected to one or two cell phones.	AUX-IN on / off (1 x beep = off, 2 x beep = on)

Status	Description	Keep Plus and Center keys pressed for 4 seconds
Standby	When the handsfree set is not connected to the cell phone.	Phone audio (1 x beep = off, 2 x beep = on)
Connected	When the handsfree set is connected to one or two cell phones.	Phone audio (1 x beep = off, 2 x beep = on)

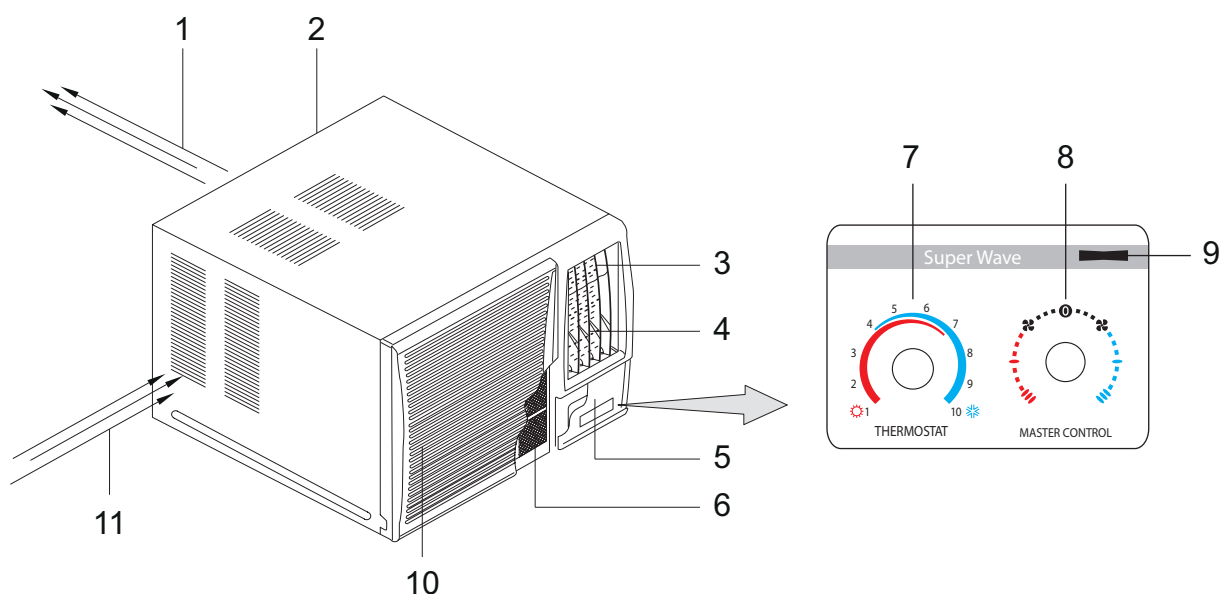
2.8 A/C unit (optional)



NOTICE

An A/C unit is available as an option.

The retrofit kit can be ordered from WOLFFKRAN with the A/C unit (Art.-No.: 30052749) or without the A/C unit (Art.-No.: 30052750). If you order the retrofit kit without A/C unit, you need to purchase an A/C unit separately.

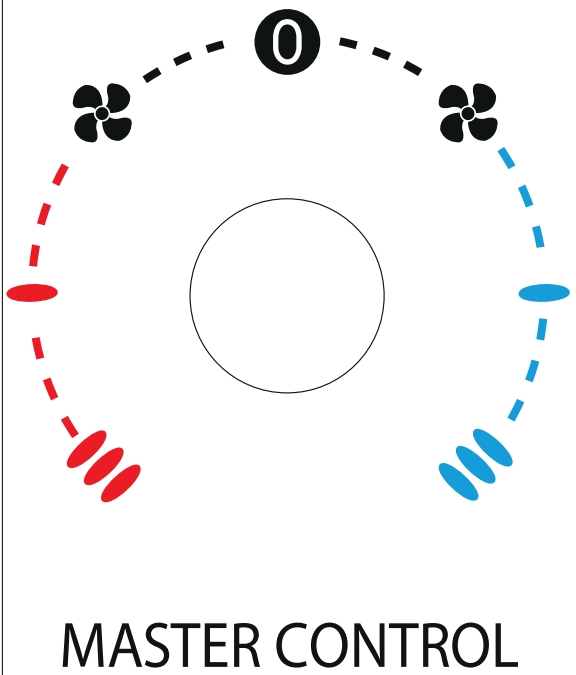


1	Exhaust air	7	Thermostat
2	Condensate line (rear)	8	Main selector switch
3	Direction of air flow left/right	9	Super Wave switch
4	Direction of air flow up/down	10	Front panel
5	Operator panel cover	11	Air inlet (both sides)
6	Air filter		

The A/C unit at the rear of the operator cabin can be used for heating and cooling of the cabin interior.

2 Operating and control elements

2.8.1 Main selector switch

Main selector switch	Position	Function
 MASTER CONTROL	 max. heating power (red)	Very fast heating with high fan speed
	 low-noise (red)	Heating at low fan speed.
	 max. fan speed	Maximum air recirculation without heating or cooling for cleaning the cabin air.
	 Off	The A/C unit is switched off.
	 low fan speed	Low air recirculation without heating or cooling for cleaning the cabin air.
	 low-noise (blue)	Cooling at low fan speed.
	 max. cooling power (blue)	Very fast cooling at high fan speed

Cooling

- > How to reach maximum cooling power (blue):
 - ▶ Set the main switch to "*max. cooling power (blue)*" position .
 - Simultaneously with cooling, the A/C unit provides maximum dehumidification, air circulation, and contamination filtering.
- > How to cool the cabin with minimum noise in the interior:
 - ▶ Set the main selector switch to "*low-noise (blue)*" .
 - The cabin is cooled with low noise emission.

Heating

- > How to reach maximum heating power (red):
 - ▶ Set the main switch to "*max. heating power (red)*" .
 - Simultaneously with heating, the A/C unit provides maximum air circulation.
- > How to heat the cabin with minimum noise in the interior:
 - ▶ Set the main selector switch to "*low-noise (red)*" .
 - The cabin is heated with low noise emission and lower heating power.

Air circulation

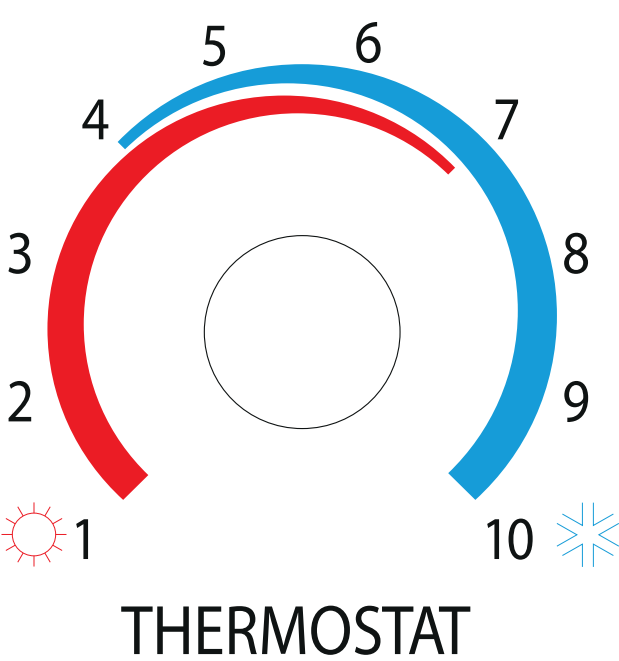
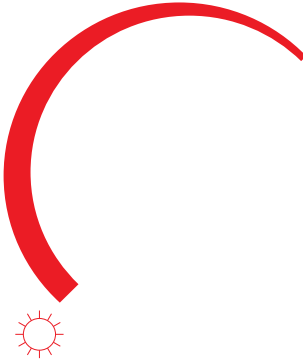
- > How to reach high air circulation in the cabin without heating or cooling:
 - ▶ Set the main switch to "*max. fan speed*".
 - The air is circulated and cleaned at the same time.
- > How to reach low-noise air circulation in the cabin without heating or cooling:
 - ▶ Set the main switch to "*low fan speed*".
 - The air is circulated and cleaned at the same time.

Switching off the A/C unit

- > How to switch off the A/C unit:
 - ▶ Set the main selector switch to "*OFF*".
 - You switched the A/C unit off.

2 Operating and control elements

2.8.2 Thermostat

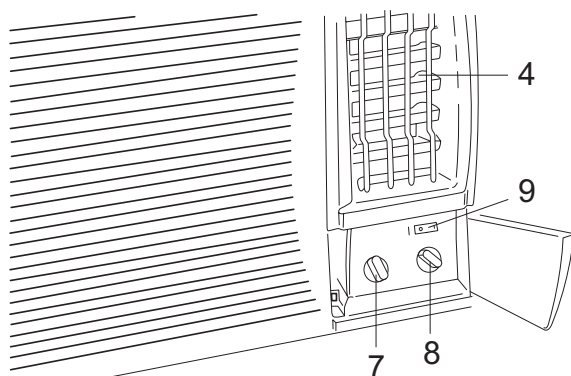
Thermostat	Position	Function
 THERMOSTAT	 Heating (red)	Here, adjust the setpoint temperature for heating.
	 Cooling (blue)	Here, adjust the setpoint temperature for cooling.
	1-10	Temperature areas.

Selecting a temperature

> How to choose an agreeable cabin temperature:

- 1) For cooling, turn the thermostat switch clockwise to the desired temperature area.
 - The A/C unit cools.
 - 2) For heating, turn the thermostat switch counter-clockwise to the desired temperature area.
 - The A/C unit heats.
- You selected the temperature.

2.8.3 Super Wave



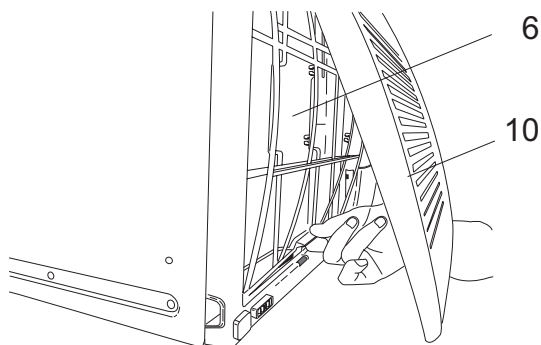
4	Direction of air flow up/down	8	Main selector switch
7	Thermostat	9	Super Wave switch

Function

The Super Wave function automatically blows air from the left to the right side. For a constantly changing direction of the air flow, leave the Super Wave switch (9) in "ON" position. Use the horizontal slats for air flow direction up/down (4) to achieve an additional up and down movement of the air flow. Set the Super Wave switch (9) to "OFF" to have the Super Wave remain in the current fan position; now, the air flow will not move any more.

2 Operating and control elements

2.8.4 Cleaning the air filter



6	Air filter	10	Front panel
---	------------	----	-------------

- > The air filter is contaminated.
 - > The air circulation power is diminished.
- 1) Open the front
 - 2) To remove the air filter (6), pull up the handle of the air filter (6) and pull the air filter (6) out of the housing.
 - Use a vacuum cleaner to remove dust and dirt from the air filter (6), or wash the air filter (6) in water with a synthetic cleaning agent.
DANGER! Never clean the filter with hot water (more than 40°C), alcohol, benzene, paint thinner, or other volatile chemicals.
 - 1) Allow the air filter (6) to dry thoroughly before replacing it in the housing.
 - 2) Use a slightly moistened cloth to remove dust and dirt from the housing.
 - 3) Wipe the housing down with a dry cloth.
 → You have dried the air filter.
 - 4) Put the air filter (6) back in the housing.
 - 5) Close the front panel (10).
- You have cleaned the air filter.

2.8.5 Malfunctions

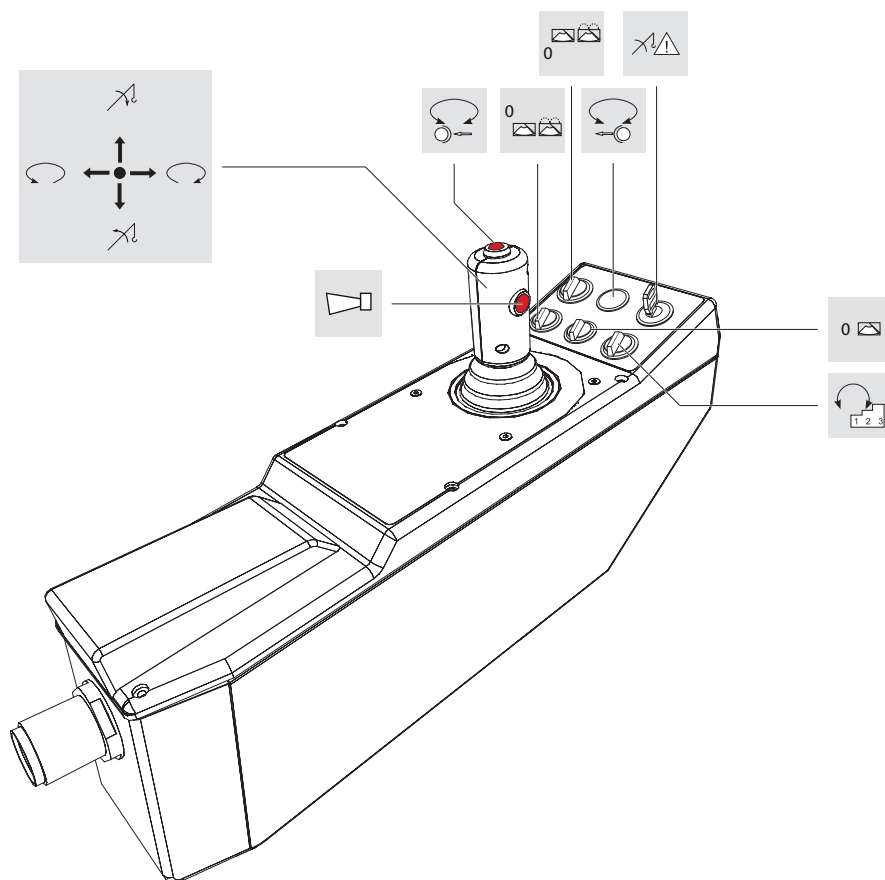
Error	Description	Cause / remedy
Noise emission	You hear liquid running during operation, after switching on or shortly before startup of the compressor.	Cooling agent runs through the pipes.
	You hear a low creaking noise during operation.	The creaking noise is caused by the expanding and shrinking of the cover when the temperature changes.
	You sometimes hear a low hissing noise when the heating is on.	This noise is caused by the automatic de-icing function of the heating.
Development of smell	The A/C unit smells.	The smell is possibly attributable to cigarette smoke or other external sources that got into the interior of the A/C unit.
Development of steam or smoke	During cooling, the A/C unit emits a small amount of steam.	This is attributable to sudden cooling of the room air by the air emitted from the A/C unit, resulting in formation of condensate and steam.
	During heating, the fan may stop and steam may rise from the A/C unit.	This is attributable to the de-frosting function.
The air flow is interrupted	During heating, the unit briefly switches off for approx. 6 to 12 minutes while automatic de-icing is carried out.	During de-icing, the control light (red) flashes slowly.
No operation	The A/C unit does not work.	Check the power plug.
		Power failure.
		Check the fuse.
		Main selector switch is set to "OFF".
Poor cooling performance	Poor cooling or heating performance.	The air filter is soiled and must be cleaned.
		The air intake or exhaust air channels are blocked. Clean out the air channels.
		The temperature is not set properly. Check the temperature setting.
		The door or the windows of the cab are open. Close the windows and door.
		The cooling performance is reduced by strong sunlight. Lower the blinds.

2 Operating and control elements

2.9 Control consoles

The control consoles are installed on the right and left side of the crane operator's seat. The left control console can be folded up for access to the seat. For additional information about the control consoles, refer to the chapters below.

2.9.1 Left control console

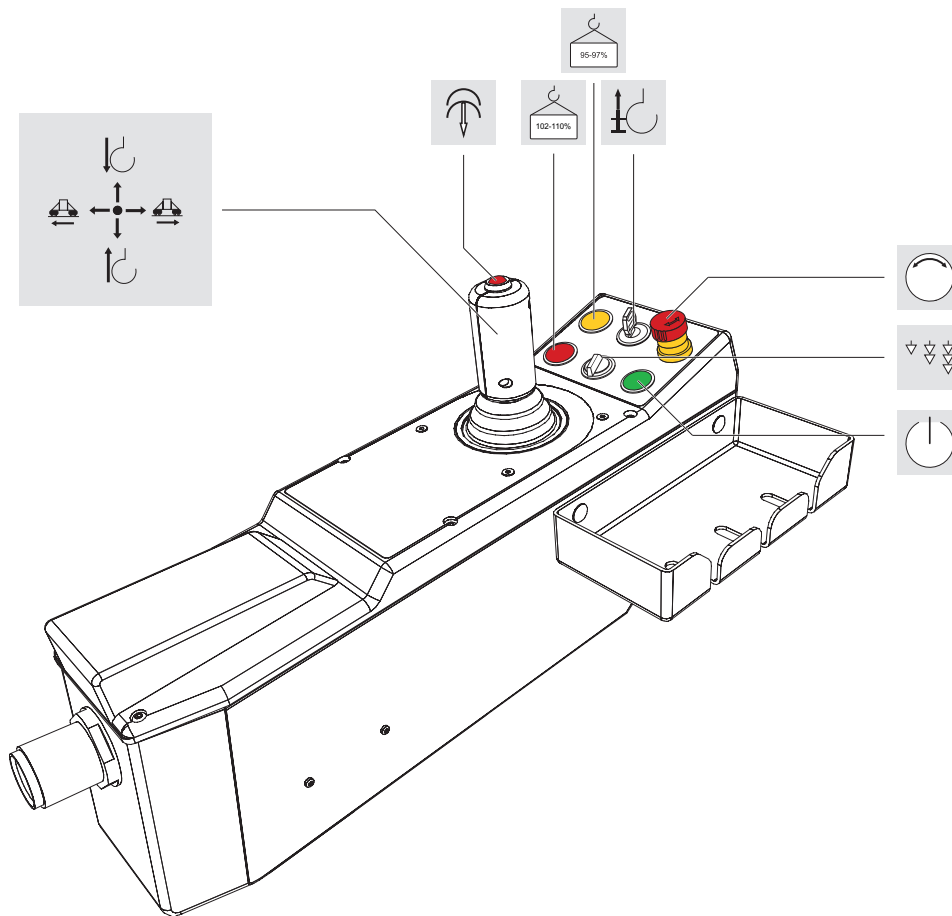


	Upper pushbutton Applies the slewing gear brake.
	Master switch forward Increases the operating radius.
	Master switch backward Decreases the operating radius.
	Master switch to right-hand side Slews the jib to right-hand side.
	Master switch to left-hand side Slews the jib to left-hand side.
	Side-mounted pushbutton Enables the warning horn.
	Pushbutton Sets the crane to windvaning mode. Slewing gear brake(s) are released and locked.

2 Operating and control elements

	Selection switch Activates the windshield wiper or the window washer at the top screen. Information on operating the windshield wiper. [23]
	Selection switch Activates the windshield wiper or the window washer at the bottom screen. Information on operating the windshield wiper. [23]
	Selection switch Sets the acceleration and braking forces for the slewing gear. Information on setting the acceleration and braking forces. [68]
	Selection switch Activates the windshield wiper at the roof screen. [23]
	Key-operated switch After the overload protection has been enabled, the jib will be luffed in.

2.9.2 Right control console



	Upper pushbutton The hoisting velocities for all master switch positions are reduced to 25 % as long as the pushbutton is pressed. As long as the pushbutton () is pressed while the master switch (6) is in zero position: ▪ The brake remains in released state. ▪ The hoisting gear holds the load in standstill. Work can be continued without delay. The pushbutton also reduces the speed of the radius adjustment.
	Master switch forward Lowers the load hook.
	Master switch backward The load hook is lifted.
	Master switch to right-hand side The crane travels towards direction 1.

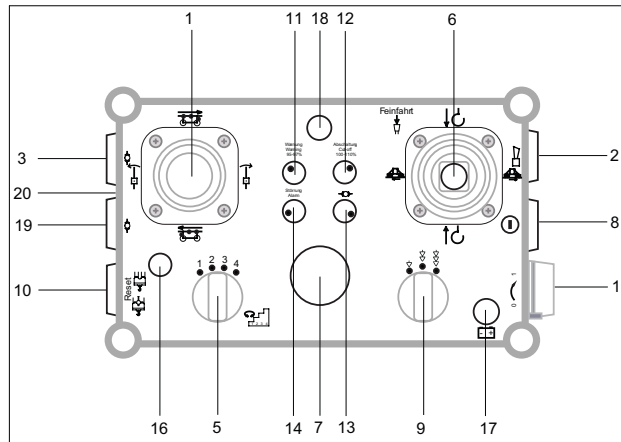
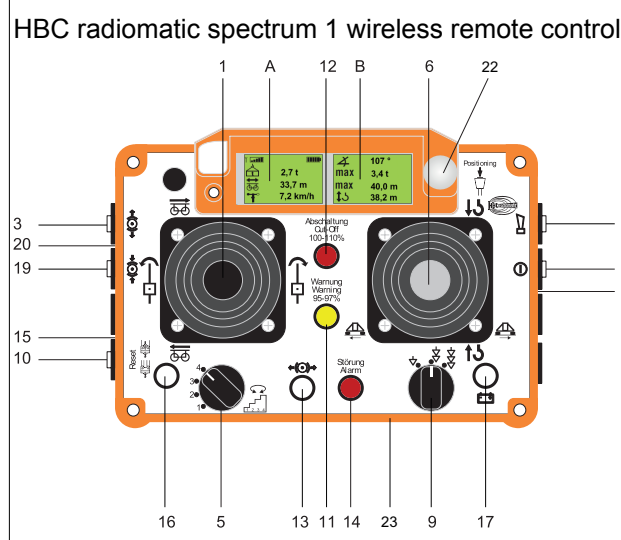
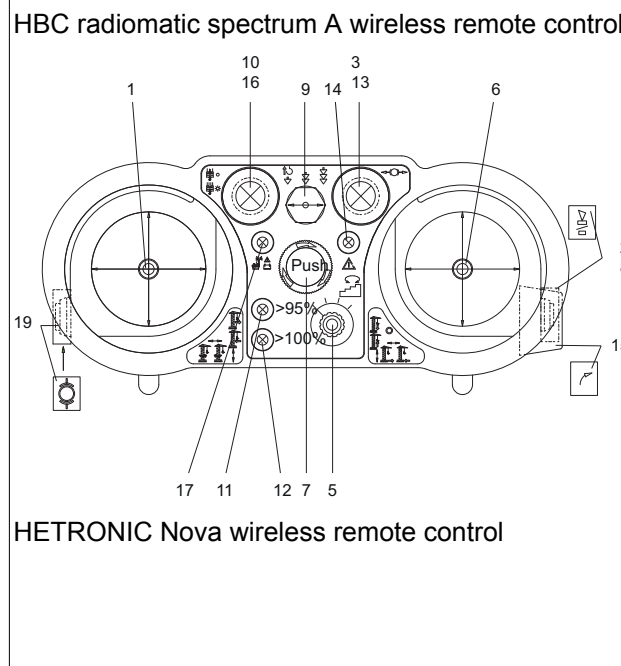
2 Operating and control elements

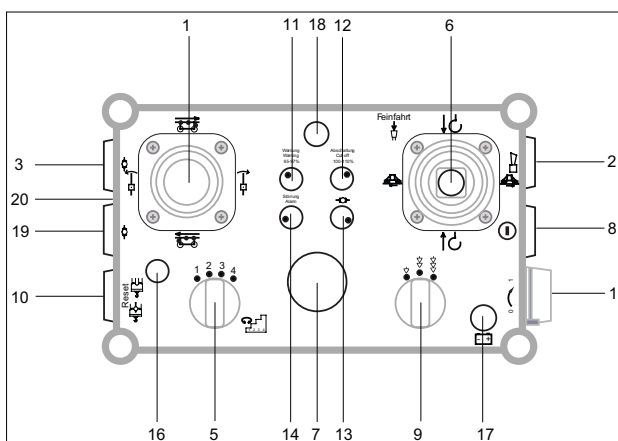
	Master switch to left-hand side The crane travels towards direction 2.
	mushroom head pushbutton De-energizes the main contactor of the slewing tower crane. All slewing tower crane motions are abruptly braked and held. To release, turn the mushroom head pushbutton (○) to the right. CAUTION! While the slewing tower crane is in operation, the mushroom head pushbutton should be enabled only in emergency situations. Frequent operation of the pushbutton will damage the crane. CAUTION! When you operate the crane from the operator cabin while the remote control unit is switched on as well, the crane control will integrate the emergency stop button of the remote control unit in the emergency off chain. If you now switch off the remote control unit or activate the emergency stop function at the remote control unit, the crane will switch off.
	Illuminated pushbutton Energizes the main contactor of the slewing tower crane. The warning lights (☹) and (☹) illuminate to indicate the status. NOTICE! After having switched off the slewing tower crane using the mushroom head pushbutton, you must wait for 30 seconds before you can restart crane operation.
	Selection switch Sets the hoisting velocity. Information on setting the hoisting velocity.
	Key-operated switch The internally calculated load measurement values are displayed for load measurements at zero position. Allows the bottom snatch block to be lifted to the re-reeving position. The bottom snatch block can only be lifted further at low speed. The trolley high speed levels are disabled. The temperature monitoring functions of the motors are bypassed. Current work cycles can still be completed. Flashing display of error message 202 indicates that you can lift a lowered bottom snatch block again using the key-operated switch (⚙). Acknowledges a malfunction.

	Warning light The warning light lights up under the following conditions: ▪ Converter self-test during power up of the slewing tower crane (approx. 10 seconds). ▪ Overload protection enabled (95 % of the rated load capacity). ▪ Air gap limit of slewing gear brake has been reached. WARNING! Inform all crane operating personnel and the person in charge. Enter the incident data into the crane log book. Request maintenance service. ▪ An error message was displayed together with an illuminated warning light (🔔). NOTICE! When lowering loads from high hook heights, the increasing rope weight may result in an improper overload of the crane. This crane may be equipped with a feature to prevent this by switching off the lowering motion. In this case, the two warning lights in the right control console will light up. When this happens, reduce the operating radius until the control unit releases the hoisting gear.
	Warning light The warning light lights up under the following conditions: ▪ Inverter self-test (approx. 10 secs.) ▪ Overload protection enabled (102 % of the allowable lifting capacity). ▪ Hoisting winch overload in high speed range.

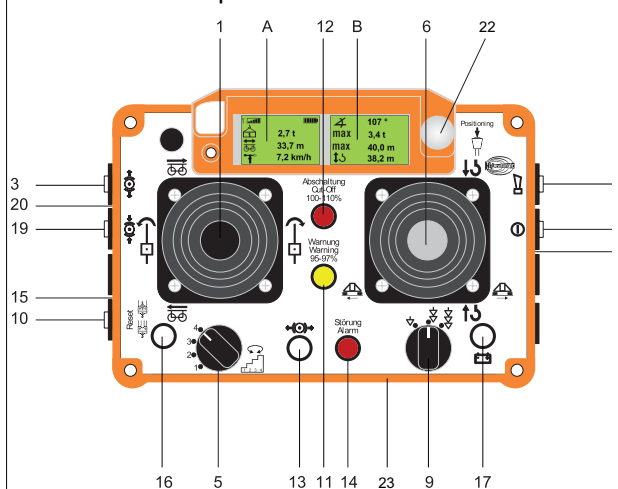
2 Operating and control elements

2.9.3 Wireless control unit

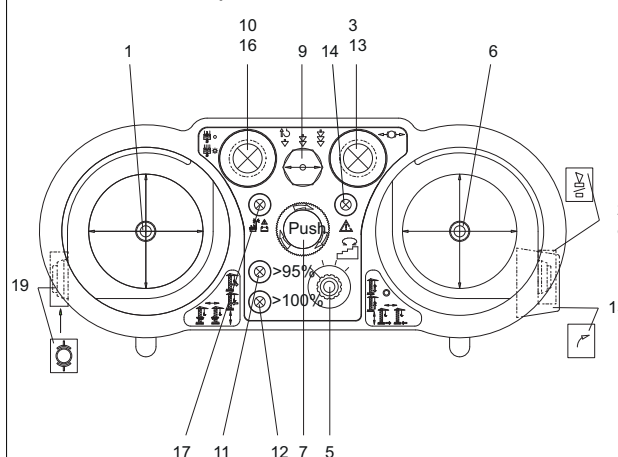
	Master switch 1 forward (1) Increases the operating radius. Master switch 1 backwards (1) Decreases the operating radius. Master switch 1 to right-hand side (1) Slews the jib to right-hand side. Master switch 1 to left-hand side (1) Slews the jib to left-hand side.
HBC radiomatic spectrum 1 wireless remote control 	Pushbutton (2) Enables the warning horn. Pushbutton (3) Sets the crane to windvaning mode. Slewing gear brake(s) are released and locked. Selector switch (5) Sets the acceleration and braking torques for the slewing gear. Information on setting the acceleration and braking torques. [67] Master switch 2 forward (6) Lowers the load hook. Master switch 2 backwards (6) The load hook is lifted.
HBC radiomatic spectrum A wireless remote control  HETRONIC Nova wireless remote control	Master switch 2 to right-hand side (6) The crane travels towards direction 1. Master switch 2 to left-hand side (6) The crane travels towards direction 2. Upper pushbutton of master switch 2 (D2) The hoisting velocities for all master switch positions are reduced to 25 % as long as the pushbutton (D2) is pressed. As long as the pushbutton (D2) is pressed while the master switch (6) is in zero position: - The brake remains in released state. - The hoisting gear holds the load in standstill. Work can be continued without delay. The pushbutton also reduces the speed of the radius adjustment.



HBC radiomatic spectrum 1 wireless remote control



HBC radiomatic spectrum A wireless remote control



HETRONIC Nova wireless remote control

Mushroom head pushbutton (7)

De-energizes the main contactor of the slewing tower crane.

All slewing tower crane motions are abruptly braked and held.

To release the mushroom head pushbutton (7), turn it clockwise.

Pushbutton (8)

Energizes the main contactor of the slewing tower crane when pressed twice.

The warning lights (11) and (14) briefly light up to indicate the status.

NOTICE! If an operator cabin is provided and connected, the emergency off pushbutton in the right control console must be unlocked during remote control operation. The crane cannot be started up unless the emergency off button is unlocked. During remote control operation of the crane, the emergency off pushbutton in the operator cabin is always enabled.

Selector switch (9)

Sets the hoisting velocity.

Information on setting the hoisting velocity. [65]

Pushbutton (10)

Some malfunctions can be reset using a Reset feature. The warning light (14) goes off after the pushbutton (14) has been pressed momentarily.

Allows the jib to be luffed in after the overload protection has been enabled.

Pushbutton (10)

The internally calculated load measurement values are displayed for load measurements at zero position.

Allows the bottom snatch block to be lifted to the reeving position.

The bottom snatch block can only be lifted further at low speed.

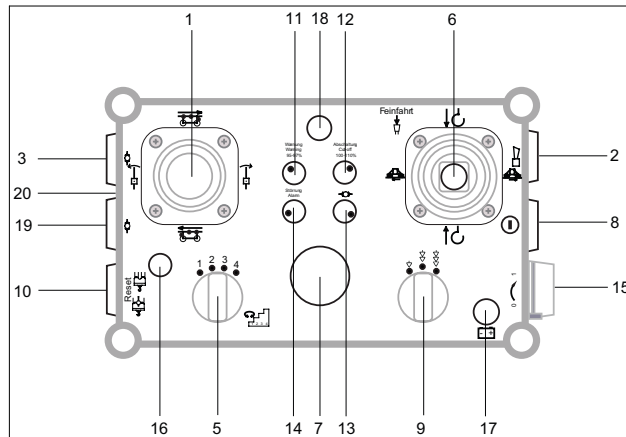
The trolley high speed levels are disabled.

The temperature monitoring functions of the motors are bypassed. Current work cycles can still be completed.

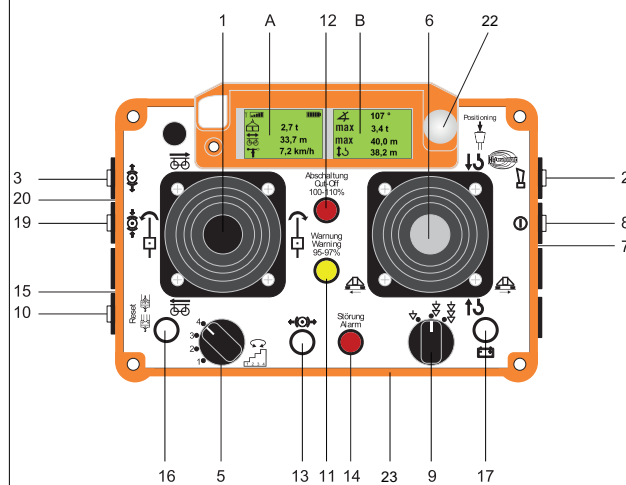
Flashing display of error message 202 indicates that you can lift a lowered bottom snatch block again using the key-operated switch (10).

Acknowledges a malfunction.

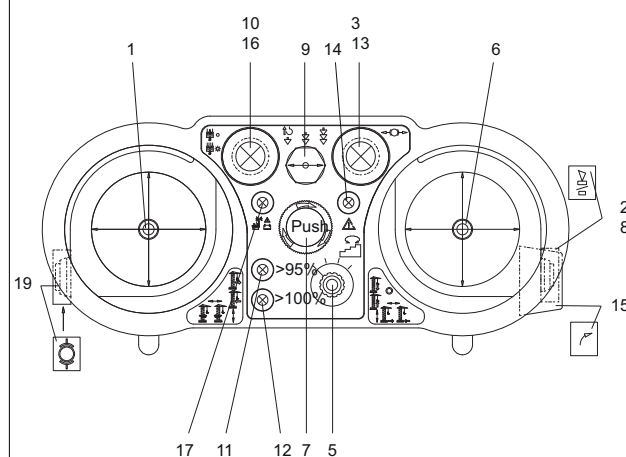
2 Operating and control elements



HBC radiomatic spectrum 1 wireless remote control



HBC radiomatic spectrum A wireless remote control



HETRONIC Nova wireless remote control

Warning light (11)

The warning light lights up under the following conditions:

- Inverter self-test (approx. 10 secs.)
- Overload protection enabled (95 % of the rated load capacity).
- Air gap limit of slewing gear brake has been reached.

An error message was displayed together with illuminated warning light (12).

Warning light (12)

The warning light illuminates at the following conditions:

- Inverter self-test (approx. 10 secs.)
- Overload protection enabled (102 % of the allowable lifting capacity).
- Hoisting winch overload in high speed range.

An error message was displayed together with illuminated warning light (11).

Indicator light (13)

The indicator light (13) illuminates after windvaning mode has been enabled.

Malfunction light (14)

The malfunction light (14) illuminates red after the crane control system has detected a warning message or malfunction.

Key-operated switch (15)

Enables or disables the wireless remote control unit.

1 – Enable

0 – Disable

Electronic key iON (15)

Controls the connection between transmitter and receiver. Without it, operation is not possible.

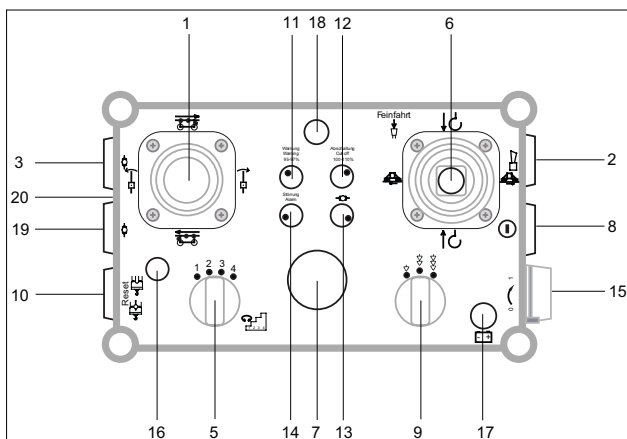
Indicator light (16)

During re-reeving, the indicator light is flashing.

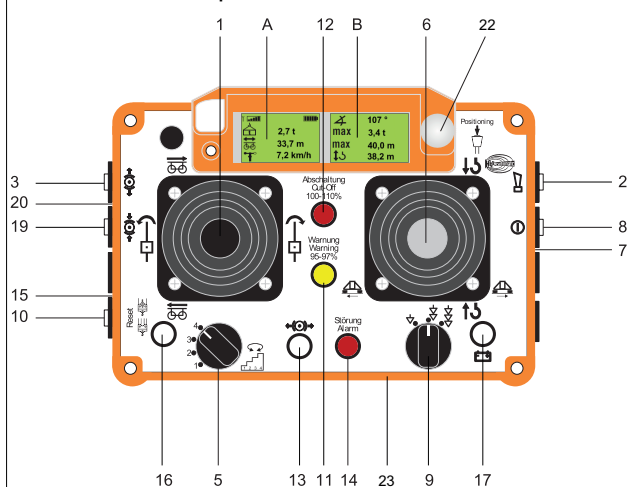
Only for 2/4-fall slewing tower cranes:

This lamp indicates that 4-fall mode is active.

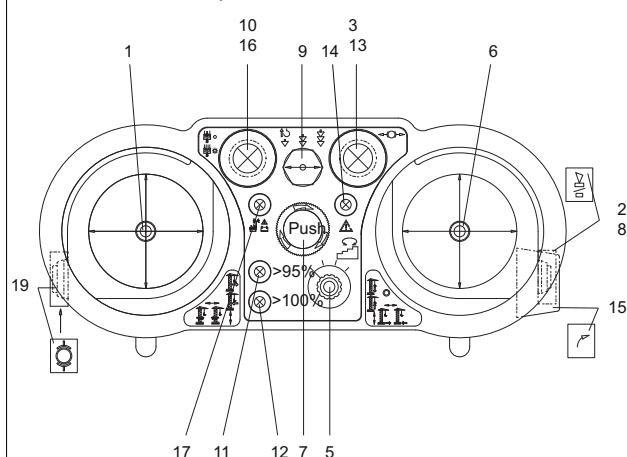
DANGER! Do not continue to move loads if the indicator light (16) is illuminated while the crane is operating in 2-fall mode.



HBC radiomatic spectrum 1 wireless remote control



HBC radiomatic spectrum A wireless remote control



HETRONIC Nova wireless remote control

Battery status light (17)

The battery status light (17) indicates the battery charge condition.

During normal operation, the battery status light (17) is flashing green.

When the color has changed to red and/or an audible warning signal is sounding, the battery must be replaced by a fully charged battery.

Antenna (18)

The short antenna is necessary to ensure reliable wireless communication between the transmitting and receiving stations.

Pushbutton (19)

Applies the slewing gear brake.

Socket for wired control unit (20)

(if wire connection is available)

The wired control unit should be used in the following scenarios:

- On-site operation of a remote control system is prohibited.
- High RF interference affect the operation of the slewing tower crane.
- Battery discharged and spare battery not available.

LED without function (21)

Display illumination (22)

Turn to switch on display illumination.

Vibration alarm (23)

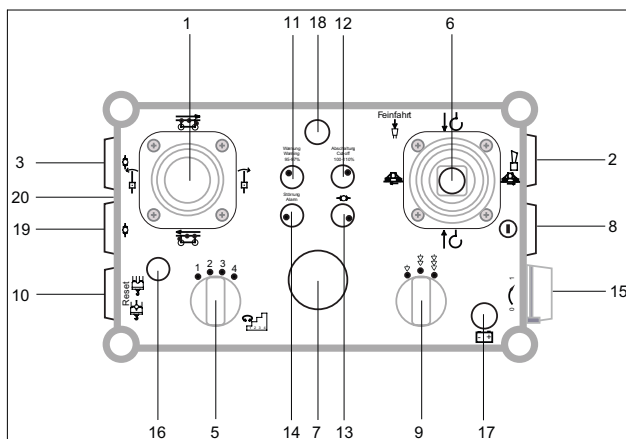
Is enabled together with each LED.

Display (A)

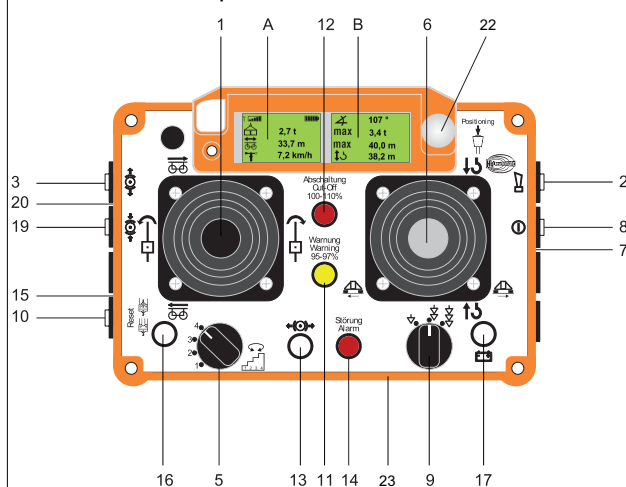
Display

- Signal strength
 - ▬ - strong
 - ▬ - weak
- Charge of battery
 - ▬ - full
 - ▬ - empty
- Current load
- Current operating radius
- Wind speed

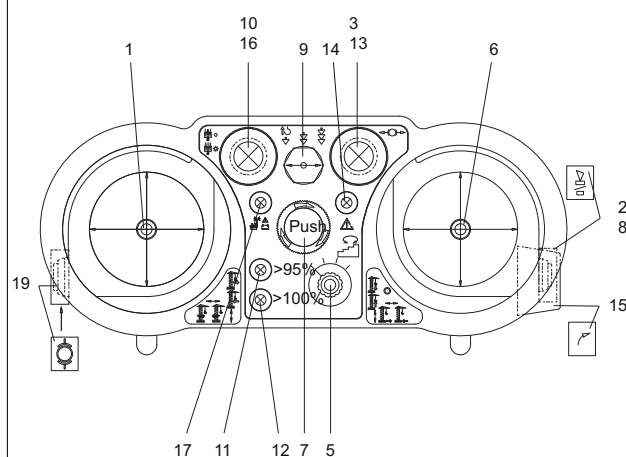
2 Operating and control elements



HBC radiomatic spectrum 1 wireless remote control



HBC radiomatic spectrum A wireless remote control



HETRONIC Nova wireless remote control

Display (B)

Display

- Slewing angle
- max. load
- max. operating radius
- Hook height

NOTICE! If an error message is pending, the error message is displayed.

(see also):

- Setting the hoist speed [65]

2.9.4 Hoisting gear

A geared squirrel-cage motor drives the hoist gear.

The frequency converter converts the standardized 3-phase power supply (e.g. 400 V, 50 Hz) into a power supply with variable voltage and frequency. The loop control system of the frequency converter enables the setup of user-specific motor speed values.

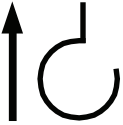
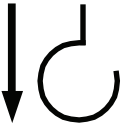
Advantages

- The controlled speed is independent of the load.
- The field weakening function by which the inverter increases the output frequency above the motor rated value can be used to convey 50% of the rated load at double speed. This functionality enables high-speed operation of the unloaded hook.
- No shift gearbox is used. The maximum speed is automatically adapted to the load. High handling performance is possible with the same drive power.
- Jerk-free acceleration and deceleration by means of ramp functions.
- Master switch push-buttons enable ultra-precise positioning speed.
- Loads can be suspended without applying the brake.
- The inverter decelerates the motor electrically. The mechanical brake is not applied until rpm is close to zero and is then used as holding brake.
- High start-up currents do not occur. By comparison to systems with slip-ring motor technology, for example, the power consumption of the slewing tower crane is significantly lower.
- No reduced activation time of the precision motion stages.

2 Operating and control elements

2.9.4.1 Raising and lowering the load hook

	NOTICE
	Use the momentary action pushbutton on the master switch to reduce the speed in all stages to 25% of the rated value for precise load positioning. The brake remains in released state if you also keep the button pressed in zero position. The hoist motor holds the suspended load so that you can reposition it without delay or jerk action.

Symbol	Meaning
	Control lever upward Lifts the load hook (A) (Master switch (6))
	Control lever downward Lowers the load hook (B) (Master switch (6))
Position 1 of the master switch	6 %
Position 2 of the master switch	15 %
Position 3 of the master switch	40 %
Position 4 of the master switch	100 %

> How to lift or lower the load hook.

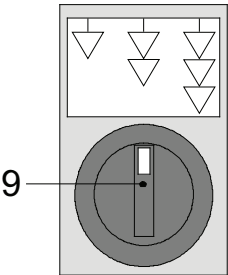
- 1) Move the master switch (6) on the right-hand control console in forward direction.
→ The load hook is lowered.
 - 2) Move the master switch (6) on the right-hand control console in backward direction.
→ The load hook is lifted.
- You have successfully moved the load hook.

2.9.4.2 Setting the hoist speed

Select one of three speed ranges by means of the selector switch (9). Use this functionality e.g. to obtain a practical subdivision of the master switch positions for handling larger loads. You may also toggle the speed range while a hoisting or lowering function is active.

The programmed limit switch determines the high and low limits of the hook position. Speed is reduced infinitely while the hook is approaching this limit. After the limit switch has been actuated, the load hook can only be moved in opposite direction.

The speed of the hoist is reduced automatically when it approaches the load torque limit.



	Symbol for normal speed		Symbol for maximum speed NOTICE! Hoisting gear with winding switching: Use the fast speed level for the loads listed below. In case of higher loads, the control will switch off the hoisting gear.
	Symbol for increased speed	9	Selection switch

Cutout values

Hoisting gear	Cutout value
HW 110kW	1-fall: 7 t/ 2-fall: 14 t

- > You intend to change the hoist speed.
- Use the mode selector switch (9) to select one of the speed levels.
- The hoist speed is now set as required.

2 Operating and control elements

Output reduction

The following additional features apply for slewing tower cranes equipped with an output reduction:

- The hoisting gear output may be adjusted in 1 kW steps by authorized expert personnel.
- By reducing the hoisting gear output, the electrical power consumption of the crane and thus its total electrical load may be reduced.
- After reduction of the hoisting gear output, the crane may be operated at weaker power supply systems.
- A reduced hoisting gear output reduces the speeds of hoisting operations indicated in the manual. The lowering speeds will not be affected.
- Contact WOLFFKRAN GmbH after-sales service for more detailed information.

Output control

The crane control identifies the current output of the hoisting gear.

When loads are to be hoisted, the crane control checks the system for output reserves.

If output reserves are available, the crane control automatically increases the hoisting speeds by increments.

With great hook heights, the hoisting speed per wound-up layer of rope on the rope drum increases. If the increased hoisting speed exceeds the permissible hoisting output, the crane control will reduce the speed by increments.

Voltage control

The crane control identifies the current supply voltage of the slewing tower crane.

If the supply voltage is too low, the crane control will automatically reduce the hoisting gear output. This automatic reduction will result in longer acceleration times, lower hoisting and lowering speeds; furthermore, warning message 111 will be indicated on the monitor.

A repeated display of warning message 111 is an indication of either a defect in or insufficient dimensioning of the supply line.

The problem may be remedied by preselection of a lower hoisting gear output.

2.9.5 Slewing gear

The slewing gear is driven by a squirrel-cage motor.

- Frequency control allows a jerk-free slewing operation of the jib.
- Loads can be positioned with minimum swing. Loads can be positioned with minimum swing.
- Torque is transferred to the slewing gear using 4 levels.
- Force is introduced into the crane tower by means of soft start function.
- Jerk-free acceleration and braking of the slewing gear.

An integrated wind startup control prevents the jib from being moved by wind force during startup (while releasing the brake). With this setup, the slewing gear provides sufficient torque to move the jib in the selected direction.

2.9.5.1 Slewing the jib

	NOTICE
	The motion of the slewing gear of the tower crane can be stopped more quickly by jogging the master switch (1) into the opposite position (counteractive jogging of the lever).

Symbol	Meaning
	Control lever to left-hand side Slews the jib to left-hand side (A). (Master switch (1))
	Control lever to right-hand side Slews the jib to right-hand side (B). (Master switch (1))
Position 1 of the master switch	15 %
Position 2 of the master switch	30 %
Position 3 of the master switch	60 %
Position 4 of the master switch	100 %

> How to slew the jib to right-hand or left-hand sides.

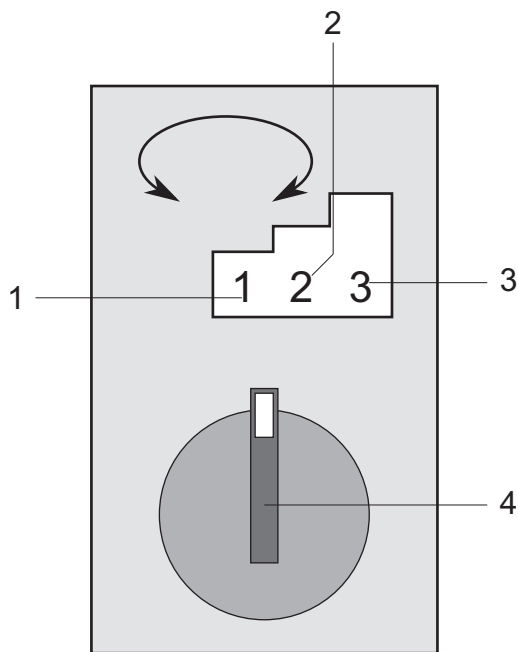
- 1) Move the master switch (1) on the left-hand control console to the right.
→ The jib is slewed to right-hand side.
 - 2) Shift the master switch (6) on the left-hand control console to the left.
→ The jib is slewed to left-hand side.
- You have successfully moved the jib.

2 Operating and control elements

2.9.5.2 Setting the slewing gear acceleration

Use the mode selector switch (4) to select one of the three performance ranges of the slewing gear drive. This functionality is useful to achieve a specific derating for shorter jibs or lower assemblies.

You can also select a different range while the slewing gear is moving.



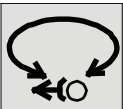
1	Low acceleration rate (short jib)	3	High acceleration rate (long jib)
2	Normal acceleration rate	4	Selection switch

> How to modify the acceleration rate of the slewing gear.

► Use the mode selector switch (4) to select one of the acceleration levels (1-3).

→ The acceleration rate of the slewing gear is now set as required.

2.9.5.3 Relieving the slewing tower crane from wind drag

Symbol	Meaning
	The slewing tower crane is relieved from wind drag - Illuminated push button (3)

> How to put the slewing tower crane out of service or set it in windvaning mode:

1) Briefly turn the left master switch to the left- or right-hand side to open the slewing gear brakes.

2) Press the illuminated pushbutton (3).

→ The slewing gear brake(s) is (are) released and locked.

→ The signal lamp of the pushbutton is lit.

DANGER! If the signal lamp of the pushbutton is not lit you must release the slewing gear brakes manually (BHB4 - Safety equipment - brakes).

→ You successfully relieved the slewing tower crane from wind drag.

2 Operating and control elements

2.9.6 Derricking gear

The luffing gear is driven by a frequency-controlled squirrel-cage motor.

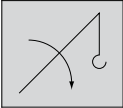
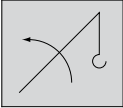
When the luffing gear is operated without the hoisting gear, the hoisting gear automatically compensates in such a way that the load hook is kept at a constant hook height.

Advantages

- The frequency control function allows for a jerk-free and infinite acceleration of the jib.
- Loads can be positioned with minimum swing. Loads can be positioned with minimum swing.
- The allowable maximum speed is adjusted infinitely to meet the load requirements.

2.9.6.1 How to operate the luffing gear

	NOTICE
The jib motion is limited by means of the programmed limit switch. As soon as the jib is approaching one of those programmed limits, its luffing velocity is infinitely decelerated within the preliminary deactivation area and shut down at the limit position. The jib can only be moved in opposite direction. When the load torque limit is approached, the luffing speed will be reduced automatically.	

Symbol	Meaning
	Control lever forward The jib is luffed out (A) (Master switch (1))
	Control lever backwards The jib is luffed in (B) (Master switch (1))
Position 1 of the master switch	16 %
Position 2 of the master switch	32 %
Position 3 of the master switch	64 %
Position 4 of the master switch	100 %
	The upper pushbutton on the master switch in the right control console (D2) (radio control position: 6 (D2)) reduces the speed to 50%. This allows you to position loads easily and accurately.

> You intend to luff in or out the jib.

- 1) Move the master switch (1) on the left-hand control console in forward direction.
→ The jib is luffed out.
- 2) Move the master switch (1) on the left-hand control console in backward direction.
→ The jib is luffed in.

→ You have successfully luffed out or in the jib.

2 Operating and control elements

2.9.7 Drive gear

	NOTICE
	This section is only valid for slewing tower cranes with undercarriage.

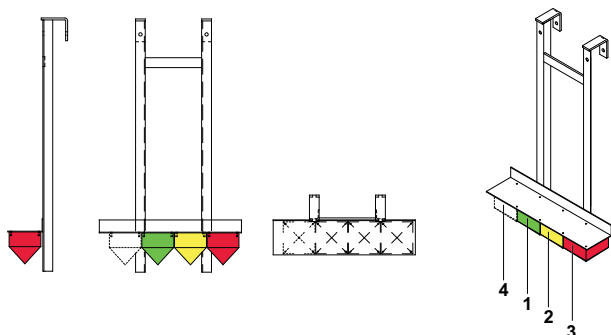
2.9.7.1 Moving the tower crane

Symbol	Meaning
	Control lever to left-hand side The slewing tower crane travels towards direction 1 (A) (Master switch (6))
	Control lever to right-hand side The slewing tower crane travels towards direction 2 (B) (Master switch (6))

- > How to move the slewing tower crane towards direction 1 or 2.
CAUTION! Within the overload range, the indicator light (12) is lit and the travelling gear of the crane is locked.

- 1) Move the master switch (6) on the right-hand control console to the left-hand side.
 → The slewing tower crane travels towards direction 1.
 - 2) Move the master switch (6) on the right-hand control console to the right-hand side.
 → The slewing tower crane travels towards direction 2.
- You have successfully repositioned the slewing tower crane.

2.10 Signal beacons



1	Green light	3	Red light
2	Amber light	4	Optional additional light

The slewing tower crane has three signal lights that are visible from ground level.

Signal light	Continuous light	Flashing light	Function
Green	X		The slewing tower crane is operated by means of a wireless control unit. Illuminated when the slewing tower crane is powered up.
Green		X	The jib of the slewing tower crane is in wind-vaning mode. Special case: The function can be enabled only by programming
Amber	X		The load / operating radius is approaching the cutoff limit. Special case: The function can be enabled only by programming.
Amber		X	Wind alarm: Wind speed above 12 m/s.
Red		X	Wind alarm: Sustained wind speed above 15 m/s. Gusts of wind of or exceeding 20 m/s wind speed are very likely to be expected .
Red	X		The load / operating radius has reached the cutoff limit. Special case: The function can be enabled only by programming.

3 Commissioning the tower crane

3 Commissioning the tower crane

	 WARNING Deviation from normal crane operation Failure of safety equipment. Damage to the slewing tower crane. Wear of parts. Changes were made to the settings. 1) Immediately report all changes found during crane operation. 2) Shut down the slewing tower crane if necessary. 3) Immediately request troubleshooting services. 4) Report any defects you might have found to the next crane operator.
---	--

3.1 Hand signals

The next sections describe the hand signals to be used by signalers in accordance with DIN 33409.

3 Commissioning the tower crane

3.1.1 Basic signals

Function (meaning)	Hand signals	Description
Caution (reference to the hand signals described below)		Arm extended vertically, palm facing forward.
Stop (stopping the current movement)		Both arms extended horizontally to the side
Stop - Danger (stopping the current movement as quickly as possible)		Both arms extended, palms down, move arms back and forth horizontally.
Slow (deceleration and continuation of a movement at slow speed)		Both arms extended forward, palms facing down, move your arms slowly up and down.
Marking the destination (marking the destination of a movement)		Point at the destination with both hands.
Indicating the distance to stop (signal to reduce the distance)		Hold both palms in parallel according to the distance to go.

3.1.2 Vertical movements

Function (Meaning)	Hand signals	Description
Hoist (initiation of a hoisting movement)		Forearm vertical, finger pointing up, move hand in small horizontal circles.
Lower (initiation of a lowering movement)		Arm extended downward, finger pointing down, move your hand in small horizontal circles.
Hoist slowly (initiation of slow hoisting)		Forearm horizontal, palm facing up, move the forearm slowly up and down.
Lower load slowly (initiation of slow lowering)		Forearm horizontal, palm facing down, move the hand slowly up and down.

3 Commissioning the tower crane

3.1.3 Horizontal movements

Function (Meaning)	Hand signals	Description
Start moving (starting or continuing to travel in direction of a previous signal)		Arm raised, palm facing forward, move your arm back and forth to the side.
Travel in direction indicated (initiation of a movement towards a specific direction)		Angle the arm that indicates the direction of movement, move the arm back and forth to the side.
Travel to me (initiation of a movement towards the signaler)		Forearms angled horizontally, palms towards the body, wave in with both arms.
Travel away from me (initiation of a movement away from the signaler)		Forearms angled horizontally, palms facing away from the body, wave off with both arms.

3.1.4 Load suspension equipment

Function (Meaning)	Hand signals	Description
Close Hook Lock (initiation of a closing motion on a load suspension device, e.g. gripper or tongs)		Extend arm horizontally with fist pointing down.
Open Release Unlock (initiation of an opening motion on a load suspension device, e.g. gripper or tongs)		Arm raised horizontally with palm facing to the side.

3 Commissioning the tower crane

3.2 Preparing the slewing tower crane for operation

As crane operator, you are responsible for regular inspection of the operating state of your slewing tower crane. Always run a visual check of the entire slewing tower crane (crane out of service and disconnected from power) before putting it into operation.

Check the slewing tower crane to exclude loose or missing bolts /nuts / pins and spring pins, cracks in welding seams, wear and tear on ropes, deformation or damage on structural elements, and leaking gears or lines.

Missing or damaged parts must be replaced or repaired before releasing the slewing tower crane for operation.

3.3 Inspecting the slewing tower crane

Visually inspect the entire tower crane every time before starting up.

Crane element	Subelement	Checks to be carried out
Safety equipment		Proper and smooth operation of all control elements (check the "0" position of the master switches).
		Steady startup of the crane's drive trains.
		Proper operation of all programmed limit switches.
		Operational noise.
		Safe response of the brakes with minimum delay.
Foundation		Settling and cracks
		Joint between the foundation anchor and the concrete (no play)
Cross frame, Cross frame elements, and undercarriage	Cross frame, cross frame element	Safe position of the central ballast block and of the cross
	Undercarriage	Subframe, track pinch bars, feed cable, cable drum, track end safety devices
Tower		The knock-in bolts must be secured by spring retainers.
		Immediately replace any damaged or missing spring retainers.
		Clear the ladder, the pedestal and working platforms from oil / grease / concrete, and ice.
Slewing frame	Tower head section upper part	Bolts, screw joints, retainers
		Standard railings
	Connecting block with luffing gear (only for luffing cranes with hydraulic cylinder)	Bolts, screw joints, retainers.
		Standard railings
		Check hydraulics for leakage.
		Check the hydraulic pressure.
		Every day, carry out a complete luffing-in and luffing-out of the jib to check for leakage.
		Check whether the jib is held safely in all positions.
	Tower head section lower part	Bolts, screw joints, retainers
		Ring platform, standard railings, where applicable
		Slip ring system (damage to the slip ring system, cable inlet)

3 Commissioning the tower crane

Crane element	Subelement	Checks to be carried out
Slewing frame	Slewing frame	Mounting bolts of the slewing joint (no corrosion, or loose nuts and bolts).
		The ball race bearing (tracks and gear rim) must be adequately lubricated (no metal abrasion in grease residue).
		Entire slewing gear (check for play at gear bearing). Slewing gear brake.
	Slewing gear	It is advisable to rotate the slewing gear once by 360° only in small sections after a certain time if working, e.g. for handling concrete. This rotary movement redistributes the grease evenly in the track of the slewing joint.
	Operator cabin	Driver's cab suspension
		Seat
		Operator cabin, general condition
		Window panes, visibility
		Windshield wiper
Counterjib		Check the forced neutral position function of the master switches.
		Control cabinet
		Bolts, screw joints, retainers
		Brace plates
		Standard railings
Jib	Jib	Counterweights
		Bolts, screw joints, retainers
		Standard railings
		Brace cross member
		Bottom snatch block with load hook
		Check the position of the bottom snatch block to the jib. If the snatch block is not in parallel to the jib, check whether the snatch block realigns itself to the jib by performing several no-load test runs before the crane goes into operation. If necessary, set the crane out of service and inform the responsible person. The rope swivel must be serviced by maintenance personnel in accordance with the assembly instructions for the hoist rope.

Crane element	Subelement	Checks to be carried out
Jib	Trolley drive (only for trolley jib cranes)	Entire trolley drive and trolley drive brake
		Trolley ropes
		Pulleys
		Trolley ropes must be tensioned. Loose trolley ropes can trigger the rope breakage protection of the trolley and lead to damage. If necessary, set the crane out of service i and inform the responsible person to have the trolley rope re-tensioned by maintenance personnel.
		Perform a no-load run at least once a day, that covers the entire traversing range of the trolley. This operation compensates for any rope twist that might have developed in the course of short operating movements.
	Derricking gear (only for luffing cranes with derricking gear)	Luffing gear, complete, luffing gear brake
		Luffing ropes
		Pulleys
		Inspect the luffing rope windings on the drum. If necessary, wind up the luffing rope in a controlled manner while the crane is in operation.
		During the first luffing-out of the jib, perform a brake check.
		Ensure that the jib is held safely in all positions.
		Proper tripping of the overload protection in accordance with specifications.
		Every day, carry out at least one complete luffing-in and luffing-out movement by fully luffing the jib in and out. This operation compensates for any rope twist that might have developed in the course of short operating movements.
	Hoisting gear	Entire hoisting gear, hoisting gear brake
		Hoisting rope

3 Commissioning the tower crane

Crane element	Subelement	Checks to be carried out
Jib	Hoisting gear	Inspect the hoisting rope windings on the drum. If necessary, wind up the hoisting rope in a controlled manner while the crane is in operation.
		Test the hoisting gear brake when initially hoisting a load (hoist the load to a height of approx. 1.5 m).
		Make sure that the load is held safely in all positions.
		Proper tripping of the overload protection in accordance with specifications.
		At least once a day, perform a no-load run that covers the entire allowable hook hoisting range. This operation compensates for any rope twist that might have developed in the course of short operating movements.

3.4 Safety measures - Crane commissioning

	NOTICE
	The maximum permitted wind velocity for operation is 20 m/s (72 km/h). This corresponds to force 8 on the Beaufort scale. Make allowances for the fact that gusts of wind with a velocity of 20 m/s must be expected as of Beaufort 6 (10.8 m/s to 13.8 m/s).

Observe the following instructions to ensure proper and safe commissioning.

- If several other cranes are in operation at your construction site, you must come to precise terms and agreements with all crane operators before putting your crane into operation. Inform your relay operators of those conditions. A minimum clearance of 2.0 m must be maintained between the cranes in all directions (including loads, hoist ropes and suspension attachments).
- Prior to commissioning the slewing tower crane, verify the proper setup of its components, e.g. of all safety equipment, control elements, couplings, brakes and drives. Harm to persons or damage to assets must be safely excluded when the slewing tower crane is being commissioned.
- Prior to commissioning of the slewing tower crane, the crane operator must verify compliance of the crane setup (jib length, hoist winch and hook-to-ground distance) with overload protection settings (overload protection and load torque monitoring).
- The crane operator must verify the overload protection settings prior to commissioning of the slewing tower crane.
- Slewing tower cranes with crawler-track undercarriage may not be put into operation if harm to persons or damage to assets cannot be safely excluded. Observe the safety clearance between the crane, stationary objects and buildings (min. 0.5 m). A signaler (banksman) must be appointed for the site if your view onto the track area is obstructed.
- Before moving the slewing tower crane, blow the horn signal and repeat this warning signal at regular intervals while the crane is moving, particularly when anyone approaches the crane.
- If visual contact to the signaler is impaired due to the development of dust, darkness, snow, fog or rain, you must monitor the crane operation more closely, e.g. by means of radio control, or take the crane out of service if necessary.
- At temperatures below 0°C, you must anticipate that the mechanical components of the slewing tower crane, in particular brakes, bogies and limit switches, may be frozen up to other parts. For this reason, you must verify that all parts of the slewing tower crane are in impeccable operational state. Do not attempt to release parts which are frozen solid by means of motor force.
- The viscosity of the oil in gear boxes and couplings increases at temperatures below -15° C. You can generally retain sufficient oil viscosity by carrying out several no-load jogging operations with the crane.
- It is not allowed to operate the slewing tower crane at temperatures of -20° C or lower.

3 Commissioning the tower crane

3.5 Power on of the slewing tower crane

	NOTICE
	Restart of the slewing tower crane after power off is disabled for a waiting time of 30 seconds.

> How to operate the crane with the control consoles in the operator cabin:

- 1) Switch the remote control unit off.
 - 2) Switch the crane on via the control consoles as described in this chapter.
- The crane is now operated via the control consoles.

	⚠ WARNING
	The remote control unit is enabled during operation via control console. When you press the emergency off pushbutton at the remote control unit or switch off the remote control unit, all crane movements will be braked abruptly. ► When you switch on the remote control unit while operating the crane via the control consoles, the emergency off pushbutton of the remote control unit will be integrated in the emergency off chain of the crane. If you then switch off the remote control unit or press the emergency off pushbutton at the remote control unit, the crane will switch off immediately.

Switching on the slewing tower crane by means of control console

> How to switch on the slewing tower crane using the control console:

- 1) When the slewing tower crane is traveling, release the rail tongues.
 - 2) Switch on the main switch at the tower base.
 - 3) Activate the power disconnect at the control cabinet on the machine platform.
 - 4) Set the slewing gear brake to ready state.
 - The slewing tower crane is now ready for operation and you can enter the operator cabin.
 - 5) Release the mushroom head pushbutton on the right control console with a clockwise turn.
 - 6) Press the ON button.
 - The warning horn of the slewing tower crane is triggered.
 - The warning lights light up briefly and go dark again after approx. 10 seconds.
- The tower crane is now ready for operation.

> How to operate the slewing tower crane using the remote control unit:

- 1) In cranes with an operator cabin, unlock the emergency off pushbutton in the right-hand side control console.
- 2) Switch the crane on via the remote control unit as described in this chapter.

→ The crane is now operated via the remote control unit.

	NOTICE Emergency off pushbutton in operator cabin is enabled while the crane is operated by remote control unit. In cranes with an operator cabin, the emergency off pushbutton in the right-hand side control console is always enabled even when you are operating the crane via remote control unit. ► Always unlock the emergency off pushbutton in the right-hand side control console before switching on the remote control control.
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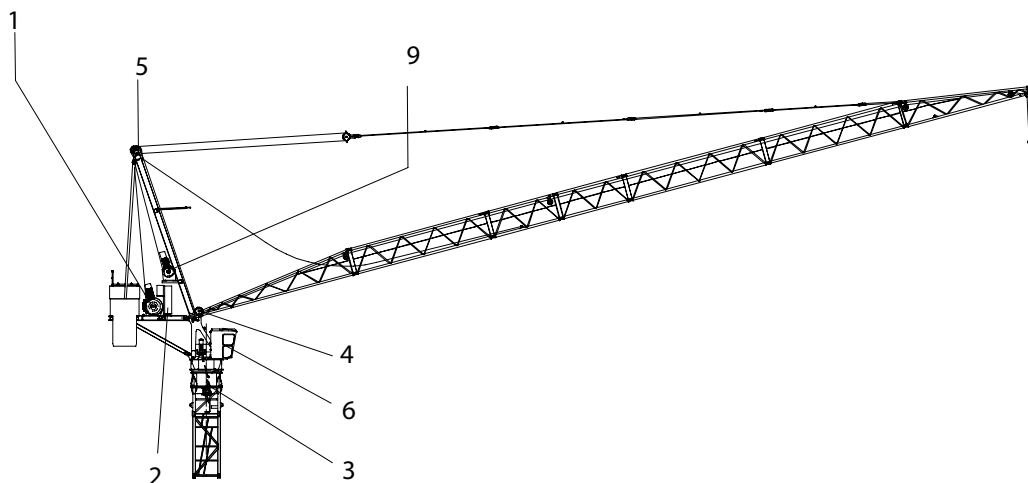
Power on of the slewing tower crane by means of control console

> How to power up the slewing tower crane using the RF control console.

- 1) Release the mushroom-head impact pushbutton (7) with a clockwise turn.
 - 2) Set the key-operated switch [15] to 1 position.
 - 3) Press the ON button (8).
 - The signal lamps indicate the current state.
 - 4) Press the ON button (8).
 - The warning horn of the slewing tower crane is triggered.
 - The warning lights light up briefly and the alarm lamp goes dark again after approx. 10 seconds.
- The tower crane is now ready for operation.

3 Commissioning the tower crane

3.6 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.

3.6.1 Slewing and radius limiting



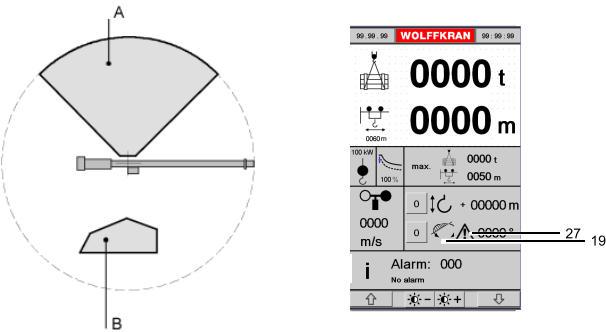
 **WARNING**

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.

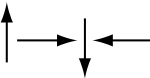
The crane can be programmed to prevent its operation in certain areas such as roads, buildings, or rail-roads tracks.



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.

3 Commissioning the tower crane

Closed areas

Closed area	Consequences
A	This area is not allowed to be overrun.
B	The jib 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 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.

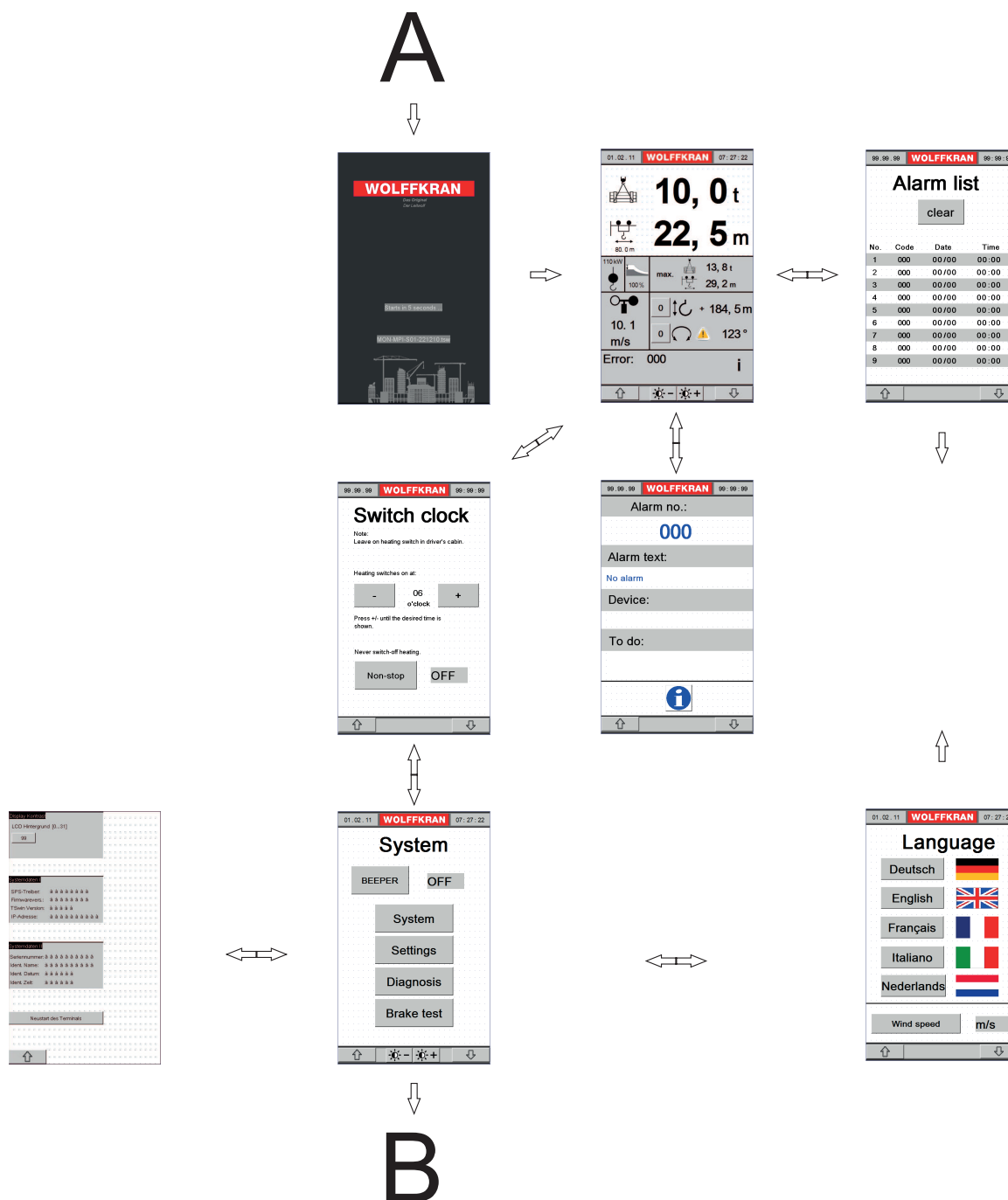
	! DANGER
	Approach to a closed area. Inconsistence. > You approach a closed area. ► Always approach the closed areas at low speed. If the speed is too high the automatic braking by the slewing and radius limitation can cause the load to swing. That may hurt the closed area.

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.

3.6.2 Crane control dialogs

3.6.2.1 Overview



3 Commissioning the tower crane

3.6.2.2 Main screen

	1 Current PLC time Setting the clock 2 Load reading NOTICE! Overload protection: NOTICE! When the threshold of 95% of the switch-off value is exceeded, the numbers will be indicated in yellow on the screen and will flash. NOTICE! When the switch-off threshold of 108% of the switch-off value is exceeded, the numbers will be indicated in red on the screen and will flash. An acoustic alarm will sound. NOTICE! In hoisting gears with winding switching, operation in fast speed level is only permissible up to a certain load. When this load is exceeded, the drive will stop. This "overload fast speed level" is also indicated as a flashing numerical value highlighted in red.
	2.1 A: Normal operation B: The crane has switched off at the load torque limit. Button: Enable WOLFF-Boost. Increased load torque limit (see section 9 and section 13). NOTICE! Drives can only be moved one after the other. C: Boost enabled. The function switches off automatically at reduction of the load torque by a smaller operating radius or putting down of the load. Description of WOLFF-Boost, page: [107]
	3 Trolley cranes: indication of trolley symbol Luffing cranes: indication of luffing crane symbol 4 Operating radius view NOTICE! Winding switching: refer to 7.

	5 Indication of hoisting gear output. Note: This is only indicated in cranes where the hoisting gear output can be adjusted via setting menu 9.
	6 Set reeving of the load hook. WARNING! Risk of mortal injury if the indicated jib length does not correspond to the actual jib length. Do not continue to operate the crane. Contact Wolffkran service department.
	7 Setting value for lifting capacity derating. Only visible if smaller than 100%. The lifting capacity derating affects lifting capacity and load torque in terms of percentage.
	8 Trolley cranes: indication of trolley symbol Luffing cranes: indication of luffing crane symbol
A	9 Maximum allowable load with the current hook operating radius. NOTICE! When WOLFF-Boost is switched on, the new limit value is indicated.
B	10 Setting value of jib length. WARNING! Risk of mortal injury if the indicated jib length does not correspond to the actual jib length. Do not continue to operate the crane. Contact Wolffkran service department.
C	11 Wind speed. Current value. When the warning threshold of 12 m/s is exceeded, the numerical value is highlighted in yellow. When the threshold of 20 m/s is exceeded, the numerical value is highlighted in red and flashes.
	12 Unit of the wind speed. Setting: Language page. [97]
	13 Maximum allowable operating radius with the load currently on the hook. NOTICE! When WOLFF-Boost is switched on, the new limit value is indicated.
	14 Key: Set hook height at the current hook position to the value zero.

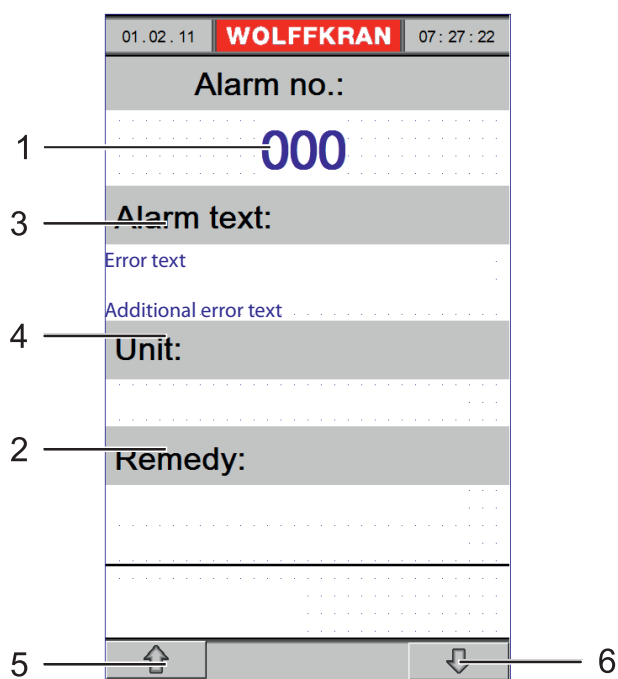
3 Commissioning the tower crane

	15 Sign of the hook height in respect of the zero point set. Above: +. Below: - 16 Hook height. Current value. 17 Key: Set slewing angle of the current jib position to the value zero. 18 Jib angle. Current value. 19 The icon changes its appearance if slewing and operating range limitations are enabled. 14 Slewing limit disabled 17 Slewing limitation enabled. 15 The load hook is within the closed area. The arrow indicates the possible direction of extension. 20 Button: Go to "Error message" screen. 21 Error number. Current value. No information displayed if value is zero. 22 Error description, brief text. For some errors, additional text is indicated to simplify troubleshooting. No information displayed if error number with value zero. 23 Key: nighttime operation. Reduced monitor backlight. 24 Key: daytime operation. Brighter monitor backlight. 25 The green symbol is indicated while the crane is operated via remote control unit. 26 Button: Go to previous page. 27 Button: Go to next screen.

(see also):

- Language [97]

3.6.2.3 Error message

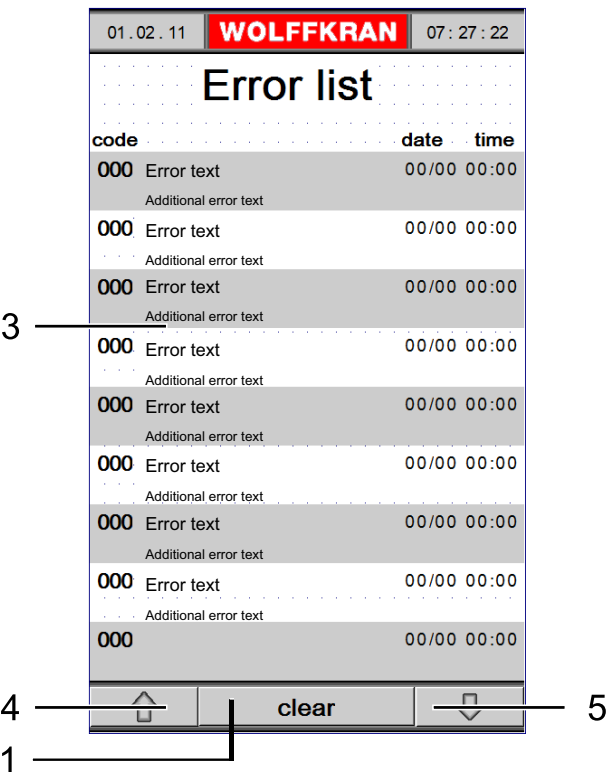


Error message

1	Indication of error number. NOTICE! If more than one error is pending simultaneously, the indicated error number changes approx. every 10 seconds to go to the next one.	4	Display of the relevant module.
2	Display of the action to be taken by the crane operator. System errors NOTICE! Eliminate all error sources before resetting the errors.	5	Button: Go to previous page.
3	Error description, brief text. For some errors, additional text is indicated to simplify troubleshooting. NOTICE! If several errors are present, the display cycles to the error number at intervals of approx. 10 seconds.	6	Button: Go to next screen.

3 Commissioning the tower crane

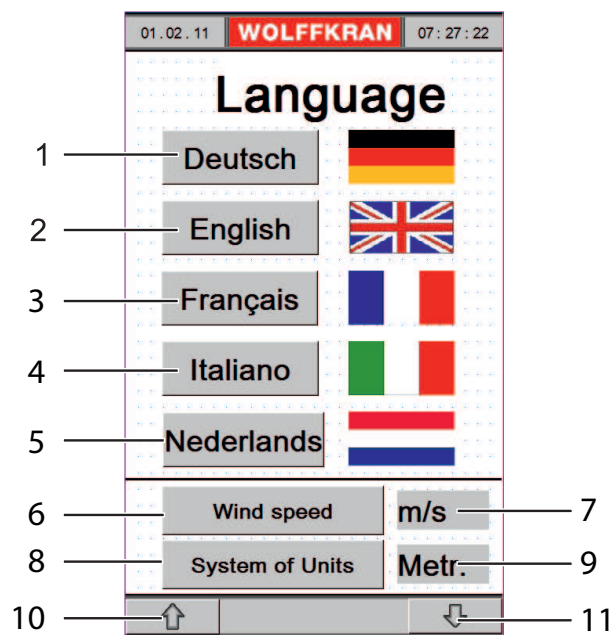
3.6.2.4 List of errors



List of errors

1	Button: Clear the error list	4	Button: Go to previous page.
3	List of most recent errors logged by the crane control system. Error description, brief text. For some errors, additional text is indicated to simplify troubleshooting. NOTICE! Meaning of the error code: Date and time: day/month hour: minute	5	Button: Go to next screen.

3.6.2.5 Language

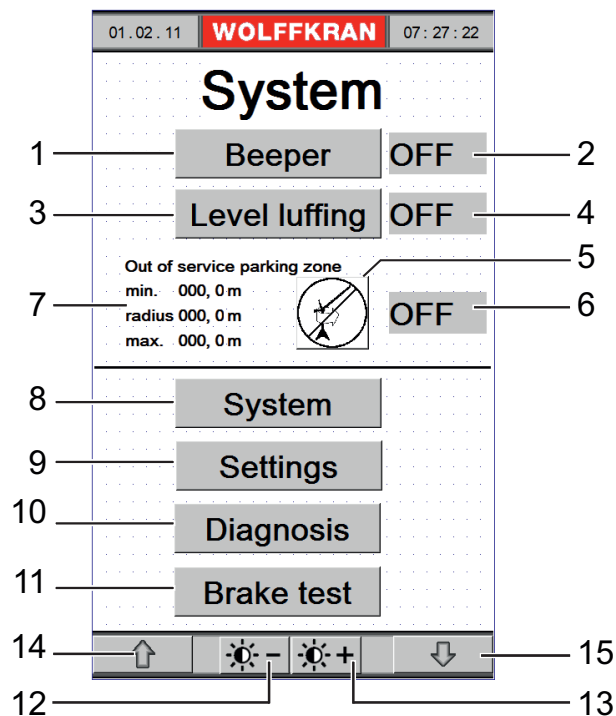


Language selection

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.		

3 Commissioning the tower crane

3.6.2.6 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.		

3 Commissioning the tower crane

3.6.2.7 Timer - Cabin heating



NOTICE

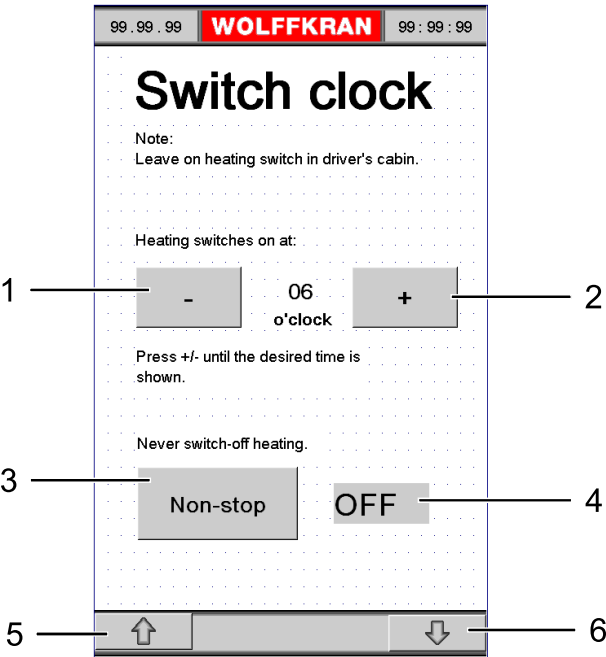
The heating is not ready for operation after the crane was disconnected from power at the mains switch on the tower base, or at the site distribution cabinet.

The timer activates the cabin heating at the selected time if:

- The heating switch inside the cabin stays is not turned off at the end of work.
- The slewing tower crane is connected to power.
- The correct time is set at the crane control system.

If the slewing tower crane is now operated for a period of three hours, the heating stays active, or is deactivated if set up otherwise.

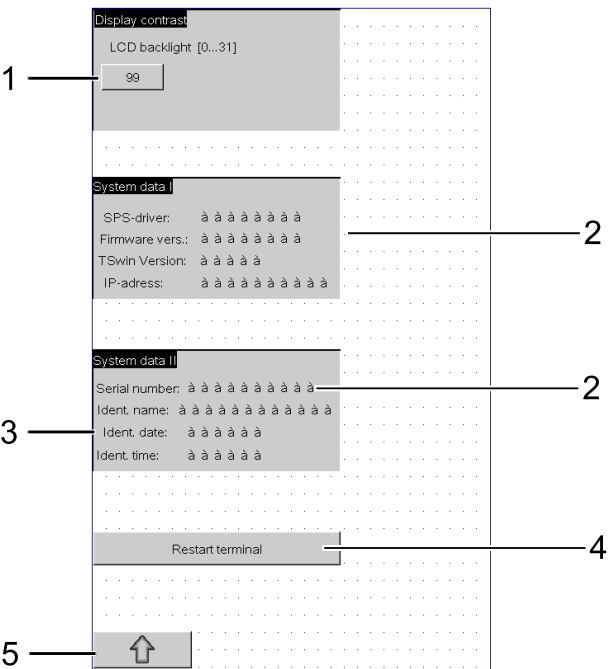
The heating is deactivated automatically one hour after the end of work. Exception: Continuous duty.



Timer

1	Button: Activate the heating one hour earlier.	4	Signal field: OFF Permanent operation switched off ON Permanent operation switched on
2	Button: Activate the heating one hour later.	5	Button: Go to previous page.
3	Button: Continuous duty. Never deactivate the heating.	6	Button: Go to next screen.

3.6.2.8 Setup

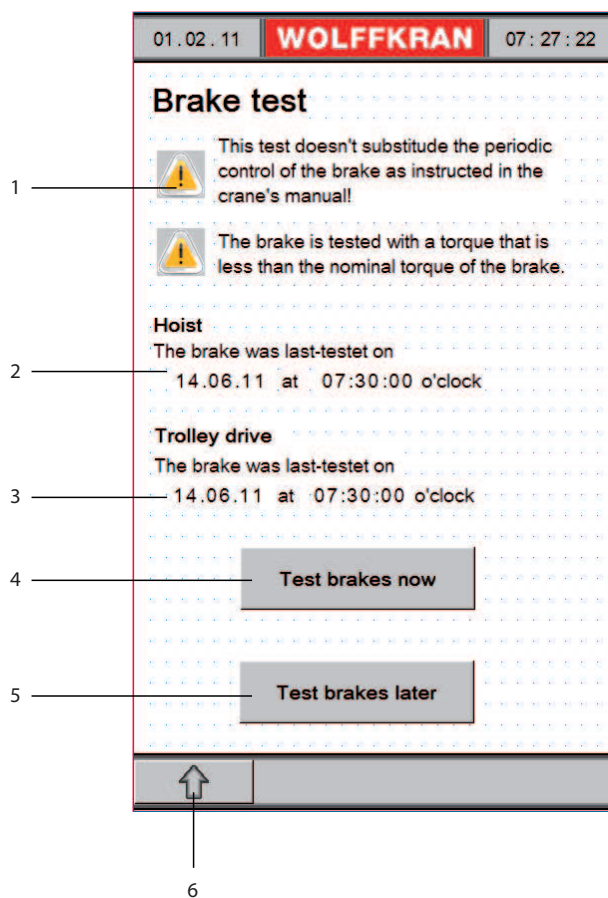


Setup

1	Backlight brightness The setting is overruled by button 23/24 of the main screen.	4	Button: Terminal re-start. Has the same effect as the brief disconnection of the unit from its voltage supply.
2	Device-specific data	5	Button: Go to previous page.
3	Project-specific data		

3 Commissioning the tower crane

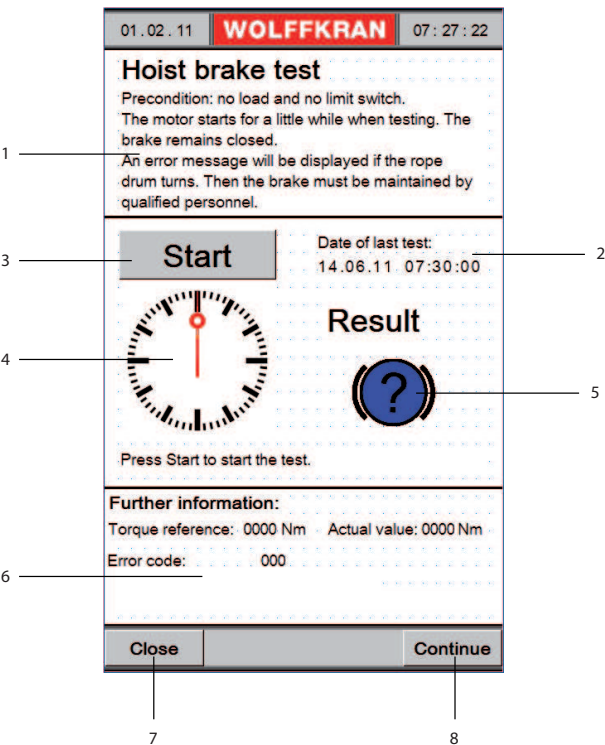
3.6.2.9 Requirement for brake test



Requirement for brake test

1	This screen is indicated every day when the crane is first switched on. Refer to the instructions.	4	Button: Go to brake test hoisting gear
2	Display when the last test of the hoisting gear brake took place.	5	Button: Change to main screen. You can perform the brake test at any time by pressing the button brake test on the system dialog.
3	Display when the last test of the trolley drive brake/ luffing gear brake took place.	6	Button: Change to main screen. You can perform the brake test at any time by pressing the button brake test on the system dialog.

3.6.2.10 Brake test hoisting gear



Brake test hoisting gear

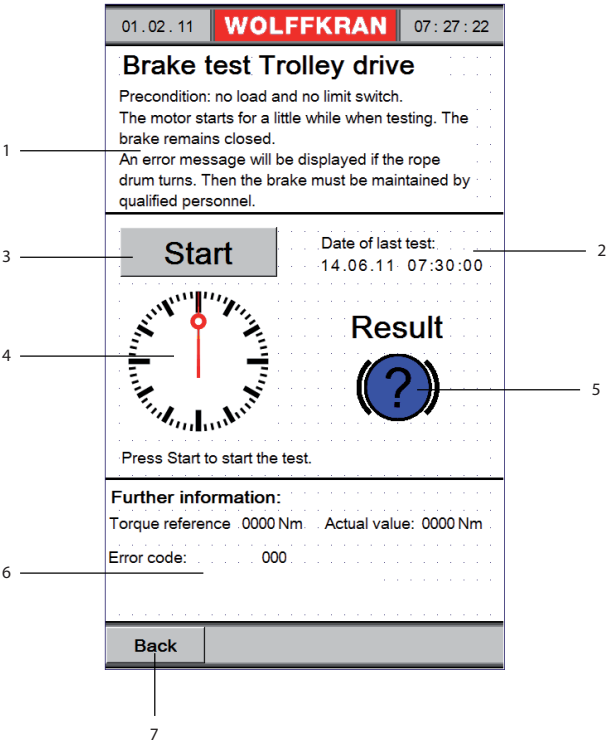
1	Requiriements for the brake test of the hoisting gear: - No load is attached to the hook. - No approach to limit switch. - No crane malfunction. - Assembly switches off.	5	- Display blue: Test not yet started. - Display green: Test completed successfully. - Display yellow: Check of brake and the brake lining is absolutely necessary. The error message 120 appears. - Display red: The brake test was aborted. If the brake test is not successful, this may be caused by: - Maintenance of the brake is absolutely necessary. - Test aborted. FC-data exchange - Test aborted. Crane malfunction. - Test aborted by user. (Master switch was moved at the test.) - Test aborted. Torque not reached.
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3 Commissioning the tower crane

2	Display when the last test of the hoisting gear took place.	6	- Further information - torque. If the required torque was not reached, the nominal value and the actually reached value are indicated. Repeat the test. - Further information - error message. If a crane fault is pending, it will be indicated here. Possibly, the brake test may cause an inverter fault. Reset the fault with the key-operated switch (1C) in the right-hand side control console and repeat the test.
3	Button: Carry out brake test. - Press Start to start the test. → Test is running. → Test completed successfully. NOTICE! If the button is not shown clearly, the brake test cannot be carried out. Check which of the conditions listed in item 1 are not met.	7	Button: Change to main screen.
4	The stopwatch indicates the progress of the brake test. After completion, the entire watch is green. The color changes to red if the test is not successful. For possible causes, refer to item 5. NOTICE! The brake test lasts approximately 10 seconds.	8	Button: Change to brake test trolley drive / der- racking gear

3.6.2.11 Brake test trolley drive / derricking gear

This crane control menu item is not applicable for luffing cranes with hydraulic cylinder.



Brake test trolley drive

1	Text for crane with trolley jib. Brake test trolley drive Precondition: - No load is attached to the hook. - No approach to limit switch. - No crane malfunction. - Assembly switches off. Text for crane with luffing jib. Brake test derricking gear Precondition: - No load is attached to the hook. - Approach to the inner limit switch. - No crane malfunction. - Assembly switches off.	5	- Display blue: Test not yet started. - Display green: Test completed successfully. - Display yellow: Check of brake and the brake lining is absolutely necessary. The error message 920 appears. - Display red: The brake test was aborted. If the brake test is not successful, this may be caused by: - Maintenance of the brake is absolutely necessary. - Test aborted. FC-data exchange - Test aborted. Crane malfunction. - Test aborted by user. (Master switch was moved at the test.) - Test aborted. Torque not reached.
---	--	---	---

3 Commissioning the tower crane

2	Display when the last test of the trolley drive / luffing gear took place.	6	- Further information - torque. If the required torque was not reached, the nominal value and the actually reached value are indicated. Repeat the test. - Further information - error message. If a crane fault is pending, it will be indicated here. Possibly, the brake test may cause an inverter fault. Reset the fault and repeat the test.
3	Button: Carry out brake test. - Press Start to start the test. → Test is running. → Test completed successfully. NOTICE! If the button is not shown clearly, the brake test cannot be carried out. Check which of the conditions listed in item 1 are not met.	7	Button: Go to brake test hoisting gear.
4	The stopwatch indicates the progress of the brake test. After completion, the entire watch is green. The color changes to red if the test is not successful. For possible causes, refer to item 5. NOTICE! The brake test lasts approximately 10 seconds.		

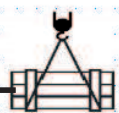
3.6.3 WOLFF-Boost

	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.	

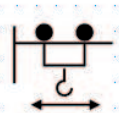
With the WOLFF-Boost function, the load is allowed to exceed the load torque range specified for the lifting capacities by up to 10%. This is, however, subject to the restriction that hoisting gear and trolley drive (trolley crane) respectively hoisting gear and derricking gear (luffing crane) must only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

2.1

01.02.11
WOLFFKRAN
07:27:22

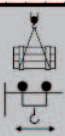


10, 0 t



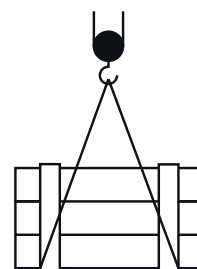
22, 5 m

80.0 m

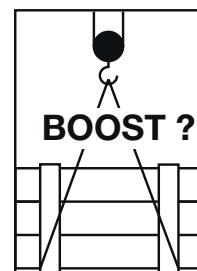
110 kW 	max.  13, 8 t 29, 2 m
10.1 m/s 	0 ↑↓ + 184, 5 m 0 ↻ ⚠ 123 °

Error: 000
Error text
Wi-Fi
i

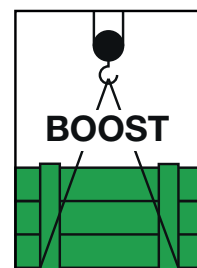
↑
☀ - ☀ +
↓



A



B



C

3 Commissioning the tower crane

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 alternately.

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: [\[92\]](#)).

Switching off WOLFF-Boost

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

3.7 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.

4 Taking the slewing tower crane out of service

4 Taking the slewing tower crane out of service

	NOTICE The maximum permitted wind velocity for operation is 20 m/s (72 km/h). This corresponds to force 8 on the Beaufort scale. Make allowances for the fact that gusts of wind with a velocity of 20 m/s must be expected as of Beaufort 6 (10.8 m/s to 13.8 m/s).
	NOTICE The brake of the slewing gear must be locked (i.e. released) manually after power failure, or after certain other faults occurred. (see BHB 4 - Safety equipment, Brakes). All brakes of the crane's slewing gear must be locked. Inform the person responsible for the crane. Attach a corresponding note to the control console in order to inform relay crane operators of the manually locked state of the slewing gear brakes. The brakes must be unlocked again before the slewing tower crane is put back into service. Enter all faults found in the crane logbook and request immediate corrective actions by maintenance personnel. Always ensure that the slewing element of the slewing tower crane is capable of resisting prevailing wind load. This is a critical aspect in terms of the crane's stability when exposed to gales. A sufficient safety clearance must be maintained within the proximity of hazards, e.g. adjacent buildings, in order to ensure unobstructed operation of the slewing section of the tower crane.

- > You have finished crane operation.
 - > You want to take a prolonged stoppage.
 - > You want to carry out maintenance and repair work.
 - > A system fault or power failure has occurred.
 - > Wind speed exceeds 20 m/s (72 km/h).
- 1) In case of a crawling slewing tower crane, run it to the end of the rail track and secure the crane by properly tightening the pinch bar.
 - 2) Bring the hook into one of the permitted decommissioning positions (see OPM "Technical Data & Construction Site Preparation").
WARNING! At decommissioning, no load, no rope or chain attachment may be suspended from the hook.
 - 3) Lift the snatch block to the highest hook position.
 - 4) Lock the released slewing gear brake(s) by pressing the illuminated pushbutton (3) on the left-hand control console.
 - 5) Set all master switches to the "0" positions.
 - 6) Press the mushroom head pushbutton (7) on the right-hand control console and lock up the operator cabin after leaving it.
 - 7) Switch-off the power disconnecter at the control cabinet.

4 Taking the slewing tower crane out of service

→ You have set the crane out of service.

4 Taking the slewing tower crane out of service

4.1 Auxiliary heating in the control cabinet

	! CAUTION
	The auxiliary heating in the control cabinet is not ready for operation. Oxidation and failure of the control cabinet. 1) Verify that the main switch at the tower base is not in OFF state. 2) Verify that the main switch at the site distribution is not in OFF state.

The control cabinet is equipped with an auxiliary heating unit. The purpose of this unit is to avoid dewing on the components as a result of the fluctuation of temperature or relative humidity.

The heating is activated automatically by means of thermostat switch at temperatures below 30°C.

Power to the heating unit is tapped upstream of the main disconnect switch in the control cabinet to prevent its deactivation when the switch is turned off.

5 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.

5 Service and maintenance

5.1 Maintenance schedule

	NOTICE All given intervals are to be considered as guide values. The intervals have to be adapted to the particular operating conditions.
	NOTICE In case of a non-linear increase of wear, the inspection intervals have to be reduced.

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: [128]
Checking the oil quality	Every 1000 hours of operation or once per year		CO	Page: [129]
Oil change.	Every 2000 hours of operation or once per year		CO / S	Page:
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: Page:
Check air gap and brake pads.	Each time the crane has been assembled. / Every 3 months.		S	Page: Page: Page:
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: Page: Page:
check brakes	Once per year.	by technical experts	S	

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	

Activity	Intervals	Remark	TBD by	Refer to page
Check oil level	Weekly.		CO	Page: [128]
Checking the oil quality	Every 1000 hours of operation or once per year		CO	Page: [129]
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:
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: Page:
Check air gap and brake pads.	Each time the crane has been assembled. / Every 3 months.		S	Page: Page: Page:
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: Page: Page:
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	
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):

- Clean vent screw [132]
- Cleaning the exterior of the transmission casing [133]
- Checking the oil quality [135]
- Check oil level [134]

5 Service and maintenance

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	- [138]
Checking the oil quality	Every 1000 hours of operation or once per year		CO	- [140]
Oil change.	Every 2000 hours of operation or once per year		CO / S	-
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	-
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 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	[144]
Bleeding the reciprocating pump of the central lubrication system.	As necessary. / After each maintenance. / After longer standstill period (>2 weeks).		CO / S	[146]
Lubricate exposed gears.	Weekly. / As necessary.		CO	[148]
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" marking.	CO	
Tighten 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	
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	
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	
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	

5 Service and maintenance

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	

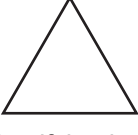
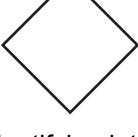
(see also):

- Clean vent screw [132]
- Cleaning the exterior of the transmission casing [133]
- Checking the oil quality [135]
- Check oil level [134]

5.2 Lubricating instructions

5.2.1 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)		

5 Service and maintenance

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

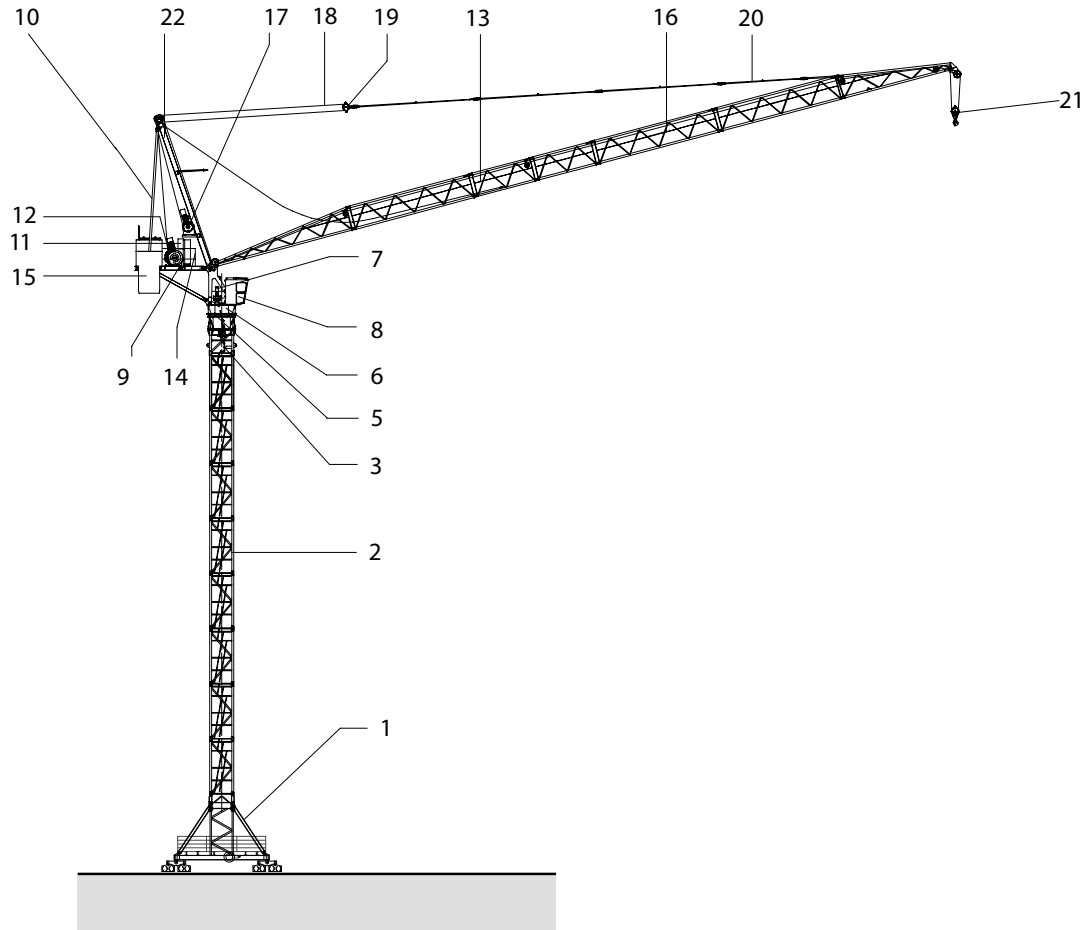
Lubricants					
Additional identifying letter	Explanation				
F	For lubricants containing solid lubricant additives (e.g. graphite, molybdenum-disulfide)				
L	For lubricating oils containing additives for increasing the protection against corrosion and/or aging resistance.				
P	For lubricants containing 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		

5.2.2 Viscosity classes

ISO viscosity class acc. to DIN 51 519	Midpoint viscosity parameter incl. limiting deviation of $\pm 10\%$	Kinematic viscosity in mm^2/s			Dynamic viscosity in mm^2/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

5 Service and maintenance

5.2.3 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

5.2.4 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	

5 Service and maintenance

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		-		-

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.

5 Service and maintenance

5.2.5 Selecting lubricant brands

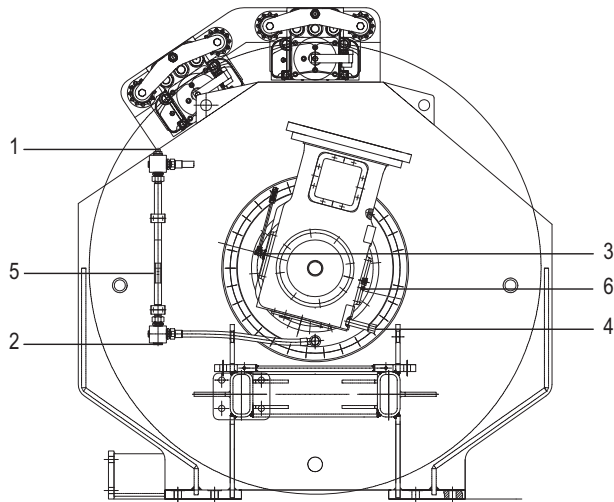
		NOTICE	
		The sorting order of the lubricants listed below is of no significance with regard to their quality. You can also choose to use ropes of equivalent quality from other, approved manufacturers.	
Identification	Aral	BP	Shell
CLP 150	Degol BG 150 Plus	Energol GR-XP 150	-
CLP 220	Degol BG 220 Plus	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	Energol EP-XP 150	Omala HD 150
CLP HC 220	Degol PAS 220	Energol EP-XP 220	Omala HD 220
CLP HC 320	Degol PAS 320	Energol EP-XP 320	Omala HD 320
HLP 32	Vitam GF 32	Energol HLP 32	Tellus Oil C22
	Aralub HLP 2	Energol LS-EP 2	Alvani EP (LF) 2

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

5 Service and maintenance

5.3 Hoisting gear

5.3.1 Checking the oil level Hw28110FU



1	Oil filler (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 (bevel input stage)	6	Oil bleeder (bevel input stage)

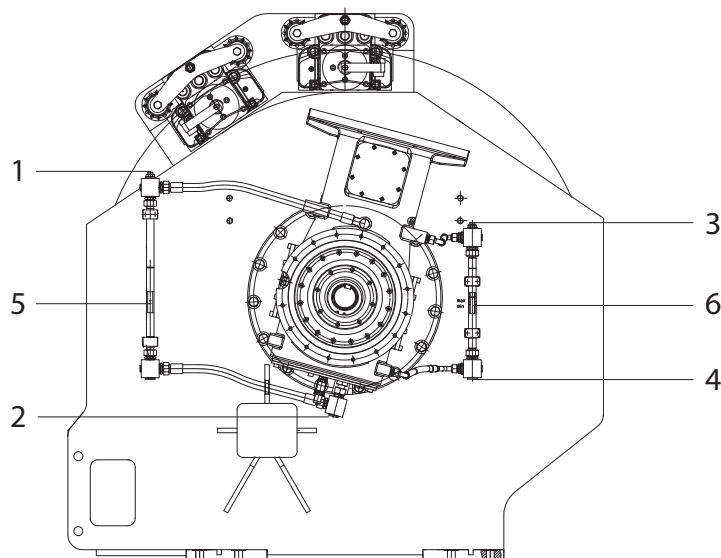
- > The slewing tower crane has been assembled.
 - > The regular interval is due.
 - > The transmission is in standstill mode.
 - > The oil has cooled down.
- 1) Check the hydraulic fluid level at the planetary gear transmission using the hydraulic fluid dipstick (5).
NOTICE! The oil level must be between the "Min" and "Max" markings.
→ You have successfully checked the oil level of the planetary gear transmission.
 - 2) Remove the oil bleeder (6) at the bevel input stage.
NOTICE! Hydraulic fluid must leak from the oil bleeder (6).
 - 3) Reinstall the oil bleeder (6).
 - 4) Collect any oil leakage and dispose of it in an environmentally compatible manner.
→ You have successfully checked the oil level at the bevel input stage.
- You have successfully checked the oil level of the entire transmission.

5.3.2 Checking the oil quality Hw28110FU

- > The regular interval is due.
- > The transmission still has its operating state temperature.
- 1) Take approx. 10 ml of oil out of the transmission.
- 2) Drop the oil on a filter tissue.
- 3) Use a magnifying glass to inspect the oil.
CAUTION! Only fine abrasion particles may be present in the oil
- 4) Contact WOLFFKRAN when you detect coarse-particle grit, scales or chips.
- 5) If the oil has a black coloration, reduce the oil change intervals.
NOTICE! A normal dark coloration of heavy duty oils or the darkening process of the oil during operation is not considered to be a black coloration. If necessary, consult an expert.
- You have successfully completed the oil quality check.

5 Service and maintenance

5.3.3 Checking the oil level 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 slewing tower crane has been assembled.
 - > The regular interval is due.
 - > The transmission is in standstill mode.
 - > The oil has cooled down.
- 1) Check the hydraulic fluid level at the planetary gear transmission using the oil sight glass (5).
NOTICE! The oil level must be between the "Min" and "Max" markings.
 → You have successfully checked the oil level of the planetary gear transmission.
 - 2) Check the oil level at the bevel input stage using the oil sight glass (6).
NOTICE! The oil level must be between the "Min" and "Max" markings.
 → You have successfully checked the oil level at the bevel input stage.
- You have successfully checked the oil level of the entire transmission.

5.3.4 Checking the oil quality Hw28132FU

- > The regular interval is due.
- > The transmission still has its operating state temperature.
- 1) Take approx. 10 ml of oil out of the transmission and the bevel input stage.
- 2) Drop the fluid on a filter tissue.
- 3) Use a magnifying glass to inspect the fluid.
CAUTION! Only fine abrasion particles may be present in the fluid.
- 4) Contact WOLFFKRAN when you detect coarse-particle grit, scales or chips.
- 5) If the oil shows a black coloration, reduce the oil change intervals.
NOTICE! A normal dark coloration of heavy duty oils or the darkening process of the oil during operation is not considered to be a black coloration. If necessary, consult an expert.
- You have successfully completed the oil quality check.

5 Service and maintenance

5.3.5 Clean vent screw

- > The regular interval is due.
- > A dust layer has accumulated on the vent screw.
- 1) Remove the vent screw.
CAUTION! Ensure that no foreign matter gets into the transmission.
- 2) Clean the vent screw using petroleum ether or a similar cleaning substance.
- 3) Dry the vent screw.
- 4) Reinstall the vent screw.
- You have successfully cleaned the vent screw.

5.3.6 Cleaning the exterior of the transmission casing

CAUTION

Cleaning the component using a high pressure cleaner

Water may get into the component and damage it.

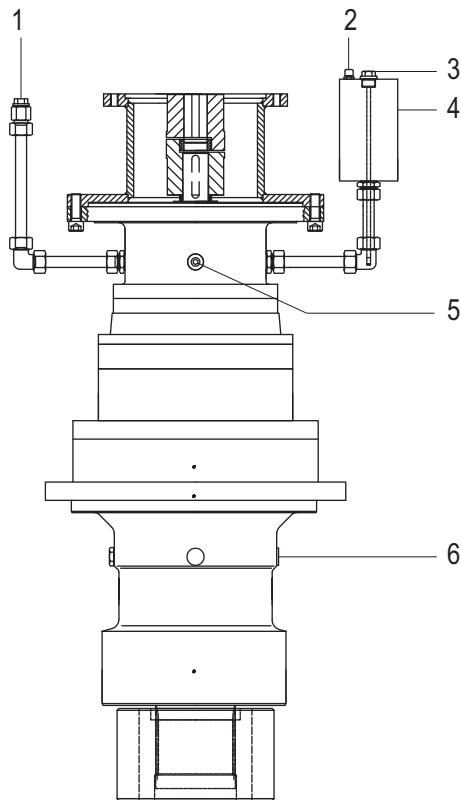
► Never clean the component using a high pressure cleaner.

- > A thick dust layer has accumulated on the vent screw.
- 1) Remove any contaminants adhering to the transmission by means of a hard brush.
- 2) Remove any rust.
- You have successfully cleaned the transmission casing.

5 Service and maintenance

5.4 Slewing gear

5.4.1 Check oil level



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

- > The slewing tower crane has been assembled.
- > The regular interval is due.
- > The transmission is in standstill mode.
- > The oil has cooled down.

1) Read the oil level by means of the oil dipstick (3).

2) When the oil level is below the "Min" marking or slightly above, top up the oil.

CAUTION! The oil level must not drop below the "Min" marking. For this reason, top up the oil early enough until the oil level is once more between the "Min" and the "Max" marking.

→ You have successfully checked the oil level.

5.4.2 Checking the oil quality

- > The regular interval is due.
- > The transmission still has its operating state temperature.
- 1) Take approx. 10 ml of fluid out of oil drain plug at the transmission.
- 2) Drop the fluid on a filter tissue.
- 3) Use a magnifying glass to inspect the fluid.
CAUTION! Only fine abrasion particles may be present in the fluid.
- 4) Contact WOLFFKRAN when you detect coarse-particle grit, scales or chips.
- 5) If the oil shows a black coloration, reduce the oil change intervals.
NOTICE! A normal dark coloration of heavy duty oils or the darkening process of the oil during operation is not considered to be a black coloration. If necessary, consult an expert.
- You have successfully completed the oil quality check.

5 Service and maintenance

5.4.3 Clean vent screw

- > The regular interval is due.
- > A dust layer has accumulated on the vent screw.
- 1) Remove the vent screw.
CAUTION! Ensure that no foreign matter gets into the transmission.
- 2) Clean the vent screw using petroleum ether or a similar cleaning substance.
- 3) Dry the vent screw.
- 4) Reinstall the vent screw.
- You have successfully cleaned the vent screw.

5.4.4 Cleaning the exterior of the transmission casing

CAUTION

Cleaning the component using a high pressure cleaner

Water may get into the component and damage it.

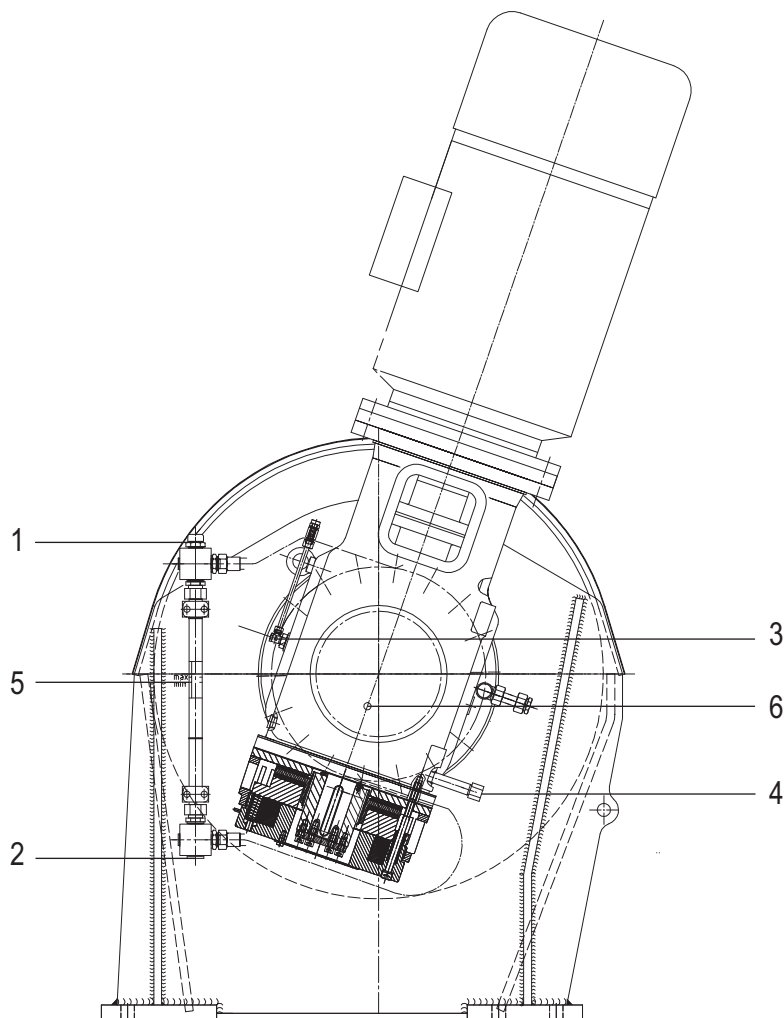
► Never clean the component using a high pressure cleaner.

- > A thick dust layer has accumulated on the vent screw.
- 1) Remove any contaminants adhering to the transmission by means of a hard brush.
- 2) Remove any rust.
- You have successfully cleaned the transmission casing.

5 Service and maintenance

5.5 Derricking gear

5.5.1 Check oil level



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

- > The slewing tower crane has been assembled.
 - > The regular interval is due.
 - > The transmission is in standstill mode.
 - > The oil has cooled down.
- 1) Check the hydraulic fluid level at the pinion gear transmission using the hydraulic fluid dipstick (5).
NOTICE! The oil level must be between the "Min" and "Max" markings.
 → You have successfully checked the oil level of the entire transmission.

- 2) Remove the oil bleeder (6) at the bevel input stage.
NOTICE! Hydraulic fluid must leak from the oil bleeder (6).
- 3) Reinstall the oil bleeder (6).
- 4) Collect any oil leakage and dispose of it in an environmentally compatible manner.
 - You have successfully checked the oil level at the bevel input stage.
 - You have successfully checked the oil level of the entire transmission.

5 Service and maintenance

5.5.2 Checking the oil quality

- > The regular interval is due.
- > The transmission still has its operating state temperature.
- 1) Take approx. 10 ml of oil out of the transmission.
- 2) Drop the oil on a filter tissue.
- 3) Use a magnifying glass to inspect the oil.
CAUTION! Only fine abrasion particles may be present in the oil
- 4) Contact WOLFFKRAN when you detect coarse-particle grit, scales or chips.
- 5) If the oil has a black coloration, reduce the oil change intervals.
NOTICE! A normal dark coloration of heavy duty oils or the darkening process of the oil during operation is not considered to be a black coloration. If necessary, consult an expert.
- You have successfully completed the oil quality check.

5.5.3 Clean vent screw

- > The regular interval is due.
- > A dust layer has accumulated on the vent screw.
- 1) Remove the vent screw.
CAUTION! Ensure that no foreign matter gets into the transmission.
- 2) Clean the vent screw using petroleum ether or a similar cleaning substance.
- 3) Dry the vent screw.
- 4) Reinstall the vent screw.
- You have successfully cleaned the vent screw.

5 Service and maintenance

5.5.4 Cleaning the exterior of the transmission casing

CAUTION

Cleaning the component using a high pressure cleaner

Water may get into the component and damage it.

► Never clean the component using a high pressure cleaner.

- > A thick dust layer has accumulated on the vent screw.
- 1) Remove any contaminants adhering to the transmission by means of a hard brush.
- 2) Remove any rust.
- You have successfully cleaned the transmission casing.

5.6 Drive gear



NOTICE

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

5 Service and maintenance

5.7 Ball race bearing

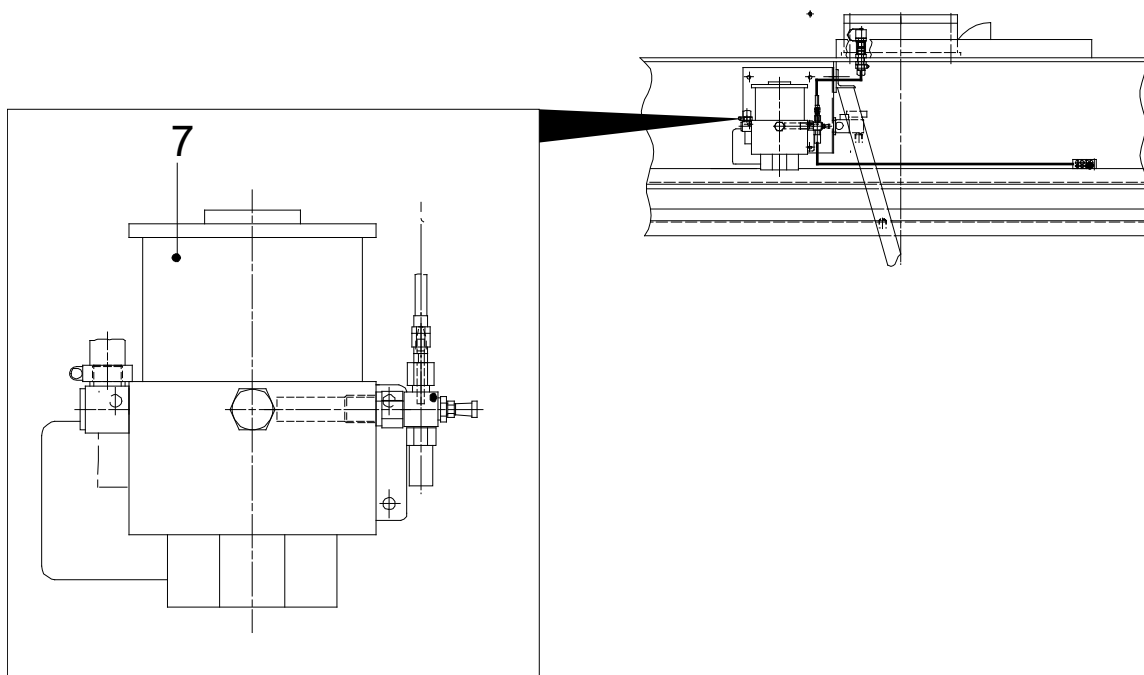
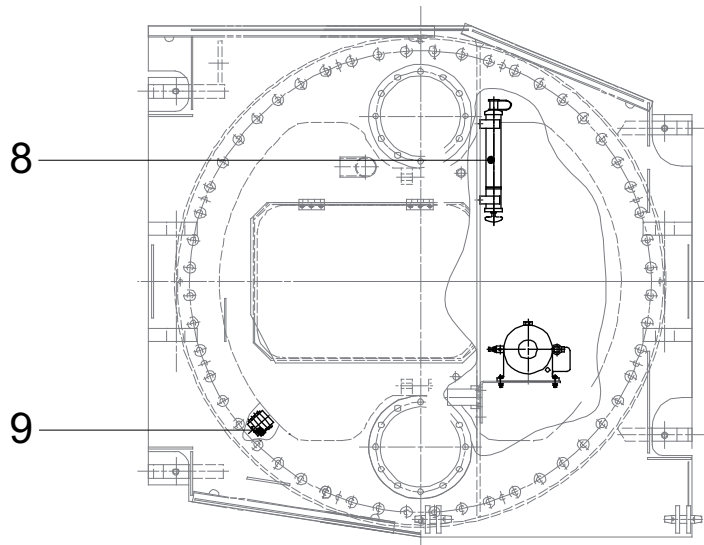
5.7.1 Filling the reciprocating pump of the central lubrication system

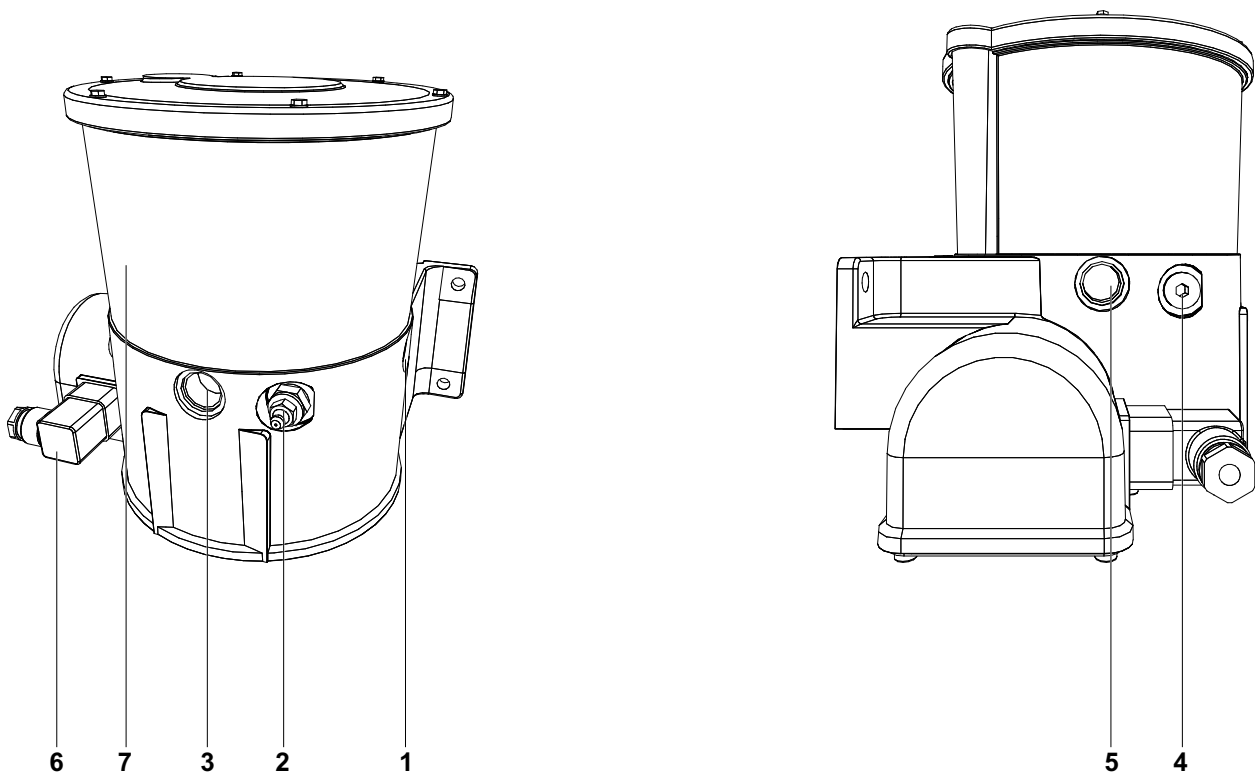


NOTICE

Check the fill level of the lubricant reservoir at cyclic intervals.

You must bleed the entire system if the reservoir was drained off.





1	Port for pump element / pressure limiting valve	6	Electrical connection
2	Filling nipple	7	Lubricant reservoir
3	Filling port	8	Filling cylinder
4	Alternative port for filling nipple	9	Distributor
5	Port for additional pump element		

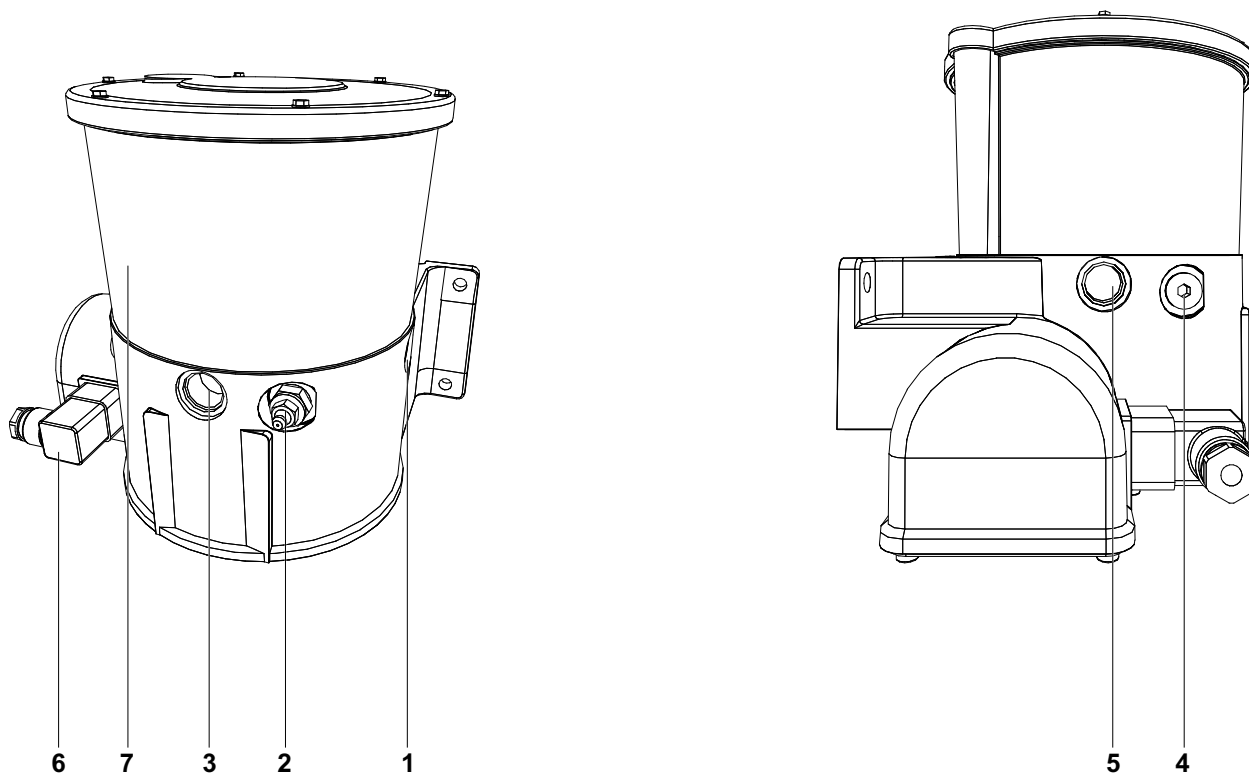
> How to replenish the lubricant reservoir

> An approved grease lubricant is available.

- 1) Remove the protective cap from the filling port (3).
 - 2) Insert the filling cylinder (8) with a full grease cartridge into the open filling port (3).
 - 3) Inject grease into the reciprocating pump up to the maximum marking.
 - 4) Close the filling port (3) with the protective cap.
 - 5) Fill the filling cylinder (8).
 - 6) Close the filling cylinder (8) with the protective cap.
 - 7) Reinsert the filling cylinder (8) into the bracket.
 - 8) Clean the reciprocating pump, if necessary.
- You have replenished the lubricant reservoir and the reciprocating pump is ready for operation.

5 Service and maintenance

5.7.2 Bleeding the reciprocating pump of the central lubrication system.



1	Port for pump element / pressure limiting valve	5	Port for additional pump element
2	Filling nipple	6	Electrical connection
3	Filling port	7	Lubricant reservoir
4	Alternative port for filling nipple		

- > The level fell below the "Min" marking of the reservoir.
- > Service or repair operations have been done.
- > A longer out of service period (>2 weeks) has occurred.

- 1) Replenish the lubricant reservoir (7) at least up to two thirds (2/3) of the reservoir capacity.
- 2) Disconnect the main pipe from the pressure limiting valve (1).
- 3) Activate the intermediate lubrication several times until grease exits the pump element (1) without air bubbles.

→ You have successfully bled the reciprocating pump of the central lubrication system.

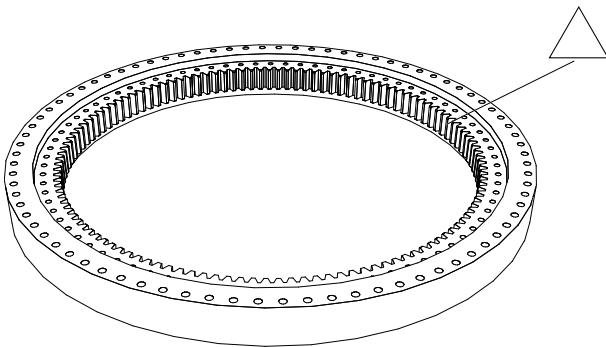
5.7.3 Troubleshooting on piston pump

Malfunction	Possible cause	Remedy
The impeller in the grease reservoir is not working within the pump activation time.	Mechanical damage, e.g. motor failure.	Replace the pump. Disconnect the main lubricating line from the outlet of the pressure limiting valve. Disconnect the wires. Remove the three mounting screws. Remove the faulty pump. Install the new pump and reconnect the lubricating line and electric cable. Commission the pump and run a performance test.
	Electrical connection interrupted.	Check or replace the fuse. Check the electrical connections. Check the cable assembly for damage!
Pump does not work, even though all electrical connections are ok.	Failure of the electrical control system. Pump drive / motor failure. Lubricant level in reservoir below minimum.	Replace the pump. Fill lubricant reservoir up to "Max" marking .
The pump does not discharge any lubricant although the impeller is turning.	The check valve in the pump element fails to close. (To check for this state, disconnect the main feed line and keep the outlet closed with your finger tip.)	Replace the pump element. Please note the following: The grooved dosing markings.
	Intake problems due to air entrapped in the grease.	Remove the pump element and operate the pump until grease is discharged from the case outlet.
	The pump element does not develop pressure and shows signs of wear and tear. (Can be recognized by the fact that the outlet can be held closed with a finger when the main line is removed.	Replace the pump element. Please note the following: The grooved dosing markings.
The pressure control valve on the pump opens and lubricant is discharged.	System pressure above 300 bar. e.g. blockage at the distributor or at a lubricating point.	Check and repair / convert the system so that its pressure does not exceed 200 bar at 20°C.
	The valve fails to close due to damage or soiling.	Replace the pressure limiting valve.

5 Service and maintenance

5.7.4 Lubrication of the gear teeth

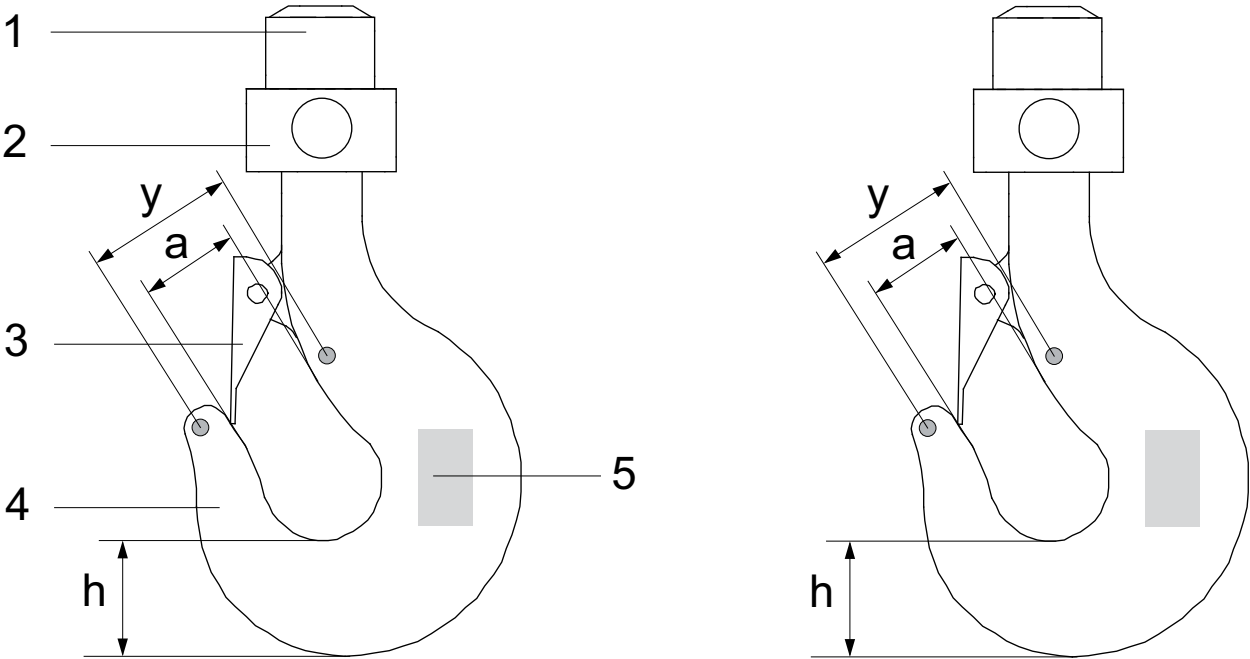
	! WARNING Risk of getting between the exposed gear rims Risk of serious contusion or fatal injury. ► Ensure that no loose objects may be caught.
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- > The exposed gear rims must be relubricated.
- > The regular interval is due.
- 1) Apply lubricant to all gear teeth of the slewing rim.
- 2) Slowly rotate the ball race bearing.
- 3) Remove any excessive lubricant.
- You have successfully relubricated the ball race bearing.

5.8 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

5 Service and maintenance

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.

6 Malfunctions

	 WARNING
	Deviation from normal crane operation Failure of safety equipment. Damage to the slewing tower crane. Wear of parts. Changes were made to the settings. 1) Immediately report all changes found during crane operation. 2) Shut down the slewing tower crane if necessary. 3) Immediately request troubleshooting services. 4) Report any defects you might have found to the next crane operator.

List of errors

Error code	Short description	Module	Remedy
000	No error	-	-
001	Metering shaft: Channel value mismatch	Load measurement	Call aftersales service
002	Profibus failure Field bus terminals control cabinet	Control cabinet	Call aftersales service
003	Profibus failure Field bus terminals in operator cabin	Driver's cab	Call aftersales service
004	Profibus failure at hoisting gear inverter	Control cabinet	Call aftersales service
005	Profibus failure at trolley drive / luffing gear inverter	Control cabinet	Call aftersales service
006	Profibus failure at slewing gear inverter	Control cabinet	Call aftersales service
007	Profibus failure at radio receiver	Control cabinet	Call aftersales service
008	SSI general error	PLC	Call aftersales service
009	Failure at 24 V sensor supply, fuse	Control cabinet	Call aftersales service
010	Thermal contact at inductor / transformer	Control cabinet	Allow to cool down
011	Phase failure, phase imbalance, low voltage	Control cabinet	Call aftersales service
012	Safety limit switch	Hoisting gear / luffing gear	Call aftersales service
014	Monitoring function for master switch zero contacts	Control console	Call aftersales service
018	Main contactor feedback	Control cabinet	Call aftersales service

6 Malfunctions

Error code	Short description	Module	Remedy
020	Hoisting gear brake contactor feed-back	Control cabinet	Call aftersales service
021	Contactor feedback Trolley / derricking / luffing gear	Control cabinet	Call aftersales service
022	Slewing gear brake contactor feed-back	Control cabinet	Call aftersales service
024	Brake chopper shorted	Control cabinet	Call aftersales service
028	Crane travelling gear control contactor feedback	Control cabinet	Call aftersales service
040	Control cabinet temperature Outside temperature $< -20^{\circ}\text{C}$	Control cabinet	Warning
080	Standstill monitoring function	Hoisting gear	Cycle main switch OFF / ON
081	Standstill monitoring function	Trolley / derricking / luffing gear	Cycle main switch OFF / ON
082	Inverter autostart error	Slewing gear	Cycle main switch OFF / ON
100	Parity of SSI signal	Hoisting gear	Briefly operate the key switch on the right-hand control console.
101	Sensor error (SSI)	Hoisting gear	Briefly operate the key switch on the right-hand control console.
104	Load dynamics above limit	Hoisting gear	Master switch in zero position
108	Absolute encoder jump / direction	Hoisting gear	Briefly operate the key switch on the right-hand control console.
110	Check whether requested function is operating.	Hoisting gear	Briefly operate the key switch on the right-hand control console.
111	Weak mains voltage.	Hoisting gear	Warning
114	Inverter brake signal	Hoisting gear	Briefly operate the key switch on the right-hand control console.
118	Speed above limit	Hoisting gear	Briefly operate the key switch on the right-hand control console.
120	Brake pad monitoring system	Hoisting gear	Warning: Call service
121	Motor overtemperature	Hoisting gear	Allow to cool down
122	Circuit breakers 1Q7, 1Q91, 12Q7 or 12Q70	Hoisting gear	Call aftersales service
124	Plug / socket, fuse	Hoisting gear	Call aftersales service
128	Hydraulics of additional brake	Hoisting gear	Call aftersales service
141	Inverter failure	Hoisting gear	Briefly operate the key switch on the right-hand control console.
144	Thermocontact of chopper resistor	Control cabinet / hoisting gear / luffing gear / slewing gear	Allow to cool down

Error code	Short description	Module	Remedy
148	Thermocontact of brake chopper	Control cabinet	Allow to cool down
181	Transmission monitoring	Hoisting gear	Allow to cool down
180	Brake hydraulics	Hoisting gear	Call aftersales service
201	Load signal above limit	Load measurement	Call aftersales service
202	Load signal below limit	Load measurement	Call aftersales service
220A	Reference current above limit	PLC	Call aftersales service
220B	Reference current below limit	Load measurement	Call aftersales service
221	Reference current	Operating radius sensing	Call aftersales service
240	Length sensor limit	Trolley drive / derricking / luffing gear	Call aftersales service
301	Operating radius above limit	Operating radius sensing	Call aftersales service
302	Operating radius below limit	Operating radius sensing	Call aftersales service
308	Inclination sensor channels differ	Operating radius sensing	Call aftersales service
310	Absolute encoder jump / direction	Trolley drive / derricking / luffing gear	Briefly operate the key switch on the right-hand control console.
320	Check whether requested function is operating.	Trolley drive / derricking / luffing gear	Briefly operate the key switch on the right-hand control console.
341	Inclination sensor channel 1 limit	Operating radius sensing	Call aftersales service
342	Inclination sensor channel 2 limit	Operating radius sensing	Call aftersales service
344	Table error	PLC	Cycle main switch OFF / ON
348	Slack rope or angle error	Trolley drive / derricking / luffing gear	Luff in the jib
401	Incorrect crane setup	PLC	Cycle main switch OFF / ON
402	Assembly switch 1SO ON	Control cabinet	Warning
404	Re-reeving key 1S124 ON	Control console	Warning
408	Setting values checksum	PLC	Cycle main switch OFF / ON
410	Reeving mode detection	Trolley drive / derricking / luffing gear	Call aftersales service
420	Inverter / DC link failure	Control cabinet	Cycle main switch OFF / ON
440	PLC error	Control cabinet / Control console	Cycle main switch OFF / ON
480	Programming key 1S9 ON	Control cabinet	Call aftersales service
600	Parity of SSI signal	Trolley drive / derricking / luffing gear	Briefly operate the key switch on the right-hand control console.
601	Sensor error (SSI)	Trolley drive / derricking / luffing gear	Briefly operate the key switch on the right-hand control console.

6 Malfunctions

Error code	Short description	Module	Remedy
614	Inverter brake signal	Trolley drive / derricking / luffing gear	Briefly operate the key switch on the right-hand control console.
618	Speed above limit	Trolley drive / derricking / luffing gear	Briefly operate the key switch on the right-hand control console.
621	Motor overtemperature	Trolley drive / derricking / luffing gear	Allow to cool down
622	Circuit breaker 6Q7	Trolley drive / derricking / luffing gear	Call aftersales service
641	Inverter failure	Trolley drive / derricking / luffing gear	Briefly operate the key switch on the right-hand control console.
700	Parity of SSI signal	Slewing gear	Briefly operate the key switch on the right-hand control console.
701	Sensor error (SSI)	Slewing gear	Briefly operate the key switch on the right-hand control console.
702	Velocity at limitation	Slewing angle limitation	Warning
708	Absolute encoder jump / direction	Slewing gear	Briefly operate the key switch on the right-hand control console.
710	Check whether requested function is operating.	Slewing gear	Briefly operate the key switch on the right-hand control console.
712	Hook in closed area	Slewing angle limitation	Warning
720	Limitation checksum	Slewing angle limitation	Cycle main switch OFF / ON
721	Motor overtemperature	Slewing gear	Allow to cool down
728	Anti-collision interface	Crane	Call aftersales service
740	Central lubrication system failure	Crane	Warning: Call service
741	Inverter failure	Slewing gear	Briefly operate the key switch on the right-hand control console.
742	Wind speed above limit	Crane	Warning
744	Ladder cover open	Crane	Warning
901	Oil level warning	Trolley drive / derricking / luffing gear	Warning
902	Oil temperature warning	Trolley drive / derricking / luffing gear	Warning
903	Oil level too low	Trolley drive / derricking / luffing gear	Call aftersales service
904	Oil temperature too high	Trolley drive / derricking / luffing gear	Allow to cool down.
905	Hydraulics line filter	Trolley drive / derricking / luffing gear	Call aftersales service

Error code	Short description	Module	Remedy
906	Hydraulics ball valve	Trolley drive / derricking / luffing gear	Call aftersales service
907	Release switch 9S01 OFF	Trolley drive / derricking / luffing gear	Warning
914	Inverter brake signal	Trolley drive / derricking / luffing gear	Briefly operate the key switch on the right-hand control console.
918	Excessive rpm or speed above limit	Trolley drive / derricking / luffing gear	Briefly operate the key switch on the right-hand control console.
920	Brake pad monitoring system	Trolley drive / derricking / luffing gear	Briefly operate the key switch on the right-hand control console.
921	Motor overtemperature	Trolley drive / derricking / luffing gear	Allow to cool down
922	Circuit breaker	Trolley drive / derricking / luffing gear	Call aftersales service
924	Plug / socket, fuse	Trolley drive / derricking / luffing gear	Call aftersales service
928	Hydraulics of additional brake	luffing gear	Call aftersales service
941	Inverter failure	Trolley drive / derricking / luffing gear	Briefly operate the key switch on the right-hand control console.

7 Crane operating instructions (BGV D6)

7 Crane operating instructions (BGV D6)

The following pages are posted in the crane operator cabin.

Notice of Employer's Liability Insurance Association

Operating instructions for cranes

§§ 29 to 43 of the Accident Prevention Regulations "Cranes" (BGV D6)

§ 7 A copy of §§ 29 to 43 (operating instructions) must be posted close to the control equipment and visible at all times to crane operators. This rule is valid both for manually operated and semi-automatic cranes.

§ 29 Crane operators, maintenance personnel

1. Contractors may only appoint insured personnel for independent operation (crane operators) or maintenance of a slewing tower crane. Conditions in particular:
 - Employees must be at least 18 years of age
 - Employees must be suitable physically and mentally
 - Employees must have been instructed appropriately about the operation and maintenance of the slewing tower crane and have submitted satisfactory evidence of such qualification.
 - Employees must be trusted to carry out their allocated tasks with due diligence and reliability.
 - Contractors must assign corresponding duties to crane operators and maintenance personnel. Operators of portable, power-driven cranes must be commissioned in writing.
2. Section 1 is not valid for cranes which are operated manually.

§ 30 Duties of crane operators

1. At the start of work, verification of the functionality of brakes and emergency stop limit devices, excluding slip couplings.
2. Looking out for obvious faults on the slewing tower crane.
3. Check of the assignment between the radio control panel and radio-controlled cranes.
4. Stopping crane operation if faults which pose a risk to safety are found.
5. Notification of the supervisor and relay operators of all faults found. In addition, recording of all faults found in the logbook of portable cranes which are assembled and disassembled at different locations.
6. Operation of control equipment only from corresponding control consoles.
7. Duties of the crane operator in particular
 - Reset of control equipment to zero or neutral before powering on the drive units.
 - Reset of all control equipment to zero or neutral and isolating drive aggregates from power the supply before leaving the control console.
 - Securing the radio control unit against unauthorized activation before laying it down.

8. Duties of the crane operator in particular
 - Taking the crane out of service if this is exposed to wind drag beyond limits specified by the crane manufacturer and arresting the crane by means of wind securing device in due time as soon as wind velocity has reached a critical limit, and at the end of work.
 - Before leaving the control console on tower cranes and jib cranes on which the jib must turn into the wind for reasons of stability, check whether all loads, slings and load suspension devices are off hook, whether the load hook is raised to the end stop and the slewing gear brake is released, whether the trolley of cranes with trolley jib is moved to the standstill position and whether the boom of a needle jib is moved to the widest radius. To exclude the risk of jib collision with obstacles due to wind drag, crane operators must take appropriate measures as specified by the contractor.
9. Crane operators must monitor the load, or the load suspension equipment during no-load operation in order to exclude hazardous situations. Crane operators who are prevented from monitoring and controlling the crane in accordance with section 1 must rely on the assistance of a signaler. This rule does not apply to cranes controlled by the program of an automation system.
10. Crane operators must give warning signals as required.
11. Crane operators must not convey suspended loads overhead of persons. This rule also applies to the usage of load suspension tackle which is operated based on magnetic, frictional, or suction force and which does not feature additional safety fixtures, and to cranes which operate without automatic break system at the hoisting gear and jib drive.
12. Crane operators must not convey any manually attached loads unless either the slinger, or the signaler, or another person signed responsible by the contractor has released the operation by means of an unambiguous signal. All signals which might have to be used for communication with crane operators are subject to agreement between the responsible person and the crane operator prior to usage. A crane operator must not convey any loads which he considers improperly attached.
13. Crane operators always have to stay within reach of the control equipment as long as a load is suspended on the hook. This rule does not apply to the towing of vehicles by means of towing crane, or to cranes controlled by an automation system program.
14. Crane operators are not allowed to shift gears across neutral on hoisting and jib drives while the crane is under load.
15. Crane operators are not allowed in normal operation to approach crane components to end positions which are limited by emergency stop switches or slip couplings.
16. Crane operators are not allowed to lift an overload by retracting or luffing the jib after the load torque limiting function has responded.
17. In order to exclude hazards, the operators of manually operated or semi-automatic cranes have to ensure that they can stop active crawling or slewing motions at any time.

§ 31 Load rating, load

1. Contractors must provide a crane that suits operational requirements, particularly under the aspect of sufficient load carrying capacity, hoisting height, operating range, or outreach.
2. Crane operators may not subject cranes to imposed loads which exceed their rated load capacity. Crane operators must adapt the torque limiting function as required for the crane setup.
3. Crane operators may only activate override switches at overload protection circuits for the purpose of retrofitting or shutdown in accordance with the operating instructions of the manufacturer.

7 Crane operating instructions (BGV D6)

4. Contractors are only allowed to install or replace operational crane components of which the following specifications are evidently known:
 - Manufacturer, importer or supplier
 - Year of construction
 - Serial number
 - Assignment to the approved crane system
 - Dead weight
 - Carrying capacity of hook blocks and cross members
 - Gripper volume and carrying capacity
5. Timber-loading cranes can also be used without load torque limiter, provided
 - A pressure control valve prevents approved load torque from being exceeded by more than 10 %
 - The control console of the slewing tower crane is located at a position where the operator is outside the danger zone of the jib
 - The crane can cope with higher stress requirements for lifting, pulling, pressing and levering the timber.
 - The crane is equipped with load suspension tackle which does not require slinger assistance
 - A warning has been posted to prohibit access to the slewing range of the crane or load.

§ 32 Safety clearances

1. Contractors must ensure that a minimum safety clearance of 0.5 m is maintained between material storage and outer power-driven elements of slewing tower cranes which are operated stationary, or on rails or tracks.
2. Contractors erecting portable cranes must ensure that a minimum clearance of 0.5 m is maintained to the outer, power-driven elements of the slewing tower crane, to stationary objects in the surroundings, or to materials on storage.
3. Crane operators lowering loads must maintain a minimum safety clearance of 0.5 m between the load and the outer, power-driven elements of the slewing tower crane.
4. The crane operator shall have travelling cranes set up in such a manner that a safety distance of at least 0.5 m is maintained between the power-driven outer parts of the crane and stationary objects in the surrounding area or stored material.
5. It is not required to maintain the safety clearance outside the working and traffic area.
6. Contractors can approve operation of log wood sorting cranes without maintaining a vertical safety distance to bench saws, provided the traversing range is secured by means of safety systems and the control equipment features functionality for automatic return to the safe position.

§ 33 Joint operation of several cranes

1. Prior to the joint operation of several cranes, contractors must specify work procedures and provide the means for reliable communication between crane operators.
2. If a load must be raised using several cranes, contractors must specify corresponding work procedures and allocate supervising personnel before such an action is carried out.

§ 34 Operating instructions

Contractors shall undertake to provide crane operating instructions if necessary under the aspect of operational conditions and work to be carried out.

§ 35 Accessing and leaving cranes

1. Unauthorized access to the crane is prohibited.
2. The slewing tower crane may only be accessed or exited while it is at a standstill and if approved by the crane operator.

§ 36 Transporting persons

1. Crane operators are not allowed to transport persons alongside with the load or using the load suspension tackle.
2. It is prohibited to step onto raised loads or load lifting tackle.
3. Sections 1 and 2 do not apply to personnel who access cross members in order to check the ropes, provided that such personnel have found a secure position and are secured against falling.
4. The conveying of people and carrying out work in equipment specially designed for this purpose is permitted, provided that the contractor has taken suitable safety measures and notified the Employer's Liability Insurance Association of such planned activities. This notification must be submitted at least two weeks prior to the planned conveyance. Contractors must take all precautions as specified.
5. Contractors must prevent cranes which are equipped with a hoisting gear transmission with neutral shift, or at which load can be lowered in free fall, from being used for work tasks specified in section 4.
6. Crane operators must not use cranes which are equipped with a hoisting gear transmission with neutral shift, or at which load can be lowered in free fall, for work tasks specified in section 4

§ 37 Diagonal pull, dragging loads, and moving vehicles using cranes

1. Crane operators are not allowed to
 - Pull loads at an angle or drag loads
 - Move vehicles with the help of the load or load tackle.
2. At conditions other than specified in section 1.1 and provided that the crane rating and setup is suited for handling such forces, crane operators are allowed to drag loads, or pull loads at an angle:
 - To clear hazards developing in rolling mills as a result of malfunction, provided the operation is supervised.
 - Using a gantry crane, provided this is equipped with an overload protection function, that the motion is executed via guide pulley and load conveying is controlled appropriately
 - To salvage vehicles using an additional salvage wrench or pulling equipment
 - Using derrick cranes in quarries and timer storage locations
 - To move rough timber using cranes without rope winch
 - To convey hay, straw, silage, dung or similar

§ 38 Breaking free seized loads

1. Contractors must always use cranes with overload protection functionality to break free seized loads. It is not allowed to use mobile cranes or slewing tower cranes to this effect.
2. Crane operators are not allowed to use mobile or slewing tower cranes to break free seized loads; the use of other cranes to this effect is only allowed if those are equipped with an overload protection system.

§ 39 Crane operation and electrical hazards

1. Contractors must take appropriate safety measures to protect human beings against the risk of electrical shock when cranes are operated in the vicinity of live electrical systems and equipment.
2. Crane operators must observe all safety measures which are necessary to protect human beings against the risk of electrical shock when operating cranes in the vicinity of live electrical systems and equipment.

§ 40 Assembly, disassembly and conversion of portable cranes

1. Contractors must ensure that portable cranes are erected on ground on which loads imposed by a crane can be safely absorbed.
2. Crane operators must use the outriggers as intended and support these with appropriate packing in accordance with the assembly instructions, depending on the carrying capacity of the ground.
3. Contractors must appoint a supervisor who is responsible for portable cranes which have to be disassembled for transport due to their size and weight, as well as for their assembly, disassembly or conversion in accordance with the assembly instructions.
4. The contractor is responsible for ensuring that
 - For appointing only trained personnel with trusted qualification for installation and the removal of truck-mounted cranes.
 - For observance of the crane and vehicle manufacturers' installation and removal specifications.

§ 41 Maintenance and inspection tasks

1. Insured personnel must verify that the crane is isolated from power and secured against unauthorized restart before starting any maintenance and inspection work. Personnel must use appropriate man-carrying platforms or working platforms to perform maintenance tasks which cannot be carried out at ground level.
2. Section 1.1 does not apply if maintenance and inspection tasks can be carried out on the live crane, provided
 - The risk of contusion or falling can be safely excluded
 - There is no risk of electrical shock caused by contact with live electrical systems and equipment
 - Communication (voice or visual) with the crane operator is ensured.

§ 42 Crane maintenance and modification and working in the crane's traversing range

1. Contractors undertake to enforce and supervise the following safety measures for the protection of human beings while maintenance and modification tasks are carried out on cranes, and while work is carried out within the danger zone of moving cranes.
 - The crane must be isolated from power and secured against unauthorized restart.
 - If there is a risk of injury due to falling objects, the danger zone below the crane must be secured appropriately by means of fencing or sentinel.
 - The crane must be secured at a position at which collision with other cranes can be safely excluded.
 - All operators of adjacent cranes located on the same track, or on an adjacent tracks must be informed of the kind and location of work to be carried out. This rule also applies to relay operators of the next shift.

2. Contractors must enforce and supervise other or additional safety measures if the safety measures specified in section 1 do not suit the purpose, do not apply for operational reasons, or if these are unsatisfactory.

§ 43 Re-commissioning after maintenance and modification tasks were completed

After maintenance, modification, or work in its traversing range has been carried out, the crane may only be commissioned for operation if approved by the contractor. Prior to release, the contractor or his representative must verify

1. Completion of all tasks pending
2. Safe state of the crane
3. All personnel have left the crane after having completed their work

8 Template - Written appointment of crane operators

8 Template - Written appointment of crane operators

Company:	
Name: _____	
Street address: _____	
Written appointment of crane operators in accordance with § 29, "Crane" Accident Prevention Regulations (BGV D6)	
The crane operator	
Mr./ Mrs.: _____	
Date of birth: _____	
Place of residence: _____	
Is herewith appointed as independent crane operator for the company named above.	
The appointment covers operation of the following cranes:	
Type: _____	
The appointed person has submitted satisfactory proof of qualification for operating the cranes specified above to the contractor. *)	
The candidate has been instructed accordingly by means of: **)	
☐ Crane operator training course: _____ ☐ Training at the external facilities: _____ ☐ Internal training (date of course): _____	
Date: _____	Date: _____
Company: _____	Crane operator: _____
*) Cross out items not applicable **) Check mark applicable items	

9 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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