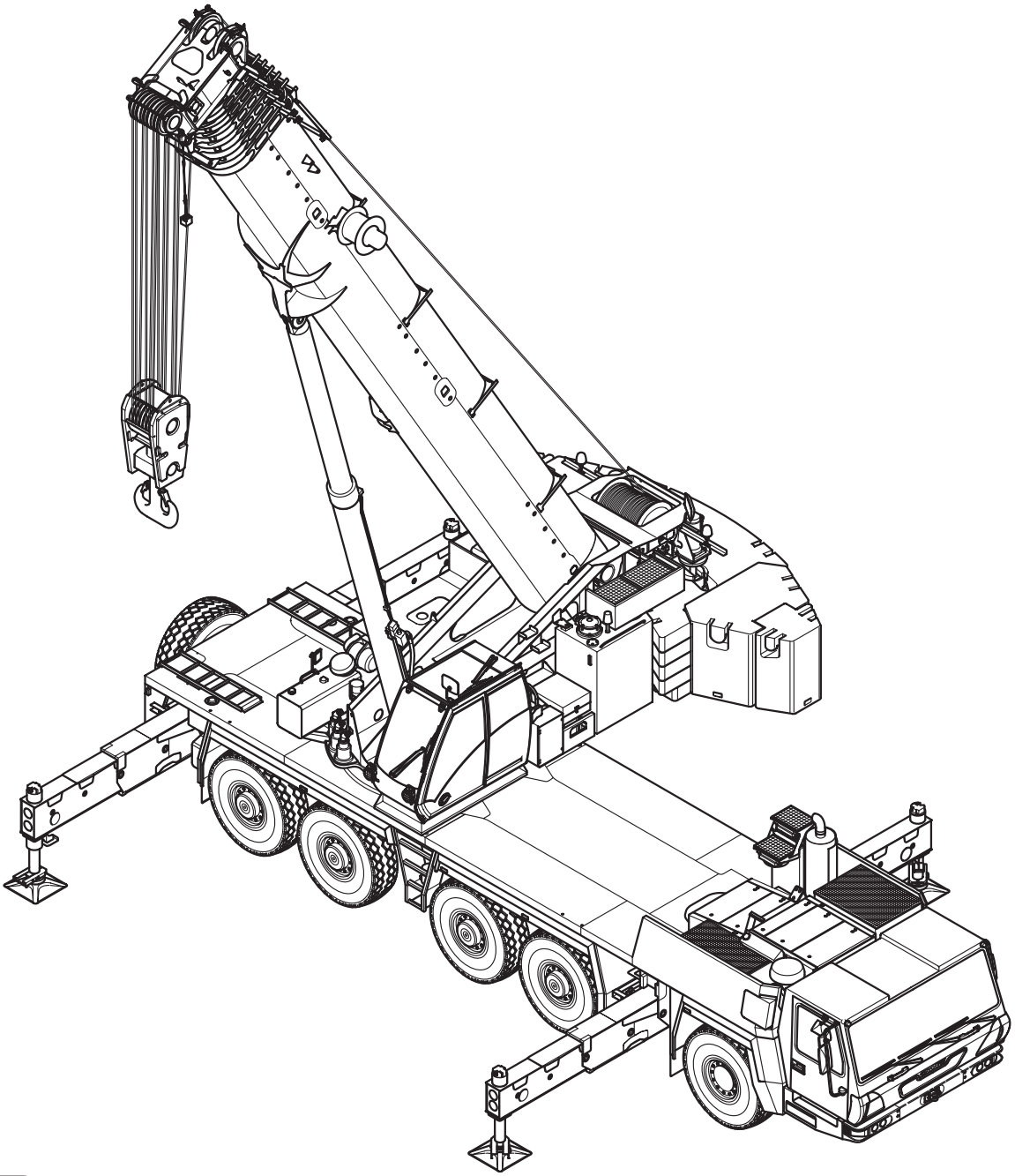
GROVE

GMK 5220

Operating instructions
Part 1 – Driving



Manitowoc Crane Group

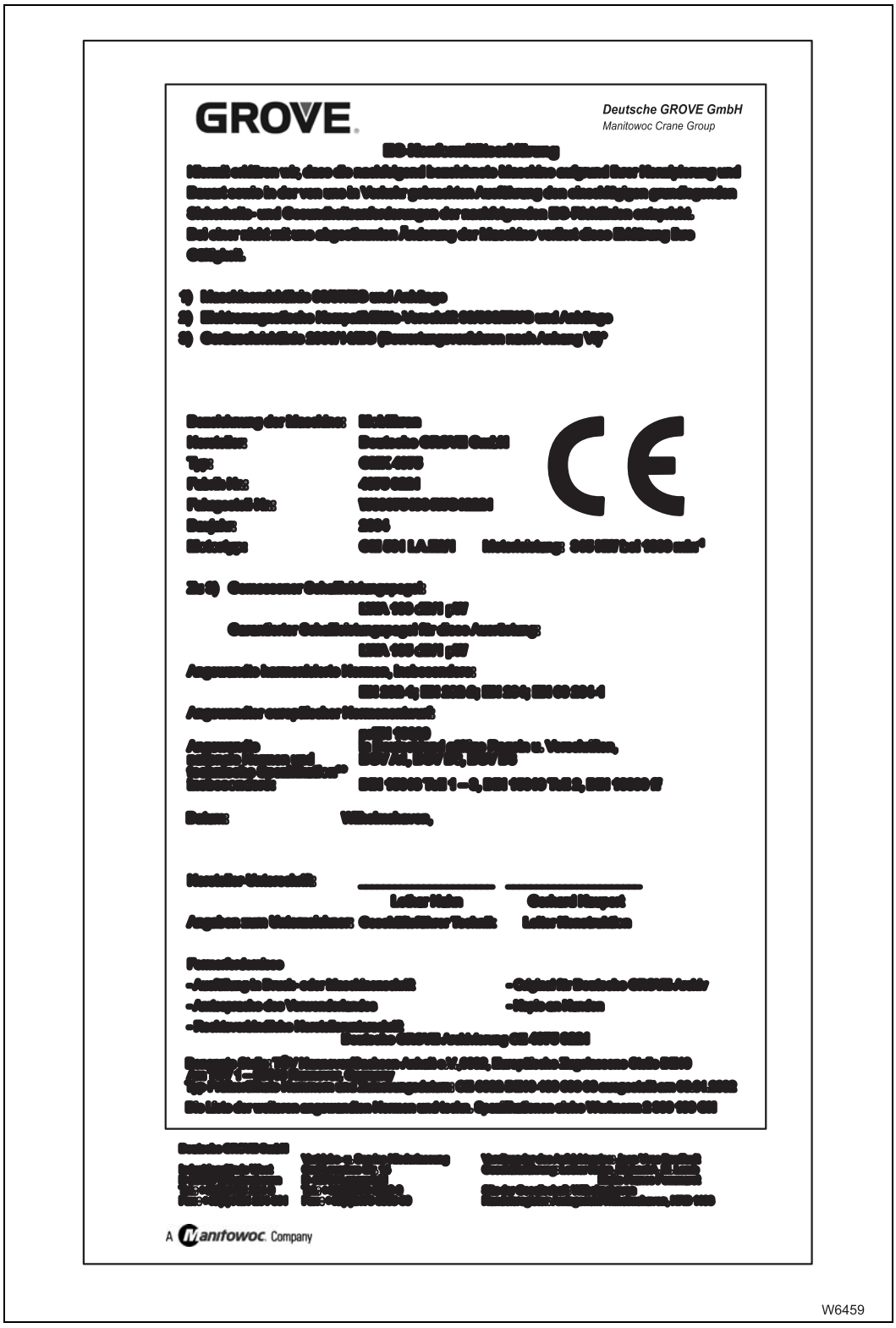
Serial number

3 112 303 en
10.09.2006

A Manitowoc Company

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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Check all operating and control elements in the driver's cab before starting the engine.

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

Secure the truck crane after driving against unauthorized use.

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 take a look at 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 beginning with 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 machine parts which are equipped with appropriate steps and railings and therefore guarantee safety. During rigging and maintenance work on machine sections above body height which have no apparatus for accessing them, always use the extension ladder supplied (e.g. when reeving the hoist rope on the boom head).

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.

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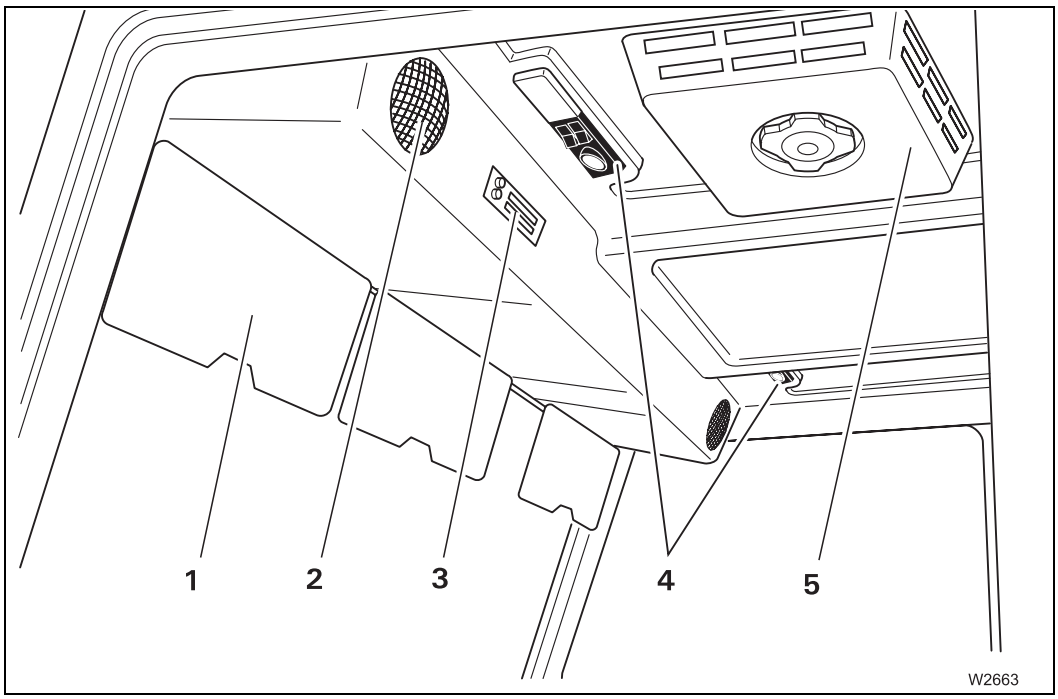
Above in the driver's cab



1 Sun visor
2 Loudspeaker[1)]
3 Radio/cassette/CD[1), 2)]
4 Cab lighting ➠ p. 3 - 59
5 Roof fan[1)] ➠ p. 3 - 63

1) Additional equipment
2) ➠ *Separate operating instructions*

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1	Transfer case for off-road gear on/off	p. 3 - 47
2	Transfer case display	p. 3 - 47
3	Additional brake display	p. 3 - 52
4	Vehicle height display[1)]	p. 5 - 9
5	Suspension display	p. 3 - 56
6	Level adjustment system submenu	p. 3 - 18
7	Monitoring submenu	p. 3 - 21
8	Transmission display	p. 3 - 43
9	Transverse differential locks display	p. 3 - 48
10	Transverse differential locks on/off	p. 3 - 48
11	Engine speed display	p. 4 - 17
12	Longitudinal differential locks display	p. 3 - 49
13	Longitudinal differential locks on/off	p. 3 - 49
14	Display for coolant temperature in the engine	p. 4 - 17
15	Settings submenu	p. 3 - 20
16	Fuel level display	p. 4 - 17
17	Serial number/program version display	p. 3 - 41
18	Warning display	p. 3 - 41
19	Steering mode display	p. 3 - 55
20	Separate steering crab travel mode on/off	p. 3 - 54
21	Separate steering manual on/off	p. 3 - 54
22	Separate steering driving around corners on/off	p. 3 - 54

1) Additional equipment

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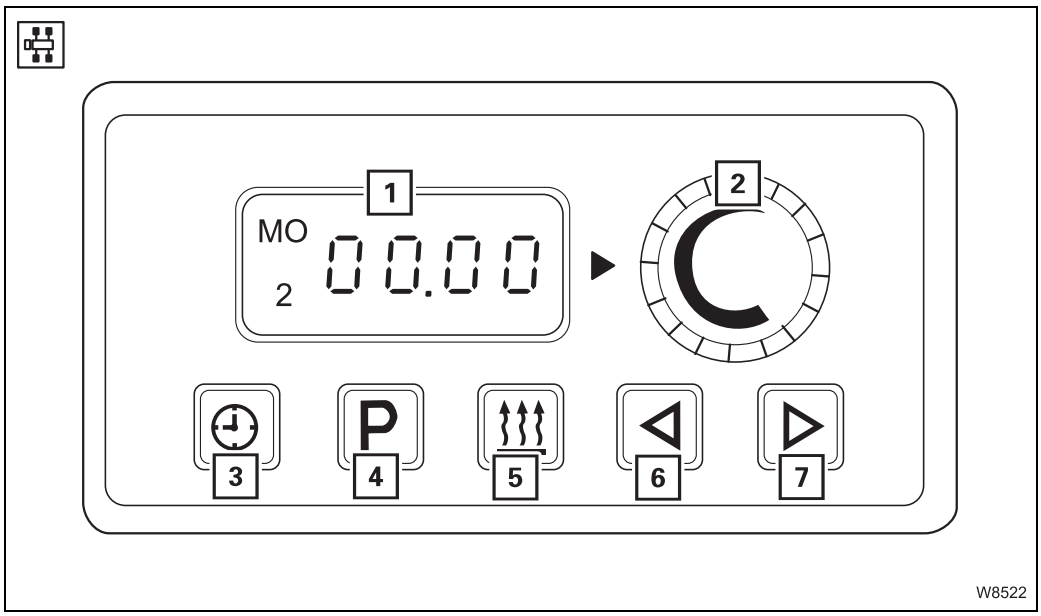
Auxiliary air heater



1	Heating display	p. 5 - 80
2	Regulate the temperature	p. 5 - 81
3	Set time/day	p. 5 - 81
4	Retrieve storage locations	p. 5 - 81
5	Switch heating on/off	p. 5 - 80
6	Input –	p. 5 - 81
7	Input +	p. 5 - 81

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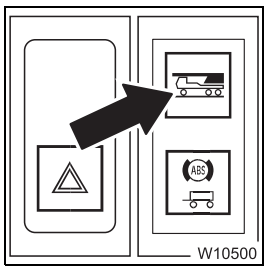
Instrument panels Front instrument panel – *left*



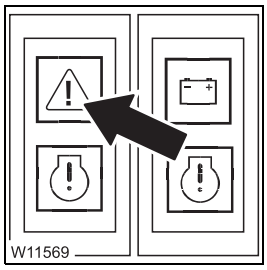
Superstructure ignition monitoring

– **On:** ignition in the crane cab on,
engine start for driving not possible

– **Off:** ignition in the crane cab off,
engine start for driving possible

➠ p. 4 - 147

Front instrument panel – *right*

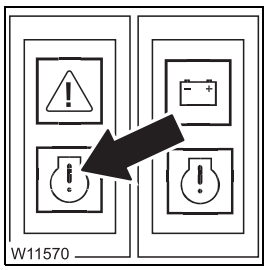


Oil change monitoring

– **On:** engine off – ignition on
or
engine on – Oil change is necessary

– **Off:** engine on – No oil change necessary

➠ *Maintenance Manual*

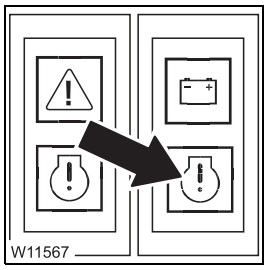


Engine warning

– **On:** engine off – ignition on
or
engine on – Malfunction at the engine

– **Off:** engine on – no malfunction

➠ p. 7 - 36

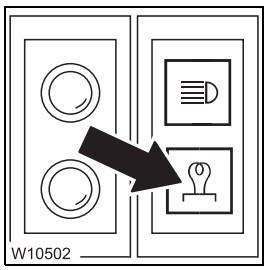


Engine malfunction

– **On:** engine off – ignition on
or
engine on – Severe malfunction at the engine

– **Off:** engine on – no malfunction

➠ p. 7 - 36



Monitoring the flame start system

– **On:** Engine not ready to start – is being warmed up

– **Off:** Engine is ready to start

➠ p. 4 - 16

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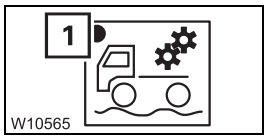
3.2.8 Transfer case

In the main menu

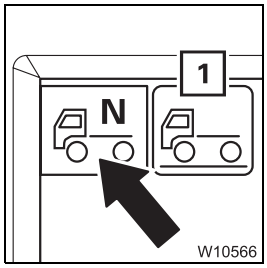


Transfer case for off-road gear on/off

- **To switch on:** Press button once – point (**1**) green
- **To switch off:** Press button once – point (**1**) black
  or
  Activate neutral position

➠ p. 5 - 54

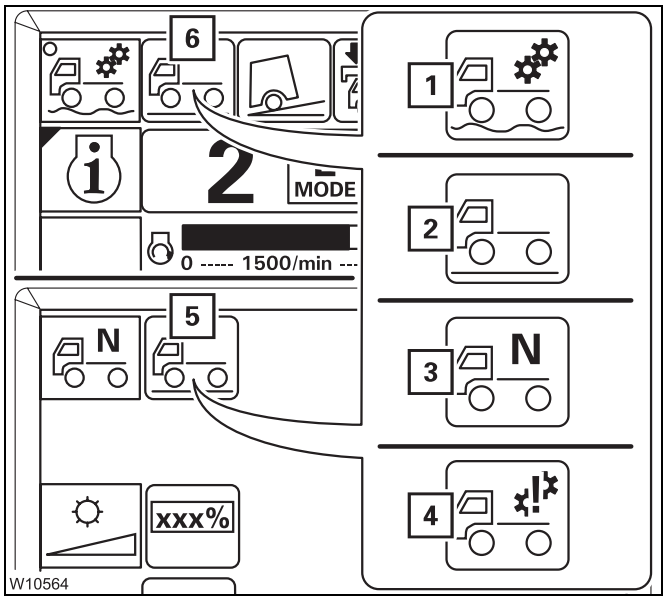
In the *Settings* submenu



Transfer case neutral position on

- **To switch on:** Press button once – display symbol (**1**)
- **To switch off:** Switch the off-road gear on/off

➠ p. 7 - 7



Transfer case display

The current status is shown using different symbols:

1 Off-road gear on

2 Off-road gear – on-road driving

3 Neutral position on

4 Error – violet

The displays in the main menu (**6**) and the *Settings* submenu (**5**) always show the same symbol.

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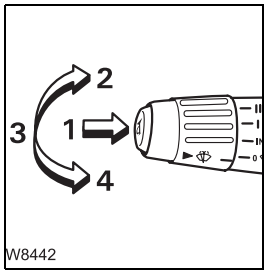
3.2.13 Lighting/windscreen wipers/horn

Steering column



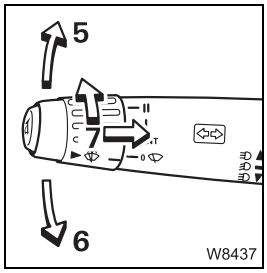
1 Horn: press the button

2 Headlight flasher: press up the switch

The parking light/headlight is switched on:

3 Parking light/headlight: Middle position

4 Full-beam headlight: down – latches into place



5 Right turn signal indicator: forwards

6 Left turn signal indicator: backwards

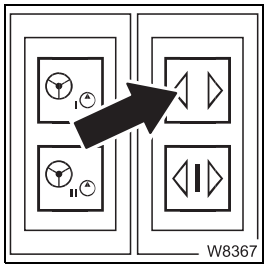
7 Windscreen wiper/washing system: press

7 Windscreen wiper: slew

- **Off:** to **0**
- **interval:** to **INT**
- **slow:** to **I**
- **fast:** to **II**

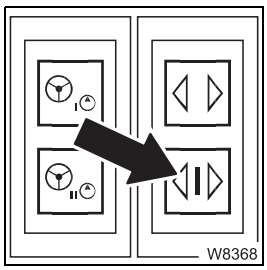
Instrument panels

Front instrument panel – *left*



Turn signal indicator monitoring

- **Flashing:** turn signal indicator on
- **Off:** turn signal indicator off
  or
  Turn signal indicator and a filament lamp is defective on the turn signal indicator



Trailer turn signal indicator lamp monitoring

- **Flashing:** turn signal indicator on and trailer electrically connected
- **Flashes once:** turn signal indicator on and trailer not electrically connected
- **Off:** turn signal indicator off

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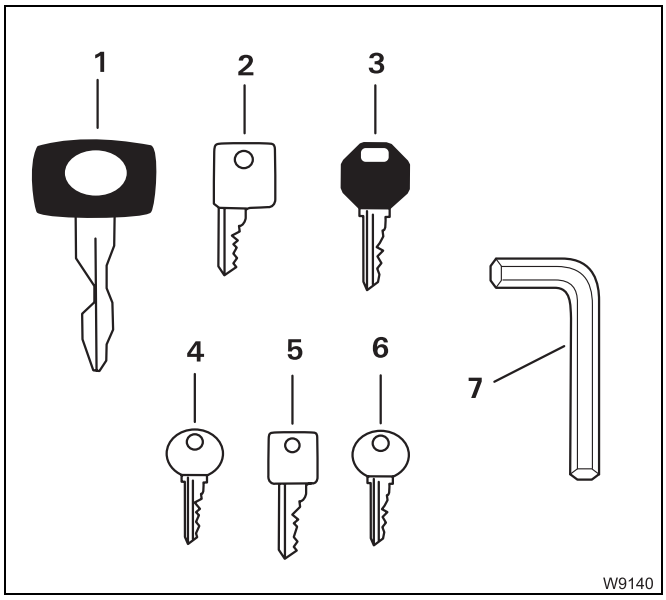
Keys



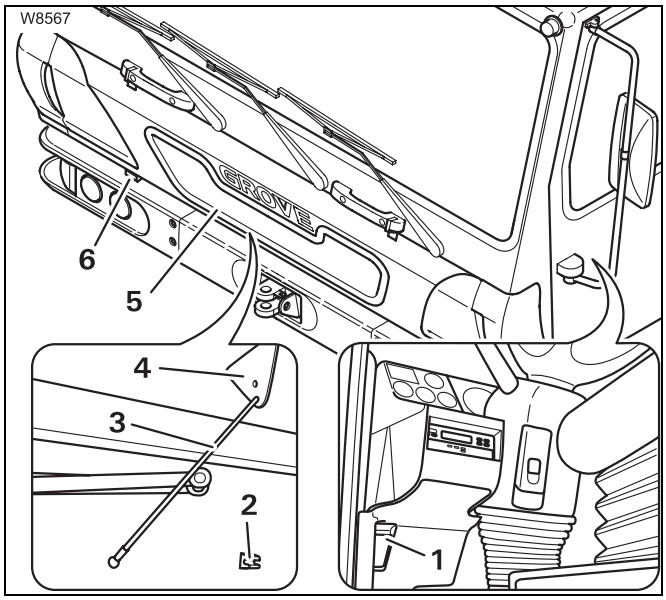
The keys supplied belong to the following locks and covers:

1 Door/Ignition lock of driver's cab
2 Key-operated switch
3 Control unit, outriggers[1)]
4 Boom floating position lock[1)]
5 Slewing gear freewheel lock[1)]
6 Fuel reserve tank[1)]
7 Carrier covers

[1)] Additional equipment

3.2.19 Front flap

The front flap has two locks. For the sake of safety, only one of the two locks may be released from the driver's cab.



Opening the front flap

– To release, pull the lever (**1**).
– Press the lever **(6**) to the right and fold up the front flap (**5**)
– Fold up the support (**3**) and attach to the holder (**4**)

Closing the front flap

– Lift the front flap (**5**)
– Pull the support (**3**) from the holder (**4**) and secure it in the holder (**2**)
– Fold down the front flap
– Press the front flap against the driver's cab until you can hear it latch into place.

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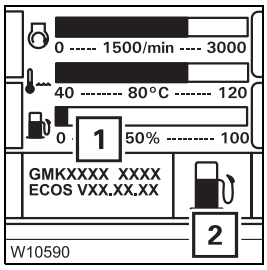
4.1.4 Refuelling



The display (**1**) indicates the current level as a percentage. 100% corresponds to approx. 400 l (106 gal). The level indicator below the display changes its colour depending on the filling level:

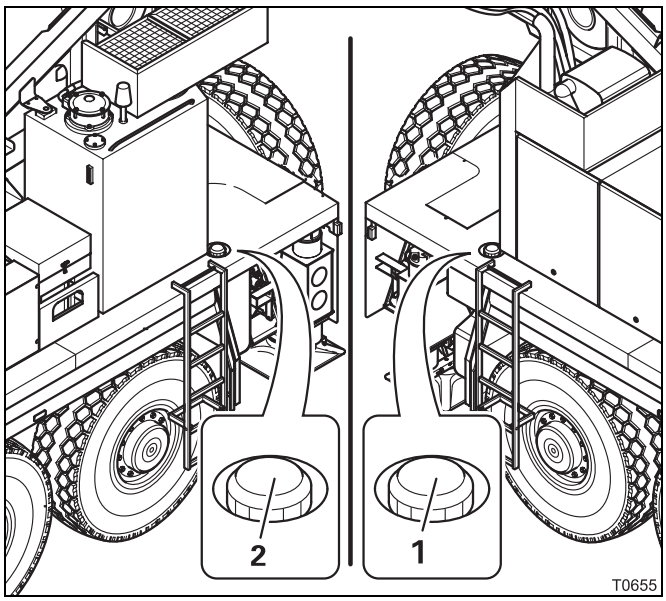
green: over 10% – over 40 l (10,5 gal)

yellow: 5 to 10% – 20 to 40 l (5 to 10.5 gal)

red: below 5% – less than 20 l (5 gal)
The red symbol (**2**) is displayed.

A further display is contained in the *Monitoring* submenu. The percentage is displayed there as a numerical value; ➠ p. 4 - 19.

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



Information on the prescribed oil specification ➠ *Separate operating instructions from the engine manufacturer*.

- Attach one ladder; ➠ p. 4 - 5
- Fill the diesel through the filler neck (**1**) or (**2**).
- Screw the cap onto the filler neck after refuelling.

Risk of accidents if the fuel tank is not closed!
Screw the cap back onto the filler neck each time after refuelling.
In this way you can prevent other vehicles from being endangered by the cap falling off or fuel escaping.

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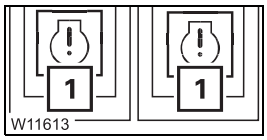
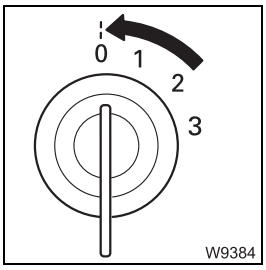
4.1.10 Checks after starting the engine



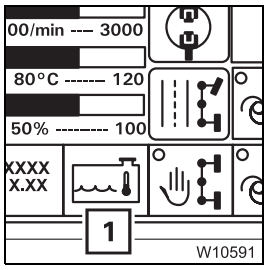
- Watch the lamp (**1**) immediately after starting the engine.
- The lamps may only stay lit together for a maximum of ten seconds.

Risk of damage to the engine!
If both lamps are still lit about ten seconds after the engine has been started and the warning buzzer is sounding, then switch off the engine.
The oil pressure could be too low. The engine can be damaged by running it when the oil pressure is too low.



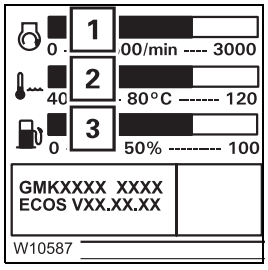
Turn the ignition key to **0** if both lamps are still lit about ten seconds after starting the engine; ➠ *Malfunctions on the engine for driving*, p. 7 - 23.

Checks in the main menu



Monitor the display (**1**) immediately after starting the engine (**1**).

If display (**1**) indicates a malfunction (e.g. coolant too hot), then another warning message will appear; ➠ *Warning submenu*, p. 5 - 45.



Furthermore the following information can be viewed in the main menu at any time:

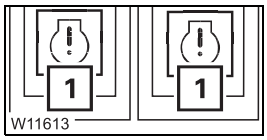
– The current engine speed (**1**)

– The current temperature of the engine coolant (**2**)

– The current fuel reserve (**3**)

Checks on the instrument panels

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



If one of the of the lamps (**1**) is lit, turn off the engine; ➠ *Malfunctions on the engine for driving*, p. 7 - 23.

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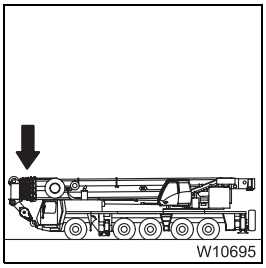
5 Driving

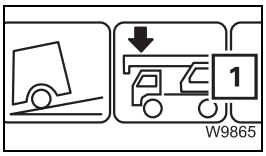
5.1 Before driving

5.1.1 CHECKLIST: Checks before on-road driving

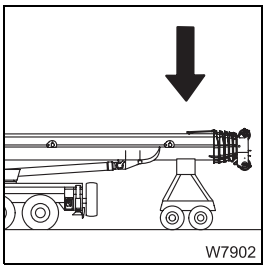
This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references. **Observe the warnings and safety instructions specified there.**



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 - 118,



   - The symbol (**1**) is displayed (if present); ➠ p. 5 - 9.



2. **When the main boom is lying on a trailer**
   - All telescopic sections are locked,
   - The slewing gear is switched off; ➠ p. 12 - 118,
   - The boom floating position is switched on; ➠ p. 6 - 5,
   - The slewing gear freewheel is switched on; ➠ p. 6 - 3,
   - The boom pre-tensioning may be switched on; ➠ p. 6 - 6,
   - The houselock may be switched off; ➠ p. 12 - 14.

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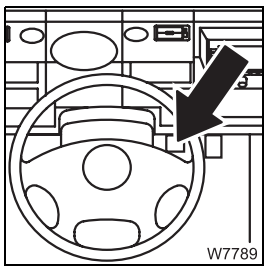
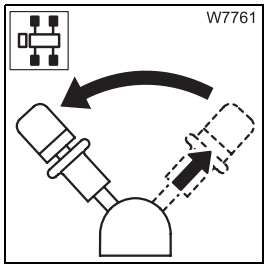
Functional check of the parking brake

You can check that sufficient air pressure is present in the brake circuit III

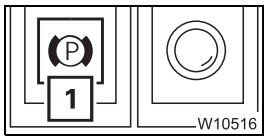


- Operate the brake pedal.

Risk of accidents due to the truck crane rolling without control!
Always activate the brake pedal before releasing the parking brake.
In this way you prevent the truck crane from starting to roll in an uncontrolled manner when the parking brake is released.



- Raise the locking ring and push the parking brake lever forwards as far as it will go.



The parking brake is released and the light (**1**) goes out once the air pressure in brake circuit III is sufficient.

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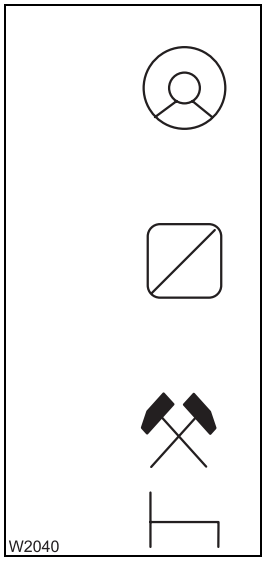
The different time groups are shown with the following symbols:



Driving times: As soon as the vehicle starts to move, the tachograph automatically switches to the symbol for driver 1 driving time.
If there are two diagram sheets inserted, the tachograph automatically switches to stand-by time for two-drivers operation.

Working hours: For all other work, the same activities apply as do for stand-by time.
When setting the working hours and stand-by time, observe the applicable local regulations for the country in which you are working.

Stand-by time: Periods of work at the truck crane, e.g. crane operation, maintenance work, passenger time etc.

Pauses and times of rest: These times are prescribed by law and must be observed.

If the drivers were changed during **two-driver operation**, the diagram sheets in the trip recorder also have to be changed. The driving time is always recorded on the diagram sheet which is on the isolating plate (driver 1).

The symbol for resting time has to be set for driver 2 in **single-driver operation**. Otherwise an error message will appear.

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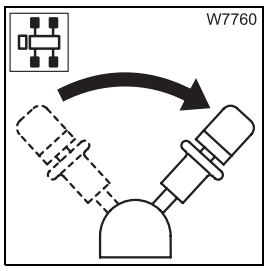
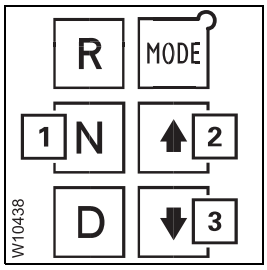
5.2.11 Oil level gauge

You can call up information on the current oil level in the transmission.

If in doubt about the accuracy of the oil-level reading, you can always check the oil level using the dipstick when the gear oil is warm; ➠ *Maintenance Manual*.



- Park the truck crane on a level surface.
- Engage the parking brake.
- Let the motor run at idling speed.
- Wait about 3 minutes – required resting time.



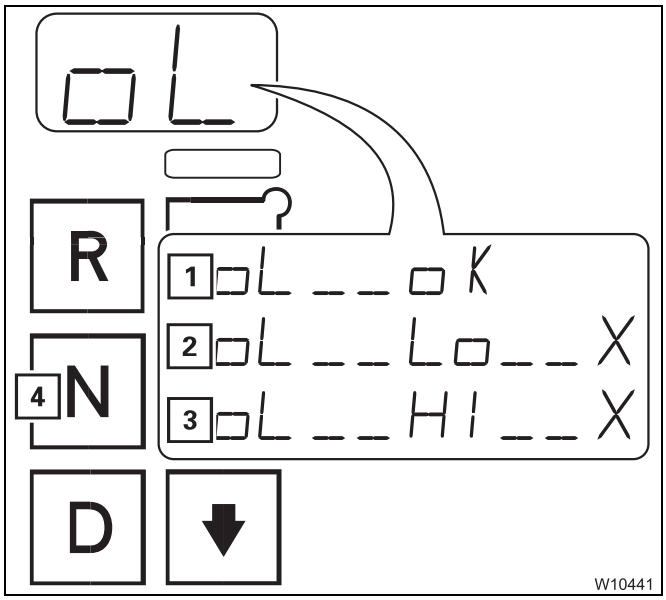
- Switch to the neutral position – button (**1**).
- Press buttons (**2**) and (**3**) together once.

The *transmission* display shows a code

– for the oil level or,

– if the oil level cannot be read, for an error.

Each code consists of different displays which are shown continuously in succession.



Displays for the oil level

1 Oil level correct

2 Oil level **x** litres too low

3 Oil level **x** litres too high

- Press button (**4**) once to exit the oil-level gauge.

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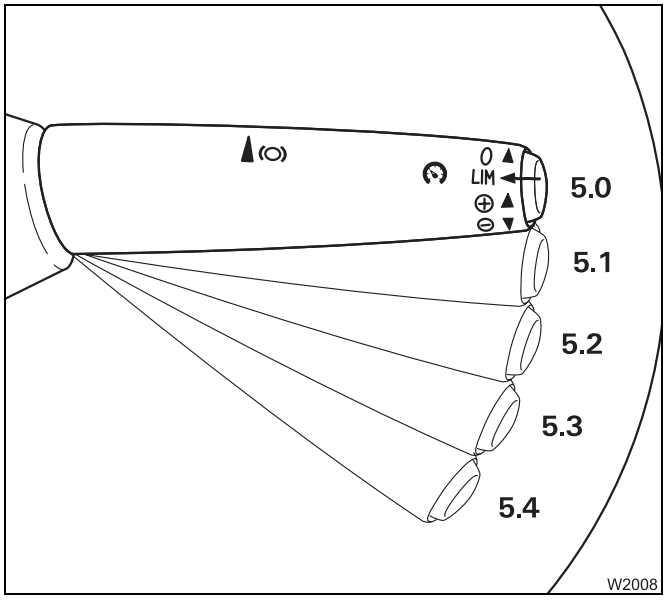
Sustained action brake

The truck crane has an engine flap brake which it uses as a sustained action brake. When the maximum permissible speed is reached, the sustained action brake is automatically switched on.

Risk of accidents due to unexpected acceleration!
Maintain sufficient distance when the sustained action brake is switched on. The effectiveness of the sustained action brake is interrupted during a shift operation. This may cause the truck crane to accelerate briefly.



Switching on the engine retarder

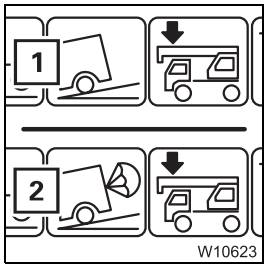
- Pull the multipurpose switch back to level **5.1**.

The sustained action brake is on.

Levels **5.2** to **5.4** are only active when the transmission is fitted with a retarder;
➠ p. 5 - 42.

Switching off the engine retarder

- Press the multipurpose switch forwards to level **5.0**.
  The sustained action brake (and retarder) are switched off.



– At level **5.0**, the symbol (**1**) is shown – the auxiliary brake is off.
– At levels **5.1** to **5.4**, the symbol (**2**) is shown – the auxiliary brake is on.
– If the sustained action brake has been switched on automatically, the symbol (**1**) is shown.

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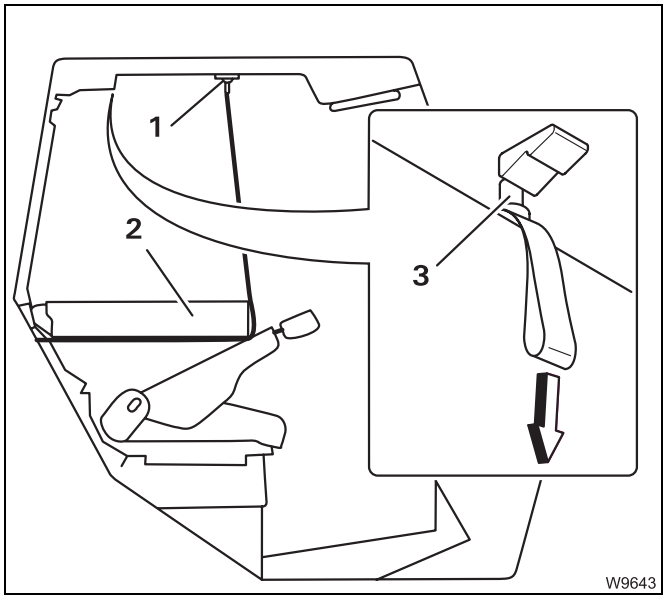
5.3.8 Folding berth

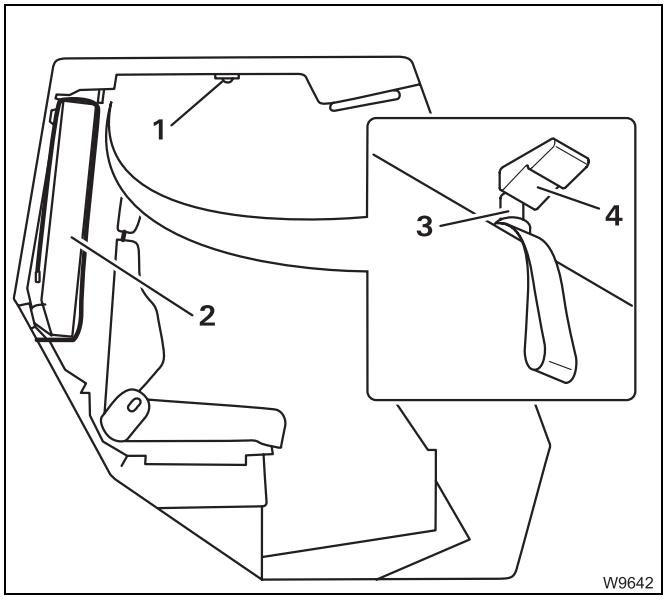
The berth must always be folded up for driving.

Risk of accidents due to the berth falling open!
Check whether the locking bar is engaged and put up the back rest of the seats before driving. In this way you can avoid the berth falling open when braking, resulting in uncontrolled manoeuvres due to fright.



Folding down

- Tilt the back rests of the seats forwards.
- Pull the locking bar (**3**) and fold the berth (**2**) down.
- Fasten both belts in the retainers (**1**).



Folding up

- Undo the belts from the retainers (**1**) and place them on the berth.
- Fold out the berth (**2**) until you can hear the locking bar (**3**) latch into place in the bore hole (**4**).
- Put up the back rests of the seats.

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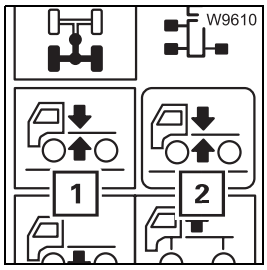
Setting the on-road level

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

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

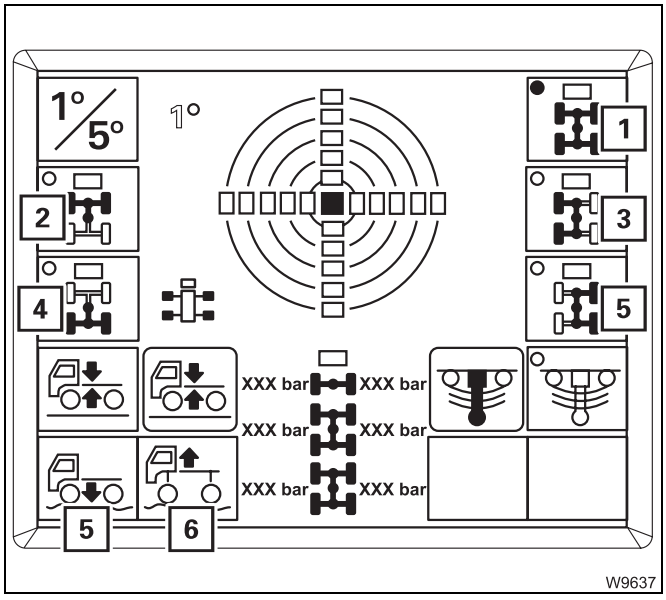


- Press the button (**1**) until the symbol (**2**) turns **green**.

The display first shows the symbol in **yellow** and when the on-road level has been reached, it shows the symbol (**2**) in **green**.

Pre-selecting suspension struts

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



– For a uniform level change

1 Overall level – all suspension struts

– For inclination

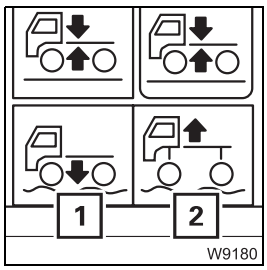
2 Front level – suspension strut for the 1st to the 3rd axle line

3 Left level – all suspension struts on the left

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

5 Right level – all suspension struts on the right

- Press the button next to the required symbol once – the dot turns **green**, e.g. for symbol (**1**).



The corresponding suspension struts remain pre-selected for approx. 5 seconds.
During this time, the symbols (**1**) and (**2**) are **black** and the corresponding buttons are active.

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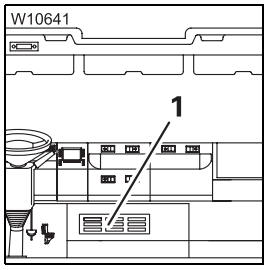
5.6 Heating and ventilating the driver's cab

5.6.1 Standard heating

The standard heating only warms the driver's cab when the engine is running.

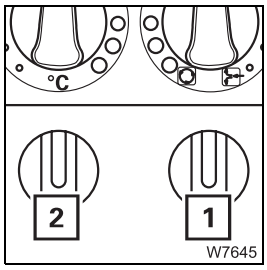


Do not cover the grille (**1**).

Air is sucked in through the grille (**1**) with the recirculated air.

Switching the heating on and off

The heating is switched on and off with the fan.



Switching on

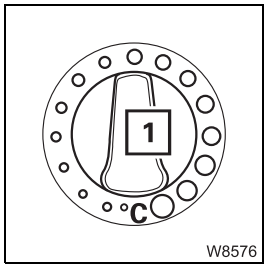
- Turn one or both switches (**1**), (**2**) clockwise.
  The switches latch into place one after the other in three stages.

Switching off

- Turn the switches (**1**) and (**2**) counterclockwise until they reach a stop.

Setting the temperature

You can continuously adjust the temperature of the heater air which flows out.



Reducing the temperature

- Turn the switch (**1**) anti-clockwise.

Increasing the temperature

- Turn the switch (**1**) clockwise.

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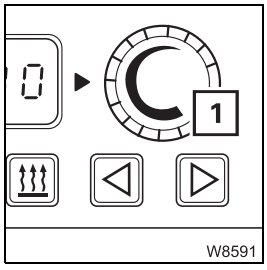
Setting the temperature

You can preselect a temperature for the driver's cab. If the temperature sinks below the preselected value, the auxiliary heating switches itself on. The auxiliary heater goes off once the value is reached.



Increasing the temperature:

- Turn the switch (**1**) clockwise.

Reducing the temperature:

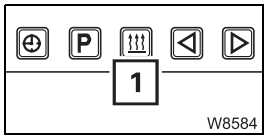
- Turn the switch (**1**) anti-clockwise.

You can recognise the current selection by looking at the position of the marking on the switch in relation to the arrow.

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

Switching off the auxiliary heater

You can switch off the auxiliary heater manually at any time.



- To **switch off** press the button (**1**) once. The auxiliary heater is switched off immediately.

Further functions

The auxiliary air heating also has the same functions as the auxiliary water heating.

➠ *Setting the time and weekday*, p. 5 - 76,

➠ *Saving the automatic heating start*, p. 5 - 77,

➠ *Setting the heating period*, p. 5 - 78,

➠ *Setting the remaining time*, p. 5 - 79.

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6 Driving modes and rigging for on-road driving

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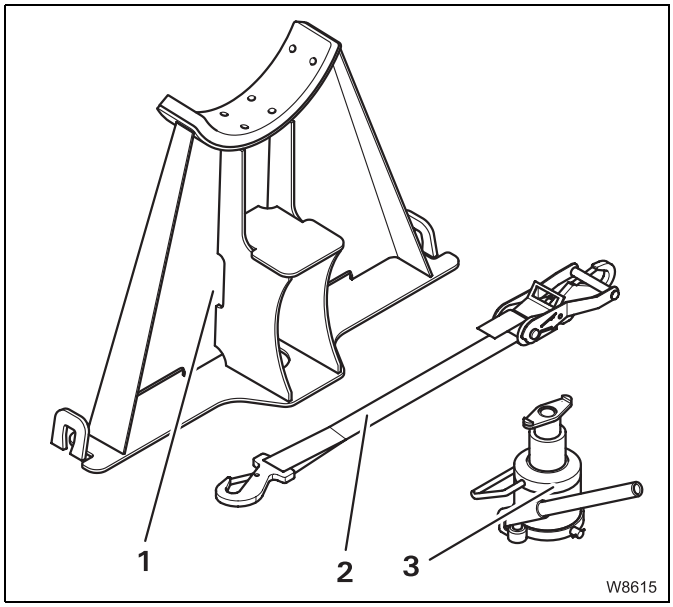
6.3 Rigging the main boom

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

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

Additional equipment required

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



- A derricking cylinder support (**1**)
- A tightening belt (**2**),
- Lifting equipment (**3**),

and also

- Suitable sling gear,
- An auxiliary crane of sufficient lifting capacity
- A separate vehicle with sufficient load bearing capacity and loading area.

Transport dimensions and weight; ➠ p. 8 - 5.

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6.3.5 Switching the pressure relief on/off

The pressure relief prevents the derricking cylinder from extending when the engine runs, after the main boom has been removed.

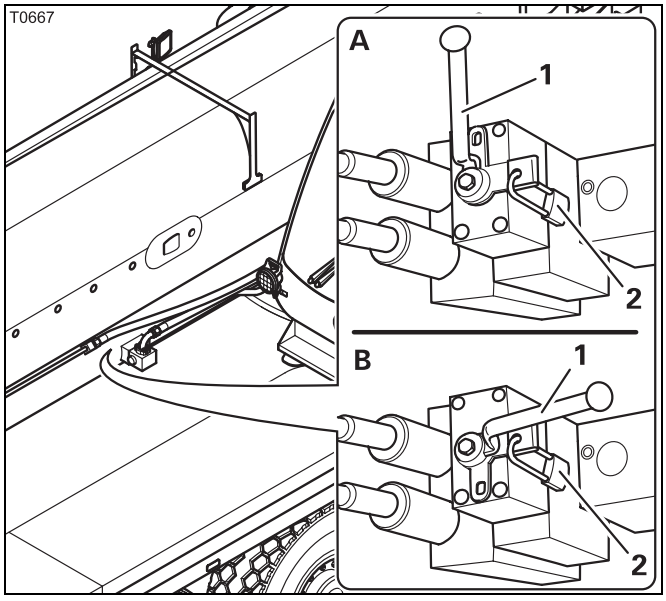
When removing the main boom

- Switch the pressure relief on before pulling the derricking cylinder head axle.

When installing the main boom

- Only switch off the pressure relief after fitting the derricking cylinder head axle.

Risk of accidents from falling boom
Check to see whether the main boom is in the boom rest before switching off the pressure relief.
In this way, you prevent the raised main boom from falling down.



- Remove the lock (**2**).
- Bring the lever (**1**)
  - used for **switching on** into position **A**. Depending on its design, the lever will face up or down.
  - used for **switching off** into position **B**.
- Secure the lever with the lock (**2**) and remove the key.

When the pressure relief is switched on, the main boom cannot be raised.

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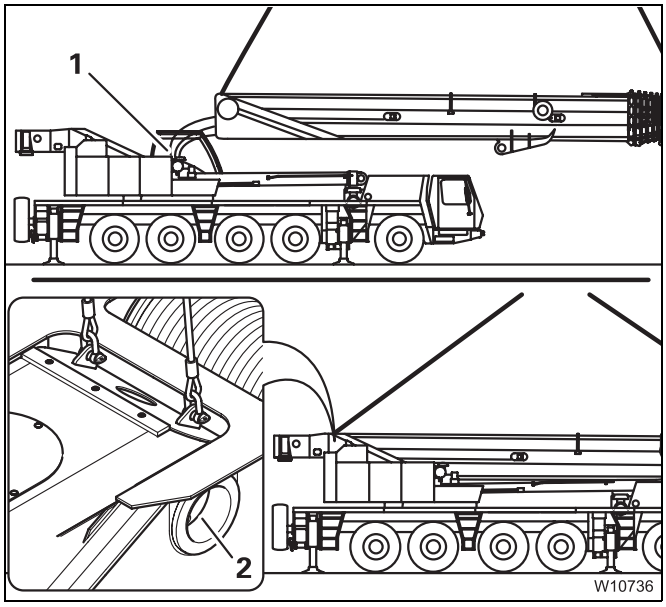
6.3.10 Aligning the connecting points

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

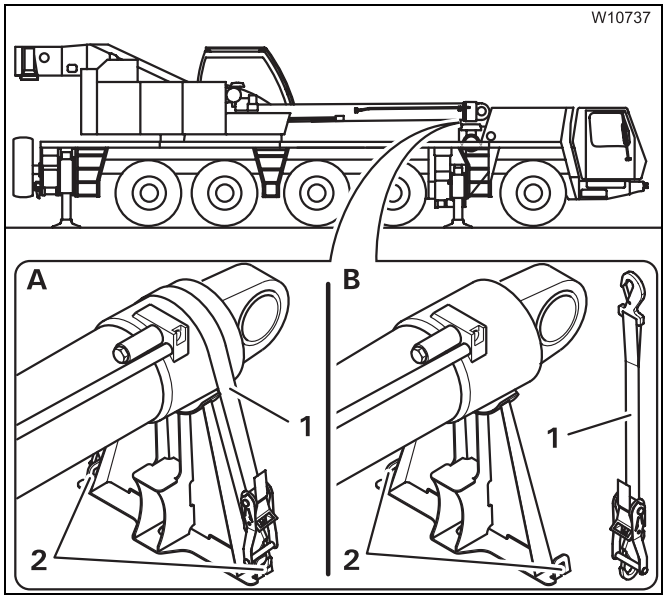


Aligning the connecting points

Make sure to not hoist the main boom too far so that the hoses/cables (**1**) are not torn off.

- Lay the hoses/cables (**1**) into the turntable so that they are not damaged during alignment.
- Align the main boom so that the boom pivot pin is aligned with the bearing points (**2**) in the turntable.
- Hold the main boom in this position until the pivot pin is extended.

6.3.11 Securing/releasing derricking cylinder



(A) – Securing

- Place the tightening belt (**1**) over the derricking cylinder and fasten it onto the holders (**2**).
- Tighten the tightening belt so that the derricking cylinder is secure within the support.

(B) – Releasing

- Loosen the tightening belt (**1**) and remove it from the holders (**2**).
- Stow the tightening belt away.

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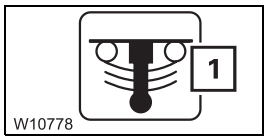
6.4.3 Preparing the truck crane

Prerequisites

The following conditions must be met before mounting/removing the outrigger beams:

- All rigging work which involves slewing the superstructure was completed.
- The parking brake is engaged.
- The truck crane is aligned horizontally using the level adjustment system; ➠ p. 5 - 60.



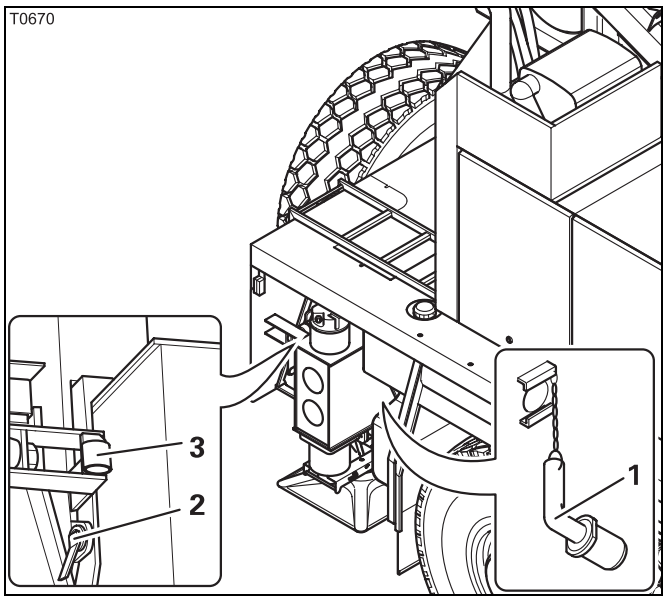
- The suspension is switched off (blocked), and the symbol (**1**) is red ➠ p. 5 - 15.

For removal

Each outrigger beam is deisgned for just one installation point. If, for example, you remove the outrigger beam on the rear left hand side, you must mount the same outrigger beam on the rear left hand side again.

Lagelling the outrigger beams

- Before you remove all outrigger beams for the first time, label them with the correct installation point and if necessary, also with the serial number of the truck crane.



Releasing the outrigger beams

All outrigger beams are retracted.

- Pull out the pin (**1**).

Lock the outrigger beams together

- Take the pin out of the clamp (**3**) and insert it into the connection point (**2**).

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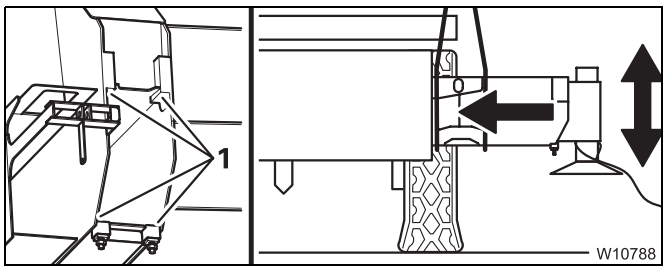
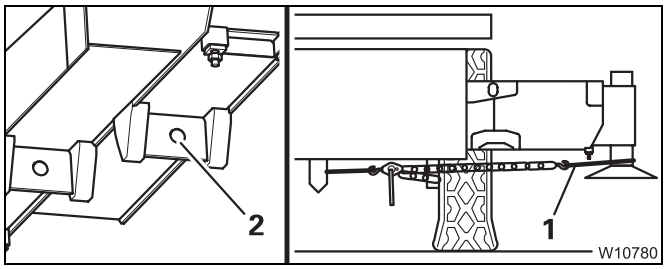
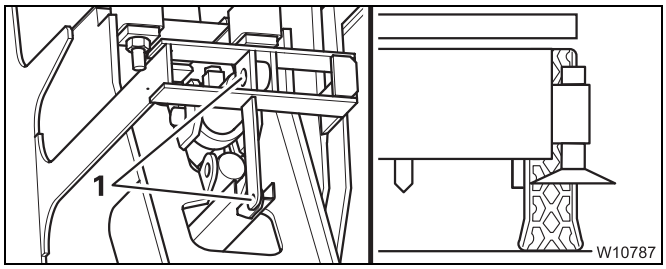


- Lift the outrigger beam as far as possible into the outrigger box.
  Correct the height so that it does not remain hanging on the edges (**1**).



- Remove the lifting gear from the centre of distribution.
- Attach the lifting gear (**1**) and a chain hoist.
- Attach the chain hoist with a suitable mounting device on the bore hole (**2**).



- Pull the outrigger beam in so far until the connecting points (**1**) align.
- Remove the chain hoist and lifting gear.

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6.5.9 Check that the auxiliary hoist is functioning properly

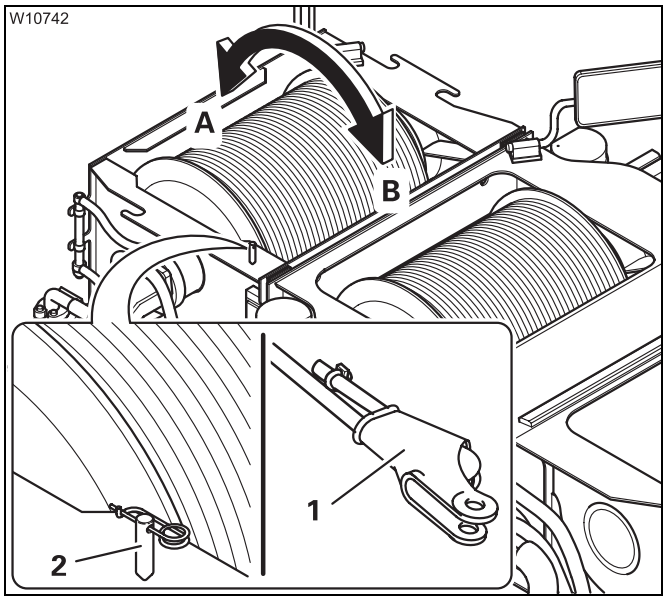
Slewing direction

Check the slewing direction before laying on the hoist rope.

Risk of accidents due to incorrect slewing direction
Check after each installation that the slewing direction is correct.
This prevents accidents caused by the hoist rope winding up unexpectedly when it is applied.

Danger posed by rope slack
Only drive the auxiliary hoist briefly and at the lowest speed.
This prevents slack rope from being created, or rope end clamps being pulled into the hoisting gear frame.

Ask someone to observe the slewing direction for you, or stand next to the auxiliary hoist and use the hand-held control.



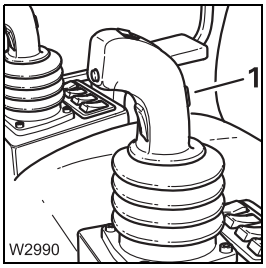
- Remove the rope end clamp (**1**) from the clamp (**2**).
- Drive slowly, and complete the *lifting* and *lowering* movements – stop the movement as soon as the hoist drum turns.
- Check that the slewing direction is correct:
  - **A** Lifting
  - **B** Lowering

If the slewing direction is incorrect

- Check whether the hoses or hydraulic system have been mistakenly identified;
⇛ p. 6 - 55.

Slewing indicator

Check the function of the slewing indicator when applying the hoist rope.



- You must feel a pulse on the slewing indicator (**1**) when the auxiliary hoist is rotating.
- If no pulse is present, contact ***CraneCARE***.

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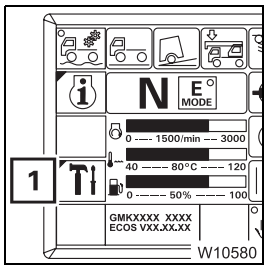
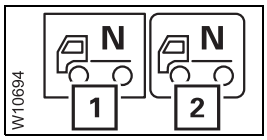
Transfer case

Prior to being towed away, you must switch the transfer case into the neutral position.



- If appropriate, open the main menu Esc.
- Press the button (**1**) once.
  The *Settings* submenu is opened.

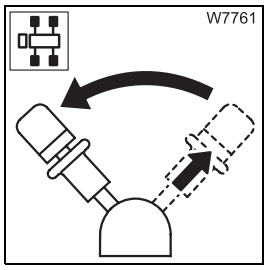


- Press the button (**1**) once.

The neutral position is switched on when the symbol (**2**) is shown.

To switch off the neutral position, you must switch the off-road gear on or off in the main menu; ➠ p. 5 - 54.

Parking brake



- Release the parking brake.
  The (P) lamp must go out.

If the (P) lamp continues to light up, the supply pressure may be too low. Let the engine of the truck crane or towing vehicle run depending on the compressed-air supply, until the supply pressure has been built up; ➠ *Building up the supply pressure*, p. 5 - 10.

If the lamp (P) fails to go out, damage has occurred to the parking brake, and you should contact ***CraneCARE***.

Risk of accidents in the event of defective brakes!
If damage has occurred to the service brake system, you may only tow the truck crane away from the immediate danger area after receiving permission to do so from ***CraneCARE***.

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Designation	Amperage (A)	Function
F2/1	10	Tachograph (elements in speedometer insert), radio, ESX3 control unit
F2/2	15	Auxiliary heater
F2/3	3	Ignition lock position **1**
F2/4	15	Fan, driver's cab Roof ventilator
F2/5	10	Radio, telephone (both additional equipment)
F2/6	20	Retarder, air-conditioning system
F2/7	20	ABS trailer
F2/8		Free

Designation	Amperage (A)	Function
F3/1	15	Rotating beacons
F3/2	10	Flame start system Monitoring the vehicle height
F3/3	10	Auxiliary heater switch clock, ignition lock position **1**
F3/4	20	Mirror heating, mirror adjustment, electric window winder, air drier
F3/5	15	Outrigger lighting
F3/6	10	Turn signal indicator
F3/7	10	Windshield wiper washer system, horn
F3/8	10	Reversing lights, reverse gear acoustic signal, trailer socket

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7.6.4 Malfunctions of the transfer case

Malfunction	Cause	Remedy
Switching operations are not conducted	Pressure of 5.5 bar (80 psi) has not yet built up in the reservoirs	Build up the supply pressure; ➠ p. 5 - 10

7.6.5 Service brake malfunctions

Malfunction	Cause	Remedy
Lamp lights while driving, or does not go out when the engine is started. **Symbol red**	The air pressure in one of the two circuits has fallen below 5.5 bar (80 psi)	The vehicle can be driven slowly to the next garage.
	The air pressure in both circuits has fallen below 5.5 bar (80 psi)	1. Top up the compressed-air supply on the filler connection; ➠ p. 7 - 6
		2. Tow the truck crane with the towing bar; ➠ p. 7 - 5
The parking brake does not release, the lamp does not go out, and the lamp has gone out.	The supply pressure is too low	Build up the supply pressure; ➠ p. 5 - 10
The lamp also lights up at speeds of over 6 km/h (4 mph)	The trailer ABS brake system has failed	Drive to next workshop; braking without ABS support is still possible.
The retarder cannot be switched off	F2/6, F4/1 fuse defective	Replace the defective fuses; ➠ p. 7 - 15

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7.7.3 Malfunctions to the transmission

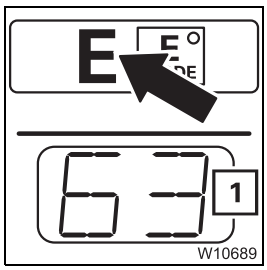
There are general transmission malfunctions and transmission malfunctions with warning messages.

General malfunctions

When a general transmission malfunction occurs, only error codes are stored.
There is no display in the driver's cab.

Check regularly whether error codes have been stored, e.g. during maintenance work; ➠ p. 7 - 39. If necessary, inform ***CraneCARE***. In this way you avoid situations where another small error could lead to a transmission failure.

Display E



The communication between ECOS and the transmission control has been interrupted.

If the transmission continues to shift, you can continue driving and read the gear currently engaged on the display (**1**).

At the end of the journey

- Turn off the ignition.
- Wait about 15 seconds.
- Turn on the ignition again.

If the malfunction is still present, contact ***CraneCARE***.

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Main boom

The values relate to the complete main boom with add-on parts (cable drum, hydraulic drum, pulling device).

Description	Length x width x height in m (ft)	Weight in kg (lbs)
Entire main boom	14.0 x 2.5 x 1.8 (46.0 x 8.5 x 6.0)	21 000 (46 500)

Auxiliary hoist

Description	Length x width x height in m (ft)	Weight in kg (lbs)
Complete auxiliary hoist	1.75 x 1.1 x 0.85 (5.7 x 3.6 x 2.8)	1 600 (3 550)

8.1.3 Carrier

Engine

Make:	Cummins
Type:	QSX 15
Power:	399 kW (543 PS) bei 2100 min^{-1} (EG 80/1269 - 89/491 EWG, Ventilator lose)
Engine emissions:	EUROMOT \ EPA \ CARB (off road)
Fuel tank:	ca. 395 l (104 gal)

Transmission

Allison 4000 SP automatic transmission with two driving programs, six forward gears and one reverse gear.

Transfer case

Kessler VG 2600, 2-stage

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10 Operating elements for crane operation

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1 Air vents ➠ p. 12 - 128
2 Hoisting gear high-speed mode on/off display ➠ p. 10 - 74
3 Front windscreen wipers on/off ➠ p. 10 - 103
4 Roof window wipers on/off ➠ p. 10 - 103
5 Windscreen washing system ➠ p. 10 - 103
6 Derricking gear/Telescoping mechanism high-speed mode on/off display ➠ p. 10 - 79
7 Spotlight sockets on/off ➠ p. 10 - 101
8 Slewable spotlights on/off[1)] ➠ p. 10 - 102
9 Air traffic control light on/off[1)] ➠ p. 10 - 101
10 Slew slewable spotlights[1)] ➠ p. 10 - 102
11 Flame start system indicator lamp[1)] ➠ p. 10 - 55
12 Battery charge indicator warning ➠ p. 10 - 101
13 Carrier ignition indicator lamp ➠ p. 10 - 55
14 Rotating beacon on/off[1)] ➠ p. 10 - 101
15 Houselock on/off[1)] ➠ p. 10 - 88
16 Setting the idling speed ➠ p. 10 - 55
17 Carrier ignition on/off ➠ p. 10 - 57
18 Soot particle filter indicator lamp[1)] ➠ p. 10 - 56
19 Ignition lock ➠ p. 10 - 55
20 Cigarette lighter (24 volts)

[1)] Additional equipment

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Various menus are displayed on the *ECOS* display.
The menus are operated with the buttons F1 to F14. The individual buttons are assigned different functions in each menu. The functions of the buttons in the displayed menu correspond to the symbols next to or above the buttons; ➠ p. 10 - 59.

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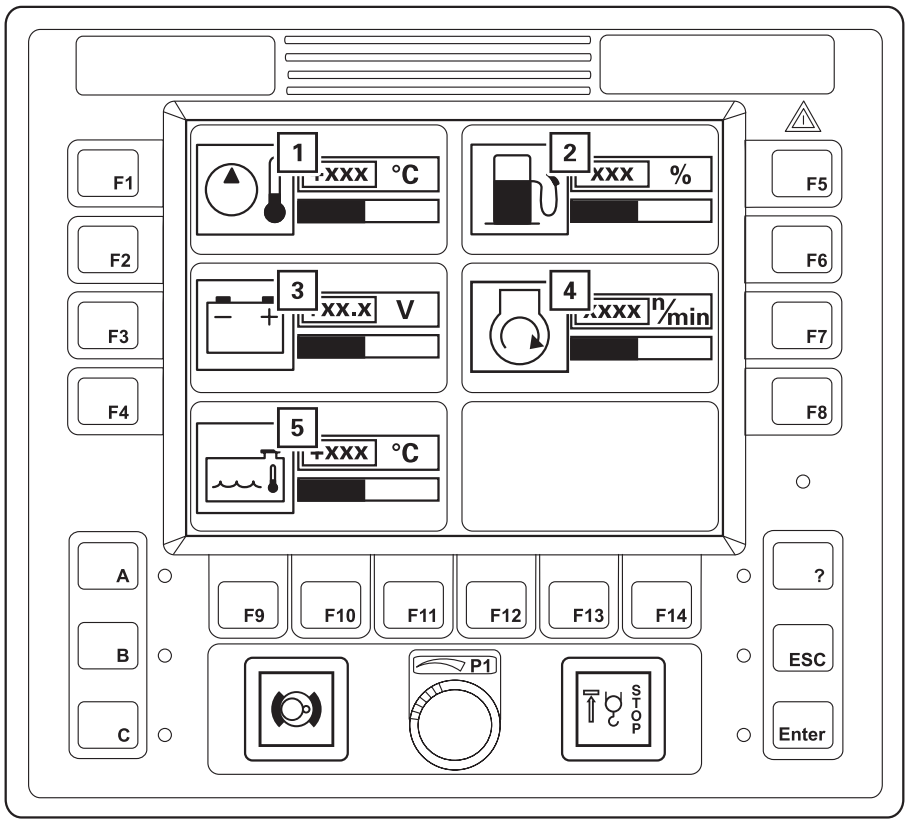
Monitoring sub-menu



1 Hydraulic oil temperature display ➠ p. 11 - 15

2 Fuel level display ➠ p. 11 - 15

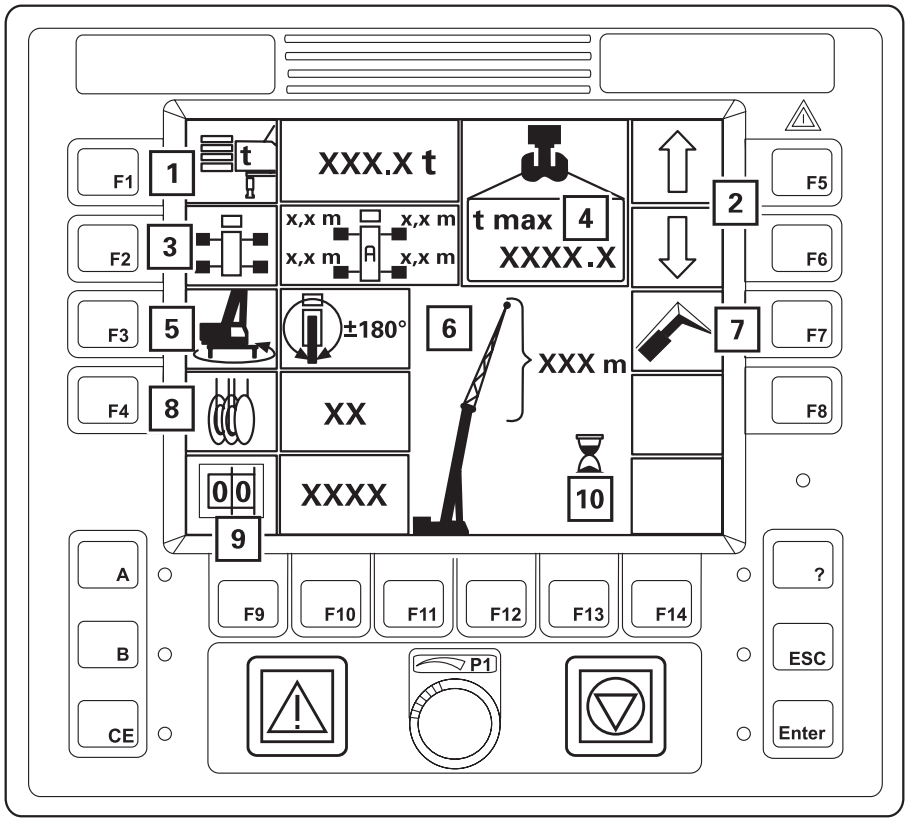
3 Voltage monitoring display ➠ p. 11 - 15

4 Engine speed display ➠ p. 11 - 15

5 Coolant temperature display ➠ p. 11 - 15

10.1.12 SLI display – submenus

Enter rigging mode submenu



1 Enter counterweight p. 10 - 93
2 Selection p. 10 - 92
3 Enter outrigger span p. 10 - 93
4 Maximum load display p. 10 - 94
5 Enter slewing range p. 10 - 93
6 Display of current boom system p. 10 - 94
7 Enter boom system[1)] p. 10 - 94
8 Enter reeving p. 10 - 92
9 Enter SLI code p. 10 - 92
10 Determine SLI code display p. 10 - 92

[1)] Additional equipment

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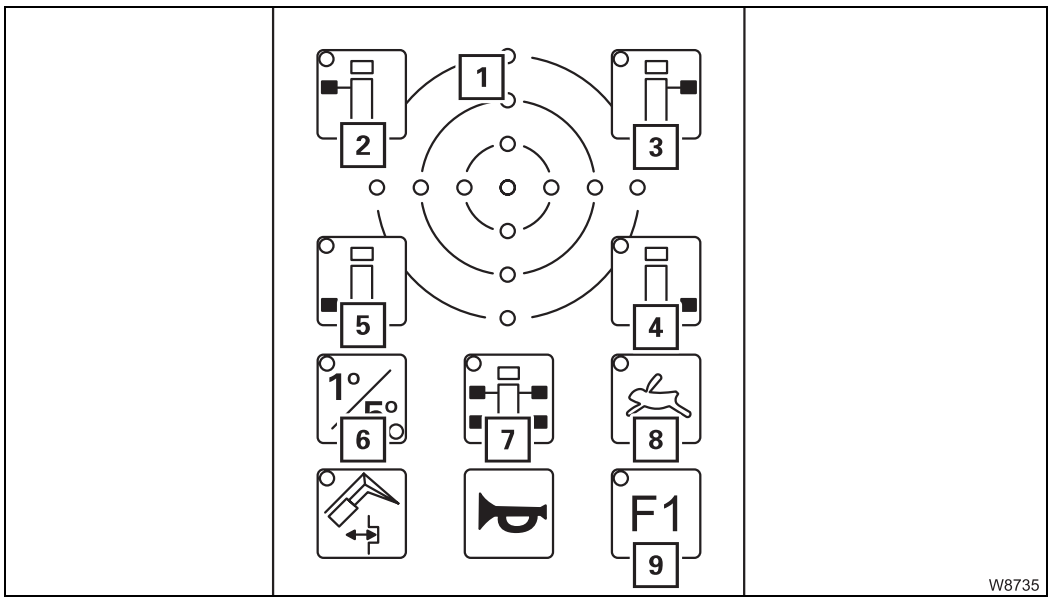
Outriggers control panel



1 Display of current inclination p. 10 - 68

2 Pre-select front left-hand outrigger p. 10 - 63

3 Pre-select front right-hand outrigger p. 10 - 63

4 Pre-select rear left-hand outrigger p. 10 - 63

5 Pre-select rear right-hand outrigger p. 10 - 63

6 Change measuring range p. 10 - 68

7 – Pre-select all outrigger cylinders p. 10 - 63
– Pre-select automatic alignment (as additional function F1) p. 10 - 63

8 Pre-select high-speed/normal speed mode p. 10 - 63

9 Additional function F1 on p. 10 - 63

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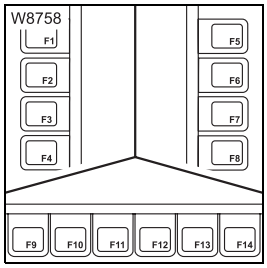
10.2.6 ECOS crane control

The truck crane GMK 5220 is equipped with the **ECOS** electronic crane control (**E**lectronic **C**rane **O**perating **S**ystem). ECOS includes a control unit in the crane cab, an operating unit in the driver's cab and several control units (ESX0, ESX1, ESX2 etc.) and I/0 circuit boards which are distributed on the superstructure and carrier.

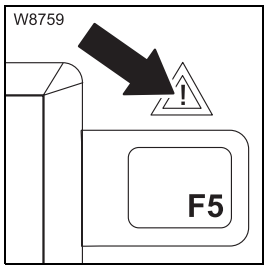
Control unit

This section contains the operating elements which are the same for all menus.



Buttons F1 to F14

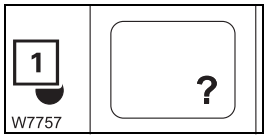
The function of buttons F1 to F14 is shown on the symbol next to or above the button. After the button is pressed, the function displayed is executed if it has been released.



Error/warning message

- **Flashing:** New warning message or error has occurred
- **On:** Error acknowledged – but still present
- **Off:** No warning message or error present

➠ p. 12 - 109

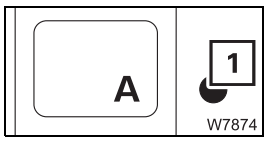


Open Error submenu

The lamp (**1**) lights up or flashes.

- **Press button once:** The *Error* submenu opens.

➠ p. 12 - 109



Open the Warning submenu

The lamp (**1**) lights up or flashes.

- **Press button once:** The *Warning* submenu for the superstructure opens

➠ p. 12 - 106

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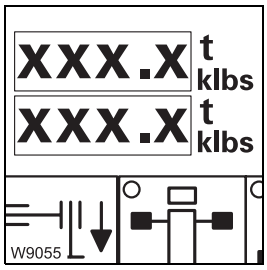
10.2.9 Outrigger pressure displays

Outriggers submenu

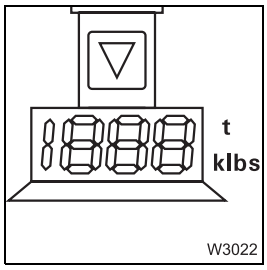


Outrigger pressure display

– **Unit of measurement** Is displayed, depending on setting
  – **t** – tons or
  – **klbs** – kilopounds – (1 kilopound = 1000 lbs)
– **Precision:** One decimal place

➠ p. 13 - 53

Outrigger control units



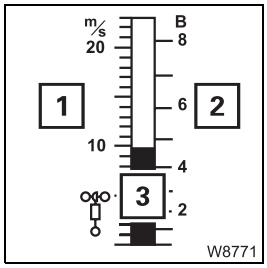
Outrigger pressure display

– **Unit of measurement** Lights up, depending on setting
  – **t** – tons or
  – **klbs** – kilopounds – (1 kilopound = 1000 lbs)
– **Precision:** With **t** one decimal place
  With **klbs** no decimal point

➠ p. 13 - 53

10.2.10 Anemometer displays

This function is the same in all the menus.
The anemometer is electrically connected.



1 Scale in meters per second (m/sec)

2 Beaufort scale (B)

3 Display of wind speed

➠ p. 12 - 43

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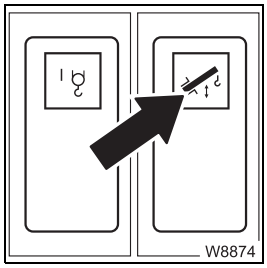
10.2.15 Derricking gear

➠ *Derricking gear*, p. 12 - 55.

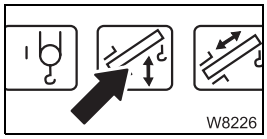


Derricking gear on/off

There is an indicator lamp in the button.

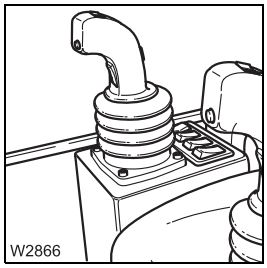
– **Press once** – Lamp bright – derricking gear on,
Power units with the same control lever assignment off
– Lamp dim – derricking gear off

➠ p. 12 - 55



Power units display

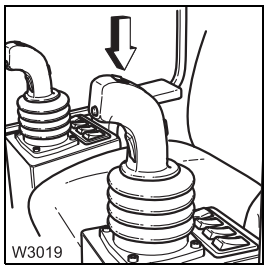
– **Green:** Derricking gear on
– **Red:** Derricking gear off



Right-hand control lever

– **To the left:** Raise – lift main boom
– **To the right:** Lower – lower main boom

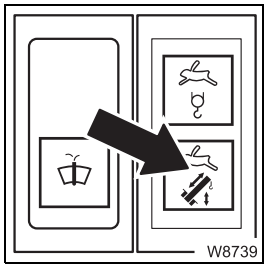
➠ p. 12 - 55



Derricking gear/Telescoping mechanismr high-speed mode on/off

– **Left:** High-speed mode on, off after releasing
– **Once to the right:** High-speed mode on – continuous operation
– **Once to the right or once to the left:** High-speed mode off

➠ p. 12 - 55



Derricking gear/Telescoping mechanism display on/off

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

➠ p. 12 - 55

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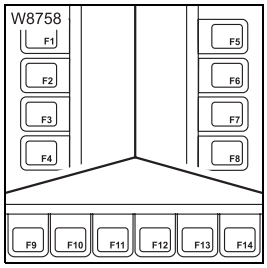
10.2.19 Safe load indicator (SLI)

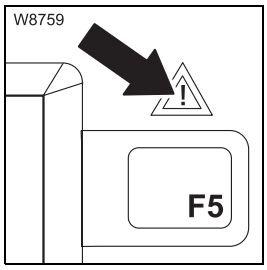
Control unit

This section contains the operating elements that are the same for all menus opened.



Buttons F1 to F14

The function of buttons F1 to F14 is shown on the symbol next to or above the button. After the button is pressed, the function displayed is executed if it has been released.

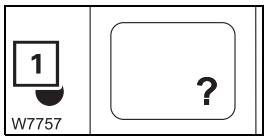


Error

– **On:** Error present

– **Off:** No error present

➠ p. 12 - 36



Open Error submenu

The lamp (**1**) lights up or flashes.

– **Press button once:** The *Errors* submenu opens.

➠ p. 15 - 30

Exit the submenu/input mode

The lamp (**1**) lights up.

– **Press button once:**
  – The opened submenu is closed – the menu from the next level up opens
  – Input mode is deactivated

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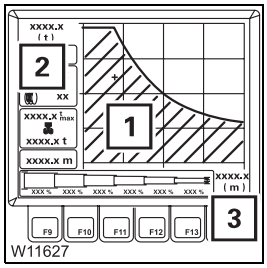
Other displays

Function like in the *Monitoring* submenu:
- SLI code display; ➠ p. 10 - 95
- Reeving display; ➠ p. 10 - 95
- Maximum load display; ➠ p. 10 - 96
- Current load display; ➠ p. 10 - 96
- Current working radius display; ➠ p. 10 - 98
- Current degree of utilization display; ➠ p. 10 - 96

Working range submenu

➠ *Displaying the lifting capacity tables*, p. 12 - 38



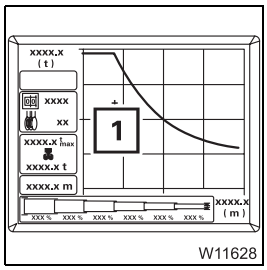
Permissible working range display

Applies to displayed SLI code and displayed telescoping

1 Permissible working range – surface under the curve

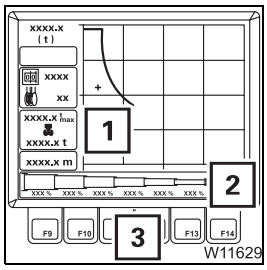
2 Maximum possible load

3 Maximum possible working radius



Current position display

1 Current position – defined by current load and current working radius



Telescoping display/input

– **Display:** Telescoping (**2**) in percent

– **Enter:** Press button (**3**)
  – Display (**2**) new telescoping
  – Display (**1**) corresponding working range
    or no display = telescoping outside the telescope status

Other displays

Function as in the *Lifting capacity table* submenu.

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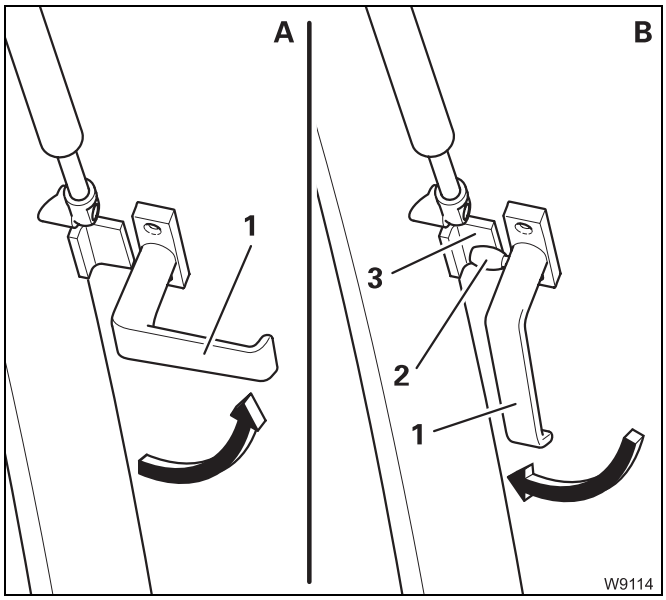
10.2.24 Windows, doors, keys

Windows

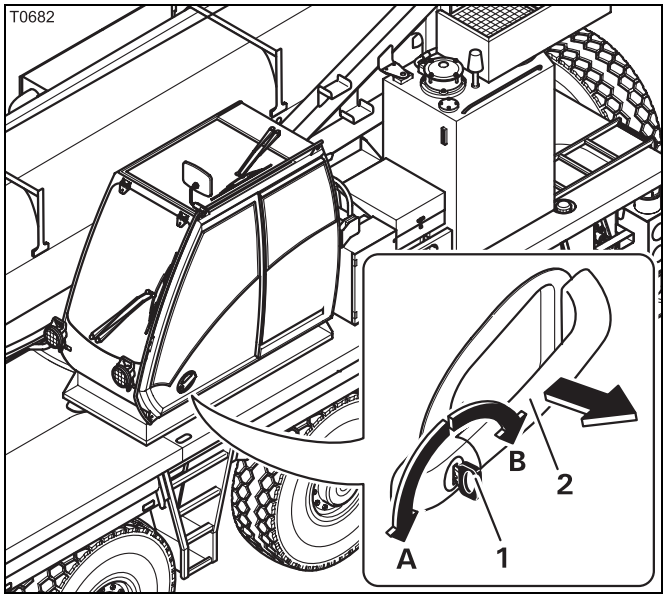
The handles on the windscreen and the rear window have the same function.



– Open window (A)
Turn both handles (**1**) inwards – push window to the front.

– Close window (B)
Draw window towards yourself – turn both handles down – pegs (**2**) located behind the holder (**3**).

Crane cab door



From outside

– Unlock
Turn the key (**1**) forwards, towards **A**

– Lock
Turn the key (**1**) backwards, towards **B**

– Open/Close
Pull handle (**2**), slide door

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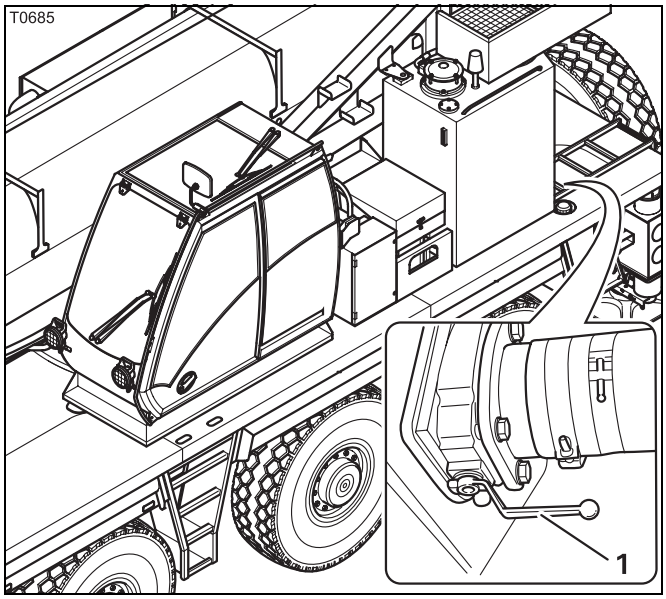
11.1.4 Checks before starting the engine

On the hydraulic tank

Before you start the engine, the valve on the hydraulic tank must be open.

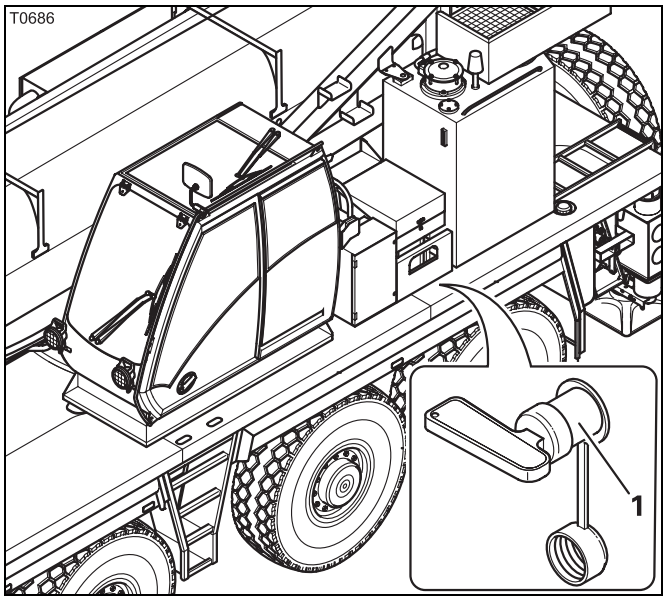
Risk of damage to the hydraulic pumps!
You may only start the engine when the valve on the hydraulic tank is open.



- Check whether the valve is open – lever (**1**) parallel to the line.
- Open the closed valve.

Battery master switch

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



- Switch on the battery master switch (**1**).

The battery master switch is switched on if you are unable to pull off the selector handle.

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11.2 Starting the engine – with the hand-held control

Prerequisites

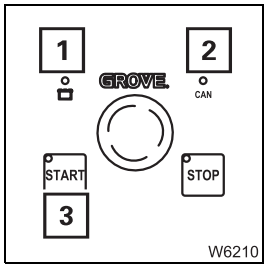
You can only start the engine for crane operation if

– the bridging plug is inserted in all sockets not used; ➠ p. 11 - 8 and

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

Starting the engine

All checks required prior to starting the engine must be done; ➠ p. 11 - 1.



• Wait until the lamps (**1**) and (**2**) light up.

There is a malfunction if the lamp (**2**) does not go on or flash after about 20 seconds; ➠ p. 15 - 17.

Press the button (**3**) once – the engine goes on.

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

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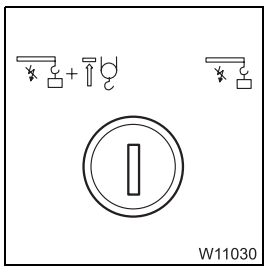
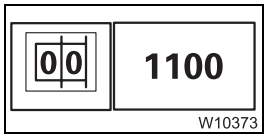
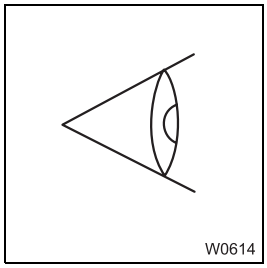


10. Remove key from the *Override* key-operated switch; ➠ p. 12 - 37.



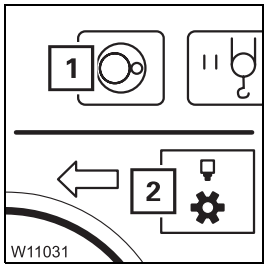
11. Compare current rigging mode to display on SLI – enter current rigging mode, if necessary; ➠ p. 12 - 21.

12. Compare current reeving of hoisting gear used to the display on the SLI – enter current reeving, if necessary; ➠ p. 12 - 26.



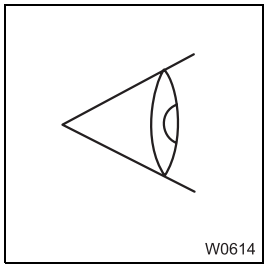
13. Check telescoping; ➠ *Checks prior to starting operations*, p. 12 - 64.

14. Perform lamp test on the SLI; ➠ p. 12 - 18.



15. – Switch off the slewing gear for 0° and 180° working positions – symbol (**1**) red; ➠ p. 12 - 94.

– Switch off houselock for other working positions – symbol (**2**) red; ➠ p. 12 - 16.



16. Check electrical system for correct operation; ➠ p. 12 - 6.

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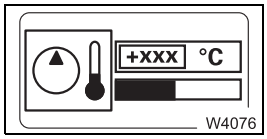
12.1.6 Preheating the hydraulic oil

It may take a time for the solenoid valves to be activated or the power units may start abruptly if the oil is cold.



The current hydraulic oil temperature is displayed in the *Monitoring* submenu. To open the submenu; p. 11 - 15.

For crane operation with loads and without speed limitation, the hydraulic oil temperature must be at least 10 °C (50 °F).

- If the oil temperature falls below 10 °C (50 °F), proceed as follows:

– from 10 °C to 0 °C (50 °F to 32 °F)

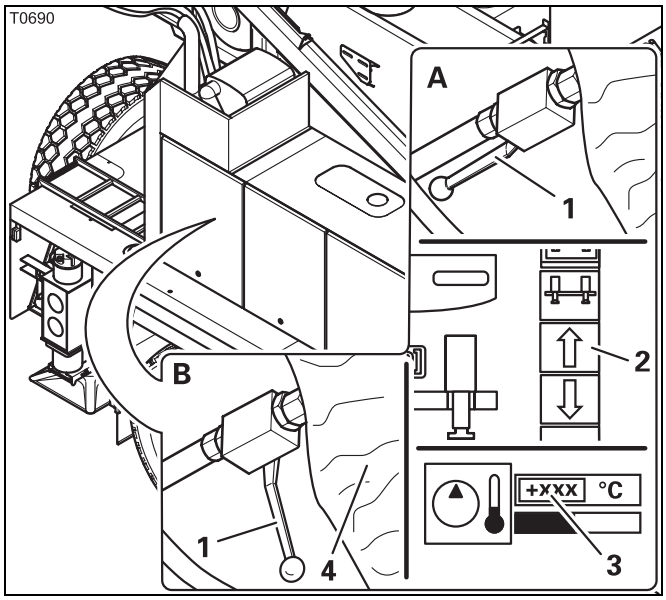
You can carry out crane movements with loads only in normal operation mode, at average engine speed and at average operating speed.

– from 0 °C to –15 °C (32 °F to 5 °F)

To preheat, only carry out crane movements **without a load**. Only operate at normal speed (crane movements), at medium engine speed and medium working speed.

– below –15 °C (5°F)

You must preheat the hydraulic oil before carrying out crane movements.



(A) – Preheating

- Open the valve – lever (**1**) parallel with the line.
- Press the button (**2**) and retract the lifting cylinders to the full extent; p. 13 - 69.

The hydraulic oil has been prewarmed when display (**3**) shows a temperature of at least 10 °C (50 °F).

(B) – Prior to crane operation

Do not touch the hot exhaust system (**4**).

- Close the valve – lever (**1**) at right angles to the line.

Operate all crane functions at least twice after preheating (hydraulic oil temperature above 10 °C (50 °F)) in order to remove the cold oil from all parts of the hydraulic system.

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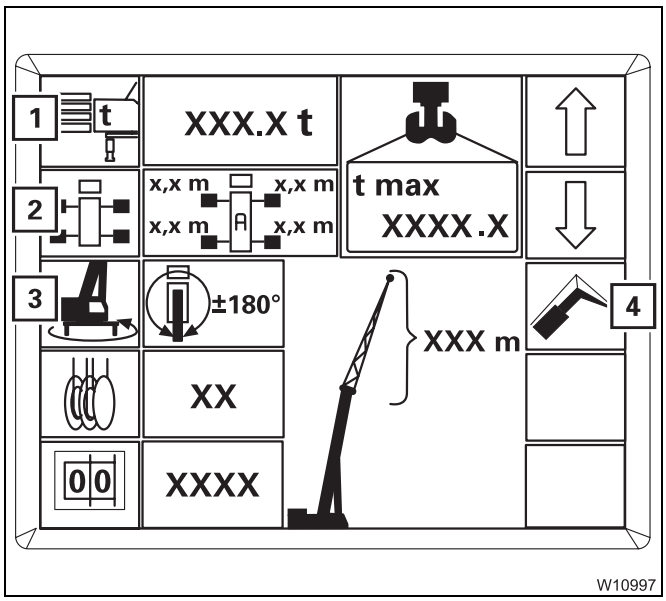
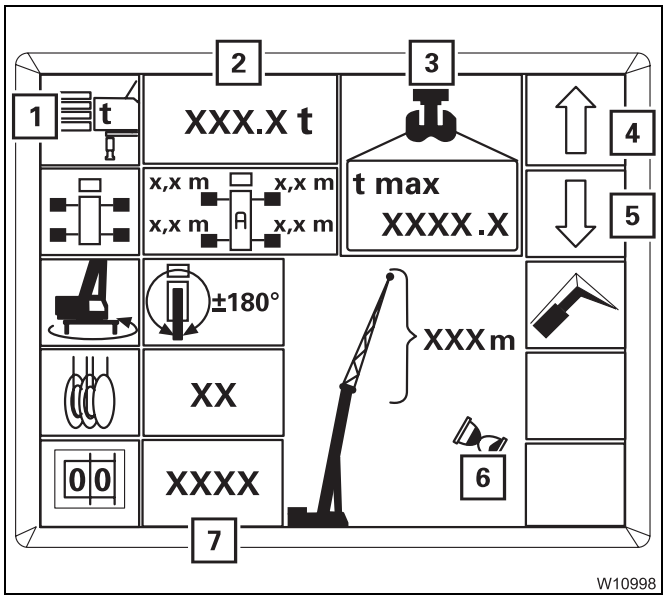


Switching to input mode

- Press one of the buttons (**1**) to (**4**) for the desired component.

  The symbol turns green – input mode is switched on.



Selecting values
With the input mode switched on, you can select values that are permissible according to the *Lifting capacity table*.

The procedure for selecting is described based on the example of the counterweight – symbol (**1**) green.

- Press the button (**4**) or (**5**) repeatedly until the display (**2**) shows the rigged counterweight version.

  4 larger versions

  5 smaller versions

The display (**7**) indicates the corresponding SLI code – the symbol (**6**) is indicated while the SLI code is being determined.

The display (**3**) indicates the maximum load for the displayed rigging mode and the displayed reeving.

You can **cancel the input** at any time. Press the button (**1**).
The main menu opens.

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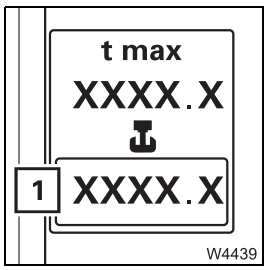
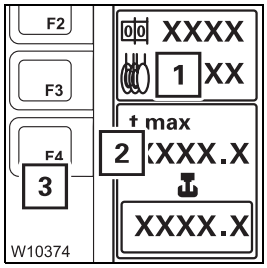


The currently raised load

The display (**1**) shows the sum of the payload + sling gear + hook block.



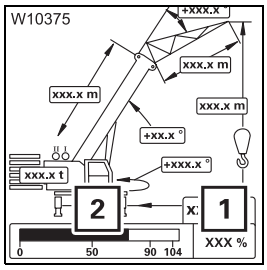
The maximum load

The display (**2**) shows the maximum load that can be lifted in the current rigging mode with the current working radius.

If the maximum load is reduced due to the entered reeving, the symbol (**1**) is red.

In this case you can have the maximum possible load displayed briefly.

- Press the button (**3**) once.
  The display (**2**) shows the maximum possible load that can be lifted with sufficient reeving according to the *Lifting capacity table*.



The degree of utilisation

The degree of utilisation shows the weight of the current load as a percentage of the maximum possible load. The display (**1**) indicates the percentage value. The display (**2**) shows the ranges in different colours:

blue: 0 – 90%

yellow: approx. 90 –100%

red: greater than 100%

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12.3.2 Permissible slewing ranges and working positions for crane operation

The following ranges are permissible according to the *Lifting capacity table*:

360° slewing range

- Support the truck crane with the outrigger span required according to the *Lifting capacity table*.
- Enter an SLI code for the 360° slewing range according to the *Lifting capacity table*; ➠ *Entering the rigging mode*, p. 12 - 21.
- Rig a counterweight version that is no larger than that permitted for the rigged outrigger span. Slewing with a rigged counterweight is not permitted with all outrigger spans; ➠ *Slewing with rigged counterweight*, p. 13 - 76.

0° to the rear working position

- Support the truck crane with the outrigger span required according to the *Lifting capacity table*.
- Slew the superstructure to the rear into the 0° position. For automatic stoppage at 0°; ➠ *Slewing to 0° or 180°*, p. 12 - 92.
- Switch off the slewing gear; ➠ p. 12 - 94.
- Enter an SLI code for the *0° to the rear* working position according to the *lifting capacity table*; ➠ *Entering the rigging mode*, p. 12 - 21.
  The SLI code is only accepted when the slewing gear has been switched off and the superstructure is in the 0° position.

All slewing operations are disabled if an SLI code is entered for the *0° to the rear* working position. An SLI shutdown is triggered if you switch on the slewing gear. To acknowledge the shutdown, you must:

– either shut down the slewing gear
– or, if slewing is permissible with the rigged counterweight (➠ p. 13 - 76), set down the load and enter an SLI code for the 360° slewing range.

180° to the front rigging position

The same prerequisites and procedures apply to this rigging position as to the working position 0° to the rear.

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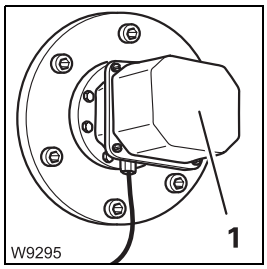
Lowering limit switch



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

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

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

Risk of accidents due to adjustments made to the lowering limit switch!
Always re-adjust the lowering limit switch if you unreel hoist rope from the stationary rope drum. The lowering limit switch does not record the number of these winds.
In this way you avoid the lowering limit switch switching off too late or not at all, the hoist rope being damaged and the load being dropped.

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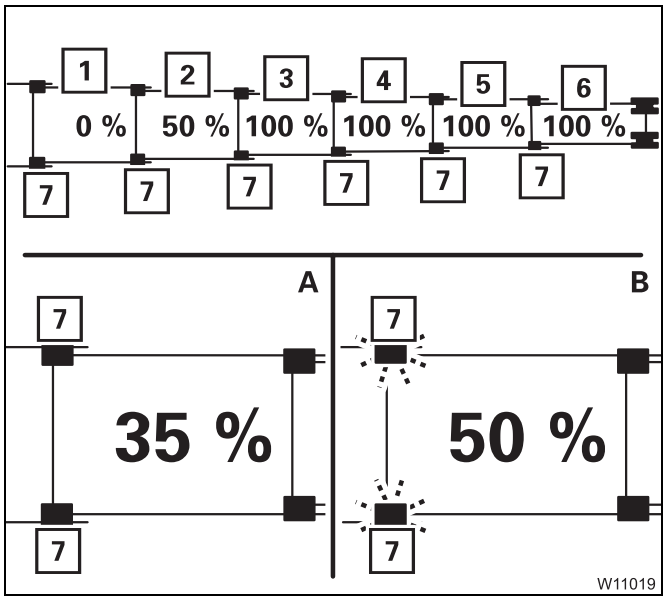
Telescoping

The position of the telescopic sections, i.e. which telescopic section is extended to what extent, is referred to as telescoping.

This section only deals with the displays on the SLI. The telescoping is also displayed on the *ECOS* display; ➠ p. 12 - 77.

The SLI displays main boom fixed lengths and main boom intermediate / telescoping lengths in different ways.



Fixed lengths

Possible fixed lengths are 0%, 50% and 100%.

The locking pins (**7**) are green.

Intermediate lengths

A Locking pins (**7**) black –
e.g. to 35%.

B Locking pins (**7**) flashing –
e.g. to 50% and telescopic section
– unlocked or
– not set down.

Telescoping sequence

The telescopic sections can only be telescoped individually, one after the other.

The telescopic section with the highest number must always be **extended** first, then the telescopic section with the next lower number and so on (e.g. VI, V, IV, III, II, I).

The telescopic sections are always **retracted** in the reverse order of extending.

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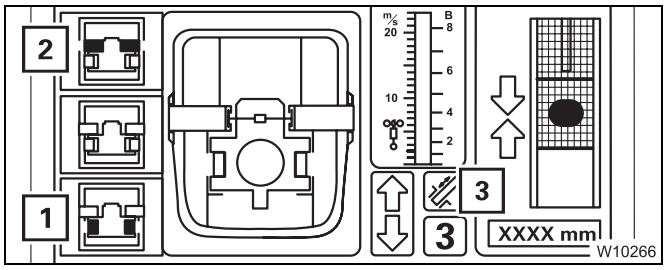
Extending/Retracting the telescoping cylinder

Operating the telescoping cylinder (without telescopic section) is required when the telescoping cylinder needs to be moved into a different telescopic section.

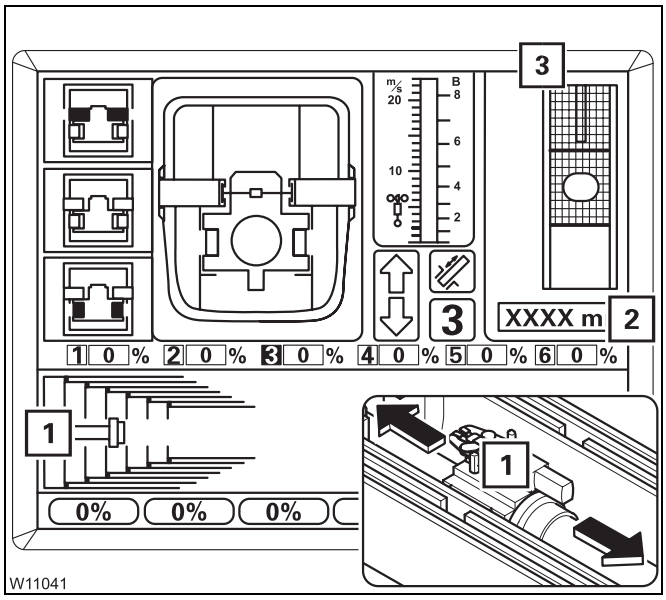


Prerequisites

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

– Telescopic section locked – symbol (**2**) grey

– Telescoping cylinder unlocked – symbol (**1**) yellow



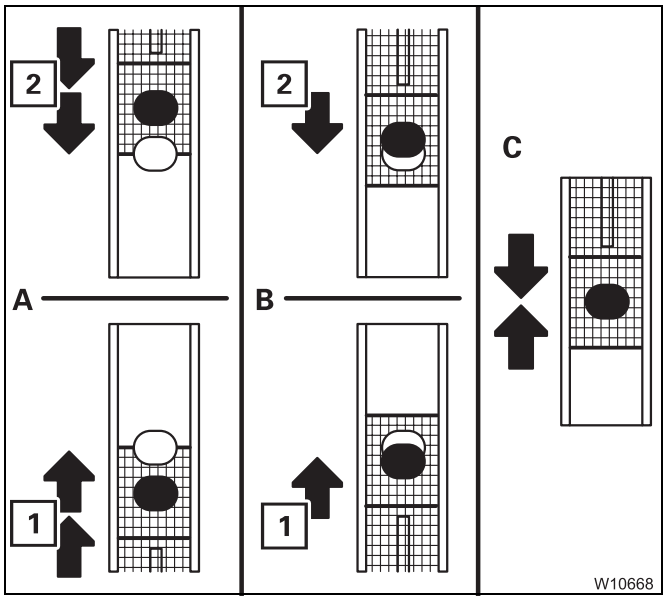
Extend/Retract

- Move the control lever in the corresponding telescoping direction:
  - **To extend:** telescope out
  - **To retract:** telescope in

The telescoping cylinder (**1**) retracts/extends.

The display (**2**) shows the currently extended length, e.g. 1500 mm (4.92 ft).

Near a locking point the display (**3**) shows:



– the distance to the locking point

  A yellow: approx. 1 m (3.3 ft)

  B yellow smaller than 1 m (3.3 ft)

  C green: at the locking point

and

– the direction of travel to the locking point:

  1 extending

  2 retracting

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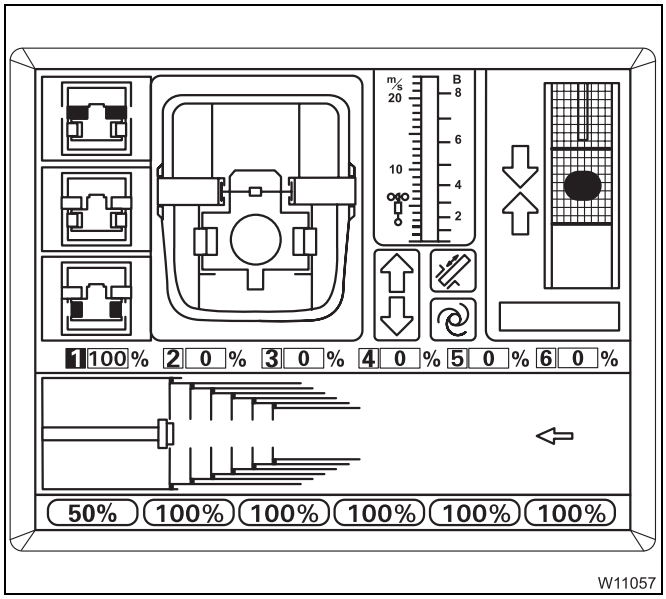
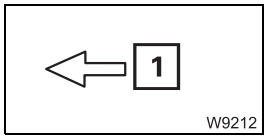
Example of telescoping with teleautomation



Assuming the current telescoping is 100/0/0/0/0 and the telescoping cylinder is locked in telescopic section I.
The desired telescoping is 50/100/100/100/100.
The display should correspond to the opposite diagram once you have entered the desired telescoping and confirmed it.

ECOS calculates the following telescoping order:

- Telescopic section I retract to 0%
- Telescopic section VI extend to 100%
- Telescopic section V extend to 100%
- Telescopic section IV extend to 100%
- Telescopic section III extend to 100%
- Telescopic section II extend to 100%
- Telescopic section I extend to 50%



Since the first step is retracting, the arrow (**1**) points to the left.

- Move the control lever to retract and hold it there.

Telescopic section I will be fully retracted. For this to be done, the following processes are carried out automatically.

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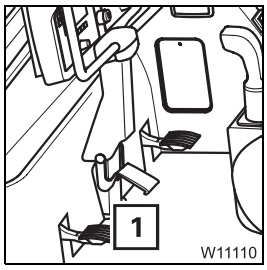
Braking the slewing movement

The procedure depends on which slewing gear brake function has been switched on.

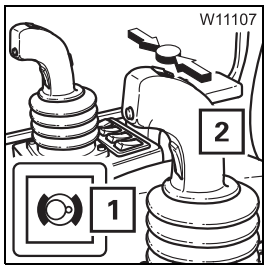
Risk of the main boom buckling!
Do not under any circumstances switch off the slewing gear to brake it. Only switch off the slewing gear after the superstructure has stopped turning.



With the *brake pedal* function active

- Actuate the brake pedal (**1**). Do not brake to such a degree that the load starts to swing.

If you only move the control lever to zero position, the slewing movement will slowly run down.



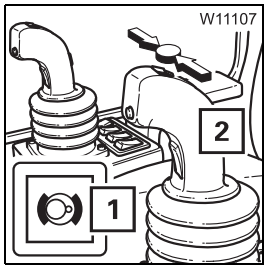
With the *control lever* function active

- Move the control lever (**2**) towards the zero position – the slewing movement is braked.

In zero position the slewing movement is stopped. At the same time the slewing gear brake engages, and the lamp (**1**) lights up.

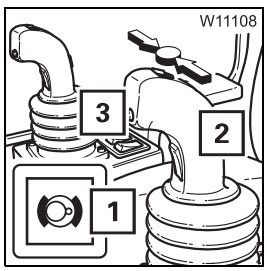
Slewing gear freewheel

The slewing gear freewheel is required if the slewing gear needs to be slewed by means of external forces, e.g. when operating with two cranes.



With the *brake pedal* function active

- Switch on the slewing gear.
  The slewing gear brake is released – lamp (**1**) lights up.
- Shift the control lever (**2**) to zero position.



With the *control lever* function active

- Switch on the slewing gear.
- Shift the control lever (**2**) to zero position.
- Press the button (**3**).
  The slewing gear brake is released – lamp (**1**) lights up.

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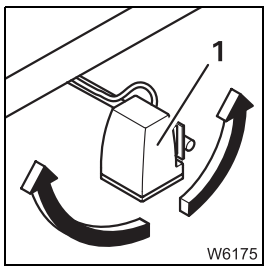
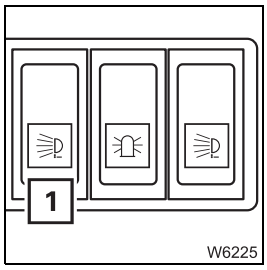
12.4.7 Operation of the directional spotlights



With the relevant equipment, there are one or two directional spotlights (**1**) on the main boom basic section.

Switching on/off



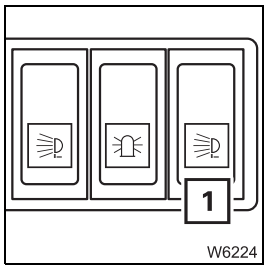
Switching on
- Press the switch (**1**) down at the bottom.

Switching off
- Press the switch (**1**) down at the top.

Directing

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

Risk of accidents due to being blinded when driving on the road!
When driving on the road, always direct the spotlight in such a way that the reflector points downwards. In this way you can prevent yourself or other motorists and cyclists from being blinded and causing accidents.



To direct the spotlights forwards
- Press the button (**1**) up at the top.

To direct the spotlights backwards
- Press the button (**1**) down at the bottom.

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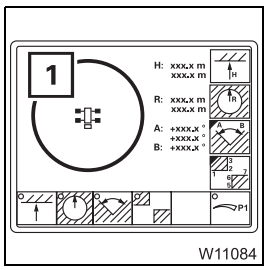
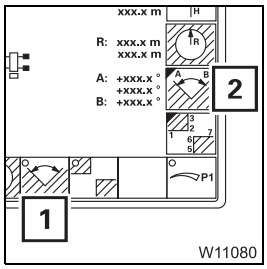


The limit value for the working radius affects the representation of defined objects.
Only points that are within the limit value (**1**) are displayed.

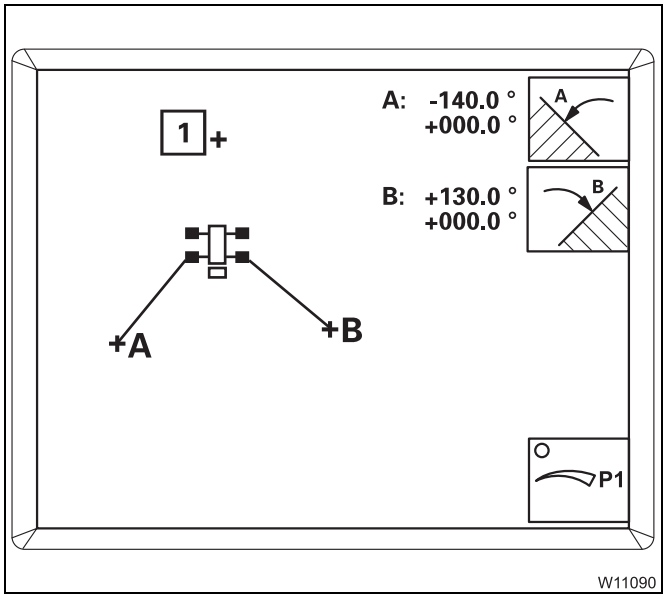
Slewing angle

Slewing angles are entered in a submenu.



Before entering values, monitoring (**1**) must be switched off – dot **black**; p. 12 - 120.

- Press the button (**2**) once.
  The *Enter slewing range* submenu opens.

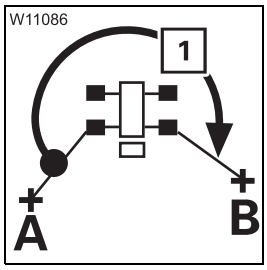


Display of the slewing angles

The cross (**1**) shows the current position of the main boom.

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

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



The permissible slewing range is represented by the angle stretching clockwise from **A** to **B**.
Approx. 270° in this illustration – arrow (**1**).

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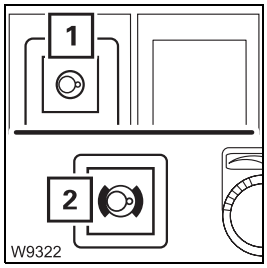
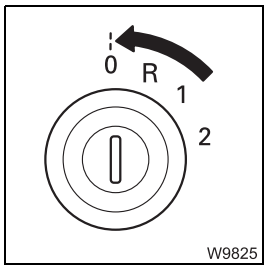
12.6 Work break

12.6.1 Short work breaks

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.



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



- Switch the engine off, turn the ignition key to position **0** and remove it.
- Ensure that no unauthorised persons can operate the truck crane;
  ➠ *Securing the truck crane against unauthorised use*, p. 12 - 124.

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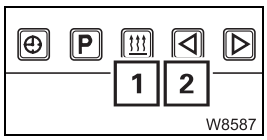
Setting the heating period

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



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

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

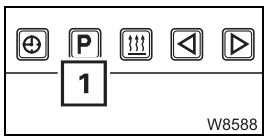
- Set the required heating period on the flashing display. You can set a heating period of 10 to 120 minutes.

Wait for approx. 5 seconds until the current time is shown, e. g. 2pm.

A new heating period has now been set.

Switching the automatic heating start on and off

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



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

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

To activate a different heating start, press the P button repeatedly until the required storage location is displayed. This heating start is activated as soon as the display stops flashing.

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

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13 Rigging work

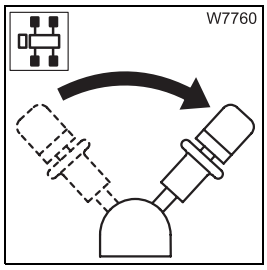
If the truck crane on the site has already been rigged, proceed according to the *CHECKLIST: Inspections before operating the crane*, p. 12 - 1.

13.1 Rigging work checklists for crane operation with the main boom

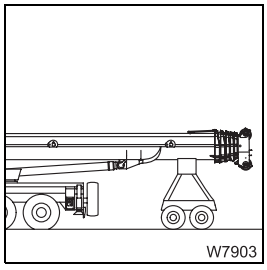
This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.
Observe the warnings and safety instructions specified there.

13.1.1 CHECKLIST: Rigging

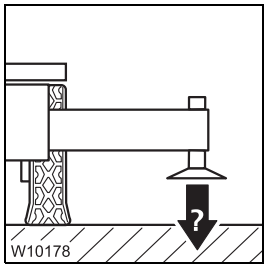
1. Choose a suitable site; ➠ p. 13 - 9.



2. Check that the parking brake is engaged – if not, engage parking brake.



3. **If the main boom is resting on a trailer:**
   – Switching off the boom floating position; ➠ p. 13 - 19,
   – Switch off the slewing gear freewheel; ➠ p. 13 - 18,
   – If necessary, switch off boom pre-tensioning; ➠ p. 13 - 20.



4. Check whether the ground will support the maximum occurring outrigger pressures; ➠ *Determining the required ground bearing area*, p. 13 - 9.

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Ground bearing area

- Now calculate the required ground bearing area.
- Check that the surface of the outrigger pad (➠ p. 8 - 7) 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 outrigger cylinder is 0.624 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 - 42.

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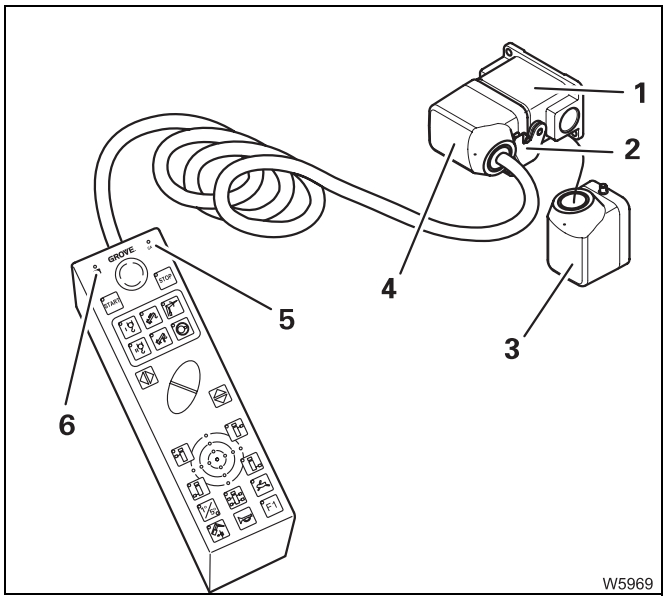
13.4 Connecting/Disconnecting the hand-held control

Switch off the engine for driving and crane operation. Pulling a bridging plug will make the engines go out, but this action is only designed for emergencies.
The ignition can be switched on or off.

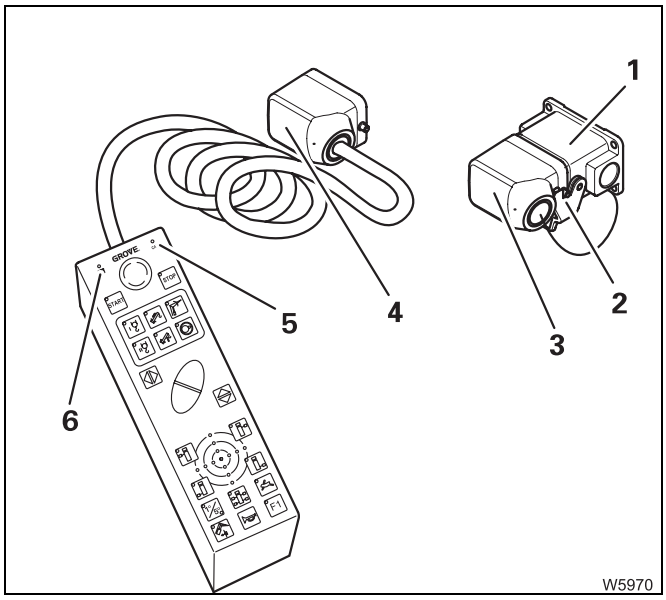


Connecting the hand-held control

- Open the cap (**2**) and pull the bridging plug (**3**) out of the socket (**1**).
- Insert the plug (**4**) into the socket (**1**) and secure it with the cap (**2**).
- After approx. 20 sec. the lamps (**5**) and (**6**) light up – the ignition is switched on.

There is a malfunction if the lamp (**5**) does not go on or flash; ➠ p. 15 - 17.

Danger due to unauthorised use
Always stow the hand-held control in the driver's cab or in the crane cab before you leave the crane, and lock the doors.
That way you can prevent unauthorised persons from starting the engine.



Disconnecting the hand-held control

- Open the cap (**2**).
- Pull the plug (**4**) out of the socket (**1**) – the lamps (**5**) and (**6**) go out.
- Insert the bridging plug (**3**) into the socket (**1**) and secure it with the cap (**2**).

The ignition is turned off, unless it is switched on at an ignition lock.

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13.6.4 Preparing the truck crane

In the driver's cab

Levelling the truck crane

- Level the truck crane with the level adjustment system; ➠ *Operation of the level adjustment system*, p. 5 - 60.

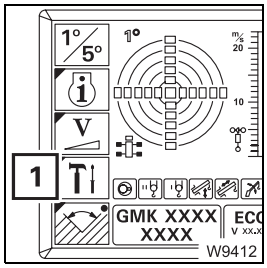
Locking the suspension

- Switch off the suspension; ➠ p. 5 - 15.

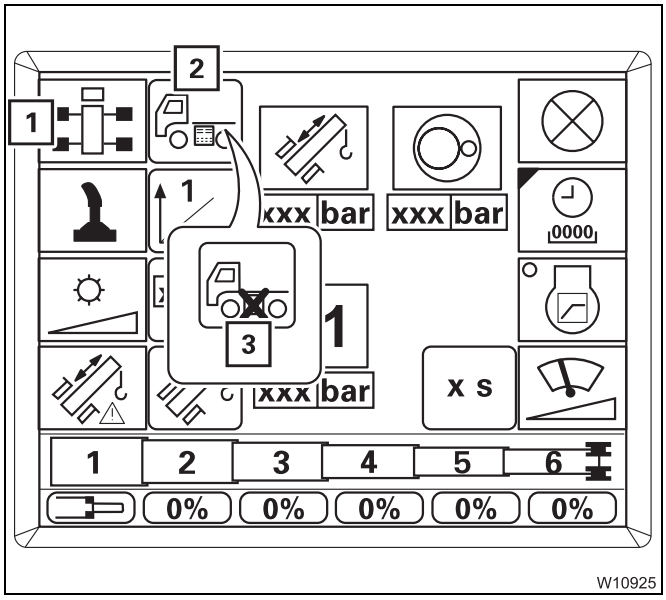
The control elements for the outriggers are only released if the suspension is deactivated. If the suspension is switched off, the wheels are lifted when the crane is put on outriggers.

Outrigger control units

You can switch the *Outriggers* control units on and off from the crane cab.



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



The *Settings* submenu opens.

The current status is displayed:

– Symbol (**2**) – operating units on, buttons enabled.

– Symbol (**3**) – operating units off, buttons disabled.

- To switch on or off, press the button next to the symbol (**1**) once.

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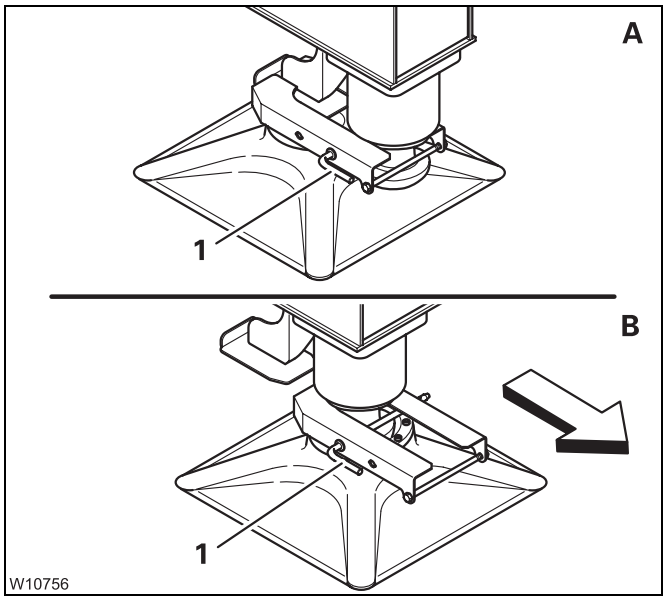
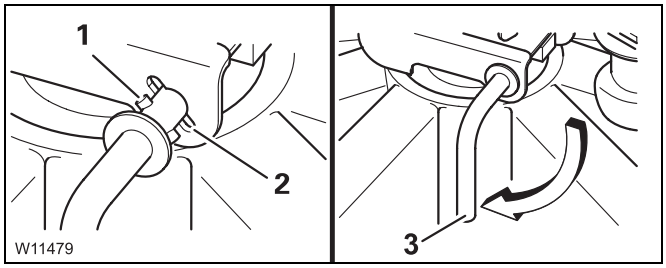
13.6.7 Moving the outrigger pads into working/driving position

The procedure is the same for all outriggers.



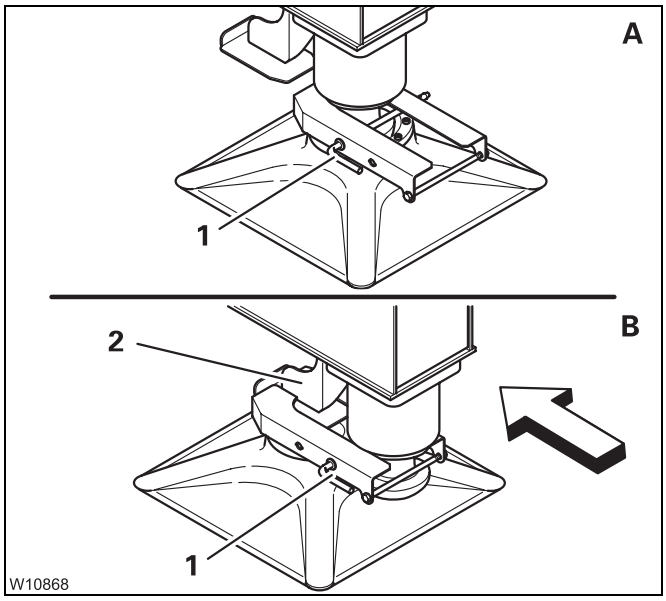
Moving them into working position

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



Secure the pin

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



Moving them into driving position

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

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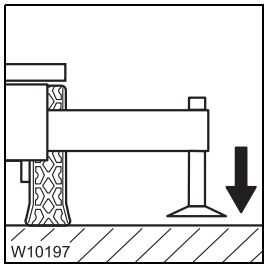
Automatic alignment

During automatic alignment, the outrigger cylinders are only **extended** to prevent the wheels from touching the ground after alignment.

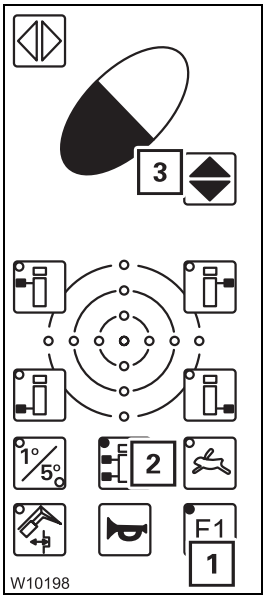
- Check that the prerequisites are met; ➠ p. 13 - 49.



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

Start procedure

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



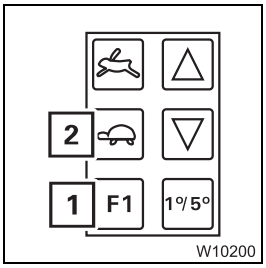
– On the hand-held control

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

The lights in the buttons go on.

- Press the button combination (**3**) for automatic alignment.

The procedure begins.



– On the control units

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

The procedure begins.

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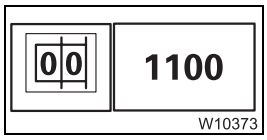
13.7.5 CHECKLIST: Unrigging counterweight

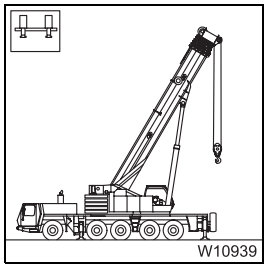
This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.
Observe the warnings and safety instructions specified there.

Danger of overturning when slewing with a rigged counterweight
Before slewing with the rigged counterweight, check whether slewing is permissible with the rigged outrigger span or with the truck free on wheels;
➠ *Slewing with rigged counterweight*, p. 13 - 76.

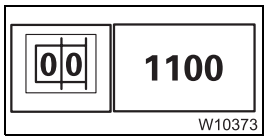
1. Check whether the truck crane is supported with the required outrigger span as specified in the *Lifting capacity table*; ➠ *Permissible outrigger spans*, p. 13 - 30.



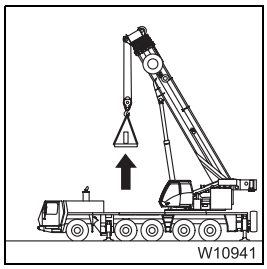
2. Enter the current rigging mode on the SLI; ➠ p. 12 - 21.



3. – Open the *Counterweight* submenu; ➠ p. 13 - 68.
   – Slew the superstructure into the rigging range and set down the counterweight onto the counterweight platform (automatic); ➠ p. 13 - 72.



4. Enter the current rigging mode with the presently rigged counterweight version on the SLI; ➠ p. 12 - 21.



5. Lift the counterweight parts off the counterweight platform, as required by the respective driving mode;
➠ *Slinging points*, p. 13 - 59,
➠ *Driving modes*, p. 6 - 1.

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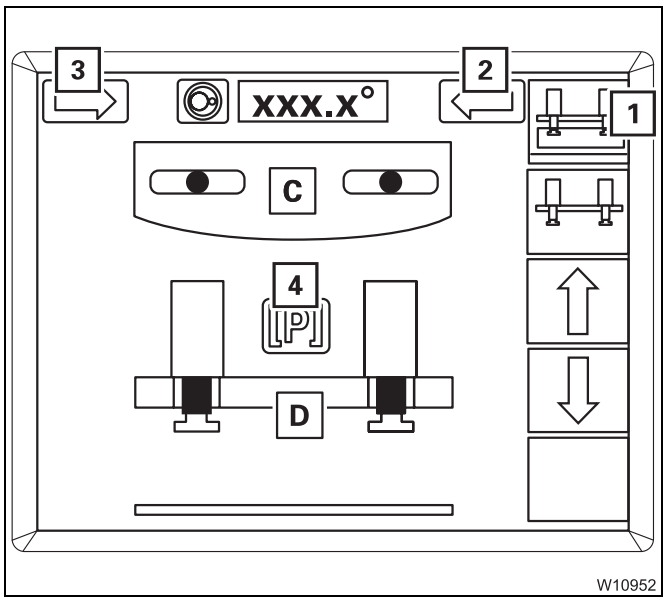

- To slew, move the control lever in the displayed direction (**2**) or (**3**) – the automatic process continues.
  - The superstructure turns into position (**C**).
  - The lifting cylinders are retracted (**D**).
  - The counterweight is pre-charged – symbol (**4**) **green**.

The symbol (**1**) is yellow and no longer flashes, the rigging process is complete.

- Let go of the control lever.

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13.8.2 Hook block on a separate vehicle

Risk of overturning while slewing!
Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius).
Correct the rigging mode if necessary; ➠ *Slewing with rigged counterweight*, p. 13 - 76.

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

Risk of damage to the separate vehicle
Only raise the hook block from the separate vehicle if the main boom head is directly above the hook block.
This prevents the hook block from swinging and damaging the separate vehicle.

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

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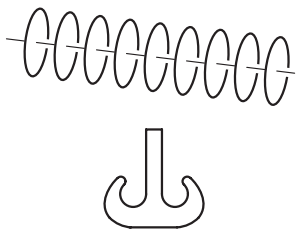
13.8.4 Possible reevings with 8 head sheaves

Possible reevings on lattice extensions and the auxiliary single-sheave boom top; *Operating instructions lattice extension GMK 5220.*

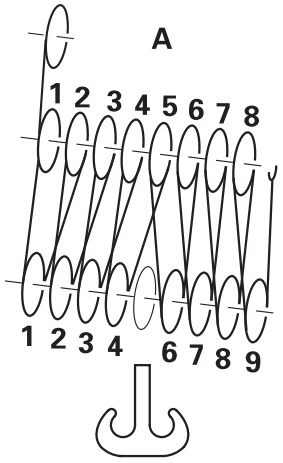
The maximum lifting capacity of individual hook blocks does not correspond to the maximum lifting capacity of the GMK 5220 together with this hook block. The lifting capacity of the GMK 5220 depends on the rope pull, the reeving and friction force. It is lower than the lifting capacity of the hook block.

Please note that the maximum lifting capacities already include the weight of the hook block and the sling gear. You must subtract these weights in order to obtain the actual payload.



9-sheave hook block

Max. lifting capacity of the hook block	200.0 t
Max. lifting capacity with the GMK 5220:	(440,900 lbs)
A With 16-fall reeving	144.0 t
	(317,500 lbs)



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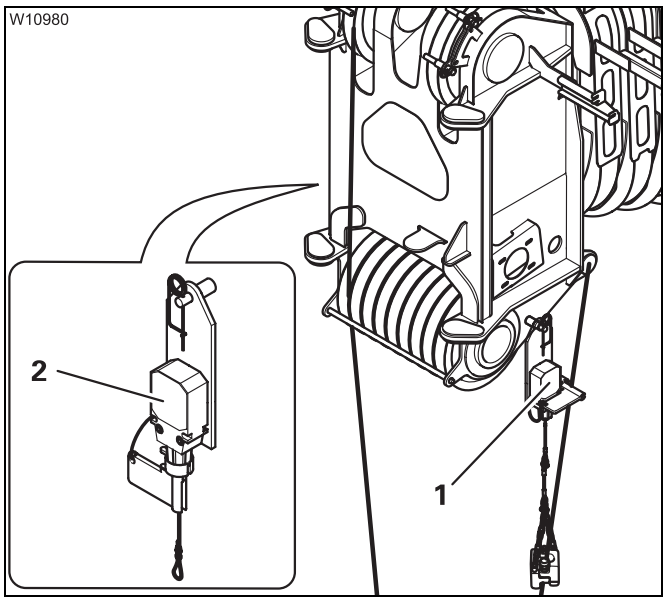


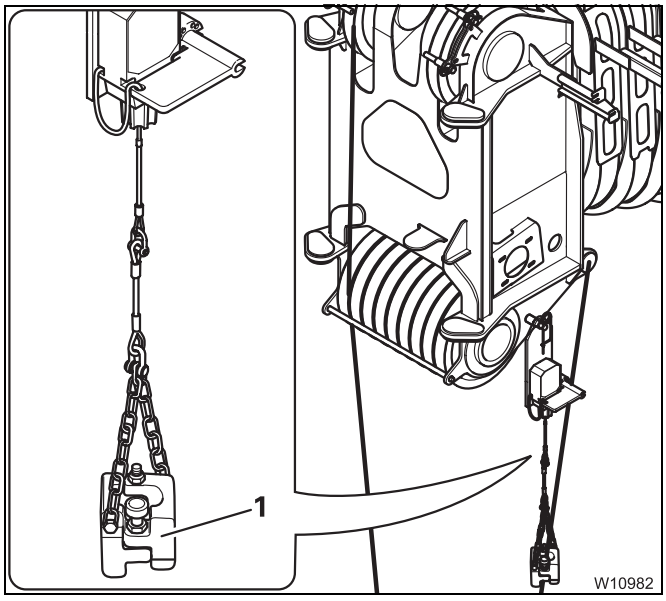
If two lifting limit switches have been installed

- Lock the lifting limit switch to which no lifting limit switch weight has been attached.

If the lifting limit switch weight has, for example, been attached to the left lifting limit switch (**1**), you must lock the right lifting limit switch (**2**); ➠ *Locking*, p. 13 - 105.

Otherwise the movements *Raise hosting gear*, *Telescope out* and *Lower the boom* will be locked.

If two hoist ropes are reeved, you must also use two lifting limit switch weights. In this case, both lifting limit switches must be unlocked; ➠ *Removing the lock*, p. 13 - 106.



Attaching the lifting limit switch weight

- Attach the lifting limit switch weight (**1**).

If two hoist ropes are reeved, you must attach a lifting limit switch weight to each of the two lifting limit switches.

This lifting limit switch must not be locked; ➠ *Removing the lock*, p. 13 - 106.

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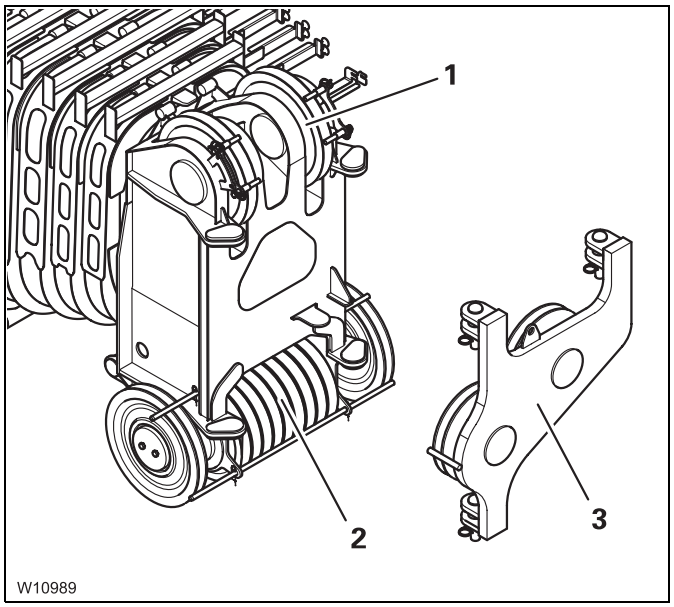
13.9.2 Installing/removing the heavy duty equipment

When heavy duty equipment is rigged the hoist rope can be reeved up to 22 times at the most. To do so, you will need hook block with at least 11 sheaves and sufficient lifting capacity.

The heavy duty equipment can be operated with the main hoist or with the auxiliary hoist. The hoist rope not needed must be rolled onto a drum.

Additional equipment required

If the truck crane has heavy duty equipment, it is supplied with the following parts:



Mounted parts

1 Left-hand head sheave

2 Head sheave axle with 11 sheaves

Supplied parts

3 Adapter with pins

Equipment required

You will also need an auxiliary crane and suitable sling gear with sufficient lifting capacity. Transport dimensions and weight; ➠ p. 16 - 3.

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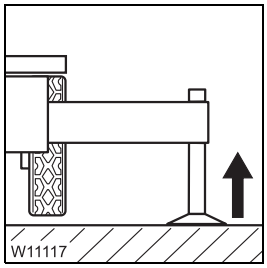
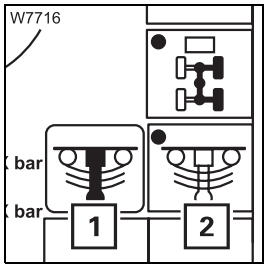
14.3.3 Putting the truck crane on the wheels

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



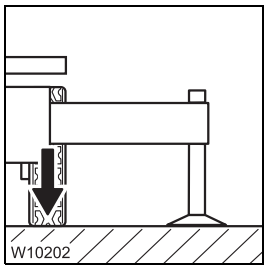
- Retract the outrigger cylinders until all wheels are just above the ground.

Danger of overturning when switching on the suspension
You may under no circumstances switch on the suspension 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.



All wheels are now lowered to the ground.

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15.3 Fuses on the superstructure

The fuses are located in different places on the superstructure:

– On the turntable

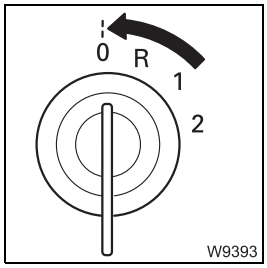
– In the crane cab

– In the battery box

– On the SLI

Notes on changing fuses

The positions of the fuses, their designations and which functions are protected by the respective fuses are shown in the following sections.



- Switch off the ignition whenever a fuse has to be replaced.

Risk of damage when the ignition is switched on!
Switch off the ignition whenever a fuse has to be replaced. In this way you can prevent the new fuse from being damaged by the increased starting current immediately after inserting it.

Risk of damage due to overloading!
Replace faulty fuses only with new fuses of the same amperage. In this way you can prevent parts from being overloaded and damaged or the fuse from being immediately damaged again.
Notify ***CraneCARE*** if a fuse of the same amperage blows again after turning on the ignition.

Danger of fire!
Never repair a defective fuse with other electrically conductive materials.

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15.4 Finding and eliminating malfunctions

15.4.1 Malfunctions on the engine for crane operation

Malfunction	Cause	Remedy
Engine will not start – starter does not turn	Battery master switch is switched off	Switch on the battery master switch; ➠ p. 11 - 7
	Ignition off	➠ *Switching on the ignition*, p. 11 - 8
	Fuse F1/8, F2/5 faulty	Replace faulty fuses; ➠ p. 15 - 6
	Hand-held control connected or bridging plug not inserted	Disconnect hand-held control or insert bridging plugs; ➠ p. 13 - 21
	Emergency stop switch actuated	➠ *Resetting the emergency stop switch*, p. 11 - 20
	Ignition in the driver's cab switched on	Switch off the ignition in the driver's cab; ➠ p. 4 - 21
Engine will not start – starter turns	Batteries insufficiently charged	Charge batteries
	Fuel tank empty	1. Refuel; ➠ p. 11 - 5
		2. Bleed the fuel system; ➠ *Maintenance Manual* ➠ *Separate operating instructions from the engine manufacturer*
	Air intake inhibitor closed	➠ *Releasing the air intake inhibitor*, p. 11 - 21
Symbol red	Air filter clogged	Replace the dry air filter; ➠ *Maintenance Manual*
Symbol red	Coolant level too low	Top up coolant; ➠ *Maintenance Manual*

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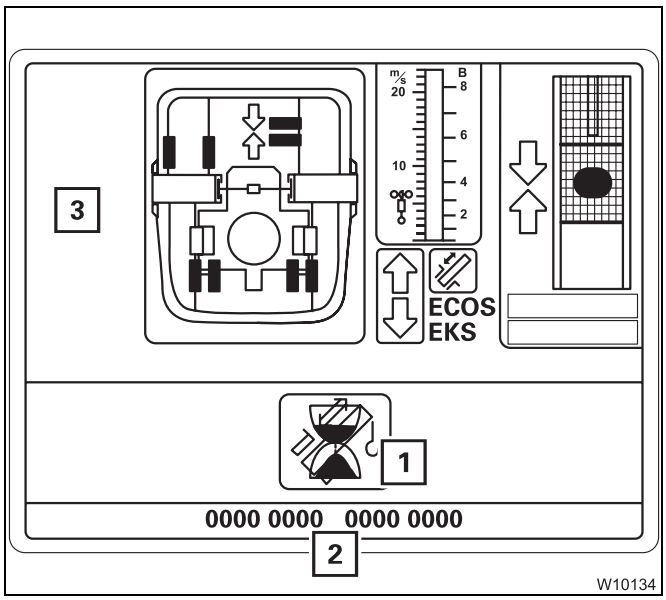
Telescoping mechanism error messages

If ECOS disables the telescoping mechanism, the following display is shown in the *Telescoping* submenu.

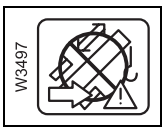


– All the symbols (**3**) for operation disappear – the corresponding buttons are disabled.
– The display (**1**) appears.
– An error code (**2**) is indicated.
• Always note down this error codes before contacting ***CraneCARE***.

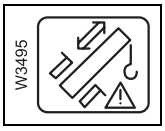
The display (**1**) shows the symbol for the current status:

Waiting
The symbol usually disappears shortly after switching on the ignition.
If the symbol does not go out or is displayed while operating the crane, this may be due to an SLI shutdown or faulty F1/2 fuse. Contact ***CraneCARE*** if the these causes do not apply.

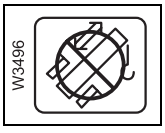
Telescope status divergence
ECOS has detected a difference between the displayed and the current telescoping. Enter the current telescoping; ➠ p. 15 - 57.



Emergency program access
The telescoping mechanism can only be operated with the emergency program; ➠ p. 15 - 47.



Emergency program
The *Telescoping* emergency program is open; ➠ p. 15 - 47.



Not active
Contact ***CraneCARE*** if this status is still displayed after repeatedly switching on the ignition.

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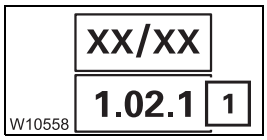
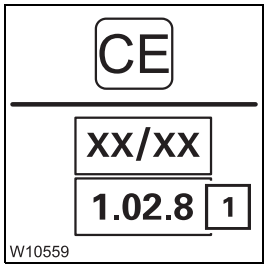
Switch off sensor/ tachogenerator

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.



- Call up the error (**1**) for the faulty sensor/tachogenerator in the *Errors* submenu, e.g. **1.02.1** for pressure sensor 2.



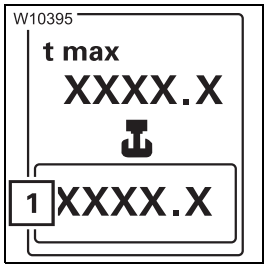
- Press button CE once.

The faulty sensor/tachogenerator is switched off and the corresponding error (**1**) is displayed, e.g. **1.02.8** for pressure sensor 2.

When the ignition is switched on again, the shutdown is cancelled and the error occurs again, possibly with different last digits, e.g. 1.02.5.

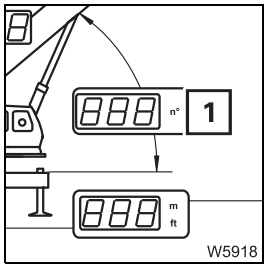
After switching off the faulty sensor/tachogenerator, you should check whether the other sensor/tachogenerator is functioning correctly.

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.



Check the pressure sensor function

- Hoist the hook block without a load.
- Check whether the display (**1**) displays, for instance, the weight of the hook block.



Check 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).

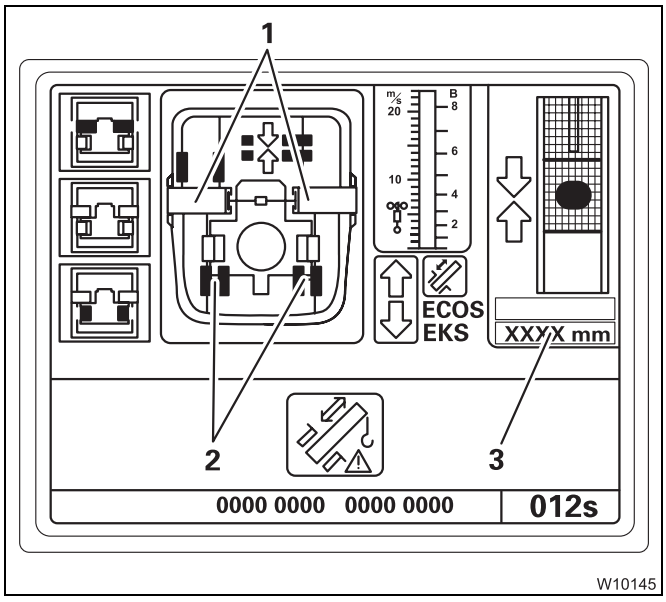
The speed is restricted to approximately 30% of the maximum speed.

– If there is an error on the proximity switch; ➠ p. 15 - 53.

– 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 in the event of a failure of the operating elements in the crane cab

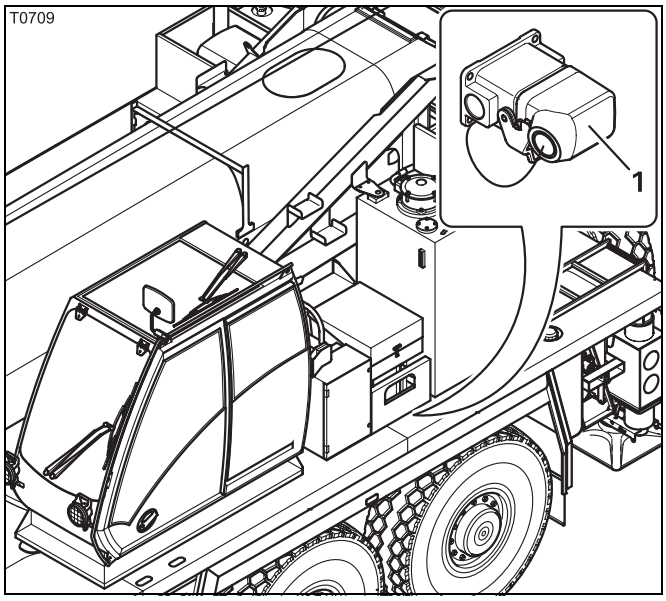
If the power units no longer respond to the operating elements in the crane cab, you can operate the power units with the hand-held control.

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

To operate the crane with the hand-held control, you must connect it, start the engine and preselect the power unit.

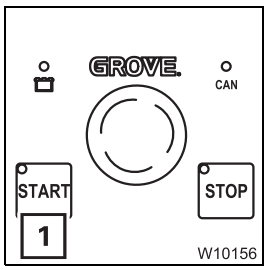


Connecting the hand-held control

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

All power units can be operated from this connection.

Information on connecting; ➠ p. 13 - 21.



Starting the engine

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

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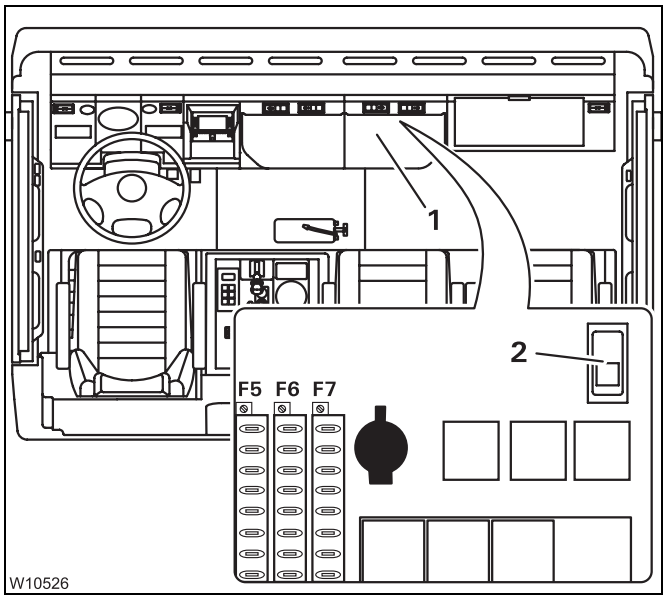
15.6.4 Activating/Deactivating emergency mode

Emergency mode (or emergency supply of another crane) is activated and deactivated in the driver's cab.



- Remove the cover (**1**).
- Start the engine for driving.

To switch on
- Press the switch (**2**) down at the bottom.

To switch off
- Press the switch (**2**) down at the top.

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16 Technical information for the superstructure

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17 Index

To avoid making the index unnecessarily long and unclear, we have not included every single element from the instrument panel.
Those elements such as switches and buttons, lamps and displays are described and named in detail in the overviews of chapter 3 and chapter 10, *Description of the truck crane*.
You are referred to more detailed descriptions of these elements from there as usual.

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