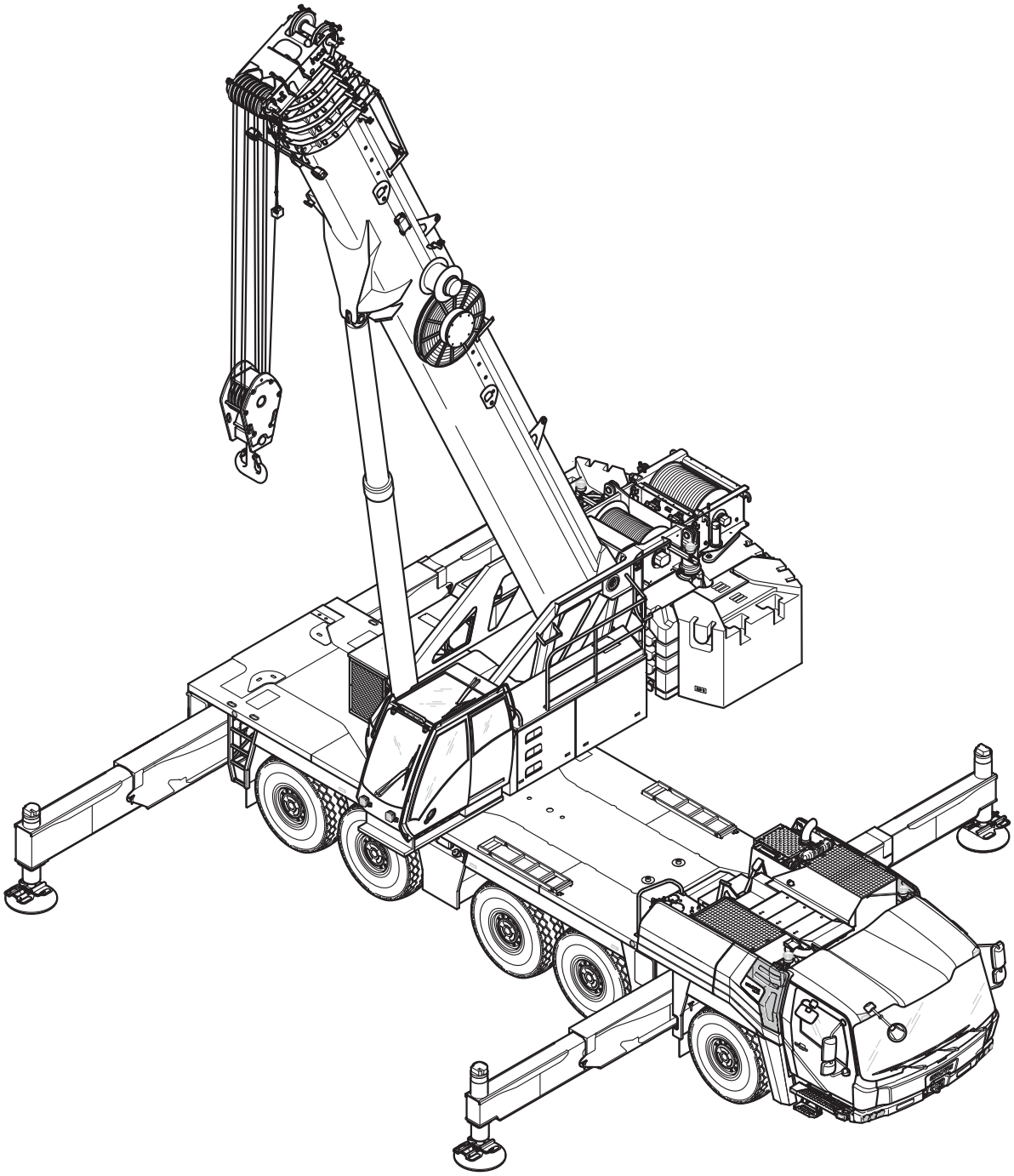
Grove GMK 5200-1

Operating manual
Part 1 – Driving



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Grove Manitowoc National Crane Potain

Manitowoc

Slewable spotlights

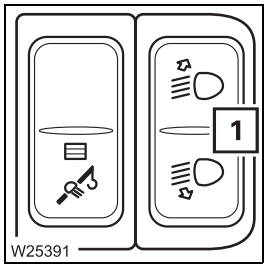
Automatic load tracking

First, the slewable spotlights must be manually aligned onto the load. You can then switch on the automatic load tracking.

Switch on spotlight

➠ *Operating manual*

Manually swinging



Turn upwards

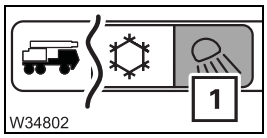
- Press the button (**1**) up.

Turn downwards

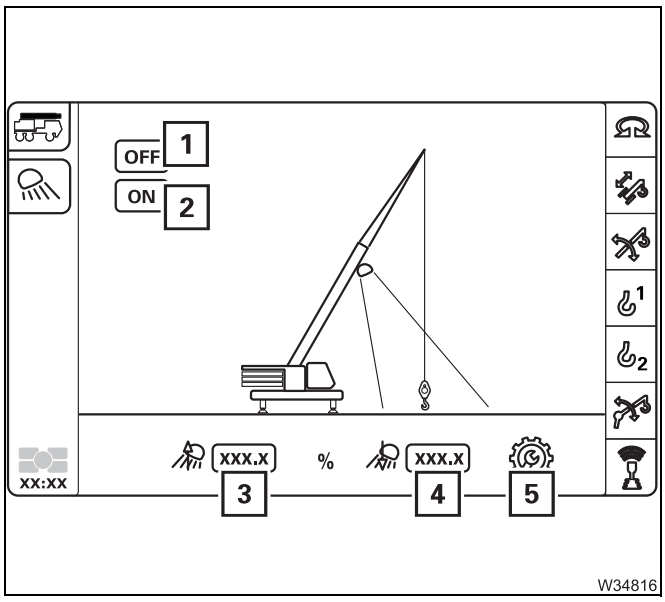
- Push the button (**1**) down.

The direction of the spotlights will be adjusted until you let go of the button or they reach their end position.

Switching load tracking on/off



- Open the *spotlight* (**1**) menu.



- Switch on the automatic load tracking – symbol (**2**).

You can adjust the pivoting speed:

- Open the submenu (**5**).

Speed

– increased with (**3**),

– decreased with (**4**).

Switch off the automatic load tracking – symbol (**1**).

08.02.2017

1 Overview

10.09.2015

Dimensions

All dimensions relate to on-road mode; ➠ *Driving modes*, p. 6 - 1.

	Length without auxiliary hoist:	15.68 m (50.4 ft)
A	Height:	At on-road level:
	– 385/95 R25	3.94 m (12.9 ft)
	– 445/95 R25	3.99 m (13.1 ft)
	– 525/80 R25	3.99 m (13.1 ft)
	Max. level change	–130/+170 mm (–5.1/+6.7 in)
B	Width:	
	– 385/95 R25	2.97 m (9.7 ft)
	– 445/95 R25	2.97 m (9.7 ft)
	– 525/80 R25	3.07 m (10.1 ft)
	Angle of negotiable banks:	At on-road level (385/95 R25)
	Front:	approx. 16°
	Rear:	approx. 8°

Weight and axle loads

For equipment with the specified axle loads in on-road mode; ➠ *Driving modes*, p. 6 - 1.

Dimensions and weights of the parts which have to be transported on separate vehicles during on-road driving; ➠ p. 1 - 10.

Total weight:	Depending on driving mode 60 t (132,277 lbs)
Axle loads:	depending on driving mode, 12 t (26,500 lbs)

10.09.2015

Cylinder:	One single-level telescoping cylinder with locking/unlocking mechanism
Power unit group Telescoping mechanism:	M1 (in accordance with ISO 4301 - 2)

[1)] Additional equipment

Lattice extension As additional equipment; ➠ *Operating Instructions Lattice Extension*.

Operating speeds The specified operating speeds only apply to an engine speed of about 1,190 rpm without load.

Main hoist:	Rope speed when lifting and lowering		
	Normal speed:	maximum	60 m/min (197 ft/min)
	High-speed mode:	maximum	120 m/min (394 ft/min)
Auxiliary hoist:	Rope speed when lifting and lowering		
	Normal speed:	maximum	60 m/min (197 ft/min)
	High-speed mode:	maximum	120 m/min (394 ft/min)
Slewing gear:	0 to 1.3 revolutions per minute		
Telescoping mechanism:	Extending from 13.7 m to 64.0 m (45.0 ft to 210.0 ft)		
	approx. 460 s	In automatic mode during uninterrupted locking and telescoping processes	
Derricking gear:	Derricking between –1.5° and 82°		
	Normal speed:	Raising:	approx. 142 s
	High-speed mode:	Raising:	approx. 68 s

Noise emission Emission sound pressure level at the workplace

At the crane cab seat: 71 dB(A)

10.09.2015

The parking brake is used as an example to show how the cross-references guide you through the operating manual.

A In this example, the general overview is shown on page 3 - 2.
The driver's cab is labelled as number **1**. The related table contains a cross-reference in the form

1 Cab ➠ p. 3 - 4

B Page 3 - 4 shows a top view of the driver's cab.
The parking brake is labelled as number **2**. The related table contains a cross-reference in the form

2 parking brake ➠ p. 3 - 57

C Page 3 - 57 gives a brief description of all the functions of the parking brake.
If further information is available, the brief description contains a cross-reference, e.g.

4 Test position for towing a trailer:
– Pull the lever down until it locks into place
– Press in the lever and pull it further backwards
The parking brake for the trailer is released; ➠ p. 5 - 87.

D Follow the cross-reference to page 5 - 87. Here, the test position of the parking brake when towing a trailer is described in detail, with all the preliminary requirements and safety instructions.

There may be additional cross-references here, such as to related pages in the chapter *Malfunctions*.

10.09.2015

2 Basic safety instructions

Notes on the warnings used; ➠ *What do the symbols used mean?*, p. 1 - 23.

2.1 Intended use

The **GMK 5200-1** is a state-of-the-art truck crane, designed in accordance with approved safety regulations. Nevertheless, the operator or third parties can still be endangered and the crane or other property put at risk while using it.

The truck crane may only be modified with the consent of **Manitowoc Crane Group Germany GmbH**.

The **GMK 5200-1** truck crane may only be used when it is in perfect technical condition and for its intended purpose and with due attention paid to safe operation and possible hazards.
Any malfunctions that could impair safety must be eliminated immediately.

The **GMK 5200-1** truck crane may only be operated without the corresponding special equipment within the permitted temperature range; ➠ *Technical data*, p. 1 - 7.

The **GMK 5200-1** truck crane is designed solely for lifting loads which are within the permitted **GMK 5200-1** lifting capacities. The load must be slung as prescribed to a hook block which is positioned vertically over the load prior to lifting.

Intended use also includes

– observing the entire crane documentation, consisting of the operating manual(s), the lifting capacity table, the outrigger pressure table and the safety manual

– adhering to the inspection and maintenance requirements specified in the maintenance manual.

The **GMK 5200-1** may only be operated with parts of equipment which are permitted by **Manitowoc Crane Group Germany GmbH** and which are labelled with the serial number of the **GMK 5200-1**.

The manufacturer is not liable for any damage caused by improper or unauthorized use of the **GMK 5200-1** truck crane. The user alone bears the risk.

10.09.2015

Truck crane

The truck crane must be equipped such (e.g. with hydraulic emergency operation) that the equipment for lifting persons can be set down and that persons transported can safely leave it even if there is a failure of the drive or crane control.

The hook that holds the lifting gear for the equipment for lifting persons must be fitted with a lockable latch that completely seals the hook opening.

The truck crane must be serviced as prescribed, regularly inspected and repaired, if required. All safety stickers must be affixed in their appropriate places and be legible.

10.09.2015

1 Passenger's seat ➠ p. 5 - 13

2 Storage space or 2nd passenger seat[1)]

3 Fire extinguisher

4 Instrument panel, left/right ➠ p. 3 - 11

5 Parking brake ➠ p. 3 - 60

6 Diagnostics ➠ p. 3 - 73
Hydraulic emergency operation on/off[1)] ➠ p. 15 - 45

7 Auxiliary water heater[1)] ➠ p. 3 - 36

8 Accelerator ➠ p. 5 - 44

9 Service brake ➠ p. 5 - 33

10 Steering column/steering wheel ➠ p. 3 - 16

11 Driver's seat ➠ p. 5 - 12

12 Behind driver's seat
- Warning triangle[1)]
- First-aid kit[1)]
- Warning lamp, warning vest[1)]

13 To open/lock door ➠ p. 3 - 77

14 Separate steering ➠ p. 3 - 64

15 Window winder ➠ p. 3 - 76

16 – Adjusting the mirrors ➠ p. 5 - 7
– Mirror heating ➠ p. 5 - 8

17 Adjusting the air vents ➠ p. 5 - 70

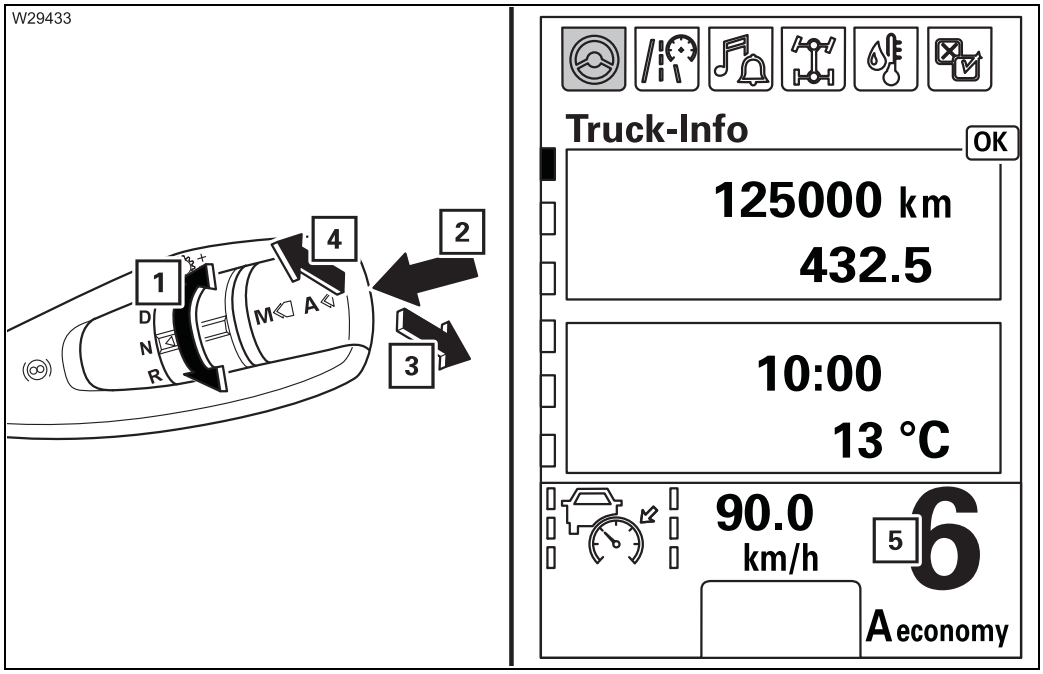
18 Tachograph or cover ➠ p. 3 - 18

19 Instrument panel, middle ➠ p. 3 - 12

[1)] Additional equipment

10.09.2015

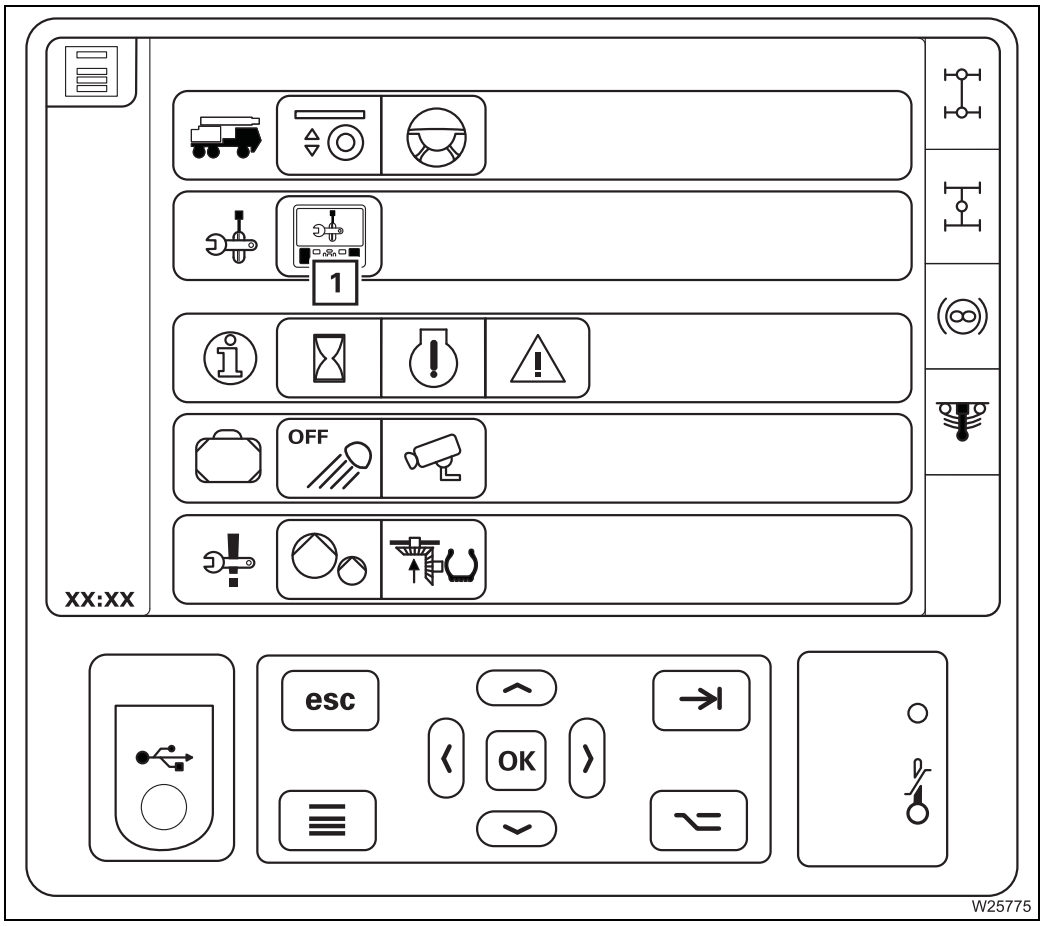
3.1.6 Transmission operating elements



1 Selecting the driving direction p. 3 - 53
2 Changing the operating mode p. 3 - 53
3 Shift down, manual p. 3 - 53
4 Shift up, manual p. 3 - 53
5 Gear indicator p. 3 - 53

10.09.2015

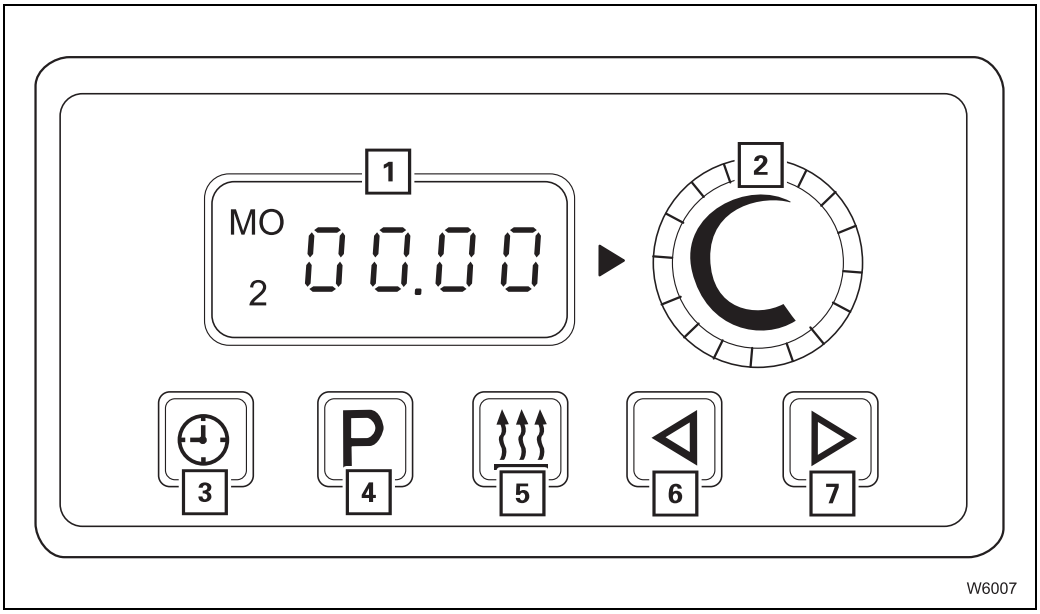
Settings menu group



1 Menu for setting the date/time and display brightness ➠ p. 3 - 28

10.09.2015

Auxiliary air heater



1 Heating display p. 5 - 81

2 Temperature p. 5 - 82

3 Setting the time/day p. 5 - 82

4 – Storing the heating start p. 5 - 82
– Switching heating start on/off p. 5 - 82

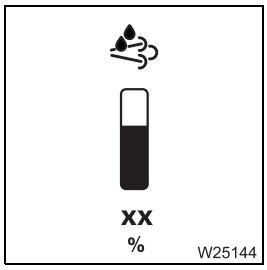
5 – Switching on p. 5 - 81
– Switching off p. 5 - 82

6 Input – p. 5 - 82

7 Input + p. 5 - 82

10.09.2015

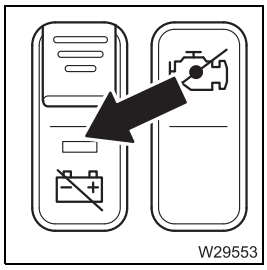
CCS display



AdBlue filling level monitoring submenu

– **Display** **Green:** Over 10% – over 4 l (0.9 gal)
Yellow: 5 to 10% – 2 to 4 l (0.4 to 0.9 gal)
Red: Below 5% – less than 2 l (0.4 gal)

3.2.5 Battery master switch



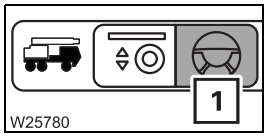
– **To switch on:** Press up
– **To switch off:** Unlock and then press in downwards

p. 4 - 11

10.09.2015

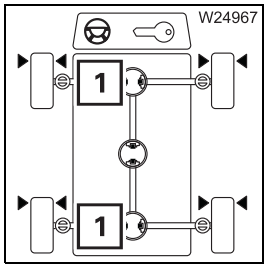
3.2.10 Final drive

Longitudinal and transverse differential locks, p. 5 - 56



Driving menu

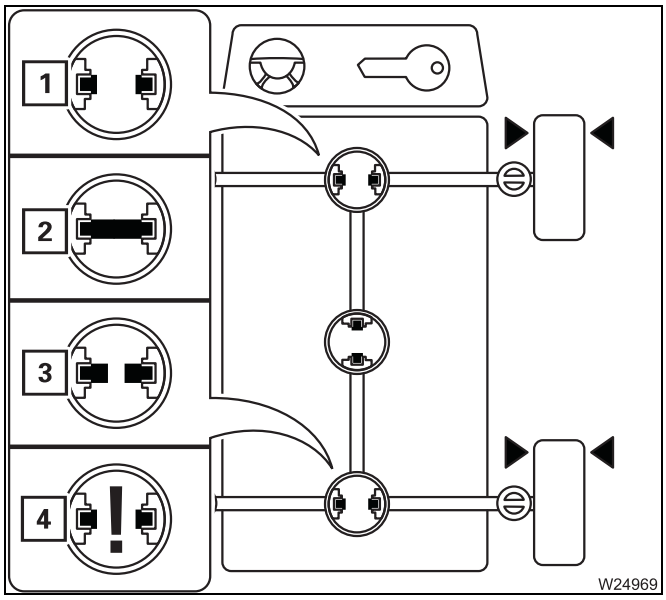
To open: Select symbol (**1**) and confirm – menu is opened



Transverse differential locks on/off

- **To switch on:** Select symbol (**1**) and confirm – Symbol is **red**
- **To switch off:** Select symbol (**1**) and confirm – Symbol is **green**

When a symbol (**1**) is selected **both** transverse differential locks are switched on or off.



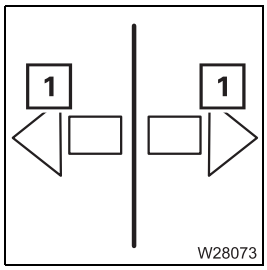
Transverse differential locks display

The current status is shown using different symbols:

1 **Green** – locks off
2 **Red** – locks on
3 **Yellow** – intermediate position
4 **Violet** – error

p. 5 - 56

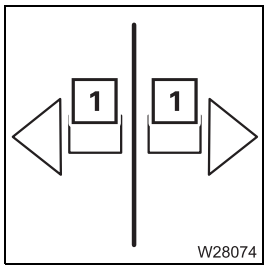
10.09.2015



Indicator lamp for turn signal indicator

1 – Flashing: Turn signal indicator on

– Off: Turn signal indicator off, or turn signal indicator on and filament lamp defective

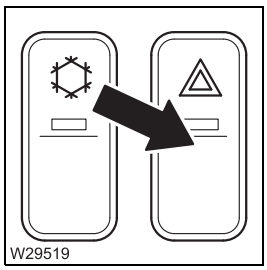


Indicator lamp for trailer turn signal indicator

1 – Flashing: Turn signal indicator on and trailer electrically connected

– Flashes once: Turn signal indicator on and trailer not electrically connected

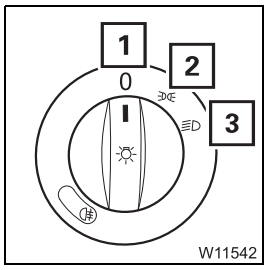
– Off: Turn signal indicator off



Hazard warning system on/off

– To switch on: Press downwards – light in the switch flashes

– To switch off: Press in upwards – not lit



Lighting on/off

1 Light off

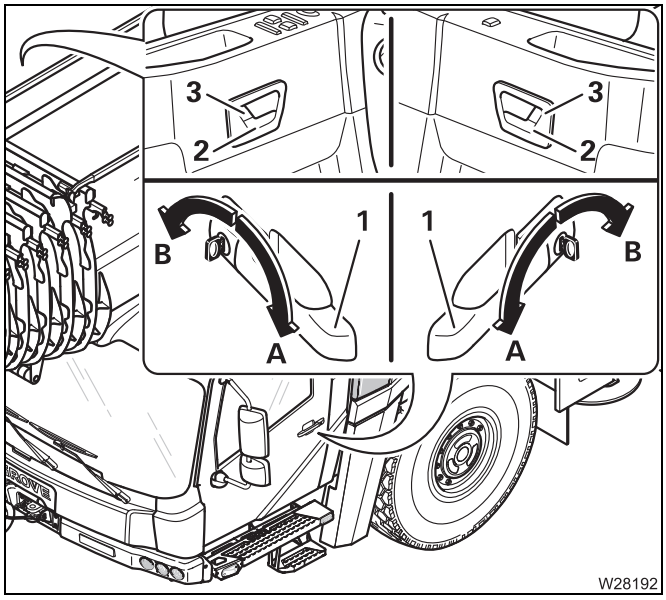
2 Parking light on Instrument lighting on

3 Headlight on Full beam can be switched on using the multipurpose switch, daytime driving light off

Doors

The same key is used for the driver's and passenger's door.

Always take the ignition key with you before closing the door from outside with the handle pressed in (**2**). Once closed in this manner, the door can only be opened again using the ignition key.



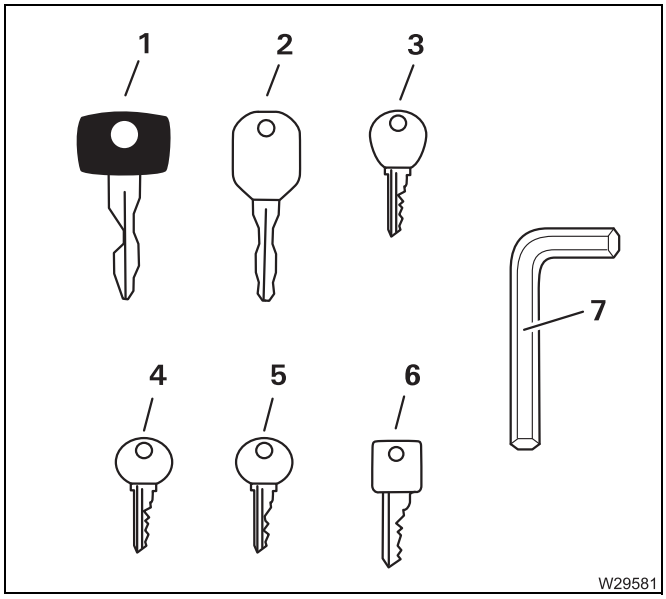
Lock
- Turn the key towards **B**, or
- Press in the handle (**3**)

Unlock
- Turn the key towards **A**, or
- Pull the handle (**3**)

Opening
- Pull the handle (**1**), or
- Pull the handle (**2**)

Keys

Different keys are supplied.



1 Door locks/ignition lock of driver's cab
2 Fuel tank[1) 2)]
3 Outrigger control units[1)]
4 Windscreen washing system reservoir
5 Boom floating position lock[1)]
6 Slewing gear freewheel lock
7 Covers

[1)] Additional equipment
[2)] Depending on equipment, key (**1**) or (**3**)

10.09.2015

4.1.4 Refuel

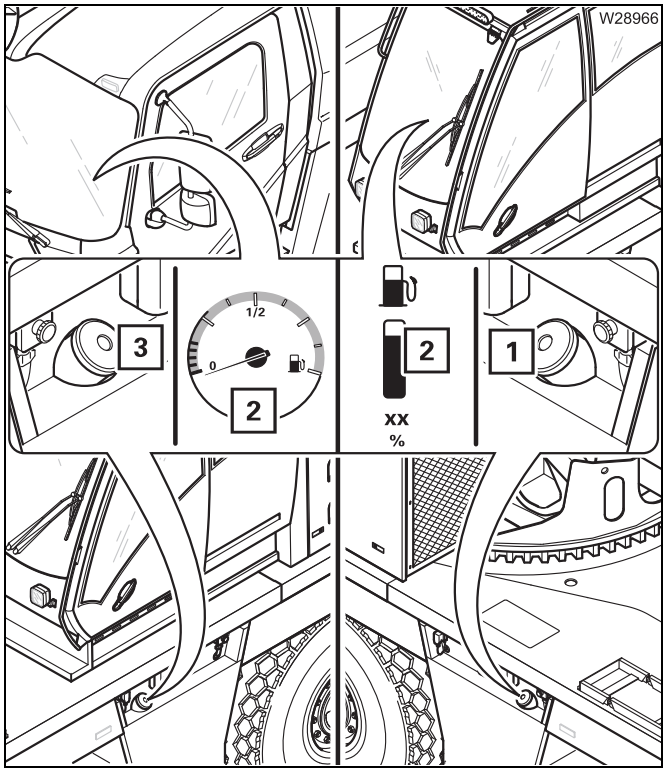
Only use permissible consumables; ➠ *Separate engine operating instructions, provided by the manufacturer*.

Danger of fire due to inflammable gases
Switch off the engine, the heater and all additional heaters before refuelling.

Risk of accidents if the tank is not closed
Close the tank each time you have refilled it.
In this way you can prevent other vehicles from being endangered by the cap falling off or consumables escaping.

Risk of damage to the engine and catalytic converter
Unauthorised consumables can damage the engine and catalytic converter and void the warranty. Only use consumables approved by the engine manufacturer.

Standard tank



The display (**2**) shows the total fuel level in the tanks (**1**) and (**3**).

The fuel tanks can be refuelled via a filler neck.

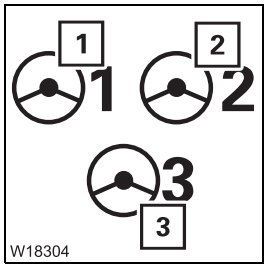
- Always open both filler necks when refuelling.
- Refill the fuel at appropriate times, and close the tanks (**1**) and (**3**) with the cap. Leave sufficient space for the fuel to be able to expand.

Also fill the tank for the crane operator's cab heating system; ➠ *Fuel tank auxiliary heater*, p. 11 - 5.

10.09.2015

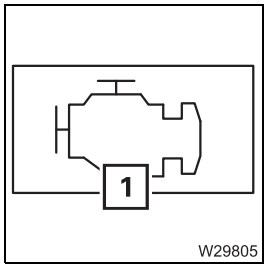
Indicator lamps on the instrument panel

Several lamps must go out on the instrument panel when the engine is running.

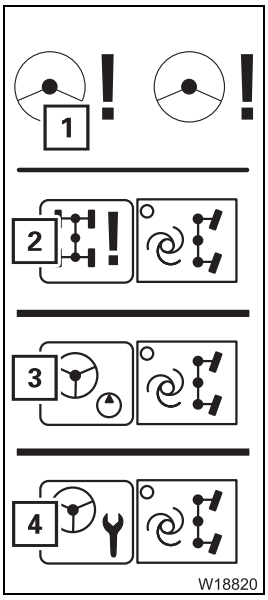


- Check that the lamps (**1**) and (**2**) go out.
  If one or both lamps are lit, refer to the information in section *Immediately after you start to move*; ➠ p. 5 - 35.

Lamp (**3**) only goes out when the vehicle starts moving.



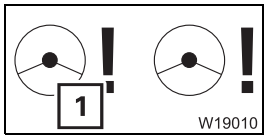
- **Stop the engine immediately** if any of the lamps (**1**) is lit. Pay attention to other messages in the on-board computer display.



- Check that the lamp (**1**) goes out.

– If the lamp (**1**) **is lit**:
  The main menu shows a symbol.

With the symbol (**2**):	The oil supply for the steering is still being built up. If the symbol has not yet gone out, contact **Manitowoc Crane Care**
With the symbol (**3**):	Service mode on. Briefly turn off the ignition and then on again. If the symbol is still not shown, contact **Manitowoc Crane Care**.
With the symbol (**4**):	The 4th and 5th axle lines are brought into the straight running position, as far as is possible, and can no longer be steered. It is possible to steer the 1st to 2nd axle lines. Arrange for the error to be rectified.



– If the lamp (**1**) **flashes**:
  The steering angle of the 4th and 5th axle line does not relate correctly to the 1st to 2nd axle line.
  - Steer using the steering wheel – the steering angle is automatically offset, and the lamp (**1**) goes out.

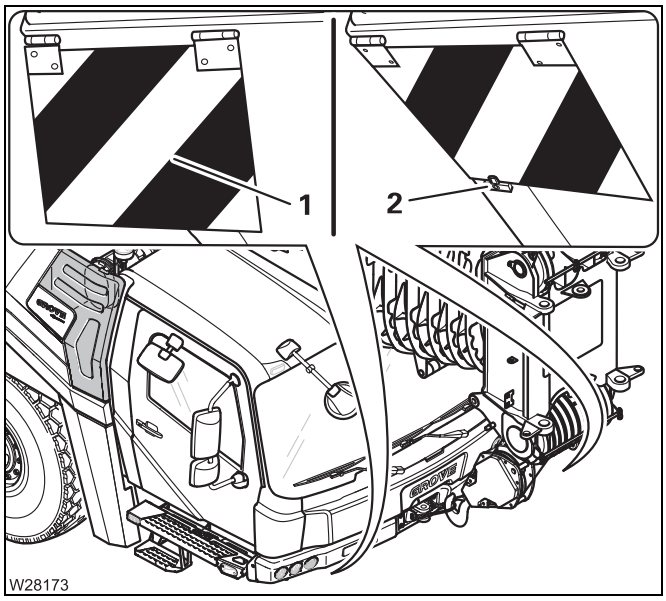
10.09.2015

5 Driving

10.09.2015

Warning plates for vehicle width

Depending on the vehicle width, fold-up warning plates are fitted below the driver's cab.



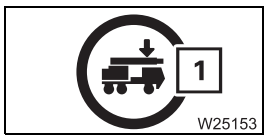
The warning plates (**1**) must be folded down to indicate the vehicle width during on-road driving.

For off-road driving, the warning plates can be folded up and fastened with the spring latch (**2**).

Displaying vehicle height

The vehicle height given at on-road driving level is only maintained when the main boom is resting in the boom rest; ➠ p. 1 - 8.

- Open the main menu.



With additional equipment the position of the main boom in the boom rest is monitored.

- Check that the symbol (**1**) is shown.
- When the symbol (**1**) is shown, derrick the main boom out until the symbol (**1**) disappears.

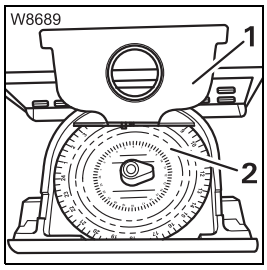
Risk of accidents by exceeding total permissible height
Check that the symbol is displayed.
Otherwise the indicated total height will also be exceeded at on-road level.

10.09.2015

Inserting diagram sheets

Only insert diagram sheets that are properly marked.
The diagram sheets are always inserted with the front facing upwards.

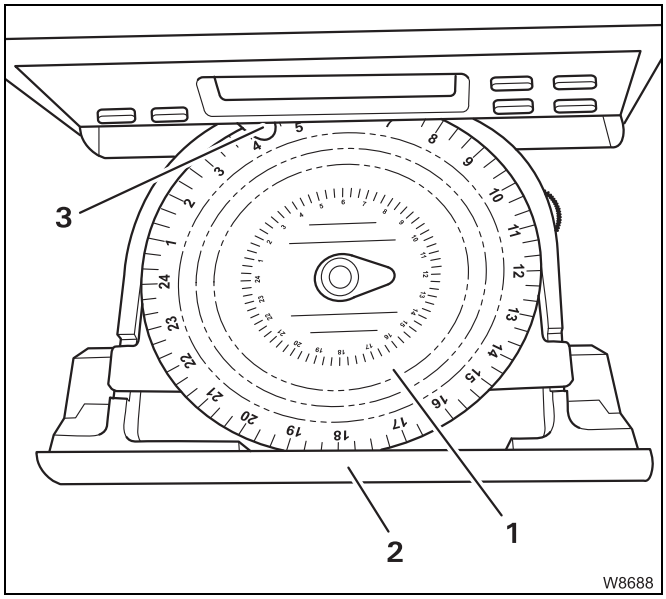
Risk of malfunctions in the electronics
If a diagram sheet has been damaged by being marked several times, this might cause malfunctions in the electronics. Always insert the plastic diagram sheet supplied should you not need to use the tachograph.



With **2-driver operation**, a diagram sheet (**2**) for driver 2 must be placed below the isolating plate (**1**):

– After checking the time, leave the diagram sheet (**2**) where it is.

– After checking the time, insert the diagram sheet (**2**).

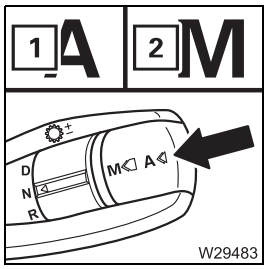


- Fold the isolating plate downwards.
- Put the diagram sheet (**1**) for driver 1 on the isolating plate.
- Take care that the diagram sheet is under the holder (**3**).
- Push the drawer (**2**) back in until it engages.

For **single-driver operation**, the diagram sheet mounting under the isolating plate is empty and only the diagram sheet (**1**) for driver 1 is inserted.

10.09.2015

5.2.4 Changing the operating mode



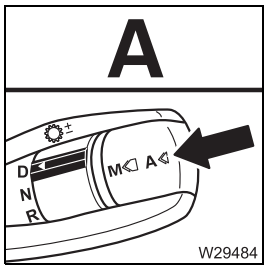
The display shows which operating mode is switched on.

– Symbol (**1**) – *Automatic* operating mode on.

– Symbol (**2**) – *Manual* operating mode on.

It is possible to switch between the operating modes when the vehicle is stationary or when driving.

Changing to automatic mode



The *Automatic* operating mode is intended for on-road driving.

• Press the gearshift lever in once.
The transmission switches to the *Automatic* operating mode.

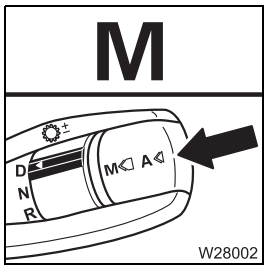
– When at a standstill, a suitable starting gear is engaged.

– While driving, the gears are changed automatically, depending on the load.

Change to manual mode

The *Manual* operating mode is intended for off-road driving with load conditions changing at short notice.

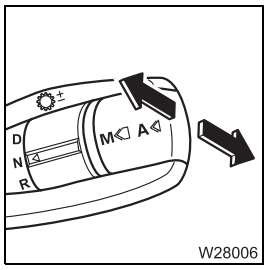
You can change over either with a gear change or without a gear change.



Changing over without gear change

• Press the gearshift lever in once.

The transmission remains in the currently selected gear and is now in *Manual* operating mode.

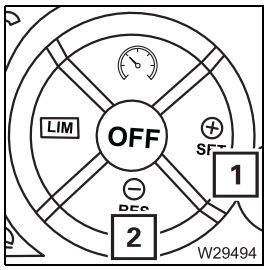


Changing over with gear change

• Push or pull the lever down or up once.

The transmission upshifts one gear (or downshifts one gear) and is now in *Manual* operating mode.

10.09.2015



Increasing/reducing the speed

– Increase with (**1**)

– Reduce with (**2**)

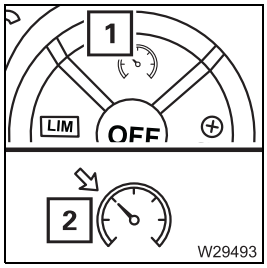
- Press the corresponding button until the desired speed is reached

  or

- Press the corresponding button once. The speed will increase/decrease by 0.5 km/h (0.3 mph).

The set speed is maintained.

Switching off



- Press the button (**1**) once. Cruise control is switched off. The symbol (**2**) goes out in the Driving display.

Cruise control is also switched off,

– when the service brake is applied,

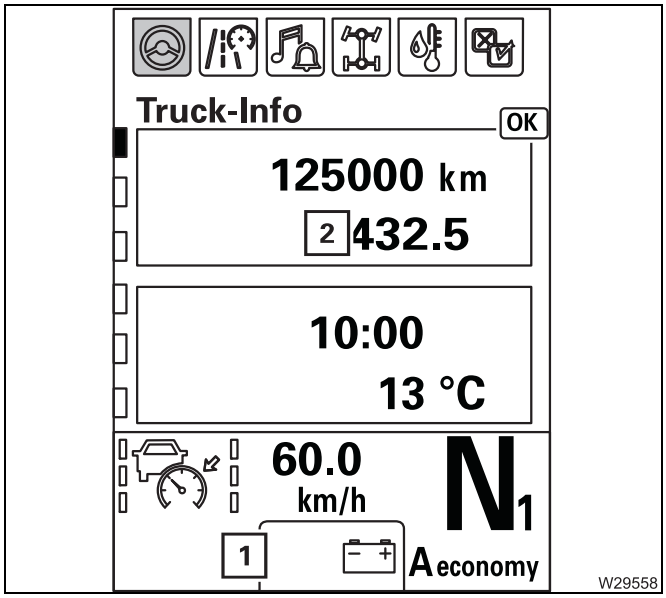
– when 10 km/h (6 mph) is exceeded,

– when the Temposet function is switched on,

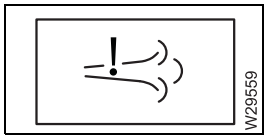
– when the ignition is switched off.

10.09.2015

5.3.9 Indicator lights in the on-board computer display



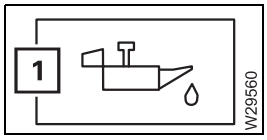
In addition to the messages shown on the on-board computer display (**2**), indicator lights are also present in the status area (**1**) of the on-board computer.



– AdBlue (DEF) filling level empty

or

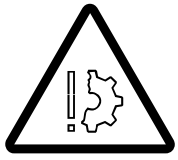
– AdBlue (DEF) system malfunction



– Oil pressure too low

A warning buzzer sounds and the lamp (**1**) lights up – the oil pressure is too low.

- Stop the truck crane as quickly as possible while observing the traffic situation and turn off the engine.
- Check the oil level; ➠ *Maintenance manual*.
- Add oil if necessary. If the error message persists, refer to **Manitowoc Crane Care**.



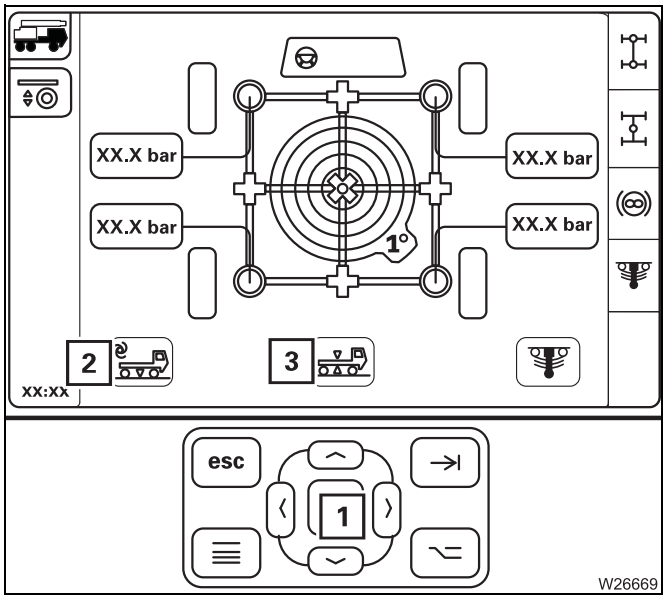
Risk of damage to the engine if the oil pressure drops
Turn off the engine as soon as possible and look for the cause if the lamp lights up or the warning buzzer sounds.
Never restart the engine before you have found the cause and eliminated the problem!.

10.09.2015

Setting the on-road level

For on-road driving, you must always set the on-road level in order to adhere to the specified overall height.

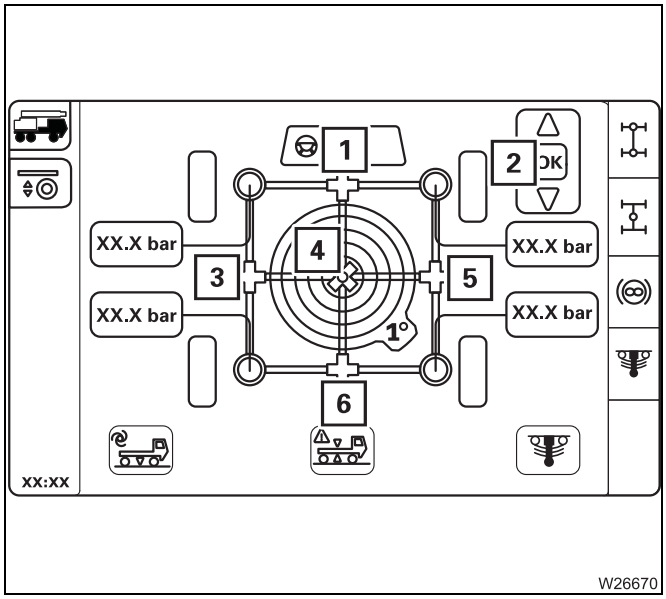
- Park the truck crane on a level surface.
- Straighten the steering.



- Select the symbol (**2**) – symbol is **orange**.
- Press the button (**1**) until the symbol (**3**) is displayed – on-road level has been reached.

Pre-selecting suspension struts

You can pre-select the suspension struts for five different level changes.



– For a uniform level change

4 Overall level – all suspension struts

– For inclination

1 Front level – suspension strut for the 1st to the 3rd axle line

3 Left level – all suspension struts on the left

5 Right level – all suspension struts on the right

6 Rear level – suspension struts for the 4th and 5th axle line

- Select and confirm the desired symbol – the symbol becomes **orange** and the symbol (**2**) is also displayed.

10.09.2015

5.6 Heating and air-conditioning system

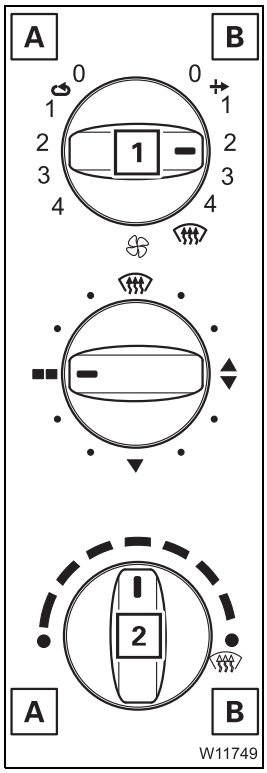
5.6.1 Standard heating system,

Switching on

- Start the engine. Heating is only available when the engine is running.

Heating

You must set the blower and the temperature.



Setting the blower/recirculated/fresh air

You can regulate the air volume with the switch (**1**) for:

A Recirculated air – air is sucked in from the driver's cab.
Change to fresh air often to ensure that oxygen is supplied.

B Fresh air – outer air is sucked in.

- Turn the switch (**1**) to the desired level **1** to **4**.
Recommended – level 2.

Setting the temperature

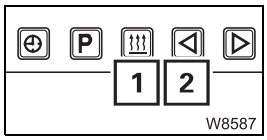
- Turn the switch (**2**) to the desired position
  - **A** Colder
  - **B** Warmer

- Press the switch (**2**) several times in succession at least once a month in order to prevent malfunctions.

10.09.2015

Setting the heating period

After an automatic start, the auxiliary heater switches itself off as soon as the set heating period has elapsed.
The heating period applies to all saved heating starts.



- Switch off the auxiliary heater using the button (**1**).
- Press the button (**2**) for longer than 3 seconds.

The last set heating period, e.g. 27 minutes, now flashes for 5 seconds in the display field.

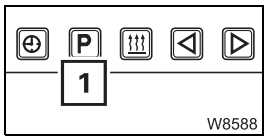
- Set the desired heating period on the flashing display. You can set a heating period of 10 to 120 minutes.

Wait for approx. 5 seconds until the current time is displayed, e.g. 14.00.

A new heating period has now been set.

Switching the automatic heating start on and off

To switch on an automatic heating start, you must retrieve the corresponding storage location.



- To retrieve a storage location, press the button (**1**) once.

The display field flashes for 5 seconds and a storage location is shown (e.g. **2**). The heating start at this storage location is now switched on.

To switch on a different heating start, press the P button repeatedly until the desired storage location is displayed. This heating start is switched on as soon as the display stops flashing.

To switch off the automatic heating start, press the P button repeatedly until no storage location is displayed any longer.

10.09.2015

6 Driving modes and rigging for on-road driving

This chapter contains:

6.1 Driving modes

Information about the axle loads

The **GMK 5200-1** truck crane is designed for driving with maximum axle loads of 12 t (26,500 lbs). **Manitowoc Crane Group Germany GmbH** notes that driving with an axle load exceeding 12 t (26,500 lbs), the brake system can overheat and the braking deceleration required by the EU partial type-approval cannot be ensured.

If country-specific regulations allow the truck crane to be driven with axle loads greater that 12 t (26,500 lbs), the crane driver/crane operator bears the sole responsibility for driving in this condition and for any subsequent damage. This also applies to damage due to premature wear.

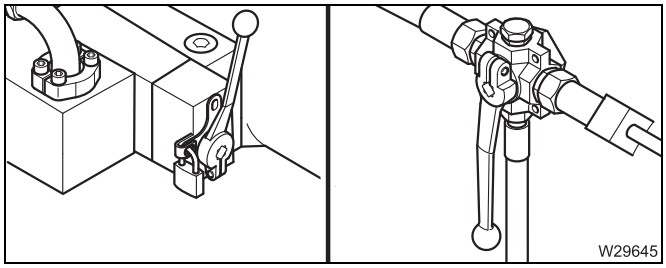
Risk of accidents from increased braking distance
When driving with axle loads in excess of 12 t (26,500 lbs), the braking deceleration required by the EU partial type-approval cannot be met. Please bear in mind that the braking distance of the truck crane will increase as a result.

Risk of damage from premature wear
Premature wear of parts under particular strain (brake system, steering, tyres, wheels, suspension, drive shafts) cannot be ruled out even if the axle loads only briefly exceed 12 t (26,500 lbs).

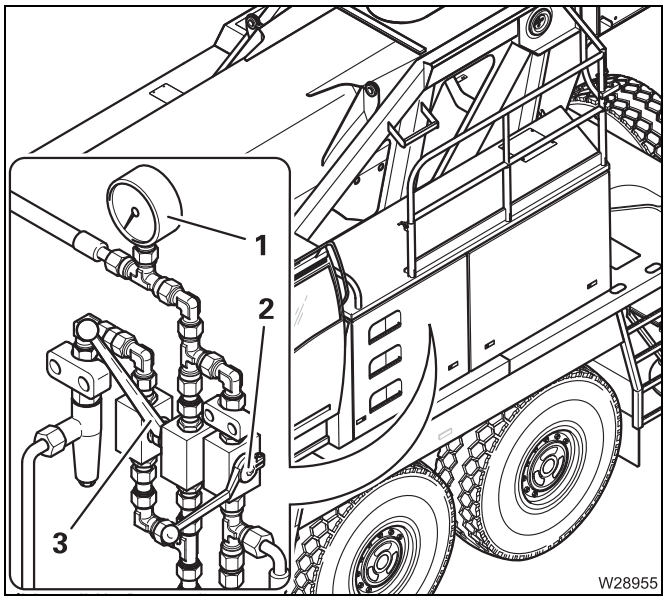
10.09.2015

6.2.3 Switching on boom pre-tensioning

If the main boom has been set down on a trailer, you can change the axle loads on the rear axle lines by switching on the boom pre-tensioning.



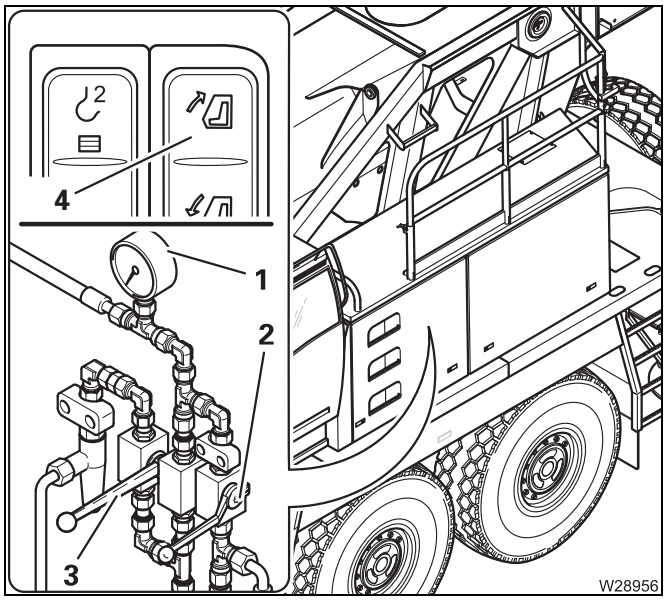
- Switch on the boom floating position; p. 6 - 10.



The valves II and III are under the pressure gauge (**1**).

- Close the valve II – the lever (**2**) is horizontal.
- Open the valve III – the lever (**3**) points upward.

You can now fill the pressure accumulator.



- Press button (**4**).
  The pressure accumulator is filled.
- Fill up the pressure accumulator until the pressure stops rising on the pressure gauge (**1**).
- Close the valve III – lever (**3**) points down.

The valve II stays closed – lever (**2**) is horizontal.

Now the boom pre-tensioning is switched on.

10.09.2015

6.3.5 Retracting/extending the boom pivot pin

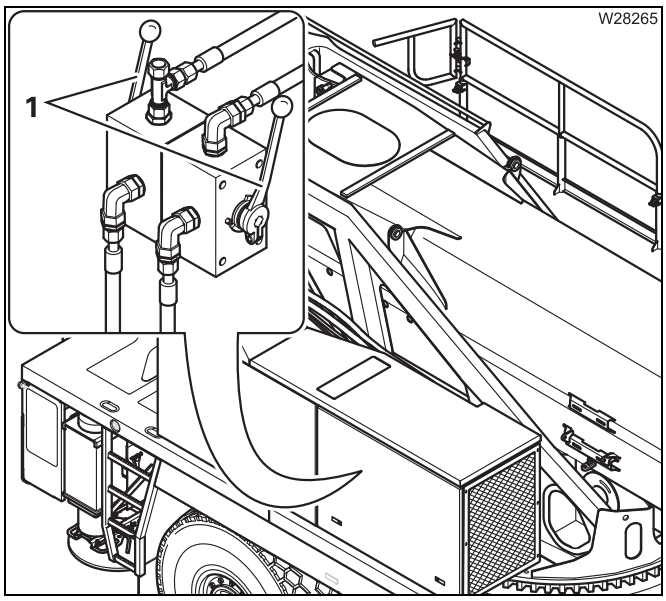
The boom pivot pin is retracted and extended with a hydraulic pulling device.

Before retracting

Before retracting the boom pivot pin you must:

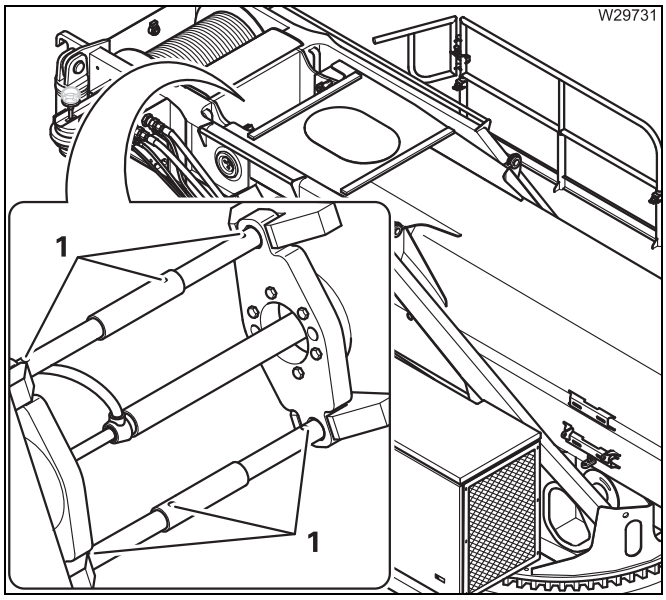
– open the hydraulic circuit,

– unlock the pulling device.



Opening the hydraulic circuit

- Open valves (**1**) – Position **upwards**.

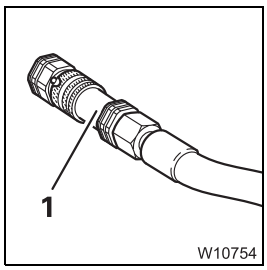


Unlocking the pulling device

- Release the retaining pins and pull out the bolt (**1**).

10.09.2015

6.4 Installing/removing outrigger beams



To rig the outrigger beams, the outriggers must be fitted with hydraulic connections (**1**) which can be separated.

During rigging, each outrigger beam is removed and mounted as a complete "package", consisting of inner and outer outrigger beams, cylinders and add-on parts.

Risk of truck crane overturning if not properly supported
Loads may only be lifted when the truck crane is supported by all the outriggers.
For this reason, always use an auxiliary crane to lift the outrigger beams.

You will require the following equipment with a sufficient load bearing capacity:

– An auxiliary crane
– Suitable lifting gear and guide ropes
– A chain hoist
– A separate vehicle.

Dimensions and weights of the outrigger beams; ➠ p. 1 - 10.

10.09.2015

6.4.7 Unscrewing/screwing in the spacers

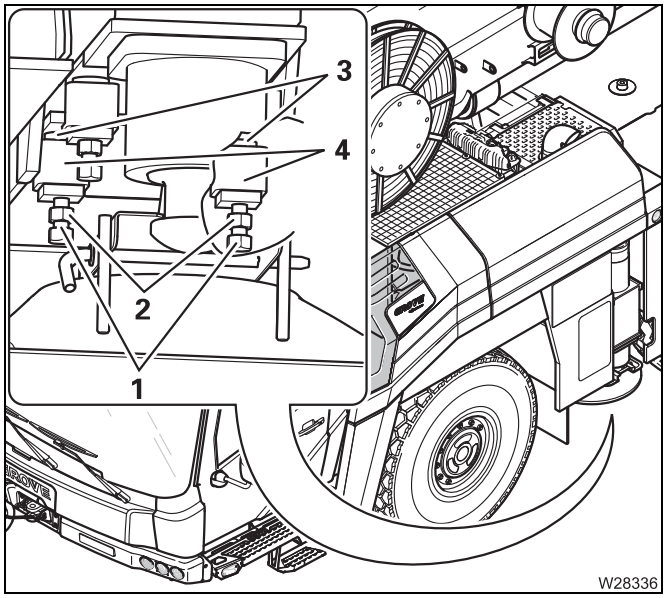
There are two spacers for each outrigger beam:

– In the outrigger box
– In the outrigger beam on the opposite side.

The illustrations show as an example the spacers for the outrigger beams on the rear right hand side.

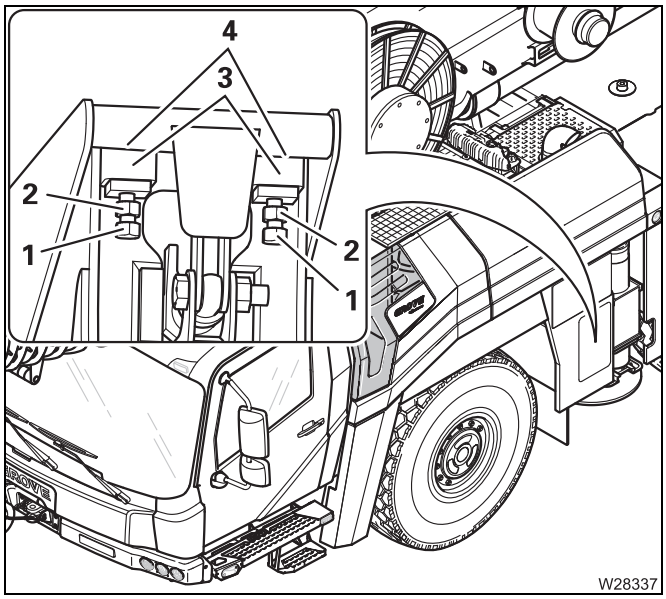
Unscrewing

Before you pull out the outrigger beams, you must unscrew the spacers.



At the outrigger box

- Undo the lug nuts (**2**).
- Unscrew the bolts (**1**) until the spacers (**3**) are screwed into the outrigger box (**4**) completely.



At the outrigger beam

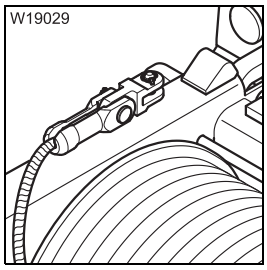
- Undo the lug nuts (**2**).
- Unscrew the bolts (**1**) until the spacers (**3**) are screwed into the outrigger beam (**4**) completely.

10.09.2015

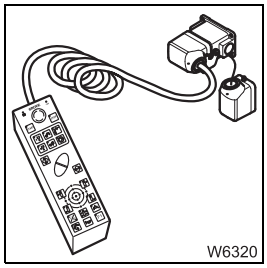
6.5.2 CHECKLIST: Removing the auxiliary hoist

Prerequisites

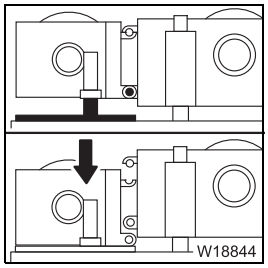
- The truck crane is supported with the required outrigger span as specified in the *Lifting capacity table*; ➠ p. 12 - 30.
- The superstructure is slewed to the rear.
- The 50 t counterweight combination is resting on the counterweight platform; ➠ p. 12 - 64,
- The hoist rope on the auxiliary hoist must be unreeved and wound up.



1. – Secure the hoist rope; ➠ p. 6 - 60.

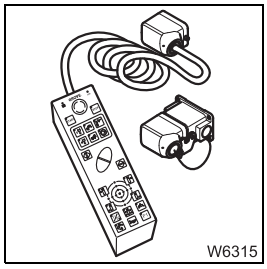


2. Connect the hand-held control on the back right at the turntable; ➠ *Connecting/disconnecting the hand-held control*, p. 12 - 21.



3. Removing the connection to the turntable:

- Lowering the lifting frame; ➠ p. 6 - 59.
- Removing the connection to the turntable; ➠ p. 6 - 57.
- Lowering the auxiliary hoist; ➠ p. 6 - 59.

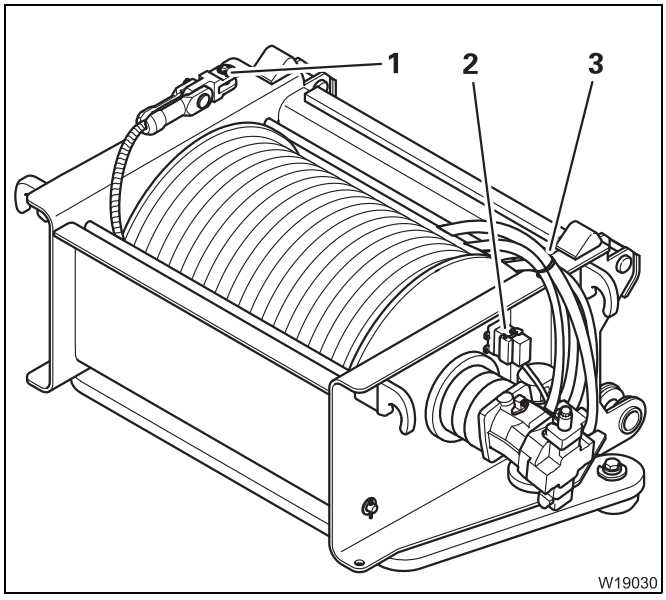


4. If necessary, disconnect the hand-held control and stow it away; ➠ *Connecting/disconnecting the hand-held control*, p. 12 - 21.

10.09.2015

6.5.11 Transporting the auxiliary hoist

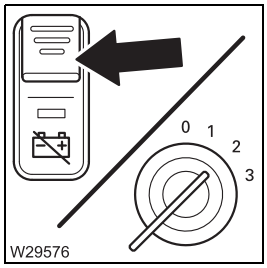
- For transportation, only use a separate vehicle with sufficient lifting capacity. Transport dimensions and weight; ➠ p. 1 - 10.
- Load the separate vehicle in such a way that the weight is evenly distributed.
- Transport and secure the auxiliary hoist in such a way that no motorists and cyclists are put at risk.



- Lift the auxiliary hoist onto the separate vehicle and remove the lifting gear.
- Secure the hoses, e.g. on the slinging point (**3**).
- The plug (**2**) must be inserted in the dummy socket.
- The hoist rope is secured on the clamp (**1**).

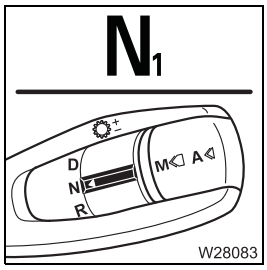
10.09.2015

Electric power supply

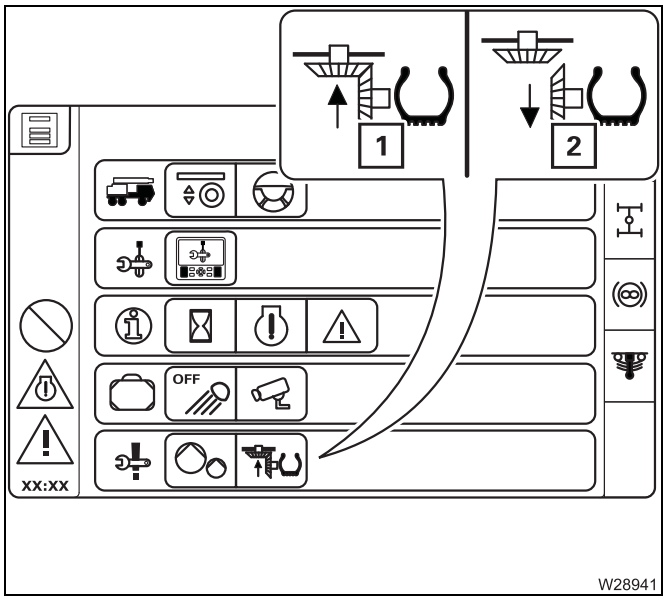


- Switch on the battery master switch.
- Switch on the ignition.

On the transmission



- Switch the transmission to neutral position **N**.



- Open the main menu, if necessary.

Switching on towing mode

- Select and confirm the symbol (**1**) – the symbol is (**2**) is displayed.
  Towing mode is switched on.

Switching off towing mode

- Select and confirm the symbol (**2**) – the symbol is (**1**) is displayed.
  Towing mode is switched off.

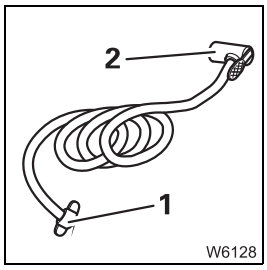
10.09.2015

7.5.2 Inflating the tyres yourself

In emergencies you can inflate the tyres with the compressed air system of the truck crane if an appropriate filling hose is available.
The tyres can be inflated up to a maximum pressure of about 8 bar (116 psi).
This pressure might not correspond to the prescribed tyre pressure, depending on the tyres; ➠ *Tyres*, p. 1 - 15.

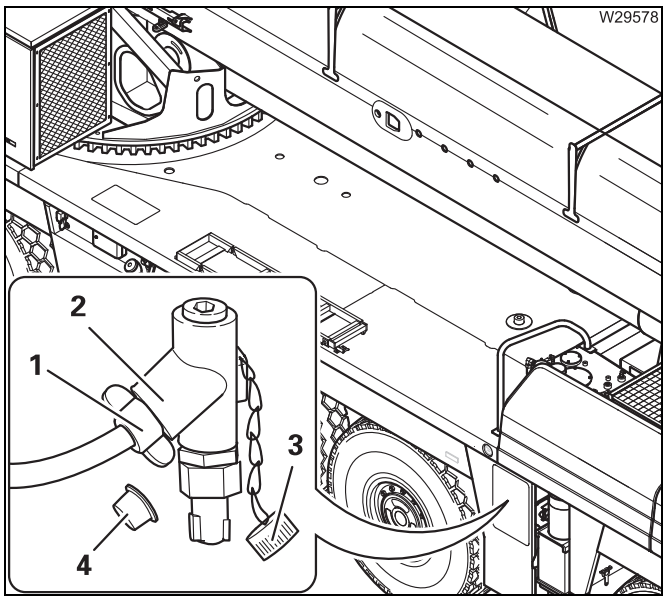
Risk of accidents due to excessive tyre pressure
If the maximum pressure is above the specified tyre pressure, then do not inflate the tyres to more than the specified pressure.
This prevents the tyres from becoming damaged and bursting while driving.

Always drive directly to a service station or garage and adjust the tyre pressure as soon as you have inflated the tyres yourself.



The filling hose has a tyre inflator connection (**2**) and a connection (**1**).

Connecting the filling hose

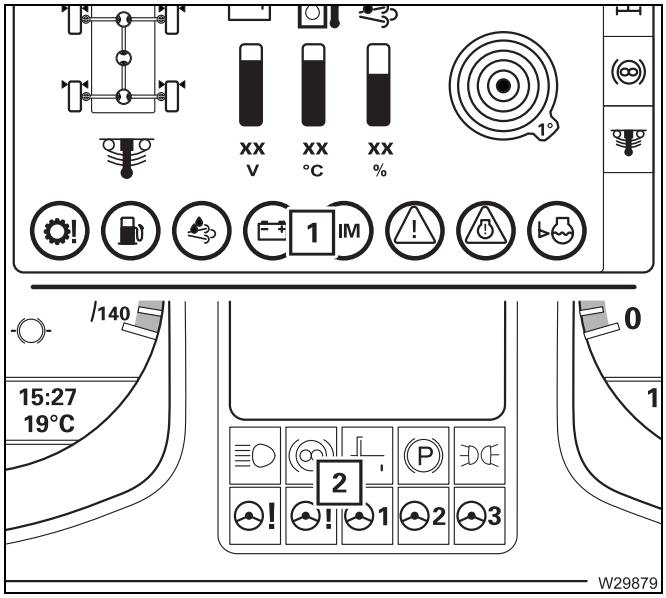


- Remove the caps (**3**) and (**4**).
- Fasten the connection (**1**) to the filler connection (**2**).

You can now inflate the tyres.

10.09.2015

7.7 Troubleshooting



This section does not include all malfunctions.

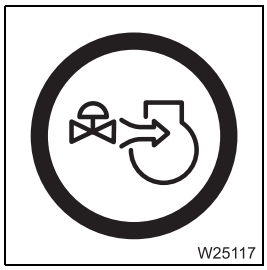
– If a warning is shown in the display (**1**); ➠ p. 5 - 45.
– If the lamp on the instrument panel (**2**) lights up; ➠ p. 5 - 46.

7.7.1 Malfunctions on the engine

In addition to this information; ➠ *Separate engine operating instructions, provided by the manufacturer*.

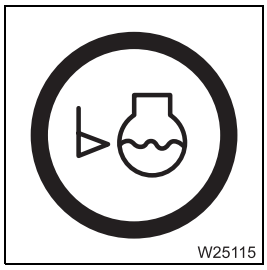
Malfunction		Cause	Solution
	Engine does not start – starter does not turn	Battery master switch is switched off	Switch on the battery master switch; ➠ p. 4 - 11
		Ignition off	➠ *Switching on the ignition*, p. 4 - 11
		Transmission not in neutral position	➠ *Switching the transmission to neutral position*, p. 5 - 26
		Parking brake released	Lock the parking brake; ➠ p. 3 - 60
		Fuse F1/5 blown	Replace blown fuses; ➠ p. 7 - 20
		Bridging plug for the hand-held control not inserted	Insert bridging plug; ➠ p. 12 - 22
		Emergency stop switch pressed	Release the emergency stop switch; ➠ p. 4 - 24

10.09.2015



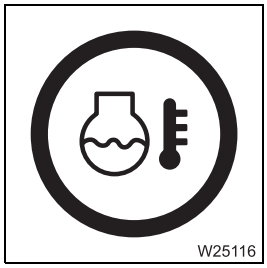
Air intake inhibitor triggered

The air intake inhibitor was triggered because the maximum permissible engine speed was exceeded. It is only possible to start the engine after the air intake inhibitor has been released manually; ➠ *Releasing the air intake inhibitor*, p. 4 - 25.



Coolant level too low

Immediately top up the coolant so that the engine does not overheat; ➠ *Maintenance manual*.

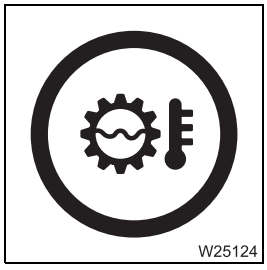


Coolant too hot

The engine coolant is hotter than approx. 110 °C.
Current temperature display; ➠ p. 10 - 7.
Possible cause and solution; ➠ p. 7 - 27.

Transmission retarder too hot

The retarder in the transmission has no function. When the transmission retarder has cooled down, the symbol turns grey and the transmission retarder is ready to function again.



Gear oil too hot

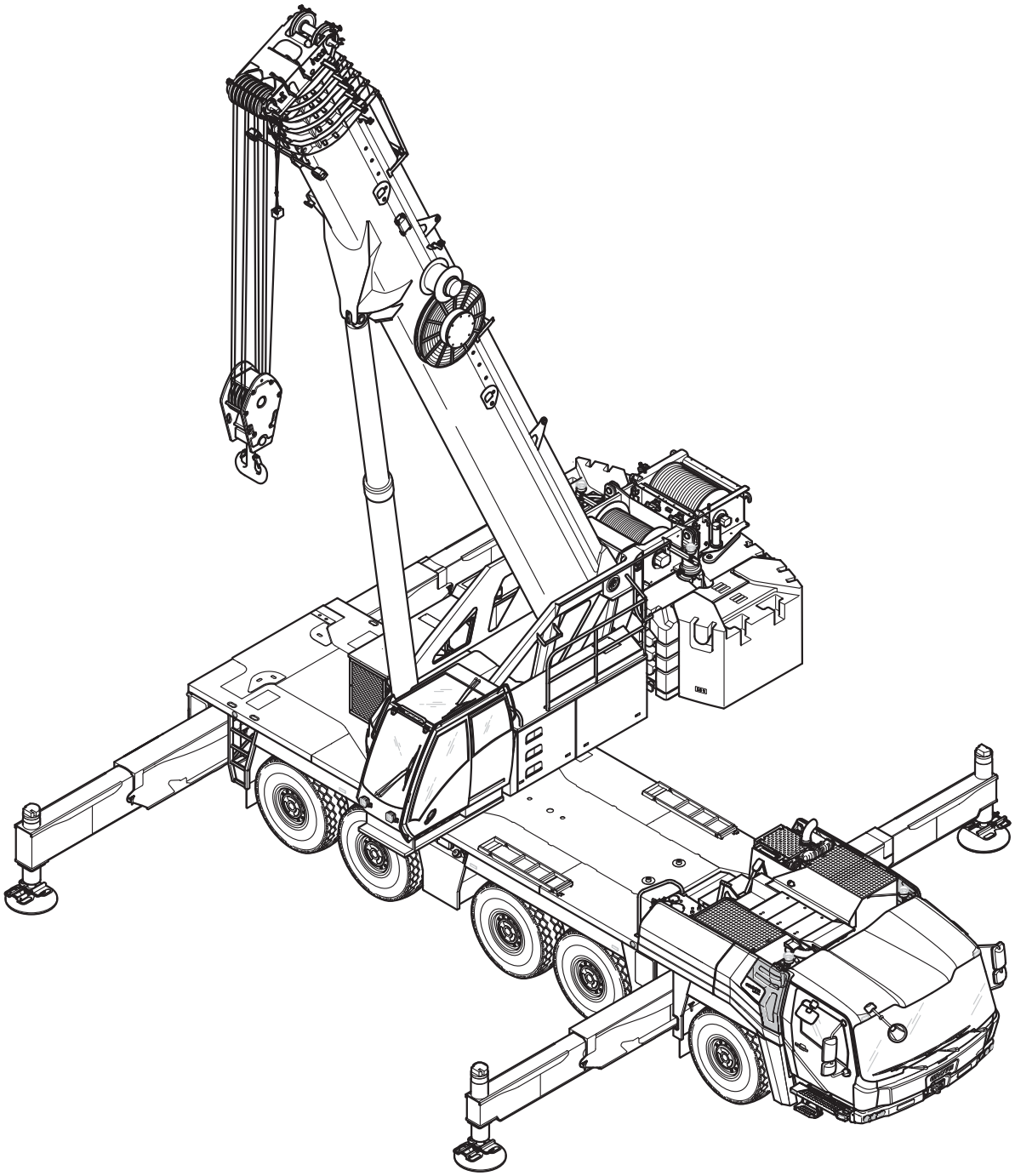
- Stop the truck crane at the next opportunity and try to find the cause; ➠ *Malfunctions in the transmission*, p. 7 - 30.

10.09.2015

10.09.2015

10.09.2015

Operating manual
Part 2 – Crane operation



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10.09.2015

Grove Manitowoc National Crane Potain

Manitowoc

Slewable spotlights

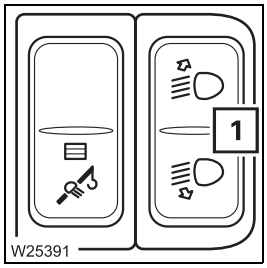
Automatic load tracking

First, the slewable spotlights must be manually aligned onto the load. You can then switch on the automatic load tracking.

Switch on spotlight

➠ *Operating manual*

Manually swinging



Turn upwards

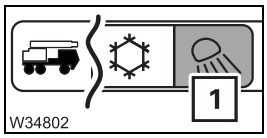
- Press the button (**1**) up.

Turn downwards

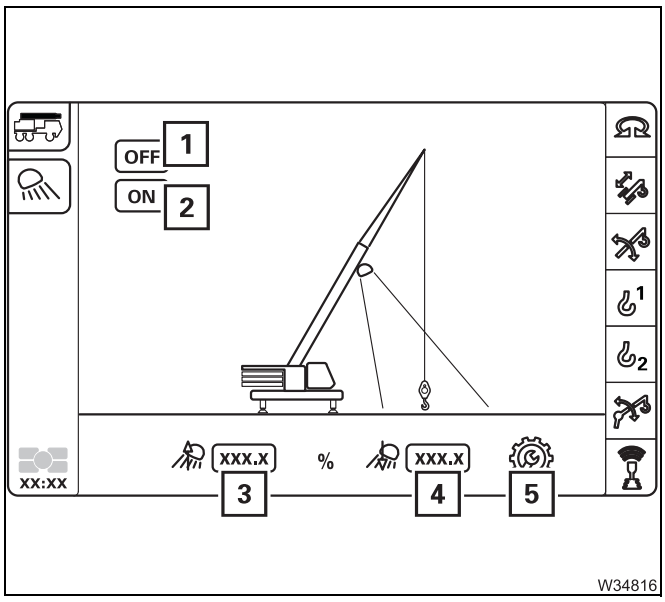
- Push the button (**1**) down.

The direction of the spotlights will be adjusted until you let go of the button or they reach their end position.

Switching load tracking on/off



- Open the *spotlight* (**1**) menu.



- Switch on the automatic load tracking – symbol (**2**).

You can adjust the pivoting speed:

- Open the submenu (**5**).

Speed

– increased with (**3**),

– decreased with (**4**).

Switch off the automatic load tracking – symbol (**1**).

08.02.2017

9 Operating elements for crane operation

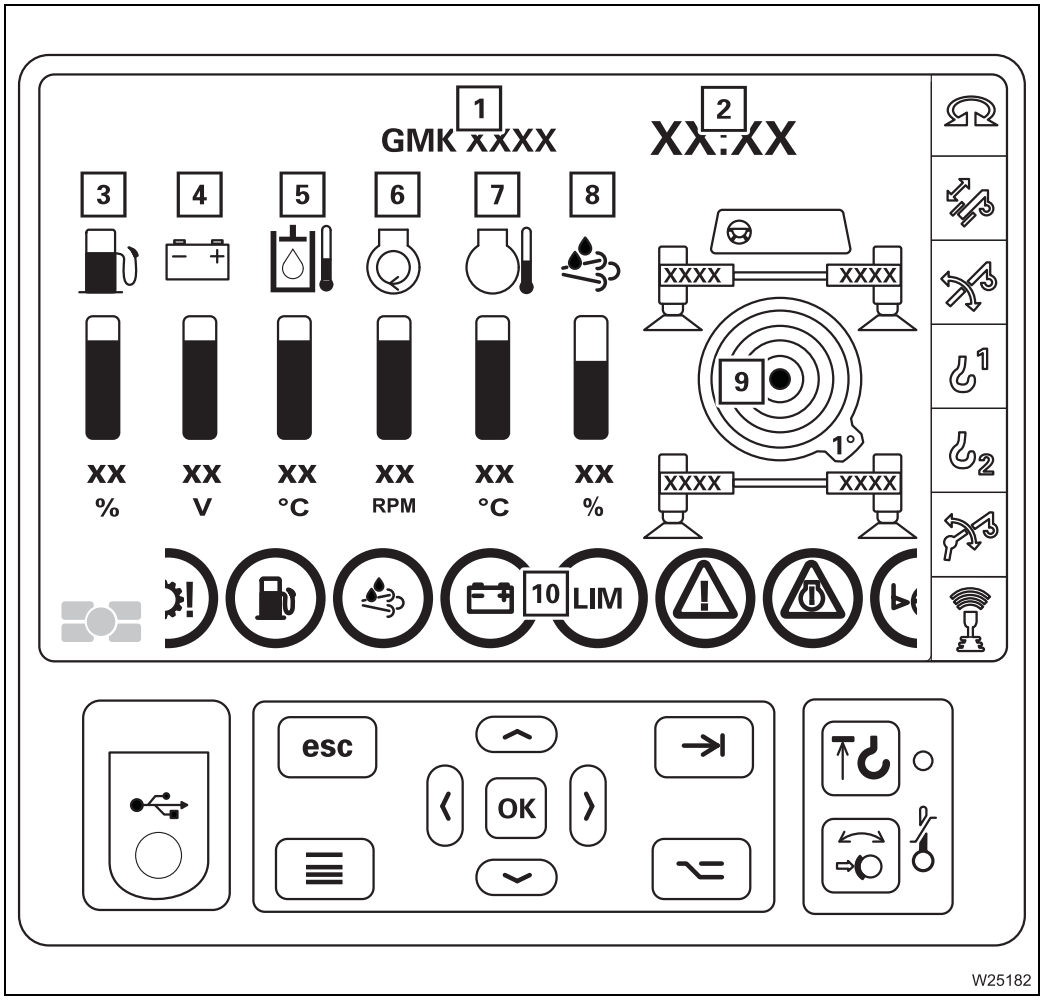
10.09.2015

[1)] Additional equipment

10.09.2015

9.1.6 CCS – Start menu

The Start menu shows the key measured values.

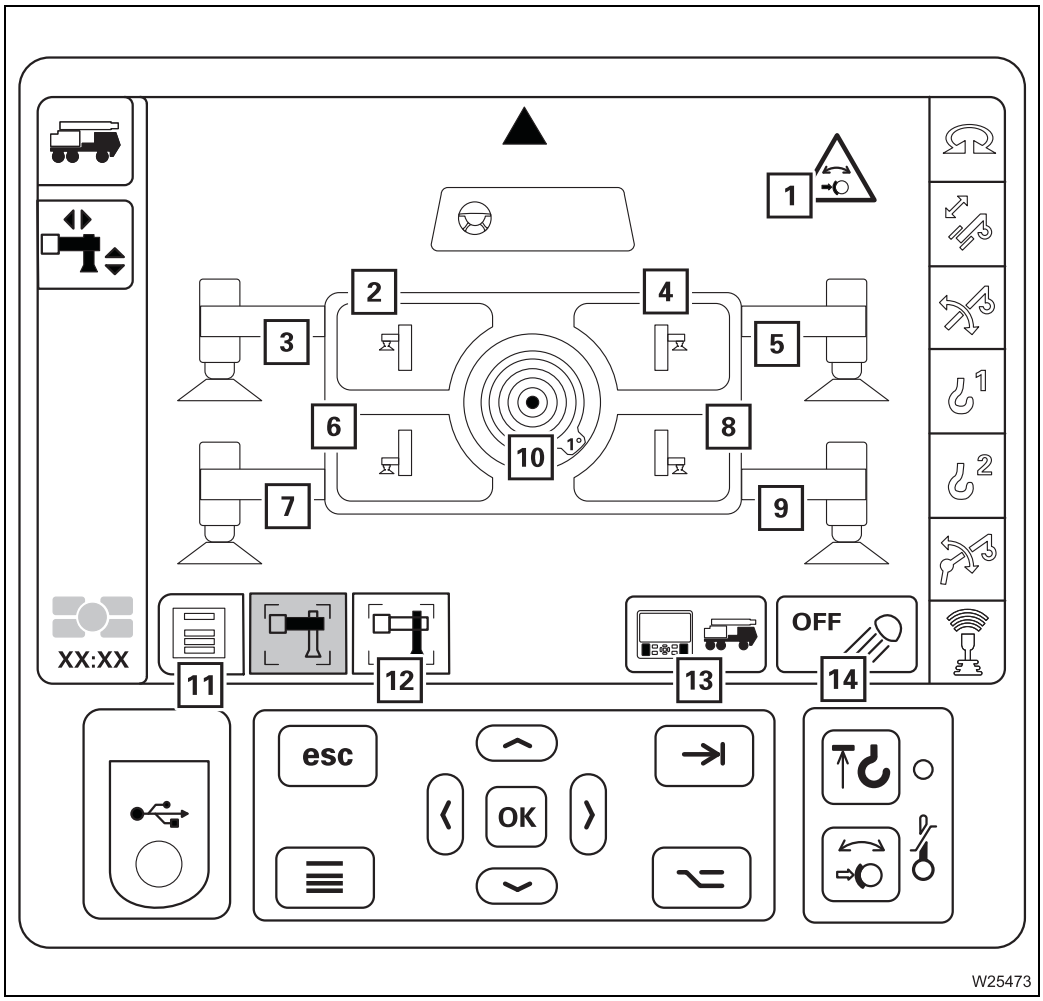


1 Display of crane type
2 Display time
3 Fuel level display p. 10 - 2
4 Voltage monitoring display p. 10 - 7
5 Hydraulic oil temperature display p. 10 - 7
6 Engine speed display p. 10 - 7
7 Coolant temperature display p. 10 - 7
8 AdBlue (DEF) filling level indicator p. 10 - 2
9 Current inclination/outrigger pressure display[1)] p. 9 - 121
10 Warning messages display p. 11 - 106

1) Additional equipment

10.09.2015

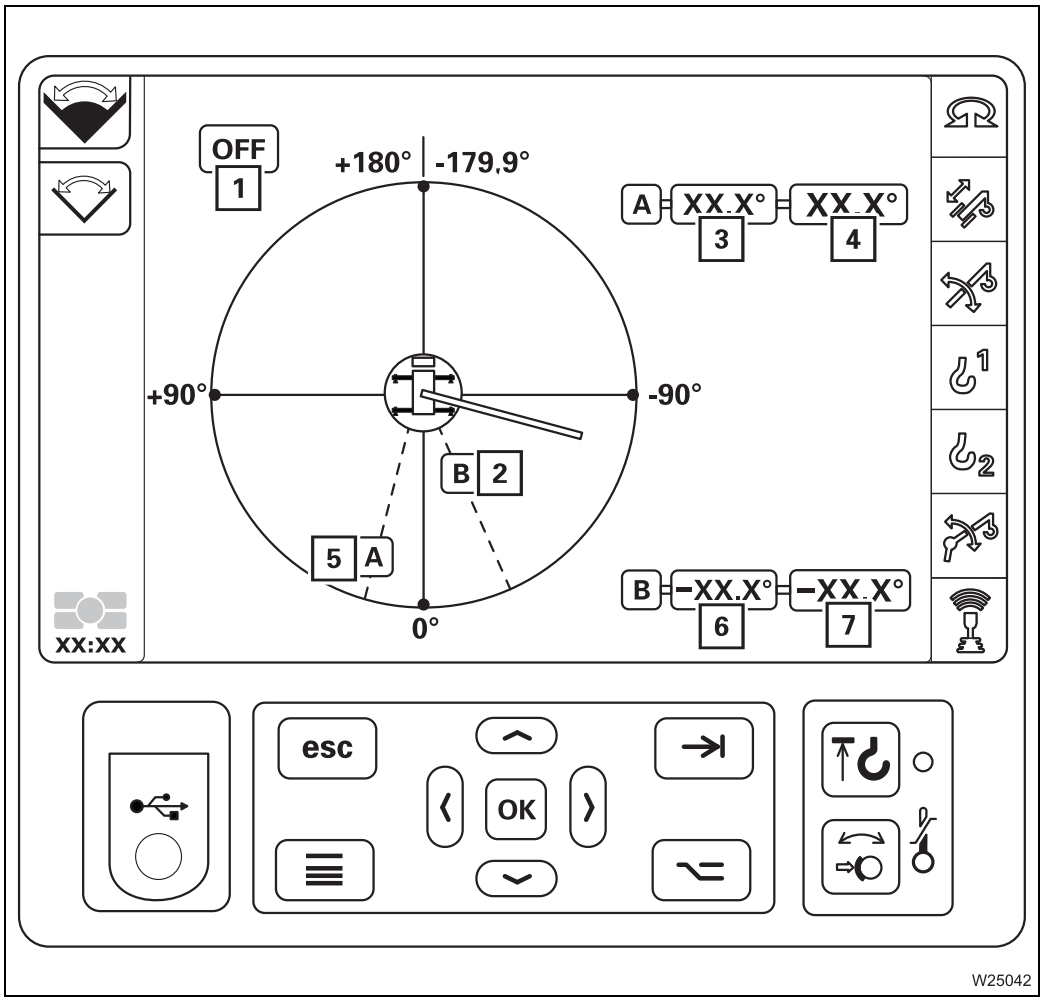
Outrigger support beam menu



1	Slewing gear brake warning display	p. 9 - 93
2	Retract/extend front left outrigger beam	p. 9 - 93
3	Front left outrigger beam	p. 9 - 93
4	Retract/extend front right outrigger beam	p. 9 - 93
5	Front right outrigger beam	p. 9 - 93
6	Retract/extend back left outrigger beam	p. 9 - 93
7	Back left outrigger beam	p. 9 - 93
8	Retract/extend back right outrigger beam	p. 9 - 93
9	Back right outrigger beam	p. 9 - 93
10	Current inclination indicator	p. 9 - 93
11	Exiting the menu	p. 9 - 93
12	Switching to the Outrigger cylinders menu	p. 9 - 93
13	Outrigger control units on/off	p. 9 - 93
14	Outrigger lighting on/off	p. 9 - 93

10.09.2015

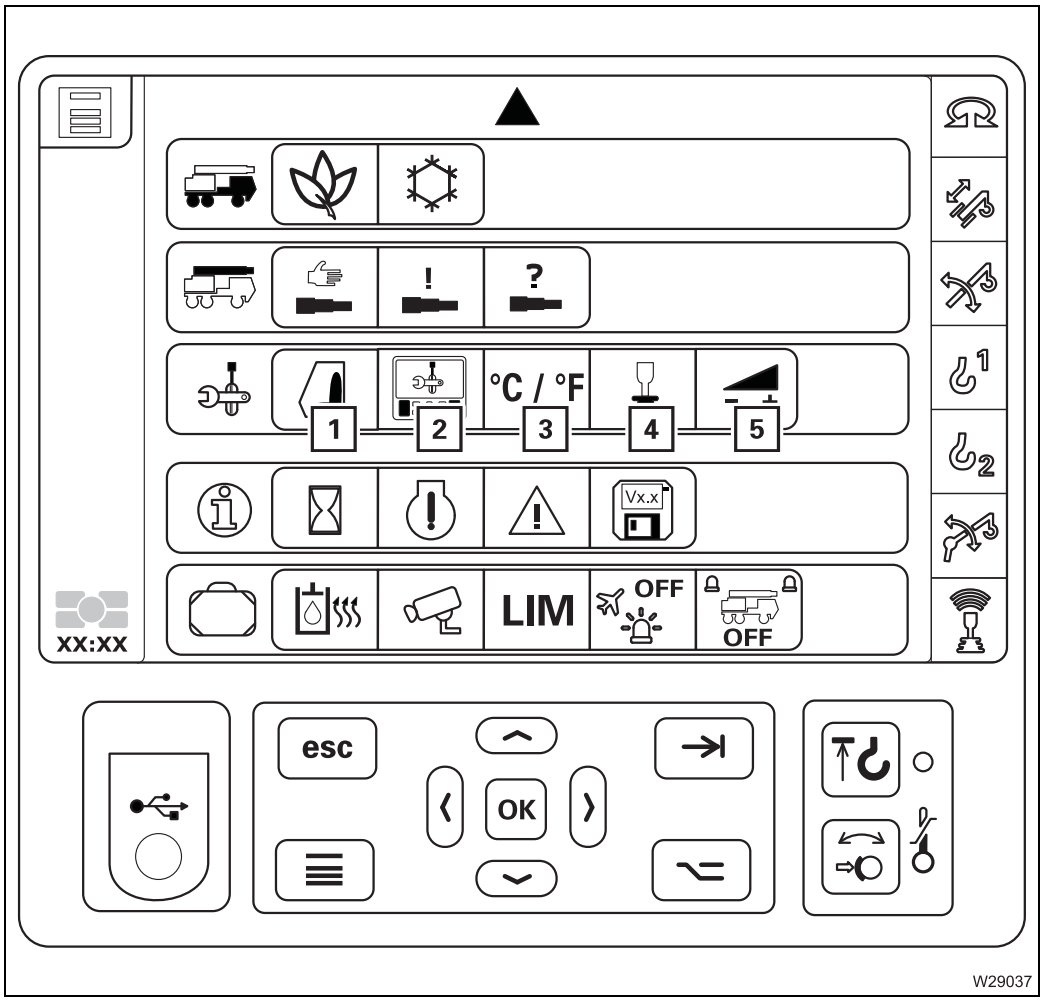
Slewing angle menu



1 Switching monitoring function on/off p. 11 - 118
2 Maximum slewing angle A display p. 11 - 112
3 Current slewing angle A display p. 11 - 112
4 Input maximum slewing angle A p. 11 - 115
5 Maximum slewing angle B display p. 11 - 112
6 Current slewing angle B display p. 11 - 112
7 Input maximum slewing angle B p. 11 - 115

10.09.2015

Settings menu group



1 Crane cab menu p. 9 - 50

2 Menu
- Adjusting display brightness p. 10 - 5
- Setting the time/date p. 11 - 46

3 Switch units menu p. 11 - 101

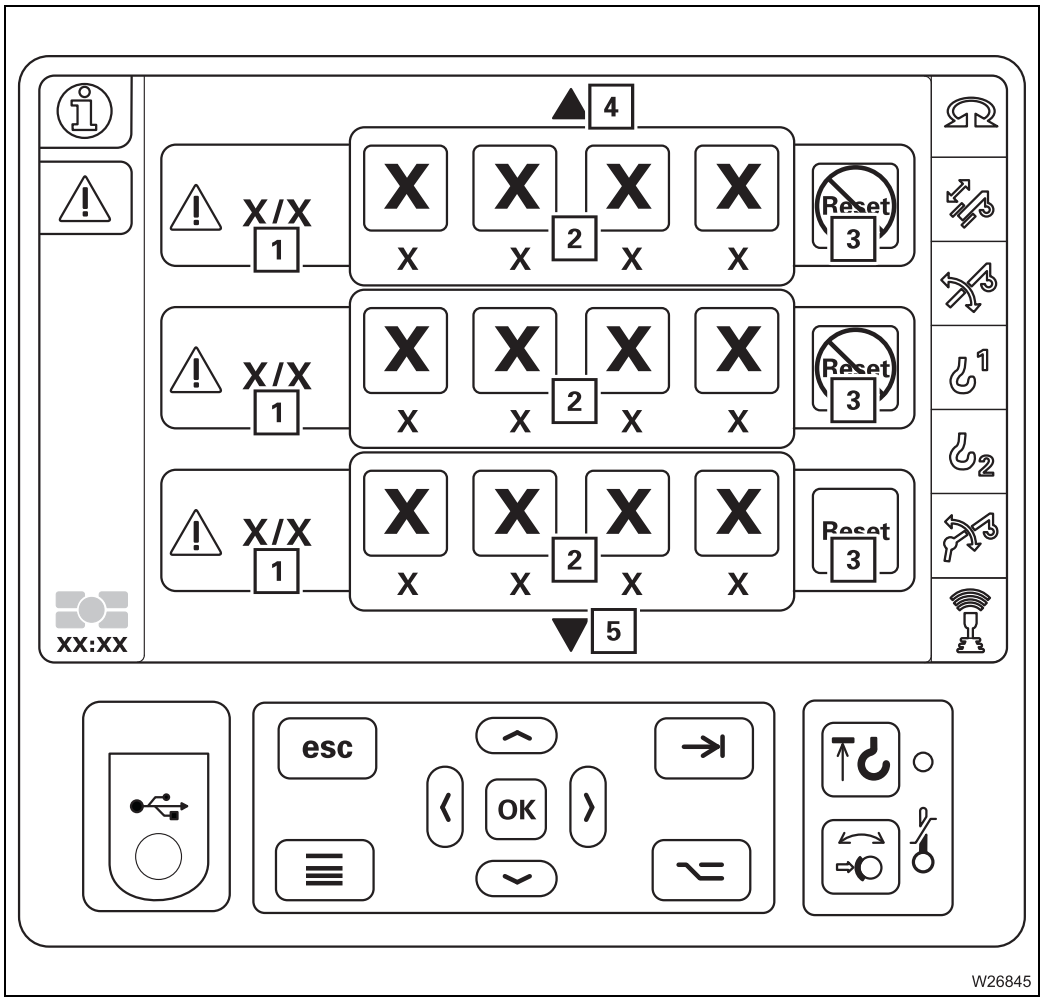
4 Set control lever characteristic curve menu p. 11 - 102

5 Power unit speeds menu p. 11 - 99

1) Additional equipment

10.09.2015

Crane operation error menu



1 Display of error/total errors p. 15 - 24
2 Error message display p. 15 - 25
3 Acknowledging the error
4 Previous error p. 15 - 24
5 Next error p. 15 - 24

10.09.2015

1 Boom system

2 Angle of the lattice extension display[1)] ➠ p. 9 - 131
Lattice extension inclination display[1)] ➠ p. 9 - 131

3 Current length of lattice extension[1)] ➠ p. 9 - 133

4 Maximum load display ➠ p. 9 - 132

5 Current load display ➠ p. 9 - 132

6 Current degree of utilisation display ➠ p. 9 - 132

7 Current main boom length ➠ p. 9 - 133

8 Current main boom angle display ➠ p. 9 - 131

9 Current overall height ➠ p. 9 - 133

10 Counterweight display ➠ p. 9 - 130

11 Current slewing angle display ➠ p. 9 - 133

12 Outrigger span display ➠ p. 9 - 130

13 Current working radius ➠ p. 9 - 133

14 Maximum permissible speed display ➠ p. 9 - 132

[1)] Additional equipment

10.09.2015

9.2 Short description of the operating elements

Risk of accident by operator error
This section is not a complete operating manual. It only provides a general overview of the functionality of the operating elements.
Before using the operating elements for the first time, read through the following chapters and the safety instructions listed there.

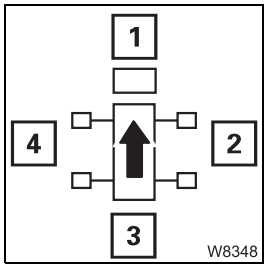
This section does not contain all the requirements that must be fulfilled for several operating elements to be active.
If some operating elements do not work, first read the following chapters which are referred to at the respective places before contacting **Manitowoc Crane Care**.

9.2.1 Definition of direction information

Basic rule

Direction information always depends on whether the carrier or the superstructure is being operated.

On the carrier

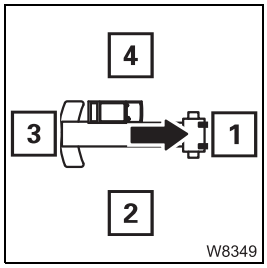


The driver's cab is always at the front, which means that:

1: front **2:** right
3: rear **4:** left

Forwards always means with the driver's cab leading.
Backwards always means with the rear lights on the carrier leading.

On the superstructure

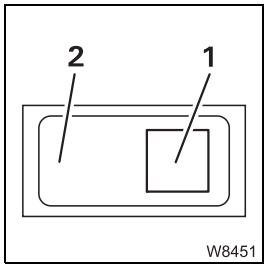


The main boom head is always at the front, which means that:

1: front **2:** right
3: rear **4:** left

Switches

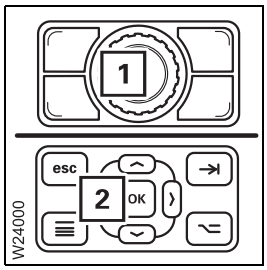
For switches and buttons, the terms **down** and **up** are used.



Regardless of the fitting position (vertical, horizontal, diagonal, perpendicular or turned), the following always applies:

- **Down:** If (**1**) press – next to the symbol
- **Up:** If (**2**) press – opposite the symbol

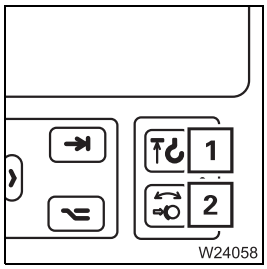
10.09.2015



Input confirmation

An input can be confirmed with button (**1**) or (**2**)

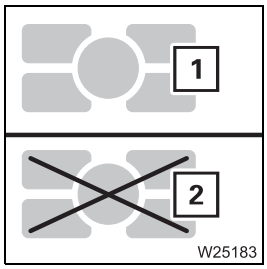
– **Press the button once:** A newly entered value is confirmed



Other

1 Lifting limit switch warning; p. 9 - 109

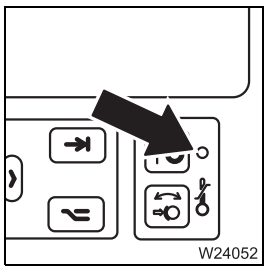
2 Slewing gear brake monitoring; p. 9 - 109



1 Display active

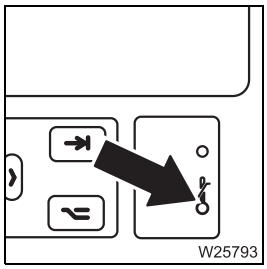
2 Display inactive

Switch display, p. 9 - 90



Sensor for brightness

Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted.
Manual input; p. 4 - 13.



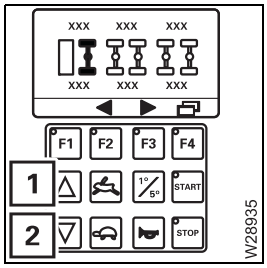
Temperature monitoring

The temperature of the control unit is measured by an internal sensor.

– **blue, flashing:**	Temperature too low – display will not be switched on
	Temperature too high:
– **red, lights up:**	Brightness is reduced
– **yellow, flashing:**	Display is switched off
– **red, flashing:**	Control unit is switched off

10.09.2015

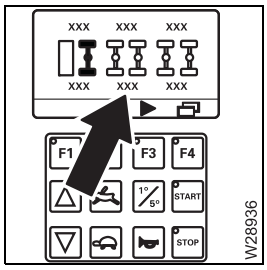
When you raise/lower the axles, the carrier's horn will sound once.



Raising/lowering axles

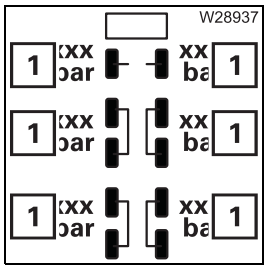
Raise:	Press button (**1**) – the selected axles are raised and the truck crane is lowered
Lower:	Press button (**2**) – the selected axles are lowered and the truck crane is raised

Movement stops after the button is released.



Axle load display

– **Unit of measurement:** Displayed depending on setting
  – **t** – tons or
  – **klbs –** kilopounds – (1 kilopound = 1,000 lbs)



Lowering the axles not functioning

If the maximum permissible operation pressure (**1**) of 210 bar (3,045 psi) per axle pair has been exceeded, then

– It is not possible to lower these axles any further

– Only the other axles can be moved.

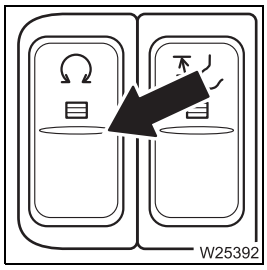
Operation of the axle raising on the opposite control unit is the same.

10.09.2015

9.2.15 Slewing gear

➠ *Slewing gear*, p. 11 - 91.

Control panels

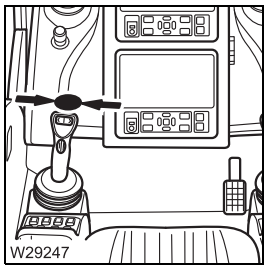


Slewing gear on/off

There is a lamp in the button.

– **Press once:** – Lamp bright – slewing gear on, slewing gear brake released
– Lamp dim – slewing gear off, slewing gear brake engaged

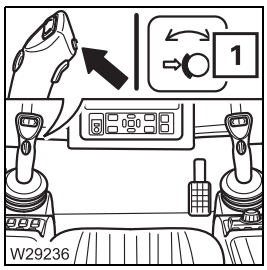
➠ p. 11 - 91



Left control lever

– **To the left:** Slewing to the left
– **To the right:** Slewing to the right

➠ p. 11 - 92

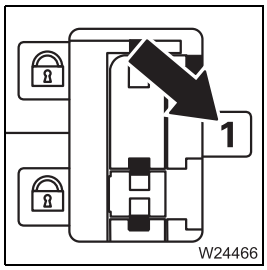


Slewing gear freewheel

– **To switch on:** Move control lever to zero position and press button – slewing gear brake released, lamp (**1**) goes out
– **To switch off:** Release switch – slewing gear brake engaged, lamp (**1**) lights up

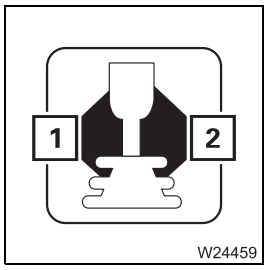
➠ p. 11 - 95

10.09.2015



Telescoping cylinder in the telescopic section display

Displayed telescopic section, e.g. telescopic section 1

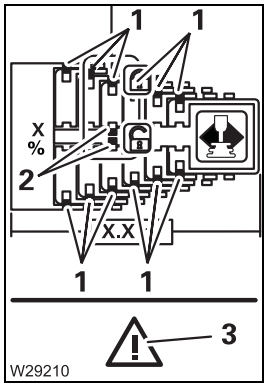


Telescoping direction display

1 Start with *Retract*

2 Start with *Extend*

➠ p. 11 - 84



Telescope diagram display

Current relation of the telescopic sections to each other – section of top view.

Locking pin

1 On the telescopic section

2 On the telescoping cylinder

3 Error

➠ p. 11 - 76

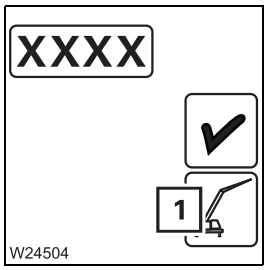
Display 1 and 2

– **Green:** Locked

– **Yellow:** Intermediate position

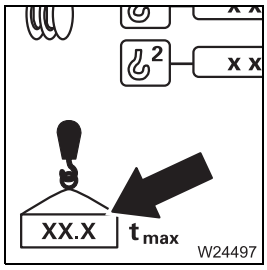
– **Red:** Unlocked

10.09.2015



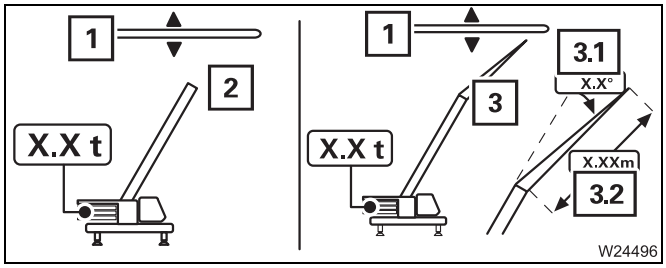
Opening the Monitoring menu

Select symbol (**1**) and confirm



Maximum load display

Short description with *Monitoring* menu; ➠ p. 9 - 132.



Boom system entry

1 Boom system selection

2 Main boom

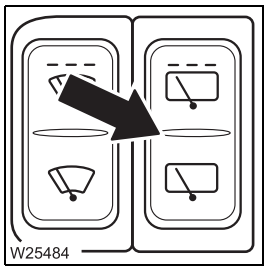
3 Lattice extension

3.1 Angle

3.2 Length

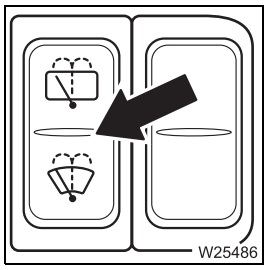
➠ p. 11 - 27

10.09.2015



Roof window wiper on/off

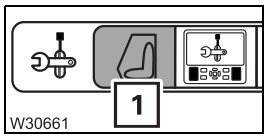
- **Off:** Middle position
- **Interval:** Press up – wiper goes to end position
- **Continuous operation:** Press down



Windscreen washing system

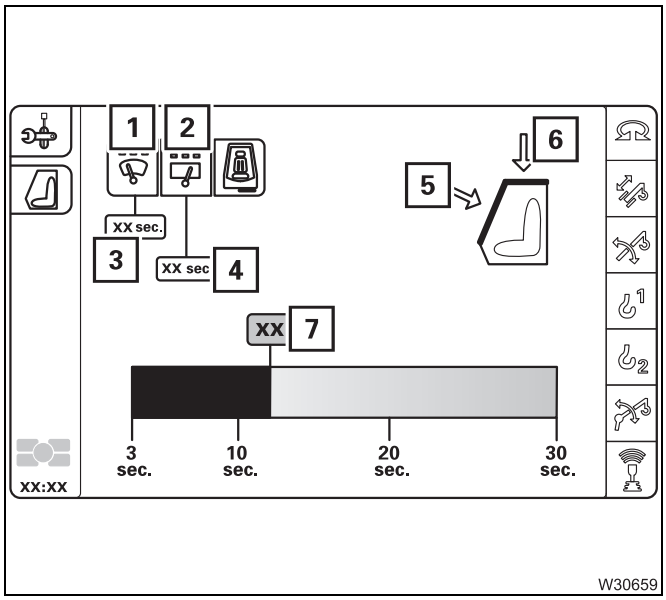
- **Windscreen:** Press down
- **Skylight:** Press up

No additional wiping function is performed



Crane cab menu

To open: Select symbol (**1**) and confirm – menu is opened



Adjusting the wiper stroke interval

1 Windscreen wiper selection, display (**5**)

2 Skylight wiper selection, display (**6**)

7 Changing the interval duration

Wiper interval in seconds for

3 Windscreen wiper

4 Roof window wiper

p. 11 - 98

10.09.2015

10 Starting/turning off the engine – for crane operation

You must start the engine from the crane cab for crane operation. If the engine has been started from the carrier, then you must shut it down in the carrier and switch off the ignition before crane operation.

All the power units required for crane operation are only released when you start the engine from the crane cab.

The procedure depends on whether you:

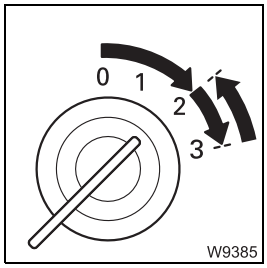
– Start the (cold) engine for the first time of the day.

– Start the engine from the crane cab; ➠ p. 10 - 6.

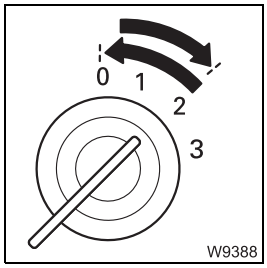
– Start the engine with the hand-held control; ➠ p. 10 - 9.

10.1 When starting the engine for the first time of the day

The first start of the day should always be made from the **driver's cab**, as all the displays for monitoring the engine can only be accessed there.



- Carry out all the required tasks and checks for starting the engine; ➠ *CHECKLIST: Starting the engine*, p. 4 - 1.
- Start the engine from the driver's cab and perform all the necessary checks; ➠ *Checks after starting the engine*, p. 10 - 7.



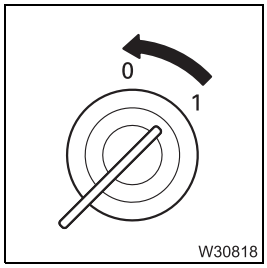
- Switch the engine off and turn off the ignition.

10.09.2015

10.3 Turning off the engine

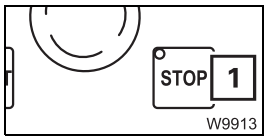
10.3.1 During normal operation, with the ignition lock/with the hand-held control

Risk of accidents due to suspended loads
Never turn off the engine with a load suspended. You must have the control levers at hand in order to intervene at any time.
Always set down the load before you leave the crane cab.



If the hand-held control is not connected:

- Turn the ignition key to position **0** – the engine will stop.



If the hand-held control is connected:

- Press the button (**1**) once – the engine turns off.

It is not possible to switch off the engine with the ignition lock.

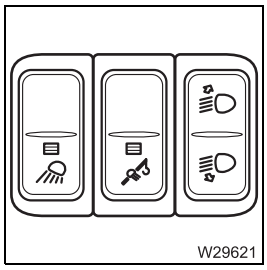
After turning off

Observe the notes in the appropriate sections;
➠ *In case of short work breaks*, p. 11 - 121,
➠ *In case of work breaks of more than 8 hours*, p. 11 - 122.

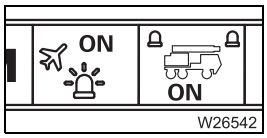
10.09.2015

Checking the electrical system

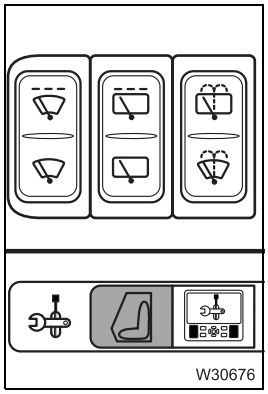
- Check the following functions and have faulty parts repaired.



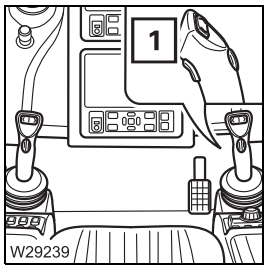
– Working area spotlight



– Air traffic control light, rotating beacons

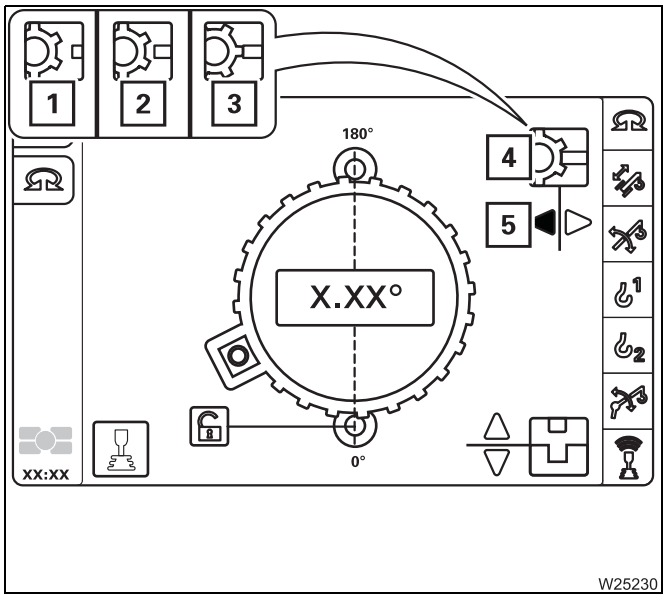


– Windscreen wipers, windscreen washing system



– Horn

10.09.2015



Switching on the Houselock

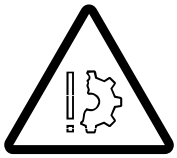
- Select the symbol (**5**).
- Press the button until the symbol (**4**) is displayed – *Houselock switched on*.

The display first shows the symbol (**1**), then (**2**) and then shows the symbol (**4**) when the Houselock is switched on.

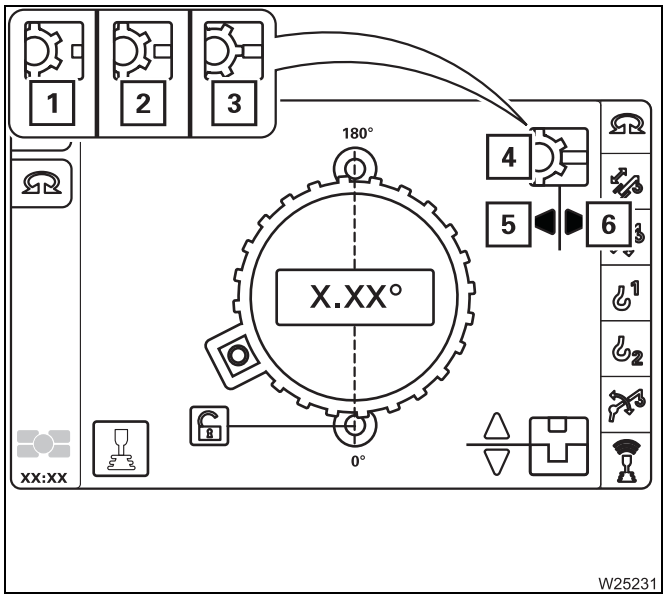
If the symbol (**3**) is displayed then:

- Let go of the button.

  The lock is blocked and you need to correct the position of the superstructure as follows.

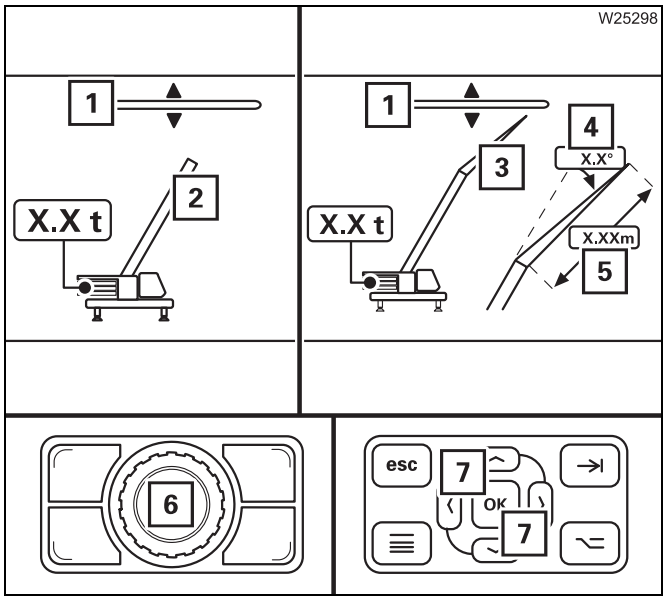


Risk of damage due to slewing with blocked lock
Before slewing ensure that the Houselock is switched off. Otherwise the system will be damaged during slewing.



- Select the symbol (**6**).
- Press the button until the symbol (**1**) is displayed – *Houselock switched off*.
- Apply the slewing gear brake.
- Switch on the slewing gear and slew the superstructure a little further (minimally).
- Switch off the slewing gear.
- Select the symbol (**5**).
- Press the button until the symbol (**4**) is displayed – *Houselock switched on*.
- If symbol (**3**) is still shown, you must again correct the position of the superstructure.

10.09.2015



– Boom system

- Select and confirm the symbol (**1**).
- Use the buttons (**6**) or (**7**) to select the rigged boom system.

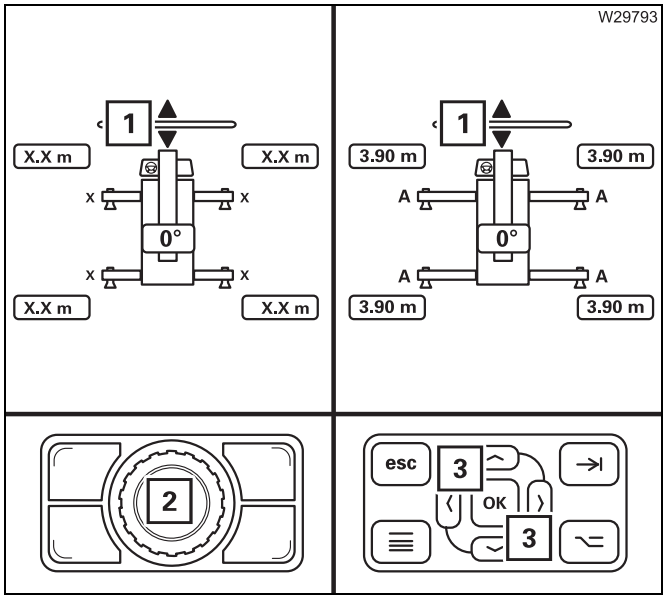
  2 Main boom

  3 Main boom with lattice extension

  4 Angle of the lattice extension

  5 Length of lattice extension

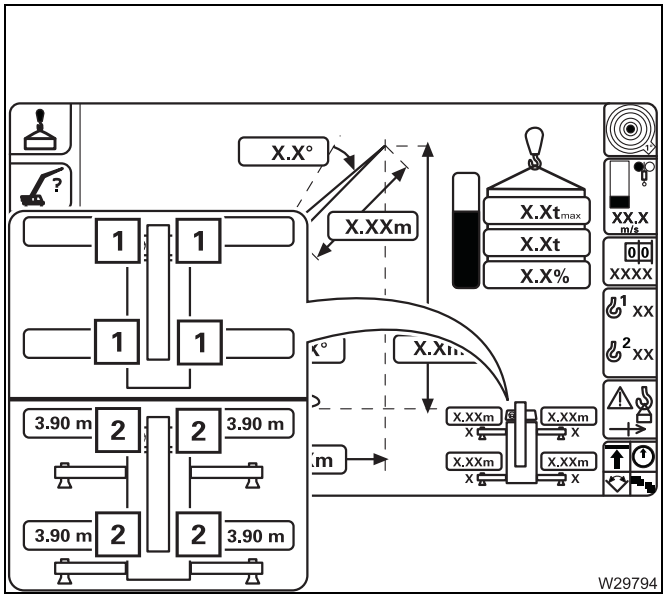
- Confirm each selection.



– Outrigger span

- Select and confirm the symbol (**1**).
- Use the buttons (**2**) or (**3**) to select the rigged outrigger span.
- Confirm the selection.

  The display indicates half the outrigger span each on the left and right, e.g. 3.90 m for the outrigger span 7.80 m with outrigger span **A**.



The outrigger span is monitored if additional equipment is used. You must check the outrigger span when entering the rigging mode.

The display is identical for all outrigger beams.

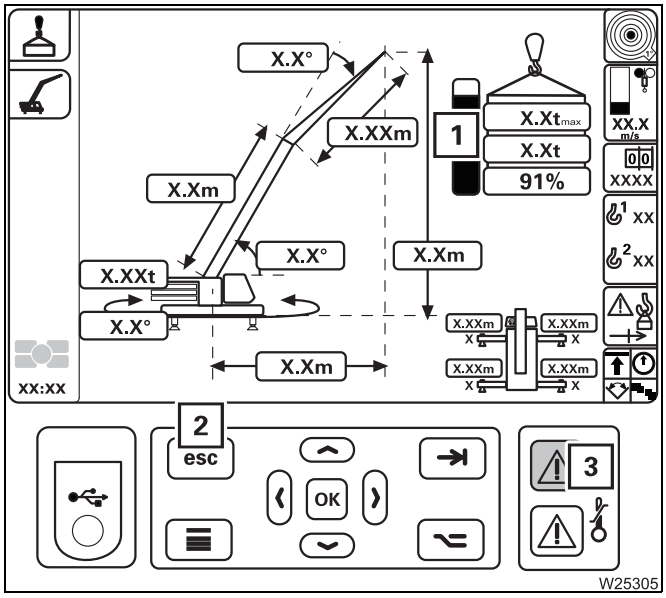
- Check display.

(**1**) – the display lights up **red**.
The required outrigger span is not rigged.

- Rig the required outrigger span.

(**2**) – the display does **not** light up **red**.
The required outrigger span is rigged.

11.2.5 RCL early warning



If about 90% of the maximum permissible load is exceeded, an RCL early warning will be issued.

– An intermittent buzzer tone will sound. After five seconds, you can switch off the buzzer tone using button (**2**).

– The lamp (**3**) lights up.

– Display (**1**) shows the current degree of utilisation, e.g. 91%; the bar is **yellow**.

If the current crane continues to move in the same direction, there will be an RCL shutdown.

11.2.6 RCL switch-off

There are different types of RCL shutdown:

– Shutdown due to overload,

– Shutdown due to an error; ➠ *Error message with shutdown*, p. 15 - 23.

Shutdown due to overload

If approx. 100% of the maximum permissible load is exceeded, shutdown will occur due to overload.

10.09.2015

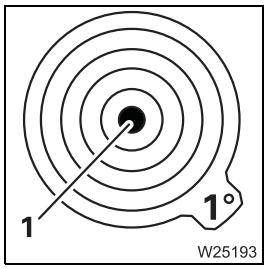
11.3 Crane operation with main boom

11.3.1 Checks during crane operation

Horizontal alignment

During crane operation, the truck crane may tilt if the ground gives way due to varying loads.

Risk of accidents if the truck crane is not level
The RCL calculates the working radius from the length and angle of the main boom. The actual working radius changes and there is a danger of the crane overturning if the truck crane is not level.



- Check the horizontal alignment of the truck crane during crane operation on the display (**1**); ➠ p. 12 - 48.

Due to deformation of the frame, the horizontal alignment can change by up to 2° when the superstructure is turned from the 0° or 180° position.
If the truck crane does not return to the horizontal position after being turned back to the 0° or 180° position, you must immediately determine the cause and eliminate it and, if necessary, realign the crane. Observe the position of the superstructure when doing so; ➠ *Level the truck crane on outriggers*, p. 12 - 48.

Safe distances

During crane operation, always ensure that the truck crane and the load are at a sufficiently large distance to objects and persons. Pay particular attention to objects that pose a direct danger (e.g. gas containers or scaffolding).

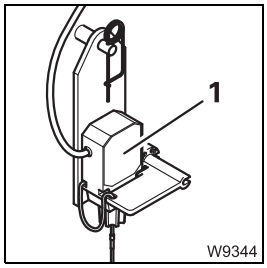
Keep a safe distance away from electrical lines; ➠ *Safe distance from electrical cables*, p. 12 - 14.

10.09.2015

11.3.5 Lifting limit switch and lowering limit switch

Lifting limit switch

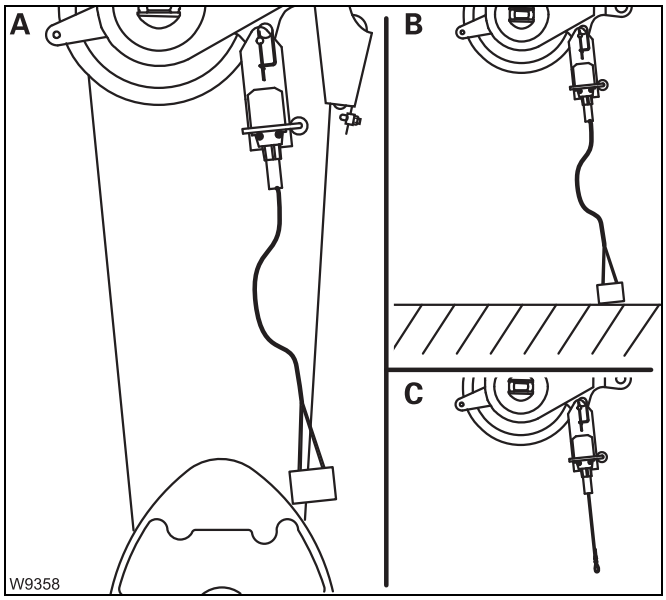
To install/remove the lifting limit switch; ➠ p. 12 - 102.



The lifting limit switch (**1**) prevents the hook block from being lifted up to the main boom head and damaging it.

The lifting limit switch only works if it has been unlocked; ➠ p. 12 - 107.

Risk of accident due to intentionally triggering the lifting limit switch
Always complete the hoisting operation (and extending) before raising the lifting limit switch weight. If the lifting limit switch is lifted at too great a speed, the hook block may swing into the main boom head and damage the head sheaves and the hoist rope.



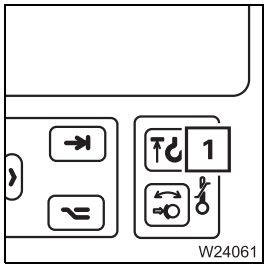
The lifting limit switch will be triggered if:

(**A**) – the hook block raises the lifting limit switch weight or

(**B**) – the lifting limit switch weight touches the ground upon lowering or

(**C**) – the lifting limit switch weight is not attached.

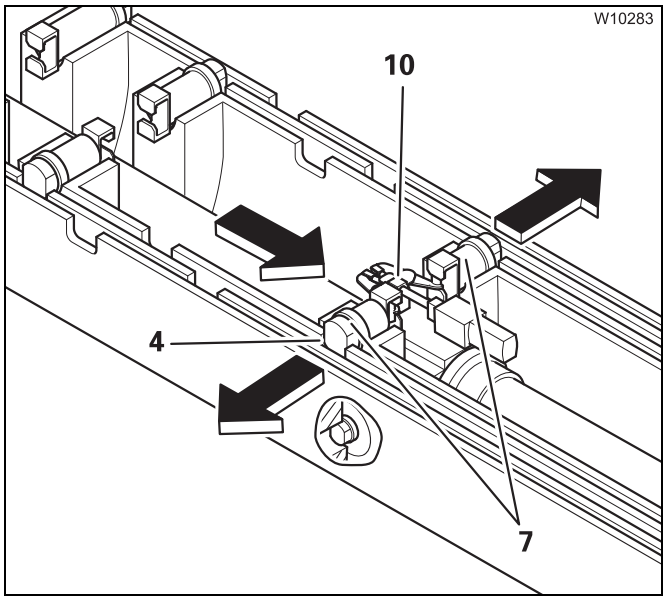
The lifting limit switch will not trigger if it is locked.



The lamp (**1**) will light up if the lifting limit switch has been triggered. At the same time, all movements which would increase the load moment will be switched off – *Lifting*, *Lowering, Extending* and *Derricking the lattice extension* if necessary.

To cancel the shutdown, leave the shutdown range by performing a different crane movement or by setting down the load.

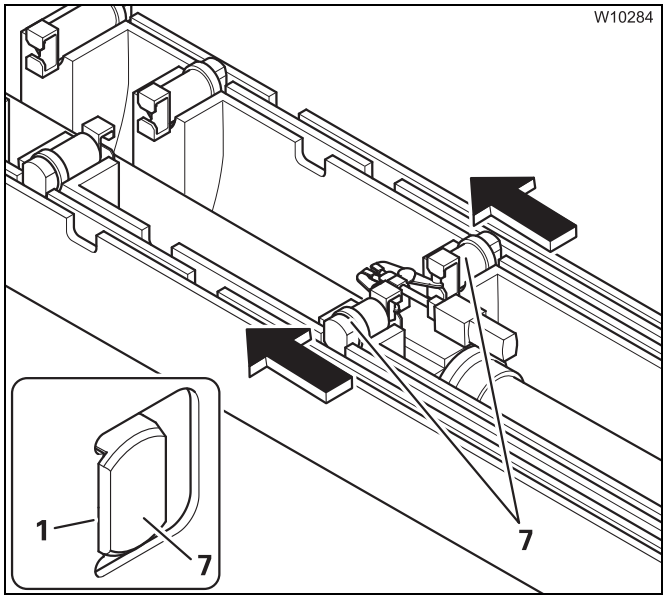
10.09.2015



4. Telescoping, locking and setting down a telescopic section

The telescoping cylinder pushes the telescopic section to a locking point.

The weight is taken off the mechanism (**10**). The locking pins (**7**) extend into the cutouts (**4**).

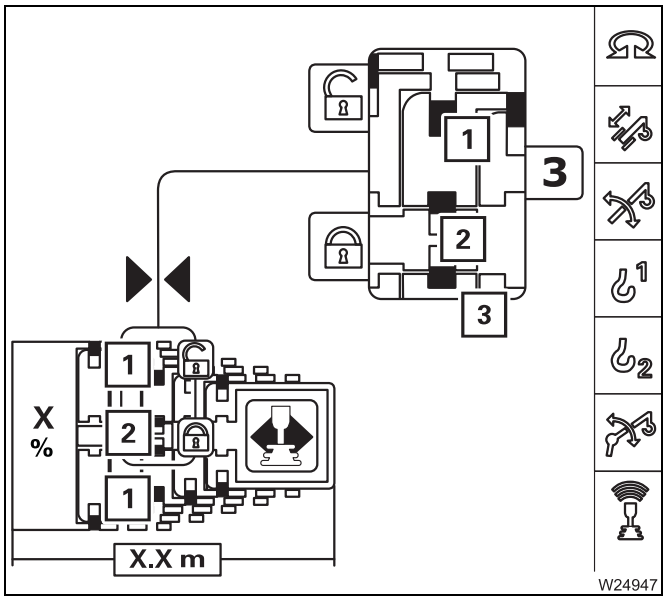


The telescopic section is automatically set down.

The telescopic cylinder retracts until the locking pins (**7**) are positioned on the above telescopic section (**1**).

The weight of the load is now on the telescopic sections and not on the telescoping cylinder.

10.09.2015



Position of the locking pins

The current positions of the locking pins are:

1 on the telescopic section

2 on the telescoping cylinder

The area (**3**) shows an enlarged cut-out.

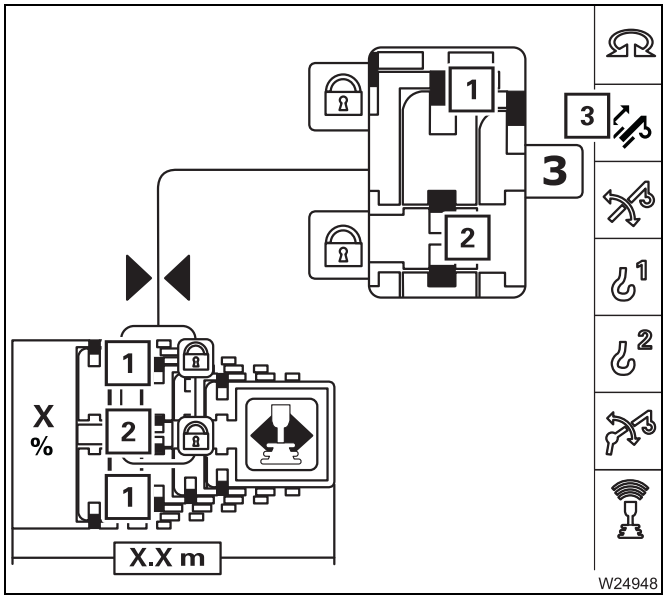
The current settings are shown in different colours.

– **Red:** Unlocked
– **Green:** Locked
– **Yellow:** Intermediate position

Unlocking the telescoping cylinder

Unlocking the telescoping cylinder is required for the telescoping cylinder to be moved separately (without telescopic section).

The telescoping cylinder and the telescopic section cannot be unlocked simultaneously.



Prerequisites

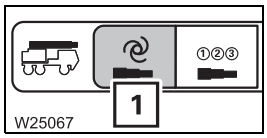
– Telescoping mechanism on – symbol (**3**) **green**
– Telescoping cylinder locked – symbol (**2**) **green**
– Telescopic section locked – symbol (**1**) **green**

10.09.2015

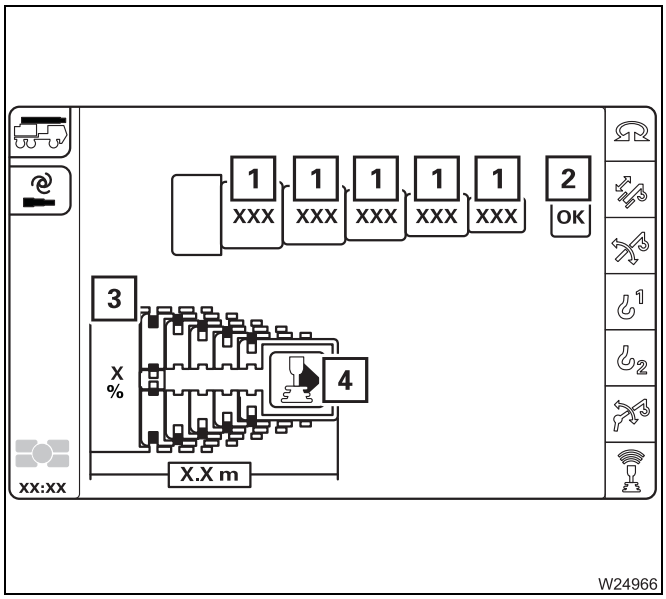
Telescoping with full automation

When telescoping with full automation, you use the suggested maximum telescoping and then move the control lever in the required direction. Switching between the telescopic sections is carried out automatically by CCS.

- Switch on the telescoping mechanism; ➠ p. 11 - 72.



- Open the *Telescoping full-automation* menu (**1**).



Display

(**1**) – possible telescoping

(**3**) – current telescoping

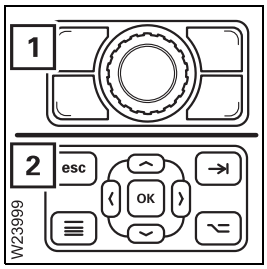
Use possible telescoping

- Select the symbol (**2**).
- Confirm the selection.

– Display symbol (**4**) – telescoping permitted – telescoping full automation on.

Telescoping

- Move the control lever for the displayed telescoping direction – symbol (**4**).



Do not use possible telescoping

- Press button (**1**) or (**2**).

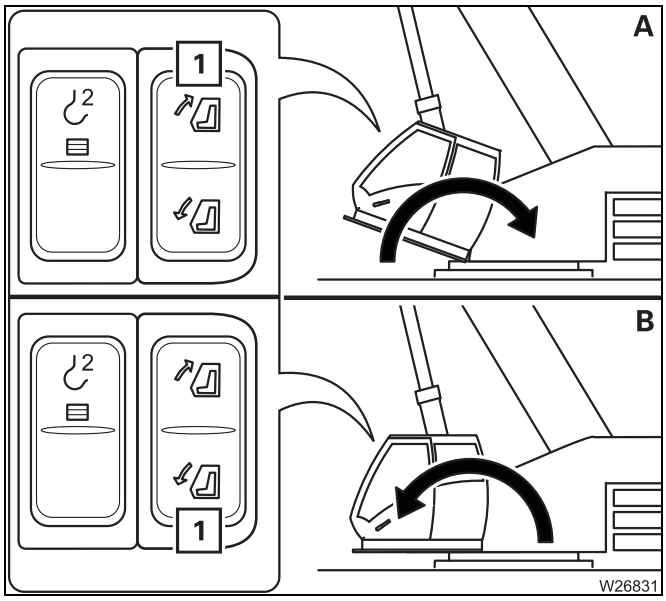
11.4 Settings and displays for crane operation

This section only describes settings and displays needed during crane operation. Operating elements that can be assigned to other procedures are described with the corresponding procedures.

11.4.1 Inclining the crane cab

With the appropriate equipment, you can incline the crane cab to the rear in order to attain a better sitting position when working at great heights.

Risk of accident due to objects overturning in the crane cab
Close the crane cab door before inclining and remove all loose objects (e.g. bottles) from the crane cab.
This prevents objects from tipping over, the crane cab door opening by itself, and unintended operational accidents caused by fright.



(A) – Incline to the rear

- Close the crane cab door.
- Press button (**1**) up.

(B) – Incline to the front

- Close the crane cab door.
- Press button (**1**) down.

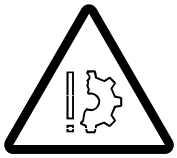
The crane cab will tilt as long as you hold the button down or its end position is reached.

10.09.2015

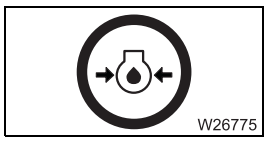
CAN bus malfunction

- Switch off the ignition and wait about 15 seconds, then switch it on again.

  If the malfunction is still present, contact **Manitowoc Crane Care**.

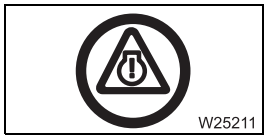


Risk of damage to the engine
Switch off the engine as quickly as possible and check the oil level. Restart the engine only when the oil level is correct.



Engine oil pressure

- Check the engine oil level and top up with oil if necessary;
  ➠ *Maintenance manual*.
- If the oil level is correct then start the engine from the driver's cab and check the warning messages that are present.



Engine error

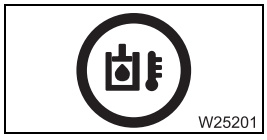
- Switch off the engine immediately and open the *Engine error* menu.
- If necessary, note the error messages and contact **Manitowoc Crane Care**.

Filling up

The fuel tank is only filled up to a level of approx. 5%.

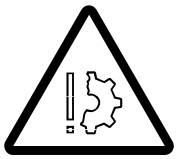
- Refuel before the fuel is used up; ➠ p. 4 - 7.

If the fuel tank is almost empty, air will be sucked in and you will have to bleed the fuel system; ➠ *Maintenance manual*.



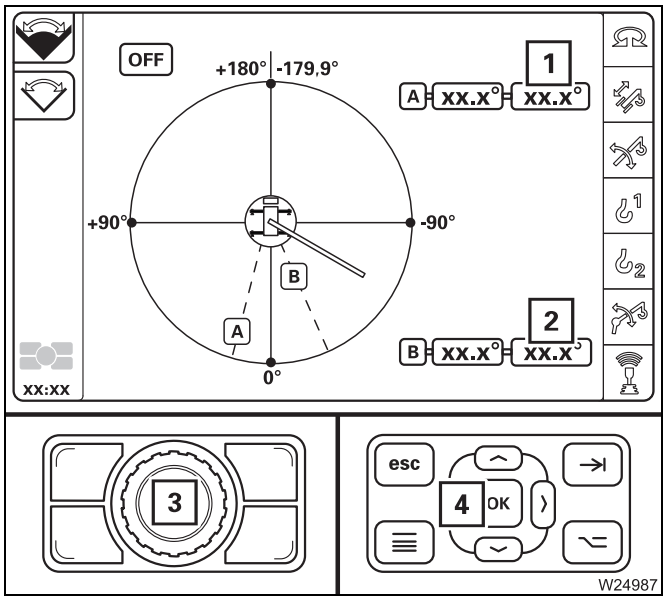
Hydraulic oil too hot

The hydraulic oil is hotter than 80 °C (176 °F).
Current temperature display; ➠ p. 10 - 7.
Possible cause and solution; ➠ p. 15 - 17.



Danger of overheating
There is a fault if the hydraulic oil temperature exceeds 80 °C (176 °F). Set down the load as soon as possible and try to find the cause.
Set down the load as soon as possible and turn off the engine if the temperature of the hydraulic oil exceeds 100 °C (176 °F).

10.09.2015



– For slewing angles

- Set the limit value and confirm with button (**3**) or (**4**). The value is adopted.

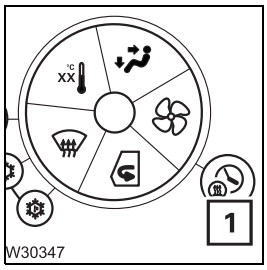
– The symbol (**1**) for the slewing angle **A** – symbol is **red**.

– The symbol (**2**) for the slewing angle **B** – symbol is **red**.

Switch on monitoring; ➠ p. 11 - 118.

10.09.2015

11.7.3 Auxiliary heater



You can use the auxiliary air heater to preheat the crane cab.

The batteries will run down if you operate the auxiliary heater with the engine switched off. You must recharge the batteries at shorter intervals if you use the auxiliary heater frequently.

Switching on

You can also set an automatic start time and duration for the heating, over several days; ➠ *Setting the heating start/heating duration*, p. 11 - 128.

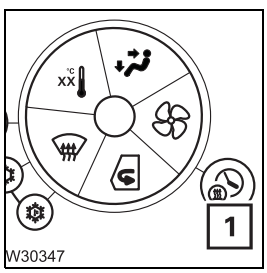
- Before switching on the heating system, check whether it is allowed to be operated at the current site of the truck crane. Find out whether there are any possible sources of danger that could result in an explosion.

Risk of explosion when operating the heating system
The heating system may not be operated:
– At service stations and tank farms.
– At places where flammable gases or vapours can be found or formed (e.g. at places where fuel is stored and in chemical factories).
– At places where explosive dust can be found or formed (e.g. coal dust, wood dust and grain dust).

Risk of suffocation when operating the heating system
Do not operate the heating system or the heating system with the timer in enclosed rooms (e.g. garages).

The engine in the carrier is switched off and the ignition in the driver's cab is switched off; ➠ *Turning off the engine*, p. 4 - 23.

- Switch on the ignition in the crane cab; ➠ *Switching on the ignition*, p. 10 - 4.

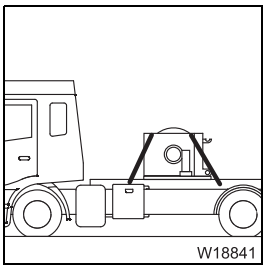


- Select and confirm the symbol (**1**) – the submenu opens.

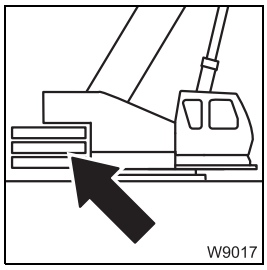
10.09.2015

12.1.2 CHECKLIST: Unrigging

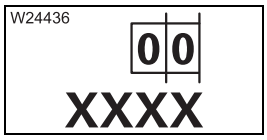
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified here.



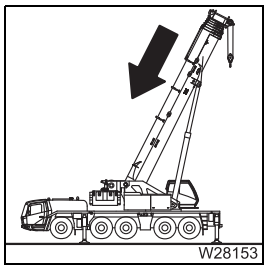
1. If required, remove the auxiliary hoist; ➠ *CHECKLIST: Removing the auxiliary hoist*, p. 6 - 51.



2. With the RCL set correspondingly, unrig the counterweight; ➠ *CHECKLIST: Unrigging the counterweight*, p. 12 - 62.



3. Enter the current rigging mode with the new rigged counterweight combination at the RCL display; ➠ p. 11 - 23.



4. Retract the main boom, lock the telescopic sections and lock the telescoping cylinder to telescopic section I for on-road driving; ➠ *Locking the telescopic section for on-road driving*, p. 11 - 84.

10.09.2015

For example, according to DIN VDE 0105

Voltage	Safe distance (A)
up to 1,000 V	1 m (3.3 ft)
more than 1,000 V up to 110,000 V	3 m (9.8 ft)
more than 110,000 V up to 220,000 V	4 m (13.1 ft)
more than 220,000 V up to 380,000 V	5 m (16.4 ft)

For example as per ASME B 30.5 (USA)

Voltage	Safe distance (A)
up to 50,000 V	3.05 m (10 ft)
more than 50,000 V up to 200,000 V	4.60 m (15 ft)
more than 200,000 V up to 350,000 V	6.10 m (20 ft)
over 350,000 V to 500,000 V	7.62 m (25 ft)
over 500,000 V to 750,000 V	10.67 m (35 ft)
over 750,000 V to 1,000,000 V	13.72 m (45 ft)

- Erect an obstacle at a minimum safe distance (**A**) from the electric cable which will keep the equipment of the truck crane and load/lifting tackle away from the cable. Account for possible swaying of the load or the cable.
- Cordon off the area around the truck crane at the safe distance (**A**). That way the safety area is enlarged in case the cable is touched.
- Have banksmen in visual or radio contact with you; check that you are observing the safe distance (**A**).
- Only use guide ropes of non-conductive material if the load has to be guided.

If you have touched the electric cable:

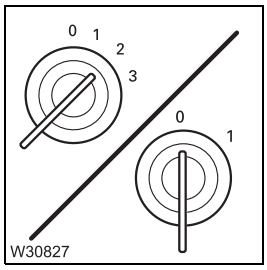
- Keep calm!
- Do not leave the crane cab!
- Tell anyone standing outside not to touch the crane, the load or the lifting tackle.
- Move the main boom out of the danger area.

10.09.2015

12.5.2 Starting/turning off the engine from the outrigger control units

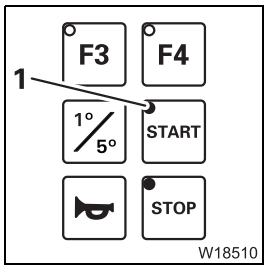
Prerequisites

The following requirements must be met before you can start the engine for driving from the outrigger control units:



– The ignition in the driver's cab is switched on.

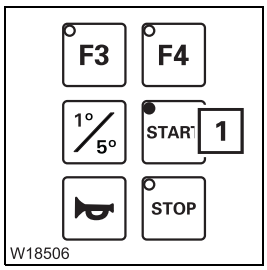
– The ignition is switched off in the crane cab.



– The lamp in the button (**1**) lights up.

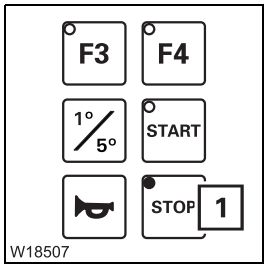
Starting the engine

All activities and inspections required to start the engine must be carried out before starting the engine; ➠ p. 4 - 1.



- Press the button (**3**) once – the engine starts.

Turning off the engine



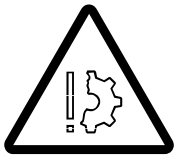
- Press the button (**1**) once – the engine goes off.

10.09.2015

12.6.6 Extending/retracting outrigger beams

Risk of accident if outrigger beams cannot be seen
Cordon off the area where you intend to extend and retract the outrigger beams. Nobody is allowed to be in this area.
Observe the moving outrigger beams or have them observed by a banksman who is in visual contact with you.

Danger of overturning if improperly supported
Always extend **all** the outrigger beams, and always extend them to the spans corresponding to the RCL code.
This also applies if you are working on one side only, since it ensures that the truck crane is stable at the rear.



Risk of damage to the outriggers
Before extending, always check whether the required pins for the desired outrigger span are inserted/removed.
Before retracting the outrigger beams, always check whether they have been secured in driving position.

- Check that the pins are inserted/removed as specified in the prerequisites (**A**) for the desired outrigger span; ➠ p. 12 - 32.

Depending on the rigging, control elements are provided for moving the outrigger beams

– On the *Outrigger* control units; ➠ p. 12 - 39,

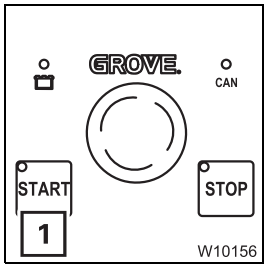
– On the hand-held control; ➠ p. 12 - 37,

– In the crane cab; ➠ p. 12 - 39.

10.09.2015

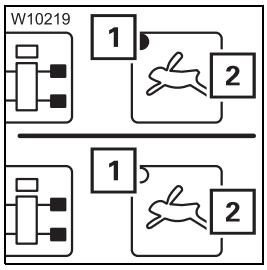
With the hand-held control

- Connect the hand-held control to any socket on the carrier; ➠ p. 12 - 22.



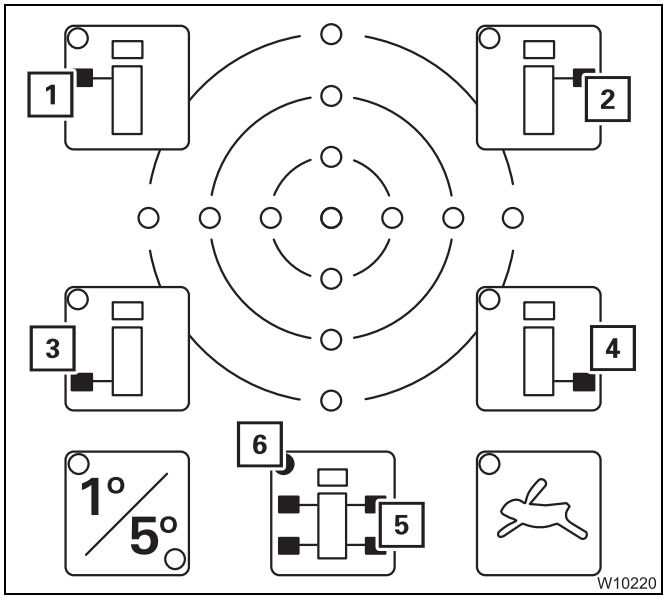
Start the engine

- Press the button (**1**) – the engine starts; ➠ p. 10 - 9.



Pre-select high-speed mode/normal speed

- Press the button (**2**).
  - Lamp (**1**) lights up – high-speed mode pre-selected.
  - Lamp (**1**) goes out – normal speed pre-selected.



Pre-selecting outriggers

- Press the button for the required outriggers once

  1 Front left
  2 Front right
  3 Rear left
  4 Rear right
  5 All

Pre-selection is switched on and the lamp in the corresponding button lights up, e.g. the lamps (**6**).

The pre-selection is switched off after approx. 10 seconds.

Combinations of the buttons (**1**) to (**4**) are also possible, e.g. buttons (**1**) and (**2**), in order to lift the truck crane at the front.

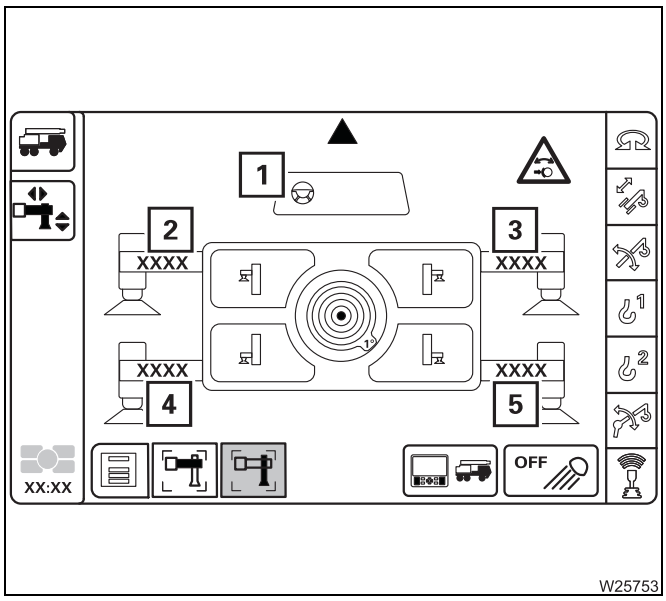
10.09.2015

12.6.12 Outrigger pressure display

After switching on the ignition, the outrigger pressure displays indicate the current outrigger pressure for all supporting cylinders.
The set unit (t or klbs) is shown next to the displays.

Outrigger cylinders retracted or extended as far as possible will lead to an incorrect outrigger pressure display.
The display will show the most accurate reading if the movement performed last was *Extend outrigger cylinders*.

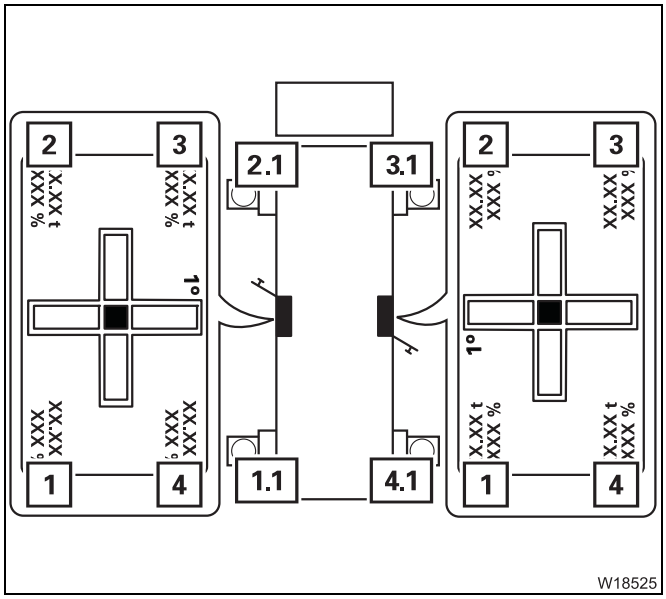
Risk of accident when misused
A displayed outrigger pressure over 0 t does nor guarantee protection against overturning or overloading. For this reason, never override the RCL.



In the Outriggers submenu

The assignment of the displays to the carrier is given by the directional indicator (**1**).

2 Front left outrigger pressure
3 Front right outrigger pressure
4 Rear left outrigger pressure
5 Rear right outrigger pressure



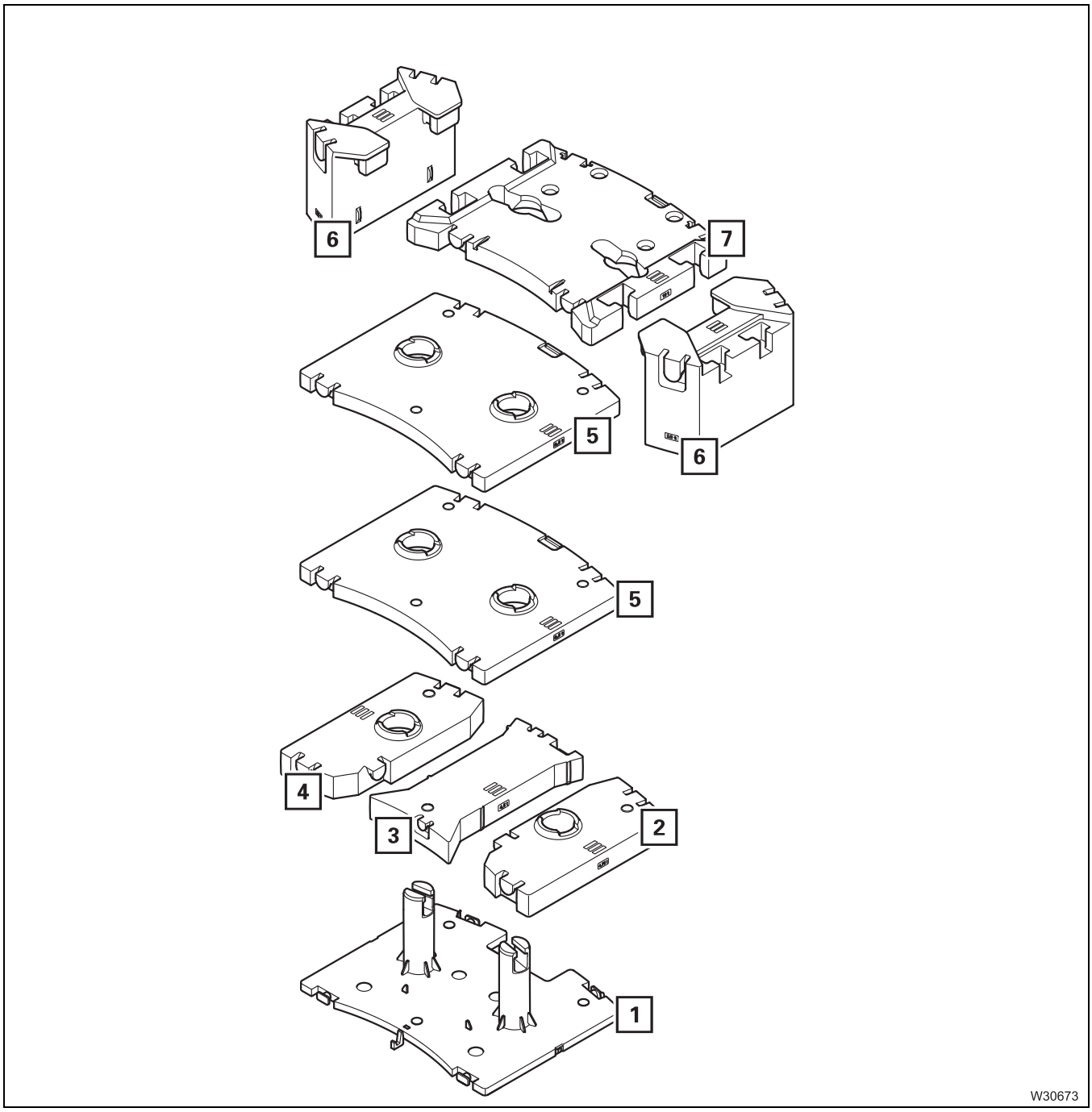
On the outrigger control units

The assignment of the displays to the carrier corresponds to the top view.

1 Display for the supporting cylinder **1.1**
2 Display for the supporting cylinder **2.1**
3 Display for the supporting cylinder **3.1**
4 Display for the supporting cylinder **4.1**

10.09.2015

The illustration and the table show all counterweight sections and all counterweight combinations which can be rigged.



- The tables specify which counterweight sections are needed for the respective counterweight combination.
- Lift the counterweight sections onto the base plate; ➠ *Slinging points on the counterweight sections*, p. 12 - 60.

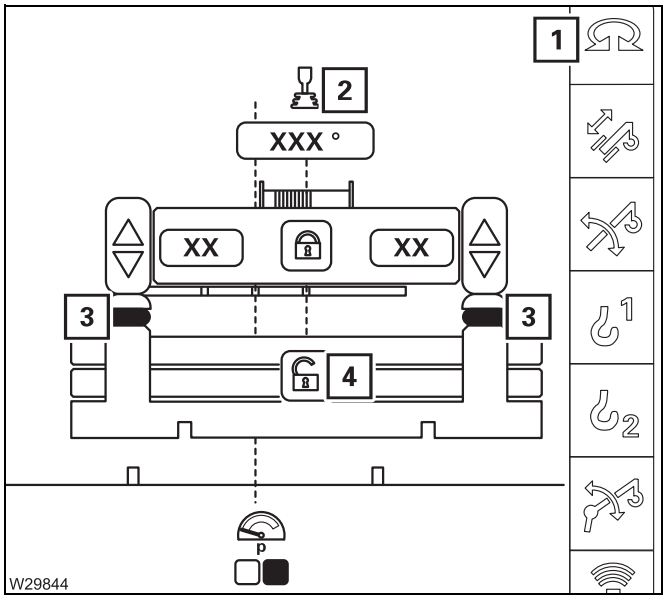
10.09.2015

Automatic mode, unrigging

While the automatic mode is being executed, you can always

– **cancel** the automatic mode; ➠ *Cancel automatic mode*, p. 12 - 76.

– **interrupt** the automatic mode by letting go of the control lever. After moving the lever in the displayed direction once more, the automatic mode is continued.

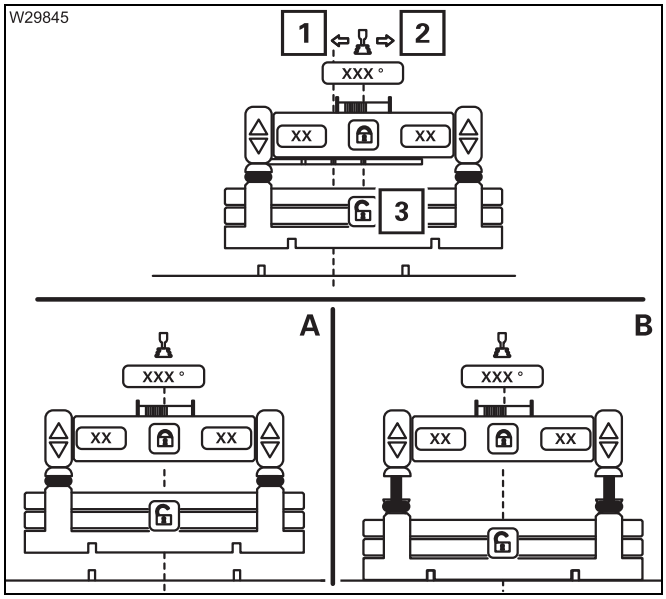


Prerequisites

– The lifting cylinders are fully retracted – symbol (**3**) **green**.

– The slewing gear is switched on – symbol (**1**) **green**.

– The superstructure is in the rigging area:
  – Symbol (**4**) active,
  – Symbol (**2**) displayed.



Switch on automatic mode

• Select and confirm the symbol (**3**).

Execute automatic mode

• To slew, move the control lever in the displayed direction (**1**) or (**2**) – the automatic mode starts.

  – The superstructure turns into position (**A**).

  – The lifting cylinders are extended (**B**).

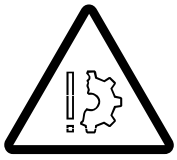
• Release the control lever.

12.8.2 Hook block in the compartment

The hook block or separable hook block, each with 3 or 5 sheaves, can be stored in the compartment for driving.

Risk of overturning while slewing
Always check before slewing whether slewing is permitted in the truck crane's current rigging mode. Correct the rigging mode if necessary;
➠ *Slewing with rigged counterweight*, p. 12 - 80.

Danger of overturning when slewing with an overridden RCL
Do not override the RCL before slewing the superstructure.
Enter an RCL code for the 360° working range if the slewing operation is not released.
This prevents the superstructure from being slewed into impermissible areas and the truck crane tipping over as a result.

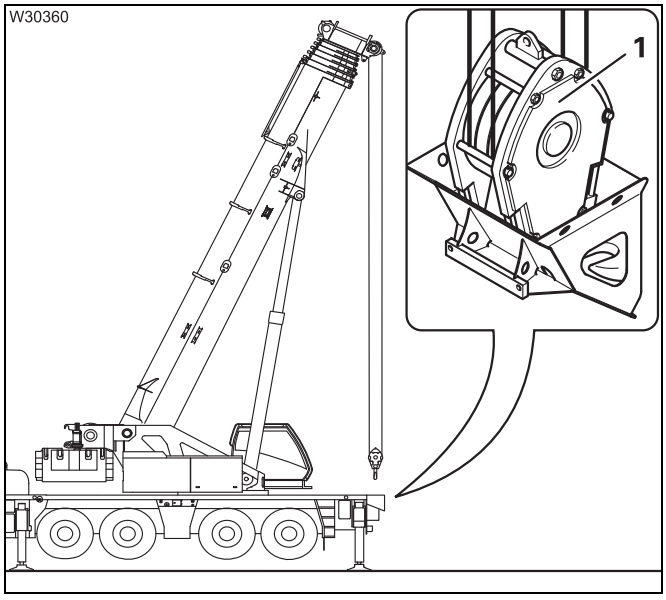


Risk of damage to the hoist rope
To prevent slack rope, do not ease down too much hoist rope when picking up and reeving the hook block!
Slack rope causes rope loops on the hoist drum, which can result in the load slipping and the hoist rope being destroyed.

Prerequisites

– The superstructure is in the position *0° to the rear*.

– The boom head is directly over the hook block.



Picking up the hook block

- Remove the lashing straps.
- Unreel the hoist rope.

– Hook block:

- Reeve the hoist rope into the hook block (**1**);
➠ *Reeving and unreeving the hoist rope*, p. 12 - 92.

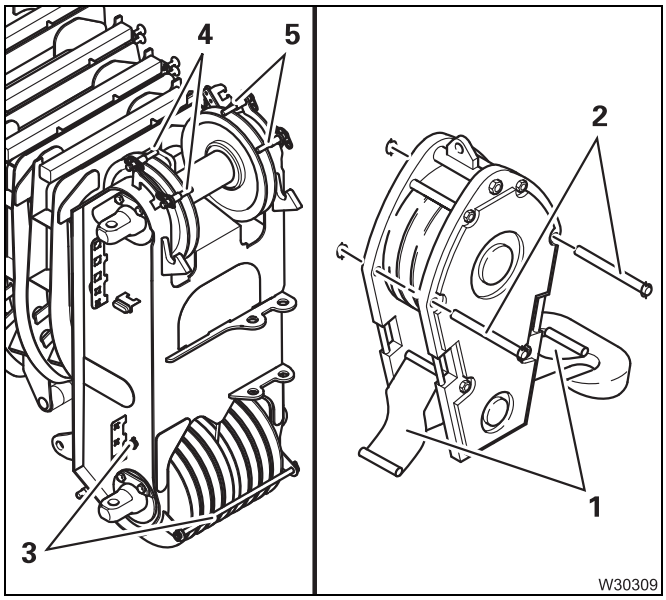
– Hook block, separable:

- Attach the sheave package to the hook;
➠ *Hook block, separable*, p. 12 - 90.
- Lift the hook block out of the holder.

10.09.2015

Reeving the hoist rope

Danger due to slack rope
Only use hook blocks and sling gear of the minimum weight prescribed in the *Lifting capacity table*, depending on the reeving and boom length. This prevents slack rope forming at large heights when lifting without a load. This can result in the load slipping.

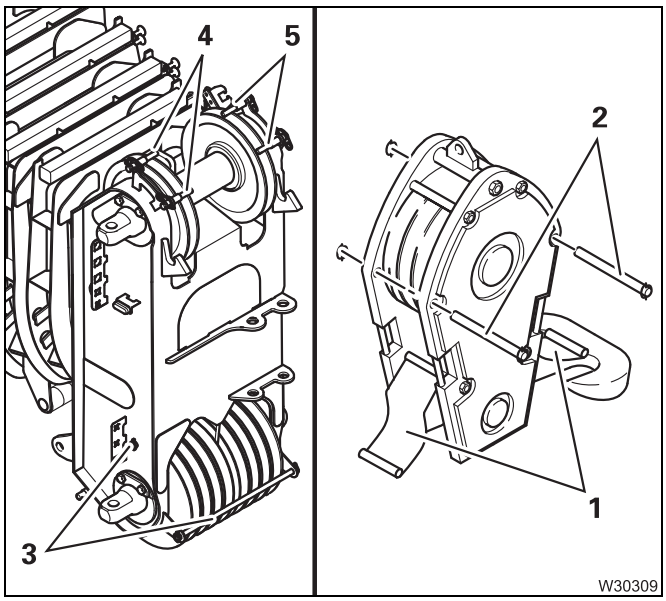


Opening the hook block

- Pull out the rods (**2**).
- Fold down the plates (**1**).

Positioning the hoist rope

- Pull out the rods (**5**).
- Pull out the rod (**3**) and push the bracket (**4**) to the rear. Insert the rod (**3**).
- Pull out the rod (**6**) for the **main hoist rope**.
- Pull out the rod (**7**) for the **auxiliary hoist rope**.



Rope grab

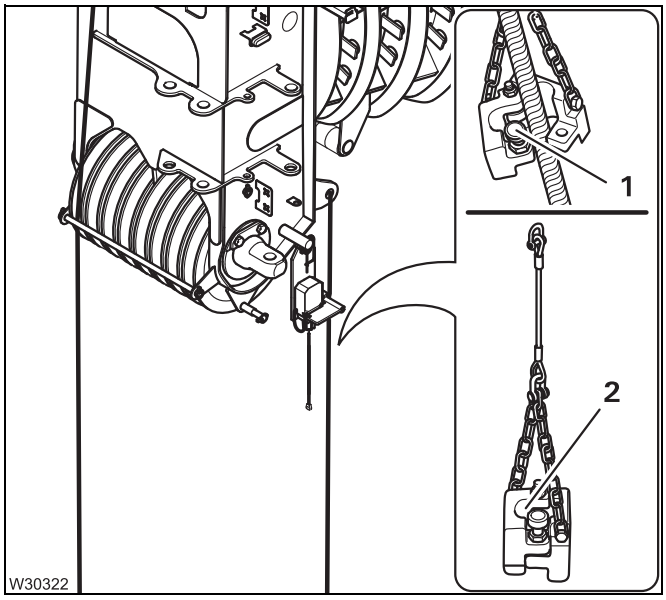
- Feed the main hoist rope (**3**) through under the sheave (**4**).
- Feed the auxiliary hoist rope (**5**) through under the sheave (**4**).
- Feed the main hoist rope (**3**) to the head sheave (**1**).
- Feed the auxiliary hoist rope (**5**) to the head sheave (**2**).

Lay the hoist rope under the sheave (**4**) also when working with the lattice extension.

10.09.2015

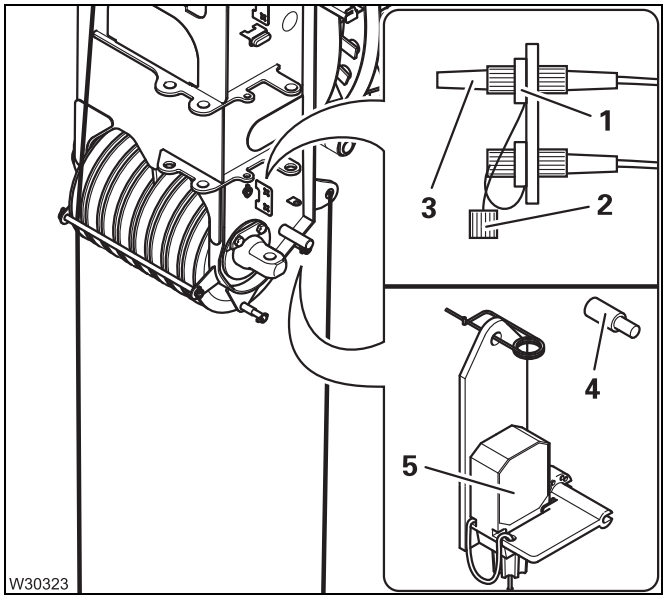
Removing the lifting limit switch

This section describes complete removal.
If the hook block is to be attached to the bumper at a later point, you will need to detach the lifting limit switch weight from the hoist rope, so that you can unreeve or reeve when unrigging the hoist rope. You can place the lifting limit switch weight around the hoist rope again before driving.



Removing the lifting limit switch weight

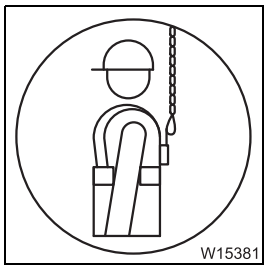
- Pull the safety pin (**1**) out and fold the two halves of the weight apart.
- Remove the halves of the weight from the rope line.
- Pull the safety pin (**1**) out, fold the two halves of the weight back together and let the safety pin engage.
- Remove the lifting limit switch weight (**2**).
- Remove the lifting limit switch weight on the other side too, if necessary.



Removing the left lifting limit switch

- Pull the plug from the socket and close the socket (**1**) with the protective cap.
- Remove the lifting limit switch (**3**) from the clamp (**2**)
- Fasten the retaining pin to the lifting limit switch.

Attaching/ detaching fall prevention safety system to/from safety harness

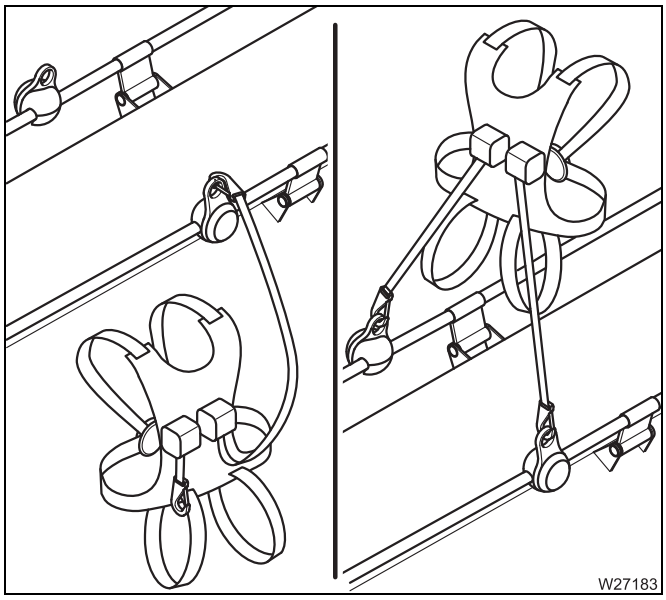


Attachment

All points designed for fastening a fall prevention safety system are marked with a symbol.

- When stepping, observe the following procedure so that you are always secured.

Risk of accidents due to incomplete safety system
Make sure you always attach one line of the fall prevention safety system with the safety harness before stepping onto the main boom.
This will prevent falling due to an incomplete safety system.

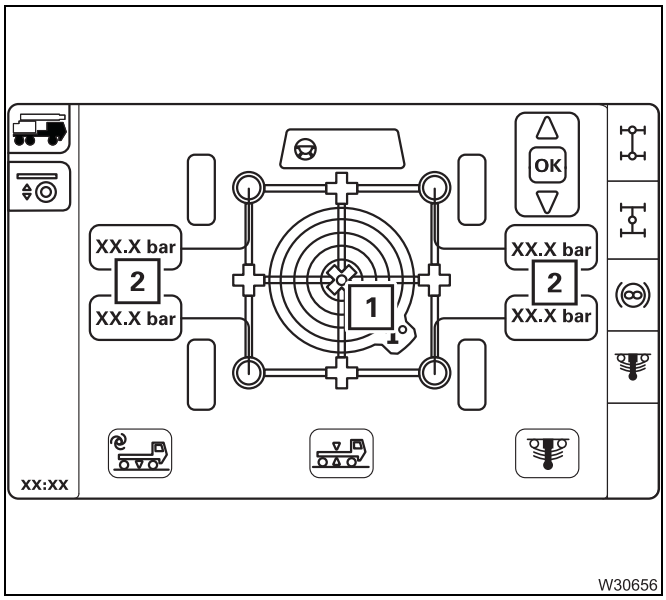


- Always ascend the truck crane using only the ladders and access ladders provided.
- Make sure you always attach one line of the fall prevention safety system with the safety harness before entering the main boom.
- Attach the second line of the fall prevention safety system with the safety harness once you are located on the main boom.

10.09.2015

13 Driving with rigged truck crane

10.09.2015



Warnings while driving

If a buzzer tone sounds in the driver's cab, stop the truck crane immediately and check whether:

– The permissible lateral tilt (**1**) of max. 1°

or

– The suspension operating pressure (**2**) of 210 bar (3,045 psi) has been exceeded.

In this case, you must re-level the truck crane using the Raise axle function as described in the *Putting the truck crane on the wheels* section; ➠ p. 13 - 6.

Danger of overturning by switching on the suspension
The suspension must be deactivated (locked) while the rigged truck crane is on wheels.
Switching on the suspension would cause the suspension cylinders to be suddenly pressed together and damaged, and the truck crane could overturn.

10.09.2015

15 Malfunctions during crane operation

10.09.2015

Designation	Amperage (A)	Function
F6/1	10	Windscreen wiper/washing system
F6/2	15	Cigarette lighter Socket 12 V
F6/3	10	Crane cab spotlight
F6/4	15	Main boom spotlight Spotlight adjustment
F6/5	5	Houselock
F6/6	3	CraneSTAR system
F6/7	3	Remote control
F6/8	5	Camera system

Designation	Amperage (A)	Function
F7/1	3	Rotating beacons
F7/2	5	Diagnostics plug
F7/3	15	Heating control
F7/4	15	Extendable step
F7/5	3	Hoist camera tripod
F7/6	–	Unassigned
F7/7	–	Unassigned
F7/8	–	Unassigned

Designation	Amperage (A)	Function
F8/1	3	VCC perm SCM
F8/2	3	VCC perm SCM 10
F8/3	3	VCC perm SCM IOL 30
F8/4	3	VCC perm SCM IOL 34
F8/5	–	Unassigned
F8/6	–	Unassigned
F8/7	–	Unassigned
F8/8	3	AGND SCM

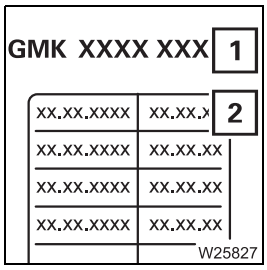
10.09.2015

15.4.14 Troubleshooting the crane control

This section contains general malfunctions that are not indicated on the control units and malfunctions that are indicated by error or information symbols on the control units.

Risk of accidents
Immediately stop operating the crane if an error message is displayed.
The crane control may only be repaired by trained and qualified personnel.

Risk of accident due to overridden or faulty RCL
In the event of a faulty RCL, first try to correct the error with the information in this section. Only override the RCL if it becomes absolutely necessary in order to lower the load in the event of an emergency.
Do not carry out any movements which increase the load moment in the event of a faulty or overridden RCL.
If the RCL is overridden, the crane operations are not monitored and no shutdown procedures are initiated when leaving the working range.



RCL program version

Always note down the number of the program version and the serial number after a malfunction occurs before notifying **Manitowoc Crane Care**.

- Open the main menu, if necessary.

The display (**1**) indicates the serial number of the truck crane.

The display (**2**) indicates the programme version.

General malfunctions

Malfunction	Cause	Solution
RCL not working – dark displays, no buzzer tone	Power supply not switched on	switching on the ignition
	Fuse has blown	Replace blown fuse; ➠ p. 15 - 5.
RCL display dark	Display temperature too high – brightness is reduced automatically	The set brightness is restored after cooling

10.09.2015

Mechanical emergency activation

The following requirements must be met before unlocking manually:

– The main boom must be lowered to the horizontal position so that the telescopic section cannot retract by itself.

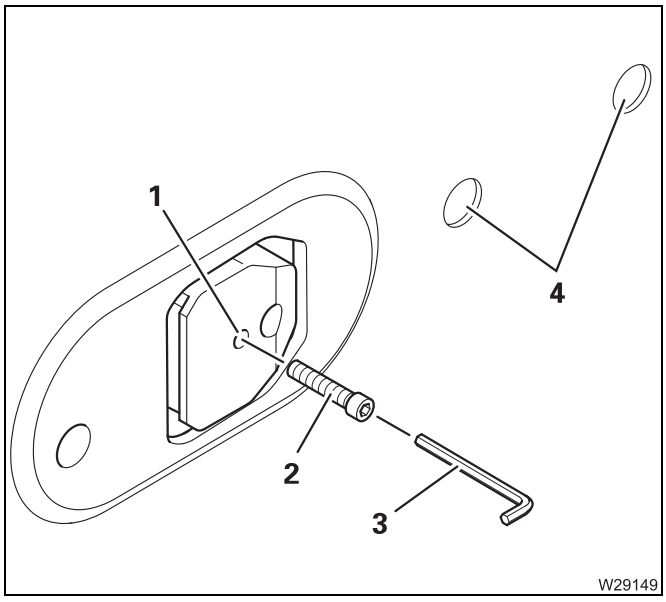
or

– The telescopic section to be unlocked is secured against retracting by itself by using an auxiliary crane. Telescoping is done with the auxiliary crane.

Risk of accident due to sudden retraction of a telescopic section
Before unlocking the telescopic section, secure it against automatic retraction. This prevents the retracting telescopic section from severing one of your limbs or the truck crane from being damaged or overturned by the telescopic section suddenly retracting.

If the telescoping cylinder is positioned at a locking point, the corresponding telescopic section cannot be locked or unlocked manually.

There are two M20 x 100 threaded studs for each telescopic section.



To unlock, the threaded studs (**2**) are screwed into the locking pins (**1**).

Pins located further inside are reached through the holes (**4**).

You will need a suitable socket wrench (**3**), with one shank being at least 200 mm long.

– To unlock, the threaded studs are screwed in.

– To lock, the threaded studs are screwed out.

10.09.2015

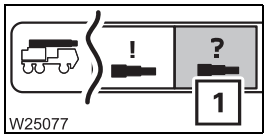
15.5.3 Entering the current telescoping

CCS no longer displays the current telescoping

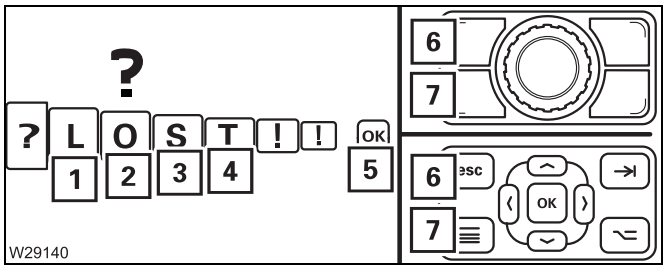
– if you telescoped in emergency mode, or

– if the power supply was interrupted in the course of saving data.

In these cases, you must enter the current telescoping, e.g. the values from the RCL display.



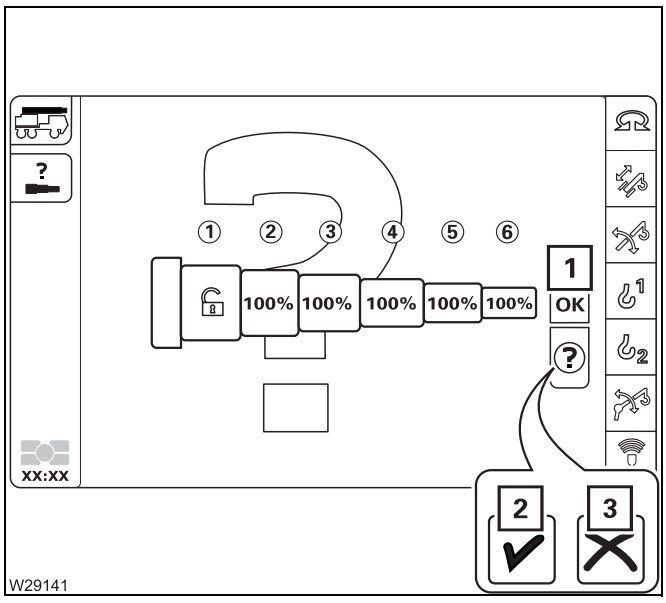
- Select and confirm the symbol (**1**) – the *Unknown telescoping* emergency programme is opened.



- Select and confirm the symbols (**1**) to (**4**).
- Confirm the entry with the symbol (**5**).

You can cancel the entry at any time using the (**6**) or (**7**) buttons.

Once the entry has been made correctly, the submenu *Unknown telescoping* is opened.



Entering target values

- Select and confirm the symbols **1** to **4**.
- Enter the desired target values for all telescopic sections, e.g. unlocked, 100%, 100%, 100%.
- Confirm the entry with the symbol (**1**).

  Display symbol:

  2 Permissible value

  3 Impermissible value

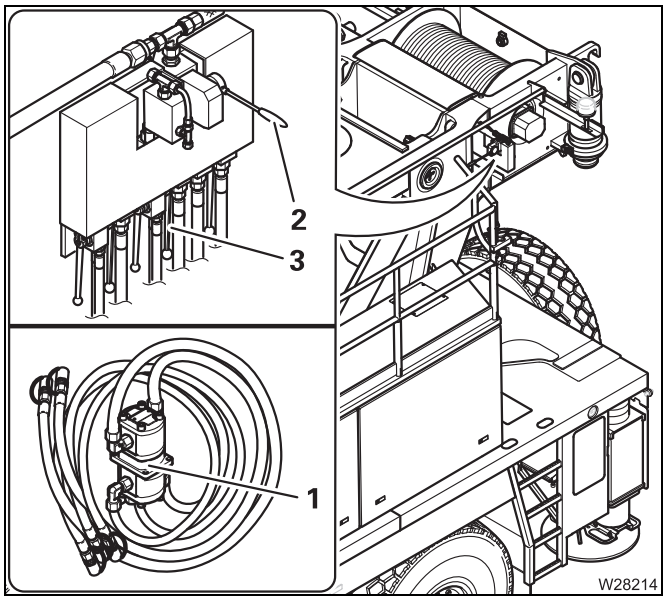
10.09.2015

15.6.3 Operating principle of emergency operation BGR 159

The hydraulic emergency operation BGR 159 enables:

– **Emergency operation** of the main hoist, derricking gear, and slewing gear

– **Emergency supply** of another truck crane that also has a hydraulic emergency operation BGR 159.

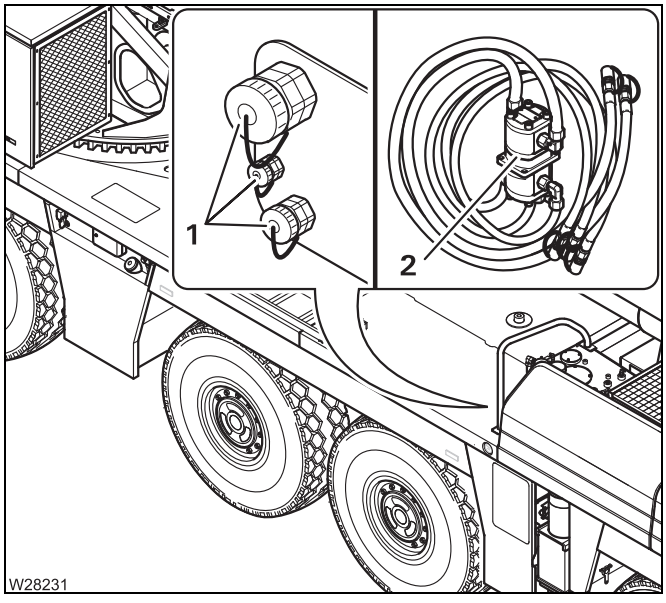


Emergency operation

A transformer (**1**) serves as a power source for the crane's hydraulic system. The transformer is powered by the carrier's hydraulic system or by the emergency supply of another truck crane.

The hydraulic circuits are switched with the valves (**2**).

The control levers (**3**) are used to control the direction of movement and the speed.



Emergency supply

When using an emergency supply, the connections (**1**) feed a transformer (**2**) that is connected to the hydraulic system of the other crane; ➠ *Emergency supply of another crane*, p. 15 - 60.

10.09.2015

15.6.8 After emergency operation

You must restore the truck crane to its original state after finishing emergency operation.

Switching off emergency operation

- Switch off the engine.

Switching over to crane operation

After every emergency operation

- Switch valves **1** to **5** to crane operation; ➠ p. 15 - 53.

Also after lifting/lowering

- Switch off continuous operation on the valves Y1105 and Y1104; ➠ p. 15 - 55.

Also after slewing

- Open the valve **6**; ➠ p. 15 - 56.

Disconnecting the hoses

- Disconnect the hoses; ➠ p. 15 - 51.
- Close all the connections and hoses with the caps.
- Remove the transformer.

10.09.2015

10.09.2015