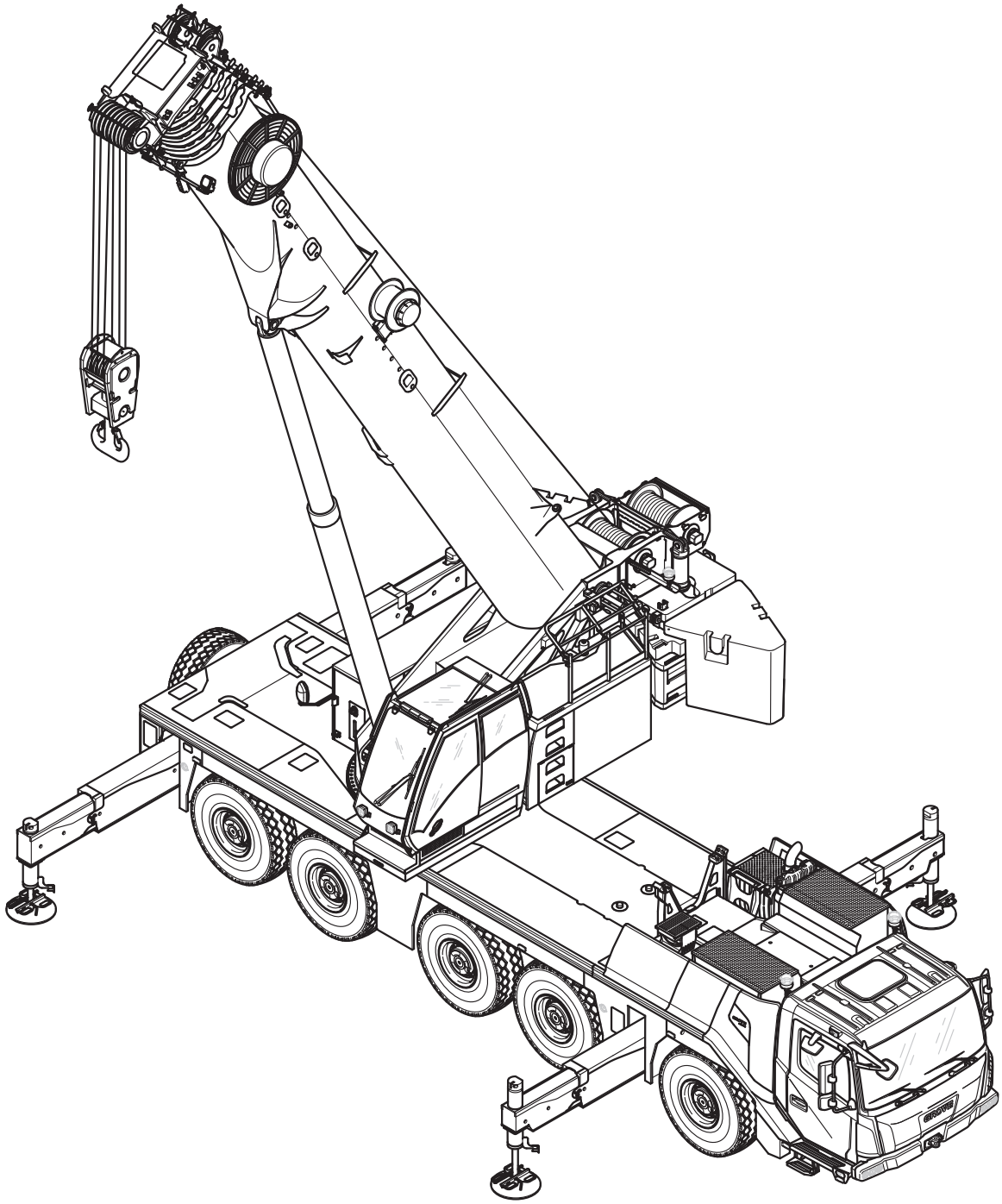
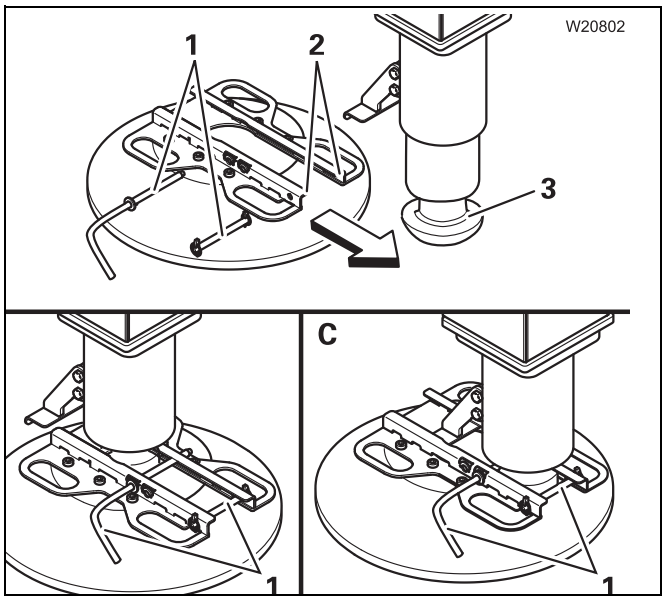
Operating Instructions



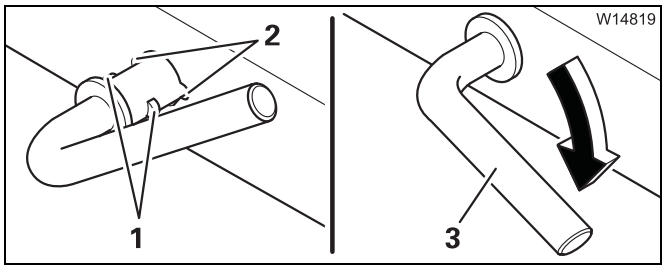
3 302 557 en
19.04.2017

Attaching the outrigger pads

After mounting the outrigger beam, you must attach the outrigger pad.



- (**A**) – Remove the pin (**1**).
- Extend the outrigger cylinder far enough so that the bearing surface (**3**) is below the guide (**2**).
- Push the outrigger pad onto the outrigger cylinder.
- Move the outrigger pad into required position.
  - On site, move it to the working position (**B**).
  - If you need to drive to the site, in driving position (**C**).
- Insert the pins (**1**) and secure them.



Securing pins

- Plug the pin with the peg (**1**) through the cutout (**2**).
- Turn the grip (**3**) downward.
- Position the other outrigger pads in the same way.

02.08.2017

1.13 Note on error messages with removed outrigger beams

Depending on the outrigger beam, the following error messages can occur after removal.

5801.x.xx.x	5802.x.xx.x	5803.x.xx.x	5804.x.xx.x
5806.x.xx.x	5807.x.xx.x	5808.x.xx.x	5809.x.xx.x

The error messages indicate only that the electrical connection between the outrigger beams and the crane control is disconnected. They have no further effect on driving.
The error messages are displayed in the driver's cab on the *CCS* display until the outrigger beams are reinstalled.

1.14 Technical data

Designation	Diameter x Height in m (ft)	Weight in kg (lbs)
Plastic outrigger pad diameter	0,50 x 0,16 (1,64 x 0,52)	25 (55)
Steel outrigger pad diameter	0,50 x 0,16 (1,64 x 0,52)	50 (110)
Front outrigger[1)], complete per packet	2,80 x 0,30 x 1,10 (9,20 x 1,00 x 3,60)	950 (2 100)
Rear outrigger[1)], complete per package	2,80 x 0,35 x 1,10 (9,20 x 1,15 x 3,60)	1050 (2 315)

1) Consists of two sets

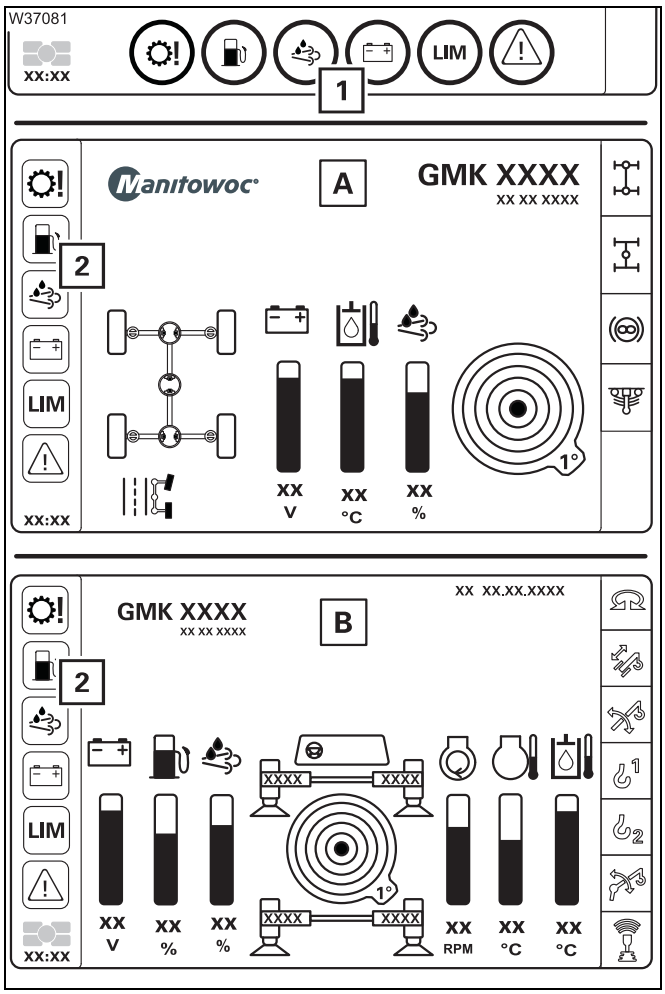
02.08.2017

CCS display
Menu changes

Depending on the program version, menus are displayed differently, deviating from the specifications in the *operating manual*, and there are additional displays.

Start menus

The specifications in this section apply for crane types GMK3060 / GMK4100L-1 / GMK5150 / GMK5150L / GMK5180-1 / GMK5200-1/ GMK5250L.



Depending on the program version, new start menus are displayed.

(**A**) – Start menu in the driver's cab

(**B**) – Start menu in the crane cab

The operating manual supplied describes the start menus with a display area (**1**).

These symbols are displayed in the new start menus in the display areas (**2**) and therefore, are immediately visible regardless of the menu opened.

All other displays are arranged differently, yet the function corresponds to the specifications in the *operating manual* supplied.

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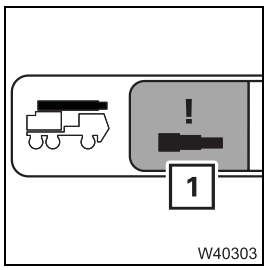
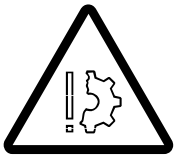
Telescoping emergency programme

Return run of the telescoping cylinder

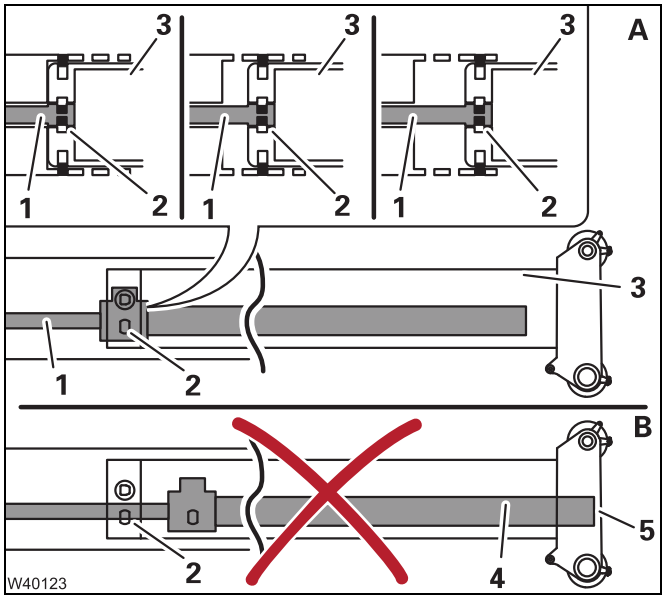


In the *Operating manual* supplied, it is noted that special care must be taken when telescoping in the emergency programme (**1**), as no automatic monitoring takes place.

If you move the telescoping cylinder without a telescopic section (return run), please also note all the information in these additional pages.



Risk of damage during return run of the telescopic cylinder!
Always stop extending once the locking point on the foremost telescopic section has been reached.
This prevents damage to the boom system through a collision between the telescoping cylinder and the main boom head.



(**A**) – These specifications apply to the foremost telescopic section (**3**) – on all fixed lengths.

- Always stop extending the telescopic cylinder (**1**) once the locking point (**2**) on the foremost telescopic section (**3**) has been reached.

  There is no automatic shutdown.

(**B**) – If you move too far past the locking point (**2**), the cylinder tube (**4**) will hit the main boom head (**5**) at the front.

This can lead to damage which makes telescoping the main boom head no longer possible.

31.08.2018

(A) – Carrier

1 Driver's cab
2 Boom rests
3 Counterweight platform
4 Axle lines
5 Outrigger beams
6 Outrigger cylinders
7 Outrigger pads

(B) – Superstructure

8 Slewing gear
9 Crane cab
10 Main boom with telescoping mechanism
11 Telescopic sections
12 Hook block
13 Derricking cylinder, derricking gear
14 Telescoping cylinder
15 Turntable
16 Counterweight
17 Main hoist
18 Auxiliary hoist[1)]

[1)] Additional equipment

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Electrical system

Alternator:	28 V/100 A
Batteries:	2, each of 12 V/180 Ah
Voltage:	24 V

Tool

1 tool kit in tool box,
wheel chocks (number according to national regulations)

Towing coupling

Front towing coupling:	100 kN (22,480 lbf) permissible tension[1)]
Rear tow lug:	75 kN (16,860 lbf) permissible tension[1)]

[1)] Only permissible at certain tension angles; ➠ p. 5 - 66

Driving speeds

At an engine speed of 1,700 rpm

Forwards:	max. 80.0 km/h (49.7 mph)
Reverse:	approx. 6 km/h (3.7 mph) depending on the tyres

Climbing ability

Transport weight 60 t (132,277 lbs)

Drive	Climbing ability with tyres		
	385/95 R25	445/95 R25	525/80 R25
8 x 6 x 8 or 8 x 8 x 8	76%	68%	68%

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1.7.3 How do I find the information I need?

The operating manual contains the following guides for orientation.

– The **Contents** lists all chapters in the operating instructions.

– The **Table of contents** provides an overview of the topics.

– The **Index** in chapter **15** gives an alphabetic list of keywords and search terms with a reference to the relevant page in the operating manual.

– Cross-references are labelled with an arrow (➠) and refer to other pages in the operating instructions. These pages contain more detailed information, or information that relates to the topic in question.
Furthermore, you can use the cross-references to systematically familiarize yourself with general to specific information on the truck crane or look up the functioning of individual elements.

The following pages give an example of how to use the cross-references.

19.04.2017

2 Basic safety instructions

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2.5 Safety instructions for crane operation

Carefully select a safe site for the truck crane, where you can work safely.

Walk around the truck crane and inspect it before beginning crane operation. Check the condition of the truck crane carefully using the checklists in the operating manual. Do not assume everything is in working order simply because it was in working order at the end of the last shift.

Check daily that all covers and safety devices are fitted properly and are in good condition before crane operation.

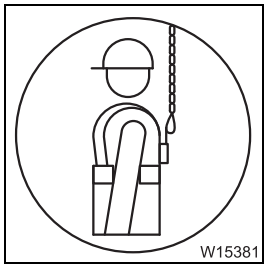
If necessary, remove any ice and snow from the truck crane before commencing crane operation.

Check the safety devices (RCL, lifting limit switch, dead man's switch, emergency stop switches) every day before you start work.

Use the appropriate access aids when carrying out overhead rigging or maintenance work. Do not use parts of the crane as access aids.

Walk on only those parts of the truck crane which are equipped with appropriate step grids and railings and therefore guarantee safety.

Use a suitable safety harness when walking on other surfaces – this also applies to sanded surfaces.



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

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3 Operating elements for driving

All operating elements for crane operation are described in Chapter 9.

3.1 Overview of the operating elements

This section shows the position and designation of the operating elements for driving. This also includes display elements such as lights or displays.

Operating elements available only with additional equipment are designated accordingly. These designations are made in this section only and are not repeated in the following sections.

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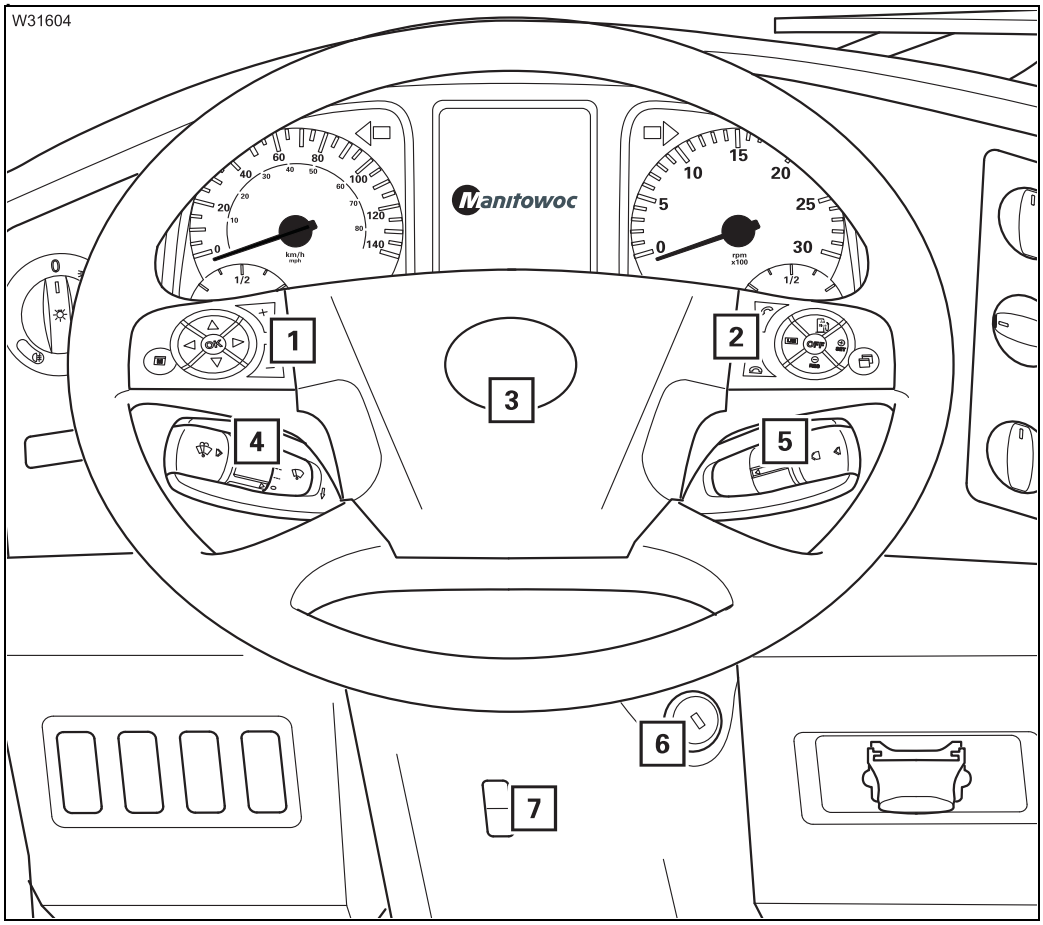
3.1.3 Steering column/steering wheel



1 Operating the on-board computer ➠ p. 3 - 74

2 Operation:
- Adjust idling speed ➠ p. 3 - 46
- Setting cruise control ➠ p. 3 - 47
- Setting the Temposet ➠ p. 3 - 47
- Engine retarder/transmission retarder[1)] ➠ p. 3 - 61
- Hands-free unit[2)]

3 Horn

4 Headlight flasher/headlight – full beam ➠ p. 3 - 67
Turn signal indicator/wiper-washing system ➠ p. 3 - 67

5 Transmission operating elements ➠ p. 3 - 16

6 Ignition lock ➠ p. 3 - 46

7 Steering column, adjusting ➠ p. 5 - 15

[1)] Additional equipment

[2)] Suitable radio required

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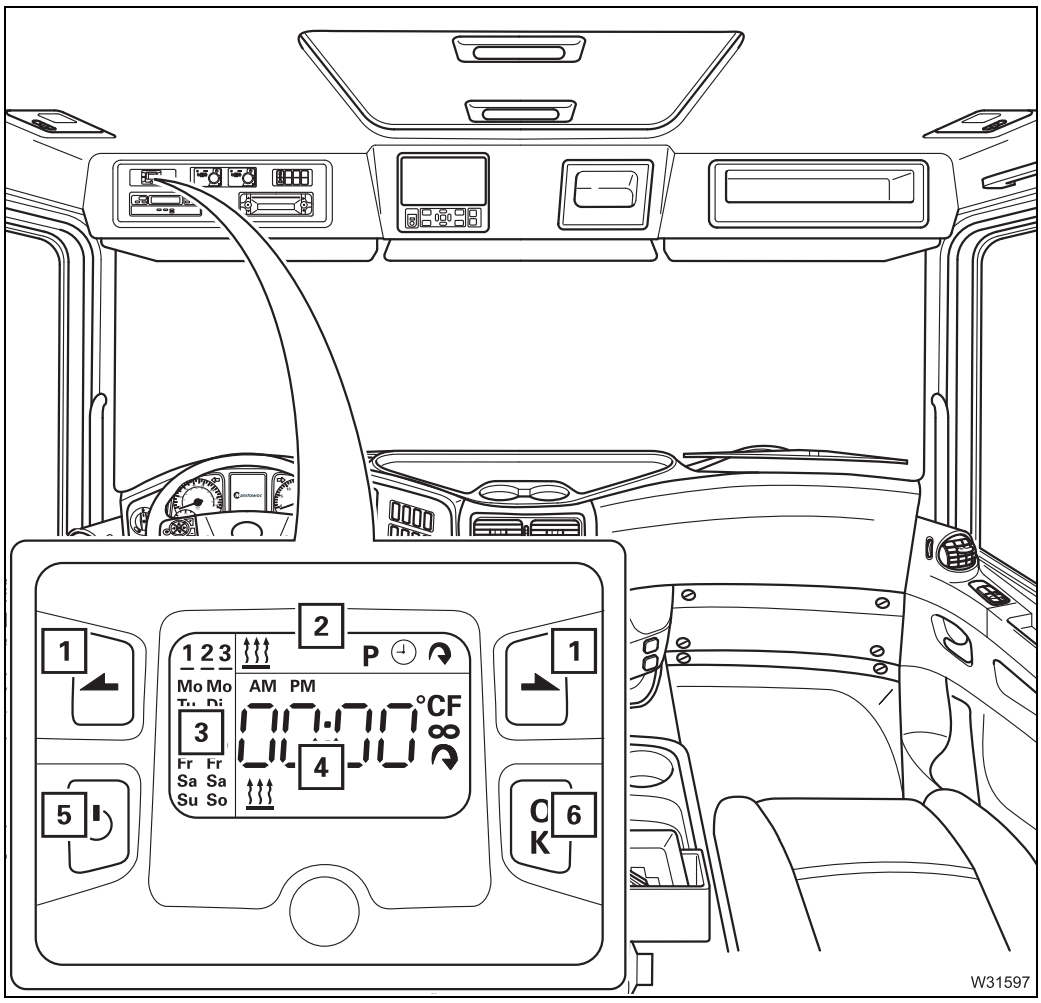
Auxiliary air heater



1 Selecting a function p. 5 - 85

2 Menu line

3 Program column

4 Display line

5 – Switching on p. 5 - 85
– Switching off p. 5 - 89

6 Confirming the entry p. 5 - 85

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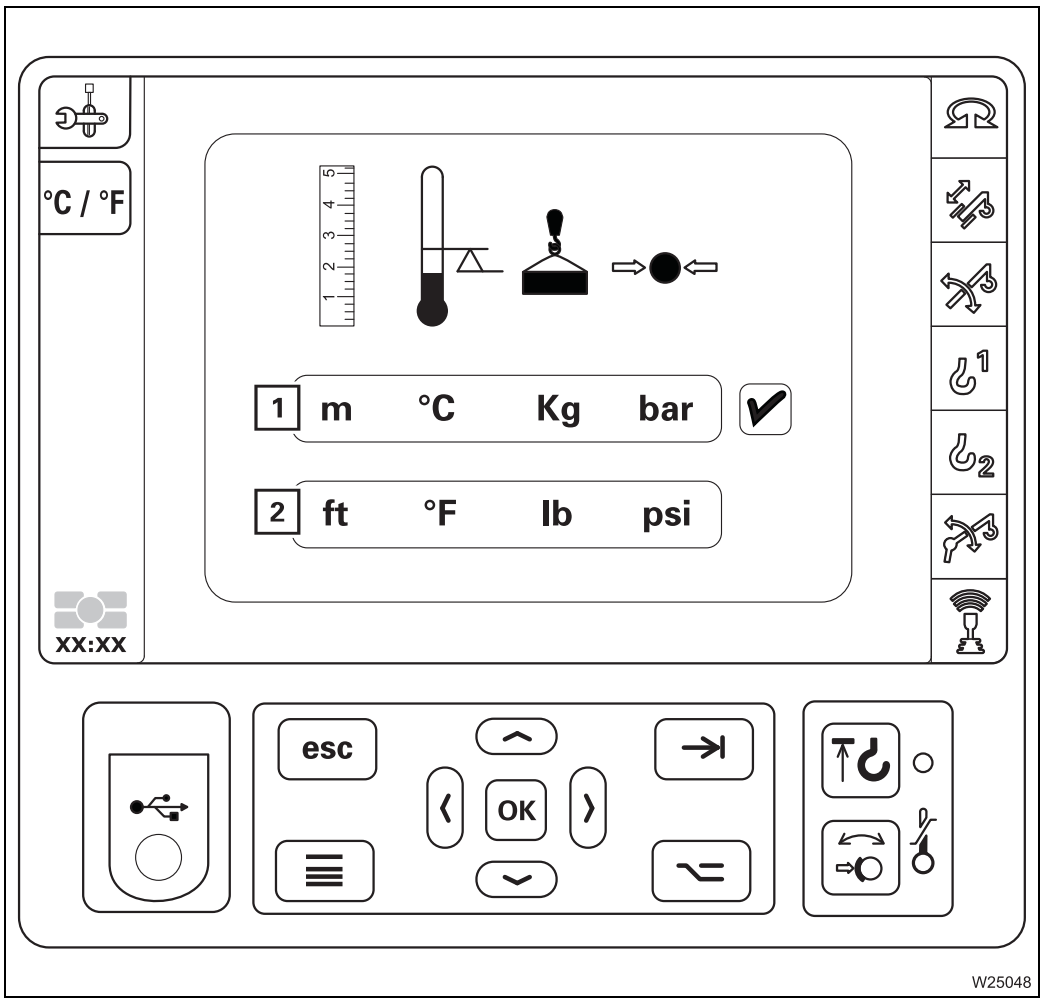
Switch units menu



1 Display units in: ➠ p. 5 - 72
- Metres
- Degrees Celsius
- Kilograms
- Bar

2 Display units in: ➠ p. 5 - 72
- Feet
- Degrees Fahrenheit
- lbs
- Psi

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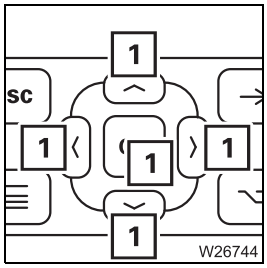
3.2.3 Crane control CCS

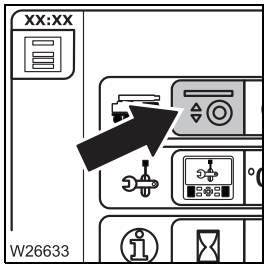
The GMK5150L truck crane is equipped with the **CCS** electronic crane control system (**C**rane **C**ontrol **S**ystem). CCS includes a control unit in the driver's cab and several control units (MWSCM and MWCCM) distributed over the superstructure and carrier.



Menu control

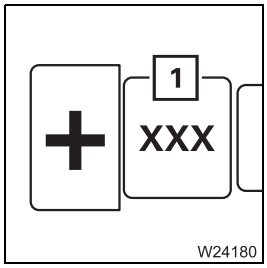
1 For marking and activating areas. The function of the buttons is different depending on the area and menu

There are three different areas.



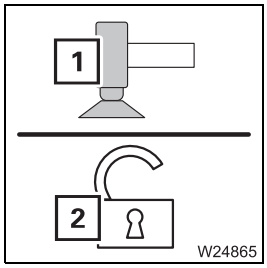
Menu area

– For opening menus and sub-menus.
One symbol is always selected.



Input area

– Selecting and confirming values.
A field (**1**) with numbers or letters is marked.



Operation area

– For carrying out movements during rigging.
The required element is marked e.g. outrigger cylinder (**1**).

– For turning on/off and switching
A symbol for a status is marked, e.g. symbol (**2**).

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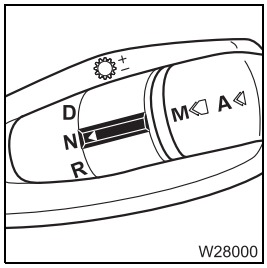
3.2.8 Transmission

➠ *Operating the transmission*, p. 5 - 25.

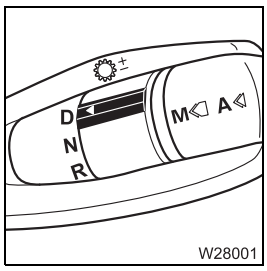
Transmission control unit

Selecting the transmission mode

The engine must be running.

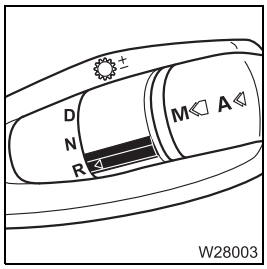


– Position N: Select neutral – No gear engaged



– Position D:

When at a standstill –	Select forwards starting gear
When driving forwards –	Select a suitable gear, clutch engages
When driving in reverse –	Select neutral position



– Position R:

When at a standstill –	Select reverse starting gear
When driving in reverse –	No gear change
When driving forwards –	Select neutral position

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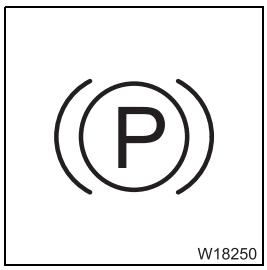


Parking brake indicator lamp

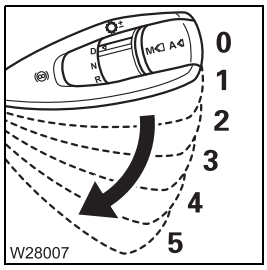
– **On:** Parking brake applied
– **Off:** Parking brake released

Additional brakes

Engine retarder/transmission retarder
➠ *Additional brakes*, p. 5 - 43

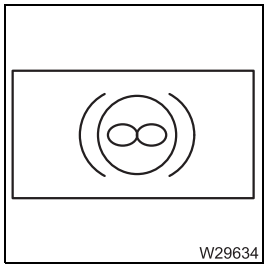
Multipurpose switch

The braking force is the smallest in position (**1**) and the greatest in position (**5**).



0 Forward: Engine retarder and transmission retarder off
1 Back: Engine retarder
2 Back: Engine retarder
3 Back: Engine retarder
4 Back: Engine retarder and transmission retarder
5 Back: Engine retarder and transmission retarder

Instrument panel



Additional brake indicator lamp

– **On:** Additional brake on
– **Off:** Additional brake off
– **Flashing:** – Ignition on – Multipurpose switch not in position **0**
– Engine is running – retarder power reduced

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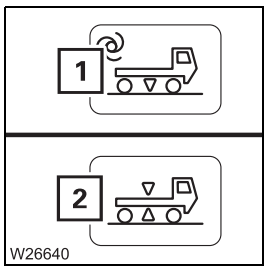


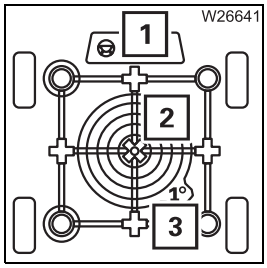
Adjust the on-road level

The suspension must be switched on.

1 Select and confirm – level is changed until the on-road driving level is reached.

2 On-road driving level reached

➠ p. 5 - 62



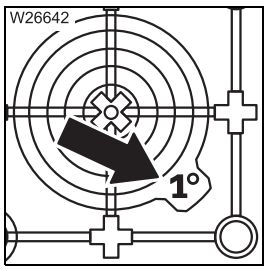
Current inclination display

1 Directional indicator

2 Inclination indicator

3 Measuring range display

➠ p. 5 - 63



Switching over the measuring range

The current measuring range 1° or 5° is displayed – changeover automatic

➠ p. 5 - 63

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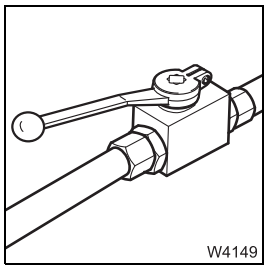
4 Starting/switching off the engine – for driving

4.1 Starting the engine from the driver's cab

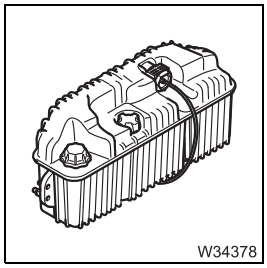
This section describes how to start the engine from within the driver's cab. You can also start the engine from the outrigger control units; ➠ p. 12 - 27.

4.1.1 CHECKLIST: Starting the engine

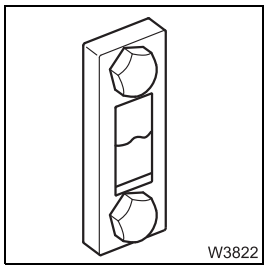
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions there!



1. Check that the valves on the hydraulic tank are open; ➠ p. 4 - 10.



2. Check the coolant level of the engine; ➠ *Maintenance Manual*.



3. Check the oil level in the hydraulic system; ➠ *Maintenance Manual*.

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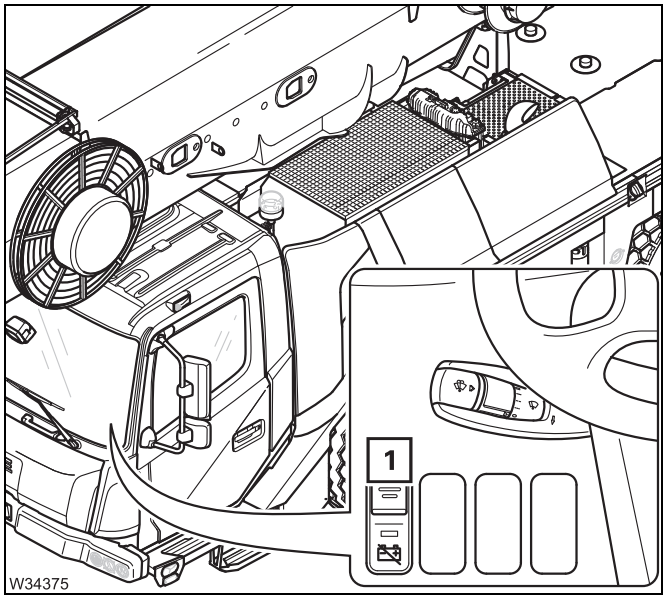
Battery master switch

You can only start the engine when the battery master switch is switched on.

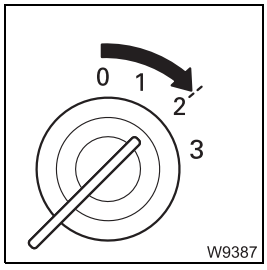


- Press switch (**1**) up – the battery master switch will be switched on.

Checking the hand-held control

Check that the hand-held control has been removed, and that bridging plugs for the hand-held control are inserted into all sockets; ➠ p. 9 - 75.

4.1.6 Switching on the ignition



- Insert the ignition key into the ignition lock and turn the key to position **2**.

After switching on the ignition, a lamp test is performed and switching states are aligned.

Do not start the engine until the main menu is displayed.

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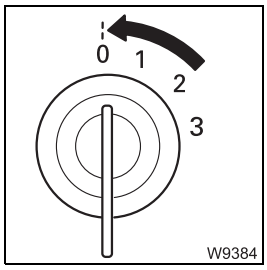
4.2 Switching off the engine

4.2.1 At the ignition lock and with the outrigger control units

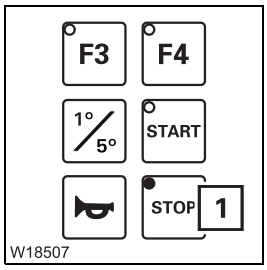
Risk of accidents because the truck crane cannot be steered!
Switch the engine off only once the truck crane has come to a standstill. If you remove the ignition key, the steering will lock and you will lose control of the moving truck crane.

If the temperature of the coolant is very high, let the engine run on for another one or two minutes at increased idling speed.



Ignition lock

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



Outrigger control units:

- Press the button (**1**) – the engine will switch off.

After turning off If you want to park the truck crane; ➠ p. 5 - 53.

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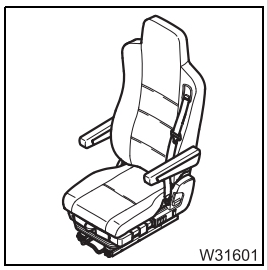
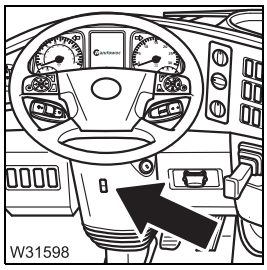
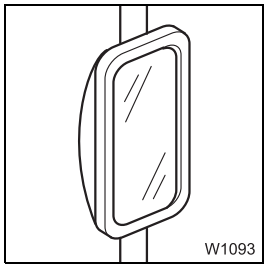


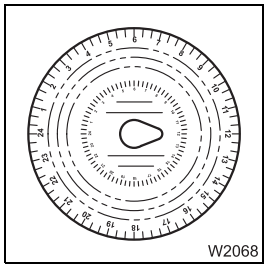
19. Adjust the driver's seat; ➠ p. 5 - 13.



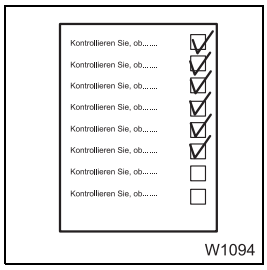
20. Adjust the steering column; ➠ p. 5 - 15.



21. Adjust the mirrors; ➠ p. 5 - 7.



22. Set the tachograph, insert the diagram sheet; ➠ p. 5 - 18.



23. Start the engine and carry out all checks; ➠ *Inspections after starting the engine*, p. 4 - 16.

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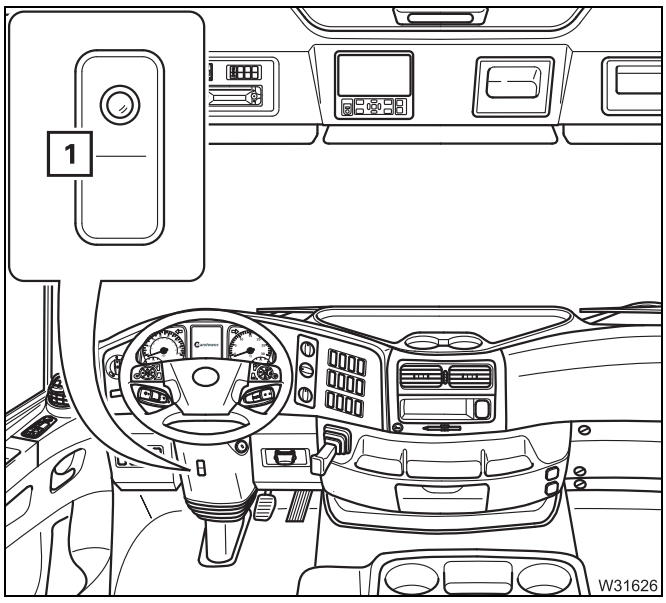
Steering column, adjusting

The steering column is unlocked pneumatically.

Risk of accidents by unlocked steering column!
Always stop the truck crane before you unlock the steering column.
Once the steering column is unlocked you can no longer steer safely.

The steering column can be unlocked only when sufficient supply pressure has been built up in the secondary consumer circuit; ➠ *Building up supply pressure*, p. 5 - 10.



- Push the button (**1**) down once. The steering column is unlocked for approx. 6 seconds.
- Move the steering column into the desired position.
- Press the button (**1**) up once.
  Or wait until the steering column locks automatically (after approx. 6 seconds).

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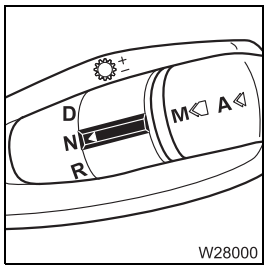
5.2 Operating the transmission

The transmission automatically controls all gear changes. Despite this, gears can be changed manually at any time.

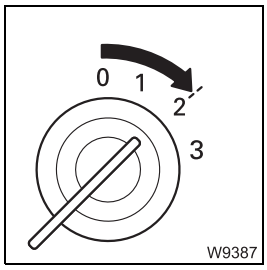
5.2.1 Switching on



When the ignition is switched off, the transmission must always be in the neutral position N.

- Shift to position **N**.

If you switch on the ignition in positions **D** or **R**, malfunctions may occur.



- Switch on the ignition.

The electronic gear system is switched on, and a warning buzzer sounds for several seconds.

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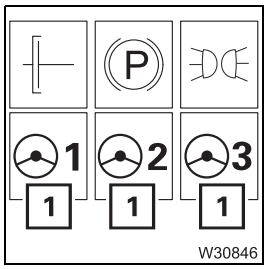
5.3 Driving and turning off the truck crane

Risk of accidents because the truck crane cannot be steered!
Never switch off the ignition or remove the ignition key while the truck crane is moving!
This precaution prevents the steering from locking and consequent loss of control of the moving truck crane.

Risk of accident when the ignition is switched off!
Never switch off the ignition while driving.
After switching off the ignition the 4th and 5th axle lines are brought into forward alignment and can no longer be moved.
This changes the turning radius of the truck crane.

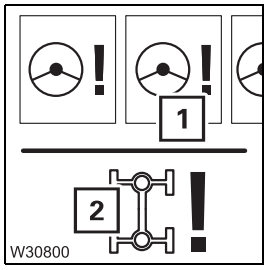
5.3.1 Checks while driving

Immediately after you start to move



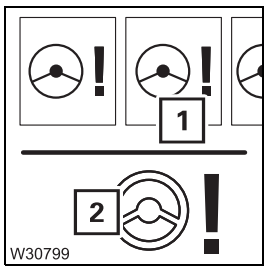
- Check the service and parking brakes for correct functioning immediately after starting out.
- Check the lamps (**1**).

At speeds above 10 km/h (6 mph) **all** the lamps **must** go out. If a lamp does not go out, this indicates a malfunction in the steering.



– The lamp (**1**) lights up when an error is detected in the steering system – the symbol (**2**) is shown. The 4th and 5th axles are brought into the straight running position and can no longer be steered. It is possible to continue driving. Steering is now only possible with the 1st and 3rd axle lines – the turning radius increases accordingly.

- Have the error rectified as soon as possible.



– The lamp (**1**) lights up when a serious malfunction is detected in the steering system – the symbol (**2**) is shown. The 4th and 5th axle lines can longer be steered in a controlled manner.

- Stop the vehicle as soon as possible. Briefly switch the ignition off then on again. If the lamp is still lit, contact **Manitowoc Crane Care**.

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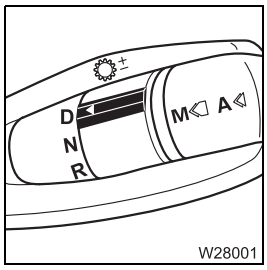
5.3.5 Driving uphill

Starting

The engine must be running.

Danger of the truck crane starting to roll away unexpectedly!
When starting to move forwards, always keep the truck crane stationary with the parking brake until the transmission is engaged. If the truck crane starts to roll away before this (when changing from brake pedal to accelerator), no gear will be engaged, and you can stop the truck crane only by braking.



To **start moving forwards** you must do the following:

– Shift into **D** position,

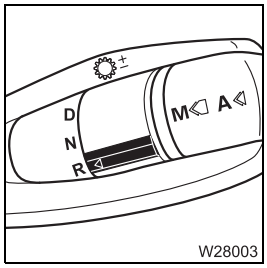
– Apply the parking brake,

– Press the accelerator,

– Release the parking brake after the clutch has engaged.

Pay attention to any messages appearing on the on-board computer display when starting driving; ➠ p. 5 - 47.

• Follow the instructions that are displayed and perform the specified measures in good time.



To **start reversing** you must do the following:

– Shift into **R** position,

– Release the parking and service brakes,

– Apply the accelerator if you wish to accelerate,

– Do not apply the accelerator if you wish to brake with the engine.

Driving

On certain gradients, the transmission may switch continuously back and forth between two gears. In this event, either release the accelerator slightly or downshift by one gear.

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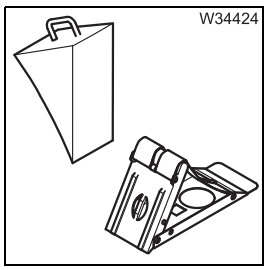
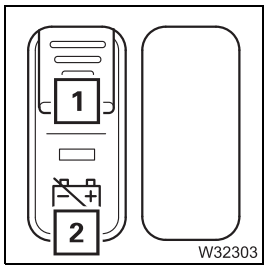


Additional chocks can be transported in the storage compartment on the turntable or at the rear of the truck crane.

When stationary for more than 8 hours

- Switch off all current consumers, e.g. auxiliary heaters.
- Switch the engine off.

In order to prevent malfunctions, you should switch the battery master switch off only when the engine has been switched off.



- Slide the guard (**1**) downwards and push the switch underneath it (**2**) in – the battery master switch is now off.

Securing the truck crane against unauthorised use

- Secure the truck crane against unauthorised use by:
  - Stowing away the hand-held control in the crane cab or in the driver's cab,
  - Removing the ignition key and
  - Locking the driver's cab and the crane cab

Danger due to unauthorised use!
Always stow away the hand-held control in the crane cab or in the driver's cab before leaving the truck crane and lock the doors.
This way you can prevent unauthorised persons from starting the engine with the hand-held control.

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5.4.4 Freeing an immobilized truck crane

Rocking the truck crane free

If the truck crane is stuck in terrain, you can try to free it by driving back and forth (rocking it free):

If you are trying to rock the crane free, you should switch on the transverse differential locks and the longitudinal differential lock.

- Switch to transmission mode **D** or **R**.
- Select a smaller starting gear with the gearshift lever.
- Press the accelerator as far as possible.
- Start driving as far as you can as high as possible.
- Release the accelerator. The transmission declutches disengage.
- Let the truck crane roll in the opposite direction as far as it will go.
- Start driving, again to the highest point.
- Repeat driving and letting the truck crane roll back until it has rocked itself free.

It is not helpful to switch between transmission mode **D** and **R**, as switching to **R** is only performed when the truck crane is stationary – and takes a few seconds. You would not be able to take advantage of the momentum generated by the change of direction.

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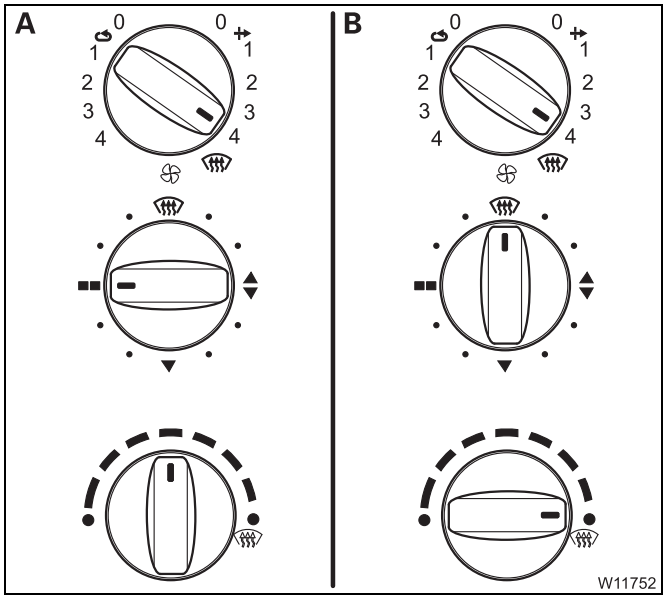
Examples

This section only contains examples of the settings.
Always adjust the setting to the current conditions (warm, cold, damp).



(A) – Ventilate

– Turn the switches to the positions shown.

– If necessary, open the air vents for the side and centre.

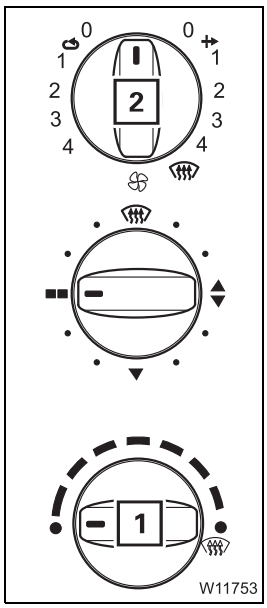
– If necessary, open the push-up roof; p. 3 - 75.

(B) – Defrosting the windscreen

– Turn the switches to the positions shown.

– Close the air vents for the side and centre.

Switching off



Switching off the heating system

• Turn the switch (**1**) as far as it will go in a counter-clockwise direction, to *Cold*.

Switching off the ventilation

• Turn the switch (**2**) to the level 0.

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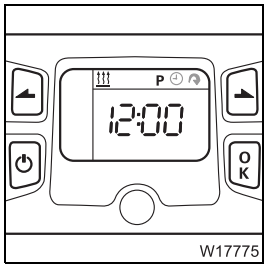
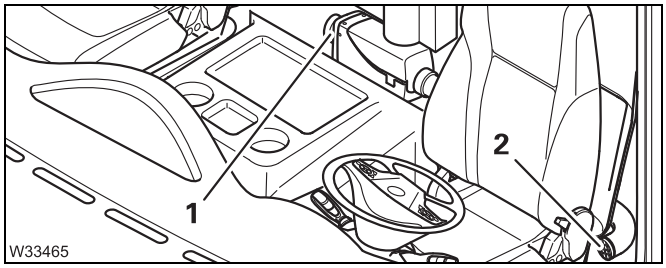
5.6.4 Auxiliary air heater



You can use the auxiliary heating to preheat the driver's cab or provide additional heating.
The auxiliary heater is supplied from the fuel tank.

The batteries will be drained 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!



Do not cover the openings for the air intake (**1**) and air outlet (**2**).

Switching on

- Before switching on the heating system, check whether it is allowed to be operated at the current location 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. carbon dust, wood dust and grain dust).

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

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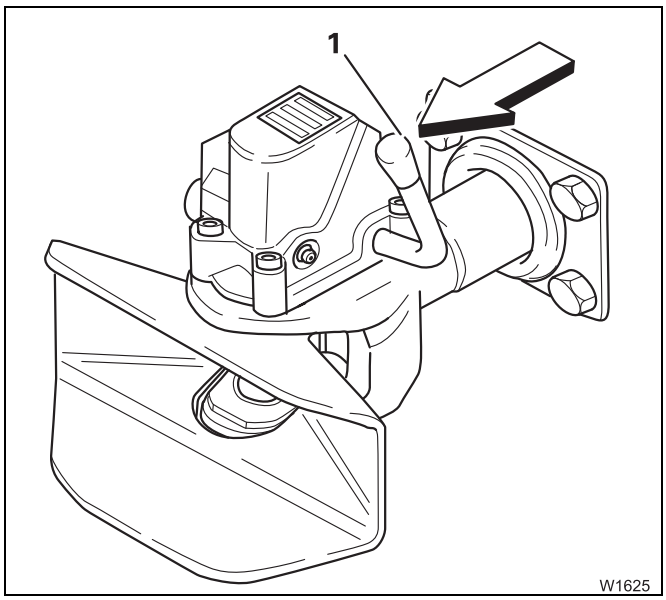
Risk of injury when manually closing the towbar coupling!
When closing, the lever moves down with great force in the direction of the coupling jaw. Start the closing process only by moving the lever briefly in the direction of the coupling jaw with the ball of your hand.
If you hold the lever and move it down, it may carry your hand with it and crush it.



If no trailer is connected, you must close the towbar coupling by hand. Proceed as follows:

- Hammer the lever (**1**) briefly in the direction of the coupling jaw (observe the arrow).

The lever swings downwards and the towbar coupling is closed.

Risk of injury when the automatic closing device is triggered!
Always close the coupling if no trailer is connected. This prevents people from being injured by the automatic closing device being activated unintentionally.

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6.2 Weighing the truck crane

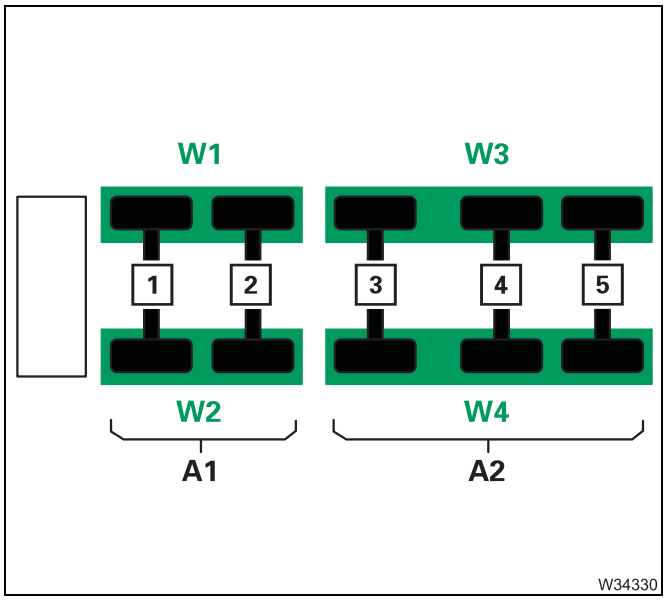
Weighing error

The most precise method for determining the total weight of the GMK5150L is to use calibrated scales of appropriate capacity and a weighbridge on which all the wheels of the truck crane can stand at the same time.

All other weighing procedures are subject to various factors which can lead to weighing errors. This Operating Instructions describes a procedure by which the greatest number of sources of weighing errors can be avoided. Also observe all the instructions provided by the manufacturer of the scales.

Defective measurement of the axle loads and total weight.
When determining the axle loads and total weight, **do not** use individual dial scales. If individual dial scales are used to weigh a truck crane, this will lead to incorrect, unreliable measurement results.

If multiple individual scales are used, allowance must be made for the fact that the axle groups are hydraulically coupled. For this purpose, you will need wheel load scales of sufficient capacity and size.



– Determining the total weight
The weights of all the axle groups belonging to the crane must be recorded at the same time in a single weighing procedure. In addition, only one set of scales may be used per axle group on each side of the vehicle. The GMK5150L has two coupled axle groups (**A1** to **A2**) and you will require four wheel load scales (**W1** to **W4**).

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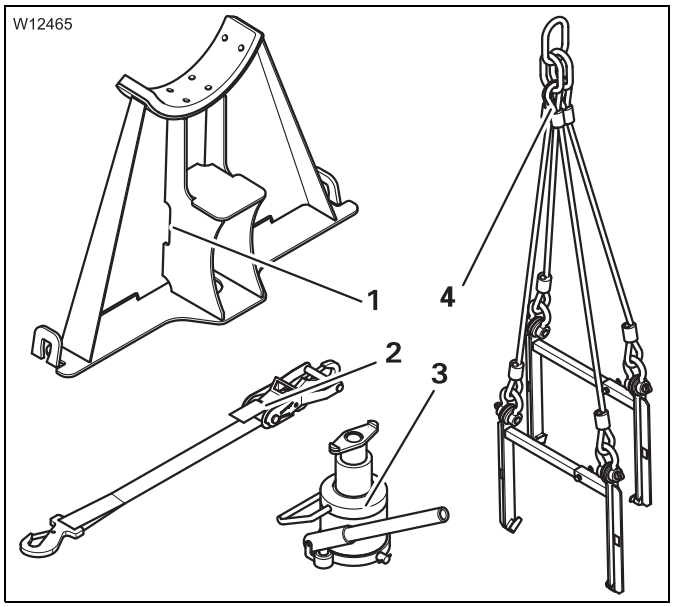
6.4 Rigging the main boom

This section applies only to truck crane which are fitted with the pulling devices for removing/mounting the main boom.

Risk of accident when removing/installing the main boom without pulling devices
Only remove or install the main boom if the truck crane is equipped with the factory-installed pulling devices and with the necessary accessories. Without these factory-installed pulling devices, the main boom may only be removed by **Manitowoc Crane Care**.

Additional equipment required

In addition to the pulling devices, you also need the following accessories:



- a derricking cylinder support (**1**),
- a tightening belt (**2**),
- a lifting device (**3**),
- lifting gear (**4**),

as well as

- an auxiliary crane with sufficient lifting capacity
- a separate vehicle with sufficient load bearing capacity and loading area.

Transport dimensions and weight;
➠ p. 1 - 10.

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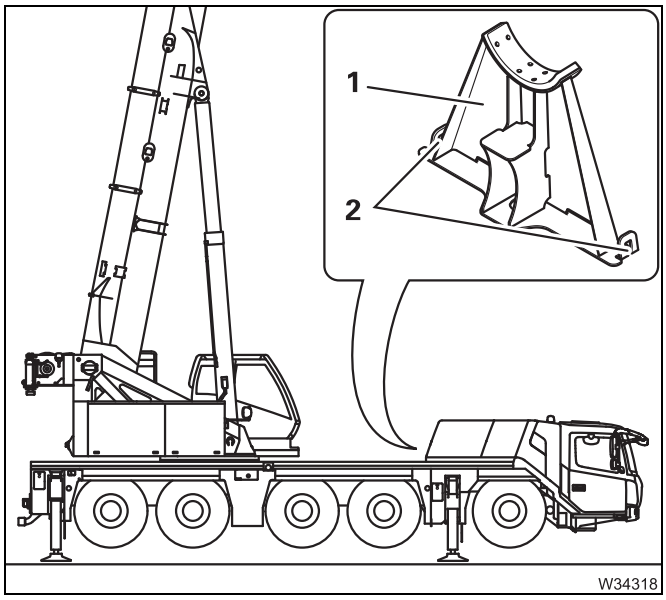
6.4.5 Retracting/fitting the derricking cylinder head pin

The derricking cylinder head axle is retracted and fitted with a pulling device.

Derricking cylinder support

Before retracting the head pin, the derricking cylinder support must be erected.

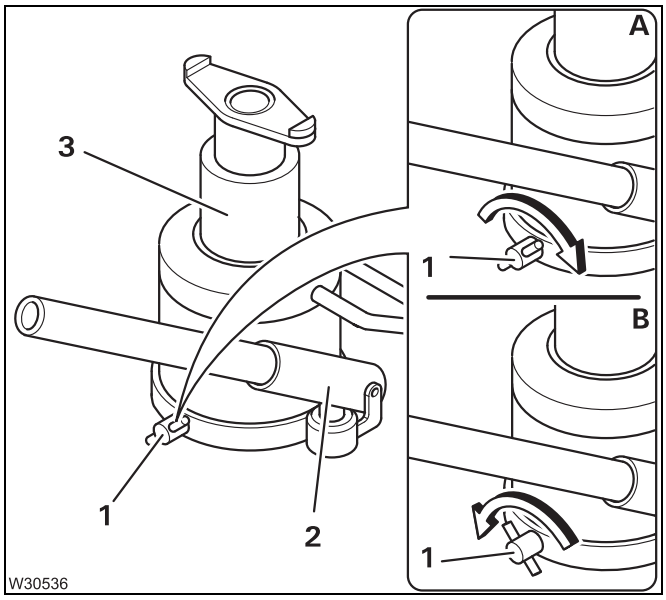


- Place the derricking cylinder support (**1**) between the holders (**2**).
- Set down the main boom on the boom rest.

Operating the lifting device

A lifting device is needed in order to relieve and level the derricking cylinder.

Danger from using unsuitable lifting device
Have the lifting device serviced in time before the maintenance interval specified on the label expires.



- Attach the lever to the holder (**2**).

(A) – Raise

- Close the drain plug (**1**) and pump the lever. The piston rod (**3**) extends.

(B) – Lower

- Slowly open the drain plug (**1**). The piston rod (**3**).retracts.

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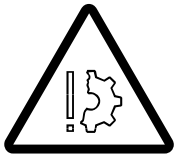
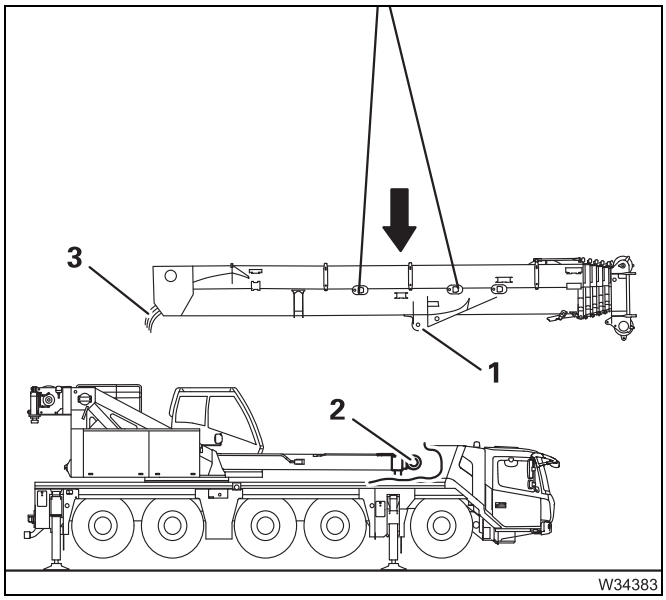
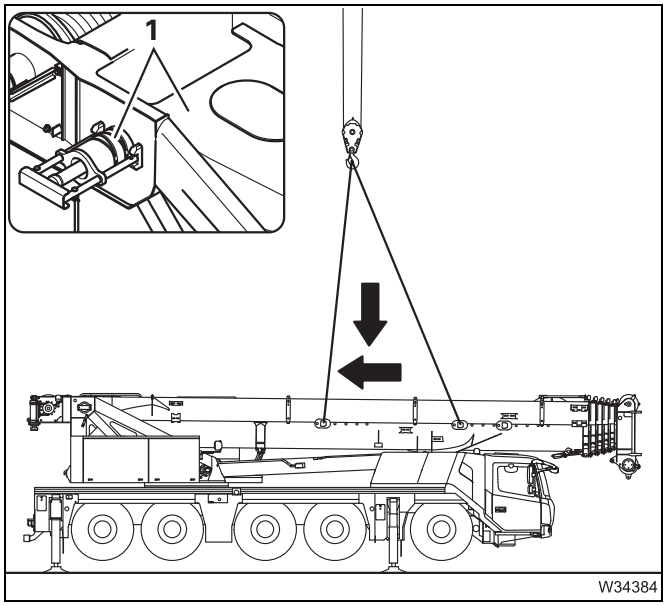
6.4.9 Aligning the connecting points



Risk of damage to the turntable and the connection lines
Make sure that the connection lines are located within the turntable and that the main boom does not swing when you raise it for insertion into the turntable.



- Hoist the main boom top in front of the turntable. Make sure that:
  - The hydraulic/electrical connection lines (**3**) do not hang loose
  - The pivot point (**1**) is higher than the driver's cab
  - The connecting points are not tilted.



- Lay the hoses into the turntable in such as way that they are not damaged during alignment.
- Align the main boom so that the boom pivot pin is aligned with the bearing points (**1**) in the turntable.
- Hold the main boom in this position until the pivot pin is pushed in.

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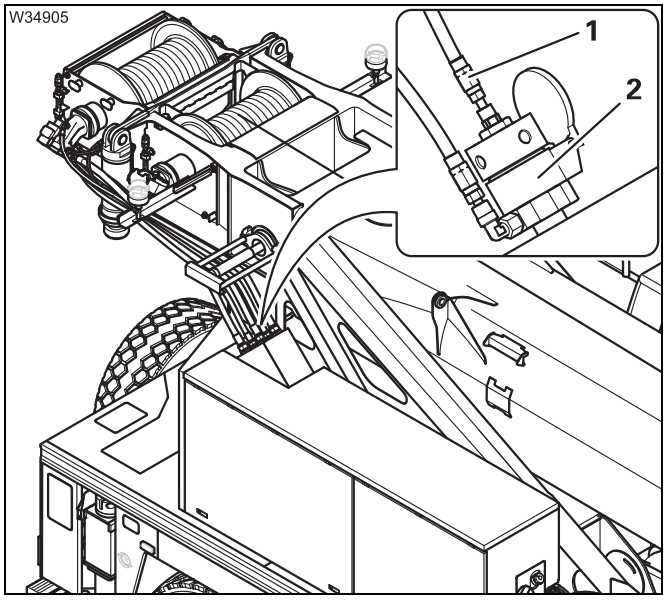
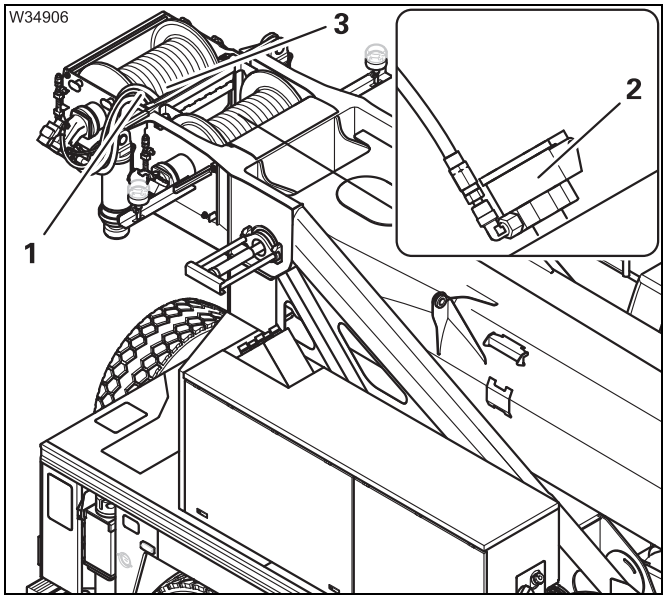
6.5.7 Making/breaking the connection to the central lubrication



Establishing a connection

- Connect the hose (**1**) to the connection (**2**)



Disconnecting

- Remove the hose (**1**) from the connection (**2**).
- Close off the hose and the connection.
- Insert the hose into the hoist frame (**3**).

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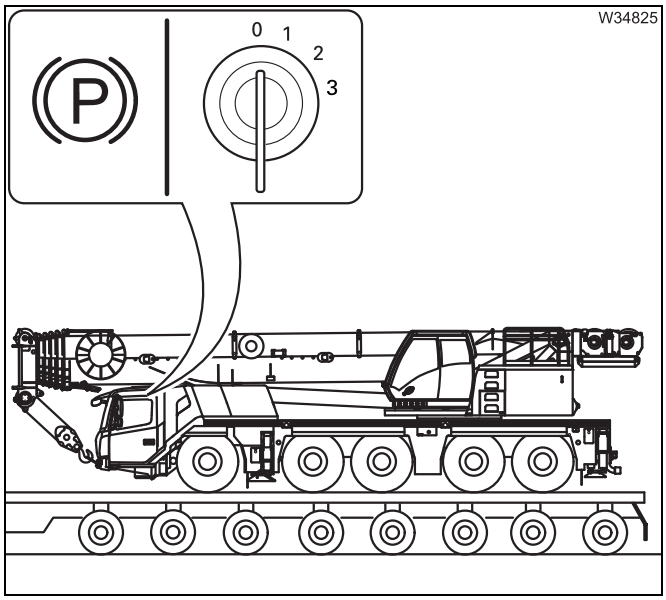
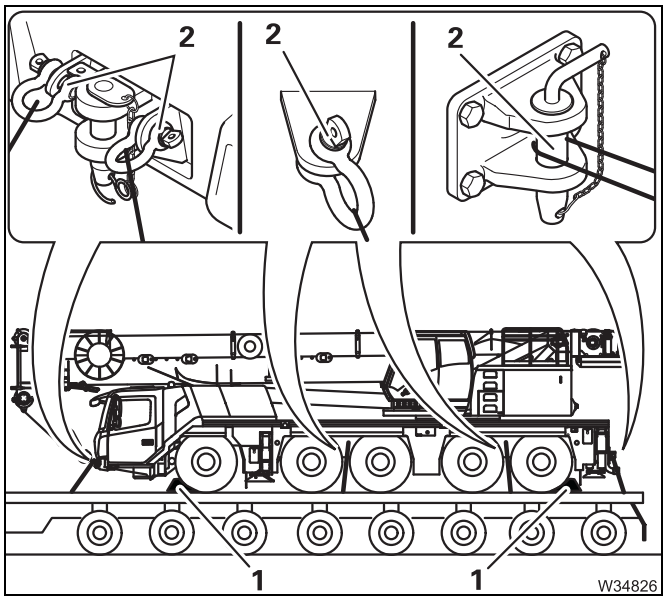
Driving on



- Drive the truck crane onto the trailer. Apply the parking brake immediately, and switch the engine off.
- Close all the doors.

Lashing

Risk of accidents due to falling parts!
Use only suitable lifting gear with sufficient load bearing capacity and use only the slinging points provided.



- Secure the truck crane with the chocks (**1**).
- Lash the truck crane down at the slinging points (**2**). Ensure that no attachments, cables or hoses are damaged in this process.

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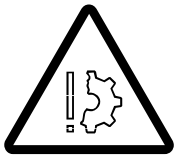
Towing the truck crane out of the danger area

Once you have made all the adjustments as described in this section, you can tow the truck crane away from the hazard area.

- Ensure that the tractor-vehicle accelerates only slowly.



Risk of damage to the chassis!
Starting jerkily or quickly can damage the chassis!

- Remember that the steering will be sluggish.
  If the engine fails, only the emergency steering pump will be available, which supports the steering only from a speed of at least 2 km/h (1.2 mph).

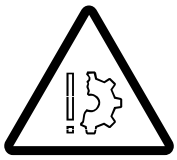
Risk of accidents due to sluggish steering!
At speeds less than 2 km/h (1.2 mph) the truck crane is barely steerable.

- Tow the truck crane at a **maximum of 7 km/h** (4 mph).
- Ensure that the towing distance does not exceed **100 m** (330 ft).

Longer towing distances

If a vehicle with automatic transmission is to be towed for a distance **greater than 100 m** (330 ft) you must disconnect the Cardan shaft between the transfer case and transmission.

- If you need to tow the truck crane further than **100 m** (330 ft) contact **Manitowoc Crane Care**.



Risk of accidents and damage when towing the truck crane long distances!
Tow the truck crane at a maximum speed of 7 km/h (4 mph) and for a maximum distance of **100 m** (330 ft). For longer distances, additional measures must be taken, contact **Manitowoc Crane Care**.

8.3.2 Tow starting

Tow starting is not possible for reasons related to the transmission.

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8.6 Tilting/lowering the driver's cab

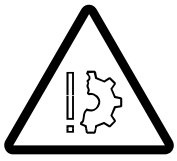
To tilt the driver's cab (e.g. for maintenance work), the main boom must be raised and the hoisting gear moved.
This assumes that the engine can be started.

If the engine cannot be started, you must use the hydraulic emergency operation to lift the main boom; ➠ p. 14 - 59.

8.6.1 Prerequisites and information on tilting

Before tilting the driver's cab, the following requirements must be met:

- The truck crane must be level.
- All loose objects must be removed from the driver's cab!
- The main boom is raised to the extent (approx. 1.5 m (4.9 ft)) that the driver's cab will not touch the main boom (nor the hose drum) when tilting!
- Ensure that the hook block is outside the driver's cab slewing range and the windscreen.



Risk of damage to the steering's universal joint!
The steering wheel may only be moved when the driver's cab is lowered and locked. When moving the steering wheel into other driver's cab positions, the steering's universal joint can be damaged.

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Designation	Amperage (A)	Function
F6/1	5	Engine emergency stop switch Tachograph, instrument panel
F6/2	3	Control unit CCM 11 Control unit IOL 31/32/33
F6/3	3	CCS display Reverse camera Radio
F6/4	5	Air intake inhibitor
F6/5	10	Gearbox control
F6/6	5	Engine/transmission diagnostics plug
F6/7	3	Outrigger control panel left/right Inclination transmitter
F6/8	3	Engine electronic control system AdBlue system

Designation	Amperage (A)	Function
F7/1	3	Alternator
F7/2	3	Brake circuits 1 and 2
F7/3	3	Auxiliary heater time switch
F7/4	15	Transmission retarder
F7/5	5	Horn Particulate filter
F7/6	-	Unassigned
F7/7	10	Operating the mirror adjustment Window winder
F7/8	-	Unassigned

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8.8.6 Malfunctions of the service brake

Malfunction		Cause	Remedy
Lights up while driving or does not go out after the engine is started		The air pressure in one of the two circuits has fallen below 5.5 bar (80 psi)	The vehicle can be driven slowly to the next repair shop
		The air pressure in both circuits has fallen below 5.5 bar (80 psi)	1. Top up the compressed-air supply on the filler connection; ➠ p. 8 - 6
			2. Tow the truck crane with the tow-rod; ➠ p. 8 - 6
Parking brake unable to be released		Supply pressure too low	➠ *Building up supply pressure*, p. 5 - 10
The retarder cannot be engaged		Fuse F7/4 blown	Replace blown fuses; ➠ p. 8 - 26

Further information; ➠ *CCS warning/error message*, p. 8 - 41.

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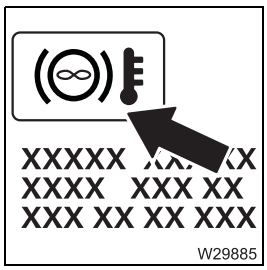

The oil temperature of the retarder is too high.

- Shift to a lower gear – the engine speed increases and the engine braking effect increases.

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1 Side panel ➠ p. 9 - 8
2 Sun visor
3 Current degree of utilisation display[1)] ➠ p. 9 - 139
4 Door unlocking mechanism ➠ p. 9 - 153
5 Lock/unlock windows ➠ p. 9 - 152
6 Air vents ➠ p. 11 - 134
7 Emergency stop switches ➠ p. 9 - 88
8 Windscreen washing system tank[2)]
9 RCL control unit (**R**ated-**C**apacity-**L**imiter) ➠ p. 9 - 67
10 Adjusting the front panel ➠ p. 11 - 9
11 CCS control unit ➠ p. 9 - 16
12 Slewing gear freewheel[1)] ➠ p. 9 - 114
13 Service brake[1)]
14 Accelerator
15 Left-hand control panel ➠ p. 9 - 12
16 Right-hand control panel ➠ p. 9 - 13
17 Handle
18 Crane cab seat with ➠ p. 11 - 8
Seat contact switch ➠ p. 9 - 93
19 Rest
20 Ignition lock ➠ p. 9 - 90
21 Cigarette lighter (24 volts)
22 Ashtray
23 Crane cab, rear ➠ p. 9 - 10

[1)] Additional equipment
[2)] ➠ *Maintenance Manual*

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1 CCS display
– Overview of the CCS start menu ➠ p. 9 - 19
– Overview of the CCS menu groups ➠ p. 9 - 20

2 Jog dial ➠ p. 9 - 130

3 Service/diagnosis connection[1)] ➠ p. 9 - 154

4 Exiting the menu/input mode ➠ p. 9 - 130

5 Selector buttons ➠ p. 9 - 83

6 no function

6.1 Operating in the Outrigger menu ➠ p. 9 - 95

7 Warning for lifting limit switch shutdown ➠ p. 9 - 111

8 Brightness sensor[2)]

9 Input confirmation ➠ p. 9 - 83

10 Changing menus ➠ p. 9 - 83

11 Switch display ➠ p. 9 - 89

12 Slewing gear brake applied/released ➠ p. 9 - 115

13 Sensor temperature display ➠ p. 9 - 88

[1)] For Service personnel only, not suitable for external devices, e.g. mobile phone

[2)] no function

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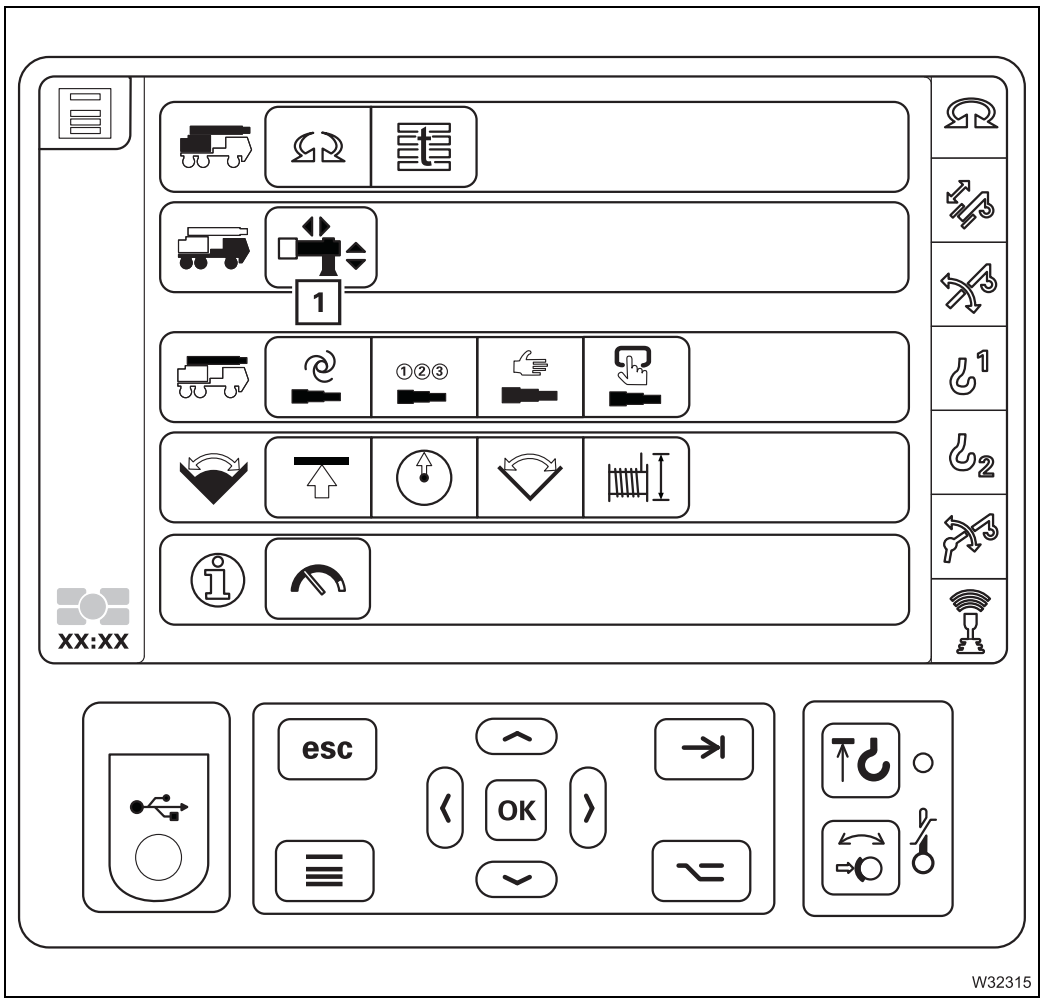
Outrigger menu



1 – Outrigger support beam menu p. 9 - 29
– Outrigger cylinders menu p. 9 - 30

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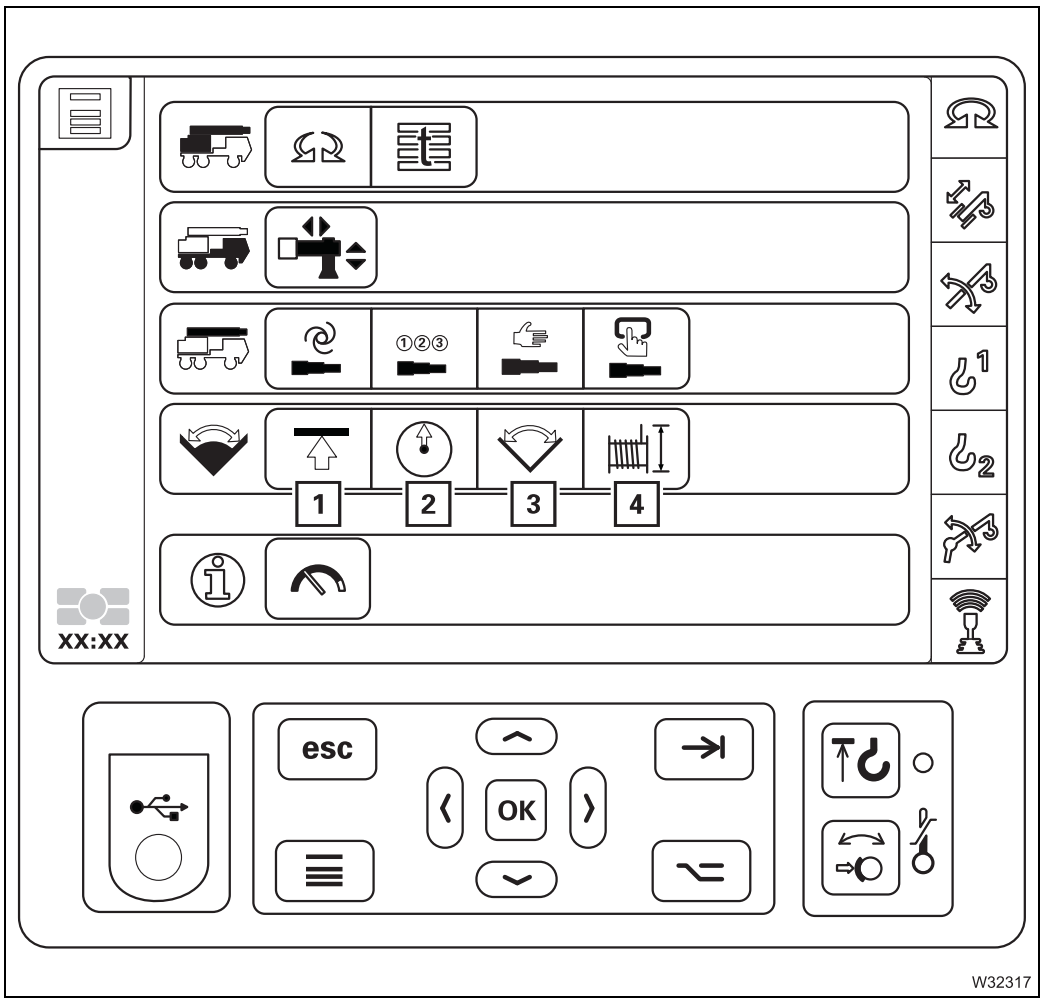
Active working range limiter menu group



1 Overall height menu p. 9 - 38
2 Working radius menu p. 9 - 39
3 Slewing angle menu p. 9 - 40
4 Hoist rope travel limitation menu p. 9 - 41

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1 Transmission mode **RM** p. 9 - 156

2 Transmission mode **R** p. 9 - 156

3 Neutral position **N** p. 9 - 156

4 Transmission mode **D** p. 9 - 156

5 Transmission mode **DM** p. 9 - 156

6 Current transmission mode display

7 Steering lock display p. 9 - 155

8 Current wheel position display p. 9 - 160

9 Steering locking status display p. 9 - 161

10 – Transverse differential locks display p. 9 - 157
– Transverse differential locks on/off p. 9 - 157

11 – Longitudinal differential lock display p. 9 - 158
– Longitudinal differential lock on/off p. 9 - 157

12 Supply pressure brake circuits 1 and 2 display p. 9 - 158

13 Parking brake indicator lamp p. 9 - 159

14 Crane hydraulic system on/off p. 9 - 155

15 Steering mode switched on indicator

16 Normal steering mode / on-road driving on p. 9 - 161

17 Separate steering, manual on p. 9 - 161

18 Automatic separate steering driving around curves on p. 9 - 162

19 Automatic separate steering for crab travel mode on p. 9 - 162

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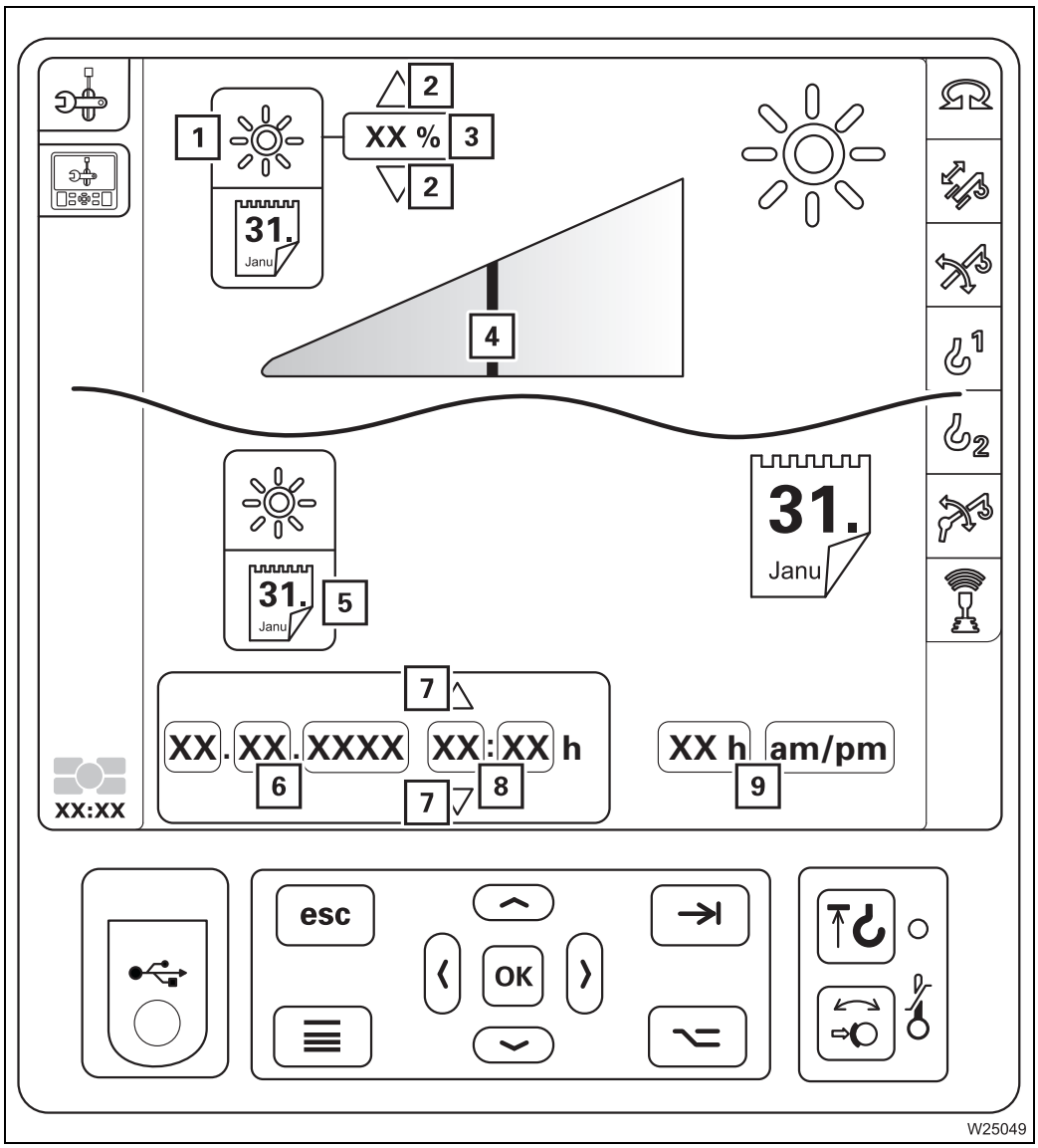
Menu for setting the display brightness and date/ time



1 Selection setting the display brightness ➠ p. 10 - 7
2 Increasing/reducing the value ➠ p. 10 - 7
3 Display in percentage ➠ p. 10 - 7
4 Display ➠ p. 10 - 7
5 Selection setting the time/date ➠ p. 11 - 50
6 Setting the date ➠ p. 11 - 50
7 Increasing/reducing the value ➠ p. 11 - 50
8 Setting the time ➠ p. 11 - 50
9 Switching the display type ➠ p. 11 - 50

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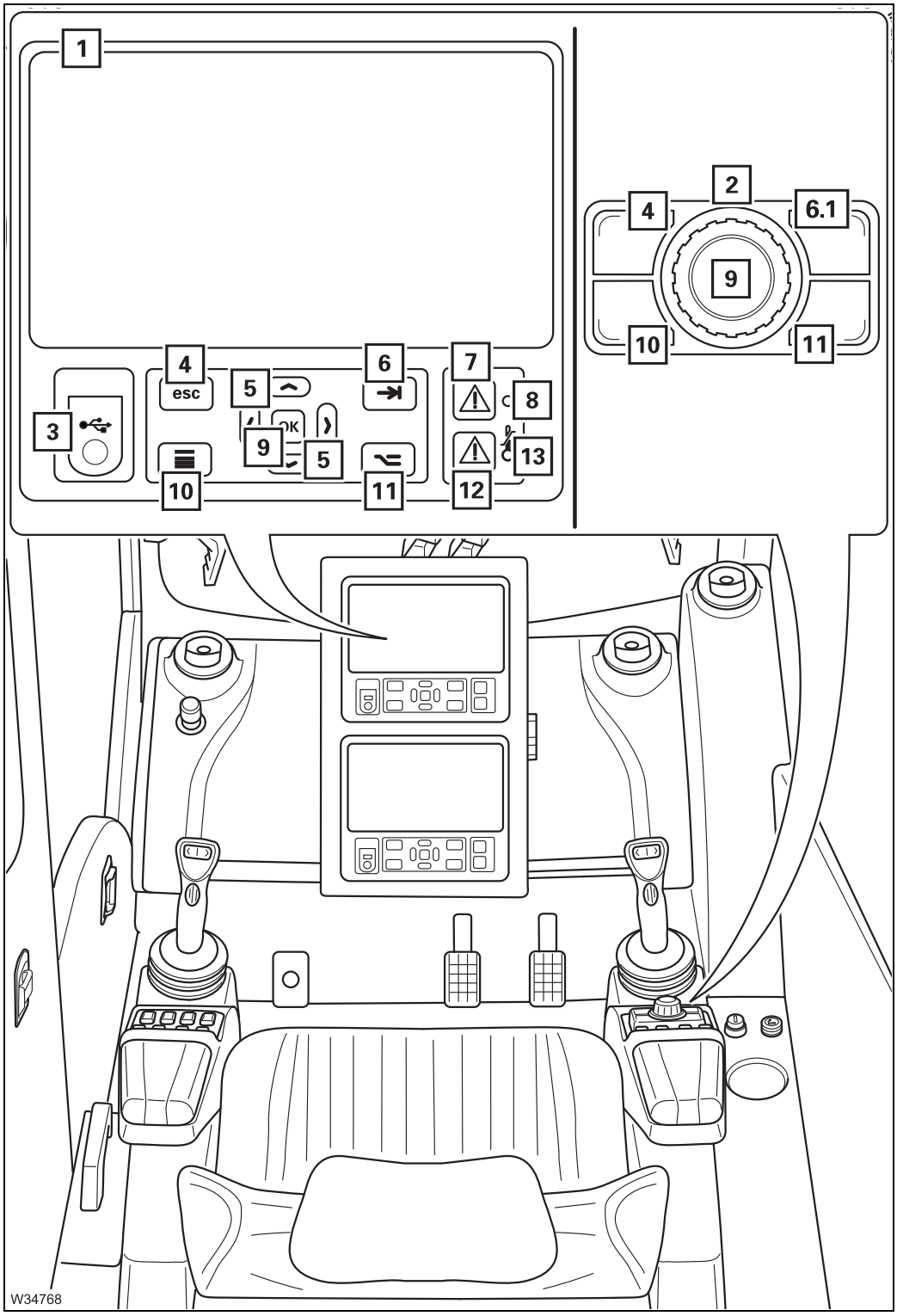
9.1.8 RCL control unit



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Opposite means: on the side of the carrier opposite to the operator when looking at the control unit.

Left and right mean: to the left or the right of the control unit.

Outrigger button

1 Operating the left-hand outrigger ➠ p. 9 - 99

2 Operate left outrigger, opposite ➠ p. 9 - 99

3 Operating the right-hand outrigger ➠ p. 9 - 99

4 Operate right outrigger, opposite ➠ p. 9 - 99

5 Inclination indicator ➠ p. 9 - 78
Raise axle display ➠ p. 9 - 79
Outrigger pressure display ➠ p. 9 - 78

6 Additional function F1 on/Position lights for indicator lamps ➠ p. 9 - 100

7 Additional function F2 Select axle pairs ➠ p. 9 - 102

8 Additional function F3 Select axle pairs ➠ p. 9 - 102

9 Additional function F4 Menu selection ➠ p. 9 - 102
– Outrigger
or
– Raise axle

10 In the Outrigger menu ➠ p. 9 - 100
– Retract all outrigger cylinders
In the Raise axle menu
– Raise the axles ➠ p. 9 - 102

11 Pre-select high-speed mode ➠ p. 9 - 99

12 Switching over the measuring range ➠ p. 9 - 101

13 Engine START

14 In the Outrigger menu ➠ p. 9 - 100
– Extend all outrigger cylinders
In the Raise axle menu
– Lower the axles ➠ p. 9 - 102

15 – Pre-select normal mode ➠ p. 9 - 99
– Automatic alignment ➠ p. 9 - 100
(as additional function F1)

16 Horn

17 Engine STOP

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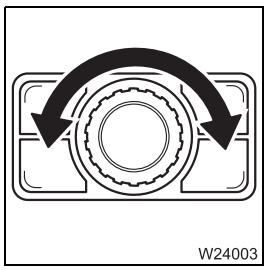


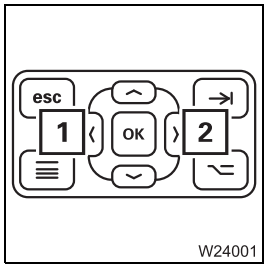
Enter the values with jog dial

The input mode is active.

– **To the right:** Increases the value

– **To the left:** Decreases the value

Slowly turning changes the value gradually
Holding pressed and turning results in a quick value change

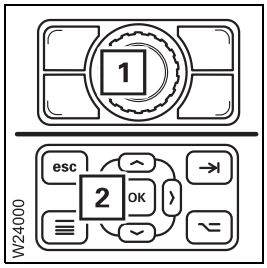


Enter values on the control panel CCS

The input mode is active.

– **Arrow pointing to the right:** Increases the value

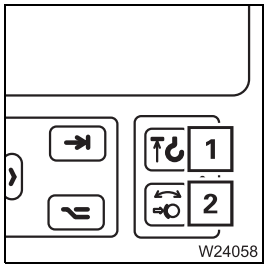
– **Arrow pointing to the left:** Decreases the value



Input confirmation

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

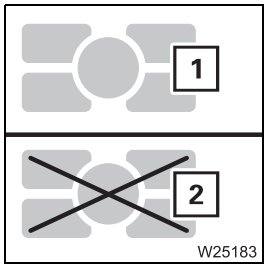
– **Press the button once:** A newly entered value is confirmed



Other

1 Lifting limit switch warning; ➠ p. 9 - 114

2 Slewing gear brake indicator lamp; ➠ p. 9 - 114



1 Display active

2 Display inactive

➠ *Switch display*, p. 9 - 89

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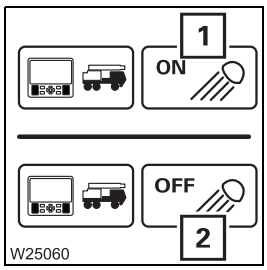
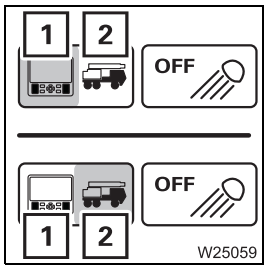


Outrigger lighting on/off

– **Switching on:** Select symbol (**2**) and confirm
– **To switch off:** Select symbol (**1**) and confirm

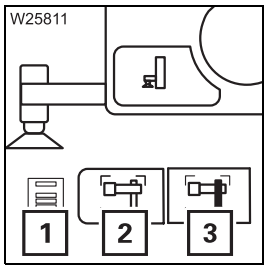
p. 12 - 34



Outrigger control units on/off

– **Switching on:** Select symbol (**2**) and confirm – symbol (**1**) is **grey**
– **To switch off:** Select symbol (**1**) and confirm – symbol (**2**) is **grey**

p. 12 - 34



Function for switching outriggers

– **Outrigger beam:** Select symbol (**2**) and confirm
– **Outrigger cylinder:** Select symbol (**3**) and confirm
– **Exiting the menu:** Select symbol (**1**) and confirm

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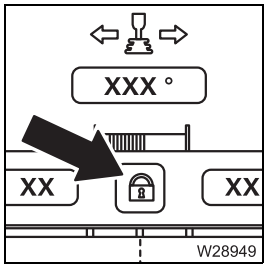


Automatic mode rigging

– Display

Yellow: Recognition that the counterweight is rigged

Flashing: Automatic mode on

Grey Automatic mode cancelled or
no recognition that the counterweight is rigged

The superstructure is within the rigging range, the slewing gear is switched on and the lifting cylinders are retracted

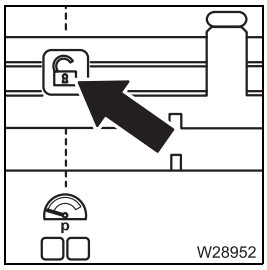
– Switch on: Select symbol and confirm – symbol flashes yellow

– To execute: Move control lever for slewing gear, automatically:
– Slewing in position *Move lifting cylinders*
– Extend lifting cylinders,

Move the control lever for slewing gear in indicated direction, automatically:
– Slewing in position *Lift/lower counterweight,*
– Lift counterweight,
– Pre-tension counterweight.

Automatic mode ends – symbol yellow

p. 12 - 94



Automatic mode unrigging

– Display

Yellow: Recognition that the counterweight is unrigged

Flashing: Automatic mode on

Grey Automatic mode cancelled or
no recognition that the counterweight is unrigged

The superstructure is within the rigging range and the slewing gear is switched on

– Switch on: Select symbol and confirm – symbol flashes yellow

– To execute: Move control lever for slewing gear, automatically:
– Slewing in position *Lift/lower counterweight,*,
– Lower the counterweight,

Move the control lever for slewing gear in indicated direction, automatically:
– Slewing in position *Move lifting cylinders*,
– Retract the lifting cylinders,

Automatic mode ends – symbol yellow

p. 12 - 96

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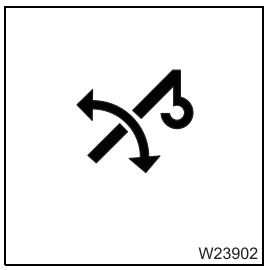
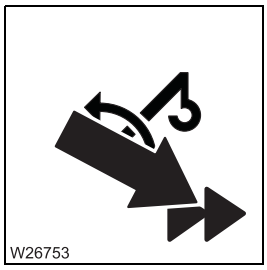
CCS display



Power units display

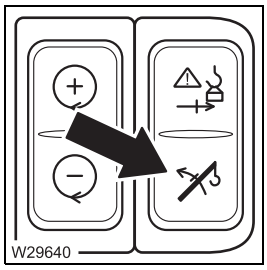
- **Green:** Derricking gear on
- **Red:** Derricking gear off



High-speed mode inspection derricking gear

- **On:** High-speed mode on
- **Off:** High-speed mode off

➠ p. 11 - 95



Raise button, shutdown bypassed

- **On:** Shutdown bypassed
- **Off:** Shutdown not bypassed

➠ p. 11 - 47

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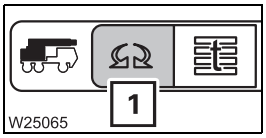
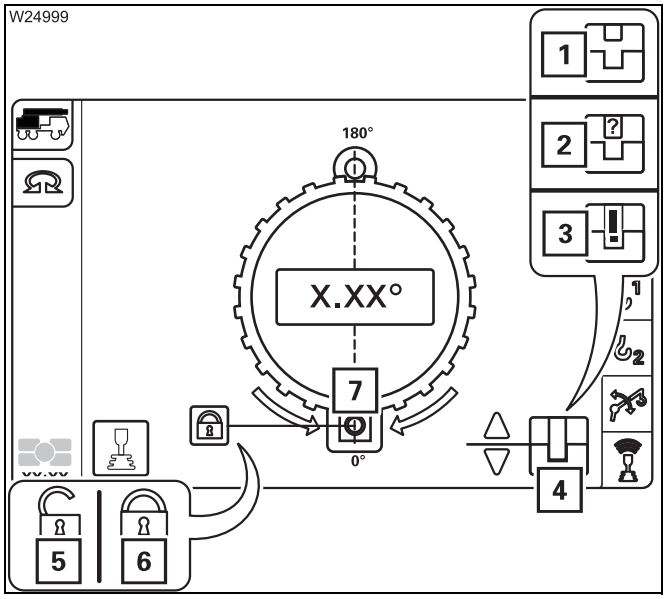
9.2.19 Superstructure lock/house lock menu



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

Superstructure lock

➠ *Locking/unlocking the superstructure*, p. 11 - 15.



Locking status displays

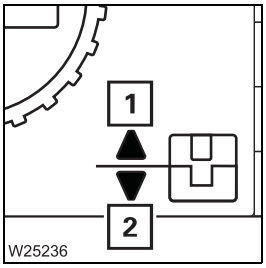
The current position of the locking pin is shown by different symbols:

1 and 7	**red** – unlocked
2 and 7	**yellow** – intermediate position
3 and 7	**violet** – error
4 and 7	**green** – locked

and

5	Unlocked
6	Locked

➠ p. 11 - 16

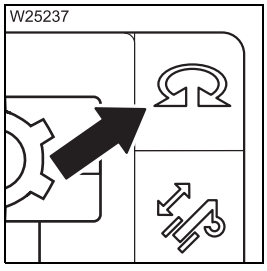


Locking/unlocking the turntable

The superstructure is in the 0° or 180° position.

To unlock:	Symbol (**1**) – locking pins retract
To lock:	Symbol (**2**) – locking pins extend

➠ p. 11 - 16



Slewing gear display

– **Green:** Slewing gear switched on

– **Red:** Slewing gear switched off

➠ p. 11 - 17

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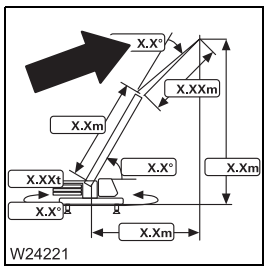
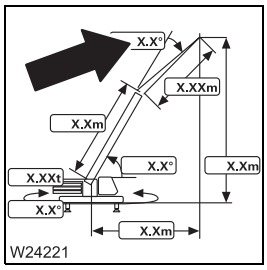


Display of the lattice extension angle

The hydraulic lattice extension is connected.

– **Display:** Current angle between lattice extension and main boom in degrees (°) – for displayed RCL code

➠ p. 11 - 38

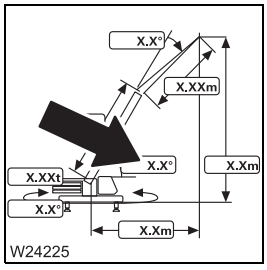


Lattice extension angle display

The mechanical lattice extension must be connected.

– **Display:** Lattice extension angle.
Current angle between lattice extension and main boom in degrees (°) – for displayed RCL code

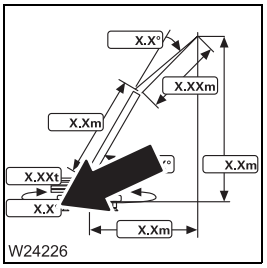
➠ p. 11 - 38



Current main boom angle display

– **Display:** Current angle between main boom and horizontal position in degrees (°)

➠ p. 11 - 37



Current slewing angle display

0°: Position *0° to the rear*

180°: Position *180° to the front*

+ 0.1 bis +180.0°: Turned to the right from 0°

-0.1 to -179.9°: Turned to the left from 0°

➠ p. 11 - 38

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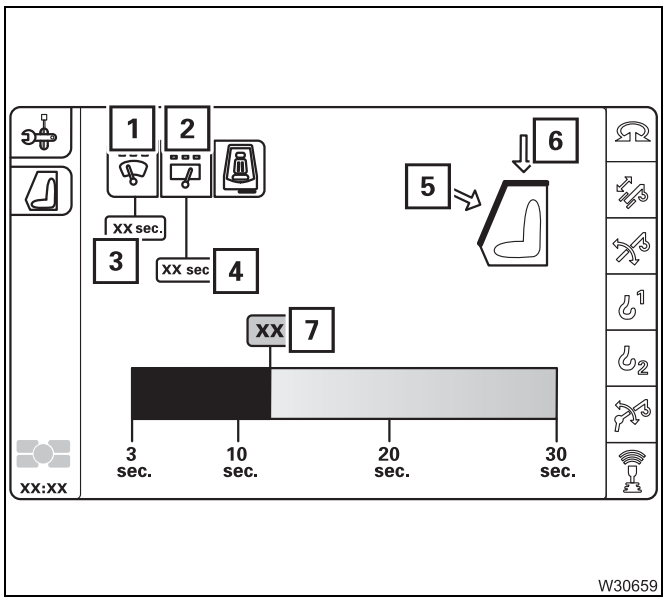

Adjusting the wiper stroke interval

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 - 104

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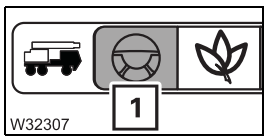
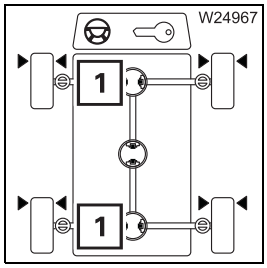
9.3.3 Final drive



Driving mode menu

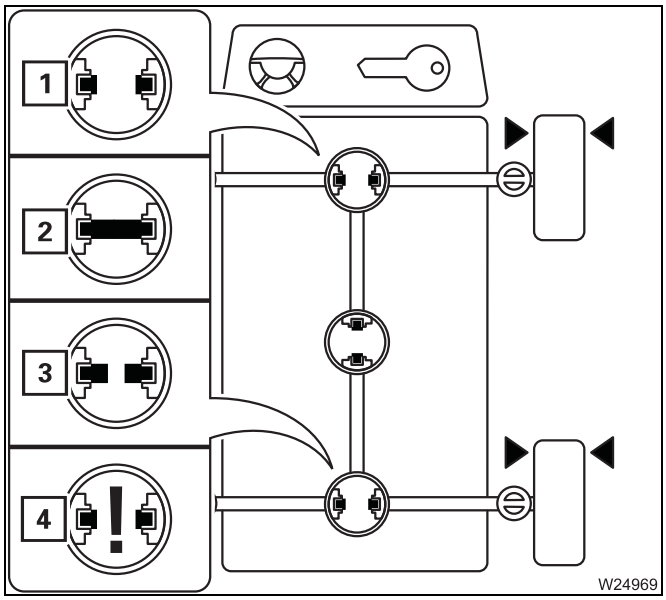
To open: Select symbol (**1**) and confirm – menu is opened



Transverse differential locks on/off

- **Switching 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.

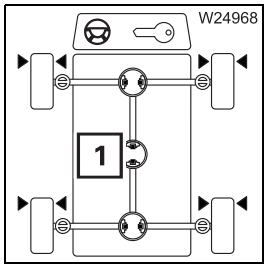


Transverse differential locks display

The current status is shown using different symbols:

1 **green** – locks off
2 **red** – locks on
3 **yellow** – intermediate position
4 **violet** – error

p. 13 - 25



Longitudinal differential lock on/off

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

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10 Starting/switching 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 in the day,

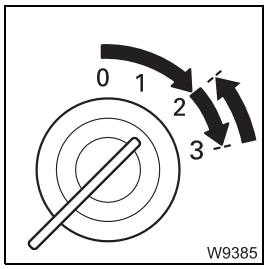
– start the engine from the crane cab; ➠ p. 10 - 3,

– start the engine with the hand-held control; ➠ p. 10 - 11.

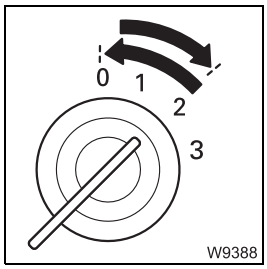
10.1 When starting the engine for the first time in the day

Risk of crushing due to turning wheels!
When you start the engine, no persons may be within the steering range of the 4th and 5th axle lines. These axle lines are steered each time the engine is started, sometimes with a 5-second delay, in order to test the steering system.

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; ➠ *Inspections after starting the engine*, p. 4 - 16.



- Switch the engine off and switch off the ignition.

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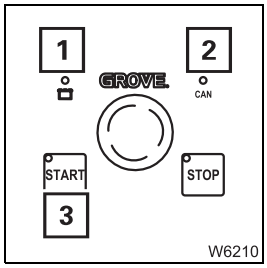
10.3 Starting the engine – with the hand-held control

You can only start the engine when bridging plugs are inserted in all sockets that are not required; ➠ p. 9 - 148.

Risk of crushing due to turning wheels!
When you start the engine, no persons may be within the steering range of the 4th and 5th axle lines. These axle lines are steered each time the engine is started, sometimes with a 5-second delay, in order to test the steering system.

All checks required before starting the engine must be carried out; ➠ p. 4 - 1.

You can also start the engine if the ignition in the driver's cab or crane cab is switched on.



- Wait until the lamps (**1**) and (**2**) illuminate.
- If the lamp (**2**) does not illuminate or flash after about 20 seconds, there is a malfunction; ➠ p. 8 - 33.
- Press the button (**3**) once – the engine will start.

If the hand-held control is connected to the superstructure, you cannot drive the power units from the crane cab.

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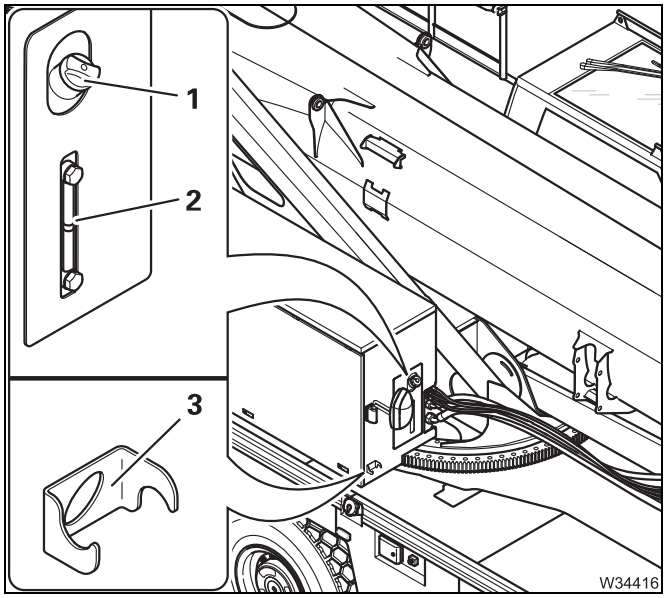
11.1.2 Checking the condition of the truck crane

Fuel tank auxiliary heater

Use the same fuel as for the engine or use EL heating oil for refuelling.

Danger of fire due to flammable gases!
Turn off the engine and heating systems before refuelling.



Insert the fuel nozzle in the clamp (**3**).

- The display (**2**) shows the fuel level in the tank (**1**).
- Refuel in due time and seal the tank (**1**) with the cap.

Visual inspection

Walk around the truck crane and look out in particular for leaking oil, fuel or coolant.

Danger if the crane cannot be unrigged!
If oil is lost, you may no longer be able to move the crane. Not even in emergency mode.

Risk of environmental damage due to leaking consumables!
Immediately repair or have repaired oil, fuel and coolant leakages.
This prevents oil or fuel from seeping into the ground or polluting waters.

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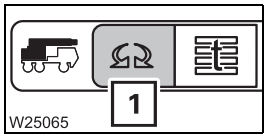
11.1.7 Locking/unlocking the superstructure

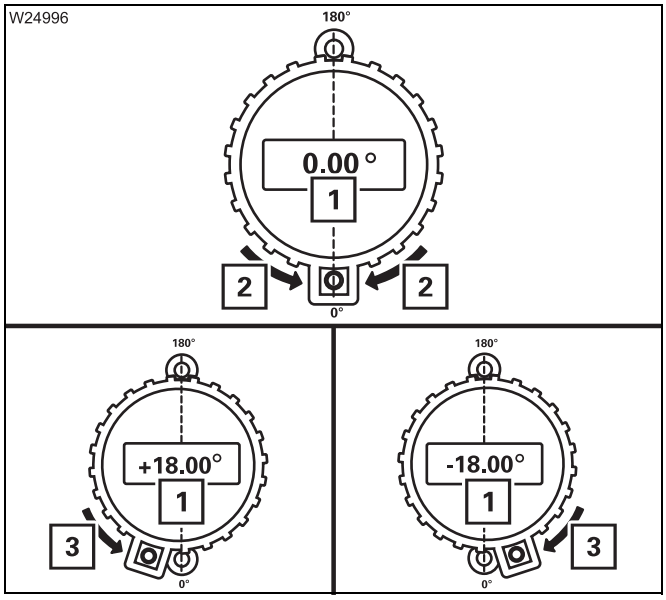
To lock, a pin can extend on the turntable and engage in two locking points on the carrier.

Locking points

The locking points are at 0° and at 180 °C.



- Open the *Superstructure lock* (**1**) menu.



The display (**1**) shows the current superstructure position.

- Slew to the locking point at **0°** or **180°**.

The display (**1**) shows positive and negative values. For an overview; ➠ p. 11 - 100.

At the locking point, both arrows (**2**) are shown.

In the range of ± 20° around the locking point, an arrow (**3**) indicates the slewing direction that leads to the locking point.

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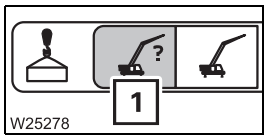
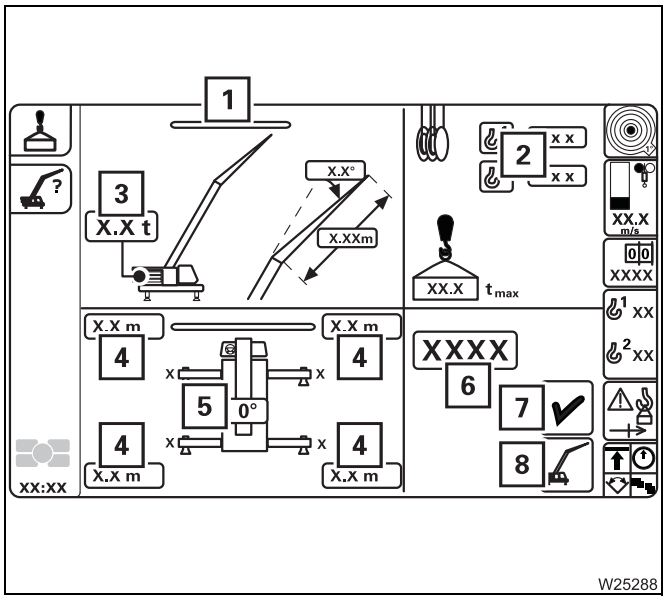
11.2.2 Enter rigging mode

For a complete rigging mode input, you must enter, confirm and accept the rigging mode and the reeving.



- Open the *Enter rigging mode* menu (**1**) if necessary.



There are two ways of entering the current rigging mode.

– **Either** enter the individual components (**1**) to (**5**) one after the other.

– **Or** enter the RCL code (**6**) and the reeving (**2**).

The newly entered rigging mode must then be confirmed

– confirm with (**7**)

and

– accept with (**8**).

The following section describes the input procedure based on the individual components. If you want to enter the rigging mode based on the RCL code; ➠ *Entering the RCL code*, p. 11 - 31.

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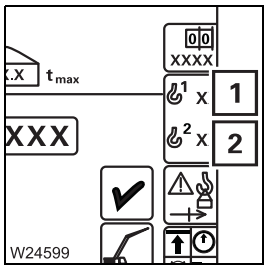


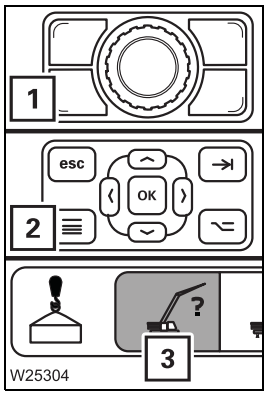
Hoists display

The symbol for the hoist with which the load is to be lifted must be shown in **green**:

Symbol (**1**): must be shown in **green** if the load is to be raised with the main hoist.

Symbol (**2**): must be shown in **green** if the load is to be raised with the auxiliary hoist.

- Switch over the display if necessary; ➠ *Example of switching over the display*, p. 11 - 36.



- If you need to correct values, press the button (**1**) or (**2**) and open the *Enter rigging mode* menu (**3**).

You can start working with the crane if the current rigging mode of the truck crane is displayed.

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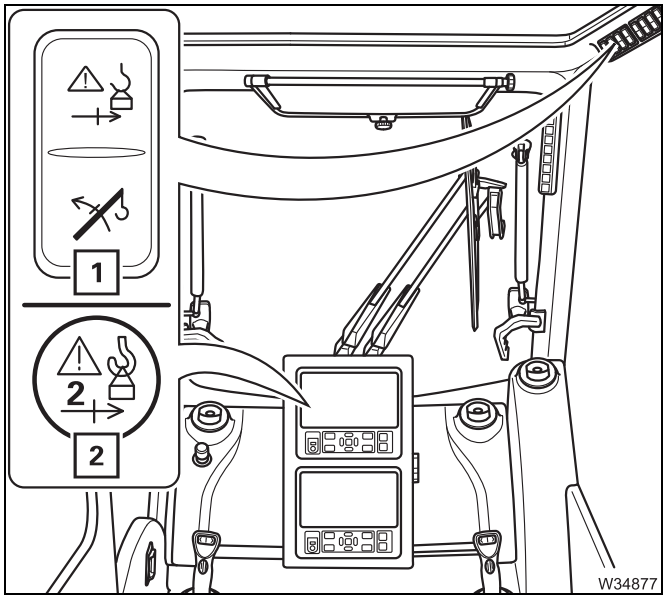
To raise the boom You can release the raise boom function for derricking again within the permitted working range.

This function is only active if the current degree of utilisation lies above 100% and the crane movements are switched off.



Raise main boom

- Press the button (**1**) once – the information message (**2**) is displayed.
  - Raising is enabled.
  - The speed will then be reduced to 50%.
- Raise the main boom until the degree of utilisation is less than 100%.
  - The crane movements will then be enabled again.
  - The button (**1**) has no function.

The raising of the main boom will be shut down if the main boom angle is too great. Then all you can do is set the load down.

Switch off function

– For degree of utilisation above 100%

The function will be switched off if you:
  – press button (**1**) again, or
  – switch off the ignition.

– For degree of utilisation below 100%

The function is switched off automatically.

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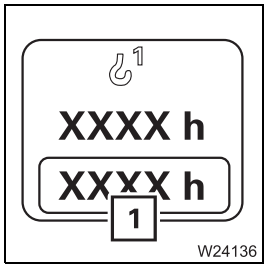
11.3.3 Main hoist

You can reeve the hoist rope of the main hoist on the main boom or on the lattice extension.

Risk of accidents from accidentally operating a hoist!
Always switch off the hoist that is not in use!
Never operate the hoist if the hook block is unreeled and the hoist rope is completely wound onto the drum.
– The rope will slacken in the course of the *Lower* movement. Rope loops will form, which can cause the load to slip and damage the hoist rope.
– The switch-off point of the lowering limit switch shifts in the course of the *Raise* movement. The lowering limit switch will lose its function as a safety device.

Risk of accidents when raising loads at an angle!
Loads can cause the main boom to bend, resulting in the hoist rope no longer being aligned in a vertical position. Compensate for the bend by lowering the boom so that the load will be lifted vertically. In this way, you can prevent the load from dragging and helpers from being injured. Inform all helpers about this issue.

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



You can display the operating hours (**1**) of the hoist; ➠ p. 11 - 114.

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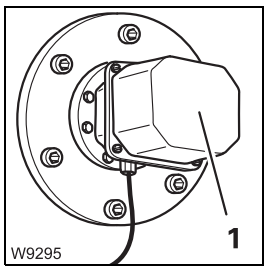
Lowering limit switch



The lowering limit switch (**1**) prevents the hoist rope from being reeled completely off the drum.

The lowering limit switch works only if the switch-off point is set correctly (e.g. after changing a hoist rope); ➠ *Maintenance Manual*.

Risk of accidents due to incorrect setting or intended triggering!
Prior to operating the crane, ensure that the lowering limit switch is set correctly and always complete the lowering operation before the lowering limit switch is triggered.
This prevents the hoist rope from becoming damaged due to complete unreeling or switching off at high speeds, and the load being dropped as a result.

Risk of accidents from incorrect setting of the lowering limit switch!
Always re-adjust the lowering limit switch if you unreel hoist rope from the stationary rope drum. The lowering limit switch does not record the number of these winds.
This prevents the lowering limit switch from switching off too late or not switching off at all, the hoist rope from being damaged and the from load being dropped.

Fixed length, intermediate length, telescoping length

There are lifting capacity tables for main boom fixed lengths, main boom intermediate lengths and main boom telescoping lengths.
The lengths are automatically detected by the RCL, and the corresponding lifting capacities according to the *Lifting capacity table* are enabled and displayed automatically.

Main boom fixed length

Main boom fixed lengths have the greatest lifting capacities. A main boom fixed length is reached if:
– All telescopic sections are locked to a fixed length
– All telescopic sections are set down.

Main boom intermediate length

A main boom intermediate length is reached if not all telescopic sections are locked to fixed lengths.
Extend the main boom to the required length before hoisting the load!
You cannot telescope the boom with the specified lifting capacities for main boom intermediate lengths.

Main boom telescoping length

The main boom is at a telescoping length if it is extended to an intermediate length and may be telescoped with the current load. The size of the load that can be telescoped depends on the angle of inclination and on the degree of lubrication of the main boom.

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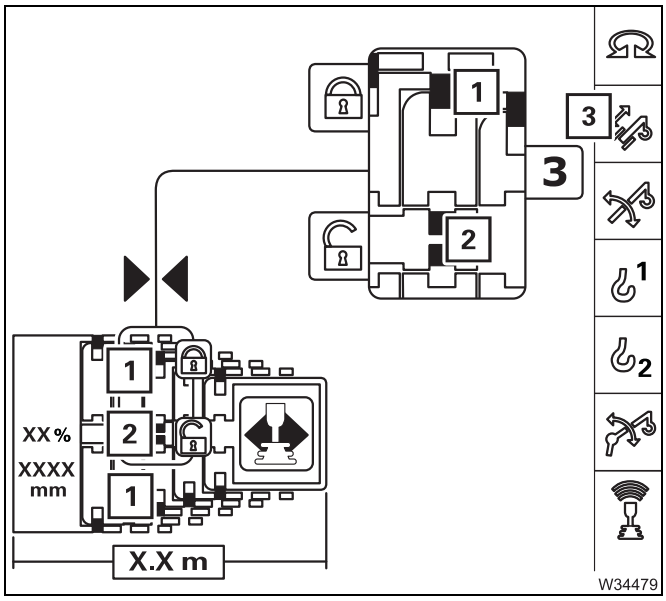
Extending/ retracting the telescoping cylinder

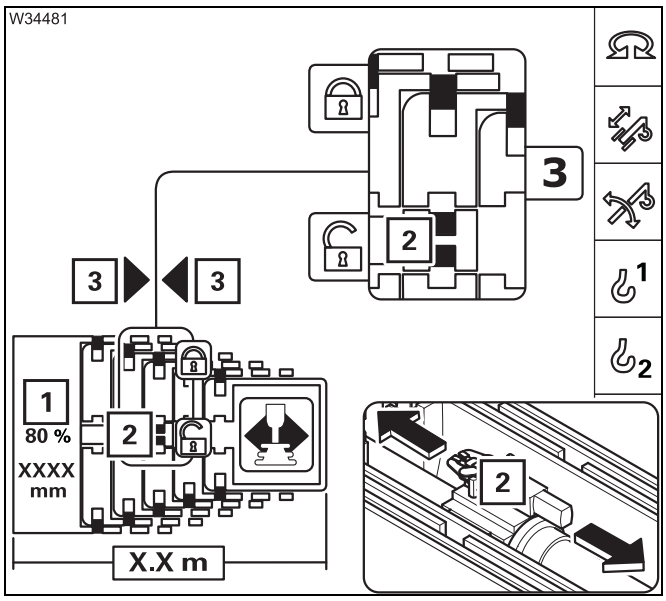


Prerequisites

– Telescoping mechanism on – symbol (**3**) **green**

– Telescopic section locked – symbol (**1**) **green**

– Telescoping cylinder unlocked – symbol (**2**) **red**



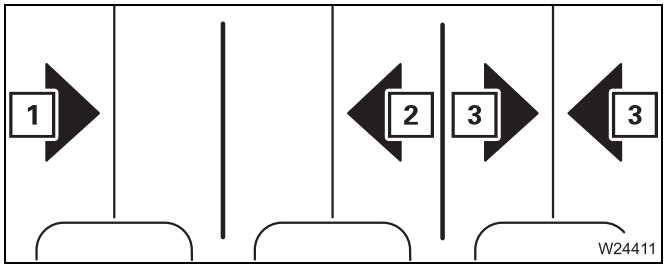
Extending/retracting

- Move the control lever in the corresponding telescoping direction:
  - **Extend:** Extending
  - **Retract:** Retracting

The telescoping cylinder (**2**) extends/retracts.

The display (**1**) shows the currently extended length, e.g. 80%.

Near a locking point, the symbols (**3**) show:



– the direction of travel to the locking point:
  1 Extending
  2 Retracting
  3 At the locking point

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11.3.8 High-speed mode

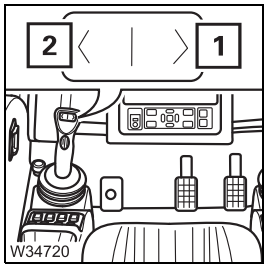
The slewing gear cannot be operated at high speed.

You can switch on the high-speed mode for a higher speed.

Risk of accidents due to the suddenly accelerating movement!
Reduce the engine speed before starting high-speed mode.
This will prevent movements from becoming excessively accelerated, which may result in the truck crane starting to sway and overturning.

Derricking gear telescoping mechanism

High-speed mode is always switched on and off for the derricking gear and the telescoping mechanism at the same time.

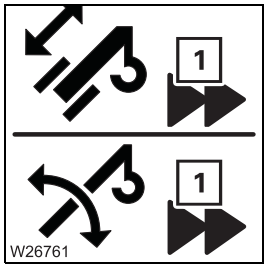


To switch on briefly

- Press the button at the right on – for (**1**).
  High-speed mode will be active until you release the button.

Continuous operation

- Press the button at the left on – for (**2**).
  High-speed mode will be enabled until you press the button again.



The symbol (**1**) indicates the current status:

– **On:** High-speed mode switched on
– **Off:** High-speed mode switched off

During lowering of the boom, high-speed mode only supports the start-up of the derricking procedure from steep boom positions; it does not increase the derricking speed.
High-speed mode is disabled for raising when performing operations with the lattice extension.

Hoists

High-speed mode is always switched on and off simultaneously for the main hoist and the auxiliary hoist.

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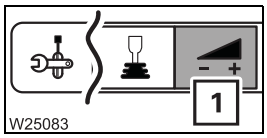
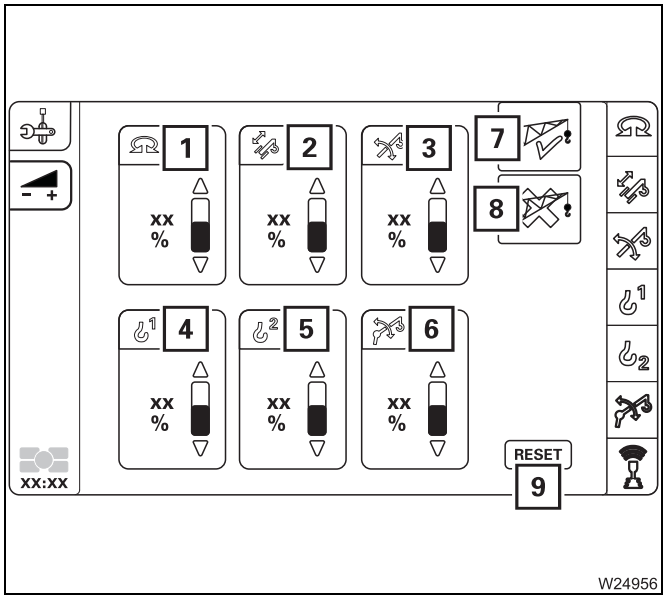
11.4.4 Limiting the power unit speeds

You can enter what percentage of the maximum speed should be enabled for each power unit.



- Select and confirm the symbol (**1**).

  The *Power unit speeds* menu opens.



The values below the symbols (**1**) to (**6**) indicate the currently set power unit speeds.

The values for the slewing gear (**1**) and derricking gear (**3**) only apply if they are lower than the automatically limited values. The automatically limited values are not displayed.

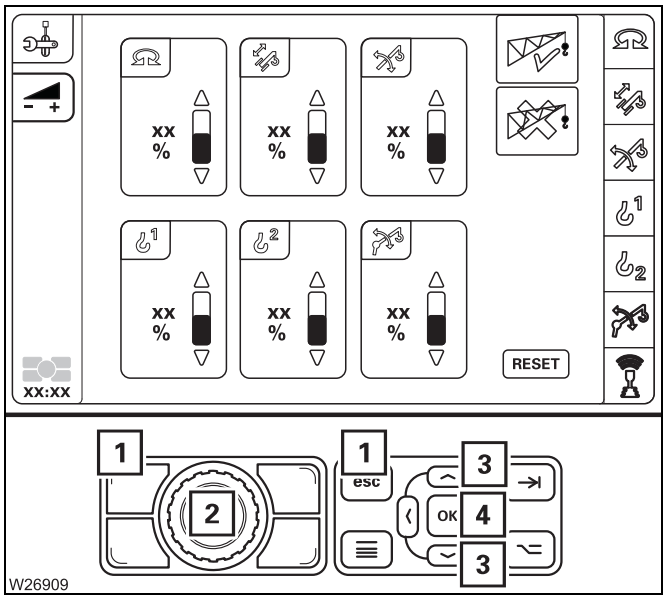
The symbol (**5**) is only active when the auxiliary hoist is connected.

With the preselection symbol for:

7 Operation **with** the lattice extension

8 Operation **without** the lattice extension

Symbol (**9**) resets all values without prior selection.



Changing values

- Select and confirm the symbol for the relevant power unit – symbol **red.**
- Change the value using switch (**2**) or the buttons (**3**).

To cancel the input – press button (**1**) once.

- Confirm the changed values – press switch (**2**) or button (**4**) once. The changed values for the power unit are applied.

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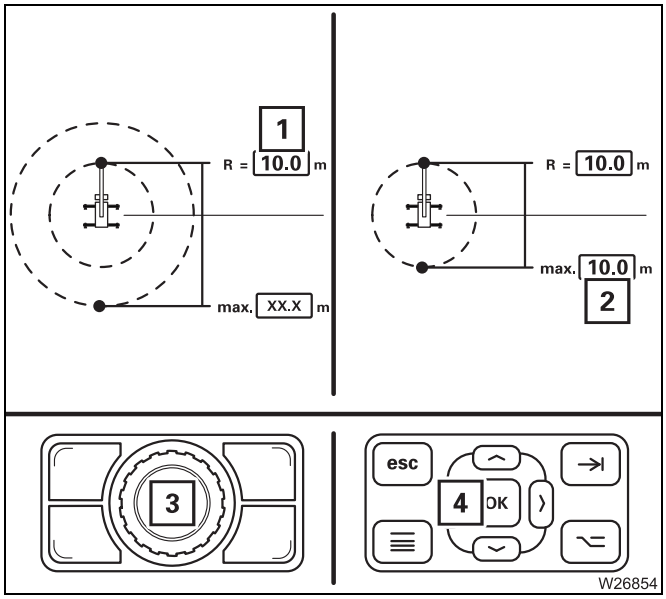
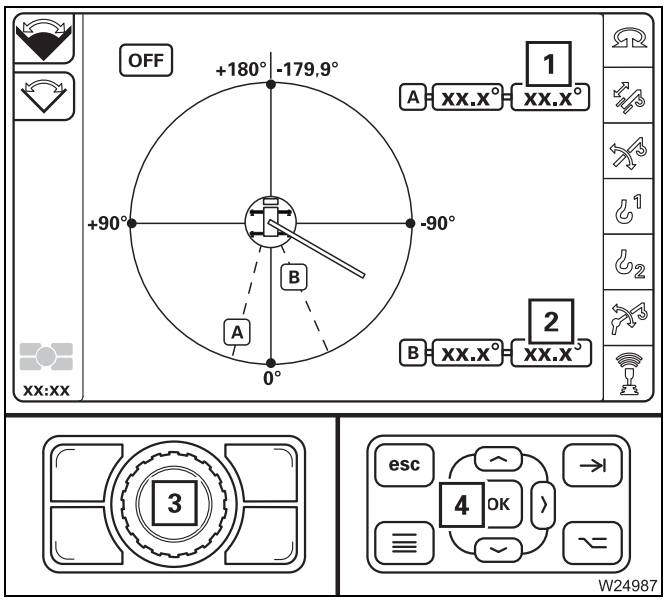
Working radius



- Move the main boom head to just before the shutdown point without a load, e.g. up to 10.0 m – value (**1**).
- Press the button (**3**) or (**4**) once.
  – The current value (**1**) will be accepted as the limit value (**2**).

  Switch on monitoring; ➠ p. 11 - 129

Slewing angle



Display of the slewing angles

– The slewing angle **A** limits slewing to the right.

– The slewing angle **B** limits slewing to the left.

The permissible slewing range is the angle from **A** anticlockwise to **B**. In the illustration approx. 270° – arrow (**1**).

- Press the button (**3**) or (**4**) once.
  – The current value (**1**) will be accepted as the limit value (**2**).

  Switch on monitoring; ➠ p. 11 - 129

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11.7.2 Air-conditioning system

You can use the air-conditioning system to cool and dry the air in the crane cab.

Information

Do not cool the air in the crane cab too much.
The difference between the outside temperature and the inside temperature should be at the most 10 °C to 14 °C (50 °F to 57.2 °F) .
If the cooling is too severe, you may frequently feel physically uncomfortable, albeit mostly only after you leave the cool environment.

Avoid having cold air blowing directly on to your body.

When using recirculated air, you should switch over to fresh air mode to ensure a fresh supply of oxygen at the same time. Adjust the cooling output to your actual needs:

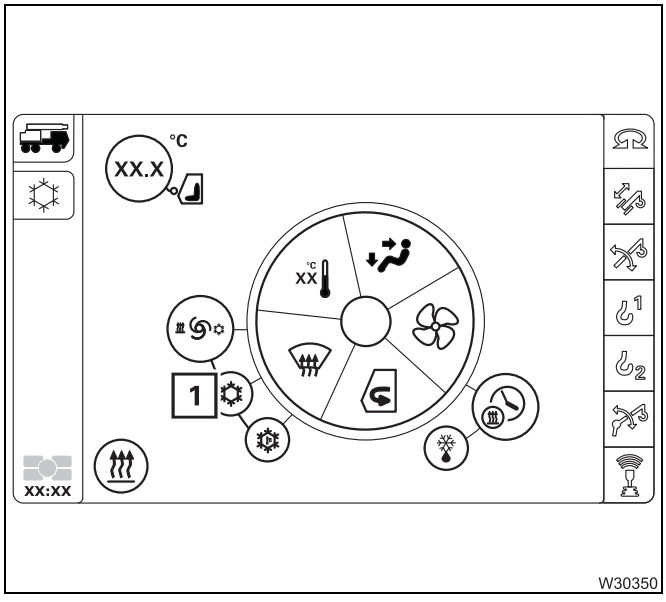
If the truck crane has been exposed to strong sunlight for a long period of time, for example, the air-conditioning system should initially be operated at the highest blower level with the engine running.
The door or at least the windows should be left open for a short while to thoroughly air the cab.

If the air-conditioning system is operated continuously, close the windows and doors to ensure sufficient cooling.

Once the inside temperature has reached the desired temperature, set the fan to a lower level.

Switching on/off

- Start the engine. The air-conditioning operates only when the engine is running.



Switching on

- Select and confirm the symbol (**1**)
  – Symbol **red**

Switching off

- Select and confirm the symbol (**1**) again
  – Symbol **grey**

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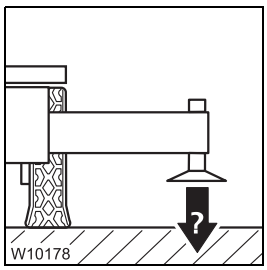
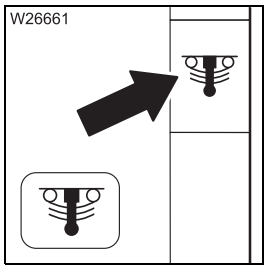
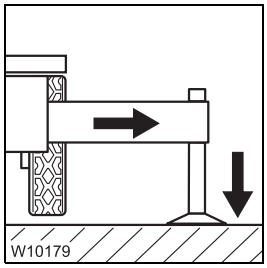


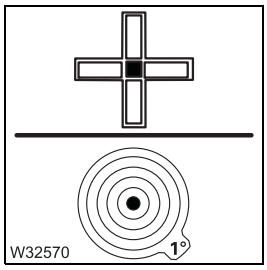
8. Check that the ground will support the maximum occurring outrigger pressures; ➠ *Determining the required load-bearing area*, p. 12 - 11.



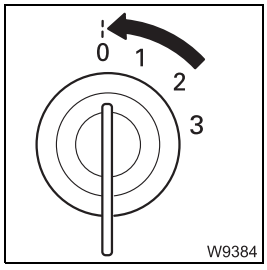
9. Switch off (lock) the suspension.
The symbol must be **red** (suspension off); ➠ p. 5 - 17.



10. Support the truck crane with the outrigger span required for the job according to the *Lifting capacity table* and raise until none of the wheels is touching the ground; ➠ *Outrigger*, p. 12 - 29.



11. Align the truck crane horizontally; ➠ p. 12 - 50.



12. Switch off the engine; ➠ *Switching off the engine*, p. 10 - 13

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Load-bearing area

- Now calculate the required load-bearing area.
- Check that the surface of the outrigger pad (➠ p. 1 - 14) is larger than the calculated load-bearing area. If the surface of the outrigger pad is smaller, you will need to enlarge the load-bearing area.

Danger of overturning if the load-bearing area is too small!
Ensure that the actual load-bearing area is at least as large as specified in the table.
This prevents the ground giving way and the truck crane overturning.

Example for calculating the required load-bearing area:

If the outrigger pressure is 25 t and the ground has a load bearing capacity of 40 t/m^2. then the required load-bearing area for this supporting cylinder is 0.625 m^2 (= 6,250 cm^2).

If the outrigger pad has a surface of 2.000 cm^2, you would need to enlarge the load-bearing area by placing packing under the outrigger pads; ➠ p. 12 - 45.

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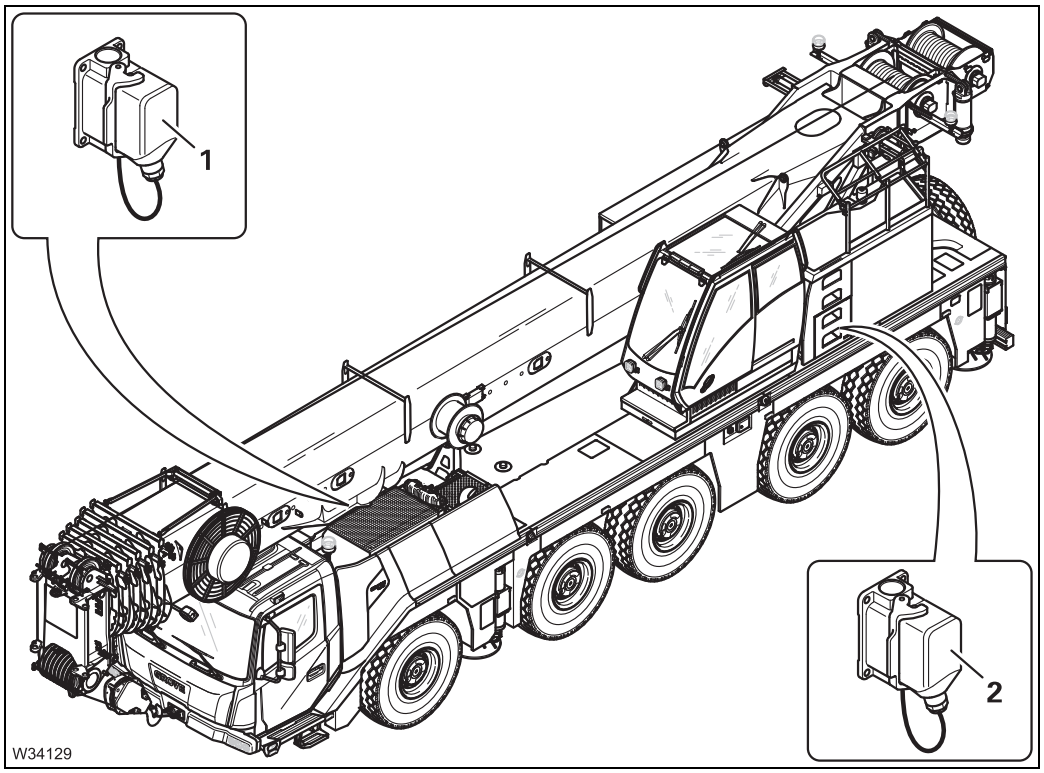
12.4 Connecting/disconnecting the hand-held control

Functionality of the sockets



The hand-held control is only active when it is connected to the sockets (**1**) or (**2**).

	Released operations
1	– Emergency operation for crane movements (except for telescoping mechanism) – Derrick lattice extension[1)]
2	– Emergency operation for crane movements

[1)] Additional equipment

Switch off the engine. Pulling a bridging plug will shut the engine off, but this action is only designed for emergencies.
The ignition can be switched on or off.

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12.6.4 Preparing the truck crane

Driver's cab

Levelling the truck crane

- Align the truck crane horizontally with the level adjustment system; ➠ *Operating the level adjustment system*, p. 5 - 61.

Locking the suspension

- Switch off the suspension; ➠ *Switching the suspension on/off*, p. 5 - 16.

The operating elements for the outriggers are only released if the suspension is switched off. If the suspension is switched off, the wheels are lifted when the crane is put on outriggers.

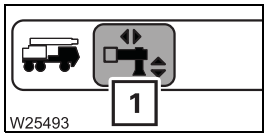
Crane cab

The outriggers can be moved from the crane only when:

– the suspension is switched off,

– the parking brake is applied,

– the slewing gear is switched off.



- Open the *Outrigger* menu (**1**) if necessary.

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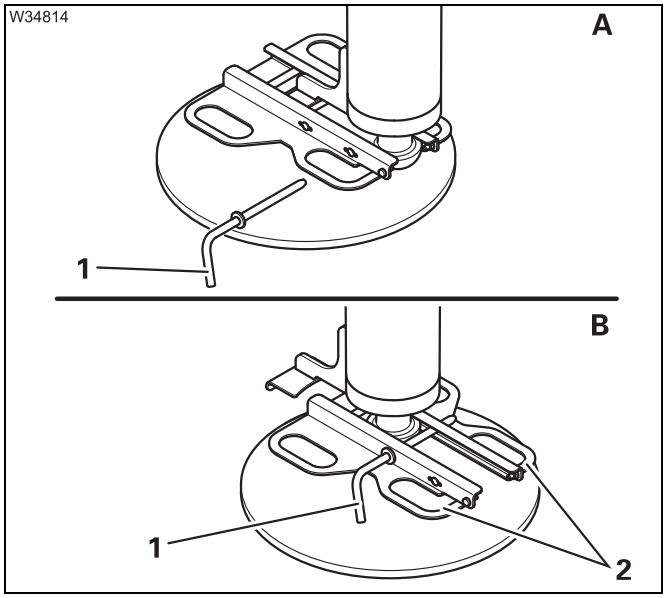
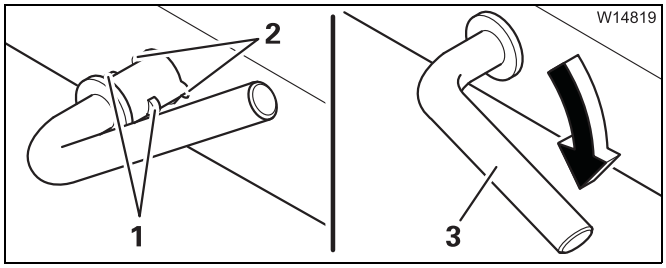
12.6.7 Moving the outrigger pads into operating/driving position



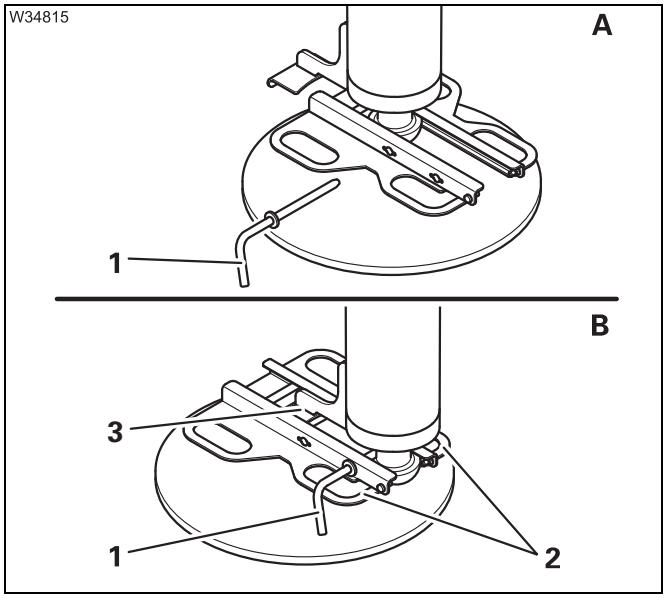
Moving them into working position

- (**A**) – Pull out the pin (**1**).
- (**B**) – Pull the outrigger pad outwards by the handle (**2**).
- Secure the outrigger pad with the pin (**1**).
- Secure the pins (**1**).
- Move the other outrigger pads into operating position in the same way.



Securing pin

- Plug the pin with the peg (**1**) through the cutout (**2**).
- Turn the handle (**3**) downward.



Moving into driving position

- (**A**) – Pull out the pin (**1**).
- (**B**) – Pull the outrigger pad by the handle (**2**) onto the holder (**3**).
- Secure the outrigger pad with the pin (**1**).
- Secure the pins (**1**).
- Move the other outrigger pads into driving position in the same way.

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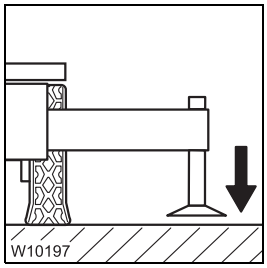
Automatic alignment

During the automatic alignment procedure, the supporting cylinders are **extended** only to prevent any wheels touching the ground after the alignment.

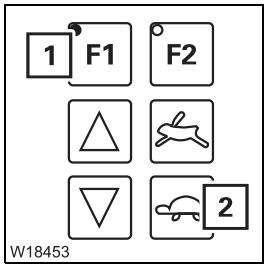
- Check that the prerequisites are met; ➠ p. 12 - 51.



- Extend the supporting cylinders until the outrigger pads are just above the ground.

Starting procedure

Depending on the truck crane's equipment, you can start the procedure from the hand-held control and the *Outrigger* control units.

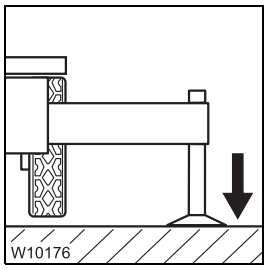


On the control units

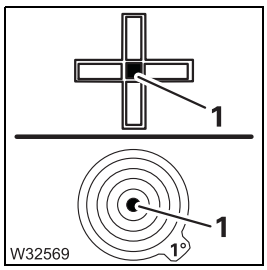
- Press the button (**1**).
- Additionally, press the button (**2**).

The procedure begins.

Automatic procedure



1. All the supporting cylinders are extended one after the other until the outrigger pads touch the ground.
2. All the supporting cylinders are extended simultaneously so that none of the wheels is touching the ground any more.



3. The truck crane is automatically levelled horizontally.

   This procedure is performed:

   – until horizontal alignment is reached, the lamp (**1**) in the centre is the only one lighting up in measuring range 1° **or**

   – until you let go of a button **or**

   – until horizontal alignment is no longer possible, e.g. when a supporting cylinder is extended as far as possible.

Danger of overturning if the truck crane is not level!
When CCS ends the automatic alignment procedure, the truck crane is not necessarily level.
Always check the horizontal alignment on the inclination indicator after automatic levelling.

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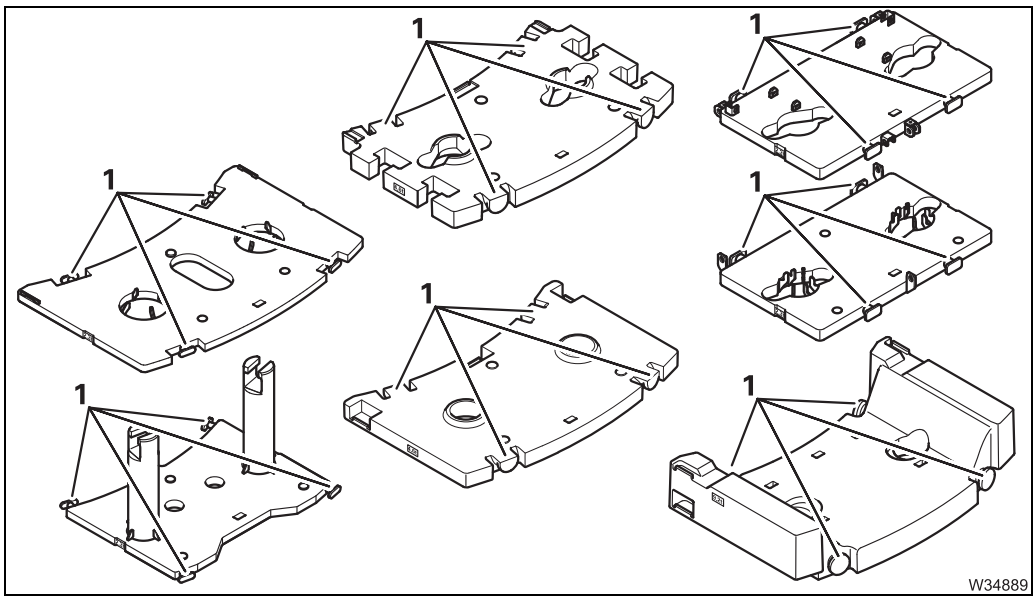
12.7.4 Slinging points on the counterweight sections

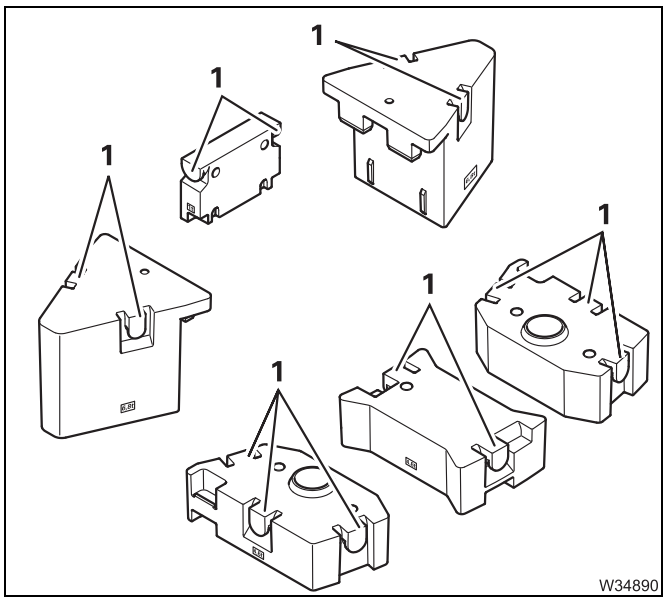
Risk of accidents if used improperly!
Attach the lifting gear to various counterweight section only at the appropriate slinging points. Ensure the lifting gear has sufficient load bearing capacity.
Only lift the sections one by one, since the slinging points are not designed for lifting stacked sections.

- Only use lifting gear of sufficient load bearing capacity.
  Weights; ➠ *Counterweight parts*, p. 1 - 11.

Sections

- Attach the counterweight sections at the slinging points (**1**).





Blocks

- Sling the blocks at the slinging points (**1**).

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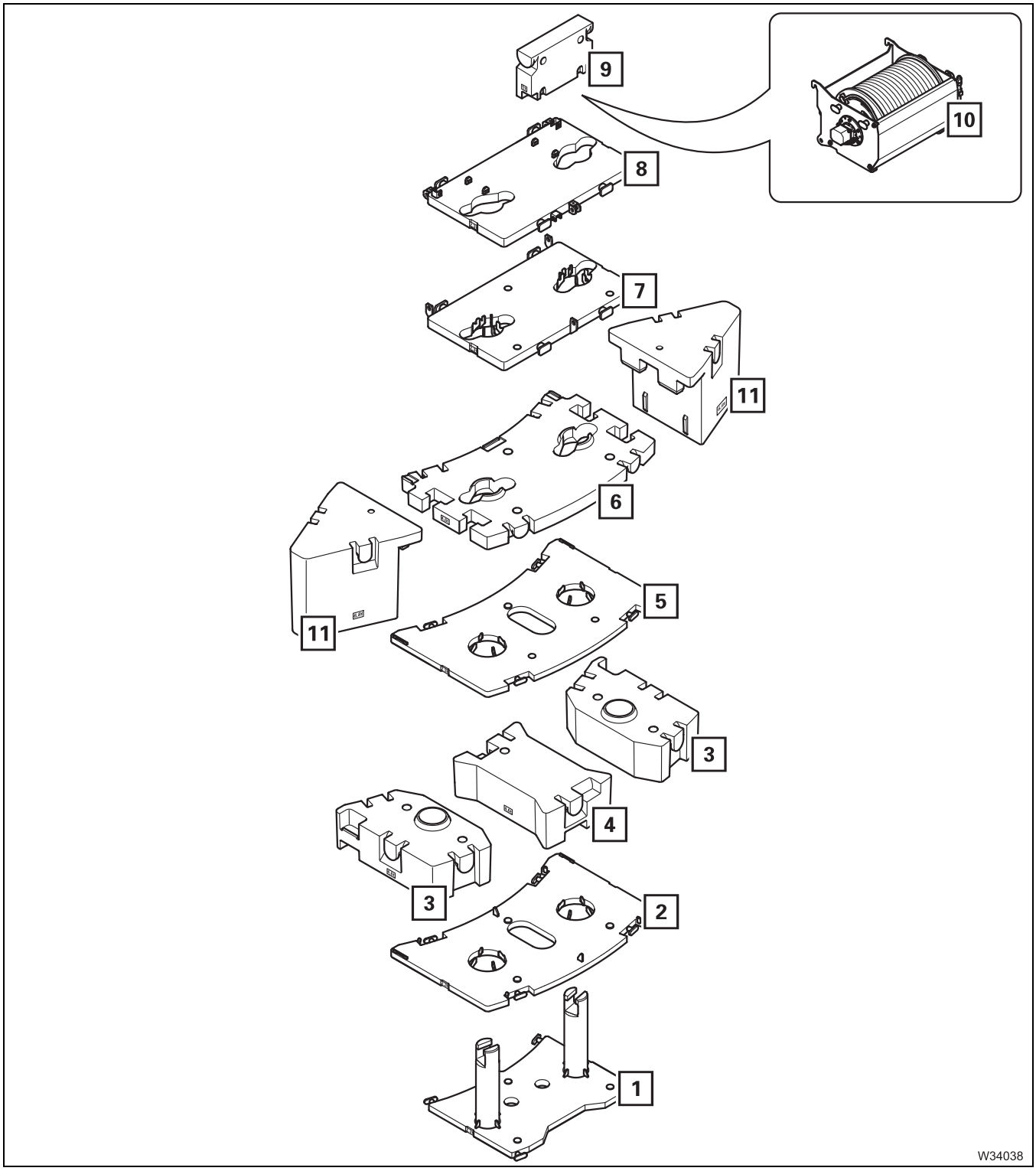
The illustration and the table show all counterweight sections and all counterweight combinations that can be rigged.



- Lift the counterweight sections on to the base plate; ➠ *Slinging points on the counterweight sections*, p. 12 - 63.

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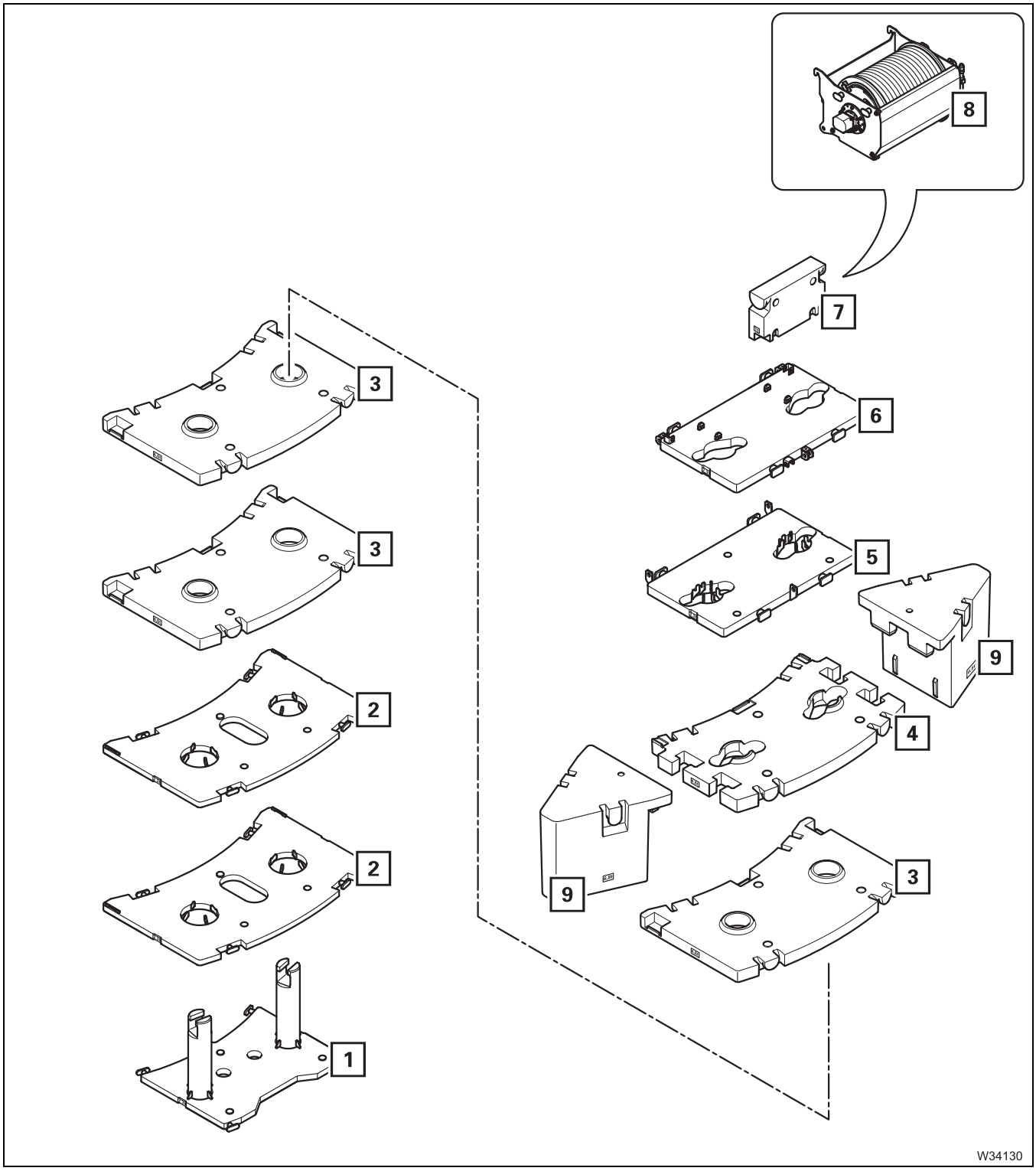
Version 3 The illustration and the table show all counterweight sections and all counterweight combinations that can be rigged.



- Lift the counterweight sections on to the base plate; ➠ *Slinging points on the counterweight sections*, p. 12 - 63.

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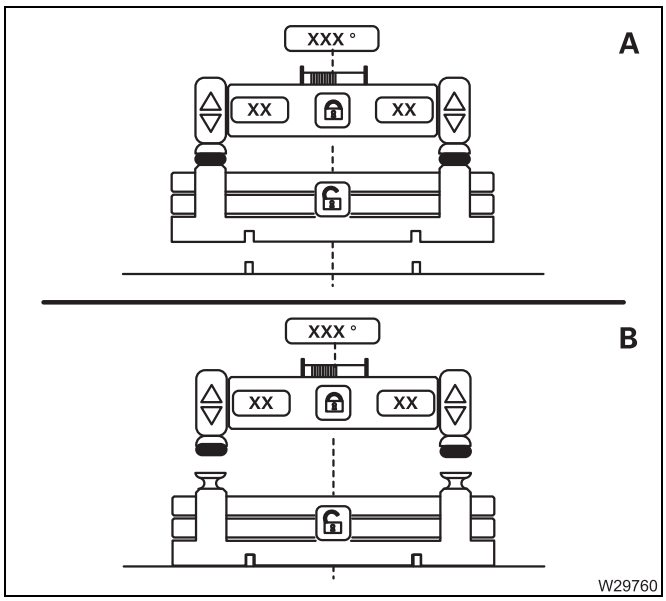


Correct the rigging mode

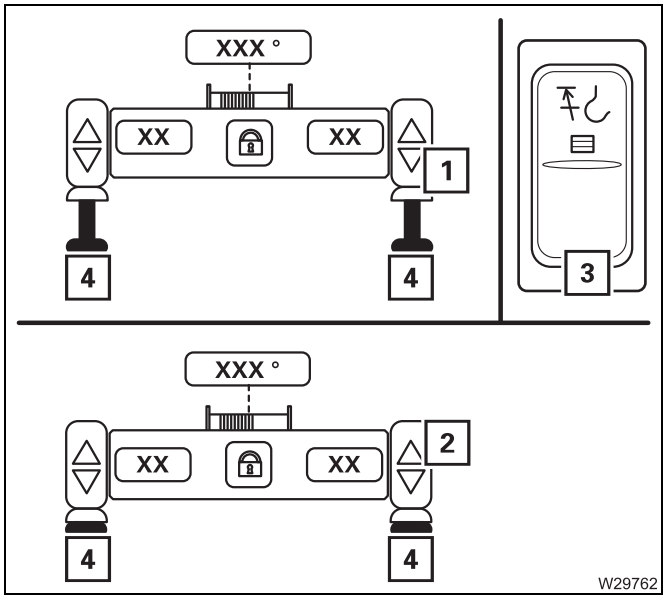
- You can use the automatic mode only if the current rigging mode is displayed.

  A Counterweight rigged

  B Counterweight unrigged

If necessary, correct the displayed rigging mode as follows:

- Slew the superstructure out of the rigging range so that the lifting cylinders can be freely extended.



Assuming the symbol (**4**) is yellow with the counterweight unrigged.

- Press in the override button (**3**).
- (**A**) Fully extend the lifting cylinders – symbol (**1**).
- Release the override button (**3**).
- (**B**) – Fully retract the lifting cylinders – symbol (**2**).

The symbols (**4**) become green.

You can now use the automatic mode.

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12.7.11 Slewing with the rigged counterweight

Slewing with a rigged counterweight is only permissible when:
– The necessary outrigger span is rigged,
– The respective RCL code is shown, and
– The permissible working radius according to *Lifting capacity table* is maintained.

Danger of overturning when slewing with an incorrectly set RCL!
Always check before slewing whether the RCL code valid for the current rigging mode is displayed.
This prevents slewing operations being released within impermissible ranges and the truck crane from overturning.

Risk of overturning when operating with the hand-held control!
When operating with the hand-held control, there is no monitoring by the RCL. Before slewing, always check using the following table whether slewing is permissible.
This prevents the truck crane overturning while slewing.

The following table specifies (depending on the counterweight and outrigger span) whether slewing the superstructure is:

– Permitted

– Only permitted for certain working radii

– Disabled (with the correct rigging mode).

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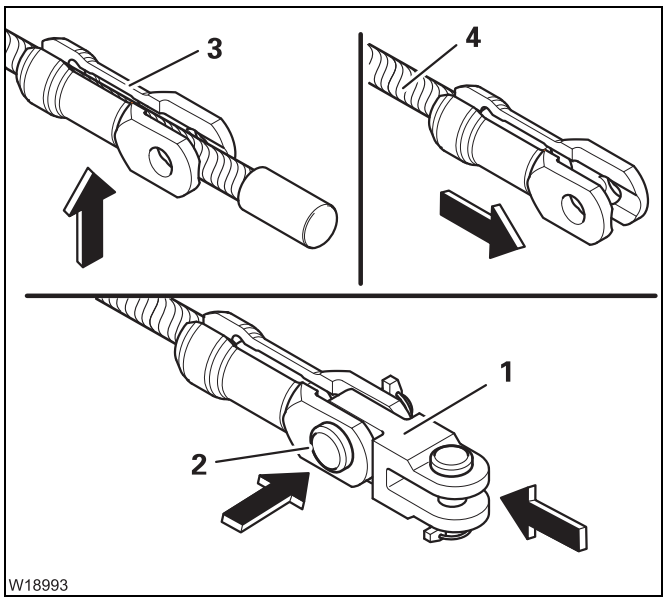
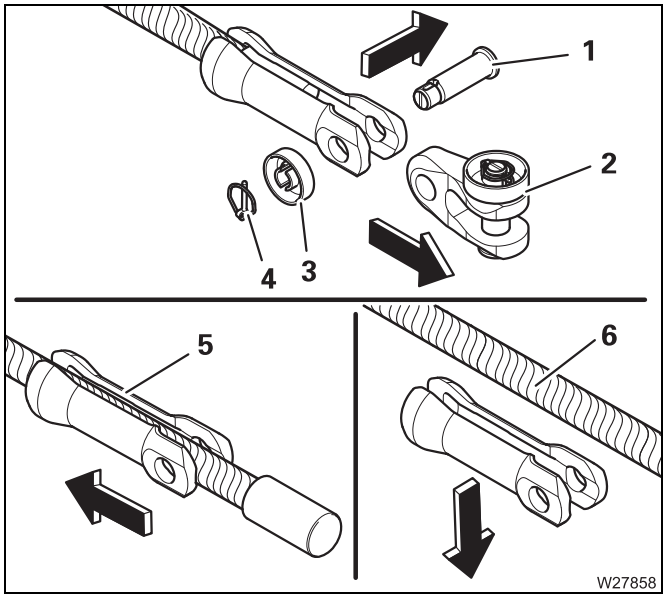


Positioning

- Insert the holder (**3**) and slide it onto the hoist rope (**4**) as far as it will go.
- Fasten the fork (**1**) using the pin (**2**).
- Secure the pin.

Version B



Removing the hoist rope

- Remove the linchpin (**4**).
- Release the locknut (**3**) and pull out the pin (**1**). Remove the bracket (**2**).
- Slide the pocket lock (**5**) back and remove it from the hoist rope (**6**).

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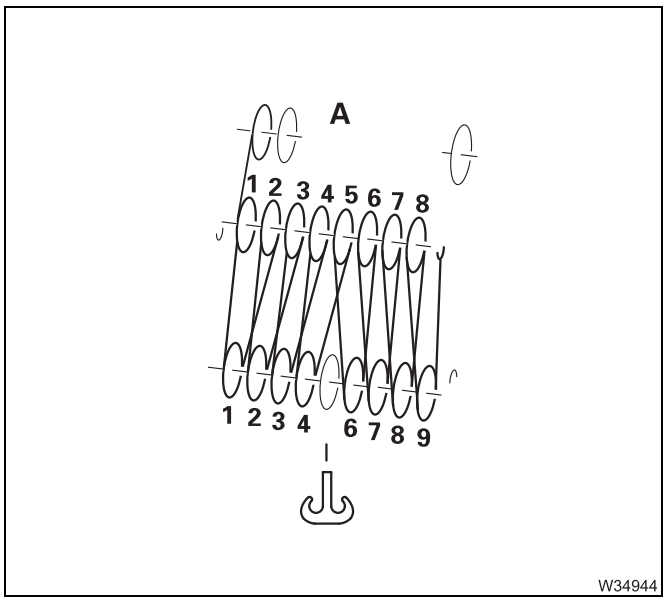
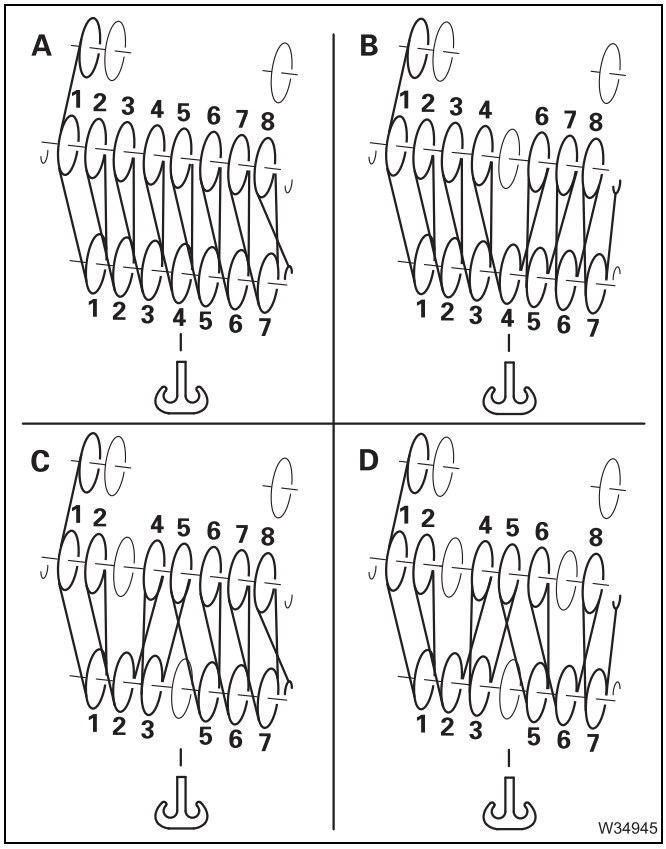


9 sheave hook block

	Reeving
A	16x



7 sheave hook block

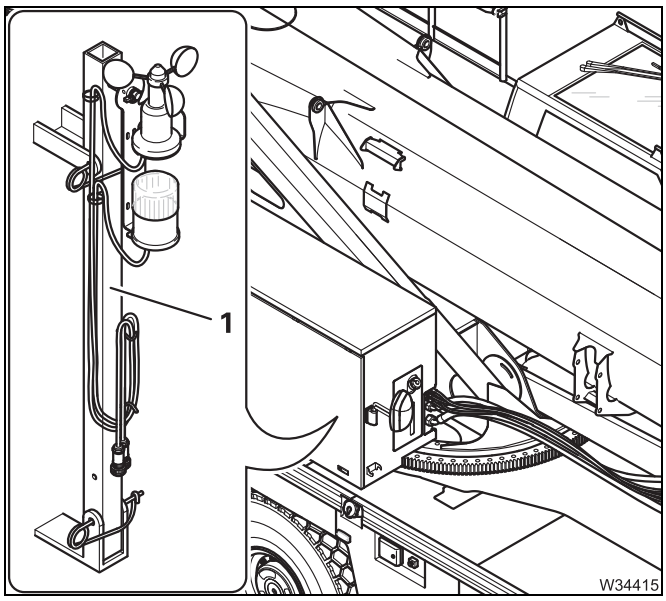
	Reeving
A	15x
B	14x
C	13x
D	12x

12.8.8 Anemometer and air traffic control light

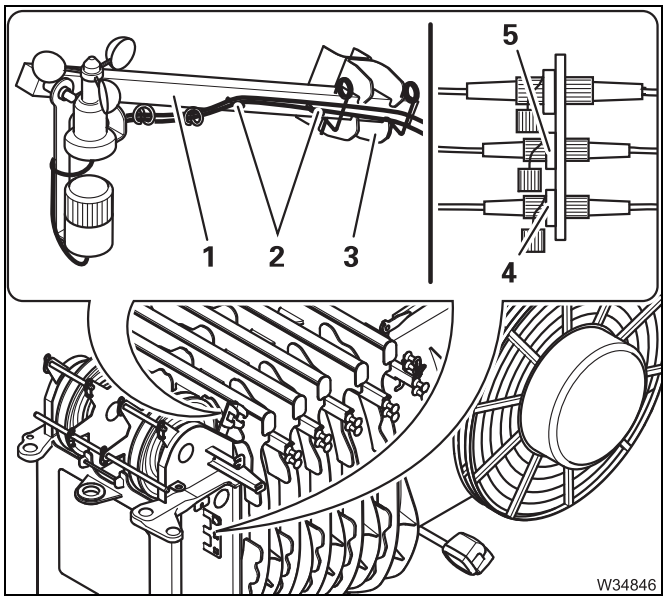
Risk of damage during on-road driving
Always remove the anemometer and air traffic control light before on-road driving.
This prevents the specified overall height being exceeded at on-road level, and the anemometer from getting damaged due to unfavourable air currents.

Installing

The anemometer and the air traffic control light – if provided – are located on the same rod.



- If necessary, remove the rod from the storage compartment (**1**).



- Insert the rod (**1**) into the holder (**3**) and secure it with the retaining pins.
- Remove the cable from the holders (**2**) and connect
  - the anemometer to the socket (**4**),
  - the air traffic control light to the socket (**5**).
- Lay the cables in such a way that they will not be damaged during crane operation.
- Check that the anemometer is able to swing so that it hangs vertically even when the main boom is raised.

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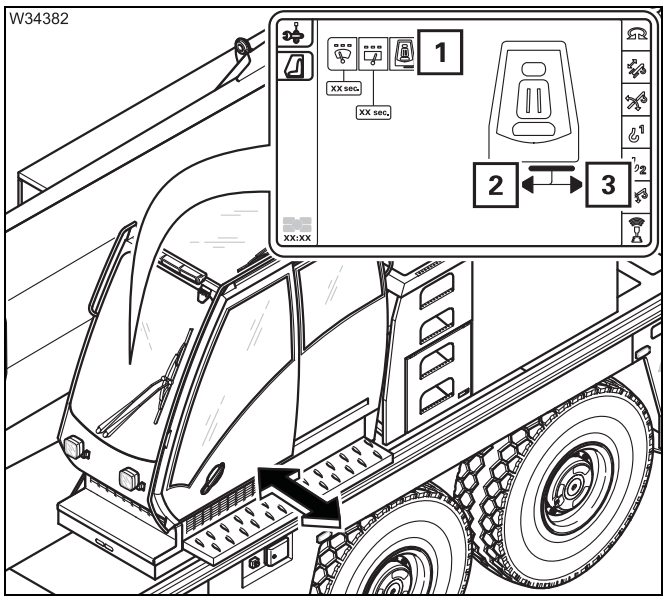
12.9.4 Step for the crane cab

You can operate the step in the *Crane cab* menu or on the outrigger control unit.

Risk of accidents by exceeding the permissible overall width!
Always retract the step for on-road driving.
When the step is extended, the overall width specified for on-road driving is exceeded.

You can only extend the step at the control unit when you are on the operator side.



In the *Crane cab menu*

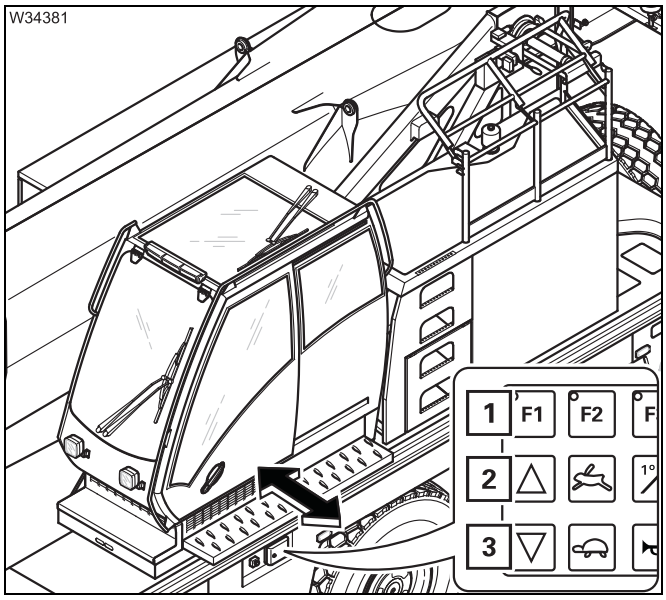
Select extend/retract step as necessary – (**1**).

Extend

- Select and confirm the symbol (**3**) – the step extends.

Retract

- Select and confirm the symbol (**2**) – the step retracts.



On the outrigger control unit

Extend

- Press the buttons (**1**) and (**3**) – the step extends.

Retract

- Press the buttons (**1**) and (**2**) – the step retracts.

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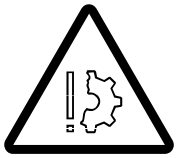
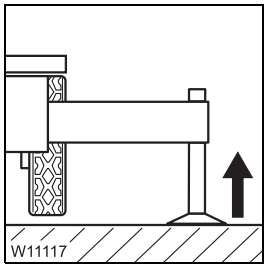
13.3.3 Putting the truck crane on the wheels

Danger of overturning by unevenly retracting the outrigger cylinders!
Retract the outrigger cylinders evenly! This prevents the truck crane from overturning while retracting individual outrigger cylinders.

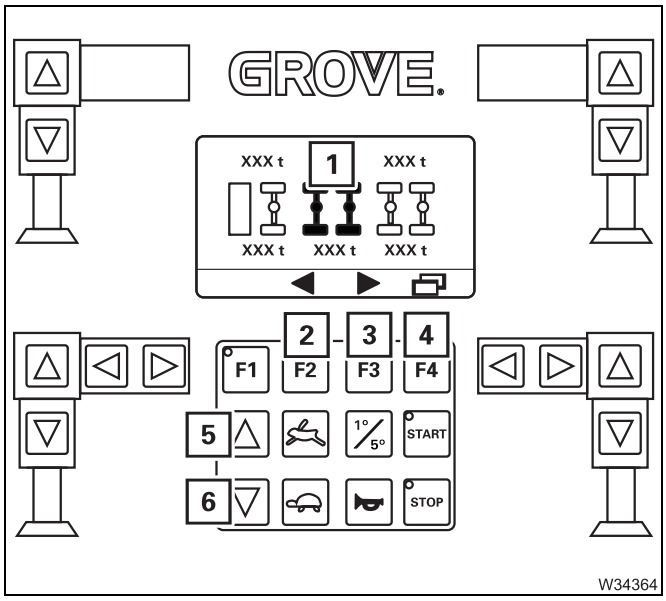


Risk of damage to the axle lines!
Retract the outrigger cylinders evenly! This prevents excessive strain on the axle lines.



- If necessary, retract the outrigger cylinders until all wheels are just above the ground.

Danger of overturning when switching on the suspension!
You may under no circumstances switch on the suspension while the rigged truck crane is on wheels. Switching on the suspension would cause the suspension struts to be suddenly collapsed and damaged, and the truck crane could overturn.



Lowering/raising the axles

- Open the Raise Axle menu – button (**4**).
- Select the axles to be lowered by pressing button (**2**) or (**3**).

– The selected axles (**1**) are displayed in black.

- Press the button for the desired movement:
  - **5** Raise the axles
  - **6** Lower the axles

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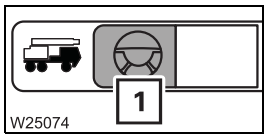
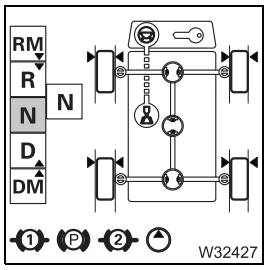
13.5.3 Steering

Switching on

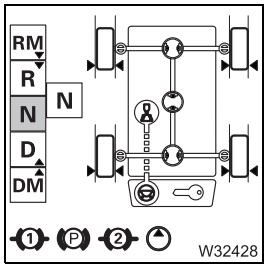


Opening the menu (**1**) switches on normal steering mode.

Steering direction The steering direction is adjusted automatically to suit.



– **Turned to the front**
The buttons' direction of movement corresponds to the steering direction of the truck crane if the superstructure is in the *180° to the front* position.



– **Turned to the rear**
The buttons' direction of movement corresponds to the steering direction of the truck crane if the superstructure is in the *0° to the rear* position.

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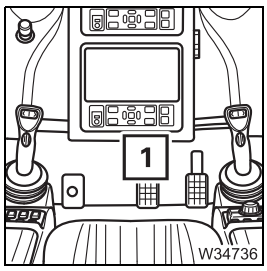
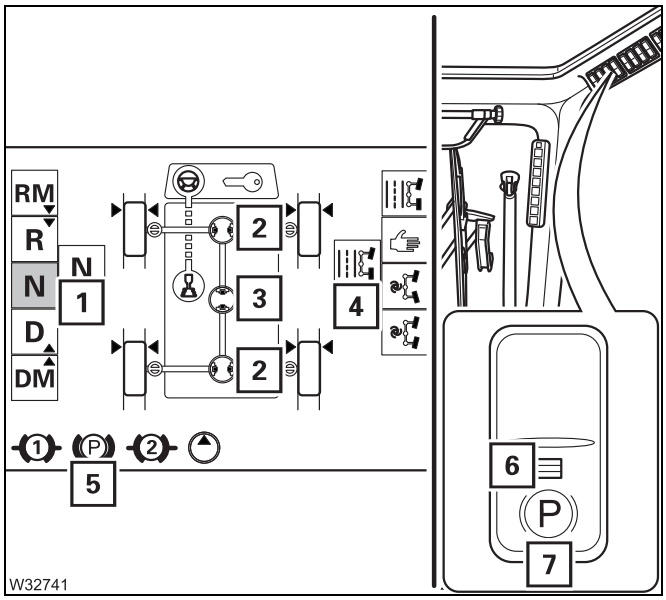
13.5.7 After driving



- Bring the truck crane to a halt with the brake pedal (**1**).



- Restore the original condition:
  - Switch the transmission to neutral position (**1**)
  - Switch off longitudinal differential lock off (**3**),
  - Switch off transverse differential locks (**2**),
  - Switch on normal steering mode (**4**).
- Press button (**7**) in at the bottom once. The lamp (**6**) lights up, symbol (**5**) is **red** – the parking brake is applied.
- If necessary, switch the engine off; ➠ *Switching off the engine*, p. 10 - 13.
- Remove the ignition key from the ignition lock in the driver's cab and lock the driver's cab to prevent unauthorised access.

Support the truck crane on outriggers if you do not intend to work in the *Free on wheels* working position.

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Designation	Amperage (A)	Function
F2/1	15	Control unit UB 1 IOL 30
F2/2	15	Control unit UB 2 IOL 30
F2/3	15	Control unit UB 2 IOL 30
F2/4	15	Control unit UB 1 IOL 34
F2/5	15	Control unit UB 2 IOL 34
F2/6	15	Control unit UB 2 IOL 34
F2/7	15	Control unit UB 2 IOL 34
F2/8	–	Unassigned

Designation	Amperage (A)	Function
F3/1	–	Unassigned
F3/2	–	Unassigned
F3/3	–	Unassigned
F3/4	3	Contact switch for cab lighting
F3/5	5	CCS display
F3/6	5	Hand-held control
F3/7	7.5	Comfort seat[1)]
F3/8	5	Cigarette lighter

[1)] Additional equipment

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14.4.11 Malfunctions on the counterweight hoist unit

Malfunction		Cause	Remedy
Counterweight hoist unit is not working		Emergency stop switch on	➠ *Resetting the emergency stop switch*, p. 4 - 22
		Control unit fuse blown	Replace blown fuse; ➠ p. 14 - 5
Error symbol (!) is displayed		Function disabled by CCS	If necessary, acknowledge error message once and briefly switch off the ignition – if error persists, notify **Manitowoc Crane Care**
		Electronic system has detected an electrical or logical error	
Extend lifting cylinder not working		Superstructure unlocked	➠ *Locking the superstructure*, p. 11 - 16

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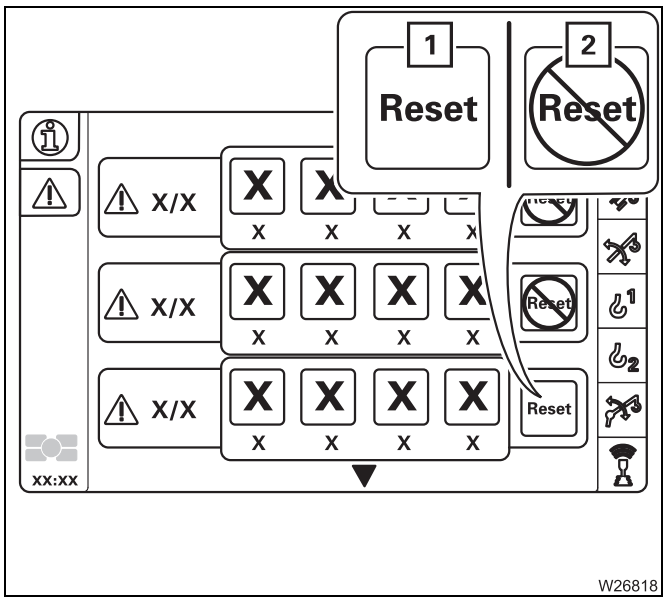
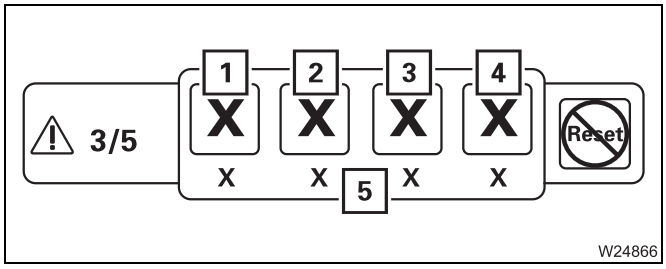


To acknowledge the error
Display symbol (**1**) – error can be acknowledged
Display symbol (**2**) – error cannot be acknowledged

- Select and confirm symbol (**1**) to acknowledge the error.

If the error cannot be acknowledged, consult **Manitowoc Crane Care**.



Error message display

For each error the display shows:

– the error code (**5**),

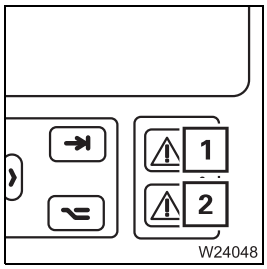
– the symbols for

1 the faulty component

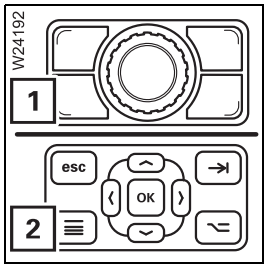
2 the error type

3 the control unit which detected the error

4 the index in the error group



When all errors are acknowledged, the lamps (**1**) and (**2**) go out.



Exiting the menu

You can exit the *Errors* menu at any time.

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

The next highest menu is opened.

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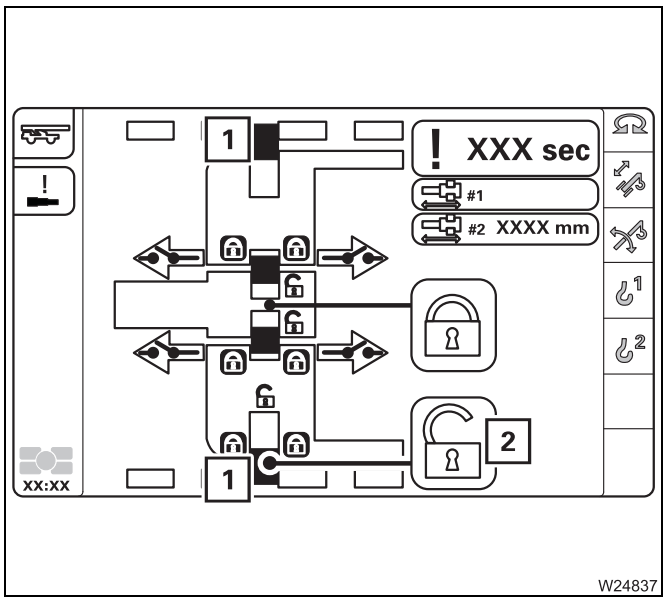
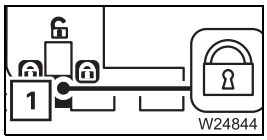


- Retract the telescopic section slowly and as far as possible; *Locking points for the telescopic sections*, p. 14 - 40.
- Extend to approx. 28 mm (0.09 ft).
- Select and confirm the symbol (**2**).

The telescopic section is now locked. In the *Locked* position Locked, the locking pins (**1**) are **green**.

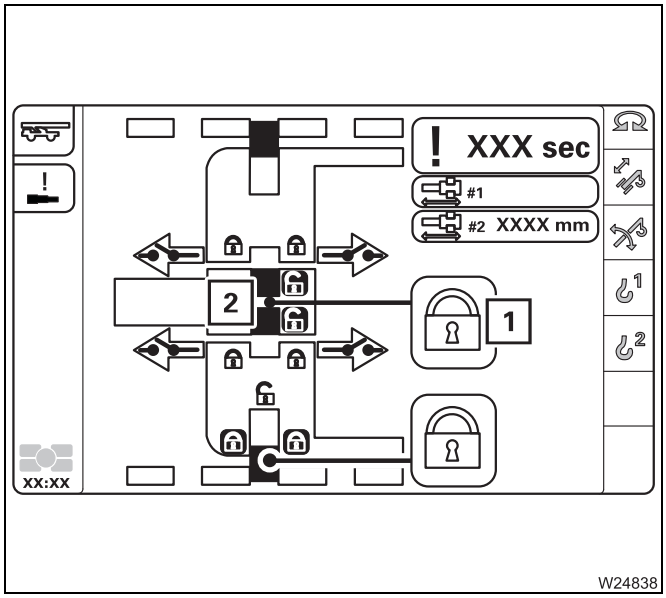
- Set down the telescopic section and retract it as far as it will go.



Unlocking the telescoping cylinder

If the telescopic section (**1**) is locked, you can now unlock the telescoping cylinder.

Risk of accidents from sudden retraction of a telescopic section!
You can select and confirm the symbol for unlocking the telescoping cylinder only a **maximum of 2 times**. If this does not start the unlocking procedure, contact **Manitowoc Crane Care**.



- Select and confirm the symbol (**1**).

The telescoping cylinder is now unlocked. In the *Unlocked* position, the locking pins (**2**) are **red**.

You can now move the telescoping cylinder into the next telescopic section; *Locking points for the telescoping cylinder*, p. 14 - 39.

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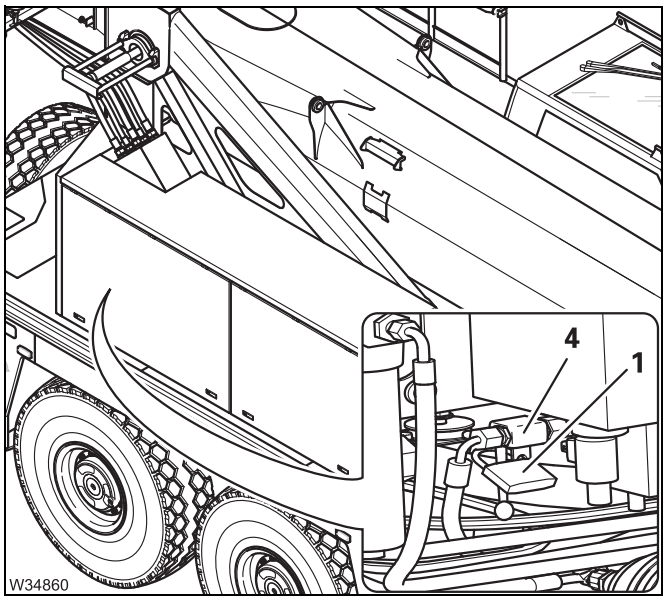
14.6 Hydraulic emergency operation

This section only applies to the standard hydraulic emergency operation. If the truck crane is equipped with an hydraulic **emergency operation system to BGR 159**; ➠ p. 14 - 52.

In hydraulic emergency operation, you can operate the derricking gear and the main hoist, e.g. to raise the main boom in the case of a defective engine.

Risk of accidents due to improper use!
Use hydraulic emergency operation only to transport small loads in emergencies. Have the malfunction rectified as soon as possible. Crane operation in hydraulic emergency operation is prohibited since it is not monitored by the RCL.

Switching over valves



On the crane's hydraulic system:

For crane operation

- Close the valve (**4**). Secure the valve with the lock (**1**).

For emergency operation

- Remove the lock (**1**). Open the valve (**4**).

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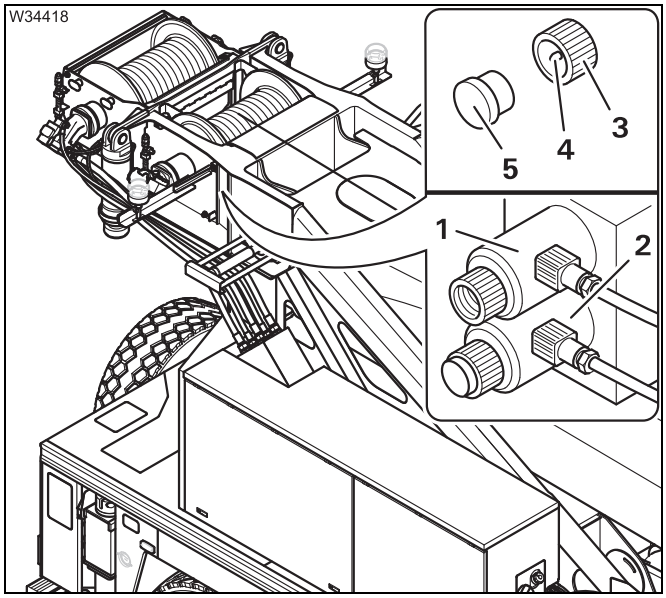
For lifting/ lowering

After establishing the hydraulic circuits you must also:

– switch one valve permanently on,

– connect one valve to the hoist.



Switching on continuous operation

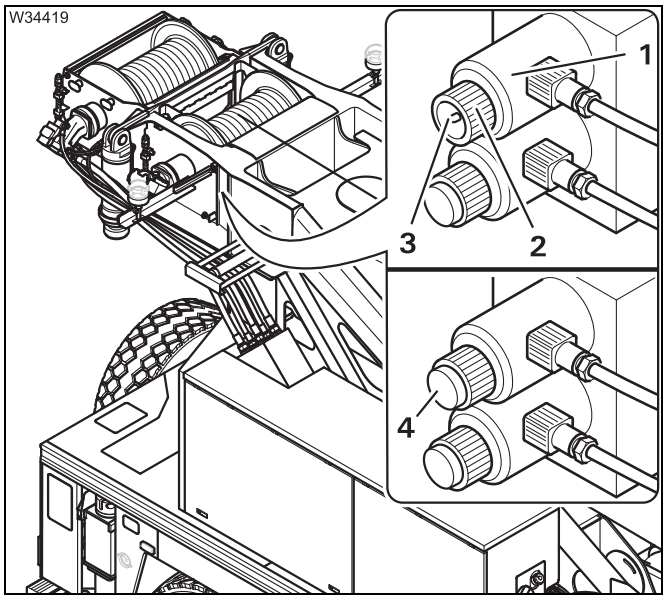
Always switch only **one** valve to continuous operation.

1 Valve Y1104 – *Lowering* **or**

2 Valve Y1105 – *Lifting*

- Unscrew the cap (**3**) e.g. from the valve (**1**).
- Remove the plug (**5**).
- Screw the cap and pin (**4**) on to the valve – continuous operation is now switched on.

Danger due to falling loads!
Switch off continuous operation immediately after emergency activation.
Check whether the pins can be seen on both caps.
Thus you prevent loads from falling down immediately after lifting in subsequent crane operation.



Switching off continuous operation

- Unscrew the cap (**3**) from the actuated valve (**1**), (**2**).
- Screw the cap on so that the pin (**4**) can be seen.
- Insert the plug (**5**).

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