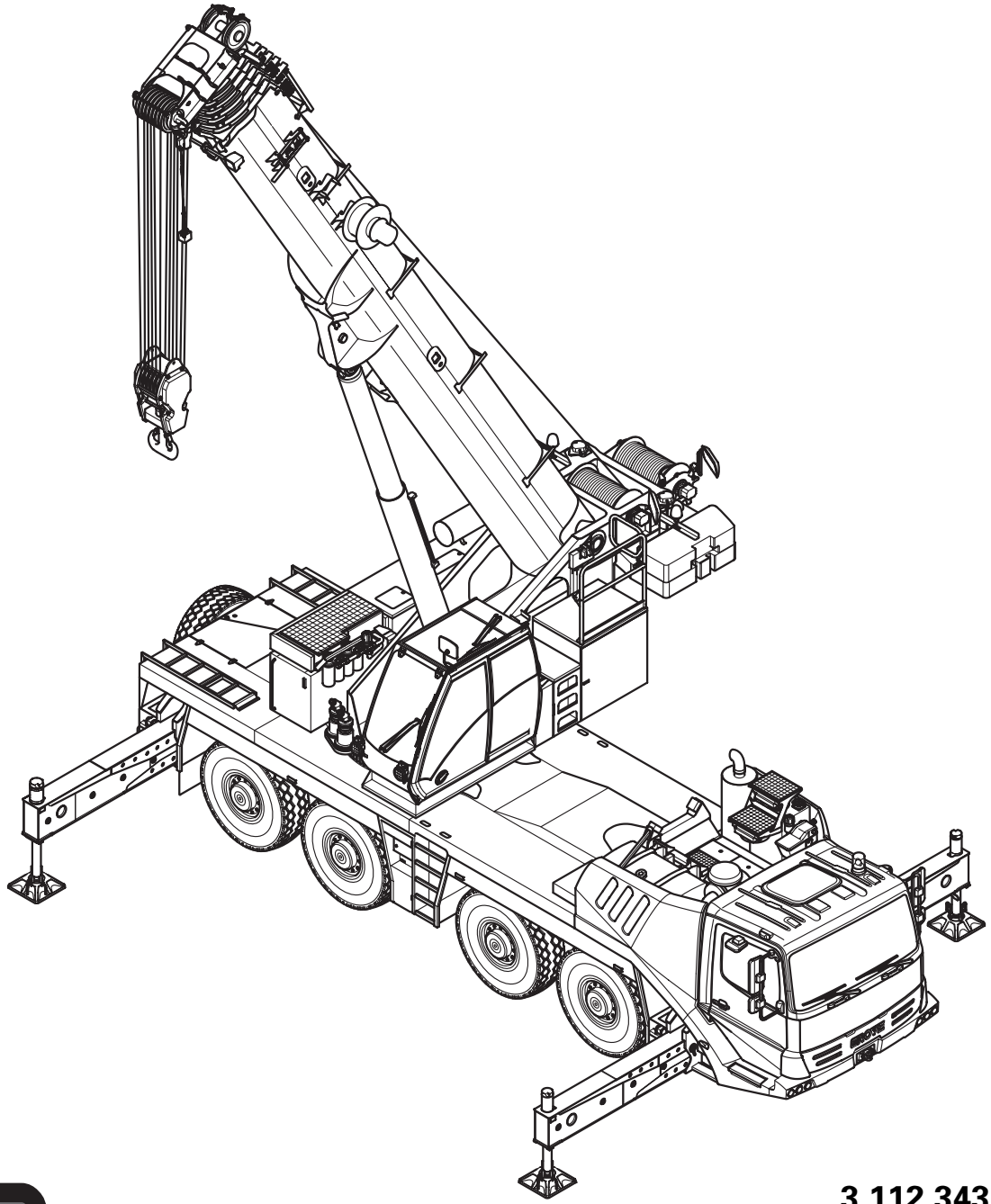
GROVE

GMK 4100

Operating instructions
Part 1 – Driving



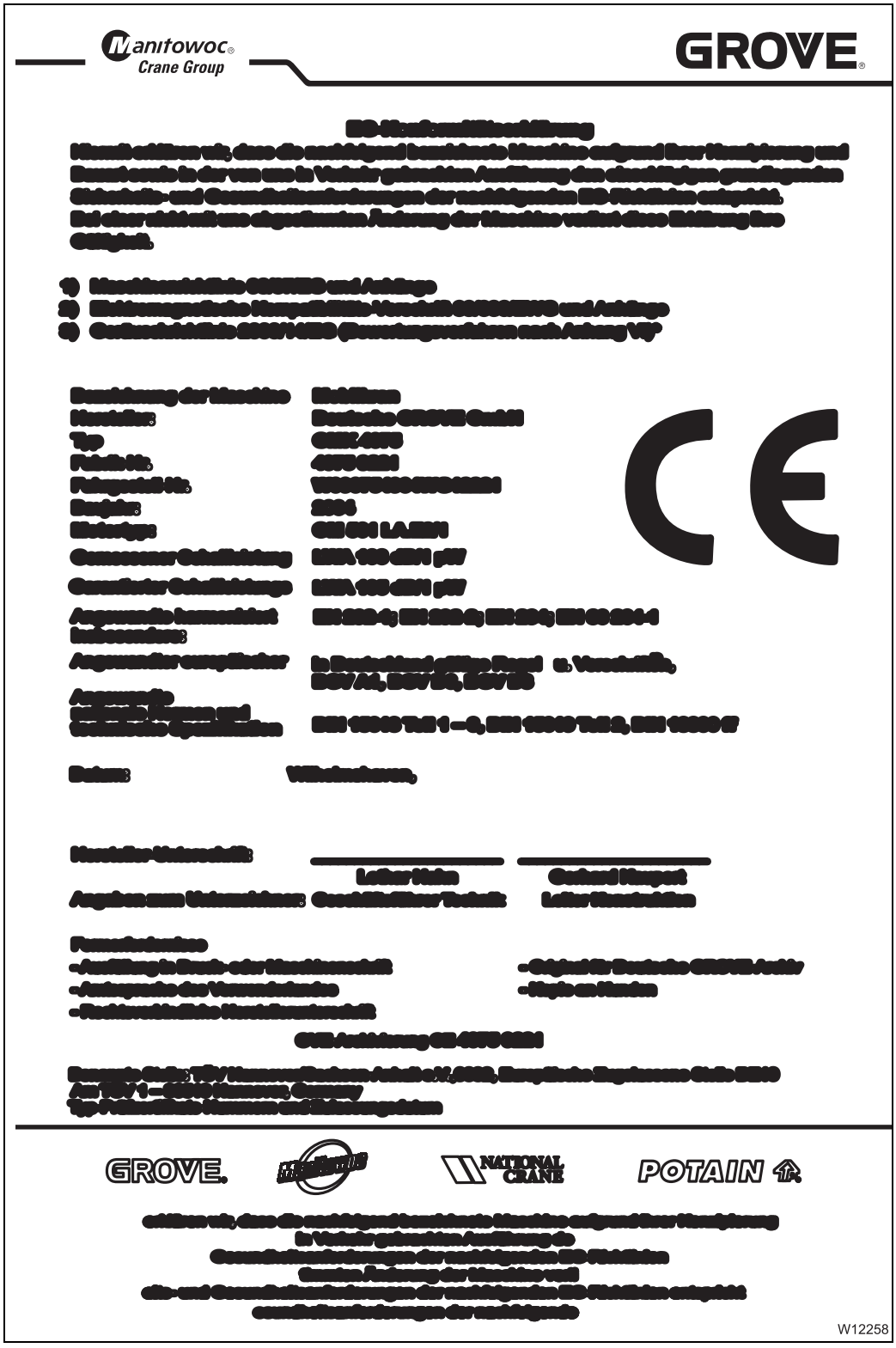
Manitowoc Crane Group

Serial number

3 112 343 en
23.11.2006

1.2 EC Declaration of Conformity

Operators of truck cranes which are delivered to EU member countries receive a declaration of conformity as a supplement to the delivery protocol. An example of the declaration of conformity is illustrated below.



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1.5 Conversion table for US measurements

The following conversion factors will help you convert from metric to US units and vice versa when the truck crane is being used in countries that use US units of measurement.

Converting from	to	Multiply by
mm	to	0.03937
to	mm	25.4
m	ft	3.28084
ft	m	0.30479
m^2	ft^2	10.76391
cm^2	in^2	0.155
cm^3	in^3	0.061
l	gal (US)	0.264178
kg	lbs	2.204622
lbs	kg	0.45359
t	lbs	2204.622
lbs	t	0.0004536
kN	lbf	224.809
daN / cm^2	lbf / in^2	14.50378
lbf / in^2	daN / cm^2	0.06895
bar	psi	14.50378
psi	bar	0.06895
m/s	ft / s	3.28084
km/h or km	mph or mi	0.62137
mph or mi	km/h or km	1.60935
Nm	lbf ft	0.7375
°C	°F	1.8 x °C + 32
°F	°C	(°F-32) / 1.8
t / m^2	lbs / ft^2	204,8
m^2 / t	ft^2 / lbs	0,04882

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2.5 Safety instructions for crane operation

Carefully select a safe site for the truck crane from 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 instructions. 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.

Check the safety devices (SLI, 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 only on those parts of the truck crane which are equipped with appropriate steps and railings and therefore guarantee safety.

Always use a ladder for work above head height.

Keep all handles, steps, step treads and ladders free of dirt, snow and ice.

Check all operating and control elements in the crane cab before starting the engine.

After starting the engine, take note of all the lights and control elements.

Make sure that there are no unauthorized people in the vicinity of or on the truck crane when rigging or during crane operation. Cordon off the danger zone clearly and mark the zone as such.

When lifting a load, raise the boom to balance out the increase in radius caused by the boom bending so that the load is lifted up vertically and does not drag, injure helpers or fall into the hoist rope diagonally (e.g. from a vehicle or scaffolding). Inform any banksmen and helpers about this issue as well.

Support the truck crane with the outrigger span required for the currently rigged counterweight before turning the superstructure.

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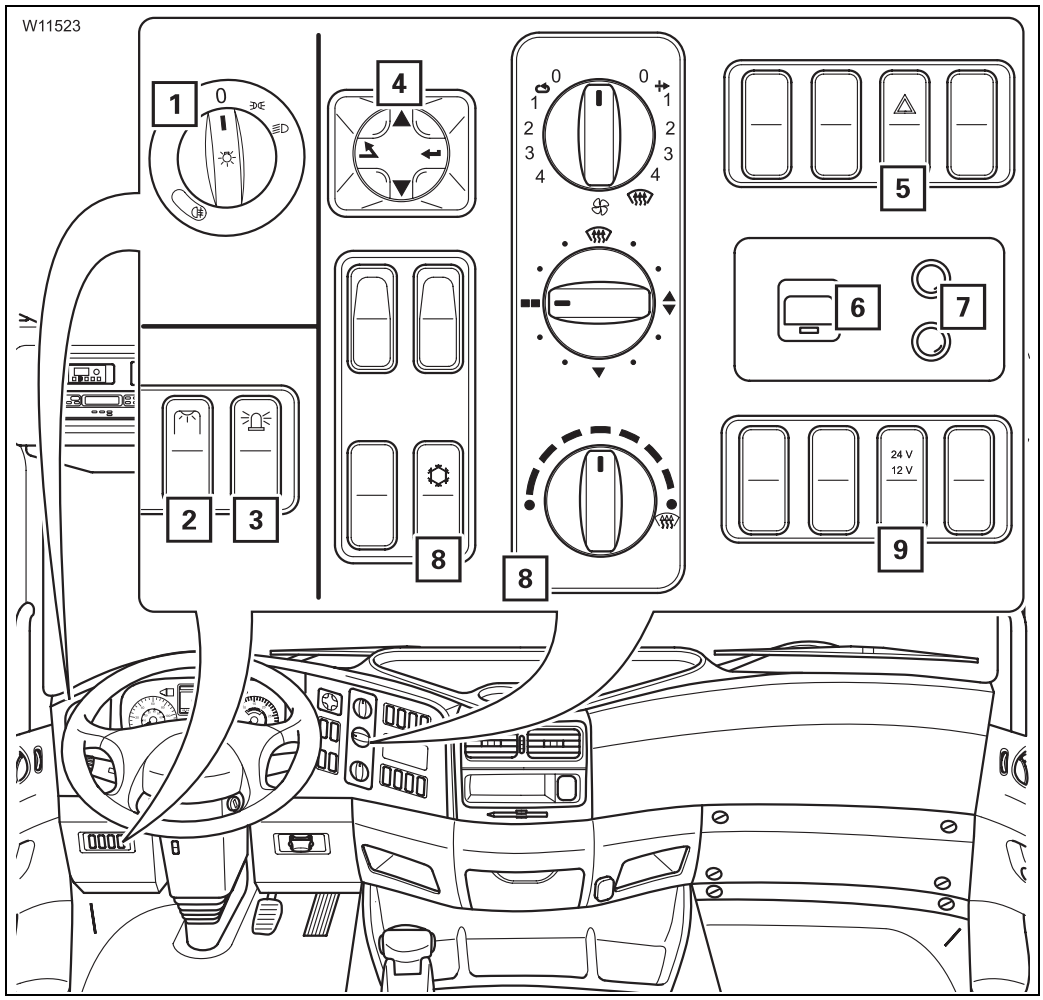
3.1.3 Instrument panel

Left / right



1 Lighting on / off ➠ p. 3 - 49

2 Outrigger lighting on / off ➠ p. 3 - 49

3 Rotating beacon on / off ➠ p. 3 - 49

4 Operating the on-board computer ➠ p. 3 - 54

5 Hazard warning system on / off ➠ p. 3 - 49

6 Data logger[1), 2)]

7 Soot particle filter indicator lamp – Version 1[1)] ➠ p. 3 - 33
Version 2[1), 2)]

8 Heating / Air-conditioning system[1)] ➠ p. 3 - 24

9 Voltage 12 V on / off ➠ p. 3 - 34

[1)] Additional equipment

[2)] ➠ *Separate operating instructions*

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1 Transfer case for off-road gear on / off p. 3 - 41
Transfer case display p. 3 - 41

2 Displaying the vehicle height[1)] p. 5 - 8

3 Suspension display p. 3 - 47

4 Level adjustment system submenu p. 3 - 18

5 Warning, steering circuit 1 and steering circuit 2 p. 3 - 46

6 Transverse differential locks display p. 3 - 42
Transverse differential locks on / off p. 3 - 42

7 Longitudinal differential locks display p. 3 - 42
Longitudinal differential locks on / off p. 3 - 42

8 Settings submenu p. 3 - 20

9 Hydraulic oil temperature display p. 4 - 18

10 Steering locking status display p. 3 - 46
Separate steering on / off p. 3 - 46

11 Serial number / program version display p. 3 - 36

12 Warning display p. 3 - 36

[1)] Additional equipment

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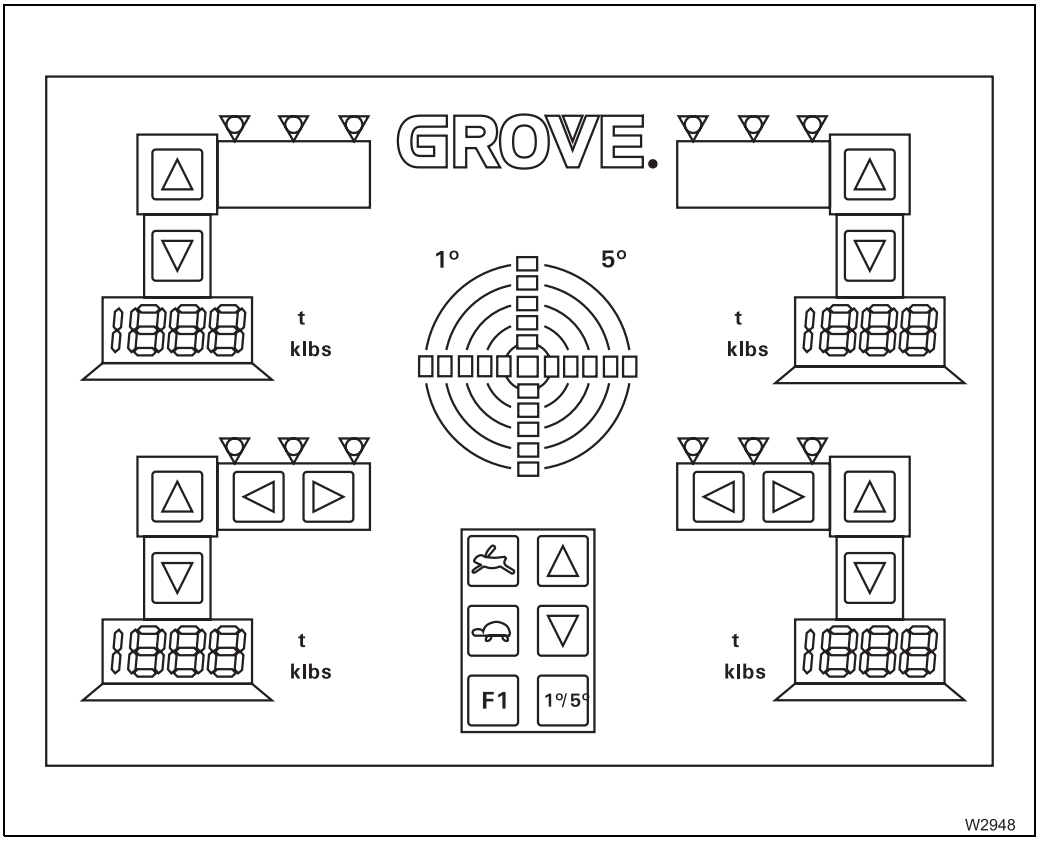
3.1.13 Outrigger control units



Contain operating elements for crane operation; ➠ *Outrigger control units*, p. 10 - 46.

When driving, error messages relating to the carrier electronics can be read on this display; ➠ p. 7 - 33.

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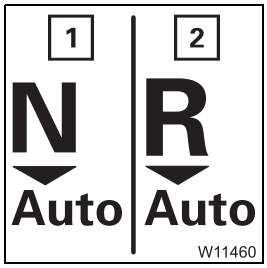
3.2.7 Transmission

Transmission display

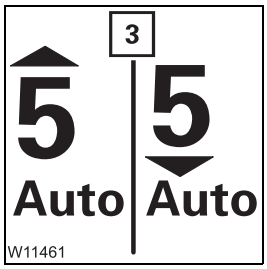
Operating the transmission, p. 5 - 29.

Transmission display



1 Neutral position switched on

2 Currently selected gear – reverse



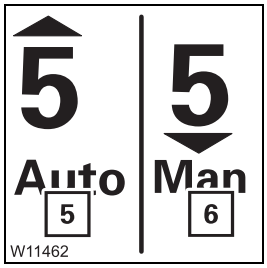
3 Currently selected gear – forwards (1 to 8) e.g. **5**

– **Arrow pointing up:** full gear

– **Arrow pointing down:** ½ gear

p. 5 - 31

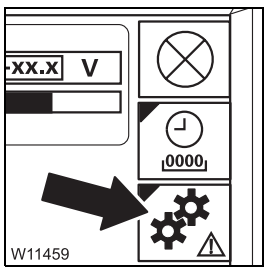
4 – Flashing: previously selected gear, e.g. **6**



5 *Automatic* operating mode on

6 *Manual* operating mode on

ECOS display



Transmission emergency program submenu

– **To open:** Press button once – submenu opens

p. 7 - 38

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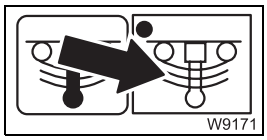
3.2.12 Suspension

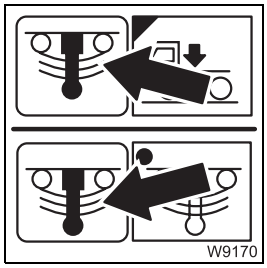
➠ *Switching the suspension on / off*, p. 5 - 14.



Suspension on / off

– **To switch on:** Press button once – dot green
– **To switch off:** Press button once – dot black

➠ p. 5 - 15

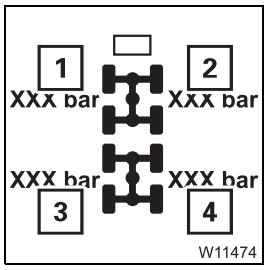


Suspension display

In the main menu and in the *level adjustment system* submenu

– **Green:** suspension on – enabled for on-road driving
– **Red:** suspension off – blocked for crane operation

➠ p. 5 - 15



Suspension operating pressure gauge

1 Suspension pressure, first and second axle lines, left-hand side
2 Suspension pressure, first and second axle lines, right-hand side
3 Suspension pressure, third and fourth axle lines, left-hand side
4 Suspension pressure, third and fourth axle lines, right-hand side

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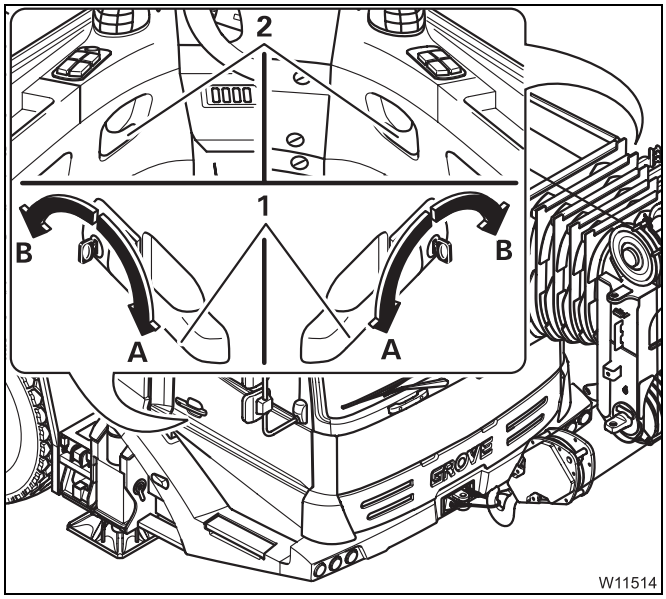
Doors The same key is used for the driver's and passenger's door.

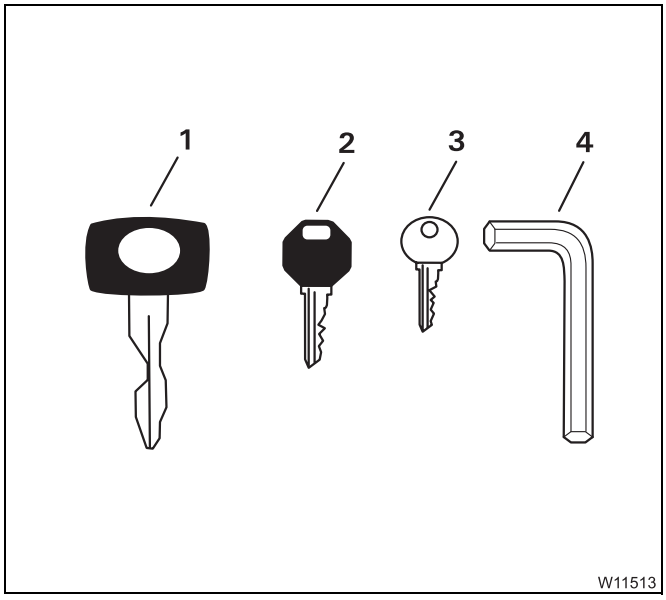


Lock
- Turn the key in the **B**, or
- Press in the handle (**2**)

Unlock
- Turn the key in the **A**, or
- Pull the handle (**2**)

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

Keys Different keys are supplied.



1 Door locks / ignition lock of driver's cab
2 Control unit, outriggers[1)]
3 Fuel tank[1)]
4 Covers

[1)] Additional equipment

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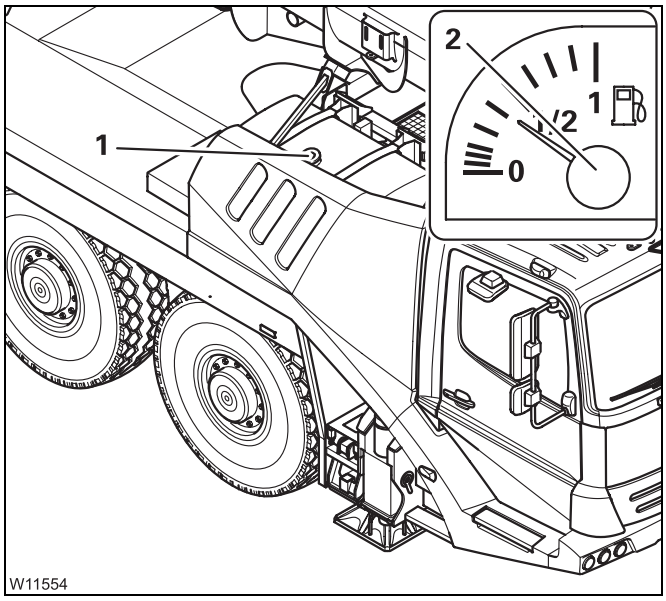
4.1.4 Refuelling

Only use permitted fuels; ➠ *Separate engine operating instructions, provided by the manufacturer*.

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



The display (**2**) shows the fuel supply in the tank (**1**).

- Refill the fuel in due time, and close the tank (**1**) with the lid.

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

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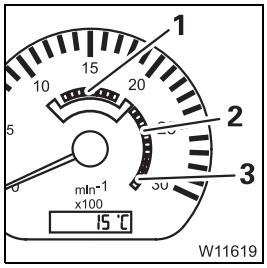
4.1.11 Control elements

Instrument panel

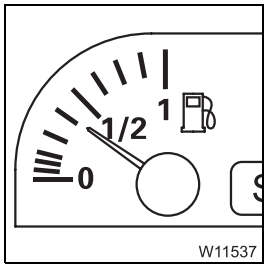


Tachometer

1 Green: appropriate consumption

2 Yellow: engine brake active

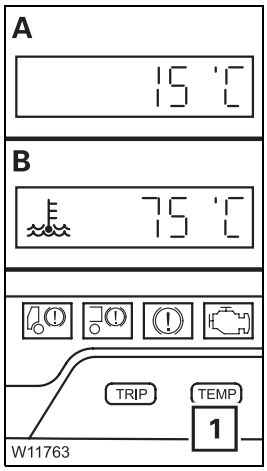
3 Red: engine speed to high – danger;
➠ *Inspections when driving downhill*, p. 5 - 44



Fuel level display

Never run the fuel tank completely dry; always refuel in due time;
➠ p. 4 - 7.

If the fuel tank is almost empty, air can be sucked in and the fuel system must be bled; ➠ *Maintenance manual*.



Temperature of the coolant / outside air display

Switch over the display:

- Press the button (**1**) repeatedly until the desired temperature is shown.

Temperature display.

A: outside air

B: coolant Is shown automatically when the limit value is exceeded;
➠ *Messages on the on-board computer display*, p. 5 - 50.

Set the temperature unit (°C / °F); ➠ p. 5 - 25.

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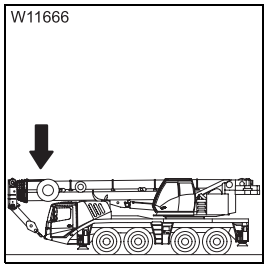
5 Driving

5.1 Before driving

5.1.1 CHECKLIST: inspections before on-road driving

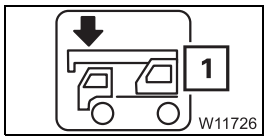
This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.
Observe the warnings and safety instructions specified there.



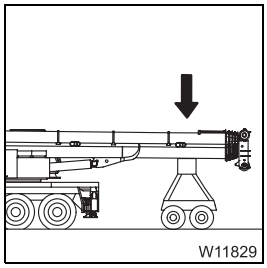
1. If the boom is on the boom rest

– All telescopic sections are interlocked; the telescoping cylinder is locked with telescopic section I

– The slewing gear is switched off; ➠ p. 12 - 92,



– The symbol (**1**) is displayed (if present); ➠ p. 5 - 8.



2. When the main boom is resting on a trailer

– All telescopic sections are locked

– The slewing gear is switched off; ➠ p. 12 - 92,

– The boom floating position is switched on; ➠ p. 6 - 9

– The slewing gear freewheel is switched on; ➠ p. 6 - 8

– The boom pre-tensioning may be switched on; ➠ p. 6 - 10

– The houselock may be switched off; ➠ p. 12 - 14

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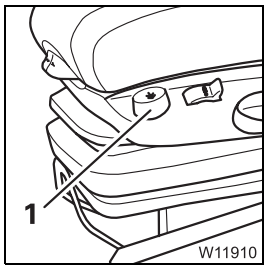
5.1.3 Adjusting the seats and steering column

Driver's seat

The seat height and lumbar support are adjusted pneumatically. You can only carry out these adjustments when

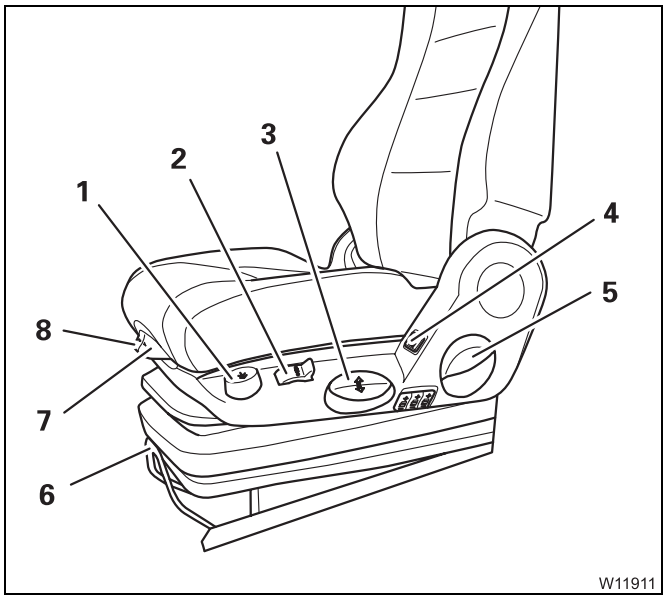


– The switch (**1**) is switched off on the driver's seat (not pressed in)

– Sufficient air pressure is available in the secondary consumer circuit. You may have to build up the supply pressure; ➠ p. 5 - 9.

• Sit on the driver's seat; the seat will rise to the last position set.

You can make adjustments to suit your body size and shape.



Settings for body size

1 Suspension on / off
Lower to lowest position

2 Spring hardness

3 Seat – height

4 Seat heating on / off[1)]

5 Angle of the back rest

6 Length adjustment of the seat

7 Seat cushion angle

8 Length adjustment of the seat cushion

[1)] Additional equipment

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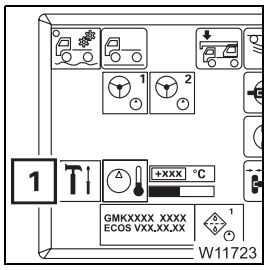
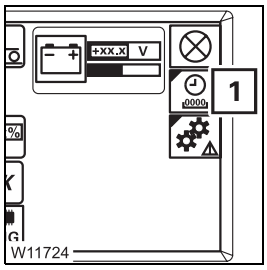
5.1.6 Displaying the operating hours

You can view the operating hours for all power units in the *Operating Hours* submenu.

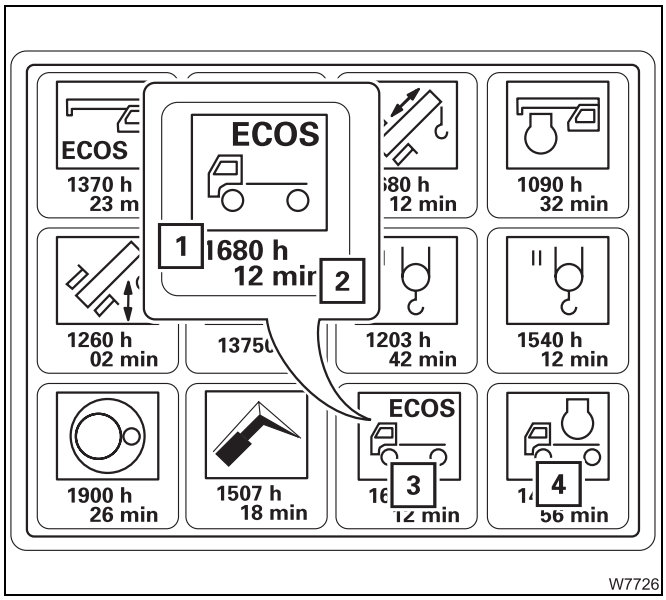


- If necessary, open the main menu Esc and press the button (**1**) once.



The *Settings* submenu opens.

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



The *Operating hours* submenu opens.

When driving, the ECOS operating hours (**3**) for the carrier and the engine (**4**) for driving are recorded:

– The value (**1**) indicates the hours, e.g. 1680 hours

– The value (**2**) indicates the minutes, e.g. 12 minutes

The other displays relate to crane operation;
➠ *Displaying the operating hours*, p. 12 - 101.

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5.2.4 Display of the selected gears

Example:

In initial position, the fifth gear is engaged as half gear.
The gear **5** selected is shown with an arrow pointing downwards.

If you shift down half a gear, the fourth gear is engaged as a full gear. The gear **4** selected is shown with an arrow pointing upwards.

If you shift down half a gear again, the fourth gear is engaged as a half gear. The gear **4** selected is shown with an arrow pointing downwards.
If you shift down from the initial position by a full gear, the fourth gear will be selected as a half gear directly and displayed.

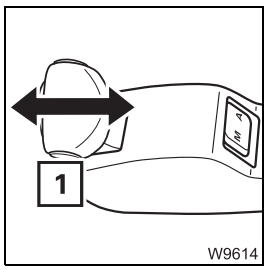
5.2.5 Selecting the direction of travel and starting gear

Selecting the driving direction

The following conditions must be met:

- The parking brake is applied
- The vehicle engine is switched on and
- The accelerator is not operated

Risk of accidents due to the truck crane moving unintentionally
When starting the truck crane, always use the service brake to stop the crane from moving until the starting gear has been engaged.



For forward travel

- Press the button (**1**) and additionally push the switch lever forwards once.

For reverse travel

- Press the button (**1**) and additionally push the switch lever backwards once. Depending on the equipment, an acoustic signal can be heard.

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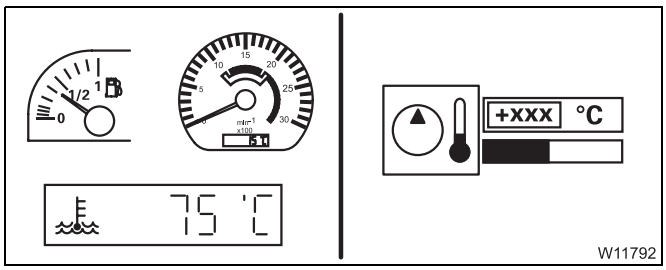


- Also note the control elements for fuel supply, engine speed, coolant temperature and hydraulic oil temperature; p. 4 - 17.

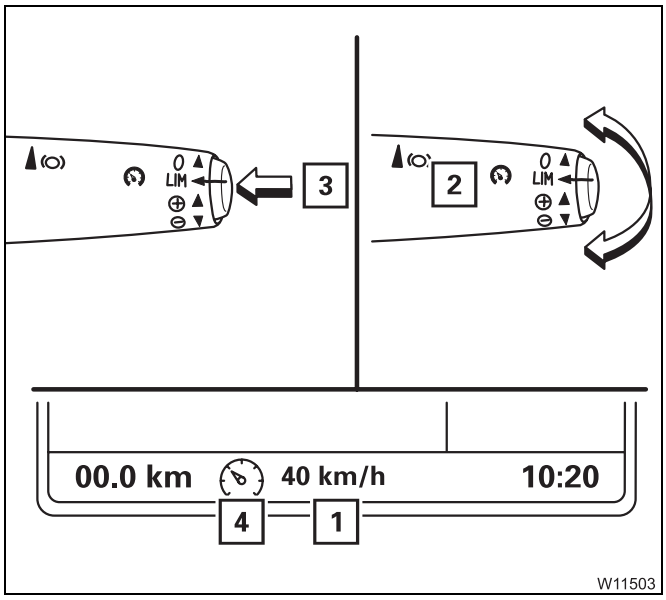
5.3.2 Tempomat

The Tempomat enables you to drive at a constant speed without pressing the accelerator.

Risk of accidents due to carelessness
Be ready to brake at all times when the tempomat is switched on.
Only switch the tempomat on if the traffic situation permits a constant speed.

Switching on

You can only switch on the tempomat at speeds of over 15 km/h (9 mph).



- With the (**3**) button, switch the tempomat on – symbol (**4**) is shown.
- Press the switch (**2**) upwards / downwards once.

The tempomat is switched on. The current speed (**1**) is shown and maintained, e.g. 40 km/h.

You can exceed the speed (**1**) with the accelerator. After the accelerator is released, the tempomat goes back down to the speed (**1**)

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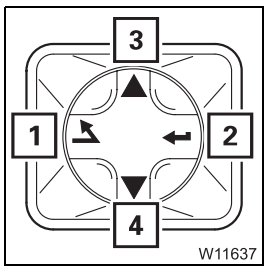


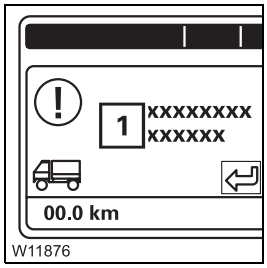
Acknowledging a messsage

- Press (**1**) once – the message disappears.

You can retrieve all existing messages in the *Error info* submenu;
➠ p. 5 - 22.

Warnings

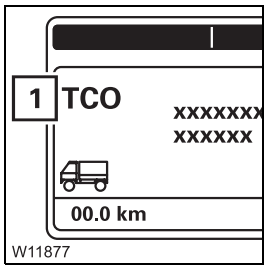
This section does not include all messages. The messages shown here can also appear with additional or different texts.



If in doubt, the current text (**1**) shown in your truck crane always applies.

Follow the requests to stop immediately and conduct the measures given in good time.

Risk of damage if messages are not observed
For all messages, always take note of the text shown.
Follow the requests to stop immediately, taking the traffic situation into account. Complete the remedial measures shown, and described here, in good time.
This avoids errors, and slight damage leading to more serious problems.



If an abbreviation (**1**) is shown, you can read off the error codes for the corresponding control device.

Always read off the error codes before contacting ***CraneCARE***.

For an overview of the control devices and reading off the error codes;
➠ p. 5 - 26.

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5.4 Off-road driving

This section describes adjustments, connections and procedures for adapting the vehicle handling to off-road conditions.

Adjustments to the transmission

If you drive continuously, for short periods of time with different loads or on a slippery surface, the transmission may switch gears too late or too early. In this case you can make the following adjustments:

- Shift to a lower starting gear; ➠ p. 5 - 32.
- Step on the accelerator as far as it will go when starting – starting mode for load on.
- Select the *Manual* operating mode. In this way you will be able to drive carefully and shift gears on time; ➠ *Changing the operating mode*, p. 5 - 30.

Connections

If the adjustments to the transmission are insufficient on their own, you can additionally connect the following one after the other:

- First, you can switch on the **off-road gear** in the transfer case; ➠ p. 5 - 62.
- Then switch on the **longitudinal differential locks**; ➠ p. 5 - 63.
- Then switch on the **transverse differential locks**; ➠ p. 5 - 63.

Changing the vehicle level

You can also adapt the truck crane to the off-road inclination using the level adjustment system, or lift and lower the truck crane; ➠ p. 5 - 65.

Rocking the vehicle free and towing

If the truck crane is stuck in terrain; ➠ *Freeing the truck crane stuck in terrain*, p. 5 - 69.

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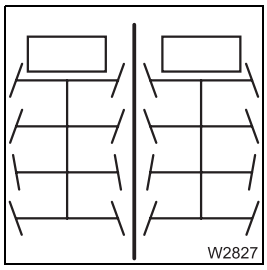
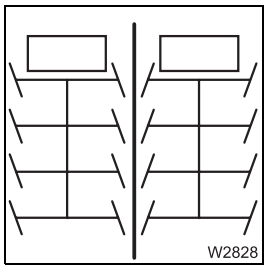
5.4.5 Separate steering

There are two types of steering with separate steering.



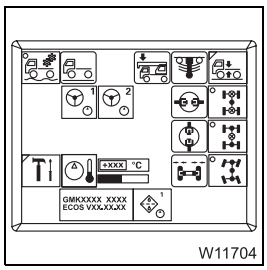
– **Driving around corners:**

When the separate steering is switched on, the steering angle is larger than for normal steering mode, and the turning circle is smaller.



– **Crab travel:**

When the separate steering is switched on, the truck crane drives sideways if you turn the wheels of the front and rear axle lines in the same direction.



• If required, open the main menu Esc.

Switching to separate steering

Always switch to separate steering when
– Driving with the rigged truck crane or
– Steering at low speed

Risk of accidents when driving on the road with unlocked steering
After driving with separate steering, change over immediately to normal steering. The locking status for normal steering mode is only restored once the green *Locked* symbol is displayed.

You can only change over to separate steering when the current speed is below approx. 5 km/h (3 mph).

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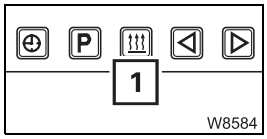
This section describes how to switch on the heater manually. You can also have the auxiliary heater switch on automatically; ➠ *Storing the heating start*, p. 5 - 82.

- Turn on the ignition; ➠ *Switching on the ignition*, p. 4 - 9.

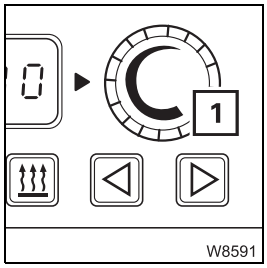


- Press the button (**1**) once.
  The auxiliary heating switches itself on and the control field lights up.

Always switch off the auxiliary heater when you turn off the truck crane when the battery master switch is switched on. In this way, you prevent the auxiliary heater from restarting and running down the batteries after the engine has cooled down.

Temperature

You can preselect a temperature. The preselected temperature is automatically set and maintained.



Increasing the temperature:
- Turn the switch (**1**) clockwise

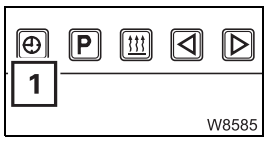
Reducing the temperature:
- Turn the switch (**1**) anti-clockwise

The higher the selected temperature is, the faster the fan of the auxiliary heater runs.

Setting the day and time

Always set the current time and weekday. These settings are required for the correct activation point of the automatic heating start.

If the power supply is interrupted, all symbols in the display will flash and you must set the time and day again.



- Press the button (**1**) for longer than 2 seconds.
  The displayed time flashes, e.g. 10.00 hrs.

Set the current time on the flashing display, e.g. 14.00 hrs.

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6 Driving modes

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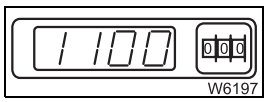
6.2.2 Switching on boom floating position

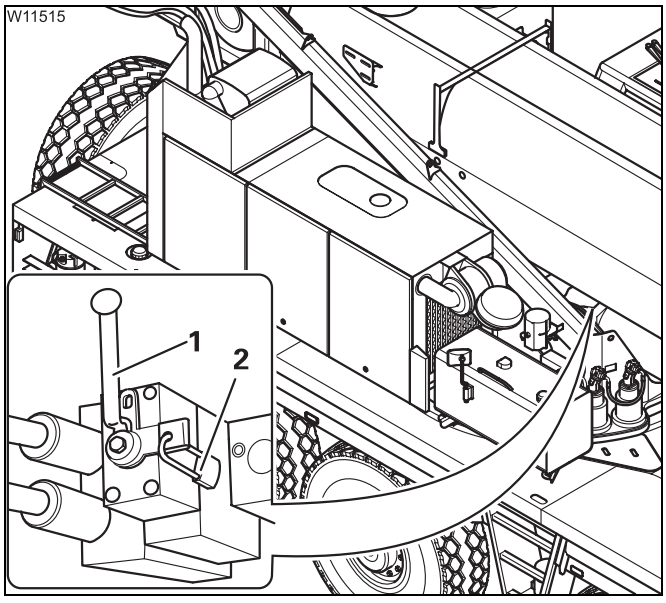
If the main boom has been placed on a trailer, the boom floating position must be switched on so that the main boom can move up and down.

Risk of accidents when the boom floating position is switched off
Always switch on the boom floating position when the main boom is on a trailer.
This prevents the trailer hanging briefly with its full weight on the main boom on uneven ground, the axle loads from rising suddenly, or the truck crane from tipping when driving around corners.



- Enter the SLI code for the current rigging mode.
- Fully retract the main boom.
- Raise the main boom to a permitted angle within the working range.
- Turn the superstructure to the *0° to the rear* working position and place the main boom on a trailer.

Risk of accidents due to the main boom falling down
You may only switch on the boom floating position when the main boom is already set down on the trailer.
In this way, you prevent the raised main boom from falling down.



- Remove the padlock (**2**)
- Switch the valve I over – and position the lever (**1**) vertically, moving it either upwards or downwards depending on its fitting position
- Secure the lever (**1**) with the padlock (**2**)

The boom floating position is now switched on.

Switching off the boom floating position; ➠ p. 13 - 17.

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7.3 Towing the truck crane

Observe the following when towing the truck crane:

- The truck crane may only be towed away with a tow bar. Attach the tow-bar to the tow-rod coupling on the front bumper.
- The statutory regulations in the country of use concerning the overall length of the towing and towed vehicle, including the towing bar, must be observed.
- If the engine, the steering and the service brake still work, you can tow the truck crane with a lorry.
- If the engine, the steering or the service brake no longer function properly, the truck crane must be towed with a special breakdown truck.

The front towing coupling is designed for a maximum tractive force of 10 t (22 000 lbs). The tractive force may only be applied forwards or at an angle of 45° to both sides from the longitudinal axle of the truck crane.

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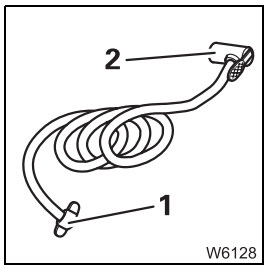
7.4.2 Filling the tyres yourself

In emergencies you can fill the tyres with the compressed air system of the truck crane if an appropriate filling hose is available.
The tyres can be filled up to a maximum pressure of about 8 bar (116 psi).
This pressure might not correspond to the prescribed tyre pressure, depending on the tyres; ➠ *Tyres*, p. 8 - 5.

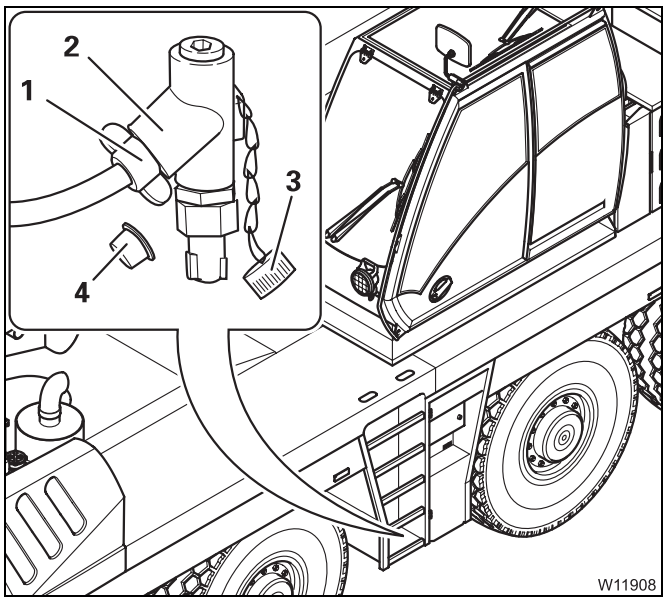
Risk of accidents due to impermissible tyre pressure
If the maximum pressure is above the specified tyre pressure, fill the tyres up to the maximum specified pressure.
In this way you prevent the tyres from becoming damaged during driving, and bursting.

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



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

Connecting the filling hose



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

You can now fill the tyres.

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7.6.2 Malfunctions on the transmission

Malfunction	Cause	Remedy
Neutral position cannot be activated	Transmission switch lever or two-stop rocker not in home position	Switch the transmission switch lever and two-stop rocker to home position.
Transmission not shifting automatically	Operating mode *Manual* switched on	Change-over to *Automatic;* ➠ p. 5 - 30
	Fuse F15, F29, A1F13 defective	Replace blown fuses; ➠ p. 7 - 17
Starting gear cannot be engaged	Supply pressure in secondary consumers too low	Build up supply pressure; ➠ p. 5 - 9
Transmission no longer upshifts at speeds over 20 km/h (12 mph)	A locking procedure is not yet completed	Lock the differential locks or steering
	Off-road gear on	Switch off the off-road gear; ➠ p. 5 - 62
Transmission does not respond to the transmission switch lever or the two-stop rocker	Fuse F15, A1F13 defective	Replace blown fuses;➠ p. 7 - 17
	Electronic gear system is no longer connected to the transmission	Switch to *Transmission emergency program*; ➠ p. 7 - 36
 **Lights up**	Transmission cannot downshift since the maximum permissible engine speed would otherwise be exceeded.	Slow down the truck crane until the symbol goes out
Engine / transmission diagnostics plug not working	Fuse F39, F10 defective	Replace blown fuses; ➠ p. 7 - 18
The transmission is not in neutral position after switching on the ignition.	The parking brake was released when the ignition was switched off	
	Mechanically switch the transmission to neutral position if the engine cannot be started because a gear has been selected and the air pressure is below 5.5 bar (80 psi); ➠ p. 7 - 41	

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7.7 Procedure in the event of malfunctions

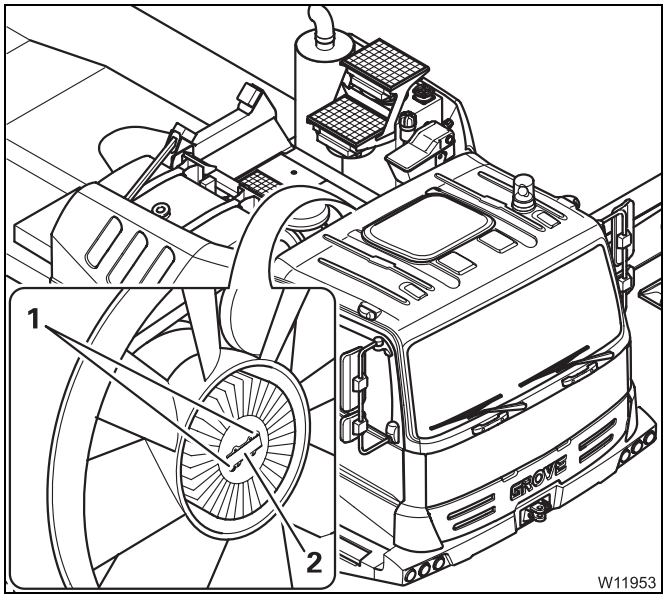
7.7.1 Switching on emergency operation in coolant circuit

For cooling purposes, the fan wheel of the engine is switched on and off automatically. When this automatic system fails, you can switch on emergency operation so that the fan wheel always runs when the engine is switched on.

- Switch off the engine and secure against unauthorized use – lock the hand-held control in the driver's cab and the doors.

Risk of accidents due a turning fan wheel
Always switch off the engine and secure against unauthorized use before switching on emergency operation.
This prevents the fan wheel from starting to turn suddenly, and injuring you.

Risk of burning yourself when the engine is hot
During operation, the engine and the add-on parts heat up to a great extent. Wear appropriate protective gloves and be careful not to touch hot parts.



Emergency operation is switched on at the fan wheel's hub.

- Undo the screws (**1**).
- Turn the metal plate (**2**) and remove it.
- Press in the pin under the metal plate.
- Emergency operation is activated and the fan wheel will run continuously as long as the engine has been switched on.

With a blocked fan wheel, you may only drive up to 1000 km (620 mi).

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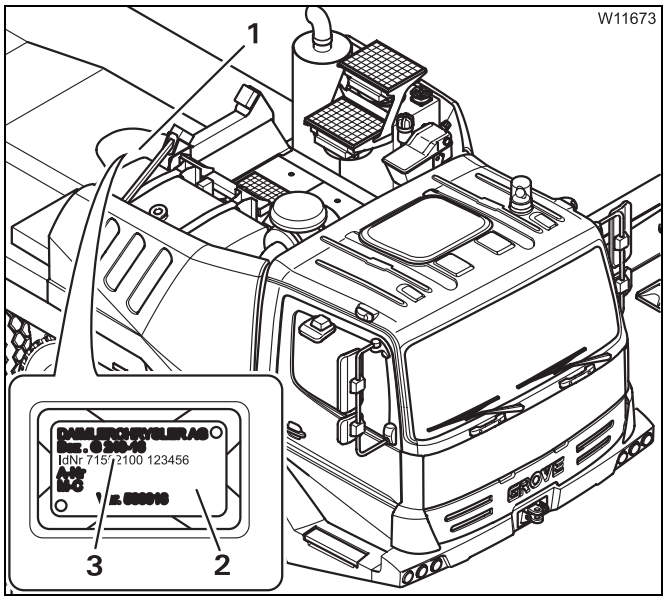
ID number of the transmission

The ID number of the transmission is on the model plate.



- Remove the rear cover plate (**1**).

The model plate (**2**) is on top of the transmission.

The ID number (**3**) consists of an eight-digit number and a six-digit number. You must add the digits 00 to the first number on the model plate if it only consists of six digits.

In this example the ID number is 71552100 123456

- Note down the ID number, on this page for example, so that you can find it at a later time.

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Driving speeds

At an engine speed of 1800 min^{-1}

Forwards:	max. 85.0 km/h (52.8 mph)
Reverse:	approx. 7 km/h (4.3 mph) depending on the tyres

Climbing ability

Transport weight 48 t (105 800 lbs)

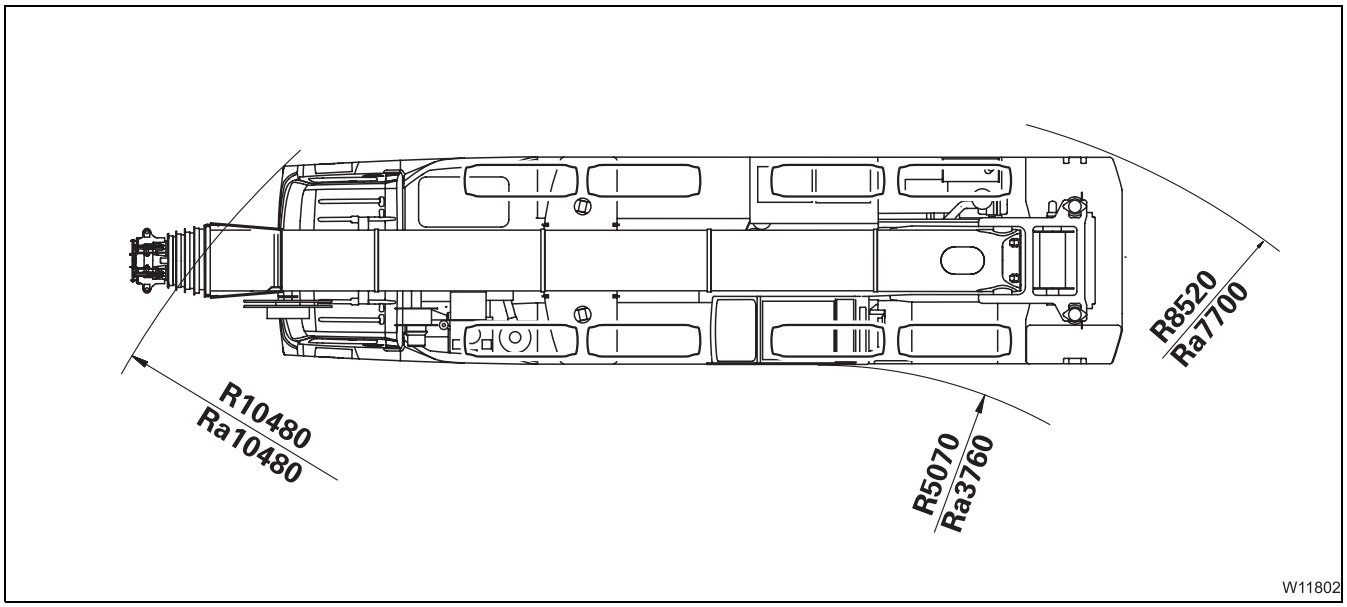
14.00 R25 tyres:	70%
16.00 R25 tyres:	63%
20.5 R25 tyres:	63%

Turning circle radiuses

The dimensions in the illustration are given in mm.

R = values for normal steering mode

Ra = values for all-wheel steering



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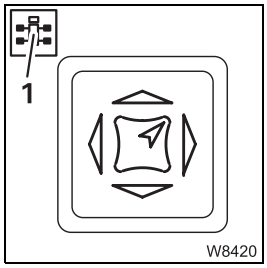
10 Operating elements for crane operation

All operating elements for driving are described in chapter 3.

10.1 Overview of the operating elements

This section shows the position and designations of the operating elements for crane operation. This also includes display elements such as lights or displays.

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



Some figures show details from a different perspective than the total view. The perspective is indicated by the symbol (**1**).

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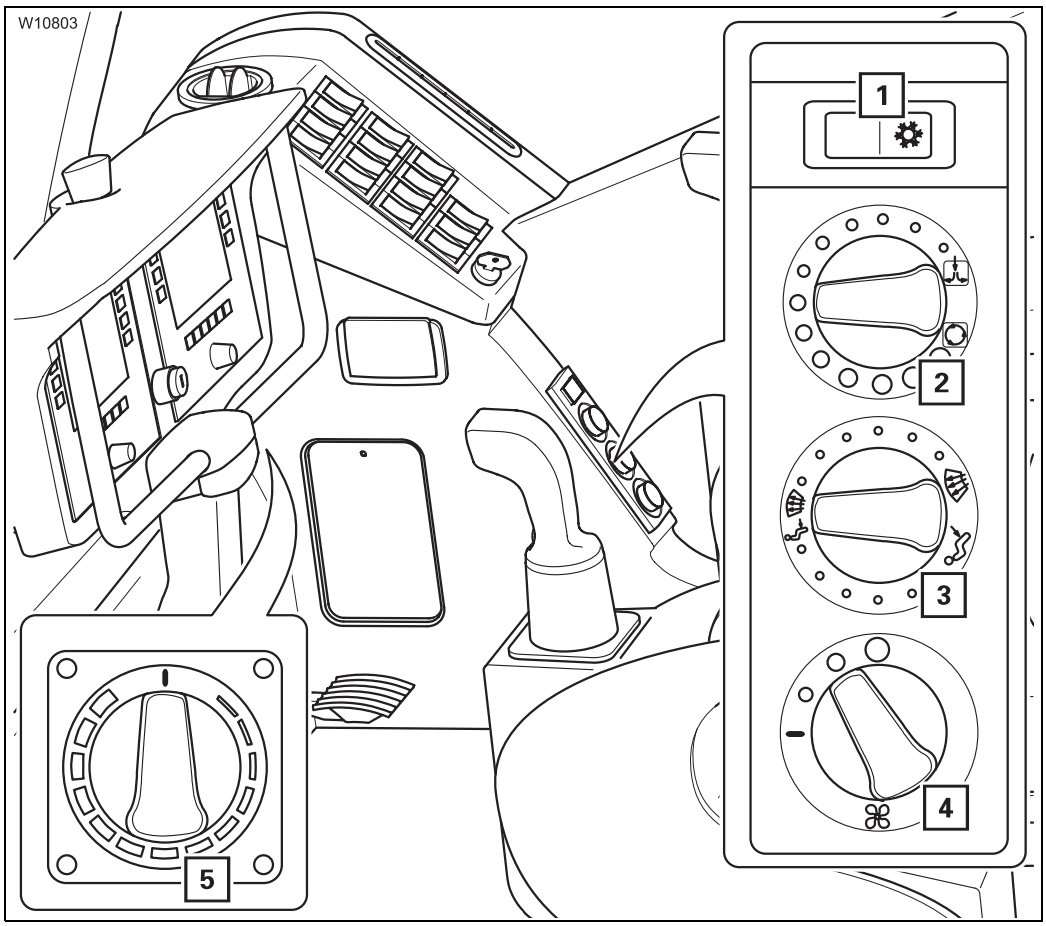
Standard heating system



1 Air-conditioning system[1)] ➠ p. 12 - 125
2 Setting fresh air / recirculated air / mixed air ➠ p. 12 - 123
3 Air distribution ➠ p. 12 - 124
4 Setting the fan ➠ p. 12 - 123
5 Setting the temperature ➠ p. 12 - 124

[1)] Additional equipment

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1	Switching over the measuring range	➠ p. 10 - 63
2	Display of current inclination	➠ p. 10 - 63
3	Anemometer display[1)]	➠ p. 10 - 64
4	Telescoping submenu	➠ p. 10 - 26
5	Monitoring submenu	➠ p. 10 - 29
6	Counterweight submenu[1)]	➠ p. 10 - 22
7	Power unit speeds submenu	➠ p. 10 - 28
8	Outriggers submenu	➠ p. 10 - 24
9	Remote control display[1), 3)]	
10	Settings submenu	➠ p. 10 - 30
11	Power units display	
	Slewing gear	➠ p. 10 - 71
	Main hoist	➠ p. 10 - 68
	Auxiliary hoist	➠ p. 10 - 70
	Derricking gear	➠ p. 10 - 73
	Telescoping mechanism	➠ p. 10 - 74
	Derricking the lattice extension[1), 2)]	
12	Slewing gear / Houselock submenu[1)]	➠ p. 10 - 23
13	Working range limitation submenu[1)]	➠ p. 10 - 36
14	Serial number and program version displays	➠ p. 10 - 57
15	Driving submenu[1)]	➠ p. 10 - 38

[1)] Additional equipment

[2)] ➠ *Operating Instructions Lattice Extension*

[3)] ➠ *Separate operating instructions*

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1	Outrigger control units on / off[1)]	➠ p. 10 - 60
2	Lamp test	➠ p. 11 - 9
3	Telescoping cylinder pressure display	➠ p. 10 - 81
4	Slewing gear hydraulic circuit pressure display	➠ p. 10 - 81
5	Setting the characteristic curve for the control levers	➠ p. 12 - 98
6	Operating hours submenu	➠ p. 10 - 32
7	Set brightness of display	➠ p. 11 - 11
8	Critical load control on / off	➠ p. 10 - 81
9	Hydraulic circuit pressure display	➠ p. 10 - 81
10	Telescoping emergency program access	➠ p. 10 - 79
11	Current telescoping mechanism status display	➠ p. 10 - 80
12	Adjusting the wiper stroke interval	➠ p. 10 - 91
13	Entering the current telescoping	➠ p. 15 - 49

[1)] Additional equipment

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1	Lattice extension angle display and input[1)] Current lattice extension inclination display[1)]	p. 10 - 85 p. 10 - 86
2	Lattice extension length display and input	p. 10 - 84
3	Reeving display and input	p. 10 - 84
4	Counterweight display and input	p. 10 - 84
5	SLI code display and input	p. 10 - 83
6	Outrigger span display and input	p. 10 - 85
7	Additional function F1 on	p. 10 - 83
8	Numerical pad	p. 10 - 83
9	Acknowledge	p. 10 - 84
10	Confirming an entry	p. 10 - 84
11	Displaying and entering the time and date	p. 12 - 39

[1)] Additional equipment

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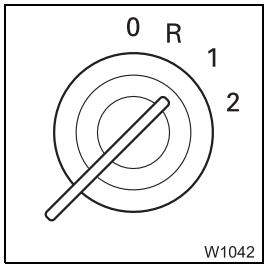
10.2.3 Engine for crane operation

Side panel

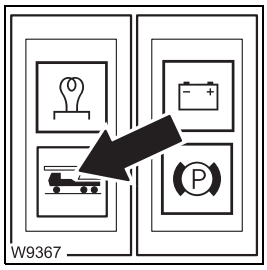
➠ *To start the engine*, p. 11 - 12.

Ignition lock



- **– 0** Ignition off, engine off, key can be removed
- **– R, 1** Ignition on and power supply on for:
  instrument lighting, ECOS, engine control system, SLI
- **– 2** Starting position

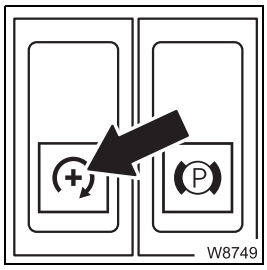
➠ p. 11 - 9



Carrier ignition indicator lamp

- **– On:** ignition in driver's cab on,
  engine start not possible
- **– Off:** ignition in driver's cab off,
  engine start possible

➠ p. 11 - 12



Setting the idling speed

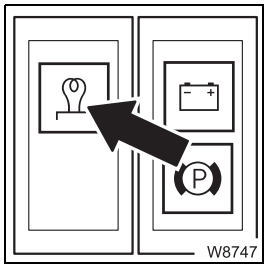
– The engine is off::

- **– press down once:** engine starts,
  idling speed = standard

– The engine is running:

- **– press down:** increases the idling speed
- **– press up:** decreases the idling speed,
  after about 6 seconds: engine STOP

➠ p. 11 - 16



Flame start system indicator lamp

- **– On:** engine not ready to start – is being warmed up
- **– Off:** engine is ready to start

➠ p. 11 - 13

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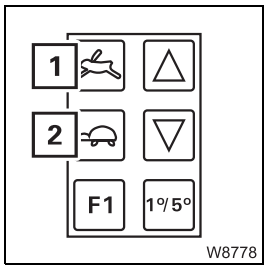
On the outrigger control units

All directional information relates to the carrier; ➠ p. 10 - 49.

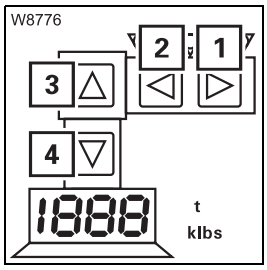
For operation in crane mode, the display fields in the *Settings* submenu need to be switched on.



Pre-select high-speed / normal speed mode

1 Pre-select: press button – high-speed mode pre-selection on

2 Pre-select: press button – normal speed pre-selection on



Operating the left-hand outriggers (next to control unit)

Button or is pressed.

1 To retract: press button – the support retracts[1)]

2 To extend: press button – the support extends[1)]

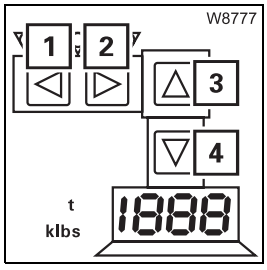
3 To retract: press button – supporting cylinder retracts

4 To extend: press button – supporting cylinder extends

[1)] only on operator's side

Supports; ➠ p. 13 - 33
Supporting cylinders; ➠ p. 13 - 42

The movement stops after the button is released, and when an end position is reached.

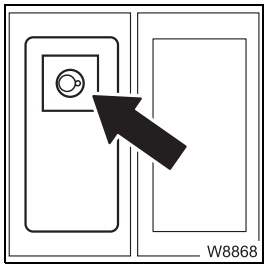


Operating the right-hand outriggers (next to control unit)

Operation is the same as on the button unit for *Outriggers to the left of display field*.

10.2.14 Slewing gear

Slewing gear, p. 12 - 88.

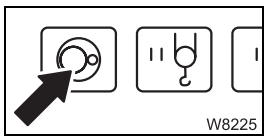


Slewing gear on / off

There is an indicator lamp in the button.

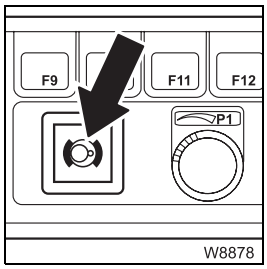
– **Press once** – lamp bright – slewing gear on
slewing gear brake released
– lamp dim – slewing gear off
slewing gear brake engaged

p. 12 - 88



Power units display

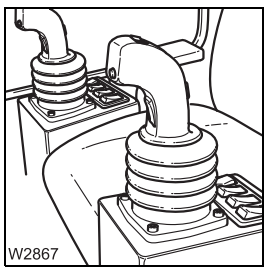
– **Green:** slewing gear on
– **Red:** slewing gear off



Slewing gear brake engaged / released

– **On:** slewing gear brake engaged
– **Off:** slewing gear brake released

p. 12 - 88



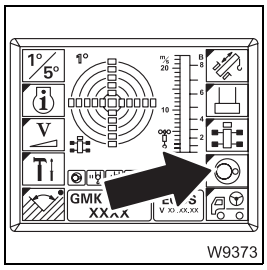
Left-hand control lever

The counterweight lifting cylinders are retracted.

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

p. 12 - 88

Submenu



Slewing gear / Houselock submenu

– **To open:** press button once – submenu opens

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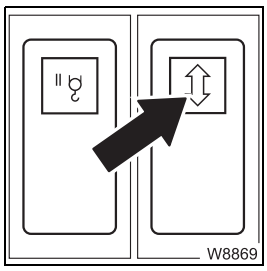
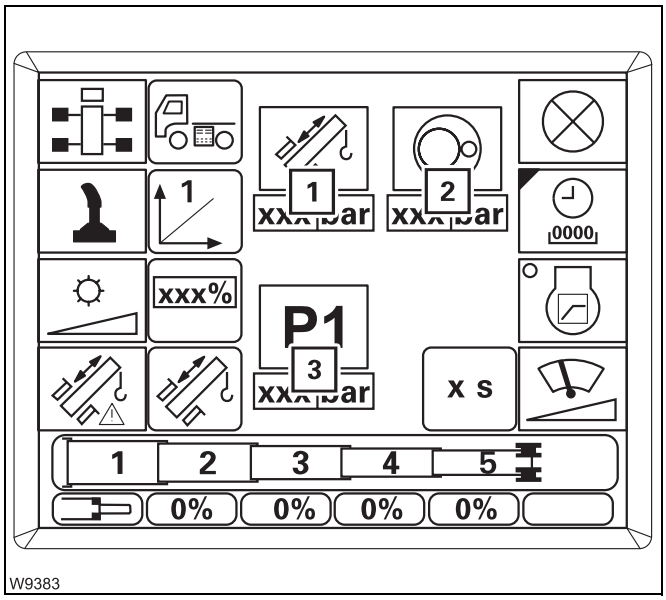
10.2.17 Hydraulic system



Inclining the crane cab

- **Press down:** incline to the rear
- **Press up:** incline to the front

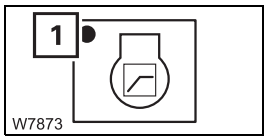
➠ p. 12 - 95



In the settings submenu

Current pressure in bar for movements of the

1 Telescoping mechanism
2 Slewing gear
3 – hoist
– derricking gear
– counterweight hoist unit
– incline cab
– locking units



Critical load control

- **To switch on:** press button until the dot (**1**) turns green.
- **To switch off:** press button until the dot (**1**) turns black.

➠ p. 12 - 99

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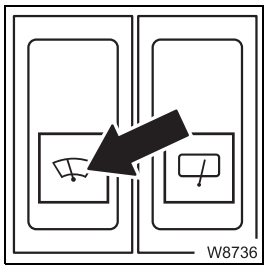
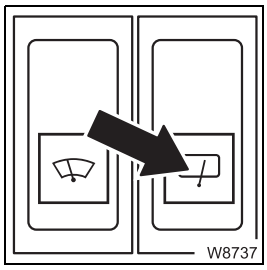
Windscreen wiper / washing system



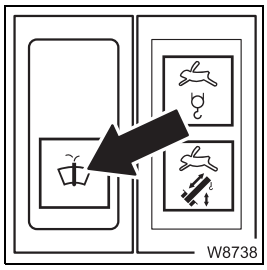
Front windscreen wiper on / off

- **Off:** press up – wiper goes to end position
- **Interval:** middle position
- **Continuous operation:** press down



Roof window wiper on / off

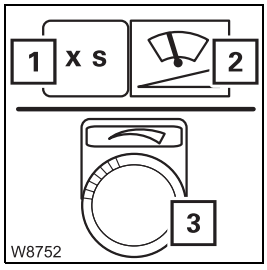
- **Off:** press up – wiper goes to end position
- **Interval:** middle position
- **Continuous operation:** press down



Windscreen washing system

- **Windscreen:** press down
- **Skylight:** press up

No additional wiping function is performed



Adjusting the wiper stroke interval

In the *Settings* submenu

1 Display of interval

2 Press once – input mode on

3 Turn – change interval

➠ p. 12 - 96

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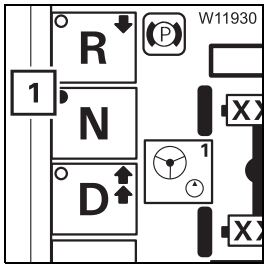
10.3.3 Transmission

➠ *Operating the transmission*, p. 14 - 15.

The following applies to all operating elements:

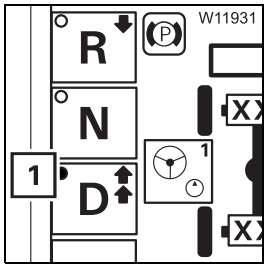
- the *Driving mode* submenu opened automatically
- the *Service brake* pedal is actuated
- the truck crane is stationary



Neutral position N

– **To switch on:** press button once – dot (**1**) green - no gear engaged

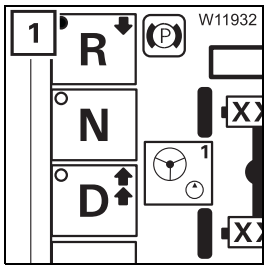
– **To switch off:** switch to (**D**) or **R** – dot (**1**) black



Transmission mode D

– **To switch on:** press button once – dot (**1**) green second gear engaged as a full gear

– **To switch off:** switch to (**R**) or **N** – dot (**1**) black



Transmission mode R

– **To switch on:** press button once – dot (**1**) green first reverse gear engaged

– **To switch off:** switch to (**D**) or **N** – dot (**1**) black

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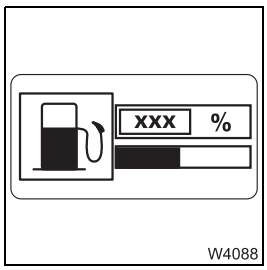
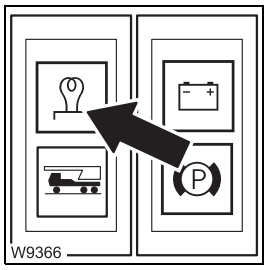
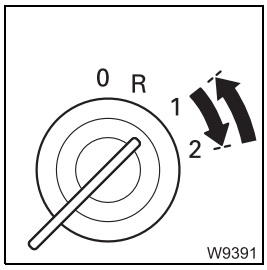


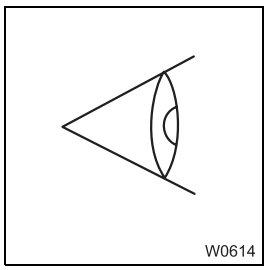
9. Check the fuel reserve; ➠ p. 11 - 5.



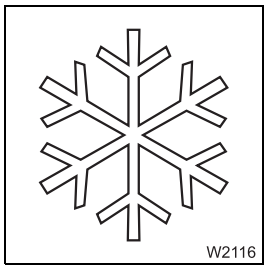
10. If the truck crane has a flame start system, wait until the lamp goes out; ➠ p. 11 - 13.



11. Start the engine; ➠ *To start the engine*, p. 11 - 12.



12. Check the instruments and displays with the engine running; ➠ p. 11 - 14.



13. In the event of low outside temperatures; ➠ *CHECKLIST: If the temperature is low*, p. 11 - 4.

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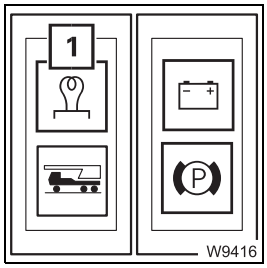
With flame start system

The flame start system warms the suction air of the engine.

This section applies to starting a warm and a cold engine.

Danger of explosions when using starter fuel
The engine must never be started with the aid of starter fuel. The starter fuel sprayed into the suction unit may ignite.

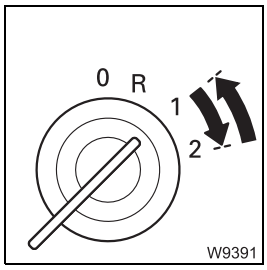
The flame start system is activated each time the ignition is turned on:



– **When the engine is warm,** the lamp (**1**) will light up only briefly (2 to 3 seconds).
– **When the engine is cold,** the lamp (**1**) goes out as soon as the engine has been preheated (duration of up to 20 seconds).
Start the engine within the next 30 seconds; otherwise, you must switch on the ignition again and wait until the lamp goes out.

If lamp (**1**) fails to go out, then there is a fault on the flame start system, please consult ***CraneCARE***.

- Wait until the lamp (**1**) goes out
- Do not press the accelerator



- Turn the ignition key to position **2** and hold it there until the engine goes on
- Let go of the ignition key after the engine goes on
- If the engine does not go on, abort the starting procedure after about 15 seconds and wait one minute before trying again.

If the engine does not go on after several attempts; ➠ *Malfunctions on the engine*, p. 15 - 13.

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12 Crane operation

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12.1.4 Checking the safety devices

Risk of accidents when working with faulty safety devices
It is prohibited to operate the crane with safety devices that are faulty, overridden or out of service.
Have faulty safety devices repaired immediately by ***CraneCARE***.

Safe load indicator

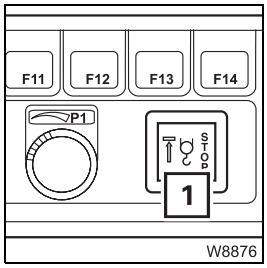
- Switch on the safe load indicator, perform all inspections and enter the current rigging mode; ➠ *Switching on the SLI*, p. 12 - 18.

The SLI is working correctly at this point in time if no error message is pending and if the crane movements have been enabled.

If the SLI is not working correctly, do not begin to work with the crane but notify ***CraneCARE***.

Lifting limit switch

- Raise the main boom until the hook block is lifted off the ground.



- Slowly perform the *Raise* movement until the hook block lifts the lifting limit switch weight.
- Now check whether the movement *Raise* is switched off and the lamp (**1**) lights up.
- Check whether the movements *Lower* and *Extend are also* switched off.

The SLI is working correctly at this point in time if the lamp (**1**) lights up and the movements *Raise*, *Lower* and *Extend* are switched off.

If the lifting limit switch is not working correctly, do not begin to work with the crane but notify ***CraneCARE***.

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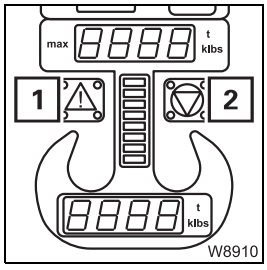
If you are unable to check all lamps in the specified time, you can repeat the lamp test on the *SLI* control unit; ➠ p. 12 - 20.

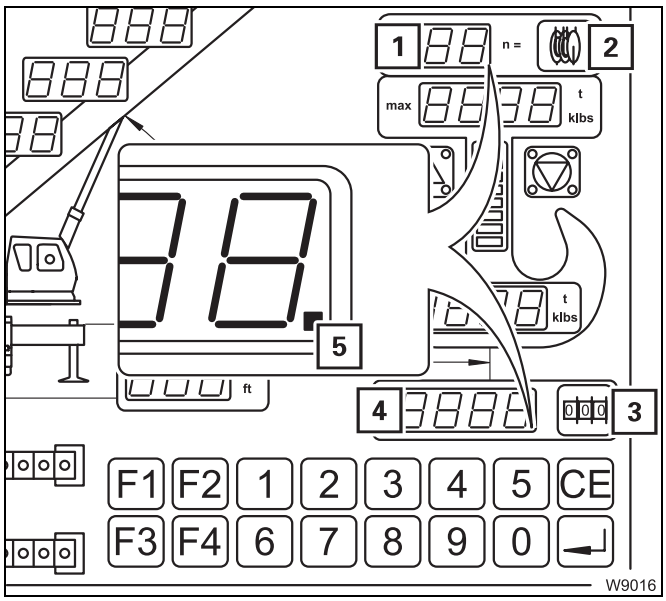


After the test program:

– the lamps (**1**) and (**2**) are on
– all power units are disabled

The current display depends on whether the SLI:

– had been switched off for less than 48 hours or
– had been switched off for longer than 48 hours

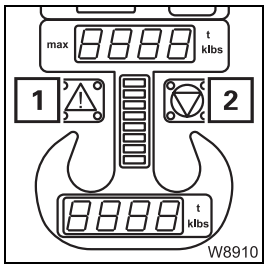


After a standstill of less than 48 hours

The displays (**1**) and (**4**) correspond to the rigging mode set last. The display (**1**) shows the signalling point (**5**).

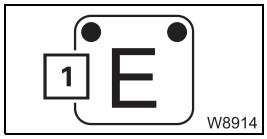
You can save the displayed values if they correspond to the current rigging mode:

- Press button (**2**) once.
  The signalling point switches to the display (**4**).
- Press button (**3**) once.
  The signalling point goes out.



The lamps (**1**) and (**2**) go out. The SLI code is accepted.

If no error message is displayed, the SLI is now set for crane operation and the crane movements are enabled; ➠ *Inspections prior to crane operation*, p. 12 - 29.



If there is an error message, both lamps in the button (**1**) go on; ➠ *Error message*, p. 12 - 37.

You must re-enter the current rigging mode if the displayed values do not correspond to the current rigging mode of the truck crane; ➠ *Entering the rigging mode*, p. 12 - 21.

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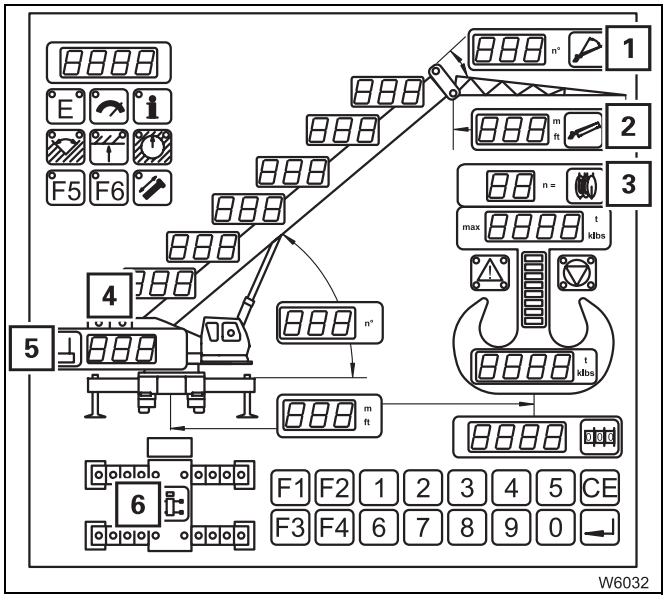
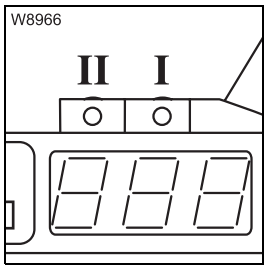
12.2.3 Inspections prior to crane operation

Risk of accidents due to incorrectly set SLI
If the current rigging mode varies from the displayed rigging mode, the maximum load displayed by the SLI does not correspond to the actually permissible lifting capacity according to the *Lifting capacity table*.
Overloading and accidents will be the result.

- Check whether the current rigging mode of the truck crane corresponds to the displayed rigging mode.



- Check
  - **5** The rigged counterweight
  - **2** The length of the rigged lattice extension
  - **1** The angle of the rigged lattice extension – inclinable
  - **6** The rigged outrigger span
  - **3** The number of reeved rope lines
  - **4** The hoist that is switched on



The lamp that goes on must always be for the hoist with which the load is to be lifted.

Lamp I: must go on if the load is to be raised with the main hoist.

Lamp II: must go on if the load is to be raised with the auxiliary hoist.

- Switch over the display if necessary; ➠ *Example of how to switch over the display*, p. 12 - 30.

You may only begin operating the crane once all displays show the current rigging mode of the truck crane.
Correct any incorrect entries, as required.

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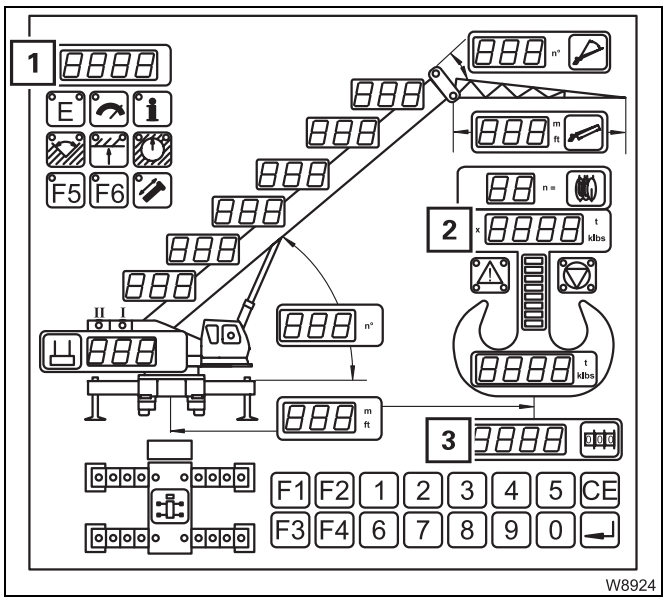
12.2.9 Displaying and entering the time and date



On the display (**1**), you can

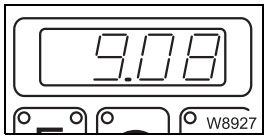
– display the time and date and

– enter the time and date.

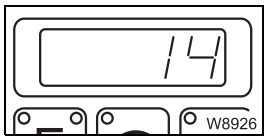
On the displays (**2**) and (**3**), input mode must not be switched on.

Display

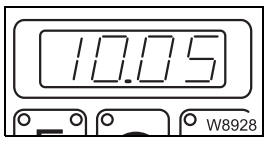
The buttons for the display are assigned as follows.



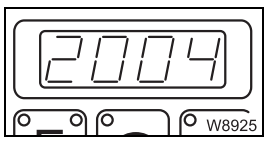
6 – Display of the **time**, e.g. 8 minutes past 9



7 – Display of the **seconds,** e.g. 14 seconds



8 – Display of the **day and month**, e.g. 10 May



9 – Display of the **year**, e.g. 2004

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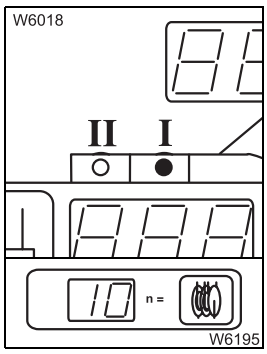


- On the SLI, check whether the lamp **II is on**.

  When the lamp **II flashes**, switch the display over; ➠ p. 12 - 30.

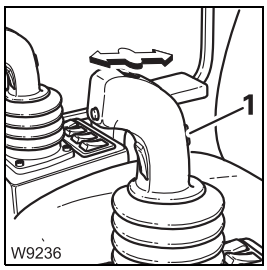
- Check whether the current reeving of the auxiliary hoist is displayed, e.g. **10**. Correct the reeving if necessary; ➠ p. 12 - 25.

Lifting and lowering

You can adjust the sensitivity of the control levers to the operating conditions; ➠ *Setting the characteristic curve for the control levers*, p. 12 - 98.

Risk of accidents due to incomplete monitoring
Operation of the hoist is only monitored fully if
– the lifting limit switch is correctly rigged; ➠ p. 13 - 102
– the lifting limit switch is not overridden, ➠ p. 12 - 51
– the lowering limit switch is correctly set; ➠ p. 12 - 51.

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

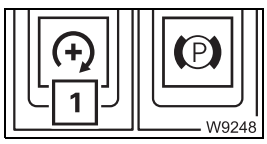


To lift: • pull the control lever backwards.

To lower: • push the control lever forwards.

When the hoist drum is turning, you will notice an impulse on the slewing indicator (**1**).

You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.



You can set the desired engine speed (idling speed) with the button (**1**); ➠ p. 11 - 16.

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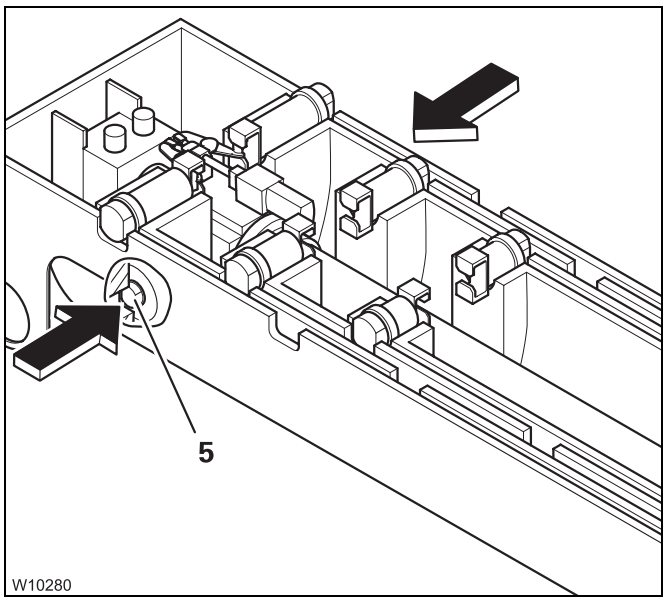
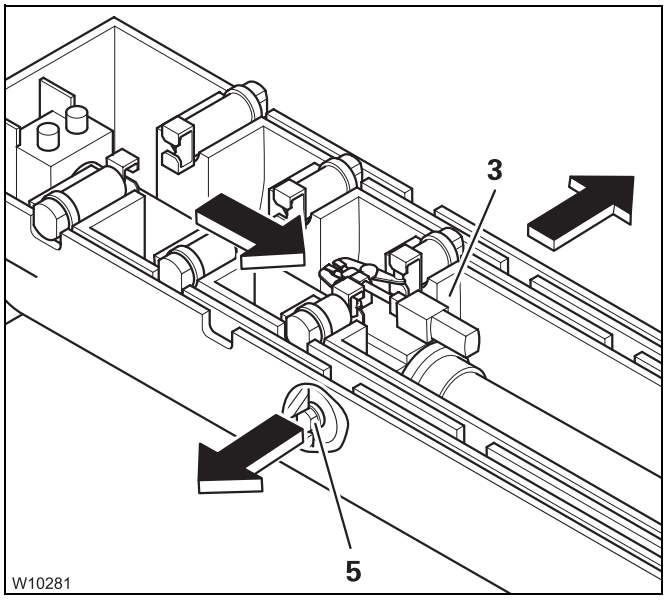


1. Unlocking the telescoping cylinder

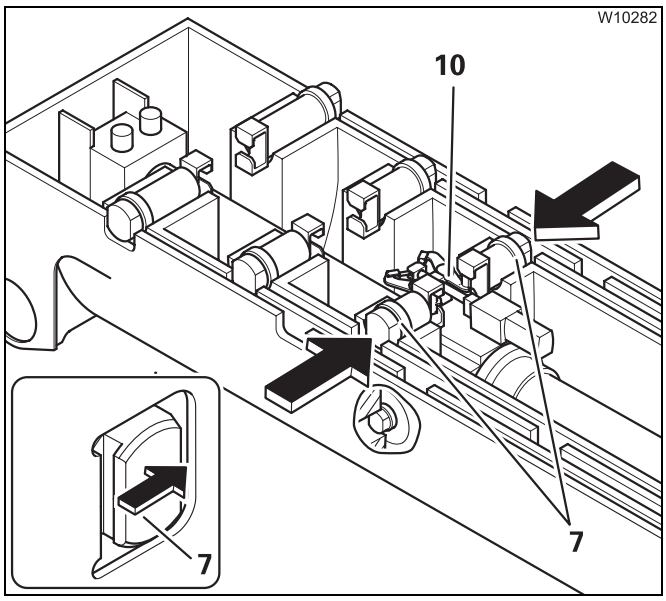
The locking pins (**5**) retract – the telescoping cylinder is unlocked.



2. Moving and locking the telescoping cylinder

The telescoping cylinder moves into the telescopic section to be telescoped, e.g. telescopic section III (**3**).

The locking pins (**5**) extend – the telescoping cylinder is locked.



3. Unlocking the telescopic section

The telescoping cylinder extends until the locking pins (**7**) are clear.

The mechanism (**10**) retracts the locking pins (**7**) – the telescopic section is unlocked.

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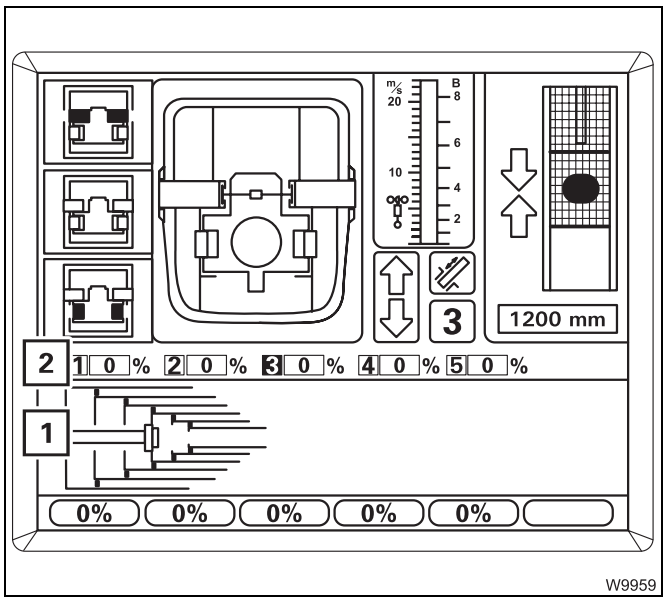
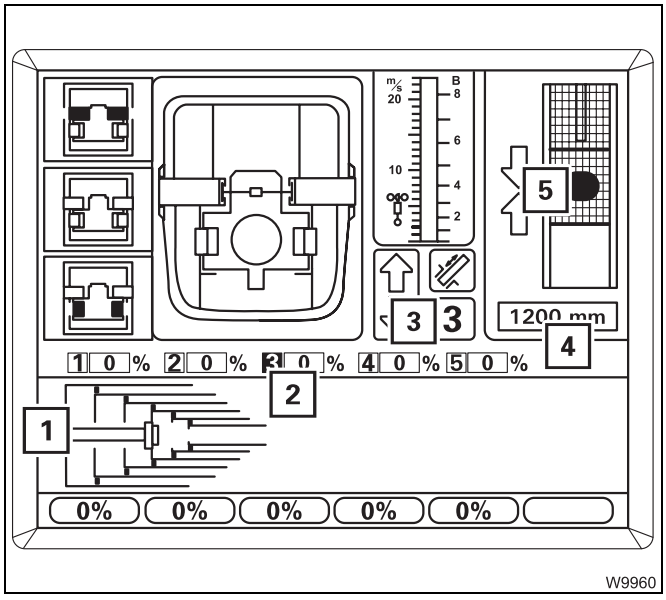


Current telescoping

The display (**2**) shows the current telescoping in percent for each telescopic section.

The display (**1**) shows the current telescope diagram.



Position of the telescoping cylinder

The display (**4**) shows how far the telescoping cylinder is extended, e.g. 1,200 mm (3.93 ft).

If the telescoping cylinder is near a locking point

- the display (**3**) shows the corresponding telescopic section, e.g. telescopic section III.
- the display (**2**) shows the corresponding telescopic section – number **green**
- the display (**5**) shows one or two arrows, depending on the distance to the locking point

The display (**1**) shows a top view of the current position.

Risk of damage to the telescoping cylinder
Move the control liver until the telescopic section is locked **and set down** – the symbol ▣ needs to be yellow.
In this way you can prevent the load from exerting pressure on the telescoping cylinder and allow the load to be released for fixed lengths.

Locking the telescopic section for on-road driving

Once you have retracted the main boom for on-road driving, you must by all means lock the telescoping cylinder in telescopic section Iso that the axle loads are in accordance with the values in the *Driving mode* table; ➠ *Driving modes*, p. 6 - 1.

If telescopic section I was the last telescopic section to be retracted, you can select locking directly.

If another telescopic section was retracted last, you must do the following before selecting locking:
– unlock the telescoping cylinder; ➠ p. 12 - 71
– move the telescoping cylinder into telescopic section I; ➠ p. 12 - 73 and
– lock the telescoping cylinder; ➠ p. 12 - 74.

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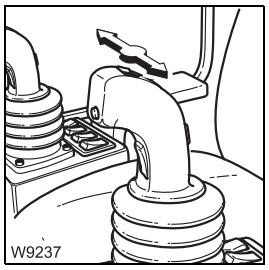
Risk of crushing during slewing
Before slewing, actuate the horn and ensure there are no persons in the slewing range.
In this way you prevent persons from becoming crushed between the superstructure and the carrier or between the superstructure and other parts.

Risk of the main boom buckling
Do not accelerate the slewing speed to such a degree that the load starts to swing.

You can adjust the sensitivity of the control levers to the operating conditions; ➠ *Setting the characteristic curve for the control levers*, p. 12 - 98.

The slewing movement is not automatically braked. If you let go of the control lever or move it to zero position, the slewing movement will slowly run down; ➠ *Braking the slewing movement*, p. 12 - 91.

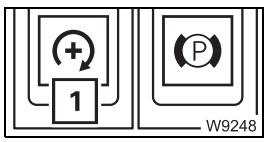


To slew to the left: • push the control lever to the left.

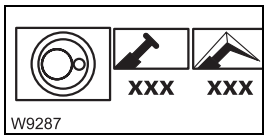
To slew to the right: • push the control lever to the right.

You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.

The maximum slewing speed is automatically reduced as the working radius is increased. If you now reduce the working radius (e.g. by retracting the boom), the slewing speed is automatically increased again.



You can set the desired engine speed (idling speed) with the button (**1**); ➠ p. 11 - 16.



You can limit the maximum slewing speed; ➠ p. 12 - 96.

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12.4.6 Critical load control

Function

The critical load control prevents the engine from stalling at low engine speeds.

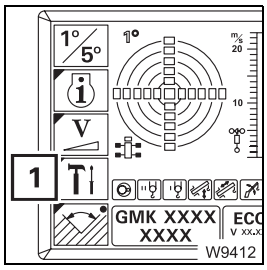
ECOS registers the currently available motor output and the hydraulic performance instantaneously required by the power units.

If the required hydraulic performance is above the current motor output (e.g. when connecting an additional crane movement), the critical load control automatically reduces the hydraulic performance of the power units. In this, the control lever movement is taken into account so that the power unit speeds remain equal.

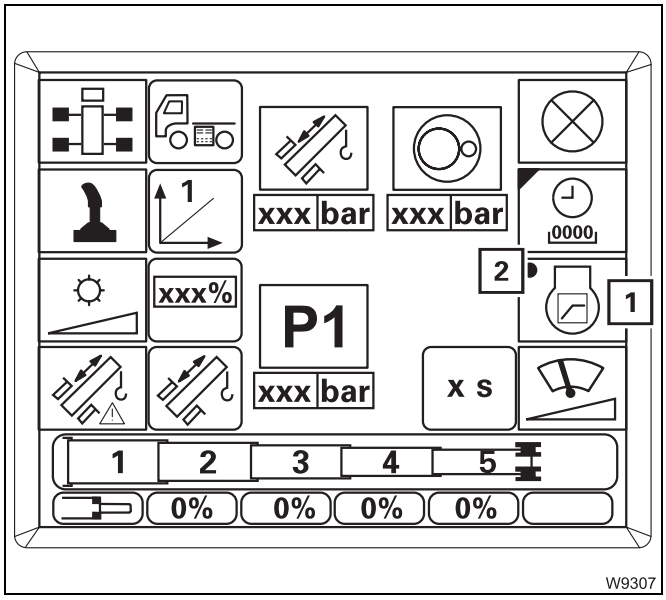
The slewing gear is not influenced by the critical load control.

Switching on and off

The critical load control is switched on together with the ignition.
You should only switch off the critical load control if it is faulty (engine stalls or individual power units can no longer be controlled).



- If necessary, open the main menu Esc and press the button (**1**) once.



The *Settings* submenu opens.

To switch off the critical load control

- Press the button (**1**) repeatedly until dot (**2**) is **black**.

To switch on the critical load control

- Press the button (**1**) repeatedly until dot (**2**) is **green**.

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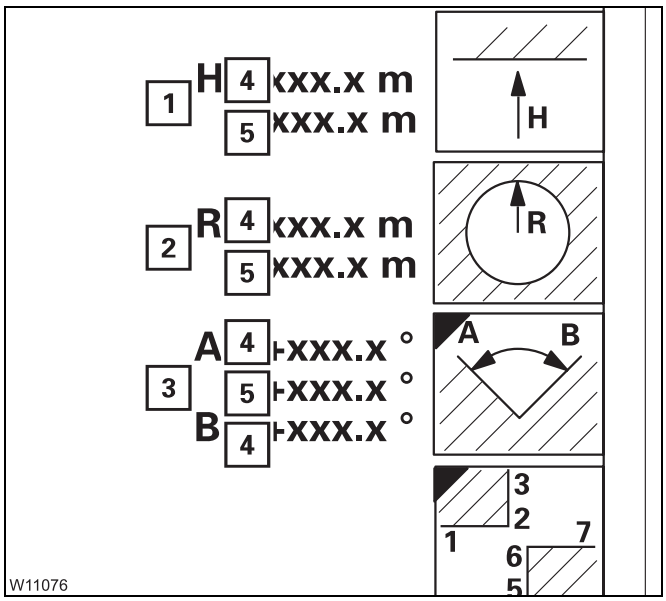


Limit values / Current values

The displays (**1**) to (**3**) indicate values for

1 Overall height

2 Working radius

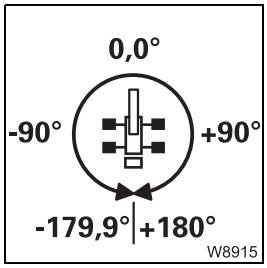
3 Slewing angle

Every display shows the following values:

4 Limit value – red

5 Current value – blue

With manual input switched on, the display (**5**) changes; ➠ p. 12 - 116.



The following applies to the slewing angle display:

0° means that the superstructure is slewed to the rear.

– Angles in the **right-hand semi-circle** are displayed as **positive** values (0° to +180.0°).

– Angles in the **left-hand semi-circle** are displayed as **negative** values (0° to –179.9°).

Viewing the limit values for object monitoring; ➠ *Objects*, p. 12 - 117.

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12.5.6 Shutdown by working range limiter

If a limit value is reached, SLI shutdown occurs. All movements that would go closer to the limit value are disabled. Shutdown remains active even if you switch off the monitoring function.

Shutdown point reached for	Disabled movements
Overall height	– Raising – Extending – Lowering the hoist – Derricking the lattice extension
Working radius	– Lowering – Extending – Lifting the hoist – Derricking the lattice extension
Slewing angle **A**	– Slewing to the left
Slewing angle **B**	– Slewing to the right
Objects	Depending on the position of the object: – slewing to the left or right – lowering – extending – lifting the hoist – derricking the lattice extension

The SLI also shows an error message. The enable the movements, you must leave the shutdown range and acknowledge the error message; ➠ *Table of error codes*, p. 15 - 28.

Danger of accidents by overriding shutdown procedures
Only override the SLI if it is absolutely necessary and you have a clear view of the danger area. Bear in mind that, due to the boom bending for example, the overall height is increased if you set down the load.

If you override the SLI, the shutdown is overridden and all movements are enabled.

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Switching on

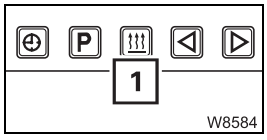
- Check whether the auxiliary heater is allowed to be operated at the current site of the truck crane before switching it on. Find out whether there are any sources of danger that could result in explosions.

Danger of explosions when operating the auxiliary heater
The auxiliary heater is not allowed to be operated:
– at service stations and tank farms,
– at places where inflammable gases or vapours can be found or may form (e.g. at places where fuel is stored and at chemical factories),
– at places where explosive dust can be found or form (e.g. coal dust, wood dust, grain dust).

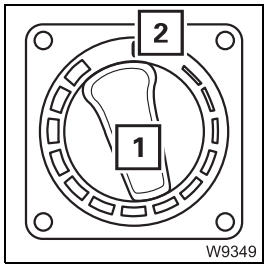
Danger of suffocation when operating the auxiliary heater
Do not use the auxiliary heater in closed spaces (e.g. a garage).

This section describes how to switch on the heater manually. You can also have the auxiliary heater switch on automatically; ➠ *Storing the heating start*, p. 12 - 131.

- Turn on the ignition; ➠ *Switch on the ignition*, p. 11 - 8.



- Press button (**1**) once.
  The auxiliary heating switches itself on – the control field lights up.



Setting the temperature

- Turn the switch (**1**) to the required temperature.

When the switch (**1**) is turned as far as possible (**2**) (*cold*), the auxiliary heater is not switched on.

The auxiliary heater only supports the heating capacity of the standard heating system as long as the engine is cold. When the engine is warm, the heater is switched off. The pump for the auxiliary heater continues to run, however, until you switch the auxiliary heater off.

Always switch off the auxiliary heater when you turn off the truck crane when the battery master switch is switched on. In this way, you prevent the auxiliary heater from restarting and running down the batteries after the engine has cooled down.

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13 Rigging work

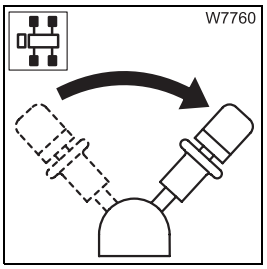
If the truck crane on the site has already been rigged, proceed according to the *CHECKLIST: Inspections prior to crane operation*, p. 12 - 1.

13.1 Rigging work checklists for crane operation with the main boom

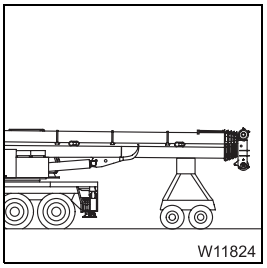
This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.
Observe the warnings and safety instructions specified there.

13.1.1 CHECKLIST: Rigging

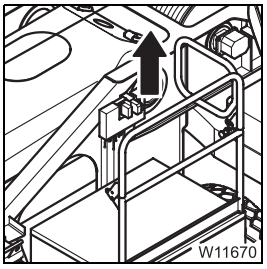
1. Choose a suitable site; ➠ *Choosing a suitable site*, p. 13 - 9.



2. Check that the parking brake is engaged – if necessary, engage the parking brake.



3. **If the main boom is resting on a trailer:**
   – Switch off the boom floating position; ➠ p. 13 - 17,
   – Switch off the slewing gear freewheel; ➠ p. 13 - 18,
   – If necessary, switch off boom pre-tensioning; ➠ p. 13 - 19.



4. Folding out the tread grid on the turntable; ➠ p. 13 - 113

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Ground bearing area

- Now calculate the required ground bearing area.
- Check that the surface of the outrigger pad (➠ p. 8 - 6) is larger than the calculated ground bearing area. If the surface of the outrigger pad is smaller, you will need to enlarge the ground bearing area.

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

Example for calculating the required ground bearing area:

If the outrigger pressure is 25 t and the ground has a bearing capacity of 40 t/m^2, then the required ground 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 ground bearing area by packing the outrigger pads; ➠ p. 13 - 39.

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13.5 Starting the engine for driving for rigging work

For rigging work, the engine for driving must be running, e.g. to move the outriggers. You can start the engine for driving:

– With the hand-held control

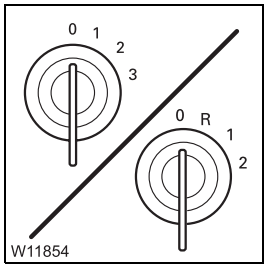
– From the crane cab

You can generally only start the engine if a bridging plug is inserted in all sockets which are not required.

13.5.1 Starting / turning off the engine with the hand-held control

Prerequisites

The following requirements must be met before you can start the engine for driving with the hand-held control:



– The ignition is switched off in the crane cab.

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

• Connect the hand-held control to a socket on the carrier; p. 13 - 20.

If you connect the hand-held control to a carrier socket while the engine for crane operation is running, that engine will go out. In that case you cannot start the engine for driving since the ignition in the crane cab is still switched on.

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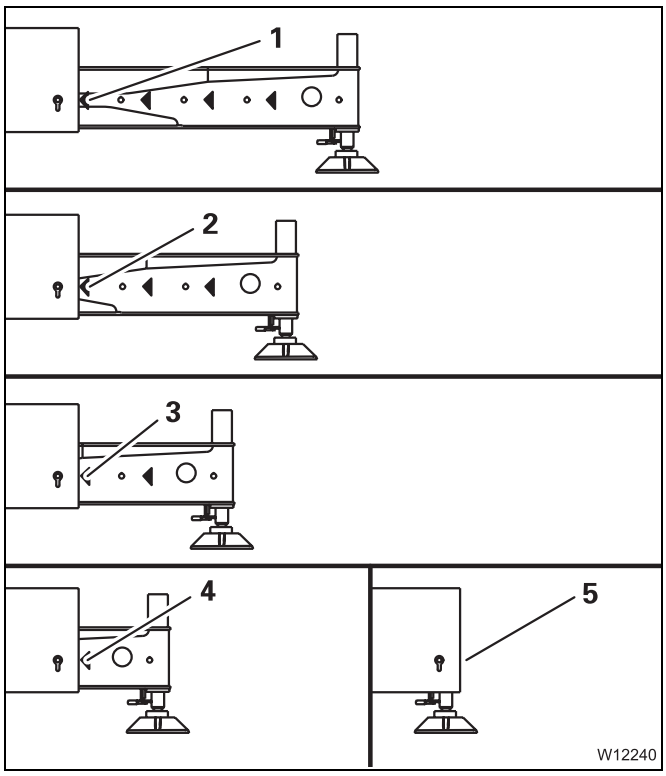

Setting the spans

- Release the outriggers.
- Extend or retract the outriggers up to the marker for the required outrigger span.
  - **1** 8.332 x 7.00 m (27.3 x 23.0 ft)
  - **2** 8.332 x 6.00 m (27.3 x 19.6 ft)
  - **3** 8.332 x 5.00 m (27.3 x 16.4 ft)
  - **4** 8.332 x 4.00 m (27.3 x 13.2 ft)
  - **5** 8.332 x 2.54 m (27.3 x 8.4 ft)
    No marker, retract fully
- Secure the outrigger.
- Set the outrigger span on the other outriggers in the same way.

For on-road driving

- Create the outrigger span 8.332 x 2.54 m (27.3 x 8.3 ft) for all outriggers and secure all outriggers.
- Bring all the outrigger pads into driving position; ➠ p. 13 - 38.

Danger of accidents due to outrigger beams moving out
Completely retract all outriggers and secure them. This prevents the outrigger beams from swaying out in curves and causing serious accidents.

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13.6.9 Extending / retracting supporting cylinders

Danger of overturning due to insufficient load bearing capacity of the ground
Enlarge the ground bearing area if the ground cannot withstand the resulting outrigger pressure.
This prevents the ground under the outrigger pad from giving way and causing the truck crane to tilt and overturn.

Risk of accidents if supporting cylinders cannot be observed
Nobody is allowed to be in the area of the supporting cylinders.
Observe the moving supporting cylinders or have them observed by a banksman who is in visual contact with you.

Risk of damage to the supporting cylinders
Move the outriggers as uniformly as possible on all four support points.
This prevents the supporting cylinders from getting damaged due to one-sided pressure.

Risk of damage to the tyres
Before retracting the supporting cylinders, remove any sharp-edged and pointed materials from below the tyres.
This keeps the tyres from being punctured or damaged when the truck crane is lowered.

Do not extend the supporting cylinders as far as possible. The supporting cylinders must have a remaining stroke of at least 25 mm (1 in) in order to carry out alignment corrections.

There are various operating elements to operate the outriggers

- On the *Outriggers* control units; ➠ p. 13 - 42
- On the hand-held control; ➠ p. 13 - 43
- In the crane cab; ➠ p. 13 - 44

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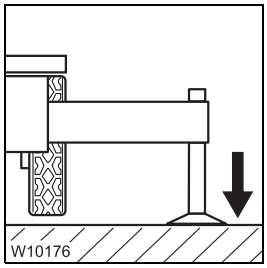
13.6.11 Levelling the free-standing truck crane

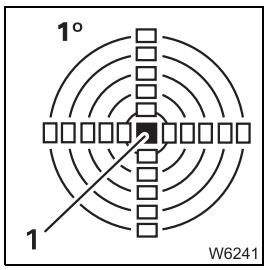
The suspension is deactivated (locked) if the truck crane is in the *Free on wheels* working position.
The suspension has to remain switched off until the truck crane is on outriggers.

Danger of overturning if the supporting cylinders are operated unevenly!
Extend or retract the supporting cylinders as evenly as possible.
In this way you can prevent the truck crane from overturning when operating individual supporting cylinders.

- Set down the load.



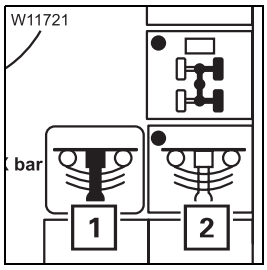
- Extend the supporting cylinders until all wheels are just above the ground.



Levelling the truck crane

- Level the truck crane on outriggers until the lamp (**1**) is the only one lighting up in the measuring range **1°**.

Danger of overturning when switching on the suspension
You may under no circumstances switch on the suspension as long as the rigged truck crane is on wheels. The suspension struts would be suddenly pressed together and damaged and the truck crane could overturn when switching on the suspension.



Switching on the suspension

- In the driver's cab, open the *Level adjustment system* submenu – button  .
- Press the button (**2**) once – dot **green**.
  The symbol **1** is **green** if the suspension is switched on.

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13.7.6 Assembling counterweight versions

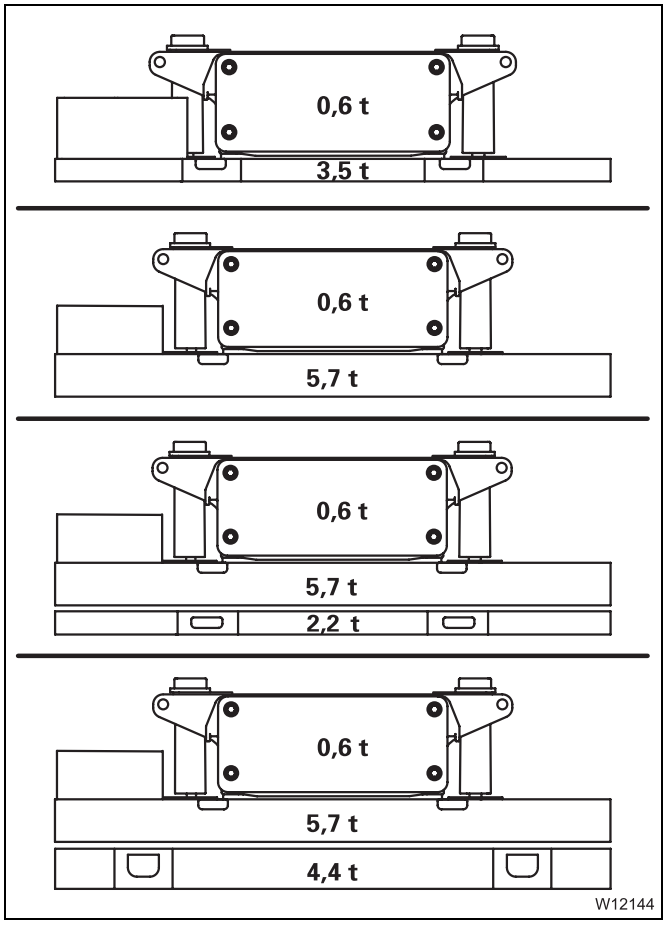
Danger of overturning when slewing with a rigged counterweight
When a counterweight version is rigged, check whether slewing is permitted with the current rigging mode (outrigger span, working radius). Correct the rigging mode if necessary; ➠ *Slewing with rigged counterweight*, p. 13 - 82.

Danger of crushing when setting down the counterweight sections
Make sure any helpers keep a sufficient distance away from the counterweight sections with any parts of their body when setting down the counterweight sections.
Remove all objects from the counterweight platform that could become jammed or crushed

Danger of crushing when slewing the superstructure
The access ladders are located in the slewing range of the superstructure. Make sure nobody uses the access ladders (helpers for example) while you lift a counterweight section onto the counterweight platform.

On the turntable

Depending on the version, different counterweight combinations can be mounted on the turntable.



4.1 t (9,000 lbs)

Is firmly mounted on the turntable with version **B**.

6.3 t (13,800 lbs)

Is firmly mounted on the turntable with version **A** and version **C**.

8.5 t (18,700 lbs)

Can only be mounted on the turntable with version **C**; ➠ p. 13 - 77.

10.7 t (23,500 lbs)

Can only be mounted on the turntable with version **C**; ➠ p. 13 - 77.

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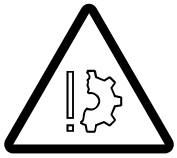

Risk of damage to the lifting cylinders!
If necessary, mount the plate 3 or 10 on the turntable, so that the lifting cylinders do not knock against the assembled counterweight while slewing.
➠ *Version C*, p. 13 - 63.
Generally, plates 3 and 10 which have been set down must always be placed below the plates 7 and 8.

Counterweight sections	Counterweight version in t (lbs)							
	19.5 (42 900)			21.7 (47 800)		23.9 (52 600)		26.1 (57 500)
6.3 t on the turntable	4 + 6 or 4 + 5							
4.4 t section	–	–	3	3 [1)]	3	3	3	3
3.3 to plates	7 8	7 8	7 8	7 8	7 8	7 8	7 8	7 8
2.2 t section	9 2 [2)]	2 10	–	9	2 [2)]	9 2 [2)]	2 10	9 2 10
2.2 t base plate	1	1	1	1	1	1	1	1

[1)] For 3, 2 + 10 can also be used
[2)] For 2, 10 can be used

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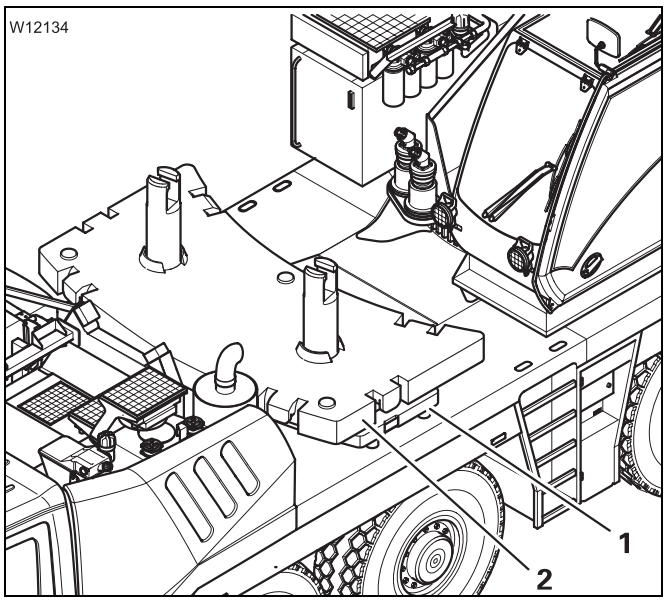
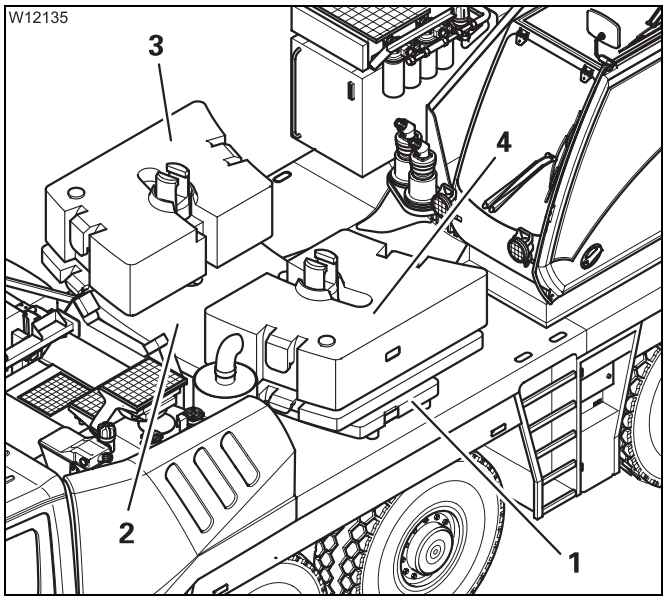


- Observe the following points to avoid damage to the derricking cylinder.

For version A and B

- At most, set
  - the 2.2 t base plate (**1**) and
  - the 4.4 t plate (**2**) down.



With version C

- At most, set
  - the 2.2 t base plate (**1**) and
  - one 2.2 t plate (**2**) down.

You can also set the die 3.3 t plates (**3**) and (**4**) onto the plate (**2**).

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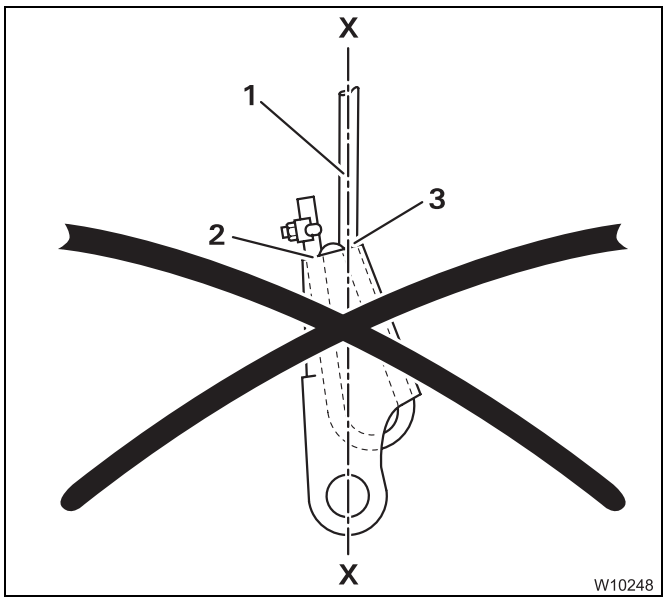


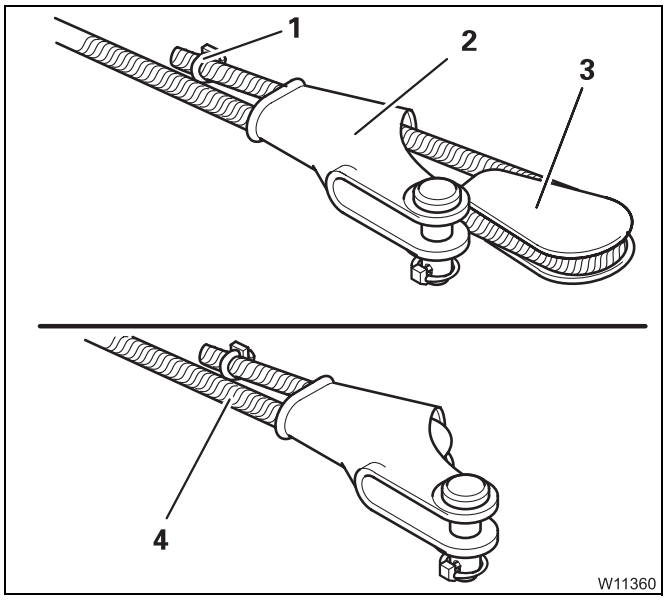
Incorrect rope guide

The hoist rope end must **never** run into the rope end clamp at point (**3**) and protrude from the rope end clamp at point (**2**).

Under a load, the load-bearing rope would become kinked at point (**3**) and become damaged as a result.

The rope end clamp and the rope wedge are marked with their size and the rope diameter they are designed for.

Risk of accidents from incorrect rope end clamp / rope wedge
Only use rope end clamps and rope wedges of the same size that are designed for the cross-section of the hoist rope you are using.
This will prevent the hoist rope from slipping out of the rope end clamp when under a load, which would cause the load to be dropped.



- Observe the correct rope guide.
- Insert the hoist rope with the corresponding rope wedge (**3**) into the rope end clamp (**2**).
- Fasten the rope clamp (**1**) to the loose end of the hoist rope.
- Pull the hoist rope (**4**) taut until the rope wedge and the hoist rope sit tightly in the rope end clamp.

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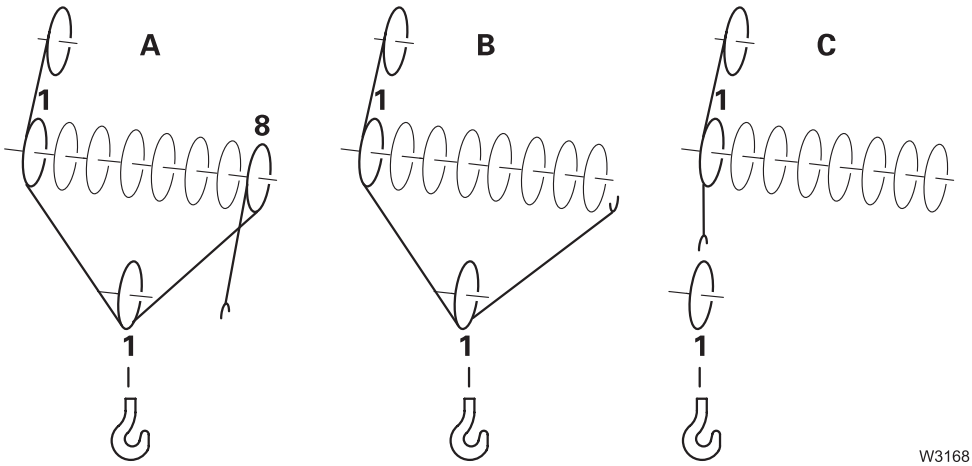
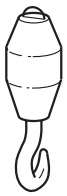
1 sheave hook block

Max. lifting capacity of the hook block	20 t (44,090 lbs)
Max. lifting capacity with the GMK 4100:	
A With 3-fall reeving	17.0 t (37,500 lbs)
B With 2-fall reeving	11.3 t (24,900 lbs)
C With 1-fall reeving	5.7 t (12,600 lbs)

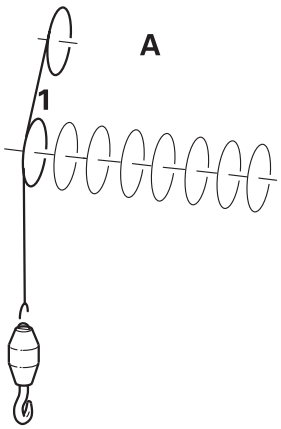


W3168



Hook tackle

Max. lifting capacity of the hook tackle	8 t (17,600 lbs)
Max. lifting capacity with the GMK 4100:	
A 1-fall reeving	5.7 t (12,600 lbs)



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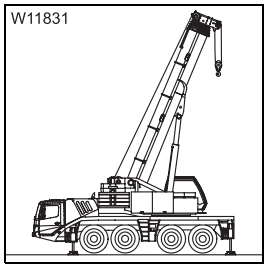
13.9 Other rigging work

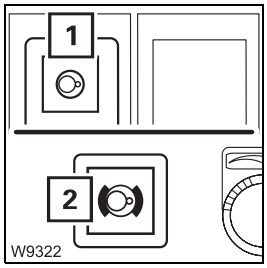
13.9.1 Rigging in free on wheels working position



– The truck crane is supported on outriggers

– The counterweight combination required for using the truck crane free on wheels is rigged.

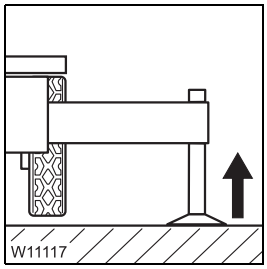
• Slew the superstructure into the *working position 0° to the rear*.



• Switch off the slewing gear so that the slewing gear brake is engaged.
  – The lamp in the button (**1**) must light up dimly.
  – The lamp (**2**) must light up.

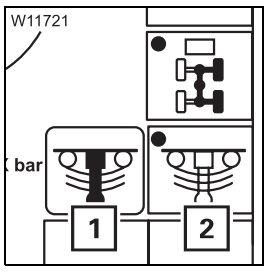
➠ *Switching off the slewing gear*, p. 12 - 92.

Danger of overturning if the supporting cylinders are retracted unevenly!
Retract all of the supporting cylinders as evenly as possible. In this way you can prevent the truck crane from overturning when retracting individual supporting cylinders.



• Retract the supporting 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 as long as the rigged truck crane is on wheels. The suspension struts would be suddenly pressed together and damaged and the truck crane could overturn when switching on the suspension.



Switching on the suspension

• In the driver's cab, open the *Level adjustment system* submenu – button  .

• Press the button (**2**) once – dot **green**.
The symbol **1** is **green** if the suspension is switched on.

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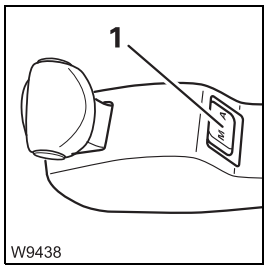
14.4 Driving from the driver's cab

If the truck crane is equipped with the Driving mode submenu, you can also drive the truck crane from the crane cab; ➠ p. 14 - 5.

Risk of accidents when driving the truck crane from the driver's cab with a lifted load!
With a lifted load, only drive the truck crane from the crane cab. You must be able to carry out crane movements in an emergency at all times.

14.4.1 Preparing to drive

Transmission

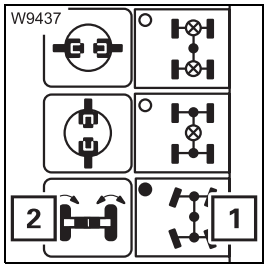


- Press the switch (**1**) where is says **M** – *Manual*.
- Shift to the lowest starting gear; ➠ p. 5 - 32.
  This prevents the transmission from upshifting and keeps the speed at a minimum.

Switching on separate steering

When driving the rigged truck crane, the separate steering must be switched on.

Risk of damage to the steering linkage
Always switch on separate steering before driving the rigged truck crane and steer the truck crane only when it is rolling.
The steering linkage can be damaged if separate steering is switched off or if you steer the vehicle while it is stationary.



- Press the button (**1**) once – dot **green**.
  The symbol (**2**) is displayed in **red** if the separate steering is switched on.

Connections

If necessary, you can connect the longitudinal and transverse differential locks; ➠ p. 5 - 63.

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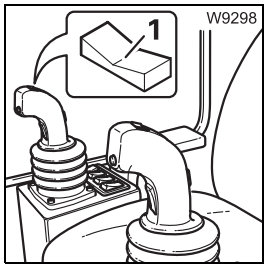
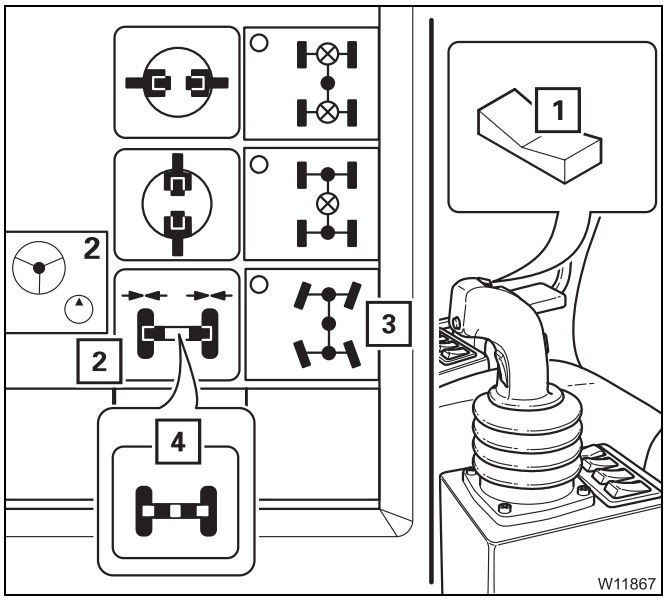
Switching to normal steering mode



- Steer the wheels of the first and second axle lines as far as possible to the right or the left with the button (**1**) and keep them in this position until the system has switched to normal steering.

The switching operation is not started unless the wheels of the front axle lines are turned as far as they will go.



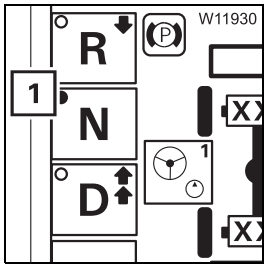
- Press the button (**3**) once – dot **black**.
- Use the button (**1**) to steer the rear axle lines in the opposite direction of the front axle lines until the symbol (**4**) is **yellow**.

The second and fourth axle lines are now connected.

- Use the button (**1**) to steer the third axle line into the straight position until the symbol (**2**) is **green**.

The third axle line is now locked and the system is switched to normal steering.

14.5.5 Operating the transmission



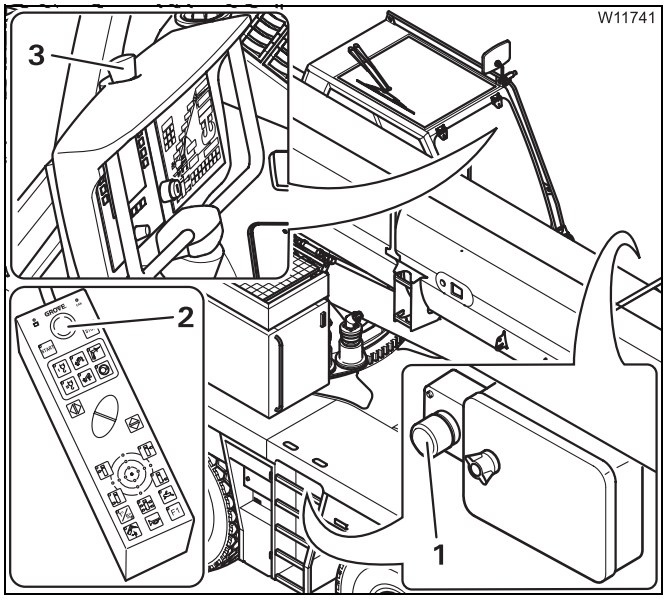
After the submenu has opened automatically, the buttons next to the symbols R, N and D have no function.

The transmission is in neutral position – dot (**1**) green.

15 Malfunctions during crane operation

15.1 Emergency stop switch

Risk of overloading if used improperly
Only actuate the emergency stop switch if it is no longer possible to stop the crane movements with the normal operating elements.
The emergency stop switch stops the crane movements suddenly. This may overload the truck crane, e.g. in the event of high working speeds and large working radiuses.



- Stop all crane movements.

Four emergency stop switches are provided for an emergency:

1 On the carrier

2 On the hand-held control

3 In the crane cab

- Press one of the emergency switches (**1**), (**2**) or (**3**). The switch engages.

The engine goes out.

After activating an emergency stop switch;
➠ *Resetting the emergency stop switch*, p. 4 - 22.

The battery master switch cannot be used as an emergency stop switch for the engine. The engine continues to run after the battery master switch has been switched off.

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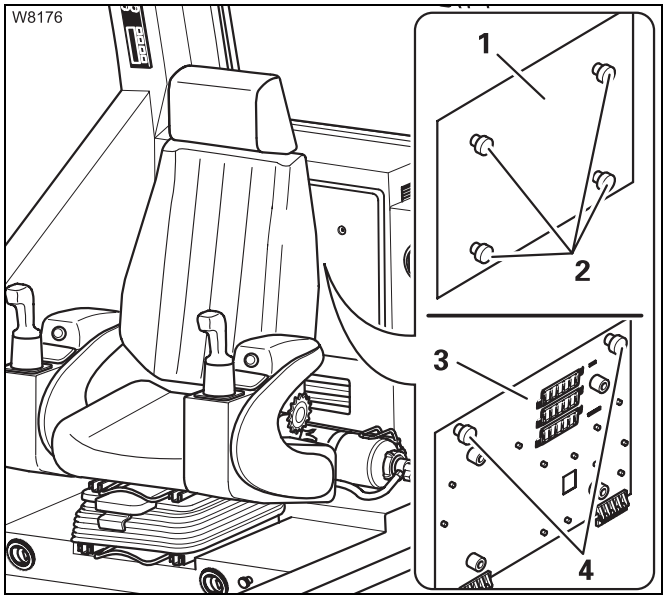
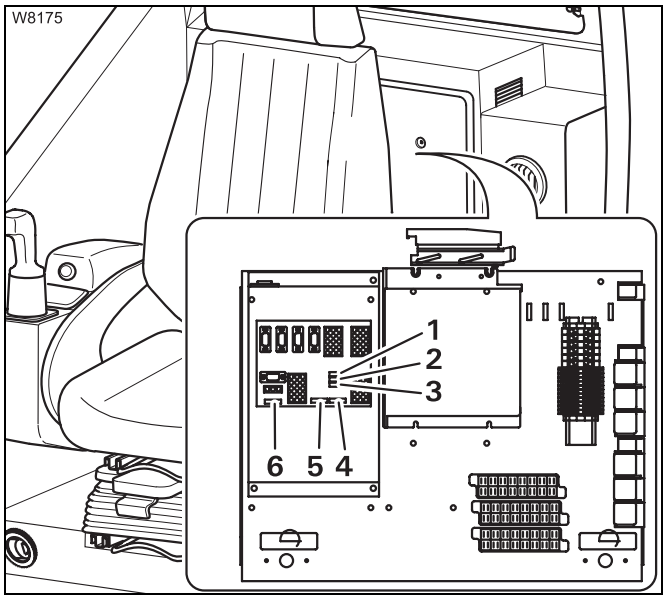
15.3.4 SLI fuses

When a fuse is blown, a corresponding error code is displayed; ➠ *Table of error codes*, p. 15 - 28.



- Undo the screws (**2**) and remove the cover (**1**).
- Undo the screws (**4**) and fold down the plate (**3**) to the front.
- Observe the instructions regarding fuse changes; ➠ p. 15 - 5



Arrangement of the fuses on the SLI control unit.

Pos.	Designation	Amperage (A)
1	Fuse F1	5
2	Fuse F2	5
3	Fuse F3	5
4	Fuse F11	5
5	Fuse F12	5
6	Fuse F6	5

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15.4.6 Malfunctions on the counterweight hoist unit

Malfunction	Cause	Remedy
Counterweight hoist unit not working	Emergency stop switch actuated	➠ *Resetting the emergency stop switch*, p. 11 - 20
	Fuse F1/1, F1/7	Replace blown fuse; ➠ p. 15 - 6
	Control unit faulty, error message displayed	Acknowledge error message once; ➠ p. 15 - 33 – if it occurs again, notify ***CraneCARE***.
	Function disabled by ECOS	If required, acknowledge error message once and briefly turn off the ignition – it if occurs again, notify ***CraneCARE***.
Error symbol (!) is displayed	Electronics has identified an error	
Retract / extend lifting cylinder not working	Superstructure in the *intermediate position* rigging range	Slew to *Move lifting cylinders* or *Lift / lower counterweight* position; ➠ p. 10 - 65
Extend lifting cylinder not working	Superstructure outside of rigging range	Slew into the rigging range
	Counterweight rigged and *Move lifting cylinders* position reached	Slew to *Lift / lower counterweight* position
	Counterweight unrigged and *Lift / lower counterweight* position reached	Slew to *Move lifting cylinders* position
Retract / extend lifting cylinder and slewing not working	Automatic mode cancelled	Meet requirements for automatic mode; ➠ p. 13 - 76

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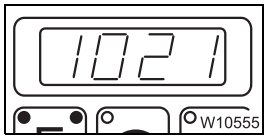
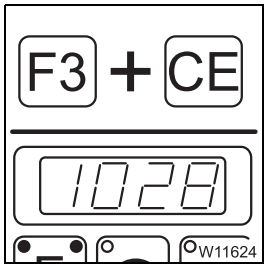
Switching off the sensor / tachogenerator

For values measured twice, you can switch off the faulty sensor / tachogenerator in the case of an error and continue working with one sensor / tachogenerator for a short time.

Danger due to failure of the SLI
Have the error rectified before the next crane job.
By doing this, the crane can then still be unrigged with SLI monitoring if the second sensor / tachogenerator fails.



- Press button E repeatedly until the error for the faulty sensor / tachogenerator is displayed, e.g. **1021** for pressure sensor 2.



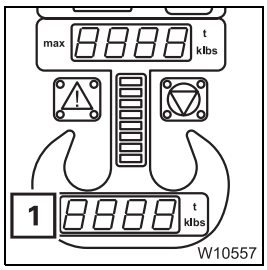
- Press the button F3 and additionally the button CE once.

The faulty sensor / tachogenerator is switched off and the corresponding error is displayed, e.g. **1028** for pressure sensor 2.

When the ignition is switched on again, the shutdown is cancelled and the error occurs again, possibly with a different last digit, e.g. 1025.

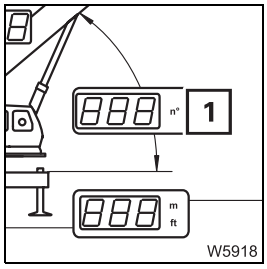
After switching off the faulty sensor / tachogenerator, you should check whether the remaining sensor / tachogenerator is functioning correctly.

Risk of accidents due to defective functioning
After switching off the faulty sensor / tachogenerator, only begin crane operation if the remaining sensor / tachogenerator is displaying correctly. In this way, you prevent the SLI from not switching off when leaving the working range and the truck crane overturning as a result.



Checking the pressure sensor function

- Lift the hook block without a load.
- Check whether the display (**1**) indicates the approximate weight of the hook block. Weights of the hook blocks; ➠ p. 16 - 2.



Checking the angle sensor function

- Set down the main boom on the boom rest.
- Check whether the display (**1**) shows an angle of 0°.

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Risk of damage to the main boom
Never telescope the main boom if there is an error on the length indicator and on the proximity switch at the same time.
It would then not be possible for you to monitor operations, and components in the main boom could be damaged, or a situation could arise in which the main boom can no longer be extended or retracted.

In the *Telescoping* emergency program, all functions for retracting the main boom remain enabled as long as there are no other errors (hydraulic or mechanical).

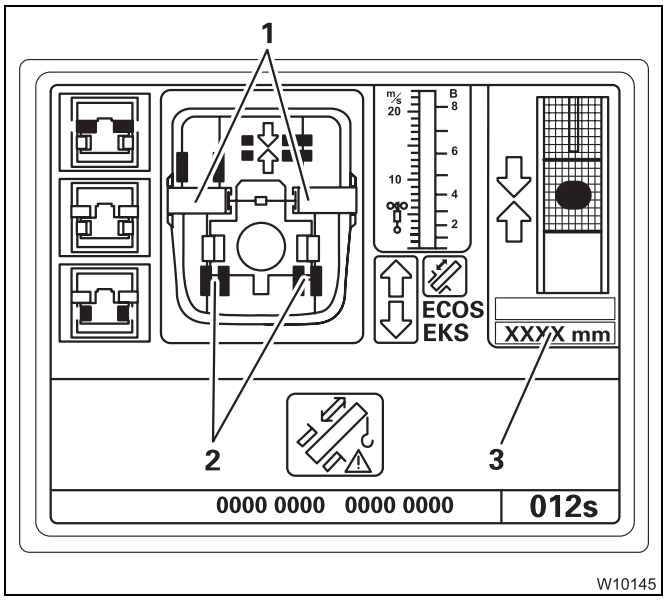
The speed is restricted to approximately 30% of the maximum speed.

– If there is an error on the proximity switch; ➠ p. 15 - 45.

– If there is an error on the length indicator; ➠ next section.

If there is an error on the length indicator

First register the current status of the telescoping mechanism.



- Check the positions of the locking pins as usual, i.e. on the displays (**1**) and (**2**).
- Check whether the display (**3**) shows the SLI measured value for the extended length of the telescoping cylinder.
- Check the telescoping on the SLI.

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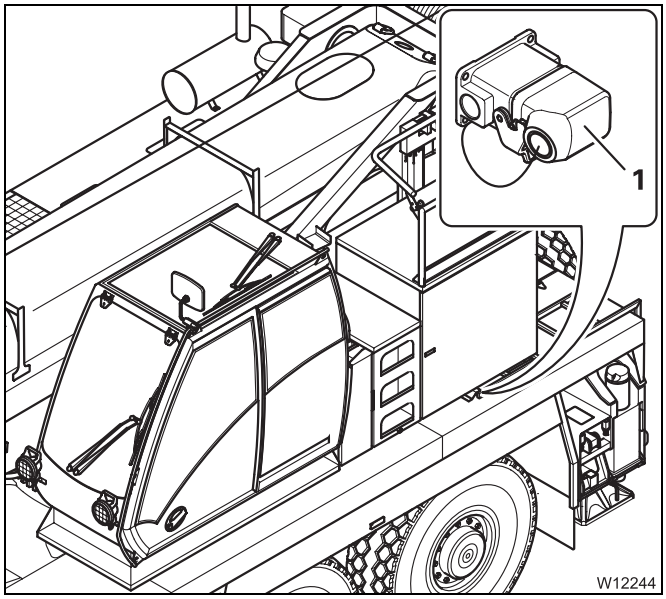
15.5.4 Emergency operation with the hand-held control

If the power units no longer respond to the operating elements in the crane cab, you can operate the power units with the hand-held control.

Operating them with the hand-held control is intended for emergencies only and for bringing the truck crane into a safe condition or supporting it.

Danger of overturning due to deactivated monitoring function
The **SLI is switched off** and the crane operations are not monitored when operating with the hand-held control. If you move into a critical range, the truck crane will overturn.

Preparations You have to connect up the hand-held control and start the engine.

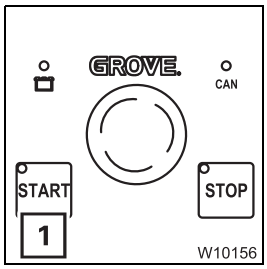


To connect the hand-held control

- Connect the hand-held control to the connector (**1**).

All power units can be operated from this connection.

Information on connecting; ➠ p. 13 - 20.



To start the engine

- Press the button (**1**) once – the engine starts; ➠ p. 11 - 17.

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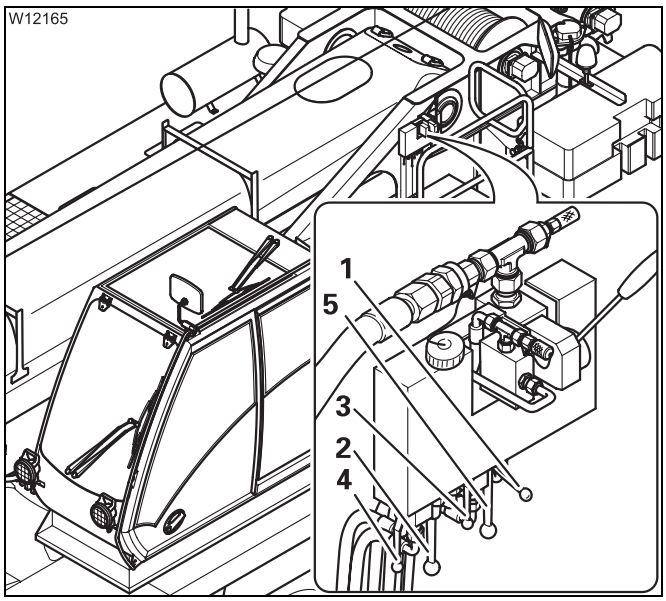

For emergency operation

- Switch the valves **1** to **5** to the positions for the required crane movement - as shown in the following table.

For the main hoist, for example, switch the valve **1 outward**. Valves 2, 3, 4, and 5 must point down.

Danger due to mutual interference of the power units
For **one crane movement**, always switch valves outward.
This prevents wrong crane movements from being performed and several movements from being performed unintentionally at the same time.

Emergency operation for crane movements	Valves outward	Valves downward	Additional switching operations
Lifting	**1**	**2, 3, 4, 5**	Valve Y1105 on continuous operation; ➠ p. 15 - 62
Lowering (Main hoist)	**1**	**2, 3, 4, 5**	Valve Y1104 on continuous operation; ➠ p. 15 - 62
Raising	**3**	**1, 2, 4, 5**	none
Lowering (Derricking gear)	**5**	**1, 2, 3, 4**	none
Slewing	**2, 4**	**1, 3, 5**	Valve **6, 7, 8** closed; ➠ p. 15 - 63

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16 Technical information for the superstructure

16.1 Technical data

GROVE truck crane GMK 4100

Permissible temperature range:	–25 °C to +40 °C (–13 °F to +104 °F)
Crane designation:	Truck crane in accordance with DIN 15 001, part 1
Crane application:	Service crane in accordance with DIN 15 001, part 2
Crane classification:	Hoist class H1 in accordance with DIN 15 018, part 1 Crane class A1 in accordance with ISO 4301, part 2

The crane is designed in accordance with crane class A1 (as defined in ISO standard 4301 - 2). This relates to the engineering design (specification of quality) and is not a guarantee in the sense of § 443 BGB (German federal law).

16.1.1 Maximum lifting capacity (DIN / ISO / EN)

Max. load bearing capacity:	85.0 t (185,000 lbs)
Max. load moment	
– in working position 0° to the rear:	301.5 tm (33.5 t x 9 m)
– within the 360° slewing range:	290.0 tm (29.0 t x 10 m)

16.1.2 Maximum lifting capacity (ANSI B 30.5)

Max. load bearing capacity:	85.0 t (185 000 lbs)
Max. load moment	
– in working position 0° to the rear:	315.0 tm (35.0 t x 9 m)
– within the 360° slewing range:	302.5 tm (27.5 t x 11 m)

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